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1-CRUISE SUMMARY

CRUISE NUMBER: *91-045* **SHIP**: *CSS-Hudson*

DATES: *Oct. 14 (Goose Bay, Labrador-NFL) - Nov. 8 (St. John's, NFL)*

CRUISE TITLE: *Leg 1/The Labrador Sea (NSERC-CSP)*
Leg 2/NW North Atlantic (NADW-Project)

SPONSORING AGENCIES:

Leg 1: *NSERC-CSP Project (UQAM, McGill, AGC)*
Paleoproductivity of the Labrador Sea
Leg 2: *Chair of Environmental Sciences & GEOTOP (UQAM)*

STAFF: Master: *Captain L.A. Strum*
Senior Scientist: *Pr. C. Hillaire-Marcel (UQAM)*
Assistant Senior Scientists: *Dr. A. de Vernal (UQAM)/Leg I*
Dr. R. Stevenson (UQAM)/Leg II

AREAS OF OPERATION:

(1) CSP-Project: Greenland slope transect (off Cape Farewell)
Labrador slope transect (off Hamilton Bank)
(2) NADW-Project: NW North Atltntic basins (Labrador, Irminger and Iceland)

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) NADW-Project: Identification of geochemical tracers of modern- and paleo-NADW (North Atlantic Deep Water current) in water and sediments

TYPE OF DATA COLLECTED:

(1) Survey lines: 12 kHz, 3.5 kHz
(2) Water samples, CTD profiles
(3) Box cores, L-Piston cores and LeHigh cores
(4) Van Veen grab samples

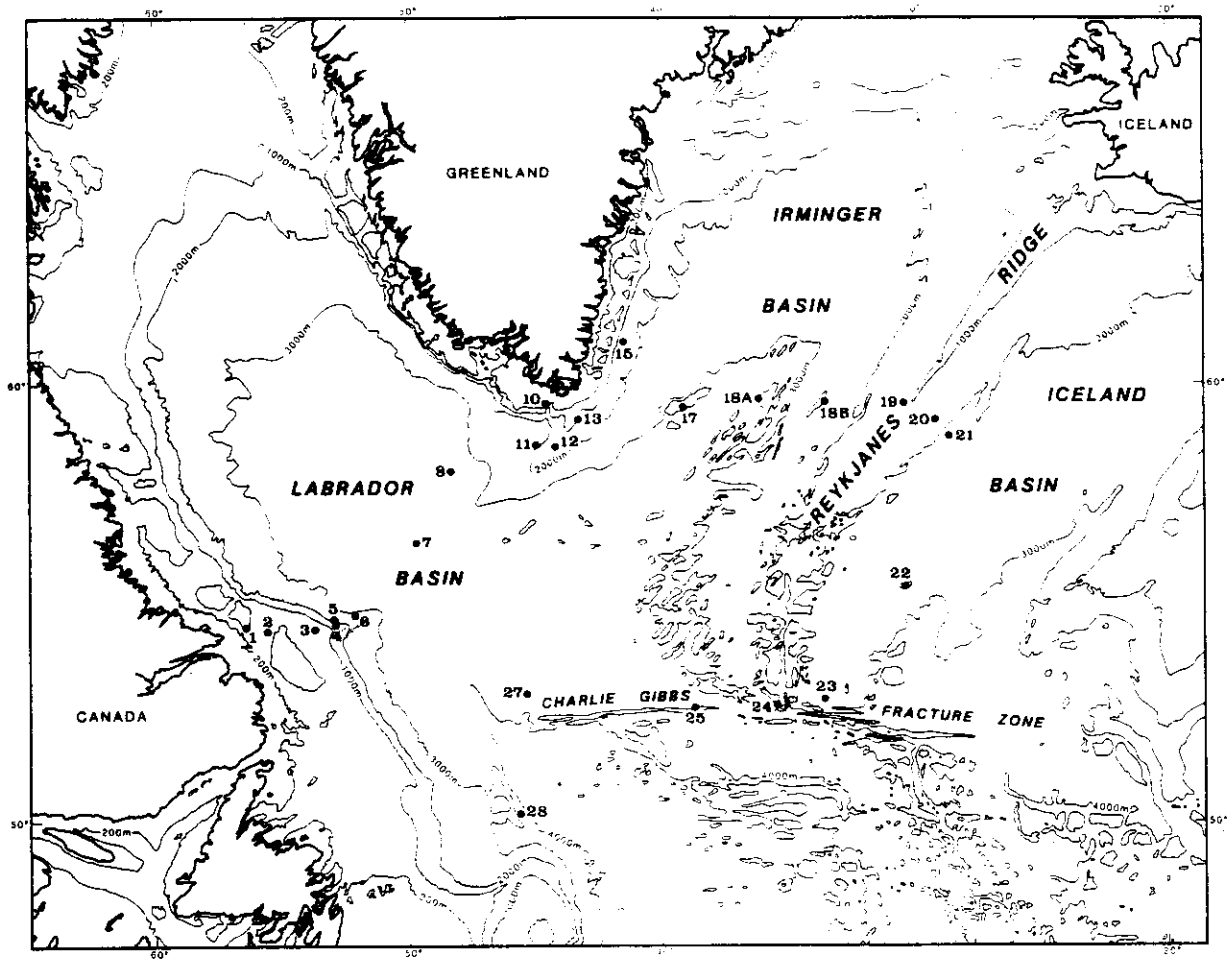

Figure 1: Sketch map of working areas during cruise 91-045.

2-SCIENTIFIC STAFF

2.1. On board scientists

René Canuel
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2.2.-On shore participants

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Jiali Gong
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Nuno Machado
researcher, GEOTOP-UQAM
Stephen Macko
professor, U. Virginia
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Alfonso Mucci
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David Piper
researcher, AGC

3-SCIENTIFIC OBJECTIVES

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

3.1.1. Project summary

Defined in 1987, this project addresses primary questions highlighted by the Canadian Committee for the *Joint Global Ocean Flux Study* (JGOFS). Its major objectives are to define the relationships between (1) climatic fluctuations, notably at the time scale of the glacial/interglacial transition, (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, geophysics, 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, ^{230}Th and ^{231}Pa excesses and U/Th ratios in sediments, etc.). Sedimentation rate changes are delt with current methods (^{14}C-AMS, ^{18}O-stratigraphy, secular paleomagnetic variations...) and with seriated measurements of U & Th isotope disequilibria. These simultaneously account for changes in sedimentation rates, for fluxes of organic carbon at the water/sediment interface (^{230}Th and ^{231}Pa excesses) and for organic activity-redox fluctuations in the surface sediments (^{238}U-uptake).

Work is done on modern water masses and particulate matter, and on box- and piston cored sediments from 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. The present cruise 91-045 complements previous sampling campaigns, notably cruise 90-013. 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 related elements or isotopes 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 second year campaign (Cruise 91-045)

In the original project, six on-shore/off-shore transects in the Labrador Sea basin were planned. Delays in ship-time allocation for this project and difficulties to find appropriate coring sites on the slope resulted in the decision to focus the sampling campaign 91-045 on two major transects (off Cape Farewell and off Hamilton Bank) which were also suitable sampling areas for the NADW-Project (see below). The tasks planned for the cruise included seismic surveying, CTD-measurements, water and particulate matter sampling, box- and piston coring at 4 or 5 sites along the transects (figure 1).

3.2. The NADW-Project

3.2.1. Project summary

Geochemical studies by Boyle and Keigwin (1987), Duplessy et al. (1988), provide evidence that the pattern of deep circulations in the North Atlantic was quite different during glacial times than at present. On these grounds, Broecker and Denton (1989) concluded that the great deep salty current originating from North Atlantic (the North Atlantic Deep Water current -NADW-) and ventilating the world oceans, was "greatly weakened or perhaps even non existent during glacial time". The present project aims at verifying this assumption from measurement of a few trace elements and isotopes in benthic foraminifers from deep sea cores from North Atlantic marginal basins which are thought to "label" water masses. The working hypothesis is that the deep Greenland and Labrador sea waters, i.e., the "immature" NADW, should be characterized by isotopic or elemental imprints allowing to distinguish it from the upper water masses. Indeed, Nd-isotopic composition of seawater differs between the major oceans, but it also differs "vertically" in each basin, notably in the North Atlantic where the proto-NADW shows a clear signature (Piepgras and Wasserburg, 1980, 1987). Other rare earths are likely to leave also an imprint in deep water masses as a consequence of variable and fractionated fluxes from the sediments (e.g., Sholkovitz et al., 1989). Similarly, lead isotopes (Pb has an oceanic residence time comparable to that of Nd; see Elderfield and Greaves, 1982) are potential tracers.

As a second step, it is considered that benthic foraminifers preserve an imprint of the bottom water geochemical properties in their shell provided that they are carefully cleaned (Boyle, 1981). As a matter of fact, Palmer and Elderfield (1985) measured εNd values in foraminiral calcite from core top sediments allowing them to spot the increased supply of mantle-derived Nd in samples from Iceland vicinity waters (see also Shaw and Wasserburg, 1985). Similarly, Palmer (1985) concluded that rare earth patterns in foraminiferal calcite could be used as paleoceanographical tracers. In spite of technical difficulties (α-counting) and very low "authigenic" U-concentration (about. 0.02 ppm) in such shells, Delaney and Boyle (1983) showed that this uranium could also be differentiated from that originating from detrital sources. More recently, Kegwin (1987) and Boyle and Kegwin (1982, 1985, 1987) used Cd/Ca ratios in foraminifers to reconstruct deep circulation patterns

From these considerations, our research steps are:
(1) to characterize the modern deep water masses (NWABW, NEADW, "immature" NADW, LSW) by their Pb, U, Nd, rare earths, Cd isotopic composition and/or concentrations;
(2) to determine the water mass geochemical imprints in benthic foraminifers from box-cores collected at water depth ranges representative of the various water masses;
(3) to compare the trace and isotope composition of these modern shells with those of foraminifers, from piston cores, representative of the last climatic sub-cycle (ca. 30,000 yrs), notably with those formed during the last glacial maximum (at ca. 18,000 BP).

The final objectives are (1) to constrain the absence of an "immature" NADW in the Labrador Sea basin during the last glacial maximum, (2) to put time constraints on its re-setting at the isotopic stage 2/1 transition; (3) later on, to evaluate its "excursions" in the basin during the last climatic cycle. The monitoring of the deep Labrador Sea water throughout the late Quaternary should give an insight into major paleoceanographical changes in relation to climatic fluctuations.

A final point which deserves consideration is the advantage of the Labrador Sea, compared to the North Atlantic itself, to conduct such a study. First, the deep water masses are still "immature" in this basin and should have a much clearer geochemical signature than that observed at the real "outlet" of the proto-NADW, east of the Grands Banks, and along its southward trajectory (e.g., Piepgras and Wasserburg, 1987). An expanded imprint of paleoceanographical changes in benthic foraminifers may therefore be anticipated. Second, this basin shows very high sedimentation rates (de Vernal et Hillaire-Marcel, 1987) allowing high resolution studies to be performed: the "smoothing effect" on geochemical records due to bioturbations, is negligible there; moreover, the biogeochemical reactions at the water/sediment interface (redox potential gradients) do not superimpose their imprint on much older sediments as it is the case elsewhere [a good example can be found by comparing data from Thompson et al. (1990) with those of Hillaire-Marcel et al. (1990)]. Third, the Labrador Sea/North Atlantic frontier, between ca. 500N and 600N, is a critical area to investigate oceanographical changes due to Arctic/Subarctic boundary fluctuations; the Labrador Sea basin may have likely been at the unique source for a proto-NADW during glacial maximums.

3.2.2. Sampling strategy

Cruise 91-045 was designed to allow sampling of water masses and deep sea sediments along the immature NADW trajectory, i.e., in the Irminger and Iceland basins, along the Charlie Gibbs fracture zone (Leg 2), and within the Labrador Sea basin (Leg 1), along the two on-shore/off-shore transects of the CSP-project, respectively off Cape Farewell and off Hamilton Bank.

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4-GRADUATE & POST-DOCTORAL RESEARCH TOPICS INVOLVED

Anasse Jenane (M Sc/PhD; with C. Hillaire-Marcel)
^{210}Pbfluxes in marginal basins off eastern Canada
Nadia Kassou (MSc; with C. Hillaire-Marcel)
^{13}C content of foraminifer linings/carbonate dissolution in Davis Strait area
Jack Kugelmass (PhD; with M. Lucotte & A. Mucci)
To be determined
Martine Lapointe (PhD; with A. de Vernal)
Diatoms/temperature-salinity transfer function in transitional environments off eastern Canada
Laurent Londeix (PDF; with A. de Vernal & C. Hillaire-Marcel)
Isotopic composition of dinocysts in NW Atlantic basins
Patrick Louchouarn (PhD; with M. Lucotte)
To be determined
André Rochon (PhD; with A. de Vernal)
Paleoceanography of North Atlantic (60th parallel) from dinocyst/temperature-salinity transfer functions
Joseph Stoner (PhD; with J.-C. Marescal & J. Channel)
Secular magnetic variations and remanent magnetism acquisition in surface sediments in marginal basins off eastern Canada
Sylvain Vallières (PhD; with C. Hillaire-Marcel)
High resolution studies of Th/U isotopes in deep sea sediments/paleoproductivity indicators
Guo-Ping Wu (PDF; with C. Hillaire-Marcel)
^{14}C activity of benthic *vs* planktonic foraminifers and residence time of carbon in the Labrador Sea basin
Yang Yong-Liang (PDF; with C. Hillaire-Marcel & R. Hesse)
^{231}Pa and ^{230}Th excesses in surface sediments down Labrador Slope: origin of turbidites
Guy Bilodeau (PhD; with C. Hillaire-Marcel & A. de Vernal)
Carbon fluxes at the water/sediment interface in deep Labrador Sea from benthic foraminifer production and isotopic composition
Jiali Gong (PhD; with C. Hillaire-Marcel & A. Mucci)
Paleoceanography and isotope startigraphy (planktonic foraminifers) off eastern Canada

5-ITINERARY

From the departure at Goose Bay (Labrador, NFL) on Oct. 14 (a.m.), until the 7 th of November (p.m.), when the *CSS-Hudson* reached St. John's (NFL), the total distance steamed amounted to about 6000 km.

After leaving Goose Bay, the Ship sailed eastward (off Hamilton Banks). Scientific operations there consisted of seismic surveying along an on-shore/off-shore transect trending WSW-ENE and sampling at 6 sites (1 to 6) along the transect at water depths varying from about 200 to 2700 m.

From there, the Ship sailed NNE and started a seismic line across the NAMOC and the Greenland Rise. Two Sites were partly sampled on the way (Sites 7 and 8). Down the Greenland slope, SW of Cape Farewell, three on-shore/off-shore transects, trending parallel, were surveyed. The two westernmost ones (of higher scientific priority) revealed unsuitable for coring (3.5 kHz records indicate that sediments accumulate essentially at depths greater than 2500/2800 m on the SW Greenland Slope). The easternmost transect, along the Eirik Ridge was the least convenient to address the scientific problems of the NSERC-CS-Project (Paleoproductivity of the Labrador Sea) but revealed suitable for coring. Sites were found at depths of about 2000, 1600 and 1000 m (11 to 13).

Being one day behind schedule at the starting point of Leg 2 (NADW-Project), E of Cape Farewell, it was decided to do minimum work at the three first sites (14 to 16) of a lesser priority, in order to return to the original plan. Further sampling sites were selected along a W-E transect across the Irminger Basin and the Rekjanes Ridge at the latitude of about 59°N (Sites 17, 18 A & B, 19, 20 A & B) and at water depths of about 3000 m (17 & 18 A), 2000 m (18 B), 1300 m (19), 900 m (20 A), 1550 (20 B).

From there, the Ship sailed southward and 2 sites were selected in the Iceland Basin at depths of about 2200 and 2900 m (Sites 21 and 22). Then, a transect trending E-W was done along the northern edge of Charlie Gibbs fracture zone with three working stations at a depth of about 3000 m, located on both sides and in the central part of the Ridge.

The last two sites were selected at a longitude of about 45°50, i.e. at the transition between the Labrador Sea and the North Atlantic Ocean, respectively at the southern margin of the Gloria Drift (27) and E of the Orphan Knoll (28).

6-SCIENTIFIC ACCOMPLISHMENTS

The cruise program involved relatively long steaming times between transects or sites. Nevertheless, the work has been intensive with overnight stations for water sampling and daylight operations for coring. Twenty-seven sites had been preselected to meet the objectives of the two research projects involved. Four of them were cancelled for various reasons (low priority, unsuitable bottom conditions for coring...) but three ad hoc sites were added. At most sites, the program included (1) CTD casts to identify the water masses present, (2) large volume sampling of up to 10 water masses (very often with two or three distinct sampling protocols), (3) box-coring, (4) trigger-weight- (TWC) and long piston coring (LPC). As may be seen in Table 1, the success rate for sampling operations varies from 50 to 100%. Equipment failures account for all unsuccesful operations. It seems likely that some of the objectives of the NSERC Collaborative Special Project will not be encountered, but all the material needed to address the scientific issues of the NADW Project has been recovered. Both from this view point and from that of the quantity and quality of the samples recovered, this was a fruitful campaign.

6.1. NSERC-CSP

Along the Labrador Slope transect, almost 100 % of the objectives were achieved. Waters and sediments were recoved from shallow sites, on the shelf, down to the edge of the slope. When casts failed due to technical difficulties with the Long Piston Corer (see below), second tries happenned to be successful. Unfortunately, a much lesser success was achieved on the SW Greenland transect. Difficulties to find shallow water sites for coring, within the short survey time available for this transect, and failures of casts (4 out of 6) resulted in a poor recovery. By adding the material already available from cruise 90-013, the NSERC-CSP research group may however address some of the scientific issues highlighted in the project.

6.2. The NADW Project

Most sampling sites which revealed successful are located along the trajectory of the various currents at the origin of the North Atlantic Deep Water. Therefore, the sampling objectives have been met with respect to this project. About 114 large volume samples of water masses are available to investigate the Nd labelling of each of these currents. Water/sediment interfaces are also available for the most important sites (about 18). They will allow to identify geochemical imprints of the modern deep water masses on recent biogenic carbonates and fine particles. Finally, long cores should permit to investigate changes in these geochemical indicators through time, in response to varying deep oceanic circulations.

6.3. Bathymetric & seismic records

During transits between sites, bathymetric recordings were obtained. They represent some 25 survey lines. Their lengths vary from 70 to 426 km, for a total of about 5570 km (see track charts in appendix 1). Of a lesser quality, but still useful in most cases, 3.5 kHz records were also obtained along the same transects.

TABLE 1: SUMMARY OF RECOVERIES AT SITES

SITE NUMBER	WATER COLUMN CTD	P1	P2	P3	INTERFACE BX	LH	VV	SEDIMENTS TWC*	LPC*	COMMENTS
Labrador Slope Transect										
1	+	+	+	+	+			171	876	
2	+		+	+	+					
3	+		+		+					
4	+		+		+			169	619	
5	+				+			153	454	
6	+	+	+	+	+			225/171	F/1135	2nd cast successful
7	+	+	+	+	+			49	F	
SW Greenland Transect										
8	+		+	+						
9	----------				cancelled			----------		
10	+	+	+	+			+			
11	+	+	+	+	F/F			20	1457	Eirik Ridge
12	+	+	+	+	F	+		20	F	Eirik Ridge
13	+	+			+			void	617	Eirik Ridge
Irminger Basin Transect										
14	----------				cancelled			----------		
15	+		+	+				void	F	
16	----------				cancelled			----------		
17	+		+	+	+			void	637	
18 A	+		+	+	+			80	987	
18 B	+		+	+	+			186	1013	Unscheduled site
Rekjanes Ridge Transect										
19	+		+	+	+			206	1164	
20 A			+	+		F				Unscheduled site
20 B			+	+		+				
Iceland Basin										
21	+		+	+	+			222	1816	
22	+				F			218	1350	
Charlie Gibbs Fracture Zone Transect										
23	+		+	+	F/F	+		200	1735	
24								F	1740	Loss of the TWC
25	+		+	+	+			169	1135	
26	----------				cancelled			----------		
27	+		+	+	+			~200	~1200	
SE Labrador Sea										
28	+				+			~130	~1100	Unscheduled site
Success (%)	100	50	75	100	60			60	65	

P1, P2, P3: Water sampling protocols (see appendix)
BX: Box core; LH: LeHigh core; VV: Van Veen grab
F: Failed
*: Core length (cm)
Site numbers as in figure 1.

6.4. On board studies

Details of on-board sub-sampling procedures can be found in the appendix. Redox potentials were measured for all box-cores (1 cm intervals) and a few TW or LP cores, and magnetic susceptibility was measured at 5 cm intervals for all cores. Results can be found in the sample description sheets by station numbers (second part of the report).

Some 100 analyses of phosphates, nitrates and nitrites in water were performed on board. Due to instabilities in the power supply, the autoanalyser did not work as expected. These measurements will have to be duplicated on shore.

6.5. Failures and difficulties

Some problems were encountered as a consequence of the underestimation of the time needed for water sampling on station. Time slots of about 4 h/site were planned. At most sites, the actual water sampling time varied from 8 to 10 hours. As a consequence, site surveys had to be reduced to minimum. This has not resulted in difficulties to find appropriate coring sites, except for the SW Greenland Rise, as stated above.

The team in charge of water sampling operations on board faced major problems. Among them, the loss of more than 2/3 of its gear when the hydrographic wire broke, on two occasions, put more constraints on the sampling program. Furthermore, the failure of the centrifuge needed to recover particulate matter (due to strong rolling) and of the autoanalyser (due to power supply instabilities) added to the difficulties.

With respect to coring operations, two distinct problems were encountered. The first one concerns the long coring device. On 4 occasions out of the first 11 casts, the corer was recovered empty with the piston "jamed " in the core catcher. By reducing the screw aperture of the piston, the problem was apparently solved as may be concluded from the fairly good cores obtained during the last two weeks of the cruise. Similarly, difficulties were encountered with the box coring device for deep water casts during the second and third weeks. They were due to pre-tripping. A remote control of the triggering mecanism would have certainly helped.

Finally, minor difficulties arose from the lack of expertise of the team, e.g., in seismic instrumentation or coring devices, due to the absence of AGC technicians on board, except for a navigation technician. Thanks are due to the Ship's personnel for its experience which very often helped to solve these difficulties. The deck crew and the boatswain in particular were very helpful.

7. SITE LOCATION, STATION PATTERN AND SAMPLE SHEETS

Tracks and seismic lines 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 operations are sketched below .

7.1. Summary list

Site number (see Fig. 1)	**Station number**	**Type of operation**
#1	91-045-001	CTD
	91-045-002	Water sampling
	91-045-003	Van Veen grab
	91-045-004	Surface water sampling
	91-045-005	Box coring
	91-045-006	TWC & P coring
#2	91-045-007	CTD
	91-045-008	Box coring
	91-045-009	Water sampling
#3	91-045-010	CTD
	91-045-011	Water Sampling
	91-045-014	Box coring
#4	91-045-012	CTD
	91-045-013	Water sampling
	91-045-015	CTD
	91-045-016	Box coring
	91-045-017	TWC & P coring
#5	91-045-021	Water sampling
	91-045-022	CTD
	91-045-023	Box coring
	91-045-024	TWC & P coring
#6	91-045-018	Box coring
	91-045-019	CTD
	91-045-020	TWC & P coring
	91-045-021	Water sampling
	91-045-025	TWC & P coring
#7	91-045-026	CTD
	91-045-027	WAter sampling
	91-045-028	Box coring
	91-045-029	TWC and P coring
#8	91-045-030	CTD
	91-045-031	Water sampling
#9	No station	

#10	91-045-032	CTD
	91-045-033	Van Veen grab
	91-045-034	Water sampling
#11	91-045-035	Water sampling
	91-045-036	CTD
	91-045-037	Box coring (pre-triping twice)
	91-045-038	TW and P coring
#12	91-045-039	TW & P coring (void)
	91-045-040	Le-Heigh
	91-045-041	CTD
	91-045-42	Water sampling
#13	91-045-043	Box coring
	91-045-044	TW & P coring
	91-045-045	CTD
	91-045-046	Water sampling (surface)
#14	No station	
#15	91-045-047	CTD
	91-045-048	Water sampling
	91-045-049	TW & P coring (void)
#16	No station	
#17	91-045-050	CTD (void)
	91-045-051	Box coring
	91-045-052	TW & P coring
	91-045-053	Water sampling
#18 A	91-045-054	TW & P coring
	91-045-055	CTD cast
	91-045-056	Box coring
	91-045-057	Water sampling
#18 B	91-045-058	TW & P coring
	91-045-059	CTD cast
	91-045-060	Box coring
	91-045-061	Water sampling
#19	91-045-062	CTD cast
	91-045-063	Box coring
	91-045-064	TW & P coring
	91-045-065	Water sampling

#20 A	91-045-066	Van Veen grab sampling
	91-045-067	Water sampling
#20 B	91-045-068	Le High coring
	91-045-069	Surface water sampling
#21	91-045-070	CTD cast
	91-045-071	Box coring
	91-045-072	TW & P coring
	91-045-073	Water sampling
#22	91-045-074	TW & P coring
	91-045-075	CTD cast
	91-045-076	Box coring
#23	91-045-077	CTD cast
	91-045-078	Water sampling
	91-045-079	Box coring
	91-045-080	TW & P coring
	91-045-081	LeHigh coring
#24	91-045-082	TW & P coring
#25	91-045-083	CTD cast (failed)
	91-045-084	Box coring
	91-045-085	TW & P coring
	91-045-086	CTD cast (2)
	91-045-087	Water sampling
#27	91-045-088	CTD cast
	91-045-089	Water sampling
	91-045-090	Box coring
	91-045-091	TW & P coring
#28	91-045-092	CTD cast
	91-045-093	Box coring
	91-045-094	TW & P coring

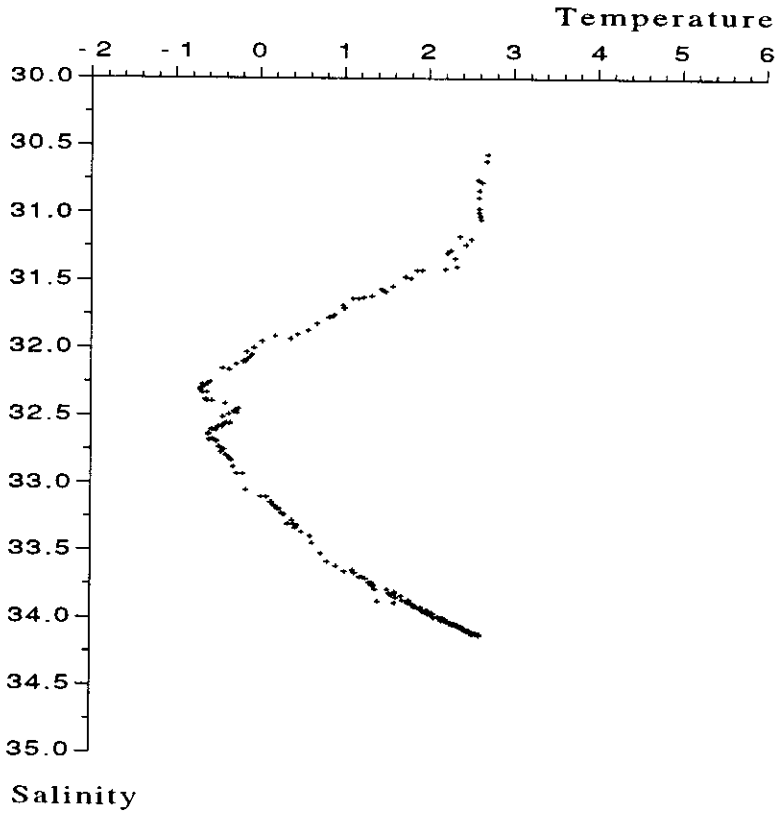
HU-91-045-001: CTD

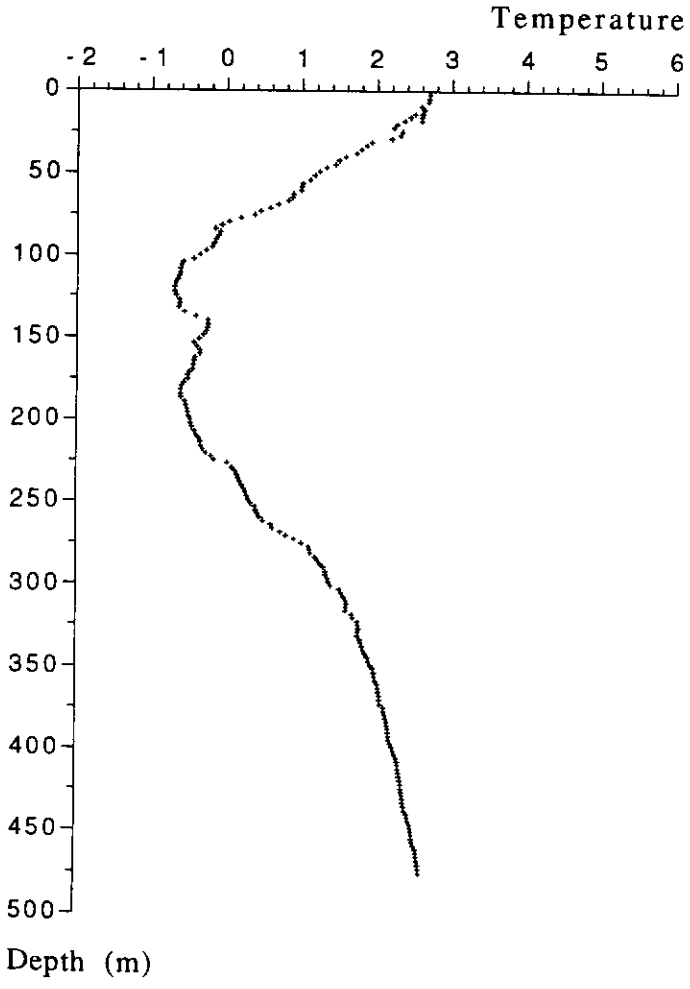
Julian day:	288	GMT Time:	04:07
Latitude:	54°42.40 N	Longitude:	56°26.97 W
Water depth:	588 m		
Location:	Labrador shelf		

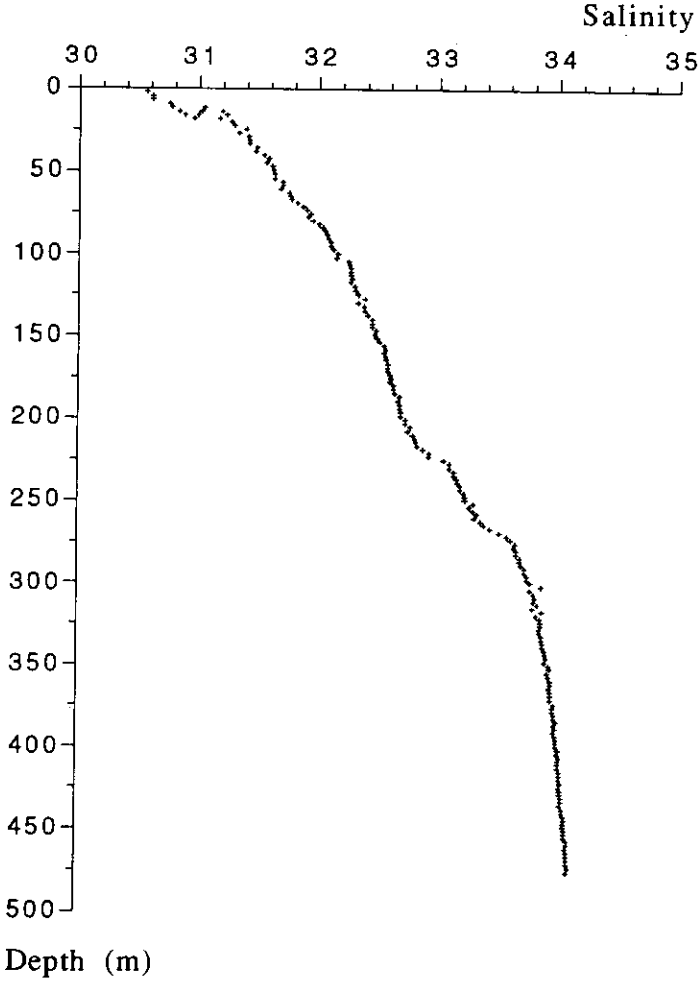
See figure 2, next page.

Figure 2: CTD cast

Cruise Number : HU-91-045
Site Number: 1
Station Number: 001
Location: Labrador Shelf
Julian Day: 288
GMT: 04:07
Water Depth: 588 m
Latitude: 54° 42.40'
Longitude: 56° 26.97'







HU-91-045-002: Water sampling

Julian day:	288	GMT Time:	05:32
Latitude:	54°42.23 N	Longitude:	56°26.45 W
Water depth:	588 m		
Location:	Labrador shelf		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocols 1 + 2)

Depth interval sampled: 380-450 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A1	3 L
GN6-A2	3 L
GN6-A3	10 L
GN6-A4	12 L
GN6-A4	6 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A3	16 L
A1	12 L
A2	14.8 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analyses or to store in freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Centrifugation for particulate matter subsampling (protocol 2)
Centrifugation of 180 L of water to concentrate the particulate suspended matter:
3 subsamples are frozen in tubes; 1 is dried in tube.

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses respectively at the following water depths:
- 5 m
- 150 m
- 380 m

HU-91-045-003: Van Veen grab

Julian day:	288	GMT Time:	09:33
Latitude:	54°42.45 N	Longitude:	56°26.82W
Water depth:	523 m		
Location:	Labrador shelf		

Description: sediments consist of brownish gray mud with macrofauna (worms).

Sampling: surface sediments (*ca.* 100 cc.) in a vial.

HU-91-045-004: Water sampling

Julian day:	288	GMT Time:	09:33
Latitude:	54°42.45 N	Longitude:	56°26.82W
Water depth:	523 m		
Location:	Labrador shelf		

Sampling: sampling of surface waters with a peristaltic pump for centrifugation and subsampling of particulate suspended matter.

HU-91-045-005: Box coring

Julian day:	288	GMT Time:	11:51
Latitude:	54°42.47 N	Longitude:	56°26.96 W
Water depth:	530 m		
Location:	Labrador shelf		

Penetration: 42 cm

Description: Surface sediments (0-2 cm) are dark olive gray (5Y3/2) sandy-silty mud.
Sub-surface sediments (2- 42 cm) consist of dark gray (5Y 4/1) silty mud heavily bioturbated (blackish motteling)

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
4 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 10 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

<u>On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:</u>

1. Redox potential measurements (figure 3, p. 23)

Depth (cm)	Eh	depth (cm)	Eh	depth (cm)	Eh
0-1	21	10-11	-113	20-21	-187
1-2	-43	11-12	-168	21-22	-100
2-3	-43	12-13	-138	21-22	-121
3-4	-27	13-14	-176	22-23	-78
4-5	-16	14-15	-221	23-24	-107
5-6	-43	15-16	-231	24-25	-123
6-7	-62	16-17	-229		
7-8	-62	17-18	-233		
8-9	-66	18-19	-191		
9-10	-66	19-20	-174		

HU-91-045-005: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-1	X	X	209
1-2	X	X	211
2-3	X	X	215
3-4	X	X	217
4-5	X	X	221
5-6	X	X	222
6-7	X	X	224
7-8	X	X	227
8-9	X	X	232
9-10	X	X	233
10-11	X	X	234
11-12	X	X	238
12-13	X	X	240
13-14	X	X	242
14-15	X	X	245
15-16	X	X	250

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (4 x 2 ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	5	X	5	3	---	---	---
2-4	5	X	5	8	5	---	---
4-6	5	X	5	8	3	---	---
6-7	5	X	5	7	---	---	---
8-10	5	X	5	8	---	---	---
10-12	5	X	5	4	---	---	---
12-13	5	X	5	6	---	---	---
13-14	5	X	5	5	---	---	---
14-15	5	X	5	5	---	---	---
15-16	5	X	5	5	---	---	---

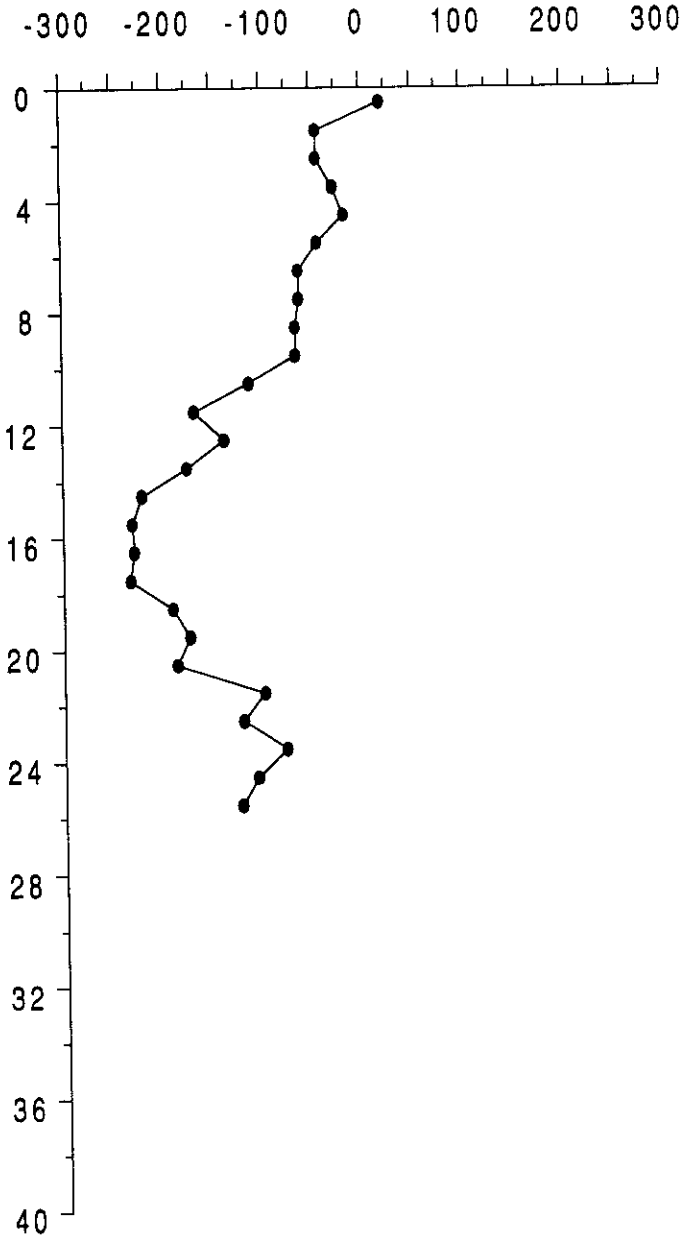
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 4, p. 26). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Continuous sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at 2 cm intervals.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 1
Location: Labrador Shelf
Station Number: 005 BC

Figure 3: Redox potential



Julian Day: 288
GMT: 11:51
Water Depth: 530 m
Latitude: 54° 42.47
Longitude: 56° 26.96

HU-91-045-006: TW & P coring

Julian day:	288	GMT Time:	14:09
Latitude:	54°42.26 N	Longitude:	56°27.06 W
Water depth:	534 m		
Location:	Labrador shelf		

Trigger Weight Core (TWC)

App. penetr.: 200 cm
Core length: 171 cm (+ cutter)

Description: Surface sediments (0-2 cm) are dark olive gray (5Y 3/2) mud.
Sub-surface sediments consists of gray to dark gray mud heavily bioturbated as follows: 2-63 cm: alternating very dark gray (5Y 3/1) and dark gray (5Y 4/1) silty-sandy mud with scattered gravel; 63-171 cm: gray (5Y 5/1) mottled silty clay with sand and granules.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 4, p. 26).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	100-102
10-12	110-112
20-22	120-122
30-32	130-132
40-42	140-142
50-52	150-152
60-62	160-162
70-72	
80-82	
90-92	

HU-91-045-006: TW & P coring (continued)

Piston Core

Corer length: 1520 cm
App. penetr.: 1600 cm
Core length: 876 cm (6 sections)

Description: Sediment consists of alternating gray and dark gray bioturbated mud as follows: 0-15 cm: dark gray (5Y 4/1) silty-sandy mud; 15-536 cm: gray (5Y 5/1) grading to dark gray (5Y 4/1) silty clay with scattered sand and granules; 536-680 cm: dark gray (5Y 4/1) silty clay to clayey silts with abundant sand and granules.

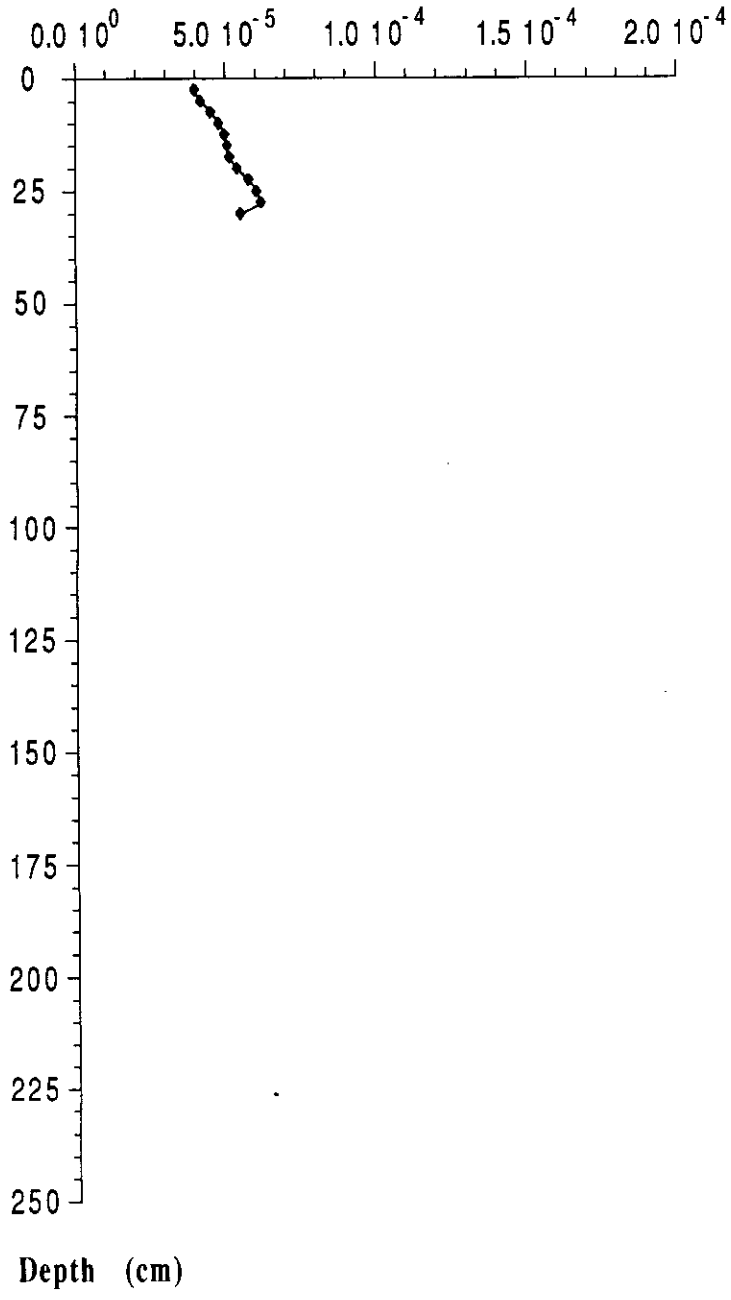
Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 5, p. 27).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	98-100	187.1-189.1	279.8-281.8	382-384
11-13	107-109	196-198	291.5-293.5	391.7-393.7
22-24	116-118	205.2-207.2	301-303	401-403
30-32	123-125	214.3-215.3	312.5-314.5	412-414
41-43	132.2-134.2	223.3-225.3	322-324	421.7-423.7
52-54	141.5-143.5	232.3-234.3	331.5-333.5	429-431
59-61	150.5-152.2	241.3-243.3	341-343	436-438
69-71	160-162	250.3-252.3	352.5-354.5	441-443
77-79	169-171	259.3-261.3	362-367	452-454
87-89	178-180	268.4-270.4	371-373	461-463
468-470	565-567	655-657	739-741	820-822
477-479	573-575	665-667	748-750	829-831
486-490	579-581	675-677	757-759	840-842
495-497	585-587	685-687	766-768	847-849
506-508	595-597	694-696	322-324	856-858
516-518	605-607	704-706	775-777	865-867
525-527	615-617	713-715	785-787	874-876
535-537	625-627	722-724	794-796	
545-547	635-637	725-727	802-804	
555-557	645-647	730-732	811-813	

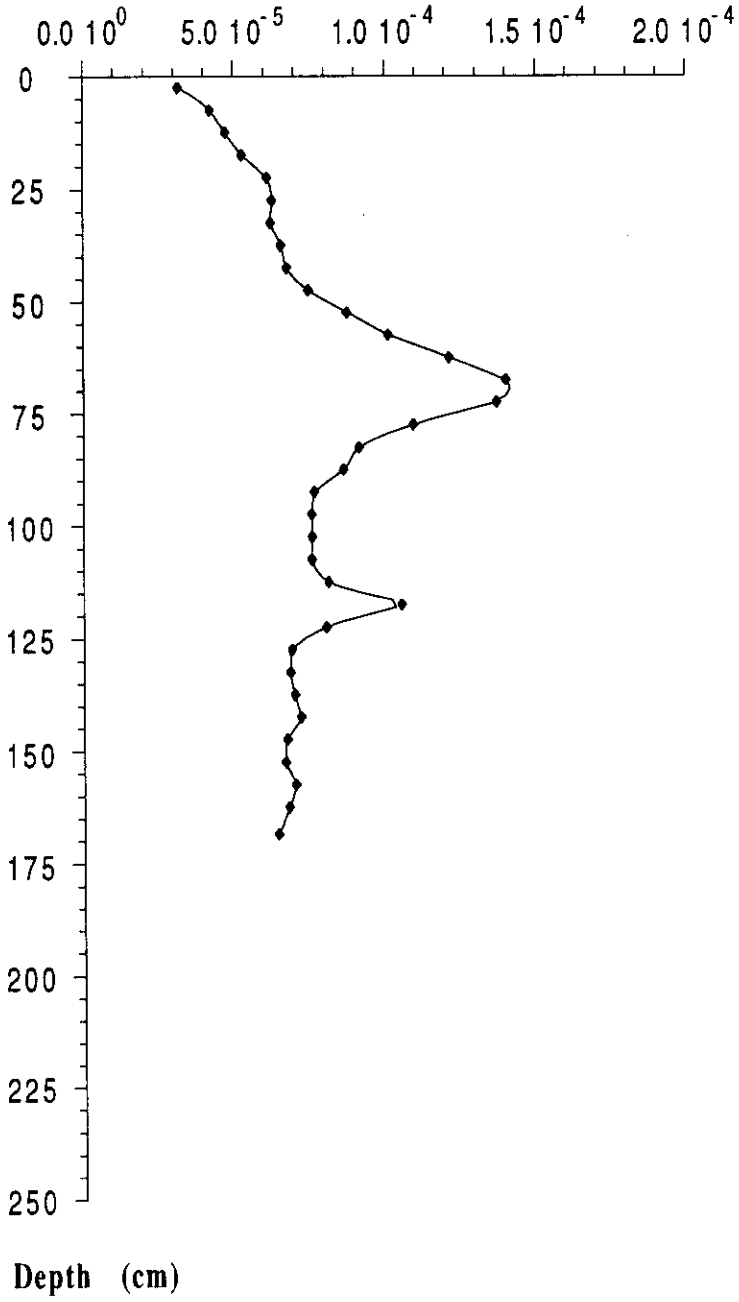
MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 1
Location: Labrador Shelf
Station Number: 005 BC

Figure 4



Julian Day: 288
GMT: 11:51
Water Depth: 530 m
Latitude: 54° 42.27
Longitude: 56° 26.96

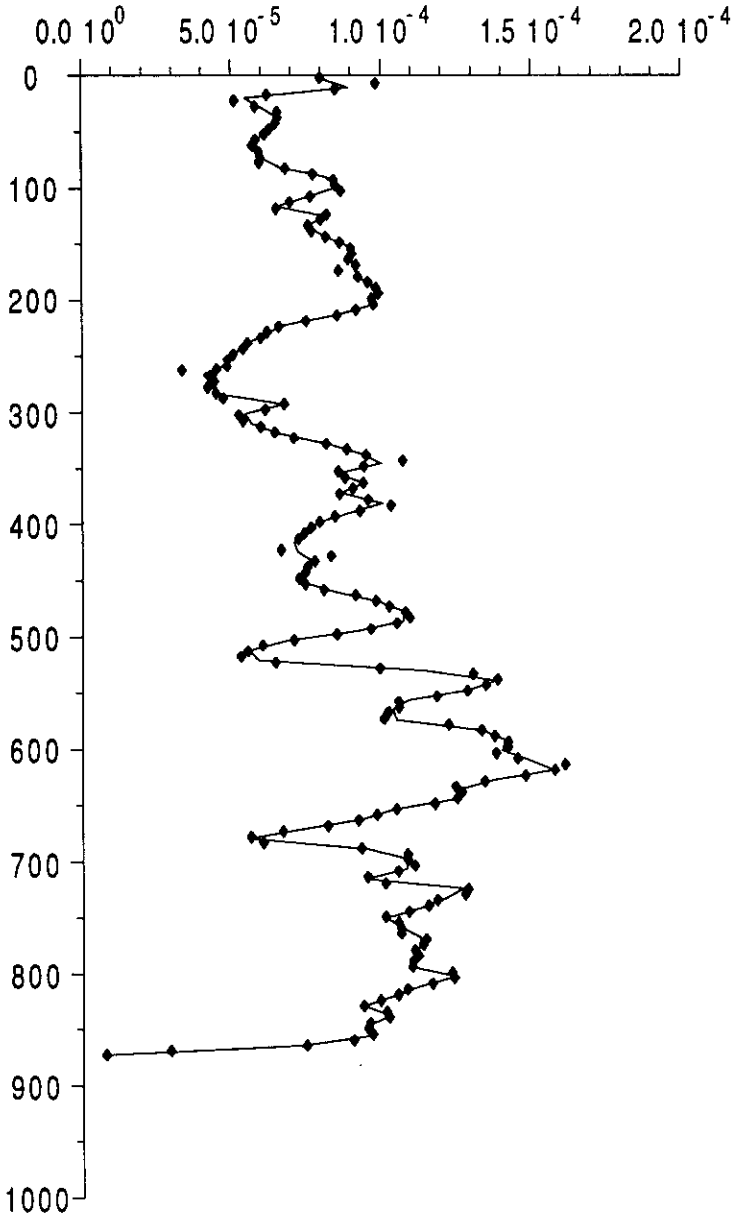
Station Number: 006 TWC



Julian Day: 288
GMT: 14:09
Water Depth: 534 m
Latitude: 54° 42.47
Longitude: 56° 26.96

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 1
Location: Labrador Shelf
Station Number: 006 PC

Figure 5



Julian Day: 288
GMT: 14:09
Water Depth: 534 m
Latitude: 54° 42.47
Longitude: 56° 26.96

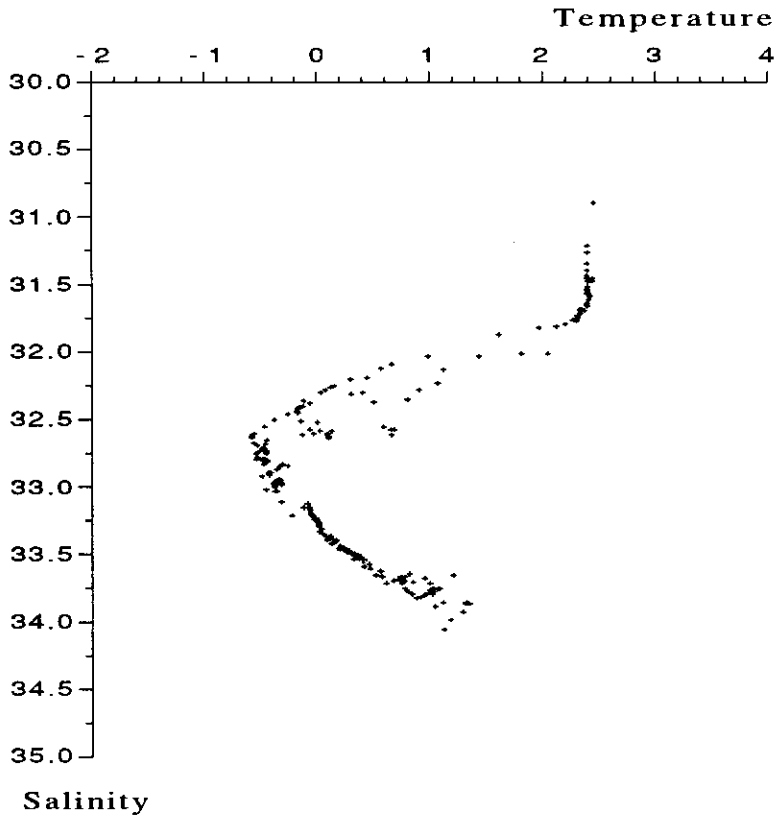
HU-91-045-007: CTD

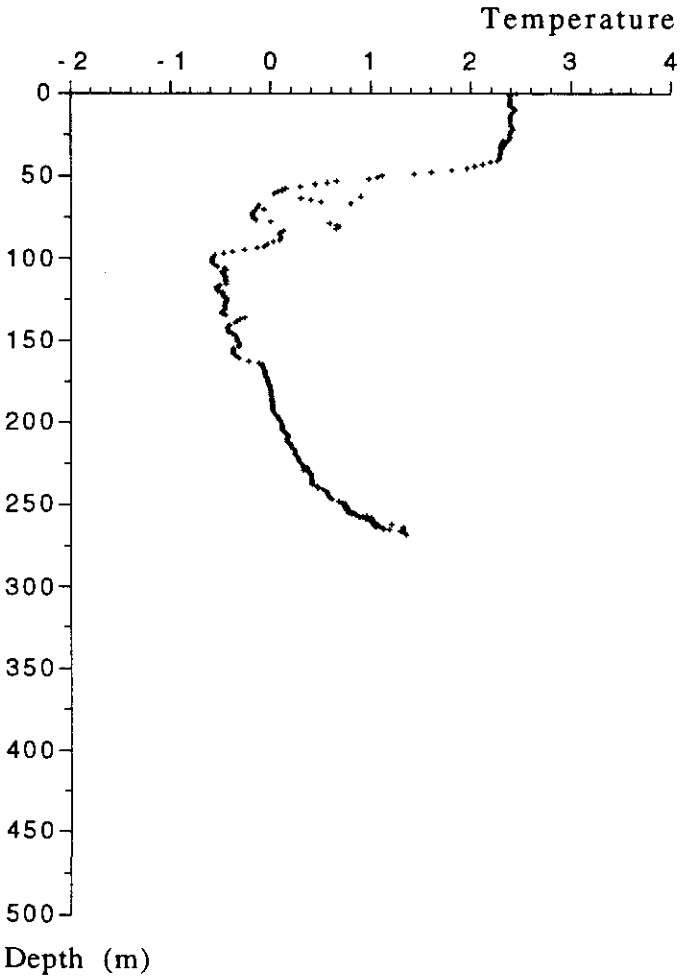
Julian day:	288	GMT Time:	17:41
Latitude:	54°42.97 N	Longitude:	55°35.05 W
Water depth:	301 m		
Location:	Labrador shelf		

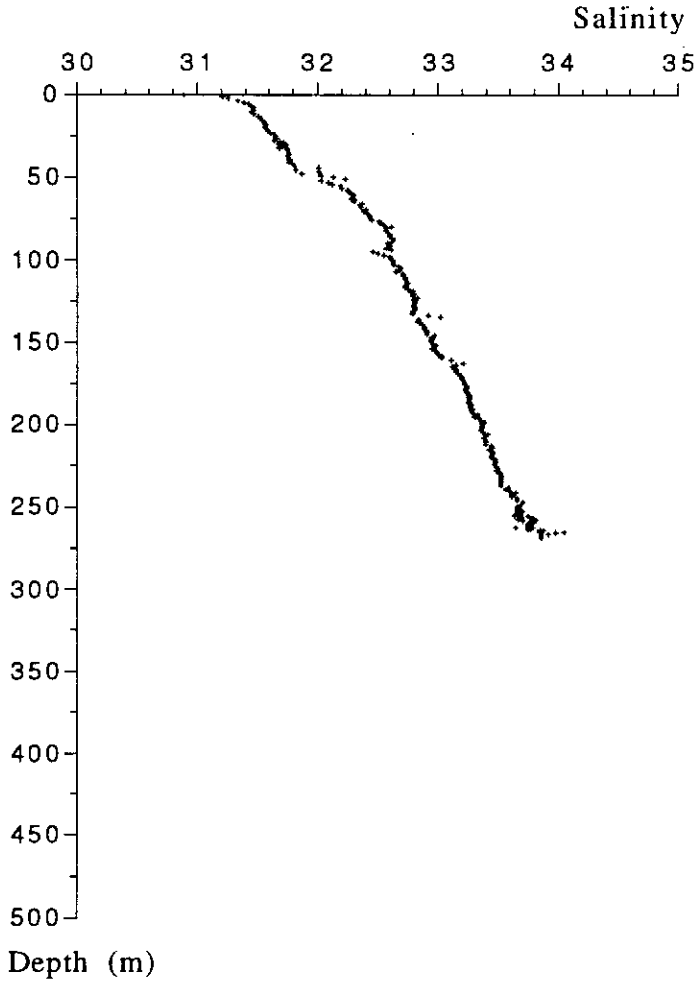
Note: the CTD was installed on the box corer (*cf.* station 91-045-008)
See figure 6, next page.

Figure 6: CTD cast

Cruise Number : HU-91-045
Site Number: 2
Station Number: 007
Location: Labrador Shelf
Julian Day: 288
GMT: 17:41
Water Depth: 301 m
Latitude: 54° 42.97'
Longitude: 55° 35.05'







HU-91-045-008: Box coring

Julian day:	288	GMT Time:	17:41
Latitude:	54°42.97 N	Longitude:	55°35.05 W
Water depth:	301 m		
Location:	Labrador shelf		

Penetration: 12 cm

Description: Sediments consist of gray sandy to gravelly mud. Benthic fauna (shells and worms) is observed at the surface.

Sampling: 1 push-core (15 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (15 cm long, 10 cm in diameter) for further analysis (UQAM)

On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:

1. Redox potential measurements (see figure 7, next page)

Depth (cm)	Eh
0-1	-3
1-2	-46
2-3	0
3-4	-57
4-5	-58

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-1	X	X	214
2-3	X	X	225
4-5	X	X	249

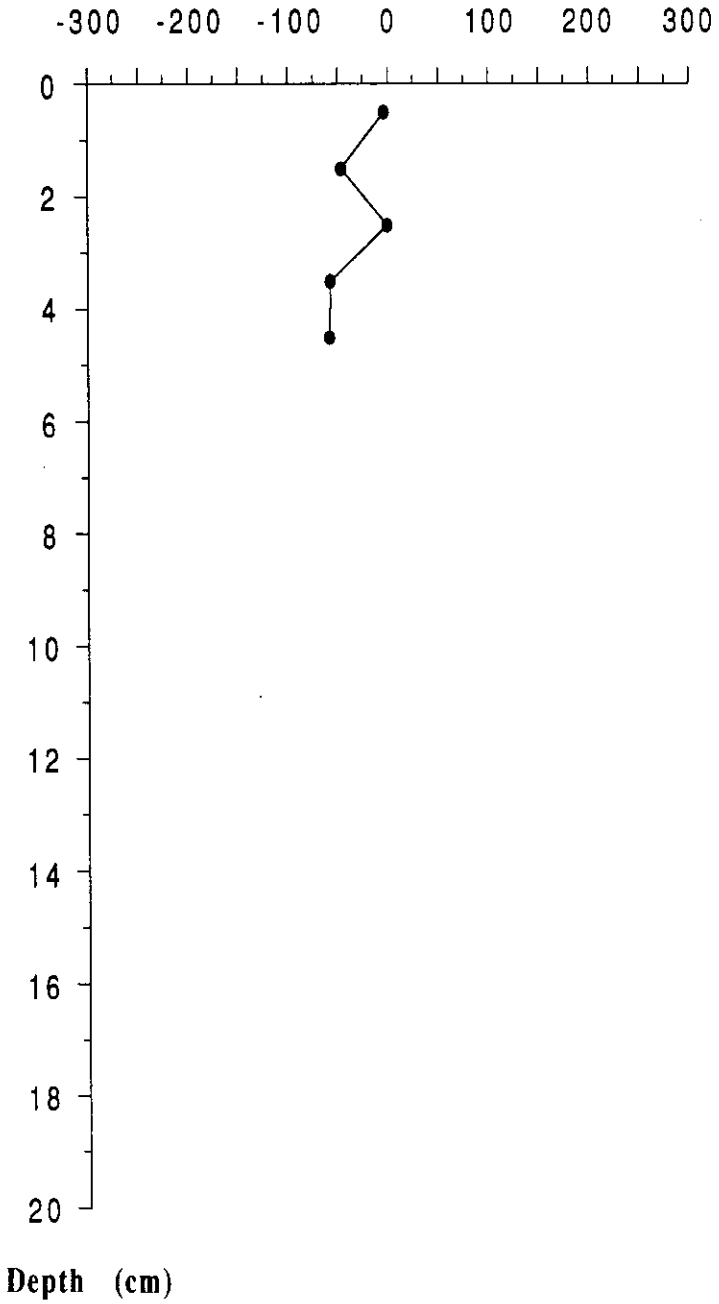
3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-1	3	---	---	---	---	---	---
2-3	5	4 x 2 ml	---	---	---	---	---
4-5	5	3 x 2 ml	---	---	---	---	---

Note: squeezed sediments are saved in separate bags.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 2
Location: Labrador Shelf
Station Number: 008 BC

Figure 7: Redox potential



Julian Day: 288
GMT: 17:41
Water Depth: 301 m
Latitude: 54° 42.97
Longitude: 55° 35.05

HU-91-045-009: Water sampling

Julian day:	288	GMT Time:	19:00
Latitude:	54°42.97N	Longitude:	55°35.05W
Water depth:	285 m		
location:	Labrador shelf		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocols 1 + 2)

Depth interval sampled: 0-10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A6	3 L
GN6-A8	8 L
GN6-A7	8 L
GN6-A9	11 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A4	5.8 L
A5	20 L
A6	28 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysez or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Centrifugation for particulate matter subsampling (protocol 2)

Centrifugation of 200 L of water to concentrate the particulate suspended matter:
2 subsamples are frozen in tubes; 1 is dried in tube.

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at a water depth of 5 m.

