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GEOLOGICAL SURVEY OF CANADA
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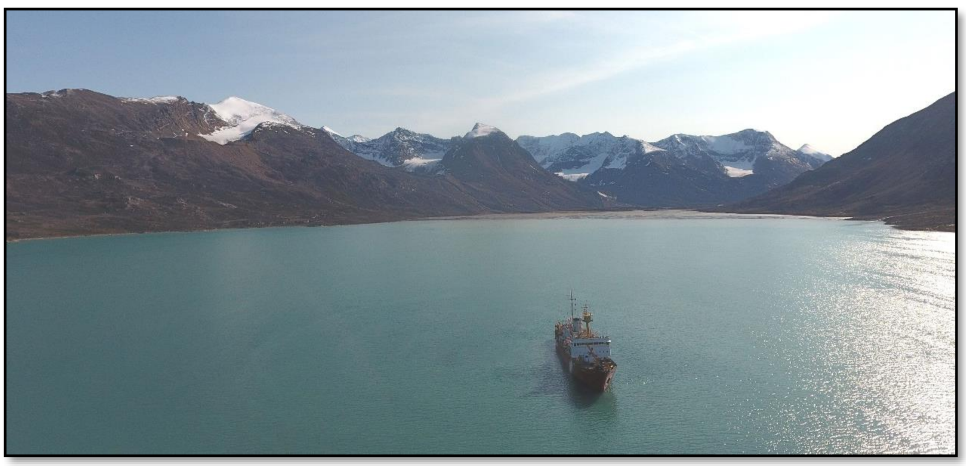
CCGS Hudson expedition 2018042: marine geohazards and natural seeps off southeastern Baffin Island, Nunavut



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2018

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Publications in this series have not been edited; they are released as submitted by the author.

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ACKNOWLEDGMENTS

On behalf of the scientific staff of Hudson 2018042 and the Geological Survey of Canada (Atlantic) at BIO, I would like to thank the Commanding Officer Fergus Francey, the deck crew led by Boatswain Robert Costello as well as the entire ship's complement for continuous support in execution of the scientific objectives.

- Alex Normandeau, Chief Scientist, Hudson 2018042

1. BACKGROUND AND OBJECTIVES

The CCGS Hudson 2018042 cruise (Fig. 1) was a collaborative cruise between the Public Safety Geoscience (PSG) and the Geo-mapping for Energy and Minerals (GEM) programs of NRCan. PSG contributed 80% of the funding and GEM contributed 20%, which is reflected in ship-time for each program.

Since 2011, Natural Resources Canada has been conducting research on marine geological hazards in Baffin Bay. The Baffin Bay Geohazards Activity of PSG is improving the understanding of geological processes and marine geohazards in Baffin Bay to support community, Nunavut government, and regulator decisions on the use of offshore areas and provide northern coastal communities with better knowledge for improving public safety. Geohazards in Baffin Bay include hydrocarbon venting features, submarine landslides, and a high level of earthquake activity.

The M 7.3 earthquake of November 20, 1933 in Baffin Bay is the largest passive margin earthquake in North America and is the largest known earthquake north of the Arctic Circle. Several community members from Pond Inlet, Clyde River, and Qikiqtarjuaq reported experiencing tremors and waves under the ice which may be evidence of possible past seismic activity, tsunamis, and submarine landslides. The Arctic communities are particularly vulnerable to such tsunamis and landslides since they are located directly on the coast, at sea-level. This vulnerability is illustrated by the 2017 landslide-induced tsunami that led to loss of lives near Nuugaatsiaq, Greenland in a similar environment as the Baffin Island communities. Understanding the frequency and recurrence of such earthquakes and submarine landslides is thus critical for risk assessments in the Arctic.

Identifying and dating submarine landslides is the preferred method for studying past earthquake activity. Areas with the highest sedimentation rates provide the most accurate measurements of earthquake recurrence rates. In the Baffin Bay region, the fjords of Baffin Island experience the highest sedimentation rates and therefore, are the best targets for studying past earthquakes.

As a second objective of the cruise, oil slick features mapped from satellite radar data offshore Baffin Island region have been confirmed as bona fide petroleum occurrences to the south east, off Cape Chidley where oil slicks are confirmed by the 2016 Amundsen cruise and off Cape Dyer where extreme amounts of dissolved methane near the seafloor are observed from a hydro chemical transect done in 2015. To date there has been no physical sampling of the underlying seafloor under the slick areas or from any slicks on the sea surface.

The specific objectives of the 2018042 cruise were to:

1) Assess the recurrence of submarine landslides in southeastern Baffin Island;
2) Understand geohazards within a fjord where a high level of submarine landslides are present;
3) Assess the stability of the slopes of the fjord and of southeastern Baffin Island;
4) Examine the modern sedimentary processes shaping the seafloor of Baffin Bay;
5) Examine the occurrence of natural seepage on the seafloor off Cape Dyer.

Figure 1: The CCGS Hudson in Southwind Fjord. ***Photo courtesy of Captain Fergus Francey***

2. PARTICIPANTS

The participants of the expedition are listed in Table 1 and shown in Figure 2.

Table 1: Participants of the CCGS Hudson expedition 2018042

First Name	Last Name	Affiliation	Role
Alex	Normandeau	GSCA	Chief Scientist
Chris	Jauer	GSCA	Planning
Peter	Pledge	GSCA	Tech
Angus	Robertson	GSCA	Lead Tech
Tom	Carson	GSCA	Tech
Desmond	Manning	GSCA	Tech
Patrick	Meslin	GSCA	Tech
Kate	Jarrett	GSCA	Lead Lab
Makeala	MacIntyre	GSCA	Lab
Kevin	MacKillop	GSCA	Lab
Meaghan	Macquarrie	GSCA	Lab
Alex	Whitney	GSCA	Watchkeeping
Logan	Robertson	GSCA	Watchkeeping
Nicole	Hobbs	GSCA	Watchkeeping
Scott	Hayward	GSCA	GIS/Nav/MBES
Eric	Patton	GSCA	GIS/Nav/MBES
Melissa	Faulkner	DFO	CTD-Rosette
Gary	Wohlgeschaffen	DFO	CTD-Rosette
Michael	White	DFO-CHS	Hydrography
Rabecca	Thiessen	MacEwan	Plankton net

Figure 2: Crew and science participants in CCGS Hudson expedition 2018042. In colour are science staff, from left to right: Patrick Meslin, Desmond Manning, Melissa Faulkner (DFO), Angus Robertson, Scott Hayward, Tom Carson, Gary Wohlgeschaffen (DFO), Chris Jauer, Meaghan Macquarrie, Eric Patton, Rabecca Thiessen (MacEwan), Michael White (CHS), Kate Jarrett, Peter Pledge, Kevin MacKillop, Nicole Hobbs, Alex Normandeau, Makeala MacIntyre, Alex Whitney and Logan Robertson. ***Photo courtesy of Captain Fergus Francey*****.**

3. SUMMARY OF ACTIVITIES

The study area with four survey areas and ship track are shown in Figure 3 and a full list of activities performed is shown in Table 2.

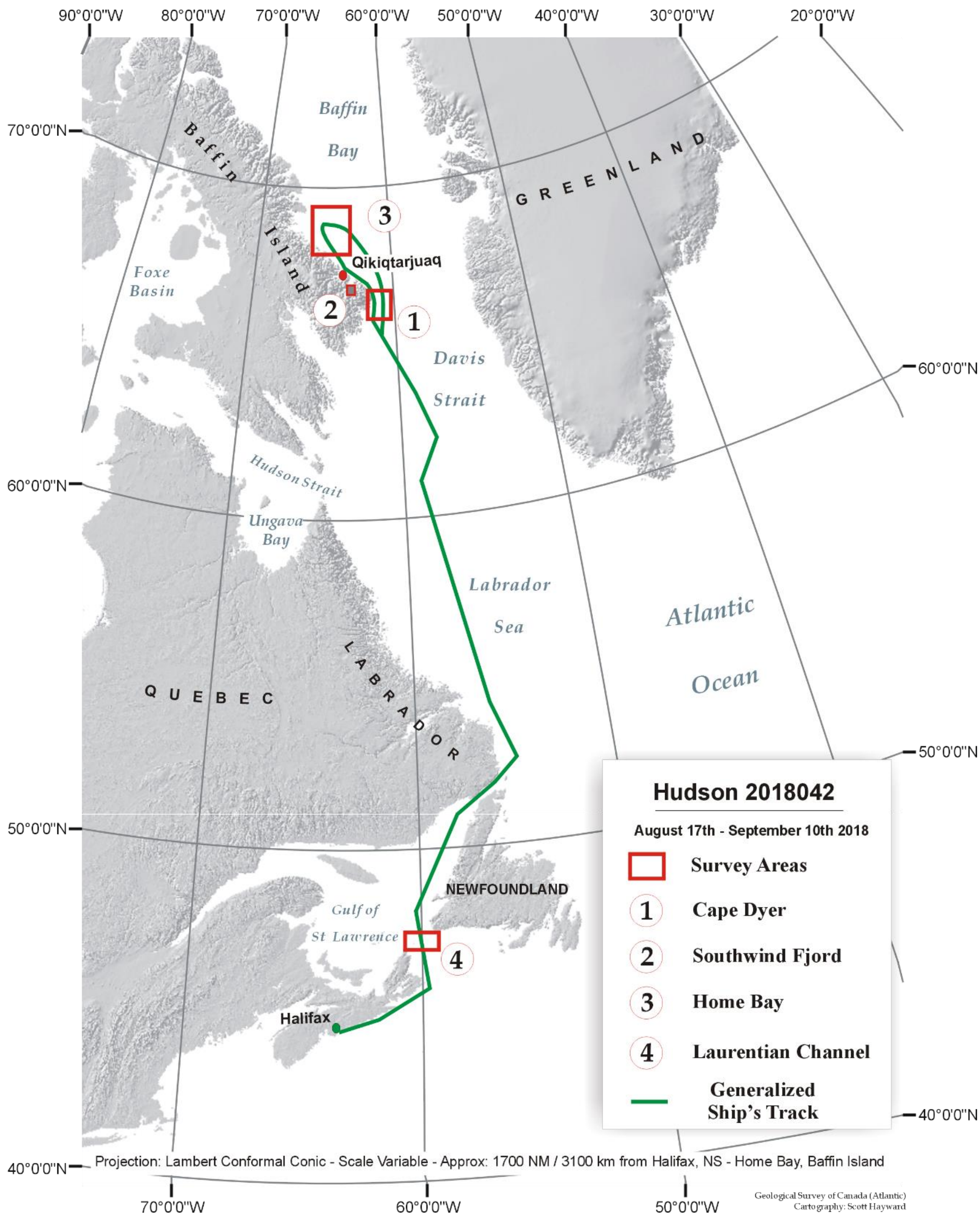

Figure 3: Navigation lines of 2018042 cruise

Table 2: Summary of activities

Date	JD	Location	PC	BC	IKU	VV	CAM	CTD-R	PN	Mooring	Drone	3.5 kHz	MBES	Notes
17 Aug.	229	Bedford Basin						X					X	Patch test of MBES and CTD-rosette test
18 Aug.	230	Gulf of St. Lawrence										X		Transit
19 Aug.	231	Strait of Belle-Isle										X		Transit
20 Aug.	232	Labrador Coast										X		Transit
21 Aug.	233	Labrador Sea										X		Weather day
22 Aug.	234	Davis Strait										X		Transit
23 Aug.	235	Cape Dyer				3	2	2	3			X	X	
24 Aug.	236	Cape Dyer	1			2	2	2			1	X	X	
25 Aug.	237	Southwind Fjord	2									X	X	
26 Aug.	238	Southwind Fjord	2	1	1			2		1		X	X	
27 Aug.	239	Southwind Fjord	3	2				2	3		1	X	X	
28 Aug.	240	Southwind Fjord	1	1	3			2				X		
29 Aug.	241	Qikiqtarjuaq										X		Community visit on the Hudson
30 Aug.	242	Home Bay Trough	3						2			X	X	
31 Aug.	243	Home Bay Trough	3						2			X	X	
1 Sept.	244	Home Bay Trough	3						2			X		
2 Sept.	245	Broughton Trough	3									X		
3 Sept.	246	Broughton Trough	3									X		
4 Sept.	247	Cape Dyer				2	2	2	2		1	X	X	
5 Sept.	248	Davis Strait										X		Transit
6 Sept.	249	Labrador Sea							2			X		Transit
7 Sept.	250	Labrador Sea										X		Transit
8 Sept.	251	Western Newfoundland										X		Transit
9 Sept.	252	Laurentian Channel	2									X		Sampling due to early arrival in Nova Scotia
10 Sept.	253	Nova Scotia												Arrival at BIO
TOTAL			26	4	4	7	6	12	16	1	3			

4. PRELIMINARY RESULTS

4.1 Cruise statistics

The CCGS Hudson 2018042 cruise allowed the collection of

1) 26 piston cores
2) 4 box cores
3) 4 IKU grabs
4) 7 Van Veen grabs
5) 6 camera transects
6) 12 CTD-Rosette
7) 16 plankton nets
8) 1 mooring deployment
9) 3 drone flight stations
10) 6985.65 km of 3.5 kHz CHIRP surveys
11) 484.6 km of multibeam surveys

4.2 Key preliminary results

4.2.1 Seeps off Cape Dyer

Multibeam bathymetry and sub-bottom profiles collected offshore Cape Dyer reveal a rough bottom, with very little fine-grained sediment accumulation. Iceberg scours and potential pockmarks were observed on the seafloor. Camera transects showed areas of the seafloor that consisted of ripples, indicative of currents transporting sediment on the seafloor. They also showed the presence of a diverse biological community on the seafloor, which will be studied further with a genomic analysis to determine biological indicators to the presence of cold seeps. Preliminary analysis of water chemistry indicates that the northern Cape Dyer site contains anomalously high dissolved methane near the seafloor and must be close to an active cold seep.

4.2.2 Active and recent geohazards in Southwind fjord

Preliminary results in Southwind fjord reveal the presence of submarine landslide deposits, sediment waves and channels (Fig. 4). Taken together, these features indicate active sediment transport processes on the seafloor. Sediment cores and IKU grabs also show the presence of turbidites at the surface of the seafloor, suggesting that they were deposited during the last snowmelt, i.e., this spring. Additionally, box cores over landslide deposits suggest that the landslides are relatively young. Sedimentation rates using ^{210}Pb analysis will allow to accurately date the timing of the landslides.

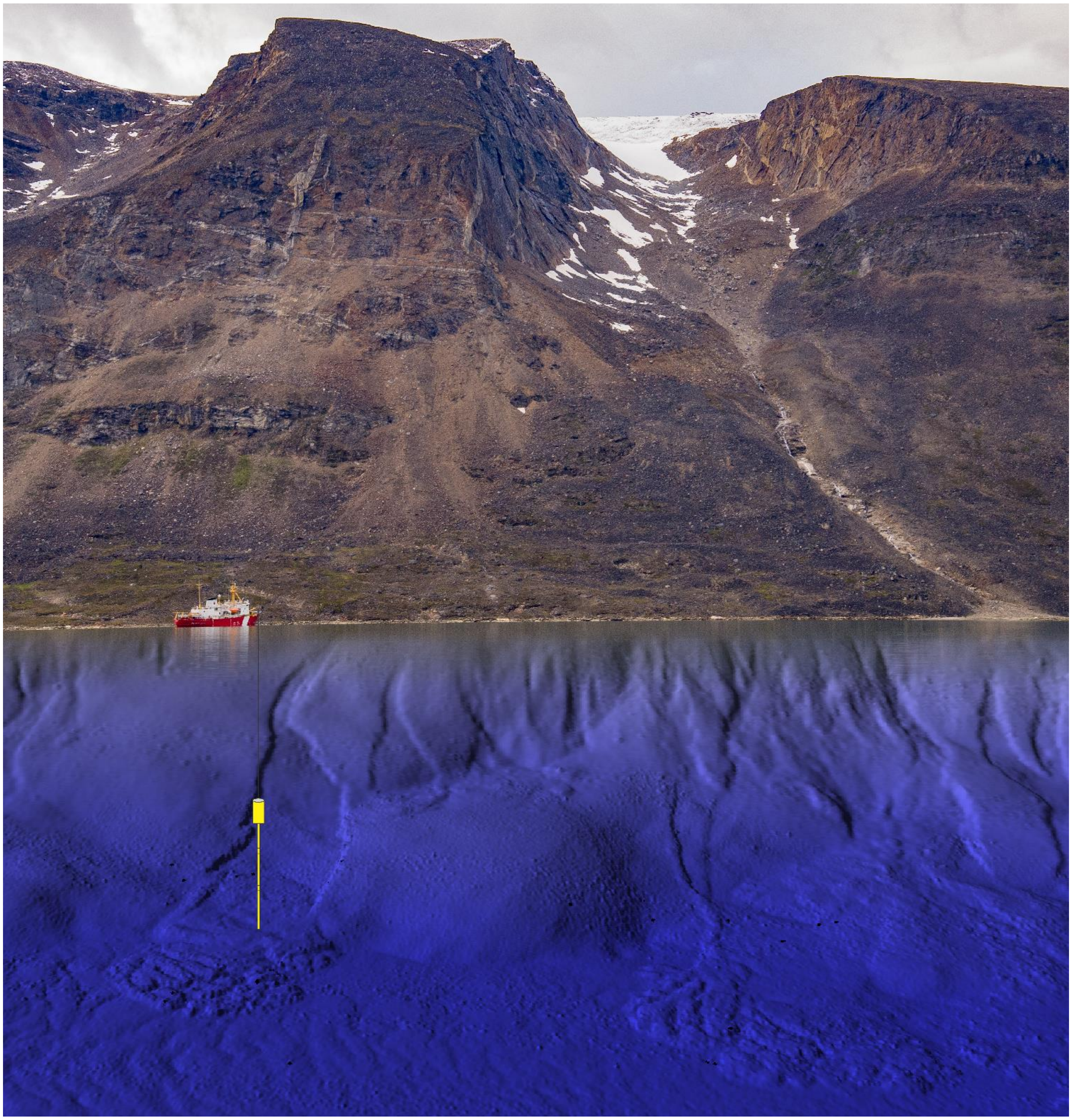

Figure 4: Representation of slope instabilities on the sidewalls of Southwind fjord. Not to scale. (*Photo courtesy of Captain Fergus Francey*).

4.2.3 A large submarine landslide offshore Home Bay

Sub-bottom profiles collected during the cruise revealed the widespread presence of a large submarine landslide within the sedimentary succession of Home Bay's offshore. Within the high-amplitude reflections (deglacial sediments?), incoherent reflections appear to be present throughout the region, suggesting that a large landslide occurred (see appendix). Sediment cores collected over the region will allow to precise the timing of this large failure.

5. DAILY NARRATIVE

*All date/time in Atlantic Standard Time. For exact UTC time, refer to Appendix A.

5.1 JD229 – Friday Aug. 17, 2018 – Bedford Basin

Science staff arrived on board the CCGS Hudson at 0800. Delays on departure were due to mold on the ship. An inspection was done at 0900 and revealed their absence. At 1000, Hudson departed for the Bedford Basin in order to test equipment. At 1100, patch test of the multibeam system started with a GAMMs calibration of the POS M/V. At 1300, a boat drill was done to get familiarized with emergency procedures. At 1315, the multibeam patch test resumed and terminated at 1420 when the side pole was raised back up. At the same time, a CTD-Rosette station was done to test a new configuration of the bottle triggers. At 1455, all tests were completed, with the CTD-Rosette one being unsuccessful. At 1500, the FRC was deployed to transfer Graham (CHS) back to shore. At 1520, Hudson began sailing towards Baffin Bay.

5.2 JD230 – Saturday Aug. 18, 2018 – Transit

Transit from southern tip of Cape Breton to western Newfoundland. There were issues with engines 2 and 4 during the night. Issues with engine 4 were resolved whereas engine 2 is considered non-functional for the rest of the cruise.

5.3 JD231 – Sunday Aug. 19, 2018 – Transit

Transit through the Strait of Belle-Isle.

5.4 JD232 – Monday Aug. 20, 2018 - Transit

Storm day. Heading towards Greenland at low speed for comfort.

5.5 JD233 – Tuesday Aug. 21 - Transit

Transit in Labrador Sea

5.6 JD234 – Wednesday Aug. 22 - Transit

Transit in Davis Strait.

5.7 JD235 – Thursday Aug. 23 – Cape Dyer

CCGS Hudson arrived at the first site off Cape Dyer at 0300 and began surveying the area using the 3.5 kHz. What appears to be a pockmark was selected as the first site for sediment sampling. At 0650, a Van Veen grab was deployed (station 0001) since the sub-bottom profiles showed a rough bottom consisting of coarse sediment. Piston and gravity cores were not recommended in that type of bottom. The Van Veen was recovered 0715. A 4k camera transect was then done (station 0002), from 0755 and to 0855. 30 photos of the seafloor were captured. A CTD-Rosette, operated by DFO, was then done to evaluate seepage in the water column (station 0003). The CTD-R was deployed at 0925 and recovered at 0950. It took 1 hour to process the water samples before a plankton net was done from 1110 to 1200 (stations 0004, 0005, 0006). The first plankton net was not successful (net was not closed) and was redone. We transited towards another depression on the seafloor believed to be a pockmark and deployed a Van Veen grab (station 0007) at 1230. It was recovered at 1255 and the 4K camera (station 0008) was deployed shortly after, at

1325. The camera captured 30 photos on the seafloor and came back up at 1415. A CTD-Rosette was then deployed at the same site from 1445 to 1515 (station 0009). Finally, a Van Veen grab was deployed at a final site from 1620 to 1645. The multibeam pole was then deployed for survey lines overnight.

5.8 JD236 – Friday Aug. 24 – Cape Dyer

The multibeam pole was raised at 0600 and the first Van Veen was deployed at 0645 (station 0011). At 0730, the camera was deployed for another 30 photos of the seafloor (station 0012), followed by a CTD-Rosette (station 0013) until 0830. Another suite of Van Veen (station 0014) and camera (station 0015) followed until 1045. We then started transiting towards Padloping Island where a piston core was collected off a grounding zone wedge in order to better constrain the timing of glacial retreat in the area (station 0016). Shortly after the piston core, at 1700, a CTD-Rosette was deployed (station 0017) to collect “background” water samples. During that time, a test drone flight (station 0018) was done. The multibeam was then deployed at 1730 and multibeam lines were run overnight over the grounding zone wedge.

5.9 JD237 – Saturday Aug. 25 – Southwind Fjord

At 0300, we started transiting towards Southwind fjord (Fig. 5) with the multibeam in the water. The multibeam along with the previous bathymetry coverage of the area allowed a safe entry into the fjord. At lunchtime, the captain deployed the FRC under the sill of the fjord. We arrived on site of the first station at 1300 where the piston core was deployed (station 0019), which was rigged for 5 barrels. Upon recovery, the 4^{th} and 5^{th} barrels were broken. We transited towards a failed slope on the western sidewall of the fjord and collected another piston core from 1630 to 1640 (station 0020). During recovery, the cutter was broken. We deployed the multibeam echosounder and started surveying the fjord seafloor at 120° swath from 1800 to 2200.

Figure 5: Entering Southwind fjord (Photo courtesy of Captain Fergus Francey).

5.10 JD238 – Sunday Aug.26 – Southwind fjord

At 0630, we began a CTD-Rosette (station 0021) while the mooring was put in place by the deckhands and NRCan. The mooring, consisting of a downward looking ADCP, was assembled and deployed at 0730 at the mouth of a submarine channel (station 0022). At 1140, an IKU grab was done in the channel in order to retrieve sedimentary structures within sandy sediments of the channel. It was back on deck at 0900. We then transited towards the levee of the channel where a piston core was collected before lunch (station 0024). After lunch, the piston core was broken down while a CTD-Rosette was done at the mouth of the submarine channel (station 0025). At 1420, a piston core was deployed on a failed slope proximal to the submarine channel (station 0026). During that time, the FRC was deployed and collected grab samples (station 0027) 1 m below the seafloor, near the shore. At 1550, a box core was deployed over a landslide deposit (station 0028). From 1730 to 2200, we began multibeam lines at 90° swath to have a better resolution of the seafloor.

5.11 JD239 – Monday Aug. 27 – Southwind fjord

At 0720, we began piston coring the unfailed slope of the fjord western sidewall (station 0029). During the breakdown of the piston core, a CTD-Rosette (station 0030) and 2 plankton nets (stations 0031 and 0032) were done before another piston core on the distal part of the unfailed slope (station 0033) until 1020. During that time, a drone flight (station 0034) aimed at capturing the western sidewall of the fjord was done over three consecutive flights. At 1300, a piston core (station 0035) was collected offshore the turbidite system, on the undisturbed seafloor. During the breakdown of the core, a CTD-Rosette (station 0036) was done until 1425. Two box cores (station 0037 and 0038) were then deployed one after the other on two different landslide deposits on each side of the fjord seafloor, followed by a plankton net until 1720 (station 0039). We then finished the multibeam lines with a swath of 90°, covering the proximal channel and the sidewalls of the fjord.

5.12 JD240 – Tuesday August 28 – Southwind fjord

At 0630, a box core on the undisturbed seafloor (reference box core) was done (station 0040). At 0800, we deployed the first of three IKU grab samples on a crescentic bedform in the channel, from the hydraulic jump location to the crest (stations 0041, 0042 and 0043, respectively). The third IKU grab did not trigger on the bottom and was sent back down. The three IKU grabs collected great results. A piston core on the eastern sidewall was then collected, on a failed slope (station 0044) between 1530 and 1600. Finally, two CTD-Rosette were done, one over the sill (station 0045) and one near the mouth of the fjord (station 0046). The multibeam was raised during station 0045 and we transited towards Qikiqtarjuaq.

5.13 JD241 – Wednesday August 29 - Qikiqtarjuaq

We arrived in Qikiqtarjuaq around 0900 where the first 3 crew members that needed to get evacuated were sent by FRC to the village. Chief scientist then went to visit the community hall to discuss with the mayor and any other representatives interested in visiting the CCGS Hudson. The mayor, deputy mayor, Hamlet Council representatives and Government Liaison Officer accepted the invitation for lunch on board the Hudson (Fig. 6). The Captain and Chief Scientist then toured the community members in the Hudson and we learned from them about tsunami alert and their interest in geohazards research. We left Qikiqtarjuaq around 1630, transiting towards Home Bay Trough.

Figure 6: Qikiqtarjuaq community visit of the CCGS Hudson. From left to right: Morris Kuniliusee (Government Liaison Office), Mary Killiktee (Mayor), Fergus Francey (Captain), Jeanie Kooneeliusie (Deputy mayor), Yukipa Audlakialc (Hamlet Council), Daisy Arnaeue (Hamlet Council), Alex Normandeau (Chief Scientist). ***Photo courtesy of Captain Fergus Francey*****.**

5.14 JD242 – Thursday Aug. 30 – Home Bay Trough

We sailed towards Home Bay Trough throughout the night, running the 3.5 kHz echosounder. At 0700, we deployed the first piston core (station 0047) over a landslide scar on the Home Bay Trough-mouth fan. The absence of sediment on the seafloor then led us to move towards south where high-amplitude reflections were observed during our transit. After a 2-hour transit, at 1130, we cored the levee of a submarine channel (station 0048), which was undisturbed. During the breakdown of the core, we deployed 2 plankton nets (stations 0049 and 0050) until 1400. At 1530, we deployed the third piston core of the day (station 0051) over a regional buried landslide deposit, which was recovered at 1700. The multibeam was then lowered in the water and we mapped the slope south of Home Bay Trough during the night.

5.15 JD2437 – Friday Aug, 31 – Home Bay Trough

We arrived on the site of a buried landslide deposit on the slope of southern Home Bay Trough at 0630 and began piston coring (station 0052). During the deployment of the piston core, the multibeam echosounder was raised. The piston core was back on board at 0845. We then transited towards another regional buried landslide deposit (station 0053) for a piston core, which began before lunch and was recovered at 1215. A final piston core of the day was done over a recent Holocene landslide deposit (station 0054) within the channel at 1430 and recovered at 1610. During the breakdown of the piston core, two plankton nets were deployed (stations 0055 and 0056). At 1730, the multibeam was deployed to map a hole in the multibeam data in the channel region south of Home Bay. A GAMMS calibration was needed, which took 3 hours to accomplish, before the survey started.

5.16 JD244 – Saturday Sept. 1 – Home Bay Trough

At 0730, the piston core was ready to be deployed over another recent Holocene landslide deposit and was recovered at 0900 (station 0057). During the deployment of the piston core, the multibeam pole was raised. Another piston core, over the undisturbed stratigraphy of the region south of Home Bay Trough (station 0058), was collected from 1130 to 1315. During the breakdown of the piston core, 2 plankton nets were done (stations 0059 and 0060). A third piston core was collected from 1520 to 1640 over the regionally buried landslide deposit (station 0061). Because of the bad quality of multibeam data at > 1000 m, it was decided to not deploy the multibeam and rather run long 3.5 kHz lines perpendicular to the slope. These lines were done at 8-10 knots to cover as much ground as possible.

5.17 JD245 – Sunday Sept. 2 – Broughton Trough

At 0730, the piston core was deployed over a channel levee deposit (station 0062), followed by another one on another similar channel levee (station 0063). These two cores were recovered by 1255. A third piston core, aiming the same regionally buried landslide deposit was cored from 1530 to 1630 (station 0064). Similar 3.5 kHz lines perpendicular to the continental slope were done during the night towards south.

5.18 JD246 – Monday Sept. 3 – Broughton Trough

At 0830, the first piston core was deployed over a regionally buried landslide deposit (station 0065), before another piston core over the undisturbed stratigraphy of the region (station 0066). An emergency with a crew member then required us to transit towards Qikiqtarjuaq. On the way to the community, we stopped for a piston core between two grounding zone wedges on the shelf (station 0067). We departed Qikiqtarjuaq around 2000 and started transiting towards Cape Dyer.

5.19 JD247 – Tuesday Sept. 4 – Cape Dyer

We arrived in Cape Dyer around 0700 and deployed the multibeam to run a few lines. However, problems with sound in the water column would not allow the sounder to calibrate. While we repaired the problem, two plankton nets (stations 0068 and 0069) were done until 0800. At 0815, we began a multibeam line for 1h30 until a suitable site for camera and Van Veen grab was found. The camera was first deployed at 1045 over what appeared to be a pockmark (station 0070). The camera was then followed by a Van Veen grab (station 0071) and a CTD-Rosette (station 0072). During the CTD-Rosette, a drone flight (station 0073) aiming at identifying slicks on the sea surface was done. We then started transiting towards a second site and deployed a camera (station 0074) at 1400. A Van Veen grab sample was deployed afterwards (station 0075), followed by two CTD-Rosettes until 1640 (stations 0076 and 0077). We then started sailing south at 1700.

5.20 JD248 – Wednesday Sept. 5 - Transit

Transit and Arctic Crossing BBQ took place in the evening.

5.21 JD249 – Thursday Sept. 6 - Transit

At 0845, a plankton net was deployed near the Labrador Sea (stations 0078 and 0079). We then continued sailing south.

5.22 JD250 – Friday Sept. 7 - Transit

Transit

5.23 JD251 – Saturday Sept. 8 - Transit

Transit. We arrived in the Laurentian Channel at 1600 and began a 3.5 kHz line over the Laurentian moraine.

