CRUISE REPORT AND ON-BOARD STUDIES

CSS HUDSON 90-13

MAY 29-JUNE 22 1990

LEG 1: THE LABRADOR SEA

Compiled by:

C. Hillaire-Marcel & André Rochon

GEOTOP-UQAM

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1-CRUISE SUMMARY

CRUISE NUMBER: *90-013* **SHIP:** *CSS-Hudson*

DATES: *May 29 (St. John's, NFL)-June 22 (Halifax, NS)*

CRUISE TITLE: *Leg 1/The Labrador Sea (NSERC-CSP & NAMOC Projects)*
Leg 2/NE Newfoundland coastal study

SPONSORING AGENCIES:

Leg 1: *NSERC-CSP Project (UQAM, McGill, Memorial, AGC)*
Paleoproductivity of the Labrador Sea
McGill: NAMOC Project
Leg 2: *AGC: NE-Newfoundland coastal study*

STAFF: Master: *Captain L.A. Strum*
Senior Scientist: *Pr. C. Hillaire-Marcel (UQAM)*
Scientific project leaders: *Pr. R. Hesse (McGill)*
Dr. J. Shaw (AGC)

AREAS OF OPERATION:

(1) CSP-Project: Greenland slope transect (off Cape Farewell)
Labrador slope transect (off Okak Bank)
(2) NAMOC-Project: Labrador slope
(3) NE-Newfoundland study: White Bay-Notre Dame Bay

SUMMARY OF PURPOSES:

(1) CSP-Project: establishment of on-shore/off-shore transects allowing to "intercalibrate" geochemical & micropaleontological productivity-paleoproductivity indicators (a contribution to the Canadian plan for JGOFS);
(2) NAMOC-Project: seismic surveying and coring of NAMOC tributaries along the Labrador slope;
(3) NE-Newfoundland study: seismic surveying and sampling of coastal sediments for mineral deposit prospection.

TYPE OF DATA COLLECTED:

(1) Seismic lines: 12 kHz, 3.5 kHz, Air-Gun, NSRF (Projects 1 and 2), 12 kHz, Air-Gun, Huntec (Project 3)
(2) Box coring, water sampling, CTD, plankton tows (Project 1)
(3) L-Piston coring (Projects 1, 2, 3)
(4) Van Veen grab sampling (Project 3)

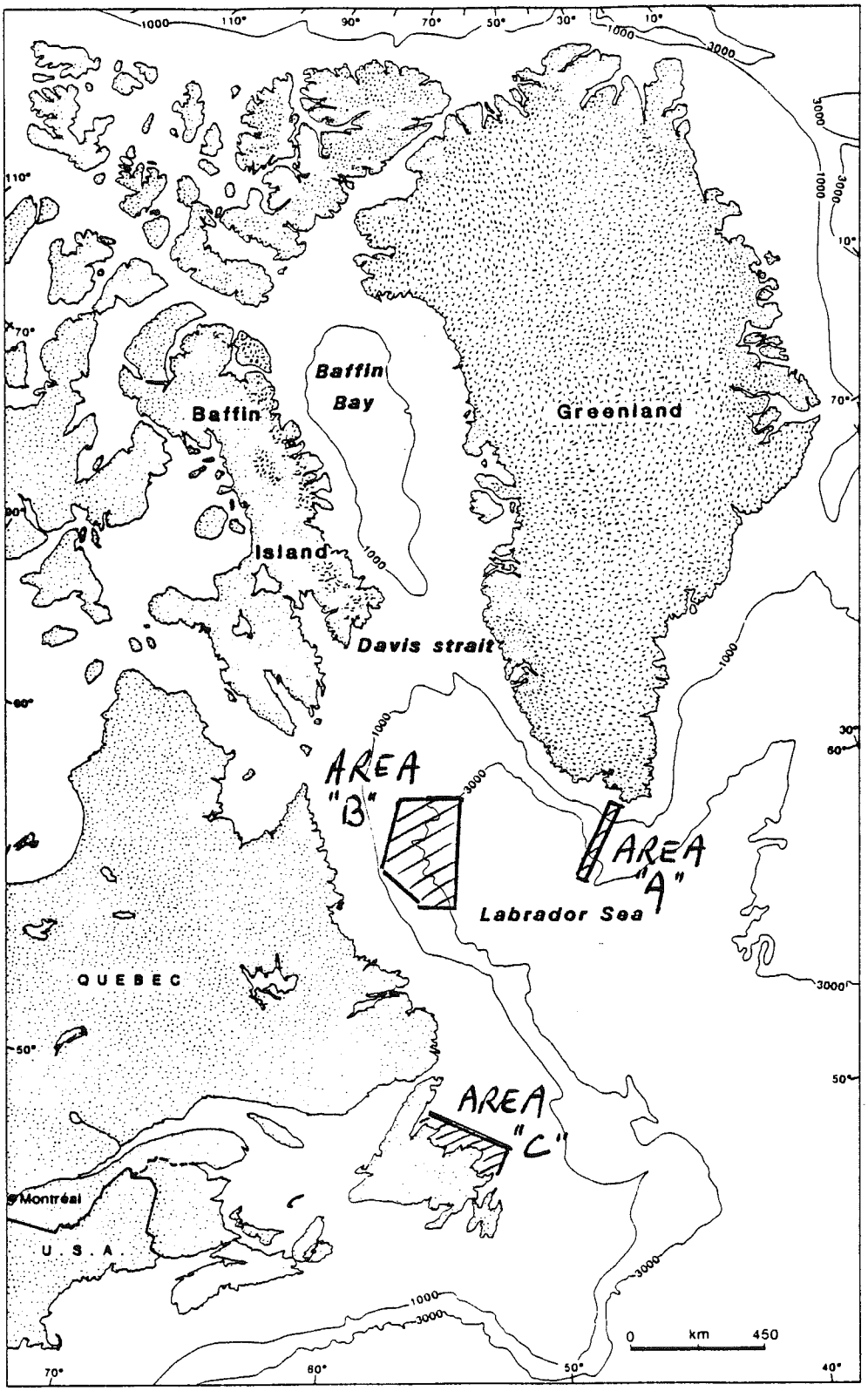

Figure 1: Sketch map of working areas during cruise 90-013;
Leg 1: areas A & B; Leg 2: area C.

2-SCIENTIFIC STAFF DURING LEG 1

Guy Bilodeau
PhD student, GEOTOP-UQAM
Pierre Ferland
research assistant, GEOTOP-UQAM
Guy Fenn
seismic technician, AGC
Pierre Girouard
navigation technician, AGC
Reinhard Hesse
prof. dept. of Geological Sciences, McGill
Claude Hillaire-Marcel
Research Chair in Environmental Sciences & GEOTOP, UQAM
Fred Jodery
coring technician, AGC
Marc Lucotte
prof. département des Sciences de la Terre & GEOTOP, UQAM
Michelle Lund
BSc student, dept. of Geological Sciences, McGill
Gavin Miller
technician, dept. of Geological Sciences, McGill
Alfonso Mucci
prof. dept. of Geological Sciences, McGill (& GEOTOP-UQAM)
Bernadette Quémerais
post-doctoral fellow, GEOTOP-UQAM
Nicolas Quash
PhD student, GEOTOP-UQAM
Allan Rakofsky
PhD student, dept. of Geological Sciences, McGill
André Rochon
MSc student, GEOTOP-UQAM
Kelly Sears
MSc student, dept. of Geological Sciences, McGill
Dong Wang
MSc student, dept. of Geological Sciences, McGill
Bruce Wile
seismic technician, AGC

3-SCIENTIFIC OBJECTIVES

3.1. NSERC-CSP 0045685: Paleoproductivity of the Labrador Sea

3.1.1. Project summary

Defined in 1987, *i.e.*, before the setting of a Canadian plan for the *Joint Global Ocean Flux Study* (JGOFS), this project actually addresses primary questions highlighted by the Canadian Committee for JGOFS. Its major objectives are to define the relationships between (1) the climatic variations of the last glacial/interglacial cycle, (2) the primary productivity and carbon fluxes in the Labrador Sea and (3) the organic activity (in the water column and in surface sediments) responsible for synsedimentary and/or early diagenetic mineralization processes.

Qualitative and quantitative assessments of organic paleoproductivity in this subarctic basin imply a partly inovative methodology developed during on-shore studies of ODP-Leg 105 cores which integrates multidisciplinary approaches (sedimentology, geochemistry, isotope studies and micropaleontology). In the Labrador Sea, ice fluctuations on surrounding landmasses resulted in strong variations of the primary productivity and of the sedimentation rates. Standard parameters (total organic carbon, $CaCO_3$, C/N, ^{13}C, ^{15}N, PO_4...) do not unequivocally account for paleofluxes of organic matter. We intend to combine them with other indicators of paleoproductivity, either "direct" (diatoms, coccoliths, autotrophic dinoflagellates) or "indirect" (heterotrophic dinoflagellates, foraminifers, Ba, Cd in foraminifer shells...). Sedimentation rate changes will be delt with current methods (^{14}C-AMS, ^{18}O-stratigraphy, secular paleomagnetic variations...) and with seriated measurements of U & Th isotope disequilibria. These can simultaneously account for changes in sedimentation rates (^{230}Th-excesses) and of organic activity-redox fluctuations in the surface sediments (^{238}U-uptake).

Work will be done on box- and piston cores taken along six on-shore/off-shore transects (off Greenland, Davis Strait and Labrador Coast) also allowing to estimate horizontal fluxes from the "productive" neritic zones to the deep sediments. At the end of this project, we expect (1) to offer a simplified methodology for the study of paleofluxes of organic matter and of some elements in high latitude basins, (2) to monitor the impact of 10^3 to 10^5 yr climatic cycles on primary production, and (3) to document the role of organic activity in the early mineralization processes of marine sediments.

3.1.2. Objectives of the first year campaign (Cruise 90-013)

In view of the reduced ship-time allocation for this project, in 1990, the objectives of the cruise were restricted to seismic surveying, CTD-measurements, water sampling, box- and piston coring at 4 or 5 sites along two high priority transects, namely the SW Greenland rise and the Labrador slope transects (Figure 2).

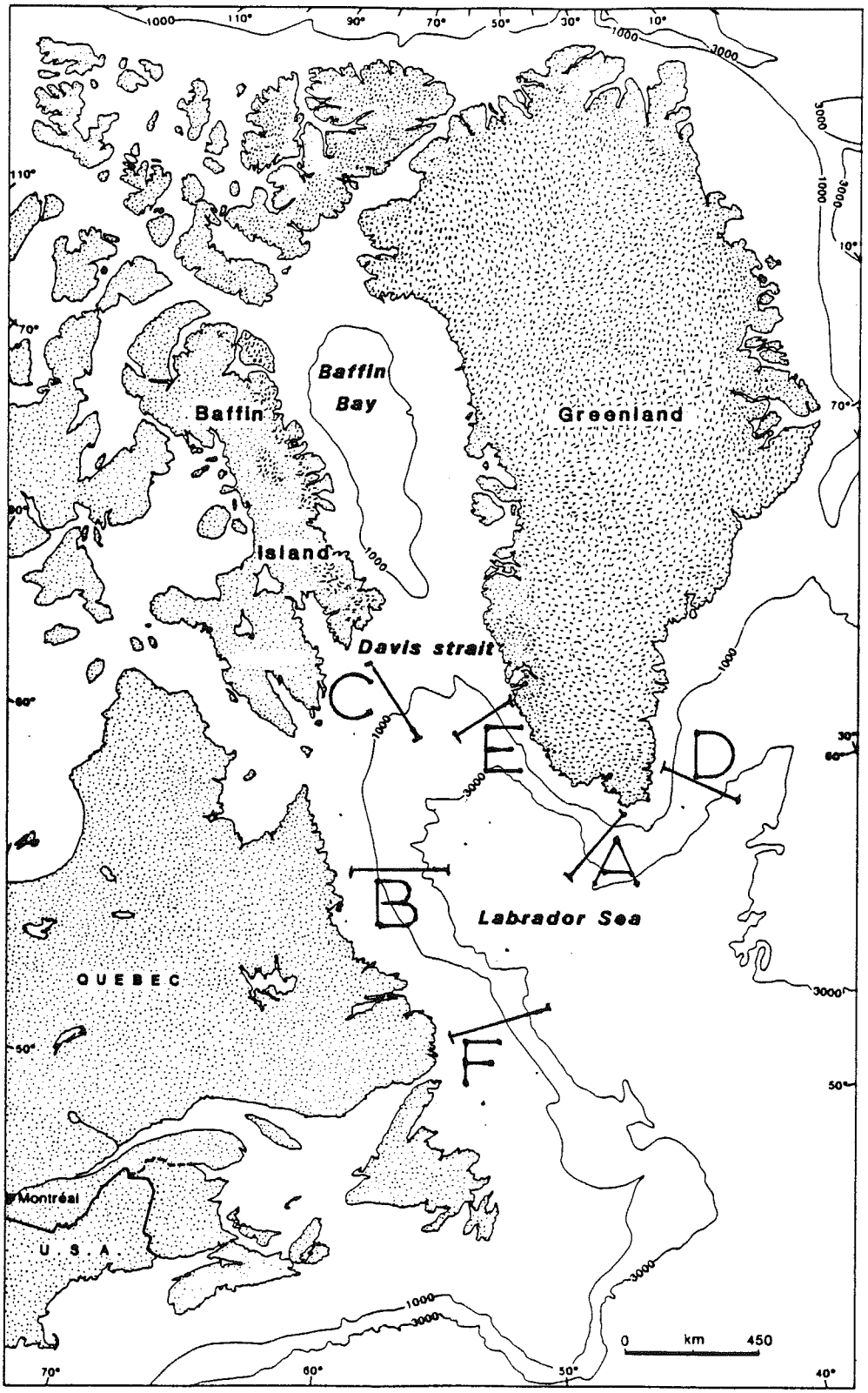

Figure 2: Sketch map of NSERC-CSP on-shore/off-shore transects in the Labrador Sea. In priority order: (A) SW Greenland rise; (B) Labrador slope; (C) W. Davis Strait; (D) SE Greenland rise; (E) E. Savis Strait; (F) E. Labrador slope.

3.2. The NAMOC Project

The Northwest Atlantic Mid-Ocean Channel -NAMOC- is a globally unique submarine feature driving terrigenous material from the Labrador Sea canyons to the deep abyssal plain. Previous campaigns allowed to investigate sedimentation patterns in the major channels and their levees (*e.g.*, Hesse, 1989; Hesse *et al.*, 1990)[1] through deep seismic surveying and coring. The objective of the 1990 cruise was to study NAMOC tributaries down the Labrador slope. Among major tasks for this cruise were (1) to run a seismic line across the Labrador slope (from 51° W, 58°48' N to 59°13' W, 56°21' N), (2) to run a seismic loop along two more or less contour-parallel profiles (one near 2500 m, the other near 2,900 m water depth) and (2) to core on the way at six sites.

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1. Hesse, R., 1989. Geology 17: 1148-1151.
   Hesse, R. et al., 1990. Marine and Petroleum Geology 7: 13-28.

4-ITINERARY (Leg 1)

From the departure on May 29 (10 a.m., NFL time), until the 14 th of June, when the *CSS-Hudson* diverted for a search and rescue operation east of Goose Bay (*Imperial Bedford* tanker), the total distance steamed amounted to 5310 km during Leg 1 of the cruise (see working areas "A" and "B" on chart).

After leaving St John's (NFL), the Ship sailed towards the southern Greenland margin (off Cape Farewell). Scientific operations there consisted in seismic surveying along a *ca.* 200 km on-shore/off-shore transect trending NE-SW and sampling at 5 sites along the transect.

From there, the Ship sailed westwards and started a seismic line across the NAMOC. Down the Labrador slope, off Okak Bank, a second on-shore/off-shore transect of *ca.* 180 km was surveyed; sampling was restricted at 2 sites (instead of 4 initially planed).

Two parallel seismic lines and two perpendicular transects totalizing *ca.* 1000 km were then ran along the Labrador slope (see chart); a few coring operations were performed on the way. Finally, when sailing to Lewisporte, a last seismic line was obtained on June 12 and 13

On June 14 at 8:20 a.m. (NFL time), the Captain had to break the program in order to carry assistance to the *Imperial Bedford* ship seriously damaged by a thick ice raft. By the very end of the day, a coast guard vessel releived the *CSS-Hudson* which resumed its steaming towards Lewisporte wich we reached finally around midnight on the 15th of June.

5-SCIENTIFIC ACCOMPLISHMENTS

Out of the three projects to be carried on during cruise 90-013, only the NAMOC-Project went as scheduled: smouth sea conditions prevailed during this part of the cruise and the operations were almost 100% successful. Both the NSERC-CSProject and the NE-Newfoundland study (Leg 2) had to account with unforeseen events (storms or search & rescue operation) and the accomplishments are below expectations.

5.1. NSERC-CSP

Steaming to and from the working area excluded, the real working time allocated to this project amounted to 142 hours. In the original schedule, some 4 days were to be spent on the on-shore/off-shore transect of SW-Greenland and the balance on the Labrador slope transect. In both cases, the scientific tasks included seismic surveying and sampling at a few sites along the transects (5 sites on the Greenland slope, 4 sites on the Labrador slope). Due to the stormy conditions of the first four days in the working area, the actual total working time available for the team was reduced to *ca.* 85 hours. Two thirds were used to carry on a minimum program on the SW-Greenland rise transect and the balance was largely shared with the NAMOC-Group along the Labrador slope in order to increase the output. On top of the reduced ship-time available to carry on the work, a few operations of the CSP-group failed (pre-tripping of the box-corer, LPC hitting an ice-rafted boulder or empty...in spite of a 15 m apparent penetration, a whole barrel spoiled with a section dropped on deck...etc.).

As a consequence of this little successful campaign, most of the first year CS-Project scientific objectives will not be encountered, notably those aiming to a contribution to the Canadian plan for JGOFS. Nevertheless, within the *ca.* 3 working days left to the group, the achievements include:

(1) four seismic lines (most with 12 kHz, 3.5 kHz, Air-Gun records) summing up to ca. 300 km (120 km of which being shared with the NAMOC-Group);
(2) seven water stations (CTD profiles and sampling at two to four depths at each site);
(3) six box-cores (3/SW Greenland; 2 Labrador slope, one being in a joint Site with the Namoc-Group);
(4) six piston-cores and six TWC (3 Sites on the Labrador slope being joint NAMOC & NSERC-CSP operations).

From this list, it can be concluded that a maximum output was achieved during real working time of the ship. A few succesful operations were made in rough sea conditions: thanks are due to the ship's personnel who managed to allow this.

5.2. The NAMOC Project

Due to the exceptionnally good weather conditions during this part of the cruise, the seismic surveying and coring operations were carried out as planned. The seismic loop had to be shortened somewhat at the southern end because of an overall reduction of working time due to longer-than-expected steaming time. Consequently the southernmost canyon system that was to be studied had to be left unseeen. Apart from this cut, the objectives were achieved at 100%. Sleeve-gun profiles of exceptional quality (see 5.3) were obtained, all accompanied by 3.5 kHz seismic profiles and 12 kHz bathymetric profiles. Due to the time-sharing agreement between UQAM and McGill, 7 cores instead of the planned 6 cores (see above) were retrieved and sampled on-board.

5.3. Highlights

As already mentioned, seismic surveying and coring operations of the NAMOC tributaries down the Labrador slope went smoothly and recovery was as planned. In spite of a much lesser "crop", the NSERC-CSP group obtained some interesting data and valuable samples, notably on Labrador Sea water masses and also some good material from box-coring operations which, unfortunatly, could not be completed along the on-shore/off-shore transects.

Worth of mention are the 3.5 kHz records obtained at full speed (> 12 knots) when smooth sea conditions prevailed *(i.e.*, during the second part of Leg 1). As shown by the record, next page, a very good penetration was achieved (*ca.* 50 m-second). The hull-mounted system thus offers the possibility to collect data when sailing to/from working areas. Nevertheless, some of the records obtained at normal working speed *(ca.* 5 knots) during the Labrador slope survey are of high quality and they clearly depicts bottom facies (debris flows, hemipelagic layers, turbidite sequences, etc.; see figures, next pages).

With respect to water studies, the team used (for the first time in deep water) the CTD-probe of *Applied Microsystems* (a Canadian Company based in BC) which revealed very efficient. It does not require a special cast to be deployed and it can easily be attached to the box core or any other item to be deployed. When attached to the hydrographic wire during water sampling operations with Niskin bottles, it also helps to clearly identify the water mass sampled. The salinity and temperature profiles obtained depict the various water masses of the basin: (1) the surface water layer (100 to 200 m) characterized by a low salinity; (2) the fairly homogeneous Labrador Sea Water mass, down to 1700-2000 m; (3) and below a clear pycnocline, a bottom water mass showing a gradient in temperature with partial mixing of the North East Atlantic Deep Water -NEADW- (originating from the southern Norvegian Sea) and the North West Atlantic Bottom Water -NWABW- (from the Greenland Sea).

Biogeochemical studies of box-cored sediments require a special care for on-board measurements and subsampling operations to avoid artefacts (for instance due to oxydation). They are however essential to investigate processes occuring at the water/sediment interface and to document on-shore/off-shore fluxes. The few box-cores collected during this campaign showed various situations with respect to the oxydizing/reducing boundary which monitors the geochemistry of several elements *(e.g.*, Mn, U, etc.). In spite of the limited number of stations available, preliminary results also show contrasted patterns down the Greenland rise and the Labrador slope. For example, at both sites ^{230}Th-excess in surface sediments are much higher than accounted by the ^{230}Th-rain produced by the dissolved U in the overlying water column; this points towards strong horizontal fluxes from neritic zones (?) in both cases. However, these excesses are higher by a factor of 2 down the Greenland slope compared to the Labrador side of the basin. Nevertheless, it must be taken into consideration for future campaigns, that immediate sampling of cores is compulsory for such studies in order to avoid geochemical artefacts resulting from Eh-changes. Example will be given in the detailed report (see HU-90-013-017) of a strong decrease in Eh values in a box core stored under N_2 atmosphere. Such redox potential changes may alter the geochemical composition of the pore water and may eventually allow a few elements to be redistributed in a core stored under normal atmosphere *(e.g.*, U).

Figure 3: 3.5 kHz recording at full speed *(ca.* 12 knots); JD 164; GMT 18:15 to 19:00; a Labrador slope turbidite sequences infilling (bottom) a deep channel.

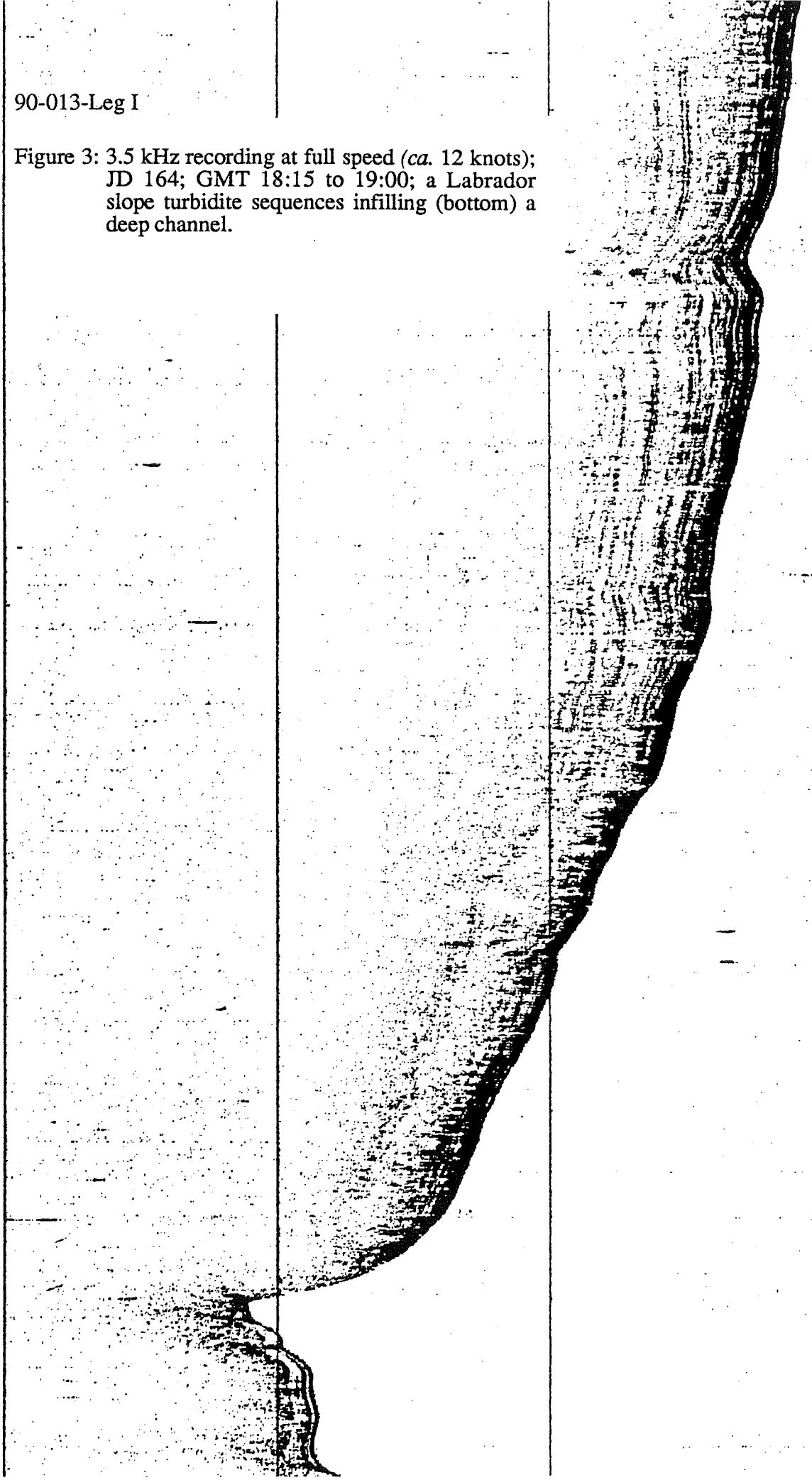
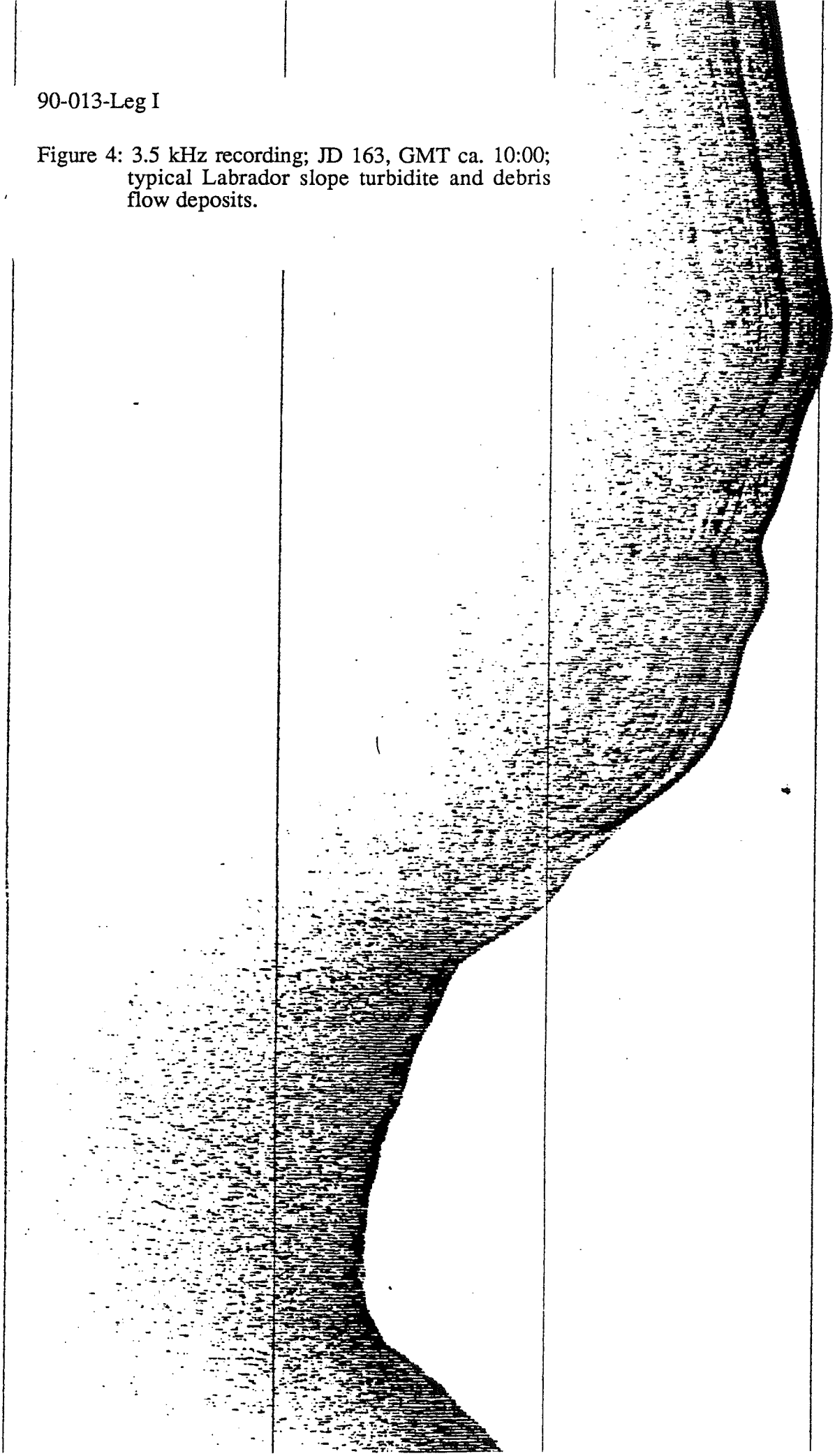


Figure 4: 3.5 kHz recording; JD 163, GMT ca. 10:00; typical Labrador slope turbidite and debris flow deposits.