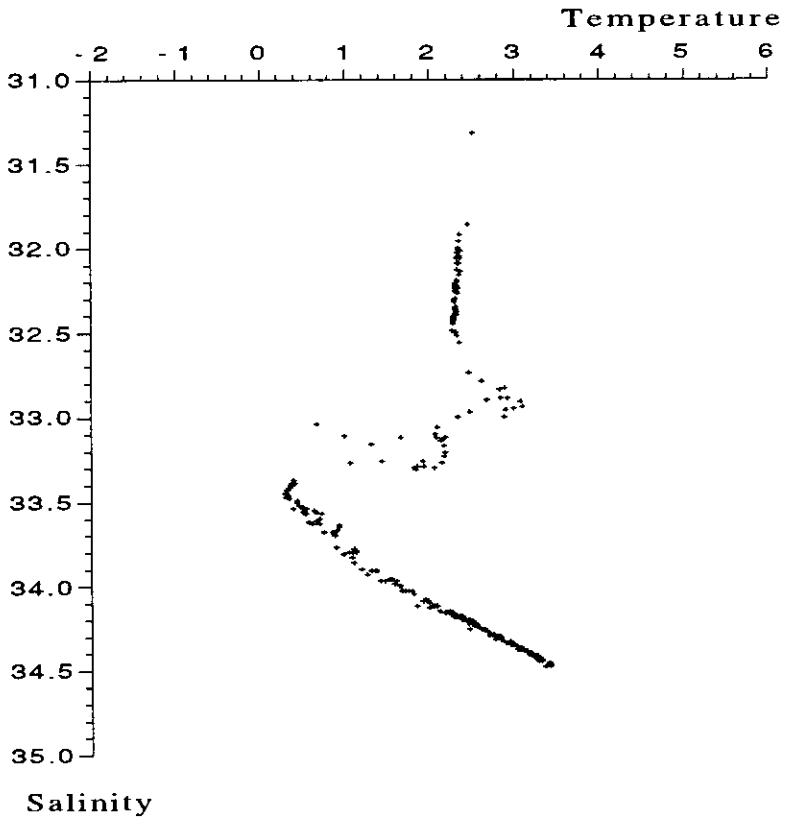
HU-91-045-010: CTD

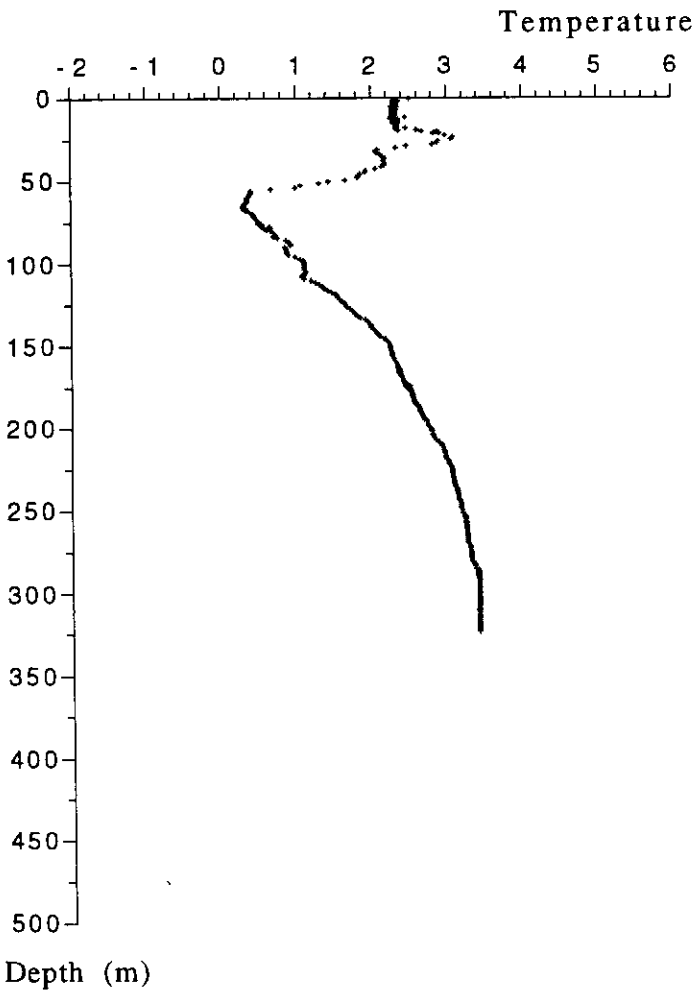
Julian day:	289	GMT Time:	00:53
Latitude:	54°44.00 N	Longitude:	53°44.48 W
Water depth:	485 m		
Location:	Labrador shelf		

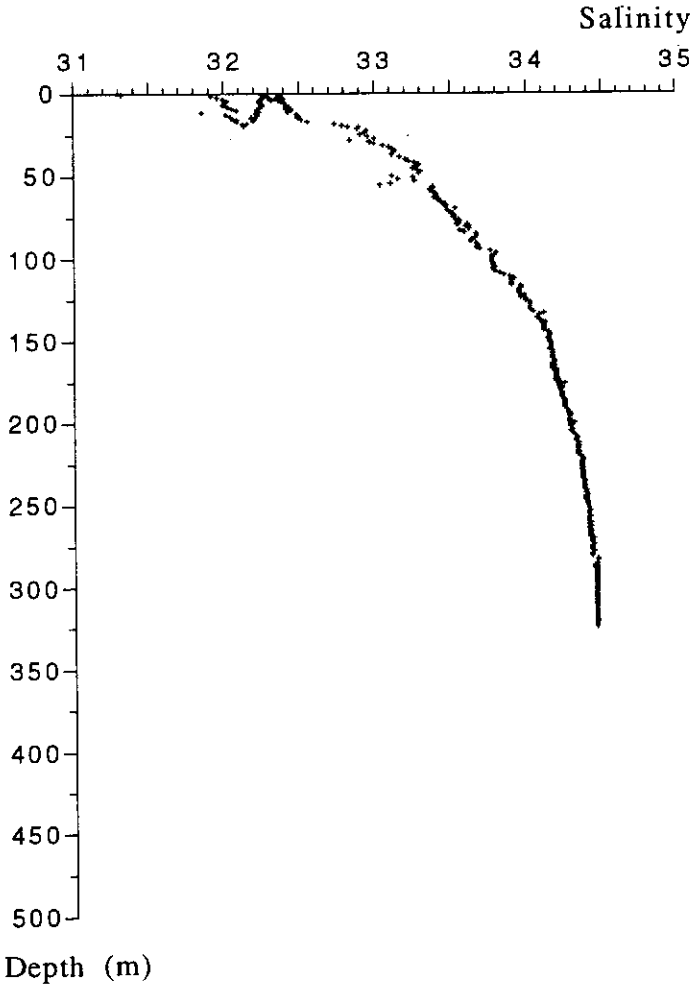
See figure 8, next page.

Figure 8: CTD cast

Cruise Number : HU-91-045
Site Number: 3
Station Number: 010
Location: Labrador Shelf
Julian Day: 289
GMT: 00:53
Water Depth: 485 m
Latitude: 54° 44.00'
Longitude: 53° 44.48'







HU-91-045-011: Water sampling

Julian day:	289	GMT Time:	01:13
Latitude:	54°44.50 N	Longitude:	53°44.00 W
Water depth:	485 m		
Location:	Labrador shelf		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 330 m

Filtration on 0.45 µm preweighed filters		Filtration on glass fiber preweighed filters	
Filter number	Volume filtered	Filter number	Volume filtered
GN6-A14	6 L	A11	27.8 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysez or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: surface

Filtration on 0.45 µm preweighed filters		Filtration on glass fiber preweighed filters	
Filter number	Volume filtered	Filter number	Volume filtered
GN6-A10	4 L	A11	10 L
GN6-A12	5.5 L	A9	14.2 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

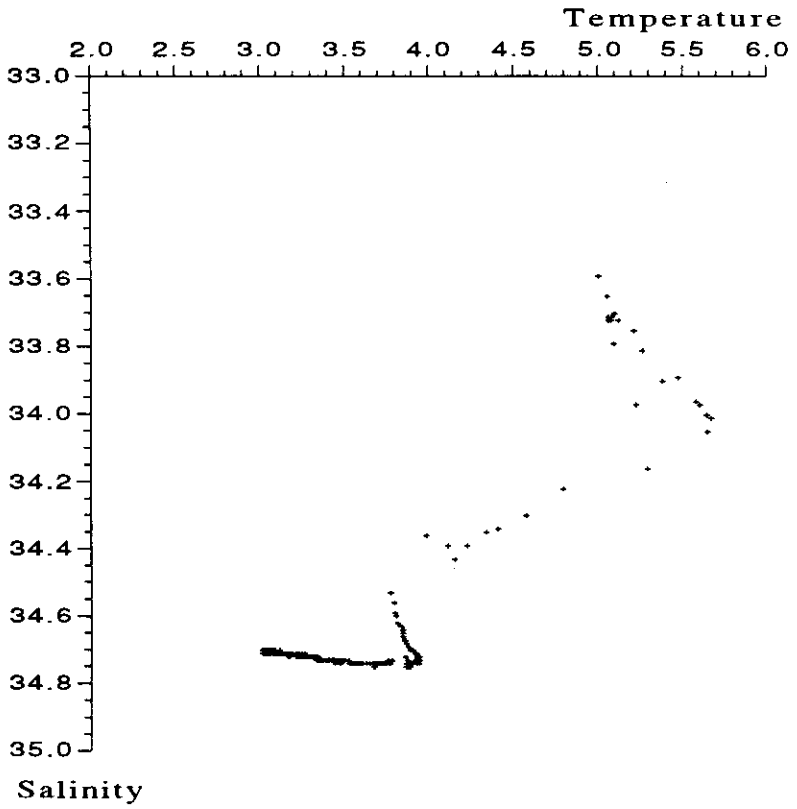
HU-91-045-012: CTD

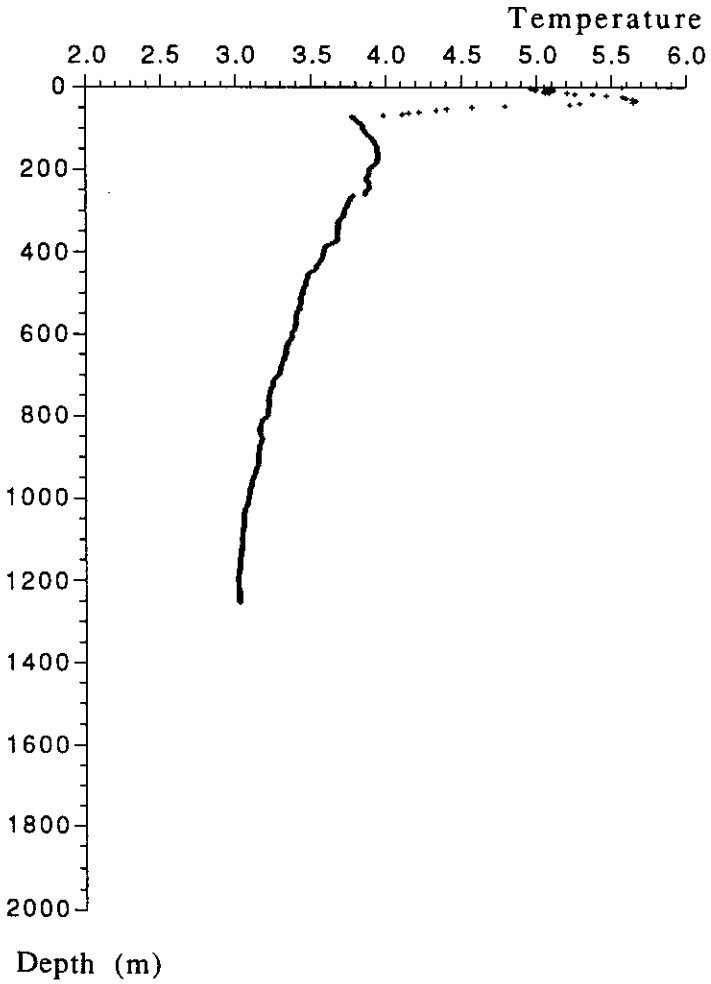
Julian day:	289	GMT Time:	05:05
Latitude:	54°49.29 N	Longitude:	52°51.92 W
Water depth:	1364 m		
Location:	Labrador slope		

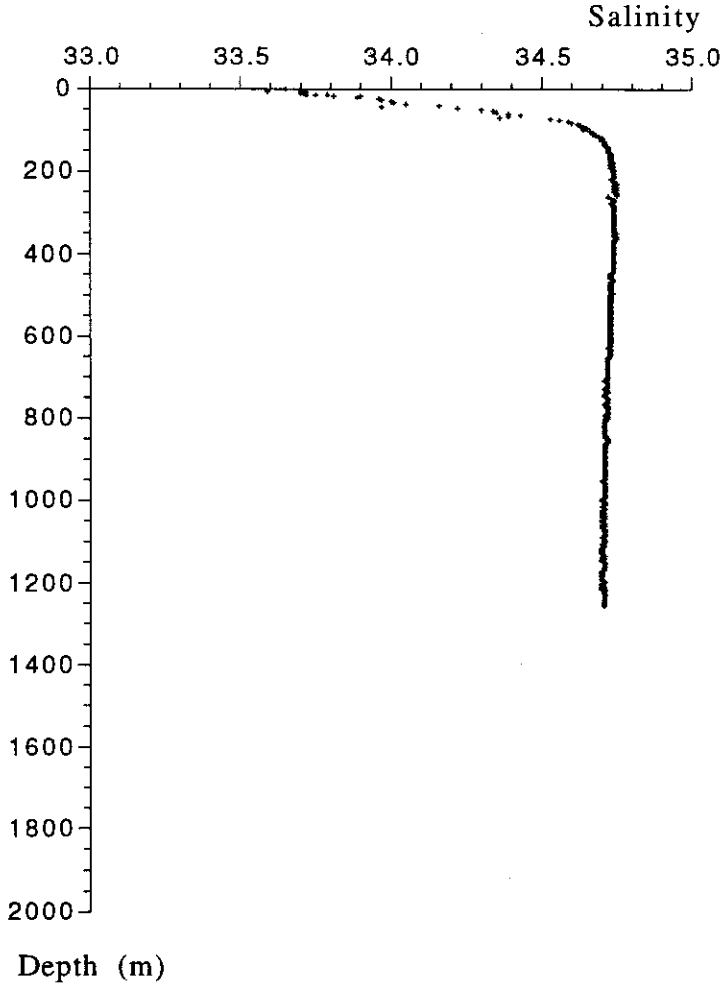
See figure 9, next page.

Figure 9: CTD cast

Cruise Number : HU-91-045
Site Number: 4
Station Number: 012
Location: Labrador Slope
Julian Day: 289
GMT: 05:05
Water Depth: 1364 m
Latitude: 54° 49.29'
Longitude: 52° 51.92'







HU-91-045-013: Water sampling

Julian day:	289	GMT Time:	05:05
Latitude:	54°49.29 N	Longitude:	52°51.92 W
Water depth:	1364 m		
Location:	Labrador slope		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A13	6 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A10	25 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 350 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A15	8 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A12	20.1 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room)

HU-91-045-013: Water sampling (continued)

III- Depth sampled: 800 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A17	8 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A14	21.8 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 1200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A16	10 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A13	18.7 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room)

HU-91-045-014: Box coring

Julian day:	289	GMT Time:	11:28
Latitude:	54°44.50 N	Longitude:	53°43.98 W
Water depth:	340 m		
Location:	Labrador shelf		

Penetration: 12 cm

Description: Sediments consist of olive gray (5Y 4/2) muddy sand with abundant gravel between 7 and 9 cm. A rich macrofauna was observed at the surface (worms, echinoderms, sponges..)

Sampling: 1 push-core (15 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (15 cm long, 10 cm in diameter) for further analysis (UQAM)

On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:

1. Redox potential and dissolved oxygen measurements (see figure 10, p. 42)

Depth (cm)	Eh	O_2
0-1	104	26
1-2	28	---
2-3	47	28
3-4	-28	18
4-5	3	9
5-6	0	7
6-7	11	0
7-8	57	0
8-9	28	0
9-10	-18	0
10-11	-19	0

HU-91-045-014: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-1	X	X	201
1-2	X	X	202
2-3	X	X	203
3-4	X	X	204
4-5	X	X	205
5-6	X	X	206
6-7	X	X	207
7-8	X	X	208
8-9	X	X	210
9-10	X	X	212
10-11	X	X	216
11-12	X	X	---

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	5	2 x 2	---	---	---	---	---
2-6	5	2	---	---	---	---	---
6-9	5	---	---	---	---	---	---

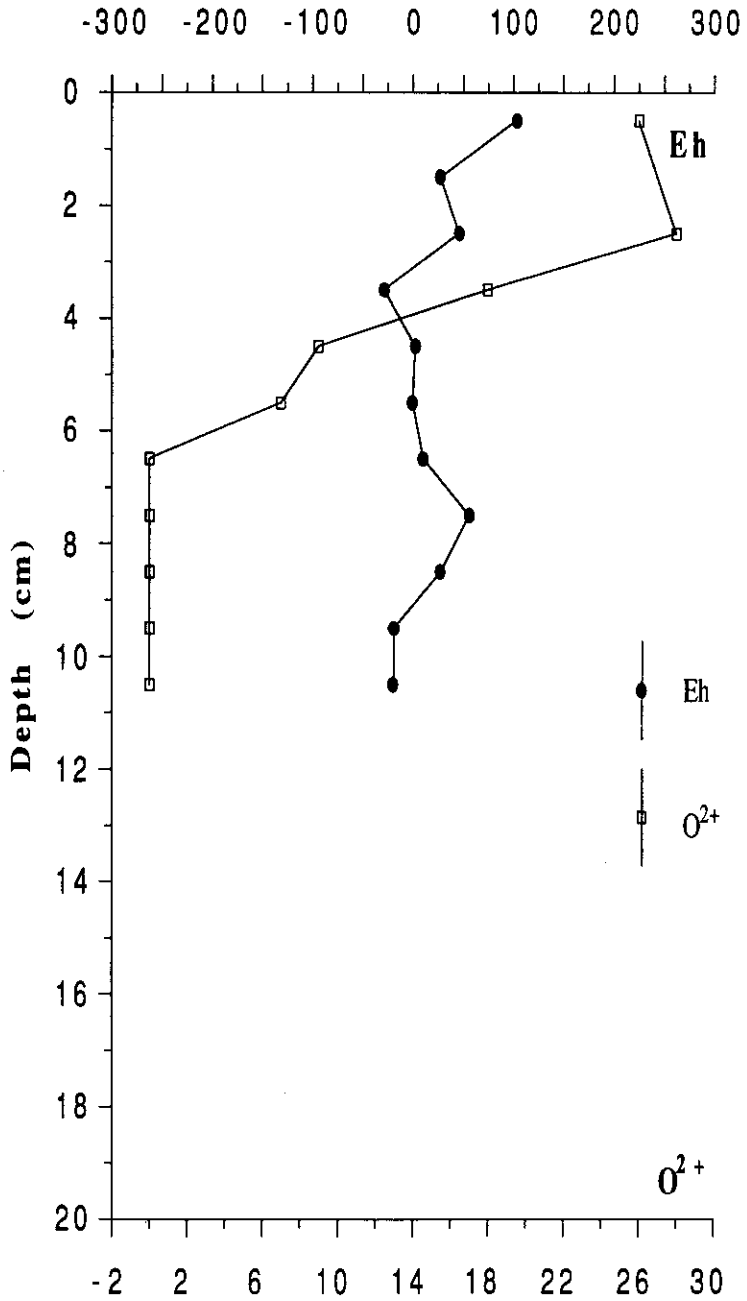
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at the following depth intervals (in cm): 0-2, 2-4, 4-6, 6-9.

Eh and O^{2+} Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 3
Location: Labrador Shelf
Station Number: 014 BC

Figure 10: Redox potential and dissolved oxygen



Julian Day: 289
GMT: 11:28
Water Depth: 340 m
Latitude: 54° 44.50
Longitude: 53° 43.98

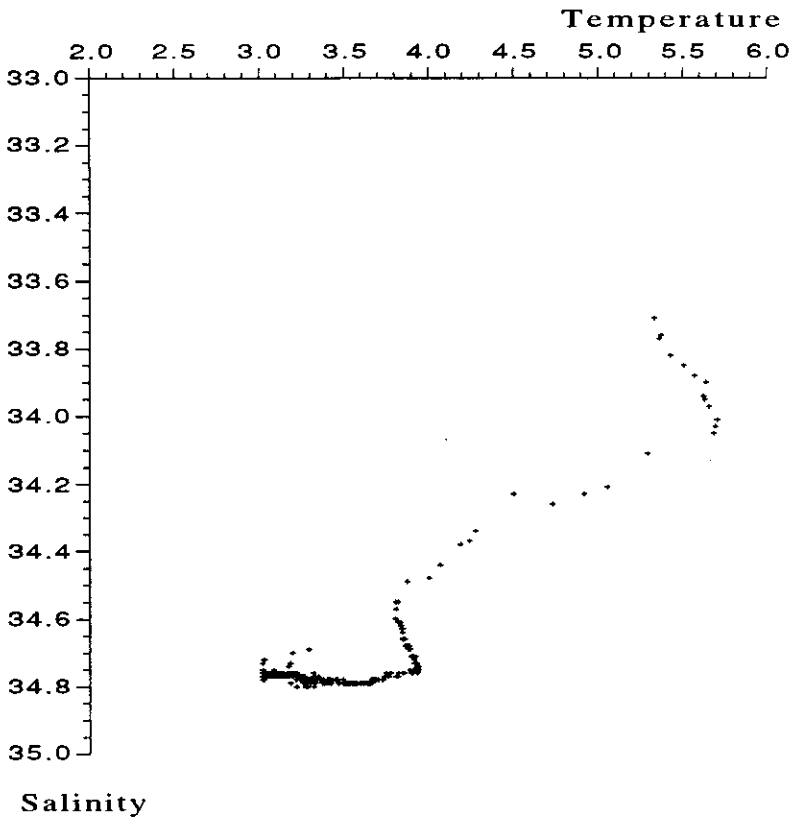
HU-91-045-015: CTD

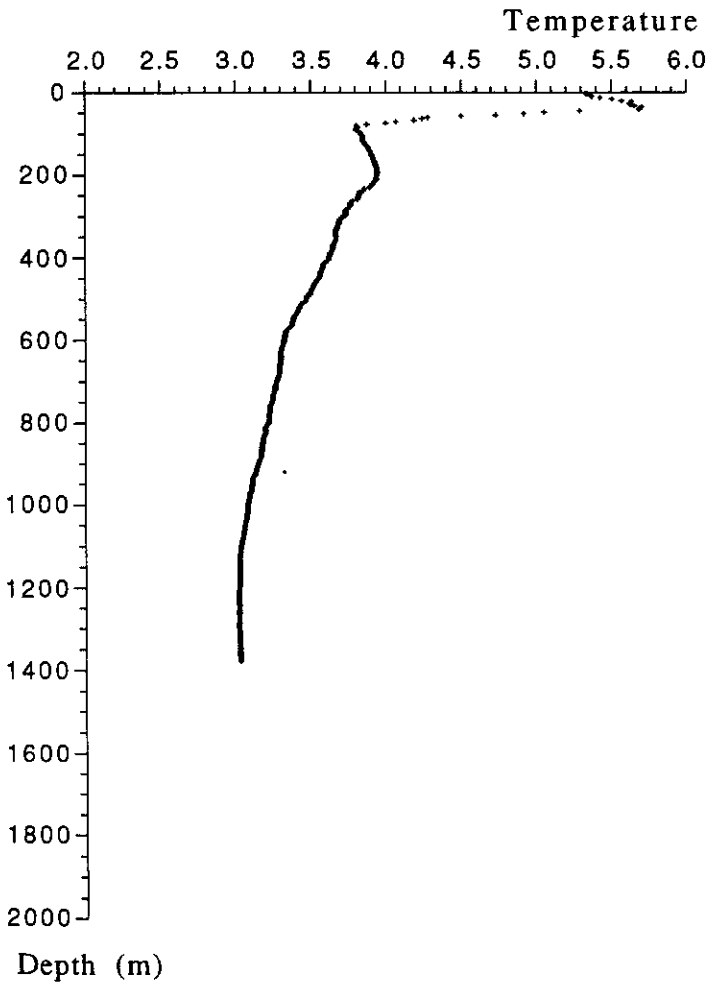
Julian day:	289	GMT Time:	14:46
Latitude:	54°49.30 N	Longitude:	52°52.15 W
Water depth:	1364 m		
Location:	Labrador slope		

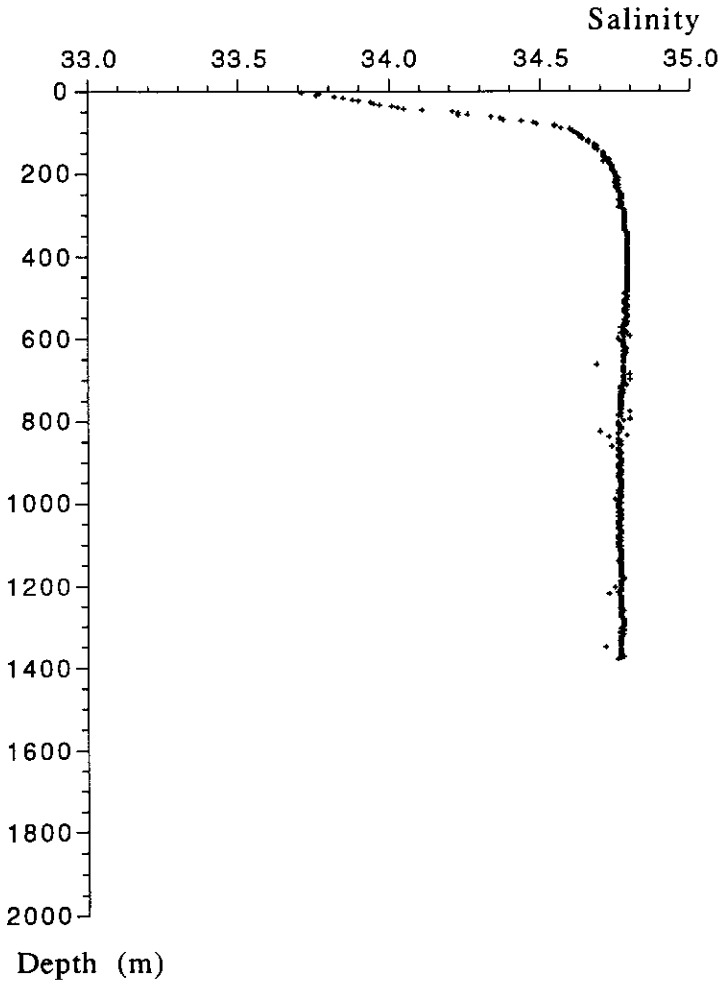
See figure 11, next page.

Figure 11: CTD cast

Cruise Number : HU-91-045
Site Number: 4
Station Number: 015
Location: Labrador Slope
Julian Day: 289
GMT: 14:46
Water Depth: 1364 m
Latitude: 54° 49.30'
Longitude: 52° 52.15'







HU-91-045-016: Box coring

Julian day:	289	GMT Time:	14:46
Latitude:	54°49.27 N	Longitude:	52°52.03 W
Water depth:	1364 m		
Location:	Labrador slope		

Penetration: 43 cm

Description: Surface sediments (0-5 cm) are dark grayish brown (2.5Y 4/2) sandy mud.
Sub-surface sediments consist of gray to dark gray mud as follows:
5-9 cm: dark gray (5Y 4/1) sandy mud with clayey clasts;
9-22 cm: gray (5Y 5/1) sandy clay with gravel and clayey clasts;
22-43 cm: gray (5Y 5/1) clayey mud with sand and gravel.

Sampling: 2 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
3 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 10 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

A- On-board measurements and sub-sampling of the 15 cm-diameter push core (A) under nitrogen atmosphere:

A1. Redox potential measurements (see figure 12, p. 48)

Depth (cm)	Eh	depth (cm)	Eh	depth (cm)	Eh
0-1	178	10-11	70	20-21	-36
1-2	174	11-12	55	21-22	-33
2-3	171	12-13	23	22-23	-60
3-4	163	13-14	19	23-24	-64
4-5	173	14-15	-9	24-25	-27
5-6	162	15-16	-24	25-26	-65
6-7	154	16-17	-36		
7-8	131	17-18	-45		
8-9	96	18-19	-39		
9-10	78	19-20	-35		

HU-91-045-016: Box coring (continued)

A2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-1	X	X	239
1-2	X	X	247
2-3	X	X	280
3-4	X	X	243
4-5	X	X	237
5-6	X	X	241
6-7	X	X	232
7-8	X	X	244
8-9	X	X	223
9-10	X	X	246
10-11	X	X	236
11-12	X	X	229
12-13	X	X	226
13-14	X	X	235
14-15	X	X	230
15-16	X	X	231
16-17	---	---	---
17-19	X	X	281
19-21	X	X	295
21-23	X	X	264
23-25	X	X	293

A3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (4 x 2 ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-1	5	X	5	5	---	---	---
1-2	5	X	5	5	---	---	---
2-3	5	X	5	---	---	---	---
3-4	5	X	2	---	---	---	---
4-5	5	X	---	---	---	---	---
5-6	5	X	---	---	---	---	---
6-7	5	X	---	---	---	---	---
7-8	5	X	5	---	---	---	---
8-9	5	X	---	---	---	---	---
9-10	5	X	---	---	---	---	---
10-13	5	X	---	---	---	---	---
13-16	2	X	---	---	---	---	---
16-17	---	---	---	---	---	---	---
17-19	5	X	2	---	---	---	---
19-21	5	X	5	3	---	---	---
21-23	5	X	5	4	---	---	---

Note: squeezed sediments were saved in separate bags.

HU-91-045-016: Box coring (continued)

B- On-board measurements and sub-sampling of the 15 cm-diameter push core (B) under nitrogen atmosphere:

B1. Redox potential measurements (see figure 12, next page)

Depth (cm)	Eh	depth (cm)	Eh	depth (cm)	Eh
0-1	60	10-11	84	20-21	-58
1-2	60	11-12	41	21-22	-57
2-3	94	12-13	-21	22-23	-65
3-4	101	13-14	-21	23-24	-58
4-5	-21	14-15	-17	24-25	-59
5-6	55	15-16	-20	25-26	-77
6-7	130	16-17	-13		
7-8	110	17-18	-2		
8-9	57	18-19	-33		
9-10	79	19-20	-36		

B3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (4 x 2 ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	5	X	6	---	---	---	---
2-4	5	X	---	---	---	---	---
4-6	5	X	---	---	---	---	---
6-8	5	X	5	3	---	---	---
8-10	3	---	---	---	---	---	---
10-12	5	X	1	---	---	---	---
12-14	5	X	5	5	---	---	---
14-16	0.5	---	---	---	---	---	---
16-18	5	X	2	---	---	---	---
18-20	4	X	---	---	---	---	---
20-22	---	---	---	---	---	---	---
22-24	5	---	---	---	---	---	---
24-26	---	---	---	---	---	---	---

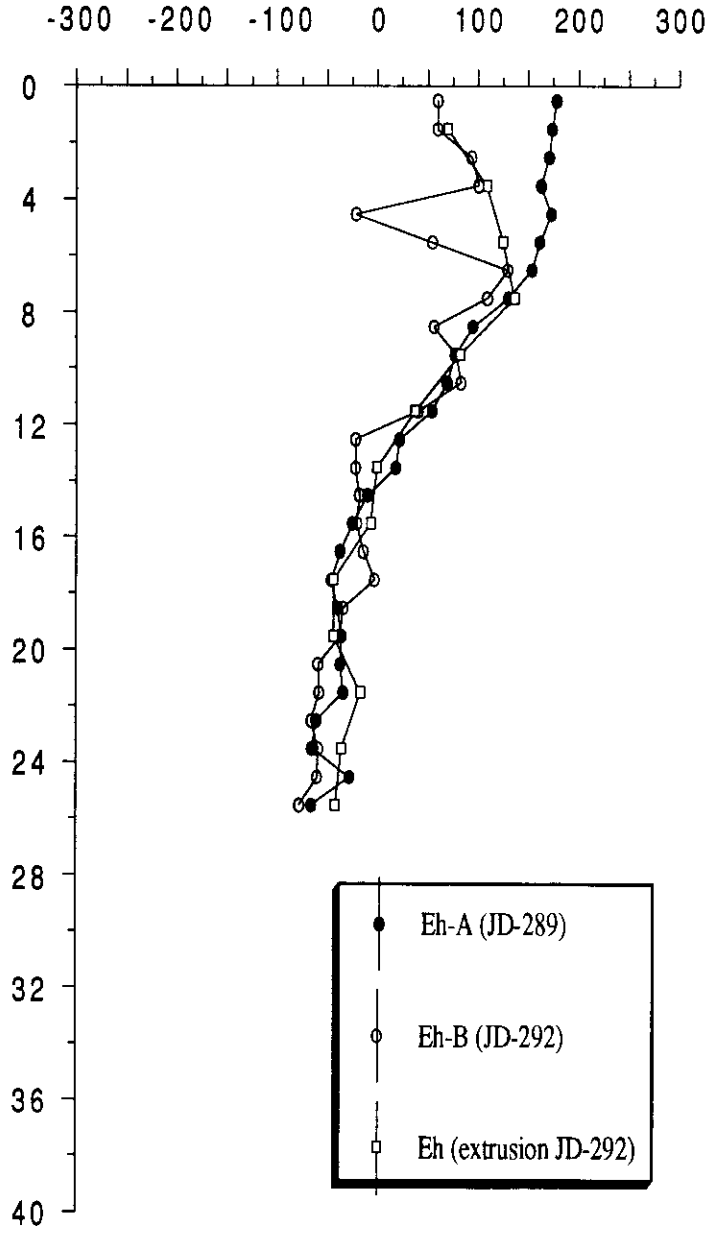
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 13, p. 52). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at the following depth intervals (in cm): 0-2, 4-6, 14.5-16.5, 24-26, 33-35, 38-40.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 4
Location: Labrador Slope
Station Number: 016 BC

Figure 12: Redox potential



Julian Day: 289
GMT: 14:46
Water Depth: 1364 m
Latitude: 54° 49.27
Longitude: 52° 52.03

HU-91-045-017: TW & P coring

Julian day:	289	GMT Time:	16:48
Latitude:	54°49.31 N	Longitude:	52°51.86 W
Water depth:	1440 m		
Location:	Labrador slope		

Trigger Weight Core (TWC)

App. penetr.: 169 cm
Core length: 169 cm (+ cutter)

Description: Surface sediments (0-2 cm) are dark grayish brown (2.5Y 4/2) sandy mud.
Sub-surface sediments consist of gray, dark gray and grayish brown mud with zones rich in sand, gravel and pebbles as follows:
2-75 cm: dark gray (5Y 4/1) silty-sandy mud grading to gray (5Y 5/1) clayey mud with sand and gravel;
75-88 cm: grayish brown (2.5Y 5/2) clayey mud;
88-95 cm: dark gray (5Y 4/1) clayey mud;
95-102 cm: dark gray (5Y 4/1) sandy to silty mud;
102-112 cm: grayish brown (2.5Y 5/2) silty clay;
112-128 cm: dark gray (5Y 4/1) sandy mud with gravel and pebbles;
128-160 cm: grayish brown (2.5Y 5/2) sandy mud with gravel and pebbles;
160-169 cm: dark gray (5Y 4/1) sandy-gravelly mud with pebble.

Subsampling: Magnetic susceptibility has been measured at 5 cm intervals throughout the core (figure 13, p. 52).The core was then split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 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). Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	92-94
10-12	98-100
18-20	108-110
26-28	117-119
36-38	126.5-128.5
45-47	134.5-136.5
54-56	145-147
63-65	154-156
74-76	161-163
84-86	167-169

HU-91-045-017: TW & P coring (continued)

Piston Core

Corer length: 1800 cm
App. penetr.: 1650 cm
Core length: 619 cm (5 sections + cutter)

Description: Sediments consist of gray, dark gray or grayish brown mud with some zones rich in sand and gravel as follows:
0-15 cm: dark gray (5Y 4/1) to grayish brown (2.5Y 5/2) bioturbated silty-sandy mud with gravelly mud layer between 10 and 12 cm;
12-31 cm: dark gray (5Y 4/1) silty-sandy clay;
31-36 cm: dark grayish brown (2.5Y 4/2) silty-sandy mud;
36-38 cm: dark gray (5Y 4/1) silty-sandy clay;
38-45 cm: grayish brown (2.5Y 4/2) silty-sandy mud;
45-78 cm: gray (5Y 5/1) to dark gray (5Y 4/1) to black (5Y 2.5/1) sandy mud;
78-89 cm: dark gray (5Y 4/1) to very dark gray (5Y 3/1) clayey mud with a sandy laminae at 89 cm;
118-124 cm: dark gray (5Y 4/1) silty clay;
124-126 cm: sandy lense;
126-138 cm: grayish brown (2.5Y 5/2) silty clay with sand and gravel;
138-180 cm: gray (5Y 5/1) sandy-silty mud with gravel and clayey clasts of *ca.* 1mm-diameter;
180-204 cm: dark gray (5Y 4/1) clayey mud with sand and gravel grading to sandy mud with abundant foraminifers;
204-248 cm: gray (5Y 5/1) silty mud with sand and clayey clasts; barely visible laminations;
248-262 cm: gray (5Y 5/1) silty mud with abundant gravel and clayey clasts;
262-276 cm gray (5Y 5/1) silty mud to dark gray (5Y 4/1) sandy mud with abundant foraminifers;
276-296 cm: dark gray (5Y 4/1) clay with sandy mud mottles;
296-414 cm: dark gray (10YR 4/1) clay with sand and granules; barely visible laminations;
414-421 cm: dark gray (10YR 4/1) sandy mud with abundant foraminifers and clayey mottles;
421-462 cm: dark gray (10YR 4/1) clay with sandy mud mottles grading to dark gray (5Y 4/1) sandy clay with gravel and clayey clasts of 1 mm- diameter;
462-619 cm: dark gray (5Y-10YR 4/1) bioturbated clayey mud.

HU-91-045-017 TW & P coring (continued)

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 14, p. 53).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

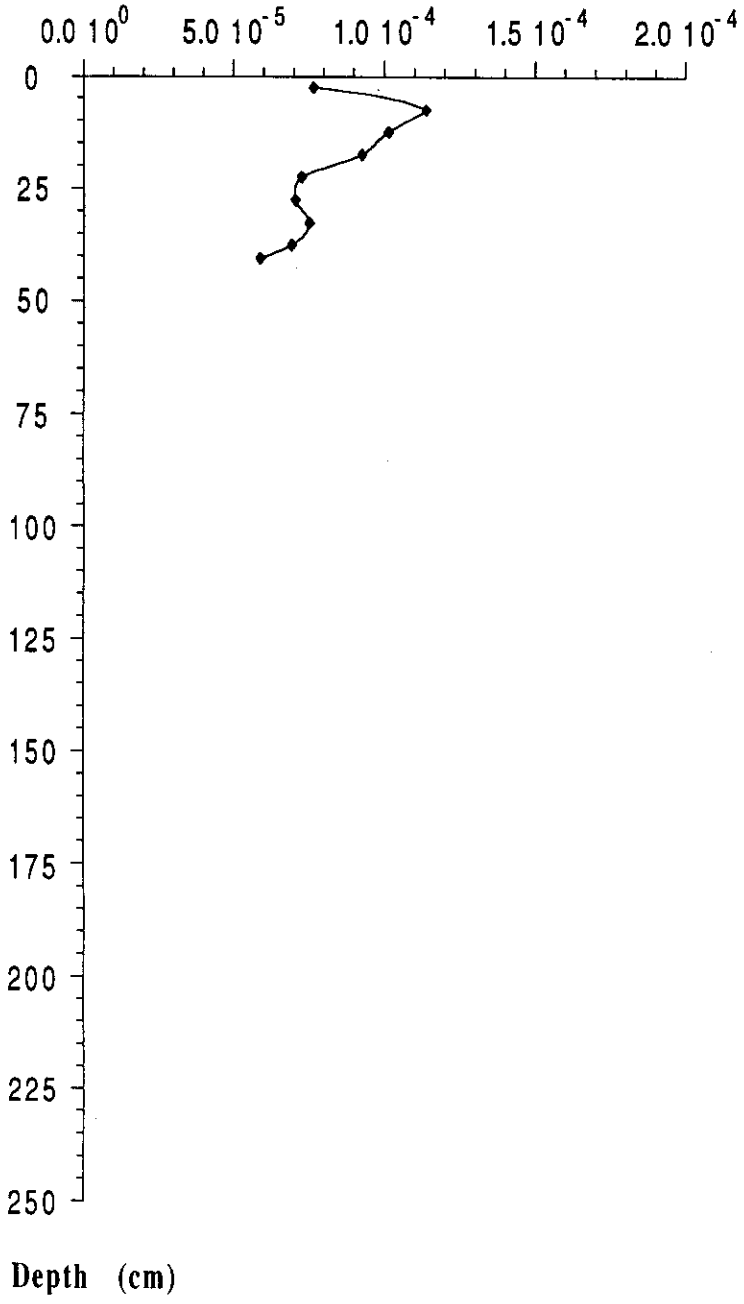
Sampling depth (cm)

0-2	92-94	176-178	270-272	355-357
12-14	101-103	185-187	280-282	364-366
20-22	110-112	194-196	288-290	373-375
29.5-31.5	119-121	204-206	298-300	382.5-384.5
39-41	128-130	214-216	308-310	392-394
48-50	138-140	224-226	314-316	401-403
57-59	146.5-148.5	233-235	320-322	410-412
62-64	155-157	242-244	327-329	419.5-426.5
70-72	161.5-163.5	251-253	336-338	429-431
83-85	168-170	261-263	346-348	438-440

448-450	535-537
457-459	544-546
464-466	553-555
471-473	562-564
480-482	571-573
489-491	580-582
499-501	589-591
508-510	598.5-600.5
517-519	607-609
525.5-527.5	617-619

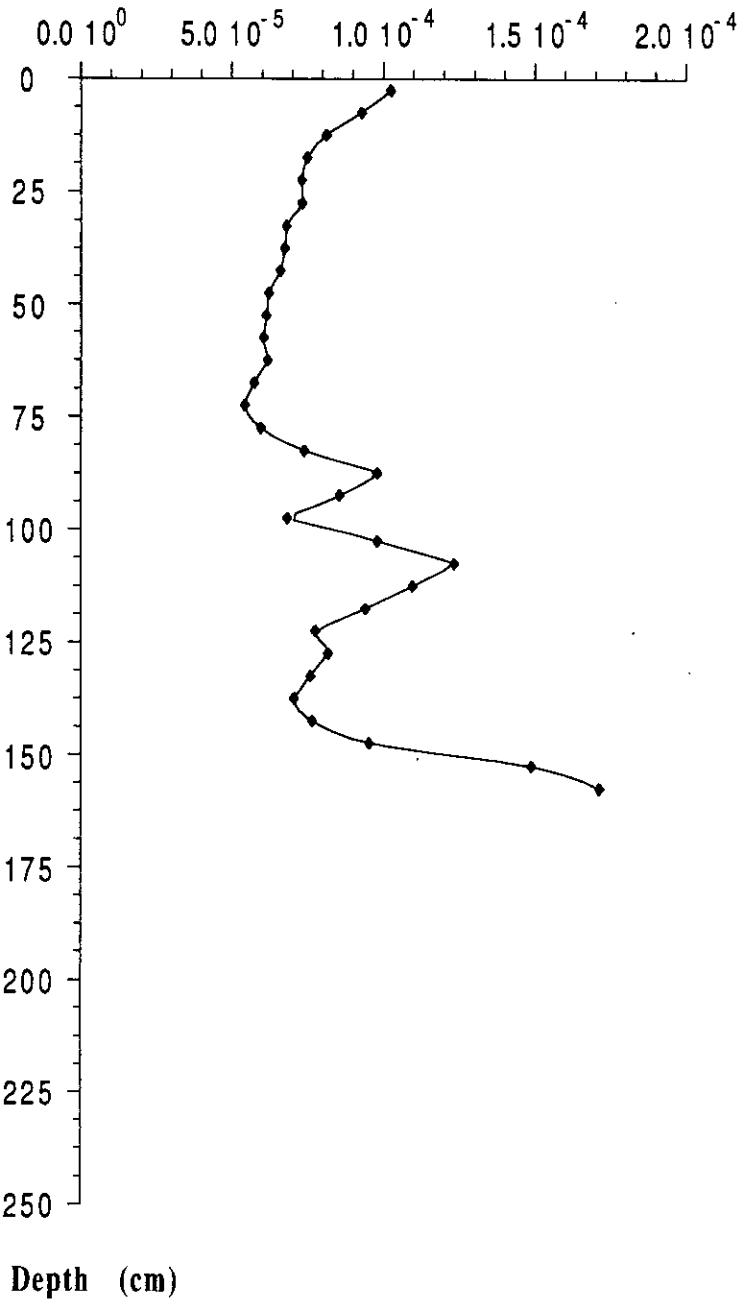
MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 4
Location: Labrador Slope
Station Number: 016 BC

Figure 13



Julian Day: 289
GMT: 14:46
Water Depth: 1364 m
Latitude: 54° 49.27
Longitude: 52° 52.03

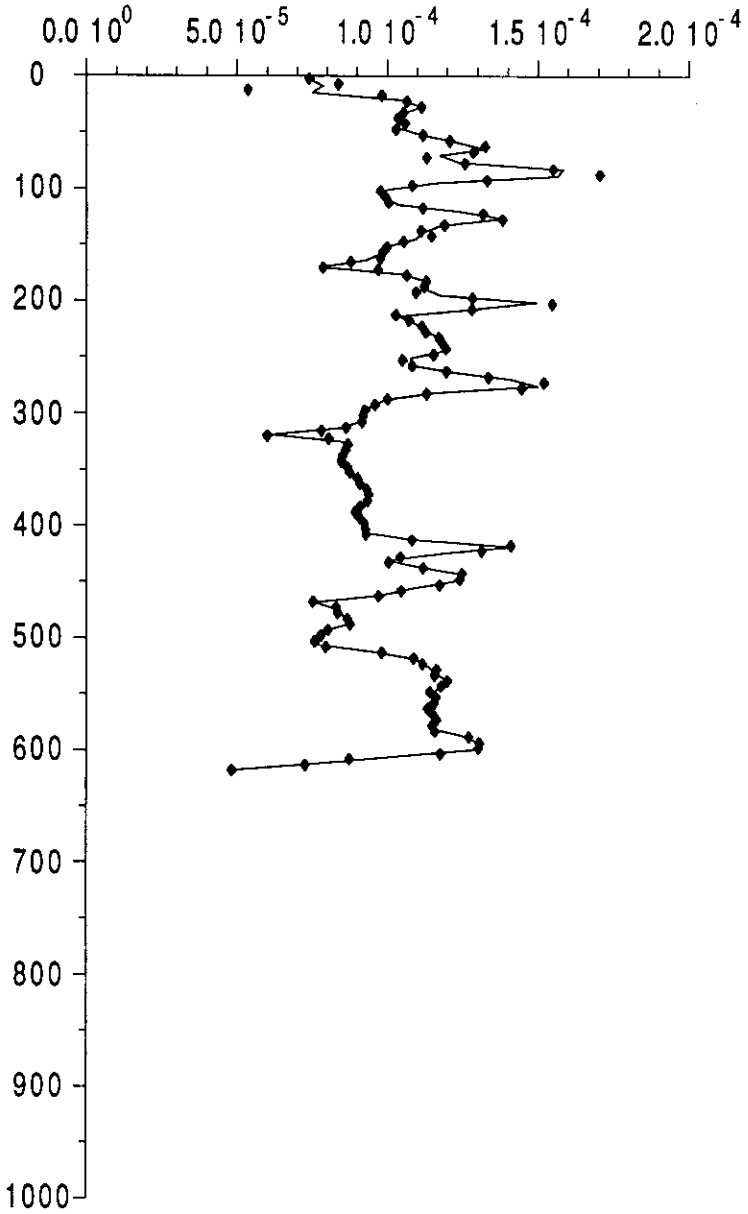
Station Number: 017 TWC



Julian Day: 289
GMT: 16:48
Water Depth: 1440 m
Latitude: 54° 49.31
Longitude: 52° 51.86

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 4
Location: Labrador Slope
Station Number: 017 PC

Figure 14



Julian Day: 289
GMT: 16:48
Water Depth: 1440 m
Latitude: 54° 49.31
Longitude: 52° 51.86

HU-91-045-018: Box coring

Julian day:	290	GMT Time:	15:27
Latitude:	55°02.06 N	Longitude:	52°07.78 W
Water depth:	2648 m		
Location:	Labrador slope		

Penetration: 40 cm

Description: Surface sediments (0-7 cm) are dark grayish brown (10 YR 4/2) sandy mud with abundant foraminifers.
Sub-surface sediments consist of grayish brown and brown mud as follows:
7-15 cm : grayish brown (10YR 5/2) bioturbated sandy-silty mud;
15-23 cm: dark grayish brown (10 YR 4/2) sandy mud with abundant foraminifers; 23-31 cm: brown (10 YR 5/3) bioturbated silty mud with sandy and clayey clasts;
31-40 cm: dark grayish brown (10 YR 4/2) clayey mud.

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
4 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 10 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

<u>On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:</u>

1. Redox potential measurements (figure 15, p. 56)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	197	10-11	187	20-21	190
1-2	190	11-12	190	21-22	186
2-3	195	12-13	188	22-23	185
3-4	175	13-14	195	23-24	190
4-5	195	14-15	181	24-25	195
5-6	195	15-16	196	25-26	176
6-7	196	16-17	180	26-27	170
7-8	186	17-18	188	27-28	185
8-9	185	18-19	186		
9-10	200	19-20	195		

HU-91-045-018: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-2	X	X	253
2-4	X	X	256
4-6	X	X	259
6-8	X	X	261
8-10	X	X	262
10-12	X	X	271
12-14	X	X	273
14-16	X	X	277
16-18	X	X	282
18-20	X	X	288
20-22	X	X	290
22-24	X	X	291
24-26	X	X	294
26-28	X	X	297

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-4	5	1 x 2	---	---	---	---	---
4-8	5	2 x 2	---	---	---	---	---
8-10	5	4 x 2	4	---	---	---	---
10-12	5	4 x 2	2	---	---	---	---
12-16	5	4 x 2	6	---	---	---	---
16-18	5	4 x 2	5	4	---	---	---
18-20	5	4 x 2	2	---	---	---	---
20-22	5	4 x 2	5	7	---	---	---
22-24	5	4 x 2	3	---	---	---	---
24-26	5	3 x 2	---	---	---	---	---
26-28	5	4 x 2	2	---	---	---	---

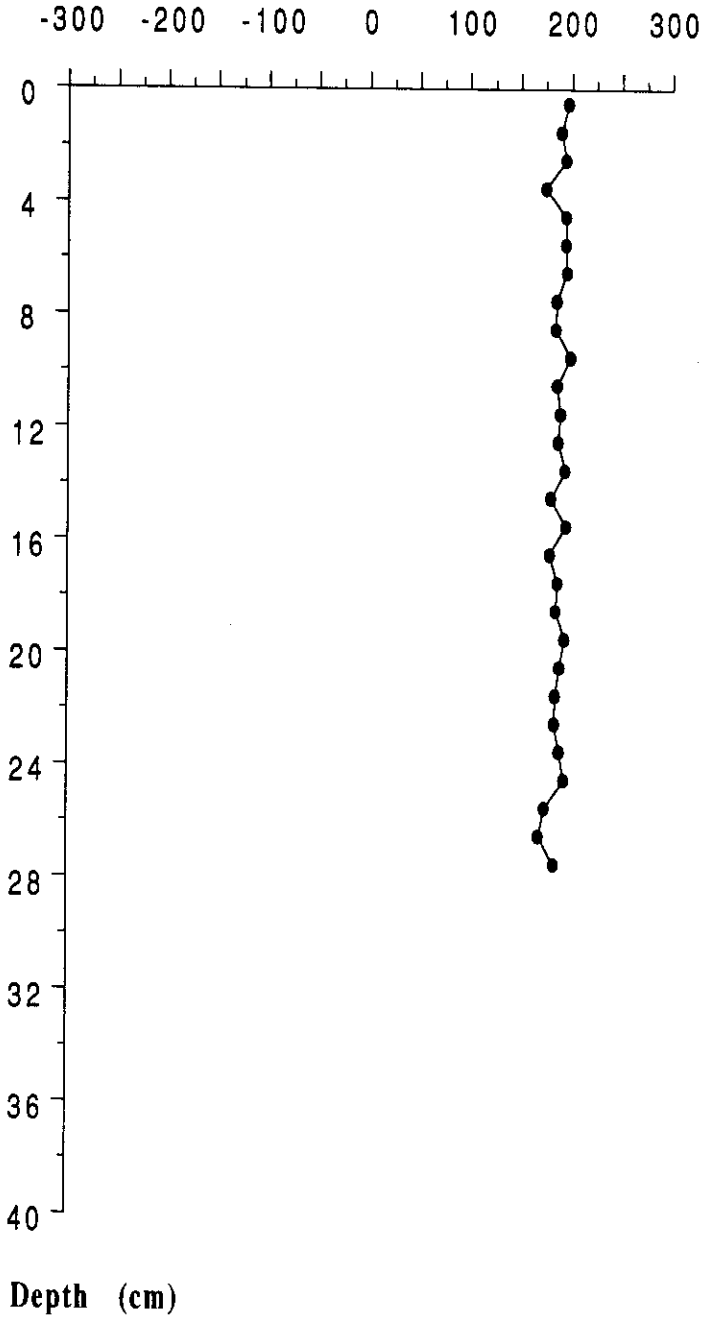
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 16, p. 61). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at the following depth intervals (in cm): 10-12, 19-21, 29-31, 38-40.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 6
Location: Labrador Slope
Station Number: 018 BC

Figure 15: Redox potential



Julian Day: 290
GMT: 15:27
Water Depth: 2648 m
Latitude: 55° 02.062
Longitude: 52° 07.777

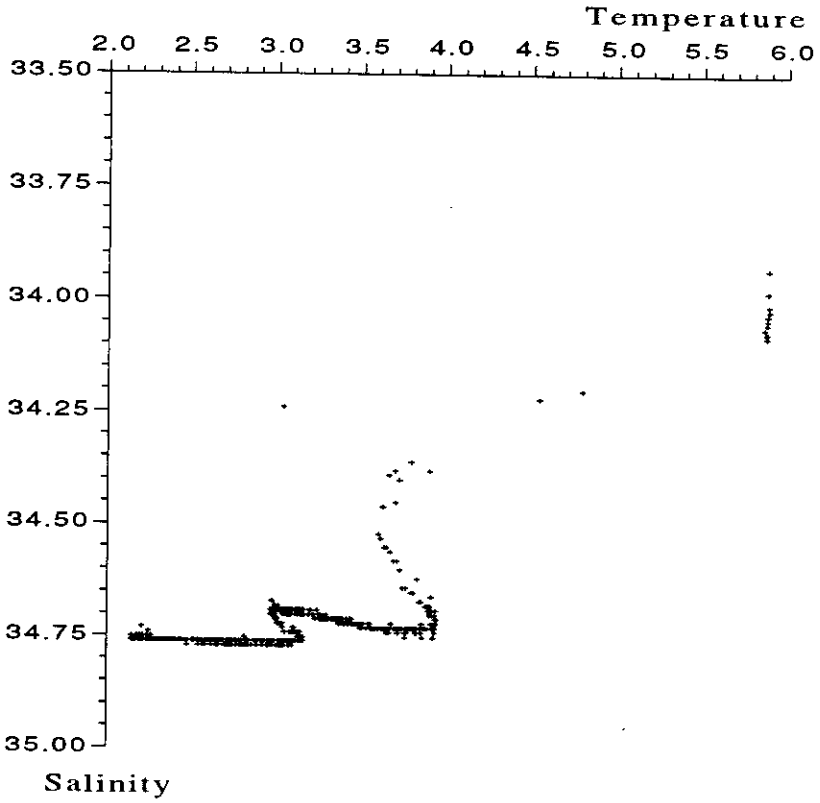
HU-91-045-019: CTD

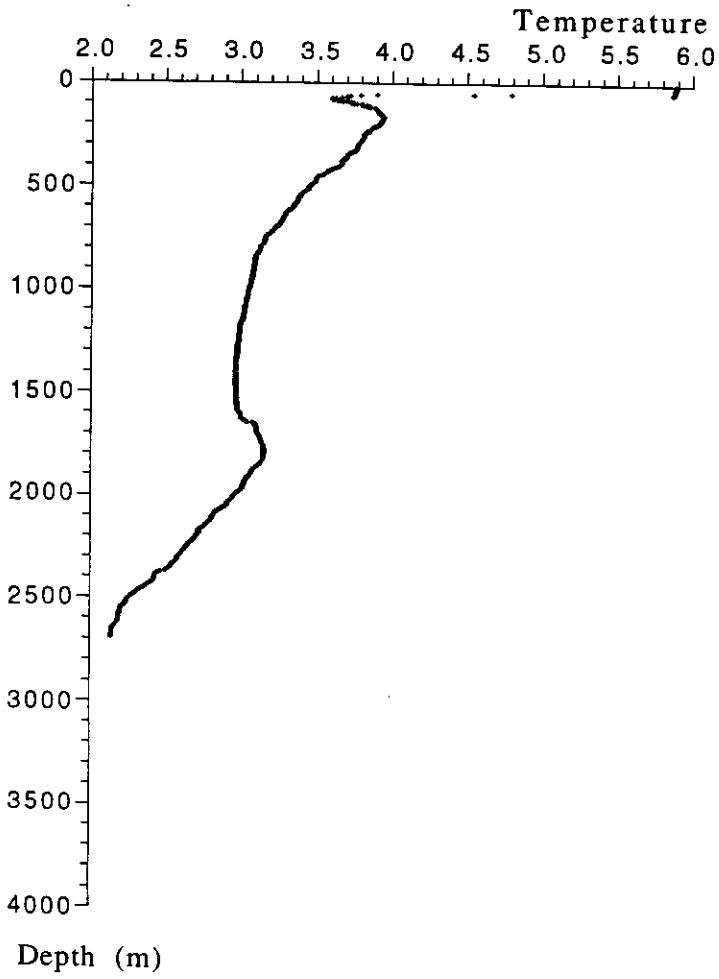
Julian day:	290	GMT Time:	12:47
Latitude:	55°01.99 N	Longitude:	52°07.88 W
Water depth:	2648 m		
Location:	Labrador slope		

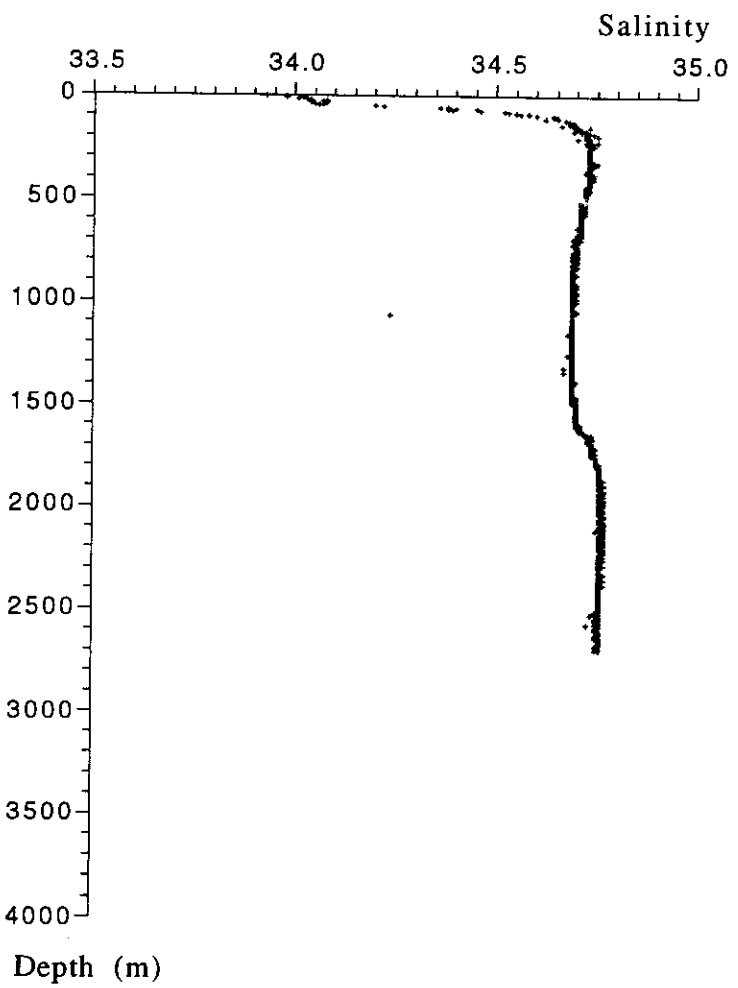
See figure 17, next page.

Figure 17: CTD cast

Cruise Number : HU-91-045
Site Number: 6
Station Number: 019
Location: Labrador Slope
Julian Day: 290
GMT: 12:47
Water Depth: 2648 m
Latitude: 55° 01.99'
Longitude: 52° 07.88'







HU-91-045-020: TW & P coring

Julian day:	290	GMT Time:	18:51
Latitude:	55°02.13 N	Longitude:	52°07.75 W
Water depth:	2648 m		
Location:	Labrador slope		

Trigger Weight Core (TWC)

App. penetr.: 70 cm
Core length: 224 cm

Description: Sediments are generally rich in foraminifer and show the alternance of grayish brown, gray and brown mud as follows:
0-7 cm: dark grayish brown (10 YR 4/2) muddy sand with abundant foraminifers (presence of a pebble between 5 and 10 cm);
7-66 cm : grayish brown (10YR-2.5 Y 5/2) sandy mud with brown mud mottles;
66-93 cm: dark gray (5Y 4/1) clayey mud with increased abundance of foraminifers at the base;
93-107 cm: gray (5Y 5/1) sandy-silty mud;
107-114 cm: dark gray (5Y 4/1) mud;
114-120 cm: brown (10YR 5/3) silty-sandy mud with grayish mottles;
120-128 cm: grayish brown (2.5 Y 5/2) clayey mud with sandy mottles;
128-133 cm: grayish brown (2.5 Y 5/2) sandy mud;
133-138 cm: light brownish gray (10 YR 6/2) sandy-silty mud;
138-154 cm: dark gray (5Y 4/1) sandy mud;
154-164 cm grayish brown (2.5 Y 5/2) sandy-silty mud;
164-177 cm: dark gray (5Y 4/1) sandy mud with gravel;
177-203 cm: grayish brown (2.5 Y 5/2) sandy-silty mud grading to gray (5Y 5/1) sandy clay with clayey clasts and gravel;
203-224 cm: dark gray (5Y 4/1) sandy mud.

HU-91-045-020: TW & P coring (continued)

Subsampling: Magnetic susceptibility has been measured at 5 cm intervals (figure 16, next page). The core was then split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 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). Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	93-95	183-185
9-11	102-104	192-195
18-20	111.5-113.5	200-202
27-29	121.5-123.5	210-212
36.5-38.5	131-133	219-221
46-48	140-142	
55-57	150-152	
65-67	157-159	
74-76	164-166	
83.5-85.5	173-175	

Piston Core

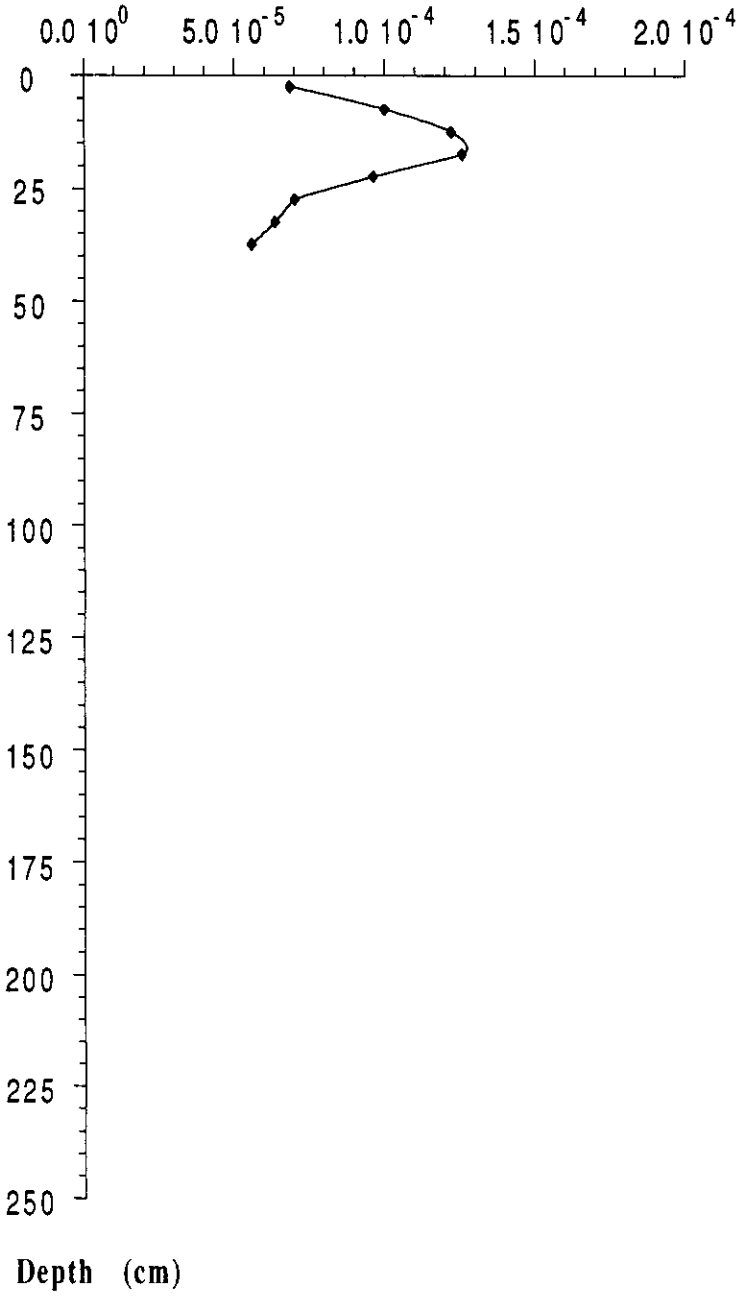
Corer length: 2100 cm
App. penetr.: 1250 cm
Core length: 0 cm (0 sections)

Note: the piston was jamed into the catcher.

