AMUNDSEN
SCIENCE

2019 | Expedition Report

CCGS *Amundsen*

LEG 1A
DFO AZOMP

LEG 1B
DFO ISECOLD / ATLAS-EU

LEG 2A
ArcticNet

LEG 2B
ArcticNet

LEG 3
DFO KEBABB/ArcticNet

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Part II – Project reports

2019 Expedition Report

The 2019 Expedition Report is a collection of all the participating research teams' Cruise Reports assembled by the Chief Scientists at the end of Leg 1, Leg 2 and Leg 3 of the CCGS *Amundsen* Expedition. The 2019 Expedition Report is divided into two parts:

Part I gives an overview of the expedition, shows the cruise track and the stations visited and provides a synopsis of operations conducted during each of the four legs.

Part II contains the reports submitted by participating science teams or researchers, with details on the specific objectives of their project, the field operations conducted and methodology used, and in some cases, preliminary results. When results are presented, they show the data as they were submitted at the end of the legs in 2019. The data presented in this report are illustrative only and have not been quality checked, thus parties interested in the results should contact the project leader or the researchers who collected the data.

The sections in Part II describing each project are organized with atmospheric, surface ocean and sea ice components first (sections 1 to 6), followed by water column properties, which include the mooring and buoy program, CTD-Rosette operations and physical properties (sections 7 to 9), as well as a suite of chemical and biological parameters (sections 10 to 16). Contaminants cycling in seawater are treated in sections 17 to 23. Subsequent sections cover benthos sampling (sections 24 and 25), sediments sampling (sections 26 and 27) and seabed mapping (section 28).

The four Appendices provide information about the location, date, time and type of sampling performed at each station visited by the ship, as well as a list of science participants onboard during each leg.

The core oceanographic data generated by the CTD-Rosette operations, as well as meteorological information (AAVOS) and data collected using the Moving Vessel Profiler (MVP), the ship-mounted current meter (SM-ADCP) and the thermosalinograph (TSG) are available in the Polar Data Catalogue (PDC) at www.polardata.ca.

Following Amundsen Science’s data policy, research teams must submit their metadata to the PDC and insure that their data are archived on the long-term, but it is not mandatory to use the PDC as a long-term archive as long as a link to the data is provided in the metadata (see www.arcticnet.ulaval.ca/Docs/data-policy for more details on data policy).

Part I – Overview and Synopsis of Operations

1 Overview of the 2019 *Amundsen* Expedition

1.1 Introduction

Arctic ecosystems and the communities they support are changing rapidly under the triple pressure of climate warming, modernization, and industrialization. In 2003, a consortium of Canadian universities jump-started Canada's research effort in the Arctic by mobilizing the icebreaker CCGS *Amundsen* for science. Equipped with leading-edge scientific instrumentation, the ship enabled no less than 28 large-scale national and international research initiatives that mustered 112 teams of scientists from academia, the North and the public and private sectors. In 15 years of operation for science, the Amundsen propelled Canada in the leading pack of nations studying the changing Arctic Ocean. The ship's annual presence in the North, her contribution to the International Polar Year and to the Network of Centres of Excellence ArcticNet, and her support of major environmental assessments have bolstered Canada's international stature in the study and stewardship of the Arctic.

Beyond the contribution to Canada's Arctic research effort, the Amundsen is part of the International Arctic Research Icebreaker Consortium (ARICE) and substantiates Canada's contribution to the 2018 Agreement on Enhancing International Arctic Scientific Cooperation by directly supporting collaborations with other Arctic countries in the multinational study of the Arctic Ocean. This cooperation takes place through diverse projects that inventory and document Arctic marine biodiversity and ecosystems, monitor their response to climate change, provide vital information on seafloor bathymetry and marine hazards, and assess the risks of increased maritime traffic and resource exploitation.

On 30 May, the Canadian research icebreaker CCGS *Amundsen* left Quebec City for its 15th annual mission to the Arctic Ocean. The multidisciplinary expedition ran until 10 September and allowed more than 150 scientists from national and international research teams to study the marine and coastal environments of the Canadian and Greenlandic Arctic. Programs onboard included the Atlantic Zonal Off-Shelf Monitoring Program (AZOMP), the Integrated Studies and Ecosystem Characterization Of the Labrador sea Deep Ocean (ISE-COLD) program, an ATLAS transatlantic consortium program, ArcticNet annual marine-based research program, Takuvik Bio-Argo project and the Knowledge and Ecosystem-Based Approach in Baffin Bay (KEBABB) program.

From aquatic microorganisms to seabirds to melting glaciers and seabed mapping, all aspects of the northern environment were studied during this 104-day expedition.

1.2 Regional settings

1.2.1 *Baffin Bay*

Baffin Bay is located between Baffin Island and Greenland and connects the Arctic Ocean to the Northwest Atlantic. It is an important pathway for exchange of heat, salt and other properties between these two oceans. Baffin Bay's connection to the Arctic Ocean consists of three relatively narrow passages through the Canadian Arctic Archipelago (CAA). One of these passages, Nares Strait, is located between Ellesmere Island and Greenland and includes from south to north: Smith Sound, Kane Basin, Kennedy Channel, Hall Basin and Robeson Channel. Each winter, there is a prolonged period during which a land-fast ice arch spans the strait at the entrance to Robeson Channel and south of Kennedy Channel the southward flux of ice. However, in the past decade, variability in the formation of the ice arch has been observed with weaker conditions resulting in an increase in ice flux from the Arctic Ocean into Baffin Bay.

1.2.2 *Canadian Arctic Archipelago*

The Canadian Arctic Archipelago (CAA) is a vast array of islands and channels that lies between Banks Island in the west and Baffin and Ellesmere Islands in the east. While transiting through the Northwest Passage, the science teams aboard the *Amundsen* extended their time series of atmosphere, ice and ocean data. This work is aimed at better understanding how the climate, ice conditions as well as ocean currents and biogeochemistry are changing under the effects of climate change and industrialization. With ice extent and volume shrinking in the Arctic, the Northwest Passage may be ice free and open to navigation during summer in the near future. Bathymetric data and sub-bottom information were collected while transiting through the Northwest Passage to map the seafloor and identify potential geohazards and obstacles to the safe navigation of this new seaway.

1.2.3 *Labrador Sea*

Between Labrador and Greenland lies the Labrador Sea, a key region that includes the Labrador Current system. This strong current carries cold water down from Baffin Bay to offshore Newfoundland and, therefore, strongly influences the oceanographic conditions on the Atlantic Canadian Shelf. The Labrador Sea acts as a corridor for southward drifting icebergs and ice islands, inducing risks for activities and operations conducted offshore Newfoundland. From this perspective, gathering scientific knowledge about the area is of particular importance as to inform federal departments and the private sector about the risks associated with the exploration and exploitation of oil and gas.

1.3 **2019 Expedition Plan**

1.3.1 *General schedule*

Based on the scientific objectives, the summer expedition was divided into three separate legs. Leg 1, divided in two shorter legs: 1a and 1b, took the Amundsen in the Labrador Sea for two distinct DFO projects: the the Atlantic Zonal Off-Shelf Monitoring Program and the Integrated Studies and Ecosystem Characterization Of the Labrador sea Deep Ocean program. Leg 2, also divided in two shorter legs: 2a and 2b, took the ship to the Baffin Bay and up to its northern most ever visited station, station Rob1 located over the 81st parallel. During Leg 3, the ship headed back towards Quebec City, but not before conducting sampling activities in Baffin Bay.

1.3.2 *Leg 1a – AZOMP – 30 May to 23 June 2019 – Labrador Sea*

The first leg of the expedition, Leg 1a, was dedicated to the Atlantic Zonal Off-Shelf Monitoring Program (AZOMP). This program led by Fisheries and Oceans Canada and involving collaborations with the universities of Dalhousie, Alberta, Manitoba, Québec à Rimouski, and Edinburgh focuses on the annual survey of the physical, chemical and biological properties of the AR7W oceanographic transect running from the Labrador to Greenland. Since 1990, AZOMP has provided observations of key oceanic characteristics essential to understand the physical and biogeochemical connectivity between the Labrador Sea and Canadian Arctic, and their impact on the regional climate variability, on the ecosystem's productivity and on fisheries.

1.3.3 *Leg 1b – ISECOLD / ATLAS-EU – 23 June to 5 July 2019- Labrador Sea*

Leg 1b of the 2019 Amundsen Expedition entailed oceanographic and seabed sampling as part of the Integrated Studies and Ecosystem Characterization Of the Labrador sea Deep Ocean (ISE-COLD) program. This program co-led by Fisheries and Oceans Canada and Memorial University aims to guide the government of Canada in the determination of new protected marine areas by investigating a large offshore portion of the Labrador Sea. The ATLAS transatlantic consortium also participated in Leg 1b by leading two lander recoveries.

1.3.4 *Leg 2a – ArcticNet / Takuvik – 5 July to 25 July 2019 - Baffin Bay*

Leg 2a sampling operations were conducted in the Baffin Bay in support of two different programs: ArcticNet and the Takuvik Bio-Argo project. ArcticNet is comprised of multiple sub-projects ranging from ocean physics, geochemistry, to glaciers and marine ecology. Oceanographic sampling, river sampling as well as Argo deployments and recoveries were conducted throughout this leg, which ended in Pond Inlet on 25 July with a science personnel rotation.

1.3.5 *Leg 2b – ArcticNet – 25 July to 15 August 2019 – Baffin Bay, Nares Strait, Lancaster Trough*

Leg 2b continued to support the multiple projects of ArcticNet. During the leg, scientists explored Nares Strait, Jones Sound, Lancaster Sound and the Baffin Bay through oceanographic and geologic sampling and glacier/iceberg operations. The leg ended in Resolute on 15 August with a full crew change.

1.3.6 *Leg 3 – KEBABB / ArcticNet – 15 August to 10 September 2019 – Baffin Bay, Lancaster trough and Labrador Sea*

Leg 3 of the 2019 Amundsen expedition took the ship from Resolute Bay to Quebec City with multiple science stations along the way. These stations supported additional ArcticNet projects and a collaboration with the Knowledge and Ecosystem-Based Approach in Baffin Bay (KEBABB) program to assess status and trends in ocean conditions that support living and fisheries resources. The Freshwater Institute of Fisheries and Oceans Canada in Winnipeg led the KEBABB program in partnership with ArcticNet. The ship reached his home port of Quebec City on 10 September, putting an end to the 2019 scientific expedition.

2 Leg 1a - 30 May to 23 June 2019 – Labrador Sea

Chief Scientist: Igor Yashayaev[1] (Igor.Yashayaev@dfo-mpo.gc.ca)

[1] Bedford Institute of Oceanography, Fisheries and Oceans Canada, Dartmouth, NS, Canada

2.1 Introduction and Objectives

Starting on 30 May in Quebec City and ending on 23 June in St. Anthony, Leg 1a was dedicated to the Atlantic Zonal Off-Shelf Monitoring Program (AZOMP). Led by the Ocean and Ecosystem Sciences Division of the Bedford Institute of Oceanography, the largest component of this program is the collection and analysis of physical, chemical and biological observations on an oceanographic section across the Labrador Sea, the AR7W Line (Figure 2-1).

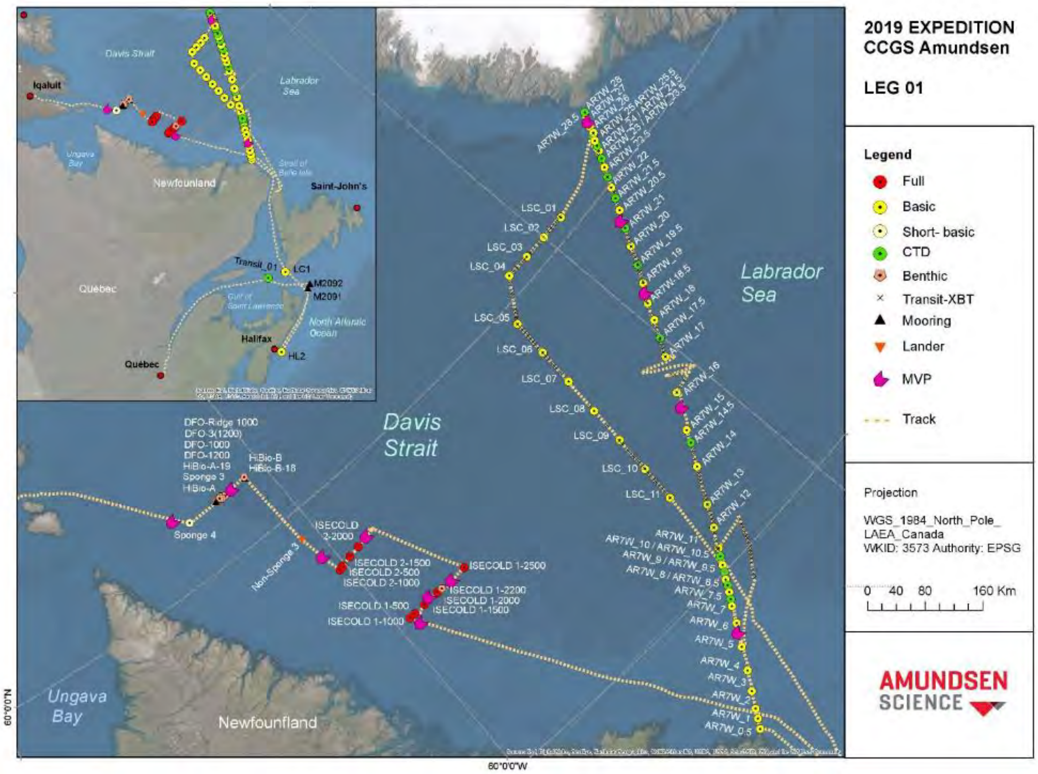

Figure 2-1 Ship track and location of stations sampled by the CCGS *Amundsen* in support of AZOMP, ISE-COLD and Atlas programs during Leg 1 of the 2019 Expedition

Specific objectives of Leg 1a were to:

- Deploy 2 moorings
- Collect physical, chemical and biological samples along the Halifax Line (HL)
- Collect physical, chemical and biological samples along the AR7W Line

2.2 Synopsis of operations

This section provides a general synopsis and timeline of operations during Leg 1a. Detailed cruise reports provided by onboard participants and including specific objectives, methodology and preliminary results for projects conducted during this leg are available in Part II of this report. During this leg, the *Amundsen* traveled from Quebec City (30 May) to St. Anthony (23 June) and 60 stations were visited with an overall tally of operations and activities as follows:

- 10 Argo floats and 2 moorings deployments
- 64 CTD-Rosette deployments
- 88 ring net, 2 tucker net, 2 Hydrobios and 1 net tow deployments

A detailed scientific log for all sampling operations conducted during Leg 1a with the positions and depths of the visited stations is available in Appendices 1 and 2.

2.2.1 *Timeline of Operations*

Leg 1a journey started on 30 May in Quebec City. The ship left its homeport after an efficient mobilization and successful sea trials. This year only, a second mobilization was planned at the Bedford Institute of Oceanograhpy's port in Dartmouth, Nova Scotia. While making its way to this port, two moorings were successfully deployed near Scatary Bank.

The two-day mobilization turned out to be a little longer due to ship malfunction, reducing the already packed expedition plan of two crucial days. While several scenarios were explored, it was decided that the Halifax Line (HL) transect should not be sampled, leaving all the effort to the AR7W line transect.

Two biological stations (HL2 and LC1) were conducted while steaming towards AR7W first station (station AR7W_0.5) which was reached on 9 June. Operations for the collection of physical, chemical and biological samples along the AR7W line went at a fast pace. The Greenland EEZ was crossed on 13 June and it took the teams three more days to reached the last transect station, AR7W_28.5. On the way back towards St. Anthony, the ship made a little detour to explore a new transect, the LSC transect (LSC_01 to LSC_11). These stations are specifically interesting for physical oceanographer as they're located in the middle of a very dynamic mixing water column.

After a very productive leg of 60 stations, the *Amundsen* made its way towards St. Anthony for a Science rotation on 23 June.

3 Leg 1b - 23 June to 5 July 2019– Labrador Sea

Chief Scientist: Anissa Merzouk[1] (anissa.merzouk@arcticnet.ulaval.ca)

[1] Amundsen Science, Université Laval, Québec, QC, Canada

3.1 Introduction and Objectives

Leg 1b of the 2019 Amundsen Expedition took place from 23 June to 5 July. This leg focused on the Integrated Studies and Ecosystem Characterization Of the Labrador sea Deep Ocean (ISE-COLD) program and the ATLAS transatlantic consortium with oceanographic sampling and Lander recoveries conducted in the Labrador Sea (Figure 3-1).

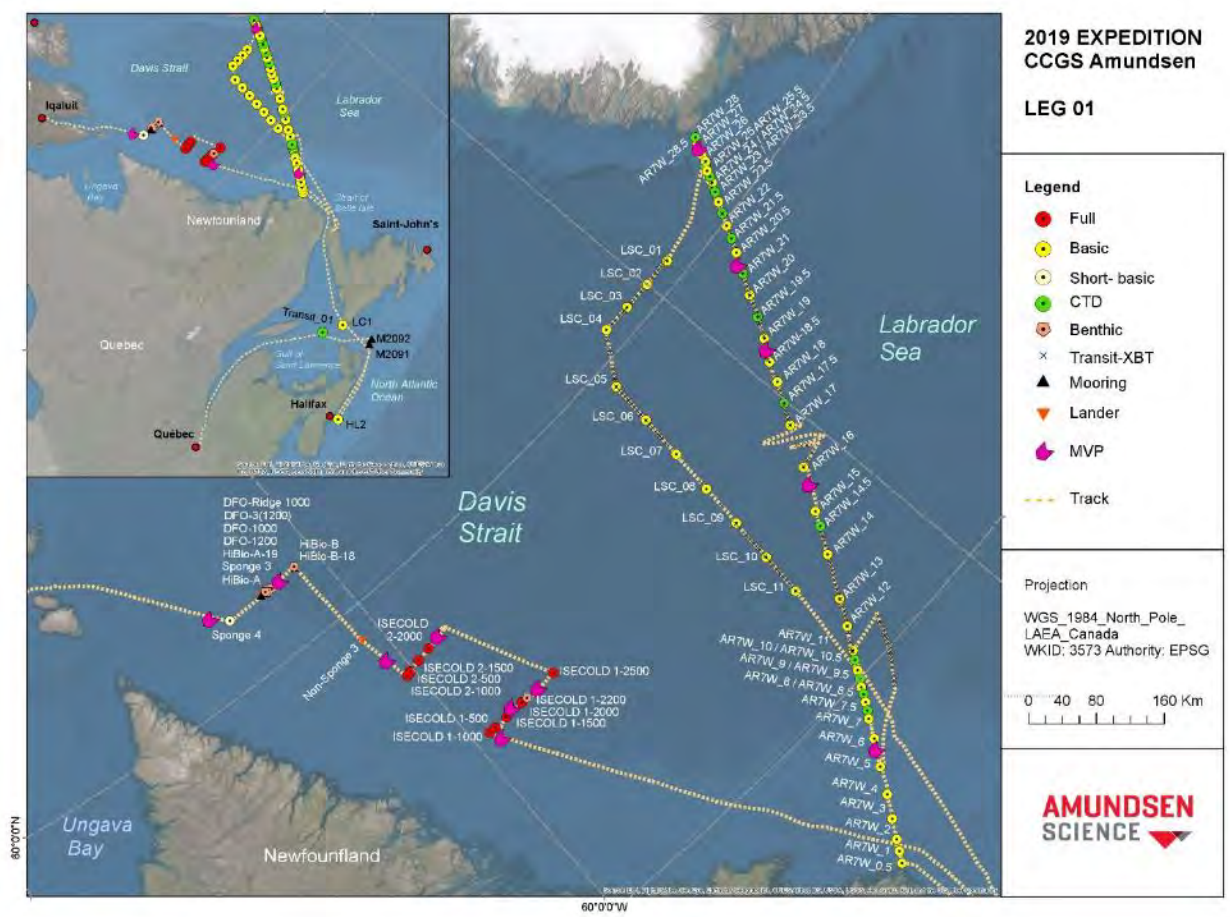

Figure 3-1 Ship track and location of stations sampled by the CCGS *Amundsen* in support of AZOMP, ISE-COLD and Atlas programs during Leg 1 of the 2019 Expedition

Secific objectives of Leg 1b were to:

- Collect physical, chemical and biological as well as bentic samples along two transect, ISECOLD1 and ISECOLD2
- Turn over two moorings, HiBio-B and HiBio-A
- Recover the two landers from ATLAS project

3.2 Synopsis of operations

This section provides a general synopsis and timeline of operations during Leg 1b. Detailed cruise reports provided by onboard participants and including specific objectives, methodology and preliminary results for projects conducted during this leg are available in Part II of this report. During this leg, the *Amundsen* traveled from St. Anthony (23 June) to Iqaluit (5 July) and 24 stations were visited with an overall tally of operations and activities as follows:

- 2 moorings deployments, 1 moorings recoveries and 2 landers recoveries
- 20 CTD-rosette deployments
- 13 drop camera deployments
- 18 rock dredge deployments
- 14 IKMT and 10 Hydrobios deployments
- 12 box corer deployments

A detailed scientific log for all sampling operations conducted during Leg 1b with the positions and depths of the visited stations is available in Appendices 1 and 2.

3.2.1 *Timeline of Operations*

Leg 1b started on 23 June with a scientist rotation in St. Anthony followed by a two-day transit to the first ISECOLD 1 transect station (ISECOLD 1-500). In three packed days, the six-station transect was completed and precious data were collected.

ISECOLD 2 transect was reached by 29 June and operations started at station ISECOLD 2-2500. Inside 48 hours, the five-station transect was completed and the ship was already steaming towards ATLAS first lander recovery station, Non-Sponge 3.

The lander recovery was a success and the photograph, Alex Ingle, had the opportunity to take great shots of this achievement.

The same day, CCG Crew and Amundsen Science team attempted to recover a mooring (HiBio-B-18), but without success. The decision was taken to move forward with the expedition and go to the next mooring to be recovered, mooring HiBio-A. This time was the good one and the successful recovery of the HiBio-A allowed its turn over along with the deployment of HiBio-C, a mooring made on the ship with the available material and deployed near HiBio-A.

With all the good vibes from the previous accomplishment and the gained expertise of the crew, the second ATLAS lander was easily recovered on 2 July with other great shots of the operation taken both from the helicopter and the zodiac.

Leg 1 ended in Iqaluit on 5 July with a full crew change.

All in all, Leg 1b was a very effective leg with more than 95% of the scheduled operations efficiently completed.

Figure 3-2 Group pictures of CCG crew and scientist on Leg 1b. Photo credit Alex Ingle

4 Leg 2a - 5 July to 25 July 2019 - Baffin Bay

Chief Scientist: Alexandre Forest[1] (alexandre.forest@as.ulaval.ca)

[1] Amundsen Science, Université Laval, Québec, QC, Canada

4.1 Introduction and Objectives

Leg 2a took place from 5 to 25 July and focused on achieving ArcticNet and Takuvik Bio-Argo projects' objectives. Oceanographic sampling, river sampling as well as Argo deployments and recoveries were conducted in Baffin Bay throughout this leg (Figure 4-1).

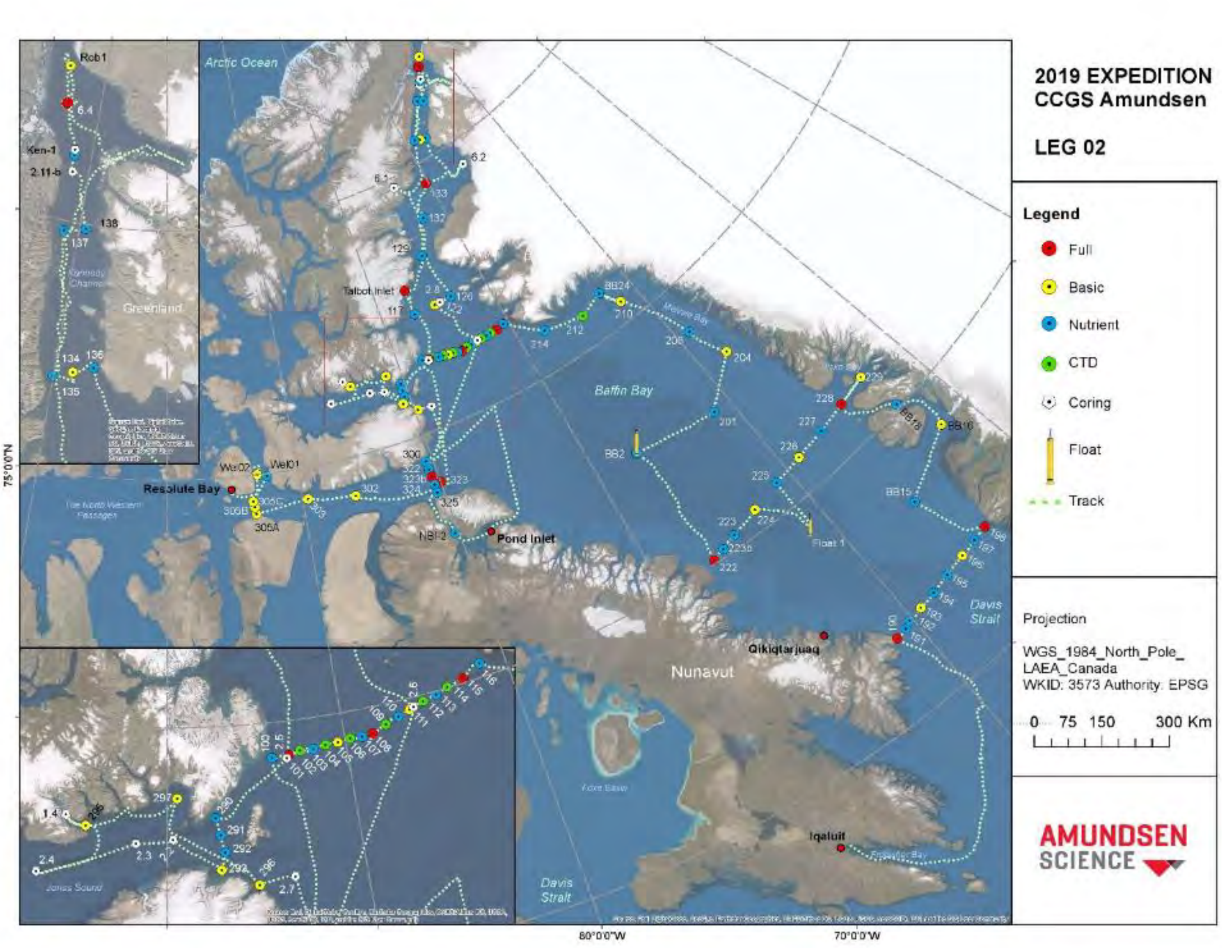

Figure 4-1 Ship track and location of stations sampled by the CCGS *Amundsen* during Leg 2 of the 2019 Expedition

Specific objectives of Leg 2a were to:

- Deploy two Bio-Argo Floats at designated locations in central Baffin Bay (stations BB2 and float 1)
- Collect oceanographic sampling along 4 transects closing the Baffin Bay: the Davis Strait transect (stations 190-198). the Central Baffin Bay transect (stations 220-229), the NOW transect (stations 100-116) and the Lancaster Sound transect (stations 322-325)
- Deploy a Rosette to the bottom of deep station BB2
- Navigate and collect oceanographic samples around Disko Island (stations BB16-BB17-BB18)
- Collect oceanographic samples along the northwest Greenland Coast (Stations 204-206-208-210-BB24-212-214)

4.2 Synopsis of operations

This section provides a general synopsis and timeline of operations during Leg 2a. Detailed cruise reports provided by onboard participants and including specific objectives, methodology and preliminary results for projects conducted during this leg are available in Part II of this report. During this leg, the *Amundsen* traveled from Iqaluit (5 July) to Pond Inlet (25 July) and 57 stations were visited with an overall tally of operations and activities as follows:

- 2 argo floats deployments
- 70 CTD-rosette, 48 trace-metal niskins and 5 surface bucket deployments
- 6 baited camera deployments
- 26 bongo net, 18 monster net, 18 tucker net and 7 Hydrobios deployments
- 15 Agassiz trawl, 6 IKMT, 3 beam trawl
- 19 box corer deployments
- 1 dedicated mapping survey

A detailed scientific log for all sampling operations conducted during Leg 2a with the positions and depths of the visited stations is available in Appendices 1 and 2.

4.2.1 *Timeline of Operations*

The charter flight to Iqaluit left Quebec City on 5 July at 10AM after a 2-hour delay owing to a cargo issue. Once in Iqaluit and despite heavy rain conditions, personnel and passengers were transported to the ship via helicopter. The ship lifted anchor at 18h00 for a 3-day transit to the first Leg 2a station (station 190).

Station 190 was reached in the early morning of 8 July, marking the beginning of Leg 2a scientific efforts and of Davis Strait transect sampling operations. Only interrupted by a family of bottleneck whales chasing the ship (Figure 4-2), the 9-station transect went smoothly with most of the operation successfully completed. By the afternoon of 11 July, all operations from station 198 were done, including the first baited camera of the leg. While minor operational issue rose from that deployment, many lessons were learned.

Figure 4-2 Friendly encounter at basic station 193

The same day, nutrient station BB15 was completed and it was decided that station BB17 would be canceled owing to time constraints. Entrance into Disko Bay around noon was spectacular, with hundreds of icebergs and magnificent coasts (Figure 4-3). The two stations around Disco Island were both breathtaking and efficient.

Figure 4-3 Iceberg in Disko Bay

Central Baffin Bay transect sampling effort begun on 12 July with full station 228. Stations 229, 227, 226 and 225 were then completed one after the other at a fair pace. Few Groenland sharks could be spotted by the baited camera deployment (Figure 4-4), unveiling precious information on a fairly unknown species.

On 14 July, right after the completion of station 225, the transect was put on hold for few hours as the ship detoured to reach station float-1 for a Bio-Argo float deployment followed by a CTD-Rosette and an IKMT deployment. As internet signal was very weak, it was decided to restrict all other communications to ensure that the Takuvik team could communicate efficiently with the floats.

Figure 4-4 Greenland Shark at station 228

Basic station 224 was reached at 00:30 AM on 15 July. Note that a revised position was assigned to this station following the rectification of the central Baffin Bay transect. The westernmost stations were shifted to the north with the expectation that heavy ice conditions may hinder the completion of this transect. This change also entailed a shift in the position of stations 223 and 222, as well as the last-minute creation of station 223b. Initial stations 220 and 221 do not exist anymore.

By the early morning of 16 July, the central Baffin Bay transect was completed and the ship was steaming towards a much expected station, station BB2. Two Bio-Argo floats were deployed there along with two CTD-Rosette casts. Station BB2 was followed by a series of stations along the northwest Greenland Coast (Stations 204-206-210-BB24-212-214). In four days, the series was completed and scientific teams and CCG crew were ready for a long, hard work, stretch, the NOW transect. This 17-station transect was completed in four very packed days without any major issues.

After completing the last NOW transect station (station 100) the ship sailed towards Lancaster Sound, reaching station 322 in the early morning of 24 July. Stations 300, 323, 323b, 324 and

325 were then completed successively and operations at the last station of the Lancaster Sound transect were completed from 3:00 to 6:00 AM on 25 July.

The ship finally sailed through Navy Board Inlet to reach Pond Inlet and dropped anchor at 6:00PM on 25 July.

Figure 4-5 Group pictures of CCG crew and scientist on Leg 2a. Photo credit Marc-André Pauzé

5 Leg 2b - 25 July to 15 August 2019 – Baffin Bay, Nares Strait and Lancaster Trough

Chief Scientist: Jean-Carlos Montero-Serrano[1] (Jeancarlos_Monteroserrano@uqar.ca)

[1] Institut des sciences de la mer de Rimouski, Université du Québec à Rimouski, Rimouski, QC, Canada

5.1 Introduction and Objectives

Leg 2b was carried out from 25 July to 15 August. This leg, conducted in the waters of Baffin Bay, Nares Strait and Lancaster Trough (Figure 5-1) focused on ArcticNet's research programs. Oceanographic and geologic sampling as well as glacier/iceberg operations were conducted during this 3-week Leg.

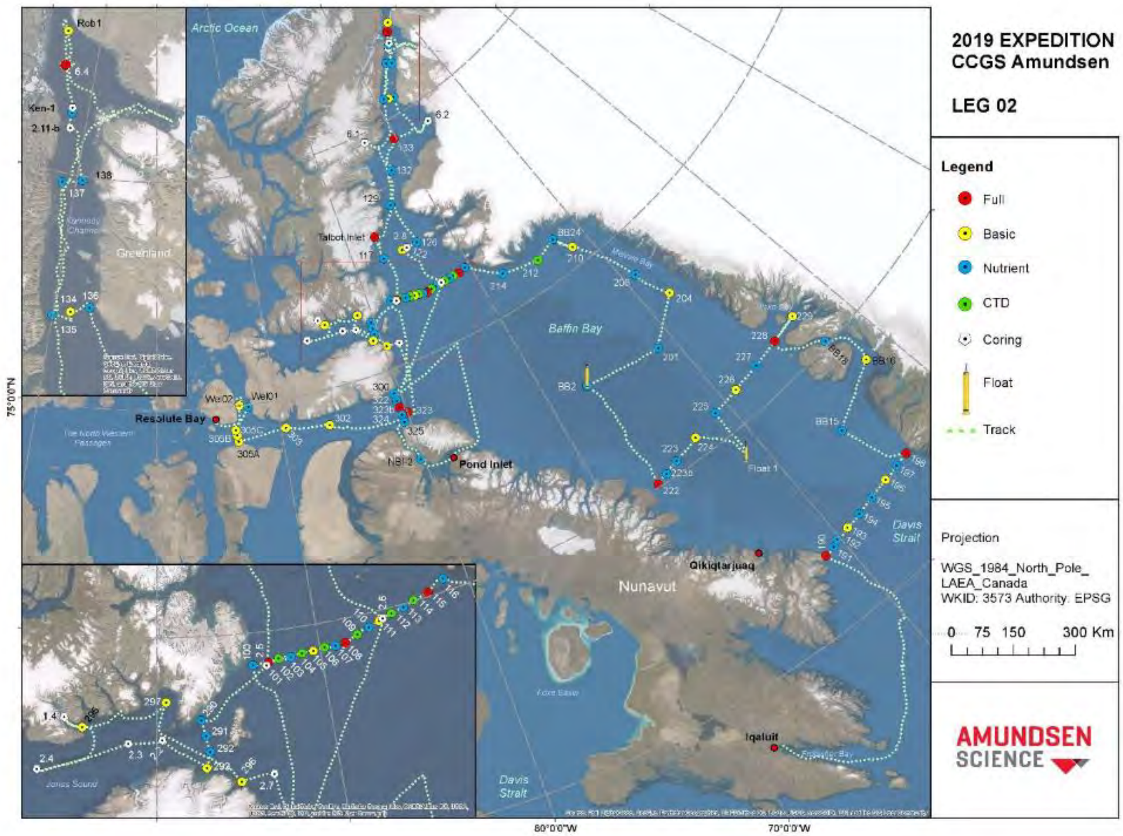

Figure 5-1 Ship track and location of stations sampled by the CCGS *Amundsen* during Leg 2 of the 2019 Expedition

Specific objectives of Leg 2b were to:

- Collect sediment cores at designated stations in northern Baffin Bay, Nares Strait and Jones Sound
- Collect oceanographic samples at designated stations in Nares Strait, Kane Basin, Kennedy Channel and Jones Sound
- Conduct ice and ocean operations at Trinity&Wykeham Glaciers and Petermann Glacier
- Dedicated multibeam and sub-bottom seafloor surveys along Ellesmere Island between Talbot Inlet and Manson Glacier
- Collect river samples at sites along the cruise track in Lancaster Sound.
- Basic Stations near the base of Sydkap, Belcher and Devon Glaciers.
- Collect nutrient samples along a transect at the entrance of Jones Sound (290-293)
- Hold a community visit in Grise Fiord

5.2 **Synopsis of operations**

This section provides a general synopsis and timeline of operations during Leg 2b. Detailed cruise reports provided by onboard participants and including specific objectives, methodology and preliminary results for projects conducted during this leg are available in Part II of this report. During this leg, the *Amundsen* traveled from Pond Inlet (25 July) to Resolute (15 August) and 43 stations were visited with an overall tally of operations and activities as follows:

- 43 CTD-rosette and 28 trace-metal niskins deployments
- 21 bongo net, 15 monster net, 11 tucker net and 4 hydrobios deployments
- 12 Agassiz trawl, 3 beam trawl and 3 IKMT deployments
- 29 box corer, 21 gravity corer and 4 piston corer deployments

A detailed scientific log for all sampling operations conducted during Leg 2b with the positions and depths of the visited stations is available in Appendices 1 and 2.

5.2.1 *Timeline of Operations*

Participants of Leg 2b left Québec City at 8:00AM on 25 July. The charter first landed in Iqaluit where it spent the night. The next morning, the charter flight brought the science personnel to Pond Inlet where a science rotation took place. All scientists were transported to the ship via helicopter. This operation was completed around 11:30 AM. Scientists used the afternoon to organize their laboratories and familiarization tours were completed. A general science meeting was held at 7:00PM to introduce participants to each other, provide information on life on board, and discuss priority of operations. A water sampling request meeting was held by Pascal Guillot and Philippe Tortell. The ship departed from Pond Inlet at 1:40 PM to coring site 2.6. The weather conditions were very good. The Chief Scientist and Anne Corminboeuf met all the scientific teams separately to discuss their expectations and sampling requirements for the mission.

On 27 July, around 5:15AM, the Amundsen was called for a Search and Rescue (SAR), which got canceled around 12:30PM the same day. This 8-hour delay pushed the expected arrival time to coring site 2.6 to 3:00 AM on 28 July. During transit, three safe work instructions meetings were held (gravity and piston corer, helicopter and drones) to provide the crew with operational and safety tips. The boat drill and abandon-ship exercise was carried out in the afternoon along with a short helicopter training carried out by Dick Morissette. A general meeting was held at 6:30PM.

Coring site 2.6, located in NW Baffin Bay, was reached on 28 July at 02:33 AM. A CTD cast was performed to calibrate the multibeam echosounder followed by a Bongo Net deployment and box and gravity core deployments. The next station, station 122, was reached by 12:10 PM the same day. A short sub-bottom survey was performed to identify the best site for the piston corer deployment. All the operations were performed successfully and the ship was ready to leave station 122 towards station 126 at 12:20 AM on 29 July.

On 29 July, a science meeting was held at 11:00 AM to plan the next sampling stations around the Kane Basin (132 and 133) and to provide information on “my project in 3 minutes” and Amundsen Quiz. Due to heavy ice conditions and in agreement with all the science teams and ice specialist, full station 132 was changed into a nutrient station, whereas nutrient station 133 was changed into a full station. After successful work at station 132, oceanographic sampling at full station 133 began around 9:00PM and continued overnight. Sea ice conditions were favorable to the deployment of all oceanographic instruments and all operations were completed by 5:05 AM.

The coring station 6.2 was reached at 10:40 AM on 30 July. A sub-bottom survey was performed to identify the best coring sites. As no bathymetric and seismic data were available around the Humboldt Glacier, the survey took a little longer than expected. Site 6.2 was completed by 6:34PM. The drone was also deployed in the early afternoon of the same day. A problem with the drone's GPS persists. Finally, Ice operations on Humboldt Glacier were carried out between 09:02AM and 11h12AM.

On 31 July, entrance into Petermann Glacier was still closed by sea ice. Helicopter flight for river sampling was carried out between 08:30AM and 1:10PM. Three rivers were sampled. The drone was deployed between 10:00AM and 10:19AM. The GPS interference was repaired and the drone flight went very well. An helicopter survey of Hans Island was performed in the afternoon and a general meeting was held at 6:30PM to plan sampling in stations Ken1 and 6.4.

Figure 5-2 Group pictures of CCG crew and scientist on Leg 2b. Photo credit Marc-André Pauzé

6 Leg 3 - 15 August to 10 September 2019 – Baffin Bay, Lancaster trough and Labrador Sea

Chief Scientist: Alexandre Normandeau[1] (alexandre.normandeau@canada.ca)

[1] Geological Survey of Canada, Natural Resources Canada, Dartmouth, NS, Canada

6.1 Introduction and Objectives

Leg 3 started on 15 August at Resolute and ended on 10 September in Quebec City. This leg supported additional ArcticNet projects as well as a collaboration with the Knowledge and Ecosystem-Based Approach in Baffin Bay (KEBABB) program.

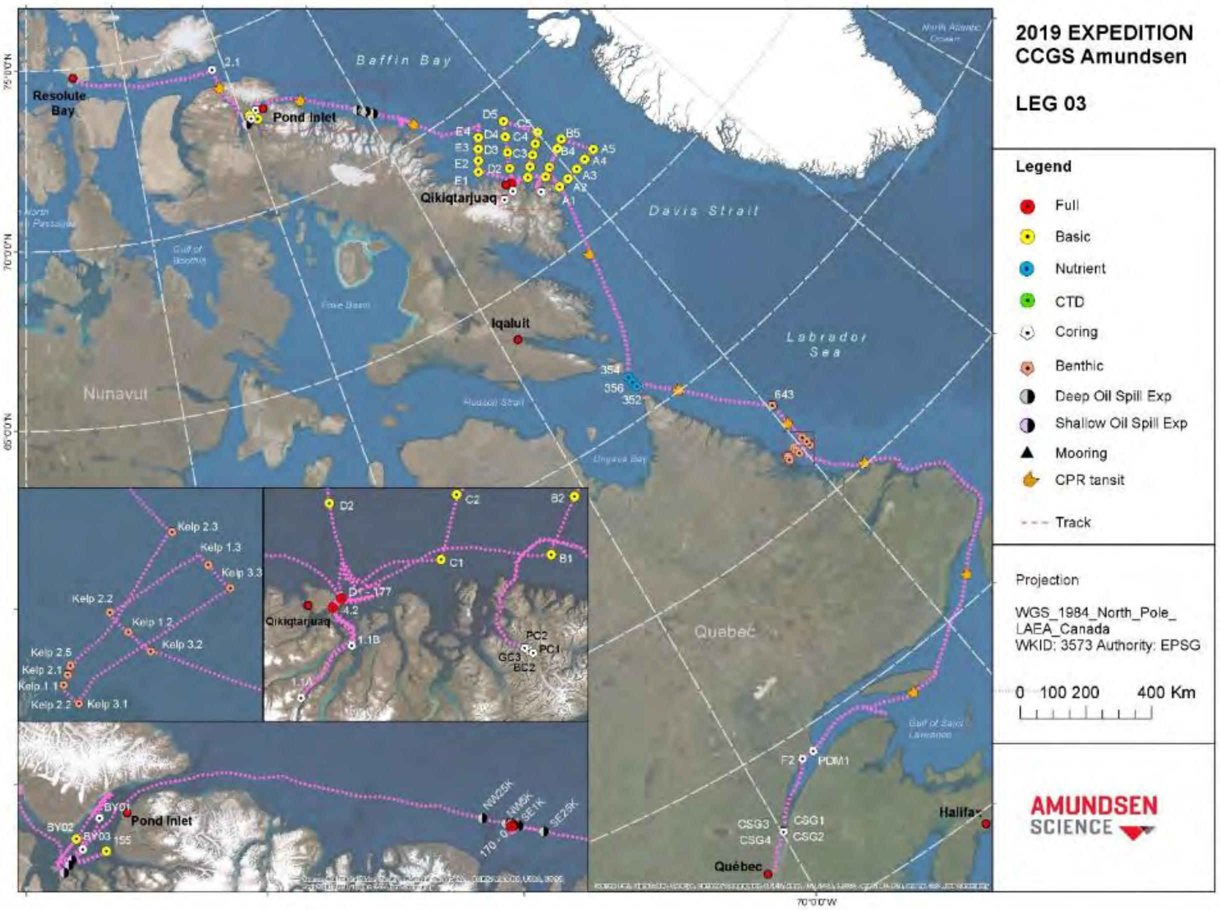

Figure 6-1 Ship track and location of stations sampled by the CCGS *Amundsen* during Leg 3 of the 2019 Expedition

Specific objectives of Leg 3 were to:

6.2 Synopsis of operations

This section provides a general synopsis and timeline of operations during Leg 3. Detailed cruise reports provided by onboard participants and including specific objectives, methodology and preliminary results for projects conducted during this leg are available in Part II of this report. During this leg, the *Amundsen* traveled from Resolute (15 August) to Quebec City (10 September) and 72 stations were visited with an overall tally of operations and activities as follows:

- 2 moorings deployments and 3 moorings recoveries
- 43 CTD-rosette deployments
- 9 continuous plankton recorder deployments
- 5 baited camera deployments
- 27 monster net, 11 hydrobios and 18 tucker net deployments
- 21 Agassiz trawl, 8 IKMT, 6 beam trawl deployments
- 15 Ben Van Been, 52 box corer, 11 gravity corer and 9 piston corer deployments

A detailed scientific log for all sampling operations conducted during Leg 3 with the positions and depths of the visited stations is available in Appendices 1 and 2.

6.2.1 *Timeline of Operations*

The 2019804 cruise began in Resolute Bay where scientific participants boarded the ship and a Coast Guard crew change took place. The ship then sailed towards Pond Inlet where most of the GENICE program (Microbial Genomics for oil spill preparedness in the Canadian Arctic) took place, led by the National Research Council. During the GENICE program, seabed mapping and sediment cores were collected in Eclipse Sound to map seafloor processes originating from Bylot Island. These activities were opportunistic since the GENICE program only had day-time operations on land. During the night, seabed mapping could be conducted while during the day, sediment coring and CTD-Rosettes could be completed.

On August 19th, we sailed to Scott Inlet where the program aimed at collecting CTD-Rosettes and Van Veen grabs for the University of Calgary. A full 24h was dedicated to this program and one box core (station 005) was collected for GSC-A purposes. Near the end of these operations, a human error led to the rupture of the CTD-Rosette cable and its loss to the seafloor. A meeting was then held on the bridge to go over our options. Since the CTD-Rosette was a major part of the ArcticNet and Department of Fisheries and Oceans (DFO) programs, a few ideas were discussed to find sensors that could replace the ones lost at sea. The CCGS Amundsen had a spare rosette on board but did not have many of the spare sensors left. Two options were considered. We knew the CCGS Louis-St Laurent (LSSL) was in Clyde

River for mapping purposes with the Canadian Hydrographic Service (CHS). Our first option was to contact the ship and ask if they had spare parts for a CTD-Rosette. The second option was to contact the Bedford Institute of Oceanography to ask if they had spare parts that could be shipped to Qikiqtarjuaq in a short period of time. That afternoon, both options were considered viable and we started making phone calls. The captain first called the CCGS LSSL to know if there was a Rosette on board. We learned that there was indeed a Rosette for the Joint Ocean Ice Studies (JOIS) program of DFO in the Beaufort Sea, led by Dr. Jane Eert. We therefore contacted Dr. Eert to discuss the possibility of borrowing some of the equipment on board. Dr. Eert agreed to lend the sensors we needed since it would benefit the DFO KEBBAB program which was one of the objectives of this Amundsen leg. After learning that the sensors were to be used later in the season for the JOIS program, we realized we could not be using these instruments for the remainder of the cruise. Therefore, we contacted Peter Pledge (NRCan) and Adam Hartling (DFO) to see if they had the sensors we needed and if they were available for our purposes. In the evening, both responded that the instruments were available and could be shipped priority to Qikiqtarjuaq. By the end of the day, we had a firm plan to move ahead: Borrow the LSSL sensors for a few days while we wait for the BIO sensors to arrive. Once the BIO sensors arrive, we would send back the LSSL sensors by helicopter. That evening, we sailed towards Clyde River to borrow the sensors from the LSSL.

During the night, we mapped part of the Clyde trough while waiting for the LSSL to be ready to welcome us on board via our helicopter. The following morning, August 21st, our helicopter went on board the LSSL and borrowed sensors that could be installed on the CCGS Amundsen Rosette. We started sailing towards the first station of the DFO KEBBAB program, which was about 8h away from Clyde River. During that time, the sensors were successfully installed on the spare Rosette and we could resume our program. The BIO spare sensors were also sent that day for Qikiqtarjuaq and were scheduled for 5-6 days later.

The KEBBAB program aimed at collecting box cores, nets and CTD-Rosettes along 5 nearshore/offshore transects in southern Baffin Bay. GSC had interests in collecting push cores at these locations to understand sediment transport processes on the seafloor. Therefore, at each KEBBAB station where box cores were collected, we also collected a push core.

At the end of the first transect, we sailed towards Qikiqtarjuaq to collect piston cores offshore a small longshore drift channel system (station 011) and in Coronation fjord. We also mapped these systems. Following the mapping and coring in these locations, we sailed towards the second transect of the KEBBAB program. On August 26th, the BIO sensors were planned to arrive in Qikiqtarjuaq. However, fog in Qikiqtarjuaq forced the cancellation of the flight. The next flight for Qikiqtarjuaq was scheduled for August 28th. On August 27th, we noticed that a flight to Pangnirtung was possible for 9am. We thus called First Air in Iqaluit to ask if they could put our packages on the Pangnirtung flight. Our sensors arrived in Pangnirtung on August 27, at 10am. In the afternoon, we sent our helicopter to Pangnirtung to collect our sensors. However, a fog bank prevented the helicopter to reach its destination and it had to come back. Later in the afternoon, we tried again and this time, it reaches Pangnirtung and brought back the sensors.

On August 28th, we realized that there was a weather window to reach the LSSL and get Dr. Eert's sensors back. A storm was coming our way for August 29th-31st, we thus had to send the equipment back that day. Since Qikiqtarjuaq did not have access to helicopter fuel, we sailed towards the community so that the helicopter flight towards the LSSL, which was now in Pond Inlet, could be made safely by fueling up in Clyde River. We began a helicopter flight towards the LSSL in the morning. While our helicopter was in flight, the LSSL captain accepted to send their helicopter to meet us 60 NM south of Pond Inlet. In early afternoon, the transfer of equipment was done and Dr Eert's sensors were safely back on board. In the meantime, we got our CTD-R to work, although some issues occurred but were resolved on August 29th. When the issues were resolved, we continued the KEBBAB program. This CTD-Rosette problem was resolved thanks to the generous help of many people: Captain Alain Gariépy and his team, Dr. Jane Eert, Dr. Christine Michel, Mike Dempsey, Peter Pledge and Adam Hartling. On board the Amundsen, Lou Tisné with the help of Paco Ferrand was largely responsible for making everything work.

The KEBBAB program was completed on September 1st in the morning. After the final site, we transited towards Southwind Fjord, where multibeam mapping, sediment coring and a mooring recovery was planned. These operations were completed by the end of the day and we began our transit south towards Quebec City. On the way back, ArcticNet operations were completed in Hudson Strait and Labrador.

After the work in Nain (Labrador) was completed, we decided to quickly head back towards the St. Lawrence Estuary to avoid two storms coming in Labrador Sea, one of them being Hurricane Dorian. By doing this, we decided to skip three stations that were planned offshore Labrador. Due to this, we arrived in the St. Lawrence Estuary approximately 2 days early. We took advantage of this by collecting multibeam bathymetry and sub-bottom profiler data and sediment cores near Pointe-des-Monts, Franquelin and St. Siméon. We arrived in Quebec City for demobilization on September 10, putting an end to the CCGS *Amundsen* season.

Figure 6-2 Group pictures of CCG crew and scientist on Leg 3. Photo credit Marc-André Pauzé

Part II – Project reports

1 Seabird Observations

Project leaders: Carina Gjerdrum[1] (carina.gjerdrum@ec.gc.ca)

Cruise participants – Leg 2a: Julia Baak[2]

Cruise participants – Leg 2b: Jessie McIntyre[2]

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1.1 Introduction

Seabird distribution is influenced by biological, chemical and physical oceanography. Thus, changes in seabird distribution can be an indicator of changes in the marine environment. In order to monitor environmental changes occurring in the arctic in response to climate change, it is important to monitor seabird distribution and abundance patterns in this area. In the Arctic, many seabird species rely on ice-dependent fish during the breeding season. As ice levels decline, fish populations and distributions may shift, causing similar shifts in seabird populations and distributions. Data on breeding colonies and at-sea distribution is required to understand this decline.

Data from at-sea surveys provide important information on pelagic seabird distribution throughout the year, including patterns of dispersal from breeding areas, migration routes and wintering areas. Over time, these data show trends in species abundance, diversity and distribution. This information can then be used to inform decisions regarding the protection of important marine areas, environmental assessment of proposed development projects, and appropriate response strategies to catastrophic events (e.g. oil spills).

1.2 Methodology

Seabird surveys were conducted using the Eastern Canada Seabirds at Sea (ECSAS) standardized protocol (Gjerdrum et al. 2012). When the Amundsen was in transit, 5-minute transects were conducted by scanning a 90° arc on the starboard side of the ship. At the beginning of each transect, weather, sea state, ice conditions and ship speed/direction were recorded. During the transect, all birds on the water were recorded continuously, and birds in the air were recorded using a snapshot approach to eliminate the over-estimation of flying birds (Gjerdrum et al. 2012). For all birds, the species, number, location (water/fly/land), and distance from ship (distance sampling methods are incorporated to address the variation in bird detectability) were recorded. During surveys, some birds were not identifiable to the species level. These were recorded based on general characteristics to the family level (e.g. Larus or Alcids). When birds were not identifiable at all, they were recorded as unknown bird. Additional details including association (e.g. observation platform or sea ice), behaviour (e.g. foraging, kleptoparasiting, diving or flying to escape ship), flight direction, age, sex and plumage were recorded when possible. The Canadian Wildlife Service places seabird observers on multiple ships of opportunity throughout the year. After the expedition, data are consolidated, summarized and analyzed from a central database maintained by the Canadian Wildlife Service Atlantic Region office in Dartmouth, Nova Scotia. The data are open and shared with other departments and jurisdictions.

1.3 Preliminary Results

A summary of bird species observed is provided in Table 1-1 and Table 1-3. In addition to recording seabirds, other wildlife and observations were recorded when possible. This includes ocean garbage and other marine wildlife such as seals, whales and walruses. A summary of non-seabird observations is provided in Table 1-2.

Table 1-1 Seabird species observed on Leg 2a of the 2019 Amundsen Expedition.

English Name	Latin Name	Number
Dovekie	*Alle alle*	2328
Northern Fulmar	*Fulmarus glacialis*	802
Thick-billed Murre	*Uria lomvia*	536
Black-legged Kittiwake	*Rissa tridactyla*	99

Common Eider	*Somateria mollissima*	48
Black Guillemot	*Cepphus grylle*	31
Glaucous Gull	*Larus hyperboreus*	14
Snow Goose	*Chen caerulescens*	13
Long-tailed Jaeger	*Stercorarius longicaudus*	3
Arctic Tern	*Sterna paradisaea*	1
Red Knot	*Calidris canutus*	1
Family: Alcids	*Alcidae*	45
Genus: Gulls	*Larus*	1

Table 1-2 Non-seabird observations recorded on Leg 2b of the 2019 Amundsen Expedition.

Common name (species or group)	**Latin name**	**Number**
Family: Seals (true seals)	*Phocidae*	254
Walrus	*Odobenus rosmarus*	8
Ringed seal	*Pusa hispida*	8
Polar bear	*Ursus maritimus*	5
Garbage	*N/A*	4
Order: Whale and dolphin	*Cetacea*	1
Harp seal	*Pagophilus groenlandicus*	1

Table 1-3 Seabird species observed on Leg 2b of the 2019 Amundsen Expedition.

Common Name (species or group)	**Latin Name**	**Number**
Dovekie	*Alle alle*	7099
Thick-billed Murre	*Uria lomvia*	2266
Northern fulmar	*Fulmarus Glacialis*	1089
Black guillemot	*Cepphus grylle*	510
Family: Auks	*Alcidae*	444
Black-legged Kittiwake	*Rissa tridactyla*	408
Unknown bird	*Aves*	73
Genus: Gulls	*Larus, Xema, Rissa, Pagophila, Rhodostethia*	76
Ivory gull	*Pagophila eburnea*	35
Sabine's gull	*Xema sabini*	19
Murre or razorbill	*Uria or Alca*	20
Arctic tern	*Sterna paradisaea*	25
Glaucous gull	*Larus hyperboreus*	24
Long-tailed jaeger	*Stercorariuslongicadus*	10
Iceland gull	*Larus glaucoides*	10
Genus: murres	*Uria*	6
Parasitic jaeger	*Stercorarius parasiticus*	4
Pomarine jaeger	*Stercorarius pomarinus*	1
Common eider	*Somateria mollissima*	3
Razorbill	*Alca torda*	1
Red phalarope	*Phalaropus fulicaria*	6

1.4 References

Gjerdrum, C., D.A. Fifield, and S.I. Wilhelm. 2012. Eastern Canada Seabirds at Sea (ECSAS) standardized protocol for pelagic seabird surveys from moving and stationary platforms. Canadian Wildlife Service Technical Report Series No. 515. Atlantic Region. vi + 37 pp.

2 Glaciers, Icebergs and Ice Islands

Project leaders: Luke Copland[1] (luke.copland@uottawa.ca), Derek Mueller[2] and Rocky Taylor[3]

Cruise participants – Leg 2b: Abigail Dalton[1], Adam Garbo[1,2] and Adam Tremblett[3]

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2.1 Introduction

Tidewater glaciers drain glaciers, ice caps, and ice sheets and terminate into the ocean where they discharge through the calving of icebergs and ice islands (large tabular icebergs). The Canadian Ice Service (CIS) produces charts to identify the presence of icebergs but has little knowledge about the sources and sinks of icebergs in Canadian waters. It is important to understand where these icebergs and ice islands originate, where they drift, how they deteriorate and the time scale of these processes. Trinity and Wykeham Glaciers on SE Ellesmere Island have increased iceberg production from 22% of total discharge from the CAA (Canadian Arctic Archipelago) in 2000 to 62% in 2016. They are the only two glaciers in the Queen Elizabeth Islands (QEI) to have shown consistent acceleration between 1999 and 2015 making it an area of significance for the study of ice discharge into Canadian Waters (Van Wychen et al., 2016). Operations during this leg will address the following gaps in knowledge surrounding the production and movement of icebergs and ice islands in Canadian waters:

- Which tidewater glaciers are the sources of icebergs and ice islands in Canadian waters and where do they drift?
- Are there changes in the size, shape or timing of iceberg production in the recent past and is this linked to glacier dynamics?
- Do sea ice conditions impact the production of icebergs at the termini of tidewater glaciers?
- How is the velocity of Trinity Glacier changing over time?
- What is the volume change of CAA glaciers over the past few decades?

2.2 **Methodology**

2.2.1 *Iceberg Beacon Deployment*

Between July 26, 2019 and August 15, 2019 a total of 11 tracking beacons were deployed by helicopter on icebergs and ice islands in Talbot Inlet (SE Ellesmere Island) and Baffin Bay (Figure 2-1; Table 2-1). The targets were chosen based on size, location, and whether they were likely to drift. All eleven beacons have since successfully transmitted data remotely. Three of the iceberg tracking beacons contain Yellowbrick Rockstar Iridium GPS receivers, batteries and solar panels. The remaining eight were Cryologger iceberg tracking beacons (Figure 2-2,Figure 2-3,Figure 2-4).

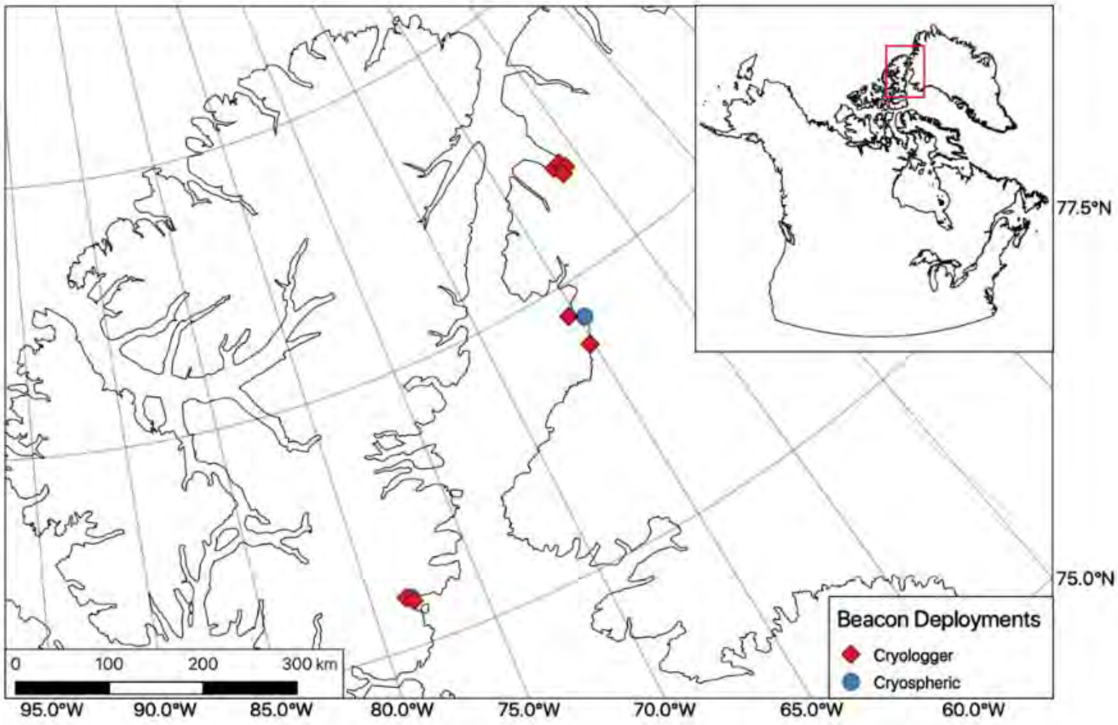


Figure 2-1 Overview of all iceberg tracking deployments during Leg 2b of 2019 Amundsen Expedition.

Three tracking beacons were deployed onto icebergs in Talbot Inlet to track movement of icebergs produced by Trinity Glacier within and out of the inlet. In total, 11 beacons have been deployed onto icebergs in Talbot Inlet between 2016 and 2019. Positions of all beacons will be tracked hourly to monitor movement and identify drift patterns of icebergs around Baffin Bay. Transmission frequency can be reduced remotely in the winter months when drift is reduced due to sea ice and the beacons are GPS transmitters are unable to report their position through snow.

Figure 2-2 (a) Cryologger iceberg tracking beacon; (b) Cryospheric iceberg tracking beacon (Rockstar Iridium)

Figure 2-3 (a) Deployment of Cryospheric tracking beacon; (b) Deployment of Cryologger tracking beacon.

Figure 2-4 Examples of icebergs where tracking beacons were deployed. (a) Iceberg near Humboldt Glacier on NW Greenland; (b) Iceberg within Talbot Inlet on SE Ellesmere Island

Table 2-1 Summary of Cryologger iceberg tracking beacon deployments.

#	IMEI	Date	Time (UTC)	Latitude	Longitude	Location
5	300434063494100	2019-07-30	14:00	79.3992	-65.1887	Humboldt Glacier
6	300434063392070	2019-07-30	15:00	79.7245	-65.3903	Humboldt Glacier
7	300434063394110	2019-08-05	15:15	77.9722	-78.4142	Talbot Inlet
8	300434063495310	2019-08-05	16:15	77.9225	-78.1355	Talbot Inlet

Table 2-2 Summary of Laboratory for Cryospheric Research tracking beacon deployments.

ID	Date	Time (UTC)	Latitude	Longitude	Location
3273	2019-07-30	14:45	79.6462	-64.6918	Humboldt Glacier
3637	2019-08-05	16:05	77.9615	-78.2145	Talbot Inlet
3386	2019-08-05	16:10	77.9603	-78.1977	Talbot Inlet

2.2.2 *Petermann Glacier Beacon Deployments*

A total of four Cryologger tracking beacons were deployed on the tongue of the Petermann Glacier, Greenland (Figure 2-5; Figure 2-6) in anticipation of the next major calving event, expected to occur in the coming year. The beacons were strategically placed close to either the terminus of the glacier, where smaller break-up events might take place, or near to where a significant crack has developed across almost the entire width of the glacier. The beacons will be placed into a deep sleep mode, transmitting only once daily, until a break-up event is detected on the Petermann Glacier. Once activity is detected, the sampling and transmission frequencies will be remotely modified in order to capture high temporal resolution drift data of the newly formed ice island and/or icebergs.

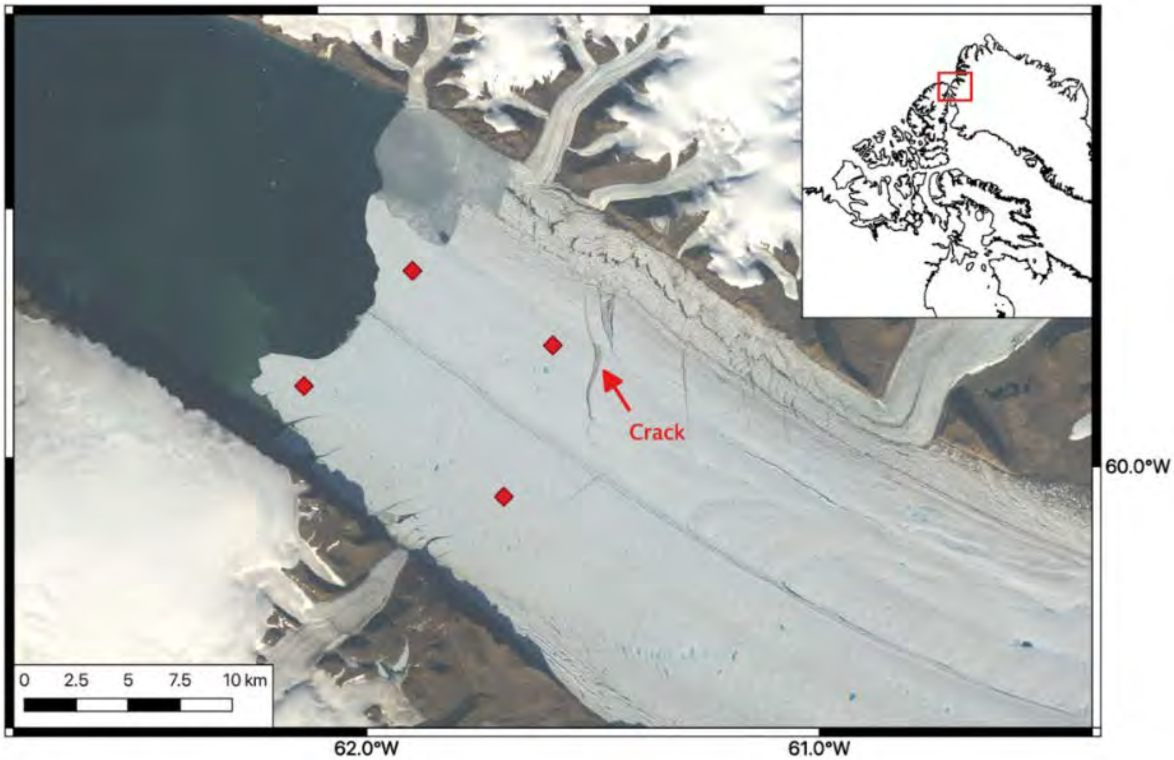


Figure 2-5 Petermann Glacier Cryologger beacon deployment locations. Base image: Landsat 8 OLI scene acquired July 18, 2019.

Figure 2-6 Deployment of Cryologger beacon on Petermann Glacier.

Table 2-3 Summary of Petermann Glacier Cryologger beacon deployments.

#	IMEI	Date	Time (UTC)	Latitude	Longitude
1	300434063496100	2019-08-01	12:50	80.9552	-61.6162
2	300434063392350	2019-08-01	13:00	80.9693	-61.1920
3	300434063292950	2019-08-01	13:15	80.9083	-60.9950
4	300434063498160	2019-08-01	13:30	80.8670	-61.3400

2.2.3 *Ice Penetrating Radar (IPR) Glacier Thickness Measurements*

Ice depth measurements were taken on 2 icebergs near Humboldt Glacier and 7 marine terminating glaciers on Ellesmere Island using a 25 mHz ice penetrating radar (IPR) system. Initial results show that NE Eugenie Glacier (79° 53.60 N 74° 21. 34 W) was ~205m thick and Eugenie Glacier (79° 48.64 N, 74° 51.59W) was ~150m thick. When combined with velocity measurements, glacier thickness data can be used to estimate volume of ice discharge from tidewater glaciers in the Canadian Arctic.

2.2.4 *Timelapse Camera System*

A DSLR camera (Canon EOS Rebel T6i with EF-S 24mm f/2.8 STM lens) was installed on a nunatak between Trinity and Wykeham Glaciers (77º55'50.64''N, 78º37'27.31''W) on August 10, 2016. The camera was housed within a Harbortronics unit mounted on a tripod. The camera was connected to a battery for power through the winter with a solar panel mounted on the tripod to recharge the battery during the summer months. The camera faces the terminus of Trinity Glacier and was set to take photos every hour to monitor iceberg calving events. The aim of this field season was to replace the memory card and reprogram the intervalometer however upon arrival we found the camera had been overturned by wildlife and significantly damaged (Figure 2-7). Fourteen months of timelapse imagery was collected between July 2017 and September 2018 before the system stopped working. As a result, the entire DLSR system was recovered from the site. Two additional SpyPoint cameras (adjacent to the DSLR camera location) were installed between Trinity and Wykeham Glaciers, one facing the terminus of Wykeham Glacier and one facing outward towards the mouth of the fiord. Photos were intended to be downloaded from these cameras. The camera facing Wykeham Glacier had also been damaged so all cameras were recovered from the site.

Figure 2-7 Trinity Glacier DSLR timelapse camera station on August 5, 2019.

2.2.5 *dGPS Station*

Two differential GPS systems (dGPS) were installed on Trinity Glacier on August 10, 2016 to monitor changes in glacier velocity. The first station was originally located down-glacier (78º01' 54.94''N, 78º50'56.40''W) and contains a battery and solar powered dGPS system (Trimble NetR9 & XI-100). In 2017, this station was found to be perched on the side of a crevasse. It was unable to be located in 2019 and is assumed to have fallen into the glacier. The second station was installed up-glacier (78º01'51.75''N, 79º12'14.62''W) and contains a battery and solar powered dGPS. The station stopped remotely transmitting its position through Iridium connection in July 2018 has since moved to 78° 02.29 N, 79° 10.01 W as of August 5, 2019 (Figure 2-8). The upper station also contains a timelapse camera (SpyPoint) facing an ablation stake marked with 5cm increments to monitor surface melt rates. Time-lapse cameras are programmed to take photos hourly. The goal of this field season was to recover the station. The tripod was removed and data from a timelapse camera, Trimble R7 GPS, and Hobo temperature/RH logger were downloaded. One 1m Kovacs flight was recovered from the site after being frozen into the glacier in 2017.

Figure 2-8 Trinity Glacier upper dGPS station on August 5, 2019.

2.2.6 *Multibeam Survey*

A bathymetric multibeam survey was conducted at the mouth of Talbot Inlet along the sea ice edge and southward following the coast of SE Ellesmere Island to understand topographic constraints on ocean circulation in northern Baffin Bay (Figure 2-9). In 2016 and 2017 the Amundsen conducted multibeam bathymetric surveys as far into Talbot Inlet as ice conditions would permit (~30 km from the termini of Trinity and Wykeham glaciers). The multibeam survey is part of a joint project with Dr. Patrick Lajeunesse aimed at reconstructing the past glacial history in this region. The objective of this part of the project is therefore to study the ocean properties and circulation in Talbot Inlet and northern Baffin Bay to better understand the role of the ocean in driving the recent retreat of these glaciers. The fieldwork goals is to continue bathymetric multibeam surveys in Talbot Inlet and its surroundings to understand topographic constraints on ocean circulation in northern Baffin Bay.

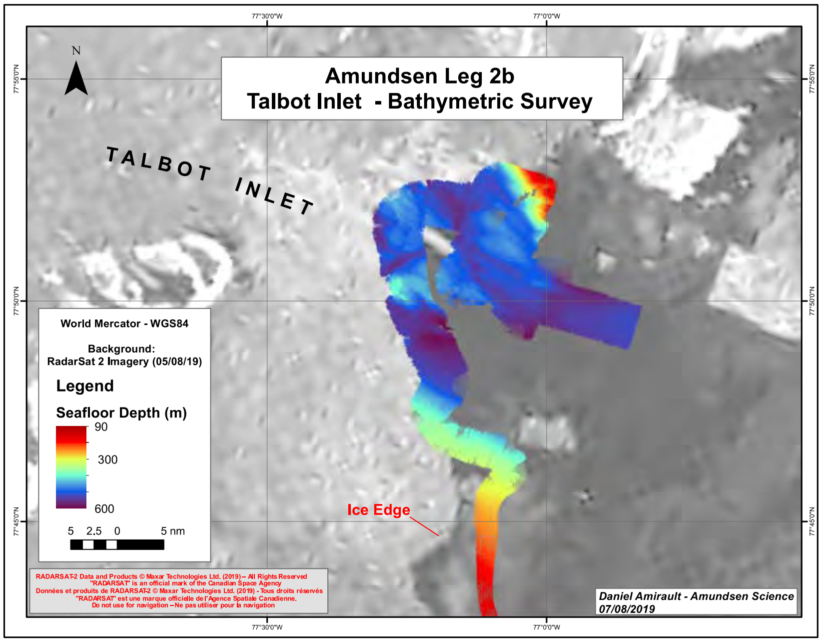


Figure 2-9 Bathymetric survey of Talbot Inlet.

2.2.7 *Hans Island Photo Survey*

At the joint request of Global Affairs Canada and the Ministry of Foreign Affairs in Copenhagen a photo/video survey of Hans Island was conducted on July 31, 2019 (Figure 2-10). This goal of this survey was to support ongoing work under the Canada-Denmark Joint Task Force on Boundary Issues.

A GoPro Hero 7 installed in the CCGS *Amundsen's* helicopter camera pod was employed to capture high resolution nadir video of Hans Island, while a Nikon D7500 was used to capture high resolution oblique photographs of the Island. Two separate surveys were conducted at varying altitudes of the entire island, and of areas of specific interest. Captured photo and video footage will be used for both visual inspection and in the reconstruction of a high-resolution 3D model of Hans Island.

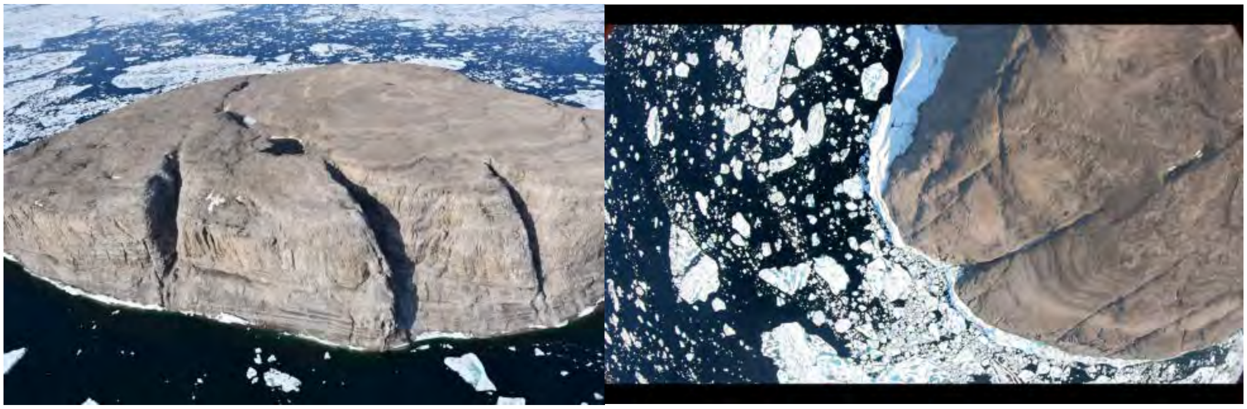


Figure 2-10 Example high resolution oblique photo (left) and GoPro video footage (right) from the aerial survey conducted of Hans Island.

2.2.8 *Bow-Mounted Camera System*

A bow-mounted camera system was deployed during this cruise in order to obtain time-lapse imagery of collisions between the vessel and chunks of multi-year ice or growlers. The project objective is to use the obtained imagery for the development of a software tool that can estimate global ice loading during these collisions. Through the analysis of the time-lapse imagery, it is expected that the size, shape, velocity, and acceleration of ice during collisions can be estimated. In turn, this should allow the calculation of the global loads that would have resulted from the required energy dissipation to produce the observed ice behaviour. This setup involved the use of a Nikon D5600 DSLR camera, a Digisnap time-lapse controller, housing manufactured by Harbortronics, and a custom-made mounting frame (Figure 2-11).

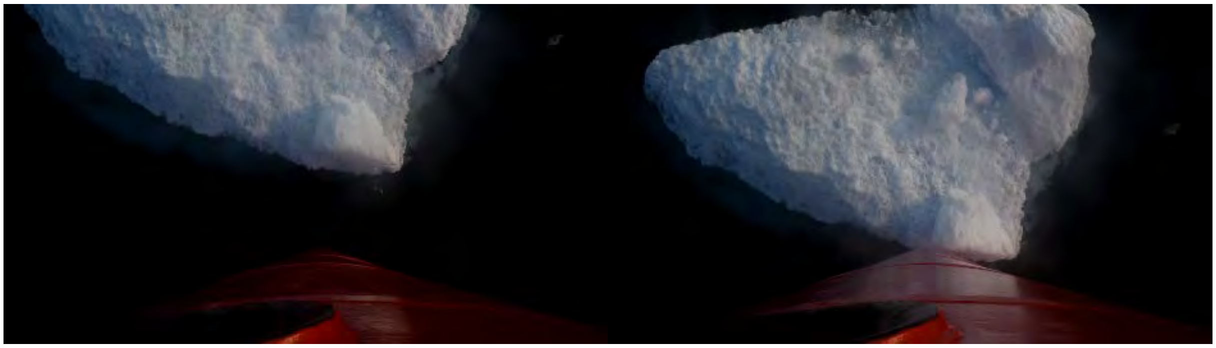
Figure 2-11 The bow-mounted camera system setup

This system was adapted from a planned long-term deployment of a time-lapse camera system on Hans Island in order to obtain similar data involving collisions between icebergs and the island. The Hans Island deployment would remain dormant and could be triggered remotely through the use of an Iridium modem whenever a collision is anticipated through the use of satellite imagery. However, it had no data transmission capabilities, and hardware limitations significantly limited the framerate of obtained imagery. With these considerations in mind, it was instead decided to opt for the bow-mounted system, which could immediately and reliably provide a much larger dataset with which to develop the processing software. Experiences during this cruise were also expected to provide insight into design refinements for a higher-commitment future long-term deployment on Hans Island or elsewhere.

2.3 Preliminary Results

Due to scale differences between the two deployments, this system was not ideal for a bow-mounted setup, and some testing was necessary to obtain suitable data. A higher framerate was required to provide similar precision for smaller-scale collisions involving relatively higher velocity and acceleration. The original setup which captured single images at the minimum interval of approximately 4 seconds was not sufficient to capture detailed interaction behaviour at this scale. Instead, the Digisnap controller was capable of holding the camera shutter, and this was used with the camera's burst mode to provide a more suitable 3-5fps. However, a delay of 10 seconds occurred between bursts, and the camera's buffer could only handle a maximum of 100 images per burst shot. As such, a significant proportion of potential interactions was missed. Additionally, while the controller was capable of transferring images to an onboard SSD, the transfer rate was not sufficient for sustained burst mode. The system was observed to slow and eventually cease functioning when large numbers of files were stored on the camera's internal SD card, and as a result the system had to be manually reset after several hours of operation.

During the later half of the cruise, the camera system was instead used to capture video of ice collisions. While file size restrictions limited the maximum length of a video to 30 minutes at 1080p/30fps, this was still a preferable alternative to the prior setup. Since the controller could not initiate video, video capture was initiated manually and the system was remounted while transiting through suitable ice conditions. This method was very successful for data collection, and overall, approximately 6 hours of video was captured while transiting through multi-year ice (Figure 2-12). A future system for long term deployment would likely necessitate the development of a custom controller that can capture video using the camera's API.



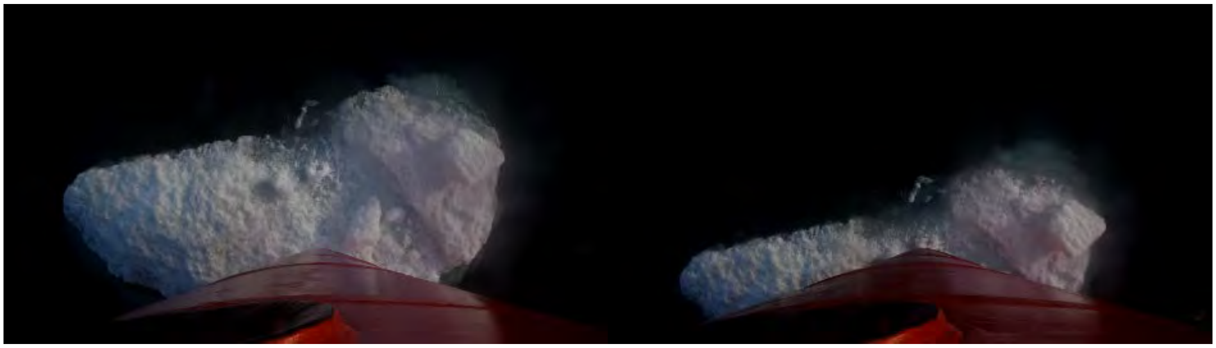


Figure 2-12 Series of video screenshots demonstrating an example collision from the bow-mounted camera system.

2.4 Acknowledgment

Many thanks to the crew of the CCGS *Amundsen* for their help with this fieldwork, especially Dick Morissette and Eddy Perron for use of the helicopter. Thanks also to Jean-Carlos Montero-Serrano, Jade Brossard, Philip Mann, Anne Corminboeuf, Maria-Emilia Rodriguez Cuicas, Philippe Tortell, and Robert Izett for their assistance during glacier/iceberg operations.

2.5 References

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3 Recording Wave-Ice Interactions and Ship's Operations

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Cruise participants – Leg 2a : Elie Dumas-Lefebvre[1]

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3.1 Introduction

By thinning sea ice and reducing its extent, global warming makes sea ice less and less resistant and thus more susceptible to breaking during storms. Waves generated during such events are the dominant process determining sea ice break up. By changing its geometrical properties and by exposing more open water to the atmosphere, wave breaks up of sea ice leads to numerous feedback on climate and has a direct impact on sea ice's dynamics and thermodynamics. Wave-ice interactions is a subject with still a lot of question marks but for this project the main interest is to record the joint floe size and thickness distribution (FSTD) resulting from the passage of a ship-generated wave in an initially somewhat uniform ice plate. Sea ice fracture by waves seems to create a preferential size but the mechanism leading to it is not well understood. It may be due to material properties of sea ice itself (Mellor, 1985; Herman, 2017), wave properties (e.g. Dumont et al. 2011) or a mix of those two. To determine if the preferential size is correlated to the wavelength of the wave packet coming from the ship, a drone and wave buoys will be deployed. To assess the ice thickness, a mapping survey will be conducted and simple measurements with a wood stick will be made.

With this information we may be able to answer one important question regarding ice break up dynamics: how important are waves in determining floe size during a fracture event ? By answering it we would be able to quantify a redistribution criterion, which dictates the evolution of the morphological properties of fracture-generated floes. Coupled wave-ice numerical models would then be more accurate in predicting the fragmentation process.

Apart from the wave-ice interactions, the drone has been used to record videos and images of the ship's operations and of the ship itself. These images will help promote Arctic science and coast guard northern operations. Moreover, a GoPro camera was put on the helicopter to record ice conditions in a larger extent. These images may be used to study rotten Arctic sea ice's morphology and geometrical properties.

3.2 Methodology

At each station where the weather conditions were good and where seabirds were not abundant, the drone was deployed for filming and taking pictures of the ship and operations such as coring and rosette deployment. On science's side, we did one experiment where the ship generated a wave train in order to break a sea ice plate having a dimension of the order of a kilometre. With the help of the zodiac, buoys measuring wave properties (amplitude, period, speed, etc.) were put on ice and its thickness were measured with a wooden stick. Lifting off from the zodiac boat, the drone was then flown above to ice sheet recording videos and images to render ice conditions numerically in 2D and 3D. After the break-up of the sheet, buoys were successfully recovered. In the end the drone has been deployed 10 times for an approximate total flight time of 6 hours

Figure 3-1 Deployment of the drone near Sydkap Glacier

3.2.1 *Issues*

One important thing about the drone's flight stability was the presence of drift either vertically or horizontally. This may have been caused by the lack of GPS coverage or by magnetic interference with the ship. Drone issues, such has flipping over itself, have happened few times during the cruise. In order to assess drone stability, manoeuvering tests have been made before every deployment while it was hovering a few meters above the flight deck.

Wave buoys are equipped with red and green LED lights to indicate the status the data acquisition. Usually, the green LED is lit when acquisition is underway but the red one was lit during the experiment. The cause of that may be that the accuracy of the GPS at these latitudes is too low (~2 m for lat/lon, ~8m for altitude) to measure variations due to waves, which are of the order of centimeters. I other words, the wave buoys, which are crucial for this experiment, may have not worked due to GPS inaccuracy but post treatment is needed to see if it is the case.

Table 3-1 Description of the drone-related operations conducted on the ship

Operation	Date	Position	Duration (min)
Flight test	28/07	77° 20′ 29′′ N 75° 00′ 38′′ W	15
Recording operations	29/07	79° 00′ 9′′ N 72° 19′ 7′′ W	15
Recording operations	30/07	79° 30′ 53′′ N 65° 45′ 47′′ W	15
Recording operations	31/07	80° 22′ 51′′ N 68° 27′ 7′′ W	15
Recording operations	31/07	81° 04 ′ 22′′ N 66° 00′ 29′′ W	45
Recording operations	04/08	79° 47′ 11′′ N 73° 40′ 21′′ W	60
Fracture experiment	05/08	77° 51′ 12′′ N 77° 04′ 31′′ W	90 & 15
Recording operations	08/08	76° 23′ 45′′ N	75 & 20

		84° 34′ 28′′ W	

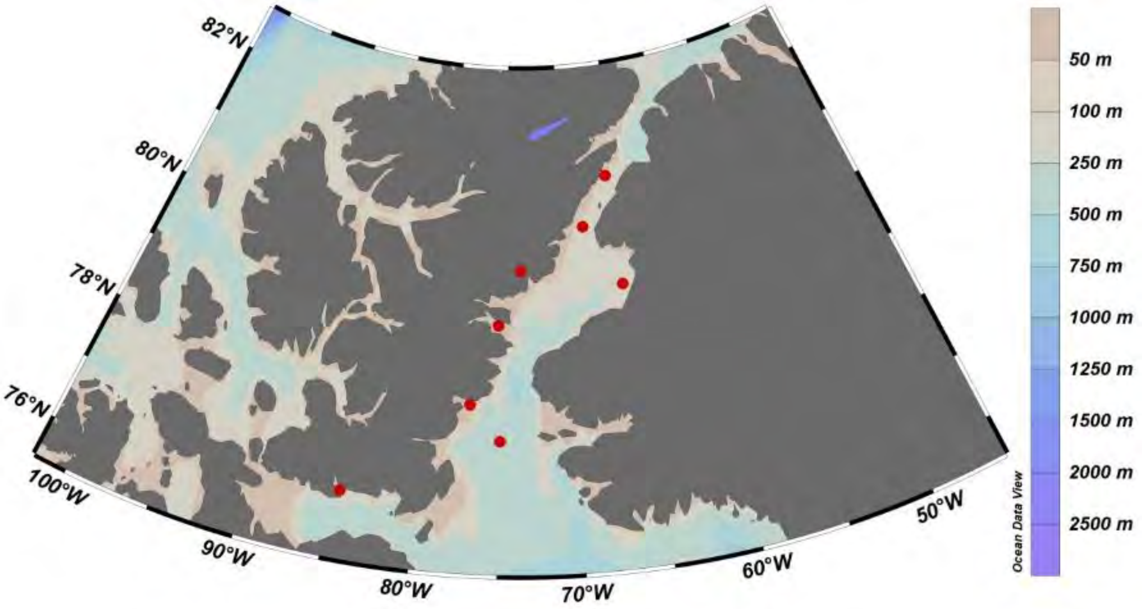

Figure 3-2 Map of the studied area. Positions of drone deployments are indicated in red.

3.3 Preliminary Results

Images of the broken ice sheet shows presence of both regularity, i.e. a preferential size, and irregularity in floe size (Figure 3-3). Preliminary postprocessing of the buoy's data shows that they have in fact recorded the wave's profile (Figure 3-4). Further analysis of the waves buoy's data will help determine wave properties which will then be compared to the observed regularity in floe size. Such a comparison will tell us how important waves are in determining floe size during a fracture event.

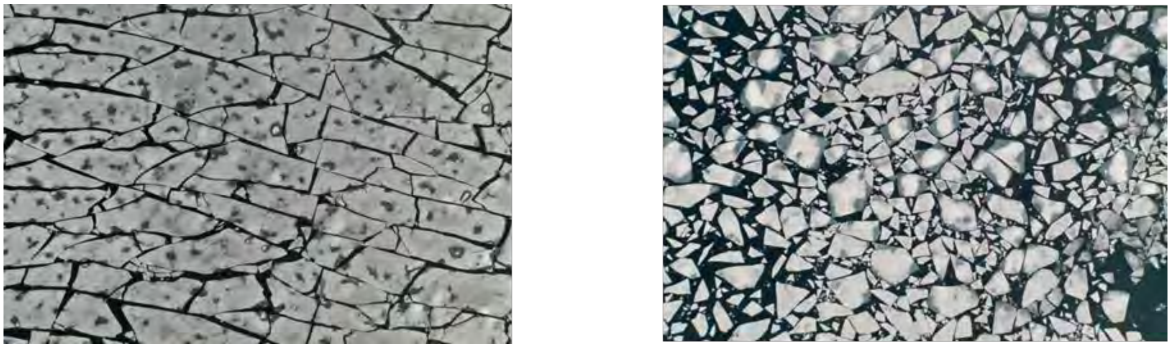

Figure 3-3 Images of the broken ice sheet showing regularity (left) and irregularity (right) in floe size.

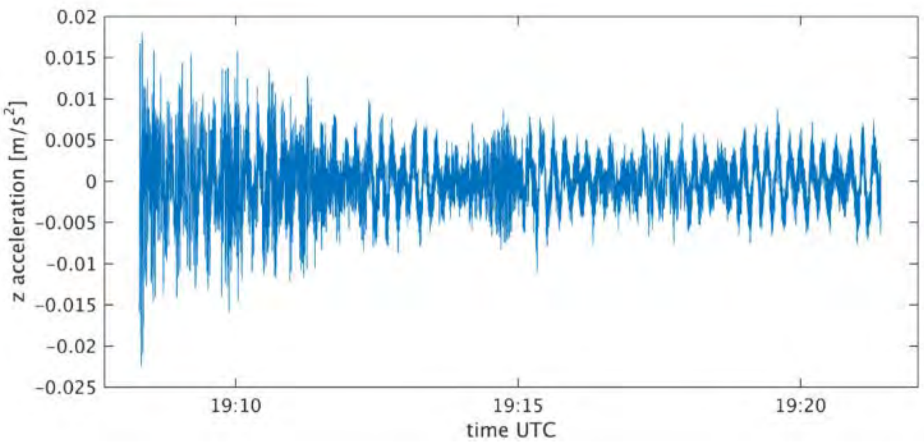

Figure 3-4 Time evolution of a wave buoy's vertical acceleration. Noise is present in the dataset but it will be filtered to show the mean trend.

3.4 Acknowledgment

Sailing onboard of the CCGS *Amundsen* across the northern part of Canada was a truly exceptional experience. The crew members were always curious about, dedicated to and cooperative regarding science operations. Thanks to Jean-Luc Dugal, the commanding officer, for his trust regarding drone-related operations on the ship and to all personnel working at the bridge for the cooperation and their patience. Thanks also to Jean Carlos Montero Serrano and Anne Corminboeuf for finding time for the fragmentation experiment and to Jade Brossard for helping for helicopter camera deployment

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4 Impacts of ice-ocean interactions on marine primary productivity in the Canadian Arctic: A collaboration with Grise Fiord, NU

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Cruise participants – Leg 2b: Megan Roberts[2], Patrick Williams[1]

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4.1 Introduction

Glaciation is one of the most transformative Earth surface processes. When glaciers retreat, they contribute significant quantities of meltwater, ice, fine-grained sediments, and dissolved chemical species to the oceans. Until recently, the physical and biogeochemical impact of these fluxes on the ocean environment remained largely unstudied. Climate change has significantly increased glacial melt and runoff, and glacial fluxes are predicted to grow, as is the export of freshwater and glacially-derived, biogeochemically reactive species to downstream marine environments. The Canadian Arctic Archipelago (CAA) is a key hotspot for such changes: from 2004-2009, CAA glaciers were the third-largest contributor of glacier meltwater to the global ocean (Gardner, Moholdt et al. 2011).

When glacial runoff enters the marine environment, it may stimulate biological productivity by supplying carbon, iron, and other essential micro- and macro-nutrients (Bhatia, Das et al. 2010, Bhatia, Kujawinski et al. 2013). Since peak glacial meltwater inputs occur during summer when primary production is nutrient-limited (Tremblay, Anderson et al. 2015) this stimulation may be particularly significant for the functioning of affected marine ecosystems. At the same time, legacy contaminants trapped in the glacial ice/firn may be released to the oceans in glacial runoff with potentially adverse effects on marine ecosystems (Blais, Schindler et al. 2001, Geisz, Dickhut et al. 2008). To date, no single study has characterized the chemical and biological nature of glacially-derived submarine discharge, the effectiveness of its transport within the marine environment, or its seasonal impact on downstream marine ecosystems.

Our objective to characterize the biogeochemical impact of glacial runoff and meltwater plumes on a regionally productive marine ecosystem that is central to the health of indigenous communities in the CAA. We will (1) characterize glacial runoff from Belcher and Sverdrup glaciers, large marine-terminating glaciers draining the north side of Devon Ice Cap (Devon Is., Nunavut) by sampling supraglacial, ice-marginal and subglacial water sources, and (2) characterize glacial meltwater plumes along a marine transect from their origin at the glacier terminus into Jones Sound and Baffin Bay with ship-based and glider observations mounted from the CCGS Amundsen and sailing vessel The Vagabond. Sampling in Baffin Bay, Nares Strait, and Smith Sound aboard the Amundsen will provide further geographic context, allowing for broader biogeochemical comparisons across the eastern CAA. Belcher and Sverdrup Glaciers are across Jones Sound from Grise Fiord. The surrounding ocean is highly productive, frequented by large groups of marine mammals, and home to traditional hunting grounds of the hamlet of Grise Fiord (Pers. Comm. Jimmie Qaapik, resident of Grise Fiord, NU). Resolving how glacial runoff influences the marine productivity observed by Grise Fiord residents and evaluating how climate change may alter this runoff are our central objectives.

4.2 Methodology

All work was conducted in chemistry lab 553 of the CCGS *Amundsen*. During leg 2b, we obtained five different types of samples (Table 4-1). Water from rosette operations was collected for the analysis of proteins, dissolved organic carbon concentration, fluorescence/absorbance of dissolved organic matter (DOM), metabolites, and oxygen(18) isotopes. Table 4-1 shows a summary of stations, samples collected, and their corresponding depths.

Table 4-1 A summary of samples taken during leg 2B

Stn	**Date**	**Lat**	Long	**Depth**	**Filter End**	**Metabolite, DOC, UV-Vis Depths**	**Metabolite Filter End**	**^{18}O_Depths**
122	7/28/19	77.328	-75.065	0, 35, 70, 170	20:40	0, 35, 70, 170	20:12	10, 20, 30, 35, 50, 60, 70, 70, 80, 100, 125, 170

126	7/29/19	77.353	-73.407	2, 35, 65, 160	10:05	2, 35, 65, 160	10:04	2, 10, 20, 35, 40, 50, 65, 80, 100, 125, 150, 160
129	7/29/19	78.336	-74.147	0, 30, 70, 175	17:00	0, 30, 70, 175	17:49	2, 10, 20, 35, 40, 50, 65, 80, 100, 125, 150, 160
132	7/29/19	79.002	-72.317	0, 47, 170	22:25	0, 47, 170	22:12	10, 20, 30, 40, 47, 60, 80, 100, 125, 150, 175, 180
133	7/29/19	79.577	-70.276	0, 23, 80, 125	3:53	0, 23, 80, 125	3:57	2, 10, 20, 23, 30, 40, 50, 60, 70, 80, 100, 125
136	7/31/19	80.382	-67.602	2, 21, 50, 160	9:30			2, 10, 20, 30, 40, 50, 60, 70, 80, 100, 160
134	7/31/19	80.404	-68.383	2, 25, 40, 200	14:00	2, 25, 40, 200	13:28	2, 10, 25, 30, 40, 50, 60, 70, 80, 100, 125, 200
135	7/31/19	80.439	-68.930	2, 20, 55, 175	22:00	2, 20, 55, 175	21:37	2, 10, 20, 30, 40, 55, 60, 80, 100, 125, 150, 175
137	8/1/19	81.072	-66.008	0, 33, 50, 150	6:10	0, 33, 50, 150	6:13	0, 10, 20, 33, 40, 50, 60, 80, 100, 125, 150, 200
6.4	8/1/19	81.605	-63.474	0, 15, 55, 200	19:35	0, 15, 55, 200	19:09	0, 10, 15, 30, 50, 55, 60, 70, 80, 100, 125, 200
Rob1	8/2/19	81.753	-62.398	0, 30, 160	6:40	0, 30, 160	6:41	0, 10, 20, 30, 40, 50, 75, 100, 150, 160, 200, 325
251B	8/3/19	80.976	-61.354	0, 10, 25, 150	11:00	0, 10, 25, 150	10:34	0, 10, 20, 25, 30, 40, 50, 60, 80, 100, 150, 200
TI	8/5/19	77.837	-77.051	2, 30, 70, 170	12:20	2, 30, 70, 170	11:48	2, 10, 20, 30, 40, 50, 60, 70, 80, 170, 250, 300
117	8/6/19	77.335	-77.040	0, 26, 32, 130	12:25	0, 26, 32, 130	12:21	0, 10, 26, 32, 40, 50, 60, 80, 100, 125, 125, 130

2.5	8/6/19	76.358	-77.506	2, 35, 55, 150	19:35	2, 35, 55, 150	18:44	2, 2, 35, 35, 56, 56, 150, 150, 368
290	8/6/19	76.132	-80.357	2, 29, 38, 140	1:50	2, 29, 38, 140	0:50	2, 10, 20, 29, 38, 50, 60, 70, 80, 100, 125, 140, 150
291	8/6/19	75.996	-80.378	2, 15, 40, 125	3:45	2, 15, 40, 125	3:12	2, 10, 15, 20, 30, 40, 50, 60, 80, 100, 125, 150, 200
292	8/6/19	75.882	-80.416	2, 22, 31, 150	6:50	2, 22, 31, 150	5:25	10, 20, 32, 40, 50, 60, 80, 100, 125, 150, 200, 250
293	8/7/19	75.733	-80.678	2, 7, 20, 120	9:15	2, 7, 20, 120	8:51	2, 7, 10, 20, 30, 40, 50, 60, 70, 80, 100, 120, 125
2.3	8/7/19	76.131	-83.020	2, 15, 32, 140	1:00	2, 15, 32, 140	23:45	2, 10, 15, 20, 30, 40, 50, 60, 80, 100, 125, 140, 150, 200
2.4	8/8/19	76.127	-86.317	2, 26, 35, 140	9:15	2, 26, 35, 140	9:01	2, 10, 20, 25, 30, 35, 40, 50, 60, 70, 80, 100, 125, 140, 150, 200, 300, 400, 600
1.4	8/8/19	76.503	-84.934	2, 5, 35, 100	20:15	2, 5, 35, 100	20:14	2, 5, 10, 20, 30, 35, 40, 50, 60, 70, 80
295	8/8/19	76.377	-84.408	2, 35, 54, 87	3:25	2, 35, 54, 87	2:45	2, 10, 20, 30, 35, 40, 50, 54, 60, 70, 87
297	8/9/19	76.373	-81.299	2, 18, 33, 140	3:05	2, 18, 33, 140	3:23	2, 10, 18, 20, 33, 40, 50, 60, 70, 80, 100, 140, 150, 175, 175, 200, 300
296	8/10/19	75.524	-79.749	2, 26, 40, 140	16:00			2, 10, 20, 30, 40, 50, 60, 80, 100, 125, 150, 200, 300, 400
2.7	8/10/19	75.482	-78.635	2, 33, 50, 150	23:55			2, 2, 33, 35, 50, 50, 75, 100, 150, 515
302	8/11/19	74.235	-86.185	0, 33, 40, 140	3:00			2, 10, 20, 30, 33, 40, 50, 60, 80, 100, 125, 140, 150, 200, 300, 400

303	8/12/19	74.374	-89.626	2, 30, 48, 150	14:10			2, 10, 20, 30, 30, 40, 48, 60, 80, 100, 125, 150, 175, 200
305_A	8/12/19	74.222	-93.508	2, 33, 50, 146	0:05			2, 10, 20, 30, 40, 50, 60, 70, 80, 100, 125, 146
305_B	8/12/19	74.363	-93.529					2, 10, 20, 25, 30, 40, 50, 60, 70, 80, 100, 125, 158
305_C	8/13/19	74.480	-93.664					2, 10, 20, 30, 34, 40, 50, 60, 70, 80, 100, 125, 160
Wel01	8/13/19	74.951	-92.399					2, 10, 20, 30, 35, 40, 50, 60, 70, 80, 100, 125, 144
Wel02	8/13/19	75.021	-93.118	2, 25, 50, 150	16:40			2, 10, 20, 25, 30, 40, 50, 60, 70, 80, 100, 125, 150, 200
305_D	8/13/19	74.597	-93.720	2, 25, 45, 100	3:45			2, 10, 20, 25, 30, 40, 45, 50, 60, 70, 80, 100, 111

4.2.1 *Protein Filtration*

At each station, water is collected at 4 depths in 10L jerrycan containers from the relevant niskin bottle on the rosette. Depths are chosen based on areas of high primary productivity. The chla fluorescence profile is observed on the CTD's decent to help decide on the appropriate depths. On the occasion of high volume demands for surface water on the rosette, surface water would be sampled using stainless steel buckets over the side of the ship. The water is then filtered through tygon tubing fitted with two filter holders containing 0.2 µm and 3.0 µm omnipore PC filters using a peristaltic pump (Figure 4-1). Output water is collected to measure and record the volume filtered. Once water is done filtering, the filters are folded with biomass facing inwards and transferred to a 20mL cryotube and stored in a -80 freezer. All filter tubing was rinsed with MilliQ water between stations and charged with over 200mL of sample water before inserting filter. Tubing was also washed with 3% HCl on occasion, approximately every 10 stations.

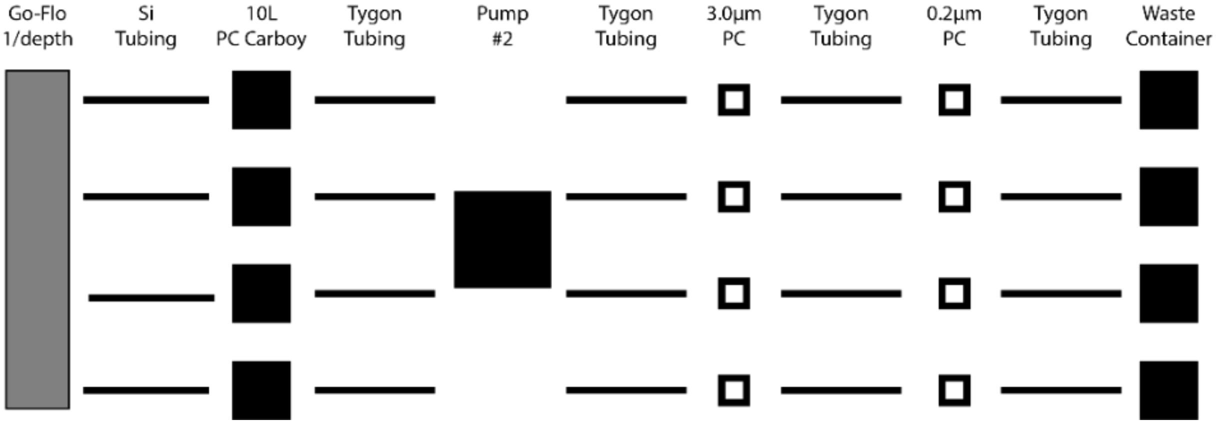

Figure 4-1 Schematic of protein filtrations set-up.

4.2.2 *Metabolites/DOC/UV-Vis*

Seawater from the Rosette and surface are collected in 4L high density polycarbonate bottles and filtered progressively, using Teflon lines and filter holders, through 2.7µm GF/D and 0.2µm PTFE, hydrophilic OmniPore filters with a peristaltic pump (Figure 4-2). All tubing was rinsed with MilliQ before each filtration and with at least 200mL of sample before collecting 4L of filtrate.

Used filters are stored at -80ºC with the filter cell side folded inward. 40mL of 0.2µm filtrate is stored in combusted amber glass EPA vials at 4ºC and kept in the dark for fluorescence/absorbance analysis of DOM. The remaining filtrate is acidified with 12M optimum grade HCl to a pH of 2-3. 40mL of this acidified filtrate is stored in combusted amber glass EPA vials at 4ºC and kept in the dark for analysis of dissolved organic carbon (DOC).

Using a glass-block filtration manifold, vacuum pump, and PTFE tubing, the remaining filtrate (roughly 4L) is passed through a PPL cartridge pre-conditioned with one cartridge volume of 100% methanol. Flow rate is kept below 40mL/min. Once the entire 4L passes through the PPL, the cartridge is rinsed with four cartridge volumes of 0.01M HCl and dried for 5 minutes with the vacuum on. The vacuum is turned off, a combusted 8mL amber vial is placed under the PPL, and eluted with one cartridge volume of 100% methanol. Samples are stored at -20ºC for analysis via high-sensitivity LCMS.

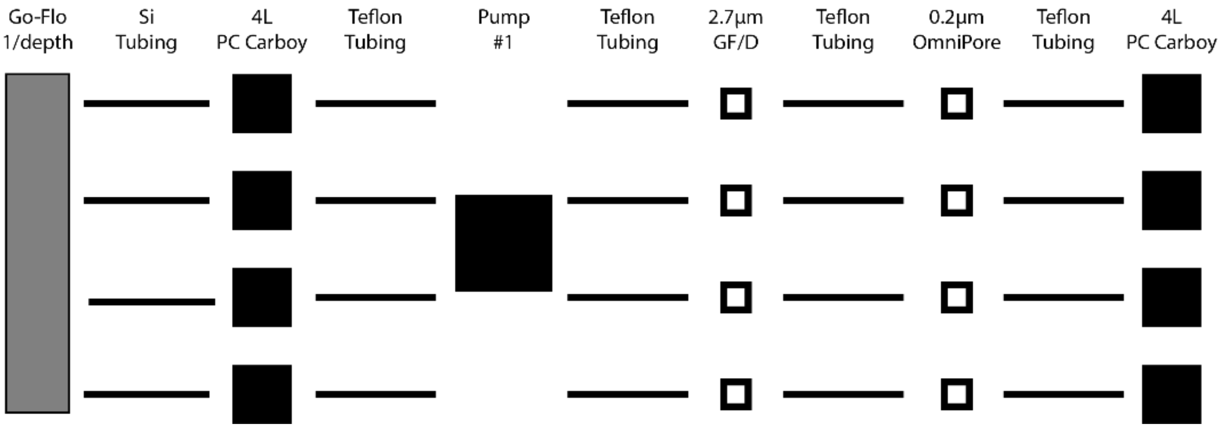

Figure 4-2 Schematic of the peristaltic filtration apparatus for Metabolites/DOC/UV-Vis.

4.2.3 *Oxygen Isotope*

Samples for oxygen(18) isotope analysis were taken directly from the rosette or the surface and stored in 20mL HDPC scintillation vials. Bottles were filled, taking care to ensure there were no air bubbles. Lids were then sealed with electrical tape.

4.3 **Preliminary Results**

All water filtered and collected during leg 2b will be analyzed upon the CCGS *Amundsen's* return to Quebec City. We currently have no preliminary results to report.

4.4 **Acknowledgment**

Firstly, a massive thanks to Pascal, Lou, Thomas and the entire rosette crew – it's just a pity you all only started playing music on week 3. Jean-Carlos Montero-Serrano's work leading the scientific portion of Leg 2b was nothing short of heroic, and we owe our success on this leg to him. We also acknowledge the constant and ever-patient help of the Amundsen Crew, who made this whole shindig happen, regardless of how many times we were accidentally underfoot. And finally, a big shout-out to Tim Rodgers and Jesse Fransisco for their aid in the near-perfect execution of several sub-sonic kinetic launches of their surface sampler – when there was no room at the Rosette, their buckets could always be relied upon.

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5 Integrated Studies and Ecosystem Characterization of the Labrador Sea Deep Ocean (ISECOLD)

Project leaders: David Cote[2] (David.Cote@dfo-mpo.gc.ca), Max Geoffroy[3], Owen Sherwood[4], Barbara Neves[2], Annie Mercier[5], Casey Hubert[6], Dmitry Dukhovskoy[7] and Johanne Vad[8]

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5.1 Introduction

The Government of Canada has committed to protecting 10% of Canada's marine and coastal areas by 2020 as part of its commitment to achieve international (the Convention on Biological Diversity 2011 20 Strategic Plan for Biodiversity's Aichi Targets) and domestic (2020 Biodiversity Goals and Targets for Canada) biodiversity conservation goals. In 2017, a three-year study was initiated for a deep offshore portion of the northern Labrador Sea that was under consideration for a large offshore MPA. From an oceanographic perspective, the area is well studied and of global significance as it is one of the few areas of the world where deep-water convection occurs. However, at depths beyond 750 m, virtually no data was available regarding the biota. Consequently, the Integrated Studies and Ecosystem Characterization of the Labrador Sea Deep Ocean (ISECOLD) was initiated. A CSAS meeting in 2017 (Cote et al. 2018) highlighted the need for characterization efforts related to benthic and pelagic communities, demersal fish communities, seabed mapping and habitat characterization and seabird and marine mammal observations. The Amundsen 2019, Leg 1B Expedition extends collections conducted in 2018 (Amundsen Leg 2C) and addresses these target areas with the exception of demersal fish; a program component for which an alternative vessel and sampling techniques are required. In addition to the scientific objectives of DFO, Leg 1B addresses the scientific objectives of several key academic, government, Indigenous and international collaborators.

The 2019 program (June 23-July 5, 2019) features many elements of the 2018 program including drop camera surveys, box core collections, Isaac Kidd Midwater Trawls, Hydrobios plankton sampling, various hydro-acoustic assessments (WBAT, EK60), water collections, bottom mapping, visual observations of marine mammals and seabirds, and the deployment and retrieval of environmental sensors on moorings/landers. While the ROV program was not conducted in 2019, the program was supplemented by rock dredge collections and Moving Vessel Profiler surveys of oceanographic fronts. Furthermore, the 2019 program includes surveys of more southerly areas of the study zone, previously sampled during fish characterization cruises in 2017 and also includes follow up visits to targeted areas characterized in 2019. In total, 102 operations were planned for Leg 1B, of which over 95% were accomplished. Program elements, their rationale, methods and preliminary results (where possible) are highlighted in greater detail below.

5.2 Methodology

5.2.1 *Drop Camera*

Drop cameras are a useful tool to characterize benthic fauna and habitat. The drop camera was deployed routinely at stations along two transects in addition to a few additional stations that were mapped with multibeam sonar in 2018. The drop camera was used in 2019 to: 1. To extend the study extent further south along the Labrador shelf and slope across a depth gradient (500m-2500m); 2. Characterize benthic fauna at targeted ridge and canyon habitats surveyed in 2018; 3. Survey a station to characterize sponge distribution at a shallow site (~350

m) on the shelf for ATLAS (A trans-Atlantic assessment and deep-water ecosystem based spatial management plan for Europe) collaborators; and 4. To test a malfuntioning HIPAP sensor. This section describes activities related to the drop camera for the ISECOLD project (objectives 1 and 2).

The deep-sea camera system was comprised of two cameras (a SubC deep-water camera and Sony 4K camera), LED lights and a HIPAP sensor, which were attached to a box core frame (Figure 5-1). The latter was used to provide the camera team with the real-time data of the camera position (relative to the vessel) as well as exact position of the camera relative to the seabed. Specific GPS coordinates of sampling stations for drop camera surveys can be seen in Table 5-1.

A modified box corer apparatus containing the drop camera setup was attached to a winch cable system and lowered from the vessel at 80 m/min. When the drop camera was within ~50 m from the last reported depth, it was lowered at 20 m/min until it touched bottom. The camera lead would communicate if the drop camera was on the seabed via observation of the HIPAP software but generally the deckhand operating the winch could determine if the camera was on bottom by examining the tensiometer on the winch, which would show a drop in tension when the drop camera system touched the bottom. From there on, a "yo-yo" method was employed whereby the camera would be raised ~2 m off the bottom (as measured by the length of winch cable retracted), and dropped on the bottom again, and this procedure was repeated for 30-40 minutes.

A record was kept of the time of the camera deployment, time on bottom, time removed from bottom, and time that the camera was lifted back on the deck. Once the camera was back on deck, the camera apparatus was rinsed with fresh water, removed from the box core frame, and taken to the foredeck lab to have the video footage from both the SubC camera and the Sony 4K camera downloaded and saved to an external hard drive. Drop camera footage was also used to inform the suitability of bottom habitats for other sampling devices (e.g. box corer).

Fourteen drop camera deployments were conducted during Leg 1B of the 2019 Amundsen Expedition, which will be analyzed for the ISECOLD project. Footage from the SubC drop camera has been preliminarily viewed for all sampling stations. Technical difficulties related to off-loading and viewing recorded video from the SubC camera system beyond ISECOLD 1-2000 station required the remaining stations to be viewed for the Sony camera only. Also, another Sony camera was installed in the camera box to get supplementary downward facing footage in some later stations.

Camera deployments were successful though some deployments were challenged by the camera view being obscured by sediment plumes, and ocean swell causing the camera to move too fast or high off the seabed. However, there were a few stations which provided very good observational conditions. There were also issues with the HIPAP signal beyond 1500 m depth and associated HIPAP data was lost in the deep stations. Drop camera surveys for the ISECOLD project ranged in depth from 369 to 2,494 m. In general, the sampling stations that occurred on hard bottom tended to have higher epifauna productivity in comparison to the soft bottom stations as observed by the abundance and distribution of marine megafauna/flora from those drop camera video transects. Transect 1 was typically soft bottomed but had the unique characteristic of more dropstones and hard substrate, with increasing depth, which will allow for a valuable comparison to last year's transect. Stations on Transect 2 by comparison were mainly soft bottom with few large rocks or boulders except for the shallow (ISECOLD 2-500) and more intermediate (ISECOLD 2-1500) sampling depths. The revisited stations for the northern 2018 transect (HiBio-B and DFO-1200) and the ATLAS station (Sponge 4) were primarily hard bottom.

Generally, anemones, urchins, sponges, corals, and brittle stars tended to dominate the epifauna of several soft bottom sites as well as the majority of hard bottom sites (Table 5-2; Figure 5-2). There were many different species of sponges (e.g. Geodia sp., Asconema sp.) and corals (Anthoptilum sp., Anthomastus sp., Acanella sp.) encountered throughout the study, however many more coral and sponge species remain to be identified in the aftermath of this survey. These taxa were observed out to the deepest sites surveyed (~2500m).

Fish species were also encountered during the survey. The primary species identified were grenadier and blue hake and other yet to be identified fish species were also observed. Cephalopods, including species of squid and octopus were seen in some video transects, and two decapod species (crabs and squat lobsters) were also sighted at some sampling stations. Other organisms (some shown in Figure 5-2 to Figure 5-4 for ISECOLD Transects 1 and 2, and the ATLAS Transect respectively) that were observed throughout the sampling period include: Greenland Halibut, anemones, sea stars, corals (including unidentified gorgonian corals, sea pens, soft coral, black-wire coral), Polymastia sp. sponges (and other unidentified species of sponges), large urchins, eels, eelpout, skates, benthic siphonophore, crinoids, gastropods tunicates, and bryozoans.

Figure 5-1 The drop camera system attached to a modified box core frame utilized in Leg 1b of the 2019 Amundsen Expedition

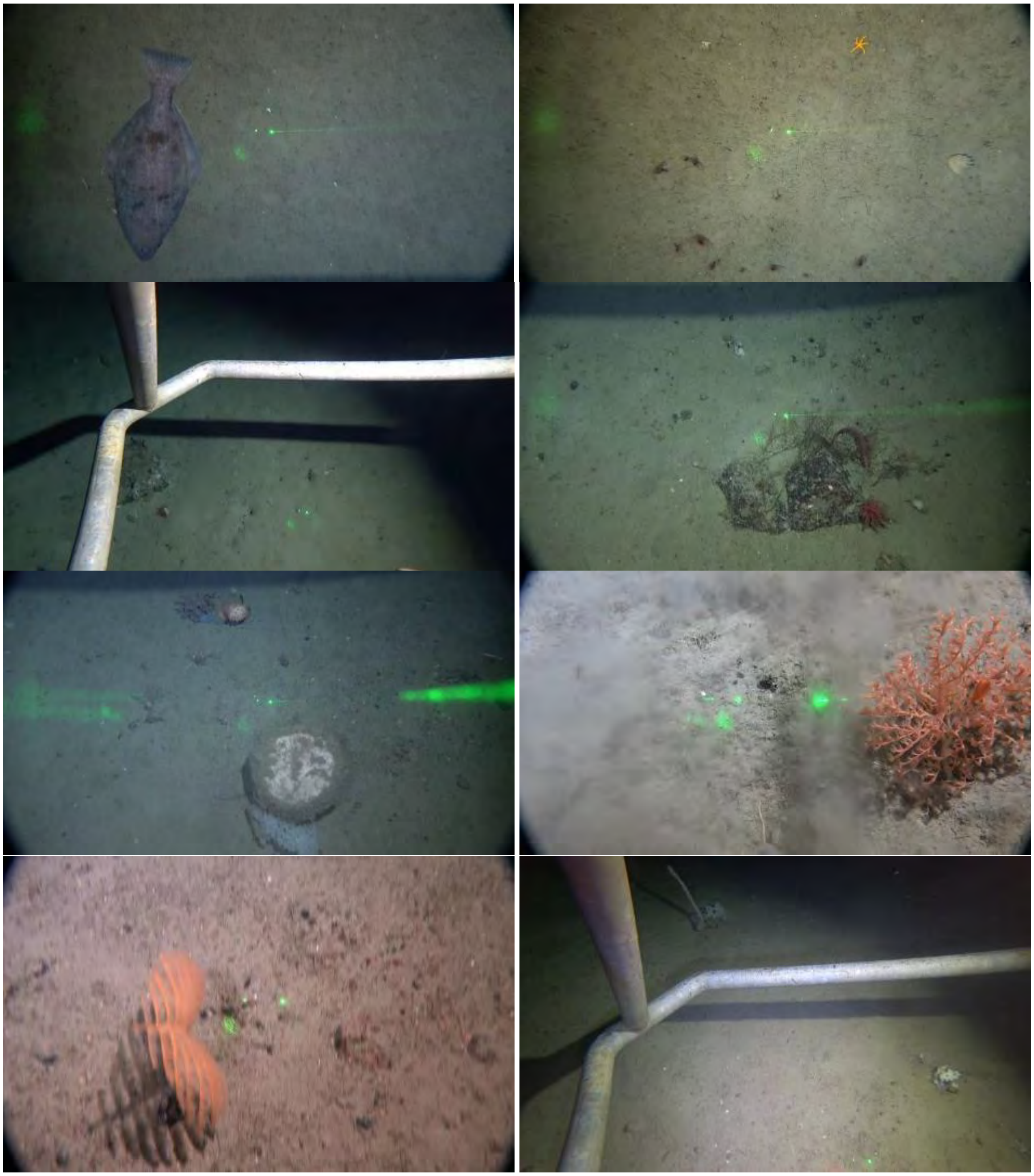


Figure 5-2 Photo captures of drop camera video from stations on ISECOLD 1 video transects

A: Greenland Halibut (ISECOLD 1-500); B: Dominant Anemone, seas star and Polymasta sp. (ISECOLD 1-500); C: Anemone and Soft coral? (representative photo of bad video quality) (ISECOLD 1-1000); D: Mushroom coral, Blue Hake and possibly dead Black-wire coral (ISECOLD 1-1500); E: Geodia sp., unidentified sponge (Lissodendoryx?), anemone, soft coral, Hymedesmia sp. (ISECOLD 1-1500); F: Acanella arbuscula. (ISECOLD 1-1500); G: Black-wire coral (Antipatharian, probably Bathypathes sp.) (ISECOLD 1-2000); H: Bamboo coral and unidentified sponges (ISECOLD 1-2500).

Figure 5-3 Photo captures of drop camera video from stations on ISECOLD 2 video transects.

A: Redfish, grenadier, and seapen (ISECOLD 2-500); B: Asconema sp. sponge with crinoid (ISECOLD 2-500); C: Mushroom coral (possibly Anthomastus sp. and/or Heteropolypus sp.) (ISECOLD 2-1000); D: Glass sponge and soft coral (ISECOLD 2-1500); E: Various sponges and anemone (ISECOLD 2-1500); F: Geodia sp. sponges (ISECOLD 2-1500); G: Blue hake (ISECOLD 2-2000); H: Skate sp. (ISECOLD 2-2500). Note: Photos A and B acquired from downward-facing Sony camera. Photos C – H acquired from side-mounted Sony camera.

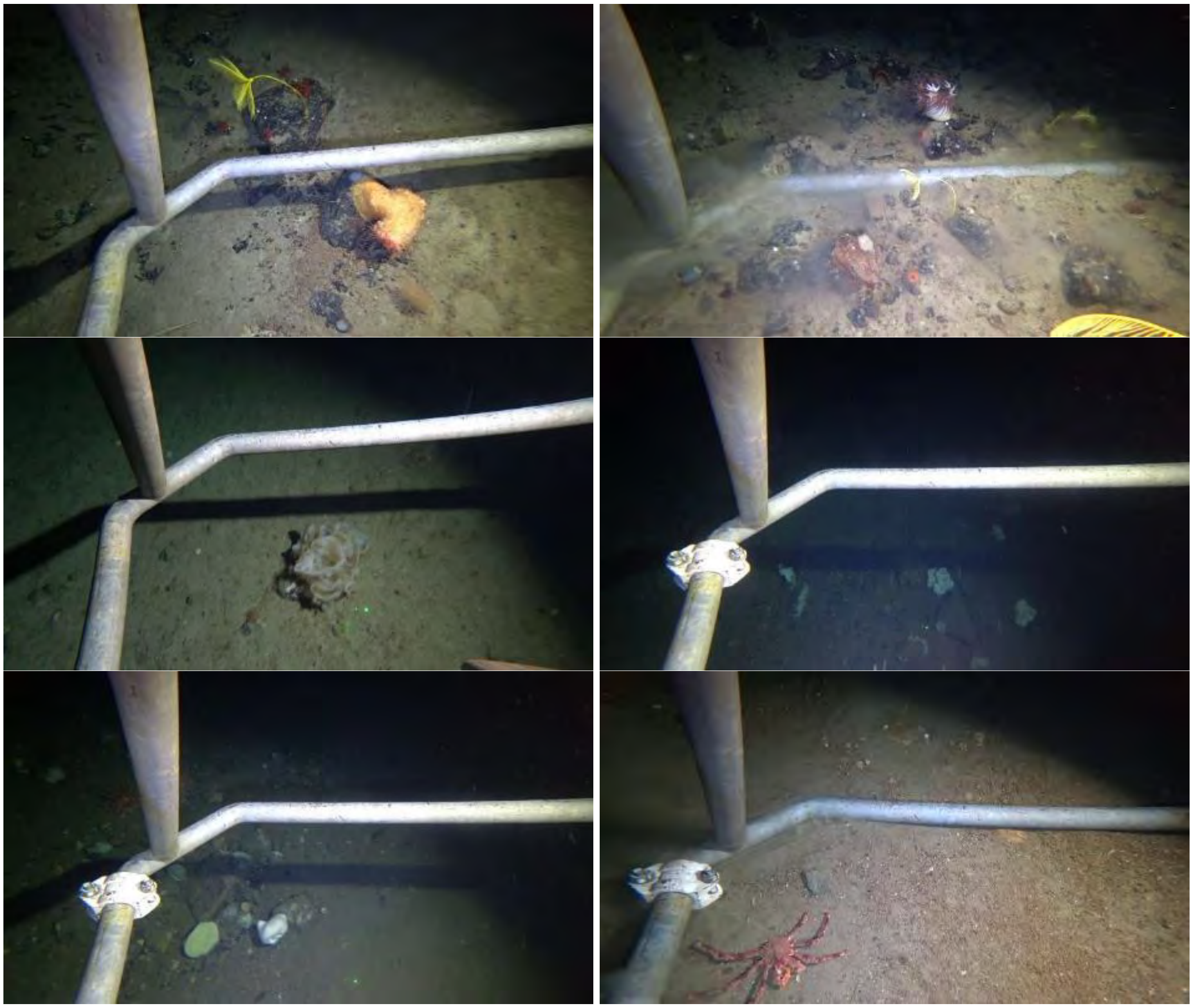


Figure 5-4 Photo captures of drop camera video from revisited ISECOLD 2018 stations (HiBio-B and DFO-1200) and ATLAS station (Sponge 4) video transects.

A: Stalked crinoid (possibly *Hyocrinus* sp.), anenome, and potentially *Acanella arbuscula* (HiBio-B); B: Crinoids, anenomes, and *Anthoptilum* sp. (HiBio-B); C: Sponge (*Asconema* sp.) and *A. arbuscula* (DFO-1200); D: Various sponges (Sponge-4); E: *Geodia* sp. and various sponges; F: Crab (Sponge-4).

Table 5-1 List of Drop Camera Sampling Stations for Leg 1B of the 2019 Amundsen Expedition

Station ID	**GPS Coordinates on**	**GPS Coordinates on Bottom**	**Date**	**Time Deployed**	**Approximate Time on Bottom**	**Approximate Bottom Depth (m)**
ISECOLD 1-500	57.7068835, 59.5290038	57.7030288, 59.5275508	25/06/2019	10:28:51	30	591
ISECOLD 1-1000	57.7100253, 59.3740387	57.7053722, 59.3706400	26/06/2019	23:24:19	30	1,038
ISECOLD 1-1500	57.7191068, 59.0786512	57.7117585, 59.0684750	26/06/2019	11:24:02	37	1,513
ISECOLD 1-2000	57.7259615, 58.6891100	57.7203665, 58.6675213	27/06/2019	02:02:42	36	2,030
ISECOLD 1-2500	57.7406145, 57.8818823	57.7434900, 57.8829188	28/06/2019	05:35:29	35	2,494
ISECOLD 2-2500	58.9054073, 58.8485567	58.8994120, 58.8509968	28/06/2019	16:02:59	42	2,393
ISECOLD 2-2000	58.8454638, 59.3721752	58.8405242, 59.3837662	29/06/2019	09:19:06	41	1,936
ISECOLD 2-1500	58.8186780, 59.6736115	58.8127792, 59.6800665	30/06/2019	22:52:46	40	1,689
ISECOLD 2-1000	58.7832133, 59.9260380	58.7795398, 59.9243578	30/06/2019	09:45:33	36	984
ISECOLD 2-500	58.7739433, 60.0435330	58.7695830, 60.0493267	30/06/2019	19:45:41	30	536
DFO-7 (HiBio B)	60.4754100, 60.3834953	60.4765185, 60.3979660	01/07/2019	19:23:21	31	1,854
DFO-1200	60.4506983, 61.0166160	60.4513527, 61.0010560	03/07/2019	00:01:45	40	1,213
Sponge 4	60.4642737, 62.1262203	60.4692672, 62.1333895	03/07/2019	16:52:21	30	369

Table 5-2 General Description of Drop Camera Sampling Stations by Bottom Depth, Bottom Type, Video Quality, Biological Productivity, and Megafauna/flora observed from preliminary observation of Drop Camera Footage for Leg 1b of the 2019 Amundsen Expedition.

#	Station ID	Bottom Depth	Bottom Type	Video Quality	Biological Productivity	Megafauna/flora observed
1	ISECOLD1-500	591 m	**Soft bottom**; muddy sediment; very few small pebbles; very few medium and	**Poor:** Visibility was poor due to rough seas and sediment plumes and camera height off bottom	**Low:** Very low diversity and abundances of organisms and sparse distribution throughout video transect.	**Dominant organisms:** Anemones. **Other organisms observed:** Polymastia and other sponge species, sea star, flat fishes, Greenland
2	ISECOLD 1-1000	1,038 m	**Soft bottom**; muddy sediment; very few small pebbles; very few medium and large rocks/boulders.	**Poor:** Visibility was poor due to rough seas and sediment plumes and camera height off bottom were very poor and often	**Low:** Very low diversity and abundances of organisms and sparse distribution throughout video transect.	**Dominant organisms:** Urchins and anemones. **Other organisms observed:** brittle stars, squid, eel, and unidentified fish.
3	ISECOLD 1-1500	1,513 m	**Soft bottom**; muddy bottom with many small rocks, pebbles, cobble, with some medium/large rocks and boulders throughout.	**Good:** Visibility and camera height off bottom were adequate.	**Medium:** High diversity though low abundances of organisms and sparse distribution throughout video transect.	**Dominant organisms:** Corals (*Acanella arbuscula*., Soft coral and sea pens), sponges (including *Geodia* sp.) and anemones. **Other organisms observed:** Anemones, sponges (*Asconema* sp., vase sponge and unidentified), yellow gorgonian coral, blue hake, unidentified fishes, sea stars, and brittle stars.

4	ISECOLD 1-2000	2,030 m	**Soft bottom**; many small rocks, pebbles, cobbles, with medium and large rocks/boulders throughout.	**Good:** Visibility and camera height off bottom were adequate.	**Low:** Low diversity and abundances of organisms and sparse distribution throughout video transect.	**Dominant organisms:** Brittle stars. **Other organisms observed:** Sponges (*Geodia* sp., glass sponges, and other unidentified sponges), corals (sea pens, *Acanella arbuscula*, soft coral, Black-wire coral), sea cucumbers, crab, and unidentified fish.
5	ISECOLD 1-2500	2,494 m	**Soft bottom**; muddy sediment, some medium and large rocks/boulders	**Poor:** Visibility good but camera height off bottom was poor and the camera touched bottom very few	**Low:** Very low diversity and abundances of organisms and sparse distribution throughout video transect	**Dominant organisms:** Yellow, round sponge (possibly *Craniella* sp.) **Other organisms observed:** Bamboo coral and unidentified sponges
6	ISECOLD 2-2500	2,393 m	**Soft bottom**; muddy sediment, very few medium and/or large rocks/boulders.	**Poor:** Camera contact mainly on bottom with no movement, dragging along bottom, or too high in water column due to	**Low:** Very barren site overall. Low diversity and abundances of organisms and sparse distribution throughout video	**Dominant organisms:** N/A. **Other organisms observed:** Sponges (*Asconema* sp., and other unidentified sponges), skate sp., blue hake
7	ISECOLD 2-2000	1,936 m	**Soft bottom**; muddy sediment, very few medium and/or large rocks/boulders.	**Good:** Visibility and camera height off bottom were adequate.	**Low:** Fairly barren site overall. Low diversity and abundances of organisms and sparse distribution throughout video transect.	**Dominant organisms:** N/A. **Other organisms observed:** Corals (*Acanella arbuscula* and unidentified soft corals), sponges (*Asconema* sp., sea pens, glass sponges, and other unidentified sponges), anemones, sea stars, benthic siphonophore, urchins, skate sp., blue hake, grenadier sp., crinoid sp.

8	ISECOLD 2-1500	1,689 m	**Variable bottom type**; muddy, silty sediment initially which changed with slope to a harder bottom with many	**Medium:** Difficulty determining bottom, however visibility and camera height off bottom were adequate in portions of the video.	**Medium-High:** Wide diversity of organisms with an intermediate abundance and moderate distribution throughout video transect.	**Dominant organisms:** Corals (sea pens, and unidentified soft corals and gorgonians) and sponges (*Geodia* sp., *Asconema* sp., glass sponges, and other unidentified sponges). **Other organisms observed:** Anemones, sea
9	ISECOLD 2-1000	984 m	**Soft bottom**; muddy sediment, some small rocks, few medium and/or large rocks/boulders.	**Good:** Visibility and camera height off bottom were adequate.	**Medium:** Moderate diversity and abundance of organisms with moderate distribution throughout video transect.	**Dominant organisms:** Corals (*Anthomastus* sp. and/or *Heteropolypus* sp., *Acanella arbuscula* and unidentified soft corals and gorgonians), sponges (*Asconema* sp., and other unidentified sponges), and urchins. **Other organisms observed:** Sea stars, anenomes, eel, eelpout, unidentified fish species, and squid.
10	ISECOLD 2-500	536 m	**Hard bottom**; gravel/sandy/silty sediment, some medium and/or large rocks/boulders.	**Good:** Visibility and camera height off bottom were adequate.	**Medium:** Moderate diversity and abundance of organisms with moderate distribution throughout video transect.	**Dominant organisms:** Grenadier sp., tunicates, anenomes, and squat lobsters. **Other organisms observed:** Corals (*Anthomastus* sp., sea pens, and unidentified soft corals and gorgonians), sponges (*Asconema* sp., and other

11	B (DFO- 7)	1,854 m	**Hard bottom**; gravel/sandy/silty sediment, many medium and/or large rocks/boulders. Sloping	**Good:** Visibility and camera height off bottom were adequate.	**Medium:** Moderate diversity and abundance of organisms with moderate distribution throughout video transect.	**Dominant organisms:** Grenadier sp., crinoids, corals (*Antomastus* sp., *Acanella arbuscula*, sea pens, and other soft corals and gorgonians). **Other organisms observed:** Anenomes, brittle stars, sponges
12	DFO-1200	1,213 m	**Hard bottom**; gravel/sandy/silty sediment, very few medium and/or large rocks/boulders.	**Poor:** Camera height was high off the bottom and into the water column for the majority of the video. Difiiculty finding bottom.	**Low:** Overall diversity of organisms moderate however abundances low and sparsely distributed in available bottom video.	**Dominant organisms:** N/A. **Other organisms observed:** Anenomes, brittle stars, sponges (*Geodia* sp., *Asconema* sp., glass sponges and other unidentified sponges), corals (Paragorgia arborea and
13	Sponge 4	369 m	**Hard bottom**; gravel/sandy/silty sediment, many medium and/or large rocks/boulders.	**Medium:** Difficulty determining bottom, however visibility and camera height off bottom were adequate in portions of the video.	**Medium-High:** Moderate diversity of organisms with a high abundance and moderate distribution throughout video transect.	**Dominant organisms:** Sponges (*Geodia* sp., *Asconema* sp. and other unidentified sponges), anenomes. **Other organisms observed:** Grenadier, crab, crinoids

5.2.2 *Box Coring*

Box core samples were collected to characterize the sediment grain size and associated benthic infaunal community along a depth gradient from 500 m to 2500 m water depth. Personnel involved in the collection of box core samples include Erin Herder (DFO, Newfoundland), Margaret Cramm (University of Calgary), Rebecca Evans (Memorial University) and Janet Ferguson-Roberts (Memorial University).

Samples collected by DFO-NL include 200 mL of sediment for grain size characterization and sediment from half of each box core to a depth of 15 cm to characterize the infaunal benthic community. Core-top sediments were collected from the undisturbed top 1-cm surface of each box core and stored at -20ºC for stable carbon isotope of amino acids (δ13CAA) by Shaomin Chen at Sherwood's Stable Isotope Biogeochemistry Lab (Dalhousie University). These results will allow an estimation of the relative contribution of phytoplankton and sea ice algae to export production and to characterize the spatial variability of δ13CAA signatures of export production in the Labrador Shelf. The Hubert lab at the University of Calgary collected surface sediment from the box core and stored them at -80°C for future DNA extraction of the surface sediment microbial community. Microbial community analysis is intended to support the GENICE* assessment of hydrocarbon-degrading microbial communities in the Canadian Arctic and sub-Arctic. Additionally, the top 10 cm of the sediment surface was collected and stored at 4°C for microbial germination of thermophilic endospore-forming bacteria which have previously been found in Arctic sediments and may be associated with the deep-to-surface movement of geologic fluids. Fisheries and Oceans (DFO), St. John's, NL collected surface sediment samples on behalf of the Centre for Environmental Genomics Applications for eDNA analysis. Three replicates of approximately 5 g each of undisturbed sediment surface were collected and sediment samples were placed in clean labelled Whirl-pak bags and immediately frozen at -20°C. The Mercier Lab (Memorial University) collected deep sea phyla for opportunistic investigations of reproduction, biodiversity, and feeding ecology. Phyla sampled included poriferans, cnidarians, annelids, molluscs, echinoderms, and bryozoans. Sediment samples collected by the Mercier Lab will be used for stable isotopes, lipids, DNA barcoding, and eDNA analysis.

The box core was lowered to the sea bottom at a rate of 50 m per minute. Once close to the bottom, the rate of descent was slowed to 30 m per minute. Once each boxcore was back on-board the vessel, a photograph was taken of the surface of the box core. Environmental DNA (eDNA) samples were collected first to reduce the chance of contamination and the samples were immediately frozen. The remaining sediment samples were then collected and lastly, half of the box core was collected and retained for biota. This sample was sieved over a 0.5 mesh screen and all organisms were retained. Samples were fixed in 10% formalin for 24 hours before being transferred to 70% ethanol for preservation. A summary of the stations sampled can be found in Table 5-3.

Table 5-3 Summary of sample stations where samples were collected by box core

Station	Date	Depth (m)	Latitude (DD)	Longitude (DD)	Successful/ Unsuccessful
ISECOLD-1-500	25/6/19	583	57.7021558	-59.5283480	Successful
ISECOLD-1-1000	26/6/19	1010	57.7140428	-59.3795900	Successful
ISECOLD-1-1500	26/6/19	1474	57.7202133	-59.0831135	Successful
ISECOLD-1-2000	27/6/19	1981	57.7295857	-58.6936458	Unsuccessful attempt. Cable wire wrapped around boxcore causing non-closure.
ISECOLD-1-2500	28/6/19	2492	57.7406032	-57.8813743	Successful
ISECOLD-2-500	30/6/19	527	58.7742730	-60.0474715	Successful on second attempt.
ISECOLD-2-1000	30/6/19	1038	58.7868608	-59.9300187	Successful
ISECOLD-2-1500	30/6/19	1496	58.8196233	-59.6731710	Successful
ISECOLD-2-2000	29/6/19	1937	58.8468195	-59.3684132	Successful
ISECOLD-2-2500	28/6/19	2395	58.9069095	-58.8513527	Successful
HiBio-B	2/7/19	1914	60.4754512	-60.3748297	Successful

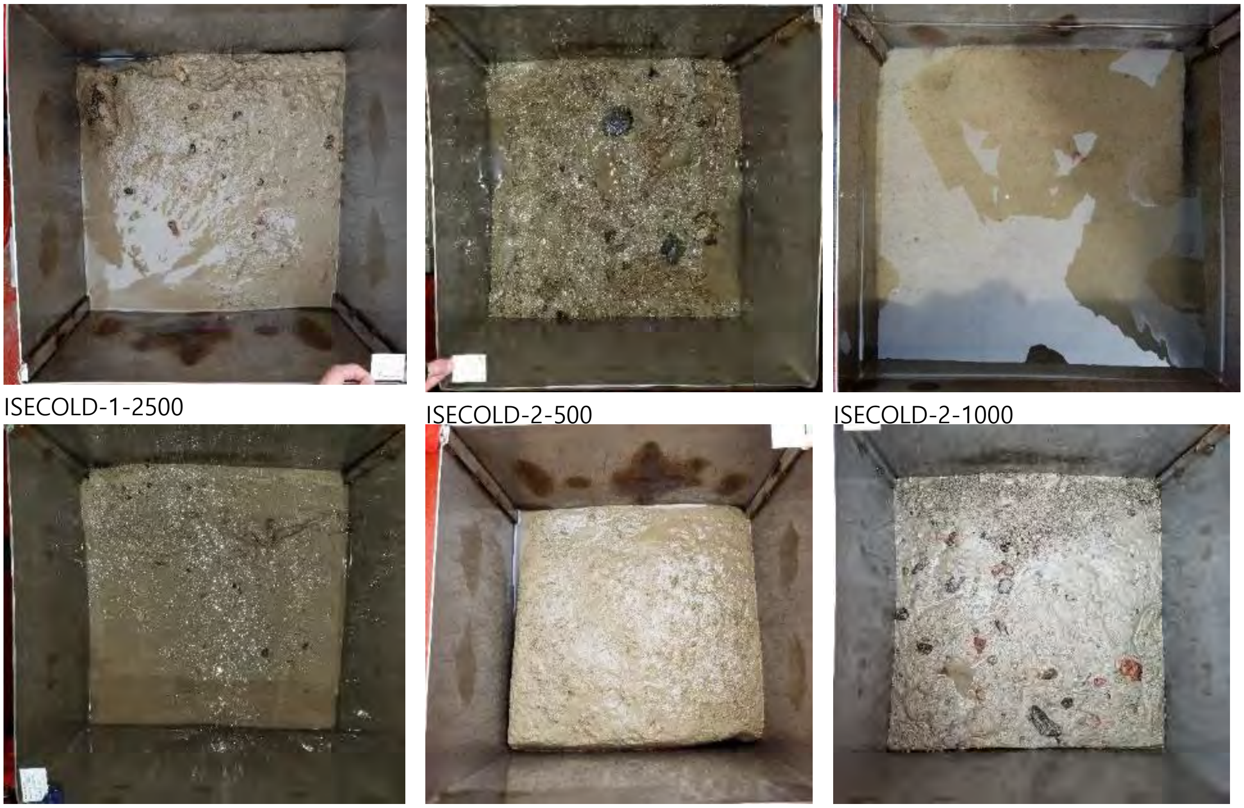
Box core samples were successfully collected at 9 of 10 stations sampled ranging in depths from 500 m to 2500 m along the two ISECOLD transects. Overall, the sediments in the box core samples ranged in consistency from very fine mud to muddy gravel (Figure 5-5).

ISECOLD-1-500 consisted of fine, sticky mud. Biota observed in this sample included polychaetes and their tubes, small bivalves and formainifera. The sediment at ISECOLD-1-1000 was a similar consistency with the surface of the boxcore housing hydroids and one small brittle star. ISECOLD-1-1500 was much more gravelly and the surface sediments contained a tunicate, encrusting sponge, and hydroids on some of the large rocks. ISECOLD-1-2000 was unsuccessful as the box core did not close due to cable wrapped around the box core. Re-deployment was not possible at this site due to time restrictions. ISECOLD-1-2500 contained small sponge fragments, polychaetes, bryozoan fragments and a brittle star. All residue (gravelly mixture) left after picking organisms was retained for further inspection for biota under a dissecting scope (Figure 5-6).