5.24 JD252 – Sunday Sept. 9 – Laurentian Channel

We finished the 3.5 kHz lines around 0530 and started transiting towards the first core of the day, which aimed undisturbed deglacial sediment under less than 10 m of Holocene mud (station 0080). We arrived on station at 0630 and the piston corer was ready for deployment at 0710. It was brought back on board at 0730. We then started transiting towards another site to core a moraine overprinting the Laurentian moraine. When we arrived on site, around 1100, we realized we were right on top of a submarine cable. We thus adjusted our coring location to 1 mile north of the cable to ensure no accident. The piston core was lowered at 1130 and was recovered at 1200. Upon recovery, we started sailing towards BIO.

5.25 JD253 – Monday Sept. 10 – BIO

Arrival at BIO at 0800.

6. EQUIPMENT AND PROCEDURES

6.1 Knudsen 3260 Echo-Sounder

During much of the cruise, a ram mounted 12 and 3.5 kHz transducer, transceiver and recorder were used to track bottom and gather sub-bottom profiles when transiting, surveying and sampling. The echosounder was used simultaneously as the multibeam echosounder. The data was heave compensated during the cruise, which provided high-quality data, even at speeds of 10 knots. No significant problems were encountered with this system for the duration of the cruise.

6.2 Reson 7160

The Reson 7160 is a single head pole-mounted system (Table 3, Fig. 7)). Throughout the 2018042 – Baffin Bay cruise, the Reson 7160 multibeam echosounder proved to be a functioning system up to a limit of approximately 1000 m water depth. Within the limit of 1000 m, the 7160 did a good job of bottom tracking, which resulted in high quality data when collected in a 90° swath width or less. The expectations were for the system to provide high quality data which would allow for the gridding of high resolution surfaces. These expectations were met in most survey areas (less than 1000 m).

Beyond the range of 1000 m water depth, the Reson 7160 did not meet the required expectations with regards to bottom tracking and overall data quality. When collecting data beyond 1000 m the swath width had to be narrowed significantly (60 – 70°) in an effort to track bottom with any sort of consistency. Regardless of swath width, the outer beams had a difficult time tracking at all which resulted in large amounts of noise and a loss of potentially high quality usable data. Overall, the consistency of bottom tracking proved to be depth dependent, with the system tracking much better in 150 m water as opposed to 1000 m water. The Reson 7160 also does not have any real-time data filtering which resulted in much more manual data cleaning with the use of Caris HIPS.

Table 3: Specifications of the Reson 7160

Beams	**512 (Equi-Distant), 150 (Equi-Angle)**
Frequency	41kHz - 47kHz
Swath	Greater than four times water depth
Max Swath Angle	150 degrees
Depth Range	10m-3000m
Power Range	190dB – 220dB

For the purpose of consistently collecting high quality multibeam data, CHS recommends that an EM2040 Dual head system from CHS be used as opposed to the Reson 7160. Although the EM2040 does not technically have the same depth range as the Reson 7160, it provides much higher data density while providing real-time data filtering. For the purposes of fulfilling the science objectives for a cruise such as this one, the EM2040 Dual head system would be a much more suitable system than the Reson 7160.

Figure 7: Pole-mounted Reson 7160

6.3 IKU grab

Both the large and small IKU were brought on the cruise and secured to the foredeck of the vessel. The small IKU was not used during the cruise as it would not provide ample sediment recovery. The large IKU (Fig. 8) was launched on 4 stations during the early phase of the mission in the Fjord and provided good recovery on all but had to be redeployed on one of the stations as it did not trip and close properly (potentially due to softer sediment).

A large 5 ton swivel was used in association with the IKU and the arming hook/chain was connected to the inner hole on the side arm on the North Pacific crane so that the jaws could be opened on deck and the trip arm set. On recovery, the IKU was placed on 2 8” x 8” wooden beams so it would be secure for the lab subsampling team. During the subsampling, sediment escaped through the lower part of the IKU, which disturbed the sedimentary structures in some locations. Finding a way of preventing such escape of sediments in the future would be helpful to preserve sedimentary structures.

Lengths of CAB plastic core liner (push cores) were slowly inserted, using a vacuum backpressure technique to prevent sediment compression, into each IKU grab sample. Cross section sample locations were identified and appropriate sized (30 x 30 cm or 30 x 40 cm) wedge-shaped rectangular aluminum trays were slowly inserted at these locations. The push cores and cross section trays were assigned and labelled with a unique letter. In addition the cross section aluminum trays were labeled with their orientation (left to right or front to back) relative to the IKU frame. Photographs of the IKU grab sample surface were taken before and after the insertion of the push cores and the aluminum trays. These photographs and the location of the push core subsamples and cross section subsamples within the IKU grab sampler are given in Appendix B.

The two aluminum trays used for each cross section subsample were clamped together at the top. They were carefully dug out and clamped together along the sides of the trays and taken to the GP Lab. The cross sections samples were photographed, air dried and rephotographed. Some cross section subsamples were further subsampled for grain size analysis. All of the cross section subsamples were carefully scraped to a flat surface, rephotographed, covered with plastic wrap and covered by custom-made wooden tops in order to preserve the sediment structures.

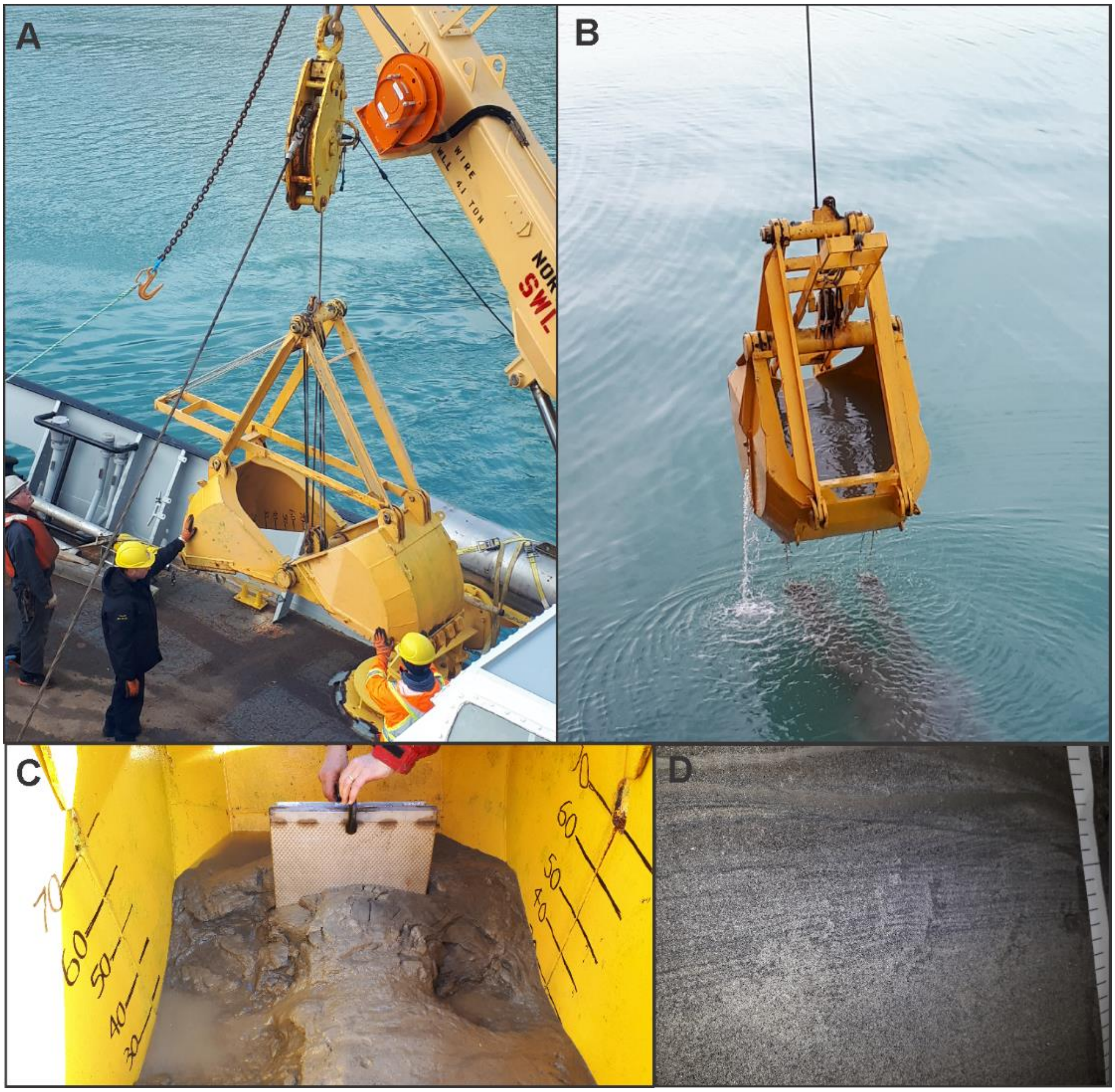

Figure 8: IKU grab sampling on CCGS Hudson.

6.4 Box Core

One standard Benthos ½ m^3 box core was used on 4 stations deployed using the North Pacific crane off the foredeck and a 3-ton swivel. The sampler worked well on each station closing and recovering sample. A total of 248.50 cm of sediment was obtained from 11 push cores taken in the 4 box cores. All cores were processed according to standard GSC Atlantic core procedures (refer to Mudie et al., 1984).

Upon retrieval the box core frame was removed and any water was drained from the top of the box. Photographs were taken of the sediment surface before and after the water was drained and prior to subsampling (see Appendix D).

On average three 50 cm lengths of CAB plastic core liner (push cores) were slowly inserted, using a vacuum backpressure technique to prevent sediment compression, into each box core. Surface samples were taken from 0028 box core by MacEwan University for micropaleontology and biogeochemical analysis. Ten undrained peak shear strength measurements (Table 4) were taken in the box cores using the Pilcon hand vane tester after ASTM Test Method D2573 Field Vane Shear Test in Saturated Fine Grained Soil. The instrument comprises a torque head with direct reading scale which is turned by hand. A non-return pointer indicates the peak shear strength. A 33 mm diameter vane was used for shear strength of 0 to 28 kPa. The measurements were made at 5 cm intervals beginning at 7.5 cm from the surface of the sediment.

Upon completion of the field vane measurements the box was lifted taking care to stabilize the push cores. The box core was rephotographed showing the sediment cross section. Push cores were carefully removed from the base if the box core, using a flat paddle, washed and capped at the base. All of the push cores were processed following the same procedure outlined below for the PC and TWC. The sealed and waxed push cores were stored upright in dredge buckets in the starboard refrigerated reefer container and maintained at 4°C. All samples and subsamples were catalogued and their location information within the container was recorded in an excel spreadsheet. All relevant station metadata was entered in ED_AT_SEA and will be uploaded into ED.

Table 4: Summary of field vane measurements

2018042 Summary of Field vane measurements			
Station Number	Sample Type	depth of measurement (cm)	Shear strength (kPa)
0028	Box core	7.5	6.7
0028	Box core	12.5	9.2
0028	Box core	17.5	9.0
0028	Box core	22.5	11.0
0028	Box core	27.5	10.0
0037	Box core	7.5	11.0
0038	Box core	7.5	10.5
0038	Box core	12.5	8.2
0040	Box core	7.5	14.0
0040	Box core	12.5	11.0

6.5 Van Veen grab

A medium-large sized VanVeen was used out of the winch room from the hydrocast winch on several stations and performed as expected on each deployment recovering a modest amount of sediment. Standard photography (Appendix E), surface samples, grain-size samples and bulk samples were taken from each grab.

Due to the cramped headroom on recovery between the closed VanVeen sampler arms and the overhead meter block it was recommended that the hydrocast wire be re-terminated with only two sleeves closer together (removing the third sleeve) so that the sampler could be raised higher eliminating the two personnel on the sample deck from physically lifting the sampler. The sample tray could also be modified with a lower forward lip facilitating an easier clearance of the sampler as it is boomed into the lab.

6.6 Piston Coring

The standard GSC-A long piston coring system (Fig. 9) was used on the cruise on 26 stations. The corer was configured with a piston, trip arm and trigger weight core on all stations. Barrel assembly ranged from 3 to 5 barrels. The coring system tripped and operated properly on all stations with the piston splitting on all but one. The standard rotating core head cradle, monorail, trolley and half-height core processing container were used for all operations. The tugger winches for raising the core string were only used on the first few stations.

The piston core head was a new stainless steel model weighing 2750 lbs. It had been used for the first time on an earlier coring trip in 2018 as a gravity coring system and a couple of deficiencies were noted. The main corehead coupling was not straight which made it difficult to reach the couplings for assembly/disassembly and the drain holes for water were not sufficient. Both these issues were corrected prior to the 2018042 cruise. A third issue was noted on the first piston station when we saw that the main coring wire drop loop attachment holes were not in the correct location. Prior to the second station new holes were drilled through the stainless steel shell to provide better locations for tie down cord. Later in the cruise, the titanium trip arm got caught on the piston core head bale and caused some gouging and bending. On the last few stations we decided to tie the trip arm to the cradle to assure its orientation prior to rotation from horizontal to vertical.

A new forward stanchion had been fabricated just prior to this cruise and both it, the monorail and outriggers worked normally. The small Kito chain hoists on the monorail trolley were switched for larger Jet hoists during the first core set up as the brake on one was slipping.

The half-height container had two new hydraulic power packs that ran the small Palfinger crane and the pickup tugger winches. A new composite Caldwell spreader bar, stainless chain and hooks were used to move the pipes.

A new trigger weight core was used throughout the cruise and worked well. Initially this small corer recovered little and it appeared it was falling over at the seabed but later when encountering more favourable seabed it performed well. The lead ballast rings were coated with a yellow vinyl to eliminate environmental concerns and we adjusted the ballast throughout the cruise using 4 – 6 of these weights (50 lbs each) and on one occasion only 3. A new acetal/rubber butterfly valve was installed in the trigger weight core barrel at the top of the liner to allow the water to escape on sediment penetration and then closing as the core was extracted from the seabed with sediment contained. This system worked very well and with the main trigger weight core head made of 304 stainless would require little maintenance.

Early on during the cruise, we were encountering rough seabed and coarser sediments so we had low recoveries in the first and second barrel and many damaged core cutters but as we moved into more favourable sediments recovery improved. We had quite good splits on the piston usually within 50 cm of the sediment interface. On one of the early cores with 5 barrels we encountered unfavourable sediment and on recovery saw that we had lost the first barrel, cutter, coupling, lower piston assembly and broken the end of the 4^{th} barrel. As we moved into more favourable sediments, we reduced the orifice size on the piston to gain further recovery and only suffered slight liner dimpling on a couple of the cores.

Early during the cruise, the main tugger winch for righting the coring string from vertical to horizontal broke welds on deck and moved violently. We assessed the spare winch base welds and decided we would have to abandon this method of core recovery for safety reasons. We discussed with the boatswain and decided to use the Foredeck Arva crane to lift the core string with a short pickup strap and moved our pickup attachment lug from the third to the second barrel. This worked well and was very efficient.

We used two new core liner racks in the hangar to house our liner out of the boxes eliminating the cardboard waste at sea. They worked well but much of the liner lengths we discovered varied in length by more than ¼" which caused some aggravation when we were installing liner in the core barrels.

The main Pengo winch performed well during the trip and we did not have to re-terminate the mechanical fitting on the end of the wire. The coring block cable counter was off slightly reading lower than the amount of cable out but the winch operator got a feel for this difference so all worked well. The small tugger winch to raise and lower the trigger weight core had been modified prior to the cruise to allow more clearance for the trip wire and hardeyes and worked well. Only one wire got jammed and damaged. The winch angle could have been less aggressive to allow easier level winding by hand when under load and the hydraulic power pack seemed to get louder as the cruise went on.

Piston coring was successful at 25 of the 26 attempted sites. At 0019 piston core (PC) site, the coupling and bottom barrel were broken resulting in no sediment recovery. 27 cm of sediment was recovered in the trigger weight core (TWC) at this site. Many of the PC cutters were damaged. There was minimal dimpling and implosions of the CAB plastic liners.

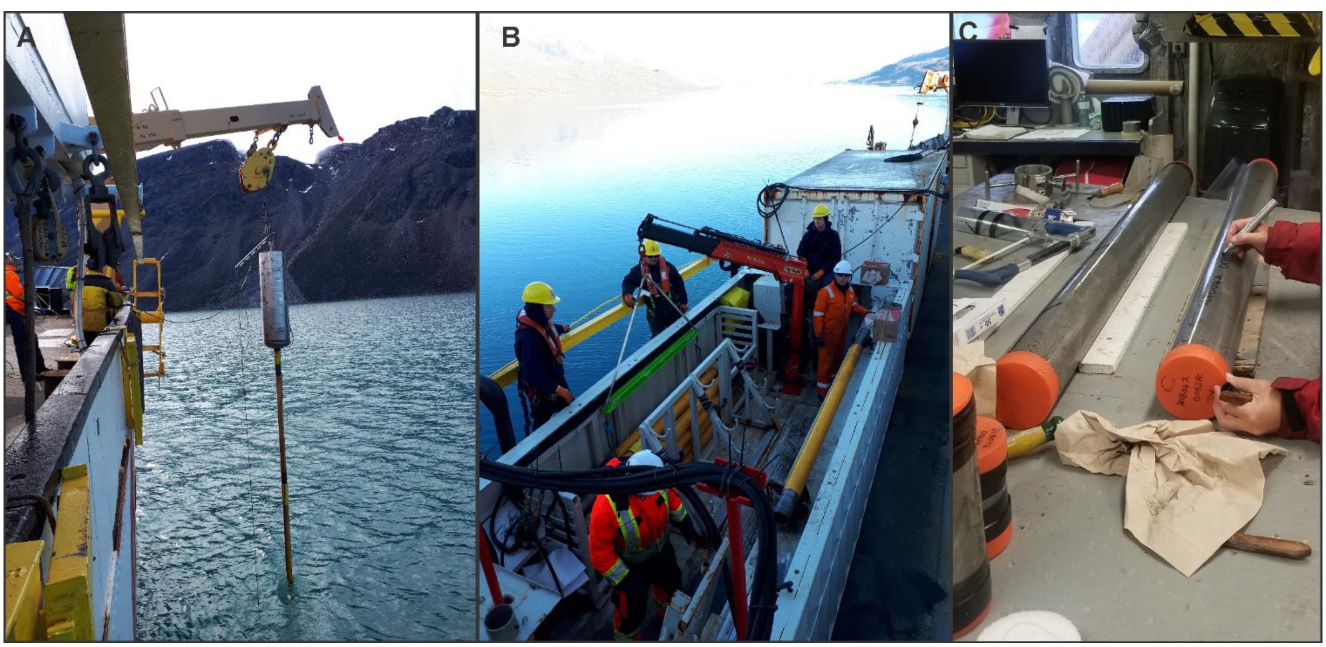

Figure 9: Piston coring on the CCGS Hudson

Onboard piston core processing and subsampling

A total of 159.41 m of sediment was obtained from 26 cores (25 PC and 26 TWC). All cores were processed according to standard GSC Atlantic core procedures (refer to GSC Open File #1044). All core barrels were kept in sequence, from the bottom to the top, as the barrels were taken apart and moved to the half-height container. Starting with the bottommost barrel each 10 ft length of liner was extruded from the barrel and cut in half, using a modified pipe cutter, in the half-height container (Fig. 9B). The sediment in the liner was cut using a wire saw and the section ends were carefully capped to minimize disturbance to the sediment surface. The top end cap was labelled with the cruise number, station number, section label and as top. The base of the piston core is designated with the letter A and the top of the base section is designated as B. Each section was taken into the GP Lab and stored horizontally on the benches. Each core, starting with the base section AB, was processed using the following procedure. The core liner was labelled with an up arrow, cruise number, station number, section label and the top and base of the section were labelled with the appropriate letter. End caps were removed if the sediment was not too fluid, and the section length was measured and recorded.

Undrained shear strength measurements and constant volume samples were taken at the top and base of each section where possible. Inert packing was placed in the voids created by the constant volume sampling. The ends of each core section were recapped, taped and sealed with beeswax to prevent further oxidation and drying. Whole core analysis and core splitting and processing will occur at the GSC Atlantic Core Processing Lab.

The sealed core sections were stored upright in custom-made whole core portable racking units in the starboard refrigerated reefer container and maintained at 4°C. All core cutters and catchers were measured, labelled, placed in split liners, waxed and stored upright in buckets in the reefer container. Core sections and subsamples were catalogued and their location information within the reefer container was recorded in an excel spreadsheet.

All station location information, core section lengths, extruded pieces and cutter/catcher lengths, sediment description, core performance information and all relevant field information were documented on deck sheets and then input into the ED_AT_SEA application. This ED_AT_SEA database was backed up and will be verified before being uploaded into the Geological Survey of Canada (GSC) expedition oracle database (ED) http://ed.gdr.nrcan.gc.ca/index_e.php. Stratigraphic locations of cores are found in Appendix C.

Physical properties measurements

Undrained shear strength measurements and constant volume samples were taken at the ends of each section if the condition of the sediment allowed (Table 5). The constant volume sampler was inserted into the end of the section, the undrained shear strength measurement was taken and then the constant volume sampler was removed.

The undrained shear strength was measured using a hand-held Hoskin Scientific Torvane according to ASTM Test Method D2573 Field Vane Shear Test in Saturated Fine Grained Soil. The dial on the Torvane was zeroed, the fins on the vane were gently pushed into the sediment until they were completely inserted. The Torvane was rotated at a constant rate until the sediment failed.

The Torvane dial reading ranges from 0 to 1 and reports values in kg-force/cm^2 units (1 kg/cm^2 = 98.07 kPa). The Torvane has three adapter vanes as described below:

L - Sensitive vane has a range of 0 to 0.2 Kg-force/cm^2

Su = dial reading * 0.2 Kg-force/cm^2

M - Regular vane has a range of 0 to 1.0 Kg-force/cm^2

Su = dial reading * 1 Kg-force/cm^2

S - High capacity vane has a range of 0 to 2.5 Kg-force/cm^2

Su = dial reading * 2.5 Kg-force/cm

The L - Sensitive vane and the M – Regular vane were used for a total of 116 undrained shear strength measurements taken during the cruise.

Constant volume samples for bulk density and water content determinations were taken by inserting stainless steel samplers of a known volume. Prior to insertion, the sampler was lightly sprayed with mineral oil and gently wiped with a small Kimwipe tissue. The bevelled edge of the sampler was placed on the flat sediment surface and the carefully inserted into the sediment using two flat-headed spatulas. The sampler is inserted at a constant rate to minimize compression of the sediment within the sampler. The sampler was then carefully removed and the sediment was trimmed using a wire saw and extruded into a pre-weighed 1 oz screw-top glass bottle. The bottle cap was then labelled and sealed using electrical tape to prevent the lid from loosening. A total of 123 constant volume samples were taken during the cruise. The samples will be weighed, dried at 105°C for 24 hours and reweighed to determine bulk density, dry density and water content according to ASTM Test Method D 2216 Laboratory Determination of Water (moisture) Content of Soil and Rock by Mass. All relevant information for the Torvane measurements and constant volumes was recorded on data sheets and input into excel spreadsheets and will be incorporated into the GSC Atlantic physical property database.

Table 5: Physical property sampling summary

2018042 Summary of Physical Property sampling			
Station Number	Sample Type	# of Torvane Measurements	# of Constant Volume samples
0016	PC	1	3
0020	PC	2	2
0024	PC	3	3
0033	PC	3	4
0035	PC	4	4
0044	PC	2	2
0047	PC	2	2
0048	TWC	1	2
0048	PC	8	8
0051	TWC	2	2
0051	PC	2	2
0052	PC	2	2
0053	TWC	1	1
0053	PC	5	5
0054	TWC	1	1
0054	PC	9	11
0057	TWC	1	1
0057	PC	6	5
0058	TWC	1	1
0058	PC	6	6
0061	PC	6	5
0062	TWC	1	1
0062	PC	7	8
0063	PC	2	4
0064	TWC	1	1
0064	PC	8	8
0065	TWC	1	1
0065	PC	8	8
0066	TWC	1	1
0066	PC	3	3
0067	PC	2	2
0080	PC	8	8
0081	TWC	1	1
0081	PC	5	5
	TOTALS	***116***	***123***

6.7 4K Camera

The GSC-A drop 4K camera was used on several stations from the winch room and performed well. A Canon Rebel Digital SLR and Canon flashes were used as in previous years powered by a 12 volt/80 Amphr Deep Sea Power & Light pressure compensated sea battery. Transects were run generally taking approximately 30 photos with a 12 kHz OIS pinger mounted on the camera sled being monitored for bottom trigger closure using the Knudsen 12 kHz in Pinger mode.

A high powered 4000m Applied Acoustics beacon was also mounted on the sled to allow sub sea positioning as it was tracked with the Trackpoint 3 USBL system from the GP lab moonpool.

There were 6 successful camera deployments with 278 raw images and 187 good quality images of the seafloor. A summary of the camera stations and underwater photographs are given in the Appendix. All relevant station metadata was entered in ED_AT_SEA and will be uploaded into ED. All relevant geographic and file name information relating to each individual image was captured in a standardized excel spread sheet. Descriptions of the biology and geology of each image will be added to this excel spreadsheet and both the spreadsheet information and underwater images will be uploaded into ED.

6.8 Mooring

An oceanographic mooring was deployed in Southwind fjord (Fig. 10) in approximately 120 m of water in order to capture turbidity currents during the spring/summer of 2019. The mooring housed a Teledyne RDI acoustic Doppler current profiler downward facing at 22 m above bottom. Due to the suspected bedform amplitude the bottom anchor for the mooring consisted of two large train wheels with combined weight of 1625 lbs plus an 18 lb Danforth anchor connected with 3 m of chain. The main train wheel anchor had 5 m of chain leading up to a Teledyne Benthos 865a acoustic release. There were two C2 floats above the release then 14 m of jacketed wire leading to the A2 float package containing the ADCP. Above this were the final two C2 floats to provide ample floatation if a strong current event of 2 -3 m s^{-1} was to pass.

The ADCP was UTC time set and compass calibrated then preprogramed with a delayed start of May 1st, 2019 12:00 UTC at BIO. In order to run off one internal battery and capture a short current event passage it was programmed to come on once every 8 seconds with no averaging. The bin size was set at 1 m and 24 bins were set. With acoustic blanking the first bin would be at 3.21 m from the transducers and the last at 27.21 m or well past the seabed. The programming suggested the ADCP would run for approximately 145 days.

The mooring components were all attached just prior to launch after we turned on the acoustic release and carefully deployed off the stern of the vessel.

Figure 10: Deployment of the mooring during 2018042.

6.9 UAV Flights

The GSC-A DJI Phantom 4 aircraft was flown on several flights from the flight deck of the vessel with good success. One flight was conducted off the foredeck and intermittent loss of control was noted and the aircraft was almost lost as it descended slowly on its own from 10 m altitude towards the sea surface. The coldest temperatures flown in were just above 0°C with winds of 15 kts. The aircraft performed well in this environment as did the flight battery but we lost the camera gimbal stabilization on one flight during the return leg. After a reboot and auto calibration, the camera was good again. Pix4D capture was used in conjunction with an iPad mini to fly all flights in manual free flight mode.

6.10 Conductivity-Temperature-Depth-Rosette (CTD-Rosette)

Colleagues from the Department of Fisheries and Oceans took the opportunity of the GSC cruise to obtain water samples in Baffin Bay. The objectives were to obtain samples of the water column vertical profile (and where possible, surface sediment samples), for chemical and biological analyses at sites and sampling stations where potential hydrocarbon seeps at the sediment surface were indicated. The sampling stations were primarily located off Cape Dyer and had been previously identified by Natural Resources Canada (NRCan) missions. One station located near the mouth of Southwind fjord was selected as a hydrocarbon-free reference. A second objective was to investigate how glacier ice water runoff affects the movement and stratification of fjords. These data will be used and compared to other northern fjords.

Chemical and biological samples were taken for pH, oxygen, total inorganic carbon, total alkalinity, nutrients, O18, pCO2, CH4, H2S, BTEX, GCMS, prokaryotes, phytoplankton, protists, genomics, total organic carbon and DNA. Water samples were obtained using the CTD rosette with 12 Niskin bottles. Surface sediment samples were obtained from Van Veen grabs. The samples required various forms of preservation (with Lugol or glutaraldehyde, poison mercuric chloride, $MnCl_2$, alkaline iodide), preliminary extraction of hydrocarbons (with dichloromethane) and storage at 4-6°C, -20°C or -86°C. Work with the samples was done in the fume hood of the Geochem lab.

The number of depths at which seawater samples were taken at each station ranged from 8 to 12 depending on the depth of the water column, and always included a near-bottom and surface (1 m) sample. The total number of samples taken for all stations for the complete suite of analyses were 522. Additional samples (1 L) of seawater were collected from the Niskin bottles of the CTD rosette at stations within Southwind fjord for GSC suspended sediment analysis.

The CTD Rosette provides vertical data profiling of conductivity (used to calculate salinity), temperature, fluorescence, and depth. The final processing of all samples and data work-up will be done in the laboratories at the Bedford Institute of Oceanography. These analyses should give indications of how hydrocarbons from deep water, oceanic seeps are related to variations in microbial community numbers and structure.

6.11 Plankton net

Geological Survey of Canada's collaborator Anna J. Pieńkowski took the opportunity of the cruise to sample foraminifera in the water column. Sampling was done by Rabecca Thiessen, student at MacEwan. Sampling activities included the deployment of a plankton net (Fig. 11) and surface sediment sampling from IKUs and box cores. This expedition aboard the CCGS Hudson in Cape Dyer, Southwind fjord, Qikiqtarjuaq and Home Bay allowed for the collection of plankton and sediment samples that will support the main objectives of:

1) Gain a better understanding of the ecological strategies and relationships that Arctic planktonic foraminifera participate in.

2) Discover distinct contemporary species of planktonic foraminifera.
3) Document the contemporary assemblages of benthic and planktonic foraminifera in the Baffin Bay area.
4) Biogeochemical analysis.

The plankton net was deployed 16 times. At each deployment two nets were taken; the first being constant at 100 m and the second at 150 m where possible or 50 m. The first net at 100 m was used for planktonic analysis. Individual specimens of *Neogloboquadrina pachyderma* and when present, *Turborotalita quinqueloba* were live picked on board and transferred to a fixative that consists of 2% formaldehyde, 4% glutaraldehyde and phosphate buffer saline for TEM analysis. When possible up to 20 specimens were collected and placed into RNA*Later* (Ambion^{TM}®) for preservation. These specimens will be used for genetic analysis once received by Clare Bird at Stirling University, UK. TEM analysis in combination with genetic analysis will be used to interpret trophic interactions of planktonic foraminifera with bacteria in the water column and particulate organic matter (Bird, 2018). Specimens are also collected and transferred to DOC buffer which is used to extract DNA for later sequencing to be undertaken at Stirling University by Clare Bird.

Figure 11: Deployment of the plankton net from the winch room.

References

Mudie, P.J., Piper, D.J.W., Rideout, K., Robertson, K.R., Schafer, C.T., Vilks, G., Hardy, I.A. (1984) Standard methods for collecting, describing and sampling Quaternary sediments at the Atlantic Geoscience Center. Open file 1044, 47 pp.

Bird, C., Darling, K.F., Russell, A.D., Fehrenbacher, J.S., Davis, C.V., Free, A., et al. (2018) 16S rRNA gene metabarcoding and TEM reveals different ecological strategies within the genus Neogloboquadrina (planktonic foraminifer). PLoS ONE 13, e0191653.

