

GEOLOGICAL SURVEY OF CANADA OPEN FILE 6044

Cruise Report Amundsen 2006-804: Beaufort Sea / Amundsen Gulf / Northwest Passage, August 22 – October 30, 2006

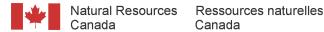


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Geological Survey of Canada (Atlantic)

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1.0 Introduction

This cruise report summarizes the activities of the geological/paleoceanographic science program of ArcticNet Leg 1 & 2 2006 which took place between August 22nd and October 30th. A GSCA cruise number (2006-804) has been given to this project since GSCA personnel were onboard and samples from this expedition are being curated at the Bedford Institute of Oceanography. The cruise number does not apply to data collected by other scientists involved in the ArcticNet program and their activities will not be discussed in this report. Additional information on the activities of other ArcticNet participants can be obtained from Martin Fortier (martin.fortier@arcticnet.ulaval.ca) or at the ArcticNet website (http://www.arcticnet-ulaval.ca/).

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1.2 Background

ArcticNet is a Network of Centres of Excellence (funded by the Government of Canada through the NCE program) that aims to contribute to the development and dissemination of the knowledge needed to formulate adaptation strategies and national policies to help Canadians face the impacts and opportunities of climate change and globalization in the Arctic. This will encompass the study of geological, ecological, environmental, biological, chemical, and cultural processes in the Arctic.



2.0 SCIENTIFIC OBJECTIVES

The primary objectives of this work were to map the coastal seabed for hydrographic charting, geological interpretation, and benthic habitat characterization. The objectives of cruise 2006-804 fell under ArcticNet projects 1.6 and 1.2. The objectives of project 1.6 entitled "Opening the Northwest Passage: Resources, Navigation, Sovereignty, & Security" included: (1) to compile corridors of precise high resolution bathymetry, and seabed geomorphology; (2) to improve the mapping of the surficial geological environment of the Canadian Archipelago channels; (3) obtain sediment cores and grabs of the Holocene record for paleoceanographic analyses at optimal sites in the region. The objectives of project 1.2 entitled "Coastal Vulnerability in a Warming Arctic" included: (1) to improve understanding and prediction of relative sea-level change and associated coastal hazards in the Arctic; (2) to measure and predict coastal sensitivity to a range of climate-change effects; and (3) to assess community and habitat vulnerability to coastal change in a warming Arctic.

In order to obtain the maximum seabed mapping coverage, geophysical data (multibeam bathymetry and sub-bottom profiles) were acquired whenever *Amundsen* was underway between sampling stations, over most of the piston core sites, and in several areas where interesting seabed features were observed.

In order to collect high-resolution sediment cores through the Northwest Passage for paleoceanographic analysis, core sites were selected based on geophysical data collected during the Canadian Arctic Shelf Exchange Study (CASES) Leg 1, Leg 8, Leg 9, ArcticNet 2004, 2005, and data archived at the GSCA. Sites were selected in order to sample thick Holocene sequences in the Northwest Passage.

Multibeam and sub-bottom profile data were acquired using the survey launch *Heron* at targeted locations to address questions of seas-level rise and associated coastal change in the western Canadian Arctic. The objectives were to identify evidence of the postglacial lowstand shoreline and to support interpretation of sea-level rise from cores (collected in a separate field program) in former lakes now converted to marine basins. Three target sites were identified: Sachs Harbour, De Salis Bay (140 km east of Sachs Harbour), and Gillett Bay near Cape Parry, 50 km north of Paulatuk. In the end, some work was accomplished at the first two sites but time allocations precluded any work at the third.



3.0 EQUIPMENT

Scientific operations for cruise 2006-804 were performed aboard the CCGS Amundsen (see Fig. 1). The Amundsen (formerly the CCGS Sir John Franklin built in 1979, and renamed Amundsen in 2003) is a Class 3 icebreaker which has been refitted to accommodate Arctic science research. The ship is 98 m long, 19 m wide with a draft of 7 m and can obtain a maximum speed of about 16 knots. There is approximately 300 m² of lab space inside the vessel with another 110 m² of lab space in temporary external lab containers. The Amundsen can accommodate 46 scientific staff in addition to the 31 ship's crew. Equipment relevant to geoscience work onboard the Amundsen includes:

- -Kongsberg-Simrad EM300 30 kHz multibeam echosounder (discussed in section 3.3)
- -Knudsen K320R 3.5 kHz sub-bottom profiler (discussed in section 3.4)
- -Applanix POS/MV 320 motion and orientation sensor
- -C&C Technologies CNAV GPS
- -AML Smart Probe surface sound speed probe
- -Surface temperature and salinity probe
- -Seabird SBE911 CTD, deployed from rosette
- -Box core (discussed in section 3.2)

Figure 1 – CCGS Amundsen





A multibeam survey launch (CSL *Heron*) was also used during 2006-804 (Fig. 2). This vessel was deployed from the *Amundsen* and was used in shallow waters for coastal surveys because of its shallow draft (about 1.15 m). The equipment installed on the *Heron* included:

- -Kongsberg-Simrad EM3002 300 kHz multibeam echosounder (discussed in section 3.3)
- -Knudsen K320B/R 3.5 kHz sub-bottom profiler (discussed in section 3.4)
- -Knudsen K320B 28/200 kHz single-beam echosounder
- -Knudsen K320B 2 x 200 kHz side scan sounders
- -CodaOctopus F185+ motion and orientation sensor
- -C&C Technologies CNAV GPS
- -Brooke-Ocean Technologies Moving Vessel Profiler 30 (MVP30)
- -AML Smart Probe salinity and temperature probe (deployed on MVP30)
- -Optical backscatter probe (deployed on MVP30)

Figure 2 – CSL *Heron*





3.1 Box Corer

The 50 cm x 50 cm x 80 cm box corer (Fig. 3) was used onboard the *Amundsen* in 2006. In most instances, one push core (99.2 mm ID) was taken from each box core sample. Two push cores were taken at some core sites if there was sufficient material and if the sediment sample proved interesting. Surface sediment samples at each box core location were also collected in order to develop reference databases of modern dinoflagellate cysts, and foraminifera populations in the study area. The surface samples will be stored at Dalhousie University and at the Institut des Sciences de la mer de Rimouski (ISMER). The box corer used during 2006 was only one year old and in good condition. Some damage was sustained to the stainless steel box on the first leg of 2006 due to the corer contacting bedrock. This damage was mostly cosmetic and did not significantly affect the performance of the corer.

Figure 3 – Photo of box corer used onboard the *Amundsen* in 2006 (photo courtesy Keith Lévesque, ArcticNet)



The multibeam echosounder and sub-bottom profiler were checked before each box core to ensure that the seabed was suitable for deployment of the corer (i.e. sediment bottom and not bedrock). The locations of the box cores collected during Leg 2 are shown in table 1 and Fig. 4.

3.2 Multibeam Echosounder

For the 2006-804 cruise, two multibeam sonar systems were used to acquire bathymetry data: the Kongsberg-Simrad EM 300 mounted on the CCGS *Amundsen*; and the Kongsberg-Simrad EM 3002, mounted on the CSL *Heron*. These two systems were



operated and maintained by the personnel of the Ocean Mapping Group (OMG) at the University of New Brunswick (Fredericton).

The EM 300 is designed for seabed mapping from the shoreline to beyond the continental rises and includes such features as phase detection, equidistant beam spacing, calibrated seabed acoustic imaging, and advanced signal processing technology. The EM 300's transmit and receive transducer arrays were hull-mounted and are networked to the control station on the Navigation Deck of the *Amundsen*. Post processing and display of the multibeam data was performed using software developed by OMG.

The basic specifications of the EM 300 are:

Frequency 30 kHz
Peak Power 4.5 or 9 kW
Pulse Length 0.7, 2, or 15 ms

Number of Beams 135

Beamwidth $1x1^{\circ}$, $1x2^{\circ}$, $2x2^{\circ}$, or $2x4^{\circ}$

Coverage sector 150°

Depth range 10 m to > 5,000 m

Maximum swath width >5,000 m

Sound velocity data for the EM 300 were acquired from the Seabird CTD on the rosette. Two hull-mounted probes were also available to supply sound velocity information to the EM 300 transducer.

The EM 3002 is designed for detailed seafloor mapping and inspection with water depths from less than 1 m up to typically 200 m in cold oceanic conditions. During 2006-804, the EM 3002 was used successfully to water depths of 120 m. This system has extremely high resolution and dynamically focused beams. Post processing and display of the multibeam data was performed using software developed by OMG.

Frequencies 293, 300, 307 kHz

No. of soundings per ping

Max 254

Maximum ping rate

40 Hz

Maximum angular coverage

130 degrees

Pitch stabilization Yes
Roll stabilization Yes
Heave compensation Yes
Pulse length 150 µs

Range sampling rate 14, 14.3, 14.6 kHz

Depth resolution 1 cm

Beam spacing Equidistant or equiangular

Beamforming Time delay with shading; Dynamically focused

receive beams



Sound velocity data for the EM 300 was acquired from the Brooke-Ocean Technologies Moving Vessel Profiler (MVP30).

3.3 Sub-bottom Profiler

The sub-bottom profiler installed onboard the *Amundsen* is the Knudsen 320R deep water echosounder. The Knudsen 320R is a high power bathymetry/sub-bottom imaging system capable of data collection at full ocean depths. The 320R utilizes sixteen 3.5 kHz hull-mounted transducers which are networked to the control station on the Navigation Deck of the *Amundsen* where the data are stored digitally.

The basic specifications of the Knudsen 320R are as follows:

Frequency 3.5 kHz

Power 4 to 8 selectable levels

Pulse Length Automatically selected with override

Phased Ranges Multiple 50% overlapped phases for each range,

manual or automatic selection

Gain Controls AGC, TVG, plus manual receive gain

CSL *Heron* is outfitted with a Knudsen K320B/R 3.5 kHz sub-bottom profiler which is similar to the profiler used on the *Amundsen*. The system on the *Heron* however uses only one hull-mounted Knudsen 3.5 kHz transducer.



4.0 GEOPHYSICAL AND GEOTECHNICAL DATA SETS

A large amount of both geophysical and geotechnical data was collected during cruise 2006-804 aboard the CCGS *Amundsen*. This section presents further details on the data collected over the duration of 2006-804. A narrative of the daily events of 2006-804 is provided in Appendix 1.

4.1 Geotechnical Samples

A total of 26 box core sites were attempted during 2006-804 (see Fig. 4 for locations, Appendix 2 for sample details, and Appendix 3 for sub-bottom profiler images of the core sites). Sufficient sediment for push cores was obtained at all but 4 core sites (2006-804-003, -004, -026, -029). Surface sediment samples for foraminifera (1 x 30cc surface sample in buffered formalin) and dinoflagellate (2 x 60cc surface sample) analysis were collected at all but three sites for which there was insufficient material (2006-804-004, -026, -029). The surface samples are curated at Dalhousie University and at ISMER.

The push cores collected during 2006-804 were stored upright in a refrigerated room at ~4°C. These cores were not processed onboard the vessel. When the *Amundsen* returned to Quebec City, the core samples were transported to the core repository at the Bedford Institute of Oceanography where they are to be processed, analyzed and curated. The deck sheets, which include a short description of sediment type of each core, are available in Appendix 4.

Personnel were transported to Banks Island by helicopter to collect three grab samples (2006-804-017, -018, -020) and a sample of peat (2006-019) from beach locations near De Salis Bay.



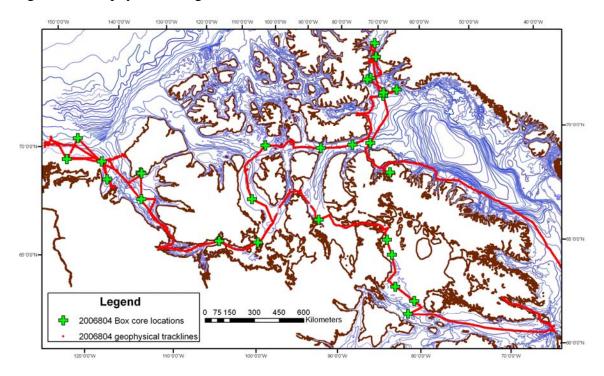


Figure 4 – Geophysical and geotechnical data collected on cruise 2006-804

4.2 Geophysical Data

Geophysical survey blocks were conducted in the following areas by the CCGS *Amundsen* and/or CSL *Heron*. Preliminary analysis of some of the data is discussed in Section 5.

Table 1: Multibeam survey blocks

Block#	Date	Survey Site	Latitude	Longitude	Dimensions	WD(m)
			N	W	(km)	
1	09/29/06	DeSalis			Recon.	
		Bay	71°21'	-121°41'	coverage	variable
2	10/03/06 -	Sachs			Recon.	
	10/04/06	Harbour	71°54'	-125°37'	coverage	variable
3	10/13/06 -	OAP				60 –
	10/15/06	Block 1	70°19'	-137°30'	17 x 5km	450m
4	10/14/06 -	OAP				70 –
	10/15/06	Block 2	70°11'	-137°52'	27 x 1km	280m
5	10/15/06 -	Slump				125 –
	10/16/06		70°37'	-136°10'	14 x 10km	600m

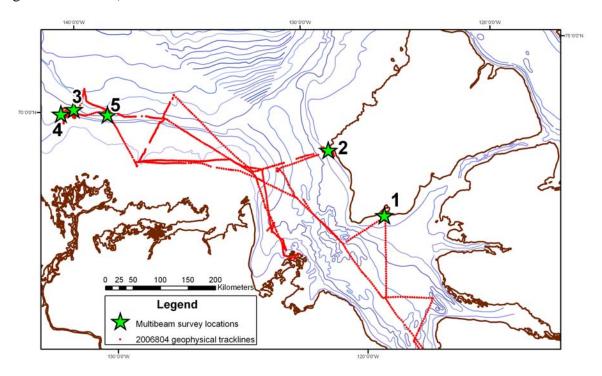
Multibeam and sub-bottom profiler data were also collected while the ship was transiting between stations, when ice conditions permitted. Fig. 4 shows the complete track of the



Amundsen where geophysical data were collected and Fig. 5 displays the locations of the survey blocks shown in Table 1 (map projection: Mercator). Images of the multibeam and sub-bottom profiler data can be viewed at the University of New Brunswick Ocean (UNB) Mapping Group's website http://www.omg.unb.ca.

There were several difficulties encountered with the EM 300 multibeam system that required downtime for repairs. When the EM 300 was in working order, it acquired excellent data in ice-free waters; however sea ice did adversely affect the quality of the bathymetric data.

Figure 5 – Multibeam echosounder survey sites for cruise 2006-804 (details for each site given in Table 1)

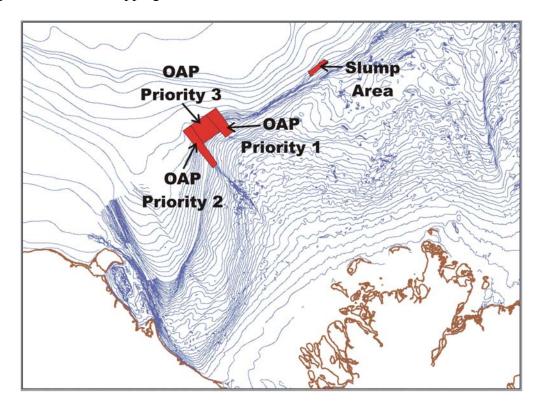




5.0 SCIENTIFIC ACCOMPLISHMENTS

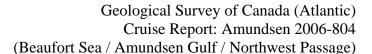
Two main areas were mapped by multibeam echosounder and sub-bottom profiler (Fig. 6). The first area was located on the eastern edge of the MacKenzie Trough and was mapped as part of Canada's Ocean Action Plan (OAP). The second area was a large seabed failure on the Mackenzie shelf break. This feature was mapped as part of NRCan's Geoscience for Ocean Management (GOM) program. The preliminary geological interpretation of these two survey areas is presented in this section.

Figure 6 – NRCan mapping areas



OAP Area

Through the Ocean Action Plan, a transect across the Beaufort Shelf from 5 m to 400 m is to be a targeted study of the seabed morphology, stratigraphy, benthic ecology, and geotechnical properties of the area. The main goal of this OAP work is to determine the effect of seabed features and processes (i.e. ice scour, gas venting) on benthic ecology. Most of this work will be accomplished using the CCGS *Nahidik*, however the *Amundsen* was used to collect multibeam data in the deeper water (greater than 70m) areas of the transect. UNB's survey launch *Heron* was also used in portions of the survey block.





OAP Priority Block 1 (OAP P1) was mapped to completion during the allotted time for NRCan mapping. This area was given the highest priority due to the large amount of benthic samples (box cores and seabed photographs) collected by NRCan. Because of the new multibeam coverage collected by the *Amundsen* and *Heron*, the benthic samples can be correlated to the shelf-wide OAP transect.

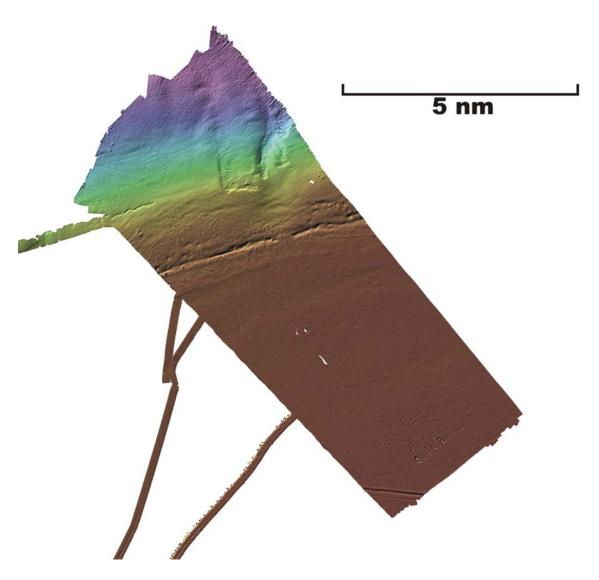
OAP P1 is a significant data set (see Fig. 7) containing several interesting features that reveal useful information on the seabed processes that are active or were active in the past. Several slope failures are visible in the deeper water portions of the survey block which are located on the continental shelf break and slope. A large trough runs approximately east-west across the mid-section of the data set. This trough is located at the shelf break and has been interpreted to be an area of extensional failure. It cannot be determined from multibeam and sub-bottom data alone if these failures are active or when they were active in the past. Core samples and radiocarbon dating will be required to determine the age of these features.

In waters shallower than the shelf break the seabed is dominated by ice scours. The maximum observed depth of active scouring in the Beaufort Sea is approximately 55 m. Since all of OAP P1 is located in water depths greater than 60 m, it is interpreted that all of the scours in this area are not formed by the present sea ice regime but were created in the past when sea level was lower or by a past, more extreme sea ice regime. One very large scour is visible in the southern most corner of the survey block.

