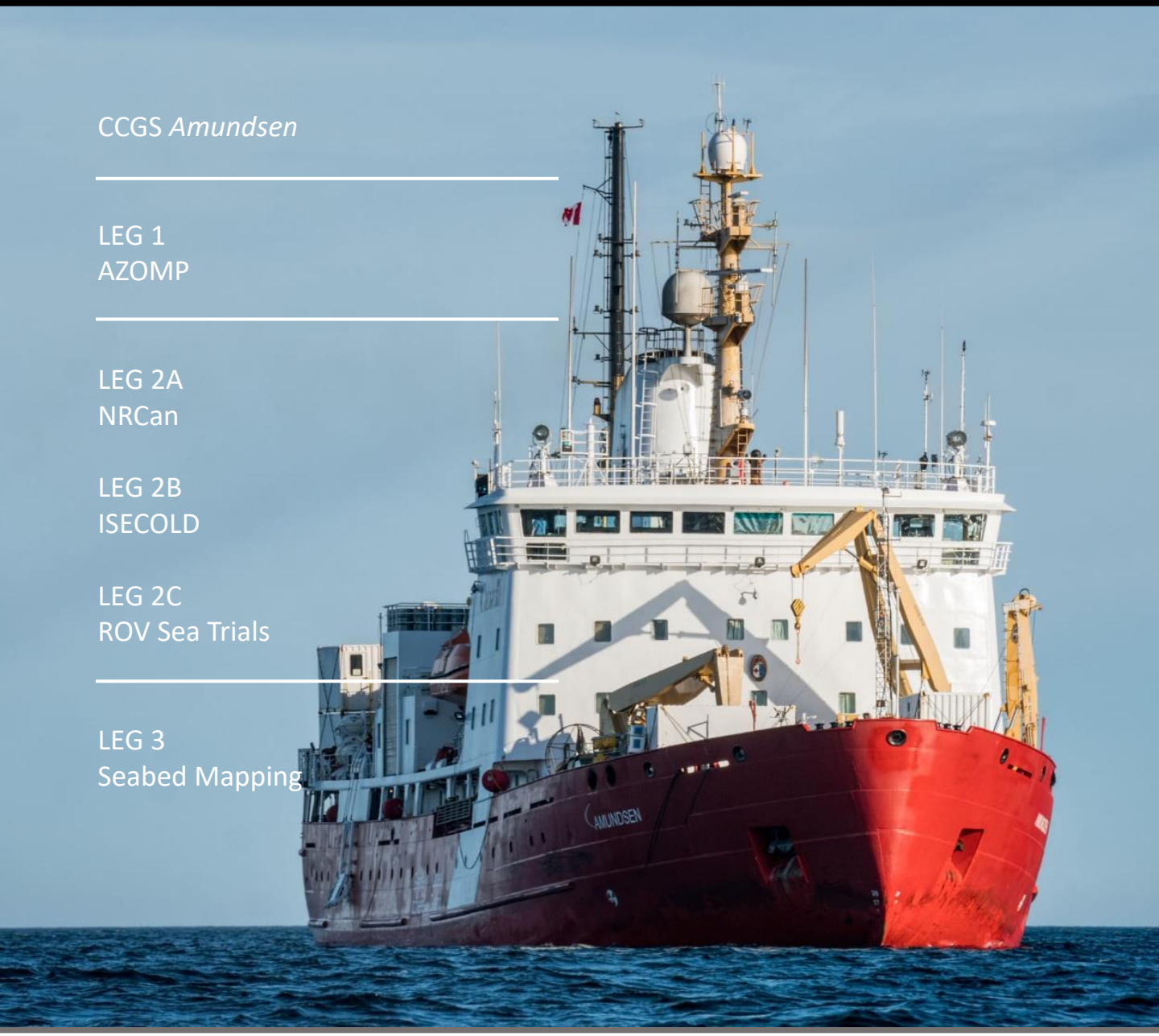
AMUNDSEN SCIENCE

2020 | Expedition Summary



CCGS *Amundsen*

LEG 1
AZOMP

LEG 2A
NRCan

LEG 2B
ISECOLD

LEG 2C
ROV Sea Trials

LEG 3
Seabed Mapping

Introduction

The 2020 Expedition Summary is an overview of the science activities that took place onboard the CCGS *Amundsen* during summer 2020. In the previous years, only the Expedition Report was distributed to our partners, users and to northern communities involved. In the objective of widely sharing our results with the public, we now distribute an Expedition Summary in addition to the Expedition Report. Please note that some photos used in this document were taken before the COVID-19 pandemic and do not follow physical distancing.