ISECOLD-1-500

ISECOLD-1-1000

ISECOLD-1-1500


ISECOLD-1-2500 ISECOLD-2-500 ISECOLD-2-1000

ISECOLD-2-1500 ISECOLD-2-2000 ISECOLD-2-2500

Figure 5-5 Photo plate showing box core samples collected along two ISECOLD station transects from shallow (500 m) to deep (2500 m).

ISECOLD-1-1000 ISECOLD-1-1000 ISECOLD-1-1500

Figure 5-6 Photo plate of biota kept by Mercier Lab from ISECOLD-1.

ISECOLD-2-500 contained many more organisms on the surface of the mud compared to previous box cores and was very gravelly. Biota observed included bryozoans (erect and encrusting), soft corals, other unidentified soft corals, tunicates, sponges, brittle stars, and polychaetes. Nine 500 mL jars of residue (gravelly sand mixture with biota) were collected but only 2 jars were retained for further examination of biota. ISECOLD-2-1000 contained mushroom corals (Anthomastus sp. or Pseudoanthomastus sp.) and two sea pens (possibly Kophobelemnon sp.). Other biota included polychaetes, sponge, and hydroids. ISECOLD-2-1500 was very gravelly and contained hydroids, polychaetes, Buccinidae gastropods, amphipods, sponges and encrusting tunicates. ISECOLD-2-2000 showed evidence of 2-3 species of corals. Fragments of bamboo corals were observed along with an unidentified skeleton of what may be a sleractinian coral, and the sea pen Distichoptilum sp. was also observed. Other species observed and retained by Mercier lab include brittle stars, polychaetes and a small sponge fragment. ISECOLD-2-2500 consisted of softer mud to a greater depth compared to 2500 m depth at ISECOLD-1. Organisms observed in this sample included brittle stars, a small sea cucumber or tunicate (to be identified by Mercier Lab), bryozoan fragments and worm tubes (Figure 5-7).

Unidentified sponge (ISECOLD-2-500)

Distichoptilum sp. and unid. Scleractinian coral (TBD)

Bamboo coral fragments (ISECOLD-2-2000)

Figure 5-7 Selection of biota observed along ISECOLD-2 transect.

HiBio-B was the last box core collected. This station was located at approimately 2000 m depth and the sediment was very gravelly. Organisms observed included a stony coral skeleton attached to a small rock, polychaete tubes, sponges, brittle stars and bivalves and gastropods (Figure 5-8).

Figure 5-8 Sediment and biota observed at station HiBio-B.

5.2.3 *Rock Dredge*

Samples of benthic megafauna were collected for a general assessment of biodiversity, species identification, ground-truthing of drop camera imagery and DNA, and stable isotope analyses. Most samples were kept for further analyses by DFO-NL, except for ATLAS Sponge-3 and Non-Sponge-3 stations, for which samples were kept by the ATLAS team onboard (J. Vad). Subsamples from all stations were also kept by the Mercier lab team aboard (E. Montgomery and J. Ferguson-Roberts).

Samples were collected using a rock dredge (7 mm mesh; Figure 5-9) at 18 stations, at depths ranging between 422-2399 m (Table 5-4). Most of the deployments were in “drift” mode, with the ship moving at a maximum speed of 2 knots for 10-20 minutes (Table 5-4). At one site (Non-Sponge-3), the dredge was deployed in “tow” mode, at a speed of 1 knot for 10 minutes. At most sites, the amount of extra cable length was 120% of the water depth (cable length limitations of the Amundsen's main winch prevented conventional deployments of 2:1 cable to depth ratios across all sites). At one station we used 10%, and this deployment turned out to be unsuccessful. Two additional deployments had 20% plus 100 m of cable (DFO-1200) and 20% plus 50 m of cable (DFO-Ridge-1000, following a previous deployment where a small yielded was obtained at similar depths using only 20% of extra cable. See note about the DFO-1200 deployment under the section Notes on the dredge deployment below.

Two deployments were unsuccessful (ISECOLD-1-1500 and DFO-1000), however samples were collected after a second attempt at ISECOLD-1-1500. Once on deck, the dredge was rinsed, and the catch deposited in fish totes (volume capacity: 64 L). Most catches were subsampled due to the large amount of material collected by the dredge, particularly muddy material. Where subsampled, the amount kept ranged between 1/8 and ½ of the catch. The remaining material (i.e. extra material) was also partly or completely sieved and checked for potential specimens of interest.

The material was sieved through a 2 mm mesh and sorted for invertebrates and fish. Retained gravel and larger rocks were weighed and photographed before being discarded. The total catch was photographed and preserved for later species identification and quantification. Only taxa known to the team aboard were readily identified to lower taxonomic levels. Both DFO-NL and ATLAS samples were fixed in either 4% formalin (for morphological identification), 100% ethanol (for DNA analyses), or frozen at -20 °C (DNA/stable isotopes).

Invertebrate/fish diversity and presence varied across stations. Most stations at the ISECOLD transect lines had a muddy substrate, with heavy silt/clay material (to be assessed through grain size analyses from box-core samples). Polychaetes and Foraminifera were the most common organisms found at the ISECOLD-1 transect stations (Figure 5-10). Diversity at ISECOLD-2 stations seemed higher compared to ISECOLD-1, with some fish, a few coral species and echinoderms not seen in the latter (Figure 5-12).

HiBio-B station was mainly characterized by a somehow high density of stalked crinoids, a large bryozoan, and a grenadier (Figure 5-12). Non-Sponge site 3 was characterized by small sponge samples including Polymastia sp., Axinella sp., Craniella sp., and possibly Mycale sp. (Figure 5-11). At Sponge-Site-3 large Geodia sp., Phakellia sp., Asconema sp. sponges, the gorgonian P. resedaeformis, and a squat lobster (Munidae sp.) were collected (Figure 5-12).

At DFO-3 the dredge yielded very small amounts of fauna, including some bivalves and the isopod (Aega sp.), and some remnants of the previous trawl (e.g. Primnoa resedaeformis fragments, (Figure 5-11). DFO-1200 was mainly characterized by Hexactinellid sponges and polychaetes (Figure 5-11). At DFO-Ridge-1000 some ophiuroids, hexactinellid sponges, bryozoans, soft corals, and polychaete tubes were collected (Figure 5-11).

Notes on the dredge deployment

The rock dredge was deployed at sites with varied substrate types, ranging from muddy to rocky areas, from depths of 500 to >2000 m. Dredge efficiency on the seafloor is therefore difficult to evaluate. At one station (~1500 m), where the amount of extra cable released was only 10% of water depth, the dredge was unsuccessful, and we believe that the amount of cable was not enough for the dredge to touch the seafloor at that depth.

At one site (DFO-1000) the amount of cable was 20% of water depth, and still the deployment was unsuccessful. Variable seafloor relief at that location, and possibly currents, might have had an impact on this deployment. At some sites, water depth was variable across the transect, and the dredge might have been going in both up and down-slope directions. For future deployments, the water depth should be more constantly checked throughout the deployment, so that the amount of cable released can be adjusted accordingly. At the DFO-Non-Sponge-Site-3 (~500 m) we added an extra 1000 m of cable (50% of water depth) during the deployment, and this dredge yielded five totes (64 L) full of soft sediment. Similarly, at DFO-1200 the extra 100 m of cable might have been too much, as another 5 totes of soft sediment were collected. The amount of extra cable to be released should therefore consider bottom type, considering time and space limitations on onboard post-processing of the samples collected.

Furthermore, the weight supported by the winch cable should be noted once the dredge reaches bottom, so that these values can be used as reference for the amount of material being collected during the deployment. Because the weight of the cable will be greater at deeper sites, the weight should be compared across areas of similar water depth.

Figure 5-9 Rock dredge deployment during leg 1b of the CCGS Amundsen 2019 expedition.

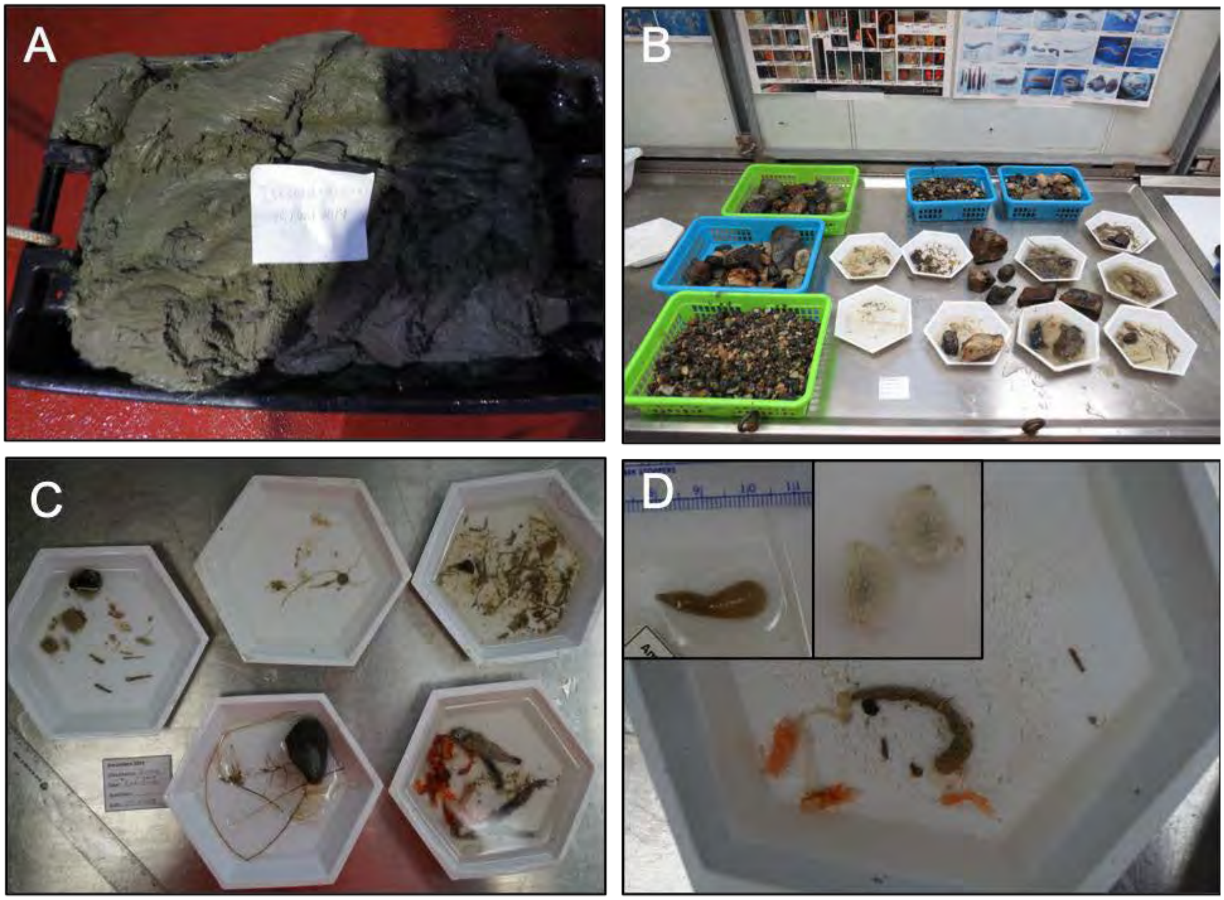


Figure 5-10 Example of benthic samples collected using the rock dredge on transect ISECOLD-1 during Leg 1B of the CCGS Amundsen 2019 expedition. A) ISECOLD-1-1000, B) ISECOLD-1-1500, C) ISECOLD-1-2000, D) ISECOLD-1-2200.

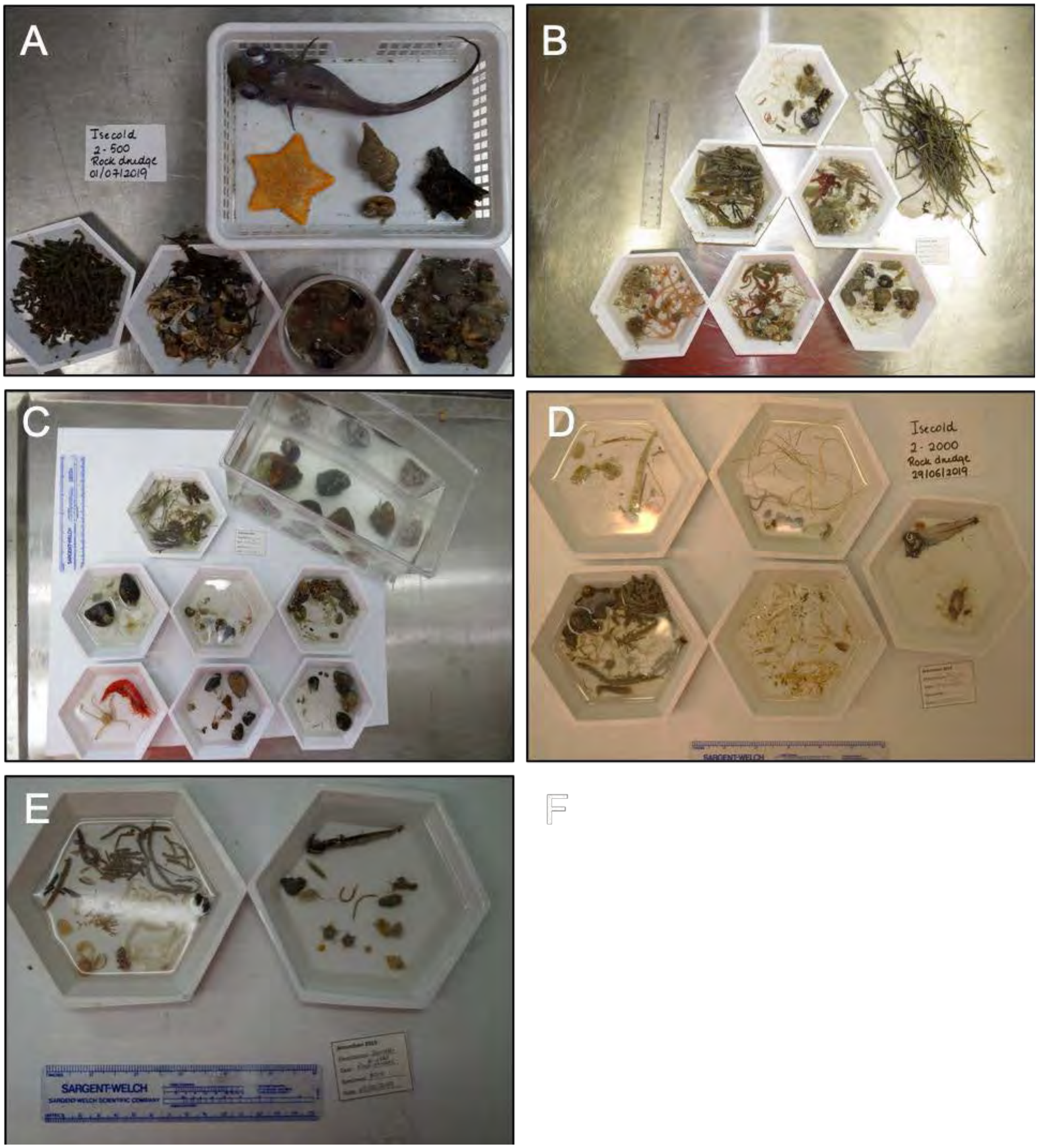


Figure 5-11 Example of benthic samples collected using the rock dredge on transect ISECOLD-2 during Leg 1B of the CCGS Amundsen 2019 expedition. A) ISECOLD-2-500, B) ISECOLD-2-1000, C) ISECOLD-2-1500, D) ISECOLD-2-2000, E) ISECOLD-2-2500.

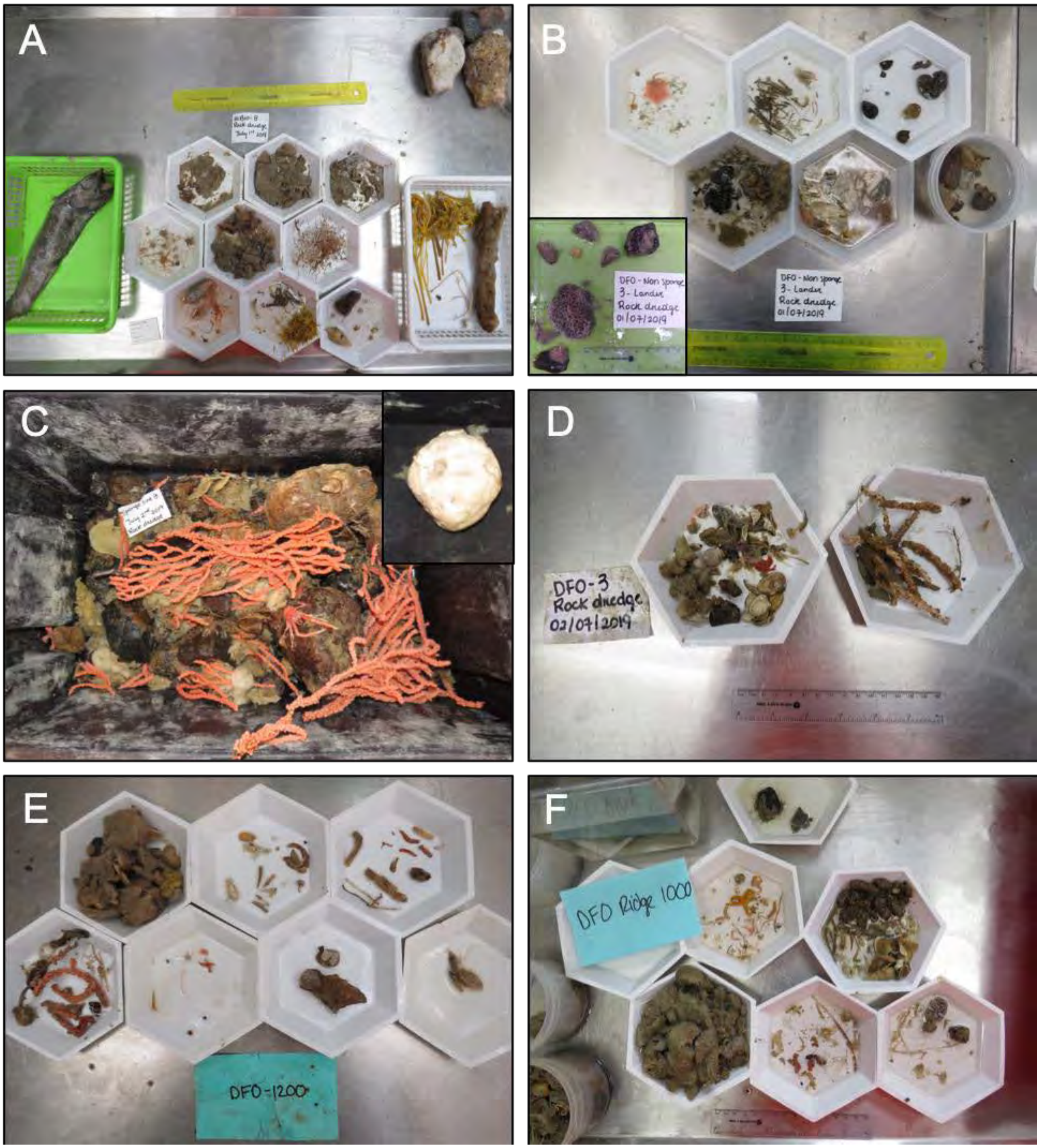


Figure 5-12 Example of benthic samples collected using the rock dredge on DFO and ATLAS stations during leg 1b of the CCGS Amundsen 2019 expedition. A) HiBio-B, B) Non-Sponge-3, C) Sponge-3 (note large Geodia sp. sponge -inset, and the gorgonian Primnoa resedaeformis), D) DFO-3, E) DFO-1200, F) DFO-Ridge-1000.

Table 5-4 Rock dredge deployment stations and parameters during leg 1b of the CCGS Amundsen 2019 expedition.

Station Name	Station type	Start Lat	Start Long	End Lat	End Long	Logged bottom depth	Time at bottom (min)	Length of cable out (m)	Max vessel speed	Comments
ISECOLD 1-500	DFO Full	57.710	-59.531	57.698	-59.525	596	10	100	2	
ISECOLD 1-1000	DFO Full	57.714	-59.378	NA	NA	1018	10	1200	2	
ISECOLD 1-1500	DFO Full	57.722	-59.085	57.705	-59.077	1470	10	1630	2	Unsuccessful
ISECOLD 1-1500	DFO Full	57.723	-59.083	57.703	-59.070	1867	10	1835**	2	Redeployment
ISECOLD 1-2000	DFO Full	57.730	-58.695	57.712	-58.640	2007*	10	2247	2	
ISECOLD 1-2200	Rock Dredge	NA	NA	57.704	-58.552	2172*	20	2714	2	
ISECOLD 2-2500	DFO Full	58.909	-58.849	58.893	-58.855	2390	20	2713	2	
ISECOLD 2-2000	DFO Full	58.846	-59.369	58.828	-59.378	1924	20	2309	2	
ISECOLD 2-1500	DFO Full	58.820	-59.674	58.819	-59.695	1497	20	1797	2	
ISECOLD 2-1000	DFO Full	58.788	-59.931	58.770	-59.931	1038	20	1250	2	
ISECOLD 2-500	DFO Full	58.773	-60.045	58.759	-60.050	566	20	600	2	
Non-Sponge Site 3	Mooring ATLAS	59.379	-60.272	59.370	-60.288	552	10	1500	1	
HiBio-B	DFO Full	60.474	-60.375	60.488	-60.391	1830*	20	2300	2	
Sponge Site 3	Mooring ATLAS	60.469	-61.285	60.482	-61.298	404	20	507	2	Small catch
DFO-3 (1200)	DFO Benthic	60.469	-61.104	60.485	-61.104	1157	20	1391	2	
DFO-1200	DFO Benthic	60.451	-61.030	60.445	-61.009	1202	20	NA	2	
DFO-Ridge 1000	DFO	60.453	-61.134	60.457	-61.164	934	20	NA	2	
DFO-1000	DFO	60.466	-61.171	60.475	-61.217	936	10	1193	2	Unsuccessful

*Depth communicated from bridge during deployment. **Estimation (20% extra cable).

Table 5-5 Rock dredge deployments and main preliminary findings during Leg 1B of the 2019 CCGS Amundsen expedition.

Station	Totes collected	Kept	Tote depth (cm)	Lrg rocks (kg)	Gravel (kg)	Main organisms	Mercier Lab
ISECOLD 1-500	1	1/4	NA	NA	0.65	Foraminifera, polychaetes, scaphopods, sea urchins	
ISECOLD 1-1000	1 and 1/2	1/2	NA	NA	0.43	Mainly Foraminifera and pebbles.	1 sipunculid worm.
ISECOLD 1-1500	1	1	8.7	6.6	NA	Sponges, hydroids, zoanthids, mushroom corals (Anthomastus sp.?), cerianthid, soft coral (Duva florida), polychaetes, brittle stars	3 brittle stars, 1 Stegophiura sp., 1 hydroid, 1 "stony coral"
ISECOLD 1-2000	1		27.5	19	7.5	Lantern fish and Brittlemouths, hydroids, polychaetes, crustaceans, brittle stars.	1 brittle star, 1 hydroid. One crustacean from extra sieve.
ISECOLD 1-2200	2	2 and 1/2	T2 = 11, T3=7.5, T5=14.5-7 (11)	6	5.9	Samples in 4% formalin, 1 sponge in ethanol 100% (2ml vials, in freezer). Extra material also kept: broken purple urchin, broken crustaceans, fish, crinoid?	2 sea cucumbers, and 1 priapulid.

ISECOLD -2-2500	1/2	1/2	14	5.5	2.2	Sponges, fish, polychaetes, sea cucumbers, ophiuroids, sea stars.	2 sea stars, 1 brown fat worm, one ophiuroid disk, and 1 unidentified potential sea cucumber/ascidian
ISECOLD -2-2000	3/4	3/4	8.7	1.02	1.03	Zoanthids, the gorgonian *Acanella arbuscula* (tissue-less), sea pen (cf. *Protoptilum carpenteri*), scaphopods, ophiuroids,	1 large Scaphopoda, 4 brittle stars
ISECOLD -2-1500	1/2	1/2	9	11.2	5.32	Sponges, hydroids, *Pseudodrifa* sp., stoloniferous octocoral, sea pen sp., gastropod, scaphopod, polychaetes, crustaceans	
ISECOLD -2-1000	1/2	1/2	12	23.75	2.77	*Duva florida, Heteropolypus* sp., sea pen *Kophobelemnon sp., Pennatula aculeata*, bivalves, gastropods, quitons,	
ISECOLD -2-500	1/2	1/2	7	2.3	2.59	Sponges, mushroom corals (*Anthomastus* sp.)	
DFO-Non-Sponge-3-Lander	5	1/4	12.8	26.94	12.7	Sponges, hydrocorals, mushroom corals (*Anthomastus* sp.), *Duva florida*, bivalves, gastropods, polychaetes, priapulids, sea stars, brittle stars, bryozoans, potential	

HiBio-B	3	1/2	9.33	6.31	8.33	*Acanella arbuscula* (intact colonies), mushroom corals (e.g.*Anthomastus*), sea pens (*Anthoptilum* sp.), octopus (*Bathypolypus*), quiton, crustaceans, stalked	
Sponge site 3	1	1	NA	NA	NA	One large *Geodia* sp., fragments of the gorgonian *Primnoa resedaeformis*, soft corals, mushroom corals, *Asconema* sp. and other smaller sponges, bryozoans, crustaceans, including one squat lobster (Munidae), ophiuroids, hydroids	*Primnoa* fragments.
DFO-3	1/3	1/3	NA	7.8	NA	Gravel and *Primnoa* fragments (possibly contamination from previous deployment). *Aega* sp., small sponges,	
DFO-1200	5	1	17	4.6	4.5	*Primnoa* fragments (possibly contamination from previous deployment). Mushroom corals, brittle stars, sponges, gastropods, bivalves and shell fragments,	*Primnoa* fragments, and sponges.
DFO-Ridge-	1	1	14	27.82	21	Soft corals (*Duva florida*), mushroom corals (*Anthomastus* sp.), *Funiculina quadrangularis* sea pen	
DFO-1000	unsuccessful	NA	NA	NA	NA	NA	NA

Table 5-6 List of taxa encountered in benthic samples collected using the rock dredge during leg 1b of CCGS Amundsen 2019 expedition. Gray cells denote presence while black cells denote the presence of the taxon in the extra sieved material.

Phylum	**Lower taxa**	**Species**	**ISECOLD-1-500**	**ISECOLD -1-1000**	**ISECOLD -1-1500**	**ISECOLD -1-2000**	**ISECOLD -1-2200**	**ISECOLD -2-500**	**ISECOLD -2-1000**	**ISECOLD -2-1500**	**ISECOLD -2-2000**	**ISECOLD -2-2500**	**DFO-NS-3-Lander**	**HiBio-B**	**Sponge site 3**	**DFO-3**	**DFO-1200**	**DFO-Ridge-1000**
Foraminifera	Undetermined	*Foraminifera sp.*	▨	▨		▨	▨	▨	▨	▨	▨	▨			▨	▨		
	Demospongiae	*Axinella sp.?*											▨					
		Craniella sp.							▨									
		Encrusting yellow sponge							▨									
		Encrusting sponge											▨				▨	
		Ficiform sponge							▨						▨			
		Geodia sp.													▨			
		Mycale sp.?											▨					
		Polymastia sp.						▨	▨									
		Sponge? with single spike								▨								
		Unidentified sponge spp.			▨		▨	▨	▨	▨		▨	▨		▨		▨	▨
	Hexactinellida	*Asconema sp.*													▨			
Cnidaria	Hydrozoa	Hydroids			▨	▨			▨	▨					▨			▨
		Hydrocoral											▨		▨			
		Jellyfish				▨					▨							
	Zoantharia	Zoanthid			▨						▨					▨		
	Actiniaria	Large sea anemone																▨
		Sea anemone sp.																
	Ceriantharia	Cerianthid			▨													
	Scleractinia	Small stony coral			▨													
	Octocorallia	*Acanella arbuscula*									▨			▨				
		Anthomastus sp.			▨			▨					▨	■	▨		▨	▨
		Anthoptilum sp.												■	▨			

		Anthothela sp.?											▨			▨		
		Duva florida			▨				▨				▨					▨
		Drifa glomerata													▨			
		Funiculina quadrangularis																▨
		Heteropolypus sol							▨									
		Kophobelemnon sp.							▨									
		Pennatula aculeata							▨									
		Primnoa resedaeformis													▨			
		Protoptilum carpenteri									▨							
		Pseudodrifa sp.								▨					▨			
		Stloniferous octocoral								▨								
		Sea pen sp.						■		▨								
		Yellow polyps											▨					
		Unknown octocoral														▨		
Mollusca	Bivalvia	*Astarte sp.*						▨	▨				▨			▨		▨
		Bivalve sp.							▨			▨					▨	
		Musculus sp.							▨									
	Cephalopoda	*Bathypolypus sp.*												▨				
	Gastropoda	Unidentified shiny gastropod						▨	▨	▨								
		Gastropoda sp.				▨							▨					▨
		Tooth-like mollusc				▨							▨					▨
	Scaphopoda	*Siphonodentalium lobatum?*							▨	▨			▨				▨	▨
		Scaphopoda sp. 1									▨							
	Polyplacophora	Polyplacophora sp. 1(hairy)							▨									
		Polyplacophora sp. 2							▨									
		Polyplacophora sp.												▨				
	Shell hash	Shell hash						▨	▨	▨			▨			▨	▨	

Annelida	Polychaeta	Polychaeta	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨				▨	▨
		Polychaete soft tubes	▨		▨	▨	▨	▨	▨	▨	▨		▨				▨	▨
		Polychaete sandy tubes			▨	▨	▨			▨		▨	▨					▨
		Polychaete "eyelashes"								▨		▨						
		Thin transparent tubes							▨	▨							▨	
Sipuncula	Undetermined	Sipunculid		▨														
Priapulida	Undetermined	Priapulid					▨						▨					
Arthropoda	Pycnogonida	Pycnogonid				▨		▨	▨									
	Crustacea	*Aega* sp.														▨		
		Amphipod										▨						
		Barnacle sp. 1				▨												
		Barnacle sp. 2																
		Caprellid					▨											
		Eualus sp.				▨									▨			
		Unidentified large red crustacean						▨	▨	▨					▨			
		Unidentified red decapod				▨								▨		▨		
		Unidentified shrimp				▨									▨			
		Unidentified orange crustacean					▨											
		Squat lobster													▨			
		Unidentified pink crustacean												▨				
Echinodermata	Asteroidea	*Ctenodiscus* sp.											▨					
		Henricia sp.											▨					▨
		Poraniomorpha (P.) hispida						▨										
		Unidentified white sea star (gray disk)										▨						
	Crinoidea	*Hyocrinus* sp.?										▨		▨				
		Unidentified white stalked crinoid					■							▨				

	Echinoidea	Unidentified red sea urchin	▨															
		Unidentified purple sea urchin					■							■				
	Holothuroidea	Unidentified red sea cucumber							▨									
		Unidentified white sea cucumber					▨					▨						
	Ophiuroidea	*Amphiura sundevalli?*							▨									
		Amphiura sp.?											▨					
		Ophiopleura sp.?											▨					
		Unidentified small white ophiuroid				▨			▨		▨		▨					
		Unidentified small orange ophiuroid							▨				▨					
		Unidentified large beige ophiuroid						▨		▨				▨				
		Stegophiura sp.			▨													
		Unidentified ophiuroid			▨	▨		▨	▨			▨				▨	▨	▨
Chordata	Pisces	Grenadier						▨						■				
		Myctophydae (*Benthosema glaciale*)				▨					▨					▨	▨	
		Gomostomatidea (Brittlemouths)				▨	■	▨				▨						
		Rockling? Look for Four-bear												▨				
		Skate egg case						▨										
Bryozoa	Undetermined	Bryozoan						▨	▨				▨		▨			▨
		Large ?bryozoan												▨				
Chaetognat	Undetermined	Chaetognatha					■	▨	▨	▨	▨	▨						
Other	Undetermined	Kelp material?						▨	▨				▨					
	Undetermined	Unknown invertebrate										▨						

5.2.4 *Pelagic Fish and Plankton*

The mesopelagic fish and mesozooplankton community of the northern Labrador Sea is poorly described. Forming dense mid-water aggregations across the global oceans known as deep sound scattering layers (DSLs), mesopelagic organisms are hypothesized to be responsible for the largest biomass aggregations of animal life on the planet and are crucial to the energy flow of the deep ocean (Proud et al 2017). In the Labrador Sea, myctophids (lanternfishes) and invertebrate zooplanktivores feed predominantly on calanoid copepods, but their effect on primary and secondary surface grazing zooplankton mortality is still unclear. While some studies attribute most of the biomass in the DSL to myctophids, the true diversity and abundance of taxa as well as foraging behavior in this region is poorly described. In the deep-water basins of the North Atlantic, seasonal differences in the diurnal vertical migration of these organisms has been observed (Anderson et al 2005). In the Arctic, the diel behavior of mesopelagic organism was associated with scattering layers originating from the Atlantic water mass (Gjøsæter et al 2017). Furthermore, differential diurnal vertical migration behavior among and within taxa in the mesopelagic zone has been observed and may be attributed to different adaptations to light conditions (Knutsen et al 2017). As an example, due to low metabolic demand of myctophids, only a portion of the population may be feeding at once, and stomach content analysis revealed some fish were feeding only every other day (Pepin 2013). On the other hand, other pelagic fish, such as Arctic cod, display vertical segregation and feeding strategies based on age and size class. In this study component, we aim to describe the behavior, spatial variation, and biodiversity of mesopelagic fishes and macroinvertebrates of the Labrador Sea.

Our understanding of the biodiversity of midwater scattering may be biased by traditional net sampling techniques which introduce selectivity bias based on avoidance behavior and size. In many cases, gelatinous zooplankton and fast-swimming mesozooplankton avoid capture and thus may be underestimated. Therefore, in this study we combine high resolution acoustic imaging (Wideband Autonomous Transceiver - WBAT), zooplankton imaging (Underwater Visioning Profiler - UVP5) with traditional midwater (Isaac-Kidd Midwater Trawl –IKMT), depth-stratified plankton net sampling (Hydrobios plankton net), and eDNA (described above) to better understand the biodiversity and forage dynamics of the DSL in the Labrador Sea. By closing this knowledge gap, we can elucidate surface to deep ocean pelagic food webs along the continental slope and their relationships to changing oceanographic conditions in the North Atlantic.

Deployments of these complimentary methods were co-located at all ISECOLD stations, except when technical problems limited the deployment of UVP5 to only the last three stations (Table 5-7). In addition to biological measurements desrcribed above, physical oceanographic parameters and light attenuation from a prototype sensor were measured at each station. Methods for each sampling approach are described below.

Table 5-7 Pelagic sampling activities related to the ISECOLD project. X's indicate the use of a particular sampling method. 2X indicates the method was deployed twice at a single station.

Station	**Sampling date**	**Multinet**	**IKMT**	**eDNA**	**WBAT**	**UVP 5**	**LOL**
ISECOLD_1_500	25-June-2019	X	X	X	X		X
ISECOLD_1_1000	25-June-2019	X	X	X	X		X
ISECOLD_1_1500	26-June-2019	X	X	X	X		X
ISECOLD_1_2000	27-June-2019	X	X	X	X		X
ISECOLD_1_2500	28-June-2019	X	2X	X	X		X
ISECOLD_2_2500	29-June-2019	X	2X	X	X		X
ISECOLD_2_2000	29-June-2019	X	2X	X	X		X
ISECOLD_2_1500	30-June-2019	X	X	X	X	X	X
ISECOLD_2_1000	30-June-2019	X	X	X	X	X	X
ISECOLD_2_500	30-June-2019	X	2X	X	X	X	X

Wideband Autonomous Tranceiver (WBAT)

Complementary to the traditionally used hull-mounted EK60 scientific echosounder, the broadband echosounder, an autonomous EK80 platform, offers wide bandwidth frequency measurements of acoustic backscatter. While the hull-mounted EK60 operates at three discrete frequencies (38-, 120-, and 200- kHz), the WBAT can be outfitted with two split-beam transducers. For this study, ES38-18DK-split and ES333-7CDK-split transducers were operated at 35-45 kHz and 320-420 kHhz bandwidths, respectively. In combination, both transducers provide frequency response curves and high-resolution target detection of fish and zooplankton.

In contrast to 2018 ISECOLD operations, this year the WBAT was mounted to the CTD-rosette and deployed in autonomous mode during each station cast. For each deployment, the WBAT was programmed for timed deployments of each transducer to coincide with downcast and upcasts. During the downcast, the 333 kHz transducer pinged to a range of 50 m every 0.5 seconds with 2.048 ms pulse length. During the upcast the 38 kHz transducer pinged to a range of 200 m every 0.5 seconds with a 2.048 ms pulse length. This sequence was chosen to maximize the likelihood of capturing true vertical distribution of targets in case of avoidance behavior in response to the rosette during operations.

At each ISECOLD sampling station the WBAT was deployed to a maximum depth of 1500 m due to limitations of the pressure casing. At stations deeper than 1500 m, a separate rosette cast was performed before removal of the WBAT and transduers. The rationale for this change in methods is three-fold: First, by mounting the transducers horizontally, we can ensonify a larger portion of the water column and therefore measure discrete targets many times. Secondly, combining WBAT measurements in both space and time with physical measurements of the water columns can help strengthen our understanding of relationships between biological and physical structuring of the pelagic zone. Finally, by mounting the WBAT system to the rosette, we saved at least one operational hour per station and advanced future methods of including the WBAT a multi-sensor package.

Observations:

Vertical casts of the WBAT on the rosette were successfully timed to capture full vertical profiles of the upper 1500 m of the water column (where depths allowed). At first glance of the first deep station, ISECOLD-1-1500, the 333 kHz transducer produces integrated scattering peaks at expected depths: subsurface cholorphyll max, epipelagic grazing zone, mesopelagic or deep-scattering layer, and some individual large targets (most likely P. Periphylla) spread throughout (Figure 15). 38 kHz data is not presented as it will require filtering of rosette events such as stops and fired bottles during the upcast to truly capture vertical distribution. Upon visual inspection, the 38 kHz produces backscattering peaks for swim-bladdered fish in the deep-scattering layer (400-600m). At present, backscattering values are uncalibrated and an accurate calibration of the WBAT and transducers will take place in a test tank at the Marine Institute in October 2019. After calibrated TS values are achieved, echo-counting will be done to calculate densities of sound-scattering organisms. Further analysis may include an investigation of patterns in frequency response curves along the measured bandwidths.

For all organisms the echo strength (TS) will depend both on the size and the acoustic properties of the organisms. Animals with equivalent size (radius) much smaller than the wavelength will give very weak echoes (Rayleigh scattering). A weak target is therefore likely to be a small organism, the nominal wavelength at 320 kHz is ~4.7 mm, at 420 kHz it is ~3.6 mm. For the strong echoes it is not

possible at present to say whether echo strengths relates to acoustic properties or size, but by comparing the vertical WBAT profiles with the hull mounted 38 kHz data, one can usually distinguish the depths where organisms with gas-inclusions (e.g. swim bladders) are present, as the scattering at 38 kHz is usually dominated by organisms with gas inclusions. During the cruise a strong scattering layer was evident in the depth range from ~300 to ~600 m, scattering from this layer is dominated by various fishes with gas-inclusions (e.g. Myctophids, Gonostomatids, and other mesopelagic fishes). This pattern included nightly vertical migrations to the surface.

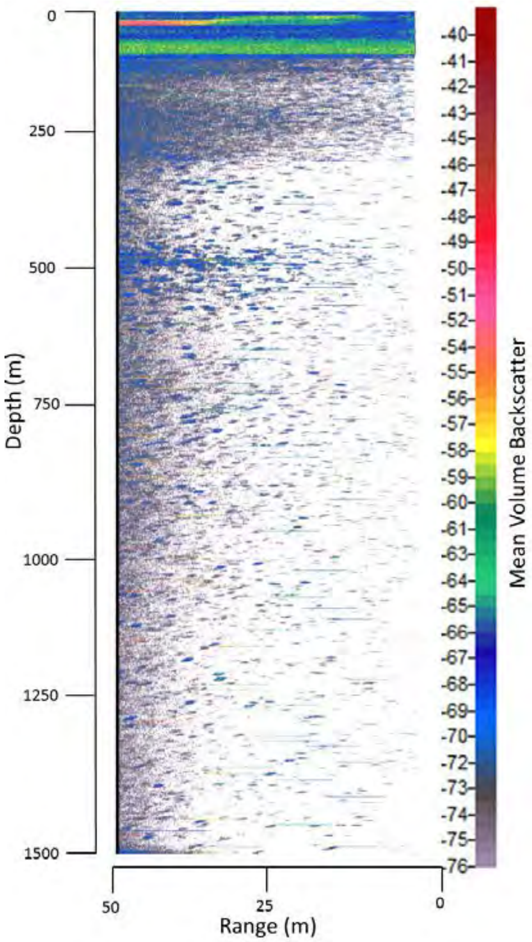


Figure 5-13 ES333-7CDK Mean volume backscatter during downcast of the CTD-rosette at ISECOLD-1-1500. Range is equivalent to distance from transducer face. Solid horizontal lines are noise artefects resulting from mild interference from the LADCP, also mounted on the rosette.

Light Sensor

For mesopelagic organisms, light has been identified as the major driver of global-scale vertical distribution (Aksnes et al. 2017, Kaartvedt et al. 2019), and estimation or measurement of light at relevant depths is probably needed to fully understand both vertical distributions and migrations. Projects studying the mesopelagic region therefore have a need for sensors more sensitive than the ones currently available to us.

During the cruise, a prototype light sensor (LOw Light integrating sensor, LOL; Figure 16) developed by colleauges at the Institute for Marine Research (IMR) in Norway, was tested out and deployed on all CTD casts. The rationale for development of the sensor is 2-fold: first, mesopelagic projects have a need for an interim sensor solution to assess mesopelagic light levels until a permanent, CTD attached sensor solution is devised. Secondly, projects deploying stationary equipment (e.g. acoustic landers, ADCP's) at depth also have a need to assess light levels at depth, and the suitability of the planned CTD attached sensor for long term battery operation is uncertain.

PAR sensors are by now standard on many research vessel CTDs, but these sensors are geared towards the needs of the groups studying primary production. These sensors rarely have sensitivity enough to reach beyond the very upper parts of the ocean, and as their spectral responsivity by definition spans at least the region 400 – 700 nm, it is problematic to use the results from these sensors to estimate light levels at depth: a PAR sensor with low sensitivity will always overestimate the attenuation coefficients relevant to calculating light at depth. While these sensors may be sufficient for mapping light levels where there is net primary production, light also has a profound effect on higher trophic levels. It is perhaps the major proximate driver for the distribution of animals ranging in size from zooplankton to micronekton, and it directly affects trophic interactions all the way up the food-chain. In situ and surface light levels relevant to animals are the most influential environmental parameters that are typically not measured. Furthermore, it has far greater implications for pelagic ecology than all but one of the hydrographical parameters we currently do measure, the exception being chlorophyll a.

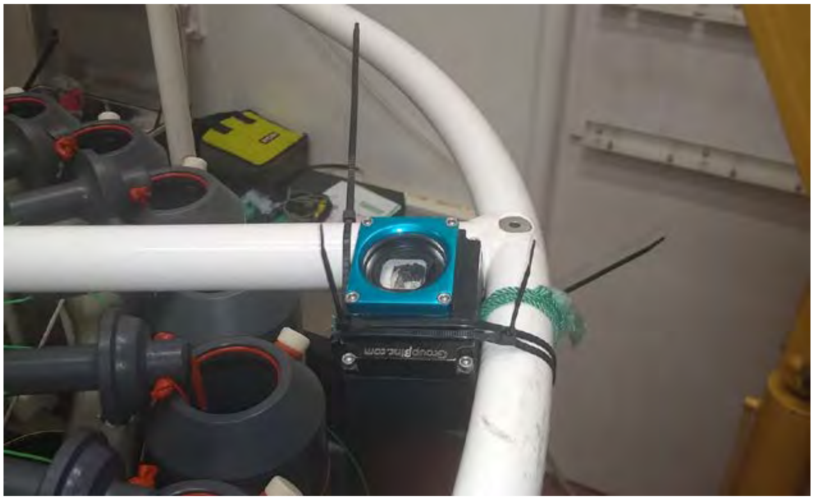


Figure 5-14 LOw Light integrating sensor (LOL) mounted on the rosette frame

Underwater Vision Profiler 5 (UVP5)

The UVP5 is an imaging platform that captures images of both living and non-living particles in the water column (Figure 17). It can provide a wide range of measurements including particulate size, number, and density. The platform is integrated with an image classification program known as Ecotaxa. Using a machine learning image classification algorithm, it can identify individuals by taxa, such as copepoda and metazoa, and in some cases down to the species level.

Technical difficulties limited the use of the UVP5 to only 3 rosette sampling stations. At each of these stations, as the rosette was lowered to its rinsing depth, the pressure sensor on the UVP5 initiates an image capture sequence. The UVP5 continuously captures images as particles moved through its light field on the downcast. A live-read out of particulate density is displayed on the rosette control screen, plotted alongside other variables such as temperature and salinity. Data was captured and downloaded with each rosette cast. Metadata was entered at the end of each day into the zooprocess program and raw files were processed for future input into Ecotaxa.

Data will be sent to an experienced Ecotaxa user and reviewed for misclassification. A portion of the data will be used to train future classification models. All post-processing will be conducted by Marc Picheral, at IFREMR Villefranche. Classified data will be delivered to Julek Chawarski for further vertical and spatial analysis.

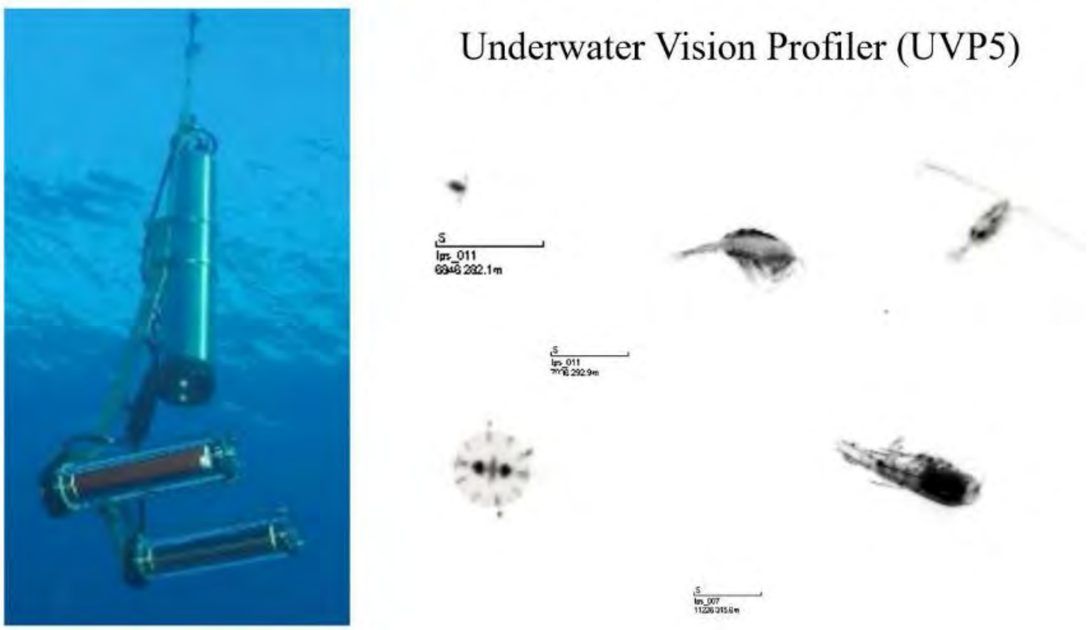


Figure 5-15 Examples of UVP5 images, processed using Zooprocess software and ready for image classification in Ecotaxa.

Multi-net plankton sampler (Hydrobios)

Plankton community characterization was done at various depth zones with a Hydrobios multi-net plankton sampler. The net is equipped with nine 200μm mesh nets (opening 0.5m^2) allowing for depth specific sampling of the water column (Table 5-8). The Hydrobios is also equipped with a CTD to record water column properties while collecting biological samples.

The net is deployed vertically from 1000m (or 15m off the bottom in depths shallower than 1000m) to the surface. The nets open and close one by one as the pressure decreases while the net is going up in the water column. The depth at which the different nets open and close is programmed before deployment. Once retrieved, the zooplankton samples (Figure 5-16) were preserved in 10% formalin solution and stored for further taxonomic identification at Laval University.

Table 5-8 Hydrobios sampling date, time and maximum and minimum sampling depth for each net

Station	Sampling date	Sampling time (UTC)	Net#	Sampling depth max	Samplin depth min
ISECOLD-1-1000/2-1000	2019-06-26	6:46:30 AM	1	965/945	800
ISECOLD-1-1000/2-1000	2019-06-26	6:46:30 AM	2	800	600
ISECOLD-1-1000/2-1000	2019-06-26	6:46:30 AM	3	600	400
ISECOLD-1-1000/2-1000	2019-06-26	6:46:30 AM	4	400	250
ISECOLD-1-1000/2-1000	2019-06-26	6:46:30 AM	5	250	100
ISECOLD-1-1000/2-1000	2019-06-26	6:46:30 AM	6	100	75
ISECOLD-1-1000/2-1000	2019-06-26	6:46:30 AM	7	75	50
ISECOLD-1-1000/2-1000	2019-06-26	6:46:30 AM	8	50	25
ISECOLD-1-1000/2-1000	2019-06-26	6:46:30 AM	9	25	2
ISECOLD-1-1500/1-200/1-2500/2-2500/2-2000/2-1500	2019-06-26	9:07:31 PM	1	1 000	800
ISECOLD-1-1500/1-200/1-2500/2-2500/2-2000/2-1500	2019-06-26	9:07:31 PM	2	800	600
ISECOLD-1-1500/1-200/1-2500/2-2500/2-2000/2-1500	2019-06-26	9:07:31 PM	3	600	400
ISECOLD-1-1500/1-200/1-2500/2-2500/2-2000/2-1500	2019-06-26	9:07:31 PM	4	400	250
ISECOLD-1-1500/1-200/1-2500/2-2500/2-2000/2-1500	2019-06-26	9:07:31 PM	5	250	100
ISECOLD-1-1500/1-200/1-2500/2-2500/2-2000/2-1500	2019-06-26	9:07:31 PM	6	100	75
ISECOLD-1-1500/1-200/1-2500/2-2500/2-2000/2-1500	2019-06-26	9:07:31 PM	7	75	50
ISECOLD-1-1500/1-200/1-2500/2-2500/2-2000/2-1500	2019-06-26	9:07:31 PM	8	50	25
ISECOLD-1-1500/1-200/1-2500/2-2500/2-2000/2-1500	2019-06-26	9:07:31 PM	9	25	2
ISECOLD-2-500/1-500	2019-07-01	3:13:14 AM	1	500/565	400

ISECOLD-2-500/1-500	2019-07-01	3:13:14 AM	2	400	300
ISECOLD-2-500/1-500	2019-07-01	3:13:14 AM	3	300	200
ISECOLD-2-500/1-500	2019-07-01	3:13:14 AM	4	200	150
ISECOLD-2-500/1-500	2019-07-01	3:13:14 AM	5	150	100
ISECOLD-2-500/1-500	2019-07-01	3:13:14 AM	6	100	75
ISECOLD-2-500/1-500	2019-07-01	3:13:14 AM	7	75	50
ISECOLD-2-500/1-500	2019-07-01	3:13:14 AM	8	50	25
ISECOLD-2-500/1-500	2019-07-01	3:13:14 AM	9	25	2

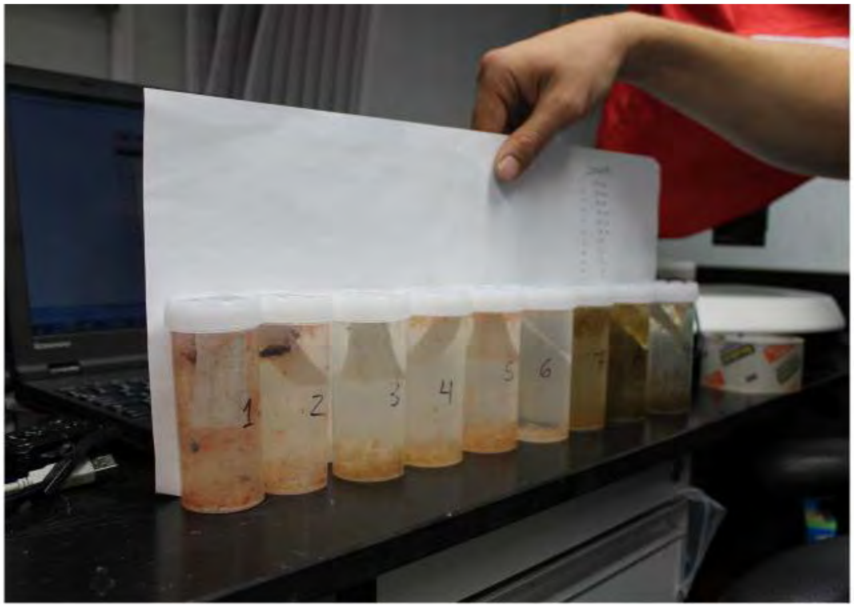


Figure 5-16 An example of the depth-specific samples collected by the Hydrobios net, with vial 1 containing the deepest samples and vial 9 containing the shallowest samples.

Isaac-Kidd Midwater Trawl (IKMT)

The IKMT (Figure 5-17) was deployed to capture pelagic juvenile and adult fish and macro-zooplankton. The net is rectangular in shape with a 9m2 mouth aperture and mesh size of 11 mm in the first section, 5 mm in the last section. The net was lowered at a target depth (Table 5-9) which was determined by the echosounder EK-60 signal and towed at that depth for 15-30 minutes at a speed between 2.5 -3 knots. A novel technique was applied during this cruise to capture vertically migrating species during the brief hours of darkness. At three stations a ‘double-dip’ method was employed. First, the net was deployed from the surface to depths between 75 and 100 m. The net was towed for 10 minutes and hauled back to the surface. Without removal of the frame, the cod end was collected by hand and emptied. The net was briefly rinsed and redeployed to the deep-scattering layer depth of ~500 m, where it was towed for 15-20 minutes. Collections were sorted in the laboratory by species, counted and weighed.

In the laboratory, each species was photographed and whole specimen were stored in ethanol. For large catches of single species like myctophids, subsamples of 50 were subsampled for length and frozen whole. For nearly all specimens, samples were frozen for stable isotope analysis and tissue samples were preserved for genetic identification and marker design for metagenomic sequencing of environmental DNA (eDNA).

Compound specific isotope analysis of amino acids (CSIA-AA) will be conducted on animal samples taken from both the IKMT and Hydrobios multi-net. Tissue samples were taken from fish and larger invertebrates, while entire bodies of smaller invertebrates and zooplankton were kept, and all samples were frozen for later analysis. Carbon ($d^{13}C$) and nitrogen ($d^{15}N$) isotopic signatures will be measured through continuous-flow gas chromatography-combustion-isotope ratio mass spectrometry (GC-C-IRMS) with existing instrumentation in the Department of Earth Sciences at Dalhousie University.

Nitrogen isotopes will be measured to look at signatures of 'trophic amino acids' (ie, glutamic acid) which undergo significant isotopic frationation between diet and consumer. These will be compared to signatures of 'source amino acids' (ie. phenylalanine) which show minimal isotopic fractionation, and will be used as a proxy for the isotopic signatures of primary producers at the base of the food web. Together, the trophic and source amino acid signatures will be used to estimate consumer trophic positions, while accounting for differences in baseline isotopic signatures.

Carbon isotopes will also be measured from consumer tissues to examine for patterns of essential amino acids which are passed from resource to consumer virtually unmodified. These patterns are particularly diagnostic of the phylogenetic identity of source carbon, and provide an 'isotopic fingerprint' of the type of primary producers at the base of the food web. The isotopic fingerprints will be used to infer the types of primary producers that support the food web through comparison with unique amino acid fingerprints of known primary producers.

Table 5-9 IKMT sampling date, time and sampling depth

Station	Sampling date	Sampling time	cast number	Sampling depth
ISECOLD-1-500	2019-06-26	5:20:00 PM	1	400
ISECOLD-1-1000	2019-06-26	8:19:20 AM	1	360
ISECOLD-1-1500	2019-06-26	10:39:00 PM	1	440
ISECOLD-1-2000	2019-06-27	1:56:56 PM	1	500
ISECOLD-1-2500	2019-06-28	5:17:50 AM	1	100
ISECOLD-1-2500	2019-06-28	5:48:39 AM	2	480
ISECOLD-2-1000	2019-06-30	6:54:12 PM	1	470
ISECOLD-2-1500	2019-06-30	9:13:00 AM	1	450
ISECOLD-2-2000	2019-06-29	9:18:00 PM	1	80
ISECOLD-2-2000	2019-06-29	9:49:00 PM	2	430-350
ISECOLD-2-2500	2019-06-29	3:41:00 AM	1	100
ISECOLD-2-2500	2019-06-29	4:17:00 AM	2	536
ISECOLD-2-500	2019-07-01	4:12:00 AM	1	75
ISECOLD-2-500	2019-07-01	4:37:06 AM	2	480

In total, roughly 12 fish and 25 invertebrate species were captured in the net. Lanternfish (Myctophidae) were present at each station and trawl with the exception of the control event, where the aforementioned ‘double-dip’ was employed during daytime. Some large species of lanternfish were captured in low numbers along with the occasional larger predators such as barracudina (Arctozenus risso) and dragonfish (Stomias boa). There was a high occurrence of bristlemouths (Gonostomatidae) although numbers were typically low (< 5 per tow). Among the invertebrates, arrow worms (Chaetognathae), jellyfish, and arthropods such as shrimp and krill were the most common. Nearly every tow contained gammarid amphipods of the genus Themisto and some unidentified, possibly rare species were captured.

Figure 5-17 IKMT being deployed off the Amundsen, Leg 2C, 2018

5.2.5 *Benthic and Pelagic Community Characterization from eDNA from Water Samples*

Seawater was collected at all ISECOLD full transect stations as well as two stations that were revisited during mooring recoveries using a CTD-Rosette water sampling system comprised of twenty-four 12L Niskin bottles. A variety of scientific analyses were conducted on these samples, and with the exception of environmental DNA, these activities (e.g. nutrient analyses) are covered in the water sampling section.

eDNA Analysis of Water

Environmental DNA is an emerging scientific tool that uses DNA fragments shed from animals into the water column to characterize biotic community composition. The technique has promise as a non-invasive approach that is complimentary to other conventional methods, particularly in the deep sea where specimens are very difficult to collect. To characterize benthic and pelagic faunal communities water samples were collected from the surface, 250m, 500m, 750m, 1000m and the ocean bottom, where station depths allowed. These depths were selected to match other sampling activities (hydroacoustics, bottom camera, box core, plankton nets and IKMT trawls) that could be used to validate/compare results.

Prior to the CTD-Rosette deployment, the inside and upper and lower lids of the Niskin bottles were sprayed first with a DNA removal solution and then rinsed with distilled water. The bottles were also closed up after they were cleaned until deployment to prevent contamination.

Once the vessel reached the selected sampling station, the CTD-Rosette was lowered from the vessel on a winch system and Niskins were closed at programmed depths to collect a water sample. The CTD-Rosette was brought back on board the vessel and eDNA sampling took place prior to other water collection activities to prevent accidental contamination by other study team members. Once again, latex gloves were used to collect three replicate samples from each sample depth in pre-labeled sterile 2 L Whirl-pak bags.

Water filtration was subsequently completed onboard the vessel in a dedicated labratory immediately following the collection of the water samples. Prior to each station, the work area was decontaminated with DRS, a DNA removal solution, and between each sample replicate gloves were changed. A new, pre-labelled, Sterivex filter was used for each replicate sample and attached to one end of the filtration tube, which was changed between sample depths. At the other end of the tube was a pipette (changed for each sample replicate) which was also placed in the sample bag to pump the water through the filter (See Figure 5-18 for set-up). Approximately 1.5 L of water was pumped through each filter and the pre-labelled Sterivex filter for each sample was removed once filtration was complete and stored in a pre-labelled Whirl-pak bag. The 3 replicates were then placed in a ziploc bag and stored in the fridge until all filtration was complete and were then moved to the -80℃ freezer.

In total, 12 stations were sampled for eDNA water sample collection (Table 5-10). The frozen Sterivex filters will be sent to Centre for Environmental Genomic Applications for analysis and the resulting data will augment and be compared to pelagic and benthic community characterization data collected with conventional methods.

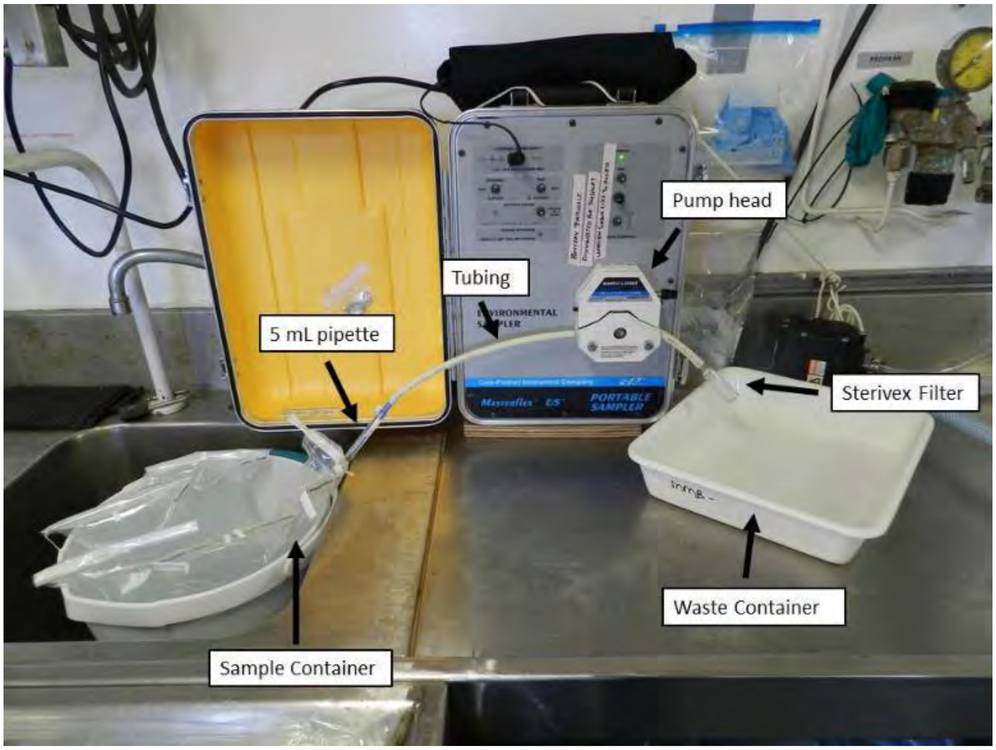


Figure 5-18 eDNA sample filtration setup

Table 5-10 List of Sampling Stations for eDNA Water Sampling for Leg 1b of 2019 Amundsen Expedition.

Station	Date	Time	Latitude	Longitude	Max depth (m)	Sample depth (m)
ISECOLD-1-500	2019-06-25	8:50	57.705050	-59.526940	600	surface, 250, 500,bottom
ISECOLD-1-1000	2019-06-25	21:35	57.708790	-59.377520	1000	Surface, 250, 500, 750, bottom
ISECOLD-1-1500	2019-06-26	9:45	57.717970	-59.087130	1500	Surface, 250, 500,750, 1000,bottom
	2019-06-27	0:05	57.729370	-58.695580	2000	Surface, 250, 500,750, 1000,bottom

ISECOLD-1-2000						
ISECOLD-1-2500	2019-06-28	3:05	57.740650	-57.883870	2500	Surface, 250, 500,750, 1000,bottom
ISECOLD-2-2500	2019-06-29	2:19	58.907280	-58.846410	2500	Surface, 250, 500,750, 1000,bottom
ISECOLD-2-2000	2019-06-29	11:17	58.846680	-59.368320	2000	Surface, 250, 500,750, 1000,bottom
ISECOLD-2-1500	2019-06-30	2:04	58.819940	-59.673430	1500	Surface, 250, 500,750, 1000,bottom
ISECOLD-2-1000	2019-06-30	12:05	58.786760	-59.929590	1000	Surface, 250, 500,750, bottom
ISECOLD-2-500	2019-06-30	20:45	58.774330	-60.046970	500	Surface, 250, Bottom
HiBio-A	2019-07-02	16:30	60.4677955	-61.1460023	1000	Surface, Bottom
DFO-1	2019-07-02	20:00	60.4690913	-61.2903132	500	Surface, Bottom

5.2.6 *Seabird and Marine Mammal Surveys*

Seabirds

Seabirds are an integral part of marine ecosystems; their distribution is influenced by biological, chemical and physical oceanography. Changes in seabird distribution can therefore be an indicator of oceanographic variability. It is critically important to monitor seabird abundance and distribution patterns in the arctic, in order to monitor changes that are happening in response to the rapid environmental changes induced by global warming. Collecting data in the remote regions of the arctic and subarctic are extremely expensive and all opportunities to fill data gaps are very important. Seabird data collected since 1980 show population trends for significant seabird colonies in the Canadian arctic (Gaston et al. 2009), including Thick-billed Murres and Northern Fulmars. Thick-billed Murre populations are apparently stable, but this species relies heavily on the sea ice-dependent Arctic Cod during the breeding season. Changes in sea ice and therefore prey availability may become a serious issue for this species in the future, potentially effecting population size and distribution throughout the eastern North Atlantic. Northern Fulmars have been in steady decline over the last decade. Data on breeding colonies and at-sea distribution is required to understand this decline. Seabird surveys provide important information on pelagic seabird distribution throughout the year, including patterns of dispersal from breeding areas, migration routes and wintering areas. Over time, these data show not only patterns of dispersal, but also trends in species abundance, diversity and distribution. This information helps inform decisions regarding protecting sensitive marine areas, environmental assessment of proposed development projects, and appropriate response to catastrophic events (e.g. oil spills). Surveys were conducted using a standardized fixed-width survey area over a 900 scanning arc as per the Environment Canada Seabirds at Sea (ECSAS) protocols (Gjerdrum et al. 2012). These protocols were developed in a manner that is compatible with methods used by north Atlantic European countries. Surveys are conducted by the Canadian Wildlife Service (CWS), Department of Environment and Conservation Canada to address management and conservation responsibilities under the Migratory Bird Convention Act (MBC Act 1996). The Canadian Wildlife Service places seabird observers on multiple ships of opportunity throughout the year. Data are consolidated, summarized and analyzed from a central database maintained by the Atlantic Region office in Dartmouth, Nova Scotia. The data are open and shared with other departments and jurisdictions. Last year, the ISECOLD sampling program was conducted during Leg 2C, (July 24-August 16 2018). This period represents the late- and post-breeding period for arctic seabirds, when they are starting to distribute away from the colonies and toward winter feeding areas. This year, the sampling program occurred during the height of breeding season (June 23-July 5, 2019), when bird distribution is limited to foraging areas closer to the breeding colonies. Distribution between years will be interesting to compare. A summary of the distance, effort and species observed is provided in Table 5-11. More detail with distribution maps will be provided by CWS in a timely manner upon return.

Marine Mammals

Marine Mammal surveys are generally conducted using protocols involving multiple observers, covering a 1800 arc at an infinite distance. There was neither the manpower nor expertise onboard to fulfill these requirements. However, marine mammal data were collected opportunistically; primarily during seabird survey efforts. Marine mammal observations made outside of seabird surveys were added to the database as “incidental observations”. All marine mammals seen by the seabird observer or other personnel were recorded in the ECSAS database. Species identity was either confirmed by the seabird observer or given a more general designation (e.g. “unidentified whale”) prior to data entry. Coverage was incomplete and likely underestimates marine mammal species composition and abundance. A summary is provided in Table 5-11.

Table 5-11 Seabird and marine mammal summary for Amundsen Leg 1b: June 23-July4. Surveys represent 2302 minutes of observation over 783.5 kilometers

Seabirds			
English	Latin	**Percentage**	**Number seen**
Northern Fulmar	*Fulmarus glacialis*	61.9	459
Thick-billed Murre	*Uria lomvia*	27.9	207
Black-legged Kittiwake	*Rissa tridactyla*	1.8	13
Northern Gannet	*Morus bassanus*	1.5	11
Genus: Murres	*Uria*	1.5	11
Atlantic Puffin	*Fratercula arctica*	1.5	11
Red Phalarope	*Phalaropus fulicaria*	1.2	9
Herring Gull	*Larus argentatus*	0.7	5
Wilson's Storm Petrel	*Oceanites oceanicus*	0.4	3
Pomarine Jaeger	*Stercorarius pomarinus*	0.4	3
Great Black-backed Gull	*Larus marinus*	0.4	3
Arctic Tern	*Sterna paradisaea*	0.4	3
Black Guillemot	*Cepphus grylle*	0.3	2
Dovekie	*Alle alle*	0.1	1
Marine Mammals			
Long-finned Pilot Whale	*Globicephala melas*	48.4	15
Order: Whales and Dolphins	Cetacea	6.5	2

5.2.7 *Moving Vessel Profiler (MVP)*

The Labrador Sea plays a critical role in the Global Ocean Thermohaline Circulation producing dense water masses that feed deep water currents driven by the Atlantic Meridional Overturning Circulation (Yashayaev et al., 2007). The importance of the Labrador Sea is related to the fact that several water masses of different thermohaline (and geochemical) properties carried by the mesoscale currents meet in the basin. Warm and salty Atlantic water is carried by the Irminger and West Greenland Currents, the polar water leaving the Arctic Ocean via the Fram Strait is transported by the East Greenland Current that merges with the West Greenland Current. The polar water from the Canadian Arctic Archipelago feeds the Baffin Current continuing as the Labrador Current on the southwestern shelf of the Labrador Sea. The outflow from Hudson Bay contributes ~50% of the freshwater transport of the Labrador Current (Straneo and Saucier, 2008). The role of the Labrador Sea in the regional and global climate is more apparent in light of the present climate changes amplified in the polar regions. Accelerating Greenland melt yields additional ~250 km3/yr of surplus freshwater adding to the mean freshwater flux of 900 km3/yr from the Greenland Ice Sheet. Greenland melt water is mixed into the boundary currents flowing along the coast of Greenland (Bamber et al., 2018; Dukhovskoy et al., 2019). The substantial part of the Greenland freshwater flux is carried to the Labrador Sea, mainly with the West Greenland Current branch that turns west following the continental shelf break south of Davis Strait. Increasing storage of fresh water in the Arctic Ocean (Haine et al., 2015) will eventually be fluxed into the subpolar North Atlantic (Proshutinsky et al., 2015). One of the routes of the freshwater fluxes from the Arctic Ocean is through the Canadian Arctic Archipelago and Baffin Bay to the Labrador Sea. In order to understand present and predict the near-future changes caused by rapid increase of the freshwater content in the Arctic climate system, it is important to study the freshwater pathways in the Arctic and subpolar basins. The monitoring of the characteristics of the ocean currents provides information about changes in their dynamics and thermohaline structure, which is used to evaluate freshwater transport from the polar regions. Planned station locations of the Amundsen Expedition Leg 1B provides a great opportunity to conduct detailed hydrographic observations of the oceanic fronts on the southwestern Labrador Sea shelf using an MVP. The MVP is equipped with salinity and temperature sensors, pressure gauge, and a fluorometer. MVP surveys were conducted during transits between the stations. The instrument was towed several hundred meters behind the vessel in order to reduce the impact of the vessel wake on the measurements. The cruising speed of the vessel was kept at ~8 kt. During the measurements, the instrument descended (downcast) down to 300 m (or 15 m off the bottom) and then ascended to the depth of ~15-20 m. Only downcast observations are considered in future analyses. The instrument provides measurements of the hydrographic fields at a high vertical (~0.2 m in vertical) and relatively high horizontal (~1-2 km between the downcasts) resolution in the upper 300 m. It would be challenging to accurately observe such a narrow oceanic front using other instruments without a-priori knowledge of the front location. Locating the front based on surface temperature and salinity measurements could also be difficult as the front only has distinct temperature manifestations on the surface and the surface temperature front does not always coincide with that below the surface. As such, multiple conventionaln point sample measurements (like CTD) would be needed to capture the subsurface front structure. The MVP observations provide valuable information about high-resolution structure of the upper ocean on the Labrador shelf. This information will be used to improve our knowledge about dynamics of the boundary currents in the region. The data are also useful for assessing numerical simulations of the Labrador Sea in terms of representation of the ocean fronts and structure of the boundary currents in the area. Finally, these data may provide some high resolution biophysical nature that will be useful for explaining variability in the biological data collected on this cruise.

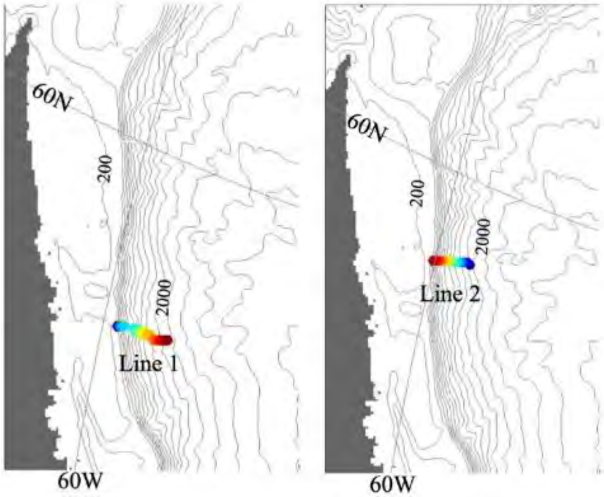


Figure 5-19 Maps of the study region showing ISECOLD Transect 1 and ISECOLD Transect 2 with the MVP data points (downcast locations)

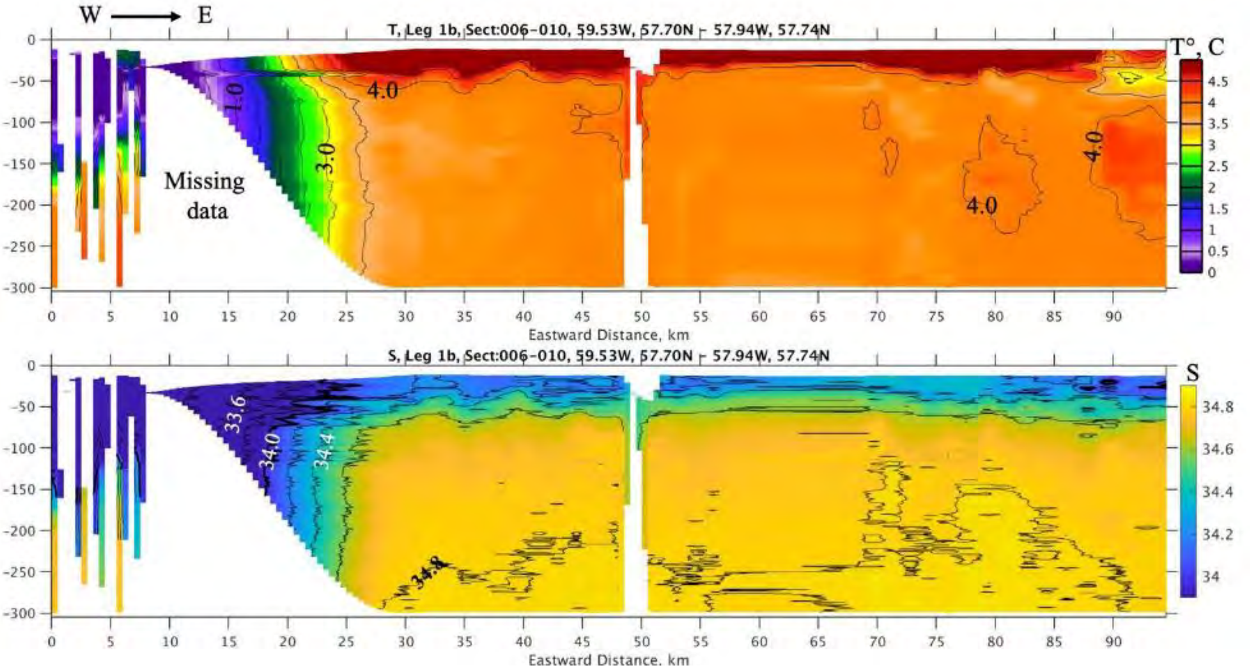


Figure 5-20 Vertical distribution of Temperature (top) and Salinity (bottom) along ISECOLD Transect 1 from the MVP observations

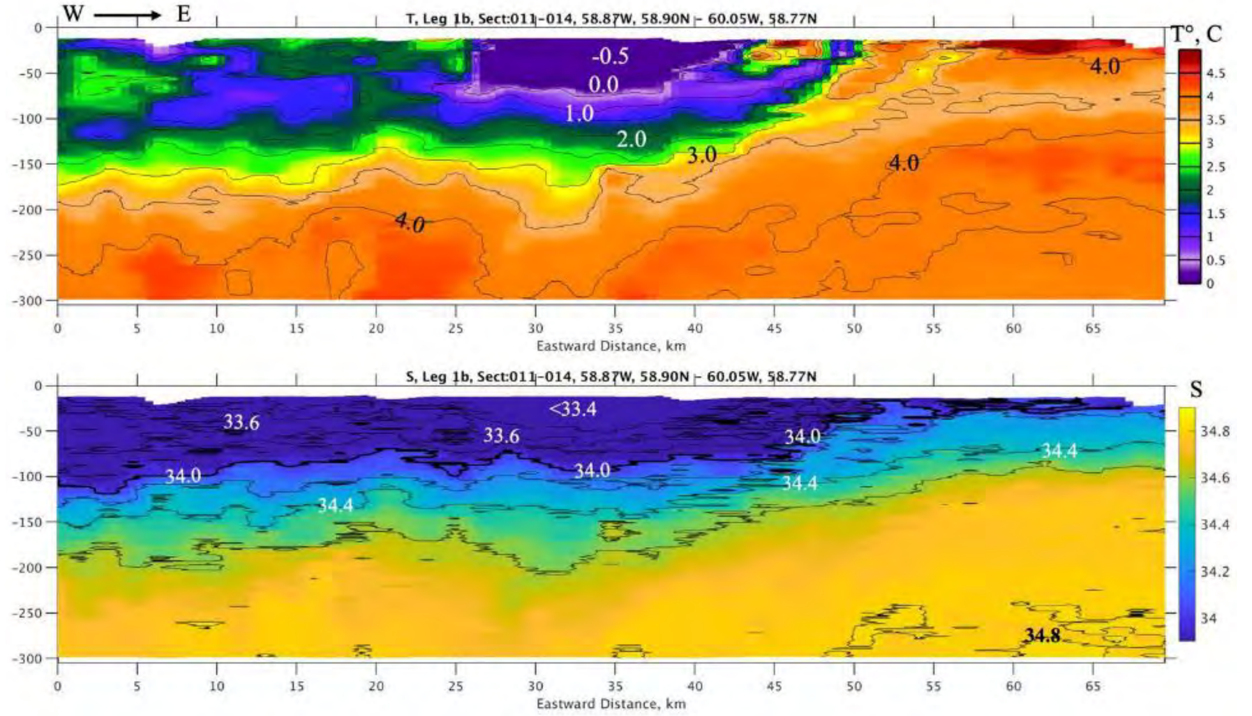


Figure 5-21 Vertical distribution of Temperature and Salinity along ISECOLD Transect 2 from the MVP observations.

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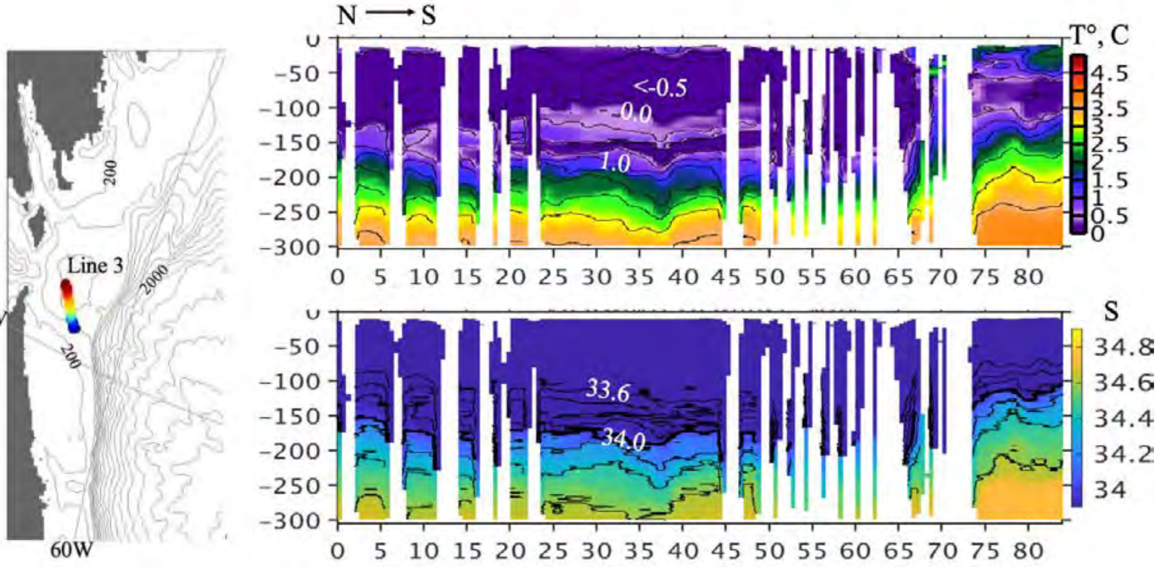

Figure 5-22 Vertical distribution of Temperature and Salinity in the Davis Strait area from the MVP observations

5.2.8 *Long Term Deployments of Environmental Sensors*

Recovery Operations Summary

Deck box communications were successful with the acoustic releases of both moorings deployed in 2018 (Table 5-12) but only HiBioC-18 (Figure 5-24) was successfully recovered. The other mooring (HiBioB-18;Figure 5-23) did not surface after it was released, nor was it observed in the water column using multibeam. It was therefore believed to have broken free from the mooring weights prior to the arrival of the Amundsen, leaving the acoustic releases on the bottom.

All instruments from the successfully recovered mooring were removed and downloaded. The sediment trap collected the maximum possible number of sediment trap samples and were processed and stored for further analysis. The remaining data will be reviewed upon return to shore.

Table 5-12 Mooring Deployment Summary 2018 from the CCGS Amundsen

Leg	Mooring ID	Latitude	Longitude	Depth (m)	Status
2c	HiBioC-18	60˚ 27.7893′ N	61˚ 09.564′ W	1020	Recovered
2c	HiBioB-18	60˚ 28.356′ N	60˚ 22.5408′ W	1983	Not Recovered

2019 Deployments

HiBioC-19 (Figure 5-25;Table 5-13) was deployed with a new AZFP (Marine Institute), new EdgeTech Port LF releases (Marine Institute) and other equipment such as an AMAR hydrophone (DFO), a sediment trap (Amundsen Science) and larval settlement plates (MUN).

HiBioA-19 (Figure 5-26; Table 5-13) was to be deployed using equipment from the recovered HiBioB-18 mooring. The unfortunate loss of this equipment during the HiBioB-18 deployment required that HiBioA-19 was deployed without a current profiler and an AMAR.

Both 2019 moorings were deployed with satellite beacons (Marine Institute) and also with single point current meters with auxiliary oceanographic sensors (Amundsen Science).

Table 5-13 2019 HiBio Project Mooring Deployments from the CCGS Amundsen

Leg	Moorin ID	Latitude	Longitude	Depth (m)
1b	HiBioC-19	60° 27.843′ N	61° 09.469′ W	1025
1b	HiBioA-19	60° 28.2738′ N	60° 16.1043′ W	516

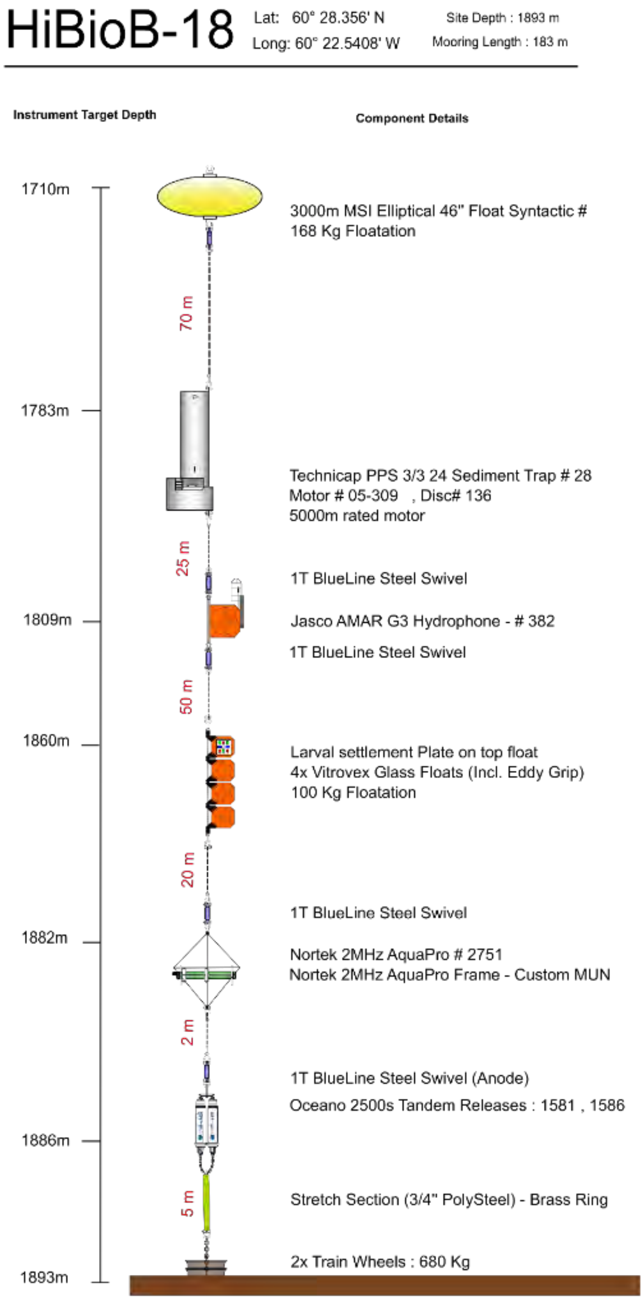

Figure 5-23 Mooring schematic for HiBioB-18

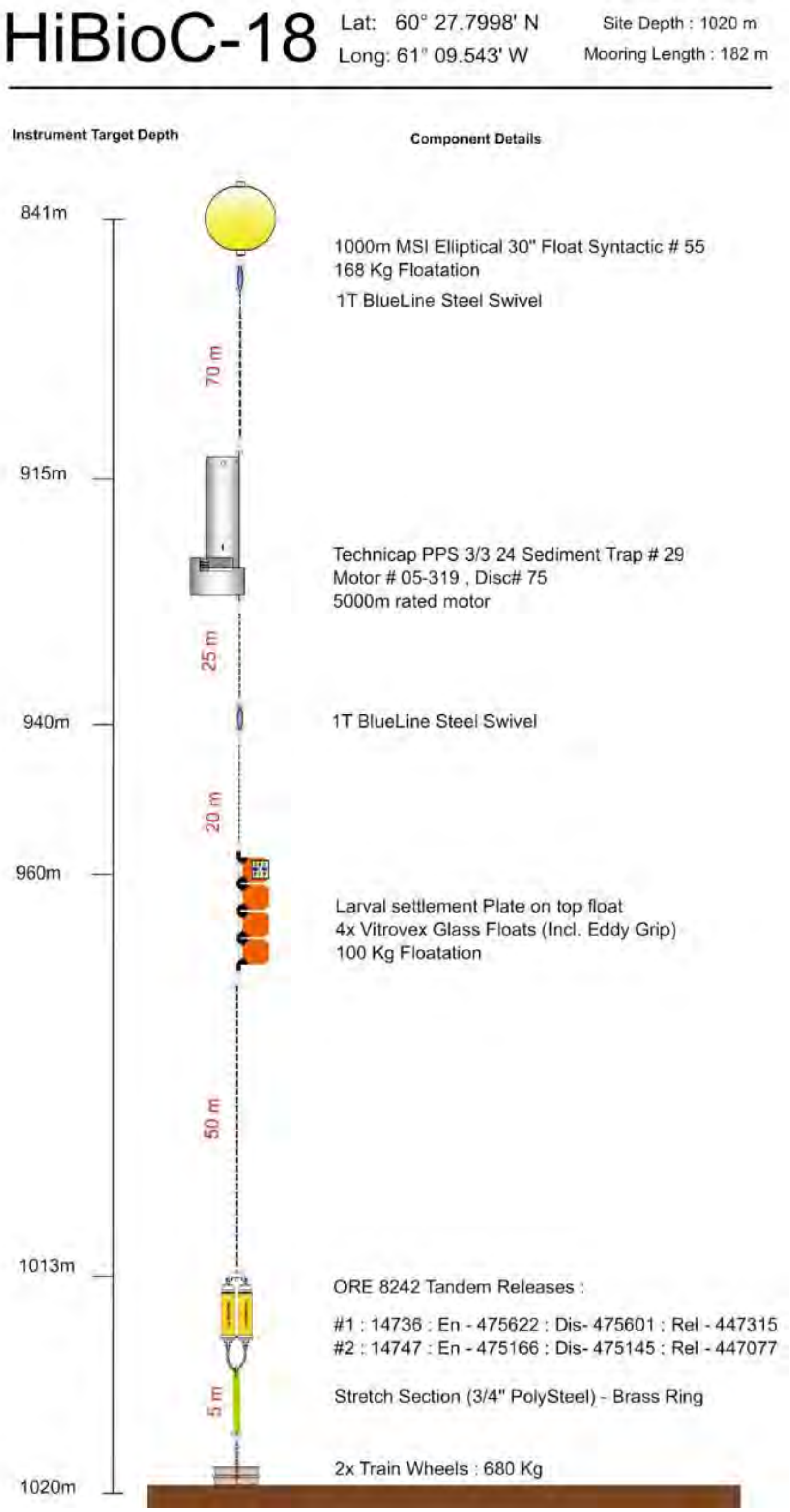

Figure 5-24 Mooring schematic for HiBioC-18

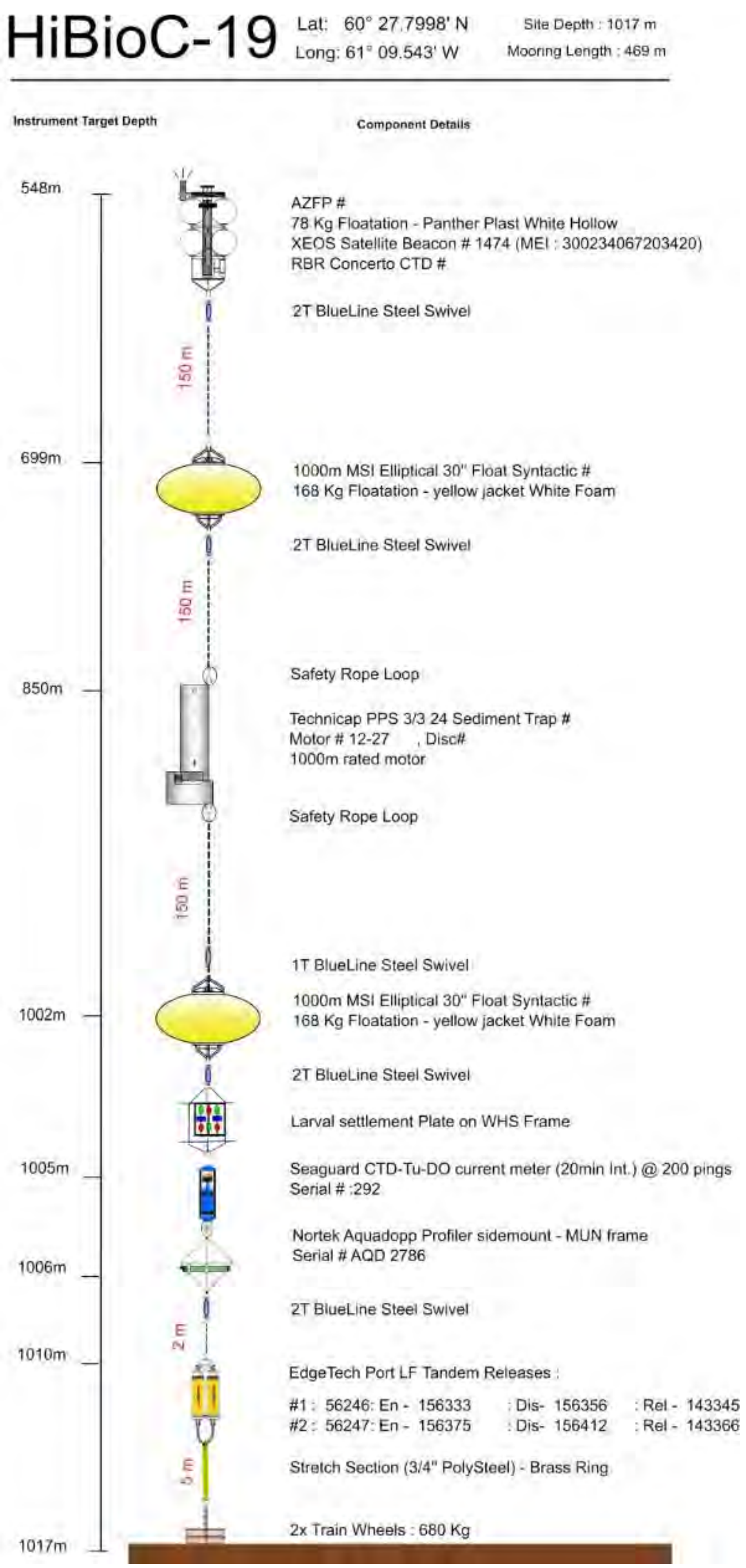

Figure 5-25 Mooring schematic for HiBioC-19

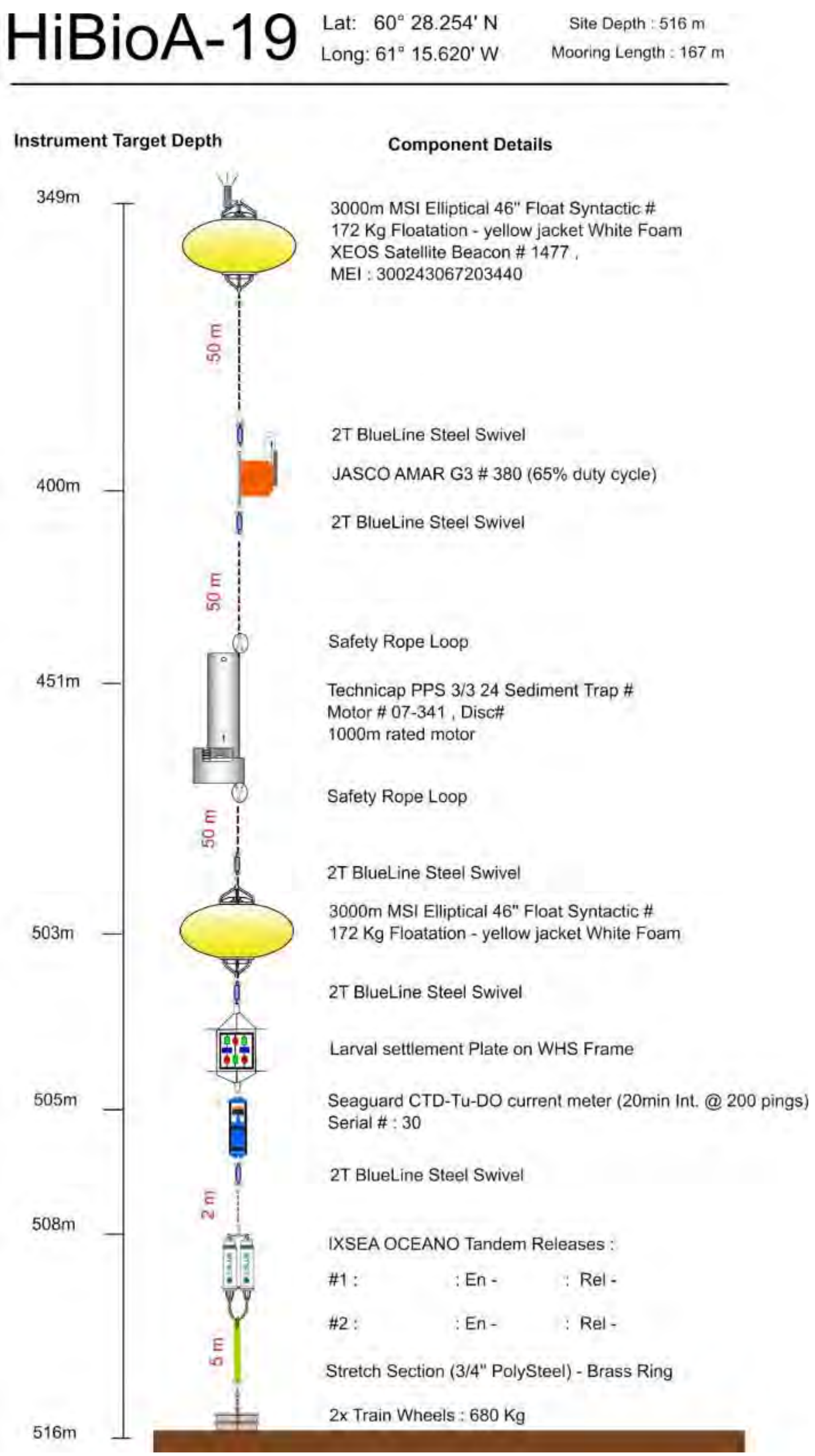

Figure 5-26 Mooring schematic for HiBioA-19

5.2.9 *Multi-Beam Habitat Mapping*

The mapping of the seabed is an important objective of the ISECOLD program. Multi Beam Echo Sounding (MBSE) data was continuously acquired on a Kongsberg EM302 during all activities (Figure 5-27) within the Labrador Sea study area, except in cases where operational requirements required that it be turned off (i.e. when HIPAP was in use for drop camera activities). When in transit, routes were selected strategically in order to complement existing multibeam coverage. Extensive sea ice (Frobisher Bay) and rough seas affected the quality of the MBES for portions of the expedition. Overall, however, the multibeam worked well and generated new data in previously uncharted areas. Post-processing of these data will continue into 2020, after which these data will be shared with the Canadian Hydrographic Service (CHS) to update marine charts and will be available to guide future scientific activities.

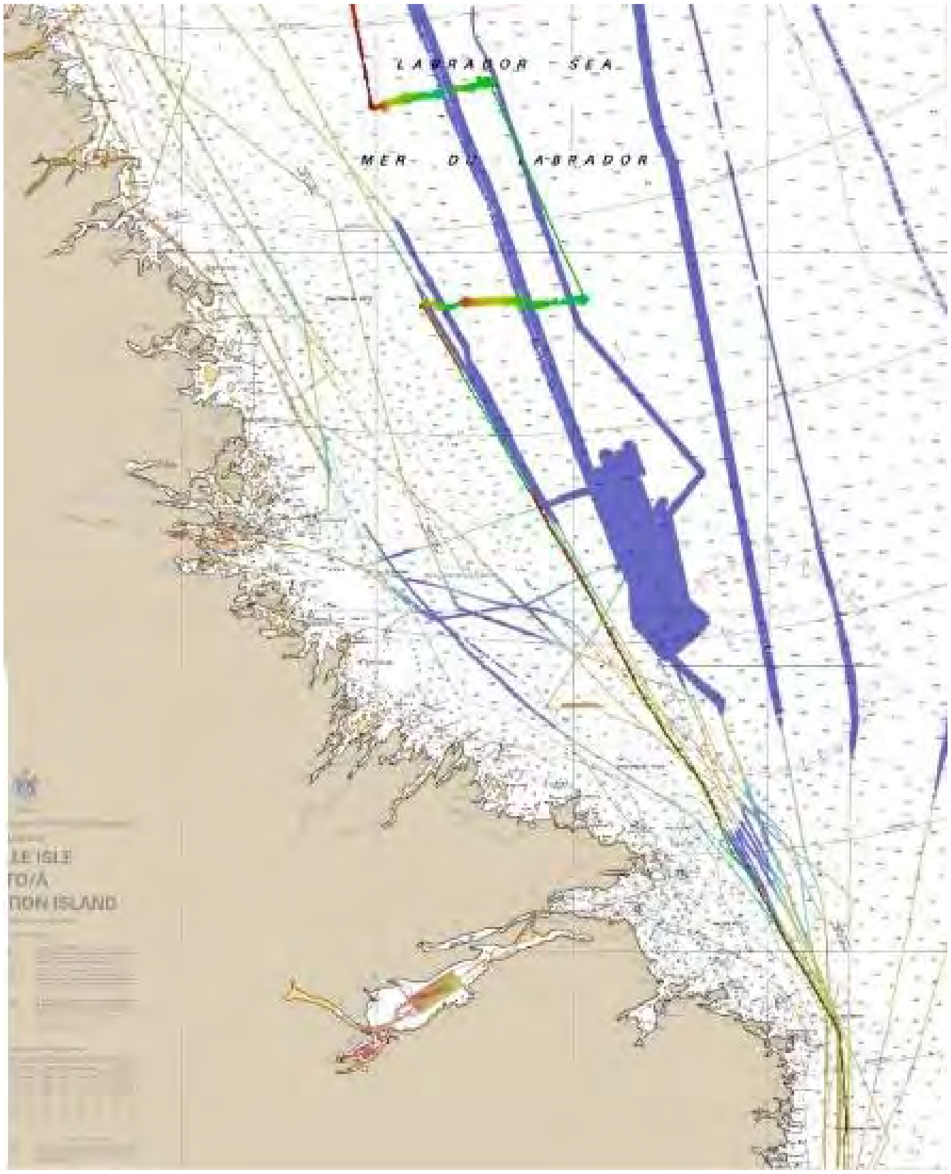

Figure 5-27 Multibeam Transit Lines from in the Labrador Sea. Leg 1b data collection is indicated by multi-colored tracks whereas previous mapping tracks are displayed in blue

5.3 References

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6 Development of A New Biogeochemical Biomarker for Sea Ice Algae

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Cruise participants – Leg 1b: Shao-min Chen[1]
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6.1 Introduction

Our objectives during this expedition are to collect seawater samples for nutrients and nitrate (NO_3) isotope analyses and size-fractionated phytoplankton, surface sediment, and sea ice algae for compound specific isotope analysis of amino acids (CSIA-AA). The samples for CSIA-AA will contribute to the development of a new biomarker to quantify the relative contribution of sea ice algae and phytoplankton to export production, which forms part of Chen's Ph.D. thesis. The results of CSIA-AA will be compared with those of nutrients and NO_3 isotope analyses which links the sea ice algae productivity to nutrient and nitrogen (N) dynamics in the environment.

6.2 Methodology

6.2.1 *Rosette Water Sampling*

Seawater samples were collected at each DFO-full station as well as some mooring/lander stations using a CTD-rosette sampling system (Table 6-1). These samples will be analyzed for nutrients by Dr. Kumiko Azetsu-Scott at Bedford Institute of Oceanography, $d^{15}N\text{-}NO_3$ isotope analysis by Dr. Owen Sherwood, and compound-specific isotope analysis of amino acids by Shao-Min Chen at Dalhousie University.

Nutrients

Acid-washed 10-ml tubes and caps were rinsed with sample water for three times. Sample was directly drawn from the Niskin bottle until ¾ full and placed in a dark bag. All the samples were stored upright in a -20℃ freezer after sampling.

$D^{15}N$-NO_3 Isotope Analysis

For depths that were 200 m or shallower, samples were filtered through 0.2 µm filters into the 60-ml bottles. Syringe was rinsed twice and filled with sample water using a tubing. Filter and bottle were rinsed twice with filtered sample water using the syringe. Filtered sample was drawn into the bottle until the shoulder (60 ml). For depths that were deeper than 200 m, bottle was rinsed for three times with sample water and filled up directly from the Niskin bottle. All the samples were stored at -20℃ after sampling. Help was received from David Cote (Fisheries and Oceans Canada), Catherine Young (Memorial University), Rebecca Evans and Amy McAllister (Memorial University), Lauren O'Dell and Kanae Komaki (Amundsen Science) for both nutrients and NO_3 isotope sampling.

Size-Fractionated Phytoplankton

During the CTD cast at each station, deep chlorophyll maximum (DCM) depth was determined. Ten or twenty liters of seawater from the surface, half-DCM depth, and the DCM were collected for size-fractionated filtration. Sample from each depth was filtered through 180 µm and 20 µm nylon filters, and 3 µm and 0.2 µm polycarbonate filters in sequence using a pump (Cole-Parmer) for a maximum period of 10 hours (Figure 6-1). The approximate filtered volume of each sample was recorded at the end of the filtration. After the filtration, each filter was removed from the filter holder, packed into a piece of tin foil, placed in a plastic bag and kept frozen at -20℃. The filtration system as well as the sample jugs was rinsed with fresh water after each filtration.

Figure 6-1 Overview of the filtration system (A). The setup of the pump for filtering 3 samples at the same time (B) and the 4 different-size filters in the filter holders for each sample with 180 µm filter at the near-pump end and 0.2 µm filter at the near-bucket end (C). Samples were covered by a dark bag during the filtration.

Table 6-1 Nutrients, $d^{15}N$-NO_3, size-fractionated phytoplankton samples collected from the CTD-Rosette and core-top sediment samples collected from the box cores during the expedition. Depth here is the bottom depth from the rosette log. Samples taken are marked by symbol "x".

Station ID	**Date**	**Depth (m)**	**Nutrients**	**$D^{15}N$-NO_3**	**Size-fractionated phytoplankton**	**Core-top sediment**
ISECOLD 1-500	20190625	599	x	x	x	x
ISECOLD 1-1000	20190625	1013	x	x		x
ISECOLD 1-1500	20190626	1464	x	x	x	x
ISECOLD 1-2000	20190627	1993	x	x		
ISECOLD 1-2500	20190628	2490	x	x	x	x
ISECOLD 2-2500	20190628	2396	x	x	x	x
ISECOLD 2-2000	20190629	1945				x
ISECOLD 2-1500	20190630	1515	x	x	x	x
ISECOLD 2-1000	20190630	1021				x
ISECOLD 2-500	20190630	529				x
ATLAS Non-Sponge 3 Lander	20190701	573	x	x	x	
HiBio-B	20190701	1914				x
HiBio-A	20190702	1055	x	x	x	

6.2.2 *Core-Top Sediment Sampling*

Core-top sediment samples were taken from box cores at DFO-full stations (Table 6-1; Figure 6-2). Several spoonsful of sediment were collected from the undisturbed top 1-cm surface of each box core by Rebecca Evans (Memorial University). The sediment was transferred to a glass jar and stored at -20℃.

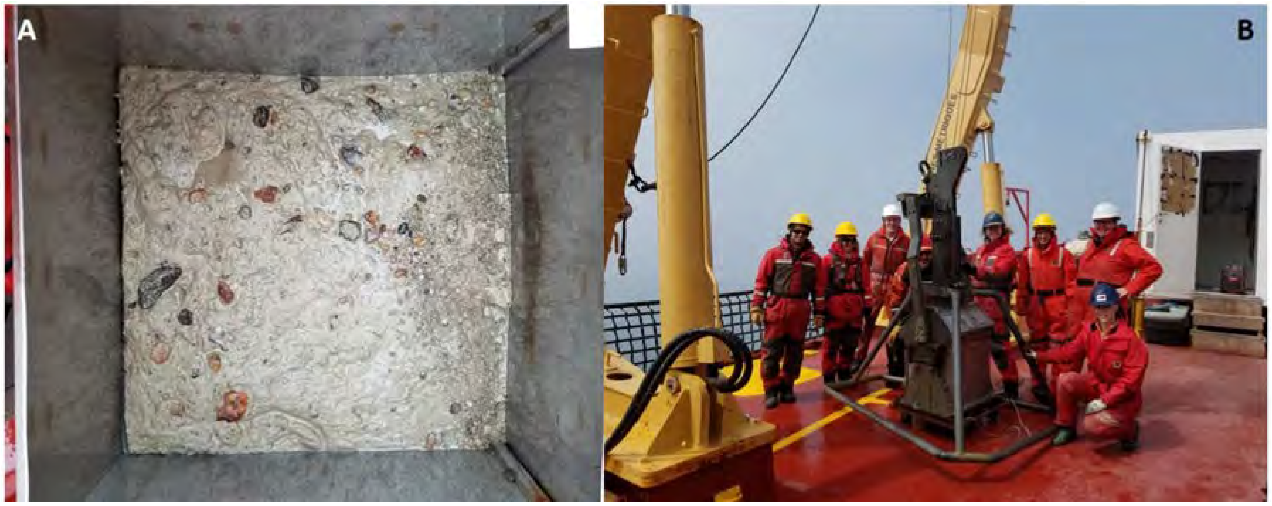


Figure 6-2 The surface of a box core (A) and the box core sampling team with the box core sampling gear (B). © Erin Herder.

6.2.3 *Sea Ice Sampling*

Sea ice pieces were collected directly from the surface in a cage (Figure 6-3) and melted at room temperature in dark. About 500 mL melted ice was filtered through 3 μm and 0.2 μm polycarbonate filters each time. Filters were stored at -20℃.

Figure 6-3 Sea ice sampling in the cage with the help from a crew member. © Alex Ingle

7 Deployment of BGC ARGO Floats

Project leaders: Marcel Babin[1] (marcel.babin@takuvik.ulaval.ca)

Cruise participants – Leg 2a: Claudie Marec[2] and José Lagunes[1]

[1] Takuvik, Université Laval, Québec, QC, Canada

7.1 Introduction

During the Amundsen's AN19 legA cruise, we deployed 2 BGC (biogeochemical) Argo floats (Proice), as well as 2 Arvor-ice Argo floats provided by CORIOLIS. Proice floats are autonomous platforms used to record the "ice edge spring and fall blooms", equipped with numerous sensors dedicated to characterize the water column. During its life (at least 3 years depending on the frequency of profiles) a float drifts following oceanic currents (Lagrangian ARGO float) and profiles between the surface and down to the bottom (or a programmed depth: 1000m in our case) then back to the surface. When in the surface, the float is geo-localized and transmits its data using the Iridium communication system.

Basically, two Ice detection systems are implemented on the Proice floats to ensure a safer navigation in icy waters (avoid surfacing when ice is present). An upward-looking altimeter will detect thick ice and icebergs, additionally an algorithm based on sea-water temperature (ISA Ice Sensing Algorithm) will be an indicator of the presence of sea-ice.

7.2 Methodology

Proice floats and 2 Arvor-ice floats were deployed from the ship's A frame. Two different areas for deployment were previously chosen after a study of the global Baffin Bay circulation (thanks to E.Rehm's simulations-Takuvik). Taking into account the global cyclonic circulation in BB, the chosen strategy is to avoid the floats to be ejected from BB through Davis' straight.

These theoretical positions were chosen according to those discussions and previous studies about the currents in the area (Tang et al, 2003). A daily study of geo-referenced Radarsat ice maps received onboard helped (thanks to Philipp Mann) to survey ice conditions in the center East of Baffin Bay and make sure our deployments take place within an ice-free area. Besides composite maps from remote-sensing (AMSR2 for sea-ice concentration and MODIS for chla concentration) were daily generated by Takuvik (thanks to P.Massicote-Takuvik).

It was decided to deploy 2 batches of floats (2 in the first area (GreenEdge cruise) and 2 in the central Baffin Bay (this site is located in the very center of the cyclonic gyre in Baffin Bay). Previously, 4Argo floats were deployed in the same areas as during the Greenedge cruise in 2016, 7 floats during AN172B and 2 more during IPS18. Hereafter, is the description of their parameters.

7.2.1 *Description of the Floats and their Scientific Payload*

Each float is equipped with the following sensors:

- CTD,
- Radiometer: OCR wavelengths:380, 412, 490nM, PAR,
- fluorescence chla,
- fluorescence CDOM,
- Backscattering,
- Suna (nitrates),
- Optode (Oxygen)

- **Proice takapm018b** (WMO 6902967) deployed on 14th, July 2019

lat: 69°29,985'N / Long 61°00,046'W bathymetry 1780m

- **Arvor-ice** (WMO6902952) deployed on 14th, July 2019

lat: 69°29,987'N/ Long 60°59,921W bathymetry 1782m

- **Proice takapm004B** (WMO 4901806) deployed on 17th, July 2019

lat: 72°45,464'N / Long 66°59,723'W bathymetry 2369m

- **Arvor-ice** (WMO 6902727) deployed on 17th, July 2019

lat: 72°45,385'N / Long 67°00,598'W bathymetry 2369m

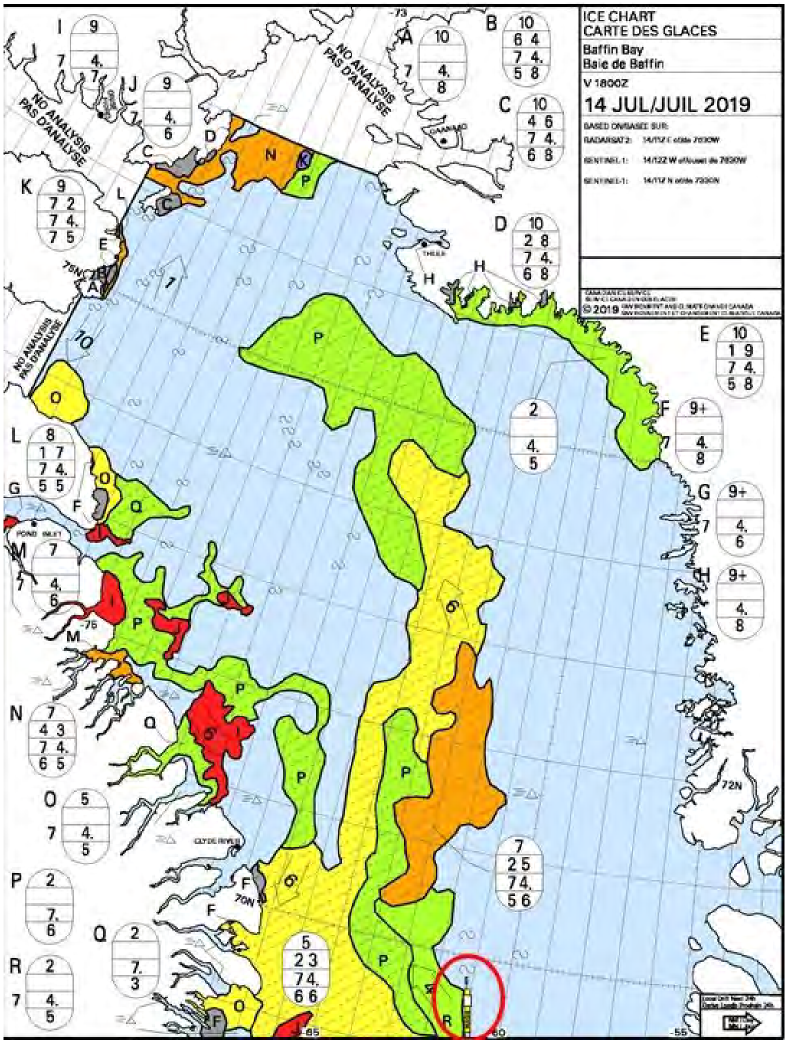


Figure 7-1 1st area for deployments: ice cover (based on Radarsat) courtesy P.Mann

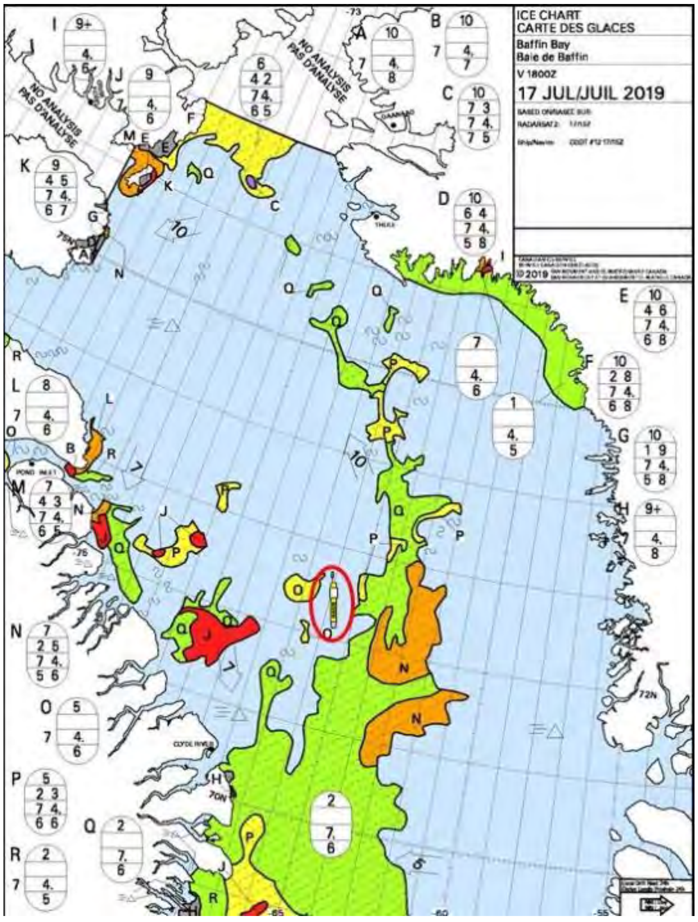


Figure 7-2 2nd area for deployments in Central Baffin Bay: ice cover (based on Radarsat) courstesy P. Mann

CTD casts were performed at both sites of deployment; as well as sampling for HPLC, chl*a*, Ultrapath (CDOM) . Nutriments, CDOM and chl*a* analysis were performed onboard to cross-calibrate sensors. Oxygen samples are analysed by the CTD team to verify the response of the CTD (helpful to cross-check the optode response of the float). BB2 is a full station were different operations and CTD casts were performed.

During this period, 2 Proice floats, came back to surface after their wintering period, the former after its second wintering period, the latter after its first.

7.2.2 *Note*

An incident occurred while lifting one of the floats with the crane from the fore-storage onto the starboard side of the front deck. The box was lifted using slings, however these were secured using the box's handles which are not certified for large charges. At a height of 2m, the handles detached from the box and the box fell. The float came out of the box and the following damages were assessed: Metal cage bent and outside bladder protector broken. After testing the system for further mechanical or internal damages in both the float's body and sensors, no harm was found other than what was already described. However; weak spots were found around the lower bladder, deep as 1mm and completely independent from the incident described before. Following the manufacturers's advise, a decision was made not to deploy this float due to the state of the bladder. At this time, one the ship's senior engineer had already repaired the metal-cage and provided a solution for the outside bladder protection. The float will be returned to the manufacturer's where it will be made fit for deployment next year.

7.3 **Preliminary Results**

Since their deployment, the sampling and navigation functionalities of all floats have worked as expected and continue to do so (see figure underneath). Data are daily collected on a remote server and made available to the scientific and general community. Their diving pattern was adapted because of a drifting foe arriving on their proximity zone. However, a mis-programming of takapm004b will delay its 1srt surfacing to mid-August.

The Proice floats are programmed on a seasonal pattern and profile the water column daily down to 1000m until fall (ice covering) arrives. During wintertime, they will park profiling once per week (without surfacing due to seasonal ice-cover). Thanks to a bi-directional satellite (Iridium) communication system, it is possible to modify the pattern of the floats and the resolution of their sensors.

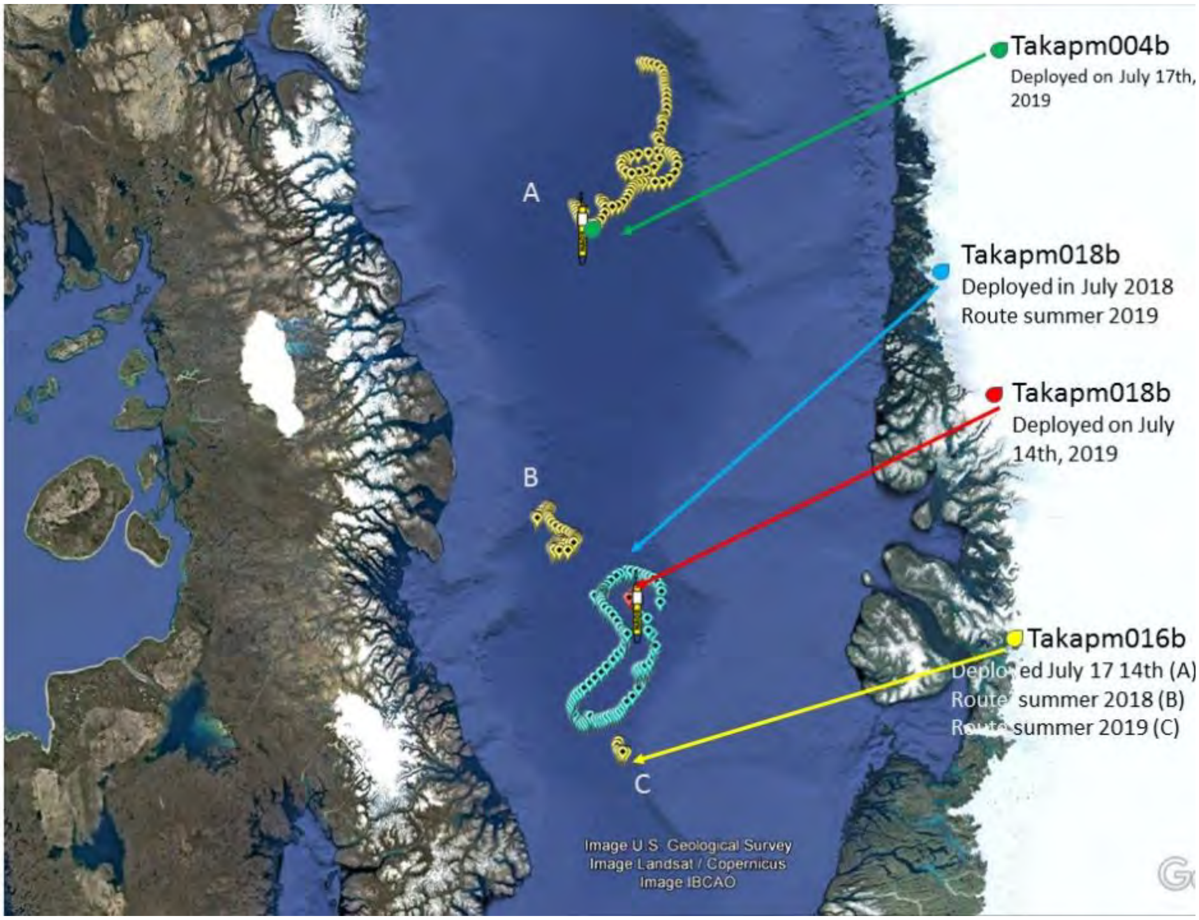


Figure 7-3 Routes of the Proice from deployment until the end of leg2A (takapm016b deployed in 2017, takapm020b, deployed in 2018 and takapm004b /takapm018B deployed in 2019), Arvor-ice floats are not represented here

7.3.1 *Amount and Type of Data Collected*

Geo-localized data from the floats are presently being collected once a day. The frequency of the profiles will vary accordingly to the month, as described in Table 1. The criteria used to produce this schedule were ice cover conditions in Baffin Bay throughout the year and phytoplankton bloom period. This year, the plan for drifting and profiling accounts for a total annual number > 150 profiles per float.

Table 7-1 Profiling schedule for deployed ProIce floas, in number of profiles per month.

Month	No. of Profiles/month	Month	No. of Profiles/month
January	3 to 4	July	17*

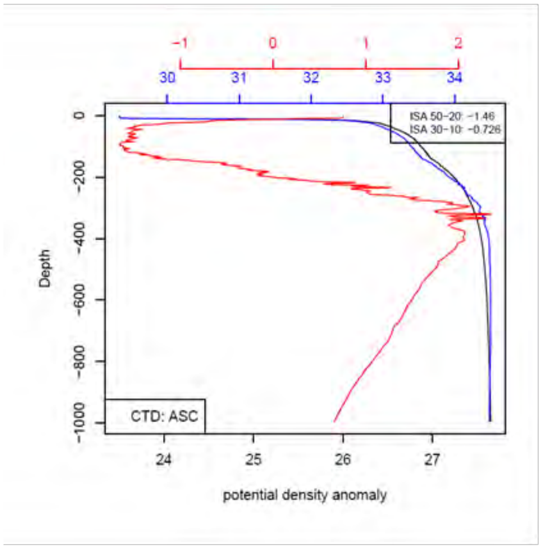
February	3 to 4	August	31
March	3 to 4	September	30
April	3 to 4	October	30
May	3 to 4	November 1-15	15*
June	3 to 4	November 16-30	2*
		December	3 to 4

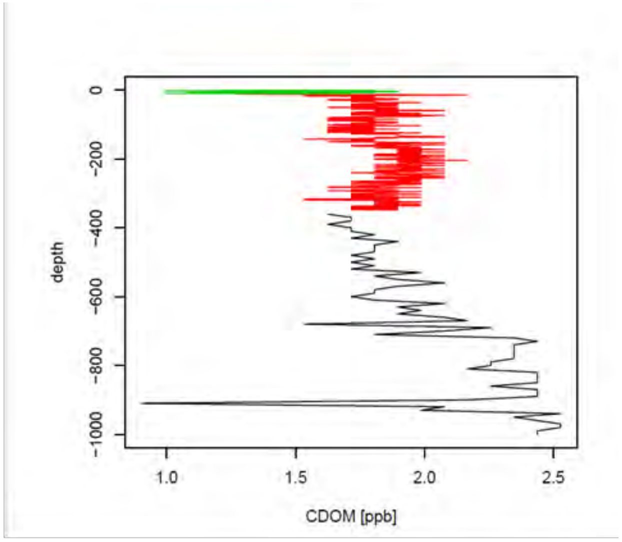
These profiles will provide data from the different sensors measuring the water column between 1000m and surface. The resolution of each sensor is set accordingly to specific depths, for instance high resolution in the euphotic zone, compared to the depth layer between 1000m and 350m. This is best described in Table 2, where the sampling rate of the sensors previously commented are modified while ascending through the water column. The last depth zone is activated whenever a 2000m bathymetry is available.

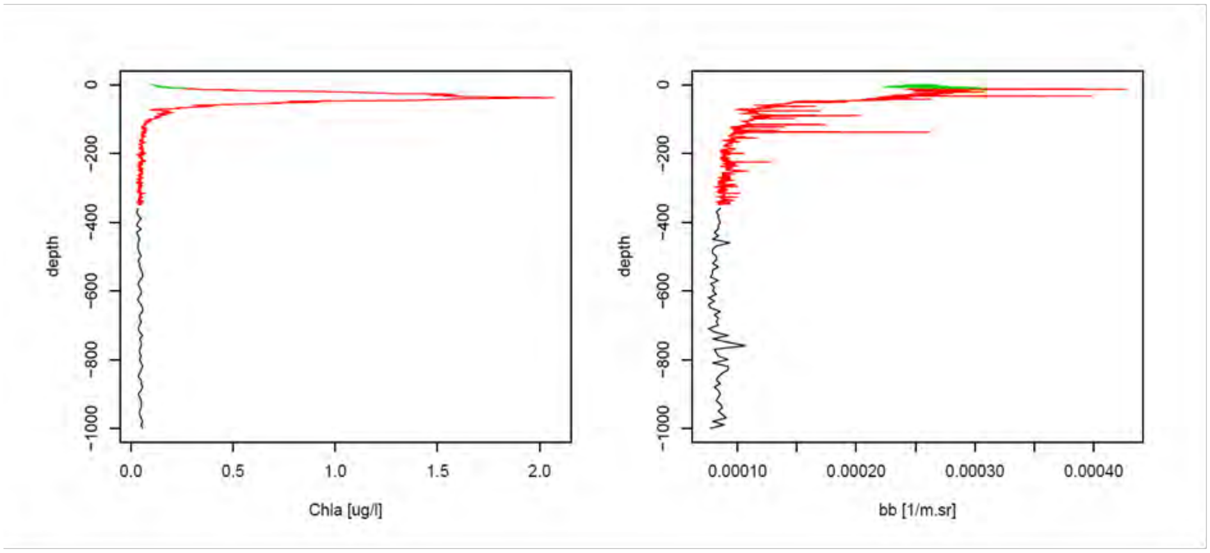
Table 7-2 Scientific payload sampling rate for the month of September, the last zone is enabled whenever a 2000m bathymetry is available .

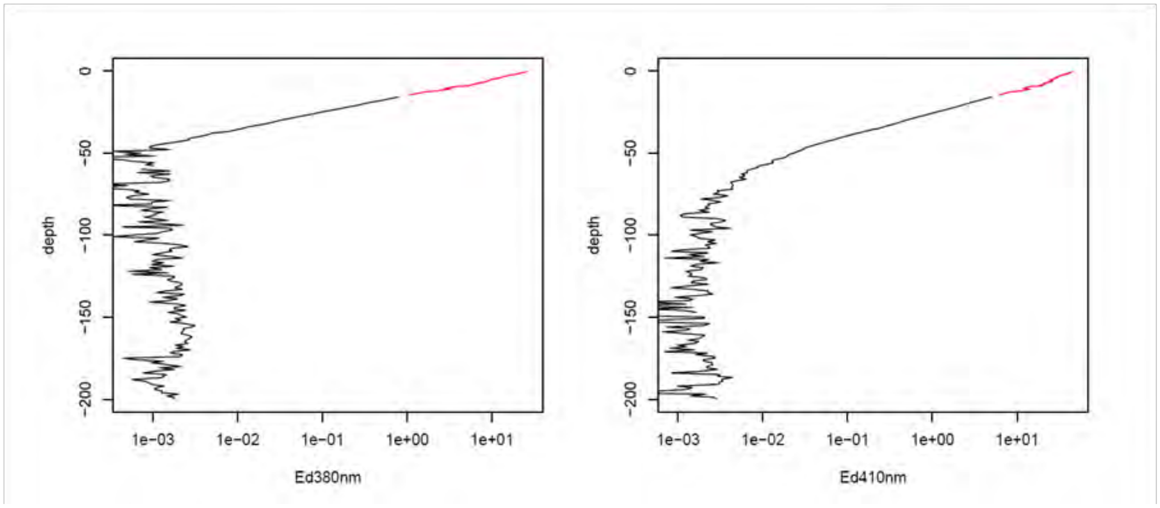
Sensor	0-10	0-15	10-350	0-70	15-200	70-350	350-1000	200-1000	1000-2000 (occas.l)
CTD	1	-	1	-	-		10	-	50
OCR	-	0,2	-	-	1		- nightcast=1	-	-
ECO	0,2	-	1	-	-		1	-	10
Optode	1	-	1	-	-		10	-	50
Suna	-	-	-	2	-	10	50	-	50

Data from the floats have been readily available since their deployment. Figure 5 and 6 show an example of preliminary of data sent back by the **takapm018b** (July, 17th 2019).


-1
0
1
2
30
31
32
33
34
ISA 50-20: -1.46
ISA 30-10: -0.726
Depth
0
-200
-400
-600
-800
-1000
CTD: ASC
24
25
26
27
potential density anomaly


depth
0
-200
-400
-600
-800
-1000
1.0
1.5
2.0
2.5
CDOM [ppb]


depth
0
-200
-400
-600
-800
-1000
0.0
0.5
1.0
1.5
2.0
Chla [ug/l]
depth
0
-200
-400
-600
-800
-1000
0.00010
0.00020
0.00030
0.00040
bb [1/m.sr]


depth
0
-50
-100
-150
-200
1e-03
1e-02
1e-01
1e+00
1e+01
Ed380nm
depth
0
-50
-100
-150
-200
1e-03
1e-02
1e-01
1e+00
1e+01
Ed410nm

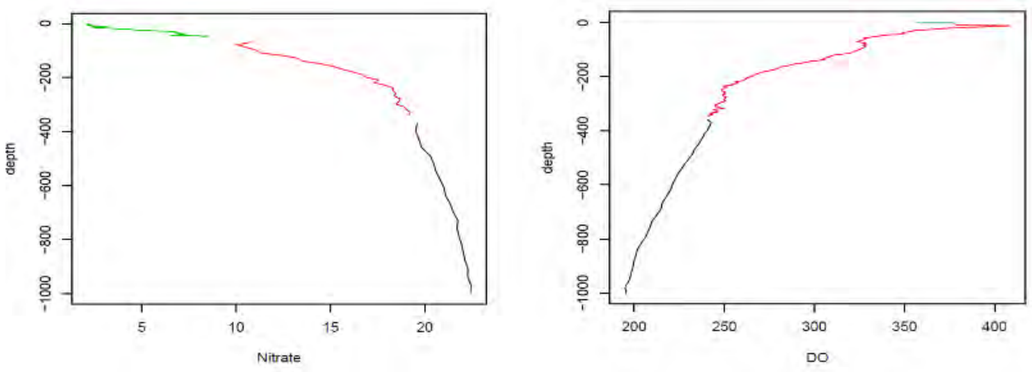


Figure 7-4 Top left: temperature, salinity and potential density anomaly Top right: CDOM (Colored dissolved organic matter). Middle left: proxy of Chlorophyll-a concentration. Middle right: back-scattering.. Data from the 3 radiometers and the PAR sensor (Photo-synthetically Available Radiation). Bottom left: Nitrate. Bottom right: Dissolved Oxygen

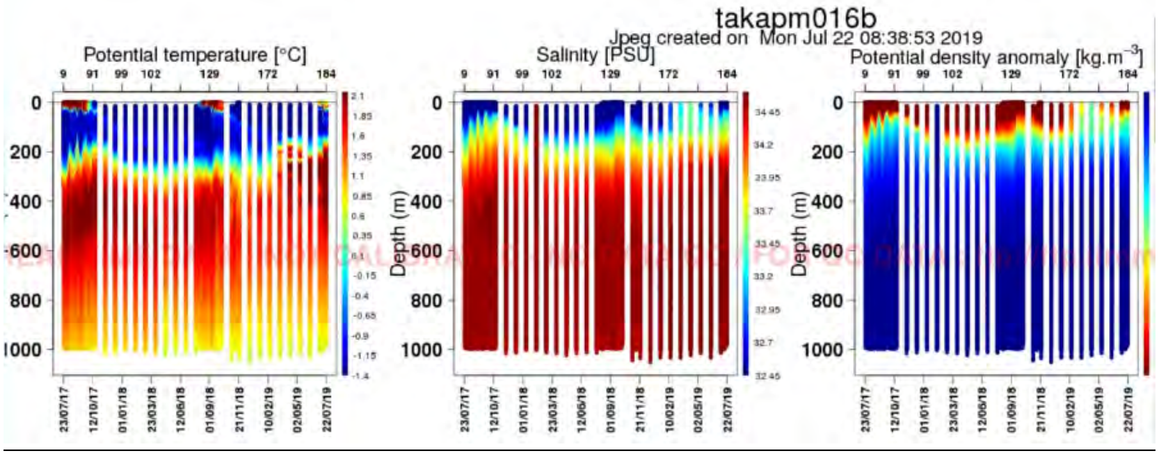


Figure 7-5 A 2 years duration time series (Temperature, Salinity, Density) recorded by Takapm016b since its deployment until July 22th, 2019

7.3.2 *Plans for Scientific Analysis and Publication*

Several publications are expected to follow with the readily available data sent back by the floats launched in 2016, in 2017, 2018 and 2019. Since these are the first Argo floats to be deployed in Baffin Bay, their data is greatly expected and it will join the large data base of the Argo community.

Dissemination of the results so far:

- Lagunas, J. et al. Sea-ice detection for autonomous underwater vehicles and oceanographic lagrangian platforms by continuous-wave laser polarimetry. SPIE Proceedings, **2018**

- Smith, G.C., R. Allard, M. Babin, L. Bertino, M. Chevallier, G. Corlett, J. Crout, F. Davidson, B. Delille, S.T. Gille, D. Hebert, P. Hyder, J. Intrieri, J. Lagunas, G. Larnicol, T. Kaminski, B. Kater, F. Kauker, C. Marec, M. Mazloff, E.J. Metzger, C. Mordy, A. O'Carroll, S.M. Olsen, M. Phelps, P. Posey, P. Prandi, E. Rehm, P. Reid, I. Rigor, S. Sandven, M. Shupe, S. Swart, O.M. Smedstad, A. Solomon, A. Storto, P. Thibaut, J. Toole, K. Wood, J. Xie., Q. Yang, and the WWRP PPP Steering Group, **2019**. Polar Ocean Observations: A Critical Gap in the Observing System and its effect on Environmental Predictions from Hours to a Season. Frontiers in Marine Science. Frontiers. DOI:10.3389/fmars.**2019**.00429

- Randelhoff A. et al., In prep. Year-long time series in phytoplankton phenology and physico-chemical forcings in the Arctic Ocean. GRL

- Babin M et al. In prep. The role of light and mixing in triggering and stopping the phytoplankton fall bloom in the Arctic Ocean. GRL

- Xing X., Lagunas-Morales J. Laboratory results on the dependence of dark current upon environmental temperature variability for Satlantic's OCR504 radiometers (Conference dec 2018: Optical Precision Manufacturing, Testing, and Applications)

- Lacour L. Australian BGC-Argo workshop nov**2018** Unexpected phytoplankton blooms in polar and subpolar environments as revealed by BGC-Argo floats (Australian Biogeochemical-Argo workshop (nov 2018)oral)

- Lacour L. Australian BGC-Argo workshop nov**2018** Canadian contribution to the international BGC-Argo program in the Arctic (Australian Biogeochemical-Argo workshop (nov 2018)oral)

- Babin M., (pres. by Marec C.) Préliminary scientific results with PRO-ICE BGC-Argo (2018 NAOS Annual meeting, Paris, 13-14 september **2018**)

- Marec C., Lagunas J. (pres. by Marec C.) PRO-ICE BGC-Argo in Arctic (2018 NAOS Annual meeting, Paris, 13-14 september **2018**)
- Contribution to a presentation of INTAROS by Stein Sandven (Arctic Summit Science Arkangelsk, Russia 202-30mai **2019**).
- Randelhoff A. Contribution to a presentation Scientific evaluation of Takuvik by CNRS 17-19 April **2019** "le phytoplankton sous la banquise: plus que l'efflorescence printannière"
- Contribution to a presentation by Blair Greenan "BGC-Argo activities in Canada " (BGC Argo-ST Hangzou March **2019)**
- Poster (Tejana Ross 6th Argo Science Workshop, Tokyo October **2018**): contribution of TAKUVIK/NAOS to BGC Argo Canadian effort.
- Newsletter #5 biogeochemical ARGO (C.Marec , M.Babin) september **2018** http://biogeochemical-argo.org/

7.4 Acknowledgment

Alexandre Forest, Jonathan Gagnon, Rémi Amiraux, Philipp Mann, the CTD operators and crew members of the Amundsen other for their help regarding this operation and Emmanuel Devred (BIO).

8 Sea Bed Lander Recovery, Labrador Sea

Project leaders: Dick van Oevelen[1] (Dick.van.Oevelen@nioz.nl)

Cruise participants – Leg 1b: Graham Tulloch[2]

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[2]British Geological Survey, Lyell Centre, Edinburgh, Scotland

8.1 Introduction

Graham Tulloch, an EU-ATLAS partner from the British Geological Survey in Edinburgh, joined the CCGS *Amundsen* in Saint Anthony, Newfoundland, to recover two sea landers deployed in August 2018, housing data recording instruments.

The deployed instruments include a sediment trap, Aquadopp current meter, flourometer and an Aanderaa system comprising turbidity, oxygen, pressure, conductivity and current sensors. They were deployed in the Labrador Sea, one each on a sponge and non-sponge location.

The location for the landers had been previously selected from video data collected during a 2016 CCGS *Amundsen* expedition. Although locations had been agreed and published in the "2018 Amundsen Expedition Plan" and later in an updated version of the "2018 CCGS *Amundsen* Expedition ROV dive plans", the precise location of the sites was planned to be finalised by viewing pre-deployment ROV footage. Unfortunately, although this was possible for site 1 (Non-sponge Site 3), due to a mechanical issue with the ROV it was not possible for the second site (Sponge site 3) and therefore the 2016 footage was reviewed and a location selected from that.

8.2 Methodology

8.2.1 *Tuesday 23rd June*

Graham Tulloch joined vessel, checked equipment was on board and location of the various packing boxes for future reference.

8.2.2 *Monday 1st July*

Non Sponge Site

08:35 local / 12:35 GMT: Lander #1 recovered.
Position - 59 22.8942 N 060 16.6939 W, in 554 m.
ORE PORT releases #36506 & 34604

The weather was perfect to recover the lander: visibility was clear and with little wind the sea was calm. Following the experience during deployment and despite the ORE Deck Box being sent for service, the Amundsen Science box and cable were put on stand by. As the helicopter was being used for outreach purposes, it was agreed to signal the lander to ensure we could communicate with it before stopping for breakfast then deploy the helicopter and recovery Zodiac. The Enable codes were sent to both releases and no replies were received using the Atlas equipment following three-minute waits for each unit. Using the Amundsen Science box a response was received from PORT #36506 within 15 seconds. A Toolbox Talk was held.

The release code was sent and the lander spotted on the surface in just over 10 minutes. The Range function on the box was used to monitor the progress of the lander through the water column. Recovery to deck was carried out without professionally and without any problems. Luc Michaud from Amundsen Science assisted to de-rig the equipment from the lander and G Tulloch removed the BIO, Dartmouth, collecting plates and placed them in the buckets provided with ethanol.

Work continued throughout the day to clean and pack the equipment.

8.2.3 *Tuesday 2nd July*

Sponge Site

18:00 local / 00:10 GMT: Lander #2 recovered
Position - 60 28.1008 N 61 17.2645W, in 410 m.
#36507 & 34603 were attached to the lander

The wind and sea were slightly higher than yesterday, however it was still a good day to recover the lander: visibility was clear and the waves low. The Enable codes were again sent to both releases using the Atlas box without success and so the Amundsen Science box a response was used and a responses received from PORT #36507 within 15 seconds. The recovery Zodiac was launched, the release code was sent and the lander was seen on the surface in just over 10 minutes. The Range function on the box was used to monitor the progress of the lander through the water column. G Tulloch removed the BIO, Dartmouth, collecting plates and placed them in the buckets provided with ethanol.

8.2.4 *Wednesday 3rd July*

G Tulloch removed and washed the instruments from the second lander and continued to pack equipment in preparation for disembarking on Friday 5th.

8.2.5 *Thursday 4th July*

Downloaded the data from the Aanderaa and Aquadopp with the help of Kanae Komaki and completed the packing of boxes and moved these to the appropriate locations for stowage until the demob in Quebec City.

8.2.6 *Friday 5th July*

Left ship by Helicopter for Iqaluit airport.

8.2.7 *Recovery*

Recovery of both landers was carried out without incident. The Amundsen Science ORE Deck Box was used to release the PORT units as they were not able to communicate with the Atlas box.

Although the seas were higher for the recovery of the second lander, compared with the previous day, which was almost flat calm, the strong current experienced during the deployment was not present. This made the boat operations safer and more straight forward, although piloting the Zodiac still had to be carefully carried out.