OAP Priority Block 2 (OAP P2) is the deep water extension of the main shelf-wide OAP transect. This area was started during 2006 however only 3 lines were collected on this site due to poor weather. No meaningful interpretation is possible at this time. There was no data collection in OAP Priority Block 3 during the 2006 cruise.



Figure 7 – Multibeam data of Ocean Action Plan Priority Block 1



"Slump" Area

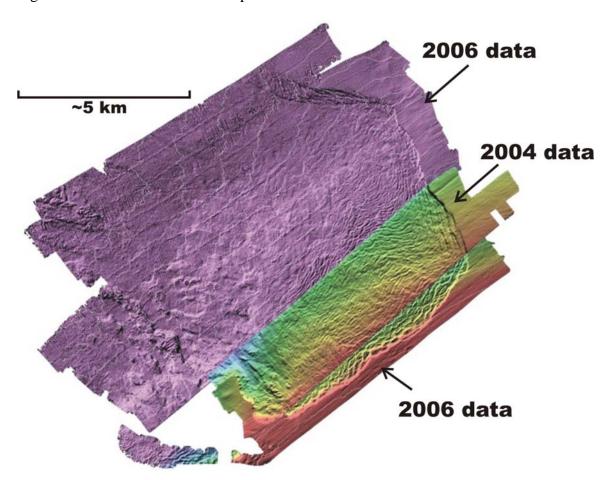
During the course of CASES Leg 8 in 2004, a large slope failure feature was imaged by multibeam echosounder and 3.5 kHz sub-bottom profiler (Bennett et al., 2008). A 3 x 11 km area was mapped during CASES, however due to its large scale; the entire feature could not be imaged during the allotted time set aside to survey the area. This same feature has been imaged and reported on at least two prior occasions by O'Connor Associates (1981) and Hill, Moran, and Blasco (1982).



Funding from NRCan was provided to ArcticNet to revisit the slump site to map the rest of the feature. The *Amundsen* was able to map the feature for almost 18 hours before it was necessary to move on to the next station. During this time, a very large amount of the slump was imaged, however the down-slope extent of the feature was still not observed (see Fig. 8). At this time, a 14 x 10 km section of the slump has been imaged in water depths from about 125 m to 600 m.

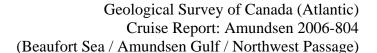
The age and origin of the feature is still not certain; however the multibeam bathymetry data collected during 2006 is an excellent data set and will be essential when integrated with future multibeam data and core samples. This data set reveals the widespread nature of sediment failure along the Beaufort Slope.

Figure 8 – Multibeam data of slump area



De Salis Bay

CSL *Heron* focused its survey in the inner bay, largely inside a large spit (Fig. 9). The survey design consisted of an initial stage in which single lines were run across the bay to provide a preliminary view of seabed bathymetry. This was followed by a more systematic survey of two areas where interesting features were identified. One area is





located along the southeastern side of the inner bay, where a bench at approximately 10 m water depth is thought to represent the Holocene sea-level lowstand. The surface of the bench is ice scoured and appears to be acoustically impenetrable, although faint stratification is visible in places. The other area of interest is located towards the head of the bay and consists of a northwest-southeast oriented trench with a central depression over 60 m deep (Fig. 10). The trench appears to follow the topographic grain of the adjacent land where Windrum Lagoon and De Salis River valley are prominent features (Fig. 9). The sub-bottom profile along the trench floor shows a thick acousticallystratified unit (20 m), which is interpreted to represent glaciomarine sedimentation during final deglaciation of the bay ca. 10,000 years ago. The profiles also display normal faulting throughout the entire glaciomarine sequence in the central depression of the trench (Fig. 11). These faults are coincident with terrace scarps observed discontinuously along the sides of the depression. Together, these data suggest that glaciomarine sediments were laid down on top of a stranded glacial ice block, which melted over time causing subsidence and faulting of the overlying sediment cover. The feature therefore may be best described as a large submarine kettle hole, equivalent to the deep, round kettle lakes on the surrounding landscape of De Salis Bay (Fig. 9). Postglacial sedimentation and current action have subtly remodeled the seabed expression of the submarine kettle.



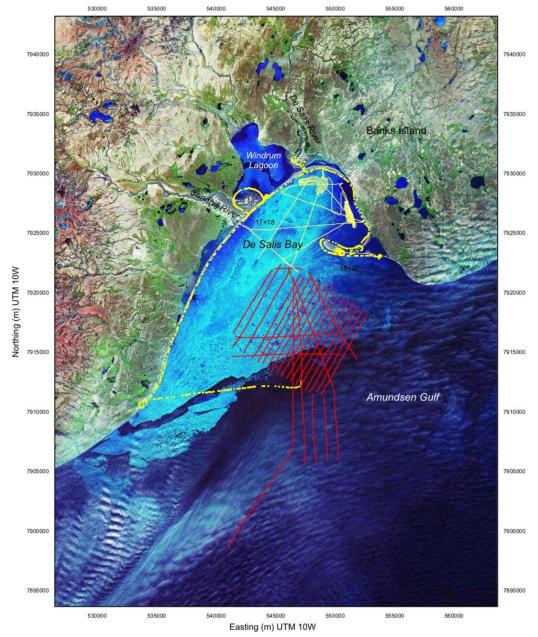


Fig. 9. Landsat mosaic of De Salis Bay showing preliminary *Amundsen* tracks [some errors] (red), *Heron* tracks (yellow), helicopter track (yellow dots), and onshore sample sites (numbered).



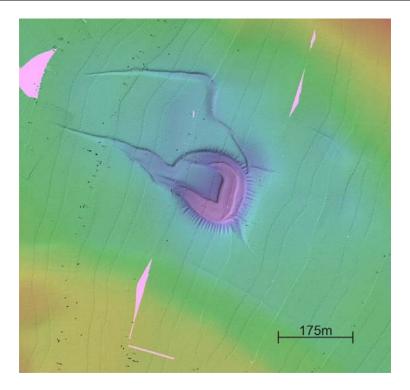


Fig. 10. Depression in the floor of inner De Salis Bay.

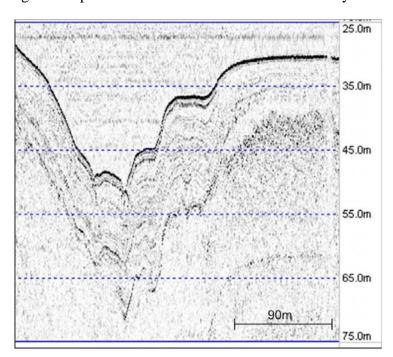
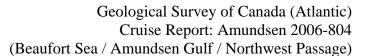


Fig. 11. Sub-bottom (3.5 kHz) profile through kettle depression in the floor of inner De Salis Bay, showing draped and faulted glaciomarine deposits.





While the *Heron* survey was working inside DeSalis Bay, CCGS *Amundsen* surveyed a large area (about 100 km²) in the outer bay and approaches on a sparse grid with line spacing of approximately 0.25 Nm. This was supplemented by three north-south check lines, three east-west check lines, and five north-south lines extending 5 km south of the main survey grid (Fig. 9). Over much of this area, the bottom was interpreted as compact sand, interrupted in places by patches of till outcrop. Extensive ice scour was found in the southeast and scour depressions were less common toward the northwest. The sub-bottom data showed substantial sand thickness and volume, consistent with the large sand sources in cliffs to the southwest and very extensive sand and gravel beaches surrounding the bay.

Additionally, helicopter C-GCHU (CG358) flew from the *Amundsen* flight deck and completed an aerial survey and photo reconnaissance of the bay. Preliminary results from the aerial survey are presented in Appendix 5.

Sachs Harbour

The interpretation of data collected during 2006-804 (Fig. 12) suggests that the inner and outer basins of Sachs Harbour are more complex than originally thought. Basin floors have remarkably irregular relief characterized by narrow ridges and troughs of up to 10 m relief. Water depths exceed 30 m in both outer basins. The sills are prominent features of the estuary and as shallow as a metre or less in places. Our surveys portray these features as steep-sided, flat topped, and for the most part acoustically impenetrable. The irregularity of the basin floors is consistent with the interpretation that the basins are kettle holes, as melting of the former glacier ice block would cause gradual subsidence and faulting of the overlying sedimentary cover, leaving an irregular surface. The steep-sided basin margins are also characteristic of kettle holes (Benn and Evans, 1998) and other lakes on the Sachs Lowland are interpreted as kettles (e.g. Gurney and Worsley, 1997).



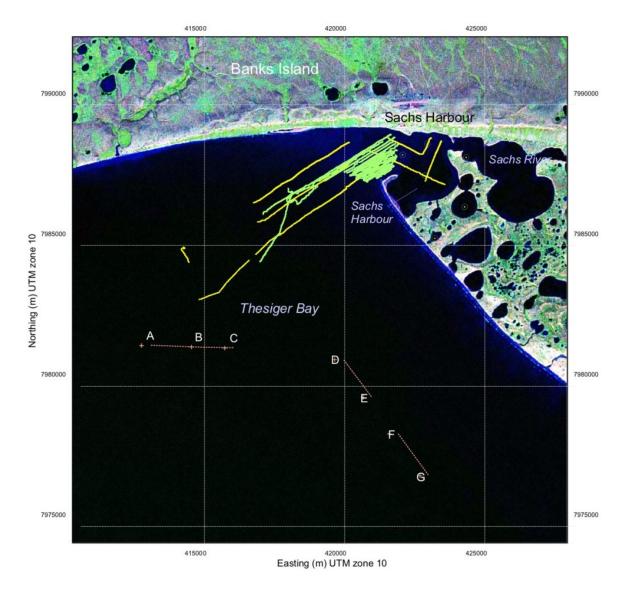


Fig. 12. Landsat image of Sachs Harbour showing the lake-studded lowland area to the southeast and amalgamated breached lake basins forming the harbour at the outlet of the Sachs River. Also shown are *Heron* survey tracks for sub-bottom profiling on October 3 [day 276] (yellow) and single-beam and side scan surveys on October 4 [day 277] (green); locations of cores taken through ice in May 2006 (circled dots); and segments of *Amundsen* track for which sub-bottom profiles are illustrated below (A-B-C, D-E, F-G).

The acoustic stratigraphy of the harbour consists of three sedimentary units: a lower acoustically stratified unit that appears thickest in the basins (at least 8 m thick in the outer basin, Fig. 13) and may thin across the sills; an overlying acoustically transparent unit, 1-2 m thick, which appears to drape basin floors, except in high relief areas, where it



is mostly ponded in small depressions; and an uppermost acoustically stratified unit which only occurs in the outer basin at its seaward end. The lower unit is interpreted to be stratified glaciomarine and/or glaciofluvial sediment deposited on an outwash plain. Although outwash deposits would normally be horizontally stratified, the kettled topography results in an apparent draping of the sills, but this is due to post-depositional subsidence in the basins and not necessarily primary sedimentation. The upper unit is interpreted to be postglacial mud in the inner basin and those parts of the outer basin distal to marine spillover processes. The mud (likely sandy mud based on source sediments) was deposited by suspension settling of reworked material from the sill tops and thermokarst erosion of the basin margins. There is evidence of slumping in the mud unit on steeper basin margins. Spillover of sand on the outer sill and behind the prominent spit of Sachs Harbour has led to the accumulation of an acoustically stratified uppermost unit on the adjacent basin floor, in places overlying the mud unit, suggesting relatively recent accumulation. Irregular thickening of the unit on sill slopes suggests active slumping of this unit due to high depositional rates and unstable slope conditions (Fig. 13).

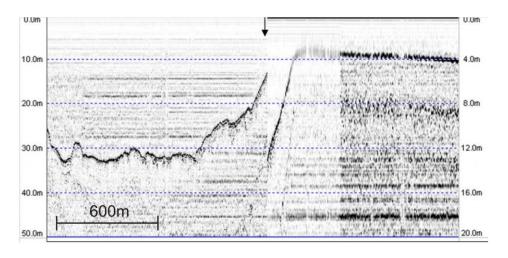


Fig. 13. Profile across outer basin heading seaward across outer sill – this line is closest to spit (phase change of sub-bottom recorder at arrow)

At least two distinct acoustic units are observed in deeper water outside the sill. The lowermost unit is a conformably stratified unit also showing some onlapping at basin or valley margins. This is interpreted as late-glacial glaciomarine or perhaps locally glacio-lacustrine facies associated with the final glacial advance in the Sachs Harbour area (Vincent, 1990). The base of this unit is somewhat irregular and interpreted as the upper surface of an underlying acoustically impenetrable unit, most likely till in many places. The stratified deposits are truncated by near-horizontal surfaces of the modern sea-floor in depths down to at least 40 m (Fig. 14).



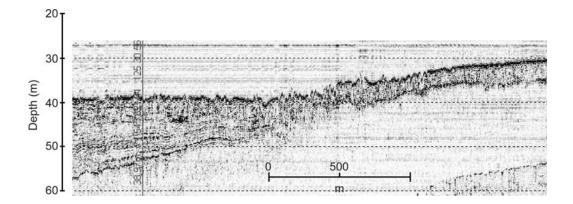


Fig. 14. East-west *Amundsen* 3.5 kHz profile off Sachs Harbour in present water depths of about 40 m shoaling to 30 m at the right. This is a continuation of the profile in Fig. 20 from A-B to C in Fig. 13 (east to the right). The surface truncation of the conformably stratified unit at the left continues into the subsurface at the right, where the overlying unit up to 3 m thick is interpreted as a possible post-transgressive marine unit.

Closer to the coast along a survey line running approximately shore-parallel southeast of Sachs Harbour (D-G in Fig. 12), sub-horizontal terraces and seafloor truncation surfaces in depths between 30 and 40 m are interrupted in places by channels or basins extending to 40 m or deeper. These basins show very similar characteristics to the breached kettle lake basins forming Sachs Harbour and may represent the overstepped basins of breached lakes on what was formerly an extension of the Sachs Lowlands terrain on shore today. In contrast to truncated lake basins found off the Tuktoyaktuk Peninsula (Héquette and Hill, 1989), where very similar terrain exists onshore, many of these basins have not been filled with sediment during the transgression.



6.0 RECOMMENDATIONS

- Complete multibeam survey of OAP Priority block #2
- Acquire sediment cores from the slope failure feature imaged during 2004-804. Also complete multibeam survey of the area to image the entire feature
- Acquire more multibeam data in the Amundsen Gulf to determine the extent of ice sheet related features

7.0 REFERENCES

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APPENDIX 1 - 2006-804 NARRATIVE



2006-804 NARRATIVE

ArcticNet 2006

Robbie Bennett- GSC Coring Technician onboard September 28th to October 30th, 2006

A daily log was not kept for Leg 1 (August 22^{nd} to September 28^{th}) of 2006-804; cores collected by personnel from UQAR and Dalhousie University during Leg 1.

September 27, 2006

-depart Halifax @ 12:15pm AT, arrive in Quebec City at 2:20pm ET

September 28, 2006

- -arrive at airport for charter flight to Kugluktuk at 4:00am ET
- -reach Kugluktuk at about 1:00pm MT
- -crew transfer to ship by helicopter beginning at 1:45pm MT
- -first science meeting at 8:00pm MT

September 29, 2006

-prepared for box core

September 30, 2006

- -DeSalis Bay survey
- -ArcticNet 2006 station 403
- -prepared for box core and net tow
- -collected box core 2006-804-016 BC, ~429m water depth
- -collect net tow for A. Rochon at same location
- -process samples

October 1, 2006

- -process samples and clean lab
- -check sample sheets and construct spreadsheet of sample data

October 2, 2006

- complete corrections to sample sheets and complete spreadsheet of sample data
- create arcview shapefiles of nav data for De Salis Bay survey

October 3, 3006

- -assist Don Forbes with coastal surveying equipment
- -survey Sachs Harbour (no coring)

October 4, 2006

- -survey Sachs Harbour (no coring)
- -discuss NRCan survey plan with Chief Scientist and Captain



October 5, 2006

-organize samples

October 6, 2006

- -ArcticNet station 420
- -collect box core 2006-804-021 BC, ~34 m water depth
- -collect plankton nets for A. Rochon at stations 420 and 421
- -process samples

October 7, 2006

- -ArcticNet station 421
- -collect box core 2006-804-022 BC, ~1218 m water depth
- -process samples
- -clean lab

October 8, 2006

-transit to Franklin Bay due to weather

October 9, 2006

- -ArcticNet station 436
- -collect box core 2006-804-023 BC, ~254 m water depth

October 10, 2006

- -process samples
- -clean lab
- -no science operations due to weather

October 11, 2006

- -transit to mooring station 435
- -deploy mooring and full station (no boxcore)

October 12, 2006

- -depart for NRCan survey site around 00:00
- -transit slowly due to poor weather

October 13, 2006

- -begin OAP block #1 at 1:45pm local (MT)
- -onboard *Heron* to collect data (6:00 pm to 1:30am local)

October 14, 2006

- -continue survey of OAP blocks 1 and 2
- -deploy Heron in block 1 (9:00am local), Amundsen moves to block 2



-poor weather causes the *Heron* to be recovered at 4:30 local, *Amundsen* moves back to complete OAP block 1

October 15, 2006

- -continue collecting data in OAP blocks 1
- -OAP block 1 completed at about 8:00am local, move to block 2
- -poor weather in block 2 causing poor data, move to slump survey (11:00pm local)
- -begin collecting data in slump block (6:00pm)

October 16, 2006

- -continue collecting data in slump block until 11:30am local
- -prepare for next box core and plankton tow

October 17, 2006

- -ArcticNet station 434
- -collect box core 2006-804-024 BC, ~55 m water depth
- -collect plankton net for A. Rochon no recovery due to ice

October 18, 2006

- -process samples
- -clean lab

October 19, 2006

-small crew change in Kugluktuk

October 20, 2006

-transit (no sampling)

October 21, 2006

-transit (no sampling)

October 22, 2006

-transit (no sampling)

October 23, 2006

- -ArcticNet station 322
- -collect box core 2006-804-025 BC, ~210 m water depth
- -collect plankton net for A. Rochon
- -process samples

October 24, 2006

- -process samples
- -prepare for next box core and plankton tow
- -ArcticNet station 322



-collect plankton net for A. Rochon

October 25, 2006

- -collect box core 2006-804-026 BC, ~34 m water depth
- -ArcticNet Station 334
- -collect plankton net for A. Rochon
- -collect box core 2006-804-027 BC, ~86 m water depth
- -ArcticNet Station 338
- -collect plankton net for A. Rochon
- -collect box core 2006-804-028 BC, ~135 m water depth

October 26, 2006

- -ArcticNet Station 346
- -collect plankton net for A. Rochon
- -collect box core 2006-804-029 BC, ~83 m water depth