APPENDIX A: STATION SUMMARY

Table A1: Totals of stations during 2018042

2018042 Station Summary Vessel: CCGS Hudson Chief Scientist: Alex Normandeau Date: August 17 to September 10, 2018																			
Sample location information							Seismic Record				Cumulative sample	Core				Grab	Camera	Rossette	Plankton Net
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instrument	Acoustic Target		Sampler Length (cm)	TWC length (cm)	PC length (cm)	Push / X section length (cm)	Grab length (cm)	No of images	No of samples	No of samples
										TOTALS			*3114.5*	*12826.5*	*1117.0*	*63.0*	*189*	*107*	*15*

Table A2: Station summary for 0001 – 0020

2018042 Station Summary Vessel: CCGS Hudson Chief Scientist: Alex Normandeau Date: August 17 to September 10, 2018																			
Sample location information							Seismic Record					Core				Grab	Camera	Rossette	Plankton Net
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instrument	Acoustic Target	Cumulative sample	Sampler Length (cm)	TWC length (cm)	PC length (cm)	Push / X section length (cm)	Grab length (cm)	No of images	No of samples	No of samples
0001	Grab - Van Veen	235/10:02:26	66.849582	-61.071963	326.0	Davis Strait - Cape Dyer	AMD2007	258/1733	3.5kHz	Rough Incoherent	1	20.0	-	-	-	20.0	-	-	-
0002	Camera - GSCA 4K	235/10:55:36	66.848416	-61.074881	326.0	Davis Strait - Cape Dyer	AMD2007	258/1733	3.5kHz	Rough Incoherent	1	-	-	-	-	-	32	-	-
0003	CTD Rosette	235/12:45:30	66.849025	-61.070455	331.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	1	-	-	-	-	-	-	12	-
0004	Plankton Net	235/14:20:27	66.859678	-61.070191	337.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	1	-	-	-	-	-	-	-	0
0005	Plankton Net	235/14:35:46	66.860524	-61.066802	337.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	2	-	-	-	-	-	-	-	1
0006	Plankton Net	235/14:54:25	66.843115	-61.061525	332.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	3	-	-	-	-	-	-	-	1
0007	Grab - Van Veen	235/15:44:04	66.842463	-61.058558	340.0	Davis Strait - Cape Dyer	2018042	236/0210	3.5kHz	Rough Incoherent	2	20.0	-	-	-	17.0	-	-	-
0008	Camera - GSCA 4K	235/16:24:52	66.842665	-61.056730	346.0	Davis Strait - Cape Dyer	2018042	236/0210	3.5kHz	Rough Incoherent	2	-	-	-	-	-	32	-	-
0009	CTD Rosette	235/18:04:46	66.843353	-61.064522	339.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	2	-	-	-	-	-	-	12	-
0010	Grab - Van Veen	235/19:31:10	66.835298	-61.030575	372.0	Davis Strait - Cape Dyer	AMD2013	218/0500	3.5kHz	Rough Incoherent	3	20.0	-	-	-	1.0	-	-	-
0011	Grab - Van Veen	236/09:55:39	66.890723	-61.359212	104.0	Davis Strait - Cape Dyer	2018042	236/0415	3.5kHz	Rough Incoherent	4	20.0	-	-	-	5.0	-	-	-
0012	Camera - GSCA 4K	236/10:25:36	66.890330	-61.357748	106.0	Davis Strait - Cape Dyer	2018042	236/0415	3.5kHz	Rough Incoherent	3	-	-	-	-	-	34	-	-
0013	CTD Rosette	236/11:28:10	66.890892	-61.356818	105.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	3	-	-	-	-	-	-	8	-
0014	Grab - Van Veen	236/12:39:43	66.864518	-61.388117	103.0	Davis Strait - Cape Dyer	2018042	235/2327	3.5kHz	Rough Incoherent	5	20.0	-	-	-	10.0	-	-	-
0015	Camera - GSCA 4K	236/13:13:03	66.864227	-61.387186	102.0	Davis Strait - Cape Dyer	2018042	235/2327	3.5kHz	Rough Incoherent	4	-	-	-	-	-	29	-	-
0016	Piston Core	236/19:06:17	67.231840	-62.269741	356.0	Davis Strait - Padloping Island	2018042	236/1647	3.5kHz	Smooth Stratified	1	914.4	10.0	242.0	-	-	-	-	-
0017	CTD Rosette	236/20:21:34	67.230852	-62.272749	360.3	Davis Strait - Mouth of Southwind Fjord	N/A	N/A	N/A	N/A	4	-	-	-	-	-	-	12	-
0018	Drone	237/11:49	66.945803	-62.496137	317.7	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	1	-	-	-	-	-	-	-	-
0019	Piston Core	237/16:15:38	66.786571	-62.368830	175.9	Davis Strait - Southwind Fjord	2018042	239/2040	3.5kHz	Smooth Stratified	2	1524.0	27.0	0.0	-	-	-	-	-
0020	Piston Core	237/19:35:15	66.776986	-62.368330	144.8	Davis Strait - Southwind Fjord	2018042	239/0025	3.5kHz	Smooth Incoherent	3	914.4	31.0	271.5	-	-	-	-	-

Table A3: Station summary for 0021 – 0041

2018042 Station Summary Vessel: CCGS Hudson Chief Scientist: Alex Normandeau Date: August 17 to September 10, 2018																			
Sample location information							Seismic Record					Core				Grab	Camera	Rossette	Plankton Net
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instrument	Acoustic Target	Cumulative sample	Sampler Length (cm)	TWC length (cm)	PC length (cm)	Push / X section length (cm)	Grab length (cm)	No of images	No of samples	No of samples
0021	CTD Rosette	238/09:51:15	66.761654	-62.340128	118.0	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	5	-	-	-	-	-	-	8	-
0022	Mooring	238/10:26:39	66.761674	-62.341354	113.3	Davis Strait - Southwind Fjord	ArcticNet2014	283/1525	3.5kHz	Rough Incoherent	1	-	-	-	-	-	-	-	-
0023	Grab - IKU	238/11:50:28	66.758032	-62.336568	114.9	Davis Strait - Southwind Fjord	2018042	239/2115	3.5kHz	Rough Incoherent	1	70.0	-	-	111.0	-	-	-	-
0024	Piston Core	238/14:30:07	66.757516	-62.338508	97.8	Davis Strait - Southwind Fjord	2018042	237/2333	3.5kHz	Smooth Stratified	4	914.4	0.0	335.5	-	-	-	-	-
0025	CTD Rosette	238/16:04:20	66.774956	-62.350534	150.0	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	6	-	-	-	-	-	-	8	-
0026	Piston Core	238/17:22:04	66.760655	-62.344360	80.0	Davis Strait - Southwind Fjord	2018042	283/1557	3.5kHz	Smooth Stratified	5	914.4	14.0	107.5	-	-	-	-	-
0027	Grab - trowel	238/18:00:00	66.763917	-62.357033	0.5	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	6	-	-	-	-	-	-	-	-
0028	Box core	238/18:57:05	66.778195	-62.362413	165.0	Davis Strait - Southwind Fjord	2018042	239/1750	3.5kHz	Rough Incoherent	1	55.0	-	-	85.0	-	-	-	-
0029	Piston Core	239/10:25:08	66.787581	-62.368570	178.0	Davis Strait - Southwind Fjord	2018042	237/2102	3.5	Rough Incoherent	6	914.4	7.0	172.5	-	-	-	-	-
0030	CTD Rosette	239/11:35:18	66.786172	-62.369254	178.0	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	7	-	-	-	-	-	-	8	-
0031	Plankton Net	239/11:56:53	66.786098	-62.369014	178.0	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	4	-	-	-	-	-	-	-	1
0032	Plankton Net	239/12:12:13	66.786223	-62.369295	178.0	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	5	-	-	-	-	-	-	-	1
0033	Piston Core	239/13:14:11	66.775403	-62.366727	126.8	Davis Strait - Southwind Fjord	2018042	237/2359	3.5kHz	Smooth Stratified	7	914.4	77.5	467.5	-	-	-	-	-
0034	Drone	239/11:56	66.786528	-62.369916	175.1	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	2	-	-	-	-	-	-	-	-
0035	Piston Core	239/16:12:25	66.759246	-62.342581	175.1	Davis Strait - Southwind Fjord	ArcticNet2014	283/1603	3.5kHz	Smooth Stratified	8	914.4	29.0	349.0	-	-	-	-	-
0036	CTD Rosette	239/17:19:34	66.758779	-62.339070	108.0	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	8	-	-	-	-	-	-	8	-
0037	Box core	239/18:29:37	66.782207	-62.367761	171.0	Davis Strait - Southwind Fjord	2018042	237/1717	3.5kHz	Rough Incoherent	2	55.0	-	-	45.5	-	-	-	-
0038	Box core	239/19:19:32	66.785935	-62.363838	175.0	Davis Strait - Southwind Fjord	ArcticNet2014	283/1801	3.5kHz	Rough Incoherent	3	55.0	-	-	57.0	-	-	-	-
0039	Plankton Net	239/20:04:18	66.786207	-62.369316	178.0	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	6	-	-	-	-	-	-	-	1
0040	Box core	240/09:40:27	66.785624	-62.369453	176.8	Davis Strait - Southwind Fjord	2018042	239/1217	3.5kHz	Smooth Stratified	4	55.0	-	-	61.0	-	-	-	-
0041	Grab - IKU	240/11:12:39	66.748338	-62.329878	86.0	Davis Strait - Southwind Fjord	2018042	239/2335	3.5kHz	Rough Incoherent	2	70.0	-	-	244.0	-	-	-	-

Table A4: Station summary for 0042 – 0062

2018042 Station Summary

Vessel: CCGS Hudson | Chief Scientist: Alex Normandeau | Date: August 17 to September 10, 2018

Sample location information							Seismic Record				Cumulative sample	Core				Grab	Camera	Rossette	Plankton Net
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instrument	Acoustic Target		Sampler Length (cm)	TWC length (cm)	PC length (cm)	Push / X section length (cm)	Grab length (cm)	No of images	No of samples	No of samples
0042	Grab - IKU	240/13:06:23	66.748600	-62.329622	86.9	Davis Strait - Southwind Fjord	2018042	239/2335	3.5kHz	Rough Incoherent	3	70.0	-	-	325.0	-	-	-	-
0043	Grab - IKU	240/16:00:02	66.748748	-62.329770	86.8	Davis Strait - Southwind Fjord	2018042	239/2336	3.5kHz	Rough Incoherent	4	70.0	-	-	188.5	-	-	-	-
0044	Piston Core	240/18:36:57	66.781037	-62.344496	115.3	Davis Strait - Southwind Fjord	2018042	240/0026	3.5kHz	Smooth Stratified	9	914.4	8.0	291.5	-	-	-	-	-
0045	CTD Rosette	240/20:23:11	66.827803	-62.418316	89.6	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	9	-	-	-	-	-	-	6	-
0046	CTD Rosette	240/21:44:36	66.898759	-62.484018	239.4	Davis Strait - Southwind Fjord	N/A	N/A	N/A	N/A	10	-	-	-	-	-	-	9	-
0047	Piston Core	242/10:40:58	69.203227	-64.064215	1331.0	Baffin Bay - Home Bay	2018042	242/0656	3.5kHz	Rough Stratified	10	914.4	108.5	327.5	-	-	-	-	-
0048	Piston Core	242/15:13:45	68.793684	-63.882891	1511.4	Baffin Bay - Home Bay	ArcticNet 2008	275/0755	3.5kHz	Smooth Stratified	11	1219.0	202.0	758.5	-	-	-	-	-
0049	Plankton Net	242/16:36:01	68.789436	-63.874253	1517.0	Baffin Bay - Home Bay	N/A	N/A	N/A	N/A	7	-	-	-	-	-	-	-	1
0050	Plankton Net	242/16:54:38	68.789239	-63.871425	1517.2	Baffin Bay - Home Bay	N/A	N/A	N/A	N/A	8	-	-	-	-	-	-	-	1
0051	Piston Core	242/19:11:13	68.786122	-64.158238	1347.0	Baffin Bay - Home Bay	2018042	242/0152	3.5kHz	Rough Stratified	12	1219.0	202.0	304.5	-	-	-	-	-
0052	Piston Core	243/11:02:05	68.819557	-64.239849	1143.0	Baffin Bay - Home Bay	2018042	242/0207	3.5kHz	Rough Stratified	13	914.4	156.0	350.5	-	-	-	-	-
0053	Piston Core	243/14:37:18	68.741171	-64.213686	1267.5	Baffin Bay - Home Bay	2018042	243/0025	3.5kHz	Rough Stratified	14	1219.0	172.5	561.0	-	-	-	-	-
0054	Piston Core	243/18:18:41	68.701563	-63.729369	1554.0	Baffin Bay - Home Bay	ArcticNet 2008	275/0825	3.5kHz	Rough Stratified	15	1219.0	203.0	956.5	-	-	-	-	-
0055	Plankton Net	243/19:43:05	68.699854	-63.708428	1560.0	Baffin Bay - Home Bay	N/A	N/A	N/A	N/A	9	-	-	-	-	-	-	-	1
0056	Plankton Net	243/19:55:20	68.698364	-63.702835	1566.0	Baffin Bay - Home Bay	N/A	N/A	N/A	N/A	10	-	-	-	-	-	-	-	1
0057	Piston Core	244/11:19:39	68.694171	-63.800582	1566.0	Baffin Bay - Home Bay	2018042	243/2036	3.5kHz	Rough Stratified	16	1219.0	201.0	560.5	-	-	-	-	-
0058	Piston Core	244/15:25:02	68.541631	-63.463641	1566.0	Baffin Bay - Home Bay	2018042	245/0228	3.5kHz	Smooth stratified	17	1219.0	212.5	641.5	-	-	-	-	-
0059	Plankton Net	244/16:46:32	68.542252	-63.462788	1543.0	Baffin Bay - Home Bay	N/A	N/A	N/A	N/A	11	-	-	-	-	-	-	-	1
0060	Plankton Net	244/16:59:47	68.543415	-63.461252	1543.0	Baffin Bay - Home Bay	N/A	N/A	N/A	N/A	12	-	-	-	-	-	-	-	1
0061	Piston Core	244/18:59:04	68.457384	-63.343453	1530.0	Baffin Bay - Home Bay	ArcticNet 2008	275/0945	3.5kHz	Rough Stratified	18	1219.0	146.0	609.5	-	-	-	-	-
0062	Piston Core	245/11:22:19	68.305138	-63.080617	1477.0	Baffin Bay - Home Bay	ArcticNet 2008	275/1040	3.5kHz	Smooth Stratified	19	1219.0	208.0	774.0	-	-	-	-	-

Table A5: Station summary for 0063 - 0081

2018042 Station Summary

Vessel: CCGS Hudson **Chief Scientist: Alex Normandeau** **Date: August 17 to September 10, 2018**

Sample location information							Seismic Record					Core				Grab	Camera	Rossette	Plankton Net
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instrument	Acoustic Target	Cumulative sample	Sampler Length (cm)	TWC length (cm)	PC length (cm)	Push / X section length (cm)	Grab length (cm)	No of images	No of samples	No of samples
0063	Piston Core	245/15:03:53	68.182890	-62.858531	1395.0	Baffin Bay - Home Bay	ArcticNet 2008	275/1127	3.5kHz	Smooth Stratified	20	1219.0	116.0	791.0	-	-	-	-	-
0064	Piston Core	245/18:52:56	68.192450	-63.427283	1265.0	Baffin Bay - Home Bay	2018042	245/0756	3.5kHz	Rough Stratified	21	1219.0	207.0	740.0	-	-	-	-	-
0065	Piston Core	246/11:49:00	67.890084	-62.353189	1130.0	Baffin Bay - Home Bay	2018042	246/0402	3.5kHz	Rough Stratified	22	1219.0	201.5	759.0	-	-	-	-	-
0066	Piston Core	246/15:42:15	68.072362	-62.573320	1273.0	Baffin Bay - Home Bay	2018042	246/0130	3.5kHz	Smooth Stratified	23	1219.0	186.5	733.0	-	-	-	-	-
0067	Piston Core	246/19:13:25	67.725993	-63.443412	592.0	Baffin Bay - off Qikiqtarjuaq	2018042	246/1847	3.5kHz	Rough Stratified	24	1219.0	29.0	239.0	-	-	-	-	-
0068	Plankton Net	247/10:47:20	66.139148	-61.351807	163.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	13	-	-	-	-	-	-	-	1
0069	Plankton Net	247/11:06:24	66.137063	-61.365932	160.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	14	-	-	-	-	-	-	-	1
0070	Camera - GSCA 4K	247/13:42:34	66.191255	-61.454136	146.0	Davis Strait - Cape Dyer	2018042	247/1628	3.5kHz	Rough Incoherent	5	-	-	-	-	-	32	-	-
0071	Grab - Van Veen	247/15:20:58	66.192786	-61.449468	146.0	Davis Strait - Cape Dyer	2018042	247/1628	3.5kHz	Rough Incoherent	7	20.0	-	-	-	5.0	-	-	-
0072	CTD Rosette	247/16:08:01	66.193665	-61.460433	146.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	11	-	-	-	-	-	-	8	-
0073	Drone	247/15:48	66.192960	-61.454499	145.3	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	3	-	-	-	-	-	-	-	-
0074	Camera - GSCA 4K	247/17:09:50	66.164662	-61.398761	153.5	Davis Strait - Cape Dyer	2018042	247/1205	3.5kHz	Rough Incoherent	6	-	-	-	-	-	30	-	-
0075	Grab - Van Veen	247/18:21:08	66.165389	-61.394087	153.5	Davis Strait - Cape Dyer	2018042	247/1205	3.5kHz	Rough Incoherent	8	20.0	-	-	-	5.0	-	-	-
0076	CTD Rosette	247/19:02:43	66.164852	-61.406783	153.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	12	-	-	-	-	-	-	0	-
0077	CTD Rosette	247/19:34:18	66.166260	-61.406279	154.0	Davis Strait - Cape Dyer	N/A	N/A	N/A	N/A	13	-	-	-	-	-	-	8	-
0078	Plankton Net	249/11:50:07	58.263312	-58.183403	2650.0	Labrador Shelf - Nain Bank	N/A	N/A	N/A	N/A	15	-	-	-	-	-	-	-	1
0079	Plankton Net	249/12:05:45	58.262706	-58.182873	2650.0	Labrador Shelf - Nain Bank	N/A	N/A	N/A	N/A	16	-	-	-	-	-	-	-	1
0080	Piston Core	252/10:17:42	47.391583	-59.648875	483.0	North Atlantic Ocean - Laurentian Channel	2018042	251/2025	3.5kHz	Smooth Stratified	25	1219.0	163.0	952.0	-	-	-	-	-
0081	Piston Core	252/14:44:56	46.857743	-59.383815	432.7	North Atlantic Ocean - Laurentian Channel	2018042	252/0612	3.5kHz	Rough Stratified	26	1219.0	196.5	531.5	-	-	-	-	-

Table A6: Detail of core stations for 0016 - 0033

2018042 Core Summary Vessel: CCGS Hudson — Chief Scientist: Alex Normandeau — Date: August 17 to September 10, 2018												
Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Location	Acoustic Target	Water Depth (m)	Corer Length (cm)	App. Penn. (cm)	Core Length (cm)	No. of Sections	Comments
0016	Piston Core	236/19:06:17	67.231840	-62.269741	Davis Strait - Padloping Island	Smooth Stratified	356.0	914.4	457	242	2	Smooth Stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 18:58:10, on the btm 19:06:17, at surface 19:18:03, TWC only recovered the catcher with gritty silty sand with one cobble, PC cutter is sandy with one cobble. PC catcher totally inverted.
	Trigger							260	Unknown	10		
0019	Piston Core	237/16:15:38	66.786571	-62.368830	Davis Strait - Southwind Fjord	Smooth Stratified	175.9	1524	0	0	0	Smooth Stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 16:01:08, on the btm 16:15:38, at surface 16:23:29, weld broke on the tugger as recovering the core, PC lost the bottom barrel and base of 4th barrel fractured and cracked, TWC recovered 27cm.
	Trigger							260	Unknown	27	1	
0020	Piston Core	237/19:35:15	66.776986	-62.368330	Davis Strait - Southwind Fjord	Smooth Incoherent	144.8	914.4	518	271.5	2	Smooth incoherent acoustic target, core to be split and processed at GSC Atlantic, in the water 19:32:02, on the btm 19:35:15, at surface 19:39:25, sediment fell out of the TWC cutter as being recovered, base of TWC black grey silty clay, TWC cutter 10cm, PC cutter dented, PC catcher/cutter 20.5cm of dark grey silty clay at base and sandy at the top.
	Trigger							260	Unknown	31	1	
0024	Piston Core	238/14:30:07	66.757516	-62.338508	Davis Strait - Southwind Fjord	Smooth Stratified	97.8	914.4	731	335.5	3	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, on the btm 14:30:07, at surface 14:34:34, butterfly valve taken out of the TWC prior to deployment , appears that the TWC fell over, PC catcher 1-2cm of dark grey very clayey silty clay bagged, top of section AB highly bioturbated dark grey silty clay, CC' 4cm placed in end caps.
	Trigger							260	Unknown	0		
0026	Piston Core	238/17:22:04	66.760655	-62.344360	Davis Strait - Southwind Fjord	Smooth Stratified	80.0	914.4	457	107.5	1	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 17:18:27, on the btm 17:22:04, butterfly valve put back in the TWC prior to deployment , substantial pull out, looks like TWC fell over and lost sediment out of the cutter during recovery, brown silty clay overlaying dark grey silty clay, PC cutter damaged and catcher inverted, 3cm catcher bagged base of PC light grey silty clay.
	Trigger							260	Unknown	14	1	
0028	Box core	238/18:57:05	66.778195	-62.362413	Davis Strait - Southwind Fjord	Rough Incoherent	165.0	55	Unknown			Rough incoherent acoustic target, in water 18:50:52, on bottom 18:57:05, at surface 19:04:07, water on top of sediment surface, estimated 29cm sediment recovered, three push cores taken to be split and processed at GSC Atlantic, one surface subsample taken for Micropaleo and one for biogeochem for Rabecca Theissen MacEwan University, field vane measurements taken at 7.5cm 6.7kPa, 12.5cm 9.2kPa, 7.5cm 9.0kPa, 22.5cm 11.0kPa and 27.5cm 10.0kPa.
	Push A									29	1	
	Push B									27	1	
	Push C									29	1	
0029	Piston Core	239/10:25:08	66.787581	-62.368570	Davis Strait - Southwind Fjord	Smooth Stratified	178.0	914.4	579	172.5	2	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 10:18:08, on the btm 10:25:08, at surface 10:32:06, piston was replaced prior to deployment, hit with a bang and some pull out, bolt on the trip arm jammed and had to be cut off, TWC recovered 7cm, PC no recovery in catcher or cutter, sand at the base of the core.
	Trigger							260	30	7	1	
0033	Piston Core	239/13:14:11	66.775403	-62.366727	Davis Strait - Southwind Fjord	Smooth Stratified	126.8	914.4	640	467.5	3	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 13:10:46, on the btm 13:14:11, at the surface 13:18:59, TWC recovered 77.5cm of soft clay with minor silt, PC cutter dented, PC catcher/cutter 17cm of coarse sandy silt in split liner, rest of the piston core appears to be homogenous silty clay.
	Trigger							260	91	77.5	1	

Table A7: Detail of core stations for 0035 – 0051

2018042 Core Summary

Vessel: CCGS Hudson | **Chief Scientist: Alex Normandeau** | **Date: August 17 to September 10, 2018**

Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Location	Acoustic Target	Water Depth (m)	Corer Length (cm)	App. Penn. (cm)	Core Length (cm)	No. of Sections	Comments
0035	Piston Core	239/16:12:25	66.759246	-62.342581	Davis Strait - Southwind Fjord	Smooth Stratified	175.1	914.4	701	349	3	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 16:09:50, on the btm 16:12:25, at the surface 16:16:01, TWC catcher/cutter 19cm and sediment fell out of the cutter on recovery, PC cutter 25cm in split liner.
	Trigger							260	45	29	1	
0037	Box core	239/18:29:37	66.782207	-62.367761	Davis Strait - Southwind Fjord	Rough Incoherent	171.0	55	Unknown			Rough incoherent acoustic target, in water 18:24:39, on bottom 18:29:37, no water on top of disturbed sediment surface, estimated 24cm sediment recovered, two push cores taken to be split and processed at GSC Atlantic, field vane measurement taken at 10cm 11.0kPa.
	Push A									24	1	
	Push B									21.5	1	
0038	Box core	239/19:19:32	66.785935	-62.363838	Davis Strait - Southwind Fjord	Rough Incoherent	175.0	55	Unknown			Rough incoherent acoustic target, in water 19:13:53, on bottom 19:19:32, at surface 19:27:45, water on top of undisturbed sediment surface, estimated 20cm sediment recovered, three push cores taken to be split and processed at GSC Atlantic, field vane measurements taken at 10cm 10.5kPa and 15cm 8.2kPa.
	Push A									19	1	
	Push B									18	1	
	Push C									20	1	
0040	Box core	240/09:40:27	66.785624	-62.369453	Davis Strait - Southwind Fjord	Smooth Stratified	176.8	55	Unknown			Smooth stratified acoustic target, in water 09:32:41, on bottom 09:40:27, at surface 09:46:15, water on top of undisturbed sediment surface, estimated 21cm sediment recovered, three push cores taken to be split and processed at GSC Atlantic, field vane measurements taken at 10cm 14kPa and 15cm 11kPa which was close to the base of the core.
	Push A									19.5	1	
	Push B									21	1	
	Push C									20.5	1	
0044	Piston Core	240/18:36:57	66.781037	-62.344496	Davis Strait - Southwind Fjord	Smooth Stratified	115.3	914.4	670	291.5	2	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 18:32:38, on the btm 18:36:57,at surface 18:43:13, TWC catcher 3cm and 5cm in base of AB recovered, PC cutter badly dented, PC cutter dark grey silty clay with a large cobble, PC cutter 23cm in split liner.
	Trigger							260	260	8	1	
0047	Piston Core	242/10:40:58	69.203227	-64.064215	Baffin Bay - Home Bay	Rough Stratified	1331.0	914.4	457	327.5	2	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 10:00:48, on the btm 10:40:58, at surface 11:18:46, TWC mud up to the weights, sediment above the butterfly valve put back in the top of the TWC as top is disturbed, PC tip 10cm dark grey stiff clayey silt with abundant gravel, PC catcher/cutter 25cm in split liner, change to light grey colour approx. 70cm from the base of AB.
	Trigger							129	129	108.5	1	
0048	Piston Core	242/15:13:45	68.793684	-63.882891	Baffin Bay - Home Bay	Smooth Stratified	1511.4	1219	1310	758.5	5	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 14:38:22, on the btm 15:13:45, at surface 15:59:12, TWC mud up to the weights, 2 cm of sediment above the butterfly valve bagged, PC catcher/cutter 20cm medium soft grey silty clay in split liner, PC CC' 8cm, EE' 5cm.
	Trigger							229	229	202	2	
0051	Piston Core	242/19:11:13	68.786122	-64.158238	Baffin Bay - Home Bay	Rough Stratified	1347.0	1219	975	304.5	2	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 18:35:39, on the btm 19:11:13, at surface 19:55:59, TWC full apparent penetration, PC catcher/cutter 20cm in split liner.
	Trigger							229	229	202	2	

Table A8: Detail of core stations for 0052 – 0064

2018042 Core Summary

Vessel: CCGS Hudson Chief Scientist: Alex Normandeau Date: August 17 to September 10, 2018

Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Location	Acoustic Target	Water Depth (m)	Corer Length (cm)	App. Penn. (cm)	Core Length (cm)	No. of Sections	Comments
0052	Piston Core	243/11:02:05	68.819557	-64.239849	Baffin Bay - Home Bay	Rough Stratified	1143.0	914.4	701	350.5	3	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 10:27:27, on the btm 11:02:05, at surface 11:42:57, PC catcher/cutter 26cm in split liner, PC base dark grey silty clay and at the top of the core there is medium sand just below the surface.
	Trigger							225	150	156	1	
0053	Piston Core	243/14:37:18	68.741171	-64.213686	Baffin Bay - Home Bay	Rough Stratified	1267.5	1219	1280	561	4	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 13:57:04, on the btm 14:37:18, at surface 15:15:48, TWC good surface but slightly disturbed by the catcher, PC catcher/cutter 22cm in split liner.
	Trigger							225	225	172.5	2	
0054	Piston Core	243/18:18:41	68.701563	-63.729369	Baffin Bay - Home Bay	Rough Stratified	1554.0	1219	944	956.5	7	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 17:32:48, on the btm 18:18:41, at surface 19:06:57, TWC weights reduced to 4 lead weights (200lbs), 2cm recovered above the butterfly valve bagged, PC catcher/cutter 23cm dark grey silty clay in split liner, PC section AB base dark grey silty clay with minor granules changing to lighter grey 32 cm from the base, section EF has sand half way up the section, section DE has a colour change from grey to lighter grey halfway up the section, PC section CD slightly dimpled the entire length and section DE dimpled the entire length, PC piston orifice size reduced to 5/64 from 3/32.
	Trigger							225	225	203	2	
0057	Piston Core	244/11:19:39	68.694171	-63.800582	Baffin Bay - Home Bay	Rough Stratified	1566.0	1219	975	560.5	4	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 10:36:08, on the btm 11:19:39, at surface 12:00:35, TWC back to 5 lead weights (250lbs), 2cm recovered above the butterfly valve bagged, PC catcher/cutter 15cm stiff dark grey silty clay with minor granules in split liner, transition from stiff grey silty clay with gravel at the base of the PC to light grey silty clay with coarse sand at 100cm from the top, piston orifice size increased back to 3/32.
	Trigger							225	225	201	2	
0058	Piston Core	244/15:25:02	68.541631	-63.463641	Baffin Bay - Home Bay	Smooth stratified	1566.0	1219	1219	641.5	4	Smooth stratifed acoustic target, core to be split and processed at GSC Atlantic, in the water 14:35:59, on the btm 15:25:02, at surface 16:13:22, TWC 7cm recovered above the butterfly valve and put in whole liner, PC tip 7cm, cutter 14cm and catcher 9cm all put in split liner.
	Trigger							225	225	212.5	2	
0061	Piston Core	244/18:59:04	68.457384	-63.343453	Baffin Bay - Home Bay	Rough Stratified	1530.0	1219	944	609.5	4	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 18:19:57, on the btm 18:59:04, at surface 19:37:47, PC catcher/cutter 18cm stiff dark grey silty clay in split liner, CC' 3.5cm.
	Trigger							225	225	146	1	
0062	Piston Core	245/11:22:19	68.305138	-63.080617	Baffin Bay - Home Bay	Smooth Stratified	1477.0	1219	1280	774	5	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 10:39:05, on the btm 11:22:19, at surface 11:55:02, TWC 4 weights(200lbs), 4cm of sediment above the butterfly valve put in end caps, TWC base is soft grey silty clay, PC catcher/cutter 21cm stiff dark grey silty clay with minor granules, CC' 13cm base is grey silty clay and top is medium grained sand put in split liner.
	Trigger							225	225	208	2	
0063	Piston Core	245/15:03:53	68.182890	-62.858531	Baffin Bay - Home Bay	Smooth Stratified	1395.0	1219	944	791	5	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 14:32:36, on the btm 15:03:53, at surface 15:34:42, bale on the PC head was bent during deployment, TWC 3 weights (150lbs), TWC base is grey silty clay with minor sand and granules, PC catcher totally inverted, PC catcher/cutter 16cm light grey silty clay with minor sand and granules in split liner.
	Trigger							225	110	116	1	
0064	Piston Core	245/18:52:56	68.192450	-63.427283	Baffin Bay - Home Bay	Rough Stratified	1265.0	1219	Unkown	740	5	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 18:23:25, on the btm 18:52:56, at surface 19:19:53, TWC 4 weights (200lbs), TWC 1 cm of sediment above the butterfly valve bagged, PC catcher/cutter 27cm in split liner.