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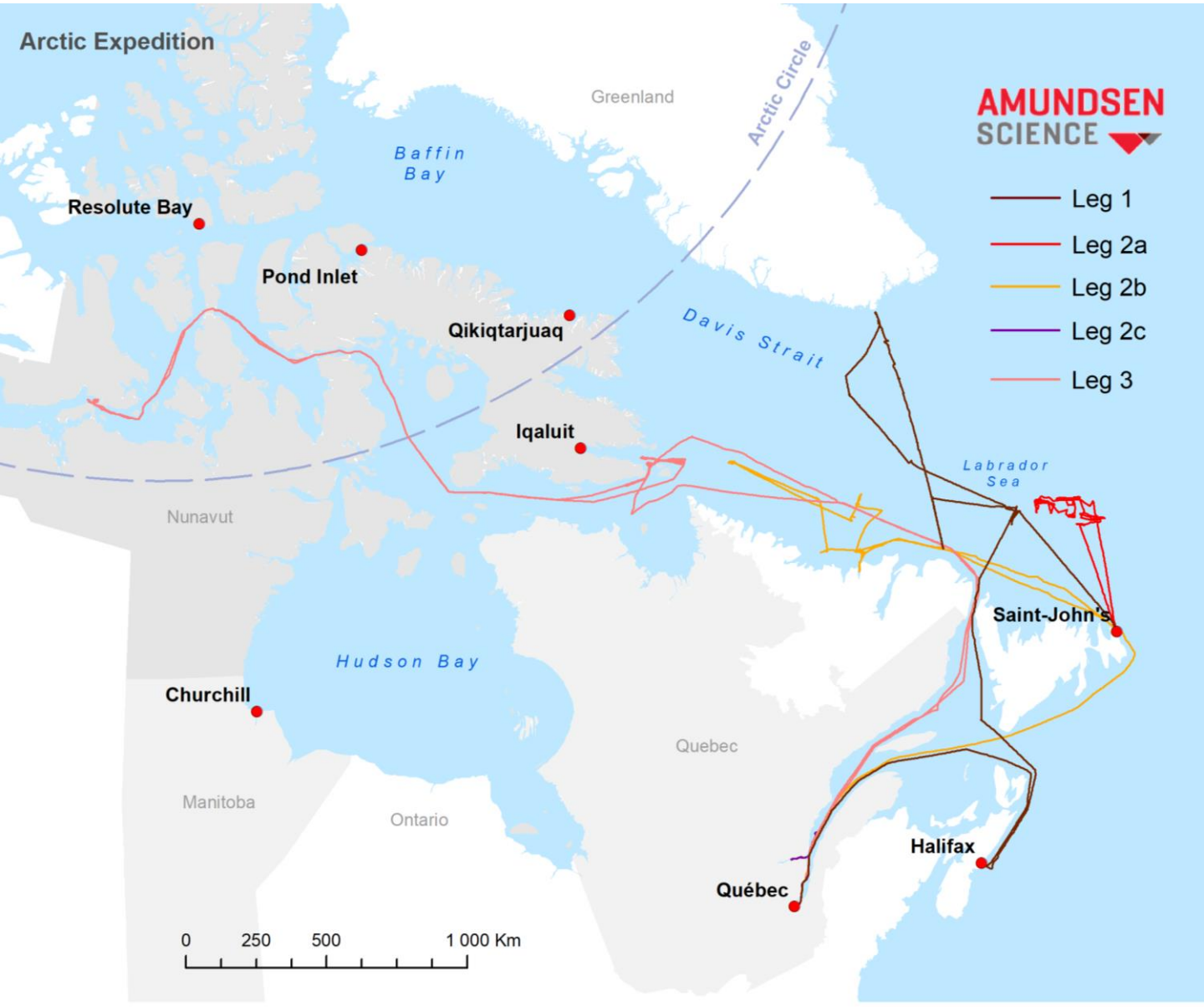
Overview