October 27, 2006

- -ArcticNet Station 350
- -collect plankton net for A. Rochon
- -collect box core 2006-804-030 BC, ~386 m water depth
- -cleaned lab and packed equipment and materials

October 28, 2006

-continued packing and write cruise report

October 29, 2006

- -continued packing equipment
- -secured core samples in refrigerator

October 30, 2006

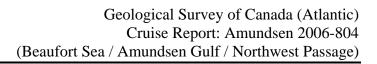
- -R. Bennett disembarks CCGS Amundsen
- -R. Bennett arrives in Halifax at about 9:30pm AT



APPENDIX 2 - 2006-804 SAMPLE INFORMATION



2006-804 ArcticNet 2006 Leg 1 & 2 (August 22nd to October 29th)									
Julian Date	Time UTC	Station No.	Core Number	Latitude	Longitude	Water Depth (m)	Sample Type	Length (cm)	Apparent Penetration
252	6:15	none	2006804-001 BC	72°15.336′ N	77°47.081' W	373	Push core	36	
"	"	"	II .	"	II .	"	Surface (Forams)	0-1	
"	"	"	"	"		"	Surface (Dinos)x2	0-0.5	
252	18:21	132	2006804-002 BC	78°59.992' N	72°17.082' W	250	Push core	15	
"	"	"	II .	"	"	"	Surface (Forams)	0-1	
"	"	"	n	"	"	"	Surface (Dinos)x2	0-0.5	
254	3:56	127	2006804-003 BC	74°02.419' N	79°55.954' W	644	Surface (Forams)	0-1	small recovery
"	"	"	"	"	"	"	Surface (Dinos)x2	0-0.5	
255	7:23	131	2006804-004 BC	78°19.076' N	73°12.422' W	258	none	0	no recovery
									,
257	4:12	119	2006804-005 BC	77°21.026′ N	76°04.896' W	527	Push core	32	
"	"	II .		"	"	"	Surface (Forams)	0-1	
"	"	"				"	Surface (Dinos)x2	0-0.5	
258	0:37	118	2006804-006 BC	77°19.620' N	76°58.147' W	452	Push core	21	
"	"	"	"	"	"	"	Surface (Forams)	0-1	
"	"	"	"	"	"	"	Surface (Dinos)x2	0-0.5	
260	2.10	115	2006904 007 DC	76940 246! N	74904 570! \\	666	Duch core	20	
260	3:10	115	2006804-007 BC	76°19.246′ N "	71°21.570' W	666	Push core Surface (Forams)	39	
"			II .	"	11	"	Surface (Dinos)x2	0-1 0-0.5	
							Odriace (Birlos)X2	0-0.5	
260	21:11	108	2006804-008 BC	76°15.704' N	74°37.012' W	448	Push core	35	
"	"	"	"	"	"	"	Surface (Forams)	0-1	
"	"	"		"	"	"	Surface (Dinos)x2	0-0.5	
000	2.00	404	2000004 000 DC	70004 C07! N	74947 7051111	244	Duch sees	24	
262	3:00	101	2006804-009 BC	76°24.687' N	74°17.735' W	311	Push core	31	
"		"	"	"		"	Surface (Forams) Surface (Dinos)x2	0-1 0-0.5	
							Surface (Dirios)X2	0-0.5	
264	4:18	301	2006804-010 BC	74°09.449' N	83°25.326' W	684	Push core	35	
"	"	II .	"	"	"	"	Surface (Forams)	0-1	
"	"	"	"	n	"	"	Surface (Dinos)x2	0-0.5	
264	20:05	303	2006804-011 BC	74°13.961' N	89°39.370' W	229	Push core	19	
204	20.03	"	"	7 - 10.301 N	89 39.370 VV	"	Surface (Forams)	0-1	
"	"	"	n	"	"	"	Surface (Dinos)x2	0-0.5	
267	6:56	307	2006804-012 BC	74°24.001' N	100°34.991' W	172	Push core	22	
"	"	II .	"	n .	H .	"	Surface (Forams)	0-1	
"	"	"	n .	"	"	ıı .	Surface (Dinos)x2	0-0.5	
269	0:22	310	2006804-013 BC A	71°28.922' N	102°14.090' W	214	Push core	32	
209	"	310	2006804-013 BC B	71°26.922 IN	102°14.090° W	Z14 "	F usir core	32 30	
"	"	"	"	II .	н	"	Surface (Forams)	0-1	
							- aa.a (1 01a.110)	٠,	





"	п		"	п	n	"	Surface (Dinos)x2	0-0.5	
269	19:21	312	2006804-014 BC A	69°09.513' N	100°42.157' W	63	Push core	34	
"	"	"	2006804-014 BC B	"	"	"	II .	32	
"	"	"	II.	"	"	"	Surface (Forams)	0-1	
"		"	"	"	"	"	Surface (Dinos)x2	0-0.5	
270	8:21	314	2006804-015 BC A	68°59.897' N 	106°36.199' W	108	Push core	42	
			2006804-015 BC B				" "	40	
			"			"	Surface (Forams)	0-1	
							Surface (Dinos)x2	0-0.5	
272	9:34	402	2006804-016 BC	70°05.985' N	120°03.254' W	410	Push core	34	
273	9.34	403	2000004-010 BC	70 05.965 IN	120 03.254 VV	410	Surface (Forams)	0-1	
			II .	"	n .	"	Surface (Dinos)x2	0-0.5	
							Surface (Dirios)X2	0-0.5	
273	20:12	none	2006804-017	71°26.268' N	121°47.799' W	-2	sediment vial	/	
	20.12	110110	200004 017	20.200 1	.2		Jodinion viai		
273	20:18	none	2006804-018	71°26.248' N	121°47.805' W	-1	sediment vial	/	
				13.2.13.1					
273	20:55	none	2006804-019	71°24.487' N	121°35.420' W	-1	sediment vial	/	
273	21:05	none	2006804-020	71°24.438' N	121°35.537' W	-1	sediment vial	/	
279	8:42	420	2006804-021 BC	71°03.3378′ N	128°31.0336' W	34	Push core	23	
"	"	"	II .	"	"	"	Surface (Forams)	0-1	
"	"	"	II .	"	"	"	Surface (Dinos)x2	0-0.5	
280	5:06	421	2006804-022 BC	71°28.3098' N	133°58.3220' W	1218	Push core	38	
"	"	"	"	"	"	"	Surface (Forams)	0-1	
"		"			"	"	Surface (Dinos)x2	0-0.5	
283	2:59	126	2006804-023 BC	70°20 20' N	126°21 50' W	254	Push core	40	_
203	2.59	436	2006604-023 BC	70°20.39' N "	126°21.58' W	254 "		40 0-1	
			II .	"	n .	,,	Surface (Forams) Surface (Dinos)x2	0-0.5	
							Surface (Dirios)X2	0-0.5	
290	4:25	434	2006804-024 BC	70°12.36' N	133°38.76' W	55	Push core	37	
"	"	"	u .	"	"	"	Surface (Forams)	0-1	
"	"	"	II .	"	u u	"	Surface (Dinos)x2	0-0.5	
296	11:09	322	2006804-025 BC	70°24.138' N	91°04.642' W	210	Push core	30	
"	"	"		"	"	"	Surface (Forams)	0-1	
"		"		"	"	"	Surface (Dinos)x2	0-0.5	
200	5.00	222	2006804 026 BC	68°45.48' N	91000 201 14/	24	Push core	bulk	minimal
298	5:09	333	2006804-026 BC	68°45.48° N	81°00.28' W "	34	Surface (Forams)	bulk 0-1	minimal
	"		"	"	"	"	Surface (Dinos)x2	0-0.5	
							Surface (Dirios)X2	0.0.0	
298	12:10	334	2006804-027 BC	67°52.71' N	80°48.08' W	86	Push core	18	
"	"	"	u .	"	"	"	Surface (Forams)	0-1	
II .	"	ıı	II	II .	II	"	Surface (Dinos)x2	0-0.5	
299	4:30	338	2006804-028 BC A	66°08.06' N	81°20.42' W	135	Push core	28	
"	"	"	2006804-028 BC B	"	"	"		31	
"	"	"	II	"	"	"	Surface (Forams)	0-1	



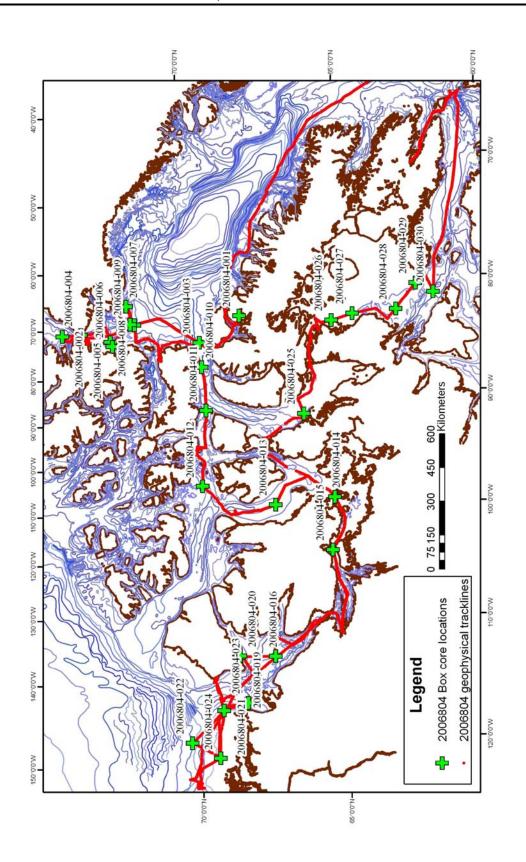
Geological Survey of Canada (Atlantic) Cruise Report: Amundsen 2006-804 (Beaufort Sea / Amundsen Gulf / Northwest Passage)

"	"	"	п	II .	II .	"	Surface (Dinos)x2	0-0.5	
299	16:48	346	2006804-029 BC	65°06.92' N	79°20.92' W	83	Push core	bulk	minimal
"	"	"	II .	"	"	"	Surface (Forams)	0-1	
"	"	"	"	n .	"	"	Surface (Dinos)x2	0-0.5	
300	5:58	350	2006804-030 BC A	64°30.81' N	80°32.34' W	386	Push core	37	
"	"	"	2006804-030 BC B	"	"	"	II .	36	
"	"	"	II .	"	u .	"	Surface (Forams)	0-1	
"	"	"	п	II .	II .	"	Surface (Dinos)x2	0-0.5	

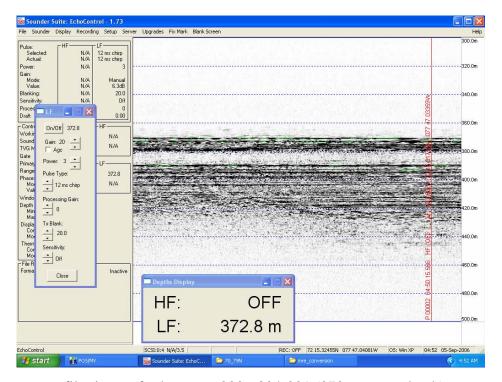


APPENDIX 3 – 2006-804 SUB-BOTTOM PROFILES OVER BOX CORE SITES

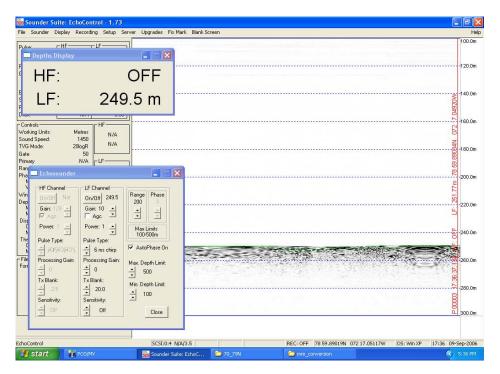






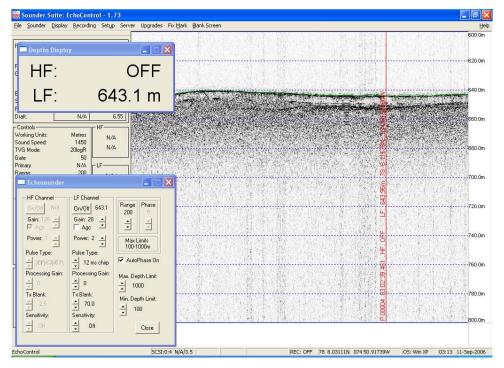


Sub-bottom profiler image for box core 2006-804-001 (373 m water depth)

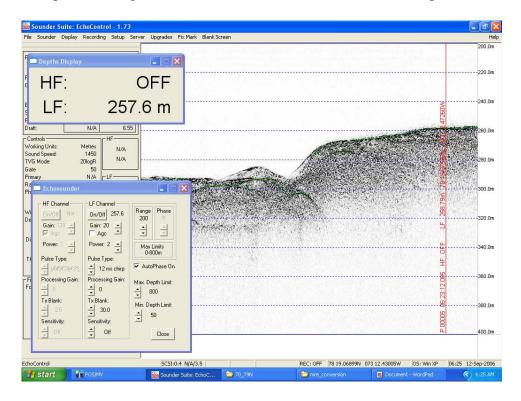


Sub-bottom profiler image for box core 2006-804-002 (250 m water depth)



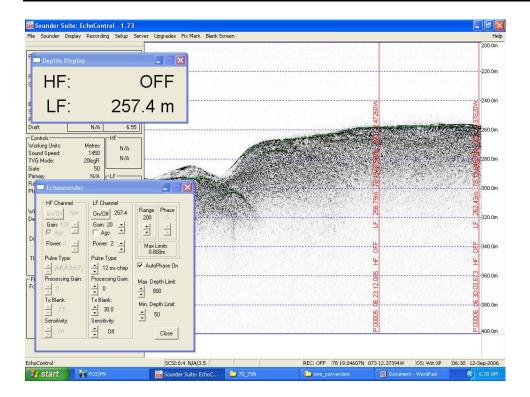


Sub-bottom profiler image for box core 2006-804-003 (644 m water depth)

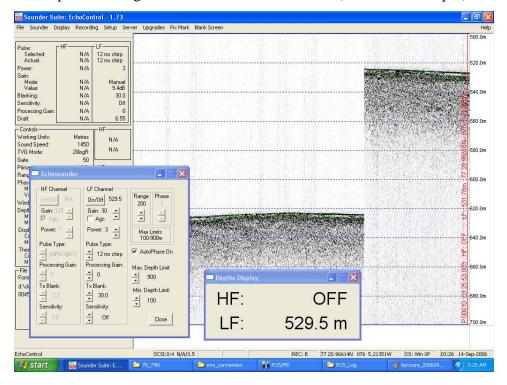


Sub-bottom profiler image for box core 2006-804-004a (258 m water depth)



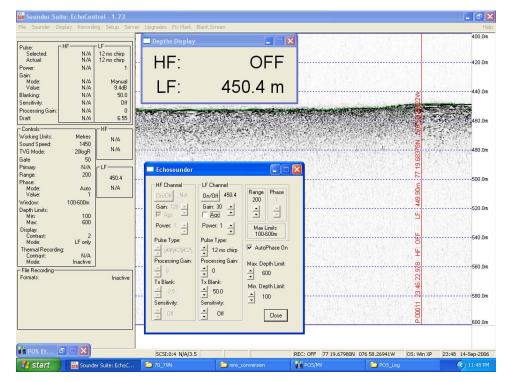


Sub-bottom profiler image for box core 2006-804-004b (258 m water depth)

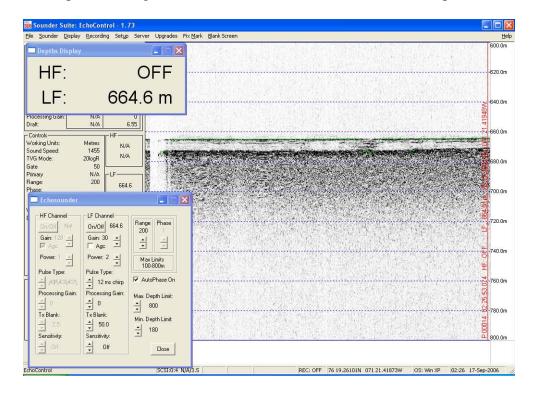


Sub-bottom profiler image for box core 2006-804-005 (527 m water depth)



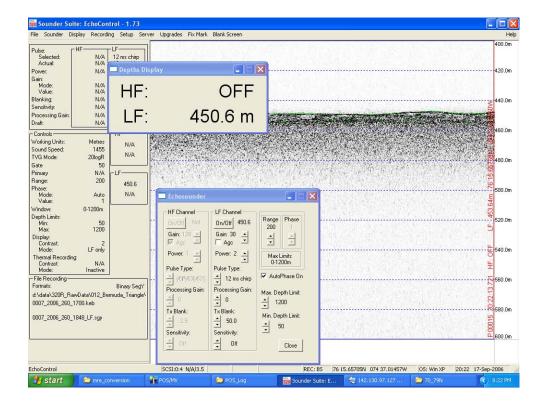


Sub-bottom profiler image for box core 2006-804-006 (452 m water depth)

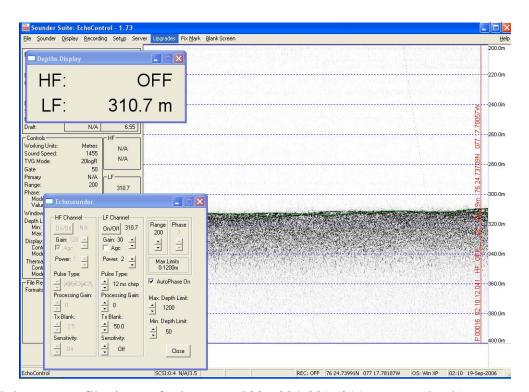


Sub-bottom profiler image for box core 2006-804-007 (666 m water depth)



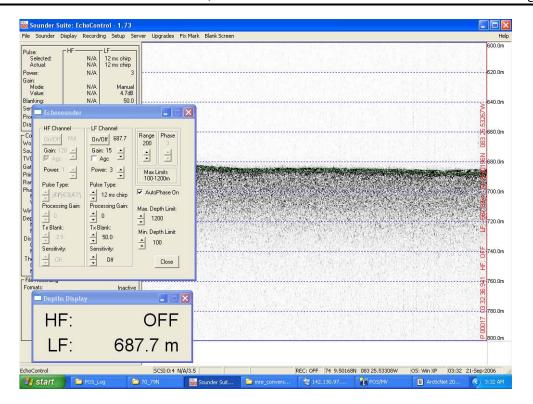


Sub-bottom profiler image for box core 2006-804-008 (448 m water depth)

