2020 | Expedition Report

CCGS *Amundsen*

LEG 1
DFO AZOMP

LEG 2A
NRCan

LEG 2B
DFO ISECOLD

LEG 2C
ROV

LEG 3
CHS

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2020 Expedition Report

The 2020 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 (a, b and c) and Leg 3 of the CCGS *Amundsen* Expedition. The 2020 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 three 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 2020. 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 multidisciplinary project reports (sections 1 to 3). Biological sampling is described in section 4, and subsequent sections cover water colums properties (section 5), benthos sampling from the ROV (section 6) and seabed mapping (section 7).

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 amundsenscience.ulaval.ca/data/data-policy/ for more details on data policy).

Part I – Overview and Synopsis of Operations

1 Overview of the 2020 *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 29 large-scale national and international research initiatives that mustered 122 teams of scientists from academia, the North and the public and private sectors. In 16 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.

The 2020 expedition has been affected by the COVID-19 global pandemic. Therefore, the planning of the expedition changed several times and no scientific activities were conducted in the Arctic this year. On the 16th of July, the Canadian research icebreaker CCGS *Amundsen* left Quebec City for its 16th annual mission, this time heading to the Atlantic Ocean. The multidisciplinary expedition ran until 27 October and allowed 37 scientists from national research teams to study the marine and coastal environments of the Canadian and Greenlandic Atlantic Ocean. Programs onboard included the Atlantic Zonal Off-Shelf Monitoring Program (AZOMP), the Integrated Studies and Ecosystem Characterization Of the Labrador sea Deep Ocean (ISECOLD) program and the Natural Ressources Canada monitoring program. Mapping of the seabed also took place during Leg 3 in the southern Arctic while the ship was requisitioned for regular coast guard activities.

From aquatic microorganisms to corals to water properties and seabed mapping, numerous aspects of the northern environment were studied during this 96-day expedition.

1.1 Regional settings

1.1.1 *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 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, fisheries and other off-shore activities.

1.1.2 *Saguenay Fjord*

The Saguenay river originates in Lac St-Jean and flows into the St. Lawrence river. Its deep gorges are the result of the last glaciation and were invaded by the sea after the glaciers melted. The fjord is highly stratified because of the high fresh surface water input. As a result, salinity, temperature and water density change rapidly with depth and the deep waters of the Saguenay Fjord are very well oxygenated. The Saguenay river is home to many living species including the southernmost beluga colony. Its monitoring helps preserve a unique environment.

1.1.3 *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 Lancaster Sound, the science teams aboard the Amundsen extended their time series of seabed data. 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. Bathymetry data and sub-bottom information allow mapping the seafloor and identifying potential geohazards and obstacles to the safe navigation of this new seaway.

1.2 **2020 Expedition Plan**

1.2.1 *General schedule*

Based on the scientific objectives, the summer expedition was divided into three separate legs. Leg 1 took the *Amundsen* in the Labrador Sea for the DFO Atlantic Zonal Off-Shelf Monitoring Program. During Leg 2a and Leg 2b, the *Amundsen* stayed in the Labrador Sea for the Integrated Studies and Ecosystem Characterization Of the Labrador sea Deep Ocean program and the Natural Resources Canada Marine Geoscience & Marine Spatial Planning program before conducting ROV sea trials during Leg 2c in the Saguenay Fjord. During Leg 3, the ship was requisitioned for regular coast guard activities but conducted seabed mapping for the Canadian Hydrographic Service in the Southern Arctic Region during transits and dedicated survey areas before headeding back towards Quebec City.

1.2.2 *LEG 1 – AZOMP (16 July to 13 August 2020) Quebec City to St. John's*

The first leg of the expedition is dedicated to the Atlantic Zonal Off-Shelf Monitoring Program (AZOMP). This long-term monitoring program led by Fisheries and Oceans Canada in partnership with Amundsen Science and several Canadian universities, including Dalhousie University, University of Manitoba, Université du Québec à Rimouski, University of Alberta, and Université Laval, is centered around the annual survey of the physical, chemical, and biological properties of a long oceanographic transect (named AR7W) running from the Labrador coast to Greenland. No less than 70 oceanographic stations up to 3500 meters deep were visited during the campaign. Since 1990, AZOMP has provided groundtruth observations of key oceanic characteristics essential to understand the physical and biogeochemical connectivity between the Labrador Sea and the Canadian Arctic. A central goal of the program is to assess the long-term regional climate variability and carbon flux/heat exchange in the Labrador Sea, and ultimately its impact on the ecosystems' productivity, diversity, and fisheries.

1.2.3 *LEG 2a – NRCan (13 to 24 August) St. John's to St. John's*

Leg 2a supports the Natural Resources Canada Marine Geoscience & Marine Spatial Planning program, involving seafloor sediment survey and deep-sea sampling operations at key geological sites of the Northeast Newfoundland Shelf and Slope. Key sampling targets are located in the West Orphan Basin within Canada's Exclusive Economic Zone to support a better understanding of the offshore/geological resource potential of the region.

1.1.1 *LEG 2b – ISECOLD (24 August to 9 September) St. John's to Quebec City*

Leg 2b supports the Integrated Studies and Ecosystem Characterization of the Labrador Sea Deep Ocean (ISECOLD) program led by Dalhousie University in collaboration with Memorial University, Fisheries and Oceans Canada, University of Calgary, and several other institutions, that aim at characterizing the Northern Labrador Sea and coastal environments using a co-located sampling of several different ecosystem components (fish, plankton, benthos, water, physical environment, mapping, etc.). In particular, the program involves the recovery and redeployment of two long-term moorings in Hatton Basin and extensive surveys of the Makkovik Bank and Nain marine ecosystems along the Labrador coast. The program directly links with the goal of acquiring the required data to define future Marine Protected Areas on the northeastern coast of Canada.

1.1.2 *LEG 2c – Remotely operated vehicule (ROV) Sea Trials (17 to 22 September 2020) Quebec City to Quebec City*

Leg 2c focuses on the Amundsen's new light work-class Comanche ROV integration and sea trials. Initially, a comprehensive 3-week ROV oceanographic mission was to take place in 2020, but because of the COVID-19 crisis, this was postponed to 2021. However, the new equipment was integrated to the ship and fully tested in 2020 to be ready for next year's official first dives. The waters of the St. Lawrence Estuary offer the ideal environment to test the ROV deployment procedures and to try out its versatile and unique capacities. The trials' operations included undertaking video surveys, high-resolution still photography of benthic habitats, the collection of coral and other benthic fauna samples, as well as sediment sampling using precisely-positioned sediment push cores.

1.1.3 *LEG 3 – CHS (24 September to 24 October 2020) Southern Arctic Region*

Leg 3 is an opportunistic science leg led by the Canadian Hydrographic Service in collaboration with Amundsen Science and the University of New Brunswick. The primary objective of this hydrographic survey is on expanding the modern hydrographic data coverage in the proposed Low Impact Shipping Corridors of eastern Canada. This program mainly involves multibeam/seafloor charting operations along the Labrador Coast, in Hudson Strait, and in southern Baffin Bay (as feasible), in areas with low or poor existing bathymetric coverage. This leg was conducted concomitantly with regular Coast Guard operations in the southern Arctic and involved dedicated science operations on an opportunity basis. Data obtained from the campaign directly feed into updating existing bathymetric charts supporting the safer navigation of public and privately-owned vessels in Canadian waters.

2 Leg 1 – 16 July to 13 August – Labrador Sea

2.1 Introduction and Objectives

The first leg of the expedition is dedicated to the Atlantic Zonal Off-Shelf Monitoring Program (AZOMP), a long-term monitoring program. Since 1990, AZOMP has provided groundtruth observations of key oceanic characteristics essential to understand the physical and biogeochemical connectivity between the Labrador Sea and the Canadian Arctic. A central goal of the program is to assess the long-term regional climate variability and carbon flux/heat exchange in the Labrador Sea, and ultimately its impact on the ecosystems' productivity, diversity, and fisheries.

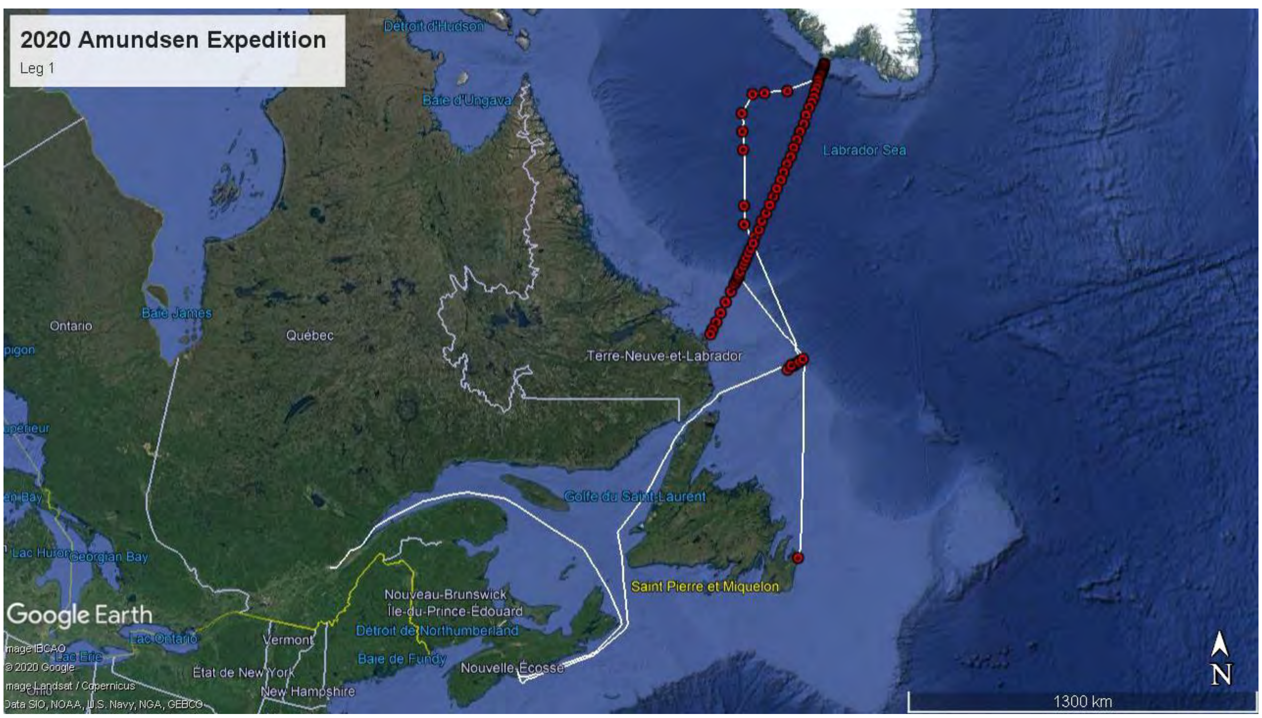

Figure 2-1: 2020 Amundsen Expedition Leg 1 cruise track and stations

2.2 **Synopsis of operations**

The Amundsen Science 2020 Leg 1 expedition took place in the Labrador Sea region (Figure 2-1). The expedition took place during July 16th – August 12th 2020, departing from Quebec City and returning to St. John's, Newfoundland on board CCGS *Amundsen*, with a short mobilization in Darmouth, NS on July 19th – 20th. The cruise activities consisted of sampling the ecosystem along the transect across the Labrador Sea.

The Amundsen 2020 Leg 1 expedition allowed the collection of:

- 70 Nets
- 16 Mezoplankton Nets
- 8 Argo floats
- 63 CTD Rosette
- 10 Hydrobios
- 7 Moorings

3 Leg 2a – 13 to 24 August – Labrador Sea

Chief Scientist: Vladimir E. Kostylev[1] (Vladimir.kostylev@canada.ca)

[1] *Geological Survey of Canada – Atlantic, Lands and Minerals Sector, Natural Resources Canada, Dartmouth, NS*

3.1 Introduction and objectives

Led by Natural Resources Canada (NRCan), the Seabed habitats and marine geohazards in Northeast Newfoundland slope program is a new Marine Geoscience for Marine Spatial Planning (MGMSP) program which aims at providing innovative regional geoscience products to support the Department of Fisheries and Oceans (DFO) Marine Spatial Planning and evidence-based decision-making.

In August 2019 a joint Geological Survey of Canada (Atlantic) and Canadian Hydrographic Service team carried out multibeam bathymetry mapping and sub-bottom profiling on board the Canadian Coast Guard ship Louis S. St. Laurent (LSSL) in the northern part of Orphan basin, as well as along the shelf break and slope from Orphan Spur to Notre Dame Trough. The multibeam survey gave new insight into surficial geology, geohazards and benthic habitats of the northeast Newfoundland slope, northern part of Orphan Basin and Orphan spur.

Better interpretation of geomorphological features observed in multibeam bathymetry and validation of preliminary interpretations of morphology and backscatter data required collection of ground-truth information on grain size distribution, stratigraphy, the age of slope failures, and on the nature of seabed habitats. Specifically, we planned to augment the existing geophysical data coverage of the area by carrying new multibeam bathymetry and sub-bottom profiler surveys, and to carry out piston and gravity coring, sampling of surficial sediments, and seabed imaging.

The scientific objectives of the Leg 2a included:

- geological mapping
- habitat mapping

- identification of geological hazards
- dating of geological hazards
- gaining better understanding of geological controls on ecological processes.

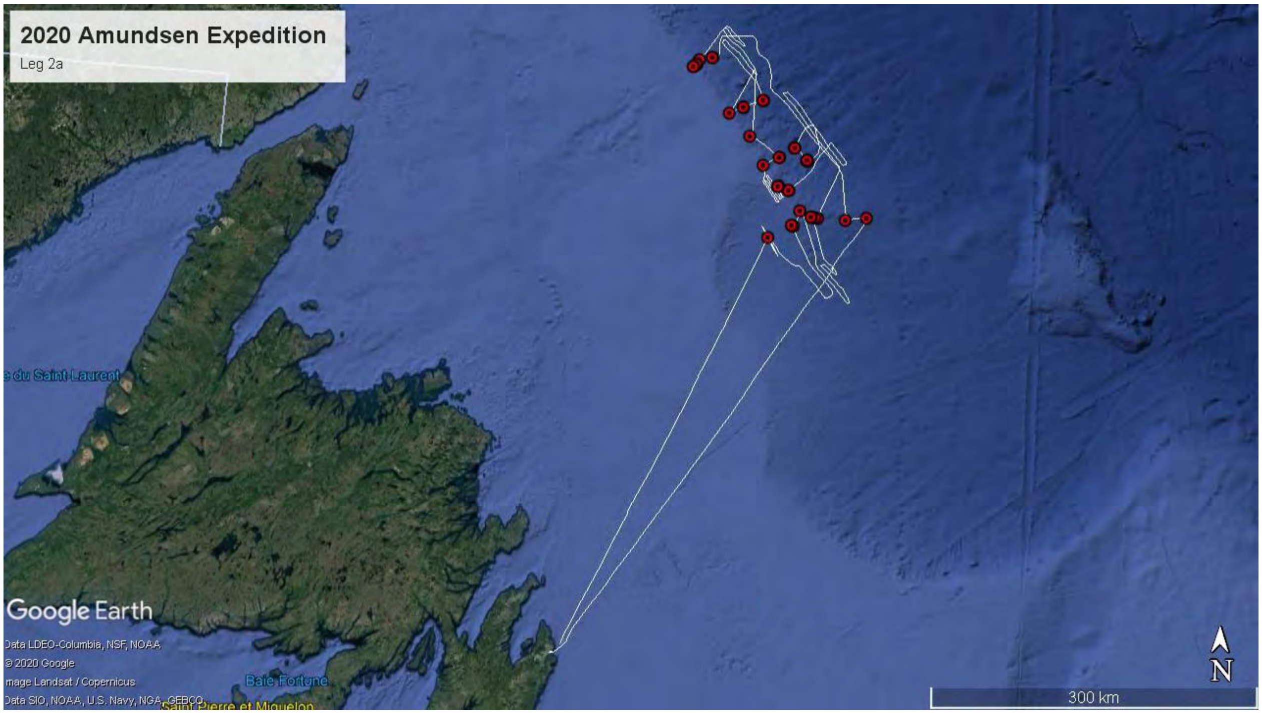

Figure 3-1: 2020 Amundsen Expedition Leg 2a cruise track and stations

3.1 **Sysnopsis of operations**

The Amundsen Science 2020 Leg 2a expedition took place in the northeast Newfoundland slope and northern Orphan Basin (Figure 3-1) region between Latitudes 50.1 – 52.6 N and Longitudes 51.1 – 48.8 W. The expedition took place during August 14th – 24th 2020, departing from and returning to St. John's, Newfoundland on board CCGS *Amundsen*. The cruise activities consisted of sampling the seabed by collecting piston cores, gravity cores, box cores, grabs and bottom camera imagery during daylight hours (approximately 6 am – 6 pm) and surveying the seabed using sub-bottom profiler and multibeam echosounder during night hours with sound velocity measurements taken along the track.

The Amundsen 2020 Leg 2a expedition allowed the collection of:

- 10 gravity cores

- 10 piston cores
- Total of 56.36 m of sediment cores
- 5 box cores
- 5 Van Veen grabs
- 18 drop camera stations, yielding 784 high-resolution photographs of sea bed
- 5900 km^2 of seabed mapped with Multibeam Echosounder in water depths of 433 m to 3049 m
- 1014 NM of 3.5 kHz sub-bottom profiler survey lines

4 Leg 2b – 24 August to 9 September – Labrador Sea

Chief Scientist: Maxime Geoffroy[1] (Maxime.Geoffroy@mi.mun.ca)
[1] *Marine Institute, Memorial University of Newfoundland, St. John's, NL*

4.1 Introduction and objectives

The Government of Canada has committed to protecting 30% of Canada's marine and coastal areas by 2030. In 2017, a study was initiated for a deep offshore portion of the northern Labrador Sea that was under consideration for a large offshore marine protected area. 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 were 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 2020, Leg 2b Expedition extends collections conducted in 2018 (Amundsen Leg 2c) and 2019 (Amundsen Leg 1b) and addresses these target areas. In addition to the scientific objectives of DFO, Leg 2b addresses the scientific objectives of several key academics, government, Indigenous and international collaborators.

The 2020 program (August 24-September 9, 2020) features many elements of the previous ISECOLD programs including drop camera surveys, box core collections, Isaac Kidd Midwater Trawls, rock dredges, Hydrobios plankton sampling, various hydro-acoustic assessments (WBAT, EK60), water collections, bottom mapping, and the deployment and retrieval of environmental sensors on moorings/landers. The operations in 2020 extend collections to the south of previous collections and also include some continental shelf sampling (off Nain and Makkovik) to inform future expeditions.

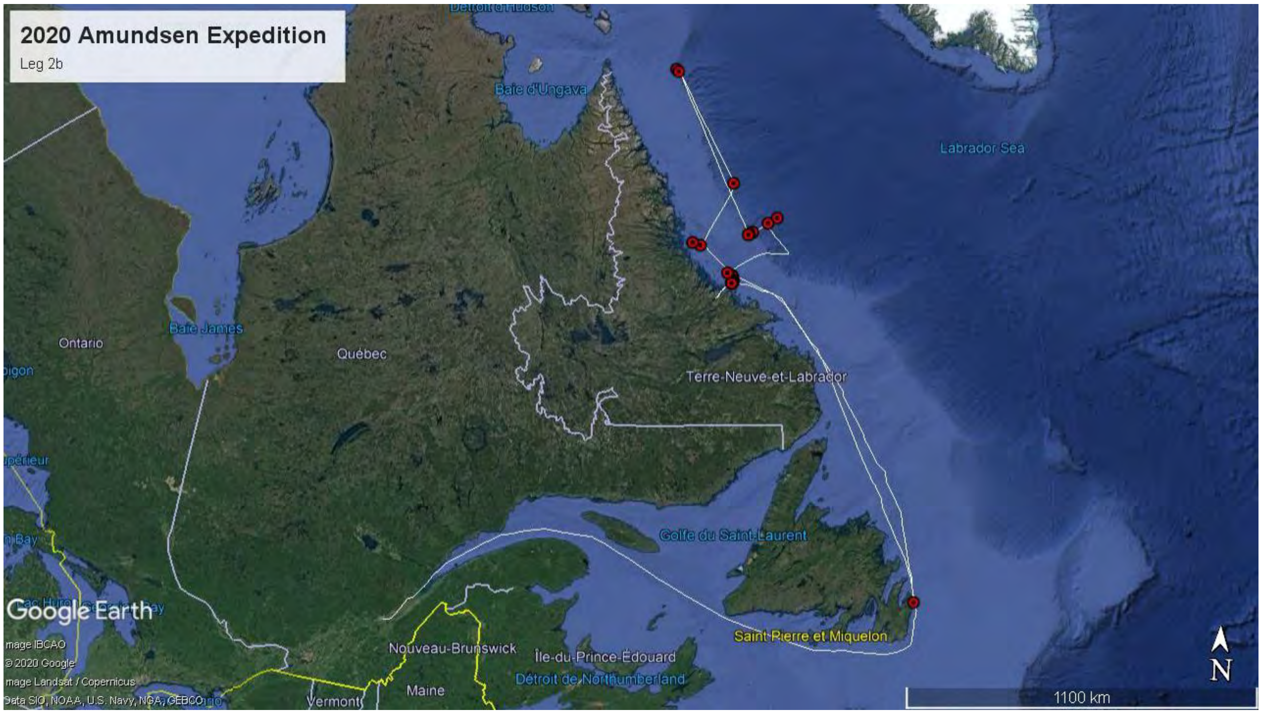

Figure 4-1: 2020 Amundsen Expedition Leg 2b cruise track and stations

4.2 Synopsis of operations

In total, 14 stations and 64 operations were planned for Leg 2b, of which 14 stations (100%) and 70 operations (109%; operations were added at certain stations) were accomplished. Program elements, their rationale, methods and preliminary results (where possible) are highlighted in greater in Part II.

Overall, the Amundsen 2020 Leg 2b expedition allowed the collection of:

- 4 baited camera deployments
- 1 bongo net
- 8 box cores
- 18 CTD Rosette
- 1 drifter
- 1 drone
- 14 Drop camera

- 6 Hydrobios
- 9 IKMT
- 3 mooring deployments
- 6 rock dredge
- 5400 MN travelled during Multibeam Echosounder and sub-bottom profiler data acquision

5 Leg 2c – 19 to 24 September – Saguenay Fjord

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

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

5.1 Introduction and objectives

Leg 2c focuses on the Amundsen's new light work-class Comanche ROV integration and sea trials. The new equipment has been integrated to the ship and tested to be ready for next year's official first dives. The waters of the Saguenay Fjord offer the ideal environment to test the ROV deployment procedures and to try out its versatile and unique capacities.

The specific objectives of Leg 2c were to:

- Test the ROV
- Collect biological samples opportunistically

Figure 5-1: 2020 Amundsen Expedition Leg 2c cruise track and stations

5.2 **Synopsis of operation**

Overall, the Amundsen 2020 Leg 2c expedition allowed the collection of:

- 7 successful ROV deployments
- 14 push-core samples (containing 11 corals)
- 534 Go of high-resolution submarine footage
- 3 zooplankton bongo-type nets (including 18 specimens of Borealis)

5.2.1 *Timeline of operations*

Thursday 17 September 2020

The CCGS *Amundsen* left her homeport of Quebec City at 9:00 AM on 17 September for a 5 day-mission in the Saguenay Fjord and St. Lawrence Estuary. The primary goal of the mission was to conduct the sea acceptance tests and sea trials of the new light-work class Comanche Remotely Operated Vehicle (ROV). The equipment has been built by Forum Energy Technologies (FTE) from November 2019 to July 2020 and was delivered to Quebec City on 22 August. Factory acceptance tests (FAT) were conducted in late July 2020 at the FTE Facility of Kirkbymoorside, UK. However, due to the COVID-19 travel restrictions, Amundsen Science could not join the FAT operations and opted to develop its own acceptance tests when the ROV would be delivered to Quebec City. Prior to the mission, integration of the new ROV and winch system on the CCGS *Amundsen* took place over 10-17 September 2020 (jointly conducted by staff from the Canadian Scientific Submersible Facility (CSSF) in collaboration with Amundsen Science). A side project to the ROV sea trials was the opportunistic sampling of cold-water *Mysidacae* species (zooplankton) by Université du Québec à Rimouski in the Saguenay fjord. As well, a complementary goal of the short mission was to assess the origin of the heightened vibration/noise caused by the rotation of the new propellers installed in spring 2020. The day of departure was dedicated to transit and assessment of the cause of the propeller's vibration by an independent technician. Familiarization tours were organized, and safety presentations were provided to the crew. The ship arrived at the mouth of the Saguenay fjord in the evening of 17 September and transited to the ROV sea trial site in Baie

Éternité overnight. A science meeting was organized in the evening to plan the next day and general schedule of the mission (i.e. 2 ROV dives per day). Light wind and sunny day.

Friday 18 September 2020

Zooplankton net tows were conducted in the early morning (6:00 to 7:30 AM) to collect *Mysidacae* species. The first dive of the ROV began at 8:00 AM. Safety procedures explained the day before were reviewed on the deck prior to the dive as a Toolbox meeting. The goal of the first dive at Baie Éternité was to generally test the deployment/recovery sequence on deck, floatability of the instrument, and manoeuverability in calm sea state conditions. The deck crew was well coordinated, and the dive was executed without any issue. The ROV was recovered around 11:00 AM. A second dive took place from 13:00 to 16:30 to further test the behavior of the ROV while conducting short transects. A debrief meeting was organized at 18:30 to discuss lessons learned and plan the next day. Light wind and sun.

Saturday 19 September 2020

Zooplankton net tows were once more conducted in the early morning (6:00 to 7:30 AM) to collect *Mysidacae* species. The first ROV dive of the began at 8:00 AM and ended at 11:15 AM. It provided the opportunity for additional training for the team with similar conditions as the day before, although the wind was stronger and the ship slightly more difficult to keep stationary. The plan for the afternoon dive was to introduce push core sampling and do aerial drone surveys at the deployment and recovery of the ROV. The plan was executed without any issue. Two push cores were collected as well a several individual small soft corals. Aerial footage of the ROV deployment and recovery was also recorded. The dive ended at 16:00. A major conclusion of the last two days of operation is that the "liveboat free-flying" deployment/recovery procedure of the Comanche ROV is far more straightforward than a deployment from the moonpool. The lack of a Tether-Management System (TMS cage) with the new system also offers more flexibility when the ROV is conducting operations around the vessel (less risk of being dragged, etc.). The horizontal range of the ROV as well as its manoeuverability around steep topography was successfully tested during the day. The ship departed from Baie Éternité at 17:00 for the second phase of the sea trials to be conducted in the St. Lawrence Estuary. A deeper site close to Forestville was selected based on the occurrence of stronger bottom currents with the aim of testing the ROV in more dynamic sea state conditions. Transit towards the site was conducted over-night.

Sunday 20 September 2020

The first operation of the day was a ROV dive that began at 8:00 AM nearby Forestville (350m depth). Light wind and sunny day, but tidal currents were presents. The ROV deployment was as planned, however, as soon as the ROV reached 20 m depth, a LIM alarm was seen at the control room and the dive was interrupted. The ROV was brought back on deck for investigation. After analysis, it was found that a dummy plug of one of the cameras has not been installed correctly. Two pins from the connector were inserted in the same hole of the dummy plug during maintenance the night before. A small water ingress in the dummy plug caused an electric field between the two pins, thus generating the LIM alarm. The ROV was set up for a second dive at 12:00. The goal of this second dive was to stay at the surface and inspect the propellers of the ship as part of the propeller noise/vibration investigation. The zodiac was launched to keep the umbilical at far-reaching distance from the ship. The investigation took 75 minutes and did not reveal any abnormality. The ROV was brought back on deck at 13:30. It was decided to quickly move forward with a third dive to begin at 14:15 as weather conditions were favorable.

This third dive would provide the opportunity to evaluate the near-bed conditions (bottom currents) and seafloor morphology/type. The ROV was launched at 14:15 as planned and the dive began without any problem. As things progress, the ROV encountered more and more stronger currents than at the surface. The Commanding Officer confirmed that the estuarine circulation was causing a shear at mid-water column with reversed currents near the sea floor compared with the surface. Below 250 m depth, high tension on the cable was noticeable and errors in the winch readings were observed (i.e. negative results as well as garbage reading and too-high numbers). When the ROV reached the seafloor, bottom currents were visually assessed to be near or greater than 2-knots (1 m/s). Although the ROV could cope with these conditions, the strong currents hindered any sediment sampling because of the low visibility (i.e. sediment resuspension) and difficulty to manoeuvre the ROV while the ship was pulled in the other direction. It was decided to bring back the ROV at the surface and end the dive. The ROV was brought back on deck at 16:00. A primary conclusion was that the conditions were too constraining to continue operations at the deep site. A common assessment was to opt for a return to Baie Éternité in order to dedicate the last day of the sea trials to additional training for the new members of the ROV team. The ship left Forestville around 17:00 and transited back over-night to the Saguenay fjord.

Monday 21 September 2020

Given the opportunity to be back at Baie Éternité, zooplankton net tows were conducted in the early morning (6:00 to 7:30 AM) to collect *Mysidacae* species for UQAR. The ROV dive began at 8:00 AM as usual and the deployment went without any issue. The goal for the last day of the sea trials was to conduct a unique long dive (8 hours) in order to fully test the capacity of the new equipment. The calm sea state conditions further offered the opportunity to test additional push core sediment sampling and soft coral sampling by new members of the ROV team. However, the 7-function arm began to behave erratically and shown signs of unresponsiveness after the push core sampling in late morning. An alarm was also noted, and the arm was judged too unresponsive to continue the dive. The ROV was brought back on deck at 11:20 AM. At that point in time, it was assessed that the repair of the arm could take up the full day. It was decided to stay at Baie Éternité until 17:00 as planned to provide a sheltered and clam environment to repair the arm. The ship dropped anchor at 11:45 AM. Fortunately, the issue with the 7-function arm was identified more rapidly than expected and the repair was completed by 13:25. In collaboration with the Commanding Officer, it was decided to use the remaining of the afternoon to conduct a short last dive while the ship was still anchored. The ROV was deployed at 14:00 and spent the rest of the afternoon collecting additional push cores and soft corals. The dive ended at 16:00. After the recovery, the ship departed for its transit back to Quebec City for demobilization of the ROV.

Tuesday 22 September 2020

The ship arrived in Quebec City by 6:30 AM. The day was devoted to demobilization of the ROV system, including the winch. Everything went smoothly.

6 Leg 3 – 24 September to 27 October – Southern Arctic Region

6.1 Introduction and Objectives

The primary objective of the 2020 Amundsen Expedition during Leg 3 is to convey a hydrographic survey and expand the modern hydrographic data coverage in the proposed Low Impact Shipping Corridors of eastern Canada. Mapping was conducted during transit and at dedicated survey areas. Regular Coast Guard operations (SAR mission) also took place during this Leg at the far western end of the cruise track (see Fig Figure 6-1). Leg 3 involved partners from the Canadian Hydrographic Service, Amundsen Science and the University of New Brunswick. Multibeam/seafloor charting operations were performed along the Labrador Coast, in Hudson Strait, and in southern Baffin Bay (as feasible), in areas with low or poor existing bathymetric coverage.

Figure 6-1: 2020 Amundsen Expedition Leg 3 cruise track and stations

Leg 3 operations were paused on the 6th day of Zone 2 dedicated mapping as the ship was called on for an escort mission. Two cargo vessels, the Adriaticborg (navigating West) and the Amstelborg (navigating East), required assistance breaking ice in the Victoria Strait region. The Amundsen left for its transit through the Northwest Passage on October 7th. It reached Cambridge Bay, Nunavut on the 14th where opportunistic surveys took place until the 15th; and completed the second escort and journey to the Hudson Strait on October 21st. Due to requirements to pick up a Bio-Argo float and an incoming storm which encouraged an early departure from the North, the ship only had time to complete half of a survey line at reduced speed in Zone 1 before returning to Quebec.

6.2 **Synopsis of operations**

Overall, the Amundsen 2020 Leg 3 expedition allowed the collection of:

- 5 CTD Rosette
- 7 drifters
- 16 XBT deployments
- 2 MVP profiling
- 12700 MN travelled during Multibeam Echosounder and sub-bottom profiler data acquision

Part II – Project reports

1 Seabed habitats and marine geohazards in Northeast Newfoundland slope, Labrador Sea

Project leaders: Vladimir. E. Kostylev[1] (Vladimir.kostylev@canada.ca)

Cruise participants – Leg 2a: Laura Bloom[1], Angus Robertson[1], Thomas E. Carson[1], Scott E. Hayward[1]

[1] *Geological Survey of Canada – Atlantic, Lands and Minerals Sector, Natural Resources Canada, Dartmouth, NS*

1.1 Introduction

The Amundsen Science 2020 Leg 2a expedition took place in the northeast Newfoundland slope and northern Orphan Basin (Figure 1-1) region between Latitudes 50.1 – 52.6 N and Longitudes 51.1 – 48.8 W. The expedition took place during August 14th – 24th 2020, departing from and returning to St. John's, Newfoundland on board CCGS *Amundsen*. The cruise activities consisted of sampling the seabed by collecting piston cores, gravity cores, box cores, grabs and bottom camera imagery during daylight hours (approximately 6 am – 6 pm) and surveying the seabed using sub-bottom profiler and multibeam echosounder during night hours with sound velocity measurements taken along the track.

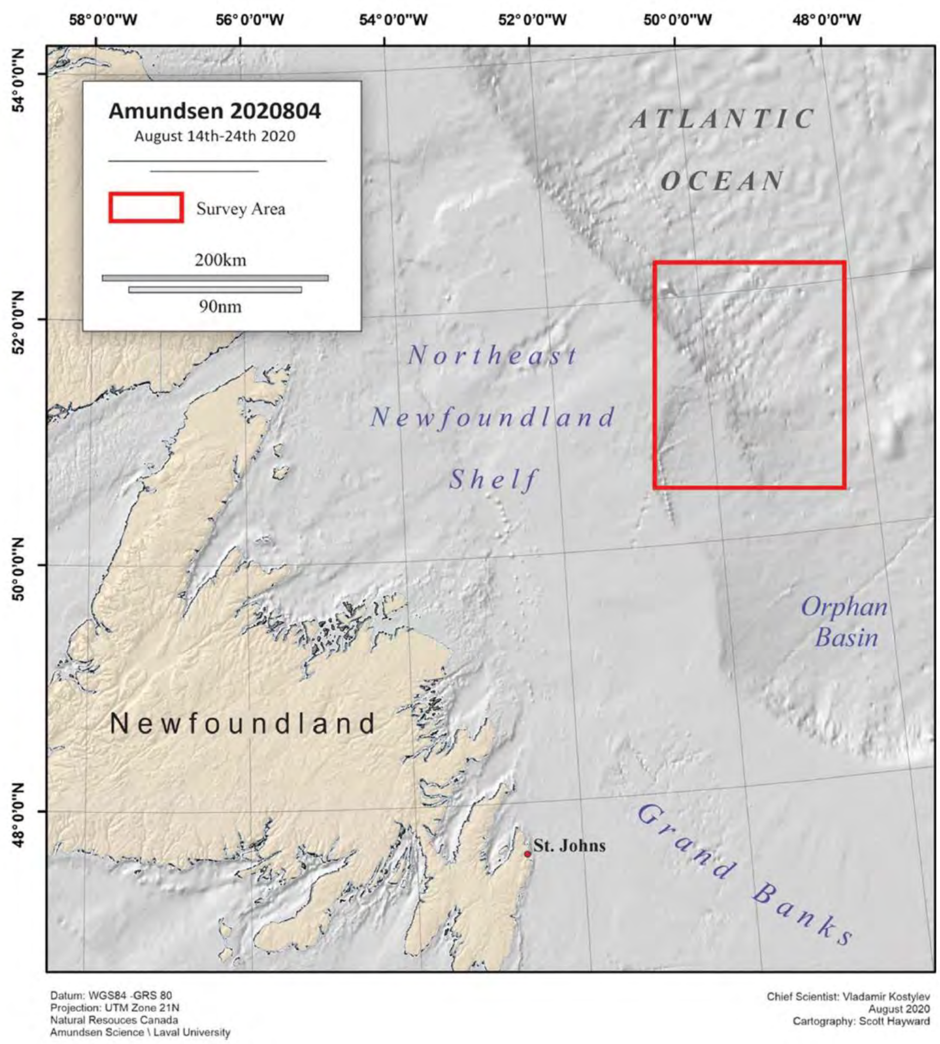

Figure 1-1: General region of fieldwork for ArcticNet Leg 2a cruise, August 14 – 24th 2020

1.2 Methodology

The following subsections describe the methodology applied for every element of this program.

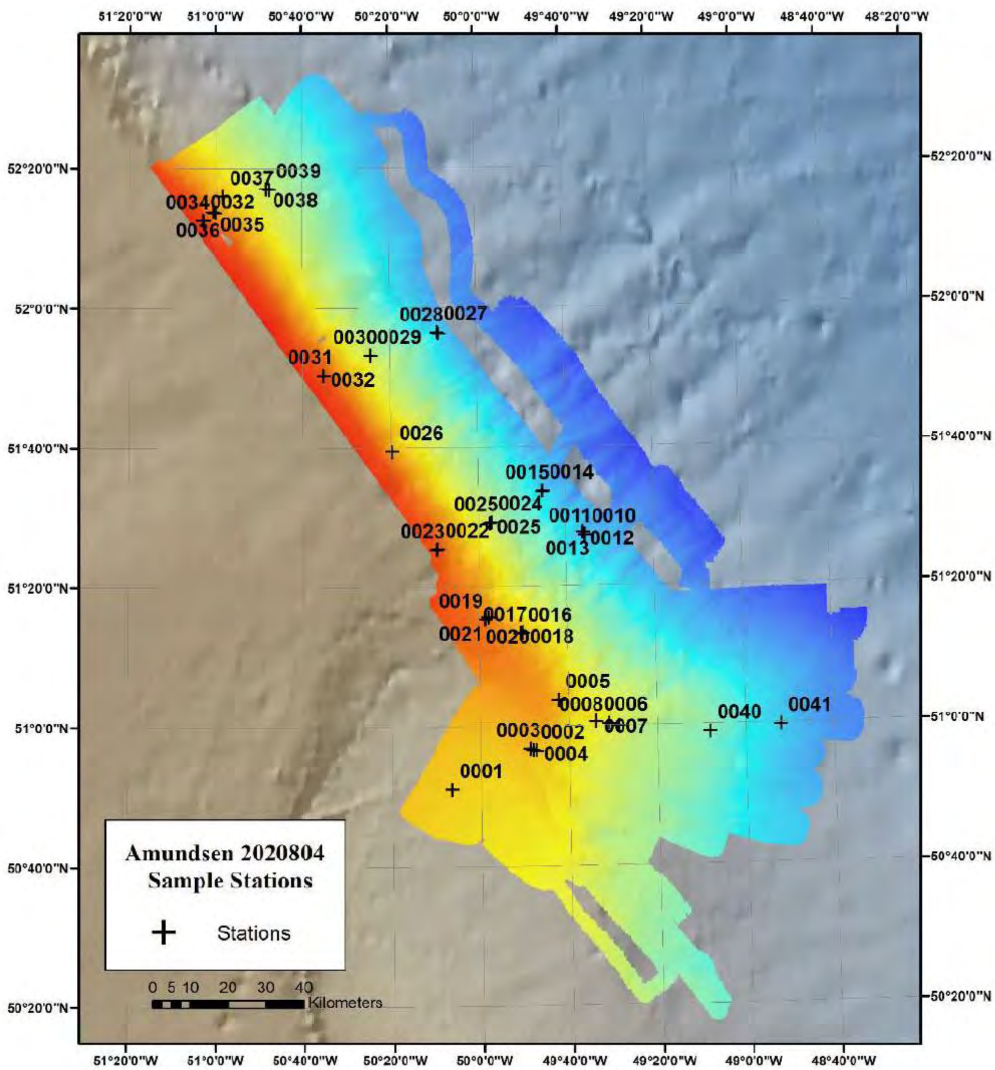

Figure 1-2: Positions of sampling stations occupied during the Amundsen 2020 Leg 2a cruise. Multibeam bathymetry collected

1.2.1 *Knudsen 3260 Echo-Sounder*

Since May 2016, a new Knudsen 3260 deck unit has been installed onboard the Amundsen. Sub- bottom profiles were acquired continuously at a frequency of 3.5 kHz to image the sub-bottom stratigraphy of the seafloor. The system was intermittently disabled during drop camera because camera bottom contacts were monitored using a hydrophone. Approximately 1014 NM of data were acquired during this cruise.

1.2.2 *EM-302 multibeam echosounder*

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 < 0.8 m in planimetry and < 1 m in altimetry. Beam forming at the transducer head is done by using an AML probe. All the data acquired during the cruise were post-processed in real-time using the CARIS HIPS&SIPS 11.1 software. Approximately 5900 km^2 of new multibeam data was acquired (Figure 1-3).

Lockheed Martin MK21 Expendable sound velocity system was used to collect sound velocity profiles for sound speed corrections using XSV-02 probes at up to 6 knots vessel speed. They were deployed using 3 m-LA handheld one to several times a night during MB survey at to produce reasonable spatial coverage for the survey area. Data were saved in an ASCII text format (.edf,) so the user can generate the measured profiles to transfer data to Kongsberg SIS. The total of 16 successful launches were performed during the cruise. A CTD Rosette cast was carried once for comparing accuracy of derived sound velocity profiles to the probes.

Table 1-1: Time and location of XSV casts

Date of Launch	Time of Launch (UTC)	Latitude	Longitude
08/15/2020	10:10:48	50° 51' 14.3703" N	50° 07' 01.1762" W
08/15/2020	22:42:59	50° 43' 07.5988" N	49° 58' 14.6635" W
08/16/2020	02:28:24	50° 25' 51.2292" N	49° 29' 36.0718" W
08/17/2020	00:36:20	50° 31' 59.7833" N	49° 24' 40.0712" W
08/18/2020	00:03:58	51° 25' 58.3379" N	49° 14' 21.8333" W
08/18/2020	03:53:58	51° 49' 14.0298" N	49° 40' 56.5510" W
08/19/2020	02:49:23	51° 41' 43.5608" N	49° 28' 20.3040" W
08/19/2020	07:03:09	51° 34' 48.7236" N	49° 16' 36.2876" W
08/19/2020	22:20:46	51° 10' 09.0156" N	49° 55' 23.3018" W
08/20/2020	05:15:08	51° 18' 04.3007" N	50° 07' 41.3389" W
08/20/2020	05:31:06	51° 17' 07.3870" N	50° 08' 51.1885" W
08/21/2020	04:26:39	52° 19' 22.4847" N	50° 34' 21.1122" W
08/22/2020	01:44:15	52° 19' 10.1571" N	50° 23' 32.9106" W)
08/22/2020	06:49:07	52° 27' 54.9574" N	50° 30' 17.7112" W
08/22/2020	23:07:55	52° 27' 24.2907" N	50° 35' 59.7082" W
08/23/2020	06:02:42	51° 40' 11.7000" N	49° 34' 47.8572" W

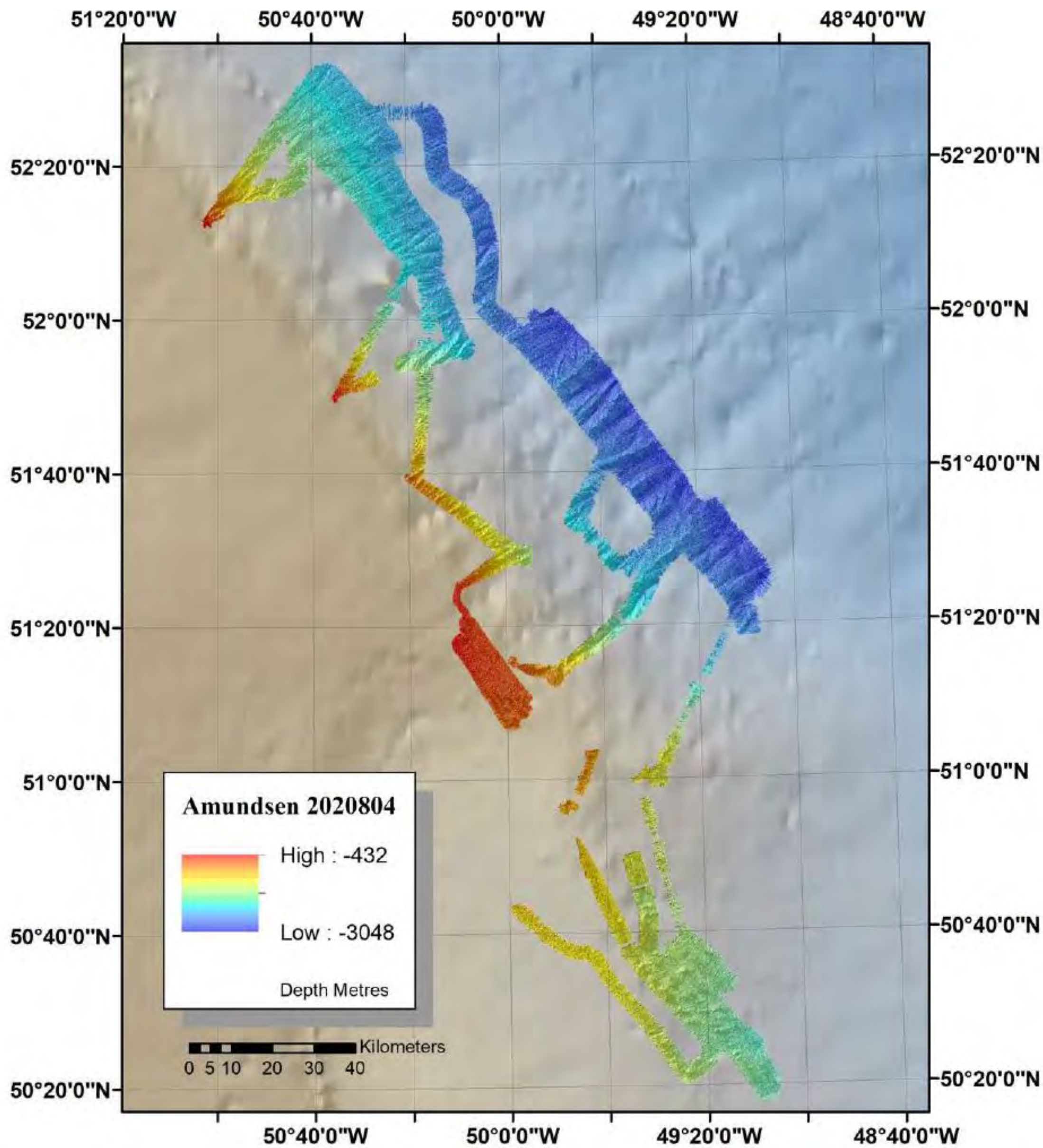

Figure 1-3: Extent of the newly collected multibeam echosounder data in the study area during Amundsen 2020 Leg 2a.

1.2.3 *Piston and gravity coring*

The standard Amundsen Science piston coring equipment was used for the mission and configured with three barrels that together totalled just over 9 m in length and an 800 kg head. The trigger weight core used in conjunction with the piston core was a new GSCA Mk

3 gravity core and this mission was its first trial. This gravity core incorporates a butterfly valve and a lower centre of gravity due to thinner lead weights placed lower on a core barrel, and is composed of aluminum 6061-T6 construction as opposed to steel. 10 piston cores were achieved, typically giving maximum recovery of over 5 m and penetration of over 6 m. The gravity core worked well and usually gave good recovery, typically 2m or more. It was also used as a standalone gravity core at several stations.

Table 1-2: Piston core (PC) and gravity core stations for Amundsen 2020 Leg 2a.

Amundsen station #	GSC-A station #	Core type	Latitude	Longitude	Depth (m)	PC length (cm)	Gravity core length (cm)
MSP-002B	0003	Piston	50.9461	-49.8128	1008	511	175
MSP-003A	0004	Piston	50.9415	-49.7897	1060	524	197
MSP-005B	0007	Piston	51.0102	-49.5626	1250	215.5	193
MSP-006	0008	Piston	51.0048	-49.5157	1340	420	62
MSP-007A	0009	Piston	50.9992	-49.4770	1443	370.5	224
MSP-020B	0015	Gravity	51.5609	-49.7534	2315	n/a	29
MSP-010	0016	Piston	51.2219	-49.8441	936	400.5	228
MSP-010	0017	Piston	51.2220	-49.8445	933	435	0
MSP-011	0018	Piston	51.2237	-49.8355	969	530	118
MSP-012B	0020	Gravity	51.2555	-49.9768	705	n/a	0
MSP-013	0021	Gravity	51.2612	-49.9657	755	n/a	70
MSP-021	0026	Piston	51.6577	-50.3253	803	170	0
MSP-028	0037	Piston	52.2677	-50.9703	1015	528.5	235

A total of 56.36 m of sediment was obtained from 20 cores (Table 2). All cores were processed according to standard GSC Atlantic core procedures (Mudie et al., 1984). The following detailed description of the processing steps is quoted from Normandeau et al. (2019), because the processing and sub-sampling was carried in identical manner with the same equipment:

All core barrels were kept in sequence, from the bottom to the top, as the barrels were taken apart. Starting with the bottommost barrel each 10 ft length of liner was extruded from the barrel and cut in half, using a modified pipe cutter. The sediment in the liner was cut using a wire saw and the section ends were carefully capped to minimize disturbance to the sediment surface. The top end cap was labelled with the cruise number, station number, section label and as top. The base of the piston core is designated with the letter A and the top of the base section is designated as B. Each core, starting with the base section AB, was processed using the following procedure. The core liner was labelled with an up arrow, cruise number, station number, section label and the top and base of the section were labelled with the appropriate letter. End caps were removed if the sediment was not too fluid, and the section length was measured and recorded. Undrained shear strength measurements and constant volume samples were taken at the top and base of each section where possible. Inert packing was placed in the voids created by the constant volume sampling. The ends of each core section were recapped, taped and sealed with beeswax to prevent further oxidation and drying. The sealed core sections were stored upright in custom-made whole core portable racking units in the starboard refrigerated reefer container and maintained at 4°C. All core cutters and catchers were measured, labelled, placed in split liners, waxed and stored upright in buckets in the reefer container.

Undrained shear strength measurements and constant volume samples were taken at the ends of each section when possible. The constant volume sampler was inserted into the end of the section, the undrained shear strength measurement was taken and then the constant volume sampler was removed. The undrained shear strength was measured using a hand-held Hoskin Scientific Torvane according to ASTM Test Method D2573 Field Vane Shear Test in Saturated Fine Grained Soil. The dial on the Torvane was zeroed, the fins on the vane were gently pushed into the sediment until they were completely inserted. The Torvane was rotated at a constant rate until the sediment failed.

Constant volume samples for bulk density and water content determinations were taken by inserting stainless steel samplers of a known volume. Prior to insertion, the sampler was lightly sprayed with PAM oil and gently wiped with a small Kimwipe tissue. The bevelled edge of the sampler was placed on the flat sediment surface and the carefully inserted into the sediment using two flat-headed spatulas. The sampler was inserted at a constant rate to minimize compression of the sediment within the sampler. The sampler was then carefully removed and the sediment was trimmed using a wire saw and extruded into a pre-weighed 1 oz screw-top glass bottle. The bottle cap was then labelled and sealed using electrical tape to prevent the lid from loosening.

1.2.4 *Box core and Van Veen samples*

A standard Benthos style box core owned by Amundsen Science was used and gave very good results considering the substrate contained some gravel in every sample. Five deployments were undertaken and all but one received a reasonable amount of recovery (Table 3). The box core sample was sub-sampled upon retrieval with three push cores when a sufficient amount of relatively undisturbed sediment was retrieved. Push cores were inserted in three of the recovered box cores, and a new battery operated vacuum pump (Laerdal Medical vacuum) was used to prevent compression during the push. This appeared to work well and eliminated the need for an electrical cable on the deck. A surface layer (approximately 3 cm thick) was also saved as a separate sample for bulk grain size measurements. On one of the stations the box core did not trigger properly at the seabed and came back to the surface with the recovery wire and swivel tangled under an edge on the upper mast. It was safely landed on deck and re-armed and deployed again with subsequent success.

The GSC-A Van Veen grab sampler was deployed at five stations (Table 1-3) and gave approximately half full recoveries. It was very easy to arm and recover and presented an efficient sampling tool for obtaining a representative sample of the seabed. The whole contents of the grabs were stored in one or several plastic bags, and refrigerated.