Figure 8-1 Lander #2 recovery. Photo Graham J. Tulloch

8.3 Acknowledgment

Thanks must be given for the help and assistance provided by many people both prior to the offshore phase and during:

Firstly I would like to thank ArcticNet for giving us the opportunity to recover these instruments during this expedition. Thanks also for the skill and experience shown by Amundsen Science Chief Scientist and personnel and the CCGS Amundsen Officers & crew during the recovery of this equipment. The work was completed quickly, professionally and safely. Thanks must be given specifically to Barry MacDonald at BIO, Halifax NS for all the preparatory work including arranging for the service and repair of the equipment, sifting through the many boxes returned to him following the 2018 season. Also for arranging the loading of the necessary equipment and boxes on to the CCGS Amundsen to allow me to “just turn up”.

On board, the experience of the Bosun, Stephane Massicotte, and his teams was invaluable to the safe and successful recovery of the landers. Thanks also to Luc and his Amundsen Science team for practical assistance in the recovery and de-rigging the equipment from the landers.

Finally, to my shipmates a big thank you for your friendship and I wish you success with your research from your labours.

9 CTD-Rosette, LADCP and UVP operations – Legs 1, 2 and 3

Project Leader: Alexandre Forest[1] (alexandre.forest@as.ulaval.ca)

Cruise participants Leg 1a: Pascal Guillot[2], Colline Gombault[1] and Paco Ferrand[1]

Cruise participants Leg 1b: Camille Wilhelmy[1] and Karine Robert[1]

Cruise participants Leg 2a: Camille Wilhelmy[1] and Karine Robert[1]

Cruise participants Leg 2b: Pascal Guillot[2] and Lou Tisne[1]

Cruise participants Leg 3: Paco Ferrand[1] and Douglas Cameron[1]

[1]Amundsen Science, Université Laval, Québec, QC, Canada

[2] Québec-Océan, Université du Québec à Rimouski, Rimouski, QC, Canada

9.1 Introduction

The objective of this shipboard fieldwork was to characterize the water column physical and chemical properties: temperature, salinity, fluorescence, CDOM, dissolved oxygen concentration, nitrate concentration, light penetration and turbidity. A SBE 911 CTD was used in conjunction with various other sensors mounted on a cylindrical frame known as a Rosette. A 300 kHz Lowered Acoustic Doppler Current Profiler (LADCP) was attached to the frame to provide vertical profiles of the velocities on station. The Rosette was also equipped with Niskin bottles, which were used to supply water samples for biologists and chemists.

9.2 Methodology

9.2.1 *CTD – Rosette*

The Rosette frame is equipped with twenty-four (24) 12-litre bottles and the sensors described in table 1.

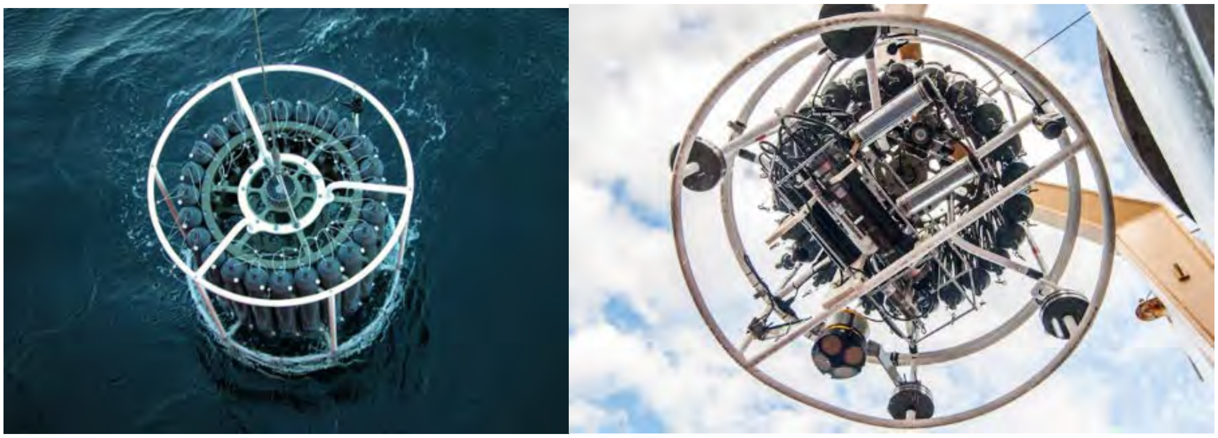

Figure 9-1 Top view of the SBE32 with 24x 12L Niskin bottles used on the *Amundsen* (left) and bottom view of the SBE32 showing the SBE9 CTD including additional sensors and the RDI LADCP (right). Photos : Jessy Barrette.

Table 9-1 Rosette Sensors

Instrument	Parameter	Properties	Serial Number	Calibration date	Leg
Sea-Bird SBE 911plus	CTD	Sampling rate : 24 Hz	09P24760-0679		All
SBE 3plus	Temperature	Range: -5°C to + 35°C Accuracy: 0.001	03P4318 03P4204	25-Oct-2016 25-Oct-2016	All
ParoscientificDigiquartz®	Pressure	Accuracy: 0.015% of full range	0679	12-Nov-2016	All
SBE 4C	Conductivity	Range: 0 to 7 S/m Accuracy: 0.0003	042696 042876	26-Oct-2016 26-Oct-2016	All
SBE 43	Dissolved Oxygen	Range: 120% of saturation Accuracy: 2% of saturation	430240	28-Oct-2016	All
SUNA	Nitrates	Range: 0.5 to 200 µM Accuracy: ± 2 µM	281		All
QCP-2300 Biosherical	PAR	PAR Dynamic Range: $1.4x10^{-5}$ to 0.5 µE/(cm^2 sec)	7270	02-Fev-2017	All
QCR-2200 Biosherical	Surface PAR	PAR Spectral Response: Equal (better than ±10%) quantum response from 400 to 700nm	20147	02-Fev-2017	All
Seapoint	Fluorometer	Minimum Detectable Level 0.02 µg/l Gain Sens, V/(µg/l) Range/(µg/l), 10x 0.33 15	SCT-3119 Nr 1 (bottom) SCT-3120 Nr 2 (top)	1-Jan-2016 15-May-2017	All
WetLabs C-Star	Transmissometer	Path length: 25 cm Sensitivity: 1.25 mV	CST-671DR	08-Jun-2017	All

Teledyne PSA-916	Altimeter	Range: 50 m from bottom	1044	Feb 2014	All
WetLabs ECO	fluorometer (CDOM)	FL(RT)D Digital output resolution : 14 bit Analog output signal: 0-5V Range: 0.09-500ppb Ex/Em: 370/460nm	FLCDRTD-2344	02-Apr-2017	All
SBE 18	pH	Measurement range 0 – 14 pH Accuracy 0.1 pH Time response 1 second	1251	15-Aug-2017	1a

Table 9-2 Sensors Specifications

Parameter	**Sensor**		**Range**	**Accuracy**	**Resolution**
	Compagny	**Instrument Type**			
Attached to the Rosette					
Data Logger	SeaBird	SBE-9plus [1]			
Temperature	SeaBird	SBE-03 [1]	-5°C à +35°C	0.001°C	0.0002°C
Conductivity	SeaBird	SBE-4C [1]	0-7 S/m (0-70mmho/cm)	0.0003 S/m (0.003mmho/cm)	0.00004 S/m (0.0004 mmho/cm)
Pressure	Paroscientific	410K-105	up to 10 500m (15 000psia)[2]	0.015% of full scale	0.001% of full scale
Dissolved oxygen	SeaBird	SBE-43 [3]	120% of surface saturation[4]	2% of saturation	unknown

Nitrates concentration	Satlantic	SUNA [6]	0.5 to 2000 μM	2 μM	0.5 μM
Light intensity (PAR)	Biospherical	QCP-2300			
sPAR	Biospherical	QCR-2200			
Fluorescence	Seapoint	Chlorophyll-fluorometer	0.02-150 □ g/l	unknown	30
pH	SeaBird	SBE 18	0-14 pH	± 0.1 pH	unkown
Transmissiometer	Wetlabs	C-Star	0-5 V	unknown	1.25 mV
Altimeter	Benthos	PSA-916 [7]	0 - 100 m	unknown	0.01 m
CDOM fluorescence	Wet Labs	FL(RT)D [7]	0.09-500ppb	unknown	14 bit

Notes: [1] Maximum depth of 6800m

[2] Depending on the configuration

[3] Maximum depth of 7,000m

[4] In all natural waters, fresh and marine

[5] Maximum depth of 1,200m

[6] Maximum depth of 2,000m

[7] Maximum depth of 6,000m

9.2.2 *Probes Calibration*

Salinity

Seabird CTD

Water samples were taken on several casts with 200 ml bottles. They were analyzed with a GuildLine, Autosal model 8400B. Its range goes from 0.005 to 42 PSU with an accuracy better than 0.002.

The analysis of the correlation between the CTD probe and the salinity samples will allow adjusting the profile values of salinity recorded with the SBE4C.

Seabird TSG.

Water samples were taken every day, during transits, from the surface thermosalinograph to measure salinity. The probe is located in the engine room. The samples were also analyzed with the GuildLine.

Oxygen

Oxygen sensor calibration was performed based on dissolved oxygen concentration measured in water samples using Winkler's method and a Mettler Toledo titration machine.

9.2.3 *Water Sampling*

Water was sampled with the rosette according to each team's requests. To identify each water sample, we used the term "rosette cast" to describe one CTD-rosette operation. A different cast number is associated with each cast. The cast number is incremented every time the rosette is lowered in the water. The cast number is a seven-digit number: xxyyzzz, with

xx : the last two digits of the current year;
yy : a sequential cruise number;
zzz : the sequential cast number.

For this cruise, the first cast number is: 1999001. To identify the twenty-four rosette bottles on this cast we simply append the bottle number: 1999001nn, where "nn" is the bottle number (01 to 24).

All the information concerning the Rosette casts is summarized in the CTD Logbook (one row per cast). The information includes the cast and event number and station id, date and time of sampling in UTC, latitude and longitude, bottom and cast depths, and minimalist comments concerning the casts (Appendix 3).

An Excel® Rosette Sheet is also created for every single cast. It includes the same information as the CTD Logbook plus a table of what was actually sampled and at what depth. Weather information and ice conditions at the sampling time is included in each Rosette. For every cast, data from three seconds after a bottle is closed to seven seconds later is averaged and recorded in the ascii 'bottle files' (files with a btl extension). The information includes the bottle number, time and date, trip pressure, temperature, salinity, light transmission, fluorescence, dissolved oxygen, irradiance and CDOM measurements.

All those files are available in the directory "Data₩Rosette" on the 'Data' folder on the Amundsen server. There are six sub-directories in the rosette folder.

- ₩Rosette₩log₩: Rosette sheets and CTD logbooks.
- ₩Rosette₩plots₩: plots of every cast including salinity, temperature, oxygen, light transmission, nitrate, fluorescence and irradiance data.
- ₩Rosette₩odv₩: Ocean Data Viewer file that include ctd cast files.
- ₩Rosette₩svp₩: bin average files to help multibeam team to create a salinity velocity profile.
- ₩Rosette₩avg₩: bin average files of every cast.
- ₩Rosette₩LADCP₩: LADCP post-process data results.

Lowered Acoustic Doppler Current Profiler (LADCP)

On Legs 1, 2 and 3, a 300 kHz LADCP (RD-Instrument Workhorse®) was mounted on the rosette frame in downward looking position. The LADCPs get their power through a battery installed on the rosette frame and the data is uploaded on the rosette acquisition computer connected to the instrument through a RS-232 interface after each cast. The LADCP are programmed in individual ping mode (one every second). The horizontal velocities are averaged over thirty-two, 8 m bins for a total (theoretical) range of 100 to 120 m. The settings are 57600 bauds, with no parity and one stop bit. Since the LADCP are lowered with the rosette, there will be several measurements for each depth interval. The processing is done in Matlab® according to Visbek (2002; J. Atmos. Ocean. Tech., 19, 794-807)

Figure 9-2 Lowered Acoustic Doppler Current Profiler (LADCP)

9.3 Preliminary Results

Data processing of the CTD-Rossette can take a while. The procced data will be made available on the polar data catalogue once ready. Sections below present exemples of raw data for each leg.

9.3.1 *Leg 1*

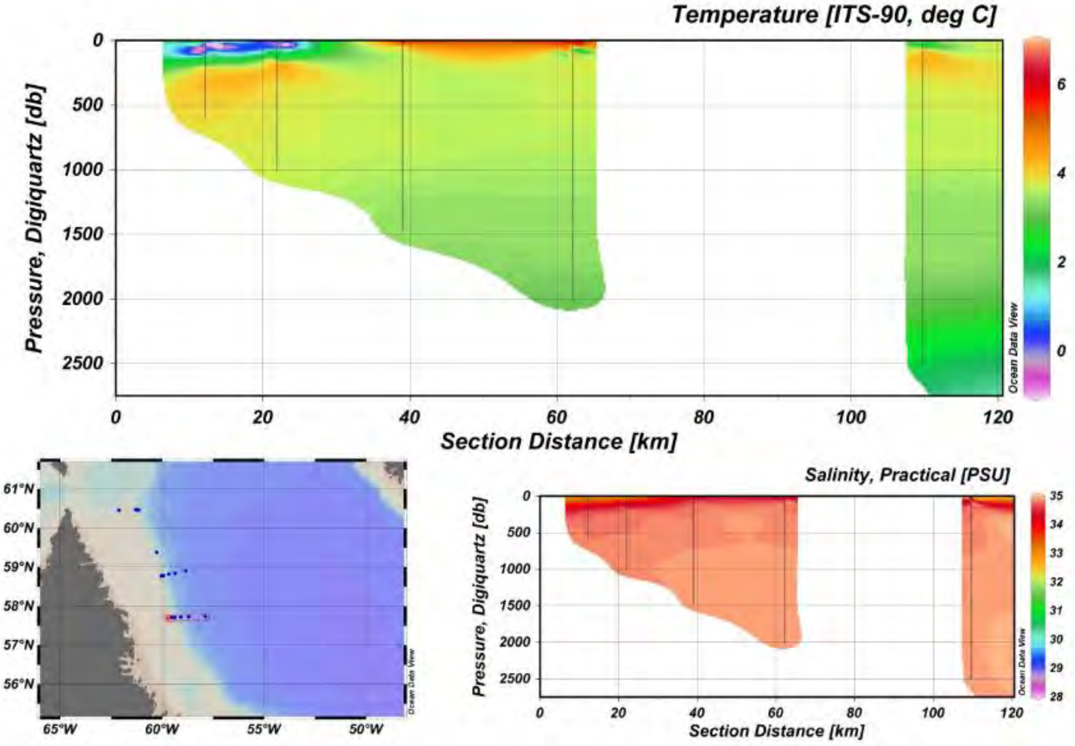

Figure 9-3 ISECOLD-1 transect; Temperature and Salinity

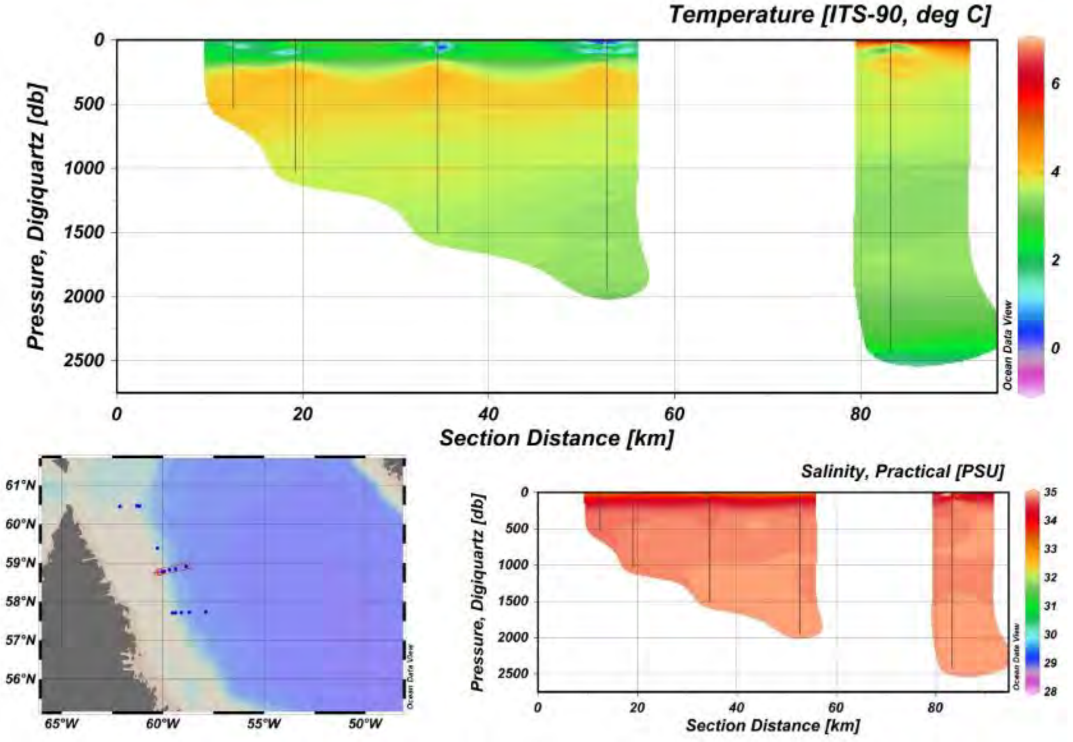

Figure 9-4 ISECOLD-2; Temperature and Salinity

9.3.2 *Leg 2*

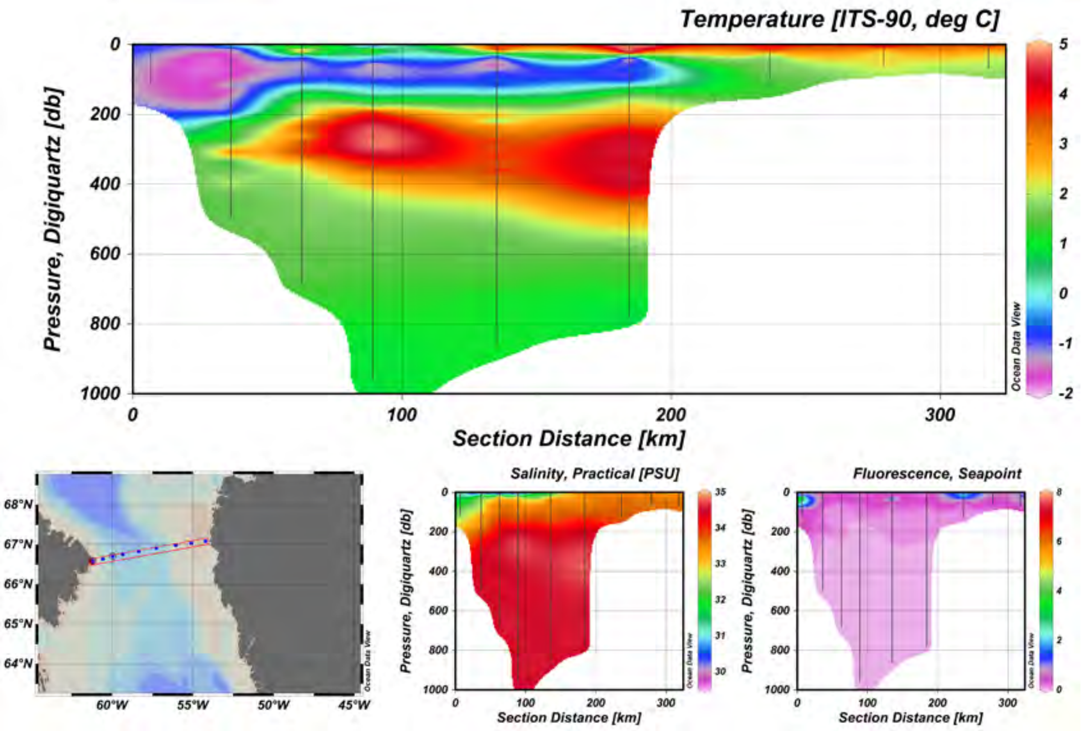

Figure 9-5 Transect of stations 191 to 198; temperature, salinity and fluorescence

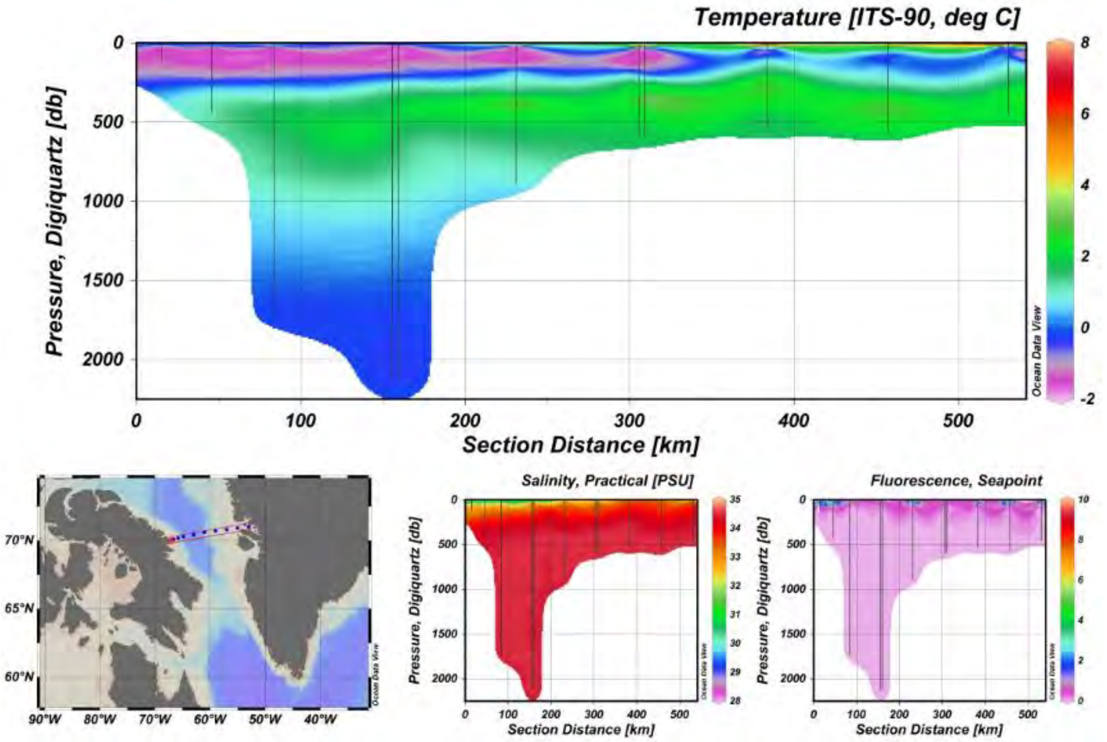

Figure 9-6 Transect of stations 228 to 222; temperature, salinity and fluorescence

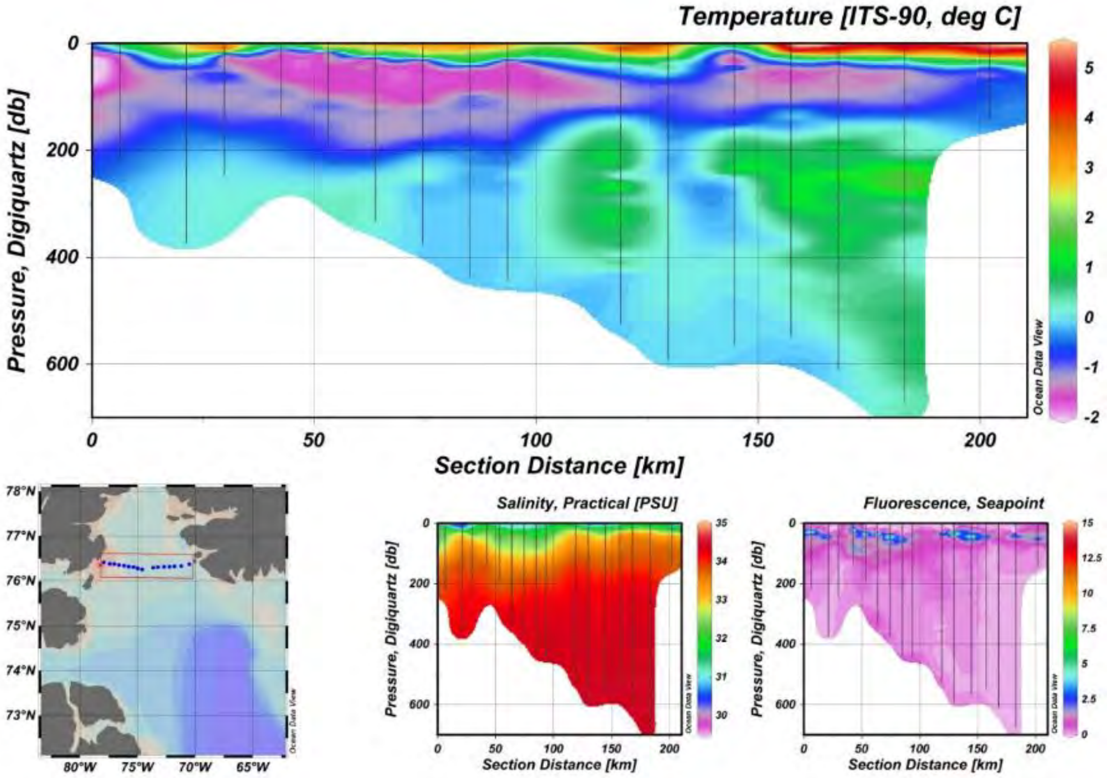

Figure 9-7 Transect of stations 116 to 100; temperature, salinity and fluorescence

9.3.3 *Leg 3*

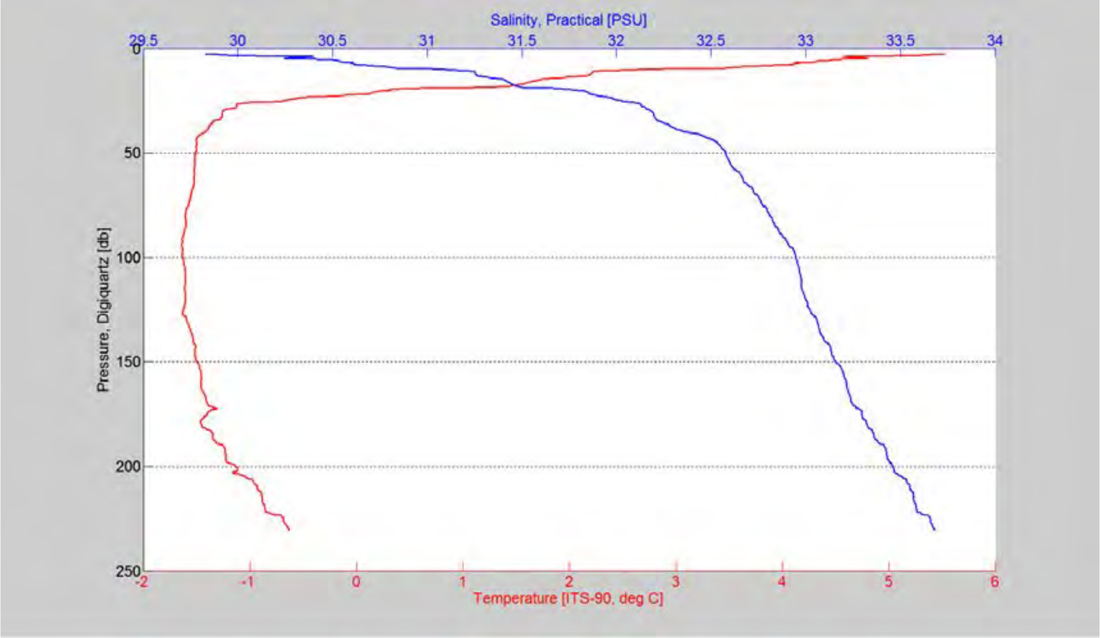

Figure 9-8 cast 1903007; temperature and salinity

10 Biogeochemical and Sedimentological River Sampling in the Canadian Arctic Archipelago

Project leaders: Jean-Carlos Montero-Serrano[1] (Jeancarlos_Monteroserrano@uqar.ca) and Philippe Tortell[2]

Cruise participants – Leg 2a: Cara Manning[2]

Cruise participants – Leg 2b: Jean-Carlos Montero-Serrano[1], Philippe Tortell[2], Anne Corminboeuf[1], Jade Brossard[1], Maria-Emilia Rodriguez-Cuicas[1], Robert Izett[2]

[1] Institut des sciences de la mer de Rimouski, Université du Québec à Rimouski, Rimouski, QC, Canada

[2] Department of Earth, Ocean, and Atmospheric Science, University of British Columbia, Vancouver, BC, Canada

10.1 Introduction

Our main goal of the 2019 river sampling program was to determine the biogeochemical and sedimentological characteristics of water and sediments of rivers in the Canadian Arctic Archipelago (CAA) region. This work is complementary to ship-based rosette and coring sampling programs, and underway primary productivity measurement. Sites were selected based on their proximity to marine stations where these operations were conducted, and to capture a broad range of geological and geographical sources of both glacial and terrestrial origin. The 2019 Amundsen Expedition represents the fifth year of opportunistic river sampling, and provides an opportunity to extend the geographical extent of previous observations. As rivers represent key source end members to the adjacent ocean and marine/glacial sediment regions, understanding the source constituents provides context for observed oceanographic and sedimentological signatures elsewhere within the CAA.

For example, rosette-based sampling during the 2019 Expedition legs 2a and 2b aimed to identify the spatial distribution of dissolved gases and biogeochemical properties (e.g. methane [CH^4], nitrous oxide [N^2O], nutrient concentrations, dissolved inorganic carbon [DIC], dissolved organic nitrogen [DON] etc.) throughout the CAA and Baffin Bay regions. Previous sampling campaigns have revealed a correlation between low-salinity and high-CH^4 waters within the CAA, but the relative contribution of observed CH^4 concentrations from marine, river or sea ice melt sources is unclear, as biogeochemical observations from Arctic rivers are sparse.

Furthermore, determination of the potential for nutrient loading by terrestrial or glacial rivers can provide important insight into the spatial variability of primary productivity, as observed using underway sensors on the CCGS *Amundsen*. Glaciers have been identified as sources of high nutrient concentrations to adjacent marine environment in Greenland and Antarctica, but no work to-date has demonstrated the same within Canada.

On the other hand, CAA rivers drain watersheds characterized by different geological provinces and petrographic signatures. Collecting sediment from the bedloads can be used to characterize the mineralogical, magnetic and geochemical signatures of sediment sources, and thus, to unravel detrital sediment provenance and transport processes within the CAA and to compare the different detrital sources of the rivers.

10.2 **Methodology**

Proposed field sites were selected based on proximity to key ArcticNet marine stations, and ease of access by helicopter. Sites were identified following cross-referencing of GIS software (e.g., Google Earth, ArcGIS), topographic maps (Natural Resources Canada), and satellite imagery (Sentinel 2).

At each site, the helicopter landed in an area close to the river mouth, in a region of strong ocean-ward flow. An extendable sampling pole inserted into the river, and water was pumped to shore using a peristaltic pump. Water conductivity, pH and temperature were measured first to confirm that the sampled water was indeed fresh (i.e. we did not want to sample high-salinity / brackish water). Finally, samples were obtained for DIC, N^2O isotope concentration, dissolved organic carbon (DOC), 18-oxgen isotope, CH^4/N^2O, and nutrient concentration analyses. Figure 1a shows the biogeochemical sampling setup.

At the same time, 2 bags of surface sediment were sampled in the periphery of the rivers with a spatula and 1 bag of rocks (Figure 10-1). Each river has a different bed load and grain size, analysis will allow a comparison of the rivers and find the detrital sources of the sediments.

Finally, samples for microplastics and contaminants analyses were obtained from the upper ~5 cm of submerged sediment. This work supports contaminants sampling conducted by the Jantunen team.

Figure 10-1 Image of biogeochemical (left; credit: A. Garbo, U. Ottawa) and sedimentological (right) sampling.

10.3 Preliminary Results

We sampled 10 sites (in addition to one glacier, sampled opportunistically), with broad geographic, geologic and morphologic diversity features (Table 10-1; Figure 10-2). We are very pleased with this outcome (Figure 10-3). Samples will be analyzed on land during the ensuing months.

Table 10-1 River sites sampled during the 2019 Arctic Net Expedition. At each site, samples for biogeochemical (DIC, N^2O isotope concentration, DOC, 18-oxgen isotope, CH^4/N^2O, nutrient concentration) measurements and sediment analyses were obtained. Contaminants / microplastics samples were obtained only at rivers RI135, RI6.1, RIDIE, and RIESC.

River Name / ID	Date Sampled [UTC]	Latitude [N]	Longitude [W]
RI135 River near station 135	31/07/2019	80 12.48	71 14.44
RIEE Ellesmere Island East	31/07/2019	80 36.45	69 07.07
RIHI River near Hans Island	31/07/2019	80 50.60	67 59.84
RI6.1 River near Site 6.1	04/08/2019	79 47.55	74 56.74
Eugenie's Sister Glacier (Opportunistic glacier sampling)	04/08/2019	79 53.60	74 21.34
RIDIE Devon Island East	07/08/2019	75 13.05	79 33.31
RISG River near Sydkap Glacier	08/08/2019	76 36.57	84 55.90
RIESC Ellesmere South Central	09/08/2019	76 38.96	83 29.52
RIDIW Devon Island West	13/08/2019	74 56.33	91 55.12
RIDIW-N Devon Island West - North	13/08/2019	75 39.29	91 58.19
RICP Copland Point	13/08/2019	75 24.50	93 53.33

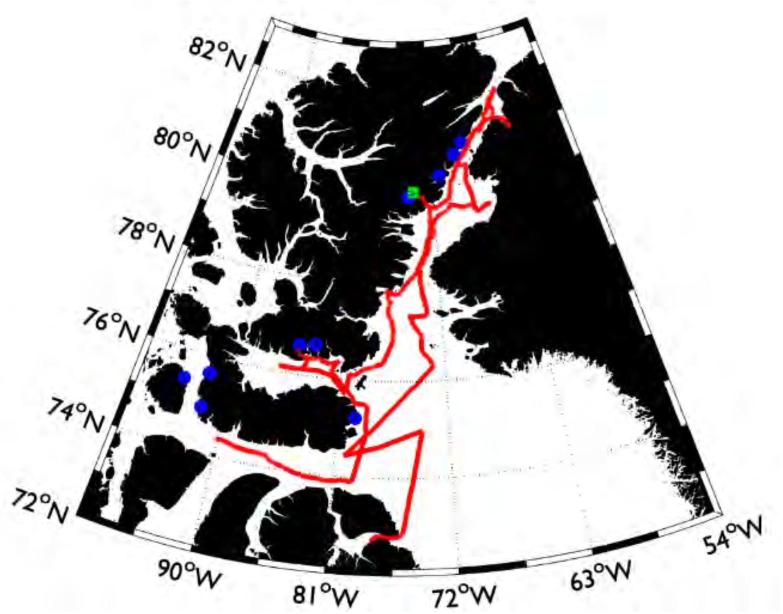

Figure 10-2 River sites sampled during the 2019 Arctic Net Expedition. The red line shows the cruise track of the CCGS Amundsen, and river sites are represented by the blue markers. The green marker is the opportunistic glacier site.

Figure 10-3 The happy river sampling teams!

10.4 Acknowledgment

We are very pleased with this year’s river sampling program. We thank everyone who contributed to making it a successful campaign. In particular, the river sampling team would like to extend a very big thank you to:

Dick Morissette, for his willingness and eagerness to fly, his attention to safety at all times, and for his involvement in the planning and execution of each excursion.

Eddy Perron and the ship’s helicopter crews.

Anissa Merzouk, Camille Wilhelmy, Alexandre Forrest and the ArcticNet team for securing the necessary flight and Parks Canada Permits.

We are also grateful to ArcticNet and the program coordinators for facilitating cross-University collaborations and sharing of the helicopter among teams from UBC (biogeochemistry team), UQAR (sediment / paleogeology team), U. Ottawa (glacier team) and U. Toronto / ECCC (contaminants team). The river sampling may not have taken place without these important collaborations.

11 Collecting Surface Sediment and Dinoflagellate Samples in Baffin Bay

Project leaders: André Rochon[1] (andre_rochon@uqar.ca)
Cruise participants – Leg 2a: Fatma Dhifallah[1]
[1] Institut des sciences de la mer de Rimouski, Université du Québec à Rimouski, Rimouski, QC, Canada

11.1 **Introduction**

Dinoflagellates are a group of unicellular biflagellate protists at the base of the food chain (Taylor et al., 2008). Some dinoflagellates can produce toxins. These toxins can be accumulated in filter feeders and fishes, transferred to the food chain and be lethal to marine fauna including marine mammals, birds and humans (Anderson, 1995). Dinoflagellates can also be responsible for changes in the water quality by producing harmful blooms and hypoxia in surface waters, leading to mortalities in fisheries.

About 13 to 16% of dinoflagellates produce cysts, which are very resistant to extreme conditions (Head, 1996). These cysts can be used to retrace the oceanographic conditions in the past (de Vernal et al., 2001; Richerol et al., 2008).

Dinoflagellates communities in the Arctic are poorly known and native species of some area constitute a black box for marine science.

The presence of the Canadian Coast Guard (CCGS) *Amundsen* in Baffin Bay during Leg 2A from Iqaluit to Pond Inlet is an opportunity to collect dinoflagellates samples from the water column and dinocysts from surface sediments in order to:

- Identify and document the motile and cyst dinoflagellate communities in the Canadian Arctic and along western of Greenland;
- Detect toxin producer taxa using taxonomy and genetics and determine their distribution.

11.2 **Methodology**

11.2.1 *Bongo Net Sampling*

Dinoflagellates samples were taken from 26 sites (Figure 11-1, Table 11-1) with a 20 um bongo net. A heavy lead weight was fixed at the base of the codend and the net was then lowered vertically down to 100 m water depth. After 30 second, the net was hauled back at a constant speed of 30m/min. The net was rinsed from top-down with seawater from the sampling site, and the inside of the net and codend were rinsed with filtered seawater (20 um) of the site to ensure that all the organisms were collected. The concentrate of organisms was transferred into a 250 ml plastic jar. A volume of 10 ml from each sample was transferred into a tube and freezed (-80°C), the rest of the sample was preserved with 10 ml of formaldehyde.

Figure 11-1 Deployment of the bongo net

11.2.2 *Surface Sediment Sampling*

The box corer collects up to 0.125 m^3 of soft sediment and is suitable for any water depths. It is used for minimum disturbance of the sediment/water interface. During the expedition, 12 box cores were sampled for surface sediment in Baffin Bay (Table 11-2). The sediment/water interface from each box-core location was subsampled into several Ziploc bags for subsequent identification of dinoflagellate cysts. Surface sediment samples were stored in a refrigerated container (4°C).

11.2.3 *Identification and Labelling*

Samples were labelled using the following numbering system:

Bongo net: AMD1902A-01	Surface sediment: AMD1902A-01BC
AMD = Amundsen	AMD = Amundsen
19 = Year 2019	19 = Year 2019
02A = Leg # 02A	02A = Leg # 02A
01 = Station # 1	01 = Station # 1
	BC = Corer type (box corer)

Bongo net samples and surface sediment from the box core will be retained in a refrigerated container on the CCGS *Amundsen* during Legs 2b & 3 and to be removed on demobilization in September in Quebec. These samples will then be shipped and analyzed in detail at ISMER (Rimouski).

11.3 **Preliminary Results**

A total of 26 bongo net and 12 samples of surface sediment from box cores were recovered at different locations along the Baffin Bay (Figure 11-2). These samples will expand the sampled area by the ISMER-UQAR team over the last ~15 years on board the CCGS *Amundsen*. They will provide an excellent surface coverage for a large part of the Canadian Arctic region.

These samples will be analyzed in detail in the laboratory to achieve the objectives of this mission. Briefly, surface sediment samples will be studied for microfossil (dinoflagellate cysts, other organic-walled microfossils) and the bongo net samples to identify the motile dinoflagellates communities.

Such studies will provide a baseline data for dinoflagellate communities in Baffin Bay. In fact, these samples will be counted and identified to the species level, and a high-resolution image with Scanning Electron Microscopy will be taken, followed by a detailed description for the less documented species. Toxin producer taxa will be studied using taxonomy and genetics to document their presence, richness and abundance, which will help determine areas with highest risk of harmful blooms and their relationship with environmental conditions.

The increase of sampling effort from year to year on board of the CCGS *Amundsen* will improve our understanding of native dinoflagellate biodiversity in the Arctic, and help determine which taxa are limited to this area, which constitute an important priority in the matter of future invasions (Ware et al., 2014).

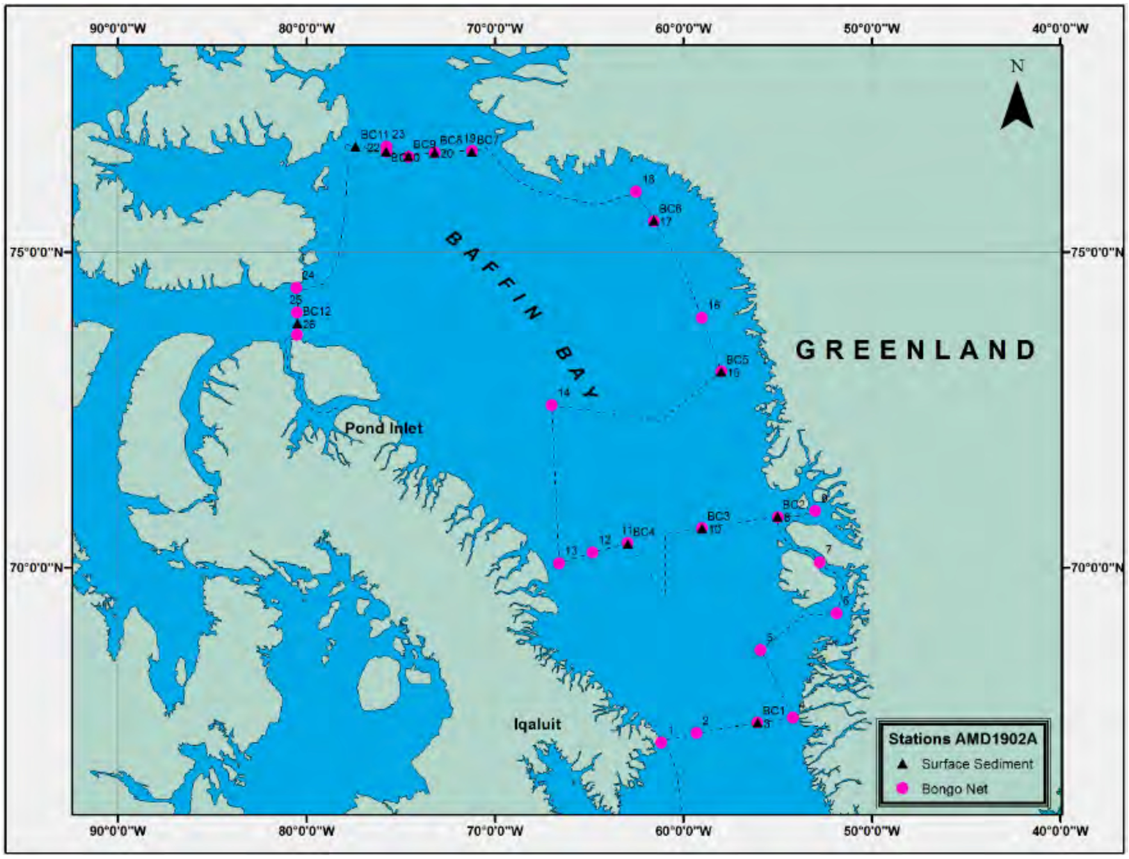

Figure 11-2 Location of the box cores and bongo net samples collected from ISMER-UQAR team during the Leg 2A (Map: Daniel Amirault)

Table 11-1 Bongo Net Samples

Name	Stn	Date - Hour (Quebec)	Zone	Latitude N	Longitude W	Sampling depth (m)	Station depth (m)	Genetic sample (ml)
AMD1902A-1	190	19/07/08 - 11:00	Baffin Bay	66,5682752	-61,1830598	100	132,87	10
AMD1902A-2	193	19/07/09 - 11:20	Baffin Bay	66,7654273	-59,3163278	100	959,33	10
AMD1902A-3	196	19/07/10 - 05:45	Baffin Bay	66,9844535	-56,0703220	100	129,99	10
AMD1902A-4	198	19/07/10 - 17:00	Baffin Bay	67,0884825	-54,1947043	65	71,92	10
AMD1902A-5	BB15	19/07/11 - 07:20	Baffin Bay	68,4489032	-55,9097173	100	496,19	10
AMD1902A-6	BB16	19/07/11 - 17:15	Baffin Bay	69,1502167	-51,8729325	100	351,65	10
AMD1902A-7	BB18	19/07/12 - 03:00	Baffin Bay	70,0959843	-52,7677322	100	503,84	10
AMD1902A-8	228	19/07/12 - 13:00	Baffin Bay	70,8957928	-55,0000062	100	565,05	10
AMD1902A-9	229	19/07/13 - 03:55	Baffin Bay	71,0057795	-53,0132528	100	435,39	10
AMD1902A-10	226	19/07/13 - 20:15	Baffin Bay	70,7019082	-59,0054128	100	594,79	10
AMD1902A-11	224	19/07/15 - 03:55	Baffin Bay	70,4420080	-62,9704950	100	2934,26	10
AMD1902A-12	223	19/07/15 - 17:45	Baffin Bay	70,2726422	-64,8297778	100	1706,54	10
AMD1902A-13	222	19/07/15 - 23:50	Baffin Bay	70,0749612	-66,6048612	100	125,37	10
AMD1902A-14	BB2	19/07/16 - 21:25	Baffin Bay	72,7481732	-66,9942685	100	3007,09	10
AMD1902A-15	204	19/07/18 - 00:21	Baffin Bay	73,2700770	-57,9894423	102	962,52	10
AMD1902A-16	206	19/07/18 - 11:20	Baffin Bay	74,0682432	-59,0348698	100	164,02	10
AMD1902A-17	210	19/07/19 - 02:05	Baffin Bay	75,4194978	-61,5748885	100	1177,83	10
AMD1902A-18	BB24	19/07/19 - 12:50	Baffin Bay	75,8087678	-62,5203825	100	577,37	10

AMD1902A-19	115	19/07/20 - 04:20	Baffin Bay	76,3297583	-71,2127097	100	652,93	10,5
AMD1902A-20	111	19/07/21 - 00:45	Baffin Bay	76,3068808	-73,1963578	100	592,85	10,5
AMD1902A-21	108	19/07/21 - 14:50	Baffin Bay	76,2554828	-74,5809228	100	443	10
AMD1902A-22	105	19/07/22 - 09:50	Baffin Bay	76,3199635	-75,7586758	100	327,68	10,5
AMD1902A-23	101	19/07/22 - 22:42	Baffin Bay	76,3811062	-75,7586758	100	362,86	10
AMD1902A-24	322	19/07/23 - 23:18	Baffin Bay	74,4986065	-80,5392425	127	661,97	11
AMD1902A-25	323	19/07/24 - 11:20	Baffin Bay	74,1451427	-80,5076980	100	785,92	10,5
AMD1902A-26	325	19/07/25 - 05:09	Baffin Bay	73,8224022	-80,5013582	100	706,26	10

Table 11-2 Surface sediment samples

Name	ArcticNet station	Date - Hour (Quebec)	Zone	Latitude N	Longitude W	Depth (m)	Comment(s)
AMD1902A-01BC	196	19/07/10 - 09:10	Baffin Bay	66,9859780	-56,0652168	129,63	Mixed surface sediments
AMD1902A-02BC	228	19/07/12 - 20:28	Baffin Bay	70,9059177	-55,0128115	574,28	
AMD1902A-03BC	226	19/07/14 00:48	Baffin Bay	70,6989365	-59,0045367	593,52	
AMD1902A-04BC	224	19/07/15 - 11:40	Baffin Bay	70,4201763	-62,9550007	2095,41	
AMD1902A-05BC	204	19/07/18 - 04:18	Baffin Bay	73,2654098	-58,0080493	960,66	
AMD1902A-06BC	210	19/07/19 - 06:14	Baffin Bay	75,4267093	-61,5673213	1165,49	
AMD1902A-07BC	115	19/07/20 - 15:09	Baffin Bay	76,3145993	-71,2370017	663,36	
AMD1902A-08BC	111	19/07/21 - 04:59	Baffin Bay	76,3085568	-73,1940932	607,28	
AMD1902A-09BC	108	19/07/22 - 01:20	Baffin Bay	76,2590235	-74,5968450	447,42	
AMD1902A-10BC	105	19/07/22 - 14:09	Baffin Bay	76,3195943	-75,7754797	333,92	
AMD1902A-11BC	101	19/07/23 - 09:59	Baffin Bay	76,3823620	-77,3908968	351,14	
AMD1902A-12BC	324	19/07/25 - 00:19	Baffin Bay	73,9884473	-80,4737992	773,6	

11.4 Acknowledgment

We gratefully thank the chief scientist Alexandre Forest, the Captain Jean-Luc Dugal, the officers and crew of the CCGS *Amundsen* for their support, their help, and friendship throughout this leg of the 2019 ArcticNet cruise.

11.5 References

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12 Knowledge and Ecosystem-Based Approach in Baffin Bay (KEBABB)

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12.1 Introduction

Stock assessment surveys are conducted by the Department of Fisheries and Oceans Canada (DFO) in the Eastern Canadian Arctic, mainly for Greenland Halibut (Reinhardtius hippoglossoides) and Northern and Striped Shrimp (Pandalus borealis and P. montagui, respectively). However, an ecosystem-based approach to fisheries management requires the collection of oceanographic data within the fishing areas in order to interpret changes in stock abundance and distribution at a regional scale. The Knowledge and Ecosystem-Based Approach in Baffin Bay (KEBABB) program, developed by DFO in 2019, will provide oceanographic conditions for the development and application of the ecosystem-based approach to fisheries management, as well as for an overall Arctic marine ecosystem monitoring program of Baffin Bay, known as a productive region. With the KEBABB program we intended to understand the pattern and changes in abiotic and biotic factors that are affected by or affect harvested stocks. Therefore, 5 transects, each composed of 5 stations, were sampled east of Qikiktarjuaq between August 22nd and August 31st, 2019. There sites covered a coastal – offshore gradient. The general objective of KEBABB is to characterize the variability and trends in physical, chemical and biological oceanographic conditions in order to evaluate their influence on fisheries resources of western Baffin Bay.

Five main components were studied during the KEBABB cruise, 1) physical and chemical oceanographic conditions; 2) abundance and composition of phytoplankton and microbial communities; 3) abundance and composition of zooplankton; 4) benthic communities and biogeochemistry; and 5) ecosystem health and interactions.

12.2 Methodology

At each station, we collected water from the CTD-Rosette at 8 to 17 depths, depending on the station depth (Table 1). Sampled depths and the analyses performed at each of them are listed in Table 2. Fractionated chlorophyll a (total and > 5µm) concentrations were measured onboard the ship, using a Turner Design fluorometer (model 10-AU) and following Parsons et al (1984). All other water samples will be analyzed later, at the Freshwater Institute, or will be sent to collaborators for analysis. DNA, POC/PON and FA samples were filtered and kept frozen until further analysis. For the other analysis, water was subsampled in different bottles and kept at 4°C or frozen (flow cytometry).

Zooplanktonic organisms were sampled for taxonomic composition using a 5-Net Vertical Sampler (5NVS) "Monster" net (200µm mesh size), throughout the entire water column and were preserved in a 10% v/v formaldehyde solution until further identification. Zooplankton for stratified taxonomic composition of the entire water column was sampled using a Hydrobios closing net (200µm mesh size, 9 nets) according to the strategy shown in Table 12-2. Samples were kept and preserved using the same method as the above-mentioned samples until further analysis. Zooplanktonic organisms for fatty acid biomarker analysis were collected using a Double Square Net (DSN) "Tucker" net (500µm mesh size), sampling the first 90 m of the water column in an oblique tow. Specimens were then isolated from the bulk sample using a dissection microscope, identified to the genus/species level if possible and kept frozen at -80 °C. Other zooplanktonic organisms, typically not found in the vertical or oblique net tows, were also collected opportunistically from the Isaacs-Kidd Midwater Trawl (IKMT) samples, identified and flash-frozen at -80 °C until further processing.

Push cores of 10 cm diameter were collected from the box core and stored at 4 °C. They were then sectioned in layers (

Table 12-3) within 12 hours after collection and individually bagged. Sectioned samples are kept at -20 °C until further analysis. Analysis that will be performed on these layers include sedimentation rate, radio isotope dating, porosity, total mercury concentration, PAH, n-alkanes, PCBs, total carbon and total inorganic carbon.

Table 12-1 Sampling operations conducted by the KEBABB team during leg 3 of the 2019 CCGS *Amundsen*

Stn	Latitude	Longitude	Cast	Date	Biochemical characterization of water column	Z taxonomy	Zoo stratified taxonomy	Zoo fatty acid	Sediment characterization
155	72.4600190	-78.7080992	N/A	17-08-2019					X
BY02	72.6441545	-79.3354563	2	18-08-2019	X*			X	
170	71.3770293	-70.0693923	6	19-08-2019	X**				
E5	69.3150698	-63.1311912	13	22-08-2019	X	X	X	X	X
E4	69.0570645	-63.6520393	14	22-08-2019	X	X			
E3	68.7988370	-64.1496930	15	22-08-2019	X	X	X	X	X
E2	68.5398815	-64.6449605	16	22-08-2019	X	X			
E1	68.2778557	-65.1386007	17	23-08-2019	X	X		X	X
D1	67.4731075	-63.6916707	18	23-08-2019	X	X	X	X	X
D2	67.8578580	-63.1519290	19	24-08-2019	X	X			
D3	68.2391315	-62.5835747	20	25-08-2019	X	X	X	X	X
D4	68.6191323	-62.0119708	21	25-08-2019	X	X			X
D5	68.9976950	-61.4074328	22	25-08-2019	X	X		X	
C5	68.1463805	-59.9693167	23	26-08-2019	X	X	X	X	X
C4	67.9514578	-60.6245318	24	26-08-2019	X	X			X
C3	67.7522037	-61.2739970	25	27-08-2019	X	X	X	X	X
C2	67.54209	-61.9310988	26	27-08-2019	X	X			
C1	67.3490923	-62.5216098	27	28-08-2019	X	X		X	
B1	67.0599847	-61.5090548	28	28-08-2019	X	X	X	X	
B2	67.2014085	-60.8970407	29	29-08-2019	X	X			X
B3	67.3282542	-60.2611657	30	29-08-2019	X	X	X	X	X
B4	67.4689852	-59.6511848	31	29-08-2019	X	X			X
B5	67.5813588	-59.0185635	32	30-08-2019	X	X		X	X
A5	66.7742550	-57.8470275	33	30-08-2019	X	X	X	X	
A4	66.7250693	-58.7057543	34	31-08-2019	X	X			
A3	66.6752040	-59.5633257	35	31-08-2019	X	X	X	X	X
A2	66.6145698	-60.4110905	36	31-08-2019	X	X			
A1	66.5895710	-61.2103067	37	31-08-2019	X	X		X	
Kelp	56.6955723	-60.3032713	N/A	05-09-2019					X

*Only chl *a* and fatty acid sampled at the surface and the chl max.

**Only chl *a* sampled at the surface, 10m, 30m, chl max, 40m, 50m, 100m.

Table 12-2 Zooplankton stratified sampling strategy for the KEBABB team during leg 3 of the 2019 CCGS Amundsen. The distance between the sea floor and the tow depths for nets #1-2-3 varied depending on the station.

Strata	**Depth start**	**Depth end**
9	2m	20m
8	20m	40m
7	40m	60m
6	Equally divided	
5		
4		
3	Bot-70m	Bot-50m
2	Bot-50m	Bot-30m
1	Bot-30m	Bot-10m

Table 12-3 Thickness of layers sectioned from push cores according to their position in the core

Section (cm)	**Layer thickness (cm)**
0-10	1
10-20	2
20-Bot	5

12.3 Preliminary Results

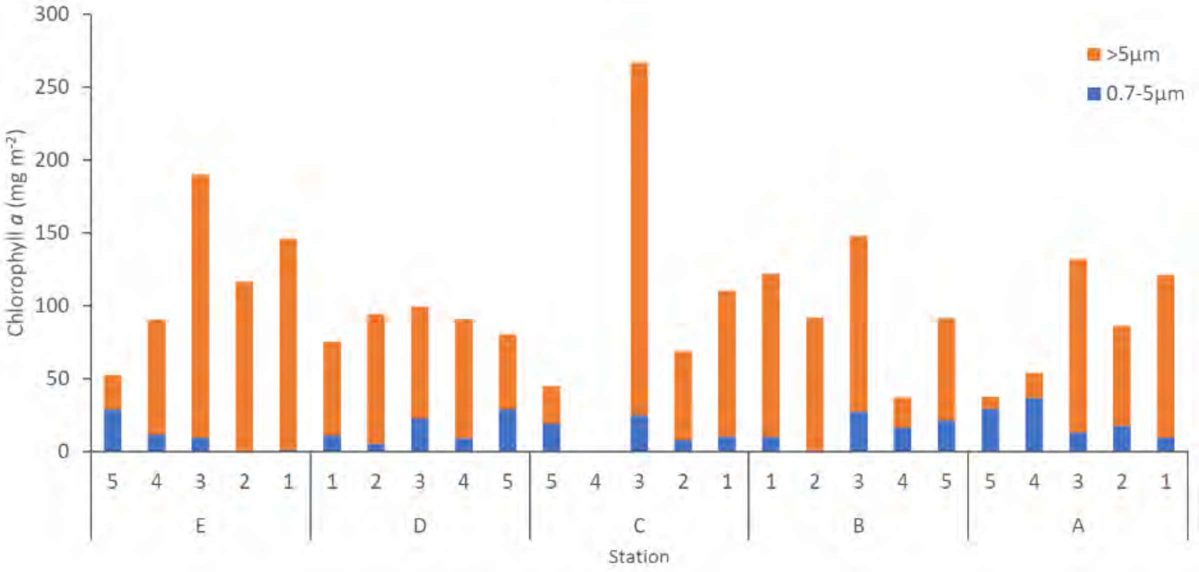

Figure 12-1 Chlorophyll a concentration varied from 37 to 266 mg m-2 along the 5 KEBABB transects. Algae 5µm generally dominated the algal biomass, except at stations E5, A5 and A4.

12.4 References

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13 Spatial Surveys of Phytoplankton Productivity and Seawater Optical Properties Obtained via High-Resolution Underway Sampling

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13.1 Introduction

During legs 2a and 2b of the 2019 ArcticNet Expedition, we deployed underway sensors in the paleo/geology lab, and the forward filtration lab. Together, these instruments collected continuous, high spatial resolution datasets of surface ocean gas concentrations (oxygen [O^2], argon [Ar], and nitrogen [N^2]), and phytoplankton photo-physiology and biomass (chlorophyll *a* and carbon biomass). Our main objectives were to obtain high spatial resolution measurements of these surface properties, and to observe fine-scale gradients of primary productivity (net primary production and net community production) across various oceanographic regions. Sampling of biogeochemical properties from the rosette and nearby rivers (see separate cruise reports) will provide context for the observed spatial variability in the measured properties.

13.1.1 *Underway Gas Sampling*

A key objective of our underway gas sensor measurements was to obtain high spatial resolution estimates of mixed layer net community production (NCP). NCP is a useful ecological metric that represents the balance between gross photosynthetic organic C-production and community-wide (i.e. autotrophic and heterotrophic) aerobic respiration, and is equivalent to carbon export on annual timescales. An increasingly common approach to estimating NCP involves using a ship-board mass spectrometer to measure the seawater oxygen-to-argon ratio (O^2/Ar) and derive a quantity known as the biological saturation anomaly (ΔO^2/Ar). NCP and ΔO^2/Ar are proportional in the surface mixed layer. The biological saturation anomaly represents the quantity of O^2 produced through biological activity, and may also be estimated from O^2 and N^2 measurements (i.e. $\Delta O^2/N^2$). To this end, a secondary objective of our underway gas sampling endeavours was to test a new instrument system that makes measurements of O^2 and N^2 at sub-minute resolution. As the new system is simpler and less expensive than mass spectrometers, and can be run fully-autonomously without oversight. A main outcome from our work on the Amundsen will be to demonstrate the suitability of the O^2/N^2 system for deriving robust estimates of NCP, by comparing $\Delta O^2/Ar$ and $\Delta O^2/N^2$ signals.

13.1.2 *Underway Phytoplankton Photophysiology Sampling*

Another objective for underway sampling was to derive biological parameters from the optical properties of seawater using a combination of three instruments: a reflective tube absorption meter (Sea-Bird Scientific AC-S) in line with a backscattering sensor (BB3), and a fast-rate repetition fluorometer (FRRF). The AC-S and BB3 respectively measure particulate absorption across the visible spectrum and backscatter at three wavelengths. Peaks in absorption around 676 nm can be used to derive chlorophyll concentrations based on an absorption line-height technique from Roesler and Barnard (2014). Further, the FRRF analyzes a characteristic excitation/relaxation response in chlorophyll fluorescence by applying a series of rapid light flashes to a seawater sample. By fitting the resulting fluorescence curve, we are able to derive a suite of physiological parameters for photosynthesis, including the maximum photochemical efficiency of Photosystem II (FvFm). Because the three sensors can take continuous measurements at a high sampling rate, they can provide estimates of chlorophyll and photosynthetic activity at a fine spatial resolution of 10-100m along the cruise track.

13.2 **Methodology**

13.2.1 *Underway Gas Sampling*

We deployed a membrane inlet mass spectrometer (MIMS) and O^2 optode / Gas Tension Device (GTD) system in the Amundsen's paleo/geology laboratory during legs 2a and 2b of the 2019 Expedition (Figure 13-1). Water was pumped continuously from the ocean surface into the laboratory, and through the respective instruments. The MIMS and optode/GTD systems were run parallel to one another, and provided high spatial resolution measurements of the seawater O^2/Ar and O^2/N^2 ratios, respectively.

The optode was calibrated by obtaining discrete samples for O^2 analysis from the seawater tap in the paleo/geology laboratory. Additional samples were obtained from surface of 10 m Niskin bottles, during Rosette sampling, to characterize potential changes in gas concentrations inside the ship's seawater supply lines. Discrete O^2 samples were analyzed onboard using our custom-built Winkler titration system. We observed a consistent offset between optode-derived and discrete O^2 samples. This offset was applied to the underway data to calibrate for instrument drift.

Samples for determination of the N^2/Ar ratio were also obtained from the Niskin (by A. Bourbonnais) and will be analyzed at a later date. These data will be used to calibrate the MIMS and GTD observations.

Figure 13-1 The underway gas measurement instruments in the Amundsen's paleo/geology laboratory. The MIMS is highlighted in blue, and the optode/GTD system in red. Seawater was pumped to the instruments from the seawater tap (to right of image)

13.2.2 *Underway Phytoplankton Photophysiology Sampling*

The AC-S and BB3 were connected to the underway line in the forward laboratory with a vortex debubbler, flow meter, and an automated switching valve to alternate the sample stream between unfiltered and filtered seawater. The two instruments recorded seawater data continuously along the cruise track except during periods when the sensors were dissembled for daily cleaning or where the underway flow stopped due to sea ice. Every hour, the same seawater line was first passed through a series of filters (1.0 and 0.2 microns) as "blanks" to measure the background optical properties of dissolved constituents in seawater.

The BB3 takes backscattering measurements at three wavelengths (470nm, 532nm, and 650nm) every second while the AC-S takes measurements of both absorption and attenuation across the visible light spectrum (400-740 nm) every 250ms. To process this large dataset, measurements were first binned by second and eventually by minute. Values were interpolated across the normal blank periods for filtered seawater and subtracted from the data to provide a measure of particulate rather than total absorption. The data were also slightly adjusted for temperature and salinity before a calculation for chlorophyll content was made using the line-height technique at 676nm (Roesler and Barnard, 2014).

We also utilized two FRRF's to measure the photo-physiological properties of surface water phytoplankton assemblages sampled in the underway seawater line. In this method, water samples are exposed to a series of rapid (~ 1 μsec) flashes that are used to saturate the photosynthetic reaction center and induce a transient fluorescence increase. By analyzing the kinetics of this increase, and the subsequent decay phase, we can infer many properties of the cell's photo-physiological status, including the photon absorption cross section (sigma; σ) and maximum quantum efficiency of charge separation at photosystem II (F_vF_m). Further, from these measurements, we can estimate rates of photosynthetic electron transport (ETR), which provide a proxy for gross primary production. By controlling the external background light to which samples are exposed, we can measure photosynthesis – light responses.

13.3 **Preliminary Results**

13.3.1 *Underway Gas Sampling*

We experienced some problems with the mass spectrometer at the beginning of leg 2a, but starting around ~16 July, we obtained a large, and high-quality dataset from MIMS and optode/GTD observations. These data, with a sampling resolution of <1 minute, enabled us to observe significant spatial variability across different regions of Baffin Bay and the Canadian Arctic Archipelago (Figure 13-2). In particular, we observed regions of high surface O^2 concentrations in fjords and near to several glaciers, suggesting significant input of terrestrially-derived nutrients from these sources. The results from river and Rosette sampling should provide further insights.

During the 2018 Amundsen Expedition, we deployed the MIMS and optode/GTD in the ship's forward filtration laboratory, and experienced significant data-loss due clogging of the ship's seawater pump during periods of ice breaking. This year, however, the seawater supply to the paleo/geology laboratory was unaffected by ice breaking, so our data coverage was continuous throughout the entire expedition.

Preliminary results from our underway gas sensors (MIMS and optode/GTD) suggest reasonable coherence between ΔO^2/Ar and $\Delta O^2/N^2$ measurements across most of the cruise track (Figure 13-2). Differences between ΔO^2/Ar and $\Delta O^2/N^2$ are expected under some conditions, and may be explained by wind speed history, sea surface temperature history, and/or ice coverage. These differences are largely driven by small differences in solubility between Ar and N^2. Overall, the early results from this Expedition are promising for the future deployment of an optode/GTD system for replacing MIMS in deriving estimates of NCP.

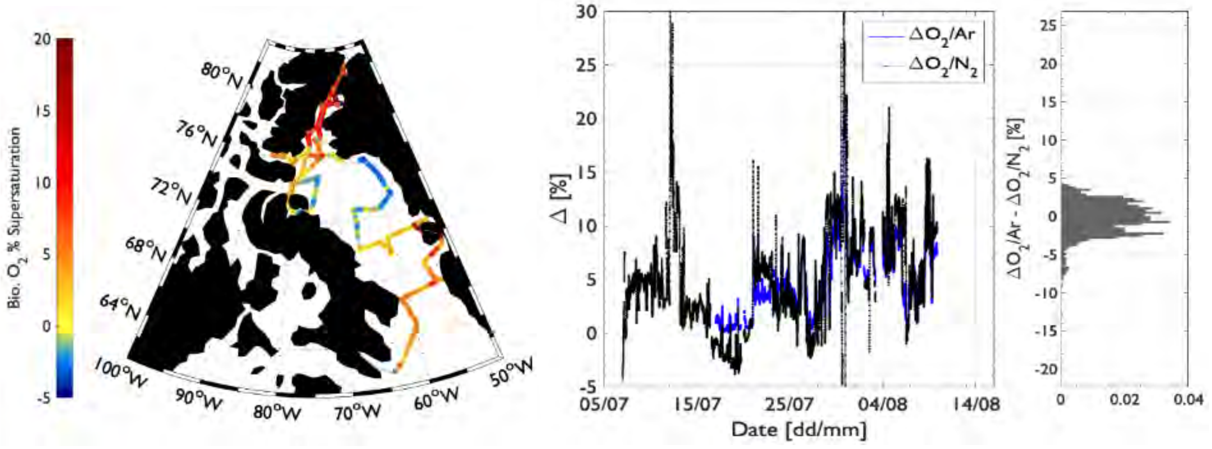


Figure 13-2 Preliminary results from the MIMS (ΔO^2/Ar) and optode/GTD (ΔO^2/N^2). Panel (a) shows the spatial distribution of ΔO^2/N^2 observations during legs 2a-2b, and panels (b-c) shows the offset between ΔO^2/Ar and ΔO^2/N^2 observations.

13.3.2 *Underway Phytoplankton Photophysiology Sampling*

At the northernmost latitudes of the cruise track over July 31st and August 2nd, the sea-ice frequently interrupted flow in the underway line in the forward filtration lab, preventing sampling from the AC-S and BB3. Similar issues with sea-ice clogging were experienced in 2018 for both the MIMS and optical instruments as mentioned in the previous section. Furthermore, when the underway pump was manually restarted after a period of dormancy, we observed contamination of the seawater by rust and other particulates from the pipes. We therefore flushed the seawater line in the laboratory for at least thirty minutes before resuming operation of the instruments in such cases.

In the first half of track 2b, large portions of AC-S and BB3 data were also removed because of compromised blank values, which indicated either accumulation of debris on the sensors, or other issues with the flow-through system. The BB3 measurements were useful for quickly visualizing particulate content in real-time and for verifying blanks during which backscattering should fall to a relatively constant value. Starting around August 3rd during the southward descent from Talbot Inlet and entry into Jones Sound and Lancaster Sound, we were able to collect high quality data. A portion of this data set is shown below (Figure 13-3), with the associated calculated chlorophyll from the AC-S data at 676 nm between August 5th and 7th. Our preliminary results suggest a possible period of interest with increased chlorophyll content around August 6th (jd=219.3) near station 117 just south of Talbot Inlet. The MIMS data also reveal high ΔO2/Ar during this period, suggesting elevated productivity.

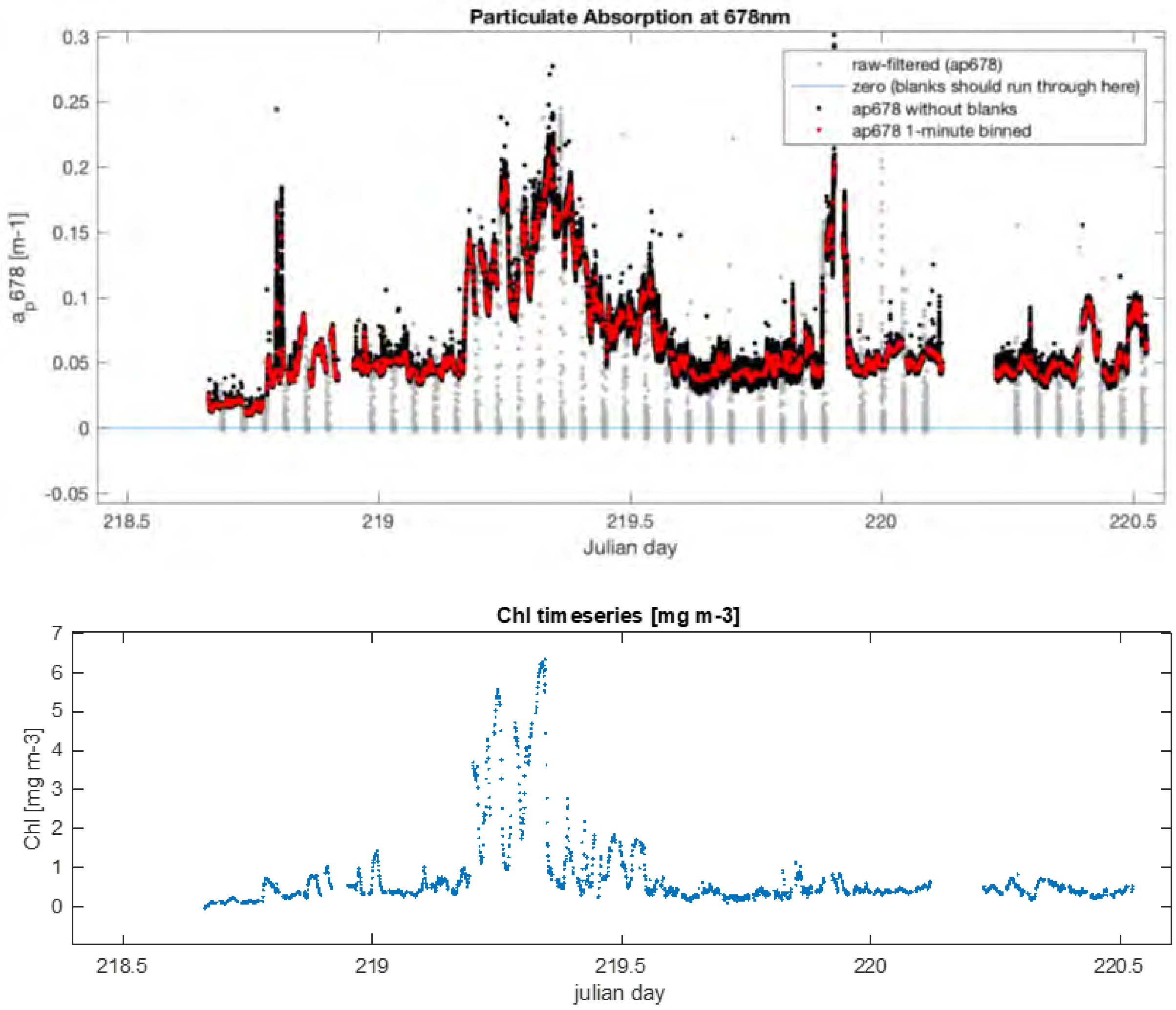
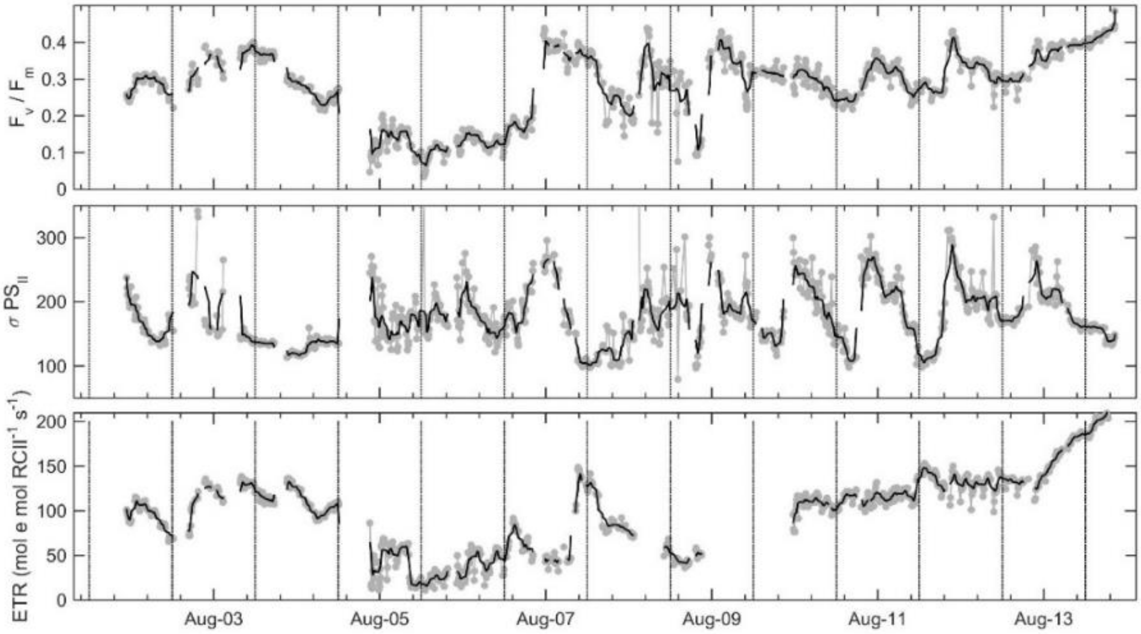


Figure 13-3 Two-day excerpt of preliminary results from AC-S data. Upper panel shows particulate absorption of a single wavelength from the AC-S (678 nm) with blank filtered seawater values shown in grey; lower panel depicts derived chlorophyll content over time calculated from AC-S data at 676 nm.

The figures below (Figure 13-4) show preliminary data derived from fast repetition rate fluorometry (FRRF). The first figure shows a time series of photo-physiological properties, including the maximum (dark-acclimated) quantum efficiency of photosystem II (F_v/F_m), the photosynthetic absorption cross-section of photosystem II (σ), and the derived electron transport rate (ETR), which is a proxy for gross primary production. The second figure shows a sample photosynthesis irradiance curve derived from the FRRF, with values indicating the initial light-dependent slope of photosynthesis (α), the maximum, light-saturated rate of electron transport (P_{max}) and the transition point between light limitation and light saturation (E_k).



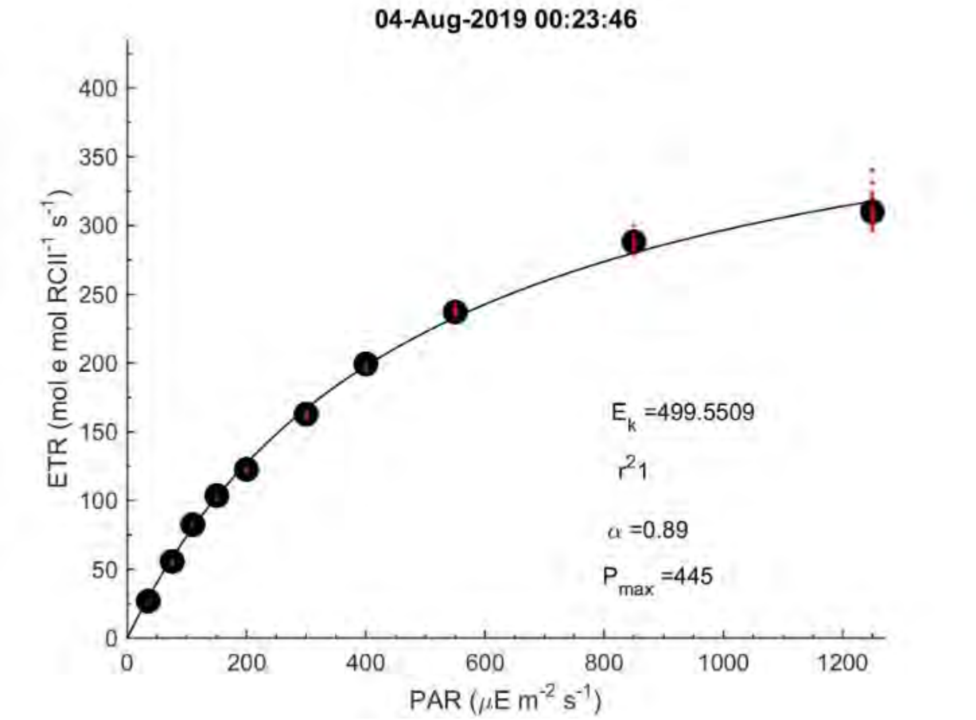


Figure 13-4 Preliminary results from underway FRRF observations, showing variability in phytoplankton photophysiological properties (top), and a derived Productivity-vs-Irradiance curve (bottom).

14 Zooplankton and Fish Ecology/Acoustics

Project leaders: Maxime Geoffroy[1] (maxime.geoffroy@mi.mun.ca), Louis Fortier[2], Jonathan Fisher[1] and Dominique Robert[3]

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14.1 Introduction

The value of fisheries landings in Nunavut has increased from 38 to 86 million $ during the period 2006-2014, and fisheries currently represent a key sector of the Northern economy. Moreover, climate change has resulted in increased abundances of boreal fish species in the Arctic and altered distributions of indigenous species. While the demersal ecosystem gets increased attention, critical knowledge gaps remain on how marine pelagic ecosystems of the Canadian Arctic are evolving under the current warming regime. The overarching objective of this proposal is to document how ongoing changes in the Arctic pelagic ecosystem impact fisheries productivity. The proposed research will fill these knowledge on the current occurrence and distribution of pelagic fish species in the Eastern Arctic/subarctic; (2) document inter-annual variations in fish and zooplankton abundance in Labrador Sea, Baffin Bay and Kitikmeot, and identify the biological and environmental drivers of these variations; (3) assess the relative importance of sea-ice as an habitat for the recruitment of juvenile Arctic cod; (4) investigate seasonal variations in the distribution of mesopelagic fish and zooplankton; and (5) Refine the ecological importance of the North Water for fisheries resources, marine mammals and seabirds.

This sampling will support the ArcticNet project ArcticFish. It also contributes samples to other projects such as the DFO project ISECOLD, the Ocean Frontier Institute project on sustainable fisheries, a proposal for the scientific mission GLACE, and the Norwegian project ArcticABC fjord

In addition, Leg 3 was an opportunity for Catherine Marcil to collect samples and data for her master's project under the supervision of professors Gesche Winkler and Piero Calosi from UQAR, Rimouski, on the genetic structure and physiological divergence in *Boreomysis nobilis*, a species of mysid also found in the Saguenay Fjord where it could be a glacial relict.

14.2 Methodology

14.2.1 *5 Nets Vertical Sampler (5NVS) (3 x 200μm, 1 x 500μm, 1 x 50μm)*

- **Description**: Zooplankton sampler
- **Specifications**: Four 1m^2 metal frames attached together and rigged with four 4.5m long, conical-square plankton nets, an external 10cm diameter, 50μm mesh net. The 5NVS is equipped with five KC Denmark ® flowmeters – each of the nets with a mesh size larger than 50μm was equipped with a flowmeter and a control flowmeter was attached on the centre of the frame.
- **Deployment**: Deployed vertically from 10 meters off the bottom to the surface.
- **Laboratory analyses**: After removal of any fish larvae/juveniles (identified, measured and preserved separately in 95% ethanol + 1% glycerol), zooplankton samples from the 500μm, 50μm and one of the 200μm mesh nets were preserved in 10% formaldehyde solution for taxonomy and abundance measurements. The zooplankton from the second 200μm mesh net were split into fractions (depending on the size of the sample); one fraction was preserved in alcohol for genetic analysis and a second fraction was divided into small (200-1000 μm) and large (>1000 μm) fraction, dried and frozen for biomass analysis. The third 200μm mesh net was given to Environment Canada team (PI: Gary Stern) for contaminant analysis

14.2.2 *Double Square Net (DSN) (1 × 500μm, 1 × 750μm, 1 × 50μm)*

- **Description**: Ichtyoplankton and microzooplankton sampler
- **Specifications**: Rectangular frame carrying two 4.5m long, 1m^2 mouth aperture, square- conical nets and an external 10cm diameter, 50μm mesh net (to collect microzooplanktonic prey of the fish larvae). The DSN was equipped with three

KC® flowmeters; one for the 750µm net, one for the 500µm net and a control flowmeter between the two nets.

- **Deployment**: The sampler was towed obliquely from the side of the ship at a speed of ca. 2 knots to a maximum depth of 90m (depth estimated with Hipap sensor). A Star-Oddi® mini-CTD was attached to the frame to provide depth, temperature and tilt of the net.
- **Laboratory analyses**: All fish larvae collected with the DSN were identified, measured and preserved individually in 95% ethanol + 1% glycerol. Zooplankton samples from the 500µm mesh and the 50µm mesh nets were preserved in 10% formalin solution for further taxonomic identification. After retrieval of fish larvae, the 750 µm mesh net was given to Environment Canada team for contaminant analysis. All fish larvae were preserved by Fortier's team.

14.2.3 *Hydrobios (9× 200µm)*

- **Description**: A multi-net plankton sampler
- **Specifications**: The Hydrobios is equipped with nine 200µm mesh nets (opening 0.5m2). This allows for depth specific sampling of the water column. The Hydrobios is also equipped with a CTD to record water column properties while collecting biological samples.
- **Deployment**: The deployment is vertical from 15m off the bottom to the surface. The nets open and close one by one as the pressure decreases while the net is going up in the water column. The depth at which the different nets open and close is programmed before deployment.
- **Laboratory analyses**: The zooplankton samples were preserved in 10% formalin solution for further taxonomic identification.

14.2.4 *Isaak-Kidd Midwater Trawl (IKMT)*

- **Description**: Pelagic juvenile, adult fish and macro-zooplankton sampler
- **Specifications**: Rectangular net with a 9m2 mouth aperture and mesh size of 11 mm in the first section, 5 mm in the last section.
- **Deployment**: The net was lowered at a target depth which was determined by the echosounder Ek-60 signal and towed at that depth for 30 minutes at a speed of 3 knots.

- **Laboratory analyses**: In the laboratory, fish were identified to the level of family or species, counted and measured. Adult fish were stored at -200C while larvae were preserved in 95% ethanol + 1% glycerol. A sub-sample of macrozooplankton were preserve in 10 % formalin solution.

14.2.5 *Benthic Beam Trawl*

- **Description**: Demersal fish sampler
- **Specifications**: Rectangular net with a 3m2 mouth aperture, 32mm mesh size in the first section, 16mm in the last section, and a 10mm mesh liner.
- **Deployment**: The net was lowered on the seafloor and towed for 15 minutes at a speed of 3 knots.
- **Laboratory analyses**: Adult fish collected with this sampler were identified, measured and stored at -200C while larvae were preserved in 95% ethanol + 1% glycerol.

14.2.6 *Continuous Plankton Recorder (CPR)*

- **Description**: Towed pelagic (~5 m depth) phytoplankton, zooplankton and microplastics sampler with potential towed distance of up to 500 nautical miles on one internal cassette. A mini CTD logger was also attached to record oceanographic information.
- **Specifications**: Torpedo-shaped steel towed body (85 kg) with a 1.6 cm square aperture that delivers seawater to a 270-micron collection silk net. As the CPR is towed, a propeller drives the advancement of the collection silk and a cover silk within an internal mechanical cassette. Both silks are spooled into a collection area for analyses of plankton samples at known locations along the tow route.
- **Deployment**: The CPR was attached to the ship with a braided steel CPR cable attached to the port side mooring winch on the upper level. The CPR was lowered to the water via the Moving Vertical Profiler lifting arm and winch where the CPR cable assumed all load. The CPR works well at speeds above 6 knots, so it could be deployed during transits and mapping operations.
- **Laboratory analyses**: In the laboratory, CPR silks were preserved in a 4% formalin solution and packaged for transportation to project partners at the Marine Biological Association of the United Kingdom for analyses of species compositions and abundances.

14.2.7 *Baited camera*

SubC Imaging high resolution camera system to characterized benthic fishes and invertebrates along with Greenland sharks. The camera system with battery, LED and laser is mounted on a 20 kg aluminium frame. The Frame is equipped with a baited arm, on which bait (Squid, both frozen and defrost) are attached.

14.2.8 *Acoustic monitoring*

The Simrad® EK60 echosounder of the Amundsen allows our group to continuously monitor the spatial and vertical distribution of zooplankton and fish. The hull-mounted transducers are in operation 24h a day thus providing an extensive mapping of where the fishes are along the ship track. The calibration of the EK60 echosounder needs to be done prior to departure.

Table 14-1 Leg 2a Operations Summary

Station	**Latitude**	**Longitude**	**Sampling Date**	**4x1m2,**	**2x1m2, tucker**	**Hydrobios**	**Beamtrawl**	**IKMT**	**Baited camera**
190	66.57708	-61.2313	08 Jul 19	1	1				
193	66.75747	-59.3507	09 Jul 19	1	1				
196	66.98959	-56.0613	10 Jul 19	1	1				
198	67.08845	-54.2015	10 Jul 19	1	1	1	1		1
BB-16	69.15191	-51.8632	11 Jul 19	1	1				
228	70.89951	-55.0027	12 Jul 19	1	1	1		1	1
229	71.00821	-53.0025	13 Jul 19	1	1				
226	70.70033	-59.0072	14 Jul 19	1	1				
float_1	69.50385	-61.1363	14 Jul 19					1	
224	70.44194	-62.9618	15 Jul 19	1	1				
222	70.0757	-66.6054	16 Jul 19	1	1	1	1		
BB-2	72.72042	-67.0201	17 Jul 19					1	

204	73.27275	-57.9889	18 Jul 19	1	1				
210	75.41985	-61.5764	19 Jul 19	1	1				
BB-24	75.80117	-62.4973	19 Jul 19						1
115	76.33136	-71.2135	20 Jul 19	1	1	1		1	1
108	76.25678	-74.5817	21 Jul 19	1	1	1	1		1
111	76.30511	-73.2074	21 Jul 19	1	1				
105	76.32115	-75.7613	22 Jul 19	1	1				
101	76.3813	-77.4066	23 Jul 19	1	1	1		1	
323	74.14256	-80.497	24 Jul 19	1	1	1		1	
323b	73.98656	-79.9761	24 Jul 19						1
Sum				18	18	7	3	6	6

Table 14-2 Leg 2b Operations Summary

Station	Sampling Date	4x1m2 V-Tow	2x1m2 O-Tow	Hydrobios	Beamtrawl	IKMT
122	29 Jul 2019	1	1			
133	30 Jul 2019	1	1	1	1	
134	31 Jul 2019	1	1			
6.4	01 Aug 2019		1			
6.4	02 Aug 2019	1				1
ROB1	02 Aug 2019	1		1		
Talbot Inlet	05 Aug 2019	1	1	1	1	
293	07 Aug 2019	1	1			1
295	09 Aug 2019	1	1			
296	10 Aug 2019	1	1			
297	10 Aug 2019					1
302	12 Aug 2019	1		1		
303	12 Aug 2019	1	1			
305A	12 Aug 2019	1	1			
305B	13 Aug 2019	1			1	
305C	13 Aug 2019	1				
Wel02	13 Aug 2019	1	1			
305D	14 Aug 2019	1	1		1	
Totals		16	12	4	4	3

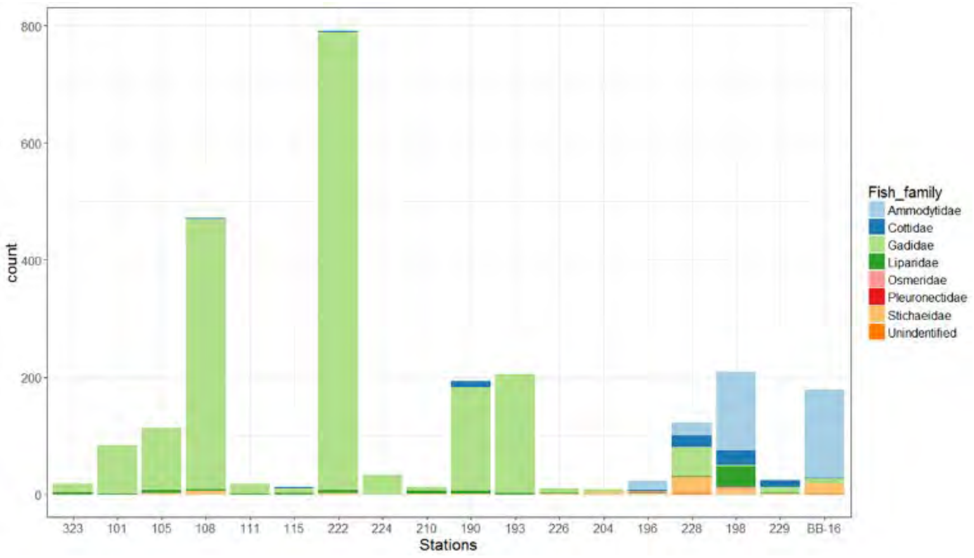
Table 14-3 Leg 3 Operations Summary

Station	Sampling Date	Latitude (N)	Longitude (W)	4x1m2 V-Tow	2x1m2 O-Tow	Hydrobios	Beamtrawl	IKMT
155	17 Aug	72.4871	-78.7614	1	1			
2.4	18 Aug	72.6427	-79.3441		1			1
170	19 Aug	71.3768	-70.0688	1	1	1	1	
E3	22 Aug	68.7911	-64.1500		1			
E4	22 Aug	69.0590	-63.6457	1				
E5	22 Aug	69.3150	-63.1256	1	1	1		1
E1	23 Aug	68.2781	-65.1417	1	1		1	
E2	23 Aug	68.5391	-64.6551	1				
E3	23 Aug	68.8002	-64.1552	1		1		
177	24 Aug	67.4738	-63.6893	1	1	1		1
D2	25 Aug	67.8586	-63.1507	1				
D3	25 Aug	68.2359	-62.5795	1	1	1		
D4	25 Aug	68.6216	-62.0081	1				
C5	26 Aug	68.1525	-59.9675	1	1	1		1
D5	26 Aug	68.9977	-61.4064	1	1			1
C2	27 Aug	67.5398	-61.9444	1				
C3	27 Aug	67.7547	-61.2715	1	1	1		
C4	27 Aug	67.9546	-60.6104	1				
C1	28 Aug	67.3476	-62.5184	1	1		1	
B1	29 Aug	67.0635	-61.5094	1	1	1	1	
B2	29 Aug	67.1996	-60.8877	1				
B3	29 Aug	67.3305	-60.2716	1	1	1		
A5	30 Aug	66.7758	-57.8541	1	1	1		1
B4	30 Aug	67.4617	-59.6506	1				
B5	30 Aug	67.5893	-59.0243	1	1			1
A2	31 Aug	66.6124	-60.4113	1				
A3	31 Aug	66.6747	-59.5647	1	1	1		
A4	31 Aug	66.7184	-58.7011	1				
A1	01 Sep	66.5903	-61.2061	1	1		1	
354	03 Sep	60.9790	-64.7503					1
Kelp	04 Sep	56.5988	-60.8011				1	
Totals				**27**	**1**	**1**	**6**	**8**

14.3 **Preliminary Results**

14.3.1 *Leg 2a*

A total of 58 deployments were conducted by the zooplankton and fish ecology team during leg 2a. Tucker nets were conducted at basic and full stations with the objective of sampling ichtyoplankton and macrozooplankton. As fish larvae were sorted, counted and identified at family level onboard, we were able to estimate the total number and relative abundance of fish larvae family along a longitudinal gradient from the western Baffin Bay to the eastern Baffin Bay (Figure 14-1). Fish larvae community changed along the east-west gradient as Gadidae (mostly Boreogadus saida) dominated on the western side of the Baffin Island while Stichaeidae, Cottidae and Ammodytidae dominated on the eastern side of the Baffin Island.



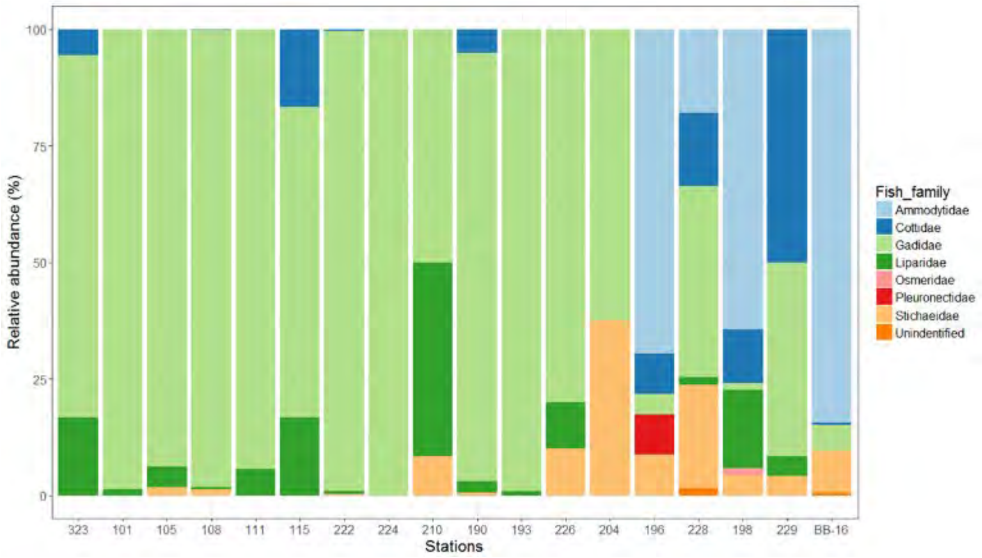


Figure 14-1 A) Counts of fish larvae individuals per family per station sampled in Tucker net B) Relative abundance of fish larvae per family per station sampled in Tucker net. Note that stations are sorted by longitudinal coordinates from western Baffin Bay to Eastern Baffin Bay.

14.3.2 *Leg 2b*

A total of 39 deployments were conducted by the zooplankton and fish ecology team during leg 2b. Tucker nets were conducted at basic and full stations with the objective of sampling ichthyoplankton and macro-zooplankton. As fish larvae were sorted, counted and identified onboard, we were able to estimate the total number and relative abundance of fish larvae family. Fish larvae community are dominated by Arctic cod (Boreogadus saida).

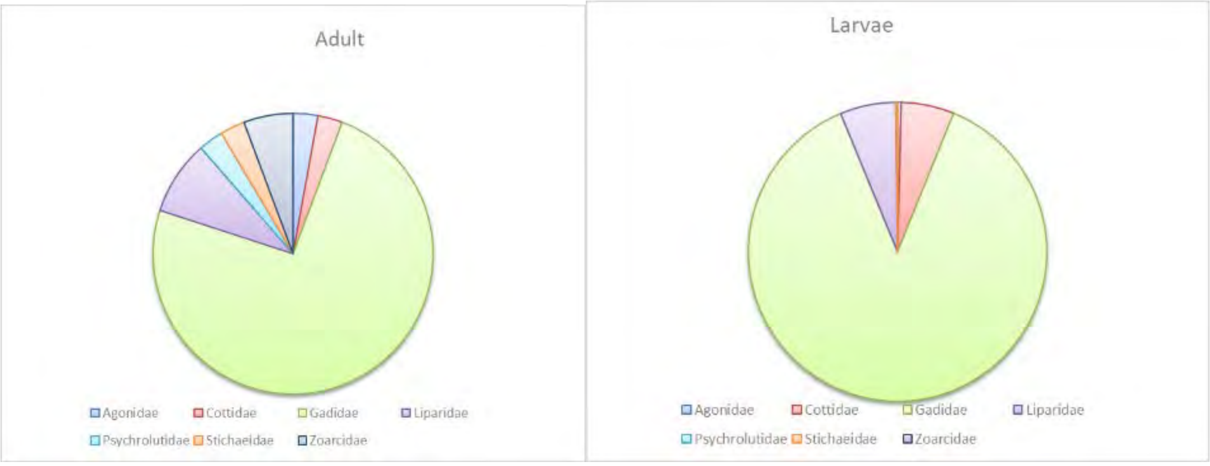


Figure 14-2 Fish Family distribution – Leg 2b

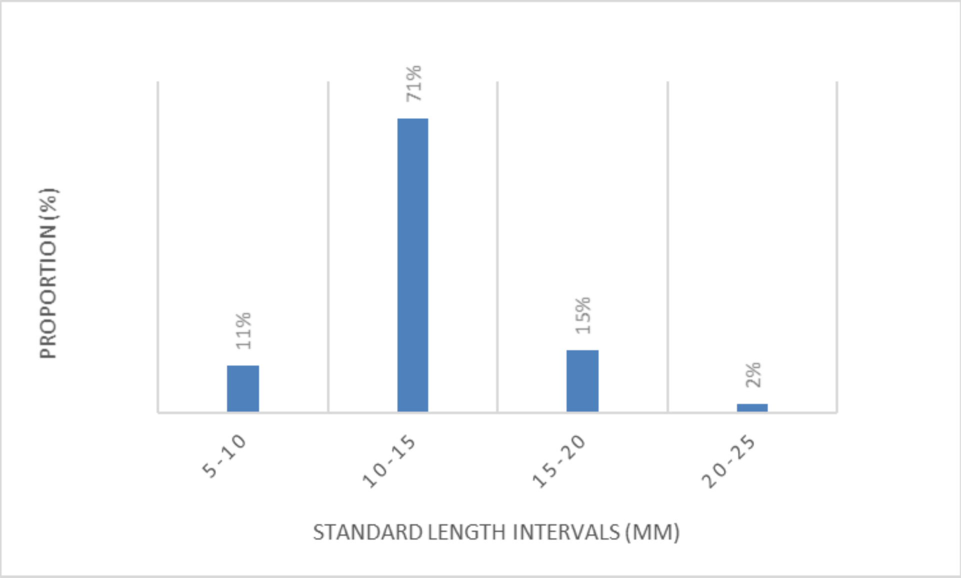


Figure 14-3 Length frequency distribution of Arctic Cod (Boreogadus saida) early stages

14.3.3 *Leg 3*

A total of 6 baited camera and 70 nets deployments were conducted by the zooplankton and fish ecology team during leg 3.

The Continuous plankton recorder (CPR) was deployed along 8 tow routes from Bylot Island, NU to Rimouski, QC. In total, the CPR sampled more than 2000 nautical miles. The plankton species compositions and abundances along those routes will be spatially geo-referenced and compared to the oceanographic data, fisheries acoustics and net-based samples that this project has also collected.

A total of 209 Boreomysis nobilis individuals were collected from 8 stations and kept at -80°C or in 95% ethanol (Thanks to the benthos team for some individuals sorted from their samples). Boreomysis nobilis were present at 11 stations. The specie is larger than other species present in the area, such as B. arctica. Genetic analysis will confirm identification.

Tucker nets were conducted at 18 stations with the objective of sampling ichthyoplankton and macro-zooplankton. As fish larvae were sorted, counted and identified onboard, we were able to estimate the total number and relative abundance of fish larvae family. Fish larvae community is dominated by Arctic cod (Boreogadus saida) in the surface water sampled.

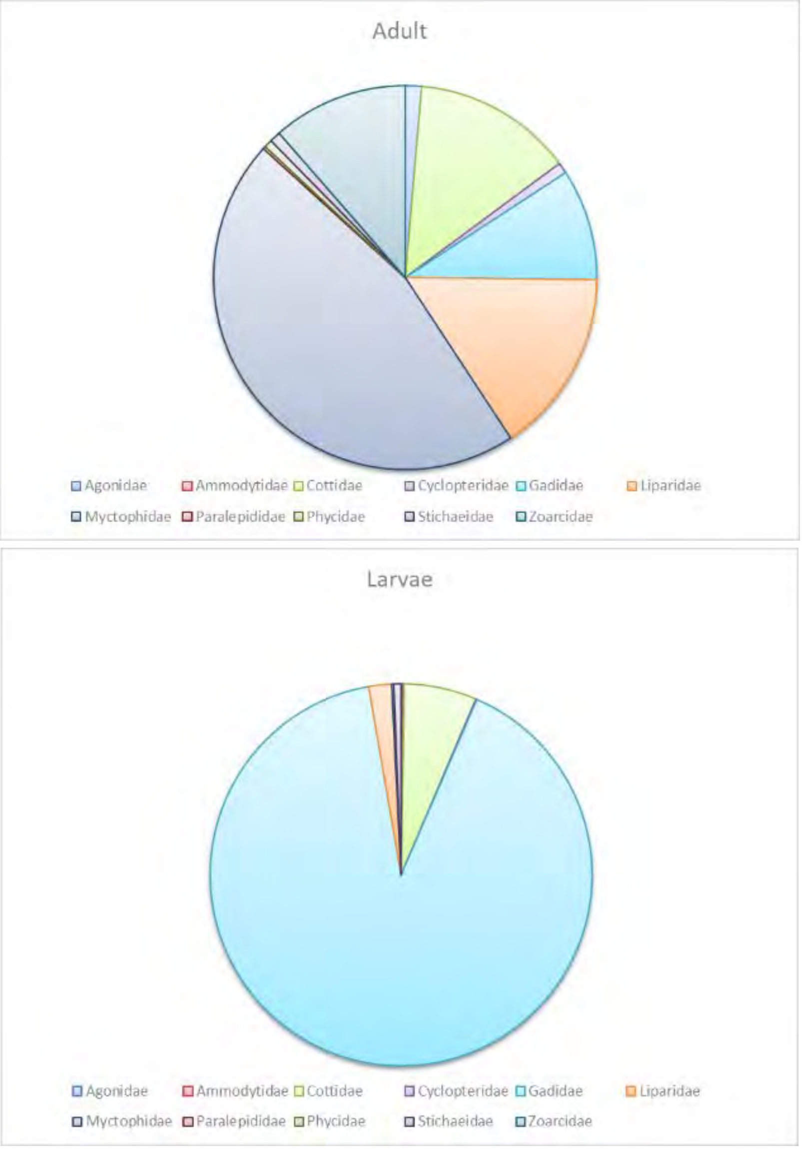


Figure 14-4 Fish Family distribution for the leg 3 sampling period

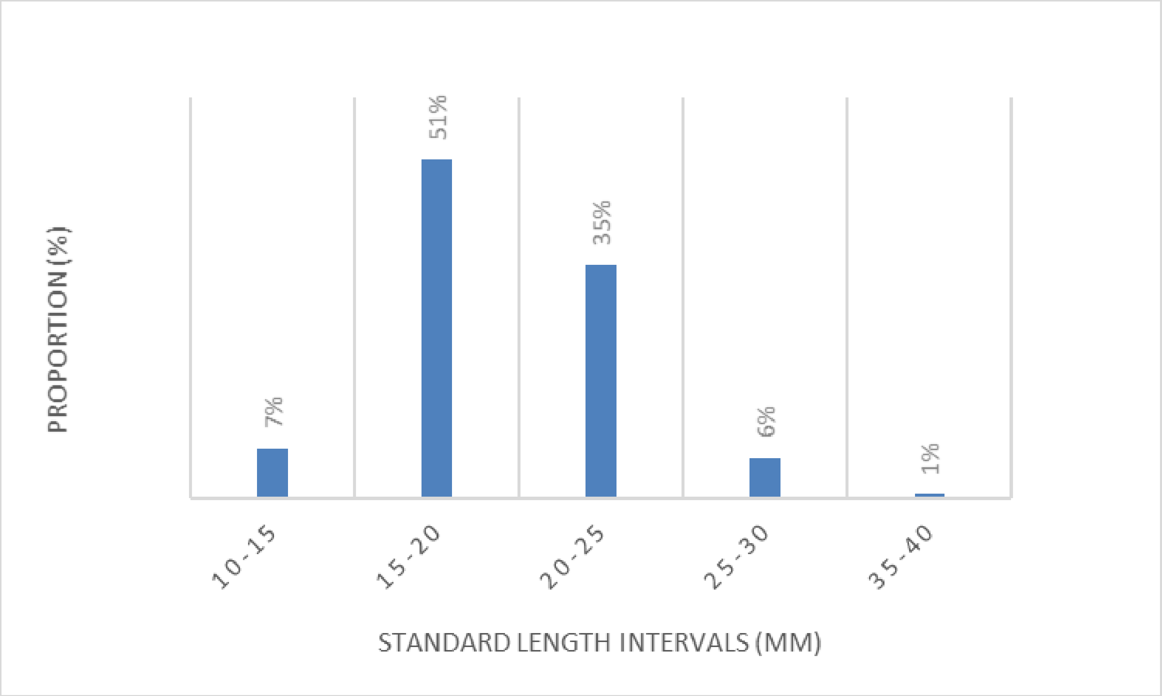


Figure 14-5 Length frequency distribution of Arctic Cod (Boreogadus saida) early stages for the 15 Aug 2019 to 09 Sep 2019 sampling period (n=294)

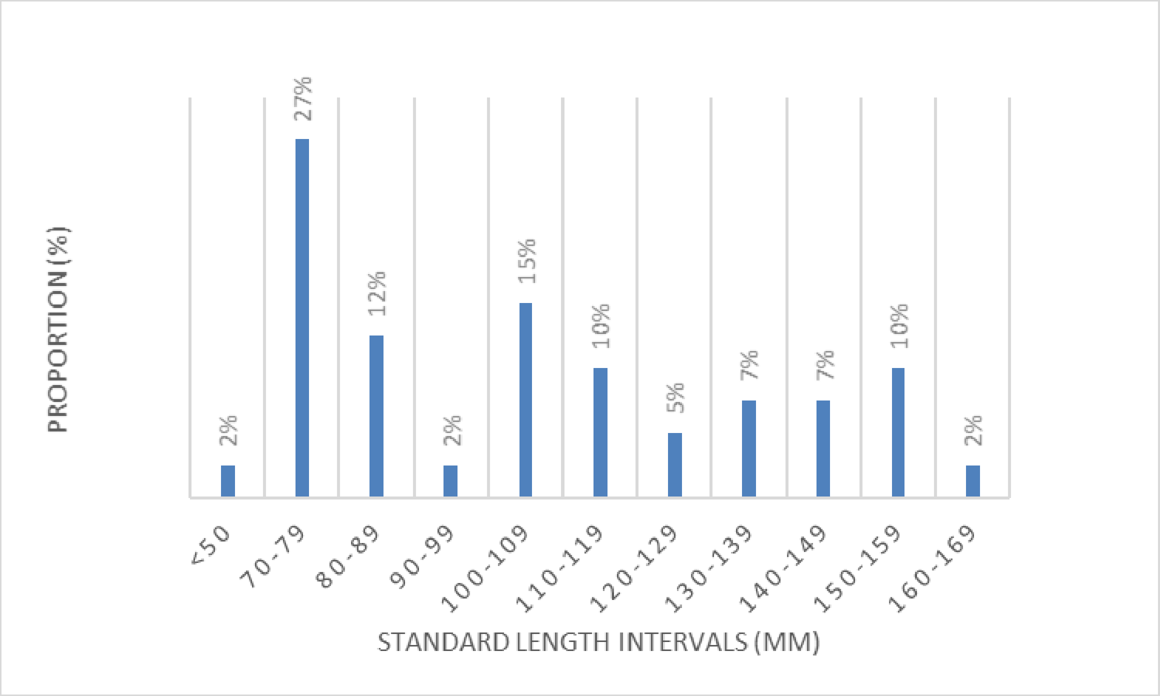


Figure 14-6 Length frequency distribution of Arctic Cod (Boreogadus saida) adult for the 15 Aug 2019 to 09 Sep 2019 sampling period (n=41)

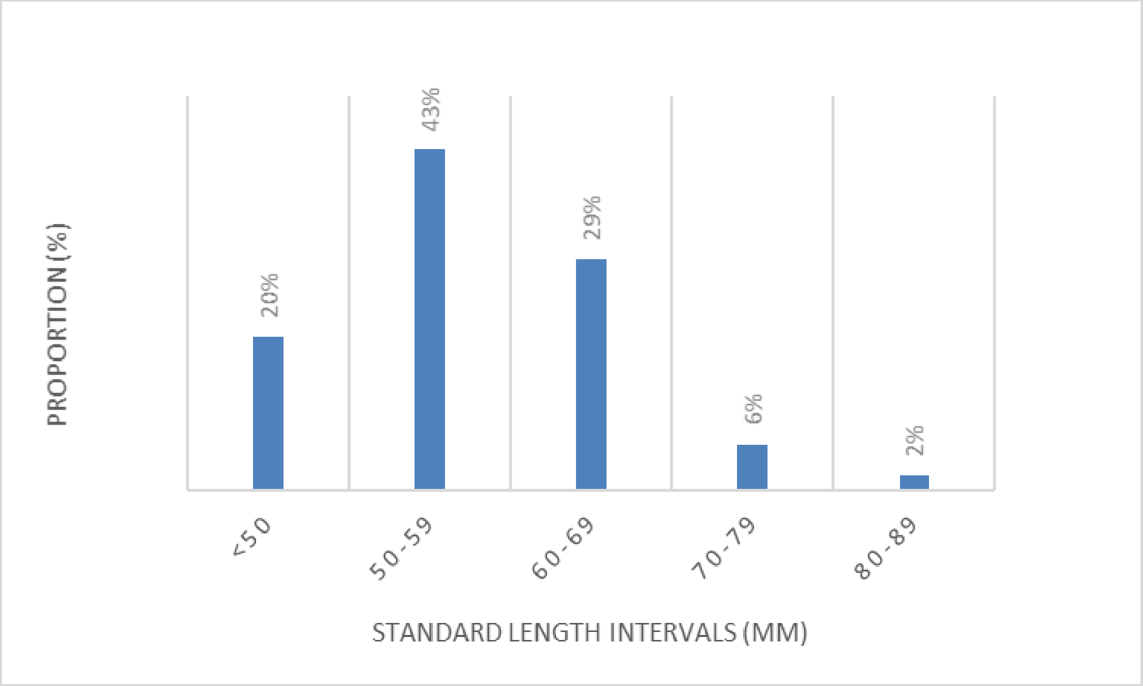


Figure 14-7 Length frequency distribution of Myctophidae Adult Fish for the 15 Aug 2019 to 09 Sep 2019 sampling period (n=51)

14.4 References

Thibaud Dezutter, Catherine Lalande, Christiane Dufresne, Gérald Darnis, Louis Fortier, Mismatch between microalgae and herbivorous copepods due to the record sea ice minimum extent of 2012 and the late sea ice break-up of 2013 in the Beaufort Sea, Progress in Oceanography, Volume 173, 2019, Pages 66-77, ISSN 0079-6611,https://doi.org/10.1016/j.pocean.2019.02.008.
http://www.sciencedirect.com/science/article/pii/S0079661118301071)

15 Carbon and Nutrients Fluxes

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15.1 Introduction

The Arctic climate displays high inter-annual variability and decadal oscillations that modulate growth conditions for marine primary producers. Much deeper perturbations recently became evident in conjunction with globally rising CO_2 levels and temperatures (IPCC 2007). Environmental changes already observed include a decline in the volume and extent of the sea-ice cover (Johannessen et al. 1999, Comiso et al. 2008), an advance in the melt period (Overpeck et al. 1997, Comiso 2006), and an increase in river discharge to the Arctic Ocean (Peterson et al. 2002, McClelland et al. 2006) due to increasing precipitation and terrestrial ice melt (Peterson et al. 2006). Consequently, a longer ice-free season was observed in both Arctic (Laxon et al. 2003) and subarctic (Stabeno & Overland 2001) environments. These changes entail a longer growth season associated with a greater penetration of light into surface waters, which is expected to favoring phytoplankton production (Rysgaard et al. 1999), food web productivity and CO2 drawdown by the ocean. However, phytoplankton productivity is likely to be limited by light but also by allochtonous nitrogen availability. The supply of allochtonous nitrogen is influenced by climate-driven processes, mainly the large-scale circulation, river discharge, upwelling and regional mixing processes. In the global change context, it appears crucial to improve the knowledge of the environmental processes (i.e. mainly light and nutrient availability) interacting to control phytoplankton productivity in the Canadian Arctic. Also, changes in fatty acid proportions and concentrations will reflect shifts in phytoplankton dynamics including species composition and size structure, and will reveal changes in marine energy pathways and ecosystem stability.

The main goals of our team were to establish the horizontal and vertical distributions of phytoplankton nutrients. Auxiliary objective was to calibrate the SUNA nitrate probe attached to the Rosette.

15.2 Methodoology

15.2.1 *Leg 2*

Samples for inorganic nutrients (ammonium, nitrite, nitrate, orthophosphate and orthosilicic acid) were taken at all NUTRIENTS/BASIC/FULL stations (Table 15-1) to establish detailed vertical profiles. Samples were stored at 4°C in the dark and analyzed for nitrate, nitrite, orthophosphate and orthosilicic acid within a few hours on a Bran+Luebbe AutoAnalyzer 3 using standard colorimetric methods adapted for the analyzer (Grasshoff et al. 1999). Additional samples for ammonium determination were taken at stations where incubations were performed and processed immediately after collection using the fluorometric method of Holmes et al. (1999). A quadrupole mass spectrometer (PrismaPlus, Pfeiffer Vacuum) was used to measure the dissolved gases (N_2, O_2, CO_2, Ar) coming for the underway seawater line located in the 610 laboratory. O_2 to Ar ratios will later be analyzed to measure primary production that occured up to 10 days prior of the ship's passage in all the areas visited.

In order to examine the potential effects of environmental conditions (e.g. acidity, alkalinity, free $C0_2$) on energy transfer through food chain, we realized at Full and Basic stations, 3L filtration in duplicate from water surface and SCM with pre-combusted GF/C, to analyse the lipids composition, which is the densest form of energy, in particulate organic matter. Samples of 100 to 1000mg of earlier and adult stage of copepods were also realized and stored on GF/F filters by -80°C to aims our objectives. Moreover, the pH of SCM and surface water has been measured by spectrophotometer by using red phenol and cresol purple colorants. Then we stored 500ml of water from each depth to determine the alkalinity in laboratory as soon as possible after the end of the mission. Finally, we continue the long term analysis conducted during previous year such as filtration of POC/PN, POP, BSi.

Table 15-1 List of sampling stations and measurements during leg 2

Sites	Cast	POC/PN	POC/PN	Bsi	POP	Fatty Acids	Total Lipids	Stable isotopes	Taxonomy	Ammonium	Bio Markers	DON	Nutrients
190	01, 02	X	X	X	X	X	X	X	X	X	X	X	X
191	3	X	X	X	X	X	X	X	X	X	X	X	X
192	4	X	X	X	X	X	X	X	X	X	X	X	X
193	05, 06	X	X	X	X	X	X	X	X	X	X	X	X
194	7	X	X	X	X	X	X	X	X	X	X	X	X
195	8	X	X	X	X	X	X	X	X	X	X	X	X
196	9	X	X	X	X	X	X	X	X	X	X	X	X
197	10	X	X	X	X	X	X	X	X	X	X	X	X
198	11	X	X	X	X	X	X	X	X	X	X	X	X
BB15	12												X
BB16	13												X
BB18	14												X
228	15,16		X								X		X
229	17		X								X		X
227	18		X								X		X
226	19, 20		X								X		X
225	21		X								X		X

Float 1	22												X
224	23, 24		X								X		X
223	25		X								X		X
223b	26		X								X		X
222	27,28												X
BB2	30, 31												X
201	33												X
204	34, 35		X								X		X
206	36												X
210	37, 38												X
BB24	39												X
214	41												X
116	42	X	X	X	X	X	X	X	X	X	X	X	X
115	43, 44	X	X	X	X	X	X	X	X	X	X	X	X
113	46												X
111	48	X	X	X	X	X	X	X	X	X	X	X	X
110	50												X
108	52, 53	X	X	X	X	X	X	X	X	X	X	X	X

108	52, 53	X	X	X	X	X	X	X	X	X	X	X	X
107	54												X
105	56, 57	X	X	X	X	X	X	X	X	X	X	X	X
103	60												X
101	61, 62	X	X	X	X	X	X	X	X	X	X	X	X
100	63	X	X	X	X	X	X	X	X	X	X	X	X
322	64	X	X	X	X	X	X	X	X	X	X	X	X
300	65												X
323	66, 67	X	X	X	X	X	X	X	X	X	X	X	X
324	68												X
325	69	X	X	X	X	X	X	X	X	X	X	X	X
NBI2	70	X	X	X	X	X	X	X	X	X	X	X	X
122	72,73												X
126	74												X
129	75	X	X	X	X			X		X	X	X	X
132	76	X	X	X	X			X		X	X	X	X
133	77, 78	X	X	X	X			X		X	X	X	X
136	79	X	X	X	X	X	X	X	X	X	X	X	X
134	81	X	X	X	X			X		X	X	X	X

135	82	X	X	X	X	X	X	X	X	X	X	X	X
137	83	X	X	X	X			X		X	X	X	X
138	84	X	X	X	X			X		X	X	X	X
Ken1	85	X	X	X	X			X		X	X	X	X
Rob1	88	X	X	X	X	X	X	X	X	X	X	X	X
Site 6.4	86, 87, 89	X	X	X	X			X			X	X	X
251b	90												X
Talbot Inlet	91, 92												X
117	93	X	X	X	X	X	X	X	X	X	X	X	X
290	95	X	X	X	X	X	X	X	X	X	X	X	X
291	96												X
292	97	X	X	X	X			X		X	X	X	X
293	98, 99	X	X	X	X	X	X	X	X	X	X	X	X
Site 2.3	100												X
Site 2.4	101												X
Site 1.4	102												X

15.2.2 *Leg 3*

Samples for inorganic nutrients (ammonium, nitrite, nitrate, orthophosphate and orthosilicic acid) were taken at all stations (Table 15-2) to establish detailed vertical profiles. Samples were stored at 4°C in the dark and analyzed for nitrate, nitrite, orthophosphate and orthosilicic acid within a few hours on a Bran+Luebbe AutoAnalyzer 3 using standard colorimetric methods adapted for the analyzer (Grasshoff et al. 1999). Additional samples for ammonium determination were taken and processed immediately after collection using the fluorometric method of Holmes et al. (1999). A quadrupole mass spectrometer (PrismaPlus, Pfeiffer Vacuum) was used to measure the dissolved gases (N2, O2, CO2, Ar) coming for the underway seawater line located in the 610 laboratory. O2 to Ar ratios will later be analyzed to measure primary production that occured up to 10 days prior of the ship’s passage in all the areas visited.

In order to examine the potential effects of environmental conditions on energy transfer through food chain, we also realized at targeted stations, filtrations in duplicate from 6 water depths with pre-combusted GF/C, to analyse the lipids composition, which is the densest form of energy, in particulate organic matter. At those stations, we also did additional filtrations for POC/PN, DON, POP, BSi, isotopic natural abundance of particulate matter, taxonomy and isotopes of nitrate.

Table 15-2 List of sampling stations and measurements during leg 3

Sites	Cast	POC/PN	POC/PN	Bsi	POP	Fatty Acids	Total Lipids	Stable isotopes	Taxonomy	Ammonium	Bio Markers	DON	Nutrients
155	01	X				X	X			X			X
CC-21													X
CGS-38													X
GICS-Z													X

BAY II													X
MI													X
NW25K	03									X			X
NW5K	04									X			X
NW1K	05									X			X
170-0	06	X				X	X			X			X
SW1K	07									X			X
SE5K	08									X			X
SE25K	09									X			X
NE1K	11									X			X
SE1K	12									X			X
E5	13									X			X
E4	14									X			X
E3	15									X			X
E2	16	X				X	X			X			X
E1	17	X				X	X			X			X
D1-177	18									X			X
D2	19									X			X
D3	20									X			X
D4	21									X			X
D5	22									X			X
C5	23									X			X

C4	24									X			X
C3	25									X			X
C3	26									X			X
C1	27									X			X
B1	28									X			X
B2	29									X			X
B3	30									X			X
B4	31									X			X
B5	32									X			X
A5	33	X				X	X			X			X
A4	34									X			X
A3	35									X			X
A2	36									X			X
A1	37									X			X
352	39	X	X	X	X	X	X	X	X	X	X	X	X
354	40	X	X	X	X	X	X	X	X	X	X	X	X
356	41	X	X	X	X	X	X	X	X	X	X	X	X
643	42	X				X	X			X			X

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16 Biogeochemistry of the Arctic Ocean

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16.1 Introduction

Climate change is affecting the biogeochemical cycling of carbon and other dissolved gases within the Arctic Ocean. The Arctic Ocean itself has undergone significant change in recent years, with increasing sea surface temperatures, increased freshwater inputs and large reductions in sea ice cover, the latter leading to higher gas exchange rates and subsequent ocean acidification. In 2018, our group measured several gases and biogeochemical tracers to provide insight into chemical processes within the water column. We measured the three most prominent anthropogenic greenhouse gases, CO_2, CH_4, and N_2O (carbon dioxide, methane, and nitrous oxide, respectively). Methane emissions from the Arctic are expected to increase as a consequence of global warming due to the thawing of permafrost on land and methane hydrates in the ocean. Nitrous oxide emissions in a changing Arctic Ocean are highly uncertain since different microbial processes can produce or consume these gases.

We also measured N_2, O_2, and Ar at select stations. Oxygen is a tracer of net photosynthetic production and N_2 is a tracer of denitrification (conversion of nitrate to N_2 by heterotrophic microbes in anoxic waters and sediments). Noble gases, which are chemically and biologically inert, can be used to parameterize physical processes in the ocean, and the insight from these measurements can be applied to biologically-active gases.

In addition to sampling at rosette stations we also visited 7 rivers to collect samples for geochemical analysis (please see separate report). While sea ice loss is the most visible impact of climate change on the Arctic Ocean, increases in river discharge and organic carbon supply (which is transported to the ocean, in part, by rivers) also have large impacts on biogeochemical cycling, and there is currently very little geochemical data on rivers in this region. This data is needed to understand the impact of rivers on the Arctic Ocean and identify the presence of river-influenced water in the ocean.

16.2 Methodology

16.2.1 *Rosette Sampling*

Seawater was collected at a number of nutrient, basic, and full stations (Table 16-1) from the ship's CTD rosette system. We collected seawater samples for the analysis of salinity and the following chemical concentrations: methane (CH_4), nitrous oxide (N_2O), dissolved inorganic carbon (DIC), total alkalinity (TA), oxygen (O_2), nitrogen (N_2), and argon (Ar), as well as stable isotopes of H_2O, N_2O, nitrate (NO_3-) and dissolved organic nitrogen (DON).

N_2, O_2, and Ar samples were poisoned with 50 µL of saturated mercuric chloride after collection and stored submerged in water until analysis at the University of South Carolina. N_2/Ar and O_2/Ar ratios will be measured by membrane inlet mass spectrometry (MIMS) following Kana et al. (1994). Briefly, the water sample is pumped through a capillary stainless steel and Viton tubing into a semipermeable microbore silicone membrane under vacuum. The gases are extracted through the silicone membrane into a glass tube immersed in a water bath at 20°C, and then passed through a U-shaped glass tube in liquid nitrogen to remove water vapor and CO_2 before being introduced into a Pfeiffer PrismaPlus QMG 220 quadrupole mass spectrometer. Standards equilibrated with seawater at 5°C and 20C will be measured every 10 samples to account for drift in the masses 28, 32, and 40 signals.

Samples for N_2O stable isotope and isotopomer analysis will be analyzed at the University of South Carolina using a Continuous Flow, MultiCollector, Isotope-Ratio Mass Spectrometer (CF-MC-IRMS, Elementar Americas PrecisION) coupled to an automated gas extraction system

(Charoenpong et al., 2014). The IRMS has the necessary collector configuration for simultaneous determination of masses 30, 31 (for SP) and 44, 45, and 46 (bulk $\delta^{15}N$ and $\delta^{18}O$). A multiple point calibration of several N_2O gases of known $^{15}N\alpha$ and $^{15}N\beta$ (as well as bulk $\delta^{15}N$ and $\delta^{18}O$) will be applied (see Mohn and al., 2014). Standard deviations for triplicate measurements of our N_2O standards are typically below 0.1‰ for δ15Nbulk-N_2O, 0.1‰ for $\delta^{18}O$-N_2O and 1.0‰ for SP. N_2O concentrations in our samples will be calculated from relative peak heights between the samples and a seawater standard of known N_2O concentration equilibrated with seawater at 5°C (12.5 nmol L-1 at salinity 34). Equilibrium N_2O concentrations will be estimated using the global mean contemporary atmospheric N_2O dry mole fraction at the time of sampling (http://agage.mit.edu/data/agage-data).

The concentration and $\delta^{15}N$ of total dissolved nitrogen (TDN, the sum of NO_3-, NO_2-, NH_4+ and dissolved organic nitrogen (DON)) will be analyzed at the University of South Carolina using the method by Knapp et al. (2005). Briefly, TDN will be oxidized to NO_3- by persulfate oxidation and analyzed using the denitrifier method. The concentration and isotopic composition ($\delta^{15}N$) of DON will then be calculated by mass balance for samples with more than 50% total DON relative to TDN, taking persulfate oxidizing reagent blank into account. For each oxidation set, DON oxidation efficiency and isotopic composition will be calculated using amino acid international standards (e.g., USGS64, glycine, $\delta^{15}N$ = 1.8‰) as well as other internal standards (urea and aminocaproic acid) (see Knapp et al., 2005, Bourbonnais et al., 2009).

Table 16-1 Rosette sampling during leg 2a

Station	Cast	Leg	Lat (N)	Lon (W)	Sal, DIC/ TA, H2O iso	CH4/ N2O	NO3 isotope	N2/Ar	N2O isotope	DON	chl
190	1	2a	66 35.59	061 11.87	X	X	X	X	X	X	X
191	3	2a	66 38.17	060 34.05	X	X	X	X	X	X	
192	4	2a	66 42.30	059 57.82	X	X	X				
193	5	2a	66 46.19	059 29.34	X	X	X	X	X	X	X

194	7	2a	66 49.70	058 21.26	X	X					
195	8	2a	66 54.77	057 10.13	X	X					
196	9	2a	66 59.13	056 3.88	X	X	X	X	X	X	X
197	10	2a	67 2.49	055 5.25	X	X					
198	11	2a	67 5.02	054 12.60	X	X	X	X	X	X	X
BB15	12	2a	68 27.07	55 54.02	X	X	X	X	X	X	X
BB16	13	2a	69 8.90	51 52.40	X	X	X	X	X	X	X
BB18	14	2a	70 5.48	052 44.63	X	X	X	X	X	X	
228	15	2a	70 54.04	055 0.11	X	X	X	X	X	X	X
229	17	2a	71 0.33	053 1.55	X	X	X	X	X	X	X
227	18	2a	70 47.82	056 59.24	X	X	X	X	X	X	
226	19	2a	70 42.02	059 0.38	X	X	X	X	X	X	X
225	21	2a	70 36.09	061 0.11	X	X	X	X	X	X	
224	23	2a	70 26.44	062 58.89	X	X	X	X	X	X	X
224	24	2a	70 25.20	062 56.71	X	X	X	X	X	X	
223	25	2a	70 16.28	064 49.04	X	X	X	X	X	X	
223b	26	2a	70 9.73	065 45.01	X	X	X	X	X	X	
222	27	2a	70 4.55	066 36.34	X	X	X	X	X	X	
BB2	29	2a	72 45.10	067 0.20	X	X		X	X	X	
BB2	30	2a	72 45.02	067 0.29	X	X	X	X	X	X	
BB2	31	2a	72 44.83	066 59.76			X				
201	33	2a	72 29.92	061 14.89		X	X	X	X	X	
204	34	2a	73 16.13	057 59.97	X	X	X	X	X	X	X
210	37	2a	75 25.15	061 33.91	X	X	X	X	X	X	X
BB24	39	2a	75 48.27	062 31.21		X	X	X	X	X	

115	43	2a	76 19.81	071 12.34	X	X	X	X	X	X	X
111	48	2a	76 18.58	073 12.28	X	X	X	X	X	X	X
108	53	2a	76 15.49	074 36.02	X	X	X	X	X	X	X
105	56	2a	76 19.32	075 46.87	X	X	X	X	X	X	X
101	61	2a	76 23.03	077 24.46	X	X	X	X	X	X	X
322	64	2a	74 28.93	080 31.85	X	X	X	X	X	X	
323	66	2a	74 9.55	080 28.21	X	X	X	X	X	X	X
325	69	2a	73 48.99	080 30.47	X	X	X	X	X	X	
122 / Site 2.8	73	2b	77 20.01	075 4.39		X	X	X	X	X	X
129	75	2b	78 20.13	074 8.84	X	X	X	X	X	X	
133	78	2b	79 34.63	070 17.72		X	X	X	X	X	X
134 / Site 2.11	81	2b	80 22.57	068 27.05	X	X	X	X	X	X	X
135	82	2b	80 26.12	068 55.73						X	
138	84	2b	81 0.74	065 24.67						X	
137	83	2b	81 4.41	065 59.87	X					X	
Ken1	85	2b	81 22	064 11.32	X	X	X	X	X	X	
Rob1	88	2b	81 45.2	062 23.86	X	X	X	X	X	X	X
Site 6.4	89	2b	81 36.92	063 13.33	X	X	X	X	X	X	X
Site 251b	90	2b	80 58.52	061 21.25	X	X	X	X	X	X	X
Talbot Inlet	92	2b	77 50.2	077 2.85		X	X	X	X	X	X
290	95	2b	76 7.94	080 21.97						X	
291	96	2b	75 59.64	080 22.63		X	X	X	X	X	
Site 2.2/ 292	97	2b	75 51.11	080 24.22						X	
293	99	2b	75 43.52	080 39.59		X	X	X	X	X	X
Site 2.3	100	2b	76 7.99	082 59.46						X	

Site 2.4	101	2b	76 7.62	086 19.03		X	X	X	X	X	
Site 1.4	102	2b	76 30.19	084 56.07						X	
295	103	2b	76 22.59	084 24.5						X	
296	105	2b	75 31.39	079 44.91		X	X	X	X	X	X
302	107	2b	74 14.07	086 11.09	X	X	X	X	X	X	X
303	108	2b	74 22.41	089 37.55	X		X				X
305C	111	2b	74 28.81	093 39.84	X		X			X	X
Wel01	112	2b	74 57.06	092 23.96		X	X			X	X
Wel02	113	2b	75 0.91	093 6.87		X	X			X	X

16.2.2 *Incubations*

We performed ^{15}N-labeled incubations to measure N_2O production at selected depths and stations (6 stations in total: 122, 133, 134, site 6.4, Talbot Inlet, and 295, one depth per station) with the following treatments:

- 5, 10 and 20 µM $^{15}N\text{-}NH_4^+$ + 2.5 µM $^{14}N\text{-}NO_2^-$
- 5, 10 and 20 µM $^{15}N\text{-}NO_2^-$ + 2.5 µM $^{14}N\text{-}NH_4^+$
- 10 µM 15N-NH_4+ or $^{15}NO_2^-$ + 2.5 µM $^{14}N\text{-}NO_2^-$ or $^{14}N\text{-}NH_4^+$ + 0.2 mL HCl to decrease the pH (0.3 to 0.4 units)

All treatments were incubated at in-situ temperature (about 0 °C) at 4 different time points: 0, 24, 48 and 72 hrs in duplicate or triplicate.

16.3 **Preliminary Results**

There are no preliminary results available as all of the analysis except for salinity will be done in laboratories following the cruise.

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17 Radiocarbon (^{14}C) and Stable Carbon (^{13}C) Isotopic Measurements of Dissolved Inorganic Carbon (DIC), Dissolved and Particulate Organic Carbon (DOC, POC) in Baffin Bay Seawater.

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17.1 Introduction

Together dissolved inorganic and organic carbon (DIC, DOC) make up the vast majority of carbon in the ocean. The DIC reservoir is ~38,000 GtC, DOC reservoir is ~662GtC, comparable to the total C content in the atmosphere. The particulate organic carbon (POC) reservoir is a small (~35 GtC) but rapidly cycling (<10 yr) pool of marine C. Knowing the carbon isotopic signatures the ocean's major C reservoirs is important for understanding water mass ages and ventilation rates, fluxes of anthropogenic C into the marine environment and the role of the biological and microbial carbon pumps in mitigating Earth's climate on modern to millennial timescales. Such data are rare, but essential for constraining the Arctic marine C cycle.

This study addresses fundamental gaps in our knowledge of the Arctic C cycle by providing much needed, quantitative information on the timescale of water mass ventilation and DOC and POC cycling in Baffin Bay. POC and DOC measurements will also help to determine the amount of terrestrially-derived organic carbon in the Arctic. DOC in particular, may serve as a sink for excess CO2 produced from fossil fuel and biomass burning. Most of this excess carbon will end up in the ocean, and it is critical to improve our understanding of the processes that are important for its long-term storage. Results of this research will be made available for use in models that assess present and future concentrations of atmospheric CO_2.

The average radiocarbon (^{14}C) age of DIC ranges from 1000-2000 ^{14}C years, whereas DOC in the deep ocean ranges from 4000 – 6500 ^{14}C years. Exceedingly few $DI^{14}C$, $DO^{14}C$ and $PO^{14}C$ data exist for the Arctic Ocean. Only two studies have reported data from the Beaufort and

Chukchi Seas as well as the Eurasian Basin (Griffith et al., 2012; Druffel et al., 2017). The main objective of this research is to determine the 14C signatures of the major marine C reservoirs ($DI^{14}C$, $DO^{14}C$, $PO^{14}C$) in Baffin Bay, for which there is no data. High-precision $\Delta^{14}C$ measurements will be performed on samples using AMS (accelerator mass spectrometry) either at the André E. Lalonde AMS facility at the University of Ottawa or at the Keck Carbon Cycle AMS lab at the University of California, Irvine.

Total DOM biomarker measurements will characterize major biochemicals in DOM and allow for quantification of labile and semi-labile DOM pools. In addition, biomarker measurements will provide estimates of bacterial DOM contributions. These tools are well suited for characterizing the microbial carbon pump (MCP) and have been previously used to study DOM cycling in the mesopelagic ocean (Kaiser & Benner, 2012), to quantify bacterial contribution to marine DOM (Kaiser & Benner, 2008) and to determine the efficiency of the MCP. Total DOM biomarker analyses include: i) total hydrolyzable D- and L- amino acids, ii) total hydrolyzable neutral sugars and iii) total hydrolyzable amino-sugars. Integrated with nuclear magnetic resonance spectroscopy (NMR), these biomarkers provide the appropriate tools to capture sources and transformations of DOM in the Arctic.

We are testing the following hypotheses:

(1) DIC radiocarbon ages will reveal the ventilation age of the Baffin Bay region, the input of $DI^{14}C$ to the Western Greenland Current via melting glacial runoff and also the intrusion of anthropogenic "bomb" ^{14}C into Baffin Bay Deep Water.

(2) DO14C values will reveal the relative contribution of Atlantic vs. Pacific vs. Glacial DOC inputs to Baffin Bay, and similarly to DIC the intrusion of anthropogenic "bomb" ^{14}C into Baffin Bay Deep Water DOC. These $DO^{14}C$ values will also be informative as pre-cursors to DOC in the Labrador Sea.

(3) $PO^{14}C$ values will help constrain estimates of C delivered to Baffin Bay sediments via export production and will vary spatially with proximity to Baffin Island, the Western Greenland Current and glacial melt waters.

(4) Dissolved enantiomeric amino acid biomarkers will help constrain extent to which DOC has been degraded through microbial heterotrophy in Baffin Bay water masses.

Increased microbial respiration of terrestrial DOC, and a concomitant increase in bacterial D-amino acids, is expected near riverine and glacial meltwater sources.

17.2 Methodology

DO^{14}C (as Δ^{14}C) samples were sampled in pre-combusted (540°C/2h) 1L borosilicate bottles (amber boston rounds). We collected DO^{14}C duplicates at stations 193 (100m), BB2 (2300m), and 210 (800m). Samples above 400m depth were filtered using pre-combusted 70mm GF/F filters (<0.7μm), acid cleaned silicone tubing and a custom built 316 stainless steel 70mm filter manifold. Samples were immediately frozen after collection and stored at -20°C for analysis at the University of California, Irvine. Once in the lab, samples will be acidified and sparged of dissolved inorganic carbon, and CO_2 will be produced from DOC via UV oxidation and vacuum line extraction (Beaupre et al., 2007; Walker et al., 2019). This CO_2 will then be graphitized and its radiocarbon content measured via AMS at the Keck Carbon Cycle AMS laboratory at UCI. DOC δ^{13}C will also be measured in a split of the CO_2 from each sample using light isotope mass spectrometry.

DI^{14}C were sampled in pre-cleaned (10% HCl soak and MQ water rinse) and combusted (540°C/2h) 250 mL square Pyrex media bottles. Depths sampled for DI^{14}C were the same as those for DO^{14}C. We collected DI^{14}C duplicates at stations 193 (400m), 227 (1000m), 224 (1000m), BB2 (0m, 2300m), 204 (800m), 210 (1080m), 108 (400m), and 323 (20m). Samples were overfilled 3x and collected with zero headspace, poisoned in the lab with 1 drop (50μl) saturated $HgCl_2$, and stored in the dark and room temperature until analysis at the University of Ottawa. DIC samples were not filtered for fear of introducing gas bubbles. Once in the lab, DI^{14}C samples will be acidified and the resulting CO_2 from dissolved inorganic carbon sparged, cryogenically purified and manometrically quantified following the methods of Gao and co-workers (Gao et al., 2014). This CO_2 will then be graphitized at U. Ottawa and its radiocarbon content measured via AMS at the Keck Carbon Cycle AMS laboratory at UCI. DOC □ ^{13}C will also be measured in a split of the CO_2 from each sample using light isotope mass spectrometry.

Depth integrated $PO^{14}C$ samples ($PO^{14}C$) were collected as onto a pre-baked (540°C/2h) 70mm QMA filter (2.0µm in liquid) stacked on top of a pre-baked GFF (0.7µm) in a custom manifold was used for all rosette filtrations. Our $PO^{14}C$ samples comprise a depth integrated (10-14 L) signature of all surface Niskin bottles sampled above 400m depth, and in some instances a minor contribution of bottom water (filtered when the Niskin was fired at a depth less than 100 meters above bottom to avoid nephloid layer POC contributions to our DOC samples).

Dissolved organic matter (DOM) biomarker samples were collected into 60 mL acid-soaked (10% HCl) and rinsed (18.2 MΩ Milli-Q water) high density polyethylene (HDPE) bottles. Sample depths shallower than 400m were filtered through a pre-combusted (540°C/2hr) GF/F filter and clean stainless steel manifold. On biomarker stations, all Niskin bottles were sampled. Biomarker samples will be analyzed for many individual biomolecules including a suite of: total dissolved amino acids (including D-enantiomeric forms), amino sugars and neutral sugars. These will be measured via high performance liquid chromatography and ion chromatography at the University of Ottawa.

Samples of opportunity for dissolved lignin phenol biomarker analysis were collected into acid soaked (10% HCl overnight) 250mL polycarbonate bottles. Lignin samples were taken only at Stations 193 and 108. For station 193, all Niskin bottle depths were sampled. At station 108, only 15 depths were sampled. At station These samples were taken as an opportunity from researchers at Texas A&M Galveston (Dr. Rainer Amon) and will be shipped frozen and measured there via high-performance liquid chromatography and triple quadrupole mass spectrometry.

17.3 **Preliminary Results**

No preliminary results to report, as all actual analyses will be performed either at the University of Ottawa André E. Lalonde Accelerator Mass Spectrometer Facility (AEL-AMS) or at the University of California, Irvine Keck Carbon Cycle Accelerator Mass Spectrometer Laboratory (KCCAMS).

Table 17-1 Overview of samples taken by the Walker group during Leg 2a of 2019 ArcticNet aboard the CCGS Amundsen. Depths listed are for $DI^{14}C$, $DO^{14}C$ and NMR samples. At stations 193 and 108, all Niskin depths were collected for lignin phenol biomarker analysis. Amino acid biomarkers were collected at all rosette depths at each station. Samples collected less than 100 meters above bottom and those shallower than 400m depth were filtered (GF/F <0.7μm). Listed sample depths were planned and are only approximations of actual depths fired/collected. A total of 12 stations and 14 rosette casts were sampled on Leg 2a. Latitude and Longitude listed are of the ship's position when the rosette was at the bottom of each cast.

Location	Cast	Station	Lat (N)	Long (W)	Samples taken
Davis Strait	005	193	66° 46.080'	059° 19.966'	Seawater (Rosette; 0, 20, 50, 100, 200, 400, 600, 800m)
E. Davis Strait Shelf	009	196	66° 59.202'	056° 03.646'	Seawater (Rosette; 0, 20, 50, 100m)
SW. Greenland Slope	012	BB15	68° 27.043'	055° 54.131'	Seawater (Rosette; 0, 20, 50, 100, 200, 400m)
Disko Bay	014	BB18	70° 05.489'	052° 44.687'	Seawater (Rosette; 0, 20, 50, 100, 200, 400m)
SW. Greenland Slope	018	227	70° 47.824'	056° 59.201'	Seawater (Rosette; 0, 20, 50, 100, 200, 400m)
Central Baffin Bay	023	224-A	70° 26.515'	062° 58.352'	Seawater (Rosette; 0, 20, 50, 100, 200, 400, 600, 800m)
Central Baffin Bay	024	224-B	70° 25.141'	062° 56.761'	Seawater (Rosette; 1000, 1200, 1400, 1600, 1800, 2000m)
N. Central Baffin Bay	029	BB2-A	72° 45.038'	067° 00.703'	Seawater (Rosette; 0, 20, 50, 100, 200, 400, 600, 800m)
N. Central Baffin Bay	030	BB2-B	72° 45.056'	067° 00.367'	Seawater (Rosette; 1000, 1200, 1400, 1600, 1800, 2000, 2300m)
W. Greenland Shelf	034	204	73° 16.343'	058° 00.029'	Seawater (Rosette; 0, 20, 50, 100, 200, 400, 600, 800m)
NW. Greenland Shelf	037	210	75° 25.151'	061° 33.910'	Seawater (Rosette; 0, 20, 50, 100, 200, 400, 600, 800, 1080m)
E. Smith Sound	044	115	76˚20.014'	071˚12.569'	Seawater (Rosette; 550m)
Central Smith Sound	053	108	76˚15.600'	074˚36.000'	Seawater (Rosette; 0, 20, 50, 100, 200, 300, 400m)
Lancaster Sound	066	323	74° 09.527'	080° 28.308'	Seawater (Rosette; 0, 20, 50, 100, 200, 400, 600, 750m)

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18 Biodiversity and biogeography of marine microbial plankton: Interconnections, interactions, and environmental drivers

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18.1 Introduction

Marine phytoplankton are responsible for around half of the global photosynthetic production, and in the Arctic Ocean single celled microscopic plankton support virtually all animal life. But unlike on land, where biologically diverse regions and productive areas can be seen from space as dense green forests and agriculture lands, the highly productive regions in the Arctic tend to have little surface biomass for most of the year and are invisible to most remote sensing technologies. In contrast to land, the location of productive regions in the Arctic are often identified initially by the presence of marine mammals and birds.