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 6
Location: Labrador Slope

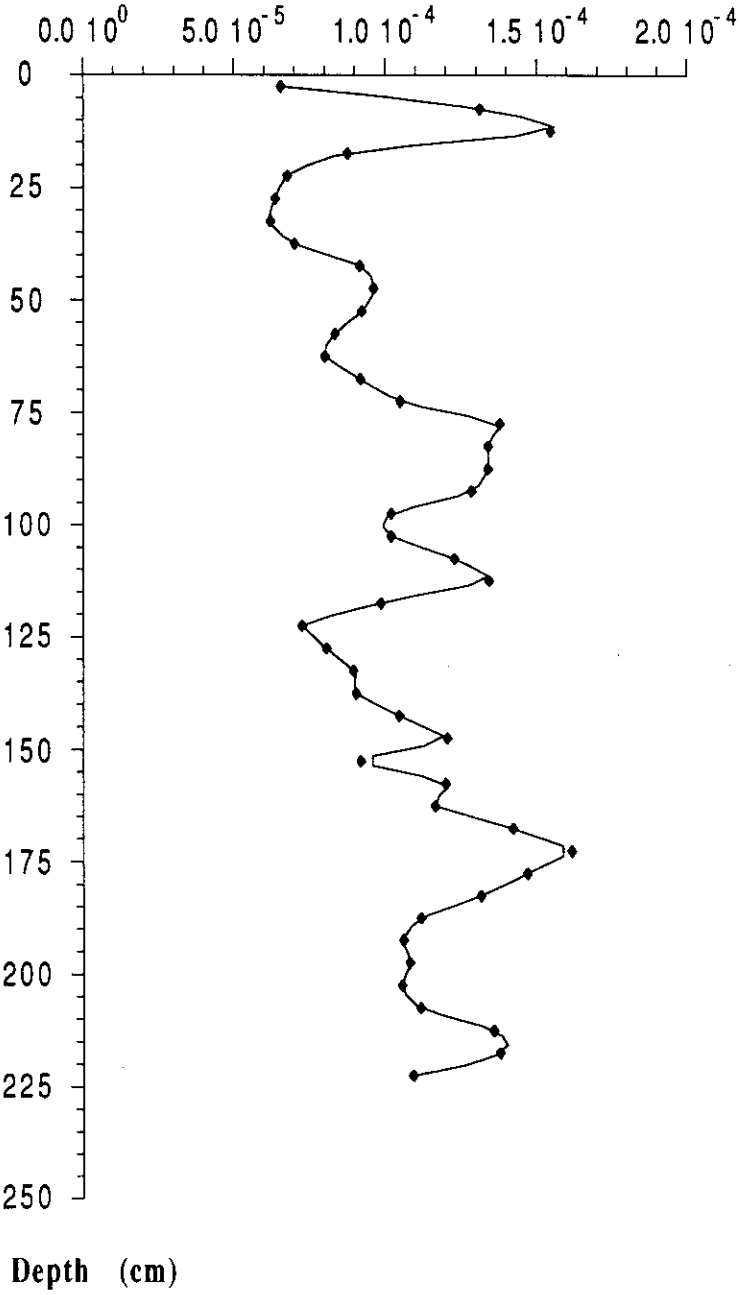
Figure 16

Station Number: 018 BC



Julian Day: 290
GMT: 15:27
Water Depth: 2648 m
Latitude: 55° 02.062
Longitude: 52° 07.777

Station Number: 020 TWC



Julian Day: 290
GMT: 18:51
Water Depth: 2648 m
Latitude: 55° 02.13
Longitude: 52° 07.75

HU-91-045-021: Water sampling

Julian day:	290	GMT Time:	22:35
Latitude:	55°24.62 N	Longitude:	51°36.15 W
Water depth:	2500 m		
Location:	Labrador slope		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A18	8 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A15	25.78 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 1200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A19	8 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A16	24.64 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-021: Water sampling (continued)

III- Depth sampled: 1800 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A20	32 L
GN6-A22	34 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A17	69.9 L
A19	32.4 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 2400 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A21	8 L
GN6-A23	12 L
GN6-A24	12 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A18	23.62 L
A 20	12 L
A 21	12 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at the following water depths: 10 m, 100 m, 200 m, 700 m, 1200 m, 1600 m, 1800 m, 2000 m, 2200 m, 2400 m.

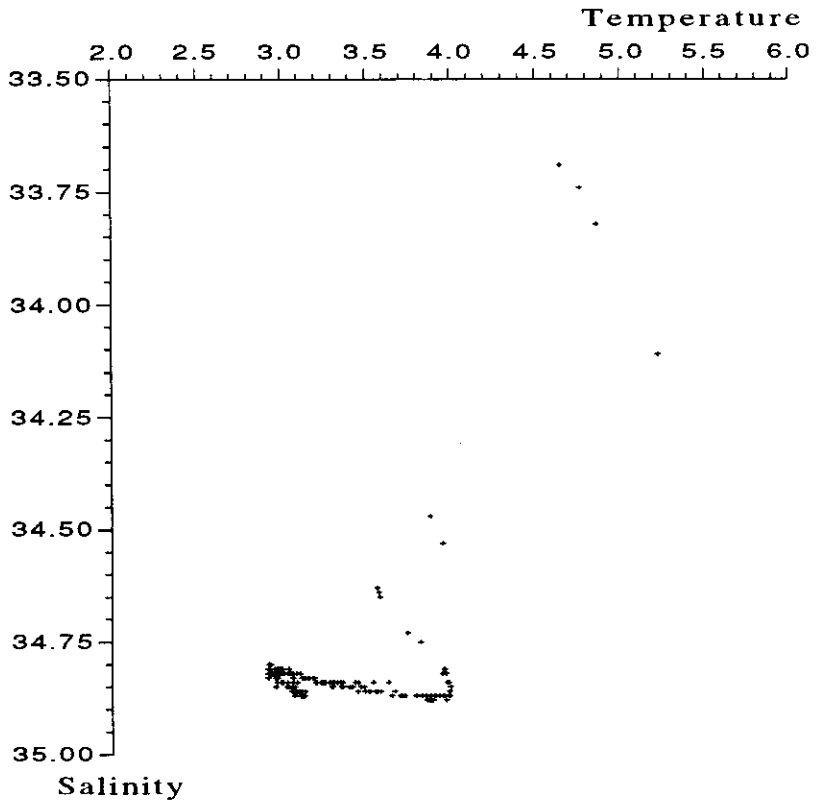
HU-91-045-022: CTD

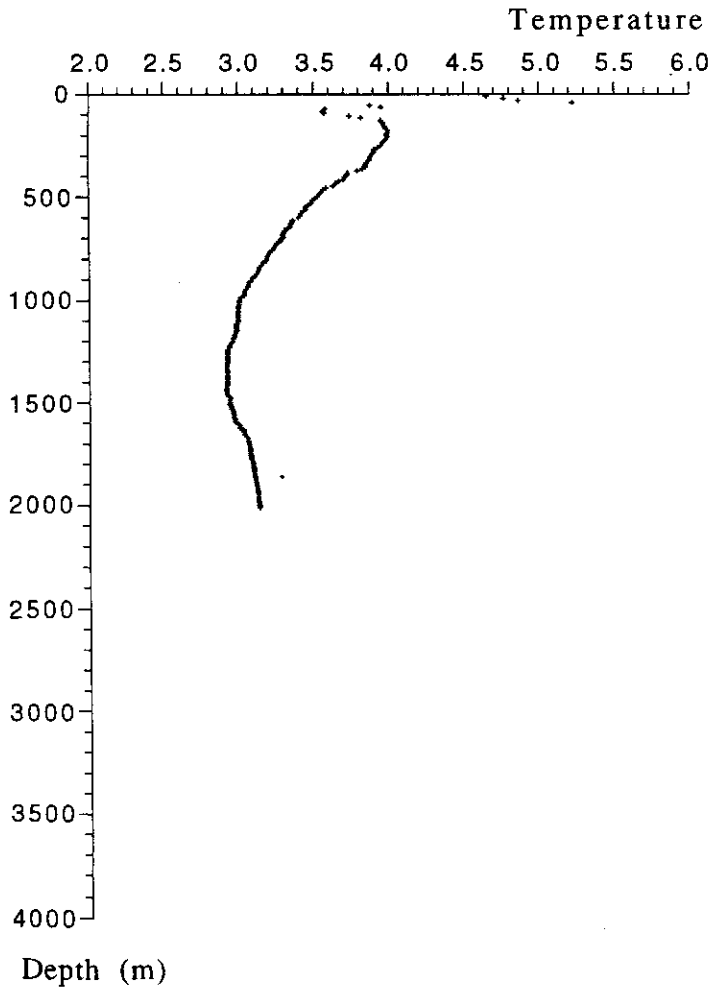
Julian day:	291	GMT Time:	12:30
Latitude:	54°54.05 N	Longitude:	52°44.73 W
Water depth:	1984 m		
Location:	Labrador slope		

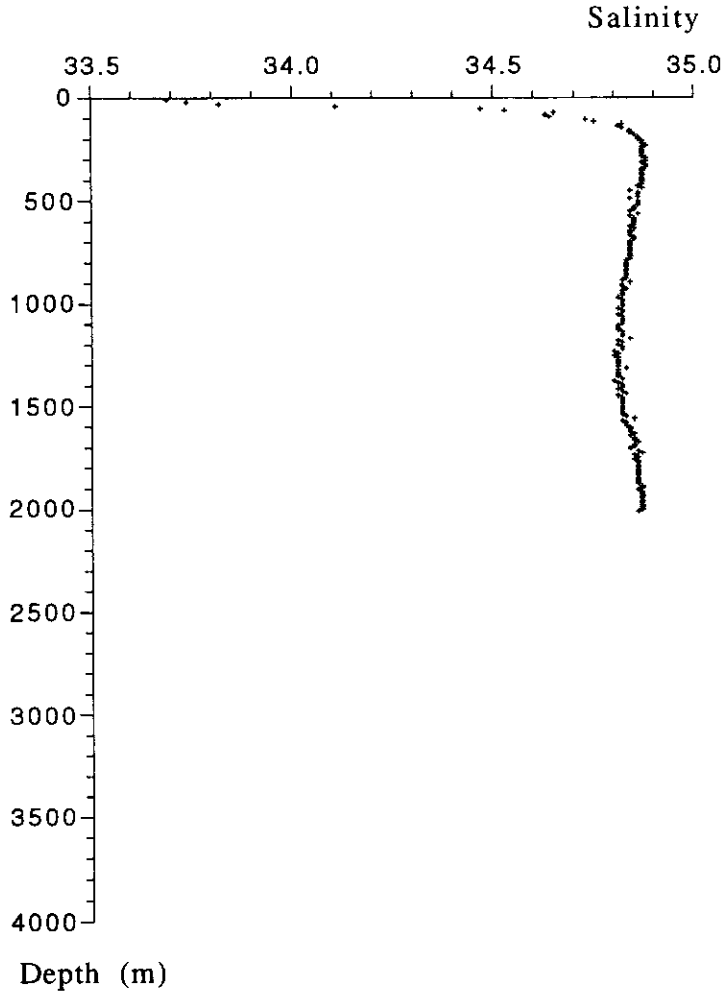
See figure 18, next page.

Figure 18: CTD cast

Cruise Number : HU-91-045
Site Number: 5
Station Number: 022
Location: Labrador Slope
Julian Day: 291
GMT: 12:30
Water Depth: 1984 m
Latitude: 54° 54.05'
Longitude: 52° 44.73'







HU-91-045-023: Box coring

Julian day:	291	GMT Time:	12:30
Latitude:	54°54.04 N	Longitude:	52°44.72 W
Water depth:	1984 m		
Location:	Labrador slope		

Penetration: 42 cm

Description: Surface sediments (0-3 cm) consist of dark grayish brown (2.5Y 4/2) muddy sand with pebble; algae and macrofauna are observed.
Sub-surface sediments consist of grayish brown and dark mud as follows:
3-19 cm: grayish brown (2.5Y 5/2) sandy mud;
19-31 cm: grayish brown (2.5Y 5/2) clayey mud with sand and gravel;
31-40 cm: dark gray (5Y 4/1) sandy mud;
40-42 cm: dark grayish brown (2.5Y 4/2) silty mud.

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
4 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 7 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

<u>On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:</u>

1. 1. Redox potential measurements (see figure 19, p. 69)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	167	10-11	133	20-21	47
1-2	190	11-12	124	21-22	45
2-3	182	12-13	131	22-23	53
3-4	174	13-14	105	23-24	36
4-5	170	14-15	143	24-25	67
5-6	170	15-16	122	25-26	10
6-7	163	16-17	149	26-27	0
7-8	173	17-18	107		
8-9	156	18-19	80		
9-10	147	19-20	86		

HU-91-045-023: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-2	X	X	218
2-4	X	X	220
4-6	X	X	223
6-8	X	X	252
8-10	X	X	254
10-12	---	---	---
12-14	X	X	267
14-15	X	X	276
15-16	X	X	276
16-17	X	X	284
17-18	X	X	286
18-20	X	X	288
20-22	X	X	289
22-23	X	X	292
23-24	X	X	295
24-25	X	X	298
25-26	X	X	300
26-27	X	X	266

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	5	4 x 2	1	---	---	---	---
2-4	5	4 x 2	5	3	---	---	---
4-6	5	4 x 2	3	---	---	---	---
6-8	5	4 x 2	5	---	---	---	---
8-10	5	4 x 2	5	---	---	---	---
10-12	---	---	---	---	---	---	---
12-14	5	4 x 2	5	---	---	---	---
14-15	5	---	---	---	---	---	---
15-16	5	4 x 2	5	---	---	---	---
16-18	5	2 x 2	---	---	---	---	---
18-20	5	1 x 2	---	---	---	---	---
20-23	5	1 x 2	---	---	---	---	---
23-24	5	3 x 2	---	---	---	---	---
24-25	5	2 x 2	---	---	---	---	---
25-26	3	---	---	---	---	---	---
26-27	5	3 x 2	---	---	---	---	---

Note: squeezed sediments are saved in separate bags.

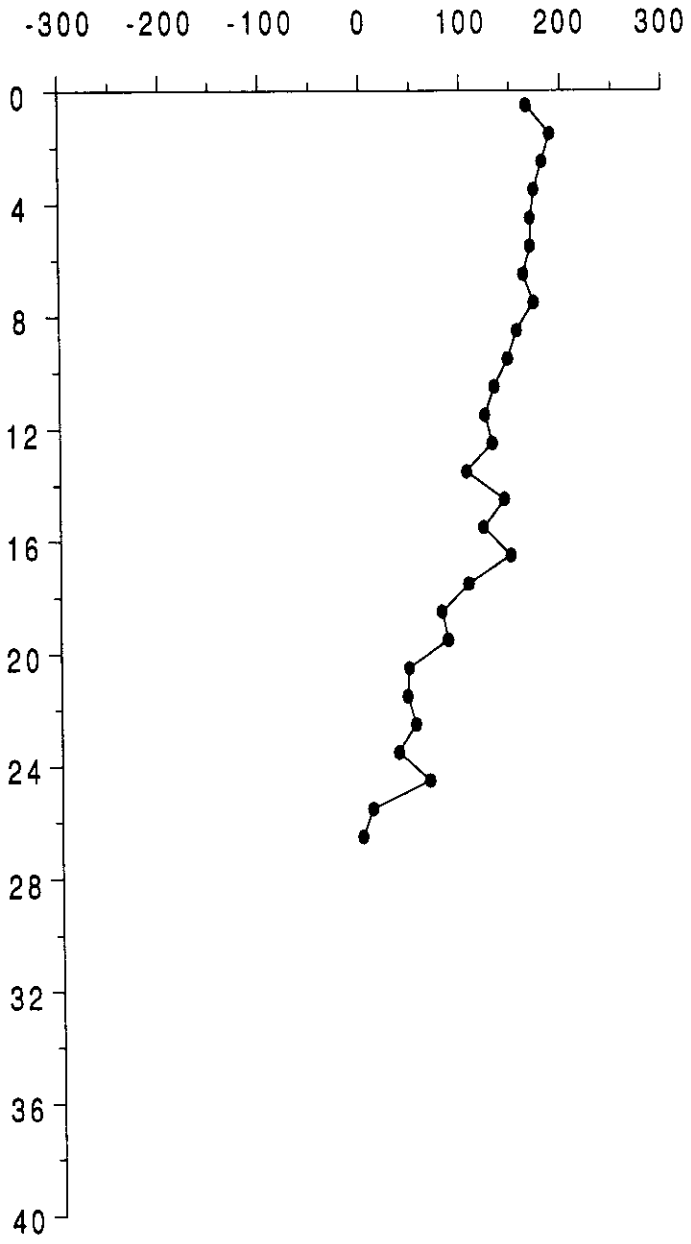
HU-91-045-023: Box coring (continued)

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 20, p. 72). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at the following depth intervals (in cm): 0-2, 9-11, 18-20, 28-30, 39.5-41.5.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 5
Location: Labrador Slope
Station Number: 023 BC

Figure 19: Redox potential



Julian Day: 291
GMT: 12:30
Water Depth: 1984 m
Latitude: 54° 54.041
Longitude: 52° 44.717

HU-91-045-024: TW & P coring

Julian day:	291	GMT Time:	14:15
Latitude:	54°54.04 N	Longitude:	52°44.59 W
Water depth:	1984 m		
Location:	Labrador slope		

Trigger Weight Core (TWC)

App. penetr.: full
Core length: 151 cm

Description: Sediments consists of brownish to gray sandy to clayey mud as follows:
0-1 cm: dark grayish brown (2.5 Y 4/2) muddy sand;
1-22 cm: grayish brown (2.5 Y 5/2) sandy mud with gravel;
22-46 cm: gray (5Y 4/1) to grayish brown (2.5Y 5/2) sandy mud with gravel;
46-88 cm: dark gray (5Y 4/1) sandy mud;
88-94 cm: gray (5Y 5/1) sandy clay;
94-139 cm: dark gray (5Y 4/1) sandy mud with gravel;
139-151 cm dark gray (5Y 4/1) clayey mud.

Subsampling: Magnetic susceptibility has been measured at 5 cm intervals (figure 20, p. 72). The core was then split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 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). Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)	
2-4	102-104
11-13	111-113
21-23	120-122
29-31	129-130
49-51	139-141
55-57	148-150
65-67	
77-79	
83-85	
92-94	

HU-91-045-024: TW & P coring (continued)

Piston Core

Corer length: 1500m
App. penetr.: 500 cm
Core length: 454 cm (3 sections + cutter)

Description: Below the grayish brown surface sediments, deposits consist mainly of an alternance of gray and dark gray clayey and sandy mud as follows:
0-2 cm: grayish brown (2.5 Y 5/2) sandy mud;
2-14 cm: dark gray (5Y 4/1) sandy mud with gravel;
14-170 cm: dark gray (10YR-5Y 4/1) clayey mud;
170-197 cm: dark gray (5Y 4/1) sandy mud with few pebbles;
197-288 cm: dark gray (5Y 4/1) clayey to sandy mud with gravel and clayey clasts;
288-295 cm: grayish brown (2.5Y 5/2) sandy-silty mud;
295-306 cm: gray (5Y 5/1) silty mud with few pebbles;
306-333 cm: dark gray (5Y 4/1) clayey mud;
333-356 cm: dark gray (5Y 4/1) sandy clay;
356-372 cm: gray (5Y 5/1) clayey mud;
372-381 cm: dark gray (5Y 4/1) sandy mud;
381-454 cm: dark gray (5Y 4/1) clayey mud.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 21, p. 73).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

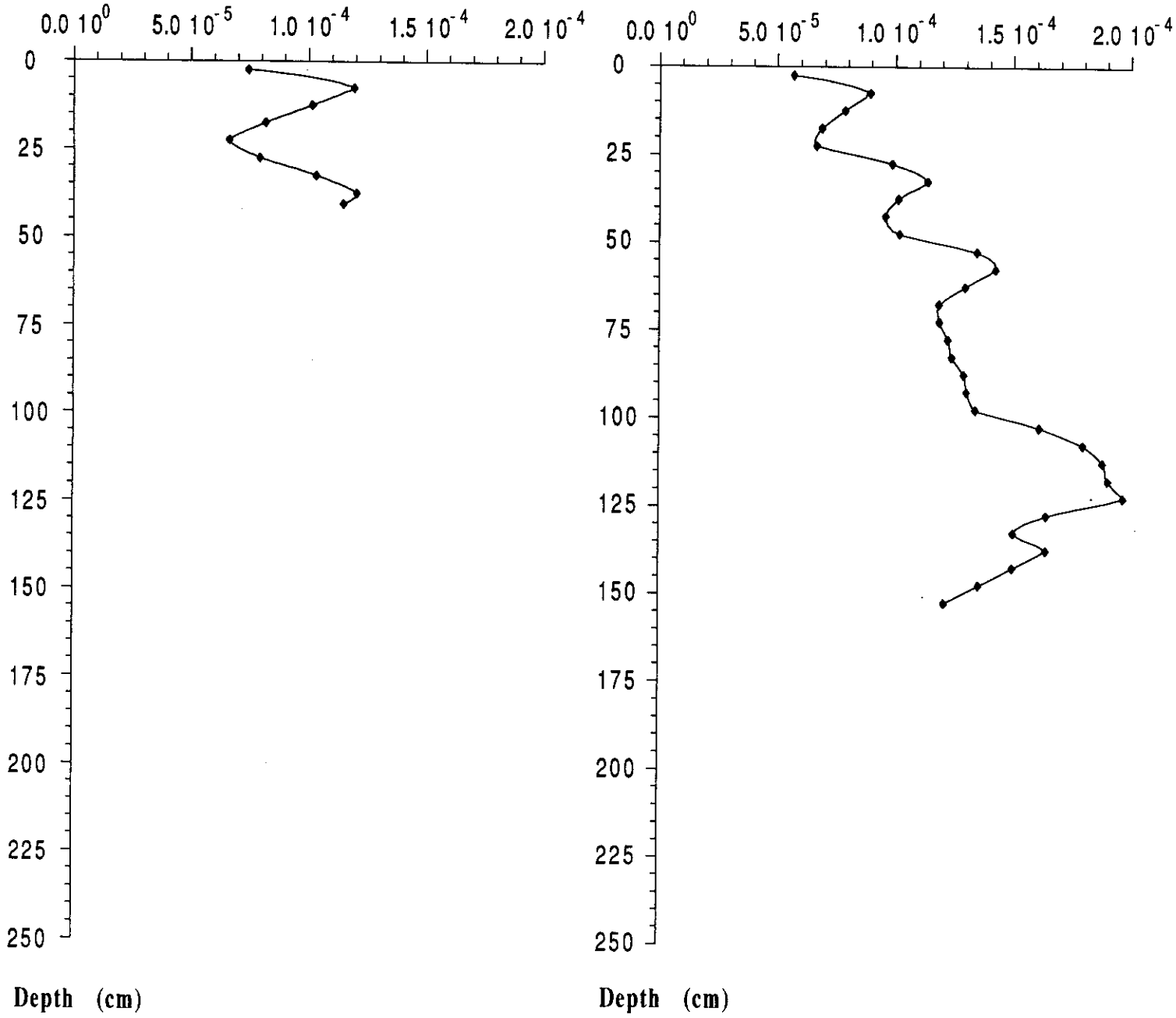
Sampling depth (cm.)

0-2	97-99	190-192	280-283	373-375
15-17	106-108	200-202	290-293	382-384
24-26	115-117	211.5-213.5	301-303	391-393
33-35	125-127	221.5-223.5	310-312	399-401
42-44	133-135	230-232	317-319	408-410
52-54	142-144	239-241	326-328	418-420
61-63	151-153	243	335-337	427-429
69.5-71.5	163-165	251-253	345-347	436-438
79-81	172-174	259-261	354-356	446-448
88-90	181-183	265-267	366-368	452-454

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 4
Location: Labrador Slope
Station Number: 023 BC

Figure 20

Station Number: 024 TWC

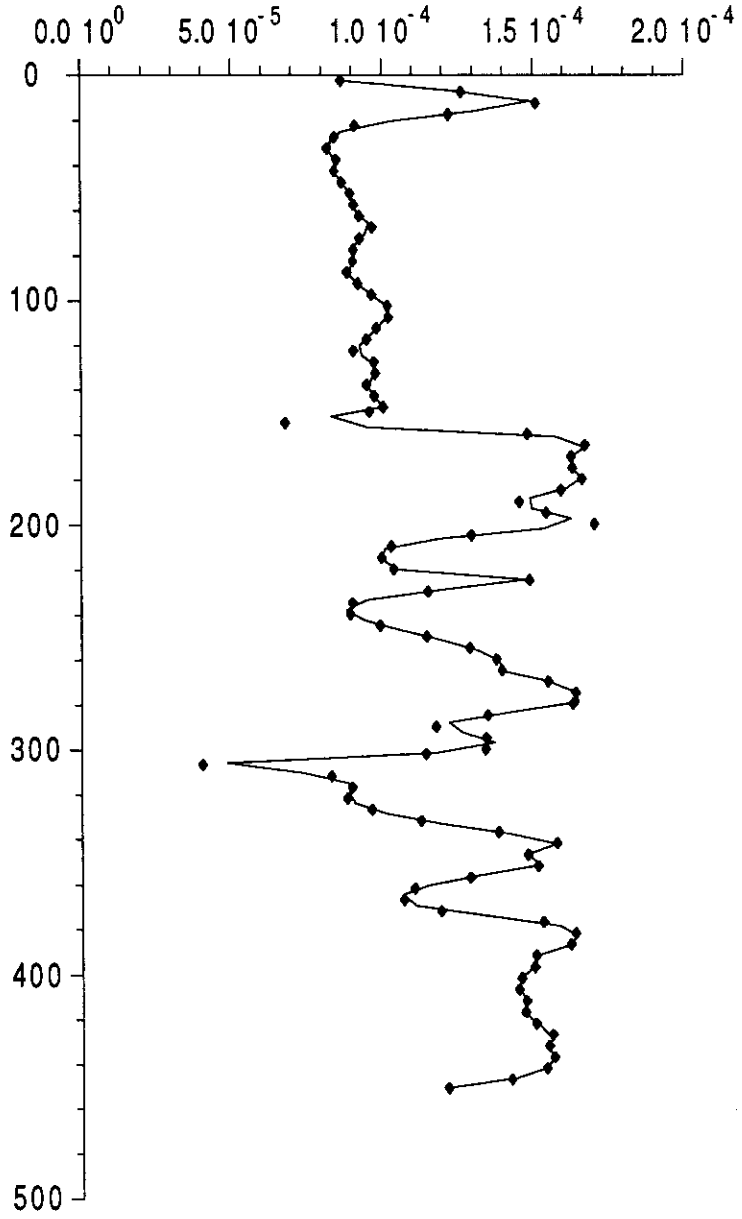


Julian Day: 291
GMT: 12:30
Water Depth: 1984 m
Latitude: 54° 54.041
Longitude: 52° 44.717

Julian Day: 291
GMT: 14:15
Water Depth: 1984 m
Latitude: 54° 54.04
Longitude: 52° 44.59

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 4
Location: Labrador Slope
Station Number: 024 PC

Figure 21



Julian Day: 291
GMT: 14:15
Water Depth: 1984 m
Latitude: 54° 54.04
Longitude: 52° 44.59

HU-91-045-025: TW & P coring

Julian day:	291	GMT Time:	18:42
Latitude:	55°02.09 N	Longitude:	52°07.83 W
Water depth:	2648 m		
Location:	Labrador slope		

Trigger Weight Core (TWC)

App. penetr.: full
Core length: 171 cm (+ cutter)

Description: Sediment consist of brown, grayish brown and gray mud or sandy mud as follows:
0-6 cm: dark grayish brown (10YR 4/2) muddy sand rich in foraminifers (pebble at the surface);
6-20 cm: dark grayish brown (2.5Y 4/2) sandy mud;
20-30 cm: brown (10YR 4/3) clayey mud with sandy clasts or mottles;
30-71 cm: grayish brown (10YR 5/2) clayey mud grading to dark grayish brown (2.5Y 4/2) silty-sandy mud;
71-82 cm: dark gray (5Y 4/1) mud with grayish brown clasts;
82-107 cm: dark gray (5Y 4/1) sandy mud grading to gray (5Y 5/1)sandy mud with abundant foraminifers;
107-139 cm: grayish brown (2.5 Y 5/2) silty clay grading to dark gray (5Y 4/1) sandy mud;
139-169 cm: gradual succession of dark grayish brown (10 YR 4/2) sandy mud, grayish brown (2.5Y 5/2) silty mud, dark gray (5Y 4/1) sandy mud rich in foraminifers, gray (5Y 5/1) silty mud with gravel and gray (5Y 5/1) sandy-silty mud.

Subsampling: Magnetic susceptibility has been measured at 5 cm intervals (figure 22, p. 77). The core was then split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 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). Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

11-13	112-114
21-23	121.5-123.5
30-32	131-133
40-42	141-143
49-51	150-152
58-60	159-161
68-70	168-169
77-79	
92-94	
101-103	

HU-91-045-025: TW & P coring (continued)

Piston Core

Corer length: 1500 cm
App. penetr.: 1200 cm
Core length: 1135 cm (8 sections + cutter)

Description: Sediment consist of brown, grayish brown and gray or dark gray clayey mud to sandy mud as follows:
0-6 cm: dark grayish brown (10YR 4/2) muddy sand rich in foraminifers (pebble at the base);
6-14 cm:
14-18 cm: dark grayish brown (10YR 4/2) silty clay;
18-22 cm: grayish brown (2.5Y 5/2) sandy mud;
22-28 cm: brown (10YR 4/3) silty mud;
28-74 cm: grayish brown (2.5Y 5/2) clayey mud grading to grayish brown (2.5Y 4/2) sandy mud;
74-78 cm: dark gray (5Y 4/1) sandy clay;
78-81 cm: grayish brown (2.5 Y 5/2) silty mud;
81-115 cm: dark gray (5Y 4/1) sandy mud grading to gray (5Y 5/1) sandy mud with abundant foraminifers;
115-154 cm: grayish brown (2.5 Y 5/2) silty clay grading to dark gray (5Y 4/1) sandy mud;
154-192 cm: grayish brown (2.5 Y 5/2) silty mud with clayey clasts;
192-214 cm: dark gray (5Y 4/1) clayey mud grading to dark gray (5Y 4/1) sandy mud with abundant foraminifers;
214-513 cm: dark gray (5Y-10YR 4/1) clayey mud with zones characterized by barely visible color laminations;
513-594 cm: dark gray (5Y 4/1) silty mud with a few sandy to gravelly mud layers;
594-630 cm: dark gray (5Y 4/1) to gray (5Y 5/1) sandy mud rich in foraminifers;
630-658 cm: dark grayish brown (2.5Y 4/2) clayey mud;
658-690 cm: dark gray (5Y 4/1) mud rich in foraminifers grading dark grayish brown (2.5Y 4/2) clayey mud;
690-720 cm: grayish brown (2.5Y 5/2) clayey mud grading to dark gray ((5Y 4/1) clayey mud;
720-761 cm: alternance of dark gray (5Y 4/1) mud layers rich in foraminifers (N=3) and dark gray (10YR-5Y 4/1) clayey mud layers (N=2);
761-813 cm: dark gray (10YR-5Y 4/1) clayey mud;
813-826 cm: dark gray (5Y 4/1) sandy-silty mud grading to dark grayish brown (2.5Y 4/2) sandy-silty mud;
826-852 cm: dark gray (5Y 4/1) sandy-gravelly mud with pebbles;
852-923 cm: dark gray (5Y 4/1) silty to sandy clay with gravel with dark grayish brown (2.5Y 4/2) silty mud layers at 902-904 and 923-926 cm;
923-962 cm: dark grayish brown (2.5Y 4/2) silty mud;
962-967 cm: dark gray (5Y 4/1) mud rich in foraminifers;
967-1135 cm: dark gray (10YR-5Y 4/1) clayey mud.

HU-91-045-025: TW & P coring (continued)

Subsampling: Magnetic susceptibility has been measured at 5 cm intervals (figure 23, p. 78). The core was then 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 stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore (see appendix 2). Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm.)

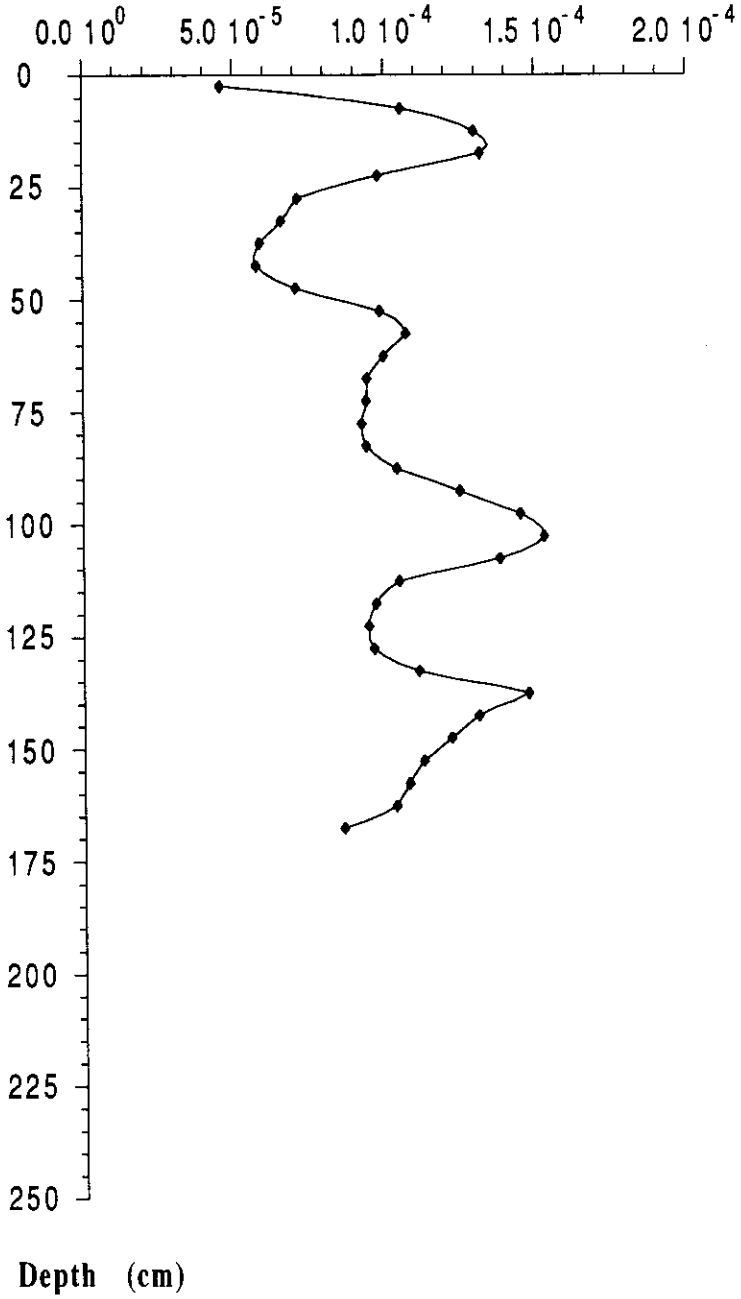
0-2	77-79	171-173	268-270	359-361
8-10	86-88	181-183	277-279	368-370
12-14	95-97	190-192	286-288	376-378
23	105-107	200-202	295-297	387-389
24-27	115-117	210-212	304-306	397-399
31-33	124-126	219-221	313-315	405-407
41-43	133-135	228-230	322-324	415.5-417.5
50-52	143-145	238-240	332-335	425-427
60-62	152-154	247-249	341-343	435-437
69-71	162-164	256-258	350-352	444-446

454-456	553-555	661-663	753-755	850-852
464-466	567-569	672-674	764-766	856-858
474-476	580-582	681.5-683.5	773-775	864-866
484-486	590-592	686-688	783-785	875-877
493-495	600-602	693-695	790-792	884-886
502-504	613.5-615.5	703-705	800-802	894-896
512-514	622-624	712-714	810-812	903-905
521-523	632.5-634.5	722-724	819-821	905-907
530-532	642-644	732-734	826-828	915-916
539-541	651.5-653.5	742-744	834-836	925-927

935-937	1011-1013	1096-1098
945-947	1021-1023	1106.5-1108.5
956-958	1031-1033	1116-1118
964-966	1041-1043	1125.5-1127.5
974-976	1050-1052	1130-1132
983-985	1059-1061	
987-989	1068-1070	
992-994	1078-1080	
1002-1004	1087.5-1089.5	

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 6
Location: Labrador Slope
Station Number: 025 TWC

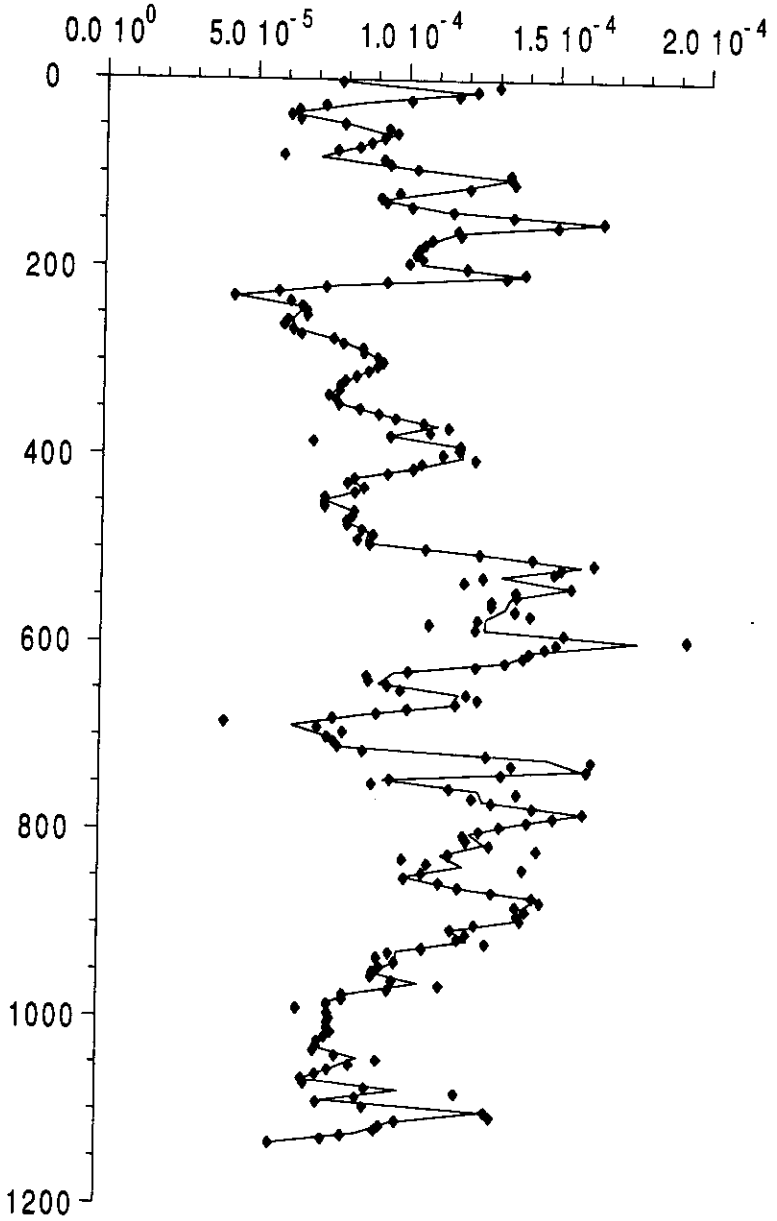
Figure 22



Julian Day: 291
GMT: 18:42
Water Depth: 2648 m
Latitude: 55° 02.09
Longitude: 52° 07.83

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 6
Location: Labrador Slope
Station Number: 025 PC

Figure 23



Julian Day: 291
GMT: 18:42
Water Depth: 2648 m
Latitude: 55° 02.09
Longitude: 52° 07.83

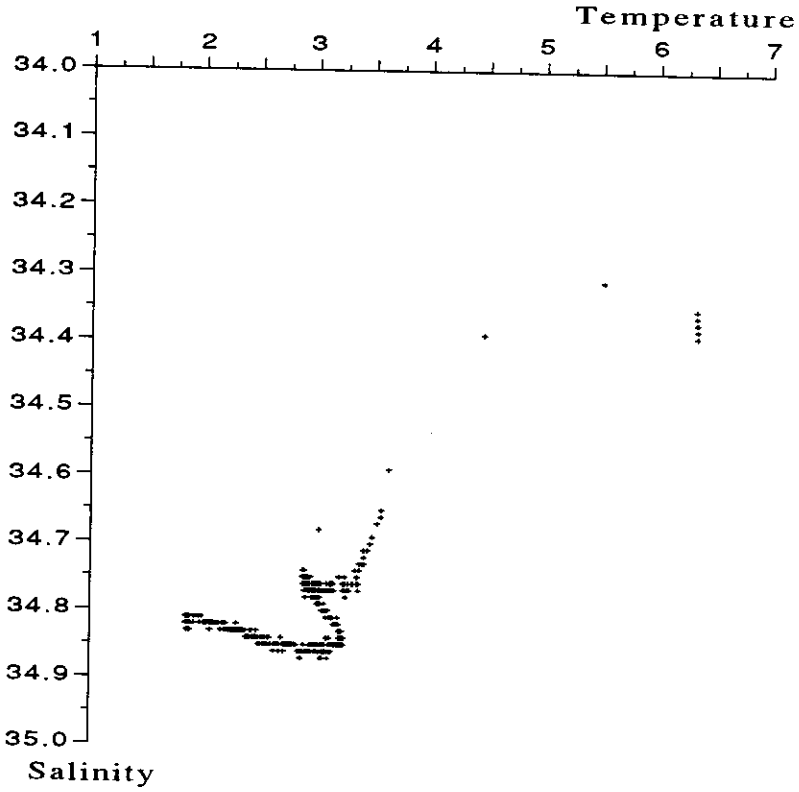
HU-91-045-026: CTD

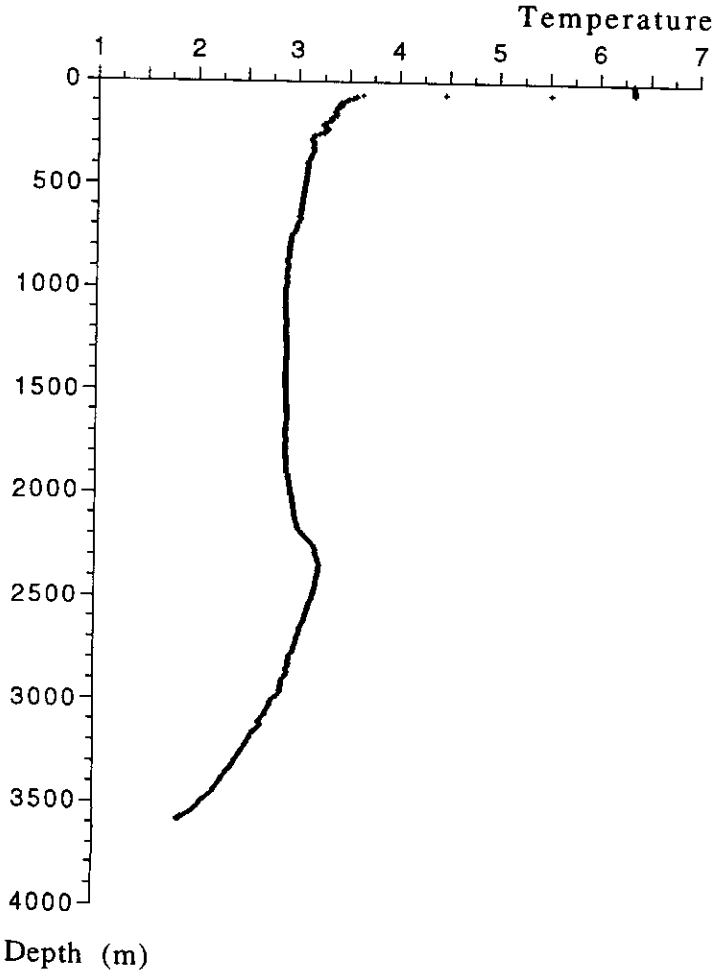
Julian day:	292	GMT Time:	08:05
Latitude:	56°37.84 N	Longitude:	49°45.67 W
Water depth:	3550 m		
Location:	Central Labrador Sea		

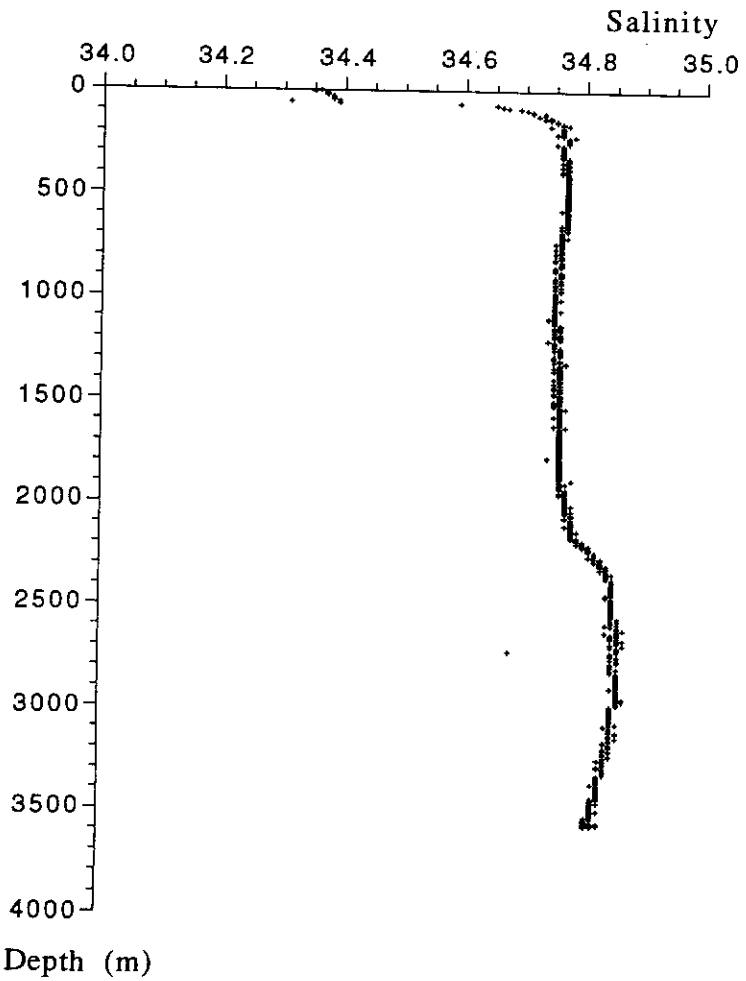
See figure 24, next page.

Figure 24: CTD cast

Cruise Number : HU-91-045
Site Number: 7
Station Number: 026
Location: Central Labrador Sea
Julian Day: 292
GMT: 08:05
Water Depth: 3550 m
Latitude: 56° 37.85'
Longitude: 49° 45.67'







HU-91-045-027: Water sampling

Julian day: 292 GMT Time: 05:52
Latitude: 56°37.05 N Longitude: 49°45.06 W
Water depth: 3612 m
Location: Central Labrador Sea

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A25	10 L
GN6-A30	12 L
GN6-A33	12 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A22	11.1 L
A28	12 L
A30	12 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 1100 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A31	4 L
GN6-A40	4.8 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A29	15.54 L
A37	12 L

HU-91-045-027: Water sampling (continued)

III- Depth sampled: 2400 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A27	24 L
GN6-A28	28 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A24	54.8 L
A25	9 L
A27	34 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 3600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A26	18 L
GN6-A29	22 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A23	30 L
A 26	43.8 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at the following water depths:
10 m, 150 m, 250 m, 700 m, 1200 m, 1800 m, 2100 m, 2400 m, 3000 m, 3600 m.

HU-91-045-028: Box coring

Julian day:	292	GMT Time:	13:45
Latitude:	56°36.99 N	Longitude:	49°45.01 W
Water depth:	3992 m		
Location:	Central Labrador Sea		

Penetration: 33 cm

Description: Surface sediments (0-6 cm) are grayish brown (10YR 5/2) mud rich in foraminifers with a few gravels. Sub-surface sediments are heavily bioturbated. They consist of grayish brown to dark grayish brown (10YR 5-4/2) mud (6-28 cm) overlying dark gray (10YR 4/1) mud (28-33 cm).

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
4 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 7 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

<u>On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:</u>

1. Redox potential measurements (figure 25, p. 85)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	105	10-11	161	20-21	150
1-2	182	11-12	168	21-22	152
2-3	180	12-13	165	22-23	152
3-4	167	13-14	163	23-24	145
4-5	167	14-15	156	24-25	127
5-6	162	15-16	165	25-26	152
6-7	162	16-17	153	26-27	160
7-8	70	17-18	156	27-28	157
8-9	166	18-19	150	28-29	149
9-10	160	19-20	148		

HU-91-045-028: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-2	X	X	257
2-4	X	X	258
4-6	X	X	260
6-8	X	X	263
8-10	X	X	269
10-12	X	X	268
12-14	X	X	276
14-16	X	X	270
16-18	X	X	272
18-20	X	X	274
20-22	X	X	265
22-24	X	X	299
24-26	X	X	283
26-28	X	X	285
28-30	X	X	289

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	5	4 x 2	5	6	---	---	---
2-4	5	4 x 2	2	---	---	---	---
4-6	5	2 x 2	---	---	---	---	---
6-8	5	3 x 2	---	---	---	---	---
8-10	5	---	---	---	---	---	---
10-12	5	3 x 2	---	---	---	---	---
12-14	5	4 x 2	---	---	---	---	---
14-16	5	4 x 2	---	---	---	---	---
16-18	5	4 x 2	5	5	---	---	---
18-20	5	4 x 2	5	5	4	---	---
20-24	5	---	5	8	4	---	---
24-26	5	2 x 2	---	---	---	---	---
26-28	3	1 x1	---	---	---	---	---
28-30	5	4 x 2	---	---	---	---	---
			5	---	---	---	---

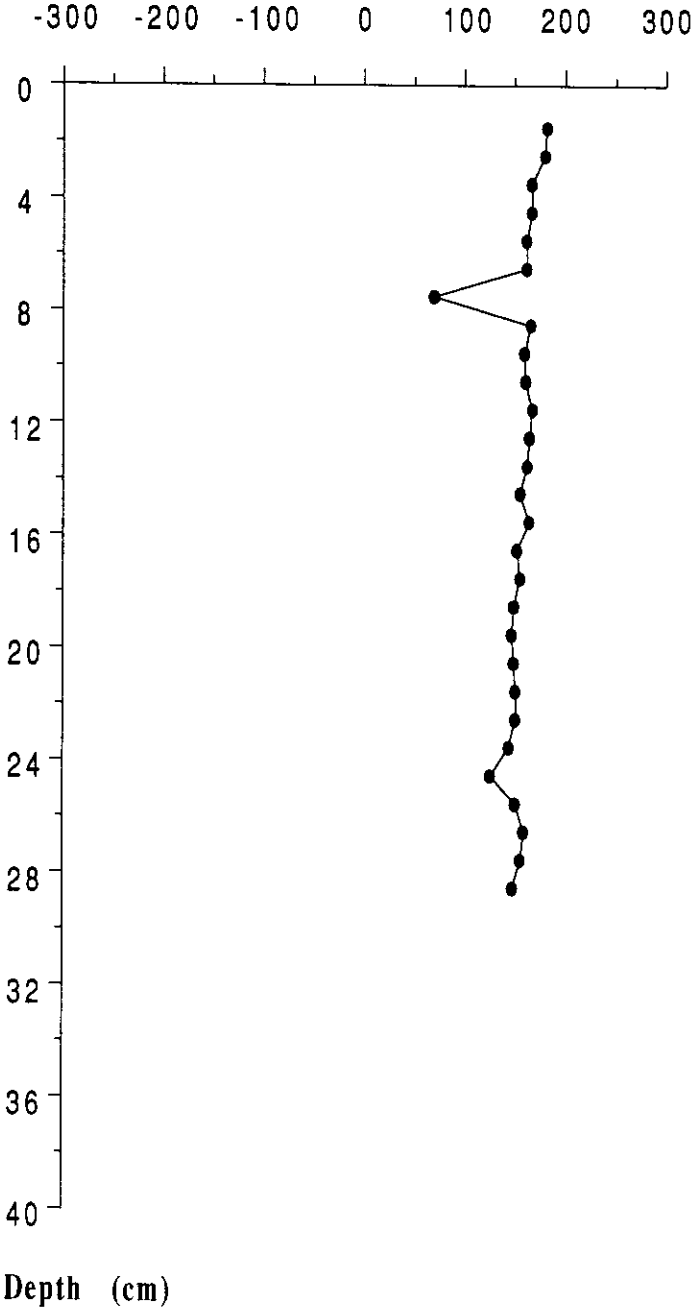
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 26, p. 87). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Continuous sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at the following depth intervals (in cm): 2-4, 11-13, 20-22, 25-27, 31-33.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 7
Location: Labrador Sea
Station Number: 028 BC

Figure 25: Redox potential



Julian Day: 292
GMT: 13:45
Water Depth: 3992 m
Latitude: 56° 36.997
Longitude: 49° 45.009

HU-91-045-029: TW & P coring

Julian day:	292	GMT Time:	20:28
Latitude:	56°36.98 N	Longitude:	49°45.04 W
Water depth:	3550 m		
Location:	Central Labrador Sea		

Trigger Weight Core (TWC)

App. penetr.: 100 cm
Core length: 49 cm (+ cutter)

Description: Sediments consist of brown to grayish brown mud as follows:
0-22 cm: olive brown (2.5Y 4/4) bioturbated mud;
22-46 cm: dark grayish brown (2.5Y 4/2) bioturbated mud with very dark grayish brown (2.5Y 4/3) silty lenses;
46-49 cm: very dark grayish brown (2.5Y 4/3) silts.

Subsampling: Magnetic susceptibility has been measured at 5 cm intervals (figure 26, next p.). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micro-paleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2
2-4
11-13
20-22
29-31
43-45
46-48

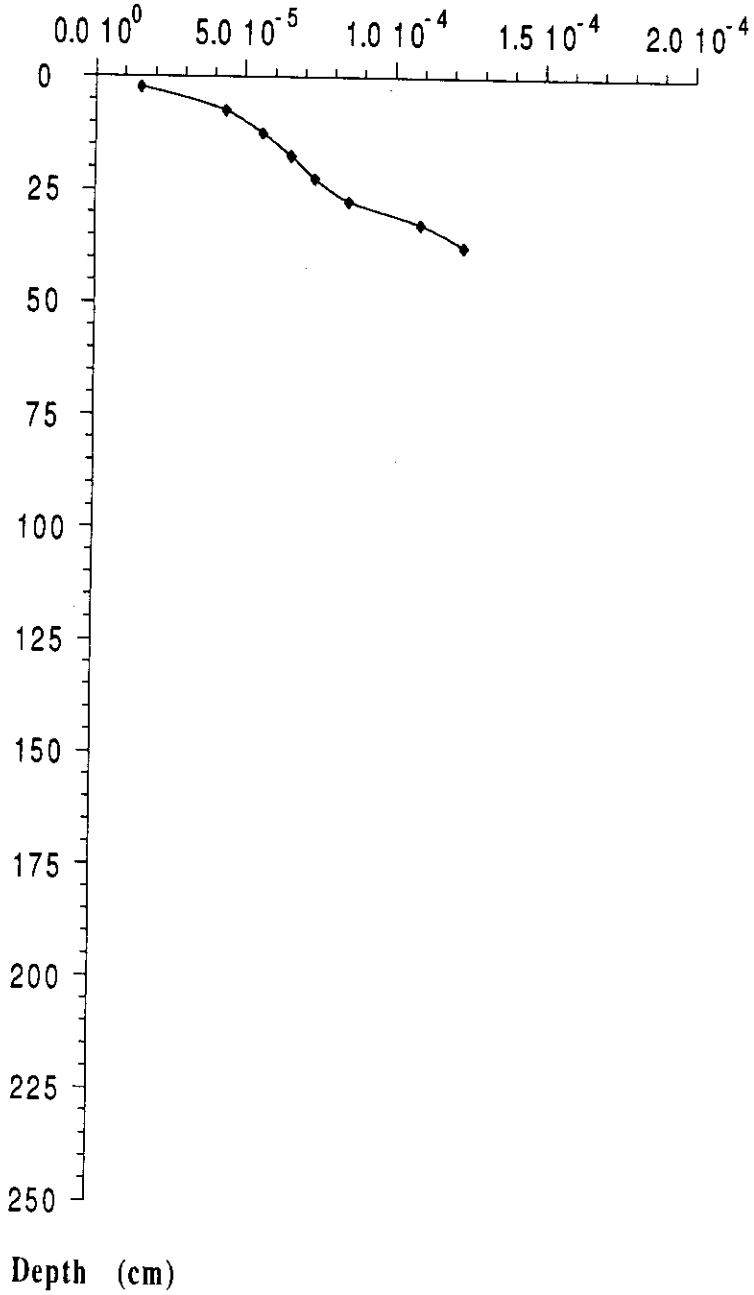
Piston Core

Corer length: 1500 cm
App. penetr.: 1250 cm
Core length: 0 cm (0 sections)

Note: the piston was jamed into the catcher.

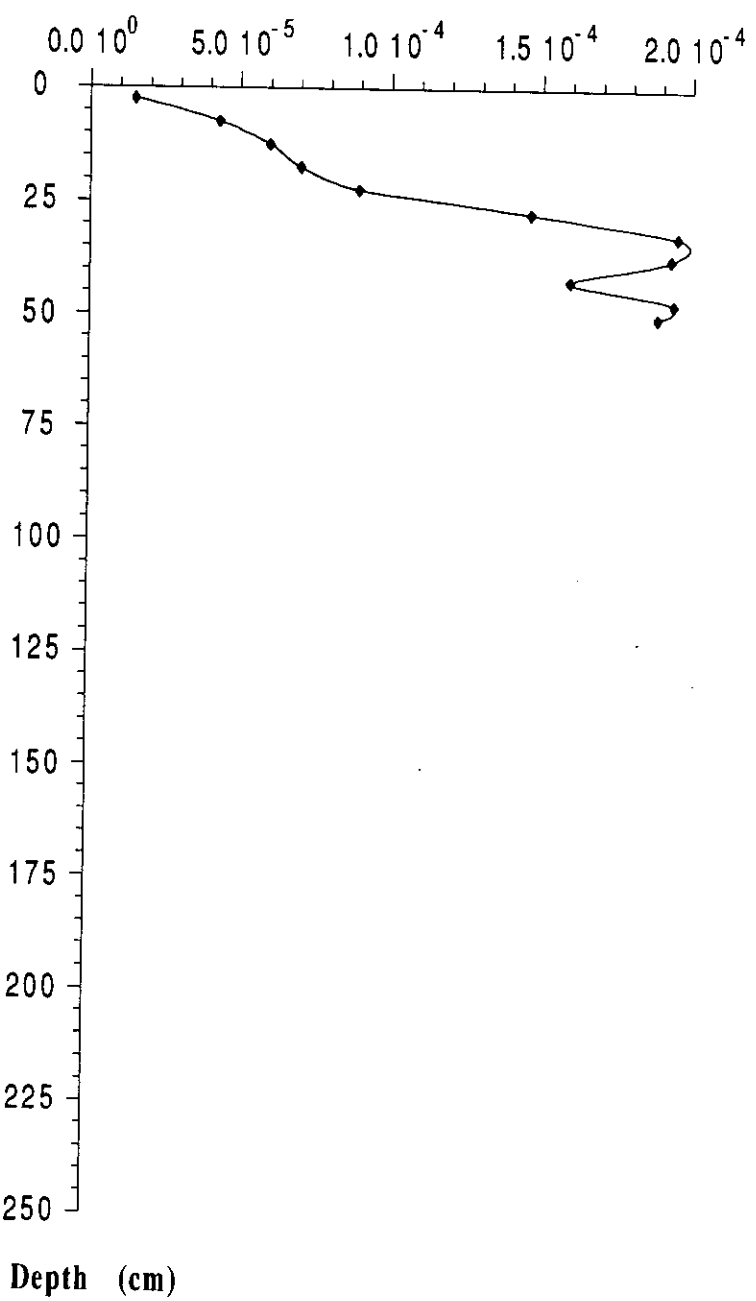
MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 7
Location: Labrador Sea
Station Number: 028 BC

Figure 26



Julian Day: 292
GMT: 13:45
Water Depth: 3992 m
Latitude: 56° 36.98
Longitude: 49° 45.04

Station Number: 029 TWC



Julian Day: 292
GMT: 20:28
Water Depth: 3550 m
Latitude: 56° 36.98
Longitude: 49° 45.04

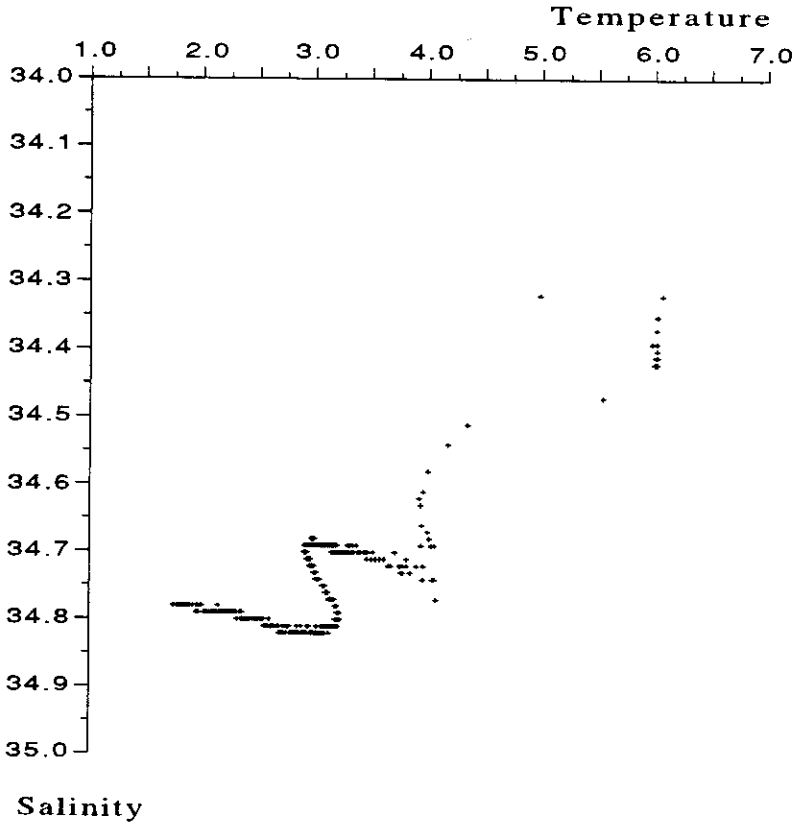
HU-91-045-030: CTD

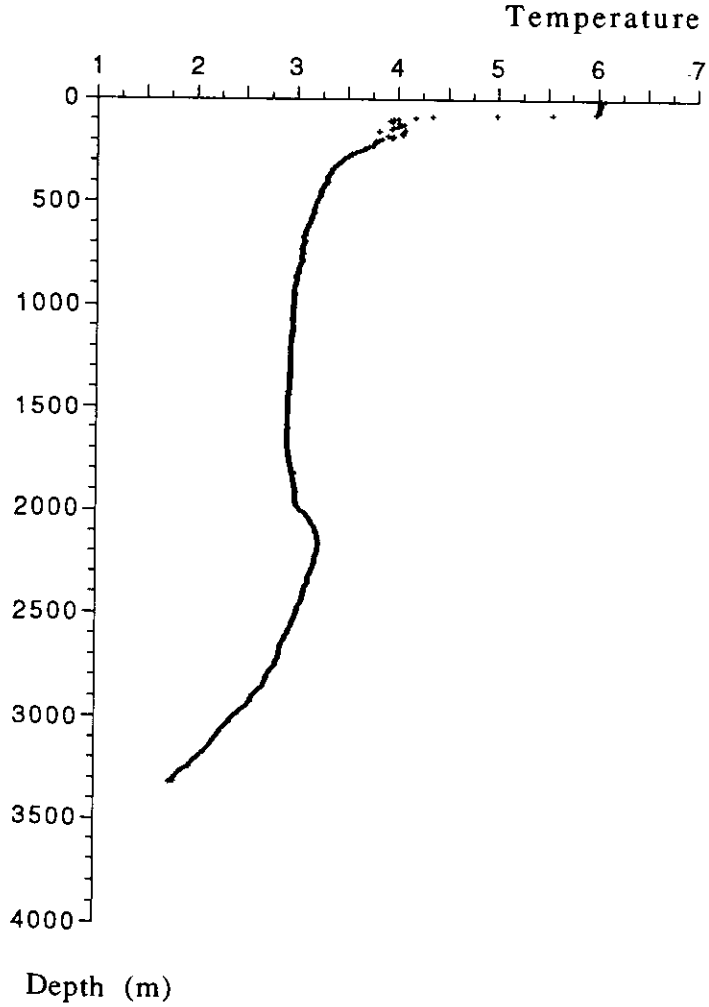
Julian day:	292	GMT Time:	11:43
Latitude:	58°14.28 N	Longitude:	48°24.19 W
Water depth:	3300 m		
Location:	Eastern Labrador Sea		

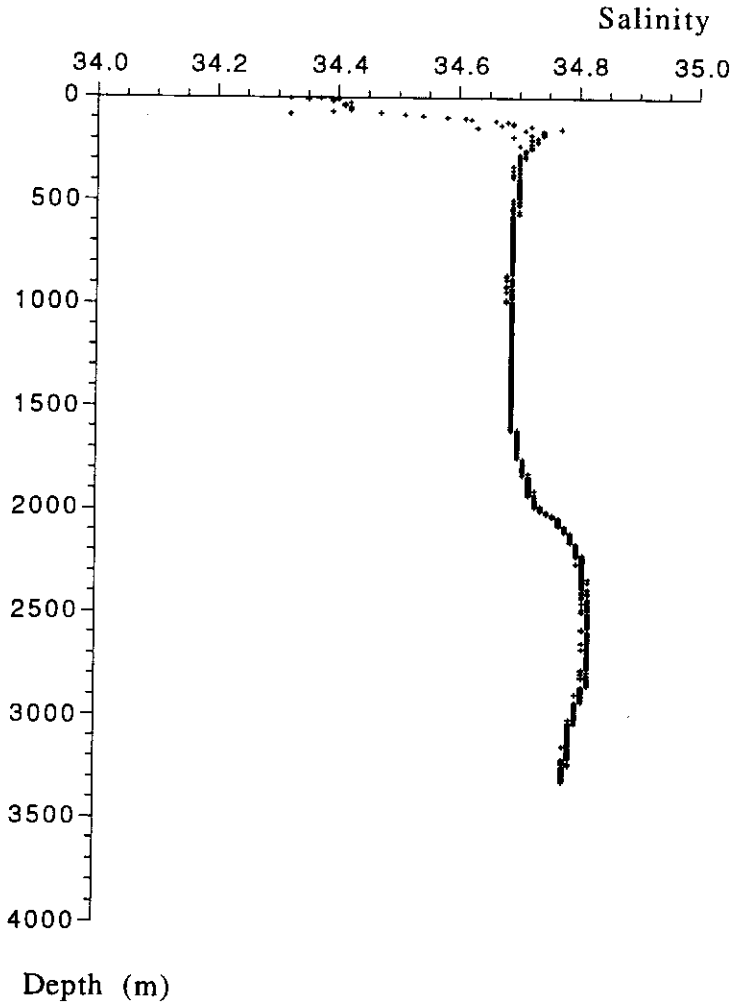
See figure 27, next page.