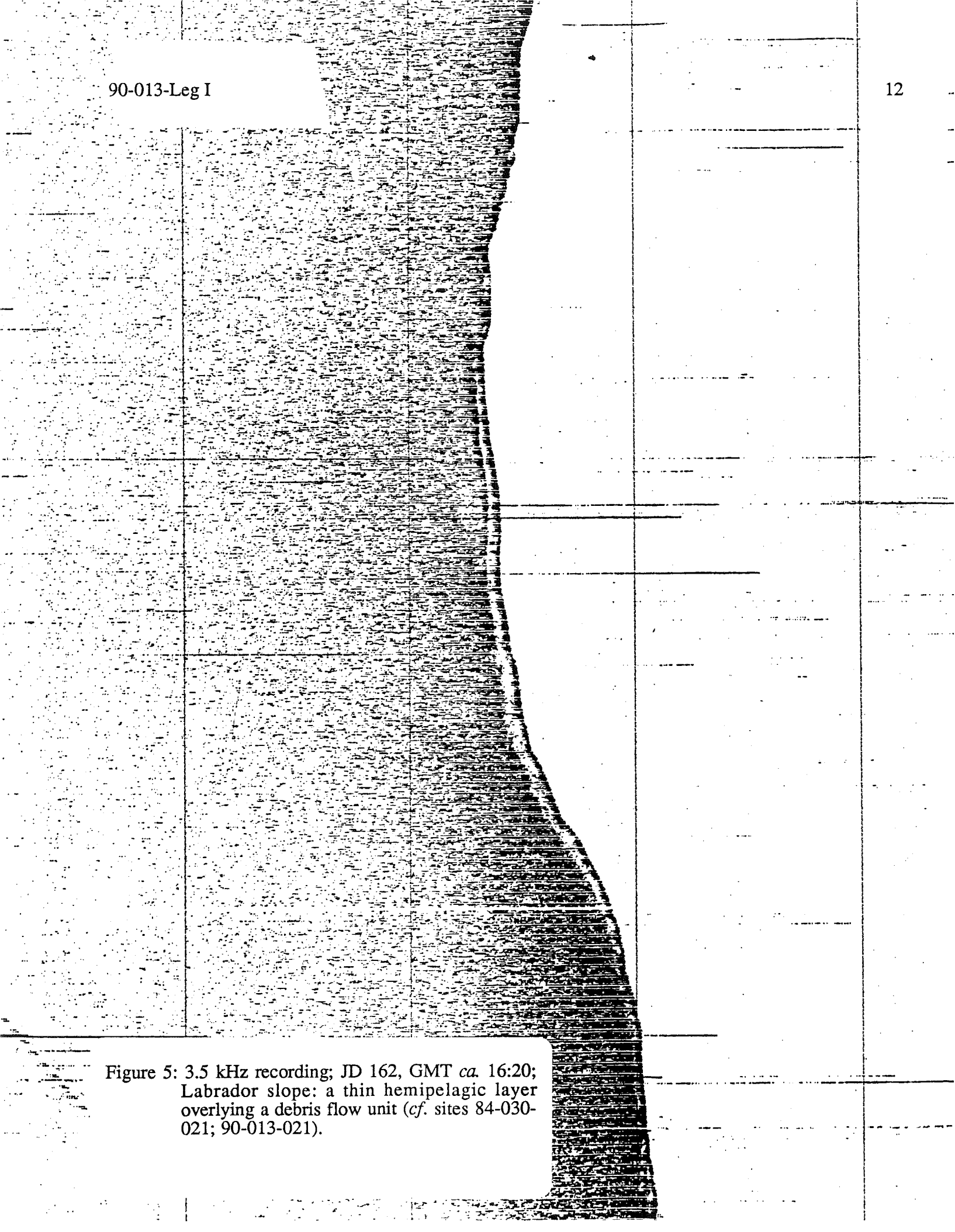


Figure 5: 3.5 kHz recording; JD 162, GMT *ca.* 16:20; Labrador slope: a thin hemipelagic layer overlying a debris flow unit (*cf.* sites 84-030-021; 90-013-021).

6-SITE DESCRIPTION AND SCIENTIFIC OPERATIONS

Tracks, seismic lines, site location and usual information on site operations will be found in appendix 1. In the following pages, on-board studies and subsampling operations will be summarized for each site. Technical information on sampling procedures will be found in appendix 2. Site locations are sketched below.

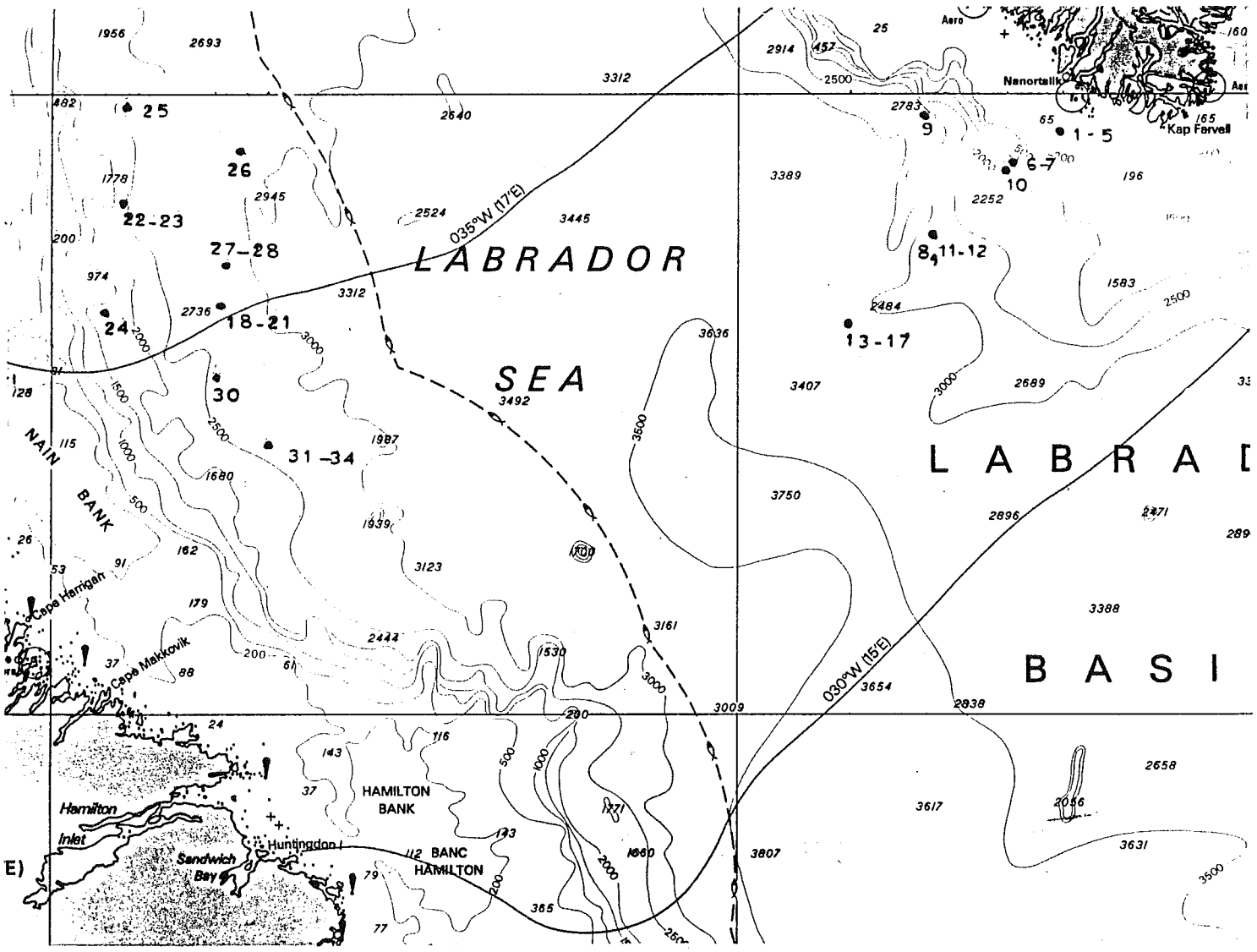


Figure 6: Sketch map of stations (90-013-Leg 1)

HU-90-013-001: Box Coring (1)

Julian day:	153	GMT Time:	13:56
Latitude:	59°37.825 N	Longitude:	45°16.936 W
Depth:	157 m	Core length:	21 cm

Geographic location: South West Greenland margin (Off Cape Farewell)

Description: The material consists of sand with ice rafted and organic debris; abundant benthic fauna was observed at the surface.

Subsampling:
1 push-core (*ca.* 21 cm long, 15 cm in diameter) for on-board processing
3 push-cores (*ca.* 21 cm long, 7 cm in diameter) for further analysis (UQAM)
1 push-core (*ca.* 21 cm long, 7 cm in diameter) for archives (BIO)
1 "micro-core" (*ca.* 21 cm^3) kept frozen for amino-acid studies (U. of Virginia)
1 sample (250 ml) at the box-core surface for foraminifer study (UQAM).

On-board measurements & subsampling:

Depth (cm)	Eh mv	Dissolved oxygen (%)	Frozen(2) sample	Sediment(3) sample
0-1	220	47	1 cc	33 cc
1-2	208	42	1 cc	33 cc
2-3	158	37	1 cc	33 cc
3-4	135	40	1 cc	33 cc
4-5	135	38	1 cc	33 cc
5-6	140	94	1 cc	33 cc
6-7	185	38	1 cc	33 cc
7-8	170	80	1 cc	33 cc
8-9	160	51	1 cc	33 cc
9-10	160	54	1 cc	33 cc
10-11	160	55	1 cc	33 cc
11-12	20	38	1 cc	33 cc
12-13	60	28	1 cc	33 cc
13-14	140	38	1 cc	33 cc
14-15	120	50	1 cc	33 cc
15-16	160	73	1 cc	33 cc
16-17	170	38	1 cc	33 cc
17-18	80	11	1 cc	33 cc
18-19	145	9	1 cc	33 cc
19-20	162	1	1 cc	33 cc
21	165	1	----	------

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1. See appendix 2.3
2. For bacterial counting (U. of Virginia)
3. For micropaleontological & geochemical studies (UQAM).

HU-90-013-002: Water sampling (1) & CTD (2)

Julian day:	153	GMT Time:	14:50
Latitude:	59°37.93 N	Longitude:	45°17.16 W
Depth:	160 m	Depth intervals sampled:	(I) 1-14 m (II) 124.5-137.5 m

Geographic location: South West Greenland margin

Summary: 2 sets of 3 x [12 L-Niskin] bottles were used for sampling water masses (I) and (II). The trigger of one of the bottles (124.5-137.5 m interval) did not work. The CTD yielded a poor record (see figure). A second CTD cast was made later on at the nearby station HU-90-013-005.

Sampling & on board processing:

(I) 1-14 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC(3)
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 µm filter: 2.6 L
Volume of water filtered through Glass Fiber Filter: 3.5,12.0 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM(4) + SiO_2	89-076
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C,^{15}N,CHNS	89-076
GFF	--	---	" " "	89-077
------	H	13	TIDC	--------

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1. See appendix 2.2 for technical details on sample preservation
2. See CTD profile in Fig. second next page
3. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
4. SPM: Suspended Particular Matter

HU-90-013-002: Water sampling & CTD (Cont'd)

(II) 124.5-137.5 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 2.9 L
Volume of water filtered through Glass Fiber Filter: 6.6 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-077
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-078
------	H	13	TIDC	---------

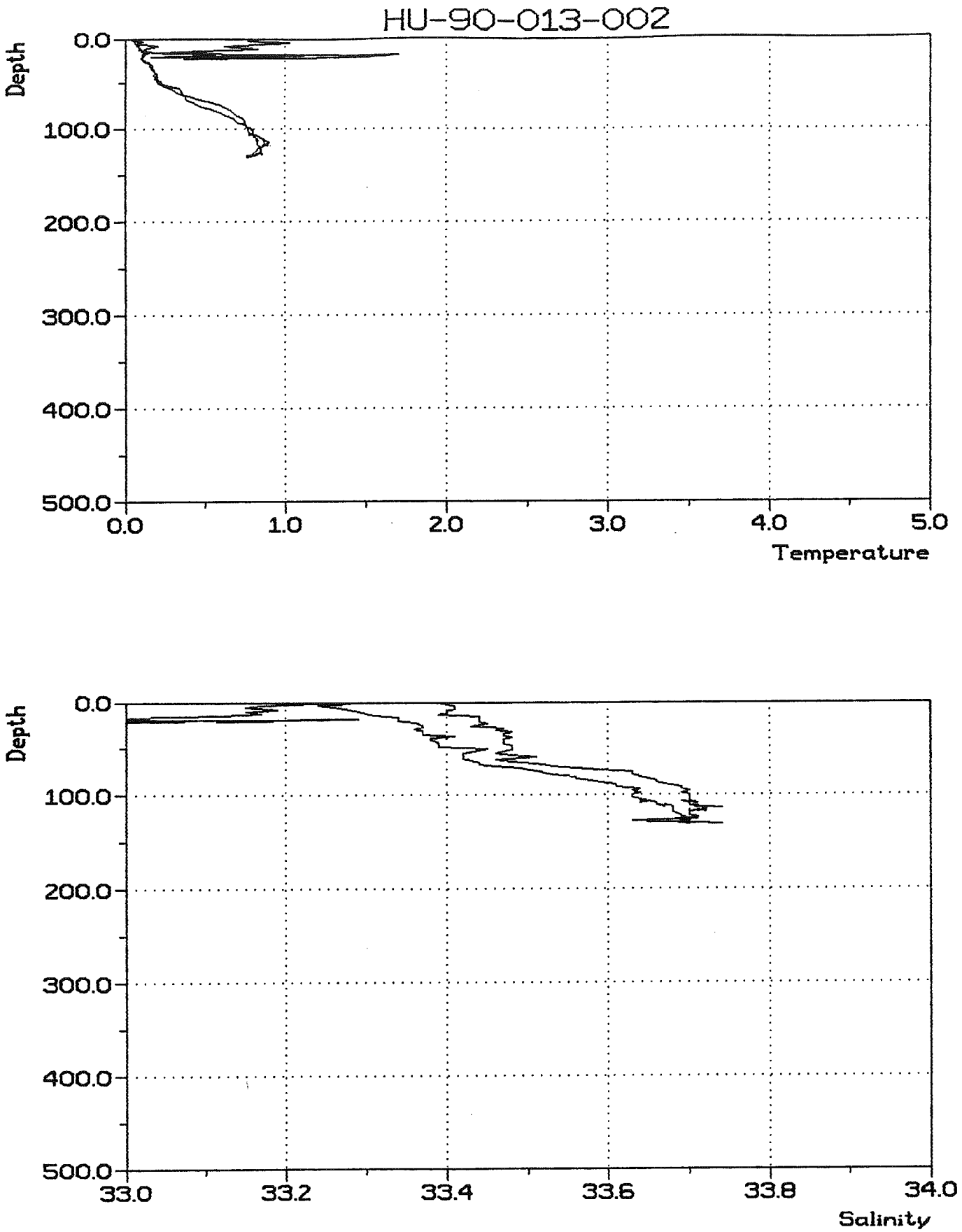

Figure 7: CTD measurements of temperature and salinity profiles at site 90-013-002

HU 90 013 003: Plankton tow

Julian day:	153	GMT Time:	15:10
Latitude:	59°38.04 N	Longitude:	45°17.69 W
Depth:	157 m	Sampling interval:	0-50 m

Geographic location: South West Greenland margin

Plankton net: Length: 3 m
Diameter: 1 m
Mesh: 73 µm

Comments: The sampling has been made from a depth of *ca.* 50 m up to the surface; 4 subsamples were taken as below:
- 2 x 250 ml were processed with 20% formaldehyde, then refrigerated;
- 2 x 250 ml were preserved frozen.

HU 90-013-004 P & TWC: L-Piston & Trigger weight coring

Julian day:	153	GMT Time:	15:52
Latitude:	59°37.78 N	Longitude:	45°17.04 W
Depth:	157 m	Corer length:	608 cm
Penetration:	? cm	Core length:	50 cm

Geographic location: South West Greenland margin

Description: 50 cm of gravelly sands were recovered in segment A-B. TWC empty.

Subsampling: Unusable.

HU 90-013-005: CTD profile

Julian day:	153	GMT Time:	16:33
Latitude:	59°37.89 N	Longitude:	45°17.37 W
Depth:	157 m	CTD cast	

Geographic location: South West Greenland margin

Comments: Surface water layer; 0.15 < temperature < 0.75°C; 33.65 < salinity < 33.95.

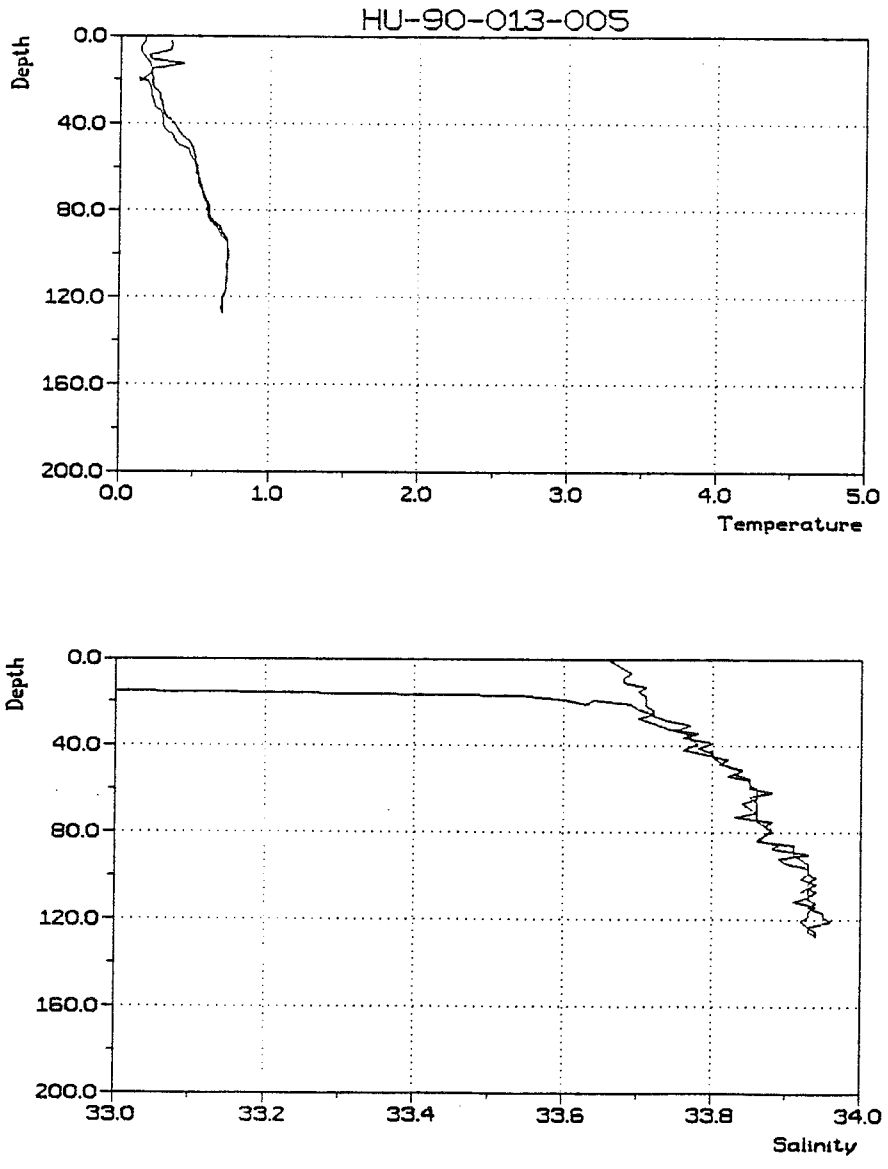

Figure 8: CTD measurements of temperature and salinity profiles at site 90-013-005.

HU-90-013-006: Box coring [1] & CTD profile

Julian day:	153	GMT Time:	21:37
Latitude:	59°29.485 N	Longitude:	45°52.241 W
Depth:	1105 m	Penetration:	15 cm

Geographic location: South West Greenland rise

CTD-profile: It depicts two water masses: a dilute surface layer (*ca.* 200 m; 34.3 < salinity <34.9) above the Labrador Sea Water (LSW) mass (salinity *ca.* 34.9).

Box core: The sediment consists of silts, coarse sands, gravels and pebbles with an abundant benthic fauna at the surface.

Subsampling:
1 push-core (20 cm long, 15 cm in diameter) for on-board processing
2 push-cores (20 cm long, 7 cm in diameter) for further analysis (UQAM)
1 push-core (20 cm long, 7 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) kept frozen for amino-acid studies (U. of Virginia)
1 sample (250 ml) at the box-core surface for foraminifer study (UQAM).

On-board measurements & subsampling:

Depth (cm)	Eh (mv)	O_2 (%)	Pore water	Frozen[2] sample	Sediment[3] sample	Squeezed seds.	Porosity[4] sample.
1-2.5	220	47	x	1 cc	33 cc	x	# 1
2.5-4.5	208	42	x	1 cc	33 cc	x	# 2
4.5-6.5	158	37	x	1 cc	33 cc	x	# 3
6.5-8.5	135	40	x	1 cc	33 cc	x	# 4
8.5-10.5	135	38	x	1 cc	33 cc	x	# 5
10.5-13.5	140	94	x	1 cc	33 cc	x	# 6
13.5-15.5	185	38	x	1 cc	33 cc	x	# 7

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1. See appendix 2.3
2. For bacterial counting (U. of Virginia)
3. For micropaleontological & geochemical studies (UQAM)
4. Sample number (Univ. McGill)

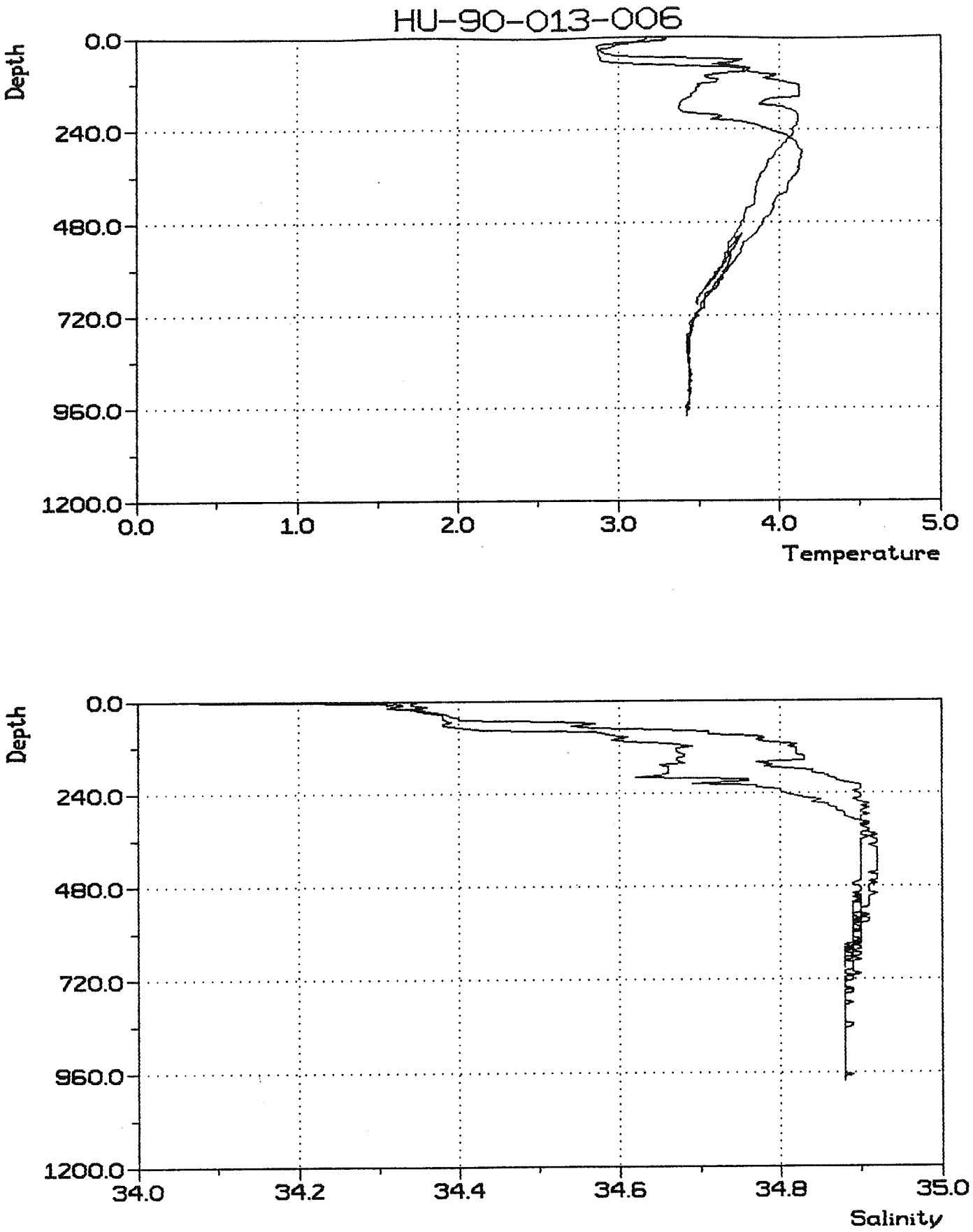


Figure 9: CTD measurements of temperature and salinity profiles at site 90-013-006.

HU-90-013-007: Water sampling [1]

Julian day:	153	GMT Time:	22:59
Latitude:	59°29.78 N	Longitude:	45°55.03 W
Depth:	1105 m	Depth intervals sampled:	(I) 2-15 m
			(II) 315-334 m
			(III) 634-651 m

Geographic location: South West Greenland margin

Summary: 4 x 12 L-Niskin bottles were used for each depth interval except for the upper one wich had only 3 bottles. CTD cast was made when box-coring at nearby site 90-013-006 [2].

Sampling & on board processing:

(I) 2-15 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC[3]
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45µm filter: 0.9 L
Volume of water filtered through Glass Fiber Filter: 1.5, 6.0, 3.7 L.

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM[4] + SiO_2	89-081
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C,^{15}N,CHNS	89-081
GFF	--	---	" " "	89-086
GFF	--	---	" " "	89-087
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. See CTD profile in Fig.second next page
3. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
4. SPM: Suspended Particular Matter

HU-90-013-007: Water sampling (Cont'd)

(II) 315-334 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 2.9 L
Volume of water filtered through Glass Fiber Filter: 6.6 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-080
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-080
------	H	13	TIDC	---------

(III) 634-651 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 13.6 L
Volume of water filtered through Glass Fiber Filter: 24 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-079
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-079
------	H	13	TIDC	---------

HU-90-013-008: Water sampling [1]

Julian day:	154	GMT Time:	11:51
Latitude:	58°55.33 N	Longitude:	47°07.74 W
Depth:	2834 m	Depth intervals sampled:	(I) 2-17 m (II) 1079-1100 m (III) 2201-2222 m

Geographic location: South West Greenland margin

Summary: 4 x 12 L-Niskin bottles were used for each depth interval except for the upper one wich had only 3 bottles.

Sampling & on board processing:

(I) 2-17 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC[23]
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45µm filter: 2 L
Volume of water filtered through Glass Fiber Filter: 4, 5, 4 L.

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM[3] + SiO_2	89-086
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C, ^{15}N, CHNS	89-085
GFF	--	---	" " "	89-088
GFF	--	---	" " "	89-089
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
3. SPM: Suspended Particular Matter

HU-90-013-008: Water sampling (Cont'd)

(II) 1079-1100 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 8, 6 L
Volume of water filtered through Glass Fiber Filter: 6, 11.1 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-083
0.45 µm	--	---	" "	89-085
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-083
GFF	--	---	" " " "	89-084
------	H	13	TIDC	---------

(III) 2201-2222 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 4 L
Volume of water filtered through Glass Fiber Filter: 17.6 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-082
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-082
------	H	13	TIDC	---------

HU-90-013-009: Box coring & CTD profile

Julian day:	154	GMT Time:	14:11
Latitude:	59°54.58 N	Longitude:	47°06.72 W
Depth:	2765 m		

Geographic location: South West Greenland rise

CTD-profile: It depicts two water masses: a dilute surface layer (*ca.*100 m; salinity *ca.* 34.45) above the Labrador Sea Water (LSW) mass (salinity *ca.* 34.83).

Box core: Pre-tripping at a depth of *ca.* 500 m due to strong swell.

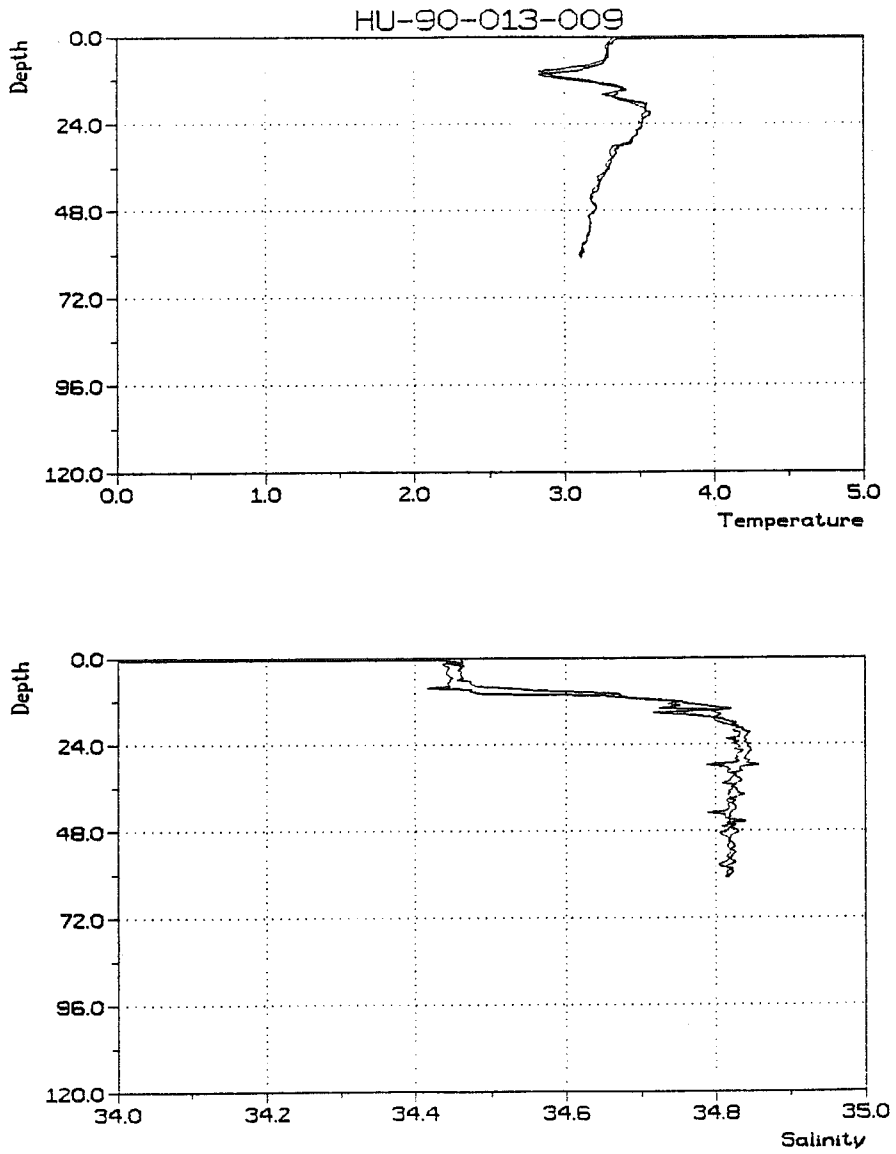


Figure 11: CTD measurements of temperature and salinity profiles at site 90-013-009.

HU-90-013-010: Water sampling [1] & CTD [2]

Julian day:	155	GMT Time:	00:22
Latitude:	59°26.47 N	Longitude:	46°04.46 W
Depth:	1958 m	Depth intervals sampled:	(I) 2-15 m
			(II) 417-437 m
			(III) 1738-17-58 m

Geographic location: South West Greenland margin

Summary: 4 x 12 L-Niskin bottles were used for each depth interval except for the upper one wich had only 3 bottles. The CTD profile depicts a dilute surface layer (<200 m) with a salinity as low as 34.02 above the Labrador Sea Water (LSW) mass (34.8 < salinity <34.9).

Sampling & on board processing:

(I) 2-15 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC[3]
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45µm filter: 0.7 L
Volume of water filtered through Glass Fiber Filter: 1.6, 1.8 L.