Table A9: Detail of core stations for 0065 - 0081

2018042 Core Summary

Vessel: CCGS Hudson **Chief Scientist: Alex Normandeau** **Date: August 17 to September 10, 2018**

Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Location	Acoustic Target	Water Depth (m)	Corer Length (cm)	App. Penn. (cm)	Core Length (cm)	No. of Sections	Comments
	Trigger							225	225	207	2	
0065	Piston Core	246/11:49:00	67.890084	-62.353189	Baffin Bay - Home Bay	Rough Stratified	1130.0	1219	914	759	5	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 11:25:13, on the btm 11:49:00, at surface 12:13:02, TWC 4 weights (200lbs), TWC base is grey silty clay changing to a lighter grey half way up the section, PC catcher/cutter 18cm stiff dark grey silty clay in split liner.
	Trigger							225	225	201.5	2	
0066	Piston Core	246/15:42:15	68.072362	-62.573320	Baffin Bay - Home Bay	Smooth Stratified	1273.0	1219	1006	733	5	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 15:15:03, on the btm 15:42:15, at surface 16:09:49, TWC has 4 weights (200lbs), PC catcher/cutter 18cm in split liner, large cobble at the top of section BC, DD' 4cm, EE' 13.5cm, liner cracked the entire length of sections CD and DE.
	Trigger							225	164	186.5	2	
0067	Piston Core	246/19:13:25	67.725993	-63.443412	Baffin Bay - off Qikiqtarjuaq	Rough Stratified	592.0	1219	670	239	2	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 18:59:38, on the btm 19:13:25, at surface 19:27:01, PC catcher inverted and coarse grained dark grey sand with gravel in the top of the catcher bagged.
	Trigger							225	0	29	1	
0080	Piston Core	252/10:17:42	47.391583	-59.648875	North Atlantic Ocean - Laurentian Channel	Smooth Stratified	483.0	1219	1280	952	6	Smooth stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 10:08:27, on the btm 10:17:42, at surface 10:28:47, TWC a lot of water at the top of the section and sediment disturbed, brownish grey soupy silty clay, PC section EF imploded 26cm from the top and section FG imploded at the base, PC catcher/cutter/tip 27cm in split liner, PC cutter red brown silty clay with some granules, section BC base looks brick red transitioning to green grey halfway up BC.
	Trigger							225	225	163	2	
0081	Piston Core	252/14:44:56	46.857743	-59.383815	North Atlantic Ocean - Laurentian Channel	Rough Stratified	432.7	1219	640	531.5	4	Rough stratified acoustic target, core to be split and processed at GSC Atlantic, in the water 14:34:25, on the btm 14:44:56, at surface 14:54:54, PC catcher/cutter/tip 30cm in split liner, section BC dimpled for the top 40 to 50cm.
	Trigger							225	225	196.5	2	
									TOTALS	*16189.5*		

Table A10: Detail of camera stations

2018042 Camera Station Summary										
Vessel: CCGS Hudson					Chief Scientist: Alex Normandeau			Date: August 17 to September 10, 2018		
Station No.	Camera Type	Film Type	Orientation	Day / Time (UTC)	Latitude	Longitude	Location	Acoustic Target	Water Depth (m)	Comments
0002	Camera - GSCA 4K	Digital	Vertical	235/10:55:36	66.848416	-61.074881	Davis Strait - Cape Dyer	Rough Incoherent	326.0	In the water 10:55:36, at surface 11:52:02 (61.073089N -61.073089W), 37 raw images, 33 processed images and 32 good quality images showing a hard gravel surface with abundant brittle stars.
0008	Camera - GSCA 4K	Digital	Vertical	235/16:24:52	66.842665	-61.056730	Davis Strait - Cape Dyer	Rough Incoherent	346.0	In the water 16:24:52, at surface 17:13:49 (66.842945N -61.069931W), 58 raw images, 32 processed images showing a hard gravel surface.
0012	Camera - GSCA 4K	Digital	Vertical	236/10:25:36	66.890330	-61.357748	Davis Strait - Cape Dyer	Rough Incoherent	106.0	In the water 10:25:36, at surface 10:57:29 (66.888870N -61.346463W), 58 raw images, 32 processed images showing a hard gravel surface.
0015	Camera - GSCA 4K	Digital	Vertical	236/13:13:03	66.864227	-61.387186	Davis Strait - Cape Dyer	Rough Incoherent	102.0	In the water 13:13:03, at surface 13:43:41 (66.862960N -61.383706W), 41 raw images, 29 processed images showing a hard gravel surface.
0070	Camera - GSCA 4K	Digital	Vertical	247/13:42:34	66.191255	-61.454136	Davis Strait - Cape Dyer	Rough Incoherent	146.0	In the water 13:42:34, at surface 14:22:46 (66.186769N -61.454133W), 48 raw images, 32 processed images showing a sandy surface with abundant brittle stars.
0074	Camera - GSCA 4K	Digital	Vertical	247/17:09:50	66.164662	-61.398761	Davis Strait - Cape Dyer	Rough Incoherent	153.5	In the water 17:09:50, at surface 17:55:34 (66.16911N -61.41044W), 36 raw images, 30 processed images showing a rippled sandy surface with abundant brittle stars.

Table A11: Detail of grab stations 0001 – 0041

2018042 Grab Station Summary

Vessel: CCGS Hudson **Chief Scientist: Alex Normandeau** **Date: August 17 to September 10, 2018**

Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Location	Target	Water Depth (m)	Grab Length (cm)	Recovered Length (cm)	No of subsamples	Comments
0001	Grab - Van Veen	235/10:02:26	66.849582	-61.071963	Davis Strait - Cape Dyer	Rough Incoherent	326.0	20	20	5	In the water 09:52:48, on bottom 10:02:26, at surface 10:12:47, approximately 20cm total recovery, medium gravel overlying greenish brown sandy mud, 2 geochem, 1 biology, 1 petrology and 1 bulk subsample.
0007	Grab - Van Veen	235/15:44:04	66.842463	-61.058558	Davis Strait - Cape Dyer	Rough Incoherent	340.0	20	17	5	In the water 15:33:20, on bottom 15:44:04, approximately 15-17cm total recovery, sandy fine gravel with rare pebbles overlying greenish brown sandy mud, 4 brittle stars and some worm tubes, 2 geochem, 1 biology, 1 petrology and 1 bulk subsamples.
0010	Grab - Van Veen	235/19:31:10	66.835298	-61.030575	Davis Strait - Cape Dyer	Rough Incoherent	372.0	20	1	1	In the water 19:19:14, on bottom 19:31:10, at surface 19:42:37, approximately 1cm total recovery, cobble caught in the grab sampler and lost most of the sample, gravelly sandy mud with 1 brittle star, 1 bulk subsample.
0011	Grab - Van Veen	236/09:55:39	66.890723	-61.359212	Davis Strait - Cape Dyer	Rough Incoherent	104.0	20	5	1	In the water 09:52:31, on bottom 09:55:39, at surface 09:59:13, approximately 5cm total recovery, grab jaws slightly open and lost most of the sample, subrounded gravel overlying sandy mud, numerous small brittle stars, worm burrows and shell fragments, entire sample bagged as bulk subsample.
0014	Grab - Van Veen	236/12:39:43	66.864518	-61.388117	Davis Strait - Cape Dyer	Rough Incoherent	103.0	20	10	6	In the water 12:36:05, on bottom 12:39:43, at surface 12:42:50, approximately 10cm total recovery, grab jaws fully closed, subrounded gravel/cobbles, fine to medium sand with shell hash, numerous small brittle stars and worm burrows, 2 geochem, 1 biology, 1 petrology, 1 coral and 1 bulk subsamples.
0023	Grab - IKU	238/11:50:28	66.758032	-62.336568	Davis Strait - Southwind Fjord	Rough Incoherent	114.9	70			In the water 11:40:30, on bottom 11:50:28, at surface 11:55:58, approximately 35cm total recovery, grab jaws fully closed, top 2cm light grey soft mud with darker grey fine sand below, turbidite structure visible in the push cores and sections.
	Push A								23.0		
	X Section B								33.0	8	Large tray, right to left , subsampled for grain size.
	X Section C								30.0		Small tray, front to back
	X Section D								25.0		Small tray, front to back
0027	Grab - trowel	238/18:00:00	66.763917	-62.357033	Davis Strait - Southwind Fjord	N/A	0.5	N/A	-	3	
0041	Grab - IKU	240/11:12:39	66.748338	-62.329878	Davis Strait - Southwind Fjord	Rough Incoherent	86.0	70		3	In the water 11:08:31, on bottom 11:12:39, at surface 11:18:48, approximately 58cm total recovery, grab jaws fully closed, three push cores and 4 cross sections taken, three subsamples of rip up clasts were taken and put in vials and a bag.
	Push A								30.5		
	Push B								46.0		
	Push C								13.5		to sample the base of the IKU
	X Section D								48.0	9	Large tray, left to right, subsampled for grain size.
	X Section E								29.0		Small tray, front to back
	X Section F								48.0		Large tray, front to back

Table A12: Detail of grab stations 0042 – 0075

2018042 Grab Station Summary Vessel: CCGS Hudson Chief Scientist: Alex Normandeau Date: August 17 to September 10, 2018											
Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Location	Target	Water Depth (m)	Grab Length (cm)	Recovered Length (cm)	No of subsamples	Comments
	X Section G								29.0		Small tray, left to right to sample the base of the IKU
0042	Grab - IKU	240/13:06:23	66.748600	-62.329622	Davis Strait - Southwind Fjord	Rough Incoherent	86.9	70			In the water 13:01:16, on bottom 13:06:23, at surface 13:12:27, approximately 80cm total recovery, IKU overflowing and sediment well above the top of the IKU box, grab jaws fully closed, two push cores and 5 cross sections taken, Note that the deck was being cleaned as the IKU was recovered.
	Push A								55.0		
	Push B								71.0		Inclined surface
	X Section C								50.0	7	Large tray, left to right, subsampled for grain size.
	X Section D								39.0		Large tray, front to back
	X Section E								49.0		Large tray, left to right
	X Section F								30.5	3	Small tray, left to right to sample the base of the IKU, subsampled for grain size.
	X Section G								30.5		Small tray, front to back to sample the base of the IKU
0043	Grab - IKU	240/16:00:02	66.748748	-62.329770	Davis Strait - Southwind Fjord	Rough Incoherent	86.8	70			In the water 15:54:48, on bottom 16:00:02, at surface 16:05:22, approximately 60cm total recovery, grab jaws fully closed, much more liquified than the previous IKU and sediment draining out of the IKU, two push cores and two cross sections taken.
	Push A								45.0		
	Push B								49.5		
	X Section C								51.0		Large tray, front to back
	X Section D								43.0	7	Large tray, left to right, subsampled for grain size.
0071	Grab - Van Veen	247/15:20:58	66.192786	-61.449468	Davis Strait - Cape Dyer	Rough Incoherent	146.0	20	5	5	In the water 15:15:42, on bottom 15:20:58, at surface 15:26:12, approximately 5cm total recovery, grab jaws fully closed, very well sorted medium sand with two brittle stars, 2 geochem, 1 biology, and 2 bulk subsamples.
0075	Grab - Van Veen	247/18:21:08	66.165389	-61.394087	Davis Strait - Cape Dyer	Rough Incoherent	153.5	20	5	4	In the water 18:15:33, on bottom 18:21:08, at surface 18:27:11, approximately 5cm total recovery, grab jaws fully closed, brown well sorted fine to medium sand with some small red brittle stars, 2 geochem and 2 bulk subsamples.
								TOTALS	*931.5*		

Table A13: Detail of CTD Rosette stations

2018042 CTD Rosette Station Summary Vessel: CCGS Hudson Chief Scientist: Alex Normandeau Date: August 17 to September 10, 2018								
Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	No of water samples	Comments
0003	CTD Rosette	235/12:45:30	66.849025	-61.070455	331.0	Davis Strait - Cape Dyer	12	12 water samples for DFO, in the water 12:23:21, missed the time of firing, 12 water samples taken to an approximate depth of 310m, sample numbers 451326 to 451337.
0009	CTD Rosette	235/18:04:46	66.843353	-61.064522	339.0	Davis Strait - Cape Dyer	12	12 water samples for DFO, in the water 17:48:24, firing at 18:04:46, at surface 18:15:10, 12 water samples taken to an approximate depth of 320m, sample numbers 451338 to 451349.
0013	CTD Rosette	236/11:28:10	66.890892	-61.356818	105.0	Davis Strait - Cape Dyer	8	8 water samples for DFO, in the water 11:19:17, firing at 11:28:10, at surface 11:31:37, 8 water samples taken to an approximate depth of 95m, sample numbers 451350 to 451357.
0017	CTD Rosette	236/20:21:34	67.230852	-62.272749	360.3	Davis Strait - Mouth of Southwind Fjord	12	12 water samples for DFO, in the water 20:04:22, firing at 20:21:34, at surface 20:31:49, 12 water samples taken to an approximate depth of 348m, sample numbers 451358 to 451369.
0021	CTD Rosette	238/09:51:15	66.761654	-62.340128	118.0	Davis Strait - Southwind Fjord	8	8 water samples for DFO, in the water 09:41:11, firing at 09:51:15, at surface 09:55:05, 8 water samples taken to an approximate depth of 110m, sample numbers 451370 to 451377.
0025	CTD Rosette	238/16:04:20	66.774956	-62.350534	150.0	Davis Strait - Southwind Fjord	8	8 water samples for DFO and GSC Atlantic, in the water 15:53:28, firing at 16:04:20, at surface 16:12, 8 water samples taken to an approximate depth of 140m, sample numbers 451378 to 451385.
0030	CTD Rosette	239/11:35:18	66.786172	-62.369254	178.0	Davis Strait - Southwind Fjord	8	8 water samples for DFO and GSC Atlantic, in the water 11:23:28, firing at 11:35:18, at surface 11:41:21, 8 water samples taken to an approximate depth of 170m, sample numbers 451386 to 451393.
0036	CTD Rosette	239/17:19:34	66.758779	-62.33907	108.0	Davis Strait - Southwind Fjord	8	8 water samples for DFO and GSC Atlantic, in the water 17:12:34, firing at 17:19:34, at surface 17:23:30, 8 water samples taken to an approximate depth of 105m, sample numbers 451394 to 451401.
0045	CTD Rosette	240/20:23:11	66.827803	-62.418316	89.6	Davis Strait - Southwind Fjord	6	6 water samples for DFO and GSC Atlantic, in the water 20:14:44, firing at 20:23:11, at surface 20:26:13, 6 water samples taken to an approximate depth of 75m, sample numbers 451402 to 451407.
0046	CTD Rosette	240/21:44:36	66.898759	-62.484018	239.4	Davis Strait - Southwind Fjord	9	9 water samples for DFO and GSC Atlantic, in the water 21:27:06, firing at 21:44:36, at surface 21:49:29, 9 water samples taken to an approximate depth of 235m, sample numbers 451408 to 451416.
0072	CTD Rosette	247/16:08:01	66.193665	-61.460433	146.0	Davis Strait - Cape Dyer	8	8 water samples for DFO, in the water 15:57:05, firing at 16:08:01, at surface 16:19:09, 8 water samples taken to an approximate depth of 135m, sample numbers 451417 to 451424.
0076	CTD Rosette	247/19:02:43	66.164852	-61.406783	153.0	Davis Strait - Cape Dyer	0	0 water samples for DFO as CTDR did not fire, in the water 18:52:16, presumed firing at 19:02:43, at surface 19:09:38, CTD data only for this station.
0077	CTD Rosette	247/19:34:18	66.166260	-61.406279	154.0	Davis Strait - Cape Dyer	8	8 water samples for DFO, in the water 19:24:26, firing at 19:34:18, at surface 19:39:28, 8 water samples taken to an approximate depth of 143m, sample numbers 451425 to 451432.

Table A14: Detail of plankton net stations

2018042 Plankton Net Station Summary

Vessel: CCGS Hudson **Chief Scientist: Alex Normandeau** **Date: August 17 to September 10, 2018**

Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	No of samples	Comments
0004	Plankton Net	235/14:20:27	66.859678	-61.070191	337.0	Davis Strait - Cape Dyer	0	Sample for Rabecca Thiessen MacEwan University, in the water 14:09:41, at 100m 14:12:52, at surface 14:16:50, net still open, Second attempt in the water 14:17:29, at 100m 14:20:27, net failed and no sample recovered. .
0005	Plankton Net	235/14:35:46	66.860524	-61.066802	337.0	Davis Strait - Cape Dyer	1	Sample for Rabecca Thiessen MacEwan University, in the water 14:31, at 100m 14:35:46, at surface 14:39:30.
0006	Plankton Net	235/14:54:25	66.843115	-61.061525	332.0	Davis Strait - Cape Dyer	1	Sample for Rabecca Thiessen MacEwan University, in the water 14:49:36, at 150m 14:54:25, at surface 14:59:08.
0031	Plankton Net	239/11:56:53	66.786098	-62.369014	178.0	Davis Strait - Southwind Fjord	1	Sample for Rabecca Thiessen MacEwan University, in the water 11:53:23, at 100m 11:56:53, at surface 11:59:54.
0032	Plankton Net	239/12:12:13	66.786223	-62.369295	178.0	Davis Strait - Southwind Fjord	1	Sample for Rabecca Thiessen MacEwan University, in the water 12:08:20, at 150m 12:12:13, at surface 12:16:47.
0039	Plankton Net	239/20:04:18	66.786207	-62.369316	178.0	Davis Strait - Southwind Fjord	1	Sample for Rabecca Thiessen MacEwan University, in the water 20:00:25, at 100m 20:04:18, at surface 20:08:03. Note cleaning the foredeck as plankton net is being brought back up.
0049	Plankton Net	242/16:36:01	68.789436	-63.874253	1517.0	Baffin Bay - Home Bay	1	Sample for Rabecca Thiessen MacEwan University, in the water 16:32:52, at 100m 16:36:01, at surface 16:39:57.
0050	Plankton Net	242/16:54:38	68.789239	-63.871425	1517.2	Baffin Bay - Home Bay	1	Sample for Rabecca Thiessen MacEwan University, in the water 16:48:48, at 150m 16:54:38, at surface 17:00:29.
0055	Plankton Net	243/19:43:05	68.699854	-63.708428	1560.0	Baffin Bay - Home Bay	1	Sample for Rabecca Thiessen MacEwan University, in the water 19:40:55, at 50m 19:43:05, at surface 19:45:17.
0056	Plankton Net	243/19:55:20	68.698364	-63.702835	1566.0	Baffin Bay - Home Bay	1	Sample for Rabecca Thiessen MacEwan University, in the water 19:52:07, at 100m 19:55:20, at surface 19:59:02.
0059	Plankton Net	244/16:46:32	68.542252	-63.462788	1543.0	Baffin Bay - Home Bay	1	Sample for Rabecca Thiessen MacEwan University, in the water 16:44:23, at 50m 16:46:32, at surface 16:48:01.
0060	Plankton Net	244/16:59:47	68.543415	-63.461252	1543.0	Baffin Bay - Home Bay	1	Sample for Rabecca Thiessen MacEwan University, in the water 16:56:25, at 100m 16:59:47, at surface 17:03:30.
0068	Plankton Net	247/10:47:20	66.139148	-61.351807	163.0	Davis Strait - Cape Dyer	1	Sample for Rabecca Thiessen MacEwan University, in the water 10:45:14, at 50m 10:47:20, at surface 10:49:11.
0069	Plankton Net	247/11:06:24	66.137063	-61.365932	160.0	Davis Strait - Cape Dyer	1	Sample for Rabecca Thiessen MacEwan University, in the water 11:03:07, at 100m 11:06:24, at surface 11:10:05.
0078	Plankton Net	249/11:50:07	58.263312	-58.183403	2650.0	Labrador Shelf - Nain Bank	1	Sample for Rabecca Thiessen MacEwan University, in the water 11:46:52, at 50m 11:50:07, at surface 11:52:07.
0079	Plankton Net	249/12:05:45	58.262706	-58.182873	2650.0	Labrador Shelf - Nain Bank	1	Sample for Rabecca Thiessen MacEwan University, in the water 12:00:45, at 100m 12:05:45, at surface 12:09:11.

Table A15: Detail of mooring station

2018042 Mooring Station Summary Vessel: CCGS Hudson Chief Scientist: Alex Normandeau Date: August 17 to September 10, 2018							
Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Comments
0022	Mooring	238/10:26:39	66.761674	-62.341354	113.3	Davis Strait - Southwind Fjord	Deployment of Acoustic Release Mooring which will start pinging May 01 2019 at 1200 hours, the battery should last for an estimated 145 days. Instrumentation is a downward facing WHS-300 Acoustic Doppler Current (ADC) meter at a height of 2200cm with a 24 one metre bin size that will record every 8 seconds with no averaging.

Table A16: Detail of drone stations

2018042 Drone Station Summary Vessel: CCGS Hudson Chief Scientist: Alex Normandeau Date: August 17 to September 10, 2018							
Station No.	Sample Type	Day / Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Comments
0018	Drone	237/11:49	66.945803	-62.496137	317.7	Davis Strait - Southwind Fjord	Testing of the drone, one flight from 237/11:49 to 237/13:14, 36 still images.
0034	Drone	239/11:56	66.786528	-62.369916	175.1	Davis Strait - Southwind Fjord	Three flights in total. **Flight 1**, 239/11:56 to 239/13:12, 315 still images (247 overlapped images west shore geology (0685-0802) & (860-990), 68 vista images). **Flight 2**, 239/17:18 to 239/17:28, 51 still images and 2 videos (still vistas (0148-0199, 0168 MOV ship overflight in fjord 0169 MOV). **Flight 3,** 239/14:12 to 239/16:10, 149 still images and 2 videos (127 overlapped images west shore geology (012-0139), 10 vista, 0011 MOV and 0140 MOV).
0073	Drone	247/15:48	66.192960	-61.454499	145.3	Davis Strait - Cape Dyer	One flight 247/15:48 to 247/15:57, 32 still images and 1 video (still images of sea appearance (slicks??) 0033 MOV ship overflight).