Table 1-3: Box core and Van Veen grab sample stations for Leg 2a

Amundsen station #	GSC-A station #	Sample type	Latitude	Longitude	Depth (m)	Recovered length (cm)
MSP-015B	0011	Box core	51.4558	-49.5939	2358	8

MSP-016A	0012	Box core	51.4620	-49.6008	2371	5
MSP-017B	0023	Van Veen	51.4224	-50.1596	548	Bulk sample
MSP-019A	0024	Box core	51.4872	-49.9497	1623	30
MSP-024B	0028	Van Veen	51.9388	-50.1443	2288	Bulk sample
MSP-023B	0030	Van Veen	51.8871	-50.4057	1535	0
MSP-022	0031	Van Veen	51.8395	-50.5861	502	0
MSP-026A	0032	Van Veen	52.2103	-51.0473	474	Bulk sample
MSP-027B	0036	Box core	52.2288	-51.0003	836	39
MSP-029B	0039	Box core	52.2837	-50.7901	1550	35

1.2.5 *Seabed imaging*

GSC-A - designed and owned drop camera (4k Cam) was used for acquiring images of the seafloor (Table 1-4). A backup camera of the same design owned by DFO-BIO was also used on a number of stations. The camera consists of an aluminum frame that supports a pressure housing containing a Canon Rebel digital SLR and wide angle 28mm f 1.8 lens. Two canon flashes are synced with the digital camera and all power is provided by a 12 v/80 AHr Deep Sea Power & Light pressure compensated sealed lead acid battery. A drop weight on a 1.5 m wire is attached to a plunger trigger switch to close the shutter when close to the seabed. A 12 kHz pinger is also controlled and shutoff by the same trigger mechanism when the camera is close to the seabed.

18 stations were completed in water depths from a few hundred metres to 2300 m. At each location, a drift over features of interest was attempted at low vessel speed over ground (less than 1 knt) and the camera spent up to 30 minutes on bottom at each station.

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, all drops were successful in providing an understanding of the bottom conditions at each site. Drop camera surveys ranged in depth from 500m to 2300m. Generally, the cameras worked very well. There were some issues with the trigger on the NRCAN 4k Cam so we switched triggers and after experiencing further problems we started to use the DFO 4k camera. Initially, we used a GSC-A-built listening device to listen for the 12 kHz pinger closure but we had a very difficult time detecting the signal with harsh background interference. We then switched to an ORE 12 kHz mooring release box owned by Amundsen Science with much better success in detecting bottom contact. Overall, the bottom photos were well illuminated with sharp focus.

Table 1-4: Camera stations for Leg 2a.

Amundsen station #	GSC-A station #	Latitude	Longitude	Depth (m)
MSP-001A	0001	50.8503907	-50.1101662	1092
MSP-002A	0002	50.9420300	-49.8022358	1060
MSP-004A	0005	51.0607835	-49.7030838	972
MSP-005A	0006	51.0092080	-49.5626168	1168
MSP-015A	0010	51.4549277	-49.5931518	2363
MSP-016B	0013	51.4617197	-49.6005852	2375
MSP-020A	0014	51.5614377	-49.7524807	2311
MSP-012A	0019	51.2555245	-49.9766070	705
MSP-017A	0022	51.4244258	-50.1540978	557
MSP-019B	0025	51.4847535	-49.9555805	1598
MSP-024A	0027	51.9418530	-50.1496000	2276
MSP-023A	0029	51.8870067	-50.4060718	1542
MSP-022B	0032	51.8393785	-50.5861227	501
MSP-026B	0034	52.2100440	-51.0433228	476
MSP-027A	0035	52.2308947	-51.0075723	785
MSP-029A	0038	52.2855920	-50.8035850	1543
MSP-008	0040	50.9808543	-49.1325942	1910
MSP-009	0041	50.9948592	-48.8648673	2288

1.3 Preliminary results

Preliminary results show that multibeam backscatter variability in the lower slope (2000 – 3000 m water depth) is related to the presence of coarse-grained sediment and hard substrate (bedrock outcrops and patches of boulders) in the lower slope, likely caused by upper slope instability and down-slope sediment migration. The conspicuous pockmark-like features in the lower slope contain winnowed gravel, possibly indicating gas or liquid escape leading to active removal of sediment. Northern canyons appear to be inactive, despite of steep walls and U-shaped cross- section, because of the thick layer of sediment observed on the bottom surface, and the lack of evidence of coarse sediments or rock outcrops. Northern Orphan basin exhibits presence of mass transport deposits, similar to the ones described by Campbell (2005) in the south of the basin. These features were piston cored, and laboratory analysis will allow for dating these events. The pagoda-like features readily identifiable in sub-bottom profiler, similar to ones found along Sackville Spur (Campbell et al. 2002), did not show unique surficial morphology or conspicuous megafauna at seabed photograph scale. Piston and gravity cores will be analysed at GSC lab for making inferences on the age of the studied slope failures. While the study area is a part of the Northeast Newfoundland Fishery closure, established mostly for the purpose of protecting corals and sponges, the seabed imagery rarely showed presence of hard corals, and soft corals occurred in moderate abundance.

The statements above are just quick observations from the field. Quantitative analysis of bottom imagery, cores and sediment samples will allow making better inferences on megafauna species composition and diversity, seabed habitats and geohazards in the study area. Based on the work carried in this area during the last two years we see the need of future fieldwork including the use of: Autonomous Underwater Vehicles, upgraded live-streaming seabed imaging system and a deep-towed broad frequency sub-bottom profiler, which would allow for high-resolution mapping of both surficial and buried features of interest.

1.4 **Aknowledgment**

We were fortunate to take advantage of cruise cancellations of other research groups who cancelled their participation because of COVID-19 situation in Canada. Amundsen Science team was very helpful in helping us organise the expedition, plan the cruise schedule, provided us with all the necessary information and forms for arranging permissions to travel and collect data. The Amundsen Science crew on board ship was extremely helpful with operation and troubleshooting of scientific gear, and all the operations were carried in safe and secure

manner. We are particularly thankful to the following persons: Lou Tisne for fixing the problem with the forward deck winch, without which we would not be able to carry our operations at all; to Daniel Amirault for his diligent work in collecting Multibeam echosounder data, and troubleshooting Kongsberg hardware problems; to Shawn Meredyk, who has timely provided his help and gear for monitoring our underwater camera pinger, and to Camille Wilhelmy for assisting with core processing in the evenings, when our crew was exhausted. Overall, we are very satisfied with conducting our research on board Amundsen and we are looking forward to opportunities to use this research platform in the future.

1.5 **References**

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2 ISECOLD

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2.1 Introduction

The Integrated Studies and Ecosystem Characterization of the Labrador Sea Deep Ocean (ISECOLD) project includes the use of many techniques and equipments, and ended in preliminary results described in the following sections.

2.2 Methodology

2.2.1 *Drop camera*

Drop cameras are a useful tool to characterize benthic fauna and habitat. The drop camera was deployed routinely at all stations with the exception of existing mooring sites where the bottom was characterized in previous years. The drop camera was used in 2020 to: extend the study extent further south along the Labrador shelf and slope across a depth gradient (500m-2500m); explore potential sites for more in-depth sampling with ROVs in 2021.

The deep-sea camera system was comprised of two cameras (a SubC deep water camera and Sony 4K camera) and LED lights. This equipment was fixed to a modified box core frame (Figure 2-1). In past deployments a HIPAP sensor was used to get positions of the camera when at depth but unfortunately the HiPAP was not functioning this year. The camera consists of an aluminum frame that supports a pressure housing containing a Canon Rebel digital SLR and wide angle 28mm f 1.8 lens. Two canon flashes are synced with the digital camera and all power is provided by a 12 v/80 AHr Deep Sea Power & Light pressure compensated sealed lead acid battery. A drop weight on a 1.5 m wire is attached to a plunger trigger switch to close the shutter when close to the seabed. A 12 kHz pinger is also controlled and shutoff by the same trigger mechanism when the camera is close to the seabed.

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 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 minutes.

Figure 2-1: The drop camera system attached to a modified box core frame utilized in Leg 2b

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). Thirteen (13) drop camera deployments were conducted during Leg 2b of the 2020 Amundsen Expedition, which will be analyzed later.

Table 2-1: List of Drop Camera Sampling Stations for Leg 2b

Station ID	**GPS Coordinates on Bottom (Start)**		**GPS Coordinates on Bottom (End)**		**Time Deployed**	**Approximate Time on Bottom (min)**	**Approximate Bottom Depth (m)**
ISECOLD 0-500	56.4958380	-58.1412793	56.4901737	-58.1334445	2020/08/30 09:36:45	30	465
ISECOLD 0-1000	56.5115738	-58.0846997	56.5048193	-58.0715035	2020/08/30 00:17:51	30	940
ISECOLD 0-1500	56.5572995	-57.9242315	56.5402833	-57.9330138	2020/08/29 14:23:59	30	1595
ISECOLD 0-2000	56.7573143	-57.2640375	56.7596492	-57.2625560	2020/08/28 09:55:16	30	2005
ISECOLD 0-2500	56.8710490	-56.8506103	56.8612567	-56.8564763	2020/08/29 00:45:05	30	2424
MAK-CAM-1	55.5081005	-58.8582848	55.5139273	-58.8624492	2020/08/26 07:20:52	30	882
MAK-CAM-2	55.4135045	-58.8514570	55.4141440	-58.8512435	2020/08/26 10:49:59	30	360
MAK-CAM-3	55.3612563	-58.8998065	55.3592622	-58.8921367	2020/08/27 08:14:13	30	224
MAK-ROV	55.6028357	-59.0601505	55.6047165	-59.0607712	2020/08/26 05:18:02	30	653
ISECOLD-3-500 / HiBioA / DFO-1	60.5253455	-61.2623885	60.5211478	-61.2530023	2020/08/31 19:39:04	30	506
ISECOLD-3-500-B	60.5722043	-61.3788937	60.5674525	-61.3652067	2020/09/01 00:32:46	30	403
ISECOLD-3-1000 / HiBioC / DFO-3	60.4639702	-61.1592380	60.4575650	-61.1456038	2020/09/01 02:28:08	30	1004
NAIN-1	56.3090473	-60.5044373	56.3127965	-60.5044585	2020/09/03 21:51:20	30	102-260
NAIN-1B	56.3147160	-60.5423645	56.3187208	-60.5360848	2020/09/03 22:41:24	30	131-285
NAIN-2	56.2518157	-60.2003610	56.2556752	-60.1889205	2020/09/03 14:33:34	30	288

2.2.2 *Baited camera*

Baited cameras are a useful tool to characterize benthic fish, fauna and habitat. The baited camera system was deployed at four stations; ISECOLD-3-500 (also known as DFO-1 and HiBioA), ISECOLD-3-1000 (also known as DFO-3 and HiBioC), Nain-1 and Nain-2 (Table 3). The baited camera was used in the 2020 science cruise to meet the following objectives: 1. To extend previous ISECOLD baited camera collections (i.e. Clears Cove Pride 2017; Odyssey 2019) further north in the Labrador Sea to the Hatton Basin Marine Refuge; and, 2. Collect pilot data on the inner Labrador Shelf to support the Imappivut marine planning initiative in collaboration with the Nunatsiavut Government.

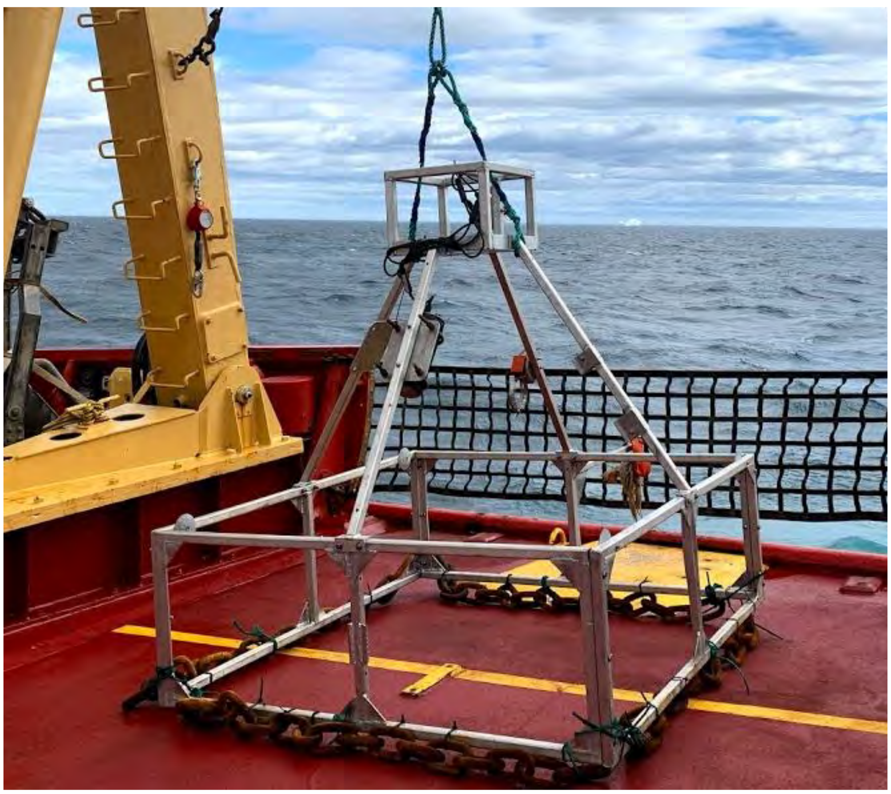

Figure 2-2: The baited camera system, ready for deployment off Nain, during Leg 2b of the 2020 Amundsen Expedition

The deep-sea camera system was comprised of one camera (a Sony 4K camera) and SubC LED light and lasers. This equipment was fixed to a frame equipped with an arm baited with 6 large squid (two of which were contained within a bait bag; Figure 2-2: The baited camera system, ready for deployment off Nain, during Leg 2b of the 2020 Amundsen Expedition). In past deployments, the frame would tip over once settled onto the bottom due to the large amount of current or lateral pulling on the surface buoy. To help prevent this from happening this year, approximately 100kg of large chain link was attached to the bottom four edges of the frame.

The camera frame system was attached to a predetermined amount of rope using spliced eye hooks and shackles. We used buoy lines 1.5-2 times the sample depth to accomodate strong currents and elevated sea states. Rope was stored in garbage buckets, each bucket holding approximately 200 m of rope. Once this system was arranged, it was attached to a hauler system that consisted of a pully on the A-frame and a hauler (capstain) drum and lowered from the vessel at 30m/min. A deckhand controlled the hauler drum, while another kept the line in place on the drum. Two science staff fed rope from the buckets to feed the hauler drum, making sure the line was not coiled or kinked. Once the frame was on bottom, the rope was detached from the hauler drum and the remaining rope was payed out by hand. When the end of the rope was reached, a high-flyer with two floats was attached using a shackle. The high-flyer was equipped with a stobe light and an AIS beacon to help with camera recovery in poor weather conditions. The frame was left on the bottom for approximately 3 hours, however the footage was limited to the battery life of the Sony 4K camera (approximately 2.5 h).

Once the camera was back on deck, the camera apparatus was rinsed with fresh water, removed from the frame, and taken to the foredeck lab to have the video footage from the Sony 4K camera downloaded and saved to an external hard drive.

Table 2-2: List of Baited Camera Sampling Stations for Leg 2b of the 2020 Amundsen Expedition.

Station ID	**GPS Coordinates on Bottom**	**Date**	**Time Deployed (EST)**	**Approximate Time on Bottom (min)**	**Approximate Bottom Depth (m)**
Nain-1	56.29486, -60.44078	03/09/2020	20:35	131	50
Nain-2	56.22850, -6017952	03/09/2020	13:11	75	291
ISECOLD-3-1000 / DFO-3 / HiBioC	60.46244, -61.18633	01/09/2020	20:07	30	905
ISECOLD-3-500 / DFO-1 / HiBioA	60.52432, -61.26742	01/09/2020	05:24	30	472

2.2.3 *Rock dredge operations*

Rock dredge operations were planned at seven stations: Makkovik stations (N = 3), one station at Isecold-0 transect, Nain (N = 2), and ISECOLD-3-500/ DFO-1/HiBio-A (N = 1). Operations were adjusted according to depth, type of bottom and observations from the drop camera work. In summary, a total of seven stations were surveyed for a total of eight deployments of the rock dredge.

At the Makkovik, the rock dredge was planned to be deployed at three stations, but only two were surveyed using this gear at this site (stations) because video observations indicated low megafauna diversity at Mak-Cam-1. At Isecold-0, we had planned to deploy the rock dredge at the 500 m station. However, drop camera video observations performed at the 1000 m station indicated that the bottom was not suitable for a box-core, which was planned for that site. Therefore, we deployed the rock dredge at this station, and skipped the rock dredge deployment at the 500 m station. At Nain we surveyed the two planned stations, with a slight modification in the original position and depth. At HiBio-A we opted for not deploying the rock dredge because drop camera imagery indicated a rich and sensitive environment where the large gorgonian Primnoa resedaeformis and Asconema sp. and Geodia sp. sponges were abundant. For this reason, we relocated the dredge deployment to a site ~8 km away from HiBio-A, but outside of the Hatton Basin Marine Refuge, where a high coral bycatch had also been reported in 2010. Video observations had indicated that the bottom at this site was mostly sandy, with the presence of sea pens and large gorgonians, but not at the high densities level seen at HiBio-A.

Samples of benthic megafauna were collected for a general assessment of biodiversity, species identification ground-truthing of drop camera imagery, DNA, and stable isotope analyses. Most samples were kept for further analyses by DFO-NL, but subsamples were also kept by the Mercier lab member aboard (Kaitlin Casey and Amy McCallister, MUN graduate students).

The rock dredge has a 7 mm mesh (Figure 2-3). Deployments took place at depths ranging between 123-804 m (Table 2-3), and consisted of the ship moving at a maximum speed of 2 knots for a variable amount of time, depending on the station. Initially, tows were planned to have a duration ranging between 5-10 minutes. However, we adjusted it based on bottom type, depth, and tension observed in the winch tensiometer. Tow duration varied between 2 and 12 minutes. The amount of extra cable depended on depth and on previous deployments. It varied between ~20 and 50% of total depth.

Figure 2-3: Rock dredge deployment in 2019. The same equipment was used in 2020

Table 2-3: . Rock dredge deployment stations and parameters during leg 2b of the CCGS *Amundsen* 2020 expedition. Final name for station Rock dredge site listed below is Isecold-3-500-B

Date	Station ID	Latitude N	Longitude W	Event	Depth (m)
2020/09/05	MAK - cam 2	55.4034	-58.8631	Recovery	356.61
2020/09/05	MAK - cam 2	55.4073	-58.8525	Bottom	524.23
2020/09/05	MAK - cam 2	55.4025	-58.8521	Deployment	463.47
2020/09/04	Mak-ROV	55.5253	-58.9426	Recovery	773.57
2020/09/04	Mak-ROV	55.5376	-58.9109	Bottom	803.63
2020/09/04	Mak-ROV	55.5436	-58.8932	Deployment	797.34
2020/09/04	ISECOLD-Nain-1	56.3180	-60.5098	Recovery	317.65
2020/09/04	ISECOLD-Nain-1	56.3177	-60.5005	Bottom	322.86
2020/09/04	ISECOLD-Nain-1	56.3178	-60.5082	Deployment	316.36
2020/09/03	ISECOLD-Nain-2	56.2503	-60.1494	Recovery	177.75
2020/09/03	ISECOLD-Nain-2	56.2449	-60.1518	Bottom	122.94
2020/09/03	ISECOLD-Nain-2	56.2430	-60.1522	Deployment	118.88
2020/09/02	Rock dredge site	60.5594	-61.3948	Recovery	429
2020/09/02	Rock dredge site	60.5671	-61.3816	Bottom	434.1
2020/09/02	Rock dredge site	60.5696	-61.3713	Deployment	437.73
2020/09/02	Rock dredge site	60.5615	-61.3934	Recovery	427.34
2020/09/02	Rock dredge site	60.5695	-61.3872	Bottom	433.46
2020/09/02	Rock dredge site	60.5712	-61.3801	Deployment	436.18
2020/08/30	Isecold -0- 1000	56.4769	-58.0822	Recovery	464.41
2020/08/30	Isecold -0- 1000	56.5001	-58.0843	Bottom	740.28
2020/08/30	Isecold -0- 1000	56.5134	-58.0836	Deployment	969.96
2020/08/27	MAK - cam 3	55.3464	-58.8801	Recovery	138.93
2020/08/27	MAK - cam 3	55.3554	-58.8954	Bottom	288.43
2020/08/27	MAK - cam 3	55.3561	-58.8977	Deployment	281.19

Once on deck, the dredge was rinsed, and the catch deposited in fish totes (volume capacity: 64 L). The first catch (ISECOLD-0-2000) yielded one very full fish tote, and half of the catch was sieved through a 2 mm mesh. The second catch (ISECOLD-0-1000) yielded an enormous amount of material, taking six people on deck to remove the extra mud that did not fit in four totes (Figure 2-4). This tow had a duration of 12 minutes and took place in a site where slope was changing quickly. We believe that the gear collected a lot of material on its way up, due to the slope of the area. One full tote was sieved through the 2 mm mesh, while the three other totes were sieved through a 17 mm mesh metal frame in the benthic lab.

Figure 2-4: Samples resulting from rock dredge deployments during leg 2b of 2020 Amundsen expedition.

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. Samples were fixed in either 4% formalin (for morphological identification), 100% ethanol (for DNA analyses), or frozen at -20 °C (DNA/stable isotopes).

Figure 2-5: Benthic samples collected using the rock dredge on transects Mak-Cam-3, Isecold-0-1000, and Isecold-3-500-B tow 1 and tow 2 during the 2020 Amundsen expedition

Figure 2-6: Benthic samples collected using the rock dredge on transects AK-ROV (A-F) and Mak-Cam-2 (G-I) during the 2020 Amundsen expedition

Box core samples were planned to be collected at 10 stations in order to characterize the benthic infaunal community along a depth gradient from 500 m to 2500 m water depth at Isecold-0, as well as to provide baseline data for the Nain and Makkovik sites. However, for the Isecold-0 sites, bottom type was only suitable for box-cores at stations 2000 and 2500. We revisited station Isecold-1-2000 sampled in 2019, since the box-core deployment at that year was unsuccessful due to technical issues. We were able to successfully sample at this station this year to complete the 2019 dataset for the Isecold-1 transect. To summarize, box-cores were successfully deployed at six stations, with the deployment being unsuccessful at one station (box-core came back empty, Table 2-4), which we believe might be related to the bottom type (i.e. hard bottom), based on video observations.

Table 2-4: Box-core deployment stations and parameters during leg 2b of the CCGS *Amundsen* 2020 expedition

Date	Station ID	Latitude N	Longitude W	Depth (m)	Notes
2020/09/05	MAK-Cam 3	55.3587	-58.8968	294	-
2020/09/05	MAK-Cam 1	55.5038	-58.8582	893	-
2020/09/04	MAK-ROV	55.5452	-58.8930	782	-
2020/09/03	ISECOLD-1-2000	57.7303	-58.6946	1980	Very rainy at time of deployment/recovery.
2020/08/29	ISECOLD-0-1500	56.5541	-57.9412	1613	Box came back empty.
2020/08/29	ISECOLD-0-2500	56.8687	-56.8644	2420	Winch had limit on amount of cable (2450 m, cable cut in previous leg)
2020/08/28	ISECOLD-0-2000	56.7536	-57.2606	2022	Box came back empty and with a bent window. It was re-deployed.

Samples collected by DFO-NL include sediment for eDNA, grain size characterization, chlorophyll *a*, organic content, and sediment from half of each box core to a depth of 15 cm to characterize the infaunal benthic community. At one station we collected sediment to 8 cm as sediment was thick and likely unsuitable to infauna. 60 ml syringes were used to collect sediment from the first 5 cm for grain size, and 1 cm for organic content. 5 ml syringes were used to collect sediment for chlorophyll *a* from the first 1 cm. A sterile disposable spoon was used to sample sediment for eDNA. 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 frozen at -20°C.

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 box-core was back on deck, a photograph was taken of its surface after removing water. Environmental DNA (eDNA) samples were collected first to reduce the chance of contamination and the samples were immediately frozen at -20 °C. 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. A summary of the stations sampled can be found in Table 2-4.

2.2.4 *Pelagic fish and Plankton*

The mesopelagic fish and zooplankton 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 trophic interactions in this region are poorly described. In the deep-water basins of the North Atlantic, seasonal differences in the diurnal vertical migration of these organisms have 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 (Knutsen et al 2017) and seasonal (Geoffroy et al. 2019) vertical migration behavior among and within taxa in the mesopelagic zone may be attributed to different adaptations to light conditions. 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). Other pelagic fish, such as Arctic cod (*Boreogadus saida*), display vertical segregation and feeding strategies based on age and size class (Geoffroy et al. 2016). This work package aims to describe the seasonal, vertical and spatial variation as well as biodiversity and trophic niche of mesopelagic fishes, meso- and macro-zooplankton 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 (hull mounted EK80, moored AZFP and Wideband Autonomous Transceiver - WBAT), with traditional midwater trawls (Isaac-Kidd Midwater Trawl –IKMT), depth-stratified plankton net sampling (Hydrobios plankton net), and environmental DNA to better understand the biodiversity and distribution of mesopelagic organisms in the Labrador Sea. Deployments of these complimentary methods were co-located at most

stations (Table 2-5).

Table 2-5: Details of all pelagic sampling activities . X's indicate the use of a particular sampling method. 2X indicates the method was deployed twice at a single station.

Station ID	Date	Latitude	Longitude	WBAT	eDNA	Multinet	IKMT
ISECOLD-0-2000	28/08/2020	56.74720	-57.26069	X	X		X
ISECOLD-0-1500	29/08/2020	56.54290	-57.93801	X	X		X
ISECOLD-0-2500	29/08/2020	56.86679	-56.84178		X		X
ISECOLD-0-1000	30/08/2020	56.51692	-58.08338	X	X	X	
ISECOLD-0-500	30/08/2020	56.49582	-58.13987	X	X		X
HiBio-A/ISECOLD-3500	31/08/2020	60.49615	-61.27060	X	X	X	X
HiBio-C/ISECOLD-3-1000	31/08/2020	60.46156	-61.15703	X	X	X	2X
ISECOLD-1-2000	03/09/2020	57.73124	-58.69524		X		
Nain-2	03/09/2020	56.25716	-60.19066	X	X	X	X
Nain-1	04/09/2020	56.31837	-60.50874	X	X	X	X
MAK-ROV	04/09/2020	55.54812	-58.90003	X	X	X	X
MAK-Cam1	05/09/2020	55.50429	-58.85094	X	X		X
MAK-Cam2	05/09/2020	55.40542	-58.85237	X	X		
MAK-Cam3	05/09/2020	55.35919	-58.89932	X	X		

Hydroacoustics

The *Amundsen* was equipped with a new state-of-the art hull-mounted EK80 broadband echosounder operating at 38, 120 and 200 kHz (Figure 2-7a). The EK80 was continuously operated in narrowband mode during transit to monitor the distribution and abundance of pelagic fish and zooplankton. It was turned to broadband mode on stations, while deploying the IKMT. The broadband data will be used to compare the frequency-response curve of single targets with the community composition of fish and zooplankton captured in the IKMT. In addition to the hull-mounted echosounder, a Wideband Autonomous Transceiver (WBAT) was mounted as an acoustic probe on the rosette. The sideward-looking WBAT was operated for the full depth at all stations <1500 m, in addition to ISECOLD-0-2000 (to a depth of 1450m) to provide a fine scale (cm) profile of the acoustic backscatter of fish (36-46 kHz) and zooplankton (283-383 kHz).

An Acoustic Zooplankton and Fish Profiler (AZFP) was moored at station HiBio-C in 2019 and successfully recovered in 2020 (Figure 2-8b). The upward-looking AZFP was deployed at 500 m depth and continuously monitored the water column a 38, 125, 255 and 455 kHz with a resolution of 1 ping x 15 sec-1. Once analyzed, this unique acoustic dataset will provide information on the seasonal variation in abundance and vertical distribution of mesopelagic fish and zooplankton.

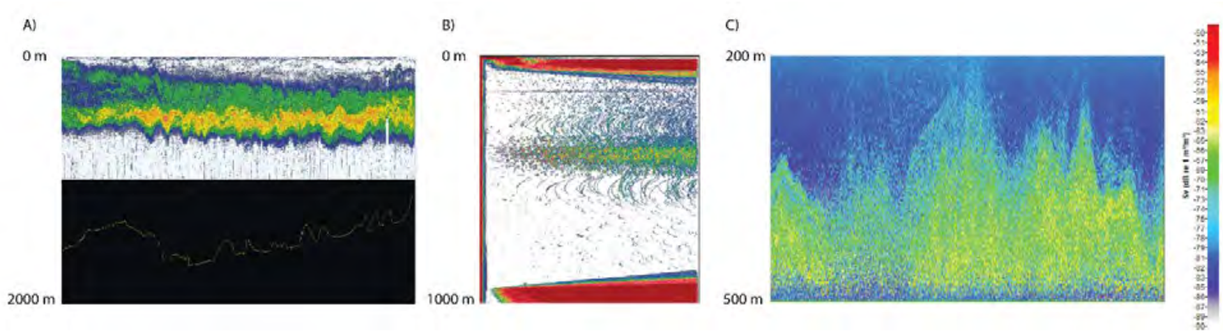

Figure 2-7: Examples of echograms from A) the hull mounted EK80 at 38 kHz; B) a WBAT profile at 38 kHz; and C) two days of the moored AZFP at 125 kHz in December. A clear mesopelagic layer of fish and zooplankton can be seen on all three echograms

Multi-net plankton sampler (Hydrobios)

Meso-zooplankton was sampled with a Hydrobios multi-net plankton sampler (Figure 2-8c). The net is equipped with nine 200µm mesh nets (opening 0.5m^2) allowing for depth-specific sampling of the water column. The Hydrobios is also equipped with a CTD to record temperature and salinity while collecting biological samples.

The multinet is deployed vertically from 1000 m (or 25-60 m off the bottom in depths shallower than 1000 m) to the surface. The nets open and close one by one 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 are preserved in 10% formalin solution and stored for further taxonomic identification at Laval University.

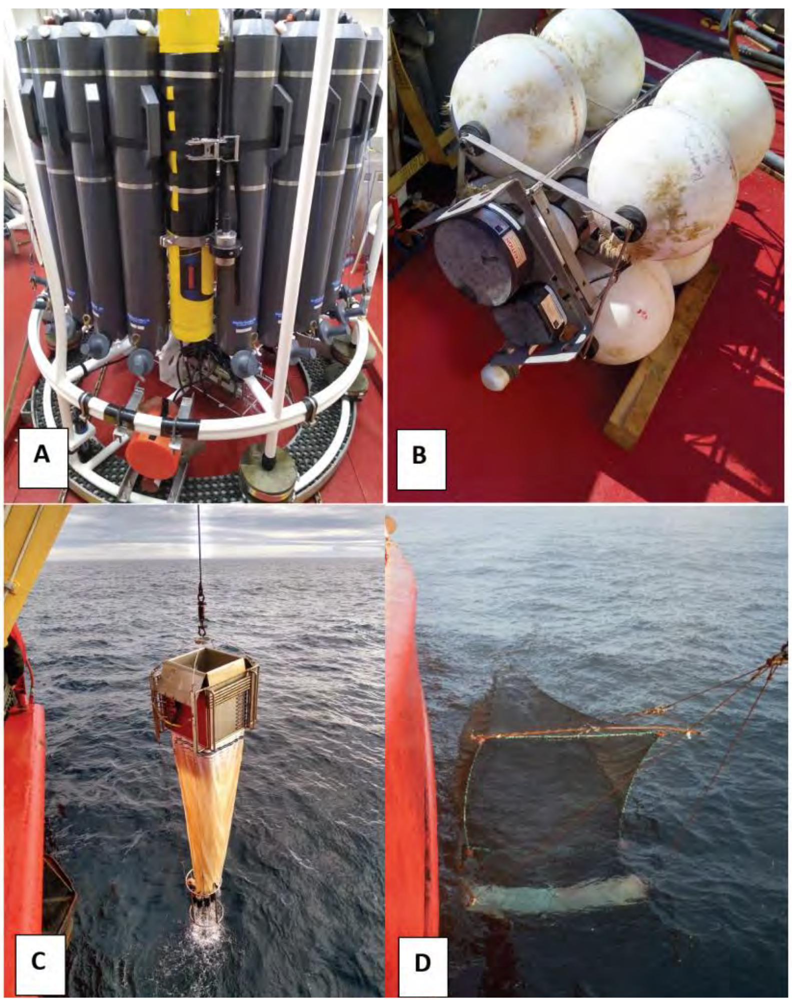

Figure 2-8: A) The WBAT mounted on the rosette; B) The AZFP recovered from the mooring; C) the multinet; and D) the IKMT

Isaac-Kidd Midwater Trawl (IKMT)

The IKMT (Figure 17c) sampled pelagic fish and macrozooplankton. The rectangular net has a 13.5 m2 (4.5m x 3m) mouth aperture and mesh size of 11 mm in the first section and 5 mm in the last section. The net was lowered at a target depth, which was determined by the echosounder EK-80 signal and towed at that depth for 15-30 minutes at a speed of 3 knots. At one-night station, a 'double-dip' was conducted, where a shallower layer was sampled first and then a deeper layer was sampled to assess which species conduct diel vertical migration and are distributed shallower at night than during daytime. All samples were sorted by species, counted and weighed before being frozen for further analyses, including compound specific isotope analysis of amino acids.

2.2.5 *Carbon Sampling in Seawater (Neves on behalf of Edinger and Reader)*

Water samples were collected at the mooring stations HiBio-A and HiBio-C. At both sites, water was collected at surface, middle, and bottom depths for TIC-DIC. Water was collected into glass jars (500 ml) and fixed using mercuric chloride ($HgCl_2$) following established protocols. Samples will be sent to the Bedford Institute of Oceanography (BIO, Dartmouth) for analysis (K. Azetsu-Scott and E. Edinger). A total of 20L of water were also collected at station HiBio-A for Dr. Heather Reader (Memorial University) for a study on dissolved organic matter.

2.2.6 *Benthic and Pelagic Community Characterization from eDNA Water Samples (McAllister and Cote)*

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 complementary to other conventional methods, particularly in the deep sea where specimens are very difficult to collect. To characterize benthic and pelagic faunal communities, sea water was collected at all stations using the CTD-Rosette water sampling system comprised of twenty-four 12L Niskin bottles. Samples were collected from the ocean surface, 250 m, 500 m, and bottom, where station depths allowed.

These depths were selected to match other sampling activities that could be used to validate and compare results.

Prior to the CTD-Rosette deployment, the inside and upper and lower lids of the Niskin bottles were sprayed first with a 10% bleach solution. Niskins were also rinsed with distilled water after waiting 10 minutes and closed until deployment to prevent contamination.

During deployment, the CTD-Rosette was lowered from the vessel on a winch system. Niskins remained open during down-cast and were closed at programmed depths during up-cast to collect water samples. The CTD-Rosette stopped at each sampling depth for 1 minute prior to niskins closing to ensure niskins contained water of the desired depth.

The CTD-Rosette was brought back on board the vessel and eDNA water sampling took place prior to any other water collection activities to prevent accidental contamination by other study team members. Latex gloves were used to collect three 1.5 L replicate samples from each collection depth in pre-labeled sterile Whirl-pak bags. Three additional replicates were collected for bottom samples at deep (ISECOLD and mooring) stations based on the recommendations of McClenaghan et al. (in review). Filled Whirl- pak bags were placed in ziploc bags and stored in a -20°C freezer that was decontaminated with 10% bleach solution prior to sampling.

Frozen samples will be sent to the Centre for Environmental Genomics Applications (CEGA) for analysis. The resulting data will augment and be compared to pelagic and benthic community characterization data collected with conventional methods.

Table 2-6: List of Stations for eDNA Water Sampling for Leg 2b of the 2020 Amundsen Expedition

Station	**Date (UTC)**	**Time (UTC)**	**Latitude**	**Longitude**	**Station depth (m)**	**Sample depths (m)**
MAK - cam 1	2020/08/27	20:08:21	55.4148660	-58.8096762	565.85	Surface, bottom
ISECOLD-0- 2000	2020/08/28	22:21:20	56.7519118	-57.2593685	2024.42	Surface, 250, 500, bottom

ISECOLD-0- 2500	2020/08/29	11:04:58	56.8752947	-56.8487157	2416	Surface, 250, 500, bottom
ISECOLD-0- 1500	2020/08/29	21:28:18	56.5488548	-57.9433563	1595.91	Surface, 250, 500, 1450
ISECOLD-0- 1000	2020/08/30	06:29:23	56.5116890	-58.0762275	976.43	Surface, 250, 500, bottom
ISECOLD-0- 500	2020/08/30	13:13:52	56.4932195	-58.1359898	459.53	Surface, 250, bottom
HiBio - A	2020/08/31	23:00:40	60.4603127	-61.2819208	412.95	Surface, 250, bottom
HiBio - C	2020/09/02	01:21:56	60.4622593	-61.1624237	998.92	Surface, 250, 500, bottom
ISECOLD-1- 2000	2020/09/03	03:56:10	57.7273953	-58.6925267	2032.48	Surface, 250, 500, bottom
ISECOLD-Nain-2	2020/09/03	18:06:47	56.2578778	-60.1811313	317.63	Surface, bottom
ISECOLD-Nain-1	2020/09/04	01:25:00	56.3183972	-60.5110778	317.99	Surface, bottom
MAK-ROV	2020/09/04	18:55:58	55.5468490	-58.8989047	759.88	Surface, 300, bottom
MAK - cam 2	2020/09/05	06:11:25	55.4053807	-58.8520500	519.15	Surface, 250, bottom
MAK - cam 3	2020/09/05	08:09:57	55.3592540	-58.8989360	288.38	Surface, 150, bottom
Station 27	2020/09/07	08:55:41	47.5455833	-52.5902255	174.32	Surface, 10, bottom

2.2.7 *Long-Term Oceanographic Observations / Oceanographic Moorings*

Long-term oceanographic moorings provide an opportunity to acquire time series data of environmental conditions in the study area. Such data is particularly valuable for understanding natural cycles and temporal variation of water properties, which is not possible from the typical point sampling activities that occur within the timeframe of a limited summer-fall mission.

Moorings deployed as part of the ISECOLD program contained instruments such as an Autonomous Marine Acoustic Recorder (AMAR) for listening to whales and anthropogenic noise, a sediment trap (particule and sediment delivery to sea floor), an Acoustic Zooplankton Fish Profiler (AZFP) to identify zooplankton and fish community dynamics, an Acoustic Doppler Current Profiler (ADCP) accompanied by Conductivity-Temperature-Pressure-Turbidity-Dissolved Oxygen sensors were also mounted near the ocean bottom in order to record the near-bottom physical oceanographic properties (i.e. Salinity,Oxygen,Current Speed,etc.) and lastly, an IN-DEEP larval settlement plate investigating any larval-substrate associations (early life stages, e.g. eggs, propagules and larvae, as well as juveniles and adults). Additional to the oceanographic instruments were XEOS satellite Recovery Beacons and Acoustic Releases, which permit the release of the mooring from its anchor and the XEOS beacon at a surface tracking solution should the need arise (e.g. fog, pre-mature mooring release, etc.).

Moorings HiBioA-19 (ISECOLD-3-500 / DFO-1), HiBioC-19 (ISECOLD-3-1000 / DFO-3) were released successfully, however, HiBioC-19 was only partially recovered due to a mid-water buoy's internal strength member breaking at the surface during the recovery operation. The broken 1000m rated buoy was recovered by the zodiac and an Abraham's ladder / net. HiBioA-19 was fully recovered without issue.

Moorings HiBioA-20, HiBioC-20 and a new mooring at Makovik Bank (MkB1-20) were deployed. The deployments of MkB1 and HiBioC were executed without complications, however, HiBioA deployment was complicated (took the better part of all daylight) with difficult surface currents, 1-2m waves, bright sunshine and the zodiac which took on too much water while trying to manage the mooring rope and was required to return to the vessel for repairs. The mooring was eventually deployed later in the afternoon of Sept 1, without zodiac support and with much calmer weather conditions.

Mooring designs of the recovered and deployed moorings can be found in the Mooring Images and Tables section below (Figure 2-9, Figure 2-10).

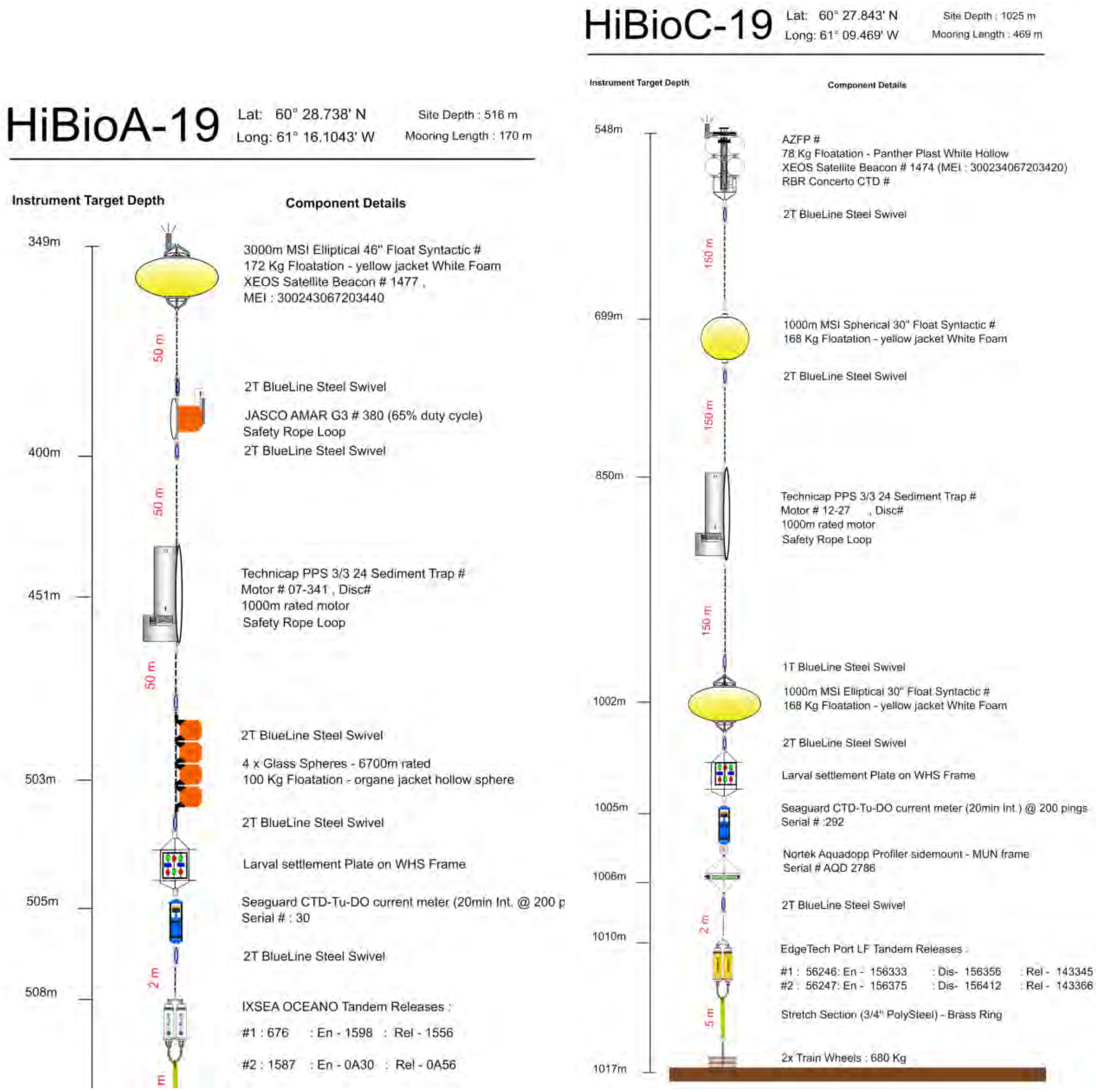

Figure 2-9: Mooring recovered (HiBioA-19) and partially recovered (HiBioC-19, AZFP only)

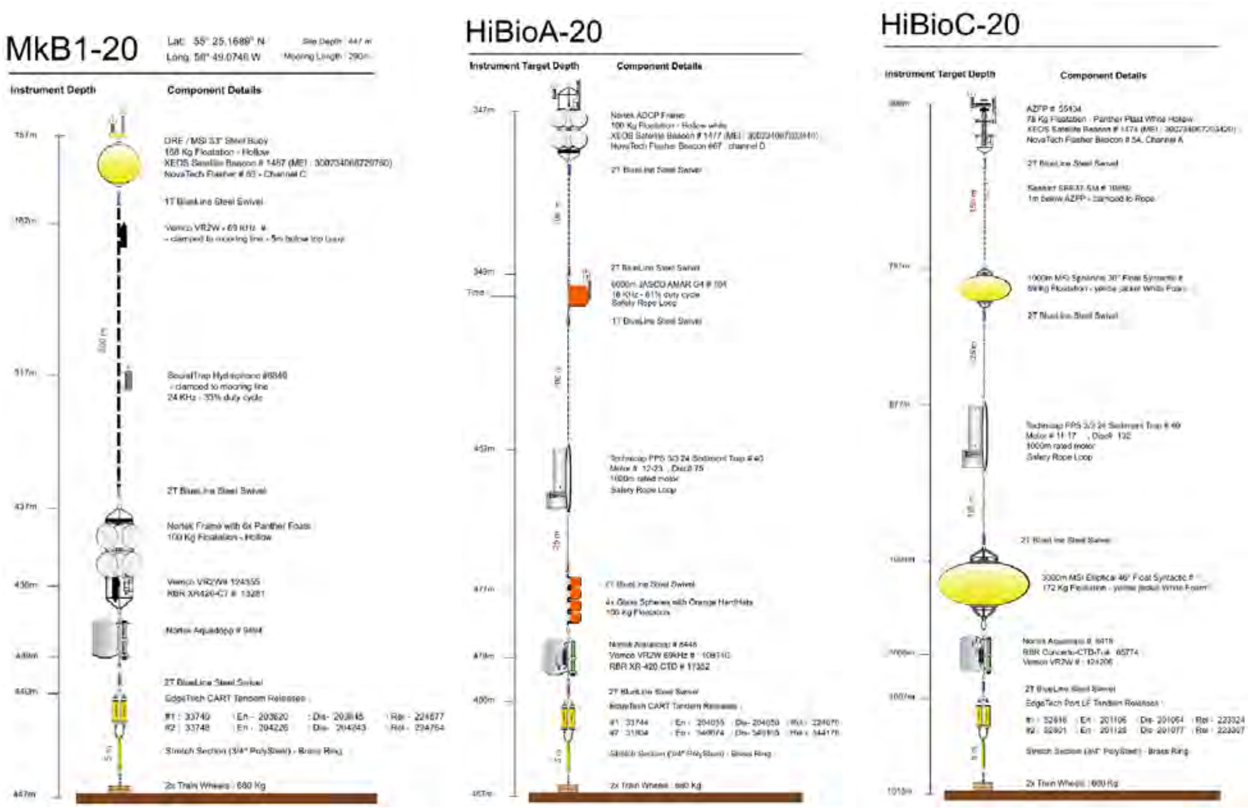

Figure 2-10: Mooring deployed on Makovik Bank (left) and on Shelf east of Hatton Basin (middle, right)

Both HiBio sites were at-depth for 14 months which is risky concerning corrosion for this region, but with Covid-19 restrictions and a lack of DFO ship availability, scheduling of the Amundsen was limited to primary DFO-NRCAN operations this summer and the timing of the late recovery operations for HiBio moorings couldn't be avoided.

Metalatic corrosion was observed on all shackle types (big, small, galvanized and stainless steel) and on the release chain. The moorings wouldn't have survived 2 additional months at-depth.

The AZFP and Sediment trap frames weren't corroded and the safety line of the Sediment trap at HiBioA-19 was engaged due to a bottom-mounted shackle which had corroded away. The current meter at HiBioA-19 (Seaguard #30) had corrosion of the one stainless housing locking pin and the anodes were completely dissolved. The releases from HiBioA-19 weren't corroded themselves however, the link connecting the drop chain had a small amount of stainless steel corrosion despite it being isolated from the drop chain.

2.2.8 *Surface drifters*

Surface drifters are autonomous devices that are deployed to collection data on ocean surface conditions such as currents, pressure, water and air temperature and location on an hourly basis. Lifetime of each unit is approximately 5 years so those deployed in the Labrador Sea are expected to circulate around the North Atlantic, going to Europe or Africa before returning to North America (see example tracks in Figure 2-11). The resulting data contribute to both meteriological and ocean prediction systems providing better forecasts for mariners at sea. Sixteen drifters, provided by NOAA (via DFO NL) were loaded aboard the Amundsen to deploy opportunitistically in the Labrador Sea; an area of interest due to data gaps. Drifters were deployed by Coast Guard crew. Deployments simply required unwrapping the drifter, recording the drifter's ID number and recording the time and deployment coordinates. During Leg 2b, 5 out of 16 drifters were deployed. The remaining are to be deployed opportunistically during Leg 3. For more information on the surface drifter program contact Fraser Davidson (fraser.davidson@dfo-mpo.gc.ca).

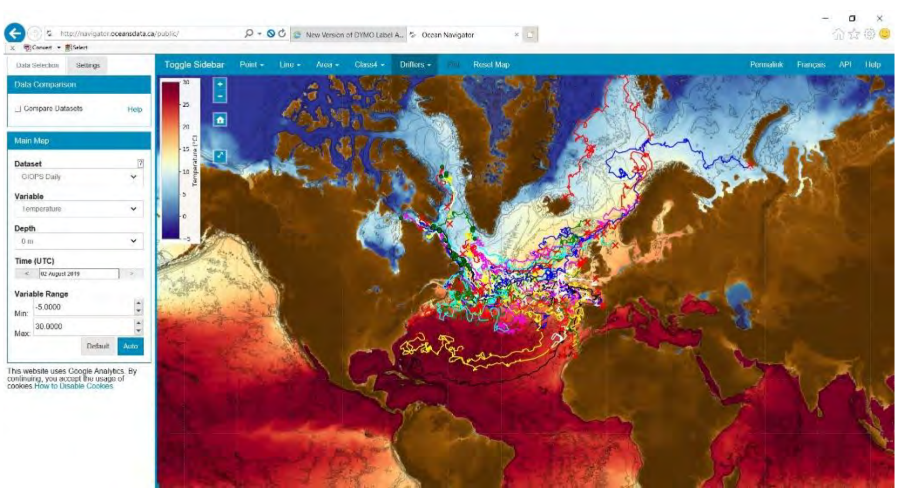

Figure 2-11: Example tracks

2.3 **Preliminary Results**

2.3.1 *Drop Camera*

Here are the preliminary results of the drop camera activities. An example of footing obtained is presented in Figure 2-12 and Table 2-7 decribes the sampling.

