ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

759
2022

Berichte
zur Polar- und Meeresforschung

Reports on Polar and Marine Research

The Permafrost Carbon in the Beaufort Sea (PeCaBeau) Expedition of the Research Vessel CCGS AMUNDSEN (AMD2104) in 2021

Edited by

Lisa Bröder, Matt O'Regan, Michael Fritz, Bennet Juhls, Taylor Priest, Julie Lattaud, Dustin Whalen, Atsushi Matsuoka, André Pellerin, Thomas Bossé-Demers, Daniel Rudbäck, Antje Eulenburg, Thomas Carson, Maria-Emilia Rodriguez-Cuicas, Paul Overduin, Jorien Vonk

HELMHOLTZ

Die Berichte zur Polar- und Meeresforschung werden vom Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar- und Meeresforschung (AWI) in Bremerhaven, Deutschland, in Fortsetzung der vormaligen Berichte zur Polarforschung herausgegeben. Sie erscheinen in unregelmäßiger Abfolge.

Die Berichte zur Polar- und Meeresforschung enthalten Darstellungen und Ergebnisse der vom AWI selbst oder mit seiner Unterstützung durchgeführten Forschungsarbeiten in den Polargebieten und in den Meeren.

Die Publikationen umfassen Expeditionsberichte der vom AWI betriebenen Schiffe, Flugzeuge und Stationen, Forschungsergebnisse (inkl. Dissertationen) des Instituts und des Archivs für deutsche Polarforschung, sowie Abstracts und Proceedings von nationalen und internationalen Tagungen und Workshops des AWI.

Die Beiträge geben nicht notwendigerweise die Auffassung des AWI wider.

Herausgeber
Dr. Horst Bornemann

Redaktionelle Bearbeitung und Layout
Susan Amir Sawadkuhi

Alfred-Wegener-Institut
Helmholtz-Zentrum für Polar- und Meeresforschung
Am Handelshafen 12
27570 Bremerhaven
Germany

www.awi.de
www.awi.de/reports

Der Erstautor bzw. herausgebende Autor eines Bandes der Berichte zur Polar- und Meeresforschung versichert, dass er über alle Rechte am Werk verfügt und überträgt sämtliche Rechte auch im Namen seiner Koautoren an das AWI. Ein einfaches Nutzungsrecht verbleibt, wenn nicht anders angegeben, beim Autor (bei den Autoren). Das AWI beansprucht die Publikation der eingereichten Manuskripte über sein Repositorium ePIC (electronic Publication Information Center, s. Innenseite am Rückdeckel) mit optionalem print-on-demand.

The Reports on Polar and Marine Research are issued by the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI) in Bremerhaven, Germany, succeeding the former Reports on Polar Research. They are published at irregular intervals.

The Reports on Polar and Marine Research contain presentations and results of research activities in polar regions and in the seas either carried out by the AWI or with its support.

Publications comprise expedition reports of the ships, aircrafts, and stations operated by the AWI, research results (incl. dissertations) of the Institute and the Archiv für deutsche Polarforschung, as well as abstracts and proceedings of national and international conferences and workshops of the AWI.

The papers contained in the Reports do not necessarily reflect the opinion of the AWI.

Editor
Dr. Horst Bornemann

Editorial editing and layout
Susan Amir Sawadkuhi

Alfred-Wegener-Institut
Helmholtz-Zentrum für Polar- und Meeresforschung
Am Handelshafen 12
27570 Bremerhaven
Germany

www.awi.de
www.awi.de/en/reports

The first or editing author of an issue of Reports on Polar and Marine Research ensures that he possesses all rights of the opus, and transfers all rights to the AWI, including those associated with the co-authors. The non-exclusive right of use (einfaches Nutzungsrecht) remains with the author unless stated otherwise. The AWI reserves the right to publish the submitted articles in its repository ePIC (electronic Publication Information Center, see inside page of verso) with the option to "print-on-demand".

Titel: Nebensonnen gesichtet an Deck der CCGS Amundsen am 03. Oktober 2021 (Foto: Dr. Michael Fritz)

Cover: Sundogs visible from the deck of the CCGS Amundsen on 03 October 2021 (Photo: Dr. Michael Fritz)

The Permafrost Carbon in the Beaufort Sea (PeCaBeau) Expedition of the Research Vessel CCGS AMUNDSEN (AMD2104) in 2021

Edited by
Lisa Bröder, Matt O'Regan, Michael Fritz, Bennet Juhls, Taylor Priest, Julie Lattaud, Dustin Whalen, Atsushi Matsuoka, André Pellerin, Thomas Bossé-Demers, Daniel Rudbäck, Antje Eulenburg, Thomas Carson, Maria-Emilia Rodriguez-Cuicas, Paul Overduin, Jorien Vonk

Please cite or link this publication using the identifiers

https://hdl.handle.net/10013/epic.b1219421-40dd-46cc-af48-5e0c9711cfee
https://doi.org/10.48433/BzPM_0759_2022

ISSN 1866-3192

CRUISE SUMMARY REPORT

PeCaBeau – Permafrost Carbon on the Beaufort Shelf
CCGS Amundsen, Cruise No. AMD2104,
09 September – 7 October 2021
Resolute Bay (Canada) – Cambridge Bay (Canada)

Authors: Lisa Bröder, Matt O'Regan, Michael Fritz, Bennet Juhls, Taylor Priest, Julie Lattaud, Dustin Whalen, Atsushi Matsuoka, André Pellerin, Thomas Bossé-Demers, Daniel Rudbäck, Antje Eulenburg, Thomas Carson, Maria-Emilia Rodriguez-Cuicas, Paul Overduin, Jorien Vonk

CONTENTS

SUMMARY

The PeCaBeau project aims to track the movement and transformation of material from permafrost thaw along the land-to-ocean continuum. This multi-disciplinary effort investigates the sediment column between subsea permafrost and the seafloor, the water column, the atmosphere and the interfaces between these three units. By studying the sources, quantities and the quality of organic matter in the water column and in sediments, we aim to improve assessments of the Beaufort shelf as a carbon source or sink, and place these outcomes in the context of the Holocene paleoenvironment and transgressed permafrost. Sampling operations took place in the Southern Beaufort Sea with five major across-shelf transects. Mapping surveys were conducted during the entire cruise, radiometry measurements were performed under way and at 18 locations, water-column profiling and sediment sampling were conducted at 35 and 27 stations, respectively.

1. RESEARCH PROGRAMME/OBJECTIVES

The continental shelves of the Arctic Ocean are rapidly responding to global climate change. Rising air temperatures and declining summer sea-ice extent have direct consequences for the shelf environment. The ingression of warm water to the shelves impacts the coasts, which are more frequently eroded by fall storms during longer ice-free seasons, and accelerates subsea permafrost thaw. Furthermore, river runoff is warming and affecting associated particulate and dissolved matter fluxes, which are important for aquatic life in the nearshore zone. These changes in the Arctic may have profound ramifications for regional ecosystems and the broader Earth climate system because: a) increasing coastal erosion and shifting fluvial fluxes are releasing greater quantities of soil carbon and nitrogen to the nearshore zone that may be exported to the shelf and beyond, and b) warming and freshening of the water column is affecting the biogeochemistry of the shelf water, its interaction with the sea floor and air-sea gas exchange. Such ramifications and their controls on carbon turnover, ocean acidification, and greenhouse gas fluxes between sediment, sea and atmosphere are important but poorly understood. Coastal erosion and permafrost degradation are alarmingly active in the southern Canadian Beaufort Sea: strong coastal erosion and terrestrial permafrost degradation lead to the release of large quantities of sediment, organic carbon and nutrients into nearshore waters (Lantuit et al., 2012). Furthermore, the large freshwater and dissolved and suspended sediment load of the Mackenzie River strongly affect water column hydrography in a spatially heterogeneous fashion with unclear consequences for the carbon budget on the shelf and deep ocean (Wegner et al., 2015).

The overall goal of this project is to quantify the fluxes, burial rates, composition and fate of organic matter (OM) in the southern Beaufort Sea. We aim to differentiate between sources deriving from permafrost coastal erosion, Mackenzie River discharge and submarine permafrost degradation, and to investigate how these sources have changed in the Holocene. The major objectives are described below.

Objective 1: To better understand the role of the Beaufort/Mackenzie system in mitigating and/or facilitating carbon dynamics, we will characterize organic matter transformation from riverine and coastal sources to the water column and surface sediment during its transport from source to sink (sediment sampling, water column sampling, remote sensing).

To achieve this objective, 4 sub-goals are identified:

1.1. Quantification of the dissolved, particulate and sedimentary OM fluxes in the Beaufort/Mackenzie area.

1.2. Qualitative analysis of OM in the Beaufort/Mackenzie area using bulk and molecular geochemical methods.

1.3. Estimates of concentrations of dissolved and particulate organic carbon, and primary production using satellite remote sensing data and collect in situ hyperspectral data.

1.4. Quantify lateral transport time on the Beaufort Shelf using compound-specific radiocarbon techniques on material collected along shelf-slope transects (as done on the Laptev Shelf by Bröder et al., 2018).

Objective 2: To evaluate whether modern sedimentation and carbon burial rates depart significantly from the long-term baseline. To do so we aim to recover paleoenvironmental sediment records to constrain past fluxes, and permit comparison of coastal and riverine sediment pathways over time. This will be achieved through gravity/piston coring for longer sedimentary sequences, and surface sediment sampling.

2.1. Quantification of carbon burial rates on the Beaufort Sea floor in space and time based on Pb/Cs, radiocarbon and paleomagnetic chronologies.

2.2. Development of paleo-oceanographic time-series documenting changes in the oceanographic and sea-ice conditions during the Holocene using micropaleontological, sedimentological and organic geochemical methods.

In addition to the overarching Objectives 1 and 2, several specific sub-projects were conducted in conjunction with the PeCaBeau sampling efforts.

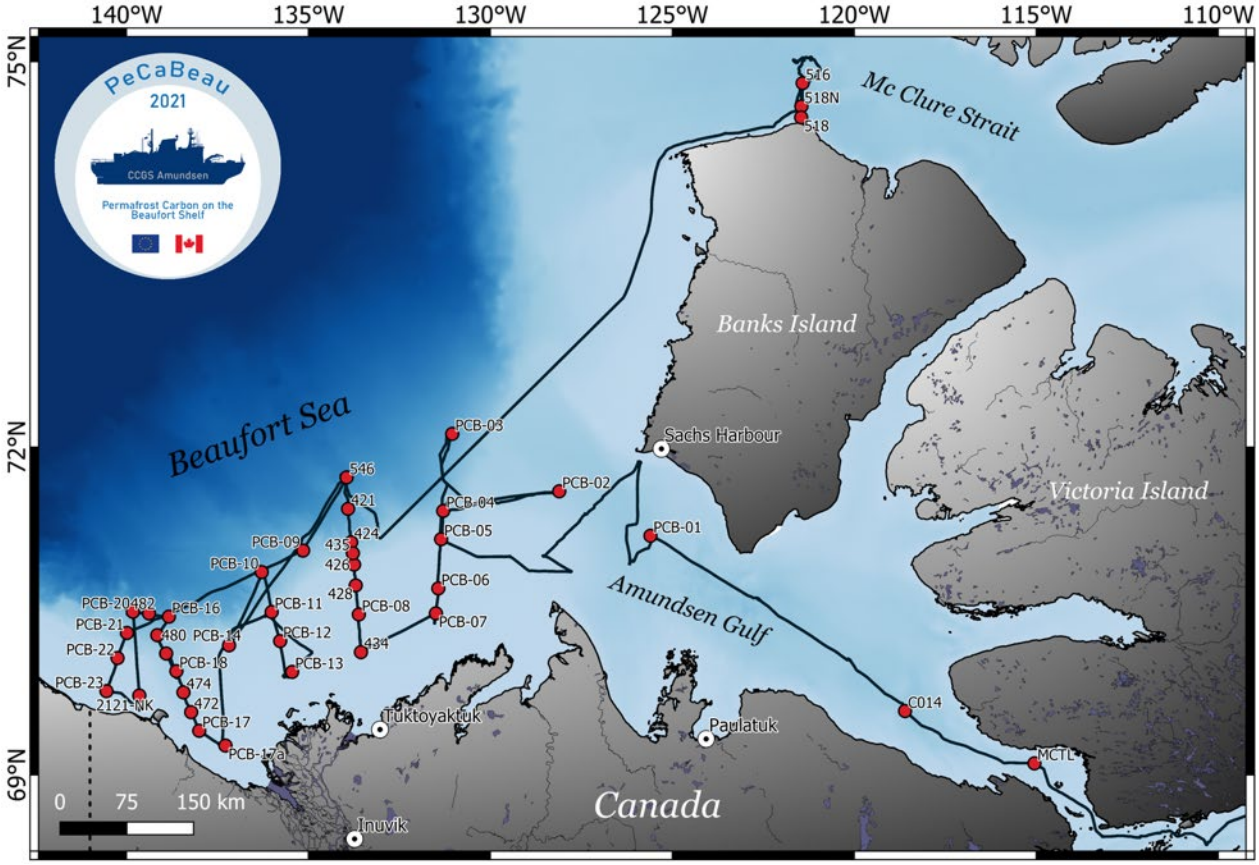


Fig. 1: Map of the study area with Leg 4 cruise track outlined in black and sampling stations involving PeCaBeau activities marked with red circles. For details on locations and which operations were conducted at each sampling station, see Tables 1 and 6.

Sampling operations focused on the Southern Beaufort Sea with additional stations in the Amundsen Gulf and McClure Strait (see Fig. 1). The cruise track centred around five major transects that traversed the shelf from coastal, shallow sites (≤ 20 m) to shelf-break and deep waters along the slope, as well as a transect down the Mackenzie Trough. Along the entire cruise track, mapping surveys using multi-beam and sub-bottom echo-sounders were conducted, in particular to define deep coring locations. Optical measurements were performed under way and at specific locations (radiometry, Tables 4 and 6). Water-column profiling (CTD and rosette water sampling) and sediment sampling (shallow multicores and long cores) took place at locations defined in Tables 1 and 6.

2. NARRATIVE OF THE CRUISE

The offshore science party joined the CCGS Amundsen on September 9, 2021, with the departure of the vessel from Resolute Bay on the following morning. During the first days of transit, the research team engaged in general safety training and specific toolbox meetings regarding the deployment of the different coring devices (Multicorer, Gravity Corer, Piston Corer, Box Corer), unpacked and set up equipment in the sediment and filtration laboratories, assembled the Multi Sensor Core Logger (MSCL) and the Multicorer. The Multicorer was then deployed for a first succesful test in the Amundsen Gulf (MultiCorer Test Location, MCTL, Tab. 1) on September 16. At station C014 (Tab. 1), a first test of the radiometry system was performed. For detailed activities at all following stations, information can be found in the Methods (Section 3) and the Station List (Section 5) below. On October 7, 2021, cruise participants disembarked in Cambridge Bay.

Tab. 1: Station information: coordinates, arrival and departure times. All stations named PCB were dedicated PeCaBeau stations, others had been requested by other programs (e.g. ArcticNet) and offered a chance for opportunistic sampling activities of the PeCaBeau team. MCTL: Multicorer test location.

Station ID	**Latitude** *(DD)*	**Longitude** *(DD)*	**Arrival** *Date Time (UTC)*	**Departure** *Date Time (UTC)*
MCTL	69.11418	-115.04719	2021/09/16 10:39:50	2021/09/16 10:51:28
C014	69.62043	-118.60309	2021/09/16 18:02:40	2021/09/16 19:07:19
PCB-01	71.23288	-125.59845	2021/09/18 00:29:32	2021/09/18 03:23:48
PCB-05	71.20294	-131.35189	2021/09/20 09:38:51	2021/09/20 10:26:43
PCB-04	71.4511	-131.2942	2021/09/20 13:18:20	2021/09/20 19:09:54
PCB-02	71.622	-128.10599	2021/09/21 01:35:34	2021/09/21 03:50:11
PCB-03	72.1131	-131.04676	2021/09/21 13:22:42	2021/09/21 22:09:24
PCB-06	70.76183	-131.42986	2021/09/22 07:17:29	2021/09/22 11:05:22
PCB-07	70.53483	-131.49528	2021/09/22 14:22:21	2021/09/22 18:38:37
434	70.17647	-133.55512	2021/09/22 23:29:42	2021/09/23 02:43:33
PCB-08 / 431	70.52486	-133.61348	2021/09/23 06:11:01	2021/09/23 08:09:33
428	70.78958	-133.69872	2021/09/23 11:54:49	2021/09/23 12:11:03
426	70.97641	-133.74497	2021/09/23 14:01:54	2021/09/23 14:23:50
435	71.07808	-133.77688	2021/09/23 15:10:07	2021/09/23 21:30:23
424	71.1755	-133.82445	2021/09/23 23:15:42	2021/09/24 00:01:37
421	71.46966	-133.9093	2021/09/24 04:39:56	2021/09/24 12:33:50
546	71.74206	-133.94863	2021/09/24 14:40:33	2021/09/24 18:28:38
PCB-09	71.10243	-135.14449	2021/09/24 23:48:28	2021/09/25 01:32:37
PCB-21	70.35477	-139.98316	2021/09/25 12:09:36	2021/09/25 17:55:45
PCB-22	70.12136	-140.24488	2021/09/25 21:38:59	2021/09/26 01:17:07
PCB-23	69.81033	-140.54852	2021/09/26 04:22:56	2021/09/26 05:11:03
2121-NK	69.76867	-139.64636	2021/09/26 11:29:45	2021/09/26 11:34:03
PCB-20	70.5492	-139.81988	2021/09/26 17:22:10	2021/09/26 20:56:36
482	70.53421	-139.37998	2021/09/26 23:25:15	2021/09/27 06:28:05
PCB-16	70.50464	-138.83203	2021/09/27 09:13:34	2021/09/27 15:11:08
480	70.33447	-139.15267	2021/09/27 17:15:23	2021/09/27 18:27:31

PCB-18 / 476	69.99839	-138.62824	2021/09/27 21:07:54	2021/09/28 07:59:17
PCB-19 / 478	70.16379	-138.90782	2021/09/28 10:22:05	2021/09/28 13:38:15
474	69.79853	-138.43304	2021/09/28 17:30:47	2021/09/28 18:08:47
472	69.60975	-138.2213	2021/09/28 20:14:53	2021/09/28 20:47:37
PCB-17 / 470	69.43113	-137.99893	2021/09/28 23:57:13	2021/09/29 05:11:04
PCB-17a	69.28782	-137.27927	2021/09/29 08:58:03	2021/09/29 10:18:53
PCB-11	70.54748	-136.00951	2021/09/29 21:12:24	2021/09/30 02:17:30
PCB-13	69.99163	-135.44577	2021/09/30 09:23:00	2021/09/30 11:40:10
PCB-12	70.27986	-135.77562	2021/09/30 16:29:18	2021/09/30 19:37:24
PCB-10	70.90951	-136.28213	2021/10/01 00:06:23	2021/10/01 03:47:15
PCB-14	70.24	-137.18	2021/10/01 08:28:25	2021/10/01 09:09:35
516	74.84704	-121.41703	2021/10/03 04:26:45	2021/10/03 10:11:39
518N	74.68005	-121.45099	2021/10/03 12:11:57	2021/10/03 14:38:05
515	75.01094	-121.36368	2021/10/04 05:42:02	2021/10/04 08:56:02
518	74.59903	-121.45739	2021/10/04 14:02:51	2021/10/04 16:19:44

3. METHODS AND PRELIMINARY RESULTS

3.1 Underway Hydroacoustics

3.1.1 Knudsen 3260 Echo-Sounder

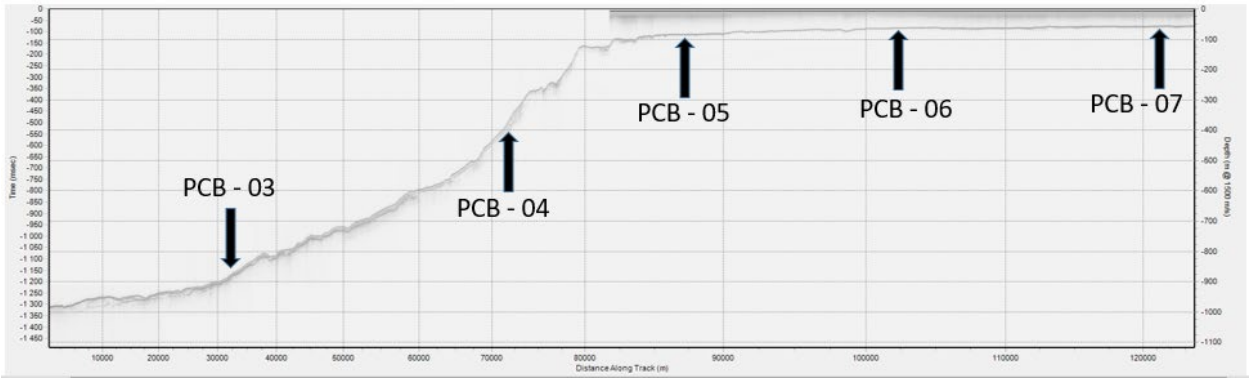


Fig. 2: Example of sub-bottom profile showing core locations along a ~120 km long transect. See appendix for more detail on each coring location.

A Knudsen 3260 deck unit is installed and used continuously 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 while on station, but always on and recording during transit and while conducting geophysical mapping exercises over core and target sampling locations. The system was operational throughout the cruise collecting 1014 NM of geophysical data. On two occasions, (Sept 30, 31) the power to Knudsen control unit was lost, however this did not result in the loss of data as the vessel was not underway at the time. Approximately 2760 NM of multi-beam data were acquired during this expedition. The original Knudsen .keb files were converted to SEGY then JP2000 on board using the tools created by the Geological Survey of Canada (Courtney, 2007). JPEG2000 is an ideal image compression format

that allows for compression of the SEGY file while achieving a higher resolution. Onboard processing tools was required to improve the data quality during intermittent conditions, allow for combination of large transects (Fig. 2) and ultimately as a tool to help verify and choose coring targets.

3.1.2 EM-302 multibeam echosounder

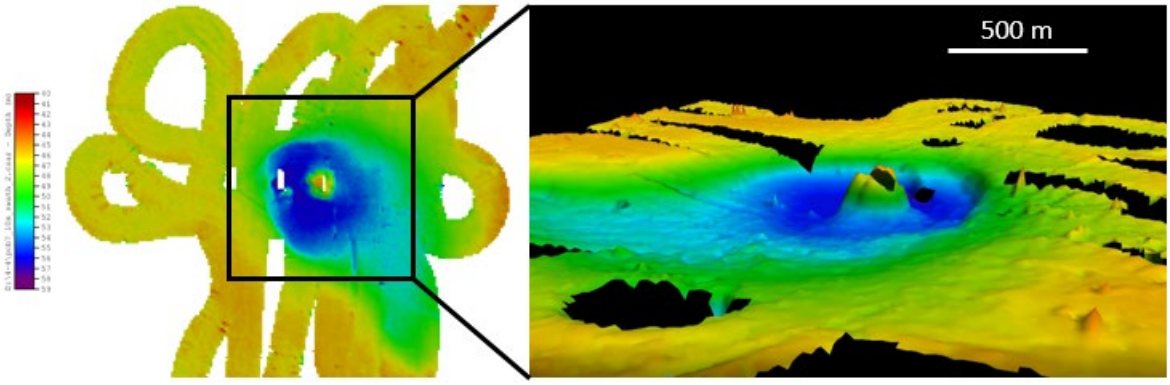


Fig. 3: An example of multibeam bathymetry data over a prominent "pingo like" feature created in a submerged thermokarst lake basin.

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 CTD probe deployed with the Rosette. Similar to the sub-bottom profiler the multibeam echosounder remained operational throughout the cruise collecting continuous data. Approximately 2760 NM were covered with the system generating high resolution grids of the seafloor. All the data acquired during the expedition were post-processed in real-time using the CARIS HIPS & SIPS 11.1 software (Fig. 3).

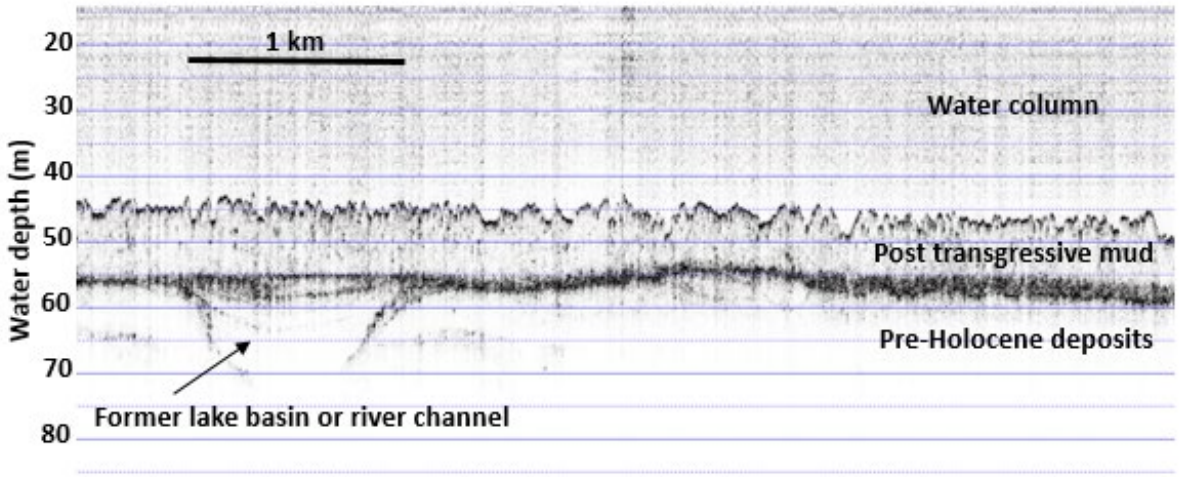


Fig. 4: Example of idea coring site as displayed on the Knudsen 3260 real-time interface. The drape of the Holocene (post transgressive) mud over the older shelf surface is an example of modern undisturbed sedimentation.

The majority of the sample locations for the cruise were predetermined along shore perpendicular transects, however the sonar packages were still a key component while looking for the optimal location for coring within the proximate location along the predetermined transects. Areas that showed clear evidence of sedimentation and no disturbance from ice movement were considered ideal spots for coring along each transect (Fig. 4).

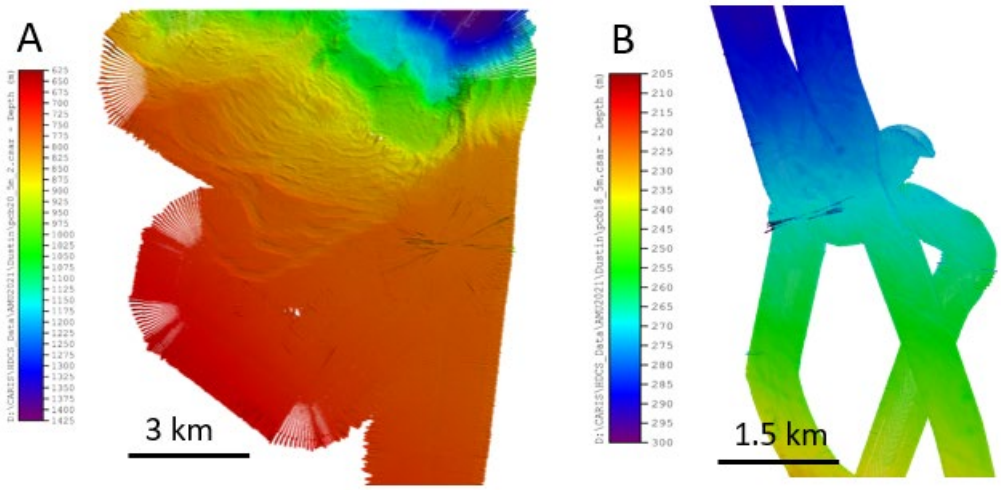


Fig. 5: Examples of ideal coring sites from processed EM-302 data. Each of these sites, along the shelf break (A) and within the Mackenzie Trough (B) are examples of undisturbed seabed where sediments are likely to accumulate.

3.2 Water Sampling with Conductivity, temperature and depth (CTD) Rosette

3.2.1 CTD Measurements

The collection of water samples for downstream analyses (see following sections) was performed using a Rosette water sampler on a CTD system “SBE911 Plus”, (Seabird-Electronics, USA) (Fig. 6). In addition to sampling, a number of physicochemical parameters were measured using sensors fitted to the CTD system, including:

- Pressure, [digiquartz, db]
- Salinity, [psu] (SBE)
- Temperature [ITS-90, deg C] (2 x SBE 3+)
- Conductivity [mS/cm] (2 x SBE 4C)
- Oxygen concentration [µmol/kg] (SBE 43)
- Fluorescence (Seapoint)
- Fluorescence [mg/m3] (WET Labs ECO CDOM)
- Photosynthetic active radiation (PAR) [µmol photons/m2/sec]
- Beam transmission [%] (WET Labs C-Star)
- Nutrients (Nitrate/Nitrite) (SUNA)

The sensors were mounted to the CTD within a tube system, where water flows through at constant velocity. The data measured with the sensors was viewed live during the cast using SeaSave Version 7.26.7.107, and subsequently saved on a hard disk and will be available from Amundsen Science upon completion.

Fig. 6: CTD rosette system being deployed by A frame from the starboard side of the ship.

The CTD was deployed from the starboard side of the ship using an A-frame and once in the water, the flow-through pumps for the sensors were switched on. Initially, the CTD was deployed to 10 m and held for several minutes, before being returned to the surface. This provides time for the tubes to be flushed and to ensure that all sensors are functioning correctly. A full CTD cast was subsequently carried out from the surface to the bottom at a speed of 1 m s^{-1}, with the downcast used to obtain data on the physical parameters. The depth of the deep chlorophyll maximum (DCM) was determined during the downcast. The lowest depth reached, termed 'bottom', was typically around 10 m from the seafloor, determined using the altimeter.

In addition to CTD profiling at discrete station locations, the surface water temperature, salinity and chlorophyll fluorescence were measured using an underway flow-through system that was operated by Amundsen Science. These data provide continuous measurements for the complete cruise track (Fig. 7). The inflow depth of the system was at 7 m below water surface. However, due to the movement of the ship and pushing of water masses, the exact depth of the water that is analysed by this system can vary.

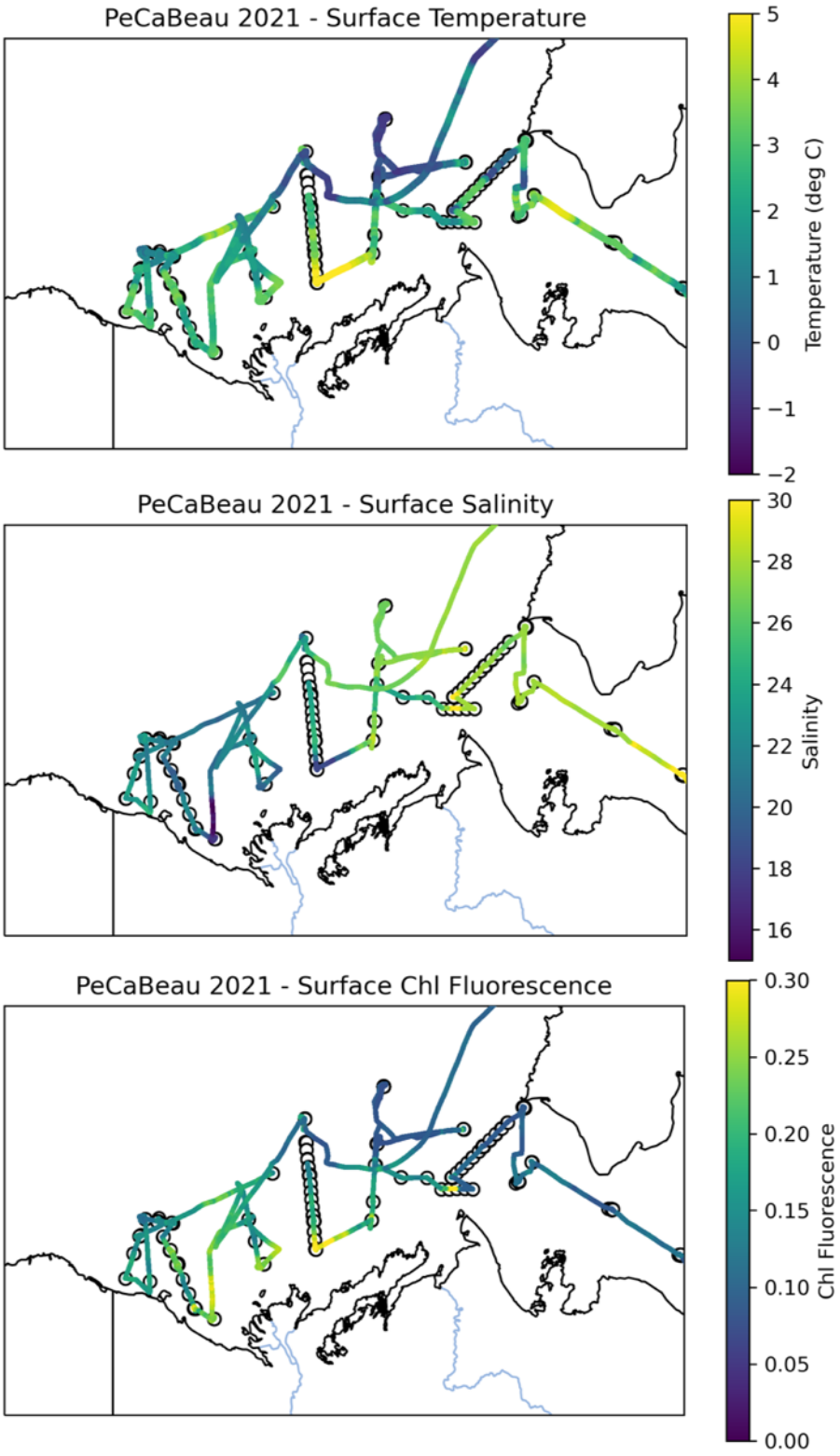


Fig. 7: Surface Temperature, Salinity and Chlorophyll Fluorescence within the PeCaBeau working area.

3.2.2 Water Sampling

Water sampling was performed using the Rosette system, consisting of 24 Niskin bottles, each with a volume of 12 L. Water sampling was performed during the upcast. At the specified depths, the CTD was stopped for 60 seconds prior to bottle closure, to ensure the correct water mass had filled the bottles. Bottles were closed using the SeaSave software. Once the CTD was placed back on deck, sampling commenced in a specified order, beginning with gas samples and finishing with microbial community sampling.

3.3 Sampling for dissolved gases, dissolved organic and inorganic carbon, coloured/fluorescent dissolved organic matter, nutrients and water isotopes

Gaseous CH_4 has been sampled in triplicate (12 ml exetainers), without headspace, poisoned with 7 µL of saturated mercury chloride solution ($HgCl_2$) and stored at 4 °C until analysis. All depths have been sampled (see Appendix 9.1).

Dissolved inorganic carbon and Total Alkalinity (300 mL) was sampled at every depth directly from the Niskin bottle to avoid air exchange, it was sealed after adding 100 µL of $HgCl_2$ and stored in the fridge until analysis.

Dissolved inorganic carbon for ^{14}C analysis (^{14}C-DIC): 12 mL of water has been sampled for dissolved inorganic carbon (DIC) radiocarbon analysis (^{14}C) at several depth (surface, 25m, 50, 100m, 150m, 200m, 250m, 300m, 400m, 500m, 700m, 1000m, see Appendix 9.1). Sampling was done without headspace, and the water subsequently poisoned with 7 µL of $HgCl_2$ and stored in the fridge until analysis.

Dissolved organic carbon (DOC), Colored dissolved organic matter (CDOM), Fluorescent dissolved organic matter (FDOM), Nutrients, Stable water isotopes: For this set of parameters, 400 mL water was sampled from the Niskin bottles at several depths (see Appendix 9.1). The sampling bottle was rinsed twice before sampling. The sample was then used and split for the different parameter.

3.4 Processing of water samples

3.4.1. Stable water isotopes, Nutrients, Dissolved organic carbon (DOC), Colored dissolved organic matter (CDOM), and Fluorescent dissolved organic matter (FDOM)

For **stable water isotopes**, untreated water samples were filled into 10 mL HDPE vials without headspace. The samples were stored cooled and dark until analysis.

For **nutrients**, untreated water samples were filled into 50 mL HDPE bottles. In cases of high particle load (see Appendix 9.1, marked as Xf), the samples were filtered using a Whatman GF/F syringe filter (filter was rinsed with 50 mL before filtrate was used). The sample was immediately frozen and stored at -20 and dark until analysis.

For **DOC**, the samples were filtered using a Whatman GF/F syringe filter (filter was rinsed with 50 mL before filtrate was used), filled into 20 mL glass vials and acidified using 20 µL HCl (37%) and stored dark and cool at +4°C until analysis.

For **CDOM** and **FDOM**, the samples were filtered using a Whatman GF/F syringe filter (filter was rinsed with 50 mL before filtrate was used) and filled into 2 x 50 mL amber glass bottle. The samples were stored dark and cool (+4°C) until analysis.

3.4.2 Filtration for total suspended solids, particulate organic carbon concentrations and carbon isotopes (^{13}C, ^{14}C), and ^{14}C on dissolved organic carbon

At each of the PeCaBeau stations, apart from PCB09, 2 to 10 L of water was sampled at specific depth intervals from the surface to the bottom, dependent upon the maximum depth at the station (see Appendix 9.1).

- For stations <100m depth: surface, 15m, 20m, 25m, 30m, 40m, 50m, 100m, bottom.
- For stations >100m depth: surface, 25m, 50m, 100m, 150m, 250m, 500m, 700m, bottom.

Waters were filtered on a pre-combusted glass filtration unit (Millipore) through 47-mm diameter pre-weighted filters (GF/F, 0.7 µm pore-size) to calculate total suspended solid concentrations and analyse particulate organic carbon concentrations and isotopes. Filters were stored frozen at -20 °C in plastic petri dishes to preserve an undisturbed particle layer on the filter.

At the surface, bottom and deep chlorophyll maximum (DCM), 750 mL of the filtrate from the 47 mm diameter filtration unit has been sampled for ^{14}C-DOC analysis. The filtrate has been sampled in pre-combusted amber glass bottles (acid washed caps) with 200 µL hydrochloric acid (HCl, 37%) and stored in the fridge until analysis.

3.4.3 Sampling and filtration for microbial communities and carbohydrate analysis

At each of the PeCaBeau stations, apart from PCB09 and PCB14, water was sampled at specific depth intervals from the surface to the bottom. The depths sampled were dependent upon the maximum depth at the station (see Appendix 9.1 for specific sampling depths per station):

1. Stations with depth <200 m: Surface, DCM and bottom,
2. Stations with depth >200 m: Surface, DCM, 200 m and bottom.

Water samples were collected and processed for different analyses as outlined below. In addition, surface sediment samples were collected from each station. The sediment samples were derived from the top 1 cm layer and were either wet sediment or sediments post-porewater removal.

A. Microbial omics (phylogenetic marker gene sequencing, metagenomics and metatranscriptomics):
   - 2 x 1 L of water was sequentially filtered through a 3 µm and 0.2 µm polycarbonate membrane filter (47 mm in diameter) and stored at -80 °C.
   - 1 x 4 ml tubes filled with surface sediment either after porewater has been extracted or wet sediment, dependent upon the success of coring operations. If 'dry' sediment was obtained, then 1 L of water that was sourced from within the core, above the sediment, was sequentially filtered through a 3 and 0.2 µm polycarbonate membrane as outline above.

B. Microbial microscopy and cell sorting (fluorescence in situ hybridisation and flow-assisted cell sorting):
   - 2 x 20 ml and 1 x 100 ml of water was fixed for 1 hour in 2% formaldehyde at room temperature, filtered through a 0.2 µm polycarbonate membrane filter and washed in milliQ water. Filters were stored at -80 °C.
   - 1 x 500 ml of water was filtered through 0.2 µm polycarbonate membrane filters (47 mm diameter) and stored at -80 °C.

C. Carbohydrate analysis (quantification of monosaccharides and polysaccharides along with composition of different polysaccharides). This was not carried out for all depths (see Appendix 9.1):
   - 2 x 3 L of water was filtered through a 0.7 µm pre-combusted GF/F filter and stored at -80 °C. 1 x 4 ml tubes filled with the flow-through from 0.7 µm GF/F filters and stored at -80 °C.