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM[4] + SiO_2	89-089
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C,^{15}N,CHNS	89-093
GFF	--	---	" " "	89-094
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. See CTD profile in Fig. second next page
3. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
4. SPM: Suspended Particular Matter

HU-90-013-010: Water sampling & CTD (Cont'd)

(II) 417-437 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 10 L
Volume of water filtered through Glass Fiber Filter: 35 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-088
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-091
------	H	13	TIDC	---------

(III) 1738-1758 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 10 L
Volume of water filtered through Glass Fiber Filter: 36 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-087
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-090
------	H	13	TIDC	---------

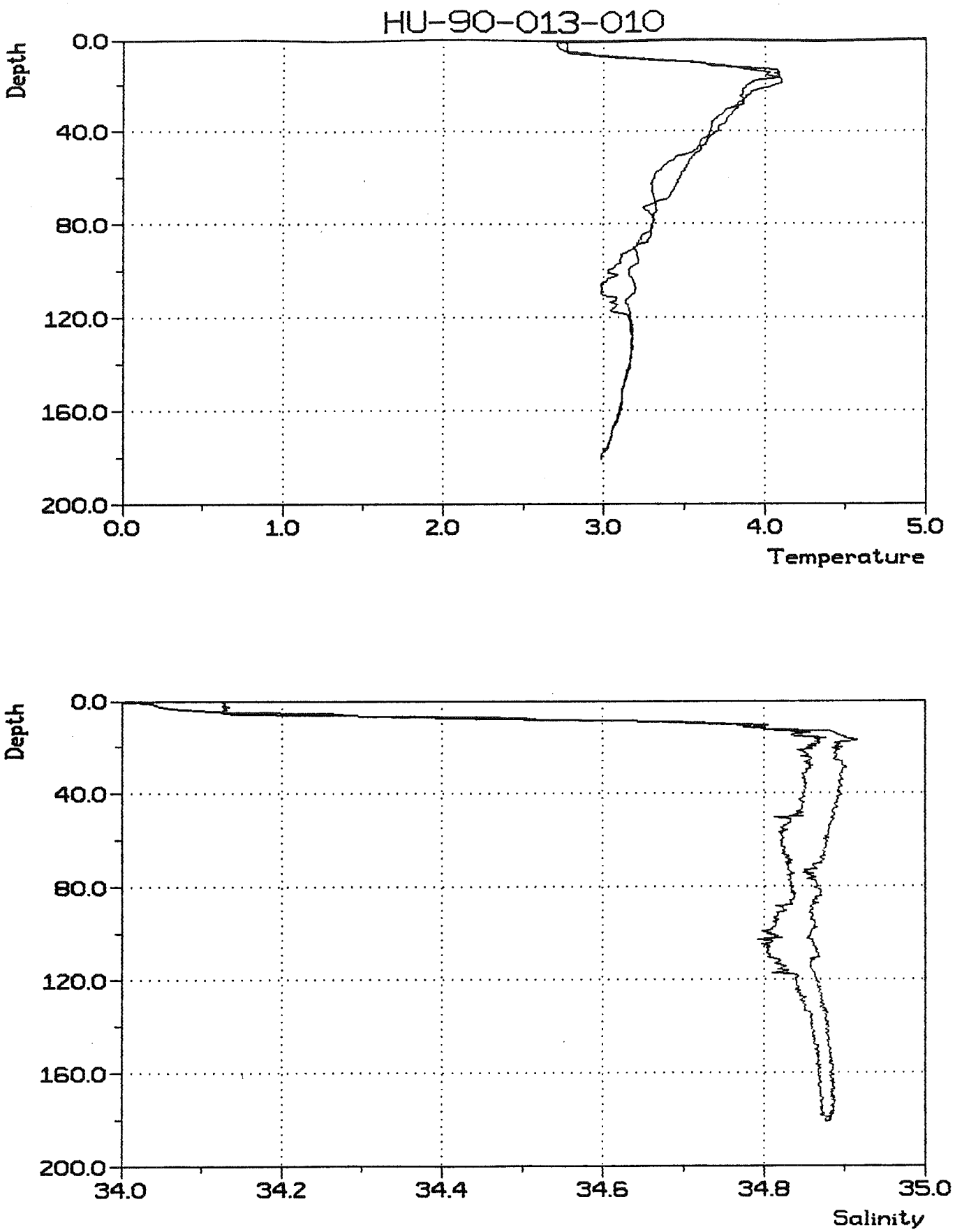


Figure 12: CTD measurement of temperature and salinity profiles at site 90-013-010.

HU-90-013-011: Box coring [1] & CTD profile [2]

Julian day:	155	GMT Time:	10:21
Latitude:	58°54.853 N	Longitude:	47°05.126 W
Depth:	2805 m	Penetration:	35 cm

Geographic location: South West Greenland rise

CTD-profile: It depicts three water masses: a surface layer (*ca.* 100 m; temperature *ca.* 3.25°C); the Labrador Sea Water mass (LSW) down to *ca.* 1700 m (minimum temperature 3°C) above a deep water mass showing a strong temperature gradient from 3.3 to 1.75°C.

Box core: The sediment consists of fine sands overlying clayey silts with lenses of coarse sands and pebbles.

Subsampling:
1 push-core (40 cm long, 15 cm in diameter) for on-board processing
4 push-cores (40 cm long, 7 cm in diameter) for further analysis (UQAM)
1 push-core (40 cm long, 7 cm in diameter) for archives (BIO)
1 "micro-core" (40 cm^3) kept frozen for amino-acid studies (U. of Virginia)
1 sample (250 ml) at the box-core surface for foraminifer study (UQAM).

On-board measurements & subsampling:

Depth (cm)	Eh (mv)	O_2 (%)	Pore water	Frozen[3] sample	Sediment[4] sample	Squeezed seds.	Porosity[5] sample
0-2	----	---	x	1 cc	33 cc	x	# 8
2-4	190	16	x	1 cc	33 cc	x	# 9
4-6	130	20	x	1 cc	33 cc	x	# 10
6-8	130	16	x	1 cc	33 cc	x	# 11
8-10	130	26	x	1 cc	33 cc	x	# 12
10-12	110	32	x	1 cc	33 cc	x	# 13
12-14	125	28	x	1 cc	33 cc	x	# 14
14-16	90	27	x	1 cc	33 cc	x	# 15
17-19	130	28	x	1 cc	33 cc	x	# 16
19-21	----	---	x	1 cc	33 cc	x	# 17
21-23	----	---	x	1 cc	33 cc	x	# 18
23-25	----	---	x	1 cc	33 cc	x	# 19
25-27	110	---	x	1 cc	33 cc	x	# 20
27-29	125	15	x	1 cc	33 cc	x	# 21
29-31	----	30	x	1 cc	33 cc	x	# 22
31-33	----	---	x	1 cc	33 cc	x	# 23
33-35	----	---	x	1 cc	33 cc	x	# 24

---

1. See appendix 2.3
2. See Fig. next page.
3. For bacterial counting (U. of Virginia).
4. For micropaleontological & geochemical studies (UQAM).
5. Sample number (McGill).

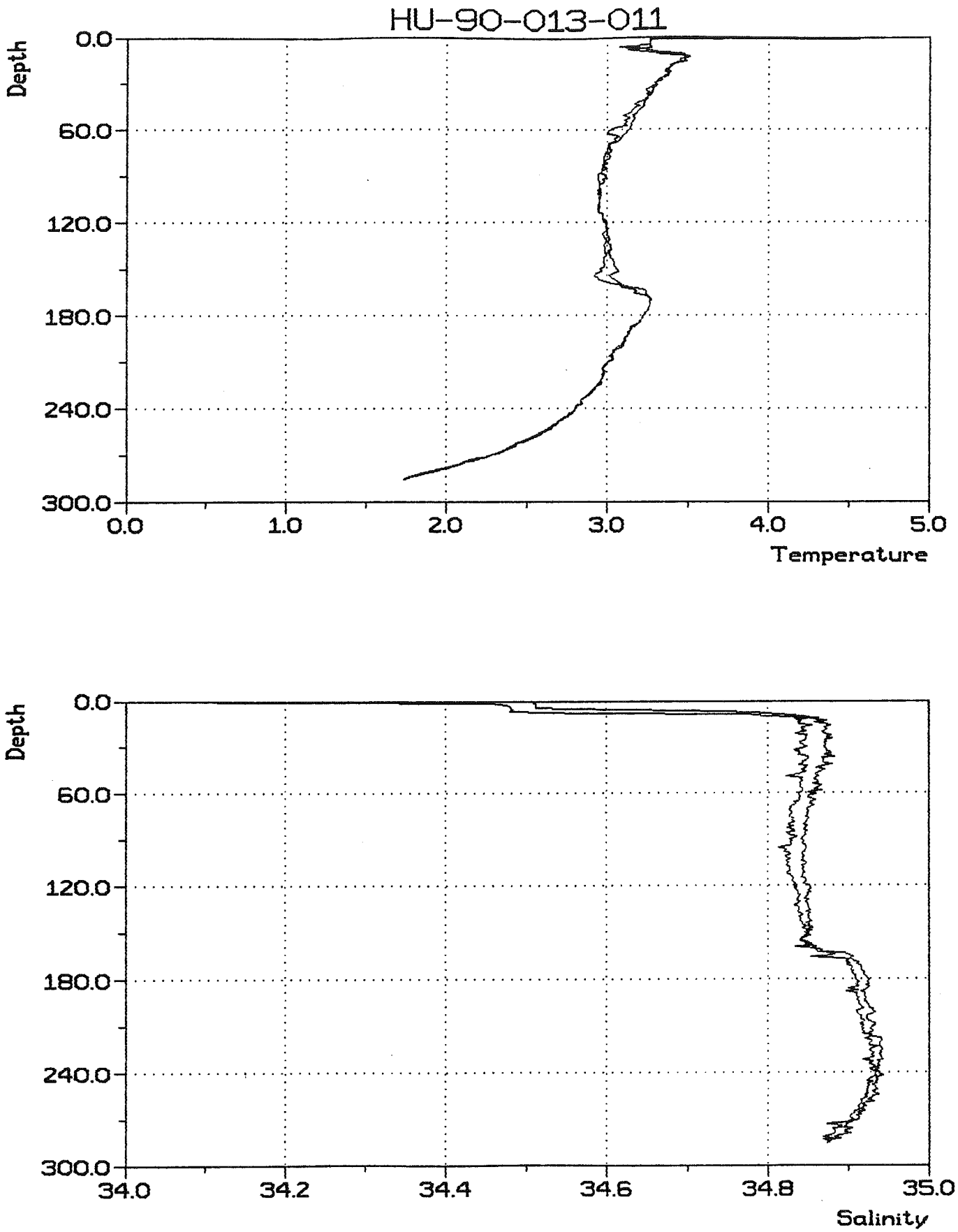


Figure 13: CTD measurement of temperature and salinity profiles at site 90-013-011.

HU 90-013-012 P: L-Piston coring

Julian day:	155	GMT Time:	13:36
Latitude:	58°55.348 N	Longitude:	47°07.01 W
Depth:	2830 m	Corer length:	1520 cm
Penetration:	1316 cm	Core length:	1254 cm

Geographic location: South West Greenland rise

Comments: In spite of a good penetration of the LPC, the trigger weight corer showed no apparent penetration and was recovered almost completely empty.

Description: The top of the core (0-17 cm) consists of sands and massive sandy silts with fine laminations. A 1.5 cm dropstone is present at 12 cm s.b. Downcore (from 17 to 1254 cm s.b.), the sediment consists of loose clayey silts with thin clay layers, disseminated sand grains, fine gravels and vesicles.A few dropstones ranging from 1 to 4 cm in diameter are present. Dark spots (sulfides?) and small tubular tracks (bioturbations) are abundant. A compacted horizon of clay is found at 413-430 cm s.b.

Subsampling: The core was cut into *ca.* 150 cm-long sections numbered as usual (see appendix 2.2). Each of them was split into 2 longitudinal half-sections. One half was described and photographied, then stored for archives. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1). Table in next pages.

HU-90-013-012/P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
0-2	x	x	x	x	
1.5-3.5					x
10-12	x	x	x	x	
11.5-13.5					x
20-22	x	x	x	x	
21.5-23.5					x
28-30	x	x	x	x	
31.5-33.5					x
38-40	x	x	x	x	
41-43					x
48-50	x	x	x	x	
51-53					x
58-60	x	x	x	x	
61-63					x
68-70	x	x	x	x	
71-73					x
78-80	x	x	x	x	
81-83					x
88-90	x	x	x	x	
91-93					x
98-100	x	x	x	x	
101-103					x
107-109	x	x	x	x	
111-113					x
117-119	x	x	x	x	
121-123					x
126-128	x	x	x	x	
131-133					x
136-138	x	x	x	x	
141-143					x
146-148	x	x	x	x	
151-153					x
156-158	x	x	x	x	
161-163					x
166-168	x	x	x	x	
171-173					x
176-178	x	x	x	x	
181-183					x
188-190	x	x	x	x	
191-193					x
198-200	x	x	x	x	
201-203					x
208-210	x	x	x	x	
211.213					x
221-223					x
227-229	x	x	x	x	
231-233					x
237-238	x	x	x	x	
241-243					x
247-249	x	x	x	x	
251-253					x
267-269	x	x	x	x	
271-273					x
277-279	x	x	x	x	
281-283					x
287-289	x	x	x	x	
291-293					x
296.5-298.5	x	x	x	x	

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
301-303					x
307-309	x	x	x	x	
313-315					x
317-319	x	x	x	x	
321-323					x
326-328	x	x	x	x	
331.5-333.5					x
337-339	x	x	x	x	
347-349	x	x	x	x	
352-354					x
357-359	x	x	x	x	
362-364					x
368-370	x	x	x	x	
372-374					x
378-380	x	x	x	x	
382-384					x
387-389	x	x	x	x	
392-394					x
397-399	x	x	x	x	
402-404					x
407-409	x	x	x	x	
412-414					x
418-420	x	x	x	x	
422-424					x
428-430	x	x	x	x	
431-434					x
438-440	x	x	x	x	
442-444					x
448-450	x	x	x	x	
452-454					x
457-459	x	x	x	x	
462-464					x
467-469	x	x	x	x	
472-374					x
477-479	x	x	x	x	
482-484					x
487-489	x	x	x	x	
491-493					x
497-499	x	x	x	x	
503-505					x
507-509	x	x	x	x	
511-513					x
517-519	x	x	x	x	
521-523					x
527-529	x	x	x	x	
531-532					x
537-539	x	x	x	x	
541-543					x
547-549	x	x	x	x	
551-553					x
557-559	x	x	x	x	
561-563					x
567-569	x	x	x	x	
571-573				x	
580-582					x
580-582	x	x	x	x	
592-594					x
590-591	x	x	x	x	

HU-90-013-012/P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
600-602	x	x	x	x	
600-602					x
610-612	x	x	x	x	
610-612					x
619-621					x
620-622	x	x	x	x	
629-631	x	x	x	x	
630-632					x
638-640	x	x	x	x	
643-645					x
648-650	x	x	x	x	
652-654					x
658-660	x	x	x	x	
662-664					x
668-670	x	x	x	x	
672-674					x
678-680	x	x	x	x	
683-685					x
688-690	x	x	x	x	
692-694					x
698-700	x	x	x	x	
702-704					x
708-710	x	x	x	x	
712-714					x
718-720	x	x	x	x	
723-725					x
728-730	x	x	x	x	
733-735					x
738-740	x	x	x	x	
743-745					x
748-750	x	x	x	x	
752-754					x
758-760	x	x	x	x	
762-764					x
768-770	x	x	x	x	
772-774					x
778-780	x	x	x	x	
781-783					x
791-793					x
798-800	x	x	x	x	
808-810	x	x	x	x	
811-813					x
818-820	x	x	x	x	
820-822					x
828-830	x	x	x	x	
831-833					x
838-840	x	x	x	x	
842-844					x
848-850	x	x	x	x	
851-853					x
858-860	x	x	x	x	
861-863					x
868-870	x	x	x	x	
872-874					x
878-880	x	x	x	x	
888-890	x	x	x	x	
891-894					x
898-900	x	x	x	x	
901-903					x
908-910	x	x	x	x	
911-913					x
918-920	x	x	x	x	
920-922					x
940-942					x
942-944	x	x	x	x	
948-950	x	x	x	x	
950-952					x
958-960	x	x	x	x	
960-962					x
968-970	x	x	x	x	
970-972					x
978-980	x	x	x	x	
980-982					x
988-990	x	x	x	x	
990-992					x
998-1000	x	x	x	x	
1000-1002					x
1008-1010	x	x	x	x	
1010-1012					x
1018-1020	x	x	x	x	
1020-1022					x
1028-1030	x	x	x	x	
1030-1032					x
1038-1040	x	x	x	x	
1040-1042					x
1048-1050	x	x	x	x	
1050-1052					x
1058-1060	x	x	x	x	
1060-1062					x
1068-1070	x	x	x	x	
1070-1072					x
1080-1082					x
1089-1091	x	x	x	x	
1091.5-1093.5					x
1098-1100	x	x	x	x	
1101-1103					x
1108-1110	x	x	x	x	
1110.5-1112.5					x
1118-1120	x	x	x	x	
1120-1122					x
1128-1130	x	x	x	x	
1130-1132					x
1138-1140	x	x	x	x	
1140-1142					x
1148-1150	x	x	x	x	
1151-1153					x
1158-1160	x	x	x	x	
1160.5-1162.5					x
1168-1170	x	x	x	x	
1170.5-1172.5					x
1178-1180	x	x	x	x	
1180.1182					x
1188-1190	x	x	x	x	
1190.5-1192.5					x

HU-90-013-012/P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
1198-1200	x	x	x	x	
1200.5-1202.5					x
1208-1210	x	x	x	x	
1210-1212					x
1218-1220	x	x	x	x	
1220.5-1122.5					x
1240-1142					x
1243-1245	x	x	x	x	
1249-1251	x	x	x	x	x

HU-90-013-013 TWC: Trigger weight coring

Julian day:	155	GMT Time:	21:26
Latitude:	58°12.59 N	Longitude:	48°22.40 W
Depth:	3380 m	Penetration:	39 cm

Geographic location: Off South West Greenland

Description: The upper part of the core consists of an oxydized horizon (0-11 cm) of brown, carbonate-rich clayey silts with cm-thick dark layers.The reduced part of the core shows a greenish gray silty clay interrupted at 18 cm s.b. by a cm-thick oxydized lense, and containing disseminated gravels and fine laminations of compacted carbonate-rich green silts.

Subsampling: One half section was described, photographied and was finally labelled for archives. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1).

Depth s.b . (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
2-4	x	x	x	x	--
8-10	x	x	x	x	--
9-11					x
17-19	x	x	x	x	--
18.2-20.2					x
25-27	x	x	x	x	--
27.8-29.8					x
34-36	x	x	x	x	--

HU-90-013-013 P: L-Piston coring

Julian day:	155	GMT Time:	21:26
Latitude:	58°12.59 N	Longitude:	48°22.40 W
Depth:	3380 m	Corer length:	4500 cm
Penetration:	1800 cm	Core length:	1744 cm

Geographic location: Off South West Greenland

Description: The upper part of the core (0-470 cm s.b.) consists of loose silty clays, finely laminated and containing small sand lenses.Horizons enriched in Mn and Fe are observed at 20 and 30 cm s.b. Centimetric vesicles are abundant between 250 to 255 cm s.b. From 470 to 950 cm s.b., the sediment consists of loose, dark green to brown clayey silts with abundant silty and sandy nodules and disseminated gravels. Below, a dry compacted olive green clay with abundant dark horizons and clayey nodules is found down to 1210 cm s.b. The bottom of the core (1210-1740 cm s.b.) consists of a succession of compacted greenish silty clays, greenish silts and dark green clayey silts with abundant dark spots which disappear below 1410 cm s.b. where disseminated gravels are found.

Subsampling: The core was cut into *ca.* 150 cm-long sections numbered as usual (see appendix 2.2). Each of them was split into 2 longitudinal half-sections. One half was described and photographied, then stored for archives. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1).

HU-90-013-013 P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
3-5	x	x	x	x	
8-10	x	x	x	x	
10-12					x
18-20	x	x	x	x	
19.8-21.8					x
28-30	x	x	x	x	
30.5-32.5					x
38-40	x	x	x	x	
40.5-42.5					x
48-50	x	x	x	x	
50-52					x
58-60	x	x	x	x	
60.5-62.5					x
68-70	x	x	x	x	
69.6-71.6					x
78-80	x	x	x	x	
80-82					x
88-90	x	x	x	x	
90-92					x
98-100	x	x	x	x	
100-102					x
108-110	x	x	x	x	
110-112					x
118-120	x	x	x	x	
120-122					x
128-130	x	x	x	x	
130-132					x
138-140	x	x	x	x	
140-42					x
148-150	x	x	x	x	
150-152					x
158-160	x	x	x	x	
160-162					x
168-170	x	x	x	x	
170-172					x
178-180	x	x	x	x	
180-182					x
188-190	x	x	x	x	
190-192					x
198-200	x	x	x	x	
200-202					x
208-210	x	x	x	x	
210-212					x
218-220	x	x	x	x	
220-222					x
228-230	x	x	x	x	
230-232					x
238-240	x	x	x	x	
240-242					x
248-250	x	x	x	x	
250-252					x
258-260	x	x	x	x	
260-262					x
268-270	x	x	x	x	
270-272					x
278-280	x	x	x	x	
280-282					x
288-290	x	x	x	x	
290-292					x
298-300	x	x	x	x	
300-302					x
308-310	x	x	x	x	
310-312					x
318-320	x	x	x	x	
320-322					x
328-330	x	x	x	x	
329.5-331.5					x
338-340	x	x	x	x	
339-341					x
348-350	x	x	x	x	
349-351					x
358-360	x	x	x	x	
360-362					x
368-370	x	x	x	x	
370-372					x
378-380	x	x	x	x	
380-382					x
388-390	x	x	x	x	
390.5					x
398-400	x	x	x	x	
400-402					x
408-410	x	x	x	x	
410-412					x
418-420	x	x	x	x	
420-422					x
428-430	x	x	x	x	
430-432					x
438-440	x	x	x	x	
440-442					x
448-450	x	x	x	x	
450-452					x
459-461	x	x	x	x	
460.5-462.5					x
468-470	x	x	x	x	
470.5-472.5					x
478-480	x	x	x	x	
480-482					x
488-490	x	x	x	x	
490-492					x
498-500	x	x	x	x	
500-502					x
508-510	x	x	x	x	
510-512					x
518-520	x	x	x	x	
520-522					x
528-530	x	x	x	x	
530-532					x
538-540	x	x	x	x	
540-542					x
548-550	x	x	x	x	
550-552					x
558-560	x	x	x	x	
560-562					x
568-570	x	x	x	x	
570-572					x
578-580	x	x	x	x	

HU-90-013-013 P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
580-582					x
588-590	x	x	x	x	
590-592					x
598-600	x	x	x	x	
600-602					x
608-610	x	x	x	x	
610-612					x
618-620	x	x	x	x	
620-622					x
628-630	x	x	x	x	
630.5-632.5					x
638-540	x	x	x	x	
640-642					x
648-650	x	x	x	x	
650-652					x
658-660	x	x	x	x	
660-662					x
668-670	x	x	x	x	
670-672					x
677-679	x	x	x	x	
679-681					x
687-689	x	x	x	x	
688-690					x
698-700	x	x	x	x	
700-702					x
708-710	x	x	x	x	
710.5-712.5					x
717-719	x	x	x	x	
719-721					x
726-728	x	x	x	x	
730-732					x
736-738	x	x	x	x	
739.8-741.8					x
746-748	x	x	x	x	
749-751					x
756-758	x	x	x	x	
760-762					x
766-768	x	x	x	x	
769.8-771.8					x
776-778	x	x	x	x	
779-780					x
786-788	x	x	x	x	
788.8-790.8					x
796-798	x	x	x	x	
800-802					x
806-808	x	x	x	x	
810-812					x
816-818	x	x	x	x	
819.5-821.5					x
825-827	x	x	x	x	
829.5-831.5					x
836-838	x	x	x	x	
839.5-841.5					x
846-848	x	x	x	x	
849.8-851.8					x
856-858	x	x	x	x	
859.3-861.3					x
866-868	x	x	x	x	
869-871					x
876-878	x	x	x	x	
878.8-880.8					x
886-888	x	x	x	x	
890.5-892.5					x
896-898	x	x	x	x	
900-902					x
906-908	x	x	x	x	
910-912					x
916-918	x	x	x	x	
920-922					x
926-928	x	x	x	x	
930-932					x
936-938	x	x	x	x	
939.8-940.8					x
946-948	x	x	x	x	
949-951					x
956-958	x	x	x	x	
959-961					x
966-968	x	x	x	x	
969-971					x
975-977	x	x	x	x	
980-982					x
986-988	x	x	x	x	
990-992					x
996-998	x	x	x	x	
100-1002					x
1006-1008	x	x	x	x	
1009.5-1011.5					x
1016-1018	x	x	x	x	
1019-1021					x
1026-1028	x	x	x	x	
1029-1031					x
1036-1038	x	x	x	x	
1038.5-1040.5					x
1046-1048	x	x	x	x	
1048-1050					x
1056-1058	x	x	x	x	
1060-1062					x
1066-1068	x	x	x	x	
1069.5-1071.5					x
1076-1078	x	x	x	x	
1079-1081					x
1086-1088	x	x	x	x	
1088.8-1090.8					x
1096-1098	x	x	x	x	
1099.5-1101.5					x
1106-1108	x	x	x	x	
1109.2-1111.2					x
1116-1118	x	x	x	x	
1121.5-1123.5					x
1126-1128	x	x	x	x	
1129.5-1131.5					x
1136-1138	x	x	x	x	
1139.5-1141.5					x
1146-1148	x	x	x	x	
1149.5-1151.5					x
1156-1158	x	x	x	x	

HU-90-013-013 P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
1158.5-1160.5					x
1166-1168	x	x	x	x	
1170-1172					x
1176-1178	x	x	x	x	
1179.5-1181.5					x
1186-1188	x	x	x	x	
1189-1191					x
1196-1198	x	x	x	x	
1198.5-1200.5					x
1206-1208	x	x	x	x	
1210.5-1212.5					x
1216-1218	x	x	x	x	
1220-1222					x
1226-1228	x	x	x	x	
1229-1231					x
1236-1238	x	x	x	x	
1239.5-1241.5					x
1246-1248	x	x	x	x	
1249-1251					x
1256-1258	x	x	x	x	
1258.5-1260.5					x
1266-1268	x	x	x	x	
1268.5-1270.5					x
1276-1278	x	x	x	x	
1278-1280					x
1286-1288	x	x	x	x	
1288.9-1290.9					x
1296-1298	x	x	x	x	
1298.7-1300.7					x
1306-1308	x	x	x	x	
1308.2-1310.2					x
1316-1318	x	x	x	x	
1320-1322					x
1326-1328	x	x	x	x	
1329.2-1331.2					x
1336-1338	x	x	x	x	
1339-1341					x
1346-1348	x	x	x	x	
1348.5-1350.5					x
1356-1358	x	x	x	x	
1358.2-1360.2					x
1366-1368	x	x	x	x	
1370.2-1372.2					x
1376-1378	x	x	x	x	
1379.9-1381.9					x
1386-1388	x	x	x	x	
1389.8-1391.8					x
1396-1398	x	x	x	x	
1399.7-1401.7					x
1406-1408	x	x	x	x	
1409.2-1411.2					x
1416-1418	x	x	x	x	
1419-1421					x
1426-1428	x	x	x	x	
1428.7-1430.7					x
1437-1439	x	x	x	x	
1438.9-1440.9					x
1446-1448	x	x	x	x	
1448.9-1450.9					x
1456-1458	x	x	x	x	
1460.4-1462.4					x
1466-1468	x	x	x	x	
1470-1472					x
1476-1478	x	x	x	x	
1479.6-1481.6					x
1486-1488	x	x	x	x	
1489-1491					x
1496-1498	x	x	x	x	
1510-1512					x
1516-1518	x	x	x	x	
1519.2-1521.2					x
1526-1528	x	x	x	x	
1528.3-1530.3					x
1536-1538	x	x	x	x	
1540.1-1542.1					x
1546-1548	x	x	x	x	
1549.5-1551.5					x
1556-1558	x	x	x	x	
1558.7-1560.7					x
1566-1568	x	x	x	x	
1570.2-1572.2					x
1576-1578	x	x	x	x	
1579.3-1581.3					x
1585-1587	x	x	x	x	
1589-1590					x
1596-1598	x	x	x	x	
1598.3-1600.3					x
1606-1608	x	x	x	x	
1609.7-1611.7					x
1612-1613	x	x	x	x	
1617-1619	x	x	x	x	
1618.4-1620.4					x
1622-1623	x	x	x	x	
1626-1628	x	x	x	x	
1627.7-1629.7					x
1631-1632	x	x	x	x	
1637-1639	x	x	x	x	
1639-1641					x
1641-1642	x	x	x	x	
1647-1649	x	x	x	x	
1648-1650					x
1651-1652	x	x	x	x	
1657-1659	x	x	x	x	
1659.2-1661.2					x
1661-1662	x	x	x	x	
1667-1669	x	x	x	x	
1668.5-1670.5					x
1671-1672	x	x	x	x	
1677-1679	x	x	x	x	
1679.4-1681.4					x
1681-1682	x	x	x	x	
1687-1689	x	x	x	x	
1688.6-1690.6					x
1691-1692	x	x	x	x	
1697-1699	x	x	x	x	
1699.8-1701.8					x

HU-90-013-013 P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
1701-1702	x	x	x	x	
1707-1709	x	x	x	x	
1709-1711					x
1711-1712	x	x	x	x	
1717-1719	x	x	x	x	
1720-1722					x
1721-1722	x	x	x	x	
1727-1729	x	x	x	x	
1729.1-1731.1					
1731-1732	x	x	x	x	
1738-1740	x	x	x	x	

HU-90-013-014: Water sampling [1] & CTD [2]

Julian day:	155	GMT Time:	11:30
Latitude:	58°12.092 N	Longitude:	48°22.66 W
Depth:	3400 m	Depth intervals sampled:	(I) 1200-1228 m; (II) 3200-3228 m

Geographic location: Off South West Greenland margin

Summary: 2 sets of 5 x [12 L-Niskin] bottles were used for sampling water masses (I) and (II) respectively. The CTD profiles depict three water masses: a surface layer (*ca.* 100 m; temperature *ca.* 2.8°C); the Labrador Sea Water mass (LSW) down to *ca.* 2100 m (minimum temperature 2.95°C; salinity *ca.* 34.82) above a deep water mass showing a strong temperature gradient from 3.4 to 1.9°C and a uniform salinity of about 34.9.