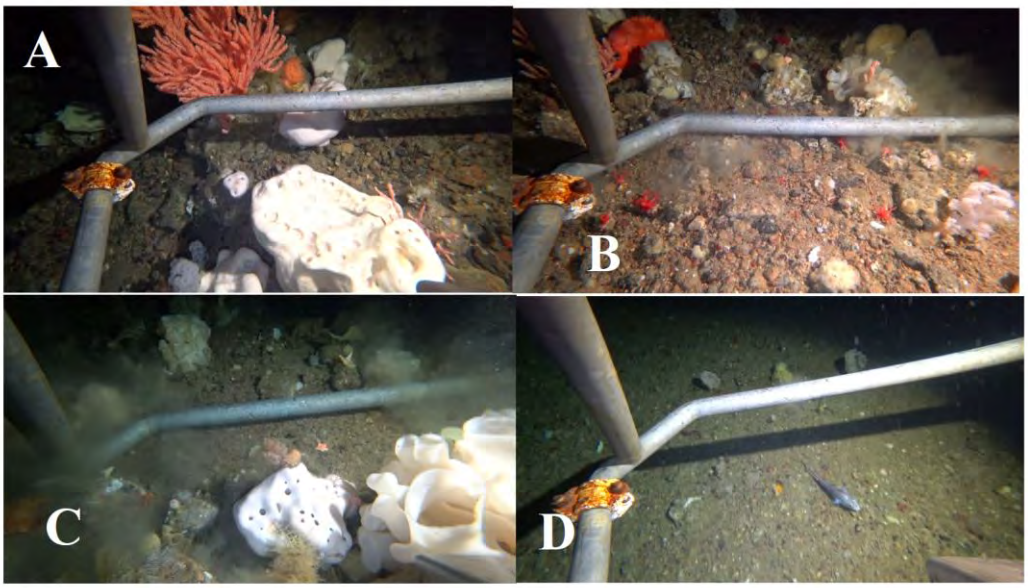

Figure 2-12: Photo captures of drop camera video from stations in Hatton Basin video transects. A: Primnoa spp. Gorgonian corals, Geodia spp. Sponges found in abundance at ISECOLD 3-500; B: Redfish taking cover next to Primnoa spp. Coral and Asconema spp. C: Sponge dominated habitats of ISECOLD-3-500B; D: Grenadier at ISECOLD-3-500B

Table 2-7: General Description of Drop Camera Sampling Stations by Bottom Type, Video Quality, Biological Productivity, and Megafauna/flora observed from preliminary observation of Drop Camera Footage for Leg 2b of the 2020 Amundsen Expedition

Station ID	Bottom Type	Video Quality	Biological Productivity	Megafauna/flora observed
ISECOLD 0-500	Mud with some gravel and sparse rocks. Ample evidence of trawl scouring	Good	Very high for fish, Medium for epifauna	Slatjaw cutthroat eels, Greenland halibut, grenadiers, redfish, anenomes (both types), starfish, soft corals, siphonophores, orange worms, squat lobster

ISECOLD 0-1000	Mud parse rock	Medium. View obscured by agitated silt frequently.	High for fish, high for soft corals	Anthomastus, grenadiers, slatjaw cutthroat eels, redfish, broccoli soft coral, cerianthids, brittlestars, squat lobster, anemones (both types), starfish, asconema sponge, octopus
ISECOLD 0-1500	Mud with pebbles and rocks	Low. Large waves meant camera was frequently off bottom and obscured by silt	High for fish, medium- low for other taxa	Anthomastus, purple urchin, cerianthids, bearded rockling, geodia sponge, pink soft coral, starfish, flashing lanternfish (25:28) and unknown fish (27:30), blue hake?, bright yellow sponge
ISECOLD 0-2000	Sand/silt with occasional rocks	Medium. Off bottom a lot due to large waves	Sparse epifauna.	Cerianthid, snailfish? (4:55), brittlestar, bowl sponge (0:29), anemones, yellow encrusting sponge, crinoid (1:23), unidentified fish (4:18), starfish, anemone
ISECOLD 0-2500	Mud with very few rocks	Low. Large waves meant camera was frequently off bottom and obscured by silt.	Medium for fish, low for other taxa	Abyssal grenadier, brittlestars, white sponge, sea cucumber (21:02), cerianthid (25:21), barrel sponge (28:42), blue ascidian, yellow sponge (0:13)
MAK-CAM-1	Mud bottom	Low. Large waves meant camera was frequently off bottom and obscured by silt.	Medium for fish, anemones and polychaete tubes but low for other epifauna.	Anemones, tube worms, brittlestars, cerianthids, sponges, spiral egg cases, shrimp, starfish, pout (10:28), flatfish (15:07, 3:04), worms (18:14), pom pom anemone (1:53)
MAK-CAM-2	Mud bottom	Low. Large waves meant camera was frequently off bottom and obscured by silt.	High densities of small white sea cucumbers over first part of transect, transitioning to	Dominated by small white sea cucumbers, and tube worms. Also observed anemones, large worms (0:05), cerianthids, unidentified fish (2:57, 13:42), flatfish (4:27), shrimp, pout (5:24, 6:10, 14:29, 4:27, 5:37, 5:44), pom

			less epifauna and good densities of pout.	pom anemone (14:38)
MAK-CAM-3	Silt covered rocky bottom and mud toward end of transect	Low. Large waves meant camera was frequently off bottom and obscured by silt.	High for fish and shrimp, low for epifauna	Snails, brittlestars, juvenile fish (17:41), shrimp, urchins, bryophytes, soft corals, rock gunnel? (20:21), Atlantic cod (adult and possibly juvenile, 21:48, 22:40, 24:17), flatfish (32:20, 4:54, 5:35, 6:19, 7:11), tube worms, anemones, pout (5:03)
MAK-CAM-ROV	Mud with occasionaly rock	Low. Large waves meant camera was frequently off bottom and obscured by silt.	Very abundant for anemones and tube worms, medium abundance for sea pens and fish, low for other taxa	Anemones, cerianthids, sea pens, tube worms, spiral egg cases, white sponge, pout (24:55, 33:35, 11:35), grenadier (1:00), unknown flatfish (1:29, 6:00), other unknown fish (6:35), bearded rockling (14:51), shrimp, soft corals (8:30)
NAIN-1	Cobble or bedrock covered in sediment, deep silt in basin	Good on plateau but low on slope cliffs (camera not always oriented correctly) and in the basin (obscured by sediment)	Abundant crabs on plateau, dense aggregations of brittlestars in basin	Seastars, sunstars, encrusting sponges, crabs, anemones, urchins, lizardfish? (11:54), shrimp, pout (16:05), worms, unidentified fish (7:01), basketstars, brittlestars, flatfish (16:41)
NAIN-1A	Mud bottom except bedrock and some boulders on slope edge	Good on plateau but obcured by sediment in basin	Hyperabundant brittlestars on plateau	Dense brittlestars, shrimp, urchins, pout? (22:12, 21:06, 1:13), yellow sponge (1:10), spider crab, sculpin (3:54), basketstars, fast burrowing taxa (8:41), adult cod (14:46)
NAIN-2	Gravel/sand with shell hash on plateau, with some boulders,	Good. Sediment obscured view in basin but good sea state.	Abundant basketstars on plateau and slope. Abundant fish and shrimp on slope and	Crabs, sea stars, sunstars, urchins, basketstars, sea peaches, unidentified fish (24:18, 27:05, 33:44, 35:08), encrusting sponges, cod?

	steep rocky cliffs on slopes and mud in bassin		basin. Epifauna generally sparse.	(30:55), flatfish (30:56, 0:50, 1:27, 3:03, 6:30), young cod? (31:04, 31:13, 31:34), shrimp, pout (35:08), skate (20:19, 3:36, 4:49, 5:03), polychaete tubes, large worm (8:43)
ISECOLD-3-500 (2nm north of HiBio-A)	Sand/gravel with cobble and boulders	Good.	High for epifauna (large gorgonians, soft corals, sponges)	Asconema spp., Geodia spp., large Primnoa spp. (some knocked over), Anthomastus, bryophytes, starfish, lanternfish (9:07), ascidians, slatjaw cutthroat eel, anemones, grenadier, squat lobster, redfish (19:29), sea spider
ISECOLD-3-500b (outside Hatton Bassin Boundary)	Sand with cobble/boulders. Conspicuous patches of flat sandy substrate and some probable trenches from trawls	Good.	High for epifauna – especially sponges and soft corals. Medium-low for gorgonians. Medium for sea pens.	Asconema sp. Sponge, starfish, Geodia spp. Sponge, brittlestars, bryozoans, anemones, snow crab (19:20), soft corals, anthomastus, Primnoa corals (several knocked over), sea pens (21:46), spider crab? (0:14), grenadier (4:45), skate (8:32), basketstar, ascidians

2.3.2 *Baited Camera*

All four camera deployments were successful though some deployments were challenged by the camera frame eventually tipping over due to the pull on the surface buoys. The other challenge was the limited battery life of the Sony 4K camera (approximately 70-130 minutes). Despite this, all four camera deployments were successful in capturing footage of both fish and invertebrates. The stations in Hatton Basin (ISECOLD-3-500 and ISECOLD-3-1000) had higher abundance and diversity than the shelf stations off Nain (Figure 2-13; Table 2-8).

At least nine species of fish were identified at the cameras (Table 2-8) and other invertebrate taxa such as squid, crabs, shrimp, sea stars, corals, and sponges were also observed.

Table 2-8: General Description of Baited Camera Sampling Stations by Bottom Depth, Bottom Type and Megafauna/flora observed from preliminary observation of Baited Camera Footage for Leg 2 of the 2020 Amundsen Expedition

Station ID	**Approximate Bottom Depth (m)**	**Bottom Type**	**Megafauna observed**
Nain-1	50	Kelp (*Agarum* sp.) over rock/bedrock	Crabs
Nain-2	291	Mud	Skate, shrimp, snow crab, unidentified juvenile eel. Very high densities of plankton
ISECOLD-3-1000/DFO-3/HiBioC	905	Pebbles, cobble and rocks	Slatjaw cuttthroat eels, Hagfish, Grenadier, Greenland halibut, Blue hake, Black dogfish, starfish, *Anthomastus* spp.
ISECOLD-3- 500 / DFO-1/HibioA	472	Mud, pebbles, cobble and rocks	Redfish, Cusk, Skate, *Primnoa* spp, *Anthomastus* spp., soft corals, sponges

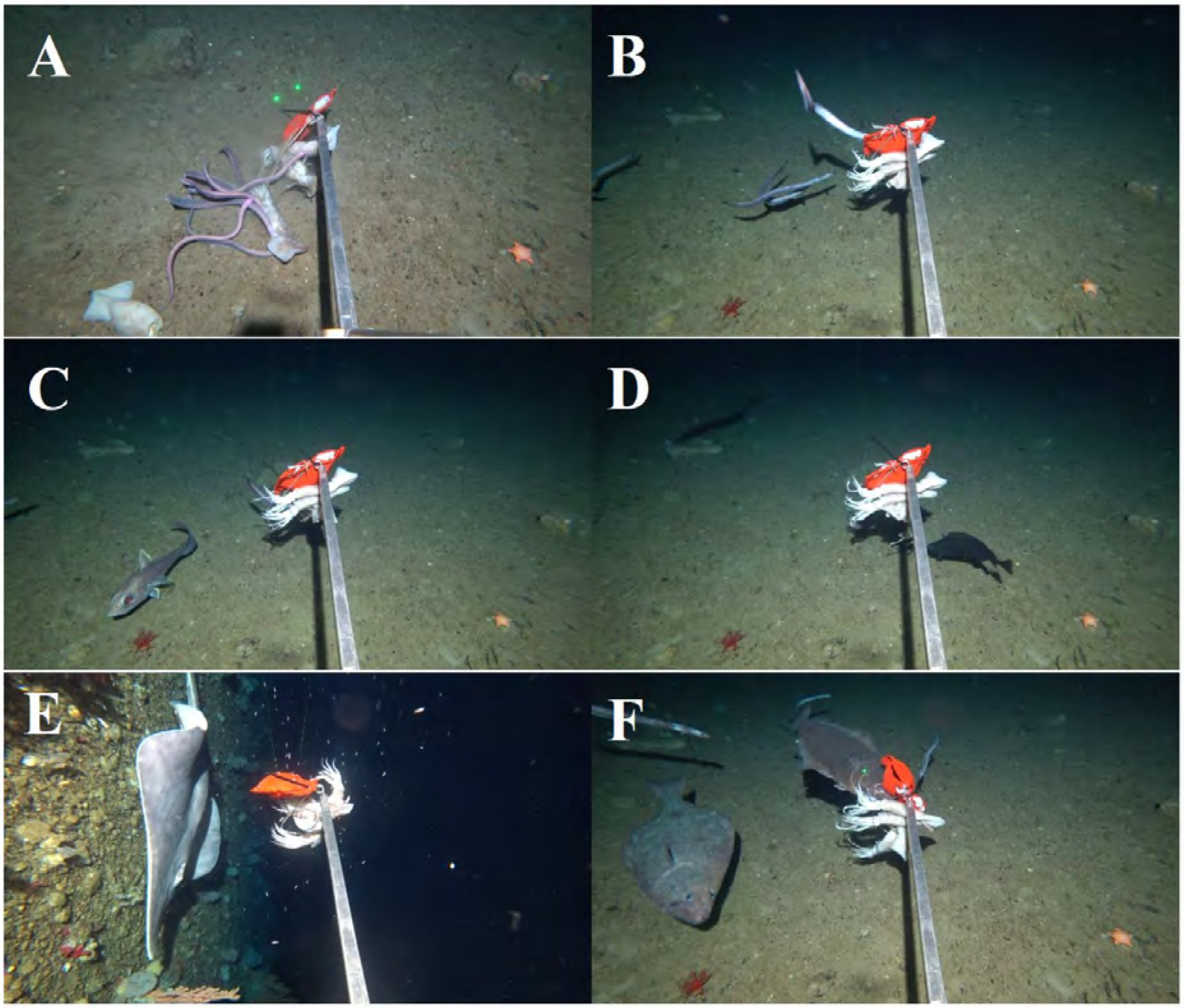

Figure 2-13: Photo captures of baited camera video from all stations. A: Hagfish (ISECOLD-3-1000); B: Slatjaw Cut-throat Eel ISECOLD-3-1000); C: Roughhead Grenadier (ISECOLD-3-1000); D: Blue Hake (ISECOLD-3-1000); E: Skate spp. (ISECOLD-3-500); F: Greenland Halibut (ISECOLD-3-1000)

2.3.3 *Rock dredge operations*

Most dredge deployments yielded soft sediment material, except at station Nain-2 and Isecold-3-500-B where the bottom was rocky (Figure 2-4). Stations with soft sediment usually had small organisms, and more apparent diversity was noticed at these two rockier stations. Invertebrate diversity and presence varied across stations. Polychaetes, their tubes, and Foraminifera were generally the most common organisms found, particularly at the soft bottom stations (Table 2-9 and Table 2-10). Only one demersal fish was caught at station Isecold-0-1000, although Lantern fish were also caught at station Isecold-3-500-B.

Table 2-9: Rock dredge deployments and main preliminary notes during leg 2b of the 2020 CCGS *Amundsen* expedition

Station	**Volume collected**	**Amount processed**	**Observations**
Mak-Cam-3	1 full tote	1/2	Catch mostly composed of polychaete tubes. Sea stars (*Ctenodiscus* sp.) were the second most commonly observed organism (i.e. megafauna). Soft corals and sponges were present, but not conspicuous.
Isecold-0-1000	4 full totes and deck	1 full sieved at 2 mm, and 3 coarsely sieved (extra)	Corals included soft corals (mostly *Duva florida*, in good state), fragments of the gorgonians *Primnoa resedaeformis* and *Paragorgia arborea*, *Acanella arbuscula*, *Anthomastus* sp., and the sea pen *Halipteris finmarchica*. Sponges, bivalves, and a small Grenadier were also present.
Isecold-3-500-B tow 1	Small amount of material, mostly gravel	Entire catch	The catch was small but diverse, with several small sponges, zoanthids, bivalves, sea stars, sea urchins, and polychaetes. A lantern fish was also collected here.
Isecold-3-500-B tow 2	Small amount of material, mostly gravel	Entire catch	The catch was small but diverse and slightly different from tow 1 at this side. Ascidians, a few soft corals, a juvenile squid and octopus, and a lantern fish were also sampled here.
Isecold-Nain-2	Small amount of material, mostly rocks	Entire catch	The catch was small but diverse. Here the basket star *Gorgonocephalus* sp., the sea urchin *Strongylocentrotus* too, and a large *Leptasteria* sp. sea star, bivalves and crustaceans were collected.
Isecold-Nain-1	1 full tote	¼ (18 cm deep)	Sub-bottom profile indicated the soft bottom nature of this site. The catch content was a very thick and dense sediment, making it difficult to be removed from the net on deck. A dark colour and sulfur smell were also noted. Ophiuroids were the most common organism in this catch, although

Station	Volume collected	Amount processed	Observations
			abundance was expected to be higher based on video observations. Other organisms include a very large sipunculid worm, two oligochaetes, one sea star (*Ctenodiscus* sp.), bivalves, and polychaetes (and tubes).
Mak-ROV	Small amount of material	Entire catch	Sub-bottom profile indicated the soft bottom nature of this site. Four colonies of the sea pen *Anthoptilum grandiflorum* were caught on the rock dredge chains (Figure 4A), but no sea pen specimens were caught in the net. Coiled structures thought to represent egg cases or parts of egg cases (e.g. tendrils in shark/skate egg cases) were also caught in the net and chains (Figure 4D). These coiled structures were also conspicuous in the video observations at this station.
Mak-Cam-2	Small amount of material	Entire catch	At this site sea stars (*Ctenodiscus* sp.) were the most common organisms. An unidentified sea cucumber was also relatively common. We believe it is the same species seen in the drop camera videos, but whose in situ identification was not possible.

Table 2-10: List of taxa encountered in benthic samples collected using the rock dredge during leg 2b of CCGS *Amundsen* 2020 expedition. Gray cells denote presence

Phylum	Lower taxa	Taxa	Mak-Cam-3	Isecold-0-1000	Isecold-3-500-B tow 1	Isecold-3-500-B tow 2	Isecold-Nain-2	Isecold-Nain-1	Mak-ROV	Mak-Cam-2
Porifera	Demospongiae	Encrusting sponge								
		Ficiform sponge			■					
		Mycale sp.?								
		Unidentified sponge spp.			■					
		Carnivorous sponge (*Abestopluma* sp?)			■		■		■	
		Tentorium-like	■							
Cnidaria	Hydrozoa	Hydroids	■			■	■			
	Zoantharia	Zoanthid			■					
	Actiniaria	*Homarthia nodosa*							■	

Phylum	Lower taxa	Taxa	Mak-Cam-3	Isecold-0-1000	Isecold-3-500-B tow 1	Isecold-3-500-B tow 2	Isecold-Nain-2	Isecold-Nain-1	Mak-ROV	Mak-Cam-2
		Sea anemone sp.	■							
		Acanella arbuscula		■						
		Anthomastus sp.		■	■	■				
		Anthoptilum grandiflorum							■	
		Anthothela sp.?								
		Duva florida		■		■				
	Octocorallia	*Gersemia* sp.	■			■				
		Halipteris finmarchica		■						
		Primnoa resedaeformis		■						
		Pseudodrifa sp.								
		Stoloniferous octocoral	■	■	■					
		Nephtheidae sp.	■	■	■	■				
		Paragorgia arborea		■						
		Astarte sp.		■	■	■				
	Bivalvia	Bivalve sp.	■		■	■	■		■	■
		Musculus sp.						■		
		Nuculana sp.							■	■
		Bathypolypus sp.				■				
Mollusca	Cephalopoda	*Rossia* sp.					■			
		Squid				■				
	Gastropoda	Gastropoda sp.	■		■	■				
		Limpet sp.	■		■					
	Scaphopoda	*Siphonodentalium lobatum*?			■					
	Polyplacophora	Polyplacophora sp.			■					
	Shell hash	Shell hash	■		■					
		Polychaete spp.			■			■	■	■
		Polychaete (hairy)			■			■		
	Polychaeta	Polychaete soft tubes								
Annelida		Polychaete sandy tubes								
		Polychaete "hairy"					■			
		Thin transparent tubes								
	Oligochaeta	Oligochaeta sp.						■		
Sipuncula	Undetermined	Sipunculid sp.						■		
	Pycnogonida	Pycnogonid sp.			■		■			
Arthropoda		*Aega* sp.				■				
	Crustacea	Amphipod sp. (includes *Temisto* sp.)	■		■		■			■
		Barnacle sp. 1					■			

Phylum	Lower taxa	Taxa	Mak-Cam-3	Isecold-0-1000	Isecold-3-500-B tow 1	Isecold-3-500-B tow 2	Isecold-Nain-2	Isecold-Nain-1	Mak-ROV	Mak-Cam-2
		Shrimp sp.				■	■		■	■
		Unidentified crustacean			■					
		Copepoda			■					
Echinoder-mata	Asteroidea	*Ctenodiscus* sp.	■					■	■	■
		Henricia sp.			■	■	■			
		Leptasteria sp.					■			
		Pteraster cf. *militaris*							■	
	Echinoidea	*Strongylocentrotus droebachiensis*		■			■			
		Brisaster fragilis			■				■	
	Holothuroidea	Unidentified red sea cucumber								
		Unidentified pink sea cucumber								■
	Ophiuroidea	Unidentified ophiuroid	■				■	■	■	■
		Gorgonocephalus sp.					■			
Chordata	Pisces	Grenadier		■						
		cf. Myctophydae (Lantern Fish)			■	■				
		Coiled egg cases?							■	
	Tunicata	Ascidian sp.			■					
		Ascidian sp. (with encrusting sand)				■			■	
		Didemnium sp.			■	■				
Bryozoa	Undetermined	Bryozoan sp.			■					
	Undetermined	Soft bryozoan			■					
Other	Undetermined	Dead coralline algae fragments?	■							

Similarly to in 2019, the rock dredge was deployed at sites with varied substrate types, ranging from muddy to rocky areas, from depths of 120 to 800 m. Dredge deployments were successful at all stations, as there was always material in the net. However, the amount of material was quite variable, which is to be expected based on differences in tow duration, depth, amount of cable released, and bottom types. Dredge efficiency on the seafloor is therefore difficult to evaluate.

Box-core sediment samples were generally similar in appearance and texture among the sampled sites, with the deepest layers of sediment (>10 cm) being think and dense (Figure

2-14). Overall, samples seem to consist of fine sediment with a mix of pebbles and cobbles. Few organisms were noticed at the surface of most box-cores. Based on macroscopic observations (naked eye) polychaetes, their tubes, and Foraminifera were the most conspicuous organisms in all cores. Sediment deeper than 10 cm was usually thick and yielded large amounts of sediment grains even after thoroughly sieving and washing. All residue (gravelly mixture) left after picking organisms was retained for further inspection of macrofauna biota.

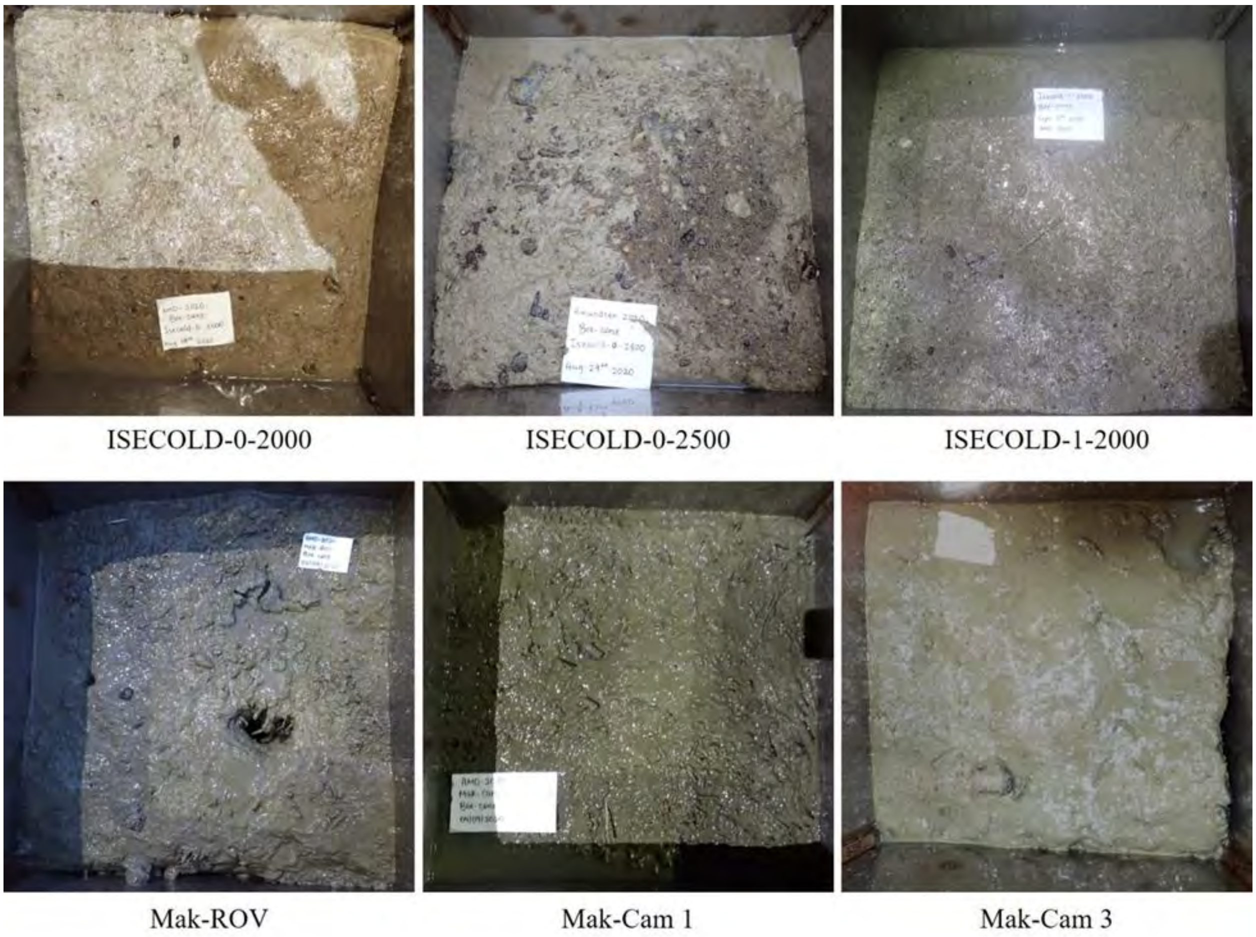

Figure 2-14: Box-core samples collected during leg 2b of the 2020 Amundsen expedition

2.3.4 *Pelagic fish and plankton*

A total of 14 fish species and 24 zooplankton species were sampled in the IKMT. Benthosema glaciale dominated the fish assemblage in terms of abundance and frequency of occurence and the amphipod Themisto libellula, the euphausid Meganycthyphanes norvegica, the squid

Gonatus fabricii and jellyfish, including the scyphomedusae Periphylla periphylla, dominated the zooplankton assemblage (Figure 2-15; Figure 2-16).

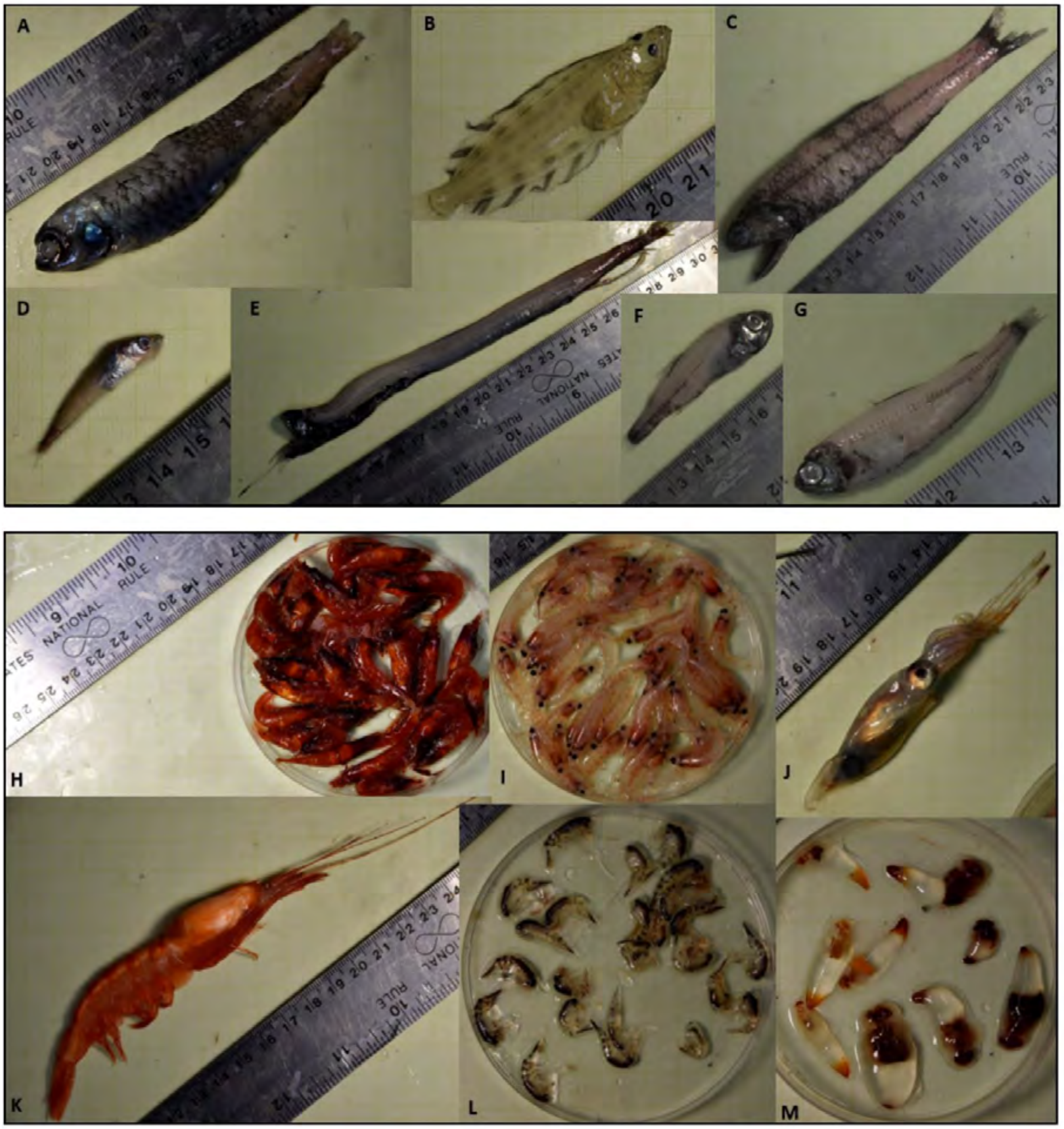

Figure 2-15: Examples of fish (upper panel) and zooplankton (lower panel) species caught with the IKMTduring leg 2b of the 2020 Amundsen expedition. A: Bathylagus euryops, B: Reinhardtius hippoglossoides, C: Lampadena sp., D: Boreogadus saida, E: Stomias boa, F: Benthosema glaciale, G: Lampadena sp., H: Robustosergia robusta, I: Meganyctiphanes norvegica, J: Gonatus fabricii, K: Pasiphaea sp., L: Themisto libellula, M: Clione limacina.

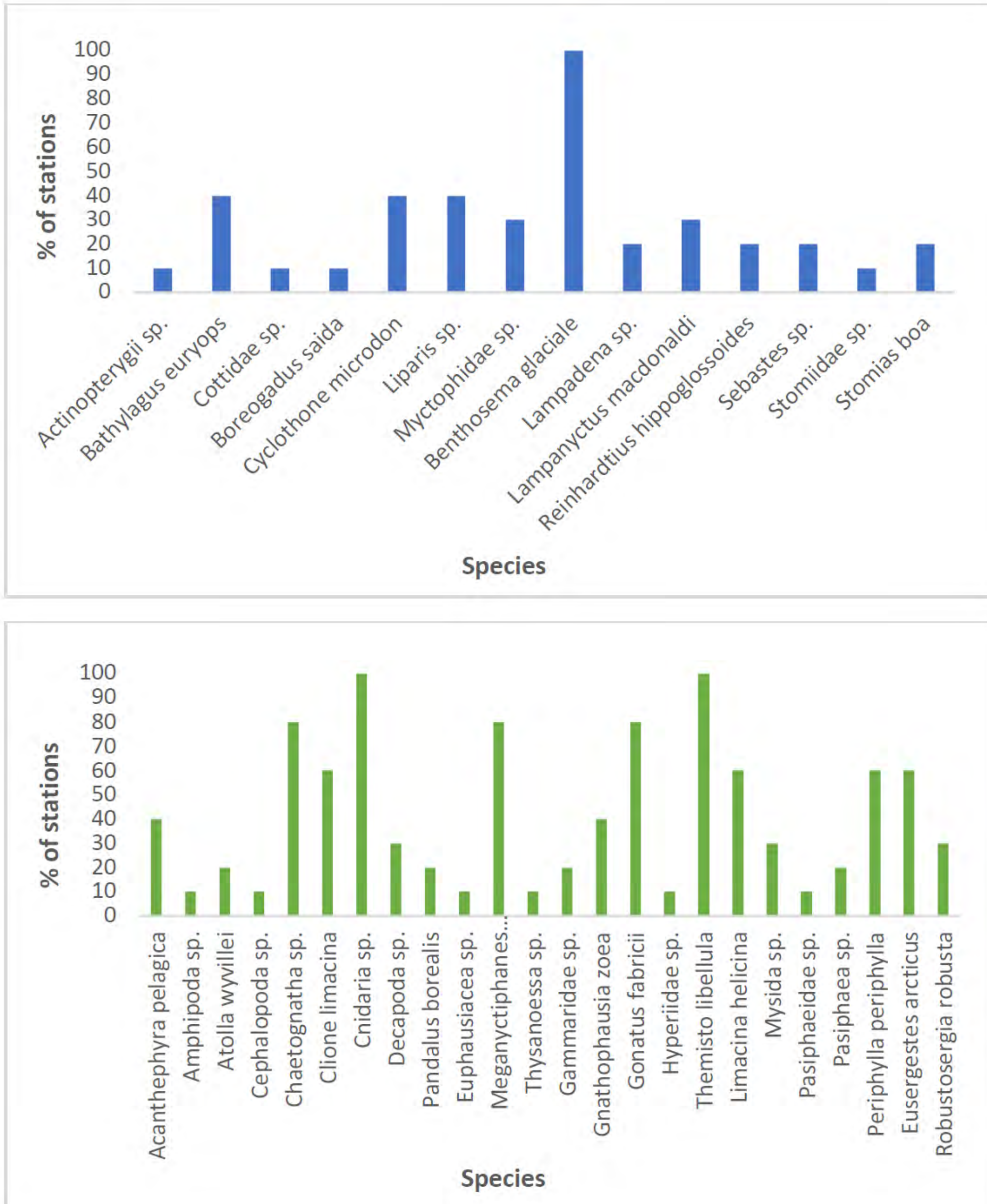

Figure 2-16: Frequency of occurrence of fish (upper panel) and zooplankton (lower panel) species caught with the IKMT during leg 2b of the 2020 Amundsen expedition

2.3.5 *Long term observation / Mooring*

HiBioC-19 saw 110% data recovery from the AZFP and from the associated CTD-Turbidity sensor (Figure 2-17). The CTD-Tu sensor indentified a salty (avg. 34.85 PSU) semi-diurnal tidal signal (~12h25min) which manifested a pull-down event during these tidal-downwelling events. The Salinity at the AZFP frame was ~34.8 PSU and the tubidity signal slowly ramps-up in May (~10-12 NTU) and then from Mid-June (~20 NTU) to mid-September (~100 NTU), peaking at the end of August (~190 NTU). The AZFP had recorded a ~120m section of the expected zone of zooplankton dynamics at the 600m depth (Figure 2-18). For further information concerning the AZFP dataset, please contact Maxime Geoffroy (Marine Institute – MUN).

The HiBioA-19 current meter (Seaguard) had malfunctioned after 4 months of successful recordings due to an internal malfunction which eventually drained the battery, but it had recorded the early summer to late fall current regime which indicated very strong, salty (avg. 35.25 PSU) SE current between 30-70 cm/s with maximum velocities between 80-110 cm/s (Figure 2-19). The sediment trap at HiBioA-19 successfully took 2-week samples for 12 months as planned and there were a variety of Chaetognaths, Copepods, Jellyfish and sediment collected (Figure 2-20). The sediment accumulation was most prominent (almost only sediment) at the onset of the spring thaw during the whole month of May, 2019. The jellyfish were seen in the mid to late September (2019, trap sample #6). For further information on the sediment trap samples, please contact David Côté (DFO).

The hydrophone from HiBioA-19 appears to have worked correctly, however, JASCO didn't provide a communications cable with the replacement unit and thus at-sea data verification was not possible. For further information concerning the hydrophone data please contact David Côté (DFO-NL).

Table 2-12 is a brief data recovery summary from HiBioA-19 and HiBioC-19.

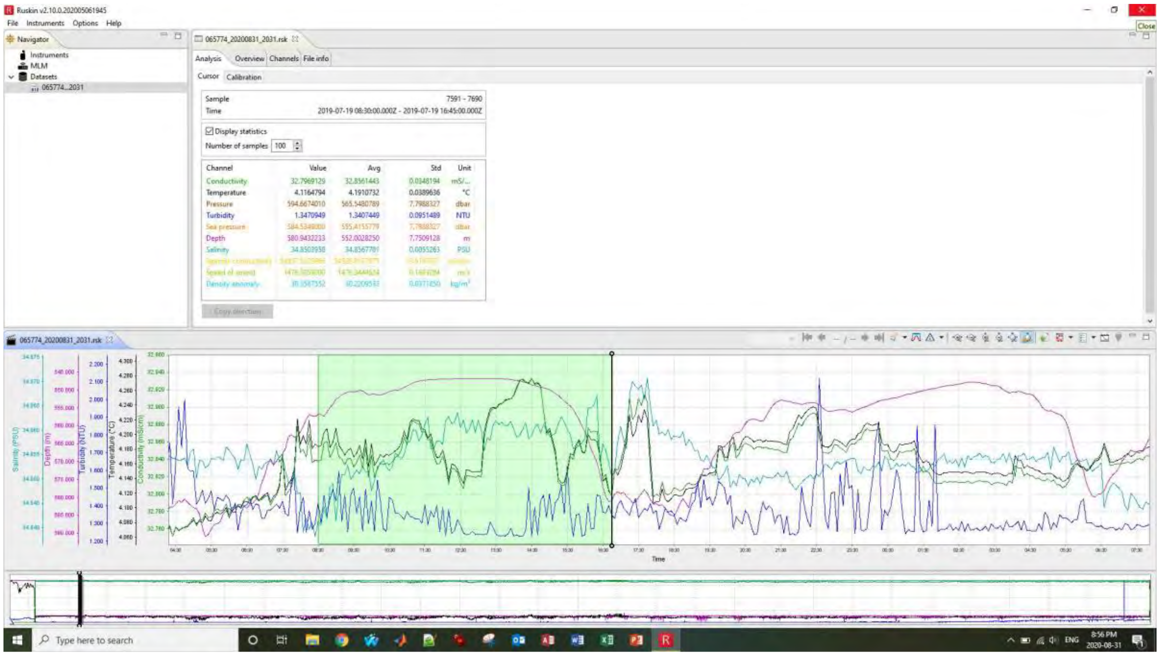

Figure 2-17: Screenshot of recovered HiBioC-19 CTD-Turb sensor on AZFP frame

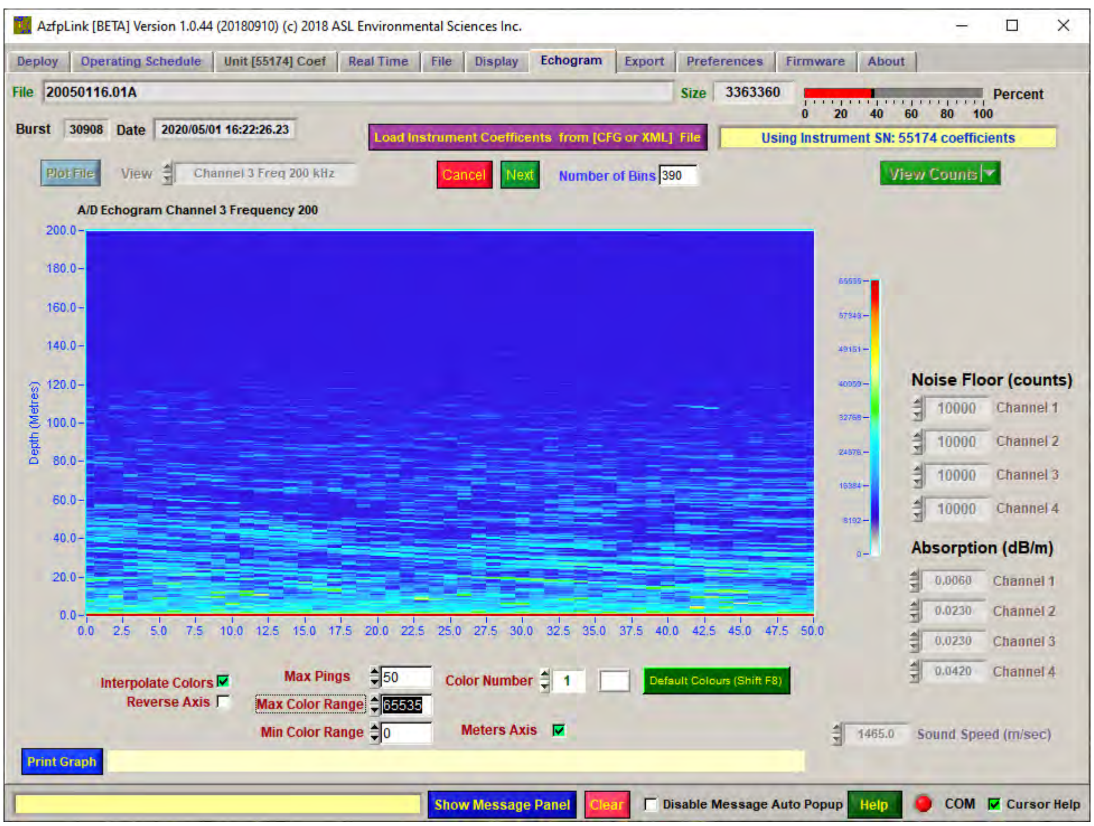

Figure 2-18: Screenshot of AZFP data recovered from HiBioC-19, indentifying the meso-pelagic activity (Depth shown is above AZFP towards the sea surface)

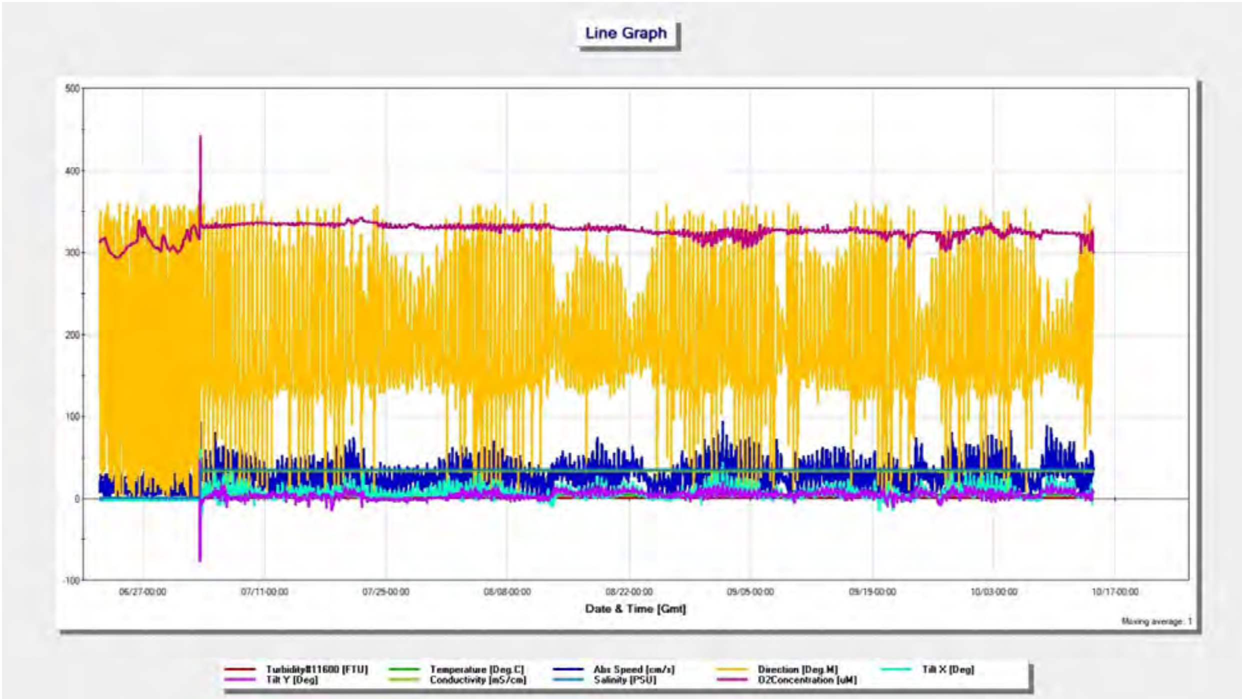

Figure 2-19: HiBioA-19 Seaguard recovered data plot from select sensors

Figure 2-20: HiBioA-19 Sediment Trap Recovered Bottle Scan

Table 2-11: HiBio 2020 mooring activities

Mooring ID	**Latitude**	**Longitude**	**Depth(m)**	**Operation**	**Date**
MkB1-20	55 25.1689 N	58 49.0746 W	447	Deployment	Aug 27, 2020
HiBioC-19	60 27.843 N	61 09.4690 W	1025	Recovery	Aug 31, 2020
HiBioA-19	60 27.6464 N	61 15.7307 W	516	Recovery	Aug 31, 2020
HiBioA-20	60 28.379 N	61 16.052 W	487	Deployment	Sept 1, 2020
HiBioC-20	60 27.817 N	61 09.569 W	1013	Deployment	Sept 2, 2020

Table 2-12: 2020 Recovered Mooring Instrument Data Summary

Mooring ID	Instrument ID	First Good (UTC)	Last Good (UTC)	Time Drift (seconds)	Depth (m)	Data Recovered (%)
HiBioA-19	JASCO_G3_380	TBD	TBD	TBD	400	TBD
HiBioA-19	Technicap_PPS3-3_07-341	04-07-2019 00:00	30-06-2020 00:00	-301	451	100
HiBioA-19	Aanderaa_Seaguard_30	03-07-2019 16:20	29-10-2019 00:00	0	508	33
HiBioC-19	ASL_AZFP_55174	05-07-2019 12:00	11-08-2020 23:33	0	546	110
HiBioC-19	RBR_Concerto-CTD-Tu_65774	02-07-2019 17:10	31-08-2020 15:10	-10	546	116

2.4 **References**

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3 Genetic structure and local metabolic adaptations in the glacial relict *Boreomysis nobilis*

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3.1 **Introduction**

Climate and sea level changes caused by the end of the Pleistocene glaciation have altered the biogeography of marine species. Also, the rapid decline in relative sea level has greatly altered the connectivity of environments such as fjords. Their moraines now form thresholds, which can limit wildlife exchanges and offer environmental conditions that are different from the bodies of water on which they depend. As a result, populations have found themselves sequestered in fjords in the boreal zone. When these populations persist despite this isolation, they can be considered glacial relics. In species with a low dispersal capacity, the modification of the thermal regime may have allowed the development of local adaptations of the metabolism, particularly in ectothermic organisms. Also, considering the limited gene flow between glacial relics and other panmictic populations, a genetic divergence can be observed.

The present project aims to shed light on the genetic structure of a species of Arctic mysidaceae, *Boreomysis nobilis* G. O. Sars (1879), which has a glacial relict population in the Saguenay Fjord, Quebec. The species is considered to be bathypelagic and hyperbenthic, at least in the fjords of Newfoundland where its distribution in the water column has been studied. The Saguenay population would be the southernmost of the species' current geographic distribution. Also, signs of local adaptations of metabolism to the warmer and variable temperature regime of the Saguenay will be highlighted by studying the susceptibility to denaturation of different enzymes by temperature. Thus, it is expected that genetic diversity will be greater in the Saguenay population than in Arctic populations. Moreover, enzymatic denaturation should be carried out at lower temperatures in Arctic populations than in the

Saguenay population, since the latter should present enzymes that are better adapted to higher temperatures.

Sampling work was carried out in 2018 in the Saguenay and in 2019 in the Canadian Arctic Archipelago. The present mission allowed the collection of *B. nobilis* specimens in the Saguenay Fjord in an opportunistic manner.

The specific objectives are the following:

- Sample *Boreomysis nobilis* opportunistically in the Saguenay Fjord
- Describe the environmental parameters of the areas where the species is present.

3.2 **Methodology**

The sampling was done in an opportunistic manner, prioritizing Comanche ROV deployments. A Jacknet-type net was deployed at three stations in the Saguenay Fjord (S1-A, S2-A and S3). These had respective depths of 223, 259 and 260 m (see Table 4-1). Equipped with a strobe light, a flowmeter and a CTD (Star-ODDI) probe, the net had an opening of one meter in diameter, a length of 4 m and a mesh size of 202 µm. It was used to sample meso- and macrozooplankton in the upper basin of the fjord in the Eternity Bay area.

The net tows were vertical/oblique, i.e., deployed vertically while the vessel was stationary. Once the net was approximately 10 m from the bottom, the vessel would then accelerate to a speed of 2 kn. The length of the cable was adjusted according to the angle it was at. The target stratum was between 10 and 50 m from the bottom, since the species should be present at the highest densities.

Once harvested, individuals of the species sampled were individually placed in 5 ml cryovials and stored at -80°C.

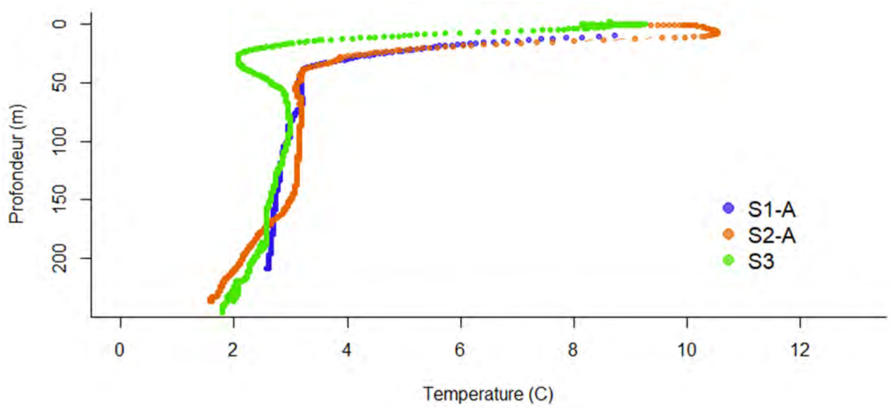
Table 3-1: Zooplankton sampling metadata

Station	Latitude (décim.)	Longitude (décim.)	Depth (m)	Date	Local time IN	Local time OUT	Vitesse DOWN /UP	net type	net diam. (m)	mesh size (µm)	flow meter start	flow meter end	cable length (m)	angle (°)	CTD max depth (m)	storage	sorted specimen (n - species)	Notes
S1-A	48,24938	-70,10496	223	2020-09-18	06:52	07:20	30	Jacknet	1	202	318201	356973	280	50	208,0	-80	8 Boreomysis nobilis	5 min. au fond
S2-A	48,32501	-70,29272	259	2020-09-19	06:36	07:12	30	Jacknet	1	202	356993	414692	285	40	236,0	-80	18 Boreomysis nobilis	10 min. au fond
S3	48,32554	-70,29409	260	2020-09-21	6 :31	7 :07	30	Jacknet	1	202	414693	468078	300	40	246	-80	10 Boreomysis nobilis	10 min. au fond

Figure 3-1: A female carrying advanced developing embryos collected during sampling at station S2-A

3.3 **Preliminary Results**

Sampling successfully harvested the target species. Sampling at stations S1-A, S2-A and S3 resulted in the collection of 8, 18 and 10 individuals respectively. All life stages were found, with a few females carrying embryos at different stages of maturity (see Figure 3-1). Individuals generally appear to be smaller in size than those collected in the Arctic, which seems to support the hypothesis that the Saguenay population presents local adaptations related to temperature. Profiles were different at the three stations, despite their geographic proximity. This observation is possibly due to the tidal regime, which was different from one station to another.



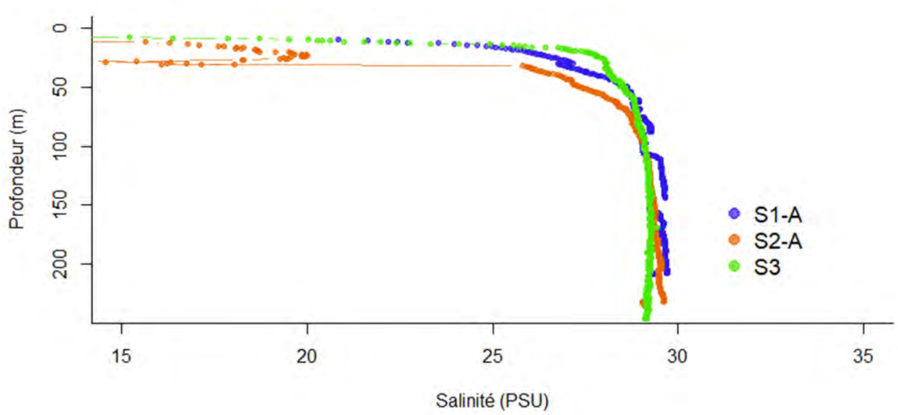


Figure 3-2: Vertical temperature (top) and salinity (bottom) profiles at stations S1-A, S2-A and S3

Temperature and salinity profiles were carried out at the sampled stations to partially describe the physico-chemical habitat of the species. Thus, temperature varied from about 1.8 to 3°C and salinity was stable around 29 at depths where the species should be present in greatest abundance (see Figure 3-2).