3.4.4 Filtration for lipid biomarker analysis and dissolved black carbon

Approximately 70 L of water was sampled at 3 depths (surface, DCM, and bottom, see Appendix 9.2 for exact volumes). The collected water was stored at 4 ºC until filtration on a stainless-steel tripod (Cole-Parmer, Fig. 8) using a peristaltic pump and 142 mm diameter pre-ashed glass fiber filters (GF/F, 0.7 µm pore-size). The loaded filters were wrapped in pre-ashed Al foil and stored at -20 ºC until lipid biomarker extraction.

Samples for dissolved black carbon were collected from the DCM (when present, see Appendix 9.2 for details). About 15 L of filtrate obtained from the 142 mm diameter filtration unit was collected in a 20 L cubitainer and immediately acidified (10%) with HCL (37%). The cubitainer was stored in the fridge until elution (no more than two days). Elution was done on board onto an activated PPL cartridge (Bond Elut PPL, 5 g, see Fig. 8). Activation was conducted as follows: pre-soaking for 12 to 24h in methanol – MeOH, then washing twice with milliQ, twice with MeOH and twice with MilliQ/HCl (10%). The filtrate slowly dripped into the cartridge (ensuring it would not run dry) over a period of 12 to 20 h. The cartridges were then stored in the -20 ºC freezer.

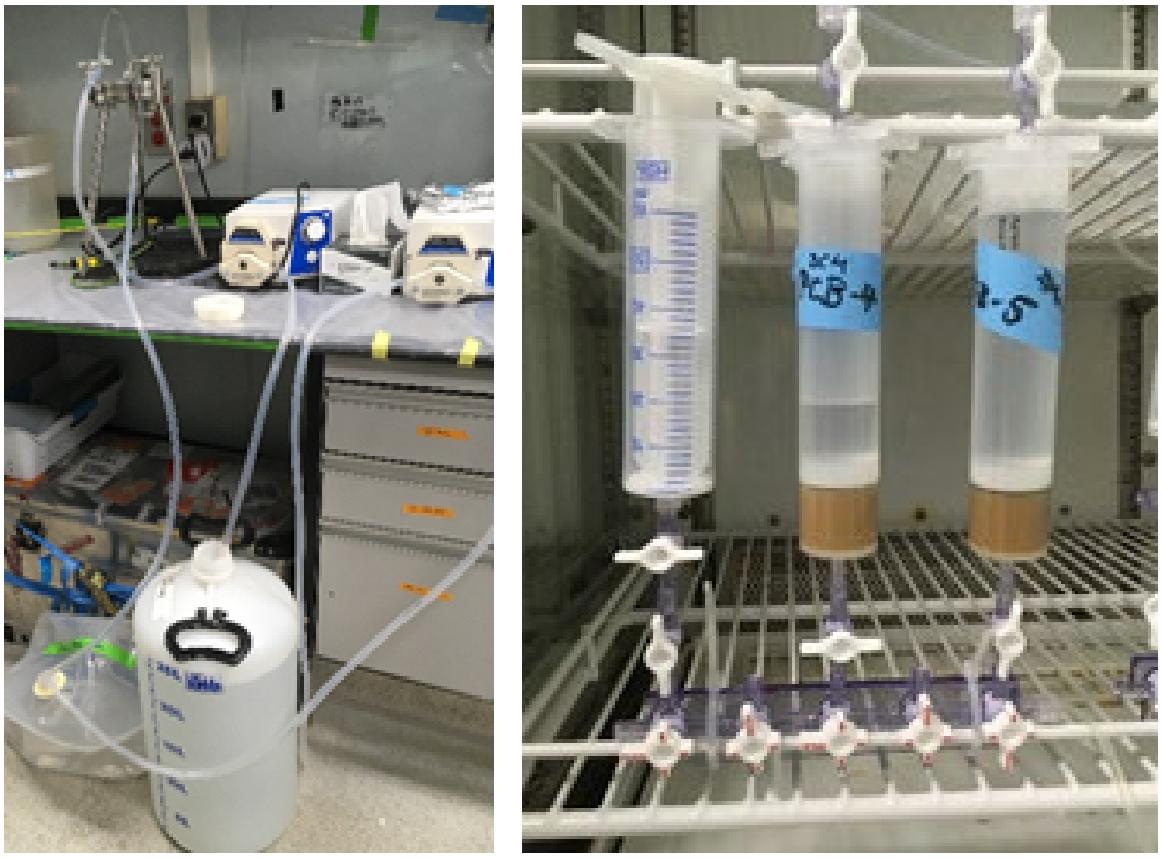


Fig. 8: Setup for large volume filtration and cartridges for the elution of dissolved black carbon.

3.4.5 Water sampling and processing for inherent optical properties (IOPs)

Several variables for IOPs and corresponding physical and biogeochemical variables in waters were obtained (Tab. 2). The absorption of CDOM was measured onboard using a separate set of samples as described in Section 3.2.1. The onboard measurement of CDOM absorption was then conducted within 4 hours after the sampling. The sampling scheme for each IOP variable is described in more detail below.

Tab. 2: Summary of inherent optical properties (IOPs) and related physical and biogeochemical variables collected from waters for the ARICE/PeCaBeau cruise. All variables were measured on board during the cruise except ones with an asterisk, which will be determined by later analyses.

Variable	Sensor/Method	Spectral range and resolution
Inherent optical properties (IOPs)		
Total light absorption coefficients, $a_t(\lambda)$ (m^{-1})	ac-s (SeaBird Scientific)	400-750 nm with 3 to 4 nm increments
	*Spectrophotometer with a 150 mm integrating sphere (Perkin Elmer) plus a liquid waveguide (World Precision Instruments, Inc.)	300-722 nm with 1 nm increments
Total light scattering coefficients, $c_t(\lambda)$ (m^{-1})	ac-s (SeaBird Scientific)	400-750 nm with 3 to 4 nm increments
Light absorption coefficients by particles, $a_p(\lambda)$ (m^{-1})	ac-s (SeaBird Scientific)	400-750 nm with 3 to 4 nm increments
	*Spectrophotometer with a 150 mm integrating sphere (Perkin Elmer)	300-850 nm with 1 nm increments
Light scattering coefficients by particles, $c_p(\lambda)$ (m^{-1})	ac-s (SeaBird Scientific)	400-750 nm with 3 to 4 nm increments
	*Spectrophotometer with a 150 mm integrating sphere (Perkin Elmer)	300-850 nm with 1 nm increments
Light absorption coefficients by non-algal particles, $a_{NAP}(\lambda)$ (m^{-1})	*Spectrophotometer with a 150 mm integrating sphere (Perkin Elmer)	300-850 nm with 1 nm increments
Light absorption coefficients by phytoplankton, $a_{ph}(\lambda)$ (m^{-1})	*Spectrophotometer with a 150 mm integrating sphere (Perkin Elmer)	300-850 nm with 1 nm increments
Light absorption coefficients of colored dissolved organic matter	ac-s (SeaBird Scientific)	400-750 nm with 3 to 4 nm increments
	Liquid waveguide, UltraPath (World Precision Instruments, Inc.)	200-722 nm with 1 nm increments
Temperature/ Salinity/Depth	CastAway (SonTek)	-
Pressure/Depth	SoloD (RBR)	-
Biogeochemical variables		

Phytoplankton pigments	High performance liquid chromatography, HPLC	mg m^{-3}
Concentrations of dissolved organic carbon	*High temperature catalytic oxidation	g m^{-3}
Concentrations of particulate organic carbon	*High temperature oxidation (elemental analyser)	g m^{-3}

3.4.6 Total, dissolved and particulate organic matter absorption/attenuation spectra

The total absorption and attenuation ($a_t(\lambda)$ and $c_t(\lambda)$, both in m^{-1}) and the absorption of colored dissolved organic matter ($a_{CDOM}(\lambda)$ and $c_{CDOM}(\lambda)$, both in m^{-1}) in water samples were measured using an ACs bench-top setup (Sullivan et al., 2006; Fig. 9). The total absorption and attenuation were measured by filling the optical path of the ACs (10 cm) with the unfiltered water sample. The dissolved absorption and attenuation were measured using the filtered water sample through 0.2 um, identical ones used for UltraPath measurements (using 0.2 µm filter, GHP Acrodics). Regarding a reference, while a MilliQ water was used for ACs, a salty reference water was used for UltraPath measurements (see below). The absorption and scattering coefficients will be determined by considering temperature and salinity effects (Pegau et al., 1997; Sullivan et al., 2006).

Fig. 9: Benchtop setup of the AC's spectrophotometer.

3.4.7 Particle absorption spectra

Water samples at surface, 10 m, DCM, and 75 m were taken and filtered through 25mm Whatman GF/F filters. Depending on the load of particles, the volume filtered (V_f, m^3) varied. The diameter of the clearance of the filtered area (A_f, m^2) depended on funnels used for the filtration, which were pre-measured at the beginning of the cruise. After the filtration, the filter sample was placed in a plastic dish and covered by aluminum foil. The filters were immediately placed in a liquid nitrogen container for fast freezing (Sosik, 1999).

Measurements of absorbance by particles retained on the filters ($OD_{fp}(\boldsymbol{\lambda})$, dimensionless) will be made at Scripps Institution of Oceanography using a custom-made spectrophotometer attached with a 150 mm integrating sphere. A sample will be placed inside the integrated sphere to minimize the scattering effect by particles. The absorption of a blank filter ($OD_{bf}(\boldsymbol{\lambda})$, dimensionless) will also be measured. By considering the pathlength amplification factor, so-called $\boldsymbol{\beta}$-factor for the specific spectrophotometer to be used (Stramski et al., 2015; IOCCG Protocol Series, 2018),

the absorption coefficients by particles ($a_p(\boldsymbol{\lambda})$, m^{-1}) will be calculated along with the volume filtered and the clearance area by $2.303*A_f*[OD_{fp}(\boldsymbol{\lambda})-OD_{bf}(\boldsymbol{\lambda})]/(\boldsymbol{\beta}*V_f)$.

A small amount of methanol (5 to 10 ml) will be added on the filters to remove phytoplankton pigments (Kishino et al., 1985). The same procedure for $a_p(\boldsymbol{\lambda})$ will be repeated for determining absorption coefficients of non-algal particles ($a_{NAP}(\boldsymbol{\lambda})$, m^{-1}). The absorption coefficients of phytoplankton ($a_{ph}(\boldsymbol{\lambda})$, m^{-1}) will then be obtained by subtracting $a_{NAP}(\boldsymbol{\lambda})$ from $a_P(\boldsymbol{\lambda})$.

Fig. 10: Filter for $a_p(\lambda)$ in dish before put to liquid nitrogen.

3.4.8 Absorption of colored dissolved organic matter

Light absorbance of colored dissolved organic matter (CDOM) was measured onboard using a liquid waveguide system, UltraPath (World Precision Instruments, Inc.) following the protocols proposed by Matsuoka et al. (2012). Water samples were collected from CTD/Niskin bottles at all PeCaBeau stations (Appendix 5.1). The sampling depths (surface, deep chlorophyll maximum (DCM), 10, 25, 50, 75, 100, 150, 200, 300, 500, and 1000 m), chosen to capture different water masses of the Beaufort Sea (Matsuoka et al., 2012), varied depending on the bathymetry of the stations visited. Occasionally, surface waters were obtained using a custom-made pump from approximately 2 m below the surface. The water samples were poured into amber glass bottles pre-rinsed with MilliQ waters. These samples were filtered immediately after the sampling through 0.2 µm GHP filters (Acrodisc Inc.) pre-rinsed with 200 ml of Milli-Q water. Absorbance spectra of filtrates were measured using a 50 cm capillary cell from 200 to 722 nm with 1 nm increments relative to a salt solution as a reference. The reference was prepared to have a similar salinity as samples (± 4 salinity units) using Milli-Q water and granular NaCl pre-combusted in an oven at 450 ˚C for 4 hours. The difference of refractive index due to salinity between a sample ($OD_{sample}(\lambda)$) and a reference ($OD_{reference}(\lambda)$) was corrected by subtracting the reference spectrum from the whole spectrum following Babin et al. (2003) and Matsuoka et al. (2012). The absorption coefficients of CDOM were calculated by $2.303*[OD_{sample}(\lambda)-OD_{reference}(\lambda)]/0.5$.

Fig. 11: Ultrapath setup onboard the CCG Amundsen.

3.4.9 High Performance Liquid Chromatography (HPLC) of phytoplankton pigments

Water samples at surface, 10m, 75m and at the DCM were taken and filtered right after sampling through 25mm Whatman GF/F filters. Depending on the load of particles, visible by colour of the filter, the volume filtered varied. After the filtration, the filters were folded and placed in cryovials, which were then immediately frozen by placing them into a liquid nitrogen container.

The filter samples will be shipped to Laboratoire d'Océanographie de Villefranche, France in November 2021. Phytoplankton pigments will be determined using high performance liquid chromatography (HPLC) following the international SeaHARRE protocols (Hooker et al., 2005).

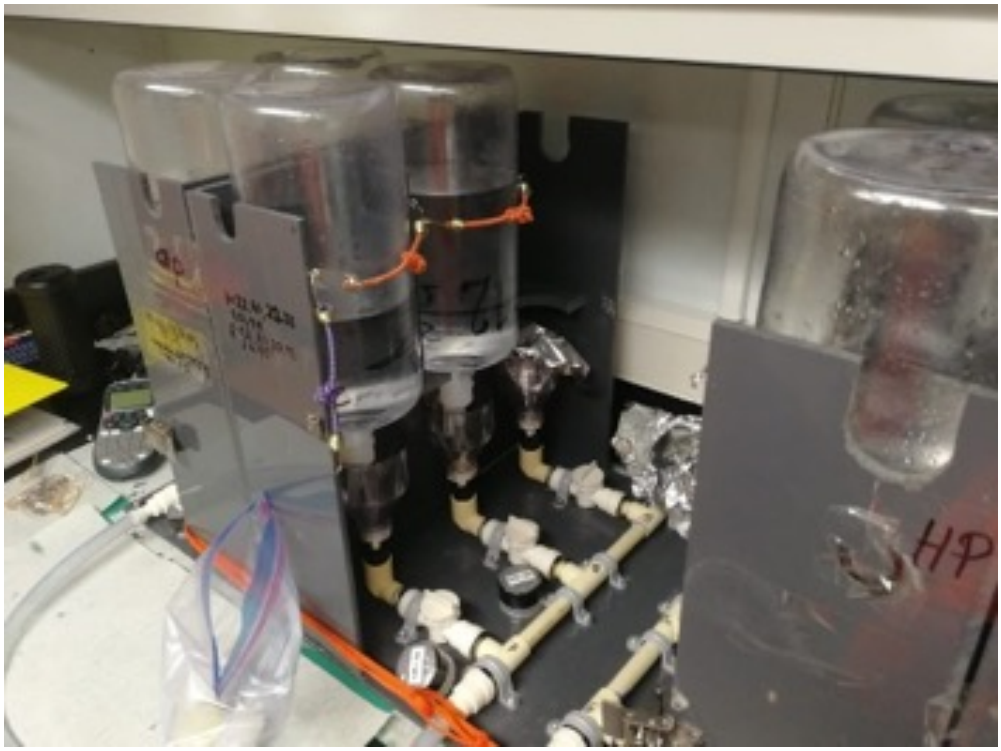


Fig. 12: Filtration system for HPLC and aP.

3.5 Radiometry

To ensure the quality of water reflectance spectra, we have conducted radiometric measurements using three separate devices nearly simultaneously (in-water, floating, and above-water devices; Tab. 3). Optical properties in the atmosphere were also measured. Sections 3.5.1-3.5.3 provide a brief explanation of each device and how the data was obtained.

Tab. 3: Summary of the variables measure onboard during the PeCaBeau cruise.

Variable	Sensor/Method	Spectral range and resolution
Apparent optical properties (AOPs)		
Water reflectance, $\rho_w(\lambda)$ (dimensionless) using above-water device	Above-water device mounted on flight deck, RAMSES (TriOS): #1. Downwelling radiance from sky, $L_{sky}(\lambda,+10m)$ (mW m^{-2} nm^{-1} sr^{-1}) #2. Upwelling radiance from water, $L_r(\lambda,+10m)$ (mW m^{-2} nm^{-1} sr^{-1}) #3. Downwelling irradiance from the sky, $E_d(\lambda,+10m)$ (mW m^{-2} nm^{-1})	300-850 nm with 4 nm increments
$\rho_w(\lambda)$ using in-water device	In-water device, RAMSES (TriOS): #4. Upwelling radiance along with a pressure sensor, $L_u(\lambda,z)$ (mW m^{-2} nm^{-1} sr^{-1}) #5. Upwelling radiance mounted 18 cm above the #4, $L_u(\lambda,z)$ (mW m^{-2} nm^{-1} sr^{-1}) #6. Downwelling irradiance mounted 20 cm above the water, $E_d(\lambda,+0.2m)$ (mW m^{-2} nm^{-1})	300-850 nm with 4 nm increments
$\rho_w(\lambda)$ using floating device	Floating device, RAMSES (TriOS): #7. Upwelling radiance mounted 6 cm below the water surface, $L_u(\lambda,-0.06m)$ (mW m^{-2} nm^{-1} sr^{-1}) with simultaneous measurement of #6	300-850 nm with 4 nm increments
Aerosol optical depth (dimensionless)	Microtops II (Solar Light)	340, 380, 440, 500, 675, 870, 1020, 1640 nm
Water vapor (cm)	Microtops II (Solar Light)	-

Tab. 4: Summary of stations where floating, in-water and above-water radiometric measurements were conducted.

Number	Station	Local date (YYYYMMDD)	Local time (start)	Local time (end)
1	316	20210915	17:46	18:14
2	C014	20210916	14:29	15:00
3	PCB-01	20210917	19:32	20:00
4	PCB-04	20210920	9:36	10:08
5	PCB-03	20210921	10:44	11:27
6	PCB-07	20210922	11:37	12:12
7	434	20210922	19:08	19:45
8	435	20210923	12:37	13:16
9	546	20210924	18:12	18:42
10	PCB-22	20210925	11:13	11:50
11	PCB-21	20210925	11:13	11:50
12	PCB-20	20210926	14:42	15:10
13	482	20210926	19:15	19:51
14	480	20210927	12:11	12:44
15	PCB-18 / 476	20210927	20:15	20:47
16	474	20210928	12:27	12:55
17	472	20210928	15:15	15:48
18	PCB-12	20210930	13:14	13:41
19	PCB-10	20210930	19:01	19:37

The light field was measured in multiple ways on board the ship. Fig.s 13 and 14 show the setup of three measuring systems. The order of measurements followed:

1. Simultaneous measurements of upwelling radiance in the water column ($L_u(\lambda,z)$) along with above-water downwelling irradiance ($E_d(\lambda,+0.2m)$)
2. Simultaneous measurements of upwelling $L_u(\lambda,z)$ at 6 cm below the water surface ($L_u(\lambda,-0.06m)$) along with downwelling irradiance along with above-water $E_d(\lambda,+0.2m)$)
3. Simultaneous measurements of downwelling radiance from the sky ($L_{sky}(\lambda,+10m)$), upwelling radiance from water ($L_r(\lambda,+10m)$), and downwelling irradiance ($E_d(\lambda,+10m)$) using an above-water device mounted on the flight deck during the observations of 1) and 2)

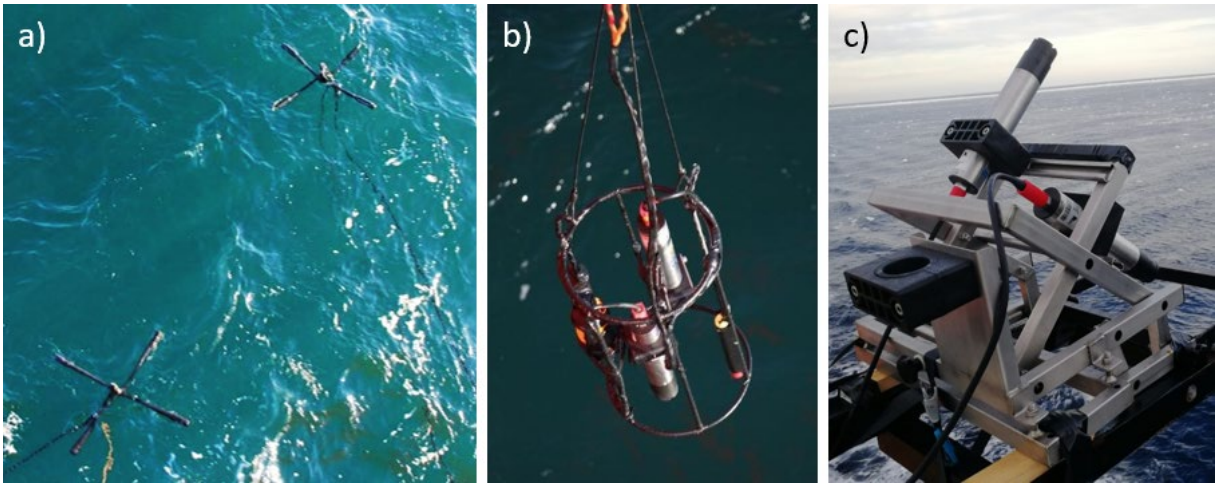


Fig. 13: a) floating, b) in-water and c) above-water radiometric systems.

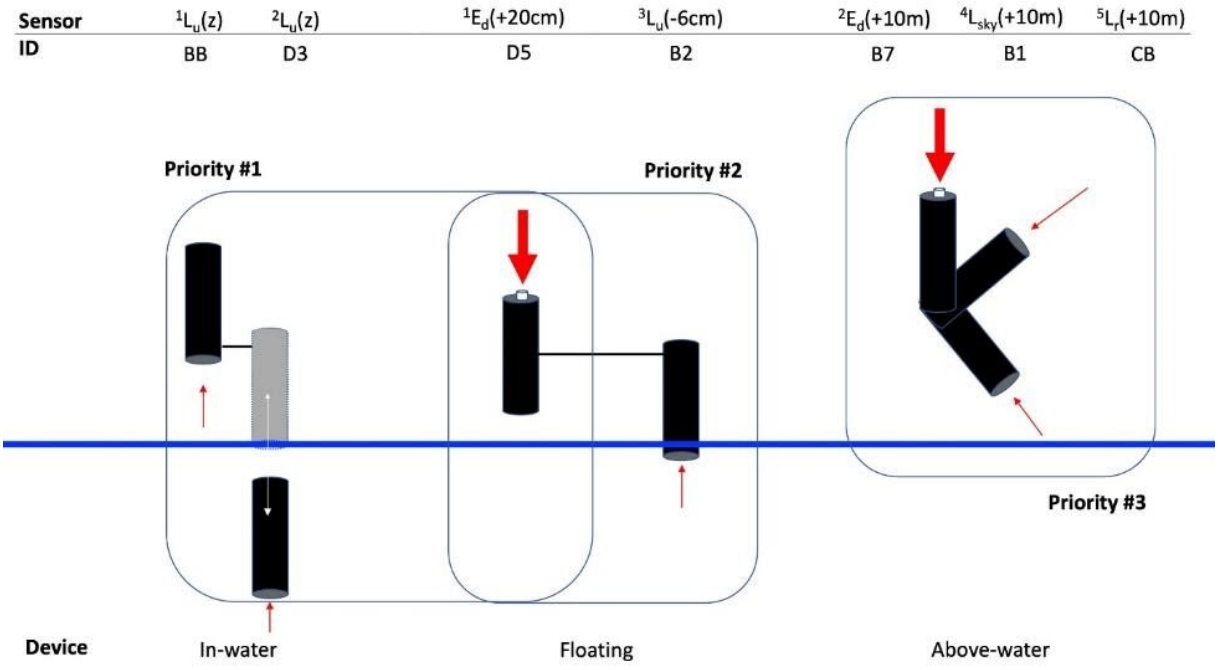


Fig. 14: Setup of three radiometric systems (in-water, floating, and above-water) using Trios Ramses radiance (BB, D3, B2, B1, CB) and irradiance sensors (D5, B7).

3.5.1 In-water profiling radiometry

The in-water profiling device includes two upwelling radiance ($L_u(\lambda,z)$) sensors with 18 cm apart. The set-up was designed for measuring $L_u(\lambda,z)$ at the different depths. This is particularly important in turbid coastal waters where the light extinguishes with depth very quickly within a few centimetres in an extreme case (Hooker et al., 2020). For oceanic waters, the two $L_u(\lambda,z)$ sensors were instead used for cross checking the quality of the data. Downwelling irradiance ($E_d(\lambda,+0.2m)$) was measured during the $L_u(\lambda,z)$ profiling. The $L_u(\lambda,z)$ data will be extrapolated to the null depth ($L_u(\lambda,0-)$) and then converted to the above water value by taking into account the air-water interface ($L_w(\lambda,0+)$). The quality control will include, not limited to, stability of radiance and irradiance spectra during the measurements, ship shadowing, corrections for self-shadowing, tilt, and immersion factor corrections (IOCCG Protocol Series, 2019). The water reflectance will be calculated by normalizing $L_w(\lambda,0+)$ by $E_d(\lambda,0+)$: $\boldsymbol{\rho}_w(\lambda)=\pi*L_w(\lambda,0+)/E_d(\lambda,+0.2m)$.

3.5.2 Floating radiometry

The floating device included two floats carrying a downwelling irradiance ($E_d(\lambda,+0.2m)$) and an upwelling radiance sensor ($L_u(\lambda,-0.06m)$). After deployment from the ship, the floats drifted away from the ship to avoid ship shadow. In some cases, the floats stayed near the ship body. During the deployment, the tilt angle of the $L_u(\lambda,-0.06m)$ was monitored particularly when the sea state was rough. The conditions of the sensors and sea state were written in a log sheet for every deployment. $L_u(\lambda,-0.06m)$ data will be compared to $L_u(\lambda,z)$, extrapolated to the null depth, and converted to the value just above the water, $L_w(\lambda,0+)$. $\boldsymbol{\rho}_w(\lambda)$ will be calculated by $\pi*L_w(\lambda,0+)/E_d(\lambda,+0.2m)$.

3.5.3 Above-water radiometry

The above-water system included downwelling radiance from sky ($L_{sky}(\lambda,+10m)$), upwelling radiance from water ($L_r(\lambda,+10m)$), and downwelling irradiance ($E_d(\lambda,+10m)$) using an above-water device mounted on the flight deck. By taking into account geometry of the sun and sensor as well as reflection of the air-water interface, those data will be used for calculating independent water reflectance spectra relative to ones obtained from in-water profiling and floating devices: $\boldsymbol{\rho}_w(\lambda)=\pi*(L_r(\lambda,+10m)-\boldsymbol{\rho}*L_{sky}(\lambda,+10m))/E_d(\lambda,+10m)$.

3.6 Sediment Coring

3.6.1 Multicoring

With a multicorer (MUC) several undisturbed sediment samples are taken simultaneously. A major advantage of the MUC is the often pristine sediment-water interface that it recovers. The MUC pushes up to eight, 60 cm long and 10 cm diameter PVC liners into the sediment. The instrument weighs about 300-400 kg, is 3 m wide and 3.5 m high. To achieve the desired penetration depth up to 10 individual ~10 kg lead weights can be added to the core head. The sampling tubes on the MUC are armed on deck. After being attached to the A-frame, a safety pin is removed that holds the core head in a fixed position with respect to the frame (Fig. 15). As soon as the rack touches down on the seabed, the core head is slowly pressed into the sediment by its own weight (Fig. 16). Upon removal from the sediments, spring-loaded closures are pressed onto the tubes from above and below to secure the samples during their ascent and recovery on deck.

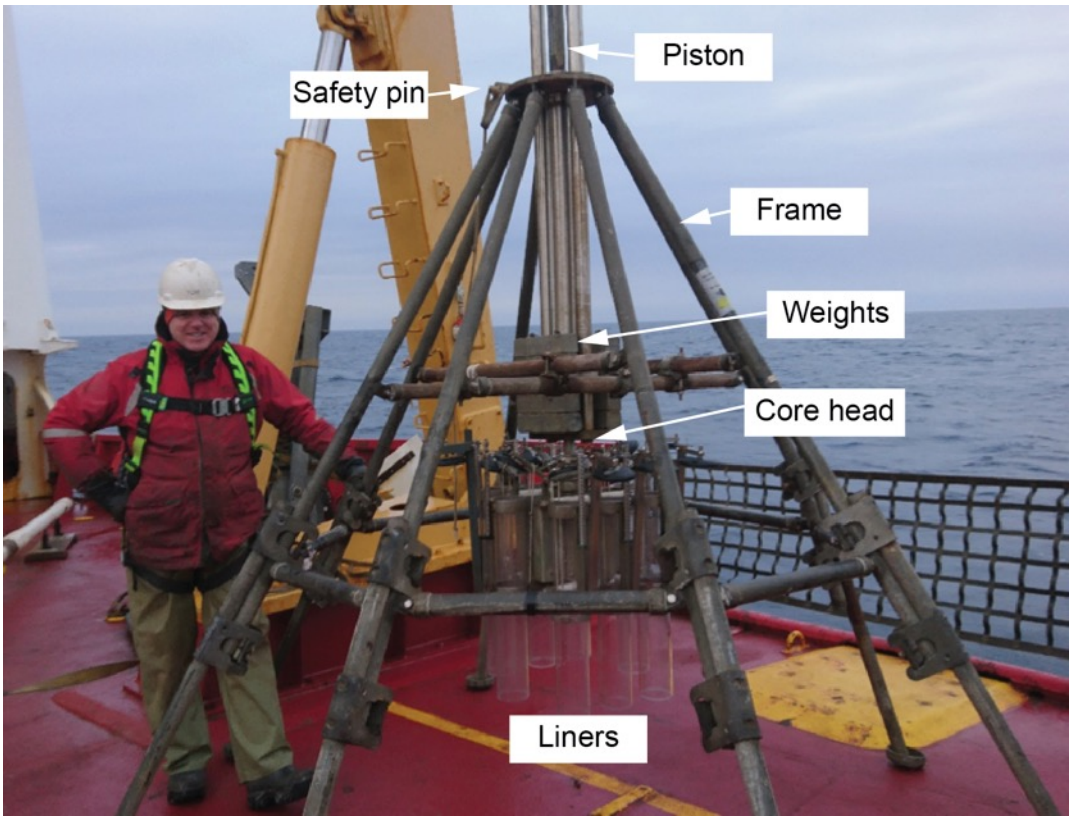


Fig. 15: Multicorer (MUC no. 4) from AWI Bremerhaven on deck the CCGS Amundsen before deployment.

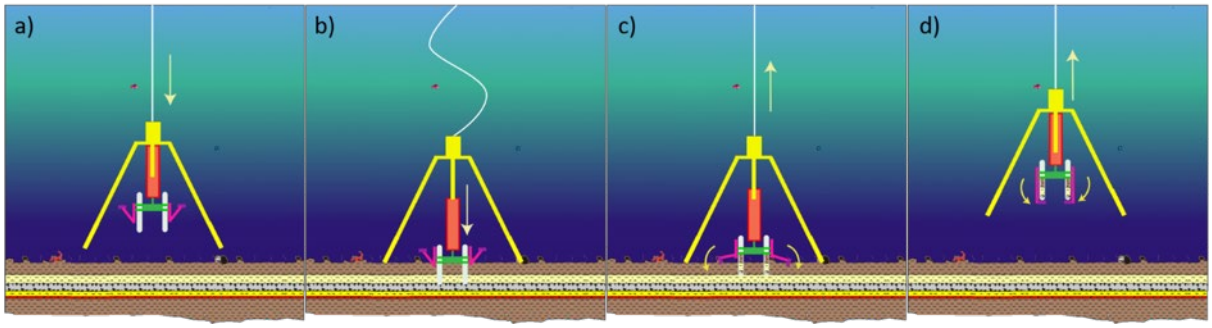


Fig. 16: Schematic of multicorer sampling the seafloor. Phases of MUC deployment are a) descent, b) contact: liners sink into the sediment, c) retract: tension on wire triggers arms to close tubes, d) recovery (illustration by Daniel Rudbäck).

The MUC was guided over the side of the ship by two scientists. Three deck crew members operated the crane and A-frame winch. They were responsible for removing and installing the safety pin and supervised the operations. Winch speed was set to 60 m/min through the water column and decreased to 30 m/min for the last 25 m until the MUC touched the seabed. About 3 m of slack was given and the MUC was left one minute on the seafloor to allow for full penetration. In case of very soft sediments, lead weights needed to be removed to avoid overfilling of the liner tubes. Reducing the lowering speed generally does not avoid overfilling but can lead to a failure in the spring-loaded closures. Upon arrival on deck, five scientists helped to secure and to remove the cores. Four scientists secured the cores with stoppers to prevent leakage and released each tube from the MUC. An additional scientist received the cores and placed them in a carrying rack. The MUC was then cleaned by the scientists, and re-positioned on the deck by the crew.

The individual tubes from each MUC were allocated for different purposes. In general, four of the tubes were sliced at 1-2 cm intervals for sedimentary properties, bulk elemental analyses and biomarker analyses; one tube was sealed and stored as an archive; two tubes were taken for pore water analyses; and a final tube was reserved for solid phase geochemical sampling. Slicing of the four MUC cores was done by the Benthos lab of the ship (Fig. 17). Sliced samples were bagged and placed in the -20 °C freezer. Additionally, two water samples (400 ml and ~1000 ml) were taken from the MUC liners for all PeCaBeau MUC stations except MCTL, PCB-1 and PCB-9. These waters were overlying the sediment cores and thus define as a real bottom water sample from just a few centimetres above the seafloor. The samples were prepared for DOC, CDOM, FDOM, stable water isotopes and nutrients (see chapter 3.4.1 for details) and microbial omics (see chapter 3.4.3 A).

Fig. 17: A sequence of sediment core slicing outside the benthos lab on the port side of the ship.

3.6.2 Piston, Giant Gravity, and Gravity coring

Longer sediment cores were obtained using one of two core barrel assemblies; a 9-m long 12.8 cm diameter core barrel (consisting of three separate pieces weighing a total of 204 kg) with an 850 kg coring head, or a 3-m long 10.25 cm diameter barrel with 108 kg core head. All piston cores (PC) were collected using the 9-m long core barrel with the 3-m long barrel deployed as the trigger weight core (TWC). Two types of gravity core were obtained; a Giant gravity core (GGC) comprised of the 9-m long assembly, and the basic gravity core (GC) consisting of the 3-m long assembly.

An orientation arrow was drawn on all the core liners before being loaded into the core barrel. This arrow points towards the seafloor. Upon recovery, core sections were cut into 1-m long sections. The GSC convention of labelling sections as they were removed from the core barrel was employed. In this system, the lowermost end cap is labelled ‘A’, the first section break moving up-core labelled ‘B’ and so on. Once in the lab, the cores were labelled with the station and section number. The deepest section of the core corresponds to the ‘A-B’ section labelled on deck. A ‘Working’ half and ‘Archive’ half were labelled on each section to ensure that the split cores can retain their azimuthal orientation for potential post-cruise paleomagnetic work. The full core ID consists of the cruise name “AMD2104”, the station number “PCB-XX”, the type of core “PC; GGC; GC; TC”, the section number “ 1, 2, 3, . . . “ and a letter (W or A) to indicate the working or archived halves when split.

3.6.3 In-situ Temperature Measurements

At eight of the long coring stations, in-situ temperature measurements were collected using ANTARES miniature temperature probes. These were attached to the outside of the 9-m long core barrel (Fig. 18). The temperature loggers have an operational range of -5 to 50 °C, 100 MPa, and a resolution of 0.001°C. The probes were inserted into stainless steel fins attached to the core barrels using hose clamps. The fins protect the temperature probes and keep them ~ 10 cm away from the core barrel. This offset distance reduces the effects of frictional heating from the core barrel as it enters into the sediments. The probes were programmed for a 1-s sampling interval, and 3-5 probes were used on each core. By the end of the expedition only 3 of the 6 probes brought offshore were working. Two had stopped communicating and one was damaged during deployment. Spacing between the sensors was ~ 1.5 m (Fig. 19). Ideally, during the

temperature measurements, the core barrel is left in the sediments for ~3 minutes to allow the frictional warming pulse to dissipate after penetration. In reality, this time varied considerably depending on the water depth, weather conditions, and ability for the ship to remain on position without drifting.

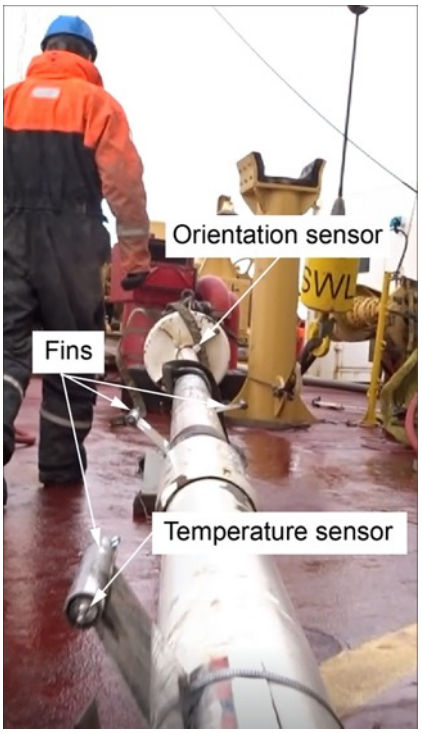


Fig. 18: A section of the 9-m core barrel assembly illustrating how the Antares miniature temperature sensors were mounted. A Star-Oddi orientation sensor was attached beneath the core head to record the angle of the core during penetration and recovery.

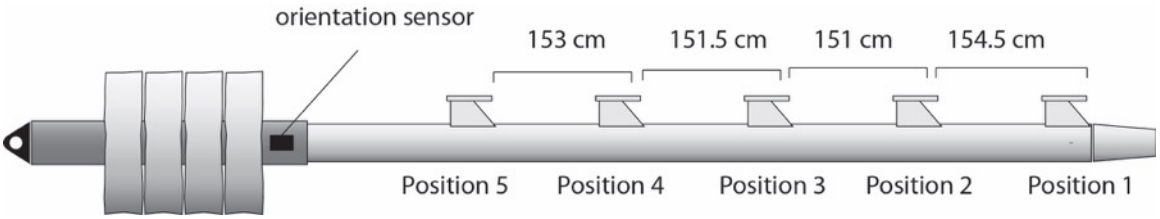


Fig. 19: Schematic illustration of the temperature probe layout on the core barrel, and position of the orientation sensor. The distance between each of the temperature probes is shown, as well as the position number. Data files assign the serial number of the temperature probes to one of the positions on the core barrel for each deployment.

To monitor the angle of the core barrel while embedded in the sediments, a Star Oddi DST magnetic orientation sensor was used. The sensor recorded the temperature, pressure (depth), ambient magnetic field strength, tilt (in 3 directions), and the azimuth. This sensor was attached to the core barrels using hose clamps and positioned just below the core head. Depth is a calculated by the sensor by measuring the pressure. The accuracy depends on the calibration of this sensor to local temperature and salinity profiles. The sensor has not been calibrated to local conditions on this expedition. The orientation and temperature sensors are synchronised to record data at the same time. In this way the depth/tilt data can be interpreted alongside the temperature measurements (Fig. 20).