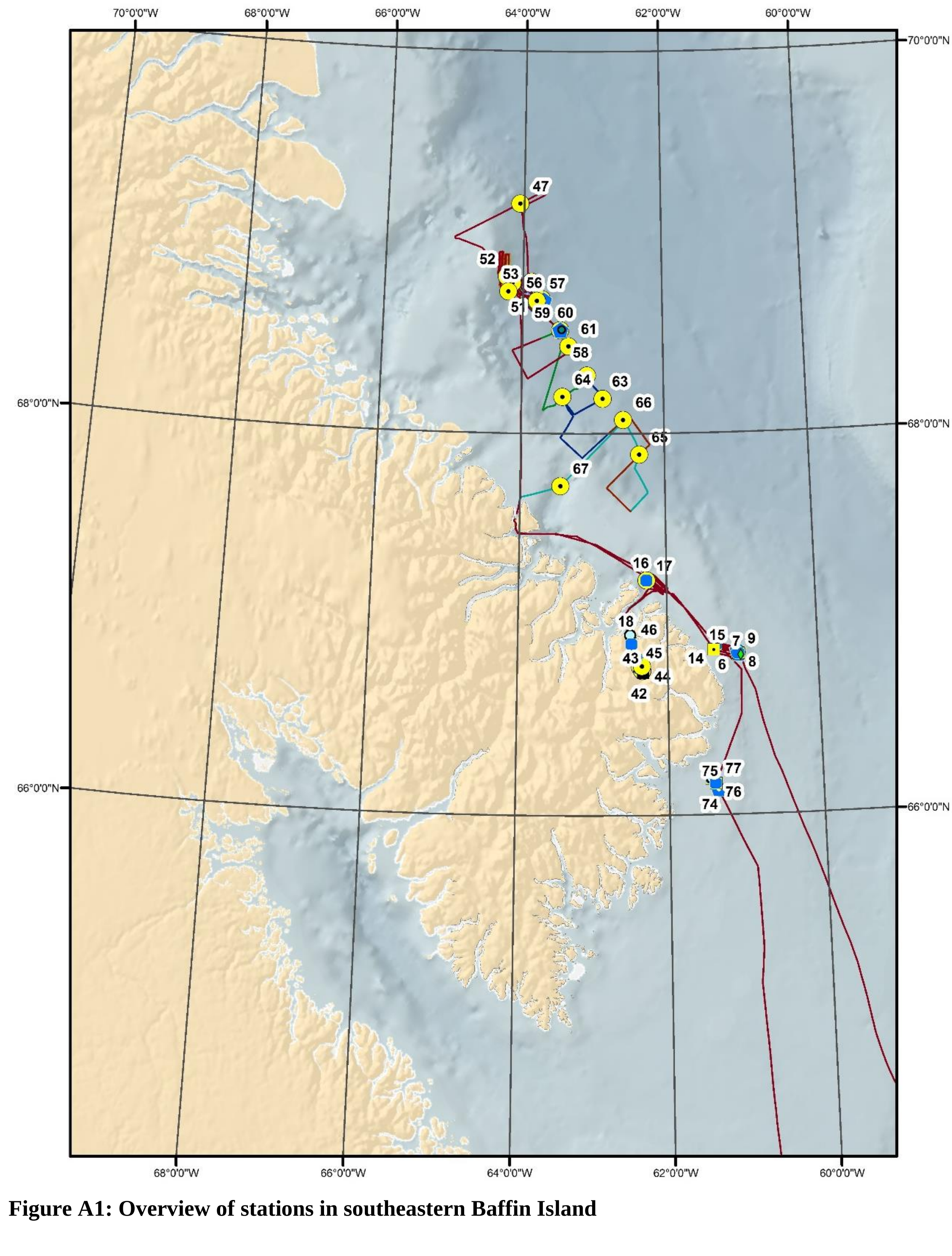

Figure A1: Overview of stations in southeastern Baffin Island

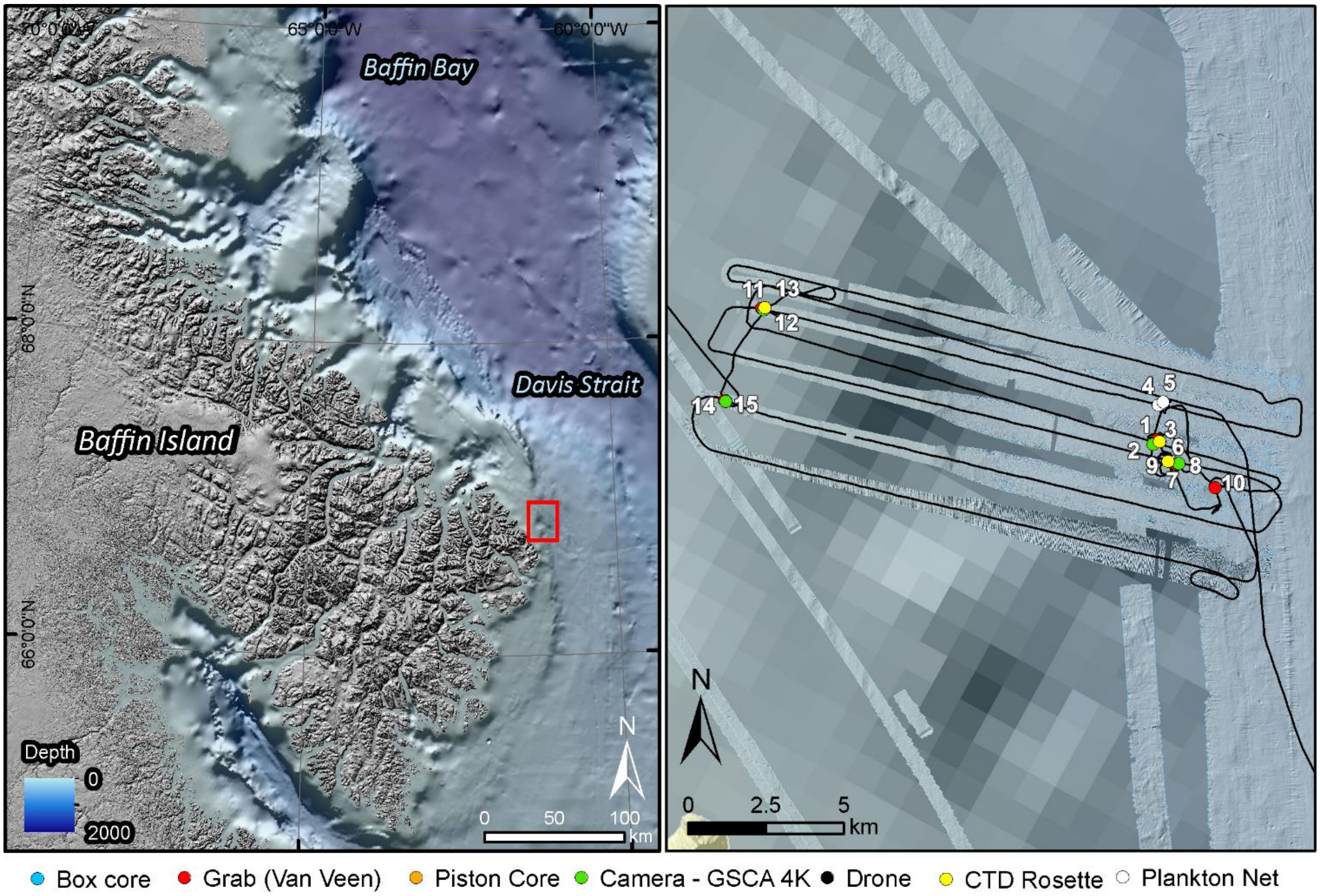

Figure A2: Stations off Cape Dyer

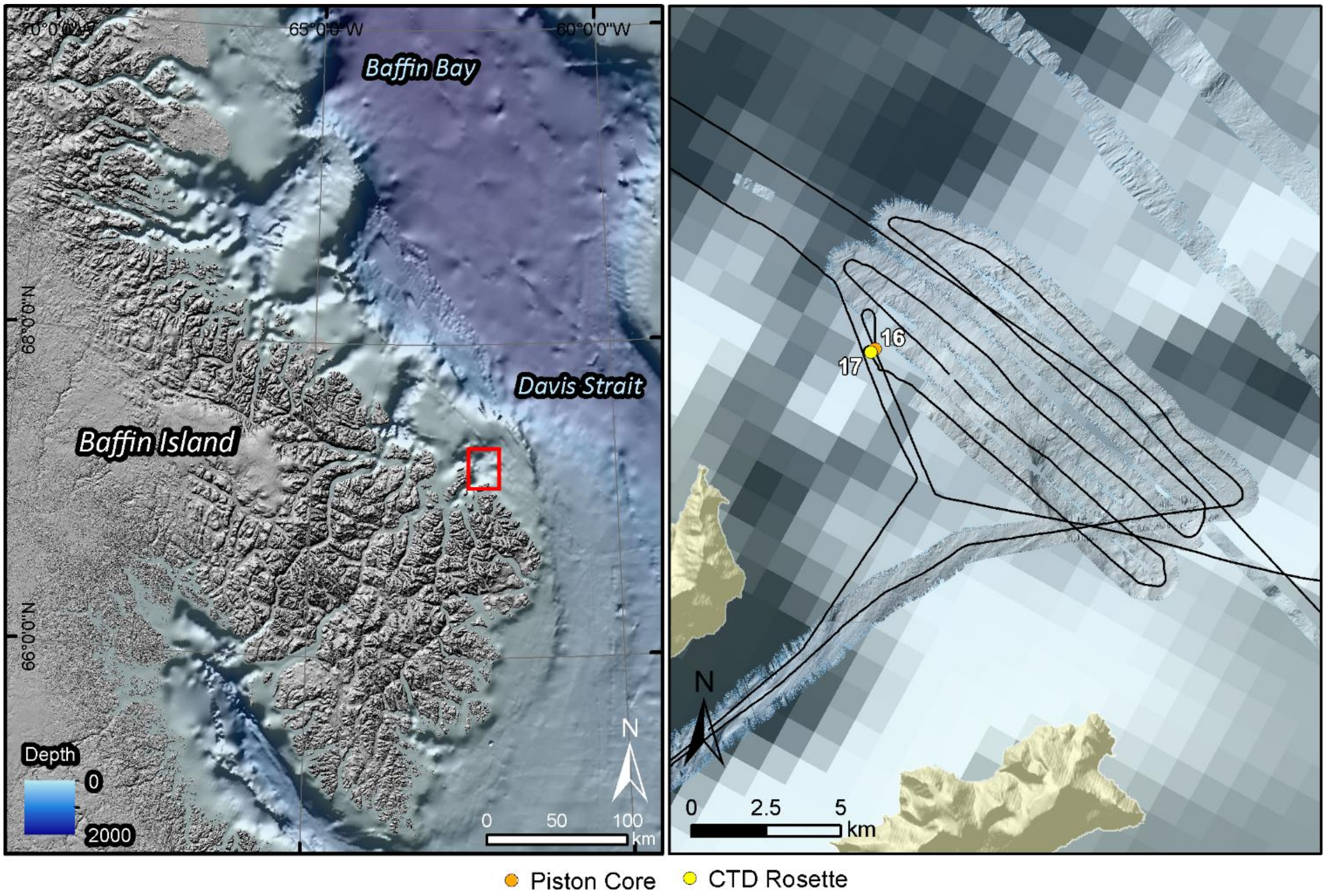

Figure A3: Stations off Padloping Island

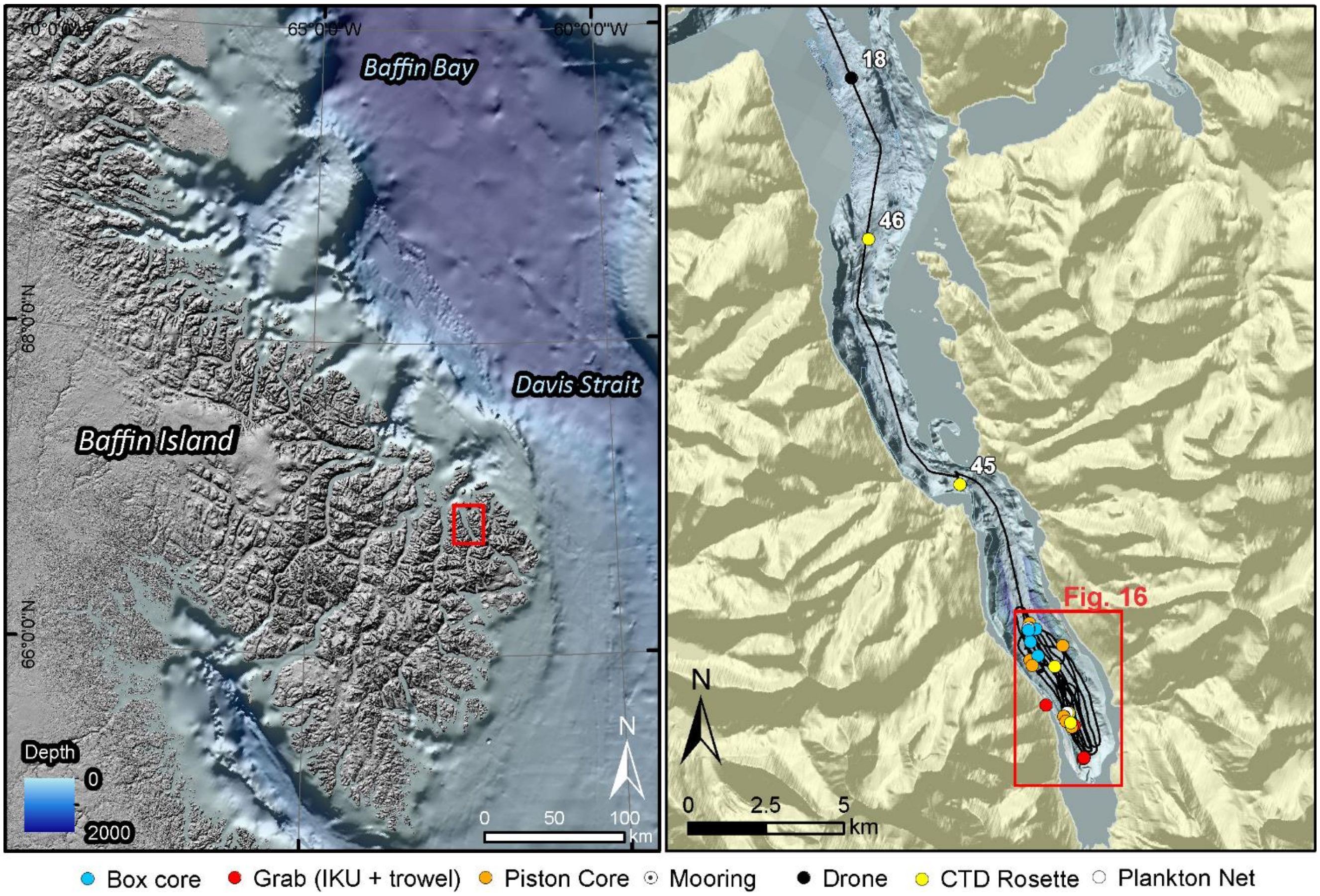

Figure A4: Stations in Southwind Fjord

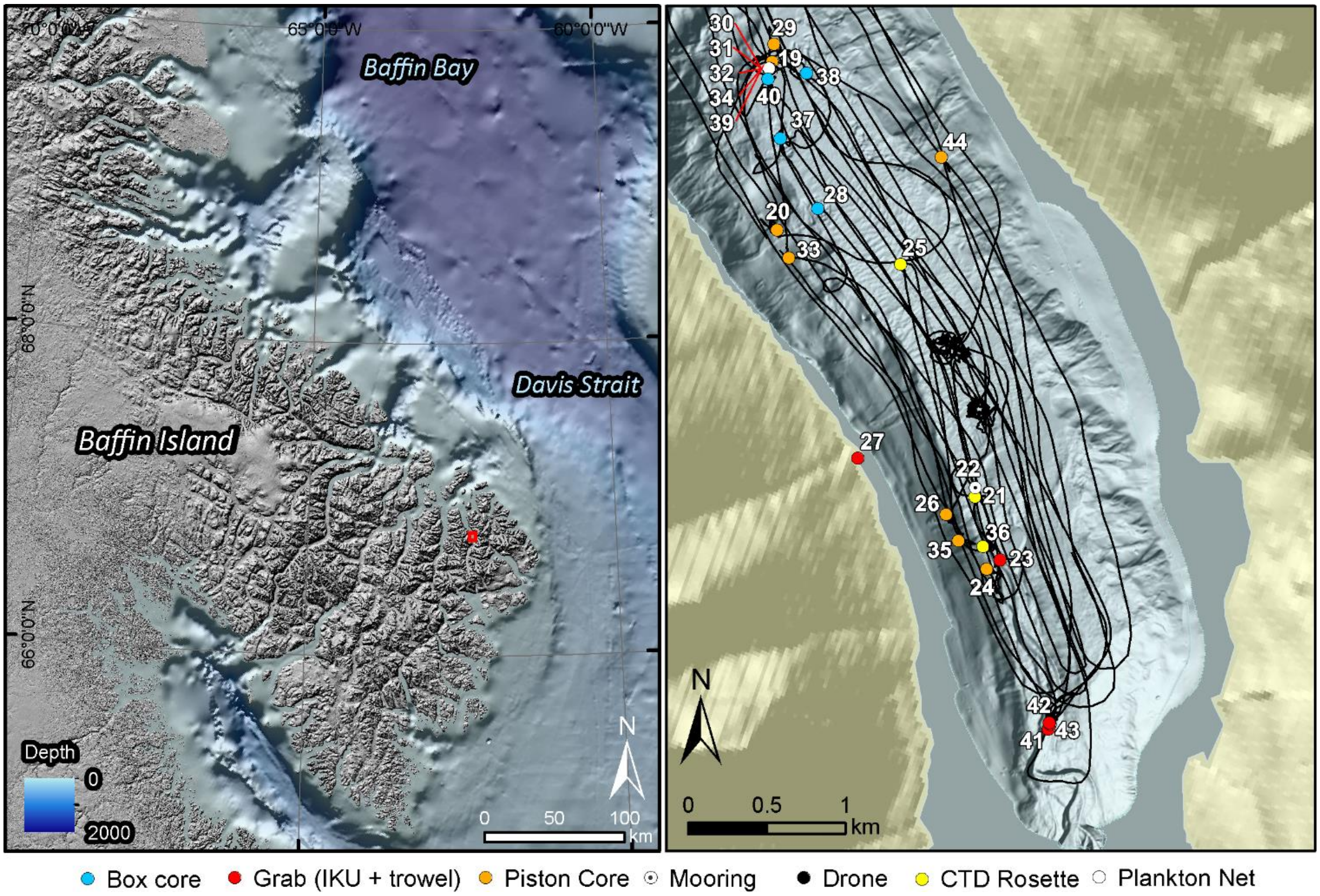

Figure A5: Stations in Southwind Fjord-head delta

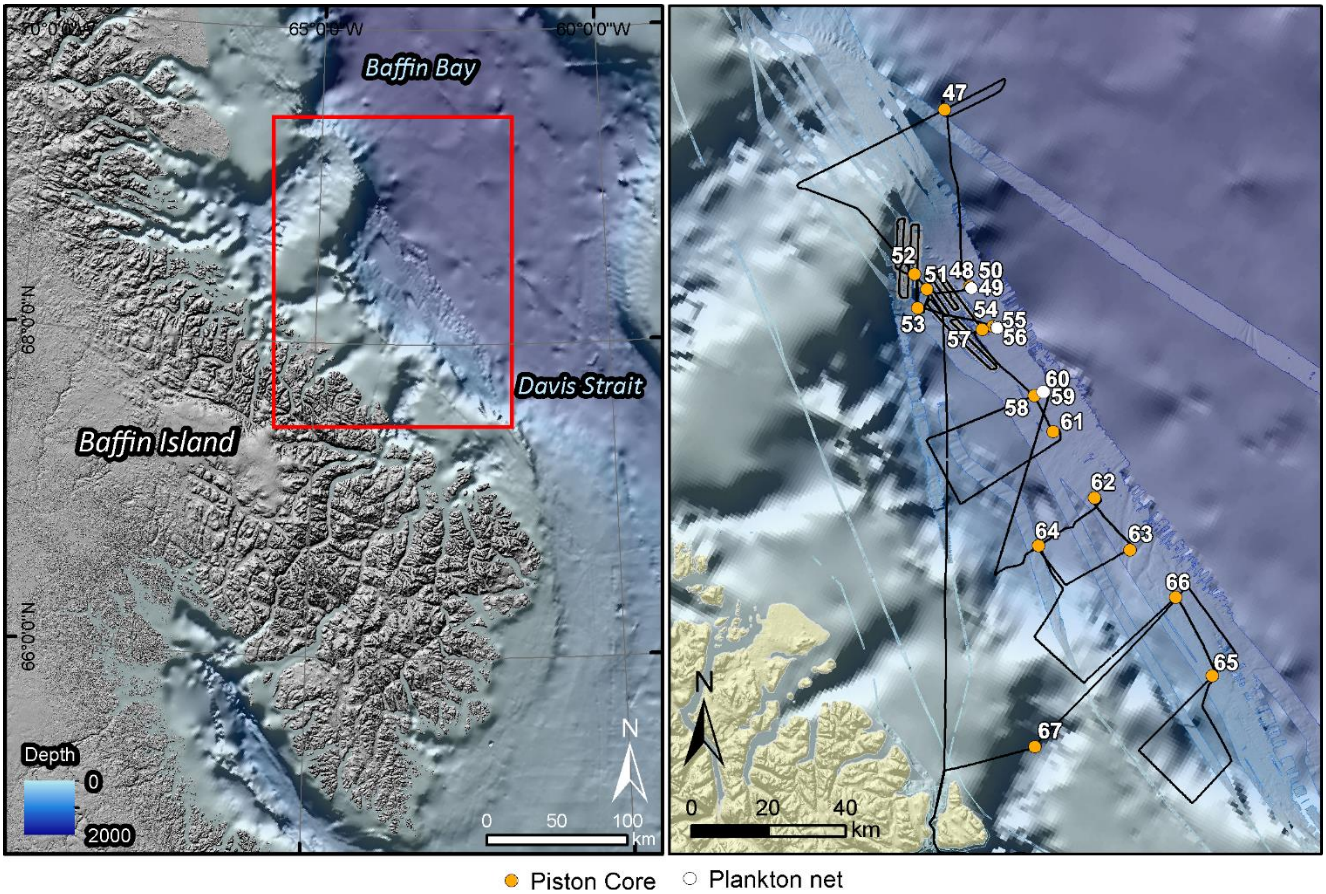

Figure A6: Stations off Home Bay

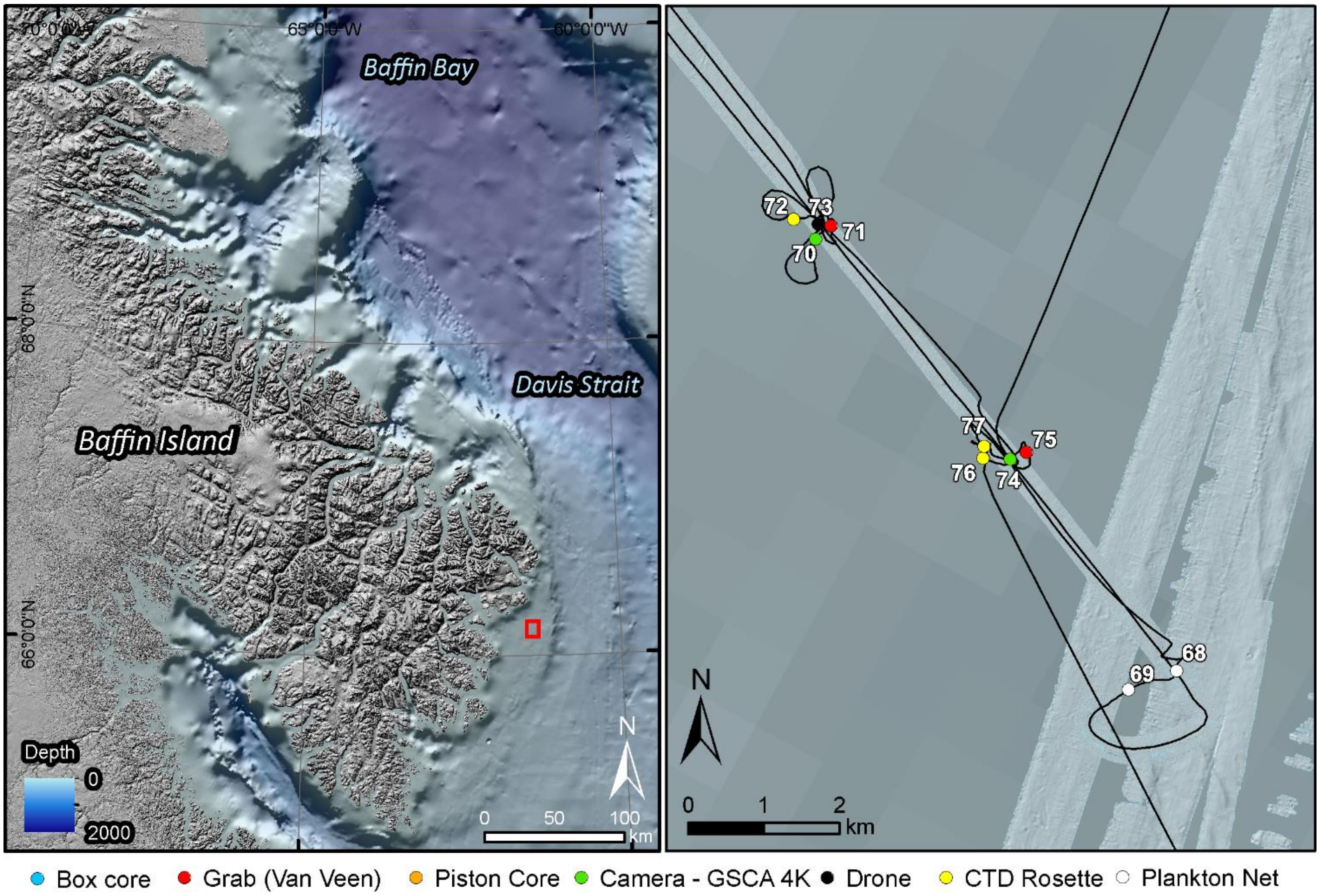

Figure A7: Stations off Cape Dyer

APPENDIX B: CROSS SECTIONS IN IKU GRABS

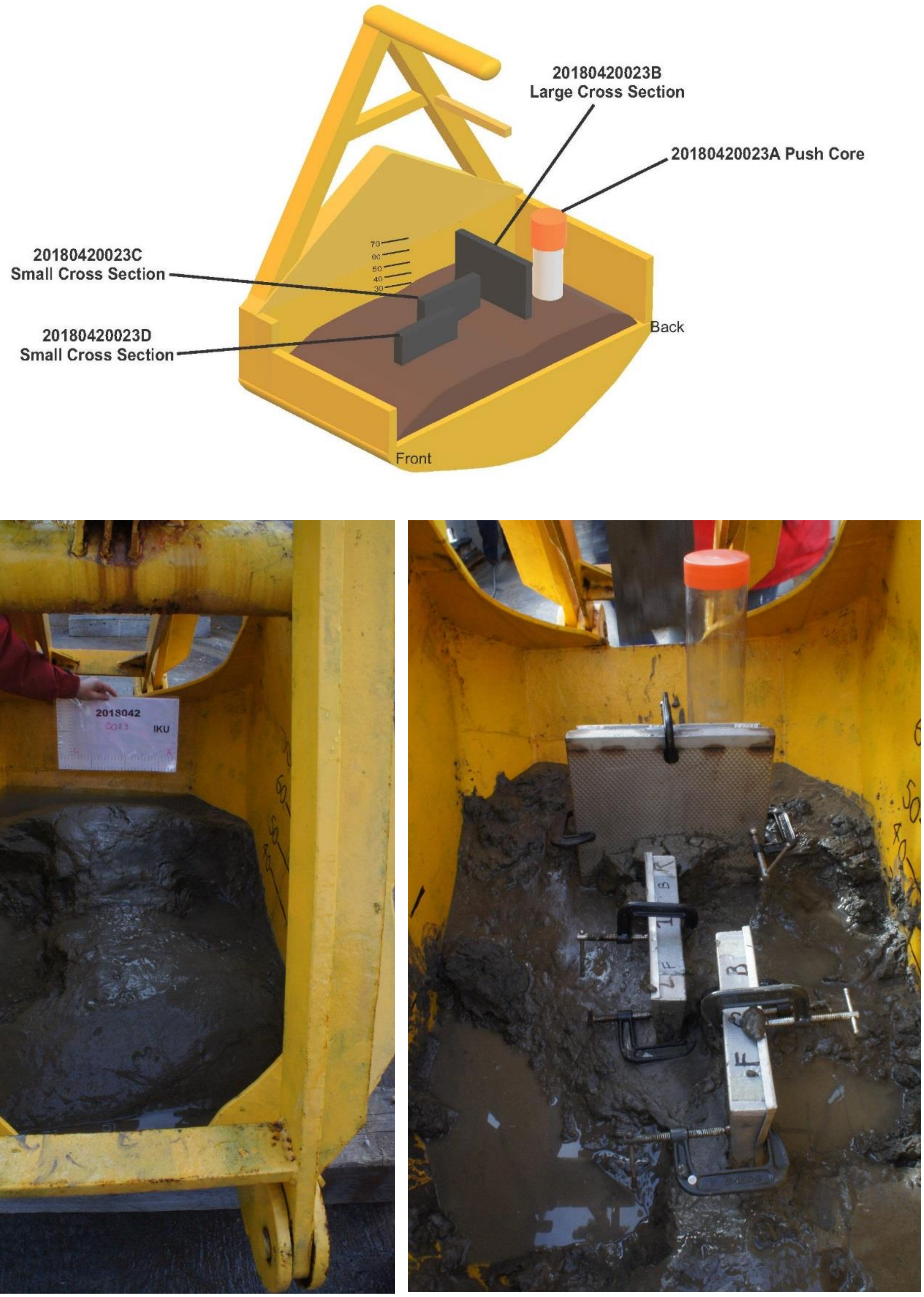

Figure B1: Position of cross-sections and push cores in IKU grab 0023.

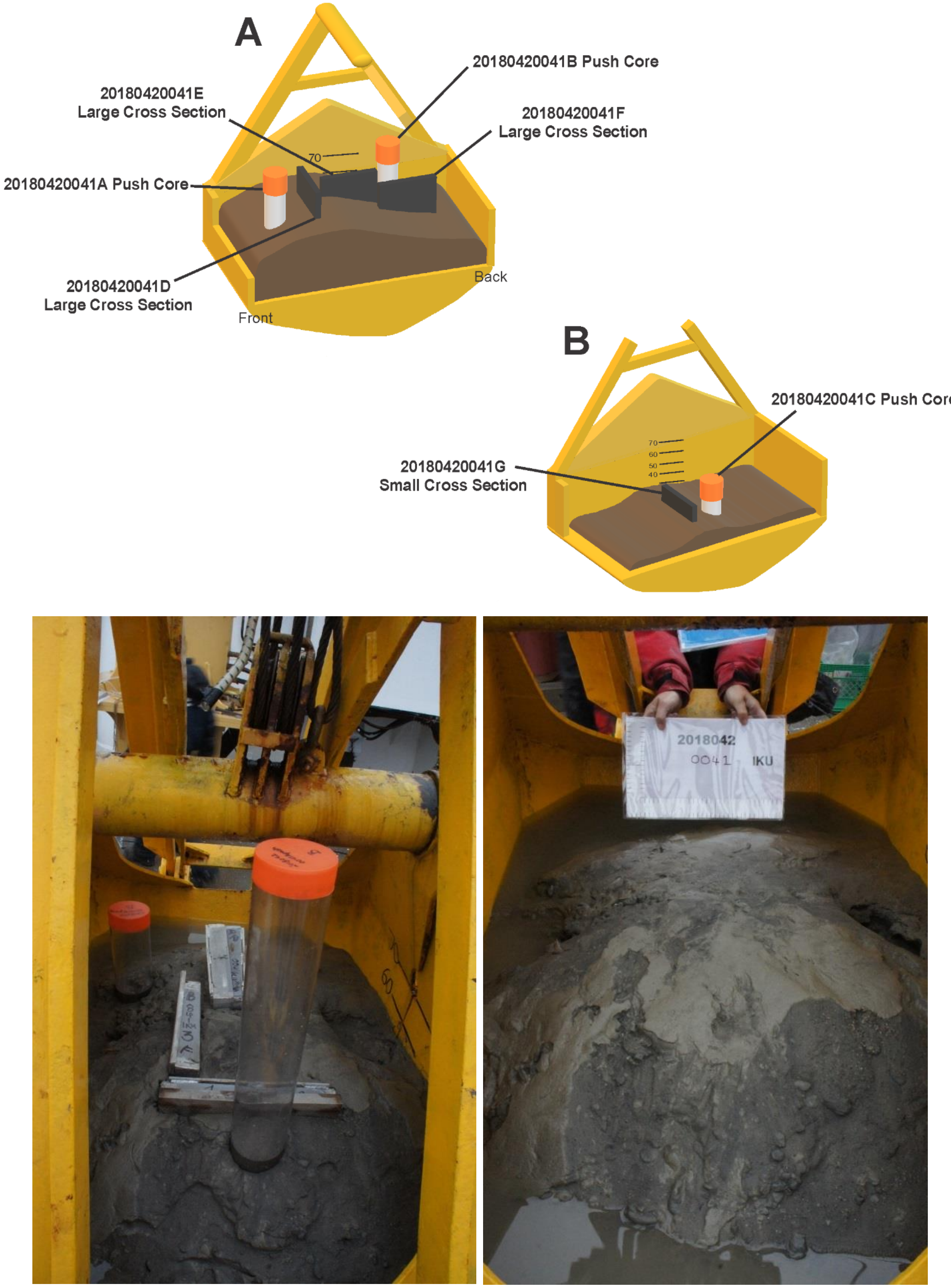

Figure B2: Position of cross-sections and push cores in IKU grab 0041

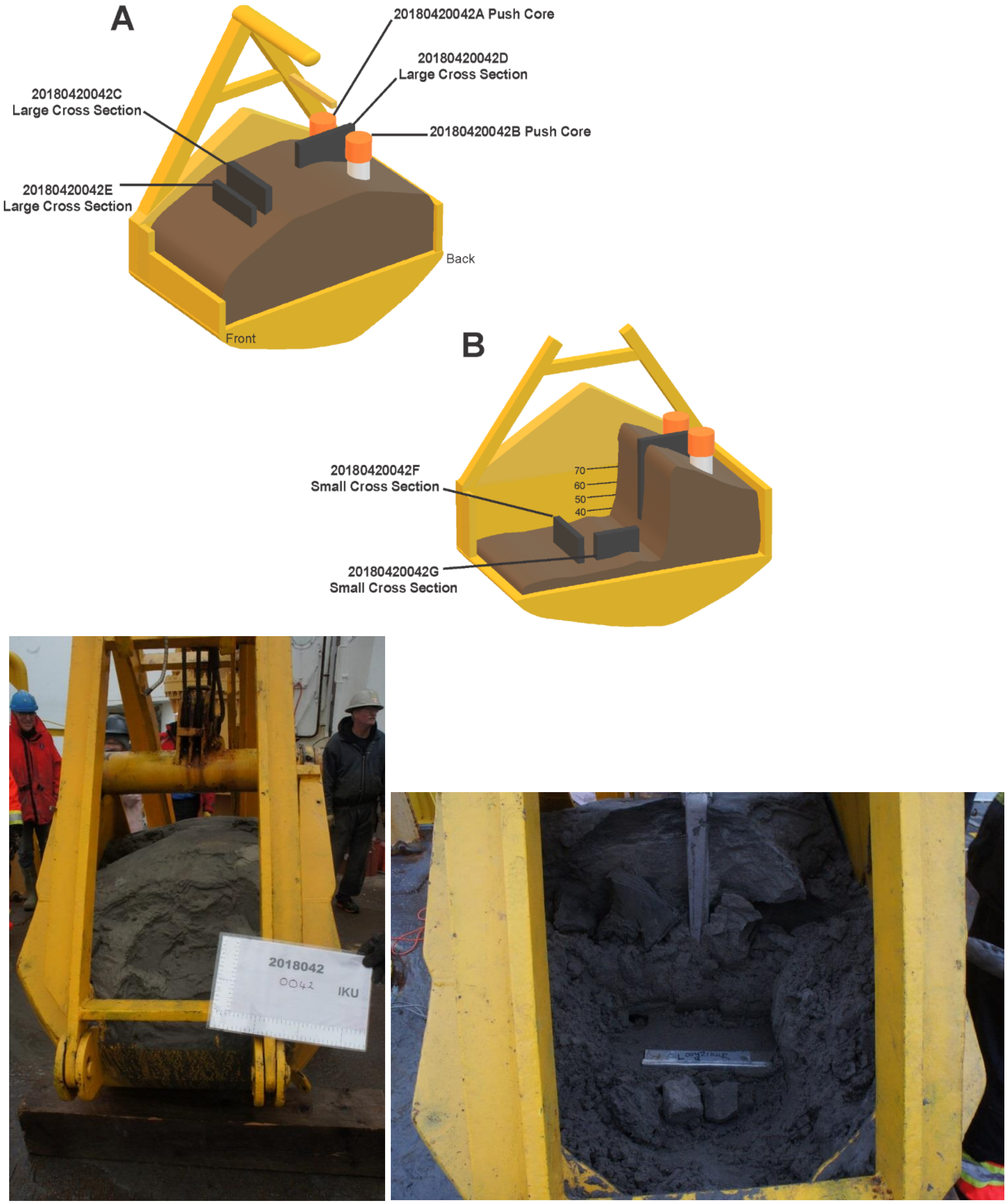

Figure B3: Position of cross-sections and push cores in IKU grab 0042.

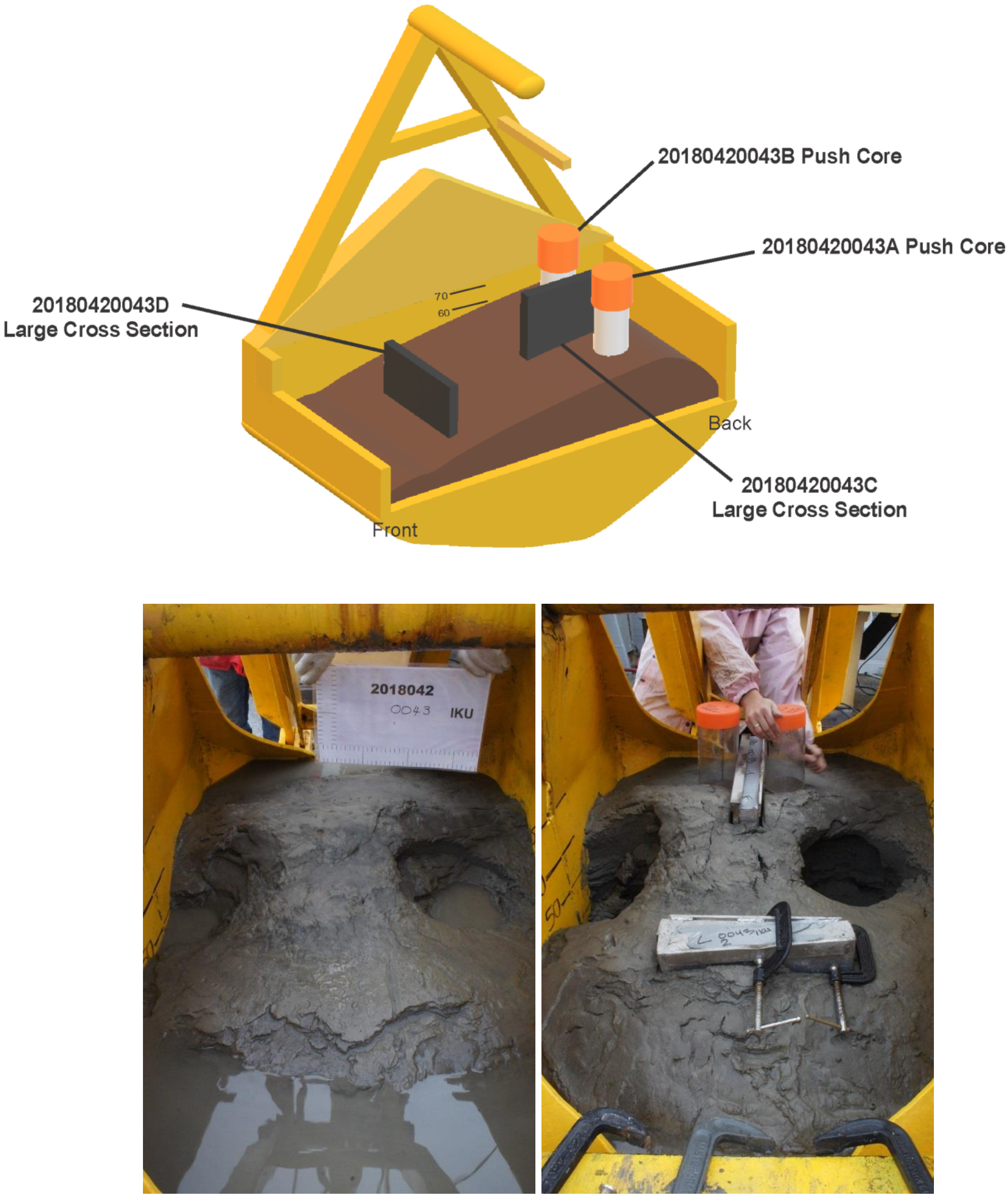

Figure B4: Position of cross-sections and push cores in IKU grab 0043.