For the most part, especially in the Canadian Arctic, surface waters lack the needed nutrients to produce prolific phytoplankton biomass, and the majority of annual production is carried out deeper in the water column where nutrients are high and light remains sufficient for photosynthesis. As a consequence, much of the standing stock phytoplankton is not readily observed with remote sensing, making ship board data collection essential for understanding patterns of phytoplankton distribution and depth (Kalenitchenko et al. 2019). The type of microbial plankton is also an important indicator of the health and state of the ecosystem (Joli et al. 2018) since species are selected by a combination of historic and current conditions (Monier et al. 2015). An overarching aim of the Lovejoy Labortory at ULaval has been to build up a more complete picture of the environment and physical oceanographic conditions that select for given species. This information will facilitate interpretation of sporadic punctual data, which is the main limitation of ship based studies.

Our approach is to use high throughput amplicon DNA sequencing to identify the microbial plankton in specific water masses (Monier et al. 2013) and to identify trends over time and seasons (Comeau et al. 2011) (Onda et al. 2017). As a complimentary approach we also use genome and metagenome sequencing to identify potential functional metabolic pathways used by microbial plankton to adapt to current and future arctic conditions (Joli et al. 2017) (Colatriano et al. 2018), (Freyria, ongoing PhD thesis). During this AN19 mission leg 2a, samples were selected to be representative of major water masses in both upper and deeper waters. Microscopy samples were also collected and will be used for species verification where warranted by sequencing results.

A potential side project was identified while on board and Fatima Dhifallah from André Rochon's group at UQAR. She subsequently sub-sampled (10 ml) all of the "bongo" phytoplankton nets for potential DNA sequencing. The aim of this study would be to identify the larger phytoplankton, match morphology with genetic identification, and contribute to a wider harmful algal event evaluation study of the Arctic Ocean. The analysis of these samples is contingent on further funding.

18.2 Preliminary Results

18.2.1 *Leg 2a*

Overall 18 stations were sampled for DNA–RNA and a total of 129 samples collected. Samples for biomass estimates using flow cytometry (all depths and stations) were also collected. In addition, for most stations the 4 upper depths for were processed for fluorescence microscopy and targeted cell population sorting using flow cytometry. For selected stations water from the surface and SCM were preserved to be used for standard inverted and confocal microscopy.

Table 18-1 samples collected during leg 2a

Cast	UTC date	UTC time	AN Station	Latitude North	Longitude West	Nb of depths
2019/1902/1902002	2019-07-08	15:34	190	66° 33.934	061° 11.907	5
2019/1902/1902006	2019-07-09	19:16	193	66° 45.162	059° 20.626	8

2019/1902/1902010	2019-07-10	16:16	197	67° 2.47	055° 5.221	5
2019/1902/1902013	2019-07-11	19:28	BB16	69° 8.899	051° 52.396	5
2019/1902/1902016	2019-07-12	22:36	228	70° 54.079	055° 0.170	8
2019/1902/1902020	2019-07-14	2:56	226	70° 41.983	058° 59.960	8
2019/1902/1902024	2019-07-15	3:22	224	70° 25.182	062° 56.696	8
2019/1902/1902028	2019-07-16	7:21	222	70° 4.639	066° 37.050	4
2019/1902/1902030	2019-07-17	3:22	BB2	72° 44.948	067° 0.367	8
2019/1902/1902035	2019-07-18	6:53	204	73° 15.845	057° 59.098	8
2019/1902/1902038	2019-07-19	8:43	210	75° 25.219	061° 32.993	8
2019/1902/1902044	2019-07-20	16:34	115	76° 19.931	071° 12.041	8
2019/1902/1902046	2019-07-20	23:05	113	76° 19.17	072° 12.940	4
2019/1902/1902050	2019-07-21	11:41	110	76°17.698	073° 36.022	4
2019/1902/1902052	2019-07-21	17:41	108	76°15.148	075° 35.429	8
2019/1902/1902057	2109-07-22	16:39	105	76° 19.105	075° 45.97	8
2019/1902/1902062	2019-07-23	08:26	101	76° 22.684	077°26.27	8
2019/1902/1902063	2019/07/24	21:38	323	74° 6.432	080° 30.653	8

18.2.2 *Leg 2b*

Overall 16 stations were sampled for DNA–RNA and a total of 81 samples collected. Samples for biomass estimates using flow cytometry (all depths and stations) were also collected. In addition, for most stations the 4 upper depths for were processed for fluorescence microscopy and targeted cell population sorting using flow cytometry. For selected stations water from the surface and SCM were preserved to be used for standard inverted and confocal microscopy.

Table 18-2 Samples collected during leg 2b

Cast	UTC date	UTC time	AN Station	Latitude North	Longitude West	Nb. of depths
2019/1902/1902072	2019-07-28	20:41	122/Site 2.8	77°20.136	75°2.447	6
2019/1902/1902076	2019-07-29	22:58	132	79°0.138	72°19.036	5
2019/1902/1902077	2019-07-30	5:31	133	79°34.622	70°16.552	4
2019/1902/1902080	2019-07-31	14:28	134	80°24.221	68°22.976	7
2019/1902/1902086	2019-08-01	19:07	Site 6.4	81°37.112	63°19.278	6
2019/1902/1902088	2019-08-02	7:01	Rob1	81°45.208	62°23.897	4

2019/1902/1902090	2019-08-03	10:57	251b	80°58.528	61°21.257	5
2019/1902/1902091	2019-08-05	12:07	Talbot Inlet	77°49.780	77°2.95	6
2019/1902/1902098	2019-08-07	9:09	293	75°43.988	80°40.702	5
2019/1902/19020102	2019-08-08	20:17	Site 1.4	76°30.198	84°56.078	4
2019/1902/19020103	2019-08-09	4:06	295	76°22.595	84°24.486	4
2019/1902/19020104	2019-08-10	4:30	297	76°22.351	81°17.888	5
2019/1902/19020105	2019-08-10	15:03	296	75°31.506	79°45.277	6
2019/1902/19020106	2019-08-10	0:31	Site 2.7	75°28.896	78°7.000	4
2019/1902/19020107	2019-08-11	3:31	302	74°14.071	86°11.102	5

18.2.3 *Remarks*

The metadata and oceanographic profiles collected by the Amundsen Science team will be essential for the analysis of our work. Specifically, we will be requesting the clean CTD files, including ADCP data. The close co-operation of Jean-Eric Tremblay's team for nutrient data is acknowledged

During the line 100 transect (76° north), I noticed an unusual depth distribution of the chlorophyll fluorescence data on the downward cast. Subsequent inspection of the data suggests the presence of a cold core eddy and I will be following this up in the coming months. I would like to request that the unusual peaks in deep fluorescent not be flagged as questionable data, I believe they are real.

18.3 **Acknowledgment**

18.3.1 *Leg 2a*

The sampling would not have been possible without the co-operation and good humour of Camille Wilhelmy and Karine Robert (Amundsen Science, Rosette team) and Jonathan Gagnon (nutrients, JET team). I acknowledge the aid and professionalism of the Canadian Coast Guard Crew, which was critical for the success of this mission. I also extend sincere thanks to the Chief Scientist. Dr. Alexandre Forest.

18.3.2 *Leg 2b*

The sampling would not have been possible without the co-operation of Pascal Guillot, Lou Tisné and Thomas Linkowski (Amundsen Science, Rosette team) and Jonathan Gagnon and Guillaume Cinq-Mars (nutrients, JET team). I would like to thank Tim Rodgers, Megan Roberts and Patrick Williams for their help during bucket sampling.

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19 Revisiting sites of the Baffin Island Oil Spill (BIOS) project after 40 years

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19.1 Introduction

The Baffin Island Oil Spill (BIOS) project was carried out between 1980 and1983 and aimed at investigating the long-term fate of spilled oil in the Canadian Arctic (Cretney et al 1987, Sergy and Blackall 1987). The BIOS project took place at Cape Hatt at the northern end of Baffin Island. The project consisted of a shoreline and a near-shore component. The shoreline component aimed at testing techniques for cleaning beaches contaminated with crude oil (Owens et al 1987b). Test plots for the shoreline component were set up on intertidal and supratidal portions of beaches of bays located in Z-Lagoon (Figure 19-1).

The near-shore component of the BIOS project aimed at investigating the fate of stranded crude oil after a spill close to the shoreline (Owens et al 1987a). This component took place at the western bays of Cape Hatt facing Ragged Channel. Two spill scenarios were tested for this component. A crude oil spill was simulated that resulted in a stranded oil slick at bay 11. The second scenario simulated stranding of chemically dispersed oil and took place at bay 9 (Figure 19-1).

The goal of this study was to re-sample sites of the BIOS project in order to determine (i) how much of the originally spilled oil can still be detected, (ii) how the oil composition has changed after weathering under Arctic conditions for almost 40 years, and (iii) to identify microorganisms that carry out biodegradation of the spilled oil.

Nine sampling sites were selected for this study. These sites included sites of the original BIOS project as well as nearby control sites (Table 19-1). The sites were to be sampled for intertidal and supratidal beach sediment, subtidal sediment and seawater; Table 19-1lists the types of samples that were to be collected at each site. The sampling campaign was planned to consist of two teams: one team that collects beach samples and a second team that simultaneously collects subtidal sediment cores and seawater samples from a scientific barge.

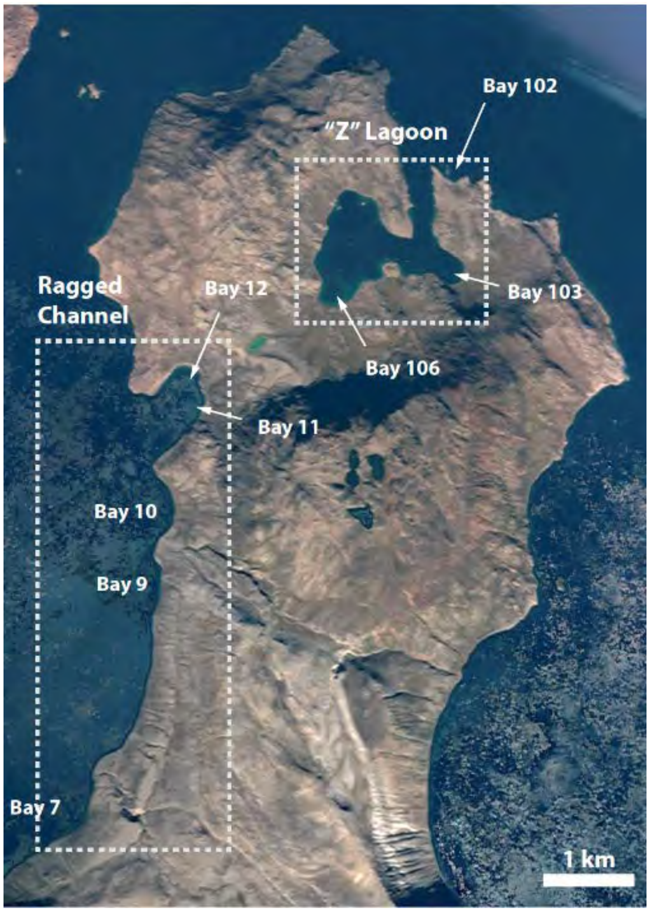

Figure 19-1 Test sites of the BIOS project

Table 19-1 Planned sampling sites and types for the BIOS re-sampling campaign.

Sampling site	Site description	Beach type	Beach	Subtidal	Water
Z-Lagoon: Bay 102	Oiled intertidal plots	High energy	X	X	X
Z-Lagoon: Bay 103	Oiled intertidal plots	Intermediate energy	X	X	X
Z-Lagoon: Bay 106	Oiled intertidal and supratidal plots	Low energy	X	X	X
Z-Lagoon: Crude Oil Point	Oiled intertidal and supratidal plots	Intermediate energy	X	-	-
Ragged Channel: Bay 11	Stranded crude oil	Intermediate energy	X	X	X
Ragged Channel: Bay 9	Stranded dispersed oil	Intermediate energy	X	X	X
Ragged Channel: Bay 7	Control site	Intermediate energy	-	X	X
Ragged Island: Milne Inlet	Control site	Intermediate energy	X	X	X
Ragged Island: Western Bay	Control site	Intermediate energy	-	X	X
Ragged Island: Northern Bay	Control site	High energy	X	X	X
Ragged Island: Southern Bay	Control site	Intermediate energy	-	X	X

19.2 Methodology

19.2.1 *Beach Sampling*

Beach sites were documented using aerial photography obtained with a drone and photos taken from the ground. Exact sampling locations were determined using a GPS device. In situ surface and subsurface temperatures of beach sediment were recorded for all sampling sites. Beach sampling included push cores for microbiological analyses and bulk sediment samples intended for sediment characterization and petroleomics. Push cores were sectioned in 5 cm intervals up to a depth of 20 cm, subsampled and finally preserved for DNA sequencing (Kostka et al 2011), cytometry (Deng et al 2019) and ATP measurements (Zhang et al 2017). Bulk sediment samples were collected from the sediment surface (0-2 cm depth) and the subsurface (5-10 cm depth).

19.2.2 *Subtidal Sediments*

Subtidal sediments were obtained using a small-scale Kajak-Brinkhurst (KB) corer and a grab sampler. Subtidal sediments cores were obtained in duplicates, with one core intended for petroleomics, Pb210 dating, and sediment characterization, and the second core being used for microbiological analyses. Subtidal cores intended for petroleomics were sectioned in 0.5 cm intervals on-board the barge. Cores for microbiological analyses were sectioned on-board the CCGS *Amundsen* and subsampled for DNA sequencing, cytometry and ATP measurements.

19.2.3 *Seawater*

Seawater temperature, oxygen content and salinity were recorded using an YSI device. Seawater samples of the surface layer were obtained by bucket casting. Water samples were obtained in triplicate with one triplicate intended for petroleomics and the other two triplicates intended for microbiological analyses. Water samples for microbiological analyses were filtered on-board the CCGS *Amundsen* for DNA sequencing. Nutrient analysis of seawater samples was carried out on-board the CCGS *Amundsen* by Gabrièle Deslongchamps and Vincent Villeneuve (members of the group of Jean-Eric Tremblay at Laval University).

19.3 **Preliminary Results**

19.3.1 *Beach sampling, Bay 102.*

We were unable to identify the location of the BIOS test plots at this beach. However, based on landmarks the overall area containing the former test plots could be determined. Intertidal beach sediments outside this area were sampled to function as a control samples.

19.3.2 *Beach sampling, Bay 103.*

Similarly to bay 102, we were unable to identify the BIOS test plots on the beach of bay 103 of Z-Lagoon. The lack of clear landmarks at this bay further made it impossible to even approximate the area of the test plots. As a consequence, no beach samples were taken from this site.

19.3.3 *Beach sampling, Bay 106.*

Bay 106 represents the most sheltered beach of Z-Lagoon (Owens and Robson 1987). Original BIOS test plots at this bay included intertidal and supratidal plots which were set up to test different beach cleaning techniques. We successfully identified the locations of the test plots on the beach of bay 106 based on metal stakes remaining from the BIOS project. We collected several push cores as well as bulk sediment samples from the supratidal BIOS plots as well as from a supratidal control site located adjacent to the plots. Several of the collected samples featured a clear oily odour and therefore likely contain residual oil. We further obtained a sample of tar/asphalt pavement that was detected between two of the test plots.

19.3.4 *Beach sampling, Crude Oil Point.*

Crude oil point represents a spit at the entrance to Z-Lagoon (Owens and Robson 1987). During the BIOS project, several intertidal and supratidal test plots were established at Crude Oil Point. We were able to identify the supratidal plots T1 and T2 based on remaining metal stakes from the BIOS project. Initially, sampling of these plots proved difficult due to shingle covering the beach sand. Nevertheless, we were able to obtain short push cores and bulk sediment from the test plots as well as from a control site adjacent to the plots. Interestingly, a specimen of Arctic willow was growing inside the crude oil test plot T1.

19.3.5 *Beach sampling, Bay 11.*

Bay 11 was the site of a simulated near-shore spill during the BIOS project (Owens et al 1987a). The last inspection of the beach of bay 11 took place in 2001. During this inspection oil residue could still be detected on the beach surface as well as in the shape of floating oil in small pits (Prince et al 2002). During our (albeit not systematic) survey of the beach of bay 11, we were unable to detect any remains of asphalt pavement or oil residue. Water accumulating in pits dug to a depth of ca. 30 cm did not feature an oily sheen as observed previously. Push cores and bulk sediment samples were collected from trough portions of the beach, which consists mainly of fine sediment. Additionally, we obtained push cores and bulk sediment samples from two supratidal beach sites.

19.3.6 *Beach sampling, Milne Inlet.*

The Milne Inlet site located at Ragged Island represented on control site for the BIOS project. Sampling beach material from this site proved difficult due to the fact that the beach mainly consists of grape to egg-sized cobbles. We eventually succeeded in identifying a few spots suitable for push coring. Intertidal and supratidal push cores as well as bulk sediment were obtained from these spots.

19.3.7 *Beach sampling, Bay 7 as well as the western, southern and northern bays of Ragged Island.*

Due to time constraints, we were unable to obtain samples from these control beaches during the sampling campaign.

19.3.8 *Beach sampling, additional observations.*

Several oil drums most likely originating from the BIOS project were detected in the area. Based on rocking the oil barrels, the majority appeared to still contain small amounts of residual oil.

19.3.9 *Barge Sampling*

Prior to setting off on the scientific barge from the CCGS *Amundsen*, there were complications that arose related to sampling equipment. Firstly, while tightening a pair of five-pound weights to the KB corer, one of the two rings holding them snapped, hence we used only the three-pound weight pair, instead of both. Secondly, the number of core tubes available were insufficient for the number of planned cores. Thus, we had to extrude cores on the barge to be able to achieve the planned number of cores resulting in loss of sampling time. At Site GICS-Z, the seafloor was rocky and multiple attempts of deploying the KB corer were unsuccessful. Although this sheltered site had calm wind and water, KB-coring proved to be difficult. We gave up on coring when the last remaining core tube broke. We also collected a small sample of barge fuel and lubricant for measuring background hydrocarbons from barge operations that could be contaminating the samples. In the end, although we did not obtain all the samples we had planned for, we consider the barge sampling to be successful and the

GCC crew was extremely helpful. A list of all sites at which barge operations were done is presented in Table 19-2.

Table 19-2 Sites of barge operations. TBD, to be determined.

Site	Coordinates	Petroleomics	Microbiology	Nutrients
CGS-38	78° 28.650' N 79° 44.452' W	1 KB Core + 1 bulk sediment + 1 surface water	1 KB Core + 1 bulk sediment + 1 surface water	2 surface water
CC-21	72° 29.063' N 79° 46.960' W	1 KB Core + 1 bulk sediment + 1 surface water	1 KB Core + 1 bulk sediment + 1 surface water	2 surface water
GICS-Z	72° 29.063' N 79° 46.960' W	1 bulk sediment + 1 surface water	1 bulk sediment + 1 surface water	2 surface water
Bay 11	72° 27.912' N 79° 49.998' W	1 KB Core + 1 bulk sediment + 1 surface water	1 KB Core + 1 bulk sediment + 1 surface water	2 surface water
Milne Inlet	TBD	1 bulk sediment + 1 surface water	1 bulk sediment + 1 surface water	2 surface water
Barge	-	1 fuel + 1 lubricant	-	-

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20 The development of a risk-based decision-making tool for the socio-economic impact of oil spills from Arctic shipping

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20.1 Introduction

This investigation is carried out in the framework of the GENICE project. The study has become necessary because of the unprecedented rate of ice melt due to global warming. These happenings has created opportunities for natural resource exploration as well as increasing shipping activities. The Northern Sea Route (NSR) has seen an increased activity of shipping and mineral exploration. Further, Russia has invested immensely in infrastructure in this region positioning itself strategically to benefit from the resources along the NSR. On the side of the North West Passage (NWP), the increase in activities is not as much as compared to the NSR. Also, infrastructure is very limited and underdeveloped. The indigenous communities along the NWP will however benefit immensely from shipping as they depend on flights for their supplies. This makes the cost of these items very expensive. A properly developed NWP will help them immensely and open up the region for development and trade. For example, supply of fuel to the communities is key to their survival.

In future oil may be transported through this route not just for use by the communities but as alternative to the traditional shipping route. Even though this is still up for debate, it may happen in the foreseeable future. If that happens it is apparent countries along the NWP are ill-prepared to deal with a potential oil spill. The spill will affect the flora and fauna in the area. This implies that the livelihood of the indigenous population will be at risk. Infact their lives depend on the Arctic. This is not only the case for the Canadian side but also is true for a place like Greenland. Most indigenous people hunt for food which are all linked to the ice. An oil spill the scale of the Exxon Valdez oil spill will affect the culture, and the social make up of the communities.

Strategically, the NWP is important to the sovereignty of these countries. For example, there is already a scramble for Greenland and there is dispute over sovereignty over the NWP between the United States and Canada and for the NSR there is similar between Russia and Norway. The BP Deep Water Horizon and the Exxon Valdez oil spill occurred in open water. Should such an event occur in ice-covered waters, the impact will even be more devastating because of the challenges of response in the Arctic as well as the presence of ice. The Arctic also has extremely low temperatures which will hamper response activities. Also, most of the methods that are normally used for oil recovery have not been extensively tested in ice-covered waters. How will they fare if they are deployed in ice-covered waters? Some meso-scale experimentations have been carried out in this regard but have not been deployed in real life oil spill situation in the Arctic since we have not had one yet.

It is therefore important to develop a scenario-based decision-making tool that would enable the prediction of the impact of potential oil spills. Such a tool will be useful for contingency planning and response in these regions. This study is therefore based on the development of such a tool. The tool is risk based mainly because of the uncertainties surrounding such events and the fact that such events have not occurred before.

The study is divided into two phases. The first phase is qualitative in nature and seeks to identify the factors that contribute to the social, environmental and economic impact of a potential oil spill in the Arctic due to shipping. This is guided by the questions: 1. What factors contribute to the social, environmental and economic impact of an oil spill during shipping; 2. What is the relationship between these factors/ How do these factors impact each other? This entails interviewing Arctic shipping crew members and other professional to obtain these factors.

The second phase is a quantitative assessment of the impact of an oil spill in the Arctic from shipping. This focusses on conducting expert elicitation to obtain probabilities of factors identified in phase 1. This aims at evaluating the potential impacts in terms of risks when an oil spill occurs from shipping in the Arctic. This feeds into a bigger framework of risk analysis using a Bayesian based assessment. A framework has already been developed and demonstrated with a case study. This framework has been published by the principal investigators in Transportation Research Part D (see Afenyo et al., 2019). The study on board seeks inputs from ship operators as well as scientist on Arctic expedition in addition to others from insurance companies and other professionals related to Arctic shipping. The opportunity to obtain direct information from people who have vast experience in Arctic shipping is key to making the model as realistic as possible.

It should be noted that the study is developed with the mind of using the Bayesian Network (Influence Diagram) which is a graphical probability-based network. It operates on the principles of Bayes' theory. This theory utilises the conditional probability concept. The theory has been used extensively in risk assessment in operational, businesses and environmental industries.

The Baye's equation is described by Equation 1

$$P(D|C) = \frac{P(C|D)}{P(C)} P(D) \tag{1}$$

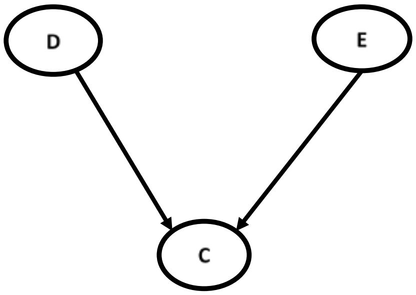

Figure 20-1 A simple structure of Bayesian Network, Source: (Afenyo et al.,2019)

$P(D|C)$ represents the posterior probability, $P(C|D)$ is the likelihood of the occurrence of the event and $P(D)$ is the prior probability and $P(C)$ is the normalization factor. The details and rules of construction of the BN can be inferred from Afenyo et al., 2019.

20.2 Methodology

The approach used entails administering a questionnaire through an interview face to face with the operating crew and some scientists. Initially a few key personnel were identified and through the snowball sampling techniques others were reached as well. These further provided information that would be helpful for the study. The questionnaire is in two parts with the first soliciting views on key questions to obtain causative factors for social, environmental and economic factors impacting the Arctic due to oil spills. The second part is structured in a way to obtain probabilities. With a scale employed, where 1 means an event is not possible and 10 very possible. This means that responders get to choose numbers between 1 and 10. The response is latter converted to probabilities for input into the Influence Diagram (IF).

This process is also used to seek opinions and clarification about factors in the already published model. This is to help fine tune the original model. For example, some risk factors that were missed during the original model construction are obtained during this exercise. The advantage of speaking to people who are at the fore front of Arctic shipping is that they get to share their experience while navigating the Arctic, as most have at least 2+ years experience. The crew are also a vital source of information for other people to contact to continue with the study considering their network.

20.3 Preliminary Results

Preliminary results are used to develop the IF which would be further fine tuned after obtaining further information. The IF is used to assess the social, environmental and economic impact in dollar terms. This will enable decision makers to know how much impact a particular scenario will have should it occur. The model presents the possibility of simulating different scenarios that could occur during shipping in the Arctic. The model below is very preliminary and will be further fine tuned for other analysis.

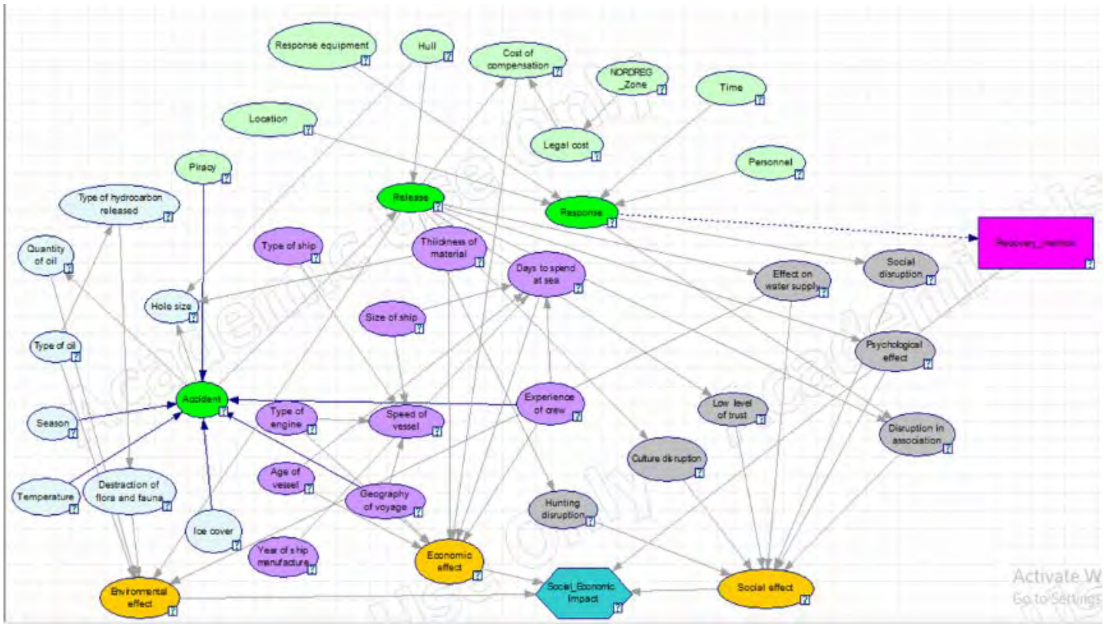

Figure 20-2 Preliminary Influence Diagram (IF) for assessing the impact of oil spill during Arctic shipping

In the model there are causative nodes which shows the reasons for happenings and they are coloured light blue while the decision nodes are actions or methods to be deployed to deal with the oil spill. They are coloured in green. The utility nodes which eventually produces the results in dollar terms is in blue.

In addition to the above project, a questionnaire was also administered to study the climate change adaptation resilience of infrastructure and ships in the Arctic. This work is just beginning.

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21 Microbial characterization of a hydrocarbon seep at Scott Inlet, Baffin Bay

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21.1 Introduction

21.1.1 *Objective 1: to Characterize the Microbial Community near a Natural Arctic Methane Seep*

As climate change reduces the extent and duration of Arctic sea ice cover, shipping and industrial development in the Arctic marine environment is expected to increase making this natural setting more vulnerable to accidental oil spills. Microorganisms are nature's first responders to an oil spill and some microorganisms have metabolisms adapted for degrading hydrocarbons. Natural hydrocarbon seeps, such as the one near Scott Inlet, Baffin Bay, first identified in academic literature by the Geological Survey of Canada (Levy, 1978; Levy and MacLean, 1980), offer a natural laboratory for studying microorganisms associated to hydrocarbon degradation. In August 2018, during the Amundsen 2018 Leg 2c expedition, the hydrocarbon seep at Scott Inlet was investigated using the Amundsen's Super Mohawk II remotely operated vehicle (ROV). Video footage from this ROV survey revealed bubbles rising from the seafloor and many microbial mats of bacteria (i.e. Beggiatoa) associated to seabed hydrocarbon seepage (Cramm et al., 2018). Methane concentrations in the water above the seep were higher than water further (5 km) from the seep confirming that methane gas was released from the seabed sediment at the seep (Cramm et al., 2018). Additionally, observations of oil trapped in rising bubbles made in earlier ROV visits to this seep and oil slicks on the surface near Scott Inlet identify this area as a natural hydrocarbon seep that releases oil and methane gas into the marine environment. Our objective was to do thorough water and sediment sampling of the seep at Scott Inlet to assess the influence of this seep on the microbial communities of the sediment and water-column.

This study contributes to the GENICE survey of hydrocarbon-degrading microorganisms in the Canadian Arctic to inform decision-makers about the preparedness of the natural Arctic environment for an accidental oil spill.

21.1.2 *Objective 2: to Explore Biogeographic Patterns of Thermophilic Endospores in Marine Sediment near a Cold Methane Seep.*

Endospores are specialized structures formed by some bacteria that allow them to survive adverse environmental conditions through dormancy. Thermophilic endospores (thermospores) are those whose temperature optimum is >50°C. Dormant thermospores have been found in cold marine sediments in high numbers (Hubert et al., 2009) and their origin is unknown. Many dormant thermospores found in these cold seabeds share phylogenic similarity to those inhabiting subsurface oil reservoirs (Hubert et al., 2010) and their route to the overlying cold seabed above may be deep-to shallow passive dispersal by rising geologic fluids associated to hydrocarbon seeps. Thermospores are part of the rare biosphere and not detected in microbial diversity assays using typical methods. High temperature (>50°C) germination experiments can reveal the presence and identity of thermospores found in cold marine sediment. A transect sampling of surface sediment across the seep at Scott Inlet may reveal biogeographic patterns of thermospore passive dispersal that point to their subsurface origins.

21.2 Methodology

Seabed surface sediment was collected by Laura- Ann Broom and Thomas Carson using a Van Veen grab sampler. Water was collected using a CTD-Rosette. A map of the stations is shown in Figure 21-1. Stn0 is the location of a bubbling methane seep identified through ROV video footage in 2018.

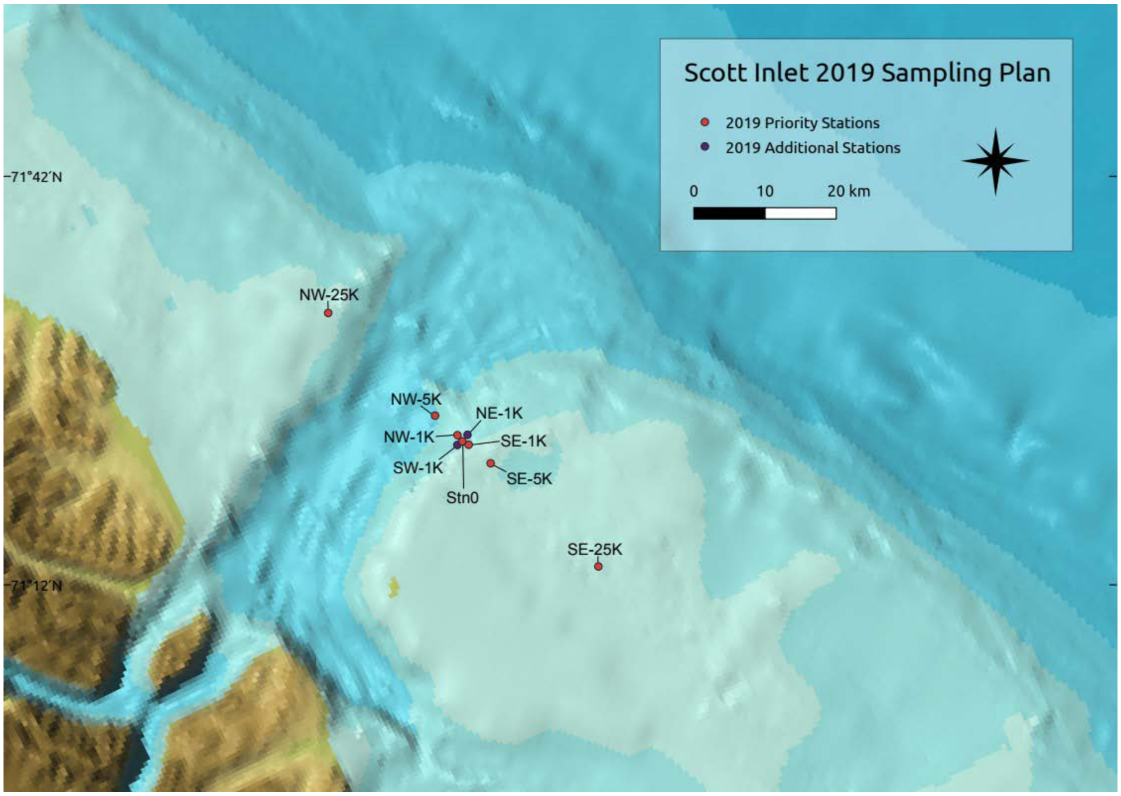

Figure 21-1 Map of the stations sampled at Scott Inlet.

Table 21-1 Coordinates and water depths for stations sampled at Scott Inlet.

Station	Latitude	Longitude	Depth (mbsl)
NW-	71.529316	-70.5850897	133.96
NW-	71.408257	-70.1811680	553.47
NW-	71.385588	-70.0967427	309.99
Stn0 t1	71.377029	-70.0693923	251.77
Stn0 t2	71.379264	-70.0727002	265.03
SE-1K	71.371972	-70.0506328	205.96
SE-5K	71.349492	-69.9678693	214.71
SE-25K	71.222148	-69.5486380	157.72
NE-1K	71.382354	-70.0529053	246.75
SW-1K	71.370592	-70.0949955	236.9

21.2.1 *Surface Sediment Sampling*

Seabed surface sediment was collected from all stations except NW-25K and SE-25K. Sediment was collected in 2 mL cryovials (stored at -80°C) and Whirl-Pak bags (stored at 4°C). To characterize the microbial community in the sediment, DNA extraction and 16S rRNA gene amplicon sequencing will be done on the frozen sediment. Non-frozen sediment will be used for incubation experiments to explore the presence and activity of thermospores in the sediment around Scott Inlet.

21.2.2 *Water Sampling*

Seawater was collected for microbial community and geochemical analyses (Table 21-2). Seawater (3 L) was filtered through 0.2 µm Pall membrane filters using a vacuum pump and filtration manifold. Filters were stored in Whirl-Pak bags at -80°C for future DNA extraction and 16S rRNA gene amplicon sequencing. Additionally, water samples (60 mL) were collected in glass bottles and preserved with $HgCl_2$ for future methane measurement using GC-MS. Methane measurement will be done in collaboration with Cara Manning (Philippe Tortell, University of British Columbia).

Surface water samples (4 L) were collected in amber glass bottles from stations NW-5K, NW-1K, Stn0 t1, Stn0 t2, SW-1K, and SE-1K. These samples were filtered using a 0.2 µm ceramic filter and acidified to pH 2 using hydrochloric acid. Dissolved organic matter (DOM) was extracted with methanol using solid phase extraction (as per Dittmar et al., 2008) with a steryne-divinylbenzene polymer sorbent (Agilent Bond Elut PPL, 5 g). Extractions are stored in glass vials at -20°C for future analyses using GC-MS and FTIR-MS. Compounds and concentrations of DOM in the water will be identified using these methods.

Table 21-2 Stations sampled for water at Scott Inlet. Future analyses for these water samples include microbial community analysis (16S rRNA gene amplicon sequencing), methane measurement, and dissolved organic matter (DOM) identification and measurement.

Station	Depth (mbsl)	Analysis
NW-25K	126	Microbiology and methane
NW-5K	1	DOM
	546	Microbiology and methane
NW-1K	1	Microbiology, methane, and DOM
	10	Methane
	30	Methane
	50	Microbiology and methane
	100	Microbiology and methane
	150	Microbiology and methane
	200	Microbiology and methane
	250	Microbiology and methane
	303	Microbiology and methane
Stn0 t1	1	Microbiology, methane, and DOM
	10	Methane
	30	Methane
	50	Microbiology and methane
	100	Microbiology and methane
	150	Microbiology and methane
	200	Microbiology and methane
	245	Microbiology and methane
Stn0 t2	1	Microbiology, methane, and DOM
	10	Methane
	30	Methane
	50	Microbiology and methane
	100	Microbiology and methane
	150	Microbiology and methane
	200	Microbiology and methane
	258	Microbiology and methane
SE-1K	1	Microbiology, methane, and DOM

	10	Methane
	30	Methane
	50	Microbiology and methane
	100	Microbiology and methane
	150	Microbiology and methane
	199	Microbiology and methane
SE-5K	208	Microbiology and methane
SE-25K	151	Microbiology and methane
NE-1K	1	Microbiology and methane
	10	Methane
	30	Methane
	50	Microbiology and methane
	100	Microbiology and methane
	150	Microbiology and methane
	200	Microbiology and methane
	240	Microbiology and methane
SW-1K	1	Microbiology, methane, and DOM
	10	Methane
	30	Methane
	50	Microbiology and methane
	100	Microbiology and methane
	150	Microbiology and methane
	230	Microbiology and methane

21.3 Preliminary Results

No analyses were performed on the ship.

21.4 Acknowledgment

Thank you to Laura-Ann Broom and Thomas Carson for operating the Van Veen grab sampler and collecting sediment samples at Scott Inlet. Thank you to Paco Ferrand and James Douglas Cameron for operating the CTD-Rosette. Thank you to the Canadian Coast Guard personnel who operated the Van Veen grab sampler and the CTD-Rosette. Thank you to Chief Scientist

Alexandre Normandeau for developing a station schedule that allowed us to achieve 100% success in our sampling goals for Scott Inlet. Thank you to Commandant Gariépy and the crew of the CCGS Amundsen for a safe, comfortable, and successful expedition.

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22 Northern Contaminants Program: Assessing Persistent Organic Pollutants in the Canadian Arctic

Project leaders: Liisa Jantunen[1, 2] (liisa.jantunen@canada.ca) and Gary Stern[3]
Cruise participants – Leg 2a: Sarah Lavoie-Bernstein[1] and Alex Crew[2]
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22.1 Introduction

Long range transport of persistent organic pollutants (POPs) has been a focus of contaminants research since the late 1960s. The Arctic is known to be an important sink for POPs, as the temperature gradient and prevailing winds bring POPs from emissions sources in warmer climates (mainly North America, Europe and Asia) to their final resting place in the Arctic. This is of significant concern since POPs partition to organic matter and in the Arctic landscape much of the organic matter is found in the animals which make up a significant part of the diets of the residents. Research in the Canadian Arctic has been critical to developing an understanding of how long-range transport occurs, and in crafting legislation (such as Canada's Chemical's Management Plan or Europe's REACH program) and international agreements (such as the Stockholm Convention) which regulate the usage and production of POPs. The Amundsen has long been an essential platform for this research, and we were lucky enough to once again gather samples and participate in this cruise, allowing us to maintain a unique historical dataset. We intend to continue monitoring of POPs as well as new and emerging compounds with POP-like behaviour to observe their trends over time, and any impacts from climate change on the behaviour of POPs in the Canadian Arctic.

Our objectives on this leg were to collect water, zooplankton, benthic and sediment samples in the Canadian Arctic to measure levels of compounds of concern, as well as new and emerging contaminants such as microplastics.

22.2 Methodology

22.2.1 *High Volume Water*

High volume water samples consisted of ~100L bucketed surface water. Buckets allowed us to be opportunistic with our sample collection, gave opportunity for us to clean equipment used between sites (lower chances of contamination), and finally allowed us to obtain large volume whereas the rosette, in such high demand, would be more difficult to reserve such amounts. We then pumped the samples through a prepacked XAD column which is used to concentrate organic compounds of interest, and stored the columns for later analysis. All high-volume samples will be analyzed at ECCC Centre for Atmospheric Research Experiments.

In leg 2a, we were able to collect 5 samples.

We collected 5 samples on Leg 2b. Many thanks to the bridge crews (esp. Thomas, Benoit, Lydia and Xavier) for watching out for us during our sampling and always taking our calls!

In Leg 3, we were able to collect 3 samples

22.2.2 *Low Volume Water*

In leg 2a, two smaller volumes of surface water were collected to analyze for perfluorocarbons (PFCs) in 1L cleaned LDPE bottles, and organophosphate esters (OPEs) at 4L in cleaned amber glass bottles. Both were collected through bucketing over the side of the ship. Both the PFC and OPE samples will be analyzed at ECCC Centre for Atmospheric Research Experiments.

In total; 4 OPE and 5 PFC surface samples were collected during leg 2a of the cruise.

We collected a total of 5 OPE and 4 PFC surface water samples in leg 2b.

In total five PFC surface samples and 3 OPE surface samples were collected during Leg 3

22.2.3 *Surface Sediment*

Surface sediment samples were collected in duplicate from the boxcore and stored in the freezer for later analysis of microplastics and SVOCs. Contaminant samples will be analyzed at ECCC Centre for Atmospheric Research Experiments, whereas microplastic samples will be analyzed at Western University.

Leg 2a

Many thanks to the benthic team who operated the sediment boxcore operations and the Nobel Gas group for agreeing to gather sediment samples during the river sampling expedition although these operations were negated due to fog. We obtained 7 microplastic and 7 contaminant samples along with 2 blanks on leg2a.

Leg 2b

Many thanks to the boxcore teams (esp. Cindy, Phillippe-Olivier, Anne, Jade, Jean-Carlos and others we may have missed) who operated the sediment boxcore operations and the river sampling teams (esp. Robert, Phillip, Anne, Jade, Abby, Adam and others we may have missed) for gathering our river sediment samples. We obtained 12 microplastic and 12 contaminant samples along with 2 blanks on leg2b

Leg 3

We obtained six sediment samples along with one blank on Leg 3

22.2.4 *Zooplankton*

Zooplankton samples were collected from both the 750 µm (Tucker) and 200 µm (Monster) tow nets. Contaminant samples will be analyzed at ECCC Centre for Atmospheric Research Experiments, whereas microplastic samples will be analyzed at Western University.

Leg 2a

Many thanks to Thibaud, Tommy, Yoan and Marion for providing us with the zooplankton samples. In leg 2a, we obtained ~18 sites (36 total nets) which were speciated and will be analyzed for contaminants at the University of Manitoba. 5 samples were collected in bulk and will be analyzed for microplastics at McGill University.

Leg 2b

Many thanks to the boxcore teams (esp. Cindy, Phillippe-Olivier, Anne, Jade, Jean-Carlos and others we may have missed) who operated the sediment boxcore operations and the river sampling teams (esp. Robert, Phillip, Anne, Jade, Abby, Adam and others we may have missed) for gathering our river sediment samples. We obtained 12 microplastic and 12 contaminant samples along with 2 blanks on leg2b

Leg 3

In Leg 3 we obtained 13 zooplankton samples which were speciated and will be analyzed for contaminants at the University of Manitoba. Twelve samples were collected in bulk and will be analyzed for microplastics at McGill University.

22.2.5 *Microplastics – Water*

Microplastic samples were taken both at the surface and at the thermocline of the water column, by bucketing 40L of surface water, in addition to using the rosette. Microplastic water samples will be analyzed at the University of Toronto and McGill University.

Leg 2a

We collected 9 – 40L surface water samples and 6 rosette samples at the same volume. Each sample was filtered through a 10μm polycarbonate filter.

Leg 2b

We collected 16 surface water samples, 5 rosette samples and 2 glacier ice samples. Many thanks to Pascal for working out the rosettes, to Megan for helping with bucketing, and to Abby, Adam, Robert and Anne for collecting the glacier samples.

Leg 3

We collected six 40 L surface water samples and four 40 L rosette samples along with one blank for the rosette samples.

22.2.6 *Water Particles*

Our particle sampler was placed on the underway line located in the Science Laboratory room 610. Through this filter, approximately 1,000L is filtered through a glass wound fibre filter. Unfortunately, we were unable to obtain these samples on Leg 2a as the underway line was too rusted to collect a viable sample. We will have to plan a new site for next year during the ArcticNet planning meeting. We are grateful to Thomas for setting up the line and his continued cooperation with our requests going forward.

22.2.7 *Air*

Air samples are collected using a continuous air sampler for 48 hours to collect air and gas phase Contaminants.

We took 9 continuous air samples for both particulate and gas phase POPs during leg 2b.

We deployed eight air heads during Leg 3

22.3 **Preliminary Results**

22.3.1 *Leg 2a*

During this leg of the cruise, we obtained 10 types of samples. Included in this list, are five types of water samples on the ocean surface; OPE, PFC, high volume for SVOCs (semi-volatile organic compounds), microplastic, and particle. Unfortunately, our particle samples were unobtainable due to rust in the lines. New this year, microplastics were sampled in the thermocline of the water column across 6 sites. Sediment was collected for SVOC analysis, as well as microplastics. Zooplankton and benthic biota obtained for the analysis of contaminants (including mercury) and microplastics.

22.3.2 *Leg 2b*

During this leg of the cruise, we obtained 11 types of samples from four environmental media: Air, water, sediment and biota. Our air sampling consisted of a high-volume air pump attached to an airhead, which contains a filter fibre and a sorbent to capture particle- and gas-phase compounds, respectively. We took water samples for five different contaminants: OPEs, PFCs, non-polar SVOCs (semi-volatile organic compounds), and microplastics. All of our water samples were taken from the surface using stainless steel buckets, except for 5 microplastics samples at the thermocline. We collected sediment samples for SVOCs and microplastics, and zooplankton and benthic biota obtained for the analysis of contaminants (including mercury) and microplastics.

22.3.3 *Leg 3*

Water, sediment and zooplankton samples will be analyzed at the ECCC Center for Atmospheric Research Experiments in Egbert, ON (ECCC facility), as well as University of Toronto, University of Manitoba, University of Western Ontario, and McGill University.

22.4 **Acknowledgment**

First, a huge thank-you to all of the crew of the Amundsen and to all the members of Amundsen Science. Specific acknowledgements are given in each of our sub-sections, there are too many to list here. Our experience here on this ship has been greatly helped by almost everyone aboard, and we owe many thanks to everyone.

Finally, a huge thank-you to Jean-Carlos, Anne and Jade for their work as Chief Scientist. This cruise went very smoothly, and their leadership & tireless energy was a big reason for this. In particular thanks to Anne for always being able to give us time in the schedule for bucketing, and for Jean-Carlos for trying to let us bucket from the rear of the ship, and for always having time to help with everything we need. You folks did amazingly!

23 Distributions of Iron and Other Trace Metals in the Eastern Arctic and Subarctic

Project leaders: Jay Cullen[1] (jcullen@uvic.ca)
Cruise participants – Leg 2: Tia Anderlini[1]
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23.1 Introduction

The goal of this work is to see how metal concentrations vary through the water column and how metal fluxes are modified as water moves through the Canadian Arctic Archipelago down through Baffin Bay, and ultimately to the North Atlantic. In the Canadian Arctic, nitrogen is known as the main limiting element for primary productivity; however the impact of iron as a micronutrient has not been systematically surveyed in this area and its importance may vary with time. In addition to measuring the distribution of Fe, trace metal concentrations of Mo, Mn, Ni, Cu, Zn, Cd, Pb, and Co will also be analyzed and evaluated as both micronutrients and toxins. This work will contribute to the ArcticNet-supported study "Nutrient Transports and Living Marine Resources Across the Inuit Nunangat" (NTRAIN), led by Dr. Jean-Eric Tremblay.

23.2 Methodology

Four trace-metal clean GO-FLO bottles were deployed on a Kevlar line at four depths per cast. Three casts were conducted per station for a total of 12 depths (typically 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175 m). Prior to attaching the GO-FLOs to the line, a weight was lowered to 50 m. This weight consisted of a plastic bucket filled with concrete. Teflon messengers were attached to the GO-FLOs with lanyards and twisted onto the Kevlar line under each GO-FLO bottle (save for the deepest bottle). Once all bottles were screwed to the line and lowered to the required depth, a final messenger was released to initiate a chain reaction. Once the messenger hit a lever at the top of the GO-FLO, the bottle would close and the messenger connected to this GO-FLO would be released. It would subsequently hit the lever on the GO-FLO bottle at the next depth, continuing the chain. After all bottles had closed, the bottles were brought up one at a time and carried to the "clean-room" container. Part of this container was converted into a clean-room bubble. Plastic sheeting closed off the trace-metal clean area which was filled with HEPA-filtered air. The GO-FLO bottles were attached to wooden stands inside this area.

Water from each bottle was filtered into GEOTRACES-clean LDPE bottles using an AcroPak 500 filter capsule (0.2 µm). Unfiltered samples were also taken for Leg 2B for future analysis of undissolved Fe. Both filtered and unfiltered samples were acidified to pH 1.7 using 12 M Baseline Seastar Chemicals Hydrochloric Acid. Unfiltered water was also collected into 15 mL vials and frozen for future analysis of nutrients, in order to confirm that the bottles closed at the expected depth. Trace-metal samples will be analyzed at UVic via triple-quadrupole ICP-MS following preparation in a Class 100 clean room and preconcentration with an ESI SeaFAST system (1).

Table 23-1 List of Samples

Leg	**Station**	**Depths (m)**		
		Filtered	**Unfiltered**	**Nutrients**
2A	190	10, 20, 30, 40, 50, 60, 70, 80		
2A	193	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		50, 60, 70, 80, 90, 100, 150, 175
2A	196	10, 20, 30, 40, 50, 60, 70, 80, 90, 100		10, 20, 30, 40, 50, 60, 70, 80, 90, 100
2A	198	10, 20, 30, 40, 50, 60		10, 20, 30, 40, 50, 60
2A	BB16	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2A	228	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2A	226	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2A	224*	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2A	222*	10, 20, 30, 40, 50, 60, 70, 80		10, 20, 30, 40, 50, 60, 70, 80
2A	115	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175

2A	111	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2A	108	10, 20, 30, 40, 50, 60, 70, 80, 100, 200, 300, 400		10, 20, 30, 40, 50, 60, 70, 80, 100, 200, 300, 400
2A	105	10, 20, 30, 40, 50, 60, 70, 80, 100, 150, 200, 290		10, 20, 30, 40, 50, 60, 70, 80, 100, 150, 200, 290
2A	101	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2A	322	10, 20, 30, 40, 50, 60, 70, 80, 100		10, 20, 30, 40, 50, 60, 70, 80, 100
2A	323	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2A	325	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175		10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2B	122	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175	10, 30, 50, 100	10, 20, 30, 40, 50, 60, 70, 80, 90, 150, 175
2B	133	10, 20, 30, 40, 50, 60, 70, 80, 100	10, 30, 50, 100	10, 20, 30, 40, 50, 60, 70, 80, 100
2B	134	10, 20, 30, 40, 50, 60, 70, 80, 100, 300	10, 30, 50, 100, 300	10, 20, 30, 40, 50, 60, 70, 80, 100, 300
2B	Rob-1	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175	10, 30, 50, 100	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2B	6.4	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175	10, 30, 50, 100	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2B	Talbot Inlet	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175	10, 30, 50, 100	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150
2B	293	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175	10, 30, 50, 100	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2B	295	10, 20, 30, 40, 50, 60	10, 30, 50	10, 20, 30, 40, 50, 60
2B	296	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175	10, 30, 50, 100	10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 175
2B	305A	10, 30, 50, 100	10, 30, 50, 100	10, 30, 50, 100
2B	Wel02	10, 30, 50, 100	10, 30, 50, 100	10, 30, 50, 100
2B	305D	10, 30, 50, 100	10, 30, 50, 100	10, 30, 50, 100

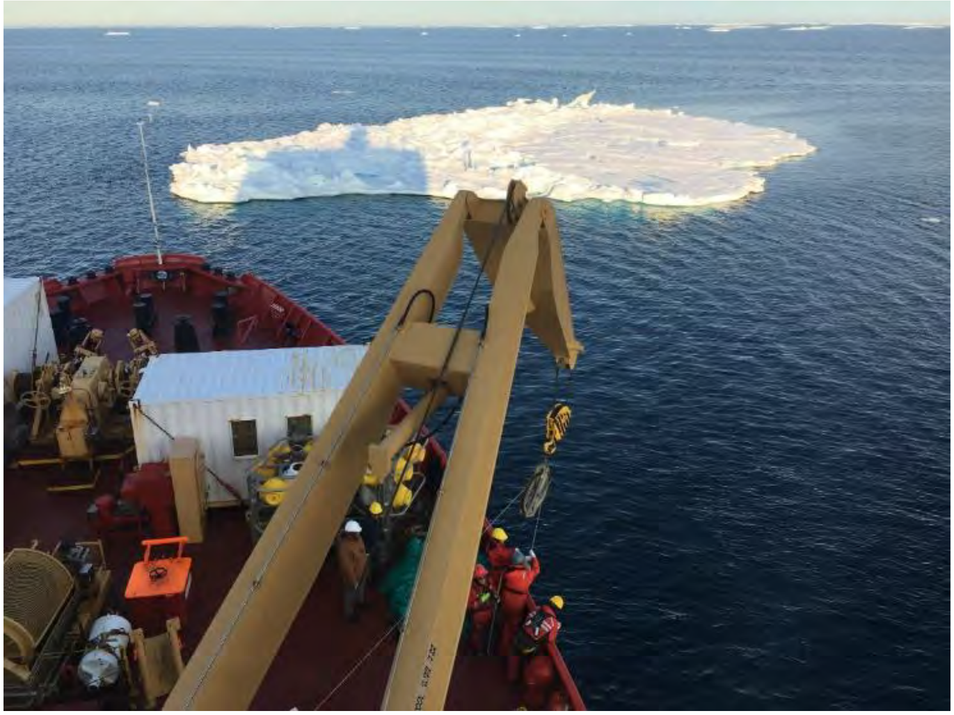

Figure 23-1 Aerial view of operation (Photo credit: Lydia Perigord-Bennett)

Figure 23-2 Attaching bottles to the Kevlar line with messenger hanging below (Photo credit: Yoan Awashish)

23.3 Acknowledgment

This sampling would not have been possible without the extra assistance from the Coast Guard crew and science personnel. Special thanks to Daniel Amirault, Josh Evans, Lauren O'Dell, Elie Dumas-Lefebvre, Paco Ferrand, Adam Tremblett, Antoinne St-Pierre, Jeff Tremblay-Girard, Vincent Lecompte, Sebastien Vallee, Steve Dassylva, and Tom Desmeules. All the added help and humour meant a lot! Also thank you to Thomas Linkowski for building my clean lab and GO-FLO stands.

23.4 References

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24 pelagic-benthic coupling, primary production of essential fatty acids, bivavles community

Project leaders: Jean-Éric Tremblay[1] (Jean-Eric.Tremblay@bio.ulaval.ca)

Cruise participants – Leg 2a: Rémi Amireaux[1,2] and Guillaume Cinq Mars[1]

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24.1 Introduction

Arctic marine food webs are viewed as being supported by three temporally and ecologically distinct types of primary production (PP): sympagic (ice-associated) algae in spring, pelagic (open water-associated) phytoplankton in summer and benthic (seafloor-associated) macroalgae from spring to autumn (Figure 24-1) [1-5].

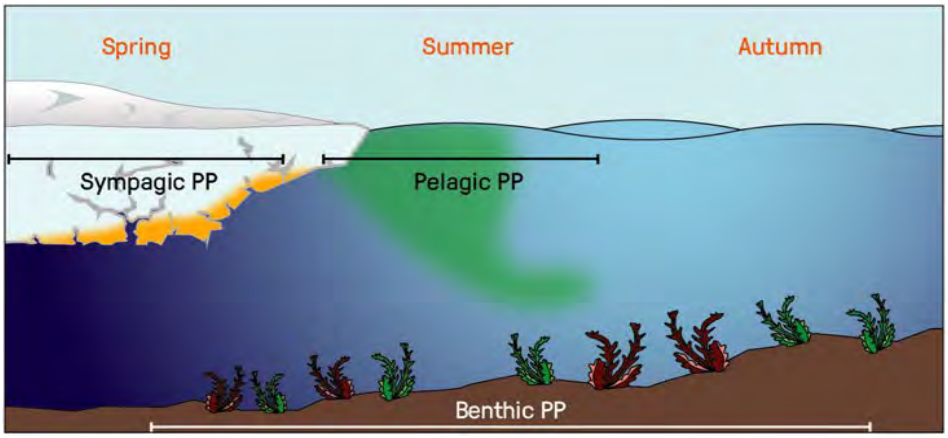

Figure 24-1 Sympagic and Pelagic PP

Among the essential lipids produced by the PP, n3-PUFAs (EPA and DHA[6]) represent for most consumers the nutritional value of the PP [7]. These particular lipids are almost only produced by the PP and are a requirement for the whole food web, from primary consumers to human being.

Objectives : It is generally agreed that pelagic–benthic coupling is tight on Arctic shelves, i.e. that organic matter produced in the surface layers supports the benthos fauna. However, this paradigm is mainly based on the assumption that pelagic and sympagic algae are the main sources of carbon for the benthic communities. Climate change is expected to alter the relative contribution of food sources for benthic organisms (including the benthic PP).Thus, our understanding of the fate of the benthic food web in a context of warming Arctic ocean depends on the elucidation of the current relative contribution of PP sources to their diet as well as the processes that impact the PP nutritional quality.

24.2 Methodology

Sinking POM: 5 water column depths were investigated (surface – 20 m – scm – 40 and 60 m) during the cruise. ca. 1.2 liters were filtered on GFF 25 mm in duplicate for further lipid analysis and 1.2 liters were also filtered on GG 25 mm burned for coresponding particulate organic carbon (POC) analysis.

Benthic samples: Sediment organic matter and bivavles were collected using box cores. The first centimeter of sediment was collected using seringes while bivalve were directly harvested in the box core. Both sample type were stored at -20 C.

24.3 Preliminary Results

Estimation of the Arctic carbon fluxes and the elucidation of biomarkers suitable for such estimation is my field of expertise. As such, this project lies on my previous findings:

Amiraux R, et al. Marine Chemistry. 2017;194:89-99.
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25 Benthic biodiversity, biological productivity and biogeochemistry in the changing Canadian Arctic

Project leaders: Philippe Archambault[1] (philippe.archambault@bio.ulaval.ca)
Cruise participants – Leg 2: Philippe-Olivier[1] and Cindy Grant[1]
Cruise participants – Leg 3: Marie-Hélène Picard[1] and Rebecca Evans[2]
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[2] Snelgrove Laboratory, Memorial University of Newfoundland, St. John's, NL, Canada

25.1 Introduction

In benthic ecosystems, the availability and quantity of food and the type of bottom influence the distribution, the abundance and the richness of benthic organisms. Generally, the rocky bottom presents a diverse assemblage of organisms (Posey and Ambrose 1994) whereas the soft bottom is more homogenous and the presence of organisms will depend of the grain size or of the availability of food. These types of bottom create heterogeneity and can be responsible of great concentrations of organisms and of the presence of the one species.

Our main sampling objective for the 2019 expedition is to advance biodiversity surveys of benthic communities with respect to the physical and chemical environment (P.O. Dumais MSc thesis).

Our second objective is to investigate how the benthic food web and organisms respond to changes in sea-ice cover and carbon input and how these changes could affect the Arctic benthic community and their resilience (G. Guarin PhD thesis).

Our third objective is to investigate how the benthic food web and organisms respond to changes in sea-ice cover and carbon input, and how these changes could affect the Arctic benthic community and their resilience (G. Guarin PhD thesis).

25.2 Methodology

25.2.1 *Box Cores*

The box core was deployed to quantitatively sample diversity, abundance and biomass of infauna and to obtain sediment cores for sediment analyses. From 39 box cores during Leg 2 and 28 box cores during Leg 3, sediments of a surface area of 0.125 m^2 and 15 cm in depth were collected and passed through a 0.5 mm mesh sieve and preserved in a 4 % formaldehyde solution for further identification in the laboratory (Table 25-1). Sub-cores of sediments were collected for sediment pigment content (top 1 cm), organic carbon content (top 1 cm), sediment grain size (top 5 cm) and stable isotope & HBI analysis (top 1 cm). Samples for sediment pigment were frozen at -80°C, and all other sediment samples were frozen at -20°C. All samples will be transported off the ship for analyses in the lab at Université Laval.

For Arctic Kelp project, the procedures were slightly different. The box core was deployed to quantitatively sample diversity, abundance and biomass of infauna and to obtain sediment (push) cores for sediment analyses. From 8 box cores, sediments of a surface area of 0.125 m2 and 10 cm in depth were collected and separated in 3 depth sections (0-2, 2-5, and 5-10 cm). These depth sections were passed through a 0.5 mm mesh sieve and preserved in a 4% formaldehyde solution for further identification in the laboratory. Sub-cores of sediments were collected for sediment pigment content (top 2 cm), organic carbon, hydrogen, nitrogen content (top 2 cm), sediment grain size (top 2 cm), and stable isotope & HBI analysis (top 2 cm). Samples for sediment pigment and stable isotope & HBI analysis were frozen at -80°C, and all other sediment samples were frozen at -20°C. All samples will be transported off the ship for analyses in the lab at Memorial University of Newfoundland.

Table 25-1 Number of samples collected from the box core during Legs 2 and 3 of the 2019 CCGS *Amundsen* expedition.

Station ID	Date	Latitude	Longitude	Depth (m)	Infauna Boidivesity	Sediment Grain size	Sediment Organic content	Sediment Pigments	Sediment Isotopes & HBI
Full 190	19-07-08	66,5959390	-61,1970510	101	Rocky bottom – no box core				
Basic 193	19-07-09	66,7645478	-59,3528067	952	Technical issus with the box core				
Basic 196	19-07-10	66,9859780	-56,0652168	130	1	1	1	3	0
Basic 198	19-07-10	67,0837615	-54,2099947	75	Rocky bottom – no box core				
Basic BB16	19-07-11	69,1482585	-51,8736407	353	Rocky bottom – no box core				
Full 228	19-07-12	70,9059177	-55,0128115	574	1	1	1	3	1
Basic 229	19-07-13	71,0107230	-53,0451293	431	1	1	1	3	1
Basic 226	19-07-14	70,6989365	-59,0045367	594	1	1	1	3	1
Basic 224	19-07-15	70,4201763	-62,9550007	2095	1	1	1	3	1
Basic 222	19-07-16	70,0759017	-66,6055998	124	Rocky bottom – no box core				
Basic 204	19-07-18	73,2654098	-58,0080493	961	1	1	1	3	1
Basic 210	19-07-19	75,4267093	-61,5673213	1165	1	1	1	3	1
Full 115	19-07-20	76,3145993	-71,2370017	663	1	1	1	3	1
Basic 111	19-07-21	76,3085568	-73,1940932	607	1	1	1	3	1
Basic 108 – BC1	19-07-22	76,2590235	-74,5968450	447	1	1	1	3	1
Basic 108 – BC2	19-07-22	76,2598767	-74,5925720	443	1	1	1	3	0

Basic 108 – BC3	19-07-22	76,2597313	-74,5959117	450	1	1	1	3	0
Basic 108 – BC4	19-07-22	76,2596813	-74,5997412	449	1	1	1	3	0
Basic 105	19-07-22	76,3196682	-75,7756192	334	1	1	1	3	1
Full 101	19-07-23	76,3823620	-77,3908968	351	1	1	1	3	1
Nutrient 324	19-07-25	73,9884473	-80,4737992	774	1	1	1	3	1
Coring 2.6	19-07-28	76,3187772	-73,0652805	575	1	1	1	3	0
Basic 122	19-07-28	77,3411193	-75,0143563	648	1	1	1	3	1
Full 133	19-07-30	-66,6055998	-70,26588417	164	Rocky bottom – no box core				
Coring 6.2	19-07-30	79,5149115	-65,7641985	379	1	1	1	3	1
Basic 134 / Coring 2.11	19-07-31	80,3564565	-68,4539427	377	Rocky bottom – no box core				
Basic Rob1	19-08-02	81,7884548	-62,3363818	672	1	1	1	3	1
Coring / Full 6.4	19-08-02	81,6260422	-63,2173528	796	1	1	1	3	1
Coring 215b – BC1	19-08-03	80,9750060	-61,3579758	1035	1	1	1	3	1
Coring 251b – BC2	19-08-03	81,0425827	-61,5571062	1135	1	1	1	3	0
Coring 6.1 – BC1	19-08-04	79,7862120	-73,6599227	206	1	1	1	3	1
Coring 6.1 – BC2	19-08-04	79,6925577	-73,0950968	246	1	1	1	3	1
Full Talbot Inlet	19-08-05	77,8432798	-77,0719115	519	1	1	1	3	1
Coring 2.5	19-08-06	76,3564053	-77,5053932	379	1	1	1	3	1

Basic 293	19-08-07	75,7281867	-80,6896988	627	1	1	1	3	1
Coring 2.2	19-08-07	76,0645868	-81,8493440	770	1	1	1	3	1
Coring 2.3	19-08-07	76,1294605	-83,0232937	828	1	1	1	3	1
Coring 2.4	19-08-08	76,1266938	-86,3004492	675	1	1	1	3	1
Coring 1.4 – BC1	19-08-08	76,3952655	-84,5717780	139	1	1	1	3	1
Coring 1.4 – BC2	19-08-08	76,5006533	-84,9312868	125	1	1	1	3	1
Basic 297	19-08-09	76,3698995	-81,3146897	452	1	1	1	3	1
Basic 296	19-08-10	75,5230320	-79,7537860	556	1	1	1	3	1
Coring 2.7	19-08-10	75,4824000	-78,6753085	521	1	1	1	3	1
Basic 302	19-08-11	74,2347353	-86,1705667	553	1	1	1	3	1
Basic 303	19-08-12	74,3683140	-89,6161322	294	1	1	1	3	1
Basic 305b	19-08-12	74,3522683	-93,5944547	164	Rocky bottom – no box core				
Wel02	19-08-13	75,0132623	-93,1120037	248	1	1	1	3	1
Basic	19-08-	72,46002	-78,70810	279	1	1	1	3	1
Full	19-08-	71,38445	-70,09292	303	1	1	1	3	1
Basic E5	19-08-	69,31619	-63,11929	1934	1	1	1	3	1
Basic E4	19-08-	69,05936	-63,64361	1573	1	1	1	3	1
Basic E3	19-08-	68,80078	-64,15421	1324	1	1	1	3	1
Basic E2	19-08-	68,54064	-64,65366	540	1	1	1	3	1
Basic E1	19-08-	68,27847	-65,14224	447	1	1	1	3	1
Full D1-	19-08-	67,47415	-63,69347	675	1	1	1	3	1
Basic	19-08-	67,85829	-63,15081	266	1	1	1	3	1
Basic	19-08-	68,24005	-62,58835	1570	1	1	1	3	1
Basic	19-08-	68,62046	-62,00757	1809	1	1	1	3	1
Basic	19-08-	68,99913	-61,40610	1838	1	1	1	3	1
Basic	19-08-	68,15174	-59,96965	1362	1	1	1	3	1
Basic	19-08-	67,95210	-60,62516	1610	1	1	1	3	1

Basic	19-08-	67,75486	-61,27049	1574	1	1	1	3	1
Basic	19-08-	67,54414	-61,93085	355	1	0	0	0	0
Basic	19-08-	67,34597	-62,52218	139	1	1	1	3	1
Basic	19-08-	67,06289	-61,51333	118	1	0	0	0	0
Basic	19-08-	67,19871	-60,89908	638	1	1	1	3	1
Basic	19-08-	67,33220	-60,27095	1089	1	1	1	3	1
Basic	19-08-	67,46177	-59,65016	1420	1	1	1	3	1
Basic	19-08-	67,59052	-59,01437	1176	1	1	1	3	1
Basic	19-08-	66,77791	-57,84766	700	1	1	1	3	1
Basic	19-08-	66,72641	-58,70685	805	1	1	1	3	1
Basic	19-08-	66,67275	-59,56425	872	1	1	1	3	1
Basic A2	19-08-31	66,62128	-60,42116	523	1	0	0	0	0
Basic A1	19-08-31	66,58705	-61,21588	75	Rocky bottom – no box core				
Nutrient 643	19-09-04	58,01555	-59,78817	349	1	1	1	3	1
Kelp 2.3	19-09-04	56,77648	-59,68334	130	1	1	0	1	1
Kelp 2.1	19-09-04	56,62078	-60,75405	173	1	1	0	1	1
Kelp 1.1	19-09-04	56,59824	-60,81204	133	1	1	0	1	1
Kelp 3.1	19-09-04	56,51737	-60,81100	70	1	1	0	1	1
Kelp 3.3	19-09-05	56,48001	-59,62576	116	1	1	0	1	1
Kelp 1.3	19-09-05	56,65372	-59,64533	115	1	1	0	1	1
Kelp 2.2	19-09-05	56,69557	-60,30327	483	1	1	0	1	1
Kelp 1.2	19-09-05	56,60012	-60,29297	268	1	1	0	1	1
Kelp 3.2	19-09-05	56,49073	-60,26451	118	Rocky bottom – no box core				

25.2.2 *Agassiz Trawls*

At 25 stations during Leg 2 and 13 stations during Leg 3, an Agassiz trawl (1.5 m width × 0.7 m height, cod end of 0.5 cm mesh size) was towed on the seabed at a speed of 1.5-2 knots for 3 minutes to survey epibenthic species diversity, abundance, and biomass (Table 25-2). Catches were passed through a 2 mm mesh sieve. Specimens were identified to the lowest taxonomic level, then counted and weighted. The unidentified specimens were preserved in a 4% seawater-formalin solution for further identification in laboratory. Specimens were preserved for collaborators (Table 25-3 and Table 25-4).

For Arctic Kelp project, at 6 stations, an Agassiz trawl (1.5 m width × 0.7 m height, cod end of 0.5 cm mesh size) was towed on the seabed at a speed of 1.5-2 knots for 3 minutes to survey epibenthic species diversity, abundance, and biomass. Catches were passed through a 2 mm mesh sieve. Approximately 100 g of specimens (of a single species) big enough to weigh were identified to the lowest taxonomic level, counted, weighed, and frozen at -20°C for isotopic analysis.

Table 25-2 Agassiz trawl stations during Legs 2 and 3 of the 2019 CCGS *Amundsen* expedition.

Station ID	Date	Start			End		
		Latitude	Longitude	Depth	Latitude	Longitude	Depth
Basic 196	19-07-10	66,9829192	-56,0649030	128	66,9807792	-56,0587207	128
Basic 198	19-07-10	67,0885677	-54,2107367	83	67,0887707	-54,2178973	85
Basic BB16	19-07-11	69,1421188	-51,8659363	506	69,1400647	-51,8556913	503
Basic 229	19-07-13	71,0171533	-53,0149475	420	71,0167688	-53,0358120	420
Full 226	19-07-14	70,7057170	-59,0298160	591	70,7045670	-59,0617737	591
Full 222	19-07-16	70,0761143	-66,6182150	239	70,0756260	-66,6099272	245
Basic 204	19-07-18	73,2758320	-58,0428618	893	73,2838492	-58,1020048	903
Basic 210	19-07-19	75,4215250	-61,6151052	1049	75,4163213	-61,6715598	1127
Full 115	19-07-20	76,3348873	-71,2499210	669	76,3259772	-71,2340612	672
Basic 111	19-07-21	76,3199437	-73,1779667	607	76,3266742	-73,2086828	601
Full 108	19-07-21	76,2612317	-74,6306542	449	76,2598203	-74,6571740	448
Basic 105	19-07-22	76,3247095	-75,7789820	692	76,3276653	-75,7992023	705

Full 101	19-07-23	76,3865707	-77,4228122	381	76,3834007	-77,4473630	396
Nutrient 324	19-07-25	73,9784703	-80,4935098	772	73,9684032	-80,5042188	770
Basic 122	19-07-28	77,3336608	-74,9797648	654	77,3236653	-74,9590917	651
Full 133	19-07-30	79,5918200	-70,3208763	173	79,5929718	-70,3357443	173
Basic 134	19-07-31	80,3645395	-68,4822682	379	80,3650147	-68,4606712	380
Coring / Full 6.4	19-08-02	81,6428680	-63,1886177	779	81,6533100	-63,1945060	771
Full Talbot Inlet	19-08-05	77,8359012	-77,0539437	530	77,8439385	-77,0756048	518
Basic 293	19-08-07	75,7267273	-80,6560122	625	75,7246660	-80,6267328	618
Basic 295	19-08-08	76,3744190	-84,3996983	103	76,3736908	-84,3939862	106
Basic 305B	19-08-12	74,3523118	-93,6115983	163	74,3521822	-93,6253758	
Basic 296	19-08-10	75,5262168	-79,7190210	558	75,5305243	-79,6918983	558
Basic 303	19-08-12	74,3742807	-89,6211630	306	74,3796772	-89,639693	
Basic 155	19-08-17	72,46117	-78,70943	279	72,46765	-78,71682	284
Full 170-0	19-08-19	71,37282	-70,08073	237	71,37028	-70,06820	209
Basic E2	19-08-23	68,53168	-64,68492	426	68,52335	-64,68170	378
Basic E1	19-08-23	68,28024	-65,17866	430	68,27847	-65,21887	419
Full D1-177	19-08-24	67,47916	-63,67212	567	67,47854	-63,70186	465
Basic D2	19-08-25	67,85976	-63,14933	268	67,86023	-63,16429	275
Basic C2	19-08-27	67,54315	-61,91684	377	67,54198	-61,92220	346
Basic C1	19-08-28	67,34975	-62,51370	141	67,34912	-62,52722	149
Basic B1	19-08-29	67,06452	-61,51636	117	67,06059	-61,53150	107
Basic B2	19-08-29	67,19589	-60,92052	630	67,19543	-60,89537	636
Basic A5	19-08-31	66,78423	-57,89411	706	66,77896	-57,93830	713
Basic A1	19-08-31	66,58689	-61,20682	98	66,59002	-61,20341	98
Nutrient	19-09-04	58,01592	-59,77965	369	58,00812	-59,78256	335
Kelp-2.3	19-09-04	56,78121	-59,67748	130	56,78765	-59,68017	130
Kelp-2.1	19-09-04	56,62048	-60,75460	172	56,61759	-60,75556	163
Kelp-1.1	19-09-04	56,59604	-60,81893	132	56,59281	-60,82127	135
Kelp-3.1	19-09-04	56,51712	-60,80783	71	56,51852	-60,81696	58
Kelp-3.3	19-09-05	56,48475	-59,63311	117	56,48222	-59,64557	124
Kelp-1.3	19-09-05	56,65600	-59,65704	114	56,64966	-59,66665	111

Table 25-3 Samples collected from the Agassiz trawl during Leg 2 of the 2019 CCGS Amundsen expedition, for our team and for collaborators.

Station ID	Epifauna Biodiversity	Buccinidae	Isotopes	Soft corals - De Moura Neves	Bivalves - Amiraux	*Ophiura sarsii* - Meyer-Kaiser	Contaminants - Stern
Basic 196	X						
Basic 198	X						X
Basic BB16	X				X		X
Basic 229	X					X	X
Full 226	X						X
Full 222	X			X			X
Basic 204	X		X				
Basic 210	X						X
Full 115	X				X	X	X
Basic 111	X				X	X	X
Full 108	X		X				X
Basic 105	X			X	X		X
Full 101	X	X		X	X		X
Nutrient 324	X		X				X
Basic 122	X	X			X	X	X
Full 133	X		X				X
Basic 134	X			X			X
Coring/Full 6.4	X		X				
Full Talbot Inl	X	X		X	X		X
Basic 293	X			X			
Basic 295	Specimens used for the Grise Fiord community visit						
Basic 297	X			X		X	X
Basic 296	X			X			X
Basic 303	X	X		X	X	X	X
Basic 305B	X			X			X

Table 25-4 Samples collected from the Agassiz trawl during Leg 3 of the 2019 CCGS Amundsen expedition, for our team and for collaborators.

Station ID	Epifauna Biodiversity	Buccinidae	Isotopes	Soft corals - De Moura Neves	Bivalves - Amiraux	*Ophiura sarsii* - Meyer-Kaiser	Knowledge and Ecosystem-Based	Arctic kelp –Memorial University	Contaminants - Stern
Basic 155	X	X		X		X			X
Full 170-	X			X		X			X
Basic E2	X					X	X		
Basic E1	X	X	X			X	X		X
Full D1-177	X				X	X	X		
Basic D2	X			X		X	X		
Basic C2	X			X		X	X		
Basic C1	X			X			X		
Basic B1	X			X			X		X
Basic B2	X			X			X		

Station ID	Epifauna Biodiversity		Isotopes	Soft corals - De Moura Neves	Bivalves - Amiraux	*Ophiura sarsii* - Meyer-Kaiser	Knowledge and Ecosystem-Based	ArcticKelp –Memorial University
Basic A5	X		X	X			X	
Basic A1	X	X					X	
Nutrient	X	X	X	X				
Kelp-2.3	X					X		X
Kelp-2.1	X					X		X
Kelp-1.1	X							X
Kelp-3.1	X							X
Kelp-3.3	X							X
Kelp-1.3	X							X

25.3 Preliminary Results

At this point, we do not know exactly if spatial and temporal variability of benthic diversity is governed by sediment type, food availability or other environmental variables. Samples collected require further analysis. For detailed results, identification of organisms and sediment analyses will be carried on in home labs.

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26 Marine geology and recent and active marine geohazards in Baffin Bay

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26.1 Introduction

Turbidity currents and submarine landslides are gravity flows that transfer large volumes of sediment and organic carbon to the deep-sea and represent major geohazards to offshore infrastructure. The knowledge of where, when and how they occur is of prime importance to mitigate their impact. A complete understanding of their impact on the seafloor is critical for the management of seabed infrastructure and the development of northern submarine infrastructures. Direct monitoring, which includes repeat seabed mapping and the deployment of ADCPs, allows to directly link geohazards with changes on the seabed.

Arctic coastlines are particularly sensitive to a warming climate because of ice-mass loss, longer open sea-ice seasons and, in some regions, a relative sea-level rise. These environmental changes in turn drastically modify Arctic coastlines, either by increasing coastal erosion, or conversely, by promoting rapid progradation of deltas due to glacial ice mass loss. Rapid changes in coastal dynamics have a direct impact on sediment fluxes to the oceans: they strongly affect the nearshore environment and other associated processes in the deeper waters, such as sediment distribution, benthos development, or the burial of organic carbon. Despite the importance of turbidity currents in the transfer of sediment and carbon to deeper-water ecosystems, remarkably little information exists on sediment transport processes on high-latitude deltas and submarine fans.

The objectives of this cruise were to: 1) map marine geohazards along eastern Baffin Island; 2) identify and core submarine landslide deposits to understand the recurrence of those events; 3) recover a mooring that monitored active marine geohazards in Southwind fjord. The combination of all these methods will allow us to understand the triggers of marine geohazards in a changing climate and their recurrence through the last 100s to 1000s year. In addition, opportunistic box cores were collected to assess the influence of ice mass loss in the surrounding regions (Baffin Island and Greenland) on sediment deposition and transport in Baffin Bay.

26.2 Methodology

A total of 43 cores and one mooring were collected during leg 3 of the 2019 Amundsen Science expedition along the coast of Baffin Island. This included nine piston cores, nine gravity cores and 25 box cores (Table 26-1 to Table 26-3). One gravity core was collected from Lancaster Sound (2.1), three from Eclipse Sound (BY01-BY03), and four from Southwind Fjord, Baffin Island (GC1-GC3 and PC2) (Table 26-1)

Table 26-1 Gravity cores collected during leg 3 of the 2019 Amundsen Science expedition

Amundsen station no.	GSC-A station no.	Latitude	Longitude	Water depth (m)	Recovery (cm)
2.1	-	74.185899	-81.1984267	780	253
BY01	002	72.73475	-78.61824	774	0
BY02	003	72.64798	-79.32648	690	288
BY03	004	72.56128	-79.27173	714	281.5
GC1	030	66.78172	-62.36735	173	147
GC2	031	66.78717	-62.36233	177	64
GC3	032	66.77791	-62.36186	166	149
PC2	034	66.79707	-62.37535	196	36
CSG4	041	47.70896	-69.93758	102	0

One piston core was collected near Qikiqtarjuaq (4.2), two were collected within Coronation Fjord, Baffin Island (1.1A and 1.1B) and one from within Southwind Fjord, Baffin Island (PC1) (Table 26-2). Each piston core had a trigger weight core collected along side it. In addition, opportunistic piston coring was done in the St. Lawrence Estuary on our transit back to Quebec City.

Table 26-2 Piston cores (PC) and trigger weight cores (TWC) collected along the coast of Baffin Island during leg 3 of the 2019 Amundsen Science Expedition.

Amundsen station no.	GSC-A station no.	Latitude	Longitude	Water depth (m)	TWC recovery (cm)	PC recovery (cm)
4.2	011	67.46695	-63.82711	496	60	551
1.1A	-	67.21934	-64.71831	189	277	619
1.1B	-	67.28458	-63.90858	603	87	201
PC1	029	66.78708	-62.36891	180	22	195
PDM1	036	49.27854	-67.34609	311	168	710
F2	037	49.2602	-67.8585	100	0	
CSG1	038	47.6953	-69.9217	91	0	575
CSG2	039	47.73155	69.9165	136	0	450
CSG3	040	47.363	-69.4069	112	0	625

Once the piston cores and gravity cores were recovered and on deck, the core tubes were cut down into 1.5 m sections. End caps were placed on each end of the core tubes and taped and then brought into the lab for further analysis. If present, material recovered in the cutter/catcher at the base of the piston and gravity cores was placed into a separate core tube. In the lab, the top and base of some of the 1.5 m sections were subsampled for constant volume measurements and shear strength measurements. These subsamples were taken only from undisturbed sediment and were not taken if the material was too soupy or consisted of sand as the measurements would not be valid in these materials. Constant volume sampling consisted of taking a subsample of a known volume of sediment using a pre-measured cylinder and placing the sub-sample in a sealed bottle to be further analysed for bulk density in the core lab at the Geological Survey of Canada- Atlantic (GSC-A). This measurement will be used to calibrate the bulk density measurements taken at the GSC-A. Shear strength measurements were taken using a torevane which was inserted into the sediment and turned at a constant rate until the sediment failed. This measurement will be used to later calibrate shear strength measurements taken in the core lab at the GSC-A. The core tubes were then covered with end caps, taped, measured, and sealed with wax. They were then placed upright in refrigerated storage.

Figure 26-1 Piston coring outside of Coronation Fjord, Baffin Island.

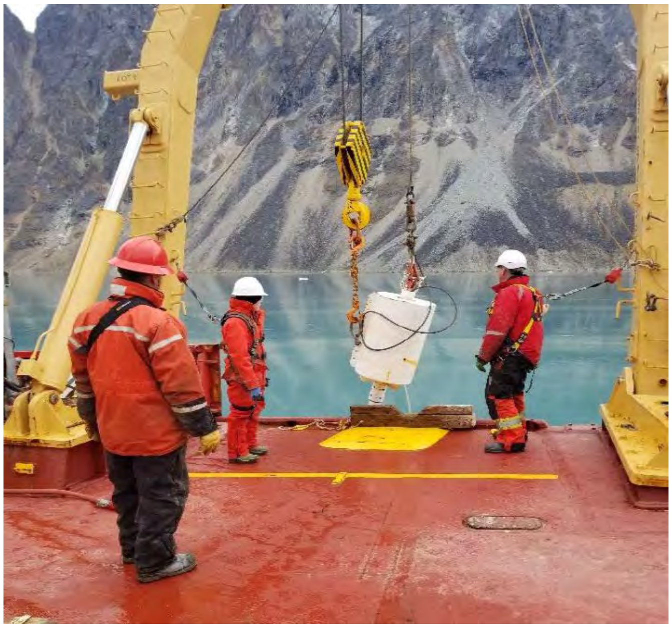

Figure 26-2 Piston coring in Coronation Fjord, Baffin Island.

total of 25 box cores were sampled along the coast of Baffin Island. One box core was collected from Eclipse Sound (2.2), one from Scott Inlet (NWK1), 22 from offshore southeastern Baffin Island (E5-A3), and one from Southwind Fjord, Baffin Island (BC2) (Table 26-3; Figure 26-3). From the box cores, push cores were taken at 19 of the sites where the recovered material appeared in situ (Table 26-3). No push cores were collected from box cores that sampled sandy and rocky material that were either to rocky to sample, too small, or disturbed.

Table 26-3 Box cores and push cores collected along the coast of Baffin Island during leg 3 of the 2019 Amundsen Science Expedition.

AS stn	GSCA stn	Lat	Lon	Depth (m)	Box core recovery (cm)	Sub-core	Sub-core recovery (cm)
2.2	001	72.46002	-78.70810	279	~35	Push A	35
NWK1	005	71.38445	-70.09292	303	~20	-	-
E5	006	69.31619	-63.11929	1934	~42	Push A	44.5
E4	007	69.05936	-63.64361	1573	~34	-	-
E3	008	68.80078	-64.15421	1325	~49	Push A	46.5
E2	009	68.54064	-64.65366	540	~20	Push A	18
E1	010	68.27847	-65.14224	447	~40	Push A	42
D2	012	67.85829	-63.15081	266	~30	-	-
D3	013	68.24005	-62.58835	1571	~41	Push A	46
D4	014	68.62046	-62.00757	1810	~41	Push A	41
D5	015	68.99913	-61.40610	1839	~41	Push A	42
C5	016	68.15084	-59.96700	1350	~38	Push A	39
C4	017	67.95210	-60.62516	1610	~39	Push A	43
C3	018	67.75486	-61.27049	1574	~43	Push A	44
C2	019	67.54414	-61.93085	354	~10	-	-
C1	020	67.34597	-62.52218	140	-	-	-
B1	021	67.06297	-61.51353	118	-	-	-
B2	022	67.19871	-60.89908	621	~37	Push A	36
B3	023	67.33220	-60.27095	683	~38	Push A	38
B4	024	67.46177	-59.65016	1421	~37	Push A	44
B5	025	67.59052	-59.01437	1176	~38	Push A	42
A5	026	66.77791	-57.84766	700	~31	Push A	30
A4	027	66.72641	-58.70685	806	~20	Push A	26
A3	028	66.67263	-59.56508	870	~30	Push A	33.5
BC2	033	66.76055	-62.34032	115	~22	Push A & B	18 and 19

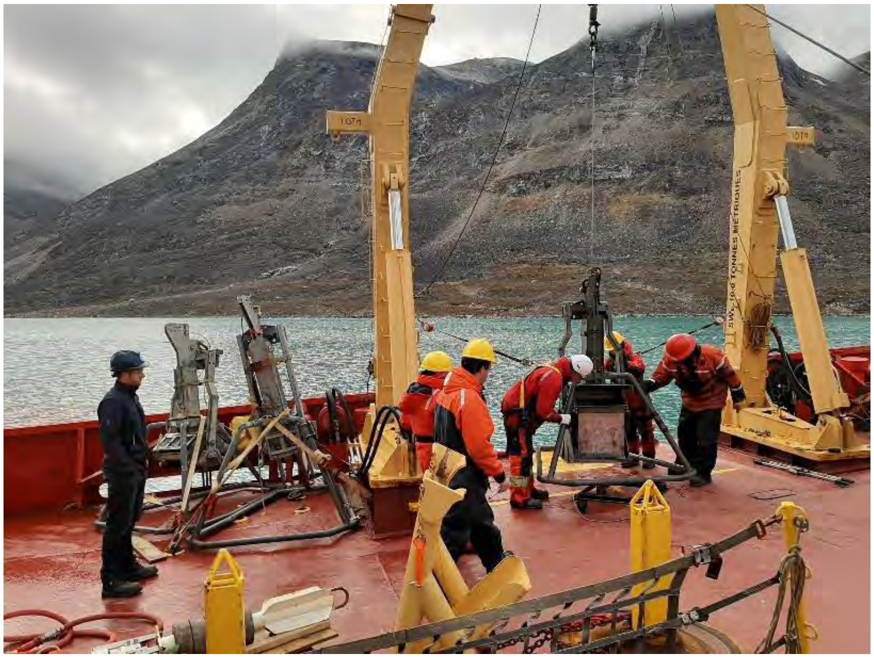

Figure 26-3 Box coring in Southwind Fjord, Baffin Island.

Push cores were sampled from box cores using a small tube attached to a vacuum pump (Figure 26-4). The core tube was inserted and pushed into the box core material while the vacuum pump was on to prevent compression or suck-up of the sediment. The outer excess material was then removed and the core was capped with end caps, taped, measured, sealed with wax and put in the fridge upright.

Figure 26-4 Push cores subsampled from a box core.

A mooring was collected in Southwind Fjord Baffin Island (Table 26-4; Figure 26-5) which had been recording turbidity currents during the last year. The mooring was equipped with an 300 kHz ADCP positioned 20 m above bottom and looking downwards.

Table 26-4 Mooring station collected during leg 3 of the Amundsen Science expedition in Southwind, Fjord, Baffin Island.

Amundsen station no.	GSC-A station no	Latitude	Longitude
BC2	035	66.76094	-62.3392

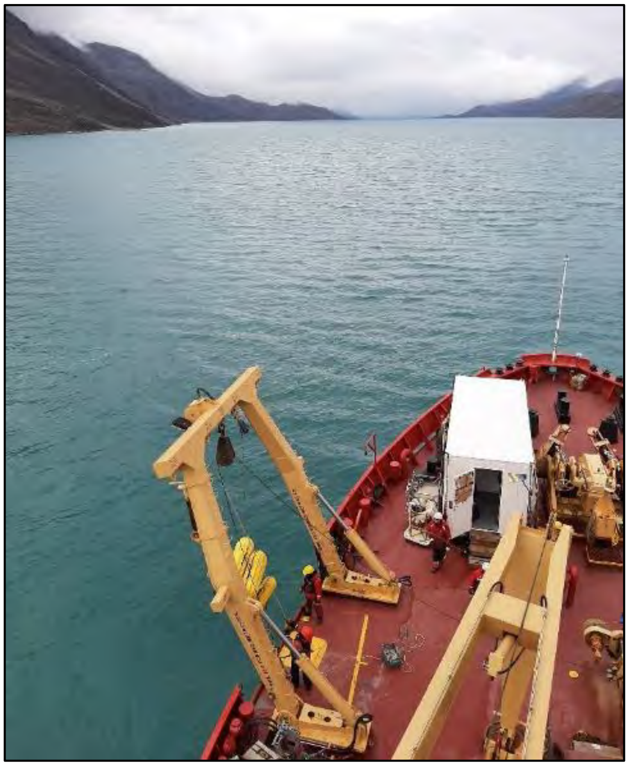

Figure 26-5 Mooring recovery from Southwind Fjord, Baffin Island.

26.3 Preliminary Results

Preliminary results suggest that marine geohazards including turbidity currents and landslides are currently active along eastern Baffin Island. Most hazards are associated with regions where glaciers are present. When glaciers melt, they bring large volumes of sediment to the coast and trigger marine geohazards. However, one location near Qikiqtarjuaq was cored to assess the occurrence of turbidity currents during storms. These cores will be analyzed at the Bedford Institute of Oceanography where physical properties (CT-Scan, density, magnetic susceptibility, P-wave velocity), chemical properties (pXRF), geotechnical properties (shear strength) and sedimentological properties (grain size and shape) will be measured. These measurements will then allow us to precisely identify the triggers and the recurrence of marine geohazards in a changing climate.

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27 Collecting sedimentary sequences and plankton samples in the continental margins from the eastern Canadian Arctic Archipelago

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27.1 Introduction

The sampling undertaken during this expedition is framed within the IRIS 2 targeted research from the ArcticNet Phase 5 funded project Mapping the Arctic Seafloor: innovation in data acquisition and processing for benthic habitat, seabed composition, geohazards, and climate dynamics.

Benefitting from the presence of the Canadian Coast Guard (CCGS) *Amundsen* in Northern Baffin Bay, Nares Strait, Kane Basin, Jones Sound and Lancaster Sound, the main objective of our team was the collection of multiple sediment cores (box, gravity and piston) and bongo Nets in these areas in order to:

1) characterize the spatial distribution patterns of siliciclastic grain size, bulk minerals, and elemental geochemistry of seafloor sediments from the continental shelf and channels of the Canadian Arctic;
2) to document the post-glacial melting history of the outlet glaciers
3) Reconstruct past variations in sediment dynamics and sea-surface conditions (temperature, salinity, sea-ice cover duration, productivity) related to Late Quaternary climate changes across the Canadian Arctic

4) establish a deglacial/Holocene high-resolution magnetostratigraphy for the Canadian Arctic Ocean;
5) document the evolution of primary and secondary productivity of the Canadian arctic ecosystem in relation with climate conditions;
6) identify and document the dinoflagellate communities living in Canadian Arctic.

27.2 **Methodology**

The UQAR-ISMER team was responsible, together with Cindy Grant from Université Laval, for box coring operations. The gravity and piston corer were deployed by UQAR-ISMER team. The multibeam echosounder (Konsberg Simrad EM300) and 3.5-kHz chirp sub-bottom profiler (Knudsen 320R) were used, in collaboration with the Amundsen Science tech Daniel Amirault and Paco Ferrand to ensure that the seabed was suitable for deployment of the corers, as well as to identify the thickest apparent deglacial/Holocene sequences with the absence of mass movements and/or sediment perturbations.

27.2.1 *Plankton (Bongo) Net Sampling*

Dinoflagellates samples were taken from 22 sites (Table 27-6) with a 20 µm bongo net (Figure 27-1). A heavy lead weight was fixed at the base of the codend and the net was then lowered vertically down to 100 m water depth. After 30 second, the net was hauled back at a constant speed of 30m/min. The net was rinsed from top-down with seawater from the sampling site, and the inside of the net and codend were rinsed with filtered seawater (20 µm) of the site to ensure that all the organisms were collected. The concentrate of organisms was transferred into a 250 ml plastic jar. A volume of ~10 ml from each sample was transferred into a tube and froze (-80°C) for genetic analysis. The rest of the sample was preserved with 6 ml of formaldehyde (37%).

Figure 27-1 Deployment of bongo net (left) and processing in the laboratory (right).

27.2.2 *River Sampling*

The main purpose of the river sampling was to take approximately 2 bags (Ziplocs) of surface sediments in the periphery of the rivers with a spatula and 1 bag (Ziploc) of rocks (Figure 27-2). A total of 10 rivers on a total of 14 were sampled (Table 27-1). At each site, the helicopter landed close to the river mouth. The rivers in the eastern Canadian Arctic Archipelago drain watersheds characterized by different geological provinces and petrographic signatures. Analysis of the mineralogy, the geochemistry and the magnetic properties will allow a comparison of the rivers and to find the detrital sources of the sediments. The river sites were selected by Robert Izett (UBC) and approved by Jean-Carlos Montero-Serrano and were based on the proximity of the stations and the access for the helicopter. The river sampling is an opportunistic sampling and is dependant of the weather.

Figure 27-2 Example of sampling at a river site (left); Sampling bedload sediments (credit: Adam Garbo) (right)

27.2.3 *Glacier Sampling*

The main purpose of the glacier sampling was to take approximately 1 small bag (Ziplocs) of sediments collected by hand near the glacier and 1 bag (Ziploc) of rocks (Figure 27-3). The glacier sampling was done 4 times, on Eugenie Glacier, a glacier near Eugenie, on Trinity Glacier and near Sydkap Glacier (Table 27-2). Those sediments will be useful to give additional information about mineralogy, the geochemistry, physical and magnetic proprieties of the glaciers. Also, those sediments will lead to a better understanding of the history of those glaciers and complement the core that was taken near those glaciers. This operation has been done in collaboration with the glacier team (Abigail Dalton and Adam Garbo).

Figure 27-3 Exemple of sampling at a glacier site.

27.2.4 *Box Corer*

The box corer (Figure 27-4) collects up to 0.125 m3 of soft sediments at the seafloor and is suitable for any water depths (limited by winch cable length). It is used for minimum disturbance of the sediment/water interface. During the expedition, the box corer was deployed 24 times (Table 27-3). When the sediment volume was sufficient (which was the case for most deployments), two push cores (PVC tubes of 10 cm diameter and ~60 cm length) were taken from each box core using a vacuum pump to reduce compaction (Figure 27-4). The sediment/water interface from each box-core location was subsampled into several Ziploc bags for subsequent identification of microfossils (dinoflagellate cysts, non-pollen palynomorphs, benthic and planktonic foraminifera) as well as grain size, mineralogical, geochemical, and magnetic analyses. Each push core and surface sediment samples were stored in a refrigerated container (4°C).

Figure 27-4 Recovery of full box core (credit: Adam Garbo) (left); Push cores in open box core, prior to extraction.(right)

Another goal for the box core sampling is to refine these methodologies to incorporate the development of a new proxy for analysis, sedimentary ancient DNA (sedaDNA). The addition of this proxy in the current datasets will improve reconstructions by providing high taxonomic resolution of past ecological communities and as a quantitative measure for changes in oceanographic conditions ensure the appropriate use of sedaDNA in subsequent analyses. To achieve this goal, there have been modifications of some of the traditional methodology used to obtain short push cores from box cores. These developments are important when working with highly degraded DNA samples left behind by past organisms, as there is a high risk of contamination from modern DNA sources. These contaminant risks can include algal biomass from other research labs onboard, seawater and the atmosphere, or DNA shed by the researchers themselves. The much greater abundance of these modern DNA contaminants in the environmental relative to the target ancient DNA molecules makes them much more competitive in downstream sequencing processes, thus inhibiting precious information that could be obtained from the ancient molecules. Therefore, short push cores taken from box cores were pretreated in the following way (Figure 27-5):

- 60 cm short cores were first rinsed with freshwater to remove any large pieces of mud.
- Under a fumehood with clean, disposable gloves:

    - The core was first cleaned with a 100% EtOH wash, followed by a 5% bleach wash and a final 100% EtOH wash.
        - A preliminary EtOH wash removes any other debris left over in the core.
        - The bleach is required to properly destroy any contaminating modern DNA, and the final EtOH wash removes any excess bleach at the end.
    - The ends of the core were then wrapped in aluminum foil for transport to the deck.
    - Caps and bungs were cleaned using the same process and placed in plastic bags for transport to the deck.
- The cap for the pump that is used to collect push core samples was also cleaned with a 100% EtOH wash prior to use on deck.
- On the deck, the push core for *sed*aDNA was always taken first to limit the possibility of contaminants entering during work on the deck.
- Once the core was back in the lab, all tools for processing for storage were first wiped with 100% EtOH. The core was then stored at 4°C as soon as possible to preserve DNA molecules within the sediment.

Figure 27-5 Preparation of a short push core that will be used to isolate sedaDNA from sediment

In a similar fashion, samples of surface sediments were conducted while wearing clean, disposable gloves and collected with plastic, disposable spoons into whirl-pak bags for storage at -20C. In the future, we would like to look at the feasibility of a metal spatula that is sterilized using aseptic technique.

27.2.5 *Gravity and Piston Corers*

The gravity core (Figure 27-6) has a maximum recovery length of ~2.80 m (in a 3.05 m aluminum barrel) using a stainless-steel cutting head and penetrating the sediment under a 136 kg weight. A core catcher keeps the sediment in the corer when the latter is pulled upward. Winch speeds (lowering) ranged from 60 to 80 metres per minute depending on estimated substrate properties. During the expedition, the gravity core was deployed 21 times (Table 27-4). The gravity core is also used for the releasing of the piston corer, being referred to as the trigger weight core (TWC) and rigged with a shorter 2.15 m aluminum barrel (liner length = 1.90 m). During the expedition, the gravity core was used for both purposes. Gravity core deployment and recovery is markedly quicker than the combined piston and trigger-weight core (15-20 minutes versus ~90 minutes), thus the gravity core was deployed at several sites where thick sea ice would have posed a risk to the piston corer (hanging over the side of the ship for a considerable time during deployment and recovery) and where time constraints necessitated shortened coring operations.

The piston corer (Figure 27-6) operates with a weight of 2000 kg with three 3.05 m steel core barrels connected with steel coupling sleeves attached with set screws, and a steel cutting head. When the companion trigger-weight core touches the seafloor, it causes the rise of the piston core's trip arm and induces the piston corer to free fall. A core catcher helps keep the sediment in the corer when the latter is pulled upward. This coring instrument allows the collection of long cores up to a maximum of 9 m length due to the suction exerted by the piston in the core tube. The piston corer was deployed 4 times during the expedition, and thus a total of 4 piston cores and 4 trigger weight cores have been sampled (Table 27-5). Once on board, all gravity and piston cores were cut into 1.5 m long sections and stored into a cold room (4°C).

Note that box cores collected in conjunction with a piston corer allow recovery of the undisturbed sediment-water interface, which is usually perturbed when the piston corer enters the sediments. Ideally, push cores from box-cores can be correlated visually, chronostratigraphically, or geochemically with piston, trigger, and gravity cores from the same site.

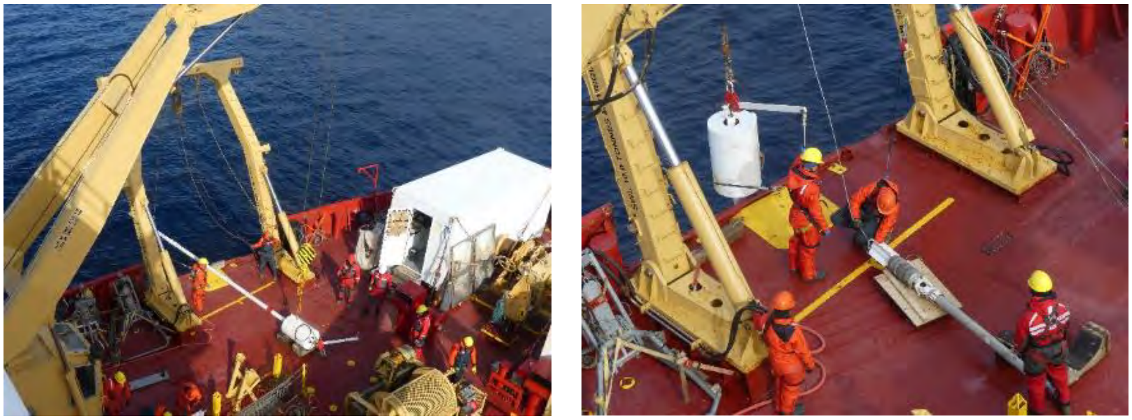


Figure 27-6 Gravity corer, rigged with a short barrel as a trigger weight (right) and piston corer on the foredeck of the CCGS Amundsen awaiting for deployment (left).

27.2.6 *Core Identification and Labelling*

The sediment core samples were labelled using the following numbering system:

AMD1902-01BC
AMD = Amundsen
19 = Year 19
02 = Leg # 2
01 = Station # 1
BC = Corer type (e.g., PC= piston core, BC = box core, GC= gravity core)
AB = Core section if applicable

Piston, trigger, and gravity core 1.5 m subsections are labelled as per Figure 27-7 with A being the base and section AB being the lowest section, followed by BC, CD etc. sequentially. Where multiple push cores were taken from a box core, they were labelled by the addition of a sequential alphabetical identifier, e.g. 03BC-A, 03BC-B, 03BC-C, etc.

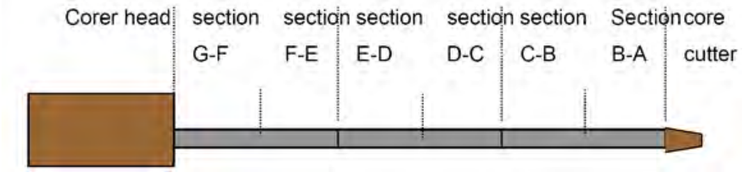


Figure 27-7 Labelling system for sections of piston and gravity cores

Core samples will be retained in refrigerated storage on the CCGS *Amundsen* during Leg 2b to be removed on demobilization during early September in Québec City. Cores will then be shipped, and stored, and analyzed in detail at UQAR-ISMER.

27.3 **Preliminary Results**

Because to good weather conditions and low sea ice extent, the mission was successful with the collection of multiple sediments samples (Table 27-1 to Table 27-5), considerably expanding sediment core and mapping coverage through the eastern Canadian Arctic. A total of 24 box cores, 21 gravity, and 4 piston cores were recovered at different locations along Northern Baffin Bay, Nares strait, Kane Basin, Jones Sound and Lancaster Sound.

All of these sediment samples will be analyzed in detail in the laboratory at UQAR-ISMER and UNB to achieve the objectives of this mission. Briefly, sediment samples will be studied for their mineralogical (bulk fraction), geochemical (elemental and isotopic), microfossil (benthic and planktonic foraminifera), palynological (dinoflagellate cysts), magnetic, and siliciclastic grain-size signatures. Such studies will to provide foundational information to improving our understanding on the past and present seafloor sediment composition, glacier-ocean interactions, dinoflagellate communities living in Canadian Arctic and Holocene sedimentation history of the eastern Canadian Arctic Archipelago.

Preliminary results are limited to direct observations of core penetration and sediments visible through the clear core-liner walls and exposed in box cores and in core cutters/catchers. In Kane Basin (Humboldt Glacier), Nares strait and Lancaster Sound the seabed sediment was predominantly composed of grey-brown silty clay with an oxic layer and with the presence of iceberg-rafted debris (IRD). In Peterman glaciers, the sediments were light brown clay and not coercive at all, which made the coring more difficult at this place. In Jones Sound, the sediment was thick greyish clay overlying by brownish silt clay.

The time period covered by each core record depends on the sediment accumulation rate at each location. The chronology of sediment cores will be established by 210Pb analysis for short sediment sequences (box and gravity cores), and on AMS 14C dating and paleomagnetic analyses for longer records (piston core; e.g., Deschamps* et al., 2018a; Caron* et al., 19a).

Finally, from a student and HQP-training perspective, the expedition was a unique opportunity for Jade Brossard (MSc student at UQAR-ISMER), Anne Corminboeuf (MSc student at UQAR-ISMER), Maria-Emilia Rodriguez-Cuicas (MSc student at UQAR-ISMER), Joshua Evans (PhD student at University of New-Brunswick) and Simon Faye (PhD student at UQAR-ISMER) to receive hands-on training on ship-based seafloor mapping and coring operations.

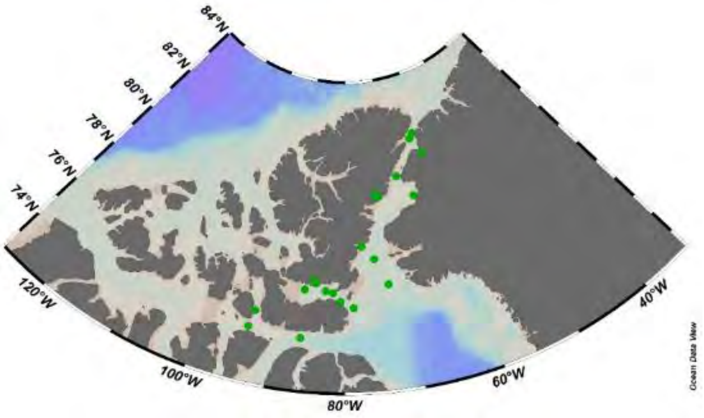


Figure 27-8 Location of the box cores sampled during the Leg 2b.

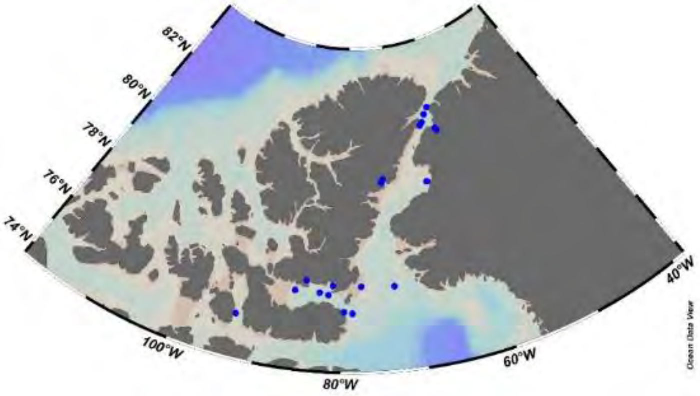


Figure 27-9 Location of the gravity cores collected during the Leg 2b

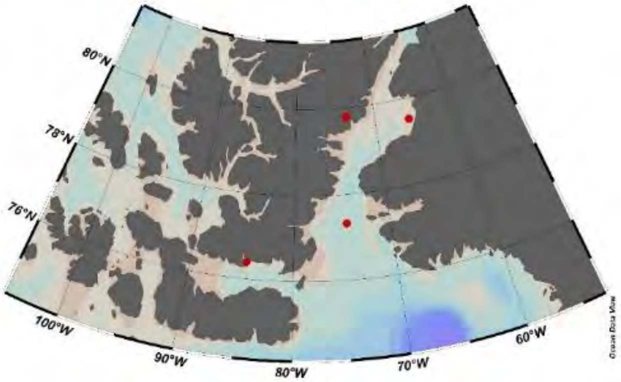


Figure 27-10 Location of the piston cores collected during the Leg 2b

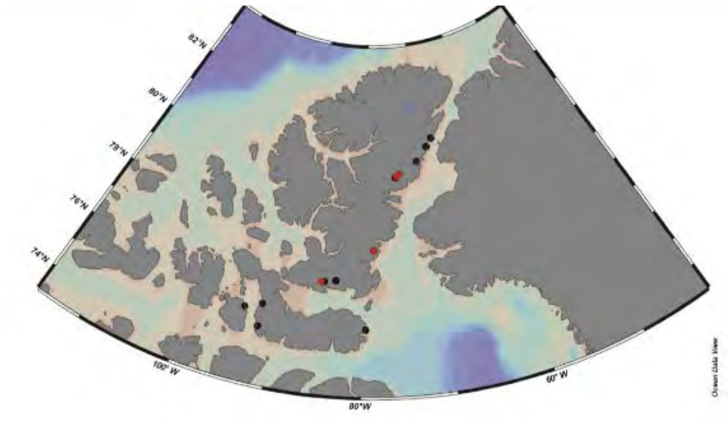


Figure 27-11 Map illustrating the location of glacier (red dot) and river (black dot) samples collected during the Leg 2b

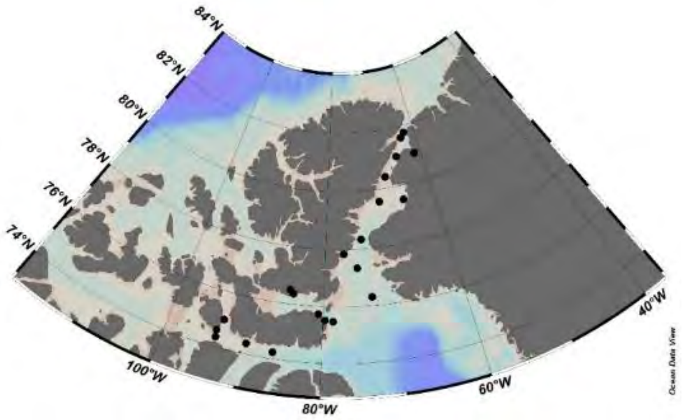


Figure 27-12 Map illustrating the location of Bongo Net samples collected during the Leg 2b

Table 27-1 Rivers sampling operations: location, identification and characteristics.

River #	Name	Latitude	Longitude	Type sediment	Date
1	near 135	80.208	-71.2406667	brown sand	19-07-31
2	near Hans Island	80.6091667	-69.1178333	silt. sand	19-07-31
3	Ellesmere east	80.8433333	-67.9973333	silt. sand	19-07-31
4	near 6.1	79.7925	-74.9956667	sand	19-08-04
5	Devon Island East	75.2175	-79.5551667	Sand	19-08-09
6	Near 1.4	76.6095	-84.9316667	Silt and clay	19-08-09
7	Ellesmere south central	76.666	-83.492	brown sand	19-08-09
8	Wellington 1 - Lovell point	74.9388333	-91.9286667	Rocks	19-08-13
9	Dragelybeck inlet - Brown point	75.6381667	-91.9698333	Rocks	19-08-13
10	Copeland point - lac Eleonar	75.4083333	-93.8888333	Rocks	19-08-13

Table 27-2 Glaciers sampling operations: location. identification and characteristics.

Glacier #	name	Lat	Long	Type sediment	Date
1	Eugenie	79.8106667	-74.8598333	Clay	19-08-04
2	Near Eugenie	79.8933333	-74.3556667	Clay	19-08-04
3	Trinity	77.6166667	-78.6166667	Coarse sediment with rocks	19-08-05
4	Near Sydkap glacier	76.6363	-85.2521667	Sand	19-08-09

Table 27-3 Box coring operations: location. depth. identification. and characteristics. Core sites are shown graphically in figs. 10. PC = Piston Core; TWC = Trigger Weight Core; GC = Gravity Core; BC = Box Core (including sequentially lettered push cores from the box core); surface = surface samples from the box core only.

ArcticNet Stn. No.	*Date*	*Time UTC*	*Latitude*	*Longitude*	*Location*	*Water Depth (m)*	*ISMER-UQAR identifier AMD1902-*	*Push cores length (cm)*		*Comment(s)*
	(d/m/y)	*(24hr)*						*A*	*B*	
Stn. 2.6	28/07/19	08:32	76.31878	-73.06528	Smith Sound	575.32	01BC	32	29	+ 1 surface sediment bag
Stn. 122	29/07/19	02:58	77.34112	-75.01436	North Baffin Bay	647.67	02BC	28.8	28.8	+ 1 surface sediment bag
Stn. 6.2	30/07/19	18:29	79.51491	-65.76420	Houmbolt Glacier	378.82	03BC	27.8	28	+ 1 surface sediment bag
Stn. 134	31/07/19	16:22	80.35646	-68.45394	Nares Strait	377.22	04BC			Empty boxcore. Only sediment surface
Stn. Rob1	02/08/19	08:41	81.80266	-62.24738	Roberson Chanel	716.15	05BC	27	30	+ 1 surface sediment bag
Stn 6.4	02/08/19	20:53	81.62604	-63.21735	Hall Basin	795.90	06BC	xx	25	+ 1 surface sediment bag
Stn. 251b	03/08/19	09:15	80.97515	-61.35902	Petermann Glacier	1037.02	07BC	29.5		Overpenetration. Top lost
Stn. 251b	03/08/19	10:10	81.04258	-6155711	Petermann Glacier	1135.23	08BC	47.3	38.5	Overpenetration. Top lost or mixed. + 1 surface sediment bag
Stn. 6.1	04/08/19	11:03	79.78621	-73.65992	Dobbin Bay	205.77	09BC	33	31.4	+ 1 surface sediment bag
Stn. 6.1	04/08/19	16:53	79.69256	-73.09510	Dobbin Bay	245.90	10BC	19.5	20	Badly closed boxcore. Probably mixed material + 1 surface sediment bag
Talbot Inlet	05/08/19	21:44	77.84329	-77.07505	Talbot Inlet	514.62	11BC	42.2	39.5	11BC-B was compressed ~ 2cm. + 1 surface sediment bag
Stn. 2.5	06/08/19	17:02	76.35641	-7750539	Smith Sound	379.17	12BC	45.5	43.3	+ 1 surface sediment bag

Stn. 293	07/08/19	10:46	75.72819	-80.68970	Belcher Glacier	627.14	13BC	46.5	45.3	13BC-A was expanded by pump suction ~ 3cm + 1 surface sediment bag
Stn. 2.2	07/08/19	17:29	76.06451	-81.84934	Jones Sound	770.10	14BC	44	44	+ 1 surface sediment bag
Stn. 2.3	07/08/19	21:46	76.12946	-83.02329	Jones Sound	827.96	15BC	44.4	43	15BC-B was compressed ~ 1.5cm. + 1 surface sediment bag
Stn. 2.4	08/08/19	06:41	76.12669	-86.30045	Jones Sound	674.74	16BC	41.5	42.5	+ 1 surface sediment bag
Stn. 1.4	08/08/19	18:37	76.39527	-84.57178	South Cape Fjord	139.17	17BC	22.8	22.7	+ 1 surface sediment bag
Stn. 1.4	08/08/19	21:12	76.50070	-84.93136	South Cape Fjord	125.83	18BC	21.2	18.5	18BC-B a rock was removed from the base + 1 surface sediment bag
Stn. 297	10/08/19	03:39	76.37011	-8131434	Jakeman Galcier	451.55	19BC	46.5	43	19BC-B was compressed ~ 1.5cm. + 1 surface sediment bag
Stn. 296	10/08/19	16:37	75.52303	-7975379	Devon Ice Cap	556	20BC	51.5	52	+ 1 surface sediment bag
Stn. 2.7	10/08/19	21:44	75.48240	-78.67531	Jones Sound	521.49	21BC	47.5	46	21BC-B was compressed ~ 1.5cm. + 1 surface sediment bag
Stn. 302	12/08/19	03:21	74.23474	-86.17057	Lancaster Sound	553.44	22BC	45.5		22BC-B was compressed ~ 0.7cm + 1 surface sediment bag
Stn. 303	12/08/19	14:09	7436831	-89.61613	Barrow strait	294.25	23BC	37.5		+ 1 surface sediment bag
Stn.305B	13/08/19	02:58	74.352527	-93.59445	Barrow strait	163.70	24BC	---	---	Boxcore vide
Stn. Wel02	13/08/19	17:10	75.01326	-93.11200	Wellington Channel	247.70	25BC	46	39	21BC-B was compressed ~ 3cm

Table 27-4 Gravity coring operations: location. depth. identification. and characteristics. Core sites are shown graphically in figs. 11. PC = Piston Core; TWC = Trigger Weight Core; GC = Gravity Core; BC = Box Core (including sequentially lettered push cores from the box core); surface = surface samples from the box core only.

ArcticNet Stn No.	*Date*	*Time UTC*	*Latitude*	*Longitude*	*Location*	*Water depth (m)*	*ISMER-UQAR identifier AMD1902-*	*Length (cm)*	*Section length (cm)*		*Comments*
	(d/m/y)	*(24hr)*							*AB*	*BC*	
Stn. 2.6	28/07/19	09:22	76.31870	-73.06510	Smith Sound	572.00	01GC	221.5	149.5	72	
Stn. 6.2	30/07/19	21:06	79.50713	-65.65826	Humboldt Glacier	298.66	02GC	146	146		

Stn. 6.2	30/07/19	21:44	79.51091	-65.71922	Humboldt Glacier	327.28	03GC	32	32		
Stn. 6.2	30/07/19	22:25	79.50946	-65.78536	Humboldt Glacier	351.52	04GC	262	147	115	B-C Section top disturbed
Stn. 2.11b	01/08/19	08:53	81.30128	-64.60051	Nares Strait	469.33	05GC	137	137		
Stn. Ken1	01/08/19	12:49	81.38611	-64.07100		513.58	06GC	207.5	149.5	58	
Stn. Rob1	02/08/19	10:17	81.81668	-62.20447	Roberson Chanel	696.40	07GC	246	149	97	
Stn. 6.4	02/08/19	23:20	81.62140	-63.21565	Hall Basin	795.83	08GC	155	134	21	
Stn. 251b	03/08/19	10:51	81.04259	-61.55913	Petermann Glacier	1134.79	09GC	150	150	---	B-C section loss during transportation
Stn. 251b	03/08/19	12:35	81.10166	-61.74623	Petermann Glacier	1085.32	10GC	272.3	148.3	124	B-C section top loss. Surpenetration
Stn. 6.1	04/08/19	14:57	79.79039	-73.37340	Dobbin Bay	182.31	11GC	18	18		
Stn. 6.1	04/08/19	16:53	79.69256	-73.69510	Dobbin Bay	245.90	12GC	229.5	147.5	82	
Stn. 2.5	06/08/19	16:33	76.35788	-77.50714	Smith Sound	379.84	13GC	238	149.5	88.5	B-C section Top disturbed
Stn. 2.2	07/08/19	18:06	76.06420	-81.84800	Jones Sound	768.83	14GC	238	150	88	B-C section Top disturbed
Stn. 2.3	07/08/19	22:43	76.12955	-83.02550	Jones Sound	827.96	15GC	238	149	89	B-C section Top disturbed
Stn. 2.4	08/08/19	07:24	76.12787	-86.29686	Jones Sound	674.52	16GC	215.5	148.5	67	
Stn. 1.4	08/08/19	21:47	76.47994	-84.91459	South Cape Fjord	127.13	17GC	73.3	73.3		
Stn. 1.4	08/08/19	22:13	76.50038	-84.93120	South Cape Fjord	124.29	18GC	71.2	71.2		
Stn. 297	10/08/19	4:58	76.37023	-81.31403	Jakeman Glacier	457.37	19GC	238	148.5	89.5	
Stn. 296	10/08/19	18:09	75.52321	-79.75348	Devon Ice Cap	559.77	20GC		149.5	83	B-C section Top disturbed
Stn. 2.7	10/08/19	22:27	75.48238	-78.67604	Jones Sound	522.02	21GC	223.5	150.5	73	
Stn Wel02	13/08/19	18:12	75.01224	-93.11377	Wellington Channel	246.63	22GC	157	157		Top disturbed

Table 27-5 Piston coring operations: location. depth. identification. and characteristics. Core sites are shown graphically in figs. 12. PC = Piston Core; TWC = Trigger Weight Core; GC = Gravity Core; BC =

Box Core (including sequentially lettered push cores from the box core); surface = surface samples from the box core only.

ArcticNe	Date	Time UTC	Latitude	Longitude	Location	Water	ISMER-UQAR identifier AMD1902-	Length	Section length (cm)					Comment(s)
Stn. No.	(d/m/y)	(24hr)				epth (m)		(cm)	A B	BC	CD	DE	EF	
Stn. 2.8	28/07/19	19:37	77.32659	-74.53167	North Baffin Bay	707.30	01PC	557.5	148.5	157	150	102		
Stn. 2.8	28/07/19	19:37	77.32659	-74.53167	North Baffin Bay	707.30	01TWC	145	136	9				B-C section top disturbed
Stn. 6.2	30/07/19	19:43	79.51553	-65.76922	Humboldt Glacier	378.86	02PC	551.3	148	152.3	150	101		
Stn. 6.2	30/07/19	19:43	79.51553	-65.76922	Humboldt Glacier	378.86	02TWC	29	29					
Stn. 6.1	04/08/19	13:22	79.78564	-73.66978	Dobbin Bay	214.62	03PC	558	149	152.5	148.5	108		
Stn. 6.1	04/08/19	13:22	79.78564	-73.66978	Dobbin Bay	214.62	03TWC	142	142					
Stn. 1.4	08/08/19	19:31	76.39507	-84.57290	South Cape Fjord	138.97	04PC	438.5	147.5	154	137			Cutter section A'- '= 24cm
Stn. 1.4	08/08/19	19:31	76.39507	-84.57290	South Cape Fjord	138.97	04TWC	15	15					

Table 27-6 Bongo net operations: name. location and date

Name	*(Articnet station)*	*Latitude*	*Longitude*	*Sampling depth(m)*	*Station depth (m)*	*Date*	*Time (UTC-4)*
AMD1902b-01	(St 2.6)	76.31211	-73.05321	100	577.00	28/07/19	3h21
AMD1902b-02	(St 122)	77.34209	-75.00405	100	649.68	28/07/19	17h35
AMD1902b-03	(St 129)	78.33551	-74.14398	100	538.67	29/07/19	9h47
AMD1902b-04	(St 133)	79.57726	-70.28459	100	170.63	29/07/19	23h01
AMD1902b-05	(St 6.2)	79.51153	-65.74466	100	333.03	30/07/19	13h48
AMD1902b-06	(St 134)	80.39387	-68.42586	100	380.28	30/07/19	8h48
AMD1902b-07	(St 138)	81.01363	-65.34960	100	395.96	01/08/19	2h46
AMD1902b-08	(St Ken1)	81.01363	-65.34960	100	395.96	01/08/19	7h05
AMD1902b-09	(St 6.4)	81.60594	-63.47462	100	753.35	01/08/19	13h20
AMD1902b-10	(St Rob1)	81.75907	-62.45906	100	675.82	02/08/19	1h13
AMD1902b-11	(St 251b)	80.97491	-61.35486	100	1032.19	03/08/19	4h21
AMD1902b-12	(Talbot inlet)	77.83689	-77.05583	100	525.49	05/08/19	5h20
AMD1902b-13	(St 293)	75.73011	-80.68309	100	626.30	07/08/19	2h21
AMD1902b-14	(St 1.4)	76.50338	-84.93516	100	122.73	08/08/19	13h05
AMD1902b-15	(St 295)	76.37664	-84.40670	82	85.59	08/08/19	20h46
AMD1902b-16	(St 296)	75.52312	-79.75203	100	557.45	10/08/19	8h56
AMD1902b-17	(St 2.7)	75.48096	-78.63397	100	522.26	10/08/19	17h15

AMD1902b-18	(St 302)	74.23421	-86.18528	100	550.94	11/08/19	20h33
AMD1902b-19	(St303)	74.37598	-89.62841	100	308.02	12/08/19	7h20
AMD1902b-20	(St305B)	74.35123	-93.58368	100	163.23	12/08/19	22h00
AMD1902b-21	(StWell02)	75.01155	-93.11417	100	246.56	13/08/19	09h38
AMD1902b-22	(St305D)	74.59995	-93.69529	100	131.73	13/08/19	21h38

27.4 **Acknowledgment**

We gratefully thank the Captain Jean-Luc Dugal, the officers and crew of the CCGS *Amundsen* for their support, their help, and friendship throughout this leg of the 19 ArcticNet cruise. We also acknowledge Daniel Amirault and Paco Ferrand for the support with the mapping and sub-bottom surveys. Finally, we gratefully thank Abigail Dalton, Adam Garbo, Robert Izett, Philippe Tortell and Dick Morissette for the river and glacier sampling.

28 Seabed Mapping & Sub-bottom Profiling

Project leaders: Alexandre Forest[1] (alexandre.forest@as.ulaval.ca)
Cruise participants – Leg 1: Lauren O'Dell[1]
Cruise participants – Leg 2: Daniel Amirault[1] and Pacp Ferrand[1]
Cruise participants – Leg 3: Annie-Pier Trottier[1]
[1] *Amundsen Science, Université Laval, Québec, QC, Canada*

28.1 **Introduction**

28.1.1 *Leg 1*

Leg 1 of the 2019 Amundsen expedition (AZOMP & ISECOLD) covered extensive territory from Quebec City, Quebec, to Halifax, Nova Scotia, to the south coast of Greenland, to St. Anthony, Newfoundland, and finally into Frobisher Bay to Iqaluit. Most of the mapping was conducted on an opportunistic basis during transit, while in standby or in support of coring and mooring operations, as well as assisting the Moving Vessel Profiler (MVP) operator. There were no dedicated mapping operations carried out during Leg 1.

28.1.2 *Leg 2*

The 2019 Amundsen Leg 2 expedition consisted of two independent parts:

- Leg 2A: The ArcticNet / Bio Argo Floats leg 2A took place from July 4th to July 26th, departing from Iqaluit and ending in Pond Inlet. During this leg, solely Daniel Amirault carried multibeam and sub-bottom operations as there were no rigorous supportive mapping projects with scientific teams onboard. One opportunistic multibeam survey occurred between Stations 191 and 192 in the Davis Straight to cover previously unmapped areas by the CCGS *Amundsen*.
- Leg 2B: Leg 2B took place from July 26th to August 15th, departing from Pond Inlet and ending in Resolute. Daniel Amirault and Paco Ferrand conducted both multibeam and sub-bottom echosounder operations. Throughout the leg, sub-bottom profiler surveys took place at every coring station as well as one dedicated mapping survey in Talbot Inlet.

28.1.3 *Leg 3*

The *Amundsen Science* 2019 Leg 3 cruise took place from August 15th to September 10th 2019 onboard the CCGS Amundsen. Annie-Pier Trottier was onboard and responsible for multibeam and sub-bottom data acquisition. Annie-Pier has been mainly involved in choosing appropriate coring sites, mapping the seabed morphology and acquiring sub-bottom stratigraphy during transits as well as during dedicated mapping time. This cruise report presents the instruments, methods and preliminary results for Leg 3.

28.2 **Methodology**

28.2.1 *Kongsberg EM302 Multibeam Sonar*

The Amundsen is equipped with an EM302 multibeam sonar operated with the Seafloor Information System (SIS). Attitude is given by an Applanix POS-MV receiving RTCM corrections from a CNAV 3050 GPS receiver. Position accuracies were approximatively < 0.8m in planimetry and < 1m in altimetry. Beam forming at the transducer head was done by using an AML probe. CTD-Rosette casts, when available, were used for sound speed corrections.

28.2.2 *Knudsen 3260 CHIRP Sub-bottom Profiler*

Since May 2016, a new Knudsen 3260 deck unit has been installed onboard the Amundsen. It was acquired to replace the old 320-BR system that shown signs of high degradation at the end of the 2015 field season. The new system now operates using a USB connector instead of a SCSII communication port. We also installed a new operating computer (HP EliteDesk). Sub-bottom profiles were acquired all along transits at a frequency of 3.5 kHz to image sub-bottom stratigraphy of the seafloor.

28.3 **Preliminary Results**

All the data acquired during the cruise was post-processed in real-time using the *CARIS HIPS & SIPS 11.1* software. Raw SIS data was converted into the HIPS & SIPS format, then went through a geobathymetry processing step that applied SVP files, TPU, and blah to the data. Surfaces were then created to allow for data cleaning in Subset Editor or in Swath Editor. This post-processing phase is essential to rapidly detect any anomalies in the data collection. The final addition of the 2019 data will be done upon the return of the ship in Quebec City.

28.3.1 *Opportunistic Data Acquisition*

Leg 1

The mapping of the Arctic seabed is an important objective of the AZOMP & ISECOLD program. MBES data was continuously acquired during transit despite heavy sea ice conditions, especially in Frobisher Bay during transit to Iqaluit. Rough seas were also encountered, mostly in the area north of St. Anthony, NL and in the Labrador Sea. Both extensive sea ice and rough seas affected the quality of the MBES and seismic data acquired during Leg 1.

Transits routes were surveyed systematically in order to increase the multibeam dataset coverage. This data will be shared with the Canadian Hydrographic Service (CHS) to update marine charts and might be useful for future work with Amundsen Science. Overall, the multibeam worked well and generated new data in previously poorly charted areas.

Since 2016, our team has been developing a bathymetry database to easily access all the bathymetry data acquired since the beginning of the ArcticNet program. This ArcMap based database is a raster catalog of more than 3500 data grids (15’x30’ spatial extent) that can be rapidly added to navigation charts in order to improve the multibeam coverage of the Arctic (Figure 28-1). In 2017, the sub-bottom profiles acquired since 2003 were added to this database, making it easier to choose alternative coring sites during the cruise depending on ice conditions.

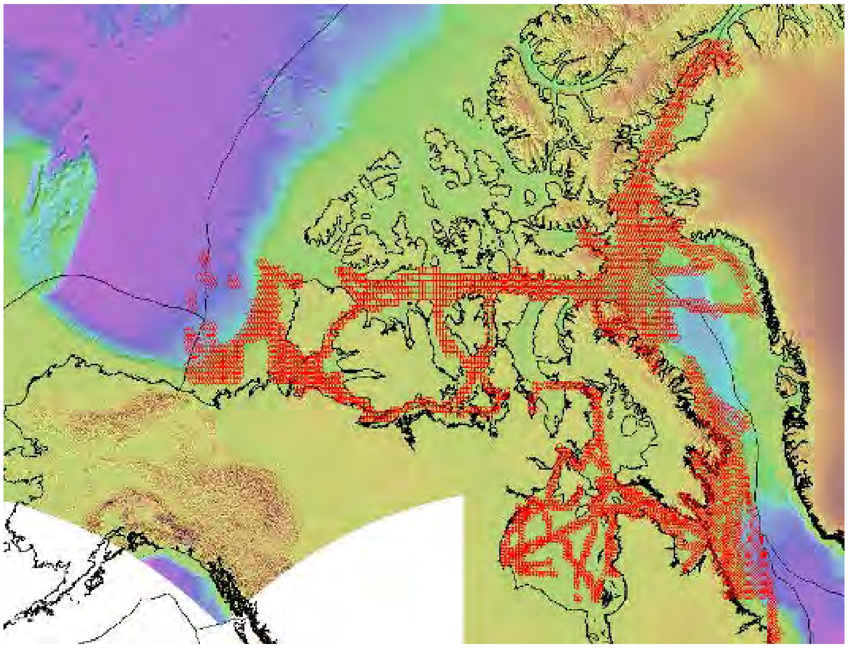


Figure 28-1 Image of the Amundsen Bathy-CHIRP Database for bathymetric and sub-bottom data collection.

Leg 2a

MBES data was acquired throughout the entirety of Leg 2A with the goal of extending the spatial coverage of Amundsen Science's Arctic bathymetric database. When possible transit routes were surveyed systematically outside the extents of previously navigated routes. Amundsen Science will share acquired datasets with the Canadian Hydrographic Service (CHS) to update marine charts. These may also be useful for future work with Amundsen Science.

Leg 2a covered one notable new area on the Greenland coast around Disko Island. This dataset will add into the database for use later in 2019. A depiction of the shiptrack can be found in Figure 28-2.

Figure 28-2 Disko Island coverage

Data quality was overall satisfactory; only the first transit from Iqaluit to Cape Dryer and the entrance to Disko Island stations showed ice conditions that perturbed data acquisition.

Davis Strait Mapping: An opportunistic survey occurred due to the short distance to cover and a long allotted timeslot between stations 191 and 192 near Cape Dryer. The survey lasted approximately 8 hours, starting at the boundary of previously mapped 2006 Amundsen transit route. Data was acquired adaptively by following the previous adjacent line, overlapping 1/3 of it's across track coverage. As seen in Figure 28-3, the multibeam's failure to find bottom during the survey caused a gap in the final product.

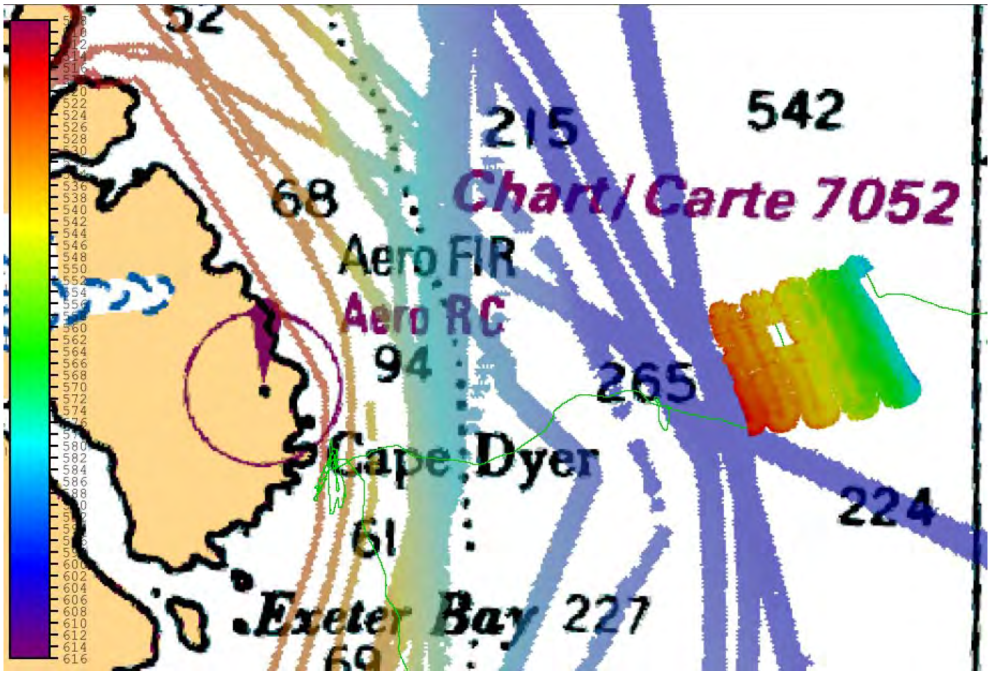


Figure 28-3 Opportunistic mapping in Baffin Bay. Background : CHS Chart 7010 and Amundsen's Bathy-Database

Leg 2b

Leg 2b's MBES data coverage shares the same goal seen in Leg2a's opportunistic mapping. As done during Leg 2A, multibeam data was acquired regardless of surveying conditions. Data quality suffered from varying quantities of ice while navigating throughout multiple portions of the Nares Strait, most notably near Petermann glacier and transiting towards the Robeson Channel

Figure 28-4 shows the CCGS *Amundsen's* exploration of new areas during Leg 2b. Dobbin Bay, Peabody Bay, Talbot Inlet and near Sydkap Glacier (Jones Sound) showed little to no soundings on the Canadian Hydrographic Services charts; therefore, navigation through the areas was conducted at safe depths. This sometimes forced a safer path than the optimal one for extending bathymetric coverage. When in Dobbin Bay and near Sydkap Glacier adaptive surveys granted the ability to both maximize bathymetric coverage and search for areas where coring could be performed (see section c. Coring Operations).

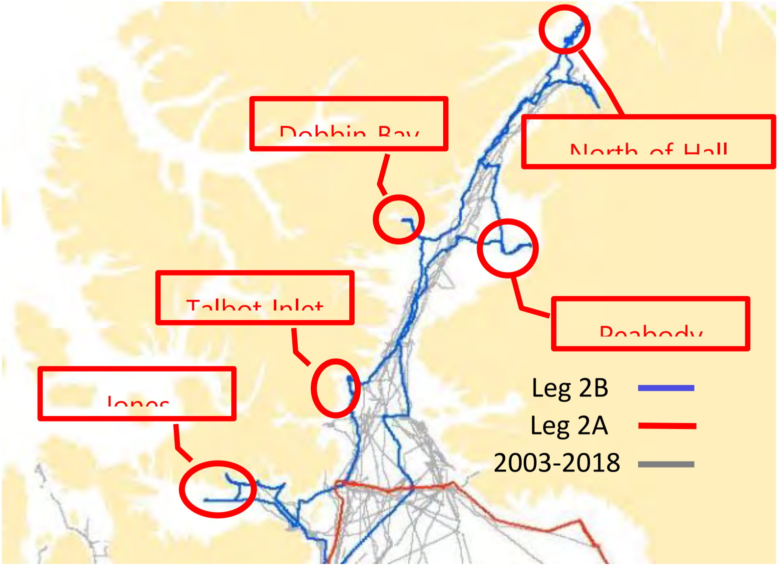


Figure 28-4 Newly acquired data during Amundsen 2019's Leg2b

Leg 3

The mapping of the Arctic seabed is an important objective of the ArcticNet program. Transits routes were surveyed systematically in order to increase the multibeam dataset. These data will be shared with the Canadian Hydrographic Service (CHS) to update marine charts and might be useful for future work within the ArcticNet program (e.g. Fig. 1). Overall, the multibeam worked well and generated new data in previously poorly charted areas.

A bathymetry database was produced in 2016 to easily access all the bathymetry data acquired since the beginning of the ArcticNet program. This ArcMap based database is a raster catalog of more than 3500 data grids (15'x30' spatial extent) that can be rapidly added to navigation charts in order to improve the multibeam coverage of the Arctic. In 2017, the subbottom profiles acquired since 2003 were added to this database, making it easier to choose alternative coring sites during the cruise depending on ice conditions. However, we had some issues with the database since it did not contain the bathymetric data from 2018 and the subbottom profiles were not accessible.

28.3.2 *Dedicated Mapping Operations*

Leg 2b

The onboard team from the Laboratory Cryogenics Research, University of Ottawa required multibeam data covering Talbot Inlet and along a portion of Eastern Ellesmere Island. The completed survey started at 19:33 (local time) lasting approximately 8 hours until its end at 04:15 (local time). The survey plan included two separate sections:

- The first section required the vessel to follow the ice edge along Talbot Inlet to obtain data as close to the coast as possible. This section was surveyed at 5.5 knots as the Talbot Inlet area was of higher priority. Slower surveying speed and favourable sea conditions allowed the multibeam to acquire a sufficient bathymetric profile of depths in this section. Some turns along the edge of the ice caused a loss in sounding density at the outer edges of the swath.
- The second section covered Eastern Ellesmere Island between Talbot Inlet and Smith Bay. The survey planned for a "zigzag" pattern that navigated to and from the ice edge at 6.5 - 7 knots, however surveying conditions were not favourable; heavy ice concentrations, thick fog, and the absence of soundings available on the chart lead to the decision to retreat from the ice edge as depths observed on the multibeam were at less than 100m.

Figure 28-5 depicts the Talbot Inlet survey.