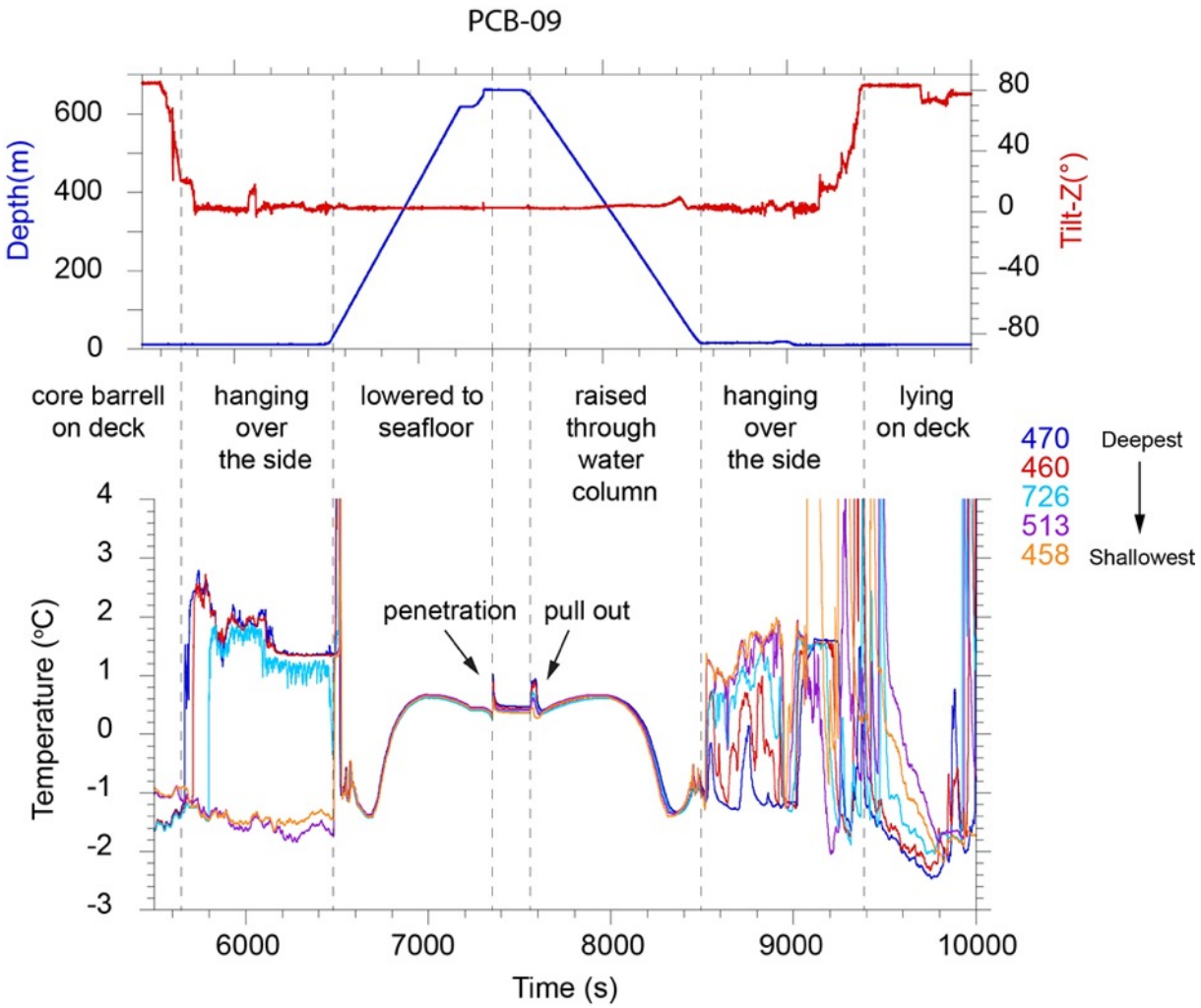


Fig. 20: A typical sequence of events during a piston core deployment includes data collection on the ship's deck, while the corer is being deployed over the side, lowered, embedded in the sediments, and raised back up to deck. Each temperature sensor is denoted by the last three digits of its serial number. Note how the order on the core barrel can be verified by the abrupt warming of the sensors as they are hung over the side and then lowered into the water column.

3.6.4 Multi Sensor Core Logging

A recently refurbished Geotek MSCL was provided by *Amundsen Science* and set-up in the Paleo Lab (Fig. 21). The sensors were oriented in the horizontal direction for whole-core logging. Measurements of the gamma ray derived bulk density, compressional wave velocity, electrical resistivity and magnetic susceptibility were acquired. On the piston, gravity and trigger cores, these measurements were acquired at a downcore resolution of 1-cm. An archived multi-core from each station was also measured, primarily to determine the bulk density of the sediments. These measurements were performed at a resolution of 0.5 cm.

Gamma-ray attenuation was measured using a ^{137}Cs source with a 5 mm collimator and a 5 s count time. Typically, the system was calibrated at the beginning or end of each work period (day). The calibration standard consisted of a machined piece of aluminium that was fit within a section of core liner. The calibration piece had 5 different thicknesses of aluminium with diameters of 2, 3, 4, 5, and 7.5 cm. The liner was filled with tap water and left to equilibrate to room temperature (~20°C). The calibration piece and liner were then placed in front of the ^{137}Cs source. The number of gamma rays passing through each section over a course of 30 s, as well as through an interval containing only water, was logged. The relationship between the measured counts per second and the known bulk density of the aluminium/water mixture at each step was determined using a 2nd order polynomial.

Magnetic susceptibility was acquired with a 120 mm Bartington loop sensor using a 1 s acquisition time. This provided a spatially integrated susceptibility signal that encompasses the entire diameter of the core with an effective sensor length of generally 4-6 cm. No volume or mass corrections were applied to the shipboard generated data. The non-contact resistivity sensor was used on most cores. The factory calibration of the sensor was applied to process the data instead of preparing standard NaCl solutions in pieces of core liner.

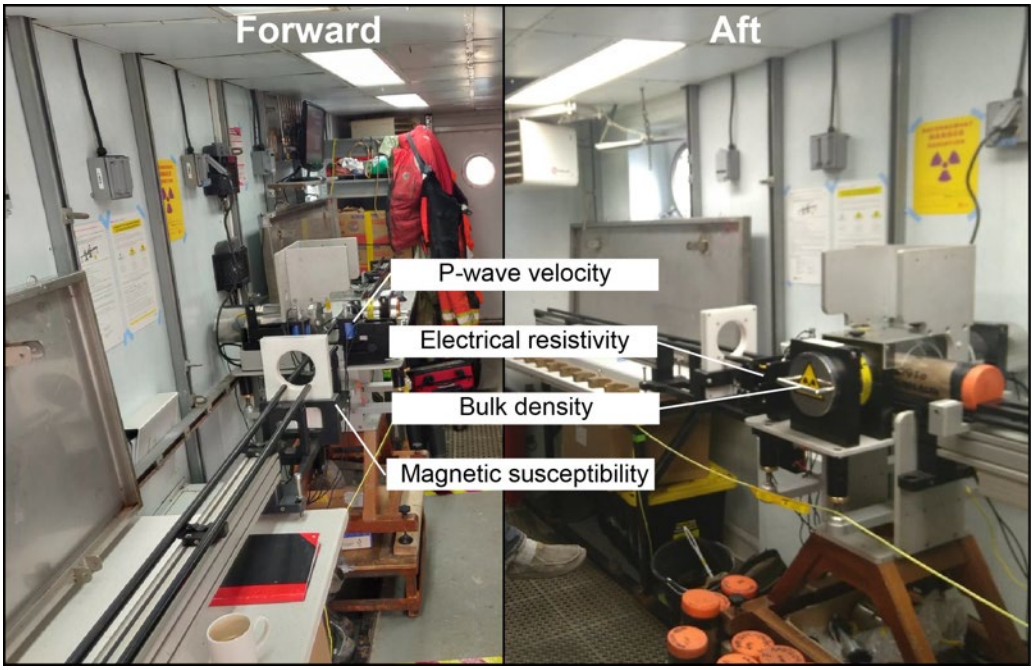


Fig. 21: Layout of the MSCL in the Paleo lab looking both forward and aft.

3.6.5 Pore Water and Solid Phase Geochemistry

In order to understand early diagenesis and the role of different electron acceptors in organic matter remineralization, sediment and porewaters were sampled at all PCB stations. Pore waters were extracted from the multi-cores using Rhizones. Samples were prepared for shore-based analyses of trace elements and cations; rare earth elements; DOC and DIC; anions; and sulphides. Sampling was conducted at a resolution of 1 cm between 0-10 cm, 2 cm from 10- 20 cm, and 5 cm from 20-50 cm. For low-resolution sampling, cores were subsampled every 2 cm until 5 cm and every 5 cm from 5 to 40 cm. In addition, in order to investigate deeper elemental fluxes that operate on meters, porewater was extracted from trigger cores at stations PCB 07, 11, 12 16, 17, 17a, 18. The resolution of porewater sampling with Rhizons was 20 cm and the samples will be analysed on-shore for the concentration and stable isotopes of dissolved inorganic carbon as well as cations and anions (ICP-OES and Ion chromatrography).

One MUC core at each station was taken and the solid phase sediment was saved to supplement the porewater work. These were sliced at 2 cm intervals for the first 10 cm, then at 5 cm intervals. Additional sampling was conducted on gravity/trigger weight cores from two specific transects; one was across the Mackenzie Trough (PCB 16, 17, 17a, 18) and the other across the shelf (PCB 11-12). Samples for the solid phase geochemistry were placed in plastic bags and frozen, a small subsample (~15 g) was placed inside of glass vials, sealed with a butyl rubber septum and purged with N_2 gas to remove oxygen. These vials were stored in the refrigerator. For the longer gravity and trigger weight cores the samples were taken every 20 cm. Post cruise analyses will include sediment incubations of the anoxic vials to better asses organic matter remineralization rates. Frozen samples will be used to quantify the amounts of acid volatile sulphides and chromium reducible sulphides (AVS+CRS) as well as the different fractions of iron present in the sediment.

3.6.5 Preliminary Results – Coring Summary

During *PeCaBeau* 26 multicore deployments were conducted, with recovery ranging between 20 and 49 cm. In most cases all eight tubes of the multi-corer were filled, and in all cases one tube has been archived and returned to Potsdam for long-term storage. Gravity/Piston cores were collected at 17 sites during the expedition. Of these, twelve were primary *PeCaBeau* stations, and five additional stations sampled for collaborative work with colleagues at Institute des sciences de la mer, Université du Québec à Rimouski, and the Geologic Survey of Canada (Atlantic) (Fig. 22 and Appendix 9.3). Cores ranged from a few decimetres to just under 6.8 m in length. Individual section lengths required to add core depths to subsamples are given in Appendix 9.3.

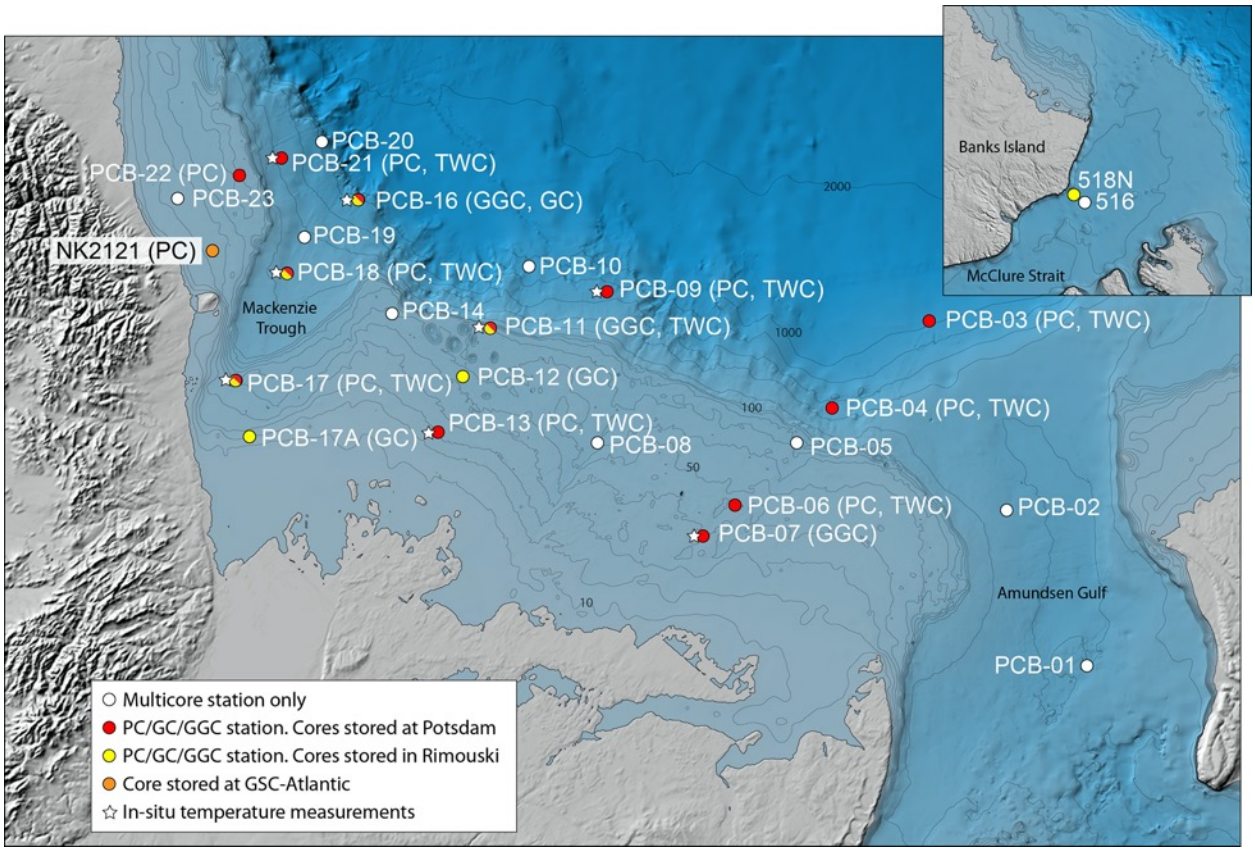


Fig. 22: Map illustrating the sediment coring stations and locations of in-situ temperature measurements. Color-coding is used to illustrate where different cores were sent for long-term storage. Multi-cores were taken at all stations.

3.6.6 Preliminary Results – Core Logging and Stratigraphy

The deglacial and Holocene stratigraphy of slope sediments along the Beaufort Sea have recently been described and constrained using radiocarbon dating by Keigwin et al. (2018) and Klotsko et al. (2021). In particular, Klotsko et al. (2021) have shown that across much of the Beaufort slope, the onset of the Holocene or end of the Younger Dryas, occurs at the top of an ice rafted debris (IRD) rich interval that can be seen in core logging data as a region of elevated magnetic susceptibility, and in sub-bottom data as the first set of hard reflectors seen below the seafloor (Fig. 23). Underlying this IRD unit is a relatively rapidly deposited, finely layered/laminated sequence. This basic stratigraphic framework provides a preliminary starting point for interpreting the shipboard core logging data. Many of the deeper water slope sites (PCB-3, 4, 9, 16, and possibly 21), captured a similar transition to what appear to be coarser, higher susceptibility sediments that likely marks the transition from deglacial to Holocene sediments (Appendix 9.5). Two of the shallower shelf sites, PCB-6 and 11 contain a more abrupt transition near their base into higher density and higher susceptibility sediments that could also be a response to shelf transgression (Appendix 9.5).

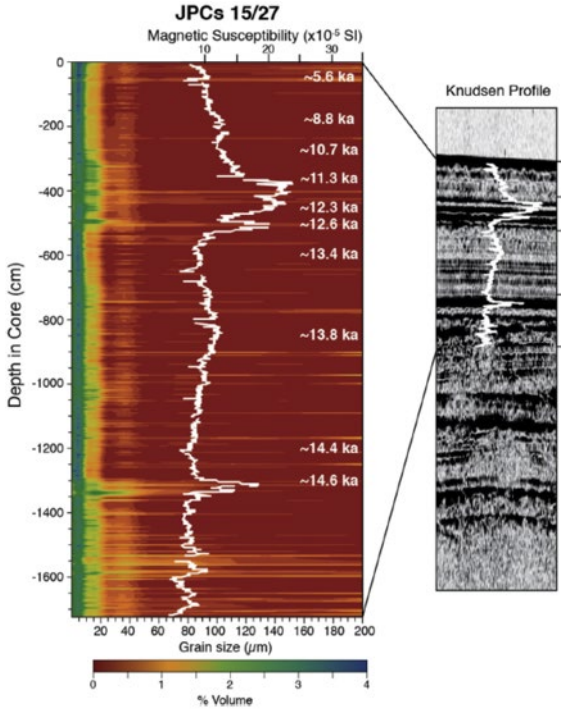


Fig. 23: Magnetic susceptibility, grain size and sub-bottom profile for the composite core JPC15/27 presented by Klotsko et al. (2021). PCB-9PC was taken very close to the location of this core and captured a similar transition into higher susceptibility sediments at its base, marking the deglacial/Holocene transition (Fig. 22).

In some instances, there appears to be a notable amount of drift in the magnetic susceptibility sensor. This may account for offsets between measurements of some PC and TWC's, for example the last section of PCB-16-TWC, and possibly also in PCB-21-PC. The offsets may be due to either prolonged pauses during logging, or temperature changes that occurred in the Paleo-lab, where often the doors needed to be left open. Finally, there appears to be a large stratigraphic offset between correlative features in PCB-13-PC and TWC. It is very possible that section 2 of PCB-13TWC was run upside down, something that needs to be checked when the cores are opened and further processed.

3.6.7 Preliminary Results – In-situ Temperature Data

Profiles of the in-situ temperatures, core depth and tilt are provided for each station where measurements were acquired (Appendix 9.6). The position and serial number for each sensor are given in Table 5. In all cases the core penetrated the sediments at a near vertical angle. Slight offsets in the temperatures recorded by each sensor may exist, and in past work have been normalised by using an average temperature recorded through the water column (i.e., O'Regan et al., 2016). Other post-processing steps necessary to establish in-situ gradients include applying a tilt correction, which should be minimal, and potentially extrapolating individual sensor measurements to an equilibrated in-situ value. At the three shallow water sites (PCB-7-GGC, 9-PC and 13-PC) the bottom water temperatures were warmer than the recorded temperatures below the seafloor. At PCB-7-GGC there is a clear gradient towards cooler temperatures with increasing depth. This may result from a number of factors, including seasonally changing bottom water temperatures or fluid flow. At station PCB-11, a piston core was first attempted but came up empty. This was later deployed as a GGC. Unfortunately, due to the long duration between deployments, the sensors stopped recording data before the GGC was deployed. However, although 11-PC came up empty, it appears that the three temperature sensors did penetrate into the seafloor (as indicated by the frictional warming pulse) (Appendix 9.6). Finally, at one station in the Mackenzie Trough (PCB-17PC), only two sensors recorded data, and one of these only recorded raw resistance measurements, and not the converted temperature values. This can be

calculated with some post-processing of the raw data, but will only provide two in-situ temperatures for this site. This data has not been included in Appendix 9.6.

Tab. 5: Stations where in-situ temperature measurements were attempted. The serial number of each temperature sensor is indicated at the relative position on the core barrel (as illustrated in Figure 19). Asterix indicate that the sensor failed to record data.

Core	Position 1	Position 2	Position 3	Position 4	Position 5
PCB-7-GGC	460	458	513	447	726
PCB-9-PC	447	460	726	513	458
PCB-11-PC	458	460	513	726*	-
PCB-13-PC	459	460	458	513	-
PCB-16-GGC	516*	460	458	513	726
PCB-17-PC	458	460	513*	726*	-
PCB-18-PC	458	460	513	726	-
PCB-21-PC	513	726	458	470*	-

4. PARTICIPANTS

No.	Name	Early career (Y/N)	Gender	Affiliation	On-board tasks
1	Lisa Bröder	Y	F	VUA, ETHZ	Co-chief Scientist, sediment sampling
2	Michael Fritz	N	M	AWI	Sediment sampling, sample logistics
3	Matt O'Regan	N	M	SU	Sediment sampling, core logging
4	Atsushi Matsuoka	N	M	UNH	Optics, water filtration
5	Bennet Juhls	Y	M	AWI	Optics, water filtration
6	Julie Lattaud	Y	F	ETHZ	Rosette / CTD, water filtration
7	Taylor Priest	Y	M	MPI	Rosette / CTD, water filtration
8	Antje Eulenburg	N	F	AWI	Rosette / CTD, water filtration
9	Daniel Rudbäck	Y	M	SU	Sediment sampling, core logging
10	Thomas Bossé-Demers*	Y	M	UL	Sediment sampling, pore waters
11	André Pellerin*	N	M	UQAR	Sediment sampling, pore waters
12	Dustin Whalen*	N	M	GSC	Subbottom, sediment sampling
13	Thomas Carson*	N	M	GSC	Sediment coring
14	Maria-Emilia Rodriguez-Cuicas*	Y	F	UQR	Sediment coring

**Participants not funded by ARICE.*

VUA	Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
ETHZ	Eidgenössische Technische Hochschule Zürich, Zurich, Switzerland
AWI	Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research
SU	Stockholm University, Stockholm, Sweden
UNH	University of New Hampshire, Durham, USA
MPI	Max-Planck-Institute for Marine Microbiology, Bremen, Germany
UL	Université Laval, Québec City, Canada
UQAR	Université du Québec à Rimouski, Rimouski, Canada
GSC	Geological Survey of Canada, Halifax, Canada

5. STATION LIST

Tab. 6: Sampling locations and conducted activities per station. PC: piston core; TWC: trigger weight core; GGC: giant gravity core; GC: gravity core. *: long coring stations where in situ temperature measurements were taken.

Station ID	**Water depth (m)**	**Sampling activities**			
		CTD-Rosette	***Radiometry***	***Multicores***	***Long cores***
MCTL	170			X	
C014	522		X		
PCB-01	411	X	X	X	
PCB-05	75	X		X	
PCB-04	531	X	X	X	PC+TWC
PCB-02	314	X		X	
PCB-03	1044	X	X	X	PC+TWC
PCB-06	50	X		X	PC+TWC
PCB-07	52	X	X	X	GGC
434	46	X	X		
PCB-08	69	X		X	
428	75	X			
426	95	X			
435	302	X	X		
424	584	X			
421	1156	X			
546	1611	X	X		
PCB-09	678			X	PC+TWC*
PCB-21	458	X	X	X	PC+TWC*
PCB-22	48	X	X	X	PC
PCB-23	33	X		X	
2121-NK	36				PC
PCB-20	782	X	X	X	
482	560	X	X		
PCB-16	799	X		X	GGC+GC*
480	560	X	X		
PCB-18	272	X	X	X	PC+TWC*
PCB-19	372	X		X	
474	173	X	X		
472	124	X	X		
PCB-17	54	X		X	PC+TWC*
PCB-17a	20	X		X	GC
PCB-11	74	X		X	GGC+TWC*
PCB-13	32	X		X	PC+TWC*

PCB-12	57	X	X	X	GC
PCB-10	954	X	X	X	
PCB-14	58	X		X	
516	493			X	
518N	526			X	GC
515	490	X			
518	437	X			

6. DATA AND SAMPLE STORAGE / AVAILABILITY

All long sediment cores that were brought back to Europe are stored at the commercial facility TempLog Berlin GmbH, Maerkische Allee 2, 14979 Grossbeeren, Germany. Sediment samples from sliced multicores for sediment properties and bulk element analyses are stored frozen at AWI in Potsdam and will be freeze-dried prior to further analyses and long-term storage. Sliced multicore samples for biomarker analyses will be stored frozen or freeze-dried at ETH Zürich. Water samples for the following analyses are stored at AWI in Potsdam, Germany: DOC, cDOM, fDOM, stable water isotopes, nutrients, alkalinity/DIC. Water samples for CH_4 concentrations, DIC-^{14}C and DOC-^{14}C are stored at ETH Zürich. Data generated at AWI will be made available on the PANGAEA repository (https://pangaea.de/). Offshore core logging data will be archived and made available on the PANGAEA repository and the Bolin Centre Database (https://bolin.su.se/data/) at Stockholm University.

7. ACKNOWLEDGEMENTS

We greatly appreciated the 24h support from all crew members of the CCGS Amundsen. In particular, we are grateful to chief scientist Martine Lizotte (Université Laval) for her immense efforts to make this cruise a success. Likewise, we want to thank the Amundsen Science Team, especially Alexandre Forest, Anissa Merzouk, Amélie Desmarais, Luc Michaud and Marcia Pearson for logistical and technical assistance, CTD operators Christophe Perron and Dylan Roux, as well as Jean Carlos Montero Serrano (Université du Québec à Rimouski UQAR, Institut des sciences de la mer de Rimouski ISMER) for support with coring equipment, and Brent Else (University of Calgary) and Brett Walker (University of Ottawa) for their help with laboratory needs. Furthermore, we acknowledge additional financial support and in-kind contributions from the Swiss Polar Institute, H2020 project NUNATARYUK (grant 773421) and the Alfred Wegener Institute's logistics department. Bennet Juhls was funded by the European Space Agency (ESA) as part of the Climate Change Initiative (CCI) fellowship (ESA ESRIN/Contract No. 4000l3376l/2l/I-NB). Julie Lattaud received funding from the Swiss Polar Institute and BNP Paribas Swiss Foundation (Project number PAF-2020-004). The ship-time leading to these results was funded by the European Union H2020 as part of the EU Project ARICE grant agreement n° 730965.

8. REFERENCES

Bröder L, Tesi T, Andersson A et al. (2018) Bounding cross-shelf transport time and degradation in Siberian-Arctic land-ocean carbon transfer. Nature Communications, 9(806), https://doi.org/10.1038/s41467-018-03192-1.

Courtney R (2007) Storage and Dissemination of SEGY Data in JPEG2000 Format. AGU Fall Meeting Abstracts.

Hooker SB, Matsuoka A, Kudela RM, Yamashita Y, Suzuki K & Houskeeper HF (2020) A global end-member approach to derive *a*CDOM(440) from near-surface optical measurements. Biogeosciences, 17(2), 475–497, https://doi.org/10.5194/bg-17-475-2020.

Hooker SB, Van Heukelem L, Thomas CS, Claustre H, Ras J, Barlow R, Sessions H, Schluter L Perl J, Trees C, Stuart V, Head E, Clementson L, Fishwick J, Llewellyn C, & Aiken J (2005) The Second SeaWiFS HPLC Analysis Round Robin Experiment (SeaHARRE-2). https://oceancolor.gsfc.nasa.gov/fsg/hplc/SH2_TM2005_212785.pdf.

IOCCG Protocol Series (2018) Inherent Optical Property Measurements and Protocols: Absorption Coefficient, Neeley, A. R. and Mannino, A. (eds.), IOCCG Ocean Optics and Biogeochemistry Protocols for Satellite Ocean Colour Sensor Validation, Volume 1.0, IOCCG, Dartmouth, NS, Canada.

Keigwin LD, Klotsko S, Zhao N, Reilly B, Giosan L and Driscol NW (2018) Deglacial floods in the Beaufort Sea preceded Younger Dryas cooling. Nature Geoscience, 11(8), 599–604, https://doi.org/10.1038/s41561-018-0169-6.

Kishino M, Takahashi M, Okami N & Ishimaru S (1985) Estimation of the spectral absorption coefficients of phytoplankton in the sea. Bulletin of Marine Science, 37(2), 634–642.

Klotsko S, Driscoll N, Keigwin L (2019) Multiple meltwater discharge and ice rafting events recorded in the deglacial sediments along the Beaufort Margin, Arctic Ocean. Quaternary Science Reviews ,203, 185-208.

Lantuit H, Overduin PP, Couture N et al. (2012) The Arctic Coastal Dynamics Database: A New Classification Scheme and Statistics on Arctic Permafrost Coastlines. Estuaries and Coasts 35, 383–400, https://doi.org/10.1007/s12237-010-9362-6.

Matsuoka A, Bricaud A, Benner R, Para J, Sempéré R, Prieur L, Bélange, S, & Babin M (2012) Tracing the transport of colored dissolved organic matter in water masses of the Southern Beaufort Sea: relationship with hydrographic characteristics. Biogeosciences, 9(3), 925–940, https://doi.org/10.5194/bg-9-925-2012.

O'Regan M, Preto P, Stranne C, Jakobsson M, & Koshnurkov A (2016) Surface heat flow measurements from the East Siberian continental slope and Southern Lomonosov Ridge, Arctic Ocean. Geochemistry, Geophysics, Geosystems (G3), https://doi.org/10.1002/2016GC006284.

Pegau WS, Gray D & Zaneveld JRV (1997) Absorption and attenuation of visible and near-infrared light in water: dependence on temperature and salinity. Applied Optics, 36(24), 6035, https://doi.org/10.1364/ao.36.006035.

Sosik HM (1999) Storage of marine particulate samples for light-absorption measurements. Limnology and Oceanography, 44(4), 1139–1141, https://doi.org/10.4319/lo.1999.44.4.1139.

Stramski D, Reynolds RA, Kaczmarek S, Uitz J, & Zheng G (2015) Correction of pathlength amplification in the filter-pad technique for measurements of particulate absorption coefficient in the visible spectral region. Applied Optics, 54(22), 6763, https://doi.org/10.1364/ao.54.006763.

Sullivan JM, Twardowski MS, Zaneveld JRV, Moore CM, Barnard AH, Donaghay PL & Rhoades B (2006) Hyperspectral temperature and salt dependencies of absorption by water and heavy water in the 400-750 nm spectral range. Applied Optics, 45(21), 5294–5309, https://doi.org/10.1364/AO.45.005294.

Wegner C, Bennett KE, de Vernal A, Forwick M, Fritz M, Heikkilä M, Łacka M, Lantuit H, Laska M, Moskalik M, O'Regan M, Pawłowska J, Promińska A, Rachold V, Vonk JE & Werner K (2015) Variability in transport of terrigenous material on the shelves and the deep Arctic Ocean during the Holocene. Polar Research, 34, https://doi.org/10.3402/polar.v%v.24964.

9. APPENDIX

9.1 CTD Casts

Terms:

A number of abbreviated terms are used throughout the following tables to describe parameters that will be measured. The explanation of each term is provided below.

Carbohydrates – Particulate and dissolved fraction (unless otherwise specified)

TSS – Total suspended solids

DO14C – Dissolved organic carbon ^{14}C

DI14C – Dissolved inorganic carbon ^{14}C

DOC – Dissolved organic carbon concentrations

DIC – Dissolved inorganic carbon concentrations

CDOM – Coloured dissolved organic matter

FDOM – Fluorescent dissolved organic matter

O-isotopes – Stable isotopes of oxygen ($\delta^{18}O$) in water

ACs – Absorption (A) and attenuation (C) spectrophotometer (s)

CDOM ultrapath – Colored dissolved organic matter (CDOM) high-performance spectrophotometer

aP – Particle (P) absorption (a)

X – sample collected

Xf – sample filtered (for nutrient analyses only)

PCB-01

Station	PCB-01
Date & Time (local)	17.09.2021 – 19:29
Date & Time (UTC)	18.09.2021 – 00:29
Total depth (m)	411
Surface depth sampled (m)	2
DCM depth sampled (m)	40
Bottom depth sampled (m)	411
Latitude (Decimal, N)	71.23288
Longitude (Decimal, E)	-125.59845

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs atot	ACs aCDOM	aCDOM ultrapath	aP	Pigments
Surface	X	X(Particulate)	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
5									X	X	X	X	X	X					
10									X	X	X	X	X	X	X	X	X	X	X
15					X	X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30					X	X			X	X	X	X	X	X					
40					X	X			X	X	X	X	X	X			X		
50					X	X	X		X	X	X	X	X	X			X		
75					X	X			X	X	X	X	X	X	X	X	X	X	X
100					X	X	X		X	X	X	X	X	X			X		
150					X	X	X		X	X	X	X	X	X			X		
200	X				X	X	X		X	X	X	X	X	X			X		
250					X	X	X		X	X	X	X	X	X					
300						X	X		X	X	X	X	X	X			X		
Bottom	X		X	X	X	X	X		X	X	X	X	X	X			X		
DCM	X	X (Particulate)	X	X	X										X	X	X	X	X

PCB-02

Station	PCB-02
Date & Time (local)	20.09.2021 – 20:35
Date & Time (UTC)	121.09.2021 – 01:35
Total depth (m)	313
Surface depth sampled (m)	3
DCM depth sampled (m)	20
Bottom depth sampled (m)	306
Latitude (Decimal, N)	71.622
Longitude (Decimal, E)	-128.10599

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10						X			X	X	X	X	X	X	X	X	X	X	X
15					X	X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30					X	X			X	X	X	X	X	X					
40					X	X			X	X	X	X	X	X					
50					X	X	X		X	X	X	X	X	X			X		
75					X	X			X	X	X	X	X	X	X	X	X	X	X
100					X	X	X		X	X	X	X	X	X			X		
150					X	X	X		X	X	X	X	X	X			X		
200	X				X	X	X		X	X	X	X	X	X			X		
250					X	X	X		X	X	X	X	X	X					
Bottom	X		X	X	X	X	X		X	X	X	X	X	X			X		
DCM	X	X	X	X	X			X							X	X	X	X	X

PCB-03

Station	PCB-03
Date & Time (local)	21.09.2021 – 08:22
Date & Time (UTC)	21.09.2021 – 13:22
Total depth (m)	1044
Surface depth sampled (m)	2

DCM depth sampled (m)	54 / 53
Bottom depth sampled (m)	1040
Latitude (Decimal, N)	72.1131
Longitude (Decimal, E)	-131.04676

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X (Particulate)	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15						X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X	X	X	X	X	X
30						X			X	X	X	X	X	X					
40					X	X			X	X	X	X	X	X					
50						X	X		X	X	X	X	X	X					
75						X			X	X	X	X	X	X	X	X	X	X	X
100					X	X	X		X	X	X	X	X	X	X	X	X	X	X
150						X	X		X	X	X	X	X	X	X	X	X	X	X
200	X					X	X		X	X	X	X	X	X	X	X	X	X	X
250					X	X	X		X	X	X	X	X	X					
300						X	X		X	X	X	X	X	X	X	X	X	X	X
400						X	X		X	X	X	X	X	X					
500					X	X	X		X	X	X	X	X	X	X	X	X	X	X
700					X	X	X		X	X	X	X	X	X					
1000						X	X		X	X	X	X	X	X	X	X	X	X	X
Bottom	X		X	X	X	X	X		X	X	X	X	X	X					
DCM	X	X (Particulate)	X	X	X			X							X	X	X	X	X

PCB-04

Station	PCB-04
Date & Time (local)	20.09.2021 – 08:18
Date & Time (UTC)	20.09.2021 – 13:18
Total depth (m)	531
Surface depth sampled (m)	2 / 3
DCM depth sampled (m)	37
Bottom depth sampled (m)	523
Latitude (Decimal, N)	71.4511
Longitude (Decimal, E)	-131.2942

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15					X	X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X	X	X	X	X	X
30					X	X			X	X	X	X	X	X					
40						X			X	X	X	X	X	X					
50					X	X	X		X	X	X	X	X	X	X	X	X	X	X
75					X	X			X	X	X	X	X	X	X	X	X	X	X
100					X	X	X		X	X	X	X	X	X	X	X	X	X	X
150					X	X	X		X	X	X	X	X	X	X	X	X	X	X
200	X				X	X	X		X	X	X	X	X	X	X	X	X	X	X
250					X	X	X		X	X	X	X	X	X					
300					X	X	X		X	X	X	X	X	X	X	X	X	X	X
400					X	X	X		X	X	X	X	X	X					
500					X	X	X		X	X	X	X	X	X	X	X	X	X	X
Bottom	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
DCM	X	X	X	X	X			X							X	X	X	X	X

PCB-05

Station	PCB-05
Date & Time (local)	20.09.2021 – 09:38
Date & Time (UTC)	20.09.2021 – 04:38
Total depth (m)	75
Surface depth sampled (m)	2
DCM depth sampled (m)	32
Bottom depth sampled (m)	65
Latitude (Decimal, N)	71.20294
Longitude (Decimal, E)	-131.35189

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15					X	X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X	X	X	X	X	X
30						X			X	X	X	X	X	X					
40					X	X			X	X	X	X	X	X					
50					X	X	X		X	X	X	X	X	X	X	X	X	X	X
Bottom	X		X	X	X	X	X		X	X	X	X	X	X					
DCM	X	X	X	X	X			X							X	X	X	X	X

PCB-06

Station	PCB-06
Date & Time (local)	22.09.2021 – 02:17
Date & Time (UTC)	22.09.2021 – 07:17
Total depth (m)	50
Surface depth sampled (m)	2
DCM depth sampled (m)	15
Bottom depth sampled (m)	40
Latitude (Decimal, N)	70.76183
Longitude (Decimal, E)	-131.42986

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15						X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30					X	X			X	X	X	X	X	X					
Bottom	X		X	X	X	X	X		X	X	X	X	Xf	X			X		
DCM	X	X	X	X	X			X							X	X	X	X	X

PCB-07

Station	PCB-07
Date & Time (local)	22.09.2021 – 09:22
Date & Time (UTC)	22.09.2021 – 14:22
Total depth (m)	52
Surface depth sampled (m)	2
DCM depth sampled (m)	14
Bottom depth sampled (m)	42
Latitude (Decimal, N)	70.53483
Longitude (Decimal, E)	-131.49528

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	Xf	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15						X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30					X	X			X	X	X	X	X	X					
Bottom	X		X	X	X	X	X		X	X	X	X	X	X			X		
DCM	X	X	X	X	X			X							X	X	X	X	X

PCB-08 / 431

Station	PCB-08 / 431
Date & Time (local)	23.09.2021 – 06:11
Date & Time (UTC)	23.09.2021 – 01:11
Total depth (m)	68
Surface depth sampled (m)	5
DCM depth sampled (m)	15
Bottom depth sampled (m)	58
Latitude (Decimal, N)	70.52486
Longitude (Decimal, E)	-133.61348

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
10									X	X	X	X	X	X					
15						X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X					
30					X	X			X	X	X	X	X	X					
40					X	X			X	X	X	X	X	X					
50						X	X		X	X	X	X	X	X					
Bottom	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
DCM	X	X	X	X	X			X											

PCB-10

Station	PCB-10
Date & Time (local)	30.09.2021 – 19:06
Date & Time (UTC)	01.10.2021 – 00:06
Total depth (m)	955
Surface depth sampled (m)	3 / 2
DCM depth sampled (m)	NA
Bottom depth sampled (m)	952
Latitude (Decimal, N)	70.90951
Longitude (Decimal, E)	-136.28213

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15	X	X	X			X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30						X			X	X	X	X	X	X					
40						X			X	X	X	X	X	X					
50						X	X		X	X	X	X	X	X			X		
75						X			X	X	X	X	X	X	X	X	X	X	X
100					X	X	X		X	X	X	X	X	X			X		
150					X	X	X		X	X	X	X	X	X			X		
200	X		X		X	X	X		X	X	X	X	X	X			X		
250					X	X	X		X	X	X	X	X	X					
300						X	X		X	X	X	X	X	X			X		
400						X	X		X	X	X	X	X	X					
500					X	X	X		X	X	X	X	X	X			X		
700									X	X	X	X	X	X					
Bottom	X	X	X	X	X	X	X										X		
DCM					X	X	X	X											

PCB-11

Station	PCB-11
Date & Time (local)	29.09.2021 – 16:12
Date & Time (UTC)	29.09.2021 – 21:12
Total depth (m)	74
Surface depth sampled (m)	5
DCM depth sampled (m)	NA / 13
Bottom depth sampled (m)	64
Latitude (Decimal, N)	70.54748
Longitude (Decimal, E)	-136.00951

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10					X				X	X	X	X	X	X	X	X	X	X	X
13	X	X	X	X	X	X		X											
15						X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30					X	X			X	X	X	X	X	X					
40					X	X			X	X	X	X	X	X					
50						X	X		X	X	X	X	X	X			X		
Bottom	X	X	X	X	X	X	X		X	X	X	X	X	X			X		
DCM				X											X	X	X	X	X

PCB-12

Station	PCB-12
Date & Time (local)	30.09.2021 – 11:29
Date & Time (UTC)	30.09.2021 – 16:29
Total depth (m)	55
Surface depth sampled (m)	3.5 / 2
DCM depth sampled (m)	NA
Bottom depth sampled (m)	45
Latitude (Decimal, N)	70.27986
Longitude (Decimal, E)	-135.77562

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15	X	X	X		X	X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30					X	X			X	X	X	X	X	X					
40									X	X	X	X	X	X					
Bottom	X	X	X	X	X	X	X		X	X	X	X	X	X			X		
DCM																			

PCB-13

Station	PCB-13
Date & Time (local)	30.09.2021 – 04:23
Date & Time (UTC)	30.09.2021 – 09:23
Total depth (m)	32
Surface depth sampled (m)	2.5 / 3
DCM depth sampled (m)	NA
Bottom depth sampled (m)	24
Latitude (Decimal, N)	69.99163
Longitude (Decimal,	-135.44577

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10	X	X	X		X	X			X	X	X	X	X	X	X	X	X	X	X
15					X	X			X	X	X	X	X	X					
20									X	X	X	X	X	X					
Bottom	X	X	X	X	X	X	X		X	X	X	X	X	X			X		
DCM									X	X	X	X	X	X					

PCB-14

Station	PCB-14
Date & Time (local)	01.10.2021 – 03:28
Date & Time (UTC)	01.10.2021 – 08:28
Total depth (m)	57
Surface depth sampled (m)	3
DCM depth sampled (m)	NA
Bottom depth sampled (m)	50 / 48
Latitude (Decimal, N)	70.23870
Longitude (Decimal, E)	-137.18105

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface						X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15						X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25						X	X		X	X	X	X	X	X			X		
30						X			X	X	X	X	X	X					
40						X			X	X	X	X	X	X					
50						X													
Bottom						X	X		X	X	X	X	X	X			X		
DCM																			