Sampling & on board processing:

(I) 1200-1228 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC[3]
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 µm filter: 18 L
Volume of water filtered through Glass Fiber Filter: 39 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM[4] + SiO_2	89-090
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C,^{15}N,CHNS	89-095
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. See CTD profile in Fig. second next page
3. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
4. SPM: Suspended Particular Matter

HU-90-013-014: Water sampling & CTD (Cont'd)

(II) 3200-3228 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 20 L
Volume of water filtered through Glass Fiber Filter: 43 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-091
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-096
------	H	13	TIDC	---------

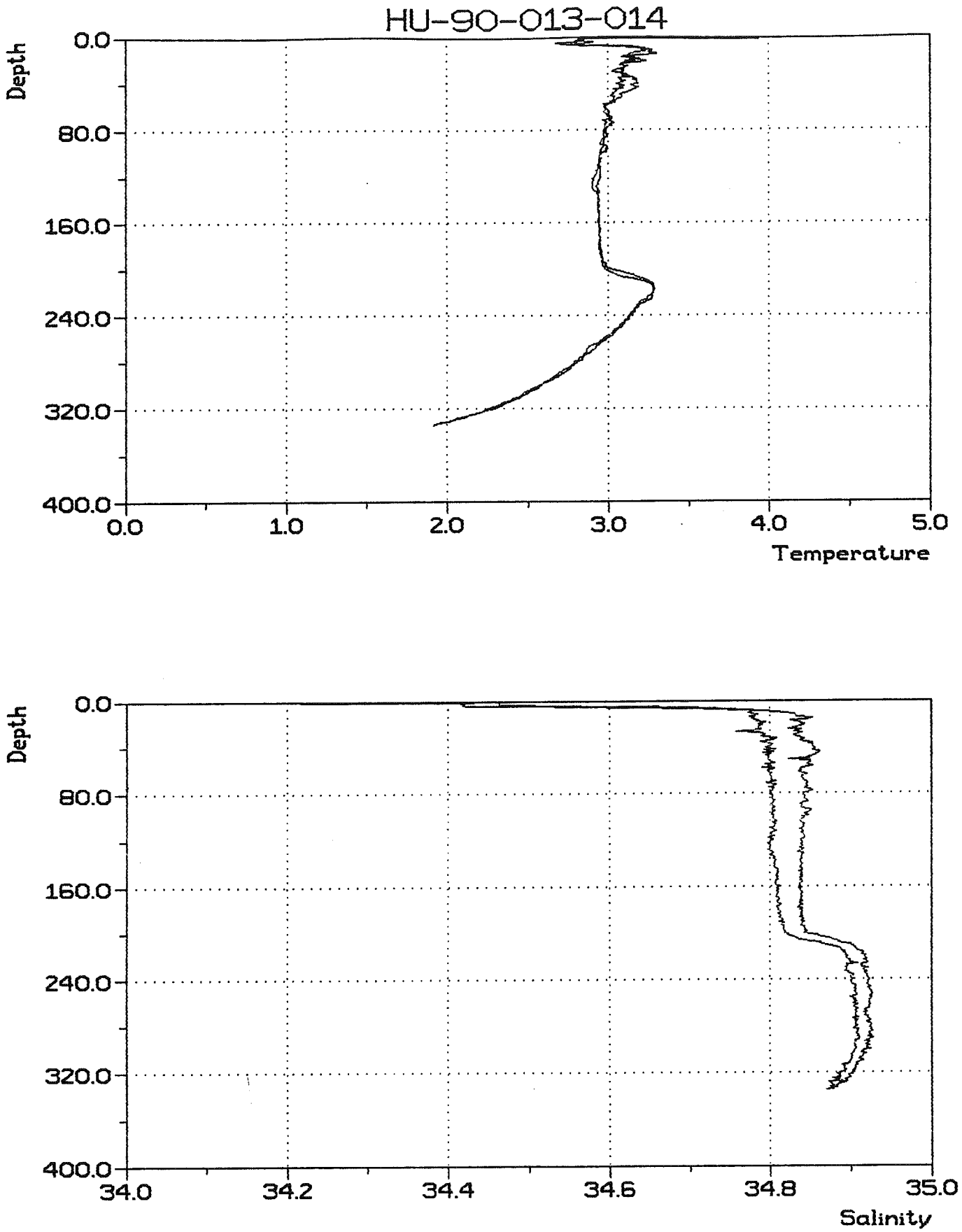


Figure 14: CTD measurement of temperature and salinity profiles at site 90-013-014.

HU-90-013-015: Water sampling [1]

Julian day:	156	GMT Time:	02:40
Latitude:	58°10.50 N	Longitude:	48°23.6 W
Depth:	3400 m	Depth intervals sampled:	(I) 2-16 m; (II) 120-134 m

Geographic location: Off South West Greenland

Summary: 2 sets of 3 x [12 L-Niskin] bottles were used for sampling water masses (I) and (II) respectively.

Sampling & on board processing:

(I) 2-16 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC[2]
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45µm filter: 1.4 L
Volume of water filtered through Glass Fiber Filter: 4.0, 4.0 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM[3]+ SiO_2	89-093
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C,^{15}N,CHNS	89-098
GFF	--	---	" " "	89-100
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
3. SPM: Suspended Particular Matter

HU-90-013-015: Water sampling (Cont'd)

(II) 120-134 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 10.9 L
Volume of water filtered through Glass Fiber Filter: 26 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-092
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-097
------	H	13	TIDC	---------

HU 90 013 016: Plankton tow

Julian day:	156	GMT Time:	03:00
Latitude:	58°10.20 N	Longitude:	48°23.60 W
Depth:	3400 m	Sampling interval:	0-50 m

Geographic location: Off South West Greenland

Plankton net: Length: 3 m
Diameter: 1 m
Mesh: 73 µm

Comments: The sampling has been made from a depth of *ca.* 50 m up to the surface; 4 subsamples were taken as below:
- 2 x 250 ml were processed with 20% formaldehyde, then refrigerated;
- 2 x 250 ml were preserved frozen.

HU-90-013-017: Box coring [1] & CTD [2]

Julian day:	156	GMT Time:	12:20
Latitude:	58°12.51 N	Longitude:	48°21.61 W
Depth:	3379 m	Penetration:	*ca.* 30 cm

Geographic location: Off South West Greenland

CTD profile: It depicts the major water masses of the basin: (1) dilute surface water (*ca.* 100 m); (2) the homogeneous Labrador Sea Water (down to *ca.* 2100 m); (4) Bottom water with a strong temperature gradient between its two components (NWABW & NEADW).

Description: The sediment consists of brownish clayey silts, overlying a reduced zone of massive greyish blue clays.

Subsampling:
1 push-core (30 cm long, 15 cm in diameter) for on-board processing
4 push-cores (30 cm long, 7 cm in diameter) for further analysis (UQAM)
1 push-core (30 cm long, 7 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acid studies (U. of Virginia)
1 sample (250 ml) at the box-core surface for foraminifer study (UQAM).

On-board measurements & subsampling:

Depth (cm)	Eh-1[2] (mv)	O_2-1[2] (%)	Eh-2[2] (mv)	O_2-2[3] (%)	Pore water	Frozen[4] sample	Sediment[5] sample	Squeezed seds.	Porosity sample.
0-1	250	41	220	47	x	1 cc	33 cc	x	# 25
1-3	227	19	208	42	x	1 cc	33 cc	x	# 26
3-5	220	29	158	37	x	1 cc	33 cc	x	# 27
5-7	210	33	135	40	x	1 cc	33 cc	x	# 28
7-9	195	27	135	38	x	1 cc	33 cc	x	# 29
9-11	195	26	140	94	x	1 cc	33 cc	x	# 30
11-13	215	21	185	38	x	1 cc	33 cc	x	# 31
13-15	192	35	220	47	x	1 cc	33 cc	x	# 32
15-16 [6]	----	---	----	---	--	----	------	--	----
16-18	145	15	208	42	x	1 cc	33 cc	x	# 33
18-20	115	13	158	37	x	1 cc	33 cc	x	# 34
20-22	90	23	135	40	x	1 cc	33 cc	x	# 35
22-24	65	2	135	38	x	1 cc	33 cc	x	# 36
24-26	60	3	140	94	x	1 cc	33 cc	x	# 37
26-28	60	---	185	38	x	1 cc	33 cc	x	# 37

---

1. See appendix 2.3
2. See CTD profile Fig. next page
3. Measurements made at 72 hours interval; push-core stored under nitrogen atmosphere (see Fig. second next page and appendix 2.3)
4. For bacterial counting
5. For micropaleontological & geochemical studies
6. When sampling, the glove-box had to be opened and this layer was slightly oxidized and unusable

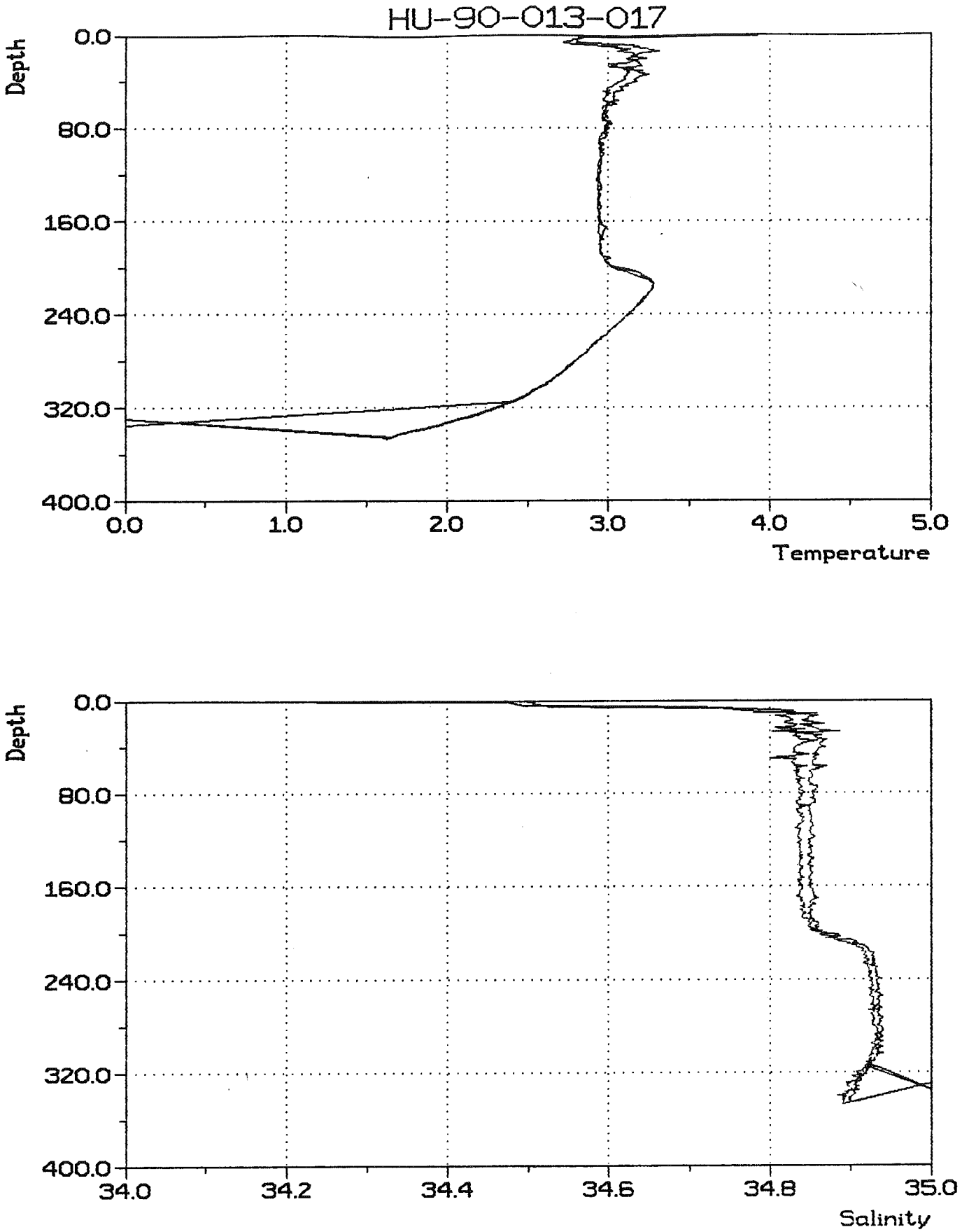


Figure 15: CTD measurement of temperature and salinity profiles at site 90-013-017.

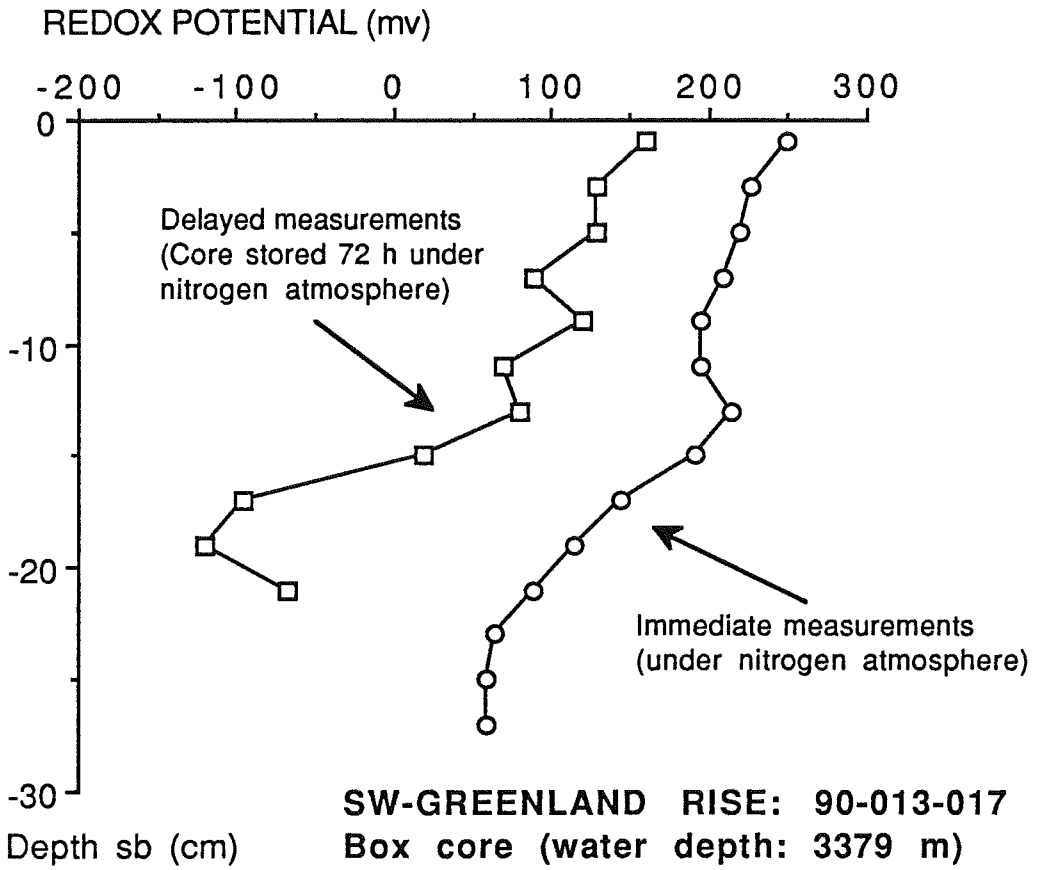


Figure 18: Redox potential in surface sediments at site 90-013-017.

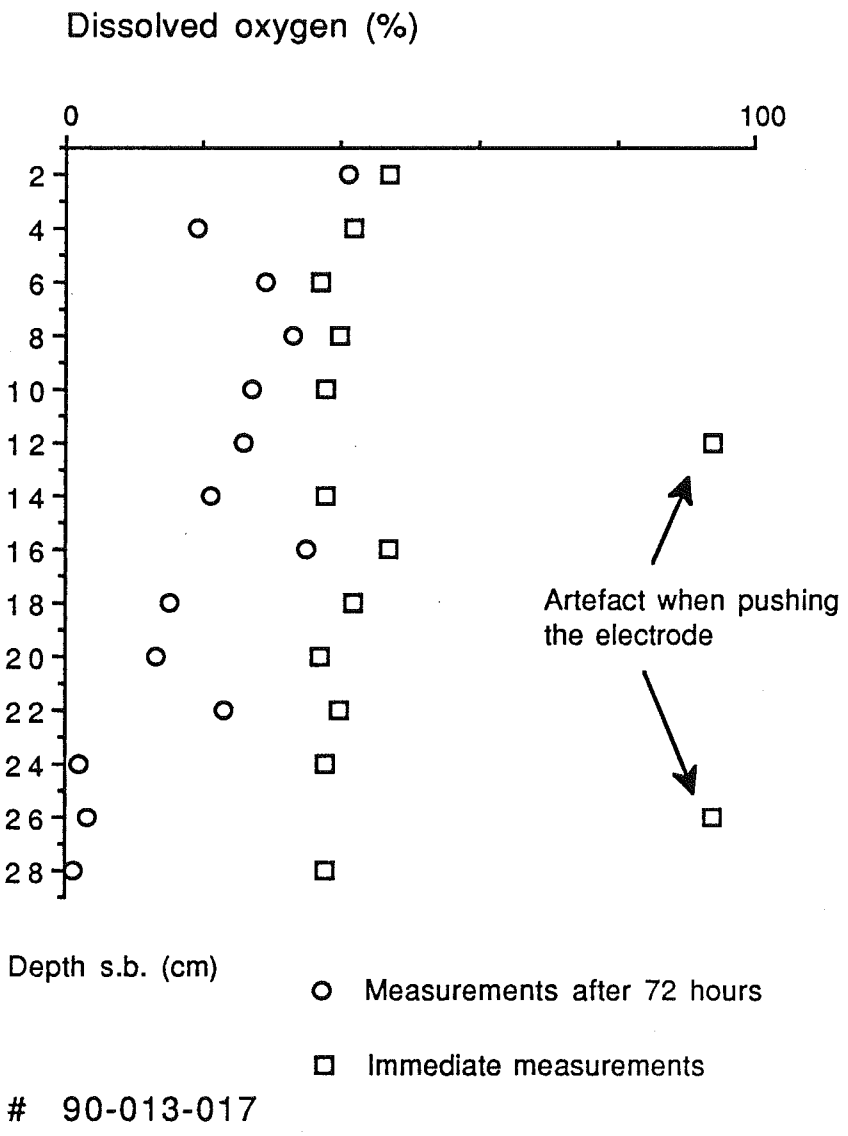


Figure 19: Dissolved oxygen in surface sediments at site 90-013-017.

HU-90-013-018: Water sampling [1] & CTD [2]

Julian day:	158	GMT Time:	08:35
Latitude:	58°22.34 N	Longitude:	57°27.72 W
Depth:	2886 m	Depth intervals sampled:	(I) 1200-1228 m; (II) 2700-2728 m

Geographic location: Labrador slope

Summary: 2 sets of 5 x [12 L-Niskin] bottles were used for sampling water masses (I) and (II) respectively. The CTD profiles depict three water masses: a surface layer (*ca.* 200 m; temperature *ca.* 1.0°C); the Labrador Sea Water mass (LSW) down to *ca.* 1900 m (minimum temperature 3.0°C; salinity *ca.* 34.65); below, the deep water mass showing a strong temperature gradient from 3.3 to 1.9°C and a uniform salinity of about 34.9.

Sampling & on board processing:

(I) 1200-1228 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC[3]
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45µm filter: 20.3 L
Volume of water filtered through Glass Fiber Filter: 42 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM[4] + SiO_2	89-094
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C,^{15}N,CHNS	89-051
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. See CTD profile in Fig. second next page
3. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
4. SPM: Suspended Particular Matter

HU-90-013-018: Water sampling & CTD (Cont'd)

(II) 2700-2728 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 23.3 L
Volume of water filtered through Glass Fiber Filter: 42 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-095
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-052
------	H	13	TIDC	---------

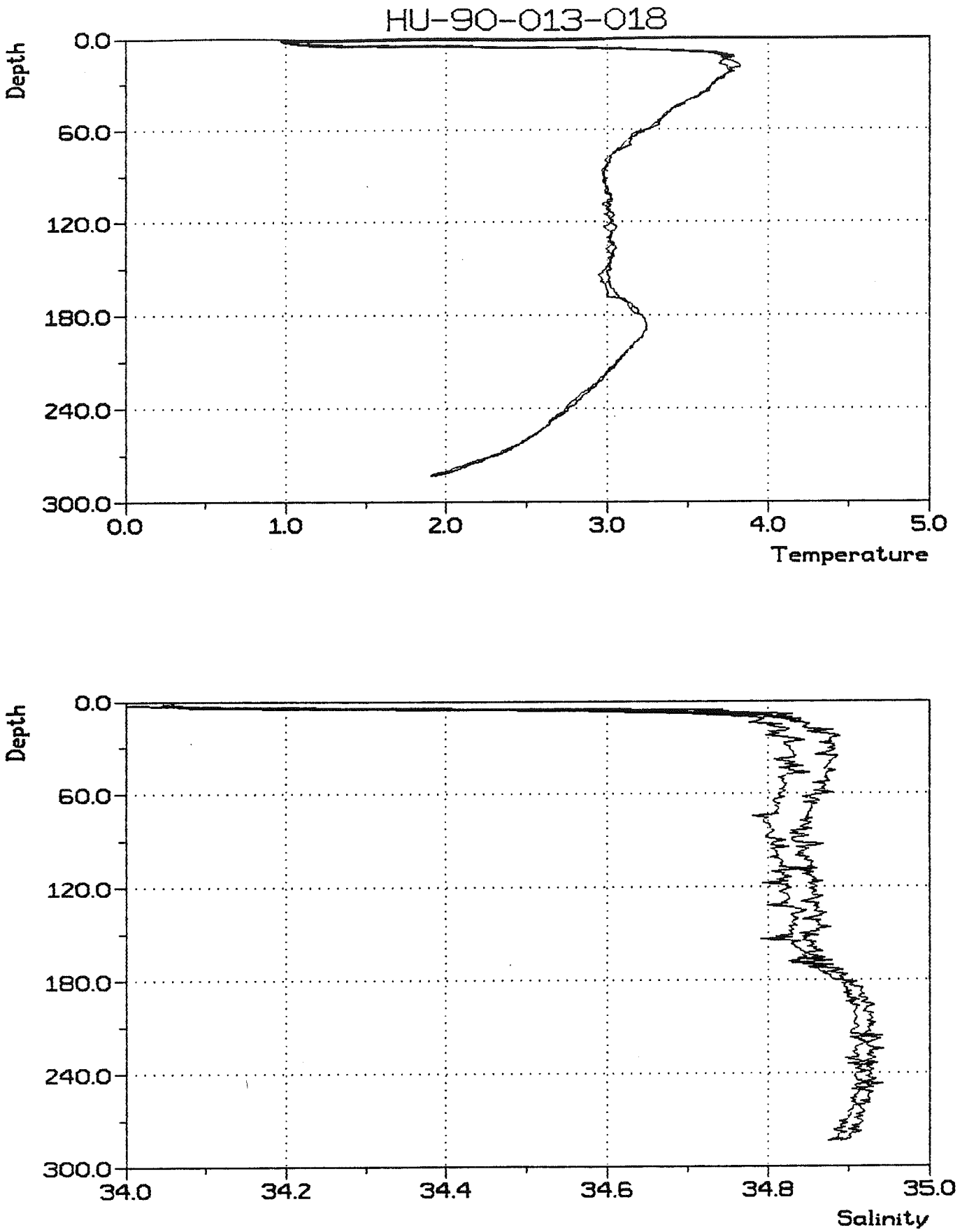


Figure 20: CTD measurement of temperature and salinity profiles at site 90-013-018.

HU-90-013-019: Water sampling [1]

Julian day:	158	GMT Time:	11:14
Latitude:	58°21.75 N	Longitude:	57°28.52 W
Depth:	2886 m	Depth intervals sampled:	(I) 2-16 m (II) 120-141 m

Geographic location: Labrador slope

Summary: 3 x [12 L-Niskin] bottles were used to sample the upper water mass (I) and 4 bottles for the lower one (II).

Sampling & on board processing:

(I) 2-16 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC[2]
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45µm filter: 0.4, 0.6 L
Volume of water filtered through Glass Fiber Filter: 0.9, 0.85 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM[3] + SiO_2	89-097
0.45 µm	--	---	SPM[3] + SiO_2	89-098
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C, ^{15}N, CHNS	89-055
GFF	--	---	" " "	89-056
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
3. SPM: Suspended Particular Matter

HU-90-013-019: Water sampling (Cont'd)

(II) 120-141 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 12 L
Volume of water filtered through Glass Fiber Filter: 38 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-096
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-053
------	H	13	TIDC	---------

HU-90-013-020: Box coring (1)

Julian day:	158	GMT Time:	12:55
Latitude:	58°21.55 N	Longitude:	57°27.38 W
Depth:	2865 m	Penetration:	30 cm

Geographic location: Labrador slope

Description: The first 20 cm of the core consist of fine clay with tubular holes (worm tracks?); the base consists of a more compacted bluish gray clay.

Subsampling:
1 push-core (30 cm long, 15 cm in diameter) for on-board processing
2 push-cores (30 cm long, 7 cm in diameter) for further analysis (UQAM)
1 push-core (30 cm long, 7 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acid studies (U. of Virginia)
1 sample (250 ml) at the box-core surface for foraminifer study (UQAM).

On-board measurements & subsampling:

Depth (cm)	Eh (mv)	O_2 (%)	Pore water	Frozen(2) sample	Sediment(3) sample	Squeezed seds.	Porosity sample
0-1	215	---	x	1 cc	33 cc	x	# 39
1-3	180	25	x	1 cc	33 cc	x	# 40
3-5	140	21	x	1 cc	33 cc	x	# 41
5-7	60	23	x	1 cc	33 cc	x	# 42
7-9	0	17	x	1 cc	33 cc	x	# 43
9-11	-80	0	x	1 cc	33 cc	x	# 44
11-13	-65	1	x	1 cc	33 cc	x	# 45
13-15	-77	0	x	1 cc	33 cc	x	# 46
15-16	----	--	--	-----	------	--	-----
16-18	-78	0	x	1 cc	33 cc	x	# 47
18-20	-100	0	x	1 cc	33 cc	x	# 48
20-22	-36	0	x	1 cc	33 cc	x	# 49
22-24	-104	3	x	1 cc	33 cc	x	# 50
24-26	-109	0	x	1 cc	33 cc	x	# 51
26-28	-121	0	x	1 cc	33 cc	x	# 52
28-30	-----	0	x	1 cc	33 cc	x	# 53

---

1. See appendix 2.3
2. For bacterial counting
3. For micropaleontological & geochemical studies

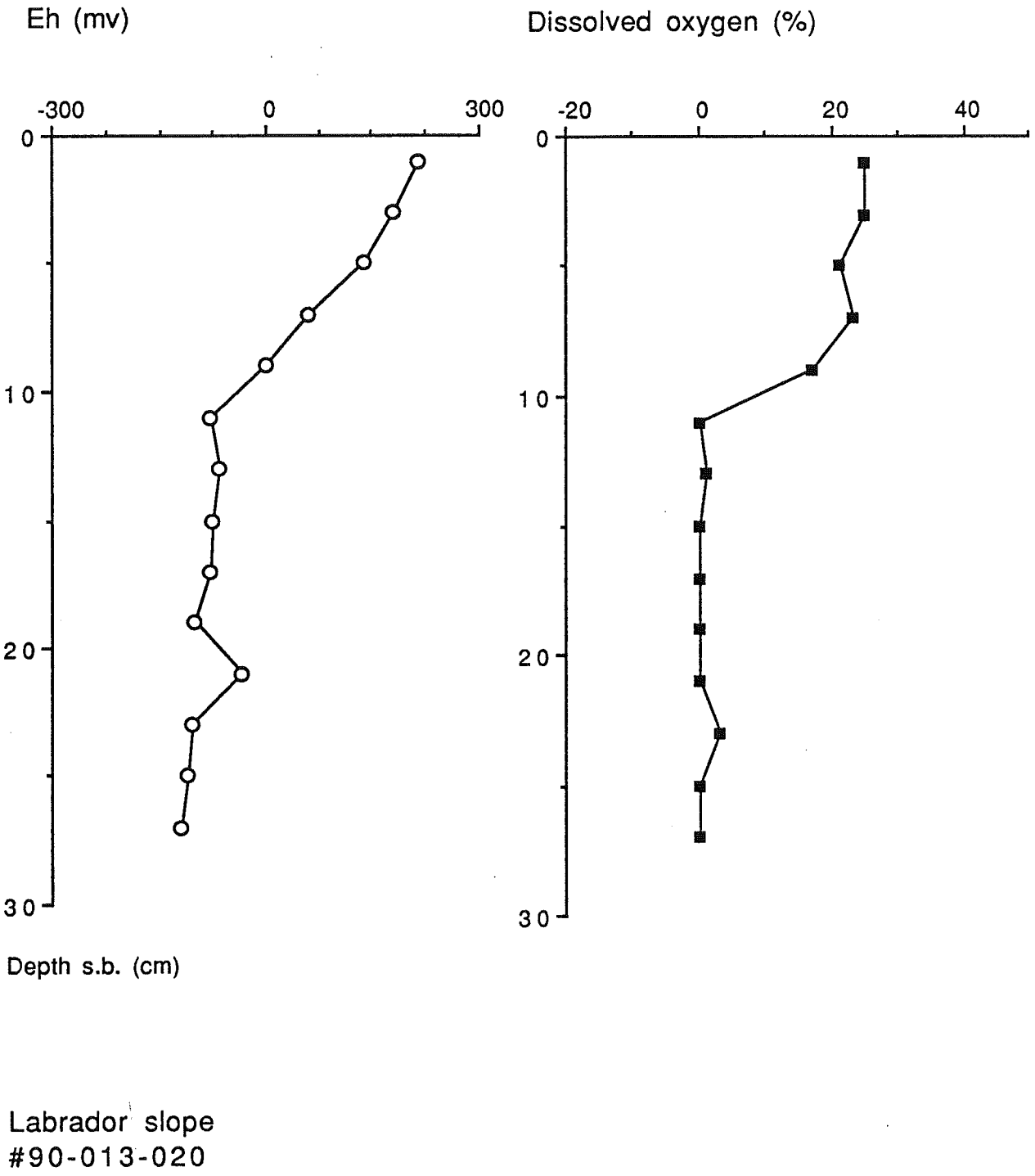


Figure 21: Redox potential & dissolved oxygen in surface sediments at site 90-013-020.

HU-90-013-021 TWC: Trigger weight coring

Julian day:	158	GMT Time:	16:48
Latitude:	58°22.18 N	Longitude:	57°27.28 W
Depth:	2864 m	Penetration:	178 cm
Core length:	155 cm		

Geographic location: Labrador slope

Description: The core consists of massive clays with disseminated vesicles (bioturbations ?) from 38 cm to the bottom.

Subsampling: The core was split into 2 longitudinal half-sections. One half was described and photographied, then labelled as usual and stored for archives. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1).

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
0-2	x	x	x	x	
8-10	x	x	x	x	
10.5-12.5					x
17-19	x	x	x	x	
19-21					x
27-29	x	x	x	x	
29-31					x
38-40	x	x	x	x	
40-42					x
48-50	x	x	x	x	
50-52					x
58-60	x	x	x	x	
60-62					x
68-70	x	x	x	x	
70-72					x
78-80	x	x	x	x	
80-82					x
88-90	x	x	x	x	
90-92					x
98-100	x	x	x	x	
100-102					x
108-110	x	x	x	x	
110-112					x
118-120	x	x	x	x	
120-122					x
128-130	x	x	x	x	
130-132					x
138-140	x	x	x	x	
140-142					x
148-150	x	x	x	x	
150-152					x

HU-90-013-021 P: L-Piston coring

Julian day:	158	GMT Time:	16:48
Latitude:	58°22.18 N	Longitude:	57°27.28 W
Depth:	2864 m	Corer length:	1520 cm
Penetration:	300 cm	Core length:	210 cm

Geographic location: Labrador slope

Description: The upper 86 cm consist of massive clays with vesicles (bioturbations?) and dark spots at 59 cm (sulfides?).From 86 cm s.b. to the bottom, clays with abundant dark spots wich disappear at 144 cm and are observed; vesicules are abundant between 144 cm s.b. and the bottom of the core.