Figure 27: CTD cast

Cruise Number : HU-91-045
Site Number: 8 A
Station Number: 030
Location: Eastern Labrador Sea
Julian Day: 292
GMT: 11:43
Water Depth: 3300 m
Latitude: 58° 14.28'
Longitude: 48° 24.19'







HU-91-045-031: Water sampling

Julian day:	293	GMT Time:	07:00
Latitude:	58°14.36 N	Longitude:	48°26.63W
Water depth:	3400 m		
Location:	Eastern Labrador Sea		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A34	10 L
GN6-A36	12 L
GN6-A38	12 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A33	38 L
A35	36 L
A37	19.4 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 900 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A41	14 L
GN6-A42	14 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A39	30 L
A40	43.1 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-031: Water sampling (continued)

III- Depth sampled: 2250 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A37	16 L
GN6-A39	36 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A34	38 L
A36	94 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled:3300 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A32	30 L
GN6-A35	24L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A 31	60 L
A32	61.9 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses
at the following water depths:
10 m, 300 m, 500 m, 900 m, 1100 m, 1700 m, 2000 m, 2250 m, 2300 m, 2900 m, 3300 m.

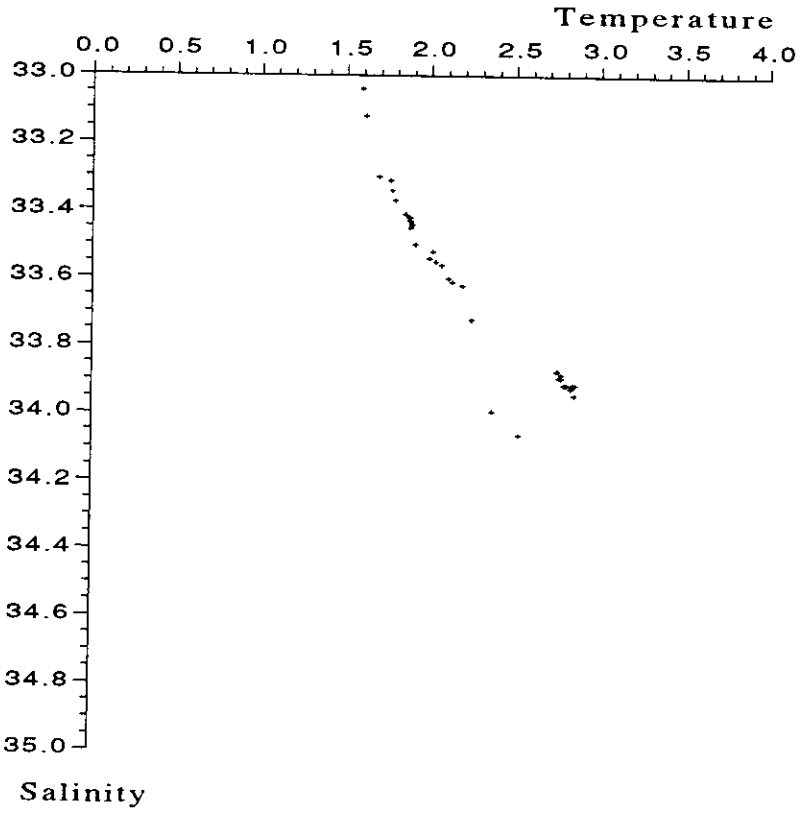
HU-91-045-032: CTD

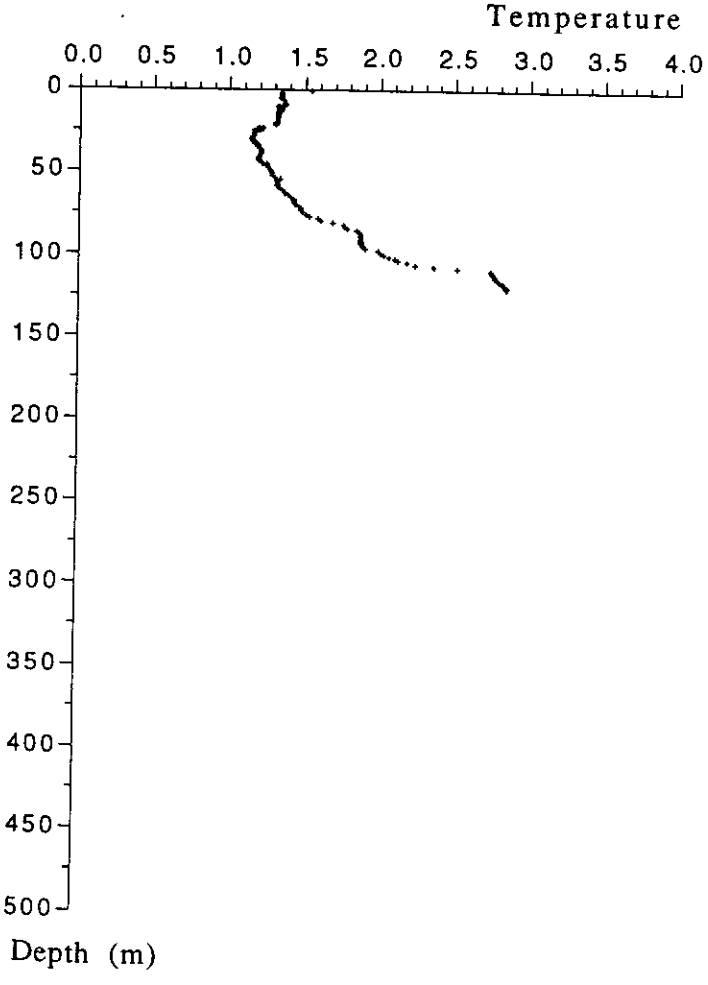
Julian day:	294	GMT Time:	19:31
Latitude:	59°37.85 N	Longitude:	44°28.32 W
Water depth:	153 m		
Location:	Southern Greenland shelf		

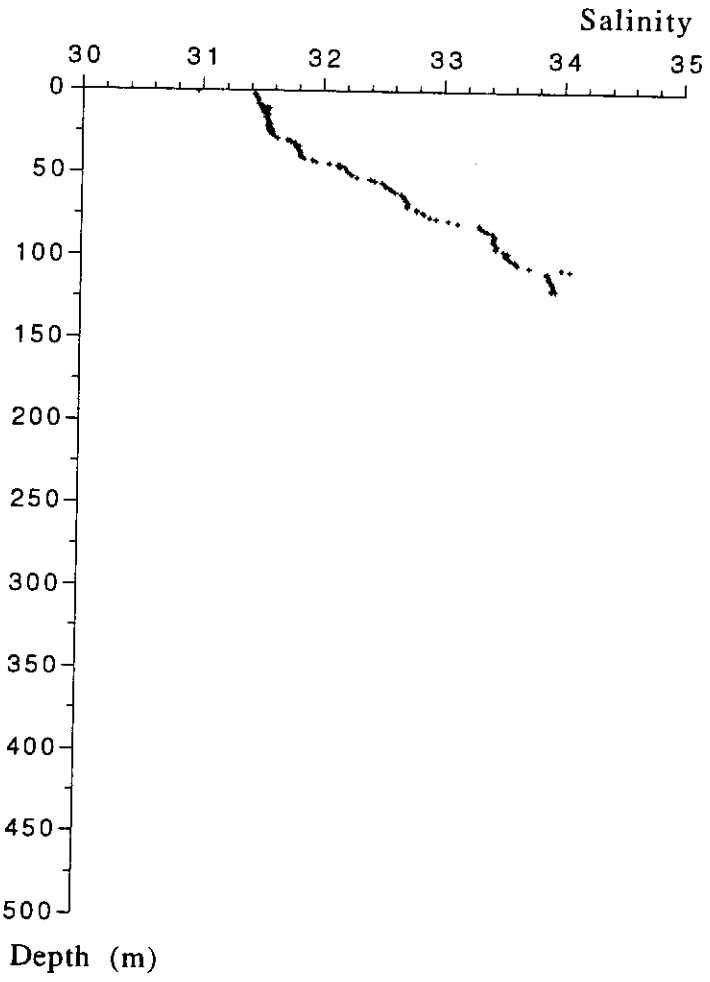
See figure 28, next page.

Figure 28: CTD cast

Cruise Number : HU-91-045
Site Number: 10
Station Number: 032
Location: Southern Greenland Shelf
Julian Day: 294
GMT: 19:31
Water Depth: 153 m
Latitude: 59° 37.854'
Longitude: 44° 28.325'







HU-91-045-033: Water sampling

Julian day:	294	GMT Time:	19:48
Latitude:	59°37.73 N	Longitude:	44°29.06 W
Water depth:	153 m		
Location:	Southern Greenland shelf		

Sampling: sampling of surface waters with a peristaltic pump for centrifugation and subsampling of particulate suspended matter.

HU-91-045-034: Water sampling

Julian day:	294	GMT Time:	20:02
Latitude:	59°37.45 N	Longitude:	44 °29.58 W
Water depth:	153 m		
Location:	Southern Greenland shelf		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 2)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A48	8 L
GN6-A49	15.3 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A42	31.1 L
A43	16 L

HU-91-045-035: Water sampling

Julian day:	295	GMT Time:	04:07
Latitude:	58°46.73 N	Longitude:	44°49.56 W
Water depth:	2060 m		
Location:	Eirik Ridge, eastern Labrador Sea		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 300 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A43	2.870L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
---	---

Subsampling of water filtered at 0.45 µm
2 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
2 x 250 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 700 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A44	2.930L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
---	---

Subsampling of water filtered at 0.45 µm
2 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
2 x 250 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

III- Depth sampled: 1000 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A45	2.850 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
---	---

HU-91-045-035: Water sampling (continued)

Subsampling of water filtered at 0.45 µm
2 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
2 x 250 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled:1300 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A46	2.860 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
---	---

Subsampling of water filtered at 0.45 µm
2 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
2 x 250 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled:1900 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A47	40 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A 41	97.91 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250ml have been collected for Nd and ^{14}C analyses at the following water depths:
300 m, 700 m, 1000 m, 1300 m, 1900 m .

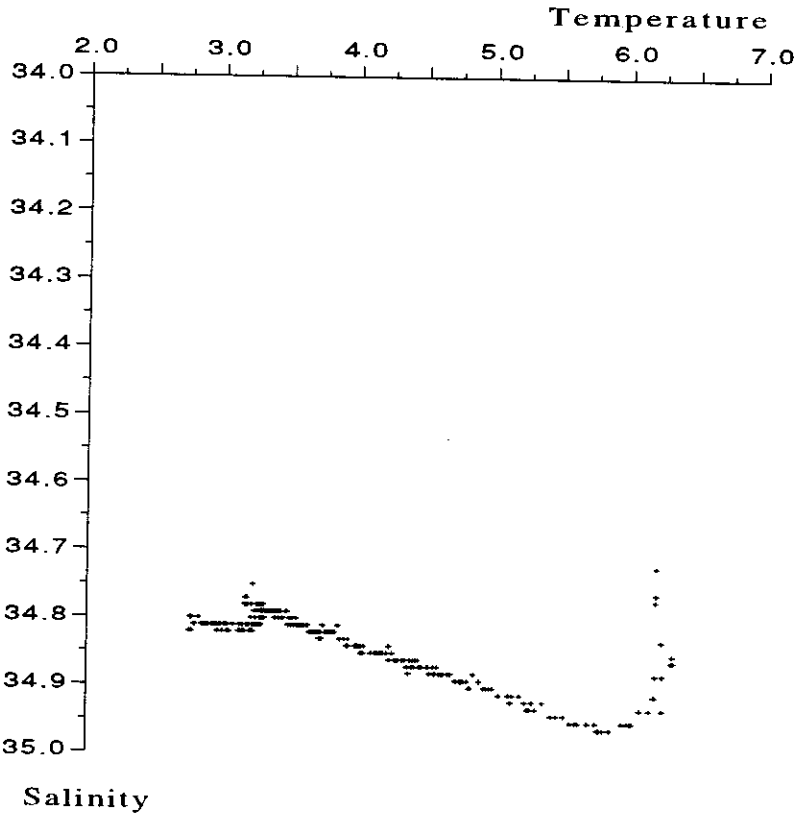
HU-91-045-036: CTD

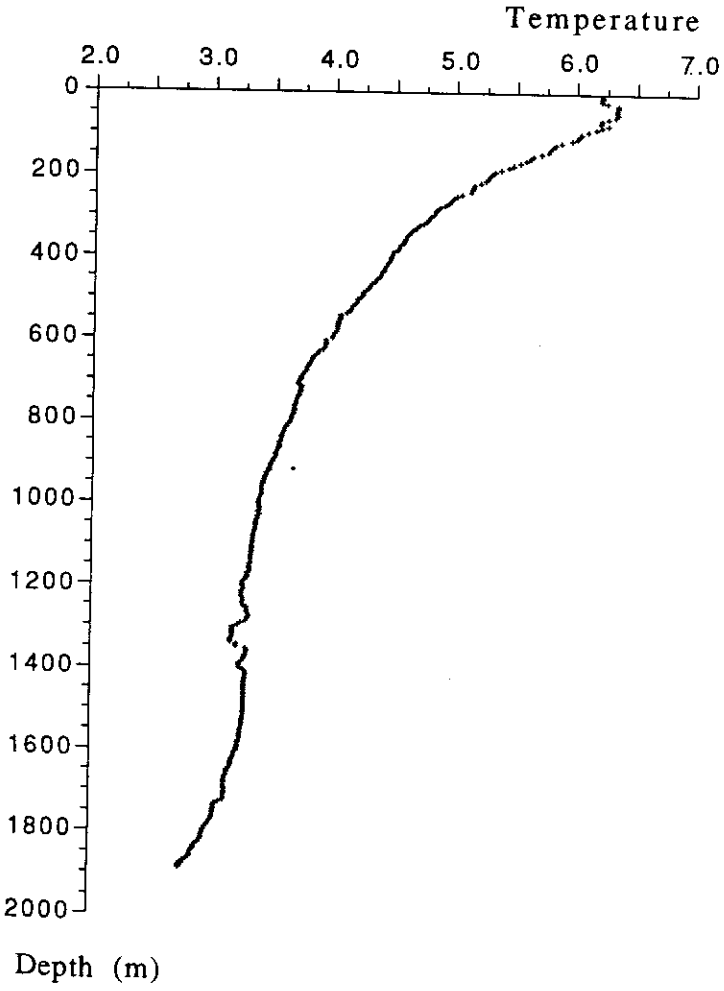
Julian day:	295	GMT Time:	03:53
Latitude:	58°46.11 N	Longitude:	44°50.86 W
Water depth:	1900 m		
Location:	Eirik Ridge, eastern Labrador Sea		

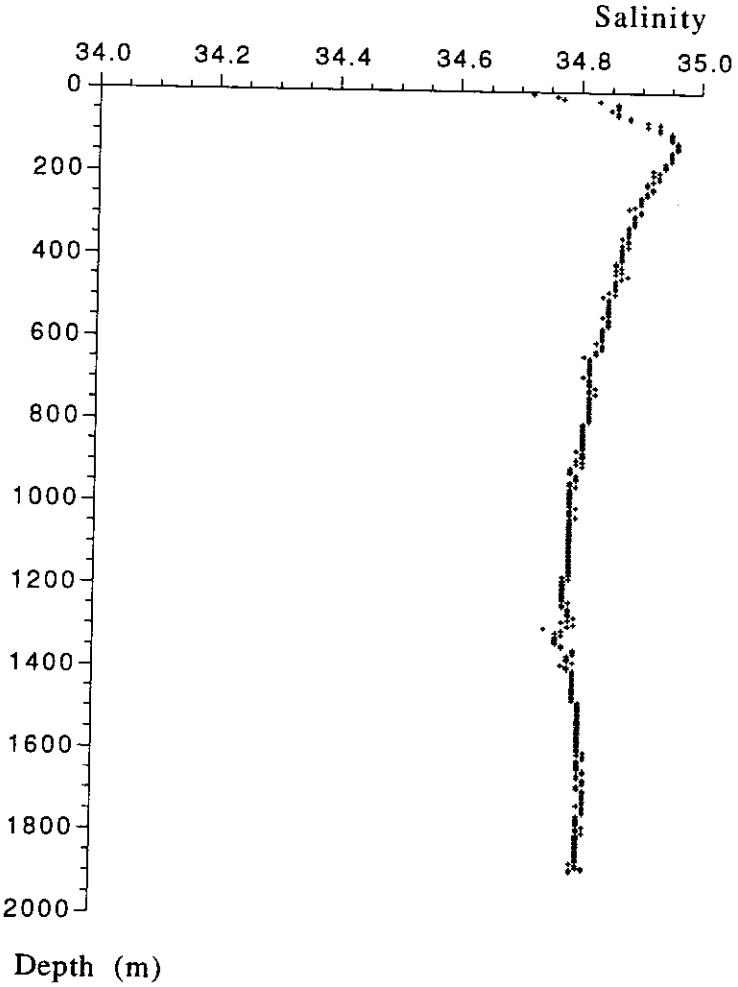
See figure 29, next page.

Figure 29: CTD cast

Cruise Number : HU-91-045
Site Number: 11
Station Number: 036
Location: Eirik Ridge, Eastern Labrador Sea
Julian Day: 295
GMT: 03:53
Water Depth: 1900 m
Latitude: 58° 46.11'
Longitude: 44° 50.86'







HU-91-045-037: Box coring

Julian day:	295	GMT Time:	11:39
Latitude:	58°45.88 N	Longitude:	44°52.60 W
Water depth:	2067 m		
Location:	Eirik Ridge, eastern Labrador Sea		

No recovery (pre-tripping twice).

HU-91-045-038: TW & P coring

Julian day:	295	GMT Time:	15:02
Latitude:	58°45.81 N	Longitude:	44°52.59 W
Water depth:	2052 m		
Location:	Eirik Ridge, eastern Labrador Sea		

Trigger Weight Core (TWC)

App. penetr.: 65 cm
Core length: 20 cm (+ cutter)

Description: Surface sediments (0-8 cm) consist of brown (10YR 4/3) muddy sand with abundant foraminifers that overlies dark grayish brown (2.5Y 4/2) sandy mud grading to very dark grayish brown (2.5Y 4/3) silty mud.

Subsampling: Magnetic susceptibility has been measured at 5 cm intervals (figure 30, p. 103). The core was then split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 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). Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

3-5
5-7
7-9
9-10
12-14
14-16
16-18

Piston Core

Corer length: 1500 cm
App. penetr.: 1500 cm
Core length: 1457 cm (8 sections + cutter)

Description: Below brownish surface sediments, cored deposits consist of gray to very dark gray mud as follows:
0-5 cm: olive brown (2.5Y 4/4) muddy sand with abundant foraminifers;
5-45 cm: dark grayish brown (2.5Y 4/2) bioturbated silty mud;
45-319 cm: very dark gray (5Y 3/1) clayey mud with scattered gravel;
319-382 cm: dark gray (5Y 4/1) clayey mud with granular texture;
382-866 cm: succession of very dark gray (5Y 3/1) clayey mud and dark gray (5Y 4/1) mud with sand and granules;

HU-91-045-038: TW & P coring (continued)

Piston Core description (continued):

866- 890 cm: alternance of dark gray (5Y 4/1) and very dark gray (5Y 3/1) silty mud;
890-910 cm: dark grayish brown (2.5Y 4/2) silty mud;
910-988 cm: very dark gray (5Y 3/1) mottled silty mud;
988-1029 cm: dark gray (5Y 4/1) silty mud with abundant foraminifers;
1029-1144 cm: very dark gray (5Y 3/1) silty-clayey mud grading to dark gray (5Y 4/1) silty mud;
1114-1119 cm: dark gray (5Y 4/1) sandy mud with abundant foraminifers;
1119-1137 cm: dark grayish brown (2.5Y 4/2) silty mud with sand and granules;
1137- 1457 cm: alternance of dark gray (5Y 4/1) and very dark gray (5Y 3/1) mud.

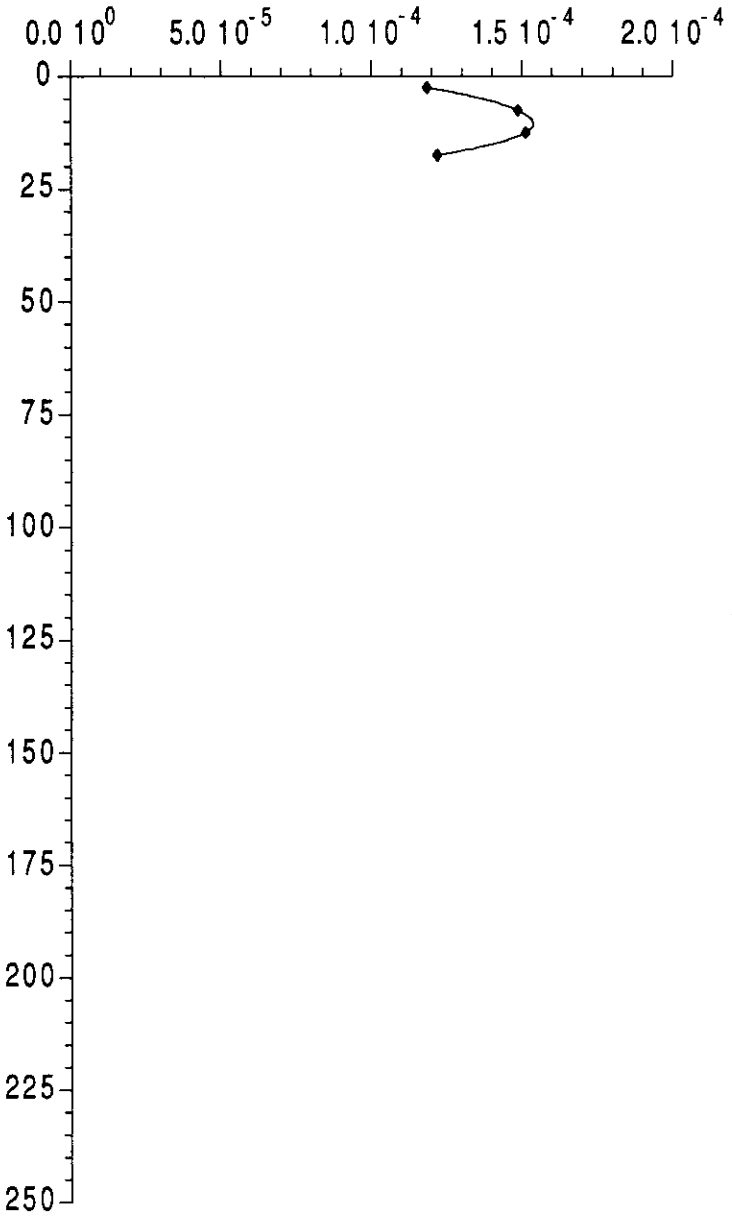
Subsampling: Magnetic susceptibility has been measured at 5 cm intervals (figure 31, p. 104). The core was then cut into two longitudinal half-sections. One half was described and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	77-79	171-173	268-270	359-361
8-10	86-88	181-183	277-279	368-370
12-14	95-97	190-192	286-288	376-378
21-23	105-107	200-202	295-297	387-389
24-27	115-117	210-212	304-306	397-399
31-33	124-126	219-221	313-315	405-407
41-43	133-135	228-230	322-324	415.5-417.5
50-52	143-145	238-240	332-335	425-427
60-62	152-154	247-249	341-343	435-437
69-71	162-164	256-258	350-352	444-446
454-456	553-555	661-663	753-755	850-852
464-466	567-569	672-674	764-766	856-858
474-476	580-582	681.5-683.5	773-775	864-866
484-486	590-592	686-688	783-785	875-877
493-495	600-602	693-695	790-792	884-886
502-504	613.5-615.5	703-705	800-802	894-896
512-514	622-624	712-714	810-812	903-905
521-523	632.5-634.5	722-724	819-821	905-907
530-532	642-644	732-734	826-828	915-916
539-541	651.5-653.5	742-744	834-836	925-927
935-937	1011-1013	1096-1098		
945-947	1021-1023	1106.5-1108.5		
956-958	1031-1033	1116-1118		
964-966	1041-1043	1125.5-1127.5		
974-976	1050-1052	1130-1132		
983-985	1059-1061			
987-989	1068-1070			
992-994	1078-1080			
1002-1004	1087.5-1089.5			

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 11
Location: Eirik Ridge
Station Number: 038 TWC

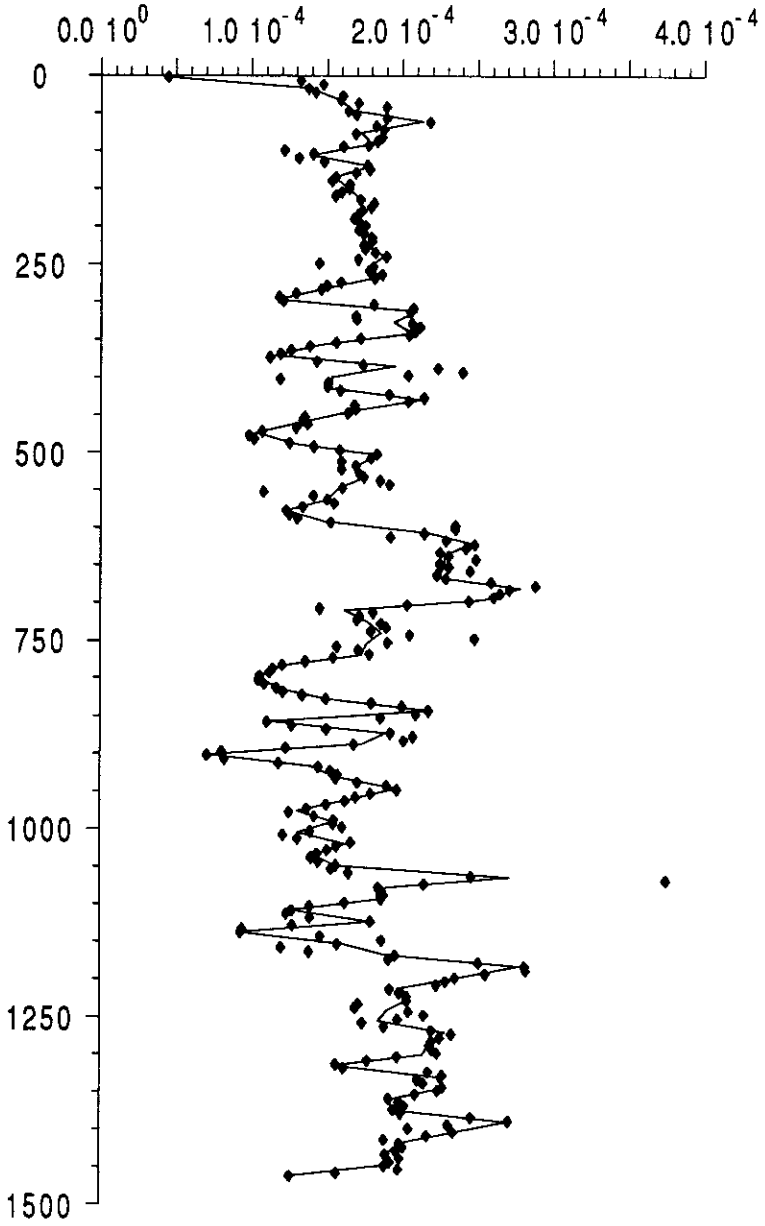
Figure 30



Julian Day: 295
GMT: 15:02
Water Depth: 2052 m
Latitude: 58° 45.81
Longitude: 44° 52.59

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 11
Location: Eirik Ridge
Station Number: 038 PC

Figure 31



Julian Day: 295
GMT: 15:02
Water Depth: 2052 m
Latitude: 58° 45.81
Longitude: 44° 52.59

HU-91-045-039 TW & P coring

Julian day:	295	GMT Time:	19:53
Latitude:	58° 47.79 N	Longitude:	43 °57.03 W
Water depth:	1660 m		
Location:	Eirik Ridge, eastern Labrador Sea		

Trigger Weight Core (TWC)

App. penetr.: 40 cm
Core length: 0 cm (recovery only in the core cutter)

Piston Core

Corer length: 1500 cm
App. penetr.: 1500 cm
Core length: 0 cm (0 section)

Note: the piston of the core was jamed into the catcher.

HU-91-045-040: Le High coring

Julian day:	295	GMT Time:	22:01
Latitude:	58° 47.83 N	Longitude:	43° 57.07 W
Water depth:	1559 m		
Location:	Erik Ridge, eastern Labrador Sea		

Recovery: 70 cm

Description: surface sediments consist of brownish sandy-silty mud with gravel.

Sampling and on-board processing:
Magnetic susceptibility has been measured at 5 cm interval (figure 32, p. 108).
The upper 42 cm of the Le-High core have been processed and subsampled under nitrogen atmosphere.

On-board measurements and sub-sampling under nitrogen atmosphere:

1. Redox Potential measurements (figure 33, p. 109)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-2	182	20-22	-77	40-42	260
2-4	195	22-24	100		
4-6	202	24-26	80		
6-8	165	26-28	117		
8-10	208	28-30	273		
10-12	210	30-32	284		
12-14	162	32-34	258		
14-16	183	34-36	250		
16-18	173	36-38	273		
18-20	166	38-40	216		

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (ca. 30cc)	porosity (5cc; vial #)
2-4	X	X	A-59
4-6	X	X	A-54
6-8	X	X	A-84
8-10	X	X	A-94
10-12	X	X	A-55
12-14	X	X	A-62

HU-91-045-040: Le High coring (continued)

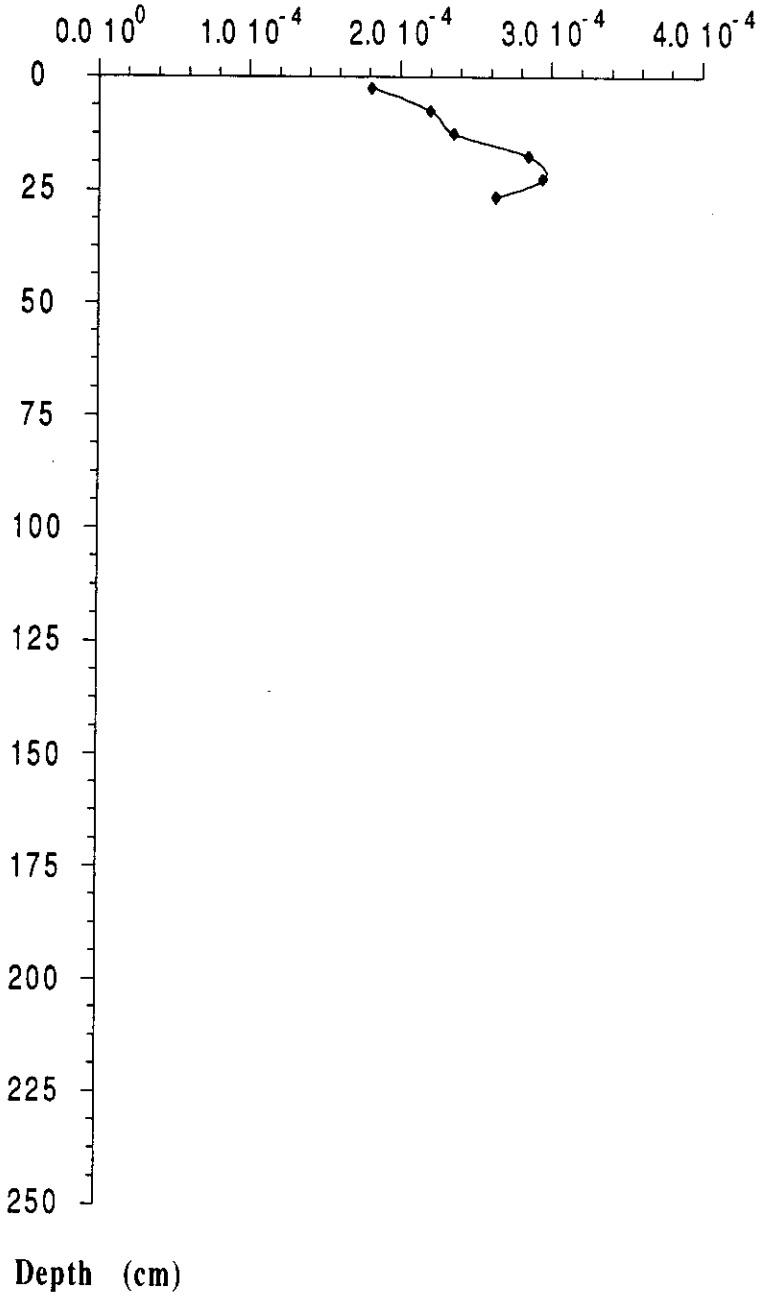
3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	13C (ml)
2-4	---	---	---	---	---	---	---
4-6	---	---	---	---	---	---	---
6-8	---	---	---	---	---	---	---
8-10	5	2 x 2	---	---	---	---	---
10-12	---	---	---	---	---	---	---
12-14	---	---	---	---	---	---	---

Note: squeezed sediments are saved in separate bags.

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 12
Location: Eirik Ridge
Station Number: 040 LHC

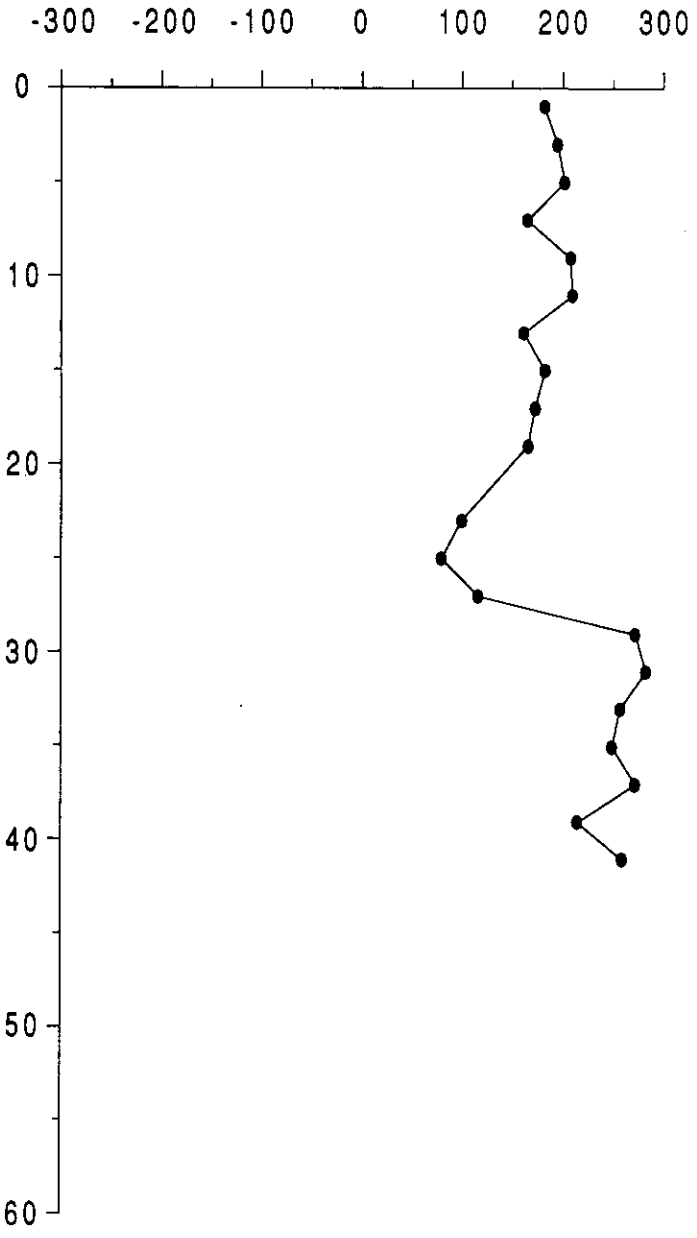
Figure 32



Julian Day: 295
GMT: 22:01
Water Depth: 1559 m
Latitude: 58° 47.83
Longitude: 43° 57.07

Eh Measurement on Le High Core
Cruise Number: HU-91-045
Site Number: 12
Location: Eirik Ridge
Station Number: 040 LHC

Figure 33: Redox potential



Julian Day: 295
GMT: 22:01
Water Depth: 1559 m
Latitude: 58° 47.83
Longitude: 43° 57.07

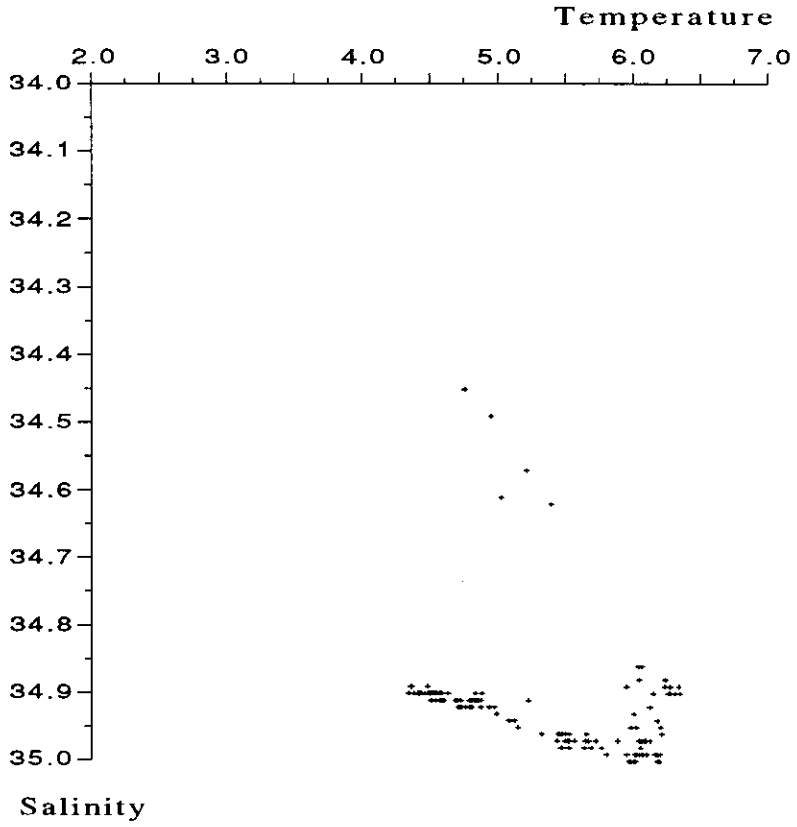
HU-91-045-041: CTD

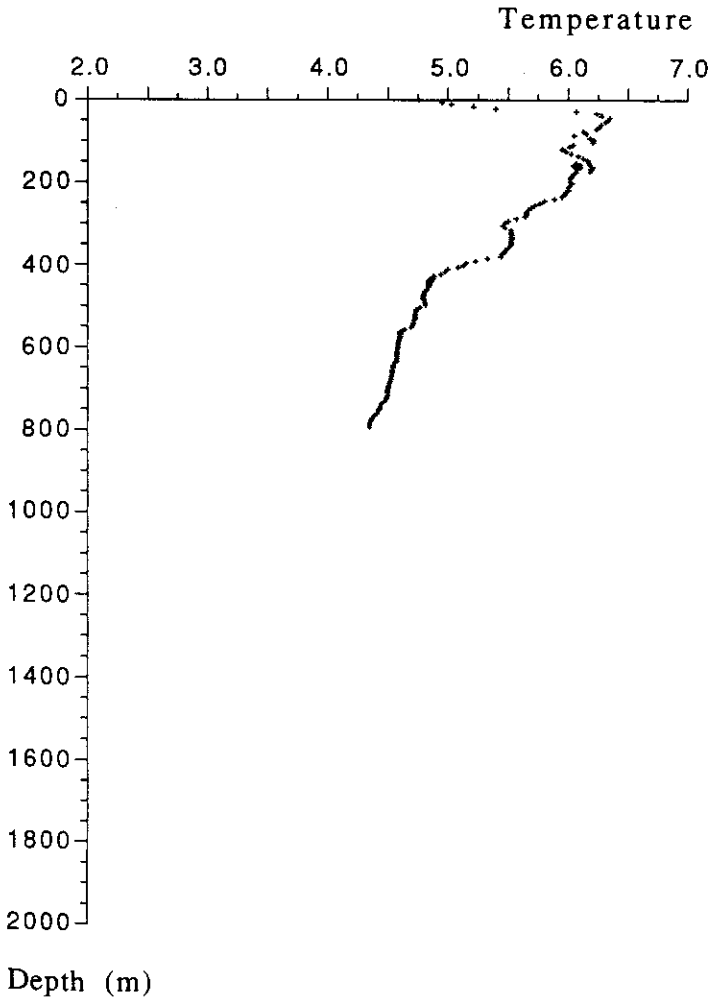
Julian day:	295	GMT Time:	22:59
Latitude:	58°47.83 N	Longitude:	43°57.02 W
Water depth:	1684 m		
Location:	Eirik Ridge, eastern Labrador Sea		

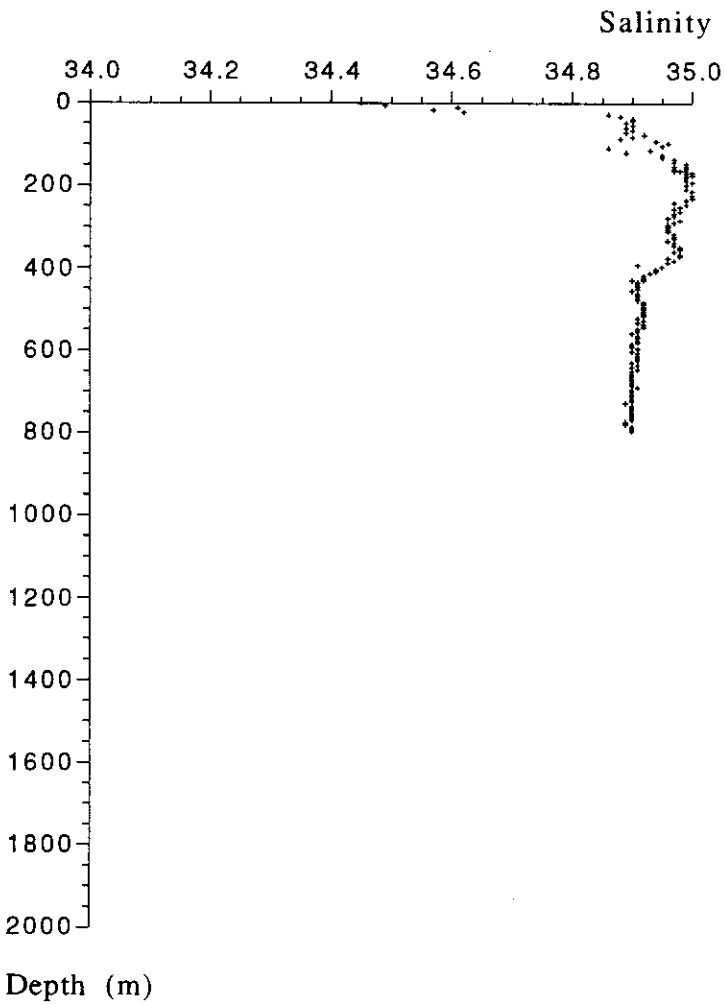
See figure 34, next page.

Figure 34: CTD cast

Cruise Number : HU-91-045
Site Number: 12
Station Number: 041
Location: Eirik Ridge, Eastern Labrador Sea
Julian Day: 295
GMT: 22:59
Water Depth: 1684 m (wire out)
Latitude: 58° 47.83'
Longitude: 43° 57.02'







HU-91-045-042: Water sampling

Julian day:	296	GMT Time:	02:35
Latitude:	58°49.65 N	Longitude:	43°54.79 W
Water depth:	1600 m		
Location:	Eirik Ridge, eastern Labrador Sea		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A51	6.9 L
GN6-A54	8 L
GN6-A55	8 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A45	16 L
A48	12 L
A49	11 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A50	6.2 L
GN6-A59	12 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A44	10 L
A51	12 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-042: Water sampling (continued)

III- Depth sampled: 1500 m

Filtration on 0.45 µm preweighed filters		Filtration on glass fiber preweighed filters	
Filter number	Volume filtered	Filter number	Volume filtered
GN6-A52	20.3 L	A46	61.7 L
GN6-A53	22 L	A47	80 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at the following water depths:
10 m, 600 m, 1500 m.

HU-91-045-043: Box coring

Julian day:	296	GMT Time:	11:55
Latitude:	59°22.05 N	Longitude:	43°27.11 W
Water depth:	984 m		
Location:	Eirik Ridge, eastern Labrador Sea		

Penetration: *ca.* 5 cm

Description: Sediments consist of sand and gravel with pebbles. A rich fauna (sponges, echinoderms, brachiopodes) is observed at the surface.

Sampling: 1 sample (250 ml) in a plastic bag.

HU-91-045-044: TW & P coring

Julian day:	296	GMT Time:	13:43
Latitude:	59°21.99 N	Longitude:	43°27.01 W
Water depth:	976 m		
Location:	Eirik Ridge, eastern Labrador Sea		

Trigger Weight Core (TWC)

App. penetr.: nul
Core length: 0 cm

Piston Core

Corer length: 1500 cm
App. penetr.: 700 cm
Core length: 617 cm (5 sections + cutter)

Description: Surface sediments (0-7 cm) consist of dark grayish brown (10Y 4/2) muddy sand with pebbles.
Sub-surface sediments (7-535 cm) are very dark gray (5Y 3/1) sandy mud with gravel. The deposits are characterized by two erosional surfaces overlain by sand-silt-clay turbidites sequences at depth intervals of 247-250 cm and 285-290 cm.
The base of the core consists of dark gray (5Y 4/1) clayey mud (535-545 cm), which overlies very dark gray (5Y 3/1) sandy mud with pebbles and gravel.

HU-91-045-044: TW & P coring (continued)

Subsampling: Magnetic susceptibility has been measured at 5 cm intervals (figure 35, next page). The core was split into 2 longitudinal half-sections. One half was described and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

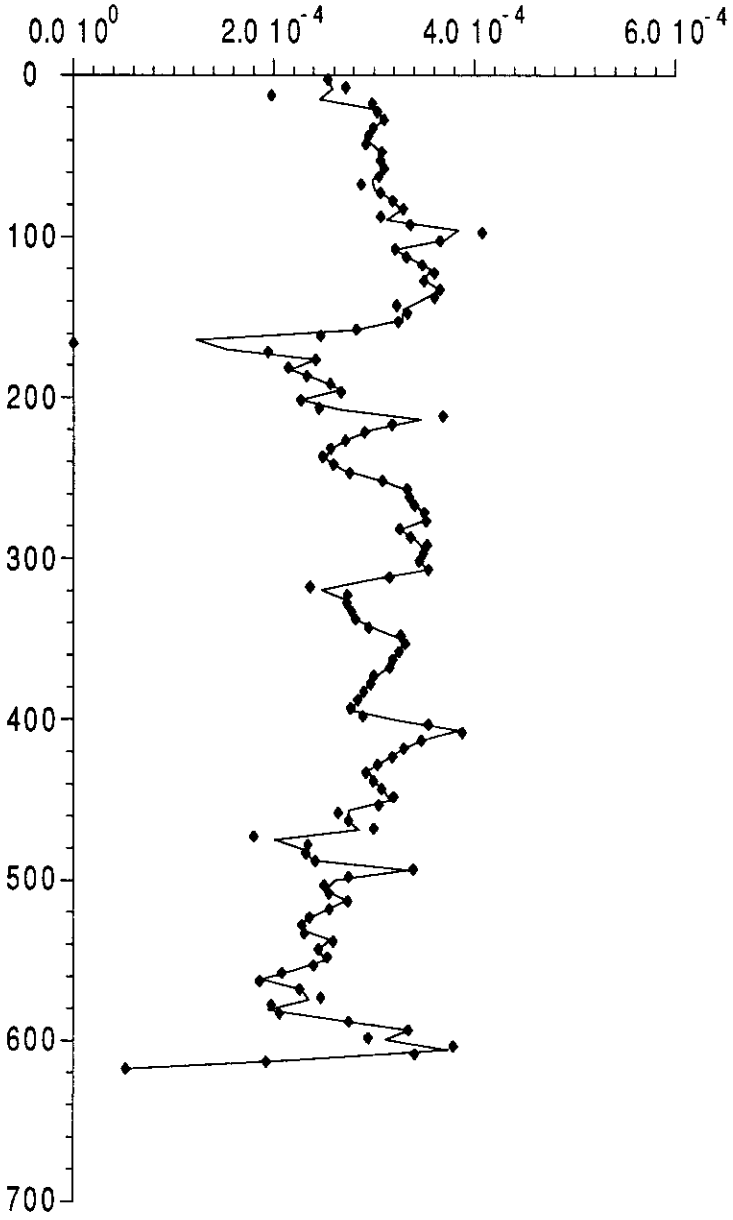
Sampling depth (cm.)

2-4	69-73	165-167	261-263	355-357
4-6	80-82	174-176	270-272	365-367
6-8	88-90	184-186	280-282	375-377
8-10	99-101	193-195	289-291	384-386
11-13	108-110	203-205	299-301	392-394
21-23	118-120	213-215	308-310	409-411
30-32	127-129	222-224	316-318	419-421
41-43	137-139	234-236	326-328	428-430
50-52	147-149	241-243	336-338	438-440
60-62	156-158	251-253	345-347	448-450

458-460	543-545
463-465	557-559
469-471	576-578
477-479	588-590
486.5-488.6	598-600
496-498	609-611
505.5-507.5	615-617
515-517	
524.5-526.5	
533.5-535.5	

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 13
Location: Eirik Ridge
Station Number: 044 PC

Figure 35



Julian Day: 296
GMT: 13:43
Water Depth: 976 m
Latitude: 59° 21.99
Longitude: 43° 27.01

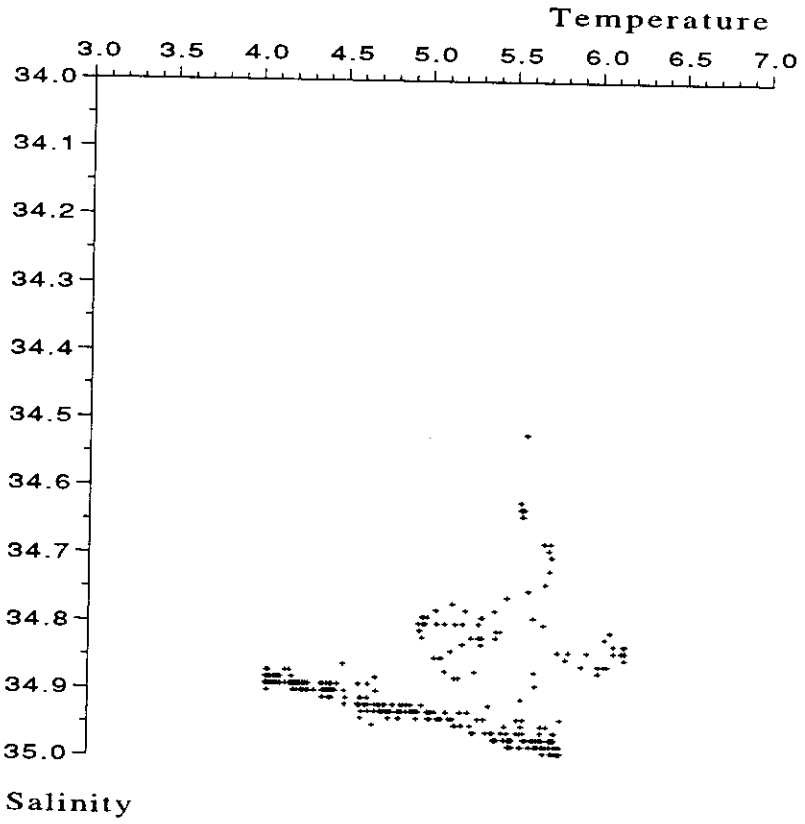
HU-91-045-045: CTD

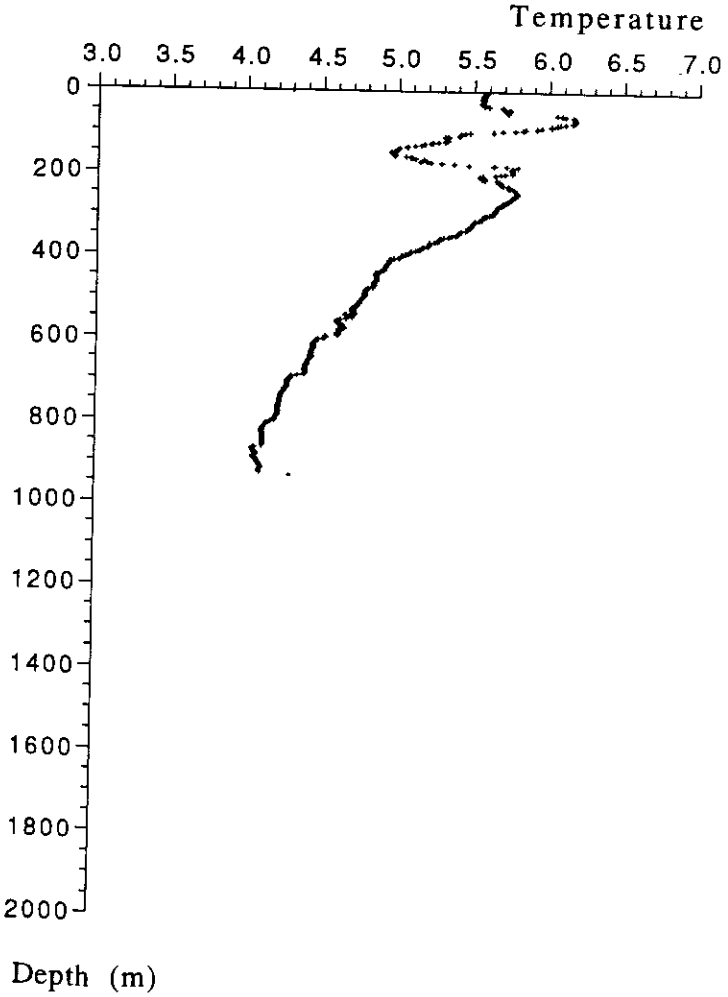
Julian day:	296	GMT Time:	15:00
Latitude:	59°22.37 N	Longitude:	43°25.41 W
Water depth:	980 m		
Location:	Eirik Ridge, eastern Labrador Sea		

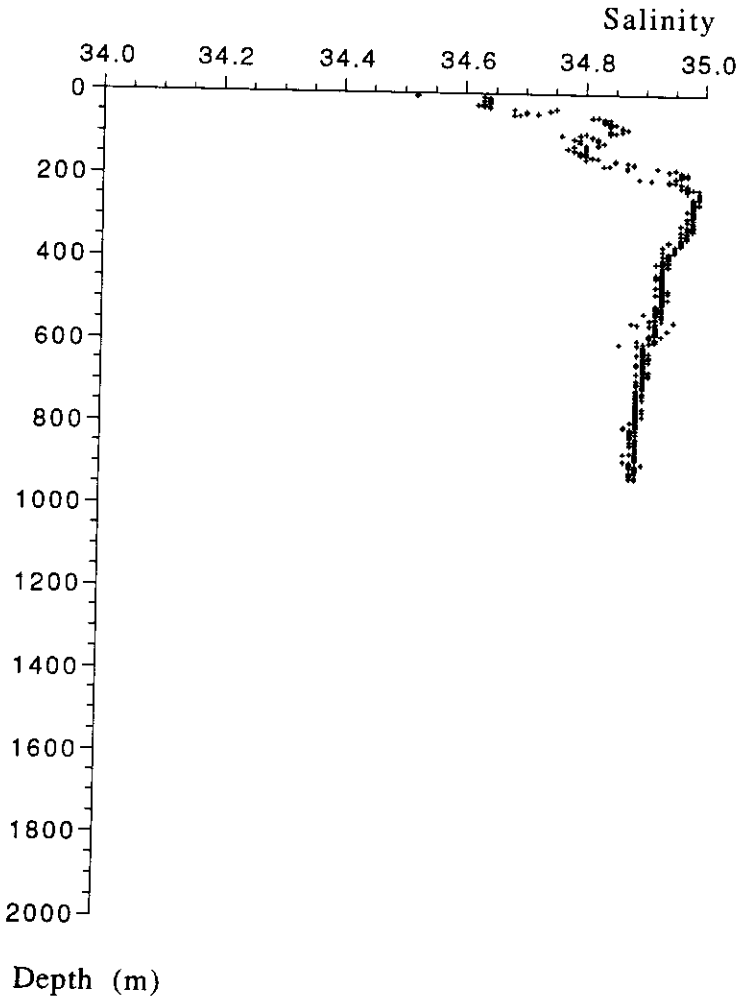
See figure 36, next page.

Figure 36: CTD cast

Cruise Number : HU-91-045
Site Number: 13
Station Number: 045
Location: Eirik Ridge
Julian Day: 296
GMT: 15:00
Water Depth: 980 m
Latitude: 59° 22.37'
Longitude: 43° 25.41'







HU-91-045-046: Water sampling

Julian day:	296	GMT Time:	15:00
Latitude:	59°22.37 N	Longitude:	43 °25.41 W
Water depth:	980 m		
Location:	Eirik ridge, eastern Labrador Sea		

Note: sampling with the centrifuge was interrupted when the centrifuge broke.

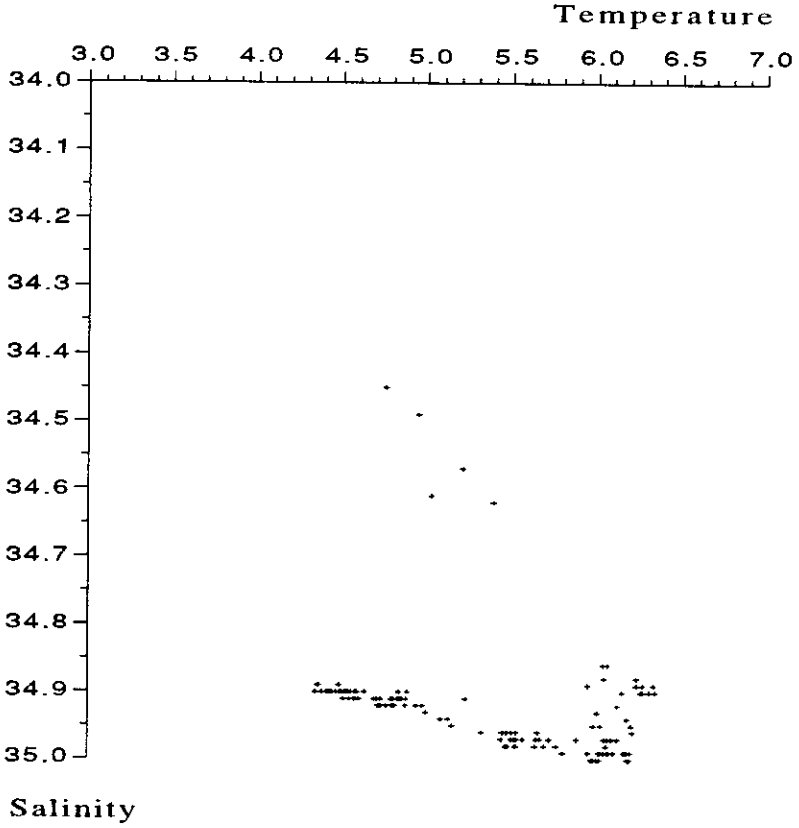
HU-91-045-047: CTD

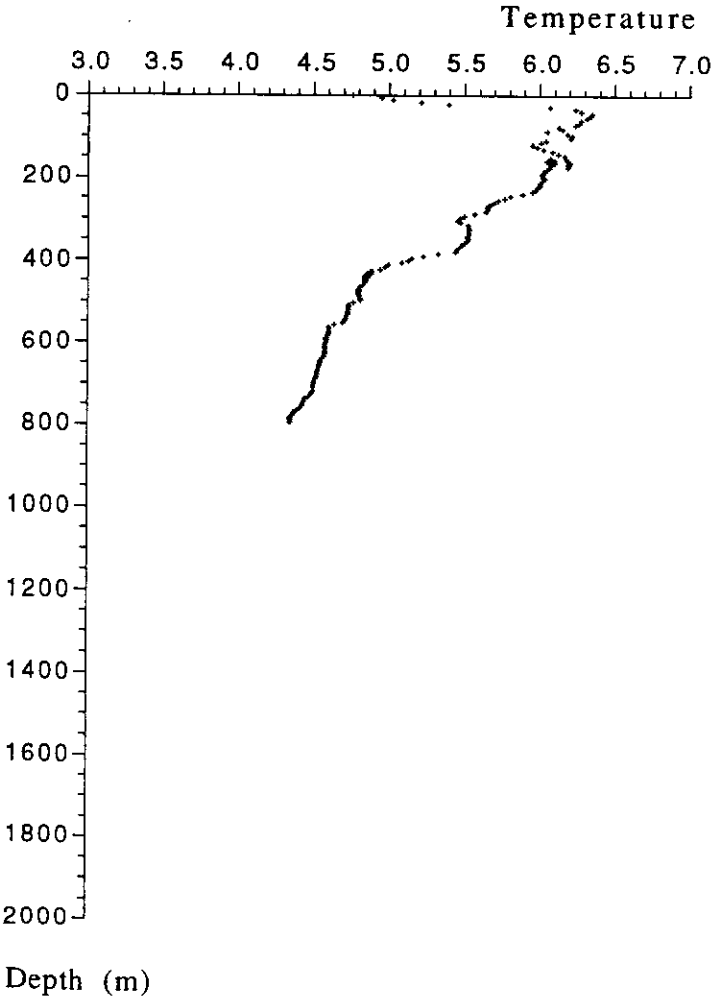
Julian day:	297	GMT Time:	07:11
Latitude:	60°45.59 N	Longitude:	41°37.04 W
Water depth:	915 m		
Location:	Irminger Basin		

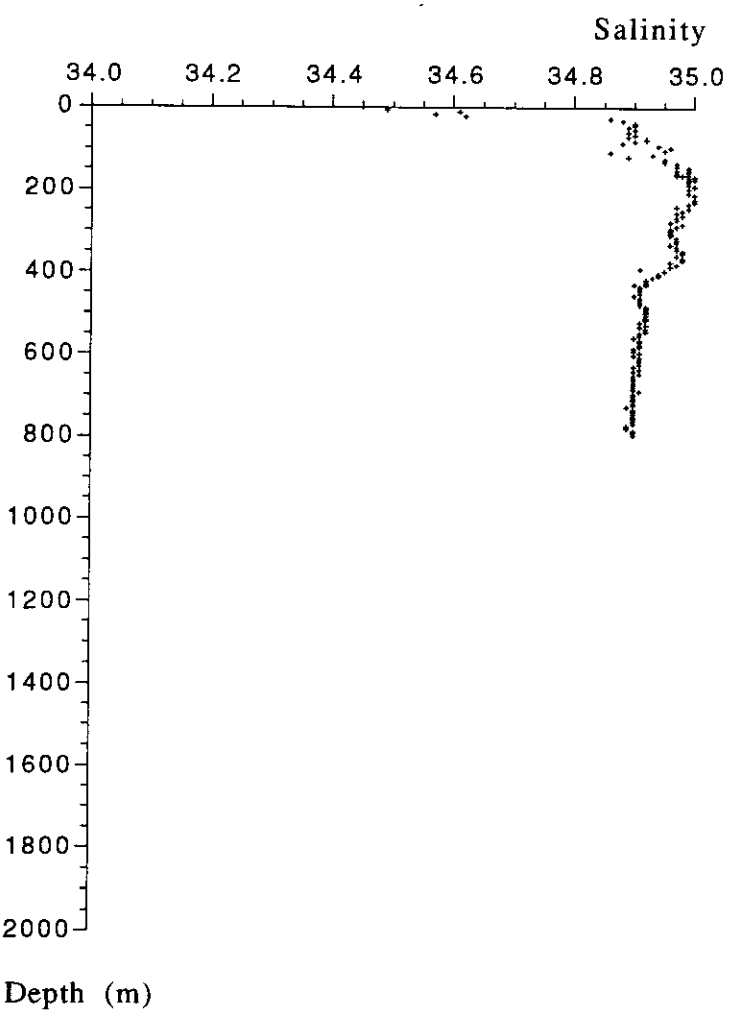
See figure 37, next page.

Figure 37: CTD cast

Cruise Number : HU-91-045
Site Number: 15
Station Number: 047
Location: Irminger Basin
Julian Day: 297
GMT: 07:11
Water Depth: 915 m
Latitude: 60° 45.59'
Longitude: 41° 37.04'







HU-91-045-048: Water sampling

Julian day:	297	GMT Time:	08:47
Latitude:	60°45.33 N	Longitude:	41°30.25 W
Water depth:	870 m		
Location:	Irminger Basin		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A61	12 L
GN6-A62	10 L
GN6-A63	10 L
GN6-A64	8 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A53	36 L
A54	32 L
A55	36 L
A56	26 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A58	20 L
GN6-A60	13.7 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A50	34 L
A52	34 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-048: Water sampling (continued)

III- Depth sampled: 600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A56	2.88 L

IV- Depth sampled: 790 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A57	2.83 L

Subsampling of water filtered at 0.45 µm

4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water

2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at the following water depths:
10 m, 200 m, 600 m, 790 m.