PCB-16

Station	PCB-16
Date & Time (local)	27.09.2021 – 04:28
Date & Time (UTC)	27.09.2021 – 09:28
Total depth (m)	799
Surface depth sampled (m)	2
DCM depth sampled (m)	50
Bottom depth sampled (m)	789
Latitude (Decimal, N)	70.50464
Longitude (Decimal, E)	-138.83203

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15						X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30						X			X	X	X	X	X	X					
40						X			X	X	X	X	X	X					
50						X	X		X	X	X	X	X	X			X		
75						X			X	X	X	X	X	X	X	X	X	X	X
100						X	X		X	X	X	X	X	X			X		
150					X	X	X		X	X	X	X	X	X			X		
200	X		X			X	X		X	X	X	X	X	X			X		
250					X	X	X		X	X	X	X	X	X					
300						X	X		X	X	X	X	X	X			X		
400						X	X		X	X	X	X	X	X					
500					X	X	X		X	X	X	X	X	X			X		
700					X	X	X		X	X	X	X	X	X					
Bottom	X	X	X	X	X	X	X		X	X	X	X	X	X			X		
DCM	X	X	X	X											X	X	X	X	X

PCB-17 / 470

Station	PCB-17 / 470
Date & Time (local)	28.09.2021 – 21:13
Date & Time (UTC)	29.09.2021 – 02:23
Total depth (m)	53
Surface depth sampled (m)	32
DCM depth sampled (m)	NA
Bottom depth sampled (m)	47
Latitude (Decimal, N)	69.43113
Longitude (Decimal, E)	-137.99893

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
12	X	X	X																
15					X	X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30					X	X			X	X	X	X	X	X					
40					X	X			X	X	X	X	X	X					
Bottom	X	X	X	X		X	X		X	X	X	X	X	X			X		

PCB-17A

Station	PCB-17A
Date & Time (local)	29.09.2021 – 03:58
Date & Time (UTC)	29.09.2021 – 08:58
Total depth (m)	19
Surface depth sampled (m)	2
DCM depth sampled (m)	NA
Bottom depth sampled (m)	10
Latitude (Decimal, N)	69.28782
Longitude (Decimal, E)	-137.27927

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
Bottom	X	X	X	X	X	X	X		X	X	X	X	Xf	X	X	X	X	X	X

PCB-18 / 476

Station	PCB-18 / 476
Date & Time (local)	27.09.2021 – 20:10
Date & Time (UTC)	28.09.2021 – 01:10
Total depth (m)	271
Surface depth sampled (m)	3 / 2
DCM depth sampled (m)	NA
Bottom depth sampled (m)	265
Latitude (Decimal, N)	69.99839
Longitude (Decimal, E)	-138.62824

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15					X	X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30						X			X	X	X	X	X	X					
40						X			X	X	X	X	X	X					
50					X	X	X		X	X	X	X	X	X			X		
75						X			X	X	X	X	X	X	X	X	X	X	X
100					X	X	X		X	X	X	X	X	X			X		
150					X	X	X		X	X	X	X	X	X			X		
200	X	X	X		X	X	X		X	X	X	X	X	X			X		
250									missed	X	X	X	X	X					
Bottom	X	X	X	X	X	X	X		X	X	X	X	X	X			X		

PCB-19 / 478

Station	PCB-19 / 478
Date & Time (local)	28.09.2021 – 05:22
Date & Time (UTC)	28.09.2021 – 10:22
Total depth (m)	372
Surface depth sampled (m)	3
DCM depth sampled (m)	NA
Bottom depth sampled (m)	362 / 364
Latitude (Decimal, N)	70.16379
Longitude (Decimal, E)	-138.90782

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15						X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25	X	X	X		X	X	X		X	X	X	X	X	X			X		
30						X			X	X	X	X	X	X					
40						X			X	X	X	X	X	X					
50					X	X	X		X	X	X	X	X	X			X		
75						X			X	X	X	X	X	X	X	X	X	X	X
100					X	X	X		X	X	X	X	X	X			X		
150					X	X	X		X	X	X	X	X	X			X		
200	X		X			X	X		X	X	X	X	X	X			X		
250									X	X	X	X	X	X					
300									X	X	X	X	X	X					
Bottom	X	X	X		X	X	X		X	X	X	X	X	X			X		

PCB-20

Station	PCB-20
Date & Time (local)	26.09.2021 – 12:22
Date & Time (UTC)	26.09.2021 – 17:22
Total depth (m)	781
Surface depth sampled (m)	2 / 3
DCM depth sampled (m)	38
Bottom depth sampled (m)	775
Latitude (Decimal, N)	70.5492
Longitude (Decimal, E)	-139.81988

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15						X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30						X			X	X	X	X	X	X					
40						X			X	X	X	X	X	X					
50					X	X	X		X	X	X	X	X	X			X		
75						X			X	X	X	X	X	X	X	X	X	X	X
100					X	X	X		X	X	X	X	X	X			X		
150						X	X		X	X	X	X	X	X			X		
200	X		X			X	X		X	X	X	X	X	X			X		
250									X	X	X	X	X	X					
300					X	X	X		X	X	X	X	X	X			X		
400						X	X		X	X	X	X	X	X					
500						X	X		X	X	X	X	X	X			X		
700					X	X	X		X	X	X	X	X	X					
Bottom	X	X	X	X	X	X	X		X	X	X	X	X	X			X		
DCM	X	X	X	X	X	X	X								X	X	X	X	X

PCB-21

Station	PCB-21
Date & Time (local)	25.09.2021 – 09:08
Date & Time (UTC)	25.09.2021 – 14:08
Total depth (m)	457
Surface depth sampled (m)	3 / 2
DCM depth sampled (m)	30
Bottom depth sampled (m)	452
Latitude (Decimal, N)	70.35477
Longitude (Decimal, E)	-139.98316

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15						X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30						X			X	X	X	X	X	X					
40						X			X	X	X	X	X	X					
50					X	X	X		X	X	X	X	X	X			X		
75						X			X	X	X	X	X	X	X	X	X	X	X
100					X	X	X		X	X	X	X	X	X			X		
150					X	X	X		X	X	X	X	X	X			X		
200	X		X		X	X	X		X	X	X	X	X	X			X		
250									X	X	X	X	X	X					
300					X	X	X		X	X	X	X	X	X			X		
400						X	X		X	X	X	X	X	X					
Bottom	X	X	X			X	X		X	X	X	X	X	X			X		
DCM	X	X	X	X	X	X	X								X	X	X	X	X

PCB-22

Station	PCB-22
Date & Time (local)	25.09.2021 – 16:35
Date & Time (UTC)	25.09.2021 – 21:35
Total depth (m)	48
Surface depth sampled (m)	2
DCM depth sampled (m)	28
Bottom depth sampled (m)	44
Latitude (Decimal, N)	70.12136
Longitude (Decimal, E)	-140.24488

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigmnets
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15					X	X			X	X	X	X	X	X					
20					X	X			X	X	X	X	X	X					
25					X	X	X		X	X	X	X	X	X			X		
30						X			X	X	X	X	X	X					
Bottom	X	X	X	X	X	X	X		X	X	X	X	X	X					
DCM	X	X	X	X	X			X							X	X	X	X	X

PCB-23

Station	PCB-23
Date & Time (local)	25.09.2021 – 23:22
Date & Time (UTC)	26.09.2021 – 04:22
Total depth (m)	33
Surface depth sampled (m)	2 / 3
DCM depth sampled (m)	NA
Bottom depth sampled (m)	29
Latitude (Decimal, N)	69.81033
Longitude (Decimal, E)	-140.54852

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
10									X	X	X	X	X	X	X	X	X	X	X
15					X	X			X	X	X	X	X	X					
20						X			X	X	X	X	X	X					
25									X	X	X	X	X	X			X		
Bottom	X	X	X	X	X	X	X		X	X	X	X	2X	X			X		

424

Station	424
Date & Time (local)	23.09.2021 – 18:15
Date & Time (UTC)	23.09.2021 – 23:15
Total depth (m)	1156
Surface depth sampled (m)	2
DCM depth sampled (m)	
Bottom depth sampled (m)	
Latitude (Decimal, N)	71.17550
Longitude (Decimal, E)	-133.82445

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface				X (DOC)	X		X			X				X					
25							X							X					
50					X		X			X				X					
100							X							X					
150							X							X					
200							X							X					
250							X							X					
300							X							X					
400							X							X					
500							X							X					
Bottom				X (DOC)	X		X			X				X					

426

Station	426
Date & Time (local)	23.09.2021 – 09:01
Date & Time (UTC)	23.09.2021 – 14:01
Total depth (m)	94
Surface depth sampled (m)	2
DCM depth sampled (m)	
Bottom depth sampled (m)	
Latitude (Decimal, N)	70.97641
Longitude (Decimal, E)	-133.74497

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	Dl14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface							X			X	X	X	X	X					
25							X							X					
50							X							X					
Bottom							X							X					

428

Station	428
Date & Time (local)	23.09.2021 – 06:54
Date & Time (UTC)	23.09.2021 – 11:54
Total depth (m)	74
Surface depth sampled (m)	2
DCM depth sampled (m)	
Bottom depth sampled (m)	
Latitude (Decimal, N)	70.78958
Longitude (Decimal, E)	-133.69872

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface							X							X					
25							X							X					
Bottom							X							X					

434

Station	434
Date & Time (local)	22.09.2021 – 19:09
Date & Time (UTC)	23.09.2021 – 00:09
Total depth (m)	46
Surface depth sampled (m)	2
DCM depth sampled (m)	
Bottom depth sampled (m)	
Latitude (Decimal, N)	70.17647
Longitude (Decimal, E)	-133.55512

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface				X (DOC)	X		X			X	X	X	X	X	X	X	X	X	X
25				X (DOC)	X		X							X					
Bottom				X (DOC)	X		X							X					

435

Station	435
Date & Time (local)	23.09.2021 – 12:40
Date & Time (UTC)	23.09.2021 – 17:40
Total depth (m)	301
Surface depth sampled (m)	2
DCM depth sampled (m)	
Bottom depth sampled (m)	
Latitude (Decimal, N)	71.07808
Longitude (Decimal, E)	-133.77688

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface							X			X	X	X	X	X	X	X	X	X	X
25							X							X					
50							X							X					
100							X							X					
150							X							X					
200							X							X					
250							X							X					
Bottom							X							X					

472

Station	472
Date & Time (local)	28.09.2021 – 15:14
Date & Time (UTC)	28.09.2021 – 20:14
Total depth (m)	124
Surface depth sampled (m)	2
DCM depth sampled (m)	12
Bottom depth sampled (m)	113
Latitude (Decimal, N)	69.60975
Longitude (Decimal, E)	-138.22130

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface				X (DOC)	X		X			X	X	X	X	X	X	X	X	X	X
10															X	X	X	X	X
25							X							X					
12 (DCM)															X	X	X	X	X
50							X							X					
75															X	X	X	X	X
Bottom				X (DOC)	X		X							X			X		

474

Station	474
Date & Time (local)	28.09.2021 – 12:30
Date & Time (UTC)	28.09.2021 – 17:30
Total depth (m)	173
Surface depth sampled (m)	2
DCM depth sampled (m)	29
Bottom depth sampled (m)	164
Latitude (Decimal, N)	69.79853
Longitude (Decimal, E)	-138.43304

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface				X (DOC)	X		X			X	X	X	X	X	X	X	X	X	X
10															X	X	X	X	X
25							X							X					
29 (DCM)															X	X	X	X	X
50							X							X					
70															X	X	X	X	X
100							X							X					
Bottom				X (DOC)	X		X							X					

480

Station	480
Date & Time (local)	27.09.2021 – 12:15
Date & Time (UTC)	27.09.2021 – 17:15
Total depth (m)	559
Surface depth sampled (m)	2
DCM depth sampled (m)	
Bottom depth sampled (m)	
Latitude (Decimal, N)	70.33447
Longitude (Decimal, E)	-139.15267

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface				X (DOC)	X		X			X	X	X	X	X	X	X	X	X	X
25							X							X					
50							X							X					
100							X							X					
150							X							X					
200							X							X					
250							X							X					
300							X							X					
400							X							X					
500							X							X					
Bottom				X (DOC)	X		X							X					

482

Station	482
Date & Time (local)	26.09.2021 – 19:31
Date & Time (UTC)	27.09.2021 – 00:31
Total depth (m)	825
Surface depth sampled (m)	2
DCM depth sampled (m)	-
Bottom depth sampled (m)	-
Latitude (Decimal, N)	70.53421
Longitude (Decimal, E)	-139.37998

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface										X	X	X	X	X	X	X	X	X	X

546

Station	546
Date & Time (local)	24.09.2021 – 14:02
Date & Time (UTC)	24.09.2021 – 19:02
Total depth (m)	
Surface depth sampled (m)	2.7
DCM depth sampled (m)	30
Bottom depth sampled (m)	1620
Latitude (Decimal, N)	71.74206
Longitude (Decimal, E)	-133.94863

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface				X (DOC)	X		X			X	X	X	X	X	X	X	X	X	X
10															X	X	X	X	X
25							X							X			X		
50 (DCM)							X							X	X	X	X	X	X
75															X	X	X	X	X
100				X (DOC)	X		X							X			X		
150							X							X					
200							X							X			X		
250							X							X					
300							X							X			X		
400							X							X					
500							X							X			X		
700							X							X					
1000							X							X			X		
1500							X							X					
Bottom				X (DOC)	X		X							X			X		

515

Station	515
Date & Time (local)	04.10.2021 – 02:31
Date & Time (UTC)	04.10.2021 – 07:31
Total depth (m)	490
Surface depth sampled (m)	1.6
DCM depth sampled (m)	35
Bottom depth sampled (m)	483
Latitude (Decimal, N)	75.00759
Longitude (Decimal, E)	-121.38886

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X			X (DOC)	X	X	X							X					
25						X	X							X					
50						X	X							X					
100						X	X							X					
150						X	X							X					
200						X	X							X					
250						X	X							X					
300						X	X							X					
400						X	X							X					
Bottom				X (DOC)	X	X	X							X					

516

Station	516
Date & Time (local)	03.10.2021 – 03:55
Date & Time (UTC)	03.10.2021 – 08.55
Total depth (m)	495
Surface depth sampled (m)	1.8
DCM depth sampled (m)	30
Bottom depth sampled (m)	489
Latitude (Decimal, N)	74.84512
Longitude (Decimal, E)	-121.41222

Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X (DOC)	X	X	X							X					
25						X	X							X					
50						X	X							X					
100						X	X							X					
150						X	X							X					
200	X		X			X	X							X					
250						X	X							X					
300						X	X							X					
400						X	X							X					
Bottom	X	X	X	X (DOC)	X	X	X							X					
DCM	X	X	X																

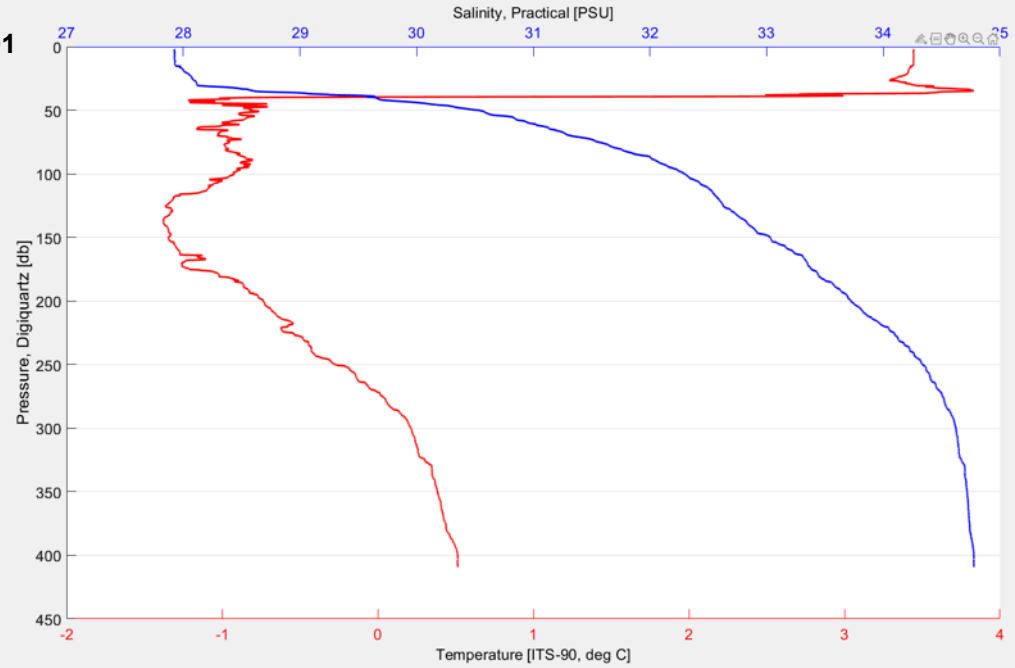
518

Station	518
Date & Time (local)	04.10.2021 – 12:21
Date & Time (UTC)	04.10.21 – 17:21
Total depth (m)	436
Surface depth sampled (m)	2.3
DCM depth sampled (m)	35
Bottom depth sampled (m)	429
Latitude (Decimal, N)	74.59925
Longitude (Decimal, E)	-121.45184

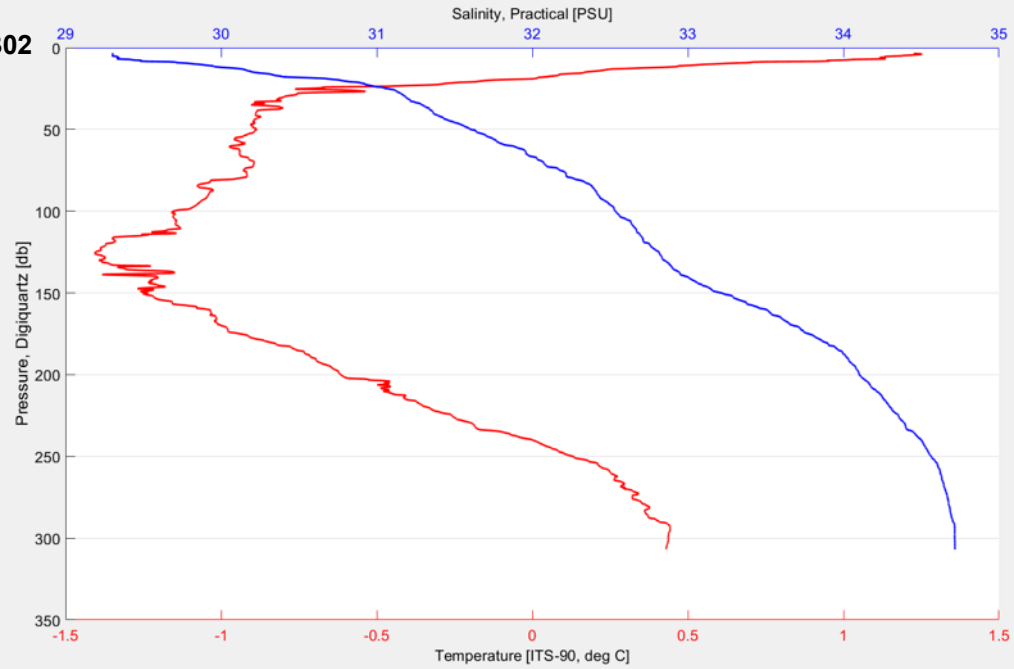
Sampled for:	DNA & RNA	Carbohydrates	Cell counts	DO14C & Biomarkers	TSS	Methane (gaseous)	DI14C	Black carbon	DIC/ Alkalinity	DOC	CDOM	FDOM	Nutrients	O-isotopes	ACs a_{tot}	ACs a_{CDOM}	a_{CDOM} ultrapath	a_P	Pigments
Surface	X	X	X	X (DOC)	X	X	X							X					
25						X	X							X					
50						X	X							X					
100						X	X							X					
150						X	X							X					
200	X		X			X	X							X					
250						X	X							X					
300						X	X							X					
400						X	X							X					
Bottom	X	X	X	X (DOC)	X	X	X							X					
DCM	X	X	X																

9.2 Temperature and salinity profiles

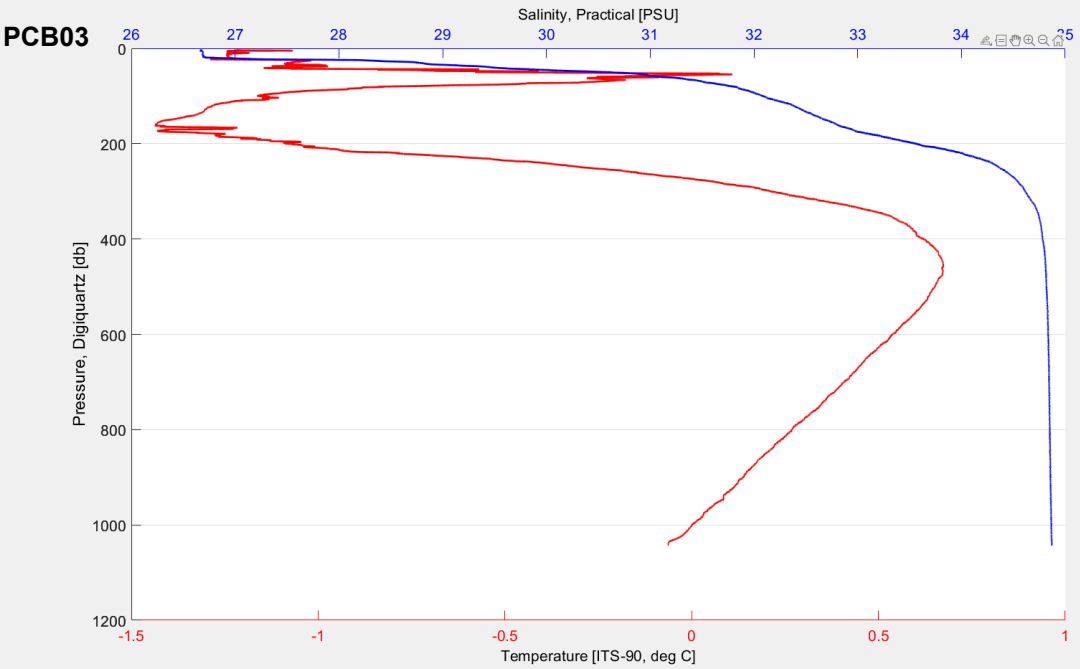
PCB01



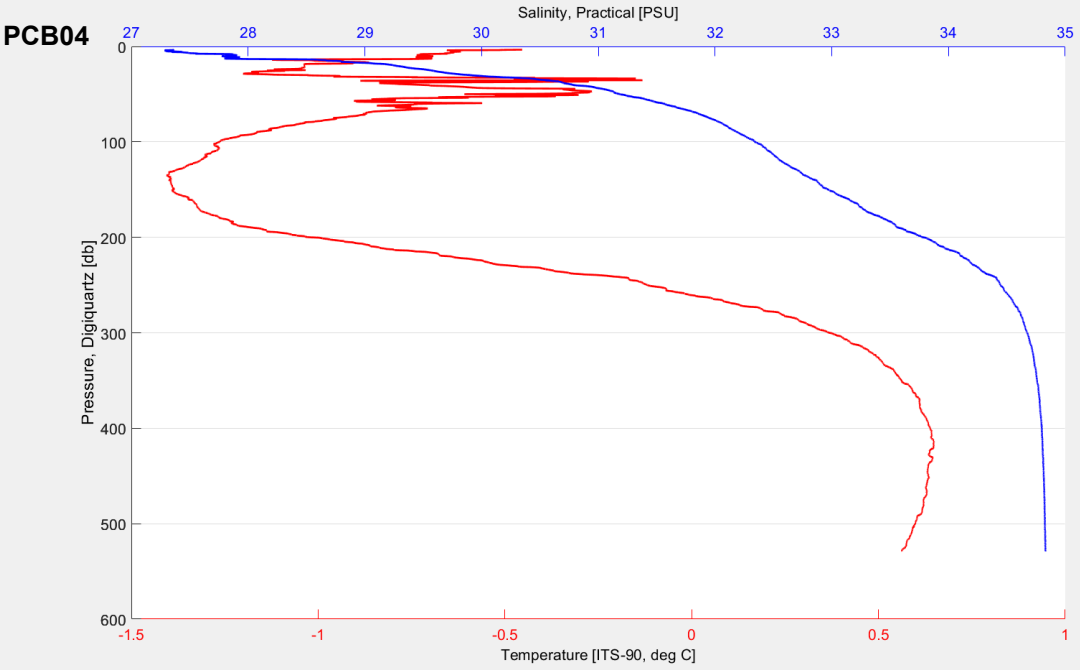
PCB02



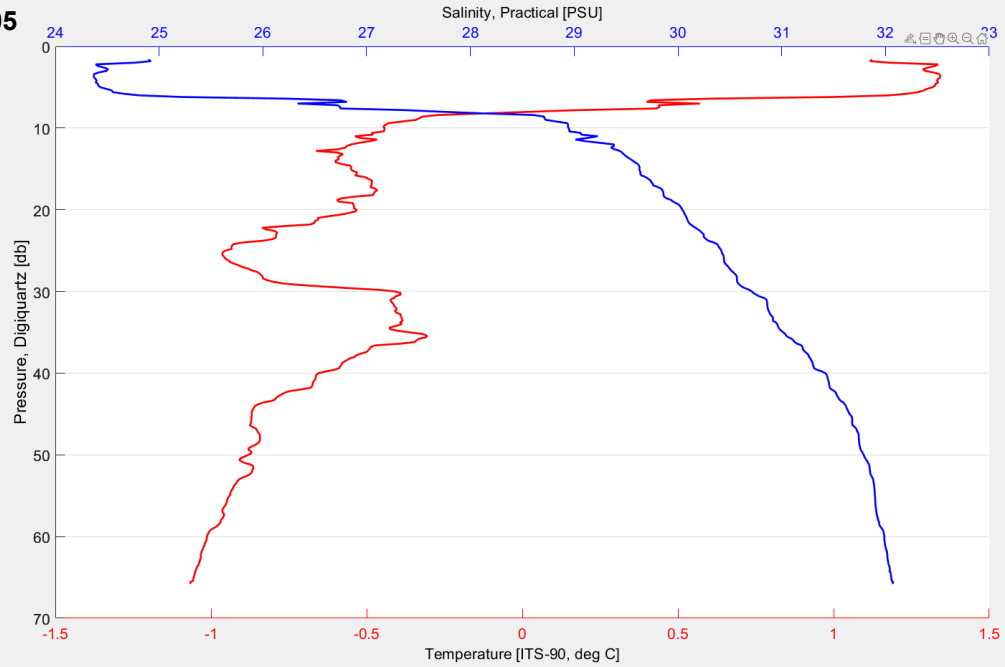
PCB03


Salinity, Practical [PSU]
26
27
28
29
30
31
32
33
34
35
0
200
400
600
800
1000
1200
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
Temperature [ITS-90, deg C]

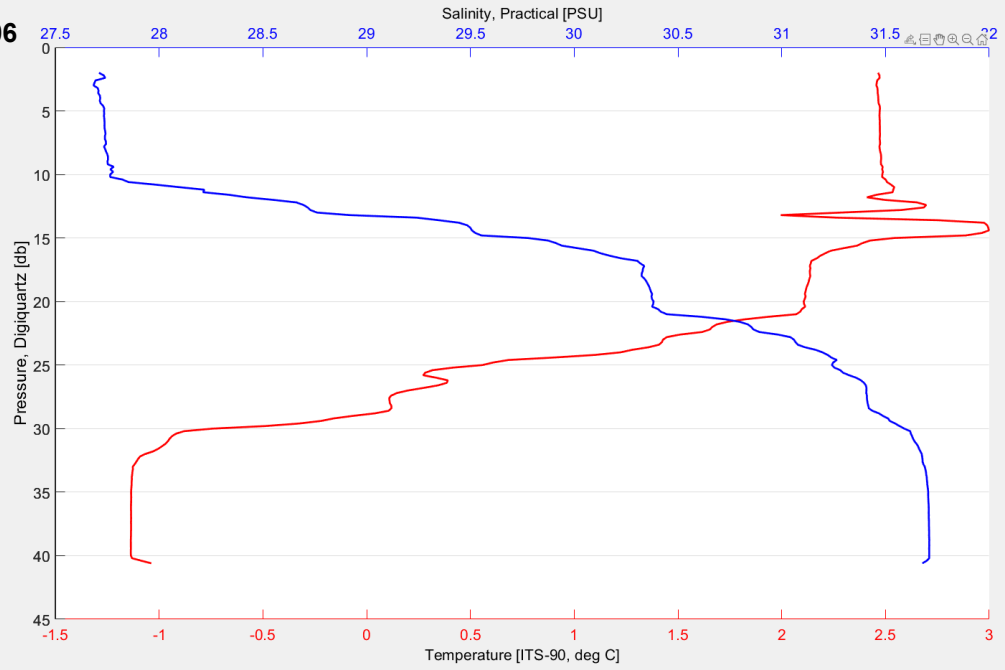
PCB04


Salinity, Practical [PSU]
27
28
29
30
31
32
33
34
35
0
100
200
300
400
500
600
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
Temperature [ITS-90, deg C]

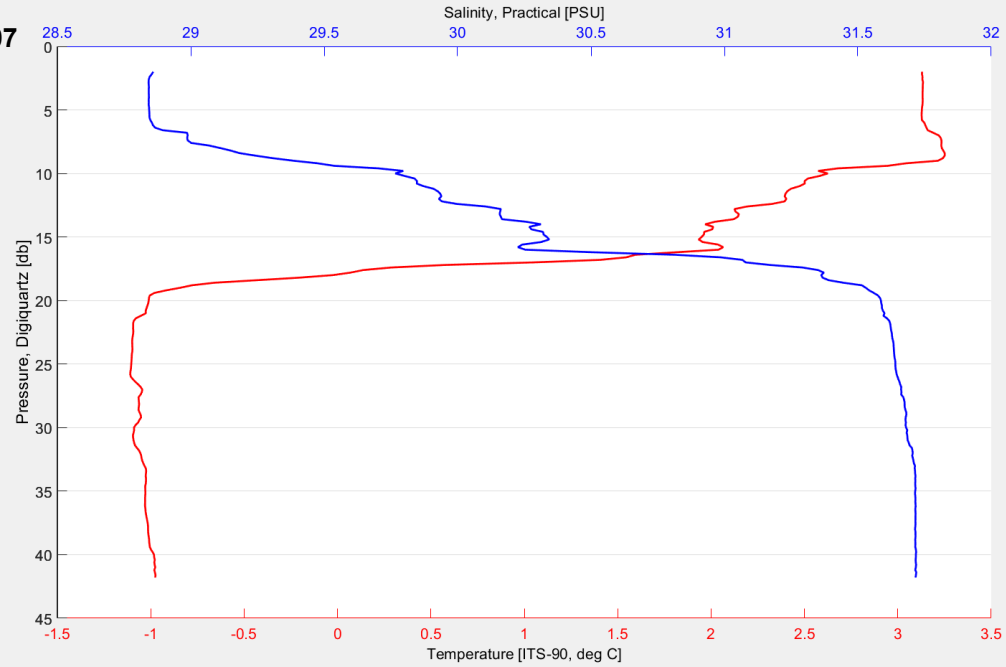
PCB05


Salinity, Practical [PSU]
24
25
26
27
28
29
30
31
32
33
0
10
20
30
40
50
60
70
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
Temperature [ITS-90, deg C]

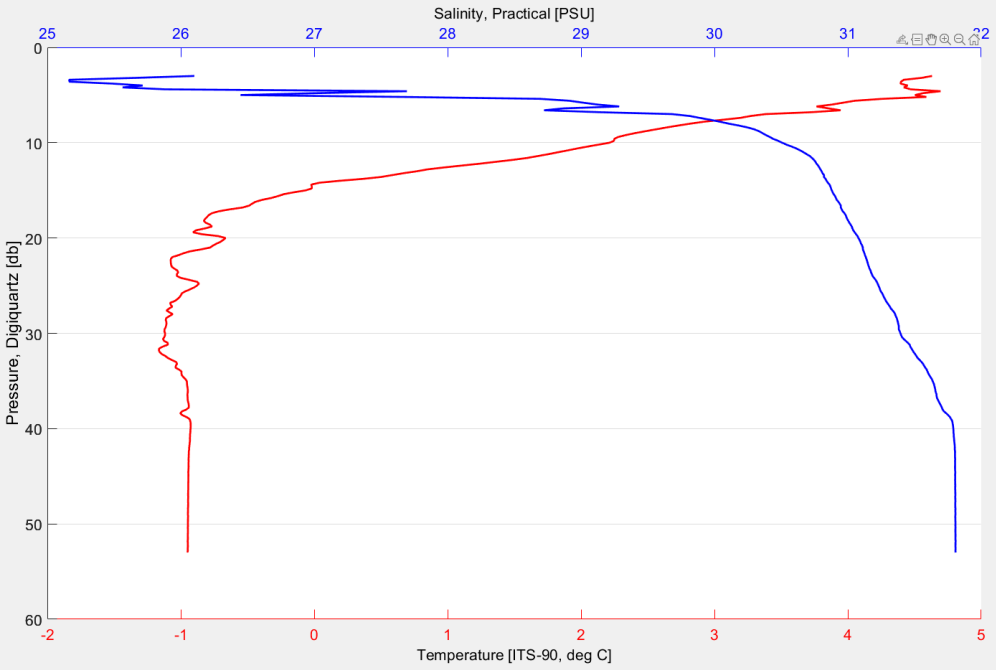
PCB06


Salinity, Practical [PSU]
27.5
28
28.5
29
29.5
30
30.5
31
31.5
32
0
5
10
15
20
25
30
35
40
45
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
3
Temperature [ITS-90, deg C]

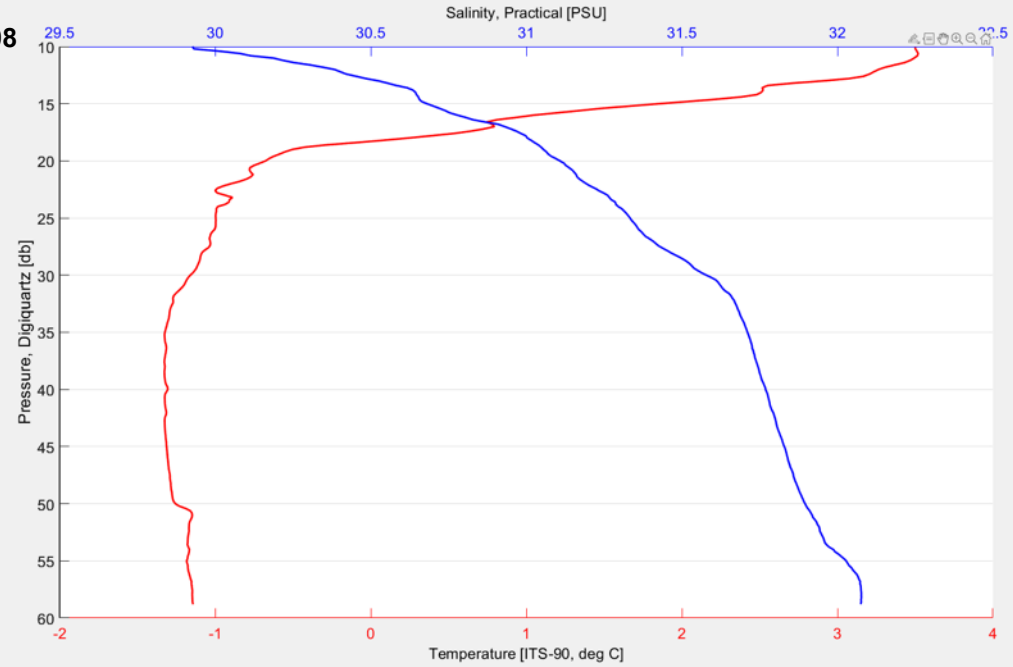
PCB07


Salinity, Practical [PSU]
28.5
29
29.5
30
30.5
31
31.5
32
Pressure, Digiquartz [db]
0
5
10
15
20
25
30
35
40
45
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
3
3.5
Temperature [ITS-90, deg C]

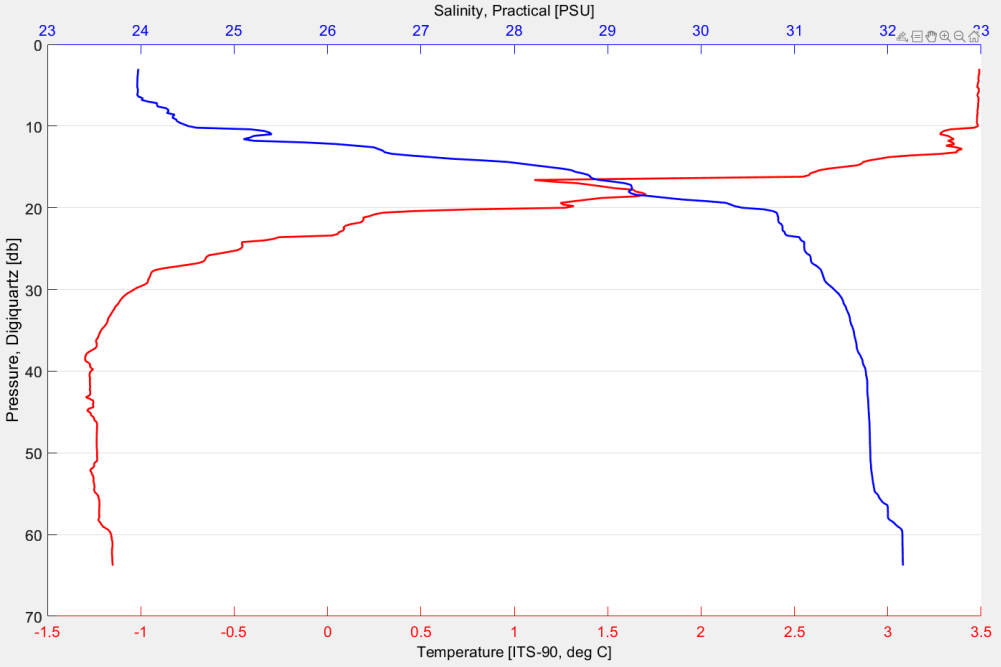
432


Salinity, Practical [PSU]
25
26
27
28
29
30
31
32
Pressure, Digiquartz [db]
0
10
20
30
40
50
60
-2
-1
0
1
2
3
4
5
Temperature [ITS-90, deg C]

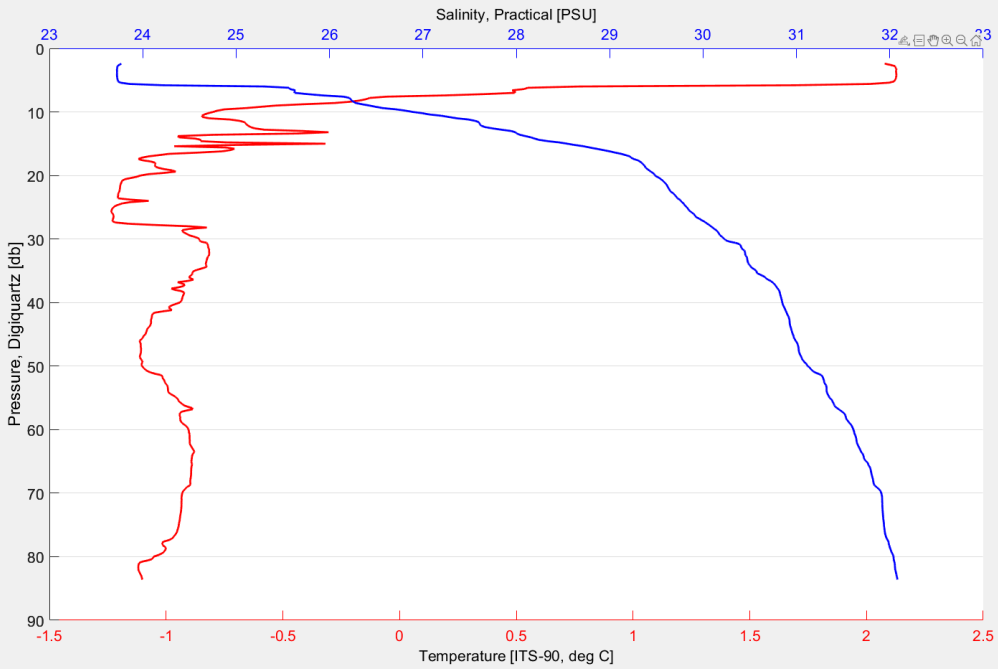
PCB08


Salinity, Practical [PSU]
29.5
30
30.5
31
31.5
32
32.5
Pressure, Digiquartz [db]
10
15
20
25
30
35
40
45
50
55
60
-2
-1
0
1
2
3
4
Temperature [ITS-90, deg C]