Subsampling: The core was cut into two sections numbered as usual (see appendix 2). Each of them was split into 2 longitudinal half-sections. One half was described and photographied, then stored for archives. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2).

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
2-4	x	x	x	x	
8-10	x	x	x	x	
10-12					x
13-15	x	x	x	x	
18-20	x	x	x	x	
20-22					x
23-25	x	x	x	x	
28-30	x	x	x	x	
30-32					x
33-35	x	x	x	x	
38-40	x	x	x	x	
40-42					x
43-45	x	x	x	x	
48-50	x	x	x	x	
50-52					x
53-55	x	x	x	x	
58-60	x	x	x	x	
60-62					x
63-65	x	x	x	x	
68-70	x	x	x	x	
70-72					x
73-75	x	x	x	x	
78-80	x	x	x	x	
80-82					x

HU-90-013-021 P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
83-85	x	x	x	x	
88-90	x	x	x	x	
90-92					x
93-95	x	x	x	x	
98-100	x	x	x	x	
100-102					x
103-105	x	x	x	x	
108-110	x	x	x	x	
110-112					x
113-115	x	x	x	x	
118-120	x	x	x	x	
120-122					x
123-125	x	x	x	x	
128-130	x	x	x	x	
130-132					x
133-135	x	x	x	x	
138-140	x	x	x	x	
140-142					x
143-145	x	x	x	x	
148-150	x	x	x	x	
150-152					x
153-155	x	x	x	x	
158-160	x	x	x	x	
160-162					x
163-165	x	x	x	x	
168-170	x	x	x	x	
170-172					x
173-175	x	x	x	x	
178-180	x	x	x	x	
180-182					x
183-185	x	x	x	x	
188-190	x	x	x	x	
190-192					x
193-195	x	x	x	x	
198-200	x	x	x	x	
200-202					x

HU-90-013-022: Water sampling [1] & CTD [2]

Julian day:	159	GMT Time:	07:20
Latitude:	58°19.21 N	Longitude:	59°13.562 W
Depth:	1646 m	Depth intervals sampled:	(I) 1000-1028 m; (II) 1475-1503 m

Geographic location: Labrador slope

Summary: 2 sets of 5 x [12 L-Niskin] bottles were used for sampling water masses (I) and (II) respectively. The CTD profiles depict two water masses: a dilute surface layer (*ca.* 200 m; 32.80 < salinity < 34.75) above the Labrador Sea Water (LSW) mass (salinity *ca.* 34.85; temperature ranging from 4.3 to 3.2°C).

Sampling & on board processing:

(I) 1000-1028 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC[3]
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 µm filter: 16.5 L
Volume of water filtered through Glass Fiber Filter: 48 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM[4] + SiO_2	89-099
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C,^{15}N,CHNS	89-057
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. See CTD profile in Fig. second next page
3. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
4. SPM: Suspended Particular Matter

HU-90-013-022: Water sampling & CTD (Cont'd)

(II) 1475-1503 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 20 L
Volume of water filtered through Glass Fiber Filter: 28 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-100
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-058
------	H	13	TIDC	---------

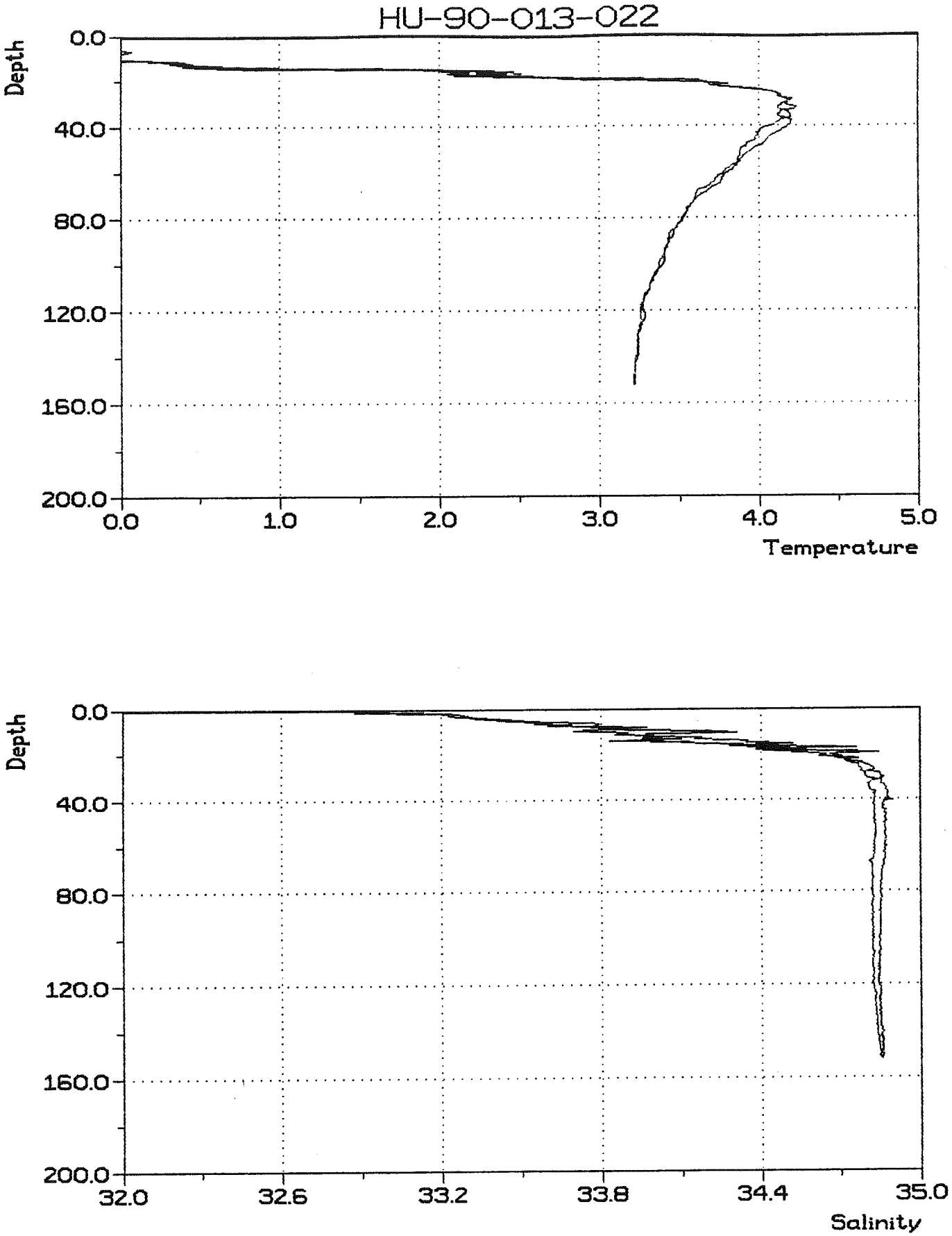


Figure 22: CTD measurement of temperature and salinity profiles at site 90-013-022.

HU-90-013-023: Water sampling [1]

Julian day:	159	GMT Time:	08:50
Latitude:	58°20.71 N	Longitude:	59°13.63 W
Depth:	1646 m	Depth intervals sampled:	(I) 2-9 m; (II) 90-111 m

Geographic location: Labrador slope

Summary: 2 [12 L-Niskin] bottles were used for sampling water mass (I) and 4 bottles for water mass (II).

Sampling & on board processing:

(I) 2-9 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC[2]
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 µm filter: 1.3 L
Volume of water filtered through Glass Fiber Filter: 4, 4, 4 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM[3]+ SiO_2	89-051
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C,^{15}N,CHNS	89-060
GFF	--	---	^{13}C,^{15}N,CHNS	89-062
GFF	--	---	^{13}C,^{15}N,CHNS	89-063
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
3. SPM: Suspended Particular Matter

HU-90-013-023: Water sampling (Cont'd)

(II) 90-111 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 16.8 L
Volume of water filtered through Glass Fiber Filter: 20 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-053
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-059
------	H	13	TIDC	---------

HU 90-013-024 P & TWC: L-Piston coring & Trigger weight coring

Julian day:	159	GMT Time:	17:32
Latitude:	58°40.51N	Longitude:	58°35.44 W
Depth:	2360 m	Corer length:	--------
Penetration:	494 cm	Core length:	315 cm

Geographic location: Labrador slope

Comments: The pilot corer did not penetrate (mud on cutter only). In the core catcher *ca*. 8 cm of sediments were found and stored in a bag.

Piston core: From top to 90 cm s.b., greenish brown sandy silts are found; they pass progressively to grey silty clays with occasional laminations. Below, down to 315 cm s.b., a structureless debris flow is observed; it contains abundant pebbles embedded within brownish silty clays pasing to grey sandy silts.

Subsampling: The core was cut into *ca.* 150 cm-long sections numbered as usual. Each of them was split into 2 longitudinal half-sections. One half was described and photographied, then stored for archives. The other half-section was used for subsampling and a 1 cm-thick slab was cut longitudinally and stored for further X-Ray analysis at McGill University.

Subsample list: Re.: Dr. R. Hesse (McGill University).

HU 90-013-025 P & TWC: L-Piston coring & Trigger weight coring

Julian day:	160	GMT Time:	10:53
Latitude:	59°53.32 N	Longitude:	58°51.39 W
Depth:	2450 m	P-Corer length:	1520 cm
PC-Penetration:	?? cm	P-Core length:	735 cm
TWC-Penetration:	?? cm	TWC length:	166 cm

Geographic location: Labrador slope

Comments: The pilot corer was cut longitudinally into two half-sections. One was stored for archives; the second, was used to cut a 1 cm-thick slab downcore for further X-Ray analyses at McGill University.

Trigger weight core: Yellowish-brown sandy silts are found from 0 to 14 cm s.b.; they overly greenish-brown sandy silts which are found down to 32 cm s.b. The lower unit consists of alternating greyish brown silty clays and thin sand layers with parallel laminations.

Piston core: From 0 to 40 cm s.b., laminated greyish brown silty clays with a few sand layers are found. Down to 128 cm s.b., they are replaced by dark grey "bioturbated" with silty laminated turbidite sequences. From 128 to 230 cm s.b., a sequence of turbidites with laminated sandy silts, sands and clays is found. Down to 265 cm s.b., a hemipelagic bioturbated dark grey mud is found. Below, down to the bottom of the core, alternating muddy turbidite layers with ice rafted debris (coarse sands, gravels and pebbles) are seen.

Subsampling: Both cores were cut into *ca.* 150 cm-long sections numbered as usual. Each section was split into 2 longitudinal half-sections. One half was described and photographied, then stored for archives. The other half-section was used for subsampling and a 1 cm-thick slab was cut longitudinally and stored for further X-Ray analysis at McGill University.

Subsample list: Re.: Dr. R. Hesse (McGill).

HU 90-013-026 P & TWC: L-Piston coring & Trigger weight coring

Julian day:	161	GMT Time:	19:44
Latitude:	59°31.34 N	Longitude:	57°16.64 W
Depth:	2895 m	P-Corer length:	1520 cm
PC-Penetration:	1216 cm	P-Core length:	1105 cm
TWC-Penetration:	43 cm	TWC length:	26 cm

Geographic location: Labrador slope

Comments: The pilot corer was cut longitudinally into two half-sections. One was stored for archives; the second was used to cut a 1 cm-thick slab for further X-Ray analyses at McGill University.

Trigger weight core: It is composed of a two-layer clayey unit: of brownish color on top (0-10 cm s.b.), of grey color on bottom.

Piston core: From 0 to 210 cm s.b., hemipelagic olive-brown bioturbated clays are found; they are interrupted by a turbidite unit between 17 and 45 cm s.b. Down to 275 cm s.b., a clayey turbidite sequence is observed. A hemipelagic hemipelagic mud follows down to 470 cm s.b. Below, an alternation of silty to muddy turbidite sequence with hemipelagic bioturbated mud layers is seen. It is interrupted, between 890 and 920 cm s.b., by a debris flow layer.

Subsampling: The P-core was cut into *ca.* 150 cm-long sections numbered as usual. Each of them was split into 2 longitudinal half-sections. One half was described and photographied, then stored for archives. The other half-section was used for subsampling and a 1 cm-thick slab was cut longitudinally and stored for further X-Ray analysis at McGill University.

Subsample list: Re.: Dr. R. Hesse (McGill).

HU-90-013-027: Box coring [1] & CTD [2]

Julian day:	162	GMT Time:	09:38
Latitude:	58°45.79 N	Longitude:	57°07.19 W
Depth:	3032 m	Penetration:	28 cm

Geographic location: Labrador slope

CTD-profile: It depicts three water masses: a surface layer (*ca.* 100 m; temperature from 1.5 to 3.5°C; salinity < 34); the Labrador Sea Water mass (LSW) down to *ca.* 1800 m (minimum temperature 3°C; salinity, *ca.* 34.80) above the deep water mass showing a strong temperature gradient from 3.3 to 1.6°C and a salinity of *ca.* 34.9).

Box core : The core consists of brown then grey clayey silts; the oxydized horizon ends at a depth of ca. 20 cm s.b.

Subsampling:
2 push-cores (30 cm long, 15 cm in diameter) for on-board processing
4 push-cores (30 cm long, 7 cm in diameter) for further analysis (UQAM)
1 push-core (30 cm long, 7 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) kept frozen for amino-acid studies (U. of Virginia)
1 sample (250 ml) at the box-core surface for foraminifer study (UQAM).

On-board measurements & subsampling:

Depth (cm)	Eh (mv)	O_2 (%)	Pore water	Frozen[3] sample	Sediment[4] sample	Squeezed seds.	Porosity[5] sample
0-1	----	---	x	1 cc	33 cc	x	62
1-3	175	36	x	1 cc	33 cc	x	63
3-5	155	35	x	1 cc	33 cc	x	64
5-7	125	12	x	1 cc	33 cc	x	65
7-8	105	16	--	1 cc	33 cc	--	---
8-10	80	15	x	1 cc	33 cc	x	66
10-12	68	17	x	1 cc	33 cc	x	67
12-14	20	9	x	1 cc	33 cc	x	68
14-16	30	19	x	1 cc	33 cc	x	69
16-18 [6]	----	---	--	----	------	--	---
18-20	18	17	x	1 cc	33 cc	x	70
20-22	-1	12	x	1 cc	33 cc	x	71
22-24	0	---	x	1 cc	33 cc	x	72
24-26	-20	---	x	1 cc	33 cc	x	73
26-28	-5	---	x	1 cc	33 cc	x	74
29	50	---	--	----	------	--	---
31	45	---	--	----	------	--	---

---

1. See appendix 2.3.
2. See figure next page.
3. For bacterial counting (U. of Virginia).
4. For micropaleontological & geochemical studies (UQAM).
5. Sample number (McGill).
6. Unusable (the glove box had to be opened).

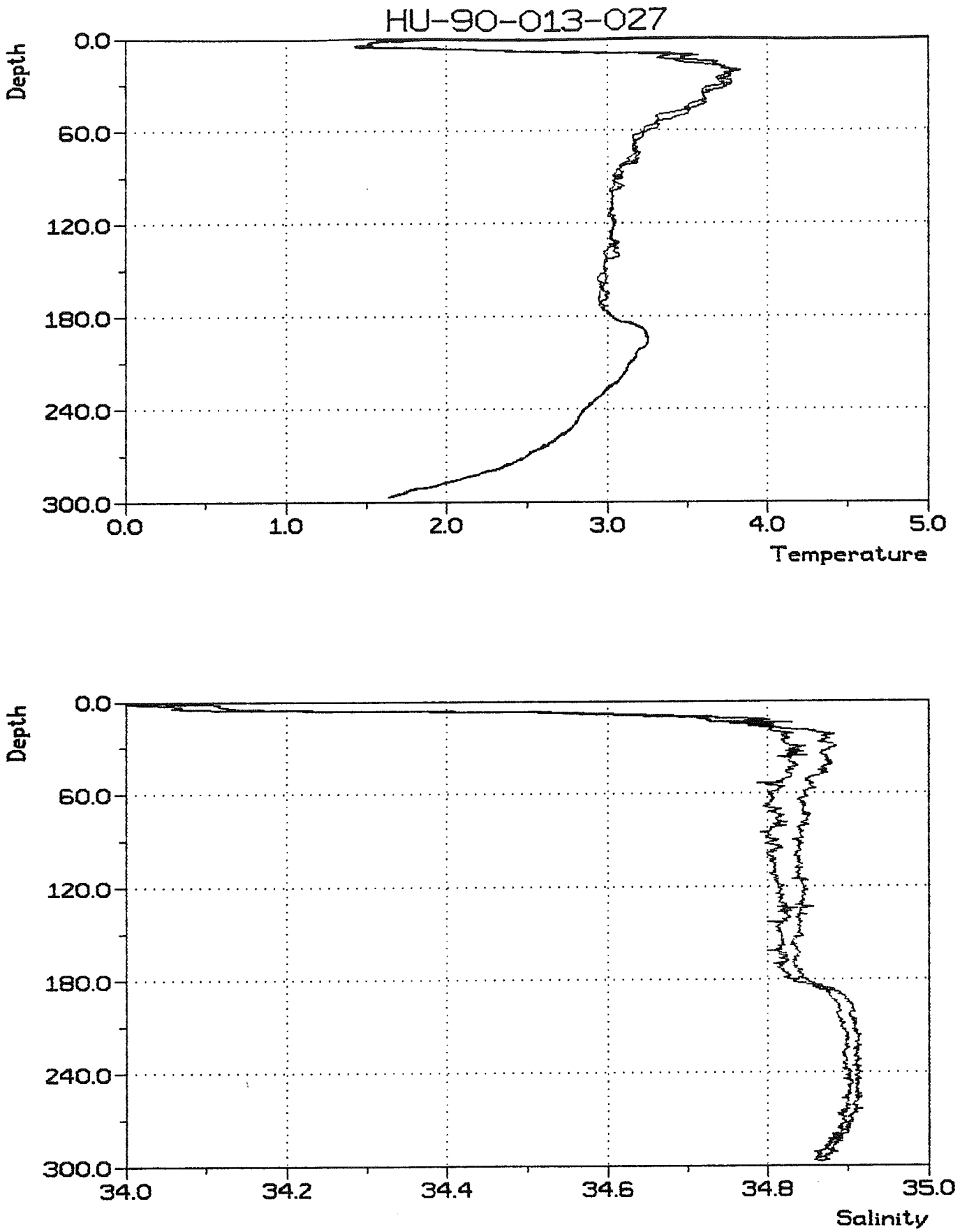


Figure 23: CTD measurement of temperature and salinity profiles at site 90-013-027.

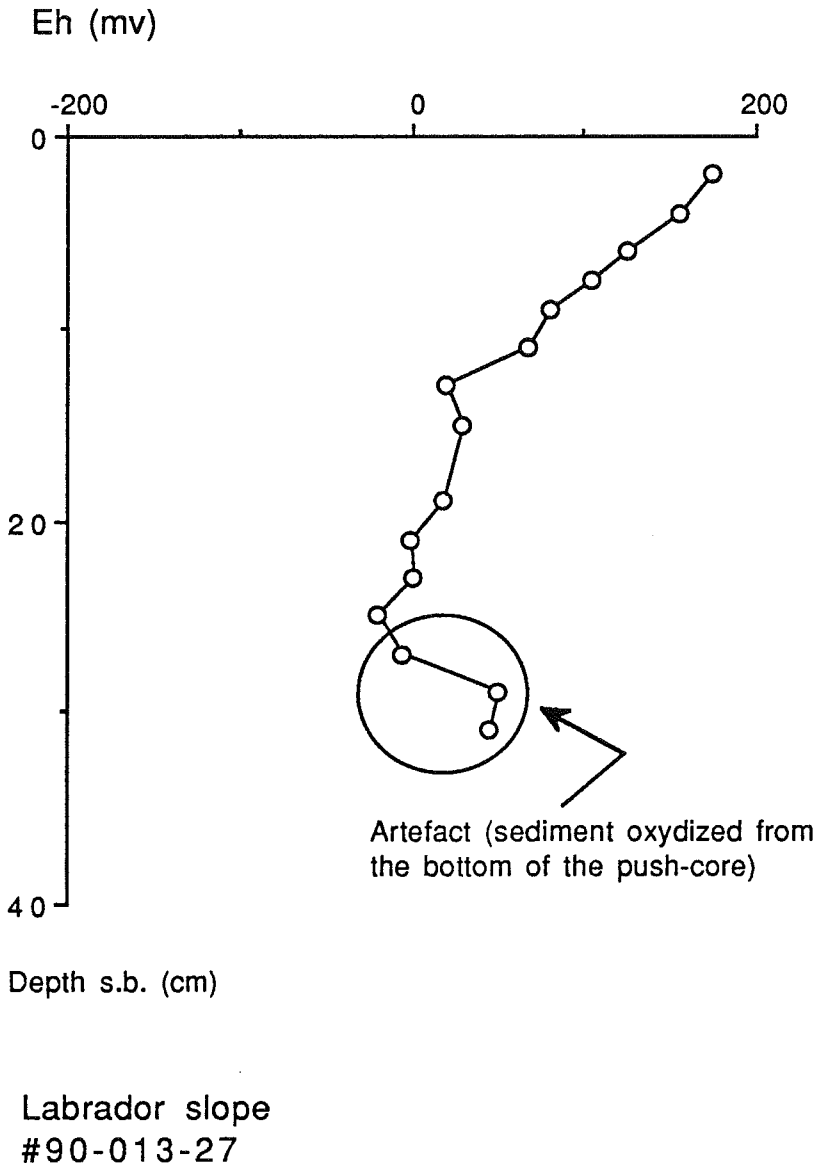


Figure 24: Redox potential in surface sediments at site 90-013-027.

HU-90-013-028 TWC: Trigger Weight Core

Julian day:	162	GMT Time:	12:37
Latitude:	58°45.80 N	Longitude:	57°06.75 W
Depth	2913 m	Penetration:	128 cm

Geographic location:: Labrador slope

Description:: The top of the core consists of greenish brown (oxydized horizon: 0-17 cm s.b.) to greenish gray (reduced zone: 17-40 cm s.b.)clayey silts. From 40 to 128 cm s.b., an alternation of bluish silty clays, beige sandy silts with a high carbonate content and greenish silty turbidites are observed.Vesicules (bioturbations ?) are present at 60 and 92 cm s.b.

Subsampling: The core was cut into two half-sections numbered as usual (see appendix 2.2). One half was described and photographied, then a 1 cm-thick slab was cut longitudinally and stored by the NAMOC-Team for further X-Ray analysis at McGill University. This half-section was finally labelled for archives. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1).

Depth s.b . (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
0-1					x
2-4	x	x	x	x	
10-12					x
12-14	x	x	x	x	
20-22					x
22-24	x	x	x	x	
29.5-31.5					x
32-34	x	x	x	x	
39-41					x
42-44	x	x	x	x	
49-51					x
52-54	x	x	x	x	
59-61	x	x	x	x	
60-62					x
69-71	x	x	x	x	
70.8-72.8					x
79-81	x	x	x	x	
80.2-81.2					x
90-92					x
92-94	x	x	x	x	
100-102					x
102-104	x	x	x	x	
109.3-111.3					x
112-114	x	x	x	x	
119-121					x
122-124	x	x	x	x	

HU 90-013-028 P: L-Piston coring

Julian day:	162	GMT Time:	12:37
Latitude:	58°45.80 N	Longitude:	57°06.75 W
Depth:	2913 m	Corer length:	1824 cm
Penetration:	1520 cm	Core length:	1178 cm

Geographic location: Labrador Slope

Description: The top of the core (from 0 to 30 cm s.b.) consists of clayey silts of greenish brown color in the oxydized zone (0-10 cm s.b.), then of greenish grey color in the reduced zone. Below, a light green silt horizon and a turbidite sequence is found (38-67 cm s.b.); it contains gravel-rich layers. From 67 to 516 cm s.b., a succession of greenish gray sandy silts, of turbidites and of greenish clayey silts is observed. From 516 to 1009 cm s.b., turbidite sequences showing silt/silty-clay alternating layers follow. Massive greenish gray clayey silts with disseminated dark nodules are then found down to 1097 cm s.b. The bottom of the core consists of a turbidite sequence with a carbonate-rich silty clay horizon bewteen *ca.* 1150 and 1168 cm s.b..

Subsampling: The core was cut into *ca.* 150 cm-long sections numbered as usual (see appendix 2.2). Each of them was split into 2 longitudinal half-sections. One half was described and photographied, then a 1 cm-thick slab was cut longitudinally and stored by the NAMOC-Team for further X-Ray analysis at McGill University. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1).

HU-90-013-028 P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
0.5-2.5					x
3-5	x	x	x	x	
8-10	x	x	x	x	
9.5-11.5					x
17-19	x	x	x	x	
19-21					x
28-30	x	x	x	x	
30.2-32.2					x
37-39	x	x	x	x	
39.2-41.2					x
48-50	x	x	x	x	
50.8-52.8					x
58-60	x	x	x	x	
60-62					x
68-70	x	x	x	x	
71.2-73.2					x
78-80	x	x	x	x	
80.8-82.8					x
88-90	x	x	x	x	
90-92					x
97-99	x	x	x	x	
99-101					x
108-110	x	x	x	x	
110.5-112.5					x
117-119	x	x	x	x	
119.4-121.4					x
127-129	x	x	x	x	
129-131					x
137-139	x	x	x	x	
139-141					x
147-149	x	x	x	x	
148.5-150.5					x
158-160	x	x	x	x	
161-163					x
168-170	x	x	x	x	
170-172					x
178-180	x	x	x	x	
180-182					x
188-190	x	x	x	x	
190-192					x
198-200	x	x	x	x	
200-202					x
207-209	x	x	x	x	
209-211					x
217-219	x	x	x	x	
219-221					x
227-229	x	x	x	x	
229-231					x
237-239	x	x	x	x	
239-241					x
247-249	x	x	x	x	
248.8-250.8					x
253-255					x
257-259	x	x	x	x	
268-270					x
270-272	x	x	x	x	
279-281					x
281-283	x	x	x	x	
288-290					x

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
291-293	x	x	x	x	
300-302					x
302-304	x	x	x	x	
309-311					x
311-313	x	x	x	x	
318-320					x
321-323	x	x	x	x	
329-331					x
331-333	x	x	x	x	
340-342					x
342-344	x	x	x	x	
349-351					x
351-353	x	x	x	x	
359-361	x	x	x	x	x
367-369	x	x	x	x	
369-371					x
378-380	x	x	x	x	
380-382					x
388-390	x	x	x	x	x
399-401	x	x	x	x	
401-403					x
410-412					x
412-414	x	x	x	x	
420-422					x
422-424	x	x	x	x	
429-431					x
431-433	x	x	x	x	
439-441					x
441-443	x	x	x	x	
449-451					x
451-453	x	x	x	x	
458-460					x
460-462	x	x	x	x	
463-365					x
471-473	x	x	x x	x	
479-481					x
481-483	x	x	x	x	
487-489					x
490-492	x	x	x	x	
500-502					x
502-504	x	x	x	x	
509-511					x
511-513	x	x	x	x	
518-520					x
520-522	x	x	x	x	
529-531					x
531-533	x	x	x	x	
538-540					x
541-543	x	x	x	x	
550-552					x
552-554	x	x	x	x	
559-561					x
560-562	x	x	x	x	
568-570					x
576-578	x	x	x	x	
578-580					x
587-589	x	x	x	x	
590-592					x
596-598	x	x	x	x	

HU-90-013-028 P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
598-600					x
607-609	x	x	x	x	
610-612					x
617-619	x	x	x	x	
619-621					x
628-630	x	x	x	x	
630-632					x
637-639	x	x	x	x	
639-641					x
646-648	x	x	x	x	
648-650					x
657-659	x	x	x	x	
660-662					x
667-669	x	x	x	x	
669-670					x
678-680	x	x	x	x	
680-682					x
687-689	x	x	x	x	
689-691					x
698-700	x	x	x	x	
700-702					x
707-709	x	x	x	x	
709-711					x
717-719	x	x	x	x	
719-721					x
727-729	x	x	x	x	
729-731					x
738-740					x
740-742	x	x	x	x	
749-751					x
751-753	x	x	x	x	
759-761					x
761-763	x	x	x	x	
770-772					x
772-774	x	x	x	x	
779-781					x
782-784	x	x	x	x	
790-792					x
792-794	x	x	x	x	
799-801					x
802-804	x	x	x	x	
810-812					x
812-814	x	x	x	x	
819-821					x
822-824	x	x	x	x	
829-831	x	x	x	x	x
838-840	x	x	x	x	x
848-850					x
851-853	x	x	x	x	
859-861					x
862-864	x	x	x	x	
869-871					x
871-873	x	x	x	x	
880-882					x
882-884	x	x	x	x	
889-891					x
892-894	x	x	x	x	
899-901					x
901-903	x	x	x	x	

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
910-912					x
912-914	x	x	x	x	
919-921					x
928-930					x
931-933	x	x	x	x	
940-942					x
942-944	x	x	x	x	
949-951					x
952-954	x	x	x	x	
958-960					x
961-963	x	x	x	x	
969-971					x
972-974	x	x	x	x	
978-980					x
981-983	x	x	x	x	
990-992					x
992-994	x	x	x	x	
999-1001					x
1002-1004	x	x	x	x	
1009-1011					x
1011-1013	x	x	x	x	
1018-1020					x
1020-1022	x	x	x	x	
1029-1031					x
1031-1033	x	x	x	x	
1040-1042					x
1042-1044	x	x	x	x	
1049-1051					x
1052-1054	x	x	x	x	
1059-1061					x
1062-1064	x	x	x	x	
1070-1072					x
1072-1074	x	x	x	x	
1078-1080					x
1083-1085	x	x	x	x	
1090-1092					x
1092-1094	x	x	x	x	
1098-1100					x
1102-1104	x	x	x	x	
1110-1112					x
1113-1115	x	x	x	x	
1119-1121					x
1122-1124	x	x	x	x	
1130-1132					x
1133-1135	x	x	x	x	
1139-1141					x
1142-1144	x	x	x	x	
1150-1152					x
1153-1155	x	x	x	x	
1159-1161					x
1162-1164	x	x	x	x	
1168-1170					x
1173-1175	x	x	x	x	
1176-1178					x

HU-90-013-029 TWC: Trigger Weight Core

Julian day:	162	GMT Time:	20:15
Latitude:	58º23.61 N	Longitude:	56º45.76 W
Depth	2918 m	Penetration:	?? cm
Core length:	95 cm		

Geographic location:: Labrador slope

Description:: The core consists of olive brown (oxydized horizon: 0-18 cm s.b.) to dark (reduced zone: 18-950 cm s.b.) silty clays.

Subsampling: The core was cut into two half-sections numbered as usual (see appendix 2.2). One half was described and photographied, then a 1 cm-thick slab was cut longitudinally and stored by the NAMOC-Team for further X-Ray analysis at McGill University. This half-section was finally labelled for archives. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1).

Subsample list: Re.: Dr. R. Hesse (McGill).

HU 90-013-029 P: L-Piston coring

Julian day:	162	GMT Time:	20:15
Latitude:	58°23.61 N	Longitude:	56°45.76 W
Depth	2918 m	Corer length:	2128 cm
Penetration:	1976 cm	Core length:	1402 cm

Geographic location: Labrador Slope

Description: The top of the core (from 0 to 12 cm s.b.) consists of oxydized olive-brown clayey silts. The reduced zone starts with a dark hemipelagic sandy (?) mud with layers of sands and gravels; it ends at 115 cm s.b. Below, a succession of silty turbidite sequences with parallel laminations and of hemipelagic mud layers is found. A debris flow unit can be observed between 500 and 520 cm s.b.