APPENDIX C: STRATIGRAPHIC POSITIONS OF SEDIMENT CORES

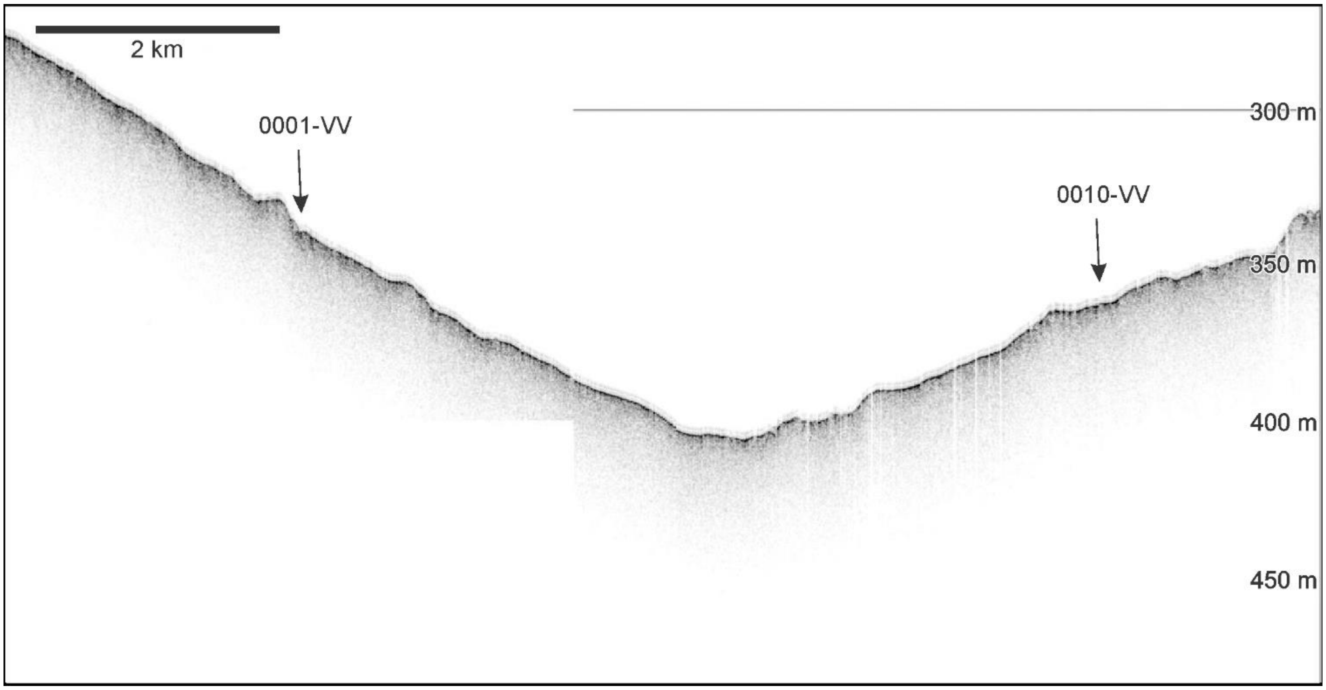

Figure C1: Stratigraphic position of Van Veen grabs 0001 and 0010.

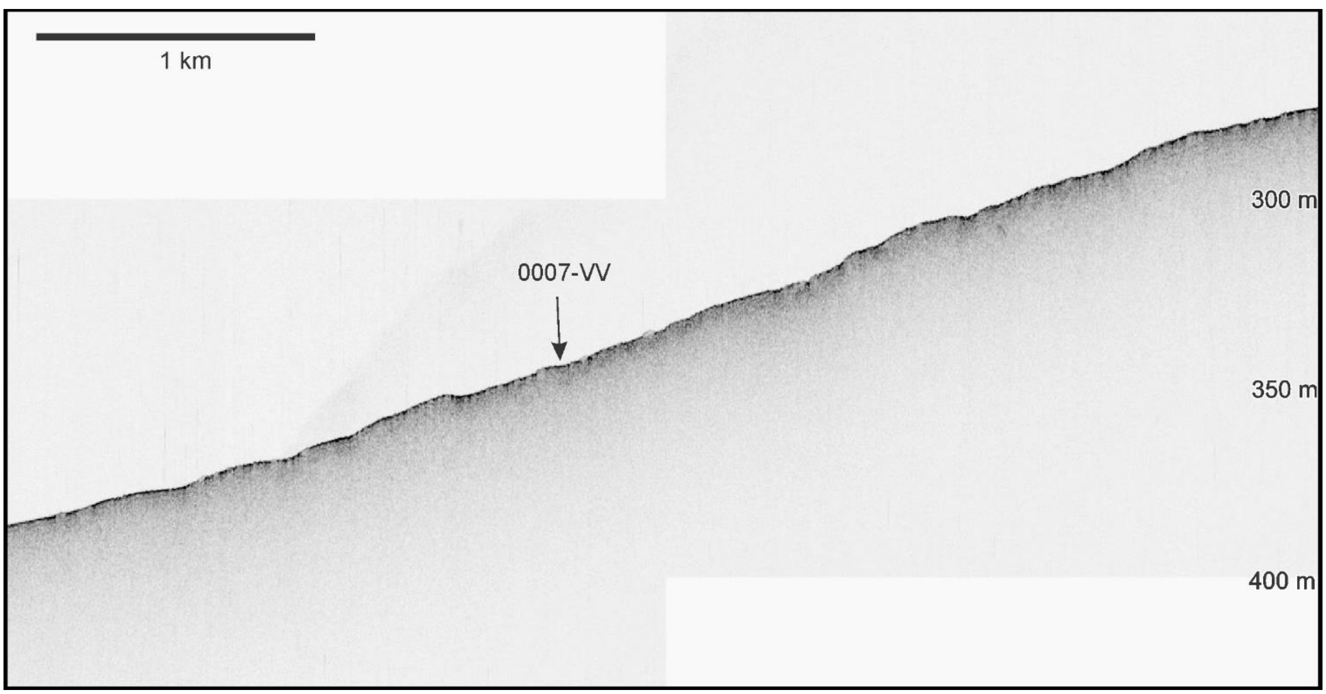

Figure C2: Stratigraphic position of Van Veen grab 0007.

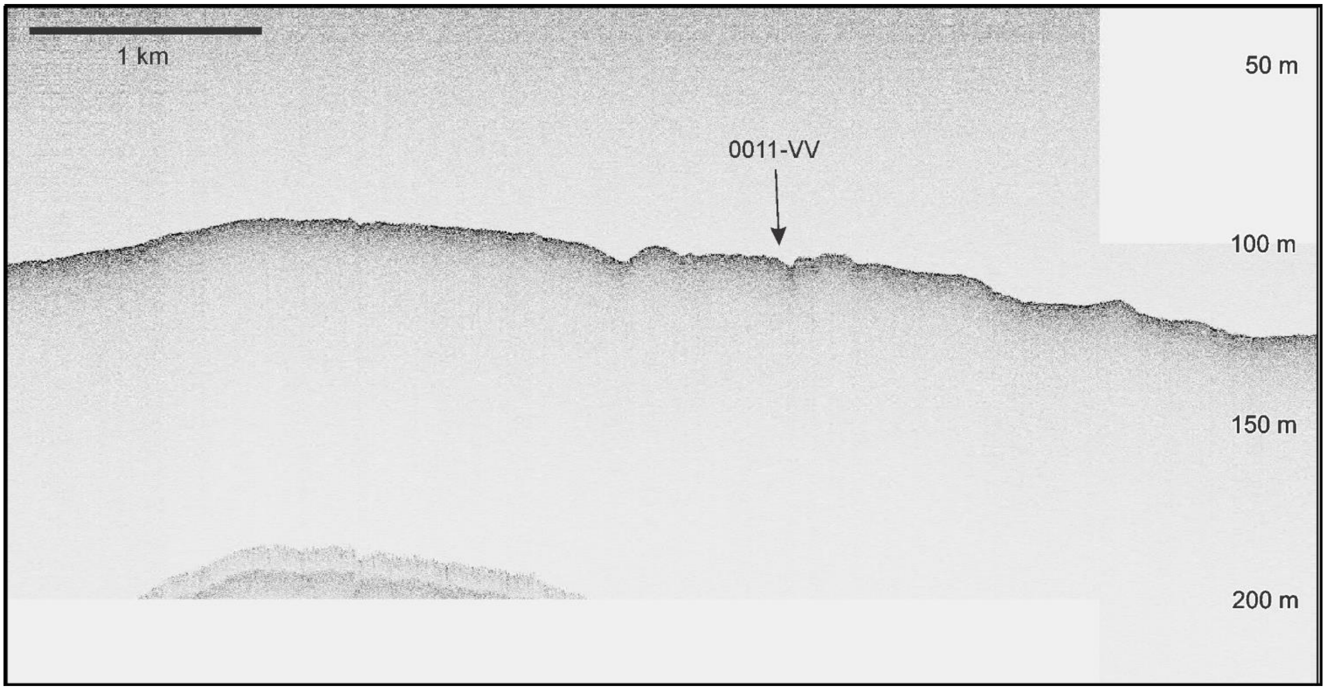

Figure C3: Stratigraphic position of Van Veen grab 0011.

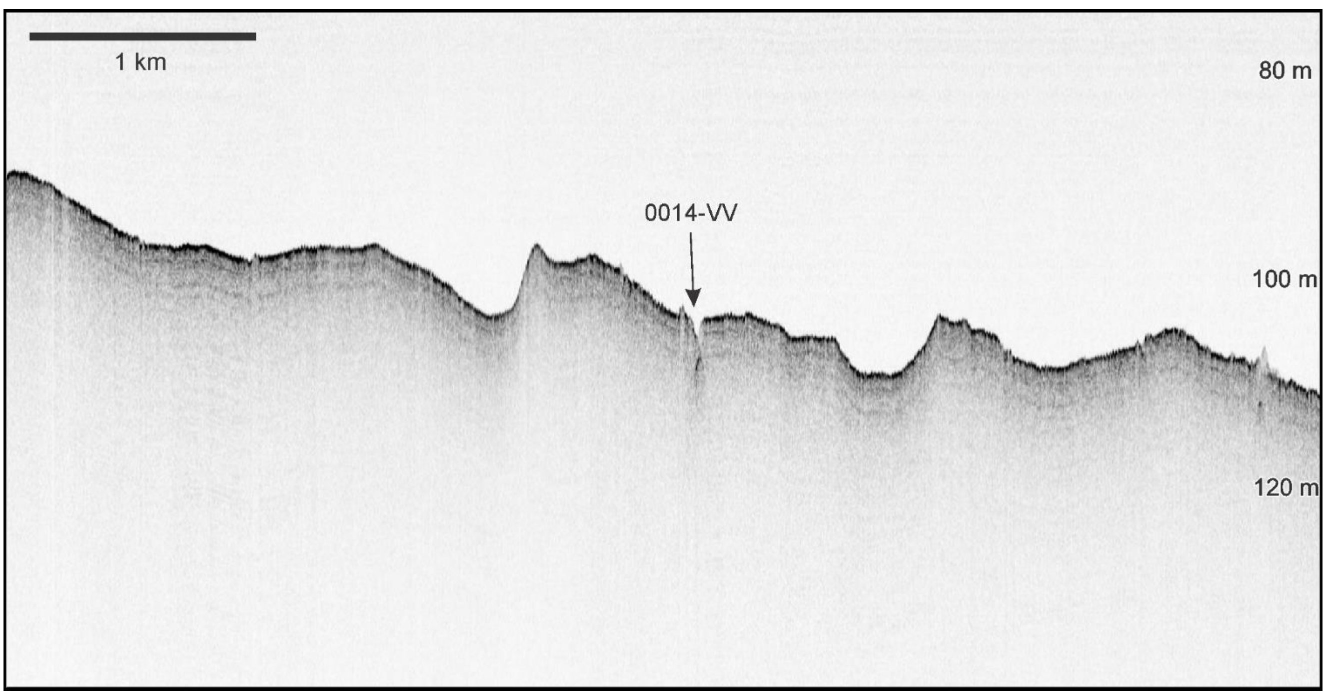

Figure C4: Stratigraphic position of Van Veen grab 0014.

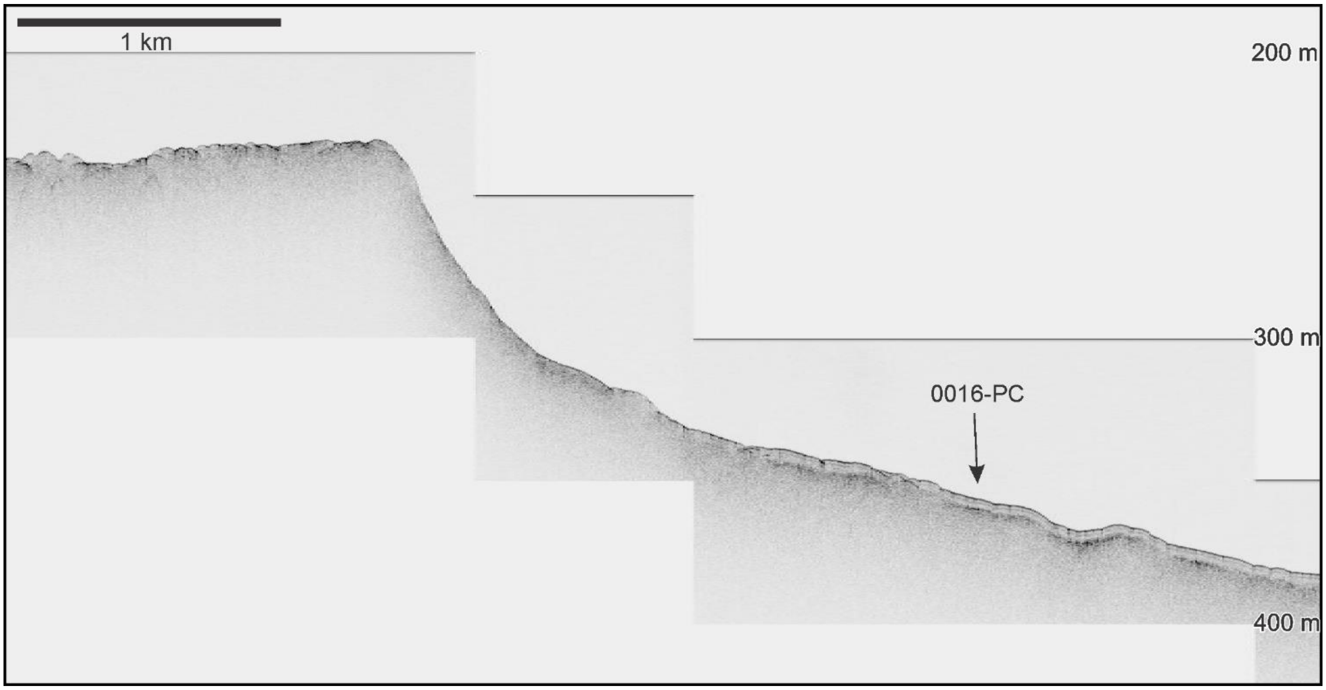

Figure C5: Stratigraphic position of piston core 0016.

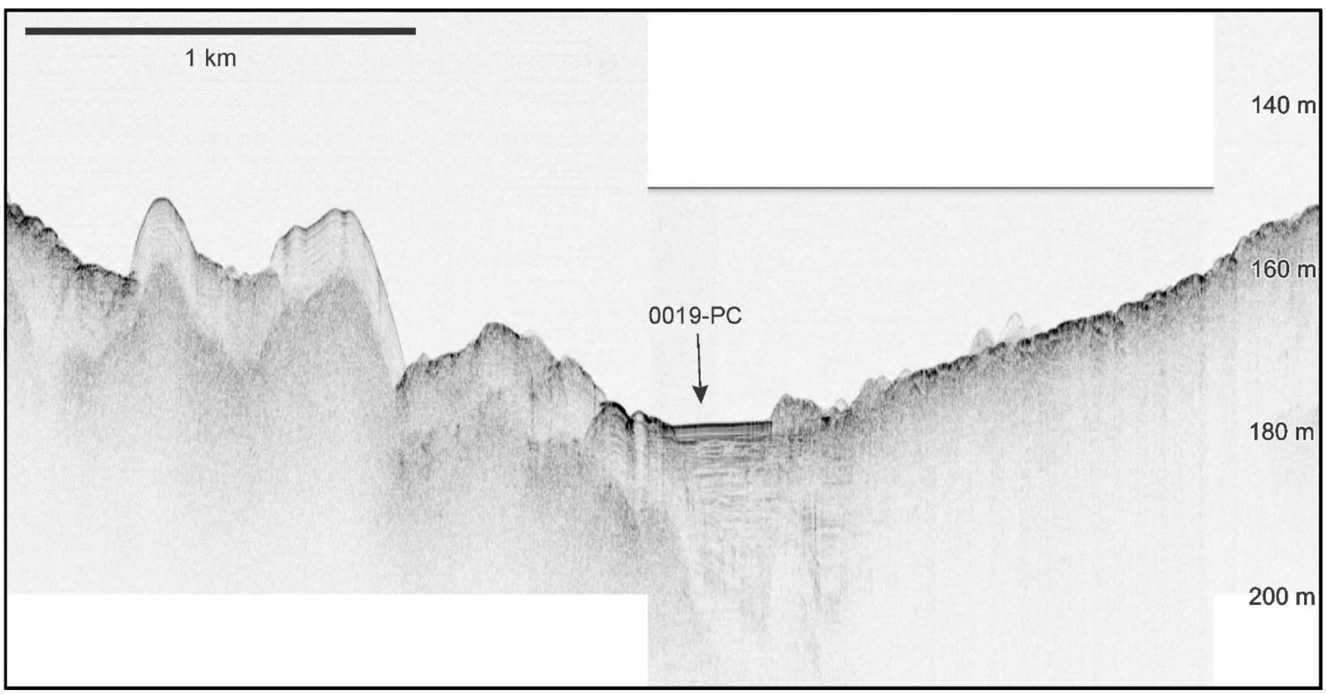

Figure C6: Stratigraphic position of piston core 0019.

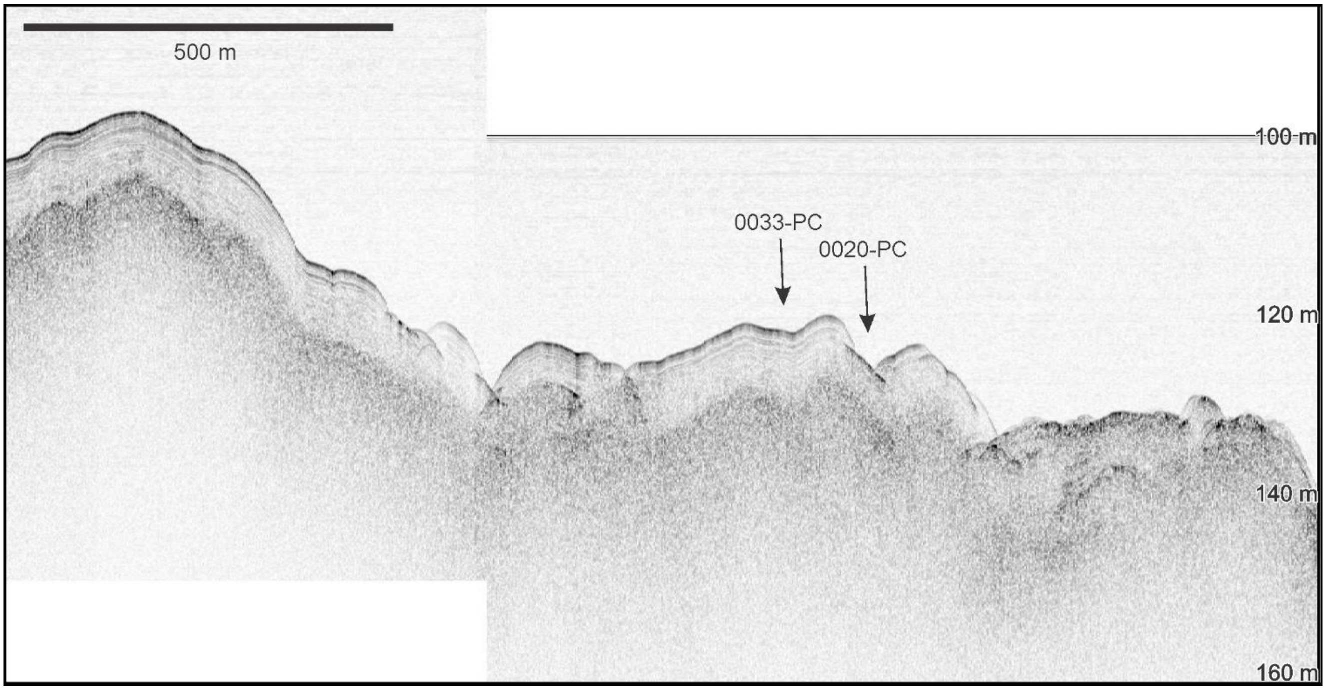

Figure C7: Stratigraphic position of piston cores 0020 and 0033.

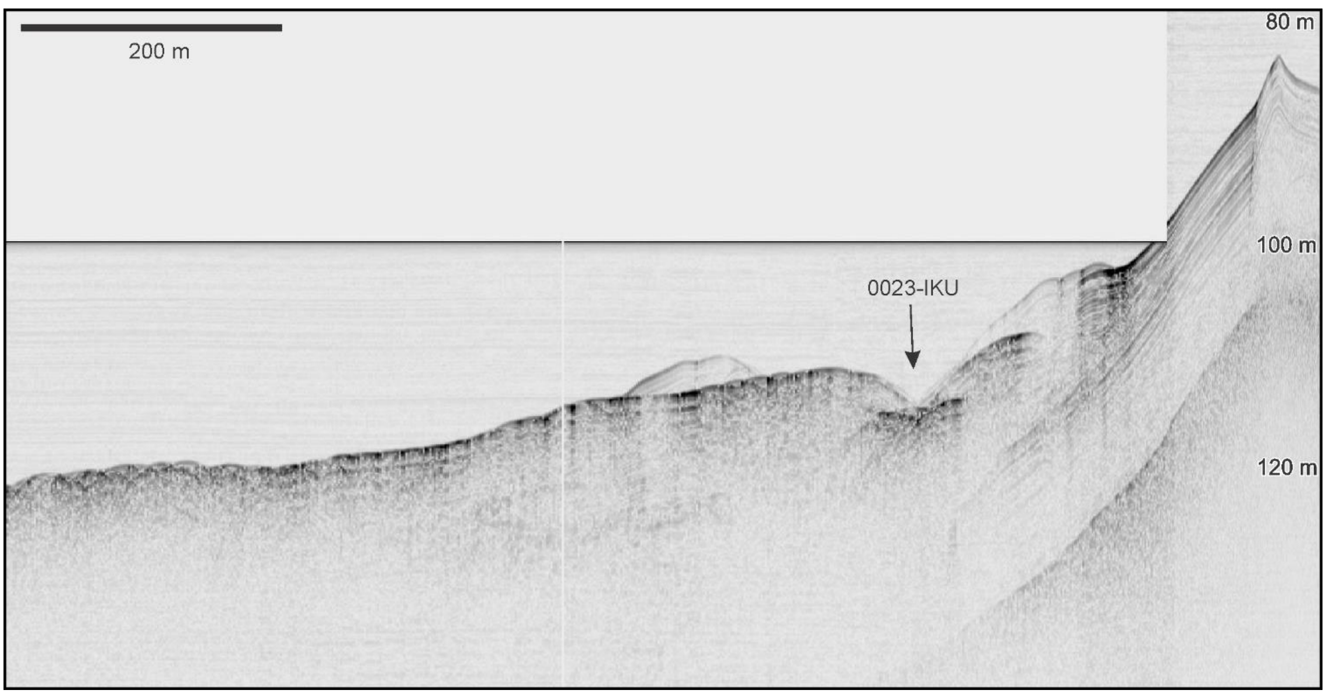

Figure C8: Stratigraphic position of IKU grab 0023

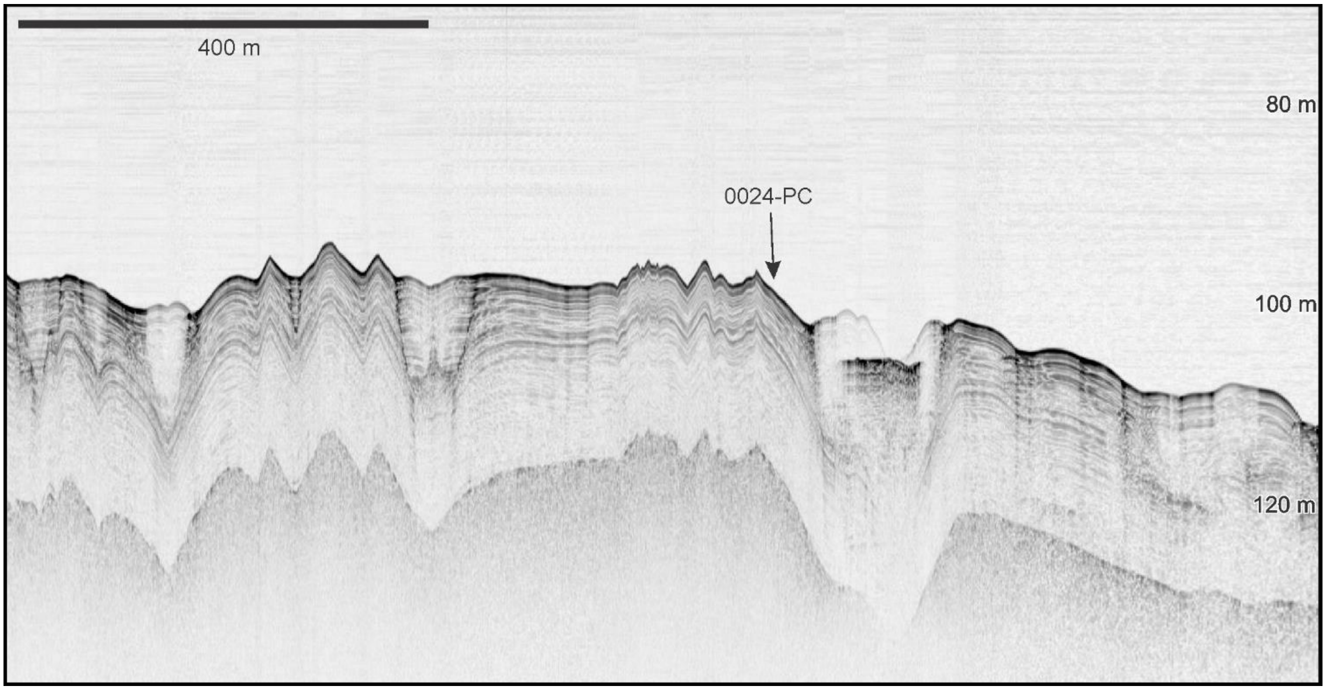

Figure C9: Stratigraphic position of piston core 0024.

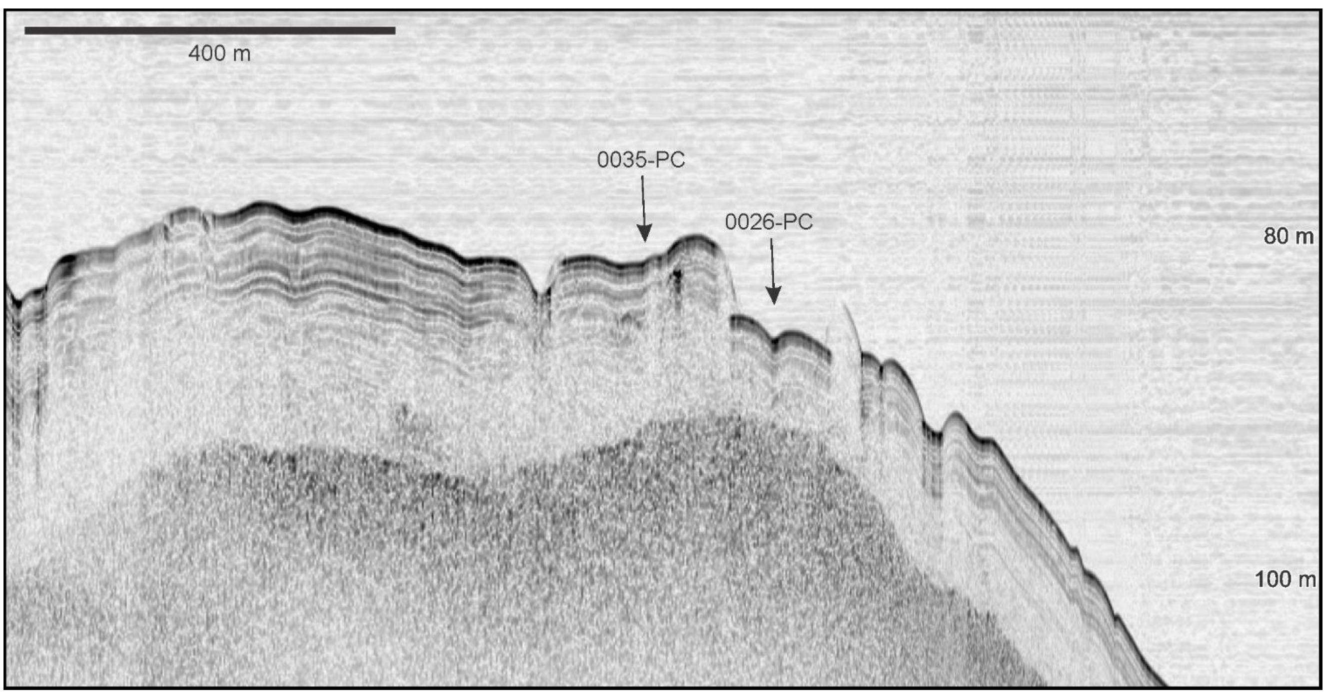

Figure C10: Stratigraphic position of piston cores 0026 and 0035.