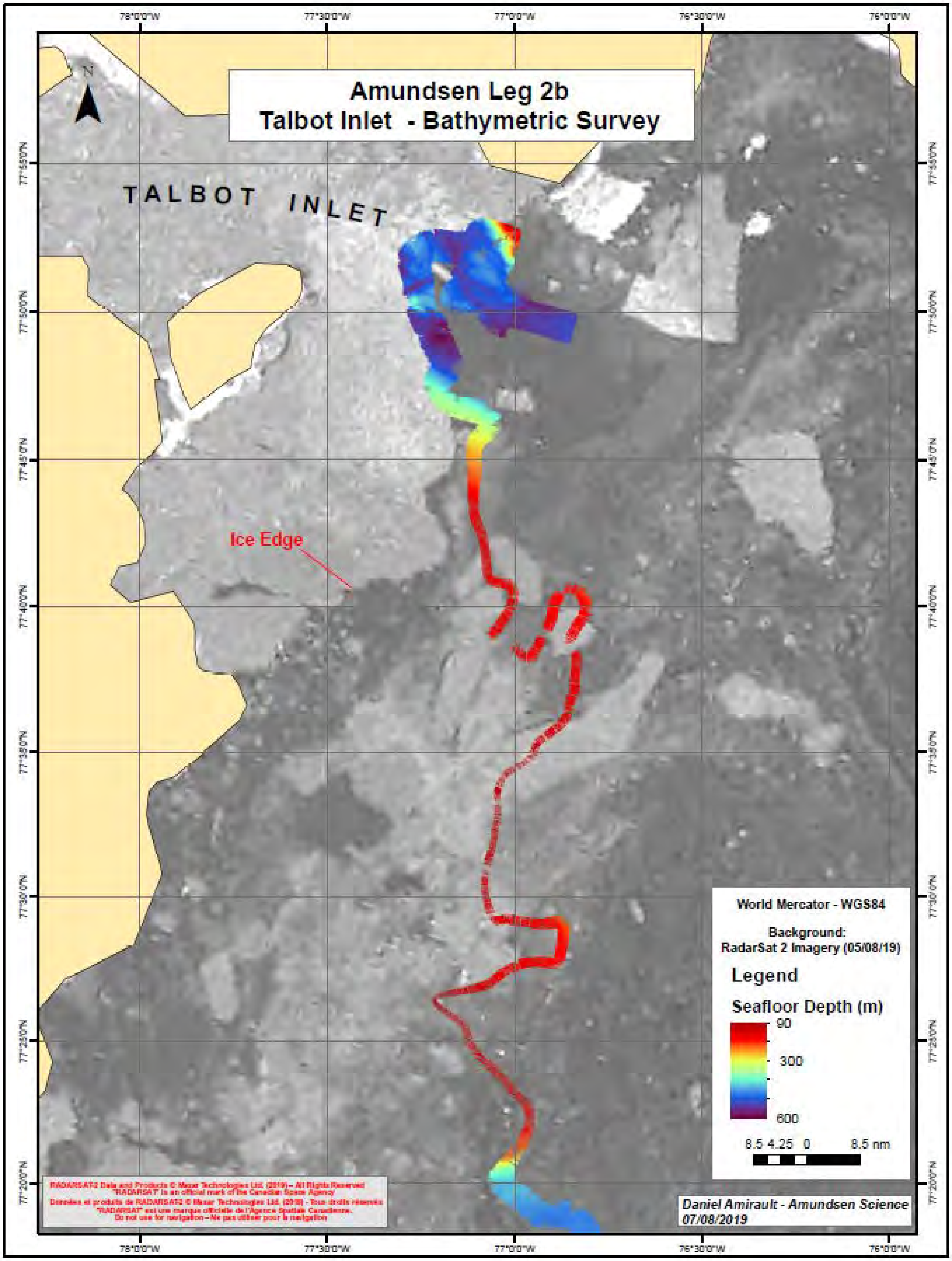


Figure 28-5 Talbot Inlet Multibeam Survey

Leg 3

Table 1 presents dedicated mapping surveys information undertaken during Leg 3. Some examples of bathymetric surfaces are presented at Figure 28-6 and Figure 28-7.

Table 28-1 Description of the opportunistic mapping operations undertaken during Leg 3

Location	Date	Duration (hr)	Area (km^2)
Ile Bilot_Delta	2019-08-17	6	24
Ile Bilot_Glacier	2019-08-18	7	109
Eclipse Sound	2019-08-18	2,5	96
Scott Inlet	2019-08-20	7	51
Clyde Inlet	2019-08-21	10	114
Qikiqtarjuaq & Coronation fjord	2019-08-24	8,5	208
Offshore Kikiqtarjuarq	2019-08-28	7	61
Franquelin,Cote-Nord	2019-09-08	4	10,97
	Total	52	673,97

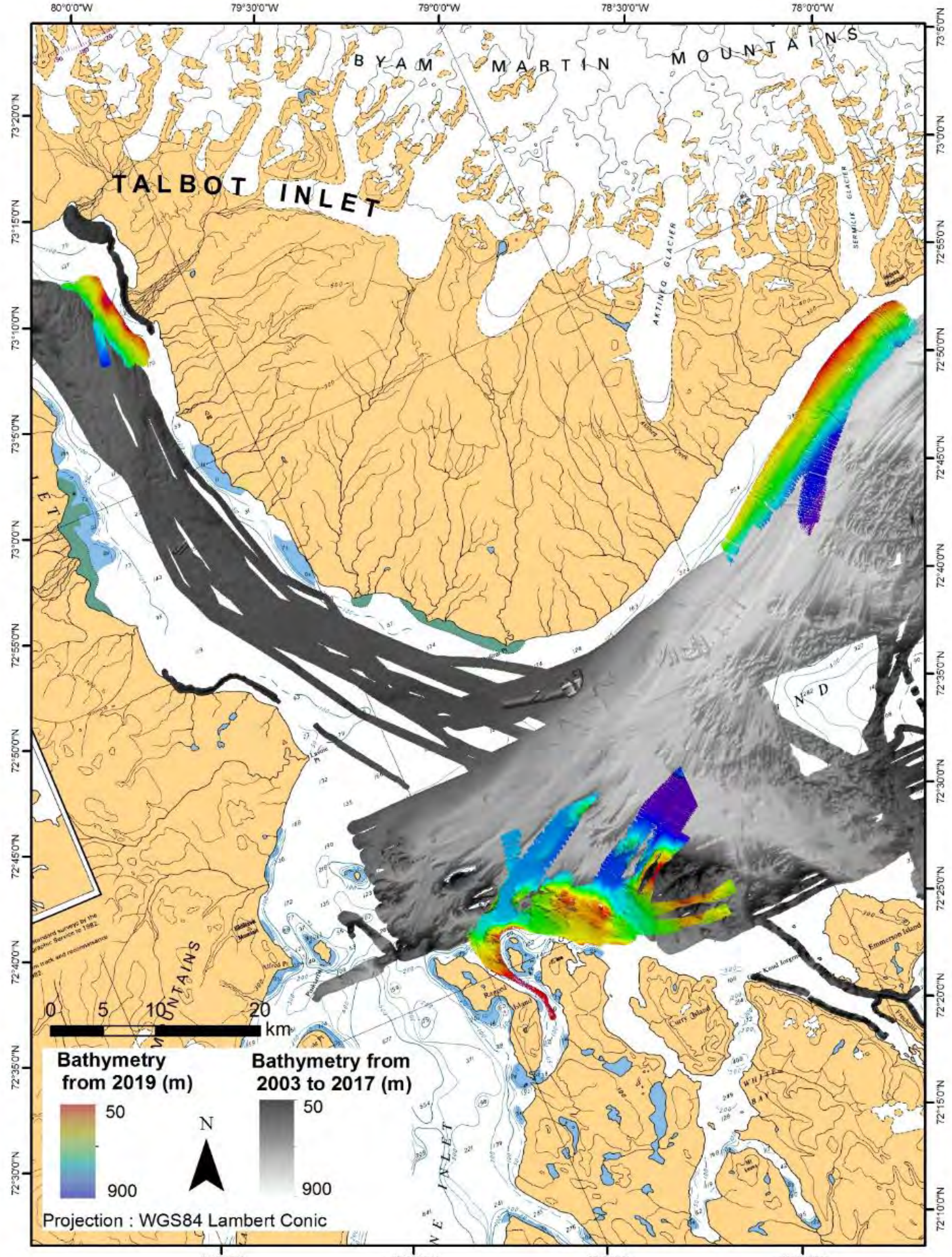


Figure 28-6 Bathymetric coverage of the mapping in Eclipse sound.

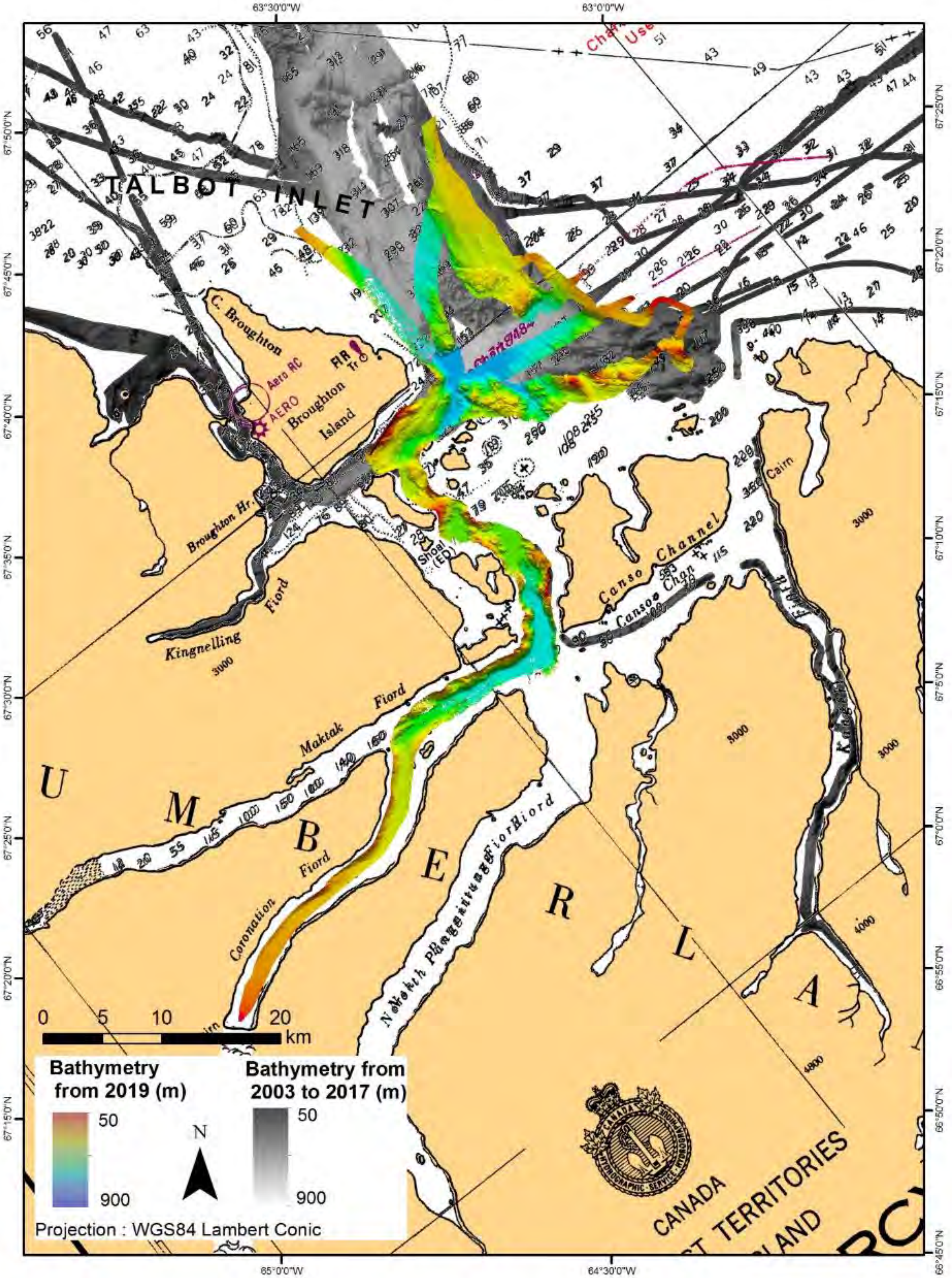


Figure 28-7 Bathymetric coverage of the mapping in Coronation Fjord.

28.3.3 *Coring Supportive Operations*

Leg 2a

During stations with box core operations, the acquisition team assessed the bottom on arrival to the station point. The box core team was notified when the sub-bottom profile analysis determined signs of a rocky bottom or very variable terrain.

Leg 2b

Coring operations required sub-bottom profiles at each station to assess the viability of deploying the box core, gravity core and the piston core. Sediment layers needed to extend deep enough below the seafloor as the coring equipment risked breaking when hitting rock.

A one nautical mile line/survey was ran at 6 knots over each coring station and underwent post processing to determine the best location for coring, this can be seen in Figure 28-8.

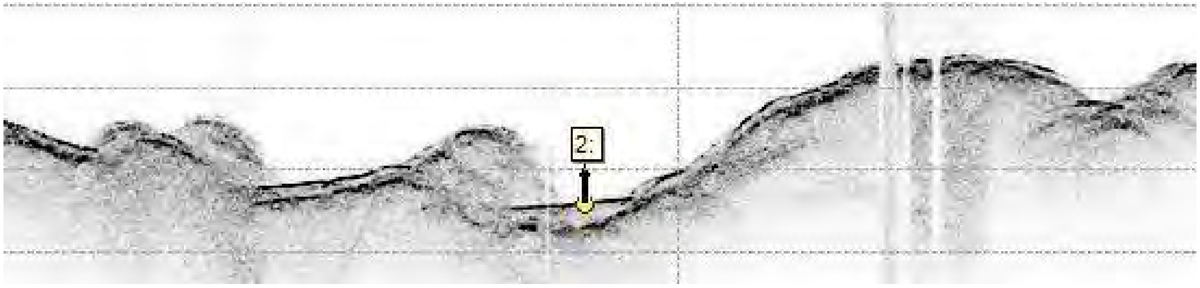


Figure 28-8 Selected coring site in Peabody Bay (Humbolt Glacier)

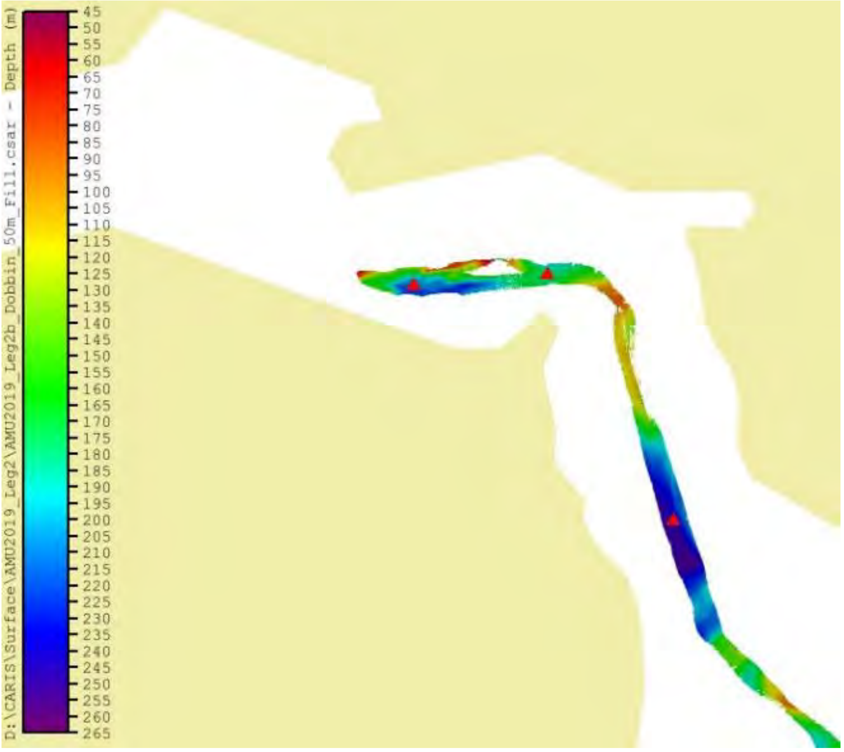


Figure 28-9 Dobbin Bay Survey – Red Triangles indicate chosen location for coring

In certain situations, such as in Dobbin Bay (Eugenie Glacier) and Peabody Bay (Humbolt Glacier), it was necessary to survey multiple lines because the bathymetry was unknown in the area. Covering multiple lines allowed the acquisition team and the chief scientist /coring team leader, Jean-Carlos Montero-Serrano, to assess a larger area with the multibeam coverage. Figure 28-9 shows the survey of Dobbin Bay, where an initial line through the area helped determine the deep channels indicating areas with more deposited sediment. The next survey lines passed directly over the deeper channels to analyse profiles and retrieve three points for coring.

Leg 3

During Leg 3, many box, gravity and piston cores were sampled. Coring sites were chosen in reel time while doing seismic survey, or by analysing subbottom profiles of previous years. Details of the cores, their location and length of recovery, as well as the targeted type of sediment/feature are presented in the coring team repport.

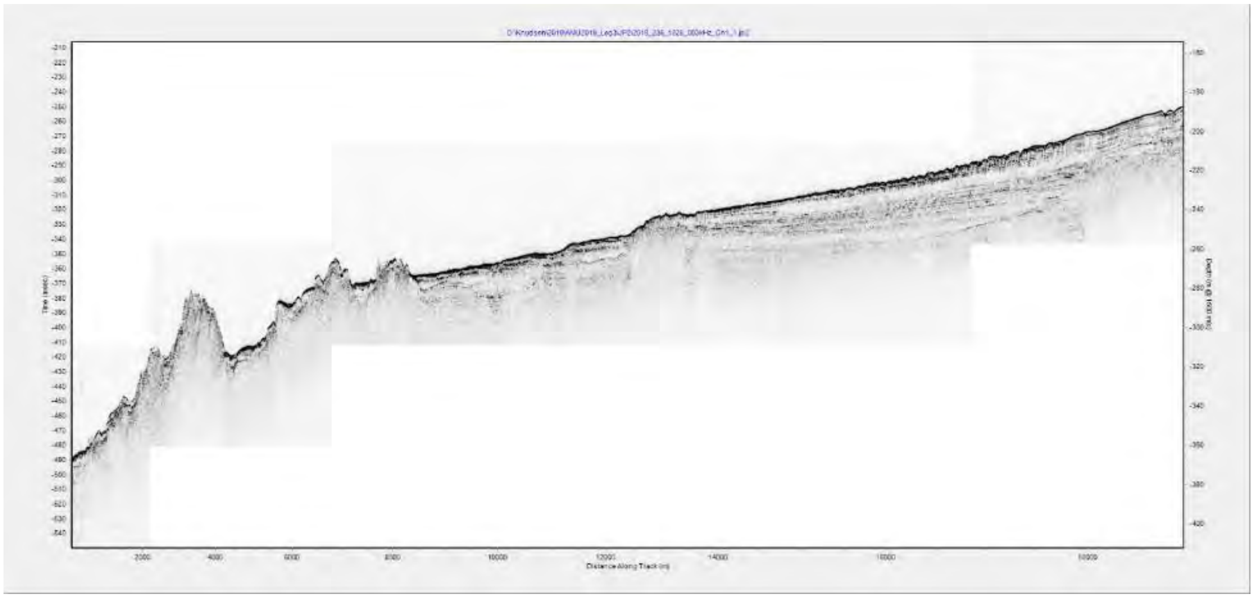


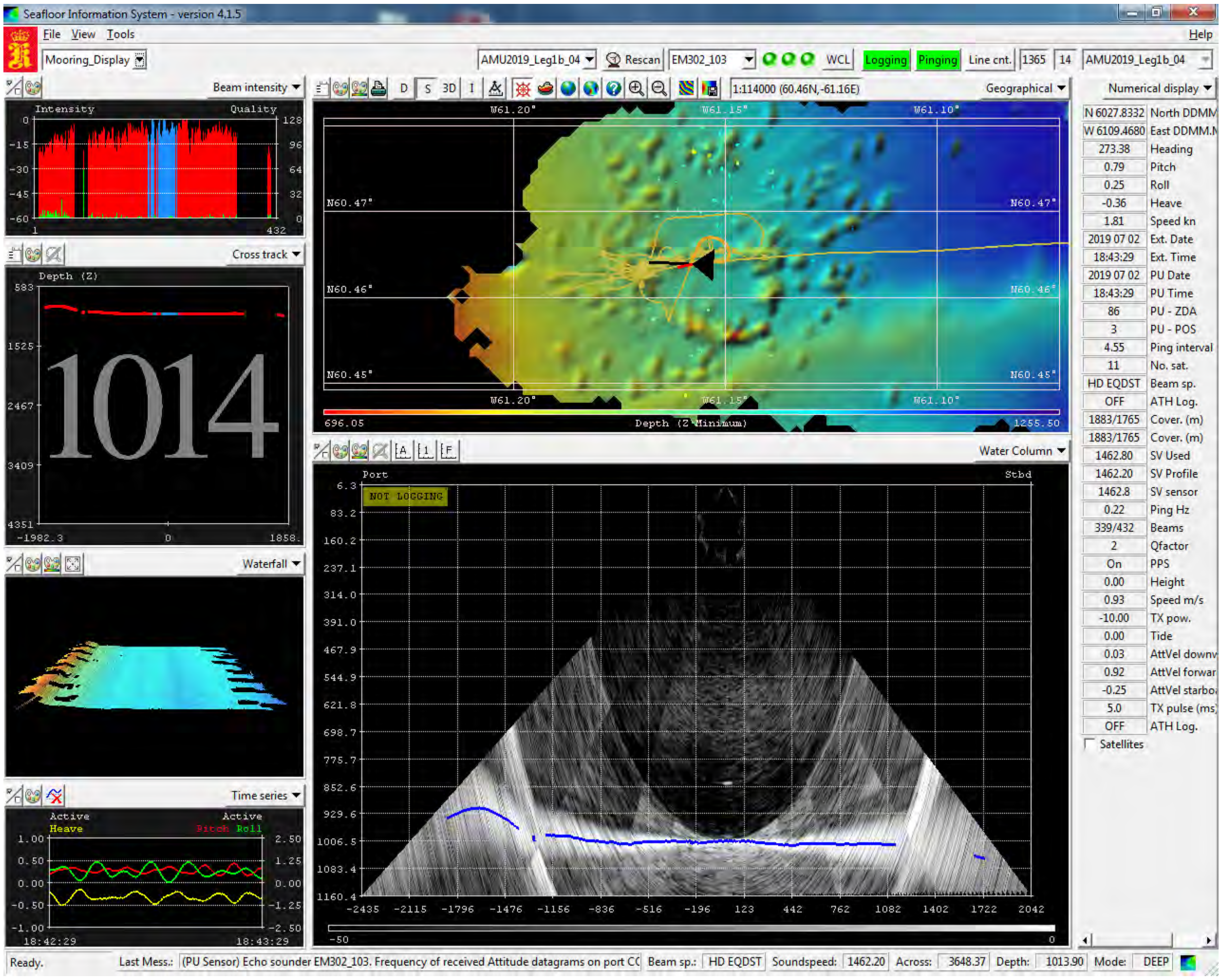
Figure 28-10 Location of the piston core site in Coronation fjord on the acoustic subbottom profile.

28.3.4 *Mooring Deployment and Recovery*

The role of the mapping team during mooring deployment and recovery was to:

1) Ensure the mooring was still in its position (identify the buoys and the exact position),
2) Validate the depths of the deployment sites,
3) Map the surface morphology of the sites, and
4) Determine the verticality of the moorings after deployment.

The survey lines from the mooring were processed in CARIS HIPS&SIPS after the survey to find the exact position of the mooring. The procedure started with the visualization of the water column data to find the buoys (Figure 28-11). The buoys scattering was added to bathymetry to find the final position of the deployment.



N 6027.8332	North DDMM
W 6109.4680	East DDMM.
273.38	Heading
0.79	Pitch
0.25	Roll
-0.36	Heave
1.81	Speed kn
2019 07 02	Ext. Date
18:43:29	Ext. Time
2019 07 02	PU Date
18:43:29	PU Time
86	PU - ZDA
3	PU - POS
4.55	Ping interval
11	No. sat.
HD EQDST	Beam sp.
OFF	ATH Log.
1883/1765	Cover. (m)
1883/1765	Cover. (m)
1462.80	SV Used
1462.20	SV Profile
1462.8	SV sensor
0.22	Ping Hz
339/432	Beams
2	Qfactor
On	PPS
0.00	Height
0.93	Speed m/s
-10.00	TX pow.
0.00	Tide
0.03	AttVel down
0.92	AttVel forwar
-0.25	AttVel starbo
5.0	TX pulse (ms)
OFF	ATH Log.

☐ Satellites

Ready.

Last Mess.: (PU Sensor) Echo sounder EM302_103. Frequency of received Attitude datagrams on port C

Beam sp.: HD EQDST

Soundspeed: 1462.20

Across: 3648.37

Depth: 1013.90

Mode: DEEP

Figure 28-11 SIS water Column display of Mooring on July 2nd before recovery. The buoys can be seen in the middle of the screen as white dots in a vertical line.

28.3.5 *Incidents*

Systematic Artefacts in MBES Data

Bathymetric data acquired by the EM302 during Leg 1 is extremely "noisy" in some areas (Figure 28-12). This is justified by the conditions under which it operates in certain areas such as: heavy sea ice, rough seas, high speeds (12 to 14 knots) and extremes in depth. However, some noisy data was also acquired under optimal surveying conditions (Figure 28-13) (calm sea state, 7-8 knots transit speed, good depth range), and there is no exact reasoning for it. Tests have been conducted to eliminate interference between the numerous acoustic systems on board as a potential cause, and the K-Sync has been implemented to help with that. One hypothesis that was made in previous years is related to the malfunctioning of the TX, because it appears the TX doesn't consistently emit. This is interpreted from the Beam Intensity datagram as well as from the Water Column data in SIS.

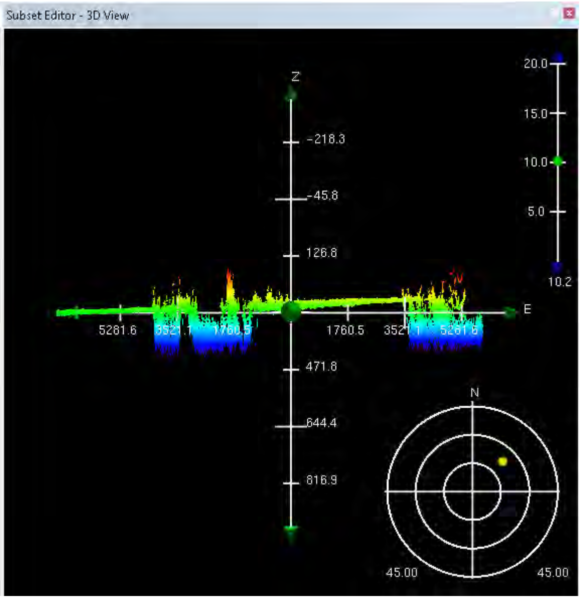
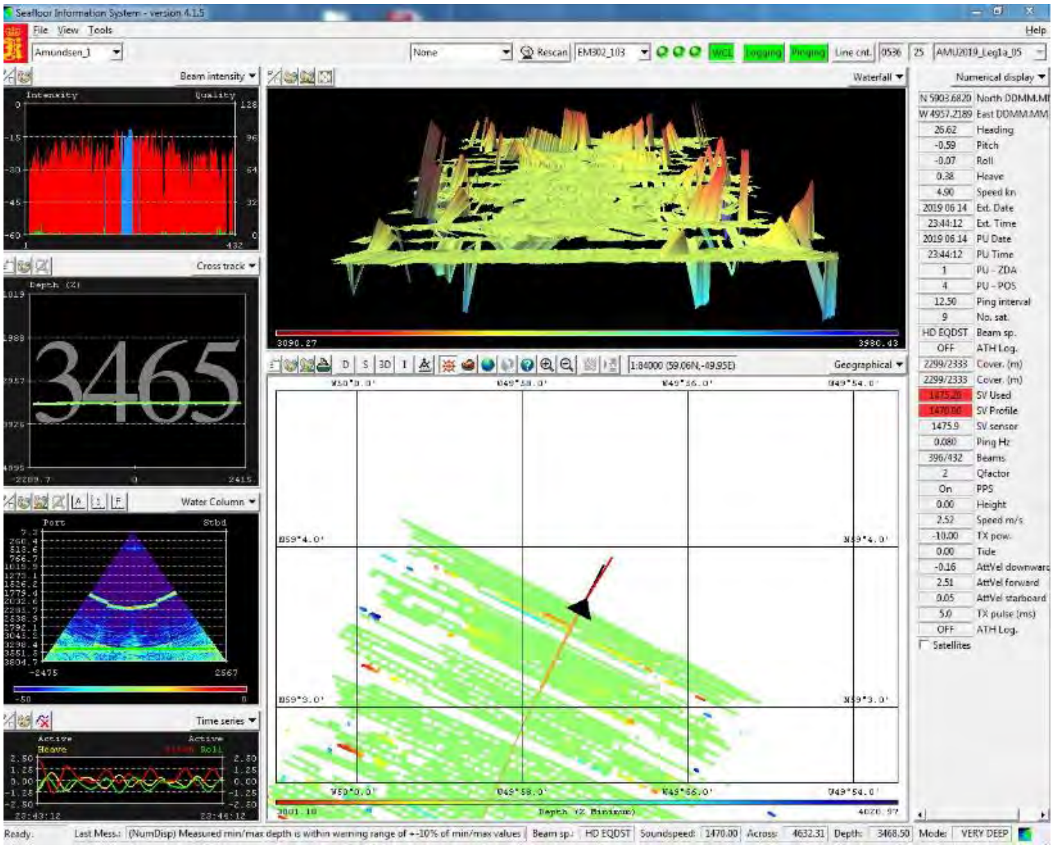


Figure 28-12 Example of systematic artefacts in MBES data viewed in HIPS & SIPS Subset Editor.



N 5903.6820	North DDMM.MM
W 4957.2189	East DDMM.MM
26.62	Heading
-0.59	Pitch
-0.07	Roll
0.38	Heave
4.90	Speed kn
2019 06 14	Ext. Date
23:44:12	Ext. Time
2019 06 14	PU Date
23:44:12	PU Time
1	PU - ZDA
4	PU - POS
12.50	Ping interval
9	No. sat.
HD EQDST	Beam sp.
OFF	ATH Log.
2299/2333	Cover. (m)
2299/2333	Cover. (m)
1475.20	SV Used
1470.00	SV Profile
1475.9	SV sensor
0.080	Ping Hz
396/432	Beams
2	Qfactor
On	PPS
0.00	Height
2.52	Speed m/s
-10.00	TX pow.
0.00	Tide
-0.16	AttVel downward
2.51	AttVel forward
0.05	AttVel starboard
5.0	TX pulse (ms)
OFF	ATH Log.

☐ Satellites

Ready. Last Mess.: (NumDisp) Measured min/max depth is within warning range of +-10% of min/max values | Beam sp.: HD EQDST | Soundspeed: 1470.00 | Across: 4632.31 | Depth: 3468.50 | Mode: VERY DEEP

Figure 28-13 SIS interface during noisy MBES data acquisition.

New CARIS HIPS & SIPS Software Update

The CARIS HIPS & SIPS 11.1 software was utilized during this cruise instead of CARIS Onboard, or 10.4. There was no outline of how to import, process, and clean the data in the existing procedure manual, so a new one had to be made. This wasn't challenging as the new software features made data processing quite simplistic, and required less steps before surfaces could be made and cleaned.

ArcGIS License Expiry

On July 2nd, 2019, ArcMap crashed, and when it was re-opened, a warning came up saying that the ArcGIS license had expired. This was leading up to entering Frobisher Bay, where the navigation team wanted map images (.tiff) of the western coastline, along with the data from last years surveys, however this couldn't be done due to the lack of access to ArcMap. Instead of using the most current updated map of the area, with the coverage from last year, the images that were given to the navigation team were the maps that were made last year. The captain wanted to be able to stay no more than 2.5 miles off the coast, but he decided that the coverage already existing on the 2018 .tiff files would suffice to ensure the vessel would be safe navigating close to shore.

Failure of the Multibeam

On August 6th at 06:43 (local time), Kongsberg's SIS indicated the Multibeam Echosounder lost connection to the Processing Unit (PU) (Figure 28-14) as the ship transited from the Talbot Inlet survey to the next station.

Connection was lost to all systems as all three status lights were red and no data was incoming on the numerical display. After restarting the program SIS indicated only the multibeam connection was still faulty. After restarting the computer with no success the PU was shutdown and rebooted which fixed the issue. No further problems seemed to persist.

```
2019 08 06   10:43:57   103   499      (CCUH) Connection to sounder type: EM302, serial number: 103 has been lost.
                                       Perform a rescan and restart sounder if found.
```

Figure 28-14 SIS messaging service - lost connection to multibeam

28.4 Acknowledgment

28.4.1 *Leg 1*

I would like to thank Amundsen Science for giving me the opportunity to work on board the CCGS *Amundsen*, and letting me get a taste of what is to come in the future, when I look for a full-time position after graduation. It was incredible getting to meet so many interesting people, and get to see and be a part of so many different scientific operations. I would also like to acknowledge the crew of the CCGS *Amundsen* for their help and professionalism during the mission.

28.4.2 *Leg 2*

The acquisition team would like to thank all the personnel involved in acquisition and processing operations:

- Jean-Carlos, chief scientist, for being the main source of sub-bottom profiling analysis, coordinating surveys and operations
- The entire team on the Bridge for coordinating and adapting to requests from the acquisition team while surveying and looking to extend bathymetric data on an opportunistic basis

28.4.3 *Leg 3*

The mapping team acknowledge the crew of the CCGS *Amundsen* for their help and professionalism during the mission.

Appendix 1: List of Stations

Leg	Station ID	Station Type	UTC Date	UTC Time	Latitude (N)	Longitude (W)	Depth (m)
Leg 1a							
1a	Transit_01	CTD	2019-06-01	14:09	48° 01,700'	60° 51,768'	376
1a	M2092	Mooring	2019-06-02	8:34	46° 17,646'	58° 48,957'	332
1a	M2091	Mooring	2019-06-02	12:23	46° 10,200'	59° 08,568'	99
1a	HL2	BIO	2019-06-07	11:43	44° 16,124'	63° 18,947'	151
1a	LC1	BIO	2019-06-08	13:54	47° 40,994'	59° 37,346'	425
1a	AR7W_0.5	BIO	2019-06-09	22:27	53° 33,696'	55° 39,599'	107
1a	AR7W_1	BIO	2019-06-10	0:45	53° 40,587'	55° 33,160'	157
1a	AR7W_2	BIO	2019-06-10	3:39	53° 47,574'	55° 26,259'	206
1a	AR7W_3	BIO	2019-06-10	6:24	53° 59,209'	55° 15,100'	150
1a	AR7W_4	BIO	2019-06-10	9:29	54° 13,126'	55° 01,459'	169
1a	AR7W_11	BIO	2019-06-11	11:07	55° 36,438'	53° 37,965'	-
1a	AR7W_12	BIO	2019-06-11	18:14	55° 50,674'	53° 23,479'	-
1a	AR7W_13	BIO	2019-06-12	1:06	56° 06,610'	53° 07,393'	3329
1a	AR7W_14	BIO	2019-06-12	7:40	56° 32,203'	52° 40,702'	3484
1a	AR7W_14.5	BIO	2019-06-12	13:04	56° 48,865'	52° 23,479'	3513
1a	AR7W_15	BIO	2019-06-12	14:58	56° 57,568'	52° 14,454'	3509
1a	AR7W_16	BIO	2019-06-12	22:41	57° 22,776'	51° 46,966'	3530
1a	AR7W_17	BIO	2019-06-13	19:20	57° 48,125'	51° 21,033'	3620
1a	AR7W_17.5	BIO	2019-06-14	2:05	58° 00,494'	51° 06,671'	3560
1a	AR7W_18	BIO	2019-06-14	6:25	58° 13,066'	50° 53,245'	3559
1a	AR7W-18.5	BIO	2019-06-14	11:44	58° 25,918'	50° 41,967'	3533
1a	AR7W_19	BIO	2019-06-14	14:20	58° 38,348'	50° 25,221'	3517
1a	AR7W_19.5	BIO	2019-06-14	20:13	58° 51,166'	50° 10,697'	3498
1a	AR7W_20	BIO	2019-06-15	0:06	59° 04,082'	49° 56,947'	3465
1a	AR7W_20.5	BIO	2019-06-15	4:45	59° 16,576'	49° 42,605'	3421
1a	AR7W_21	BIO	2019-06-15	8:00	59° 28,880'	49° 28,432'	3390
1a	AR7W_22	BIO	2019-06-15	13:07	59° 44,954'	49° 09,925'	3217
1a	AR7W_21.5	BIO	2019-06-15	18:42	59° 36,981'	49° 18,527'	3320
1a	AR7W_24	BIO	2019-06-16	2:32	60° 10,457'	48° 40,723'	2888
1a	AR7W_22.5	BIO	2019-06-16	6:59	59° 51,970'	49° 02,128'	3118
1a	AR7W_23.5	BIO	2019-06-16	10:24	60° 05,021'	48° 47,452'	2918
1a	AR7W_24.5	BIO	2019-06-16	13:34	60° 13,899'	48° 36,489'	-
1a	AR7W_27	BIO	2019-06-16	16:42	60° 26,864'	48° 21,870'	148
1a	AR7W_28	BIO	2019-06-16	18:33	60° 33,944'	48° 13,570'	133
1a	AR7W_28.5	BIO	2019-06-16	21:03	60° 37,131'	48° 09,845'	120
1a	AR7W_25.5	BIO	2019-06-17	1:41	60° 20,431'	48° 30,076'	-
1a	AR7W_26	BIO	2019-06-17	4:06	60° 22,301'	48° 25,054'	-
1a	AR7W_25	BIO	2019-06-17	8:51	60° 17,598'	48° 33,189'	-
1a	AR7W_23	BIO	2019-06-17	16:16	59° 59,008'	48° 53,851'	-
1a	LSC_01	BIO	2019-06-18	4:02	60° 00,093'	50° 30,060'	3229
1a	LSC_02	BIO	2019-06-18	8:24	59° 59,995'	51° 07,563'	3322
1a	LSC_03	BIO	2019-06-18	12:38	59° 59,968'	51° 45,017'	3360
1a	LSC_04	BIO	2019-06-18	17:04	60° 00,007'	52° 22,498'	3365
1a	LSC_05	BIO	2019-06-19	0:14	59° 30,121'	53° 04,771'	3423
1a	LSC_06	BIO	2019-06-19	5:47	59° 00,306'	53° 09,743'	3480
1a	LSC_07	BIO	2019-06-19	11:20	58° 30,403'	53° 14,656'	3433
1a	LSC_08	BIO	2019-06-19	16:12	58° 00,488'	53° 19,759'	-
1a	LSC_09	BIO	2019-06-19	21:25	57° 30,771'	53° 24,564'	3420
1a	LSC_10	BIO	2019-06-20	2:26	57° 00,773'	53° 29,286'	3383
1a	LSC_11	BIO	2019-06-20	7:40	56° 30,903'	53° 34,194'	3333
1a	AR7W_10	BIO	2019-06-20	14:51	55° 25,066'	53° 49,636'	2669
1a	AR7W_9.5	BIO	2019-06-20	18:20	55° 20,343'	53° 54,323'	-
1a	AR7W_9	BIO	2019-06-20	20:23	55° 15,795'	53° 59,787'	-

1a	AR7W_8.5	BIO	2019-06-20	23:32	55° 11,241'	54° 03,419'	1586
1a	AR7W_8	BIO	2019-06-21	1:12	55° 06,748'	54° 08,480'	972
1a	AR7W_7.5	BIO	2019-06-21	3:47	55° 01,893'	54° 12,980'	542
1a	AR7W_7	BIO	2019-06-21	5:21	54° 57,422'	54° 18,392'	362
1a	AR7W_6	BIO	2019-06-21	8:07	54° 45,795'	54° 29,530'	244
1a	AR7W_5	BIO	2019-06-21	11:14	54° 29,388'	54° 45,549'	195
1a	AR7W_10.5	BIO	2019-06-21	23:48	55° 31,032'	53° 43,790'	-
Leg 1b							
1b	ISECOLD 1-500	DFO Full	2019-06-25	12:57	57° 42,302'	59° 31,616'	603
1b	ISECOLD 1-1000	DFO Full	2019-06-26	1:37	57° 42,707'	59° 22,650'	1009
1b	ISECOLD 1-1500	DFO Full	2019-06-26	13:34	57° 43,193'	59° 05,105'	1457
1b	ISECOLD 1-2000	DFO Full	2019-06-27	4:04	57° 43,762'	58° 41,734'	-
1b	ISECOLD 1-2200	Rock Dredge	2019-06-27	20:09	57° 43,782'	58° 33,536'	-
1b	ISECOLD 1-2500	DFO Full	2019-06-28	2:29	57° 44,405'	57° 53,017'	2492
1b	ISECOLD 2-2500	DFO Full	2019-06-28	20:36	58° 54,324'	58° 50,913'	2397
1b	ISECOLD 2-2000	DFO Full	2019-06-29	13:19	58° 50,848'	59° 22,086'	-
1b	ISECOLD 2-1500	DFO Full	2019-06-30	2:52	58° 49,163'	59° 40,336'	1484
1b	ISECOLD 2-1000	DFO Full	2019-06-30	13:45	58° 47,202'	59° 55,762'	1029
1b	ISECOLD 2-500	DFO Full	2019-06-30	23:45	58° 46,434'	60° 02,607'	534
1b	Non-Sponge 3	DFO Full	2019-07-01	10:29	59° 22,834'	60° 16,183'	575
1b	HiBio-B-18	Mooring	2019-07-01	20:41	60° 28,145'	60° 22,672'	-
1b	HiBio-B	Mooring	2019-07-01	23:23	60° 28,556'	60° 23,062'	1830
1b	HiBio-A	Mooring	2019-07-02	9:12	60° 27,748'	61° 10,150'	971
1b	Sponge 3	Mooring	2019-07-02	22:20	60° 28,291'	61° 18,255'	402
1b	DFO-3(1200)	DFO Benthic	2019-07-03	1:48	60° 28,146'	61° 06,263'	1150
1b	DFO-1200	DFO Benthic	2019-07-03	6:23	60° 27,066'	61° 01,813'	1188
1b	DFO-Ridge 1000	DFO Benthic	2019-07-03	8:40	60° 27,163'	61° 08,013'	946
1b	DFO-1000	DFO Benthic	2019-07-03	10:14	60° 27,966'	61° 10,257'	964
1b	HiBio-A-19	Mooring	2019-07-03	14:17	60° 28,018'	61° 17,486'	399
1b	Sponge 4	ATLAS	2019-07-03	20:15	60° 27,500'	62° 07,136'	367
Leg 2a							
2a	190	Full	2019-07-08	12:20	66° 35,756'	61° 11,823'	103
2a	191	Nutrient	2019-07-08	22:18	66° 38,269'	60° 33,940'	505
2a	192	Nutrient	2019-07-09	9:25	66° 43,247'	60° 10,141'	587
2a	193	Basic	2019-07-09	12:50	66° 46,176'	59° 20,408'	961
2a	194	Nutrient	2019-07-10	1:07	66° 49,874'	58° 21,447'	866
2a	195	Nutrient	2019-07-10	4:43	66° 54,771'	57° 16,129'	783
2a	196	Basic	2019-07-10	8:34	66° 59,292'	56° 03,491'	130
2a	197	Nutrient	2019-07-10	16:12	67° 02,488'	55° 05,247'	67
2a	198	Full	2019-07-10	19:29	67° 04,979'	54° 14,117'	88
2a	BB15	Nutrient	2019-07-11	9:59	68° 27,079'	55° 53,989'	494
2a	BB16	Basic	2019-07-11	19:00	69° 08,839'	51° 52,587'	349
2a	BB18	Nutrient	2019-07-12	5:44	70° 05,408'	52° 44,418'	502
2a	228	Full	2019-07-12	14:03	70° 53,912'	54° 58,685'	557
2a	229	Basic	2019-07-13	6:37	71° 00,189'	53° 00,628'	456
2a	227	Nutrient	2019-07-13	17:42	70° 47,813'	56° 59,265'	538
2a	226	Basic	2019-07-13	22:08	70° 42,018'	59° 00,364'	596
2a	225	Nutrient	2019-07-14	9:48	70° 35,996'	60° 59,807'	890
2a	Float 1	Float	2019-07-14	17:36	69° 29,987'	60° 59,920'	1781
2a	224	Basic	2019-07-15	4:42	70° 26,444'	62° 58,885'	2102
2a	223	Nutrient	2019-07-15	19:45	70° 16,283'	64° 49,039'	1720
2a	223b	Nutrient	2019-07-15	23:46	70° 09,725'	65° 48,006'	443
2a	222	Full	2019-07-16	2:30	70° 04,554'	66° 36,335'	125
2a	BB2	Float/Nut	2019-07-16	22:47	72° 45,028'	66° 59,790'	2368
2a	201	Nutrient	2019-07-17	19:15	72° 29,872'	61° 14,591'	739
2a	204	Basic	2019-07-18	2:42	73° 16,113'	57° 59,973'	962
2a	206	Nutrient	2019-07-18	14:21	74° 04,301'	59° 02,250'	174

2a	BB24	Nutrient	2019-07-19	1:08	75° 48,071'	62° 29,838'	532
2a	210	Basic	2019-07-19	4:10	75° 25,166'	61° 33,562'	1161
2a	212	CTD	2019-07-19	20:01	75° 38,217'	64° 37,191'	512
2a	214	Nutrient	2019-07-20	0:15	75° 48,900'	67° 51,025'	249
2a	116	Nutrient	2019-07-20	4:55	76° 22,386'	70° 29,714'	142
2a	115	Full	2019-07-20	6:44	76° 19,878'	71° 11,958'	677
2a	114	CTD	2019-07-20	21:43	76° 19,552'	71° 47,387'	614
2a	113	Nutrient	2019-07-20	23:01	76° 19,168'	72° 12,981'	551
2a	112	CTD	2019-07-21	1:08	76° 18,970'	72° 42,294'	572
2a	111	Basic	2019-07-21	2:42	76° 18,409'	73° 12,699'	599
2a	110	Nutrient	2019-07-21	11:35	76° 17,848'	73° 37,522'	530
2a	109	CTD	2019-07-21	14:10	76° 17,397'	74° 06,308'	456
2a	108	Full	2019-07-21	16:27	76° 16,450'	74° 36,981'	452
2a	107	Nutrient	2019-07-22	8:22	76° 16,829'	74° 59,045'	446
2a	106	CTD	2019-07-22	10:00	76° 18,508'	75° 20,841'	389
2a	105	Basic	2019-07-22	12:20	76° 19,282'	75° 46,223'	339
2a	104	CTD	2019-07-22	19:31	76° 20,541'	76° 10,493'	201
2a	102	CTD	2019-07-22	22:20	76° 22,589'	77° 00,865'	257
2a	103	Nutrient	2019-07-22	23:24	76° 21,215'	76° 35,414'	148
2a	101	Full	2019-07-23	1:05	76° 23,025'	77° 24,460'	364
2a	100	Nutrient	2019-07-23	11:58	76° 24,873'	77° 56,633'	224
2a	322	Nutrient	2019-07-24	0:54	74° 29,532'	80° 31,050'	667
2a	300	Nutrient	2019-07-24	4:18	74° 18,984'	80° 30,855'	707
2a	323	Full	2019-07-24	9:58	74° 09,567'	80° 28,225'	790
2a	323b	Full	2019-07-24	12:39	73° 59,919'	80° 00,281'	808
2a	324	Nutrient	2019-07-25	2:12	73° 59,302'	80° 28,112'	778
2a	325	Nutrient	2019-07-25	6:33	73° 49,064'	80° 29,983'	683
2a	NBI-2	Nutrient	2019-07-25	16:42	72° 55,581'	80° 17,034'	193
Leg 2b							
2b	Coring 2.6	Coring	2019-07-28	6:33	76° 18,650'	73° 03,729'	603
2b	Basic 122	Basic	2019-07-28	16:16	77° 20,439'	75° 01,239'	651
2b	Coring 2.8	Coring	2019-07-28	19:21	77° 19,597'	74° 31,910'	711
2b	122	Basic	2019-07-28	21:35	77° 20,525'	75° 00,243'	655
2b	126	Nutrient	2019-07-29	6:22	77° 20,852'	73° 23,998'	336
2b	129	Nutrient	2019-07-29	12:41	78° 20,051'	74° 08,217'	543
2b	132	Nutrient	2019-07-29	18:53	79° 00,150'	72° 19,122'	250
2b	133	Full	2019-07-30	1:27	79° 34,690'	70° 15,953'	166
2b	6.2	Coring	2019-07-30	17:48	79° 30,696'	65° 44,561'	337
2b	136	Nutrient	2019-07-31	6:06	80° 21,813'	67° 40,967'	196
2b	134	Basic	2019-07-31	8:05	80° 23,922'	68° 19,953'	339
2b	135	Nutrient	2019-07-31	18:21	80° 26,380'	68° 55,831'	341
2b	137	Nutrient	2019-08-01	3:30	81° 04,297'	66° 00,378'	362
2b	138	Nutrient	2019-08-01	5:37	81° 00,593'	65° 21,814'	388
2b	2.11-b	Coring	2019-08-01	8:45	81° 18,076'	64° 36,236'	474
2b	Ken1	Nutrient	2019-08-01	9:47	81° 22,004'	64° 11,385'	499
2b	6.4	Full	2019-08-01	15:02	81° 37,200'	63° 17,824'	794
2b	Rob1	Basic	2019-08-02	2:35	81° 45,991'	62° 20,388'	718
2b	251b	Nutrient	2019-08-03	6:52	80° 58,455'	61° 20,354'	-
2b	6.1	Coring	2019-08-04	11:03	79° 47,171'	73° 39,654'	209
2b	Talbot Inlet	Full	2019-08-05	8:02	77° 50,202'	77° 03,037'	534
2b	117	Nutrient	2019-08-06	8:38	77° 20,021'	77° 02,445'	441
2b	2.5	Coring	2019-08-06	16:06	76° 21,450'	77° 30,157'	380
2b	290	Nutrient	2019-08-06	22:08	76° 07,920'	80° 20,221'	169
2b	291	Nutrient	2019-08-06	23:59	75° 59,516'	80° 21,992'	687
2b	292	Nutrient	2019-08-07	2:45	75° 51,141'	80° 25,479'	633
2b	293	Basic	2019-08-07	4:40	75° 43,870'	80° 42,129'	626
2b	2.2	Coring	2019-08-07	17:18	76° 03,928'	81° 51,039'	773

2b	2.3	Coring	2019-08-07	20:14	76° 07,827'	83° 01,358'	833
2b	2.4	Coring	2019-08-08	4:56	76° 07,620'	86° 19,851'	684
2b	1.4	Coring	2019-08-08	16:12	76° 30,188'	84° 56,113'	124
2b	295	Basic	2019-08-08	23:38	76° 22,610'	84° 24,646'	87
2b	297	Basic	2019-08-10	0:26	76° 22,407'	81° 18,106'	450
2b	296	Basic	2019-08-10	10:36	75° 31,362'	79° 45,090'	566
2b	2.7	Coring	2019-08-10	20:27	75° 28,947'	78° 38,626'	525
2b	302	Basic	2019-08-11	23:17	74° 14,020'	86° 09,397'	554
2b	303	Basic	2019-08-12	10:15	74° 22,227'	89° 37,191'	300
2b	305A	Basic	2019-08-12	20:17	74° 13,413'	93° 30,786'	161
2b	305B	Basic	2019-08-13	1:06	74° 21,627'	93° 33,577'	169
2b	305C	Basic	2019-08-13	5:24	74° 29,039'	93° 38,353'	173
2b	Wel01	Nutrient	2019-08-13	9:46	74° 57,025'	92° 23,185'	156
2b	Wel02	Basic	2019-08-13	12:41	75° 00,739'	93° 06,876'	249
Leg 3							
3	2.1	Coring	2019-08-16	18:37	74° 11,180'	81° 11,818'	785
3	BIOS	BIO	2019-08-17	10:51	72° 31,318'	79° 35,868'	512
3	155	Basic	2019-08-17	15:22	72° 29,246'	78° 45,463'	292
3	BY01	Coring	2019-08-18	0:32	72° 44,064'	78° 37,102'	781
3	BY02	Basic	2019-08-18	13:12	72° 38,743'	79° 19,948'	683
3	BY03	Coring	2019-08-18	18:11	72° 33,684'	79° 16,316'	719
3	NW25K	CTD	2019-08-19	13:20	71° 31,762'	70° 35,139'	135
3	NW5K	CTD	2019-08-19	14:52	71° 24,483'	70° 10,727'	555
3	NW1K	Full	2019-08-19	17:44	71° 23,343'	70° 04,889'	298
3	170 - 0	Full	2019-08-19	19:38	71° 22,632'	70° 04,295'	257
3	SW1K	CTD	2019-08-20	0:49	71° 22,272'	70° 05,689'	244
3	SE5K	CTD	2019-08-20	2:34	71° 20,979'	69° 57,974'	216
3	SE25K	CTD	2019-08-20	4:24	71° 13,345'	69° 32,886'	154
3	NE1K	CTD	2019-08-20	11:00	71° 23,061'	70° 03,368'	258
3	SE1K	CTD	2019-08-20	14:09	71° 22,330'	70° 03,024'	209
3	E5	Basic	2019-08-22	1:22	69° 18,858'	63° 07,028'	1933
3	E4	Basic	2019-08-22	13:35	69° 03,475'	63° 38,769'	1570
3	E3	Basic	2019-08-22	19:39	68° 48,040'	64° 09,147'	1326
3	E2	Basic	2019-08-22	23:28	68° 32,403'	64° 38,865'	536
3	E1	Basic	2019-08-23	12:56	68° 17,007'	65° 08,016'	435
3	D1 - 177	Full	2019-08-24	1:09	67° 28,984'	63° 41,538'	654
3	4.2	Full	2019-08-24	11:37	67° 28,020'	63° 49,623'	500
3	1.1A	Coring	2019-08-24	20:34	67° 13,171'	64° 43,091'	192
3	D2	Basic	2019-08-25	2:34	67° 51,477'	63° 09,110'	271
3	D3	Basic	2019-08-25	7:27	68° 14,406'	62° 35,243'	1571
3	D4	Basic	2019-08-25	17:23	68° 37,216'	62° 00,452'	1809
3	D5	Basic	2019-08-26	2:03	68° 59,949'	61° 24,443'	1838
3	C5	Basic	2019-08-26	14:08	68° 08,925'	59° 58,138'	1379
3	C4	Basic	2019-08-27	2:00	67° 57,165'	60° 37,351'	1611
3	C3	Basic	2019-08-27	9:41	67° 45,116'	61° 16,118'	1571
3	C2	Basic	2019-08-27	22:18	67° 32,604'	61° 55,687'	349
3	C1	Basic	2019-08-28	3:28	67° 20,948'	62° 31,319'	143
3	1.1B	Coring	2019-08-28	18:56	67° 17,075'	63° 54,511'	605
3	B1	Basic	2019-08-29	2:57	67° 03,628'	61° 30,566'	116
3	B2	Basic	2019-08-29	10:11	67° 12,018'	60° 53,857'	645
3	B3	Basic	2019-08-29	16:31	67° 19,816'	60° 16,382'	1082
3	B4	Basic	2019-08-29	23:51	67° 27,842'	59° 38,836'	1433
3	B5	Basic	2019-08-30	5:33	67° 35,208'	59° 01,189'	1195
3	A5	Basic	2019-08-30	17:13	66° 46,874'	57° 50,298'	700
3	A4	Basic	2019-08-31	6:59	66° 43,630'	58° 42,451'	805
3	A3	Basic	2019-08-31	12:49	66° 40,484'	59° 33,797'	874
3	A2	Basic	2019-08-31	20:21	66° 36,927'	60° 24,780'	520

3	A1	Basic	2019-09-01	1:23	66° 35,312'	61° 12,688'	83
3	PC1	Coring	2019-09-01	12:09	66° 47,266'	62° 22,226'	181
3	GC1	Coring	2019-09-01	15:00	66° 46,897'	62° 22,035'	173
3	GC2	Coring	2019-09-01	16:12	66° 47,227'	62° 21,734'	176
3	GC3	Coring	2019-09-01	16:50	66° 46,671'	62° 21,702'	166
3	BC2	Coring	2019-09-01	17:42	66° 45,633'	62° 20,419'	115
3	PC2	Coring	2019-09-01	20:23	66° 47,823'	62° 22,510'	195
3	352	Nutrient	2019-09-03	7:03	61° 09,639'	64° 47,916'	432
3	354	Nutrient	2019-09-03	9:03	60° 58,738'	64° 45,011'	556
3	356	Nutrient	2019-09-03	13:40	60° 48,525'	64° 44,047'	343
3	643	Nutrient	2019-09-04	6:08	58° 00,903'	59° 47,547'	342
3	Kelp 2.3	Benthic	2019-09-04	13:46	56° 46,580'	59° 41,053'	132
3	Kelp 2.7	Benthic	2019-09-04	17:46	56° 38,416'	60° 42,275'	49
3	Kelp 2.6	Benthic	2019-09-04	17:48	56° 38,427'	60° 42,276'	49
3	Kelp 2.5	Benthic	2019-09-04	17:50	56° 38,433'	60° 42,295'	46
3	Kelp 2.4	Benthic	2019-09-04	18:25	56° 37,244'	60° 45,247'	175
3	Kelp 2.2	Benthic	2019-09-04	18:33	56° 37,255'	60° 45,248'	174
3	Kelp 2.1	Benthic	2019-09-04	18:43	56° 37,252'	60° 45,244'	175
3	Kelp 1.1	Benthic	2019-09-04	20:05	56° 35,889'	60° 48,721'	134
3	Kelp 3.1	Benthic	2019-09-04	22:11	56° 30,452'	60° 48,707'	49
3	Kelp 3.3	Benthic	2019-09-05	2:53	56° 28,887'	59° 37,693'	116
3	Kelp 1.3	Benthic	2019-09-05	5:11	56° 35,993'	59° 38,342'	102
3	Kelp 1.2	Benthic	2019-09-05	10:49	56° 35,992'	60° 17,562'	269
3	Kelp 3.2	Benthic	2019-09-05	11:47	56° 29,411'	60° 15,788'	117
3	PDM1	Coring	2019-09-08	19:39	49° 16,712'	67° 20,764'	313
3	F2	Coring	2019-09-08	23:16	49° 15,613'	67° 51,513'	111
3	CSG1	Coring	2019-09-09	13:15	47° 41,717'	69° 55,294'	91
3	CSG2	Coring	2019-09-09	15:10	47° 43,891'	69° 54,984'	137
3	CSG3	Coring	2019-09-09	17:59	47° 43,418'	69° 54,419'	113
3	CSG4	Coring	2019-09-09	19:48	47° 42,535'	69° 56,258'	103

Appendix 2 : Scientific Log

Leg	Station ID	Station Type	UTC Date	UTC time	Latitude (N)	Longitude (W)	Activity	Event	Depth (m)	Wind		Air (°C)	Water (°C)	Surface Salinity	Pr Baro	Hum (%)	Ice
										Dir	Speed						
Leg 1a																	
1a	Transit_01	CTD	2019-06-01	14:09	48° 01,700'	60° 51,768'	CTD-Rosette	↓	376	175	17,3	3,8	3,48	31,31	1009,38	98	
1a	Transit_01	CTD	2019-06-01	14:27	48° 01,571'	60° 51,851'	CTD-Rosette	(bottom)	376	170	12,4	4	3,45	31,34	1009,89	98	
1a	Transit_01	CTD	2019-06-01	14:47	48° 01,553'	60° 51,896'	CTD-Rosette	↑	375	183	16	4,1	3,45	31,40	1010,76	98	
1a	M2092	Mooring	2019-06-02	8:34	46° 17,646'	58° 48,957'	Mooring	↓	332	138	8,2	4,2	5,20	31,44	1018,29	98	
1a	M2092	Mooring	2019-06-02	8:53	46° 17,692'	58° 49,013'	Mooring	(bottom)	332	145	8,2	4,3	5,77	31,42	1018,50	98	
1a	M2092	Mooring	2019-06-02	9:38	46° 17,706'	58° 48,616'	CTD-Rosette	↓	335	131	10,1	4	5,60	31,43	1018,81	98	
1a	M2092	Mooring	2019-06-02	9:52	46° 17,679'	58° 48,560'	CTD-Rosette	(bottom)	335	152	13,1	3,9	5,61	31,44	1018,59	98	
1a	M2092	Mooring	2019-06-02	10:05	46° 17,646'	58° 48,544'	CTD-Rosette	↑	335	134	11,4	3,8	5,63	31,44	1019,13	98	
1a	M2091	Mooring	2019-06-02	12:23	46° 10,200'	59° 08,568'	Mooring	↓					5,39	30,73			
1a	M2091	Mooring	2019-06-02	12:30	46° 10,205'	59° 08,693'	Mooring	(bottom)	99	121	16,9	4,2	5,43	30,73	1019,77	98	
1a	M2091	Mooring	2019-06-02	13:34	46° 10,139'	59° 09,074'	CTD-Rosette	↓	95	133	16,6	4,5	5,41	30,86	1019,05	98	
1a	M2091	Mooring	2019-06-02	13:39	46° 10,162'	59° 09,162'	CTD-Rosette	(bottom)	93	123	17,1	4,4	5,42	30,78	1018,84	98	
1a	M2091	Mooring	2019-06-02	14:00	46° 10,213'	59° 09,370'	CTD-Rosette	↑	92	119	20	4,5	5,37	30,72	1018,96	98	
1a	HL2		2019-06-07	11:43	44° 16,124'	63° 18,947'	CTD-Rosette	↓	151				5,61	30,63			
1a	HL2		2019-06-07	11:45	44° 16,133'	63° 18,941'	CTD-Rosette	(bottom)	151				5,43	30,68			
1a	HL2		2019-06-07	11:57	44° 16,185'	63° 18,875'	CTD-Rosette	↑	133				5,78	30,62			
1a	HL2		2019-06-07	12:22	44° 15,917'	63° 18,058'	Net Tow	↓	155				5,82	30,62			
1a	HL2		2019-06-07	12:29	44° 15,978'	63° 18,002'	Net Tow	(bottom)	154				5,58	30,68			
1a	HL2		2019-06-07	12:31	44° 16,002'	63° 17,975'	Net Tow	↑	146				5,75	30,63			
1a	HL2		2019-06-07	12:36	44° 15,998'	63° 17,938'	Ring Net	↓	147				5,79	30,63			
1a	HL2		2019-06-07	12:44	44° 16,040'	63° 17,866'	Ring Net	(bottom)	148				5,72	30,64			
1a	HL2		2019-06-07	12:46	44° 16,064'	63° 17,843'	Ring Net	↑	149				5,53	30,67			
1a	LC1		2019-06-08	13:54	47° 40,994'	59° 37,346'	CTD-Rosette	↓	425				5,59	30,99			
1a	LC1		2019-06-08	14:03	47° 40,882'	59° 37,226'	CTD-Rosette	(bottom)	426				5,35	31,09			
1a	LC1		2019-06-08	14:22	47° 40,646'	59° 37,006'	CTD-Rosette	↑	427				5,44	31,05			
1a	LC1		2019-06-08	14:37	47° 40,374'	59° 36,751'	Ring Net	↓	428				5,65	30,98			
1a	LC1		2019-06-08	14:52	47° 40,190'	59° 36,599'	Ring Net	(bottom)	431				5,63	31,01			
1a	LC1		2019-06-08	15:01	47° 40,136'	59° 36,494'	Ring Net	↑	430				5,37	31,06			
1a	LC1		2019-06-08	15:05	47° 40,181'	59° 36,468'	Ring Net	↓	430				5,87	30,98			
1a	LC1		2019-06-08	15:10	47° 40,140'	59° 36,409'	Ring Net	(bottom)	429				5,89	30,98			
1a	LC1		2019-06-08	15:13	47° 40,123'	59° 36,385'	Ring Net	↑	429				5,95	30,98			
1a	AR7W_0.5	BIO	2019-06-09	22:27	53° 33,696'	55° 39,599'	CTD-Rosette	↓	107				1,04	28,58			
1a	AR7W_0.5	BIO	2019-06-09	22:33	53° 33,663'	55° 39,442'	CTD-Rosette	(bottom)	106				1,15	28,71			
1a	AR7W_0.5	BIO	2019-06-09	22:44	53° 33,583'	55° 39,283'	CTD-Rosette	↑	103				1,23	28,74			
1a	AR7W_0.5	BIO	2019-06-09	23:08	53° 33,727'	55° 39,068'	Ring Net	↓	105				1,30	28,77			
1a	AR7W_0.5	BIO	2019-06-09	23:10	53° 33,733'	55° 39,046'	Ring Net	(bottom)	105				1,22	28,66			
1a	AR7W_0.5	BIO	2019-06-09	23:12	53° 33,715'	55° 39,014'	Ring Net	↑	106				1,25	28,68			
1a	AR7W_0.5	BIO	2019-06-09	23:17	53° 33,645'	55° 38,927'	Ring Net	↓	105				1,08	29,00			
1a	AR7W_0.5	BIO	2019-06-09	23:21	53° 33,614'	55° 38,865'	Ring Net	(bottom)	106				0,54	29,77			
1a	AR7W_0.5	BIO	2019-06-09	23:23	53° 33,590'	55° 38,815'	Ring Net	↑	105				0,97	29,07			
1a	AR7W_1	BIO	2019-06-10	0:45	53° 40,587'	55° 33,160'	CTD-Rosette	↓	157				-0,39	28,72			3
1a	AR7W_1	BIO	2019-06-10	0:49	53° 40,540'	55° 33,174'	CTD-Rosette	(bottom)	155				-0,34	29,22			3
1a	AR7W_1	BIO	2019-06-10	1:04	53° 40,370'	55° 33,251'	CTD-Rosette	↑	155				-0,40	29,43			3
1a	AR7W_1	BIO	2019-06-10	1:24	53° 40,686'	55° 33,002'	Ring Net	↓	157				-0,52	28,05			3
1a	AR7W_1	BIO	2019-06-10	1:29	53° 40,658'	55° 33,010'	Ring Net	(bottom)	157				-0,64	28,06			2
1a	AR7W_1	BIO	2019-06-10	1:32	53° 40,647'	55° 33,011'	Ring Net	↑	156				-0,42	30,10			2
1a	AR7W_1	BIO	2019-06-10	1:35	53° 40,639'	55° 33,017'	Ring Net	↓	156				-0,44	30,07			2
1a	AR7W_1	BIO	2019-06-10	1:39	53° 40,620'	55° 33,040'	Ring Net	(bottom)	155				-0,41	30,98			2
1a	AR7W_1	BIO	2019-06-10	1:42	53° 40,604'	55° 33,064'	Ring Net	↑	155				-0,36	30,96			1
1a	AR7W_1	BIO	2019-06-10	1:47	53° 40,512'	55° 33,081'	Ring Net	↓	156				-0,39	30,51			1
1a	AR7W_1	BIO	2019-06-10	1:50	53° 40,477'	55° 33,089'	Ring Net	(bottom)	156				-0,40	30,44			1
1a	AR7W_1	BIO	2019-06-10	1:53	53° 40,456'	55° 33,093'	Ring Net	↑	157				-0,40	31,11			1
1a	AR7W_2	BIO	2019-06-10	3:39	53° 47,574'	55° 26,259'	CTD-Rosette	↓	206				0,39	30,44			0
1a	AR7W_2	BIO	2019-06-10	3:45	53° 47,525'	55° 26,365'	CTD-Rosette	(bottom)	205				1,01	30,08			0
1a	AR7W_2	BIO	2019-06-10	4:02	53° 47,413'	55° 26,510'	CTD-Rosette	↑	207				-0,21	31,26			0
1a	AR7W_2	BIO	2019-06-10	4:19	53° 47,809'	55° 26,227'	Ring Net	↓	206				0,18	30,79			0
1a	AR7W_2	BIO	2019-06-10	4:20	53° 47,796'	55° 26,235'	Ring Net	(bottom)	207				-0,14	31,14			0
1a	AR7W_2	BIO	2019-06-10	4:24	53° 47,747'	55° 26,251'	Ring Net	↑	205				0,51	30,44			0
1a	AR7W_2	BIO	2019-06-10	4:27	53° 47,682'	55° 26,261'	Ring Net	↓	206				-0,12	31,55			0
1a	AR7W_2	BIO	2019-06-10	4:30	53° 47,681'	55° 26,265'	Ring Net	(bottom)	204				0,03	31,35			0
1a	AR7W_2	BIO	2019-06-10	4:34	53° 47,629'	55° 26,281'	Ring Net	↑	205				-0,12	31,52			0
1a	AR7W_2	BIO	2019-06-10	4:40	53° 47,579'	55° 26,279'	Ring Net	↓	206				-0,25	31,44			0
1a	AR7W_2	BIO	2019-06-10	4:41	53° 47,579'	55° 26,292'	Ring Net	(bottom)	206				-0,27	31,51			0
1a	AR7W_2	BIO	2019-06-10	4:53	53° 47,495'	55° 26,312'	Ring Net	↑	205				-0,25	31,52			0
1a	AR7W_3	BIO	2019-06-10	6:24	53° 59,209'	55° 15,100'	CTD-Rosette	↓	150				1,64	32,05			0
1a	AR7W_3	BIO	2019-06-10	6:31	53° 59,199'	55° 15,137'	CTD-Rosette	(bottom)	150				1,61	32,00			0
1a	AR7W_3	BIO	2019-06-10	6:44	53° 59,136'	55° 15,162'	CTD-Rosette	↑	152				1,75	31,90			0
1a	AR7W_3	BIO	2019-06-10	6:54	53° 59,013'	55° 15,189'	Ring Net	↓	150				1,65	31,94			0
1a	AR7W_3	BIO	2019-06-10	6:59	53° 58,953'	55° 15,199'	Ring Net	(bottom)	150				1,82	31,91			0
1a	AR7W_3	BIO	2019-06-10	7:02	53° 58,909'	55° 15,188'	Ring Net	↑	150				2,13	31,57			0
1a	AR7W_3	BIO	2019-06-10	7:05	53° 58,854'	55° 15,178'	Ring Net	↓	150				1,58	31,97			1
1a	AR7W_3	BIO	2019-06-10	7:08	53° 58,803'	55° 15,177'	Ring Net	(bottom)	150				1,99	31,71			1
1a	AR7W_3	BIO	2019-06-10	7:12	53° 58,755'	55° 15,187'	Ring Net	↑	150				1,93	31,85			1
1a	AR7W_3	BIO	2019-06-10	7:14	53° 58,725'	55° 15,188'	Ring Net	↓	149				2,05	31,53			1
1a	AR7W_3	BIO	2019-06-10	7:18	53° 58,671'	55° 15,193'	Ring Net	(bottom)	149				1,67	31,92			1
1a	AR7W_3	BIO	2019-06-10	7:22	53° 58,613'	55° 15,192'	Ring Net	↑	149				1,89	31,84			1
1a	AR7W_4	BIO	2019-06-10	9:29	54° 13,126'	55° 01,459'	CTD-Rosette	↓	169				-0,13	31,12			1
1a	AR7W_4	BIO	2019-06-10	9:37	54° 12,982'	55° 01,553'	CTD-Rosette	(bottom)	168				-0,69	32,00			1
1a	AR7W_4	BIO	2019-06-10	9:51	54° 12,786'	55° 01,495'	CTD-Rosette	↑	169				-0,20	31,18			1
1a	AR7W_4	BIO	2019-06-10	10:19	54° 12,717'	55° 01,354'	Ring Net	↓	170				-0,33	31,43			1
1a	AR7W_4	BIO	2019-06-10	10:24	54° 12,659'	55° 01,301'	Ring Net	(bottom)	167				-0,28	31,46			1
1a	AR7W_4	BIO	2019-06-10	10:26	54° 12,652'	55° 01,279'	Ring Net	↑	168				-0,24	31,27			1
1a	AR7W_4	BIO	2019-06-10	10:31	54° 12,631'	55° 01,205'	Ring Net	↓	168				-0,18	31,19			1
1a	AR7W_4	BIO	2019-06-10	10:35	54° 12,586'	55° 01,167'	Ring Net	(bottom)	168				-0,17	31,18			1
1a	AR7W_4	BIO	2019-06-10	10:38	54° 12,544'	55° 01,136'	Ring Net	↑	167				-0,22	31,24			1
1a	AR7W_4	BIO	2019-06-10	10:41	54° 12,512'	55° 01,098'	Ring Net	↓	167				-0,32	31,40			1
1a	AR7W_4	BIO	2019-06-10	10:46	54° 12,470'	55° 01,036'	Ring Net	(bottom)	168				-0,33	31,22			1
1a	AR7W_4	BIO	2019-06-10	10:54	54° 12,433'	55° 00,913'	Ring Net	↑	170				-0,10	31,07			1
1a	AR7W_4	BIO	2019-06-10	11:01	54° 12,466'	55° 00,770'	Ring Net	↓	170				-0,08	30,97			1

1a	AR7W_4	BIO	2019-06-10	11:07	54° 12,376'	55° 00,716'	Ring Net	(bottom)	169			-0,11	31,03			1
1a	AR7W_4	BIO	2019-06-10	11:11	54° 12,328'	55° 00,668'	Ring Net	↑	170			-0,20	31,11			1
1a	AR7W_11	BIO	2019-06-11	11:07	55° 36,438'	53° 37,965'	CTD-Rosette	↓				4,13	33,75			
1a	AR7W_11	BIO	2019-06-11	11:16	55° 36,363'	53° 38,016'	CTD-Rosette	(bottom)				4,13	33,75			
1a	AR7W_11	BIO	2019-06-11	11:40	55° 36,115'	53° 38,209'	CTD-Rosette	↑				4,11	33,73			
1a	AR7W_11	BIO	2019-06-11	12:30	55° 36,794'	53° 38,078'	Ring Net	↓				4,32	33,88			
1a	AR7W_11	BIO	2019-06-11	12:34	55° 36,777'	53° 38,118'	Ring Net	(bottom)				4,06	33,64			
1a	AR7W_11	BIO	2019-06-11	12:37	55° 36,747'	53° 38,174'	Ring Net	↑				4,33	33,89			
1a	AR7W_11	BIO	2019-06-11	12:43	55° 36,714'	53° 38,265'	Ring Net	↓				4,27	33,88			
1a	AR7W_11	BIO	2019-06-11	12:47	55° 36,688'	53° 38,341'	Ring Net	(bottom)				4,10	33,62			
1a	AR7W_11	BIO	2019-06-11	12:50	55° 36,688'	53° 38,367'	Ring Net	↑				4,06	33,62			
1a	AR7W_11	BIO	2019-06-11	13:05	55° 36,410'	53° 38,770'	Tucker Net	↓				4,16	33,69			
1a	AR7W_11	BIO	2019-06-11	13:09	55° 36,380'	53° 38,837'	Tucker Net	(bottom)				4,08	33,64			
1a	AR7W_11	BIO	2019-06-11	13:11	55° 36,365'	53° 38,859'	Tucker Net	(bottom)				4,09	33,62			
1a	AR7W_11	BIO	2019-06-11	13:46	55° 36,745'	53° 38,480'	CTD-Rosette	↓				4,17	33,56			
1a	AR7W_11	BIO	2019-06-11	14:37	55° 36,579'	53° 38,999'	CTD-Rosette	(bottom)				4,24	33,67			
1a	AR7W_11	BIO	2019-06-11	15:50	55° 36,360'	53° 39,632'	CTD-Rosette	↑				4,34	33,51			
1a	AR7W_12	BIO	2019-06-11	18:14	55° 50,674'	53° 23,479'	CTD-Rosette	↓				4,31	34,35			
1a	AR7W_12	BIO	2019-06-11	19:12	55° 50,302'	53° 23,304'	CTD-Rosette	(bottom)				4,37	34,35			
1a	AR7W_12	BIO	2019-06-11	20:14	55° 49,891'	53° 23,001'	CTD-Rosette	↑				4,49	34,36			
1a	AR7W_12	BIO	2019-06-11	21:08	55° 50,869'	53° 22,783'	Hydrobios	↓				4,41	34,35			
1a	AR7W_12	BIO	2019-06-11	21:46	55° 50,611'	53° 22,610'	Hydrobios	(bottom)				4,48	34,35			
1a	AR7W_12	BIO	2019-06-11	22:07	55° 50,455'	53° 22,459'	Hydrobios	↑				4,46	34,35			
1a	AR7W_12	BIO	2019-06-11	22:25	55° 50,294'	53° 22,572'	Ring Net	↓				4,52	34,36			
1a	AR7W_12	BIO	2019-06-11	22:34	55° 50,224'	53° 22,494'	Ring Net	(bottom)				4,46	34,36			
1a	AR7W_12	BIO	2019-06-11	22:38	55° 50,190'	53° 22,424'	Ring Net	↑				4,48	34,36			
1a	AR7W_12	BIO	2019-06-11	22:42	55° 50,157'	53° 22,375'	Ring Net	↓				4,46	34,37			
1a	AR7W_12	BIO	2019-06-11	22:43	55° 50,150'	53° 22,317'	Ring Net	(bottom)				4,46	34,36			
1a	AR7W_12	BIO	2019-06-11	22:51	55° 50,083'	53° 22,233'	Ring Net	↑				4,46	34,36			
1a	AR7W_13	BIO	2019-06-12	1:06	56° 06,610'	53° 07,393'	CTD-Rosette	↓	3329							
1a	AR7W_13	BIO	2019-06-12	2:10	56° 06,134'	53° 07,254'	CTD-Rosette	(bottom)	3320							
1a	AR7W_13	BIO	2019-06-12	3:32	56° 05,791'	53° 07,042'	CTD-Rosette	↑	3318			5,23	34,63			
1a	AR7W_13	BIO	2019-06-12	3:59	56° 06,462'	53° 07,211'	Argo float	↓				5,22	34,62			
1a	AR7W_13	BIO	2019-06-12	4:14	56° 06,783'	53° 07,094'	Ring Net	↓				5,23	34,63			
1a	AR7W_13	BIO	2019-06-12	4:18	56° 06,785'	53° 07,114'	Ring Net	(bottom)				5,33	34,63			
1a	AR7W_13	BIO	2019-06-12	4:21	56° 06,773'	53° 07,144'	Ring Net	↑				5,35	34,63			
1a	AR7W_13	BIO	2019-06-12	4:24	56° 06,757'	53° 07,185'	Ring Net	↓	3320			5,31	34,63			
1a	AR7W_13	BIO	2019-06-12	4:28	56° 06,734'	53° 07,218'	Ring Net	(bottom)	3319			5,23	34,63			
1a	AR7W_13	BIO	2019-06-12	4:31	56° 06,718'	53° 07,230'	Ring Net	↑	3319			5,38	34,63			
1a	AR7W_14	BIO	2019-06-12	7:40	56° 32,203'	52° 40,702'	CTD-Rosette	↓				5,14	34,61			
1a	AR7W_14	BIO	2019-06-12	8:51	56° 32,416'	52° 41,049'	CTD-Rosette	(bottom)	3484			5,15	34,61			
1a	AR7W_14	BIO	2019-06-12	10:13	56° 32,742'	52° 41,680'	CTD-Rosette	↑	3483			5,17	34,61			
1a	AR7W_14	BIO	2019-06-12	10:30	56° 32,856'	52° 41,635'	Argo float	↓				5,24	34,61			
1a	AR7W_14	BIO	2019-06-12	10:57	56° 32,088'	52° 40,734'	Ring Net	↓	3487			5,13	34,61			
1a	AR7W_14	BIO	2019-06-12	11:01	56° 32,085'	52° 40,748'	Ring Net	(bottom)	3486			5,21	34,61			
1a	AR7W_14	BIO	2019-06-12	11:04	56° 32,090'	52° 40,743'	Ring Net	↑	3487			5,13	34,61			
1a	AR7W_14	BIO	2019-06-12	11:10	56° 32,107'	52° 40,732'	Ring Net	↓	3486			5,13	34,61			
1a	AR7W_14	BIO	2019-06-12	11:11	56° 32,111'	52° 40,739'	Ring Net	(bottom)	3487			5,13	34,61			
1a	AR7W_14	BIO	2019-06-12	11:13	56° 32,113'	52° 40,757'	Ring Net	↑	3488			5,13	34,61			
1a	AR7W_14.5	BIO	2019-06-12	13:04	56° 48,865'	52° 23,479'	CTD-Rosette	↓				5,12	34,63			
1a	AR7W_14.5	BIO	2019-06-12	13:23	56° 48,965'	52° 23,509'	CTD-Rosette	(bottom)	3513			5,13	34,63			
1a	AR7W_14.5	BIO	2019-06-12	13:47	56° 49,113'	52° 23,577'	CTD-Rosette	↑	3513			5,14	34,63			
1a	AR7W_15	BIO	2019-06-12	14:58	56° 57,568'	52° 14,454'	CTD-Rosette	↓	3509			5,22	34,68			
1a	AR7W_15	BIO	2019-06-12	16:01	56° 57,996'	52° 14,371'	CTD-Rosette	(bottom)				5,29	34,69			
1a	AR7W_15	BIO	2019-06-12	17:08	56° 58,814'	52° 14,584'	CTD-Rosette	↑				5,28	34,70			
1a	AR7W_15	BIO	2019-06-12	17:42	56° 57,462'	52° 14,191'	Ring Net	↓				5,29	34,68			
1a	AR7W_15	BIO	2019-06-12	17:46	56° 57,471'	52° 14,300'	Ring Net	(bottom)	3511			5,28	34,69			
1a	AR7W_15	BIO	2019-06-12	17:50	56° 57,484'	52° 14,407'	Ring Net	↑	3510			5,28	34,69			
1a	AR7W_15	BIO	2019-06-12	17:53	56° 57,480'	52° 14,478'	Ring Net	↓	3510			5,27	34,69			
1a	AR7W_15	BIO	2019-06-12	17:58	56° 57,476'	52° 14,607'	Ring Net	(bottom)	3510			5,33	34,69			
1a	AR7W_15	BIO	2019-06-12	18:01	56° 57,480'	52° 14,697'	Ring Net	↑	3511			5,27	34,69			
1a	AR7W_15	BIO	2019-06-12	18:04	56° 57,496'	52° 14,795'	Ring Net	↓	3510			5,29	34,69			
1a	AR7W_15	BIO	2019-06-12	18:10	56° 57,485'	52° 14,935'	Ring Net	(bottom)	3509			5,31	34,69			
1a	AR7W_15	BIO	2019-06-12	18:14	56° 57,502'	52° 15,036'	Ring Net	↑	3509			5,29	34,69			
1a	AR7W_16	BIO	2019-06-12	22:41	57° 22,776'	51° 46,966'	CTD-Rosette	↓				5,19	34,64			
1a	AR7W_16	BIO	2019-06-12	23:41	57° 22,754'	51° 47,192'	CTD-Rosette	(bottom)	3530			5,22	34,64			
1a	AR7W_16	BIO	2019-06-13	1:01	57° 23,316'	51° 46,895'	CTD-Rosette	↑				5,15	34,63			
1a	AR7W_17	BIO	2019-06-13	19:20	57° 48,125'	51° 21,033'	CTD-Rosette	↓	3620			5,17	34,70			
1a	AR7W_17	BIO	2019-06-13	20:25	57° 48,316'	51° 22,297'	CTD-Rosette	(bottom)	3574			5,10	34,69			
1a	AR7W_17	BIO	2019-06-13	21:44	57° 48,433'	51° 23,338'	CTD-Rosette	↑	3544			5,15	34,70			
1a	AR7W_17	BIO	2019-06-13	21:56	57° 48,472'	51° 23,692'	Argo float	↓	3554			5,11	34,69			
1a	AR7W_17	BIO	2019-06-13	22:38	57° 47,737'	51° 21,372'	Hydrobios	↓				5,14	34,70			
1a	AR7W_17	BIO	2019-06-13	23:15	57° 47,767'	51° 22,245'	Hydrobios	(bottom)				5,15	34,70			
1a	AR7W-17	BIO	2019-06-13	23:40	57° 47,774'	51° 22,789'	Hydrobios	↑				5,24	34,71			
1a	AR7W_17	BIO	2019-06-14	0:03	57° 47,529'	51° 23,106'	Ring Net	↓	3512			5,25	34,70			
1a	AR7W_17	BIO	2019-06-14	0:08	57° 47,541'	51° 23,254'	Ring Net	(bottom)	3506			5,26	34,71			
1a	AR7W_17	BIO	2019-06-14	0:11	57° 47,555'	51° 23,342'	Ring Net	↑	3503			5,41	34,71			
1a	AR7W_17	BIO	2019-06-14	0:13	57° 47,559'	51° 23,417'	Ring Net	↓	3501			5,35	34,70			
1a	AR7W_17	BIO	2019-06-14	0:17	57° 47,582'	51° 23,521'	Ring Net	(bottom)	3501			5,30	34,71			
1a	AR7W_17	BIO	2019-06-14	0:21	57° 47,592'	51° 23,620'	Ring Net	↑				5,38	34,70			
1a	AR7W_17.5	BIO	2019-06-14	2:05	58° 00,494'	51° 06,671'	CTD-Rosette	↓				5,44	34,70			
1a	AR7W_17.5	BIO	2019-06-14	3:19	58° 00,488'	51° 07,660'	CTD-Rosette	(bottom)	3560			5,33	34,69			
1a	AR7W_17.5	BIO	2019-06-14	4:41	58° 00,324'	51° 08,927'	CTD-Rosette	↑	3559			5,37	34,68			
1a	AR7W_18	BIO	2019-06-14	6:25	58° 13,066'	50° 53,245'	CTD-Rosette	↓	3559			5,54	34,43			
1a	AR7W_18	BIO	2019-06-14	7:38	58° 12,914'	50° 55,274'	CTD-Rosette	(bottom)	3548			5,55	34,36			
1a	AR7W_18	BIO	2019-06-14	9:12	58° 12,530'	50° 57,697'	CTD-Rosette	↑	3548			5,37	34,34			
1a	AR7W_18	BIO	2019-06-14	9:25	58° 12,413'	50° 58,355'	Ring Net	↓	3544			5,58	34,32			
1a	AR7W-18	BIO	2019-06-14	9:29	58° 12,376'	50° 58,461'	Ring Net	(bottom)	3546			5,64	34,30			
1a	AR7W-18	BIO	2019-06-14	9:34	58° 12,375'	50° 58,606'	Ring Net	↑	3547			5,49	34,30			
1a	AR7W-18	BIO	2019-06-14	9:35	58° 12,371'	50° 58,646'	Ring Net	↓	3547			5,54	34,29			
1a	AR7W-18	BIO	2019-06-14	9:38	58° 12,362'	50° 58,732'	Ring Net	(bottom)	3547			5,39	34,29			
1a	AR7W-18	BIO	2019-06-14	9:45	58° 12,355'	50° 58,970'	Ring Net	↑	3547			5,43	34,29			
1a	AR7W-18.5	BIO	2019-06-14	11:44	58° 25,918'	50° 41,967'	CTD-Rosette	↓	3533			4,94	34,38			

1a	AR7W-18.5	BIO	2019-06-14	12:02	58° 25,814'	50° 42,610'	CTD-Rosette	(bottom)	3533				4,87	34,32			
1a	AR7W-18.5	BIO	2019-06-14	12:27	58° 25,715'	50° 43,538'	CTD-Rosette	↑					5,35	34,35			
1a	AR7W_19	BIO	2019-06-14	14:20	58° 38,348'	50° 25,221'	CTD-Rosette	↓	3517				5,29	34,26			
1a	AR7W_19	BIO	2019-06-14	15:30	58° 37,539'	50° 25,208'	CTD-Rosette	(bottom)					5,08	34,28			
1a	AR7W_19	BIO	2019-06-14	16:53	58° 36,705'	50° 25,194'	CTD-Rosette	↑	3520				5,04	34,43			
1a	AR7W_19	BIO	2019-06-14	17:15	58° 37,369'	50° 25,257'	Argo float	↓					5,17	34,43			
1a	AR7W_19	BIO	2019-06-14	17:22	58° 37,264'	50° 25,348'	Argo float	↑	3520				5,59	34,43			
1a	AR7W_19	BIO	2019-06-14	17:26	58° 37,250'	50° 25,328'	Argo float	↓	3520				5,57	34,42			
1a	AR7W_19	BIO	2019-06-14	17:47	58° 38,313'	50° 24,873'	Ring Net	↓	3519				5,12	34,42			
1a	AR7W_19	BIO	2019-06-14	17:52	58° 38,252'	50° 24,824'	Ring Net	(bottom)					5,10	34,40			
1a	AR7W_19	BIO	2019-06-14	17:55	58° 38,217'	50° 24,799'	Ring Net	↑	3518				5,16	34,41			
1a	AR7W_19	BIO	2019-06-14	17:58	58° 38,187'	50° 24,777'	Ring Net	↓	3519				4,97	34,41			
1a	AR7W_19	BIO	2019-06-14	18:03	58° 38,156'	50° 24,750'	Ring Net	(bottom)	3520				5,03	34,41			
1a	AR7W_19	BIO	2019-06-14	18:06	58° 38,143'	50° 24,735'	Ring Net	↑					4,96	34,41			
1a	AR7W_19	BIO	2019-06-14	18:22	58° 38,050'	50° 24,649'	Tucker Net	↓	3520				4,92	34,42			
1a	AR7W_19	BIO	2019-06-14	18:27	58° 38,028'	50° 24,622'	Tucker Net	(bottom)	3519				5,15	34,41			
1a	AR7W_19	BIO	2019-06-14	18:30	58° 38,007'	50° 24,602'	Tucker Net	↑	3519				5,05	34,41			
1a	AR7W_19.5	BIO	2019-06-14	20:13	58° 51,166'	50° 10,697'	CTD-Rosette	↓	3498				5,79	34,64			
1a	AR7W_19.5	BIO	2019-06-14	21:14	58° 50,871'	50° 10,288'	CTD-Rosette	(bottom)	3499				5,86	34,63			
1a	AR7W_19.5	BIO	2019-06-14	22:21	58° 50,458'	50° 09,825'	CTD-Rosette	↑	3497				6,00	34,62			
1a	AR7W_20	BIO	2019-06-15	0:06	59° 04,082'	49° 56,947'	CTD-Rosette	↓	3465	330	12,2	3,6	5,65	34,37	1025,85	98	0
1a	AR7W_20	BIO	2019-06-15	1:07	59° 03,956'	49° 57,033'	CTD-Rosette	(bottom)	3464	322	12,2	3,4	5,39	34,38	1025,57	98	0
1a	AR7W_20	BIO	2019-06-15	2:23	59° 03,821'	49° 57,134'	CTD-Rosette	↑		337	10,3	3,2	5,51	34,38	1025,05	98	0
1a	AR7W_20	BIO	2019-06-15	2:36	59° 03,907'	49° 57,212'	Ring Net	↓		330	11,6	3,2	5,55	34,38	1024,74	98	0
1a	AR7W_20	BIO	2019-06-15	2:56	59° 03,899'	49° 57,257'	Ring Net	(bottom)	3465	333	10,5	3,1	5,66	34,37	1024,52	98	0
1a	AR7W_20	BIO	2019-06-15	2:59	59° 03,896'	49° 57,252'	Ring Net	↑	3465	327	11,4	3	5,49	34,38	1024,56	98	0
1a	AR7W_20	BIO	2019-06-15	3:02	59° 03,922'	49° 57,232'	Ring Net	↓	3467	337	12,4	3,2	5,49	34,37	1024,48	98	0
1a	AR7W_20	BIO	2019-06-15	3:06	59° 03,951'	49° 57,219'	Ring Net	(bottom)	3465	350	9,7	3,2	5,47	34,37	1024,51	98	0
1a	AR7W_20	BIO	2019-06-15	3:09	59° 03,935'	49° 57,207'	Ring Net	↑	3467	354	9,5	3,3	5,53	34,37	1024,45	98	0
1a	AR7W_20.5	BIO	2019-06-15	4:45	59° 16,576'	49° 42,605'	CTD-Rosette	↓	3421	327	15	3	5,67	34,43	1023,58	98	0
1a	AR7W_20.5	BIO	2019-06-15	5:50	59° 17,009'	49° 43,377'	CTD-Rosette	(bottom)		316	11,6	3	5,46	34,44	1023,87	98	0
1a	AR7W_20.5	BIO	2019-06-15	6:41	59° 17,383'	49° 43,788'	CTD-Rosette	↑	3423	329	12,8	2,7	5,49	34,44	1023,78	98	0
1a	AR7W_21	BIO	2019-06-15	8:00	59° 28,880'	49° 28,432'	CTD-Rosette	↓		327	14,3	3,3	4,93	34,34	1023,40	98	0
1a	AR7W_21	BIO	2019-06-15	9:02	59° 29,162'	49° 28,671'	CTD-Rosette	(bottom)		323	15,8	3,1	4,91	34,34	1023,19	98	0
1a	AR7W_21	BIO	2019-06-15	10:31	59° 29,637'	49° 28,351'	CTD-Rosette	↑		330	15,4	3,6	4,89	34,34	1022,82	98	0
1a	AR7W_21	BIO	2019-06-15	10:48	59° 29,772'	49° 28,202'	Ring Net	↓		318	12,9	3,7	4,92	34,34	1022,67	98	0
1a	AR7W_21	BIO	2019-06-15	10:51	59° 29,794'	49° 28,148'	Ring Net	(bottom)	3390	333	13,9	3,8	4,99	34,34	1022,62	98	0
1a	AR7W_21	BIO	2019-06-15	10:54	59° 29,828'	49° 28,117'	Ring Net	↑	3389	324	11,8	3,8	4,96	34,34	1022,67	98	0
1a	AR7W_21	BIO	2019-06-15	10:59	59° 29,831'	49° 28,054'	Ring Net	↓	3389	333	14,9	3,7	4,98	34,35	1022,61	98	0
1a	AR7W_21	BIO	2019-06-15	11:04	59° 29,864'	49° 28,035'	Ring Net	(bottom)	3390	332	13,3	3,6	4,94	34,34	1022,66	98	0
1a	AR7W_21	BIO	2019-06-15	11:05	59° 29,872'	49° 28,024'	Ring Net	↑	3389	324	15	3,7	4,94	34,34	1022,60	98	0
1a	AR7W_21	BIO	2019-06-15	11:11	59° 29,915'	49° 27,937'	Ring Net	↓	3390	346	15,4	3,7	4,99	34,35	1022,55	98	0
1a	AR7W_21	BIO	2019-06-15	11:15	59° 29,936'	49° 27,895'	Ring Net	(bottom)	3388	341	15,2	3,8	4,96	34,34	1022,51	98	0
1a	AR7W_21	BIO	2019-06-15	11:18	59° 29,950'	49° 27,863'	Ring Net	↑	3388	321	13,9	3,8	4,95	34,34	1022,63	98	0
1a	AR7W_22	BIO	2019-06-15	13:07	59° 44,954'	49° 09,925'	CTD-Rosette	↓	3217	337	16	3,8	5,14	34,35	1022,53	98	0
1a	AR7W_22	BIO	2019-06-15	13:26	59° 44,751'	49° 09,801'	CTD-Rosette	(bottom)		335	16,2	3,9	5,24	34,35	1022,35	98	0
1a	AR7W_22	BIO	2019-06-15	13:51	59° 44,484'	49° 09,576'	CTD-Rosette	↑	3222	338	15,6	4	5,30	34,35	1022,36	98	0
1a	AR7W_22	BIO	2019-06-15	14:21	59° 44,855'	49° 09,946'	Ring Net	↓		346	13,9	3,8	5,36	34,35	1022,46	98	0
1a	AR7W_22	BIO	2019-06-15	14:27	59° 44,809'	49° 09,895'	Ring Net	(bottom)		337	12,2	3,7	5,22	34,35	1022,33	98	0
1a	AR7W_22	BIO	2019-06-15	14:30	59° 44,765'	49° 09,847'	Ring Net	↑		334	13,3	3,9	5,28	34,34	1022,20	98	0
1a	AR7W_22	BIO	2019-06-15	14:34	59° 44,751'	49° 09,790'	Ring Net	↓	3219	351	13,5	4	5,18	34,34	1022,25	98	0
1a	AR7W_22	BIO	2019-06-15	14:38	59° 44,727'	49° 09,743'	Ring Net	(bottom)		332	11,2	4	5,14	34,35	1022,26	98	0
1a	AR7W_22	BIO	2019-06-15	14:41	59° 44,695'	49° 09,691'	Ring Net	↑		326	12,4	4	5,18	34,35	1022,30	98	0
1a	AR7W_22	BIO	2019-06-15	15:04	59° 44,911'	49° 09,885'	CTD-Rosette	↓	3215	343	13,5	3,9	5,24	34,36	1021,90	98	0
1a	AR7W_22	BIO	2019-06-15	16:04	59° 44,430'	49° 09,492'	CTD-Rosette	(bottom)	3222	336	10,1	4	5,28	34,35	1021,98	98	0
1a	AR7W_22	BIO	2019-06-15	17:14	59° 43,907'	49° 08,837'	CTD-Rosette	↑	3228	337	11,2	4	5,40	34,41	1021,93	98	
1a	AR7W_21.5	BIO	2019-06-15	18:42	59° 36,981'	49° 18,527'	CTD-Rosette	↓		349	11,4	3,8	5,11	34,37	1021,59	98	
1a	AR7W_21.5	BIO	2019-06-15	19:40	59° 36,853'	49° 17,845'	CTD-Rosette	(bottom)		339	11,4	4,1	5,05	34,35	1021,68	98	
1a	AR7W_21.5	BIO	2019-06-15	20:48	59° 36,629'	49° 17,284'	CTD-Rosette	↑	3320	1	11,8	3,9	5,15	34,35	1021,45	98	
1a	AR7W_24	BIO	2019-06-16	2:32	60° 10,457'	48° 40,723'	CTD-Rosette	↓		340	6,5	1,8	5,56	34,82	1020,25	98	
1a	AR7W_24	BIO	2019-06-16	3:24	60° 10,680'	48° 41,612'	CTD-Rosette	(bottom)		331	6,7	1,7	5,60	34,81	1019,76	98	
1a	AR7W_24	BIO	2019-06-16	4:31	60° 10,957'	48° 42,572'	CTD-Rosette	↑	2888	340	10,7	1,9	5,55	34,83	1019,95	98	
1a	AR7W_24	BIO	2019-06-16	4:40	60° 10,999'	48° 42,714'	Ring Net	↓	2889	334	9,3	1,7	5,70	34,83	1020,05	98	
1a	AR7W_24	BIO	2019-06-16	4:44	60° 10,996'	48° 42,775'	Ring Net	(bottom)	2889	328	11,6	1,8	5,59	34,81	1020,08	98	
1a	AR7W_24	BIO	2019-06-16	4:48	60° 10,992'	48° 42,852'	Ring Net	↑		337	9,5	1,6	5,50	34,81	1020,05	98	
1a	AR7W_24	BIO	2019-06-16	4:51	60° 10,990'	48° 42,901'	Ring Net	↓		328	11,2	1,8	5,48	34,82	1020,19	98	
1a	AR7W_24	BIO	2019-06-16	4:55	60° 10,986'	48° 42,957'	Ring Net	(bottom)	2891	324	10,9	1,5	5,54	34,81	1020,09	98	
1a	AR7W_24	BIO	2019-06-16	4:59	60° 10,982'	48° 42,993'	Ring Net	↑		317	10,7	1,5	5,55	34,82	1020,02	98	
1a	AR7W_22.5	BIO	2019-06-16	6:59	59° 51,970'	49° 02,128'	CTD-Rosette	↓		350	9,9	2,4	5,73	34,77	1021,10	98	
1a	AR7W_22.5	BIO	2019-06-16	7:56	59° 52,042'	49° 02,296'	CTD-Rosette	(bottom)	3118	357	10,7	2,3	5,99	34,74	1021,18	98	
1a	AR7W_22.5	BIO	2019-06-16	8:48	59° 52,025'	49° 02,598'	CTD-Rosette	↑		354	8,2	2,4	5,80	34,75	1019,29	98	
1a	AR7W_23.5	BIO	2019-06-16	10:24	60° 05,021'	48° 47,452'	CTD-Rosette	↓		318	4,8	1,7	5,37	34,63	1020,75	98	
1a	AR7W_23.5	BIO	2019-06-16	11:15	60° 05,235'	48° 47,763'	CTD-Rosette	(bottom)	2918	358	3,6	2,5	5,58	34,58	1020,96	98	
1a	AR7W_23.5	BIO	2019-06-16	12:15	60° 05,301'	48° 48,091'	CTD-Rosette	↑	2918	327	6,7	3,7	5,63	34,59	1018,79	98	
1a	AR7W_24.5	BIO	2019-06-16	13:34	60° 13,899'	48° 36,489'	CTD-Rosette	↓		313	3,4	3,5	5,88	34,80	1018,54	98	
1a	AR7W_24.5	BIO	2019-06-16	14:26	60° 13,830'	48° 36,621'	CTD-Rosette	(bottom)		258	0,6	4,1	6,15	34,80	1018,50	94	
1a	AR7W_24.5	BIO	2019-06-16	15:07	60° 13,833'	48° 36,889'	CTD-Rosette	↑		296	2,5	4	6,25	34,80	1018,34	94	
1a	AR7W_27	BIO	2019-06-16	16:42	60° 26,864'	48° 21,870'	CTD-Rosette	↓	148	310	8	0,7	1,41	32,66	1017,57	98	
1a	AR7W_27	BIO	2019-06-16	16:49	60° 26,889'	48° 22,006'	CTD-Rosette	(bottom)	142	306	9,9	0,8	0,83	32,75	1017,58	98	
1a	AR7W_27	BIO	2019-06-16	17:00	60° 26,934'	48° 22,234'	CTD-Rosette	↑	149	313	9,1	0,8	0,92	32,72	1017,53	98	
1a	AR7W_27	BIO	2019-06-16	17:10	60° 26,960'	48° 22,384'	Ring Net	↓	151	315	9,7	0,8	1,62	32,65	1017,60	98	
1a	AR7W_27	BIO	2019-06-16	17:14	60° 26,972'	48° 22,431'	Ring Net	(bottom)	151	311	8,8	0,7	1,60	32,65	1017,62	98	
1a	AR7W_27	BIO	2019-06-16	17:17	60° 26,982'	48° 22,469'	Ring Net	↑	151	312	8,8	0,9	1,40	32,65	1017,58	98	
1a	AR7W_27	BIO	2019-06-16	17:21	60° 27,007'	48° 22,557'	Ring Net	↓	152	310	8,4	0,8	1,25	32,66	1017,61	98	
1a	AR7W_27	BIO	2019-06-16	17:25	60° 27,032'	48° 22,652'	Ring Net	(bottom)	151	318	9,1	0,7	1,42	32,66	1017,40	98	
1a	AR7W_27	BIO	2019-06-16	17:28	60° 27,049'	48° 22,707'	Ring Net	↑	152	317	8,9	0,8	1,22	32,65	1017,42	98	
1a	AR7W_27	BIO	2019-06-16	17:31	60° 27,071'	48° 22,778'	Ring Net	↓	152	316	8,2	0,7	1,23	32,67	1017,41	98	
1a	AR7W_27	BIO	2019-06-16	17:35	60° 27,092'	48° 22,844'	Ring Net	(bottom)	152	313	9,1	0,8	1,21	32,67	1017,44	98	
1a	AR7W_27	BIO	2019-06-16	17:38	60° 27,108'	48° 22,908'	Ring Net	↑	151	319	8,9	0,9	1,42	32,66	1017,40	98	
1a	AR7W_28	BIO	2019-06-16	18:33	60° 33,944'	48° 13,570'	CTD-Rosette	↓	133	294	9,1	1,4	1,82	32,60	1017,10	98	
1a	AR7W_28	BIO	2019-06-16	18:41	60° 33,947'	48° 13,615'	CTD-Rosette	(bottom)	138	286	9,5	1,6	2,33	32,59	1017,02	98	
1a	AR7W_28	BIO	2019-06-16	18:50	60° 33,960'	48° 13,696'	CTD-Rosette	↑	132	294	9,5	1,7	2,41	32,59	1017,04	98	
1a	AR7W_28	BIO	2019-06-16	19:00	60° 33,923'	48° 13,732'	Ring Net	↓	131	296	9,7	1,8	2,22	32,59	1016,92	98	

1a	AR7W_28	BIO	2019-06-16	19:04	60° 33,907'	48° 13,719'	Ring Net	(bottom)	133	294	9,3	1,8	2,24	32,59	1016,79	98	
1a	AR7W_28	BIO	2019-06-16	19:06	60° 33,897'	48° 13,700'	Ring Net	↑	133	291	10,3	1,8	2,19	32,61	1016,84	98	
1a	AR7W_28	BIO	2019-06-16	19:10	60° 33,888'	48° 13,680'	Ring Net	↓	135	292	10,1	1,9	2,18	32,59	1016,80	98	
1a	AR7W_28	BIO	2019-06-16	19:13	60° 33,880'	48° 13,664'	Ring Net	(bottom)	136	295	10,9	2	2,39	32,59	1016,85	98	
1a	AR7W_28	BIO	2019-06-16	19:16	60° 33,871'	48° 13,649'	Ring Net	↑	141	297	10,5	2	1,77	32,61	1016,86	98	
1a	AR7W_28	BIO	2019-06-16	19:21	60° 33,848'	48° 13,607'	Ring Net	↓	144	292	9,3	1,9	2,14	32,59	1016,81	98	
1a	AR7W_28	BIO	2019-06-16	19:25	60° 33,836'	48° 13,584'	Ring Net	(bottom)	145	292	9,3	2,1	2,47	32,59	1016,85	98	
1a	AR7W_28	BIO	2019-06-16	19:28	60° 33,828'	48° 13,570'	Ring Net	↑	146	291	8,9	2	2,32	32,59	1016,81	98	
1a	AR7W_28	BIO	2019-06-16	19:37	60° 33,795'	48° 13,548'	CTD-Rosette	↓	147	284	9,5	2	1,54	32,60	1016,89	98	
1a	AR7W_28	BIO	2019-06-16	19:43	60° 33,800'	48° 13,574'	CTD-Rosette	(bottom)	149	283	11,6	2	1,83	32,59	1016,87	98	
1a	AR7W_28	BIO	2019-06-16	19:55	60° 33,824'	48° 13,686'	CTD-Rosette	↑	130	292	12,2	2,2	2,50	32,58	1016,78	98	
1a	AR7W_28.5	BIO	2019-06-16	21:03	60° 37,131'	48° 09,845'	Ring Net	↓	120	291	14,9	2,9	2,49	32,52	1016,12	97	
1a	AR7W_28.5	BIO	2019-06-16	21:06	60° 37,108'	48° 09,764'	Ring Net	(bottom)	111	289	14,7	2,9	3,17	32,43	1016,04	97	
1a	AR7W_28.5	BIO	2019-06-16	21:09	60° 37,104'	48° 09,788'	Ring Net	↑	110	289	14,3	3	2,98	32,42	1016,02	97	
1a	AR7W_28.5	BIO	2019-06-16	21:09	60° 37,104'	48° 09,793'	Ring Net	↓	110	290	16	3,1	2,93	32,42	1016,08	97	
1a	AR7W_28.5	BIO	2019-06-16	21:14	60° 37,097'	48° 09,804'	Ring Net	(bottom)	107	289	15	3	2,10	32,48	1016,01	97	
1a	AR7W_28.5	BIO	2019-06-16	21:19	60° 37,077'	48° 09,792'	Ring Net	↑					3,22	32,42			
1a	AR7W_28.5	BIO	2019-06-16	21:38	60° 37,228'	48° 10,003'	CTD-Rosette	↓					2,31	32,49			
1a	AR7W_28.5	BIO	2019-06-16	21:59	60° 37,128'	48° 10,066'	CTD-Rosette	↑					2,30	32,53			
1a	AR7W_25.5	BIO	2019-06-17	1:41	60° 20,431'	48° 30,076'	CTD-Rosette	↓		297	9,5	4,7	1,80	33,12	1016,22	94	
1a	AR7W_25.5	BIO	2019-06-17	1:44	60° 20,485'	48° 30,217'	CTD-Rosette	↑		287	6,3	6	1,44	33,35	1016,25	84	
1a	AR7W_25.5	BIO	2019-06-17	2:02	60° 20,293'	48° 29,768'	CTD-Rosette	↓		275	11	4,3	1,87	32,98	1016,02	96	
1a	AR7W_25.5	BIO	2019-06-17	2:41	60° 20,500'	48° 30,499'	CTD-Rosette	(bottom)		257	5,7	6,6	1,86	33,02	1016,10	88	
1a	AR7W_25.5	BIO	2019-06-17	3:12	60° 20,658'	48° 30,860'	CTD-Rosette	↑		218	5,9	6,1	1,77	33,04	1015,77	82	
1a	AR7W_26	BIO	2019-06-17	4:06	60° 22,301'	48° 25,054'	CTD-Rosette	↓		274	8,8	4,5	2,22	32,48	1015,48	87	
1a	AR7W_26	BIO	2019-06-17	4:35	60° 22,284'	48° 25,555'	CTD-Rosette	(bottom)		241	5,3	4	2,59	32,43	1015,30	94	
1a	AR7W_26	BIO	2019-06-17	5:19	60° 22,389'	48° 26,316'	CTD-Rosette	↑		276	7,6	3,1	2,69	32,38	1015,15	97	
1a	AR7W_26	BIO	2019-06-17	6:51	60° 22,176'	48° 25,265'	Ring Net	↓		271	5,9	6,5	2,63	32,38	1014,92	83	
1a	AR7W_26	BIO	2019-06-17	6:54	60° 22,224'	48° 25,464'	Ring Net	(bottom)		266	5,5	7,2	1,05	32,48	1014,91	84	
1a	AR7W_26	BIO	2019-06-17	6:58	60° 22,267'	48° 25,640'	Ring Net	↑		263	8,2	6,8	1,27	32,64	1014,86	84	
1a	AR7W_26	BIO	2019-06-17	7:02	60° 22,312'	48° 25,824'	Ring Net	↓		271	6,9	7	1,78	32,52	1014,94	81	
1a	AR7W_26	BIO	2019-06-17	7:05	60° 22,348'	48° 25,977'	Ring Net	(bottom)		256	3,6	5,9	2,01	32,52	1014,84	89	
1a	AR7W_26	BIO	2019-06-17	7:09	60° 22,378'	48° 26,122'	Ring Net	↑		261	5,9	6,4	2,48	32,41	1014,82	83	
1a	AR7W_25	BIO	2019-06-17	8:51	60° 17,598'	48° 33,189'	CTD-Rosette	↓		87	6,9	5,8	4,99	34,05	1014,84	93	
1a	AR7W_25	BIO	2019-06-17	9:40	60° 18,002'	48° 34,722'	CTD-Rosette	(bottom)		272	7,8	6,5	5,30	34,14	1015,00	92	
1a	AR7W_25	BIO	2019-06-17	10:51	60° 18,833'	48° 36,567'	CTD-Rosette	↑		267	10,9	5,8	5,32	34,28	1014,68	94	
1a	AR7W_25	BIO	2019-06-17	11:02	60° 19,028'	48° 36,885'	Ring Net	↓		281	9,1	5,6	5,37	34,11	1014,80	95	
1a	AR7W_25	BIO	2019-06-17	11:06	60° 19,085'	48° 37,034'	Ring Net	(bottom)		274	9,7	5,4	4,91	33,98	1014,77	95	
1a	AR7W_25	BIO	2019-06-17	11:09	60° 19,102'	48° 37,117'	Ring Net	↑		275	9,5	5,5	5,73	34,13	1014,77	95	
1a	AR7W_25	BIO	2019-06-17	11:13	60° 19,128'	48° 37,287'	Ring Net	↓		282	11	5,7	4,99	34,08	1014,63	95	
1a	AR7W_25	BIO	2019-06-17	11:17	60° 19,154'	48° 37,485'	Ring Net	(bottom)		289	9,7	5,7	5,02	33,83	1014,61	95	
1a	AR7W_25	BIO	2019-06-17	11:20	60° 19,184'	48° 37,566'	Ring Net	↑		288	10,7	5,8	5,09	33,85	1014,64	95	
1a	AR7W_25	BIO	2019-06-17	11:24	60° 19,221'	48° 37,705'	Ring Net	↓		288	11,2	5,8	5,10	33,90	1014,61	95	
1a	AR7W_25	BIO	2019-06-17	11:28	60° 19,255'	48° 37,875'	Ring Net	(bottom)		288	9,1	5,6	5,05	33,88	1014,81	95	
1a	AR7W_25	BIO	2019-06-17	11:30	60° 19,283'	48° 37,961'	Ring Net	↑		287	9,3	5,7	4,90	33,89	1014,74	95	
1a	AR7W_23	BIO	2019-06-17	16:16	59° 59,008'	48° 53,851'	CTD-Rosette	↓		260	12,2	4,1	5,75	34,83	1015,14	98	
1a	AR7W_23	BIO	2019-06-17	17:12	59° 58,862'	48° 53,365'	CTD-Rosette	(bottom)		265	13,9	4	6,04	34,83	1014,91	98	
1a	AR7W_23	BIO	2019-06-17	18:22	59° 58,825'	48° 53,312'	CTD-Rosette	↑		268	9,3	4,1	6,10	34,83	1014,73	98	
1a	AR7W_23	BIO	2019-06-17	18:34	59° 58,852'	48° 53,356'	Ring Net	↓		269	10,3	4,2	6,09	34,83	1014,71	98	
1a	AR7W_23	BIO	2019-06-17	18:38	59° 58,854'	48° 53,361'	Ring Net	(bottom)		266	10,9	4	6,11	34,82	1014,73	98	
1a	AR7W_23	BIO	2019-06-17	18:40	59° 58,853'	48° 53,358'	Ring Net	↑		254	10,9	4,1	6,09	34,83	1014,71	98	
1a	AR7W_23	BIO	2019-06-17	18:45	59° 58,857'	48° 53,363'	Ring Net	↓		279	10,5	4,2	6,07	34,83	1014,72	98	
1a	AR7W_23	BIO	2019-06-17	18:48	59° 58,856'	48° 53,403'	Ring Net	(bottom)		280	11	4,1	6,06	34,82	1014,75	98	
1a	AR7W_23	BIO	2019-06-17	18:51	59° 58,856'	48° 53,425'	Ring Net	↑		271	12	4	6,09	34,82	1014,60	98	
1a	LSC_01	BIO	2019-06-18	4:02	60° 00,093'	50° 30,060'	CTD-Rosette	↓	3229	252	11	3,6	5,60	34,38	1014,04	98	
1a	LSC_01	BIO	2019-06-18	5:01	60° 00,529'	50° 30,189'	CTD-Rosette	(bottom)	3225	256	11,4	3,4	5,90	34,37	1013,82	98	
1a	LSC_01	BIO	2019-06-18	6:13	60° 01,160'	50° 30,554'	CTD-Rosette	↑	3221	286	8,2	4,2	5,81	34,39	1013,87	98	
1a	LSC_01	BIO	2019-06-18	6:25	60° 01,249'	50° 30,531'	Ring Net	↓	3221	300	11,2	3,6	5,93	34,38	1014,57	98	
1a	LSC_01	BIO	2019-06-18	6:29	60° 01,276'	50° 30,509'	Ring Net	(bottom)	3221	269	8,4	3,8	5,95	34,38	1014,64	98	
1a	LSC_01	BIO	2019-06-18	6:33	60° 01,307'	50° 30,510'	Ring Net	↑	3221	298	6,1	3,8	5,96	34,38	1014,81	98	
1a	LSC_02	BIO	2019-06-18	8:24	59° 59,995'	51° 07,563'	CTD-Rosette	↓	3322	280	5,7	3,9	5,66	34,27	1014,87	94	
1a	LSC_02	BIO	2019-06-18	9:21	60° 00,043'	51° 08,848'	CTD-Rosette	(bottom)	3324	232	6,5	3,7	5,59	34,26	1013,76	98	
1a	LSC_02	BIO	2019-06-18	10:38	60° 00,092'	51° 10,530'	CTD-Rosette	↑	3328	223	5,7	4,1	5,49	34,26	1013,64	93	
1a	LSC_02	BIO	2019-06-18	10:46	60° 00,084'	51° 10,707'	Ring Net	↓	3329	244	6,9	4	5,49	34,27	1013,76	93	
1a	LSC_02	BIO	2019-06-18	10:50	60° 00,085'	51° 10,790'	Ring Net	(bottom)	3329	246	7	4,1	5,47	34,27	1013,72	94	
1a	LSC_02	BIO	2019-06-18	10:53	60° 00,091'	51° 10,850'	Ring Net	↑	3329	273	9,1	4,2	5,49	34,27	1013,74	96	
1a	LSC_03	BIO	2019-06-18	12:38	59° 59,968'	51° 45,017'	CTD-Rosette	↓		252	3,8	4,6	6,21	34,28	1013,90	89	
1a	LSC_03	BIO	2019-06-18	13:42	59° 59,824'	51° 45,202'	CTD-Rosette	(bottom)	3360	237	5	5,2	6,52	34,29	1013,96	90	
1a	LSC_03	BIO	2019-06-18	14:48	59° 59,635'	51° 45,416'	CTD-Rosette	↑	3357	208	5,1	5,1	6,16	34,28	1014,05	88	
1a	LSC_03	BIO	2019-06-18	15:00	59° 59,850'	51° 45,358'	Ring Net	↓		194	3	6,3	6,59	34,29	1014,16	82	
1a	LSC_03	BIO	2019-06-18	15:04	59° 59,851'	51° 45,373'	Ring Net	(bottom)		217	3,6	6,5	6,52	34,29	1014,15	84	
1a	LSC_03	BIO	2019-06-18	15:07	59° 59,850'	51° 45,391'	Ring Net	↑		232	1,5	6,5	6,57	34,30	1014,19	83	
1a	LSC_03	BIO	2019-06-18	15:11	59° 59,847'	51° 45,435'	Ring Net	↓		347	0,4	6,5	6,73	34,30	1014,11	81	
1a	LSC_03	BIO	2019-06-18	15:16	59° 59,839'	51° 45,433'	Ring Net	(bottom)		205	2,9	6,8	6,77	34,30	1014,10	83	
1a	LSC_03	BIO	2019-06-18	15:18	59° 59,836'	51° 45,412'	Ring Net	↑		235	3,2	6,7	6,80	34,30	1014,15	83	
1a	LSC_04	BIO	2019-06-18	17:04	60° 00,007'	52° 22,498'	CTD-Rosette	↓		193	3,4	5,4	5,68	34,59	1013,98	90	
1a	LSC_04	BIO	2019-06-18	18:03	59° 59,897'	52° 22,247'	CTD-Rosette	(bottom)	3365	181	4,8	8	6,73	34,62	1013,83	77	
1a	LSC_04	BIO	2019-06-18	19:21	59° 59,917'	52° 22,014'	CTD-Rosette	↑	3364	138	2,7	7,4	7,56	34,62	1013,84	82	
1a	LSC_04	BIO	2019-06-18	19:34	60° 00,262'	52° 21,054'	Argo float	↓		234	7	7	6,99	34,62	1013,78	84	
1a	LSC_04	BIO	2019-06-18	20:53	60° 00,006'	52° 22,519'	Ring Net	↓	3364	202	2,7	5,9	7,36	34,64	1013,69	87	
1a	LSC_04	BIO	2019-06-18	20:57	60° 00,015'	52° 22,532'	Ring Net	(bottom)	3363	226	4,4	6	7,41	34,63	1013,72	86	
1a	LSC_04	BIO	2019-06-18	20:59	60° 00,022'	52° 22,540'	Ring Net	↑	3362	244	3,8	6,1	7,41	34,64	1013,70	86	
1a	LSC_05	BIO	2019-06-19	0:14	59° 30,121'	53° 04,771'	CTD-Rosette	↓		64	5,3	6,3	7,91	34,69	1013,07	98	
1a	LSC_05	BIO	2019-06-19	1:14	59° 30,252'	53° 04,458'	CTD-Rosette	(bottom)	3423	194	1,3	6,9	6,19	34,67	1013,04	98	
1a	LSC_05	BIO	2019-06-19	2:27	59° 30,490'	53° 04,111'	CTD-Rosette	↑		215	1,3	7	6,25	34,70	1012,91	98	
1a	LSC_05	BIO	2019-06-19	2:38	59° 30,565'	53° 03,976'	Argo float	↓		211	1,9	7,3	6,79	34,69	1012,90	98	
1a	LSC_05	BIO	2019-06-19	2:54	59° 30,150'	53° 04,649'	Ring Net	↓	3426	193	3,8	6,6	7,42	34,69	1012,84	98	
1a	LSC_05	BIO	2019-06-19	2:58	59° 30,151'	53° 04,651'	Ring Net	(bottom)	3422	202	4	6,5	7,54	34,68	1012,85	98	
1a	LSC_05	BIO	2019-06-19	3:02	59° 30,164'	53° 04,637'	Ring Net	↑	3424	198	4,4	6,5	6,83	34,67	1012,84	98	
1a	LSC_06	BIO	2019-06-19	5:47	59° 00,306'	53° 09,743'	CTD-Rosette	↓		182	7	6,3	6,27	34,55	1012,50	98	
1a	LSC_06	BIO	2019-06-19	6:51	59° 00,254'	53° 09,744'	CTD-Rosette	(bottom)		168	5,7	6	6,59	34,53	1012,51	98	
1a	LSC_06	BIO	2019-06-19	8:16	59° 00,308'	53° 09,398'	CTD-Rosette	↑		172	5,3	5,8	6,60	34,50	1012,28	98	
1a	LSC_06	BIO	2019-06-19	8:27	59° 00,302'	53° 09,359'	Argo float	↓		169	8,2	6,4	6,03	34,54	1012,28	98	

1a	LSC_06	BIO	2019-06-19	8:36	59° 00,130'	53° 09,277'	Ring Net	↓	3480	177	8,6	5,9	6,80	34,50	1012,18	98	
1a	LSC_06	BIO	2019-06-19	8:39	59° 00,148'	53° 09,280'	Ring Net	(bottom)	3481	178	6,5	5,8	6,51	34,49	1012,19	98	
1a	LSC 06	BIO	2019-06-19	8:43	59° 00,162'	53° 09,262'	Ring Net	↑	3479	177	8	5,7	6,58	34,51	1012,24	98	
1a	LSC_07	BIO	2019-06-19	11:20	58° 30,403'	53° 14,656'	CTD-Rosette	↓		78	6,7	6,4	6,22	34,61	1012,16	97	
1a	LSC_07	BIO	2019-06-19	12:19	58° 30,539'	53° 14,872'	CTD-Rosette	(bottom)	3433	84	6,7	6,5	5,81	34,62	1011,96	96	
1a	LSC_07	BIO	2019-06-19	13:18	58° 30,656'	53° 14,915'	CTD-Rosette	↑	3433	94	7,8	6,7	7,10	34,61	1012,05	95	
1a	LSC_07	BIO	2019-06-19	13:27	58° 30,708'	53° 14,963'	Argo float	↓		102	6,1	6,9	7,18	34,61	1012,05	94	
1a	LSC_07	BIO	2019-06-19	13:37	58° 30,503'	53° 15,281'	Ring Net	↓		79	5,1	6,8	7,00	34,61	1012,09	94	
1a	LSC_07	BIO	2019-06-19	13:41	58° 30,503'	53° 15,314'	Ring Net	(bottom)		83	6,7	6,8	7,03	34,61	1012,04	94	
1a	LSC_07	BIO	2019-06-19	13:44	58° 30,518'	53° 15,338'	Ring Net	↑		78	6,1	6,7	7,12	34,62	1012,11	94	
1a	LSC_08	BIO	2019-06-19	16:12	58° 00,488'	53° 19,759'	CTD-Rosette	↓		115	7,8	6,6	5,81	34,59	1011,73	96	
1a	LSC_08	BIO	2019-06-19	17:15	58° 00,418'	53° 20,054'	CTD-Rosette	(bottom)		85	8,8	6,5	7,37	34,61	1011,59	95	
1a	LSC_08	BIO	2019-06-19	18:36	58° 00,559'	53° 20,661'	CTD-Rosette	↑		97	9,3	6,5	6,87	34,59	1011,39	94	
1a	LSC_08	BIO	2019-06-19	18:45	58° 00,592'	53° 20,800'	Argo float	↓		74	10,7	6,4	7,42	34,59	1011,31	97	
1a	LSC_08	BIO	2019-06-19	18:59	58° 00,490'	53° 19,815'	Ring Net	↓		89	9,1	6,4	7,16	34,59	1011,29	95	
1a	LSC_08	BIO	2019-06-19	19:03	58° 00,499'	53° 19,860'	Ring Net	(bottom)		80	9,3	6,2	7,30	34,59	1011,27	94	
1a	LSC_08	BIO	2019-06-19	19:06	58° 00,501'	53° 19,914'	Ring Net	↑		73	9,9	6,5	7,37	34,59	1011,27	94	
1a	LSC_09	BIO	2019-06-19	21:25	57° 30,771'	53° 24,564'	CTD-Rosette	↓		105	10,5	5,9	6,25	34,66	1010,97	94	
1a	LSC_09	BIO	2019-06-19	22:28	57° 30,765'	53° 25,043'	CTD-Rosette	(bottom)		82	11,6	5,6	6,99	34,71	1011,01	94	
1a	LSC_09	BIO	2019-06-19	23:43	57° 30,751'	53° 25,507'	CTD-Rosette	↑	3420	73	9,1	5,6	7,24	34,73	1011,19	95	
1a	LSC_09	BIO	2019-06-19	23:52	57° 30,732'	53° 25,596'	Ring Net	↓		94	9,5	5,8	7,17	34,73	1011,21	96	
1a	LSC_09	BIO	2019-06-19	23:56	57° 30,727'	53° 25,626'	Ring Net	(bottom)		97	10,7	5,7	7,17	34,73	1011,12	96	
1a	LSC_09	BIO	2019-06-19	23:59	57° 30,721'	53° 25,649'	Ring Net	↑		89	10,3	5,6	7,16	34,74	1011,12	96	
1a	LSC_10	BIO	2019-06-20	2:26	57° 00,773'	53° 29,286'	CTD-Rosette	↓		86	10,9	6	6,68	34,55	1010,72	95	
1a	LSC_10	BIO	2019-06-20	3:27	57° 01,079'	53° 29,212'	CTD-Rosette	(bottom)	3383	88	10,9	5,9	7,21	34,50	1010,72	98	
1a	LSC_10	BIO	2019-06-20	4:41	57° 01,512'	53° 29,291'	CTD-Rosette	↑		87	9,5	6	7,08	34,50	1010,57	98	
1a	LSC_10	BIO	2019-06-20	4:50	57° 01,551'	53° 29,391'	Ring Net	↓	3385	95	9,3	5,9	7,00	34,51	1010,54	98	
1a	LSC_10	BIO	2019-06-20	4:53	57° 01,570'	53° 29,406'	Ring Net	(bottom)	3382	90	10,7	5,8	7,15	34,51	1010,50	97	
1a	LSC_10	BIO	2019-06-20	4:57	57° 01,588'	53° 29,439'	Ring Net	↑	3382	93	11,4	5,9	6,78	34,55	1010,57	97	
1a	LSC_11	BIO	2019-06-20	7:40	56° 30,903'	53° 34,194'	CTD-Rosette	↓	3333	88	13,3	5,8	6,49	34,65	1010,25	98	
1a	LSC_11	BIO	2019-06-20	8:43	56° 30,971'	53° 33,943'	CTD-Rosette	(bottom)	3336	80	11	6	6,67	34,65	1010,40	98	
1a	LSC_11	BIO	2019-06-20	9:30	56° 31,010'	53° 33,730'	CTD-Rosette	↑		90	11,6	6	6,66	34,65	1010,51	98	
1a	AR7W_10	BIO	2019-06-20	14:51	55° 25,066'	53° 49,636'	CTD-Rosette	↓		117	2,9	6,2	5,68	34,61	1010,49	98	
1a	AR7W_10	BIO	2019-06-20	15:40	55° 24,915'	53° 49,456'	CTD-Rosette	(bottom)	2669	82	5,7	6,4	6,20	34,60	1010,54	98	
1a	AR7W_10	BIO	2019-06-20	16:39	55° 24,493'	53° 48,859'	CTD-Rosette	↑	2641	80	2,1	8,6	6,45	34,60	1010,71	86	
1a	AR7W_10	BIO	2019-06-20	16:51	55° 24,454'	53° 48,878'	Ring Net	↓		91	4,6	7,4	6,52	34,60	1010,73	95	
1a	AR7W_10	BIO	2019-06-20	16:54	55° 24,450'	53° 48,878'	Ring Net	(bottom)		90	4,2	7,4	6,46	34,60	1010,70	96	
1a	AR7W_10	BIO	2019-06-20	16:57	55° 24,439'	53° 48,852'	Ring Net	↑		79	4,6	7,7	6,06	34,61	1010,71	88	
1a	AR7W_10	BIO	2019-06-20	17:02	55° 24,416'	53° 48,862'	Ring Net	↓		76	5,1	7,8	6,36	34,60	1010,67	87	
1a	AR7W_10	BIO	2019-06-20	17:06	55° 24,387'	53° 48,882'	Ring Net	(bottom)		73	5,1	7,6	6,35	34,60	1010,68	91	
1a	AR7W_10	BIO	2019-06-20	17:09	55° 24,362'	53° 48,903'	Ring Net	↑		73	4,4	7,1	6,35	34,60	1010,73	95	
1a	AR7W_10	BIO	2019-06-20	17:12	55° 24,330'	53° 48,928'	Ring Net	↓		66	4,2	6,8	6,43	34,60	1010,64	96	
1a	AR7W_10	BIO	2019-06-20	17:16	55° 24,326'	53° 48,917'	Ring Net	(bottom)		66	5,1	6,5	6,24	34,60	1010,72	97	
1a	AR7W_10	BIO	2019-06-20	17:19	55° 24,323'	53° 48,912'	Ring Net	↑		63	4,6	6,4	6,40	34,60	1010,70	97	
1a	AR7W_9.5	BIO	2019-06-20	18:20	55° 20,343'	53° 54,323'	CTD-Rosette	↓		90	6,9	7,5	6,18	34,25	1010,61	94	
1a	AR7W_9.5	BIO	2019-06-20	19:06	55° 20,077'	53° 54,169'	CTD-Rosette	(bottom)		115	4,4	7,9	6,15	34,24	1010,57	92	
1a	AR7W_9.5	BIO	2019-06-20	19:40	55° 19,944'	53° 53,967'	CTD-Rosette	↑		83	7,4	6,4	5,97	34,48	1010,77	97	
1a	AR7W_9	BIO	2019-06-20	20:23	55° 15,795'	53° 59,787'	CTD-Rosette	↓		91	6,1	6,3	5,88	33,59	1010,64	97	
1a	AR7W_9	BIO	2019-06-20	20:59	55° 15,679'	53° 59,717'	CTD-Rosette	(bottom)		104	4,4	7,2	5,95	33,60	1010,68	94	
1a	AR7W_9	BIO	2019-06-20	21:55	55° 15,478'	53° 59,541'	CTD-Rosette	↑		87	5,9	6,8	5,85	33,54	1010,76	94	
1a	AR7W_9	BIO	2019-06-20	22:04	55° 15,469'	53° 59,521'	Ring Net	↓		164	6,7	6,1	6,05	33,52	1010,84	97	
1a	AR7W_9	BIO	2019-06-20	22:07	55° 15,475'	53° 59,527'	Ring Net	(bottom)		103	6,5	6,4	5,93	33,51	1010,83	97	
1a	AR7W_9	BIO	2019-06-20	22:11	55° 15,485'	53° 59,537'	Ring Net	↑		99	6,5	6,2	5,92	33,51	1010,78	98	
1a	AR7W_9	BIO	2019-06-20	22:15	55° 15,475'	53° 59,479'	Ring Net	↓		114	7	5,9	5,65	33,58	1010,78	98	
1a	AR7W_9	BIO	2019-06-20	22:18	55° 15,465'	53° 59,466'	Ring Net	(bottom)		118	6,3	5,7	5,66	33,58	1010,74	98	
1a	AR7W_9	BIO	2019-06-20	22:22	55° 15,469'	53° 59,483'	Ring Net	↑		116	5,9	6,2	5,71	33,52	1010,79	98	
1a	AR7W_8.5	BIO	2019-06-20	23:32	55° 11,241'	54° 03,419'	CTD-Rosette	↓		106	7,4	5,3	3,63	32,44	1010,75	98	
1a	AR7W_8.5	BIO	2019-06-20	23:58	55° 11,141'	54° 03,086'	CTD-Rosette	(bottom)	1586	115	5,7	5,1	3,70	32,59	1011,18	98	
1a	AR7W_8.5	BIO	2019-06-21	0:22	55° 11,049'	54° 03,056'	CTD-Rosette	↑	1558	115	7,4	5,1	3,61	32,43	1011,01	98	
1a	AR7W_8	BIO	2019-06-21	1:12	55° 06,748'	54° 08,480'	CTD-Rosette	↓	972	121	8,2	5,1	3,05	32,62	1010,73	98	
1a	AR7W_8	BIO	2019-06-21	1:33	55° 06,682'	54° 08,536'	CTD-Rosette	(bottom)	971	117	8,2	4,8	3,07	33,03	1010,57	98	
1a	AR7W_8	BIO	2019-06-21	2:04	55° 06,469'	54° 08,634'	CTD-Rosette	↑	934	124	7,6	4,3	3,28	33,27	1010,68	98	
1a	AR7W_8	BIO	2019-06-21	2:13	55° 06,415'	54° 08,889'	Ring Net	↓	937	130	5,3	4,7	2,95	32,35	1010,48	98	
1a	AR7W_8	BIO	2019-06-21	2:17	55° 06,426'	54° 08,893'	Ring Net	(bottom)	937	140	8	4,5	2,96	32,32	1010,51	98	
1a	AR7W_8	BIO	2019-06-21	2:20	55° 06,419'	54° 08,871'	Ring Net	↑	936	148	7	4,4	2,95	32,34	1010,55	98	
1a	AR7W_8	BIO	2019-06-21	2:23	55° 06,399'	54° 08,889'	Ring Net	↓	934	154	7	4,5	2,98	32,47	1010,63	98	
1a	AR7W_8	BIO	2019-06-21	2:27	55° 06,368'	54° 08,909'	Ring Net	(bottom)	933	156	7,6	4,4	3,09	33,01	1010,60	98	
1a	AR7W_8	BIO	2019-06-21	2:30	55° 06,351'	54° 08,902'	Ring Net	↑	930	145	7,4	4,3	3,06	32,89	1010,57	98	
1a	AR7W_7.5	BIO	2019-06-21	3:47	55° 01,893'	54° 12,980'	CTD-Rosette	↓	542	132	7,8	3,3	3,41	31,45	1010,68	98	
1a	AR7W_7.5	BIO	2019-06-21	3:59	55° 01,820'	54° 12,818'	CTD-Rosette	(bottom)	541	148	7,6	3,6	3,22	32,05	1010,62	98	
1a	AR7W_7.5	BIO	2019-06-21	4:08	55° 01,758'	54° 12,693'	CTD-Rosette	↑	537	140	6,3	3,4	3,23	31,66	1010,77	98	
1a	AR7W_7	BIO	2019-06-21	5:21	54° 57,422'	54° 18,392'	CTD-Rosette	↓	362	144	8,8	4,3	2,01	30,93	1011,42	98	
1a	AR7W_7	BIO	2019-06-21	5:31	54° 57,313'	54° 18,191'	CTD-Rosette	(bottom)	361	145	7,6	3,9	2,38	30,84	1011,47	98	
1a	AR7W_7	BIO	2019-06-21	5:48	54° 57,201'	54° 17,869'	CTD-Rosette	↑	361	136	9,3	3,9	2,28	30,91	1011,39	98	
1a	AR7W_7	BIO	2019-06-21	5:57	54° 57,127'	54° 17,694'	Ring Net	↓	360	147	8,6	5,2	2,33	30,83	1011,37	98	
1a	AR7W_7	BIO	2019-06-21	6:01	54° 57,082'	54° 17,616'	Ring Net	(bottom)	359	124	6,9	5,4	2,43	30,83	1011,40	98	
1a	AR7W_7	BIO	2019-06-21	6:04	54° 57,037'	54° 17,539'	Ring Net	↑	358	153	3,2	5	2,25	30,85	1011,34	98	
1a	AR7W_7	BIO	2019-06-21	6:07	54° 57,013'	54° 17,477'	Ring Net	↓	358	80	8,4	4,6	2,22	30,85	1011,34	98	
1a	AR7W_7	BIO	2019-06-21	6:11	54° 56,985'	54° 17,408'	Ring Net	(bottom)	357	139	7,8	4,8	2,34	30,87	1011,31	98	
1a	AR7W_7	BIO	2019-06-21	6:14	54° 56,952'	54° 17,339'	Ring Net	↑	357	118	6,5	5,1	2,35	30,83	1011,33	98	
1a	AR7W_7	BIO	2019-06-21	6:17	54° 56,926'	54° 17,278'	Ring Net	↓	357	153	8,6	4,2	2,34	30,83	1011,32	98	
1a	AR7W_7	BIO	2019-06-21	6:28	54° 56,829'	54° 17,061'	Ring Net	(bottom)	355	143	8,6	4,5	2,42	30,84	1011,23	98	
1a	AR7W_7	BIO	2019-06-21	6:37	54° 56,758'	54° 16,893'	Ring Net	↑	355	144	9,5	3,3	2,37	30,84	1011,15	98	
1a	AR7W_6	BIO	2019-06-21	8:07	54° 45,795'	54° 29,530'	CTD-Rosette	↓	244	136	3,6	4,5	2,29	31,26	1011,34	98	
1a	AR7W_6	BIO	2019-06-21	8:13	54° 45,780'	54° 29,583'	CTD-Rosette	(bottom)	244	119	4,2	4,4	2,23	31,47	1011,27	98	
1a	AR7W_6	BIO	2019-06-21	8:23	54° 45,767'	54° 29,658'	CTD-Rosette	↑	244	134	8,6	4,2	0,14	31,82	1011,36	98	
1a	AR7W_6	BIO	2019-06-21	8:32	54° 45,811'	54° 29,819'	Ring Net	↓	244	120	7,6	3,5	1,32	31,49	1011,26	98	
1a	AR7W_6	BIO	2019-06-21	8:35	54° 45,826'	54° 29,865'	Ring Net	(bottom)	244	126	7,4	3,3	2,43	31,21	1011,26	98	
1a	AR7W_6	BIO	2019-06-21	8:39	54° 45,830'	54° 29,888'	Ring Net	↑	244	125	8	3,3	0,27	31,82	1011,20	98	
1a	AR7W_6	BIO	2019-06-21	8:42	54° 45,843'	54° 29,933'	Ring Net	↓	245	122	7,2	3,1	0,25	31,79	1011,19	98	
1a	AR7W_6	BIO	2019-06-21	8:47	54° 45,866'	54° 29,996'	Ring Net	(bottom)	244	122	8	3,2	0,70	31,63	1011,06	98	
1a	AR7W_6	BIO	2019-06-21	8:50	54° 45,876'	54° 30,025'	Ring Net	↑	244	126	8,9	3,2	0,46	31,40	1011,04	98	
1a	AR7W_6	BIO	2019-06-21	8:53	54° 45,893'	54° 30,062'	Ring Net	↓	245	127	8,9	3,4	0,61	31,67	1011,06	98	