Subsampling: The core was cut into *ca.* 150 cm-long sections numbered as usual (see appendix 2.2). Each of them was split into 2 longitudinal half-sections.One half was described and photographied, then a 1 cm-thick slab was cut longitudinally and stored by the NAMOC-Team for further X-Ray analysis at McGill University. The other half-section was used for subsampling.

Information : Dr. Hesse (McGill).

HU 90-013-030 P & TWC: L-Piston coring & Trigger weight coring

Julian day:	163	GMT Time:	19:30
Latitude:	57°49.886 N	Longitude:	57°36.787 W
Depth:	2636 m	P-Corer length:	2432 cm
PC-Penetration:	600 cm	P-Core length:	void
TWC-Penetration:	?? cm	TWC length:	33 cm

Geographic location: Labrador slope

Comments: The P-corer was bent between the second and the third barrel; the core catcher was reversed and the corer was empty.
The TW-core was split into 2 longitudinal half-sections. One half was described and photographied, then stored for archives. The other half-section was used for subsampling and a 1 cm-thick slab was cut longitudinally and stored for further X-Ray analysis at McGill University.

Information: Dr. R. Hesse (McGill).

HU-90-013-031: Water sampling (1) & CTD (2)

Julian day:	164	GMT Time:	06:55
Latitude:	57°16:72 N	Longitude:	56°50.55 W
Depth:	2527 m	Depth intervals sampled:	(I) 5-10 m (II) 1860-1895 m (III) 1900-1968

Geographic location: Labrador slope

Summary: 2 [12 L-Niskin] bottles were used for sampling water mass (I) and 6 bottles for water masses (II) and (III). The CTD profiles depict three water masses: a surface layer (*ca.* 100 m; temperature *ca.* 2.8°C); the Labrador Sea Water mass (LSW) down to *ca.* 2100 m (minimum temperature 2.95°C; salinity *ca.* 34.82) above a deep water mass showing a strong temperature gradient from 3.4 to 1.9°C and a uniform salinity of about 34.9.

Sampling & on board processing:

(I) 5-10 m interval

(a) Non filtered water:

Sample	Volume (ml)	Analytical purpose
A	250	^{13}C of TIDC(3)
B	250	Phytoplankton
C	30	^{18}O of water
D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45µm filter: 10.5, 0.55 L
Volume of water filtered through Glass Fiber Filter: 1, 1 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM(4)+ SiO_2	89-052
0.45 µm	--	---	SPM(4)+ SiO_2	89-054
------	E	30	SiO_2 + NH_3	--------
------	F	13	Alkali	--------
GFF	--	---	^{13}C,^{15}N,CHNS	89-065
GFF	--	---	^{13}C,^{15}N,CHNS	89-066
------	H	13	TIDC	--------

---

1. See appendix 2.2 for technical details on sample preservation
2. See CTD profile in Fig. second next page
3. TIDC: Total Inorganic Dissolved Carbon (ΣCO_2)
4. SPM: Suspended Particular Matter

HU-90-013-031: Water sampling & CTD (Cont'd)

(II) 1860-1895 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Mixed with samples from water mass (III).

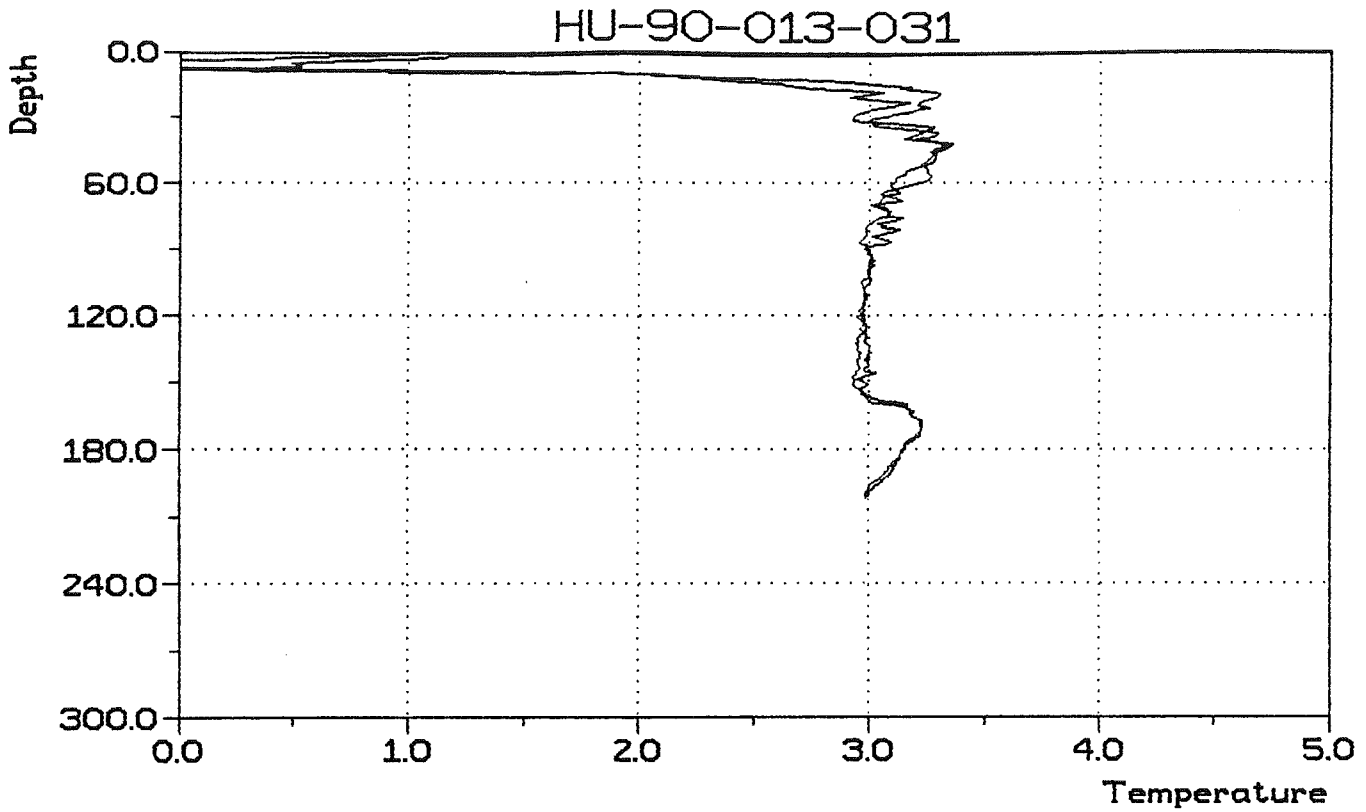
(II) 1860-1895 m interval

(a) Non filtered water:	Sample	Volume (ml)	Analytical purpose
	A	250	^{13}C of TIDC
	B	250	Phytoplankton
	C	30	^{18}O of water
	D	30	PO_4 & NO_3 analyses

(b) Filtered water (pre-weighted filters):

Volume of water filtered through 0.45 micron filter: 28 L
Volume of water filtered through Glass Fiber Filter: 80.4 L

Filter type	Sample #	Volume (ml)	Analytical purpose	Filter #
0.45 µm	--	---	SPM+ SiO_2	89-056
------	E	30	SiO_2 + NH_3	---------
------	F	13	Alkali	---------
GFF	--	---	^{13}C,^{15}N,CHNS	89-067
------	H	13	TIDC	---------



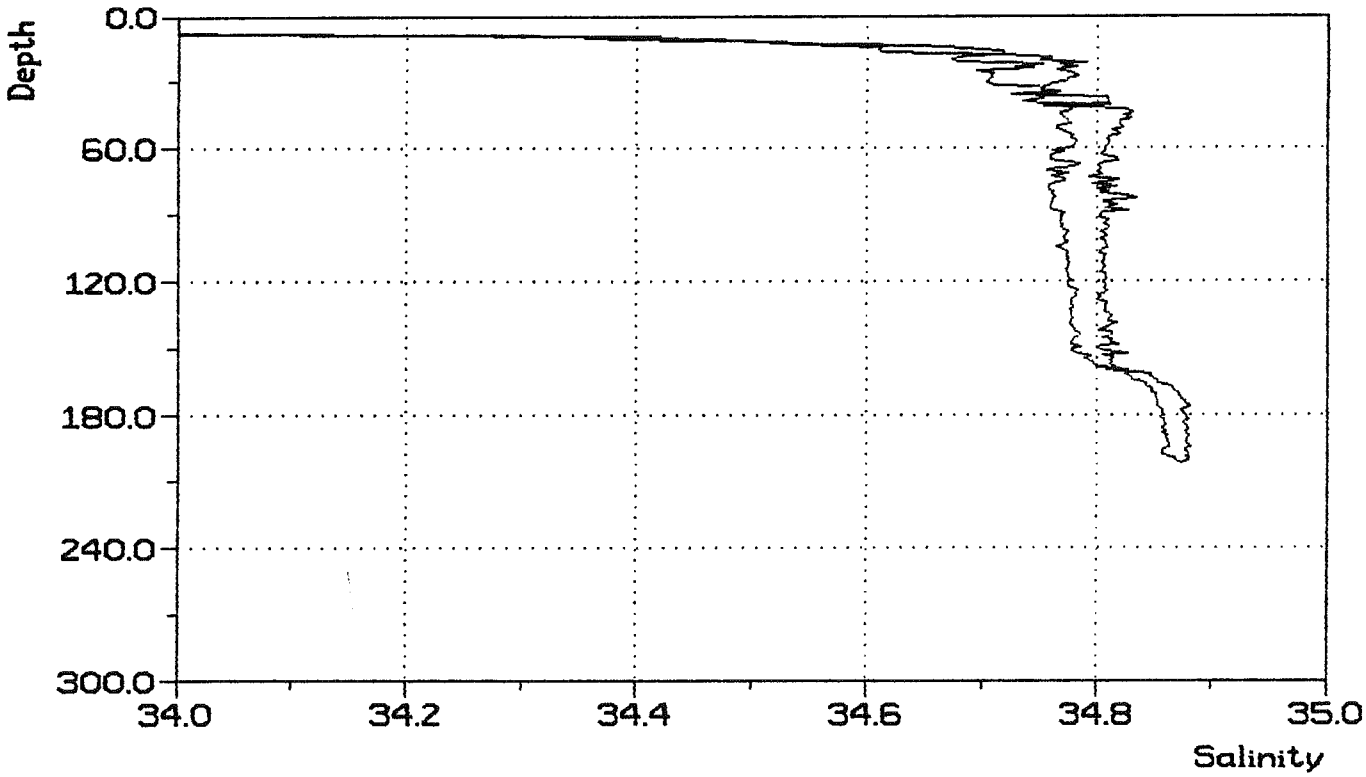


Figure 25: CTD measurement of temperature and salinity profiles at site 90-013-031.

HU 90 013 032: Plankton tow

Julian day:	164	GMT Time:	08:15
Latitude:	57°16.72 N	Longitude:	56°50.55 W
Depth:	2527 m	Sampling interval:	0-30 m

Geographic location: Labrador slope

Plankton net: Length: 3 m
Diameter: 1 m
Mesh: 73 µm

Comments: The sampling has been made from a depth of *ca.* 30 m up to the surface; 4 subsamples were taken as below:
- 2 x 250 ml were processed with 20% formaldehyde, then refrigerated;
- 2 x 250 ml were preserved frozen.

HU 90-013-033 P & TWC: L-Piston- & Trigger Weight coring

Julian day:	164	GMT Time:	09.42
Latitude:	57°16.84 N	Longitude:	56°50.70 W
Depth:	2577 m	Corer length:	2128 cm
Penetration:	1064 cm	Core length:	770 cm

Geographic location: Labrador slope

Comments: A 23 cm-long TWC was recovered and stored (unsampled) for archives.

Description: The P-core top (0-33 cm s.b.) consists of an oxydized layer of carbonate-rich sands containing disseminated gravels. It is followed by a reduced zone (33-82 cm s.b.) of sandy carbonate-rich silts with disseminated gravels. From ca. 82 to 166 cm s.b., the sediment is composed of clayey silts with fine laminations (bottom currents ?) and a high carbonate content. The section from 166 to 314 cm s.b. was dropped on the deck during barrel processing and was strongly disturbed, preventing any description or subsampling. Similarly, the section from 314 to 387 cm s.b. was unusable due to mixing of the sediment in the PVC lining but was stored in a bag. The next section (387-470 cm s.b.) consists of alternating gray to green silts and sandy silts with sand lenses and a high carbonate content. From 470 to 575 cm s.b., an olive green silty clay with abundant sand lenses is observed.The next section has been identified as a debris flow wich consists of green silty carbonate-rich sands with disseminated gravels and pebbles up to 5 cm in diameter. The bottom of the core (672-770 cm s.b.) shows an alternation of gray clayey silts, olive sandy silts and silty clays, all of them having a high carbonate content.

Subsampling: The undisturbed parts of the core were cut into *ca.* 150 cm-long sections numbered as usual (see appendix 2.2). Each of them was split into 2 longitudinal half-sections. One half was described and photographied, then a 1 cm-thick slab was cut longitudinally and stored by the NAMOC-Team for further X-Ray analysis at McGill University. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1).

HU-90-013-033/P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
2-4	x	x	x	x	
2-4					x
8.8-10.8					x
11-13	x	x	x	x	
18.2-21.2					x
21-23	x	x	x	x	
30.1-31.1					x
32-34	x	x	x	x	
40-42					x
42-44	x	x	x	x	
49-51					x
51-53	x	x	x	x	
60.5-62.5					x
62-64	x	x	x	x	
69.8-71.8					x
72-74	x	x	x	x	
79-81					x
80-82	x	x	x	x	
87-89	x	x	x	x	
89.7-91.7					x
99.6-101.6					x
101-103	x	x	x	x	
110-112					x
112-114	x	x	x	x	
119-120					x
121-123	x	x	x	x	
130-132					x
132-134	x	x	x	x	
139.2-141.2					x
141-143	x	x	x	x	
148.3-150.3					x
150-152	x	x	x	x	
159.6-161.6					x
161-163	x	x	x	x	
389.5-391.5					x
392-394	x	x	x	x	
399.3-401.3					x
402-404	x	x	x	x	
409.2-411.2					x
411-413	x	x	x	x	
419-421					x
421-423	x	x	x	x	
429-431					x
431-433	x	x	x	x	
439-441	x	x	x	x	
441-443					x
448-450	x	x	x	x	
450.5-452.5					x
458-460	x	x	x	x	
460.5-462.5					x
470-472					x
472-474	x	x	x	x	
480-482					x
482-484	x	x	x	x	
490.1-492.1					x
492-494	x	x	x	x	
499.8-501.8					x
502-504	x	x	x	x	
509.5-511.5					x
511-513	x	x	x	x	
520.2-522.2					x
522-524	x	x	x	x	
530-532					x
532-534	x	x	x	x	
539.9-541.9					x
542-544	x	x	x	x	
550.2-552.2					x
552-554	x	x	x	x	
560.5-562.5					x
562-564	x	x	x	x	
570.5-572.5					x
572-574	x	x	x	x	
580.2-582.2					x
582-584	x	x	x	x	
589.9-591.9					x
591-593	x	x	x	x	
599.1-601.1					x
601-603	x	x	x	x	
611-612					x
613-615	x	x	x	x	
618.3-620.3					x
620-622	x	x	x	x	
620-622					x
629.5-631.5					x
631-633	x	x	x	x	
639.5-641.5					x
640-642	x	x	x	x	
648.5-650.5					x
650-652	x	x	x	x	
658.5-660.5					x
660-662	x	x	x	x	
670.5-672.5					x
672-674	x	x	x	x	
680-682					x
682-684	x	x	x	x	
690-692					x
692-694	x	x	x	x	
699.1-701.1					x
702-704	x	x	x	x	
709-711					x
711-713	x	x	x	x	
719.2-721.2					x
721-723	x	x	x	x	
728.3-730.3					x
730-732	x	x	x	x	
739-741					x
740-742	x	x	x	x	
750-752	x	x	x	x	
758.5-760.5					x
761-763	x	x	x	x	
768-770	x	x	x	x	

HU-90-013-034 TWC: Trigger weight coring (1)

Julian day:	164	GMT Time:	13:27
Latitude:	57°19.17 N	Longitude:	56°51.68 W
Depth:	2586 m	Penetration:	165 cm
Core length:	174 cm		

Geographic location: Labrador slope

Description: The top of the core (0-22 cm s.b.) consists of an oxydized horizon of brown sands and sandy silts with pebbles, followed by a reduced zone of clayey silts. From 42 to 129 cm s.b., the clayey silts are interrupted by fine millimetric silty laminations. Thebottom of the core (129-170 cm s.b.) consists of greenish gray sandy silts with deformed laminations.

Subsampling: The core was cut into two sections, each of them was split into 2 longitudinal half-sections. One half was described and photographied, then a 1 cm-thick slab was cut longitudinally and stored by the NAMOC-Team for further X-Ray analysis at McGill University. This half-section was finally labelled for archives. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1).

HU-90-013-034 TWC (Cont'd)

Depth s.b . (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
0-2					x
2-4	x	x	x	x	
8-10					x
10-12	x	x	x	x	
18.1-20.1					x
20-22	x	x	x	x	
28-30					x
30-32	x	x	x	x	
38-40					x
40-42	x	x	x	x	
50-52					x
50-52	x	x	x	x	
58-60	x	x	x	x	x
59.7-61.7					x
67-69	x	x	x	x	
69.5-71.5					x
77-79	x	x	x	x	
79-80					x
88.8-90.8					x
91-93	x	x	x	x	
100-102					x
102-104	x	x	x	x	
109.2-111.2					x
111-113	x	x	x	x	
118.5-120.5					x
121-123	x	x	x	x	
129.8-131.8					x
131-133	x	x	x	x	
139-141					x
141-143	x	x	x	x	
150-151					x
152-154	x	x	x	x	
159-161					x
161-163	x	x	x	x	
168.2-170.2					x

HU-90-013-034 P: L-Piston coring

Julian day:	164	GMT Time:	13:27
Latitude:	57°19.17 N	Longitude:	56°51.68 W
Depth:	2586 m	Corer length:	2128 cm
Penetration:	640 cm	Core length:	538 cm

Geographic location: Labrador slope

Description: The top of the core (0-19 cm s.b.) consists of anoxydized horizon of brown sands and disseminated gravels which change gradually to greenish brown sandy silts. Most of the core consists in a finely laminated silty turbidite sequence interrupted by greenish sandy debris flow horizons. The bottom 100 cm consist of a massive sandy debris flow with abundant pebbles.

Subsampling: The core was cut into *ca.* 150 cm-long sections numbered as usual (see appendix 2.2). Each of them was split into 2 longitudinal half-sections. One half was described and photographied, then a 1 cm-thick slab was cut longitudinally and stored by the NAMOC-Team for further X-Ray analysis at McGill University. The other half-section was used for subsampling. Continuous sampling with 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2.1).

HU-90-013-034 P (Cont'd)

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
0-2					x
2-4	x	x	x	x	
8.8-10.8					x
11-13	x	x	x	x	
18-20					x
20-22	x	x	x	x	
29-31					x
30-32	x	x	x	x	
40.2-42.2					x
42-44	x	x	x	x	
49.2-51.2					x
51-53	x	x	x	x	
58.2-60.2					x
60-62	x	x	x	x	
69.6-71.6					x
71-73	x	x	x	x	
78.8-80.8					x
81-83	x	x	x	x	
89-91					x
91-93	x	x	x	x	
99-101					x
101-103	x	x	x	x	
109-111					x
110.5-112.5	x	x	x	x	
119-121					x
120-122	x	x	x	x	
129-131					x
131-133	x	x	x	x	
139-141					x
141-143	x	x	x	x	
149.7-151.7					x
151-153	x	x	x	x	
159-161					x
161-163	x	x	x	x	
168.2-170.2					x
170.5-172.5	x	x	x	x	
177.9-179.9					x
180-182	x	x	x	x	
187.6-189.6					x
189.7-191.7	x	x	x	x	
197.2-199.2					x
199.5-201.5	x	x	x	x	
207-209					x
209.5-211.5	x	x	x	x	
216.5-218.5					x
220-222	x	x	x	x	
226-228					x
230-232	x	x	x	x	
236.8-238.8					x
239-241					x
241-243	x	x	x	x	
249-251					x
251-253	x	x	x	x	
259-261					x

Depth s.b. (cm)	Foram. sample (30 cc)	Bacterial counting (1 cc)	Pollen & Dinocysts (2 cc)	Diatoms & Coccoliths (2 cc)	Th/U. sample (8 cc)
261-263	x	x	x	x	
268.5-270.5					x
270.5-272.5	x	x	x	x	
278-280					x
280-282	x	x	x	x	
289-291					x
291.5-293.5	x	x	x	x	
298.2-300.2					x
300.5-302.5	x	x	x	x	
309.3-311.3					x
311.5-313.5	x	x	x	x	
318.6-320.6					x
320.7-322.7	x	x	x	x	
329.5-331.5					x
331.8-333.8	x	x	x	x	
338.6-340.6					x
341-343	x	x	x	x	
350-352					x
352-354	x	x	x	x	
359-361					x
361-363	x	x	x	x	
368-370					x
370-372	x	x	x	x	
379.5-381.5					x
380.5-382.5	x	x	x	x	
390-392					x
392-394	x	x	x	x	
399.2-401.2					x
401-403	x	x	x	x	
410.2-412.2					x
412-414	x	x	x	x	
419.4-421.4					x
421-423	x	x	x	x	
428.5-430.5					x
431-433	x	x	x	x	
440-442					x
442-444	x	x	x	x	
448.9-450.9					x
451-453	x	x	x	x	
460.1-462.1					x
462-463	x	x	x	x	
469.6-471.6					x
471-473	x	x	x	x	
478.4-480.4					x
480-482	x	x	x	x	
489.7-491.7					x
491-493	x	x	x	x	
498.8-500.8					x
501-503	x	x	x	x	
510.2-512.2					x
512-514	x	x	x	x	
519.4-521.4					x
524-526	x	x	x	x	
528.8-530.8					x
531-533	x	x	x	x	x

APPENDIX 1

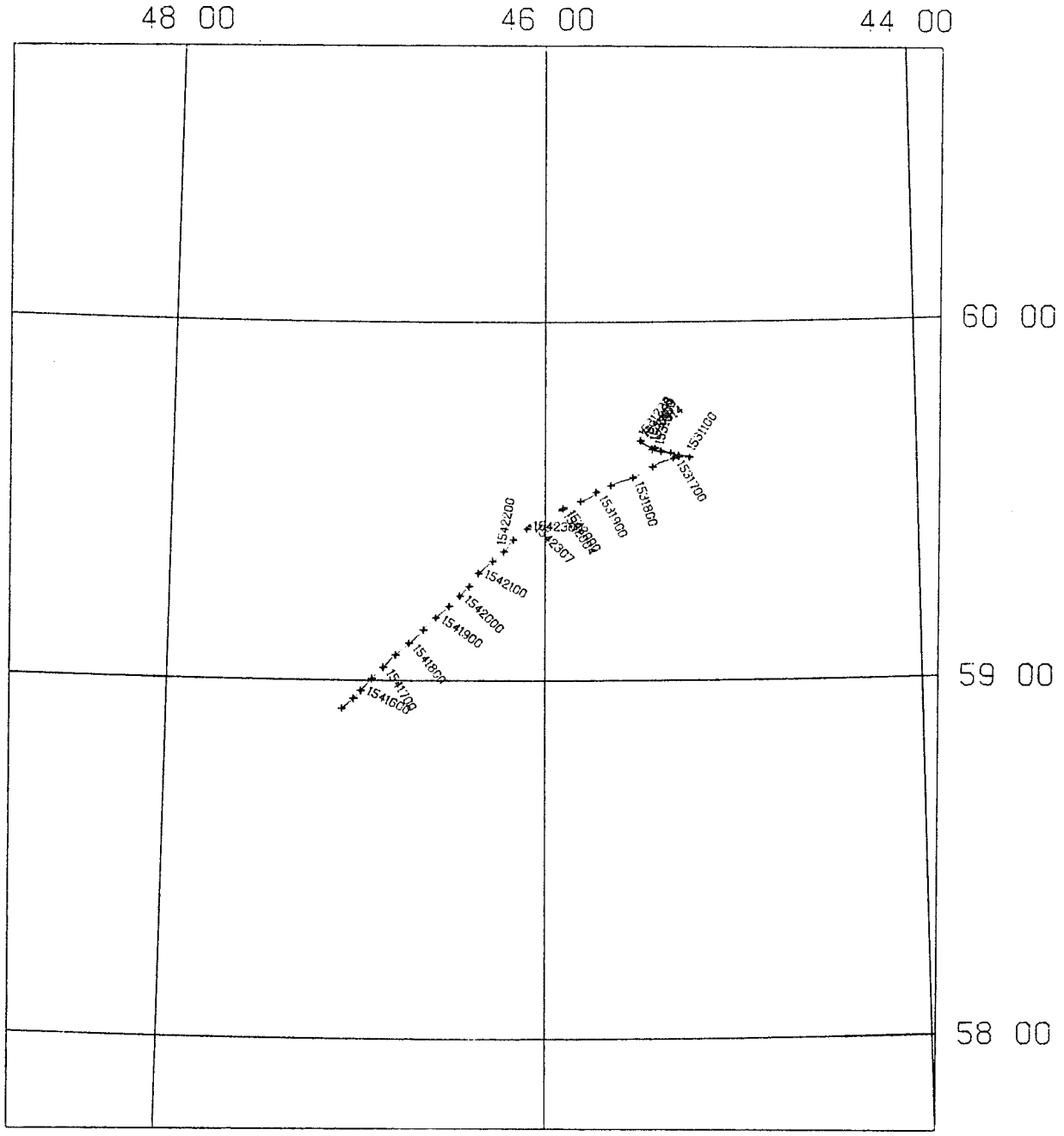
TRACK CHARTS AND TABLES

Charts

Tables

HUDSON 90-013

lines 1, 2 & 3



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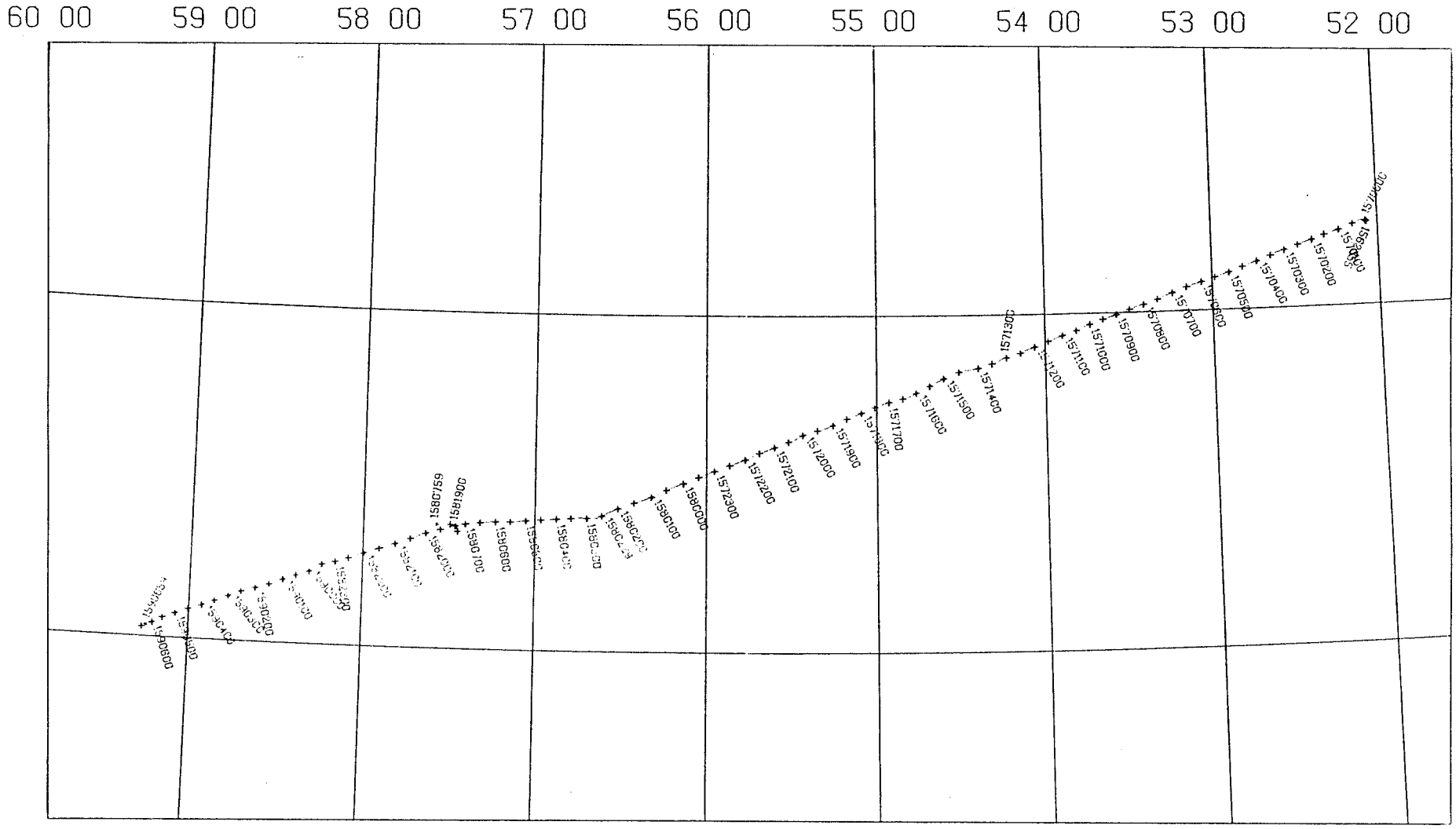
9-JUN-1990 21:29:05.96