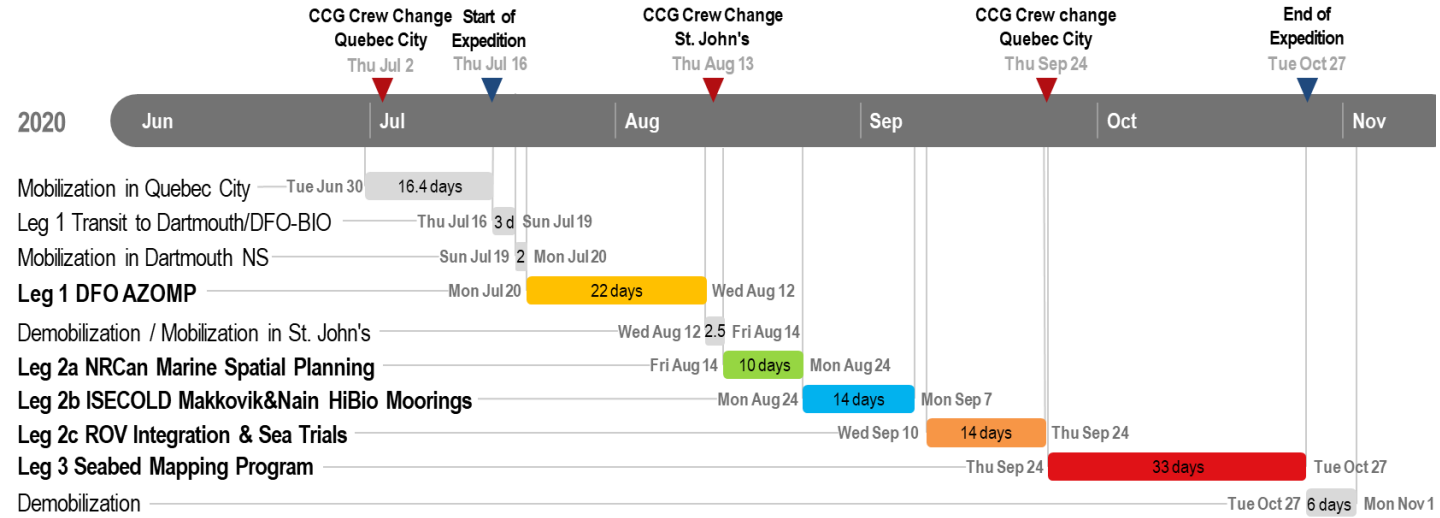
The 2020 Expedition began on 16 July, when the Canadian research icebreaker CCGS *Amundsen* left Quebec City for its 16th annual mission. The multidisciplinary expedition ran until 27 October and allowed 38 scientists from national research teams to study the marine and coastal environments of the Canadian and Greenlandic Labrador Sea, the Atlantic Ocean and the Southern Arctic.



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 high Arctic this year. Furthermore, no communities were visited by the CCGS *Amundsen* and the transit and crew changes all took place in the south.

Anyhow, high quality research was conducted with a reduced scientific crew. The 2020 Expedition was split in 3 Legs and supported 5 research programs. The Atlantic Zonal Off-Shelf Monitoring Program (AZOMP) took place during Leg 1. Leg 2 was split in 3 parts: Leg 2a supported the Natural Resources Canada (NRCan) Marine Spatial planning for 10 days, the Integrated Studies and Ecosystem Characterization Of the Labrador sea Deep ocean (ISECOLD) took place during Leg 2b and the sea trials of Amundsen Science new Remotely Operated Vehicle (ROV) were conducted during Leg 2c. Finally, a Seabed Mapping program in collaboration with the Canadian Hydrographic Survey (CHS) took place during Leg 3 for 33 days.

The 2020 *Amundsen* Expedition was successful considering all constrains that affected the planning and the realization of this trip. Data acquired during the Expedition is currently being analyzed by the research programs. Scientific publications and their outputs are usually shared on our website once they are published.

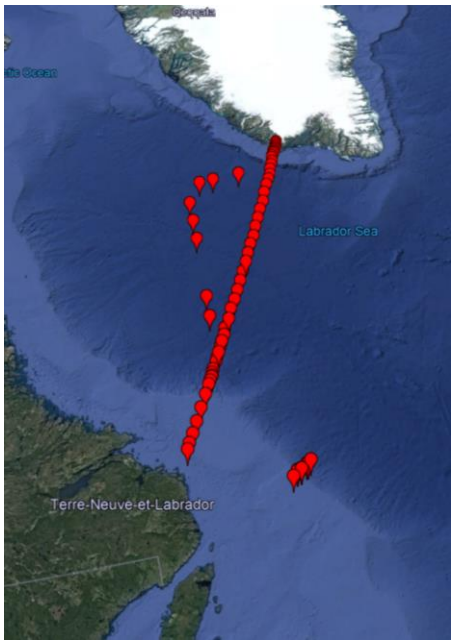


Leg 1

Description of the Programs

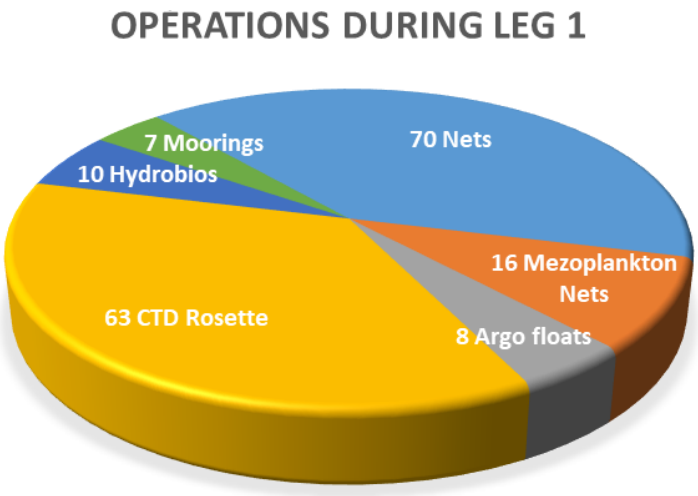
The Atlantic Zonal Off-Shelf Monitoring Program (AZOMP) is led by the Ocean and Ecosystem Sciences Division at the Bedford Institute of Oceanography. It is one of the few monitoring programs that has been going on since 1990. This long time-series of observations along a 880 km-line running from Labrador to Greenland provides a description of physical, chemical, and biological properties within the Labrador Sea area and how these properties evolve with time.