1a	AR7W_6	BIO	2019-06-21	9:02	54° 45,922'	54° 30,138'	Ring Net	(bottom)	245	122	8,6	3,1	0,37	31,72	1011,15	98	
1a	AR7W_6	BIO	2019-06-21	9:08	54° 45,945'	54° 30,198'	Ring Net	↑	244	127	7,2	3,3	1,08	31,80	1011,24	98	
1a	AR7W_6	BIO	2019-06-21	9:12	54° 45,964'	54° 30,248'	Ring Net	↓	244	131	6,7	3,3	0,27	31,83	1011,30	98	
1a	AR7W_6	BIO	2019-06-21	9:16	54° 45,981'	54° 30,310'	Ring Net	(bottom)	244	134	7	3,3	2,45	31,26	1011,33	98	
1a	AR7W_6	BIO	2019-06-21	9:19	54° 45,993'	54° 30,344'	Ring Net	↑	244	133	7,2	3,4	2,63	31,12	1011,37	98	
1a	AR7W_5	BIO	2019-06-21	11:14	54° 29,388'	54° 45,549'	CTD-Rosette	↓	195	123	6,7	7,9	3,42	30,37	1011,86	88	
1a	AR7W_5	BIO	2019-06-21	11:18	54° 29,347'	54° 45,551'	CTD-Rosette	(bottom)	196	128	12,9	6,4	2,42	30,63	1011,89	92	
1a	AR7W_5	BIO	2019-06-21	11:32	54° 29,242'	54° 45,589'	CTD-Rosette	↑	196	126	13,1	4,3	2,56	30,43	1011,82	98	
1a	AR7W_5	BIO	2019-06-21	11:41	54° 29,213'	54° 45,725'	Ring Net	↓	195	120	10,5	4	3,92	29,97	1011,69	98	
1a	AR7W_5	BIO	2019-06-21	11:44	54° 29,198'	54° 45,728'	Ring Net	(bottom)	194	122	11,6	3,9	3,03	29,98	1011,58	98	
1a	AR7W_5	BIO	2019-06-21	11:47	54° 29,187'	54° 45,726'	Ring Net	↑	193	124	13,5	3,8	2,35	30,73	1011,57	98	
1a	AR7W_5	BIO	2019-06-21	11:50	54° 29,177'	54° 45,705'	Ring Net	↓	194	123	11,8	3,8	2,42	30,80	1011,53	98	
1a	AR7W_5	BIO	2019-06-21	11:54	54° 29,161'	54° 45,713'	Ring Net	(bottom)	194	117	10,9	3,9	3,44	29,97	1011,47	98	
1a	AR7W_5	BIO	2019-06-21	11:57	54° 29,149'	54° 45,709'	Ring Net	↑	194	124	11,6	3,7	2,86	30,18	1011,45	98	
1a	AR7W_5	BIO	2019-06-21	12:00	54° 29,143'	54° 45,707'	Ring Net	↓	195	127	11,6	3,8	1,90	30,88	1011,39	98	
1a	AR7W_5	BIO	2019-06-21	12:07	54° 29,126'	54° 45,696'	Ring Net	(bottom)	194	125	11,4	3,8	2,18	30,79	1011,25	98	
1a	AR7W_5	BIO	2019-06-21	12:12	54° 29,107'	54° 45,694'	Ring Net	↑	195	123	12,6	3,8	3,44	30,15	1011,15	98	
1a	AR7W_5	BIO	2019-06-21	12:18	54° 29,082'	54° 45,732'	Ring Net	↓	195	125	12,6	3,8	3,42	30,30	1011,18	98	
1a	AR7W_6	BIO	2019-06-21	12:22	54° 29,064'	54° 45,725'	Ring Net	(bottom)	195	124	11,4	3,8	1,89	30,65	1011,17	98	
1a	AR7W_5	BIO	2019-06-21	12:24	54° 29,052'	54° 45,721'	Ring Net	↑	195	122	11,8	3,8	2,98	30,46	1011,17	98	
1a	AR7W_10.5	BIO	2019-06-21	23:48	55° 31,032'	53° 43,790'	CTD-Rosette	↓		136	12	5,9	6,01	34,17	1012,77	98	
1a	AR7W_10.5	BIO	2019-06-22	0:40	55° 30,942'	53° 44,013'	CTD-Rosette	(bottom)		138	13,7	6	5,91	34,18	1011,89	98	
1a	AR7W_10.5	BIO	2019-06-22	1:18	55° 30,917'	53° 44,086'	CTD-Rosette	↑		137	13,5	5,9	5,52	34,23	1011,87	98	
Leg 1b																	
1b	ISECOLD 1-500	DFO Full	2019-06-25	12:57	57° 42,302'	59° 31,616'	CTD-Rosette	↓	603	328	17,7	1,7	1,18	32,68	1008,84	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	13:07	57° 42,206'	59° 31,608'	CTD-Rosette	(bottom)	594	340	14,9	1,5	2,17	32,67	1008,27	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	13:46	57° 41,694'	59° 31,705'	CTD-Rosette	↑	517	331	14,9	1,6	2,16	32,68	1008,92	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	14:28	57° 42,415'	59° 31,818'	Drop Camera	↓	592	325	16,8	1,6	2,07	32,70	1008,70	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	14:37	57° 42,413'	59° 31,740'	Drop Camera	(bottom)		325	17,1	1,5	2,08	32,70	1008,75	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	15:19	57° 42,181'	59° 31,653'	Drop Camera	↑	590	326	16,6	1,6	1,81	32,71	1010,11	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	17:22	57° 41,999'	59° 31,538'	IKMT	↓	565	350	14,9	2,3	0,58	32,60	1011,32	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	17:45	57° 42,638'	59° 31,165'	IKMT	(bottom)	646	345	13,9	2,3	0,80	32,65	1011,34	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	18:40	57° 44,583'	59° 30,271'	IKMT	↑	682	324	13,5	2,5	0,70	32,69	1011,59	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	19:20	57° 42,591'	59° 31,872'	Rock Dredge	↓	594	337	13,3	2,2	0,69	32,54	1011,67	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	19:28	57° 42,513'	59° 31,851'	Rock Dredge	(bottom)	592	338	14,9	2,2	0,76	32,54	1011,61	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	20:03	57° 41,868'	59° 31,490'	Rock Dredge	↑	556	332	11,8	2	0,68	32,55	1011,01	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	21:11	57° 42,323'	59° 31,776'	Hydrobios	↓	594	338	13,7	1,7	-0,10	32,61	1009,31	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	21:35	57° 42,157'	59° 31,562'	Hydrobios	(bottom)	584	344	14,7	1,9	0,81	32,54	1009,41	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	21:53	57° 41,999'	59° 31,387'	Hydrobios	↑	570	321	12,9	1,6	0,83	32,56	1009,22	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	22:34	57° 42,371'	59° 31,806'	Box Core	↓	594	316	12,8	1,4	0,75	32,54	1009,45	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	22:48	57° 42,129'	59° 31,698'	Box Core	(bottom)	581	319	14,1	1,4	0,83	32,55	1008,82	98	
1b	ISECOLD 1-500	DFO Full	2019-06-25	22:59	57° 42,071'	59° 31,556'	Box Core	↑	569	338	17,1	1,4	1,02	32,52	1008,61	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	1:37	57° 42,707'	59° 22,650'	CTD-Rosette	↓	1009	356	7,2	2,6	2,23	32,81	1011,89	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	1:55	57° 42,527'	59° 22,651'	CTD-Rosette	(bottom)	1005	358	8,8	3	1,69	32,78	1012,00	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	2:50	57° 41,871'	59° 22,590'	CTD-Rosette	↑	974	20	8,6	3,5	1,00	32,80	1012,86	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	3:24	57° 42,806'	59° 22,634'	Drop Camera	↓	1012	22	9,3	4	1,73	32,83	1013,78	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	3:55	57° 42,601'	59° 22,442'	Drop Camera	(bottom)	1014	35	9,3	3,9	2,02	32,95	1013,89	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	4:27	57° 42,322'	59° 22,238'	Drop Camera	↑	1011	19	7,2	4,3	2,07	32,94	1014,28	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	5:03	57° 42,835'	59° 22,671'	Rock Dredge	↓	1010	340	6,5	3,4	2,21	32,95	1014,30	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	5:15	57° 42,755'	59° 22,562'	Rock Dredge	(bottom)	1014	351	5,7	3,6	2,26	32,95	1014,31	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	5:56	57° 42,065'	59° 22,097'	Rock Dredge	↑	996	345	7	2,8	2,23	32,95	1014,01	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	6:48	57° 42,827'	59° 22,772'	Hydrobios	↓	1005	342	9,5	2,5	2,28	32,76	1012,66	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	7:12	57° 42,464'	59° 22,586'	Hydrobios	(bottom)	1007	355	10,1	3,4	2,30	32,76	1012,92	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	7:44	57° 42,096'	59° 22,255'	Hydrobios	↑	996	359	8,8	3,6	2,34	32,77	1013,18	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	8:20	57° 42,732'	59° 22,136'	IKMT	↓	1030	337	7,4	2,6	1,53	32,81	1013,07	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	9:33	57° 40,830'	59° 17,450'	IKMT	↑	1100	334	8,8	2,8	1,46	32,80	1013,64	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	10:18	57° 42,964'	59° 22,974'	Box Core	↓	969	310	7,2	1,7	1,50	32,42	1014,14	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	10:30	57° 42,842'	59° 22,775'	Box Core	(bottom)	1003	329	8,6	1,8	1,51	32,42	1014,30	98	
1b	ISECOLD 1-1000	DFO Full	2019-06-26	10:47	57° 42,652'	59° 22,656'	Box Core	↑	1008	333	8	2,3	1,51	32,42	1014,71	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	13:34	57° 43,193'	59° 05,105'	CTD-Rosette	↓	1457	320	8,4	4,7	5,48	34,08	1017,59	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	14:00	57° 43,078'	59° 05,228'	CTD-Rosette	(bottom)	1451	337	8	4,7	5,50	34,08	1016,54	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	15:00	57° 42,777'	59° 05,494'	CTD-Rosette	↑	1443	301	7,8	4,7	5,61	34,06	1016,78	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	15:24	57° 43,228'	59° 04,870'	Drop Camera	↓	1465	290	6,1	4,6	5,57	34,13	1016,83	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	15:48	57° 43,146'	59° 04,719'	Drop Camera	(bottom)	1468	311	7,6	4,6	5,75	34,13	1016,96	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	16:43	57° 42,706'	59° 04,108'	Drop Camera	↑		334	9,1	4,8	5,50	34,15	1017,17	96	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	17:02	57° 43,292'	59° 05,119'	Rock Dredge	↓	1464	317	6,9	4,8	5,78	34,08	1017,43	94	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	17:20	57° 43,073'	59° 05,017'	Rock Dredge	(bottom)	1460	304	8,9	4,5	5,58	34,08	1017,26	97	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	18:06	57° 42,272'	59° 04,644'	Rock Dredge	↑	1552	301	9,1	4,4	5,62	34,07	1017,82	97	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	18:30	57° 43,368'	59° 05,000'	Rock Dredge	↓	1476	298	9,1	4,4	5,75	34,10	1017,88	96	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	18:49	57° 43,141'	59° 04,745'	Rock Dredge	(bottom)	1468	298	9,7	4,1	5,69	34,08	1018,12	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	19:52	57° 42,206'	59° 04,192'	Rock Dredge	↑		314	9,7	4,2	5,72	34,10	1018,49	96	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	21:09	57° 43,166'	59° 04,848'	Hydrobios	↓	1464	297	5,5	4,7	5,95	34,09	1019,35	92	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	21:37	57° 42,895'	59° 04,614'	Hydrobios	(bottom)	1485	322	8,8	4,6	5,87	34,10	1019,33	93	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	22:05	57° 42,609'	59° 04,450'	Hydrobios	↑	1546	292	8	4,3	5,95	34,12	1019,71	94	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	22:41	57° 43,483'	59° 05,266'	IKMT	↓	1498	283	7,2	3,9	5,85	34,09	1019,85	97	
1b	ISECOLD 1-1500	DFO Full	2019-06-26	23:05	57° 44,163'	59° 05,062'	IKMT	(bottom)	1478	298	10,3	3,5	5,74	34,12	1019,80	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-27	0:01	57° 43,094'	59° 06,790'	IKMT	↑	1452	306	4,4	3,8	5,92	34,09	1020,49	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-27	0:33	57° 43,182'	59° 04,973'	Box Core	↓	1460	277	4	4	5,80	34,12	1020,62	97	
1b	ISECOLD 1-1500	DFO Full	2019-06-27	1:06	57° 43,212'	59° 04,986'	Box Core	(bottom)	1461	280	6,3	3,7	5,74	34,11	1020,97	98	
1b	ISECOLD 1-1500	DFO Full	2019-06-27	1:32	57° 43,178'	59° 04,795'	Box Core	↑	1466	293	4,4	3,5	5,89	34,13	1021,20	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	4:04	57° 43,762'	58° 41,734'	CTD-Rosette	↓		265	7	4,7	6,15	34,24	1021,56	94	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	4:44	57° 43,856'	58° 41,404'	CTD-Rosette	(bottom)		322	6,5	5,4	6,00	34,25	1021,75	90	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	5:43	57° 43,873'	58° 41,189'	CTD-Rosette	↑		270	8,4	3,9	6,17	34,27	1022,13	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	6:02	57° 43,777'	58° 41,629'	Drop Camera	↓		284	7,8	3,9	5,87	34,26	1022,10	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	6:32	57° 43,557'	58° 41,346'	Drop Camera	(bottom)		293	8,4	4	6,00	34,24	1022,24	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	7:39	57° 43,222'	58° 40,050'	Drop Camera	↑		255	8	3,4	6,06	34,23	1022,69	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	7:59	57° 43,771'	58° 41,695'	Rock Dredge	↓		274	8	3,3	6,15	34,30	1022,64	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	8:23	57° 43,693'	58° 41,403'	Rock Dredge	(bottom)		286	4,8	3,4	6,16	34,30	1022,68	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	9:35	57° 42,706'	58° 38,395'	Rock Dredge	↑		290	5,3	3,9	5,64	34,20	1023,00	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	10:28	57° 43,793'	58° 41,630'	CTD-Rosette	↓		302	5,1	4,4	6,02	34,25	1023,25	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	10:54	57° 43,725'	58° 41,652'	CTD-Rosette	(bottom)		318	3,8	4,6	6,00	34,22	1023,44	98	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	11:35	57° 43,633'	58° 41,761'	CTD-Rosette	↑		329	4,4	4,8	5,99	34,21	1023,59	97	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	12:28	57° 43,798'	58° 41,679'	Hydrobios	↓		323	3,4	5	5,82	34,22	1023,67	96	

1b	ISECOLD 1-2000	DFO Full	2019-06-27	13:01	57° 43,824'	58° 41,698'	Hydrobios	(bottom)		283	3	5	5,91	34,23	1024,07	95	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	13:30	57° 43,820'	58° 41,559'	Hydrobios	↑		259	3,6	5,3	5,91	34,21	1024,11	93	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	13:57	57° 44,017'	58° 40,996'	IKMT	↓		286	2,1	5,1	6,03	34,24	1024,08	95	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	14:24	57° 44,238'	58° 41,687'	IKMT	(bottom)		237	9,7	5,2	6,14	34,24	1024,04	96	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	15:13	57° 44,293'	58° 40,241'	IKMT	↑		268	10,1	4,7	6,33	34,27	1023,88	97	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	16:16	57° 43,815'	58° 41,647'	Box Core	↓		295	5,9	4,9	5,90	34,28	1023,85	96	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	16:54	57° 43,775'	58° 41,618'	Box Core	(bottom)		320	5,3	5,5	6,11	34,24	1023,69	95	
1b	ISECOLD 1-2000	DFO Full	2019-06-27	18:06	57° 43,524'	58° 41,730'	Box Core	↑		324	5	5,3	6,33	34,23	1023,64	95	
1b	ISECOLD 1-2200	Rock Dredge	2019-06-27	20:09	57° 43,782'	58° 33,536'	Rock Dredge	↓					6,09	34,14			
1b	ISECOLD 1-2200	Rock Dredge	2019-06-27	20:34	57° 43,613'	58° 33,465'	Rock Dredge	(bottom)		360	6,7	5,3	5,78	34,16	1023,28	95	
1b	ISECOLD 1-2200	Rock Dredge	2019-06-27	22:12	57° 42,216'	58° 33,144'	Rock Dredge	↑		340	4	5,2	6,00	34,16	1023,65	89	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	2:29	57° 44,405'	57° 53,017'	CTD-Rosette	↓	2492	263	3,8	4,2	4,10	33,86	1023,22	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	2:55	57° 44,384'	57° 53,110'	CTD-Rosette	(bottom)	2492	298	2,7	4,6	3,09	33,86	1022,94	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	3:23	57° 44,315'	57° 53,312'	CTD-Rosette	↑	2495	4	3,6	4,6	3,46	33,85	1022,85	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	3:48	57° 44,412'	57° 52,998'	Hydrobios	↓	2492	338	1,5	4,6	3,61	33,84	1022,65	97	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	4:15	57° 43,945'	58° 41,298'	Hydrobios	(bottom)	2493	0	0	4,6	4,04	33,85	1022,58	96	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	4:47	57° 44,259'	57° 53,459'	Hydrobios	↑	2493	264	2,3	6	4,01	33,85	1022,62	90	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	5:15	57° 44,455'	57° 52,721'	IKMT	↓	2495	316	2,1	4,7	4,95	33,81	1022,37	97	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	5:27	57° 44,616'	57° 53,194'	IKMT	(bottom)		235	3,4	4,5	4,79	33,83	1022,36	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	5:42	57° 44,208'	57° 53,070'	IKMT	↑		51	0,8	4,4	4,91	33,82	1022,42	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	5:48	57° 44,471'	57° 53,070'	IKMT	↓		284	3,2	4,2	4,95	33,80	1022,38	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	6:12	57° 44,159'	57° 53,966'	IKMT	(bottom)		199	5	4,3	4,96	33,81	1022,09	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	6:47	57° 43,575'	57° 52,574'	IKMT	↑	2481	292	3	4,3	5,08	33,82	1022,05	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	7:11	57° 44,439'	57° 53,033'	CTD-Rosette	↓	2493	297	5,5	4,2	4,28	33,84	1021,98	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	8:06	57° 44,435'	57° 53,137'	CTD-Rosette	(bottom)	2494	300	8,2	4,1	5,08	33,79	1021,53	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	9:13	57° 44,355'	57° 53,054'	CTD-Rosette	↑	2492	328	7,2	4,1	5,06	33,82	1021,30	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	9:35	57° 44,418'	57° 52,943'	Drop Camera	↓		325	8,8	4,3	4,74	33,82	1021,19	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	10:05	57° 44,436'	57° 52,912'	Drop Camera	(bottom)		311	6,7	4,2	4,99	33,82	1021,15	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	11:09	57° 44,609'	57° 52,975'	Drop Camera	↑		309	6,5	4,4	4,74	33,84	1021,53	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	12:10	57° 44,416'	57° 52,932'	Box Core	↓		295	4	4,4	5,06	33,88	1021,18	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	12:45	57° 44,436'	57° 52,882'	Box Core	(bottom)		271	3,4	4,8	4,03	33,84	1021,18	98	
1b	ISECOLD 1-2500	DFO Full	2019-06-28	13:29	57° 44,360'	57° 52,796'	Box Core	↑		278	5,3	4,5	5,20	33,87	1021,14	98	
1b	ISECOLD 2-2500	DFO Full	2019-06-28	20:02	58° 54,426'	58° 51,018'	Drop Camera	↓		80	1	6,4	6,29	34,14	1019,01	93	
1b	ISECOLD 2-2500	DFO Full	2019-06-28	20:36	58° 54,324'	58° 50,913'	Drop Camera	(bottom)		159	1,1	6,8	6,76	34,14	1018,88	93	
1b	ISECOLD 2-2500	DFO Full	2019-06-28	21:52	58° 53,964'	58° 51,059'	Drop Camera	↑		127	3	6,4	6,70	34,12	1018,73	97	
1b	ISECOLD 2-2500	DFO Full	2019-06-28	22:21	58° 54,506'	58° 51,099'	Box Core	↓		128	3,4	5,7	6,78	34,07	1018,52	98	
1b	ISECOLD 2-2500	DFO Full	2019-06-28	23:12	58° 54,414'	58° 51,081'	Box Core	(bottom)		177	1,3	6	6,07	34,03	1018,45	96	
1b	ISECOLD 2-2500	DFO Full	2019-06-28	23:55	58° 54,222'	58° 51,115'	Box Core	↑		150	1	6,2	6,27	34,05	1018,37	96	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	0:40	58° 54,538'	58° 51,024'	CTD-Rosette	↓		149	1	5,8	5,60	34,02	1018,40	98	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	1:06	58° 54,572'	58° 51,160'	CTD-Rosette	(bottom)	2397	139	4,8	5,7	6,66	34,04	1018,20	98	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	1:42	58° 54,590'	58° 51,277'	CTD-Rosette	↑	2396	224	5	5,5	6,72	34,05	1017,93	98	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	2:06	58° 54,438'	58° 51,120'	Hydrobios	↓	2396	199	4,8	5,2	6,23	34,06	1017,83	98	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	2:33	58° 54,421'	58° 51,346'	Hydrobios	(bottom)		210	4,8	5,3	6,93	34,09	1017,69	98	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	3:05	58° 54,352'	58° 51,264'	Hydrobios	↑		203	8,6	5,2	6,78	34,10	1017,19	98	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	3:39	58° 53,975'	58° 51,374'	IKMT	↓		185	12,6	5,2	6,92	34,13	1017,11	96	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	4:06	58° 54,334'	58° 51,229'	IKMT	↑	2392	177	8,4	5	6,98	34,13	1017,02	96	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	4:17	58° 54,462'	58° 51,605'	IKMT	↓	2393	169	8	4,9	7,06	34,12	1016,90	97	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	4:51	58° 55,047'	58° 53,916'	IKMT	(bottom)		204	11,4	5	6,52	34,04	1016,39	97	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	5:36	57° 43,945'	58° 41,298'	IKMT	↑		187	12,8	4,5	6,41	34,01	1016,23	97	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	6:19	58° 54,436'	58° 50,784'	CTD-Rosette	↓	2398	200	9,1	4,8	6,84	34,14	1016,24	95	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	7:06	58° 54,366'	58° 50,486'	CTD-Rosette	(bottom)		199	6,3	4,5	6,68	34,15	1016,50	96	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	8:11	58° 54,327'	58° 50,031'	CTD-Rosette	↑	2401	207	6,5	4,3	6,57	34,13	1016,39	98	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	8:33	58° 54,532'	58° 50,919'	Rock Dredge	↓	2399	137	3	5,2	6,61	34,07	1016,45	94	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	9:11	58° 54,111'	58° 50,988'	Rock Dredge	(bottom)		174	3,8	4,9	6,68	34,08	1016,51	96	
1b	ISECOLD 2-2500	DFO Full	2019-06-29	10:19	58° 53,580'	58° 51,274'	Rock Dredge	↑	2375	177	4	4,8	6,67	34,10	1016,41	95	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	13:19	58° 50,848'	59° 22,086'	Drop Camera	↓		160	1,7	4,1	2,87	32,42	1016,61	98	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	13:48	58° 50,727'	59° 22,330'	Drop Camera	(bottom)		135	1,9	5,4	2,90	32,42	1016,76	94	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	14:50	58° 50,431'	59° 23,026'	Drop Camera	↑		155	2,9	5,6	3,04	32,43	1016,77	94	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	15:17	58° 50,800'	59° 22,099'	CTD-Rosette	↓		86	2,1	5,9	2,68	32,46	1016,68	89	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	15:51	58° 50,730'	59° 22,360'	CTD-Rosette	(bottom)		94	6,3	5,1	3,59	32,45	1016,59	94	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	16:31	58° 50,626'	59° 22,823'	CTD-Rosette	↑		104	6,1	5,3	2,73	32,45	1016,49	92	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	16:46	58° 50,903'	59° 21,627'	Box Core	↓		93	6,3	5,2	3,57	32,48	1016,51	92	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	17:14	58° 50,809'	59° 22,104'	Box Core	(bottom)		81	6,1	5,2	3,81	32,49	1016,55	93	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	17:41	58° 50,533'	59° 22,473'	Box Core	↑		81	4,2	5,2	2,40	32,53	1016,80	94	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	18:31	58° 50,851'	59° 22,064'	CTD-Rosette	↓		56	4,6	5,5	3,25	32,49	1016,86	90	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	19:01	58° 50,740'	59° 22,443'	CTD-Rosette	(bottom)		43	2,1	5,6	3,36	32,50	1016,77	90	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	19:34	58° 50,653'	59° 22,611'	CTD-Rosette	↑		44	2,5	5,6	2,86	32,49	1016,75	91	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	19:53	58° 50,851'	59° 22,088'	Hydrobios	↓		55	4,6	5,2	3,51	32,52	1016,66	91	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	20:19	58° 50,689'	59° 22,383'	Hydrobios	(bottom)		51	3,4	5,1	3,76	32,52	1016,72	91	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	20:52	58° 50,700'	59° 22,626'	Hydrobios	↑		47	5,5	4,8	3,61	32,50	1016,65	92	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	21:18	58° 50,459'	59° 22,045'	IKMT	↓		20	4,4	4,5	3,80	32,51	1016,70	94	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	21:33	58° 50,695'	59° 21,871'	IKMT	(bottom)		344	7,4	4,5	4,28	32,57	1016,62	94	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	21:41	58° 50,549'	59° 22,408'	IKMT	↑		322	2,9	5,4	3,85	32,49	1016,68	89	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	21:48	58° 50,314'	59° 22,293'	IKMT	↓		10	3,8	4,5	3,99	32,52	1016,69	94	
1b	ISECOLD2-2000	DFO Full	2019-06-29	22:12	58° 50,847'	59° 21,805'	IKMT	(bottom)		354	7,6	4,5	4,30	32,54	1016,85	94	
1b	ISECOLD2-2000	DFO Full	2019-06-29	22:36	58° 50,323'	59° 23,047'	IKMT	↑		89	3,6	4,6	3,22	32,53	1016,84	95	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	23:02	58° 50,768'	59° 22,133'	Rock Dredge	↓		88	4	5	2,82	32,53	1017,02	94	
1b	ISECOLD 2-2000	DFO Full	2019-06-29	23:23	58° 50,600'	59° 22,132'	Rock Dredge	(bottom)		49	5,7	5	2,36	32,54	1017,12	94	
1b	ISECOLD 2-2000	DFO Full	2019-06-30	0:40	58° 49,686'	59° 22,702'	Rock Dredge	↑		97	2,3	5	1,68	32,57	1017,44	93	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	2:52	58° 49,163'	59° 40,336'	Drop Camera	↓	1484	61	5,9	4,3	3,00	33,00	1017,38	96	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	3:10	58° 49,120'	59° 40,416'	Drop Camera	(bottom)	1487	36	3,8	4,3	3,06	33,07	1017,44	96	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	4:09	58° 48,766'	59° 40,803'	Drop Camera	↑		356	3,6	4,6	3,55	32,98	1017,22	96	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	4:27	58° 49,165'	59° 40,388'	Box Core	↓	1484	324	1,9	4,3	2,60	33,20	1017,26	96	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	4:58	58° 49,177'	59° 40,390'	Box Core	(bottom)	1485	77	3,6	4,5	2,60	33,17	1017,23	95	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	5:27	58° 49,204'	59° 40,361'	Box Core	↑	1484	0	2,7	4,2	3,48	33,02	1017,10	95	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	6:04	58° 49,196'	59° 40,405'	CTD-Rosette	↓	1486	112	2,9	4,3	2,99	32,98	1017,02	95	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	6:35	58° 49,123'	59° 40,562'	CTD-Rosette	(bottom)	1493	3	6,9	3,3	3,58	32,84	1017,03	98	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	7:30	58° 48,955'	59° 40,624'	CTD-Rosette	↑	1528	67	2,9	4,3	3,85	32,85	1016,88	98	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	7:47	58° 49,102'	59° 40,305'	Hydrobios	↓	1490	15	6,5	3,3	3,69	32,77	1016,76	98	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	8:13	58° 49,036'	59° 40,390'	Hydrobios	(bottom)	1494	16	4,6	3,3	3,88	32,91	1016,79	98	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	8:46	58° 49,042'	59° 40,288'	Hydrobios	↑	1493	47	5,3	3,5	3,86	32,75	1016,91	98	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	9:12	58° 48,952'	59° 39,814'	IKMT	↓		34	5,7	3,6	3,64	32,77	1017,11	98	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	9:34	58° 49,444'	59° 39,253'	IKMT	(bottom)	1537	3	7	3,8	3,87	32,68	1017,24	96	

1b	ISECOLD 2-1500	DFO Full	2019-06-30	10:17	58° 48,983'	59° 41,511'	IKMT	↑	1481	56	6,1	3,7	3,71	32,81	1017,33	94	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	10:45	58° 49,201'	59° 40,412'	Rock Dredge	↓	1486	70	5	4,1	2,79	32,95	1017,55	90	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	11:02	58° 49,219'	59° 40,454'	Rock Dredge	(bottom)	1487	41	4,4	3,9	3,80	32,87	1017,76	92	
1b	ISECOLD 2-1500	DFO Full	2019-06-30	12:12	58° 49,130'	59° 41,690'	Rock Dredge	↑	1470	44	4,2	3,9	3,15	32,90	1017,63	94	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	13:45	58° 47,202'	59° 55,762'	Drop Camera	↓	1029	39	4,4	3,8	2,41	33,32	1017,62	95	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	14:20	58° 46,992'	59° 55,562'	Drop Camera	(bottom)	1001	56	1,1	5,1	3,01	33,32	1017,44	89	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	14:48	58° 46,772'	59° 55,461'	Drop Camera	↑	896	66	4	4,3	2,93	33,44	1017,41	96	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	15:03	58° 47,237'	59° 55,815'	Box Core	↓	1032	87	1,9	3,6	3,64	33,34	1017,35	98	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	15:24	58° 47,211'	59° 55,801'	Box Core	(bottom)	1032	173	0,6	4	3,53	33,39	1017,31	92	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	15:39	58° 47,194'	59° 55,748'	Box Core	↑	1028	34	0,2	5,4	3,12	33,47	1017,32	88	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	16:05	58° 47,205'	59° 55,775'	CTD-Rosette	↓	1031	74	1	5,1	3,82	33,38	1017,34	95	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	16:28	58° 47,055'	59° 55,750'	CTD-Rosette	(bottom)	1010	117	1,5	5,3	3,89	33,34	1017,35	93	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	16:58	58° 46,865'	59° 55,637'	CTD-Rosette	↑	973	83	4	4,2	3,81	33,32	1017,40	98	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	17:18	58° 47,255'	59° 55,773'	Hydrobios	↓	1037	56	2,7	3,5	4,19	33,30	1017,22	98	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	17:44	58° 47,173'	59° 55,769'	Hydrobios	(bottom)	1027	109	1,3	4,6	3,58	33,28	1017,04	94	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	18:17	58° 47,056'	59° 55,732'	Hydrobios	↑	1011	145	0,2	5,8	3,05	33,18	1017,09	87	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	18:54	58° 46,956'	59° 55,399'	IKMT	↓	990	125	4	3,9			1017,16	98	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	19:24	58° 46,283'	59° 56,064'	IKMT	(bottom)	893	124	6,7	3,5	3,67	32,98	1017,19	98	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	20:07	58° 45,545'	59° 53,864'	IKMT	↑	1086	17	2,7	3,8	4,31	33,37	1017,42	98	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	20:37	58° 47,251'	59° 55,830'	Rock Dredge	↓	1033	107	2,7	3,8	2,86	32,93	1017,39	98	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	20:49	58° 47,194'	59° 55,824'	Rock Dredge	(bottom)	1032	108	2,3	4			1017,24	98	
1b	ISECOLD 2-1000	DFO Full	2019-06-30	21:47	58° 46,223'	59° 55,888'	Rock Dredge	↑	896	56	5	4,1	3,21	32,86	1017,11	98	
1b	ISECOLD 2-500	DFO Full	2019-06-30	23:45	58° 46,434'	60° 02,607'	Drop Camera	↓	534	45	4,2	3,7	3,20	33,07	1017,20	98	
1b	ISECOLD 2-500	DFO Full	2019-06-30	23:52	58° 46,436'	60° 02,612'	Drop Camera	(bottom)	534	46	4	3,9	2,94	33,05	1017,20	98	
1b	ISECOLD 2-500	DFO Full	2019-07-01	0:30	58° 46,174'	60° 02,959'	Drop Camera	↑	534	152	2,1	4,2	2,87	33,09	1017,09	95	
1b	ISECOLD 2-500	DFO Full	2019-07-01	0:45	58° 46,459'	60° 02,818'	CTD-Rosette	↓	524	114	1,5	4,5	2,52	33,14	1016,99	93	
1b	ISECOLD 2-500	DFO Full	2019-07-01	0:59	58° 46,450'	60° 02,915'	CTD-Rosette	(bottom)	522	139	4,4	4,2	2,41	33,27	1016,86	93	
1b	ISECOLD 2-500	DFO Full	2019-07-01	1:14	58° 46,406'	60° 03,036'	CTD-Rosette	↑	514	202	1,3	3,9	1,76	33,21	1016,91	93	
1b	ISECOLD 2-500	DFO Full	2019-07-01	1:30	58° 46,446'	60° 02,782'	Box Core	↓	528	123	4	4,3	2,54	33,14	1016,78	93	
1b	ISECOLD 2-500	DFO Full	2019-07-01	1:44	58° 46,426'	60° 02,811'	Box Core	(bottom)	528	80	1,7	4,3	2,68	33,20	1016,69	91	
1b	ISECOLD 2-500	DFO Full	2019-07-01	1:54	58° 46,424'	60° 02,895'	Box Core	↑	523	99	4,6	4,8	2,87	33,09	1016,82	87	
1b	ISECOLD 2-500	DFO Full	2019-07-01	2:17	58° 46,420'	60° 02,866'	Box Core	↓	528	108	8,2	4,3	2,73	33,14	1016,52	90	
1b	ISECOLD 2-500	DFO Full	2019-07-01	2:31	58° 46,456'	60° 02,848'	Box Core	(bottom)	524	120	8,4	4,4	1,94	33,25	1016,53	88	
1b	ISECOLD 2-500	DFO Full	2019-07-01	2:43	58° 46,449'	60° 02,914'	Box Core	↑	524	124	9,3	4,4	2,44	33,23	1016,56	89	
1b	ISECOLD 2-500	DFO Full	2019-07-01	3:12	58° 46,434'	60° 02,767'	Hydrobios	↓	531	124	6,7	4,2	2,62	33,15	1016,66	91	
1b	ISECOLD 2-500	DFO Full	2019-07-01	3:27	58° 46,426'	60° 02,727'	Hydrobios	(bottom)	535	138	5,5	3,9	2,36	33,16	1016,67	92	
1b	ISECOLD 2-500	DFO Full	2019-07-01	3:45	58° 46,374'	60° 02,571'	Hydrobios	↑	544	108	1	4,5	2,10	33,22	1016,93	86	
1b	ISECOLD 2-500	DFO Full	2019-07-01	4:11	58° 46,484'	60° 02,320'	IKMT	↓	543	48	5,1	4	3,19	33,13	1016,81	93	
1b	ISECOLD 2-500	DFO Full	2019-07-01	4:17	58° 46,550'	60° 02,625'	IKMT	(bottom)	521	118	3,2	3,8	3,21	33,16	1016,86	90	
1b	ISECOLD 2-500	DFO Full	2019-07-01	4:28	58° 46,219'	60° 02,591'	IKMT	↑	566	106	7,2	3,9	3,32	33,21	1016,58	90	
1b	ISECOLD 2-500	DFO Full	2019-07-01	4:36	58° 46,362'	60° 02,256'	IKMT	↓	553	83	2,7	4,3	3,05	33,17	1016,45	91	
1b	ISECOLD 2-500	DFO Full	2019-07-01	4:57	58° 45,857'	60° 02,321'	IKMT	(bottom)	623	100	7,4	4	2,87	33,02	1016,70	91	
1b	ISECOLD 2-500	DFO Full	2019-07-01	5:26	58° 46,131'	60° 00,858'	IKMT	↑	636	149	1,5	4,2	3,10	33,14	1016,73	90	
1b	ISECOLD 2-500	DFO Full	2019-07-01	6:01	58° 46,407'	60° 02,706'	Rock Dredge	↓	535	78	6,3	4,4	1,77	32,72	1016,66	90	
1b	ISECOLD 2-500	DFO Full	2019-07-01	6:13	58° 46,157'	60° 02,684'	Rock Dredge	(bottom)	563	50	6,9	4,2	2,38	33,27	1016,58	91	
1b	ISECOLD 2-500	DFO Full	2019-07-01	6:45	58° 45,551'	60° 02,989'	Rock Dredge	↑	602	84	7,2	4,3	2,06	32,66	1016,28	93	
1b	Non-Sponge 3		2019-07-01	10:29	59° 22,834'	60° 16,183'	CTD-Rosette	↓	575	82	9,3	3,8	1,25	32,51	1016,55	98	
1b	Non-Sponge 3		2019-07-01	10:39	59° 22,780'	60° 16,199'	CTD-Rosette	(bottom)	571	79	8,8	3,7	2,05	32,45	1016,57	98	
1b	Non-Sponge 3		2019-07-01	11:16	59° 22,473'	60° 16,101'	CTD-Rosette	↑		67	11,2	3,7	1,68	32,47	1016,68	98	
1b	Non-Sponge 3		2019-07-01	12:40	59° 22,594'	60° 16,314'	Lander	↑		100	12	4,2	3,50	32,85	1016,95	98	
1b	Non-Sponge 3		2019-07-01	13:57	59° 22,769'	60° 16,316'	Rock Dredge	↓	562	77	10,7	4,4	2,65	32,60	1018,94	94	
1b	Non-Sponge 3		2019-07-01	14:07	59° 22,740'	60° 16,442'	Rock Dredge	(bottom)	552	81	9,3	4,5	2,65	32,58	1019,02	93	
1b	Non-Sponge 3		2019-07-01	15:52	59° 22,188'	60° 17,274'	Rock Dredge	↑	545	91	9,7	5	2,62	32,54	1016,84	90	
1b	HiBio-B-18	Mooring	2019-07-01	20:41	60° 28,145'	60° 22,672'	Mooring	↑		120	5,7	6,6	5,16	33,74	1017,27	69	
1b	HiBio-B	Mooring	2019-07-01	23:23	60° 28,556'	60° 23,062'	Drop Camera	↓	1830	132	6,5	5	5,47	33,72	1017,09	82	
1b	HiBio-B	Mooring	2019-07-01	23:41	60° 28,524'	60° 23,009'	Drop Camera	(bottom)	1847	151	5,7	5,1	5,64	33,72	1017,09	76	
1b	HiBio-B	Mooring	2019-07-02	0:34	60° 28,591'	60° 23,877'	Drop Camera	↑		169	7,8	5,1	5,60	33,72	1016,86	78	
1b	HiBio-B	Mooring	2019-07-02	1:04	60° 28,459'	60° 22,513'	Rock Dredge	↓		190	6,1	5,3	5,75	33,73	1016,89	76	
1b	HiBio-B	Mooring	2019-07-02	1:23	60° 28,489'	60° 22,621'	Rock Dredge	(bottom)		156	11	5,1	5,78	33,73	1016,55	76	
1b	HiBio-B	Mooring	2019-07-02	2:52	60° 29,280'	60° 23,445'	Rock Dredge	↑	1786	183	5	5,1	5,03	33,75	1016,60	77	
1b	HiBio-B	Mooring	2019-07-02	3:21	60° 28,544'	60° 22,494'	Box Core	↓	1901	185	5,3	5	5,52	33,72	1016,65	75	
1b	HiBio-B	Mooring	2019-07-02	4:04	60° 28,527'	60° 22,489'	Box Core	(bottom)	1914	198	5,7	4,9	5,35	33,74	1016,63	78	
1b	HiBio-B	Mooring	2019-07-02	4:39	60° 28,667'	60° 22,149'	Box Core	↑	1885	196	5	5	5,77	33,73	1016,54	81	
1b	HiBio-A	Mooring	2019-07-02	9:12	60° 27,748'	61° 10,150'	CTD-Rosette	↓	971	140	4	4,8	3,48	33,36	1015,34	83	
1b	HiBio-A	Mooring	2019-07-02	9:30	60° 27,773'	61° 10,502'	CTD-Rosette	(bottom)	947	172	10,1	4,5	3,51	33,35	1015,14	84	
1b	HiBio-A	Mooring	2019-07-02	9:44	60° 27,829'	61° 10,674'	CTD-Rosette	↑	935	175	10,3	4,2	3,51	33,36	1015,13	84	
1b	HiBio-A	Mooring	2019-07-02	12:07	60° 27,764'	61° 10,729'	Mooring	↑		170	11,8	4,5	3,66	33,49	1015,37	84	
1b	HiBio-A	Mooring	2019-07-02	16:26	60° 27,812'	61° 10,139'	Mooring	↓	966	143	13,9	4,8	3,51	33,29	1015,69	84	
1b	HiBio-A	Mooring	2019-07-02	18:59	60° 28,067'	61° 08,760'	CTD-Rosette	↓	1051	160	14,9	4,7	3,30	33,32	1015,39	87	
1b	HiBio-A	Mooring	2019-07-02	19:22	60° 28,002'	61° 08,545'	CTD-Rosette	(bottom)	1062	158	15,6	4,6	3,74	33,31	1015,30	87	
1b	HiBio-A	Mooring	2019-07-02	20:11	60° 27,822'	61° 08,673'	CTD-Rosette	↑	1053	163	15	4,6	3,58	33,36	1015,28	87	
1b	Sponge 3	Mooring	2019-07-02	22:20	60° 28,291'	61° 18,255'	Lander	↑		153	13,9	5,3	3,60	33,45	1014,39	84	
1b	Sponge 3	Mooring	2019-07-02	23:11	60° 28,145'	61° 17,418'	CTD-Rosette	↓	402	152	20,8	4,3	3,20	33,49	1014,18	88	
1b	Sponge 3	Mooring	2019-07-02	23:19	60° 28,223'	61° 17,606'	CTD-Rosette	(bottom)	403	150	14,5	9,2	3,20	33,49	1013,99	69	
1b	Sponge 3	Mooring	2019-07-02	23:27	60° 28,289'	61° 17,868'	CTD-Rosette	↑	402	143	13,7	7,1	3,05	33,49	1014,17	69	
1b	Sponge 3	Mooring	2019-07-03	0:01	60° 28,120'	61° 17,129'	Rock Dredge	↓	407	158	19,4	4,3	3,37	33,40	1014,16	88	
1b	Sponge 3	Mooring	2019-07-03	0:10	60° 28,266'	61° 17,293'	Rock Dredge	(bottom)	403	148	19,6	4,2	3,35	33,40	1013,97	88	
1b	Sponge 3	Mooring	2019-07-03	0:40	60° 28,928'	61° 17,877'	Rock Dredge	↑	405	152	19,8	4,3	3,38	33,40	1014,11	87	
1b	DFO-3(1200)	DFO Benthic	2019-07-03	1:48	60° 28,146'	61° 06,263'	Rock Dredge	↓	1150	161	20,8	4,5	2,82	33,63	1014,44	86	
1b	DFO-3(1200)	DFO Benthic	2019-07-03	2:02	60° 28,267'	61° 06,291'	Rock Dredge	(bottom)	1150	163	19,4	4,5	3,56	33,60	1014,40	87	
1b	DFO-3(1200)	DFO Benthic	2019-07-03	2:57	60° 29,113'	61° 06,226'	Rock Dredge	↑	1160	150	18,3	4,4	3,93	33,58	1014,30	86	
1b	Non-Sponge 3		2019-07-03	4:01	60° 26,997'	61° 01,273'	Drop Camera	↓	1196	155	18,8	4,4	3,76	33,52	1014,30	86	
1b	Non-Sponge 3		2019-07-03	4:18	60° 27,041'	61° 00,996'	Drop camera	(bottom)	1199	161	20	4,4	3,76	33,53	1014,44	87	
1b	Non-Sponge 3		2019-07-03	5:13	60° 27,081'	61° 00,063'	Drop camera	↑	1215	147	19,8	4,3	3,71	33,49	1014,31	86	
1b	DFO-1200	DFO Benthic	2019-07-03	6:23	60° 27,066'	61° 01,813'	Rock Dredge	↓	1188	154	20,9	5,1	3,55	33,40	1014,31	85	
1b	DFO-1200	DFO Benthic	2019-07-03	6:36	60° 27,084'	61° 01,515'	Rock Dredge	(bottom)	1194	153	21,5	4	3,55	33,39	1014,30	86	
1b	DFO-1200	DFO Benthic	2019-07-03	7:44	60° 26,708'	61° 00,565'	Rock Dredge	↑	1200	162	20,4	6,2	3,44	33,47	1013,86	69	
1b	DFO-Ridge 1000	DFO Benthic	2019-07-03	8:40	60° 27,163'	61° 08,013'	Rock Dredge	↓	946	165	22,3	4	3,32	33,36	1013,25	88	
1b	DFO-Ridge 1000	DFO Benthic	2019-07-03	8:51	60° 27,152'	61° 08,203'	Rock Dredge	(bottom)	927	161	22,7	3,9	3,23	33,50	1013,26	87	
1b	DFO-Ridge 1000	DFO Benthic	2019-07-03	9:42	60° 27,395'	61° 09,836'	Rock Dredge	↑	988	163	26,5	4,2	3,33	33,49	1013,31	87	
1b	DFO-1000	DFO Benthic	2019-07-03	10:14	60° 27,966'	61° 10,257'	Rock Dredge	↓	964	160	20	4	3,53	33,56	1013,10	87	
1b	DFO-1000	DFO Benthic	2019-07-03	10:29	60° 28,030'	61° 10,798'	Rock Dredge	(bottom)	929	159	22,7	4	3,54	33,57	1013,13	87	
1b	DFO-1000	DFO Benthic	2019-07-03	11:24	60° 28,509'	61° 13,011'	Rock Dredge	↑	762	163	25,5	3,9	3,61	33,55	1012,84	88	

1b	HiBio-A-19	Mooring	2019-07-03	14:17	60° 28,018'	61° 17,486'	Mooring	↓	399	146	21,3	3,8	3,16	33,34	1012,97	90	
1b	HiBio-A-19	Mooring	2019-07-03	15:48	60° 28,295'	61° 15,817'	Mooring	(bottom)	497	134	20,6	3,7	3,17	33,36	1012,92	90	
1b	HiBio-A-19	Mooring	2019-07-03	17:15	60° 28,781'	61° 14,220'	CTD-Rosette	↓	650	134	18,8	3,8	3,29	33,48	1013,29	91	
1b	HiBio-A-19	Mooring	2019-07-03	17:31	60° 28,748'	61° 13,736'	CTD-Rosette	(bottom)	702	140	19	3,7	3,34	33,50	1013,05	91	
1b	HiBio-A-19	Mooring	2019-07-03	17:44	60° 28,717'	61° 13,403'	CTD-Rosette	↑	727	151	19,8	3,7	3,54	33,51	1013,18	91	
1b	Sponge 4	ATLAS	2019-07-03	20:15	60° 27,500'	62° 07,136'	CTD-Rosette	↓	367	136	22,7	3,5	2,12	32,69	1010,71	92	
1b	Sponge 4	ATLAS	2019-07-03	20:23	60° 27,545'	62° 07,169'	CTD-Rosette	(bottom)	366	151	12,4	4,7	2,12	32,71	1011,25	91	
1b	Sponge 4	ATLAS	2019-07-03	20:31	60° 27,546'	62° 07,298'	CTD-Rosette	↑	368	132	14,5	5,1	2,11	32,74	1011,15	80	
1b	Sponge 4	ATLAS	2019-07-03	20:52	60° 27,804'	62° 07,519'	Drop Camera	↓	368	140	22,8	4,3	2,15	32,78	1011,14	89	
1b	Sponge 4	ATLAS	2019-07-03	20:58	60° 27,856'	62° 07,573'	Drop Camera	(bottom)	369	137	17,7	4,6	2,14	32,78	1011,36	89	
1b	Sponge 4	ATLAS	2019-07-03	21:34	60° 28,156'	62° 08,003'	Drop Camera	↑	370	132	17,9	2,8	2,06	32,73	1010,93	92	
Leg 2a																	
2a	190	Full	2019-07-08	12:20	66° 35,756'	61° 11,823'	CTD-Rosette	↓	103	359	21,7	4,5	-0,93	31,26	1015,57	83	4
2a	190	Full	2019-07-08	12:24	66° 35,670'	61° 11,829'	Surface Bucket	↓	103	353	20	2,6	-0,90	31,28	1015,93	93	4
2a	190	Full	2019-07-08	12:36	66° 35,329'	61° 11,863'	CTD-Rosette	(bottom)	105	344	14,3	4,5	-0,94	31,28	1015,66	90	4
2a	190	Full	2019-07-08	12:57	66° 34,937'	61° 11,648'	CTD-Rosette	↑	112	353	16	7,8	-0,95	31,31	1015,88	74	4
2a	190	Full	2019-07-08	13:48	66° 35,611'	61° 11,509'	Trace-Metal Cast	↓	110	13	15,8	6,4	-0,62	31,04	1015,06	74	4
2a	190	Full	2019-07-08	14:32	66° 34,286'	61° 10,714'	Trace-Metal Cast	↑	139	349	22,5	2,6	-0,65	31,09	1014,77	92	4
2a	190	Full	2019-07-08	15:03	66° 34,096'	61° 10,983'	Bongo Net	↓	135	347	16	4,6	-0,73	31,11	1014,91	78	4
2a	190	Full	2019-07-08	15:07	66° 34,007'	61° 11,017'	Bongo Net	(bottom)	135	356	25,5	3,4	-0,72	31,12	1014,73	91	4
2a	190	Full	2019-07-08	15:11	66° 33,967'	61° 11,057'	Bongo Net	↑	135	358	26,1	2,6	-0,66	31,11	1014,63	91	4
2a	190	Full	2019-07-08	15:29	66° 34,095'	61° 11,783'	CTD-Rosette	↓	121	354	24	2,9	-0,81	31,09	1014,91	91	4
2a	190	Full	2019-07-08	15:39	66° 33,829'	61° 11,969'	CTD-Rosette	(bottom)	122	4	14,7	6,1	-0,78	31,09	1014,47	83	4
2a	190	Full	2019-07-08	15:52	66° 33,658'	61° 12,084'	CTD-Rosette	↑	123	18	4,6	5,2	-0,75	31,08	1014,8	88	4
2a	190	Full	2019-07-08	16:40	66° 36,634'	61° 12,259'	Trace-Metal Cast	↓	93	358	14,7	6,2	-0,83	31,24	1015,46	84	4
2a	190	Full	2019-07-08	17:03	66° 36,273'	61° 12,285'	Trace-Metal Cast	↑	92	322	18,1	5,9	-0,94	31,32	1015,18	76	4
2a	190	Full	2019-07-08	17:57	66° 34,624'	61° 13,880'	Tucker Net	↓	84	358	24	3,1	-0,71	31,18	1014,98	91	4
2a	190	Full	2019-07-08	18:05	66° 34,477'	61° 13,708'	Tucker Net	↑	90	342	22,7	2,7	-0,72	31,16	1015,08	92	3
2a	190	Full	2019-07-08	18:49	66° 35,043'	61° 13,409'	Monster Net	↓	81	14	33,7	3,5	-0,66	30,90	1014,68	92	3
2a	190	Full	2019-07-08	18:54	66° 34,992'	61° 13,613'	Monster Net	(bottom)	82	20	29,1	3,6	-0,72	30,93	1014,62	91	3
2a	190	Full	2019-07-08	19:05	66° 34,782'	61° 13,775'	Monster Net	↑	83	5	31,2	3,4	-0,79	30,89	1014,81	91	3
2a	190	Full	2019-07-08	20:00	66° 36,462'	61° 12,178'	Trace-Metal Cast	↓	95	355	23,2	3	-0,84	30,64	1015,62	95	3
2a	190	Full	2019-07-08	20:20	66° 36,093'	61° 12,415'	Trace-Metal Cast	↑	86	350	17,7	4,2	-0,98	31,33	1015,63	90	3
2a	191	Nutrient	2019-07-08	22:18	66° 38,269'	60° 33,940'	CTD-Rosette	↓	505	34	6,3	1,3	-0,45	29,98	1016,62	98	4
2a	191	Nutrient	2019-07-08	22:33	66° 38,032'	60° 34,103'	CTD-Rosette	(bottom)	505	337	16,2	1,1	-0,48	29,97	1016,58	98	4
2a	191	Nutrient	2019-07-08	23:14	66° 37,483'	60° 34,215'	CTD-Rosette	↑	503	359	14,7	1,6	-0,53	29,93	1016,51	98	4
2a	191	Nutrient	2019-07-09	0:20	66° 38,165'	60° 33,242'	Mapping	start	507	354	19,2	2,9	-0,55	29,85	1016,14	96	2
2a	192	Nutrient	2019-07-09	9:25	66° 43,247'	60° 10,141'	Mapping	end	587	325	24,8	5,5	1,35	30,68	1016,45	89	1
2a	192	Nutrient	2019-07-09	10:03	66° 42,385'	59° 57,816'	CTD-Rosette	↓	693	319	27,4	4,2	1,29	30,84	1016,51	82	1
2a	192	Nutrient	2019-07-09	10:27	66° 42,071'	59° 57,556'	CTD-Rosette	(bottom)	692	311	15,6	3,4	0,98	30,36	1016,29	92	1
2a	192	Nutrient	2019-07-09	11:08	66° 41,723'	59° 56,646'	CTD-Rosette	↑	696	329	24,9	3,9	1,17	30,42	1016,39	90	1
2a	193	Basic	2019-07-09	12:50	66° 46,176'	59° 20,408'	CTD-Rosette	↓	961	328	19,6	1,3	-0,26	30,02	1015,83	96	1
2a	193	Basic	2019-07-09	12:54	66° 46,200'	59° 20,333'	Surface Bucket	↓	962	322	19,8	1,3	-0,24	30,02	1015,86	96	2
2a	193	Basic	2019-07-09	13:14	66° 46,075'	59° 19,957'	CTD-Rosette	(bottom)	960	276	14,1	1,9	-0,27	30,02	1015,88	93	2
2a	193	Basic	2019-07-09	14:11	66° 45,884'	59° 17,903'	CTD-Rosette	↑	958	295	16,4	4,6	-0,09	30,19	1015,57	82	2
2a	193	Basic	2019-07-09	14:47	66° 45,754'	59° 20,420'	Trace-Metal Cast	↓	955	324	19,4	4,8	-0,19	29,98	1015,74	84	2
2a	193	Basic	2019-07-09	14:57	66° 45,845'	59° 19,961'	Trace-Metal Cast	(bottom)	956	341	17,3	7,1	-0,21	30,01	1015,73	73	3
2a	193	Basic	2019-07-09	15:04	66° 45,889'	59° 19,633'	Trace-Metal Cast	↑	958	305	15,4	7,4	-0,16	30,08	1015,65	73	3
2a	193	Basic	2019-07-09	15:17	66° 45,925'	59° 18,979'	Bongo Net	↓	959	325	21,1	2,5	0,04	30,42	1015,86	89	3
2a	193	Basic	2019-07-09	15:20	66° 45,919'	59° 18,801'	Bongo Net	(bottom)	959	316	20,6	1,9	-0,05	30,30	1015,65	93	3
2a	193	Basic	2019-07-09	15:24	66° 45,932'	59° 18,676'	Bongo Net	↑	960	321	24	1,8	0,11	30,35	1015,53	93	3
2a	193	Basic	2019-07-09	16:04	66° 45,446'	59° 21,032'	Tucker Net	↓	954	97	20	2,6	-0,28	29,97	1015,78	91	2
2a	193	Basic	2019-07-09	16:10	66° 45,342'	59° 20,572'	Tucker Net	(bottom)	954	318	22,3	1,9	-0,28	29,95	1015,28	92	2
2a	193	Basic	2019-07-09	16:18	66° 45,315'	59° 19,933'	Tucker Net	↑	954	309	19	1,7	-0,28	29,96	1015,46	93	2
2a	193	Basic	2019-07-09	17:31	66° 45,757'	59° 21,199'	Monster Net	↓	953	315	20,9	2,6	0,09	30,30	1015,71	91	2
2a	193	Basic	2019-07-09	17:57	66° 45,733'	59° 20,963'	Monster Net	(bottom)	955	315	22,5	2,7	0,10	30,22	1015,73	90	2
2a	193	Basic	2019-07-09	18:30	66° 45,600'	59° 20,783'	Monster Net	↑	954	318	23,8	2,7	0,15	30,46	1015,71	89	2
2a	193	Basic	2019-07-09	18:45	66° 45,288'	59° 20,615'	Trace-Metal Cast	↓	954	316	13,1	3,5	-0,14	29,95	1015,88	90	2
2a	193	Basic	2019-07-09	19:03	66° 45,234'	59° 20,623'	Trace-Metal Cast	↑	953	316	14,5	6,9	-0,14	29,97	1016,02	72	2
2a	193	Basic	2019-07-09	19:13	66° 45,191'	59° 20,631'	CTD-Rosette	↓	953	327	12,2	3,4	-0,11	30,00	1015,82	88	2
2a	193	Basic	2019-07-09	19:34	66° 45,151'	59° 20,778'	CTD-Rosette	(bottom)	952	315	21,3	4	-0,11	29,96	1015,92	87	2
2a	193	Basic	2019-07-09	20:22	66° 45,169'	59° 21,199'	CTD-Rosette	↑	953	303	11	2,9	-0,06	30,02	1016,1	88	2
2a	193	Basic	2019-07-09	20:38	66° 45,837'	59° 20,142'	Trace-Metal Cast	↓	955	337	6,7	3,4	0,06	30,08	1016,09	86	2
2a	193	Basic	2019-07-09	21:46	66° 45,886'	59° 21,052'	Box Core	↓	952	320	22,7	4,3	0,08	30,24	1015,96	85	2
2a	193	Basic	2019-07-09	22:02	66° 45,872'	59° 21,168'	Box Core	(bottom)	954	316	19,2	3,5	-0,08	30,23	1015,92	87	2
2a	193	Basic	2019-07-09	22:18	66° 45,907'	59° 21,235'	Box Core	↑	955	319	13,3	4,2	-0,16	30,21	1015,99	86	2
2a	193	Basic	2019-07-09	22:23	66° 46,010'	59° 21,282'	Box Core	↓	955	319	22,8	3,7	-0,14	30,22	1016,11	86	2
2a	193	Basic	2019-07-09	22:41	66° 46,034'	59° 21,264'	Box Core	(bottom)	955	304	16,4	5,6	-0,01	30,31	1016,02	79	2
2a	193	Basic	2019-07-09	22:55	66° 46,015'	59° 21,268'	Box Core	↑	955	277	3,8	3,7	-0,12	30,29	1015,96	87	2
2a	194	Nutrient	2019-07-10	1:07	66° 49,874'	58° 21,447'	CTD-Rosette	↓	866	323	17,1	8,1	3,54	32,09	1014,15	70	1
2a	194	Nutrient	2019-07-10	1:29	66° 49,681'	58° 21,176'	CTD-Rosette	(bottom)	862	306	18,8	8,9	3,74	32,10	1013,89	68	1
2a	194	Nutrient	2019-07-10	2:11	66° 49,529'	58° 20,628'	CTD-Rosette	↑	851	294	9,9	7,9	3,48	32,27	1013,69	77	1
2a	195	Nutrient	2019-07-10	4:43	66° 54,771'	57° 16,129'	CTD-Rosette	↓	783	334	22,5	5,2	4,80	33,42	1011,89	91	0
2a	195	Nutrient	2019-07-10	5:05	66° 54,692'	57° 16,011'	CTD-Rosette	(bottom)	782	348	14,5	9,5	4,80	33,45	1011,98	70	0
2a	195	Nutrient	2019-07-10	5:51	66° 54,719'	57° 15,823'	CTD-Rosette	↑	781	334	17,7	5,2	4,53	33,46	1011,97	90	0
2a	196	Basic	2019-07-10	8:34	66° 59,292'	56° 03,491'	Trace-Metal Cast	↓	130	322	14,7	4,5	3,81	33,50	1011,24	95	0
2a	196	Basic	2019-07-10	8:41	66° 59,270'	56° 03,431'	Trace-Metal Cast	↑	130	330	15	5,3	3,88	33,49	1011,15	90	0
2a	196	Basic	2019-07-10	8:58	66° 59,213'	56° 03,576'	CTD-Rosette	↓	132	326	16,6	4,9	3,44	33,50	1011,12	94	0
2a	196	Basic	2019-07-10	9:07	66° 59,181'	56° 03,680'	CTD-Rosette	(bottom)	132	329	12,4	5,7	3,63	33,50	1011,18	91	0
2a	196	Basic	2019-07-10	9:30	66° 59,109'	56° 04,001'	CTD-Rosette	↑	125	310	12,9	4,7	3,73	33,51	1011,26	94	0
2a	196	Basic	2019-07-10	9:43	66° 59,067'	56° 04,219'	Bongo Net	↓	132	313	15,2	7,9	3,40	33,50	1011,24	78	0
2a	196	Basic	2019-07-10	9:48	66° 59,043'	56° 04,269'	Bongo Net	(bottom)		309	9,9	7,6	3,27	33,52	1011,45	91	0
2a	196	Basic	2019-07-10	9:52	66° 59,031'	56° 04,312'	Bongo Net	↑		313	15	7	2,99	33,50	1011,32	89	0
2a	196	Basic	2019-07-10	10:06	66° 58,925'	56° 04,369'	Trace-Metal Cast	↓	131	310	7,6	8,9	3,80	33,48	1011,21	75	0
2a	196	Basic	2019-07-10	10:26	66° 58,859'	56° 04,389'	Trace-Metal Cast	↑	130	322	14,3	5,6	4,03	33,48	1011,09	92	0
2a	196	Basic	2019-07-10	10:42	66° 58,574'	56° 03,574'	Tucker Net	↓	134	316	13,5	4,6	3,99	33,47	1011,3	93	0
2a	196	Basic	2019-07-10	10:58	66° 58,391'	56° 02,603'	Tucker Net	↑	131	311	16,8	4,6	3,93	33,46	1011,2	93	0
2a	196	Basic	2019-07-10	11:30	66° 59,374'	56° 03,676'	Monster Net	↓		331	9,5	5,9	3,55	33,49	1011,34	91	0
2a	196	Basic	2019-07-10	11:34	66° 59,325'	56° 03,688'	Monster Net	(bottom)		318	13,1	5,3	3,28	33,52	1011,19	92	0
2a	196	Basic	2019-07-10	11:41	66° 59,244'	56° 03,751'	Monster Net	↑	132	309	11,4	4,7	3,84	33,48	1011,18	93	0
2a	196	Basic	2019-07-10	12:33	66° 59,239'	56° 03,572'	Trace-Metal Cast	↓	131	338	9,3	6,5	3,74	33,49	1011,25	84	0
2a	196	Basic	2019-07-10	12:37	66° 59,222'	56° 03,541'	Trace-Metal Cast	(bottom)	131	317	10,3	7,1	3,85	33,49	1011,43	86	0
2a	196	Basic	2019-07-10	12:42	66° 59,192'	56° 03,493'	Trace-Metal Cast	↑	131	322	8,2	8,3	3,94	33,50	1011,26	81	0
2a	196	Basic	2019-07-10	13:06	66° 59,175'	56° 03,866'	Box Core	↓	131	302	10,9	6,2	3,91	33,49	1011,12	89	0
2a	196	Basic	2019-07-10	13:10	66° 59,158'	56° 03,915'	Box Core	(bottom)	130	315	10,1	5,1	3,93	33,49	1011,05	92	0
2a	196	Basic	2019-07-10	13:13	66° 59,129'	56° 03,947'	Box Core	↑	128	307	9,7	5,4	3,94	33,49	1011,14	92	0
2a	196	Basic	2019-07-10	13:35	66° 59,022'	56° 03,977'	Agassiz Trawl	↓	126	313	7,4	6,1	3,80	33,49	1011,05	91	0
2a	196	Basic	2019-07-10	13:37	66° 58,975'	56° 03,894'	Agassiz Trawl	(bottom)	127	320	8,4	5,3	3,88	33,49	1011,12	91	0
2a	196	Basic	2019-07-10	13:43	66° 58,846'	56° 03,523'	Agassiz Trawl	↑	128	313	8,9	5,1	3,93	33,49	1010,97	92	0
2a	197	Nutrient	2019-07-10	16:12	67° 02,488'	55° 05,247'	CTD-Rosette	↓	67	268	0,8	5,8	4,11	33,44	1010,49	95	0
2a	197	Nutrient	2019-07-10	16:18	67° 02,460'	55° 05,207'	CTD-Rosette	(bottom)	67	262	3	5,5	4,20	33,43	1010,51	96	0
2a	197	Nutrient	2019-07-10	16:40	67° 02,436'	55° 05,119'	CTD-Rosette	↑	68	238	3,6	5,6	4,74	33,41	1010,48	95	0
2a	198	Full	2019-07-10	19:29	67° 04,979'	54° 14,117'	Baited Camera	↓	88	108	5,7	6,4	3,37	33,01	1011,3	89	0
2a	198	Full	2019-07-10	19:42	67° 05,039'	54° 13,990'	Baited Camera	(bottom)	85	166	7,6	6,9	3,23	33,25	1011,44	86	0
2a	198	Full	2019-07-10	20:01	67° 05,026'	54° 12,600'	CTD-Rosette	↓	76				3,47	33,03			0
2a	198	Full	2019-07-10	20:15	67° 05,054'	54° 12,428'	CTD-Rosette	(bottom)	75	145	7,8	7,8	3,62	33,24	1011,54	83	0
2a	198	Full	2019-07-10	20:26	67° 05,091'	54° 12,276'	CTD-Rosette	↑	74	189	4,2	6,2	3,48	33,25	1011,43	92	0
2a	198	Full	2019-07-10	20:48	67° 05,225'	54° 11,958'	Trace-Metal Cast	↓	76	158	7	7,2	3,18	33,31	1011,59	86	0
2a	198	Full	2019-07-10	20:54	67° 05,281'	54° 11,833'	Trace-Metal Cast	↑	73	155	9,7	5,3	2,99	33,38	1011,41	94	0

2a	198	Full	2019-07-10	21:00	67° 05,308'	54° 11,681'	Bongo Net	↓	72	150	11,6	5,8	2,97	33,37	1011,65	91	0
2a	198	Full	2019-07-10	21:07	67° 05,322'	54° 11,598'	Bongo Net	↑	71	142	8,8	5,6	3,21	33,38	1011,48	92	0
2a	198	Full	2019-07-10	21:32	67° 05,203'	54° 11,394'	Tucker Net	↓	71	160	8,9	5	3,68	32,51	1011,64	95	0
2a	198	Full	2019-07-10	21:47	67° 05,205'	54° 12,388'	Tucker Net	↑	80	161	10,7	4,6	4,78	30,80	1011,53	96	0
2a	198	Full	2019-07-10	22:21	67° 05,250'	54° 12,159'	Monster Net	↓	79	175	10,9	4,5	3,52	32,93	1011,8	96	0
2a	198	Full	2019-07-10	22:23	67° 05,270'	54° 12,129'	Monster Net	(bottom)	80	170	10,3	4,3	3,47	32,98	1011,73	96	0
2a	198	Full	2019-07-10	22:28	67° 05,306'	54° 12,088'	Monster Net	↑	80	154	10,3	4,3	3,59	32,71	1011,68	97	0
2a	198	Full	2019-07-10	23:09	67° 05,385'	54° 12,073'	Hydrobios	↓	81	166	9,1	4,7	3,50	32,60	1011,92	94	0
2a	198	Full	2019-07-10	23:11	67° 05,393'	54° 12,036'	Hydrobios	(bottom)	81	160	9,3	4,7	3,50	33,09	1011,83	95	0
2a	198	Full	2019-07-10	23:15	67° 05,387'	54° 11,908'	Hydrobios	↑	78	164	11,2	4,5	3,55	33,19	1011,75	96	0
2a	198	Full	2019-07-10	23:44	67° 05,051'	54° 12,662'	Trace-Metal Cast	↓	76	172	11,2	5,5	3,50	33,31	1011,76	93	0
2a	198	Full	2019-07-10	23:49	67° 05,087'	54° 12,602'	Trace-Metal Cast	↑	76	169	12	5	3,88	32,67	1011,76	95	0
2a	198	Full	2019-07-11	0:06	67° 05,221'	54° 12,556'	Agassiz Trawl	↓	81	166	10,1	4,7	4,69	31,42	1011,89	94	0
2a	198	Full	2019-07-11	0:10	67° 05,314'	54° 12,644'	Agassiz Trawl	(bottom)	83	171	12,8	4,7	4,67	31,38	1011,68	94	0
2a	198	Full	2019-07-11	0:16	67° 05,324'	54° 13,080'	Agassiz Trawl	↑	85	162	13,1	4,7	4,69	31,35	1011,71	94	0
2a	198	Full	2019-07-11	0:45	67° 05,066'	54° 12,131'	Beam Trawl	↓	74	172	10,7	6,1	4,67	31,34	1012,07	90	0
2a	198	Full	2019-07-11	0:51	67° 05,237'	54° 12,221'	Beam Trawl	(bottom)	79	181	10,7	4,9	4,63	31,40	1011,89	94	0
2a	198	Full	2019-07-11	1:09	67° 05,244'	54° 14,105'	Beam Trawl	↑	84	180	9,9	4,8	4,83	31,24	1012,14	95	0
2a	198	Full	2019-07-11	2:12	67° 04,989'	54° 13,977'	Baited Camera	↑	83	195	2,3	5,7	3,70	32,55	1012,08	92	0
2a	BB15	Nutrient	2019-07-11	9:59	68° 27,079'	55° 53,989'	CTD-Rosette	↓	494	114	7,6	4,1	5,74	33,54	1011,58	98	0
2a	BB15	Nutrient	2019-07-11	10:15	68° 27,043'	55° 54,118'	CTD-Rosette	(bottom)	494	117	9,9	4	5,95	33,54	1011,58	98	0
2a	BB15	Nutrient	2019-07-11	11:02	68° 26,926'	55° 54,592'	CTD-Rosette	↑	496	129	9,9	4	5,91	33,54	1011,63	96	0
2a	BB15	Nutrient	2019-07-11	11:16	68° 26,934'	55° 54,582'	Bongo Net	↓	496	126	8,9	3,9	5,80	33,54	1011,73	97	0
2a	BB15	Nutrient	2019-07-11	11:20	68° 26,939'	55° 54,545'	Bongo Net	(bottom)	496	145	8	4,1	5,77	33,54	1011,8	97	0
2a	BB15	Nutrient	2019-07-11	11:25	68° 26,955'	55° 54,529'	Bongo Net	↑	495	132	7	4	5,82	33,54	1011,83	97	0
2a	BB16	Basic	2019-07-11	19:00	69° 08,839'	51° 52,587'	Trace-Metal Cast	↓	349	353	5,9	7	8,75	32,76	1012,36	91	0
2a	BB16	Basic	2019-07-11	19:16	69° 08,878'	51° 52,464'	Trace-Metal Cast	↑	351	29	2,1	8	9,51	32,67	1012,32	85	1
2a	BB16	Basic	2019-07-11	19:24	69° 08,895'	51° 52,417'	CTD-Rosette	↓	352	355	2,9	8,6	10,16	32,62	1012,29	84	1
2a	BB16	Basic	2019-07-11	19:39	69° 08,906'	51° 52,369'	CTD-Rosette	(bottom)	353	84	2,5	8,5	10,17	32,65	1012,12	84	1
2a	BB16	Basic	2019-07-11	20:22	69° 08,986'	51° 52,448'	CTD-Rosette	↑	350	24	3,4	8	10,31	32,68	1011,98	87	1
2a	BB16	Basic	2019-07-11	20:55	69° 09,013'	51° 52,387'	Trace-Metal Cast	↓	351	60	0,8	8,6	10,21	32,65	1011,66	85	1
2a	BB16	Basic	2019-07-11	21:05	69° 09,014'	51° 52,377'	Trace-Metal Cast	↑	351	123	0,6	8,8	10,16	32,64	1011,61	83	1
2a	BB16	Basic	2019-07-11	21:11	69° 09,012'	51° 52,375'	Bongo Net	↓	351	25	5,7	9,3	10,15	32,64	1011,63	84	1
2a	BB16	Basic	2019-07-11	21:20	69° 09,004'	51° 52,373'	Bongo Net	↑	351	350	4,2	8,9	10,19	32,64	1011,67	84	1
2a	BB16	Basic	2019-07-11	21:39	69° 08,840'	51° 52,235'	Tucker Net	↓	394	346	6,1	8,1			1011,68	88	1
2a	BB16	Basic	2019-07-11	21:55	69° 08,915'	51° 50,800'	Tucker Net	↑	469	4	6,7	8,2	10,45	32,64	1011,61	89	1
2a	BB16	Basic	2019-07-11	22:21	69° 09,109'	51° 51,589'	Monster Net	↓	400	10	6,5	8,5	7,81	32,82	1011,47	88	1
2a	BB16	Basic	2019-07-11	22:31	69° 09,127'	51° 51,701'	Monster Net	(bottom)	393	5	6,1	8,1	10,03	32,68	1011,44	90	1
2a	BB16	Basic	2019-07-11	22:45	69° 09,114'	51° 51,791'	Monster Net	↑	387	4	5,9	8,3	10,53	32,66	1011,4	89	1
2a	BB16	Basic	2019-07-11	23:13	69° 08,993'	51° 52,401'	Trace-Metal Cast	↓	351	37	4,4	10	9,75	32,69	1011,39	86	1
2a	BB16	Basic	2019-07-11	23:27	69° 08,979'	51° 52,354'	Trace-Metal Cast	↑	352	6	3	9,9	10,29	32,66	1011,33	86	1
2a	BB16	Basic	2019-07-11	23:36	69° 08,907'	51° 52,387'	Agassiz Trawl	↓	357	41	8,8	8,9	9,92	32,71	1011,26	89	1
2a	BB16	Basic	2019-07-11	23:53	69° 08,526'	51° 51,954'	Agassiz Trawl	(bottom)	504	56	9,5	8,8	10,35	32,63	1011,3	89	1
2a	BB16	Basic	2019-07-12	0:04	69° 08,403'	51° 51,333'	Agassiz Trawl	↑	501	49	9,1	9	10,40	32,65	1011,27	88	1
2a	BB18	Nutrient	2019-07-12	5:44	70° 05,408'	52° 44,418'	CTD-Rosette	↓	502	123	3,8	6,2	3,19	31,68	1010,74	86	1
2a	BB18	Nutrient	2019-07-12	5:58	70° 05,488'	52° 44,690'	CTD-Rosette	(bottom)	502	145	4,2	6,8	3,71	31,61	1010,76	86	1
2a	BB18	Nutrient	2019-07-12	6:40	70° 05,676'	52° 45,744'	CTD-Rosette	↑	504	132	4,6	7	4,93	31,63	1010,91	86	1
2a	BB18	Nutrient	2019-07-12	6:54	70° 05,759'	52° 46,064'	Bongo Net	↓	502	321	4,4	6,9	4,26	31,50	1010,91	84	1
2a	BB18	Nutrient	2019-07-12	7:02	70° 05,812'	52° 46,245'	Bongo Net	↑	500	111	3,2	7,4	4,74	31,57	1010,91	82	1
2a	228	Full	2019-07-12	14:03	70° 53,912'	54° 58,685'	Baited Camera	↓	557	249	5,7	8,3	5,51	33,06	1010,86	79	1
2a	228	Full	2019-07-12	14:38	70° 54,096'	54° 58,670'	Baited Camera	(bottom)	564	244	7	8	5,66	33,05	1010,96	86	1
2a	228	Full	2019-07-12	14:56	70° 54,037'	55° 00,105'	CTD-Rosette	↓	568	248	6,7	7,1	5,89	33,06	1010,93	92	1
2a	228	Full	2019-07-12	15:12	70° 54,120'	54° 59,972'	CTD-Rosette	(bottom)	569			7,8	5,46	33,07	1010,94	87	1
2a	228	Full	2019-07-12	15:55	70° 54,177'	54° 59,976'	CTD-Rosette	↑	569			8,1	6,15	32,95	1011,03	86	1
2a	228	Full	2019-07-12	16:36	70° 53,778'	55° 00,176'	Trace-Metal Cast	↓	566			6,5	5,74	33,02	1011,22	92	1
2a	228	Full	2019-07-12	16:49	70° 53,756'	55° 00,112'	Trace-Metal Cast	↑	566			7	6,04	32,93	1011,31	87	1
2a	228	Full	2019-07-12	16:57	70° 53,747'	55° 00,000'	Bongo Net	↓	567			6,3	5,85	32,95	1011,24	91	1
2a	228	Full	2019-07-12	17:06	70° 53,762'	54° 59,836'	Bongo Net	↑	565			6,2	5,97	32,98	1011,24	91	1
2a	228	Full	2019-07-12	17:14	70° 53,771'	54° 59,606'	Tucker Net	↓	564			6,1	5,63	33,04	1011,32	91	1
2a	228	Full	2019-07-12	17:31	70° 54,208'	55° 00,110'	Tucker Net	↑	571	204	10,7	6	5,91	33,02	1011,21	93	1
2a	228	Full	2019-07-12	18:00	70° 53,701'	55° 00,034'	IKMT	↓	568	216	9,3	5,6	6,40	32,91	1011,3	95	1
2a	228	Full	2019-07-12	18:19	70° 54,358'	55° 00,423'	IKMT	(bottom)	574	217	10,5	5,4	6,46	32,97	1011,35	96	1
2a	228	Full	2019-07-12	19:08	70° 54,263'	55° 06,177'	IKMT	↑	566	196	12,6	5,3	6,52	32,77	1011,29	97	1
2a	228	Full	2019-07-12	19:33	70° 53,970'	55° 00,162'	Monster Net	↓	565	211	10,9	5,3	3,69	33,20	1011,42	96	1
2a	228	Full	2019-07-12	19:51	70° 54,002'	55° 00,130'	Monster Net	(bottom)	567	213	13,1	5,2	4,71	33,14	1011,37	97	1
2a	228	Full	2019-07-12	20:09	70° 54,064'	55° 00,162'	Monster Net	↑	570	217	13,3	5	3,79	33,21	1011,25	98	1
2a	228	Full	2019-07-12	20:47	70° 54,312'	55° 00,403'	Hydrobios	↓	575	224	12,6	5,2	5,21	33,10	1011,24	97	1
2a	228	Full	2019-07-12	21:24	70° 54,388'	55° 01,194'	Hydrobios	↑	585	173	2,7	7	5,87	33,07	1011,51	89	1
2a	228	Full	2019-07-12	22:11	70° 53,992'	55° 01,038'	Trace-Metal Cast	↓	569	234	2,1	7,9	4,72	33,10	1011,59	81	1
2a	228	Full	2019-07-12	22:19	70° 54,037'	55° 01,395'	Trace-Metal Cast	↑	570	270	1,9	8,4	5,01	33,06	1011,58	82	1
2a	228	Full	2019-07-12	22:31	70° 54,030'	55° 00,025'	CTD-Rosette	↓	569	235	2,3	6,9	4,08	33,10	1011,39	88	1
2a	228	Full	2019-07-12	22:47	70° 54,233'	55° 00,498'	CTD-Rosette	(bottom)	574	257	1,3	7,7	3,87	33,12	1011,51	85	1
2a	228	Full	2019-07-12	23:18	70° 54,465'	55° 01,389'	CTD-Rosette	↑	555	276	0,8	6,7	5,89	33,02	1011,59	92	1
2a	228	Full	2019-07-12	23:42	70° 54,139'	55° 00,562'	Trace-Metal Cast	↓	570	312	1	6,4	3,70	33,14	1011,65	93	1
2a	228	Full	2019-07-12	23:56	70° 54,413'	55° 00,897'	Trace-Metal Cast	↑	577	308	1,7	7,2	5,96	32,95	1011,73	86	1
2a	228	Full	2019-07-13	0:18	70° 54,255'	55° 00,473'	Box Core	↓	574	275	2,5	6,4	4,38	33,03	1011,72	92	1
2a	228	Full	2019-07-13	0:28	70° 54,355'	55° 00,769'	Box Core	(bottom)	576	248	5,3	5,9	4,34	33,04	1011,81	96	1
2a	228	Full	2019-07-13	0:38	70° 54,457'	55° 01,098'	Box Core	↑	583	257	4,8	5,7	4,77	33,04	1011,97	95	1
2a	228	Full	2019-07-13	0:52	70° 54,655'	55° 01,502'	Agassiz Trawl	↓	565	256	4,4	4,6	5,11	32,95	1011,95	98	1
2a	228	Full	2019-07-13	1:12	70° 55,376'	55° 02,137'	Agassiz Trawl	(bottom)	544	250	6,3	4,1	5,83	32,89	1011,96	98	1
2a	228	Full	2019-07-13	1:30	70° 56,024'	55° 03,210'	Agassiz Trawl	↑	530	247	7,4	3,9	5,82	32,92	1012,03	98	1
2a	228	Full	2019-07-13	2:45	70° 54,275'	54° 59,058'	Baited Camera	↑	578	219	5,7	4,1	7,07	32,57	1012,27	98	1
2a	229	Basic	2019-07-13	6:37	71° 00,189'	53° 00,628'	CTD-Rosette	↓	456	87	1,9	9,4	6,63	31,67	1012,78	96	1
2a	229	Basic	2019-07-13	6:51	71° 00,205'	53° 00,696'	CTD-Rosette	(bottom)	454	76	1,9	10,5	8,87	31,79	1012,89	88	1
2a	229	Basic	2019-07-13	7:31	71° 00,337'	53° 00,822'	CTD-Rosette	↑	435	39	1	10,6	8,90	31,72	1013,04	86	1
2a	229	Basic	2019-07-13	7:52	71° 00,346'	53° 00,795'	Bongo Net	↓	433	71	1,9	10,3	6,61	31,89	1012,98	86	1
2a	229	Basic	2019-07-13	7:56	71° 00,344'	53° 00,790'	Bongo Net	(bottom)	434	60	2,7	10,2	7,43	32,15	1013,01	87	1
2a	229	Basic	2019-07-13	8:00	71° 00,337'	53° 00,784'	Bongo Net	↑	435	90	2,3	10,2	8,63	31,83	1013,01	87	1
2a	229	Basic	2019-07-13	8:24	71° 00,491'	53° 00,158'	Tucker Net	↓	425	104	4,4	9,8	8,88	31,69	1012,98	80	1
2a	229	Basic	2019-07-13	8:39	71° 00,305'	53° 01,593'	Tucker Net	↑	438	153	0,2	11,1	9,54	31,37	1013,2	78	1
2a	229	Basic	2019-07-13	9:09	71° 00,525'	53° 00,854'	Monster Net	↓	418	68	0,6	11,1	9,40	31,53	1013,38	74	1
2a	229	Basic	2019-07-13	9:20	71° 00,527'	53° 00,866'	Monster Net	(bottom)	417	124	2,3	12,1	8,41	31,95	1013,46	72	1
2a	229	Basic	2019-07-13	9:35	71° 00,550'	53° 00,923'	Monster Net	↑	418	121	2,7	11,1	9,04	31,68	1013,49	73	1
2a	229	Basic	2019-07-13	9:58	71° 00,879'	52° 59,927'	Agassiz Trawl	↓	411	289	1	10,9	8,94	31,63	1013,63	78	1
2a	229	Basic	2019-07-13	10:12	71° 01,029'	53° 00,896'	Agassiz Trawl	(bottom)	422	152	2,3	11,4	9,94	31,50	1013,62	68	1
2a	229	Basic	2019-07-13	10:28	71° 01,006'	53° 02,148'	Agassiz Trawl	↑	422	197	3,2	10,6	10,06	31,62	1013,64	73	1
2a	229	Basic	2019-07-13	10:51	71° 00,652'	53° 02,690'	Box Core	↓	432	148	1,9	11	6,26	32,54	1013,8	72	1
2a	229	Basic	2019-07-13	10:59	71° 00,643'	53° 02,707'	Box Core	(bottom)	432	132	2,7	11,1	7,73	32,03	1013,71	74	1
2a	229	Basic	2019-07-13	11:07	71° 00,634'	53° 02,706'	Box Core	↑	432	98	1,5	11,6	6,97	32,11	1013,76	70	1
2a	227	Nutrient	2019-07-13	17:42	70° 47,813'	56° 59,265'	CTD-Rosette	↓	538	156	8,6	8,2	5,49	33,33	1015,12	81	0
2a	227	Nutrient	2019-07-13	17:56	70° 47,833'	56° 59,186'	CTD-Rosette	(bottom)	540	170	7,8	7,6	5,46	33,34	1015,09	88	0
2a	227	Nutrient	2019-07-13	18:44	70° 48,008'	56° 59,442'	CTD-Rosette	↑	537	142	15,8	6,1	5,44	33,34	1015,25	95	0
2a	226	Basic	2019-07-13	22:08	70° 42,018'	59° 00,364'	CTD-Rosette	↓	596	140	12,4	6	4,18	31,93	1014,32	98	0
2a	226	Basic	2019-07-13	22:27	70° 42,177'	59° 00,531'	CTD-Rosette	(bottom)	595	81	10,3	5,2	3,79	32,01	1014,22	98	0
2a	226	Basic	2019-07-13	23:14	70° 42,439'	59° 00,690'	CTD-Rosette	↑	594	134	14,3	5,3	4,29	31,91	1014,31	96	0
2a	226	Basic	2019-07-13	23:48	70° 42,094'	59° 00,202'	Trace-Metal Cast	↓	595	147	14,3	4,6	3,22	31,99	1014,22	98	0
2a	226	Basic	2019-07-13	23:57	70° 42,168'	59° 00,343'	Trace-Metal Cast	↑	595	145	12,4	4,5	4,19	31,91	1014,29	98	0
2a	226	Basic	2019-07-14	0:09	70° 42,115'	59° 00,322'	Bongo Net	↓	595	143	11,4	4,4	4,18	31,83	1014,41	98	0
2a	226	Basic	2019-07-14	0:13	70° 42,128'	59° 00,304'	Bongo Net	(bottom)	595	142	12,9	4,4	4,18	31,83	1014,44	98	0
2a	226	Basic	2019-07-14	0:17	70° 42,161'	59° 00,336'	Bongo Net	↑	595	126	12	4,3	4,18	31,83	1014,36	98	0
2a	226	Basic	2019-07-14	0:26	70° 42,016'	59° 00,427'	Tucker Net	↓	596	141	12,8	4,4	4,11	31,80	1014,26	98	0
2a	226	Basic	2019-07-14	0:36	70° 41,879'	58° 59,871'	Tucker Net	(bottom)	596	137	15,2	4,4	4,10	31,79	1014,26	98	0

2a	226	Basic	2019-07-14	0:44	70° 42,085'	58° 59,286'	Tucker Net	↑	593	160	1,7	4,6	4,22	31,83	1014,48	98	0
2a	226	Basic	2019-07-14	1:17	70° 42,059'	58° 59,506'	Monster Net	↓	594	352	12,4	4,8	4,14	31,89	1014,46	98	0
2a	226	Basic	2019-07-14	1:32	70° 42,209'	58° 59,420'	Monster Net	(bottom)	594	135	12,6	4,1	4,12	31,81	1014,39	98	0
2a	226	Basic	2019-07-14	1:51	70° 42,363'	58° 59,318'	Monster Net	↑	594	136	11,8	4,2	4,08	31,81	1014,46	98	0
2a	226	Basic	2019-07-14	2:17	70° 41,967'	58° 59,755'	Trace-Metal Cast	↓	595	148	13,5	4,4	4,01	31,77	1014,56	98	0
2a	226	Basic	2019-07-14	2:24	70° 41,967'	58° 59,802'	Trace-Metal Cast	(bottom)	595	158	13,9	4,2	4,04	31,76	1014,66	98	0
2a	226	Basic	2019-07-14	2:29	70° 41,973'	58° 59,776'	Trace-Metal Cast	↑	595	161	13,3	4,2	3,97	31,78	1014,75	98	0
2a	226	Basic	2019-07-14	2:52	70° 41,985'	58° 59,930'	CTD-Rosette	↓	595	160	13,7	4,2	3,97	31,82	1014,65	98	0
2a	226	Basic	2019-07-14	3:09	70° 41,980'	58° 59,958'	CTD-Rosette	(bottom)	595	159	14,1	4,2	4,08	31,86	1014,55	98	0
2a	226	Basic	2019-07-14	3:33	70° 42,001'	59° 00,018'	CTD-Rosette	↑	595	155	13,3	4,1	4,02	31,85	1014,85	98	0
2a	226	Basic	2019-07-14	4:00	70° 42,008'	58° 59,928'	Trace-Metal Cast	↓	595	149	15,6	4	3,93	31,76	1014,79	98	0
2a	226	Basic	2019-07-14	4:19	70° 42,032'	58° 59,944'	Trace-Metal Cast	↑	595	160	13,1	3,7	4,07	31,77	1014,9	98	0
2a	226	Basic	2019-07-14	4:39	70° 41,980'	59° 00,147'	Box Core	↓	595	144	12	3,3	3,32	32,04	1014,77	98	0
2a	226	Basic	2019-07-14	4:48	70° 41,936'	59° 00,273'	Box Core	(bottom)	596	100	5,1	4,4	2,59	32,20	1014,64	98	0
2a	226	Basic	2019-07-14	4:57	70° 41,899'	59° 00,437'	Box Core	↑	596	144	13,5	3,4	3,90	31,80	1014,79	98	0
2a	226	Basic	2019-07-14	5:12	70° 41,994'	59° 00,729'	Agassiz Trawl	↓	596	150	4,2	4,6	3,98	31,78	1014,77	98	0
2a	226	Basic	2019-07-14	5:32	70° 42,343'	59° 01,797'	Agassiz Trawl	(bottom)	594	152	12,9	3,7	4,01	31,82	1014,7	98	0
2a	226	Basic	2019-07-14	5:58	70° 42,273'	59° 03,708'	Agassiz Trawl	↑	596	147	13,1	3,9	3,98	31,81	1015,5	98	0
2a	225	Nutrient	2019-07-14	9:48	70° 35,996'	60° 59,807'	CTD-Rosette	↓	890	182	4,6	3,9	3,20	30,96	1015,09	98	0
2a	225	Nutrient	2019-07-14	10:11	70° 36,133'	61° 00,178'	CTD-Rosette	(bottom)	893	153	4,8	4,6	3,17	30,94	1015,04	98	0
2a	225	Nutrient	2019-07-14	11:02	70° 36,521'	61° 01,110'	CTD-Rosette	↑	899	152	10,7	4,3	3,02	31,00	1015,07	98	0
2a	Float 1	Float	2019-07-14	17:36	69° 29,987'	60° 59,920'	Argo Float	↓		112	11	1,8	1,35	29,74	1012,87	98	0
2a	Float 1	Float	2019-07-14	17:51	69° 29,984'	61° 00,046'	Argo Float	↓	1781	121	12	2,6	1,35	29,74	1013,53	98	0
2a	Float 1	Float	2019-07-14	18:46	69° 30,335'	61° 00,236'	CTD-Rosette	↓		43	9,3	1,9	0,78	29,84	1013,89	98	0
2a	Float 1	Float	2019-07-14	20:08	69° 30,230'	61° 01,527'	CTD-Rosette	↑	1789	136	4,6	2,3	0,87	29,54	1011,76	98	0
2a	Float 1	Float	2019-07-14	20:29	69° 30,499'	61° 00,038'	IKMT	↓	1780	108	5,9	2,2	1,05	29,73	1011,71	98	0
2a	Float 1	Float	2019-07-14	21:53	69° 29,110'	61° 08,174'	IKMT	↑		104	10,7	1	0,42	29,49	1011,24	98	0
2a	224	Basic	2019-07-15	4:42	70° 26,444'	62° 58,885'	CTD-Rosette	↓	2102	120	4,2	0,8	0,08	29,28	1009,74	98	0
2a	224	Basic	2019-07-15	6:48	70° 26,407'	62° 57,003'	CTD-Rosette	↑	2102	116	8,6	1,2	0,05	29,17	1009,62	98	0
2a	224	Basic	2019-07-15	7:32	70° 26,557'	62° 58,695'	Trace-Metal Cast	↓		119	10,3	1,2	-0,04	30,05	1011,12	98	0
2a	224	Basic	2019-07-15	7:43	70° 26,516'	62° 58,392'	Trace-Metal Cast	↑	2101	115	8,9	1,4	0,13	29,43	1011,46	98	0
2a	224	Basic	2019-07-15	7:49	70° 26,520'	62° 58,229'	Bongo Net	↓		109	8,6	1,2	-0,13	30,34	1009,52	98	0
2a	224	Basic	2019-07-15	7:58	70° 26,508'	62° 58,045'	Bongo Net	↑	2103	101	8,9	1,2	0,12	29,62	1009,39	98	0
2a	224	Basic	2019-07-15	8:18	70° 26,516'	62° 57,709'	Tucker Net	↓		129	10,7	1,3	0,11	29,26	1009,28	98	0
2a	224	Basic	2019-07-15	8:32	70° 26,846'	62° 57,732'	Tucker Net	↑		113	9,1	1,3	0,06	29,23	1009,32	98	0
2a	224	Basic	2019-07-15	8:59	70° 26,576'	62° 56,513'	Monster Net	↓		90	2,3	1,4	0,08	29,23	1009,45	98	0
2a	224	Basic	2019-07-15	9:57	70° 26,268'	62° 55,634'	Monster Net	(bottom)		150	8,4	2	0,08	29,40	1009,55	98	0
2a	224	Basic	2019-07-15	11:06	70° 25,661'	62° 55,794'	Monster Net	↑	2099	122	5,9	2,4	0,19	29,20	1009,4	98	0
2a	224	Basic	2019-07-15	11:35	70° 25,472'	62° 56,451'	Trace-Metal Cast	↓		132	9,9	1,8	0,11	29,85	1009,38	98	0
2a	224	Basic	2019-07-15	11:41	70° 25,418'	62° 56,499'	Trace-Metal Cast	↑		135	9,3	1,8	0,18	29,32	1009,35	98	0
2a	224	Basic	2019-07-15	12:27	70° 25,195'	62° 56,711'	CTD-Rosette	↓	2095	133	9,1	2,3	0,23	29,17	1009,23	98	2
2a	224	Basic	2019-07-15	13:09	70° 25,135'	62° 56,791'	CTD-Rosette	(bottom)		135	8,8	2,3	0,11	29,29	1009,06	98	2
2a	224	Basic	2019-07-15	14:21	70° 25,259'	62° 56,768'	CTD-Rosette	↑	2096	132	12	2,4	0,19	29,18	1008,99	98	2
2a	224	Basic	2019-07-15	14:41	70° 25,448'	62° 56,474'	Trace-Metal Cast	↓	2099	140	10,5	2,6	0,36	29,21	1008,93	98	2
2a	224	Basic	2019-07-15	14:55	70° 25,517'	62° 56,644'	Trace-Metal Cast	↑		133	9,9	2,3	0,33	29,31	1008,98	98	2
2a	224	Basic	2019-07-15	15:12	70° 25,162'	62° 57,320'	Box Core	↓		135	10,3	2,5	0,27	29,23	1009,04	98	2
2a	224	Basic	2019-07-15	15:40	70° 25,210'	62° 57,300'	Box Core	(bottom)	2097	128	11,2	2,7	0,27	29,33	1009,07	98	2
2a	224	Basic	2019-07-15	16:07	70° 25,233'	62° 57,366'	Box Core	↑	2096	118	9,7	2,5	0,46	29,20	1009,11	98	2
2a	223	Nutrient	2019-07-15	19:45	70° 16,283'	64° 49,039'	CTD-Rosette	↓	1720	108	9,1	3,1	0,98	29,47	1007,56	95	2
2a	223	Nutrient	2019-07-15	20:20	70° 16,279'	64° 49,337'	CTD-Rosette	(bottom)	1717	103	4,2	2,5	1,20	29,43	1007,49	96	2
2a	223	Nutrient	2019-07-15	21:26	70° 16,306'	64° 49,693'	CTD-Rosette	↑	1708	117	7,6	2,2	1,09	29,57	1007,32	98	2
2a	223	Nutrient	2019-07-15	21:38	70° 16,358'	64° 49,786'	Bongo Net	↓	1708	106	10,9	1,4	0,89	29,91	1007,11	98	2
2a	223	Nutrient	2019-07-15	21:46	70° 16,397'	64° 49,885'	Bongo Net	↑	1705	106	10,7	1,2	1,01	29,51	1007,05	98	2
2a	223b	Nutrient	2019-07-15	23:46	70° 09,725'	65° 48,006'	CTD-Rosette	↓	443	134	2,1	1,4	1,10	28,21	1006,7	98	2
2a	223b	Nutrient	2019-07-15	23:59	70° 09,723'	65° 47,853'	CTD-Rosette	(bottom)	446	219	4,8	1	1,43	27,80	1006,75	98	2
2a	223b	Nutrient	2019-07-16	0:42	70° 09,872'	65° 47,474'	CTD-Rosette	↑	457	124	5,5	0,7	0,90	28,61	1006,4	98	2
2a	222	Full	2019-07-16	2:30	70° 04,554'	66° 36,335'	CTD-Rosette	↓	125	104	7,4	-0,4	0,53	28,34	1005,57	98	2
2a	222	Full	2019-07-16	2:33	70° 04,541'	66° 36,376'	Surface Bucket	↓	126	108	4,6	0,2	0,23	29,27	1005,52	98	2
2a	222	Full	2019-07-16	2:41	70° 04,511'	66° 36,491'	CTD-Rosette	(bottom)	125	107	5,9	0,5	0,49	28,85	1005,75	98	2
2a	222	Full	2019-07-16	3:05	70° 04,443'	66° 36,978'	CTD-Rosette	↑	121	131	1	0	0,61	28,43	1005,63	98	2
2a	222	Full	2019-07-16	3:27	70° 04,519'	66° 36,308'	Trace-Metal Cast	↓	127	131	6,3	-0,4	0,77	28,21	1005,57	98	2
2a	222	Full	2019-07-16	3:35	70° 04,503'	66° 36,292'	Trace-Metal Cast	↑	127	118	5,9	-0,2	0,74	28,89	1005,52	98	2
2a	222	Full	2019-07-16	3:43	70° 04,497'	66° 36,291'	Bongo Net	↓	127	103	6,5	-0,4	0,91	28,27	1005,41	98	2
2a	222	Full	2019-07-16	3:51	70° 04,494'	66° 36,296'	Bongo Net	↑	127	81	6,9	-0,3	0,92	28,31	1005,35	98	2
2a	222	Full	2019-07-16	4:05	70° 04,541'	66° 36,325'	Tucker Net	↓	127	78	8,2	-0,2	0,99	28,20	1005,2	98	2
2a	222	Full	2019-07-16	4:24	70° 04,507'	66° 37,369'	Tucker Net	↑	118	102	7,4	-0,3	1,02	28,23	1005,18	98	2
2a	222	Full	2019-07-16	5:07	70° 04,339'	66° 37,922'	Monster Net	↓	115	84	6,5	-0,1	1,05	28,24	1004,84	98	2
2a	222	Full	2019-07-16	5:16	70° 04,288'	66° 38,005'	Monster Net	↑	114	91	6,3	-0,2	0,72	28,54	1004,72	98	2
2a	222	Full	2019-07-16	6:08	70° 04,626'	66° 35,975'	Hydrobios	↓	140	83	8,2	0	0,53	29,31	1004,43	98	2
2a	222	Full	2019-07-16	6:12	70° 04,610'	66° 36,013'	Hydrobios	(bottom)	139	94	10,1	0,1	0,45	28,95	1004,57	98	2
2a	222	Full	2019-07-16	6:18	70° 04,584'	66° 36,113'	Hydrobios	↑	133	75	8,4	0,1	0,50	29,12	1004,42	98	2
2a	222	Full	2019-07-16	6:36	70° 04,565'	66° 36,301'	Trace-Metal Cast	↓	129	84	8	0	0,58	28,65	1004,35	98	2
2a	222	Full	2019-07-16	7:01	70° 04,528'	66° 36,811'	Trace-Metal Cast	↑	121	82	7,4	0,2	0,46	29,44	1004,33	98	2
2a	222	Full	2019-07-16	7:17	70° 04,633'	66° 37,027'	CTD-Rosette	↓	121	66	5,7	0,6	0,25	29,31	1004,2	98	2
2a	222	Full	2019-07-16	7:23	70° 04,639'	66° 37,070'	CTD-Rosette	(bottom)	122	74	6,7	0,2	0,08	29,73	1004,11	98	2
2a	222	Full	2019-07-16	7:34	70° 04,626'	66° 37,341'	CTD-Rosette	↑	120	64	5,3	1,3	0,50	28,79	1003,96	98	2
2a	222	Full	2019-07-16	7:46	70° 04,663'	66° 37,256'	Agassiz Trawl	↓	122	72	8,2	0,4	0,82	28,34	1003,97	98	2
2a	222	Full	2019-07-16	7:51	70° 04,566'	66° 37,091'	Agassiz Trawl	(bottom)	120	78	9,1	0,2	0,92	27,90	1004	98	2
2a	222	Full	2019-07-16	7:58	70° 04,539'	66° 36,588'	Agassiz Trawl	↑	125	85	11,6	0,3	0,94	27,85	1004,09	98	2
2a	222	Full	2019-07-16	8:33	70° 04,865'	66° 38,233'	Beam Trawl	↓	113	88	4,4	0,1	0,89	28,16	1003,84	98	2
2a	222	Full	2019-07-16	9:05	70° 03,942'	66° 37,188'	Beam Trawl	↑	124	76	7,2	0,3	0,93	27,84	1003,61	98	2
2a	BB2	Float/Nut	2019-07-16	22:47	72° 45,028'	66° 59,790'	CTD-Rosette	↓		87	8	5,4	2,10	29,87	1004,41	97	2
2a	BB2	Float/Nut	2019-07-16	23:37	72° 45,139'	67° 00,694'	CTD-Rosette	(bottom)	2368	89	9,1	7	2,09	29,86	1004,11	76	2
2a	BB2	Float/Nut	2019-07-17	0:57	72° 45,152'	67° 02,034'	CTD-Rosette	↑	2369	82	6,3	4,2	2,33	29,78	1003,81	95	2
2a	BB2	Float/Nut	2019-07-17	1:17	72° 44,890'	66° 59,656'	Bongo Net	↓		105	8,4	2,8	1,74	30,08	1003,69	98	0
2a	BB2	Float/Nut	2019-07-17	1:25	72° 44,906'	66° 59,670'	Bongo Net	↑		95	9,5	3,1	2,01	29,95	1003,67	98	0
2a	BB2	Float/Nut	2019-07-17	1:44	72° 45,021'	67° 00,025'	IKMT	↓	2369	105	5,1	3,7	2,21	29,83	1003,5	96	0
2a	BB2	Float/Nut	2019-07-17	2:40	72° 43,225'	67° 01,202'	IKMT	↑		98	13,3	2,5	2,25	29,95	1003	98	0
2a	BB2	Float/Nut	2019-07-17	3:18	72° 44,940'	66° 59,691'	CTD-Rosette	↓		96	9,3	3,2	2,22	29,92	1002,73	98	0
2a	BB2	Float/Nut	2019-07-17	4:12	72° 45,050'	67° 00,347'	CTD-Rosette	(bottom)		101	7,4	3,8	2,32	29,90	1002,44	96	0
2a	BB2	Float/Nut	2019-07-17	5:36	72° 45,273'	67° 00,384'	CTD-Rosette	↑	2368	113	10,3	4,5	2,23	29,92	1002,14	95	0
2a	BB2	Float/Nut	2019-07-17	6:12	72° 45,385'	67° 00,597'	Argo Float	↓		107	8,4	2,8	1,42	30,60	1002	98	0
2a	BB2	Float/Nut	2019-07-17	7:11	72° 45,463'	66° 59,721'	Argo Float	↓	2369	114	8,2	2,8	1,01	30,08	1002,22	98	0
2a	BB2	Float/Nut	2019-07-17	7:44	72° 44,837'	66° 59,750'	CTD-Rosette	↓		167	6,1	2,9	1,48	30,01	1002,21	98	0
2a	BB2	Float/Nut	2019-07-17	9:12	72° 44,854'	67° 00,244'	CTD-Rosette	↑	2368	112	4	1,4	2,16	29,88	1002,03	98	0
2a	201	Nutrient	2019-07-17	19:15	72° 29,872'	61° 14,591'	CTD-Rosette	↓	739	131	13,9	10,6	6,31	31,21	1002,87	72	0
2a	201	Nutrient	2019-07-17	19:32	72° 29,916'	61° 14,861'	CTD-Rosette	↑	741	157	21,3	9,3	6,33	31,21	1002,98	80	0
2a	201	Nutrient	2019-07-17	19:33	72° 29,923'	61° 14,903'	CTD-Rosette	↓	741	161	18,8	10,3	6,35	31,18	1002,85	73	0
2a	201	Nutrient	2019-07-17	19:47	72° 29,950'	61° 15,160'	CTD-Rosette	(bottom)	743	135	22,1	8,8	6,16	31,43	1003	79	0
2a	201	Nutrient	2019-07-17	20:35	72° 30,047'	61° 15,665'	CTD-Rosette	↑	743	160	23,6	5	5,96	31,33	1003,13	95	0
2a	204	Basic	2019-07-18	2:42	73° 16,113'	57° 59,973'	CTD-Rosette	↓	962	138	10,5	11,6	7,74	32,15	1007,4	69	1
2a	204	Basic	2019-07-18	2:49	73° 16,202'	58° 00,015'	Surface Bucket	↓	966	102	10,5	10,6	7,63	32,17	1007,37	83	1
2a	204	Basic	2019-07-18	3:07	73° 16,341'	58° 00,027'	CTD-Rosette	(bottom)	962	109	12,2	8,7	7,52	32,14	1007,38	89	1
2a	204	Basic	2019-07-18	3:49	73° 16,612'	58° 00,500'	CTD-Rosette	↑	925	100	12,6	8,5	7,66	32,11	1007,2	89	1
2a	204	Basic	2019-07-18	4:16	73° 16,204'	57° 59,366'	Bongo Net	↓	964	78	5,9	9,8	7,26	32,34	1007,39	86	1
2a	204	Basic	2019-07-18	4:23	73° 16,246'	57° 59,367'	Bongo Net	↑	964	113	12,9	10,7	7,47	32,18	1007,35	77	1
2a	204	Basic	2019-07-18	4:33	73° 16,366'	57° 59,332'	Tucker Net	↓	966	132	12	8,7	7,55	32,22	1007,31	89	1
2a	204	Basic	2019-07-18	4:44	73° 16,649'	58° 00,109'	Tucker Net	↑	929	109	9,9	9,8	7,70	32,17	1007,21	83	0
2a	204	Basic	2019-07-18	5:07	73° 16,700'	58° 00,205'	Monster Net	↓	922	107	9,1	9,1	7,14	32,33	1006,97	87	0
2a	204	Basic	2019-07-18	5:33	73° 16,787'	58° 00,394'	Monster Net	(bottom)	906	104	12	9,9	6,87	32,18	1006,92	76	0
2a	204	Basic	2019-07-18	5:59	73° 16,841'	58° 00,610'	Monster Net	↑	900	100	12,6	9,7	7,58	32,18	1006,76	81	0
2a	204	Basic	2019-07-18	6:49	73° 15,809'	57° 59,045'	CTD-Rosette	↓	962	179	12,8	8,6	7,22	32,25	1006,77	89	0

2a	204	Basic	2019-07-18	7:13	73° 15,871'	57° 59,523'	CTD-Rosette	(bottom)	959	144	7,8	10,1	7,88	32,23	1006,7	82	0
2a	204	Basic	2019-07-18	7:44	73° 15,918'	58° 00,164'	CTD-Rosette	↑	959	145	8,6	10,5	7,68	32,23	1006,62	77	0
2a	204	Basic	2019-07-18	8:04	73° 15,960'	58° 00,455'	Box Core	↓	962	160	10,7	7,9	7,46	32,30	1006,43	90	0
2a	204	Basic	2019-07-18	8:18	73° 15,924'	58° 00,483'	Box Core	(bottom)	961	159	9,5	7,7	6,98	32,30	1006,42	91	0
2a	204	Basic	2019-07-18	8:31	73° 15,934'	58° 00,572'	Box Core	↑	961	154	9,7	7,7	7,16	32,29	1006,36	91	0
2a	204	Basic	2019-07-18	8:49	73° 16,055'	58° 00,908'	Agassiz Trawl	↓	963	166	6,1	7,7	7,65	32,26	1006,57	90	0
2a	204	Basic	2019-07-18	9:16	73° 16,550'	58° 02,573'	Agassiz Trawl	(bottom)	897	158	7,4	7,6	7,63	32,18	1006,41	91	0
2a	204	Basic	2019-07-18	10:06	73° 17,030'	58° 06,120'	Agassiz Trawl	↑	906	144	6,3	7,6	7,41	31,93	1006,37	91	0
2a	206	Nutrient	2019-07-18	14:21	74° 04,301'	59° 02,250'	CTD-Rosette	↓	174	126	1,7	8,1	7,52	30,93	1005,26	95	1
2a	206	Nutrient	2019-07-18	14:29	74° 04,347'	59° 02,292'	CTD-Rosette	(bottom)	177	111	4,6	9,2	6,83	31,20	1005,06	90	1
2a	206	Nutrient	2019-07-18	14:57	74° 04,431'	59° 02,366'	CTD-Rosette	↑	179	82	3	9,7	6,12	31,61	1004,97	89	1
2a	206	Nutrient	2019-07-18	15:16	74° 04,094'	59° 02,092'	Bongo Net	↓	165	80	3,4	8,9	4,78	32,10	1004,73	92	1
2a	206	Nutrient	2019-07-18	15:24	74° 04,102'	59° 02,124'	Bongo Net	↑	167	77	5,1	8,8	5,52	31,92	1004,74	94	1
2a	BB24	Nutrient	2019-07-19	1:08	75° 48,071'	62° 29,838'	Baited Camera	↓	532	294	7,8	9,2	8,98	32,60	1000,39	84	1
2a	BB24	Nutrient	2019-07-19	1:39	75° 48,145'	62° 30,104'	Baited Camera	(bottom)	509	300	7,6	8,9	9,28	32,53	1000,08	81	1
2a	210	Basic	2019-07-19	4:10	75° 25,166'	61° 33,562'	CTD-Rosette	↓	1161	267	4,4	8,9	7,01	32,93	999,69	91	1
2a	210	Basic	2019-07-19	4:38	75° 25,150'	61° 33,912'	CTD-Rosette	(bottom)	1174	256	4,4	8,9	8,56	32,82	999,94	89	1
2a	210	Basic	2019-07-19	5:38	75° 25,234'	61° 34,487'	CTD-Rosette	↑		154	1,7	10,1	8,41	32,93	1000,09	84	1
2a	210	Basic	2019-07-19	6:00	75° 25,169'	61° 34,493'	Bongo Net	↓	1171	152	1,9	10,5	9,31	32,86	1000,16	86	1
2a	210	Basic	2019-07-19	6:08	75° 25,149'	61° 34,531'	Bongo Net	↑	1160	54	0	10,2	9,52	32,94	1000,22	85	1
2a	210	Basic	2019-07-19	6:17	75° 25,193'	61° 34,585'	Tucker Net	↓	1163	127	0,6	10,4	9,64	32,96	1000,25	86	1
2a	210	Basic	2019-07-19	6:31	75° 25,602'	61° 35,298'	Tucker Net	↑	1095	187	1	9,4	9,50	32,93	1000,3	90	1
2a	210	Basic	2019-07-19	6:56	75° 25,397'	61° 33,355'	Monster Net	↓	1165	154	3	9,1	8,76	32,94	1000,53	93	1
2a	210	Basic	2019-07-19	7:27	75° 25,519'	61° 33,494'	Monster Net	(bottom)	1164	133	3,8	8,9	9,43	32,93	1000,55	92	1
2a	210	Basic	2019-07-19	8:05	75° 25,619'	61° 33,657'	Monster Net	↑	1160	74	5,3	8,7	9,31	32,93	1000,5	84	1
2a	210	Basic	2019-07-19	8:39	75° 25,212'	61° 32,996'	CTD-Rosette	↓	1173	113	2,5	10	6,86	32,91	1000,75	90	1
2a	210	Basic	2019-07-19	9:07	75° 25,245'	61° 33,220'	CTD-Rosette	(bottom)	1171	105	10,5	9,2	8,99	32,92	1000,99	94	1
2a	210	Basic	2019-07-19	9:43	75° 25,413'	61° 33,906'	CTD-Rosette	↑	1132	247	1	8,9	9,52	32,94	1001,3	95	1
2a	210	Basic	2019-07-19	9:57	75° 25,508'	61° 34,014'	Box Core	↓	1128	120	14,3	8,6	7,33	32,87	1001,37	95	1
2a	210	Basic	2019-07-19	10:14	75° 25,603'	61° 34,038'	Box Core	(bottom)	1146	137	12,9	8,7	7,68	32,86	1001,42	94	1
2a	210	Basic	2019-07-19	10:37	75° 25,705'	61° 33,908'	Box Core	↑	1130	142	11,4	8,6	8,87	32,89	1001,53	92	1
2a	210	Basic	2019-07-19	11:02	75° 25,250'	61° 33,532'	Agassiz Trawl	↓	1157	130	9,7	8,5	9,43	32,95	1001,81	97	1
2a	210	Basic	2019-07-19	11:38	75° 25,291'	61° 36,907'	Agassiz Trawl	(bottom)	1043	116	8,6	8,3	9,66	32,95	1001,86	98	1
2a	210	Basic	2019-07-19	12:13	75° 24,978'	61° 40,301'	Agassiz Trawl	↑	1122	103	12,2	8,5	9,72	32,92	1001,8	96	1
2a	BB24	Nutrient	2019-07-19	15:11	75° 48,302'	62° 31,094'	Baited Camera	↑	499	125	20,8	7,3	9,36	32,68	1002,97	93	1
2a	BB24	Nutrient	2019-07-19	15:38	75° 48,182'	62° 30,903'	CTD-Rosette	↓	483	122	16,8	8,4	9,02	32,69	1003,23	83	1
2a	BB24	Nutrient	2019-07-19	15:52	75° 48,380'	62° 31,610'	CTD-Rosette	(bottom)	558	129	18,1	10,8	8,90	32,72	1003,38	73	1
2a	BB24	Nutrient	2019-07-19	16:36	75° 48,522'	62° 31,436'	CTD-Rosette	↑	582	122	16,8	6,7	6,41	32,90	1003,56	94	1
2a	BB24	Nutrient	2019-07-19	16:45	75° 48,526'	62° 31,218'	Bongo Net	↓	572	122	23	7,9	8,88	32,70	1003,52	92	1
2a	BB24	Nutrient	2019-07-19	16:53	75° 48,559'	62° 31,116'	Bongo Net	↑	564	107	14,7	9,7	8,67	32,72	1003,68	84	1
2a	212	CTD	2019-07-19	19:47	75° 38,155'	64° 37,071'	CTD-Rosette	↓	512	141	12	10	6,99	32,36	1003,73	81	0
2a	212	CTD	2019-07-19	20:01	75° 38,217'	64° 37,191'	CTD-Rosette	(bottom)	512	144	11,8	7,7	5,62	32,57	1003,42	98	0
2a	212	CTD	2019-07-19	20:11	75° 38,203'	64° 37,396'	CTD-Rosette	↑	510	150	20,8	8,3	6,91	32,35	1003,94	86	0
2a	214	Nutrient	2019-07-20	0:15	75° 48,900'	67° 51,025'	CTD-Rosette	↓	249	134	9,3	9,3	6,84	32,21	1005,13	79	3
2a	214	Nutrient	2019-07-20	0:23	75° 48,938'	67° 51,218'	CTD-Rosette	(bottom)	248	124	10,3	6,3	6,85	32,21	1004,94	95	3
2a	214	Nutrient	2019-07-20	0:56	75° 49,013'	67° 51,747'	CTD-Rosette	↑	253	133	8,4	7,5	6,79	32,24	1004,82	88	3
2a	116	Nutrient	2019-07-20	4:55	76° 22,386'	70° 29,714'	CTD-Rosette	↓	142	104	3,6	5,9	5,17	31,34	1005,41	98	2
2a	116	Nutrient	2019-07-20	5:03	76° 22,494'	70° 30,113'	CTD-Rosette	(bottom)	149	88	3,8	5,8	5,19	31,32	1005,54	98	2
2a	116	Nutrient	2019-07-20	5:31	76° 22,779'	70° 31,128'	CTD-Rosette	↑	144	110	4	6,3	5,42	31,25	1005,91	98	2
2a	115	Full	2019-07-20	6:44	76° 19,878'	71° 11,958'	CTD-Rosette	↓	677	104	10,5	5,1	4,69	31,28	1005,69	98	0
2a	115	Full	2019-07-20	7:01	76° 19,867'	71° 12,167'	CTD-Rosette	(bottom)	659	121	8,9	5,3	4,65	31,27	1005,77	98	0
2a	115	Full	2019-07-20	8:00	76° 19,769'	71° 12,654'	CTD-Rosette	↑	653	101	5	5,8	4,45	31,25	1005,89	97	0
2a	115	Full	2019-07-20	8:15	76° 19,785'	71° 12,764'	Bongo Net	↓	655	105	9,3	4,5	4,48	31,37	1005,83	98	0
2a	115	Full	2019-07-20	8:24	76° 19,801'	71° 12,853'	Bongo Net	↑	655	101	9,1	4,4	4,45	31,25	1005,78	98	0
2a	115	Full	2019-07-20	9:07	76° 20,573'	71° 10,254'	Baited Camera	↓	645	123	7	4,9	4,64	31,42	1006,23	98	0
2a	115	Full	2019-07-20	9:57	76° 20,625'	71° 10,255'	Baited Camera	(bottom)	643	127	8,8	4,5	4,75	31,41	1006,48	98	0
2a	115	Full	2019-07-20	10:21	76° 19,816'	71° 11,620'	Trace-Metal Cast	↓	646	131	7,6	4,3	4,53	31,56	1006,39	98	0
2a	115	Full	2019-07-20	10:25	76° 19,774'	71° 11,812'	Trace-Metal Cast	↑	644	141	4,2	4,7	4,73	31,39	1007,01	98	0
2a	115	Full	2019-07-20	10:40	76° 19,881'	71° 12,811'	Tucker Net	↓	650	117	4,8	4,1	4,76	31,36	1008,68	98	0
2a	115	Full	2019-07-20	10:56	76° 19,639'	71° 14,294'	Tucker Net	↑	671	100	6,3	4,3	4,46	31,24	1008,36	98	0
2a	115	Full	2019-07-20	11:57	76° 19,925'	71° 12,785'	IKMT	↓	652	145	1,3	4,6	4,78	31,37	1008,93	98	0
2a	115	Full	2019-07-20	13:05	76° 17,410'	71° 13,093'	IKMT	↑	661	92	4,8	4,1	4,78	31,32	1007,14	98	0
2a	115	Full	2019-07-20	13:30	76° 19,909'	71° 11,419'	Monster Net	↓	677	91	1	4,9	4,64	31,43	1007,14	98	0
2a	115	Full	2019-07-20	13:50	76° 20,040'	71° 11,786'	Monster Net	(bottom)	661	154	1,5	5,2	4,62	31,56	1008,33	98	0
2a	115	Full	2019-07-20	14:13	76° 20,210'	71° 11,841'	Monster Net	↑	660	268	0	5,3	4,64	31,62	1009,89	98	0
2a	115	Full	2019-07-20	14:41	76° 20,024'	71° 11,995'	Hydrobios	↓	666	53	0,6	5,1	4,67	31,37	1010,07	98	0
2a	115	Full	2019-07-20	14:59	76° 20,150'	71° 12,465'	Hydrobios	(bottom)	661	349	2,1	5,8	4,61	31,43	1009,82	98	0
2a	115	Full	2019-07-20	15:21	76° 20,391'	71° 13,025'	Hydrobios	↑	661	35	1,9	5,6	4,38	31,79	1007,7	97	0
2a	115	Full	2019-07-20	15:37	76° 19,940'	71° 12,009'	Trace-Metal Cast	↓	678	46	3	5,1	4,51	31,64	1007,7	98	0
2a	115	Full	2019-07-20	15:49	76° 20,037'	71° 12,173'	Trace-Metal Cast	↑	665	6	3,2	4,9	4,56	31,70	1007,81	98	0
2a	115	Full	2019-07-20	16:30	76° 19,907'	71° 11,960'	CTD-Rosette	↓	678	39	2,7	4,9	4,58	31,80	1007,92	98	0
2a	115	Full	2019-07-20	16:46	76° 20,000'	71° 12,506'	CTD-Rosette	(bottom)	678	3	3,2	5,6	4,50	31,82	1007,86	98	0
2a	115	Full	2019-07-20	17:19	76° 20,140'	71° 13,139'	CTD-Rosette	↑	669	53	1,7	6,1	4,53	31,87	1008,11	98	0
2a	115	Full	2019-07-20	17:30	76° 20,201'	71° 12,895'	Trace-Metal Cast	↓	664	19	3,2	6,4	4,41	31,88	1008,05	96	0
2a	115	Full	2019-07-20	17:48	76° 20,334'	71° 13,126'	Trace-Metal Cast	↑	665	50	3,6	5,1	4,41	31,89	1008,05	98	0
2a	115	Full	2019-07-20	17:56	76° 20,413'	71° 13,351'	Agassiz Trawl	↓	668	32	1,7	5,6	4,40	31,90	1008,16	98	0
2a	115	Full	2019-07-20	18:16	76° 20,093'	71° 14,995'	Agassiz Trawl	(bottom)	673	73	2,7	5,2	5,04	31,87	1008,11	98	0
2a	115	Full	2019-07-20	18:41	76° 19,555'	71° 14,036'	Agassiz Trawl	↑	673	95	3	4,7	4,94	31,69	1008,03	98	0
2a	115	Full	2019-07-20	18:58	76° 18,820'	71° 14,219'	Box Core	↓	666	342	0	5,6	5,02	31,49	1008,13	98	0
2a	115	Full	2019-07-20	19:09	76° 18,875'	71° 14,220'	Box Core	(bottom)		334	1,9	6	4,52	31,71	1008,17	98	0
2a	115	Full	2019-07-20	19:20	76° 18,895'	71° 14,199'	Box Core	↑		79	0,8	4,8	4,76	31,61	1008,4	98	0
2a	115	Full	2019-07-20	20:39	76° 20,662'	71° 10,408'	Baited Camera	↑	646	245	1,9	4,9	4,53	31,89	1008,82	98	0
2a	114	CTD	2019-07-20	21:43	76° 19,552'	71° 47,387'	CTD-Rosette	↓	614	187	6,5	4	5,33	31,77	1009,17	98	0
2a	114	CTD	2019-07-20	22:04	76° 19,547'	71° 47,394'	CTD-Rosette	(bottom)	614	214	1,7	5,3	5,61	31,76	1009,32	98	0
2a	114	CTD	2019-07-20	22:13	76° 19,546'	71° 47,378'	CTD-Rosette	↑	614	229	1,1	5,3	5,55	31,77	1009,32	98	0
2a	113	Nutrient	2019-07-20	23:01	76° 19,168'	72° 12,981'	CTD-Rosette	↓	551				5,12	31,24			0
2a	113	Nutrient	2019-07-20	23:17	76° 19,127'	72° 12,978'	CTD-Rosette	(bottom)	553	129	2,7	3,6	5,19	31,25	1009,64	98	0
2a	113	Nutrient	2019-07-21	0:09	76° 19,203'	72° 13,274'	CTD-Rosette	↑	550	318	0,2	3,7	5,33	31,31	1009,66	98	0
2a	112	CTD	2019-07-21	1:08	76° 18,970'	72° 42,294'	CTD-Rosette	↓	572	171	5,3	1,9	0,57	31,20	1009,87	98	0
2a	112	CTD	2019-07-21	1:23	76° 19,015'	72° 42,314'	CTD-Rosette	(bottom)	572	175	5,7	1,5	0,27	31,42	1009,83	98	0
2a	112	CTD	2019-07-21	1:33	76° 19,025'	72° 42,354'	CTD-Rosette	↑	572	171	7	2,3	1,16	31,23	1009,85	98	0
2a	111	Basic	2019-07-21	2:42	76° 18,409'	73° 12,699'	CTD-Rosette	↓	599	161	6,9	2	3,25	30,60	1009,74	98	1
2a	111	Basic	2019-07-21	2:50	76° 18,473'	73° 12,609'	Surface Bucket	↓	595	155	8,4	1,9	3,23	30,61	1009,63	98	1
2a	111	Basic	2019-07-21	2:58	76° 18,505'	73° 12,487'	CTD-Rosette	(bottom)	597	151	5,9	3	3,36	30,70	1009,7	98	1
2a	111	Basic	2019-07-21	3:45	76° 18,646'	73° 12,367'	CTD-Rosette	↑	607	165	5	2,8	4,00	30,48	1009,51	98	1
2a	111	Basic	2019-07-21	4:22	76° 18,345'	73° 12,241'	Trace-Metal Cast	↓	601	168	9,3	2,9	3,09	30,83	1009,34	98	1
2a	111	Basic	2019-07-21	4:33	76° 18,383'	73° 12,002'	Trace-Metal Cast	↑	596	166	8,8	2,8	3,32	30,96	1009,27	98	1
2a	111	Basic	2019-07-21	4:40	76° 18,412'	73° 11,780'	Bongo Net	↓	597	157	8,4	2,3	3,47	30,94	1009,29	98	1
2a	111	Basic	2019-07-21	4:48	76° 18,495'	73° 11,545'	Bongo Net	↑	608	157	8,2	2,6	3,40	31,02	1009,27	98	1
2a	111	Basic	2019-07-21	4:59	76° 18,721'	73° 11,434'	Tucker Net	↓	606	164	7,6	2,2	3,23	30,58	1009,27	98	1
2a	111	Basic	2019-07-21	5:13	76° 19,129'	73° 12,052'	Tucker Net	↑	613	170	7	2,2	3,45	30,56	1009,3	98	1
2a	111	Basic	2019-07-21	5:39	76° 18,307'	73° 12,443'	Monster Net	↓	598	179	8,4	1,7	4,16	30,75	1009,35	98	1
2a	111	Basic	2019-07-21	5:56	76° 18,337'	73° 11,813'	Monster Net	(bottom)	598	175	8	2	3,87	31,11	1009,35	98	1
2a	111	Basic	2019-07-21	6:16	76° 18,391'	73° 11,019'	Monster Net	↑	606	164	9,5	1,9	3,51	31,22	1009,36	98	1
2a	111	Basic	2019-07-21	6:49	76° 18,324'	73° 14,147'	Trace-Metal Cast	↓	603	154	6,5	3,1	3,48	30,14	1009,24	98	1
2a	111	Basic	2019-07-21	7:03	76° 18,328'	73° 13,657'	Trace-Metal Cast	↑	606	185	6,7	3,3	3,72	31,09	1009,2	98	1
2a	111	Basic	2019-07-21	7:21	76° 18,471'	73° 13,053'	CTD-Rosette	↓	597	163	8,9	2,8	3,67	30,76	1009,13	98	1
2a	111	Basic	2019-07-21	7:39	76° 18,445'	73° 12,739'	CTD-Rosette	(bottom)	597	159	6,9	2,8	3,64	30,81	1009,12	98	1
2a	111	Basic	2019-07-21	7:52	76° 18,430'	73° 12,476'	CTD-Rosette	↑	596	200	8,6	3,9	3,60	31,14	1009,21	93	1
2a	111	Basic	2019-07-21	8:18	76° 18,473'	73° 12,340'	Trace-Metal Cast	↓	597	219	1,3	2,4	3,70	30,79	1009,21	98	1
2a	111	Basic	2019-07-21	8:29	76° 18,468'	73° 12,267'	Trace-Metal Cast	↑	597	178	2,7	2,4	3,70	30,71	1009,3	98	1
2a	111	Basic	2019-07-21	8:49	76° 18,496'	73° 11,848'	Box Core	↓	606	177	7	1,9	3,79	30,80	1009,27	98	2

2a	111	Basic	2019-07-21	8:59	76° 18,513'	73° 11,644'	Box Core	(bottom)	607	173	8,8	1,9	3,30	30,97	1009,29	98	2
2a	111	Basic	2019-07-21	9:08	76° 18,540'	73° 11,439'	Box Core	↑	606	163	6,9	1,9	3,68	30,87	1009,39	98	2
2a	111	Basic	2019-07-21	9:33	76° 18,632'	73° 10,675'	Agassiz Trawl	↓	605	164	5,7	2,3	3,58	30,58	1009,37	98	2
2a	111	Basic	2019-07-21	9:57	76° 19,200'	73° 10,684'	Agassiz Trawl	(bottom)	610	192	6,1	1,9	2,09	29,50	1009,4	98	2
2a	111	Basic	2019-07-21	10:23	76° 19,600'	73° 12,522'	Agassiz Trawl	↑	599	176	7,4	2,3	2,04	29,39	1009,39	98	2
2a	110	Nutrient	2019-07-21	11:35	76° 17,848'	73° 37,522'	CTD-Rosette	↓	530	210	4,6	2,1	2,55	30,03	1009,12	98	3
2a	110	Nutrient	2019-07-21	11:51	76° 17,702'	73° 37,053'	CTD-Rosette	(bottom)	530	179	8,4	2,1	2,94	30,91	1009,01	98	3
2a	110	Nutrient	2019-07-21	12:39	76° 17,363'	73° 36,076'	CTD-Rosette	↑	525	179	1,5	2,8	3,11	30,79	1008,84	98	3
2a	109	CTD	2019-07-21	14:10	76° 17,397'	74° 06,308'	CTD-Rosette	↓	456	211	4,6	1,3	1,01	29,92	1008,4	98	4
2a	109	CTD	2019-07-21	14:24	76° 17,340'	74° 05,825'	CTD-Rosette	(bottom)	456	244	0,4	1,6	0,36	30,30	1008,2	98	4
2a	109	CTD	2019-07-21	14:33	76° 17,325'	74° 05,747'	CTD-Rosette	↑	456	218	2,9	1,1	0,75	30,57	1008,18	98	4
2a	108	Full	2019-07-21	16:27	76° 16,450'	74° 36,981'	Baited Camera	↓	452	227	9,3	2,1	2,66	31,31	1007,72	98	0
2a	108	Full	2019-07-21	16:54	76° 16,474'	74° 36,835'	Baited Camera	(bottom)	452	218	8	2,1	2,59	31,34	1007,56	98	0
2a	108	Full	2019-07-21	17:16	76° 15,486'	74° 36,056'	Trace-Metal Cast	↓	450	196	4,4	2,7	2,77	31,33	1007,72	98	0
2a	108	Full	2019-07-21	17:29	76° 15,468'	74° 35,967'	Trace-Metal Cast	↑	450	259	5,1	2,9	2,86	31,34	1007,79	98	0
2a	108	Full	2019-07-21	17:37	76° 15,469'	74° 35,951'	CTD-Rosette	↓	451	222	8,4	2,5	3,06	31,33	1007,79	98	0
2a	108	Full	2019-07-21	17:51	76° 15,458'	74° 35,689'	CTD-Rosette	(bottom)	451	222	7	2,1	2,93	31,33	1007,8	98	0
2a	108	Full	2019-07-21	18:14	76° 15,387'	74° 35,428'	CTD-Rosette	↑	450	223	4	3,1	3,11	31,33	1007,85	98	0
2a	108	Full	2019-07-21	18:23	76° 15,370'	74° 35,320'	Trace-Metal Cast	↓	449	223	4	3,5	3,05	31,33	1007,82	98	0
2a	108	Full	2019-07-21	18:37	76° 15,355'	74° 35,001'	Trace-Metal Cast	↑	448	191	3,8	3,5	3,08	31,33	1007,72	98	0
2a	108	Full	2019-07-21	18:46	76° 15,328'	74° 34,855'	Bongo Net	↓	446	157	4	3,3	3,02	31,33	1007,75	98	0
2a	108	Full	2019-07-21	18:55	76° 15,306'	74° 34,725'	Bongo Net	↑	447	176	4,2	3,5	3,04	31,33	1007,75	98	0
2a	108	Full	2019-07-21	19:02	76° 15,309'	74° 34,529'	Tucker Net	↓	447				3,01	31,33			0
2a	108	Full	2019-07-21	19:22	76° 15,850'	74° 34,421'	Tucker Net	↑	448	180	5,5	2,6	2,80	31,34	1007,66	98	0
2a	108	Full	2019-07-21	19:46	76° 15,739'	74° 37,049'	Monster Net	↓	454	181	5,3	3	2,48	31,34	1007,87	98	0
2a	108	Full	2019-07-21	20:14	76° 15,643'	74° 36,261'	Monster Net	↑	449	192	6,1	2,4	2,74	31,31	1008,13	98	0
2a	108	Full	2019-07-21	20:46	76° 15,616'	74° 35,688'	Trace-Metal Cast	↓	448	214	6,1	2,6	2,65	31,31	1008,35	98	0
2a	108	Full	2019-07-21	21:23	76° 15,475'	74° 34,875'	Trace-Metal Cast	↑	446	254	5	2,6	2,73	31,31	1008,76	98	0
2a	108	Full	2019-07-21	22:41	76° 15,566'	74° 35,658'	Hydrobios	↓	447	216	6,1	3	3,10	31,17	1009,17	98	0
2a	108	Full	2019-07-21	22:54	76° 15,498'	74° 35,242'	Hydrobios	(bottom)	448	235	5,5	2,9	3,06	31,17	1009,24	98	0
2a	108	Full	2019-07-21	23:09	76° 15,406'	74° 34,904'	Hydrobios	↑	446	187	2,5	3	3,10	31,17	1009,13	98	0
2a	108	Full	2019-07-21	23:30	76° 15,543'	74° 36,114'	CTD-Rosette	↓	451	236	4,8	3,5	2,30	31,34	1009,26	98	0
2a	108	Full	2019-07-21	23:44	76° 15,491'	74° 36,050'	CTD-Rosette	(bottom)	449	213	5,5	3,2	2,96	31,18	1009,32	98	0
2a	108	Full	2019-07-22	0:24	76° 15,441'	74° 35,556'	CTD-Rosette	↑	450	188	4,6	2,9	3,11	31,14	1009,5	98	0
2a	108	Full	2019-07-22	1:16	76° 16,387'	74° 37,001'	Baited Camera	↑	451	209	1,7	4,2	2,25	30,55	1009,41	97	0
2a	108	Full	2019-07-22	1:49	76° 15,626'	74° 36,427'	Beam trawl	↓	450	159	7	2,9	2,82	30,88	1009,24	98	0
2a	108	Full	2019-07-22	2:14	76° 15,531'	74° 39,923'	Beam trawl	(bottom)	450	158	7	2,2	3,17	31,00	1009,33	98	1
2a	108	Full	2019-07-22	2:50	76° 14,581'	74° 45,890'	Beam trawl	↑	459	167	10,5	2,7	3,21	30,79	1009,43	98	1
2a	108	Full	2019-07-22	3:37	76° 15,653'	74° 36,465'	Agassiz Trawl	↓	451	159	6,5	2,6	3,10	31,06	1009,37	98	1
2a	108	Full	2019-07-22	3:51	76° 15,673'	74° 37,848'	Agassiz Trawl	(bottom)	452	165	7,4	2,6	3,16	31,10	1009,37	98	1
2a	108	Full	2019-07-22	4:06	76° 15,589'	74° 39,432'	Agassiz Trawl	↑	450	164	6,9	2,8	3,29	31,19	1009,26	98	0
2a	108	Full	2019-07-22	5:02	76° 15,548'	74° 35,894'	Box Core	↓	453	159	6,5	5	3,07	31,15	1009,25	95	0
2a	108	Full	2019-07-22	5:09	76° 15,541'	74° 35,810'	Box Core	(bottom)	452	140	10,5	4,6	2,95	31,18	1009,35	94	0
2a	108	Full	2019-07-22	5:17	76° 15,536'	74° 35,765'	Box Core	↑	452	149	6,9	5,5	3,02	31,15	1009,4	90	0
2a	108	Full	2019-07-22	5:48	76° 15,587'	74° 35,665'	Box Core	↓	448	151	9,3	5,7	3,03	31,18	1009,54	85	0
2a	108	Full	2019-07-22	5:56	76° 15,592'	74° 35,553'	Box Core	(bottom)	447	148	5	4,1	3,01	31,19	1009,59	97	0
2a	108	Full	2019-07-22	6:02	76° 15,604'	74° 35,471'	Box Core	↑	448	154	5	4,8	3,03	31,19	1009,58	89	0
2a	108	Full	2019-07-22	6:17	76° 15,591'	74° 35,572'	Box Core	↓	447	145	9,1	3,2	3,17	31,19	1009,61	98	0
2a	108	Full	2019-07-22	6:25	76° 15,593'	74° 35,615'	Box Core	(bottom)	447	148	1	3,2	3,19	31,19	1009,58	98	0
2a	108	Full	2019-07-22	6:33	76° 15,602'	74° 35,679'	Box Core	↑	448	150	9,9	2,8	3,20	31,20	1009,51	98	0
2a	108	Full	2019-07-22	6:41	76° 15,598'	74° 35,754'	Box Core	↓	449	100	5,9	2,7	3,22	31,21	1009,54	98	0
2a	108	Full	2019-07-22	6:48	76° 15,583'	74° 35,754'	Box Core	(bottom)	451	162	8,2	6	3,23	31,20	1009,63	88	0
2a	108	Full	2019-07-22	6:55	76° 15,584'	74° 35,770'	Box Core	↑	450	83	1,9	3,4	3,24	31,15	1009,55	97	0
2a	108	Full	2019-07-22	7:11	76° 15,573'	74° 35,932'	Box Core	↓	453	185	5,5	2,8	2,89	30,92	1009,58	98	0
2a	108	Full	2019-07-22	7:18	76° 15,581'	74° 35,984'	Box Core	(bottom)	453	183	6,5	2,6	2,83	30,84	1009,56	98	0
2a	108	Full	2019-07-22	7:26	76° 15,579'	74° 36,061'	Box Core	↑	453	271	0,4	2	2,68	30,72	1009,56	98	0
2a	107	Nutrient	2019-07-22	8:22	76° 16,829'	74° 59,045'	CTD-Rosette	↓	446	98	5,5	2,5	3,16	31,25	1009,3	98	0
2a	107	Nutrient	2019-07-22	8:37	76° 16,793'	74° 59,298'	CTD-Rosette	(bottom)	444	151	8,9	2,4	3,23	31,25	1009,32	98	0
2a	107	Nutrient	2019-07-22	9:14	76° 16,852'	74° 59,751'	CTD-Rosette	↑	443	107	2,7	2,2	3,24	31,24	1009,41	98	0
2a	106	CTD	2019-07-22	10:00	76° 18,508'	75° 20,841'	CTD-Rosette	↓	389	181	1,9	3,2	3,08	30,95	1009,16	98	0
2a	106	CTD	2019-07-22	10:12	76° 18,504'	75° 21,250'	CTD-Rosette	(bottom)	386	130	6,7	3,7	3,05	30,95	1009	98	0
2a	106	CTD	2019-07-22	10:21	76° 18,476'	75° 21,407'	CTD-Rosette	↑	385	129	11,2	3,9	3,04	30,96	1009,04	98	0
2a	105	Basic	2019-07-22	12:20	76° 19,282'	75° 46,223'	CTD-Rosette	↓	339	135	11	6,6	2,83	30,92	1010,02	87	1
2a	105	Basic	2019-07-22	12:26	76° 19,294'	75° 46,294'	CTD-Rosette	(bottom)	339	169	5,3	6,8	2,79	30,93	1010,09	89	1
2a	105	Basic	2019-07-22	13:12	76° 19,340'	75° 47,523'	CTD-Rosette	↑	348	134	11,4	8,5	3,02	30,86	1008,47	76	1
2a	105	Basic	2019-07-22	13:29	76° 19,162'	75° 45,202'	Trace-Metal Cast	↓	331	142	8,6	7,1	3,07	30,88	1008,32	79	1
2a	105	Basic	2019-07-22	13:37	76° 19,182'	75° 45,376'	Trace-Metal Cast	↑	331	70	2,9	4,8	3,08	30,88	1008,32	95	1
2a	105	Basic	2019-07-22	13:46	76° 19,198'	75° 45,523'	Bongo Net	↓	332	129	14,9	4,1	2,97	30,91	1008,3	96	1
2a	105	Basic	2019-07-22	13:54	76° 19,239'	75° 45,639'	Bongo Net	↑	331	129	16	7,5	2,56	31,03	1008,22	79	1
2a	105	Basic	2019-07-22	14:03	76° 19,269'	75° 45,679'	Tucker Net	↓	333	132	18,3	4,1	2,95	30,93	1007,95	97	1
2a	105	Basic	2019-07-22	14:24	76° 19,434'	75° 48,683'	Tucker Net	↑	344	135	19,6	4,1	3,02	30,88	1007,39	97	1
2a	105	Basic	2019-07-22	14:54	76° 19,226'	75° 45,647'	Monster Net	↓	332	139	18,3	4	2,60	31,00	1007,82	97	1
2a	105	Basic	2019-07-22	15:03	76° 19,289'	75° 45,518'	Monster Net	(bottom)	331	140	21,5	3,9	2,70	30,98	1007,72	98	1
2a	105	Basic	2019-07-22	15:15	76° 19,357'	75° 45,281'	Monster Net	↑	334	143	19,6	3,8	2,61	31,03	1007,84	98	1
2a	105	Basic	2019-07-22	15:43	76° 19,135'	75° 45,804'	Trace-Metal Cast	↓	333	140	12,2	5,5	3,20	30,99	1008,87	96	1
2a	105	Basic	2019-07-22	15:53	76° 19,219'	75° 46,099'	Trace-Metal Cast	↑	336	134	20,8	4,6	3,19	30,98	1008,9	95	0
2a	105	Basic	2019-07-22	16:35	76° 19,061'	75° 45,666'	CTD-Rosette	↓	332	119	16	4,5	3,07	30,98	1008,75	97	0
2a	105	Basic	2019-07-22	16:46	76° 19,145'	75° 45,967'	CTD-Rosette	(bottom)	335	123	20	4,3	3,02	30,98	1008,73	98	0
2a	105	Basic	2019-07-22	17:11	76° 19,186'	75° 46,537'	CTD-Rosette	↑	337	130	14,7	4,2	3,04	30,98	1008,75	98	0
2a	105	Basic	2019-07-22	17:22	76° 19,203'	75° 46,722'	Trace-Metal Cast	↓	339	146	15,6	4,5	2,98	30,99	1008,62	96	0
2a	105	Basic	2019-07-22	17:47	76° 19,170'	75° 46,779'	Trace-Metal Cast	↑	341	132	11,6	6,5	3,07	30,99	1008,51	88	0
2a	105	Basic	2019-07-22	18:02	76° 19,175'	75° 46,526'	Box Core	↓	337	114	11,8	7,7	2,98	31,00	1008,57	81	0
2a	105	Basic	2019-07-22	18:09	76° 19,180'	75° 46,537'	Box Core	(bottom)	337	128	10,7	8,1	3,02	30,97	1008,68	80	0
2a	105	Basic	2019-07-22	18:14	76° 19,172'	75° 46,473'	Box Core	↑	338	157	16,9	7,2	3,01	30,95	1008,66	84	0
2a	105	Basic	2019-07-22	18:28	76° 19,201'	75° 46,362'	Agassiz Trawl	↓	336	129	18,1	5,6	3,00	30,96	1008,62	93	0
2a	105	Basic	2019-07-22	18:38	76° 19,482'	75° 46,738'	Agassiz Trawl	(bottom)	345	136	22,8	3,9	2,93	30,95	1007,89	97	0
2a	105	Basic	2019-07-22	18:52	76° 19,659'	75° 47,952'	Agassiz Trawl	↑	352	131	20,4	3,9	2,95	30,94	1007,94	97	0
2a	104	CTD	2019-07-22	19:31	76° 20,541'	76° 10,493'	CTD-Rosette	↓	201	137	17,9	6,3	2,63	30,93	1007,9	90	0
2a	104	CTD	2019-07-22	19:40	76° 20,569'	76° 10,617'	CTD-Rosette	(bottom)	199	132	16,2	7,3	2,69	30,91	1007,99	87	0
2a	104	CTD	2019-07-22	19:45	76° 20,567'	76° 10,600'	CTD-Rosette	↑	198	143	12,8	6,4	2,76	30,91	1007,73	91	0
2a	102	CTD	2019-07-22	22:20	76° 22,589'	77° 00,865'	CTD-Rosette	↓	257	142	21,1	4,8	3,49	31,00	1006,22	95	0
2a	102	CTD	2019-07-22	22:29	76° 22,684'	77° 00,815'	CTD-Rosette	(bottom)	255	142	17,1	4,9	3,32	31,11	1006,2	98	0
2a	102	CTD	2019-07-22	22:36	76° 22,727'	77° 00,768'	CTD-Rosette	↑	254	142	25,3	5,1	2,91	30,92	1006,07	91	0
2a	103	Nutrient	2019-07-22	23:24	76° 21,215'	76° 35,414'	CTD-Rosette	↓	148	136	25,3	3,8	1,88	31,05	1006,08	97	0
2a	103	Nutrient	2019-07-22	23:33	76° 21,242'	76° 35,643'	CTD-Rosette	(bottom)	147	142	18,3	6,3	2,12	31,12	1006,07	88	0
2a	103	Nutrient	2019-07-22	23:55	76° 21,256'	76° 36,354'	CTD-Rosette	↑	147	149	25,5	6,3	2,42	31,01	1006,12	83	0
2a	101	Full	2019-07-23	1:05	76° 23,025'	77° 24,460'	CTD-Rosette	↓	364	144	16	6,7	2,58	30,26	1005,39	85	2
2a	101	Full	2019-07-23	1:18	76° 23,023'	77° 25,013'	CTD-Rosette	(bottom)	374	161	19,8	4,9	2,53	30,32	1005,7	96	2
2a	101	Full	2019-07-23	1:59	76° 22,980'	77° 26,138'	CTD-Rosette	↑	396	174	15,2	5,6	2,47	30,40	1005,71	89	2
2a	101	Full	2019-07-23	2:19	76° 22,949'	77° 23,795'	Trace-Metal Cast	↓	354	165	8,8	6	2,57	30,28	1005,79	93	2
2a	101	Full	2019-07-23	2:28	76° 22,917'	77° 24,026'	Trace-Metal Cast	↑	361	165	14,1	3,6	2,55	30,31	1005,63	97	2
2a	101	Full	2019-07-23	2:37	76° 22,912'	77° 24,242'	Bongo Net	↓	366	159	13,9	3,1	2,40	30,59	1005,48	98	2
2a	101	Full	2019-07-23	2:46	76° 22,866'	77° 24,146'	Bongo Net	↑	365	156	14,3	3,1	2,48	30,35	1005,43	98	2
2a	101	Full	2019-07-23	2:55	76° 22,878'	77° 24,398'	Tucker Net	↓	369	150	7,6	6,2	2,51	30,38	1005,64	86	2
2a	101	Full	2019-07-23	3:12	76° 23,120'	77° 25,885'	Tucker Net	↑	394	148	13,3	3,1	2,55	30,37	1005,4	98	2
2a	101	Full	2019-07-23	4:21	76° 23,462'	77° 25,455'	IKMT	↓	374	159	11,2	3	2,63	30,42	1005,7	98	1
2a	101	Full	2019-07-23	4:37	76° 23,672'	77° 27,652'	IKMT	(bottom)	404	164	11	3,1	2,72	30,62	1005,46	98	1
2a	101	Full	2019-07-23	5:21	76° 22,250'	77° 33,279'	IKMT	↑	361	157	11,2	3	2,25	29,82	1005,36	98	1
2a	101	Full	2019-07-23	5:55	76° 22,989'	77° 23,852'	Monster Net	↓	356	149	13,7	2,9	2,37	30,58	1005,52	98	1
2a	101	Full	2019-07-23	6:06	76° 22,948'	77° 23,945'	Monster Net	(bottom)	361	150	13,3	2,8	2,54	30,41	1005,53	98	1
2a	101	Full	2019-07-23	6:19	76° 22,923'	77° 24,308'	Monster Net	↑	367	157	11,8	3,6	2,62	30,34	1005,6	98	1
2a	101	Full	2019-07-23	7:10	76° 22,934'	77° 24,785'	Hydrobios	↓	374	135	10,7	2,7	2,65	30,36	1005,66	98	1