Some zooplankton diversity was observed in the samples, including amphipods (Temisto sp.), ctenophores (Beroë sp.), mysids other than the species of interest (Mysis sp.), chetognates and euphausiids (Meganyctiphanes norvegica). Two fish (sticklebacks) were also collected at station S3. A few large copepods of the genus Calanus were also collected, but their sampling was not effective. It is possible that the inadequate sampling of the genus may be explained by the presence of a gelatinous sea-snow-like substance that clogged the mesh of the net and bucket.

The specific objectives were successfully met.

3.4 **Aknowledgments**

Our team would like to thank the Canadian Coast Guard crew for their hospitality, logistical support and invaluable experience. We would also like to thank the Amundsen Science team for allowing us to carry out the sampling required for the project. These opportunities represent an incredible chance to carry out our research work, in addition to sharing a unique experience at sea.

4 CTD Rosette

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4.1 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 clarity of water A SBE 911 CTD is used in parallel 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 current velocities at sampling stations. The Rosette was also equipped with Niskin bottles, which were used to supply water samples for biologists and chemists.

4.2 Methodology

4.2.1 *CTD – Rosette*

The Rosette frame is equipped with twenty-four (24) 12-litre bottles and the sensors described in Table 4-1.

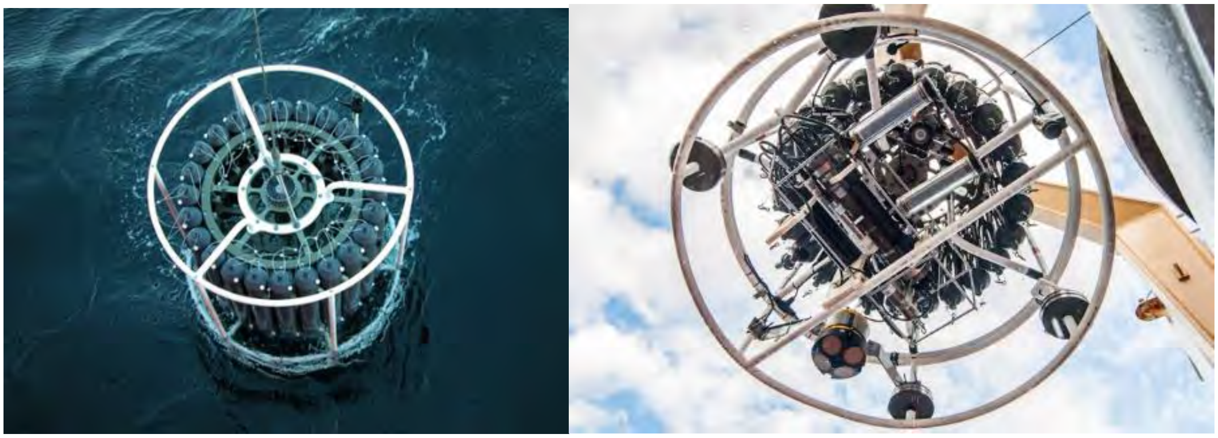

Figure 4-1: Top view of the SBE32 with 24x 12L Niskin bottles used on the Amundsen (left) and bottom view of the SBE32 showing the SBE9 CTD including additional sensors and the RDI LADCP (right). Photos: Jessy Barrette.

Problems Encountered with the CTD-Rosette and its Sensors

Leg 2a et 2b: There was a problem with the Sea-Bird C-Star transmissometer during the mission. Furthermore, both SUNA (nitrates captor) and SBE 43 (oxygen captor) had sporadic problems.

Leg 3: Once again, there were sporadic problems with the Sea-Bird C-Star transmissometer.

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 of 0.002 PSU.

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

Table 4-1: Rosette sensors

Instrument	Parameter	Properties	Serial Number	Calibration date	Leg
SBE 3plus	Temperature	Range: -5ºC to + 35ºC Accuracy: 0.001	6513 6522	2020-06-24 2020-06-25	All
ParoscientificDigiquartz®	Pressure	Accuracy: 0.015% of full range	0679	2020-06-17	All
SBE 4	Conductivity	Range: 0 to 7 S/m Accuracy: 0.0003	4976 4981	2020-06-16	All
SBE 43	Dissolved Oxygen	Range: 120% of saturation Accuracy: 2% of saturation	3966	2020-07-01	All
SUNA	Nitrates	Range: 0.5 to 200 μM Accuracy: ± 2 μM	281	2019-06-24	All
QCP-2350 Bioshperical	PAR / Irradiance	Unit: μE/m^2/sec	70755	2017-12-17	All
QCR-2200 Bioshperical	SPAR / Surface Irradiance	PAR Spectral Response: Equal (better than ±10%) quantum response from 400 to 700nm	20147	2020-08-16	All
Seapoint	Fluorescence	Minimum Level: 0.02 μg/l Sensitivity: 0.33 V/μg/l Range: 15 μg/l	3119	2019	All
Sea-Bird C-Star (WetLabs)	Transmissometer	Path length: 25 cm Sensitivity: 1.25 mV Wavelength: 657 nm	CST2021	2020-01-24	All
Benthos PSA-916	Sonar Altimeter	Range: 100m	427	2020-08-14	All
Sea-Bird (WetLabs)	Fluorescence	Sensitivity: 0.09ppb Range: 0-500ppb	FLRTD-4689	2017-03-09	All

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.

Quality Control

The Rosette is also equiped with a double set of temperature / conductivity (salinity) sensors that allows real-time and post-processing quality control of these parameters.

4.2.2 *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: 2001001.

Odyssée St-Laurent cruise number: 99
Leg 1 cruise number: 01
Leg 2 cruise number: 02
Leg 3 cruise number: 03

All the information concerning the Rosette casts is summarized in the CTD Logbook (one row per cast). The information includes the cast and station id (and event number for Leg 2a) 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.

4.2.3 *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 4-2: Lowered Acoustic Doppler Current Profiler (LADCP)

4.3 **Preliminary Results**

Data processing of the CTD-Rossette can take a while. The proceed data will be made available on the polar data catalogue once ready.

5 ROV Sea Trials

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5.1 Introduction

The purpose of this report is to describe my experience during sea trials of the new Comanche ROV aboard CCGS *Amundsen* (Figures 1 and 2). I have obtained great feedback from the ROV team throughout trials, and although this report describes my perspective, it also represents the result of countless team discussions.

The main objectives of the 2020 Comanche ROV trials aboard CCGS *Amundsen* were to test the basic functionality of the new ROV and its elements, seven-function arm, sampling skid, push cores, and provide additional training for pilots Christopher Morrissey and Simon Morisset (Amundsen Science). Dives had a variable duration, with the longest deployment lasting ~4 hours (deck-to-deck). Dive objectives were also variable, but included all the steps of a regular ROV survey including launching and recovery (new deployment from CCGS *Amundsen*), ROV landing on the seafloor, direct object sampling (e.g. soft corals), sampling using the push-cores, video transects (i.e. appropriate speed and distance from seafloor), etc. Details on technical aspects of the operations are not provided here, but will be provided to Amundsen Science by the ROV team.

The ROV was deployed in the harbor in Québec City prior to trials, but staying at the surface, for some basic testing before real trials (do not count as dives). A total of nine dives were performed, with one of them aiming to inspect the ships' propellers (C-0006). Maximum depth surveyed was ~260 m. Six dives (C-0001-0004 and C-0008-00009) took place in the Saguenay

Fjord. Three dives took place near Rimouski (C-0005-0007). Dive 0007 was aborted once on the seafloor, due to very strong bottom currents and very low visibility due to intense sediment resuspension (at ~350 m depth).

One main difference in the deployment of the Comanche ROV in comparison to SuMo is that with the former, deployments take place from the deck (starboard side) and not from the moon-pool. Deploying the ROV from the deck allows scientists to better watch the launch process in comparison to when using SuMo. It will also make it more straightforward to transport samples to the benthic lab to process push-cores. Appropriate PPE and work clothing (e.g. weather-appropriate) will need to be a consideration for scientists working with the new ROV aboard CCGS *Amundsen*.

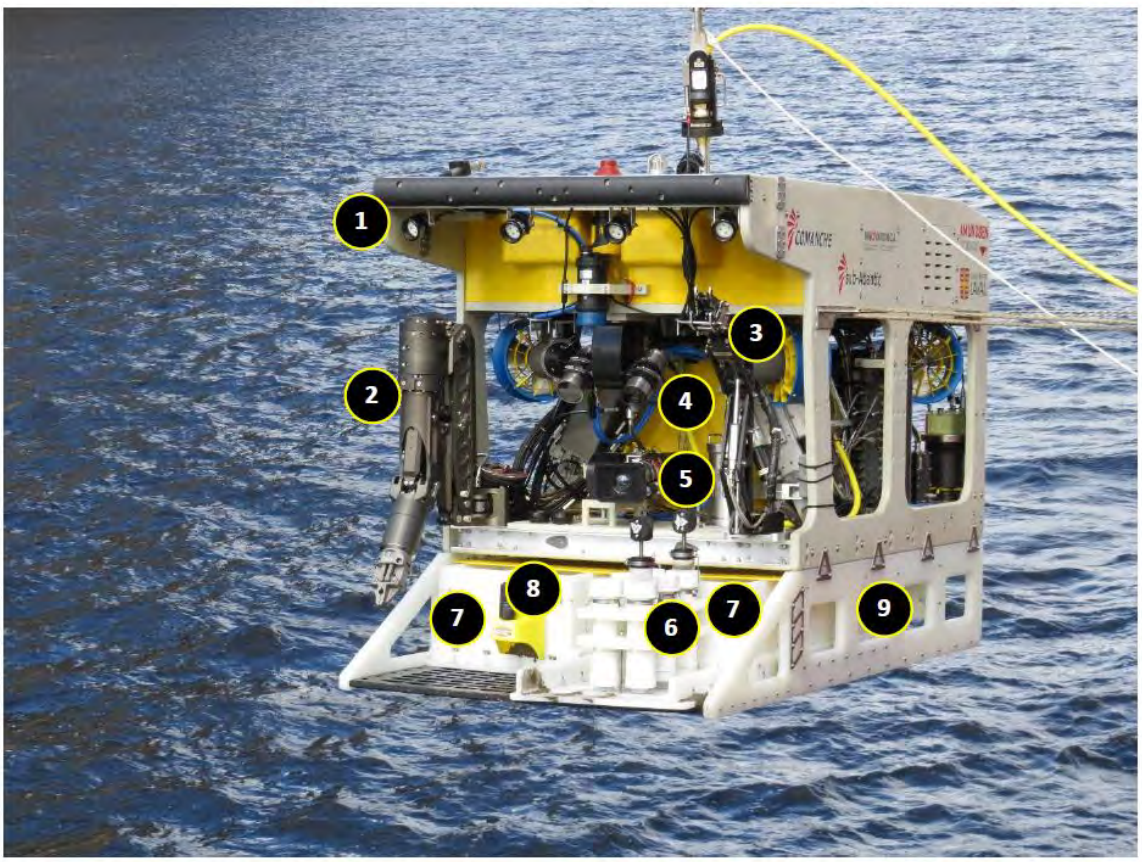

Figure 5-1: Comanche ROV being deployed from CCGS *Amundsen* during ROV sea trials (September 2020). 1) set of lights, 2) 7-function arm, 3) port arm, 4) 1 Cam Alpha camera, 5) Rayfin camera, 6) push-cores, 7) sampling drawers (retracted), 8) sampling scoop, 9) whole sampling skid

5.2 **Methodology**

5.2.1 *Cameras and Lasers*

The new ROV has two main cameras (plus auxiliary ones): a centered Rayfin camera (4K and HD, SubC imaging) and a 1 Cam Alpha camera (HD, SubC imaging, SuMo's HD camera, Figure 1). The Rayfin camera has a much wider field of view than the 1 Cam Alpha (SuMo's, Figure 3) and it can record in 4K mode in addition to HD. Another advantage of the Rayfin is that it is set to HD mode in live fed mode, which is not the case of the 1 Cam Alpha camera. Furthermore, in the Rayfin files are automatically downloaded while it records, making the post-dive processing faster. However, while the 1 Cam Alpha camera imagery worked well, the Rayfin camera was a huge disappointment. The image was not sharp, and there were illumination issues (Figure 5-2; Figure 5-3), despite the presence of four lights on the front of the ROV (Figure 5-1). Furthermore, the Rayfin camera would often freeze the image and give an error message during the dives. The ROV team aboard has contacted SubC imaging for a solution, as the imagery from this camera - as it currently stands - does not meet our expectations.

Both SubC cameras have associated laser beams that can be used for object size estimation. However, the laser points associated to the 1 Cam Alpha are ~6 cm apart, while in the Rayfin these are 10 cm apart. This information should be clearly provided to potential users (especially new users). Additionally, the Rayfin laser beams are too powerful and bright, to the point of being a nuisance. They hamper the imagery and were not used during trials other than to display how intense they were.

Figure 5-2: Comparison of 1 Cam Alpha (left) and Rayfin (right) field of views.

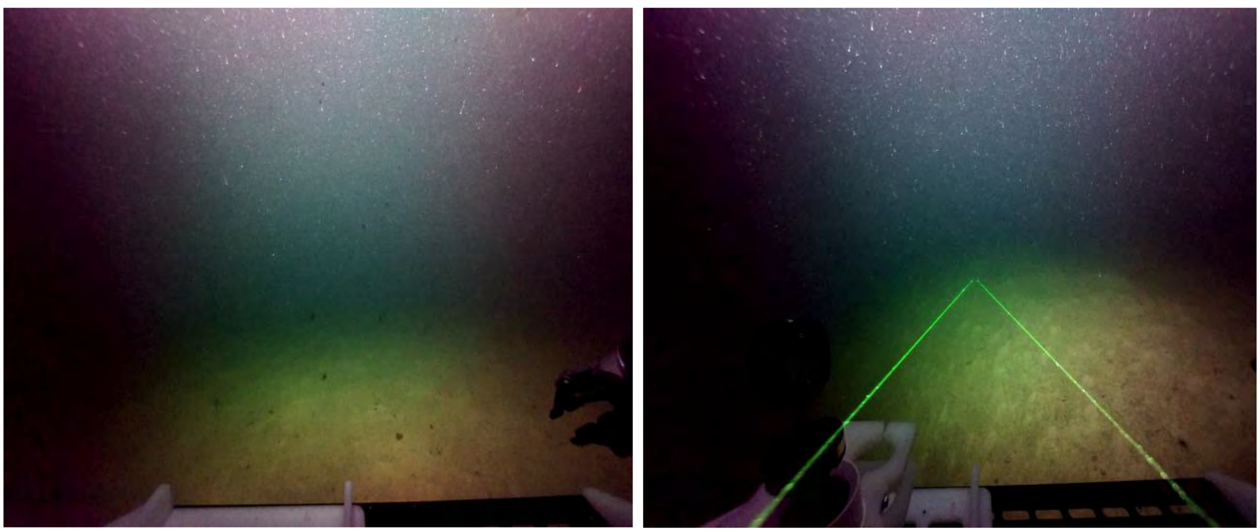

Figure 5-3: Example of (left) Rayfin snapshot extracted from 4K video in VLC, (rigth) Rayfin lasers.

5.2.2 *Video transects*

Video transects were performed mostly as a practice opportunity for new pilots. Transects took place in both flat and steep environments. Videos were recorded using both cameras, and in the Rayfin in both HD and 4K modes (not simultaneously). A naming convention to distinguish HD and 4K video files should be considered. Photo stills are not an option when recording in

4K mode with the Rayfin camera, but they are possible under HD mode. HD stills were taken using the 1 Cam Alpha camera.

The Comanche ROV does not have an altimeter, but distance from the seafloor is obtained through a DVL (Doppler Velocity Log). Altitude information is constantly displayed on the 1 Cam Alpha overlay video, along with roll, pitch, depth, and time. Technically, the DVL should give altitude to 0.1 m of the seafloor. However, during tests it was noticed that at ~6 m from the seafloor, the altitude did not change anymore, and it was unreliable. The ROV team is working with the DVL company on solutions.

From a scientific point of view, maintaining a relatively constant distance from the seafloor is often necessary during transects; therefore, having altitude information for when the ROV is close to the seafloor is quite useful, and might be particularly useful to new pilots. ROV speed during video transects is another essential parameter that needs to be mastered to assure good quality video data.

5.2.3 *Logging system*

During trials I did not have the opportunity to use the logging system used with SuMo (and ROPOS) in previous years (IRLS). IRLS is a system that allows users to log dive activities and events of interest in real-time. Through IRLS, scientists can enter information about dive events (e.g. sampling, transiting, ascending, descending, problem with ROV, etc) and observations (e.g. species A, high densities of something, change in fauna, etc), with the navigation data (and optional photos) associated to that particular observation being automatically recorded. IRLS is very useful for video post-processing and quick finding of events of interest, as well as for properly logging sample entries. Not having a logging system would be a significant disadvantage when using this ROV. Therefore, as a scientific user of IRLS in the past years, I strongly recommend Amundsen Science to consider making it available for scientific dives. IRSL is used nationally and internationally (with ROV ROPOS), it is well established, reliable, user-friendly, and is already familiar to SuMo's and ROPOS' users.

5.2.4 *Sampling*

A total of 19 samples were collected through six of the dives (Table 5-1). Most of these were soft coral samples collected using the seven-function arm jaw (starboard). The current port arm (SuMo's) cannot be used for sampling, as it cannot reach the seafloor due to the sampling skid tray (Figure 5-1). A second seven-function arm (less powerful than the current one) will potentially be added to the ROV (grant-dependent), to be used as auxiliary to the main starboard arm.

Table 5-1: Summary of samples collected using the Comanche ROV during the 2020 ROV sea trials aboard CCGS *Amundsen*

Id	Dive	Method	Sample id	Type	Notes
1	C-0001	Jaw	C-0001-1	Coral	Broken base
2	C-0001	Jaw	C-0001-2	Coral	
3	C-0001	Jaw	C-0001-3	Coral	
4	C-0002	Jaw	C-0002-1	Coral	
5	C-0002	Jaw	C-0002-2	Coral	
6	C-0002	Jaw	C-0002-3	Coral	
7	C-0003	Jaw	C-0003-1	Coral	Extra light added
8	C-0004	Jaw	C-0004-1-PC	Push-core	Did not record. No coral
9	C-0004	Jaw	C-0004-2-PC	Push-core	Perfect sample. With coral
10	C-0004	Scoop	C-0004-1	Coral	
11	C-0008	Jaw	C-0008-1-PC	Push-core	With coral
12	C-0008	Jaw	C-0008-1	Coral	
13	C-0008	Jaw	C-0008-2-PC	Push-core	With coral
14	C-0008	Jaw	C-0008-2	Coral	
15	C-0008	Jaw	C-0008-3	Coral	
16	C-0009	Jaw	C-0009-1	Coral	
17	C-0009	Jaw	C-0009-1-PC	Push-core	With coral
18	C-0009	Jaw	C-0009-2	Coral	
19	C-0009	Jaw	C-0009-3	Coral	

One soft coral sample was collected using a sample scoop, and four push cores were also collected, three of them with a soft coral inside (Table 5-1). Soft coral and sediment samples were frozen in -80 °C and will be used in a pilot study on the relationship between soft corals and their surrounding sediment. Only surface sediment samples were kept for analysis.

The seven-function arm is powerful and it was successfully used to collect objects on the seafloor (e.g. soft corals) and push cores. The sampling scoop works very well for fragile, unattached specimens, and it is a great simple addition to the ROV toolset. The scoop could not be used using SuMo's arm, so this represents a great improvement. Sampling using the jaws was also successful, and pilots were happy about its general performance, particularly in comparison to SuMo's limited arms.

The sampling skid worked perfectly, and for true scientific dives it would be useful to produce stickers to be placed inside of the skid's drawers, to avoid confusion regarding where each specimen was placed (e.g. starboard front 1, starboard front 2, etc). The number of drawers will change between dives (depending on dive objectives), so stickers might be adjusted too. This information (sample locations in drawers) should also be added in IRLS to provide a clear and synthesized list of samples collected per dive and their location (IRLS is very useful to keep a handy list of samples and their associated navigation data).

The push-cores also worked very well (Figure 5-4). Similarly to sampling with the scoop, precise push-core sampling was not possible with SuMo's 5F arm geometry, but possible with the new ROV's 7-function arm. Push-core sampling is an ROV activity that requires finesse and experience. As such, it was only performed by CSSF pilots. The cores came back to surface in good state and with no noticeable sediment disturbance. Scientists should be ready to receive the push-cores and to have their own tools to remove the liners from the holsters and access the sediment (instructions available from CSSF). Colored tape (i.e. a markers) should be placed on the cores before future ROV deployments, in order to clearly distinguish them from one another (as seen in ROPOS's push-cores).

The push-core frame can currently fit six push-cores. There is a potential to add two additional cores to this set; however, costs associated to acquiring these as well as to increasing the size of the frame will need to be considered (Figure 5-5). Only the port side of the ROV can hold push-cores, as the starboard tray is not extensible (i.e. the tray needs to be extensible for the starboard arm to reach the cores). Discussions regarding the inclusion of a second extensible tray (i.e. starboard) are ongoing among scientists (B. M. Neves, E. Edinger) and CSSF, but the addition of a second set of cores on the starboard side might still not be viable (i.e. depends on arm reach).

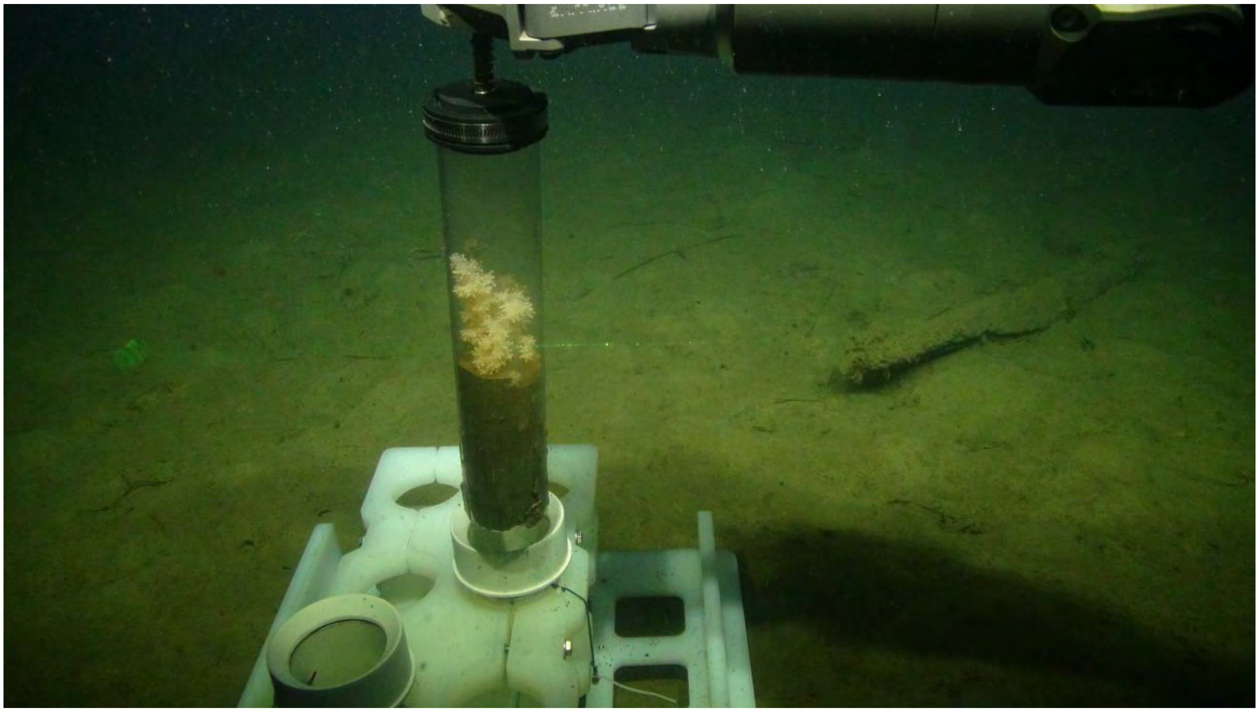

Figure 5-4: Push-core successfully sampled using the Comanche ROV during trials (1 Cam Alpha camera). This core was sampled with a soft coral inside

One important note about the push-cores is that in this ROV they occupy a large portion of the Rayfin's field of view (Figure 5-6). Therefore, dives should be planned to avoid both push-coring and actual video-transects in the same dive. Of course, video data can still be used with the push-cores in the tray, but the field of view is clearly limited.

A final note regarding sampling is that in soft bottom areas (e.g. Saguenay Fjord) sampling of specimens might be accompanied by associated sediment, which will tend to accumulate in the sampling drawers. It would be useful to have a Shop-Vac available (potentially dedicated to the ROV, or readily available for ROV use) in order to remove remaining sediment and water from previous sites between dives. This is particularly important if contamination between samples and sites is a concern.

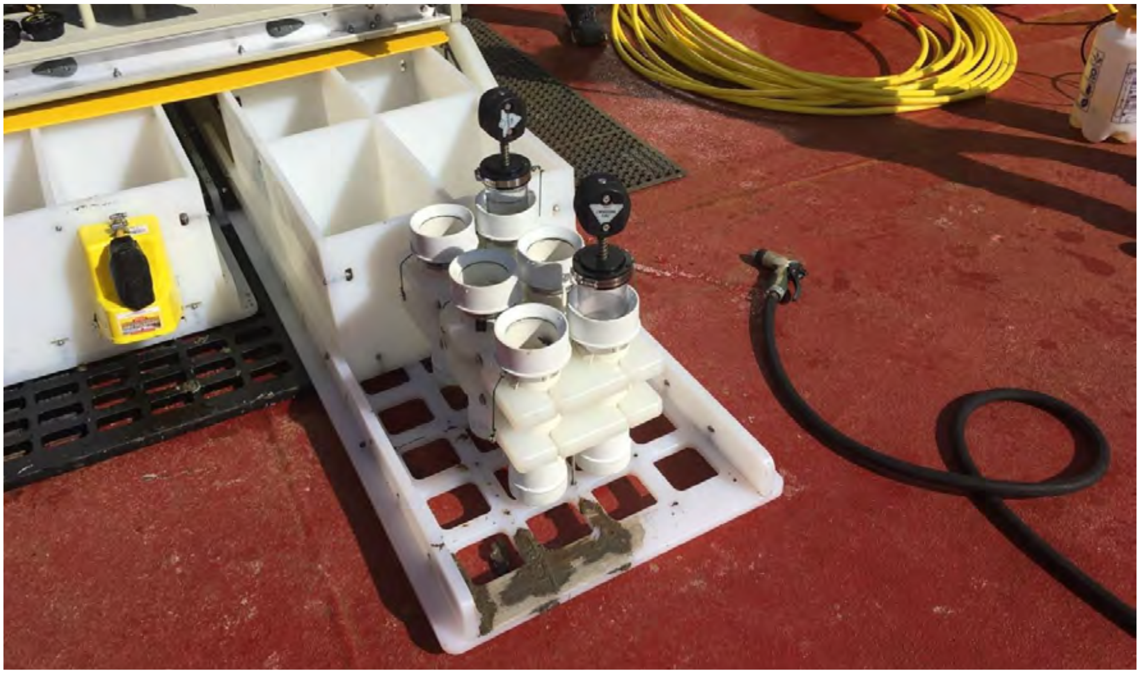

Figure 5-5: Positioning of push-cores on extensible tray during the 2020 ROV trials. Two additional push-cores could potentially be added to the frame, which would extend to the red polygon area.

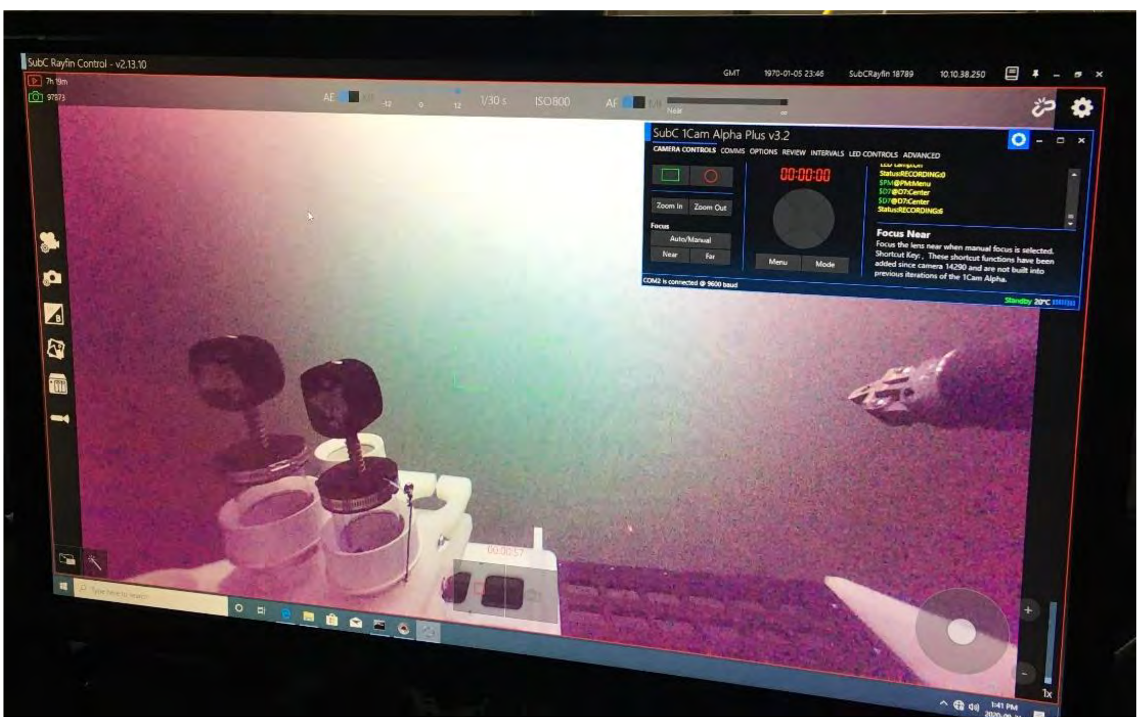

Figure 5-6: Position of push-cores in Rayfin camera field of view

5.3 **Final considerations**

During trials I was able to obtain a number of samples often not possible with the old SuMo through the course of an entire expedition (due to technical issues). In addition, obtaining push-core samples alone shows the potential of the Comanche ROV. There is also the possibility of including additional instruments and tools (e.g. CTD, suction sampler) to be associated with this ROV, which is quite promising. The issues regarding the quality of the RayFin camera will hopefully be solved (new camera?) by next sea trials, as well as any potential outstanding ROV technical issues not described here.

Navigation data is a fundamental part of the data collected during dives, and export files in a similar format to those produced in the past years with SuMo are a critical requirement. These were not readily produced during trials because they were not essential to the trials objectives.

The possibility of adding a time stamp to the HD and 4K videos also needs to be considered. In the past, a subtitle containing this information could be added when watching videos in VLC. That is how we could link the videos to the navigation data. Therefore, options regarding the availability of navigation data as well as access to IRLS are essential and should be discussed with CSSF and defined ahead of time for future deployments.

ROV trials was an excellent opportunity to provide some training to new pilots to operate Comanche in the future. As this is a new ROV, even experienced pilots are still in the process of learning about its features. The entire ROV team aboard contributed to make sure that operations occurred smoothly, successfully, and safely. However, it is important to emphasize that main scientific operations including true video-transects and sampling (push-core or not) should still be *mostly* performed by experienced pilots to assure efficacy and data quality, until new pilots acquire more experience.

6 Seabed Mapping and Sub-Bottom Profiling

Project leaders: Amundsen Science

Cruise participants – Leg 2a: Daniel Amirault[1]

Cruise participants – Leg 2b: Daniel Amirault[1]

Cruise participants – Leg 3: Daniel Amirault[1], Reilly MacKay[2], Marc Fortner[3]

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[2] *Marine Institute, Memorial University, St. John's, NL*

[2] *University of New Brunswick, Fredericton, NB*

6.1 Introduction

From August 13th – August 24th (Leg 2a), Amundsen Science acquired multibeam echo sounder and sub-bottom profiler data in support of NRCan's requirements of dedicated seabed mapping off the coast of Labrador; throughout areas on and in close proximity to Canada's continental shelf. Opportunistic seabed mapping also occurred while conducting separate operations or transiting between stations. In total, seabed mapping covered a distance of 1838 nm over an operational time of 1605 hours.

Leg 2b's Seabed Mapping initiatives supported research and operations conducted by the Department of Fisheries and Oceans (DFO) located in St. John's Newfoundland. Multibeam and sub-bottom data was collected continually from August 24th until September 11th in support of opportunistic data acquisition and dedicated mapping operations. In total, seabed mapping covered a distance of approximately 4000nm over an operational time of around 570 hours. Objectives of Leg 2b were centered around opportunistic data acquisition; a dedicated multibeam survey in Makkovik, Labrador; supportive uses of the sub-bottom profiler for box core and rock dredge operations; and testing the levels of noise produced by the ships propellers through the EM302 and EK80 sounders (see ship tracks in Figure 6-1).

The Amundsen's 2020 Leg 3 expedition primarily focuses on efforts from the Canadian Hydrographic Service (CHS) to collect new bathymetric data within proposed Low Impact Shipping Corridors (LISC) and an effort from Natural Resources Canada (NRCan) to obtain bathymetric data on Canada's continental shelf break. The mission concentrated efforts to obtain bathymetric coverage within three selected Zones within the LISCs , seen in Figure 6-2.

Data collected during opportunistic mapping will also be used in research projects carried out by the University of New Brunswick's Ocean Mapping Group. The water column data collected by the EM302 is of special interest; ongoing research projects will involve the investigation of water column noise levels in different ocean sectors with the goal of developing processes to identify "signals" in noise indicating different qualities. Possible applications of this research could include improved identification of biological and geological processes, a real-time system for tracking changing environmental parameters as they effect the survey, and a possible real-time classification method for physical seabed characteristics, all using data collected by a multibeam echo sounder.

Due to unforeseen circumstances explained in Section Incidents and Events, the final cruise track, seen in Figure 6-3 differs from the plans of Leg 3. Throughout Leg 3, the Amundsen collected bathymetric data for a total of 31 days during acquisition.

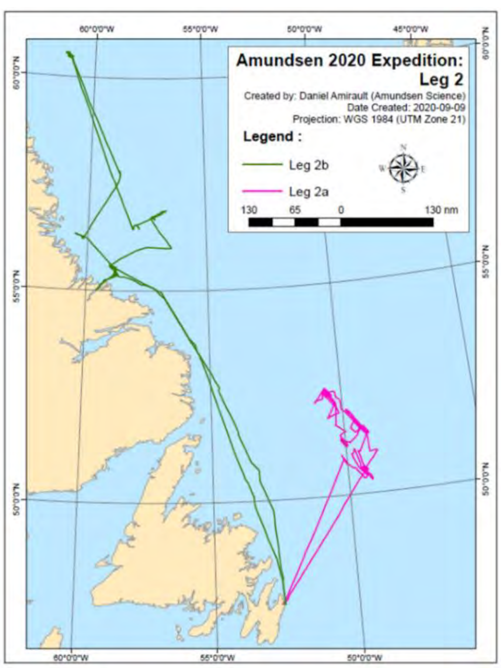


Figure 6-1: Shiptrack of Amundsen 2020 Expedition – Leg 2

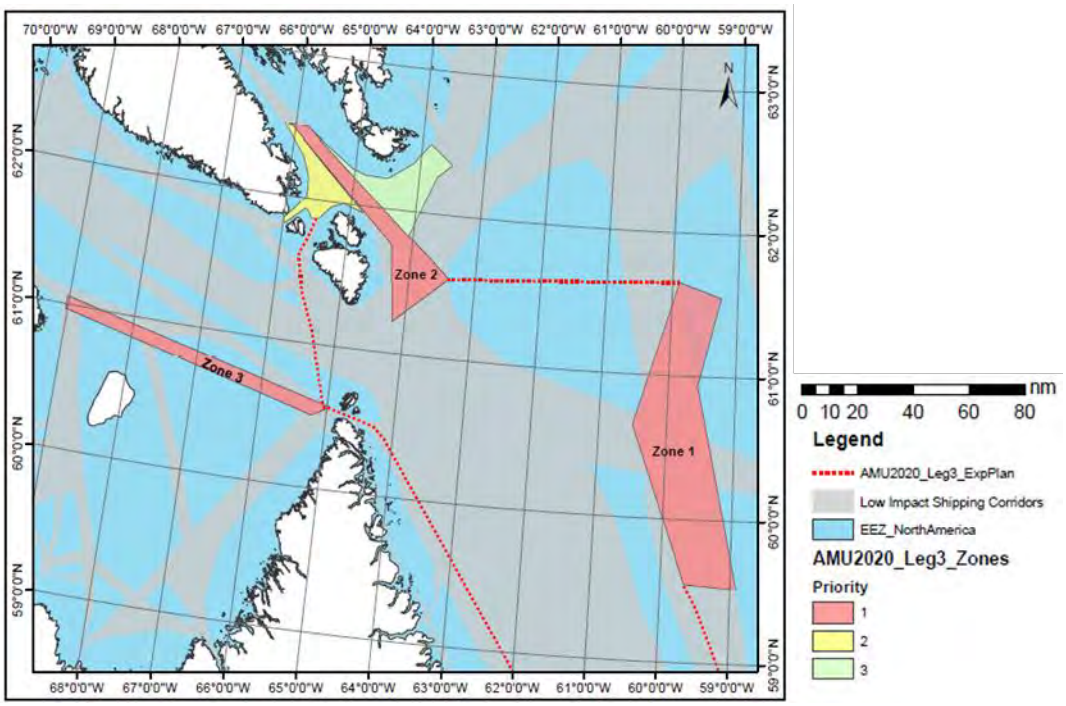


Figure 6-2: Amundsen 2020 Leg 3 Expedition Plan

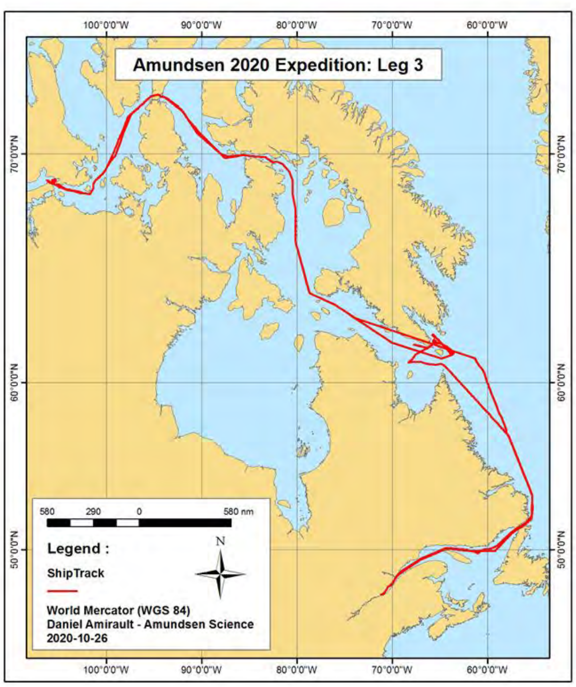


Figure 6-3: Amundsen Leg 3 Shiptrack

6.2 **Methodology**

6.2.1 *Kongsberg EM302 Multibeam Sonar*

The Amundsen is equipped with an EM302 multibeam echosounder (MBES) operated through Kongsberg Maritime's proprietary acquisition software, *Seafloor Information System (SIS)*. Attitude is given by an *Applanix POS-MV* receiving RTCM corrections from a CNAV 3050 GPS receiver. Position accuracies in planimetry and altimetry were approximatively < 0.6m and < 0.9m respectively. An AML probe is used for beam forming at the transducer head.

6.2.2 *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. The Knudsen 3260 acquired sub-bottom profiles along transits at a frequency of 3.5 kHz to image sub-bottom stratigraphy of the seafloor. The dedicated HP Elite Desk computer was used for acquisition and processing.

6.3 **Preliminary results**

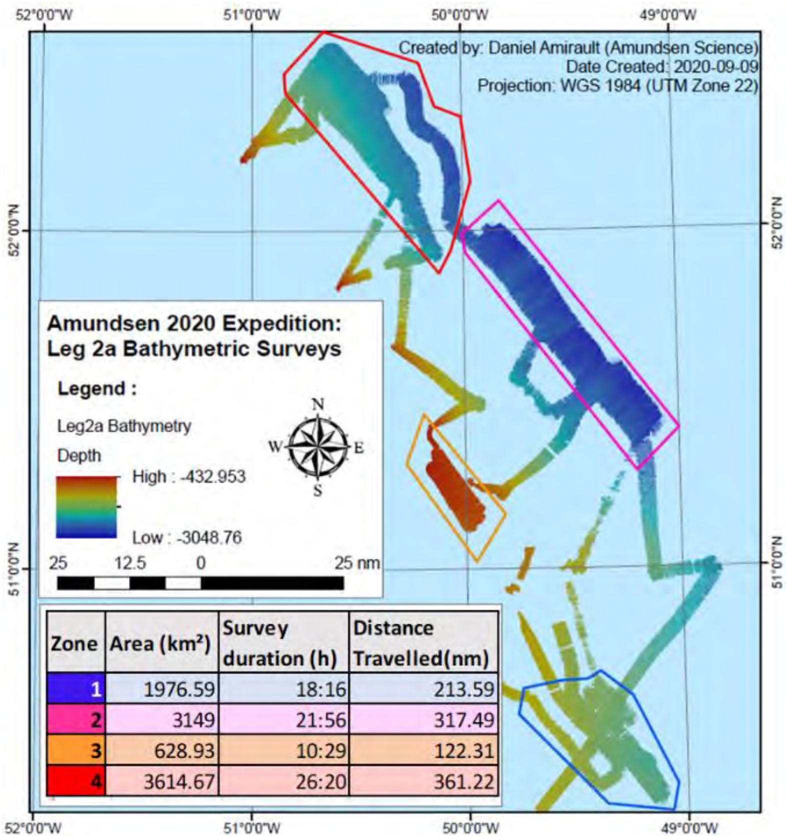
All the data acquired during the cruise was post-processed in real-time using the *CARIS HIPS&SIPS 11.1* software. This post-processing phase is essential to rapid detection of any anomalies in the data collection. Vertical measurements reference Mean Sea Level (MSL) through the integration of Bedford Institute of Oceanography's Webtide Model. Sound Velocity profiles were created from CTD Rosette casts, moving vessel profiler (MVP) casts, XSV/XBT casts, and profiles retrieved from the World Ocean Atlas Model.

6.3.1 *Opportunistic data acquisition*

The EM302 MBES and Knudsen 3260 CHIRP Sub-bottom profiler acquired data throughout the entirety of Leg 2 with the goal of extending the spatial coverage of Amundsen Science's Arctic bathymetric database. The EM302 MBES and Knudsen 3260 CHIRP Sub-bottom profiler acquired data throughout the entirety of Leg 3 in order extend the spatial coverage of Amundsen Science and the Canadian Hydrographic Service's (CHS) North Atlantic bathymetric databases. Outside the scope of dedicated mapping operations, opportunistic data acquisition focuses on systematically surveying outside the extents of the Canadian Hydrographic Service's (CHS) compilation of bathymetric data collected by Canada's fleet of Coast Guard vessels and other sources. Amundsen Science will share acquired datasets with the CHS to update their database and marine charts. These may also be useful for future work with Amundsen Science

6.3.2 *Dedicated mapping operations*

During Leg 2a, dedicated bathymetric surveys took place in four separate zones, seen in Figure 6-4. Each survey zone extended bathymetric data coverage previously obtained by NRCan. Adaptive planning ensured surveys began and ended as close as possible to the scheduled stations. Amundsen Science utilized line plans as a general reference for navigation; however, priority was placed on obtaining 20% overlap with previous coverage. Survey speeds averaged 7.5 knots to ensure feasible along-track coverage and to remain outside high-noise ranges of the vessel's propeller speeds (see section 6.4.1).



Zone	Area (km²)	Survey duration (h)	Distance Travelled(nm)
1	1976.59	18:16	213.59
2	3149	21:56	317.49
3	628.93	10:29	122.31
4	3614.67	26:20	361.22

Figure 6-4: Amundsen Leg 2a Bathymetric Surveys

The acquisition team performed one dedicated mapping survey near the coast of Makkovik, Newfoundland. The Makkovik ROV survey, seen in Figure 6-5, supports site selection and operational planning for an ROV dive arranged to occur during the CCGS *Amundsen*'s 2020 expedition. The area of interest was considered after an angler local to the Makkovik region suggested the possible presence of a seabed feature with the depth of 100m rose from local depths of 600m-800m. In support of the claim, a CHS nautical chart from the region depicted a feature rising to 100m of depth close to the suggested position. The nautical chart indicated the position of the feature was approximate; therefore, the team arranged to collect data within the general region.

Dedicated mapping operations for Leg 3 begun on the 1st of October, starting with the mapping of Zone 2. Mapping in this area was done for a total of 7 days, with the 7th of October being the day the Amundsen was called for an escort mission. Results of the Zone 2 Surveying can be seen in Figure 6-6.

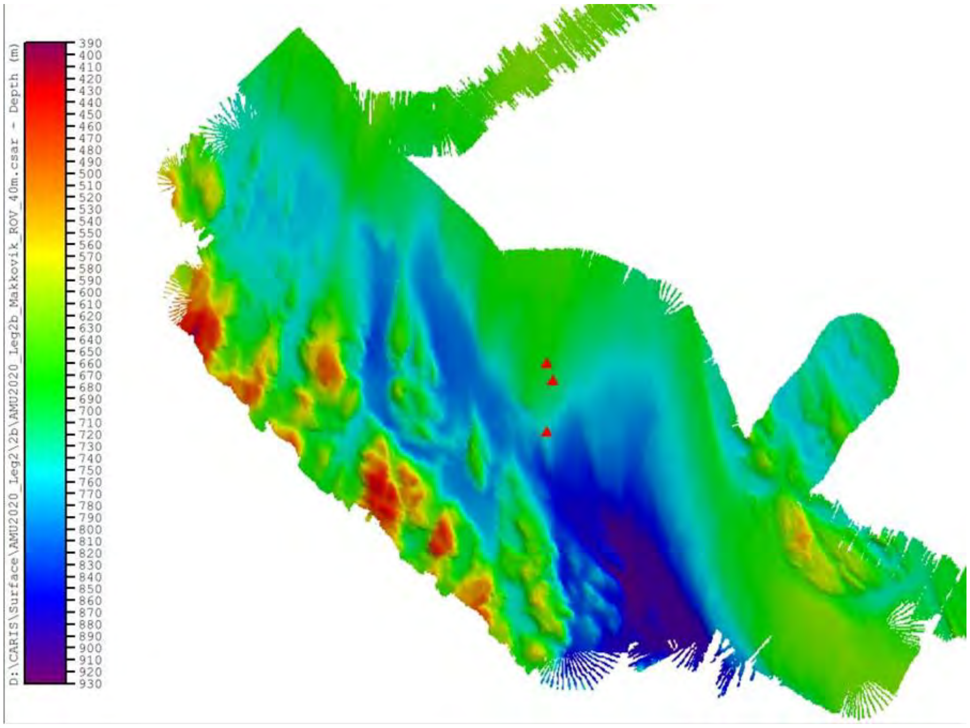


Figure 6-5: Makkovik ROV Multibeam Survey. 154.45 nautical miles were travelled in the time of both surveys, which have a total duration of 11 hours. The triangles depict the given coordinate of the suspected feature (middle), and the seaman's placed line extended between the top and bottom points

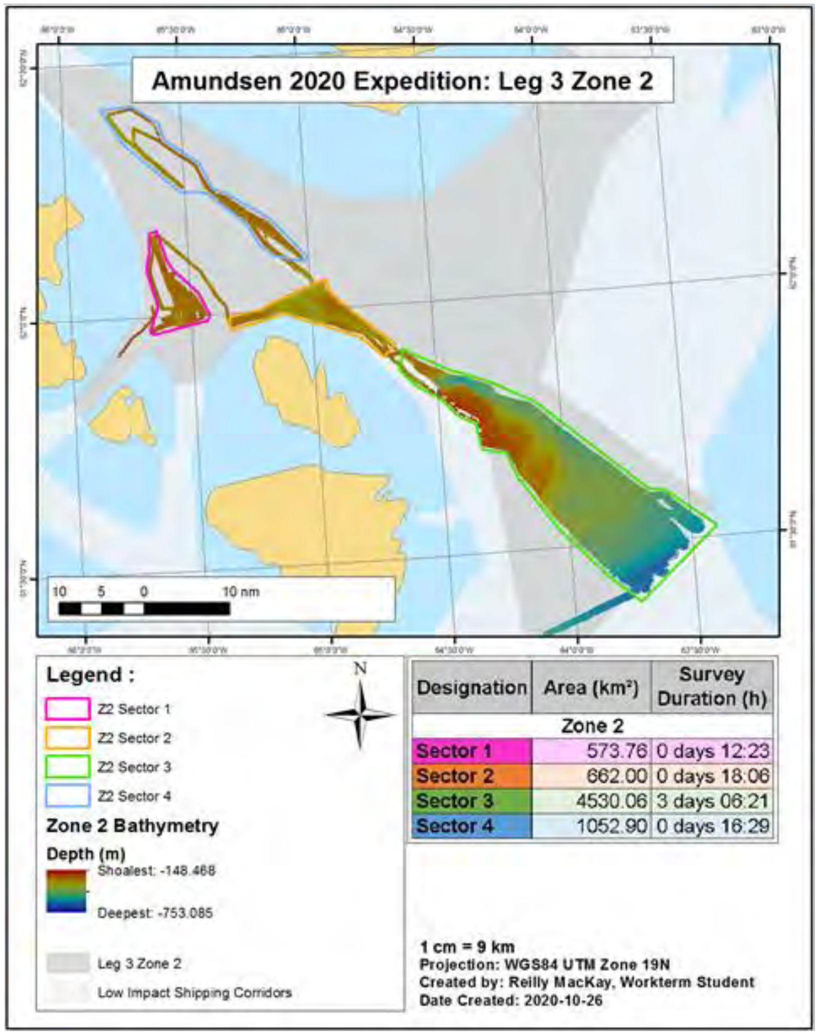


Figure 6-6: Dedicated Mapping of Leg 3's designated Zone 2

Secondary Mapping opportunities were searched for during the escort missions. In the event that there was a reason to idle / wait for the escorted vessels, hydrographic staff contacted the bridge and attempted to plan an impromptu survey. This resulted in two secondary surveys being conducted, one being on the eastern end of the Bellot Strait, and the second being performed in Cambridge Bay, Nunavut. This second survey can be seen in Figure 6-7.

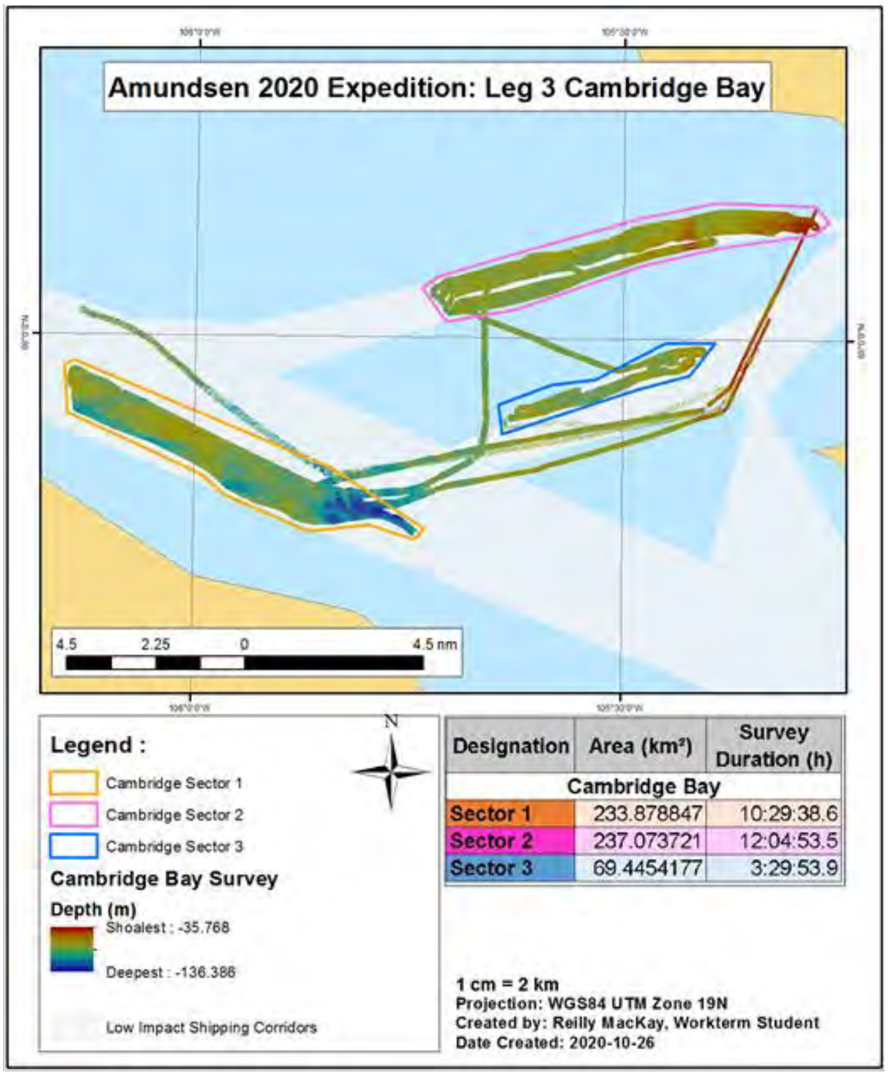


Figure 6-7: Leg 3 Cambridge Bay Survey

6.3.3 *Supportive Sub-Bottom Operations - BoxCore / Rock Dredge*

Stations with a planned boxcore or rock dredge required a general knowledge of seabed composition before deploying equipment. Some stations, located in areas of particularly unknown bottom type, profited from brief sub-bottom profile assessments to predict the nature of the seafloor. Figure 6-8 depicts a profile, which helped evaluate the location of the rock dredge planned at Nain 2 station.