Across the scientific community, the Labrador Sea is viewed as a region of high importance since it receives and blends warm and cold waters from the Atlantic and Arctic Oceans.



Research Activities

During this 22-day Leg, 174 scientific operations took place across the historical transect from Labrador to Greenland. The sampling activities mostly implied biological sampling and water physiochemical properties to better understand the ecology of the area.



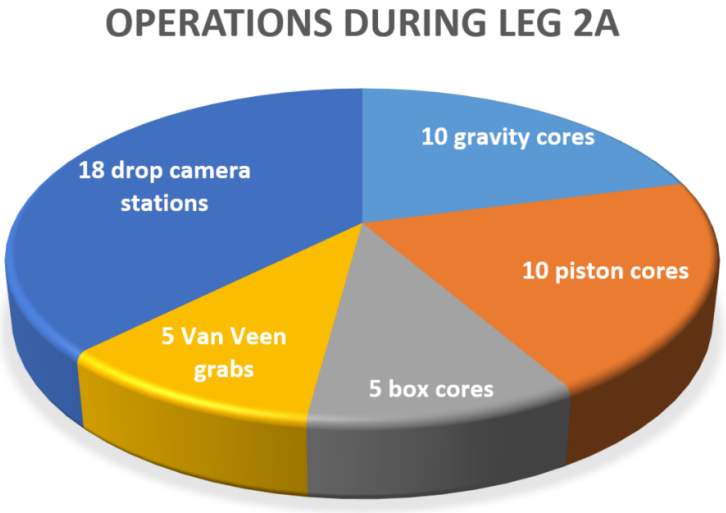
Leg 2a

Description of the Programs

Leg 2a supports the Natural Resources Canada (NRCan) Marine Geoscience & Marine Spatial Planning program, involving seafloor sediment survey and deep-sea sampling operations in the Northeast Newfoundland Shelf and Slope. The objectives of this program aims at better understanding the offshore geological resource potential of the region.