2a	101	Full	2019-07-23	7:20	76° 22,904'	77° 25,094'	Hydrobios	(bottom)	380	139	9,7	3,6	2,66	30,31	1005,61	98	1
2a	101	Full	2019-07-23	7:36	76° 22,885'	77° 25,808'	Hydrobios	↑	398	150	4,6	3,9	2,65	30,29	1005,85	98	1
2a	101	Full	2019-07-23	8:03	76° 22,952'	77° 24,056'	Trace-Metal Cast	↓	362	133	7,6	4,8	2,59	30,26	1005,89	97	1
2a	101	Full	2019-07-23	8:10	76° 22,880'	77° 24,215'	Trace-Metal Cast	↑	368	136	8	7	2,63	30,21	1005,82	87	1
2a	101	Full	2019-07-23	8:23	76° 22,812'	77° 24,664'	CTD-Rosette	↓	375	131	8,6	4,5	2,55	30,37	1005,84	97	1
2a	101	Full	2019-07-23	8:34	76° 22,772'	77° 25,161'	CTD-Rosette	(bottom)	385	104	6,5	4,5	2,65	30,23	1005,89	98	1
2a	101	Full	2019-07-23	8:54	76° 22,683'	77° 26,029'	CTD-Rosette	↑	398	125	10,7	6,5	2,67	30,27	1005,88	86	1
2a	101	Full	2019-07-23	9:22	76° 22,971'	77° 23,910'	Trace-Metal Cast	↓	358	131	9,9	3,6	2,63	30,12	1005,76	98	1
2a	101	Full	2019-07-23	9:32	76° 22,932'	77° 24,395'	Trace-Metal Cast	↑	367	145	5,7	3,2	2,65	30,12	1005,74	98	1
2a	101	Full	2019-07-23	9:52	76° 22,975'	77° 23,309'	Box Core	↓	354	120	12,4	2,4	2,52	30,51	1005,67	98	1
2a	101	Full	2019-07-23	9:59	76° 22,941'	77° 23,455'	Box Core	(bottom)	354	128	12,2	2,5	2,59	30,50	1005,78	98	1
2a	101	Full	2019-07-23	10:06	76° 22,919'	77° 23,697'	Box Core	↑	356	128	11,2	2,6	2,44	30,51	1005,83	98	1
2a	101	Full	2019-07-23	10:22	76° 23,236'	77° 23,867'	Agassiz Trawl	↓	345	122	11,8	2,5	2,66	30,12	1005,8	98	1
2a	101	Full	2019-07-23	10:36	76° 23,194'	77° 25,368'	Agassiz Trawl	(bottom)	384	125	12,4	2,5	2,70	30,20	1005,68	98	1
2a	101	Full	2019-07-23	10:51	76° 23,004'	77° 26,841'	Agassiz Trawl	↑	400	114	9,5	2,5	2,76	30,29	1005,75	98	1
2a	100	Nutrient	2019-07-23	11:58	76° 24,873'	77° 56,633'	CTD-Rosette	↓	224	106	5	2,6	0,29	29,71	1005,65	98	3
2a	100	Nutrient	2019-07-23	12:07	76° 24,818'	77° 56,867'	CTD-Rosette	(bottom)	227	100	10,5	3,7	0,50	30,63	1005,93	98	3
2a	100	Nutrient	2019-07-23	12:38	76° 24,689'	77° 57,320'	CTD-Rosette	↑	231	78	6,3	4,4	0,15	30,58	1006,03	98	3
2a	322	Nutrient	2019-07-24	0:54	74° 29,532'	80° 31,050'	Trace-Metal Cast	↓	667	294	5,1	1,9	1,91	30,38	1003,71	98	1
2a	322	Nutrient	2019-07-24	1:02	74° 29,528'	80° 31,307'	Trace-Metal Cast	↑	667	252	3	1,7	2,27	30,66	1003,65	98	1
2a	322	Nutrient	2019-07-24	1:16	74° 29,191'	80° 30,410'	CTD-Rosette	↓	669	292	6,3	1,7	2,10	30,74	1003,39	98	1
2a	322	Nutrient	2019-07-24	1:33	74° 29,126'	80° 30,655'	CTD-Rosette	(bottom)	668	305	3,2	1,6	2,21	30,74	1003,15	98	1
2a	322	Nutrient	2019-07-24	2:21	74° 28,947'	80° 31,780'	CTD-Rosette	↑	669	354	1,1	1,8	1,79	30,95	1003,18	98	1
2a	322	Nutrient	2019-07-24	2:40	74° 29,107'	80° 32,025'	Trace-Metal Cast	↓	669	281	6,7	1,3	1,77	30,99	1003,14	98	1
2a	322	Nutrient	2019-07-24	2:51	74° 29,084'	80° 32,334'	Trace-Metal Cast	↑	669	288	5,1	2	1,97	30,69	1003,28	98	1
2a	322	Nutrient	2019-07-24	3:07	74° 29,916'	80° 32,354'	Bongo Net	↓	666	276	6,7	1	2,39	30,33	1003,17	98	1
2a	322	Nutrient	2019-07-24	3:17	74° 29,897'	80° 32,605'	Bongo Net	↑	666	269	6,7	1,4	1,89	30,72	1003,35	98	1
2a	300	Nutrient	2019-07-24	4:18	74° 18,984'	80° 30,855'	CTD-Rosette	↓	707	232	5,5	1,1	1,43	29,57	1003,23	98	2
2a	300	Nutrient	2019-07-24	4:40	74° 18,804'	80° 31,416'	CTD-Rosette	(bottom)	708	231	5,7	1,1	0,88	31,50	1003,22	98	2
2a	300	Nutrient	2019-07-24	5:26	74° 18,500'	80° 32,653'	CTD-Rosette	↑	706	245	6,1	0,9	1,44	30,94	1003,3	98	2
2a	323	Full	2019-07-24	9:58	74° 09,567'	80° 28,225'	CTD-Rosette	↓	790	237	1,9	1,1	1,52	29,02	1006,38	98	2
2a	323	Full	2019-07-24	10:18	74° 09,527'	80° 28,311'	CTD-Rosette	(bottom)	790	233	3,2	1,2	2,05	29,81	1007,71	98	2
2a	323	Full	2019-07-24	11:06	74° 09,358'	80° 28,069'	CTD-Rosette	↑	794	272	0,8	1,5	2,35	30,37	1005,62	97	2
2a	323b	Full	2019-07-24	12:39	73° 59,919'	80° 00,281'	Baited Camera	↓	808	42	2,1	1,5	2,21	29,77	1006,14	98	1
2a	323b	Full	2019-07-24	13:36	73° 59,489'	79° 59,133'	Baited Camera	(bottom)	808	82	1	2,5	2,26	29,89	1006,19	93	1
2a	323	Full	2019-07-24	15:00	74° 08,869'	80° 30,733'	Trace-Metal Cast	↓	787	81	5,7	0,7	2,29	30,31	1006,47	98	3
2a	323	Full	2019-07-24	15:10	74° 08,764'	80° 30,586'	Trace-Metal Cast	↑	789	131	1,7	1,4	2,36	30,48	1006,59	98	3
2a	323	Full	2019-07-24	15:16	74° 08,707'	80° 30,459'	Bongo Net	↓	790	128	0,4	1,9	2,63	30,70	1006,63	96	3
2a	323	Full	2019-07-24	15:24	74° 08,639'	80° 30,328'	Bongo Net	↑	787	72	5,1	2,1	2,68	31,01	1006,65	94	3
2a	323	Full	2019-07-24	16:11	74° 08,553'	80° 29,818'	Tucker Net	↓	789	110	6,9	0,9	1,91	30,28	1006,93	98	1
2a	323	Full	2019-07-24	16:25	74° 08,205'	80° 30,679'	Tucker Net	↑	803	106	7	0,9	2,05	29,40	1006,97	98	1
2a	323	Full	2019-07-24	16:49	74° 08,072'	80° 30,195'	IKMT	↓	812	107	3,8	1,4	1,94	30,04	1007,07	98	1
2a	323	Full	2019-07-24	17:09	74° 07,681'	80° 32,041'	IKMT	(bottom)	803	97	7	0,7	2,51	29,64	1006,92	98	1
2a	323	Full	2019-07-24	17:58	74° 05,900'	80° 28,354'	IKMT	↑	793	92	10,9	1	2,73	30,33	1007,2	98	1
2a	323	Full	2019-07-24	18:27	74° 08,058'	80° 31,569'	Monster Net	↓	801	95	5,1	1,9	2,39	30,21	1007,46	98	2
2a	323	Full	2019-07-24	18:49	74° 07,864'	80° 31,224'	Monster Net	(bottom)	809	87	8,6	1,6	2,19	30,81	1007,33	98	2
2a	323	Full	2019-07-24	19:15	74° 07,678'	80° 30,653'	Monster Net	↑	807	103	8,4	1,5	2,35	30,57	1007,43	98	2
2a	323	Full	2019-07-24	19:52	74° 07,404'	80° 31,407'	Hydrobios	↓	798	91	9,7	1,6	2,46	30,67	1007,82	98	2
2a	323	Full	2019-07-24	20:13	74° 07,231'	80° 31,018'	Hydrobios	(bottom)	794	98	9,9	1,8	2,37	30,83	1007,97	98	2
2a	323	Full	2019-07-24	20:44	74° 07,016'	80° 30,417'	Hydrobios	↑	795	73	10,1	1,9	2,44	30,51	1008,1	98	3
2a	323	Full	2019-07-24	21:07	74° 06,741'	80° 30,214'	Trace-Metal Cast	↓	799	65	9,3	1,4	2,22	30,85	1008,12	98	3
2a	323	Full	2019-07-24	21:22	74° 06,633'	80° 30,009'	Trace-Metal Cast	↑	800	71	10,3	1,7	1,66	31,22	1008,26	98	3
2a	323	Full	2019-07-24	21:33	74° 06,437'	80° 30,672'	CTD-Rosette	↓	799	87	11,4	2,1	2,76	30,47	1008,2	98	3
2a	323	Full	2019-07-24	21:58	74° 06,243'	80° 30,811'	CTD-Rosette	(bottom)	792	73	9,5	2,6	2,66	30,57	1008,42	98	3
2a	323	Full	2019-07-24	22:30	74° 05,999'	80° 31,015'	CTD-Rosette	↑	791	58	2,9	2,4	2,77	30,55	1008,4	98	3
2a	323	Full	2019-07-24	22:59	74° 05,385'	80° 32,087'	Trace-Metal Cast	↓	793	34	2,9	2,5	2,88	30,87	1008,34	98	3
2a	323	Full	2019-07-24	23:12	74° 05,198'	80° 32,104'	Trace-Metal Cast	↑	791	125	6,7	3	3,02	30,81	1008,53	98	3
2a	323b	Camera	2019-07-25	1:09	73° 59,193'	79° 58,564'	Baited Camera	↑	808	84	10,3	2,5	2,30	31,31	1008,65	98	1
2a	324	Nutrient	2019-07-25	2:12	73° 59,302'	80° 28,112'	CTD-Rosette	↓	778	76	8,9	5	3,12	30,93	1008,62	94	0
2a	324	Nutrient	2019-07-25	2:32	73° 59,056'	80° 27,724'	CTD-Rosette	(bottom)	777	57	11,6	2,2	2,86	31,08	1008,48	98	0
2a	324	Nutrient	2019-07-25	3:20	73° 58,835'	80° 26,848'	CTD-Rosette	↑	777	64	13,5	1,9	2,27	30,62	1008,46	98	0
2a	324	Nutrient	2019-07-25	4:06	73° 59,327'	80° 28,387'	Box Core	↓	778	61	18,3	2,3	1,15	29,77	1008,24	98	1
2a	324	Nutrient	2019-07-25	4:19	73° 59,306'	80° 28,427'	Box Core	(bottom)	777	58	17,9	2,3	1,30	29,86	1008,49	98	1
2a	324	Nutrient	2019-07-25	4:31	73° 59,288'	80° 28,505'	Box Core	↑	777	60	16,2	2,3	1,43	30,02	1009,73	98	1
2a	324	Nutrient	2019-07-25	4:44	73° 59,264'	80° 28,875'	Agassiz Trawl	↓	775	60	13,1	2,6	1,38	30,00	1009,84	98	0
2a	324	Nutrient	2019-07-25	5:07	73° 58,708'	80° 29,610'	Agassiz Trawl	(bottom)	775	50	14,1	2,3	0,65	29,71	1010,09	98	0
2a	324	Nutrient	2019-07-25	5:30	73° 58,102'	80° 30,254'	Agassiz Trawl	↑	775	47	13,9	2,4	0,57	29,40	1009,78	98	0
2a	325	Nutrient	2019-07-25	6:33	73° 49,064'	80° 29,983'	Trace-Metal Cast	↓	683	71	17,1	2,3	1,03	29,38	1009,83	98	1
2a	325	Nutrient	2019-07-25	6:47	73° 48,982'	80° 30,240'	Trace-Metal Cast	↑	675	78	17,7	2,6	0,70	30,17	1009,78	98	1
2a	325	Nutrient	2019-07-25	6:59	73° 48,974'	80° 30,504'	CTD-Rosette	↓	672	79	19,2	2,5	1,01	30,17	1010,06	98	1
2a	325	Nutrient	2019-07-25	7:16	73° 49,025'	80° 30,473'	CTD-Rosette	(bottom)	677	79	18,5	2,5	0,79	29,72	1009,84	98	1
2a	325	Nutrient	2019-07-25	8:13	73° 48,970'	80° 30,828'	CTD-Rosette	↑	669	78	7,8	4,6	0,92	29,33	1010,1	98	1
2a	325	Nutrient	2019-07-25	8:49	73° 48,955'	80° 29,980'	Trace-Metal Cast	↓	674	69	6,7	3,3	1,24	28,33	1010,08	98	1
2a	325	Nutrient	2019-07-25	8:53	73° 48,899'	80° 29,977'	Trace-Metal Cast	↑	671	81	11	3	1,22	27,91	1010,08	98	1
2a	325	Nutrient	2019-07-25	9:04	73° 49,344'	80° 30,081'	Bongo Net	↓	708	76	15,4	2,5	0,90	27,95	1010,15	98	1
2a	325	Nutrient	2019-07-25	9:12	73° 49,330'	80° 30,126'	Bongo Net	↑	706	76	13,3	2,3	0,82	29,72	1010,07	98	1
2a	325	Nutrient	2019-07-25	10:12	73° 49,106'	80° 30,215'	Trace-Metal Cast	↓	685	69	15,8	3,9	0,90	29,66	1010,15	98	1
2a	325	Nutrient	2019-07-25	10:26	73° 49,009'	80° 30,046'	Trace-Metal Cast	↑	678	57	12,2	6,4	1,02	28,68	1010,03	91	1
2a	NBI-4	Nutrient	2019-07-25	16:04	72° 55,953'	80° 17,072'	CTD-Rosette	↓	194	358	13,7	3,7	2,33	27,09	1006,7	94	1
2a	NBI-3	Nutrient	2019-07-25	16:15	72° 55,875'	80° 17,135'	CTD-Rosette	(bottom)	197	324	2,1	4	1,67	27,47	1006,91	94	1
2a	NBI-2	Nutrient	2019-07-25	16:42	72° 55,581'	80° 17,034'	CTD-Rosette	↑	193	332	11,4	4,5	2,24	27,29	1006,95	97	1
Leg 2b																	
2b	Coring 2.6	Coring	2019-07-28	6:33	76° 18,650'	73° 03,729'	CTD-Rosette	↓	603	162	4,6	2,4	3,34	31,22	1016,65	98	0
2b	Coring 2.6	Coring	2019-07-28	6:50	76° 18,668'	73° 03,575'	CTD-Rosette	(bottom)	602	162	3,4	2,8	3,38	30,43	1017,01	98	0
2b	Coring 2.6	Coring	2019-07-28	7:08	76° 18,691'	73° 03,325'	CTD-Rosette	↑	595	138	6,3	2,9	3,42	30,91	1017,02	98	0
2b	Coring 2.6	Coring	2019-07-28	7:21	76° 18,726'	73° 03,232'	Bongo Net	↓	586	146	4,2	3,5	3,37	30,44	1016,84	98	0
2b	Coring 2.6	Coring	2019-07-28	7:29	76° 18,755'	73° 03,192'	Bongo Net	↑	581	145	2,7	3,2	3,37	30,37	1017,13	98	0
2b	Coring 2.6	Coring	2019-07-28	8:22	76° 19,159'	73° 03,759'	Box Core	↓	574	134	10,5	2,2	3,22	30,59	1016,82	98	0
2b	Coring 2.6	Coring	2019-07-28	8:32	76° 19,126'	73° 03,916'	Box Core	(bottom)	577	129	9,9	2,2	3,21	30,40	1016,76	98	0
2b	Coring 2.6	Coring	2019-07-28	8:42	76° 19,183'	73° 03,774'	Box Core	↑	573	138	9,1	1,9	3,24	30,57	1016,39	98	0
2b	Coring 2.6	Coring	2019-07-28	9:10	76° 19,110'	73° 03,753'	Gravity Core	↓	576	145	9,3	2	3,16	30,56	1016,49	98	0
2b	Coring 2.6	Coring	2019-07-28	9:22	76° 19,121'	73° 03,906'	Gravity Core	(bottom)	578	120	8,8	1,9	3,00	30,42	1016,47	98	0
2b	Coring 2.6	Coring	2019-07-28	9:34	76° 19,176'	73° 03,687'	Gravity Core	↑	573	130	9,5	1,8	3,19	30,88	1016,36	98	0
2b	Basic 122	Basic	2019-07-28	16:16	77° 20,439'	75° 01,239'	Trace-Metal Cast	↓	651	173	3,8	3,2	3,69	29,91	1018,32	98	0
2b	Basic 122	Basic	2019-07-28	16:31	77° 20,339'	75° 01,917'	Trace-Metal Cast	↑	649	144	5,7	2,4	2,22	30,52	1017,95	98	0
2b	Basic 122	Basic	2019-07-28	16:42	77° 20,281'	75° 01,953'	CTD-Rosette	↓	649	161	6,9	2,5	3,16	30,05	1017,44	98	0
2b	Basic 122	Basic	2019-07-28	16:59	77° 20,152'	75° 02,416'	CTD-Rosette	(bottom)	649	145	5,7	2,3	3,16	29,95	1017,55	98	0
2b	Basic 122	Basic	2019-07-28	17:52	77° 19,652'	75° 03,872'	CTD-Rosette	↑	635	148	5,7	2,1	3,13	29,92	1017,32	98	0
2b	Coring 2.8	Coring	2019-07-28	19:21	77° 19,597'	74° 31,910'	Piston Core	↓	711	158	7,2	2,3	5,72	31,44	1017,6	98	0
2b	Coring 2.8	Coring	2019-07-28	19:37	77° 19,595'	74° 31,900'	Piston Core	(bottom)	711	197	6,1	2,6	5,74	31,44	1017,62	98	0
2b	Coring 2.8	Coring	2019-07-28	19:54	77° 19,584'	74° 31,946'	Piston Core	↑	711	224	0,8	2,8	5,77	31,44	1017,71	98	0
2b	122	Basic	2019-07-28	21:35	77° 20,525'	75° 00,243'	Bongo Net	↓	655	137	0,8	2,5	2,05	30,13	1017,92	98	0
2b	122	Basic	2019-07-28	21:43	77° 20,490'	75° 00,537'	Bongo Net	↑	653	268	0,6	2,3	1,44	30,28	1017,98	98	0
2b	122	Basic	2019-07-28	22:04	77° 20,430'	75° 00,768'	Trace-Metal Cast	↓	653	187	1,9	2,9	1,62	30,24	1018,05	98	0
2b	122	Basic	2019-07-28	22:20	77° 20,304'	75° 01,388'	Trace-Metal Cast	↑	652	186	1,1	3			1018,05	98	0
2b	122	Basic	2019-07-28	22:36	77° 20,382'	75° 01,509'	CTD-Rosette	↓	650	200	0,8	2,4	1,17	30,42	1018,07	98	0
2b	122	Basic	2019-07-28	22:53	77° 20,354'	75° 02,137'	CTD-Rosette	(bottom)	649	144	1,3	2,3	1,05	30,39	1018,06	98	0
2b	122	Basic	2019-07-28	23:52	77° 20,017'	75° 04,396'	CTD-Rosette	↑	642	262	3,2	1,6	0,95	30,44	1018,21	98	0
2b	122	Basic	2019-07-29	0:22	77° 20,501'	75° 01,187'	Trace-Metal Cast	↓	652	299	1,1	1,9	0,98	30,54	1018,17	98	1
2b	122	Basic	2019-07-29	0:29	77° 20,457'	75° 01,613'	Trace-Metal Cast	↑	650	360	1,1	2	0,96	30,69	1018,15	98	1
2b	122	Basic	2019-07-29	0:42	77° 20,566'	75° 01,115'	Tucker Net	↓	652	103	0	2,3	1,50	30,43	1018,32	98	1

2b	122	Basic	2019-07-29	1:05	77° 20,737'	74° 59,742'	Tucker Net	↑	655	339	4,8	1,9	1,39	30,43	1018,35	98	1
2b	122	Basic	2019-07-29	1:36	77° 20,509'	75° 00,792'	Monster Net	↓	654	12	3,4	1,3	1,33	30,45	1018,56	98	1
2b	122	Basic	2019-07-29	1:56	77° 20,366'	75° 01,654'	Monster Net	(bottom)	651	335	3	1,1	0,80	30,52	1018,57	98	1
2b	122	Basic	2019-07-29	2:13	77° 20,257'	75° 02,169'	Monster Net	↑	650	336	3,2	1	1,23	30,42	1018,62	98	1
2b	122	Basic	2019-07-29	2:47	77° 20,513'	75° 00,616'	Box Core	↓	654	357	3,4	1	1,34	30,43	1018,7	98	1
2b	122	Basic	2019-07-29	2:58	77° 20,467'	75° 00,861'	Box Core	(bottom)	653	14	4	0,8	1,14	30,48	1018,79	98	1
2b	122	Basic	2019-07-29	3:07	77° 20,442'	75° 00,868'	Box Core	↑	653	23	5,5	1	1,24	30,43	1018,76	98	1
2b	122	Basic	2019-07-29	3:24	77° 20,541'	75° 00,231'	Agassiz Trawl	↓	656	17	4,4	0,7	1,27	30,42	1018,9	98	1
2b	122	Basic	2019-07-29	3:47	77° 20,019'	74° 58,785'	Agassiz Trawl	(bottom)	660	360	4,2	0,7	1,63	30,30	1019,03	98	1
2b	122	Basic	2019-07-29	4:11	77° 19,415'	74° 57,523'	Agassiz Trawl	↑	657	43	6,7	0,9	1,76	30,27	1019,1	98	1
2b	126	Nutrient	2019-07-29	6:22	77° 20,852'	73° 23,998'	CTD-Rosette	↓	336	173	7,2	5	6,00	30,85	1019,67	98	0
2b	126	Nutrient	2019-07-29	6:33	77° 20,922'	73° 24,003'	CTD-Rosette	(bottom)	337	176	6,5	5,3	6,24	30,85	1019,75	98	0
2b	126	Nutrient	2019-07-29	7:14	77° 21,190'	73° 24,447'	CTD-Rosette	↑	333	164	2,1	5,3	6,17	30,89	1020,02	98	0
2b	129	Nutrient	2019-07-29	12:41	78° 20,051'	74° 08,217'	CTD-Rosette	↓	543	176	7,6	3,9	0,46	28,99	1020,69	96	3
2b	129	Nutrient	2019-07-29	12:57	78° 20,067'	74° 08,455'	CTD-Rosette	(bottom)	537	171	10,7	3	0,65	27,60	1020,73	94	3
2b	129	Nutrient	2019-07-29	13:38	78° 20,133'	74° 08,842'	CTD-Rosette	↑	535	155	4	1,9	0,74	26,75	1020,88	96	3
2b	129	Nutrient	2019-07-29	13:47	78° 20,130'	74° 08,638'	Bongo Net	↓	544	188	3,6	2,3	0,84	27,73	1020,88	95	3
2b	129	Nutrient	2019-07-29	13:55	78° 20,111'	74° 08,552'	Bongo Net	↑	540	206	6,9	2,1	0,82	27,77	1020,89	95	3
2b	132	Nutrient	2019-07-29	18:53	79° 00,150'	72° 19,122'	CTD-Rosette	↓	250	28	5,3	0,2	-0,42	28,74	1021,56	98	4
2b	132	Nutrient	2019-07-29	19:03	79° 00,137'	72° 19,160'	CTD-Rosette	(bottom)	250	32	5,7	0,3	-0,36	28,40	1021,54	98	4
2b	132	Nutrient	2019-07-29	19:43	79° 00,138'	72° 19,034'	CTD-Rosette	↑	250	7	1,5	2	-0,46	28,24	1021,64	97	4
2b	133	Full	2019-07-30	1:27	79° 34,690'	70° 15,953'	CTD-Rosette	↓	166	278	6,3	8,1	1,02	29,52	1020,11	75	6
2b	133	Full	2019-07-30	1:35	79° 34,668'	70° 16,092'	CTD-Rosette	(bottom)	168	285	4,6	8,5	0,70	29,61	1020,07	73	6
2b	133	Full	2019-07-30	2:08	79° 34,621'	70° 16,543'	CTD-Rosette	↑	173	274	8,6	7,3	1,11	29,47	1020,16	79	6
2b	133	Full	2019-07-30	2:31	79° 34,610'	70° 16,780'	Trace-Metal Cast	↓	175	313	1,9	7,3	1,67	29,35	1020,15	76	6
2b	133	Full	2019-07-30	2:55	79° 34,628'	70° 17,028'	Trace-Metal Cast	↑	173	237	2,3	6,4	1,78	29,36	1020,29	80	6
2b	133	Full	2019-07-30	3:01	79° 34,635'	70° 17,076'	Bongo Net	↓	172	236	5,9	6,4	1,44	29,37	1020,25	79	6
2b	133	Full	2019-07-30	3:09	79° 34,652'	70° 17,249'	Bongo Net	↑	168	244	5,9	6,3	0,72	29,44	1020,21	81	6
2b	133	Full	2019-07-30	3:20	79° 34,673'	70° 17,328'	CTD-Rosette	↓	167	232	5,1	6,4	0,55	29,48	1020,16	79	6
2b	133	Full	2019-07-30	3:28	79° 34,680'	70° 17,357'	CTD-Rosette	(bottom)	166	284	4,4	6,4	0,56	29,46	1020,2	79	6
2b	133	Full	2019-07-30	3:57	79° 34,638'	70° 17,729'	CTD-Rosette	↑	168	254	4,4	5,4	1,25	29,38	1020,25	82	6
2b	133	Full	2019-07-30	4:36	79° 34,662'	70° 18,000'	Trace-Metal Cast	↓	165	175	1,7	5,7	2,09	29,31	1020,19	76	6
2b	133	Full	2019-07-30	4:54	79° 34,717'	70° 18,308'	Trace-Metal Cast	↑	166	188	0,6	4,6	1,04	29,44	1020,14	86	6
2b	133	Full	2019-07-30	5:00	79° 34,759'	70° 17,967'	Tucker Net	↓	166	148	1,1	4	1,70	29,34	1020,13	88	6
2b	133	Full	2019-07-30	5:13	79° 35,125'	70° 17,664'	Tucker Net	↑	164	190	3,8	4,5	1,92	29,33	1020,07	84	6
2b	133	Full	2019-07-30	5:47	79° 35,238'	70° 17,959'	Hydrobios	↓	167	174	4,2	3,6	0,88	29,50	1020,14	86	6
2b	133	Full	2019-07-30	5:53	79° 35,236'	70° 17,888'	Hydrobios	(bottom)	165	183	4,2	3,6	0,84	29,59	1020,12	86	6
2b	133	Full	2019-07-30	5:59	79° 35,237'	70° 17,879'	Hydrobios	↑	164	191	3,4	3,9	0,88	29,55	1020,12	84	6
2b	133	Full	2019-07-30	6:27	79° 35,218'	70° 17,940'	Trace-Metal Cast	↓	162	252	3,6	4,8	0,94	29,57	1020,19	81	6
2b	133	Full	2019-07-30	6:42	79° 35,223'	70° 18,125'	Trace-Metal Cast	↑	167	266	3,2	5,2	0,89	29,56	1020,17	80	6
2b	133	Full	2019-07-30	6:51	79° 35,243'	70° 18,183'	Monster Net	↓	163	264	3	5,2	0,97	29,51	1020,16	80	6
2b	133	Full	2019-07-30	6:56	79° 35,254'	70° 18,213'	Monster Net	(bottom)	165	228	2,1	4,9	0,92	29,52	1020,17	80	6
2b	133	Full	2019-07-30	7:02	79° 35,265'	70° 18,262'	Monster Net	↑	164	215	2,1	4,7	0,84	29,54	1020,21	81	6
2b	133	Full	2019-07-30	7:35	79° 35,407'	70° 18,630'	Agassiz Trawl	↓	170	174	5,7	3,3	1,21	29,53	1020,34	88	6
2b	133	Full	2019-07-30	7:41	79° 35,509'	70° 19,254'	Agassiz Trawl	(bottom)	174	178	7	2,9	1,73	29,33	1020,44	92	6
2b	133	Full	2019-07-30	7:48	79° 35,578'	70° 20,146'	Agassiz Trawl	↑	175	189	5,9	3,3	1,67	29,27	1020,54	89	6
2b	133	Full	2019-07-30	8:35	79° 35,596'	70° 16,567'	Beam Trawl	↓	163	217	5,1	3,9	0,83	29,76	1020,73	87	6
2b	133	Full	2019-07-30	8:37	79° 35,626'	70° 16,747'	Beam Trawl	(bottom)	161	219	5,1	3,8	0,97	29,62	1020,77	88	6
2b	133	Full	2019-07-30	9:05	79° 35,836'	70° 21,935'	Beam Trawl	↑	186	208	4,2	3,3	1,69	29,22	1020,7	90	6
2b	6.2	Coring	2019-07-30	17:48	79° 30,696'	65° 44,561'	Bongo Net	↓	337	37	6,5	3,8	0,96	29,09	1020,39	83	7
2b	6.2	Coring	2019-07-30	17:57	79° 30,691'	65° 44,679'	Bongo Net	↑	336	54	5	5,2	0,82	28,33	1020,47	79	7
2b	6.2	Coring	2019-07-30	18:22	79° 30,889'	65° 45,785'	Box Core	↓	384	17	0,8	5,1	2,29	26,46	1020,43	81	7
2b	6.2	Coring	2019-07-30	18:29	79° 30,894'	65° 45,852'	Box Core	(bottom)	384	20	3	5,5	1,57	28,75	1020,42	83	7
2b	6.2	Coring	2019-07-30	18:35	79° 30,900'	65° 45,924'	Box Core	↑	384	351	2,3	4,9	1,84	28,29	1020,44	85	7
2b	6.2	Coring	2019-07-30	19:34	79° 30,936'	65° 46,040'	Piston Core	↓	383	340	2,5	5,3	1,73	28,29	1020,78	81	7
2b	6.2	Coring	2019-07-30	19:43	79° 30,931'	65° 46,152'	Piston Core	(bottom)	383	328	1,7	5,8	1,54	28,36	1020,83	80	7
2b	6.2	Coring	2019-07-30	19:52	79° 30,918'	65° 46,345'	Piston Core	↑	375	320	4	5,2	1,62	28,61	1020,85	85	7
2b	6.2	Coring	2019-07-30	20:57	79° 30,425'	65° 39,659'	Gravity Core	↓	311	243	7,6	2,2	1,27	28,67	1021,23	92	7
2b	6.2	Coring	2019-07-30	21:06	79° 30,427'	65° 39,495'	Gravity Core	(bottom)	299	225	7,4	2,1	0,73	29,73	1021,35	93	7
2b	6.2	Coring	2019-07-30	21:12	79° 30,439'	65° 39,436'	Gravity Core	↑	295	225	6,7	1,9	1,19	28,36	1021,4	94	7
2b	6.2	Coring	2019-07-30	21:35	79° 30,628'	65° 42,968'	Gravity Core	↓	354	212	4,6	2,2	1,10	28,94	1021,5	94	7
2b	6.2	Coring	2019-07-30	21:44	79° 30,654'	65° 43,153'	Gravity Core	(bottom)	298	192	5,1	2,3	1,06	29,48	1021,5	93	7
2b	6.2	Coring	2019-07-30	21:52	79° 30,681'	65° 43,264'	Gravity Core	↑	270	197	3,4	2,8	1,35	29,07	1021,44	91	7
2b	6.2	Coring	2019-07-30	22:18	79° 30,534'	65° 47,101'	Gravity Core	↓	348	166	5,5	2,2	1,50	28,29	1021,59	95	7
2b	6.2	Coring	2019-07-30	22:25	79° 30,567'	65° 47,121'	Gravity Core	(bottom)	352	176	6,3	2	1,19	29,30	1021,53	95	7
2b	6.2	Coring	2019-07-30	22:34	79° 30,604'	65° 47,108'	Gravity Core	↑	335	176	5,9	1,5	1,56	29,12	1021,6	96	7
2b	136	Nutrient	2019-07-31	6:06	80° 21,813'	67° 40,967'	CTD-Rosette	↓	196	161	11,6	5,8	-0,25	30,44	1021,16	79	5
2b	136	Nutrient	2019-07-31	6:16	80° 22,023'	67° 39,824'	CTD-Rosette	(bottom)	198	161	10,1	9,1	-0,28	30,54	1021,17	65	5
2b	136	Nutrient	2019-07-31	6:51	80° 22,995'	67° 36,113'	CTD-Rosette	↑	208	69	2,3	2	-0,18	30,24	1021,41	90	5
2b	134	Basic	2019-07-31	8:05	80° 23,922'	68° 19,953'	Trace-Metal Cast	↓	339	228	5,1	3	-0,80	31,18	1021,56	91	5
2b	134	Basic	2019-07-31	8:17	80° 23,961'	68° 20,316'	Trace-Metal Cast	↑	335	234	5	2,9	-0,82	31,16	1021,57	92	5
2b	134	Basic	2019-07-31	8:32	80° 24,348'	68° 20,281'	Tucker Net	↓	313	225	6,1	3	-0,05	29,85	1021,53	93	5
2b	134	Basic	2019-07-31	8:46	80° 24,187'	68° 22,335'	Tucker Net	↑	358	187	7,8	2,7	-0,07	29,98	1021,53	94	5
2b	134	Basic	2019-07-31	9:18	80° 24,087'	68° 21,292'	Monster Net	↓	347	184	5,1	2,3	-0,76	30,84	1021,48	95	5
2b	134	Basic	2019-07-31	9:28	80° 24,121'	68° 21,275'	Monster Net	(bottom)	347	210	3,6	2,1	-0,76	30,77	1021,54	96	5
2b	134	Basic	2019-07-31	9:41	80° 24,169'	68° 21,352'	Monster Net	↑	347	252	4,8	1,9	-0,48	30,34	1021,5	96	5
2b	134	Basic	2019-07-31	10:00	80° 24,404'	68° 21,145'	Trace-Metal Cast	↓	326				-0,50	30,31			5
2b	134	Basic	2019-07-31	10:15	80° 24,444'	68° 21,212'	Trace-Metal Cast	↑	325	237	5,5	3,1	-0,15	30,06	1021,48	93	5
2b	134	Basic	2019-07-31	10:28	80° 24,394'	68° 21,536'	CTD-Rosette	↓	333	238	4,4	3,4	-0,27	30,12	1021,62	91	5
2b	134	Basic	2019-07-31	10:35	80° 24,367'	68° 21,823'	CTD-Rosette	(bottom)	345	216	5,3	3,6	-0,29	30,14	1021,51	90	5
2b	134	Basic	2019-07-31	11:16	80° 24,229'	68° 22,971'	CTD-Rosette	↑	363	226	8	2,5	-0,67	30,04	1021,55	93	5
2b	134	Basic	2019-07-31	12:48	80° 23,632'	68° 25,551'	Bongo Net	↓	384	184	10,3	2,5	0,25	29,78	1021,16	87	5
2b	134	Basic	2019-07-31	12:56	80° 23,518'	68° 25,901'	Bongo Net	↑	384	228	3,8	2,2	0,04	29,92	1021,39	91	5
2b	134	Basic	2019-07-31	13:05	80° 23,477'	68° 26,279'	Trace-Metal Cast	↓	388	185	7,6	2,7	0,31	29,64	1021,24	90	5
2b	134	Basic	2019-07-31	13:29	80° 23,286'	68° 26,696'	Trace-Metal Cast	↑	389	165	14,3	2,7	0,03	29,92	1021,03	89	5
2b	134	Basic	2019-07-31	13:39	80° 23,164'	68° 26,722'	CTD-Rosette	↓	388	262	6,9	2,4	-0,23	30,21	1021,34	90	5
2b	134	Basic	2019-07-31	13:51	80° 23,049'	68° 26,722'	CTD-Rosette	(bottom)	388	175	13,9	3,4	0,00	29,92	1020,93	86	5
2b	134	Basic	2019-07-31	14:34	80° 22,576'	68° 27,052'	CTD-Rosette	↑	384	182	7,6	4,3	-0,48	30,18	1021,25	82	5
2b	134	Basic	2019-07-31	14:58	80° 21,944'	68° 29,989'	Agassiz Trawl	↓	381	173	1,3	3,3	0,35	29,69	1021,28	86	5
2b	134	Basic	2019-07-31	15:08	80° 21,872'	68° 28,936'	Agassiz Trawl	(bottom)	384	203	5,7	3,8	0,43	29,64	1021,36	86	5
2b	134	Basic	2019-07-31	15:22	80° 21,900'	68° 27,638'	Agassiz Trawl	↑	384	168	6,3	4,5	0,11	29,88	1021,27	81	5
2b	134	Basic	2019-07-31	16:15	80° 21,455'	68° 27,270'	Box Core	↓	381	178	4,8	3,7	0,29	29,49	1021,15	83	6
2b	134	Basic	2019-07-31	16:22	80° 21,387'	68° 27,236'	Box Core	(bottom)	381	178	0,6	3,8	-0,11	30,03	1021,16	83	6
2b	134	Basic	2019-07-31	16:28	80° 21,351'	68° 27,101'	Box Core	↑	381	229	3,8	3,7	-0,13	30,14	1021,16	83	6
2b	135	Nutrient	2019-07-31	18:21	80° 26,380'	68° 55,831'	CTD-Rosette	↓	341	10	4,2	3,3	-0,85	29,42	1021	88	6
2b	135	Nutrient	2019-07-31	18:32	80° 26,336'	68° 55,759'	CTD-Rosette	(bottom)	340	31	3	3,3	-0,83	29,29	1020,99	88	6
2b	135	Nutrient	2019-07-31	19:07	80° 26,129'	68° 55,736'	CTD-Rosette	↑	340	58	2,9	3,6	-0,91	29,37	1020,98	86	6
2b	137	Nutrient	2019-08-01	3:30	81° 04,297'	66° 00,378'	CTD-Rosette	↓	362	133	5,7	3,2	-0,97	29,85	1017,81	84	8
2b	137	Nutrient	2019-08-01	3:42	81° 04,289'	66° 00,474'	CTD-Rosette	(bottom)	362	187	5,3	3,3	-1,01	29,89	1017,71	84	8
2b	137	Nutrient	2019-08-01	4:23	81° 04,416'	65° 59,875'	CTD-Rosette	↑	362	86	1	2,9	-1,02	29,98	1017,69	83	8
2b	138	Nutrient	2019-08-01	5:37	81° 00,593'	65° 21,814'	CTD-Rosette	↓	388	5	5,1	4,8	-1,02	29,97	1017,18	74	8
2b	138	Nutrient	2019-08-01	5:49	81° 00,597'	65° 22,575'	CTD-Rosette	(bottom)	392	19	3,4	5,3	-0,96	30,00	1017,14	72	8
2b	138	Nutrient	2019-08-01	6:31	81° 00,744'	65° 24,673'	CTD-Rosette	↑	423	16	2,1	6	-1,00	30,00	1016,96	68	8
2b	138	Nutrient	2019-08-01	6:46	81° 00,817'	65° 20,979'	Bongo Net	↓	398	25	3	5,2	-0,58	29,58	1016,87	72	8
2b	138	Nutrient	2019-08-01	6:54	81° 00,893'	65° 21,281'	Bongo Net	↑	407	13	2,3	5	-0,83	29,99	1016,93	74	8
2b	2.11-b	Coring	2019-08-01	8:45	81° 18,076'	64° 36,236'	Gravity Core	↓	474	43	6,7	2,6	-0,86	30,14	1016,63	85	8
2b	2.11-b	Coring	2019-08-01	8:53	81° 18,118'	64° 36,030'	Gravity Core	(bottom)	474	79	1	2,9	-0,57	30,02	1016,61	83	4
2b	2.11-b	Coring	2019-08-01	9:05	81° 18,181'	64° 35,976'	Gravity Core	↑	474	28	1,9	3,4	-0,55	30,05	1016,54	80	4
2b	Ken1	Nutrient	2019-08-01	9:47	81° 22,004'	64° 11,385'	CTD-Rosette	↓	499	9	2,9	1,9	-0,76	30,50	1016,56	87	3
2b	Ken1	Nutrient	2019-08-01	10:02	81° 22,001'	64° 11,327'	CTD-Rosette	(bottom)	500	332	2,7	3,5	-0,75	30,43	1016,53	82	3
2b	Ken1	Nutrient	2019-08-01	10:45	81° 21,883'	64° 11,514'	CTD-Rosette	↑	496	64	1,7	5,2	-0,43	30,25	1016,26	71	3
2b	Ken1	Nutrient	2019-08-01	10:57	81° 21,863'	64° 11,945'	Bongo Net	↓	495	67	4,6	3,3	-0,61	30,36	1016,17	81	3

2b	Ken1	Nutrient	2019-08-01	11:05	81° 21,834'	64° 12,252'	Bongo Net	↑	494	74	6,3	3	-0,44	30,26	1016,19	83	3
2b	Ken1	Coring	2019-08-01	12:40	81° 23,185'	64° 04,381'	Gravity Core	↓	520	208	6,3	3,2	-0,51	30,25	1016,15	82	3
2b	Ken1	Coring	2019-08-01	12:49	81° 23,166'	64° 04,260'	Gravity Core	(bottom)	518	217	6,1	2,2	-0,62	30,36	1016,19	88	3
2b	Ken1	Coring	2019-08-01	12:59	81° 23,184'	64° 04,134'	Gravity Core	↑	513	212	13,7	1,7	-0,59	30,36	1016,03	87	3
2b	6.4	Full	2019-08-01	15:02	81° 37,200'	63° 17,824'	CTD-Rosette	↓	794	195	15,6	4	-1,22	30,37	1015,78	78	6
2b	6.4	Full	2019-08-01	15:22	81° 37,033'	63° 18,770'	CTD-Rosette	(bottom)	792	200	22,3	3,6	-0,56	26,91	1015,35	79	6
2b	6.4	Full	2019-08-01	16:00	81° 37,109'	63° 19,268'	CTD-Rosette	↑	788	179	24,4	6,1	-0,78	28,84	1015,43	74	8
2b	6.4	Full	2019-08-01	16:45	81° 36,148'	63° 27,879'	CTD-Rosette	↓	769	204	13,7	8,4	-0,44	29,51	1016,04	68	8
2b	6.4	Full	2019-08-01	17:12	81° 36,326'	63° 28,456'	CTD-Rosette	↑	758	172	5,9	9,1	-0,33	29,30	1016,46	61	8
2b	6.4	Full	2019-08-01	17:20	81° 36,356'	63° 28,477'	Bongo Net	↓	758	185	10,1	8,7	-0,54	29,62	1016,43	67	3
2b	6.4	Full	2019-08-01	17:29	81° 36,373'	63° 28,589'	Bongo Net	↑	757	194	20,2	5,5	-0,52	29,67	1016,12	76	3
2b	6.4	Full	2019-08-01	17:49	81° 36,581'	63° 28,402'	Tucker Net	↓	757	174	17,3	7,4	-0,68	29,79	1015,52	65	3
2b	6.4	Full	2019-08-01	18:08	81° 37,184'	63° 27,173'	Tucker Net	↑	752	198	27	4,4	-0,36	29,37	1015,65	80	3
2b	Rob1	Basic	2019-08-02	2:35	81° 45,991'	62° 20,388'	Trace-Metal Cast	↓	718	159	24,4	7	-0,94	29,46	1014,65	71	7
2b	Rob1	Basic	2019-08-02	2:47	81° 45,837'	62° 20,727'	Trace-Metal Cast	↑	718	185	28,2	7	-1,07	29,57	1015,01	71	7
2b	Rob1	Basic	2019-08-02	2:56	81° 45,745'	62° 21,049'	CTD-Rosette	↓	718	181	27,6	7,1	-1,03	29,51	1014,7	71	7
2b	Rob1	Basic	2019-08-02	3:16	81° 45,516'	62° 21,676'	CTD-Rosette	(bottom)	716	189	25,7	6,8	-1,15	29,55	1014,84	71	7
2b	Rob1	Basic	2019-08-02	4:02	81° 45,201'	62° 23,865'	CTD-Rosette	↑	707	158	18,1	4,6	-1,07	29,59	1015,36	79	7
2b	Rob1	Basic	2019-08-02	4:14	81° 45,251'	62° 24,943'	Trace-Metal Cast	↓	703	161	13,9	5,6	-1,12	29,53	1015,48	76	7
2b	Rob1	Basic	2019-08-02	4:38	81° 45,303'	62° 26,616'	Trace-Metal Cast	↑	690	155	16,2	4,2	-1,17	29,70	1015,26	81	7
2b	Rob1	Basic	2019-08-02	5:13	81° 45,543'	62° 27,543'	Bongo Net	↓	677	196	20,9	6,4	-1,17	29,67	1015,16	73	7
2b	Rob1	Basic	2019-08-02	5:20	81° 45,625'	62° 27,830'	Bongo Net	↑	677	187	15,2	5,5	-1,19	29,66	1015,43	77	7
2b	Rob1	Basic	2019-08-02	5:33	81° 45,731'	62° 27,854'	Monster Net	↓	674	197	18,8	6,1	-1,08	29,58	1015,15	74	7
2b	Rob1	Basic	2019-08-02	5:52	81° 45,871'	62° 28,251'	Monster Net	(bottom)	679	189	13,1	5,5	-1,04	29,55	1015,55	77	7
2b	Rob1	Basic	2019-08-02	6:13	81° 46,059'	62° 27,312'	Monster Net	↑	674	169	12,2	6,2	-1,08	29,50	1015,72	74	7
2b	Rob1	Basic	2019-08-02	6:54	81° 45,196'	62° 27,148'	Hydrobios	↓	689	87	5,7	3,3	-0,79	29,29	1015,58	84	7
2b	Rob1	Basic	2019-08-02	7:12	81° 45,559'	62° 26,557'	Hydrobios	(bottom)	679	34	10,7	3,8	-0,78	29,29	1015,6	82	7
2b	Rob1	Basic	2019-08-02	7:34	81° 46,051'	62° 25,259'	Hydrobios	↑	672	174	10,1	6	-0,77	29,35	1015,63	75	7
2b	Rob1	Basic	2019-08-02	7:51	81° 46,290'	62° 23,526'	Trace-Metal Cast	↓	671	176	12,9	3,5	-0,65	29,08	1015,2	86	7
2b	Rob1	Basic	2019-08-02	8:17	81° 46,849'	62° 22,180'	Trace-Metal Cast	↑	670	170	16,6	3,9	-0,64	29,07	1015,08	83	7
2b	Rob1	Basic	2019-08-02	8:31	81° 47,148'	62° 20,816'	Box Core	↓	677	263	5,1	3,2	-0,74	29,25	1015,54	85	7
2b	Rob1	Basic	2019-08-02	8:41	81° 47,309'	62° 20,181'	Box Core	(bottom)	677	244	7,2	3,7	-0,74	29,18	1015,53	84	7
2b	Rob1	Basic	2019-08-02	8:52	81° 47,519'	62° 19,352'	Box Core	↑	668	240	4,8	3,6	-0,77	29,23	1015,57	83	7
2b	Rob1	Basic	2019-08-02	9:20	81° 47,837'	62° 16,001'	Box Core	↓	701	227	0,6	3,8	-0,95	29,42	1015,6	80	7
2b	Rob1	Basic	2019-08-02	9:35	81° 48,160'	62° 14,841'	Box Core	(bottom)	709	181	0,6	4,6	-0,73	29,22	1015,44	80	7
2b	Rob1	Basic	2019-08-02	9:45	81° 48,389'	62° 13,950'	Box Core	↑	717	161	11	4,5	-0,66	29,10	1015,31	81	7
2b	Rob1	Basic	2019-08-02	10:03	81° 48,851'	62° 12,253'	Gravity Core	↓	740	181	13,3	5,5	-0,73	29,17	1015,32	74	7
2b	Rob1	Basic	2019-08-02	10:17	81° 49,001'	62° 12,268'	Gravity Core	(bottom)	697	145	3	5,1	-0,71	29,17	1015,24	75	7
2b	Rob1	Basic	2019-08-02	10:29	81° 49,205'	62° 11,666'	Gravity Core	↑	691	221	8,8	5,1	-0,84	29,28	1015,44	74	7
2b	6.4	Full	2019-08-02	14:13	81° 37,480'	63° 14,127'	Monster Net	↓	805	169	13,5	3,7	-0,61	29,02	1014,69	82	5
2b	6.4	Full	2019-08-02	14:34	81° 37,312'	63° 13,391'	Monster Net	(bottom)	804	193	13,3	3,4	-0,84	29,47	1014,1	82	5
2b	6.4	Full	2019-08-02	15:02	81° 37,096'	63° 11,810'	Monster Net	↑	775				-0,67	29,28			5
2b	6.4	Full	2019-08-02	15:14	81° 37,094'	63° 11,423'	Trace-Metal Cast	↓	759	176	18,3	4,9	-0,58	29,09	1014,09	82	5
2b	6.4	Full	2019-08-02	15:24	81° 37,053'	63° 11,463'	Trace-Metal Cast	↑	752	202	19,6	6,8	-0,43	28,80	1013,85	71	5
2b	6.4	Full	2019-08-02	16:09	81° 37,044'	63° 15,988'	CTD-Rosette	↓	814	200	17,7	4,5	-0,72	29,13	1014,37	85	5
2b	6.4	Full	2019-08-02	16:31	81° 36,963'	63° 15,391'	CTD-Rosette	(bottom)	815	183	8,4	4,6	-0,71	29,38	1014,75	88	5
2b	6.4	Full	2019-08-02	17:28	81° 36,922'	63° 13,337'	CTD-Rosette	↑	786	205	23	5,7	-0,63	29,25	1014,07	83	5
2b	6.4	Full	2019-08-02	17:36	81° 36,847'	63° 12,952'	Trace-Metal Cast	↓	754	212	21,7	8	-0,71	29,36	1014,45	74	5
2b	6.4	Full	2019-08-02	17:55	81° 36,847'	63° 12,715'	Trace-Metal Cast	↑	744	209	14,9	7,5	-0,45	28,94	1014,33	74	5
2b	6.4	Full	2019-08-02	18:42	81° 35,641'	62° 59,202'	IKMT	↓	481	163	15,8	6	-0,57	29,17	1014,65	92	5
2b	6.4	Full	2019-08-02	19:38	81° 36,825'	63° 09,068'	IKMT	↑	610	189	24	2,6	-0,51	29,06	1014,8	96	5
2b	6.4	Full	2019-08-02	20:09	81° 37,335'	63° 15,522'	Trace-Metal Cast	↓	807	181	22,1	5,4	-0,85	29,58	1014,58	87	5
2b	6.4	Full	2019-08-02	20:27	81° 37,398'	63° 15,774'	Trace-Metal Cast	↑	803	201	29,5	5,3	-0,72	29,29	1014,16	89	5
2b	6.4	Full	2019-08-02	20:42	81° 37,499'	63° 13,150'	Box Core	↓	801	197	28,9	3,5	-0,76	29,41	1014,26	93	5
2b	6.4	Full	2019-08-02	20:53	81° 37,563'	63° 13,041'	Box Core	(bottom)	800	216	23,2	6,6	-0,77	29,47	1015,09	79	5
2b	6.4	Full	2019-08-02	21:05	81° 37,741'	63° 11,994'	Box Core	↑	798	226	29,1	3,7	-0,76	29,38	1014,96	93	5
2b	6.4	Full	2019-08-02	21:21	81° 37,923'	63° 10,483'	Agassiz Trawl	↓	796	202	20,4	4,9	-0,64	29,28	1015,21	89	5
2b	6.4	Full	2019-08-02	21:46	81° 38,573'	63° 11,321'	Agassiz Trawl	(bottom)	781	232	12,9	2,6	-0,90	29,51	1015,83	94	5
2b	6.4	Full	2019-08-02	22:10	81° 39,198'	63° 11,670'	Agassiz Trawl	↑	775	196	16,2	2,4	-0,98	29,57	1016	95	3
2b	6.4	Full	2019-08-02	23:06	81° 37,272'	63° 13,681'	Gravity Core	↓	804	194	15	5,8	-0,65	29,22	1016,01	80	
2b	6.4	Full	2019-08-02	23:20	81° 37,283'	63° 12,936'	Gravity Core	(bottom)	799	208	12,4	4,9	-0,72	29,41	1016,16	71	
2b	6.4	Full	2019-08-02	23:36	81° 37,348'	63° 12,554'	Gravity Core	↑	798	149	8,9	2,8	-0,57	29,14	1016,33	93	
2b	251b	Nutrient	2019-08-03	6:52	80° 58,455'	61° 20,354'	CTD-Rosette	↓		101	10,9	8,7	-1,01	29,24	1021,51	62	1
2b	251b	Nutrient	2019-08-03	7:17	80° 58,484'	61° 20,512'	CTD-Rosette	(bottom)		114	12,6	7,6	-0,93	29,35	1021,58	65	1
2b	251b	Nutrient	2019-08-03	8:12	80° 58,528'	61° 21,256'	CTD-Rosette	↑		121	15,2	6,8	-0,69	29,53	1022,07	68	1
2b	251b	Nutrient	2019-08-03	8:21	80° 58,495'	61° 21,290'	Bongo Net	↓		143	19,6	6,1	-0,73	29,78	1022,29	74	1
2b	251b	Nutrient	2019-08-03	8:30	80° 58,507'	61° 21,354'	Bongo Net	↑		146	14,3	8,3	-0,79	29,83	1022,24	63	1
2b	251b	Coring	2019-08-03	8:45	80° 58,489'	61° 21,418'	Box Core	↓		145	18,1	8,9	-0,65	29,63	1022,45	62	1
2b	251b	Coring	2019-08-03	9:00	80° 58,500'	61° 21,478'	Box Core	(bottom)		140	11,6	10,3	-0,64	29,78	1022,55	59	1
2b	251b	Coring	2019-08-03	9:15	80° 58,509'	61° 21,542'	Box Core	↑		141	12	10	-0,68	30,01	1022,57	59	1
2b	251b	Coring	2019-08-03	9:58	81° 02,559'	61° 33,509'	Box Core	↓		142	24	6,4	-0,49	29,88	1022,31	73	1
2b	251b	Coring	2019-08-03	10:10	81° 02,555'	61° 33,427'	Box Core	(bottom)		118	21,7	7,1	-0,51	29,91	1022,37	62	1
2b	251b	Coring	2019-08-03	10:29	81° 02,578'	61° 33,479'	Box Core	↑		127	14,5	8	-0,48	29,99	1022,58	58	1
2b	251b	Coring	2019-08-03	10:51	81° 02,555'	61° 33,547'	Gravity Core	↓		148	22,3	5,7	-0,60	30,00	1022,55	72	1
2b	251b	Coring	2019-08-03	11:13	81° 02,592'	61° 33,641'	Gravity Core	(bottom)		145	21,7	7,6	-0,67	30,10	1022,71	65	1
2b	251b	Coring	2019-08-03	11:27	81° 02,651'	61° 33,917'	Gravity Core	↑		160	15,6	10,9	-0,59	30,03	1022,45	54	1
2b	251b	Coring	2019-08-03	12:15	81° 06,057'	61° 44,514'	Gravity Core	↓		160	19	4,8	-0,68	30,01	1022,44	73	1
2b	251b	Coring	2019-08-03	12:35	81° 06,100'	61° 44,773'	Gravity Core	(bottom)		166	16,8	5	-0,70	30,03	1022,66	72	1
2b	251b	Coring	2019-08-03	12:48	81° 06,120'	61° 44,401'	Gravity Core	↑		162	18,8	3,3	-0,76	30,18	1022,52	78	1
2b	6.1	Coring	2019-08-04	11:03	79° 47,171'	73° 39,654'	Box Core	↓	209	267	2,1	2,8	0,76	27,89	1018,19	93	3
2b	6.1	Coring	2019-08-04	11:03	79° 47,171'	73° 39,654'	Box Core	↓	209	267	2,1	2,8	0,76	27,89	1018,19	93	1
2b	6.1	Coring	2019-08-04	11:08	79° 47,172'	73° 39,595'	Box Core	(bottom)	207	233	2,3	2,9	0,55	28,90	1018,18	93	3
2b	6.1	Coring	2019-08-04	11:11	79° 47,168'	73° 39,554'	Box Core	↑	207	232	2,9	2,7	0,75	29,04	1018,18	94	3
2b	6.1	Coring	2019-08-04	13:17	79° 47,137'	73° 40,215'	Piston Core	↓	217	49	0,4	4,3	0,74	29,00	1018,02	90	3
2b	6.1	Coring	2019-08-04	13:22	79° 47,138'	73° 40,186'	Piston Core	(bottom)	217	56	0	4,3	0,83	28,72	1018,04	90	3
2b	6.1	Coring	2019-08-04	13:40	79° 47,136'	73° 40,513'	Piston Core	↑	217	96	2,9	3,5	0,79	28,89	1018,04	93	3
2b	6.1	Coring	2019-08-04	14:53	79° 47,418'	73° 22,403'	Gravity Core	↓	185	134	4	4,6	0,58	29,55	1017,71	85	3
2b	6.1	Coring	2019-08-04	14:57	79° 47,423'	73° 22,404'	Gravity Core	(bottom)	184	140	4,8	4,4	0,63	29,56	1017,71	88	3
2b	6.1	Coring	2019-08-04	15:00	79° 47,427'	73° 22,409'	Gravity Core	↑	184	137	3	3,9	0,65	29,63	1017,73	91	3
2b	6.1	Coring	2019-08-04	16:29	79° 41,531'	73° 05,699'	Gravity Core	↓	249	42	1,5	3,5	0,41	29,90	1017,53	88	3
2b	6.1	Coring	2019-08-04	16:34	79° 41,531'	73° 05,719'	Gravity Core	(bottom)	250	106	1,9	3,7	0,67	29,52	1017,51	87	3
2b	6.1	Coring	2019-08-04	16:37	79° 41,533'	73° 05,740'	Gravity Core	↑	250	122	3,2	3,6	0,50	29,28	1017,46	93	3
2b	6.1	Coring	2019-08-04	16:49	79° 41,548'	73° 05,694'	Box Core	↓	249	113	0,6	3,7	0,62	29,41	1017,44	88	3
2b	6.1	Coring	2019-08-04	16:53	79° 41,553'	73° 05,705'	Box Core	(bottom)	248	123	1	4	0,60	29,45	1017,41	87	3
2b	6.1	Coring	2019-08-04	16:57	79° 41,558'	73° 05,721'	Box Core	↑	249	119	1,3	3,8	0,69	29,44	1017,38	87	3
2b	6.1	Coring	2019-08-04	17:15	79° 41,561'	73° 05,654'	Box Core	↓	249	128	2,1	4	0,94	29,07	1017,33	85	3
2b	6.1	Coring	2019-08-04	17:19	79° 41,560'	73° 05,621'	Box Core	(bottom)	249	145	3	4	0,93	29,18	1017,34	85	3
2b	6.1	Coring	2019-08-04	17:23	79° 41,565'	73° 05,639'	Box Core	↑	249	157	2,9	3,8	0,96	29,19	1017,41	89	3
2b	Talbot Inlet	Full	2019-08-05	8:02	77° 50,202'	77° 03,037'	CTD-Rosette	↓	534				0,32	28,78			3
2b	Talbot Inlet	Full	2019-08-05	8:18	77° 50,110'	77° 02,765'	CTD-Rosette	(bottom)	536	319	3	2,7	0,45	29,03	1020,94	89	0
2b	Talbot Inlet	Full	2019-08-05	9:07	77° 49,790'	77° 02,051'	CTD-Rosette	↑	554	343	7	2,9	0,60	28,91	1021,02	88	0
2b	Talbot Inlet	Full	2019-08-05	9:20	77° 50,213'	77° 03,349'	Bongo Net	↓	531	341	5,3	2,8	0,25	28,48	1021,05	87	0
2b	Talbot Inlet	Full	2019-08-05	9:29	77° 50,206'	77° 03,143'	Bongo Net	↑	530	1	4,2	2,8	0,25	29,24	1021,07	87	0
2b	Talbot Inlet	Full	2019-08-05	9:38	77° 50,187'	77° 02,805'	Tucker Net	↓	531	20	3,2	2,3	0,26	29,43	1021,09	89	0
2b	Talbot Inlet	Full	2019-08-05	9:57	77° 50,194'	76° 59,498'	Tucker Net	↑	549	349	4,6	3,4	0,21	26,83	1021,14	87	0
2b	Talbot Inlet	Full	2019-08-05	10:23	77° 50,299'	77° 03,282'	Monster Net	↓	523	293	4,6	2,1	0,27	28,81	1021,32	89	0
2b	Talbot Inlet	Full	2019-08-05	10:38	77° 50,246'	77° 03,151'	Monster Net	(bottom)	528	317	4	1,9	0,30	29,26	1021,43	90	0
2b	Talbot Inlet	Full	2019-08-05	10:56	77° 50,196'	77° 03,116'	Monster Net	↑	532	307	6,5	1,5	0,34	29,36	1021,37	92	0
2b	Talbot Inlet	Full	2019-08-05	11:13	77° 50,168'	77° 02,767'	Trace-Metal Cast	↓	532	304	5,9	2,3	0,30	29,47	1021,41	93	0
2b	Talbot Inlet	Full	2019-08-05	11:24	77° 50,145'	77° 02,522'	Trace-Metal Cast	↑	533	297	5,7	2,1	0,34	29,07	1021,47	94	0
2b	Talbot Inlet	Full	2019-08-05	12:53	77° 50,199'	77° 02,822'	Hydrobios	↓	530	295	2,5	2,9	0,29	29,09	1021,57	89	1
2b	Talbot Inlet	Full	2019-08-05	13:14	77° 50,206'	77° 02,820'	Hydrobios	(bottom)	530	325	5	2,6	0,31	28,91	1021,4	90	

2b	Talbot Inlet	Full	2019-08-05	13:28	77° 50,204'	77° 02,823'	Hydrobios	↑	530	344	6,7	3	0,31	28,92	1021,4	87	1
2b	Talbot Inlet	Full	2019-08-05	13:48	77° 50,194'	77° 02,848'	Trace-Metal Cast	↓	530	327	8,2	3	0,31	28,98	1021,36	87	1
2b	Talbot Inlet	Full	2019-08-05	14:00	77° 50,194'	77° 02,825'	Trace-Metal Cast	↑	530	328	8	3,2	0,33	28,96	1021,42	84	1
2b	Talbot Inlet	Full	2019-08-05	14:14	77° 50,196'	77° 02,854'	CTD-Rosette	↓	531	333	7,2	3,9	0,35	28,96	1021,39	82	1
2b	Talbot Inlet	Full	2019-08-05	14:28	77° 50,189'	77° 02,867'	CTD-Rosette	(bottom)	531	333	5,9	3,3	0,30	28,98	1021,4	85	1
2b	Talbot Inlet	Full	2019-08-05	15:19	77° 50,204'	77° 02,859'	CTD-Rosette	↑	530	349	7,2	3,9	0,29	28,98	1021,36	82	1
2b	Talbot Inlet	Full	2019-08-05	16:47	77° 50,202'	77° 02,467'	Trace-Metal Cast	↓	531	15	1,9	4,6	0,45	28,86	1021,42	79	1
2b	Talbot Inlet	Full	2019-08-05	17:06	77° 50,188'	77° 02,305'	Trace-Metal Cast	↑	531	335	5,7	3,7	0,50	28,87	1021,24	84	1
2b	Talbot Inlet	Full	2019-08-05	17:22	77° 49,746'	77° 02,767'	Agassiz Trawl	↓	558	346	7,4	3,7	0,83	26,87	1021,09	83	
2b	Talbot Inlet	Full	2019-08-05	17:40	77° 50,155'	77° 03,240'	Agassiz Trawl	(bottom)	533	350	7,8	3,2	0,94	26,34	1020,92	86	
2b	Talbot Inlet	Full	2019-08-05	18:01	77° 50,636'	77° 04,538'	Agassiz Trawl	↑	520	329	4,6	4,3	0,58	25,19	1020,88	81	
2b	Talbot Inlet	Full	2019-08-05	19:00	77° 51,193'	77° 06,024'	Drone	↓	487	164	4,6	4,7	0,28	28,39	1020,94	80	1
2b	Talbot Inlet	Full	2019-08-05	20:06	77° 50,903'	77° 05,039'	Drone	↑	527	330	3,6	2,1	0,32	28,91	1020,9	93	1
2b	Talbot Inlet	Full	2019-08-05	21:44	77° 50,597'	77° 04,502'	Box Core	↓	518	239	1,9	4,6	0,53	27,72	1020,76	77	1
2b	Talbot Inlet	Full	2019-08-05	21:53	77° 50,596'	77° 04,314'	Box Core	(bottom)	521	231	4,4	4,7	0,51	29,14	1020,8	79	1
2b	Talbot Inlet	Full	2019-08-05	22:02	77° 50,587'	77° 04,202'	Box Core	↑	522				0,53	29,19			1
2b	Talbot Inlet	Full	2019-08-05	22:28	77° 50,297'	77° 02,988'	Beam Trawl	↓	523	249	2,9	4	0,60	27,84	1020,68	88	1
2b	Talbot Inlet	Full	2019-08-05	22:57	77° 50,826'	77° 06,849'	Beam Trawl	(bottom)	518	277	5,5	3,3	0,91	25,01	1020,63	93	1
2b	Talbot Inlet	Full	2019-08-05	23:19	77° 50,518'	77° 10,017'	Beam Trawl	↑	494	219	5,7	2,8	0,55	26,15	1020,63	98	1
2b	117	Nutrient	2019-08-06	8:38	77° 20,021'	77° 02,445'	CTD-Rosette	↓	441	314	6,3	1,7	1,37	29,25	1018,48	98	1
2b	117	Nutrient	2019-08-06	8:53	77° 20,070'	77° 02,414'	CTD-Rosette	(bottom)	438	349	2,1	2,1	1,40	29,00	1018,53	98	1
2b	117	Nutrient	2019-08-06	9:32	77° 20,196'	77° 02,387'	CTD-Rosette	↑	423	311	3,4	2,4			1018,37	98	1
2b	2.5	Coring	2019-08-06	16:06	76° 21,450'	77° 30,157'	CTD-Rosette	↓	380	106	2,9	4,6	4,98	31,03	1017,69	97	0
2b	2.5	Coring	2019-08-06	16:19	76° 21,489'	77° 30,370'	CTD-Rosette	(bottom)	379	94	0,8	4,7	5,29	30,87	1017,73	96	0
2b	2.5	Coring	2019-08-06	16:37	76° 21,556'	77° 30,655'	CTD-Rosette	↑	376	76	1	4,9	5,26	30,86	1017,72	96	0
2b	2.5	Coring	2019-08-06	16:55	76° 21,373'	77° 30,198'	Box Core	↓	379	46	1,5	5,5	5,05	30,89	1017,83	92	0
2b	2.5	Coring	2019-08-06	17:02	76° 21,384'	77° 30,323'	Box Core	(bottom)	379				4,84	30,92			0
2b	2.5	Coring	2019-08-06	17:07	76° 21,410'	77° 30,421'	Box Core	↑	379	104	0	5,2	4,54	30,99	1017,82	94	0
2b	2.5	Coring	2019-08-06	17:25	76° 21,488'	77° 30,400'	Gravity Core	↓	380	141	0	5,3	5,30	30,85	1017,72	93	0
2b	2.5	Coring	2019-08-06	17:33	76° 21,472'	77° 30,428'	Gravity Core	(bottom)	380	182	1	5,5	5,24	30,89	1017,74	92	0
2b	2.5	Coring	2019-08-06	17:38	76° 21,480'	77° 30,459'	Gravity Core	↑	380	23	0	5,4	5,41	30,85	1017,66	91	0
2b	290	Nutrient	2019-08-06	22:08	76° 07,920'	80° 20,221'	CTD-Rosette	↓	169	79	8,4	3,4	1,95	30,31	1017,43	98	0
2b	290	Nutrient	2019-08-06	22:26	76° 07,907'	80° 21,403'	CTD-Rosette	(bottom)	180	83	6,9	3,7	1,96	30,16	1017,39	98	0
2b	290	Nutrient	2019-08-06	22:54	76° 07,941'	80° 21,974'	CTD-Rosette	↑	181	94	6,9	4,1	2,00	29,41	1017,36	98	0
2b	291	Nutrient	2019-08-06	23:59	75° 59,516'	80° 21,992'	CTD-Rosette	↓	687	68	3,8	4,2	1,29	31,26	1017,59	96	1
2b	291	Nutrient	2019-08-07	0:17	75° 59,645'	80° 22,630'	CTD-Rosette	(bottom)	680	77	5,3	3,9	1,51	30,99	1017,51	97	1
2b	291	Nutrient	2019-08-07	1:05	75° 59,765'	80° 22,695'	CTD-Rosette	↑	674	57	6,3	3,6	2,92	30,12	1017,29	98	1
2b	292	Nutrient	2019-08-07	2:45	75° 51,141'	80° 25,479'	CTD-Rosette	↓	633	140	6,1	3,3	3,00	30,68	1017,51	98	0
2b	292	Nutrient	2019-08-07	3:02	75° 51,103'	80° 24,956'	CTD-Rosette	(bottom)	634	147	5,1	3,4	1,93	30,97	1017,56	98	0
2b	292	Nutrient	2019-08-07	3:45	75° 51,118'	80° 24,224'	CTD-Rosette	↑	641	98	4	3,3	2,53	30,79	1017,53	98	0
2b	293	Basic	2019-08-07	4:40	75° 43,870'	80° 42,129'	Trace-Metal Cast	↓	626	130	6,7	3	0,88	31,09	1017,44	98	0
2b	293	Basic	2019-08-07	4:57	75° 43,986'	80° 42,007'	Trace-Metal Cast	↑	627	130	7,2	3,4	0,32	31,62	1017,44	98	0
2b	293	Basic	2019-08-07	5:05	75° 43,911'	80° 41,621'	CTD-Rosette	↓	626	115	7,4	2,8	1,45	31,05	1017,37	98	0
2b	293	Basic	2019-08-07	5:22	75° 43,944'	80° 41,260'	CTD-Rosette	(bottom)	625	132	7	3,1	0,53	31,40	1017,34	98	0
2b	293	Basic	2019-08-07	6:00	75° 43,988'	80° 40,701'	CTD-Rosette	↑	625	123	5,7	4,6	0,45	31,53	1017	94	0
2b	293	Basic	2019-08-07	6:21	75° 43,821'	80° 41,096'	Bongo Net	↓	627	111	5,5	3,7	2,01	30,91	1017,13	96	0
2b	293	Basic	2019-08-07	6:29	75° 43,806'	80° 40,985'	Bongo Net	↑	626	115	6,5	3,9	0,87	31,24	1017,11	95	0
2b	293	Basic	2019-08-07	6:33	75° 43,800'	80° 40,928'	Trace-Metal Cast	↓	626	114	6,5	4	0,63	31,43	1017,02	95	0
2b	293	Basic	2019-08-07	6:52	75° 43,790'	80° 40,531'	Trace-Metal Cast	↑	627	108	6,7	3,5	0,16	31,69	1017,04	95	0
2b	293	Basic	2019-08-07	7:00	75° 43,734'	80° 40,474'	CTD-Rosette	↓	626	99	5,5	3,2	0,81	31,33	1017,14	95	0
2b	293	Basic	2019-08-07	7:17	75° 43,701'	80° 40,228'	CTD-Rosette	(bottom)	626	114	5	4	0,57	31,40	1017,29	94	0
2b	293	Basic	2019-08-07	8:07	75° 43,520'	80° 39,598'	CTD-Rosette	↑	627	143	5,7	4,9	0,75	31,30	1017,22	90	0
2b	293	Basic	2019-08-07	8:26	75° 43,765'	80° 42,069'	Tucker Net	↓	628	133	7,2	5,4	1,43	30,76	1017,38	86	0
2b	293	Basic	2019-08-07	8:46	75° 43,753'	80° 39,178'	Tucker Net	↑	624	114	6,1	3,6	1,67	30,67	1017,47	94	0
2b	293	Basic	2019-08-07	9:15	75° 43,874'	80° 41,992'	Monster Net	↓	628	122	0,8	6,9	0,74	31,28	1017,72	77	0
2b	293	Basic	2019-08-07	9:31	75° 43,821'	80° 41,909'	Monster Net	(bottom)	627	128	0	6,7	0,91	31,23	1017,87	78	0
2b	293	Basic	2019-08-07	9:52	75° 43,785'	80° 41,761'	Monster Net	↑	627	302	2,1	6,2	1,37	30,91	1017,84	81	0
2b	293	Basic	2019-08-07	10:03	75° 43,855'	80° 41,521'	Trace-Metal Cast	↓	627	312	1,5	6,1	0,44	31,53	1017,84	81	0
2b	293	Basic	2019-08-07	10:22	75° 43,776'	80° 41,657'	Trace-Metal Cast	↑	627	289	5,1	4,9	0,89	31,23	1018	88	0
2b	293	Basic	2019-08-07	10:36	75° 43,778'	80° 41,471'	Box Core	↓	628	18	4,6	5,3	-0,05	31,85	1017,93	89	0
2b	293	Basic	2019-08-07	10:37	75° 43,771'	80° 41,442'	Box Core	↓	628	322	5,7	5,3	-0,03	31,86	1017,95	88	0
2b	293	Basic	2019-08-07	10:46	75° 43,691'	80° 41,382'	Box Core	(bottom)	627	310	11,4	5,1	-0,05	31,90	1017,99	89	0
2b	293	Basic	2019-08-07	10:54	75° 43,680'	80° 41,326'	Box Core	↑	627	302	9,5	4,7	0,86	31,26	1018,07	90	0
2b	293	Basic	2019-08-07	11:09	75° 43,715'	80° 41,057'	Agassiz Trawl	↓	627	294	7,4	3,5	1,25	31,21	1018,21	94	0
2b	293	Basic	2019-08-07	11:26	75° 43,603'	80° 39,352'	Agassiz Trawl	(bottom)	625	319	9,5	4	1,39	30,94	1018,16	94	0
2b	293	Basic	2019-08-07	11:44	75° 43,479'	80° 37,589'	Agassiz Trawl	↑	623	301	8,9	5,6	1,37	30,90	1018,27	87	0
2b	293	Basic	2019-08-07	12:59	75° 43,760'	80° 42,253'	IKMT	↓	627	233	6,9	5,5	1,26	31,09	1018,6	86	1
2b	293	Basic	2019-08-07	14:11	75° 43,290'	80° 30,894'	IKMT	↑	617	241	4,8	9,1	2,24	30,38	1018,56	75	1
2b	2.2	Coring	2019-08-07	17:18	76° 03,928'	81° 51,039'	Box Core	↓	773	216	4	7,4	2,97	29,78	1019,16	83	0
2b	2.2	Coring	2019-08-07	17:29	76° 03,875'	81° 50,960'	Box Core	(bottom)	773	244	3,4	6,7	3,08	29,78	1019,11	84	0
2b	2.2	Coring	2019-08-07	17:39	76° 03,852'	81° 50,918'	Box Core	↑	773	251	2,7	6,4	2,90	29,79	1019,13	86	0
2b	2.2	Coring	2019-08-07	17:52	76° 03,930'	81° 50,927'	Gravity Core	↓	773	245	4	5,6	2,97	29,81	1019,25	89	0
2b	2.2	Coring	2019-08-07	18:06	76° 03,852'	81° 50,879'	Gravity Core	(bottom)	773	220	4,6	5,1	2,94	29,81	1019,24	91	0
2b	2.2	Coring	2019-08-07	18:15	76° 03,805'	81° 50,911'	Gravity Core	↑	774	226	5	5,6	2,85	29,82	1019,24	90	0
2b	2.3	Coring	2019-08-07	20:14	76° 07,827'	83° 01,358'	CTD-Rosette	↓	833	251	4,8	5,9	1,32	30,91	1019,61	98	0
2b	2.3	Coring	2019-08-07	20:34	76° 07,878'	83° 01,188'	CTD-Rosette	(bottom)	834	254	8,4	5,7	1,70	30,68	1019,66	98	0
2b	2.3	Coring	2019-08-07	21:30	76° 07,998'	82° 59,469'	CTD-Rosette	↑	842	277	5,9	7	2,48	30,23	1019,88	98	0
2b	2.3	Coring	2019-08-07	21:46	76° 07,796'	83° 01,409'	Box Core	↓	833	290	9,3	5,9	2,24	30,27	1019,76	98	0
2b	2.3	Coring	2019-08-07	21:59	76° 07,767'	83° 01,397'	Box Core	(bottom)	833	292	8	5,7	2,11	30,39	1019,8	98	0
2b	2.3	Coring	2019-08-07	22:12	76° 07,753'	83° 01,359'	Box Core	↑	833	267	7,8	5,4	2,06	30,44	1019,88	98	0
2b	2.3	Coring	2019-08-07	22:29	76° 07,796'	83° 01,558'	Gravity Core	↓	833	288	7	6,4	1,90	30,64	1019,88	98	0
2b	2.3	Coring	2019-08-07	22:43	76° 07,772'	83° 01,530'	Gravity Core	(bottom)	833	285	6,1	5,1	2,42	30,45	1019,95	98	0
2b	2.3	Coring	2019-08-07	22:57	76° 07,776'	83° 01,542'	Gravity Core	↑	833	293	2,5	4,4	2,55	30,41	1020,07	98	0
2b	2.4	Coring	2019-08-08	4:56	76° 07,620'	86° 19,851'	CTD-Rosette	↓	684	248	2,9	4,7	1,69	30,53	1020,8	98	0
2b	2.4	Coring	2019-08-08	5:16	76° 07,601'	86° 19,574'	CTD-Rosette	(bottom)	681	210	3,4	4,6	1,64	30,50	1020,8	98	0
2b	2.4	Coring	2019-08-08	6:12	76° 07,626'	86° 19,034'	CTD-Rosette	↑	679	221	2,5	5,6	2,47	30,50	1020,89	98	0
2b	2.4	Coring	2019-08-08	6:30	76° 07,629'	86° 17,998'	Box Core	↓	678	197	4,6	6,2	1,66	30,52	1020,88	98	0
2b	2.4	Coring	2019-08-08	6:41	76° 07,601'	86° 18,026'	Box Core	(bottom)	677	196	4,8	6,1	1,62	30,52	1020,94	98	0
2b	2.4	Coring	2019-08-08	6:52	76° 07,595'	86° 17,892'	Box Core	↑	677	207	4,2	6,2	1,65	30,50	1020,92	98	0
2b	2.4	Coring	2019-08-08	7:12	76° 07,663'	86° 17,822'	Gravity Core	↓	678	195	6,5	4,8	1,96	30,45	1020,92	98	0
2b	2.4	Coring	2019-08-08	7:24	76° 07,671'	86° 17,811'	Gravity Core	(bottom)	678	192	4,8	4,1	1,73	30,49	1020,98	98	0
2b	2.4	Coring	2019-08-08	7:34	76° 07,673'	86° 17,846'	Gravity Core	↑	678	196	4,6	3,6	1,72	30,50	1021,07	98	0
2b	1.4	Coring	2019-08-08	16:12	76° 30,188'	84° 56,113'	CTD-Rosette	↓	124	288	0	8,9	0,66	28,93	1021,28	78	0
2b	1.4	Coring	2019-08-08	16:21	76° 30,198'	84° 56,087'	CTD-Rosette	(bottom)	124	357	2,9	9,3	0,76	28,19	1021,24	76	1
2b	1.4	Coring	2019-08-08	16:54	76° 30,197'	84° 56,077'	CTD-Rosette	↑	124	292	2,5	8,1	0,49	28,57	1021,12	77	1
2b	1.4	Coring	2019-08-08	17:05	76° 30,202'	84° 56,109'	Bongo Net	↓	124	304	2,1	8,6	0,54	28,40	1021,11	73	1
2b	1.4	Coring	2019-08-08	17:12	76° 30,207'	84° 56,122'	Bongo Net	↑	124	344	2,1	8,9	0,55	28,43	1021,04	73	1
2b	1.4	Coring	2019-08-08	18:34	76° 23,718'	84° 34,305'	Box Core	↓	140	76	3,4	9,1	0,82	28,34	1020,97	87	1
2b	1.4	Coring	2019-08-08	18:37	76° 23,715'	84° 34,306'	Box Core	(bottom)	140	106	4	8,9	0,76	28,01	1021,03	88	1
2b	1.4	Coring	2019-08-08	18:40	76° 23,714'	84° 34,316'	Box Core	↑	140	82	4,6	8,8	0,77	28,18	1021,04	88	1
2b	1.4	Coring	2019-08-08	19:27	76° 23,707'	84° 34,369'	Piston Core	↓	140	86	0,6	9,2	0,73	28,63	1021,03	87	1
2b	1.4	Coring	2019-08-08	19:31	76° 23,704'	84° 34,374'	Piston Core	(bottom)	140	99	1	9,1	0,67	28,53	1021,01	85	1
2b	1.4	Coring	2019-08-08	19:35	76° 23,703'	84° 34,375'	Piston Core	↑	141	93	1,9	8,8	0,77	28,66	1021,01	88	1
2b	1.4	Coring	2019-08-08	21:09	76° 30,032'	84° 55,873'	Box Core	↓	125	14	1,1	9	0,84	25,74	1020,89	79	1
2b	1.4	Coring	2019-08-08	21:12	76° 30,039'	84° 55,877'	Box Core	(bottom)	126	351	3	9	0,87	29,09	1020,9	78	1
2b	1.4	Coring	2019-08-08	21:14	76° 30,042'	84° 55,881'	Box Core	↑	126	349	4	8,9	0,78	28,37	1020,91	78	1
2b	1.4	Coring	2019-08-08	21:45	76° 28,796'	84° 54,874'	Gravity Core	↓	129	290	2,3	9,3	0,76	27,54	1020,93	76	1
2b	1.4	Coring	2019-08-08	21:47	76° 28,794'	84° 54,859'	Gravity Core	(bottom)	129	315	2,5	9,5	0,70	28,41	1020,94	75	1
2b	1.4	Coring	2019-08-08	21:51	76° 28,789'	84° 54,813'	Gravity Core	↑	129	325	2,3	9,7	0,60	28,21	1020,93	74	1
2b	1.4	Coring	2019-08-08	22:11	76° 30,018'	84° 55,857'	Gravity Core	↓	126	348	7,2	9,6	0,94	25,49	1020,89	73	1
2b	1.4	Coring	2019-08-08	22:13	76° 30,022'	84° 55,872'	Gravity Core	(bottom)	126	330	5,1	9,8	0,91	28,17	1020,89	74	1
2b	1.4	Coring	2019-08-08	22:16	76° 30,029'	84° 55,875'	Gravity Core	↑	126	314	4,6	9,4	0,92	28,59	1020,93	76	1

2b	295	Basic	2019-08-08	23:38	76° 22,610'	84° 24,646'	Trace-Metal Cast	↓	87	78	2,3	6,6	1,32	24,85	1020,86	96	1
2b	295	Basic	2019-08-08	23:54	76° 22,624'	84° 24,507'	Trace-Metal Cast	↑	85	82	1,5	7	1,34	27,85	1020,89	94	1
2b	295	Basic	2019-08-09	0:01	76° 22,606'	84° 24,498'	CTD-Rosette	↓	87	79	1,1	7,6	1,36	28,28	1020,87	87	1
2b	295	Basic	2019-08-09	0:08	76° 22,591'	84° 24,500'	CTD-Rosette	(bottom)	88	91	0	7,8	1,38	28,27	1020,83	87	1
2b	295	Basic	2019-08-09	0:38	76° 22,593'	84° 24,487'	CTD-Rosette	↑	87	80	1,7	9,7	1,24	28,16	1020,66	81	1
2b	295	Basic	2019-08-09	0:46	76° 22,598'	84° 24,402'	Bongo Net	↓	87	46	1,1	9,4	1,34	27,91	1020,71	84	1
2b	295	Basic	2019-08-09	0:50	76° 22,603'	84° 24,377'	Bongo Net	(bottom)	86	98	1,9	8,8	1,28	28,03	1020,71	85	1
2b	295	Basic	2019-08-09	0:53	76° 22,608'	84° 24,365'	Bongo Net	↑	85	86	1,5	8,4	1,28	28,10	1020,71	89	1
2b	295	Basic	2019-08-09	1:06	76° 22,622'	84° 24,329'	Trace-Metal Cast	↓	86	95	2,5	7,7	1,41	28,11	1020,7	90	1
2b	295	Basic	2019-08-09	1:14	76° 22,629'	84° 24,329'	Trace-Metal Cast	↑	86	94	2,3	7,6	1,23	28,36	1020,76	87	1
2b	295	Basic	2019-08-09	1:26	76° 22,622'	84° 25,637'	Tucker Net	↓	76	115	4	7,9	1,82	25,82	1020,77	88	1
2b	295	Basic	2019-08-09	1:59	76° 23,158'	84° 20,719'	Tucker Net	↑	107	40	5	7,4	2,61	24,05	1020,79	95	1
2b	295	Basic	2019-08-09	2:29	76° 22,573'	84° 24,230'	Monster Net	↓	85	55	4	7,2	1,36	28,97	1020,71	96	1
2b	295	Basic	2019-08-09	2:32	76° 22,575'	84° 24,200'	Monster Net	(bottom)	84	56	3,6	7,2	1,39	28,23	1020,71	96	1
2b	295	Basic	2019-08-09	2:36	76° 22,579'	84° 24,165'	Monster Net	↑	83	49	4,2	7	1,37	28,17	1020,69	96	1
2b	295	Basic	2019-08-09	3:00	76° 22,534'	84° 24,362'	Agassiz Trawl	↓	98	113	3,6	6,6	1,93	27,18	1020,71	96	1
2b	295	Basic	2019-08-09	3:04	76° 22,464'	84° 23,980'	Agassiz Trawl	(bottom)	104	99	1,7	6,5	1,72	24,81	1020,66	96	1
2b	295	Basic	2019-08-09	3:07	76° 22,421'	84° 23,637'	Agassiz Trawl	↑	106	110	3,8	6,6	2,19	24,80	1020,63	96	1
2b	297	Basic	2019-08-10	0:26	76° 22,407'	81° 18,106'	CTD-Rosette	↓	450	340	3,4	8,4	2,82	30,21	1019,5	83	1
2b	297	Basic	2019-08-10	0:39	76° 22,387'	81° 17,917'	CTD-Rosette	(bottom)	448	29	0,4	8,9	2,17	30,29	1019,53	85	1
2b	297	Basic	2019-08-10	1:25	76° 22,350'	81° 17,886'	CTD-Rosette	↑	448	343	3,2	8,1	2,20	30,14	1019,49	88	1
2b	297	Basic	2019-08-10	1:50	76° 22,264'	81° 18,720'	IKMT	↓	457	322	2,9	8,5	4,10	29,78	1019,42	87	1
2b	297	Basic	2019-08-10	2:55	76° 19,861'	81° 19,468'	IKMT	↑	236	98	4,8	7,8	2,84	27,73	1019,1	87	1
2b	297	Basic	2019-08-10	3:30	76° 22,206'	81° 18,860'	Box Core	↓	458	230	0	8,5	2,01	30,24	1019,04	81	1
2b	297	Basic	2019-08-10	3:39	76° 22,193'	81° 18,881'	Box Core	(bottom)	459	341	0	8,7	2,01	30,40	1018,97	80	1
2b	297	Basic	2019-08-10	3:46	76° 22,178'	81° 18,874'	Box Core	↑	460	24	1,1	7,9	1,76	30,44	1018,93	89	1
2b	297	Basic	2019-08-10	4:02	76° 22,130'	81° 18,783'	Agassiz trawl	↓	462	31	3,4	8,1	1,64	30,63	1018,85	82	1
2b	297	Basic	2019-08-10	4:16	76° 22,371'	81° 17,491'	Agassiz trawl	(bottom)	442	26	5,1	7,3	5,40	29,47	1018,77	82	1
2b	297	Basic	2019-08-10	4:33	76° 22,677'	81° 16,247'	Agassiz trawl	↑	450	16	4,8	7,7	5,62	29,46	1018,75	77	1
2b	297	Basic	2019-08-10	4:49	76° 22,213'	81° 18,841'	Gravity Core	↓	457	59	1,5	7,5	3,56	29,72	1018,77	77	0
2b	297	Basic	2019-08-10	4:58	76° 22,202'	81° 18,910'	Gravity Core	(bottom)	457	75	3,2	7,5	2,13	30,37	1018,66	81	0
2b	297	Basic	2019-08-10	5:05	76° 22,193'	81° 18,912'	Gravity Core	↑	458	67	4,8	7,7	1,56	30,59	1018,58	75	0
2b	296	Basic	2019-08-10	10:36	75° 31,362'	79° 45,090'	Trace-Metal Cast	↓	566	113	2,3	4,9	3,01	30,58	1019,29	97	0
2b	296	Basic	2019-08-10	10:50	75° 31,388'	79° 44,947'	Trace-Metal Cast	↑	566	110	4,4	5,1	3,27	30,54	1019,27	96	0
2b	296	Basic	2019-08-10	10:58	75° 31,397'	79° 44,911'	CTD-Rosette	↓	566	113	2,7	5,2	3,54	30,51	1019,32	94	0
2b	296	Basic	2019-08-10	11:14	75° 31,428'	79° 44,956'	CTD-Rosette	(bottom)	565	51	3,4	5,3	4,20	30,47	1019,26	97	0
2b	296	Basic	2019-08-10	12:06	75° 31,505'	79° 45,276'	CTD-Rosette	↑	565	102	2,7	4,7	3,89	30,49	1019,28	98	0
2b	296	Basic	2019-08-10	12:56	75° 31,387'	79° 45,121'	Bongo Net	↓	566	68	2,3	4,9	3,60	30,51	1019,46	98	1
2b	296	Basic	2019-08-10	13:04	75° 31,408'	79° 45,002'	Bongo Net	↑	566	15	3,8	5,3	3,05	30,54	1019,53	98	1
2b	296	Basic	2019-08-10	13:16	75° 31,430'	79° 44,973'	Trace-Metal Cast	↓	565	39	1,1	5,1	2,20	30,70	1019,59	98	1
2b	296	Basic	2019-08-10	13:29	75° 31,445'	79° 44,779'	Trace-Metal Cast	↑	566	112	3,2	5,4	2,69	30,63	1019,63	98	1
2b	296	Basic	2019-08-10	13:39	75° 31,493'	79° 44,297'	Tucker Net	↓	566	78	4,6	4,5	4,06	30,48	1019,64	98	1
2b	296	Basic	2019-08-10	14:00	75° 31,453'	79° 41,714'	Tucker Net	↑	568	87	9,3	5,3	3,99	30,44	1019,52	98	1
2b	296	Basic	2019-08-10	14:28	75° 31,420'	79° 45,139'	Monster Net	↓	565	125	4	4,6	2,33	30,66	1019,61	98	1
2b	296	Basic	2019-08-10	14:44	75° 31,384'	79° 45,012'	Monster Net	(bottom)	566	143	2,9	4	3,18	30,53	1019,63	98	1
2b	296	Basic	2019-08-10	15:02	75° 31,357'	79° 44,930'	Monster Net	↑	566	147	2,1	4,5	3,49	30,52	1019,69	98	1
2b	296	Basic	2019-08-10	15:14	75° 31,384'	79° 45,150'	Trace-Metal Cast	↓	565	181	1,3	4,1	4,01	30,48	1019,85	98	1
2b	296	Basic	2019-08-10	15:30	75° 31,353'	79° 44,981'	Trace-Metal Cast	↑	566	216	1,5	4,2	3,75	30,53	1019,81	98	1
2b	296	Basic	2019-08-10	16:28	75° 31,392'	79° 45,199'	Box Core	↓	565	335	1,9	4,8	3,44	30,54	1019,76	98	0
2b	296	Basic	2019-08-10	16:37	75° 31,381'	79° 45,227'	Box Core	(bottom)	565	11	2,5	4,8	3,63	30,52	1019,7	98	0
2b	296	Basic	2019-08-10	16:45	75° 31,364'	79° 45,172'	Box Core	↑	565	345	0,8	4,8	3,68	30,53	1019,7	98	0
2b	296	Basic	2019-08-10	17:01	75° 31,335'	79° 44,778'	Agassiz trawl	↓	566	46	2,1	5	2,92	30,67	1019,64	98	0
2b	296	Basic	2019-08-10	17:19	75° 31,573'	79° 43,141'	Agassiz trawl	(bottom)	566	339	2,9	4,8	3,36	30,24	1019,65	98	0
2b	296	Basic	2019-08-10	17:37	75° 31,831'	79° 41,513'	Agassiz trawl	↑	566	38	4	4,4	3,44	29,64	1019,6	98	0
2b	296	Basic	2019-08-10	18:00	75° 31,361'	79° 45,226'	Gravity Core	↓	565	268	2,3	3,7	4,08	30,35	1019,64	98	0
2b	296	Basic	2019-08-10	18:09	75° 31,392'	79° 45,208'	Gravity Core	(bottom)	564	259	3	3,9	3,79	30,47	1019,64	98	0
2b	296	Basic	2019-08-10	18:17	75° 31,385'	79° 45,174'	Gravity Core	↑	565	281	1,7	3,8	3,77	30,46	1019,63	98	0
2b	2.7	Coring	2019-08-10	20:27	75° 28,947'	78° 38,626'	CTD-Rosette	↓	525	170	1,1	7,3	6,31	29,96	1020,08	98	0
2b	2.7	Coring	2019-08-10	20:42	75° 28,916'	78° 38,470'	CTD-Rosette	(bottom)	526	180	4,4	7,5	5,94	30,70	1020,21	98	0
2b	2.7	Coring	2019-08-10	21:05	75° 28,897'	78° 38,109'	CTD-Rosette	↑	527	142	6,7	7,4	5,73	30,34	1020,15	97	0
2b	2.7	Coring	2019-08-10	21:15	75° 28,857'	78° 38,037'	Bongo Net	↓	526	196	4,8	7,1	5,24	30,41	1020,2	95	0
2b	2.7	Coring	2019-08-10	21:23	75° 28,830'	78° 37,928'	Bongo Net	↑	524	146	6,9	7,5	5,30	30,69	1020,18	96	0
2b	2.7	Coring	2019-08-10	21:36	75° 28,943'	78° 40,565'	Box Core	↓	527	178	8,8	7,5	6,29	29,74	1020,19	96	0
2b	2.7	Coring	2019-08-10	21:44	75° 28,943'	78° 40,518'	Box Core	(bottom)	526	161	7,8	7,7	6,39	30,41	1020,2	96	0
2b	2.7	Coring	2019-08-10	21:53	75° 28,941'	78° 40,538'	Box Core	↑	527	197	7,6	8,9	6,41	30,53	1020,21	86	0
2b	2.7	Coring	2019-08-10	22:12	75° 28,944'	78° 40,611'	Gravity Core	↓	527	175	9,7	5,8	6,46	30,32	1020,19	98	0
2b	2.7	Coring	2019-08-10	22:21	75° 28,942'	78° 40,562'	Gravity Core	(bottom)	527	303	12,2	5,2	6,47	30,06	1020,24	98	0
2b	2.7	Coring	2019-08-10	22:29	75° 28,944'	78° 40,500'	Gravity Core	↑	527	167	9,1	7,1	6,43	29,94	1020,22	98	0
2b	302	Basic	2019-08-11	23:17	74° 14,020'	86° 09,397'	CTD-Rosette	↓	554	79	14,9	2,9	1,56	28,83	1018,77	98	0
2b	302	Basic	2019-08-11	23:33	74° 14,042'	86° 09,899'	CTD-Rosette	(bottom)	554	81	8	5,3	1,46	29,68	1019,02	98	0
2b	302	Basic	2019-08-12	0:20	74° 14,070'	86° 11,098'	CTD-Rosette	↑	555	65	12,9	5,3	1,74	29,05	1018,99	96	6
2b	302	Basic	2019-08-12	0:33	74° 14,052'	86° 11,119'	Bongo Net	↓	555	71	8,6	7,7	1,43	29,46	1019,18	86	6
2b	302	Basic	2019-08-12	0:41	74° 14,061'	86° 11,359'	Bongo Net	↑	555	98	4,2	3,9	1,21	29,48	1019,11	98	6
2b	302	Basic	2019-08-12	0:53	74° 14,107'	86° 10,970'	Monster Net	↓	555	78	13,1	2,9	1,41	29,30	1019	98	5
2b	302	Basic	2019-08-12	1:07	74° 14,182'	86° 11,328'	Monster Net	(bottom)	556	77	13,7	2,8	1,41	29,55	1018,99	98	5
2b	302	Basic	2019-08-12	1:24	74° 14,205'	86° 11,671'	Monster Net	↑	556	75	11,2	4,3	0,99	29,71	1019,1	98	5
2b	302	Basic	2019-08-12	2:04	74° 14,281'	86° 11,560'	Hydrobios	↓	556	70	16,4	3,8	1,50	29,50	1018,98	98	4
2b	302	Basic	2019-08-12	2:18	74° 14,276'	86° 11,956'	Hydrobios	(bottom)	557	71	13,9	4	1,25	29,42	1019,04	98	4
2b	302	Basic	2019-08-12	2:36	74° 14,279'	86° 12,620'	Hydrobios	↑	557	84	4	3	1,39	29,56	1019,16	98	4
2b	302	Basic	2019-08-12	3:13	74° 14,065'	86° 10,092'	Box Core	↓	555	73	11,6	2,6	1,62	27,38	1019,64	98	3
2b	302	Basic	2019-08-12	3:21	74° 14,084'	86° 10,234'	Box Core	(bottom)	555	77	10,5	2,5	2,19	28,85	1019,56	98	3
2b	302	Basic	2019-08-12	3:31	74° 14,106'	86° 10,497'	Box Core	↑	556	79	11,4	2,5	2,01	29,19	1019,48	98	3
2b	303	Basic	2019-08-12	10:15	74° 22,227'	89° 37,191'	CTD-Rosette	↓	300	104	25,3	2,4	1,29	26,57	1018,81	98	0
2b	303	Basic	2019-08-12	10:26	74° 22,299'	89° 37,290'	CTD-Rosette	(bottom)	303	90	23	4,2	1,35	26,21	1018,74	95	0
2b	303	Basic	2019-08-12	11:11	74° 22,417'	89° 37,549'	CTD-Rosette	↑	307	114	20,9	3,7	1,26	26,19	1018,86	88	0
2b	303	Basic	2019-08-12	11:20	74° 22,498'	89° 37,720'	Bongo Net	↓	309	91	13,1	6	1,17	26,54	1019,06	82	0
2b	303	Basic	2019-08-12	11:29	74° 22,558'	89° 37,704'	Bongo Net	↑	310	100	14,7	6,4	1,18	26,58	1019,1	81	0
2b	303	Basic	2019-08-12	12:08	74° 22,185'	89° 37,322'	Tucker Net	↓	300	96	15,6	3,7	1,27	26,00	1019,08	96	1
2b	303	Basic	2019-08-12	12:34	74° 22,831'	89° 40,007'	Tucker Net	↑	319	101	18,8	2	1,17	25,86	1017,05	98	1
2b	303	Basic	2019-08-12	13:03	74° 22,054'	89° 36,841'	Monster Net	↓	296	35	19,6	6,1	1,21	27,75	1017,06	81	1
2b	303	Basic	2019-08-12	13:15	74° 22,060'	89° 36,701'	Monster Net	(bottom)	295	94	13,5	7,8	1,32	27,06	1016,91	77	1
2b	303	Basic	2019-08-12	13:22	74° 22,090'	89° 36,609'	Monster Net	↑	296	100	21,7	4,5	1,21	27,38	1016,97	95	1
2b	303	Basic	2019-08-12	14:04	74° 22,076'	89° 37,000'	Box Core	↓	297	107	12	8,2	1,21	26,79	1016,93	74	1
2b	303	Basic	2019-08-12	14:09	74° 22,099'	89° 36,965'	Box Core	(bottom)	297	326	21,3	6,1	1,23	27,10	1016,81	89	1
2b	303	Basic	2019-08-12	14:14	74° 22,123'	89° 36,825'	Box Core	↑	297	101	23,8	2,7	1,23	27,70	1016,51	97	1
2b	303	Basic	2019-08-12	14:26	74° 22,192'	89° 36,438'	Agassiz Trawl	↓	297	84	20,6	4,3	1,20	27,87	1016,42	93	1
2b	303	Basic	2019-08-12	14:37	74° 22,456'	89° 37,269'	Agassiz Trawl	(bottom)	308	95	14,9	6,2	1,27	25,77	1016,73	80	1
2b	303	Basic	2019-08-12	14:50	74° 22,781'	89° 38,385'	Agassiz Trawl	↑	316	94	18,7	6,2	1,28	25,91	1016,78	82	1
2b	305A	Basic	2019-08-12	20:17	74° 13,413'	93° 30,786'	Trace-Metal Cast	↓	161	108	12,2	4,1	0,75	26,22	1014,3	92	1
2b	305A	Basic	2019-08-12	20:47	74° 13,335'	93° 30,819'	Trace-Metal Cast	↑	157	105	22,7	2,4	0,09	28,69	1014,17	97	1
2b	305A	Basic	2019-08-12	21:01	74° 13,330'	93° 30,949'	CTD-Rosette	↓	158	105	16	5,6	0,51	26,93	1014,37	86	0
2b	305A	Basic	2019-08-12	21:09	74° 13,333'	93° 30,970'	CTD-Rosette	(bottom)	158	75	13,7	6,8	0,63	27,04	1014,24	77	0
2b	305A	Basic	2019-08-12	21:37	74° 13,298'	93° 30,494'	CTD-Rosette	↑	160	87	16,6	5,1	0,87	26,03	1014,37	83	0
2b	305A	Basic	2019-08-12	21:48	74° 13,447'	93° 30,846'	Tucker Net	↓	157	62	12	3,1	0,93	25,68	1014,55	95	0
2b	305A	Basic	2019-08-12	22:13	74° 13,202'	93° 33,545'	Tucker Net	↑	152	84	15,4	1,9	0,86	25,73	1014,07	98	0
2b	305A	Basic	2019-08-12	22:40	74° 13,336'	93° 30,697'	Monster Net	↓	158	84	11,4	5	0,75	26,51	1014,29	85	0
2b	305A	Basic	2019-08-12	22:50	74° 13,391'	93° 30,404'	Monster Net	(bottom)	160	98	21,3	2,3	0,43	27,94	1014,15	96	0
2b	305A	Basic	2019-08-12	22:58	74° 13,416'	93° 30,331'	Monster Net	↑	161	107	19	3,9	0,60	27,04	1013,94	92	0
2b	305B	Basic	2019-08-13	1:06	74° 21,627'	93° 33,577'	CTD-Rosette	↓	169	92	16,6	1,9	-0,04	28,50	1014,14	98	1
2b	305B	Basic	2019-08-13	1:10	74° 21,647'	93° 33,368'	CTD-Rosette	(bottom)	169	103	17,5	1,9	0,48	28,08	1014,14	98	1
2b	305B	Basic	2019-08-13	1:41	74° 21,797'	93° 31,725'	CTD-Rosette	↑	171	107	19,4	2	0,59	27,65	1014,16	98	1
2b	305B	Basic	2019-08-13	2:00	74° 21,073'	93° 35,020'	Bongo Net	↓	165	108	18,3	2	1,02	24,75	1013,99	98	1

2b	305B	Basic	2019-08-13	2:08	74° 21,122'	93° 34,883'	Bongo Net	↑	168	101	15,8	1,9	0,69	28,82	1014,13	98	1
2b	305B	Basic	2019-08-13	2:15	74° 21,126'	93° 34,545'	Monster Net	↓	168	113	17,1	2,1	0,52	28,41	1014,13	98	1
2b	305B	Basic	2019-08-13	2:22	74° 21,146'	93° 34,256'	Monster Net	(bottom)	169	111	15,6	1,9	0,19	28,26	1014,15	98	1
2b	305B	Basic	2019-08-13	2:30	74° 21,145'	93° 33,938'	Monster Net	↑	168	103	17,7	2	0,43	29,11	1013,88	98	1
2b	305B	Basic	2019-08-13	2:58	74° 21,110'	93° 35,688'	Box Core	↓	165	108	17,7	1,9	1,33	23,79	1013,53	98	1
2b	305B	Basic	2019-08-13	3:02	74° 21,136'	93° 35,667'	Box Core	(bottom)	166	105	18,7	2	1,40	24,80	1013,42	98	1
2b	305B	Basic	2019-08-13	3:05	74° 21,131'	93° 35,687'	Box Core	↑	166	104	16,8	2	1,45	23,59	1013,41	98	1
2b	305B	Basic	2019-08-13	3:16	74° 21,145'	93° 36,091'	Agassiz Trawl	↓	165	108	17,7	2	1,44	23,61	1013,44	98	1
2b	305B	Basic	2019-08-13	3:22	74° 21,138'	93° 36,709'	Agassiz Trawl	(bottom)	166	104	17,7	1,9	1,41	23,48	1013,42	98	1
2b	305B	Basic	2019-08-13	3:31	74° 21,130'	93° 37,532'	Agassiz Trawl	↑	168	110	19,2	1,9	1,38	23,62	1013,22	98	1
2b	305B	Basic	2019-08-13	3:47	74° 21,189'	93° 35,145'	Beam Trawl	↓	168	107	16,4	1,9	1,44	23,62	1013,42	98	1
2b	305B	Basic	2019-08-13	3:57	74° 21,095'	93° 36,391'	Beam Trawl	(bottom)	168	110	16,6	1,9	1,39	23,73	1013,4	98	1
2b	305B	Basic	2019-08-13	4:24	74° 20,498'	93° 40,261'	Beam Trawl	↑	166	107	16,2	1,8	1,35	23,58	1013,23	98	1
2b	305C	Basic	2019-08-13	5:24	74° 29,039'	93° 38,353'	CTD-Rosette	↓	173	112	17,1	2,3	0,76	27,81	1013,74	98	1
2b	305C	Basic	2019-08-13	5:33	74° 28,978'	93° 38,561'	CTD-Rosette	(bottom)	171	98	12,2	5,1	0,70	27,78	1013,76	88	1
2b	305C	Basic	2019-08-13	6:03	74° 28,819'	93° 39,844'	CTD-Rosette	↑	165	107	13,3	7,1	0,84	27,38	1013,66	76	1
2b	305C	Basic	2019-08-13	6:18	74° 28,822'	93° 40,664'	Monster Net	↓	160	109	10,3	6,3	1,00	27,19	1013,63	82	1
2b	305C	Basic	2019-08-13	6:23	74° 28,819'	93° 40,961'	Monster Net	(bottom)	159	112	16,9	3,1	0,50	28,13	1013,67	95	1
2b	305C	Basic	2019-08-13	6:30	74° 28,808'	93° 41,310'	Monster Net	↑	159	123	10,3	4,2	1,04	26,65	1013,66	91	1
2b	Wel01	Nutrient	2019-08-13	9:46	74° 57,025'	92° 23,185'	CTD-Rosette	↓	156	136	13,5	5,8	1,58	27,88	1014,28	87	0
2b	Wel01	Nutrient	2019-08-13	9:55	74° 57,027'	92° 23,369'	CTD-Rosette	(bottom)	157	137	11,2	5,8	1,58	27,85	1014,44	87	0
2b	Wel01	Nutrient	2019-08-13	10:24	74° 57,060'	92° 23,962'	CTD-Rosette	↑	158	160	7,6	5,3	1,96	27,82	1014,39	88	0
2b	Wel02	Basic	2019-08-13	12:41	75° 00,739'	93° 06,876'	CTD-Rosette	↓	249	168	13,5	4,5	1,51	27,87	1014,29	87	0
2b	Wel02	Basic	2019-08-13	12:50	75° 00,912'	93° 06,872'	CTD-Rosette	(bottom)	249	211	7,4	3	1,41	27,94	1014,44	93	0
2b	Wel02	Basic	2019-08-13	13:23	75° 01,261'	93° 07,105'	CTD-Rosette	↑	247	207	12,4	4,2	1,50	27,81	1014,06	88	0
2b	Wel02	Basic	2019-08-13	13:38	75° 00,694'	93° 06,847'	Bongo Net	↓	249	183	13,3	3,3	1,92	27,83	1013,75	93	0
2b	Wel02	Basic	2019-08-13	13:47	75° 00,774'	93° 06,679'	Bongo Net	↑	249	192	14,1	3,5	1,92	27,86	1013,69	92	0
2b	Wel02	Basic	2019-08-13	13:56	75° 00,804'	93° 06,836'	Tucker Net	↓	249	178	7,4	5	2,03	27,77	1013,87	84	0
2b	Wel02	Basic	2019-08-13	14:21	75° 01,832'	93° 06,600'	Tucker Net	↑	237	175	16,2	3,3	1,79	27,76	1013,14	93	0
2b	Wel02	Basic	2019-08-13	14:48	75° 00,690'	93° 06,705'	Monster Net	↓	249	197	15,4	3,9	1,95	27,79	1013,82	91	0
2b	Wel02	Basic	2019-08-13	14:56	75° 00,769'	93° 06,712'	Monster Net	(bottom)	250	197	14,1	3,6	1,85	27,85	1013,77	92	0
2b	Wel02	Basic	2019-08-13	15:05	75° 00,775'	93° 06,690'	Monster Net	↑	249	197	13,3	4,1	1,89	27,78	1013,83	90	0
2b	Wel02	Basic	2019-08-13	15:23	75° 00,896'	93° 06,832'	Trace-Metal Cast	↓	249	208	13,3	4,2	1,76	27,83	1013,82	90	0
2b	Wel02	Basic	2019-08-13	15:48	75° 01,256'	93° 07,064'	Trace-Metal Cast	↑	247	241	4,2	4,3	1,81	27,78	1013,65	91	0
2b	Wel02	Basic	2019-08-13	17:05	75° 00,776'	93° 06,761'	Box Core	↓	250	216	12	3,4	1,40	27,61	1013,35	98	0
2b	Wel02	Basic	2019-08-13	17:10	75° 00,796'	93° 06,720'	Box Core	(bottom)	251	219	12	3,1	1,40	27,61	1013,37	98	0
2b	Wel02	Basic	2019-08-13	17:14	75° 00,815'	93° 06,740'	Box Core	↑	250	219	12,2	3,1	1,40	27,61	1013,4	98	0
2b	Wel02	Basic	2019-08-13	17:32	75° 00,782'	93° 06,511'	Agassiz Trawl	↓	249	213	10,3	3,5	1,36	27,61	1013,22	98	0
2b	Wel02	Basic	2019-08-13	17:40	75° 01,027'	93° 06,823'	Agassiz Trawl	(bottom)	249	216	8,6	3	1,33	27,66	1013,16	98	0
2b	Wel02	Basic	2019-08-13	17:50	75° 01,333'	93° 07,167'	Agassiz Trawl	↑	247	211	9,9	2,9	1,40	27,61	1013,07	98	0
Leg 3																	
3	2.1	Coring	2019-08-16	18:37	74° 11,180'	81° 11,818'	Gravity Core	↓	785	101	12,8	4,7	7,58	31,39	1011,42	98	0
3	2.1	Coring	2019-08-16	18:53	74° 11,153'	81° 11,905'	Gravity Core	(bottom)	785	70	11,8	4,4	7,60	31,38	1011,61	98	0
3	2.1	Coring	2019-08-16	19:07	74° 11,100'	81° 12,186'	Gravity Core	↑	784	81	9,7	4,5	7,49	31,39	1011,71	98	0
3			2019-08-16	20:27	74° 10,156'	81° 13,964'	CPR	↓	769	89	13,1	4	7,56	31,42	1011,86	98	0
3			2019-08-17	10:13	72° 34,038'	79° 47,024'	CPR	↑	588	35	18,1	5,5	5,02	27,45	1010,99	85	0
3	BIOS		2019-08-17	10:51	72° 31,318'	79° 35,868'	Helicopter	↓	512	85	12,4	5,3	4,51	28,22	1011,47	86	0
3	BIOS		2019-08-17	11:33	72° 32,892'	79° 41,816'	Helicopter	↑	421	52	21,7	5,4	4,43	28,26	1011,44	85	0
3	BIOS		2019-08-17	13:17	72° 29,695'	79° 42,893'	Barge	↓	203	324	6,9	5,6	4,63	27,87	1012,21	87	0
3	155	Basic	2019-08-17	15:22	72° 29,246'	78° 45,463'	CTD-Rosette	↓	292	302	7,6	7,1	6,29	26,39	1012,11	67	0
3	155	Basic	2019-08-17	15:28	72° 29,273'	78° 45,387'	CTD-Rosette	↑	292	308	6,9	7,2	6,37	26,27	1012,18	69	0
3	155	Basic	2019-08-17	15:29	72° 29,276'	78° 45,373'	CTD-Rosette	↓	292	305	6,5	7,2	6,28	26,26	1012,17	69	0
3	155	Basic	2019-08-17	15:34	72° 29,299'	78° 45,299'	CTD-Rosette	(bottom)	293	295	6,1	7,1	6,32	26,32	1012,16	70	0
3	155	Basic	2019-08-17	16:03	72° 29,340'	78° 44,718'	CTD-Rosette	↑	277	271	4,6	6,9	5,81	26,67	1012,39	75	0
3	155	Basic	2019-08-17	16:23	72° 29,185'	78° 45,538'	Tucker Net	↓	272	262	2,9	6,9	6,38	26,40	1012,43	78	0
3	155	Basic	2019-08-17	16:35	72° 29,117'	78° 44,243'	Tucker Net	(bottom)	267	304	3	6,8	6,06	26,49	1012,44	79	0
3	155	Basic	2019-08-17	16:44	72° 29,287'	78° 43,325'	Tucker Net	↑	234	292	3,8	6,3	5,96	26,66	1012,47	80	0
3	155	Basic	2019-08-17	17:10	72° 29,267'	78° 45,834'	Monster Net	↓	286	285	5,3	6,1	5,75	27,19	1012,57	91	0
3	155	Basic	2019-08-17	17:18	72° 29,281'	78° 45,683'	Monster Net	(bottom)	288	281	6,3	5,9	6,30	26,68	1012,59	92	0
3	155	Basic	2019-08-17	17:28	72° 29,303'	78° 45,582'	Monster Net	↑	296	279	6,1	5,9	6,52	26,50	1012,62	92	0
3	155	Basic	2019-08-17	17:52	72° 27,612'	78° 42,469'	Box Core	↓	282	271	5,5	7,6	5,61	24,43	1012,7	78	0
3	155	Basic	2019-08-17	17:58	72° 27,601'	78° 42,486'	Box Core	(bottom)	282	300	6,9	7,1	6,16	26,12	1012,72	82	0
3	155	Basic	2019-08-17	18:05	72° 27,587'	78° 42,484'	Box Core	↑	282	309	5,9	6,5	6,35	26,22	1012,81	82	0
3	155	Basic	2019-08-17	18:26	72° 27,585'	78° 42,219'	Agassiz Trawl	↓	279	309	5,1	6,7	6,91	26,44	1012,85	80	0
3	155	Basic	2019-08-17	18:36	72° 27,856'	78° 41,749'	Agassiz Trawl	(bottom)	260	305	7	6,9	8,48	23,67	1012,85	77	0
3	155	Basic	2019-08-17	18:46	72° 28,188'	78° 42,148'	Agassiz Trawl	↑	272	298	6,7	7,1	7,90	24,01	1012,93	80	0
3	155	Basic	2019-08-17	19:03	72° 27,400'	78° 43,208'	Agassiz Trawl	↓	289	287	5,3	6,7	6,88	25,47	1012,98	83	0
3	155	Basic	2019-08-17	19:14	72° 27,670'	78° 42,565'	Agassiz Trawl	(bottom)	281	290	6,3	6,8	8,37	23,38	1013,04	84	0
3	155	Basic	2019-08-17	19:27	72° 28,059'	78° 43,010'	Agassiz Trawl	↑	287	299	8,4	6,7	7,94	24,12	1013,08	86	0
3	BIOS		2019-08-17	22:23	72° 30,204'	79° 42,285'	Barge	↑	291	36	6,1	6,4	4,83	27,56	1013,5	90	0
3	BY01	Coring	2019-08-18	0:32	72° 44,064'	78° 37,102'	Gravity Core	↓	781	53	15,8	6,2	6,53	25,73	1013,46	90	0
3	BY01	Coring	2019-08-18	0:44	72° 44,087'	78° 37,095'	Gravity Core	(bottom)	781	48	16,2	6	6,89	26,16	1013,47	90	0
3	BY01	Coring	2019-08-18	0:56	72° 44,134'	78° 37,150'	Gravity Core	↑	780	44	15,2	6,1	2,82	29,57	1013,52	90	0
3	BY01	Coring	2019-08-18	0:59	72° 44,145'	78° 37,186'	Gravity Core	↓	780	49	15	6	4,51	29,52	1013,39	90	0
3	BY01	Coring	2019-08-18	1:12	72° 44,085'	78° 37,094'	Gravity Core	(bottom)	781	44	14,5	6,1	6,14	26,43	1013,44	91	0
3	BY01	Coring	2019-08-18	1:35	72° 44,210'	78° 37,244'	Gravity Core	↑	779	57	15	6,2	4,35	28,29	1013,43	91	0
3	BIOS		2019-08-18	11:01	72° 27,260'	79° 52,738'	Barge	↓	86	204	4,2	5,9	4,33	27,79	1014,23	92	0
3	BY02	Basic	2019-08-18	13:12	72° 38,743'	79° 19,948'	CTD-Rosette	↓	683	245	4,6	5,7	4,20	28,43	1014,02	86	0
3	BY02	Basic	2019-08-18	13:24	72° 38,649'	79° 20,127'	CTD-Rosette	(bottom)	685	258	3	5,7	4,94	27,71	1013,95	86	0
3	BY02	Basic	2019-08-18	13:47	72° 38,490'	79° 20,620'	CTD-Rosette	↑	680	251	4,4	5,6	4,37	28,01	1014,01	89	0
3	BY02	Basic	2019-08-18	14:00	72° 38,340'	79° 21,096'	Tucker Net	↓	675	254	4,8	5,7	5,88	27,07	1014,06	89	0
3	BY02	Basic	2019-08-18	14:26	72° 37,764'	79° 23,210'	Tucker Net	↑	681	235	7	6,3	6,18	26,65	1013,9	89	0
3	BY02	Basic	2019-08-18	14:55	72° 38,943'	79° 19,437'	Gravity Core	↓	691	246	3,8	6,1	6,91	25,41	1013,98	88	0
3	BY02	Basic	2019-08-18	15:07	72° 38,876'	79° 19,589'	Gravity Core	(bottom)	691	232	5,5	6,1	5,53	27,51	1013,99	89	0
3	BY02	Basic	2019-08-18	15:21	72° 38,793'	79° 19,830'	Gravity Core	↑	684	229	5	6,3	4,33	28,30	1013,84	88	0
3	BY02	Basic	2019-08-18	16:15	72° 38,781'	79° 20,200'	IKMT	↓	681	206	4	8,2	5,41	27,68	1013,48	86	0
3	BY02	Basic	2019-08-18	16:38	72° 38,556'	79° 17,712'	IKMT	(bottom)	708	271	0,8	8,4	7,00	25,62	1013,54	80	0
3	BY02	Basic	2019-08-18	17:31	72° 38,548'	79° 10,042'	IKMT	↑	721	299	2,7	7,1	5,39	28,31	1013,52	86	0
3	BY03	Coring	2019-08-18	18:11	72° 33,684'	79° 16,316'	Gravity Core	↓	719	323	0	7,5	4,45	28,40	1013,37	77	0
3	BY03	Coring	2019-08-18	18:25	72° 33,676'	79° 16,303'	Gravity Core	(bottom)	719	350	0	8,4	4,14	28,90	1013,33	79	0
3	BY03	Coring	2019-08-18	18:39	72° 33,652'	79° 16,225'	Gravity Core	↑	719	241	0	9,4	4,54	28,51	1013,32	74	0
3	BIOS		2019-08-18	21:53	72° 30,474'	79° 35,399'	Barge	↑	528	74	14,3	8	6,93	25,98	1013,14	71	0
3			2019-08-18	22:34	72° 34,842'	79° 12,845'	CPR	↓	698	138	3,4	8,2	7,23	26,19	1013	84	0
3			2019-08-19	13:08	71° 31,780'	70° 35,456'	CPR	↑	135	340	6,5	3,9	7,17	28,10	1014,9	98	0
3	NW25K	CTD	2019-08-19	13:20	71° 31,762'	70° 35,139'	CTD-Rosette	↓	135	299	4,4	3,8	6,52	28,87	1015,2	98	0
3	NW25K	CTD	2019-08-19	13:23	71° 31,759'	70° 35,105'	CTD-Rosette	(bottom)	134	306	5,7	3,9	5,64	29,11	1015,26	98	0
3	NW25K	CTD	2019-08-19	13:40	71° 31,737'	70° 34,979'	CTD-Rosette	↑	131	328	5	4,1	6,14	28,95	1014,58	98	0
3	NW5K	CTD	2019-08-19	14:52	71° 24,483'	70° 10,727'	CTD-Rosette	↓	555	239	7,2	4,3	4,67	30,27	1014,58	98	0
3	NW5K	CTD	2019-08-19	15:03	71° 24,495'	70° 10,870'	CTD-Rosette	(bottom)	560	262	4,8	4,3	6,13	29,45	1014,62	98	0
3	NW5K	CTD	2019-08-19	15:37	71° 24,529'	70° 11,259'	CTD-Rosette	↑	572	266	7,2	4,3	3,99	30,68	1014,53	98	0
3	NW5K	Coring	2019-08-19	16:20	71° 24,510'	70° 10,692'	Ben Van Been	↓	553	263	6,3	4	4,48	30,44	1014,63	98	0
3	NW5K	Coring	2019-08-19	16:41	71° 24,505'	70° 10,798'	Ben Van Been	(bottom)	556	182	1,5	4,6	5,36	29,62	1014,55	98	0
3	NW5K	Coring	2019-08-19	16:57	71° 24,482'	70° 10,903'	Ben Van Been	↑	562	222	3,8	5,3	4,26	30,61	1014,54	98	0
3	NW1K	Full	2019-08-19	17:44	71° 23,343'	70° 04,889'	Baited Camera	↓	298	338	1,1	4,6	4,06	30,27	1014,7	98	0
3	NW1K	Full	2019-08-19	17:56	71° 23,373'	70° 05,127'	Baited Camera	(bottom)	305	243	6,1	5	5,52	29,93	1014,68	98	0
3	NW1K	CTD	2019-08-19	18:14	71° 23,121'	70° 05,770'	CTD-Rosette	↓	311	265	2,5	4,2	2,55	30,59	1014,67	98	0
3	NW1K	CTD	2019-08-19	18:25	71° 23,135'	70° 05,804'	CTD-Rosette	(bottom)	313	250	2,9	4,9	6,41	29,53	1014,7	98	0
3	NW1K	CTD	2019-08-19	18:48	71° 23,148'	70° 05,929'	CTD-Rosette	↑	322	265	1,5	5,5	6,53	29,56	1014,76	98	0
3	NW1K	Coring	2019-08-19	18:59	71° 23,115'	70° 05,668'	Ben Van Been	↓	313	224	0,2	5,1	3,65	30,95	1014,74	98	0
3	NW1K	Coring	2019-08-19	19:11	71° 23,133'	70° 05,535'	Ben Van Been	(bottom)	311	215	4,4	4,5	5,16	30,03	1014,83	98	0
3	NW1K	Coring	2019-08-19	19:19	71° 23,127'	70° 05,418'	Ben Van Been	↑	306	233	5,7	4,4	5,22	30,40	1014,79	98	0

3	170 - 0	Full	2019-08-19	19:38	71° 22,632'	70° 04,295'	CTD-Rosette	↓	257	218	4,4	4	3,45	31,05	1014,77	98	0
3	170 - 0	Full	2019-08-19	19:47	71° 22,621'	70° 04,163'	CTD-Rosette	(bottom)	253	232	4,6	4,1	4,72	30,03	1014,72	98	0
3	170 - 0	Full	2019-08-19	20:09	71° 22,573'	70° 03,741'	CTD-Rosette	↑	246	210	1,1	4,7	6,02	29,61	1014,81	98	0
3	170 - 0	Full	2019-08-19	20:24	71° 22,471'	70° 03,254'	Tucker Net	↓	228	238	3,8	3,9	6,74	28,80	1014,79	98	0
3	170-0	Full	2019-08-19	20:34	71° 22,287'	70° 03,988'	Tucker Net	(bottom)	216	195	4,8	4	6,67	28,62	1014,75	98	0
3	170 - 0	Full	2019-08-19	20:44	71° 21,990'	70° 03,569'	Tucker Net	↑	194	122	4,8	4	6,57	28,82	1014,62	98	0
3	170 - 0	Full	2019-08-19	21:06	71° 22,600'	70° 04,180'	Monster Net	↓	254	169	2,7	3,7	6,38	29,80	1014,65	98	0
3	170 - 0	Full	2019-08-19	21:14	71° 22,579'	70° 04,052'	Monster Net	(bottom)	250	173	4,6	3,8	7,00	29,24	1014,63	98	0
3	170 - 0	Full	2019-08-19	21:22	71° 22,550'	70° 04,041'	Monster Net	↑	251	185	2,9	3,8	7,14	29,03	1014,65	98	0
3	170 - 0	Full	2019-08-19	21:56	71° 22,599'	70° 04,219'	Hydrobios	↓	255	182	3	4,2	6,20	29,86	1014,44	98	0
3	170 - 0	Full	2019-08-19	22:03	71° 22,564'	70° 04,186'	Hydrobios	(bottom)	252	196	2,9	4,3	5,90	29,48	1014,59	98	0
3	170 - 0	Full	2019-08-19	22:10	71° 22,528'	70° 04,107'	Hydrobios	↑	248	191	3,2	4,4	6,39	30,01	1014,47	98	0
3	170 - 0	Full	2019-08-19	22:29	71° 22,659'	70° 04,494'	Ben Van Been	↓	260	186	2,3	4,6	6,33	29,33	1014,54	98	0
3	170 - 0	Full	2019-08-19	22:41	71° 22,612'	70° 04,345'	Ben Van Been	(bottom)	259	201	2,7	5,1	6,95	29,29	1014,49	98	0
3	170 - 0	Full	2019-08-19	22:50	71° 22,563'	70° 04,219'	Ben Van Been	↑	253	207	3,2	5,3	6,62	29,63	1014,41	98	0
3	170 - 0	Full	2019-08-19	22:58	71° 22,605'	70° 04,328'	Agassiz Trawl	↓	258	256	1,9	5,7	7,13	29,10	1014,41	98	0
3	170 - 0	Full	2019-08-19	23:15	71° 22,369'	70° 04,843'	Agassiz Trawl	(bottom)	238	189	4	5,4	6,78	29,39	1014,39	98	0
3	170 - 0	Full	2019-08-19	23:23	71° 22,216'	70° 04,091'	Agassiz Trawl	↑	210	163	3,2	5,5	6,77	29,36	1014,42	98	0
3	170 - 0	Full	2019-08-19	23:47	71° 22,767'	70° 04,853'	Beam Trawl	↓	269	189	4,6	5,5	7,06	29,05	1014,38	98	0
3	170 - 0	Full	2019-08-20	0:20	71° 22,363'	70° 01,574'	Beam Trawl	↑	197	82	0,8	6,2	6,71	29,44	1014,41	98	0
3	SW1K	CTD	2019-08-20	0:49	71° 22,272'	70° 05,689'	CTD-Rosette	↓	244	289	1,5	6,2	5,22	30,44	1014,39	98	0
3	SW1K	CTD	2019-08-20	0:56	71° 22,235'	70° 05,700'	CTD-Rosette	(bottom)	237	324	2,9	6,3	3,26	30,65	1014,31	98	0
3	SW1K	CTD	2019-08-20	1:09	71° 22,140'	70° 05,781'	CTD-Rosette	↑	228	268	0	6,2	5,94	29,78	1014,29	98	0
3	SW1K	Coring	2019-08-20	1:34	71° 22,355'	70° 05,517'	Ben Van Been	↓	254	38	2,1	5,8	7,05	28,73	1014,28	98	0
3	SW1K	Coring	2019-08-20	1:44	71° 22,330'	70° 05,513'	Ben Van Been	(bottom)	252	40	2,5	5,6	3,02	30,95	1014,3	98	0
3	SW1K	Coring	2019-08-20	1:51	71° 22,288'	70° 05,575'	Ben Van Been	↑	240	15	2,1	5,6	4,90	30,49	1014,18	98	0
3	SE5K	CTD	2019-08-20	2:34	71° 20,979'	69° 57,974'	CTD-Rosette	↓	216	53	1,9	5,5	3,50	30,56	1013,76	98	0
3	SE5K	CTD	2019-08-20	2:39	71° 20,969'	69° 58,072'	CTD-Rosette	(bottom)	218	79	1	5,7	3,42	30,63	1013,75	98	0
3	SE5K	CTD	2019-08-20	2:44	71° 20,963'	69° 58,171'	CTD-Rosette	↑	218	53	2,9	5,6	3,39	30,55	1013,8	98	0
3	SE5K	Coring	2019-08-20	3:03	71° 20,990'	69° 58,072'	Ben Van Been	↓	216	61	1,5	5,5	2,72	30,48	1013,78	98	0
3	SE5K	Coring	2019-08-20	3:12	71° 20,952'	69° 58,036'	Ben Van Been	(bottom)	215	92	0	5,5	2,65	30,97	1013,78	98	0
3	SE5K	Coring	2019-08-20	3:17	71° 20,927'	69° 58,056'	Ben Van Been	↑	214	34	0	5,4	3,07	30,88	1013,69	98	0
3	SE25K	CTD	2019-08-20	4:24	71° 13,345'	69° 32,886'	CTD-Rosette	↓	154	140	0,4	6	4,67	29,97	1013,28	98	0
3	SE25K	CTD	2019-08-20	4:31	71° 13,328'	69° 32,918'	CTD-Rosette	(bottom)	156	166	0	6	6,26	29,07	1013,24	98	0
3	SE25K	CTD	2019-08-20	4:49	71° 13,330'	69° 32,904'	CTD-Rosette	↑	157	196	1,3	5,8	6,48	29,04	1013,01	97	0
3	170 - 0	CTD	2019-08-20	6:12	71° 22,745'	70° 04,407'	CTD-Rosette	↓	263	214	2,7	6,1	6,72	28,66	1012,72	98	0
3	170 - 0	CTD	2019-08-20	6:23	71° 22,755'	70° 04,362'	CTD-Rosette	(bottom)	266	232	1,3	6,5	4,52	30,50	1012,79	98	0
3	170 - 0	CTD	2019-08-20	6:43	71° 22,762'	70° 04,351'	CTD-Rosette	↑	268	168	0,4	6,3	5,36	29,97	1012,66	98	0
3	170 -0	Coring	2019-08-20	6:52	71° 22,760'	70° 04,351'	Ben Van Been	↓	265	273	5,1	6,1	4,44	30,38	1012,58	98	0
3	170 -0	Coring	2019-08-20	7:03	71° 22,754'	70° 04,374'	Ben Van Been	(bottom)	264	276	2,5	6,2	4,29	30,51	1012,59	98	0
3	170 -0	Coring	2019-08-20	7:09	71° 22,752'	70° 04,366'	Ben Van Been	↑	264	267	1,1	6,3	4,42	30,36	1012,63	98	0
3	NW1K	Cam	2019-08-20	10:26	71° 23,309'	70° 04,895'	Baited Camera	(bottom)	299	355	9,1	6,8	7,01	28,66	1012,4	96	0
3	NW1K	Cam	2019-08-20	10:33	71° 23,281'	70° 04,899'	Baited Camera	↑	298	353	6,9	7	6,02	29,45	1012,35	94	0
3	NE1K	CTD	2019-08-20	11:00	71° 23,061'	70° 03,368'	CTD-Rosette	↓	258	354	8,9	7,3	3,70	30,41	1012,26	90	0
3	NE1K	CTD	2019-08-20	11:26	71° 22,941'	70° 03,174'	CTD-Rosette	↑	250	344	11,6	7,2	3,74	30,31	1012,36	91	0
3	NE1K	Cam	2019-08-20	12:12	71° 23,341'	70° 03,229'	Baited Camera	↓	263	340	11	7,2	7,22	29,11	1012,56	89	0
3	NE1K	Cam	2019-08-20	12:20	71° 23,331'	70° 03,225'	Baited Camera	(bottom)	264	346	12	7,2	7,32	28,95	1012,6	89	0
3	NE1K	Coring	2019-08-20	12:43	71° 23,074'	70° 03,136'	Ben Van Been	↓	255	335	12	7,1	7,44	28,89	1012,9	91	0
3	NE1K	Coring	2019-08-20	12:53	71° 23,083'	70° 03,137'	Ben Van Been	(bottom)	254	337	13,3	7,2	7,44	28,96	1012,94	90	0
3	NE1K	Coring	2019-08-20	13:02	71° 23,078'	70° 03,152'	Ben Van Been	↑	255	332	12,4	7,1	6,02	29,68	1012,98	90	0
3	NW1K	Coring	2019-08-20	13:27	71° 23,066'	70° 05,535'	Box Core	↓	307	331	10,3	6,8	7,13	29,19	1013,24	93	0
3	NW1K	Coring	2019-08-20	13:33	71° 23,066'	70° 05,575'	Box Core	(bottom)	306	320	9,5	6,9	7,29	29,17	1013,22	93	0
3	NW1K	Coring	2019-08-20	13:40	71° 23,043'	70° 05,597'	Box Core	↑	306	320	10,1	6,7	7,10	29,24	1013,33	94	0
3	SE1K	CTD	2019-08-20	14:09	71° 22,330'	70° 03,024'	CTD-Rosette	↓	209	316	13,1	6,8	6,08	29,91	1013,41	94	0
3	SE1K	CTD	2019-08-20	14:13	71° 22,317'	70° 03,039'	CTD-Rosette	(bottom)	208	320	12,9	6,7	6,48	28,86	1013,4	93	0
3	SE1K	CTD	2019-08-20	14:28	71° 22,284'	70° 03,084'	CTD-Rosette	↑	207	313	12,6	6,7	3,54	30,67	1013,45	94	0
3	SE1K	Coring	2019-08-20	14:40	71° 22,323'	70° 03,025'	Ben Van Been	↓	207	317	13,5	6,6	7,32	28,89	1013,55	96	0
3	SE1K	Coring	2019-08-20	14:45	71° 22,321'	70° 02,997'	Ben Van Been	(bottom)	207	328	12,4	6,5	7,35	28,83	1013,6	97	0
3	SE1K	Coring	2019-08-20	14:50	71° 22,321'	70° 03,046'	Ben Van Been	↑	208	324	10,5	6,5	4,84	29,41	1013,57	98	0
3		Cam	2019-08-20	21:23	71° 23,301'	70° 03,093'	Baited Camera	(bottom)	263	324	13,3	7,1	7,27	29,43	1014,93	84	0
3		Cam	2019-08-20	21:35	71° 23,251'	70° 03,117'	Baited Camera	↑	262	312	10,5	7	5,79	30,02	1015,02	83	0
3			2019-08-20	22:46	71° 14,005'	69° 34,684'	CPR	↓	144	310	6,9	7,4	7,53	28,29	1015,26	84	0
3	E5	Basic	2019-08-22	1:22	69° 18,858'	63° 07,028'	Tucker Net	↓		320	5,7	7,1	7,34	29,35	1014,25	83	0
3	E5	Basic	2019-08-22	1:32	69° 18,650'	63° 06,266'	Tucker Net	(bottom)		316	6,7	6,3	7,35	29,35	1014,15	88	0
3	E5	Basic	2019-08-22	1:41	69° 18,720'	63° 05,490'	Tucker Net	↑		323	8,4	6,2	7,37	29,37	1014,25	87	0
3	E5	Basic	2019-08-22	2:04	69° 18,970'	63° 07,311'	Monster Net	↓		341	8	6,2	7,24	29,35	1014,22	88	0
3	E5	Basic	2019-08-22	2:56	69° 18,987'	63° 07,335'	Monster Net	(bottom)		313	7,2	6	6,83	29,36	1014,13	85	0
3	E5	Basic	2019-08-22	3:55	69° 19,018'	63° 07,680'	Monster Net	↑		279	6,9	6,1	7,26	29,34	1013,97	85	0
3	E5	Basic	2019-08-22	4:19	69° 18,956'	63° 07,698'	CTD-Rosette	↓		322	3,2	6,5	7,33	29,43	1013,89	73	0
3	E5	Basic	2019-08-22	4:59	69° 18,904'	63° 07,871'	CTD-Rosette	(bottom)		256	2,5	6,4	7,24	29,45	1013,88	71	0
3	E5	Basic	2019-08-22	6:28	69° 18,915'	63° 07,849'	CTD-Rosette	↑	1933	258	4,8	6,2	7,28	29,45	1013,65	75	0
3	E5	Basic	2019-08-22	6:44	69° 18,894'	63° 07,791'	Hydrobios	↓		260	4,8	6,2	6,87	29,77	1013,6	76	0
3	E5	Basic	2019-08-22	7:32	69° 18,889'	63° 07,439'	Hydrobios	(bottom)		248	4,8	6,1	7,35	29,41	1013,5	76	0
3	E5	Basic	2019-08-22	8:34	69° 18,874'	63° 06,524'	Hydrobios	↑		333	5,5	6,3	7,21	29,43	1013,52	79	0
3	E5	Basic	2019-08-22	9:02	69° 18,871'	63° 08,004'	IKMT	↓		308	3,2	7	7,32	29,37	1013,62	76	0
3	E5	Basic	2019-08-22	9:23	69° 18,435'	63° 06,559'	IKMT	(bottom)		7	4,2	6,3	7,40	29,40	1013,49	76	0
3	E5	Basic	2019-08-22	10:20	69° 19,647'	63° 01,669'	IKMT	↑		294	6,3	6,4	7,20	29,33	1013,47	83	0
3	E5	Basic	2019-08-22	10:49	69° 18,992'	63° 07,435'	Box Core	↓		339	3,4	6,3	7,32	29,35	1013,53	84	0
3	E5	Basic	2019-08-22	11:17	69° 18,971'	63° 07,157'	Box Core	(bottom)	1934	15	7,6	6,4	7,31	29,34	1013,48	83	0
3	E5	Basic	2019-08-22	11:46	69° 18,981'	63° 07,161'	Box Core	↑	1934	34	7	6,5	7,34	29,32	1013,49	81	0
3	E4	Basic	2019-08-22	13:35	69° 03,475'	63° 38,769'	CTD-Rosette	↓	1570	117	1,1	7,5	6,64	29,79	1013,58	75	0
3	E4	Basic	2019-08-22	14:04	69° 03,423'	63° 39,122'	CTD-Rosette	(bottom)		159	0,6	8,3	6,83	29,27	1013,51	75	0
3	E4	Basic	2019-08-22	14:58	69° 03,390'	63° 39,887'	CTD-Rosette	↑	1553	103	2,7	8,9	5,18	30,08	1013,68	71	0
3	E4	Basic	2019-08-22	15:17	69° 03,542'	63° 38,740'	Monster Net	↓	1574	78	2,9	7,2	7,38	29,18	1013,69	75	0
3	E4	Basic	2019-08-22	15:58	69° 03,504'	63° 39,317'	Monster Net	(bottom)		123	5,1	6,9	5,31	29,73	1013,77	78	0
3	E4	Basic	2019-08-22	16:48	69° 03,566'	63° 39,891'	Monster Net	↑		115	4,2	6,7	6,54	29,31	1014,09	83	0
3	E4	Basic	2019-08-22	17:12	69° 03,562'	63° 38,630'	Box Core	↓		99	4	6,6	6,83	29,51	1014,17	84	0
3	E4	Basic	2019-08-22	17:35	69° 03,561'	63° 38,616'	Box Core	(bottom)		84	2,9	6,7	7,36	29,18	1014,21	84	0
3	E4	Basic	2019-08-22	17:55	69° 03,591'	63° 38,688'	Box Core	↑		81	2,7	6,7	7,27	29,32	1014,24	85	0
3	E3	Basic	2019-08-22	19:39	68° 48,040'	64° 09,147'	CTD-Rosette	↓	1326	103	5,5	6,2	6,72	29,20	1014,69	82	0
3	E3	Basic	2019-08-22	20:08	68° 47,930'	64° 08,981'	CTD-Rosette	(bottom)	1324	96	5,7	6,3	6,70	29,34	1014,76	82	0
3	E3	Basic	2019-08-22	20:55	68° 47,627'	64° 08,799'	CTD-Rosette	↑	1325	100	5,5	6,3	7,39	29,15	1015,01	84	0
3	E3	Basic	2019-08-22	21:12	68° 47,467'	64° 08,997'	Tucker Net	↓	1325	116	6,3	6,5	7,44	29,16	1014,99	85	0
3	E3	Basic	2019-08-22	21:20	68° 47,289'	64° 08,414'	Tucker Net	(bottom)	1334	113	6,1	6,5	7,43	29,15	1015	85	0
3	E3	Basic	2019-08-22	21:26	68° 47,275'	64° 07,820'	Tucker Net	↑	1342	99	6,3	6,6	7,35	29,15	1015,06	86	0
3	E2	Basic	2019-08-22	23:28	68° 32,403'	64° 38,865'	CTD-Rosette	↓	536	94	7	6,4	3,76	29,97	1015,5	87	0
3	E2	Basic	2019-08-22	23:40	68° 32,392'	64° 38,695'	CTD-Rosette	(bottom)	538	95	7,6	6,3	3,59	29,88	1015,52	87	0
3	E2	Basic	2019-08-23	0:12	68° 32,290'	64° 38,271'	CTD-Rosette	↑	530	97	5,9	6,3	5,48	29,31	1015,61	87	0
3	E3	Basic	2019-08-23	2:24	68° 48,000'	64° 09,247'	Monster Net	↓	1325	44	3,4	6,6	7,43	29,19	1016,19	84	0
3	E3	Basic	2019-08-23	2:59	68° 47,940'	64° 09,516'	Monster Net	(bottom)	1313	50	4,2	6,5	7,37	29,20	1016,17	86	0
3	E3	Basic	2019-08-23	3:38	68° 47,944'	64° 09,710'	Monster Net	↑	1309	89	3,8	6,6	7,34	29,21	1016,02	88	0
3	E3	Basic	2019-08-23	4:06	68° 48,028'	64° 09,377'	Hydrobios	↓	1323	125	4,8	6,6	7,20	29,27	1015,92	89	0
3	E3	Basic	2019-08-23	4:42	68° 47,987'	64° 09,563'	Hydrobios	(bottom)	1314	190	2,3	6,6	7,27	29,23	1016,11	87	0
3	E3	Basic	2019-08-23	5:23	68° 47,888'	64° 09,613'	Hydrobios	↑	1305	223	2,3	7	7,25	29,19	1016,25	86	0
3	E3	Basic	2019-08-23	5:43	68° 48,067'	64° 09,247'	Box Core	↓	1326	89	0	6,7	7,15	29,26	1016,27	87	0
3	E3	Basic	2019-08-23	6:02	68° 48,047'	64° 09,252'	Box Core	(bottom)	1325	149	1,1	6,3	7,17	29,18	1016,24	88	0
3	E3	Basic	2019-08-23	6:29	68° 47,976'	64° 09,221'	Box Core	↑	1322	194	0,2	6,3	7,18	29,17	1016,22	88	0
3	E2	Basic	2019-08-23	8:22	68° 32,348'	64° 39,306'	Monster Net	↓	515	117	4,2	6,1	5,79	29,13	1016,38	93	0
3	E2	Basic	2019-08-23	8:37	68° 32,291'	64° 39,414'	Monster Net	(bottom)	509	102	6,9	5,8	5,03	29,28	1016,35	95	0
3	E2	Basic	2019-08-23	8:53	68° 32,242'	64° 39,532'	Monster Net	↑	510	103	7,4	5,9	3,93	29,73	1016,42	95	0
3	E2	Basic	2019-08-23	9:12	68° 32,262'	64° 40,234'	Agassiz Trawl	↓	502	111	5,5	5,9	6,07	28,62	1016,46	93	0
3	E2	Basic	2019-08-23	9:27	68° 31,900'	64° 41,095'	Agassiz Trawl	(bottom)	429	111	5,5	5,9	6,02	28,58	1016,47	91	0