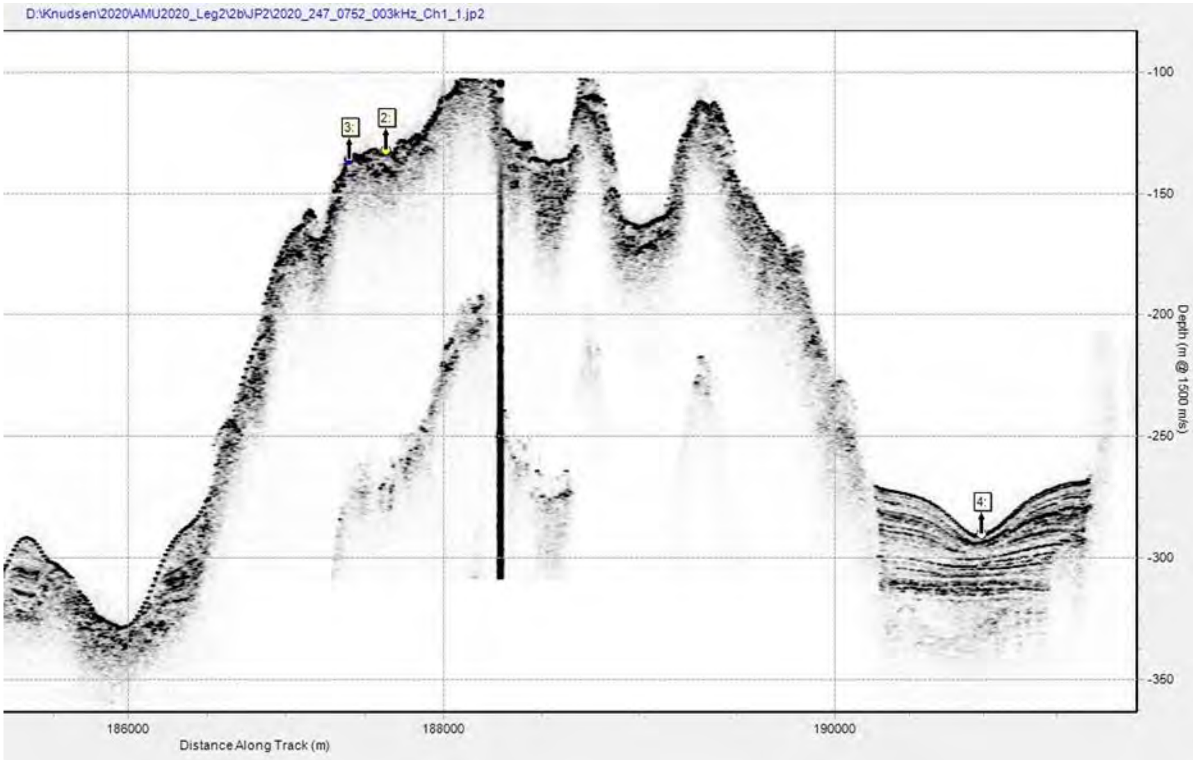


Figure 6-8: : Nain 2 Site Selection. The valley at Point #4 was initially chosen for a rock dredge, however after noticing the very soft nature of the bottom points 2 and 3 were chosen as locations that are more feasible

6.4 **Incidents and events**

6.4.1 *Testing Leg 2b*

The Coast Guard recently replaced the CCGS *Amundsen*'s propulsion system during April 2020's dry dock. Since then, reports of heightened noise from the propellers were made by crew onboard the ship. During Leg 1 the technician onboard perceived higher than normal noise levels in both the EK80 and the EM302 data; consequently, increased vibrational noise from the vessel's propellers was suspected as the primary cause. Two series of tests performed on the EK80 and the EM302 assessed the incoming noise levels at varying RPMs. The first series of tests, which occured on August 26th, were conducted as the Amundsen sheltered itself from strong offshore winds and waves. At the testing zone, in Kaipokok, Newfoundland, the following conditions were recorded: 100m seafloor depth (the recommended depth for a noise test is 500m), 15-25 knot winds (ESE), and around 1m waves. The results seen in Figure 6-9 and Table 6-1 depict levels of self-noise recorded by both the EM302 and EK80.

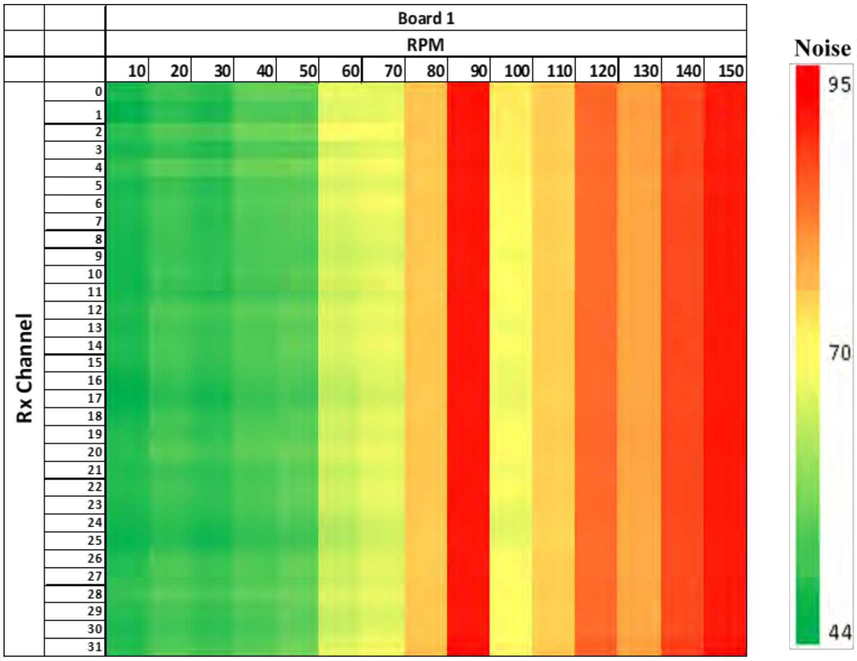


Figure 6-9: EM302 Receiver Noise Levels during Test 1 (100m depth) - channel 0-31 at RPMs ranging from 10-150 RPM

Table 6-1: Ek80 noise levels - Test 1 (100m depth) (values represent difference between returning signal strength and noise in dB), 10-150 RPM at Continuous Wave (CW) and Frequency Modulated (FM) pulses.

38kHz		Speed (knots)														
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Pulse	CW	-153	-120	-117	-125	-118	-124	-115	-100	-105	-107	-118	-106	-111	-105	-100
	FM	-125	-130	-130	-133	-124	-112	-112	-125	-117	-122	-126	-111	-115	-115	-107

120kHz		Speed (knots)														
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Pulse	CW	-152	-140	-139	-141	-132	-152	-137	-130	-122	-135	-133	-127	-127	-119	-110
	FM	-146	-145	-148	-154	-152	-138	-151	-149	-140	-148	-151	-146	-140	-129	-120

200kHz		Speed (knots)														
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Pulse	CW	-140	-143	-141	-138	-137	-156	-139	-131	-128	-142	-140	-126	-129	-115	-118
	FM	-158	-155	-159	-159	-156	-139	-158	-156	-142	-155	-154	-151	-148	-142	-133

The shallow depths during testing caused more noise in each sonar; therefore, the team decided to conduct tests in a deeper location. At the second testing sight, located offshore Labrador, the multibeam measured depths that ranged in the 2000s. At the time of the test, winds were around 25-30 knots and waves were 1.5-2m. A line for the Multibeam test followed the direction of the waves and wind whereas the EK80 lines were run in the opposite direction. A preview of the results from completed tests is depicted in Figure 6-10 and Table 6-2.

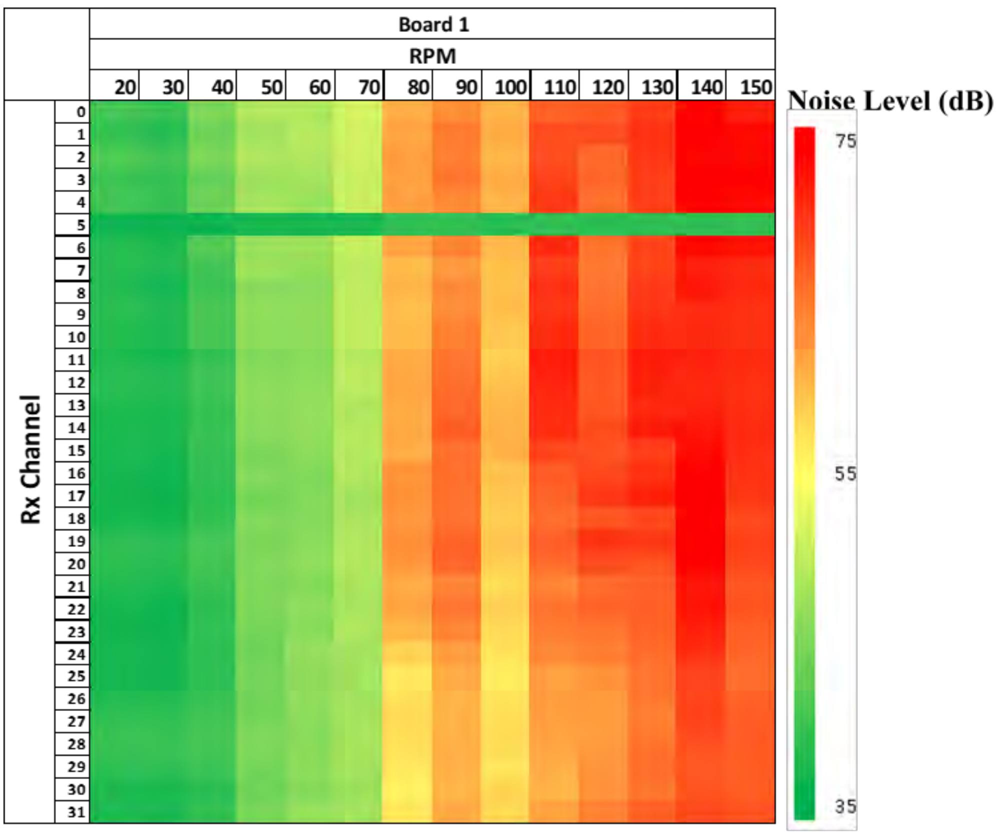


Figure 6-10: EM302 Receiver Noise Levels during Test 2 (2000m depth) - channel 0-31 at RPMs ranging from 10-150 RPM

Table 6-2: Ek80 noise levels - Test 2 (2000m depth) (values represent difference between returning signal strength and noise in dB), 10-150 RPM at Continuous Wave (CW) and Frequency Modulated (FM) pulses

38kHz		Speed (knots)														
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Pulse	CW	-156	-164	-154	-158	-154	-158	-159	-155	-152	-156	-149	-155	-153	-147	-140
	FM	-165	-163	-149	-158	-163	-165	-163	-164	-164	-163	-162	-164	-160	-156	-148

120kHz		Speed (knots)														
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Pulse	CW	-156	-163	-159	-157	-155	-157	-162	-156	-157	-159	-155	-155	-157	-153	-155
	FM	-164	-165	-163	-165	-161	-165	-166	-162	-163	-163	-165	-160	-161	-161	-162

200kHz		Speed (knots)														
		10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Pulse	CW	-152	-157	-153	-154	-153	-153	-155	-151	-153	-153	-153	-153	-155	-152	-152
	FM	-162	-163	-161	-160	-161	-164	-161	-164	-159	-162	-160	-160	-162	-162	-159

The tests indicate RPMs ranging from 80-90 and 110-150 introduce higher levels of noise to the sounders and reduce the level of quality of collected data. For the remainder of Leg 2b and the upcoming Leg 3 these propeller speeds have been flagged and the bridge has been notified to avoid these ranges during surveys. The Amundsen Science team will summarize the following issue and results in a report addressed to the Coast Guard in order to formulate a long-term solution.

By looking at the echograms, we conclude that:

1) Synchronization between the multibeam, sub-bottom and EK80 through the K-Sync system works well. The concomitant operation of the three sounders does not result in additional noise when they are synchronized.

2) The bridge's echosounder is not synchronized and results in important noise in the EK80 when both instruments are operated. We strongly recommend turning the bridge's echosounder off and displaying the depth from the multibeam at the bridge when the Amundsen is in science mode, because the EK80 data are always recorded.

3) Resonance noise in the EK80 data started at 120 RPM in the coastal area and 130 RPM in the deep area. There is also a resonance peak at 80-90 RPM. EK80 data recorded <80 RPM and between 100-110 RPM were generally of good quality (Figures 40-43).

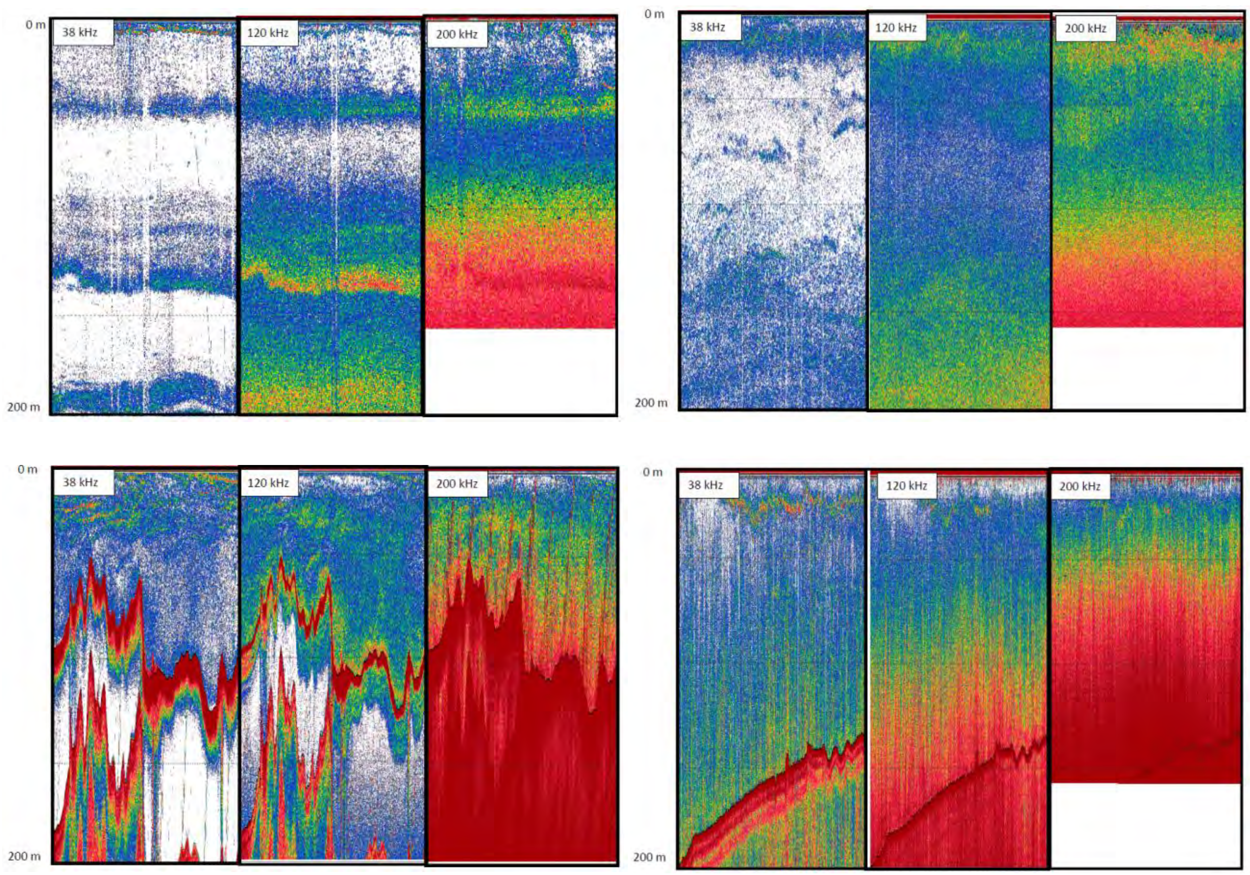


Figure 6-11: Volume basckscattering echograms (Sv) in CW at 20 RPM (top left, no apparent noise), at 110 RPM (top rigth, no apparent noise), at 90 RPM (bottom left, resonance noise at 200kHz), at 140 RPM (bottom rigth, noise at all frequencies). Vertical range is 200 m and Sv colour range varies from -90 to -50 dB re 1 m^{-1}.

6.4.2 *Escot Mission Leg 3*

Leg 3 operations were paused on the 6th day of Zone 2 dedicated mapping as the ship was called on for an escort mission. Two cargo vessels, the Adriaticborg (navigating West) and the Amstelborg (navigating East), required assistance breaking ice in the Victoria Strait region. The Amundsen left for its transit through the Northwest Passage on October 7^{th}. It reached

Cambridge Bay, Nunavut on the 14th where opportunistic surveys took place until the 15th; and completed the second escort and journey to the Hudson Strait on October 21st. Due to requirements to pick up a Bio-Argo float and an incoming storm which encouraged an early departure from the North, the ship only had time to complete half of a survey line at reduced speed in Zone 1 before returning to Quebec.

6.4.3 *MVP Fixed Leg 3*

On October 4th, Amundsen Science worked on a longstanding communication issue between the MVP and the acquisition PCs. For many years, the acquisition team could not automatically receive sound velocity profiles from the MVP during deployment. Instead, a manual process was required to convert the format of received profiles and send them through the ship's network to the SVP Editor installed on the Linux laptop. As Amundsen Science obtained a new version of the MVP software, this process was revisited during 2020's Leg 3. The analysis concluded multiple factors caused the issue, as configurations for software on both the MVP computer and the Linux laptop required modifications. The Linux's SVP Editor contains a file called SVPEditor.ini, which requires a specific configuration to coordinate correctly with the MVP computer settings. Figure 6-12 depicts the final accepted format for this configuration.

```
# New options for SVP Editor version 1.0.5
# Set the port to listen to for MVP datagram input
mvp_listen_port=2006

# Set the listen interval for MVP datagram input
mvp_listen_timeout=1


# Set the MVP data transmission protocol,
# currently supports the following protocols from MVP software:
# - NAVO_ISS60 (transmits data in chunks to avoid overflow of UDP packet max size, necessary for deep ocean)
# - UNDEFINED (transmits entire datagram at once, okay for short casts)
mvp_transmission_protocol=NAVO_ISS60

# Set the MVP data format, currently supports:
# - CALC
# - ASVP
# - S12
mvp_format=S12

# For MVP raw sensor data, not currently used.
mvp_winch_port=3601
mvp_fish_port=3602
mvp_nav_port=3603
mvp_system_port=3604
mvp_sw_version=2.47

# For MVP raw sensor data, not currently used.
mvp_instrument_id=A
# MVP sensor type, the following are supported
# - AML_uSVP
# - AML_uSVPT
# - AML_Smart_SVP
# - AML_uCTD
# - AML_uCTD+
# - Valeport_SVPT
# - SBE_911+
# - SBE_49
mvp_instrument=AML_uSVP
```

Figure 6-12: Setting of fixed MVP

Once configurations on both software agreed, the MVP could automatically send sound velocity profiles to SVP Editor for processing and transmission to the Multibeam. As a result, sound velocity profiles can be applied much more efficiently during surveys as the MVP is deployed. This was found out via usage in the Zone 2 survey, during which the MVP functioned without problems.

Appendix 1 - List of stations sampled during the 2020 Amundsen Expedition

Leg	Station ID	Station Type	UTC Date	UTC Time	Latitude (N)	Longitude (W)	Depth (m)
Leg 1							
1	-27	BIO	2020-08-11	18:10	47,5488167	-52,5834967	179
1	LSC_11	BIO	2020-08-09	20:30	56,5003025	-53,591927	3332
1	LSC_10	BIO	2020-08-09	12:31	56,9952998	-53,5065058	3386
1	LSC_07	BIO	2020-08-08	23:32	58,50046	-53,2484422	3439
1	LSC_06	BIO	2020-08-08	15:46	59,001463	-53,1841507	3487
1	LSC_05	BIO	2020-08-08	8:49	59,498095	-53,1007028	3426
1	LSC_04	BIO	2020-08-08	1:54	59,9986387	-52,4067637	3368
1	LSC_03	BIO	2020-08-07	18:26	59,9988712	-51,7500542	3362
1	LSC_01	BIO	2020-08-07	14:52	59,9864863	-50,5153878	3257
1	L3_24.5	BIO	2020-08-07	4:31	60,2375162	-48,6796552	2829
1	L3_25.5	BIO	2020-08-07	1:45	60,336475	-48,5681323	2517
1	L3_25	BIO	2020-08-06	23:32	60,2948377	-48,554427	2757
1	L3_26	BIO	2020-08-06	17:16	60,3792983	-48,4978862	536
1	L3_27.5	BIO	2020-08-06	14:27	60,506284	-48,2880962	139
1	L3_28	BIO	2020-08-06	13:37	60,5757315	-48,2540427	132
1	L3_28.5	BIO	2020-08-06	11:50	60,6178007	-48,204948	-
1	L3_27	BIO	2020-08-06	9:39	60,4518573	-48,3615232	154
1	L3_26.5	BIO	2020-08-06	8:00	60,4078178	-48,4094072	470
1	L3_24	BIO	2020-08-06	5:51	60,1835217	-48,731244	2885
1	L3_23.5	BIO	2020-08-06	1:55	60,0760187	-48,7756515	2922
1	L3_23	BIO	2020-08-05	22:53	59,9865363	-48,8999977	3015
1	L3_22.5	BIO	2020-08-05	18:51	59,8707418	-49,0282633	3117
1	L3_22	BIO	2020-08-05	15:46	59,7254267	-49,1335608	3215
1	L3_21.5	BIO	2020-08-05	4:07	59,5979988	-49,2806705	-
1	L3_21	BIO	2020-08-05	0:38	59,4663317	-49,4735895	3391
1	L3_20.5	BIO	2020-08-04	19:49	59,2718715	-49,715702	3424
1	L3_20	BIO	2020-08-04	16:01	59,0369055	-49,9141198	3462
1	L3_19.5	BIO	2020-08-04	10:44	58,8445625	-50,1759283	3499
1	L3_19	BIO	2020-08-04	6:47	58,6388975	-50,4084907	3520
1	L3_18.5	BIO	2020-08-03	9:53	58,425516	-50,6389055	3538
1	L3_18	BIO	2020-08-03	5:58	58,1945135	-50,86588	3551
1	L3_17.5	BIO	2020-08-02	23:19	58,0190628	-51,1052962	3563
1	L3_17	BIO	2020-08-02	19:15	57,8037495	-51,3351028	3631
1	L3_16.5	BIO	2020-08-02	13:27	57,6063053	-51,5174423	3538
1	L3_16	BIO	2020-08-02	9:34	57,3763825	-51,7922027	3539
1	L3_15.5	BIO	2020-08-02	2:57	57,1707072	-52,0159125	3521
1	L3_15	BIO	2020-08-01	23:11	56,9550605	-52,2344653	3515
1	L3_14.5	BIO	2020-08-01	17:58	56,7431913	-52,4779735	3516
1	L3_14	BIO	2020-08-01	14:02	56,5553915	-52,7109225	3488
1	L3_13.5	BIO	2020-08-01	8:22	56,3261485	-52,906781	3513
1	L3_13	BIO	2020-08-01	4:06	56,1380532	-53,1509693	3348
1	L3_12.5	BIO	2020-07-31	23:16	55,9833232	-53,2499438	3231
1	L3_12	BIO	2020-07-31	19:40	55,8482887	-53,3957375	3128
1	L3_11.5	BIO	2020-07-31	13:20	55,7358687	-53,5152767	3038
1	L3_11	BIO	2020-07-31	10:16	55,6147088	-53,628767	2916
1	LS_10.5	BIO	2020-07-31	6:09	55,5160638	-53,7293725	2843
1	L3_10	BIO	2020-07-31	3:09	55,421702	-53,811385	2680
1	L3_09	BIO	2020-07-30	21:07	55,2645142	-53,9914163	2074
1	L3_08.5	BIO	2020-07-30	17:29	55,1842212	-54,0630858	1664
1	L3_08	BIO	2020-07-30	15:29	55,0882332	-54,09968	937
1	L3_07	BIO	2020-07-30	11:14	54,9539997	-54,2826562	370
1	L3_06	BIO	2020-07-30	7:52	54,7593015	-54,4892622	245

1	L3_04	BIO	2020-07-30	2:37	54,2179818	-55,0273898	169
1	L3_02	BIO	2020-07-29	17:47	53,7948078	-55,43783	206
1	L3_01	BIO	2020-07-29	13:56	53,6561763	-55,5494667	140
1	L3_03	BIO	2020-07-29	9:54	53,9843825	-55,2505205	151
1	L3_05	BIO	2020-07-29	5:28	54,4868877	-54,759366	197
1	L3_07.5	BIO	2020-07-28	23:31	55,029662	-54,1983403	552
1	Hamilton Bank	Mooring	2020-07-28	20:25	55,1205482	-54,100655	1079
1	OS_03	BIO	2020-07-28	0:04	52,8036948	-51,5527795	1203
1	OS_01	BIO	2020-07-27	20:28	52,6831678	-51,9508785	304
1	C2 (M2034)	Mooring	2020-07-27	13:28	52,7576415	-51,8397688	356
1	C2 (M2033)	Mooring	2020-07-27	12:44	52,7544722	-51,8510698	346
1	OS_00	BIO	2020-07-26	20:53	52,5761653	-52,287346	276
1	C1 (M2032)	Mooring	2020-07-26	18:27	52,6706678	-52,0906093	302
1	C1 (M2031)	Mooring	2020-07-26	17:38	52,6731312	-52,1044775	303
1	C1_b (M2123)	Mooring	2020-07-26	13:03	52,683062	-51,9496372	304
1	C1_b (M2122)	Mooring	2020-07-26	11:41	52,6839715	-51,9627038	306
1	OS_02	BIO	2020-07-26	1:16	52,7558202	-51,7433738	454
1	C2_b	Mooring	2020-07-25	21:48	52,7538942	-51,6813832	576
Leg 2a							
2a			2020-08-23	19:11	50,5921323	-49,3071592	1836
2a	MSP-09		2020-08-23	14:56	50,9873105	-48,8565085	2296
2a	MSP-08		2020-08-23	11:41	50,9741238	-49,1212338	1940
2a	MSP-029B		2020-08-22	21:16	52,2828375	-50,7880033	1557
2a	MSP-029A		2020-08-22	19:10	52,2845088	-50,7887932	1557
2a	MSP-028		2020-08-22	16:37	52,2680987	-50,9655923	1038
2a	MSP-027B		2020-08-22	14:30	52,2280603	-50,9964207	854
2a	MSP-027A		2020-08-22	13:40	52,2303392	-50,9962795	863
2a	MSP-026B		2020-08-22	11:47	52,2117908	-51,0256243	553
2a	MSP-026A		2020-08-22	10:38	52,21173	-51,0475043	473
2a	MSP-022B		2020-08-21	22:22	51,8323603	-50,5786845	500
2a	MSP-023B		2020-08-21	19:30	51,8872858	-50,4034068	
2a	MSP-023A		2020-08-21	17:53	51,8837168	-50,3971587	
2a	MSP-024B		2020-08-21	15:07	51,9393495	-50,1448237	2289
2a	MSP-024A		2020-08-21	13:02	51,9457805	-50,1546428	-
2a	MSP-021		2020-08-20	22:58	51,6559788	-50,320805	866
2a	MSP-019B		2020-08-20	19:55	51,4851093	-49,9560812	1607
2a	MSP-019A		2020-08-20	14:49	51,485301	-49,9484088	1628
2a	MSP-017A		2020-08-20	12:15	51,4217737	-50,1595023	547
2a			2020-08-19	23:10	51,1660023	-49,9308722	-
2a	MSP-013		2020-08-19	21:19	51,2610027	-49,9675778	748
2a	MSP-012B		2020-08-19	20:15	51,2551475	-49,9776602	-
2a	MSP-012A		2020-08-19	19:30	51,2574897	-49,9809167	698
2a	MSP-011		2020-08-19	17:16	51,2247037	-49,8373535	974
2a	MSP-010		2020-08-19	14:49	51,2248938	-49,8478805	944
2a	MSP-020B		2020-08-19	0:35	51,5606647	-49,7544467	2274
2a	MSP-020A		2020-08-18	23:07	51,5555055	-49,7527145	2249
2a	MSP-016B		2020-08-18	19:21	51,4528653	-49,6030562	-
2a	MSP-016A		2020-08-18	16:31	51,4569215	-49,6016725	-
2a	MSP-015B		2020-08-18	14:25	51,4565677	-49,5943927	-
2a	MSP-015A		2020-08-18	12:21	51,4467897	-49,5929987	-
2a	MSP-07A		2020-08-17	20:29	50,9980158	-49,4796698	-
2a	MSP-06		2020-08-17	17:38	51,0015773	-49,516007	-
2a	MSP-05B	Basic	2020-08-17	14:18	51,0093655	-49,5677795	-
2a	MSP-05A	Basic	2020-08-17	12:26	51,0089805	-49,5639622	-
2a	MSP-04A	Basic	2020-08-16	21:36	51,0571282	-49,698724	-
2a	MSP-03A	Basic	2020-08-16	18:52	50,9397393	-49,786479	-

2a	MSP-02B	Basic	2020-08-16	14:55	50,9484303	-49,806237	-
2a	MSP-02A	Basic	2020-08-16	12:18	50,9395602	-49,7914438	-
2a	MSP-01A	Basic	2020-08-15	21:10	50,8451548	-50,097073	-
Leg 2b							
2b	27	Basic	2020-09-07	8:55	47,5455848	-52,5878758	176
2b	MAK - cam 3	Basic	2020-09-05	8:09	55,3590918	-58,8980258	296
2b	MAK - cam 2	Basic	2020-09-05	7:01	55,4033478	-58,863133	357
2b	MAK - cam 1	Basic	2020-09-05	4:47	55,5037057	-58,8568862	899
2b	Mak-ROV	Basic	2020-09-05	0:28	55,5253337	-58,942642	774
2b	ISECOLD-Nain-1	Basic	2020-09-04	7:49	56,2945338	-60,4413838	46
2b	ISECOLD-Nain-2	Basic	2020-09-03	23:11	56,2503347	-60,1494422	178
2b	ISECOLD-1-2000	Basic	2020-09-03	5:46	57,7280873	-58,6964187	1999
2b	HiBio-C	Basic	2020-09-02	10:22	60,4481548	-61,1916272	848
2b	Rock dredge site	Basic	2020-09-02	8:04	60,5593532	-61,3948162	429
2b	HiBio-A	Mooring	2020-09-01	22:30	60,4760763	-61,2922427	406
2b	ISECOLD-0-1000	Basic	2020-08-30	20:53	57,3985587	-58,814704	-
2b	ISECOLD-0-500	Basic	2020-08-30	15:39	56,4524708	-58,1109102	320
2b	ISECOLD 1500-1000	Basic	2020-08-30	2:43	56,554755	-57,9362782	1621
2b	ISECOLD-0-1500	Basic	2020-08-30	2:12	56,5540915	-57,9412103	1617
2b	ISECOLD-0-2500	Basic	2020-08-29	13:10	56,8647342	-56,8745067	-
2b	ISECOLD-0-2000	Basic	2020-08-29	1:48	56,753918	-57,2591318	2023
2b	MAK-Cam1	Basic	2020-08-27	20:08	55,4154203	-58,809423	563
2b	MAK-Cam3	Basic	2020-08-27	14:51	55,3463537	-58,8800902	140
2b	MAK-Cam2	Basic	2020-08-26	15:34	55,4195383	-58,854394	-
2b	MAK-Cam ROV	Basic	2020-08-26	10:11	55,604717	-59,0607717	641
Leg 2c							
2c	Baie Éternité	ROV	2020-09-21	18:33	48,3039838	-70,3234515	-
2c	Forestville	ROV	2020-09-20	19:30	48,6741687	-68,7883545	-
Leg 3							
3	AMU2020_3-5	CTD Rosette	2020-10-14	18:44	69,0109807	-105,687433	80
3	AMU2020_3-4	CTD Rosette	2020-10-07	17:51	61,7103802	-64,2987283	208
3	AMU2020_3-3	CTD Rosette	2020-10-04	13:47	61,4899078	-63,5304	577
3	AMU2020_3-2	CTD Rosette	2020-10-03	11:05	62,0332013	-64,967704	349
3	AMU2020_3-1	CTD Rosette	2020-10-02	15:10	62,1436563	-65,637291	297

Appendix 2 - Scientific log of science activities conducted during the 2020 Amundsen Expedition

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 1																	
1	-27	BIO	2020-08-11	18:10	47,5488167	-52,5834967	Nets	Recovery	179	188	16,4	17,1	15,04	31,19	1016,05	92	
1	-27	BIO	2020-08-11	18:06	47,54882	-52,5839333	Nets	Bottom	179	182	15	17,2	15,20	31,17	1015,88	93	
1	-27	BIO	2020-08-11	18:00	47,548769	-52,5842555	Nets	Deployment	178	185	17,7	17,9	15,25	31,13	1015,95	89	
1	-27	BIO	2020-08-11	17:54	47,5487772	-52,584582	Nets	Recovery	178	183	15	17,1	15,44	31,13	1016,06	93	
1	-27	BIO	2020-08-11	17:44	47,5488147	-52,5855953	Nets	Deployment	178	184	17,5	18	15,41	31,07	1015,98	92	
1	-27	BIO	2020-08-11	17:36	47,548903	-52,585514	CTD Rosette	Recovery	178	191	12,9	22,7	15,51	31,13	1016,02	65	
1	-27	BIO	2020-08-11	17:12	47,5486622	-52,5857318	CTD Rosette	Bottom	178	185	18,1	17,7	15,52	31,09	1016,04	93	
1	-27	BIO	2020-08-11	17:03	47,5482557	-52,585654	CTD Rosette	Deployment	179	190	9,1	20,7	15,65	31,08	1016,06	73	
1	LSC_11	BIO	2020-08-09	20:30	56,5003025	-53,591927	2 Nets	Recovery	3332	352	15,6	10,9	11,66	34,39	1004,85	98	
1	LSC_11	BIO	2020-08-09	20:27	56,5004992	-53,591984	2 Nets	Bottom	3332	351	16	10,4	11,69	34,42	1004,89	98	
1	LSC_11	BIO	2020-08-09	20:23	56,500466	-53,5918363	2 Nets	Deployment	3332	354	14,5	10,6	11,78	34,38	1004,82	97	
1	LSC_11	BIO	2020-08-09	20:17	56,501563	-53,5922587	2 Nets	Recovery	3331	351	12,6	12,1	11,44	34,42	1004,64	94	
1	LSC_11	BIO	2020-08-09	20:13	56,5016453	-53,5922262	2 Nets	Bottom	3330	349	16,9	10,6	11,05	34,45	1004,68	97	
1	LSC_11	BIO	2020-08-09	20:10	56,5014403	-53,591658	2 Nets	Deployment	3330	358	14,1	11,1	11,49	34,41	1004,58	96	
1	LSC_11	BIO	2020-08-09	20:00	56,5029215	-53,5916568	CTD Rosette	Recovery	3333	330	5,1	12,3	11,67	34,40	1004,55	92	
1	LSC_11	BIO	2020-08-09	18:21	56,5023745	-53,5969615	CTD Rosette	Bottom	3332	337	7,6	14,2	11,52	34,43	1003,06	81	
1	LSC_11	BIO	2020-08-09	17:14	56,4979973	-53,600149	CTD Rosette	Deployment	3332	322	8,6	13,3	11,56	34,41	1002,64	97	
1	LSC_11	BIO	2020-08-09	16:40	56,510201	-53,593638	Hydrobios	Recovery	3331	302	8,8	12,1	12,15	34,34	1002,49	98	
1	LSC_11	BIO	2020-08-09	16:14	56,5089538	-53,5944393	Hydrobios	Bottom	3331	287	7,8	12,3	11,94	34,35	1002,44	96	
1	LSC_11	BIO	2020-08-09	15:36	56,5064902	-53,5916283	Hydrobios	Deployment	3333	287	6,5	12,5	11,99	34,35	1002,43	96	
1	LSC_10	BIO	2020-08-09	12:31	56,9952998	-53,5065058	2 Nets	Recovery	3386	312	5	11,7	11,46	34,34	1000,84	97	
1	LSC_10	BIO	2020-08-09	12:28	56,9953223	-53,5062107	2 Nets	Bottom	3387	313	5,3	11,7	11,69	34,32	1000,87	97	
1	LSC_10	BIO	2020-08-09	12:24	56,995328	-53,5057647	2 Nets	Deployment	3387	319	5	11,8	11,75	34,32	1000,87	96	
1	LSC_10	BIO	2020-08-09	12:17	56,9949917	-53,5049303	2 Nets	Recovery	3387	324	5,3	13	11,69	34,32	1000,89	94	
1	LSC_10	BIO	2020-08-09	12:14	56,9946898	-53,5046097	2 Nets	Bottom	3387	352	4,2	12,1	11,61	34,34	1000,88	95	
1	LSC_10	BIO	2020-08-09	12:10	56,9944653	-53,5044548	2 Nets	Deployment	3387	293	1,7	12,2	11,56	34,35	1000,80	97	
1	LSC_10	BIO	2020-08-09	11:59	56,9953295	-53,503954	CTD Rosette	Recovery	3388	292	7	12	11,55	34,33	1000,80	98	
1	LSC_10	BIO	2020-08-09	10:13	56,9986935	-53,502255	CTD Rosette	Bottom	3386	356	1,7	12,2	11,59	34,37	1000,69	98	
1	LSC_10	BIO	2020-08-09	9:03	57,0054218	-53,50657	CTD Rosette	Deployment	3384	319	4,2	12,3	11,37	34,36	1000,47	98	
1	LSC_10	BIO	2020-08-09	8:40	56,9941665	-53,4922122	Hydrobios	Recovery	3388	293	7,4	11,8	11,47	34,38	1000,40	98	
1	LSC_10	BIO	2020-08-09	8:18	56,9958025	-53,4958833	Hydrobios	Bottom	3387	288	7,4	12	11,51	34,36	1000,46	98	
1	LSC_10	BIO	2020-08-09	7:38	56,9985217	-53,499261	Hydrobios	Deployment	3385	256	6,5	13	11,55	34,36	1000,41	94	
1	LSC_07	BIO	2020-08-08	23:32	58,50046	-53,2484422	2 Nets	Recovery	3439	130	5,1	9,6	10,24	34,51	1002,39	98	
1	LSC_07	BIO	2020-08-08	23:29	58,500003	-53,248457	2 Nets	Bottom	3439	131	5,1	9,5	10,23	34,51	1002,44	98	
1	LSC_07	BIO	2020-08-08	23:25	58,499306	-53,2484255	2 Nets	Deployment	3439	136	5,7	9,7	10,23	34,51	1002,33	98	
1	LSC_07	BIO	2020-08-08	23:22	58,4987997	-53,2484953	2 Nets	Recovery	3439	121	7,6	9,5	10,26	34,50	1002,16	98	

1	LSC_07	BIO	2020-08-08	23:15	58,4979137	-53,2492718	2 Nets	Deployment		111	4,4	10,3	10,35	34,51	1002,25	98	
1	LSC_07	BIO	2020-08-08	22:54	58,5292875	-53,252351	CTD Rosette	Recovery	3434	129	6,3	10	10,39	34,49	1002,43	98	
1	LSC_07	BIO	2020-08-08	21:11	58,5104293	-53,2457745	CTD Rosette	Bottom	3437	166	8,8	10,3	10,40	34,50	1003,18	98	
1	LSC_07	BIO	2020-08-08	20:01	58,5019405	-53,2412435	CTD Rosette	Deployment	3438				10,34	34,49		98	
1	LSC_07	BIO	2020-08-08	19:39	58,5024252	-53,242266	Hydrobios	Recovery	3438	167	8,2	9,4	10,47	34,49	1003,61	98	
1	LSC_07	BIO	2020-08-08	19:17	58,5012415	-53,2445138	Hydrobios	Bottom	3439	171	8,9	9,3	10,29	34,49	1003,61	98	
1	LSC_07	BIO	2020-08-08	18:40	58,499615	-53,2501172	Hydrobios	Deployment	3438	191	7,8	9,5	10,32	34,49	1003,97	98	
1	LSC_06	BIO	2020-08-08	15:46	59,001463	-53,1841507	Argo Float	Deployment	3487	123	1,3	9,6	9,34	34,31	1004,86	96	
1	LSC_06	BIO	2020-08-08	15:36	59,001135	-53,1814128	2 Nets	Recovery	3488	191	11,8	8,6	9,38	34,31	1004,93	98	
1	LSC_06	BIO	2020-08-08	15:33	59,0006273	-53,1808855	2 Nets	Bottom	3488	198	11	8,6	9,35	34,30	1004,94	98	
1	LSC_06	BIO	2020-08-08	15:29	59,000141	-53,1803308	2 Nets	Deployment	3488	193	9,7	8,6	9,30	34,30	1005,08	98	
1	LSC_06	BIO	2020-08-08	15:23	58,9997657	-53,1794402	2 Nets	Recovery	3487	190	11	8,7	9,33	34,30	1004,94	97	
1	LSC_06	BIO	2020-08-08	15:19	58,9995613	-53,178651	2 Nets	Bottom	3488	189	9,3	8,9	9,32	34,30	1005,01	97	
1	LSC_06	BIO	2020-08-08	15:15	58,9992178	-53,17807	2 Nets	Deployment	3487	196	8,8	9,1	9,31	34,29	1005,15	96	
1	LSC_06	BIO	2020-08-08	15:01	58,9982677	-53,1766777	CTD Rosette	Recovery		202	8,4	9,4	9,28	34,29	1005,35	94	
1	LSC_06	BIO	2020-08-08	13:18	58,9992037	-53,1599015	CTD Rosette	Bottom	3486	228	5,7	10,3	9,23	34,29	1006,08	93	
1	LSC_06	BIO	2020-08-08	12:06	59,0016807	-53,1535558	CTD Rosette	Deployment	3485	181	4,4	9,8	9,26	34,30	1006,21	92	
1	LSC_05	BIO	2020-08-08	8:49	59,498095	-53,1007028	2 Nets	Recovery	3426	113	0	8,2	8,69	34,26	1006,49	87	
1	LSC_05	BIO	2020-08-08	8:46	59,4985917	-53,1010135	2 Nets	Bottom	3426	204	0,2	8,3	8,73	34,26	1006,46	88	
1	LSC_05	BIO	2020-08-08	8:42	59,4993308	-53,102326	2 Nets	Deployment	3415	237	2,3	8,2	8,70	34,26	1006,60	87	
1	LSC_05	BIO	2020-08-08	8:39	59,4999618	-53,1031097	2 Nets	Recovery		220	2,5	8,1	8,69	34,26	1006,60	88	
1	LSC_05	BIO	2020-08-08	8:36	59,500454	-53,1032133	2 Nets	Bottom		244	3	8	8,69	34,26	1006,61	89	
1	LSC_05	BIO	2020-08-08	8:32	59,5009757	-53,1034415	2 Nets	Deployment		265	2,7	7,5	8,68	34,26	1006,52	89	
1	LSC_05	BIO	2020-08-08	8:08	59,4895528	-53,0536782	CTD Rosette	Recovery	3428	281	5	8,1	8,73	34,25	1006,55	87	
1	LSC_05	BIO	2020-08-08	6:27	59,4978405	-53,0759125	CTD Rosette	Bottom	3427	337	4,8	8,4	8,71	34,24	1006,52	86	
1	LSC_05	BIO	2020-08-08	5:18	59,502307	-53,0953217	CTD Rosette	Deployment	3426	311	8,9	7,2	8,73	34,25	1006,37	88	
1	LSC_04	BIO	2020-08-08	1:54	59,9986387	-52,4067637	Argo Float	Deployment	3368	333	14,3	7,8	9,02	34,34	1005,02	89	
1	LSC_04	BIO	2020-08-08	1:40	59,9983635	-52,403218	2 Nets	Recovery	3366	333	12,9	7,3	8,96	34,34	1004,77	91	
1	LSC_04	BIO	2020-08-08	1:37	59,9985207	-52,4027733	2 Nets	Bottom	3367	332	15	8	9,01	34,34	1004,85	92	
1	LSC_04	BIO	2020-08-08	1:33	59,9986602	-52,4020177	2 Nets	Deployment	3365	339	15,2	7,4	9,00	34,34	1004,79	92	
1	LSC_04	BIO	2020-08-08	1:29	59,9985658	-52,4006347	2 Nets	Recovery	3364	344	15	7,4	8,92	34,35	1004,77	91	
1	LSC_04	BIO	2020-08-08	1:26	59,9980785	-52,3994792	2 Nets	Bottom	3363	337	16	7,5	9,06	34,34	1004,71	91	
1	LSC_04	BIO	2020-08-08	1:22	59,998145	-52,3982245	2 Nets	Deployment	3362	332	17,1	7,8	9,02	34,34	1004,64	90	
1	LSC_04	BIO	2020-08-08	1:11	59,9993918	-52,3979172	CTD Rosette	Recovery	3362	305	12,6	11,1	9,01	34,34	1004,47	78	
1	LSC_04	BIO	2020-08-07	23:32	59,9993067	-52,399886	CTD Rosette	Bottom	3363	332	14,3	8,5	8,96	34,33	1003,92	88	
1	LSC_04	BIO	2020-08-07	22:24	60,0035588	-52,3952452	CTD Rosette	Deployment	3360	326	16	9,9	8,98	34,33	1003,31	87	
1	LSC_04	BIO	2020-08-07	21:52	59,9932432	-52,4095468	Hydrobios	Recovery	3370	313	17,3	8,7	8,92	34,33	1003,09	87	
1	LSC_04	BIO	2020-08-07	21:29	59,9961075	-52,4056375	Hydrobios	Bottom	3368	172	18,7	8,5	8,72	34,33	1003,05	87	
1	LSC_04	BIO	2020-08-07	20:51	59,9992917	-52,4004625	Hydrobios	Deployment	3362	323	19,6	9,4	8,98	34,33	1002,81	85	
1	LSC_03	BIO	2020-08-07	18:26	59,9988712	-51,7500542	Argo Float	Deployment	3362	321	18,3	8,2	9,19	34,30	1001,11	88	

1	LSC_01	BIO	2020-08-07	14:52	59,9864863	-50,5153878	2 Nets	Recovery	3257	317	7,6	8,3	8,67	34,49	999,32	98	
1	LSC_01	BIO	2020-08-07	14:48	59,986755	-50,5153175	2 Nets	Bottom	3256	322	8	8,4	8,67	34,50	999,32	98	
1	LSC_01	BIO	2020-08-07	14:45	59,9871413	-50,5153715	2 Nets	Deployment	3256	326	7	8,5	8,69	34,51	999,33	97	
1	LSC_01	BIO	2020-08-07	14:38	59,9873748	-50,5137428	2 Nets	Recovery	3256	315	9,7	8,9	8,82	34,48	999,36	98	
1	LSC_01	BIO	2020-08-07	14:35	59,9876142	-50,5128255	2 Nets	Bottom	3256	320	9,3	8,9	8,84	34,47	999,39	98	
1	LSC_01	BIO	2020-08-07	14:31	59,9875785	-50,5107293	2 Nets	Deployment	3255	318	7,4	8,7	8,62	34,48	999,23	97	
1	LSC_01	BIO	2020-08-07	14:18	59,9875782	-50,5058523	CTD Rosette	Recovery	3254	298	2,5	9,8	8,92	34,45	999,26	94	
1	LSC_01	BIO	2020-08-07	12:37	59,9976298	-50,4985933	CTD Rosette	Bottom	3248	314	5,9	9,9	9,00	34,43	998,78	98	
1	LSC_01	BIO	2020-08-07	11:29	59,9991682	-50,5001278	CTD Rosette	Deployment	3248	276	4,6	9,6	9,22	34,33	998,49	98	
1	LSC_01	BIO	2020-08-07	10:40	59,9999085	-50,5043227	Hydrobios	Recovery	3248	330	0,8	10	9,28	34,32	998,59	98	
1	LSC_01	BIO	2020-08-07	10:17	59,9998205	-50,5045807	Hydrobios	Bottom	3248	178	2,9	9,4	9,17	34,32	998,46	98	
1	LSC_01	BIO	2020-08-07	9:40	59,9995948	-50,5047212	Hydrobios	Deployment	3249	125	2,9	9,2	9,01	34,37	998,42	98	
1	L3_24.5	BIO	2020-08-07	4:31	60,2375162	-48,6796552	CTD Rosette	Recovery	2829	139	16,9	8	7,57	34,45	998,67	97	
1	L3_24.5	BIO	2020-08-07	3:45	60,23414	-48,6614538	CTD Rosette	Bottom	2826	115	11,8	11,6	7,61	34,41	998,96	84	
1	L3_24.5	BIO	2020-08-07	2:42	60,232625	-48,6224685	CTD Rosette	Deployment	2856	113	11	8,2	7,55	34,40	999,21	98	
1	L3_25.5	BIO	2020-08-07	1:45	60,336475	-48,5681323	CTD Rosette	Recovery	2517	86	13,9	5,3	4,11	32,93	999,36	98	
1	L3_25.5	BIO	2020-08-07	1:05	60,33708	-48,5470582	CTD Rosette	Bottom	2385	85	7,8	5,4	3,53	32,82	999,33	98	
1	L3_25.5	BIO	2020-08-07	0:14	60,3272742	-48,5100328	CTD Rosette	Deployment		88	13,7	5,4			999,54	98	
1	L3_25	BIO	2020-08-06	23:32	60,2948377	-48,554427	2 Nets	Recovery	2757	123	9,7	8,4	4,55	33,01	999,34	98	
1	L3_25	BIO	2020-08-06	23:29	60,2941647	-48,5528023	2 Nets	Bottom	2759	128	13,7	7,1	4,60	33,02	999,32	98	
1	L3_25	BIO	2020-08-06	23:25	60,2932108	-48,5503905	2 Nets	Deployment	2758	126	13,5	6,9	4,69	33,01	999,24	98	
1	L3_25	BIO	2020-08-06	23:21	60,292597	-48,5483997	2 Nets	Recovery	2756	128	13,9	7	4,59	33,03	999,25	98	
1	L3_25	BIO	2020-08-06	23:18	60,2919945	-48,546465	2 Nets	Bottom	2756	126	13,5	6,9	4,76	33,03	999,24	98	
1	L3_25	BIO	2020-08-06	23:14	60,2911952	-48,5444837	2 Nets	Deployment		123	13,9	6,8	4,72	33,05	999,16	98	
1	L3_25	BIO	2020-08-06	22:43	60,308384	-48,6300488	CTD Rosette	Recovery	2798	128	9,5	10,5	5,01	33,00	999,16	83	
1	L3_25	BIO	2020-08-06	21:09	60,2980513	-48,5750195	CTD Rosette	Bottom	2759	103	18,5	7	4,71	32,91	998,56	93	
1	L3_25	BIO	2020-08-06	20:12	60,2875962	-48,5450068	CTD Rosette	Deployment	2761	101	12,8	6,5	4,74	32,82	998,91	98	
1	L3_25	BIO	2020-08-06	19:22	60,3069153	-48,5797717	Hydrobios	Recovery		98	7,4	6,7	4,03	32,74	999,32	98	
1	L3_25	BIO	2020-08-06	18:59	60,3015175	-48,568585	Hydrobios	Bottom		119	14,1	6,9	4,16	32,70	999,00	94	
1	L3_25	BIO	2020-08-06	18:26	60,2935553	-48,5493827	Hydrobios	Deployment		107	10,5	5,9	4,26	32,63	998,89	98	
1	L3_26	BIO	2020-08-06	17:16	60,3792983	-48,4978862	2 Nets	Recovery	536	101	10,3	7,3	3,86	32,51	998,71	98	
1	L3_26	BIO	2020-08-06	17:12	60,378839	-48,4964982	2 Nets	Bottom	536	112	15,8	5,4	3,62	32,54	998,69	98	
1	L3_26	BIO	2020-08-06	17:09	60,3782783	-48,4945345	2 Nets	Deployment	540	111	15	5,5	3,77	32,51	998,51	98	
1	L3_26	BIO	2020-08-06	17:00	60,3768648	-48,4909488	2 Nets	Recovery	573	115	16,6	6	4,11	32,37	998,70	98	
1	L3_26	BIO	2020-08-06	16:57	60,3763938	-48,489907	2 Nets	Bottom	584	114	14,7	5,3	3,96	32,42	998,80	98	
1	L3_26	BIO	2020-08-06	16:53	60,3758078	-48,4890397	2 Nets	Deployment	586	110	15,2	6	3,63	32,54	998,73	97	
1	L3_26	BIO	2020-08-06	16:40	60,376379	-48,487073	CTD Rosette	Recovery	578	105	9,3	8,9	3,87	32,49	998,97	81	
1	L3_26	BIO	2020-08-06	16:00	60,374248	-48,4682458	CTD Rosette	Bottom	603	127	8,6	8,1	3,57	32,55	998,95	87	
1	L3_26	BIO	2020-08-06	15:44	60,3722377	-48,4584145	CTD Rosette	Deployment	652	116	13,7	6,2	4,31	32,45	998,93	96	
1	L3_27.5	BIO	2020-08-06	14:27	60,506284	-48,2880962	CTD Rosette	Bottom	139	109	7,8	4,9	4,43	32,51	999,50	98	