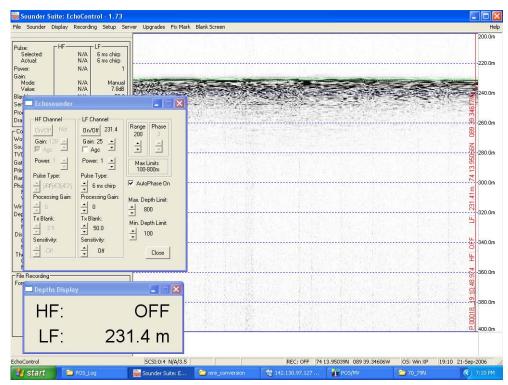


Sub-bottom profiler image for box core 2006-804-009 (311 m water depth)



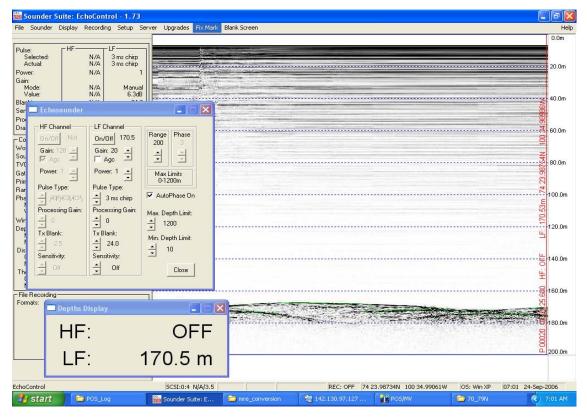


Sub-bottom profiler image for box core 2006-804-010 (684 m water depth)

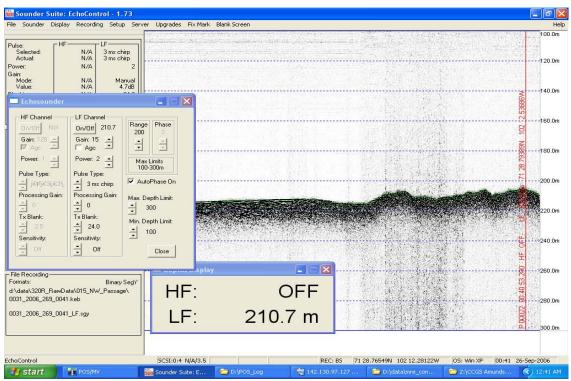


Sub-bottom profiler image for box core 2006-804-011 (229 m water depth)



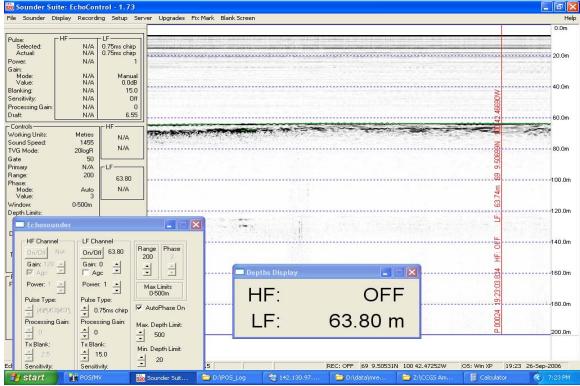


Sub-bottom profiler image for box core 2006-804-012 (172 m water depth)

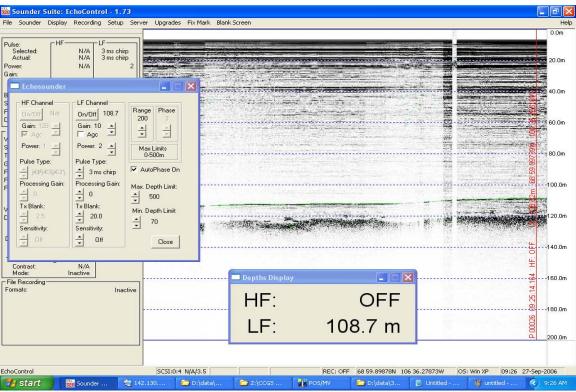


Sub-bottom profiler image for box core 2006-804-013 (214 m water depth)



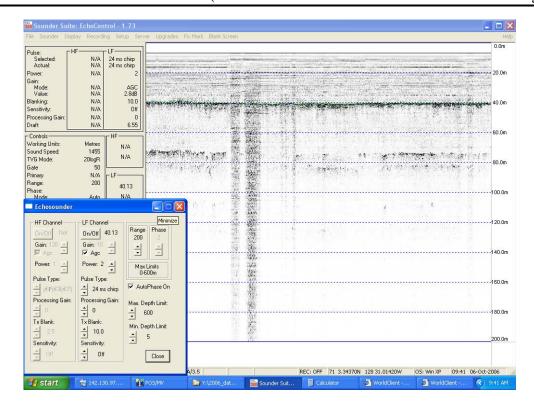


Sub-bottom profiler image for box core 2006-804-014 (63 m water depth)

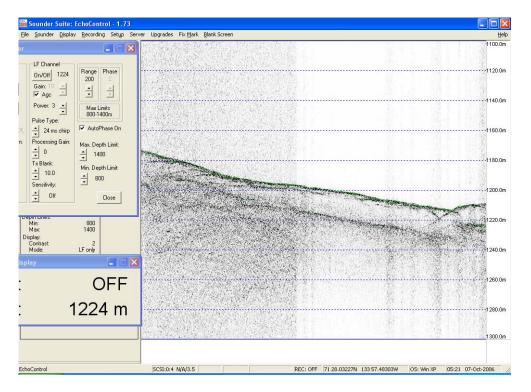


Sub-bottom profiler image for box core 2006-804-015 (108 m water depth)



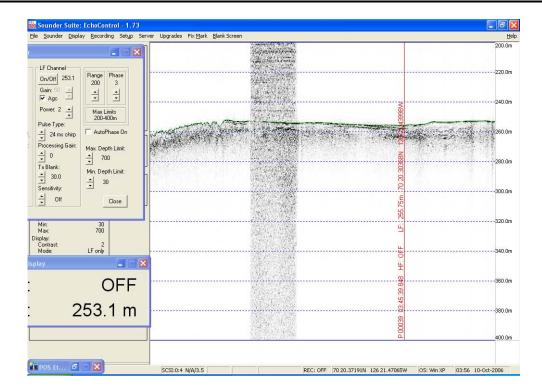


Sub-bottom profiler image for box core 2006-804-021 (34 m water depth)

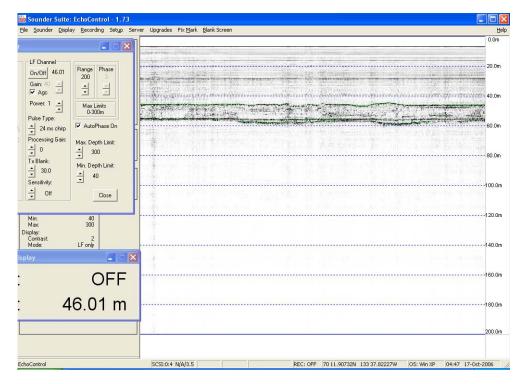


Sub-bottom profiler image for box core 2006-804-022 (1218 m water depth)



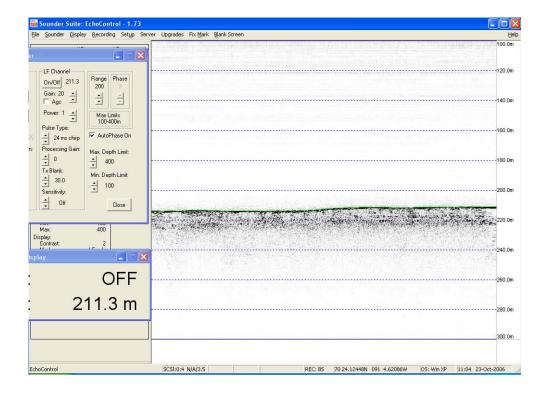


Sub-bottom profiler image for box core 2006-804-023 (254 m water depth)

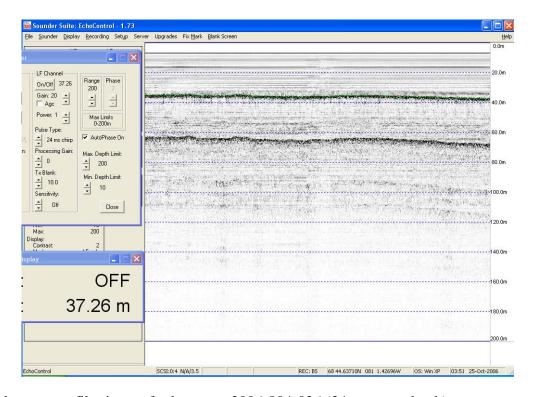


Sub-bottom profiler image for box core 2006-804-024 (55 m water depth)



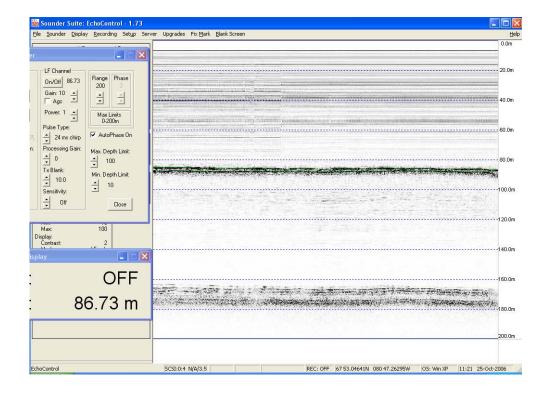


Sub-bottom profiler image for box core 2006-804-025 (210 m water depth)

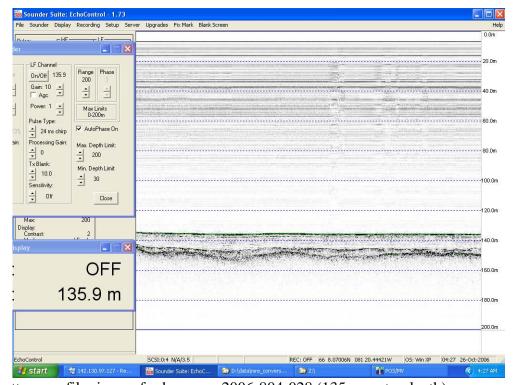


Sub-bottom profiler image for box core 2006-804-026 (34 m water depth)



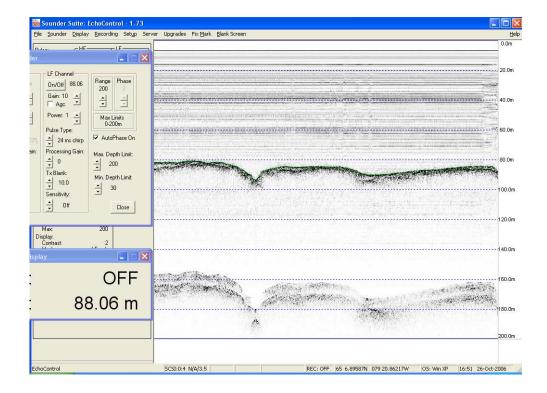


Sub-bottom profiler image for box core 2006-804-027 (86 m water depth)

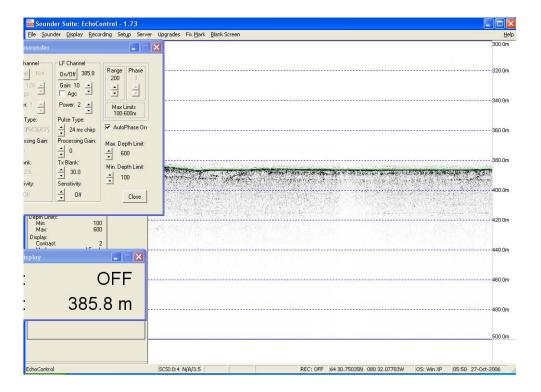


Sub-bottom profiler image for box core 2006-804-028 (135 m water depth)





Sub-bottom profiler image for box core 2006-804-029 (83 m water depth)



Sub-bottom profiler image for box core 2006-804-030 (386 m water depth)



APPENDIX 4 – 2006-804 BOX CORE DECK SHEETS

GRABS		GEOLOGICAL	, SU.	RVEY of CAN	AD	A (ATLANTIC)		C	RAB	S
CRUISE NUMBER	<u>s</u>	TATION NUMBER		VESSEL NAME		PROJECT NUMBER		CHIE	F SCIE	TRITY
2006-804	L	001	,	AMUNDSEN				Δ.	BARREF	***
Day of Year \ UTC time	,	LATITUDE	-	LONGITUDE		* GEOREGION *			B-REGI	
1 st 20 07:15	• *	72'15'336		77°47'081	1 1	eg: Gulf of St. Lawrence eg: Scotian Shelf	<i>?</i> 1		de Chal ble Basir	
2 Try						ARCTIC		oLi	16E 20	UND
Water Depth (m)	Ele	vation Reference :		Depth Method :	000					***************************************
373				3,5 kHz	l	EM100, EM1000, EM 3.5 khz, 5khz, 12 khz,) lchg
Wire out (m)		ault: local water leve	:1			Lead Line, Other, None	·	:	-	, KIIZ
If station is based o			S	eismic instrumen		Choose Fre				70000
Please comp Seis Expedition Code		below:	1 _			3.5 khz, Airgun, Bathy: Bubblepulser, Chirp, Grav		-		
	Г		1	3,5 kHz		Magnetics, Multibeam,	-	-		
			L			Seaotter, Sidescan, Sle			_	20
			1			Sparker, Seabed2, Sear				JR.
<u>GRAB</u>		Choos Van				from the list ipek, Eckman,		belov Ponar	♥: □	
Comments:										
	J	Please choos	e a	nalysis typ	e i	for collection	fre	om lis	st bel	ow.
		Age		Carbon Content		Isotopes			omagne	
<u>SUBSAMPLES</u>		Archeology		Grain Size		Macropaleontology	J		ılynolog	
	_	Biology		ndex Properties		Micropaleontology		P	etrolog	y
Analysis Type		Biostratigraphy Fop Interval		rganic Chemist		Organic Chemistry		0-	XRD	4
Analysis Type		Top Interval	<u> DU</u>	ttom Interva	1	Subcore name		Co	mmen	<u>ts:</u>
	•						_			****
							_			***************************************
							-		****	***
							_			,
If subsample is from					1					NAME OF THE OWNER, WHEN PERSONS ASSESSMENT
If subsample is from	n u	subcore, pieuse	s em	er name oj su	DC	ле. (e.g. A, B, С, e	ic.	.)		
]	BOXCORE_	<u>/ I</u>]	KU GRAB			Ī	A 🗌	В	C
Choose from below	R	ecovered core		35.5 cr	m	Subcores				
BOXCORE Standard		<u>Length</u>	<u></u>				≥	D \square	E	F
IKU GRAB 1 cu (m)	Λ	Lengths of		ores : In cent		·	ŀ			
	A	31.3	D			G		_ 🚽	-	_
subcore Type :	В		\mathbf{E}			н	ľ		4-	
Peel or Push?								AA	BB	cc
N-MARINAN,	<u>C</u>		F			<u> </u>	ᅪ	}		
two surfaces sa	~1	ba (linos	und	from / Ko	-Same	<u>Subsamples</u>	. -	DD	EE	FF
overale of 10 or	飞	HE 11.26	On (L2 38 01:34			>	GG	нн	
to the second second		Dieace obooc		nalwaia twa		or collection (<u> </u>			
		Age		Carbon Content	<u>C 1</u>	for collection for the state of	TTC		omagne	
SUBSAMPLES		Archeology	C	Grain Size		Macropaleontology	ı		lynolog	
		Biology	Ir	ndex Properties		Micropaleontology			etrologi	
		Biostratigraphy	Ino	rganic Chemistr	ry	Organic Chemistry			XRD	***************************************
<u>Analysis Type</u>	7	<u> Fop Interval</u>	<u>Bo</u>	ttom Interva	1_	Com	ım	ents:		

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GRABS	GEOLOGICAL S	SURVEY of CANAI	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-804	00)	AMUNDSEN	<u> </u>	D. BARBER
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st 75 19:21	78°59'992	72"17"08)	eg: Gulf of St. Lawrence eg: Scotian Shelf	= Baie de Chaleur = Sable Basin
2 nd Try			ARCTIC	KANE BASIN
Water Depth (m)	Elevation Reference:	Depth Method:	Choose From	
250	`	3,5 KH2	EM100, EM1000, EM30	000, RTK-DGPS, 0 khz, 50 khz, 200 khz
	Default: local water level		Lead Line, Other, None	
If station is based or	The second secon	Seismic instrument	Choose From	
Please compl Seis Expedition Code	Seis Day / UTC Time		3.5 khz, Airgun, Bathyme Bubblepulser, Chirp, Gravit	•
Louis de la constant		3,5 14/2	Magnetics, Multibeam, O	
		2,3,1412	Seaotter, Sidescan, Sleev	•
			Sparker, Seabed2, Seama	arc, Seistec, OTHER.
GRAB	Choose VanVe		from the list nipek, Eckman,	below: Ponar
Comments:				
	Please choose	analysis tyne	for collection fr	om list helow
	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
A 1		Inorganic Chemistry		XRD
<u>Analysis Type</u>	<u>Top Interval</u>	Bottom Interval	Subcore name	Comments:
	and the second s			Karakan managan
			\square	
If subsample is from	ι a subcore, please e	enter name of subc	core. (e.g. A, B, C, etc	c.)
	BOXCORE /	IKU GRAB		A B C
Choose from below	Recovered core		Subcores	
BOXCORE Standard	Length	15,0 cm		
IKU GRAB 1 cu (m)		ubc <u>ores : In centim</u>		D E F
GRAB 0.5 cu (m)	A [5,0]	D	G	
subcore Type :	в	- T	TT	<u> </u>
Peel or Push?	D	E	Н	
Comments:	C ₁	F,	I	AA BB CC
Two surface som	Va /A in a L	Los alle	Subsamples	DD EE FF
be the	4.6.			
N	A Dilan			СС НН П
	Please choose	<u>analysis type</u>	<u>for collection fr</u>	om list below.
SUBSAMPLES	Age	Carbon Content	Isotopes	Paleomagnetics
SUDSAMIFLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology Biostratigraphy I	Index Properties Inorganic Chemistry	Micropaleontology Organic Chemistry	Petrology XRD
Analysis Type		Bottom Interval	······································	nents:
AND CONTRACT AND CONTRACT OF THE CONTRACT OF T				
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GRABS	GEOLOGICAL	SURVEY of CANAL	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-804	003	AMUNDSEN		D. BARBER
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st Try 54 04:56	78°08'135	74°50′558	eg: Gulf of St. Lawrence eg: Scotian Shelf	= Baie de Chaleur = Sable Basin
2d Try			Aperic	SMITH SOUND
Water Depth (m)	Elevation Reference:	Depth Method:	Choose From	
644	`	3,5 kHz	EM100, EM1000, EM30	000, RTK-DGPS, 0 khz, 50 khz, 200 khz
	Default: local water level		Lead Line, Other, None	
If station is based on		Seismic instrument	Choose From	
Please compl Seis Expedition Code	Seis Day / UTC Time		3.5 khz, Airgun, Bathyme Bubblepulser, Chirp, Gravit	•
		3,5 wHz	Magnetics, Multibeam, O	· · · · · · · · · · · · · · · · · · ·
		7,3 6112	Seaotter, Sidescan, Sleev	•
			Sparker, Seabed2, Seama	arc, Seistec, OTHER.
<u>GRAB</u>			from the list hipek, Eckman,	below:
Comments:	O CONTRACTOR OF THE PROPERTY O			
	Please choos	e analysis type	for collection fr	om list helow
**************************************	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
A 1	Biostratigraphy	Inorganic Chemistry		XRD
<u>Analysis Type</u>	<u>Top Interval</u>	Bottom Interval	Subcore name	<u>Comments:</u>