HU-91-045-049 TWC & P

Julian day:	297	GMT Time:	12:23
Latitude:	60° 45. 78 N	Longitude:	41°36.72 W
Water depth:	959 m		
Location:	Irminger Basin		

Trigger Weight Core (TWC)

App. penetr.: 50 cm
Core length: 0 cm

Piston Core

Corer length: 1500 cm
App. penetr.: 180 cm
Core length: 0 cm

Note: the piston was jamed into the core cutter.

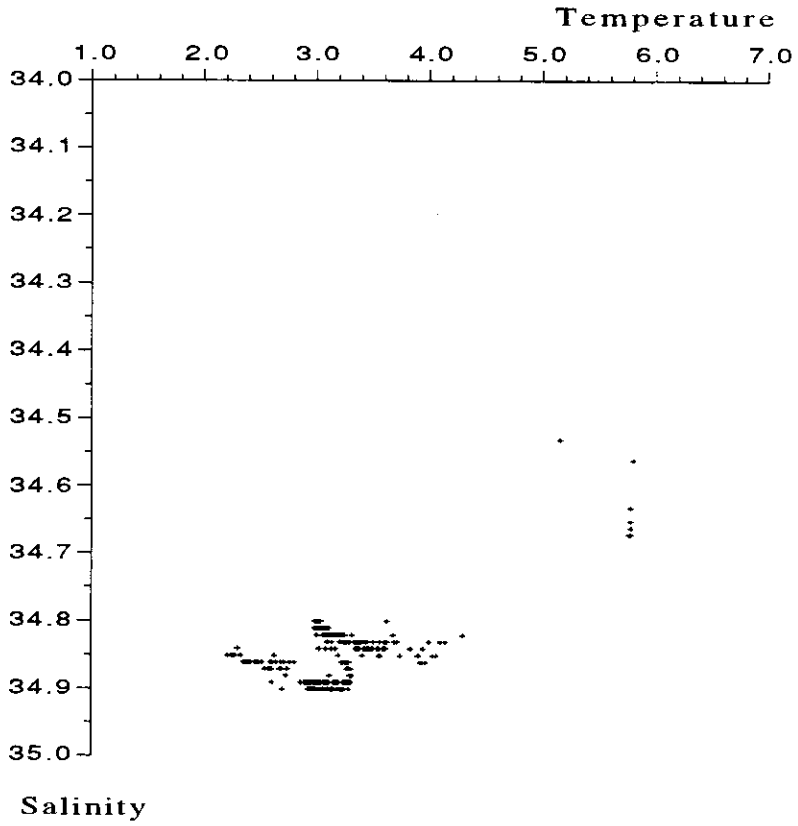
HU-91-045-050: CTD

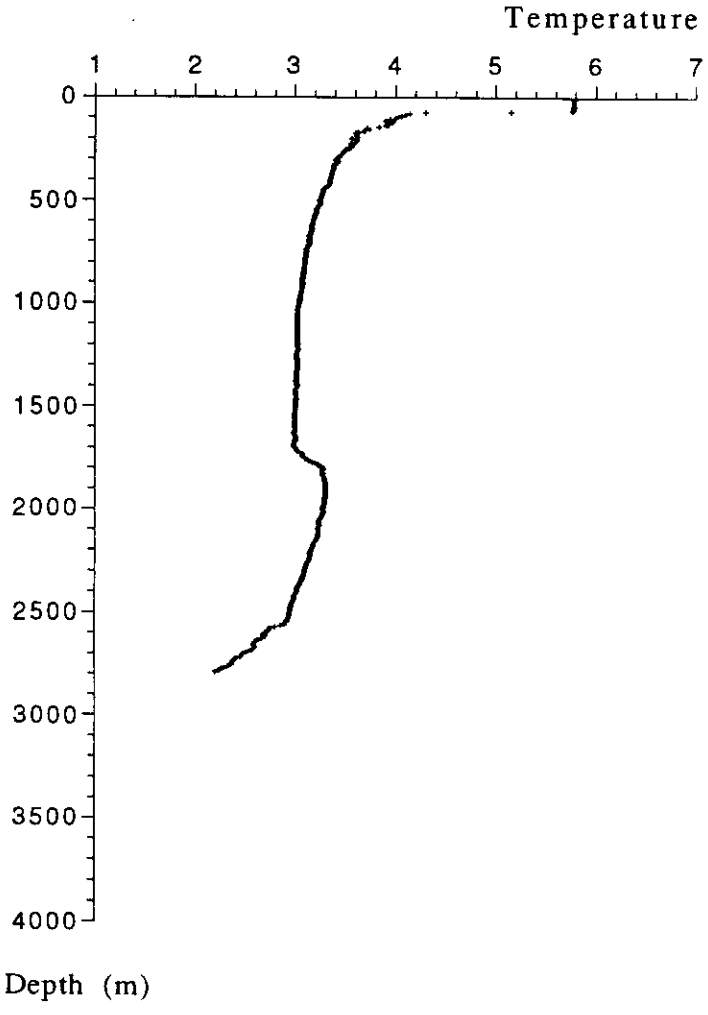
Julian day:	298	GMT Time:	16:56
Latitude:	59° 29.50 N	Longitude:	39° 18.40 W
Water depth:	2878 m		
Location:	Irminger Basin		

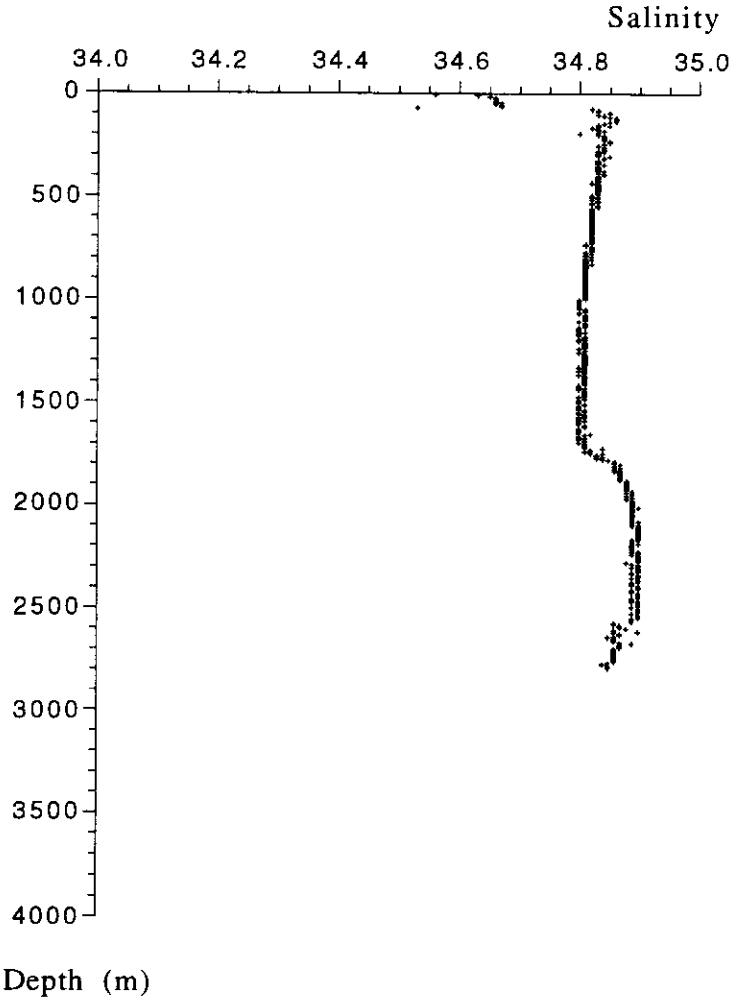
See figure 38, next page.

Figure 38: CTD cast

Cruise Number : HU-91-045
Site Number: 17
Station Number: 050
Location: Irminger Basin
Julian Day: 298
GMT: 16:56
Water Depth: 2878 m
Latitude: 59° 29.50'
Longitude: 39° 18.40'







HU-91-045-051: Box coring

Julian day:	298	GMT Time:	12:52
Latitude:	59°29.56 N	Longitude:	39°18.43 W
Water depth:	2949 m		
Location:	Irminger Basin		

Penetration: 23 cm

Description: Sediments (0-22 cm) consist of dark grayish brown (10YR 4/2) mud rich in foraminifers overlying very dark grayish brown (2.5Y 3/2) silty mud (22-23 cm).

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
2 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:

1. 1. Redox potential measurements (figure 39, p. 130)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	169	10-11	188	20-21	226
1-2	199	11-12	188	21-22	222
2-3	188	12-13	190		
3-4	188	13-14	191		
4-5	186	14-15	195		
5-6	194	15-16	190		
6-7	188	16-17	178		
7-8	188	17-18	182		
8-9	189	18-19	185		
9-10	188	19-20	213		

HU-91-045-051: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30 cc)	porosity (5cc; vial #)
0-2	A	A	A-51
2-4	B	B	A-53
4-6	C	C	A-56
6-8	D	D	A-58
8-10	E	E	A-61
10-12	F	F	A-64
12-14	G	G	A-73
14-16	H	H	A-75
16-18	I	I	A-77
18-20	J	J	A-81
20-22	K	K	A-83

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	10	4 x 2	5	8	5	2	5
2-4	5	4 x 2	5	8	5	---	---
4-6	5	4 x 2	5	8	5	2	---
6-8	5	---	---	---	---	---	---
8-10	5	4 x 2	5	4	---	---	---
10-12	5	2 x 2	---	---	---	---	---
12-14	5	---	---	---	---	---	---
14-16	5	4 x 2	4	---	---	---	---
16-18	5	1 x 2	---	---	---	---	---
18-20	5	---	---	---	---	---	---
20-22	5	4 x 2	5	4	---	---	---

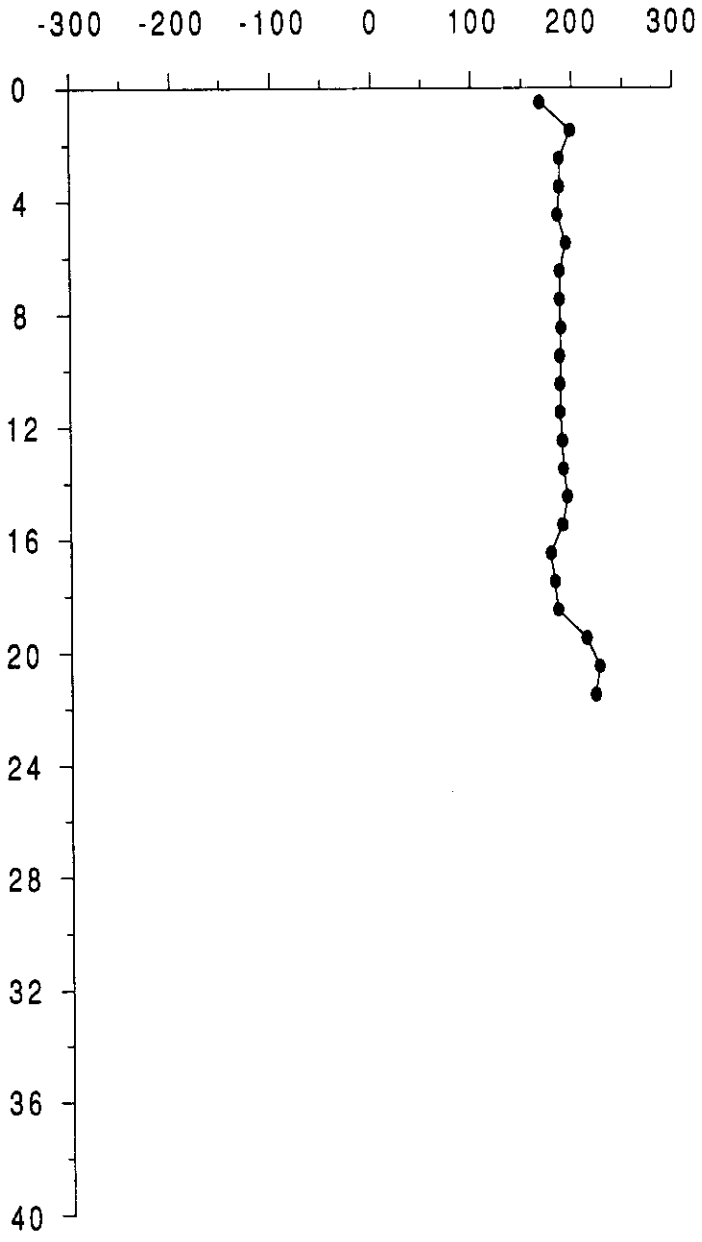
Note: squeezed sediments are saved in a separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 40, p. 131). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Continuous sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at the following depth intervals (in cm): 0-2, 5-7, 7-9, 9-11, 11-12, 15-17, 17-19, 20-22, 22-23.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 17
Location: Western Irminger Sea Basin
Station Number: 051 BC

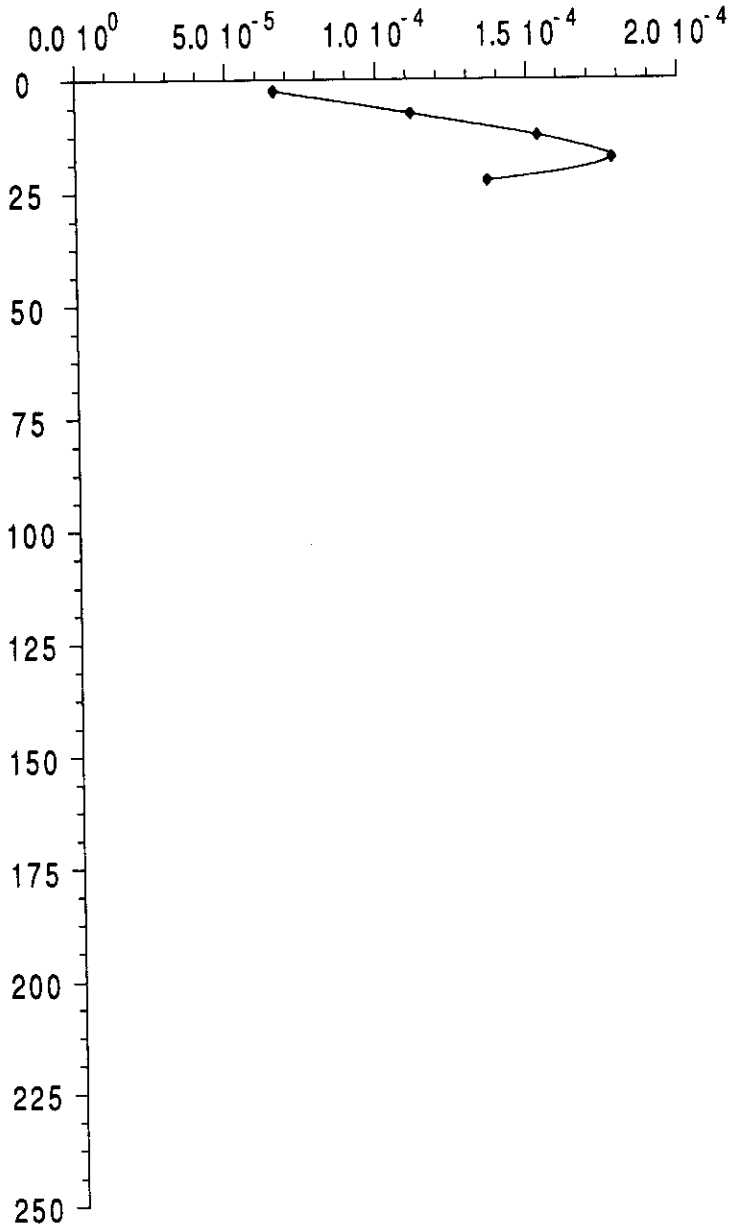
Figure 39: Redox potential



Julian Day: 298
GMT: 12:52
Water Depth: 2949 m
Latitude: 59° 29.56
Longitude: 39° 18.43

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 17
Location: Western Irminger Sea Basin
Station Number: 051 BC

Figure 40



Julian Day: 298
GMT: 12:52
Water Depth: 2949 m
Latitude: 59° 29.56
Longitude: 39° 18.43

HU-91-045-052: TW & P coring

Julian day:	298	GMT Time:	15:35
Latitude:	59°29.51 N	Longitude:	39°18.39 W
Water depth:	2883 m		
Location :	Irminger Basin		

Trigger Weight Core (TWC)

App. penetr.: 0 cm
Core length: 0 cm

Piston Core

Corer length: 1500 cm
App. penetr.: 1200 cm
Core length: 637 cm (5 sections)

Description: Sediments consist of dark grayish brown mud overlying dark gray mud as follows:
0-21 cm: dark grayish brown (10YR 4/2) mud rich in foraminifers;
21-23 cm: layer of dark grayish brown (2.5Y 4-3/2) silty mud with abundant foraminifers;
23-35 cm: dark grayish brown (2.5Y 4/2) mud;
35-41 cm: very dark gray (5Y 3/1) mud grading to silts;
41-49 cm: dark gray (5Y 4/1) mud grading to muddy sand with gravel;
49-259 cm: dark grayish brown (2.5Y 4/2) bioturbated mud grading to dark gray (5Y 4/1) bioturbated mud;
259-297 cm: dark grayish brown (2.5Y 4/2) mud heavily bioturbated;
297-310 cm: gray mud (5Y 5/1) heavily bioturbated;
310-396 cm: dark grayish brown (2.5Y 4/2) bioturbated mud with very dark grayish brown (2.5Y 3/1) mud layer at 355-356 and 361-363 cm;
396-443 cm: dark gray (10YR 4/1) grading to very dark gray (10YR 3/1) mud;
443-523 cm: very dark gray (5Y 3/1) clayey mud;
523-560 cm: dark gray (5Y 4/1) bioturbated clayey mud;
560-602 cm: very dark gray (5Y 3/1) mud grading to dark gray (5Y 4/1) mud, to gray (5Y 5/1) mud rich in foraminifers;
602-632 cm: very dark gray (5Y 3/1) silts with blackish bands;
632-637 cm: dark gray (5Y 4/1) mud.

HU-91-045-052: TW & P coring (continued)

Subsampling: Magnetic susceptibility has been measured at 5 cm intervals (figure 41, next page). The core was split into 2 longitudinal half-sections. One half was described and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements and numbered according to their depth downcore. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

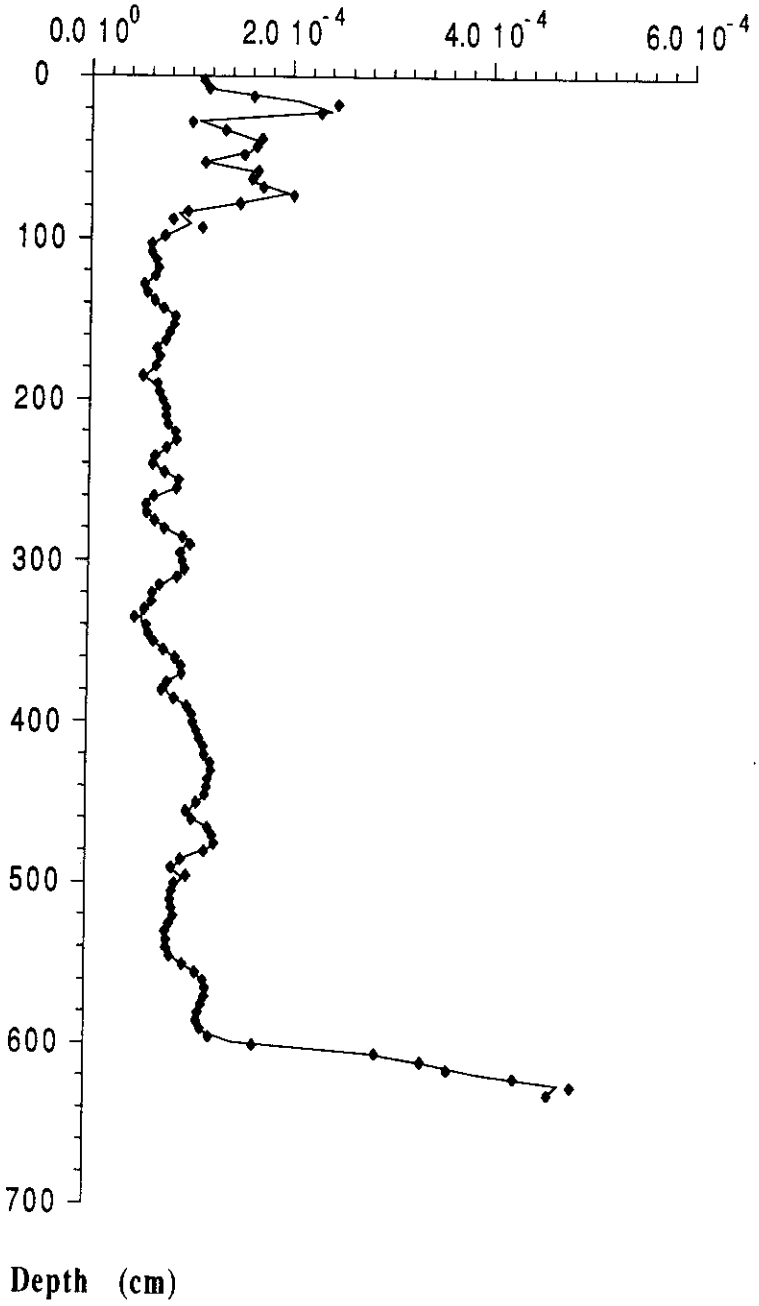
Sampling depth (cm)

0-2	61-63	155-157	248-250	338-340
5-7	70-72	164-166	258-260	348-350
13.5-15.5	80-82	173-175	267.5-269.5	358-360
23-25	89-91	183-185	277-279	362-364
27-29	99-101	190-192	287-289	368-370
32-34	109-111	199.5-201.5	297-299	378-380
34-36	116-118	209-211	306.5-308.5	388-390
36-38	126-128	219-221	316-318	393-395
41.5-43	135-137	229-231	326-328	400-402
51-53	145-147	238.5-240.5	333-335	407.5-409.5

417.5-419.5	513-515	601.5-603.5
428-430	523-525	607-609
438-440	542-545	613-615
447-449	551.5-553.5	618-620
457-459	561-563	627-629
466.5-468.5	571-573	632-634
476.5-478.5	581-583	
486-488	590-592	
494-496	597.5-599.5	
503-505	599.5-601.5	

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 17
Location: Western Irminger Sea Basin
Station Number: 052 PC

Figure 41



Julian Day: 298
GMT: 15:35
Water Depth: 2883 m
Latitude: 59° 29.51
Longitude: 39° 18.39

HU-91-045-053: Water sampling

Julian day:	298	GMT Time:	16:00
Latitude:	59°29.52 N	Longitude:	39°18.48 W
Water depth:	2950 m		
Location:	Irminger Basin		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A74	13 L
GN6-A75	12 L
GN6-A76	8 L
GN6-A77	6 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A61	32 L
A62	17.8 L
A63	24 L
A64	9 L

II- Depth sampled: 300 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A70	2.85 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

III- Depth sampled: 600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A72	2.83 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-053: Water sampling (continued)

IV- Depth sampled: 900 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A67	2.95 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

V- Depth sampled: 1200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A69	20 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A60	51.3 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VI- Depth sampled: 1600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A68	2.85 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-053: Water sampling (continued)

VII- Depth sampled: 2200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A66	26 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A58	56 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VIII- Depth sampled: 2400 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A71	2.84

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
---	---

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-053: Water sampling (continued)

IX- Depth sampled: 2850 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A65	24 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A57	72 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at the following water depths:
10 m, 300 m, 600 m, 900 m , 1200 m, 1600 m, 2200 m, 2400 m, 2850 m.

HU-91-045-054: TW & P coring

Julian day:	299	GMT Time:	13:10
Latitude:	59°38.08 N	Longitude:	36°07.47 W
Water depth:	3025 m		
Location:	Irminger Basin		

Trigger Weight Core (TWC)

App. penetr.: full
Core length: 186 cm

Description: Sediment consists of brown to very dark gray mud as follows:
0-24 cm: brown (10YR 4/3) bioturbated mud with very dark gray sandy patches;
24- 70 cm: dark grayish brown (10YR 4/2) bioturbated mud with scattered clayey clasts;
70-186 cm: very dark gray (5Y 3/1) sandy mud with clayey clasts.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 42, p. 143).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows::

Sampling depth (cm)

0-1	81-83	178-180
3.5-5.5	90.5-92.5	
14-16	100-102	
24-26	110-112	
34-36	120-122	
45-47	129.5-131.5	
51.5-53.5	139.5-141.5	
61-63	149-151	
66-68	159-161	
73-75	168.5-170.5	

HU-91-045-054: TW & P coring (continued)

Onboard measurements: Redox potential

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
1	196	50	204	100	123
5	201	55	212	105	131
10	209	60	198	110	124
15	208	65	186	115	131
20	211	70	165	120	123
25	196	75	151	125	120
30	208	80	143	130	134
35	206	85	138	135	129
40	210	90	142	140	120
45	202	95	113	145	117
150	107				
155	108				
160	118				
165	84				
170	106				
175	104				
180	87				
185	72				

Piston Core

Corer length: 1500 cm
App. penetr.: 1400 cm
Core length: 987 cm (6 sections)

Description: Sediments are generally rich in biogenic carbonates. They consist of a succession of brown and gray mud to sandy mud as follows:
0-19 cm: dark grayish brown (10YR 4/2)bioturbated mud;
19-30 cm: brown (10YR 5/3) bioturbated mud;
30-240 cm: very dark gray (5Y 3/1) sandy mud with scattered clayey clasts;
240-295 cm: very dark gray (5Y 3/1) muddy sand overlying a gravel lense over an erosional surface;
295-298 cm: very dark gray (5Y 3/1) silty mud layer;
298-387 cm: brown (10YR 4/3) bioturbated mud;
387-393 cm: grayish brown (10YR 5/2) bioturbated mud;
393-456 cm: brown (10YR 4/3) bioturbated mud grading to grayish brown (10YR 4/3) mud rich in foraminifers;
456-462 cm: dark grayish brown (10YR 4/2) clayey mud grading to dark gray (10YR 4/1) silty mud;
462-467 cm: grayish brown (10YR 5/2) mud rich in foraminifers;

HU-91-045-054: TW & P (continued)

Piston core description (continued):

467-474 cm: dark grayish brown (10YR 4/2) mud;
474-478 cm: dark yellowish brown (10YR 3/3) mud;
478-632 cm: brown (10YR 4/3) mud with barely visible laminations grading to dark grayish brown (10YR 4/2) sandy mud;
632-685 cm: very dark gray (5Y 3/1) muddy sand overlying a gravel lense over an erosional surface;
685-700 cm: dark grayish brown (2.5Y 4/2) bioturbated mud;
700-720 cm: dark gray (5Y 4/1) mud;
720-768 cm: dark grayish brown (2.5Y-10YR 4/2) mud;
768-838 cm: dark gray (10YR to 5Y 4/1) sandy mud;
838-870 cm: dark grayish brown (2.5Y 4/2) bioturbated mud;
870-884 cm: olive brown (2.5 Y 4/3) bioturbated mud;
884-922 cm: dark grayish brown (10YR 4/2) sandy mud grading to very dark gray sand (10YR 4/1) over an erosional surface;
922-978 cm: dark grayish brown (10YR 4/3) mud grading to brown-yellowish brown 10YR-2.5Y 4/3) mud with diffuse color laminations and abundant bioturbations;
978-994 cm: dark grayish brown (10YR 4/2) bioturbated mud with very dark gray (10YR 3/1) silt lenses.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 43, p. 144). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm.)

surface	68-70	160-162	246-248	334-336
0-2	78-80	169-171	256-258	344-346
9-11	85-87	178.5-180.5	265-267	354-356
19-21	91-93	188-190	276-278	364-366
21-22	104-106	198-200	285.5-287.5	373-375
24.5-26.5	113-115	207-209	295-297	383-385
30-32	122-124	217-219	299-301	388-390
39-41	131-133	227-229	305-307	393-395
48-50	141-143	236.5-238.5	314.5-316.5	402.5-404.5
58-60	150-152	239-241	324-326	413-415

HU-91-045-054: TW & P (continued)

Piston core subsampling (continued):

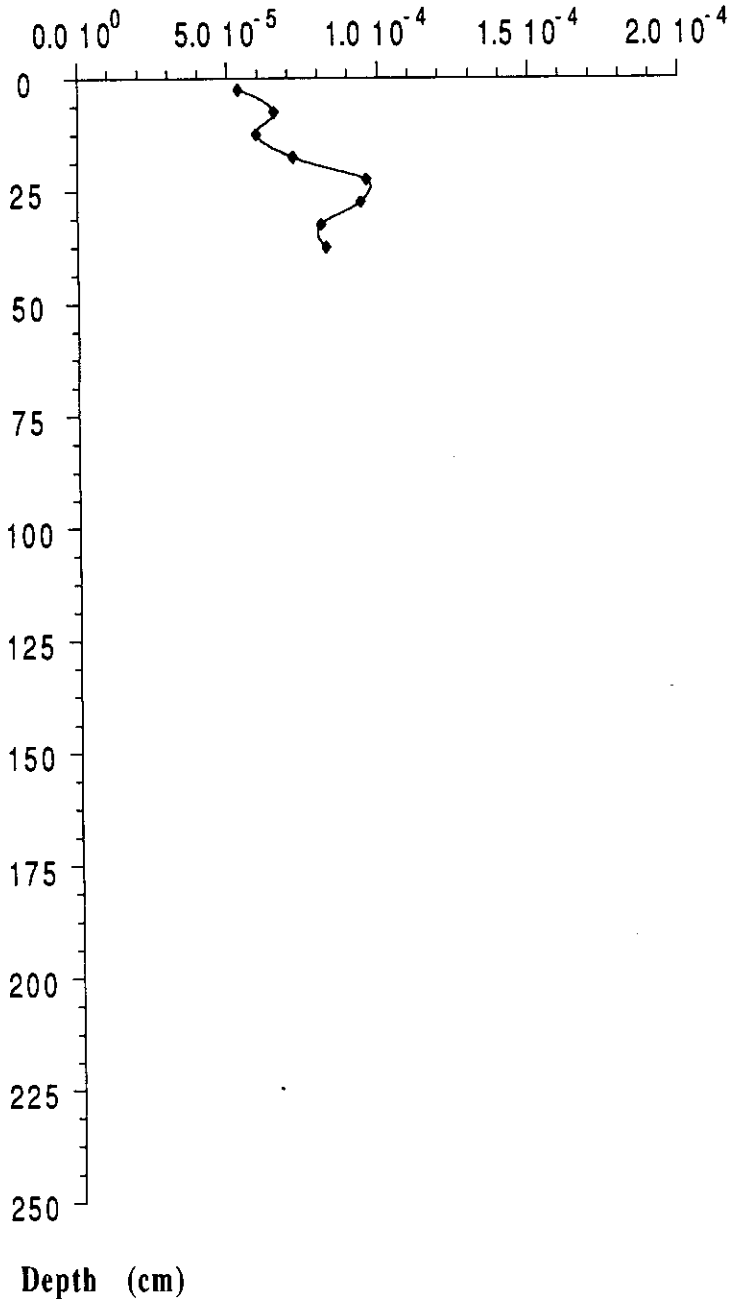
Sampling depth (cm)

425-427	522-524	613-615	709-711	805-807
434.5-436.5	532-534	623-625	719-721	815-817
444.5-446.5	541-543	632-634	729-731	825-827
454-456	547-549	642-644	738-740	833-835
463.5-465.5	557-559	654-656	747-749	838.5-840.5
473-475	566-568	664-666	758-760	847-849
483-485	576-578	673-676	767-769	854-856
493-495	586-588	682.5-684.5	777-779	863-865
503-505	594-596	687.5-689.5	786-788	873-875
512.5-514.5	604-606	700-702	795.5-797.5	877-879

882-884	976-978
892-894	985-987
901-903	
910-912	
920-922	
929-931	
939-941	
949-951	
957-959	
966.6-968.5	

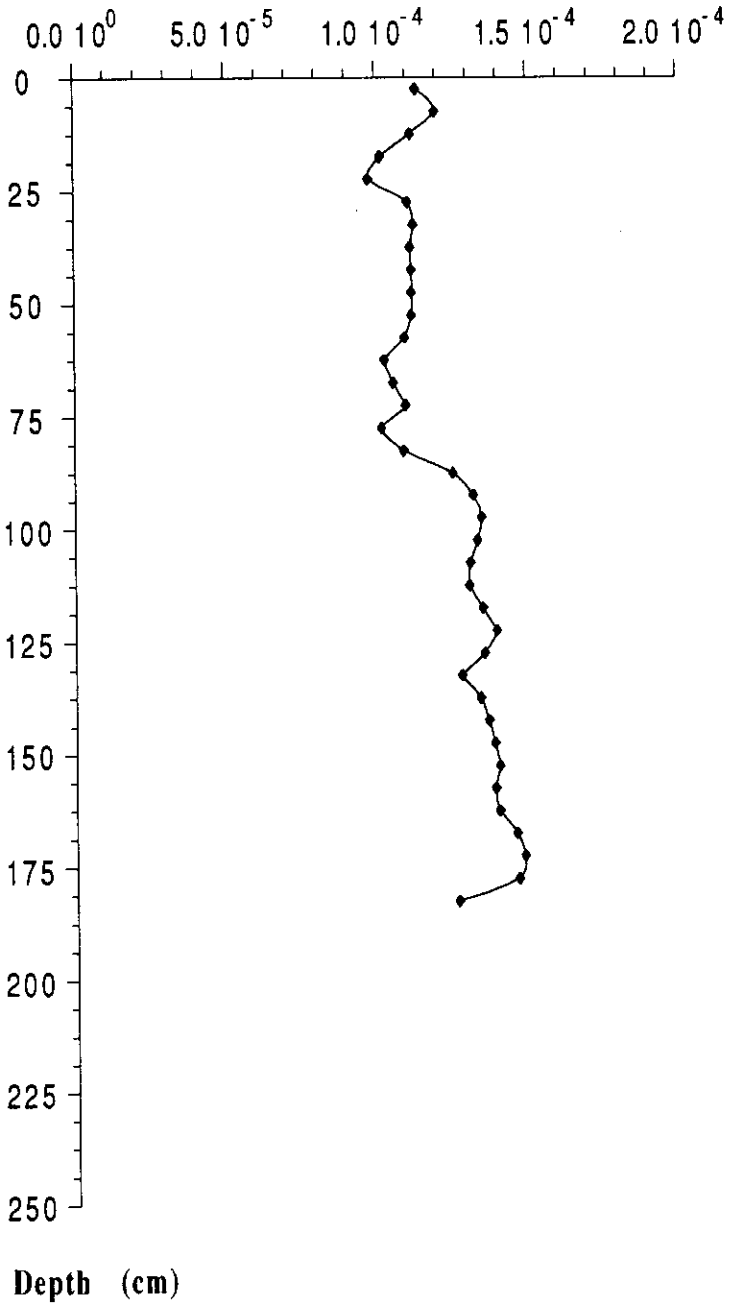
MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 18 A
Location: Irminger Basin
Station Number: 056 BC

Figure 42



Julian Day: 299
GMT: 13:10
Water Depth: 3025 m
Latitude: 59° 38.07
Longitude: 36° 07.53

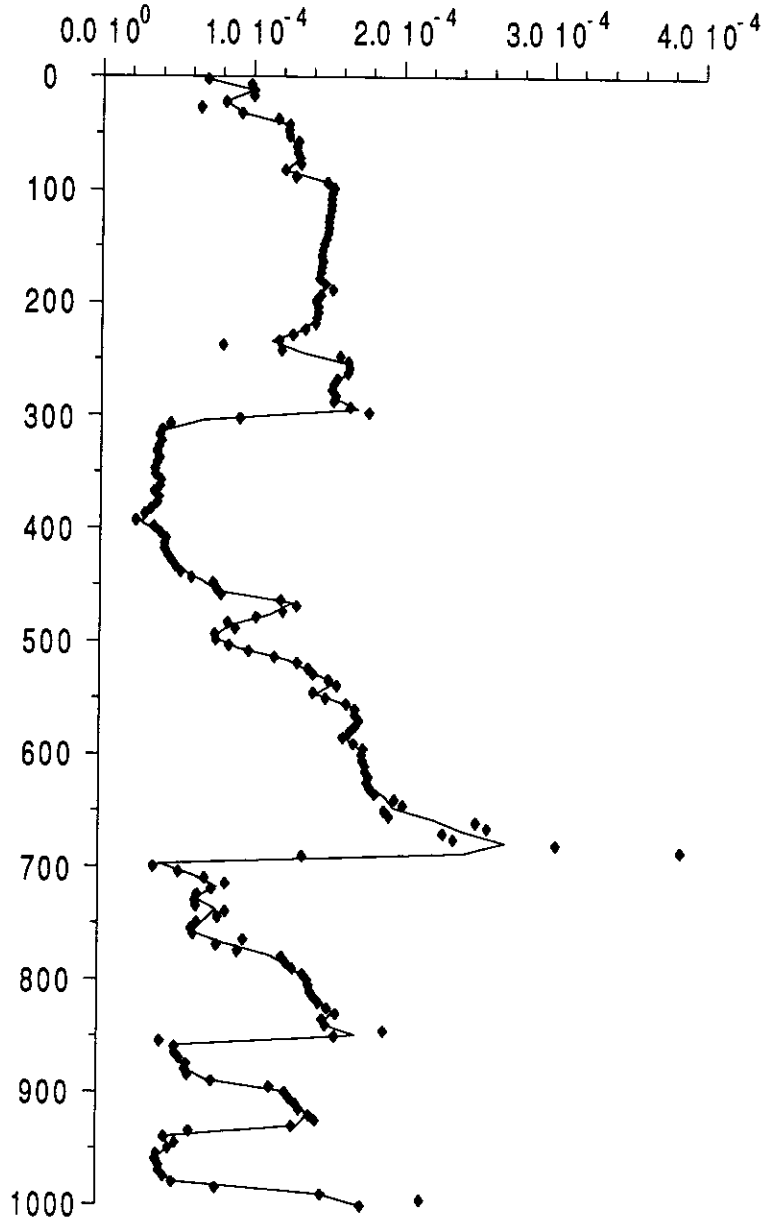
Station Number: 054 TWC



Julian Day: 299
GMT: 13:10
Water Depth: 3025 m
Latitude: 59° 38.08
Longitude: 36° 07.47

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 18 A
Location: Irminger Basin
Station Number: 054 PC

Figure 43



Julian Day: 299
GMT: 13:10
Water Depth: 3025 m
Latitude: 59° 38.08
Longitude: 39° 07.47

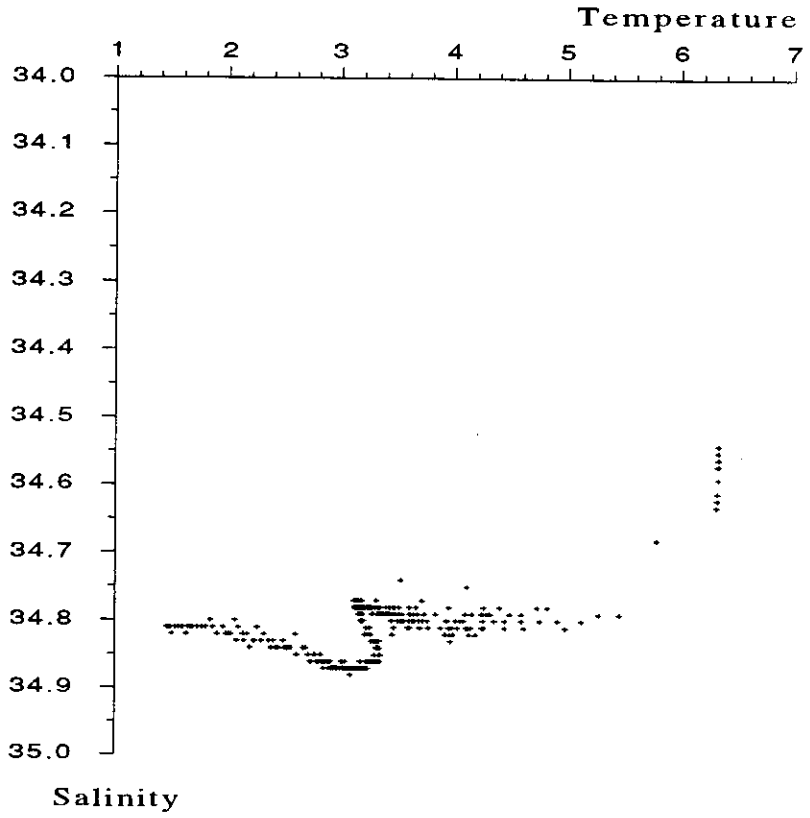
HU-91-045-055: CTD

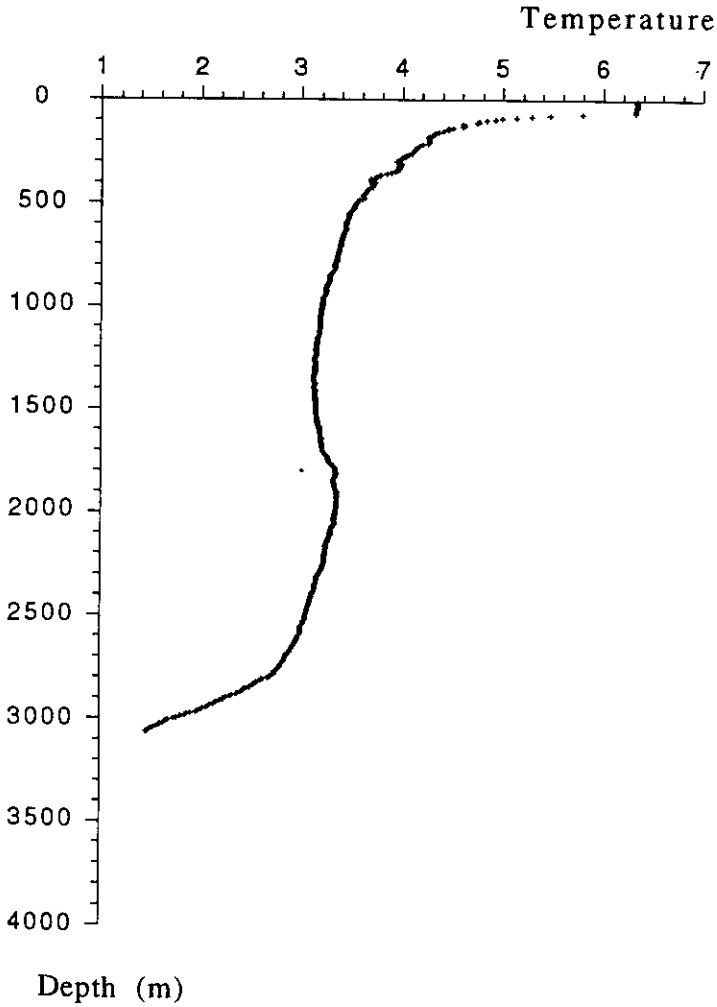
Julian day:	299	GMT Time:	15:59
Latitude:	59°38.07 N	Longitude:	36°07.53 W
Water depth:	1559 m		
Location:	Irminger Basin		

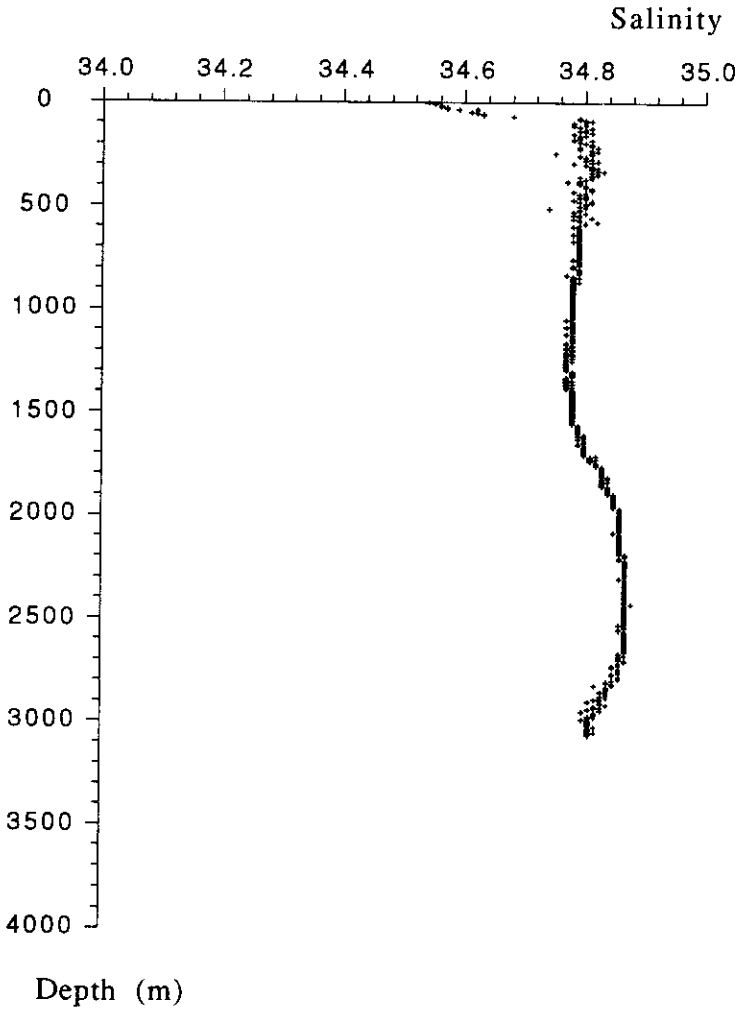
See figure 44, next page.

Figure 44: CTD cast

Cruise Number : HU-91-045
Site Number: 18 A
Station Number: 055
Location: Irminger Basin
Julian Day: 299
GMT: 15:59
Water Depth: 3025 m
Latitude: 59° 38.07'
Longitude: 36° 07.53'







HU-91-045-056: Box coring

Julian day:	299	GMT Time:	15:59
Latitude:	59° 38.07 N	Longitude:	36° 07.53 W
Water depth:	3025 m		
Location:	Irminger Basin		

Penetration: 40 cm

Description: Surface sediments consist of dark grayish brown (10YR 4/2) mud.
Sub-surface sediments are brown to dark grayish brown bioturbated mud as follows:
1-22 cm: brown (10YR 4/3) mud;
22-39 cm: dark grayish brown (10YR 4/2) mud;
39-40 cm: brown (10YR 5/3) mud.

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
4 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 10 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

<u>On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:</u>

1. 1. Redox potential measurements (figure 45, p. 149)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	209	10-11	233	20-21	167
1-2	213	11-12	226	21-22	220
2-3	196	12-13	222	22-23	207
3-4	216	13-14	215	23-24	---
4-5	217	14-15	212	24-25	---
5-6	234	15-16	227	25-26	79
6-7	229	16-17	233	26-27	55
7-8	231	17-18	212		
8-9	223	18-19	225		
9-10	221	19-20	228		

HU-91-045-056: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-2	X	X	A-88
2-4	X	X	A-93
4-6	X	X	A-97
6-8	X	X	A-95
8-10	X	X	A-251
10-12	X	X	A-91
12-14	X	X	A-255
14-16	X	X	A-90
16-18	X	X	A-66
18-20	X	X	A-98
20-23	X	X	A-52
23-25	X	X	A-89
25-27	X	X	A-80

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	5	4 x 2	5	2	---	---	---
2-4	5	4 x 2	5	8	4	---	---
4-6	5	4 x 2	5	8	4	---	---
6-8	5	4 x 2	5	4	---	---	---
8-10	5	4 x 2	5	5	---	---	---
10-12	5	4 x 2	5	5	---	---	---
12-14	5	4 x 2	5	8	---	---	---
14-16	5	4 x 2	5	7	---	---	---
16-18	5	4 x 2	5	7	---	---	---
18-20	5	4 x 2	5	2	---	---	---
20-23	5	4 x 2	5	4	---	---	---
23-25	5	4 x 2	5	---	---	---	---
25-27	5	4 x 2	5	5	---	---	---

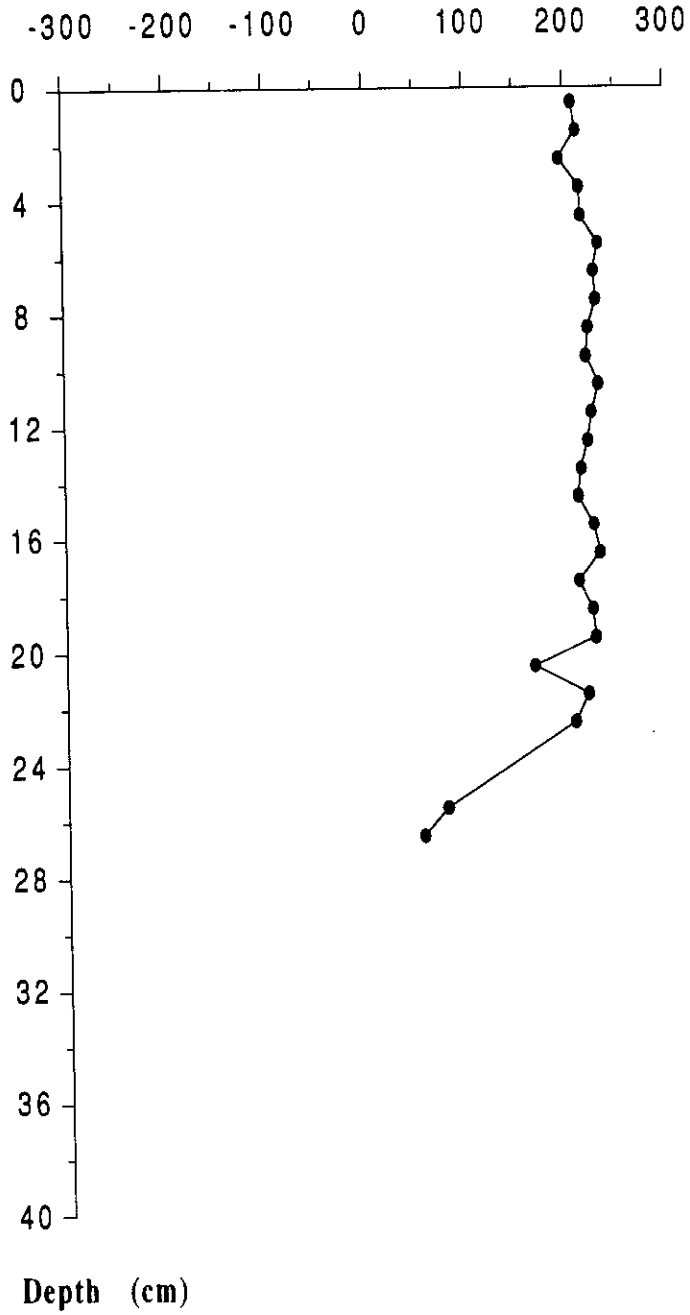
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 42, p. 143). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at at the following depth intervals (in cm): 0-2, 2-4, 4-6, 9-11, 11-13, 13-15, 19-21, 22-23, 23-25, 28-30, 30-32, 32-34, 37-39, 39-40.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 18 A
Location: Irminger Basin
Station Number: 056 BC

Figure 45: Redox potential



Julian Day: 299
GMT: 15:59
Water Depth: 3025 m
Latitude: 59° 38.07
Longitude: 36° 07.53

HU-91-045-057: Water sampling

Julian day:	299	GMT Time:	18:00
Latitude:	59°38.02 N	Longitude:	36°07.54 W
Water depth:	3025 m		
Location:	Irminger Basin		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A86	8 L
GN6-A87	8 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A68	31.7 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 400 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A79	2.85 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-057: Water sampling (continued)

III- Depth sampled: 800 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A78	2.92 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 1100 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A80	2.85 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

V- Depth sampled: 1400 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A80	18 L
GN6-A84	20 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A67	57.2 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-057: Water sampling (continued)

VI- Depth sampled: 1700 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A81	2.9 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VII- Depth sampled: 2300 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A82	2.92 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VIII- Depth sampled: 2600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A93	2.96

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-057: Water sampling (continued)

IX- Depth sampled: 2950 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A83	6 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A66	22 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at the following water depths:
10 m, 400 m, 800 m, 1100 m, 1400 m, 1700 m, 2000 m (x 2), 2600 m, 2950 m.

HU-91-045-058: TW & P coring

Julian day:	300	GMT Time:	12:37
Latitude:	59°50.97 N	Longitude:	33°34.82 W
Water depth:	2255 m		
Location:	Irminger Basin		

Trigger Weight Core (TWC)

App. penetr.: full
Core length: 187 cm (+ cutter)

Description: Sediment consists of brownish bioturbated mud rich in biogenic carbonates.
0-52 cm: pale brown (10YR 6/3) grading to brown (10YR 5/3), to pale brown (10YR 6/3) and to light brownish gray (10YR 6/2) mud;
52-96 cm: dark yellowish brown (10YR 4/4) mud with sand and granules;
96-107 cm: brown (10YR 4/3) with sand and granules;
107-124 cm: grayish brown mud ((10YR 5/2);
124-142 cm: dark yellowish brown (10YR 4/4) mud with sand and granules;
142-149 cm: pale brown (10YR 6/3) mud;
149-156 cm: light gray (10YR 7/2) mud;
156-170 cm: brown (10YR 5/3) mud;
170-180 cm: dark yellowish brown (10YR 4/4) mud with lighter mottles.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 46, p. 157).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	78.5-80.5	168-170
4-6	88-90	177-179
14-16	96-98	186-188
23.5-25.5	108-110	
33-35	114-116	
38-40	123-125	
42.5-44.5	132-134	
52-54	141-143	
61-63	150-152	
70-72	159-161	

HU-91-045-058: TW & P (continued)

Piston Core

Corer length: 1500 cm
App. penetr.: 1350 cm
Core length: 1013 cm (7 sections + cutter)

Description: Sediments consist of brownish to light gray mud heavily bioturbated and rich in biogenic carbonates.
0-0.5 cm: light brownish gray (10YR 6/2) mud;
0.5-10 cm: pale brown (10YR 6/3) mud
10-138 cm: brown (10YR 4-5/3) mud grading to dark yellowish brown (10YR 4/4) mud with sand and granules;
138-146 cm: pale brown (10YR 6/3) mud;
146-151 cm: light gray (10YR 7/2) mud;
151-168 cm: pale brown (10YR 6/3) mud;
168-174 cm: brown (10YR 5/3) mud;
174-217 cm: pale brown (10YR 6/3) mud;
217-234 cm: light gray (10YR 7/2) mud;
234-259 cm: brown (10YR 5/3) mud;
259-340 cm: dark brown (10YR 4/3) mud with sand and granules;
340-405 cm: alternance of brown (10YR 5/3), dark brown (10YR 4/3) and dark yellowish brown (10YR 4/4) mud layers;
405-410 cm: pale brown (10YR 6/3) mud;
410-476 cm: succession of brown (10YR 5/3), olive brown (2.5Y 4/4), dark brown (10YR 4/3), yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mud with sand, granules and gravel;
476-489 cm: pale brown (10YR 6/3) mud;
489-588 cm: alternance of brown (10YR 4-5/3) and dark yellowish brown (10YR 4/4) mud layers with sand and granules;
588-670 cm: alternance of pale brown (10YR 6/3) and light gray (10YR 7/2) mud layers;
670-729 cm: succession of brown (10YR 5/3), dark yellowish brown (10YR 4/4) and brown (10YR 5/3) layers of mud with sand, granules and gravel;
729-746 cm: succession of pale brown (10YR 6/3), white (10YR 8/2), pale brown (10YR 6/3) and light gray (10YR 7/2) mud layers;
746-750 cm: brown (10YR 5/3) mud;
750-790 cm: light brownish gray (10YR 6/2) to light gray (10YR 7/2) mud;
790-801 cm: brown (10YR 4/3) mud with sand and granules;
801-809 cm: light brownish gray (10YR 6/2) mud with sand and granules;
809-825 cm: brown (10YR 4/3) mud with sand and granules;
825-842 cm: light brownish gray (10YR 6/2) mud;
842-931 cm: succession of grayish brown (10YR 5/2), dark yellowish brown (10YR 4/4), brown (10YR 5/3), dark yellowish and yellowish brown (10YR 4-5/4) mud with sand and granules;
931-938 cm: light brownish gray (10YR 6/2) to light gray (10YR 7/2) mud;
938-950 cm: grayish brown (10YR 5/2) mud;
950-954 cm: light brownish gray (10YR 6/2) mud;
954-1014 cm: alternance of brown (10YR 4/3) mud with grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/4) mud with sand and granules.