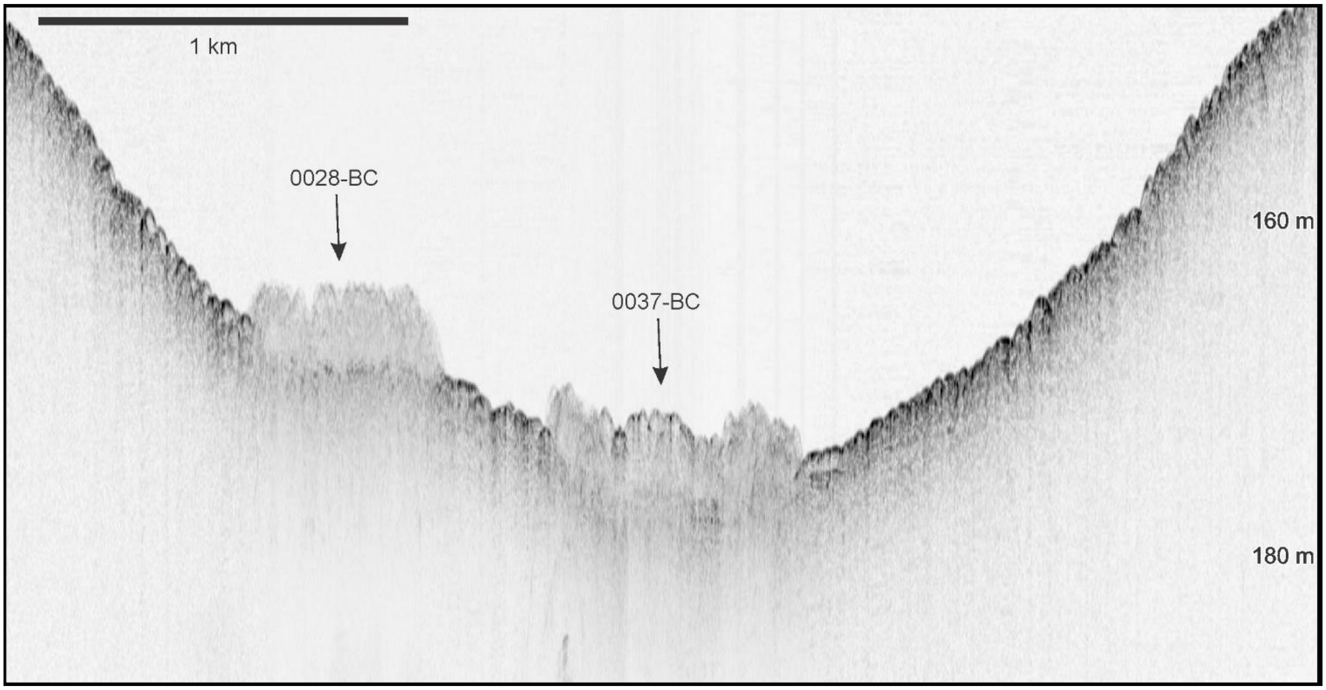

Figure C11: Stratigraphic position of box cores 0028 and 0037.

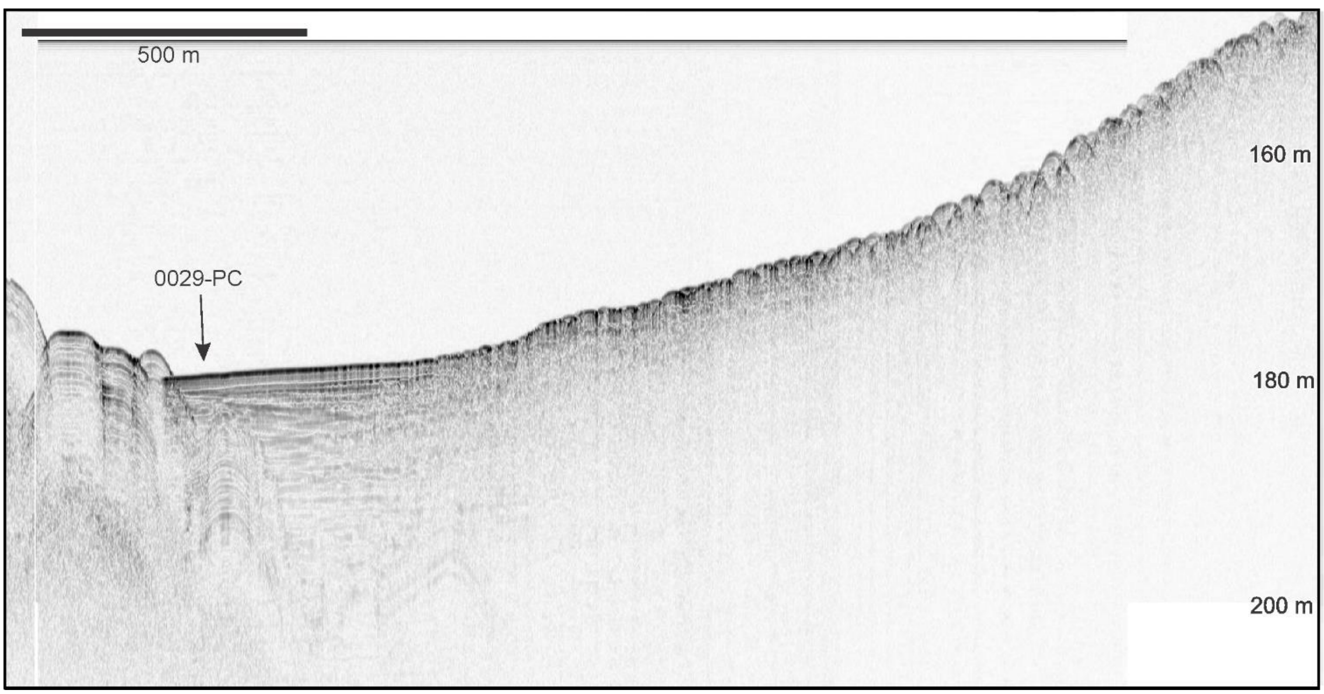

Figure C12: Stratigraphic position of piston core 0029.

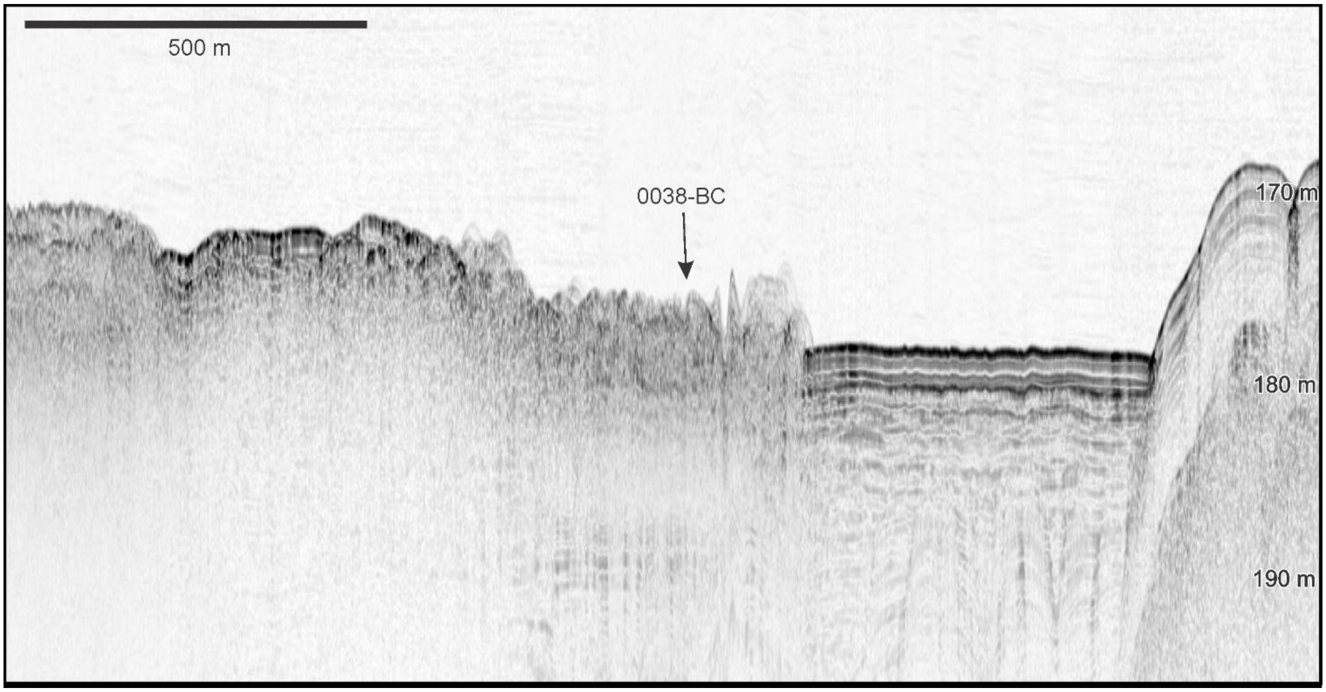

Figure C13: Stratigraphic position of box core 0038.

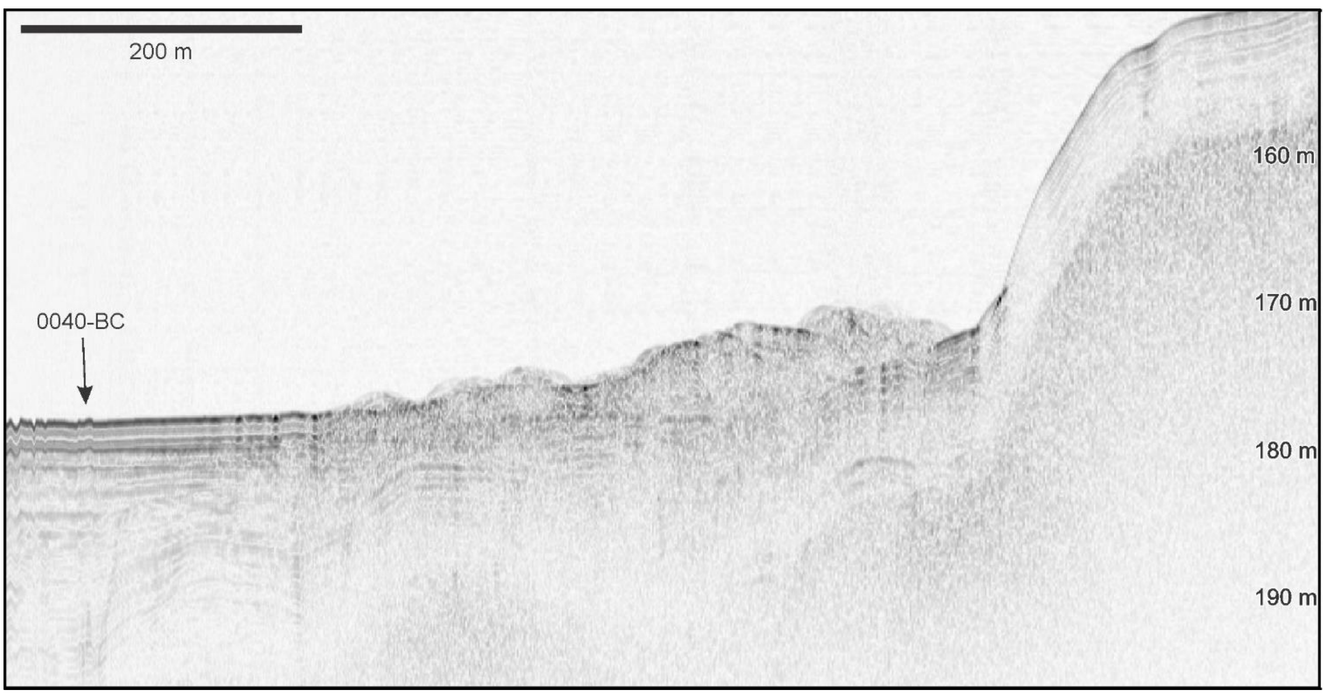

Figure C14: Stratigraphic position of box core 0040.

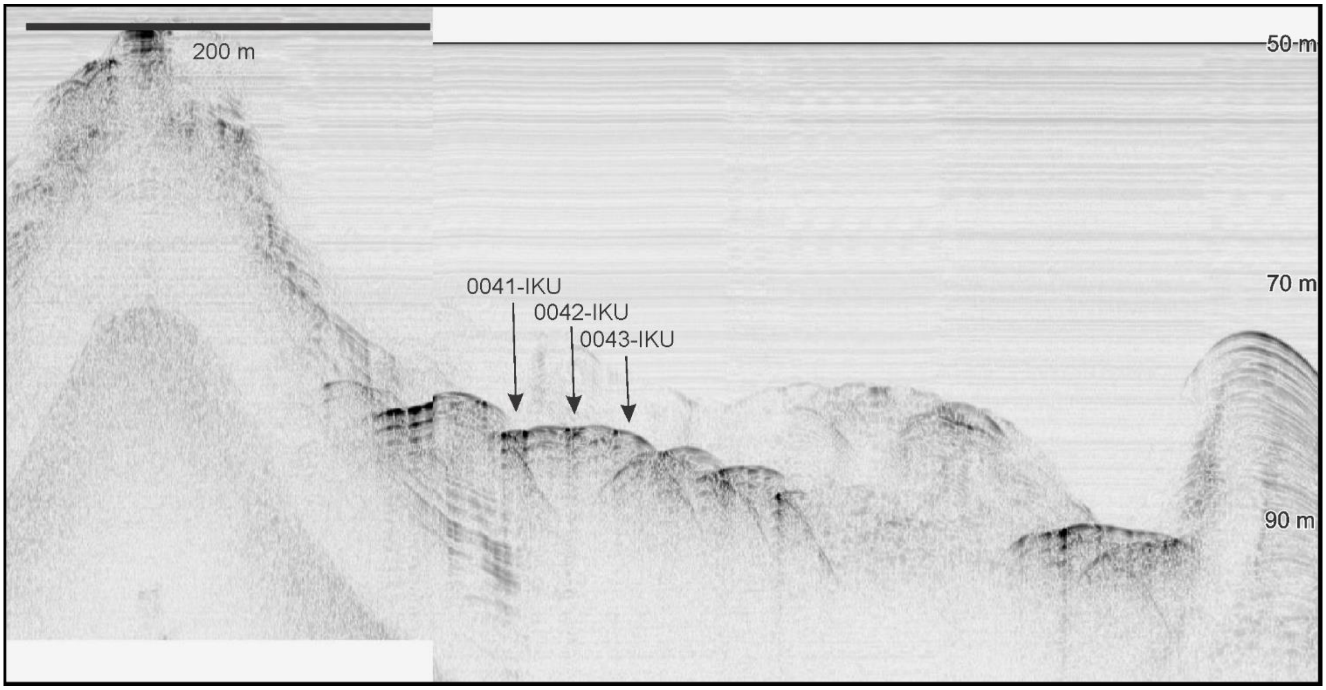

Figure C15: Stratigraphic position of IKU grabs 0041, 0042, and 0043.

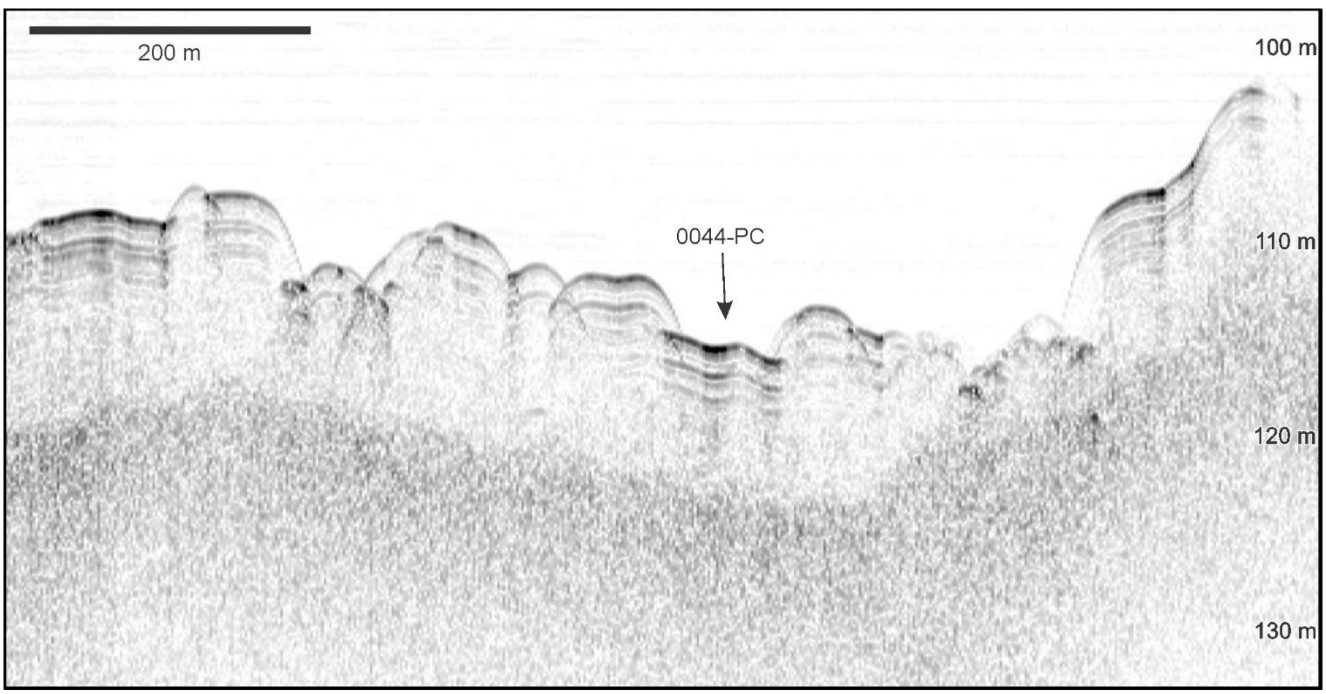

Figure C16: Stratigraphic position of piston core 0044.

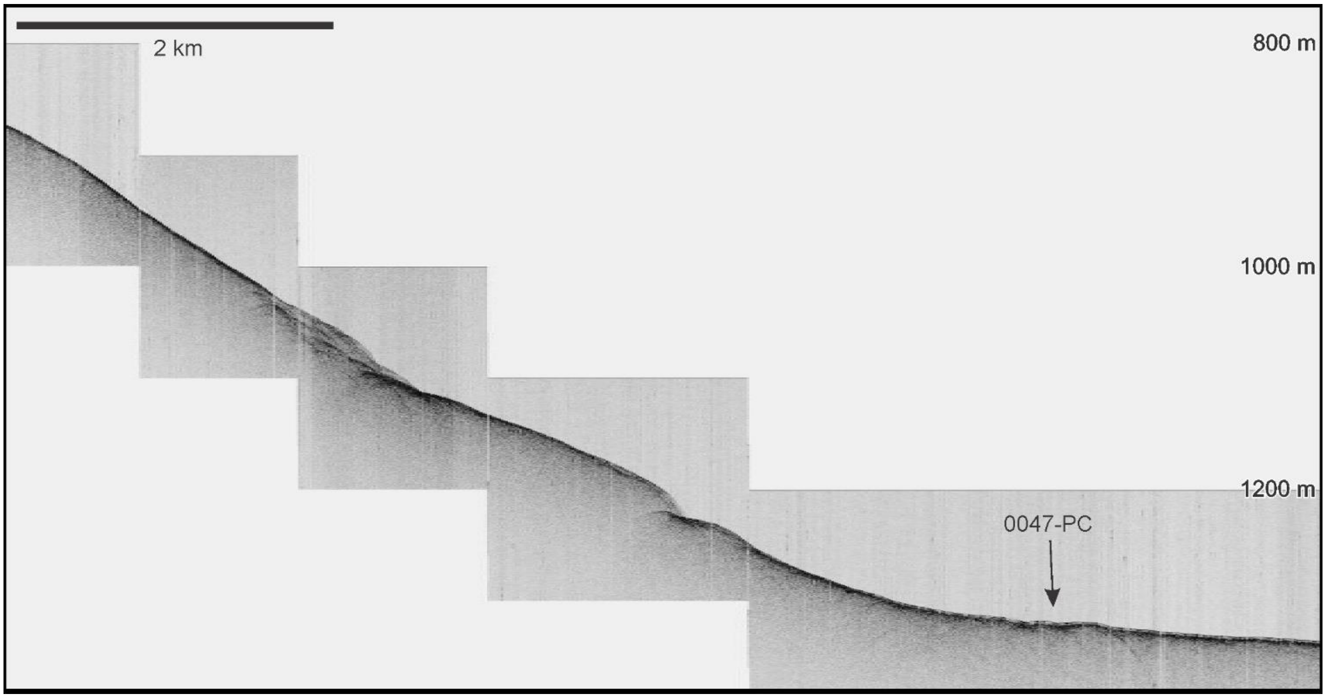

Figure C17: Stratigraphic position of piston core 0047.

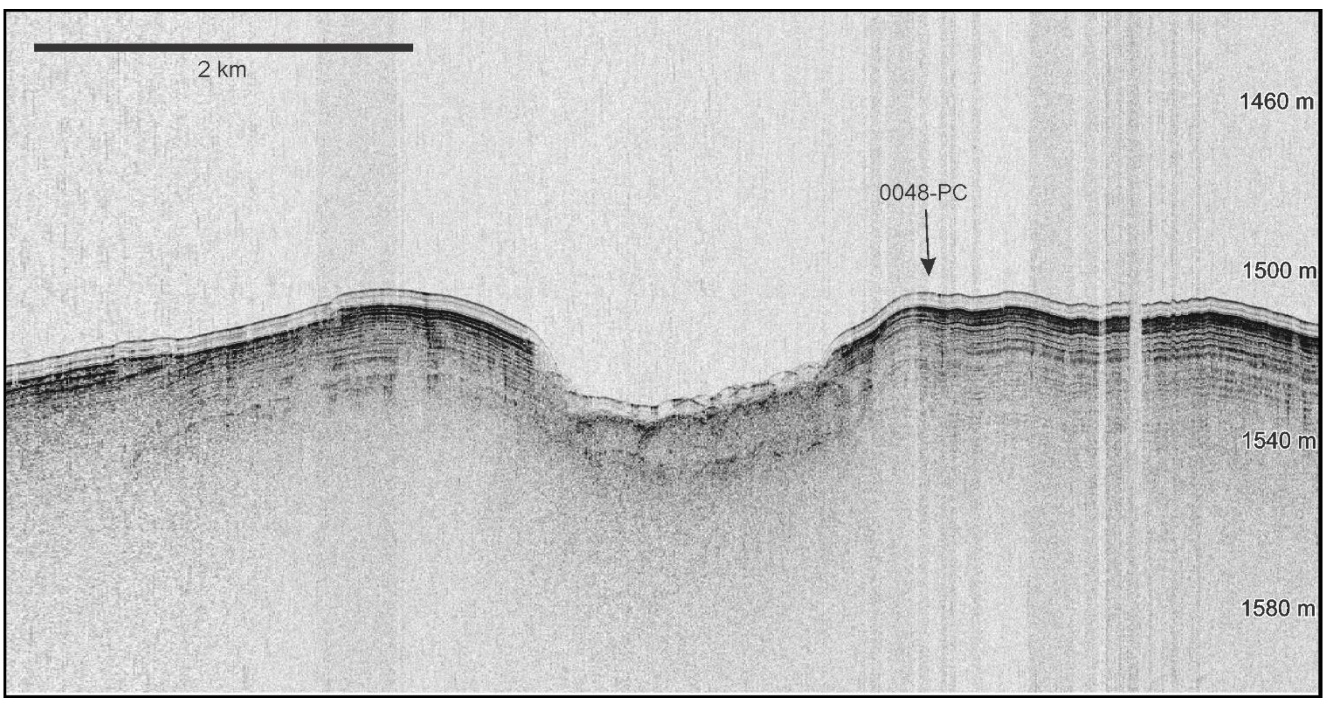

Figure C18: Stratigraphic position of piston core 0048.

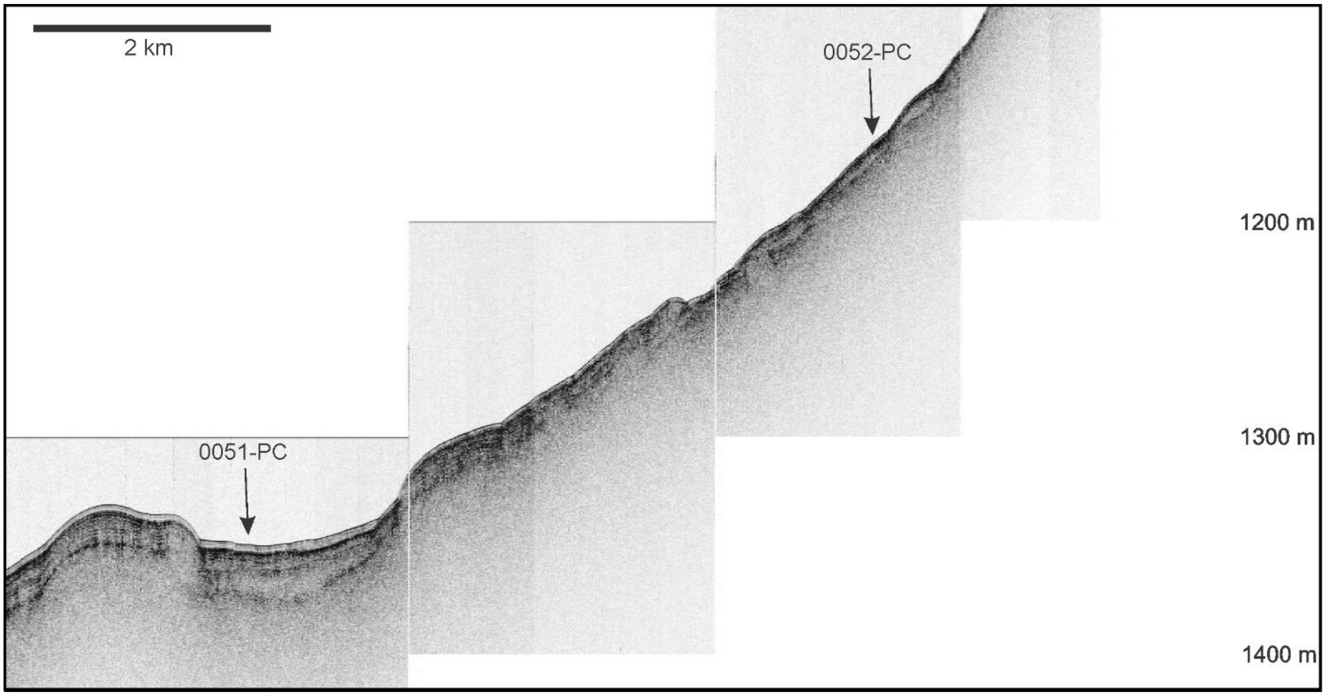

Figure C19: Stratigraphic position of piston cores 0051 and 0052.

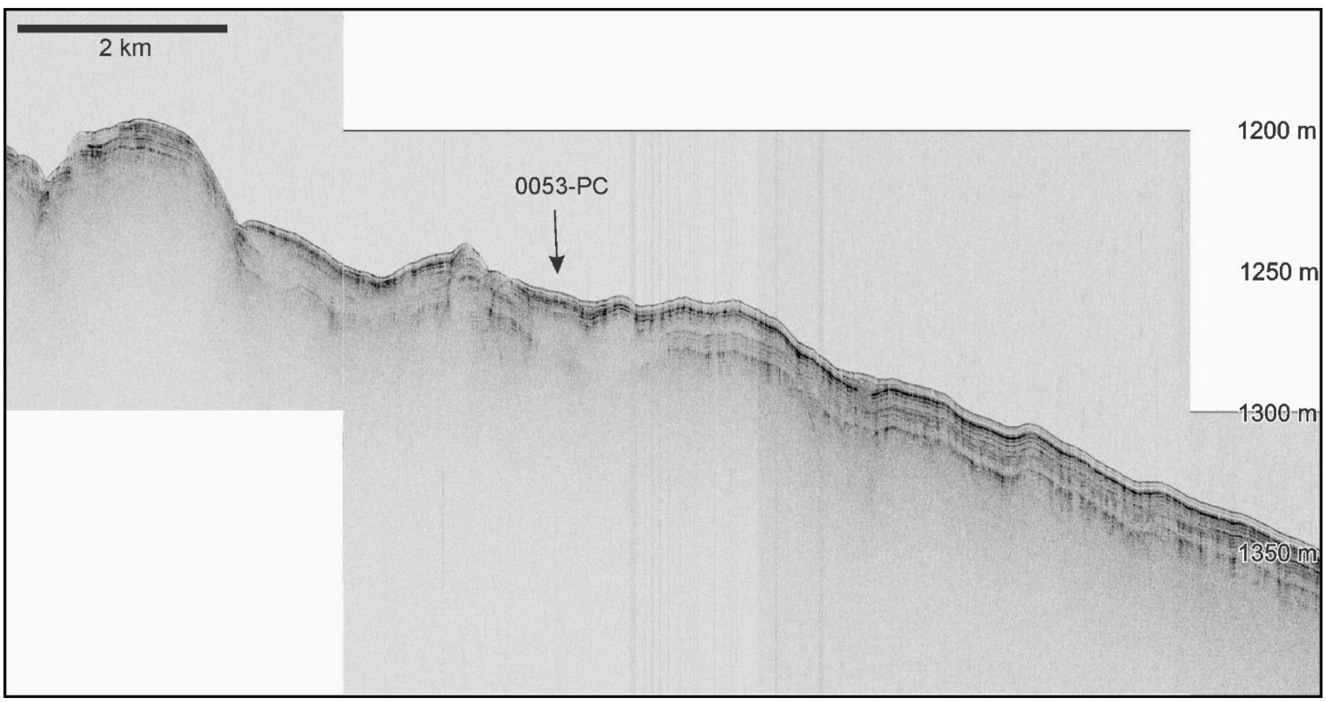

Figure C20: Stratigraphic position of piston core 0053.

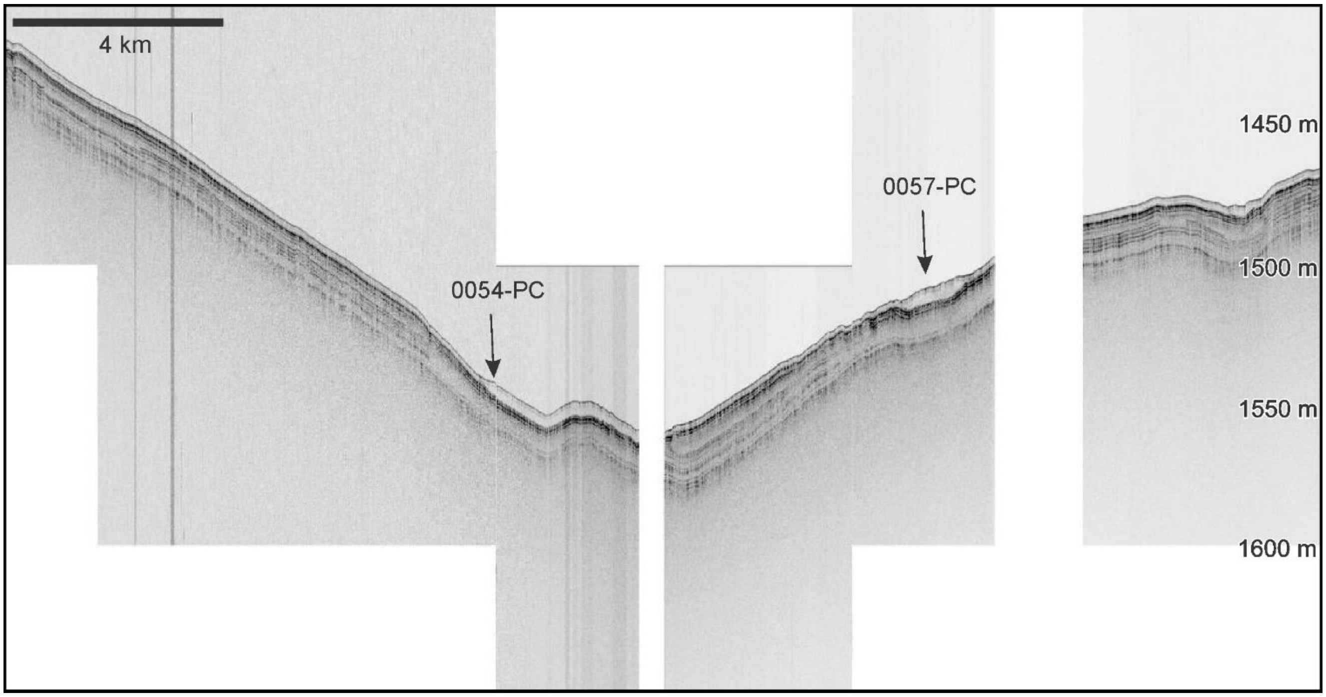

Figure C21: Stratigraphic position of piston cores 0054 and 0057.