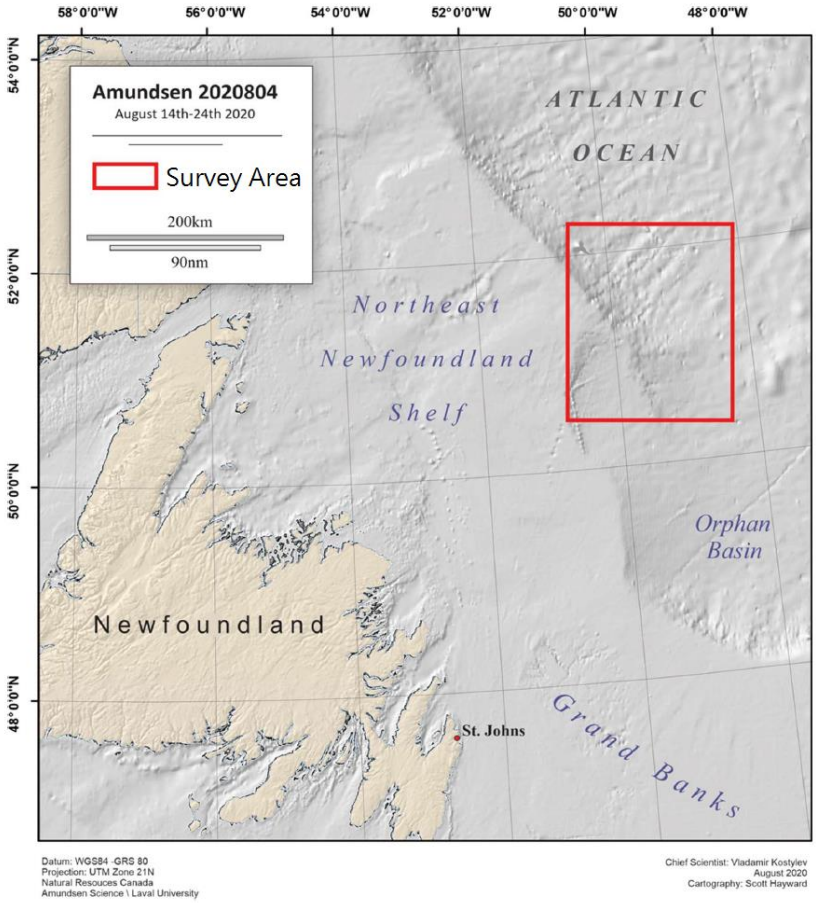
Research Activities

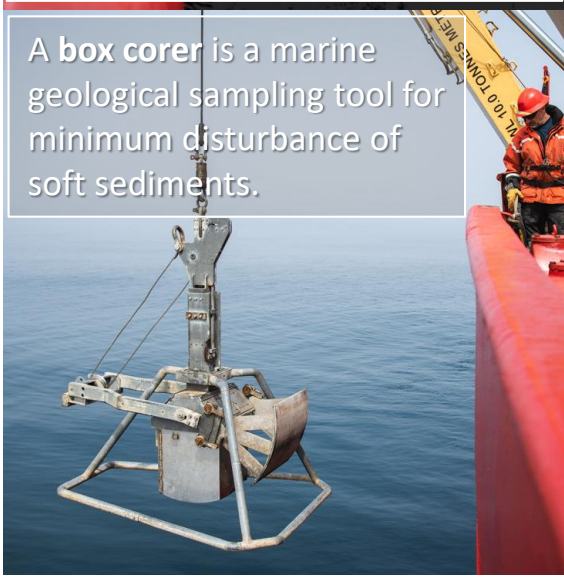
The Leg 2a took place in the northeast Newfoundland slope and northern Orphan Basin region. The expedition took place during August 14th – 24th 2020, departing from and returning to St. John's, Newfoundland on board CCGS *Amundsen*. The cruise activities consisted of sampling the seabed by collecting various type of core (piston cores, gravity cores, box cores, grabs) and bottom camera imagery during daylight hours (approximately 6 am – 6 pm). Additionally, the seabed was surveyed during night hours using sub-bottom profiler and multibeam echosounder, two types of sonar used to calculate the water depth.



In the end, Leg 2a of the 2020 *Amundsen* Expedition allowed 48 scientific operations. Furthermore, the *Amundsen* collected information on the bottom and sub-bottom profile during 1800 MN and the 18 drop camera stations yield 784 high-resolution photographs of sea bed.

A **gravity corer** allows researchers to sample and study sediment layers of the ocean bottom.



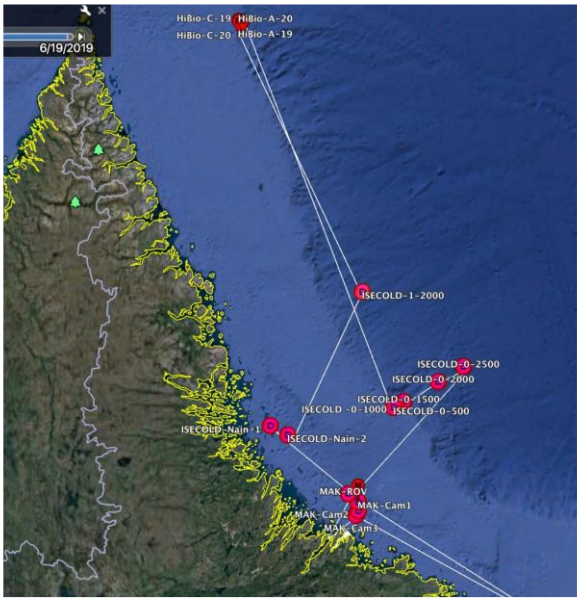


A **box corer** is a marine geological sampling tool for minimum disturbance of soft sediments.

Leg 2b

Description of the Programs

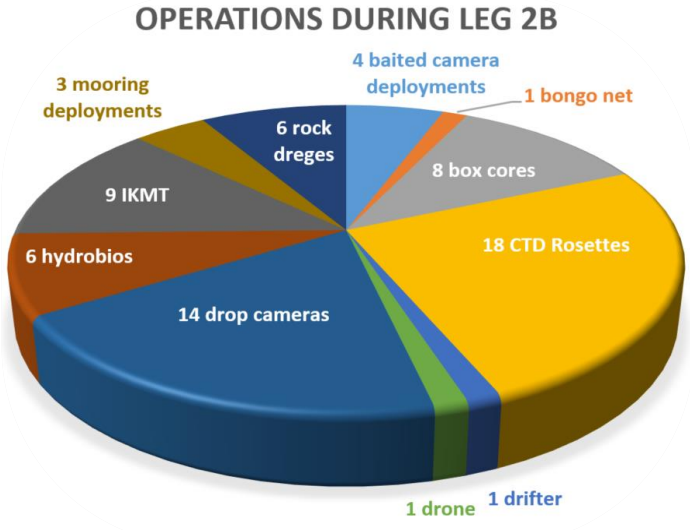
The Leg 2b supports the Integrated Studies and Ecosystem Characterization of the Labrador Sea Deep Ocean (ISECOLD) program led by Dalhousie University in collaboration with Memorial University, Fisheries and Oceans Canada, University of Calgary, and several other institutions, that aim at characterizing the Northern Labrador Sea and coastal environments. This area of global importance is well studied except at depths beyond 750 m, where virtually no data were available regarding the biota .