HUDSON 90-013

lines 4, 5 & 6



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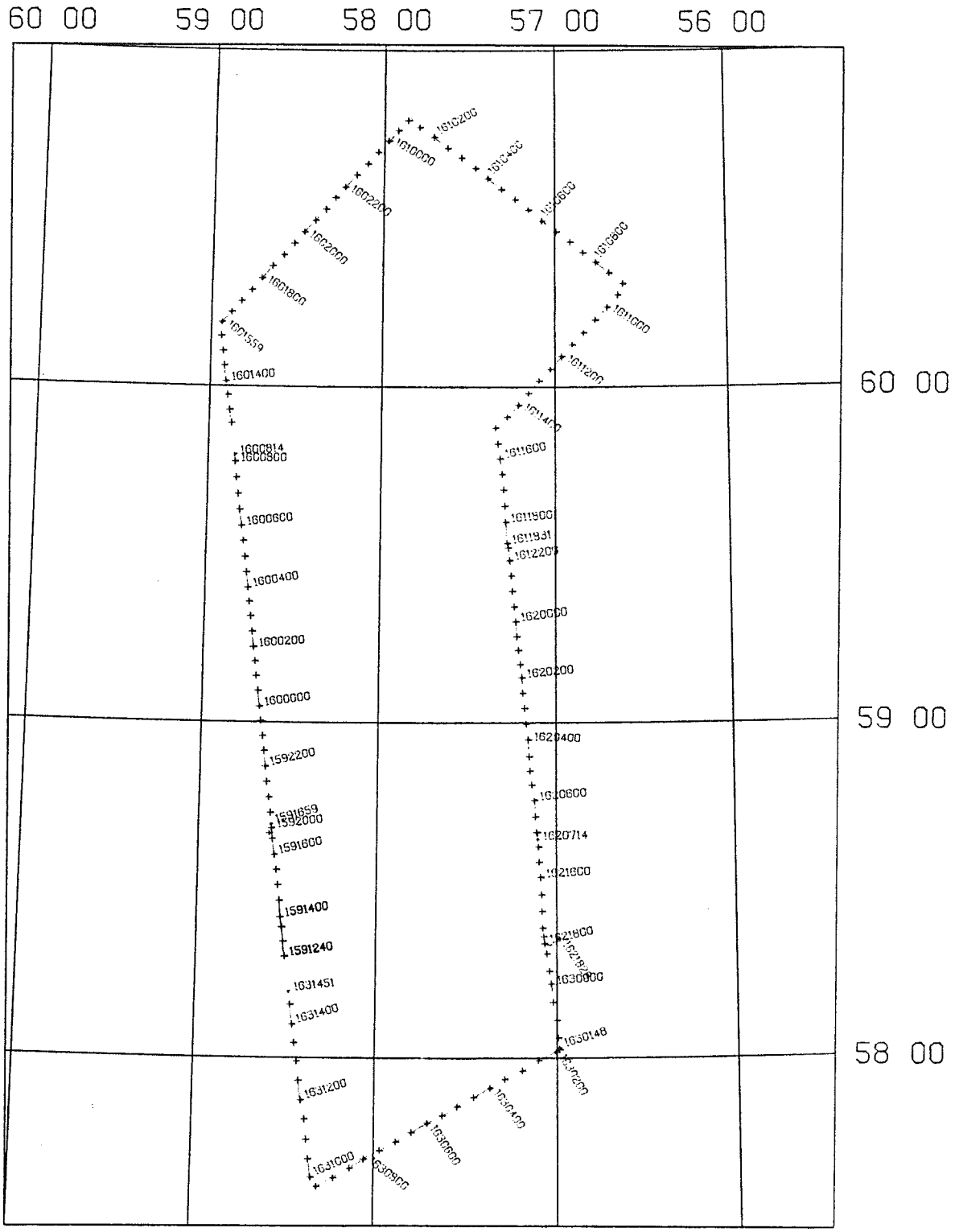
9-JUN-1990 22:42:46.66

90-013-Leg I

HUDSON 90-013

lines 7 to 14



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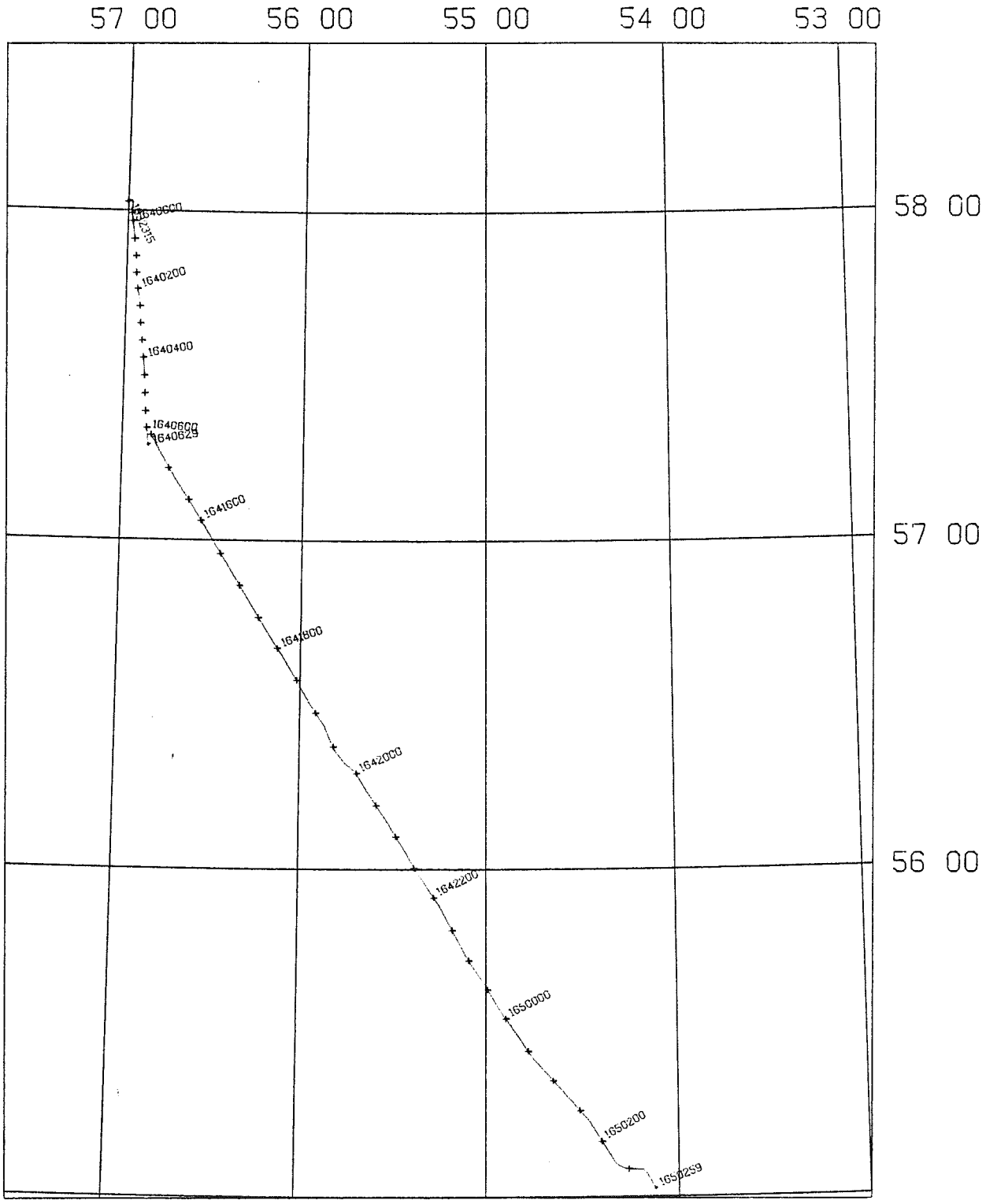
13-JUN-1990 21:42:51.33

HUDSON 90-013

line 15 and extension



LAMBERT 2000000. AT 45.00-66.00

14-JUN-1990 10:12:41.51

TABLE 1

SEISMIC RECORDS

CRUISE NUMBER = 90013
CHIEF SCIENTIST = HILLAIRE-MARCEL
PROJECT NUMBER =

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
1	1531050	1532005	S.E. 100'	1, 2	SINGLE	S/W GREENLAND	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
20	1531050	1532005	NSRF 25'	1, 2	SINGLE	S/W GREENLAND	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
2	1541510	1542310	S.E. 100'	3	SINGLE	S/W GREENLAND	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
14	1562355	1580750	NSRF 25'	4, 5	SINGLE	S/W GREENLAND TO LABRADOR SLOPE	EPC 4800	AGC SEISMICS SLEEVE GUN 40 CU IN
3	1570010	1580750	S.E. 100'	4, 5	SINGLE	S/W GREENLAND TO LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
8	1570010	1580730	S.E. 100'	4, 5	SINGLE	S/W GREENLAND TO LABRADOR SLOPE	EPC 4600	AGC SEISMICS SLEEVE GUN 40 CU IN
21	1570010	1580750	NSRF 25'	4, 5	SINGLE	S/W GREENLAND TO LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
15	1581840	1591705	NSRF 25'	6, 7	SINGLE	LABRADOR SLOPE	EPC 4800	AGC SEISMICS SLEEVE GUN 40 CU IN
4	1581850	1600905	S.E. 100'	6, 7, 8	SINGLE	LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
9	1581850	1600905	S.E. 100'	6, 7, 8	SINGLE	LABRADOR SLOPE	EPC 4600	AGC SEISMICS SLEEVE GUN 40 CU IN
22	1581905	1600905	NSRF 25'	6, 7, 8	SINGLE	LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
16	1591945	1600905	NSRF 25'	8	SINGLE	LABRADOR SLOPE	EPC 4800	AGC SEISMICS SLEEVE GUN 40 CU IN
5	1601230	1611832	S.E. 100'	9, 10	SINGLE	LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
10	1601230	1611230	S.E. 100'	9, 10	SINGLE	LABRADOR SLOPE	EPC 4600	AGC SEISMICS SLEEVE GUN 40 CU IN
17	1601230	1611830	NSRF 25'	9, 10	SINGLE	LABRADOR SLOPE	EPC 4800	AGC SEISMICS SLEEVE GUN 40 CU IN
23	1601232	1611830	NSRF 25'	9, 10	SINGLE	LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
11	1611235	1611830	S.E. 100'	10	SINGLE	LABRADOR SLOPE	EPC 4600	AGC SEISMICS SLEEVE GUN 40 CU IN

TABLE 1

SEISMIC RECORDS

CRUISE NUMBER = 90013
CHIEF SCIENTIST = HILLAIRE-MARCEL
PROJECT NUMBER =

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
18	1612132	1631450	NSRF 25'	11, 12, 13, 14	SINGLE	LABRADOR SLOPE	EPC 4800	AGC SEISMICS SLEEVE GUN 40 CU IN
24	1612132	1631450	NSRF 25'	11, 12, 13, 14	SINGLE	LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
6	1612140	1631450	S.E. 100'	11, 12, 13, 14	SINGLE	LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
12	1612140	1631450	S.E. 100'	11, 12, 13, 14	SINGLE	LABRADOR SLOPE	EPC 4600	AGC SEISMICS SLEEVE GUN 40 CU IN
7	1632315	1640627	S.E. 100'	15	SINGLE	LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
13	1632315	1640627	S.E. 100'	15	SINGLE	LABRADOR SLOPE	EPC 4600	AGC SEISMICS SLEEVE GUN 40 CU IN
19	1632317	1640627	NSRF 25'	15	SINGLE	LABRADOR SLOPE	EPC 4800	AGC SEISMICS SLEEVE GUN 40 CU IN
25	1632317	1640627	NSRF 25'	15	SINGLE	LABRADOR SLOPE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
27	1671659	1681040	SE 100'	16 TO 32	SINGLE	BAY VERTE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
26	1671700	1681040	NSRF 25'	16 TO 32	SINGLE	BAY VERTE	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
28	1682127	1691316	NSRF 25'	33 TO 42	SINGLE	NOTRE DAME BAY	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
29	1682127	1691316	DE 100''	33 TO 42	SINGLE	NOTRE DAME BAY	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
30	1700035	1701437	NSRF 25'	43, 44, 45	SINGLE	NOTRE DAME BAY AND HALL BAY	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
31	1700035	1701437	SE 100'	43, 44, 45	SINGLE	NOTRE DAME BAY AND HALL BAY	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	FREQUENCY	LINE NUMBERS	FIX NUMBERS	GEOGRAPHIC LOCATION	RECORDER	NOTES
1	1530915	1531050	12 KHZ.	1, 2		S/W GREENLAND	UGR	
10	1671520	1681207	12 KHZ.	16 TO 32		BAY VERTE	UGR	
11	1682120	1692028	12 KHZ.	33 TO 42		BAY VERTE TO WHITE BAY	UGR	
12	1692023	1700715	12 KHZ.	43, 44		NOTRE DAME BAY	UGR	
13	1700735	1702135	12 KHZ.	44, 45		HALL BAY	UGR	
14	1711232	1720440	12 KHZ.			STRAIT BELLE ISLE	UGR	
15	1502200	1510900	12 KHZ.			LABRADOR SEA	UGR	
2	1541500	1542310	12 KHZ.	3		S/W GREENLAND	UGR	
3	1561340	1581025	12 KHZ.	4, 5		S/W GREENLAND TO LABRADOR SLOPE	UGR	
4	1581850	1600920	12 KHZ.	6, 7, 8		LABRADOR SLOPE	UGR	
5	1601145	1611845	12 KHZ.	9, 10		LABRADOR SLOPE	UGR	
6	1612123	1620830	12 KHZ.	11		LABRADOR SLOPE	UGR	
7	1621428	1631505	12 KHZ.	12, 13, 14		LABRADOR SLOPE	UGR	
8	1631735	1641235	12 KHZ.	15		LABRADOR SLOPE	UGR	
9	1641447	1650251	12 KHZ.			LABRADOR SLOPE	UGR	

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
1	1530900	1531420		1		S/W GREENLAND	EPC 4100	ORE HULL MOUNTED
2	1531650	1532050		2		S/W GREENLAND	EPC 4100	ORE HULL MOUNTED
3	1541130	1541300				S/W GREENLAND	EPC 4100	ORE HULL MOUNTED
4	1541455	1552130		3		S/W GREENLAND	EPC 4100	ORE HULL MOUNTED
5	1562355	1580900		4, 5		S/W GREENLAND TO LABRADOR SLOPE	EPC 4100	ORE HULL MOUNTED
6	1581835	1600955		6, 7, 8		LABRADOR SLOPE	EPC 4100	ORE HULL MOUNTED
7	1600955	1610805		9, 10		LABRADOR SLOPE	EPC 4100	ORE HULL MOUNTED
8	1610807	1611845		10		LABRADOR SLOPE	EPC 4100	ORE HULL MOUNTED
9	1612100	1631505		11, 12, 13, 14		LABRADOR SLOPE	EPC 4100	ORE HULL MOUNTED
10	1631742	1540637		15		LABRADOR SLOPE	EPC 4100	ORE HULL MOUNTED
11	1640643	1641407				LABRADOR SLOPE	EPC 4100	ORE HULL MOUNTED
12	1641508	1642240				LABRADOR SLOPE	EPC 4100	ORE HULL MOUNTED
13	1671400	1671630				NOTRE DAME BAY	EPC 4100	ORE HULL MOUNTED
14	1700210	1701249		45		HALL BAY	EPC 4100	ORE HULL MOUNTED
15	1711059	1712254				STRAIT BELLE ISLE	EPC 4100	ORE HULL MOUNTED
16	1712259	1720440				STRAIT BELLE ISLE	EPC 4100	ORE HULL MOUNTED

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	HUNTEC SYSTEM
2	1671650	1681038	INTERNAL	16 TO 42	SINGLE	BAIE VERTE	EPC 4100	AGC
1	1671720	1681038	EXTERNAL	16 TO 32	SINGLE	BAIE VERTE	EPC 4100	AGC
3	1682140	1691316	EXTERNAL		SINGLE	NOTRE DAME BAY	EPC 4100	AGC
4	1682140	1691316	INTERNAL	33 TO 42	SINGLE	NOTRE DAME BAY	EPC 4100	AGC
5	1700034	1701437	EXTERNAL	43, 44, 45	SINGLE	NOTRE DAME BAY AND HALL BAY	EPC 4100	AGC
6	1700034	1701437	INTERNAL	43, 44, 45	SINGLE	NOTRE DAME BAY AND HALL BAY	EPC 4100	AGC
7	1700034	1701437	INTERNAL		SINGLE	NOTRE DAME BAY AND HALL BAY	EPC 4100	AGC

TABLE 5

SEISMICS/SIDESCAN COMBINED ON-LINE DATA TAPES

CRUISE NUMBER = 90013
CHIEF SCIENTIST = HILLAIRE-MARCEL
PROJECT NUMBER =

TAPE NUMBERS	START DAY/TIME	STOP DAY/TIME	GEOGRAPHIC LOCATION	CHANNEL INFO	NOTES
1	167----	1672120	BAY VERTE	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 16 TO 23
2	1672120	1680010	BAY VERTE	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 23 TO 28
3	1680010	1680305	BAY VERTE	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 28 & 29
4	1680305	1680600	BAY VERTE	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 29 & 30
5	1680600	1680853	BAY VERTE	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 30 & 31
6	1680853	1681039	BAY VERTE	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINE 32
7	1682126	1690015	NOTRE DAME BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINE 34
8	1690016	1690310	NOTRE DAME BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 34 & 35
9	1690310	1690600	NOTRE DAME BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 35 & 36
10	1690600	1690857	NOTRE DAME BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 36 & 37

TAPE NUMBERS	START DAY/TIME	STOP DAY/TIME	GEOGRAPHIC LOCATION	CHANNEL INFO	NOTES
11	1690858	1691226	NOTRE DAME BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 37 TO 42
12	1691226	1700151	NOTRE DAME BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 42 & 43
13	1700151	1700455	NOTRE DAME BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINE 43
14	1700455	1700745	NOTRE DAME BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 43 & 44
15	1700745	1701048	NOTRE DAME BAY AND HALL BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINES 44 & 45
16	1701048	1701340	HALL BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINE 45
17	1701340	1701437	HALL BAY	CH.1-3 = AGC SEISMICS CH 4 = HUNTEC INTERNAL CH 5 = HUNTEC TRIGGER SYNC CH 6 = HUNTEC EXTERNAL	LINE 45

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE	LONGITUDE	DEPTH (M)	GEOGRAPHIC LOCATION
1	BOXCORE	1531358	59 37.82N	45 17.00W	157	S/W GREENLAND
10	WATER	1550022	59 26.47N	46 04.46W	1958	S/W GREENLAND
11	BOXCORE	1551024	58 54.85N	47 05.12W	2805	S/W GREENLAND
12	CORE	1551335	58 55.36N	47 07.01W	2831	S/W GREENLAND
13	CORE	1552126	58 12.59N	48 22.40W	3380	S/W GREENLAND
14	WATER	1552330	58 12.66N	48 22.09W	3400	S/W GREENLAND
15	WATER	1560240	58 10.30N	48 23.36W	3400	S/W GREENLAND
16	PLANKTON	1560300	58 10.30N	48 23.36W	3400	S/W GREENLAND
17	BOXCORE	1561220	58 12.51N	48 21.61W	3379	S/W GREENLAND
18	WATER	1580835	58 22.34N	57 57.27W	2886	LABRADOR SLOPE
19	WATER	1581114	58 21.75N	57 28.52W	2886	LABRADOR SLOPE
2	WATER	1531449	59 37.93N	45 17.16W	157	S/W GREENLAND
20	BOXCORE	1581225	58 21.55N	57 27.38W	2865	LABRADOR SLOPE
21	CORE	1581648	58 22.18N	57 27.28W	2864	LABRADOR SLOPE
22	WATER	1590720	58 19.21N	59 13.56W	1646	LABRADOR SLOPE
23	WATER	1590850	58 20.71N	59 13.63W	1646	LABRADOR SLOPE
24	CORE	1591824	58 40.51N	58 35.44W	2360	LABRADOR SLOPE
25	CORE	1601053	59 53.32N	58 51.39W	2450	LABRADOR SLOPE
26	CORE	1611944	59 31.34N	57 16.64W	2895	LABRADOR SLOPE
27	BOXCORE	1620938	58 45.79N	57 07.19W	2913	LABRADOR SLOPE
28	CORE	1621237	58 45.80N	57 06.75W	2913	LABRADOR SLOPE
29	CORE	1622015	58 23.61N	56 45.76W	2918	LABRADOR SLOPE
3	PLANKTON	1531510	59 38.04N	45 17.69W	157	S/W GREENLAND
30	CORE	1631930	57 48.88N	57 36.78W	2626	LABRADOR SLOPE
31	WATER	1640655	57 16.72N	56 50.55W	2527	LABRADOR SLOPE

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE	LONGITUDE	DEPTH (M)	GEOGRAPHIC LOCATION
32	PLANKTON	1640815	57 16.72N	56 50.55W	2527	LABRADOR SLOPE
33	CORE	1640942	57 16.84N	56 50.70W	2577	LABRADOR SLOPE
34	CORE	1641327	57 19.17N	56 51.68W	2586	LABRADOR SLOPE
36	GRAB	1681513	49 56.31N	56 10.96W	25	BAIE VERTE,NFLD
37	GRAB	1681549	49 56.63N	56 09.95W	32	BAIE VERTE,NFLD
38	GRAB	1681604	49 57.16N	56 09.17W	44	BAIE VERTE,NFLD
39	GRAB	1681654	49 57.48N	56 09.20W	54	BAIE VERTE,NFLD
4	CORE	1531552	59 37.78N	45 17.04W	157	S/W GREENLAND
40	GRAB	1681706	49 57.90N	56 09.28W	42	BAIE VERTE,NFLD
41	GRAB	1681718	49 58.13N	56 08.97W	72	BAIE VERTE,NFLD
42	IKU	1681744	49 59.61N	56 03.07W	43	BAIE VERTE,NFLD
43	GRAB		50 00.48N	56 06.52W	157	BAIE VERTE,NFLD
44	GRAB	1681840	50 01.00N	56 06.60W	186	BAIE VERTE,NFLD
45	GRAB	1681900	50 01.55N	56 05.19W	242	BAIE VERTE,NFLD
46	GRAB	1681932	50 01.42N	56 04.91W	311	BAIE VERTE,NFLD
47	IKU	1681958	50 01.72N	56 03.52W	51	BAIE VERTE,NFLD
48	GRAB	1682017	50 02.26N	56 03.31W	228	BAIE VERTE,NFLD
49	IKU	1682044	50 02.52N	56 01.68W	55	BAIE VERTE,NFLD
5	WATER	1531633	59 37.89N	45 17.37W	157	S/W GREENLAND
50	GRAB	1691425	49 45.93N	55 38.34W	288	NOTRE DAME BAY
51	CORE	1691507	49 47.96N	55 36.42W	263	NOTRE DAME BAY
52	GRAB	1691602	49 49.42N	55 36.05W	228	NOTRE DAME BAY
53	GRAB	1691647	49 51.87N	55 35.25W	98	NOTRE DAME BAY
54	CORE	1691746	49 50.42N	55 28.03W	252	NOTRE DAME BAY
55	GRAB	1691835	49 50.48N	55 27.08W	253	NOTRE DAME BAY

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE	LONGITUDE	DEPTH (M)	GEOGRAPHIC LOCATION
56	GRAB	1691905	49 51.25N	55 26.87W	257	NOTRE DAME BAY
57	GRAB	1691933	49 53.15N	55 27.59W	147	NOTRE DAME BAY
58	GRAB	1692018	49 54.13N	55 27.12W	97	NOTRE DAME BAY
59	GRAB	1692100	49 51.77N	55 33.71W	150	NOTRE DAME BAY
6	BOXCORE	1532137	59 29.48N	45 52.24W	1105	S/W GREENLAND
60	GRAB	1692125	49 51.02N	55 30.45W	227	NOTRE DAME BAY
61	GRAB	1692231	49 47.32N	55 42.76W	275	NOTRE DAME BAY
62	GRAB	1692300	49 48.05N	55 44.77W	229	NOTRE DAME BAY
63	CORE	1701532	49 27.89N	56 04.70W	241	HALL BAY
64	CORE	1701947	49 45.84N	55 38.61W	311	MOUTH HALL BAY
65	GRAB	1701830	49 45.38N	55 39.63W	273	MOUTH HALL BAY
66	GRAB	1702003	49 45.37N	55 39.76W	277	MOUTH HALL BAY
67	GRAB	1702025	49 45.88N	55 49.98W	292	GREEN BAY
68	GRAB	1710100	50 01.09N	55 46.02W	193	BONNA VISTA BAY
69	GRAB	1710132	50 03.39N	55 48.72W	205	BONNA VISTA BAY
7	WATER	1532259	59 29.78N	45 55.03W	1105	S/W GREENLAND
70	GRAB	1710252	50 05.79N	55 50.60W	211	BONNA VISTA BAY
8	WATER	1541151	58 55.33N	47 07.74W	2834	S/W GREENLAND
9	BOXCORE	154___	58 54.58N	47 06.72W	2765	S/W GREENLAND FAILED AT 500M.

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (MTRS)	CORER LENGTH (CM)	APP. PENN (CM)	CORE LENGTH (CM)	NO OF SECT	GEOGRAPHIC LOCATION	NOTES
12	AGC LONG CORE	1551335	58 55.36N 47 07.01W	2831	1520	1316	1254	9	S/W GREENLAND	A:1237, B:1086, C:938, D:789, E:633 F:484, G:327, H:182, H"I":104, I'I':24 TWC: SMALL SAMPLE FROM LINER BAGGED CATCHER BAGGED I-I", 24-104 CM. H'-H, 104-182 CM. CUTTER, 1237-1254 CM. CATCHER BAGGED I-J, SHORT SECTION (10CM.) I', SMALL BAG SAMPLE BETWEEN I-I H"QI", SECTION HAD TO BE CUT, TOO LONG FOR CUTTER & D-TUBE
13	AGC LONG CORE	1552126	58 12.59N 48 22.40W	3380	3040	1827		12	S/W GREENLAND	3442CM. RESD OUT ON BLOCK TWC: MUD SHOWING ON CUTTER ONLY
21	AGC LONG CORE	1581648	58 22.18N 57 27.28W	2864	1520	456			LABRADOR SLOPE	TWC: LENGHT=154 CM. A: 155CM. B: 76CM. CORE: CUTTER SMASHED ON A ROCK A: 202CM., B:154CM. A-B, SHORT SECTION B-C, CUT WITH HOT KNIFE A-B, CUT WITH PIANO WIRE
24	AGC LONG CORE	1591824	58 40.51N 58 35.44W	2360					LABRADOR SLOPE	2395 READ OUT ON METER BLOCK TWC: MUD ON CUTTER ONLY CATCHER SAMPLE BAGGED (APP. 8CM.) CUTTER SAMPLE SPLIT AND IN HALF ROUND. CUTTER SAMPLE FOR TWC SPLIT, PUT IN HALF ROUND & IN D-TUBE WITH CUTTER SAMPLE FROM TWC A: 315CM., B:165CM., C:14CM.
25	AGC LONG CORE	1601053	59 53.32N 58 51.39W	2450	1520	1216			LABRADOR SLOPE	E'-E', SHORT PIECE (12CM.) CAME OUT OF LINER, SPLIT AND PUT IN HALF ROUND CATCHER & CUTTER BOTH BAGGED B:578CM., C:426CM.,

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (MTRS)	CORER LENGTH (CM)	APP. PENN (CM)	CORE LENGTH (CM)	NO OF SECT	GEOGRAPHIC LOCATION	NOTES
26	AGC LONG CORE	1611944	59 31.34N 57 16.64W	2895	1520	1216		08	LABRADOR SLOPE	TWC: APP. PENN. 43CM. TOT. LENGHT 26CM. NO LINER BUT THE CUTTER WAS EXTRUDED. CORE: CATCHER WAS BAGGED. CUTTER IN A HALF ROUND EE' IS SMALL SECTION (4CM.) THAT FELL ON FLOOR AND WAS BAGGED. D:651CM., E':498CM., E:494CM. F:348CM., G:196CM., H:44CM.
28	AGC LONG CORE	1621237	58 45.80N 57 06.75W	2913	1824	1520			LABRADOR SLOPE	TWC: CATCHER BAGGED APP.PENN. 143CM. TOTAL LENGHT 128CM. H:114CM., G:266CM., F:418CM.
29	AGC LONG CORE	1622015	58 23.61N 56 45.76W	2918	2128	1976			LABRADOR SLOPE	
30	AGC LONG CORE	1631930	57 48.88N 57 36.78W	2626	2432	1490			LABRADOR SLOPE	TWC: APP.PENN. 158CM. TOT.LENGHT 33CM.
33	AGC LONG CORE	1640942	57 16.84N 56 50.70W	2577	2128	1064		6	LABRADOR SLOPE	2ND SECTION TIPPED AND DUMPED HALF OF CORE ON DECK, BAGGED (CAME OUT OF E-D END). - CUTTER BAGGED (APP. 20CM.) - C'C' 5CM. BAGGED - SMALL SAMPLE FROM BASE OF CUTTER IN 250ML. PLASTIC JAR.
34	AGC LONG CORE	1641327	57 19.17N 56 51.68W	2586	1824	638			LABRADOR SLOPE	TWC: APP. PENN. 165CM. TOT. LENGHT 174CM.
4	AGC LONG CORE	1531552	59 37.78N 45 17.04W	157	608	0	0		S/W GREENLAND	CUTTER BENT IN TWO OR THREE SPOTS. RECOVERED APP. 50CM. GRAVELY SAND IN LINER B-A. SEDIMENTS HAVE BEEN REWORKED AND WASHED OUT. -- UNUSABLE --
51	AGC LONG CORE	1691507	49 47.96N 55 36.42W	263	912	1060			NOTRE DAME BAY	TWC APP. PENETRATION 100CM. E-E' 4CM. WAS BAGGED CATCHER WAS BAGGED

TABLE 7

CORE SAMPLES

CRUISE NUMBER = 90013
CHIEF SCIENTIST = HILLAIRE-MARCEL
PROJECT NUMBER =

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (MTRS)	CORER LENGTH (CM)	APP. PENN (CM)	CORE LENGTH (CM)	NO OF SECT	GEOGRAPHIC LOCATION	NOTES
54	AGC LONG CORE	1691746	49 50.42N 55 28.03W	252	912	912		3	NOTRE DAME BAY	FULL PENETRATION BOTTOM OF CORE: STIFF BROWN CLAY
63	AGC LONG CORE	1701532	49 27.89N 56 04.70W	241	1824	1216			HALL BAY	C-C' 5CM.
64	AGC LONG CORE	1701947	49 45.84N 55 38.61W	311	1812	520			MOUTH HALL BAY	CUTTER SAMPLE BAGGED

TABLE 3

BOXCORE SAMPLES 90013

SAMPLE NUMBER	TYPE OF BOXCORE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATTEMPTS	NO OF SUBSAMPLES	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
1	BOXCORE	1531358	59 37.82N 45 17.00W	157	1				S/W GREENLAND	SAND AND GRAVEL WITH ROCKS 2 TO 5 CM. DIAM.
11	BOXCORE	1551024	58 54.85N 47 05.12W	2805	1	1	6	N	S/W GREENLAND	HEMIPELAGIC MUD FEW DROPSTONES BIOTURBATION 7CM. DIAM.: B,D,E,F: UQAM G: BIO 10CM. DIAM.: UQAM SURFACE SAMPLE TAKEN FOR FORAM ANALYSIS
17	BOXCORE	1561220	58 12.51N 48 21.61W	3379	1	1	7	N	S/W GREENLAND	-NO VISIBLE LIFE -FEW BIOTURBATIONS -CLAY, GREY & COMPACT 7CM. DIAM.: A,B,E,G: UQAM/GEOTOP H: BIO ARCHIVE 10CM. DIAM.: C,F: UQAM/GEOTOP SURFACE SAMPLE TAKEN FOR MICROPALEO
20	BOXCORE	1581225	58 21.55N 57 27.38W	2865	1	1	7	N	LABRADOR SLOPE	4 7CM. DIAM. FOR UQAM 1 7CM. DIAM. FOR BIO ARCHIVE 1 15CM. DIAM. FOR UQAM 1 MINI CORE FOR UQAM 1 SURFACE SAMPLE FOR FORAM ANALYSIS
27	BOXCORE	1620938	58 45.79N 57 07.19W	2913	1	1	7	N	LABRADOR SLOPE	SURFRACE SAMPLE FOR FORAM 7CM. DIAM. CORES: A,B,D I: UQAM F: BIO ARCHIVE 15CM. DIAM. CORE: BIO ARCHIVE

TABLE 8

BOXCORE SAMPLES 90013

SAMPLE NUMBER	TYPE OF BOXCORE	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATTEMPTS	NO OF SUBSAMPLES	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
6	BOXCORE	1532137	59 29.48N 45 52.24W	1105	1	1	5		S/W GREENLAND	-SANDY MUD WITH LARGE ROCKS 2-15 CM. DIAM. -BENTHIC LIFE VERY ABUNDANT 7CM. DIAM.: G,H&I: UQAM F: BIO ARCHIVE 10CM. DIAM.: E: UQAM/MCGILL SURFACE SAMPLES TAKEN FOR FORAM ANALYSIS
9	BOXCORE	154___	58 54.58N 47 06.72W	2765					S/W GREENLAND FAILED AT 500M.	