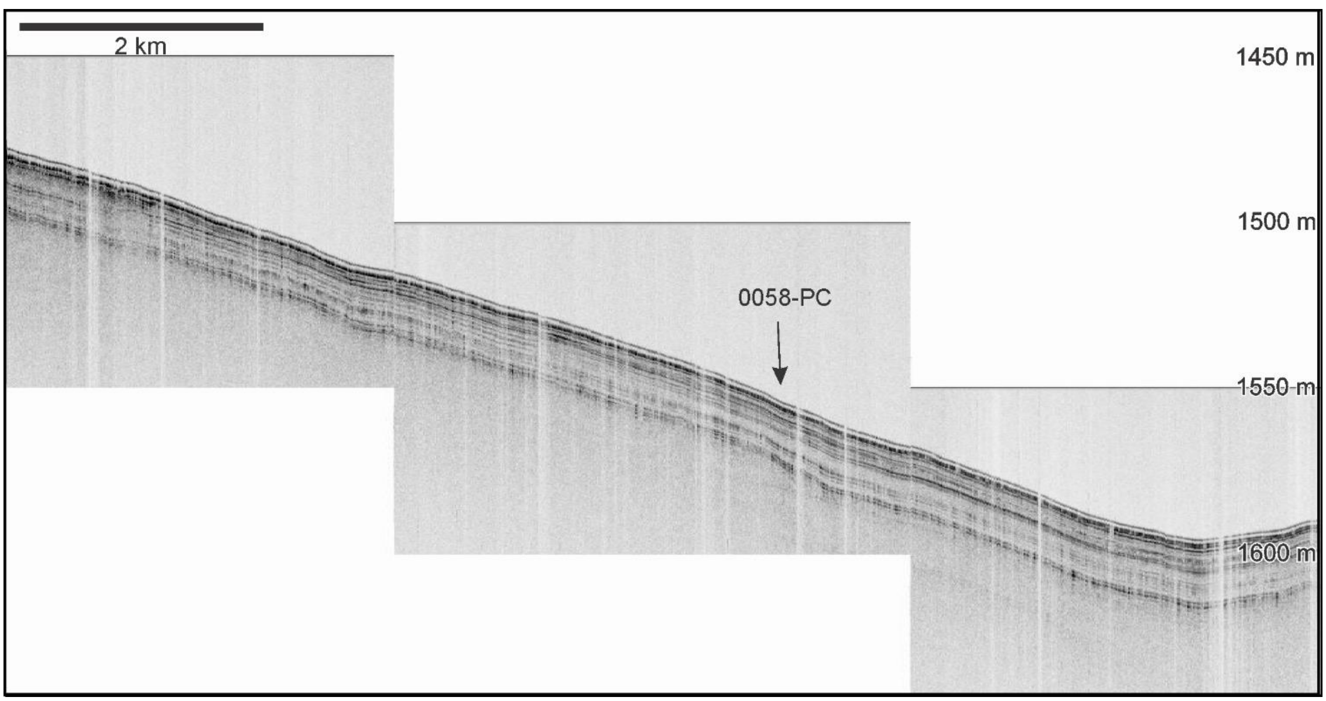

Figure C22: Stratigraphic position of piston core 0058.

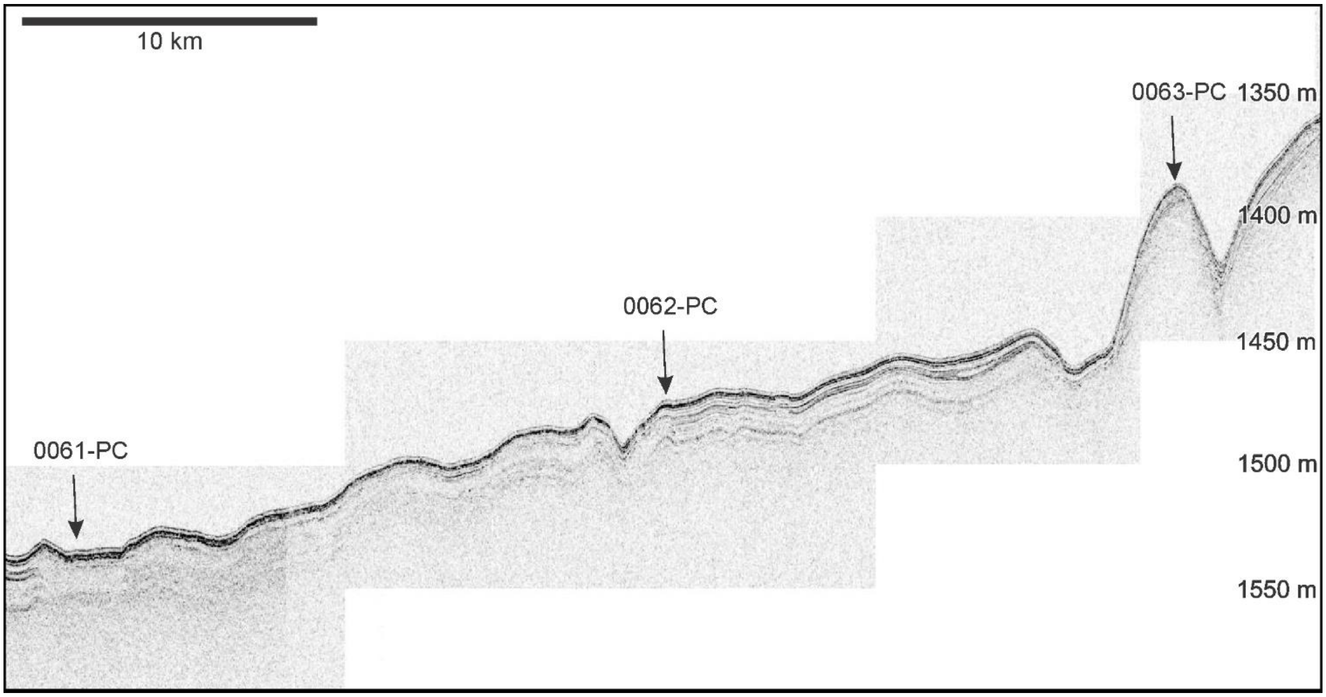

Figure C23: Stratigraphic position of piston cores 0061, 0062 and 0063.

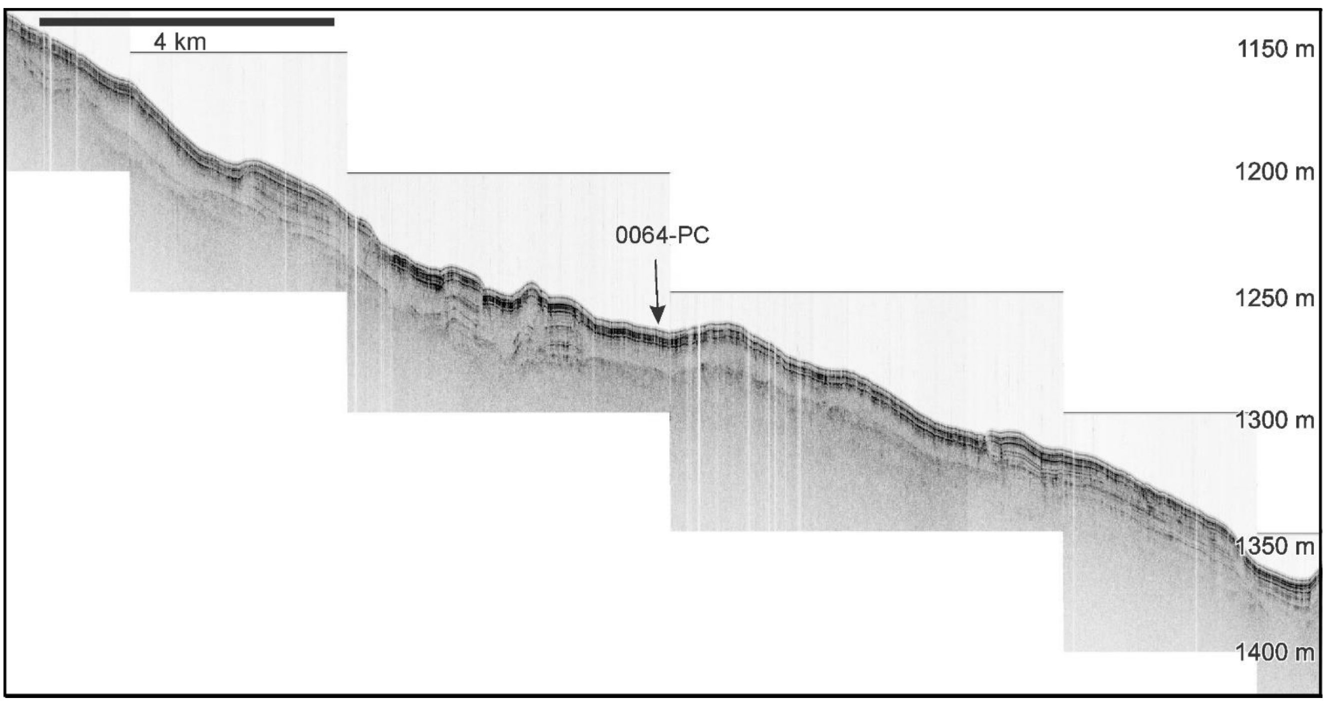

Figure C24: Stratigraphic position of piston core 0064.

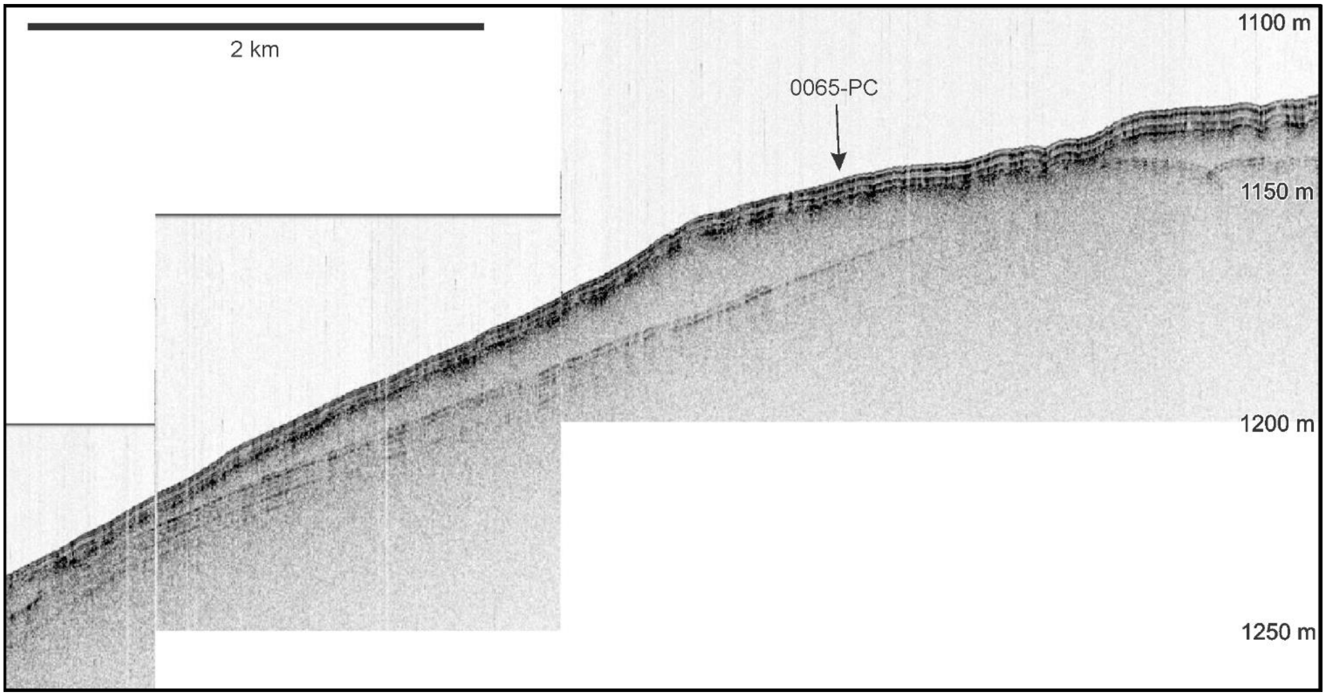

Figure C25: Stratigraphic position of piston core 0065.

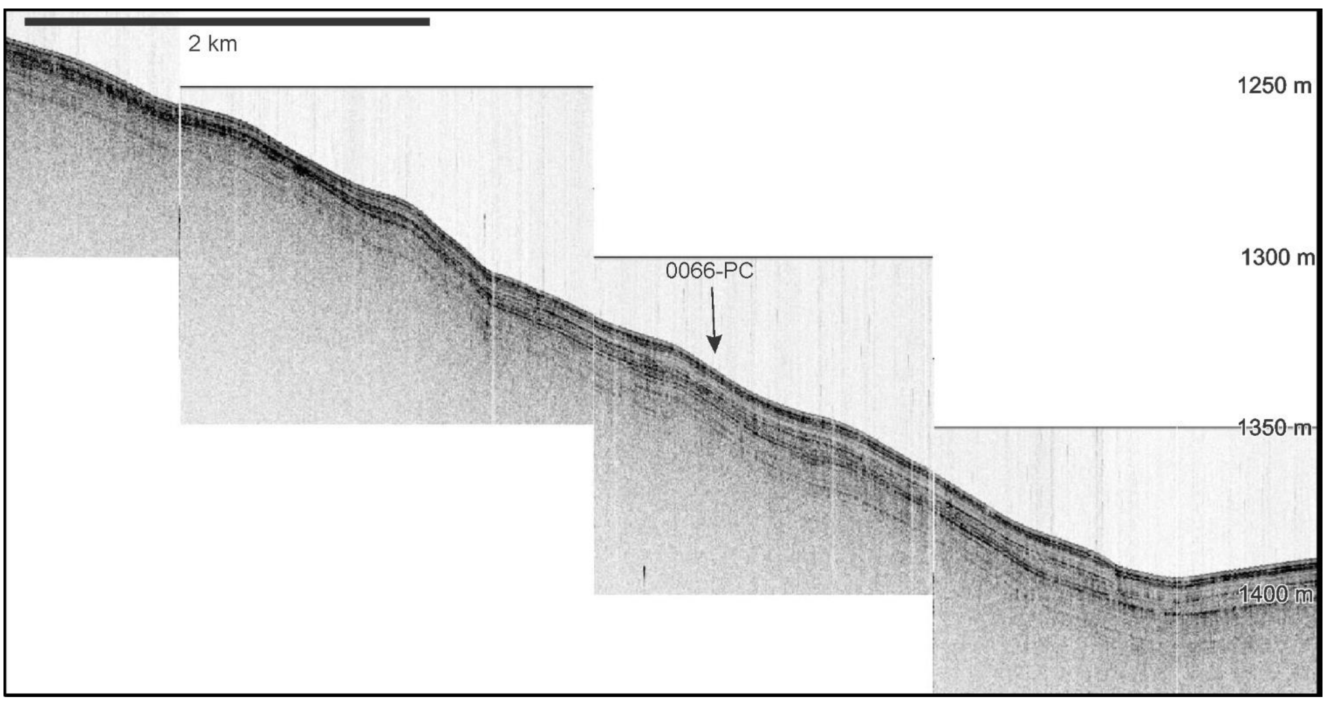

Figure C26: Stratigraphic position of piston core 0066.

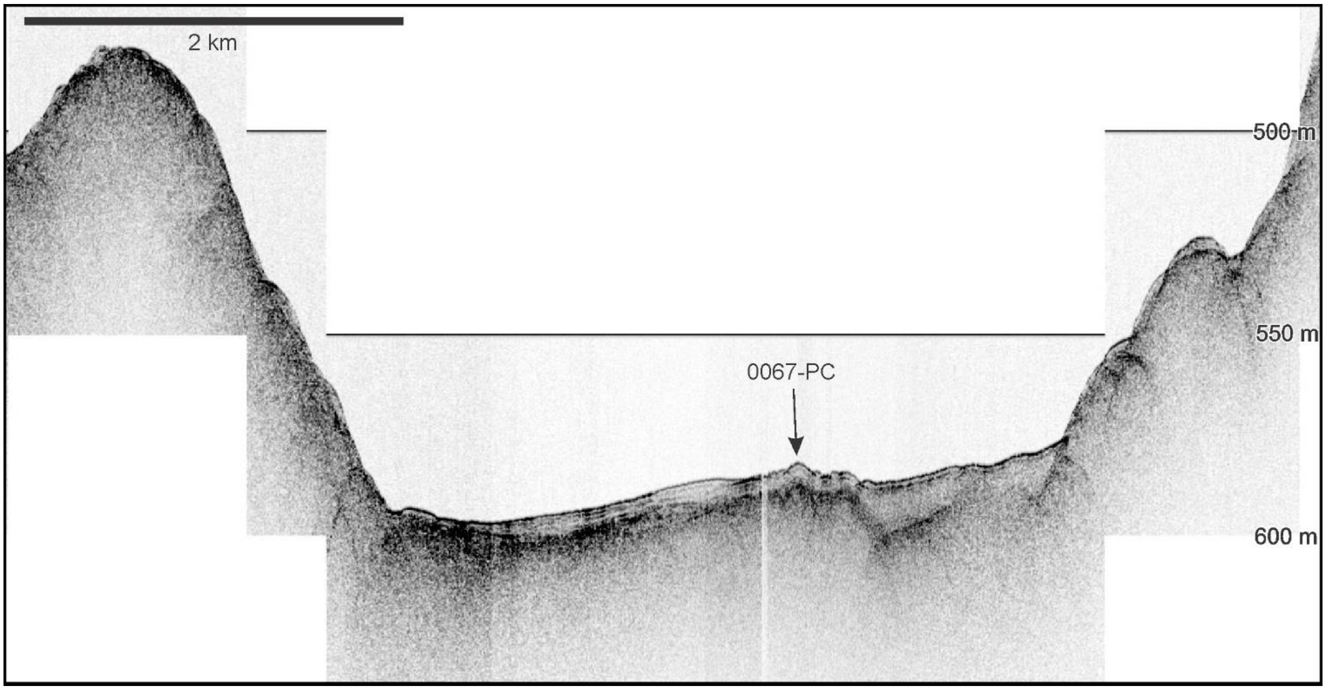

Figure C27: Stratigraphic position of piston core 0067.

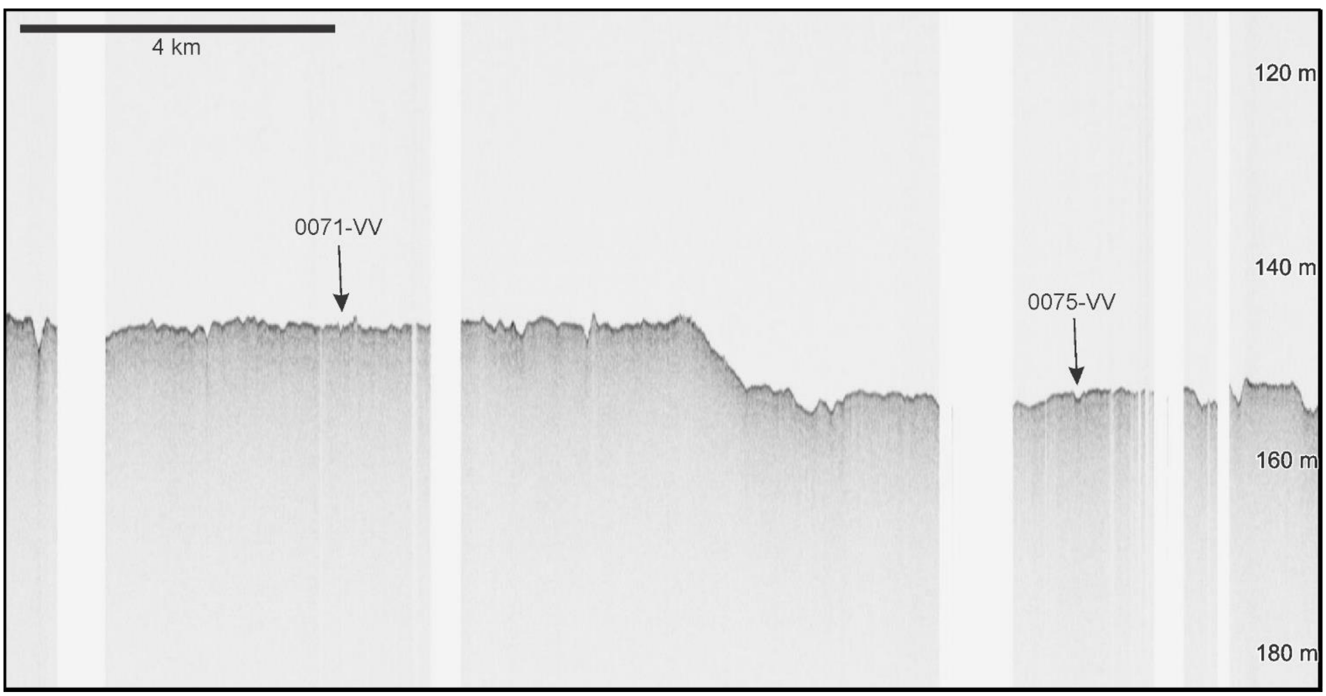

Figure C28: Stratigraphic position of Van Veen grabs 0071 and 0075.

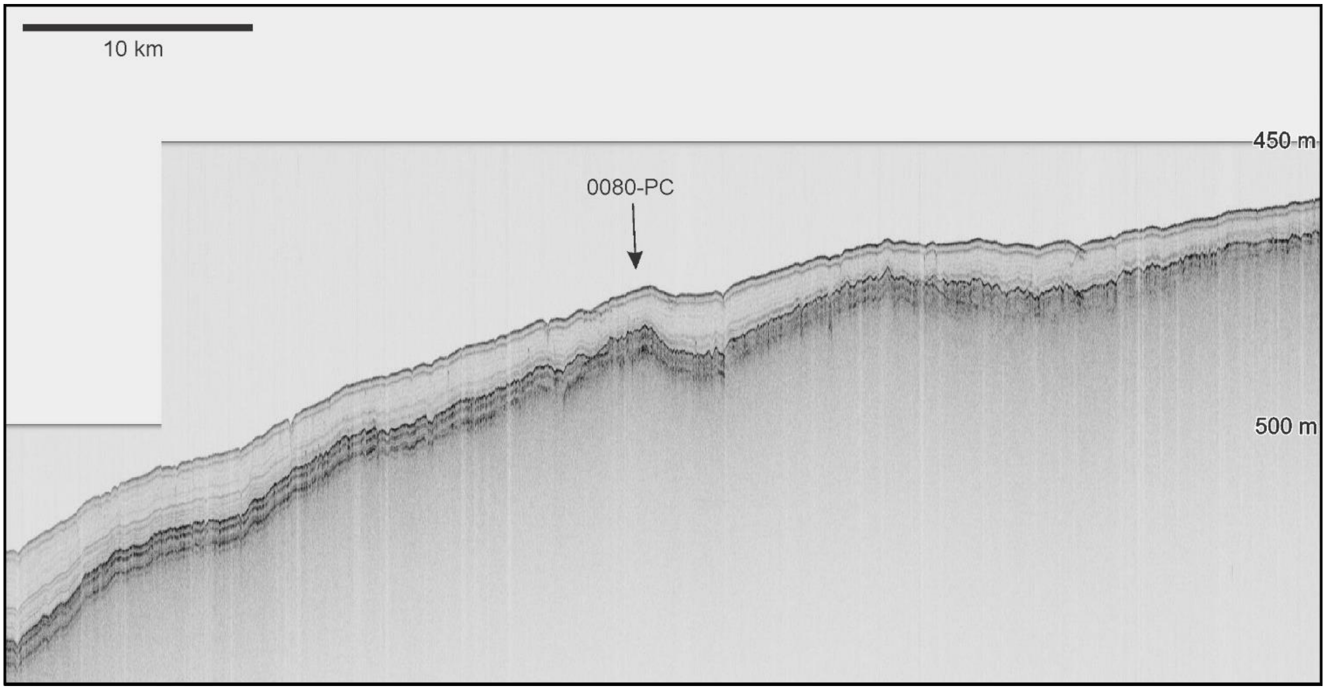

Figure C29: Stratigraphic position of piston core 0080.

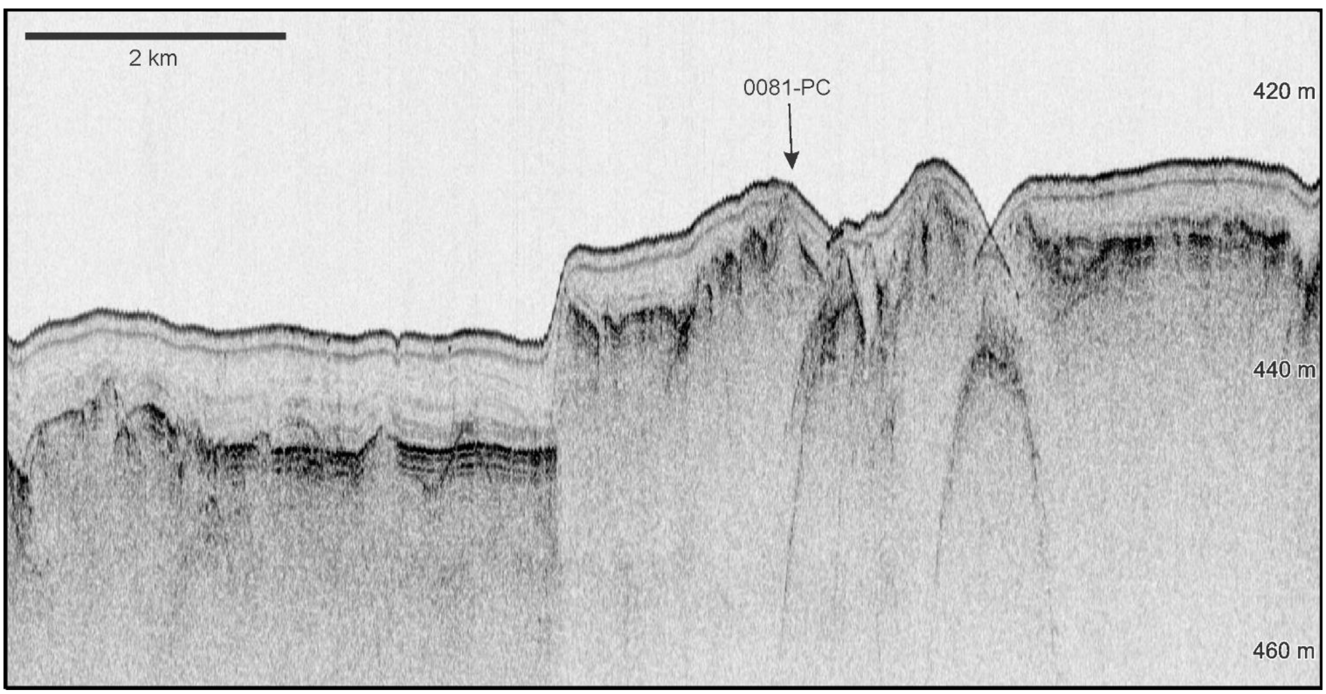

Figure C30: Stratigraphic position of piston core 0081.

APPENDIX D: BOX CORE STATIONS

Figure D1: Box core 0028

Figure D2: Box core 0037

Figure D3: Box core 0038

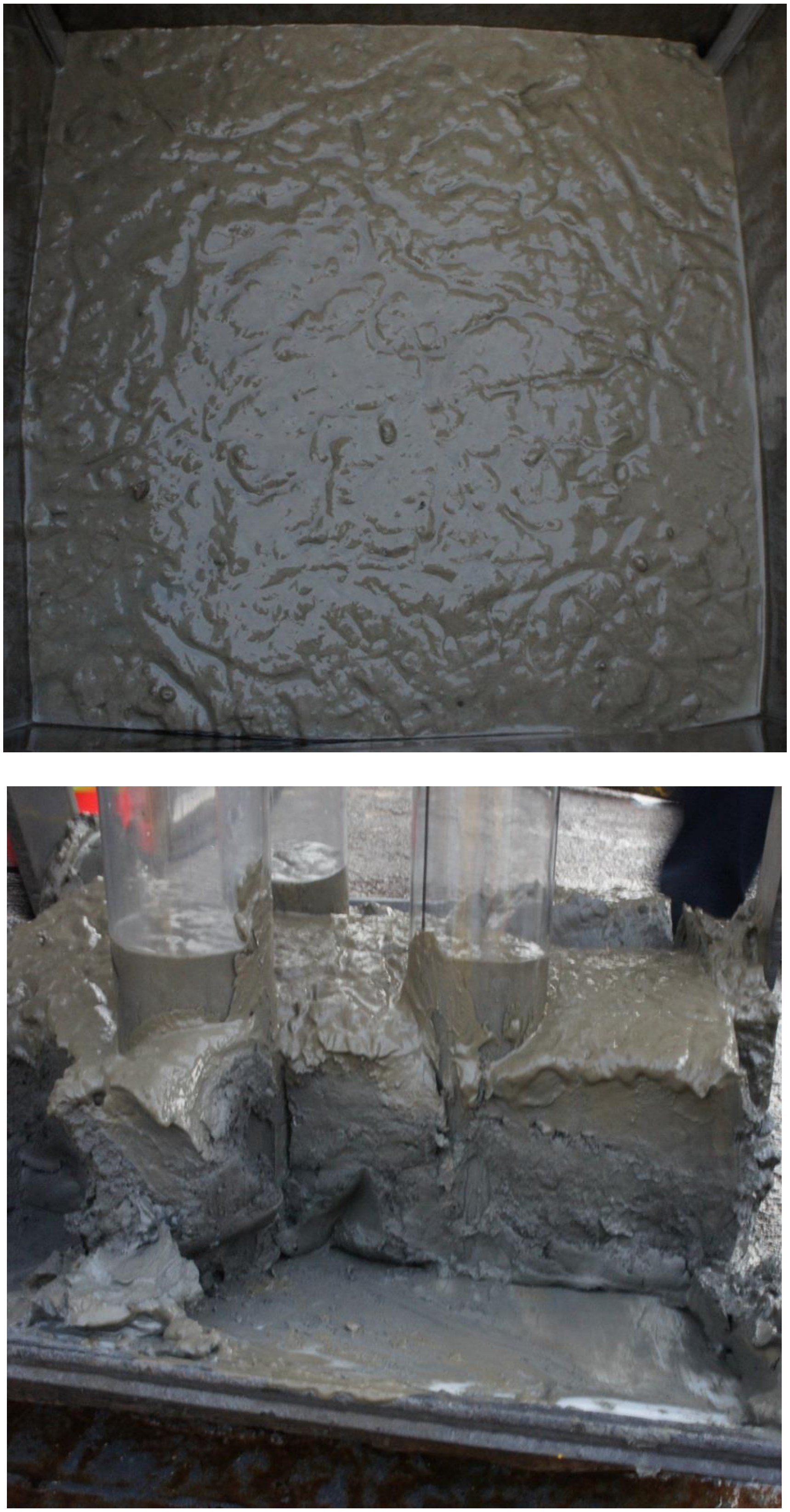

Figure D4: Box core 0040

APPENDIX E: VAN VEEN GRABS

Figure E1: Van Veen 0001

Figure E2: Van Veen 0007

Figure E2

Figure E3: Van Veen 0010

Figure E4: Van Veen 0011

Figure E5: Van Veen 0014

Figure E6: Van Veen 0071

Figure E7: Van Veen 0075