HU-91-045-058: TW & P coring (continued)

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 47, p. 158). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

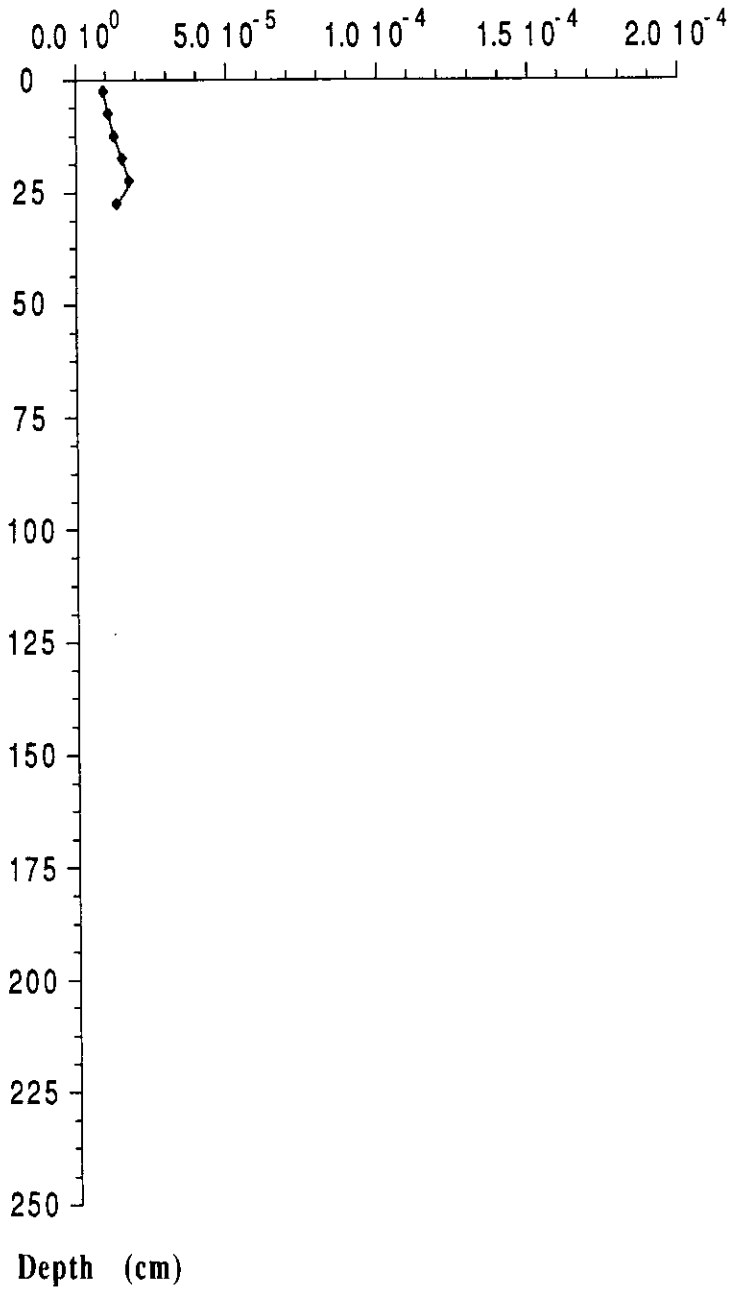
0-2	92-94	175-177	258-260	353-355
5-7	102-104	185-187	268-270	362.5-364.5
15-17	105-107	194-196	278-280	372-374
24-26	112-114	203-205	287-289	381.5-383.5
34-36	121-123	212-214	297-299	391.5-393.5
44-46	130-132	221-223	306-308	400.5-402.5
54-56	139-141	230-232	315-317	406-408
63-65	148-150	239-241	325-327	408-410
73-75	157-159	249-251	334-336	413-415
83-85	166-168	257-258	343.5-345.5	422.5-424.5

432-434	525.5-527.5	600.5-602.5	682-684	779.-781.5
442-444	535-537	602.5-604.5	691.5-693.5	789-791
450.5-452.5	544-546	610-612	701-703	798-800
460-462	554-556	619-621	707.5-709.5	808-810
469-471	562-564	628-630	721-723	817-819
478-480	566.5-568.5	637-639	731-733	827-829
488-490	576-578	646-648	741-743	836-838
497-499	582.5-584.5	655-657	750.5-752.5	846-848
507-509	591.5-593.5	664-666	760-762	855-857
516-518	593.5-595.5	673-675	770-772	862.5-864.5

965.5-667.5	958-960
872-874	967.5-969.5
881.5-883.5	977-979
891-893	986-988
900.5-902.5	996-998
910-912	1005.5-1007.5
920-922	1010.3-1013.3
929-931	
939-941	
949-951	

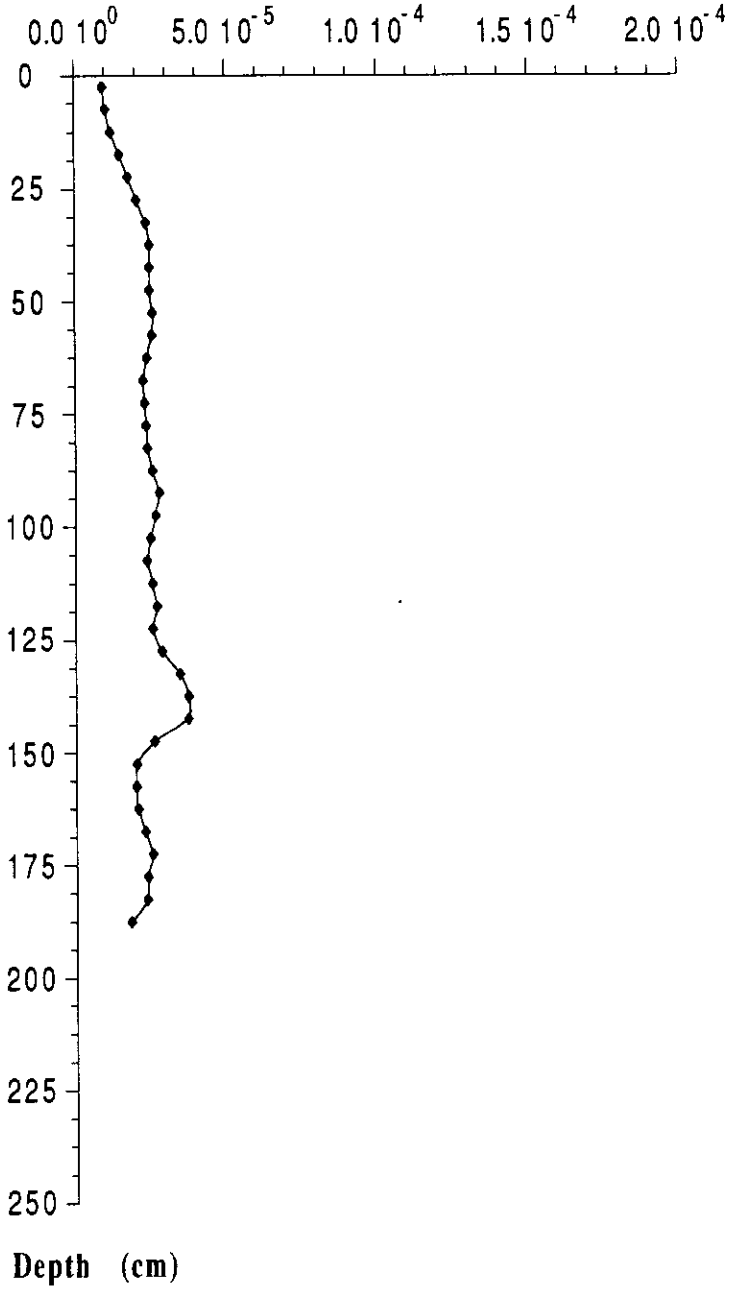
MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 18 B
Location: Irminger Basin
Station Number: 060 BC

Figure 46



Julian Day: 300
GMT: 16:27
Water Depth: 2255 m
Latitude: 59° 50.96
Longitude: 33° 34.93

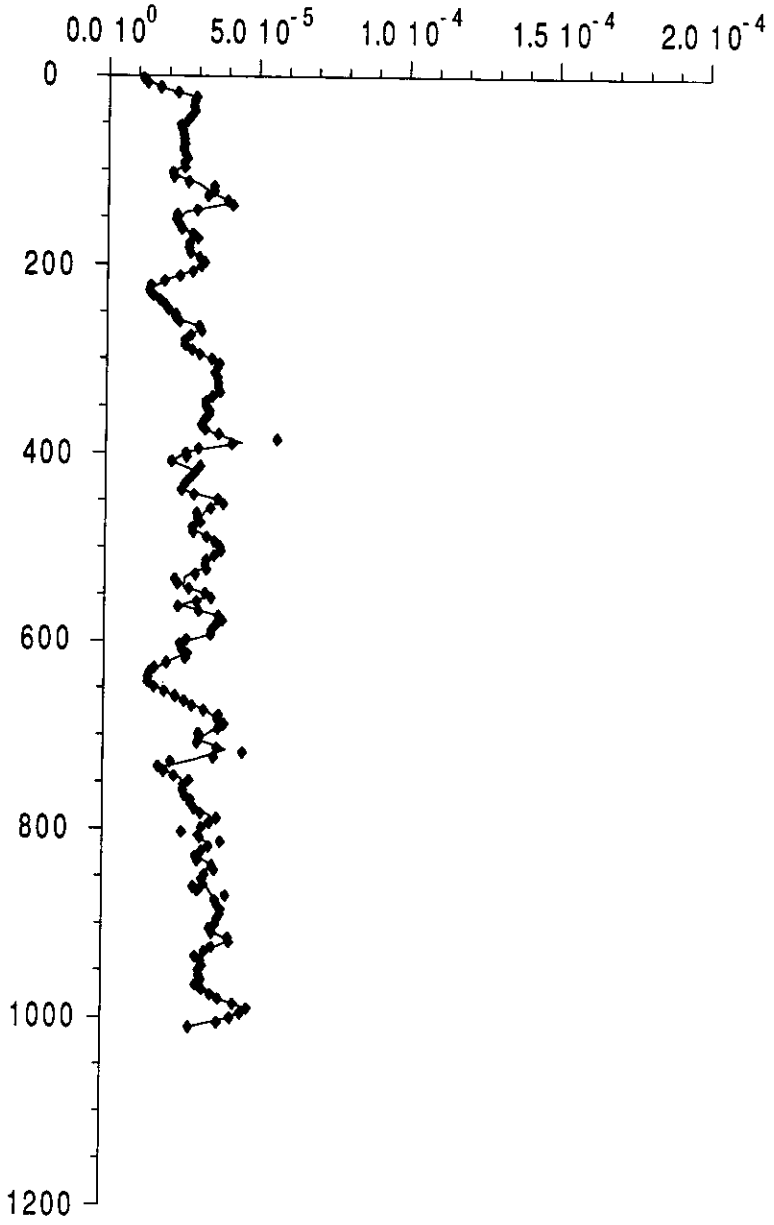
Station Number: 058 TWC



Julian Day: 300
GMT: 12:37
Water Depth: 2255 m
Latitude: 59° 50.97
Longitude: 33° 34.82

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 18 B
Location: Irminger Basin
Station Number: 058 PC

Figure 47



Julian Day: 300
GMT: 12:37
Water Depth: 2255 m
Latitude: 59° 50.96
Longitude: 33° 34.93

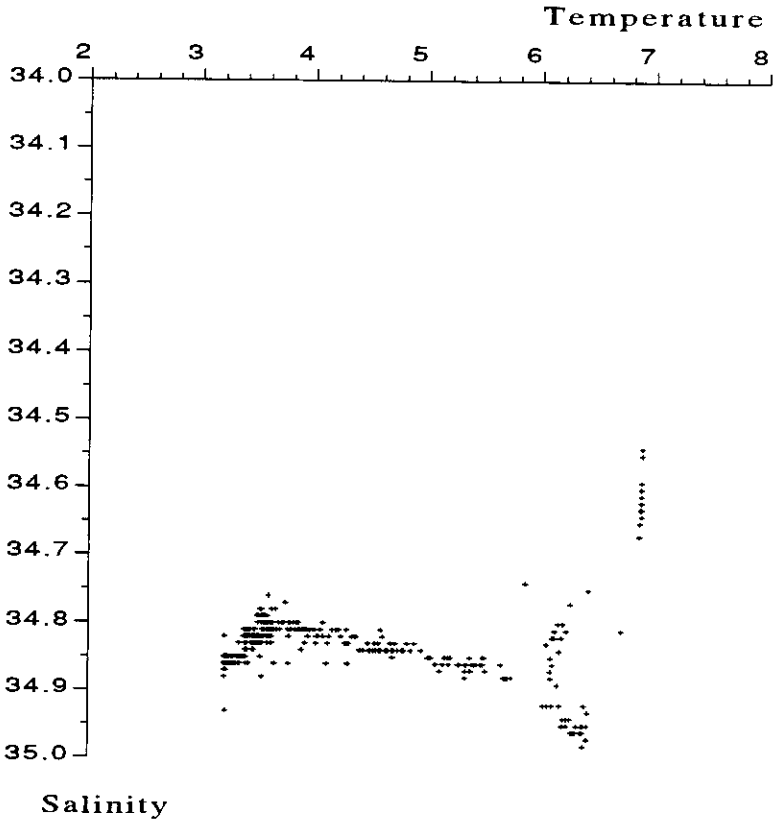
HU-91-045-059: CTD

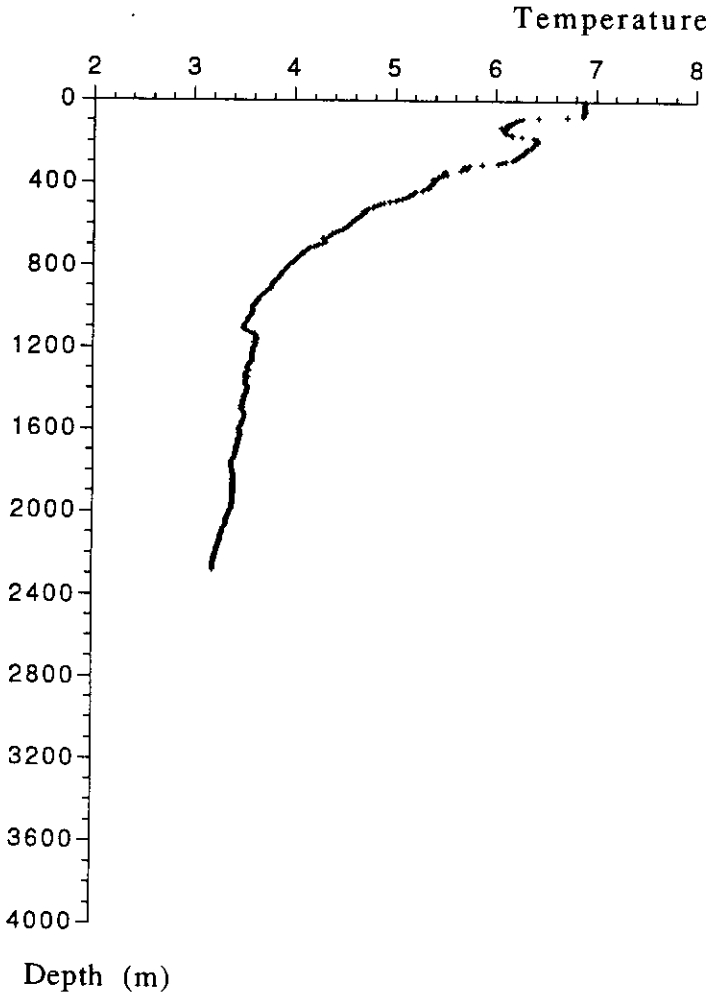
Julian day:	300	GMT Time:	16:30
Latitude:	59°50.92 N	Longitude:	53°34.84 W
Water depth:	2255 m		
Location:	Irminger Basin		

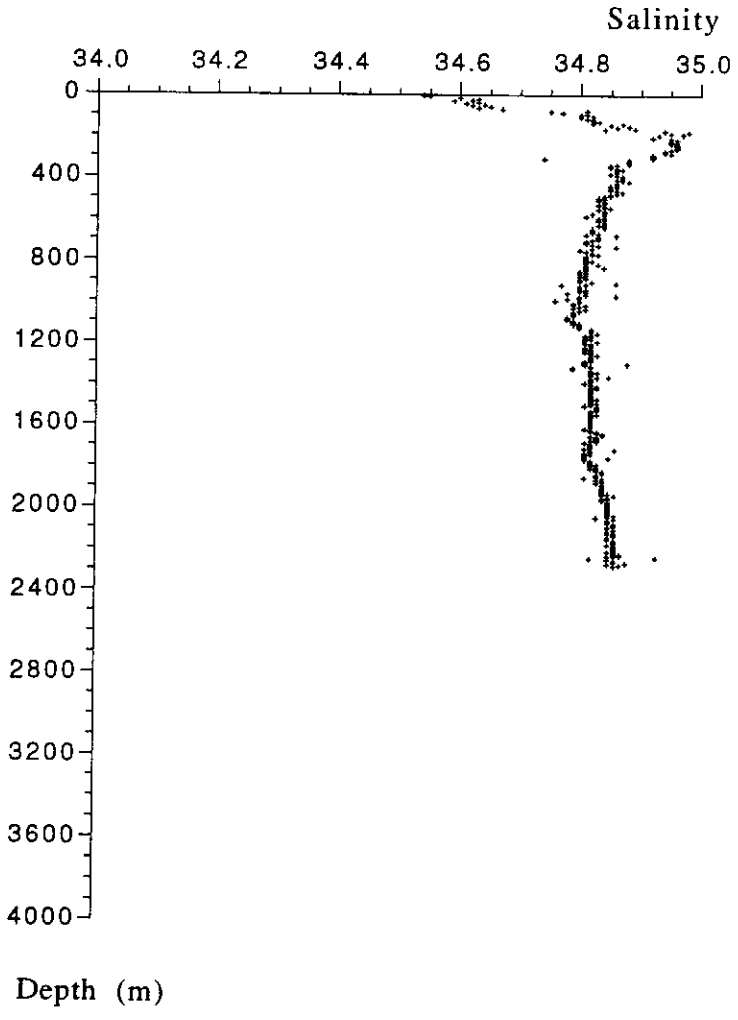
See figure 48, next page.

Figure 48: CTD cast

Cruise Number : HU-91-045
Site Number: 18 B
Station Number: 059
Location: Irminger Basin
Julian Day: 300
GMT: 16:30
Water Depth: 2255 m
Latitude: 59° 50.92'
Longitude: 33° 34.84'







HU-91-045-060: Box coring

Julian day:	300	GMT Time:	16:27
Latitude:	59° 50.96 N	Longitude:	33° 34.93 W
Water depth:	2255 m		
Location:	Irminger Basin		

Penetration: 28 cm

Description: Surface sediments (0-5 cm) consist of light olive brown (2.5Y 5/4) mud. Black gravel and macrofauna (worms, gastropodes) are observed at the surface.
Sub-surface sediments consist of pale brown (10YR 6/3) to brown (10YR 5/3) bioturbated mud.

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
4 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 10 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

<u>On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:</u>

1. 1. Redox potential measurements (figure 49, p. 163)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	202	10-11	174	20-21	176
1-2	216	11-12	182	21-22	182
2-3	191	12-13	186	22-23	187
3-4	200	13-14	186	23-24	191
4-5	190	14-15	183	24-25	183
5-6	189	15-16	178	25-26	181
6-7	191	16-17	183	26-27	183
7-8	180	17-18	175	27-28	180
8-9	171	18-19	179	28-29	201
9-10	176	19-20	185		

HU-91-045-060: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-2	X	X	A-50
2-4	X	X	A-65
4-6	X	X	A-67
6-8	X	X	A-71
8-10	X	X	A-72
10-12	X	X	A-74
12-14	X	X	A-76
14-16	X	X	A-78
16-18	X	X	A-82
18-20	X	X	A-85
20-22	X	X	A-86
22-24	X	X	A-87
24-26	X	X	A-99
26-28	X	X	A-100

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	11	4 x 2	8	8	8	2	8
2-4	8	4 x 2	8	5	5	2	5
4-6	5	4 x 2	5	5	5	---	---
6-8	5	4 x 2	5	8	5	2	2
8-10	5	4 x 2	2	---	---	---	---
10-12	5	4 x 2	5	8	2	---	---
12-14	6	4 x 2	5	8	---	---	---
14-16	5	4 x 2	5	6	---	---	---
16-18	5	4 x 2	5	8	1	---	---
18-20	5	4 x 2	5	6	---	---	---
20-22	5	4 x 2	5	7	---	---	---
22-24	5	4 x 2	5	5	---	---	---
24-26	5	4 x 2	4	---	---	---	---
26-28	---	4 x 2	---	----	---	---	---

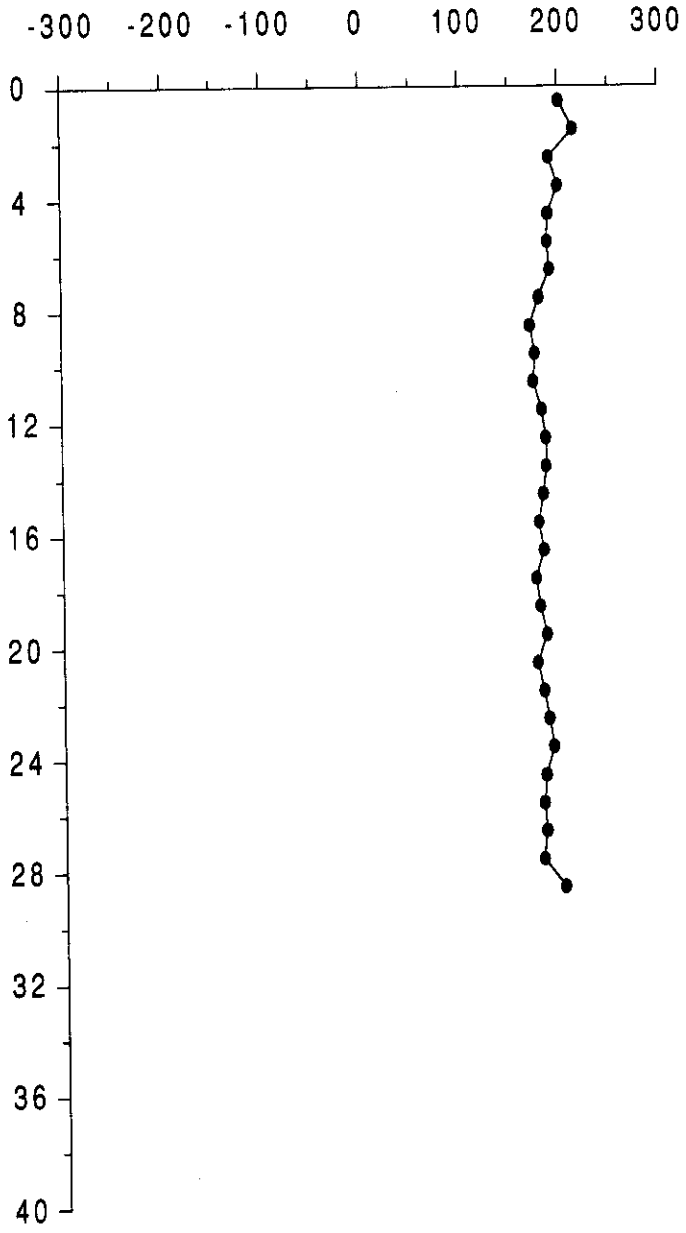
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 46, p. 157). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Continuous sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at 2 cm intervals.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 18 B
Location: Irminger Basin
Station Number: 060 BC

Figure 49: Redox potential



Julian Day: 300
GMT: 16:27
Water Depth: 2255 m
Latitude: 59° 50.96
Longitude: 33° 34.93

HU-91-045-061: Water sampling

Julian day:	300	GMT Time:	18:00
Latitude:	59°50.95 N	Longitude:	33 °34.98 W
Water depth:	2255 m		
Location:	Irminger Basin		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A92	10 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A71	31.3 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A88	2.85 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-061: Water sampling (continued)

III- Depth sampled: 1200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A89	2.89 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 2100 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A90	10 L
GN6-A91	16 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A69	1.9 L
A70	48 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses
at the following water depths:
10 m, 600 m, 1200 m, 2100 m .

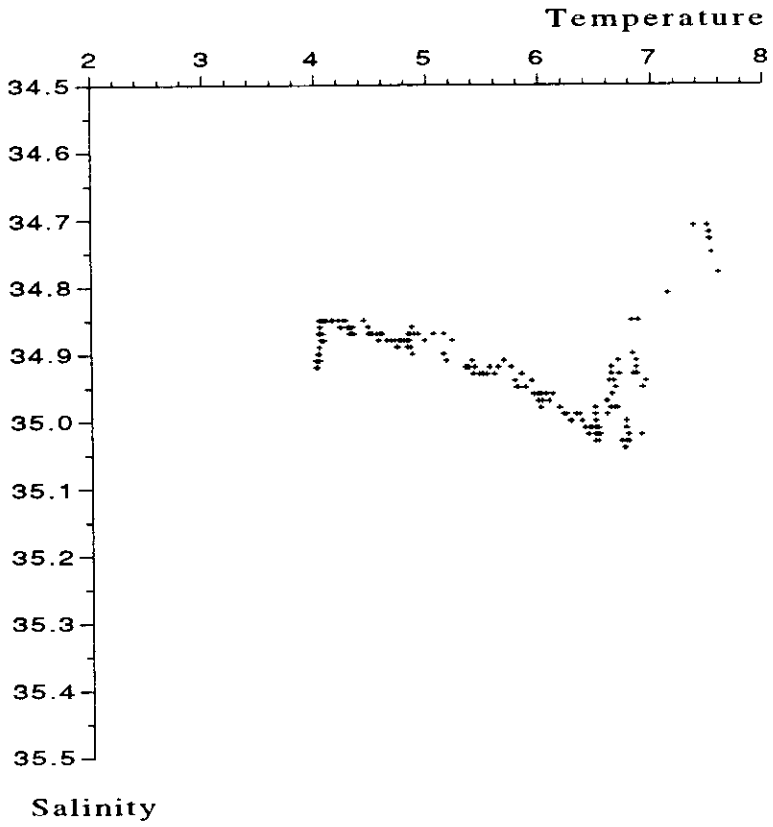
HU-91-045-062: CTD

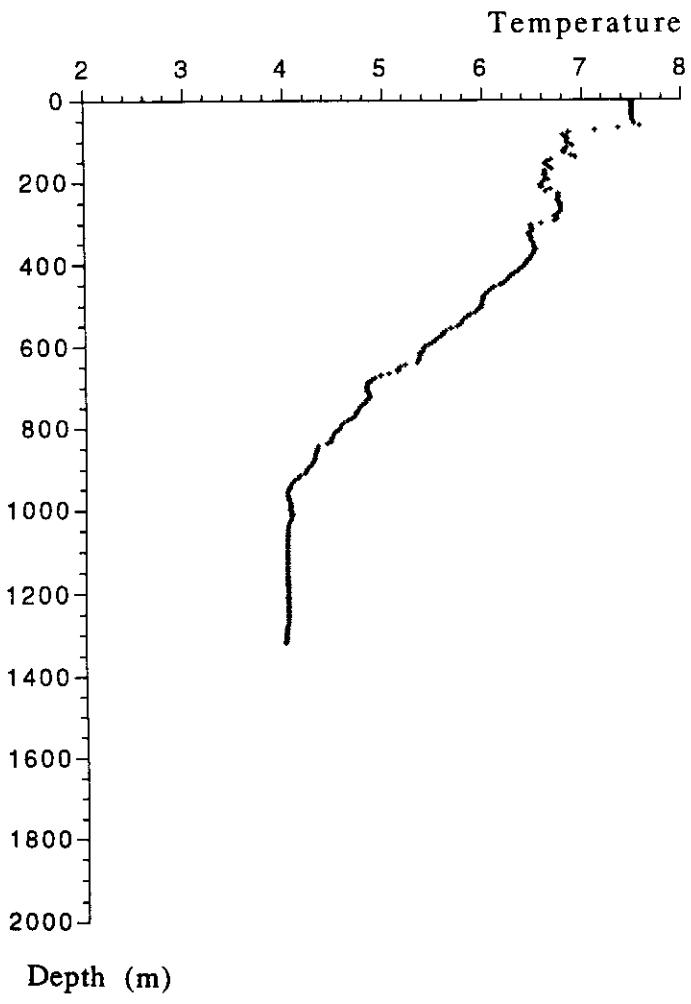
Julian day:	301	GMT Time:	12:17
Latitude:	59°40.51 N	Longitude:	30°21.51 W
Water depth:	1316 m		
Location:	Reykjanes Ridge		

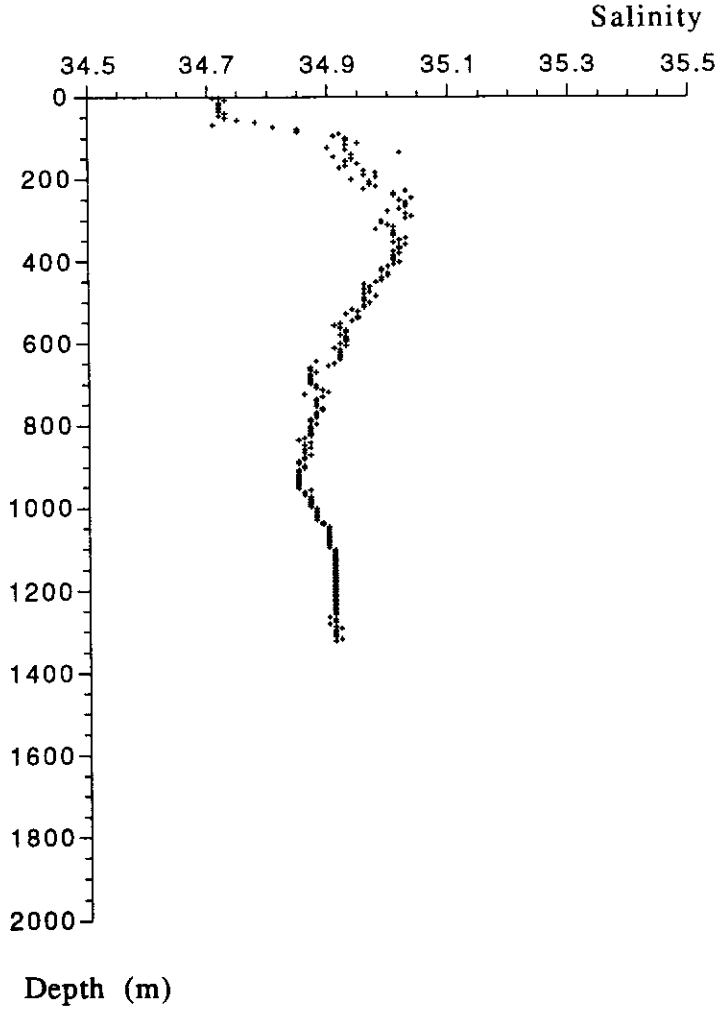
See figure 50, next page.

Figure 50: CTD cast

Cruise Number : HU-91-045
Site Number: 19
Station Number: 062
Location: Reykjanes Ridge
Julian Day: 301
GMT: 12:17
Water Depth: 1316 m
Latitude: 59° 40.51'
Longitude: 30° 21.51'







HU-91-045-063: Box coring

Julian day:	301	GMT Time:	12:18
Latitude:	59° 40.61 N	Longitude:	30° 21.46 W
Water depth:	1319 m		
Location:	Reykjanes Ridge		

Penetration: 34 cm

Description: A very rich macrofauna composed of sponges, echinoderms, gastropodes was observed at the surface of the sediments. Surface sediments (0-13 cm) consists of light olive brown (2.5Y 5/4) mud very rich in sponge spicules. They overlie yellowish brown (10YR 5/4) mud rich in sponge spicules.

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
4 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 10 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

<u>On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:</u>

1. 1. Redox potential measurements (figure 51, p. 170)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	152	10-11	216	20-21	226
1-2	179	11-12	215	21-22	220
2-3	189	12-13	229	22-23	226
3-4	201	13-14	226	23-24	193
4-5	195	14-15	224	24-25	215
5-6	203	15-16	223		
6-7	207	16-17	229		
7-8	212	17-18	228		
8-9	211	18-19	226		
9-10	1966	19-20	200		

HU-91-045-063: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-2	X	X	A-131
2-4	X	X	A-100
4-6	X	X	A-121
6-8	X	X	A-69
8-10	X	X	A-63
10-12	X	X	A-79
12-14	X	X	A-92
14-16	X	X	A-96
16-18	X	X	A-60
18-20	X	X	A-101
20-22	X	X	A-68
22-23	X	X	A-52

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	5	4 x 2	5	8	4	---	---
2-4	12	4 x 2	8	8	5	2	8
4-6	10	5 x 2	8	8	5	2	5
6-8	10	6 x 2	5	8	5	2	5
8-10	10	8 x 2	5	8	5	2	5
10-12	10	6 x 2	5	8	5	2	5
12-14	10	7 x 2	5	8	5	2	5
14-16	9	4 x 2	5	8	5	2	5
16-18	9	4 x 2	5	8	5	2	5
18-20	10	5 x 2	5	8	5	2	5
20-22	10	4 x 2	5	8	5	2	5
22-23	10	4 x 2	5	8	5	2	5

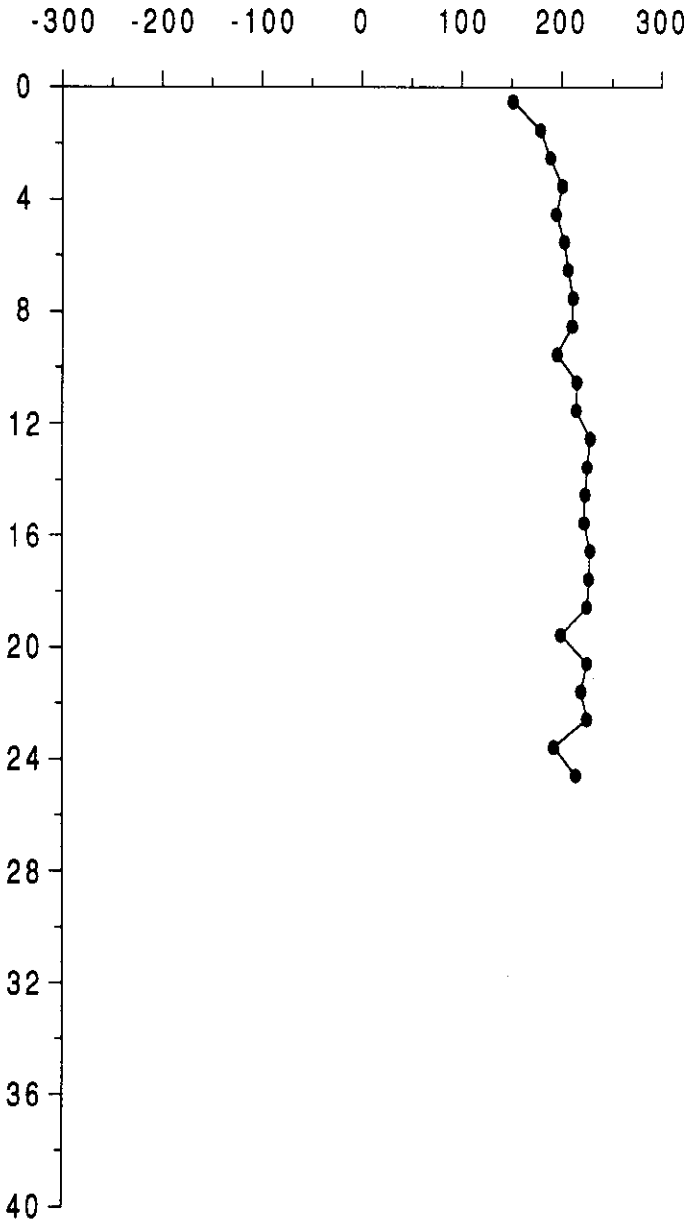
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 52, p. 174). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Continuous sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at 2 cm intervals.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 19
Location: Reykjanes Ridge
Station Number: 063 BC

Figure 51: Redox potential



Julian Day: 301
GMT: 12:18
Water Depth: 1319 m
Latitude: 59° 40.61
Longitude: 30° 21.46

HU-91-045-064: TW & P coring

Julian day:	301	GMT Time:	14:37
Latitude:	59° 40. 62 N	Longitude:	30 °34.35 W
Water depth:	1316 m		
Location:	Reykjanes Ridge		

Trigger Weight Core (TWC)

App. penetr.: 72 cm
Core length: 206 cm (+ cutter)

Description: Sediments consist of olive brown to grayish brown to gray mud rich in both biogenic carbonates and sponge spicules. Note that sponge spicules seem to be most abundant in olivish muds. A sponge was recovered at the surface of the TWCore.
0-8 cm: olive brown (2.5Y 4/4) mud;
8-135 cm: alternance of light olive brown (2.5Y 5/4) and olive brown (2.5Y 4/4) mud layers;
135-206 cm: dark grayish brown (10YR 4/2) to dark gray (10YR 4/1) to dark grayish brown (10YR 4/2) to dark brown (10YR 4/3) mud with sand and granules;

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 52, p. 174).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

2-4	92-94	180.5-182.5
5.5-7.5	102-104	190-192
15.5-17.5	112-114	199.5-201.5
26-28	122-124	204.5-206
35.5-37.5	131-133	
45-47	141-143	
54.5-56.5	146-147	
63.5-65.5	152-154	
73-75	162-164	
82.5-84.5	171.5-173.5	

HU-91-045-064: TW & P coring (continued)

Piston Core

Corer length: 1500 cm
App. penetr.: full
Core length: 1164 cm (8 sections + cutter)

Description: Sediments consist of olive brown to grayish brown to gray bioturbated mud rich in both biogenic carbonates and sponge spicules:
0-4 cm: olive brown (2.5Y 4/4) mud;
4-125 cm: alternance dark grayish brown (10YR-2.5Y 4-5/2) and olive brown (2.5Y 4/3) mud;
125- 143 cm: dark grayish brown (10YR-2.5Y 4/2) mud with sand and granules;
143-158 cm: succession of grayish brown (2.5Y 4/2), dark gray (5Y 4/1) and grayish brown (2.5Y 4/2) mud layers;
158-173 cm: olive gray (5Y 5/2) mud;
173-235 cm: dark grayish brown (2.5Y 4/2) to olive gray (2.5 Y 5/2) to grayish brown (10YR 5/2) mud;
235-239 cm: brown (10YR 4/3) mud;
239-263 cm: grayish brown (10YR 5/2) mud;
263-440 cm: light brownish gray (2.5Y 6/2) mud, grading to grayish brown (2.5Y 5/2), dark yellowish brown (10YR 4/4) and dark grayish brown (2.5Y 4/2) mud with scattered sand and granules;
430-472 cm: dark gray (10YR 4/2) mud with sand and granules;
472-515 cm: dark grayish brown (2.5Y 4/2) mud;
525-547 cm: gradation of olive brown (2.5Y 4/4), grayish brown (2.5Y 5/2), dark grayish brown (2.5Y 4/2), grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) mud;
547-568 cm: dark grayish brown (2.5Y 4/2) mud;
568-582 cm: olive brown (2.5Y 4/4) mud;
582-595 cm: brown (10YR 4/3) mud;
595-634 cm: grayish brown (2.5Y 5/2) mud;
634-662 cm: olive brown (2.5Y 4/4) mud;
662-686 cm: dark grayish brown (10YR 4/2) mud with sand and granules;
686-733 cm: brown (10YR 4/3) to dark grayish brown (2.5Y 4/2) to grayish brown (2.5Y 5/2) mud;
733-761 cm: brown (10YR 4/3) mud with sand and granules grading to dark grayish brown (2.5Y 4/2) mud;
761-846 cm: very dark grayish brown (2.5Y 3/2) to dark olive gray (5Y 3/2) mud grading to dark gray (10YR 4/1) mud with sand and granules;
846-870 cm: dark grayish brown (2.5Y 4/2) mud with sand and granules;
870-926 cm: alternance of dark gray (5Y 4/1) and gray (5Y 5/1) mud layers;
926-962 cm: very dark grayish brown (5Y 3/2) to dark olive gray (2.5Y 3/2) mud;
962-1103 cm: alternance of dark gray (5Y 4/1), very dark gray (5Y 3/1) and dark grayish brown (2.5Y 4-3/2) mud;
1103-1105 cm: olive gray (5Y 4/2) mud;
1105-1132 cm: very dark gray (5Y 3/1) and dark gray (10YR-5Y 4/1) mud layers.

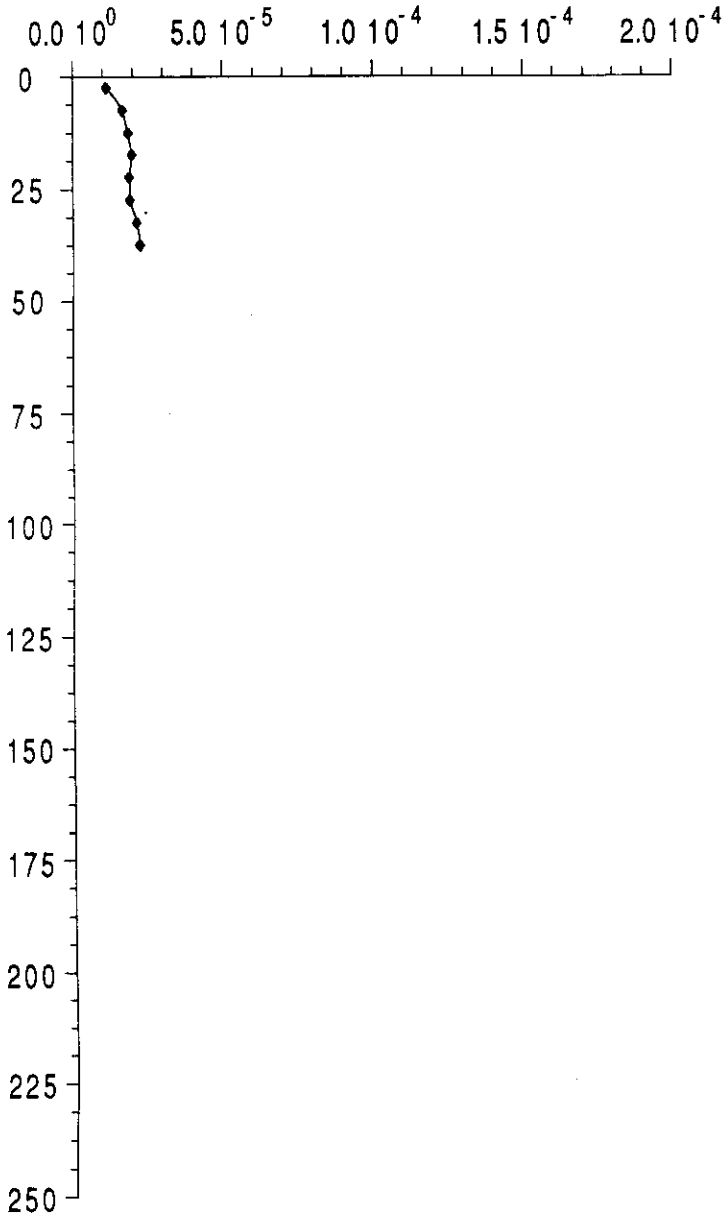
HU-91-045-064: TW & P coring (continued)

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 53, p. 175).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm.)

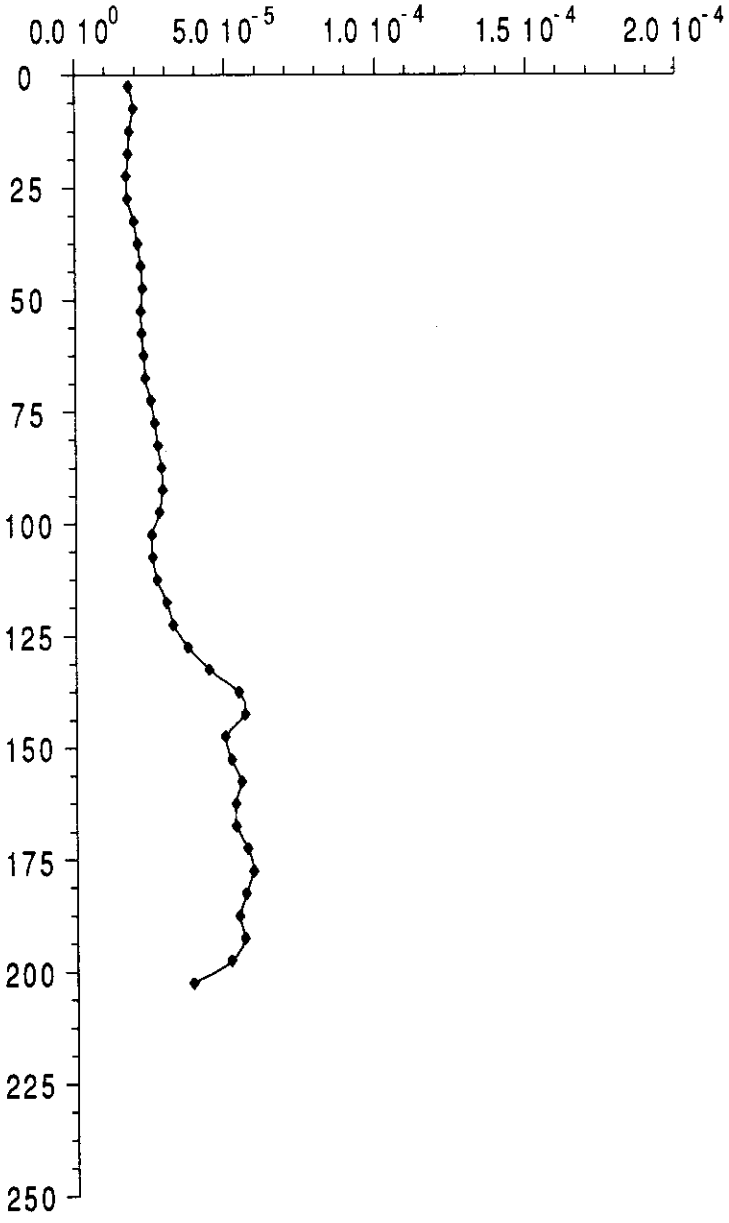
3-5	98.5-100.5	184-186	281-283	379-381
12.5-14.5	105-107	193-195	291-293	389-391
21-23	111-113	202-204	301-303	398.5-400.5
30.5-32.5	120-122	211-213	311-313	409-411
40-42	129.5-131.5	220.5-222.5	320.5-322.5	419-421
50-52	139-141	229.5-231.5	330-332	429-431
59-61	148-150	238.5-240.5	340-342	439-441
69-71	157-159	248-250	349.5-351.5	449-451
79-81	166-168	261.5-623.5	360-362	459-461
89-91	175-177	271-273	370-372	470-472
480-482	579-581	670-672	762-764	858-860
490-492	587-589	679-681	772-774	865-867
499.5-501.5	596-598	688-690	781-783	872-874
510-512	605-607	697-699	791-793	882-884
520-522	614-616	706-708	801-803	891.5-893.5
530-532	623-625	715-717	810-812	901-903
539-541	632-634	724-726	820-822	920-922
549-551	643-645	734-736	829-831	930-932
559-561	652-654	743.5-745.5	839-841	939.5-941.5
569-571	661-663	753-755	848-850	949-950
959-960	1049-1051	1139-1141		
969-971	1058.5-1060.5	1149-1151		
979-981	1068-1070	1154-1156		
989-991	1078-1080			
998.5-1000.5	1088-1090			
1008-1010	1098-1100			
1019-1021	1110-1112			
1030-1032	1119-1121			
1039-1041	1129-1131			

Station Number: 063 BC



Julian Day: 301
GMT: 12:18
Water Depth: 1319 m
Latitude: 59° 40.61
Longitude: 30° 21.46

Station Number: 064 TWC

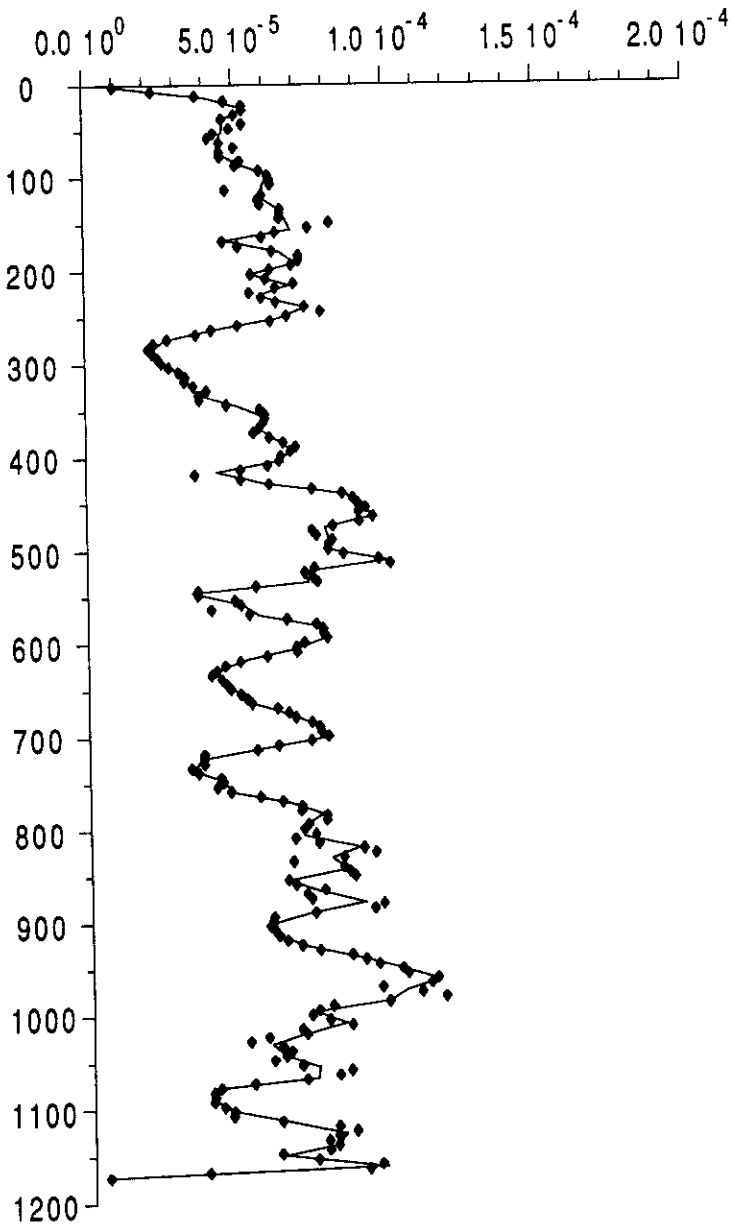


Julian Day: 301
GMT: 14:37
Water Depth: 1316 m
Latitude: 59° 40.62
Longitude: 33° 34.35

MAGNETIC SUSCEPTIBILITY (cgs)

Figure 53

Cruise Number: HU-91-045
Site Number: 19
Location: Reykjanes Ridge
Station Number: 064 PC



Julian Day: 301
GMT: 14:37
Water Depth: 1316 m
Latitude: 59° 40.62
Longitude: 33° 34.35

HU-91-045-065: Water sampling

Julian day:	301	GMT Time:	15:30
Latitude:	59°40.62 N	Longitude:	30°21.29 W
Water depth:	1300 m		
Location:	Reykjanes Ridge		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A93	8 L
GN6-A94	5.8 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A72	20 L
A73	12 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room)..

II- Depth sampled: 250 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A99	2.8 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-065: Water sampling (continued)

III- Depth sampled: 500 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A98	2.83 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 700 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A100	15 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A76	32 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

V- Depth sampled: 1100 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-065: Water sampling (continued)

VI- Depth sampled: 1250 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A95	4 L
GN6-A96	18 L
GN6-A97	18 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A74	65.5 L
A75	46 L

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at the following water depths:
10 m, 250 m, 500 m, 700 m , 1100 m, 1250 m.

HU-91-045-066: Van Veen Grab

Julian day:	301	GMT Time:	22:35
Latitude:	59° 32.92 N	Longitude:	30°03.34 W
Water depth:	900 m		
Location:	Reykjanes Ridge		

No recovery.

HU-91-045-067: Water sampling

Julian day:	301	GMT Time:	23:00
Latitude:	59°32.51 N	Longitude:	30°03.06 W
Water depth:	987 m		
Location:	Rekjanes Ridge		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A103	10 L
GN6-A104	10 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A78	24 L

II- Depth sampled: 700 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A102	14 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A77	59 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at a water depth of 10 m.

HU-91-045-068: Le High coring

Julian day:	302	GMT Time:	02: 30
Latitude:	59°13.36 N	Longitude:	29°20.96 W
Water depth:	1551 m		
Location:	Reykjanes Ridge		

Penetration: 82 cm

Description: Sediments (0-82) consist in dark brown (10YR 4/3) brown mud with sand.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 54, p. 183); redox potential has also been measured at 5 cm intervals (see below). The core was split into 2 longitudinal half-sections. One half was used for interstitial water sampling. The other half-section was subsampled as follows: continuous sampling in 2 cm-edge plastic cubes for paleomagnetic measurements; continuous sampling at 1 cm interval for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer).

On-board measurements of the redox potential (figure 55, p. 184)

Depth (cm)	Eh	Depth (cm)	Eh
0-5	182	50-55	181
5-10	182	55-60	186
10-15	175	60-65	165
15-20	177	65-70	178
20-25	182	70-75	171
25-30	175	75-80	170
30-35	174		
35-40	180		
40-45	181		
45-50	181		

HU-91-045-068: Le High coring (continued)

Subsampling for interstitial waters

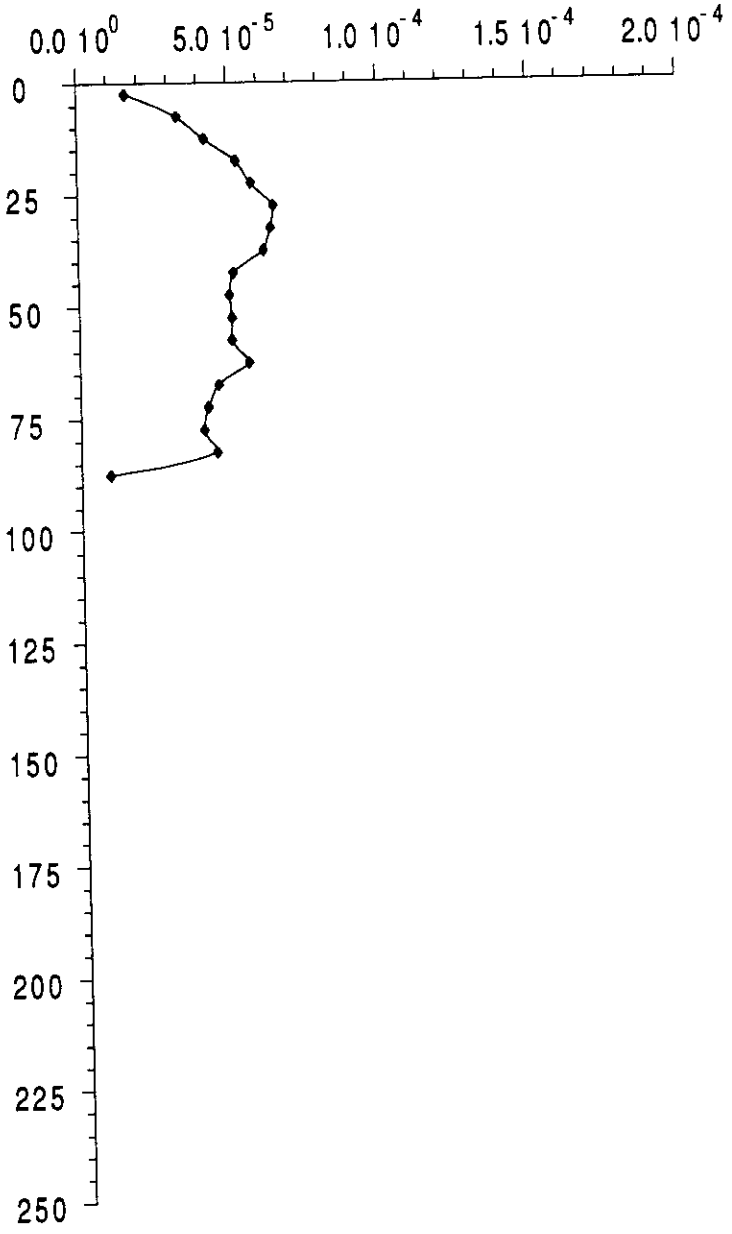
depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-5	5	4 x 2	3	---	---	---	---
5-10	5	4 x 2	5	8	5	2	3
10-15	10	4 x 2	5	8	5	2	5
15-20	5	4 x 2	5	8	2	---	---
20-25	5	4 x 2	5	8	2	---	---
25-30	5	4 x 2	2	---	---	---	---
30-35	5	4 x 2	5	8	5	2	2
35-40	5	4 x 2	5	8	2	---	---
40-45	5	4 x 2	5	8	3	---	---
45-50	5	4 x 2	5	8	5	---	---
50-55	5	4 x 2	5	8	5	2	6
55-60	5	4 x 2	5	4	---	---	---
60-65	5	4 x 2	5	2	---	---	---
65-70	5	4 x 2	5	8	6	---	---
70-75	10	4 x 2	5	8	5	2	5
75-80	5	4 x 2	5	8	2	---	---

Note: squeezed sediments are saved in separate bags.

MAGNETIC SUSCEPTIBILITY (cgs)

Figure 54

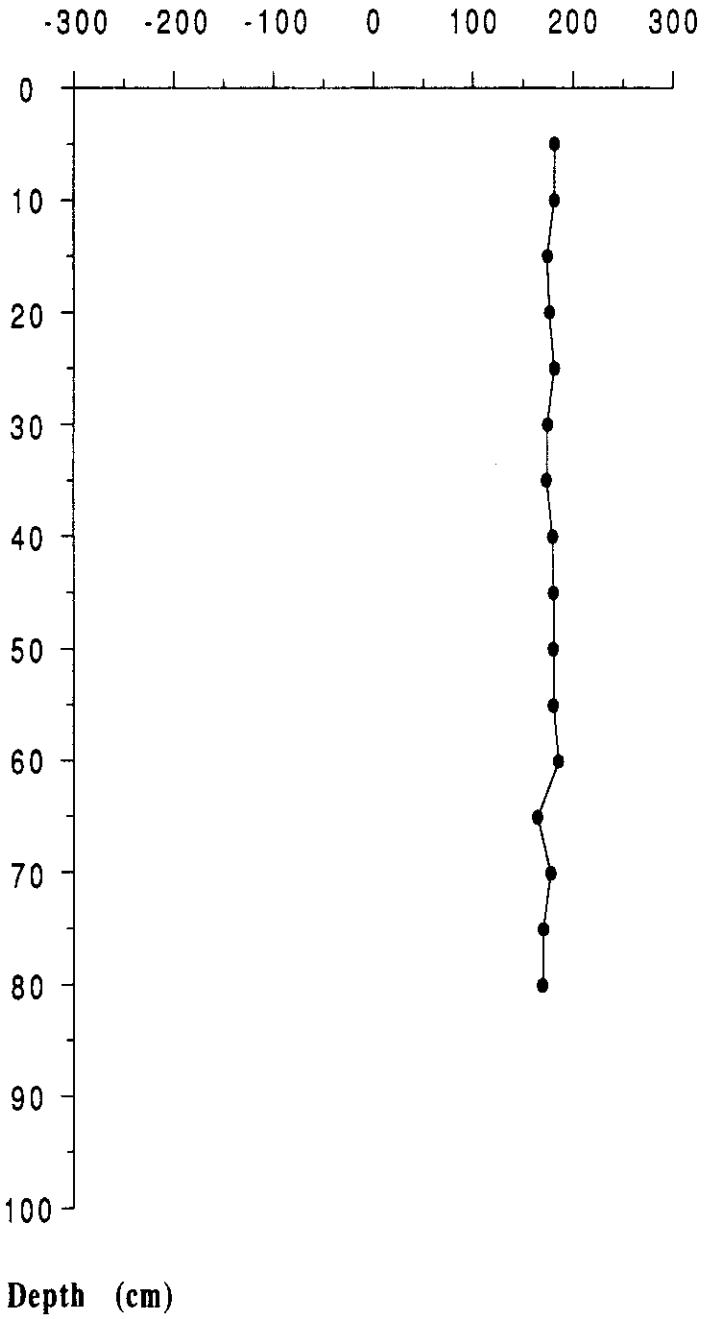
Cruise Number: HU-91-045
Site Number: 20 B
Location: Reykjanes Ridge
Station Number: 068 LHC



Julian Day: 302
GMT: 02:30
Water Depth: 1551 m
Latitude: 59° 13.36
Longitude: 29° 20.96

Eh Measurement on Le High Core
Cruise Number: HU-91-045
Site Number: 20 B
Location: Reykjanes Ridge
Station Number: 068 LHC

Figure 55: Redox potential



Julian Day: 302
GMT: 02:30
Water Depth: 1551 m
Latitude: 59° 13.36
Longitude: 29° 20.96

HU-91-045-069: Water sampling

Julian day:	302	GMT Time:	03:41
Latitude:	59°13.36 N	Longitude:	29°20.97 W
Water depth:	1550 m		
Location:	Reykjanes Ridge		

Onboard sampling and processing

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at a water depth of 10 m.

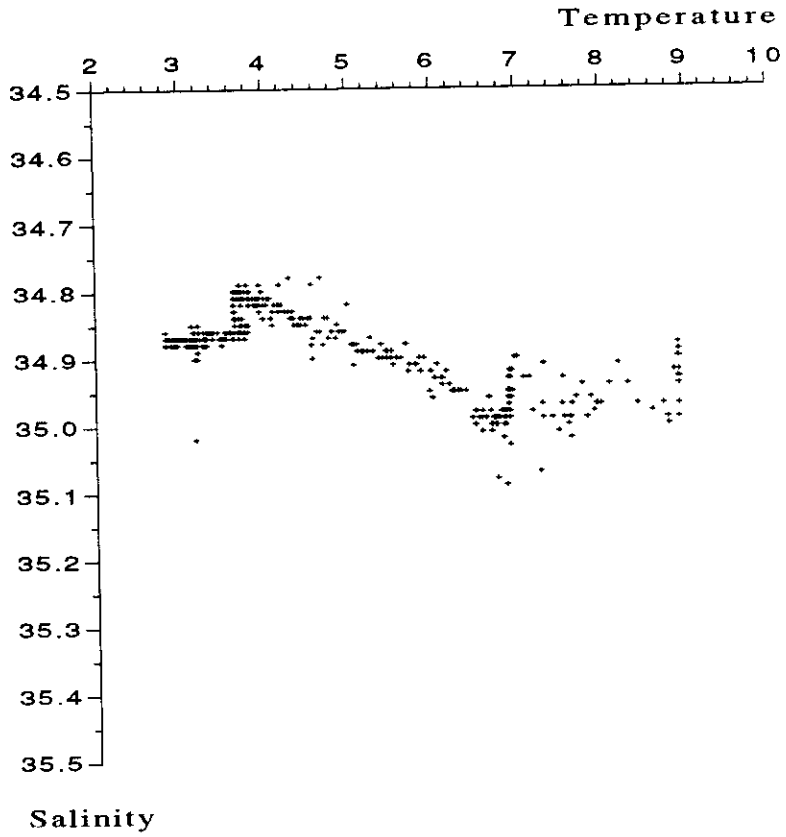
HU-91-045-070: CTD

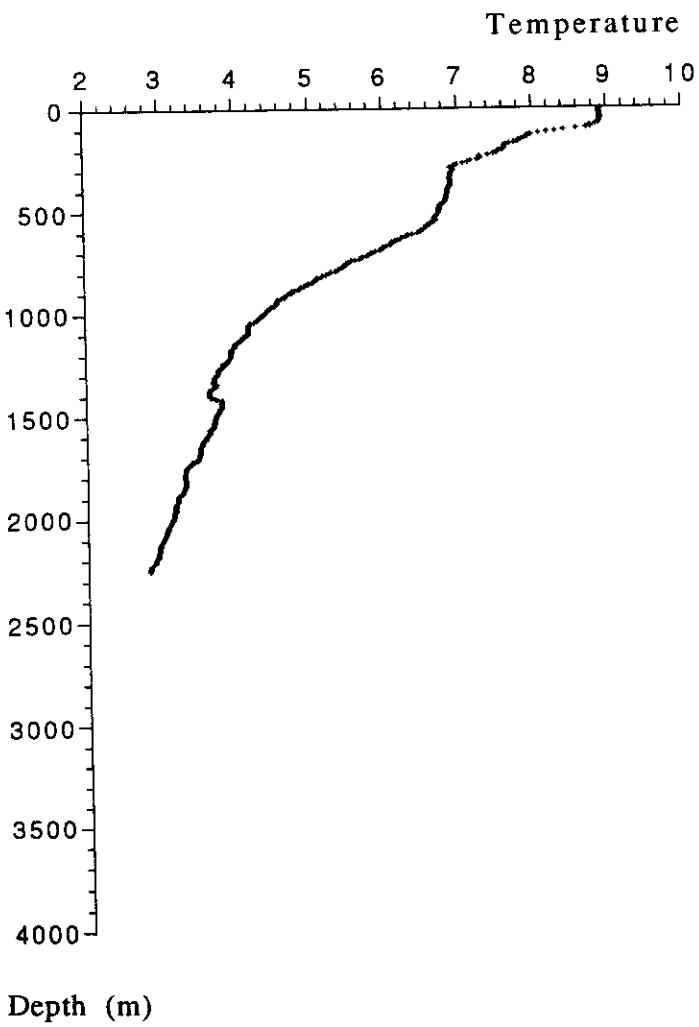
Julian day:	302	GMT Time:	11:39
Latitude:	58°56.43 N	Longitude:	28°44.44 W
Water depth:	2230 m		
Location:	Iceland Basin		

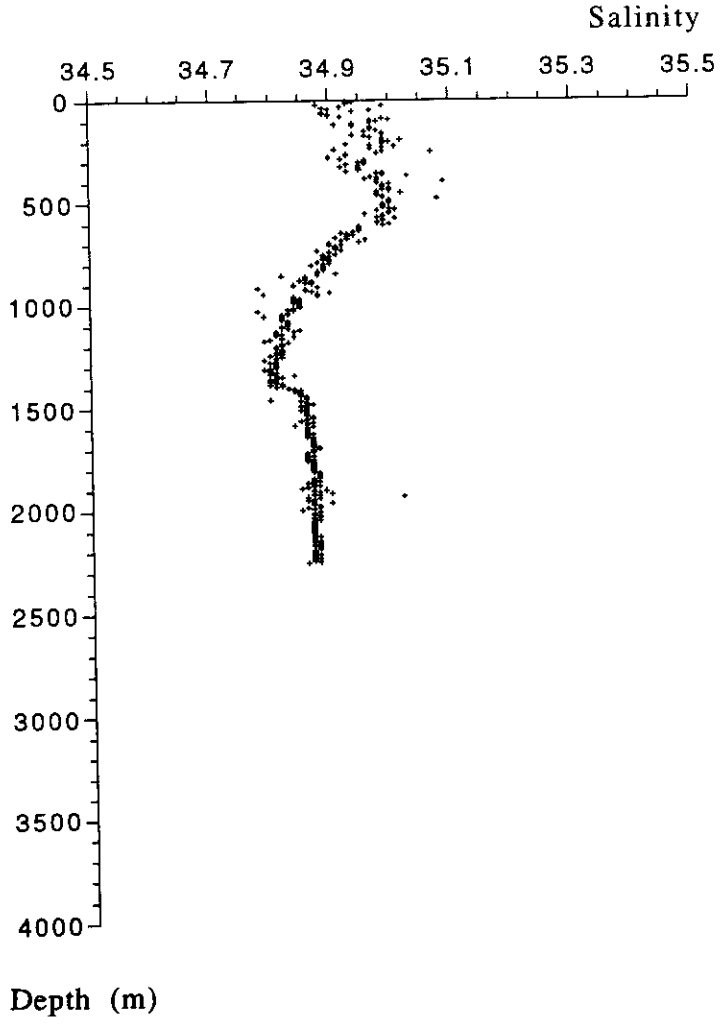
See figure 56, next page.

Figure 56: CTD cast

Cruise Number : HU-91-045
Site Number: 21
Station Number: 070
Location: Iceland Basin
Julian Day: 302
GMT: 11:39
Water Depth: 2230 m
Latitude: 58° 56.43'
Longitude: 28° 44.44'







HU-91-045-071: Box coring

Julian day:	302	GMT Time:	11:39
Latitude:	58° 56.42 N	Longitude:	28° 44.44 W
Water depth:	2237 m		
Location:	Iceland Basin		

Penetration: 54 cm

Description: Surface sediments (0-3 cm) are olive brown (2.5Y4/4) mud.
Sub-surface sediments (2- 54 cm) consist of dark gray (5Y 4/1) silty mud with blackish and olivish mottles

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
4 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 10 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:

1. Redox potential measurements (figure 57, p. 191)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	198	10-11	114	20-21	-9
1-2	160	11-12	40	21-22	21
2-3	163	12-13	44	22-23	6
3-4	169	13-14	29	23-24	12
4-5	155	14-15	0	24-25	14
5-6	107	15-16	-7	25-26	18
6-7	127	16-17	-6	26-27	-10
7-8	127	17-18	-6	27-28	-39
8-9	82	18-19	-6	28-29	2
9-10	103	19-20	-9	29-30	-20
30-31	-19	40-41	-32	50-51	22
31-32	-2	41-42	7		
32-33	-24	42-43	-14		
33-34	-7	43-44	-27		
34-35	-5	44-45	1		
35-36	-13	45-46	-2		
36-37	-1	46-47	-5		
37-38	-9	47-48	16		
38-39	34	48-49	-29		
39-40	-4	49-50	-17		

HU-91-045-071: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (ca. 30cc)	porosity (5cc; vial #)
0-2	X	X	A-70
2-4	X	X	A-102
4-6	X	X	A-106
6-8	X	X	A-104
8-10	X	X	A-105
10-12	X	X	A-103
12-14	X	X	A-107
14-16	X	X	A-108
16-18	X	X	A-109
18-20	X	X	A-110
20-22	X	X	A-111
22-24	X	X	---
24-26	X	X	A-112
26-28	X	X	A-113
28-30	X	X	A-114
30-32	X	X	A-115
32-34	X	X	A-116
34-36	X	X	A-117
36-38	X	X	A-118
38-40	X	X	A-120
40-42	X	X	A-125
42-44	X	X	A-127
44-46	X	X	A-128
46-48	X	X	A-130
48-50	X	X	A-132
50-51	X	X	A-135

HU-91-045-071: box coring (continued)

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	10	8 x 2	10	8	5	2	5
2-4	10	8 x 2	9	8	5	2	5
4-6	10	8 x 2	5	8	5	2	5
6-8	11	7 x 2	5	8	5	2	5
8-10	10	6 x 2	5	8	5	2	5
10-12	10	7 x 2	5	8	5	2	5
12-14	10	6 x 2	5	8	5	2	5
14-16	10	4 x 2	5	8	5	2	5
16-18	10	4 x 2	6	8	5	2	5
18-20	10	4 x 2	6	8	5	2	5
20-21	5	4 x 2	6	8	5	2	5
24-26	10	6 x 2	3	8	5	2	5
26-28	7	4 x 2	3	8	5	2	5
28-30	9	4 x 2	5	8	5	2	5
30-32	5	4 x 2	5	8	5	2	4
32-34	5	4 x 2	5	8	5	2	2
34-36	5	4 x 2	5	8	5	0.5	---
36-38	5	4 x 2	5	8	5	1	---
38-40	5	4 x 2	5	8	5	2	---
40-42	5	4 x 2	5	8	5	2	2
42-44	5	4 x 2	5	8	5	2	---
44-46	5	4 x 2	5	8	5	2	1
46-48	5	4 x 2	5	8	5	---	---
48-50	5	4 x 2	5	8	5	2	2
50-51	---	---	---	---	---	---	---

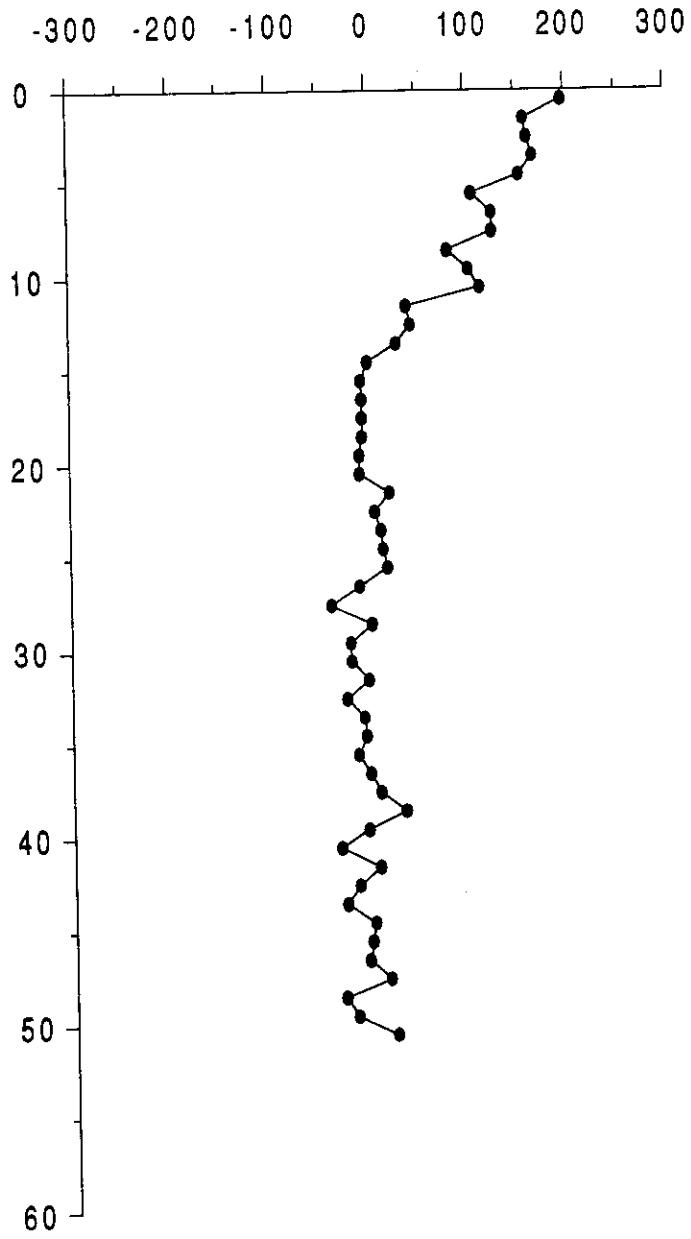
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 58, p. 195). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Continuous sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at 2 cm intervals.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 21
Location: Iceland Basin
Station Number: 071 BC

Figure 57: Redox potential



Julian Day: 302
GMT: 11:39
Water Depth: 2237 m
Latitude: 58° 56.42
Longitude: 28° 44.44

HU-91-045-072: TW & P coring

Julian day:	302	GMT Time:	14: 10
Latitude:	58° 56.45 N	Longitude:	28 °44.32 W
Water depth:	2237 m		
Location:	Iceland Basin		

Trigger Weight Core (TWC)

App. penetr.: full
Core length: 225 cm

Description: Sediment (0-225 cm) consists of dark gray (5Y 4/1) mud heavily bioturbated.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 58, p. 195).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	93-95	178-180
4-6	103-105	188-190
14-16	113-115	197-199
24-26	120.5-122.5	206-208
34-36	132-134	215-217
44-46	142-144	220-222
54-56	146-148	
63.5-65.5	150-152	
73.5-75.5	159-161	
83-85	168-170	

HU-91-045-072: TW & P coring (continued)

Piston Core

Corer length: 2000 cm
App. penetr.: full
Core length: 1814 cm (12 sections + cutter)

Description: Sediments mainly consist of bioturbated dark gray mud with occasional occurrences of laminae rich in biogenic silicate.
0-591 cm: dark gray (5Y 4/1) mud heavily bioturbated (occurrences of biogenic silica lenses between 474 and 499 cm);
591-639 cm: dark grayish brown (2.5Y 4/2) bioturbated mud;
639-707 cm: alternance of dark gray (5Y 4/1) and gray (5Y 5/1) layers of bioturbated mud;
707-1029 cm: dark gray (5Y 4/1) mud with barely visible color laminations and frequent lenses of siliceous rich material;
1029-1814 cm: alternance of gray (5Y 5/1) and dark gray (5Y 4/1) bioturbated mud with barely visible color laminations.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 59, p. 196).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm.)