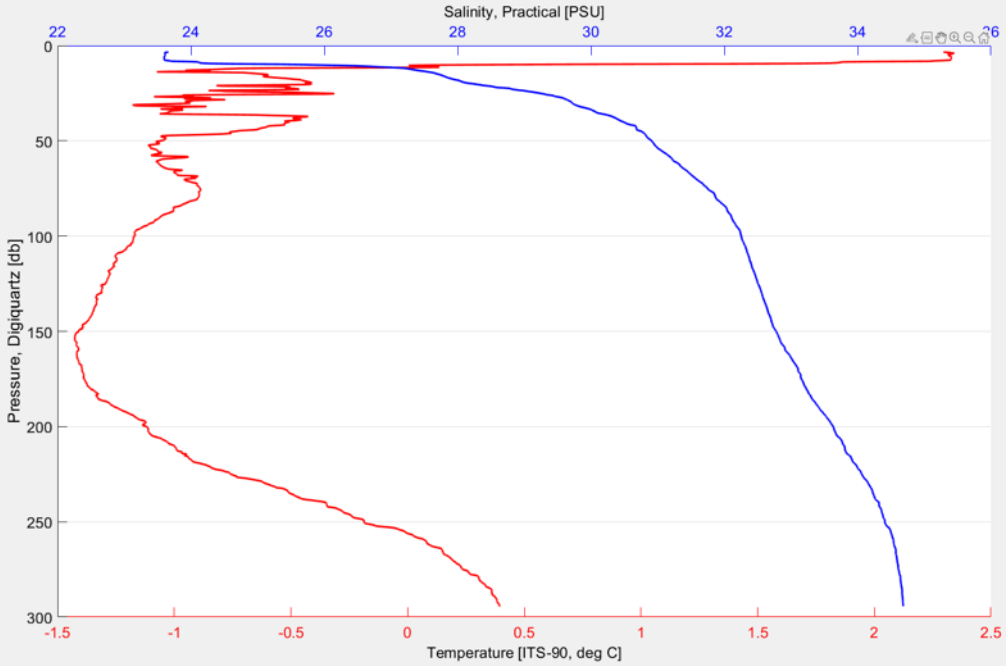
428


Salinity, Practical [PSU]
23
24
25
26
27
28
29
30
31
32
33
Pressure, Digiquartz [db]
0
10
20
30
40
50
60
70
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
3
3.5
Temperature [ITS-90, deg C]

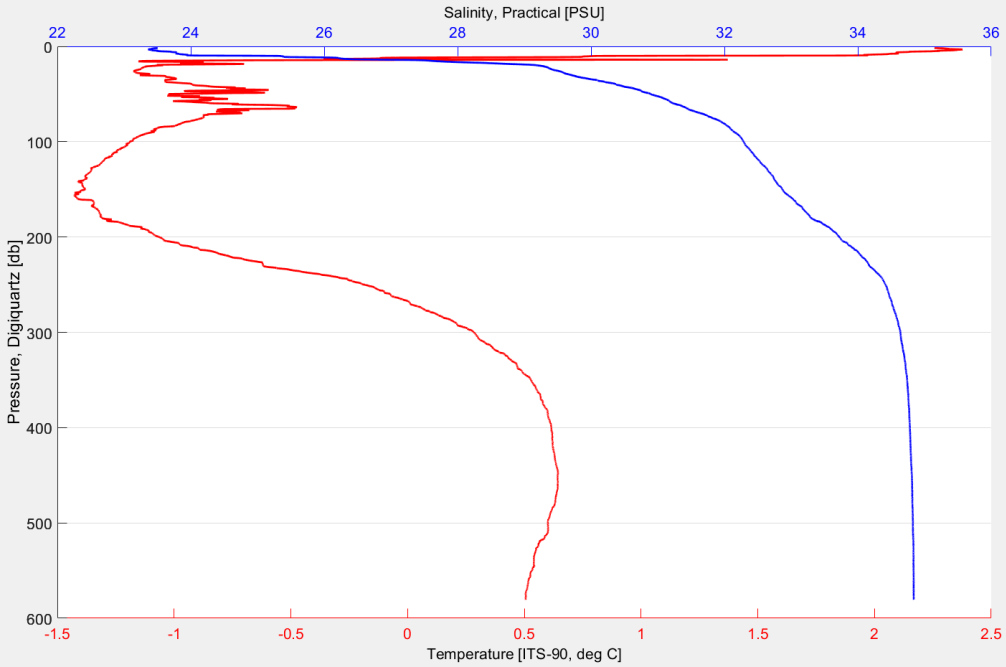
426


Salinity, Practical [PSU]
23
24
25
26
27
28
29
30
31
32
33
0
10
20
30
40
50
60
70
80
90
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Temperature [ITS-90, deg C]

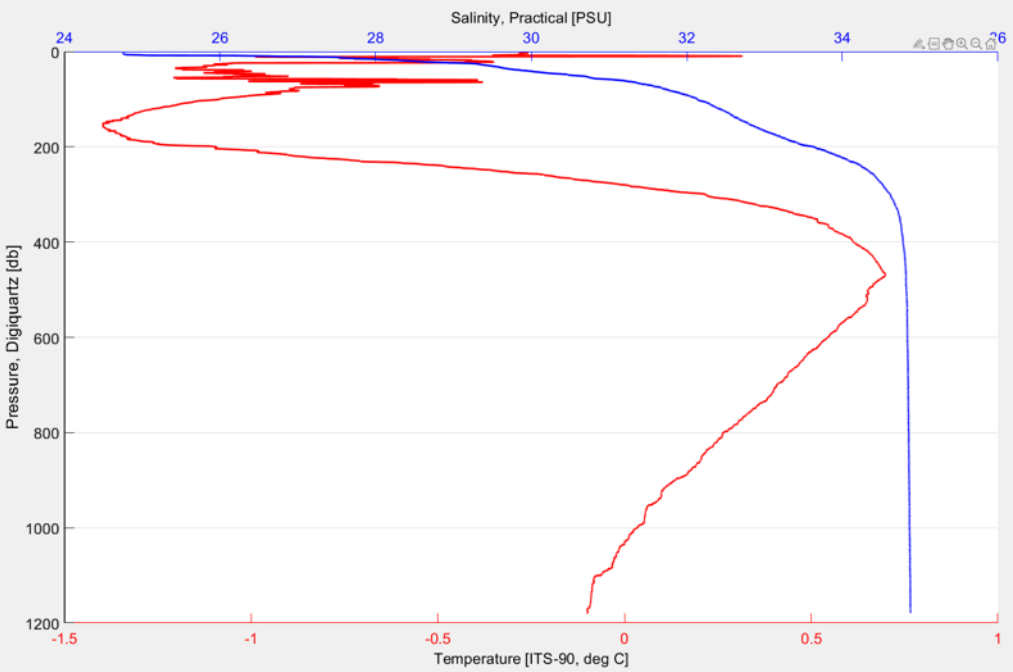
435


Salinity, Practical [PSU]
22
24
26
28
30
32
34
36
0
50
100
150
200
250
300
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Temperature [ITS-90, deg C]

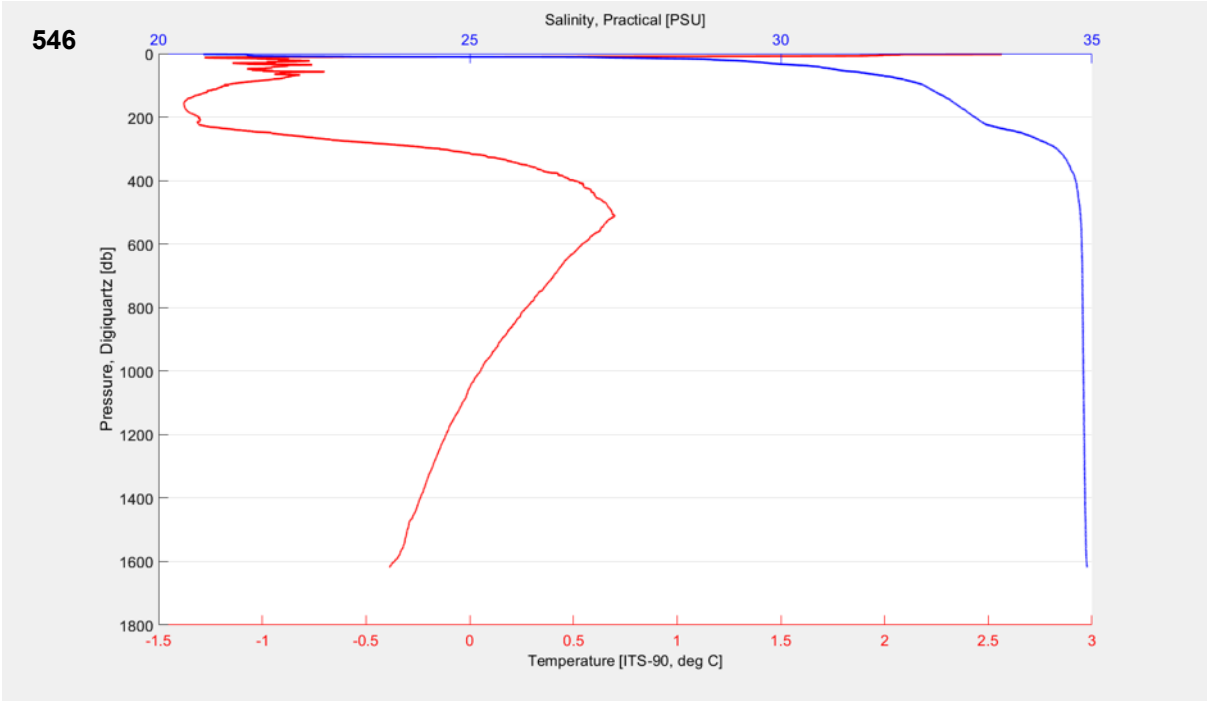
424


Salinity, Practical [PSU]
22
24
26
28
30
32
34
36
0
100
200
300
400
500
600
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Temperature [ITS-90, deg C]

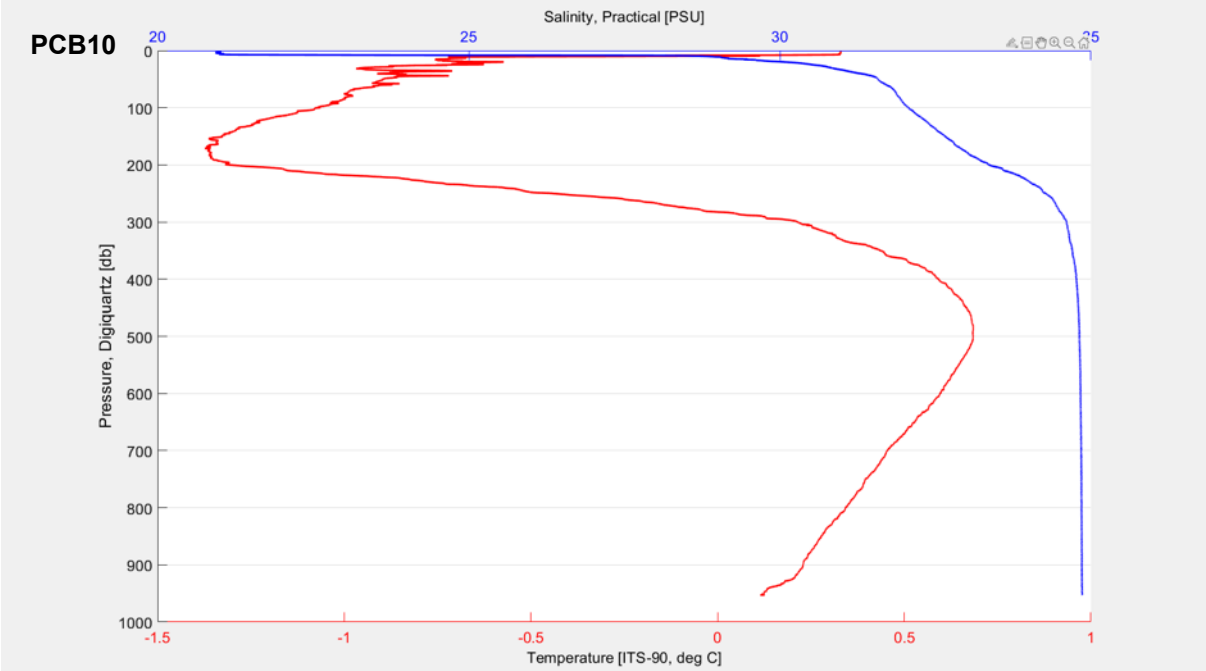
421


Salinity, Practical [PSU]
24
26
28
30
32
34
36
0
200
400
600
800
1000
1200
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
Temperature [ITS-90, deg C]

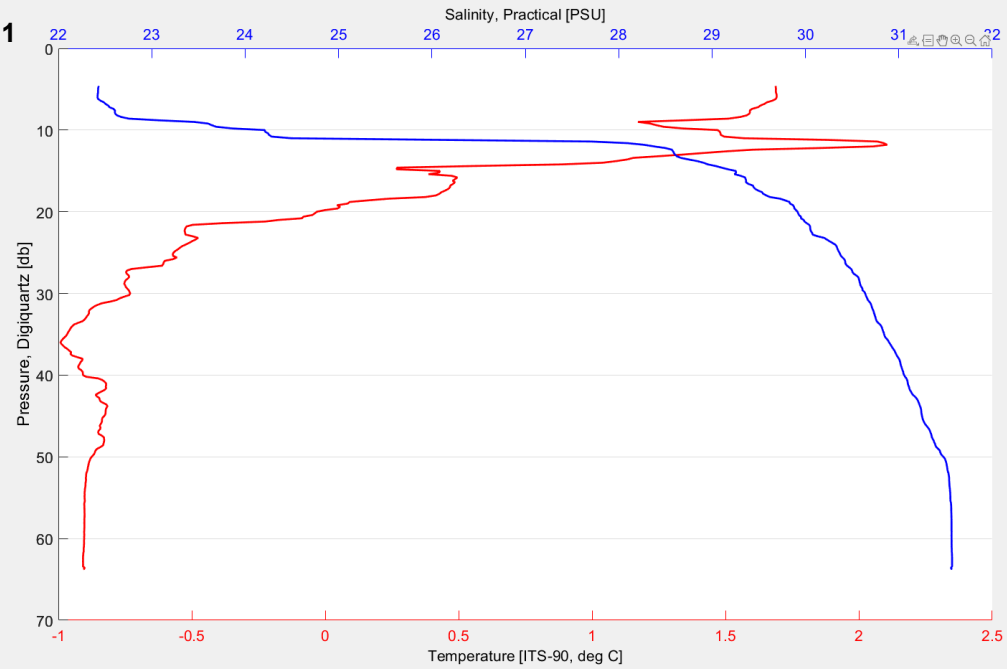
546


Salinity, Practical [PSU]
20
25
30
35
0
200
400
600
800
1000
1200
1400
1600
1800
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
3
Temperature [ITS-90, deg C]

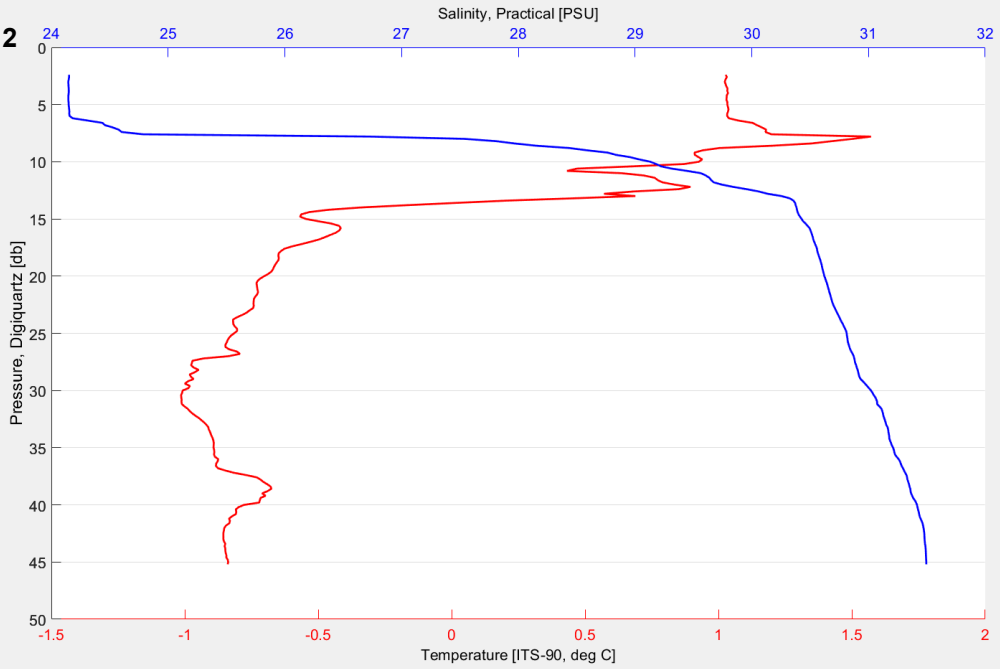
PCB10


Salinity, Practical [PSU]
20
25
30
35
0
100
200
300
400
500
600
700
800
900
1000
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
Temperature [ITS-90, deg C]

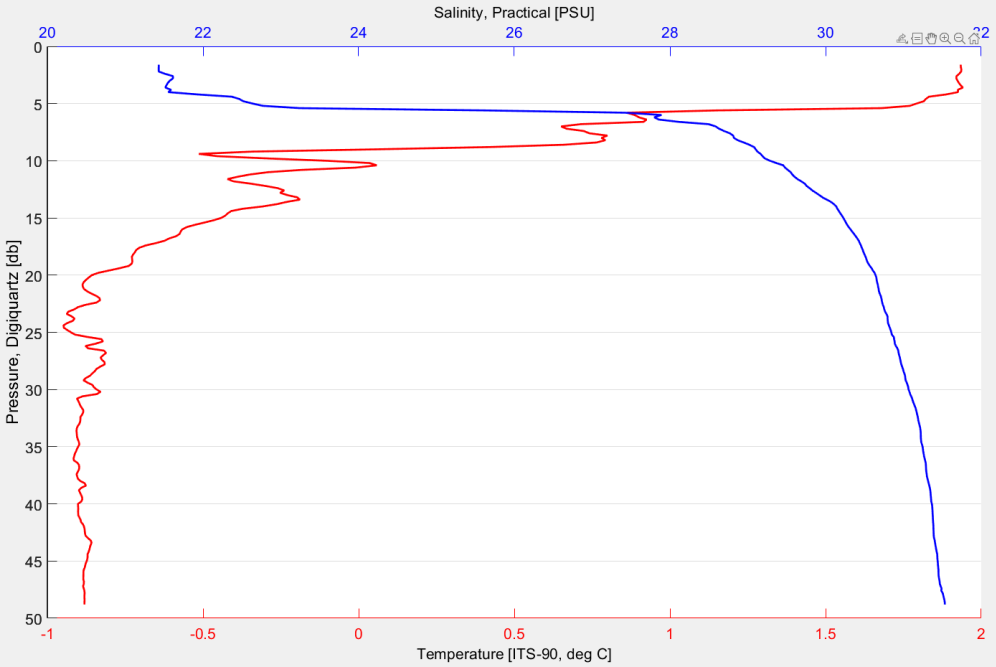
PCB11


Salinity, Practical [PSU]
22
23
24
25
26
27
28
29
30
31
32
Pressure, Digiquartz [db]
0
10
20
30
40
50
60
70
-1
-0.5
0
0.5
1
1.5
2
2.5
Temperature [ITS-90, deg C]

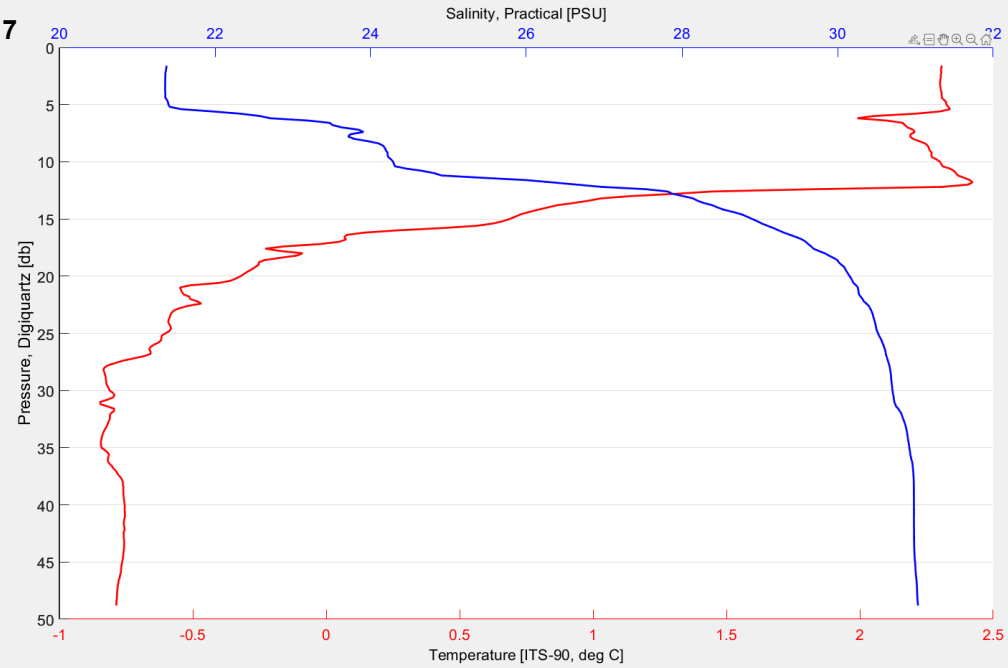
PCB12


Salinity, Practical [PSU]
24
25
26
27
28
29
30
31
32
Pressure, Digiquartz [db]
0
5
10
15
20
25
30
35
40
45
50
-1.5
-1
-0.5
0
0.5
1
1.5
2
Temperature [ITS-90, deg C]

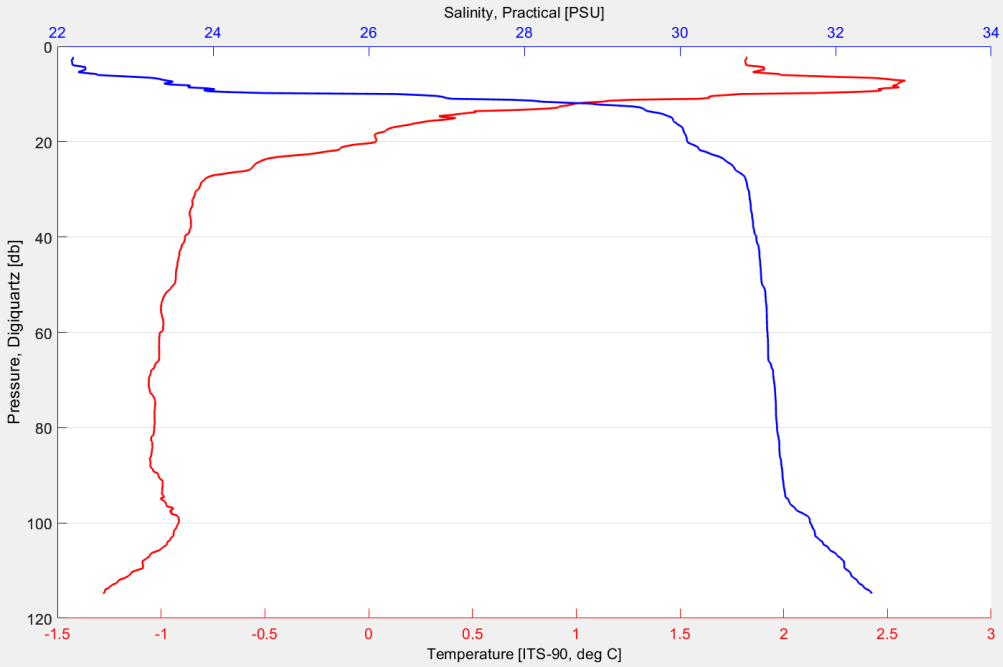
PCB14


Salinity, Practical [PSU]
20
22
24
26
28
30
32
0
5
10
15
20
25
30
35
40
45
50
Pressure, Digiquartz [db]
-1
-0.5
0
0.5
1
1.5
2
Temperature [ITS-90, deg C]

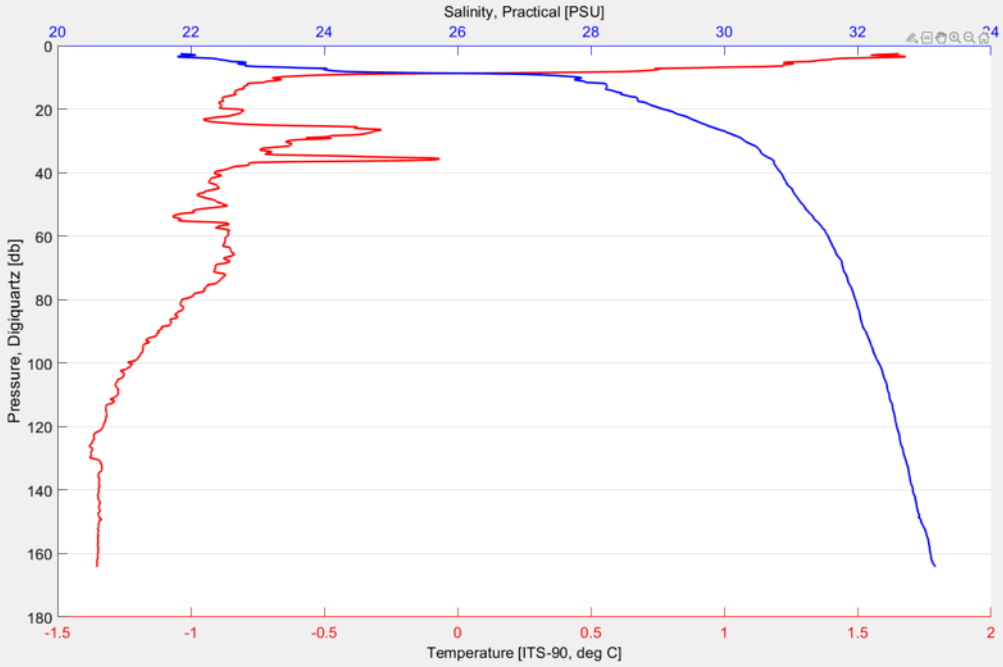
PCB17


Salinity, Practical [PSU]
20
22
24
26
28
30
32
0
5
10
15
20
25
30
35
40
45
50
Pressure, Digiquartz [db]
-1
-0.5
0
0.5
1
1.5
2
2.5
Temperature [ITS-90, deg C]

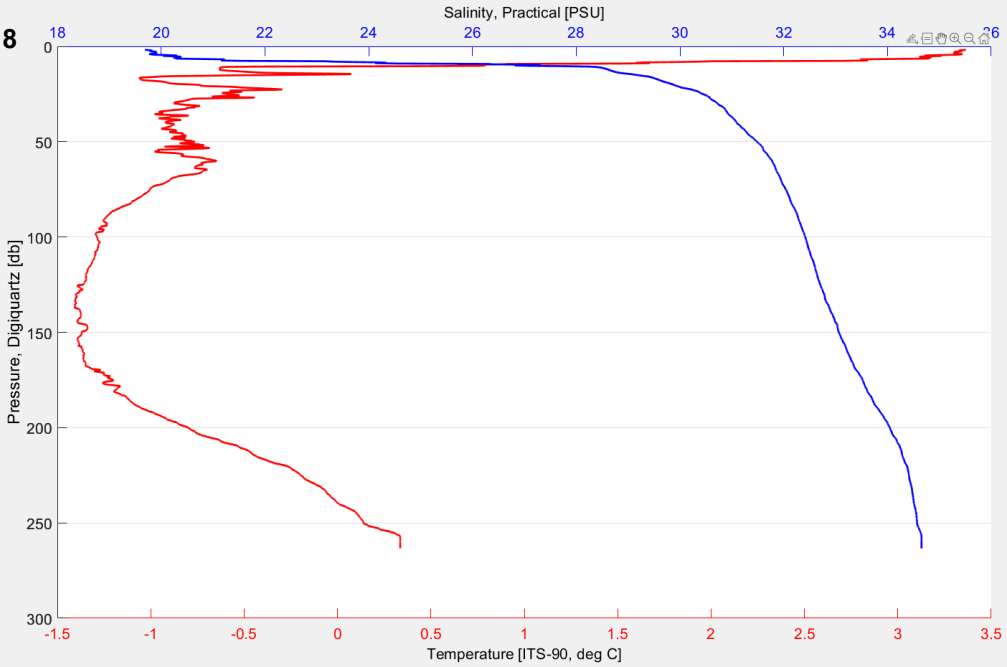
472


Salinity, Practical [PSU]
22
24
26
28
30
32
34
0
20
40
60
80
100
120
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
3
Temperature [ITS-90, deg C]

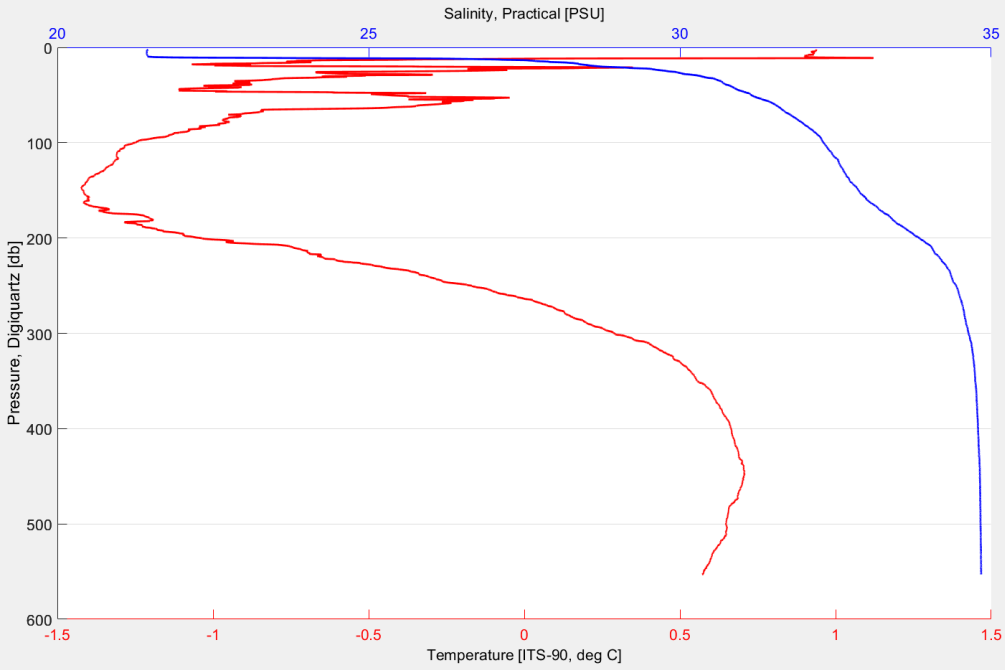
474


Salinity, Practical [PSU]
20
22
24
26
28
30
32
34
0
20
40
60
80
100
120
140
160
180
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
2
Temperature [ITS-90, deg C]

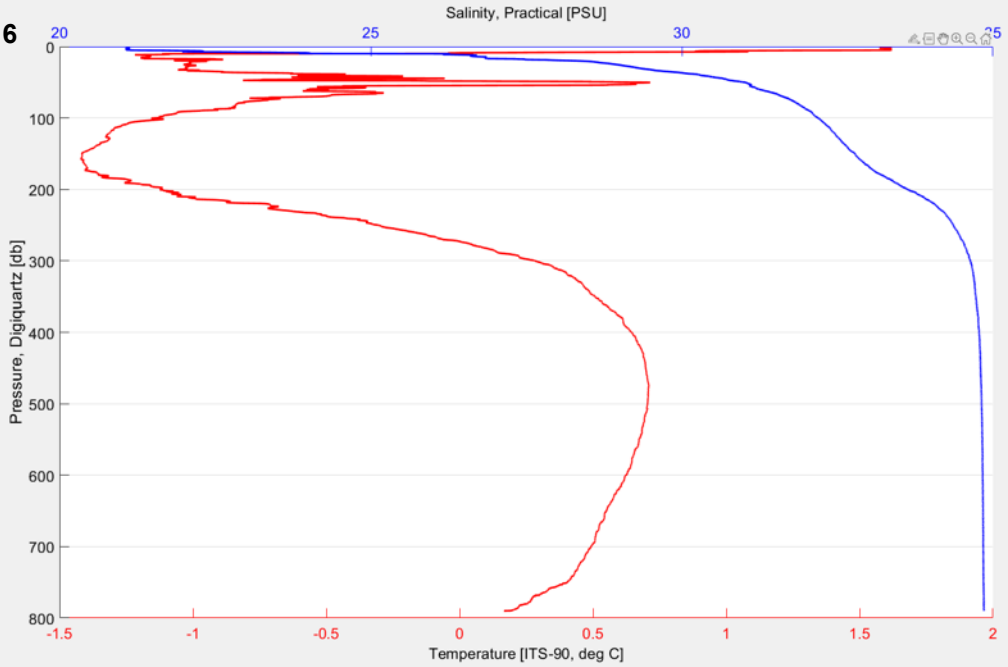
PCB18


Salinity, Practical [PSU]
18
20
22
24
26
28
30
32
34
36
0
50
100
150
200
250
300
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
3
3.5
Temperature [ITS-90, deg C]

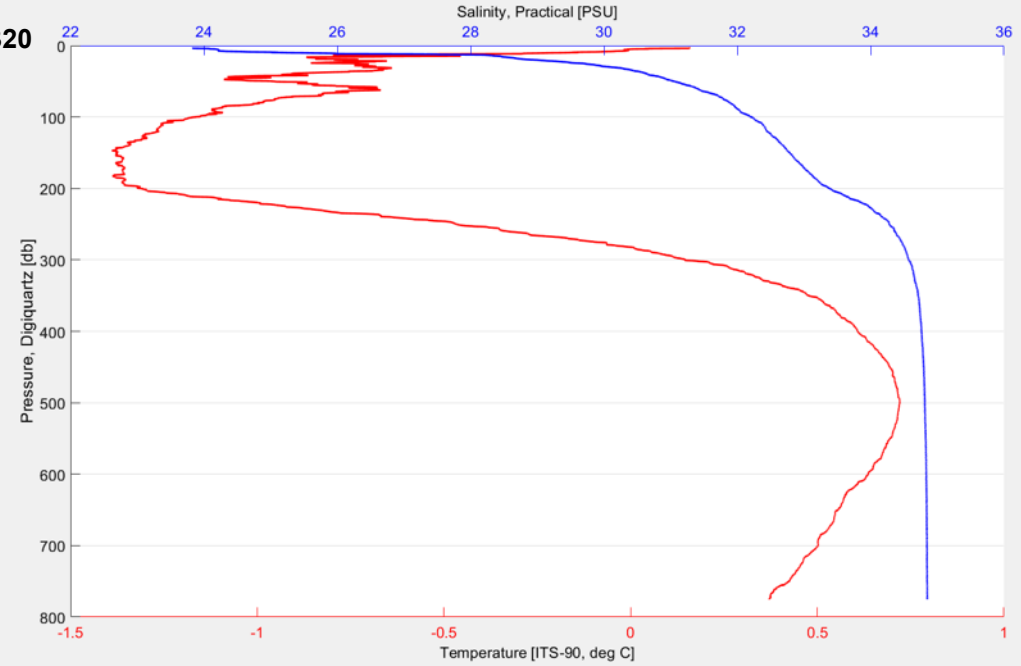
480


Salinity, Practical [PSU]
20
25
30
35
0
100
200
300
400
500
600
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
Temperature [ITS-90, deg C]

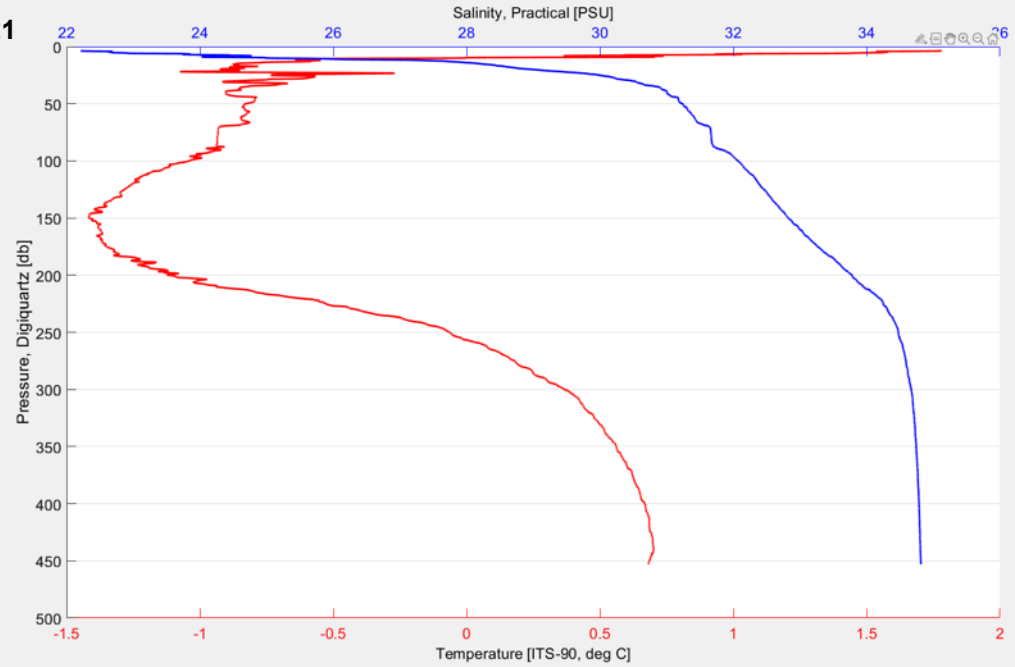
PCB16


Salinity, Practical [PSU]
20
25
30
35
0
100
200
300
400
500
600
700
800
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
1.5
2
Temperature [ITS-90, deg C]

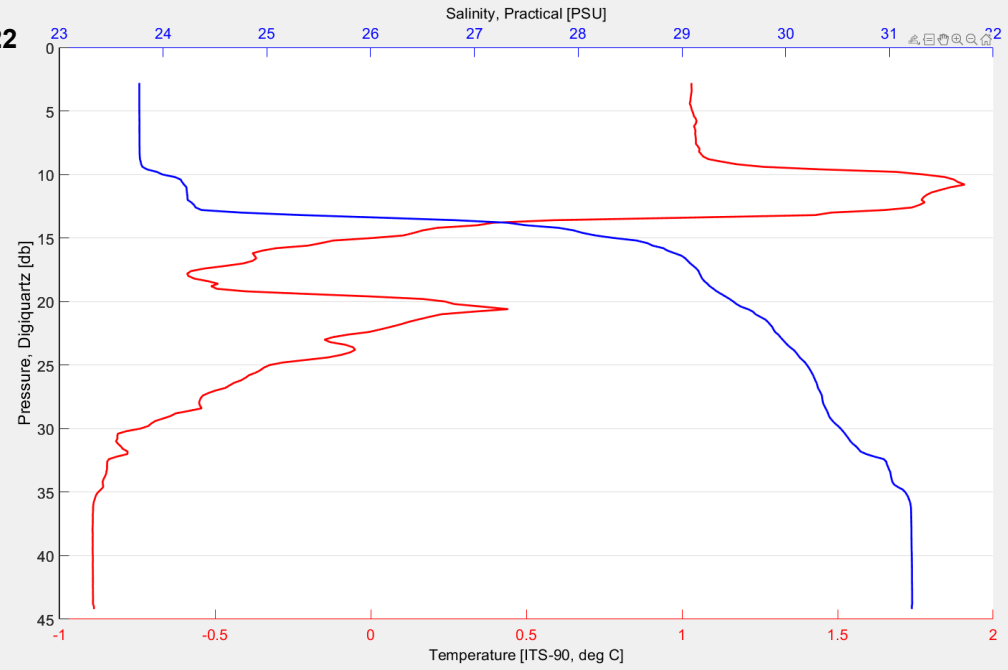
PCB20


Salinity, Practical [PSU]
22
24
26
28
30
32
34
36
0
100
200
300
400
500
600
700
800
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
1
Temperature [ITS-90, deg C]