1	L3_27.5	BIO	2020-08-06	14:19	60,505982	-48,2881287	CTD Rosette	Deployment	139	109	7,4	4,8	4,40	32,52	999,67	98	
1	L3_28	BIO	2020-08-06	13:37	60,5757315	-48,2540427	2 Nets	Recovery	132	131	5,9	6,3	4,20	31,91	999,53	88	
1	L3_28	BIO	2020-08-06	13:34	60,5753753	-48,2532618	2 Nets	Bottom	129	90	9,9	5,8	4,16	31,90	999,49	90	
1	L3_28	BIO	2020-08-06	13:30	60,5749988	-48,2521157	2 Nets	Deployment	149	147	4	5,1	4,15	31,90	999,47	95	
1	L3_28	BIO	2020-08-06	13:19	60,573703	-48,2479827	2 Nets	Recovery	186	103	10,7	6,3	4,13	31,89	999,49	87	
1	L3_28	BIO	2020-08-06	13:16	60,573325	-48,2471188	2 Nets	Bottom	189	148	6,5	4,8	4,15	31,88	999,50	97	
1	L3_28	BIO	2020-08-06	13:12	60,5727083	-48,2455717	2 Nets	Deployment	161	89	7,4	4,9	4,17	31,88	999,34	96	
1	L3_28	BIO	2020-08-06	13:00	60,5718028	-48,2423618	CTD Rosette	Recovery	129	104	10,1	5,9	4,19	31,87	999,50	87	
1	L3_28	BIO	2020-08-06	12:40	60,5724577	-48,2362948	CTD Rosette	Bottom		132	8	4,7	4,10	31,86	999,50	96	
1	L3_28	BIO	2020-08-06	12:32	60,572008	-48,23323	CTD Rosette	Deployment		129	8,2	4,6	4,03	31,84	999,51	97	
1	L3_28.5	BIO	2020-08-06	11:50	60,6178007	-48,204948	2 Nets	Recovery		94	10,1	5	3,10	32,32	999,73	95	
1	L3_28.5	BIO	2020-08-06	11:47	60,617524	-48,2032175	2 Nets	Bottom		76	8,2	6	3,49	31,84	999,67	88	
1	L3_28.5	BIO	2020-08-06	11:43	60,6172395	-48,2006432	2 Nets	Deployment		86	11,6	4	3,75	31,70	999,61	98	
1	L3_28.5	BIO	2020-08-06	11:35	60,616466	-48,1976685	2 Nets	Recovery		96	12,2	5,4	3,40	32,03	999,46	89	
1	L3_28.5	BIO	2020-08-06	11:31	60,6160677	-48,1973162	2 Nets	Bottom		86	11,2	5	4,14	31,71	999,47	95	
1	L3_28.5	BIO	2020-08-06	11:27	60,6153493	-48,1962083	2 Nets	Deployment		85	13,1	4,7	3,43	32,06	999,37	97	
1	L3_28.5	BIO	2020-08-06	11:02	60,6131702	-48,1863958	CTD Rosette	Recovery		138	4,8	4,2	4,27	31,20	999,40	98	
1	L3_28.5	BIO	2020-08-06	10:38	60,6089752	-48,1808222	CTD Rosette	Deployment		117	11,4	3,9	4,03	31,47	999,31	98	
1	L3_27	BIO	2020-08-06	9:39	60,4518573	-48,3615232	2 Nets	Recovery		192	1,9	3,7	3,68	32,60	998,99	98	
1	L3_27	BIO	2020-08-06	9:32	60,4519877	-48,3595628	2 Nets	Deployment		100	9,1	4	3,44	32,60	999,15	98	
1	L3_27	BIO	2020-08-06	9:29	60,4521115	-48,3587557	2 Nets	Recovery		97	8,4	4	3,60	32,60	999,25	98	
1	L3_27	BIO	2020-08-06	9:21	60,4520952	-48,3569792	2 Nets	Deployment		96	8,6	3,9	3,69	32,60	999,24	98	
1	L3_27	BIO	2020-08-06	9:07	60,4501765	-48,3539538	CTD Rosette	Recovery	157	88	8	3,7	3,67	32,60	999,32	98	
1	L3_27	BIO	2020-08-06	8:50	60,4487905	-48,3555167	CTD Rosette	Bottom	154	113	6,3	3,8	3,66	32,60	999,49	98	
1	L3_27	BIO	2020-08-06	8:41	60,4477928	-48,3552352	CTD Rosette	Deployment	152	108	4	3,9	3,67	32,60	999,84	98	
1	L3_26.5	BIO	2020-08-06	8:00	60,4078178	-48,4094072	CTD Rosette	Recovery	470	141	1,7	4,3	3,54	32,55	999,41	98	
1	L3_26.5	BIO	2020-08-06	7:49	60,4065188	-48,405924	CTD Rosette	Bottom	504	149	3	4,3	3,56	32,55	999,36	98	
1	L3_26.5	BIO	2020-08-06	7:33	60,4047797	-48,4004427	CTD Rosette	Deployment	523	154	1,7	4,4	3,58	32,55	999,41	98	
1	L3_24	BIO	2020-08-06	5:51	60,1835217	-48,731244	2 Nets	Recovery	2885	194	4,6	6,5	7,56	34,43	999,34	98	
1	L3_24	BIO	2020-08-06	5:48	60,1836682	-48,7305673	2 Nets	Bottom	2886	216	4,8	6	7,50	34,38	999,33	98	
1	L3_24	BIO	2020-08-06	5:44	60,1833683	-48,7300475	2 Nets	Deployment	2887	190	2,1	6,5	7,48	34,39	999,25	98	
1	L3_24	BIO	2020-08-06	5:40	60,1832568	-48,729288	2 Nets	Recovery	2890	173	2,5	6,2	7,46	34,36	999,12	98	
1	L3_24	BIO	2020-08-06	5:37	60,1832855	-48,7283365	2 Nets	Bottom	2891	230	6,1	5,7	7,46	34,36	999,22	98	
1	L3_24	BIO	2020-08-06	5:33	60,1834203	-48,727078	2 Nets	Deployment	2892	215	2,3	6,3	7,48	34,42	999,24	98	
1	L3_24	BIO	2020-08-06	5:22	60,183165	-48,7250422	CTD Rosette	Recovery	2896	220	5,3	5,7	7,40	34,30	999,04	98	
1	L3_24	BIO	2020-08-06	3:45	60,1754292	-48,692666	CTD Rosette	Bottom	2860	282	2,5	5,8	7,54	34,43	998,94	98	
1	L3_24	BIO	2020-08-06	2:56	60,172777	-48,6784168	CTD Rosette	Deployment	2850	300	5,3	5,7	7,37	34,25	999,17	98	
1	L3_23.5	BIO	2020-08-06	1:55	60,0760187	-48,7756515	CTD Rosette	Recovery	2922	194	0,6	6,5			999,05	98	
1	L3_23.5	BIO	2020-08-06	1:06	60,0771432	-48,7816185	CTD Rosette	Recovery	2922	292	6,1	6,7			998,96	98	
1	L3_23.5	BIO	2020-08-06	0:58	60,07713	-48,7821697	CTD Rosette	Bottom	2922	10	2,9	6,6			998,93	98	

1	L3_23.5	BIO	2020-08-05	23:59	60,0774015	-48,7842645	CTD Rosette	Deployment	2923	318	5,9	7,2	8,18	34,84	998,93	98	
1	L3_23	BIO	2020-08-05	22:53	59,9865363	-48,8999977	2 Nets	Recovery	3015	310	12	7,3	8,23	34,86	998,30	93	
1	L3_23	BIO	2020-08-05	22:50	59,9867672	-48,899735	2 Nets	Bottom	3014	321	8,9	7,2	8,21	34,86	998,32	93	
1	L3_23	BIO	2020-08-05	22:46	59,9871982	-48,8998103	2 Nets	Deployment	3013	320	8,4	7,3	8,15	34,86	998,37	93	
1	L3_23	BIO	2020-08-05	22:43	59,98743	-48,8994475	2 Nets	Recovery		322	9,3	7,3	8,21	34,86	998,25	93	
1	L3_23	BIO	2020-08-05	22:36	59,9876588	-48,8988178	2 Nets	Deployment		323	9,3	8,2	8,23	34,86	998,33	95	
1	L3_23	BIO	2020-08-05	22:24	59,9886262	-48,898285	CTD Rosette	Recovery	3012	332	9,9	7,5	8,25	34,86	998,25	93	
1	L3_23	BIO	2020-08-05	20:48	59,986181	-48,8956808	CTD Rosette	Bottom	3011	320	9,9	8,1	8,28	34,86	997,64	92	
1	L3_23	BIO	2020-08-05	19:46	59,985115	-48,899499	CTD Rosette	Deployment	3012	298	10,1	8,4	8,21	34,85	996,91	90	
1	L3_22.5	BIO	2020-08-05	18:51	59,8707418	-49,0282633	CTD Rosette	Recovery	3117	307	8,2	9,6	8,50	34,70	996,97	87	
1	L3_22.5	BIO	2020-08-05	17:54	59,871561	-49,0302012	CTD Rosette	Bottom	3114	318	8,4	7,9	8,44	34,70	996,83	88	
1	L3_22.5	BIO	2020-08-05	16:52	59,8717212	-49,0365847	CTD Rosette	Deployment	3111	294	6,7	8,3	8,48	34,71	997,02	88	
1	L3_22	BIO	2020-08-05	15:46	59,7254267	-49,1335608	2 Nets	Recovery	3215	294	4,6	8,6	8,33	34,43	997,11	90	
1	L3_22	BIO	2020-08-05	15:41	59,7258295	-49,134802	2 Nets	Bottom	3215	296	2,9	8,4	8,33	34,43	997,21	91	
1	L3_22	BIO	2020-08-05	15:38	59,7259493	-49,1350782	2 Nets	Deployment	3216	267	5,1	8,8	8,33	34,43	997,17	92	
1	L3_22	BIO	2020-08-05	15:35	59,72631	-49,1357078	2 Nets	Recovery	3216	235	5,5	8,6	8,36	34,43	997,17	92	
1	L3_22	BIO	2020-08-05	15:31	59,7268023	-49,1364668	2 Nets	Bottom	3218	258	5,5	8,6	8,33	34,42	997,10	93	
1	L3_22	BIO	2020-08-05	15:27	59,7273765	-49,1375373	2 Nets	Deployment	3217	273	7,8	8,2	8,33	34,42	997,23	92	
1	L3_22	BIO	2020-08-05	15:12	59,7296982	-49,1447383	CTD Rosette	Recovery	3226	265	5,5	8,9	8,14	34,41	997,14	90	
1	L3_22	BIO	2020-08-05	13:33	59,738384	-49,158803	CTD Rosette	Bottom	3225	304	8,2	9,9	8,25	34,39	998,30	81	
1	L3_22	BIO	2020-08-05	12:28	59,7473418	-49,1697047	CTD Rosette	Deployment	3218	296	12,8	11,1	8,33	34,36	998,95	73	
1	L3_21.5	BIO	2020-08-05	4:07	59,5979988	-49,2806705	CTD Rosette	Recovery		308	24,4	8,9	8,63	34,39	1001,31	86	
1	L3_21.5	BIO	2020-08-05	3:01	59,6078585	-49,2932557	CTD Rosette	Bottom		303	19,8	8,6			1001,52	87	
1	L3_21.5	BIO	2020-08-05	1:53	59,6123623	-49,3202353	CTD Rosette	Deployment		281	19	11			1001,68	70	
1	L3_21	BIO	2020-08-05	0:38	59,4663317	-49,4735895	2 Nets	Recovery	3391	344	11,8	10,2			1002,81	75	
1	L3_21	BIO	2020-08-05	0:35	59,466498	-49,472468	2 Nets	Bottom		314	23,8	8,7			1002,46	89	
1	L3_21	BIO	2020-08-05	0:31	59,4673297	-49,4713652	2 Nets	Deployment		317	17,3	8,7			1002,53	89	
1	L3_21	BIO	2020-08-05	0:25	59,4690733	-49,475806	2 Nets	Recovery	3393	315	17,9	8,7			1002,34	88	
1	L3_21	BIO	2020-08-05	0:21	59,4703877	-49,4763678	2 Nets	Bottom		315	20,6	8,7			1002,43	87	
1	L3_21	BIO	2020-08-05	0:17	59,471335	-49,4755265	2 Nets	Deployment		306	17,1	8,8			1002,42	88	
1	L3_21	BIO	2020-08-05	0:05	59,4737642	-49,4782017	CTD Rosette	Recovery	3394	335	12,6	12,5			1002,60	78	
1	L3_21	BIO	2020-08-04	22:25	59,4805635	-49,4756855	CTD Rosette	Bottom	3396	9	9,3	10,4	9,15	34,40	1002,54	89	
1	L3_21	BIO	2020-08-04	21:17	59,4847902	-49,4796975	CTD Rosette	Deployment		327	10,5	10,4	9,20	34,40	1002,62	81	
1	L3_20.5	BIO	2020-08-04	19:49	59,2718715	-49,715702	CTD Rosette	Recovery	3424	324	8,4	10,4	9,39	34,41	1002,63	86	
1	L3_20.5	BIO	2020-08-04	18:46	59,2728017	-49,7143083	CTD Rosette	Bottom		5	4,6	9,3	9,44	34,39	1002,48	93	
1	L3_20.5	BIO	2020-08-04	17:37	59,2753943	-49,714136	CTD Rosette	Deployment		311	8,4	9,4	9,20	34,40	1002,59	94	
1	L3_20	BIO	2020-08-04	16:01	59,0369055	-49,9141198	2 Nets	Recovery	3462	270	8	10,7	8,59	34,37	1002,57	89	
1	L3_20	BIO	2020-08-04	16:00	59,0369978	-49,9138815	2 Nets	Bottom	3462	272	5,5	10,6	8,84	34,37	1002,50	88	
1	L3_20	BIO	2020-08-04	15:55	59,0375143	-49,9151417	2 Nets	Deployment	3463	252	8,6	9,9	8,90	34,37	1002,66	93	
1	L3_20	BIO	2020-08-04	15:48	59,0384717	-49,9174958	2 Nets	Recovery	3462	237	8	10,5	8,87	34,37	1002,75	89	

1	L3_20	BIO	2020-08-04	15:44	59,038876	-49,9180955	2 Nets	Bottom	3462	254	4,6	9,7	8,87	34,37	1002,77	95	
1	L3_20	BIO	2020-08-04	15:40	59,038868	-49,9177175	2 Nets	Deployment	3462	268	4,6	9,3	8,94	34,37	1002,86	96	
1	L3_20	BIO	2020-08-04	15:30	59,039833	-49,9187123	CTD Rosette	Recovery	3463	210	3	9,1	8,87	34,37	1002,90	97	
1	L3_20	BIO	2020-08-04	13:39	59,0543638	-49,9450958	CTD Rosette	Bottom	3466	212	4,4	9,6	8,82	34,37	1003,11	90	
1	L3_20	BIO	2020-08-04	12:27	59,0613442	-49,9585522	CTD Rosette	Deployment		251	6,7	9,3	8,84	34,37	1003,81	89	
1	L3_19.5	BIO	2020-08-04	10:44	58,8445625	-50,1759283	CTD Rosette	Recovery		273	6,5	10,1	8,13	34,38	1004,60	88	
1	L3_19.5	BIO	2020-08-04	9:35	58,8481542	-50,1801622	CTD Rosette	Bottom		216	1,7	9,1	8,56	34,37	1004,75	91	
1	L3_19.5	BIO	2020-08-04	8:25	58,8518857	-50,1827042	CTD Rosette	Deployment	3499	288	6,9	9,4	8,57	34,37	1004,91	91	
1	L3_19	BIO	2020-08-04	6:47	58,6388975	-50,4084907	CTD Rosette	Recovery	3520	311	10,3	9,6	9,60	34,48	1005,10	90	
1	L3_19	BIO	2020-08-04	5:00	58,634419	-50,4089242	CTD Rosette	Bottom		330	11,6	10,5	9,64	34,48	1005,24	80	
1	L3_19	BIO	2020-08-04	3:46	58,6316667	-50,4101403	CTD Rosette	Deployment		326	18,1	8,3	9,65	34,48	1005,24	94	
1	L3_19	BIO	2020-08-04	1:45	58,6278665	-50,4043193	CTD Rosette	Recovery	3521	324	16,6	8	9,57	34,48	1005,24	94	
1	L3_19	BIO	2020-08-04	1:36	58,6286147	-50,4055022	CTD Rosette	Deployment	3522	319	17,7	9,4	9,63	34,48	1005,48	91	
1	L3_19	BIO	2020-08-03	16:49	58,626651	-50,3888065	Argo Float	Deployment		299	11,2	8	9,79	34,46	1005,20	90	
1	L3_19	BIO	2020-08-03	15:45	58,6288805	-50,411477	2 Nets	Recovery	3522	280	13,1	7,7	9,81	34,46	1005,54	92	
1	L3_19	BIO	2020-08-03	15:42	58,629626	-50,4121598	2 Nets	Bottom		280	13,9	7,7	9,81	34,46	1005,60	91	
1	L3_19	BIO	2020-08-03	15:38	58,6305115	-50,4124365	2 Nets	Deployment		284	13,9	7,7	9,79	34,46	1005,45	91	
1	L3_19	BIO	2020-08-03	15:28	58,6328487	-50,4139632	2 Nets	Recovery	3519	287	13,9	7,6	9,76	34,46	1005,46	93	
1	L3_19	BIO	2020-08-03	15:25	58,6336423	-50,41447	2 Nets	Bottom		282	13,7	7,6	9,71	34,46	1005,50	94	
1	L3_19	BIO	2020-08-03	15:21	58,6344417	-50,414852	2 Nets	Deployment	3521	282	13,7	7,9	9,61	34,47	1005,55	94	
1	L3_19	BIO	2020-08-03	14:45	58,6380972	-50,4222727	CTD Rosette	Recovery	3519	263	15,2	10,3	9,72	34,46	1005,61	89	
1	L3_19	BIO	2020-08-03	12:48	58,6398378	-50,4193575	CTD Rosette	Bottom		308	10,7	7,9	9,50	34,46	1005,49	98	
1	L3_19	BIO	2020-08-03	11:22	58,6379015	-50,4217037	CTD Rosette	Deployment	3522	336	9,3	7,7	9,68	34,46	1004,93	98	
1	L3_18.5	BIO	2020-08-03	9:53	58,425516	-50,6389055	CTD Rosette	Recovery	3538	318	10,1	7,9	9,67	34,42	1005,52	98	
1	L3_18.5	BIO	2020-08-03	8:46	58,4285215	-50,6450845	CTD Rosette	Bottom	3536	303	9,1	7,5	9,73	34,42	1006,30	98	
1	L3_18.5	BIO	2020-08-03	7:34	58,4290265	-50,6542683	CTD Rosette	Deployment		282	5,1	8	9,48	34,45	1005,52	98	
1	L3_18	BIO	2020-08-03	5:58	58,1945135	-50,86588	2 Nets	Recovery	3551	308	10,3	6,8	9,59	34,39	1005,77	98	
1	L3_18	BIO	2020-08-03	5:55	58,1948562	-50,8661358	2 Nets	Bottom	3553	320	8,2	6,9	9,53	34,41	1005,78	98	
1	L3_18	BIO	2020-08-03	5:51	58,1953465	-50,8663962	2 Nets	Deployment	3553	316	11,2	7,2	9,22	34,46	1005,81	98	
1	L3_18	BIO	2020-08-03	5:47	58,1955742	-50,8663288	2 Nets	Recovery	3552	320	11	7,1	9,09	34,45	1005,77	98	
1	L3_18	BIO	2020-08-03	5:43	58,1957563	-50,8660958	2 Nets	Bottom	3553	313	10,3	7,2	9,47	34,42	1005,71	98	
1	L3_18	BIO	2020-08-03	5:40	58,1959473	-50,8664715	2 Nets	Deployment	3553	326	8,2	7,2	9,60	34,39	1005,78	98	
1	L3_18	BIO	2020-08-03	5:29	58,1960493	-50,8653158	CTD Rosette	Recovery	3553	349	8,9	7,6	9,60	34,39	1005,66	98	
1	L3_18	BIO	2020-08-03	3:42	58,1939732	-50,8623347	CTD Rosette	Bottom	3553	318	5,1	8,4	9,63	34,40	1005,96	98	
1	L3_18	BIO	2020-08-03	2:26	58,1981675	-50,8721335	CTD Rosette	Deployment	3552	330	4,4	8	9,65	34,42	1006,09	98	
1	L3_18	BIO	2020-08-03	1:58	58,20098	-50,8771972	Hydrobios	Recovery	3552	307	8,6	7,8	9,67	34,43	1006,06	98	
1	L3_18	BIO	2020-08-03	1:36	58,2046132	-50,8815733	Hydrobios	Bottom	3552	295	7,6	7,9	9,68	34,43	1006,31	98	
1	L3_18	BIO	2020-08-03	0:56	58,211582	-50,8836732	Hydrobios	Deployment	3552	267	7,4	7,9	9,66	34,43	1006,19	98	
1	L3_17.5	BIO	2020-08-02	23:19	58,0190628	-51,1052962	CTD Rosette	Recovery	3563	294	11,8	9,3	10,34	34,47	1006,30	98	
1	L3_17.5	BIO	2020-08-02	22:15	58,0128745	-51,1111608	CTD Rosette	Bottom	3569	225	3,6	10,3	10,37	34,48	1006,38	98	

1	L3_17.5	BIO	2020-08-02	21:05	58,0074158	-51,11585	CTD Rosette	Deployment	3569	252	11,6	10,1	10,42	34,48	1006,10	98	
1	L3_17	BIO	2020-08-02	19:15	57,8037495	-51,3351028	CTD Rosette	Recovery	3631	253	14,5	10	10,70	34,49	1006,61	98	
1	L3_17	BIO	2020-08-02	17:25	57,7995225	-51,3354923	CTD Rosette	Bottom	3629	230	8	14,3	10,94	34,50	1006,96	78	
1	L3_17	BIO	2020-08-02	16:09	57,7999465	-51,339549	CTD Rosette	Deployment	3628	243	12,2	10,3	10,84	34,49	1007,03	97	
1	L3_17	BIO	2020-08-02	15:22	57,7954488	-51,3499897	Argo Float	Deployment	3583	240	11,2	9,8	10,74	34,49	1007,27	98	
1	L3_17	BIO	2020-08-02	15:09	57,7976075	-51,3352758	2 Nets	Recovery	3628	248	15,4	9,8	10,75	34,49	1007,20	98	
1	L3_17	BIO	2020-08-02	15:06	57,7980818	-51,3364422	2 Nets	Bottom	3627	240	12,4	9,8	10,75	34,48	1007,27	98	
1	L3_17	BIO	2020-08-02	15:02	57,7983118	-51,3380612	2 Nets	Deployment	3627	255	11	9,9	10,21	34,48	1007,20	97	
1	L3_17	BIO	2020-08-02	14:53	57,7990893	-51,3406035	2 Nets	Recovery	3627	236	11,8	9,8	10,37	34,49	1007,33	98	
1	L3_17	BIO	2020-08-02	14:50	57,799518	-51,3416027	2 Nets	Bottom	3627	243	11,2	9,7	10,68	34,49	1007,28	97	
1	L3_17	BIO	2020-08-02	14:47	57,7995682	-51,3432575	2 Nets	Deployment	3627	237	13,5	9,8	10,79	34,49	1007,36	98	
1	L3_16.5	BIO	2020-08-02	13:27	57,6063053	-51,5174423	CTD Rosette	Recovery	3538	225	12,9	11,6	10,17	34,47	1007,58	92	
1	L3_16.5	BIO	2020-08-02	12:20	57,5971155	-51,531955	CTD Rosette	Bottom	3538	227	12,9	12,2	10,02	34,46	1007,92	78	
1	L3_16.5	BIO	2020-08-02	11:08	57,5907318	-51,5533852	CTD Rosette	Deployment	3539	219	9,7	9,9	10,12	34,47	1008,01	96	
1	L3_16	BIO	2020-08-02	9:34	57,3763825	-51,7922027	2 Nets	Recovery	3539	225	16	9,8	9,80	34,49	1008,08	92	
1	L3_16	BIO	2020-08-02	9:31	57,3763713	-51,7919882	2 Nets	Bottom	3538	225	12,4	10	9,96	34,48	1008,27	93	
1	L3_16	BIO	2020-08-02	9:27	57,3762138	-51,7917695	2 Nets	Deployment	3538	228	13,9	9,9	9,88	34,48	1008,28	93	
1	L3_16	BIO	2020-08-02	9:24	57,3761398	-51,7917022	2 Nets	Recovery	3539	231	13,5	9,9	9,74	34,48	1008,27	94	
1	L3_16	BIO	2020-08-02	9:21	57,3760862	-51,7915222	2 Nets	Bottom	3538	224	10,3	9,9	9,18	34,49	1008,35	95	
1	L3_16	BIO	2020-08-02	9:16	57,3758567	-51,7906983	2 Nets	Deployment	3538	231	12,6	10	9,89	34,48	1008,39	94	
1	L3_16	BIO	2020-08-02	8:56	57,3962982	-51,8065995	CTD Rosette	Recovery	3536	223	10,5	11,2	10,15	34,48	1008,50	90	
1	L3_16	BIO	2020-08-02	7:09	57,3803485	-51,797127	CTD Rosette	Bottom	3537	192	11,8	10	10,16	34,48	1008,54	97	
1	L3_16	BIO	2020-08-02	5:57	57,3754753	-51,7931488	CTD Rosette	Deployment	3539	208	7,6	12	9,69	34,48	1009,44	87	
1	L3_16	BIO	2020-08-02	5:33	57,3775228	-51,7925515	Hydrobios	Recovery	3535	201	8,9	11	9,21	34,49	1009,54	98	
1	L3_16	BIO	2020-08-02	5:12	57,3772415	-51,791022	Hydrobios	Bottom	3537	209	11,4	9,8	9,85	34,47	1009,56	98	
1	L3_16	BIO	2020-08-02	4:34	57,3757302	-51,7893633	Hydrobios	Deployment	3538	184	9,5	11,9	10,03	34,48	1009,53	86	
1	L3_15.5	BIO	2020-08-02	2:57	57,1707072	-52,0159125	CTD Rosette	Recovery	3521	191	11,2	13,2	10,75	34,46	1010,37	84	
1	L3_15.5	BIO	2020-08-02	1:50	57,166359	-52,0112285	CTD Rosette	Bottom	3522	194	8,8	12,1	10,62	34,45	1010,52	93	
1	L3_15.5	BIO	2020-08-02	0:38	57,1614797	-52,0123952	CTD Rosette	Deployment	3523	189	13,1	12,6	10,56	34,43	1010,52	90	
1	L3_15	BIO	2020-08-01	23:11	56,9550605	-52,2344653	Argo Float	Deployment	3515	96	12,4	11,4	10,99	34,47	1010,77	95	
1	L3_15	BIO	2020-08-01	23:01	56,954926	-52,2358823	2 Nets	Recovery	3517	181	13,1	10,9	10,94	34,46	1010,65	95	
1	L3_15	BIO	2020-08-01	22:58	56,95488	-52,2364045	2 Nets	Bottom	3517	175	11,2	11,5	10,58	34,46	1010,71	95	
1	L3_15	BIO	2020-08-01	22:54	56,955103	-52,2371135	2 Nets	Deployment	3517	186	12,9	11,1	10,11	34,48	1010,72	95	
1	L3_15	BIO	2020-08-01	22:51	56,9553295	-52,2375237	2 Nets	Recovery	3517	183	12,6	11,2	11,09	34,46	1010,78	94	
1	L3_15	BIO	2020-08-01	22:48	56,9553497	-52,2378983	2 Nets	Bottom	3517	181	9,1	12,3	10,67	34,47	1010,76	83	
1	L3_15	BIO	2020-08-01	22:44	56,9553343	-52,2381255	2 Nets	Deployment	3516	185	13,1	10,7	11,14	34,46	1010,68	95	
1	L3_15	BIO	2020-08-01	22:27	56,9677427	-52,248773	CTD Rosette	Recovery	3516	181	12	12	11,26	34,42	1010,66	91	
1	L3_15	BIO	2020-08-01	20:39	56,9620085	-52,2448488	CTD Rosette	Bottom	3516	192	14,1	13,2	11,17	34,47	1011,23	84	
1	L3_15	BIO	2020-08-01	19:27	56,95609	-52,2352782	CTD Rosette	Deployment	3517	187	14,7	12	11,09	34,47	1011,44	92	
1	L3_14.5	BIO	2020-08-01	17:58	56,7431913	-52,4779735	CTD Rosette	Recovery	3516	181	12,8	12,2	11,18	34,47	1011,74	93	

1	L3_14.5	BIO	2020-08-01	16:52	56,7470373	-52,4618252	CTD Rosette	Bottom	3516	175	6,7	14,5	11,08	34,48	1012,26	74	
1	L3_14.5	BIO	2020-08-01	15:44	56,7507823	-52,4491657	CTD Rosette	Deployment	3515	183	6,9	12,3	11,11	34,48	1012,45	87	
1	L3_14	BIO	2020-08-01	14:02	56,5553915	-52,7109225	Argo float	Deployment	3488	169	11,6	11,1	10,30	34,44	1012,79	91	
1	L3_14	BIO	2020-08-01	13:53	56,5548932	-52,7100197	2 Nets	Recovery	3489	170	13,1	11,1	10,16	34,44	1012,71	90	
1	L3_14	BIO	2020-08-01	13:50	56,5549172	-52,7100335	2 Nets	Bottom	3487	169	11,4	11,1	10,57	34,44	1012,59	91	
1	L3_14	BIO	2020-08-01	13:46	56,5545633	-52,7099407	2 Nets	Deployment	3488	172	12,2	11	10,55	34,44	1012,61	91	
1	L3_14	BIO	2020-08-01	13:38	56,55412	-52,7101248	2 Nets	Recovery	3488	171	13,1	11	10,50	34,44	1012,56	90	
1	L3_14	BIO	2020-08-01	13:35	56,553813	-52,7102673	2 Nets	Bottom	3488	169	15,2	11	10,45	34,44	1012,56	90	
1	L3_14	BIO	2020-08-01	13:31	56,5539068	-52,7109347	2 Nets	Deployment	3489	161	14,9	11,1	10,30	34,45	1012,38	91	
1	L3_14	BIO	2020-08-01	12:54	56,5452645	-52,704399	CTD Rosette	Recovery	3489	164	11	12,7	10,35	34,44	1012,69	86	
1	L3_14	BIO	2020-08-01	11:05	56,5415562	-52,6868587	CTD Rosette	Bottom	3493	126	2,7	11,7	10,77	34,44	1012,99	90	
1	L3_14	BIO	2020-08-01	9:52	56,5372873	-52,6719458	CTD Rosette	Deployment	3495	177	12,9	10,7	10,69	34,44	1012,83	92	
1	L3_13.5	BIO	2020-08-01	8:22	56,3261485	-52,906781	CTD Rosette	Recovery	3513	173	15,2	13,6	11,31	34,45	1012,74	82	
1	L3_13.5	BIO	2020-08-01	7:22	56,3255405	-52,9015585	CTD Rosette	Bottom	3516	183	10,1	10,9	11,18	34,45	1012,73	96	
1	L3_13.5	BIO	2020-08-01	6:12	56,325187	-52,895755	CTD Rosette	Deployment	3510	163	9,9	12,5	10,06	34,46	1013,07	86	
1	L3_13	BIO	2020-08-01	4:06	56,1380532	-53,1509693	Argo Float	Deployment	3348	176	16	12,1	10,67	34,49	1013,58	91	
1	L3_13	BIO	2020-08-01	3:49	56,1367478	-53,1524218	2 Nets	Recovery	3348	172	18,3	11	12,05	34,48	1013,13	94	
1	L3_13	BIO	2020-08-01	3:46	56,1364257	-53,1530998	2 Nets	Bottom	3346	162	16,8	11	10,88	34,51	1013,03	96	
1	L3_13	BIO	2020-08-01	3:42	56,1358428	-53,1535035	2 Nets	Deployment	3350	154	11,8	11,2	12,16	34,49	1013,05	96	
1	L3_13	BIO	2020-08-01	3:34	56,1334047	-53,1533848	2 Nets	Recovery	3352	287	1,3	11,2	12,23	34,49	1013,25	96	
1	L3_13	BIO	2020-08-01	3:31	56,1323493	-53,1529795	2 Nets	Bottom	3357	158	10,3	11,7	12,23	34,49	1013,33	96	
1	L3_13	BIO	2020-08-01	3:27	56,1314607	-53,1523883	2 Nets	Deployment	3356	113	4,2	11,6	12,22	34,49	1013,47	96	
1	L3_13	BIO	2020-08-01	3:13	56,1288078	-53,1487775	CTD Rosette	Recovery	3355	341	2,7	11,5	12,21	34,49	1013,55	96	
1	L3_13	BIO	2020-08-01	1:28	56,1241833	-53,131744	CTD Rosette	Bottom	3349	157	9,1	11,8	12,17	34,49	1014,50	92	
1	L3_13	BIO	2020-08-01	0:20	56,119033	-53,1217993	CTD Rosette	Deployment	3331	173	3,4	12,1			1014,88	88	
1	L3_12.5	BIO	2020-07-31	23:16	55,9833232	-53,2499438	CTD Rosette	Recovery	3231	150	10,5	11,2	11,46	34,35	1014,47	90	
1	L3_12.5	BIO	2020-07-31	22:17	55,9815377	-53,2503387	CTD Rosette	Bottom	3229	161	11	10,6	11,94	34,34	1014,18	96	
1	L3_12.5	BIO	2020-07-31	21:14	55,9798245	-53,2505293	CTD Rosette	Deployment	3229	161	12,8	11,2	10,11	34,37	1014,47	91	
1	L3_12	BIO	2020-07-31	19:40	55,8482887	-53,3957375	2 Nets	Recovery	3128	135	8,2	11,3	10,65	34,41	1014,60	90	
1	L3_12	BIO	2020-07-31	19:37	55,8482098	-53,3960008	2 Nets	Bottom	3127	131	10,1	11,3	10,68	34,42	1014,49	89	
1	L3_12	BIO	2020-07-31	19:32	55,848185	-53,3966663	2 Nets	Deployment	3126	126	10,1	11,4	11,05	34,41	1014,39	88	
1	L3_12	BIO	2020-07-31	19:26	55,8488088	-53,3981868	2 Nets	Recovery	3127	134	9,9	11,7	10,68	34,42	1014,54	90	
1	L3_12	BIO	2020-07-31	19:22	55,8486378	-53,3983013	2 Nets	Bottom	3127	136	11,6	11,3	11,18	34,41	1014,49	89	
1	L3_12	BIO	2020-07-31	19:19	55,8484818	-53,3983388	2 Nets	Deployment	3127	146	9,5	11,7	10,03	34,44	1014,53	88	
1	L3_12	BIO	2020-07-31	19:05	55,8505358	-53,4014205	CTD Rosette	Recovery	3124	134	10,5	11,6	10,61	34,42	1014,51	87	
1	L3_12	BIO	2020-07-31	17:18	55,8455988	-53,3937425	CTD Rosette	Bottom	3126	155	6,7	11,6	11,65	34,39	1014,67	82	
1	L3_12	BIO	2020-07-31	16:15	55,8438848	-53,3904238	CTD Rosette	Deployment	3126	151	4,6	12,3	10,54	34,45	1014,92	77	
1	L3_12	BIO	2020-07-31	15:24	55,8502117	-53,405227	Hydrobios	Recovery	3125	169	4,6	11,2	11,57	34,40	1015,05	79	
1	L3_12	BIO	2020-07-31	14:54	55,8491858	-53,405098	Hydrobios	Bottom	3124	184	6,7	10,9	10,71	34,41	1015,06	80	
1	L3_12	BIO	2020-07-31	14:19	55,8492998	-53,4091733	Hydrobios	Deployment	3123	163	7	11,1	11,34	34,40	1015,22	81	

1	L3_11.5	BIO	2020-07-31	13:20	55,7358687	-53,5152767	CTD Rosette	Recovery	3038	128	3,2	11,6	11,09	34,34	1015,20	82	
1	L3_11.5	BIO	2020-07-31	12:23	55,7332395	-53,5144992	CTD Rosette	Bottom	3044	139	9,1	10,7	10,84	34,34	1014,97	84	
1	L3_11.5	BIO	2020-07-31	11:21	55,7302168	-53,513073	CTD Rosette	Deployment	3039	144	6,7	10,7	8,84	34,39	1014,85	82	
1	L3_11	BIO	2020-07-31	10:16	55,6147088	-53,628767	2 Nets	Recovery	2916	131	3,8	11,2	11,30	34,35	1014,92	80	
1	L3_11	BIO	2020-07-31	10:12	55,6146562	-53,6286703	2 Nets	Bottom	2916	89	5	10,9	11,08	34,36	1014,85	79	
1	L3_11	BIO	2020-07-31	10:08	55,614574	-53,628384	2 Nets	Deployment	2916	127	5,5	10,7	11,10	34,35	1014,83	80	
1	L3_11	BIO	2020-07-31	10:01	55,6143752	-53,6280145	2 Nets	Recovery	2916				11,38	34,34			
1	L3_11	BIO	2020-07-31	9:58	55,6142725	-53,6279253	2 Nets	Bottom	2917	157	5,5	10,3	11,17	34,35	1014,69	82	
1	L3_11	BIO	2020-07-31	9:54	55,6143588	-53,628159	2 Nets	Deployment	2916	130	8	10,2	11,13	34,35	1014,53	83	
1	L3_11	BIO	2020-07-31	9:42	55,6143672	-53,6285558	CTD Rosette	Recovery	2916	127	6,9	10	11,48	34,35	1014,49	83	
1	L3_11	BIO	2020-07-31	8:07	55,615113	-53,6322733	CTD Rosette	Bottom		139	9,7	9,7	11,31	34,37	1014,45	92	
1	L3_11	BIO	2020-07-31	7:03	55,6135522	-53,6274368	CTD Rosette	Deployment	2915	122	7,2	9,7	10,94	34,38	1014,24	97	
1	LS_10.5	BIO	2020-07-31	6:09	55,5160638	-53,7293725	CTD Rosette	Recovery	2843	141	4,8	9,9	10,73	33,99	1014,35	93	
1	LS_10.5	BIO	2020-07-31	5:16	55,5170265	-53,7291863	CTD Rosette	Bottom	2842	91	2,9	11	10,92	33,97	1014,28	93	
1	LS_10.5	BIO	2020-07-31	4:17	55,5192335	-53,7276402	CTD Rosette	Deployment	2839	170	2,1	10,5	9,53	34,09	1014,50	95	
1	L3_10	BIO	2020-07-31	3:09	55,421702	-53,811385	2 Nets	Recovery	2680	286	3	9,5	10,83	33,86	1014,56	98	
1	L3_10	BIO	2020-07-31	3:06	55,421492	-53,8115443	2 Nets	Bottom	2678	295	3,8	9,4	10,88	33,87	1014,50	98	
1	L3_10	BIO	2020-07-31	3:02	55,421313	-53,8119328	2 Nets	Deployment	2679	303	2,7	9,5	10,89	33,86	1014,65	98	
1	L3_10	BIO	2020-07-31	2:58	55,421129	-53,8122723	2 Nets	Recovery	2680	305	3,2	9,5	10,84	33,86	1014,64	98	
1	L3_10	BIO	2020-07-31	2:55	55,4208958	-53,8123293	2 Nets	Bottom	2679	312	3,2	9,5	10,88	33,86	1014,74	98	
1	L3_10	BIO	2020-07-31	2:51	55,4205773	-53,8124347	2 Nets	Deployment	2678	309	3	9,4	10,91	33,86	1014,81	98	
1	L3_10	BIO	2020-07-31	2:37	55,4200462	-53,8132868	CTD Rosette	Recovery	2678	309	3,6	9,5	10,96	33,86	1014,77	96	
1	L3_10	BIO	2020-07-31	1:01	55,4200715	-53,8206993	CTD Rosette	Bottom	2689	219	2,7	10,2	10,14	33,88	1014,75	86	
1	L3_10	BIO	2020-07-31	0:05	55,4213533	-53,825192	CTD Rosette	Deployment		220	2,7	10,6			1014,74	84	
1	L3_10	BIO	2020-07-30	23:29	55,421963	-53,8103223	Hydrobios	Recovery	2678	199	3	10,1	10,13	34,05	1014,54	88	
1	L3_10	BIO	2020-07-30	23:05	55,4209245	-53,8132517	Hydrobios	Bottom	2683	202	2,1	10,2	10,01	34,21	1014,62	87	
1	L3_10	BIO	2020-07-30	22:24	55,4210763	-53,8248047	Hydrobios	Deployment		191	4,6	10,4	10,23	33,96	1014,45	88	
1	L3_09	BIO	2020-07-30	21:07	55,2645142	-53,9914163	2 Nets	Recovery	2074	174	3,6	9,6	7,62	33,80	1014,31	91	
1	L3_09	BIO	2020-07-30	21:03	55,2645973	-53,9917205	2 Nets	Bottom	2079	171	4,8	9,8			1014,29	91	
1	L3_09	BIO	2020-07-30	21:00	55,2645973	-53,991827	2 Nets	Deployment	2076	165	4,8	9,8	7,77	33,80	1014,27	92	
1	L3_09	BIO	2020-07-30	20:50	55,264708	-53,9916675	2 Nets	Recovery	2078	159	5	9,8	8,32	33,74	1014,25	93	
1	L3_09	BIO	2020-07-30	20:46	55,2647922	-53,9917677	2 Nets	Bottom		150	4,8	9,7	7,94	33,84	1014,12	93	
1	L3_09	BIO	2020-07-30	20:43	55,2649407	-53,9917313	2 Nets	Deployment		152	5,1	9,8	7,98	33,75	1014,13	93	
1	L3_09	BIO	2020-07-30	20:25	55,2526712	-53,9937012	CTD Rosette	Recovery	1996	137	3,8	9,8	8,68	33,69	1014,08	93	
1	L3_09	BIO	2020-07-30	19:01	55,2592485	-53,993597	CTD Rosette	Bottom	2042	108	1,5	13,1	8,74	33,69	1013,89	79	
1	L3_09	BIO	2020-07-30	18:16	55,2629032	-53,9926055	CTD Rosette	Deployment	2066	46	2,5	12,4	7,85	33,69	1013,69	78	
1	L3_08.5	BIO	2020-07-30	17:29	55,1842212	-54,0630858	CTD Rosette	Recovery	1664	220	0,6	11	8,10	33,59	1013,86	86	
1	L3_08.5	BIO	2020-07-30	16:55	55,1881032	-54,0617607	CTD Rosette	Bottom	1651	140	3	10,2	6,39	33,95	1013,86	91	
1	L3_08.5	BIO	2020-07-30	16:20	55,1914388	-54,0610495	CTD Rosette	Deployment		129	1,7	10,2	7,92	33,61	1013,90	91	
1	L3_08	BIO	2020-07-30	15:29	55,0882332	-54,09968	3 Nets	Recovery	937	177	1,3	9,7	7,99	32,49	1013,78	96	

1	L3_08	BIO	2020-07-30	15:12	55,0917495	-54,1059663	3 Nets	Bottom	882	61	4,4	9,1	8,14	32,19	1013,75	97	
1	L3_08	BIO	2020-07-30	14:36	55,1000792	-54,1185548	3 Nets	Deployment	914	337	3	9,3	7,54	32,44	1013,90	96	
1	L3_08	BIO	2020-07-30	14:32	55,1009635	-54,1199208	3 Nets	Recovery	914	315	3	9,3	6,06	32,42	1013,89	96	
1	L3_08	BIO	2020-07-30	14:31	55,1011563	-54,1202758	3 Nets	Bottom	913	324	2,3	9,2	5,89	32,49	1013,99	96	
1	L3_08	BIO	2020-07-30	14:22	55,1031842	-54,1246497	3 Nets	Deployment	910	323	1,7	9,3	6,14	32,58	1014,02	96	
1	L3_08	BIO	2020-07-30	14:12	55,105504	-54,1291132	3 Nets	Recovery	915	329	1,1	9,3	7,89	32,09	1014,06	95	
1	L3_08	BIO	2020-07-30	14:11	55,105691	-54,1294075	3 Nets	Bottom	916	332	1,1	9,4	7,94	32,15	1014,08	95	
1	L3_08	BIO	2020-07-30	13:59	55,1079202	-54,1356598	3 Nets	Deployment	927	331	1,9	8,9	7,94	32,20	1014,19	97	
1	L3_08	BIO	2020-07-30	13:02	55,1030837	-54,1254187	CTD Rosette	Recovery	906	251	3,2	8,9	7,50	32,42	1013,95	97	
1	L3_08	BIO	2020-07-30	13:02	55,1031415	-54,125468	CTD Rosette	Bottom	906	252	4,2	9	7,48	32,39	1014,00	97	
1	L3_08	BIO	2020-07-30	12:27	55,1093878	-54,1356308	CTD Rosette	Deployment	930	272	3	9,4	6,39	32,47	1014,11	97	
1	L3_07	BIO	2020-07-30	11:14	54,9539997	-54,2826562	3 Nets	Recovery	370	10	0,4	10,2	5,82	31,71	1014,05	90	
1	L3_07	BIO	2020-07-30	11:04	54,954284	-54,2841405	3 Nets	Bottom	370	25	0	10,1	2,78	32,22	1013,95	90	
1	L3_07	BIO	2020-07-30	10:52	54,9544612	-54,2876	3 Nets	Deployment	369	344	1,3	9,5	2,00	32,28	1013,91	92	
1	L3_07	BIO	2020-07-30	10:45	54,9545325	-54,2896433	3 Nets	Recovery	368	332	2,1	9,5	3,28	32,25	1013,90	92	
1	L3_07	BIO	2020-07-30	10:43	54,9546192	-54,290244	3 Nets	Bottom	368	313	1,1	9,5	3,18	32,22	1013,96	91	
1	L3_07	BIO	2020-07-30	10:38	54,9547647	-54,2919148	3 Nets	Deployment	368	304	1,5	9,5	7,94	31,68	1014,04	91	
1	L3_07	BIO	2020-07-30	10:30	54,9545782	-54,2929667	3 Nets	Recovery	366	317	1,7	9,6	4,76	32,11	1013,95	91	
1	L3_07	BIO	2020-07-30	10:26	54,9545733	-54,2939687	3 Nets	Bottom	367	313	1	9,3	3,32	32,15	1013,85	91	
1	L3_07	BIO	2020-07-30	10:22	54,9545527	-54,2956037	3 Nets	Deployment	365	313	2,9	9,2	8,21	31,64	1013,91	93	
1	L3_07	BIO	2020-07-30	10:05	54,9562203	-54,2883258	CTD Rosette	Recovery	370	251	0,4	9,2	7,94	31,66	1013,73	93	
1	L3_07	BIO	2020-07-30	9:18	54,955258	-54,292531	CTD Rosette	Deployment	369	224	4,2	9,3	7,84	31,65	1013,78	93	
1	L3_06	BIO	2020-07-30	7:52	54,7593015	-54,4892622	3 Nets	Recovery	245	327	3	9,1	8,77	31,51	1013,52	94	
1	L3_06	BIO	2020-07-30	7:46	54,7595658	-54,4890223	3 Nets	Bottom	245	317	4,6	8,8	6,64	31,76	1013,47	97	
1	L3_06	BIO	2020-07-30	7:36	54,759722	-54,4887418	3 Nets	Deployment	245	329	5,1	8,8	8,63	31,57	1013,49	97	
1	L3_06	BIO	2020-07-30	7:32	54,7595722	-54,4884917	3 Nets	Recovery	245	277	3	9,3	9,23	31,43	1013,30	98	
1	L3_06	BIO	2020-07-30	7:28	54,7596407	-54,4884217	3 Nets	Bottom	245	333	4,8	8,8	8,33	31,63	1013,43	97	
1	L3_06	BIO	2020-07-30	7:25	54,7596255	-54,4884103	3 Nets	Deployment	245	326	3	9,3	8,51	31,49	1013,62	98	
1	L3_06	BIO	2020-07-30	7:20	54,7595173	-54,4883027	3 Nets	Recovery	245	315	2,7	9,4	8,93	31,48	1013,42	98	
1	L3_06	BIO	2020-07-30	7:15	54,759485	-54,4880267	3 Nets	Bottom	245	325	4	8,6	9,25	31,47	1013,58	98	
1	L3_06	BIO	2020-07-30	7:12	54,7595868	-54,487758	3 Nets	Deployment	245	252	5,3	9	9,66	31,44	1013,47	98	
1	L3_06	BIO	2020-07-30	6:55	54,7601098	-54,4877388	CTD Rosette	Recovery	245	307	3	8,6	7,82	31,57	1013,53	98	
1	L3_06	BIO	2020-07-30	6:28	54,7615693	-54,4867382	CTD Rosette	Bottom	246	287	3,4	8,8	7,56	31,47	1013,49	98	
1	L3_06	BIO	2020-07-30	6:16	54,7617545	-54,487005	CTD Rosette	Deployment	246	271	4,2	8,9	7,39	31,46	1013,46	98	
1	L3_04	BIO	2020-07-30	2:37	54,2179818	-55,0273898	3 Nets	Recovery	169	190	2,5	9,4	10,41	31,76	1014,40	98	
1	L3_04	BIO	2020-07-30	2:31	54,217594	-55,0274925	3 Nets	Bottom	169	179	2,5	9,4	10,46	31,76	1014,46	98	
1	L3_04	BIO	2020-07-30	2:27	54,2173828	-55,0275123	3 Nets	Deployment	169	166	2,1	9,4	10,51	31,75	1014,56	98	
1	L3_04	BIO	2020-07-30	2:24	54,2172425	-55,027482	3 Nets	Recovery	169	17	3,4	9,6	10,44	31,76	1014,51	98	
1	L3_04	BIO	2020-07-30	2:19	54,217023	-55,0274412	3 Nets	Bottom	169	176	4,6	9,2	10,34	31,77	1014,48	98	
1	L3_04	BIO	2020-07-30	2:16	54,216902	-55,0272732	3 Nets	Deployment	169	189	3,6	9,2	10,35	31,77	1014,59	98	