3-5	101.5-103.5	194.5-196.5	285-287	386-388
12-14	111-113	204-206	294-296	396-398
22-24	121-123	213-215	307-309	406-408
32-34	130-132	221.5-223.5	318-320	415-417
42-44	139-141	230.5-232.5	328-330	425-427
52-54	149-151	239.5-241.5	338-340	434-436
62-64	158-160	249-251	347-349	444-446
72-74	167-169	258-260	357-359	453-455
82-84	176-178	267-269	367-369	462-464
91.5-93.5	185-187	276-278	376-378	472-474
483-485	579-581	677-679	774-776	873-875
492-494	589-591	687-689	783.5-785.5	883-885
502-504	599-601	696-698	793-795	892.5-894.5
512-514	612-614	706-708	803-805	902-904
522-524	619-621	716-718	813-815	905.5-907.5
531.5-533.5	629-631726-728	823-825	910-912	
541-543	638-640	735-737	833-835	920-922
551-553	648-650	745-747	843-845	930-932
560-562	658-660	755-757	853.5-855.5	939-941
570-572	669.5-671.5	764-766	863-865	949-951

HU-91-045-072: TW & P coring (continued)

Subsampling of the piston core (continued)

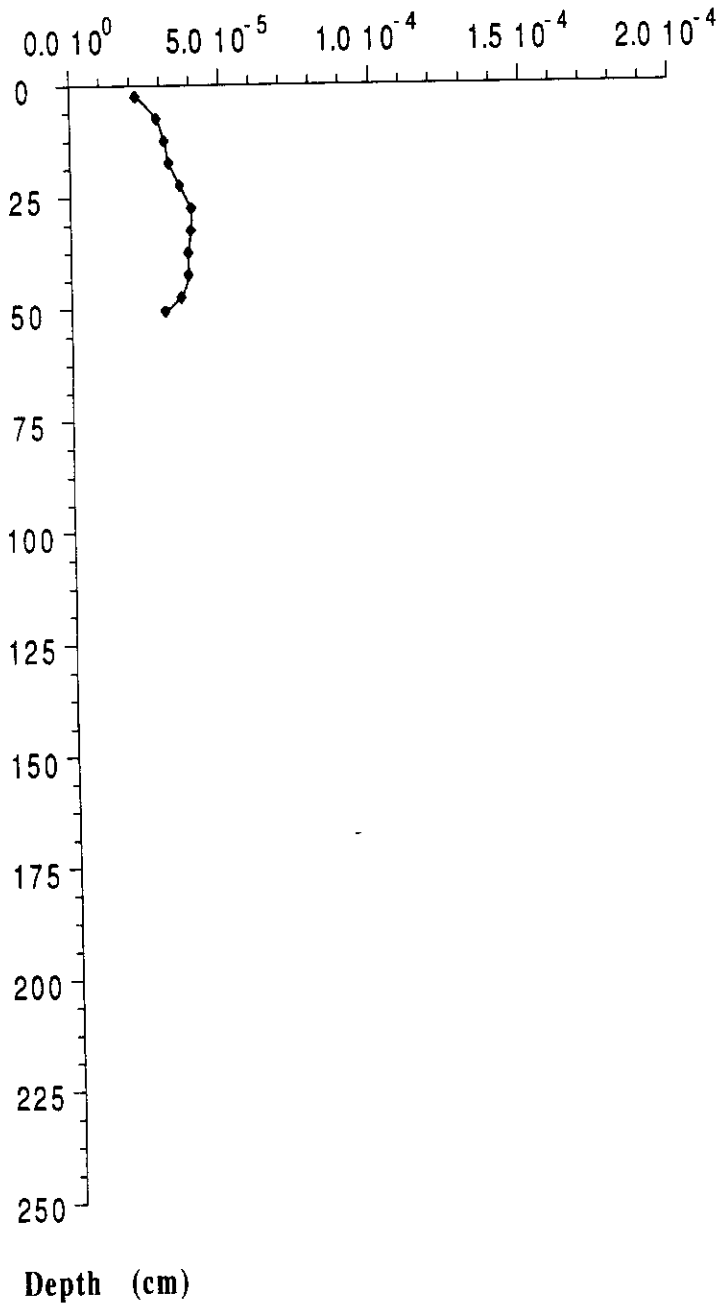
Sampling depth (cm.)

958.5-960.5	1055-1057	1144-1146	1238-1240	1332-1334
968.5-970.5	1062-1064	1153-1155	1247-1249	1341-1343
978-980	1072-1074	1162-1164	1256-1258	1351-1353
987.5-989.5	1081-1083	1171-1173	1265.5-1267.5	1361-1363
997-999	1090-1092	1180-1182	1275-1277	1370-1372
1007-1009	1099-1101	1189-1191	1285-1287	1379.5-1381.5
1016.5-1018.5	1108-1110	1198-1200	1294-1296	1388.5-1390.5
1026.5-1028.5	1116-1118	1210-1212	1304-1306	1397.5-1399.5
1036-1038	1126-1128	1219.5-1221.5	1313-1315	1407-1409
1045.5-1047.5	1135-1137	1228-1230	1321-1323	1410.5-1412.5

1416-1418	1488.5-1490.5	1586-1588	1673-1675	1766-1768
1420-1422	1498-1500	1596-1598	1682-1684	1775.5-1777.5
1425-1427	1507-1509	1605-1607	1692-1694	1785.5-1787.5
1429.5-1431.5	1518-1520	1615-1617	1701-1703	1795-1797
1435.5-1437.5	1527-1529	1625-1627	1711-1713	1804.5-1806.5
1443-1445	1537-1539	1635-1637	1720-1722	1813-1815
1452-1454	1547-1549	1644-1646	1729.5-1731.5	
1461-1463	1557-1559	1654-1656	1739-1741	
1470-1472	1567-1569	1559-1561	1748-1750	
1479-1481	1576-1578	1666-1668	1757-1759	

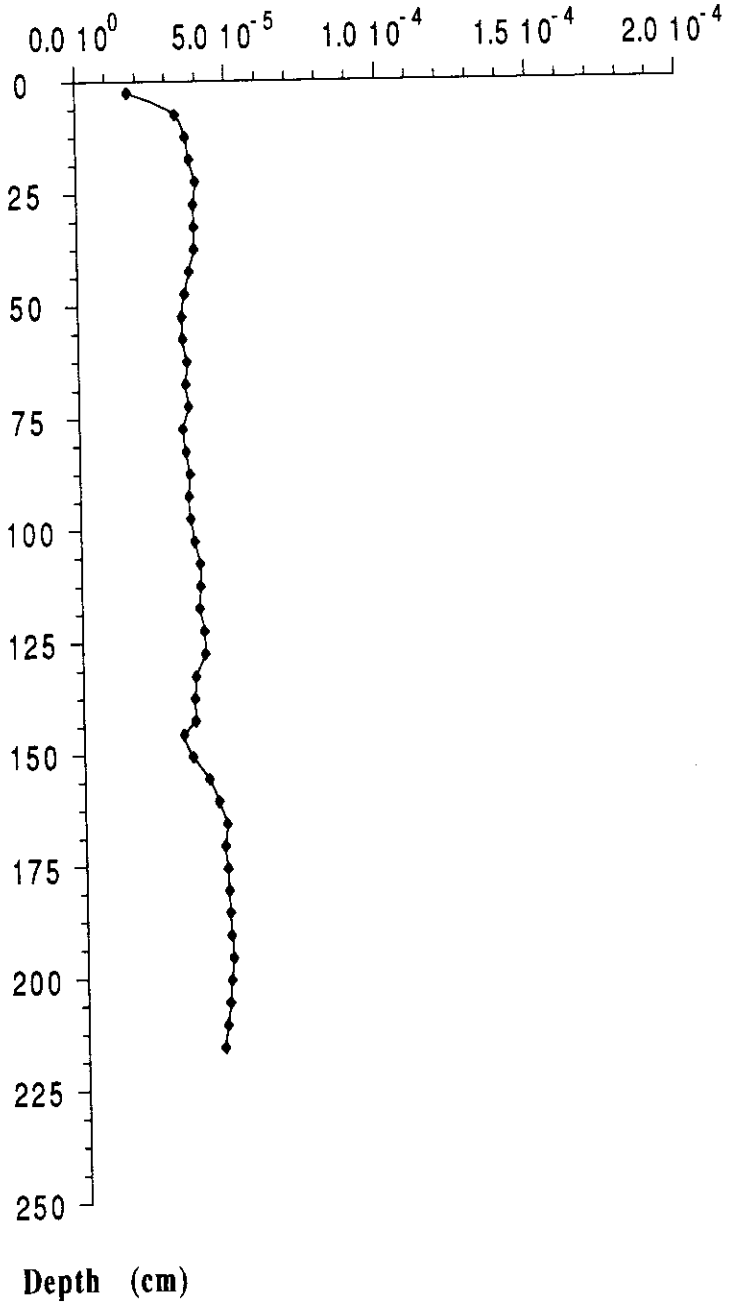
MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 21
Location: Iceland Basin
Station Number: 071 BC

Figure 58



Julian Day: 302
GMT: 11:39
Water Depth: 2237 m
Latitude: 58° 56.42
Longitude: 28° 44.44

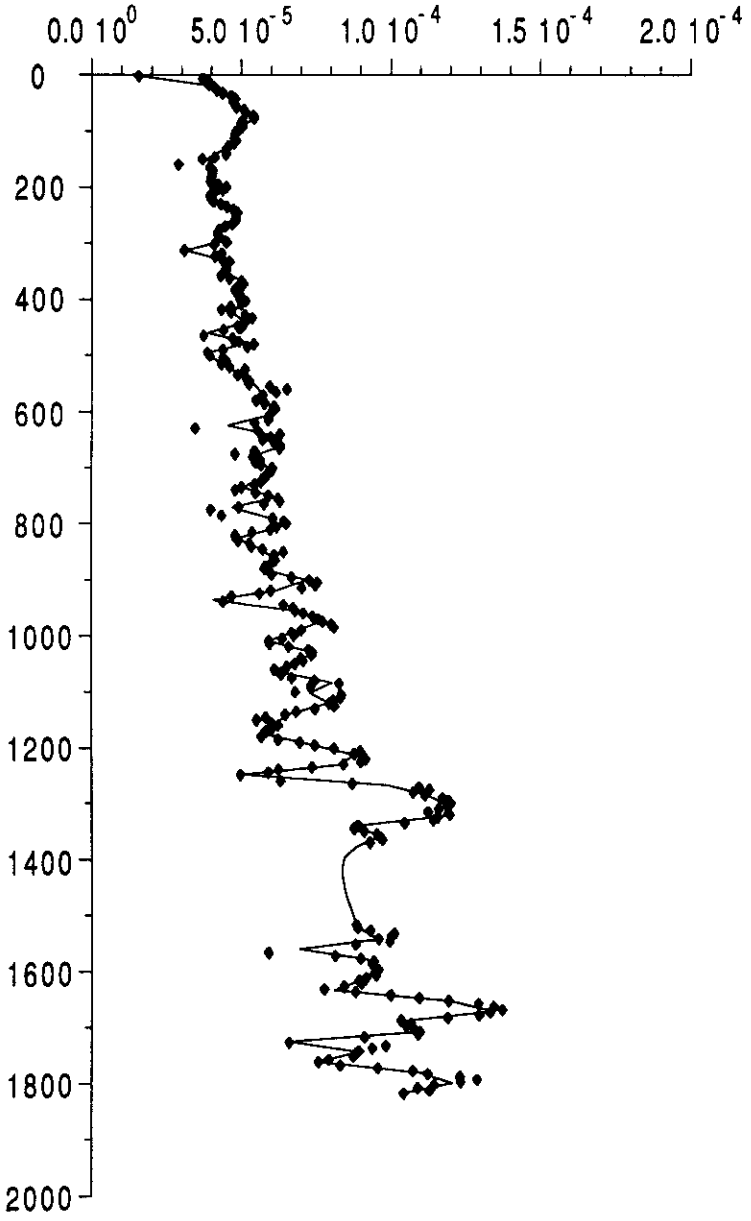
Station Number: 072 TWC



Julian Day: 302
GMT: 14:10
Water Depth: 2237 m
Latitude: 58° 56.45
Longitude: 28° 44.32

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 21
Location: Iceland Basin
Station Number: 072 PC

Figure 59



Julian Day: 302
GMT: 14:10
Water Depth: 3237 m
Latitude: 58° 56.45
Longitude: 28° 44.32

HU-91-045-073: Water sampling

Julian day:	303	GMT Time:	16:00
Latitude:	58°56.43 N	Longitude:	28°44.44 W
Water depth:	2233 m		
Location:	Iceland basin		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A113	10 L
GN6-A114	10 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A81	24.7 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 250 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A108	2.82

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-073: Water sampling (continued)

III- Depth sampled: 700 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A111	18 L
GN6-A112	20 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A80	54.4 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 1200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A107	2.81 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-073: Water sampling (continued)

V- Depth sampled: 1500 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A109	24 L
GN6-A110	22.4 L

Filtration on glass fibers preweighed filters

Filter number	Volume filtered
A79	72 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VI- Depth sampled: 2100 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A105	16 L
GN6-A106	14 L

Filtration on glass preweighed filters

Filter number	Volume filtered
A100	63.1 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses
at the following water depths:
10 m, 250 m, 700 m, 1200 m , 1500 m, 2100 m.

HU-91-045-074: TW & P coring

Julian day:	303	GMT Time:	14: 19
Latitude:	55 °44.71 N	Longitude:	30 °13.81 W
Water depth:	2926 m		
Location:	Iceland Basin		

Trigger Weight Core (TWC)

App. penetr.: full
Core length: 223 cm

Description: The sediment consists of gray (5Y 5-6/1) mud heavily bioturbated.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 60, p. 203).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	92.5-94.5	187-189
10-12	101.5-103.5	196.5-198.5
19-21	110.5-112.5	206-208
29-31	119.5-121.5	215-217
38.5-40.5	128-130	
47.5-49.5	137-139	
56.5-58.5	146-148	
65.5-67.5	158-160	
75-77	167-169	
83.5-85.5	177-179	

Redox potential measurements on the TWCore

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
5	-30	55	-42	105	-61
10	-20	60	-32	110	-24
15	-40	65	-44	115	-40
20	-29	70	-19	120	-30
25	0	75	-35	125	-12
30	-70	80	0	130	-40
35	-93	85	-25	135	-30
40	-8	90	-22	140	-24
45	-10	95	-42	145	-22
50	-37	100	-14	150	-22

HU-91-045-074: TW & P coring (continued)

Piston Core

Corer length: 1500 cm
App. penetr.: full
Core length: 1354 cm (9 sections)

Description: The sediment consists of gray to brown mud heavily bioturbated and generally rich in biogenic carbonates.
0-78 cm: light gray (5Y 6/1) to gray (5Y 5/1) to olive gray (5Y 4/2) mud;
78-160 cm: dark grayish brown (2.5Y 4/2) to grayish brown (2.5Y-10YR 5/2) mud;
160-210 cm: alternance of brown (10YR 5/3) and grayish brown (2.5Y-10YR 5/2) mud;
210-284 cm: gray (10YR-5Y 5-6/1) mud layers;
284-330 cm: dark grayish brown (2.5Y 4/2) mud;
330-350 cm: light gray (5Y 6/1) mud;
350-382 cm: gray (5Y 5/1) mud grading to dark grayish brown (2.5Y 4/2) mud;
382-409 cm: light gray (5Y 6/1) mud;
409-451 cm: gray (5Y 5/1) mud;
451-461 cm: dark grayish brown (2.5Y 4/2) mud;
461-485 cm: light gray (5Y 7/1) mud;
485-603 cm: gray (5Y 6/1) to light gray (5Y 7/1) to gray (5Y 6/1-5/1) mud;
603-622 cm: dark grayish brown (2.5Y 4/2) mud with sand and gravel;
622-644 cm: light gray (5Y 6/1) to gray (5Y 5/1) mud;
644-685 cm: dark gray (5Y 4/1) mud with greenish and purple bands;
685-838 cm: alternance of gray (5Y 5/1) and light gray (5Y 6/1 mud);
838-841 cm: dark grayish brown (2.5Y 4/2) mud with sand;
841-989 cm: alternance of gray (5Y 5/1) and light gray (5Y 6/1 mud);
989-1086 cm: dark gray (5Y-10YR 4/1) to dark grayish brown (2.5Y 4/2) mud;
1086-1098 cm: gray (5Y 5/1) mud;
1098-1173 cm: dark grayish brown (2.5Y 4/2) mud with sand and scattered gravel;
1173-1234 cm: gray (5Y 5/1) to dark gray (5Y 4/1) mud;
1234-1239 cm: dark grayish brown (2.5Y 4/2) mud with sand;
1239-1342 cm: dark gray (5Y 4/1) to gray (5Y 5/1) to dark gray (5Y 4/1) mud;
1342-1354 cm: dark grayish brown (2.5Y 4/2) mud.

HU-91-045-074: TW & P coring (continued)

Piston Core

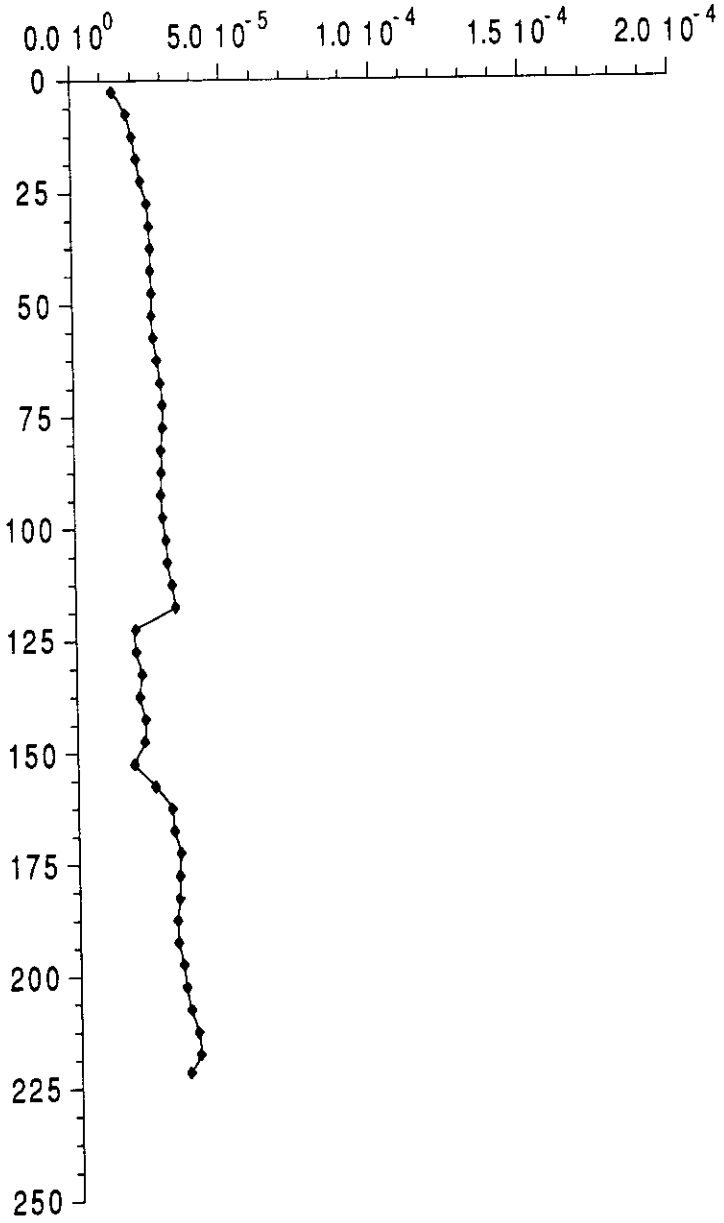
Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 61, p. 204).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

2-4	101-103	194.5-196.5	291-293	390-392
11-13	111-113	204-206	303.5-305.5	399.5-401.5
21-23	120-122	215-217	313-315	409.5-411.5
31-33	130-132	224.5-226.5	322.5-324.5	419-421
41-43	140-142	233-235	332-334	428.5-430.5
51-53	147-149	244-246	341.5-343.5	438-440
61-63	156-158	253.5-255.5	351-353	450-452
71-73	166-168	262.5-264.5	361-363	455-457
81-83	175.5-177.5	273-275	370.5-372.5	462-464
91-93	185-187	282-284	380.5-382.5	472-474
482-484	581-583	669-671	763-765	858-860
492-494	591-593	676-678	772-774	868-870
501-503	595.5-597.5	686-688	781-783	878-880
512-514	603-605	695-697	791-793	887-889
521-523	612.5-614.5	704.5-706.5	800-802	897-899
531-533	622-624	714-716	810-812	907-909
541-543	631.5-633.5	723.5-725.5	819.5-821.5	912-914
551-553	641-643	733-735	829-831	916-918
561-563	651-653	742-744	838.8-840.5	925.5-927.5
571-573	659.5-661.5	754-756	848-850	937-939
944-946	1036-1038	1129-1131	1219-1221	1310-1312
953-955	1045-1047	1138.5-1140.5	1228-1230	1319-1321
962-964	1059-1061	1147-1149	1237-1239	1328.5-1330.5
971-973	1064.5-1066.5	1157-1159	1246-1248	1337.5-1339.5
980.5-982.5	1074-1076	1166-1168	1256-1258	1347-1349
990-992	1083-1085	1173-1175	1265-1267	
999-1001	1092-1094	1182.5-1184.5	1275-1277	
1008-1010	1101-1103	1192-1194	1283-1285	
1017.5-1019.5	1110.5-1112.5	1201-1203	1292-1294	
1026.5-1028.5	1120-1122	1210-1212	1301-1303	

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 22
Location: Iceland Basin
Station Number: 074 TWC

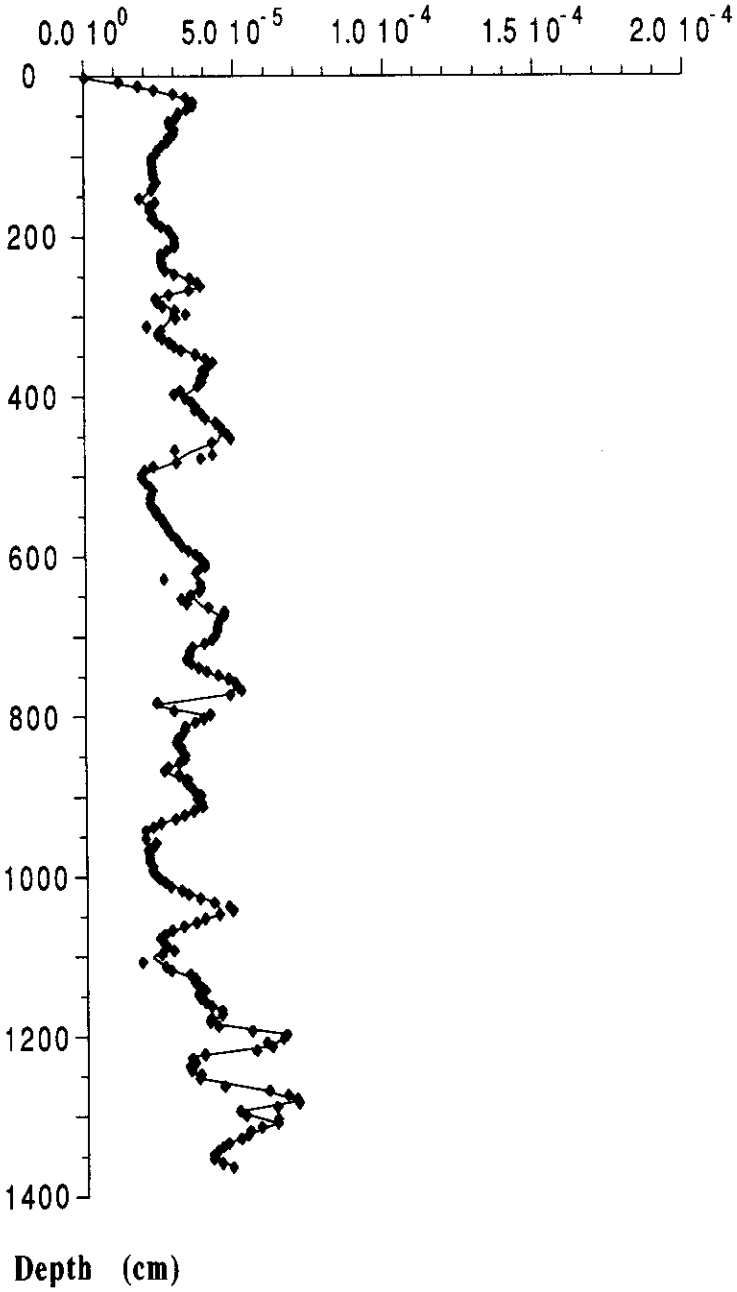
Figure 60



Julian Day: 303
GMT: 14:19
Water Depth: 2926 m
Latitude: 55° 44.71
Longitude: 30° 13.81

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 22
Location: Iceland Basin
Station Number: 074 PC

Figure 61



Julian Day: 303
GMT: 14:19
Water Depth: 2926 m
Latitude: 55° 44.71
Longitude: 30° 13.81

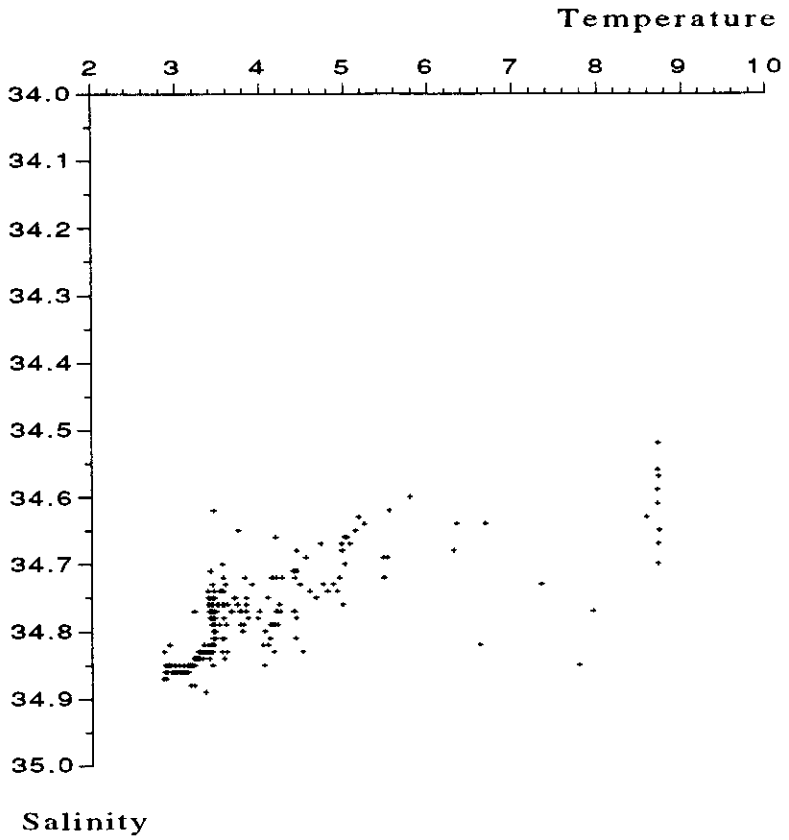
HU-91-045-075: CTD

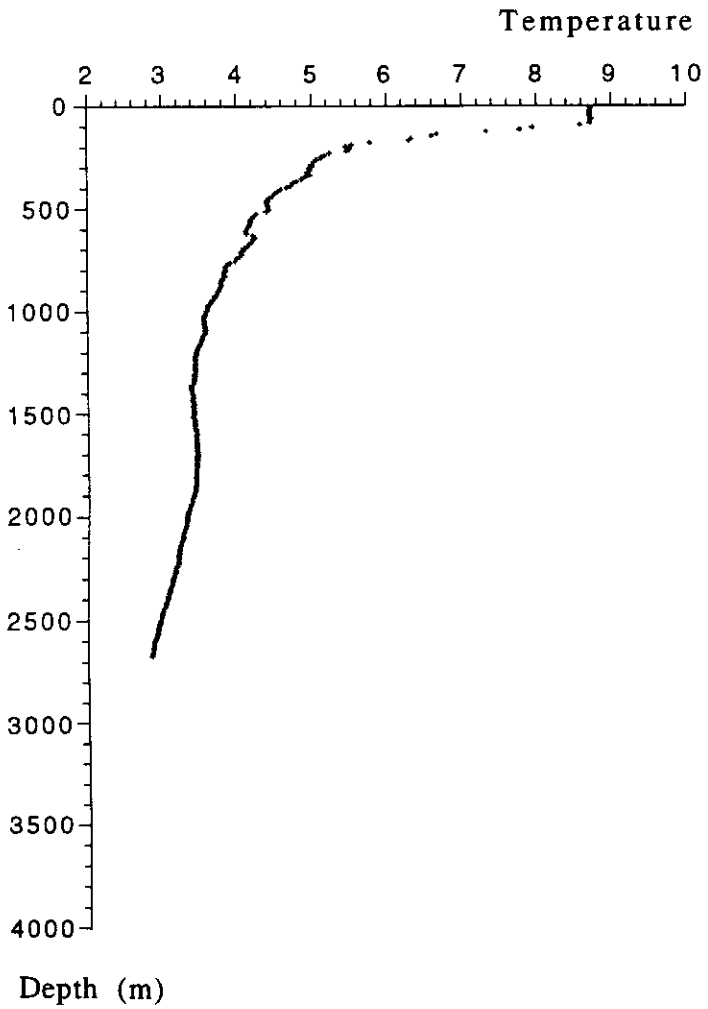
Julian day:	303	GMT Time:	17:13
Latitude:	55° 44.70 N	Longitude:	30° 13.94 W
Water depth:	2926 m		
Location:	Iceland Basin		

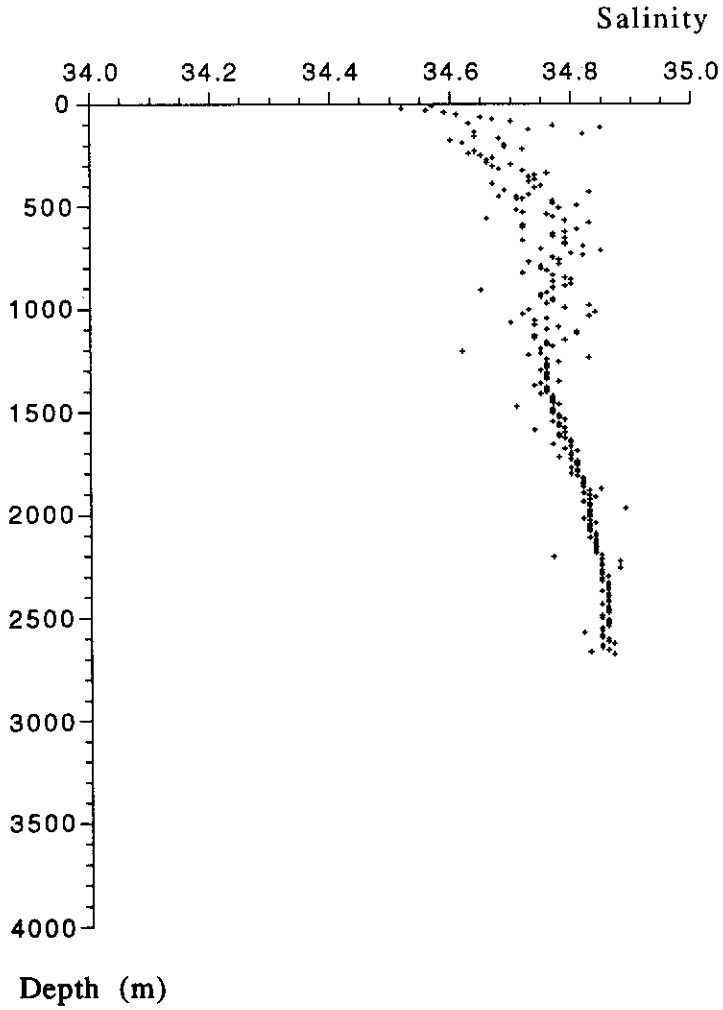
See figure 62, next page.

Figure 62: CTD cast

Cruise Number : HU-91-045
Site Number: 22
Station Number: 075
Location: Iceland Basin
Julian Day: 303
GMT: 17:13
Water Depth: 2926 m
Latitude: 55° 44.70'
Longitude: 30° 13.94'







HU-91-045-076: Box coring

Julian day:	303	GMT Time:	17:13
Latitude:	55° 44.07 N	Longitude:	30° 13.94 W
Water depth:	2926 m		
Location:	Iceland Basin		

No recovery (pre-tripping).

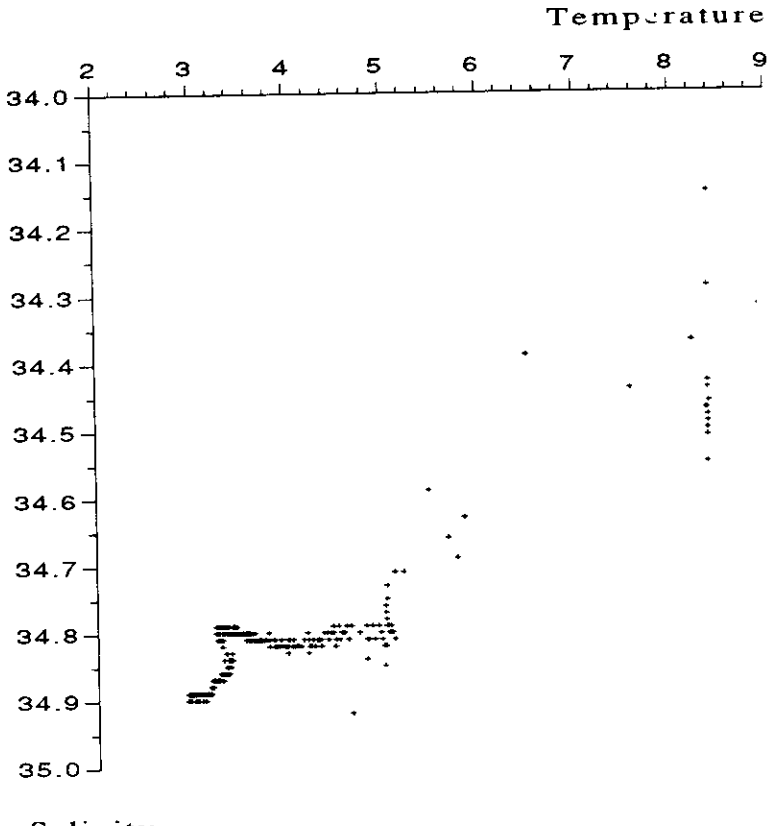
HU-91-045-077: CTD

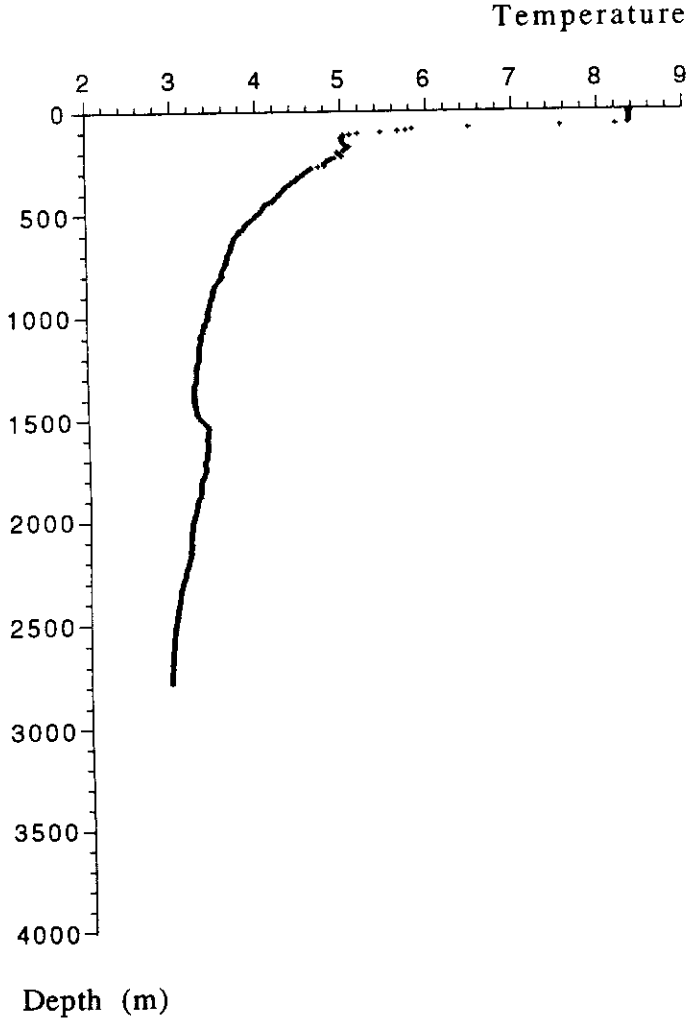
Julian day:	304	GMT Time:	23:45
Latitude:	53° 04.68 N	Longitude:	33° 38.80 W
Water depth:	2835 m		
Location:	Charlie Gibbs Fracture Zone		

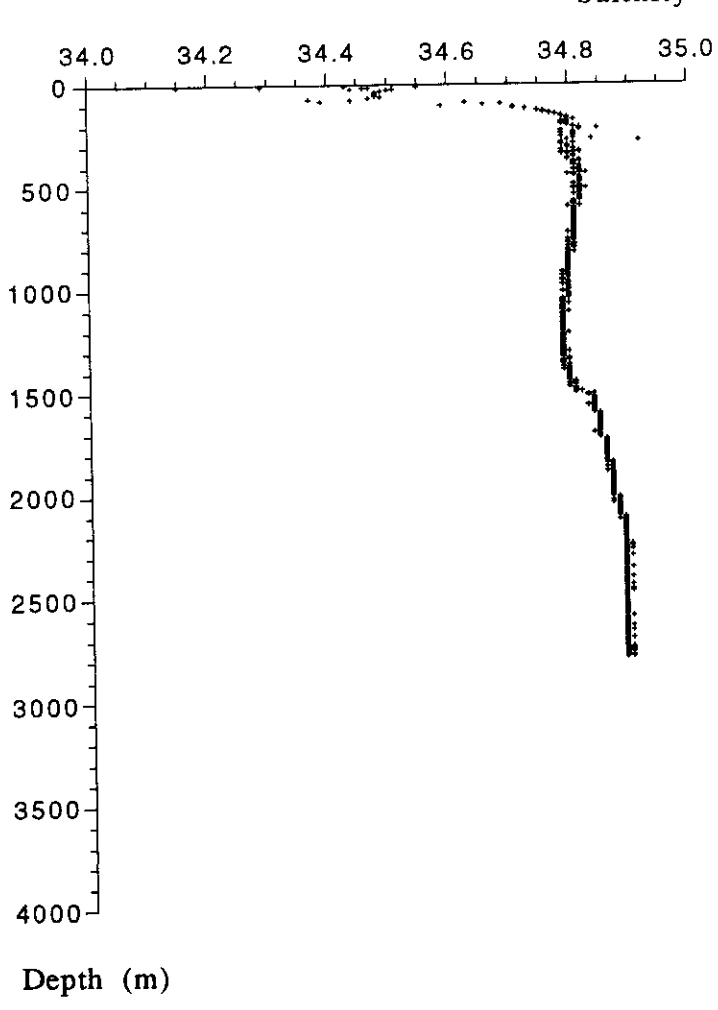
See figure 63, next page.

Figure 63: CTD cast

Cruise Number : HU-91-045
Site Number: 23
Station Number: 077
Location: Charlie Gibbs
Fracture Zone
Julian Day: 304
GMT: 23:45
Water Depth: 2835 m
Latitude: 53° 04.68'
Longitude: 33° 38.80'







HU-91-045-078: Water sampling

Julian day:	304	GMT Time:	23:45
Latitude:	53°04.68 N	Longitude:	33°38.80 W
Water depth:	2835 m		
Location:	Charlie Gibbs Fracture Zone		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A126	8 L
GN6-A127	10 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A85	30 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A120	2.9 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-078: Water sampling (continued)

III- Depth sampled: 500 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A122	10 L
GN6-A123	10 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A83	80 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 800 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A121	2.93 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

V- Depth sampled: 1200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A117	20 L
GN6-A118	18 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A84	80.44 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-078: Water sampling (continued)

VI- Depth sampled: 1600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A119	2.91 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VII- Depth sampled: 2000 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A124	2.9 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VIII- Depth interval sampled: 2400 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A115	20 L
GN6-A116	20 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A82	71.2 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-078: Water sampling (continued)

IX- Depth sampled: 2750 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A125	2.85 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses
at the following water depths:
10 m, 200 m, 500 m, 800 m, 1200 m, 1600 m, 2000 m, 2400 m, 2750 m.

HU-91-045-079: Box coring

Cast 1

Julian day:	305	GMT Time:	10:57
Latitude:	53° 03.41 N	Longitude:	33° 31.76 W
Water depth:	3024 m		
Location:	Charlie Gibbs Fracture Zone		

Pre-tripping at 2600 m

Cast 2

Julian day:	305	GMT Time:	17:20
Latitude:	53° 03.37N	Longitude:	33° 31.71W
Water depth:	3024 m		
Location:	Charlie Gibbs Fracture Zone		

Pre-tripping at 3000 m

No recovery.

HU-91-045-080: TW & P coring

Julian day:	305	GMT Time:	14:15
Latitude:	53° 03.40 N	Longitude:	33 °31.78 W
Water depth:	3024 m		
Location:	Charlie Gibbs Fracture Zone		

Trigger Weight Core (TWC)

App. penetr.: 60 cm
Core length: 200 cm

Description: Surface sediments consist of dark yellowish brown (10YR 4/4) mud overlying gray (5Y 5/1) bioturbated mud.A reccuring layer of dark yellowish brown (10YR 4/4) mud is observed between 17 and 18 cm. the rest of the core (18-200 cm) consists of gray (5Y 5/1) bioturbated mud.
Note that duplicate coring of the surface sediments appears probable in view of reccuring dark yellowish brown mud at 17 cm.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 64, p. 218).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

6-8	94-96	188.5-190.5
10.5-12.5	103.5-105.5	196-198
19-21	114-116	
28-30	123-125	
37.5-39.5	133.5-135.5	
47-49	143-145	
56-58	150-152	
65-67	159.5-161.5	
74.5-76.5	169-171	
84-86	179-181	

HU-91-045-080: TW & P coring (continued)

Piston Core

Corer length: 2000 cm
App. penetr.: nil
Core length: 1735 cm (12 sections + cutter)

Description: Sediments are gray to brownish mud generally bioturbated and rich in biogenic carbonates. The sequence is however characterized by the occurrence of laminae and layers of biogenic silicate material with a peculiar "matted cardboard" texture.
0-185 cm: gray (5Y 5/1) to dark gray (5Y 4/1) bioturbated mud;
185-210 cm: olive gray (5Y 4/2) siliceous rich layer;
210-297 cm: alternance of dark gray (5Y 4/1) and dark grayish brown (2.5Y 4/2) sandy mud with scattered gravel;
297-302 cm: olive gray (5Y 4/2) siliceous rich layer;
302-341 cm: dark grayish brown (2.5Y 4/2) to grayish brown (2.5Y 5/2) mud with sand;
341-346 cm: olive gray (5Y 4/2) siliceous rich layer;
346-631 cm: alternating gray (5Y 6-5/1) and dark gray (5Y 4/1) bioturbated mud with scattered laminae of siliceous rich material;
631-654 cm: dark grayish brown (2.5Y 4/2) bioturbated mud with sand and scattered gravel;
654-878 cm: alternating gray (5Y 6-5/1) and olive gray (5Y 5/2) mud with layers of laminated siliceous rich material;
878-886 cm: dark grayish brown (2.5Y 4/2) bioturbated sandy mud with pebble;
886-1045 cm: alternance of gray (5Y 6-5/1) and dark gray (5Y 4/1) bioturbated mud;
1045-1079 cm: gray (5Y 6-5/1) mud with layers of laminated siliceous material;
1079-1082 cm: dark grayish brown (2.5Y 4/2) mud with sand;
1082-1140 cm: gray (5Y 6-5/1) layer of laminated siliceous material;
1140-1159 cm: dark gray (5Y 4/1) bioturbated mud;
1159-1430 cm: gray (5Y 6-5/1) mud rich in biogenic silica characterized by olive (5Y 5/2) subhorizontal bands showing a marble-like structure; presence of laminated layers of siliceaous material;
1430-1536 cm: gray (5Y 5/1) to dark gray (5Y 4/1) bioturbated mud;
1536-1655 cm: alternance of dark gray (5Y 4/1), gray (5Y 5/1) and dark grayish brown (2.5Y 4/2) bioturbated mud with sand and granules;
1655-1719 cm: dark gray (10YR 4/1) mud with lenses of laminated siliceous material;
1719-1740 cm: dark grayish brown (2.5Y 4/2) to gray (5Y 5/1) to dark gray (5Y 4/1) bioturbated mud with sand.

HU-91-045-080: TW & P coring (continued)

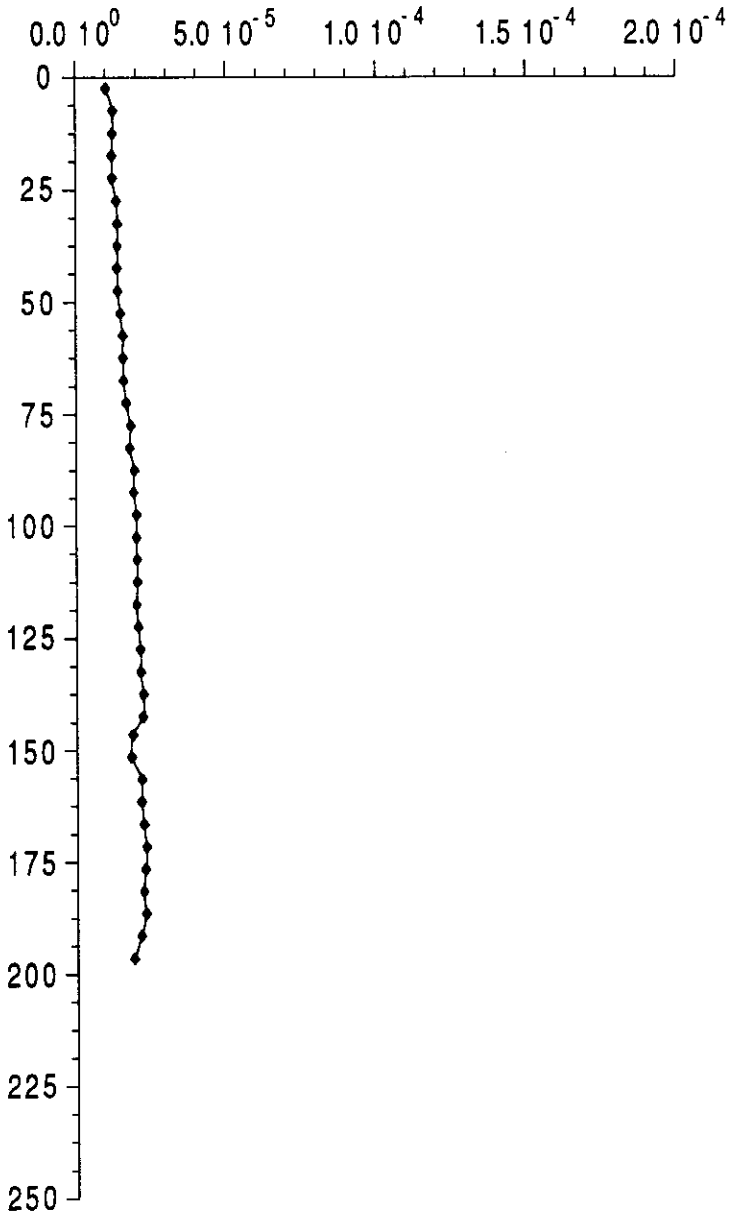
Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 65, p. 219).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	93-95	187-189	276-278	360-362
8.5-10.5	102.5-104.5	197-199	286-288	370-372
17-19	112-114	207-209	295-297	384-386
26.5-28.5	121-123	217-219	298-300	393-396
35.5-37.5	130-132	223-225	304-306	403-405
45-47	139-141	230-232	314-316	413-415
52-54	148-150	237-239	324-326	422-424
63-65	158-160	247-249	333-335	434-436
75-77	167-169	257-259	341-343	442-444
84.2-86.2	177-179	269-271	350-352	451-453
461-463	563-565	665.5-667.5	755-757	844-846
470-472	575-577	676-678	765-767	847.5-849.5
480-482	584.5-586.5	686-688	775.5-777.5	855-857
490-492	594.5-596.4	696-698	784.5-786.5	865-867
499-501	604-606	704-706	793-795	874.5-876.5
508.5-510.5	614.5-616.5	710.5-712.5	802-804	884-886
518-520	624-626	719.5-721.5	811-813	895-897
527-529	634-636	730-732	820-822	904.5-906.5
540-542	644-646	737.5-739.5	829-831	914-916
553-555	656-658	746.5-748.5	837-839	924-926
933.5-935.5	1019-1021	1115-1117	1199-1201	1291-1293
943-945	1028-1030	1125-1127	1208.5-1210.5	1297-1299
955-957	1037-1039	1135-1137	1219-1221	1307-1309
965-967	1049-1051	1141-1143	1231.5-1333.5	1316-1318
972-974	1058-1060	1150.5-1152.5	1244-1246	1326-1328
981.5-983.5	1072-1074	1160.5-1162.5	1255-1257	1335.5-1337.5
992-994	1082.5-1084.5	1170-1172	1265-1267	1348-1350
1000-1002	1095-1097	1180-1182	1274.5-1276.5	1358-1359
1009-1011	1105-1107	1189-1191	1282-1284	1359-1361
1368-1370	1471.5-1473.5	1569-1571	1664-1666	
1378-1380	1481-1483	1579-1581	1673.5-1675.5	
1388-1390	1491-1493	1589-1591	1683-1685	
1402.5-1404.5	1501-1503	1598.5-1600.5	1692.5-1694.5	
1412-1414	1510.5-1512.5	1608-1610	1702-1704	
1423-1425	1520.5-1522.5	1617-1619	1712-1714	
1432-1434	1530-1532	1627-1629	1721.5-1723.5	
1442-1444	1540-1542	1636-1638	1731-1733	
1452-1454	1549.5-1551.5	1646-1648		
1462-1464	1559.9-1561.5	1655-1657		

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 23
Location: Charlie Gibbs Fracture Zone
Station Number: 080 TWC

Figure 64

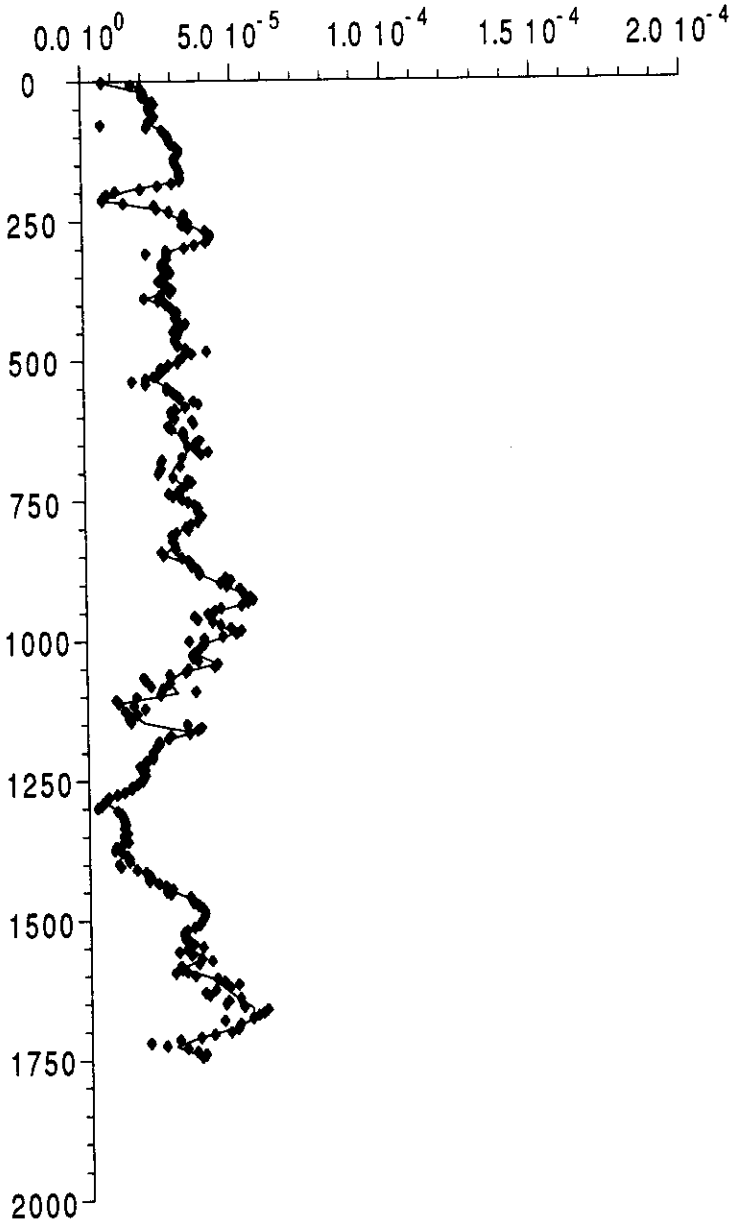


Julian Day: 305
GMT: 14:15
Water Depth: 3024 m
Latitude: 53° 03.40
Longitude: 33° 31.78

MAGNETIC SUSCEPTIBILITY (cgs)

Figure 65

Cruise Number: HU-91-045
Site Number: 23
Location: Charlie Gibbs Fracture Zone
Station Number: 080 PC



Julian Day: 305
GMT: 14:15
Water Depth: 3024 m
Latitude: 53° 03.40
Longitude: 33° 31.78

HU-91-045-081: Le High coring

Julian day:	305	GMT Time:	19: 38
Latitude:	53°03.43 N	Longitude:	33°31.70 W
Water depth:	3024 m		
Location:	Charlie Gibbs Fracture Zone		

Penetration: 80 cm

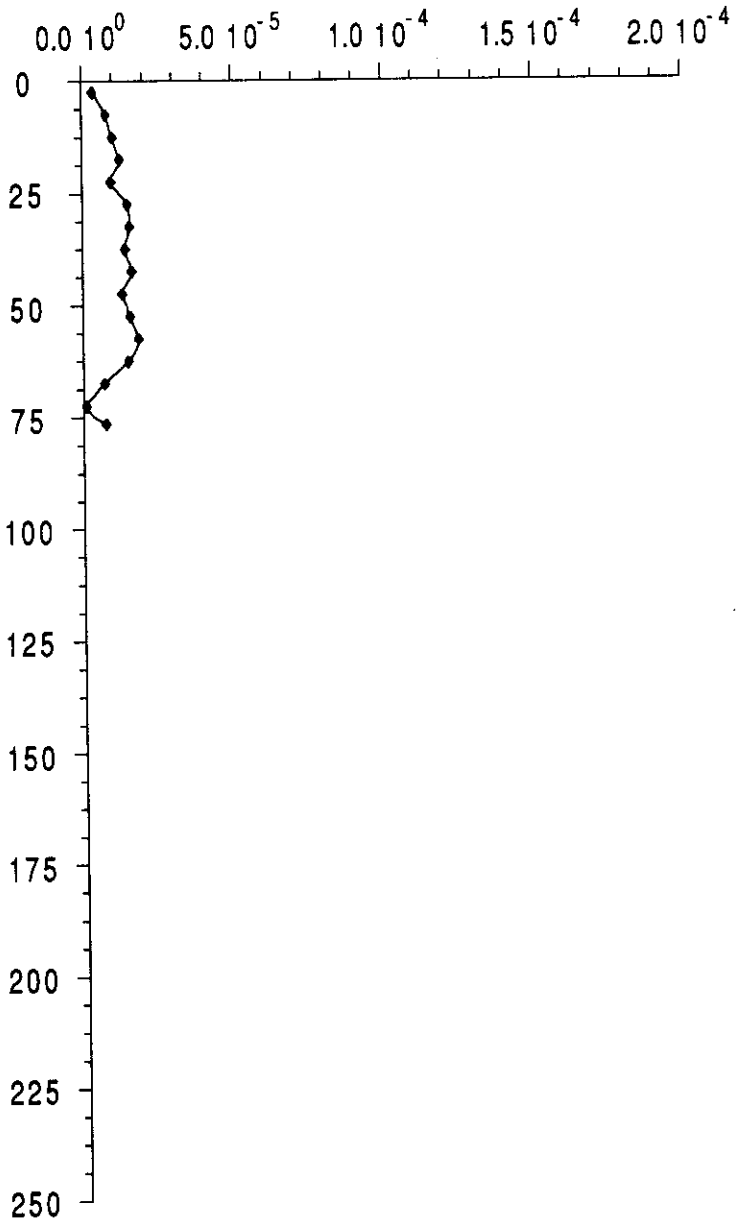
Onboard processing: Magnetic susceptibility has been measured at 5 cm intervals (see figure 66 next page). Redox potential has also been measured at 5 cm intervals.

Redox potential measurements:

Depth (cm)	Eh	Depth (cm)	Eh
0	-25	50	-67
5	-40	55	-50
10	-15	60	-60
15	-116	65	-44
20	-74	70	-26
25	-70	75	-15
30	-39	80	---
35	-26	85	-14
40	-36	90	---
45	-38		

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 23
Location: Charlie Gibbs Fracture Zone
Station Number: 081 LHC

Figure 66



Julian Day: 305
GMT: 19:38
Water Depth: 3024 m
Latitude: 53° 03.43
Longitude: 33° 31.70

HU-91-045-082: TW & P coring

Julian day:	306	GMT Time:	13:49
Latitude:	52° 51.67 N	Longitude:	35 °32.09 W
Water depth:	3109 m		
Location:	Charlie Gibbs Fracture Zone		

Trigger Weight Core (TWC)

Note: The Trigger Weight corer was lost at sea (it was apparently hit by the piston corer and the shock broke the bail of the TWCorer)

Piston Core

Corer length: 2400 cm
App. penetr.: nil
Core length: 1170 cm (7 sections)

Description: Sediments mainly consist of gray to olive gray mud with bioturbated zones rich in biogenic carbonates and other zones more richer rich in biogenic silica.
0-5 cm: brown (10YR 5/3) bioturbated mud;
5-116 cm: gray (5Y 5/1) bioturbated mud with lenses of sand and foraminifers;
116-147 cm: dark olive gray (5Y3/2) layers of diatom oozes alternating with dark gray (5Y 4/1) mud; presence of volcanic clasts;
147-164 cm: dark gray (5Y 4/1) bioturbated mud grading to foraminiferal sand;
164-226 cm: gray (5Y 5/1) to dark gray (5Y 4/1) mottled mud;
226-235 cm: dark olive gray (5Y 4/2) mottled mud;
235-254 cm: dark gray (5Y 4/1) bioturbated mud;
254-275 cm: dark olive gray (5Y 4/2) mud rich in biogenic silica;
275-310 cm: dark gray (5Y 4/1) mud with sand and granules;
310-323 cm: foraminifers and sand;
323-385 cm: dark gray (5Y 4/1) to dark brownish gray (2.5Y 4/2) bioturbated mud with sand and granules;
385-415 cm: dark gray (5Y 4/1) mud rich in biogenic silica;
415-450 cm: gray (5Y 5/1) bioturbated mud;
450-563 cm: dark gray (5Y 4/1) bioturbated mud rich in biogenic silica;
563-586 cm: dark gray (5Y 4/1) bioturbated mud with sand and granules;
586-724 cm: dark gray (5Y-10-YR-2.5Y 4/1) bioturbated mud;
724-810 cm: gray (5Y 5/1) bioturbated mud with foraminiferal sand layer at 785-787.5 cm;
810-861 cm: dark gray (5Y 4/1) to dark grayish brown (2.5Y 4/2) bioturbated mud with sand and granules;
861-863 cm: foraminiferal sand;
863-884 cm: gray (5Y 5/1) to dark olive gray (5Y 4/2) biotubated mud.
884-920 cm : gray (5Y 6-5/1) to dark grayish brown (2.5 Y 4/2) bioturbated mud;
920-972 cm: gray (5Y 6-5/1) mud;
972-982 cm: grayish brown (2.5Y 5/2) to dark grayish brown (2.5Y 4/2) mud with sand and granules;
982-992 cm: gray (5Y 5/1) bioturbated mud;
992-1062 cm: dark gray (5Y 4/1) grading to gray (5Y 5/1) mud;
1062-1067 cm: dark grayish brown (2.5Y 4/2) mud;

HU-91-045-082: TW & P coring (continued)

Description (continued):
1067-1100 cm: gray (5Y 6-5/1) mud;
1100-1106 cm: dark grayish brown (2.5Y 4/2) bioturbated mud;
1106-1175 cm: alternance of dark gray (5Y 4/1) and gray (5Y 5-6/1) bioturbated mud layers.