			\square	
If subsample is from	a subcore, please	enter name of sub	core. (e.g. A, B, C, et	c.)
	BOXCORE	/ IKU GRAB		A B C
Choose from below	Recovered core		Subcores	L
BOXCORE Standard	Length	cm		
IKU GRAB 1 cu (m)	Lengths of s	<u>subcores : In cențin</u>	netres	D E F
GRAB 0.5 cu (m)	A Management of the second	D	G	Land Land , layana
subcore Type :	В	E	н	
Peel or Push?				AA BB CC
Comments:	C,	F	I	AA BB CC
No prohesso have	antoler, it	was put an	<u>Subsamples</u>	DD EE FF
free of very rop	By mud. Spinger	a, sample (deno		
	a car tale	James The hope	J92	GG HH II
	Please choose		for collection fr	om list below.
SUBSAMPLES	Age	Carbon Content	Isotopes	Paleomagnetics
SOBSIMI DES	Archeology Biology	Grain Size Index Properties	Macropaleontology Micropaleontology	Palynology Patrology
		Inorganic Chemistry	2 00	Petrology XRD
Analysis Type	Top Interval	Bottom Interval		nents:
			<u></u>	

	L	h		

GRABS	GEOLOGICAL :	SURVEY of CANAL	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-804	004	AMUNDSEN		0. BARBER
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st Try 355 06:23	78°19'076	73°12'422	eg: Gulf of St. Lawrence eg: Scotian Shelf	= Baie de Chaleur = Sable Basin
2 I Try			ARCTIC	Smith Sound
Water Depth (m)	Elevation Reference :	Depth Method:		
258		3,51442	EM100, EM1000, EM30	
Wire out (m)	Default: local water level		3.5 khz, 5khz, 12 khz, 30 Lead Line, Other, None) knz, 50 knz, 200 knz
If station is based o	n a Seismic Record	Seismic instrument	Choose From	
Please comp	· · · · · · · · · · · · · · · · · · ·		3.5 khz, Airgun, Bathym	-
Seis Expedition Code	Seis Day / UTC Time	3,5 KH2	Bubblepulser, Chirp, Gravit Magnetics, Multibeam, C	-
		1, 10112	Seaotter, Sidescan, Sleev	
			Sparker, Seabed2, Seam	4
	01		from the list	h-1
GRAB	VanVe		from the list nipek, Eckman,	Ponar Ponar
Comments:				
	Please choose	analysis type	for collection fr	om list below.
	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	1	Inorganic Chemistry	Organic Chemistry	XRD
Analysis Type	Top Interval	Bottom Interval	Subcore name	Comments:
weeks and the state of the stat	,			And the second s
	:		(V	
na paulan kanda kand				62
If subsample is fron	n a subcore, please e	enter name of subc	core. (e.g. A, B, C, etc	2.)
	BOXCORE /	IKU GRAB		A B C
Ohaasa fram halarri			Subcores	
Choose from below	Recovered core	cm		
BOXCORE Standard	Length L	ıbcores : In centim		D E F
IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m)		D Cores : In Centini	G	
	A A			
_ubcore Type :	в	E	H	
Peel or Push?				AA BB CC
Comments:		f L	I	
No securenz of	select / wit 3	by rocks.	<u>Subsamples</u>	DD EE FF
	/ 3			
				GG HH II
	Please choose	analysis type	<u>for collection fr</u>	om list below.
	Age	Carbon Content	Isotopes	Paleomagnetics
<u>SUBSAMPLES</u>	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
		norganic Chemistry	Organic Chemistry	XRD
<u>Analysis Type</u>	Top Interval	Bottom Interval	Comn	nents:
		-		
			Ą.	
THE PROPERTY OF THE PROPERTY O				

GRABS	GEOLOGICAL	SURVEY of CANA	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-800	005	AMUNBSEN		D. BARBER
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st 61 0510	72026	76°04'896	eg: Gulf of St. Lawrence	= Baie de Chaleur
Try 25 05:12	77 01 006	7009016	eg: Scotian Shelf	= Sable Basin
Try			APOTIC	NORTH WATER
Water Depth (m)	Elevation Reference:	Depth Method:	Choose From	
527		3,5 LH2	EM100, EM1000, EM3 3.5 khz, 5khz, 12 khz, 3	
Wire out (m)	Default: local water leve	English and the second	Lead Line, Other, None	
If station is based o		Seismic instrument	Choose From 3.5 khz, Airgun, Bathym	
Seis Expedition Code	Seis Day / UTC Time	раздужениј антирарска је од време и је ве мене од је од остане ве остане ве остане и постане и се се се се се	Bubblepulser, Chirp, Gravi	•
		3,5 KH2	Magnetics, Multibeam, C	
		7,3 8,4,8,	Seaotter, Sidescan, Sleev	-
			Sparker, Seabed2, Seam	iare, Seistee, Offier.
<u>GRAB</u>			from the list	
	Van\	Veen, Trowel, S	hipek, Eckman,	Ponar
Comments:				
	Please choos	e analysis type	for collection f	rom list below.
	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy	Inorganic Chemistry		XRD
<u>Analysis Type</u>	<u>Top Interval</u>	Bottom Interval	Subcore name	<u>Comments:</u>
				Company of the Compan
			ا / است	

If subsample is from	n a subcore, please	enter name of sub	core. (e.g. A, B, C, et	tc.)
If subsample is from	an no no service de parada Comerca en destador de moral, contrator en		core. (e.g. A, B, C, et	
	BOXCORE	enter name of sub		
Choose from below	BOXCORE Recovered core		Subcores	
Choose from below BOXCORE Standard	BOXCORE Recovered core Length	/ IKU GRAB 31,7 cm	Subcores	
Choose from below BOXCORE Standard IKU GRAB 1 cu (m)	BOXCORE Recovered core Length Lengths of	/ IKU GRAB	Subcores	A [B [C [
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m)	BOXCORE Recovered core Length	/ IKU GRAB 31,7 cm subcores: In centin	Subcores netres G	A [B [C [
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type:	BOXCORE Recovered core Length Lengths of	/ IKU GRAB 31,7 cm subcores: In centin	Subcores III	A
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m)	BOXCORE Recovered core Length Lengths of s	/ IKU GRAB 31,7 cm subcores: In centin	Subcores netres G	A [B [C [
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push?	BOXCORE Recovered core Length Lengths of s A 31,4	/ IKU GRAB 31,7 cm subcores: In centin D	Subcores netres G H	A
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push?	BOXCORE Recovered core Length Lengths of s A 31,4	/ IKU GRAB 31,7 cm subcores: In centin D	Subcores netres G H	A B C D E F AA BB CC DD EE FF
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push?	BOXCORE Recovered core Length Lengths of s A 31,4	/ IKU GRAB 31,7 cm subcores: In centin D	Subcores netres G H	A B C D E F AA BB CC
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push?	BOXCORE Recovered core Length Lengths of s A 31,4 B C	/ IKU GRAB 31,7 cm subcores: In centin D E	Subcores netres G H I Subsamples	A B C D E F AA BB CC DD EE FF GG HH II
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A 31,4 B C	/ IKU GRAB 31,7 cm subcores: In centin D E	Subcores netres G H	A B C D E F AA BB CC DD EE FF GG HH II
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of second	/ IKU GRAB 31,7 cm subcores: In centin D E F Grans Content Grain Size	Subcores netres G H Subsamples for collection for Isotopes Macropaleontology	A B C D E F AA BB CC DD EE FF GG HH II rom list below. Paleomagnetics Palynology
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A 31,4 B C Please choos Age Archeology Biology	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties	Subcores netres G H Subsamples for collection for Isotopes Macropaleontology Micropaleontology	A B C D E F DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A B C Please choos Age Archeology Biology Biostratigraphy	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry	Subcores netres G H Subsamples Include the subsamples Macropaleontology Micropaleontology Organic Chemistry	A B C D E F DD EE FF DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A 31,4 B C Please choos Age Archeology Biology	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties	Subcores netres G H Subsamples Include the subsamples Macropaleontology Micropaleontology Organic Chemistry	A B C D E F DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A B C Please choos Age Archeology Biology Biostratigraphy	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry	Subcores netres G H Subsamples Include the subsamples Macropaleontology Micropaleontology Organic Chemistry	A B C D E F DD EE FF DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A B C Please choos Age Archeology Biology Biostratigraphy	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry	Subcores netres G H Subsamples Include the subsamples Macropaleontology Micropaleontology Organic Chemistry	A B C D E F DD EE FF DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A B C Please choos Age Archeology Biology Biostratigraphy	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry	Subcores netres G H Subsamples Include the subsamples Macropaleontology Micropaleontology Organic Chemistry	A B C D E F DD EE FF DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A B C Please choos Age Archeology Biology Biostratigraphy	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry	Subcores netres G H Subsamples Include the subsamples Macropaleontology Micropaleontology Organic Chemistry	A B C D E F DD EE FF DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A B C Please choos Age Archeology Biology Biostratigraphy	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry	Subcores Detres G H Subsamples Subsamples For collection for Isotopes Macropaleontology Micropaleontology Organic Chemistry Comi	A B C D E F DD EE FF DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A B C Please choos Age Archeology Biology Biostratigraphy	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry	Subcores netres G H Subsamples Include the subsamples Macropaleontology Micropaleontology Organic Chemistry	A B C D E F DD EE FF DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A 31,4 B C Please choos Age Archeology Biology Biostratigraphy Top Interval	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry Bottom Interval	Subcores Detres G H Subsamples Subsamples For collection for Isotopes Macropaleontology Micropaleontology Organic Chemistry Comi	A B C D E F AA BB CC DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD ments:
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A 31,4 B C Please choos Age Archeology Biology Biostratigraphy Top Interval	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry Bottom Interval	Subcores Detres G H Subsamples Subsamples For collection for Isotopes Macropaleontology Micropaleontology Organic Chemistry Comi	A B C D E F DD EE FF DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD
Choose from below BOXCORE Standard IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m) ubcore Type: Peel or Push? Comments:	BOXCORE Recovered core Length Lengths of s A 31,4 B C Please choos Age Archeology Biology Biostratigraphy Top Interval	/ IKU GRAB 31,7 cm subcores: In centin D E F Carbon Content Grain Size Index Properties Inorganic Chemistry	Subcores Detres G H Subsamples Subsamples For collection for Isotopes Macropaleontology Micropaleontology Organic Chemistry Comi	A B C D E F AA BB CC DD EE FF GG HH II rom list below. Paleomagnetics Palynology Petrology XRD ments:

GRABS		SURVEY of CANA		GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-804	00 6	AMUNDSEN		D BARRER
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st 00 01:27	1 204 10 1/	2/0501117	eg: Gulf of St. Lawrence	= Baie de Chaleur
Try 058 01:37	77 19 620	76°58'147	eg: Scotian Shelf	= Sable Basin
Try			ARCTIC	NORTH WATCH
Water Depth (m)	Elevation Reference		EM100, EM1000, EM3	
453		3,5 kHz	8.5 khz, 5khz, 12 khz, 3	
Wire out (m)	Default: local water leve	el	Lead Line, Other, None	
If station is based o		Seismic instrument	Choose From	
Please comp Seis Expedition Code			3.5 khz, Airgun, Bathym	·
Sels expedition Code	Seis Day / UTC Time	3,5 W/2	Bubblepulser, Chirp, Gravit Magnetics, Multibeam, C	-
			Seaotter, Sidescan, Sleev	
			Sparker, Seabed2, Seam	arc, Seistec, OTHER.
	Choos	se type of grab	from the list	below:
<u>GRAB</u>			hipek, Eckman,	Ponar
Comments:		vooli, liovvoi, o.		
Comments:				
			for collection for	
SUBSAMPLES	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology Biostratigraphy	Index Properties Inorganic Chemistry	Micropaleontology Organic Chemistry	Petrology XRD
Analysis Type	Top Interval	Bottom Interval	Subcore name	Comments:

			(<u>1</u>)———	
A STATE OF THE STA				
If subsample is fron	n a subcore, please	e enter name of sub	core. (e.g. A, B, C, et	C.J
	BOXCORE	/ IKU GRAB		A B C
Choose from below	Recovered core		Subcores	
BOXCORE Standard	Length	<u>30,5</u> cm		D E F
IKU GRAB 1 cu (m)		subcores : In centin		D E F
IKU GRAB 0.5 cu (m)	A 30,5	D [G	
_ubcore Type :				C + + +
Peel or Push?	В	E	H	
	C	F	ı	AA BB CC
4	Vaca.		Subsamples	DD EE FF
To the last	- Contract	and formally		
been later from	~ 74 \+			GG HH II
	Please choos	e analysis type	for collection fr	om list below.
	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy	Inorganic Chemistry		XRD
<u>Analysis Type</u>	<u>Top Interval</u>	Bottom Interval	Comi	nents:
		<u></u>		
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Andrew American Ameri				
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				0.1
	Cleal	M. /KL 118)	uni-	6 June 2000 DH
	Dent. 13 /	JO (JIM. 114)		
	>ept. 13/	06 (Stn. 118) 55		

GRABS		GEOLOGICA	MLSU	JRVEY of CAN	ADA	(ATLANTIC)		GRA	m2
CRUISE NUMBER	S'	TATION NUMBE	3	VESSEL NAME]	PROJECT NUMBER	-	CHIEF SC	IENTIST
2006-804		607		AMUN DSEN				O. BAR	A.L.
Day of Year \ UTC time	······	LATITUDE		LONGITUDE	T	* GEOREGION *		* SUB-RE	GION *
1 st 10	7 [7/6:01-11/		71.71,240	-	Gulf of St. Lawrence	? =	= Baie de C	
Try 060 04:10	. L	H6, 14, 7A9	*****	<u> </u>	eg	Scotian Shelf	= 1	= Sable B	
2 I Try	Ì					ARCTIC		NORTA	0
Water Depth (m)	 Ele	vation Referenc	<u> </u> e:	Depth Method:		Choose Fr	om 7	This List	A MANAGEMENT OF THE PROPERTY O
	ľ		Т Г	3.5 KHz	EM	1100, EM1000, EM	3000	, RTK-DGPS	3,
	L		L	3,3 412	April 19 Company	khz, 5khz, 12 khz,		hz, 50 khz, 3	200 khz
Wire out (m)	Defa	ult: local water le	evel		Lea	ad Line, Other, None	••		
If station is based o	on a S	Seismic Record	1 5	Seismic instrumen	t DD	Choose Fr	om I	his List	
Please com						khz, Airgun, Bathy			
Seis Expedition Code	Se	is Day / UTC Tim	ie		1	oblepulser, Chirp, Gra	-	7	
				3,5 kHz	1	gnetics, <u>Multibeam,</u> aotter, Sidescan, Sle			
	<u> </u>					arker, Seabed2, Sea	-		-
					Î	COLUMN COLUMN COLUMN PROGRAM		10 mg -	
GRAB		Choo	se	type of gra	b fi	om the lis	t b	elow:	5)
<u> </u>		Va	nVee	n, Trowel,	Ship	ek, Eckman,	Po	onar	<u> </u>
Comments:									
	T	Massa aba	~~~	maleraia term	a fo	r collection	fro.	m list h	alow
				Carbon Content	C IU	Isotopes	<u> </u>	Paleoma	
SUBSAMPLES		Age Archeology		Grain Size	71./	Isolopes Iacropaleontologi	,	Palyno	
		Biology		Index Properties		ficropaleontology Licropaleontology		Petrol	
	B	Biology iostratigraphy		organic Chemist		rganic Chemistri		XR	-
Analysis Type	The state of the s	Cop Interval	(constitution of the constitution of the const	ottom Interva		Subcore name	<u></u>	Comm	
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	-								
	•					<u> </u>			myuujaeeemeejaaseemidaks seesia
MESSA JUNE RESIDENCE DE L'ARTE DE L'	-					/			
	•								
If subsample is fro	n a s	subcore, plea	se en	ter name of su	bcore	e. (e.g. A, B, C, e	tc.)		
	T	BOXCORE	`/]	KU GRAB			A	В	С
C1 C 1 - 1			· · · · · · · · · · · · · · · · · · ·		ı	Subcores			
Choose from below	K	ecovered core	2	39,0 cr	n	Subcores	\downarrow \vdash		
BOXCORE Standard		Length	fenh	cores : In cent	metr		$\exists P$	E	F
IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m)	A	39.0	D		G				
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ubcore Type:	в		\mathbf{E}		H				
Peel or Push?	,					,	-	AA B	B CC
Comments:	C	<u> </u>	F		<u> </u>		_ -		
to surlars so	·	La Colenor	- a-	1 Long		Subsamples	_		EE FF
Commenter of the comment of the comm		4	Ĺ	/\				GG L	и Д
MA /	- /	V Vicini	V-2-13-	<i>[-37]</i>					
	_F	lease choo		-	e for	collection	roi		
CTIDO A REDI DO		Age		Carbon Content		Isotopes		Paleoma	•
<u>SUBSAMPLES</u>		Archeology		Grain Size		acropaleontology		Palyno	
	_	Biology		ndex Properties		licropaleontology		Petrolo XRI	-
Analysis Type		iostratigraphy Cop Interval	····	organic Chemistr ottom Interva		rganic Chemistry Com		nts:	
Analysis Type		Op Interval			_	<u> </u>	eeee x		
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						id.			
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		0 1	hr/NI	(Stn. 115)				6 June	2000 DH
		DATIL	W/ Hin	The It		. 405°.			