1	L3_04	BIO	2020-07-30	2:13	54,2168668	-55,0270878	3 Nets	Recovery	169	168	3	8,9	10,33	31,77	1014,72	98	
1	L3_04	BIO	2020-07-30	2:13	54,2168622	-55,0270718	3 Nets	Bottom	169	186	3	9	10,35	31,77	1014,59	98	
1	L3_04	BIO	2020-07-30	2:03	54,2168147	-55,026375	3 Nets	Deployment	169	158	3,8	8,9	10,42	31,82	1014,62	98	
1	L3_04	BIO	2020-07-29	23:32	54,2196883	-55,024515	CTD Rosette	Recovery	169	230	2,7	8,9	9,94	31,75	1014,67	98	
1	L3_04	BIO	2020-07-29	22:58	54,2214573	-55,0215177	CTD Rosette	Deployment	169	285	1	9,6	10,39	31,64	1014,94	98	
1	L3_02	BIO	2020-07-29	17:47	53,7948078	-55,43783	CTD Rosette	Recovery	206	275	3,2	9,7	9,46	30,29	1014,77	92	
1	L3_02	BIO	2020-07-29	17:19	53,7983742	-55,4342278	CTD Rosette	Bottom	207	310	3	9,6	9,70	30,25	1014,78	94	
1	L3_02	BIO	2020-07-29	17:09	53,7995043	-55,4320473	CTD Rosette	Deployment	206	320	3,8	9,5	8,56	31,18	1014,69	94	
1	L3_02	BIO	2020-07-29	16:04	53,7945302	-55,4541443	Mesozooplancton-2 (filet 200	Recovery	206	325	6,7	8,9	10,10	30,22	1015,08	97	
1	L3_02	BIO	2020-07-29	15:59	53,7953185	-55,453131	Mesozooplancton-2 (filet 200	Bottom	205	308	7	9	9,98	30,24	1015,04	96	
1	L3_02	BIO	2020-07-29	15:51	53,7961762	-55,4513138	Mesozooplancton-2 (filet 200	Deployment	205	315	5,5	9,3	9,75	30,29	1015,15	96	
1	L3_02	BIO	2020-07-29	15:39	53,7969247	-55,4493842	Mesozooplancton-2 (filet 200	Recovery	204	332	5,7	9,9	8,95	30,51	1015,11	95	
1	L3_02	BIO	2020-07-29	15:38	53,7969412	-55,4490688	Mesozooplancton-2 (filet 200	Deployment	204	350	5	9,4	9,05	30,60	1015,13	96	
1	L3_02	BIO	2020-07-29	15:30	53,7969057	-55,4457893	Mesozooplancton-1 (filet 200	Recovery	206	305	9,1	9,1	8,68	30,60	1015,08	98	
1	L3_02	BIO	2020-07-29	15:20	53,7984945	-55,4412492	Mesozooplancton-1 (filet 200	Deployment	209	297	9,7	8,6	9,96	30,20	1015,16	98	
1	L3_01	BIO	2020-07-29	13:56	53,6561763	-55,5494667	CTD Rosette	Recovery	140	323	8	9,8	9,48	30,44	1015,57	93	
1	L3_01	BIO	2020-07-29	13:23	53,6650525	-55,5505808	CTD Rosette	Deployment	151	2	2,9	10,5	9,31	30,87	1015,74	91	
1	L3_01	BIO	2020-07-29	12:49	53,6677775	-55,5460843	Mesozooplancton-2 (filet 200	Recovery	149	290	9,3	8,8	9,28	30,50	1015,38	97	
1	L3_01	BIO	2020-07-29	12:44	53,6690518	-55,5463303	Mesozooplancton-2 (filet 200	Bottom	149	289	7,8	8,7	9,34	30,43	1015,33	98	
1	L3_01	BIO	2020-07-29	12:40	53,6704337	-55,5466778	Mesozooplancton-2 (filet 200	Deployment	149	284	8,8	8,7	9,56	30,42	1015,21	98	
1	L3_01	BIO	2020-07-29	12:31	53,6730915	-55,5471218	Mesozooplancton-2 (filet 200	Recovery	155	279	9,3	8,7	9,75	30,27	1015,40	98	
1	L3_01	BIO	2020-07-29	12:28	53,6740862	-55,5473182	Mesozooplancton-2 (filet 200	Bottom	156	282	10,5	8,6	9,56	30,46	1015,18	98	
1	L3_01	BIO	2020-07-29	12:24	53,6752773	-55,5475058	Mesozooplancton-2 (filet 200	Deployment	156	278	10,3	8,6	9,13	30,57	1015,21	98	
1	L3_01	BIO	2020-07-29	12:15	53,6781503	-55,5483018	Mesozooplancton-1 (filet 200	Recovery	156	276	9,9	8,7	9,08	30,60	1015,11	98	
1	L3_01	BIO	2020-07-29	12:11	53,6789542	-55,5489103	Mesozooplancton-1 (filet 200	Bottom	157	277	8,4	8,6	8,60	30,85	1015,22	98	
1	L3_01	BIO	2020-07-29	12:05	53,6803145	-55,5497512	Mesozooplancton-1 (filet 200	Deployment	156	284	8,8	8,6	8,90	30,15	1015,22	98	
1	L3_03	BIO	2020-07-29	9:54	53,9843825	-55,2505205	CTD Rosette	Recovery	151	323	9,3	9,3	2,08	31,87	1013,87	96	
1	L3_03	BIO	2020-07-29	9:21	53,9891458	-55,2486535	CTD Rosette	Deployment	152	316	2,3	8,6	7,04	31,05	1013,64	98	
1	L3_03	BIO	2020-07-29	9:05	53,9790752	-55,2564903	Mesozooplancton-2 (filet 200	Recovery	150	321	8	7,9	1,23	32,12	1013,66	98	
1	L3_03	BIO	2020-07-29	8:55	53,9805682	-55,2553582	Mesozooplancton-2 (filet 200	Deployment	151	309	9,5	8	0,67	32,05	1013,69	98	
1	L3_03	BIO	2020-07-29	8:51	53,981173	-55,2545672	Mesozooplancton-2 (filet 200	Recovery	151	313	9,5	8	2,43	31,97	1013,68	98	
1	L3_03	BIO	2020-07-29	8:44	53,9821905	-55,2533432	Mesozooplancton-2 (filet 200	Deployment	151	320	8,2	7,9	1,65	31,93	1013,65	98	
1	L3_03	BIO	2020-07-29	8:39	53,9832167	-55,2529545	Mesozooplancton-1 (filet 200	Recovery	151	315	9,1	8	2,06	31,80	1013,63	98	
1	L3_03	BIO	2020-07-29	8:31	53,9846858	-55,2522235	Mesozooplancton-1 (filet 200	Deployment		305	9,9	8,6	3,11	31,82	1013,44	98	
1	L3_05	BIO	2020-07-29	5:28	54,4868877	-54,759366	CTD Rosette	Recovery	197	328	2,1	9,6	10,42	31,17	1012,12	98	
1	L3_05	BIO	2020-07-29	5:02	54,4896443	-54,7616815	CTD Rosette	Bottom	194	238	1,9	9,7	9,94	31,19	1011,97	98	
1	L3_05	BIO	2020-07-29	4:52	54,4905127	-54,7625802	CTD Rosette	Deployment	193	299	0,8	9,8	9,69	30,84	1012,03	98	
1	L3_05	BIO	2020-07-29	4:37	54,4891573	-54,7648922	Mesozooplancton-2 (filet 200	Recovery	193	281	6,3	10,1	9,54	31,09	1012,05	98	
1	L3_05	BIO	2020-07-29	4:33	54,4892867	-54,7647948	Mesozooplancton-2 (filet 200	Bottom	193	336	5,3	10,4	8,67	31,44	1011,97	98	
1	L3_05	BIO	2020-07-29	4:23	54,4901327	-54,7635958	Mesozooplancton-2 (filet 200	Deployment	193	298	8,8	9,2	9,02	31,39	1011,98	98	

1	L3_05	BIO	2020-07-29	4:20	54,490551	-54,763089	Mesozooplancton-2 (filet 200	Recovery	193	297	8,2	9	8,96	31,22	1011,86	98	
1	L3_05	BIO	2020-07-29	4:17	54,4910407	-54,7623322	Mesozooplancton-2 (filet 200	Bottom	194	306	7,8	9,1	7,78	31,61	1011,88	98	
1	L3_05	BIO	2020-07-29	4:13	54,4916338	-54,7614323	Mesozooplancton-2 (filet 200	Deployment	195	301	7	9	8,65	30,64	1011,88	98	
1	L3_05	BIO	2020-07-29	4:09	54,4920113	-54,7614925	Mesozooplancton-1 (filet 200	Recovery	193	300	7,4	9,1	10,25	30,64	1011,87	98	
1	L3_05	BIO	2020-07-29	4:02	54,4925755	-54,7622073	Mesozooplancton-1 (filet 200	Bottom	193	288	5,9	9,1	9,46	31,22	1011,85	98	
1	L3_05	BIO	2020-07-29	3:58	54,4931857	-54,7626877	Mesozooplancton-1 (filet 200	Deployment	193	295	8,2	9,2	10,32	30,68	1011,76	98	
1	L3_07.5	BIO	2020-07-28	23:31	55,029662	-54,1983403	CTD Rosette	Recovery	552	20	7	9	6,57	31,90	1010,26	98	
1	L3_07.5	BIO	2020-07-28	23:02	55,0322643	-54,2114607	CTD Rosette	Deployment	548				5,55	31,99		98	
1	Hamilton Bank	Mooring	2020-07-28	20:25	55,1205482	-54,100655	Mooring Deployment	Bottom	1079	311	7,4	9	8,09	32,93	1009,21	98	
1	Hamilton Bank	Mooring	2020-07-28	18:38	55,1213975	-54,1269578	Mooring Deployment	Deployment	970	285	6,3	8,8	7,24	32,98	1008,72	98	
1	Hamilton Bank	Mooring	2020-07-28	17:46	55,1227735	-54,0487427	Mooring Recovery	Recovery	1331	311	10,5	9,1	8,60	32,97	1008,38	98	
1	Hamilton Bank	Mooring	2020-07-28	16:50	55,1206862	-54,0747503	Mooring Recovery	Bottom	1122	313	6,9	8,8	6,04	33,70	1008,08	98	
1	Hamilton Bank	Mooring	2020-07-28	16:40	55,120888	-54,078938	Mooring Recovery	Deployment	1089	319	9,3	8,9	7,03	33,60	1007,83	98	
1	OS_03	BIO	2020-07-28	0:04	52,8036948	-51,5527795	CTD Rosette	Recovery	1203	161	2,7	9			1003,95	98	
1	OS_03	BIO	2020-07-27	22:38	52,803517	-51,5611885	CTD Rosette	Deployment	1188	152	5,9	8,6	8,28	32,03	1003,20	98	
1	OS_03	BIO	2020-07-27	22:18	52,8036157	-51,559202	Mesozooplancton-1 (filet 200	Recovery		149	6,3	8,7	7,25	32,98	1003,18	98	
1	OS_03	BIO	2020-07-27	22:10	52,8049013	-51,5612062	Mesozooplancton-1 (filet 200	Deployment		142	7	8,6	8,28	32,02	1003,01	98	
1	OS_01	BIO	2020-07-27	20:28	52,6831678	-51,9508785	CTD Rosette	Recovery	304	305	1	10,9	6,24	32,21	1003,24	94	
1	OS_01	BIO	2020-07-27	19:44	52,684604	-51,9503217	CTD Rosette	Deployment	304	278	0,4	10,6	6,48	32,22	1003,38	98	
1	OS_01	BIO	2020-07-27	19:30	52,6844025	-51,9503203	Mesozooplancton-1 (filet 200	Recovery	304	343	0	10,5	7,17	32,22	1003,47	98	
1	OS_01	BIO	2020-07-27	19:27	52,6843055	-51,9501387	Mesozooplancton-1 (filet 200	Bottom	304	288	0	10,5	8,43	32,16	1003,35	98	
1	OS_01	BIO	2020-07-27	19:16	52,683499	-51,9504927	Mesozooplancton-1 (filet 200	Deployment	304	122	1	10,2	9,50	32,13	1003,39	98	
1	C2 (M2034)	Mooring	2020-07-27	13:28	52,7576415	-51,8397688	Mooring Recovery	Recovery	356	135	11,4	9,2	8,64	32,07	1002,83	98	
1	C2 (M2034)	Mooring	2020-07-27	12:57	52,7589392	-51,8525468	Mooring Recovery	Bottom	350	190	2,1	9,7	8,67	32,08	1002,94	98	
1	C2 (M2033)	Mooring	2020-07-27	12:44	52,7544722	-51,8510698	Mooring Recovery	Recovery	346	130	10,3	9	8,46	32,09	1002,81	98	
1	C2 (M2033)	Mooring	2020-07-27	10:30	52,7627652	-51,841394	Mooring Recovery	Bottom		124	13,5	8,8	8,70	32,08	1003,17	98	
1	OS_00	BIO	2020-07-26	20:53	52,5761653	-52,287346	CTD Rosette	Recovery	276	159	7,2	11,8	9,34	32,06	1004,05	98	
1	OS_00	BIO	2020-07-26	20:09	52,5740245	-52,2858688	CTD Rosette	Deployment	275	188	10,7	11,8	9,41	32,04	1004,05	98	
1	OS_00	BIO	2020-07-26	20:01	52,5734062	-52,2860975	Mesozooplancton-1 (filet 200	Recovery	275	191	10,1	11	9,32	32,05	1004,01	98	
1	OS_00	BIO	2020-07-26	19:57	52,5733682	-52,2862252	Mesozooplancton-1 (filet 200	Bottom	275	184	10,5	11,1	9,22	32,06	1004,05	98	
1	OS_00	BIO	2020-07-26	19:50	52,573205	-52,2863388	Mesozooplancton-1 (filet 200	Deployment		181	11,4	11,3	9,31	32,05	1003,98	98	
1	C1 (M2032)	Mooring	2020-07-26	18:27	52,6706678	-52,0906093	Mooring Recovery	Recovery	302	172	9,5	10,9	8,68	32,11	1003,93	98	
1	C1 (M2032)	Mooring	2020-07-26	18:06	52,6663748	-52,0933023	Mooring Recovery	Bottom	302	180	12,6	10,9	8,60	32,14	1003,75	98	
1	C1 (M2032)	Mooring	2020-07-26	17:55	52,668685	-52,0984853	Mooring Recovery	Deployment	301	186	11,6	11,1	8,35	32,12	1003,85	98	
1	C1 (M2031)	Mooring	2020-07-26	17:38	52,6731312	-52,1044775	Mooring Recovery	Recovery	303	175	8,6	10,8	8,44	32,15	1003,76	98	
1	C1 (M2031)	Mooring	2020-07-26	17:08	52,6674198	-52,1020013	Mooring Recovery	Bottom		188	11,6	11,3	4,00	32,39	1003,79	98	
1	C1 (M2031)	Mooring	2020-07-26	16:33	52,6690827	-52,1010487	Mooring Recovery	Deployment	301	196	11,4	11,4	8,49	32,12	1003,95	98	
1	C1_b (M2123)	Mooring	2020-07-26	13:03	52,683062	-51,9496372	Mooring deployment	Bottom	304	182	14,3	10,3	6,80	32,25	1003,86	98	
1	C1_b (M2123	Mooring	2020-07-26	12:57	52,682617	-51,949239	Mooring deployment	Deployment		200	15,6	10,4	6,65	32,24	1004,06	98	
1	C1_b (M2122)	Mooring	2020-07-26	11:41	52,6839715	-51,9627038	Mooring Deployment	Bottom	306	155	13,3	9,9			1003,86	98	

1	C1_b (M2122)	Mooring	2020-07-26	11:06	52,6818478	-51,9627358	Mooring Deployment	Deployment	306	152	12,4	10			1003,94	98	
1	OS_02	BIO	2020-07-26	1:16	52,7558202	-51,7433738	CTD Rosette	Recovery	454	198	3,8	10,1			1008,44	98	
1	OS_02	BIO	2020-07-26	0:31	52,7530597	-51,7318268	CTD Rosette	Bottom	463	197	3,6	9,9			1008,88	98	
1	OS_02	BIO	2020-07-26	0:14	52,7520615	-51,7299615	CTD Rosette	Deployment	468	209	2,5	10,1			1009,00	98	
1	OS_02	BIO	2020-07-25	23:55	52,751436	-51,7263717	Mesozooplancton-1 (filet 200	Recovery	471	147	18,7	9,6	7,05	32,30	1009,15	98	
1	OS_02	BIO	2020-07-25	23:47	52,7526057	-51,7266757	Mesozooplancton-1 (filet 200	Deployment		160	19	10,3	8,47	32,25	1009,28	98	
1	C2_b	Mooring	2020-07-25	21:48	52,7538942	-51,6813832	Mooring Deployment	Bottom	576	155	16,8	9,8	8,81	32,25	1009,53	98	
1	C2_b	Mooring	2020-07-25	20:19	52,7517342	-51,678852	Mooring Deployment	Deployment	578	140	18,3	10	8,86	32,37	1010,00	98	
Leg 2a																	
2a			2020-08-23	19:11	50,5921323	-49,3071592	CTD Rosette	Recovery	1836	295	17,3	12,1			1009,67	98	
2a			2020-08-23	18:53	50,593636	-49,309982	CTD Rosette	Bottom	1832	291	14,5	12,2	12,80	34,01	1009,26	98	
2a			2020-08-23	18:46	50,5942767	-49,311159	CTD Rosette	Deployment	1830	294	13,1	12,4	12,89	34,04	1009,44	98	
2a	MSP-09		2020-08-23	14:56	50,9873105	-48,8565085	Drop Camera	Recovery	2296	280	6,1	13,7	13,40	34,16	1008,64	92	
2a	MSP-09		2020-08-23	13:50	50,9948557	-48,8648673	Drop Camera	Bottom	2288	258	4,2	12,8	13,32	34,16	1008,79	97	
2a	MSP-09		2020-08-23	12:47	51,000763	-48,8704227	Drop Camera	Deployment	2273	302	12,4	12,2	13,24	34,16	1008,46	98	
2a	MSP-08		2020-08-23	11:41	50,9741238	-49,1212338	Drop Camera	Recovery	1940	296	11,2	12,1	12,89	34,28	1008,11	98	
2a	MSP-08		2020-08-23	10:40	50,9808432	-49,1325868	Drop Camera	Bottom	1910	285	11,8	12,1	12,81	34,27	1007,93	98	
2a	MSP-08		2020-08-23	10:03	50,9825633	-49,1323957	Drop Camera	Deployment	1906	260	8,9	11,9	12,96	34,27	1007,90	98	
2a	MSP-029B		2020-08-22	21:16	52,2828375	-50,7880033	Box Core	Recovery	1557	261	11,6	11,3	12,03	34,01	1003,73	98	
2a	MSP-029B		2020-08-22	20:50	52,2836772	-50,7900888	Box Core	Bottom	1551	270	11,8	11,5	11,97	33,99	1003,69	98	
2a	MSP-029B		2020-08-22	20:26	52,2844543	-50,7936198	Box Core	Deployment	1544	257	11,6	11,3	11,93	33,96	1003,55	98	
2a	MSP-029B		2020-08-22	20:19	52,2845725	-50,7955798	Box Core	Recovery	1542	257	10,3	11,4	11,89	34,05	1003,70	98	
2a	MSP-029B		2020-08-22	19:48	52,2858052	-50,8026263	Box Core	Bottom	1543	258	12	11,5	11,81	33,94	1003,53	98	
2a	MSP-029B		2020-08-22	19:21	52,2854255	-50,8033965	Box Core	Deployment	1542	245	8,9	11,2	11,69	33,91	1003,38	98	
2a	MSP-029A		2020-08-22	19:10	52,2845088	-50,7887932	Drop Camera	Recovery	1557	256	11,2	11,4	11,71	34,00	1003,41	98	
2a	MSP-029A		2020-08-22	18:16	52,285592	-50,803585	Drop Camera	Bottom	1541	260	11,8	11,2	11,16	34,19	1002,88	98	
2a	MSP-029A		2020-08-22	17:48	52,2855797	-50,8056837	Drop Camera	Deployment		263	11,2	11,2	11,60	34,05	1002,85	98	
2a	MSP-028		2020-08-22	16:37	52,2680987	-50,9655923	Piston Core	Recovery	1038	265	9,5	10,8			1002,69	98	
2a	MSP-028		2020-08-22	16:19	52,2676848	-50,9702828	Piston Core	Bottom	1016	269	9,9	10,8			1002,49	98	
2a	MSP-028		2020-08-22	15:56	52,2669748	-50,9669083	Piston Core	Deployment	1028	258	8,4	10,7			1002,39	98	
2a	MSP-027B		2020-08-22	14:30	52,2280603	-50,9964207	Box Core	Recovery	854	269	5	10,6			1002,05	98	
2a	MSP-027B		2020-08-22	14:13	52,2287843	-51,0003002	Box Core	Bottom	837	266	9,3	10,9			1001,96	98	
2a	MSP-027B		2020-08-22	13:54	52,2289083	-51,0033625	Box Core	Deployment	823	246	7,8	10,8			1001,83	98	
2a	MSP-027A		2020-08-22	13:40	52,2303392	-50,9962795	Drop Camera	Recovery	863	255	8,6	11,1			1001,77	98	
2a	MSP-027A		2020-08-22	12:50	52,2308968	-51,007571	Drop Camera	Bottom	756	275	5,5	12,4			1001,69	95	
2a	MSP-027A		2020-08-22	12:19	52,2301362	-51,0092728	Drop Camera	Deployment	786	177	12,4	13,1			1001,62	90	
2a	MSP-026B		2020-08-22	11:47	52,2117908	-51,0256243	Drop Camera	Recovery	553	254	11,8	11,7			1001,46	96	
2a	MSP-026B		2020-08-22	11:04	52,210043	-51,0433187	Drop Camera	Bottom	478	244	11	11,7			1001,25	96	
2a	MSP-026B		2020-08-22	10:48	52,211029	-51,04699	Drop Camera	Deployment	472	260	11,4	11,7			1001,26	96	
2a	MSP-026A		2020-08-22	10:38	52,21173	-51,0475043	Benne Van Veen	Recovery	473	242	12,2	11,8			1001,25	95	

2a	MSP-026A		2020-08-22	10:22	52,2102815	-51,0473198	Benne Van Veen	Bottom	473	236	13,7	11,8			1001,13	95	
2a	MSP-026A		2020-08-22	10:06	52,2115683	-51,0474082	Benne Van Veen	Deployment	473	240	11,2	11,6			1001,18	96	
2a	MSP-022B		2020-08-21	22:22	51,8323603	-50,5786845	Drop Camera	Recovery	500	270	17,5	12,6			999,11	97	
2a	MSP-022B		2020-08-21	21:42	51,8393738	-50,5861207	Drop Camera	Bottom	501	264	21,7	12,8			998,69	96	
2a	MSP-022B		2020-08-21	21:26	51,8408432	-50,5868282	Drop Camera	Deployment	500	258	19,6	12,7			998,67	96	
2a	MSP-022B		2020-08-21	21:08	51,838748	-50,5859808	Benne Van Veen	Recovery		256	20,2	12,8			998,48	96	
2a	MSP-022B		2020-08-21	20:56	51,8395058	-50,5861092	Benne Van Veen	Bottom	501								
2a	MSP-022B		2020-08-21	20:37	51,8406385	-50,5881412	Benne Van Veen	Deployment	498								
2a	MSP-023B		2020-08-21	19:30	51,8872858	-50,4034068	Benne Van Veen	Recovery									
2a	MSP-023B		2020-08-21	18:49	51,8871352	-50,4056763	Benne Van Veen	Bottom									
2a	MSP-023B		2020-08-21	18:01	51,8867338	-50,4058112	Benne Van Veen	Deployment									
2a	MSP-023A		2020-08-21	17:53	51,8837168	-50,3971587	Drop Camera	Recovery									
2a	MSP-023A		2020-08-21	16:57	51,887005	-50,4060792	Drop Camera	Bottom		227	11,6	12,7			997,00	98	
2a	MSP-023A		2020-08-21	16:14	51,886818	-50,4047835	Drop Camera	Deployment		209	11,8	12,6			997,04	98	
2a	MSP-024B		2020-08-21	15:07	51,9393495	-50,1448237	Box Core	Recovery	2289	202	16	13,1			997,12	95	
2a	MSP-024B		2020-08-21	14:25	51,9388058	-50,144274	Box Core	Bottom	2286	183	13,5	12,8			997,47	95	
2a	MSP-024B		2020-08-21	13:17	51,9378813	-50,1429587	Box Core	Deployment		191	18,7	13			997,36	96	
2a	MSP-024A		2020-08-21	13:02	51,9457805	-50,1546428	Drop Camera	Recovery		208	16,9	12,8			997,52	96	
2a	MSP-024A		2020-08-21	11:53	51,9418557	-50,149605	Drop Camera	Bottom		177	12,2	12,5			997,70	96	
2a	MSP-024A		2020-08-21	10:53	51,938572	-50,1451548	Drop Camera	Deployment		190	14,7	12,7			997,82	97	
2a	MSP-021		2020-08-20	22:58	51,6559788	-50,320805	Piston Core	Recovery	866	166	12,4	11,2	12,51	32,84	1000,49	98	
2a	MSP-021		2020-08-20	22:37	51,6577402	-50,325278	Piston Core	Bottom	803	141	15,6	11,2	12,44	32,68	1000,59	98	
2a	MSP-021		2020-08-20	22:12	51,6540467	-50,3252682	Piston Core	Deployment	838	160	20	11,4	12,60	32,43	1000,20	98	
2a	MSP-019B		2020-08-20	19:55	51,4851093	-49,9560812	Drop Camera	Recovery	1607	150	11,6	12	12,84	33,30	1003,14	98	
2a	MSP-019B		2020-08-20	19:30	51,4847545	-49,9555863	Drop Camera	Bottom	1600	138	6,5	13,7	13,10	33,50	1003,24	98	
2a	MSP-019B		2020-08-20	18:09	51,4859165	-49,9506763	Drop Camera	Deployment	1619	160	9,1	11,4	13,08	33,57	1003,90	98	
2a	MSP-019B		2020-08-20	17:52	51,4857635	-49,957763	Drop Camera	Recovery	1605	156	12,6	11,4	13,29	33,58	1004,25	98	
2a	MSP-019B		2020-08-20	16:35	51,4853263	-49,9544713	Drop Camera	Bottom		148	9,1	11,8	12,97	33,60	1005,07	98	
2a	MSP-019B		2020-08-20	15:31	51,4860047	-49,948585	Drop Camera	Deployment	1622	143	8,6	12	13,25	33,62	1005,79	98	
2a	MSP-019A		2020-08-20	14:49	51,485301	-49,9484088	Box Core	Recovery	1628	139	11,6	12,1	13,03	33,77	1006,12	98	
2a	MSP-019A		2020-08-20	14:16	51,4871748	-49,9497437	Box Core	Bottom	1626	125	11	11,8	12,77	33,63	1006,46	98	
2a	MSP-019A		2020-08-20	13:39	51,486861	-49,9470022	Box Core	Deployment	1630	120	8,2	11,8	12,90	33,66	1006,90	98	
2a	MSP-017A		2020-08-20	12:15	51,4217737	-50,1595023	Benne Van Veen	Recovery	547	138	10,3	11,5	11,03	33,09	1007,36	98	
2a	MSP-017A		2020-08-20	11:54	51,422387	-50,159641	Benne Van Veen	Bottom	549	125	13,3	11,4	12,10	33,00	1007,23	98	
2a	MSP-017A		2020-08-20	11:37	51,4234203	-50,1598985	Benne Van Veen	Deployment	549	116	12,4	11,5	12,48	32,88	1007,51	98	
2a	MSP-017A		2020-08-20	11:30	51,4240665	-50,160034	Drop Camera	Recovery	546	117	13,1	11,4	11,81	32,88	1007,54	98	
2a	MSP-017A		2020-08-20	10:45	51,4244245	-50,1540963	Drop Camera	Bottom		121	11,6	11,4	11,44	33,14	1007,78	98	
2a	MSP-017A		2020-08-20	10:28	51,4254332	-50,1546962	Drop Camera	Deployment		120	12	11,4	11,37	33,33	1008,00	98	
2a			2020-08-19	23:10	51,1660023	-49,9308722	CTD Rosette	Recovery		97	6,9	13,5	12,43	33,40	1010,27	88	
2a			2020-08-19	22:49	51,1686005	-49,9280152	CTD Rosette	Bottom		102	7	15,2	12,35	33,42	1010,08	83	

2a			2020-08-19	22:35	51,1695745	-49,9261835	CTD Rosette	Deployment		105	7,4	15,7	12,60	33,46	1010,01	77	
2a			2020-08-19	22:18	51,1687365	-49,9216592	XBT	Deployment		139	6,7	12,7	12,56	33,54	1010,08	93	
2a	MSP-013		2020-08-19	21:19	51,2610027	-49,9675778	Gravity Core	Recovery	748	105	10,1	11,6	11,09	33,44	1009,97	97	
2a	MSP-013		2020-08-19	21:06	51,2611798	-49,9656938	Gravity Core	Bottom	756	107	11	11,5	11,08	33,42	1009,92	96	
2a	MSP-013		2020-08-19	20:40	51,2610625	-49,9602562	Gravity Core	Deployment	772	110	14,7	11,8	10,92	33,41	1009,81	94	
2a	MSP-012B		2020-08-19	20:15	51,2551475	-49,9776602	Gravity Core	Recovery		97	11,8	11,6	10,92	33,50	1009,73	94	
2a	MSP-012B		2020-08-19	20:03	51,2554593	-49,9768302	Gravity Core	Bottom	705	114	18,8	12	10,84	33,39	1009,36	93	
2a	MSP-012B		2020-08-19	19:47	51,2545625	-49,9758747	Gravity Core	Deployment	706	143	7	12	10,60	33,38	1009,90	93	
2a	MSP-012A		2020-08-19	19:30	51,2574897	-49,9809167	Drop Camera	Recovery	698	106	14,3	11,9	10,87	33,39	1009,64	95	
2a	MSP-012A		2020-08-19	18:54	51,2555245	-49,976607	Drop Camera	Bottom	706	118	15	11,9	10,64	33,39	1009,60	95	
2a	MSP-012A		2020-08-19	18:38	51,2552582	-49,9769165	Drop Camera	Deployment	706	116	14,1	11,8	10,93	33,36	1009,94	95	
2a	MSP-011		2020-08-19	17:16	51,2247037	-49,8373535	Piston Core	Recovery	974	117	4,4	12,6	12,84	33,72	1010,07	93	
2a	MSP-011		2020-08-19	16:58	51,2237042	-49,8354828	Piston Core	Bottom	971	109	13,1	12,1	12,40	33,77	1010,24	95	
2a	MSP-011		2020-08-19	16:42	51,2230635	-49,8356972	Piston Core	Deployment	969	100	15,8	12,1	13,17	33,75	1010,04	95	
2a	MSP-010		2020-08-19	14:49	51,2248938	-49,8478805	Piston Core	Recovery	944	107	17,7	12,4	12,76	33,71	1009,84	90	
2a	MSP-010		2020-08-19	14:18	51,2220007	-49,8444962	Piston Core	Bottom	934	114	20,9	12,3	12,66	33,73	1009,96	89	
2a	MSP-010		2020-08-19	13:56	51,2249193	-49,8455277	Piston Core	Deployment	948	131	19	12,2	13,13	33,73	1010,04	91	
2a	MSP-010		2020-08-19	11:21	51,222838	-49,8450497	Piston Core	Recovery	939	104	13,7	12,4	12,84	33,69	1010,54	88	
2a	MSP-010		2020-08-19	11:04	51,2219422	-49,8440628	Piston Core	Bottom	937	100	17,9	12,2	12,93	33,69	1010,30	87	
2a	MSP-010		2020-08-19	10:48	51,2233908	-49,8442963	Piston Core	Deployment	944	114	12,9	12,2	12,96	33,67	1010,77	89	
2a	MSP-020B		2020-08-19	0:35	51,5606647	-49,7544467	Box Core	Recovery	2274	78	12,9	12,8	13,84	34,22	1014,90	81	
2a	MSP-020B		2020-08-19	0:02	51,5608765	-49,7534077	Box Core	Bottom	2329	69	13,3	12,8	13,88	34,20	1014,91	79	
2a	MSP-020B		2020-08-18	23:19	51,5623568	-49,7521793	Box Core	Deployment	2282	65	10,7	12,9	13,94	34,19	1015,08	79	
2a	MSP-020A		2020-08-18	23:07	51,5555055	-49,7527145	Drop Camera	Recovery	2249	56	11,4	12,9	13,90	34,19	1015,29	78	
2a	MSP-020A		2020-08-18	21:52	51,5614255	-49,7524945	Drop Camera	Bottom	2309	43	10,7	13,1	13,93	34,20	1014,77	78	
2a	MSP-020A		2020-08-18	20:19	51,5627602	-49,7525525	Drop Camera	Deployment	2283	33	11,2	13,1	13,93	34,28	1015,23	79	
2a	MSP-016B		2020-08-18	19:21	51,4528653	-49,6030562	Drop Camera	Recovery		34	11	13	13,58	34,28	1015,96	80	
2a	MSP-016B		2020-08-18	18:10	51,4617115	-49,6005845	Drop Camera	Bottom		22	12,6	12,7	13,61	34,30	1016,05	80	
2a	MSP-016B		2020-08-18	18:06	51,4620215	-49,6007368	Drop Camera	Bottom		19	12	12,7	13,77	34,30	1016,12	81	
2a	MSP-016B		2020-08-18	17:02	51,4652352	-49,6007407	Drop Camera	Deployment		355	9,7	12,5	13,66	34,28	1016,63	82	
2a	MSP-016A		2020-08-18	16:31	51,4569215	-49,6016725	Box Core	Recovery		6	8,4	12,5	13,73	34,28	1016,61	82	
2a	MSP-016A		2020-08-18	15:50	51,462035	-49,6008025	Box Core	Bottom		0	8,6	12,5	13,86	34,31	1016,42	84	
2a	MSP-016A		2020-08-18	15:04	51,4634555	-49,6015097	Box Core	Deployment		0	9,3	12,2	13,70	34,31	1016,77	82	
2a	MSP-015B		2020-08-18	14:25	51,4565677	-49,5943927	Box Core	Recovery		359	7,6	12,3	13,65	34,30	1016,68	83	
2a	MSP-015B		2020-08-18	13:36	51,455847	-49,5938673	Box Core	Bottom		351	7,6	12,2	13,45	34,30	1016,81	83	
2a	MSP-015B		2020-08-18	12:48	51,4582292	-49,5918713	Box Core	Deployment		1	7,2	12,2	13,31	34,29	1016,86	82	
2a	MSP-015A		2020-08-18	12:21	51,4467897	-49,5929987	Drop Camera	Recovery		18	8	12,3	12,82	34,28	1016,68	81	
2a	MSP-015A		2020-08-18	11:06	51,4549277	-49,5931518	Drop Camera	Bottom		40	7,8	12,1	12,73	34,27	1016,44	81	
2a	MSP-015A		2020-08-18	10:10	51,4565048	-49,5921223	Drop Camera	Deployment		22	6,5	12,1	12,73	34,27	1016,44	80	
2a		Mapping	2020-08-18	8:23	51,7199378	-49,5017608	Mapping	Recovery		83	4	11,6	13,21	34,22	1016,15	81	

2a		Mapping	2020-08-17	23:21	51,3557863	-49,2130442	Mapping	Deployment		42	19,8	12	12,98	34,18	1014,99	67	0
2a	MSP-07A		2020-08-17	20:29	50,9980158	-49,4796698	Piston Core	Recovery		53	13,9	11,9	12,92	33,90	1014,02	68	0
2a	MSP-07A		2020-08-17	20:04	50,9991555	-49,477038	Piston Core	Bottom		49	15,4	11,8	12,84	33,87	1013,87	68	0
2a	MSP-07A		2020-08-17	19:39	51,0003917	-49,4825685	Piston Core	Deployment		50	15,4	11,9	12,65	33,91	1013,66	69	0
2a	MSP-06		2020-08-17	17:38	51,0015773	-49,516007	Piston Core	Recovery		33	15,6	11,9	12,53	33,83	1012,90	72	0
2a	MSP-06		2020-08-17	17:17	51,0034655	-49,5130012	Piston Core	Bottom		35	14,5	12	13,34	33,72	1012,94	74	0
2a	MSP-06		2020-08-17	16:50	51,006049	-49,5166555	Piston Core	Deployment		38	13,9	12	13,32	33,75	1012,60	76	0
2a	MSP-05B	Basic	2020-08-17	14:18	51,0093655	-49,5677795	Piston Core	Recovery		29	12	12,7	12,85	33,69	1012,23	83	0
2a	MSP-05B	Basic	2020-08-17	13:43	51,0102392	-49,5625782	Piston Core	Bottom		25	10,3	12,5	13,06	33,65	1012,20	87	0
2a	MSP-05B	Basic	2020-08-17	13:18	51,0118763	-49,5648465	Piston Core	Deployment		36	15,8	12,7	12,63	33,69	1011,60	85	0
2a	MSP-05A	Basic	2020-08-17	12:26	51,0089805	-49,5639622	Drop Camera	Recovery		36	10,1	12,6	13,09	33,60	1011,33	89	0
2a	MSP-05A	Basic	2020-08-17	11:54	51,009208	-49,5626168	Drop Camera	Bottom		27	9,9	12,7	12,45	33,74	1011,35	91	0
2a	MSP-05A	Basic	2020-08-17	10:53	51,0035092	-49,5602975	Drop Camera	Deployment		48	10,1	12,7	12,96	33,65	1010,61	91	0
2a	MSP-05A	Basic	2020-08-17	10:50	51,0044045	-49,5603037	Drop Camera	Recovery		53	9,7	12,6	13,07	33,60	1010,38	91	0
2a	MSP-05A	Basic	2020-08-17	10:16	51,0097242	-49,5624217	Drop Camera	Deployment		34	11,8	12,6	13,13	33,59	1010,32	98	0
2a		Mapping	2020-08-17	7:59	50,6644957	-49,4124658	Mapping	Other		312	14,7	13	13,35	33,83	1009,37	92	0
2a		Mapping	2020-08-16	23:58	50,6318583	-49,5306307	Mapping	Other		229	19,8	13,1	13,67	33,60	1013,05	94	0
2a	MSP-04A	Basic	2020-08-16	21:36	51,0571282	-49,698724	Drop Camera	Recovery		252	8,8	12,6	12,98	33,56	1013,30	94	
2a	MSP-04A	Basic	2020-08-16	21:06	51,0607822	-49,7030753	Drop Camera	Bottom		252	9,1	12,7	13,14	33,56	1013,49	94	
2a	MSP-04A	Basic	2020-08-16	20:46	51,0604767	-49,7051967	Drop Camera	Deployment		262	6,9	12,8	12,91	33,55	1013,50	93	
2a	MSP-03A	Basic	2020-08-16	18:52	50,9397393	-49,786479	Piston Core	Recovery		244	10,9	13,1	13,63	33,57	1013,73	92	
2a	MSP-03A	Basic	2020-08-16	18:32	50,941462	-49,7896805	Piston Core	Bottom		242	10,3	13,2	13,30	33,57	1013,88	92	
2a	MSP-03A	Basic	2020-08-16	18:11	50,9410938	-49,7905532	Piston Core	Deployment		249	11	13,3	13,59	33,54	1014,08	91	
2a	MSP-02B	Basic	2020-08-16	14:55	50,9484303	-49,806237	Piston Core	Recovery		233	9,7	13	13,19	33,58	1015,34	92	
2a	MSP-02B	Basic	2020-08-16	14:27	50,9460648	-49,8127692	Piston Core	Bottom		255	8,6	13	12,87	33,43	1015,96	91	
2a	MSP-02B	Basic	2020-08-16	14:09	50,9469878	-49,8132525	Piston Core	Deployment		242	8,2	12,7	13,10	33,51	1015,86	91	
2a	MSP-02A	Basic	2020-08-16	12:18	50,9395602	-49,7914438	Drop Camera	Recovery		251	8,9	12,5	13,15	33,59	1016,26	91	
2a	MSP-02A	Basic	2020-08-16	12:16	50,9392953	-49,7916157	Drop Camera	Deployment		257	9,3	12,5	13,24	33,59	1016,29	91	
2a	MSP-02A	Basic	2020-08-16	11:22	50,942013	-49,8022062	Drop Camera	Bottom		258	11,4	12,3	12,94	33,58	1016,33	90	
2a	MSP-02A	Basic	2020-08-16	10:52	50,945173	-49,8073945	Drop Camera	Deployment		257	9,5	12,3	12,93	33,56	1016,30	90	
2a	MSP-01A	Basic	2020-08-15	21:10	50,8451548	-50,097073	Drop Camera	Recovery		294	13,3	14,7	12,91	33,58	1018,25	82	
2a	MSP-01A	Basic	2020-08-15	20:02	50,8503865	-50,1101587	Drop Camera	Bottom		245	16	12,6	13,24	33,53	1017,80	86	
2a	MSP-01A	Basic	2020-08-15	19:32	50,855242	-50,1194793	Drop Camera	Deployment		252	14,1	12,6	13,11	33,53	1018,03	87	0
2a	MSP-01A	Basic	2020-08-15	19:14	50,852001	-50,1095793	Drop Camera	Recovery		253	14,5	12,6	13,30	33,54	1018,19	87	0
2a	MSP-01A	Basic	2020-08-15	18:37	50,8557707	-50,115926	Drop Camera	Deployment		254	13,3	12,6	13,25	33,53	1018,37	86	0
Leg 2b																	
2b	27	Basic	2020-09-07	8:55	47,5455848	-52,5878758	Bongo Net	Recovery	176	270	19,8	13,6	13,70	31,18	1023,2	91	0
2b	27	Basic	2020-09-07	8:51	47,545427	-52,5882915	Bongo Net	Bottom	176	272	20,4	13,6	13,06	31,27	1022,93	91	0
2b	27	Basic	2020-09-07	8:46	47,5457272	-52,5886105	Bongo Net	Deployment	178	284	22,7	13,7	13,77	31,21	1022,7	90	0
2b	27	Basic	2020-09-07	8:33	47,545207	-52,5904275	CTD Rosette	Recovery	174	270	12,8	14,5	13,50	31,20	1022,64	84	0
2b	27	Basic	2020-09-07	8:27	47,5455797	-52,5902252	CTD Rosette	Bottom	174	278	11,8	14,6	13,79	31,19	1022,44	84	0

2b	27	Basic	2020-09-07	8:23	47,5459463	-52,5901435	CTD Rosette	Deployment	175	280	10,9	14,6	13,85	31,19	1022,32	84	0
2b	MACK ROV		2020-09-05	8:36	55,358375	-58,8966505	Box Core	Recovery	291	205	14,9	11,3	6,00	31,09	996,36	74	0
2b	MACK ROV		2020-09-05	8:29	55,3587117	-58,896849	Box Core	Bottom	294	194	12,8	10,8	5,94	31,12	996,29	79	0
2b	MAK... ROV		2020-09-05	8:22	55,3591177	-58,8970355	Box Core	Deployment	301	196	15,4	11,6	5,83	31,23	996,2	75	0
2b	MAK - cam 3	Basic	2020-09-05	8:09	55,3590918	-58,8980258	CTD Rosette	Recovery	296	196	13,3	11,3	4,71	31,57	996,27	76	0
2b	MAK - cam 3	Basic	2020-09-05	8:02	55,3592532	-58,898932	CTD Rosette	Bottom	288	177	13,3	11,5	5,62	31,41	996,37	75	0
2b	MAK - cam 3	Basic	2020-09-05	7:53	55,359188	-58,8993238	CTD Rosette	Deployment		179	13,5	11,3	5,57	31,34	996,1	74	0
2b	MAK - cam 2	Basic	2020-09-05	7:01	55,4033478	-58,863133	Rock dredge	Recovery	357				5,20	31,31			0
2b	MAK - cam 2	Basic	2020-09-05	6:43	55,4072848	-58,8525215	Rock dredge	Bottom	524	201	12,8	11,6	4,99	31,35	996,26	73	0
2b	MAK - cam 2	Basic	2020-09-05	6:27	55,402535	-58,8520515	Rock dredge	Deployment	466	208	12,4	11,3	5,01	31,42	996,05	75	0
2b	MAK - cam 2	Basic	2020-09-05	6:11	55,4060232	-58,8515815	CTD Rosette	Recovery	516	210	16,6	12,5	5,08	31,36	995,91	74	0
2b	MAK - cam 2	Basic	2020-09-05	5:59	55,4053807	-58,85205	CTD Rosette	Bottom	520	198	15,8	11,8	5,06	31,36	995,86	77	0
2b	MAK - cam 2	Basic	2020-09-05	5:50	55,4054115	-58,852369	CTD Rosette	Deployment	519	200	19,8	11,9	5,00	31,40	995,93	78	0
2b	MAK - cam 1	Basic	2020-09-05	4:47	55,5037057	-58,8568862	Box Core	Recovery	899	219	22,3	12	5,63	31,84	995,33	79	0
2b	MAK - cam 1	Basic	2020-09-05	4:29	55,5038267	-58,8582073	Box Core	Bottom	893	218	21,9	12,1	5,62	31,86	995,12	79	0
2b	MAK - cam 1	Basic	2020-09-05	4:09	55,503932	-58,8579187	Box Core	Deployment	894	216	20,6	11,3	5,53	31,86	995,18	84	0
2b	MAK - cam 1	Basic	2020-09-05	3:03	55,5538753	-58,7732938	IKMT	Recovery	751	222	16,6	10,4	5,72	31,90	994,45	84	0
2b	MAK - cam 1	Basic	2020-09-05	2:08	55,5235778	-58,8160995	IKMT	Bottom	684	222	19,2	11	5,79	31,90	994,01	84	0
2b	MAK - cam 1	Basic	2020-09-05	1:26	55,5042877	-58,8509353	IKMT	Deployment	896	225	13,9	13,8	5,70	31,88	993,65	71	0
2b	Mak-ROV	Basic	2020-09-05	0:28	55,5253337	-58,942642	Rock dredge	Recovery	774	223	26,5	11,4	5,71	31,79	992,5	90	0
2b	Mak-ROV	Basic	2020-09-04	23:40	55,5376482	-58,9109383	Rock dredge	Bottom	804	168	15,2	9,3	5,65	31,86	992,24	98	0
2b	Mak-ROV	Basic	2020-09-04	23:03	55,5436012	-58,893163	Rock dredge	Deployment	793	153	10,9	8	4,86	31,96	992,28	98	0
2b	Mak-ROV	Basic	2020-09-04	22:40	55,5450672	-58,8930367	Box Core	Recovery	786	165	15,4	8,8	5,52	31,89	991,9	98	0
2b	Mak-ROV	Basic	2020-09-04	22:24	55,545242	-58,8929822	Box Core	Bottom	783	169	16,6	8,9	5,58	31,87	991,94	98	0
2b	MAK-ROV		2020-09-04	22:10	55,5460425	-58,892759	Drone	Recovery	777	171	18,7	10,1	4,78	31,99	991,78	98	0
2b	Mak-ROV	Basic	2020-09-04	22:07	55,5463978	-58,892885	Box Core	Deployment	772	175	16,4	9,5	5,24	31,89	991,75	98	0
2b	MAK-ROV		2020-09-04	22:05	55,5464258	-58,8930285	Drone	Deployment	773	176	12,8	9,4	5,55	31,86	991,74	98	0
2b	Mak-ROV	Basic	2020-09-04	21:46	55,536997	-58,9127285	IKMT	Recovery	788	164	14,3	9,2	5,71	31,85	992,26	98	0
2b	Mak-ROV	Basic	2020-09-04	20:47	55,5550942	-58,9321553	IKMT	Bottom	784	164	10,3	9,5	5,68	31,88	992,12	96	0
2b	Mak-ROV	Basic	2020-09-04	20:18	55,5507325	-58,9039238	IKMT	Deployment	714	165	9,1	9,2	5,65	31,86	992,54	96	0
2b	Mak-ROV	Basic	2020-09-04	19:58	55,546016	-58,9030082	Hydrobios	Recovery	736	149	7	8,9	5,60	31,87	992,69	96	0
2b	Mak-ROV	Basic	2020-09-04	19:34	55,547139	-58,9014938	Hydrobios	Bottom	740	178	13,9	9,6	5,63	31,87	992,98	95	0
2b	Mak-ROV	Basic	2020-09-04	19:13	55,5474497	-58,899301	Hydrobios	Deployment	752	161	15,8	10,2	5,48	31,89	992,92	94	0
2b	Mak-ROV	Basic	2020-09-04	18:55	55,5467465	-58,899254	CTD Rosette	Recovery	760	154	20,4	9,3	5,61	31,87	993,12	95	0
2b	Mak-ROV	Basic	2020-09-04	18:48	55,5468505	-58,8989082	CTD Rosette	Bottom	759	159	13,9	9,4	5,76	31,88	993,47	93	0
2b	Mak-ROV	Basic	2020-09-04	18:25	55,546252	-58,896883	CTD Rosette	Deployment	773	141	13,9	9,3	5,68	31,89	993,55	93	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	7:49	56,2945338	-60,4413838	Baited camera (recovery)	Recovery	46	197	9,7	11	5,06	31,32	999,57	79	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	6:28	56,3180397	-60,5098297	Rock dredge	Recovery	317	218	15,4	11,9	5,32	31,22	999,89	76	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	6:11	56,3176633	-60,500534	Rock dredge	Bottom	323	204	7,4	11,5	5,28	31,23	1000,09	75	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	5:58	56,3178165	-60,5081452	Rock dredge	Deployment	316	166	10,1	9,8	4,99	31,32	999,84	85	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	5:38	56,317032	-60,4815165	IKMT	Recovery	315	230	7,4	11,2	5,00	31,32	999,57	80	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	4:50	56,3182812	-60,511561	IKMT	Bottom	317	276	10,9	12,6	5,27	31,24	998,77	79	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	4:29	56,318865	-60,5036775	IKMT	Deployment	320	268	10,9	10,8	5,10	31,31	998,91	83	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	4:08	56,318177	-60,5084745	Hydrobios	Recovery	317	293	13,7	11,4	5,12	31,32	998,48	82	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	3:58	56,3181393	-60,5098735	Hydrobios	Bottom	318	273	10,1	11,5	5,11	31,32	998,33	80	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	3:48	56,317642	-60,5107455	Hydrobios	Deployment	318	246	4,4	10,1	5,10	31,33	998,34	84	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	3:20	56,3187208	-60,5360848	Drop Camera 2	Recovery	298	268	17,1	10,7	5,22	31,25	997,33	82	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	2:47	56,314716	-60,5423645	Drop Camera 2	Bottom	154	255	20,8	12,2	5,21	31,26	996,41	77	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	2:41	56,3134882	-60,5440812	Drop Camera 2	Deployment	100	244	17,5	12,3	5,36	31,22	996,48	76	0