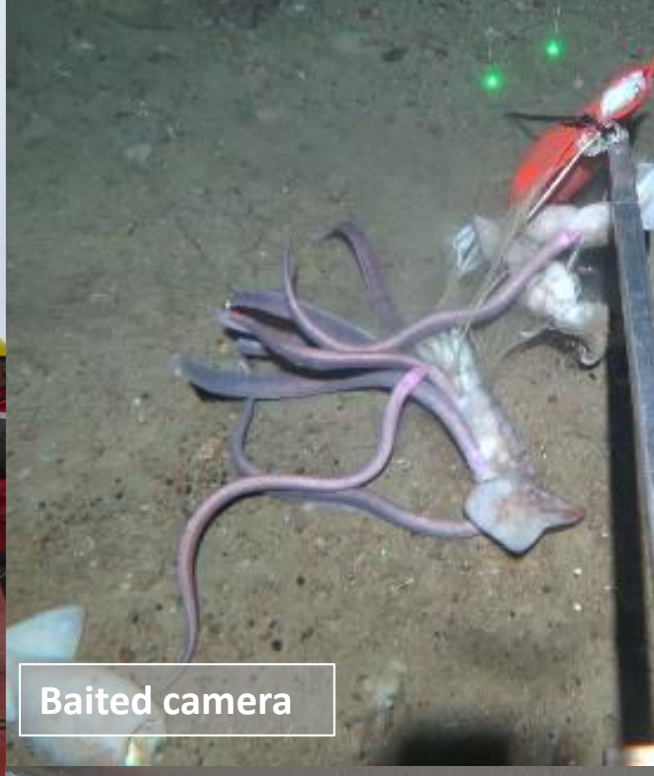
The Leg 2b of the 2020 Expedition extends collections conducted in previous years and directly links with the goal of acquiring the required data to define future Marine Protected Areas on the northeastern coast of Canada. In addition to the scientific objectives of DFO, Leg 2b addresses the scientific objectives of several key academic, government, Indigenous and international collaborators.

Research Activities

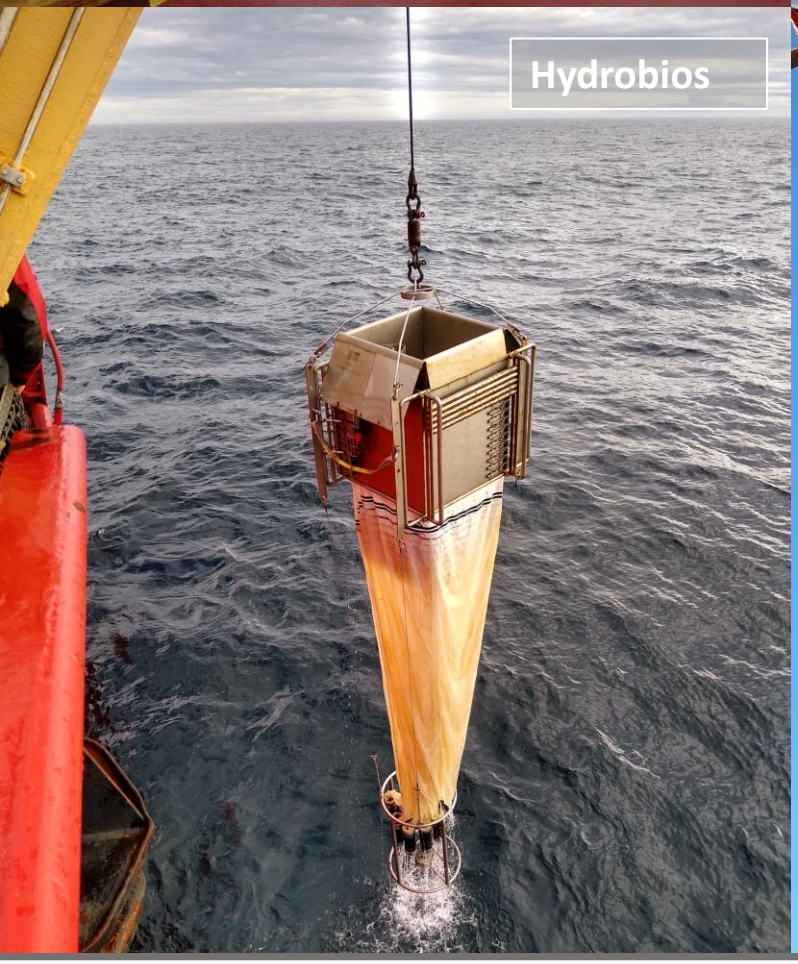
The ISECOLD program characterizes the Northern Labrador Sea and coastal environment using sampling of different ecosystem components (fish, plankton, water, benthos, geological samples, etc.) all at the same location. This allows for comparison of different sampling techniques and gives an overview of the environment's state. Overall, the *Amundsen* 2020 Leg 2b Expedition allowed 70 scientific operations at 14 stations. The *Amundsen* also collected information on the bottom and sub-bottom profile while travelling over 5400 NM and allow the recovery and redeployment of two long-term moorings in Hatton Basin.