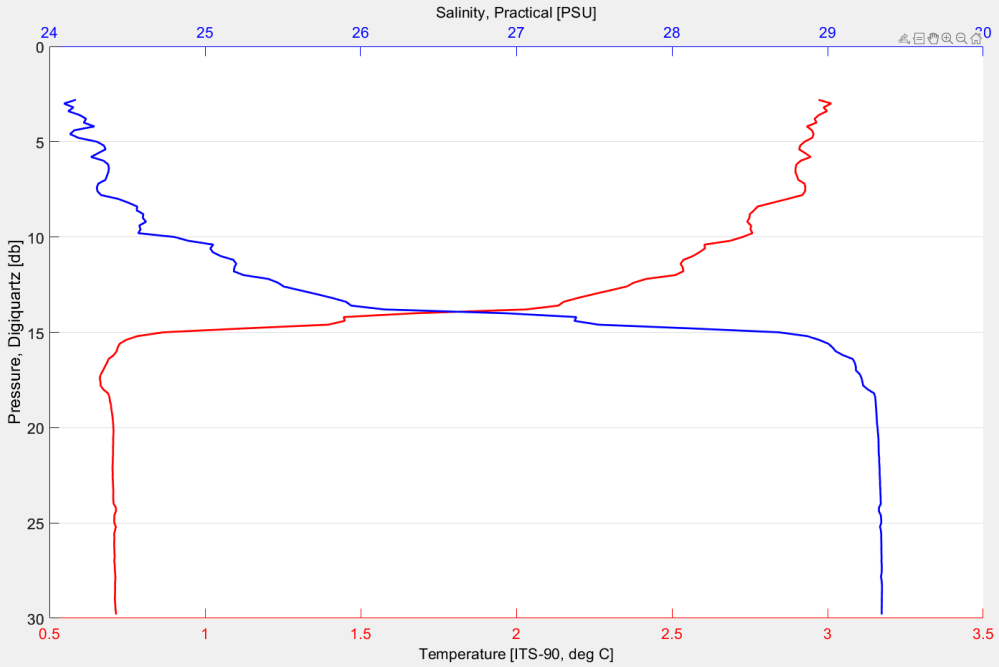
PCB21


Salinity, Practical [PSU]
22
24
26
28
30
32
34
36
Pressure, Digiquartz [db]
0
50
100
150
200
250
300
350
400
450
500
-1.5
-1
-0.5
0
0.5
1
1.5
2
Temperature [ITS-90, deg C]

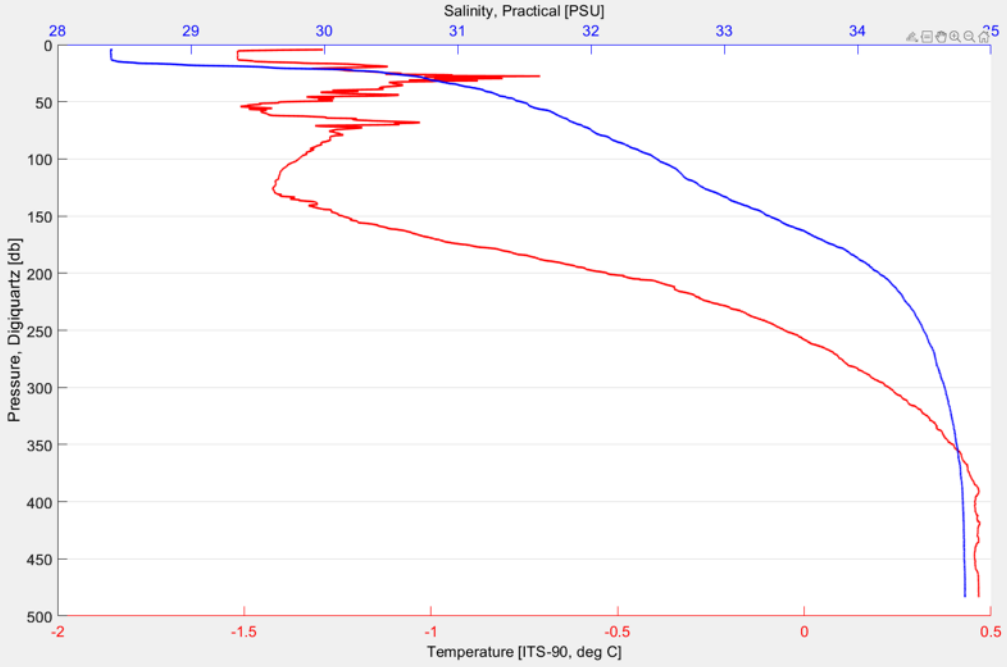
PCB22


Salinity, Practical [PSU]
23
24
25
26
27
28
29
30
31
32
Pressure, Digiquartz [db]
0
5
10
15
20
25
30
35
40
45
-1
-0.5
0
0.5
1
1.5
2
Temperature [ITS-90, deg C]

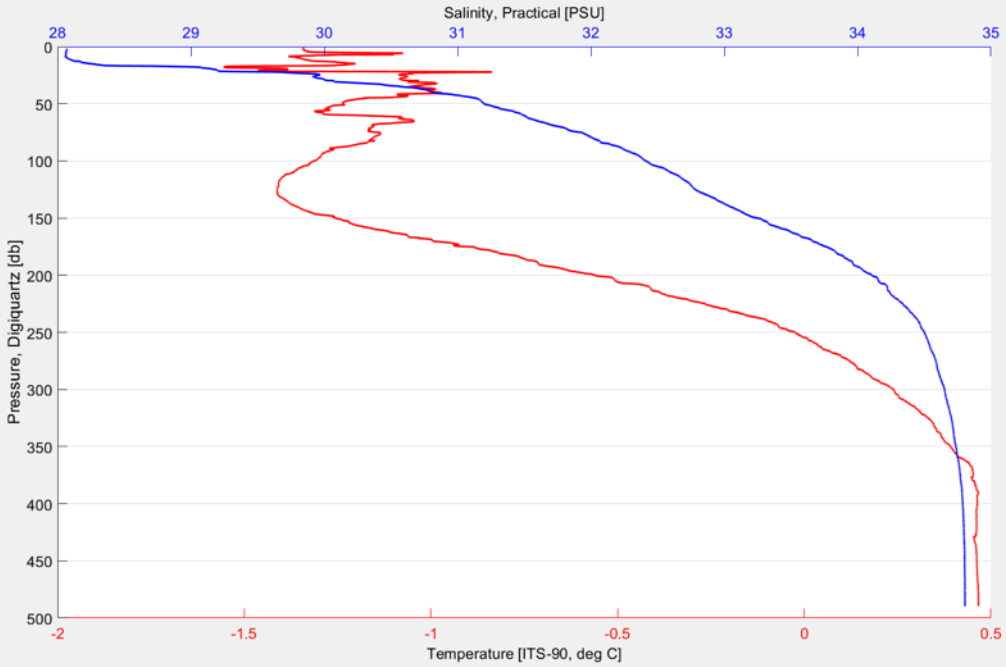
PCB23


Salinity, Practical [PSU]
24
25
26
27
28
29
30
Pressure, Digiquartz [db]
0
5
10
15
20
25
30
0.5
1
1.5
2
2.5
3
3.5
Temperature [ITS-90, deg C]

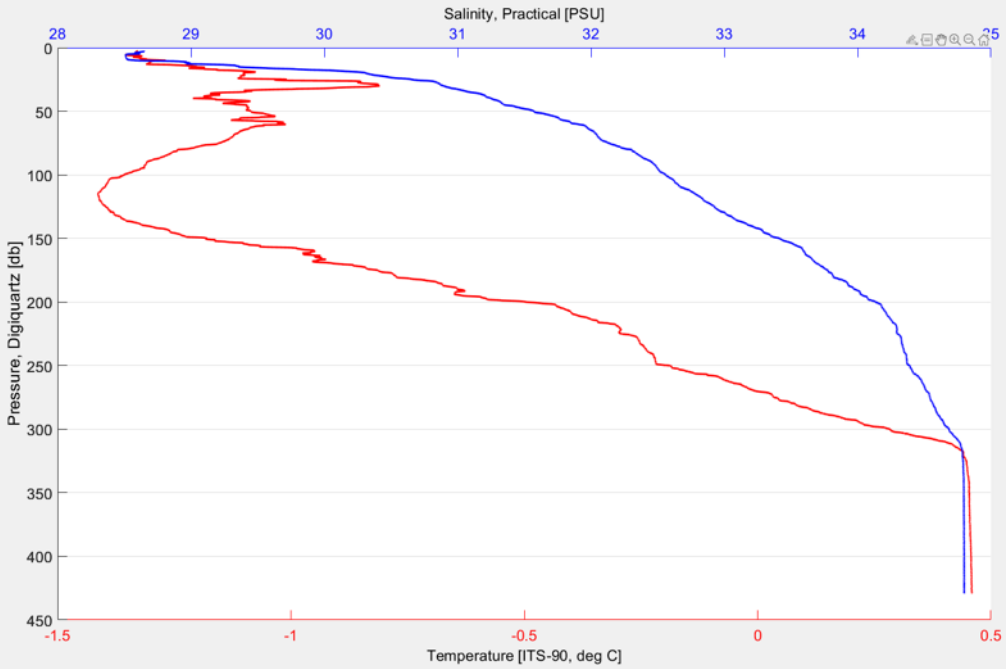
514


Salinity, Practical [PSU]
28
29
30
31
32
33
34
35
Pressure, Digiquartz [db]
0
50
100
150
200
250
300
350
400
450
500
-2
-1.5
-1
-0.5
0
0.5
Temperature [ITS-90, deg C]

516


Salinity, Practical [PSU]
28
29
30
31
32
33
34
35
0
50
100
150
200
250
300
350
400
450
500
Pressure, Digiquartz [db]
-2
-1.5
-1
-0.5
0
0.5
Temperature [ITS-90, deg C]

518


Salinity, Practical [PSU]
28
29
30
31
32
33
34
35
0
50
100
150
200
250
300
350
400
450
Pressure, Digiquartz [db]
-1.5
-1
-0.5
0
0.5
Temperature [ITS-90, deg C]

9.3 Filtration for lipid biomarkers and dissolved black carbon

Tab. 7: Volumes of water (surface, DCM or bottom) filtered for biomarker and dissolved black carbon analyses.

Station	**Biomarkers**			**Black carbon**
	Surface (L)	**DCM (L)**	**Bottom (L)**	**DCM (L)**
PCB-01	74	70.5	75	-
PCB-02	73	64	74	11.5
PCB-03	71	55	35	5
PCB-04	74	68	74	13.7
PCB-05	74	68	72	15
PCB-06	76	66	24	9.5
PCB-07	70	71	29	9.5
PCB-08	73	57	37	-
PCB-10	69	-	64	-
PCB-11	75	63	69	9.2
PCB-12	74	-	69	-
PCB-13	42	-	36	-
PCB-16	75	67	68	12.5
PCB-17	44	-	70	-
PCB-17a	18	-	51	-
PCB-18	61	-	71	-
PCB-19	61	-	73	-
PCB-20	72	63	74	9.5
PCB-21	74	71	73	9
PCB-22	73	67	71	11.5
PCB-23	69	-	41	-

9.4 Long cores

Tab. 8: Storage location, number of sections and total length of sediment cores collected. For locations, see Figure 22. GGC: giant gravity core, PC: piston core, TWC: trigger weight core, GC: gravity core, CC: core catcher.

Cores Stored in Potsdam	Water depth (m)	Sections	Core Length (cm)
PCB-11-GGC	74	3	292.5
PCB-13-PC	33	2	153
PCB-13-TWC	33	1	77
PCB-16-GGC	783	4	350.5
PCB-17-PC	54	4	327
PCB-18-PC	268	7	682
PCB-21-PC	443	5	436.5
PCB-21-TWC	443	3	281.5
PCB-22-PC	48	1	46
PCB-3-PC	1041	6	547.5
PCB-3-TWC	1041	2	183.5
PCB-4-PC	529	5	442.5
PCB-4-TWC	529	2	195.5
PCB-6-PC	50	2	176.5
PCB-6-TWC	50	1	41
PCB-7-GGC	52	6	544.5
PCB-9-PC	678	4	420
PCB-9-TWC	678	3	254
Cores Stored in Rimouski			
518N-GGC	525	3	314
AMD2104-1-GC	46	2	218
PCB-11-TWC	74	3	220.5
PCB-12-GC	55	2	200
PCB-16-GC	778	3	269
PCB-17-TWC	54	3	232.5
PCB-17a-GC	19	2	124.5
PCB-18-TWC	268	3	288.5
Core sent to GSC - Halifax			
AMD2104-2121NK-PC	36	1+CC	59

Tab. 9: Length of each section. For locations, see Figure 21. GGC: giant gravity core, PC: piston core, TWC: trigger weight core, GC: gravity core, CC: core catcher.

CORE	SECTION	LENGTH (cm)	Top (cm)	Base (cm)
PCB-3-PC	1	39.5	0	39.5
	2	100	39.5	139.5
	3	100	139.5	239.5
	4	106.5	239.5	346
	5	101.5	346	447.5
	6	100	447.5	547.5
PCB-3-TWC	1	83.5	0	83.5
	2	100	83.5	183.5
PCB-4-PC	1	34	0	34
	2	101	34	135
	3	107	135	242
	4	100	242	342
	5	100.5	342	442.5
PCB-4-TWC	1	95.5	0	95.5
	2	100	95.5	195.5
PCB-6-TWC	1	41	0	41
PCB-6-PC	1	75.5	0	75.5
	2	101	75.5	176.5
AMD2104-1-GC	1	68	0	68
	2	150	68	218
PCB-7-GGC	1	44	0	44
	2	100	44	144
	3	100	144	244
	4	98	244	342
	5	101.5	342	443.5
	6	101	443.5	544.5
PCB-9-PC	1	113	0	113
	2	107	113	220
	3	100	220	320
	4	100	320	420
PCB-9-TWC	1	52.5	0	52.5
	2	100.5	52.5	153
	3	101	153	254
PCB-11-GGC	1	93	0	93
	2	100	93	193
	3	99.5	193	292.5
PCB-11-TWC	1	20.5	0	20.5
	2	100	20.5	120.5
	3	100	120.5	220.5
PCB-12-GC	1	100	0	100

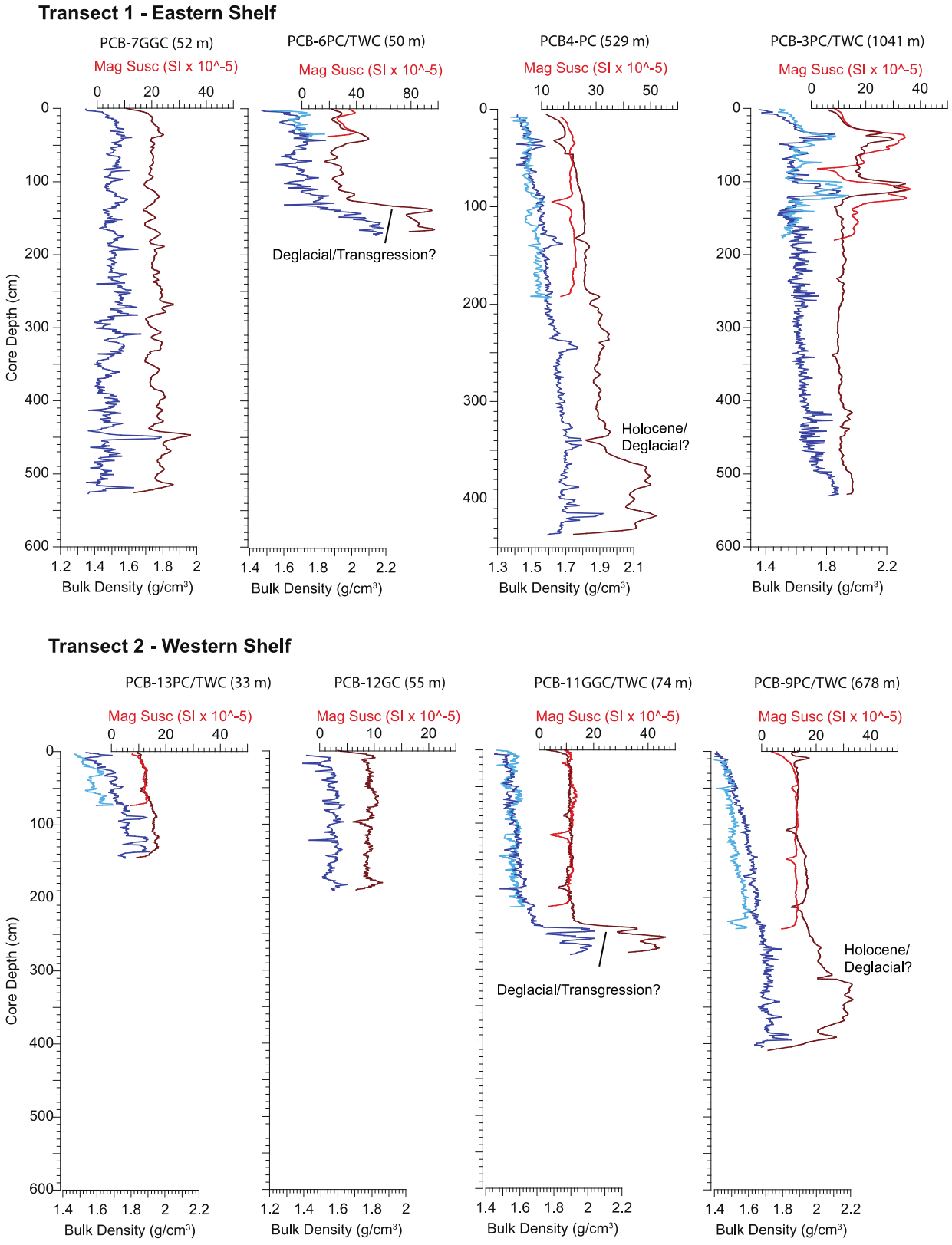
	2	100	100	200
PCB-13-PC	1	53	0	53
	2	100	53	153
PCB-13-TWC	1	77	0	77
PCB-16-GC	1	68.5	0	68.5
	2	100.5	68.5	169
	3	100	169	269
PCB-16-GGC	1	51.5	0	51.5
	2	97.5	51.5	149
	3	100.5	149	249.5
	4	101	249.5	350.5
PCB-17-PC	1	20	0	20
	2	106	20	126
	3	100.5	126	226.5
	4	100.5	226.5	327
PCB-17-TWC	1	30.5	0	30.5
	2	101	30.5	131.5
	3	101	131.5	232.5
PCB-17a-GC	1	24.5	0	24.5
	2	100	24.5	124.5
PCB-18-PC	1	69	0	69
	2	106.5	69	175.5
	3	100.5	175.5	276
	4	100	276	376
	5	106	376	482
	6	100	482	582
	7	100	582	682
PCB-18-TWC	1	85.5	0	85.5
	2	102	85.5	187.5
	3	101	187.5	288.5
PCB-21-PC	1	29.5	0	29.5
	2	100	29.5	129.5
	3	106.5	129.5	236
	4	100.5	236	336.5
	5	100	336.5	436.5
PCB-21-TWC	1	82	0	82
	2	100	82	182
	3	99.5	182	281.5
AMD2104-2121NK-PC	1+CC	59	0	59
PCB-22-PC	1+CC	46	0	46

9.5 Archive MUC cores

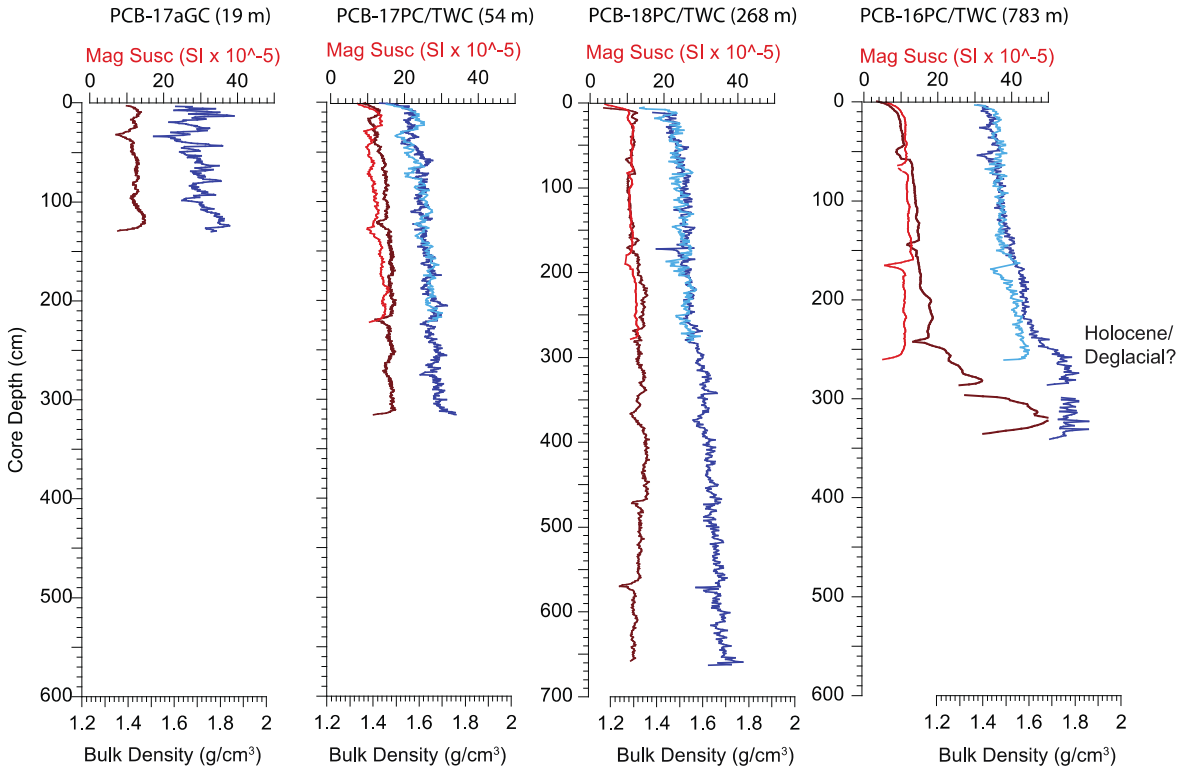
Tab. 10: Multicorer (MUC) archive cores stored in Potsdam. Total length of sediment cores collected. For locations, see Figures 1 and 22.

STATION ID	LENGTH (cm)
MCTL	43
PCB-01	46
PCB-02	38
PCB-03	35
PCB-04	37
PCB-05	23
PCB-06	38.5
PCB-07	46
PCB-08 / 431	40
PCB-09	39
PCB-10	40
PCB-11	39.5
PCB-12	39
PCB-13	35
PCB-14	20.5
PCB-16	43
PCB-17 / 470	48.5
PCB-17A	27.5
PCB-18 / 476	42
PCB-19 / 478	44
PCB-20	40.5
PCB-21	36
PCB-22	20.5
PCB-23	26.5
516	38
518N	37.5

9.6 Multi Sensor Core Logger data

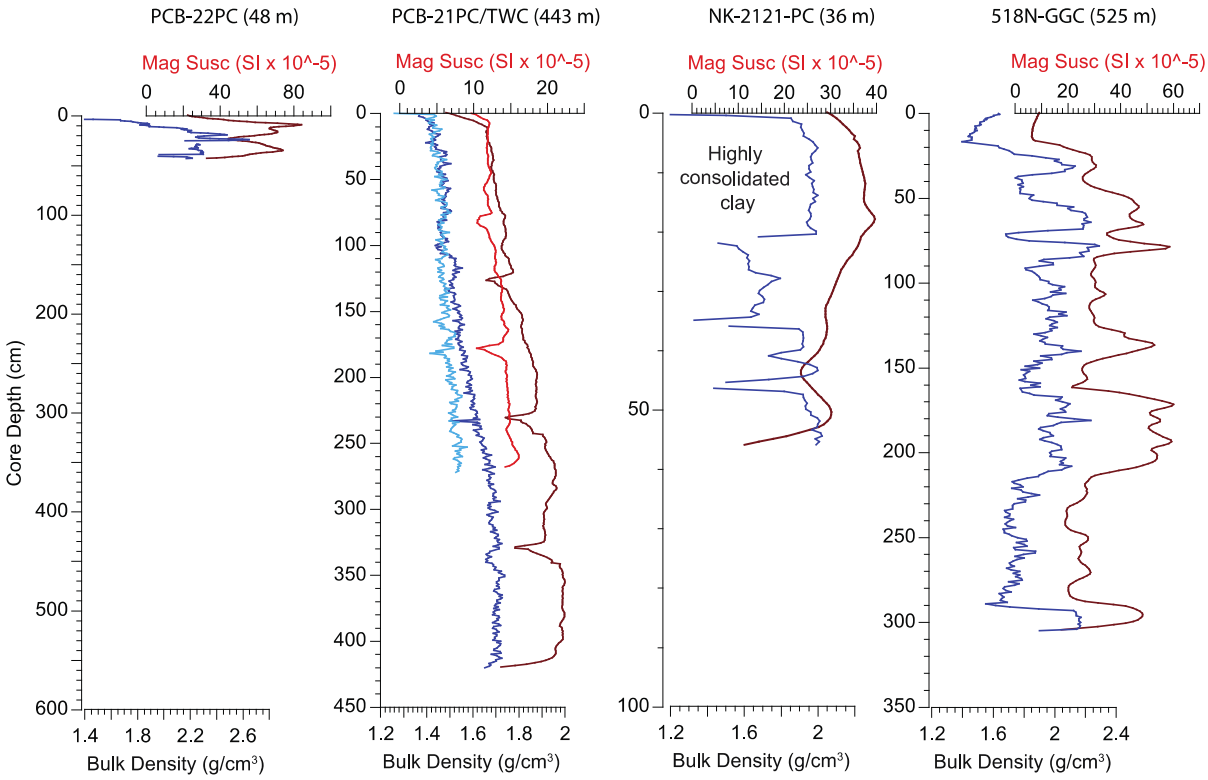


Transect 3 - Mackenzie Trough



Transect 4 - Alaskan shelf

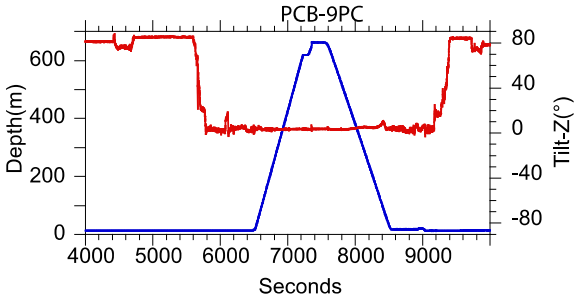
Other Cores

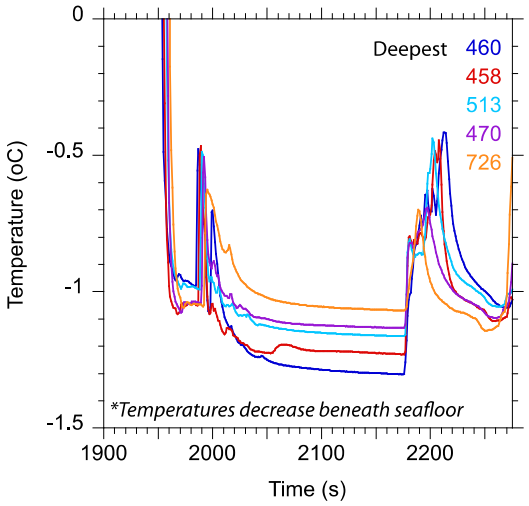


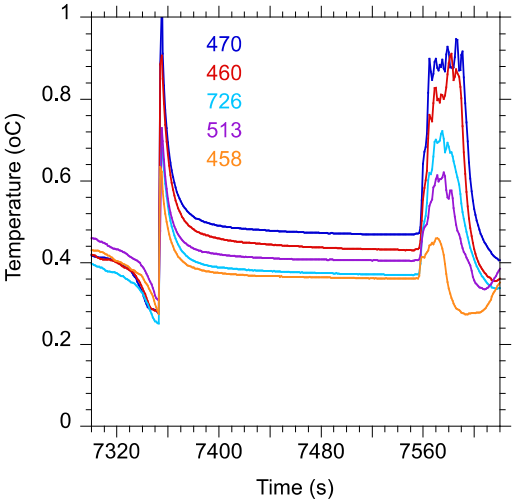
9.7 Sediment temperature probes

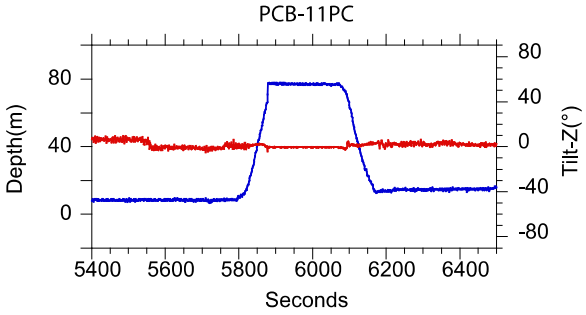
PCB-7GGC

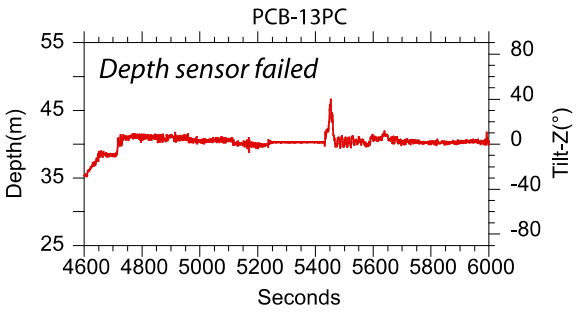
No orientation data

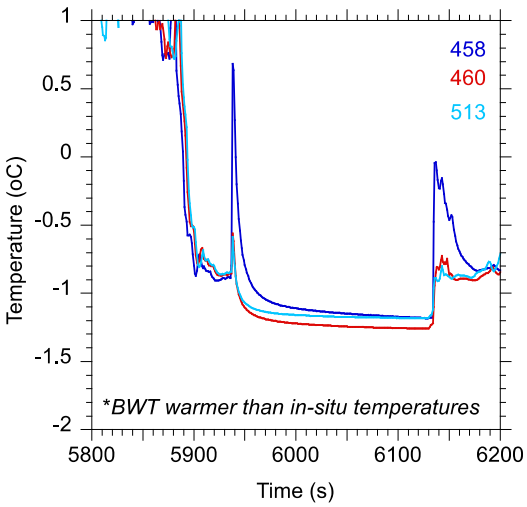


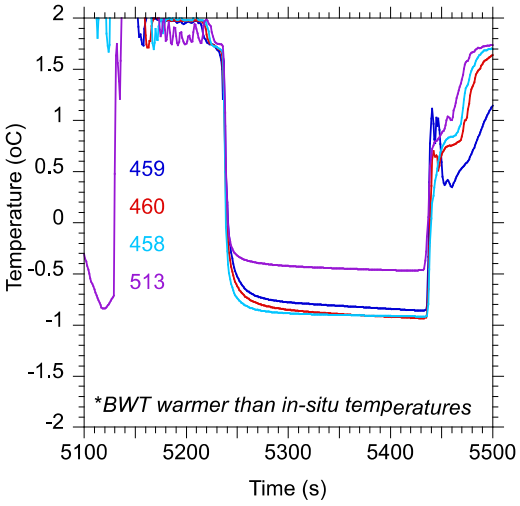


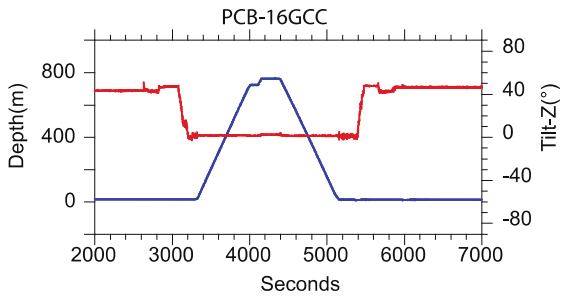


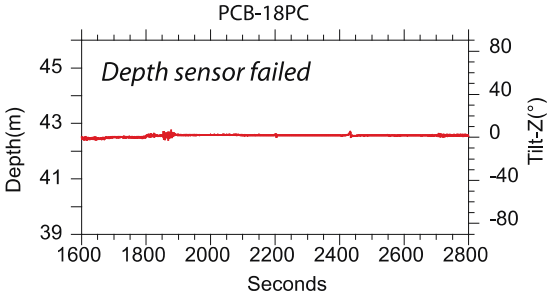


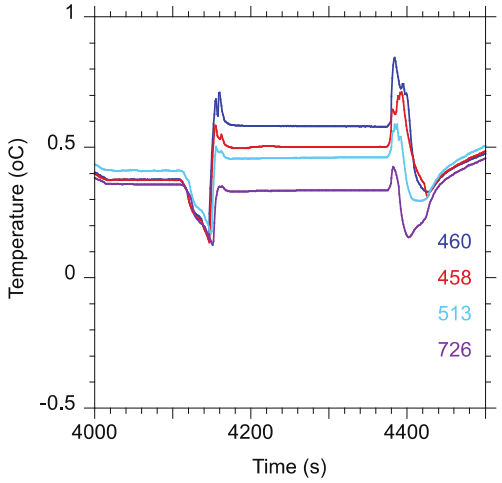


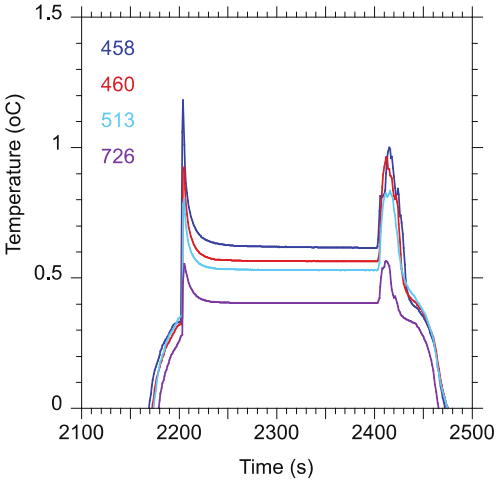


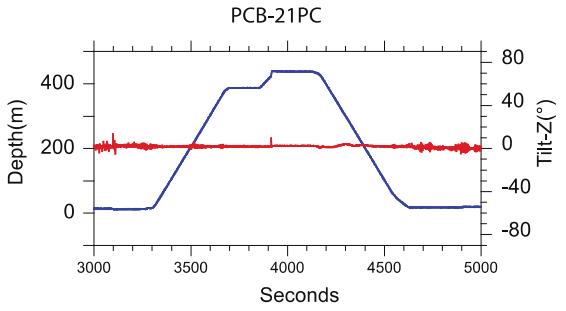


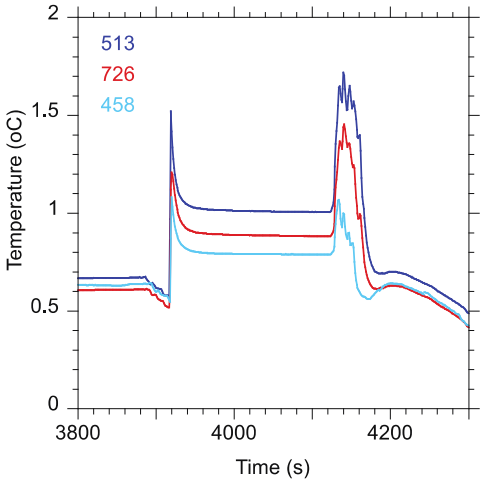

PCB-16GCC
Depth(m)
Tilt-Z(°)
Seconds


PCB-18PC
Depth sensor failed
Depth(m)
Tilt-Z(°)
Seconds

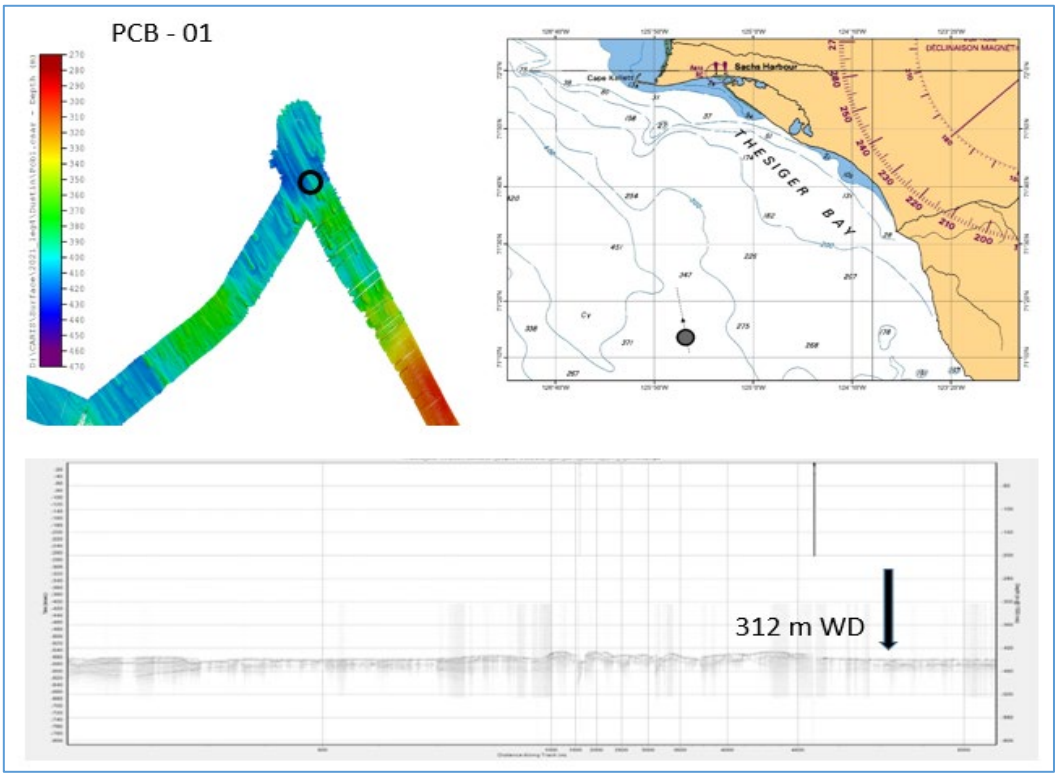

Temperature (oC)
460
458
513
726
Time (s)

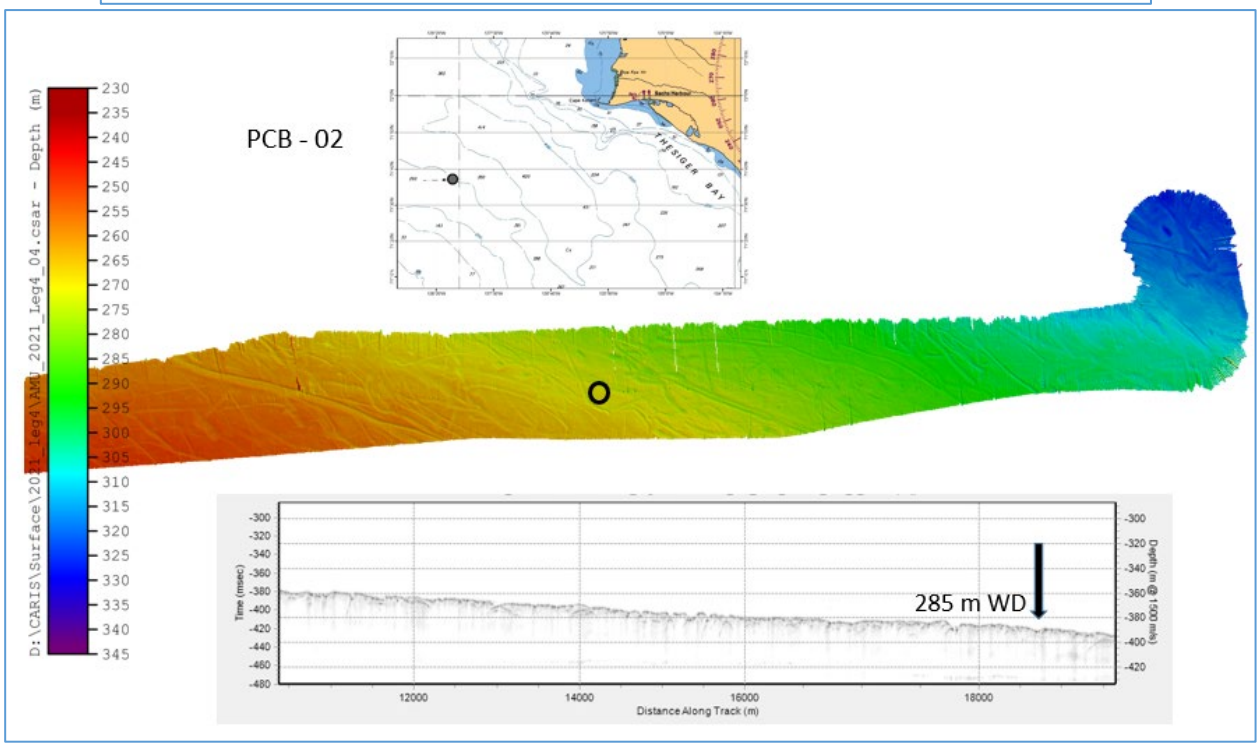

458
460
513
726
Temperature (oC)
Time (s)