3	E2	Basic	2019-08-23	9:44	68° 31,400'	64° 40,902'	Agassiz Trawl	↑	380	117	8,6	6	6,11	28,72	1016,43	92	0
3	E2	Basic	2019-08-23	10:29	68° 32,424'	64° 39,187'	Box Core	↓	536	119	7,8	6,3	5,65	29,01	1016,54	90	0
3	E2	Basic	2019-08-23	10:38	68° 32,438'	64° 39,219'	Box Core	(bottom)	539	117	8	6,5	5,90	28,98	1016,5	91	0
3	E2	Basic	2019-08-23	10:46	68° 32,457'	64° 39,367'	Box Core	↑	540	120	8,2	6,3	4,95	29,26	1016,5	91	0
3	E1	Basic	2019-08-23	12:56	68° 17,007'	65° 08,016'	Baited Camera	↓	435	113	12,8	6,5	6,96	29,08	1015,86	93	0
3	E1	Basic	2019-08-23	13:14	68° 16,993'	65° 07,880'	Baited Camera	(bottom)	436	123	12,4	6,4	4,90	29,99	1015,78	93	0
3	E1	Basic	2019-08-23	13:36	68° 16,694'	65° 08,288'	CTD-Rosette	↓	451	128	12,6	6,3	6,99	29,07	1015,61	93	0
3	E1	Basic	2019-08-23	13:45	68° 16,671'	65° 08,316'	CTD-Rosette	(bottom)	453	122	14,1	6,5	7,00	29,07	1015,57	93	0
3	E1	Basic	2019-08-23	14:16	68° 16,645'	65° 08,370'	CTD-Rosette	↑	453	118	13,7	6,4	6,97	29,07	1015,42	93	0
3	E1	Basic	2019-08-23	14:26	68° 16,637'	65° 08,514'	Tucker Net	↓	453	122	8,6	9,2	6,47	29,59	1015,43	82	0
3	E1	Basic	2019-08-23	14:35	68° 16,745'	65° 09,192'	Tucker Net	(bottom)	450	130	13,5	6,6	6,93	29,05	1015,33	91	0
3	E1	Basic	2019-08-23	14:42	68° 16,621'	65° 09,724'	Tucker Net	↑	450	126	13,1	6,5	6,93	29,07	1015,38	90	0
3	E1	Basic	2019-08-23	15:06	68° 16,721'	65° 08,385'	Monster Net	↓	449	134	14,3	6,4	5,29	29,13	1015,29	91	0
3	E1	Basic	2019-08-23	15:18	68° 16,704'	65° 08,455'	Monster Net	(bottom)	450	134	13,1	6,5	6,79	29,07	1015,13	91	0
3	E1	Basic	2019-08-23	15:33	68° 16,690'	65° 08,533'	Monster Net	↑	451	127	13,5	6,5	4,70	29,56	1015,12	90	0
3	E1	Basic	2019-08-23	16:23	68° 16,727'	65° 08,463'	Box Core	↓	448	137	17,3	6,5	5,29	29,58	1014,82	88	0
3	E1	Basic	2019-08-23	16:31	68° 16,708'	65° 08,534'	Box Core	(bottom)	449	136	14,7	6,5	5,67	28,97	1014,8	89	0
3	E1	Basic	2019-08-23	16:40	68° 16,716'	65° 08,640'	Box Core	↑	448	135	15,4	6,6	6,07	28,95	1014,83	88	0
3	E1	Basic	2019-08-23	16:56	68° 16,782'	65° 08,915'	Agassiz Trawl	↓	447	90	11	7,1	6,15	29,13	1014,94	88	0
3	E1	Basic	2019-08-23	17:15	68° 16,814'	65° 10,721'	Agassiz Trawl	(bottom)	433	119	14,5	6,5	6,50	28,70	1014,48	89	0
3	E1	Basic	2019-08-23	17:41	68° 16,707'	65° 13,133'	Agassiz Trawl	↑	422	120	15,6	6,6	6,48	28,79	1014,43	87	0
3	E1	Basic	2019-08-23	18:11	68° 16,697'	65° 08,623'	Beam Trawl	↓	448	134	14,1	8	6,80	29,01	1014,11	84	0
3	E1	Basic	2019-08-23	18:33	68° 16,687'	65° 10,633'	Beam Trawl	(bottom)	442	131	13,9	6,5	6,58	28,85	1013,9	87	0
3	E1	Basic	2019-08-23	19:02	68° 16,536'	65° 13,637'	Beam Trawl	↑	429	124	15,8	6,5	6,84	29,05	1013,59	87	0
3	E1	Basic	2019-08-23	20:06	68° 16,971'	65° 08,466'	Baited Camera	↑	438	130	19,2	6,6	6,53	29,05	1013,18	87	0
3	D1 - 177	Full	2019-08-24	1:09	67° 28,984'	63° 41,538'	Baited Camera	↓	654	123	9,7	5,9	3,20	28,93	1012,26	90	0
3	D1 - 177	Full	2019-08-24	1:29	67° 29,069'	63° 41,562'	Baited Camera	(bottom)	625	100	7	5,8	2,12	29,57	1012,03	90	0
3	D1 - 177	Full	2019-08-24	1:56	67° 28,421'	63° 41,567'	CTD-Rosette	↓	673	115	6,5	6	3,45	28,50	1011,63	93	0
3	D1 - 177	Full	2019-08-24	2:09	67° 28,386'	63° 41,500'	CTD-Rosette	(bottom)	649	127	7,6	6	1,87	29,75	1011,41	93	0
3	D1 - 177	Full	2019-08-24	2:48	67° 28,377'	63° 41,354'	CTD-Rosette	↑	627	141	4,8	6,2	2,60	29,71	1011,1	95	0
3	D1 - 177	Full	2019-08-24	3:03	67° 28,422'	63° 41,304'	Tucker Net	↓	665	156	0,2	7,3	5,20	28,82	1010,99	91	0
3	D1 - 177	Full	2019-08-24	3:13	67° 28,620'	63° 41,784'	Tucker Net	(bottom)		191	2,7	6,4	5,75	23,88	1010,86	94	0
3	D1 - 177	Full	2019-08-24	3:17	67° 28,564'	63° 42,100'	Tucker Net	↑	524	204	5,1	6,2	4,89	24,67	1010,88	94	0
3	D1 - 177	Full	2019-08-24	3:40	67° 28,436'	63° 41,550'	Monster Net	↓	674	190	2,3	6,2	2,99	29,14	1010,67	94	0
3	D1 - 177	Full	2019-08-24	3:58	67° 28,396'	63° 41,412'	Monster Net	(bottom)	646	154	1,5	5,9	3,41	29,54	1010,54	94	0
3	D1 - 177	Full	2019-08-24	4:19	67° 28,384'	63° 41,361'	Monster Net	↑	640	152	3	5,8	3,56	28,86	1010,52	94	0
3	D1 - 177	Full	2019-08-24	4:43	67° 28,387'	63° 41,341'	Hydrobios	↓	645	140	3,4	5,8	3,58	29,23	1010,23	95	0
3	D1 - 177	Full	2019-08-24	5:00	67° 28,384'	63° 41,343'	Hydrobios	(bottom)	646	125	4,6	6	3,80	29,06	1010,16	92	0
3	D1 - 177	Full	2019-08-24	5:21	67° 28,414'	63° 41,286'	Hydrobios	↑	667	165	1,1	7,1	3,15	28,68	1009,89	88	0
3	D1 - 177	Full	2019-08-24	5:48	67° 28,468'	63° 41,237'	IKMT	↓	681	166	2,1	6,8	5,69	29,23	1009,56	86	0
3	D1 - 177	Full	2019-08-24	6:06	67° 28,341'	63° 41,994'	IKMT	(bottom)		163	5,3	6,4	5,91	24,62	1009,5	91	0
3	D1 - 177	Full	2019-08-24	6:56	67° 28,280'	63° 41,186'	IKMT	↑	619	151	3,2	6,4	5,14	25,43	1009,05	94	0
3	D1 - 177	Full	2019-08-24	7:20	67° 28,434'	63° 41,588'	Box Core	↓	678	178	5,1	7,1	2,02	28,97	1008,69	87	0
3	D1 - 177	Full	2019-08-24	7:29	67° 28,449'	63° 41,607'	Box Core	(bottom)	679	193	5,5	7,1	2,13	28,51	1008,61	89	0
3	D1 - 177	Full	2019-08-24	7:46	67° 28,449'	63° 41,577'	Box Core	↑	679	188	5,7	6,5	2,46	28,96	1008,57	92	0
3	D1 - 177	Full	2019-08-24	8:14	67° 28,237'	63° 40,529'	Agassiz Trawl	↓	552	222	0	7,3	5,28	24,39	1008,25	86	0
3	D1 - 177	Full	2019-08-24	8:32	67° 28,752'	63° 40,334'	Agassiz Trawl	(bottom)	593	204	4	7,3	4,54	26,78	1008,09	83	0
3	D1 - 177	Full	2019-08-24	8:54	67° 28,712'	63° 42,111'	Agassiz Trawl	↑	426	229	5,9	7,8	5,70	23,52	1008,03	80	0
3	4.2	Full	2019-08-24	11:37	67° 28,020'	63° 49,623'	Piston Core	↓	500	285	0,4	8,5	1,89	30,04	1007,06	77	0
3	4.2	Full	2019-08-24	11:46	67° 28,016'	63° 49,626'	Piston Core	(bottom)	500	100	0	8,5	1,87	30,06	1007,03	75	0
3	4.2	Full	2019-08-24	12:00	67° 28,051'	63° 49,552'	Piston Core	↑	500	311	0,8	8,1	2,54	29,94	1006,94	79	0
3	D1 - 177	Coring	2019-08-24	16:09	67° 28,982'	63° 41,240'	Baited Camera	↑	686	122	1,9	9,3	3,43	28,85	1004,82	82	0
3	1.1A	Coring	2019-08-24	20:34	67° 13,171'	64° 43,091'	Piston Core	↓	192	8	5,1	8,3	3,70	29,28	1004,86	71	0
3	1.1A	Coring	2019-08-24	20:42	67° 13,160'	64° 43,098'	Piston Core	(bottom)	191	77	4	7,9	2,79	28,33	1004,88	74	0
3	1.1A	Coring	2019-08-24	20:48	67° 13,158'	64° 43,122'	Piston Core	↑	191	89	2,5	8,5	3,09	28,40	1004,87	72	0
3	D2	Basic	2019-08-25	2:34	67° 51,477'	63° 09,110'	CTD-Rosette	↓	271	224	2,7	6,9	6,31	29,40	1006,02	92	0
3	D2	Basic	2019-08-25	2:39	67° 51,471'	63° 09,115'	CTD-Rosette	(bottom)	271	273	5,7	6,9	6,32	29,39	1006,07	91	0
3	D2	Basic	2019-08-25	3:08	67° 51,499'	63° 09,138'	CTD-Rosette	↑	269	346	4,2	6,7	6,32	29,40	1006,35	90	0
3	D2	Basic	2019-08-25	3:20	67° 51,514'	63° 09,040'	Monster Net	↓	272	297	2,1	7,1	6,32	29,45	1006,26	86	0
3	D2	Basic	2019-08-25	3:28	67° 51,522'	63° 09,012'	Monster Net	(bottom)	272	17	1,1	6,8	6,48	29,35	1006,27	89	0
3	D2	Basic	2019-08-25	3:38	67° 51,530'	63° 08,966'	Monster Net	↑	273	324	6,9	6,5	6,40	29,33	1006,4	90	0
3	D2	Basic	2019-08-25	4:00	67° 51,493'	63° 09,041'	Box Core	↓	268	318	4,8	6,5	6,57	29,34	1006,65	94	0
3	D2	Basic	2019-08-25	4:04	67° 51,497'	63° 09,048'	Box Core	(bottom)	267	301	3,8	7,2	6,40	29,40	1006,58	94	0
3	D2	Basic	2019-08-25	4:10	67° 51,510'	63° 09,057'	Box Core	↑	267	183	0,4	7,5	6,38	29,40	1006,59	90	0
3	D2	Basic	2019-08-25	4:42	67° 51,456'	63° 09,425'	Agassiz Trawl	↓	273	230	6,9	7,3	6,45	29,47	1006,43	90	0
3	D2	Basic	2019-08-25	4:53	67° 51,585'	63° 08,959'	Agassiz Trawl	(bottom)	271	243	6,7	7,8	6,64	29,33	1006,41	86	0
3	D2	Basic	2019-08-25	5:06	67° 51,610'	63° 09,856'	Agassiz Trawl	↑	278	239	11,6	7,8	6,57	29,33	1006,3	86	0
3	D3	Basic	2019-08-25	7:27	68° 14,406'	62° 35,243'	CTD-Rosette	↓	1571	322	16,9	7,7	6,82	29,20	1006,04	91	0
3	D3	Basic	2019-08-25	7:57	68° 14,347'	62° 35,014'	CTD-Rosette	(bottom)	1577	328	17,9	7,7	7,07	29,15	1006,56	90	0
3	D3	Basic	2019-08-25	8:49	68° 14,121'	62° 34,668'	CTD-Rosette	↑	1576	336	19,4	7,7	6,85	29,20	1007,09	86	0
3	D3	Basic	2019-08-25	9:06	68° 13,812'	62° 33,753'	Tucker Net	↓	1563	326	13,1	8,7	7,06	29,15	1007,28	83	0
3	D3	Basic	2019-08-25	9:15	68° 13,554'	62° 33,262'	Tucker Net	(bottom)	1556	329	16,9	7,7	7,05	29,15	1007,22	83	0
3	D3	Basic	2019-08-25	9:23	68° 13,324'	62° 32,921'	Tucker Net	↑	1553	336	14,7	7,7	7,04	29,18	1007,4	82	0
3	D3	Basic	2019-08-25	9:51	68° 14,303'	62° 35,061'	Monster Net	↓	1578	324	17,3	7,7	7,05	29,19	1008,97	87	0
3	D3	Basic	2019-08-25	10:32	68° 14,180'	62° 34,968'	Monster Net	(bottom)	1578	335	18,1	7,4	7,07	29,18	1009,26	89	0
3	D3	Basic	2019-08-25	11:16	68° 14,109'	62° 35,179'	Monster Net	↑	1574	315	16,9	7,2	7,06	29,20	1009,96	89	0
3	D3	Basic	2019-08-25	12:22	68° 14,347'	62° 35,481'	Hydrobios	↓	1567	308	17,5	7,2	7,00	29,31	1009,27	89	0
3	D3	Basic	2019-08-25	13:00	68° 14,351'	62° 35,592'	Hydrobios	(bottom)	1565	310	16,9	7,1	6,98	29,39	1009,71	90	0
3	D3	Basic	2019-08-25	13:47	68° 14,371'	62° 35,471'	Hydrobios	↑	1568	306	13,7	7	7,01	29,38	1010,05	90	0
3	D3	Basic	2019-08-25	14:07	68° 14,418'	62° 35,424'	Box Core	↓	1569	316	16,6	6,9	7,03	29,38	1010,05	89	0
3	D3	Basic	2019-08-25	14:26	68° 14,403'	62° 35,301'	Box Core	(bottom)	1573	309	16,2	6,9	7,00	29,41	1009,98	90	0
3	D3	Basic	2019-08-25	14:52	68° 14,329'	62° 35,176'	Box Core	↑	1577	304	16,2	6,8	6,95	29,45	1010,04	89	0
3	D4	Basic	2019-08-25	17:23	68° 37,216'	62° 00,452'	CTD-Rosette	↓	1809	329	17,5	6,3	6,37	29,39	1010,43	87	0
3	D4	Basic	2019-08-25	17:59	68° 37,147'	62° 00,718'	CTD-Rosette	(bottom)	1810	346	16,6	6,5	6,46	29,39	1010,69	86	0
3	D4	Basic	2019-08-25	18:59	68° 37,021'	62° 01,296'	CTD-Rosette	↑	1810	342	16,8	6,5	6,29	29,87	1011,01	82	0
3	D4	Basic	2019-08-25	19:18	68° 37,296'	62° 00,484'	Monster Net	↓	1810	349	15,6	6,6	6,75	29,49	1011,17	81	0
3	D4	Basic	2019-08-25	20:07	68° 37,260'	62° 00,805'	Monster Net	(bottom)	1810	356	12,2	6,7	5,94	29,73	1011,27	83	0
3	D4	Basic	2019-08-25	20:55	68° 37,190'	62° 00,846'	Monster Net	↑	1810	349	10,3	6,6	6,78	29,46	1011,38	85	0
3	D4	Basic	2019-08-25	22:37	68° 37,264'	62° 00,479'	Box Core	↓	1809	351	7,4	6,5	6,64	29,57	1011,28	87	0
3	D4	Basic	2019-08-25	23:01	68° 37,227'	62° 00,453'	Box Core	(bottom)	1809	355	6,5	6,4	6,29	29,67	1011,24	87	0
3	D4	Basic	2019-08-25	23:25	68° 37,145'	62° 00,366'	Box Core	↑	1809	352	4,2	6,4	6,63	29,53	1011,09	87	0
3	D5	Basic	2019-08-26	2:03	68° 59,949'	61° 24,443'	CTD-Rosette	↓	1838	7	8,6	5,7	7,32	29,94	1010,09	81	0
3	D5	Basic	2019-08-26	2:32	68° 59,861'	61° 24,445'	CTD-Rosette	(bottom)	1838	25	9,1	5,7	7,31	29,94	1010,04	83	0
3	D5	Basic	2019-08-26	3:31	68° 59,525'	61° 24,242'	CTD-Rosette	↑	1835	43	6,3	5,5	7,39	30,04	1009,99	85	0
3	D5	Basic	2019-08-26	3:49	68° 59,847'	61° 24,326'	Tucker Net	↓		311	3	5,8	7,19	30,12	1009,89	82	0
3	D5	Basic	2019-08-26	3:57	68° 59,594'	61° 24,263'	Tucker Net	(bottom)		31	1,7	5,6	7,30	29,95	1009,79	82	0
3	D5	Basic	2019-08-26	4:04	68° 59,481'	61° 23,830'	Tucker Net	↑		350	5,1	5,3	7,31	29,97	1009,79	84	0
3	D5	Basic	2019-08-26	4:21	68° 59,912'	61° 24,505'	Monster Net	↓	1838	7	5	5,3	7,22	30,03	1009,74	83	0
3	D5	Basic	2019-08-26	5:05	68° 59,655'	61° 24,514'	Monster Net	(bottom)	1837	54	9,5	5,6	6,88	30,17	1009,64	81	0
3	D5	Basic	2019-08-26	5:58	68° 59,476'	61° 24,626'	Monster Net	↑	1836	20	3,8	5,6	7,15	30,13	1009,47	82	0
3	D5	Basic	2019-08-26	6:22	68° 59,818'	61° 24,314'	IKMT	↓	1837	52	2,3	5,6	7,29	30,10	1009,46	80	0
3	D5	Basic	2019-08-26	6:41	69° 00,045'	61° 23,833'	IKMT	(bottom)		291	1	5,5	7,30	30,10	1009,26	80	0
3	D5	Basic	2019-08-26	7:43	68° 59,483'	61° 22,907'	IKMT	↑		358	0,6	5,8	7,34	30,13	1008,85	81	0
3	D5	Basic	2019-08-26	8:06	69° 00,001'	61° 24,380'	Box Core	↓	1838	55	5,5	5,6	6,51	30,30	1008,49	79	0
3	D5	Basic	2019-08-26	8:30	68° 59,947'	61° 24,365'	Box Core	(bottom)	1838	40	0,8	5,7	7,12	29,94	1008,18	79	0
3	D5	Basic	2019-08-26	8:56	68° 59,790'	61° 24,316'	Box Core	↑	1836	97	3,4	5,9	7,11	29,92	1008	79	0
3	C5	Basic	2019-08-26	14:08	68° 08,925'	59° 58,138'	CTD-Rosette	↓	1379	127	9,3	4,8	6,86	31,70	1006,28	88	0
3	C5	Basic	2019-08-26	14:32	68° 08,782'	59° 58,159'	CTD-Rosette	(bottom)	1385			4,7	6,91	31,69	1006,13	90	0
3	C5	Basic	2019-08-26	15:25	68° 08,598'	59° 58,296'	CTD-Rosette	↑	1395	217	3	5,2	7,08	31,69	1005,6	86	0
3	C5	Basic	2019-08-26	16:10	68° 09,075'	59° 58,045'	Tucker Net	↓	1364	113	8,4	5,1	7,05	31,58	1005,22	87	0
3	C5	Basic	2019-08-26	16:19	68° 08,794'	59° 58,335'	Tucker Net	(bottom)	1386	128	12,8	4,4	7,05	31,50	1005,1	91	0
3	C5	Basic	2019-08-26	16:27	68° 08,590'	59° 57,828'	Tucker Net	↑	1390	123	16,4	4,6	7,04	31,56	1004,86	92	0

3	C5	Basic	2019-08-26	16:45	68° 08,935'	59° 58,059'	Monster Net	↓	1374	68	0,8	5,6	6,55	30,83	1004,88	87	0
3	C5	Basic	2019-08-26	17:22	68° 08,682'	59° 58,046'	Monster Net	(bottom)	1389	126	3,4	5,9	6,46	30,41	1004,69	89	0
3	C5	Basic	2019-08-26	18:08	68° 08,493'	59° 58,088'	Monster Net	↑	1398	137	13,7	5,1	6,61	30,35	1004,5	93	0
3	C5	Basic	2019-08-26	18:34	68° 09,062'	59° 58,021'	Hydrobios	↓	1361	139	12,6	5,4	6,74	30,88	1004,46	91	0
3	C5	Basic	2019-08-26	19:14	68° 09,022'	59° 57,992'	Hydrobios	(bottom)	1364	132	15,4	4,9	6,37	31,08	1004,18	93	0
3	C5	Basic	2019-08-26	19:57	68° 08,950'	59° 57,810'	Hydrobios	↑	1362	129	12,9	4,8	6,71	30,89	1004,06	95	0
3	C5	Basic	2019-08-26	20:32	68° 09,541'	59° 58,081'	IKMT	↓	1364	94	7,4	5,5	6,65	30,49	1004,13	93	0
3	C5	Basic	2019-08-26	20:58	68° 09,199'	59° 59,828'	IKMT	(bottom)	1386	139	14,5	5,1	6,35	29,98	1004,14	96	0
3	C5	Basic	2019-08-26	21:47	68° 09,178'	59° 56,956'	IKMT	↑	1363	116	8,8	5,2	6,79	30,86	1003,95	95	0
3	C5	Basic	2019-08-26	22:14	68° 09,104'	59° 58,178'	Box Core	↓	1365	116	11,4	5,3	6,65	30,99	1004,08	94	0
3	C5	Basic	2019-08-26	22:33	68° 09,050'	59° 58,020'	Box Core	(bottom)	1362	110	1,7	5,6	6,70	30,67	1004,23	94	0
3	C5	Basic	2019-08-26	23:02	68° 09,193'	59° 58,123'	Box Core	↑	1359	120	8,6	5,6	6,35	30,18	1004,3	93	0
3	C4	Basic	2019-08-27	2:00	67° 57,165'	60° 37,351'	CTD-Rosette	↓	1611	122	3,8	6,5			1004,41	93	0
3	C4	Basic	2019-08-27	2:28	67° 57,087'	60° 37,471'	CTD-Rosette	(bottom)	1612	90	5,1	5,9			1004,44	95	0
3	C4	Basic	2019-08-27	3:18	67° 56,820'	60° 37,705'	CTD-Rosette	↑	1615	67	7,2	5,8	6,40	29,85	1004,56	95	0
3	C4	Basic	2019-08-27	5:06	67° 57,275'	60° 36,622'	Monster Net	↓	1609	35	6,1	5,6	4,33	30,45	1004,78	95	0
3	C4	Basic	2019-08-27	5:50	67° 56,895'	60° 36,369'	Monster Net	(bottom)	1609	17	8,4	5,6	6,33	29,89	1004,9	97	0
3	C4	Basic	2019-08-27	6:41	67° 56,430'	60° 36,373'	Monster Net	↑	1612	352	8,4	5,4	6,17	30,02	1005,22	96	0
3	C4	Basic	2019-08-27	7:07	67° 57,353'	60° 37,475'	Box Core	↓	1611	354	11	5,5	5,89	29,98	1005,33	95	0
3	C4	Basic	2019-08-27	7:28	67° 57,125'	60° 37,510'	Box Core	(bottom)	1611	338	10,1	5,5	6,11	29,79	1005,44	96	0
3	C4	Basic	2019-08-27	7:50	67° 56,907'	60° 37,556'	Box Core	↑	1613	309	9,7	5,3	6,20	29,84	1005,52	97	0
3	C3	Basic	2019-08-27	9:41	67° 45,116'	61° 16,118'	CTD-Rosette	↓	1571	314	9,9	5,4	5,78	30,27	1007,48	94	0
3	C3	Basic	2019-08-27	10:08	67° 45,132'	61° 16,439'	CTD-Rosette	(bottom)	1571	308	11,2	5,5	5,91	29,88	1008,03	95	0
3	C3	Basic	2019-08-27	11:05	67° 45,140'	61° 17,083'	CTD-Rosette	↑	1570	326	10,7	6,2	5,98	30,27	1008,9	92	0
3	C3	Basic	2019-08-27	11:20	67° 45,013'	61° 16,625'	Tucker Net	↓	1568	303	8,9	9,6	6,07	29,80	1009,09	70	0
3	C3	Basic	2019-08-27	11:32	67° 44,726'	61° 16,052'	Tucker Net	(bottom)	1565	326	17,5	5,9	6,20	29,81	1008,92	90	0
3	C3	Basic	2019-08-27	11:41	67° 44,629'	61° 15,328'	Tucker Net	↑	1565	318	14,9	5,5	6,25	29,78	1008,89	91	0
3	C3	Basic	2019-08-27	12:40	67° 45,253'	61° 16,204'	Monster Net	↓	1572	325	13,1	6,1	6,47	29,74	1007,94	91	0
3	C3	Basic	2019-08-27	13:19	67° 45,108'	61° 16,350'	Monster Net	(bottom)	1571	320	15	5,9	6,26	29,81	1008,01	94	0
3	C3	Basic	2019-08-27	14:08	67° 45,026'	61° 16,006'	Monster Net	↑	1570	327	12,8	5,4	6,43	29,75	1008,44	96	0
3	C3	Basic	2019-08-27	16:48	67° 45,582'	61° 16,039'	Hydrobios	↓	1577	326	15,6	6,5	6,19	30,19	1009,2	86	0
3	C3	Basic	2019-08-27	17:27	67° 45,334'	61° 16,074'	Hydrobios	(bottom)	1574	328	14,5	6,9	5,81	29,97	1009,79	84	0
3	C3	Basic	2019-08-27	18:17	67° 44,966'	61° 16,443'	Hydrobios	↑	1569	328	13,7	7,6	6,26	29,68	1010,23	79	0
3	C3	Basic	2019-08-27	18:40	67° 45,503'	61° 16,134'	Box Core	↓		327	15	6,3	5,44	30,39	1010,33	83	0
3	C3	Basic	2019-08-27	19:01	67° 45,291'	61° 16,229'	Box Core	(bottom)	1574	310	15,4	6,6	5,12	29,85	1010,36	85	0
3	C3	Basic	2019-08-27	19:22	67° 45,129'	61° 16,350'	Box Core	↑	1572	323	14,7	6,8	6,42	29,62	1010,69	82	0
3	C2	Basic	2019-08-27	22:18	67° 32,604'	61° 55,687'	CTD-Rosette	↓	349	310	18,8	6,1	6,26	29,55	1012,48	90	0
3	C2	Basic	2019-08-27	22:28	67° 32,525'	61° 55,866'	CTD-Rosette	(bottom)	335	318	14,7	5,9	4,95	29,56	1012,82	89	0
3	C2	Basic	2019-08-27	23:00	67° 32,457'	61° 55,997'	CTD-Rosette	↑	317	302	14,7	5,9	6,18	29,66	1013,1	92	0
3	C2	Basic	2019-08-27	23:30	67° 32,385'	61° 56,662'	Monster Net	↓	287	293	12,2	5,8	5,39	30,04	1013,37	94	0
3	C2	Basic	2019-08-27	23:39	67° 32,376'	61° 56,635'	Monster Net	(bottom)	288	294	9,9	5,9	5,99	29,77	1013,34	93	0
3	C2	Basic	2019-08-27	23:48	67° 32,395'	61° 56,540'	Monster Net	↑	294	301	13,7	5,8	5,69	29,67	1013,43	92	0
3	C2	Basic	2019-08-28	0:14	67° 32,683'	61° 56,157'	Box Core	↓	353	295	11,6	5,8			1013,59	92	0
3	C2	Basic	2019-08-28	0:19	67° 32,673'	61° 56,080'	Box Core	(bottom)	353	292	10,3	5,8			1013,6	93	0
3	C2	Basic	2019-08-28	0:25	67° 32,656'	61° 56,048'	Box Core	↑	350	281	11,4	5,6			1013,65	93	0
3	C2	Basic	2019-08-28	0:29	67° 32,652'	61° 55,955'	Box Core	↓	353	286	10,9	5,8			1013,75	93	0
3	C2	Basic	2019-08-28	0:34	67° 32,648'	61° 55,850'	Box Core	(bottom)	357	281	10,3	5,7			1013,79	93	0
3	C2	Basic	2019-08-28	0:41	67° 32,645'	61° 55,701'	Box Core	↑	364	292	11,4	5,7			1013,75	93	0
3	C2	Basic	2019-08-28	1:01	67° 32,588'	61° 55,009'	Agassiz Trawl	↓	375	295	11,6	5,6			1013,77	94	0
3	C2	Basic	2019-08-28	1:31	67° 32,518'	61° 55,331'	Agassiz Trawl	↑	344	311	7,2	6			1013,99	92	0
3	C1	Basic	2019-08-28	3:28	67° 20,948'	62° 31,319'	CTD-Rosette	↓	143	217	10,3	5,2			1014,37	88	0
3	C1	Basic	2019-08-28	3:32	67° 20,945'	62° 31,296'	CTD-Rosette	(bottom)	143	213	12	5,3			1014,39	87	0
3	C1	Basic	2019-08-28	3:53	67° 20,902'	62° 31,291'	CTD-Rosette	↑	139	203	11,2	5,3			1014,25	88	0
3	C1	Basic	2019-08-28	4:06	67° 20,965'	62° 30,908'	Tucker Net	↓	142	214	12,9	5,8			1014,3	84	0
3	C1	Basic	2019-08-28	4:18	67° 21,321'	62° 30,942'	Tucker Net	(bottom)	210	209	12,2	5,5			1014,12	86	0
3	C1	Basic	2019-08-28	4:28	67° 21,639'	62° 31,239'	Tucker Net	↑	198	215	13,3	5,5			1014,28	87	0
3	C1	Basic	2019-08-28	4:48	67° 20,878'	62° 31,281'	Monster Net	↓	139	207	12,4	5,4			1014,28	88	0
3	C1	Basic	2019-08-28	4:56	67° 20,820'	62° 31,292'	Monster Net	(bottom)	139	185	12,4	6			1014,34	87	0
3	C1	Basic	2019-08-28	5:00	67° 20,789'	62° 31,239'	Monster Net	↑	139	201	9,1	6,4			1014,39	89	0
3	C1	Basic	2019-08-28	5:23	67° 20,835'	62° 31,465'	Box Core	↓	141	207	13,1	5,3			1014,34	88	0
3	C1	Basic	2019-08-28	5:26	67° 20,827'	62° 31,438'	Box Core	(bottom)	140	206	12,9	5,3			1014,42	89	0
3	C1	Basic	2019-08-28	5:30	67° 20,826'	62° 31,440'	Box Core	↑	140	199	12,4	5,3			1014,46	89	0
3	C1	Basic	2019-08-28	5:42	67° 20,788'	62° 31,376'	Box Core	↓	141	197	11,4	5,4			1014,45	88	0
3	C1	Basic	2019-08-28	5:45	67° 20,784'	62° 31,359'	Box Core	(bottom)	141	203	12,9	5,4			1014,34	88	0
3	C1	Basic	2019-08-28	5:48	67° 20,781'	62° 31,348'	Box Core	↑	141	202	11,8	5,5			1014,45	87	0
3	C1	Basic	2019-08-28	5:54	67° 20,766'	62° 31,328'	Box Core	↓	141	206	11,2	5,4			1014,58	87	0
3	C1	Basic	2019-08-28	5:57	67° 20,758'	62° 31,330'	Box Core	(bottom)	141	199	13,1	5,5			1014,4	86	0
3	C1	Basic	2019-08-28	6:01	67° 20,740'	62° 31,340'	Box Core	↑	142	205	13,5	5,6			1014,39	86	0
3	C1	Basic	2019-08-28	6:22	67° 20,778'	62° 30,797'	Agassiz Trawl	↓	139	215	11,8	5,9			1014,87	84	0
3	C1	Basic	2019-08-28	6:28	67° 20,984'	62° 30,822'	Agassiz Trawl	(bottom)	143	217	11,6	5,9			1014,63	84	0
3	C1	Basic	2019-08-28	6:38	67° 20,945'	62° 31,634'	Agassiz Trawl	↑	149	216	17,9	6,5			1014,55	81	0
3	C1	Basic	2019-08-28	6:54	67° 20,725'	62° 31,114'	Beam Trawl	↓	143	205	10,9	5,9			1014,79	84	0
3	C1	Basic	2019-08-28	7:01	67° 20,904'	62° 31,251'	Beam Trawl	(bottom)	139								0
3	C1	Basic	2019-08-28	7:22	67° 20,524'	62° 30,851'	Beam Trawl	↑	151	214	12	6,3			1015	82	0
3	1.1B	Coring	2019-08-28	18:56	67° 17,075'	63° 54,511'	Piston Core	↓	605	359	4,2	9,9			1016,64	71	0
3	1.1B	Coring	2019-08-28	19:05	67° 17,074'	63° 54,515'	Piston Core	(bottom)	605	55	4	9,7			1016,67	71	0
3	1.1B	Coring	2019-08-28	19:15	67° 17,072'	63° 54,509'	Piston Core	↑	605	14	5,5	10,1			1016,73	62	0
3	B1	Basic	2019-08-29	2:57	67° 03,628'	61° 30,566'	CTD-Rosette	↓	116	158	8,8	4,7	4,68	29,29	1018,37	95	0
3	B1	Basic	2019-08-29	3:00	67° 03,599'	61° 30,543'	CTD-Rosette	(bottom)	116	162	8,6	4,9	4,60	29,18	1018,37	95	0
3	B1	Basic	2019-08-29	3:21	67° 03,413'	61° 30,506'	CTD-Rosette	↑	114	157	7,6	4,5	4,76	29,14	1018,39	95	0
3	B1	Basic	2019-08-29	3:38	67° 03,788'	61° 30,619'	Tucker Net	↓	118	196	2,9	6	4,74	29,15	1018,27	92	0
3	B1	Basic	2019-08-29	3:49	67° 03,789'	61° 31,032'	Tucker Net	(bottom)	117	152	6,7	4,7	4,75	29,17	1018,2	96	0
3	B1	Basic	2019-08-29	3:58	67° 03,431'	61° 31,215'	Tucker Net	↑	106	141	8,4	4,8	4,78	29,12	1018,19	96	0
3	B1	Basic	2019-08-29	4:15	67° 03,759'	61° 30,725'	Monster Net	↓	118	107	6,7	5,7	4,71	29,16	1018,32	93	0
3	B1	Basic	2019-08-29	4:19	67° 03,704'	61° 30,701'	Monster Net	(bottom)	116	133	1	5,7	4,27	29,17	1018,18	92	0
3	B1	Basic	2019-08-29	4:23	67° 03,651'	61° 30,608'	Monster Net	↑	116	156	7,8	5,4	3,63	29,44	1018,35	93	0
3	B1	Basic	2019-08-29	4:46	67° 03,748'	61° 30,827'	Hydrobios	↓	121	245	0,2	5,5	4,20	29,39	1018,29	92	0
3	B1	Basic	2019-08-29	4:49	67° 03,708'	61° 30,786'	Hydrobios	(bottom)	120	146	9,3	5,5	4,54	29,52	1018,16	93	0
3	B1	Basic	2019-08-29	4:54	67° 03,634'	61° 30,687'	Hydrobios	↑	116	146	9,5	5	4,38	29,37	1018,16	96	0
3	B1	Basic	2019-08-29	5:57	67° 03,778'	61° 30,811'	Box Core	↓	119	144	10,5	5,4	4,55	29,34	1018,3	94	0
3	B1	Basic	2019-08-29	6:00	67° 03,778'	61° 30,817'	Box Core	(bottom)	119	144	11,6	5,3	4,53	29,35	1018,24	95	0
3	B1	Basic	2019-08-29	6:03	67° 03,773'	61° 30,799'	Box Core	↑	120	139	11,6	5	4,53	29,36	1018,25	96	0
3	B1	Basic	2019-08-29	6:35	67° 03,815'	61° 30,503'	Agassiz Trawl	↓	124	137	7,4	4,7	4,44	29,38	1018,37	97	0
3	B1	Basic	2019-08-29	6:40	67° 03,795'	61° 30,985'	Agassiz Trawl	(bottom)	118	133	12,8	4,5	4,39	29,43	1018,25	98	0
3	B1	Basic	2019-08-29	6:49	67° 03,635'	61° 31,890'	Agassiz Trawl	↑	109	129	12	4,1	4,41	29,46	1018,23	98	0
3	B1	Basic	2019-08-29	7:04	67° 03,897'	61° 30,285'	Agassiz Trawl	↓	119	142	12,4	4,4	4,81	29,44	1018,09	98	0
3	B1	Basic	2019-08-29	7:08	67° 03,871'	61° 30,728'	Agassiz Trawl	(bottom)	121	140	12,2	4,3	4,65	29,45	1017,95	98	0
3	B1	Basic	2019-08-29	7:22	67° 03,862'	61° 32,208'	Agassiz Trawl	↑	115	137	12	4,3	4,32	29,49	1017,96	98	0
3	B1	Basic	2019-08-29	7:41	67° 03,949'	61° 30,093'	Beam Trawl	↓	123	134	9,7	4,7	4,95	29,43	1018	98	0
3	B1	Basic	2019-08-29	7:47	67° 03,948'	61° 30,734'	Beam Trawl	(bottom)	123	134	10,5	4,7	4,85	29,40	1018,11	98	0
3	B1	Basic	2019-08-29	8:03	67° 03,785'	61° 32,486'	Beam Trawl	↑	106	130	10,9	4,2	4,24	29,46	1018,1	98	0
3	B2	Basic	2019-08-29	10:11	67° 12,018'	60° 53,857'	CTD-Rosette	↓	645	143	15,2	6,2	5,08	29,87	1018,51	89	0
3	B2	Basic	2019-08-29	10:22	67° 12,084'	60° 53,822'	CTD-Rosette	(bottom)	650	139	14,5	6,3	5,37	29,81	1018,59	89	0
3	B2	Basic	2019-08-29	10:59	67° 12,277'	60° 53,978'	CTD-Rosette	↑	650	143	17,7	6,3	4,03	29,82	1018,46	90	0
3	B2	Basic	2019-08-29	11:10	67° 11,975'	60° 53,262'	Monster Net	↓	649	144	16,2	6,4	4,00	29,69	1018,58	91	0
3	B2	Basic	2019-08-29	11:29	67° 12,091'	60° 53,242'	Monster Net	(bottom)	651	142	15,2	6,3	5,69	29,67	1018,63	90	0
3	B2	Basic	2019-08-29	11:49	67° 12,169'	60° 53,286'	Monster Net	↑	653	143	14,9	6,2	5,28	29,59	1018,73	90	0
3	B2	Basic	2019-08-29	12:44	67° 11,930'	60° 53,928'	Ben Van Been	↓	642	141	15,8	6,1	5,54	29,51	1018,46	90	0
3	B2	Basic	2019-08-29	12:59	67° 11,925'	60° 53,915'	Ben Van Been	(bottom)	642	146	16	6,1	5,61	29,56	1018,67	90	0
3	B2	Basic	2019-08-29	13:14	67° 11,914'	60° 53,957'	Ben Van Been	↑	641	140	13,7	6,2	5,53	29,50	1018,76	90	0
3	B2	Basic	2019-08-29	13:31	67° 11,933'	60° 53,934'	Box Core	↓	642	156	16,2	5,9	4,97	29,98	1018,92	91	0
3	B2	Basic	2019-08-29	13:41	67° 11,922'	60° 53,944'	Box Core	(bottom)	641	141	14,7	6,1	5,64	29,42	1018,72	91	0

3	B2	Basic	2019-08-29	13:52	67° 11,915'	60° 54,020'	Box Core	↑	641	137	15,6	5,9	5,61	29,42	1018,64	91	0
3	B2	Basic	2019-08-29	14:11	67° 12,036'	60° 54,330'	Agassiz Trawl	↓	641	136	11,8	5,6	5,69	29,41	1018,61	92	0
3	B2	Basic	2019-08-29	14:32	67° 11,753'	60° 55,230'	Agassiz Trawl	(bottom)	636	140	16,2	6	5,62	29,38	1018,29	92	0
3	B2	Basic	2019-08-29	14:55	67° 11,726'	60° 53,721'	Agassiz Trawl	↑	642	169	3,8	6,6	5,64	29,38	1018,62	90	0
3	B3	Basic	2019-08-29	16:31	67° 19,816'	60° 16,382'	CTD-Rosette	↓		164	12	6,3	6,89	30,88	1018,95	94	0
3	B3	Basic	2019-08-29	16:54	67° 19,695'	60° 15,669'	CTD-Rosette	(bottom)	1082	161	11,6	6,3	6,83	30,22	1018,63	93	0
3	B3	Basic	2019-08-29	17:42	67° 19,526'	60° 14,090'	CTD-Rosette	↑		148	10,1	6,1	6,77	30,31	1018,4	93	0
3	B3	Basic	2019-08-29	18:00	67° 19,793'	60° 16,466'	Tucker Net	↓	1087	143	1,5	7	6,95	29,41	1018,23	89	0
3	B3	Basic	2019-08-29	18:14	67° 20,005'	60° 16,802'	Tucker Net	(bottom)	1091	144	9,9	6,1	6,95	29,41	1017,98	92	0
3	B3	Basic	2019-08-29	18:28	67° 19,690'	60° 17,662'	Tucker Net	↑					6,93	29,40			0
3	B3	Basic	2019-08-29	18:47	67° 19,909'	60° 16,624'	Monster Net	↓					6,00	30,04			0
3	B3	Basic	2019-08-29	19:15	67° 19,827'	60° 15,952'	Monster Net	(bottom)	1092	122	14,5	5,8	6,95	29,39	1017,39	93	0
3	B3	Basic	2019-08-29	19:47	67° 19,778'	60° 15,536'	Monster Net	↑	1091	125	13,1	5,7	6,94	29,39	1017,37	91	0
3	B3	Basic	2019-08-29	20:15	67° 19,868'	60° 16,459'	Hydrobios	↓	1094	137	14,9	6	4,98	30,55	1017,17	91	0
3	B3	Basic	2019-08-29	20:41	67° 19,717'	60° 16,163'	Hydrobios	(bottom)	1090	139	12,6	5,9	6,91	29,40	1016,97	91	0
3	B3	Basic	2019-08-29	21:14	67° 19,592'	60° 15,887'	Hydrobios	↑	1087	135	12,9	5,8	6,88	29,41	1016,99	91	0
3	B3	Basic	2019-08-29	21:39	67° 19,908'	60° 16,483'	Box Core	↓	1096	137	14,7	5,9	6,75	29,43	1016,75	90	0
3	B3	Basic	2019-08-29	21:53	67° 19,931'	60° 16,257'	Box Core	(bottom)	1095	113	16	5,6	6,89	29,41	1016,36	92	0
3	B3	Basic	2019-08-29	22:08	67° 19,992'	60° 16,340'	Box Core	↑	1097	103	13,5	5,3	6,89	29,40	1016,26	93	0
3	B4	Basic	2019-08-29	23:51	67° 27,842'	59° 38,836'	CTD-Rosette	↓	1433	111	13,3	5,9	6,99	31,00	1015,76	98	0
3	B4	Basic	2019-08-30	0:21	67° 28,139'	59° 39,071'	CTD-Rosette	(bottom)	1443	104	14,7	6,2	7,07	31,02	1015,33	98	0
3	B4	Basic	2019-08-30	1:18	67° 28,783'	59° 39,743'	CTD-Rosette	↑	1451	118	11,4	6,8	7,04	31,04	1015,24	93	0
3	B4	Basic	2019-08-30	1:40	67° 27,699'	59° 39,035'	Monster Net	↓	1426	104	12,4	6,8	6,95	30,84	1015,02	93	0
3	B4	Basic	2019-08-30	2:13	67° 27,806'	59° 39,413'	Monster Net	(bottom)	1421	125	12,4	6,8	6,97	30,88	1014,88	93	0
3	B4	Basic	2019-08-30	2:54	67° 27,981'	59° 39,782'	Monster Net	↑	1413	114	10,1	6,8	6,88	31,15	1014,44	93	0
3	B4	Basic	2019-08-30	3:14	67° 27,713'	59° 39,119'	Box Core	↓	1424	118	11,4	6,9	6,87	30,65	1014,29	92	0
3	B4	Basic	2019-08-30	3:33	67° 27,706'	59° 39,009'	Box Core	(bottom)	1426	125	10,7	6,8	7,01	30,59	1014,04	93	0
3	B4	Basic	2019-08-30	3:51	67° 27,713'	59° 38,895'	Box Core	↑	1430	131	11,8	6,9	6,95	30,98	1013,83	93	0
3	B5	Basic	2019-08-30	5:33	67° 35,208'	59° 01,189'	CTD-Rosette	↓	1195	108	14,1	7	5,86	31,36	1012,7	88	0
3	B5	Basic	2019-08-30	6:00	67° 34,881'	59° 01,113'	CTD-Rosette	(bottom)	1209	113	16,2	7,1	4,89	31,54	1012,38	89	0
3	B5	Basic	2019-08-30	6:51	67° 34,510'	59° 01,023'	CTD-Rosette	↑	1219	119	17,3	7,4	6,17	31,27	1011,9	86	0
3	B5	Basic	2019-08-30	7:08	67° 35,419'	59° 00,914'	Tucker Net	↓	1185	116	14,7	7,7	6,41	31,38	1011,74	82	0
3	B5	Basic	2019-08-30	7:18	67° 35,224'	59° 01,660'	Tucker Net	(bottom)	1198	110	15,8	7,2	6,45	31,46	1011,5	85	0
3	B5	Basic	2019-08-30	7:27	67° 35,034'	59° 02,223'	Tucker Net	↑	1212	110	15,2	7,1	6,45	31,47	1011,44	85	0
3	B5	Basic	2019-08-30	7:45	67° 35,356'	59° 01,293'	Monster Net	↓	1193	124	15	7,4	6,30	31,48	1011,62	84	0
3	B5	Basic	2019-08-30	8:17	67° 35,079'	59° 01,045'	Monster Net	(bottom)	1201	115	14,7	7,4	6,40	31,47	1011,44	86	0
3	B5	Basic	2019-08-30	8:53	67° 34,814'	59° 00,710'	Monster Net	↑	1216	119	16,9	7	6,23	31,26	1010,92	87	0
3	B5	Basic	2019-08-30	9:18	67° 35,299'	59° 02,163'	IKMT	↓	1204	122	12,9	6,9	6,44	31,49	1010,93	86	0
3	B5	Basic	2019-08-30	9:40	67° 34,974'	59° 03,723'	IKMT	(bottom)	1208	116	14,1	6,8	6,67	31,11	1010,82	87	0
3	B5	Basic	2019-08-30	10:54	67° 34,608'	59° 06,775'	IKMT	↑	1240	120	13,9	6,7	6,81	30,77	1010,32	89	0
3	B5	Basic	2019-08-30	11:26	67° 35,419'	59° 00,842'	Box Core	↓	1183	114	15,2	6,9	6,25	31,25	1010,15	88	0
3	B5	Basic	2019-08-30	11:41	67° 35,431'	59° 00,861'	Box Core	(bottom)	1183	123	13,9	7	6,18	31,26	1010,31	89	0
3	B5	Basic	2019-08-30	11:59	67° 35,511'	59° 00,937'	Box Core	↑	1186	119	13,7	6,8	6,10	31,28	1010,27	90	0
3	A5	Basic	2019-08-30	17:13	66° 46,874'	57° 50,298'	Baited Camera	↓	700	121	9,1	7,9	7,67	32,97	1008,5	84	0
3	A5	Basic	2019-08-30	17:32	66° 46,824'	57° 50,308'	Baited Camera	(bottom)	701	113	10,1	7,8	7,76	32,96	1008,62	85	0
3	A5	Basic	2019-08-30	17:49	66° 46,589'	57° 50,838'	CTD-Rosette	↓	700	109	11,6	7,9	7,18	33,08	1008,36	80	0
3	A5	Basic	2019-08-30	18:09	66° 46,454'	57° 50,822'	CTD-Rosette	(bottom)	697	101	3,8	8,5	7,62	32,99	1008,16	73	0
3	A5	Basic	2019-08-30	18:46	66° 46,171'	57° 50,959'	CTD-Rosette	↑	698	101	13,3	7,6	7,62	32,99	1007,57	84	0
3	A5	Basic	2019-08-30	19:04	66° 46,541'	57° 50,983'	Tucker Net	↓	698	119	12	7,9	7,69	32,96	1007,46	86	0
3	A5	Basic	2019-08-30	19:14	66° 46,208'	57° 51,321'	Tucker Net	(bottom)	697	108	16,6	7,4	7,67	32,96	1007,44	85	0
3	A5	Basic	2019-08-30	19:23	66° 45,911'	57° 51,415'	Tucker Net	↑	698	118	15,4	7,4	7,61	33,00	1007,46	86	0
3	A5	Basic	2019-08-30	19:46	66° 46,617'	57° 50,886'	Monster Net	↓	700	136	15,6	8,4	7,73	32,97	1007,4	78	0
3	A5	Basic	2019-08-30	20:04	66° 46,558'	57° 51,044'	Monster Net	(bottom)	699	125	16	7,5	7,62	33,02	1007,22	85	0
3	A5	Basic	2019-08-30	20:27	66° 46,368'	57° 50,983'	Monster Net	↑	697	139	17,3	7,7	7,47	33,06	1007	86	0
3	A5	Basic	2019-08-30	20:54	66° 46,463'	57° 51,190'	Hydrobios	↓	699	139	16,6	7,6	7,49	33,13	1006,93	86	0
3	A5	Basic	2019-08-30	21:12	66° 46,407'	57° 51,157'	Hydrobios	(bottom)	699	136	18,3	7,7	7,55	33,01	1006,8	86	0
3	A5	Basic	2019-08-30	21:34	66° 46,351'	57° 51,345'	Hydrobios	↑	700	134	16	7,6	7,35	33,12	1006,67	88	0
3	A5	Basic	2019-08-30	21:59	66° 46,558'	57° 51,921'	IKMT	↓	700	135	13,9	7,5	7,68	33,01	1006,49	88	0
3	A5	Basic	2019-08-30	22:39	66° 46,271'	57° 55,910'	IKMT	(bottom)	712	125	13,5	7,1	7,69	32,98	1006,22	91	0
3	A5	Basic	2019-08-30	23:21	66° 45,352'	57° 59,804'	IKMT	↑	702	129	15,8	7	7,75	32,95	1006,2	93	0
3	A5	Basic	2019-08-31	1:53	66° 47,148'	57° 50,849'	Baited Camera	↑	700	132	16	6,4	7,60	33,04	1005,9	95	0
3	A5	Basic	2019-08-31	2:43	66° 46,661'	57° 50,804'	Box Core	↓	701	134	16,4	5,6	7,50	33,06	1005,89	97	0
3	A5	Basic	2019-08-31	2:53	66° 46,662'	57° 50,875'	Box Core	(bottom)	700	162	18,1	5,4	7,49	33,08	1006,13	98	0
3	A5	Basic	2019-08-31	3:03	66° 46,728'	57° 51,033'	Box Core	↑	700	149	18,7	4,8	7,51	33,11	1006,04	98	0
3	A5	Basic	2019-08-31	3:23	66° 46,653'	57° 50,910'	Box Core	↓	699	154	17,7	4,8	7,51	33,13	1005,81	98	0
3	A5	Basic	2019-08-31	3:36	66° 46,674'	57° 50,859'	Box Core	(bottom)	700	149	15,8	4,6	7,49	33,13	1005,96	98	0
3	A5	Basic	2019-08-31	3:47	66° 46,705'	57° 50,944'	Box Core	↑	700	152	16,8	4,4	7,53	33,13	1005,77	98	0
3	A5	Basic	2019-08-31	4:04	66° 46,892'	57° 50,958'	Agassiz Trawl	↓	700	156	12	5	7,47	33,13	1005,81	96	0
3	A5	Basic	2019-08-31	4:36	66° 47,053'	57° 53,648'	Agassiz Trawl	(bottom)	703	142	15,6	4,6	7,36	33,14	1005,71	96	0
3	A5	Basic	2019-08-31	5:09	66° 46,737'	57° 56,299'	Agassiz Trawl	↑	711	152	12,6	4,6	7,37	33,13	1005,85	96	0
3	A4	Basic	2019-08-31	6:59	66° 43,630'	58° 42,451'	CTD-Rosette	↓	805	142	15,4	5	7,46	32,91	1004,53	94	0
3	A4	Basic	2019-08-31	7:19	66° 43,504'	58° 42,344'	CTD-Rosette	(bottom)	803	154	16,6	5,1	7,44	32,95	1004,51	94	0
3	A4	Basic	2019-08-31	7:55	66° 43,191'	58° 42,119'	CTD-Rosette	↑	804	157	14,1	5	7,53	32,92	1004,48	93	0
3	A4	Basic	2019-08-31	8:06	66° 43,101'	58° 42,063'	Monster Net	↓	803	142	18,8	5,3	7,50	32,92	1004,4	93	0
3	A4	Basic	2019-08-31	8:26	66° 42,897'	58° 41,797'	Monster Net	(bottom)	800	142	17,3	5,1	7,38	32,95	1004,16	92	0
3	A4	Basic	2019-08-31	8:52	66° 42,559'	58° 41,686'	Monster Net	↑	793	165	17,9	5,1	7,40	32,92	1004,15	91	0
3	A4	Basic	2019-08-31	10:08	66° 43,609'	58° 42,499'	Box Core	↓	807	143	21,1	5,3	7,52	32,94	1003,6	90	0
3	A4	Basic	2019-08-31	10:20	66° 43,584'	58° 42,411'	Box Core	(bottom)	806	139	15	5,2	7,77	32,91	1003,72	91	0
3	A4	Basic	2019-08-31	10:32	66° 43,556'	58° 42,483'	Box Core	↑	806	142	15,4	5,2	7,64	32,92	1003,76	91	0
3	A3	Basic	2019-08-31	12:49	66° 40,484'	59° 33,797'	CTD-Rosette	↓	874	148	14,1	5,6	5,79	29,81	1002,89	89	0
3	A3	Basic	2019-08-31	13:04	66° 40,512'	59° 33,799'	CTD-Rosette	(bottom)	874	149	14,9	5,6	4,80	29,99	1002,83	88	0
3	A3	Basic	2019-08-31	13:46	66° 40,585'	59° 33,859'	CTD-Rosette	↑	874	148	15,6	5,6	5,76	29,79	1002,46	90	0
3	A3	Basic	2019-08-31	14:04	66° 40,611'	59° 34,077'	Tucker Net	↓	869	109	10,9	6,1	5,68	29,72	1002,53	87	0
3	A3	Basic	2019-08-31	14:13	66° 40,781'	59° 34,790'	Tucker Net	(bottom)	867	139	12,9	5,4	5,83	29,67	1002,18	88	0
3	A3	Basic	2019-08-31	14:22	66° 40,788'	59° 35,516'	Tucker Net	↑	864	134	12,6	5,3	5,83	29,69	1002,05	87	0
3	A3	Basic	2019-08-31	14:50	66° 40,464'	59° 33,842'	Monster Net	↓	872	151	12,9	5,8	5,77	29,79	1002,07	88	0
3	A3	Basic	2019-08-31	15:13	66° 40,495'	59° 34,018'	Monster Net	(bottom)	870	129	15,2	5,6	5,97	29,69	1001,91	86	0
3	A3	Basic	2019-08-31	15:37	66° 40,540'	59° 34,077'	Monster Net	↑	869	130	13,3	5,8	5,98	29,70	1001,75	88	0
3	A3	Basic	2019-08-31	16:40	66° 40,366'	59° 33,724'	Hydrobios	↓	872	109	11,8	5,9	5,49	29,94	1001,3	88	0
3	A3	Basic	2019-08-31	17:03	66° 40,420'	59° 33,941'	Hydrobios	(bottom)	870	106	12,9	6	5,91	29,76	1001,11	89	0
3	A3	Basic	2019-08-31	17:28	66° 40,400'	59° 34,127'	Hydrobios	↑	868	101	13,7	5,7	5,07	30,02	1000,98	93	0
3	A3	Basic	2019-08-31	17:46	66° 40,364'	59° 33,855'	Box Core	↓	871	115	12,9	5,7	5,86	29,78	1000,83	96	0
3	A3	Basic	2019-08-31	17:58	66° 40,357'	59° 33,904'	Box Core	(bottom)	871	118	14,5	5,7	5,88	29,77	1000,64	98	0
3	A3	Basic	2019-08-31	18:11	66° 40,312'	59° 33,806'	Box Core	↑	871	120	12,2	5,7	4,27	29,91	1000,72	98	0
3	A2	Basic	2019-08-31	20:21	66° 36,927'	60° 24,780'	CTD-Rosette	↓	520	122	10,9	5,7	5,74	30,17	999,65	98	0
3	A2	Basic	2019-08-31	20:31	66° 36,873'	60° 24,665'	CTD-Rosette	(bottom)	520	105	10,1	5,5	5,90	30,02	999,64	98	0
3	A2	Basic	2019-08-31	21:03	66° 36,777'	60° 24,759'	CTD-Rosette	↑	520	122	9,7	5,6	6,01	29,93	999,41	98	0
3	A2	Basic	2019-08-31	21:14	66° 36,742'	60° 24,676'	Monster Net	↓	521	127	12,8	5,7	5,37	29,87	999,36	98	0
3	A2	Basic	2019-08-31	21:29	66° 36,728'	60° 24,427'	Monster Net	(bottom)	522	123	10,5	5,5	5,27	30,01	999,28	98	0
3	A2	Basic	2019-08-31	21:46	66° 36,800'	60° 24,546'	Monster Net	↑	522	110	8	5,5	5,91	29,84	999,1	98	0
3	A2	Basic	2019-08-31	22:06	66° 36,967'	60° 24,780'	Ben Van Been	↓	520	108	9,7	5,8	5,35	30,24	998,97	98	0
3	A2	Basic	2019-08-31	22:25	66° 37,102'	60° 24,862'	Ben Van Been	(bottom)	523	110	8,8	5,4	5,94	29,85	998,88	98	0
3	A2	Basic	2019-08-31	22:40	66° 37,177'	60° 25,054'	Ben Van Been	↑	523	98	6,5	5,4	6,06	29,73	998,86	98	0
3	A2	Basic	2019-08-31	22:46	66° 37,207'	60° 25,103'	Ben Van Been	↓	523	96	7,8	5,4	6,06	29,71	998,78	98	0
3	A2	Basic	2019-08-31	23:03	66° 37,276'	60° 25,269'	Ben Van Been	(bottom)	522	89	8,4	5,5	6,06	29,67	998,77	98	0
3	A2	Basic	2019-08-31	23:17	66° 37,395'	60° 25,393'	Ben Van Been	↑	522	106	9,1	5,5	6,00	29,66	998,65	98	0
3	A1	Basic	2019-09-01	1:23	66° 35,312'	61° 12,688'	CTD-Rosette	↓	83	175	1	4,9	1,10	31,22	998,5	98	0
3	A1	Basic	2019-09-01	1:27	66° 35,374'	61° 12,618'	CTD-Rosette	(bottom)	87	128	0,6	4,8	1,22	31,18	998,45	98	0
3	A1	Basic	2019-09-01	1:44	66° 35,622'	61° 12,384'	CTD-Rosette	↑	96	242	0	5	1,14	31,19	998,43	98	0
3	A1	Basic	2019-09-01	1:56	66° 35,680'	61° 12,121'	Tucker Net	↓	98	185	1,1	5,4	0,98	31,21	998,5	98	0
3	A1	Basic	2019-09-01	2:06	66° 35,987'	61° 11,350'	Tucker Net	(bottom)	110	352	1,7	5	1,02	31,28	998,38	98	0
3	A1	Basic	2019-09-01	2:10	66° 36,186'	61° 11,315'	Tucker Net	↑	109	271	2,9	5,1	1,07	31,20	998,42	98	0

3	A1	Basic	2019-09-01	2:31	66° 35,260'	61° 12,861'	Monster Net	↓	77	279	1	5,4	0,87	31,29	998,28	98	0
3	A1	Basic	2019-09-01	2:34	66° 35,303'	61° 12,795'	Monster Net	(bottom)	78	301	0,4	5,5	0,86	31,27	998,21	98	0
3	A1	Basic	2019-09-01	2:37	66° 35,332'	61° 12,747'	Monster Net	↑	82	324	0,8	5,4	0,77	31,32	998,09	98	0
3	A1	Basic	2019-09-01	3:01	66° 35,213'	61° 12,964'	Ben Van Been	↓	75				1,23	31,08			0
3	A1	Basic	2019-09-01	3:05	66° 35,223'	61° 12,953'	Ben Van Been	(bottom)	75	268	0,6	5,4	1,22	31,09	998,19	98	0
3	A1	Basic	2019-09-01	3:07	66° 35,216'	61° 12,954'	Ben Van Been	↑	75	259	0	5,3	1,15	31,09	998,01	98	0
3	A1	Basic	2019-09-01	3:20	66° 35,173'	61° 12,795'	Agassiz Trawl	↓	88	26	1,9	5,2	0,79	31,34	998	98	0
3	A1	Basic	2019-09-01	3:25	66° 35,214'	61° 12,404'	Agassiz Trawl	(bottom)	98	355	3,4	5,3	1,15	31,17	997,96	98	0
3	A1	Basic	2019-09-01	3:30	66° 35,401'	61° 12,204'	Agassiz Trawl	↑	99	354	4,6	5,3	1,14	31,17	998,02	98	0
3	A1	Basic	2019-09-01	3:45	66° 35,308'	61° 12,107'	Beam Trawl	↓	100	14	3	5,3	0,79	31,35	997,95	98	0
3	A1	Basic	2019-09-01	3:51	66° 35,438'	61° 11,644'	Beam Trawl	(bottom)	107	14	5,1	5,1	1,00	31,20	997,91	98	0
3	A1	Basic	2019-09-01	4:12	66° 35,662'	61° 12,375'	Beam Trawl	↑	95	60	2,1	5,2	0,62	31,41	997,86	98	0
3	PC1	CTD	2019-09-01	12:09	66° 47,266'	62° 22,226'	CTD-Rosette	↓	181	351	2,9	6,9	2,16	28,50	997,91	85	0
3	PC1	CTD	2019-09-01	12:12	66° 47,259'	62° 22,231'	CTD-Rosette	(bottom)	181	342	0,8	6,5	2,08	28,73	997,91	89	0
3	PC1	CTD	2019-09-01	12:16	66° 47,250'	62° 22,242'	CTD-Rosette	↑	181	346	1,5	6,4	2,08	28,81	997,91	91	0
3	PC1	Coring	2019-09-01	13:15	66° 47,224'	62° 22,127'	Piston Core	↓	181	343	6,5	5,5	2,20	29,10	997,92	94	0
3	PC1	Coring	2019-09-01	13:19	66° 47,224'	62° 22,134'	Piston Core	(bottom)	181	349	6,5	5,3	2,26	28,88	997,94	94	0
3	PC1	Coring	2019-09-01	13:26	66° 47,214'	62° 22,117'	Piston Core	↑	180	332	7,8	5,4	2,13	28,98	997,92	94	0
3	GC1	Coring	2019-09-01	15:00	66° 46,897'	62° 22,035'	Gravity Core	↓	173	343	10,9	5,3	3,52	27,29	997,73	94	0
3	GC1	Coring	2019-09-01	15:05	66° 46,903'	62° 22,040'	Gravity Core	(bottom)	173	343	10,9	5,6	2,55	27,83	997,65	93	0
3	GC1	Coring	2019-09-01	15:10	66° 46,896'	62° 22,067'	Gravity Core	↑	173	347	10,9	5,6	2,30	28,45	997,59	93	0
3	GC2	Coring	2019-09-01	16:12	66° 47,227'	62° 21,734'	Gravity Core	↓	176	334	11,6	5,6	2,15	28,80	997,58	91	0
3	GC2	Coring	2019-09-01	16:17	66° 47,230'	62° 21,739'	Gravity Core	(bottom)	176	333	12	5,6	2,04	28,92	997,6	90	0
3	GC2	Coring	2019-09-01	16:21	66° 47,217'	62° 21,727'	Gravity Core	↑	176	334	11,2	5,7	1,99	29,01	997,67	90	0
3	GC3	Coring	2019-09-01	16:50	66° 46,671'	62° 21,702'	Gravity Core	↓	166	354	11	5,9	3,63	27,40	997,65	89	0
3	GC3	Coring	2019-09-01	16:54	66° 46,674'	62° 21,711'	Gravity Core	(bottom)	166	354	9,9	5,9	3,67	27,42	997,59	89	0
3	GC3	Coring	2019-09-01	16:57	66° 46,672'	62° 21,701'	Gravity Core	↑	166	356	12	5,7	3,61	27,43	997,61	89	0
3	BC2	Coring	2019-09-01	17:39	66° 45,633'	62° 20,414'	Box Core	↓	115	331	11,4	5,5	2,64	27,03	997,47	91	0
3	BC2	Coring	2019-09-01	17:42	66° 45,633'	62° 20,419'	Box Core	(bottom)	115	336	11,6	5,4	2,79	28,19	997,49	91	0
3	BC2	Coring	2019-09-01	17:45	66° 45,632'	62° 20,418'	Box Core	↑	115	335	12,6	5,6	3,11	27,53	997,47	90	0
3	BC2	Coring	2019-09-01	17:57	66° 45,641'	62° 20,401'	Mooring	↓		335	14,3	6	2,99	27,85	997,32	88	0
3	BC2	Coring	2019-09-01	18:09	66° 45,655'	62° 20,349'	Mooring	↑		338	15	6	2,81	27,65	997,32	88	0
3	BC2	Coring	2019-09-01	18:21	66° 45,800'	62° 19,948'	Mooring	↓		336	14,7	5,9	2,91	26,80	997,33	89	0
3	BC2	Coring	2019-09-01	18:31	66° 45,779'	62° 19,927'	Mooring	↑		343	14,3	5,7	3,06	27,90	997,32	91	0
3			2019-09-01	19:06	66° 45,333'	62° 20,193'	Mooring	↑	101	348	12,8	5,6	2,51	28,61	997,24	93	0
3	PC2	Coring	2019-09-01	20:23	66° 47,823'	62° 22,510'	Gravity Core	↓	195	325	13,5	5,5	3,70	27,51	997,21	94	0
3	PC2	Coring	2019-09-01	20:27	66° 47,824'	62° 22,521'	Gravity Core	(bottom)	195	328	12,6	5,6	2,82	27,83	997,23	95	0
3	PC2	Coring	2019-09-01	20:31	66° 47,824'	62° 22,516'	Gravity Core	↑	195	328	12,9	5,5	2,53	28,43	997,24	96	0
3			2019-09-01	23:59	67° 04,862'	61° 58,992'	CPR	↓	98	346	8,4	4,6	2,43	29,19	997,95	97	0
3			2019-09-03	6:42	61° 10,405'	64° 46,151'	CPR	↑	396	301	20,9	2,6	2,16	32,03	998,55	96	0
3	352	Nutrient	2019-09-03	7:03	61° 09,639'	64° 47,916'	CTD-Rosette	↓	432	306	20,6	2,2	1,07	32,06	998,62	96	0
3	352	Nutrient	2019-09-03	7:15	61° 09,610'	64° 46,581'	CTD-Rosette	(bottom)	417	308	20,8	2,1	0,99	32,36	998,59	96	0
3	352	Nutrient	2019-09-03	7:46	61° 09,920'	64° 43,172'	CTD-Rosette	↑	404	312	18,5	2,2	1,49	32,28	998,52	96	0
3	354	Nutrient	2019-09-03	9:03	60° 58,738'	64° 45,011'	IKMT	↓	556	289	16	2,7	1,39	32,88	999,41	95	0
3	354	Nutrient	2019-09-03	9:21	60° 59,144'	64° 42,702'	IKMT	(bottom)	548	278	15	1,3	1,32	32,88	998,73	98	0
3	354	Nutrient	2019-09-03	9:55	61° 00,129'	64° 40,657'	IKMT	↑	548	275	20,4	1,4	1,32	32,90	998,75	98	0
3	354	Nutrient	2019-09-03	10:33	60° 58,052'	64° 46,281'	CTD-Rosette	↓	576	280	15,8	1,8	1,84	32,83	999,72	98	0
3	354	Nutrient	2019-09-03	10:44	60° 57,899'	64° 46,540'	CTD-Rosette	(bottom)	567	276	18,1	1,7	1,62	32,83	999,78	98	0
3	354	Nutrient	2019-09-03	11:23	60° 57,462'	64° 48,065'	CTD-Rosette	↑	589	279	23,4	1,7	1,61	32,85	999,36	98	0
3	354	Nutrient	2019-09-03	12:10	60° 58,472'	64° 46,510'	Ben Van Been	↓	563	270	16,8	1,3	1,28	32,88	999,24	97	0
3	354	Nutrient	2019-09-03	12:24	60° 58,402'	64° 47,560'	Ben Van Been	(bottom)	564	336	4	2,6	1,29	32,88	999,6	94	0
3	354	Nutrient	2019-09-03	12:34	60° 58,249'	64° 48,229'	Ben Van Been	↑	573	242	16,9	3,4	1,28	32,89	999,48	97	0
3	356	Nutrient	2019-09-03	13:40	60° 48,525'	64° 44,047'	CTD-Rosette	↓	343	273	15,4	2,1	1,25	32,46	1000,12	96	0
3	356	Nutrient	2019-09-03	13:47	60° 48,579'	64° 44,674'	CTD-Rosette	(bottom)	340	257	18,8	2,6	1,25	32,49	1000,19	94	0
3	356	Nutrient	2019-09-03	14:16	60° 49,111'	64° 46,573'	CTD-Rosette	↑	385	244	17,1	2,9	1,37	32,46	1000,27	91	0
3			2019-09-03	14:33	60° 49,468'	64° 47,957'	CPR	↓	392	244	20	2,4	1,33	32,47	1000,2	94	0
3			2019-09-04	5:57	58° 01,366'	59° 48,104'	CPR	↑	349	355	2,9	6,6	4,72	32,01	1007,48	82	0
3	643	Nutrient	2019-09-04	6:08	58° 00,903'	59° 47,547'	CTD-Rosette	↓	342	264	17,5	6,8	4,35	32,09	1007,55	80	0
3	643	Nutrient	2019-09-04	6:20	58° 00,815'	59° 47,349'	CTD-Rosette	(bottom)	343	272	12,6	6,7	4,27	32,12	1007,87	83	0
3	643	Nutrient	2019-09-04	6:52	58° 00,536'	59° 47,185'	CTD-Rosette	↑	334	277	15,8	6,5	4,76	32,01	1007,96	80	0
3	643	Nutrient	2019-09-04	7:14	58° 00,936'	59° 47,310'	Box Core	↓	352	247	10,9	6,2	4,90	31,97	1008,38	85	0
3	643	Nutrient	2019-09-04	7:19	58° 00,933'	59° 47,290'	Box Core	(bottom)	351	254	11,8	6,1	4,92	31,95	1008,4	86	0
3	643	Nutrient	2019-09-04	7:25	58° 00,916'	59° 47,301'	Box Core	↑	350	256	10,5	5,8	4,88	31,96	1008,39	87	0
3	643	Nutrient	2019-09-04	7:47	58° 00,724'	59° 46,746'	Agassiz Trawl	↓	349	266	9,1	6	4,86	31,95	1008,6	84	0
3	643	Nutrient	2019-09-04	8:02	58° 00,955'	59° 46,778'	Agassiz Trawl	(bottom)	370	279	12,9	6,7	4,84	31,95	1008,65	80	0
3	643	Nutrient	2019-09-04	8:19	58° 00,487'	59° 46,953'	Agassiz Trawl	↑	337	278	3,4	7,1	4,83	31,95	1009,03	77	0
3			2019-09-04	8:34	57° 59,788'	59° 46,262'	CPR	↓	324	239	7,6	6,6	4,86	31,95	1009,07	80	0
3	Kelp 2.3		2019-09-04	13:46	56° 46,580'	59° 41,053'	Box Core	↓	132	230	15,4	6,7	6,12	32,01	1012,59	87	0
3	Kelp 2.3		2019-09-04	13:50	56° 46,589'	59° 41,074'	Box Core	(bottom)	131	227	16,8	6,9	6,40	31,99	1012,4	87	0
3	Kelp 2.3		2019-09-04	13:53	56° 46,598'	59° 41,030'	Box Core	↑	131	232	13,9	7	6,50	31,99	1012,47	88	0
3	Kelp 2.3		2019-09-04	14:03	56° 46,582'	59° 40,954'	Box Core	↓	131	233	16,9	6,9	6,59	31,99	1012,52	87	0
3	Kelp 2.3		2019-09-04	14:07	56° 46,588'	59° 41,000'	Box Core	(bottom)	131	239	19,8	6,9	6,23	32,02	1012,6	86	0
3	Kelp 2.3		2019-09-04	14:11	56° 46,588'	59° 41,029'	Box Core	↑	132	228	16,9	7	6,53	31,98	1012,64	86	0
3	Kelp 2.3		2019-09-04	14:27	56° 46,712'	59° 40,801'	Agassiz Trawl	↓	129	220	16	8,2	6,47	31,99	1012,8	80	0
3	Kelp 2.3		2019-09-04	14:32	56° 46,873'	59° 40,648'	Agassiz Trawl	(bottom)	131	217	13,5	7,1	6,47	31,99	1012,6	86	0
3	Kelp 2.3		2019-09-04	14:43	56° 47,259'	59° 40,810'	Agassiz Trawl	↑	132	222	15	6,9	6,49	31,99	1012,56	86	0
3	Kelp 2.7		2019-09-04	17:46	56° 38,416'	60° 42,275'	Ben Van Been	↓	49	165	13,5	8,3	6,11	31,45	1011,66	77	0
3	Kelp 2.6		2019-09-04	17:48	56° 38,427'	60° 42,276'	Ben Van Been	(bottom)	49	172	12,6	8,5	6,24	31,35	1011,82	77	0
3	Kelp 2.5		2019-09-04	17:50	56° 38,433'	60° 42,295'	Ben Van Been	↑	46	168	11,4	8,4	6,41	31,36	1011,7	76	0
3	Kelp 2.4		2019-09-04	18:25	56° 37,244'	60° 45,247'	Ben Van Been	↓	175	144	11,2	8,9	5,39	31,28	1011,43	75	0
3	Kelp 2.3		2019-09-04	18:29	56° 37,250'	60° 45,247'	Ben Van Been	(bottom)	174	151	9,3	9,2	5,39	31,28	1011,53	71	0
3	Kelp 2.2		2019-09-04	18:33	56° 37,255'	60° 45,248'	Ben Van Been	↑	174	152	9,7	9,4	5,33	31,29	1011,6	70	0
3	Kelp 2.1		2019-09-04	18:43	56° 37,252'	60° 45,244'	Box Core	↓	175	150	8,9	9,1	5,37	31,29	1011,61	73	0
3	Kelp 2.1		2019-09-04	18:46	56° 37,246'	60° 45,243'	Box Core	(bottom)	174	145	10,1	9,1	5,35	31,29	1011,4	74	0
3	Kelp 2.1		2019-09-04	18:49	56° 37,246'	60° 45,243'	Box Core	↑	174	139	7,6	8,8	5,41	31,28	1011,54	75	0
3	Kelp 2.1		2019-09-04	19:12	56° 37,053'	60° 45,084'	Agassiz Trawl	↓	172	133	7	8,7	5,18	31,31	1011,39	80	0
3	Kelp 2.1		2019-09-04	19:19	56° 37,228'	60° 45,277'	Agassiz Trawl	(bottom)	174	145	8,6	8	5,37	31,28	1011,24	81	0
3	Kelp 2.1		2019-09-04	19:30	56° 37,055'	60° 45,333'	Agassiz Trawl	↑	165	148	8	8,2	5,64	31,27	1011,12	83	0
3	Kelp 1.1		2019-09-04	20:05	56° 35,889'	60° 48,721'	Box Core	↓	134	140	6,7	8,8	5,58	31,27	1011,12	75	0
3	Kelp 1.1		2019-09-04	20:08	56° 35,894'	60° 48,721'	Box Core	(bottom)	134	130	5,3	8,8	5,49	31,27	1011,11	76	0
3	Kelp 1.1		2019-09-04	20:11	56° 35,898'	60° 48,728'	Box Core	↑	134	140	5,7	8,6	5,50	31,27	1011,02	77	0
3	Kelp 1.1		2019-09-04	20:24	56° 35,843'	60° 48,936'	Agassiz Trawl	↓	135	157	6,1	8,4	5,56	31,27	1010,93	78	0
3	Kelp 1.1		2019-09-04	20:28	56° 35,761'	60° 49,136'	Agassiz Trawl	(bottom)	134	145	8,2	8,6	5,59	31,27	1011,02	77	0
3	Kelp 1.1		2019-09-04	20:35	56° 35,567'	60° 49,276'	Agassiz Trawl	↑	135	158	9,3	8,6	5,60	31,26	1010,92	78	0
3	Kelp 1.1		2019-09-04	20:55	56° 35,927'	60° 48,073'	Beam Trawl	↓	135	165	7,6	7,8	5,55	31,26	1010,64	83	0
3	Kelp 1.1		2019-09-04	21:08	56° 35,868'	60° 48,796'	Beam Trawl	(bottom)	135	169	7,2	7,5	5,61	31,27	1010,49	84	0
3	Kelp 1.1		2019-09-04	21:33	56° 34,907'	60° 49,777'	Beam Trawl	↑	105	162	11,4	7,3	4,63	31,16	1010,23	86	0
3	Kelp 3.1		2019-09-04	22:11	56° 30,452'	60° 48,707'	Box Core	↓	49	147	15,4	8,3	5,45	31,16	1009,51	83	0
3	Kelp 3.1		2019-09-04	22:13	56° 30,455'	60° 48,716'	Box Core	(bottom)	49	148	15,8	7,8	5,46	31,15	1009,48	83	0
3	Kelp 3.1		2019-09-04	22:15	56° 30,457'	60° 48,711'	Box Core	↑	49	151	14,5	7,6	5,52	31,12	1009,27	83	0
3	Kelp 3.1		2019-09-04	22:23	56° 30,496'	60° 48,692'	Box Core	↓	45	142	16	7,5	5,52	31,09	1009,17	84	0
3	Kelp 3.1		2019-09-04	22:25	56° 30,505'	60° 48,728'	Box Core	(bottom)	47	146	16,2	7,4	5,52	31,09	1009,44	84	0
3	Kelp 3.1		2019-09-04	22:27	56° 30,509'	60° 48,756'	Box Core	↑	40	151	16,6	7,5	5,36	31,15	1009,42	83	0
3	Kelp 3.1		2019-09-04	22:39	56° 30,653'	60° 48,576'	Box Core	↓	51	162	18,5	8	5,40	31,08	1009,1	82	0
3	Kelp 3.1		2019-09-04	22:41	56° 30,665'	60° 48,568'	Box Core	(bottom)	12	163	19,2	7,9	5,43	31,08	1009,07	82	0
3	Kelp 3.1		2019-09-04	22:42	56° 30,670'	60° 48,556'	Box Core	↑	12	155	19,4	7,7	5,41	31,10	1009,27	82	0
3	Kelp 3.1		2019-09-04	23:01	56° 31,018'	60° 48,654'	Box Core	↓	70				5,45	31,06			0
3	Kelp 3.1		2019-09-04	23:04	56° 31,042'	60° 48,660'	Box Core	(bottom)	70	160	17,7	8,1	5,49	31,11	1009,21	83	0
3	Kelp 3.1		2019-09-04	23:05	56° 31,048'	60° 48,655'	Box Core	↑	70	158	17,9	8	5,45	31,11	1009,17	83	0
3	Kelp 3.1		2019-09-04	23:32	56° 30,928'	60° 48,395'	Agassiz Trawl	↓	63	135	12,9	8,9	5,51	31,21	1009,44	79	0
3	Kelp 3.1		2019-09-04	23:35	56° 31,027'	60° 48,471'	Agassiz Trawl	(bottom)	72	160	14,1	8,3	5,58	31,12	1009,29	82	0
3	Kelp 3.1		2019-09-04	23:43	56° 31,111'	60° 49,017'	Agassiz Trawl	↑	59	144	15,4	7,3	5,41	31,08	1009,02	85	0

3	Kelp 3.3		2019-09-05	2:53	56° 28,887'	59° 37,693'	Box Core	↓	116	132	14,9	7,2	5,84	31,96	1007,52	89	0
3	Kelp 3.3		2019-09-05	2:55	56° 28,890'	59° 37,702'	Box Core	(bottom)	117	142	13,3	7,3	5,83	31,96	1007,62	89	0
3	Kelp 3.3		2019-09-05	2:58	56° 28,887'	59° 37,723'	Box Core	↑	117	134	15,2	7,2	5,72	31,98	1007,44	90	0
3	Kelp 3.3		2019-09-05	3:12	56° 28,809'	59° 37,379'	Box Core	↓	117	136	13,9	6,9	5,80	31,97	1007,21	91	0
3	Kelp 3.3		2019-09-05	3:14	56° 28,811'	59° 37,384'	Box Core	(bottom)	118	139	14,1	6,9	5,79	31,97	1007,21	91	0
3	Kelp 3.3		2019-09-05	3:18	56° 28,815'	59° 37,439'	Box Core	↑	116	135	14,3	6,9	5,79	31,97	1006,95	91	0
3	Kelp 3.3		2019-09-05	3:23	56° 28,801'	59° 37,518'	Box Core	↓	117	139	15	6,8	5,79	31,97	1006,94	91	0
3	Kelp 3.3		2019-09-05	3:25	56° 28,800'	59° 37,545'	Box Core	(bottom)	117	143	15,6	6,9	5,80	31,97	1006,91	91	0
3	Kelp 3.3		2019-09-05	3:33	56° 28,810'	59° 37,583'	Box Core	↑	118	139	15,8	6,8	5,78	31,97	1006,78	92	0
3	Kelp 3.3		2019-09-05	3:47	56° 28,960'	59° 37,761'	Agassiz Trawl	↓	117	134	11,4	10,3	5,80	31,97	1006,65	75	0
3	Kelp 3.3		2019-09-05	3:52	56° 29,085'	59° 37,986'	Agassiz Trawl	(bottom)	118	131	11,6	7,2	5,79	31,97	1006,41	91	0
3	Kelp 3.3		2019-09-05	4:05	56° 28,933'	59° 38,734'	Agassiz Trawl	↑	125	135	12	6,7	5,87	31,96	1006,02	93	0
3	Kelp 1.3		2019-09-05	5:11	56° 35,993'	59° 38,342'	Box Core	↓	102	115	14,1	6,9	6,32	31,98	1004,68	95	0
3	Kelp 1.3		2019-09-05	5:13	56° 35,993'	59° 38,352'	Box Core	(bottom)	101	119	14,5	7	5,97	31,99	1004,6	95	0
3	Kelp 1.3		2019-09-05	5:16	56° 35,982'	59° 38,374'	Box Core	↑	102	121	13,3	7	6,38	31,97	1004,54	95	0
3	Kelp 1.3		2019-09-05	5:20	56° 35,972'	59° 38,394'	Box Core	↓	101	131	15,8	7,1	6,41	31,97	1004,39	95	0
3	Kelp 1.3		2019-09-05	5:22	56° 35,979'	59° 38,388'	Box Core	(bottom)	101	125	16,2	7,1	6,30	31,97	1004,25	96	0
3	Kelp 1.3		2019-09-05	5:26	56° 35,987'	59° 38,384'	Box Core	↑	101	123	15,2	7,2	6,34	32,01	1004,28	96	0
3	Kelp 1.3		2019-09-05	5:36	56° 35,970'	59° 38,391'	Box Core	↓	101	121	13,9	7,1	6,52	31,96	1004,04	96	0
3	Kelp 1.3		2019-09-05	5:38	56° 35,977'	59° 38,388'	Box Core	(bottom)	101	120	13,9	7,2	6,53	31,96	1004,01	96	0
3	Kelp 1.3		2019-09-05	5:42	56° 35,988'	59° 38,385'	Box Core	↑	101	124	13,3	7,1	6,54	31,96	1003,8	97	0
3	Kelp 1.3		2019-09-05	6:09	56° 35,989'	59° 38,593'	Box Core	↓	101	110	13,9	6,9	5,48	31,98	1002,84	98	0
3	Kelp 1.3		2019-09-05	6:11	56° 35,994'	59° 38,587'	Box Core	(bottom)	101	110	15,4	6,8	5,66	32,09	1002,81	98	0
3	Kelp 1.3		2019-09-05	6:16	56° 36,021'	59° 38,583'	Box Core	↑	101	108	13,9	6,8	6,44	31,96	1002,77	98	0
3	Kelp 1.3		2019-09-05	6:39	56° 39,202'	59° 38,629'	Box Core	↓	116	111	16,4	6,7	6,93	31,92	1002,23	98	0
3	Kelp 1.3		2019-09-05	6:41	56° 39,223'	59° 38,625'	Box Core	(bottom)	116	112	16,8	6,7	7,04	31,92	1002,12	98	0
3	Kelp 1.3		2019-09-05	6:46	56° 39,237'	59° 38,647'	Box Core	↑	116	99	14,9	6,7	6,56	31,95	1001,87	98	0
3	Kelp 1.3		2019-09-05	7:10	56° 39,215'	59° 38,736'	Box Core	↓	116	100	15,8	6,5	6,66	31,93	1001,52	98	0
3	Kelp 1.3		2019-09-05	7:12	56° 39,223'	59° 38,719'	Box Core	(bottom)	117	102	17,5	6,4	6,81	31,92	1001,43	98	0
3	Kelp 1.3		2019-09-05	7:17	56° 39,218'	59° 38,680'	Box Core	↑	116	104	15,2	6,5	6,56	31,93	1001,33	98	0
3	Kelp 1.3		2019-09-05	7:35	56° 39,396'	59° 39,119'	Agassiz Trawl	↓	115	105	16,9	6,2	6,92	31,91	1000,88	98	0
3	Kelp 1.3		2019-09-05	7:40	56° 39,359'	59° 39,423'	Agassiz Trawl	(bottom)	115	92	17,3	6,4	6,92	31,91	1000,65	98	0
3	Kelp 1.3		2019-09-05	7:54	56° 38,979'	59° 39,999'	Agassiz Trawl	↑	111	99	15	6,3	6,77	31,90	1000,25	98	0
3	Kelp 2.2		2019-09-05	9:43	56° 41,745'	60° 18,104'	Box Core	↓	484	86	18,1	7,8	6,33	31,52	996,96	97	0
3	Kelp 2.2		2019-09-05	9:51	56° 41,734'	60° 18,196'	Box Core	(bottom)	485	76	18,8	6,7	6,10	31,55	996,49	98	0
3	Kelp 2.2		2019-09-05	10:02	56° 41,594'	60° 18,362'	Box Core	↑	487	74	19	6,5	6,33	31,51	997,77	98	0
3	Kelp 1.2		2019-09-05	10:49	56° 35,992'	60° 17,562'	Box Core	↓	269	73	28,2	6,4	6,47	31,43	994,77	98	0
3	Kelp 1.2		2019-09-05	10:53	56° 36,006'	60° 17,578'	Box Core	(bottom)	266	74	25,5	6,5	6,47	31,43	994,79	98	0
3	Kelp 1.2		2019-09-05	10:58	56° 36,019'	60° 17,590'	Box Core	↑	266	74	23,4	6,5	6,46	31,43	994,87	98	0
3	Kelp 3.2		2019-09-05	11:47	56° 29,411'	60° 15,788'	Box Core	↓	117	88	22,1	6,6	4,33	31,70	993,62	98	0
3	Kelp 3.2		2019-09-05	11:50	56° 29,415'	60° 15,788'	Box Core	(bottom)	116	87	26,1	6,7	6,03	31,50	993,49	98	0
3	Kelp 3.2		2019-09-05	11:53	56° 29,425'	60° 15,788'	Box Core	↑	115	95	23,4	6,7	6,24	31,48	993,59	98	0
3	Kelp 3.2		2019-09-05	11:59	56° 29,416'	60° 15,875'	Box Core	↓	117	87	24,6	6,9	6,02	31,58	993,37	98	0
3	Kelp 3.2		2019-09-05	12:02	56° 29,444'	60° 15,870'	Box Core	(bottom)	119				6,26	31,47			0
3	Kelp 3.2		2019-09-05	12:04	56° 29,466'	60° 15,868'	Box Core	↑	120	91	26,7	6,8	6,27	31,48	993,09	98	0
3			2019-09-05	17:23	55° 32,252'	59° 13,875'	CPR	↓	214	187	8,8	9,7	6,49	31,19	984,73	98	0
3			2019-09-06	20:43	51° 11,599'	57° 20,007'	CPR	↓	96	264	22,8	14	13,97	30,39	1009,53	57	0
3			2019-09-07	10:06	49° 25,075'	60° 59,251'	CPR	↑	254	108	4,4	11,7	12,09	30,32	1018,66	88	0
3			2019-09-07	17:41	49° 00,826'	61° 57,917'	CPR	↓	35	52	15,2	17,5	13,81	29,84	1013,5	57	0
3			2019-09-08	18:40	49° 17,761'	67° 16,616'	CPR	↑	340	268	22,7	12	8,68	29,93	1005,65	74	0
3	PDM1	Coring	2019-09-08	19:39	49° 16,712'	67° 20,764'	Piston Core	↓	313	247	7,4	11,5	8,43	30,02	1007,64	75	0
3	PDM1	Coring	2019-09-08	19:44	49° 16,712'	67° 20,765'	Piston Core	(bottom)	313	249	6,9	11,7	8,56	29,98	1007,71	75	0
3	PDM1	Coring	2019-09-08	19:50	49° 16,713'	67° 20,772'	Piston Core	↑	313	282	7	12,1	8,60	29,97	1007,89	72	0
3	F2	Coring	2019-09-08	23:16	49° 15,613'	67° 51,513'	Piston Core	↓	111	268	5	10,9	7,29	29,92	1008,78	73	0
3	F2	Coring	2019-09-08	23:19	49° 15,611'	67° 51,511'	Piston Core	(bottom)	111	273	4,8	10,7	7,24	29,96	1008,78	75	0
3	F2	Coring	2019-09-08	23:22	49° 15,611'	67° 51,511'	Piston Core	↑	111	271	4,6	10,6	7,46	29,91	1008,9	76	0
3	CSG1	Coring	2019-09-09	13:15	47° 41,717'	69° 55,294'	Piston Core	↓	91	244	9,9	13	12,19	15,45	1022,51	68	0
3	CSG1	Coring	2019-09-09	13:18	47° 41,720'	69° 55,303'	Piston Core	(bottom)	91	234	9,7	13	12,21	15,42	1022,52	68	0
3	CSG1	Coring	2019-09-09	13:22	47° 41,713'	69° 55,294'	Piston Core	↑	91	239	10,5	13,1	12,24	15,35	1022,47	69	0
3	CSG2	Coring	2019-09-09	15:10	47° 43,891'	69° 54,984'	Piston Core	↓	137	74	4	13,8	11,54	16,28	1022,88	65	0
3	CSG2	Coring	2019-09-09	15:12	47° 43,892'	69° 54,989'	Piston Core	(bottom)	137	67	4,2	13,8	11,80	16,12	1022,85	63	0
3	CSG2	Coring	2019-09-09	15:16	47° 43,897'	69° 54,977'	Piston Core	↑	137	79	3,2	13,5	10,92	17,55	1022,84	65	0
3	CSG3	Coring	2019-09-09	17:59	47° 43,418'	69° 54,419'	Piston Core	↓	113	92	5,7	13,6	11,16	17,43	1022,25	62	0
3	CSG3	Coring	2019-09-09	18:01	47° 43,417'	69° 54,413'	Piston Core	(bottom)	113	90	6,1	13,3	11,19	17,42	1022,24	64	0
3	CSG3	Coring	2019-09-09	18:04	47° 43,420'	69° 54,411'	Piston Core	↑	113	93	6,9	13,2	11,27	17,25	1022,22	65	0
3	CSG4	Coring	2019-09-09	19:48	47° 42,535'	69° 56,258'	Gravity Core	↓	103	2	0,4	14	11,18	17,47	1022,58	71	0
3	CSG4	Coring	2019-09-09	19:50	47° 42,539'	69° 56,264'	Gravity Core	(bottom)	103	6	2,5	14,2	11,16	17,48	1022,6	71	0
3	CSG4	Coring	2019-09-09	19:52	47° 42,537'	69° 56,261'	Gravity Core	↑	102	16	1,9	14,5	11,15	17,49	1022,58	70	0
3	CSG4	Coring	2019-09-09	19:53	47° 42,533'	69° 56,250'	Gravity Core	↓	102	25	1,5	14,4	11,14	17,50	1022,56	67	0
3	CSG4	Coring	2019-09-09	19:56	47° 42,538'	69° 56,255'	Gravity Core	(bottom)	103	99	1,9	13,8	11,13	17,51	1022,51	67	0
3	CSG4	Coring	2019-09-09	19:58	47° 42,545'	69° 56,260'	Gravity Core	↑	103	86	2,3	13,5	11,12	17,52	1022,5	67	0

Appendix 3: CTD Logbook

Leg	Cast #	Station	Start date UTC	Time UTC	Latitude (N)	Longitude (W)	Bottom depth	Cast depth	Comments	Rosette Type	init.
Leg 1a											
1a	001	test	2019-06-01	14:19:00	48°1,616	060°51,810	375	366		Test	PF
1a	002	M2092	2019-06-02	09:44:00	46°17,681	058°48,592	335	326		Mouillage	CG
1a	003	M2091	2019-06-02	13:34:00	46°10,140	059°9,074	92	83		Mouillage	PF
1a	004	HL_02	2019-06-07	11:37:00	44°16,070	063°18,976	151	145			CG
1a	005	transit	2019-06-08	13:52:00	47°41,070	059°37,380	427	421		Transit	PF
1a	006	AR7W_00	2019-06-09	22:26:00	53°33,700	055°39,616	105	98		New	PG
1a	007	AR7W_01	2019-06-10	00:41:00	53°40,655	055°33,173	154	145			CG
1a	008	AR7W_02	2019-06-10	03:36:00	53°47,624	055°26,206	203	195			CG
1a	009	AR7W_03	2019-06-10	06:24:00	53°59,209	055°15,101	148	139			PF
1a	010	AR7W_04	2019-06-10	09:28:00	54°13,148	055°1,454	167	159			PG
1a	011	AR7W_11	2019-06-11	11:03:00	55°36,492	053°37,892	2898	496		Bio	PG
1a	012	AR7W_11	2019-06-11	13:42:00	55°36,762	053°38,416	2898	2889	no Par no Ph	Chemical	CG
1a	013	AR7W_12	2019-06-11	18:14:00	55°50,671	053°23,480	3116	3107	no Par no Ph	Chemical	PF/PG
1a	014	AR7W_13	2019-06-12	01:03:00	56°6,647	053°7,302	3322	3312	no Par no Ph		CG
1a	015	AR7W_14	2019-06-12	07:40:00	56°32,200	052°40,709	3486	3478	no Par no Ph	Bio+Float	PF/PG
1a	016	AR7W_14.5	2019-06-12	13:02:00	56°48,854	052°23,478	3512	992	no Par no Ph	Bio	CG
1a	017	AR7W_15	2019-06-12	14:54:00	56°57,536	052°14,472	3508	3500	no Par no Ph	Bio+Float	PF
1a	018	AR7W_16	2019-06-12	22:36:00	57°22,717	051°47,118	3529	3522	no Par no Ph	Bio+Float	CG
1a	019	AR7W_17	2019-06-13	19:20:00	57°48,130	051°21,050	3579	3572	no Par no Ph	BIO	PF&PG
1a	020	AR7W_17.5	2019-06-14	02:02:00	58°0,500	051°6,624	3558	3550	no Par no Ph	CTD	PF
1a	021	AR7W_18	2019-06-14	06:25:00	58°13,067	050°53,240	3549	3540	no Par no Ph	BIO	PF&PG
1a	022	AR7W_18.5	2019-06-14	11:40:00	58°25,909	050°41,791		989	no Par no Ph	BIO	CG
1a	023	AR7W_19	2019-06-14	14:17:00	58°38,363	050°25,201	3519	3510	no Par no Ph		PF
1a	024	AR7W_19.5	2019-06-14	20:10:00	58°51,181	050°10,718	3496	3487	no Par no Ph	BIO	PG
1a	025	AR7W_20	2019-06-15	00:02:00	59°4,070	049°56,946	3461	3452	no Par no Ph		CG
1a	026	AR7W_20.5	2019-06-15	04:45:00	59°16,576	049°42,602	3421	3412	no Par no Ph	CTD	PF
1a	027	AR7W_21	2019-06-15	07:57:00	59°28,862	049°28,440	3390	3382	no Par no Ph	BIO	PF&PG
1a	028	AR7W_22	2019-06-15	13:05:00	59°44,970	049°9,923		1002		BIO	CG
1a	029	AR7W_22	2019-06-15	15:00:00	59°44,945	049°9,960	3220	3212	no Par no Ph	Chemical	PF
1a	030	AR7W_21,5	2019-06-15	18:40:00	59°36,989	049°18,595	3310	3299	no Par no Ph		PF&PG
1a	031	AR7W_24	2019-06-16	02:30:00	60°10,453	048°40,678	2859	2851	no Par no Ph	Chemical	PF&PG
1a	032	AR7W_22,5	2019-06-16	06:59:00	59°51,970	049°2,128	3118	3109	no Par no Ph	CTD	PF&PG
1a	033	AR7W_23.5	2019-06-16	10:19:00	60°4,961	048°47,386	2915	2906	no Par no Ph	CTD	CG
1a	034	AR7W_24.5	2019-06-16	13:31:00	60°13,924	048°36,469	2837	2830	no Par no Ph	CTD	CG
1a	035	AR7W_27	2019-06-16	16:42:00	60°26,864	048°21,869	142	133		BIO	PF
1a	036	AR7W_28	2019-06-16	18:34:00	60°33,944	048°13,571	138	128		BIO	PF
1a	037	AR7W_28	2019-06-16	19:37:00	60°33,796	048°13,548	147	137	rosette refaite	BIO	PF
1a	038	AR7W_28.5	2019-06-16	21:40:00	60°37,219	048°10,000	109	102			PF
1a	039	AR7W_25.5	2019-06-17	01:58:00	60°20,269	048°29,580	2000	1994	no Par no Ph, annulé	CTD	CG
1a	040	AR7W_25.5	2019-06-17	01:39:00	60°20,389	048°29,950	2000	21	no Par no Ph	CTD	CG
1a	041	AR7W_26	2019-06-17	04:06:00	60°22,300	048°25,050	1354	1344	no Par no Ph	BIO	PF
1a	042	AR7W_25	2019-06-17	08:48:00	60°17,554	048°33,006	2750	2741	no Par no pH	CHEM	PG
1a	043	AR7W_23	2019-06-17	16:16:00	59°59,009	048°53,856	3009	3000	no Par no pH	BIO	PG
1a	044	Lsc_01	2019-06-18	04:02:00	60°0,090	050°30,065	3224	3215	no Par no pH	BIO	PF
1a	045	Lsc_02	2019-06-18	08:20:00	59°59,995	051°7,548	3321	3313	no Par no pH	BIO	PG
1a	046	Lsc_03	2019-06-18	12:35:00	59°59,975	051°45,016	3359	3351			CG
1a	047	Lsc_04	2019-06-18	17:04:00	60°0,007	052°22,498	3362	3353			PF
1a	048	Lsc_05	2019-06-19	00:11:00	59°30,122	053°4,798	3424	3418	with WetLabs CDOM		CG
1a	049	Lsc_06	2019-06-19	05:47:00	59°0,306	053°9,744	3479	3471	with WetLabs CDOM		PF&PG
1a	050	Lsc_07	2019-06-19	11:17:00	58°30,403	053°14,645	3434	3424	with WetLabs CDOM	Bio	PG
1a	051	Lsc_08	2019-06-19	16:12:00	58°0,488	053°19,760	3472	3462	with WetLabs CDOM	BIO	PF
1a	052	Lsc_09	2019-06-19	21:25:00	57°30,773	053°24,570	3421	3413	with WetLabs CDOM		PG
1a	053	Lsc_10	2019-06-20	02:22:00	57°0,782	053°29,279	3381	3373			PG
1a	054	Lsc_11	2019-06-20	07:41:00	56°30,902	053°34,200	3331	3323			PF&PG
1a	055	ARW7_10	2019-06-20	14:48:00	55°25,078	053°49,633	2670	2664		BIO	PF&PG
1a	056	ARW7_9.5	2019-06-20	18:21:00	55°20,341	053°54,326	2396	2388		CTD	PF
1a	057	ARW7_9	2019-06-20	20:19:00	55°15,792	053°59,705	2072	2063			PG
1a	058	AR7W_8.5	2019-06-20	23:28:00	55°11,234	054°3,458	1550	1561			PG
1a	059	AR7W_8	2019-06-21	01:09:00	55°6,762	054°8,468	1005	990	with pH		CG
1a	060	AR7W_7.5	2019-06-21	03:45:00	55°1,920	054°13,006	542	533	PH		PF
1a	061	AR7W_07	2019-06-21	05:21:00	54°57,424	054°18,394	360	351	PH et par	BIO	PF
1a	062	AR7W_06	2019-06-21	08:04:00	54°45,787	054°29,488	242	232	PH et par	BIO	PG
1a	063	AR7W_05	2019-06-21	11:10:00	54°29,411	054°45,527	194	185			PG
1a	064	AR7W_10.5	2019-06-21	23:45:00	55°31,025	053°43,780	2839	2830	No Ph, No Par		PG
Leg 1b											
1b	065	ISECOLD 1-500	2019-06-25	12:57:00	57°42,306	059°31,618	599	592	WBAT réussi	Full	CW
1b	066	ISECOLD 1-1000	2019-06-26	01:36:00	57°42,715	059°22,656	1013	1000		Full	KR
1b	067	ISECOLD 1-1500	2019-06-26	13:34:00	57°43,193	059°5,106	1464	1454	No Par	Full	KR
1b	068	ISECOLD 1-2000	2019-06-27	04:10:00	57°43,771	058°41,682	1993	1986	No PAR, SUNA and WBAT	Full	KR
1b	069	ISECOLD 1-2000	2019-06-27	10:27:00	57°43,796	058°41,629		1501		WBAT	CW
1b	070	ISECOLD 1-2500	2019-06-28	02:29:00	57°44,406	057°53,017		1502	No Par	WBAT	KR
1b	071	ISECOLD 1-2500	2019-06-28	07:16:00	57°44,449	057°53,081	2490	2481	No PAR, SUNA and WBAT	Full	CW
1b	072	ISECOLD 2-2500	2019-06-29	00:40:00	58°54,538	058°51,024		1503	No Par	WBAT	CW
1b	073	ISECOLD 2-2500	2019-06-29	06:24:00	58°54,397	058°50,783	2396	2388	No PAR, SUNA and WBAT	Full	KR
1b	074	ISECOLD 2-2000	2019-06-29	15:17:00	58°50,801	059°22,098	1933	1924	No PAR, SUNA and WBAT	Full	CW
1b	075	ISECOLD 2-2000	2019-06-29	18:35:00	58°50,834	059°22,127		1504	No PAR	WBAT	KR

1b	076	ISECOLD 2-1500	2019-06-30	06:09:00	58°49,201	059°40,410	1515	1494	No PAR	Full	CW
1b	077	ISECOLD 2-1000	2019-06-30	16:10:00	58°47,188	059°55,768	1021	1016	No PAR	Full	KR
1b	078	ISECOLD 2-500	2019-07-01	00:49:00	58°46,464	060°2,839	529	521			CW
1b	079	ATLAS Lander Non-Sponge	2019-07-01	10:28:00	59°22,838	060°16,186	573	565		Mooring	KR
1b	080	HiBio-A	2019-07-02	09:12:00	60°27,748	061°10,152	953	945	No PAR, CDT seulement, pas d'eau	Mooring	CW
1b	081	HiBio-A	2019-07-02	19:04:00	60°28,044	061°8,700	1067	1057	No PAR	Mooring	KR
1b	082	Atlas Lander Sponge	2019-07-02	23:11:00	60°28,150	061°17,423	405	396	CTD Seulement	Mooring	CW
1b	083	Hibio-A-19	2019-07-03	17:19:00	60°28,753	061°14,100	704	695	CTD Seulement	Mooring	KR
1b	084	Sponge 4	2019-07-03	20:15:00	60°27,502	062°7,135	369	360	CTD Seulement	DFO Benthic	CW
Leg 2a											
2a	001	190	2019-07-08	12:27:00	66°35,586	061°11,868	102	92		full-nut	CW
2a	002	190	2019-07-08	15:34:00	66°33,934	061°11,906	122	113		full-bio	KR
2a	003	191	2019-07-08	22:23:00	66°38,167	060°34,045	501	492		nut	CW
2a	004	192	2019-07-09	10:07:00	66°42,300	059°57,816	689	679		nut	KR
2a	005	193	2019-07-09	12:54:00	66°46,202	059°20,330	959	949		Basic -nut	CW
2a	006	193	2019-07-09	19:16:00	66°45,162	059°20,626	951	944		Basic -bio	KR
2a	007	194	2019-07-10	01:12:00	66°49,790	058°21,354	862	853		nut	CW
2a	008	195	2019-07-10	04:48:00	66°54,718	057°16,078	782	772		nut	CW
2a	009	196	2019-07-10	09:02:00	66°59,202	056°3,646	132	123		Basic -nut	KR
2a	010	197	2019-07-10	16:16:00	67°2,470	055°5,221	69	59		nut/bio	KR
2a	011	198	2019-07-10	20:05:00	67°5,039	054°12,604	77	68		Full-nut	CW
2a	012	BB15	2019-07-11	10:04:00	68°27,071	055°54,017	494	486		nut	CW
2a	013	BB16	2019-07-11	19:28:00	69°8,899	051°52,396	362	352		nut/bio	KR
2a	014	BB18	2019-07-12	05:48:00	70°5,452	052°44,539	500	490		nut	KR
2a	015	228	2019-07-12	15:00:00	70°54,080	055°0,048	567	558		full-nut	CW
2a	016	228	2019-07-12	22:36:00	70°54,079	055°0,170	569	559		full-bio	KR
2a	017	229	2019-07-13	06:41:00	71°0,194	053°0,656	452	444		basic-nut	CW
2a	018	227	2019-07-13	17:47:00	70°47,824	056°59,269	538	529		nut	KR
2a	019	226	2019-07-13	22:13:00	70°42,060	059°0,356	592	584		basic-nut	CW
2a	020	226	2019-07-14	02:56:00	70°41,983	058°59,918	593	584		basic-bio	CW
2a	021	225	2019-07-14	09:50:00	70°36,008	060°59,864	889	879		nut	KR
2a	022	Float1	2019-07-14	18:50:00	69°30,332	061°0,308		989		Float	CW
2a	023	224	2019-07-15	04:46:00	70°26,476	062°58,838	2101	2090	pas de PAR, pas de SUNA	BGC shallow	CW
2a	024	224	2019-07-15	12:31:00	70°25,182	062°56,696	2094	2086	pas de PAR, pas de SUNA	BGC deep - bio	KR
2a	025	223	2019-07-15	19:48:00	70°16,273	064°49,058	1714	1705	pas de PAR	Nut BGC	CW
2a	026	223b	2019-07-15	23:51:00	70°9,707	065°47,966	443	432		Nut	KR
2a	027	222	2019-07-16	02:35:00	70°4,530	066°36,394	124	115		full-nut	KR
2a	028	222	2019-07-16	07:21:00	70°4,639	066°37,050	121	111		full-bio	CW
2a	029	BB2	2019-07-16	22:51:00	72°45,038	066°59,857	2368	2359		BGC shallow	CW
2a	030	BB2	2019-07-17	03:22:00	72°44,948	066°59,731	2369	2359		BGC deep - nut	KR
2a	031	BB2	2019-07-17	07:49:00	72°44,833	066°59,755		988		float	KR
2a	032	201							Pompe à off, cast annulé!	nut	CW
2a	033	201	2019-07-17	19:33:00	72°29,923	061°14,893	739	729	reprise du cast 032	nut	CW
2a	034	204	2019-07-18	02:46:00	73°16,166	057°59,976	961	952		Basic	KR
2a	035	204	2019-07-18	06:53:00	73°15,845	057°59,098	957	948		basic-bio	CW
2a	036	206	2019-07-18	14:25:00	74°4,337	059°2,248	174	164		Nut	KR
2a	037	210	2019-07-19	04:16:00	75°25,166	061°33,660	1173	1164	pas de PAR	basic-nut	CW
2a	038	210	2019-07-19	08:43:00	75°25,219	061°32,993	1172	1162	pas de PAR	basic-bio	KR
2a	039	BB24	2019-07-19	15:42:00	75°48,269	062°31,213	552	534	pas de PAR	nut	CW
2a	040	212	2019-07-19	19:51:00	75°38,178	064°37,205	508	499		CTD	KR
2a	041	214	2019-07-20	00:20:00	75°48,918	067°51,104	248	238		Nut	KR
2a	042	116	2019-07-20	04:59:00	76°22,446	070°29,929	149	140		Nut	CW
2a	043	115	2019-07-20	06:48:00	76°19,877	071°12,002	670	663		full-nut	CW
2a	044	115	2019-07-20	16:34:00	76°19,931	071°12,041	674	665		full-bio	KR
2a	045	114	2019-07-20	21:47:00	76°19,542	071°47,383	610	602		CTD	CW
2a	046	113	2019-07-20	23:05:00	76°19,157	072°12,940	552	542		nut	KR
2a	047	112	2019-07-21	01:13:00	76°18,985	072°42,302	567	558		CTD	CW
2a	048	111	2019-07-21	02:46:00	76°18,439	073°12,655	591	581		basic nut + bio	CW
2a	049	111	2019-07-21	07:25:00	76°18,468	073°12,973	595	585		basic bio	KR
2a	050	110	2019-07-21	11:41:00	76°17,784	073°37,300	527	517		nut	CW
2a	051	109	2019-07-21	14:15:00	76°17,374	074°6,157	453	444	Un des deux capteur de T est non fonctionnel	CTD	KR
2a	052	108	2019-07-21	17:41:00	76°15,466	074°35,892	445	438		full-bio	KR
2a	053	108	2019-07-21	23:34:00	76°15,520	074°36,092	445	435		full-nut	CW
2a	054	107	2019-07-22	08:26:00	76°16,841	074°59,083	440	432		Nut	CW
2a	055	106	2019-07-22	10:04:00	76°18,522	075°20,996	383	371		CTD	KR
2a	056	105	2019-07-22	12:25:00	76°19,291	075°46,264	339	328		Basic-nut	KR
2a	057	105	2019-07-22	16:39:00	76°19,105	075°45,809	331	321		basic-bio	CW
2a	058	104	2019-07-22	19:35:00	76°20,560	076°10,549	197	188		CTD	CW
2a	059	102	2019-07-22	22:23:00	76°22,636	077°0,877	253	243		CTD	CW
2a	060	103	2019-07-22	23:29:00	76°21,245	076°35,551	146	137		nut	KR
2a	061	101	2019-07-23	01:09:00	76°23,048	077°24,697	370	360		full-nut	KR
2a	062	101	2019-07-23	08:26:00	76°22,804	077°24,802	380	369		full-bio	CW
2a	063	100	2019-07-23	12:02:00	76°24,856	077°56,784	224	215		nut	KR
2a	064	322	2019-07-24	01:20:00	74°29,173	080°30,460	663	653		nut	CW
2a	065	300	2019-07-24	04:23:00	74°18,956	080°31,001	702	695		nut	KR
2a	066	323	2019-07-24	10:02:00	74°9,546	080°28,202	791	781		full-nut	CW
2a	067	323	2019-07-24	21:38:00	74°6,432	080°30,653	791	781		full-bio	KR
2a	068	324	2019-07-25	02:16:00	73°59,246	080°28,100	771	762		nut	CW
2a	069	325	2019-07-25	07:03:00	73°48,985	080°30,468	671	661		nut	KR
2a	070	NBI2	2019-07-25	16:08:00	72°55,944	080°17,124	195	185	Fin du leg 2a!	nut	CWKR

Leg 2b											
2b	071	Coring 2.6	2019-07-28	06:38:00	76°18,664	073°3,676	598	588	pb pressure sensor	CTD	LTPG
2b	072	122/site2.8	2019-07-28	16:41:00	77°20,290	075°1,919	642	632		Basic-bio	PG
2b	073	122/site2.8	2019-07-28	22:40:00	77°20,381	075°1,657	643	633		Basic-nut	LT
2b	074	126	2019-07-29	06:26:00	77°20,870	073°24,013	335	326		nut	PG
2b	075	129	2019-07-29	12:46:00	78°20,051	074°8,267	531	522		nut	lt
2b	076	132	2019-07-29	18:58:00	79°0,144	072°19,117	248	238	btl 17 and 18 not closed	nut	PG
2b	077	133	2019-07-30	01:31:00	79°34,679	070°16,025	167	158		Full-Bio	PG
2b	078	133	2019-07-30	03:24:00	79°34,679	070°17,341	167	156		full-nut	LT
2b	079	136	2019-07-31	06:11:00	80°21,907	067°40,435	193	184		nut	PG
2b	080	134	2019-07-31	10:28:00	80°24,395	068°21,536	344	335		Full-Bio	LT
2b	081	134	2019-07-31	13:43:00	80°23,120	068°26,736	382	371		Full-Nut	LT
2b	082	135	2019-07-31	18:25:00	80°26,364	068°55,795	336	327		Nutrient	PG
2b	083	137	2019-08-01	03:34:00	81°4,294	066°0,437	357	347		nut	lt
2b	084	138	2019-08-01	05:41:00	81°0,595	065°22,079	389	380		nut	lt
2b	085	ken 1	2019-08-01	09:52:00	81°22,009	064°11,334	493	484		nut	PG
2b	086	site 6.4	2019-08-01	15:07:00	81°37,156	063°17,998	789	781	Cancelled during the upcast	Full-Bio	PG
2b	087	site 6.4	2019-08-01	16:50:00	81°36,202	063°27,908	760	99	End of the cast 086	Full-Bio	PG
2b	088	Rob1	2019-08-02	03:01:00	81°45,685	062°21,452	709	700		Rosette	PG
2b	089	6,4	2019-08-02	16:14:00	81°37,031	063°15,930	806	798		nut	lt
2b	090	251b	2019-08-03	06:57:00	80°58,457	061°20,406	1030	963		Rosette	lt
2b	091	Talbot	2019-08-05	08:07:00	77°50,182	077°2,983	528	519		Full-bio	PG
2b	092	Talbot	2019-08-05	14:18:00	77°50,196	077°2,876	523	512		Full-Nut	LT
2b	093	177	2019-08-06	08:42:00	77°20,033	077°2,423	431	421		nut	LT
2b	094	site 2.5	2019-08-06	16:11:00	76°21,468	077°30,246	374	365		coring	PG
2b	095	290	2019-08-06	22:13:00	76°7,936	080°20,394	171	159		nut	lt
2b	096	291	2019-08-07	00:04:00	75°59,542	080°22,218	678	671		nut	PG
2b	097	292/site2.2	2019-08-07	02:49:00	75°51,136	080°25,363	626	616			lt
2b	098	293	2019-08-07	05:09:00	75°43,906	080°41,543	618	609		basic bio	lt
2b	099	293	2019-08-07	07:04:00	75°43,711	080°40,434	619	610		basic nut	PG
2b	100	site 2.3	2019-08-07	20:19:00	76°7,868	083°1,316	826	816		nut	PF
2b	101	site 2.4	2019-08-08	05:01:00	76°7,608	086°19,804	674	665		nut	PG
2b	102	site 1.4	2019-08-08	16:17:00	76°30,194	084°56,101	122	111		nut	lt
2b	103	295	2019-08-09	00:06:00	76°22,596	084°24,499	84	75		Basic	PG
2b	104	297	2019-08-10	00:30:00	76°22,405	081°18,053	442	432		nut	lt
2b	105	296	2019-08-10	11:03:00	75°31,402	079°44,902	558	548		Basic	PG
2b	106	site 2.7	2019-08-10	20:31:00	75°28,943	078°38,605	519	510		coring	PG
2b	107	302	2019-08-11	23:21:00	74°14,032	086°9,564	547	537		Basic	lt
2b	108	303	2019-08-12	10:19:00	74°22,279	089°37,242	297	286		Basic	lt
2b	109	305a	2019-08-12	21:04:00	74°13,337	093°30,986	154	145		nut	lt
2b	110	305b	2019-08-13	01:11:00	74°21,652	093°33,358	166	157		nut	PG
2b	111	305c	2019-08-13	05:29:00	74°29,003	093°38,414	168	158		nut	lt
2b	112	Wel01	2019-08-13	09:50:00	74°57,028	092°23,286	153	143		nut	PG
2b	113	Wel02	2019-08-13	12:45:00	75°0,815	093°6,872	244	237		Basic	PG
2b	114	305d	2019-08-14	00:32:00	74°35,968	093°42,995	130	121		nut	PF
Leg 3											
3	001	155	2019-08-17	15:28:00	72°29,274	078°45,385	286	277		basic	PF
3	002	2,4	2019-08-18	13:12:00	72°38,738	079°19,958	679	669		test	DC
3	003	NW 25k	2019-08-19	13:18:00	71°31,765	070°35,158	132	123		scott inlet	PF
3	004	NW 5k	2019-08-19	14:53:00	71°24,481	070°10,738	554	548		scott inlet	DC
3	005	NW 1k	2019-08-19	18:19:00	71°23,126	070°5,820	311	305		scott inlet	DC
3	006	170-stn0	2019-08-19	19:41:00	71°22,633	070°4,252	252	245		scott inlet	PF
3	007	SW 1k	2019-08-20	00:50:00	71°22,270	070°5,693	234	228		scott inlet	PF
3	008	SE 5k	2019-08-20	02:35:00	71°20,980	069°57,980	213	202		scott inlet	DC
3	009	SE 25k	2019-08-20	04:28:00	71°13,330	069°32,908	153	143		scott inlet	DC
3	010	170-stn0	2019-08-20	06:18:00	71°22,748	070°4,392	262	255		scott inlet	DC
3	011	NE 1k	2019-08-20	11:04:00	71°23,054	070°3,323	248	239		scott inlet	PF
3	012	SE 1k	2019-08-20	14:09:00	71°22,331	070°3,024	203	197		scott inlet	DC
3	013	E5	2018-11-30	00:00:00	00°0,000	000°0,000				Kebbab	PF
3	014	E4	2018-11-30	00:00:00	00°0,000	000°0,000				Kebbab	DC
3	015	E3	2018-11-30	00:00:00	00°0,000	000°0,000				Kebbab	PF
3	016	E2	2018-11-30	00:00:00	00°0,000	000°0,000				Kebbab	PF
3	017	E1	2018-11-30	00:00:00	00°0,000	000°0,000				Kebbab	DC
3	018	D1	2019-08-24	01:56:00	67°28,421	063°41,566	665	656		Kebbab	PF
3	019	D2	2019-08-25	02:34:00	67°51,478	063°9,113	275	265		Kebbab	PF
3	020	D3	2019-08-25	07:31:00	68°14,389	062°35,164	1573	1564	pas de PAR car prof»1000m	Kebbab	PF
3	021	D4	2019-08-25	17:27:00	68°37,238	062°0,341	1806	1797	pas de PAR car prof»1000m	Kebbab	DC
3	022	D5	2019-08-26	02:03:00	68°59,948	061°24,443	1835	1825	pas de PAR car prof»1000m	Kebbab	PF
3	023	C5	2019-08-26	14:08:00	68°8,926	059°58,138	1381	1372	pas de PAR car prof»1000m	Kebbab	DC
3	024	C4	2019-08-27	02:00:00	67°57,166	060°37,351	1608	1599	pas de PAR car prof»1000m	Kebbab	PF
3	025	C3	2019-08-27	09:41:00	67°45,118	061°16,117	1567	1558	pas de PAR car prof»1000m	Kebbab	DC
3	026	C2	2019-08-27	22:18:00	67°32,605	061°55,685	329	323	Par on	Kebbab	PF
3	027	C1	2019-08-28	03:28:00	67°20,948	062°31,319	141	131	Par on	Kebbab	PF
3	028	B1	2019-08-29	02:57:00	67°3,626	061°30,565	115	106	Nouvelle rosette	Kebbab	DC
3	029	B2	2019-08-29	10:10:00	67°12,014	060°53,858	645	635	Nouvelle rosette	Kebbab	DC
3	030	B3	2019-08-29	16:35:00	67°19,770	060°16,237	1083	1074	Nouvelle rosette	Kebbab	PF
3	031	B4	2019-08-29	23:55:00	67°27,889	059°38,836	1440	1429	Nouvelle rosette	Kebbab	DC
3	032	B5	2019-08-30	05:37:00	67°35,131	059°1,229	1204	1194	Nouvelle rosette	Kebbab	PF
3	033	A5	2019-08-30	17:54:00	66°46,528	057°50,755	696	687	Nouvelle rosette	Kebbab	DC
3	034	A4	2019-08-31	07:04:00	66°43,614	058°42,500	800	791	Nouvelle rosette	Kebbab	PF

3	035	A3	2019-08-31	12:49:00	66°40,483	059°33,796	867	859	Nouvelle rosette	Kebbab	DC
3	036	A2	2019-08-31	20:21:00	66°36,926	060°24,784	514	505	Nouvelle rosette	Kebbab	PF
3	037	A1	2019-09-01	01:25:00	66°35,341	061°12,660	85	75	Nouvelle rosette	Kebbab	DC
3	038	PC1	2019-09-01	12:09:00	66°47,267	062°22,226	177	167	pas de bouteilles juste CTD	FJORD	PF
3	039	352	2019-09-03	07:07:00	61°9,575	064°47,510	413	408		Nutrient	DC
3	040	354	2019-09-03	10:33:00	60°58,051	064°46,282	575	569		Nutrient	PF
3	041	356	2019-09-03	13:40:00	60°48,526	064°44,048	337	327		Nutrient	PF
3	042	643	2019-09-04	06:13:00	58°0,870	059°47,454	341	334		Nutrient	PF

Appendix 4: List of Participants

Leg	Name	Position	Affiliation	Network Investigator/Supervisor	Embark place	Embark date	Disembark place	Disembark date
Leg 3	Afenyo, Mawuli	Postdoctoral Fellow	University of Manitoba	Ng, Adolf / Stern, Gary	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 3	Altshuler, Ianina	Postdoctoral Fellow	NRC Montréal / University of Calgary	Charles Greer / Hubert, Casey	Resolute Bay	15-08-2019	TBD	TBD
Leg 2a,2b	Amirault, Daniel	Professional	Amundsen Science	Forest, Alexandre	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 2a	Amiraux, Rémi	Postdoctoral Fellow	Université Laval	Tremblay, Jean-Éric	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 2a, 2b	Anderlini, Tia	PhD Student	University of Victoria	Cullen, Jay	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 3	Athey, Samantha	PhD Student	University of Western Ontario	Stern, Gary	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 2b, 3	Aubry, Cyril	Research Staff	Université Laval	Fortier, Louis	Pond Inlet	26-07-2019	Quebec City (End)	10-09-2019
Leg 2a, 2b	Awashish Soucy, Yoan	MSc Student	Université Laval	Fortier, Louis	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 2a	Baak, Julia	Professional	Canadian Wildlife Service - ECCC	Gjerdrum, Carina	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 1a	Barthelotte, Jay	Professional	Fisheries and Oceans Canada - BIO	Moors-Murphy, Hilary	Quebec City (Start)	30-05-2019	Dartmouth BIO	03-06-2019
Leg 2a	Bernstein-Lavoie, Sarah	Research Staff	University of Toronto / Environment and Climate Change Canada	Jantunen, Liisa	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 3	Bhatnagar, Srijak	Postdoctoral Fellow	University of Calgary	Hubert, Casey	Resolute Bay	15-08-2019	Qikiqtarjuaq	24-08-2019
Leg 2a	Boulard, Marion	PhD Student	Memorial University	Geoffroy, Maxime	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 2b	Bourbonnais, Annie	Researcher/Professor	University of South Carolina	Bourbonnais, Annie	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 3	Broom, Laura	Professional	Geological Survey of Canada / Natural Resource Canada	Normandeau, Alexandre	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 2b	Brossard, Jade	MSc Student	Université du Québec à Rimouski - Institut des sciences de la mer	Montero-Serrano, Jean-Carlos	Pond Inlet	26-07-2019	Quebec City (End)	10-09-2019
Leg 3	Caissy, Pascale	MSc Student	Université Laval	Fortier, Louis	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 3	Cameron, Douglas	Professional	Amundsen Science	Forest, Alexandre	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 1a	Capelle, David	Postdoctoral Fellow	University of Manitoba - CEOS	Papakyriakou, Tim	Quebec City (Start)	30-05-2019	Dartmouth BIO	03-06-2019
Leg 3	Carson, Tom	Professional	Geological Survey of Canada / Natural Resource Canada	Normandeau, Alexandre	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 1a	Caverhill, Carla	Research Staff	Fisheries and Oceans Canada - BIO	Devred, Emmanuel	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 3	Charette, Joannie	Research Staff	Fisheries and Oceans Canada	Michel, Christine	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 1b	Chawarski, Julek	PhD Student	Memorial University	Geoffroy, Maxime	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1b	Chen, Shaomin	PhD Student	Dalhousie University	Sherwood, Owen	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1a	Cheng, Lin	Research Staff	Dalhousie University	Atamanchuk, Dariia / Wallace, Douglas	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1a	Childs, Darlene	Research Staff	Fisheries and Oceans Canada - BIO	Azetsu-Scott, Kumiko	Quebec City (Start)	30-05-2019	St. Anthony	23-06-2019
Leg 3	Ciastek, Stephen	Technician	University of Manitoba - CEOS	Kuzyk, ZouZou	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 2a, 2b	Cinq-Mars, Guillaume	MSc Student	Université Laval	Tremblay, Jean-Éric	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 2b	Corminboeuf, Anne	MSc Student	Université du Québec à Rimouski - Institut des sciences de la mer	Montero-Serrano, Jean-Carlos	Pond Inlet	26-07-2019	Quebec City (End)	10-09-2019
Leg 1b	Cote, David	Researcher/Professor	Fisheries and Oceans Canada	Cote, David	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1b	Cramm, Margaret	Research Staff	University of Calgary	Hubert, Casey	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 3	Cramm, Margaret	Technician	University of Calgary	Hubert, Casey	Resolute Bay	15-08-2019	Qikiqtarjuaq	24-08-2019
Leg 2a	Crew, Alexandre	BSc Student	University of Toronto / Environment and Climate Change Canada	Jantunen, Liisa	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 2b	Dalton, Abigail	PhD Student	University of Ottawa	Copland, Luke	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 1b	de Moura Neves, Barbara	Postdoctoral Fellow	Fisheries and Oceans Canada	Cote, David	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 3	Deslongchamps, Gabrièle	Research Staff	Université Laval	Tremblay, Jean-Eric	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 1a	Devred, Emmanuel	Researcher/Professor	Fisheries and Oceans Canada - BIO	Devred, Emmanuel	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1b, 2a	Dezutter, Thibaud	Research Staff	Université Laval - Québec-Océan	Fortier, Louis	St. Anthony	23-06-2019	Pond Inlet	26-07-2019
Leg 2a	Dhifallah, Fatma	MSc Student	Université du Québec à Rimouski / ISMER	Rochon, André	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 1b	Dicker, Megan	Technician	Nunatsiavut Government	Laing, Rodd	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 3	Duffaud, Constance	MSc Student	Fisheries and Oceans Canada	Michel, Christine	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 1b	Dukhovskoy, Dmitry	Researcher/Professor	Florida State University	Dukhovskoy, Dmitry	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 2a, 2b	Dumais, Philippe-Olivier	MSc Student	Université Laval	Archambault, Philippe	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 2b	Dumas-Lefebvre, Élie	MSc Student	Université du Québec à Rimouski - Institut des sciences de la mer	Dany Dumont	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 3	Ellis, Madison	TBD	NRC Montréal / University of Calgary	Charles Greer / Hubert, Casey	Resolute Bay	15-08-2019	Qikiqtarjuaq	24-08-2019
Leg 3	Etuangat, Jason	Research Staff	Fisheries and Oceans Canada	Hedges, Kevin	Qikiqtarjuaq	24-08-2019	Quebec City (End)	10-09-2019
Leg 2a, 2b	Evans, Joshua	PhD Student	University of New Brunswick	Limoges, Audrey	Iqaluit	04-07-2019	Resolute Bay	15-08-2019

Leg 1b	Evans, Rebecca	MSc Student	Memorial University	Snelgrove, Paul	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 3	Evans, Rebecca	MSc Student	Memorial University	Snelgrove, Paul	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 1a	Faulkner, Melissa	Technician	Fisheries and Oceans Canada - BIO	Azetsu-Scott, Kumiko	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 2b	Faye, Simon	PhD Student	Université du Québec à Rimouski - Institut des sciences de la mer	Rochon, André	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 1b	Ferguson-Roberts, Janet	MSc Student	Memorial University	Mercier, Annie	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1a, 1b	Ferrand, Paco	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Start)	30-05-2019	Iqaluit	04-07-2019
Leg 2b, 3	Ferrand, Paco	Professional	Amundsen Science	Forest, Alexandre	Pond Inlet	26-07-2019	Quebec City (End)	10-09-2019
Leg 3	Fisher, Jonathan	Researcher/Professor	Memorial University	Fisher, Jonathan	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 2a	Forest, Alexandre	Chief Scientist	Amundsen Science	Forest, Alexandre	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 2b	Francisco, Jesse	MSc Student	University of Toronto / Environment and Climate Change Canada	Jantunen, Liisa	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 2b	Freyria, Nastasia	PhD Student	Université Laval	Lovejoy, Connie	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 2a, 2b	Gagnon, Jonathan	Research Staff	Université Laval - Québec-Océan	Tremblay, Jean-Éric	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 1a	Ganeshram, Raja S.	Researcher/Professor	University of Edinburgh	Ganeshram, Raja	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 2b	Garbo, Adam	MSc Student	University of Ottawa	Copland, Luke	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 1a	Geshelin, Yuri	Research Staff	Fisheries and Oceans Canada - BIO	Azetsu-Scott, Kumiko	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1a	Golombek, Nina	PhD Student	Dalhousie University	Sherwood, Owen	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1a	Gombault, Colline	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Start)	30-05-2019	St. Anthony	23-06-2019
Leg 3	Góngora Bernoske, Esteban	PhD Student	McGill University	Lyle White / Charles Greer	Resolute Bay	15-08-2019	Qikiqtarjuaq	24-08-2019
Leg 2a, 2b	Grant, Cindy	Research Staff	Université Laval	Archambault, Philippe	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 1a	Guillot, Pascal	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Start)	30-05-2019	St. Anthony	23-06-2019
Leg 2b	Guillot, Pascal	Professional	Amundsen Science	Forest, Alexandre	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 3	Hammett, Devin	BSc Student	University of Manitoba - CEOS	Kuzyk, ZouZou	Qikiqtarjuaq	24-08-2019	Quebec City (End)	10-09-2019
Leg 1a	Head, Erica	Researcher/Professor	Fisheries and Oceans Canada - BIO	Ringuette, Marc	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1b	Herder, Erin	Professional	Fisheries and Oceans Canada	Cote, David	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1b	Hogan, Holly	Professional	Environment Canada and Climate Change	Gjerdrum, Carina	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 3	Hunnie, Blake	BSc Student	University of Manitoba - CEOS	Stern, Gary	Resolute Bay	15-08-2019	Qikiqtarjuaq	24-08-2019
Leg 1b	Ingle, Alex	Media/Artist	ATLAS-EU	van Oevelen, Dick	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 2b	Izett, Robert	PhD Student	University of British Columbia	Tortell, Philippe	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 1a	Jackson, Jeffrey	Professional	Fisheries and Oceans Canada - BIO	Yashayaev, Igor	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1a	Kam, Ka Ki (Kitty)	Research Staff	Dalhousie University	Atamanchuk, Dariia / Wallace, Douglas	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1a	Kitching, Tor	PhD Student	Dalhousie University	LaRoche, Julie	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1a	Klevjer, Thor	Researcher/Professor	Norwegian Institute of Marine Research, Norway	Ringuette, Marc	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1b	Komaki, Kanae	Professional	Amundsen Science	Forest, Alexandre	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 2a	Lagunas Morales, José	Research Staff	Université Laval / Takuvik	Babin, Marcel	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 1a	Lawson, Matthew	Technician	Fisheries and Oceans Canada - BIO	Moors-Murphy, Hilary	Quebec City (Start)	30-05-2019	St. Anthony	23-06-2019
Leg 2a, 2b	Linkowski, Thomas	Professional	Amundsen Science	Forest, Alexandre	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 2a	Lovejoy, Connie	Researcher/Professor	Université Laval	Lovejoy, Connie	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 1a	Ludkin, Derek Owen (Rick)	Professional	Environment and Climate Change Canada - Canadian Wildlife Service	Gjerdrum, Carina	Quebec City (Start)	03-06-2019	St. Anthony	23-06-2019
Leg 1a	MacIsaac, Kevin	Technician	Fisheries and Oceans Canada - BIO	Ringuette, Marc	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 2a, 2b	Mann, Philip	Professional	Canadian Ice Service - ECCC	Thibault, Érick	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 2a	Manning, Cara	Postdoctoral Fellow	University of British Colombia	Tortell, Philippe	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 3	Marcil, Catherine	MSc Student	Université Laval	Fortier, Louis	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 2a	Marec, Claudie	Research Staff	Université Laval / Takuvik	Babin, Marcel	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 2a	Marriott, Shawn	Technician	University of Calgary	Else, Brent	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 1b	McAllister, Amy	MSc Student	Memorial University	Snelgrove, Paul / Sherwood, Owen	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 2b	McIntyre, Jessie	Professional	Canadian Wildlife Service - ECCC	Gjerdrum, Carina	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 1a	Melville, Anna Olivia	PhD Student	Dalhousie University	LaRoche, Julie	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1b	Merzouk, Anissa	Chief Scientist	Amundsen Science	Forest, Alexandre	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1a	Michaud, Luc	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Start)	30-05-2019	Dartmouth BIO	03-06-2019
Leg 1b	Michaud, Luc	Professional	Amundsen Science	Forest, Alexandre	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 2b	Montero-Serrano, Jean-Carlos	Chief Scientist	Université du Québec à Rimouski - Institut des sciences de la mer	Jean-Carlos Montero-Serrano	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019

Leg 1b	Montgomery, Emaline	Research Staff	Memorial University	Mercier, Annie	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1a, 1b	Morisset, Simon	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Start)	30-05-2019	Iqaluit	04-07-2019
Leg 1b	Murphy, Andrew	Professional	Fisheries and Oceans Canada	Cote, David	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1a	Nelson, Richard	Research Staff	Fisheries and Oceans Canada - BIO	Azetsu-Scott, Kumiko	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 3	Normandeau, Alexandre	Chief Scientist	Geological Survey of Canada / Natural Resource Canada	Normandeau, Alexandre	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 1a, 1b, 2a	O'Dell, Lauren	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Start)	30-05-2019	Pond Inlet	26-07-2019
Leg 1a	Perry, Timothy	Technician	Fisheries and Oceans Canada - BIO	Ringuette, Marc	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 3	Picard, Marie-Hélène	BSc Student	Université Laval	Archambault, Philippe	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 2a, 2b	Pontbriand, Tommy	BSc Student	Université Laval	Fortier, Louis	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 2b	Prestie, Sarah	TBD	University of Calgary	Else, Brent	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 1a	Punshon, Stephen	Research Staff	Fisheries and Oceans Canada - BIO	Azetsu-Scott, Kumiko	Quebec City (Start)	30-05-2019	St. Anthony	23-06-2019
Leg 1a	Ringuette, Marc	Research Staff	Fisheries and Oceans Canada - BIO	Ringuette, Marc	Quebec City (Start)	30-05-2019	St. Anthony	23-06-2019
Leg 1b, 2a	Robert, Karine	Professional	Amundsen Science	Forest, Alexandre	St. Anthony	23-06-2019	Pond Inlet	26-07-2019
Leg 2b	Roberts, Megan	MSc student	Dalhousie University	Bertrand, Erin / Bhatia, Maya	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 2b	Rodgers, Tim	PhD Student	University of Toronto / Environment and Climate Change Canada	Stern, Gary	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 2b	Rodriguez-Cuicas, Maria-Emilia	MSc Student	Université du Québec à Rimouski - Institut des sciences de la mer	Montero-Serrano, Jean-Carlos	Pond Inlet	26-07-2019	Quebec City (End)	10-09-2019
Leg 3	Salimi, Mercedeh	PhD Student	Memorial University	Robert, Katleen	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 3	Schreiber, Lars	Research Staff	NRC Montréal / University of Calgary	Charles Greer / Hubert, Casey	Resolute Bay	15-08-2019	Qikiqtarjuaq	24-08-2019
Leg 1b	Schuster, Jasmin	PhD Student	Ocean Science Center - Memorial University	Geoffroy, Maxime	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 3	Sokolowski, Monica	MSc Student	University of Windsor	Hedges, Kevin	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 2b	Song, Sangmin	TBD	University of British Columbia	Tortell, Philippe	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 1a	Thamer, Peter	Technician	Fisheries and Oceans Canada - BIO	Ringuette, Marc	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 3	Thaysen, Clara	MSc Student	University of Toronto	Jantunen, Liisa	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 1a	Théberge, Alexandre	MSc Student	Université du Québec à Rimouski	Yashayaev, Igor	Quebec City (Start)	30-05-2019	St. Anthony	23-06-2019
Leg 2b, 3	Tisné, Lou	Professional	Amundsen Science	Forest, Alexandre	Pond Inlet	26-07-2019	Quebec City (End)	10-09-2019
Leg 2b	Tortell, Philippe	Researcher/Professor	University of British Columbia	Tortell, Philippe	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 3	Tremblay, Pascal	Technician	Fisheries and Oceans Canada	Michel, Christine	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 2b	Tremblett, Adam	MSc Student	Carleton University	Mueller, Derek	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 3	Trottier, Annie-Pier	Professional	Amundsen Science	Forest, Alexandre	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 1b	Tulloch, Graham	Professional	ATLAS-EU	van Oevelen, Dick	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1b	Vad, Johanne	Postdoctoral Fellow	ATLAS-EU	van Oevelen, Dick	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 1a	Vanderlaan, Angelia S.	Researcher/Professor	Fisheries and Oceans Canada - BIO	Higginson, Simon	Quebec City (Start)	30-05-2019	Dartmouth BIO	03-06-2019
Leg 3	Villeneuve, Vincent	TBD	Université Laval	Tremblay, Jean-Eric	Resolute Bay	15-08-2019	Quebec City (End)	10-09-2019
Leg 2a	Walker, Brett	Researcher/Professor	University of Ottawa	Walker, Brett	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 3	Weleschuk, Damien John	MSc Student	University of Calgary	Hubert, Casey	Resolute Bay	15-08-2019	Qikiqtarjuaq	24-08-2019
Leg 2a, 2b	Westbrook, Holly	MSc Student	University of South Carolina	Bourbonnais, Annie	Iqaluit	04-07-2019	Resolute Bay	15-08-2019
Leg 1b, 2a	Wilhelmy, Camille	Professional	Amundsen Science	Forest, Alexandre	St. Anthony	23-06-2019	Pond Inlet	26-07-2019
Leg 2b	Williams, Patrick	MSc Student	University of Alberta	Bhatia, Maya / Bertrand, Erin	Pond Inlet	26-07-2019	Resolute Bay	15-08-2019
Leg 1a	Xu, Jinshan	Researcher/Professor	Fisheries and Oceans Canada - BIO	Moors-Murphy, Hilary	Quebec City (Start)	30-05-2019	Dartmouth BIO	03-06-2019
Leg 1a	Yashayaev, Igor	Chief Scientist	Fisheries and Oceans Canada - BIO	Yashayaev, Igor	Dartmouth BIO	03-06-2019	St. Anthony	23-06-2019
Leg 1b	Young, Catherine	MSc Student	Memorial University	Snelgrove, Paul / Cote, David	St. Anthony	23-06-2019	Iqaluit	04-07-2019
Leg 2a	Zeidan, Sara	MSc Student	University of Ottawa	Walker, Brett	Iqaluit	04-07-2019	Pond Inlet	26-07-2019
Leg 2a	Zheng, Zhiyin (Zarah)	MSc Student	University of British Colombia	Tortell, Philippe	Iqaluit	04-07-2019	Pond Inlet	26-07-2019