GRABS	GEOLOGICAL	SURVEY of CANAL	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-804	008	AMUNOSEN		D. BARBER
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st 0 6 0011	1 720,6140	74037012	eg: Gulf of St. Lawrence	= Baie de Chaleur
Try 360 00	1 76° 15' 704	11 ST 012	eg: Scotian Shelf	= Sable Basin
2			ARCTIÓ	ENTRANCE OF NORTH WATEL
Try				
Water Depth (m)	Elevation Reference:	Depth Method:	Choose From	
448	,	3,5 Wh	EM100, EM1000, EM3-3.5 khz, 5khz, 12 khz, 3	
Wire out (m)	Default: local water leve	1	Lead Line, Other, None	
If station is based o Please comp		Seismic instrument	3.5 khz, Airgun, Bathym	
Seis Expedition Code	Seis Day / UTC Time		Bubblepulser, Chirp, Gravi	•
Baranana de cristia de des assesses en construcciones en construcc	- Francisco de Caracterio de C	3,5 wh	Magnetics, Multibeam, C	
			Seaotter, Sidescan, Sleev	9
		1	Sparker, Seabed2, Seam	
GRAB	Choos	e type of grab	from the list	below:
GIVAD	Van	Veen, Trowel, St	nipek, Eckman,	Ponar
Comments:	The second secon			
	Please choos	e analysis type	for collection for	rom list helow
	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy	Inorganic Chemistry	Organic Chemistry	XRD
Analysis Type	Top Interval	Bottom Interval	Subcore name	Comments:
			\	WATER THE
omenical halos de servicio en en esta en	·			The state of the s
If subsample is fron	n a subcore, please	e enter name of subc	core. (e.g. A. B. C. et	c.)
				and the control of th
	BOXCORE	/ IKU GRAB		
Choose from below	Recovered core	24.1 cm	Subcores	
BOXCORE Standard	Length			
IKU GRAB 1 cu (m)	Charles MAN	subcores : In centim	G	
	A	D		
abcore Type:	В	E	Н	
Peel or Rush?				AA BB CC
Comments:	C	F	I	
The surfex so	~ claca	and honey	Subsamples	DD EE FF
1 - La-	A A	baterl		GG HH I
	79		for collection fo	om list holovy
		e analysis type Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Age Archeology	Grain Size	Macropaleontology	Palynology
OODDIRIII DDO	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy	Inorganic Chemistry	Organic Chemistry	XRD
Analysis Type	Top Interval	Bottom Interval	Com	nents:
WATER TO THE TOTAL OF THE TOTAL				
			Accessed to the second	·
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	Language and the second	hand the second		
	6 117	M. / (1 1/19)		6 June 2000 DH
	Jept. 111	06 (Str. 108)	AGS	

GRABS	GEOLOGICAI	SURVEY of CANAL	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-804	669	AMUNOSEN		O. Baffel
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st [/ 5]	40	***************************************	eg: Gulf of St. Lawrence	= Baie de Chaleur
Try 262 04:00	1 76°24'687	2201435	eg: Scotian Shelf	= Sable Basin
			ARCTIC	ENTRANCE OF
Try			7166716	NORTH WATER
Water Depth (m)	Elevation Reference	Depth Method:	Choose Fro	m This List
311		3.544	EM100, EM1000, EM3	
Wire out (m)	Default: local water leve	The second secon	3.5 khz, 5khz, 12 khz, 3 Lead Line, Other, None	
WIIC Out (III)	Delatit. Ioeai water iev			
If station is based o		Seismic instrument	Choose Fro	
Please comp			3.5 khz, Airgun, Bathyn Bubblepulser, Chirp, Gravi	•
Seis Expedition Code	Seis Day / UTC Time	3,5442	Magnetics, Multibeam, (-
		- X	Seaotter, Sidescan, Slee	
		<u> </u>	Sparker, Seabed2, Seam	narc, Seistec, OTHER.
	Choos	se type of grab	from the list	below:
<u>GRAB</u>			nipek, Eckman,	Ponar
	Vall	veen, mower, or	iipek, Dekillali,	TOHAL
Comments:				
	Please choos	<u>se analysis type</u>	<u>for collection f</u>	<u>rom list below.</u>
	Age	Carbon Content	Isotopes	Paleomagnetics
<u>SUBSAMPLES</u>		Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
A 1 1 75	Biostratigraphy	Inorganic Chemistry	Organic Chemistry	XRD
<u>Analysis Type</u>	Top Interval	Bottom Interval	Subcore name	Comments:

				MATERIAL STATE OF THE STATE OF
If subsample is from	n a subcore, pleas	e enter name of subc	core. (e.g. A, B, C, et	tc.)
	BOXCORE	/ IKU GRAB		A B C
Choose from below	Recovered core	Parameter (101 - 102 - 1	Subcores	
BOXCORE Standard	Length	3/ 2 cm		
IKU GRAB 1 cu (m)		subcores : In centim	L	D E F
IKU GRAB 0.5 cu (m)	A 31,2	D	G	
abcore Type:			-	
	В	E	H	
Peel or Push?	<u> </u>	F	I	AA BB CC
Comments:	C		Subsamples	DD EE FF
Two surface "	samples Chings	- and formal		
have the	- La the	axha		GG HH II
	Please choos	se analysis type	for collection f	rom list below.
	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy	Inorganic Chemistry	Organic Chemistry	XRD
Analysis Type	Top Interval	Bottom Interval	Com	ments:
				·
			W W	
	L	<u> </u>		
	Cant. 191	06 (Stn. 101)	.ali	<i>6 June 2000</i> DH
	2001 14/	00 (JM. 101)		

GRABS	GEOLOGICAL S	SURVEY of CANAL	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-809	6 10	Anunosen		O. BALBER
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st 704 05:18	74069'449	63°25'346	eg: Gulf of St. Lawrence eg: Scotian Shelf	= Baie de Chaleur = Sable Basin
2 Try			Aperic	CANCASTER SOUND
Water Depth (m)	Elevation Reference:	Depth Method:	Choose From	
684	,	3.56Hz	EM100, EM1000, EM30 3.5 khz, 5khz, 12 khz, 30	
	Default: local water level	•	Lead Line, Other, None	
If station is based or Please compl		Seismic instrument	3.5 khz, Airgun, Bathym	
Seis Expedition Code	Seis Day / UTC Time		Bubblepulser, Chirp, Gravit	
		3,5 LHL	Magnetics, Multibeam, C	
			Seaotter, Sidescan, Sleev Sparker, Seabed2, Seam	w •
			and the second s	
GRAB	Choose VanVe		from the list	below: Ponar
Comments:				
	Please choose	analysis type	for collection fr	om list below.
	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
Analysis Type		Inorganic Chemistry Bottom Interval	Organic Chemistry Subcore name	XRD Comments:
imalysis Type		Bottom meervar	Subcore name	Comments.

If subsample is from	a subcore, please e	enter name of subc	core. (e.a. A. B. C. etc	·]
		ordonos se appetados por como como esta en est	graphic and Marie Camping Country and Camping	
	BOXCORE /	IKU GRAB	1	
Choose from below	Recovered core	35,2 cm	Subcores	
BOXCORE Standard	Length L	ibcores : In centim		D E F
IKU GRAB I cu (m) IKU GRAB 0.5 cu (m)	E come	D Cores in century	G	
ubcore Type :				C H L
	B	E L	H	
Peel or Push? Comments:	c 🔼 I	F	1	AA BB CC
Comments.			Subsamples	DD EE FF
and make &	Johnson Spiros	and (money)		
has been tile	from The box	cr3-"	- ·	GG HH II
	Please choose	analysis type	for collection fr	om list below.
	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology XRD
Analysis Type		norganic Chemistry Bottom Interval	Organic Chemistry Comn	nents:
			ķį.	