2b	ISECOLD-Nain-1	Basic	2020-09-04	2:26	56,3127965	-60,5044585	Drop Camera (two sites)	Recovery	279	265	13,5	9,7	5,10	31,31	996,57	85	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	1:51	56,3090473	-60,5044373	Drop Camera (two sites)	Bottom	110	261	16,9	10,7	5,14	31,32	996,03	81	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	1:25	56,3179868	-60,5104598	CTD Rosette	Recovery	318	256	19,6	11,5	5,15	31,30	995,64	78	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	1:18	56,3183972	-60,5110778	CTD Rosette	Bottom	318	261	24,6	11,8	5,12	31,31	995,36	77	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	1:11	56,3186048	-60,5117182	CTD Rosette	Deployment	317	258	22,8	11,3	5,10	31,32	995,28	79	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	0:35	56,2948597	-60,4407712	Baited camera (deployment)	Bottom	43	264	23	12,5	5,24	31,33	994,55	73	0
2b	ISECOLD-Nain-1	Basic	2020-09-04	0:33	56,2948838	-60,440877	Baited camera (deployment)	Deployment	43	269	24,6	12,5	5,08	31,42	994,52	73	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	23:11	56,2503347	-60,1494422	Rock dredge	Recovery	178	239	17,1	11,7	4,90	31,71	993,74	72	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	23:06	56,2481062	-60,1503872	Rock dredge	Bottom	136	242	14,7	11,5	4,90	31,71	993,7	73	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	22:55	56,2430275	-60,1521658	Rock dredge	Deployment	119	242	15,6	11	4,82	31,70	993,31	73	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	22:25	56,2280373	-60,1799377	Baited camera (recovery)	Recovery	287	259	22,8	12,3	4,58	31,66	992,81	69	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	21:19	56,2675173	-60,1478572	IKMT	Recovery	336	258	25,1	11,2	4,80	31,72	990,62	73	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	20:57	56,2633045	-60,1787153	IKMT	Bottom	303	260	23,4	11,6	4,92	31,65	990,71	71	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	20:37	56,2578963	-60,2013258	IKMT	Deployment	305	263	22,1	11,9	5,07	31,56	990,27	70	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	20:06	56,2569012	-60,1878753	Hydrobios	Recovery	313	255	26,5	12,5	5,06	31,57	989,64	72	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	19:55	56,2559887	-60,1887043	Hydrobios	Bottom	311	257	23	11,7	5,05	31,57	989,64	74	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	19:47	56,2561175	-60,1889335	Hydrobios	Deployment	310	245	17,5	11,2	5,12	31,57	989,92	77	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	19:12	56,2556777	-60,188923	Drop Camera	Recovery	309	229	23,2	10,7	5,11	31,54	988,92	79	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	18:37	56,2518182	-60,20036	Drop Camera	Bottom	96	238	22,3	11,2	4,91	31,56	988,44	77	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	18:33	56,251499	-60,2009737	Drop Camera	Deployment	95	239	24	11,1	5,06	31,62	988,29	77	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	18:06	56,258785	-60,18041	CTD Rosette	Recovery	320	244	28,6	11,5	4,72	31,70	987,4	77	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	17:54	56,2578838	-60,181133	CTD Rosette	Bottom	317	246	30,8	11,3	4,73	31,68	987,2	77	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	17:48	56,2574777	-60,1815952	CTD Rosette	Deployment	315	245	28,9	11,6	4,76	31,67	987,07	76	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	17:11	56,2285012	-60,1795177	Baited camera (deployment)	Bottom	291	240	29,5	12,4	5,18	31,52	986,45	74	0
2b	ISECOLD-Nain-2	Basic	2020-09-03	17:04	56,2279995	-60,1795315	Baited camera (deployment)	Deployment		243	30,7	12,5	5,16	31,51	986,32	71	0
2b	ISECOLD-1-2000	Basic	2020-09-03	5:46	57,7280873	-58,6964187	Box Core	Recovery	1999	169	23	10,3	9,15	34,28	992,24	98	0
2b	ISECOLD-1-2000	Basic	2020-09-03	5:06	57,7301302	-58,6945328	Box Core	Bottom	1988	171	23,6	10,2	9,10	34,28	993,54	96	0
2b	ISECOLD-1-2000	Basic	2020-09-03	4:22	57,7323602	-58,6973433	Box Core	Deployment	1979	158	22,7	10,3	9,11	34,28	994,62	92	0
2b	ISECOLD-1-2000	Basic	2020-09-03	3:56	57,7242707	-58,6882732	CTD Rosette	Recovery	2049	147	21,7	10,1	9,09	34,29	995,13	92	0
2b	ISECOLD-1-2000	Basic	2020-09-03	3:19	57,7273953	-58,6925267	CTD Rosette	Bottom	2010	154	20,8	10,3	9,10	34,29	996,02	92	0
2b	ISECOLD-1-2000	Basic	2020-09-03	2:40	57,731243	-58,6952442	CTD Rosette	Deployment		151	22,8	10,3	9,12	34,29	996,84	91	0
2b	HiBio-C	Basic	2020-09-02	10:22	60,4481548	-61,1916272	Baited camera (recovery)	Recovery	848	129	18,1	7,4	5,60	32,94	1005,86	89	0
2b	Rock dredge site	Basic	2020-09-02	8:04	60,5593532	-61,3948162	Rock dredge	Recovery	429	111	11,8	6,6	6,75	33,23	1007,24	91	0
2b	Rock dredge site	Basic	2020-09-02	7:47	60,567067	-61,3816377	Rock dredge	Bottom	433	115	11,8	6,7	6,66	33,19	1007,32	90	0
2b	Rock dredge site	Basic	2020-09-02	7:33	60,5695605	-61,3712983	Rock dredge	Deployment	438	116	13,7	6,5	5,89	32,99	1007,2	90	0
2b	Rock dredge site	Basic	2020-09-02	7:10	60,561505	-61,3934213	Rock dredge	Recovery	428	132	12,4	6,8	6,77	33,26	1007,66	90	0
2b	Rock dredge site	Basic	2020-09-02	6:55	60,5694977	-61,38717	Rock dredge	Bottom	433	120	12,2	6,7	6,79	33,23	1007,91	90	0
2b	Rock dredge site	Basic	2020-09-02	6:42	60,571232	-61,3801517	Rock dredge	Deployment	436	129	10,7	6,6	6,71	33,20	1008,37	89	0
2b	HiBio-C	Basic	2020-09-02	5:06	60,4733085	-61,0624213	IKMT (double dip)	Recovery	1226	144	10,1	7,4	6,56	33,40	1009,7	88	0
2b	HiBio-C	Basic	2020-09-02	4:22	60,4630862	-61,114794	IKMT (double dip)	Bottom	1124	131	11,4	7,4	6,40	33,18	1010,3	91	0
2b	HiBio-C	Basic	2020-09-02	3:17	60,4651507	-61,1548073	IKMT (double dip)	Deployment	1026	132	8,6	7,1	6,37	33,16	1011,13	94	0
2b	HiBio-C	Basic	2020-09-02	2:49	60,4639313	-61,1543882	Hydrobios	Recovery	1027	183	0,8	7,2	6,49	33,17	1011,51	94	0
2b	HiBio-C	Basic	2020-09-02	2:16	60,4649897	-61,1609385	Hydrobios	Bottom	1007	131	9,1	7,2	6,37	33,16	1011,45	95	0
2b	HiBio-C	Basic	2020-09-02	1:48	60,4653513	-61,1592948	Hydrobios	Deployment	1014	149	5,7	7,1	6,36	33,14	1011,67	94	0
2b	HiBio-C	Basic	2020-09-02	1:21	60,4609183	-61,1650702	CTD Rosette	Recovery	992	128	5,1	6,7	6,48	33,20	1012	93	0
2b	HiBio-C	Basic	2020-09-02	0:59	60,4622543	-61,1624242	CTD Rosette	Bottom	998	131	3,8	6,3	6,48	33,19	1012,17	93	0
2b	HiBio-C	Basic	2020-09-02	0:41	60,4637375	-61,1594598	CTD Rosette	Deployment	1013	118	1,5	6,6	6,53	33,22	1012,34	92	0
2b	HiBio-C	Basic	2020-09-02	0:07	60,4624432	-61,1863358	Baited camera (deployment)	Bottom	905	167	1,5	6,3	6,60	33,21	1012,49	93	0
2b	HiBio-C	Basic	2020-09-01	23:40	60,4649783	-61,1745722	Baited camera (deployment)	Deployment	960	104	4	6,1	6,63	33,19	1012,18	91	0

2b	HiBio-A	Mooring	2020-09-01	22:30	60,4760763	-61,2922427	CTD Rosette	Recovery	406	346	3	6,6			1012,3	86	0
2b	HiBio-A	Mooring	2020-09-01	22:21	60,476774	-61,2877173	CTD Rosette	Bottom	408	344	3,2	6,7	5,77	33,03	1012,4	86	0
2b	HiBio-A	Mooring	2020-09-01	22:13	60,4776487	-61,2830853	CTD Rosette	Deployment	415	321	3,6	6,6	5,75	33,02	1012,51	87	0
2b	HiBio-A	Mooring	2020-09-01	21:02	60,472917	-61,2659	Mooring deployment	Bottom	484	315	6,3	6,3	5,58	33,04	1012,88	89	0
2b	HiBio-A	Mooring	2020-09-01	20:44	60,4785797	-61,2607355	Mooring deployment	Deployment	522	336	7	6,4	5,62	33,03	1012,89	89	0
2b	HiBio-A	Mooring	2020-09-01	18:34	60,4519285	-61,232479	Mooring deployment	Recovery	628	322	15,4	6,9	7,52	33,34	1013,09	88	0
2b	HiBio-A	Mooring	2020-09-01	16:49	60,4710033	-61,2660708	Mooring deployment	Deployment	486	317	13,1	6,4	7,68	33,35	1013,13	90	0
2b	HiBio-A	Basic	2020-09-01	13:56	60,524723	-61,266848	Baited camera (recovery)	Recovery	466	312	15,8	5,1	7,10	33,50	1013,21	93	0
2b	HiBio-A	Mooring	2020-09-01	11:55	60,4723247	-61,3032753	Mooring recovery	Recovery	402	302	19,8	4,9	6,55	33,16	1013,32	94	0
2b	HiBio-A	Basic	2020-09-01	9:24	60,5243183	-61,2674207	Baited camera (deployment)	Bottom	471	297	22,7	5,2	6,10	33,02	1012,82	93	0
2b	HiBio-A	Basic	2020-09-01	9:05	60,5260415	-61,2643253	Baited camera (deployment)	Deployment	502	288	18,5	4,9	6,21	33,04	1012,75	93	0
2b	HiBio-C		2020-09-01	7:30	60,457565	-61,1456038	Drop camera	Recovery	1037	292	18,3	4,6	6,67	33,24	1012,71	98	0
2b	HiBio-C		2020-09-01	6:44	60,4639702	-61,159238	Drop camera	Bottom	1009	295	19,8	3,4	6,67	33,17	1012,37	98	0
2b	HiBio-C		2020-09-01	6:28	60,4650312	-61,1657223	Drop camera	Deployment	988	295	19,6	3,1	6,56	33,14	1012,5	98	0
2b	HiBio-A		2020-09-01	5:18	60,567443	-61,365168	Drop camera	Recovery	435	290	16,2	2,5	7,29	33,38	1012,23	98	0
2b	HiBio-A		2020-09-01	4:42	60,5722077	-61,3788877	Drop camera	Bottom	434	291	17,3	2,5	7,30	33,38	1012,64	98	0
2b	HiBio-A		2020-09-01	4:32	60,5737363	-61,3794583	Drop camera	Deployment	438	296	17,9	2,4	7,41	33,36	1012,62	98	0
2b	HiBio-A	Basic	2020-09-01	3:26	60,5642593	-61,2472372	IKMT	Recovery	579	293	19,8	3	6,77	33,26	1012,57	98	0
2b	HiBio-A	Basic	2020-09-01	2:26	60,5314065	-61,258094	IKMT	Bottom	527	299	16,2	3,6	6,73	33,24	1012,47	98	0
2b	HiBio-A	Basic	2020-09-01	2:03	60,52131	-61,2590157	IKMT	Deployment	521	305	16,8	4,5	6,82	33,25	1012,36	94	0
2b	HiBio-A	Basic	2020-09-01	1:32	60,5235113	-61,2528555	Hydrobios	Recovery	574	301	15,6	4,7	6,73	33,26	1012,21	95	0
2b	HiBio-A	Basic	2020-09-01	1:13	60,5250518	-61,2572688	Hydrobios	Bottom	537	305	18,5	4,6	6,79	33,25	1012,21	96	0
2b	HiBio-A	Basic	2020-09-01	0:57	60,5256578	-61,2603157	Hydrobios	Deployment	524	313	15,6	4,1	6,83	33,24	1012,22	98	0
2b	HiBio-A	Basic	2020-09-01	0:27	60,5211498	-61,2530012	Drop Camera	Recovery	577	296	16,9	4,8	6,87	33,27	1012,02	95	0
2b	HiBio-A	Basic	2020-08-31	23:49	60,5253443	-61,2623782	Drop Camera	Bottom	512	311	20	4,8	6,69	33,26	1011,81	96	0
2b	HiBio-A	Basic	2020-08-31	23:39	60,526846	-61,2642345	Drop Camera	Deployment	484	314	20,2	4,4	6,87	33,24	1011,9	98	0
2b	HiBio-A	Basic	2020-08-31	23:00	60,4598728	-61,2861463	CTD Rosette	Recovery	401	315	16,6	3,4	7,41	33,32	1011,66	98	0
2b	HiBio-A	Basic	2020-08-31	22:49	60,4603095	-61,2819275	CTD Rosette	Bottom	412	310	17,1	3,3	7,51	33,31	1011,69	98	0
2b	HiBio-A	Basic	2020-08-31	22:42	60,4600137	-61,2799947	CTD Rosette	Deployment	411	303	17,1	3,3	7,57	33,28	1011,66	98	0
2b	HiBio-C	Mooring	2020-08-31	15:36	60,4584387	-61,144188	Mooring recovery	Recovery	1042	329	13,9	6,4	8,05	33,43	1009,52	92	0
2b	HiBio-C	Mooring	2020-08-31	14:02	60,4520008	-61,1492135	CTD Rosette	Recovery	981	346	18,3	6,8	8,13	32,90	1008,94	91	0
2b	HiBio-C	Mooring	2020-08-31	13:40	60,4533558	-61,1521423	CTD Rosette	Bottom	1000	357	13,1	6,5	8,02	33,10	1009,19	91	0
2b	HiBio-C	Mooring	2020-08-31	13:21	60,4555892	-61,1523267	CTD Rosette	Deployment	1011	350	16	6,4	7,80	33,42	1008,91	92	0
2b	ISECOLD-0-1000		2020-08-30	20:53	57,3985587	-58,814704	Drifter	Deployment		347	23	6,1	5,25	33,51	1004,41	98	0
2b	ISECOLD-0-500	Basic	2020-08-30	15:39	56,4524708	-58,1109102	IKMT	Recovery	320	341	9,7	5,5	4,51	32,15	1001,48	98	0
2b	ISECOLD-0-500	Basic	2020-08-30	14:59	56,483785	-58,1323073	IKMT	Bottom	401	335	11,2	5,3	4,40	32,13	1001,31	98	0
2b	ISECOLD-0-500	Basic	2020-08-30	14:43	56,4950202	-58,1393053	IKMT	Deployment	462	349	10,9	5,5	4,40	32,13	1001,32	98	0
2b	ISECOLD-0-500	Basic	2020-08-30	14:19	56,4901602	-58,1334403	Drop Camera	Recovery	438	340	13,3	5,6	4,41	32,14	1001,25	98	0
2b	ISECOLD-0-500	Basic	2020-08-30	13:44	56,495838	-58,1412793	Drop Camera	Bottom	463	319	15,4	5	4,42	32,14	1000,99	98	0
2b	ISECOLD-0-500	Basic	2020-08-30	13:36	56,4967762	-58,1428098	Drop Camera	Deployment	465	319	16,9	4,8	4,41	32,13	1000,84	98	0
2b	ISECOLD-0-500	Basic	2020-08-30	13:13	56,4904635	-58,1337937	CTD Rosette	Recovery	438	317	16	4,7	4,39	32,14	1000,78	98	0
2b	ISECOLD-0-500	Basic	2020-08-30	13:01	56,4932195	-58,1359898	CTD Rosette	Bottom	458	308	17,5	4,6	4,45	32,14	1000,8	98	0
2b	ISECOLD-0-500	Basic	2020-08-30	12:46	56,49662	-58,1404327	CTD Rosette	Deployment	479	307	17,5	4,6	4,43	32,14	1000,37	98	0
2b	ISECOLD-0-1000		2020-08-30	10:59	56,4769397	-58,0821993	Rock Dredge	Recovery	464	292	14,9	8	4,00	32,25	1000,12	85	0
2b	ISECOLD-0-1000		2020-08-30	10:06	56,5001008	-58,0843062	Rock Dredge	Bottom	748	298	17,9	4,6	3,73	32,27	999,7	96	0
2b	ISECOLD-0-1000		2020-08-30	9:30	56,513439	-58,083603	Rock Dredge	Deployment	969	301	11,4	6,7	4,00	32,26	999,31	89	0
2b	ISECOLD-0-1000	Basic	2020-08-30	7:58	56,506378	-58,072092	Hydrobios	Recovery	912	300	17,9	4,2	4,04	32,35	998,64	98	0
2b	ISECOLD-0-1000	Basic	2020-08-30	7:25	56,5137528	-58,0808233	Hydrobios	Bottom	964	301	17,3	4,2	4,14	32,40	998,49	98	0
2b	ISECOLD-0-1000	Basic	2020-08-30	7:03	56,5182922	-58,0858793	Hydrobios	Deployment	995	295	16,4	4,3	4,19	32,42	998,5	98	0

2b	ISECOLD-0-1000	Basic	2020-08-30	6:29	56,507617	-58,0726025	CTD Rosette	Recovery	905	296	16	4,4	4,02	32,30	998,46	95	0
2b	ISECOLD-0-1000	Basic	2020-08-30	6:06	56,511689	-58,0762275	CTD Rosette	Bottom	977	294	18,8	4,6	3,98	32,31	998,26	95	0
2b	ISECOLD-0-1000	Basic	2020-08-30	5:49	56,5155143	-58,08083	CTD Rosette	Deployment	992	297	18,5	4,7	3,94	32,31	998,36	94	0
2b	ISECOLD-0-1000	Basic	2020-08-30	5:18	56,5047838	-58,071472	Drop camera	Recovery	844	297	19,4	4,6	4,02	32,38	998,41	94	0
2b	ISECOLD-0-1000	Basic	2020-08-30	4:35	56,5115738	-58,0846997	Drop camera	Bottom	941	299	20,2	4,7	4,08	32,37	998,12	94	0
2b	ISECOLD-0-1000	Basic	2020-08-30	4:17	56,513102	-58,0873947	Drop camera	Deployment	958	304	18,5	5	4,11	32,38	998,19	92	0
2b	ISECOLD 1500-10		2020-08-30	2:43	56,554755	-57,9362782	Box Core	Recovery	1621	293	20,4	4,8	5,78	33,20	998,13	96	0
2b	ISECOLD-0-1500		2020-08-30	2:12	56,5540915	-57,9412103	Box Core	Bottom	1617	291	19,4	5,3	5,84	33,21	997,59	90	0
2b	ISECOLD-0-1500		2020-08-30	1:26	56,555325	-57,9404905	Box Core	Deployment	1622	294	24,8	5,5	5,88	33,22	997,45	86	0
2b	ISECOLD-0-1500		2020-08-29	23:44	56,4719757	-57,8427482	IKMT	Recovery	1201	310	25,1	5,4	5,46	33,02	997,41	89	0
2b	ISECOLD-0-1500		2020-08-29	22:33	56,5128478	-57,9047347	IKMT	Bottom	1432	293	17,9	6,1	5,49	32,93	996,72	89	0
2b	ISECOLD-0-1500		2020-08-29	22:02	56,532672	-57,9293905	IKMT	Deployment	1537	321	9,9	7,5	5,53	32,93	996,42	81	0
2b	ISECOLD-0-1500		2020-08-29	21:28	56,5439143	-57,9361303	CTD Rosette	Recovery	1563	311	23	4,9	5,56	32,92	995,94	92	0
2b	ISECOLD-0-1500		2020-08-29	20:56	56,5488547	-57,9433573	CTD Rosette	Bottom	1595	293	25,1	4,8	5,56	32,93	995,64	93	0
2b	ISECOLD-0-1500		2020-08-29	20:28	56,553092	-57,9465752	CTD Rosette	Deployment	1586	304	24,4	4,9	5,62	32,98	995,59	92	0
2b	ISECOLD-0-1500	Basic	2020-08-29	19:45	56,5402437	-57,9329905	Drop camera	Recovery	1572	301	22,7	4,8	5,54	32,91	995,29	93	0
2b	ISECOLD-0-1500	Basic	2020-08-29	18:46	56,549699	-57,9462442	Drop camera	Bottom	1601	299	23	4,7	5,67	32,91	994,82	91	0
2b	ISECOLD-0-1500	Basic	2020-08-29	18:23	56,5527805	-57,9457243	Drop camera	Deployment	1592	296	22,1	4,4	5,62	32,90	994,97	90	0
2b	ISECOLD-0-2500		2020-08-29	13:10	56,8647342	-56,8745067	Box Core	Recovery		324	24,9	8,7	10,20	34,30	989,82	92	0
2b	ISECOLD-0-2500		2020-08-29	12:21	56,8686912	-56,864368	Box Core	Bottom		323	19,6	9	9,99	34,30	989,15	96	0
2b	ISECOLD-0-2500		2020-08-29	11:33	56,8736583	-56,8605255	Box Core	Deployment	2368	337	13,7	8,9	10,20	34,30	988,75	98	0
2b	ISECOLD-0-2500		2020-08-29	11:04	56,8722245	-56,8507517	CTD Rosette	Recovery	2418	283	5,1	9,9	10,19	34,29	988,92	92	0
2b	ISECOLD-0-2500		2020-08-29	10:15	56,875283	-56,8487248	CTD Rosette	Bottom	2416	275	12,9	11,1	10,15	34,29	988,79	85	0
2b	ISECOLD-0-2500		2020-08-29	9:31	56,879075	-56,8489965	CTD Rosette	Deployment	2416	351	12,8	7,3	10,22	34,30	988,57	98	0
2b	ISECOLD-0-2500		2020-08-29	8:36	56,8742312	-56,719618	IKMT	Recovery	2510	266	6,1	7,4	9,94	34,27	988,59	98	0
2b	ISECOLD-0-2500		2020-08-29	7:35	56,857513	-56,7971023	IKMT	Bottom	2433	269	7	7,2	10,17	34,27	988,72	98	0
2b	ISECOLD-0-2500		2020-08-29	6:57	56,8544888	-56,834479	IKMT	Deployment	2403	283	6,5	6,8	10,02	34,27	989,06	98	0
2b	ISECOLD-0-2500	Basic	2020-08-29	6:21	56,8612445	-56,8564713	Drop Camera	Recovery	2414	280	10,9	6,6	10,23	34,28	989,03	98	0
2b	ISECOLD-0-2500	Basic	2020-08-29	5:20	56,871049	-56,8506103	Drop Camera	Bottom	2422	290	8,2	6,7	10,15	34,27	988,91	98	0
2b	ISECOLD-0-2500	Basic	2020-08-29	4:45	56,875345	-56,8511638	Drop Camera	Deployment	2415	304	9,3	7,3	10,14	34,27	988,85	98	0
2b	ISECOLD-0-2000		2020-08-29	1:48	56,753918	-57,2591318	Box Core	Recovery	2023	317	13,1	7,4	7,10	33,58	989,79	98	0
2b	ISECOLD-0-2000		2020-08-29	1:12	56,753586	-57,2605635	Box Core	Bottom	2022	321	10,9	8,1	7,13	33,60	989,72	98	0
2b	ISECOLD-0-2000		2020-08-29	0:30	56,7517107	-57,260858	Box Core	Deployment	2023	334	8,6	8,4	7,13	33,62	989,9	98	0
2b	ISECOLD-0-2000		2020-08-29	0:02	56,7522845	-57,2620243	Box Core	Recovery	2022	334	8,8	8,5	7,22	33,61	989,87	98	0
2b	ISECOLD-0-2000		2020-08-28	23:26	56,7528517	-57,2600423	Box Core	Bottom	2024	324	10,3	8,1	6,93	33,63	989,94	98	0
2b	ISECOLD-0-2000		2020-08-28	22:46	56,7521488	-57,2610993	Box Core	Deployment	2023	341	11,4	8,7	6,93	33,67	989,74	98	0
2b	ISECOLD-0-2000		2020-08-28	22:21	56,7513643	-57,2601942	CTD Rosette	Recovery	2025	354	8	8,9	7,20	33,63	989,71	97	0
2b	ISECOLD-0-2000		2020-08-28	21:34	56,7519158	-57,2593782	CTD Rosette	Bottom	2025	8	8,8	9,3	7,21	33,67	989,86	94	0
2b	ISECOLD-0-2000		2020-08-28	20:57	56,7538235	-57,2617437	CTD Rosette	Deployment	2022	10	8,4	9,7	7,37	33,66	989,65	92	0
2b	ISECOLD-0-2000		2020-08-28	19:50	56,6881418	-57,1951762	IKMT	Recovery	2115	29	8	9,7	7,23	33,56	989,62	94	0
2b	ISECOLD-0-2000		2020-08-28	18:44	56,7247322	-57,2447638	IKMT	Bottom	2044	64	10,5	9,9	7,01	33,59	989,92	92	0
2b	ISECOLD-0-2000		2020-08-28	18:11	56,7405767	-57,2596292	IKMT	Deployment	2013	53	10,1	9,9	7,25	33,65	989,79	92	0
2b	ISECOLD-0-2000		2020-08-28	17:40	56,7519422	-57,2750852	CTD Rosette	Recovery	2004	41	9,9	9,8	7,22	33,67	989,69	93	
2b	ISECOLD-0-2000		2020-08-28	17:14	56,7534102	-57,2755817	CTD Rosette	Bottom		50	10,3	9,9	7,16	33,66	989,88	93	
2b	ISECOLD-0-2000		2020-08-28	17:03	56,7540282	-57,2759662	CTD Rosette	Bottom	2004	63	10,7	10,1	7,17	33,62	990	92	
2b	ISECOLD-0-2000		2020-08-28	16:43	56,7543957	-57,2747482	CTD Rosette	Bottom	2005	67	11,2	10,3	7,14	33,61	990,23	91	
2b	ISECOLD-0-2000		2020-08-28	16:28	56,7545617	-57,2736097	CTD Rosette	Deployment	2006	81	12,4	10,1	6,99	33,61	990,29	91	
2b	ISECOLD-0-2000	Basic	2020-08-28	15:31	56,7596473	-57,262552	Drop Camera	Recovery	2000	96	12	10,1	6,79	33,57	990,45	94	
2b	ISECOLD-0-2000	Basic	2020-08-28	14:31	56,757314	-57,2640342	Drop Camera	Bottom	2008	77	13,5	10,1	6,73	33,58	990,98	94	

2b	ISECOLD-0-2000	Basic	2020-08-28	13:55	56,7538863	-57,261828	Drop Camera	Deployment	2015	86	16,2	10,1	6,89	33,59	990,78	92	
2b	MAK-Cam1		2020-08-27	20:08	55,4154203	-58,809423	CTD Rosette	Recovery	563	300	2,7	6,3	5,22	31,19	989,24	98	
2b	MAK-Cam1		2020-08-27	19:54	55,4148652	-58,8096748	CTD Rosette	Bottom	562	14	2,1	6,2	6,22	31,15	989,77	98	
2b	MAK-Cam1		2020-08-27	19:43	55,4145243	-58,8090698	CTD Rosette	Deployment	569	24	4	6,1	6,09	31,15	989,77	98	
2b	MAK-Cam1	Mooring	2020-08-27	18:42	55,4191628	-58,8185732	Mooring deployment	Bottom	448	57	6,7	5,7	6,16	31,14	989,89	98	
2b	MAK-Cam1	Mooring	2020-08-27	18:22	55,418806	-58,8182072	Mooring deployment	Deployment	462	39	7,8	5,5	6,36	31,11	989,74	98	
2b	MAK-Cam3		2020-08-27	14:51	55,3463537	-58,8800902	Rock dredge	Recovery	140	102	11,8	5,6	5,40	30,98	990,44	98	
2b	MAK-Cam3		2020-08-27	14:00	55,3553905	-58,8954057	Rock dredge	Bottom	289	90	10,5	5,5	4,96	30,98	990,27	98	
2b	MAK-Cam3		2020-08-27	13:54	55,356083	-58,8976935	Rock dredge	Deployment	282	81	11,2	5,5	4,94	30,98	990,28	98	
2b	MAK-Cam3	Basic	2020-08-27	12:56	55,3592598	-58,8921367	Drop Camera	Recovery	299	133	7,2	5,1	4,90	30,99	990,9	98	
2b	MAK-Cam3	Basic	2020-08-27	12:24	55,3612543	-58,8997852	Drop Camera	Bottom	229	129	8,6	4,8	4,72	31,01	990,53	98	
2b	MAK-Cam3	Basic	2020-08-27	12:14	55,3613778	-58,9016858	Drop Camera	Deployment	200	124	6,7	4,9	4,66	31,02	990,39	98	
2b	MAK-Cam2	Basic	2020-08-26	15:34	55,4195383	-58,854394	Drop Camera	Recovery		82	36	8,7	5,16	31,44	992,73	98	
2b	MAK-Cam2	Basic	2020-08-26	14:57	55,413523	-58,851433	Drop Camera	Bottom	492	87	32,9	9	7,28	31,11	993,88	97	
2b	MAK-Cam2	Basic	2020-08-26	14:49	55,4117383	-58,8498157	Drop Camera	Deployment	474	85	32	9	7,92	31,08	993,99	97	
2b	MAK-Cam1	Basic	2020-08-26	12:18	55,5139305	-58,8624527	Drop Camera	Recovery	898	99	25,5	8,9	5,18	31,23	996,93	96	
2b	MAK-Cam1	Basic	2020-08-26	11:34	55,5081067	-58,858272	Drop Camera	Bottom	900	97	33,1	9	6,32	31,09	997,02	96	
2b	MAK-Cam1	Basic	2020-08-26	11:20	55,5058608	-58,8591452	Drop Camera	Deployment	901	96	31,4	9	7,40	30,90	997	96	
2b	MAK-Cam ROV	Basic	2020-08-26	10:11	55,604717	-59,0607717	Drop Camera	Recovery	641	103	25,7	8,2			997,78	96	
2b	MAK-Cam ROV	Basic	2020-08-26	9:31	55,6028373	-59,0601552	Drop Camera	Bottom	627	100	27,6	8,4	4,06	31,68	998,11	95	
2b	MAK-Cam ROV	Basic	2020-08-26	9:18	55,601844	-59,0612402	Drop Camera	Deployment	653	103	29,7	8,5	7,21	31,24	997,99	95	
Leg 2c																	
2c	Baie Éternité	ROV	2020-09-21	20:03	48,3042052	-70,3229372	ROV	Recovery		13	1,5	14,4			1029,27	43	0
2c	Baie Éternité	ROV	2020-09-21	18:33	48,3039838	-70,3234515	ROV	Bottom		72	6,9	13,8			1030,45	42	0
2c	Baie Éternité	ROV	2020-09-21	18:24	48,3041928	-70,3229795	ROV	Deployment		68	7	13,5			1030,7	42	0
2c	Baie Éternité	ROV	2020-09-21	15:20	48,3211882	-70,2951938	ROV	Recovery		318	1,7	7,5			1034,17	72	0
2c	Baie Éternité	ROV	2020-09-21	12:49	48,3208373	-70,2967655	ROV	Bottom		178	1,5	4,1			1034,63	80	0
2c	Baie Éternité	ROV	2020-09-21	12:24	48,3214575	-70,2992788	ROV	Deployment		176	0,6	4			1034,69	81	0
2c	Baie Éternité		2020-09-21	11:05	48,3250382	-70,2978755	Zooplankton Net	Recovery		88	4,2	2,6			1034,75	80	0
2c	Baie Éternité		2020-09-21	10:39	48,316281	-70,290519	Zooplankton Net	Bottom		21	6,9	2,8			1034,68	83	0
2c	Baie Éternité		2020-09-21	10:30	48,3168532	-70,292488	Zooplankton Net	Deployment		208	1,1	2,9			1034,71	86	0
2c	Forestville	ROV	2020-09-20	19:30	48,6741687	-68,7883545	ROV	Recovery		196	12,9	6,7			1031,53	67	0
2c	Forestville	ROV	2020-09-20	18:56	48,6759998	-68,7850302	ROV	Bottom		198	11,8	6,2			1031,88	73	0
2c	Forestville	ROV	2020-09-20	18:25	48,678256	-68,7845613	ROV	Deployment		212	14,5	6,3			1032,16	72	0
2c	Forestville	ROV	2020-09-20	17:21	48,6722735	-68,7784827	ROV	Recovery		235	8,9	6,5			1032,76	75	0
2c	Forestville	ROV	2020-09-20	16:34	48,672036	-68,7979083	ROV	Deployment		211	8,8	7			1033,09	81	0
2c	Forestville	ROV	2020-09-20	12:39	48,6834867	-68,7887285	ROV	Recovery		315	15,2	5,4			1032,16	72	0
2c	Forestville	ROV	2020-09-20	12:27	48,6818507	-68,7866933	ROV	Deployment		316	14,3	5,4			1032,01	72	0
2c	Baie Éternité	ROV	2020-09-19	19:27	48,3105945	-70,3199562	ROV	Recovery		168	10,5	10,6			1023,83	37	0
2c	Baie Éternité	ROV	2020-09-19	17:55	48,3107917	-70,3147365	ROV	Bottom		185	13,9	10,5			1023,95	38	0
2c	Baie Éternité	ROV	2020-09-19	17:13	48,3108233	-70,3144423	ROV	Deployment		200	10,1	9,5			1024,46	52	0
2c	Baie Éternité	ROV	2020-09-19	15:15	48,3104418	-70,3196025	ROV	Recovery		212	17,7	8,8			1024,32	59	0
2c	Baie Éternité	ROV	2020-09-19	12:55	48,3106248	-70,3142963	ROV	Bottom		220	9,7	6,3			1024,06	73	0
2c	Baie Éternité	ROV	2020-09-19	12:32	48,3105847	-70,3145052	ROV	Deployment		208	9,7	6,1			1024,09	74	0
2c	Baie Éternité		2020-09-19	11:10	48,325003	-70,2927228	Zooplankton Net	Recovery		305	14,1	5,5			1023,14	81	0
2b	Baie Éternité		2020-09-19	10:44	48,3152388	-70,2875098	Zooplankton Net	Bottom		238	14,5	5,2			1022,89	78	0
2b	Baie Éternité		2020-09-19	10:35	48,3165028	-70,2914795	Zooplankton Net	Deployment		241	15	6			1022,8	73	0
2b	Baie Éternité	ROV	2020-09-18	20:12	48,3079785	-70,3145787	ROV	Recovery		202	13,3	12,1			1017,27	36	0

2b	Baie Éternité	ROV	2020-09-18	17:25	48,3112517	-70,3139377	ROV	Bottom		246	16,4	11,1			1018,69	37	0
2b	Baie Éternité	ROV	2020-09-18	17:07	48,3110175	-70,3136867	ROV	Deployment		258	12	11			1019,12	39	0
2b	Baie Éternité	ROV	2020-09-18	15:09	48,3107913	-70,314068	ROV	Recovery		21	10,9	7,8			1020,51	64	0
2b	Baie Éternité	ROV	2020-09-18	13:25	48,3110737	-70,3137675	ROV	Bottom		334	1,3	7			1021,16	70	0
2b	Baie Éternité	ROV	2020-09-18	12:55	48,3110303	-70,3136738	ROV	Deployment		184	1,7	4,9			1020,87	72	0
2b	Baie Éternité		2020-09-18	11:19	48,249362	-70,1049045	Zooplankton Net	Recovery		148	6,5	2,5			1020,02	91	0
2b	Baie Éternité		2020-09-18	10:59	48,2521822	-70,0983848	Zooplankton Net	Bottom		163	5	2			1019,93	91	0
2b	Baie Éternité		2020-09-18	10:51	48,2514827	-70,0999947	Zooplankton Net	Deployment		163	7	2			1019,86	91	0
Leg 3																	
3			2020-10-24	14:36	50,1324045	-59,3687158	XBT	Deployment	156	196	31,6	7,6	7,67	30,92	1011,37	84	
3			2020-10-22	14:18	58,4895743	-58,867777	Drifter	Deployment	2091	194	12,8	1,6	5,14	34,39	1013,45	54	0
3			2020-10-22	11:05	59,0992007	-59,3188745	Drifter	Deployment	2216	188	7,4	0,9	4,67	34,19	1014,99	54	0
3			2020-10-22	7:34	59,7011867	-59,7758337	Drifter	Deployment	1954	245	9,7	1,1	2,47	33,56	1016,03	63	0
3			2020-10-22	2:14	60,365552	-60,2414948	Drifter	Deployment	2046	248	21,3	1,3	4,51	34,10	1017,07	64	0
3			2020-10-21	22:03	60,9575688	-60,9960777	Drifter	Deployment	852	264	3,6	0,1	2,47	33,15	1017,01	85	0
3			2020-10-21	18:49	61,5267938	-61,6528807	Drifter	Deployment	591	262	7,2	1,6	1,10	32,67	1015,67	75	0
3			2020-10-21	15:40	61,9716397	-62,2477698	Camera 360	Calibration	445	252	16,4	1	2,52	33,11	1013,48	76	0
3			2020-10-21	15:35	61,9698112	-62,2504318	Argo Float	Recovery	446	257	24,2	0,8	2,50	33,11	1013,08	76	0
3			2020-10-21	13:55	62,0269217	-62,646485	Drifter	Deployment	468	241	8,8	1,9	2,52	33,10	1013,21	79	
3			2020-10-20	14:52	63,0076737	-73,2450387	XBT	Deployment	366	179	24,6	-0,2	1,62	32,09	1008,09	80	
3			2020-10-17	19:48	71,8235852	-93,4231797	XBT	Deployment	105	42	7,2	-1	-1,26	29,07	1011,28	92	
3			2020-10-16	16:57	68,707012	-101,394027	XBT	Deployment	47	57	21,1	0	0,59	25,29	1005,12	98	
3	AMU2020_3-5	CTD	2020-10-14	18:44	69,0109807	-105,687433	CTD Rosette	Recovery	80	127	8,2	0	-0,41	25,30	991,24	96	
3	AMU2020_3-5	CTD	2020-10-14	18:42	69,0111547	-105,685482	CTD Rosette	Bottom	73	91	9,1	0,8	-0,41	25,30	991,25	95	
3	AMU2020_3-5	CTD	2020-10-14	18:34	69,0116153	-105,680504	CTD Rosette	Deployment	77	97	12,6	1,1	-0,40	25,30	991,14	96	
3			2020-10-14	16:04	68,9882987	-105,434084	XBT	Deployment	72	64	12,8	-1,1	-0,33	25,30	988,98	96	
3			2020-10-14	15:35	68,9744512	-105,542832	XBT	Deployment	89	69	28,9	-0,9	-0,03	25,23	988,02	95	
3			2020-10-13	16:45	68,9637107	-101,242067	XBT	Deployment	64	86	15,8	-1,6	-1,14	26,54	989,77	96	
3			2020-10-11	20:48	71,6364137	-92,5545297	XBT	Deployment	162	298	28,4	-5,6	-1,07	29,53	1009,26	76	
3			2020-10-11	16:37	71,0228643	-91,0783213	XBT	Deployment	187	338	33,5	-3,4	-0,27	29,54	1006,48	74	
3			2020-10-09	14:47	63,9688512	-76,7466385	XBT	Deployment	367	352	4,2	1,5	1,23	32,54	1004,88	85	
3			2020-10-08	14:41	62,0130637	-70,0402803	XBT	Deployment	305	259	11,2	0,8	2,27	32,07	1000,33	76	
3			2020-10-08	0:40	61,2376438	-64,9657198	XBT	Deployment	289	278	32,9	0,6	0,39	32,55	994,69	78	
3	AMU2020_3-4	CTD	2020-10-07	17:51	61,7103802	-64,2987283	CTD Rosette	Recovery	208	243	2,5	1,8	0,95	32,00	989,1	98	
3	AMU2020_3-4	CTD	2020-10-07	17:44	61,7102512	-64,3006982	CTD Rosette	Bottom	206	294	2,7	2,3	0,87	32,02	989,06	98	
3	AMU2020_3-4	CTD	2020-10-07	17:34	61,7099755	-64,301641	CTD Rosette	Deployment	207	241	4,6	2,2	0,98	32,02	988,88	98	
3			2020-10-06	17:11	61,5427807	-63,994131	XBT	Deployment	399	150	21,5	2,2	1,93	32,90	994,43	83	
3			2020-10-06	13:45	61,6221845	-64,1131393	XBT	Deployment	303	147	34,8	2,1			996,84	78	
3		MVP	2020-10-05	20:47	61,7158212	-64,1926533	MVP	Recovery	262	186	14,9	1,2	1,05	31,90	1009,48	89	
3		MVP	2020-10-05	13:05	61,7913043	-64,4205617	MVP	Deployment	166	190	15,8	0,4	0,80	31,71	1009,62	97	
3		MVP	2020-10-04	20:46	61,7316007	-64,1360715	MVP	Recovery	315	194	10,5	0,9	1,36	32,01	1012,38	94	0
3		MVP	2020-10-04	17:10	61,7358497	-64,1198437	MVP	Deployment	376	210	8,6	0,6	1,36	32,08	1013,06	84	0
3	AMU2020_3-3	CTD	2020-10-04	13:47	61,4899078	-63,5304	CTD Rosette	Recovery	577	280	8,8	2,4	3,54	33,73	1013,98	49	0
3	AMU2020_3-3	CTD	2020-10-04	13:30	61,490909	-63,5285385	CTD Rosette	Bottom	574	278	10,1	1,2	3,60	33,72	1014,04	58	0
3	AMU2020_3-3	CTD	2020-10-04	13:15	61,4918893	-63,5322217	CTD Rosette	Deployment	573	259	3,4	1,6	3,54	33,72	1014,13	62	0
3			2020-10-04	3:41	61,5903727	-63,7019618	XBT	Deployment	445	293	22,7	0,9	2,44	33,39	1014,92	77	0
3	AMU2020_3-2	CTD	2020-10-03	11:05	62,0332013	-64,967704	CTD Rosette	Recovery	349	266	12,2	1,4	0,78	31,63	1016,05	66	0
3	AMU2020_3-2	CTD	2020-10-03	10:55	62,0331595	-64,9566078	CTD Rosette	Bottom	337	306	10,5	0,7	0,76	31,63	1016,07	65	0

3	AMU2020_3-2	CTD	2020-10-03	10:43	62,0330407	-64,9448887	CTD Rosette	Deployment	326	277	8,6	2	0,76	31,63	1016,15	52	0
3	AMU2020_3-1	CTD	2020-10-02	15:10	62,1436563	-65,637291	CTD Rosette	Recovery	297	298	18,1	0,9	1,08	31,68	1006,03	62	0
3	AMU2020_3-1	CTD	2020-10-02	14:58	62,1452687	-65,6402807	CTD Rosette	Bottom	296	320	10,7	1,7	1,08	31,68	1006,04	61	0
3	AMU2020_3-1	CTD	2020-10-02	14:45	62,1474298	-65,6405607	CTD Rosette	Deployment	299	285	21,9	1,9	1,10	31,68	1005,58	61	0
3		Mapping	2020-10-02	11:15	61,840165	-66,007995	Mapping	Start Survey	281	327	11,6	-1,1	0,45	32,38	1004,12	67	0
3			2020-09-27	20:58	50,1549425	-58,8234888	XBT	Deployment	217	239	1,3	11,3	9,44	30,96	1010,43	94	

Appendix 3 - CTD Logbook for the 2020 Amundsen Expedition

Leg	Cast #	Station	Start date UTC	Time UTC	Latitude (N)	Longitude (W)	Bottom depth	Cast depth	Comments	Rosette Type	init.
Leg 1											
Leg 1									AZOMP, Contacter Pascal Guillot		
Leg 2a											
Leg 2a	001	ISECOLD-2000									CW
Leg 2a	002	ISECOLD-2000	2020-08-23	18:47:00	50°35,653	49°18,66		309			CW
Leg 2b											
Leg 2b	003	ISECOLD-2500	2020-08-27	19:43:00	55°24,871	58°48,545	555	547			CW
Leg 2b	004	ISECOLD-1500	2020-08-28	16:28:00	56°45,271	57°16,417	2000	1434	Seulement CTD jusqu'à 1450m + arrêts pendant la descente		CW
Leg 2b	005	ISECOLD-1000	2020-08-28	20:56:00	56°45,229	57°15,704	2023	2015	Cast complet, pas de SUNA, pas de PAR		CW
Leg 2b	006	ISECOLD-500	2020-08-29	9:31:00	56°52,745	56°50,94	2411	2402	Cast complet, pas de SUNA, pas de PAR		CW
Leg 2b	007	HiBio-C	2020-08-29	20:28:00	56°33,173	57°56,779		1503	Pas de SUNA		CW
Leg 2b	008	HiBio-A	2020-08-30	5:49:00	56°30,931	58°4,85	985	978	Pas de SUNA		CW
Leg 2b	009	HiBio-A	2020-08-30	12:51:00	56°29,734	58°8,28	456	448			CW
Leg 2b	010	HiBio-C	2020-08-31	13:21:00	60°27,338	61°9,137	1000	991	Cast CTD		CW
Leg 2b	011	ISECOLD-1-2000	2020-08-31	22:41:00	60°27,6	61°16,799	410	403			CW
Leg 2b	012	ISECOLD-Nain-2	2020-09-01	22:12:00	60°28,66	61°16,981	405	396	Cast CTD		CW
Leg 2b	013	ISECOLD-Nain-1	2020-09-02	0:41:00	60°27,823	61°9,568	1003	997			CW
Leg 2b	014	Mak-ROV	2020-09-03	2:40:00	57°43,874	58°41,714	2010	2000			CW
Leg 2b	015	Mak-Cam2	2020-09-03	17:48:00	56°15,449	60°10,895	312	303			CW
Leg 2b	016	Mak-Cam3	2020-09-04	1:11:00	56°19,118	60°30,7	315	307			CW
Leg 2b	017	Station 27	2020-09-04	18:25:00	55°32,776	58°53,813	760	751			CW
Leg 2b	018		2020-09-05	5:50:00	55°24,326	58°51,143	515	507			CW
Leg 2b	019		2020-09-05	7:56:00	55°21,545	58°53,968	288	279			CW
Leg 2b	020		2020-09-07	8:23:00	47°32,756	52°35,408	174	165			CW
Leg 2c											
Leg 3											
Leg 3	001	AMU2020_3-1	2020-10-02	14:52:00	62°8,773	65°38,4	298	291			SM
Leg 3	002	AMU2020_3-2	2020-10-03	10:48:00	62°1,966	64°56,893	337	326			TD
Leg 3	003	AMU2020_3-3	2020-10-04	13:19:00	61°29,495	63°31,843	575	569			TD
Leg 3	004	AMU2020_3-4	2020-10-07	17:38:00	61°42,618	64°18,09	205	197			TD
Leg 3	005	AMU2020_3-5	2020-10-14	18:39:00	69°0,682	105°41,028	73	63			TD

Appendix 4 - List of participants on the 2020 Amundsen Expedition

Leg	Name	Position	Affiliation	Network Investigator/Supervisor	Embark place	Embark date	Disembark place	Disembark date
Leg 2a, 2b	Amirault, Daniel	Professional	Amundsen Science	Forest, Alexandre	St. John's	2020-08-13	Quebec City	2020-09-11
Leg 3	Amirault, Daniel	Professional	Amundsen Science	Forest, Alexandre	Quebec City	2020-09-24	Quebec City	2020-10-27
Leg 2a, 2b	Aubry, Cyril	Research Staff	Université Laval	Cote, David	St. John's	2020-08-13	Quebec City	2020-09-11
Leg 2c	Auger, Vincent	Professional	Canadian SSF	Forest, Alexandre	Quebec City	2020-09-11	Quebec City	2020-09-22
Leg 1	Barthelotte, Jay	Professional	Department of Fisheries and O	Hebert, David	Dartmouth BIO	2020-07-20	St. John's	2020-08-13
Leg 2a	Broom, Laura	Researcher/Professor	Natural Resources Canada - Ge	Kostylev, Vladimir	St. John's	2020-08-13	St. John's	2020-08-24
Leg 2a	Carson, Thomas	Professional	Natural Resources Canada - Ge	Kostylev, Vladimir	St. John's	2020-08-13	St. John's	2020-08-24
Leg 2b	Casey, Kaitlin	MSc Student	Memorial University of Newfo	Mercier, Annie	St. John's	2020-08-24	St. John's	2020-09-07
Leg 2b	Cote, David	Researcher/Professor	Department of Fisheries and O	Cote, David	St. John's	2020-08-24	St. John's	2020-09-07
Leg 2b, 2c	de Moura Neves, Barbara	Researcher/Professor	Department of Fisheries and O	de Moura Neves, Barbara	St. John's	2020-08-24	Quebec City	2020-09-24
Leg 3	Dezutter, Thibaud	Professional	Amundsen Science	Forest, Alexandre	Quebec City	2020-09-24	Quebec City	2020-10-27
Leg 1	Faulkner, Melissa	Technician	Department of Fisheries and O	Azetsu-Scott, Kumiko	Dartmouth BIO	2020-07-20	St. John's	2020-08-13
Leg 2c	Forest, Alexandre	Chief Scientist	Amundsen Science	Forest, Alexandre	Quebec City	2020-09-17	Quebec City	2020-09-22
Leg 3	Fortner, Marc	MSc Student	University of New Brunswick	Church, Ian	Quebec City	2020-09-24	Quebec City	2020-10-27
Leg 2b	Geoffroy, Maxime	Chief Scientist	Marine Institute of Memorial U	Geoffroy, Maxime	St. John's	2020-08-24	St. John's	2020-09-07
Leg 1	Guillot, Pascal	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Sta	2020-07-16	St. John's	2020-08-13
Leg 2a	Hayward, Scott	Technician	Natural Resources Canada - Ge	Kostylev, Vladimir	St. John's	2020-08-13	St. John's	2020-08-24
Leg 1	Hebert, David	Chief Scientist	Department of Fisheries and O	Hebert, David	Dartmouth BIO	2020-07-20	St. John's	2020-08-13
Leg 2a	Kostylev, Vladimir	Chief Scientist	Natural Resources Canada - Ge	Kostylev, Vladimir	St. John's	2020-08-13	St. John's	2020-09-24
Leg 1	Lawson, Matthew	Technician	Department of Fisheries and O	Hebert, David	Dartmouth BIO	2020-07-20	St. John's	2020-08-13
Leg 1	Linkowski, Thomas	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Sta	2020-07-16	St. John's	2020-08-13
Leg 2c	Lockhart, Peter	Professional	Canadian SSF	Forest, Alexandre	Quebec City	2020-09-11	Quebec City	2020-09-22
Leg 3	Ludkin, Derek Owen (Rick)	Professional	Environment and Climate Char	Gjerdrum, Carina	Quebec City	2020-09-24	Quebec City	2020-10-27
Leg 3	Mackay, Reilly	Professional	Marine Institute of Memorial U	Forest, Alexandre	Quebec City	2020-09-24	Quebec City	2020-10-27
Leg 2c	Marcil, Catherine	MSc Student	Université du Québec à Rimou	Winkler, Geshe	Quebec City	2020-09-17	Quebec City	2020-09-22
Leg 2b	McAllister, Amy	MSc Student	Memorial University of Newfo	Snelgrove, Paul	St. John's	2020-08-24	St. John's	2020-09-07
Leg 1	Meredyk, Shawn	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Sta	2020-07-16	Quebec City	2020-09-09
Leg 2a, 2b	Meredyk, Shawn	Professional	Amundsen Science	Forest, Alexandre	Quebec City (Sta	2020-07-16	Quebec City	2020-09-11
Leg 2c	Michaud, Luc	Professional	Amundsen Science	Forest, Alexandre	Quebec City	2020-09-17	Quebec City	2020-09-22
Leg 3	Morisset, Simon	Professional	Amundsen Science	Forest, Alexandre	Quebec City	2020-09-24	Quebec City	2020-10-27
Leg 2c	Morisset, Simon	Professional	Amundsen Science	Forest, Alexandre	Quebec City	2020-09-17	Quebec City	2020-09-22
Leg 2c	Morrissey, Christopher	Professional	Amundsen Science	Forest, Alexandre	Quebec City	2020-09-11	Quebec City	2020-09-22
Leg 1	Perry, Timothy	Technician	Department of Fisheries and O	Ringuette, Marc	Dartmouth BIO	2020-07-20	St. John's	2020-08-13
Leg 1	Punshon, Stephen	Research Staff	Department of Fisheries and O	Azetsu-Scott, Kumiko	Dartmouth BIO	2020-07-20	St. John's	2020-08-13
Leg 1	Ringuette, Marc	Research Staff	Department of Fisheries and O	Hebert, David	Dartmouth BIO	2020-07-20	St. John's	2020-08-13
Leg 2a	Robertson, Angus	Professional	Natural Resources Canada - Ge	Kostylev, Vladimir	St. John's	2020-08-13	St. John's	2020-09-24
Leg 2b	Roul, Sheena	Technician	Department of Fisheries and O	Cote, David	St. John's	2020-08-24	St. John's	2020-09-07
Leg 1	Thamer, Peter	Technician	Department of Fisheries and O	Azetsu-Scott, Kumiko	Dartmouth BIO	2020-07-20	St. John's	2020-08-13
Leg 2a, 2b	Tisné, Lou	Professional	Amundsen Science	Forest, Alexandre	St. John's	2020-08-13	Quebec City	2020-09-11

Leg 2a, 2b	Wilhelmy, Camille	Professional	Amundsen Science	Forest, Alexandre	St. John's	2020-08-13	Quebec City	2020-09-11