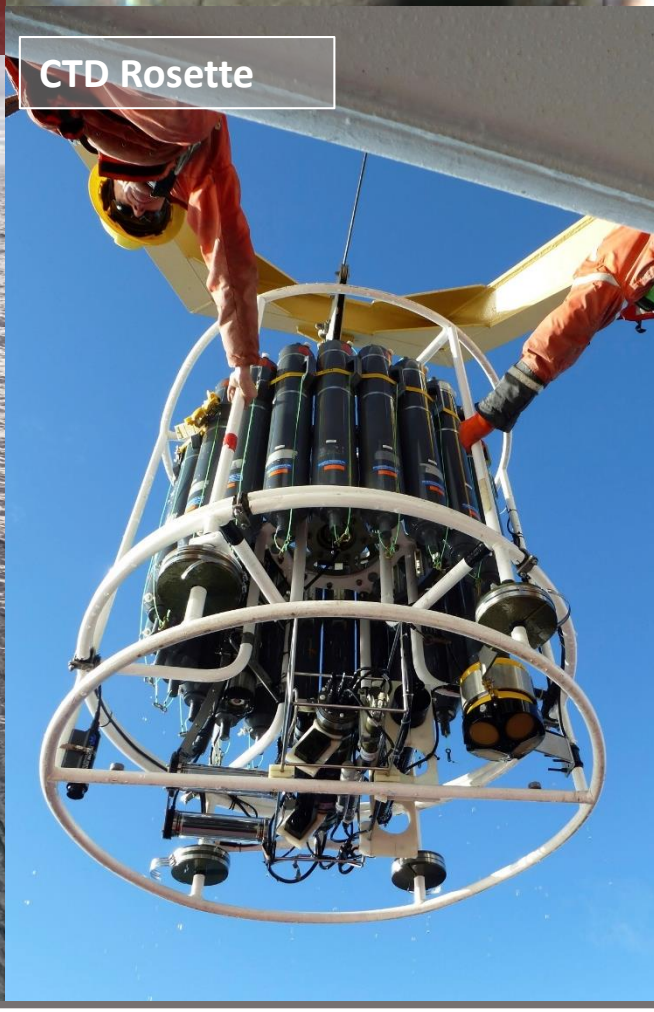
Rock dredge



Baited camera



Hydrobios



CTD Rosette

Leg 2c

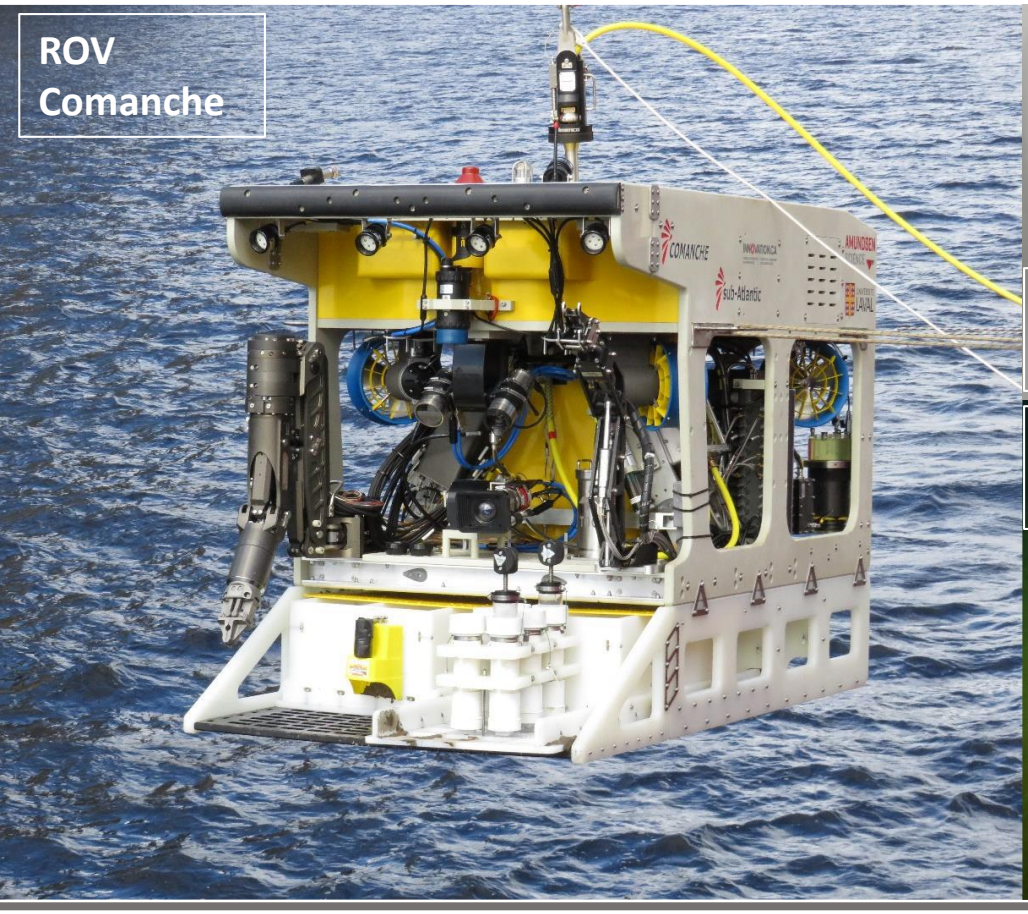
Description of the Programs

Leg 2c focuses on Amundsen Science's new light work-class Comanche Remotely Operated Vehicule (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.

Research Activities

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 (with 18 specimens of *Boreomysis nobilis*)



Leg 3

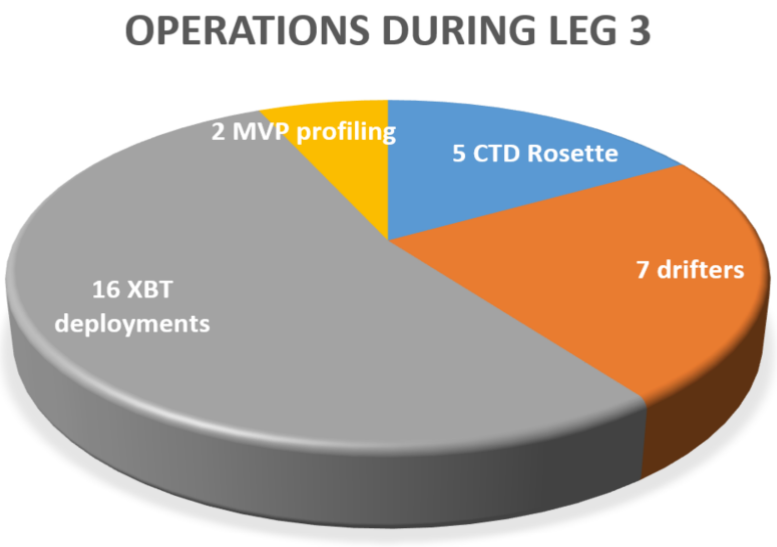
Description of the Programs

Leg 3 is an opportunistic science leg and involve partners from the Canadian Hydrographic Service, Amundsen Science and the University of New Brunswick. 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.

Research Activities

Overall, the *Amundsen* 2020 Leg 3 Expedition allowed 30 scientific operations. Furthermore, the *Amundsen* collected information on the bottom and sub-bottom profile while travelling over 12 700 MN.

The scientific operations were affected by bad weather and regular Coast Guard activities, especially when the ship was called on an escort mission in the Victoria Strait region. Opportunistic surveys took place near Cambridge Bay and during transit.



XBT deployments and **MVP profiling** help mapping the sea-bottom with high precision and low impact on the environment.

Conclusion

Like many aspects of our lives during the year 2020, the *Amundsen* Expedition was affected by the COVID-19 pandemic. A good collaboration between the Canadian Coast Guard, the scientific programs and Amundsen Science allowed research activities to take place in the Labrador Sea, the Atlantic Ocean and the southern Arctic. No communities were visited during this Expedition and all crew changes were conducted in the South.

The research activities which took place onboard the CCGS *Amundsen* during 2020 will allow a better understanding of coastal and marine ecosystems of visited areas as well as increase the safety of shipping activities through more precise mapping of the sea-floor. Scientists are still working on further analysis on the data collected.

The planning and licensing processes are ongoing for the 2021 Expedition which Amundsen Science oversees with optimism. Please, do not hesitate to reach out to media@as.ulaval.ca for any questions or comments about this document or the *Amundsen* Expedition.