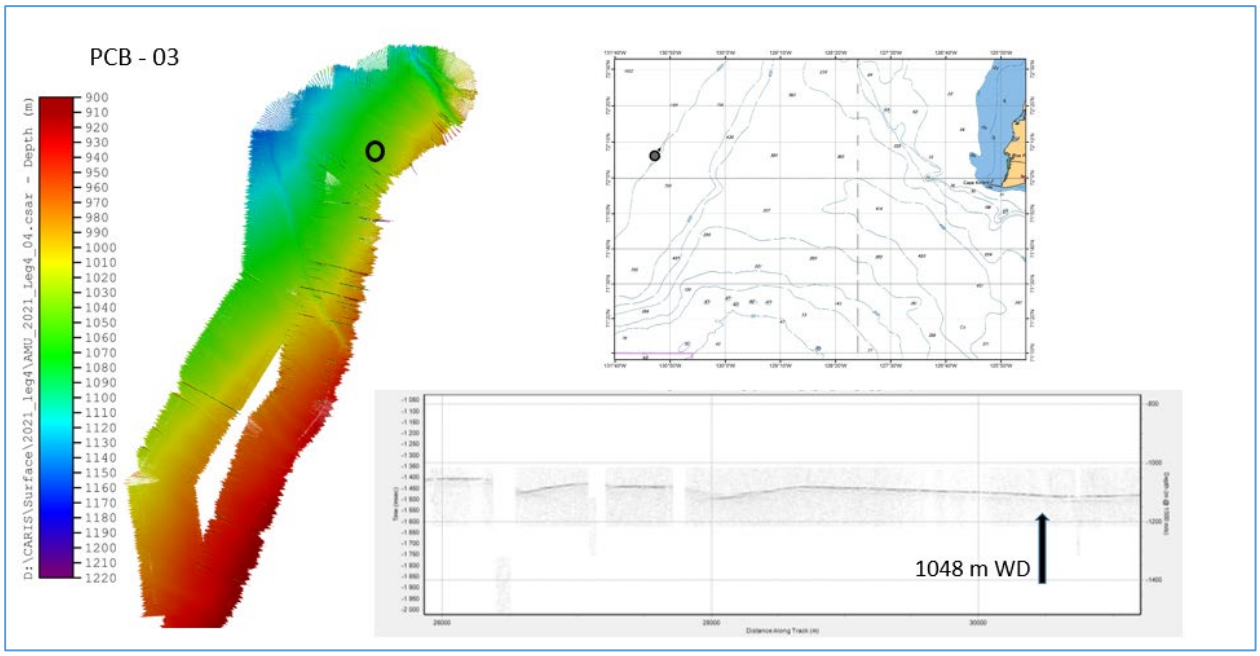

PCB-21PC
Depth(m)
Tilt-Z(°)
Seconds

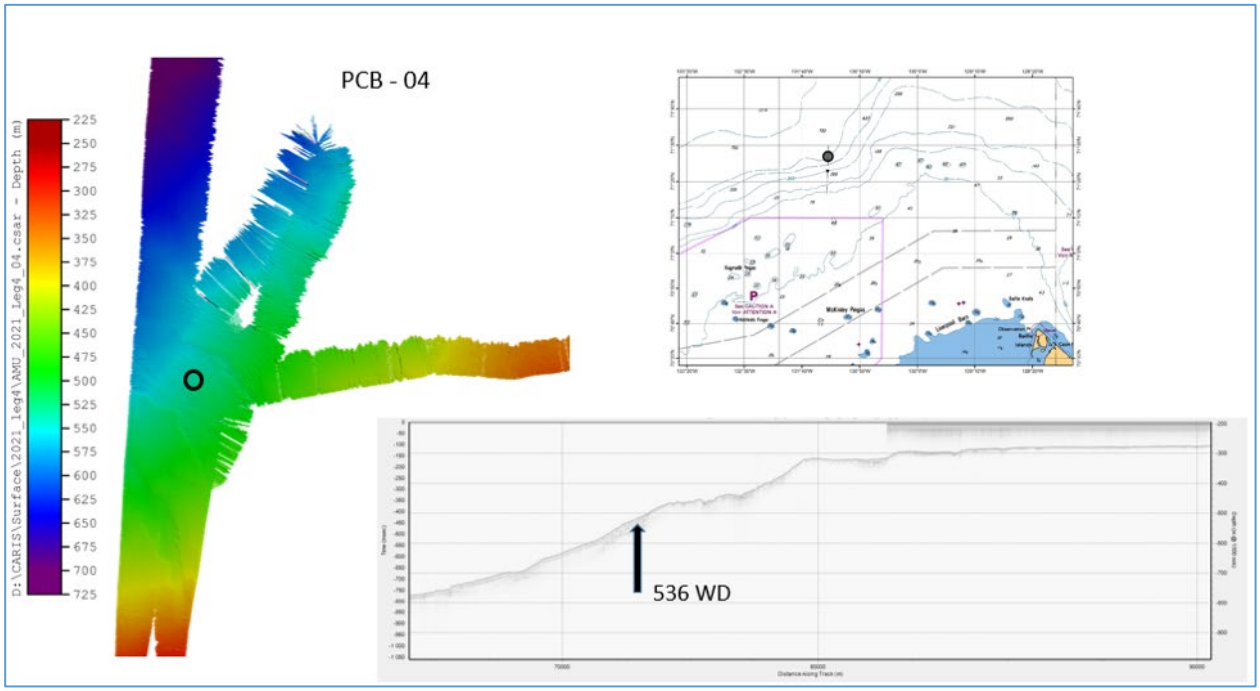

513
726
458
Temperature (oC)
Time (s)

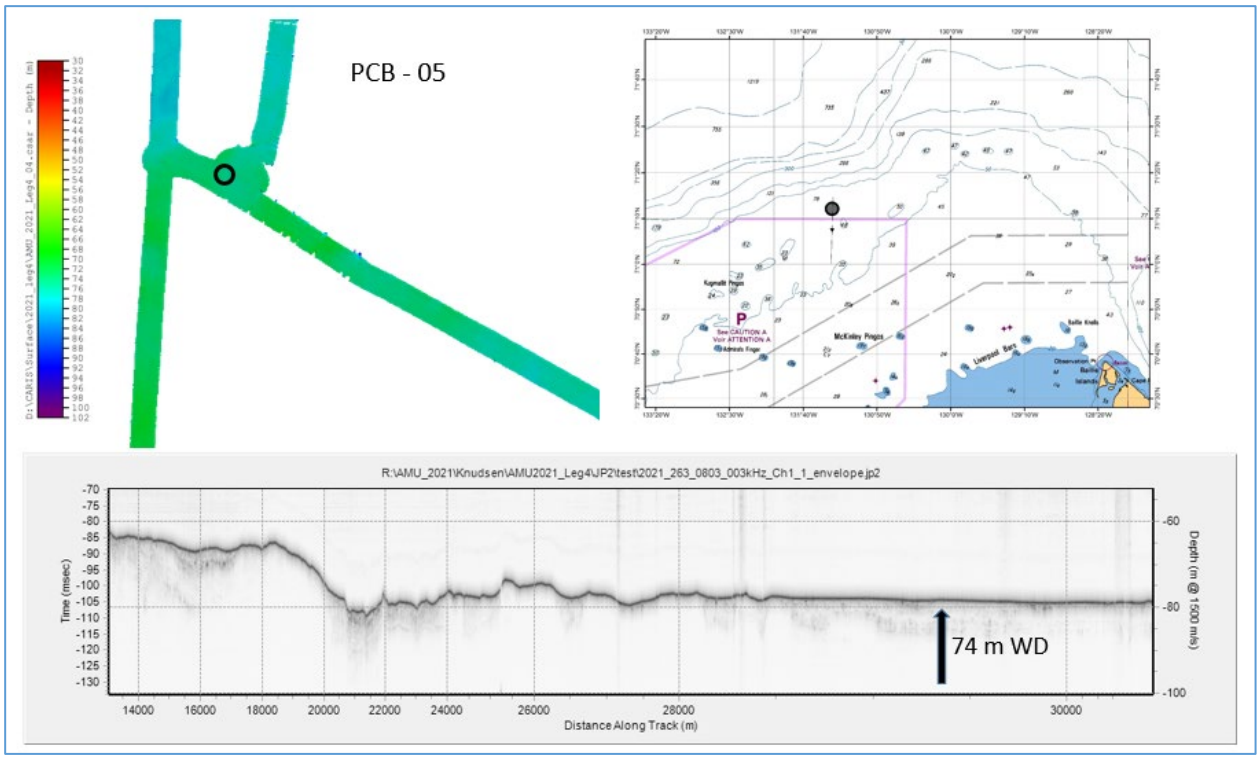
9.8 Underway Hydro-acoustic Mapping and Coring Locations

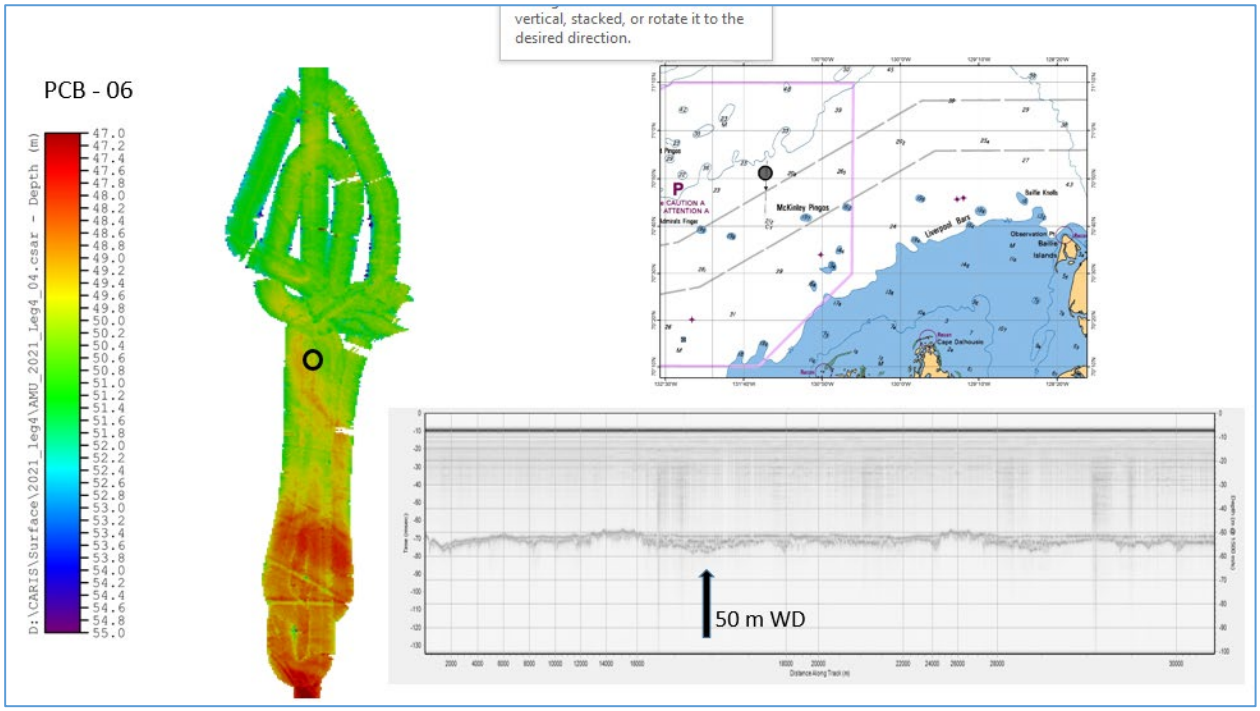


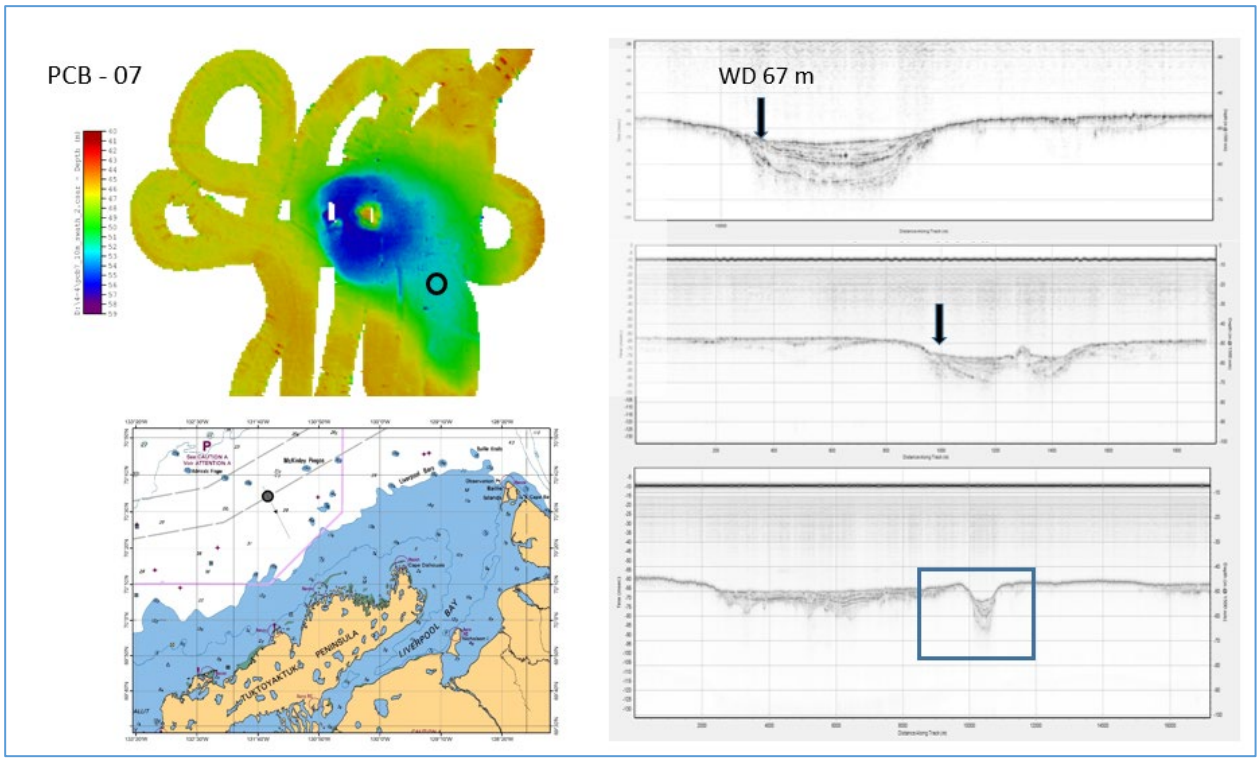


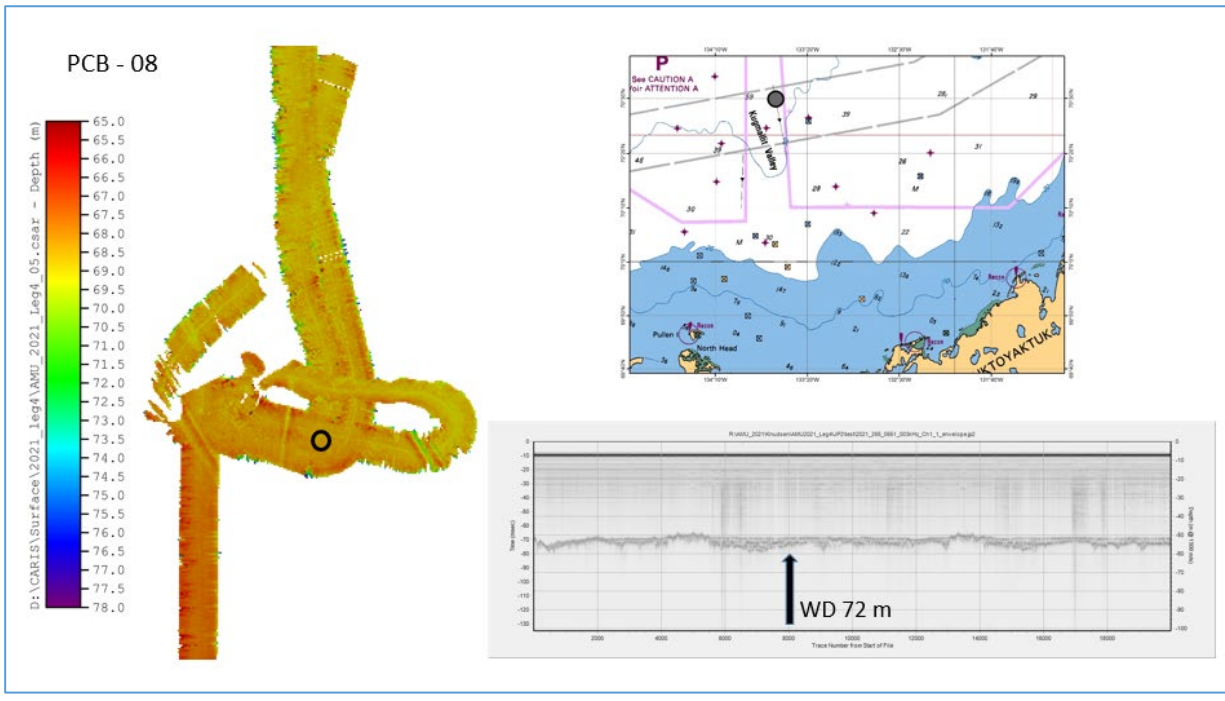

PCB - 03
D:\CARIS\Surface\2021_Leg4\AMU_2021_Leg4_04.csar - Depth (m)
900
910
920
930
940
950
960
970
980
990
1000
1010
1020
1030
1040
1050
1060
1070
1080
1090
1100
1110
1120
1130
1140
1150
1160
1170
1180
1190
1200
1210
1220
1048 m WD


PCB - 04
D:\CARIS\Surface\2021_Leg4\AMU_2021_Leg4_04.csar - Depth (m)
225
250
275
300
325
350
375
400
425
450
475
500
525
550
575
600
625
650
675
700
725
536 WD

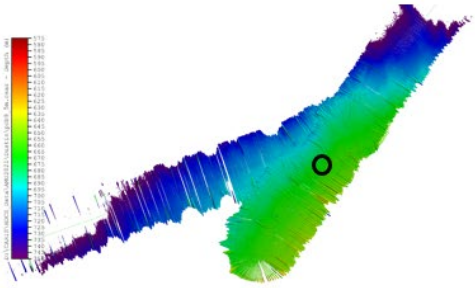

PCB - 05
R:\AMU_2021\Knudsen\AMU2021_Leg4\JP2\test\2021_263_0803_003kHz_Ch1_1_envelope.jp2
Time (msec)
Depth (m @ 1500 m/s)
Distance Along Track (m)
74 m WD

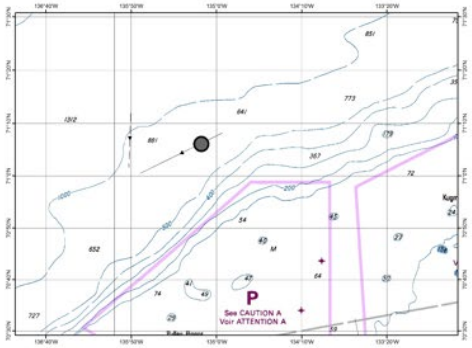

vertical, stacked, or rotate it to the desired direction.
PCB - 06
D:\CARIS\Surface\2021_leg4\AMU_2021_Leg4_04.csar - Depth (m)
50 m WD

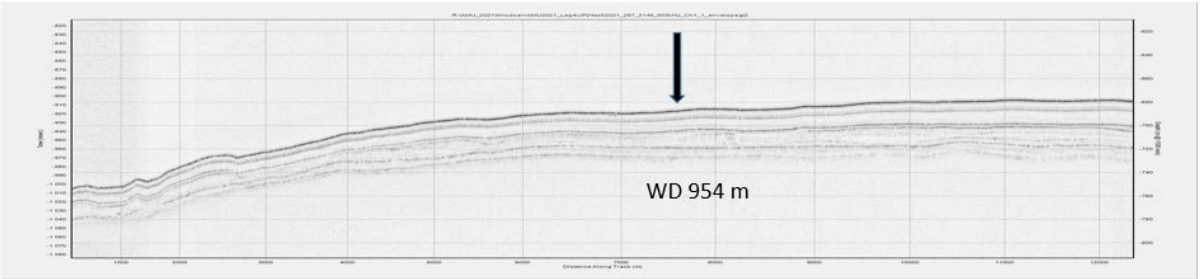

PCB - 07
WD 67 m
PENINSULA
LIVERPOOL
BAY
KTOYAKTUK


PCB - 08
D:\CARIS\Surface\2021_leg4\AMU_2021_Leg4_05.csar - Depth (m)
65.0
65.5
66.0
66.5
67.0
67.5
68.0
68.5
69.0
69.5
70.0
70.5
71.0
71.5
72.0
72.5
73.0
73.5
74.0
74.5
75.0
75.5
76.0
76.5
77.0
77.5
78.0
See CAUTION A
Voir ATTENTION A
North Head
KTOYAKTUK
WD 72 m

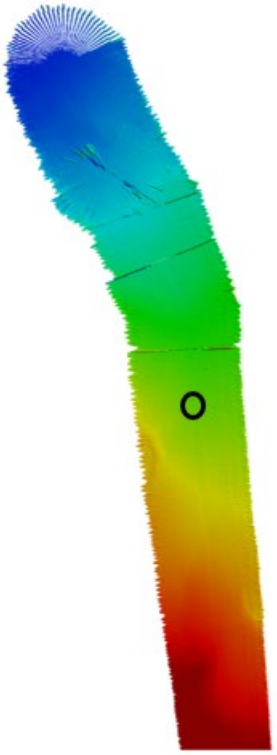
PCB - 09

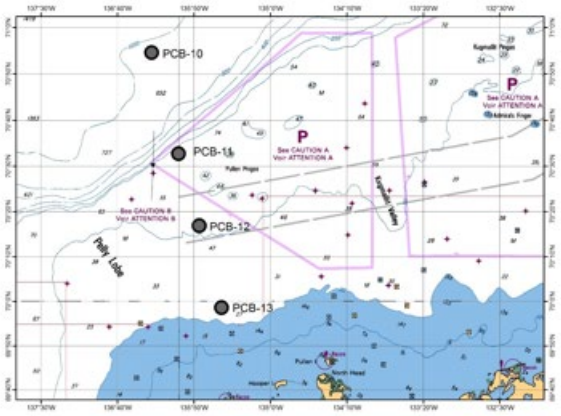


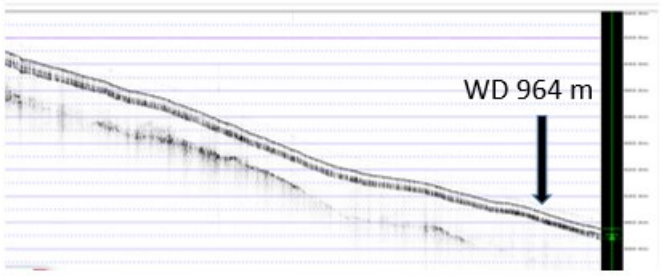



WD 954 m

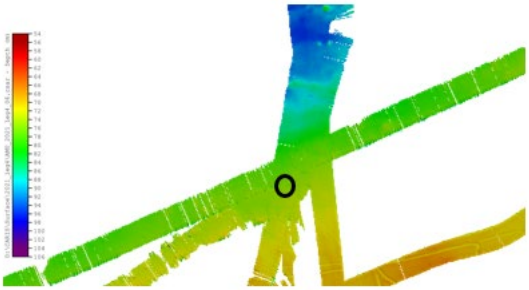
PCB - 10


D:\CARIS\Surface\2021_leg4\Dustin\Pcb10.csar - Depth (m)
680
690
700
710
720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
910
920
930
940
950
960
970
980
990
1000
1010
1020
1030
1040
1050
1060
1070

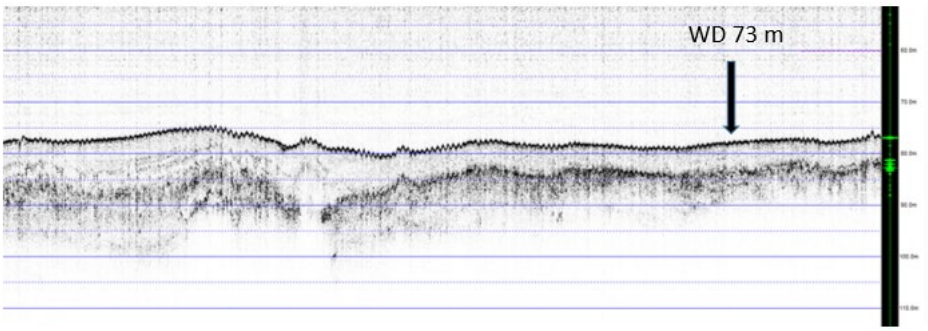

PCB-10
PCB-11
PCB-12
PCB-13
Polly Lake


WD 964 m

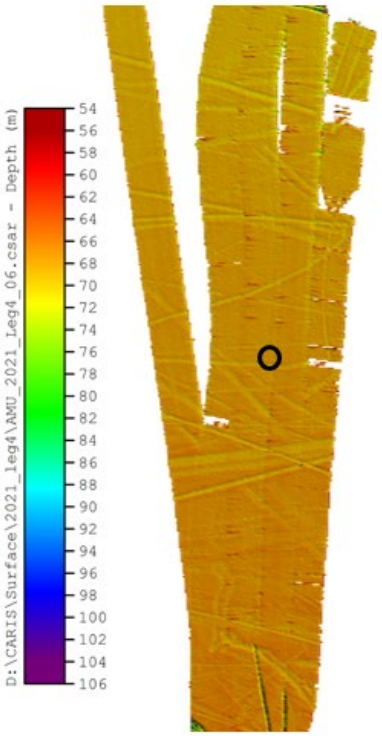
PCB - 11

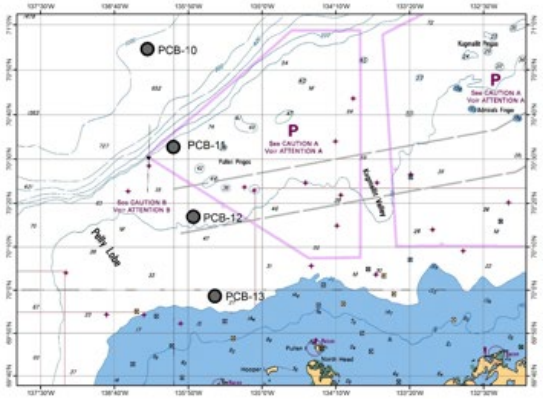


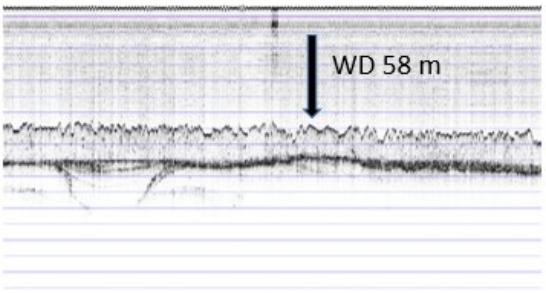

PCB-10
PCB-11
PCB-12
PCB-13
Polly Lake

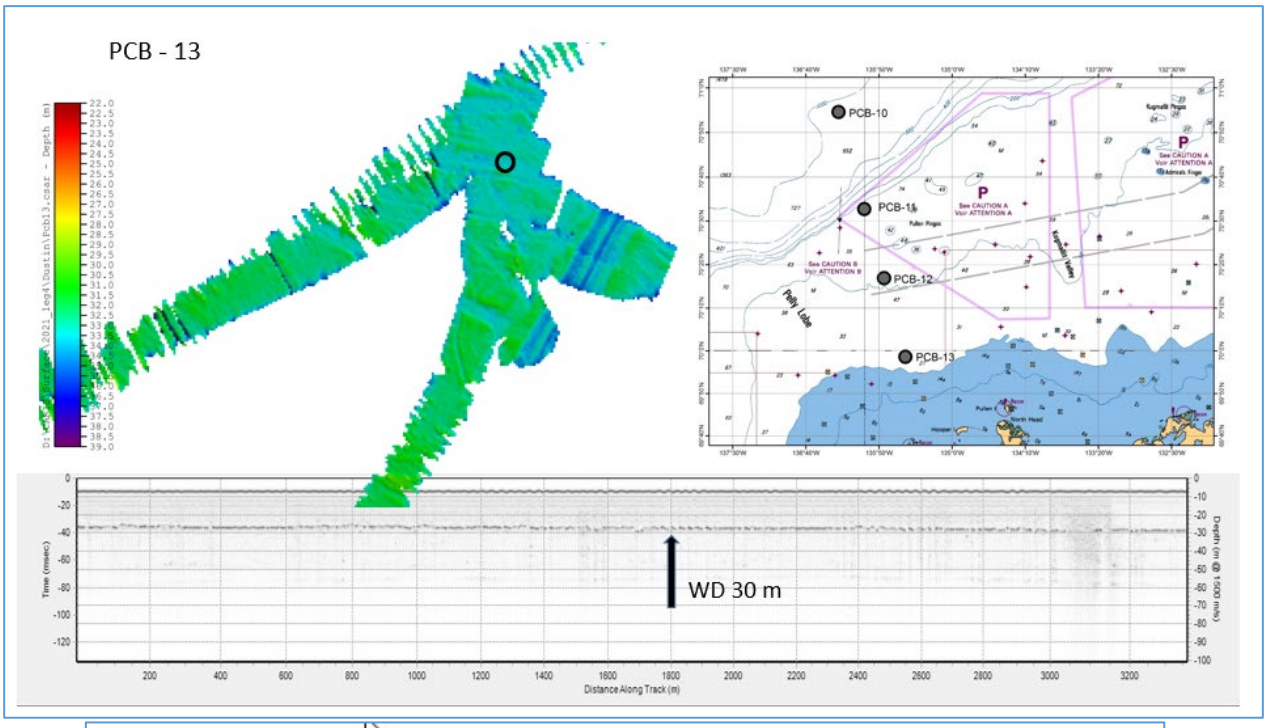

WD 73 m

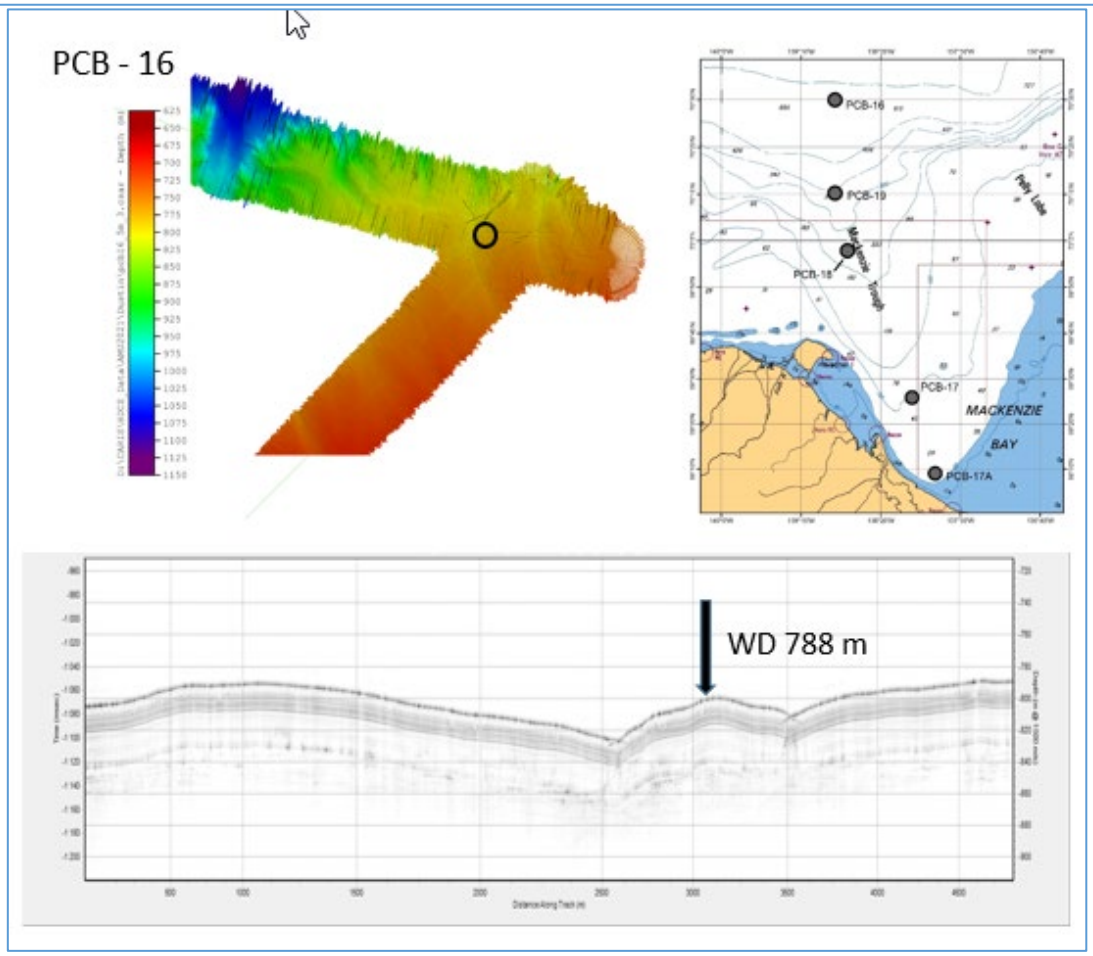
PCB - 12


D:\CARIS\Surface\2021_leg4\AMU_2021_Leg4_06.csar - Depth (m)
54
56
58
60
62
64
66
68
70
72
74
76
78
80
82
84
86
88
90
92
94
96
98
100
102
104
106

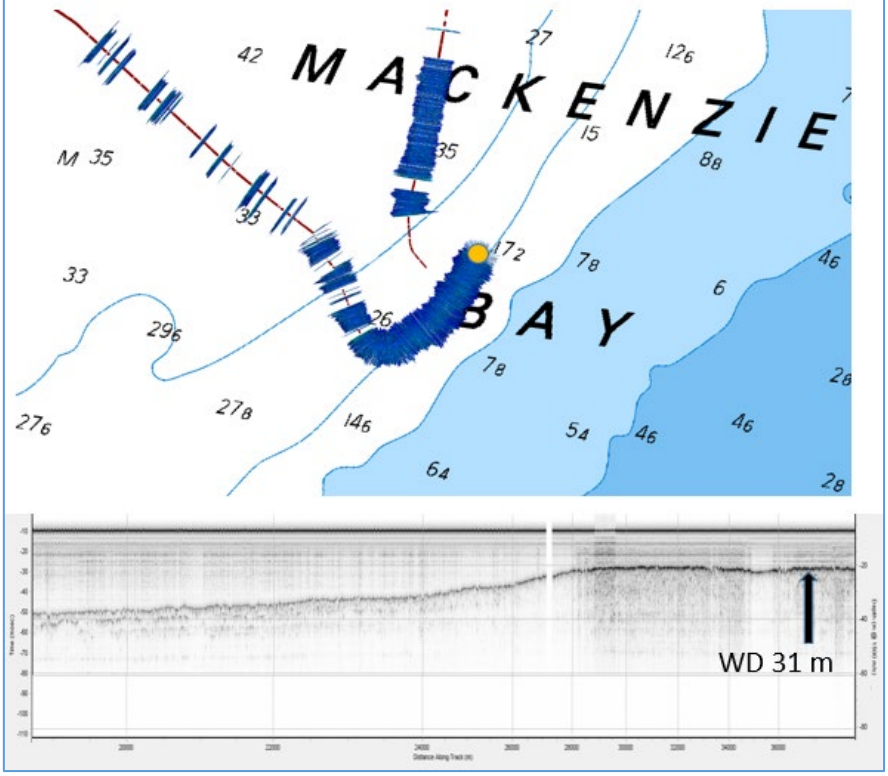

PCB-10
PCB-11
PCB-12
PCB-13
Polly Lake


WD 58 m

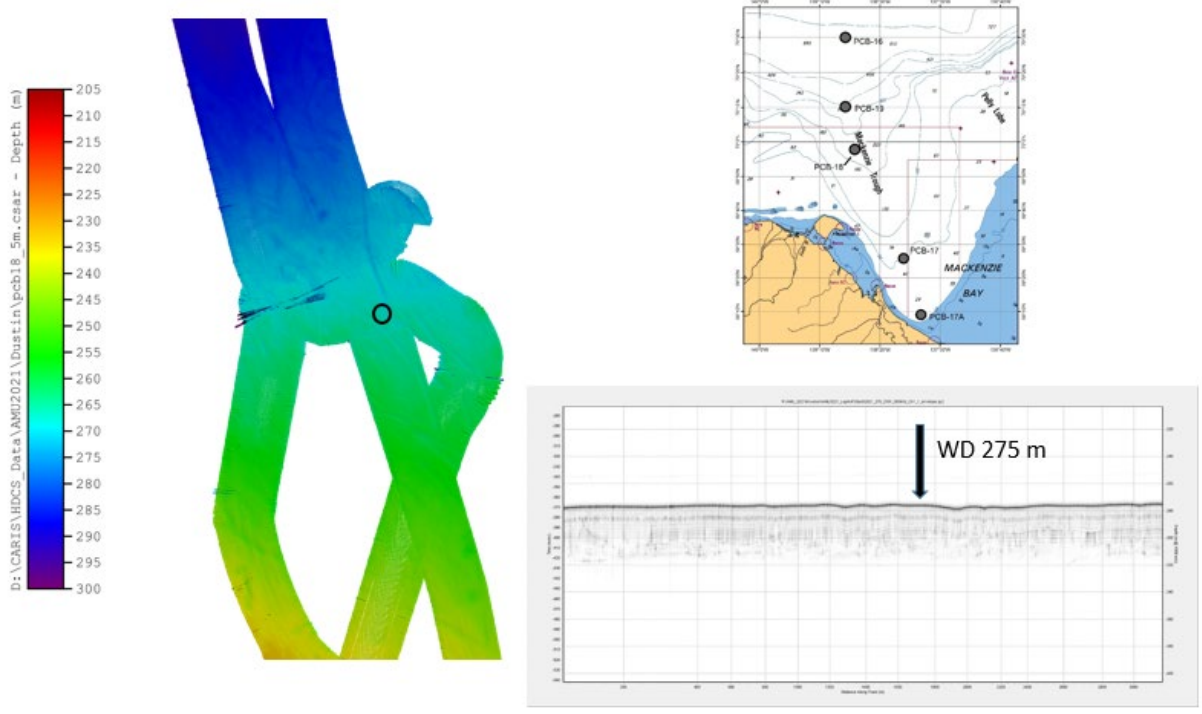

PCB - 13
PCB-10
PCB-11
PCB-12
PCB-13
WD 30 m
Distance Along Track (m)