TABLE 9

WATER SAMPLES 90013

SAMPLE NUMBER	SAMPLE TYPE	JULIAN DAY/TIME	LATITUDE	LONGITUDE	DEPTH (MTRS)	BOTTLE VOLUMN	DEPTH 1 DEPTH 2 DEPTH 3	GEOGRAPHIC LOCATION	NOTES
2	WATER	1531449	59 37.93	45 17.16	157	80	1 7.5 14 124.5 131 137.5	S/W GREENLAND	BOTTLE #5 STAYED OPE CONTENTS
5	WATER	1531633	59 37.89	45 17.37	157			S/W GREENLAND	NO INFO RECORDED ON
7	WATER	1532259	59 29.78	45 55.03	1105	20	2 8.5 15 315 321.5 328 334.5 634.5 641.5	S/W GREENLAND	BOTTLE #11 AT 651 M. BOTTLE #6 OPEN, CONT
8	WATER	1541151	58 55.33	47 07.74	2834	220	2 8.5 15 1079 1086 1092 1099 2201 2208	S/W GREENLAND	BOTTLE #11 AT 2221 M
10	WATER	1550022	59 26.47	46 04.46	1958	132	2 9 16 417 424 431 438 1738 1758	S/W GREENLAND	BOTTLE #11 AT 1759M.
14	WATER	1552330	58 12.66	48 22.09	3400	120	1200 1207 1214 1221 1228 3200 3207 3214 3228	S/W GREENLAND	
15	WATER	1560240	58 10.30	48 23.36	3400	72	2 9 16 120 127 134	S/W GREENLAND	

TABLE 9

WATER SAMPLES 90013

SAMPLE NUMBER	SAMPLE TYPE	JULIAN DAY/TIME	LATITUDE	LONGITUDE	DEPTH (MTRS)	BOTTLE VOLUMN	DEPTH 1 DEPTH 2 DEPTH 3	GEOGRAPHIC LOCATION	NOTES
18	WATER	1580835	58 22.34	57 57.27	2886	120	1200 1207 1214 1221 1228 1700 2707 2714 2728	LABRADOR SLOPE	
19	WATER	1581114	58 21.75	57 28.52	2886	84	2 9 16 120 127 134 141	LABRADOR SLOPE	
22	WATER	1590720	58 19.21	59 13.56	1646	120	1000 1007 1014 1021 1028 1475 1482 1489 1906	LABRADOR SLOPE	
23	WATER	1590850	58 20.71	59 13.63	1646	72	2 9 90 97 104 111	LABRADOR SLOPE	
31	WATER	1640655	57 16.72	56 50.55	2527		5 10 1860 1867 1874 1881 1888 1895	LABRADOR SLOPE	

SAMPLE NUMBER	TYPE OF SAMPLER	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (M)	NO. OF ATTEMPTS	GEOGRAPHIC LOCATION	GRAB SAMPLE NOTES
36	VANVEEN	1681513	49 56.31N 56 10.96W	25	2	BAIE VERTE,NFLD	
37	VANVEEN	1681549	49 56.63N 56 09.95W	32	1	BAIE VERTE,NFLD	
38	VANVEEN	1681604	49 57.16N 56 09.17W	44	1	BAIE VERTE,NFLD	ONE 2.5 GAL. BUCKET FULL IKU ATTEMPTED 4 TIMES BUT WOULD NOT CLOSE
39	VANVEEN	1681654	49 57.48N 56 09.20W	54	1	BAIE VERTE,NFLD	
40	VANVEEN	1681706	49 57.90N 56 09.28W	42	1	BAIE VERTE,NFLD	
41	VANVEEN	1681718	49 58.13N 56 08.97W	72	2	BAIE VERTE,NFLD	
43	VANVEEN		50 00.48N 56 06.52W	157	3	BAIE VERTE,NFLD	
44	VANVEEN	1681840	50 01.00N 56 06.60W	186	1	BAIE VERTE,NFLD	MUD (SILT)
45	VANVEEN	1681900	50 01.55N 56 05.19W	242	1	BAIE VERTE,NFLD	DARK OLIVE-BLACK CLAYEY SILT A FEW PEBBLES
46	VANVEEN	1681932	50 01.42N 56 04.91W	311	1	BAIE VERTE,NFLD	BLACK MUD SAMPLER FULL
48	VANVEEN	1682017	50 02.26N 56 03.31W	228	1	BAIE VERTE,NFLD	MUD, CLAY AND PEBBLES
50	VANVEEN	1691425	49 45.93N 55 38.34W	288	3	NOTRE DAME BAY	
52	VANVEEN	1691602	49 49.42N 55 36.05W	228	2	NOTRE DAME BAY	
53	VANVEEN	1691647	49 51.87N 55 35.25W	98	2	NOTRE DAME BAY	
55	VANVEEN	1691835	49 50.48N 55 27.08W	253	1	NOTRE DAME BAY	OLIVE GREEN MUD WITH PEBBLES
56	VANVEEN	1691905	49 51.25N 55 26.87W	257	1	NOTRE DAME BAY	OLIVE GREEN MUD

SAMPLE NUMBER	TYPE OF SAMPLER	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (M)	NO. OF ATTEMPTS	GEOGRAPHIC LOCATION	GRAB SAMPLE NOTES
57	VANVEEN	1691933	49 53.15N 55 27.59W	147	3	NOTRE DAME BAY	OLIVE GREEN
58	VANVEEN	1692018	49 54.13N 55 27.12W	97	3	NOTRE DAME BAY	1ST ATT.: MED. OLOVE GREEN 2ND ATT.: MUDDY SAND & PEBBLES 3RD ATT.: ONE PEBBLE ONLY
59	VANVEEN	1692100	49 51.77N 55 33.71W	150	1	NOTRE DAME BAY	OLIVE GREEN SITY SAND WITH A FEW PEBBLES AND GRANULES
60	VANVEEN	1692125	49 51.02N 55 30.45W	227	1	NOTRE DAME BAY	OLIVE GREEN SILTY FINE SAND
61	VANVEEN	1692231	49 47.32N 55 42.76W	275	1	NOTRE DAME BAY	OLIVE GREEN MUD
62	VANVEEN	1692300	49 48.05N 55 44.77W	229	1	NOTRE DAME BAY	GRITTY MUD WITH PEBBLES AND STARFISH
65	VANVEEN	1701830	49 45.38N 55 39.63W	273	2	MOUTH HALL BAY	SANDY/GRAVEL MUD WITH BOULDERS
66	VANVEEN	1702003	49 45.37N 55 39.76W	277	2	MOUTH HALL BAY	SANDY/GRAVEL MUD WITH BOULDERS
67	VANVEEN	1702025	49 45.88N 55 49.98W	292	1	GREEN BAY	MUD WITH PEBBLES
68	VANVEEN	1710100	50 01.09N 55 46.02W	193	1	BONNA VISTA BAY	OLIVE GREEN MUD WIYH PEBBLES
69	VANVEEN	1710132	50 03.39N 55 48.72W	205	1	BONNA VISTA BAY	OLIVE GREEN MUD WITH PEBBLES
70	VANVEEN	1710252	50 05.79N 55 50.60W	211	1	BONNA VISTA BAY	OLIVE GREEN MUD WITH PEBBLES

APPENDIX 2

ON BOARD SAMPLING PROCEDURES

APPENDIX 2.1: Sampling procedures for paleomagnetic measurements

Scientific objective: to measure paleomagnetic declination and inclination of the sediments in order to reconstruct secular fluctuations of the magnetic field.

Rationale: (1) basic studies of high resolution paleomagnetic changes;
(2) their possible link with climatic fluctuations (due to rotational changes induced by loading/unloading of continents by ice sheets?);
(3) magnetostratigraphy and correlations of cored sequences based on secular changes. [Ref.: Thouveny: *J. can. Sci. Terre* 25 (1988), 833-843].

Sampling objective: to sample sediments as undisturbed as possible and as carefully oriented as possible with 2 cc-edge plastic cubes pushed in continuity along half-sections;

Material needed: Centimetric tape; Cutting blade; Curved spatula; Permanent markers (fine)
Tweezers; Metallic plate (aluminum)
Sticking plaster (Band-Aid™) cut into 25 mm² sqares
8-cc plastic cubes (2 cc-edge) and covers for sampling
Hermetic plastic box for storage

Procedures:

01. Drill a hole (*ca.* 1mm²) in the corner of the face of each cube opposite to the cover [event to let the air out when pushing the cube into the sediment].

02. Try to cut as evenly as possible each working half-section of the core (electric knife or wire) along the lines already made on liners when recovered from the barrels (in order to limit relative rotation of sections).

03. Push the cubes into the sediment along the working half axis, with a uniform and vertical pression; insure that the "drilled" face of the cube is parallel to the surface of the sediment and maintain the other faces of the cubes parallel (lateral faces) or perpendicular (fore and aft faces) to the axis.

04. Plug the cube events with the already cut sticking plaster pieces (the plaster should be cut first into 25 mm² sqares on the aluminum plate).

05. Indicate the core top direction with an arrow on each cube (*cf.* figure p. 118); alternately, only on the top and bottom cubes of each working half, if all working halves are processed similarly, *e.g.*, with the top of the section at left hand and writings from left (=top) to right (=bottom).

06. On each cube, indicate the core section number on left top, and the depth (from top of the section) of the center of the face (at ± 1 mm). Indicate the core number on the top cube of each section.

07. On the log book: note the exact length (in cm) of each section. Note sampling hiatuses if any (*e.g.*, disturbances due to sample processing, pebbles, coarse layers...).

08. Remove the cubes as gently as possible with tweezers and a curved spatula (to cut the mud at the base of the cube); avoid to twist the sampled mud.

09. Cut and remove the mud in excess.

10. Put the covers on the cubes.

11. Clean the cubes and store them in numerical order in a hermetic box.

12. Put a wet paper towel in the box (to prevent dehydration) before storage in a refrigerator.

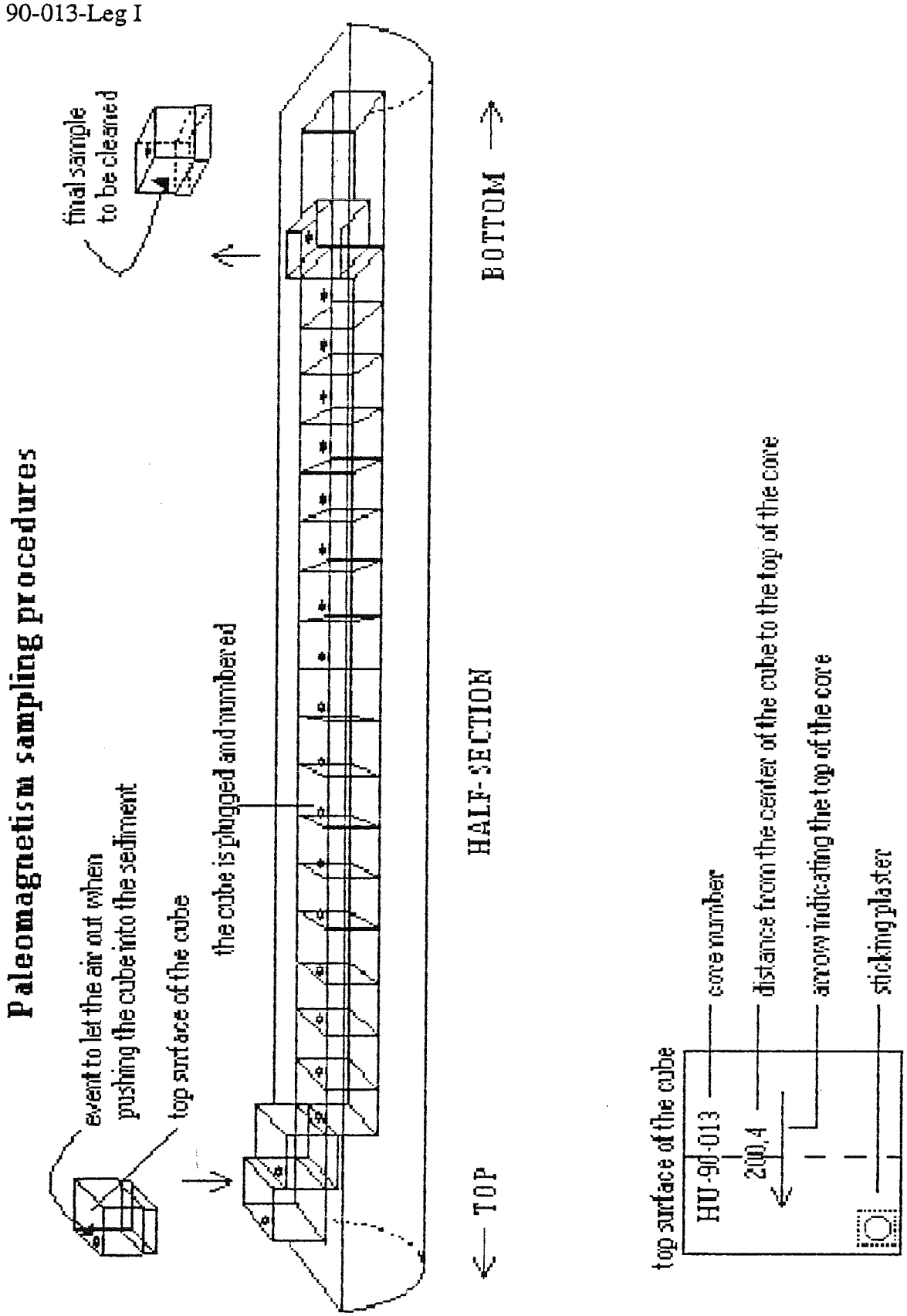


Figure 26: Sampling procedures for paleomagnetic measurents

APPENDIX 2.2. Water sampling procedures

Based on casts with 12 L-Niskin bottles (1 or 2 for surface water; 4 to 6 for deeper water masses).

Scientific objective: to analyse the chemical and isotopic composition of water, dissolved carbon, suspended particulate matter, etc.

Rationale: basic studies of water mass properties and of organic matter composition. [Ref.: Lucotte (1989a), *Can J. Fish. Aquat. Sci.* 46, 59-65; (1989b): *Estuar. Coastal Shelf Sci.* 29, 293-304; Lucotte *et al.* (1990), in print: *Estuar. Coastal Shelf Sci.*].

Sampling objective: to collect for each sample a volume of water allowing all chemical and isotopic analyses to be done; to avoid (when necessary) isotopic exchanges with atmospheric water vapor, or CO_2, during storage; to restrict (when necessary) bacterial activity during storage.

Material needed: Nalgene™ vials (250 ml, 30 ml, 13 ml)
Filters: 0.45 µm; Glass Fiber Filters;
Funnels; vacuum pump (to force percolation through filters when needed);
Hoses; vacuum chamber or oven to dry samples on filters;
Tweezers (to avoid contamination of filters); plastic bags; markers, etc.

Procedures:

2.2.1. *Non filtered water*:

(A) Fill a 250 ml Nalgene™ vial (with hermetic caps) for ^{13}C analysis. Add a few drops of $HgCl_2$ and store at room temperature.

(B) Fill a 250 ml Nalgene™ vial for phytoplankton studies. Add a few drops of Lugol and store at room temperature.

(C) Fill a 30 ml Nalgene™ vial (with hermetic cap) for ^{18}O (and ^{2}H if planned) analysis. Refrigerate.

(D) Fill a 30 ml Nalgene™ vial for PO_4 and NO_3 analysis. Freeze.

2.2.2. *Filtered water on pre-weighted 0.45 µm filters*:

(E) Fill a 30 ml Nalgene™ vial for SiO_2 and NH_3 analysis. Freeze.

(F) Fill a 13 ml Nalgene™ vial for alkali analysis. Add a few drops of HCl (30%) and refrigerate.

(G) For SPM+SiO_2 (biogenic) analysis: poor the sampled water on the filter until the filter is "plugged" and note the volume (generally ≥ 4L). Remove the zooplankton (*e.g.*, copepods) and transfer it on a Glass Fiber Filter. Dry the filters, then store them.

APPENDIX 2.2. Water sampling procedures (Cont'd)

2.2.3. *Filtered water on pre-weighted Glass Fiber Filters*:

(H) Fill a 13 ml Nalgene™ vial for CO_2 analysis. Add a few cristals of $HgCl_2$, close hermetically and refrigerate.

(I) For ^{13}C, ^{15}N and C, H, N, S, analysis: poor water on the filter until it is "plugged" and note the volume (take as much as possible). Remove zooplankton as above and transfer it on another Glass Fiber Filter. Dry the filters.

Note on plankton tow sample processing:

1. Fill 2 x 250 ml Nalgene™ vials; add 5 ml of Formaldehyde (20%) in each. Refrigerate.
2. Fill 2 x 250 ml Nalgene™ vials and freeze.
3. Make sure that the plankton net is carefully cleaned after each use.

APPENDIX 2.3. Box core sampling procedures

Scientific objective: to measure Eh and O_2, to sample pore water and surface sediments, to measure the porosity.

Rationale:
(1) to investigate biogeochemical processes occuring at the water/sediment interface;
(2) to study the early diagenesis of the organic matter;
(3) to sample fossil assemblages, carbonates and organic matter really representative of modern conditions in the water column and in the nearby neritic zones (other coring methods frequently result in the loss of the modern surface sediments).

Sampling objective: to measure Eh and dissolved oxygen as little changed from original values as possible; to extract and "settle" pore water; to avoid further chemical and/or bacterial activity in the pore water samples.

Material needed: "push corers" (pieces of liners) of 1 cm, 7 cm and 15 cm in diameter, with caps; a glove box to process the sub-cores under nitrogen atmosphere; nitrogen tanks and regulators; squeezers for mud with filter holders and tubing attachments; syringes to recover the filtered pore water (see figure); pH meter; probe for dissolved oxygen measurements; hermetic plastic vials; towels; plastic bags; a plastic cutter to slice the sediment; wood blocks -or a jack- to lift the sediment into the liner; plastic film; etc.

Procedures:

01. Holes (2 to 3 mm in diameter) should be drilled longitudinally at 1 cm intervals in one or two plastic cylinders of *ca.* 15 cm in diameter to be used as "push [working] corers"; a plastic tape should be used to plug the holes untill the working core(s) is (are) stored in the glove box (to avoid oxydation).

02. When the box-core is on deck, take a picture of the surface and collect "macros" if any and if needed.

03. Insert rapidly as many "push corers" as needed (ϕ: 1 cm, 7 cm , 15 cm).

04. Collect the first mm of "liquid mud" at the surface of the box core and store it in a numbered vial.

05. Remove the push corers (take the precaution to "secure" the bottom of the core) and protect the 15 cm-working core top and bottom with a plastic film (to restrict Eh changes); transfer the working core in the glove box under N_2 flow.

06. Seal the 7 cm-push corers; one should be labelled for archives and all should be stored in a refrigerator untill further processing as needed; subsample the 1 cm-diameter push core at 1 cm intervals; transfer each 1 cc sample in centrifuge tubes containing some $HgCl_2$; refrigerate for further bacterial counting.

07. All other operations will be done in the glove box; most sampling operations will be made with plastic tools (to avoid sample contamination).

08. Use the drilled holes at 1 cm intervals to measure Eh and dissolved oxygen profiles (a 2 mm in diameter platinium wire -of a few cm in length- should be introduced as deeply as possible in the working core for Eh measurements; note that artefacts may often occur when introducing the O_2 probe in the holes; the electrodeis ofen too short to penetrate deeply into the sediment).

09. By using the wood blocks (or the jack), lift progressively the working core out of the liner in 1 cm steps.

Box core sampling procedures (Cont'd)

10. At 1 cm intervals: (1) collect 1 cc for amino-acid studies, store the sample in a pre-numbered vial; at the end of sampling operations in the glove box, these will be kept frozen; (2) collect 30 cc for micropaleontological studies in an appropriate pre-numbered vial to be refrigerated later on; (3) collect 2 cc for porosity measurements and store as appropriate.

11. Take as much as possible of each 1 cm-thick slice of sediment by using a plastic cutter, avoid to tuse the possibly contaminated outer ring of the core; transfer the sediment into the pre-set (with filters) sample-squeezer, close it; when all squeezers are filled and closed, transfer them on the squeezer rack.

12. Further processing takes place on the rack; set the sample squeezers in place and plug tubings and syringes; start squeezing; rince the syringes with the first cc of pore water recovered and put them back in place; squeeze again until maximum volume of pore water is recovered.

13. Subsample pore water in Nalgene™ vials:
    - 10 ml for U isotope measurements, add 0.5 ml of HCl (30%);
    - 6 ml for Total Inorganic Dissolved Carbon -TIDC-studies (ΣCO_2 & ^{13}C), add $HgCl_2$ (powder);
    - 4 ml for alkali, add $HgCl_2$ (powder);
    - 3 ml for Ca^{2+} and SO_4^{2-};
    - 5 ml for Fe^{2+} & Mn^{2+}, add 0.5 ml of HCl (30%);
    - 2 ml for dissolved organic carbon -DOC- in a centrifuge tube to store frozen;
    - 15 ml for nutrient studies, freeze;

14. Store squeezed sediments in plastic labelled bags and freeze.

15. Clean carefully all equipments and set everything back in place for next box coring operation.

16. The above procedures for a 30 cm-box core may take about 7 hours. Therefore, box-coring operations should be realized at time intervals allowing to process each of them rapidly (and to avoid storage before processing).

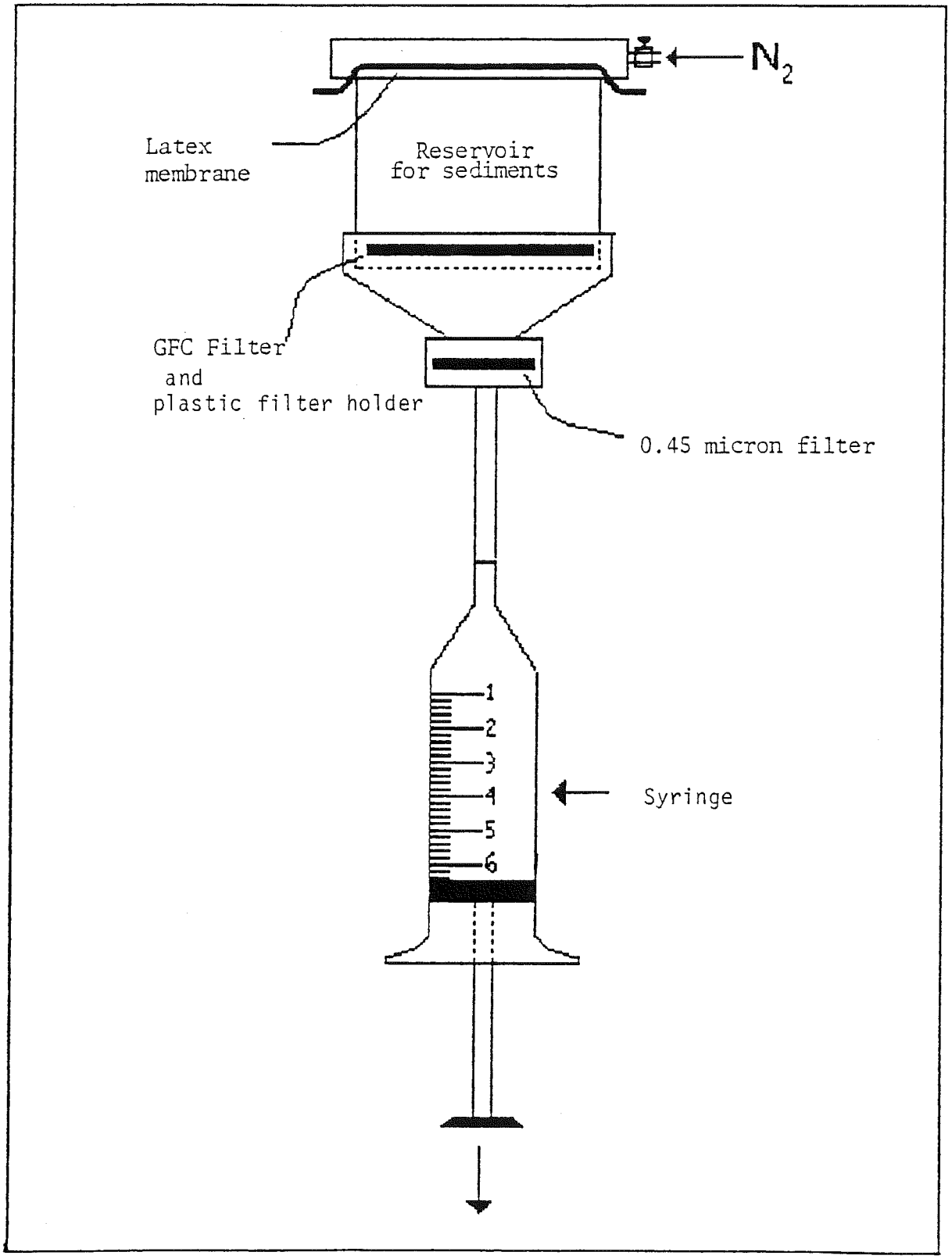


Figure 27: Box-core studies (squeezing equipment)

APPENDIX 2.4 Long Piston- and Trigger Weight core sampling procedures

Scientific objective: High resolution studies of (1) sedimentary petrology, (2) micropaleontological assemblages, (3) elemental and isotope geochemistry.

Rationale:
(1) to set a a stratigraphy (litho-, eco-, and isotope stratigraphy...)
(2) basic studies of paleoceanographical/paleoclimatic changes;
(3) assessment of carbon paleofluxes and paleobudgets,paleoproductivity studies;
(4) investigations on the behaviour of a few elements or isotopes in relation to paleoceanographical changes; diagenetic processes, etc.[Ref.: Hillaire-Marcel *et al.* (1990): *Geology* 18: 162-165; see also papers in *Proc. Ocean Drilling Progr.* 105, part A (1987) & B (1989), Srivastava, Arthur & Clement, eds.; Hillaire-Marcel & de Vernal (1989): *Géogr. phys. Quaternaire* 43 (3): 263-290.].

Sampling objective: to sample sediments as undisturbed as possible and to avoid contamination;

Material needed:

Centimetric tape	Cutting blades (use the AGC cutter preferably)
Spatulas (plastic)	Permanent markers
Plastic vials and bags	Paper towels, etc.

Pre-sampling procedures:

01. Check apparent penetration marks on the corer.

02. When the corer is secured along deck, insure proper identification (A-C, C-E, E-G, etc.) and orientation (Top-Bottom) of 3m-segments during disassembling operations (including "declination" of each 3 m-liner *vs* its neighbours/longitudinal mark); cut the mud with a blade (preferably in plastic) between the barrels; and secure carefully the liners with caps and electrical tape before transportation to the cold room or to the laboratory; repeat the operation until there is no sediment left in the corer; cut the empty part of the top liner and secure the section.

03. Recover the sediments in the core cutter, try to store them as a small oriented core in a PVC- craddle, otherwise put what is found in a bag, label and seal; .

04. Recover the sediments in the core catcher, put them in a labelled bag.

05. Cut each 3 m-segment into *ca.* 1.5 m sections; secure; complete the labelling of each section (B, D, F, etc. tags); see figure.

06. Store sections into the cold room until further processing; wax the section ends when the core is not to be opened within the next 72 hours.

07. If by mistake any mud falls out from a liner, recover it, eliminate the contaminated part and store the balance in a labelled bag; take note in the log book (this may unfortunately happen during deck processing operations of the core).

Sampling procedures:

08. Sample preferably sections in stratigraphic order (from top to bottom of the core, *i.e.*, from the upper section "N" to "A", then to core cutter).

Long Piston- and Trigger Weight core sampling procedures (Cont'd)

09. Secure each section on the cutting-rack and insure that the cut will be made along the orientation (declination) mark on the liner; to cut the liner, use preferably the AGC-cutting bench (if available), otherwise, an electric saw; be careful during further operations (the liner has lost its rigidity).

10. Cut the mud with a thin metallic wire (piano wire) or with an electrical knife; stick a centimetric tape along each half-section; put numbers on both tapes from top to bottom; insure to carry on the ordinate depth s.b. (in cm), from one section to the next.

11. One of the half-sections ("archive-section") is used for description and photographied immediately (to avoid changes in colour due to oxydation); then, after appropriate labelling, it is carefully wrapped (a plastic film should be placed on the mud surface; then the section is introduced in a plastic sleeve tightly taped at both ends and finally stored in a D-(rigid)-tube, with caps taped with electrical tape); a good precaution against dehydration is to put a wet paper towel in the D-tube before closure; insure appropriate labelling of the D-tube for AGC archives.

12. The description (texture, structure, color/Munsell chart, smell, $CaCO_3$ content, bioturbations, drop stones, etc.) should be reported on appropriate sheets provided by AGC.

13. The working half should be subsampled as soon as possible (to avoid dehydration) as required for further studies. On a routine basis, sampling should be as follows:

    - set a continuous track of plastic cubes for paleomagnetic measurements (as in appendix 2.1.);
    - for next steps, insure to clean the mud surface by removing a thin layer of sediments (which may have been "contaminated during cutting operation);
    - at 10 cm intervals, triple the cubes (one control sample to keep refrigerated; one sample for Th/U disequilibria studies);
    - at 10 cm intervals, sample as much sediment as possible in 2-cm thick layers (avoid to sample the outer 1 to 0.5 cm-ring of the half core which was contaminated during corer penetration in the deep sea sediments); take 1 cc in a plastic bag to be frozen for further organic carbon studies; fill 1 (2 if possible) 33 cc-plastic can with hermetic covers; label all samples as appropriate and report sample numbers and detailed information in the log book; the 33 cc (or more) samples will be used for sedimentary petrology, routine geochemistry and micropaleontological studies; they should be stored in a refrigerator.

14. Fill hollows in the working section with pieces of foam to avoid mixing of the sediments in the liners during further handling and storage operations.

15. Wrap carefully the working half-section as in [11] above and label the host D-tube. Store it into a cold room until final storage by AGC personnel.

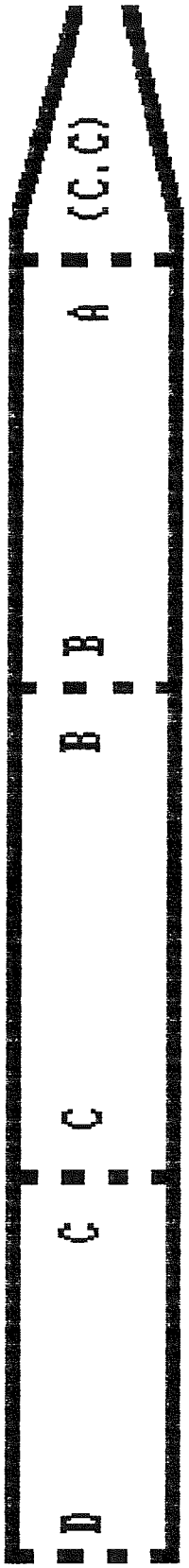


Figure 28: Numbering core sections