Sept. 20/06 (Stn. 301) -

CRUISE NUMBER		THE PROPERTY OF THE PROPERTY O		
	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-864	GU	Amunosen		D. BARBER
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st Tru 264 21:05	74"13"961	89 839370	eg: Gulf of St. Lawrence	
Try 269 21:05	412,101		eg: Scotian Shelf	= Sable Basin
2 J Try			Aletic	OF LANCASTER SO
Water Depth (m)	Elevation Reference	: Depth Method :	Choose Fro	
229		3.5 W/2	EM100, EM1000, EM3	
Wire out (m)	Default: local water lev	d hamman paragraphic of the control	Lead Line, Other, None.	30 khz, 50 khz, 200 khz
If station is based o	on a Seismic Record	Seismic instrument		
·	plete below:	getskepsterske modelke konstruer synnem kan server en en en skriver de en	_	netry, Boomer, BRUTIV,
Seis Expedition Code	Seis Day / UTC Time		Bubblepulser, Chirp, Grav. Magnetics, Multibeam,	
		3,5 klh	Seaotter, Sidescan, Slee	
			Sparker, Seabed2, Sean	narc, Seistec, OTHER.
~~~	Choo	se type of gra	b from the list	below:
<u>GRAB</u>			Shipek, Eckman,	Ponar
Comments:				
Comments.				
			for collection f	
SUBSAMPLES	Age	Carbon Content Grain Size	Isotopes Macronalcontologu	Paleomagnetics
SOBSIMIL DES	Archeology Biology	Index Properties	Macropaleontology Micropaleontology	Palynology Petrology
	Biostratigraphy	Inorganic Chemistr		
Analysis Type	Top Interval	Bottom Interval		Comments:
	<b>34</b>			tion to the state of the state
- CONTRACTOR OF THE STATE OF TH		***************************************		
	**************************************			
7C 1 1 - : - C				
ij subsample is from			ocore. (e.g. A, B, C, e	IA B C
	BOXCORE	/ IKU GRAB	1 0 1	
Choose from below	Recovered core	19,0 cm	Subcores	
BOXCORE Standard	Length	subcores : In centing		
IKU GRAB 1 cu (m) IKU GRAB 0.5 cu (m)	A 19.0	D D	menes	
INO GIORD O.5 CU (III)			G	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			G	G H I
_ubcore Type :	В	Е	G	
Peel or Push?	В	E	н	AA BB CC
The state of the s			н	
Peel or Push?	В	E	HI Subsamples	AA BB CC DD EE FF
Peel or Push?	В	E	н	DD EE FF
Peel or Push?	B C C C Cope	E F ond from //	H Subsamples	DD EE FF
Peel or Push?	B C Please choose	F f from //	H Subsamples for collection for	DD EE FF GG HH II rom list below.
Peel or Push?  Comments:  Two way for a few fields and the few fields are the few fields	Please choos	F F Se analysis type Carbon Content	H Subsamples  for collection for Isotopes	DD EE FF GG HH II  rom list below.  Paleomagnetics
Peel or Push?  Comments:  Two way for a few fields and the few fields are the few fields	Please choos  Age Archeology	F f from //	H Subsamples for collection for	DD EE FF GG HH II rom list below.
Peel or Push?  Comments:  Two way for a few fields and the few fields are the few fields	Please choos	F  se analysis type  Carbon Content  Grain Size  Index Properties  Inorganic Chemistry	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry	DD EE FF  GG HH II  rom list below.  Paleomagnetics Palynology
Peel or Push?  Comments:  Two way for a few fields and the few fields are the few fields	Please choos  Age Archeology Biology	F  se analysis type Carbon Content Grain Size Index Properties	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry	DD EE FF GG HH II  rom list below.  Paleomagnetics Palynology Petrology
Peel or Push? Comments:  Two ware grants  SUBSAMPLES	Please choos  Age  Archeology  Biology  Biostratigraphy	F  se analysis type  Carbon Content  Grain Size  Index Properties  Inorganic Chemistry	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry	DD EE FF GG HH II  rom list below.  Paleomagnetics Palynology Petrology XRD
Peel or Push? Comments:  Two ware grants  SUBSAMPLES	Please choos  Age  Archeology  Biology  Biostratigraphy	F  se analysis type  Carbon Content  Grain Size  Index Properties  Inorganic Chemistry	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry	DD EE FF GG HH II  rom list below.  Paleomagnetics Palynology Petrology XRD
Peel or Push? Comments:  Two ware grants  SUBSAMPLES	Please choos  Age  Archeology  Biology  Biostratigraphy	F  se analysis type  Carbon Content  Grain Size  Index Properties  Inorganic Chemistry	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry	DD EE FF GG HH II  rom list below.  Paleomagnetics Palynology Petrology XRD
Peel or Push? Comments:  Two ware grants  SUBSAMPLES	Please choos  Age  Archeology  Biology  Biostratigraphy	F  se analysis type  Carbon Content  Grain Size  Index Properties  Inorganic Chemistry	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry	DD EE FF GG HH II  rom list below.  Paleomagnetics Palynology Petrology XRD
Peel or Push? Comments:  Two ware grants  SUBSAMPLES	Please choos  Age  Archeology  Biology  Biostratigraphy	F  se analysis type  Carbon Content  Grain Size  Index Properties  Inorganic Chemistry	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry	DD EE FF GG HH II  rom list below.  Paleomagnetics Palynology Petrology XRD
Peel or Push? Comments:  Two ware grants  SUBSAMPLES	Please choos  Age  Archeology  Biology  Biostratigraphy	F  se analysis type  Carbon Content  Grain Size  Index Properties  Inorganic Chemistry	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry	DD EE FF GG HH II  rom list below.  Paleomagnetics Palynology Petrology XRD
Peel or Push? Comments:  Two ware grants  SUBSAMPLES	Please choos  Age  Archeology  Biology  Biostratigraphy	F  se analysis type  Carbon Content  Grain Size  Index Properties  Inorganic Chemistry	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry  Comm	DD EE FF GG HH II  rom list below.  Paleomagnetics Palynology Petrology XRD  ments:
Peel or Push? Comments:  Two ware grants  SUBSAMPLES	Please choos  Age Archeology Biology Biostratigraphy  Top Interval	F  se analysis type  Carbon Content  Grain Size  Index Properties  Inorganic Chemistry	H  Subsamples  For collection for  Isotopes  Macropaleontology  Micropaleontology  Organic Chemistry  Comm	DD EE FF GG HH II  rom list below.  Paleomagnetics Palynology Petrology XRD

GRABS		GEOLOGIC/	IL SU	RVEY of CA	NAI	DA (ATLANTI	C)	C	RAB	S
CRUISE NUMBER	<u>s</u>	STATION NUMBER	******************************	VESSEL NAME		PROJECT NUM		CHIE	F SCIEN	YTIST
700G-80H		_ 0/2		Anodo	e_			1).	Brasil	ber
Day of Year \ UTC time	<u> </u>	LATITUDE		LONGITUDE		* GEOREGIC			JB-REGIO	
1 st Try 267 07:56		74° 24'001		100° 34'00		eg: Gulf of St. Lau eg: Scottan Shel	<u>f</u>	= Sal	de Chale ble Basir	
2d Try						NWP Archic		<u> </u>		7'011
Water Depth (m)	Ele	evation Reference	<u>e:</u>	Depth Method:	: 00	EM100, EM1000		m This Lis		ers
Wire out (m)	L Defa	ault: local water le		3.5 14		3.5 khz, 5khz, 12 Lead Line, Other,	khz, 3	0 khz, 50 l		) khz
If station is based o	on a s	Seismic Record	S	eismic instrume	<u>ent</u>	DD > Choos				Augustian and a second a second and a second a second and
Please comp	plete	below:		Reductivity and account of the second of the		3.5 khz, Airgun, E	3athym	netry, Boon	ner, BRU	
Seis Expedition Code	Se	eis Day / UTC Tim		1		Bubblepulser, Chirp Magnetics, Multib		-		
				5 HA E. E	manus 47"	Seaotter, Sidescar	n, Sleev	vegun, Son	nobuoy,	
			ᆜ			Sparker, Seabed2				CR.
GRAB			nSe t			from the nipek, Eckm		<b>belov</b> Ponar	v : ¬	
Comments:		ATT STATE OF THE S								
	J	Please cho	ose a	nalysis ty	pe	for collecti	on fr	rom lis	st bel	ow.
- A THIT INC		Age		Carbon Conter		Isotopes		Pale	omagne	etics
SUBSAMPLES	-	Archeology	r	Grain Size		Macropaleonto			alynolog etrolog	<b></b>
	E	Biology Biostratigraphy		ndex Propertie organic Chemis		Micropaleonto Organic Chem		r	etrologı XRD	y
Analysis Type	NAME AND ADDRESS OF THE PARTY O	Top Interval		ottom Interv		Subcore na		Con	mmen	ıt <u>s:</u>
	-				1			-	1000	
					1		_			
The state of the s	•				1		$\dashv$			
						<b>Y</b>	1			Manufacture of the second seco
							$\dashv$	***************************************		**************************************
If subsample is fron	n a_	subcore, plea	se ent	ter name of s	subc	core. (e.g. A, B,	C, et	:c.)		
	T	BOXCORE	× / T	KU GRAB	<u> </u>	goriginaen erigine erikken konsektik (antanio		A	В	С
of from helow		ecovered core		AU GIVAL	<u>.</u>	Subcores				
Choose from below BOXCORE (Standard)	T.	ecovered core Length		2,0	cm	Subcore				
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Please com							z, Airgun, Batl				UTIV,
Seis Expedition Code	S	eis Day / UTC Tim	2				pulser, Chirp, G				
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<b>SUBSAMPLES</b>		Archeology		Grain Size		Macı	ropaleontolo	gy	$P^{c}$	alynolo	gy
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	-	Biostratigraphy	System Commission Comm	ganic Chemis			<u>ınic Chemist</u>			XRD	
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CRUISE NUMBER	5	STATION NUMBER	ļ.	VESSEL NAME	£	PRO	OJECT NUMBER	CI	HIEF SCIE	ENTIST
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Day of Year \ UTC time	·	LATITUDE	Г	LONGITUDE		,	GEOREGION *		SUB-REG	
1 st Try 00:21		9°09/513	L	1000 42/19		eg:	ulf of St. Lawrence Scotian Shelf	=	Sable Bas	sin
2d Try							Arctic	<u> </u>	ichori Veen	Nove
Water Depth (m)	Ele	evation Reference	:	Depth Method	: 00	-	Choose Fro			Gal
63	L		L	3.5 KN.	<u></u>	3.5 kł	hz, 5khz ,12 khz, 3	30 khz, 5		)Q khz
Wire out (m)	***************************************	fault: local water leve					Line, Other, None.			
If station is based o Please comp			S	eismic instrum	ent		<b>Choose Fro</b> hz, Airgun, Bathyr			SILLIA'
Seis Expedition Code		eis Day / UTC Time	IF	espoi) aniilisapadii adrid kassa adrinida punkari fersa aarus meese ekeema.		Bubble	epulser, Chirp, Grav	rity, Gravi	ity 2, Hunte	ec,
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Analysis Type		Top Interval	Во	ttom Interv	val		bcore name		Comme	nts:
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BOXCORE Standard	77	Length			cm		Subcores >	<u>, L</u> t		
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Analysis Type		Top Interval		ttom Interv			Com	ments	<b>3.</b>	
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GRABS		GEOLOGIC	CAL SI	JRVEY of CA	INA	DA (A)	LANTIC)	15,014	GRAE	S
CRUISE NUMBER	·	STATION NUMB	ER	VESSEL NAM	E	PROJ	ECT NUMBER	CH	iief scie	NTIST
2006-804		- 015		A murde	<u>se</u> -	¹⁷ ha _p .		I	-23. C	W
Day of Year \ UTC time	<u>.</u>	LATITUDE		LONGITUDE			EOREGION *		SUB-REG	
1 st Try 270 69:21		C8° A91'893		166° 36' 19	9	eg: Sc	of St. Lawrence otian Shelf	] = (	nie de Cha Sable Basi	in
2 nd Try						1 1	space c	"l l	5 m par 10	· · · · /
Water Depth (m)	E	evation Referen	ice:	Depth Method	: 00		Choose Fr			
Wire out (m)	De	fault: local water	· level	35 KW,	,,,,,,	3.5 khz,	EM1000, EM 5khz ,12 khz, ne, Other, None	30 khz, 5		Q khz
If station is based o	on a	Seismic Record	ı E	Seismic instrum	nent		Choose Fr	om This !	 List	
Please com	plete	e below :	_		013000000000000000000000000000000000000	3.5 khz,	Airgun, Bathy	metry, Bo	omer, BR	
Seis Expedition Code	.S	eis Day / UTC T	ime			-	ılser, Chirp, Gra cs, Multibeam,	-	-	
				35 KM		Seaotter	, Sidescan, Sle	evegun, S	Sonobuoy,	
	L			THE COURSE WERE STREET		Sparker	, Seabed2, Sea	marc, Seis	stec, OTHI	ER.
GRAB			ose t anVeer	type of gangler, Trowel,		fron	the list	t belo Pona		
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	Π_	Please cho	ose a	nalysis ty	pe	for co	llection	from 1	ist be	low.
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THE RESIDENCE OF THE PROPERTY	-							***************************************	And confusion (1) The state of the forest of the state of	
If subsample is from	n a	subcore, ple	ase en	ter name of	subc	ore. (e.	g. A, B, C, e	tc.)		
		BOXCOR	$\overline{\mathbf{E}/\mathbf{I}}$	KU GRAI	3			A	В	c
Choose from below	, ′	Recovered co				S	ubcores		7 X	
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subcore Type :	В	40.0	E		7	н				
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Analysis Type	<del></del>	<u> Fop Interval</u>	<del></del>	ttom Interv		<u> Jigan</u>		ments		
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GRABS	GEOLOG	SICAL SURVEY of		TIC) GRABS
CRUISE NUMBER	STATION NUM	MBER VESSEL NA	AME PROJECT N	UMBER CHIEF SCIENTIST
2006-804	016	Anundse		G. Stern
Day of Year \ UTC time	LATITUD	E LONGITU		
1 st Try 273 09:34	70005 95	100003 C	eg: Gulf of St. I eg: Scotian S	
Try 315 09.39	. 10 00.10	24/1		Tieg - State Basin
2d Try			Archie NW Passa	Amudson Gulf
Water Depth (m)	Elevation Refe	rence: Depth Meth		oose From This List
410m		35kHz	i	000, EM3000, RTK-DGPS, ,12 khz, 30 khz, 50 khz, 200 khz
Wire out (m)	Default: local wa	ter level	Lead Line, Oth	
If station is based o	on a Seismic Rec	ord Seismic instr		oose From This List
<b>1</b>	plete below:			n, Bathymetry, Boomer, BRUTIV,
Seis Expedition Code	Seis Day / UTC		_	hirp, Gravity, Gravity 2, Huntec, ltibeam, OBS, Reflection, SAR,
		3.5 kt	-d I	scan, Sleevegun, Sonobuoy,
	<u> </u>		Sparker, Seabe	ed2, Seamarc, Seistec, OTHER.
	Ci	oose type of	grab from th	e list below:
<u>GRAB</u>	0.	VanVeen, Trowe		man, Ponar
Commentar	MANAGEMENT AND	variveer, from	a, ompek, Eck	illali, i ollai
Comments:	T 57		<u> </u>	4° C 1°-4 1 -1
	i .	•	· -	tion from list below.
SUBSAMPLES	Age Archeolog	Carbon Cor y Grain Siz	•	**
OODOMINI DEO	Biology	Index Prope	*	
	Biostratigra		•	
Analysis Type	Top Inter			
	•			**************************************
If outpourneds is from	m a orthogra s	logo ontor namo	of subserve (e.g. A	R C ata)
If subsample is from	n a subcore, p	rease enter name (	n subcore. (e.g. A,	B, C, etc.,
	<b>BOXCO</b>	RE / IKU GR	AB	$\begin{array}{c c} A & \square & B & \square & C \square \end{array}$
Choose from below	Recovered	core e	cm Subco	res
BOXCORE Standard	Length			
IKU GRAB 1 cu (m)			centimetres	
·	Lengt	hs of subcores : In		
GRAB 0.5 cu (m)		hs of subcores : In o	G	
y U GRAB 0.5 cu (m)	A 34	D	G	
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Peel or Push?  Comments:  Souther Samples	A 34  B  C  Solvin - Ohos	D E F	G	
Peel or Push?  Comments:  Souther Samples	Lengt  A 34  B C	B E F Cocc blue stay mud,	G H I I Subsam	ples DD EE FF
Peel or Push?  Comments:  Sourface Samples	A 34  B  C  Brown sunpy mad  45 cm	E  F  Government  Gt (UM) (265)	G  H  I  Subsam    pash core	ples DD EE FF
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Peel or Push?  Comments:  Sourface Samples  Do. hos (Rochon) bocc  Oforans (Schell) 30cc	Lengt  A 34  B  C  Potvin - Anos brown sungy mad  45 cm  Please cl  Age  Archeology  Biology	F  Government  F  Compare Size  Carbon Con  Grain Size  Index Prope	H  I  Subsam  Subsam  Pack Core  type for collect  atent Isotope  Macropaleon  rties Micropaleon	gg HH II  tion from list below. es Paleomagnetics ntology Palynology ntology Petrology
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30 September, 2636

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GRABS		GEOLOGICA	uslimits variable v	RVEY of CANA	DA	(ATLANTIC)		GRAB	5
CRUISE NUMBER	<b>S</b> 2	TATION NUMBER	3	VESSEL NAME		PROJECT NUMBER		CHIEF SCIE	NTIST
2006804		6017		AMUNDSEN		CC4800		G. STER	N
Day of Year \ UTC time	e	LATITUDE		LONGITUDE	Т	* GEOREGION *	·	* SUB-REGI	ON *
1 st		***************************************	7 [		eg.	: Gulf of St. Lawrence	=	Baie de Chal	
Try 273. 2012		71.437807	ا ل	-121.796652	eg.	: Scotian Shelf	= r	Sable Basii	n
ن. نط Try						WESTERN ARCTIL		DE SALL	S
Water Depth (m)	Ele	vation Reference	2:	Depth Method:		——  Choose Fro	m Th	is List	
Serving and August Contract Co	٠٦٠	OCAL WL	7 [	ESTIMATE	EM	1100, EM1000, EM3	3000,	RTK-DGPS,	
Wire out ( m )	L	ult: local water le	J L vel			5 khz, 5khz ,12 khz, 3 ad Line, Other, None.		z, 50 khz, 200	) khz
If station is based	on a S	eismic Record	T s	eismic instrument	000	Choose Fro	m Th	is List	**************************************
Please com	plete 1	below:				khz, Airgun, Bathyn			JTIV.
Seis Expedition Code	<u>Sei</u>	s Day / UTC Tim	e   [			bblepulser, Chirp, Gravi			
					Ma	gnetics, Multibeam, (	OBS,	Reflection, SA	AR,
						aotter, Sidescan, Slee	-		
					Spa	arker, Seabed2, Seam	iarc, S	Seistec, OTHE	ER.
		Choo	CA 1	wne of grat	· f.	om the list	<u> </u>	10777	
GRAB	wa . F .	Vai	nVeei	n, (Trowel, S	hipe	ek, Eckman,	Por	nar 🚄	
Comments:	ELIU(	DRIEK C-90	HU Nivi	BROWN SILTY	FIN	JE SAND FROM BANKS ISLAND, N	A LO	ONE VIAL	
						r collection f			
		Age		Carbon Content		Isotopes		Paleomagne	
SUBSAMPLES		Archeology		Grain Size	M	acropaleontology	•	Palynolog	
	]	Biology	I	ndex Properties		licropaleontology		Petrologi	
	Bi	ostratigraphy		rganic Chemistry		rganic Chemistry		XRD	9
Analysis Type		op Interval		ottom Interval		Subcore name			+0.
GRAIN SIZE	<u> </u>	O	יב	->	7	Subcore Haine		Commen	<u> 15.</u>
PETROLOGY	-						×		······································
	•	**************************************							
	•				$\overline{}$	/	***************************************		Mary Company of Community
	•				( '		***************************************		
	_ [								***************************************
If subsample is from	n a s	ubcore, pleas	se ent	ter name of subc	core	e. (e.g. A, B, C, et	<u>c.)</u>		
	<u>B</u>	<b>OXCORE</b>	<u>/ I</u>	KU GRAB			A	В 🗌	C
Choose from below	Re	covered core	8			Subcores			
BOXCORE Standard		Length		cm					
IKU GRAB 1 cu (m)			Subc	ores : In centin	L		D	E	F
IKU GRAB 0.5 cu (m)	ΑГ	DOMESTIC OF	D		G				
					u				horoson
<u>abcore Type :</u>	в		E		H		Mil		
Peel or Push?	<b></b>	AND THE RESIDENCE OF THE PARTY				**************************************	Ι,	A BB	cc
Comments:	C		F		I				
· •			( <del>quantum)quaqqua</del>			Subsamples	1,	DD EE	FF
							H		
								сс нн	
				- 4					
	P	lease choo	se a	nalysis type	tor	<u>collection fr</u>	<u>om</u>	<u>list belo</u>	ow.
		Age	C	arbon Content		Isotopes	P	Paleomagne:	tics
<b>SUBSAMPLES</b>	A	Archeology		Grain Size	Mo	acropaleontology		Palynolog	y
		Biology	Ir	idex Properties	M	icropaleontology		Petrology	!
AV01004132-04444	Bic	stratigraphy	Inoi	ganic Chemistry	Or	ganic Chemistry		XRD	
<u>Analysis Type</u>	To	op Interval	Bo	ttom Interval		Comp	nent	ts:	
GRAMESIZE		€		. 35					
Petroeday		A COMMENT		tan diagram					
	<u> </u>								
						·	***************************************		
	F						<del></del>	K	
A Commence of the Commence of									
		i i		1					
	-	***************************************							
	L					W- 100 Maria			

GRABS		GEOLOGICAI	SU	RVEY of CANA	MA	(ATLANTIC)		GRAL	<b>3</b> 5
CRUISE NUMBER		STATION NUMBER		VESSEL NAME		PROJECT NUMBER	CI	HEF SCIE	NTIST
2006804		0018		AMUNDSEN		CC4800		C. STE	RN
Day of Year \ UTC time	2	LATITUDE	o ije savriji ostenom	LONGITUDE	T	* GEOREGION *	*	SUB-REG	ION *
1 st 273. 2018	7 [	71,437466	Γ	-121,796758	eg	: Gulf of St. Lawrence	$= B_0$	aie de Cha	ıleur
Try 2/3 2018	JL		L	121,130130	eg	: Scotian Shelf	=	Sable Bas	in
2d Try						WESTERN ARCTIC	,	DE SAL BAY	15
Water Depth (m)	E	levation Reference	*	Depth Method:		Choose Fro	m This	List	
	ſ	LOCAL WL	Г	ESTIMATE		M100, EM1000, EM3			
Wire out (m)	De	fault: local water leve	Ļ			5 khz, 5khz ,12 khz, 3 ad Line, Other, None.		50 khz, 20	0 khz
If station is based	on a	Seismic Record	S	eismic instrument	000	Choose Fro	m This	List	
Please com					3.5	5 khz, Airgun, Bathyn	ietry, Bo	omer, BR	UTIV,
Seis Expedition Code	S	Seis Day / UTC Time				bblepulser, Chirp, Gravi	-	-	
		and an analysis of the second	1			agnetics, Multibeam, ( aotter, Sidescan, Slee			
	L		╢╶	de describerantes describerantes de la companya de		arker, Seabed2, Seam	N-ART		
				-					DIC.
GRAB		Van	Veer	Trowel S	Shin	r <b>om the list</b> ek, Eckman,	Pona	r 1	)
Comments:	LLC	OPTER C-9CHU	, 91	REY-BROWN W	160	INM SAND FROM BANKS ISLAND, N	1 BEA	CH BERI	N
	T	Please choose	- N	nalveie tyne	fo	r collection f	wr. c	ict be	AL. Laver
	-	Age		Carbon Content	<u>. 10</u> .	Isotopes			
SUBSAMPLES		Archeology	Ć	Grain Size	71./	Isolopes (acropaleontology		leomagn Palynolo	
		Biology	Ιτ	ndex Properties		<i>Micropaleontology</i>	•	Petrolog	
		Biostratigraphy		rganic Chemistri		rganic Chemistry		XRD	ıy
Analysis Type	***************************************	Top Interval		ttom Interval		Subcore name		ommer	nts:
GRAIN SIZE		0	**************************************	3	3			VIIIIVI	103.
PETROLOGY		O		3					
				***		· )			
		***			$' \cap$	<b>/</b>		**************************************	
	•								
	•								****
If subsample is from	n a	subcore, please	ent	er name of sub	core	e. (e.g. A, B, C, et	c.)	######################################	And the second s
		BOXCORE	/ TI	KU GRAB			Α	В	c
Choose from below		j6		<u>xo Givab</u>	ı	0-1	-		
	7	Recovered core		cm	.	Subcores	<u> </u>		