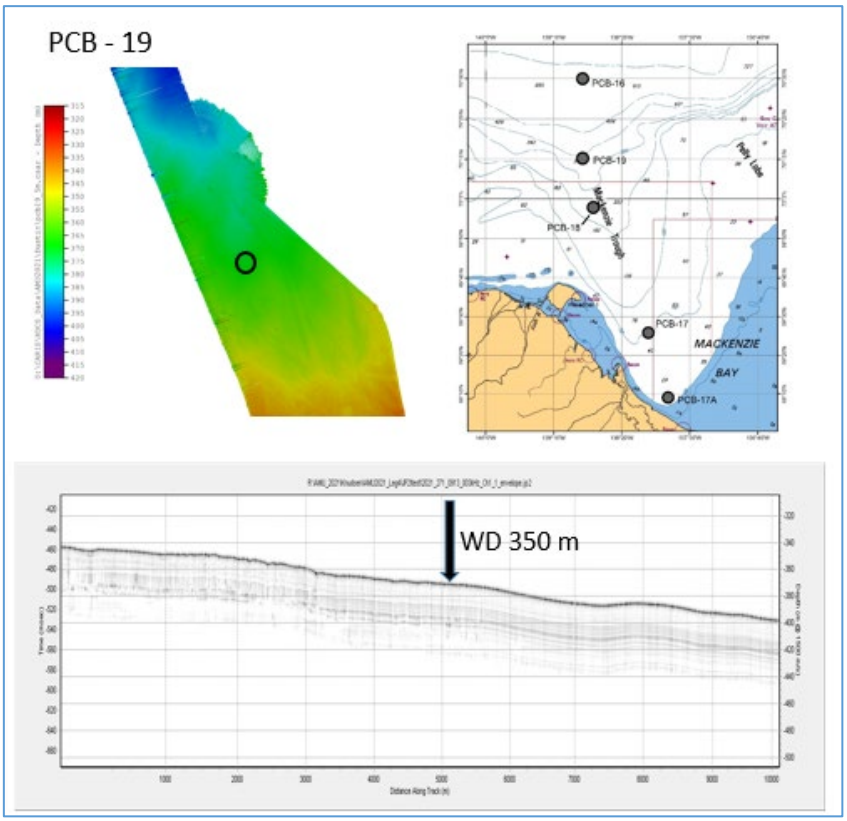

PCB - 16
PCB-16
PCB-19
PCB-18
PCB-17
PCB-17A
MACKENZIE
BAY
WD 788 m

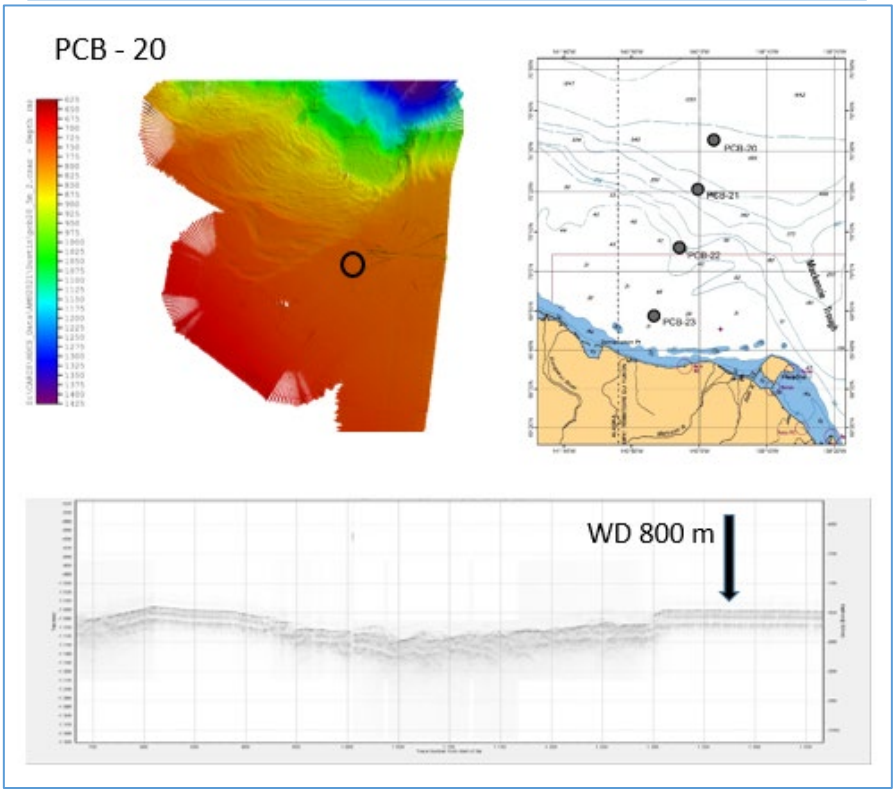
PCB – 17A

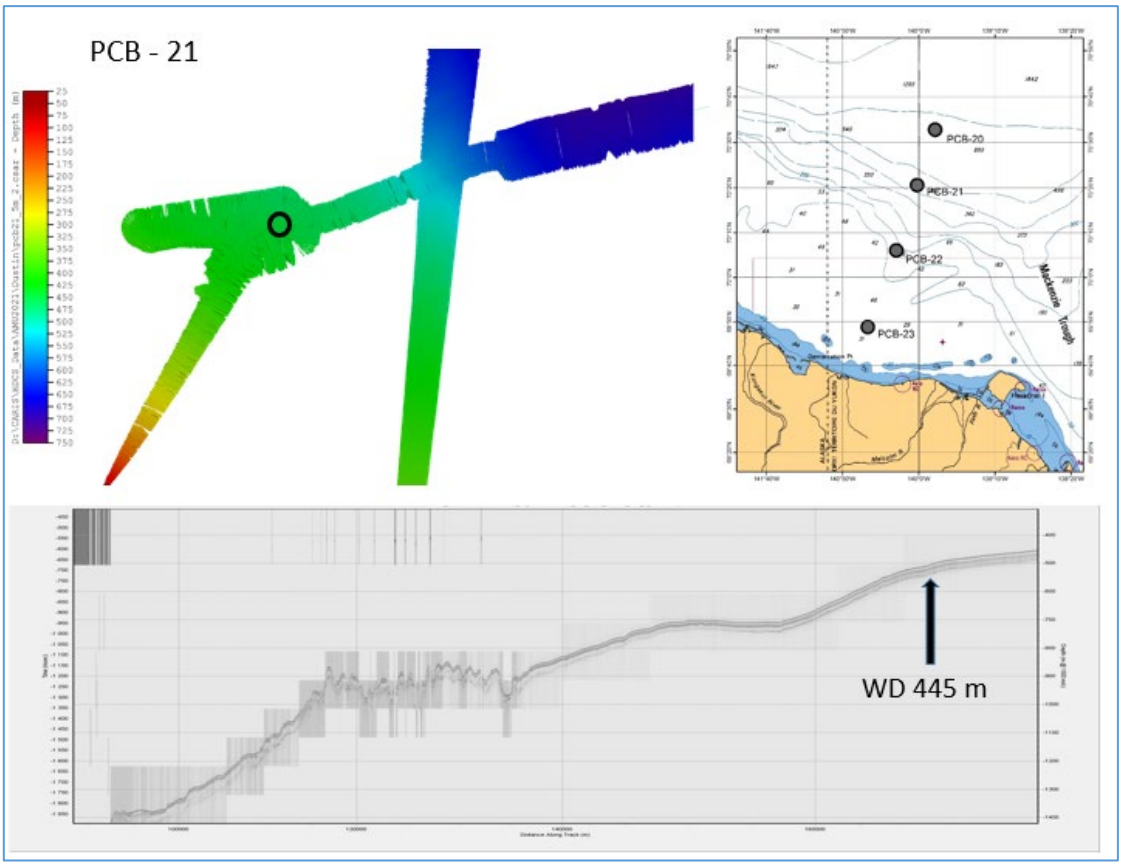


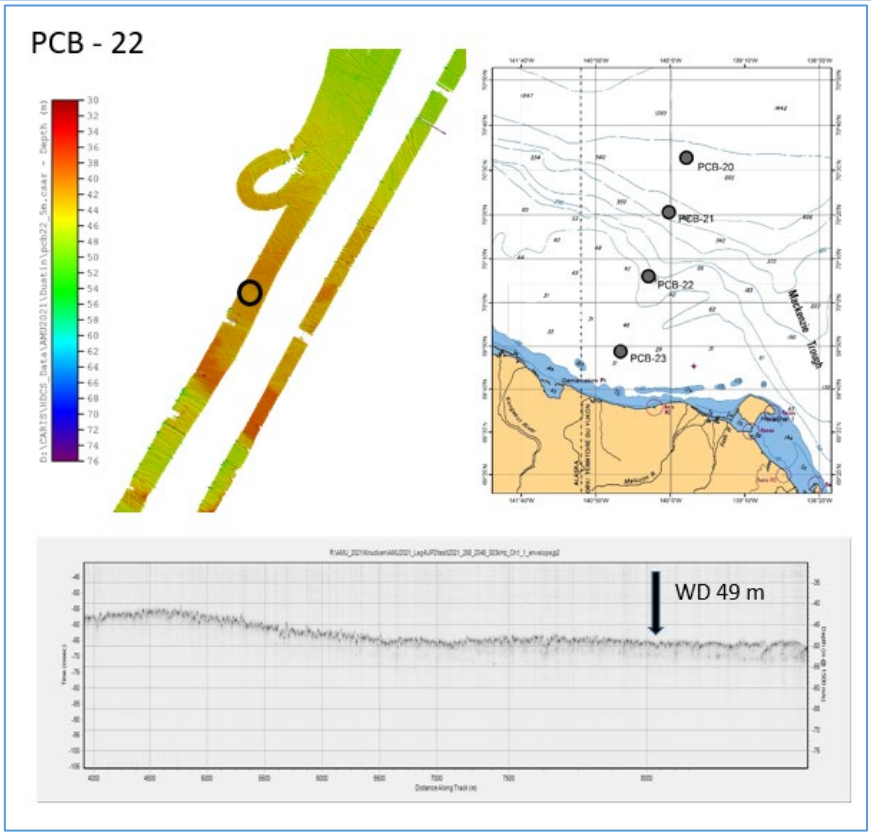
PCB - 18

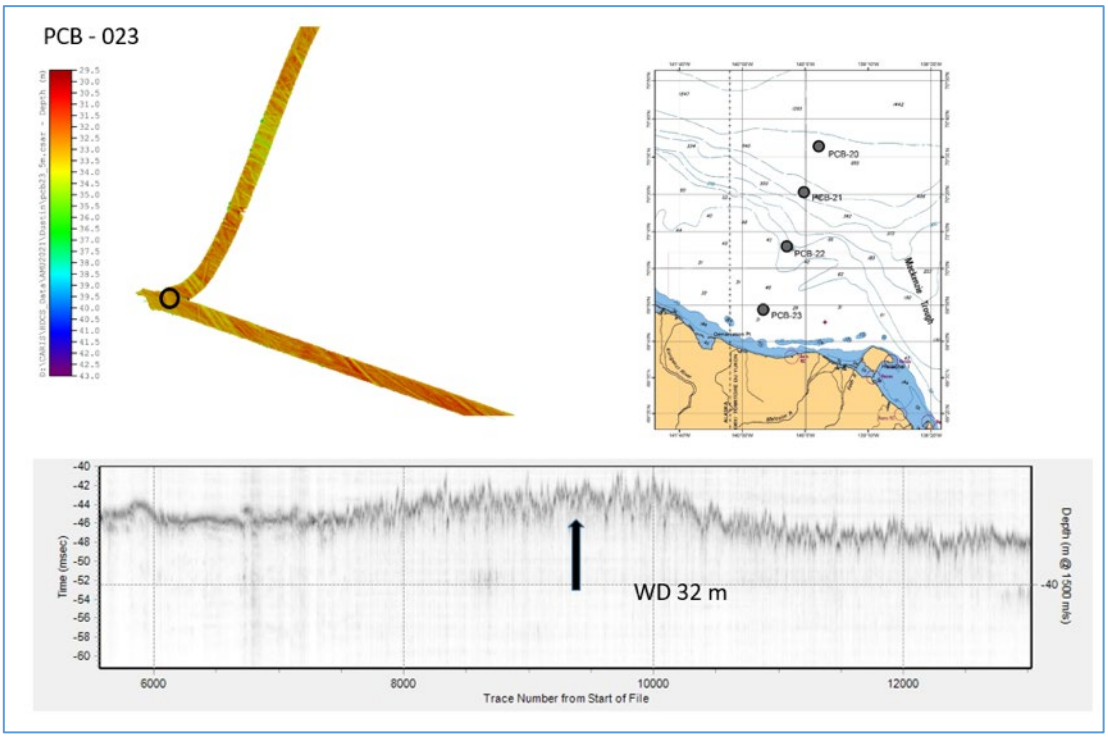


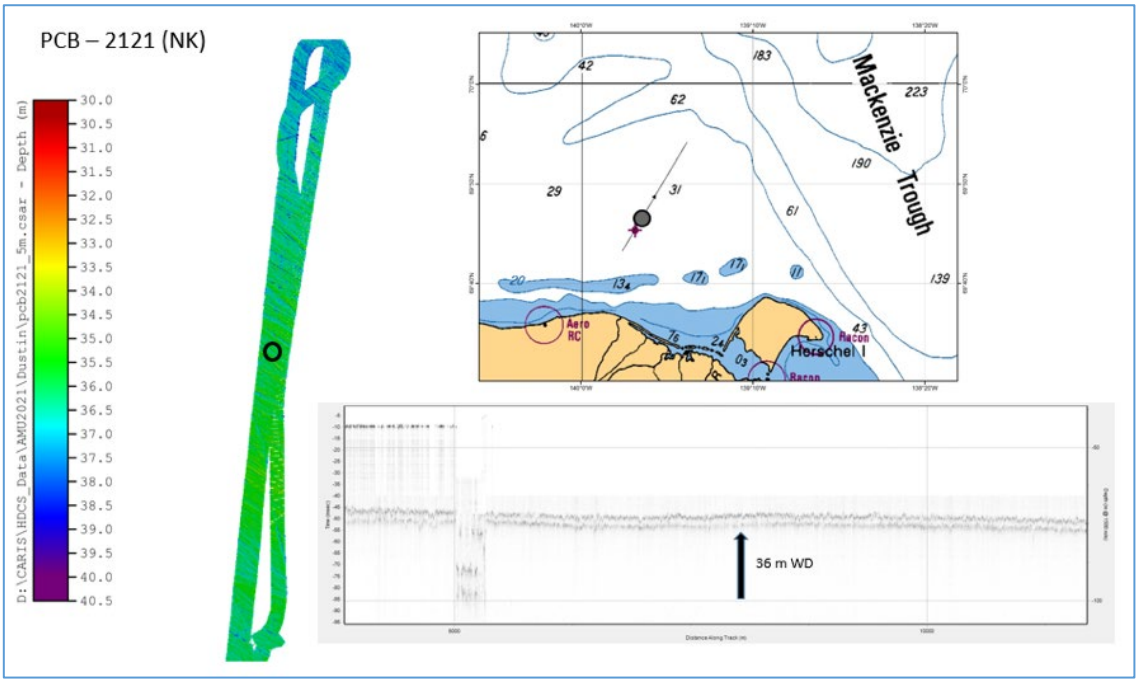

PCB - 19
PCB-16
PCB-19
PCB-18
PCB-17
MACKENZIE
BAY
PCB-17A
WD 350 m


PCB - 20
PCB-20
PCB-21
PCB-22
PCB-23
WD 800 m


PCB - 21
PCB-20
PCB-21
PCB-22
PCB-23
Mackenzie Trough
WD 445 m


PCB - 22
PCB-20
PCB-21
PCB-22
PCB-23
Mackenzie Trough
WD 49 m

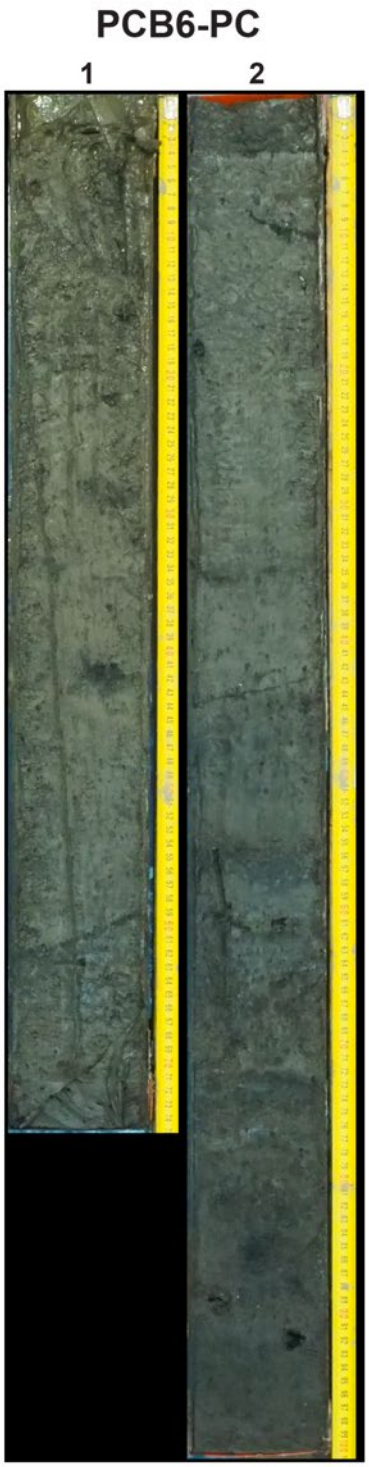

PCB - 023
PCB-20
PCB-21
PCB-22
PCB-23
Mackenzie Trough
WD 32 m
Time (msec)
Depth (m @ 1500 m/s)
Trace Number from Start of File
6000
8000
10000
12000

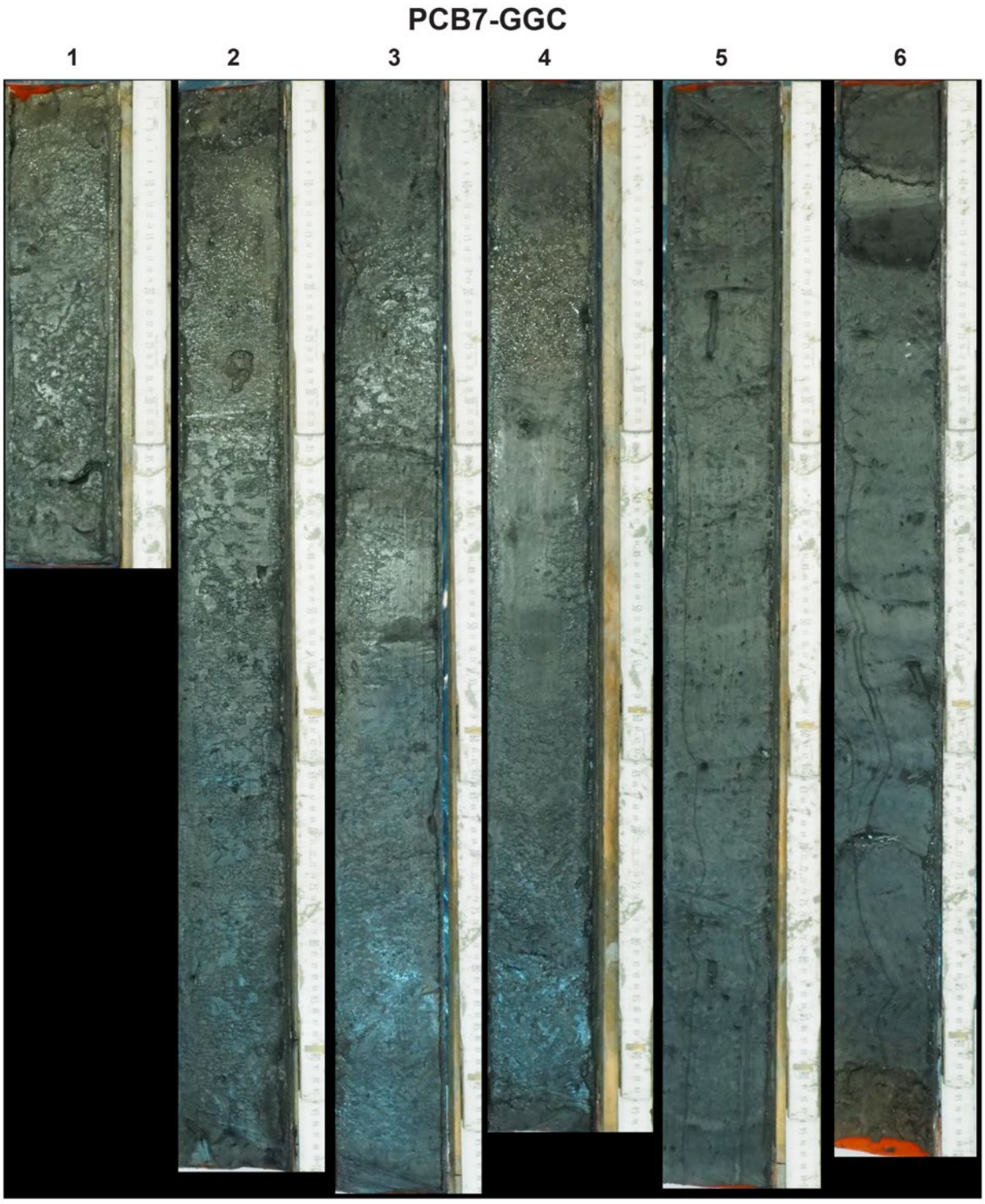

PCB – 2121 (NK)
D:\CARIS\HDCS_Data\AMU2021\Dust.in\pcb2121_5m.csar - Depth (m)
Mackenzie Trough
Aero RC
Racon
Herschel I
36 m WD

9.9 Long cores: images of archive halves

1.1

PCB4-PC


PCB6-PC
1
2


PCB7-GGC
1
2
3
4
5
6

PCB9-PC

PCB11-GGC

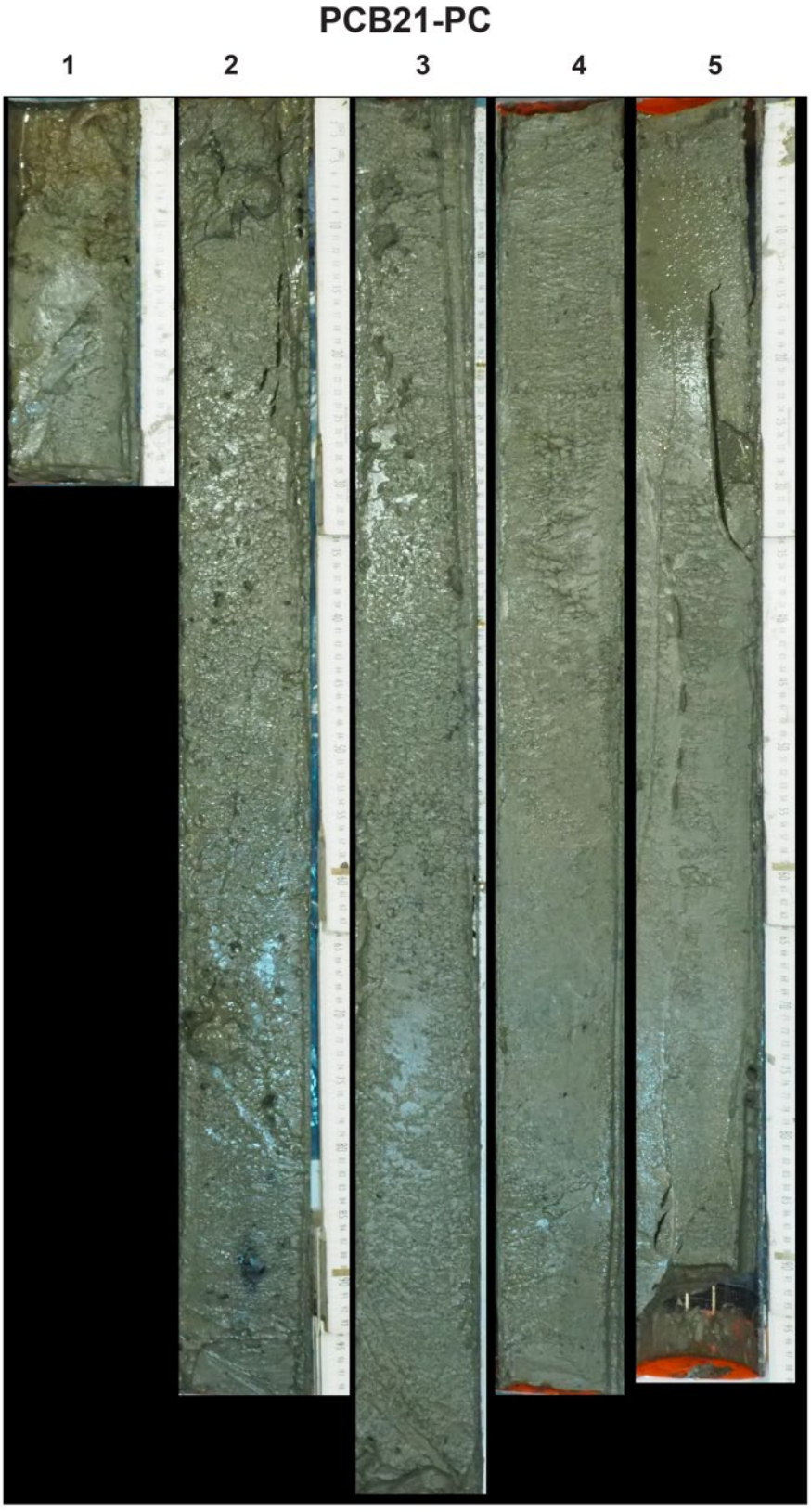
PCB13-PC

1 2

PCB16-GGC


PCB17-PC
1
2
3
4


PCB18-PC
1
2
3
4
5
6
7


PCB21-PC
1
2
3
4
5

PCB22-PC

1

9.10 Shells picked from sediment cores

Station	Core	Section	Depth in section (cm)	Total depth (cm bsf)	Name	Description
PCB-17	MUC			28	PCB17-MC-SD-28	Shell Fragments
PCB-17	MUC			2	PCB17-MC-BM2-2	Shell Fragment
PCB-17	MUC			30	PCB17-MC-SD-30	Massive shell
PCB-17a	MUC			8	PCB17a-MC-BM2-8	Shell
PCB-12	MUC			27	PCB12-MC-SD-27	Shell Fragment (Large)
PCB-22	MUC			13	PCB22-MC-13	Shell in living position
PCB-23	MUC			4	PCB23-MC-SD-4	Shell Fragments
PCB-23	MUC			7	PCB23-MC-SD-7	Shell Fragments
PCB-23	MUC			5	PCB23-MC-5	Shell Fragment
PCB-23	MUC			5	PCB23-MC-5	Full shell
PCB-23	MUC			8	PCB23-MC-BM3-8	Shell in living position
PCB-23	MUC			17	PCB23-MC-BM3-17	Shell Fragment (small)
PCB-11	MUC			11	PCB11-MC-BM1-11	Shell Fragment
PCB-11	MUC			14	PCB11-MC-BM1-14	Shell Fragment
PCB-11	MUC			13	PCB11-MC-BM3-13	Shell
PCB-07	MUC			17	PCB7-MC-BM3-17	Shell fragment
PCB-07	MUC			18	PCB7-MC-BM3-18	Shell fragment
PCB-07	MUC			36	PCB7-MC-BM3-36	Small shell fragment
PCB-08	MUC			5	PCB8-MC-SD-5	Shell fragment
PCB-08	MUC			14	PCB8-MC-BM3-14	Shell fragment in mud
PCB-08	MUC			15	PCB8-MC-BM3-15	Shell fragment (large)
PCB-08	MUC			20	PCB8-MC-BM3-20	Shell fragment (large)
PCB-08	MUC			22	PCB8-MC-BM3-22	Crushed shell fragment
PCB-17	PC	3	74-75	200.5	PCB17-PC-2-74-75	Full shell
PCB-17	PC	2	99	119	PCB17-PC-2-99	Full shell
PCB-17	PC	2	98-100	119	PCB17-PC-2-98-100	Full shell
PCB-17	PC	3	8-9	134.5	PCB17-PC-3-8-9	Broken piece of shells
PCB-17	PC	3	57-58	183.5	PCB17-PC-3-57-58	Broken piece of shells
PCB-17	PC	4	98-99	224.5	PCB17-PC-3-98-99	Broken piece of shells
PCB-17	PC	4	12	238.5	PCB17-PC-4-12	small broken shells
PCB-17	PC	4	29-30	256	PCB17-PC-4-29-30	Full shell
PCB-17	PC	4	33-34	260	PCB17-PC-4-33-34	Shells
PCB-17	PC	4	49-50	276	PCB17-PC-4-49-50	Full shell
PCB-17	PC	4	80-82	307.5	PCB17-PC-4-80-82	small broken shells
PCB-17	PC	1	8	8	PCB17-PC-1-8	shell
PCB-17	PC	4	96	322.5	PCB17-PC-4-96	Shells
PCB-17	PC	4	98-100	325.5	PCB17-PC-4-98-100	Shells
PCB-06	PC	1	14	14	PCB6-PC-1-14	Shells
PCB-06	PC	1	41	41	PCB6-PC-1-41	Shells
PCB-18	PC	6	84-86	567	PCB18-PC-6-84-86	shells
PCB-06	PC	1	36-38	37	PCB6-GCC-1-36-38	big full shell

PCB-06	PC	1	44-46	45	PCB6-GCC-1-44-46	1 big broken piece of shell
PCB-06	PC	1	46-48	47	PCB6-GCC-1-46-48	2 medium broken piece of shell
PCB-06	PC	2	8-9	84	PCB6-GCC-2-8-9	medium broken shells + 2 full small shells (maybe *Portlandia arctica*)
PCB-06	PC	2	12-14	88.5	PCB6-GCC-2-12-14	medium broken shells
PCB-06	PC	2	13-14	89	PCB6-GCC-2-13-14	full small shell
PCB-06	PC	2	38-39	114	PCB6-GCC-2-38-39	small broken shells
PCB-06	PC	2	62-64	139	PCB6-GCC-2-62-64	2 large piece of shell
PCB-06	PC	2	68-70	145	PCB6-GCC-2-68-70	1 piece of "snail" type shell
PCB-06	PC	2	80-82	156.5	PCB6-GCC-2-80-82	small broken shells
PCB-06	PC	2	89-90	165	PCB6-GCC-2-89-90	medium broken shells
PCB-06	PC	2	90-92	166.5	PCB6-GCC-2-90-92	big full shell
PCB-06	PC	2	91-92	167	PCB6-GCC-2-91-92	medium broken shells
PCB-06	PC	2	94-95	170	PCB6-GCC-2-94-95	medium broken shells
PCB-11	PC	1	40-42	41	PCB11-PC-1-40-42	Big intact shell
PCB-11	PC	1	44-46	45	PCB11-PC-1-44-46	Big intact shell
PCB-11	PC	2	70	163	PCB11-PC-2-70	Shell fragment
PCB-11	PC	3	25	218	PCB11-PC-3-25	Full shell
PCB-11	PC	3	35	228	PCB11-PC-3-35	Full shell
PCB-11	PC	3	59	242	PCB11-PC-3-59	small shell
PCB-11	PC	3	53	246	PCB11-PC-3-53	Full shell
PCB-11	PC	3	59-60	252.5	PCB11-PC-3-59-60	Big broken pieces of shell
PCB-11	PC	3	60-62	254	PCB11-PC-3-60-62	one big broken piece of shell
PCB-11	PC	3	80-82	274	PCB11-PC-3-80-82	Big intact shell
PCB-11	PC	3	92-94	286	PCB11-PC-3-92-94	One medium broken piece
PCB-18	PC	CC		682	PCB-18-PC-CC-0	Shell fragments
PCB-18	TWC	2	42	127.5	PCB-18-TWC-2-42	Full shell
PCB-17	TWC	3	41	228.5	PCB-17-TWC-3-41	Shell fragments
PCB-17	TWC	3	81	268.5	PCB-17-TWC-3-81	Shell fragments
PCB-13	PC	1	52-53	52.5	PCB13-PC-1-52-53	Broken shells
PCB-13	PC	2	56-57	109.5	PCB13-PC-2-56-57	Broken shells
PCB-13	PC	2	87	140	PCB13-PC-2-87	Broken shells
PCB-13	PC	2	92	145	PCB13-PC-2-92	Broken shells
PCB-07	GGC	4	82-84	327	PCB07-GCC-4-82-84	one large bit of broken shell
PCB-07	GGC	4	36-38	281	PCB07-GCC-4-36-38	several broken piece of shell
PCB-07	GGC	3	60-62	205	PCB07-GCC-3-60-62	small bit of shell
PCB-07	GGC	3	50	194	PCB07-GCC-3-50	small bit of shell
PCB-07	GGC	3	34	178	PCB07-GCC-3-34	small bit of shell
PCB-07	GGC	3	38	182	PCB07-GCC-3-38	one large bit of broken shell

PCB-07	GGC	3	13	157	PCB07-GCC-3-13	one large bit of broken shell
PCB-07	GGC	3	2	146	PCB07-GCC-3-2	small bit of shell
PCB-07	GGC	3	4-6	149	PCB07-GCC-3-4-6	small bit of shell
PCB-07	GGC	2	4-6	49	PCB07-GCC-2-4-6	several broken piece of shell
PCB-07	GGC	2	52-54	97	PCB07-GCC-2-52-54	one large bit of broken shell
PCB-07	GGC	4	33	277	PCB07-GCC-4-33	one large bit of broken shell
PCB-07	GGC	3	97-98	241.5	PCB07-GCC-3-97-98	small bit of shell
PCB-07	GGC	3	87-88	231.5	PCB07-GCC-3-87-88	small bit of shell
PCB-07	GGC	3	66-67	210.5	PCB07-GCC-3-66-67	one large bit of broken shell
PCB-07	GGC	3	65	209	PCB07-GCC-3-65	Full shells (both valves)
PCB-07	GGC	2	54-56	99	PCB07-GCC-2-54-56	several broken piece of shell
PCB-07	GGC	2	50-52	95	PCB07-GCC-2-50-52	one large bit of broken shell
PCB-07	GGC	1	38-40	39	PCB07-GCC-1-38-40	several broken piece of shell
PCB-07	GGC	2	3	47	PCB07-GCC-2-3	small bit of shell
PCB-07	GGC	6	56	499.5	PCB07-GCC-6-56	full shell
PCB-07	GGC	6	94	537.5	PCB07-GCC-6-94	small bit of shell
PCB-07	GGC	6	72-73	516	PCB07-GCC-6-72-73	full shell (both valves)
PCB-07	GGC	6	26	469.5	PCB07-GCC-6-26	small bit of shell
PCB-07	GGC	4	88-90	333	PCB07-GCC-4-88-90	small bit of shell
PCB-07	GGC	5	82-83	424.5	PCB07-GCC-5-82-83	small bit of shell
PCB-07	GGC	5	62	404	PCB07-GCC-5-62	several broken piece of shell
PCB-07	GGC	5	76-78	419	PCB07-GCC-5-76-78	several broken piece of shell
PCB-07	GGC	5	58-60	401	PCB07-GCC-5-58-60	small bit of shell
PCB-07	GGC	6	83-84	527	PCB07-GCC-6-83-84	full shell (both valves)
PCB-07	GGC	6	36-38	480.5	PCB07-GCC-6-36-38	snail type shell+broken pieces
PCB-07	GGC	5	64-66	407	PCB07-GCC-5-64-66	several broken piece of shell
PCB-07	GGC	6	60-62	504.5	PCB07-GCC-6-60-62	full shell (both valves)
PCB-07	GGC	5	34-36	377	PCB07-GCC-5-34-36	several small broken piece of shell
PCB-07	GGC	5	96-98	439	PCB07-GCC-5-96-98	several small broken piece of shell
PCB-07	GGC	6	28-30	472.5	PCB07-GCC-6-28-30	full shell (*portlandia*?)
PCB-07	GGC	6	86-88	530.5	PCB07-GCC-6-86-88	several small broken piece of shell
PCB-07	GGC	6	58-60	502.5	PCB07-GCC-6-58-60	several small broken piece of shell
PCB-07	GGC	6	16-18	460.5	PCB07-GCC-6-16-18	several broken piece of shell (from turbidite event)

PCB-07	GGC	5	6-8	349	PCB07-GCC-5-6-8	several broken piece of shell
PCB-07	GGC	6	50-52	494.5	PCB07-GCC-6-50-52	almost full shell
PCB-07	GGC	6	90-92	534.5	PCB07-GCC-6-90-92	outer layer of shell?
PCB-04	PC	3	19-20	154.5	PCB04-PC-3-19-20	charcoal
PCB-07	GGC	5	2-4	345	PCB07-GCC-5-2-4	big piece of broken shell
PCB-07	GGC	5	98-100	441	PCB07-GCC-5-98-100	several broken piece of shell
PCB-07	GGC	6	34-36	478.5	PCB07-GCC-6-34-36	several broken piece of shell
PCB-21	PC	2	69-73	100.5	PCB21-PC-2-69-73	Spiral shell type.
PCB-13	MUC			6	PCB13-MC-BM2-6	crab?
PCB-16	MUC			13	PCB16-MC-BM2-13	Large Tube (??)
PCB-19	MUC			11	PCB19-MC-BM1-11	Wood/Tube
PCB-23	MUC			3	PCB23-MC-3	Wood
PCB-11	MUC			19	PCB11-MC-BM1-19	Snail
PCB-11	MUC			14	PCB11-MC-BM3-14	Snail

Die **Berichte zur Polar- und Meeresforschung** (ISSN 1866-3192) werden beginnend mit dem Band 569 (2008) als Open-Access-Publikation herausgegeben. Ein Verzeichnis aller Bände einschließlich der Druckausgaben (ISSN 1618-3193, Band 377-568, von 2000 bis 2008) sowie der früheren **Berichte zur Polarforschung** (ISSN 0176-5027, Band 1-376, von 1981 bis 2000) befindet sich im electronic Publication Information Center **(ePIC)** des Alfred-Wegener-Instituts, Helmholtz-Zentrum für Polar- und Meeresforschung (AWI); see https://epic.awi.de. Durch Auswahl “Reports on Polar- and Marine Research“ (via “browse”/”type”) wird eine Liste der Publikationen, sortiert nach Bandnummer, innerhalb der absteigenden chronologischen Reihenfolge der Jahrgänge mit Verweis auf das jeweilige pdf-Symbol zum Herunterladen angezeigt.

The **Reports on Polar and Marine Research** (ISSN 1866-3192) are available as open access publications since 2008. A table of all volumes including the printed issues (ISSN 1618-3193, Vol. 377-568, from 2000 until 2008), as well as the earlier **Reports on Polar Research** (ISSN 0176-5027, Vol. 1-376, from 1981 until 2000) is provided by the electronic Publication Information Center **(ePIC)** of the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI); see URL https://epic.awi.de. To generate a list of all Reports, use the URL http://epic.awi.de and select “browse”/ ”type” to browse ”Reports on Polar and Marine Research”. A chronological list in declining order will be presented, and pdf-icons displayed for downloading.

Zuletzt erschienene Ausgaben:

Recently published issues:

759 (2022) The Permafrost Carbon in the Beaufort Sea (PeCaBeau) Expedition of the Research Vessel CCGS AMUNDSEN (AMD2104) in 2021. Edited by Lisa Bröder, Matt O’Regan, Michael Fritz, Bennet Juhls, Taylor Priest, Julie Lattaud, Dustin Whalen, Atsushi Matsuoka, André Pellerin, Thomas Bossé-Demers, Daniel Rudbäck, Antje Eulenburg, Thomas Carson, Maria-Emilia Rodriguez-Cuicas, Paul Overduin, and Jorien Vonk

758 (2021) Expeditions to Antarctica: ANT-Land 2020/21 NEUMAYER STATION III, Kohnen Station, Flight Operations and Field Campaigns. Edited by Tanja Fromm, Constance Oberdieck, Tim Heitland and Christine Wesche with contributions of the participants

757 (2021) The Expedition PS126 of the Research Vessel POLARSTERN to the Fram Strait in 2021, edited by Thomas Soltwedel with contributions of the participants

756 (2021) Russian-German Cooperation: Expeditions to Siberia in 2020, edited by Boris K. Biskaborn, Dmitry Yu. Bolshiyanov, Mikhail N. Grigoriev, Anne Morgenstern, Luidmila A. Pestryakova, Leonid V. Tsibizov, and Antonia Dill

755 (2021) The Expedition PS124 of the Research Vessel POLARSTERN to the southern Weddell Sea in 2021, edited by Hartmut H. Hellmer and Moritz Holtappels with contributions of the participants

754 (2021) MOSAiC Expedition: Airborne Surveys with Research Aircraft POLAR 5 and POLAR 6 in 2020, edited by Andreas Herber, Sebastian Becker, Hans Jakob Belter, Jörg Brauchle, André Ehrlich, Marcus Klingebiel, Thomas Krumpen, Christof Lüpkes, Mario Mech, Manuel Moser, and Manfred Wendisch

753 (2021) The Expedition PS123 of the Research Vessel POLARSTERN to NEUMAYER STATION III in 2020/2021, edited by Tim Heitland with contributions of the participants

752 (2021) Expeditions to Fennoscandia in 2020, edited by Matthias Fuchs, Lona van Delden, Nele Lehmann, and Torben Windirsch

ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG

BREMERHAVEN

Am Handelshafen 12
27570 Bremerhaven
Telefon 0471 4831-0
Telefax 0471 4831-1149
www.awi.de

HELMHOLTZ