BOXCORE Standard  IKU GRAB 1 cu (m)	***************************************	Length	cubo	ores : In centir			D L	E	F
IKU GRAB 0.5 cu (m)	A	Lengths or	D D	ores : in centin	G				<del> </del>
[	4.2		17		u				_
<u>ubcore Type :</u>	В	The state of the s	E		H				
Peel or Push?							AA	BB	cc
Comments:	C		F		I		ш		
						<u>Subsamples</u>	DI	D EE	FF
							GC	<del>}</del> HH	TI II
	]	Please choos	e ai	nalysis type	for	collection fr	om 1	ist bel	ow.
		Age	C	arbon Content		Isotopes	Pal	eomagne	etics
<b>SUBSAMPLES</b>		Archeology		Grain Size	$M_0$	acropaleontology		Palynolog	
		Biology	In	dex Properties	M	icropaleontology		Petrologi	y
		Biostratigraphy		ganic Chemistry	<u> </u>	rganic Chemistry	V-1	XRD	
<u>Analysis Type</u>	٠.	<u> Fop Interval</u>	Bot	tom Interval		Comr	<u>nents</u>	<u>:</u>	
GRANDS SIZE									
PERLICATION		- D		**************************************					
					***************************************		<del></del>	······································	
							#		

GRABS	GEOLOGICA	L SURVEY of CANA	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	R VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006804	0019	AMUNDSEN	CC4800	9 STERN
Day of Year \ UTC tim	e <u>LATITUDE</u>	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st 773. 7055	71,408110	-121.590337	eg: Gulf of St. Lawrence eg: Scotian Shelf	= Baie de Chaleur = Sable Basin
2d Try			WESTERN	DE SALIS BAY
Water Depth (m)	Elevation Reference	e: Depth Method:	Choose From	m This List
**************************************	LOCAL WL	ESTIMATE	EM100, EM1000, EM3	000, RTK-DGPS,
Wire out (m)	Default: local water le		3.5 khz, 5khz, 12 khz, 3 Lead Line, Other, None	
If station is based	on a Seismic Record	Seismic instrument	Choose From	n This List
	plete below:		3.5 khz, Airgun, Bathym	
Seis Expedition Code	Seis Day / UTC Tim	e l	Bubblepulser, Chirp, Gravit	y, Gravity 2, Huntec,
	Malaman department of the second of the seco		Magnetics, Multibeam, C	
			Seaotter, Sidescan, Sleev	
			Sparker, Seabed2, Seam	arc, Seistec, OTHER.
GRAB 5	OND Choo	se type of grat	from the list	below:
1	- Vai	nVeen, Trowel, S	hipek, Eckman,	Ponar
Comments:	DCM) IN YEGTERS	LACE IN SPIT SWALE	DESALIS BAY, BANKS	ISHAND, NWT, ONG VIAL.
	Please choo	<u>se analysis type</u>	for collection fr	om list below.
	Aae	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy	Inorganic Chemistry	Organic Chemistry	XRD
<u>Analysis Type</u>	<b>Top Interval</b>	<b>Bottom Interval</b>	Subcore name	Comments:
AGE	25	30		
MICROPALEO	25	30		
MACROPALEO	25	30	/ <u>}</u>	
		<u> </u>	$A \vdash A \vdash$	
				THE RESIDENCE OF THE PROPERTY
If subsample is from	m a subcore, pleas	se enter name of sub	core. (e.g. A. B. C. etc	c.)
	BOXCORE	/ IKU GRAB		
Choose from below	Recovered core	cm	<u>Subcores</u>	
BOXCORE Standard	<u>Length</u>	CIII		D E F
IKU GRAB 1 cu (m)	Lengths of	subcores : In centin	netres	D E F
IKU GRAB 0.5 cu (m)	A	D	G	
_abcore Type:		P		C H I
_	В	E	H	
Peel or Push?				AA BB CC
<u>Comments:</u>	C	F	I	
			<u>Subsamples</u>	DD EE FF
				GG HH II
	Please choo	se analysis type	for collection fro	om list below.
	Age	Carbon Content	Isotopes	Paleomagnetics
<u>SUBSAMPLES</u>	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy	Inorganic Chemistry	Organic Chemistry	XRD
Analysis Type	Top Interval	<b>Bottom Interval</b>	Comn	ients:
		***************************************		
				<u> </u>
(Sharman				

GRABS	GEOLOGICAL :	SURVEY of CANAL	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006804	6020	AMUNDSEN	CC 4 8 0 0	C1. STERN
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION *
1 st 273 2105	71.407308	-121.592279	eg: Gulf of St. Lawrence	= Baie de Chaleur
119			eg: Scotian Shelf	= Sable Basin
2			WESTERN	DE SALIS
Try			ARCTIC	BAY
Water Depth (m)	Elevation Reference:	Depth Method:	Choose From	
· (	LOCALWL	ESTMATE	EM100, EM1000, EM30	
Wire out (m)	Default: local water level	The state of the s	Lead Line, Other, None	0 khz, 50 khz, 200 khz
				· · · · · · · · · · · · · · · · · · ·
If station is based o		Seismic instrument	Choose Fron	
Please comp Seis Expedition Code	Seis Day / UTC Time		3.5 khz, Airgun, Bathyme	•
Seis Expedition Code	Seis Day / OTC Time		Bubblepulser, Chirp, Gravit Magnetics, Multibeam, O	
			Seaotter, Sidescan, Sleev	
			Sparker, Seabed2, Seama	•
	Choose	treno of deal	from the list	h-1
GRAB	VanVe	een, Trowel, Sl	from the list	Ponar
Comments: CSE	LICOPTER C-9CHU. C EAWARD SHORE), DE	TREY-BROADE ME	sium sand from s	NE VIAL
	Please choose	e analysis type	for collection fr	om list below
- Name	A ae	Carbon Content	Isotopes	Paleomagnetics
<b>SUBSAMPLES</b>	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy .	Inorganic Chemistry		XRD
Analysis Type	Top Interval	<b>Bottom Interval</b>	Subcore name	Comments:
GRAIN SIZE	0	3		
PETROLOGY		3		
· · · · · · · · · · · · · · · · · · ·				
	,			
	,			**************************************
If subsample is from	n a subcore, please (	enter name of subo	core. (e.g. A, B, C, etc	c.)
	BOXCORE /	IKII GRAR		A B C
Choose from below	Recovered core		Subcores	
BOXCORE Standard	Length	cm	Subcores	
IKU GRAB 1 cu (m)		ubcores : In centin		D E F
1 ' '		D D	G	
		and the second s	<u> </u>	
Subcore Type :	B	E	H	
Peel or Push?	-			AA BB CC
<u>Comments:</u>	C 1	F	I	
			<u>Subsamples</u>	DD EE FF
				GG HH II
	Please choose	analysis type	for collection fr	<u>om list below.</u>
CTIPO ATENT TO	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	Archeology	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology	Petrology
A 1		Inorganic Chemistry		XRD .
<u>Analysis Type</u>	Top Interval	Bottom Interval	Comn	nents:
West and the second sec				
Yes.				

GRABS	GEOLOGICAL	SURVEY of CANAL	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-804	160	Amundsen		G. Stern
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION * = Baie de Chaleur
1 st 79 09:42	71°03.3376′	-128°31.0336'	eg: Gulf of St. Lawrence eg: Scotian Shelf	= Sable Basin
2d Try		0	NW Passage	Hmmdsen, Gulf
Water Depth (m)	Elevation Reference :	Depth Method:	EM100, EM1000, EM30	
34		3.5 KHz	3.5 khz, 5khz, 12 khz, 30	
Wire out (m)	Default: local water level		Lead Line, Other, None	
If station is based o		Seismic instrument	Choose From	
Please comp Seis Expedition Code	plete below : Seis Day / UTC Time		3.5 khz, Airgun, Bathymo Bubblepulser, Chirp, Gravity	•
2 Sel 3 de de la sel se		1 3514	Magnetics, Multibeam, O	DBS, Reflection, SAR,
		J.JKFIL	Seaotter, Sidescan, Sleeve	•
		Section (About Section )	Sparker, Seabed2, Seama	
GRAB			from the list hipek, Eckman,	below: Ponar
Comments:				
	Please choos	e analysis type	for collection fr	om list below.
	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES	1	Grain Size	Macropaleontology	Palynology
	Biology	Index Properties	Micropaleontology  Organic Chemistry	Petrology XPD
Analysis Type	Biostratigraphy Top Interval	Inorganic Chemistry  Bottom Interval		XRD Comments:
Allalysis Lype	Top Interval	Dottom med var	Superic manny	Commence.
		/		
If cubsample is from	n a subcore, please	enter name of sub	core. (e.g. A, B, C, etc	<u>~ )</u>
ij subsumpec _ j	a salah yang p <mark>ersagan daga saka</mark> kaskan salam daga daga pang andar an ang	a taronita a travana para ditermina di periodi di periodi di periodi di periodi di periodi di periodi di periodi -	, or e. (e.g , . , . ,	
	BOXCORE	/ IKU GRAB	1	A B C
Choose from below	Recovered core	cm	Subcores	
BOXCORE Standard  IKU GRAB 1 cu (m)	Length Lengths of s	subcores : In centim	netres	D E F
		D	G	
-wheare Tyme :				C   H   I
Peel or Push?	В	E	H	
WHEN THE PROPERTY OF THE PARTY	c	F	ı	AA BB CC
4 Subsamples: 4. Stern		22	Subsamples	DD EE FF
1. Rochan (Dinos) 2. Petrin (Dinos)	Imabrix round	- gravel w/ clay led clasks.		GG HH II
3. Schall (Herans)	/	- 4		
			for collection fro	
SUBSAMPLES	Age Archeology	Carbon Content Grain Size	Isotopes Macropaleontology	Paleomagnetics Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy	Inorganic Chemistry	Organic Chemistry	XRD
<u>Analysis Type</u>	Top Interval	Bottom Interval	Comm	nents:
				Marie Constitution of the
When the state of			W/AMERICAN AND AND AND AND AND AND AND AND AND A	
			48	

Oct. 6/06 ... Str. 4200

GRABS	GEOLOGICAI	L SURVEY of CANA	DA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-804	022	Amunden		G. Stern
Day of Year \ UTC time	e LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION * = Baie de Chaleur
1 st 780 06:06	71°28.3068'	-133°58.5200'	eg: Gulf of St. Lawrence eg: Scotian Shelf Wesken	= Baie de Chaleur = Sable Basin Reau Fort
2d Try Water Porth (m)	7		Arcke	Sea
Water Depth (m)	Elevation Reference	Depth Method:	EM100, EM1000, EM30	
	Default: local water leve	S, SKHz	3.5 khz, 5khz, 12 khz, 30 Lead Line, Other, None	
N .	on a Seismic Record plete below :	Seismic instrument	3.5 khz, Airgun, Bathyme	
Seis Expedition Code	Seis Day / UTC Time		Bubblepulser, Chirp, Gravit	y, Gravity 2, Huntec,
potable annual control and annual control annual control and annual control and annual control and annual control annual contr		1 3.5 KHz	Magnetics, Multibeam, O Seaotter, Sidescan, Sleev	
			Sparker, Seabed2, Seama	<u> </u>
CDAD	Choos	se type of grat	from the list	helow:
<u>GRAB</u>				Ponar
Comments:				
	Please choos	se analysis type	for collection fr	om list below.
CHIPC ANDT DO	Age	Carbon Content	Isotopes	Paleomagnetics
SUBSAMPLES		Grain Size	Macropaleontology	Palynology
	Biology Biostratigraphy	Index Properties Inorganic Chemistry	Micropaleontology  Organic Chemistry	Petrology XRD
Analysis Type	Top Interval	Bottom Interval		Comments:
				***************************************
If subsample is from	n a subcore, please	e enter name of sub	core. (e.g. A, B, C, etc	·.)
	BOXCORE	/ IKU GRAB		A L B C
Choose from below	Recovered core		Subcores	Institution Instit
BOXCORE Standard	Length	<u>38</u> cm		D E F
IKU GRAB 1 cu (m)		subcores : In centin	***************************************	
:	A 38	D	G	
and the second s	В	E	H	
Peel or Push?			_	AA BB CC
3 subsamples	C Soft on 1	F L	I Subsamples	
1. Rochan Dinos 2. Porta Dinos	Soft gray 1	n vel	Subsamples	DD EE FF
3. Schell Forms				GG HH II
			for collection fro	
SUBSAMPLES	Age Archeology	Carbon Content Grain Size	Isotopes Macropaleontology	Paleomagnetics Palynology
	Biology	Index Properties	Micropaleontology	Petrology
	Biostratigraphy	Inorganic Chemistry	Organic Chemistry	XRD
Analysis Type	Top Interval	Bottom Interval	Comm	ients:
NUMBER OF STREET, STRE				
THE		***************************************	₩	
	<u> </u>	L.,		

Oct. 7/06 Sh. 421

GRABS	GEOLOGICAL	SURVEY of CANA		GRABS
CRUISE NUMBER	STATION NUMBER	VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-804	023	Amundsen		G. Stern
Day of Year \ UTC time	LATITUDE	LONGITUDE	* GEOREGION *	* SUB-REGION * = Baie de Chaleur
1 st Try 03:59	70°20.39′	D6°21.58	eg: Gulf of St. Lawrence eg: Scotian Shelf	= Sable Basin
2_d Try			Western Archi	Franklin Bay
Water Depth (m)	Elevation Reference:	<u> </u>	EM100, EM1000, EM30	
Wire out (m)	Default: local water level	3.5KHz	3.5 khz, 5khz, 12 khz, 30 Lead Line, Other, None	
If station is based o	Cciamia Dagard	Seismic instrument	D Choose From	- Mis Yist
II station is based of Please comp		Seisinic mstrument	3.5 khz, Airgun, Bathyme	
Seis Expedition Code	Seis Day / UTC Time	2014	Bubblepulser, Chirp, Gravity	y, Gravity 2, Huntec,
		3.5 kHz	Magnetics, Multibeam, Ol Seaotter, Sidescan, Sleeve	
			Sparker, Seabed2, Seama	-
GRAB	Choose	e type of grat	from the list	below:
	VanV	een, Trowel, S	hipek, Eckman,	Ponar 💋
Comments:				
	Please choose		for collection fr	om list below.
SUBSAMPLES	Age	Carbon Content	Isotopes	Paleomagnetics
SODSWALDS	Archeology Biology	Grain Size Index Properties	Macropaleontology Micropaleontology	Palynology Petrology
	1 00	Inorganic Chemistry		retrology XRD
Analysis Type	Top Interval	Bottom Interval		Comments:
	-		<u> </u>	
			(= - A B C otc	
If subsample is from	n a subcore, pieuse	enter name oj suv	core. (e.g. A, B, C, etc	:. <i>]</i>
	BOXCORE /	/ IKU GRAB	_	A B C
Choose from below		(m) cm	Subcores	
BOXCORE Standard	Length	ubcores : In centin		$\mathbf{D}  \Box  \mathbf{E}  \Box  \mathbf{F} $
IKU GRAB 1 cu (m)  UKU GRAB 0.5 cu (m)		D Cores : In centin	G	
(rhoore Trme :		International Control of the Control		C H I
Peel or Push?	В	E	H	
Comments:	С	F	Ι	AA BB CC
	Brown soft clay over silt or clay.	gray cohesive	Subsamples	DD EE FF
3. Forms, Schell /				GG HH I
			for collection from	
SUBSAMPLES	Age	Carbon Content Grain Size	Isotopes Macronaleontologu	Paleomagnetics Palynology
SODSWII DEC	Archeology Biology	Grain Size Index Properties	Macropaleontology Micropaleontology	Patynology Petrology
	Biostratigraphy .	Inorganic Chemistry	Organic Chemistry	XRD
<u>Analysis Type</u>	Top Interval	Bottom Interval	Comm	ients:
			No. of the second secon	
			- Ad	<b>XI</b>

GRABS	GEOLOGICA	AL SURVEY of CANA	ADA (ATLANTIC)	GRABS
CRUISE NUMBER	STATION NUMBER	R VESSEL NAME	PROJECT NUMBER	CHIEF SCIENTIST
2006-404	024	Amundsen		G. Stern
Day of Year \ UTC time	e <u>LATITUDE</u>	LONGITUDE	* GEOREGION * eg: Gulf of St. Lawrence	* SUB-REGION * = Baie de Chaleur
Try 290 04:25	10°12.36′	-133° 36.76'	eg: Scotian Shelf	= Sable Basin
2d Try			Western Arctic	Sean fort Sea
Water Depth (m)	Elevation Referenc	e: Depth Method:	EM100, EM1000, EM3	
Wire out (m)	Default: local water le	J 3.5kHz evel	3.5 khz, 5khz, 12 khz, 3 Lead Line, Other, None	0 khz, 50 khz, 200 khz
	on a Seismic Record	Seismic instrument	Choose From	n This List
Please com Seis Expedition Code	<pre>plete below :     Seis Day / UTC Tim</pre>		3.5 khz, Airgun, Bathym Bubblepulser, Chirp, Gravii	•
Scio Pripedition Code	Scis Day / OTC Tim	35/11	Magnetics, Multibeam, C	*
		J J.JKTC	Seaotter, Sidescan, Sleev Sparker, Seabed2, Seam	
	<u>~1</u>		ACCUSED TO THE PARTY OF THE PAR	
<u>GRAB</u>			b from the list Shipek, Eckman,	below: Ponar
Comments:				
	Please choo	se analysis type	for collection fi	om list below.
SUBSAMPLES	Age	Carbon Content	Isotopes	Paleomagnetics
SODSMITLES	Archeology Biology	Grain Size Index Properties	Macropaleontology Micropaleontology	Palynology
	Biostratigraphy	Inorganic Chemistr		Petrology XRD
<b>Analysis Type</b>	Top Interval	Bottom Interval	<u> </u>	Comments:
WATER TO THE TOTAL THE TOT			Λ	Water a management of the control of
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If subsample is from	n a subcore, plea	se enter name of sub	core. (e.g. A, B, C, et	c.)
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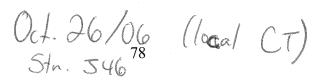
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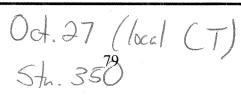
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APPENDIX 5 – 2006-804 AERIAL SURVEY OF DESALIS BAY COASTLINE



# **Helicopter Survey of De Salis Bay**

### **Objectives**

The main objectives of the coastal work were to identify evidence of the postglacial lowstand shoreline and to support interpretation of sea-level rise from cores in former lakes now converted to marine basins. Secondary objectives included surveys and interpretation of shoreline evolution and investigations of a shallow, highly-stratified, breached-lake, tidal basin with dense hypersaline water at depth.

This appendix reports on an aerial survey of the De Salis Bay coast conducted as part of the 2006-804 cruise in order to help address these objectives. This survey included ground observations and sampling at two locations on the shores of Se Salis Bay.

## **Study Site**

De Salis Bay is a prominent feature on the southeast coast of Banks Island. Although no detailed seabed mapping or coastal surveys have been undertaken previously in this area, the shores of the bay have been visited briefly by a number of earlier researchers, including Donnelly (1943), Porsild (1950), and Manning (1953), among others. The bay is an important site for the present residents of Sachs Harbour and Thule structures along the coast (Manning, 1953) attest to older human presence in the area. The bay as a whole forms a triangular indentation 25 km long and 12 km deep in the otherwise straight southeast coast of the island. The west coast of the bay consists of prominent cliffs cut into a complex sequence of Pleistocene tills, outwash, and marine sediments (Vincent, 1993, 1990), erosion of which feeds sediment northward along a sand and gravel barrier extending more than 20 km to the outlet of Windrum Lagoon at the north end of the bay. For the first 9 km, the barrier encloses a narrow lagoon south of the Sandhill River delta. This river drains north into Windrum Lagoon, a large basin enclosed behind the barrier extending from the delta front to the prograded beach-ridge complex fronting the Windrum Lagoon outlet channel seaward of the De Salis River delta. A large tombolo and spit complex extending about 5 km westward from the east side of the bay partially encloses the inner harbour (Fig. A1).



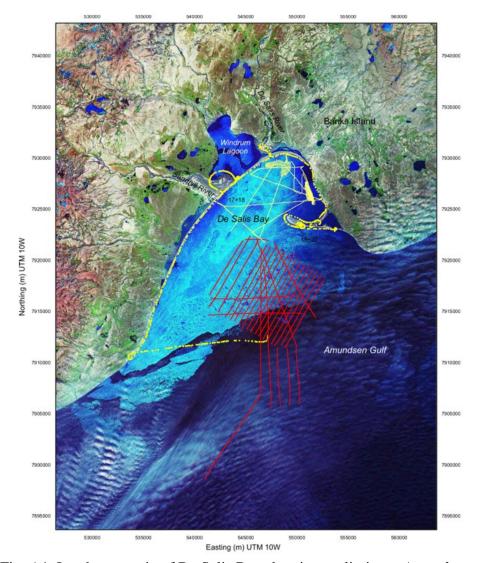


Fig. A1. Landsat mosaic of De Salis Bay showing preliminary *Amundsen* tracks [some errors] (red), *Heron* tracks (yellow), helicopter track (yellow dots), and onshore sample sites (numbered).



#### **Data Collection and Preliminary Results**

The survey was carried out while Amundsen and Heron were conducting marine surveys in the De Salis Bay area.

Helicopter Cc-GCHU (CG358) with pilot Michel Fiset flew from the *Amundsen* flight deck and completed an aerial survey and photo reconnaissance of the bay. From the eroding cliffs in the southwest, the flight path proceeded clockwise around the bay, following ~24 km of sand and gravel barrier beach along the western and northern shore, a ~5 km section of low bluffs in the northeast corner, and the ~5 km long tombolo and spit extending from the eastern shore toward the middle of the bay.

Landings were made at two sites, one on the beach fronting the Sandhill River (Fig. A2) and the other at a site on the outer part of the spit-tombolo structure extending west into the bay from the eastern shore (Fig. A1). Sand samples were collected at both sites (2006-804-0017, -0018, -0020) and a sample of peat (2006-804-019) was collected on the spit (Appendix 2).



Fig. A2. Helicopter C-GCHU on the beach at Sandhill River, showing patchy dunes cut by sand-gravel washover channels and recent notching of dunes and washover deposits.

At the Sandhill River site, extensive sandy-gravel outwash deposits extend landward toward the river. Sand (much of it evidently blown seaward from the river channel and floodplain) forms small dunes interspersed between the washover channels and elongated normal to the shore (Fig. A3). There is no evidence of river breakout channels or overflow seaward across the beach, indicating that most of the river sediment load continues to be deposited in Windrum Lagoon (Fig. A1).





Fig. A3. Beach-cut section through shore-normal dune between washover channels at Sandhill River beach.

The tombolo and spit structure on the eastern side of De Salis Bay is very large, extending about 5 km westward into the bay (Fig. A1). The northern arm of the tombolo consists of a prograded sequence of beach ridges (Fig. A4) similar to the prograded sequence across the north end of Windrum Lagoon. The southern arm of the tombolo appears to be a transgressive feature with extensive washover and landward migration. This is also the main pathway for westward longshore sediment transport from cliffs to the northeast. Over time, this longshore transport has constructed a large recurved spit structure at the outer end (Fig. A5). Manning (1953) noted extensive windblown dust deposition on ice in the tombolo lagoon in early spring.





Fig. A4. Large shore-normal frost cracks in prograded beach-ridge sequence in northern arm of tombolo on the east side of De Salis Bay.



Fig. A5. View east from outer end of De Salis Bay spit. Note double-armed tombolo in the distance.

The ridges on the spit are all quite low (<3 m elevation), and most of the area between ridges is filled with sand. A few deeper troughs have accumulated water and organic material, allowing formation of very thin peat. The second landing was made at one such



site (Fig. A6), where sample 0019 was obtained from a 5 cm unit of compact black peat underlying 25 cm of sand.



Fig. A6. View westward along spit and across De Salis Bay, yellow circle showing location of peat sample (station 19 in Fig. A1) along the outer edge of a moist depression between vegetated ridges.

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