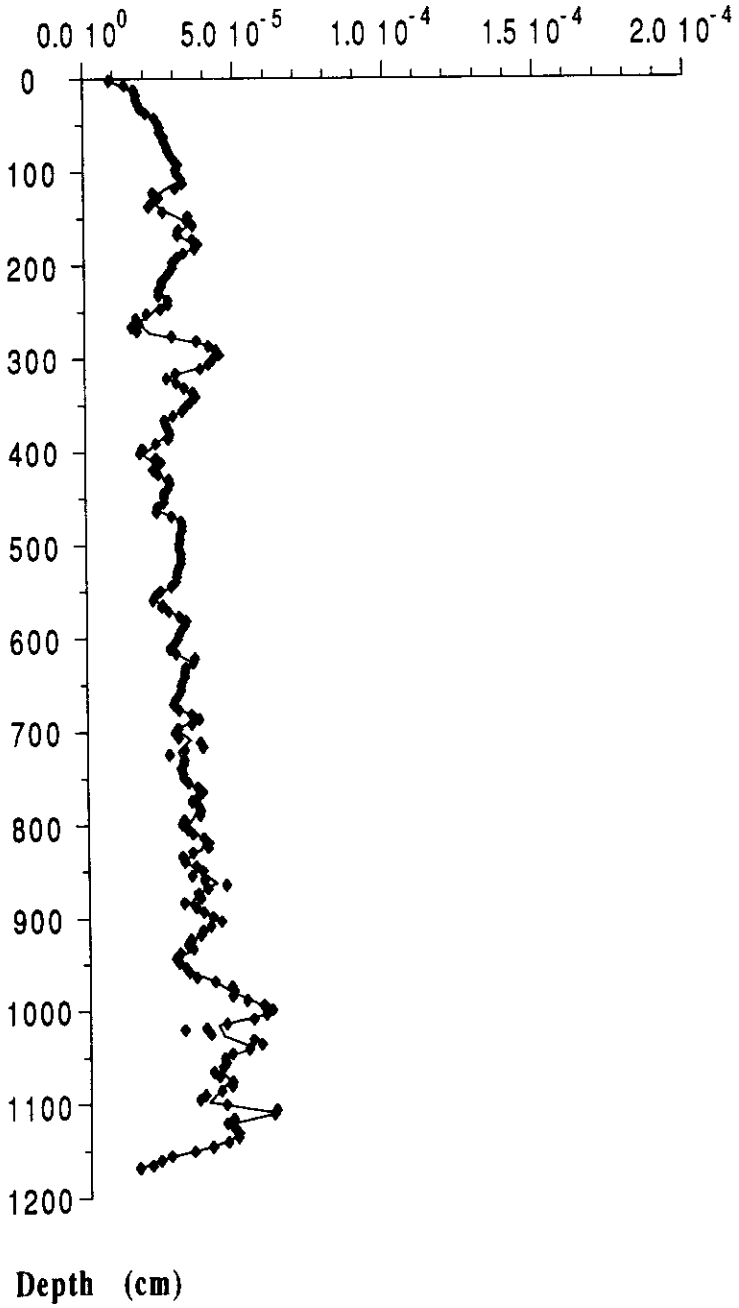
Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (see figure 67 next page).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	82.5-84.5	169-171	267-269	362.5-364.5
4.5-6.5	92-94	179-181	274-276	374.5-376.5
14-16	95-97	189-191	283.5-285.5	381-383
25-27	102.5-104.5	199-201	295.5-297.5	390.5-392.5
33-35	111.5-113.5	208-210	305-307	401-403
43.5-45.5	118-120	218-220	314.5-316.5	412-414
49-51	127-129	228-230	324-326	419-421
53-55	137-139	238-240	333.5-335.5	430-432
63-65	147-149	248-250	342.5-344.5	439-441
73-75	160-162	259-261	352-354	448-450
457-459	549-551	645-647	735-737	825-827
466-468	558-560	654-656	744-746	834.5-836.5
476-478	567-569	664-666	753-755	844-846
485-487	576-578	673-675	762-764	853.5-855.5
494-496	586-588	683-685	771-773	863-865
503-505	596-598	692.5-694.5	780-782	876.5-878.5
512-514	606-608	702-704	789-791	886.5-888.5
521.5-523.5	615-617	712-714	798-800	896-898
530.5-532.5	625-627	721.5-723	807-809	905-907
540-542	635-637	726-728	816-818	914.5-916.5
924-926	1007-1009	1120-1122		
933-935	1016-1018	1130-1132		
942-944	1032-1034	1140-1142		
951-95	1042-1044	1150-1152		
960-962	1051.5-1053.5	1159-1161		
969.5-971.5	1081-1083	1168-1171		
979-981	1091-1093			
988-990	1101-1103			
997.5-999.5	1110.5-1112.5			

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 24
Location: Charlie Gibbs Fracture Zone
Station Number: 082 PC

Figure 67



Julian Day: 306
GMT: 13:49
Water Depth: 3109 m
Latitude: 52° 51.67
Longitude: 35° 32.09

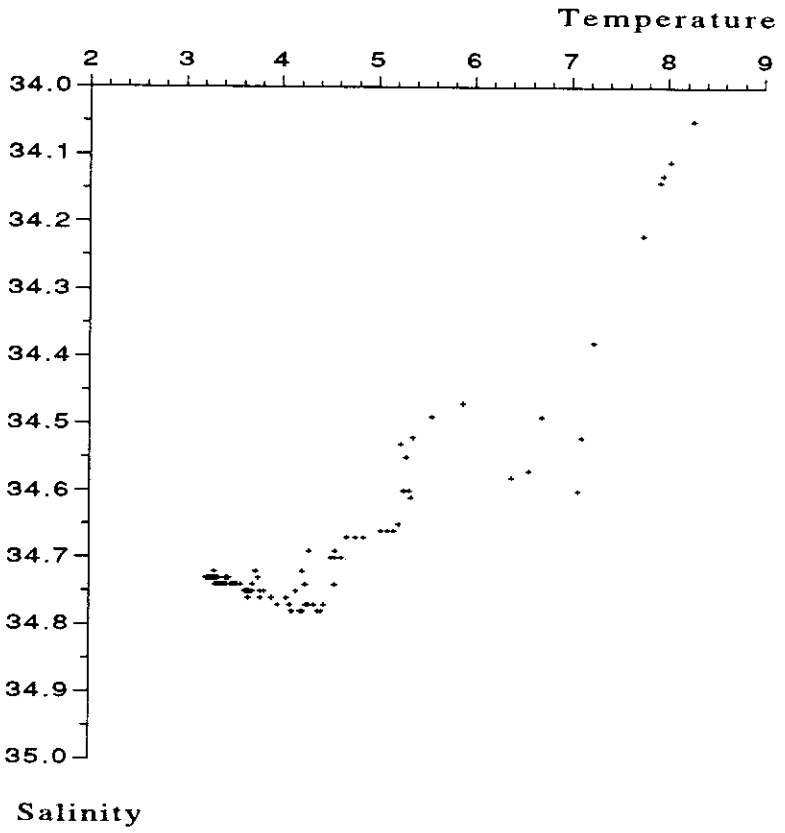
HU-91-045-083: CTD

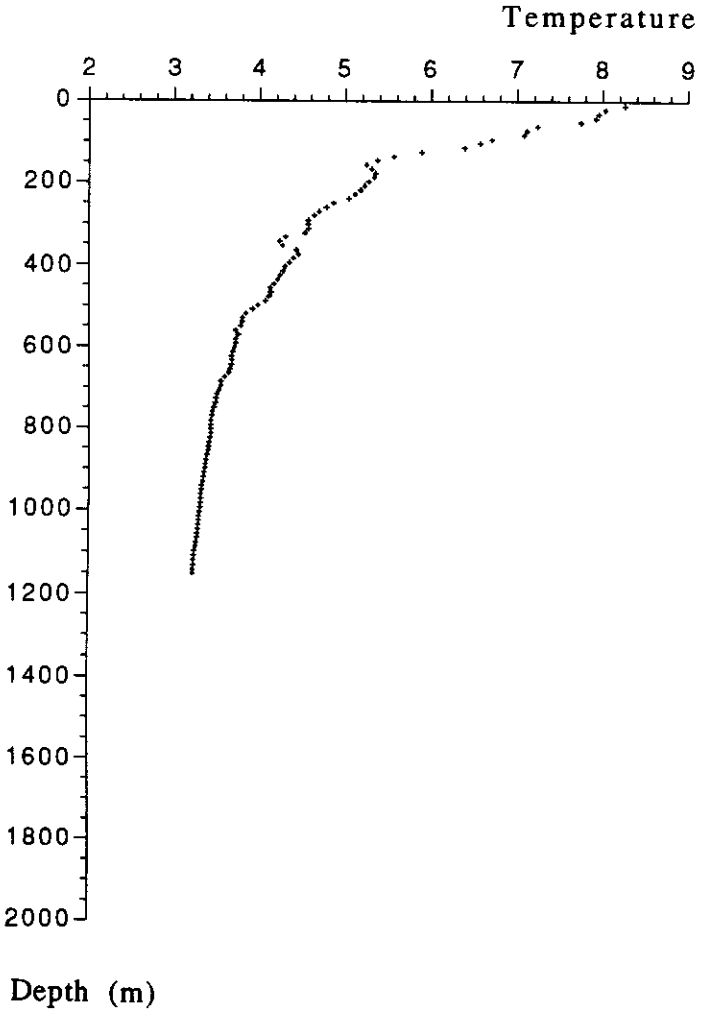
Julian day:	307	GMT Time:	13:39
Latitude:	52° 58.52 N	Longitude:	38° 38.27 W
Water depth:	3603 m		
Location:	Charlie Gibbs Fracture Zone		

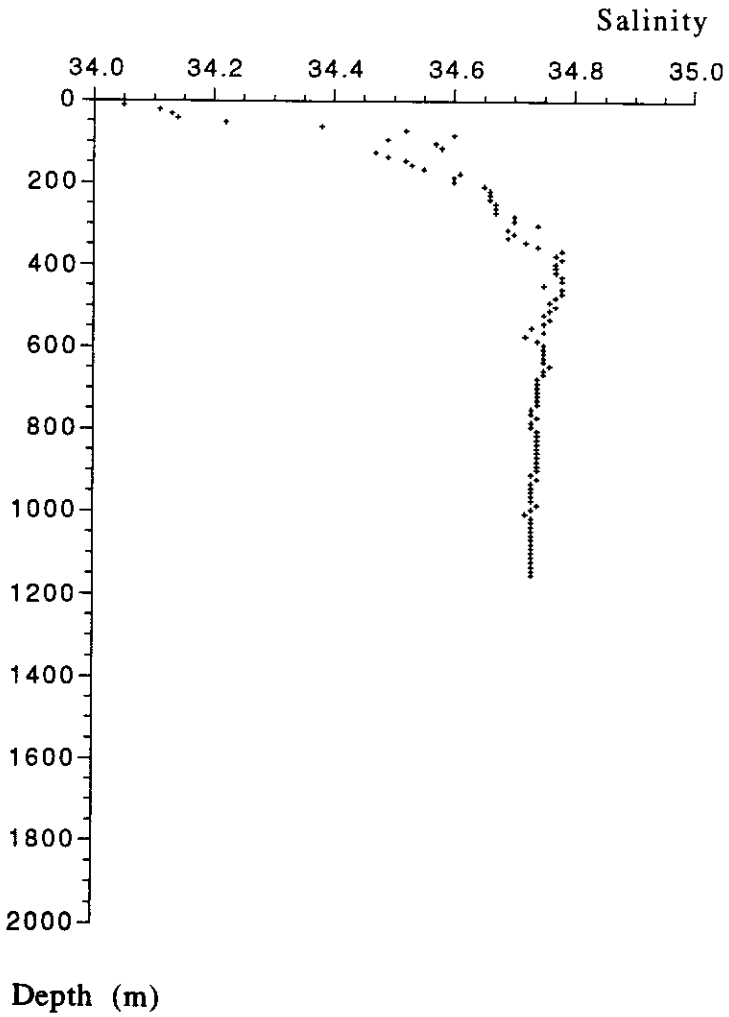
See figure 68 next page.

Figure 68: CTD cast

Cruise Number : HU-91-045
Site Number: 25
Station Number: 083
Location: Charlie Gibbs
Fracture Zone
Julian Day: 307
GMT: 13:39
Water Depth: 3603 m
Latitude: 52° 58.52'
Longitude: 38° 38.27'







HU-91-045-084: Box coring

Julian day:	308	GMT Time:	13 : 39
Latitude:	52°58.52 N	Longitude:	38°38.27 W
Water depth:	3603 m		
Location:	Charlie Gibbs Fracture Zone		

No recovery (pre-tripping).

HU-91-045-085: TW & P coring

Julian day:	307	GMT Time:	17:08
Latitude:	53° 58. 51 N	Longitude:	38 °38.25 W
Water depth:	3603 m		
Location:	Charlie Gibbs Fracture Zone		

Trigger Weight Core (TWC)

App. penetr.: Full
Core length: 189 cm (+ cutter)

Description: Sediments consist in brownish and gray mud moderately bioturbated and generaly rich in biogenic carbonates.
0-10 cm: yellowish brown (10YR 5/4) mud;
10-18 cm: dark yellowish brown (10YR 4/4) bioturbated mud;
18-60 cm: yellowish brown (10YR 5/4) to brown (10YR 5/3) bioturbated mud;
60-103 cm: grayish brown (2.5Y 5/2) mud grading to gray (5Y 5/1) mud with greenish lenses, grading to dark gray (5Y 4/1) bioturbated mud;
103-117cm: brown (10YR 5/3) bioturbated mud;
117-175 cm: grayish brown (2.5Y 5/2) mud grading to gray (5Y 5/1) mud with greenish lenses, grading to dark gray (5Y 4/1) bioturbated mud;
175-188 cm: dark gray (5Y 4/1) clayey mud.
Note that duplicate coring of the sediments (103-189 cm) appears probable in view of reccurence of the sedimentary facies.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 69, p. 231).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	79-80	162-164
4-6	88-90	172.5-174.5
14-16	98-100	181-183
21-23	102.5-104.5	
30-32	108-110	
40-42	119.5-121.5	
50-52	127-129	
55-57	138-140	
60-62	145-147	
70-72	133.5-135.5	

HU-91-045-085: TW & P coring (continued)

Piston Core

Corer length: 2000 cm
App. penetr.: full
Core length: 1444 cm (10 sections + cutter)

Description: Sediments consist in brownish and gray mud generaly bioturbated and rich in biogenic carbonates.
0-19 cm: yellowish brown (10YR 5/4) mud;
19-78 cm: brown (10YR 5/3) mud;
78-151 cm: grayish brown (2.5Y 5/2) mud grading to gray (5Y 5/1) mud with greenish lenses, grading to dark gray (5Y 4/1) mud;
151-206 cm: dark gray (5Y 4/1) clayey mud grading to dark gray (5Y 4/1) mud with sand and granules;
206-245 cm: dark grayish brown (2.5Y 4/2) to grayish brown (2.5Y 5/2) mud with sand and granules;
245-274 cm: grayish brown (10YR 5/2) mud;
274-295 cm: brown (10YR 4/3) mud with sand and granules;
295-368 cm: grayish brown (2.5Y 5/2) to dark grayish brown (2.5Y 4/2) mud;
368-426 cm: dark gray (5Y 4/1) mud grading to dark grayish brown (2.5Y 4/2) mud with sand and gravel;
426-443 cm: grayish brown (2.5Y 5/2) mud;
443-489 cm: light gray (10YR 6/1) mud with abundant brownish mottles;
489-506 cm: grayish brown (2.5Y 5/2) to dark grayish brown (2.5Y 4/2) mud with sand and granules;
506-517 cm: light grayish brown (2.5Y 6/2) mud;
517-560 cm: grayish brown (2.5Y 5/2) to light grayish brown (2.5Y 6/2) mud;
560-587 cm: light brownish gray (10YR 6/2) mottled mud;
587-596 cm: light grayish brown (2.5Y 6/2) mud;
596-605 cm: grayish brown (2.5Y 5/2) mud with sand and granules;
605-638 cm: light grayish brown (2.5Y 6/2) to light gray (10YR 7/2) mud;
638-647 cm: grayish brown (10YR 5/2) mud;
647-675 cm: light grayish brown (2.5Y 6/2) to grayish brown (2.5Y 5/2) mud;
675-784 cm: dark grayish brown (2.5Y 4/2) to grayish brown (2.5Y 5/2) mud with sand and granules;
784-794 cm: light grayish brown (2.5Y 6/2) mud;
794-828 cm: grayish brown (2.5Y 5/2) mud with sand and granules;
828-847 cm: grayish brown (2.5Y 5/2) to brown (10YR 5/3) mud;
847-880 cm: gray (5Y 5/1) mud;
880-902 cm: dark grayish brown (2.5Y 4/2) mud with sand and granules;
902-942 cm: gray (5Y 6-5/2) mud;
942-956 cm: dark gray (5Y 4/1) mud with sand and granules;
956-1034 cm: gray (5Y 6-5/2) mud grading to dark grayish brown (2.5Y 4/2) mud with sand and gravel;
1034-1094 cm: dark gray (5Y 4/1) mud with sand and granules;
1094-1152 cm: gray (5Y 5/1) to dark grayish brown (2.5Y 4/2) mud with sand and gravel;
1152-1444 cm: alternance of gray (5Y 6-5/1) mud, grayish brown (2.5Y 5/2) mud and dark grayish brown (2.5Y 4/2) mud with sand and gravel.

HU-91-045-085: TW & P coring (continued)

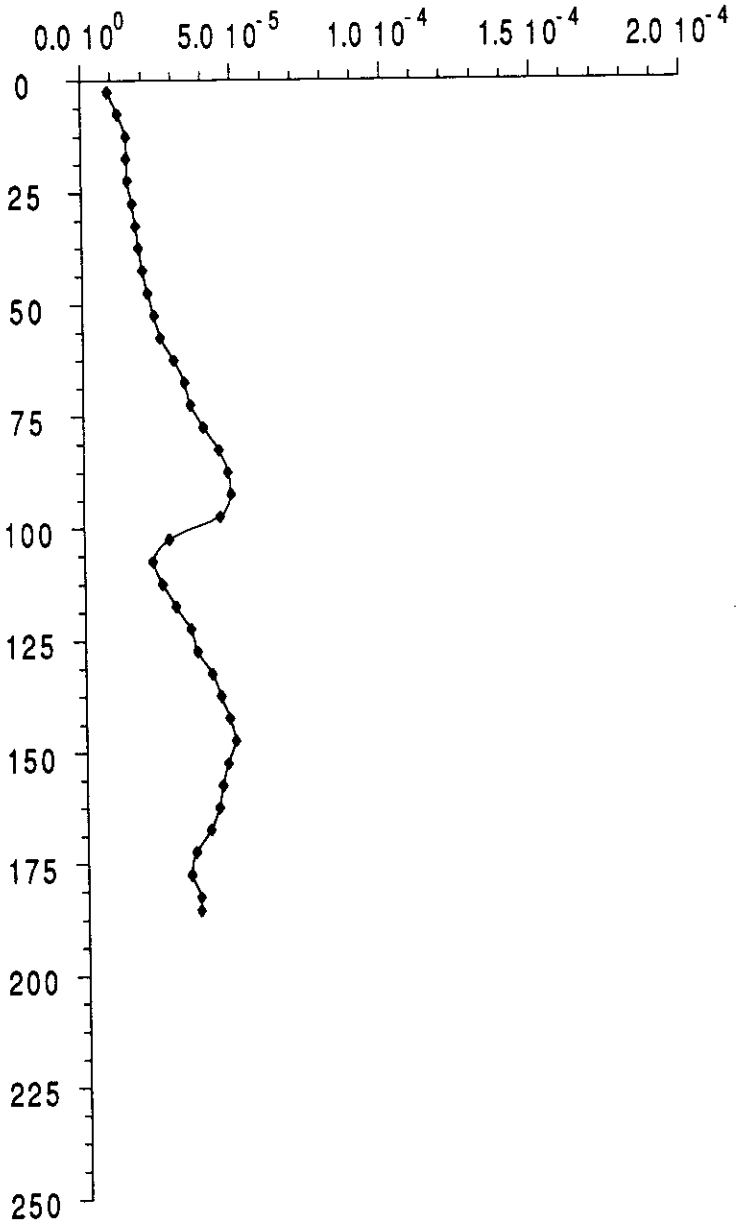
Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 70, p. 232).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	90-92	186-188	280-282	372-374
8-10	98-100	195.5-197.5	289-291	383-385
17-19	108-110	205-207	298-300	391-397
26-28	118-120	215-217	307-309	401-403
35-37	128-130	224-226	316-318	411-413
44-46	138-140	233-235	326-328	422.5-424.5
53-55	148-150	243-245	335-337	430.5-432.5
62-64	157-159	253-255	344-346	440-442
71-73	167-169	262-264	354-356	450-452
79-81	176-1788	271-273	363-365	460-462
470-472	568-570	649-651	740-742	838-840
480-482	577.5-579.2	655-657	749.5-751.5	847-849
490-492	587-589	664-666	759-761	856.5-858.5
499.5-501.5	596.5-598.5	674-676	768.5-770.5	866-868
509.5-511.5	606-608	683-685	778-780	876-878
519-521	616-618	691.5-693.5	788-790	885.5-887.5
529-531	626-628	701-703	797.5-799.5	895.5-897.5
539-541	635-637	711-713	807-809	905-907
548.5-550.5	639-641	720.5-722.5	817-819	915-917
558.5-560.5	645-647	730-732	826.5-828.5	924.5-926.5
934-936	1022-1024	1109.5-1111.5	1177-1179	1262.5-1264.5
944-946	1032-1034	1119-1121	1186.5-1189.5	1272-1274
954-956	1041-1043	1128.5-1130.5	1196-1198	1282-1284
964-966	1051-1053	1138-1140	1206-1208	1291-1293
973.5-975.5	1060.5-1062.5	1140-1142	1215-1217	1301.5-1303.5
983.5-985.5	1070-1072	1148-1150	1225-1227	1311-1313
993-995	1080-1082	1153-1155	1234-1236	1321-1323
1002.5-1004.5	1089.5-1091.5	1158-1160	1244-1246	1330.5-1332.5
1012.5-1014.5	1099.5-1101.5	1167.5-1169.5	1253-1255	1341-1343
1351-1353	1439-1441			
1360-1362				
1370-1372				
1380-1382				
1389-1391				
1399-1401				
1409-1411				
1419-1421				
1429-1431				
1436-1438				

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 25
Location: Charlie Gibbs Fracture Zone
Station Number: 085 TWC

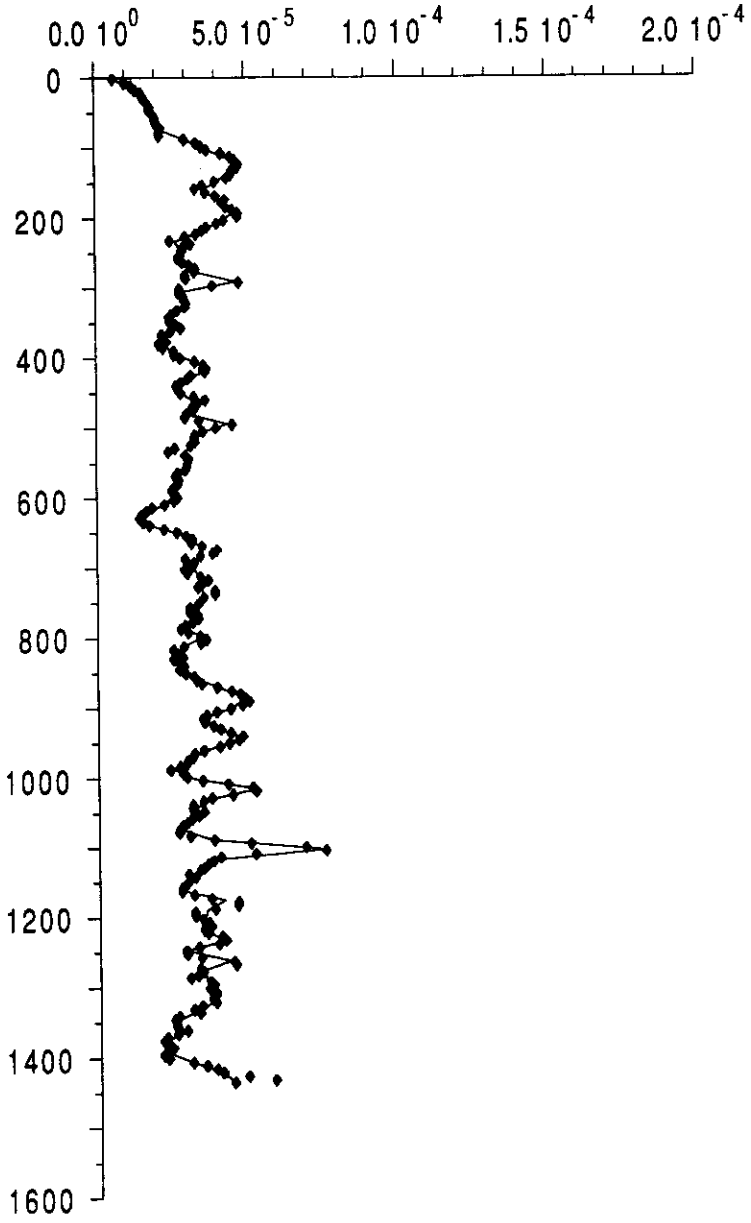
Figure 69



Julian Day: 307
GMT: 17:08
Water Depth: 3603 m
Latitude: 53° 58.51
Longitude: 38° 38.25

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 25
Location: Charlie Gibbs Fracture Zone
Station Number: 085 PC

Figure 70



Julian Day: 307
GMT: 17:08
Water Depth: 3603 m
Latitude: 53° 58.51
Longitude: 38° 38.25

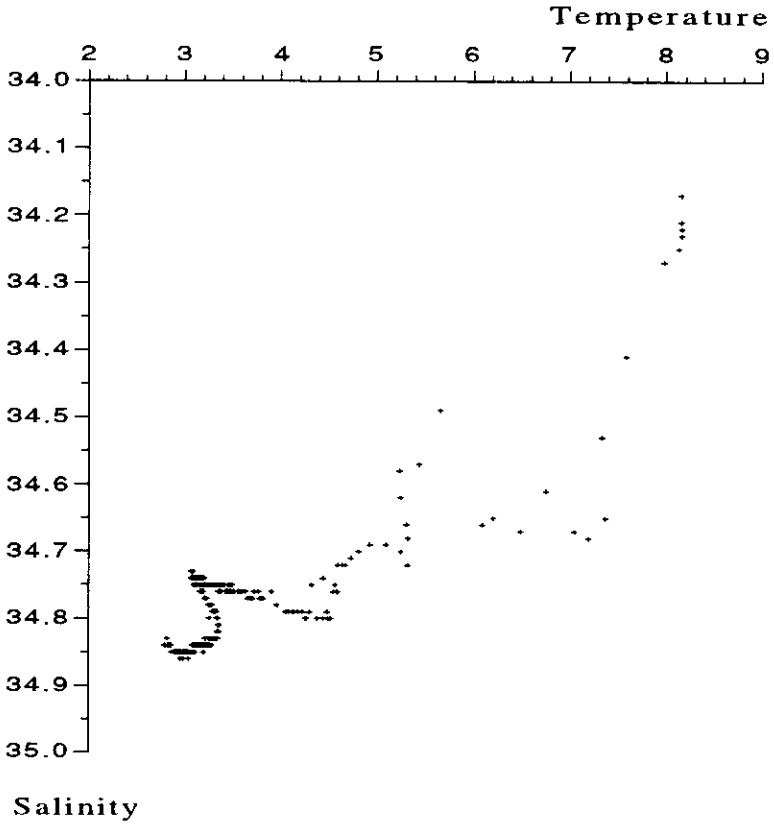
HU-91-045-086: CTD

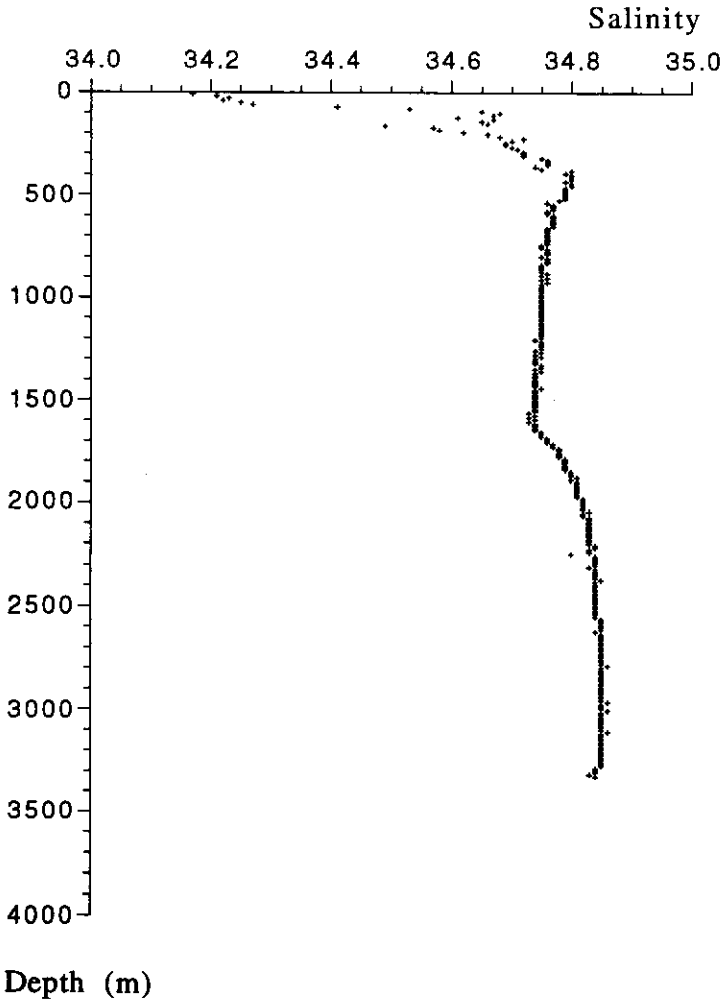
Julian day:	307	GMT Time:	20:04
Latitude:	52° 58.00 N	Longitude:	38° 39.23 W
Water depth:	3603 m		
Location:	Charlie Gibbs Fracture Zone		

See figure 71 next page.

Figure 71: CTD cast

Cruise Number : HU-91-045
Site Number: 25
Station Number: 086
Location: Charlie Gibbs
Fracture Zone
Julian Day: 307
GMT: 20:04
Water Depth: 3603 m
Latitude: 52° 58.00'
Longitude: 38° 39.23'





HU-91-045-087: Water sampling

Julian day:	307	GMT Time:	20:00
Latitude:	52°54.48 N	Longitude:	38°38.26 W
Water depth:	3511 m		
Location:	Charlie Gibbs Fracture Zone		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A129	8 L
GN6-A128	12 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A86	39.4 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 210 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A130	2.88 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-087: Water sampling (continued)

III- Depth sampled: 400 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A138	14 L
GN6-A135	16 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A88	64.6L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 800 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A134	2.93 L

Subsampling of water filtered at 0.45 µm
4 x 30 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 30 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

V- Depth sampled: 1200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A142	2 L
GN6-A143	16 L
GN6-A141	18 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A90	60.8 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-087: Water sampling (continued)

VI- Depth sampled: 1800 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A136	22 L
GN6-A139	22.4 L
GN6-A144	3.92 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A89	54.7 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VII- Depth sampled: 2200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A137	2.9 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
---	---

Subsampling of water filtered at 0.45 µm
4 x 30 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 30 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VIII- Depth interval sampled: 2600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A140	2 L

Subsampling of water filtered at 0.45 µm
4 x 30 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 30 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-087: Water sampling (continued)

IX- Depth sampled: 3000 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A133	2.82 L

Subsampling of water filtered at 0.45 µm
4 x 30 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 30 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

X- Depth sampled: 3400 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A131	14 L
GN6-A132	16 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A87	68 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at the following water depths:
10 m, 210 m, 400 m, 800 m, 1200 m, 1800 m, 2200 m, 2600 m, 3000 m, 3400 m.

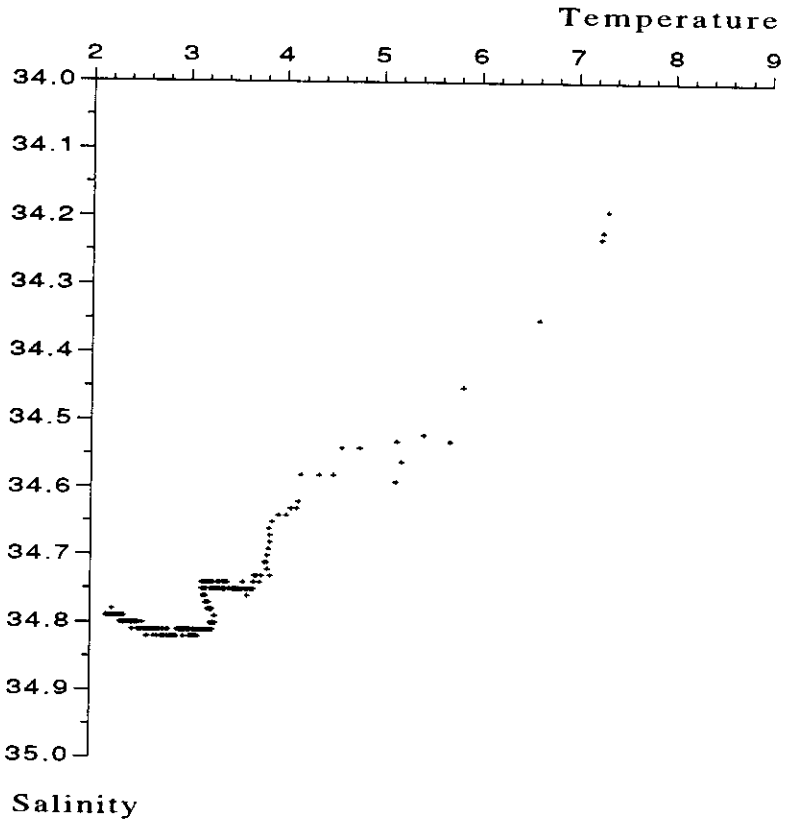
HU-91-045-088: CTD

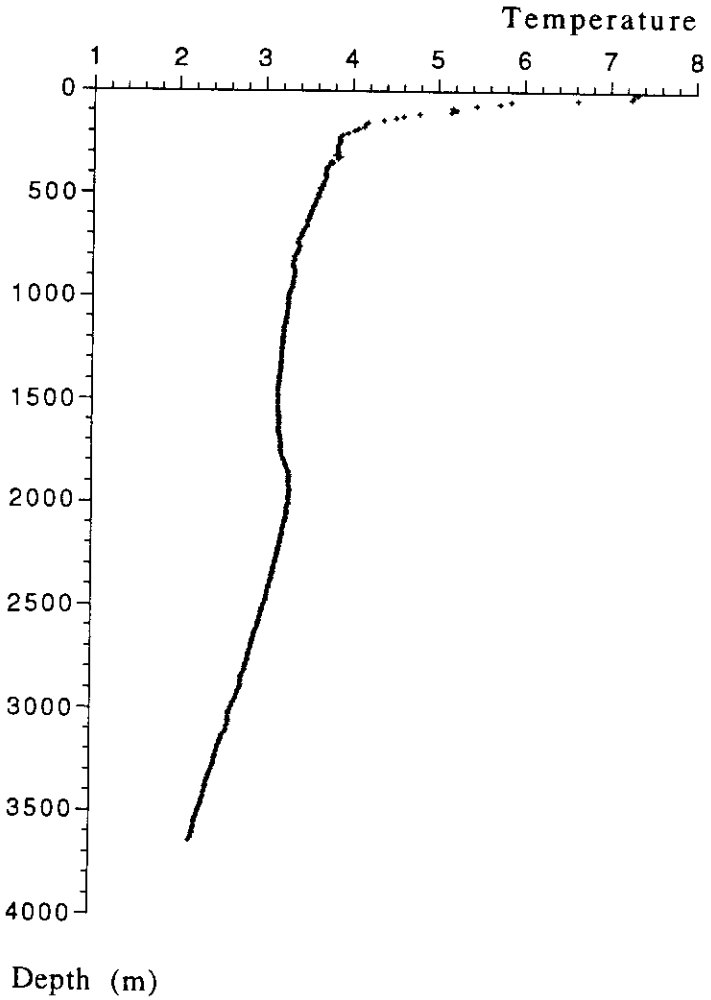
Julian day:	308	GMT Time:	23:58
Latitude:	53° 19.28 N	Longitude:	45° 15.31 W
Water depth:	3650 m		
Location:	South central Labrador Sea		

See figure 72 next page.

Figure 72: CTD cast

Cruise Number : HU-91-045
Site Number: 27
Station Number: 088
Location: South Central
Labrador Sea
Julian Day: 308
GMT: 23:58
Water Depth: 3650 m
Latitude: 53° 19.28'
Longitude: 45° 15.31'





HU-91-045-089: Water sampling

Julian day:	309	GMT Time:	00:00
Latitude:	53°19.82 N	Longitude:	45°15.63 W
Water depth:	3771 m		
Location:	Central Labrador Sea		

Onboard sampling and processing

Subsampling and processing for particulate matter and water geochemistry (protocol 1)

I- Depth sampled: 10 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A146	8 L
GN6-A145	10 L
GN6-A160	1.88 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A91	21.2 L
A92	10 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml & 250 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml & 6 x 30 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml & 6 x 30 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

II- Depth sampled: 200 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A157	2.76 L

Subsampling of water filtered at 0.45 µm
4 x 30 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 30 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-089: Water sampling (continued)

III- Depth sampled: 400 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A151	20 L
GN6-A152	20 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A94	58.9 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

IV- Depth sampled: 800 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A150	2.72 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
---	---

Subsampling of water filtered at 0.45 µm
4 x 30 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 250 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 30 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

V- Depth sampled: 1100 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A158	18 L
GN6-A159	20 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A96	59.5 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-089: Water sampling (continued)

VI- Depth sampled: 1600 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A156	2.67 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VII- Depth sampled: 2000 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A153	22 L
GN6-A154	22 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A95	53.4 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

VIII- Depth sampled: 2700 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A155	1.78 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
---	---

Subsampling of water filtered at 0.45 µm
4 x 30 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
2 x 250 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 30 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

HU-91-045-089: Water sampling (continued)

IX- Depth sampled: 3100 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A149	2.88 L

Subsampling of water filtered at 0.45 µm
4 x 30 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 250 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 30 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
2 x 30 ml for ^{2}H and ^{18}O analyses (stored in cold room).

X- Depth sampled: 3650 m

Filtration on 0.45 µm preweighed filters

Filter number	Volume filtered
GN6-A147	20 L
GN6-A148	20 L

Filtration on glass fiber preweighed filters

Filter number	Volume filtered
A93	61.5 L

Subsampling of water filtered at 0.45 µm
4 x 40 ml for analyses of dissolved nutrients (to be immediately analysed or stored in a freezer)
3 x 40 ml for alkalinity , DOC and ^{13}C analyses (stored in cold room)
2 x 40 ml for trace metal analyses (stored in freezer)

Subsampling of unfiltered water
250 ml for salinity (stored in cold room)
40 ml for DIC analyses (stored in cold room)
2 x 40 ml for ^{2}H and ^{18}O analyses (stored in cold room).

Water sampling for Nd & ^{14}C (protocol 3)

20 L Jerrycan and 3 bottles of 250 ml have been collected for Nd and ^{14}C analyses at the following water depths:
10 m, 200 m, 400 m, 800 m,1100 m, 1600 m, 2000 m, 2700 m, 3100 m, 3650 m.

HU-91-045-090: Box coring

Julian day:	309	GMT Time:	11: 51
Latitude:	53°19.79 N	Longitude:	45°15.60 W
Water depth:	3378 m		
Location:	South central Labrador Sea		

Penetration: 31 cm

Description: Surface sediment (0-18 cm) consists of light olive brown (2.5Y 5/4) mud rich in foraminifers. Subsurface sediment (18-31 cm) consists of dark brown (10YR 4/3) mud with scattered sand and granules.

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
4 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 10 cm in diameter) for archives (BIO)
1 "micro-core" (30 cm^3) for amino-acids studies (U. of Virginia)
1 sample (250 ml) at the box-core surface (0-1 cm)

<u>On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:</u>

1. Redox potential measurements (figure 73, p. 247)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	135	10-11	184	20-21	178
1-2	148	11-12	184	21-22	166
2-3	159	12-13	187	22-23	166
3-4	190	13-14	182	23-24	167
4-5	190	14-15	179	24-25	179
5-6	186	15-16	179	25-26	180
6-7	183	16-17	177		
7-8	184	17-18	177		
8-9	183	18-19	176		
9-10	183	19-20	173		

HU-91-045-090: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-2	X	X	A-134
2-4	X	X	A-136
4-6	X	X	A-137
6-8	X	X	A-138
8-10	X	X	A-139
10-12	X	X	A-140
12-14	X	X	A-141
14-16	X	X	---
16-18	X	X	A-142
18-20	X	X	A-143
20-22	X	X	A-144
22-24	X	X	A-145
24-26	X	X	A-146

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	10	4 x 2	5	8	6	2	---
2-4	5	4 x 2	5	8	5	2	2
4-6	5	4 x 2	5	8	5	2	2
6-8	5	4 x 2	6	---	---	---	---
8-10	5	4 x 2	5	6	---	---	---
10-12	5	4 x 2	5	4	---	---	---
12-14	5	4 x 2	---	---	---	---	---
14-16	5	4 x 2	5	3	---	---	---
16-18	5	4 x 2	5	8	2	---	---
18-20	5	4 x 2	1	---	---	---	---
20-22	5	4 x 2	5	---	---	---	---
22-24	5	3 x 2	---	---	---	---	---
24-26	5	3 x 2	---	---	---	---	---

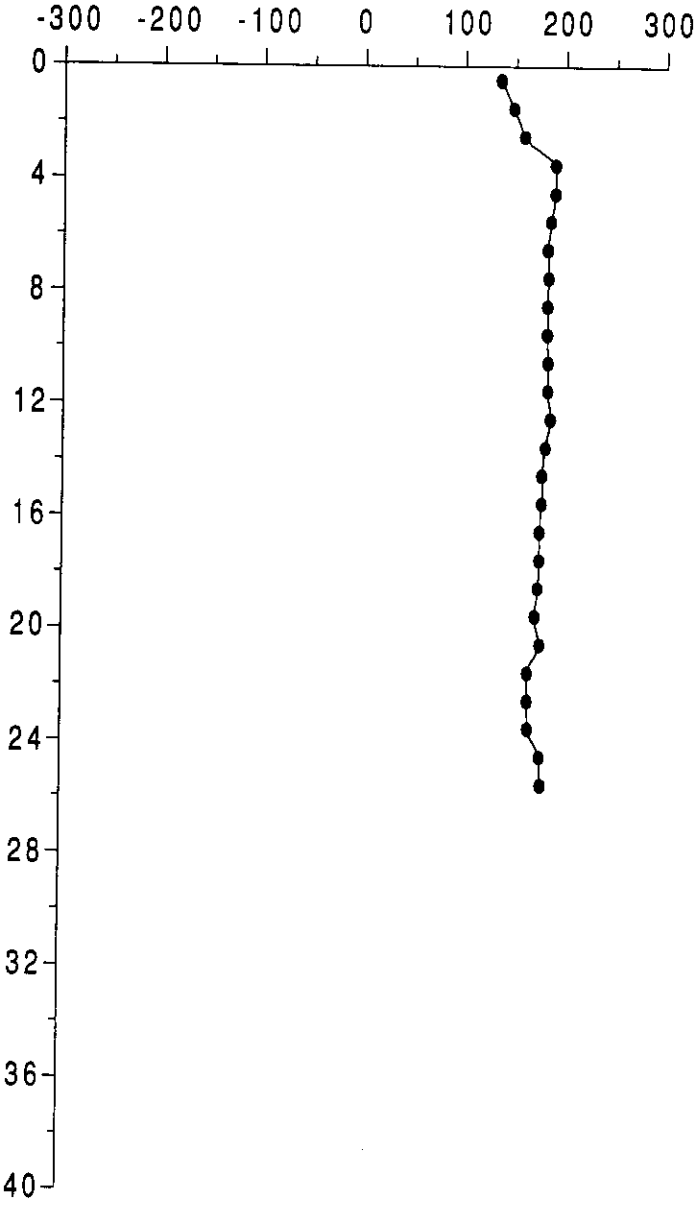
Note: squeezed sediments are saved in a separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 74, p. 251). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Continuous sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at 2 cm intervals.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 27
Location: Central Labrador Sea
Station Number: 090 BC

Figure 73: Redox potential



Julian Day: 309
GMT: 11:51
Water Depth: 3378 m
Latitude: 53° 19.79
Longitude: 45° 15.60

HU-91-045-091: TW & P coring

Julian day:	309	GMT Time:	14:55
Latitude:	53° 19. 81 N	Longitude:	45 °15.74 W
Water depth:	3870 m		
Location:	South central Labrador Sea		

Trigger Weight Core (TWC)

App. penetr.: 150 cm
Core length: 202 cm (+ cutter)

Description: Sediment consists of olive brown to brown bioturbated mud that are moderately rich in biogenic carbonates.
0-16 cm: light olive brown (2.5Y 5/4) mud rich in foraminifers;
16-38 cm: dark brown (10YR 4/3) mud with scattered sand and granules;
38-146 cm: dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) mud with sand and gravel;
143-146 cm: dark brown (10YR 4/3) mud with sand and granules;
146-202 cm: dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) mud with sand and gravel.

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 74, p. 251).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

0-2	89.5-91.5	181-183
4-6	98.5-100.5	190-192
13-15	107.5-109.5	200-202
22.5-24.5	117-119	
32-34	126.5-128.5	
43-45	136-138	
52-54	148-150	
61-63	153-155	
71-73	162-164	
80-82	172-174	

HU-91-045-091: TW & P coring (continued)

Piston Core

Corer length: 2400 cm
App. penetr.: 2050
Core length: 1139 cm (8 sections + cutter)

Description: Sediment consists of olive brown, brown and grayish bioturbated mud which is moderately rich in biogenic carbonates and generally contains sand and granules.
0-18 cm: light olive brown (2.5Y 5/4) mud rich in foraminifers;
18-61 cm: olive brown (2.5Y 4/4) mud;
61-150 cm: dark grayish brown (10YR 4/2) mud;
150-199 cm: grayish brown (10YR 5/2) mud;
199-277 cm: dark grayish brown (10YR-2.5Y 4/2) mud;
277-301 cm: grayish brown (2.5Y 5/2) mud;
301-324 cm: dark grayish brown (2.5Y 4/2) mud;
324-360 cm: dark gray (5Y 4/1) mud;
360-396 cm: grayish brown (2.5Y 5/2) clayey mud;
396-422 cm: dark grayish brown (2.5Y 4/2);
422-455 cm: gray (5Y 5/1) mud;
455-466 cm: dark grayish brown (2.5Y 4/2) mud withs;
466-485 cm: gray (5Y 5/1) mud;
485-500 cm: dark grayish brown (2.5Y 4/2) mud;
500-567 cm: dark gray (5Y 4/1) mud;
567-576 cm: gray (5Y 5/1) mud;
576-620 cm: mottled gray (5Y 5/1) and grayish brown (2.5Y 5/2) mud;
620-641 cm: light brownish gray (2.5Y 6/2) mud;
641-643 cm: grayish brown (10YR 5/2) mud layer;
643-685 cm: mud grading from dark gray (10YR 4/1) to brown (10YR 4/3) and to grayish brown (10YR 5/2);
685-720 cm: dark grayish brown (2.5Y 4/2) mud;
720-742 cm: grayish brown (2.5Y 5/2) mud grading to brown (7.5YR 4/2) clayey mud;
742-759: grayish brown (2.5Y 5/2) mud grading to brown (7.5YR 4/2) clayey mud;
759-768 cm: grayish brown (2.5Y 5/2) mud;
768-782 cm: gray (5Y 5/1) mud;
782-835 cm: dark gray (5Y 4/1) mud;
935-871 cm: mud grading from grayish brown (2.5Y 5/2) to gray (5Y 5/1);
871-884 cm: dark grayish brown (2.5Y 4/2) mud;
884-905 cm: dark grayish brown (2.5Y 4/2) to grayish brown (2.5Y 5/2) mud ;
905-966 cm: gray (5Y 5/1) mud;
966-976 cm: grayish brown (2.5Y 4-5/2) mud;
976-1029 cm: dark gray (5Y 4/1) to very dark gray (5Y 3/1) mud;
1029-1061 cm: grayish brown (2.5Y 5/2) to dark gray (10YR 4/1) mud;
1061-1139 cm: alternance of mottled gray (5Y-10YR 5/1) and dark gray (10YR 4/1) mud layers.

HU-91-045-091: TW & P coring (continued)

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 75, p. 251).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) in the upper 5 sections at about 10 cm interval as follows:

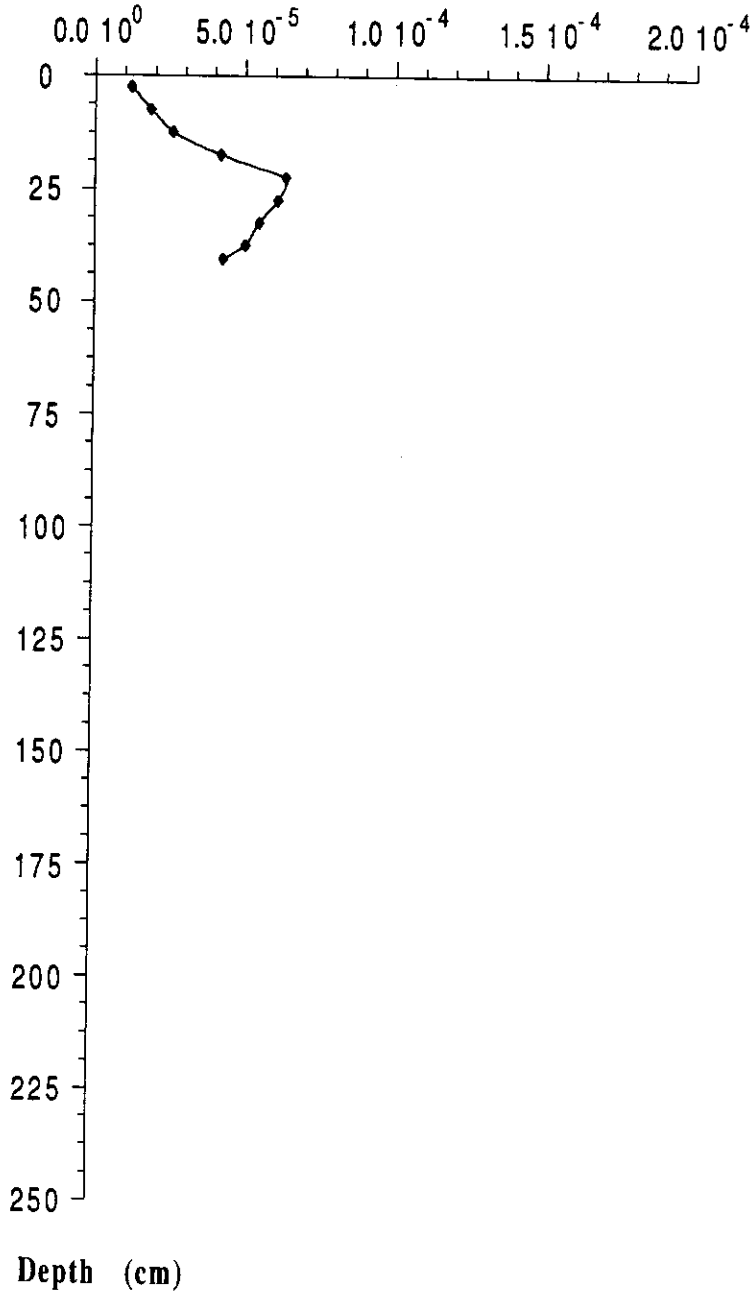
Sampling depth (cm)

2-4	88-90	185-187	273.5-275.5	369-371
11-13	98-100	195-197	283-285	379-381
20.5-22.5	107-109	205-207	293-295	389-391
30-32	117-119	212-214	302-304	398-400
39.5-41.5	126.5-128.5	219-221	311.5-313.5	408-410
49-51	136-138	227.5-229.5	321-323	417.5-419.5
58-60	146-148	237-239	330-332	427-429
68-70	155-157	246-248	340-342	436-438
72-74	165-167	255-257	349-351	446-448
78.8-80.5	175-177	264-266	359-361	455-457

464.5-466.5	551.5-553.5	657-659
474-476	570-572	666-668
483-485	580-582	676-678
493-495	589-591	
502-504	599-601	
512-514	609-611	
521-523	619-621	
524-526	628-630	
531.5-533.5	638-640	
541.5-543.5	647.5-649.5	

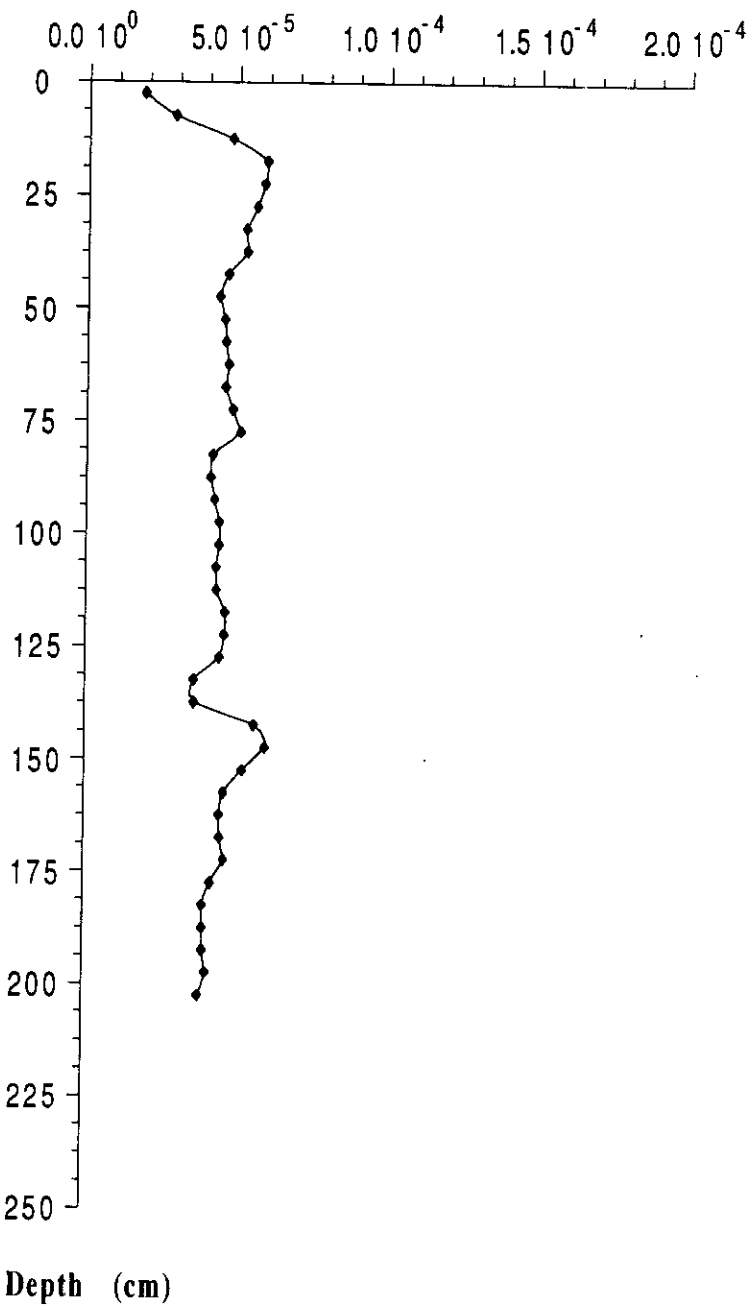
MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 27
Location: Central Labrador Sea
Station Number: 090 BC

Figure 74



Julian Day: 309
GMT: 11:51
Water Depth: 2237 m
Latitude: 53° 19.79
Longitude: 45° 15.60

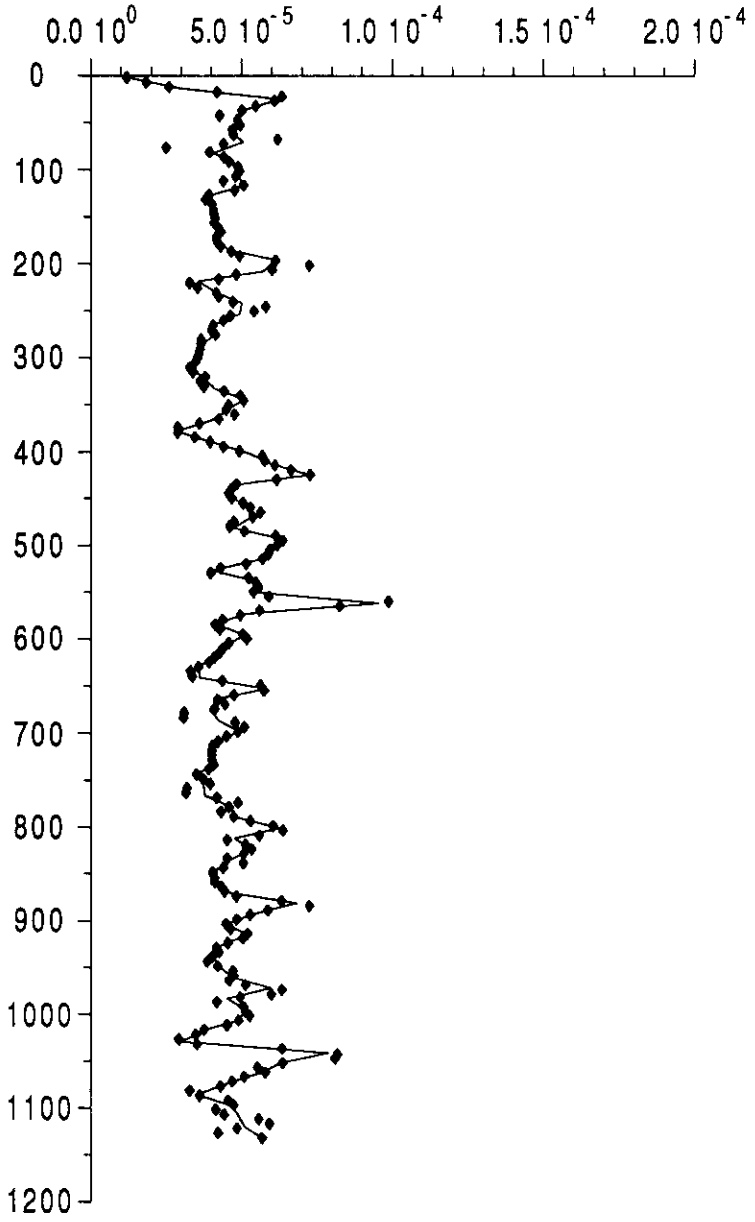
Station Number: 091 TWC



Julian Day: 309
GMT: 14:55
Water Depth: 3870 m
Latitude: 53° 19.81
Longitude: 45° 15.74

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 27
Location: Central Labrador Sea
Station Number: 091 PC

Figure 75



Julian Day: 309
GMT: 14:55
Water Depth: 3870 m
Latitude: 53° 19.81
Longitude: 45° 15.74

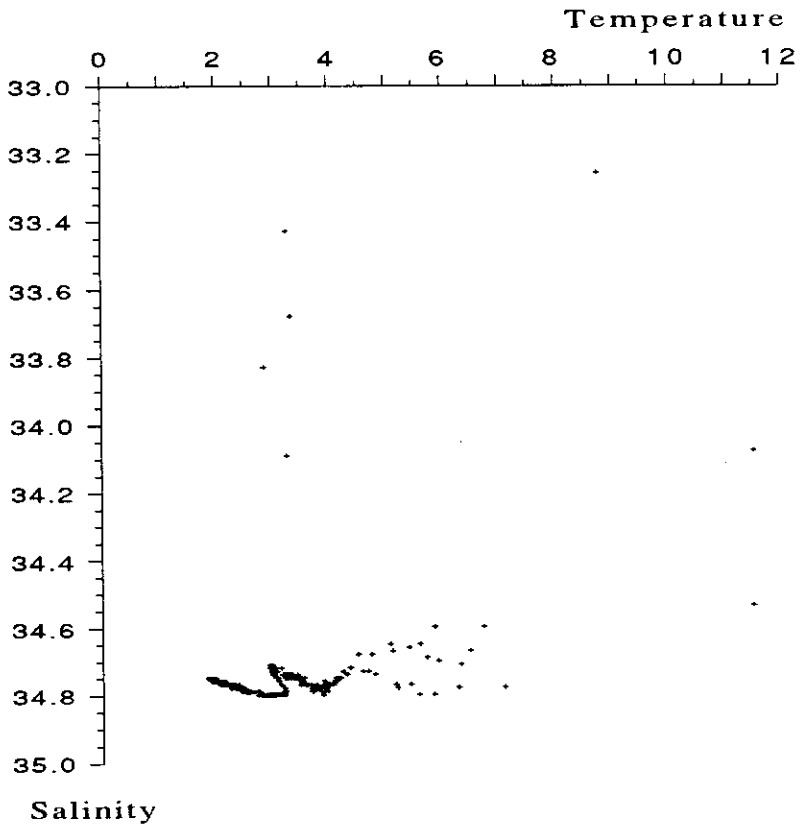
HU-91-045-092: CTD

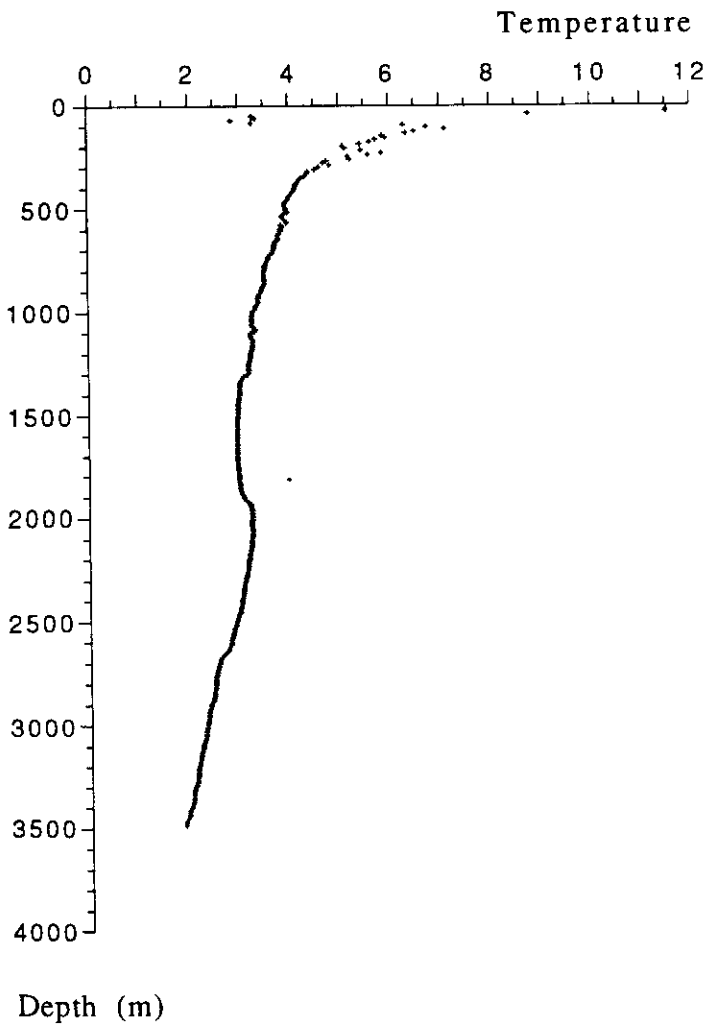
Julian day:	310	GMT Time:	13:00
Latitude:	50° 12.28 N	Longitude:	45° 41.15 W
Water depth:	3448 m		
Location:	Western Labrador Sea		

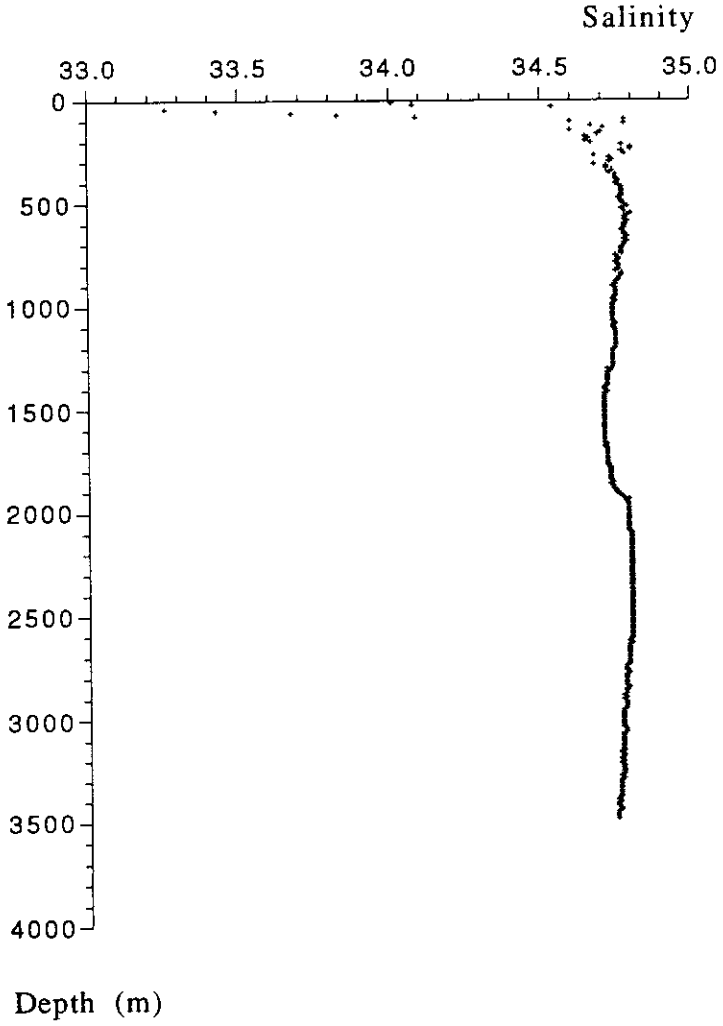
See figure 76 next page.

Figure 76: CTD cast

Cruise Number : HU-91-045
Site Number: 28
Station Number: 092
Location: Western Labrador Sea
Julian Day: 310
GMT: 13:00
Water Depth: 3448 m
Latitude: 50° 12.28'
Longitude: 45° 41.15'







HU-91-045-093: Box coring

Julian day:	310	GMT Time:	13: 00
Latitude:	50°12.28 N	Longitude:	45°41.15 W
Water depth:	3448 m		
Location:	Western Labrador Sea		

Penetration: 42 cm

Description: Surface sediment (0-5 cm) consists of olive brown (2.5Y 4/4) mud. Subsurface sediment (5-11 cm) consists of brown- dark brown (10YR 4/3-2) bioturbated mud overlying gray mud (11-42 cm).

Sampling: 1 push-core (30 cm long, 15 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing under nitrogen atmosphere
1 push-core (42 cm long, 10 cm in diameter) for on-board processing
3 push-cores (42 cm long, 10 cm in diameter) for further analysis (UQAM)
1 push-core (42 cm long, 10 cm in diameter) for archives (BIO)
1 sample (250 ml) at the box-core surface (0-1 cm)

On-board measurements and sub-sampling of the 15 cm-diameter push core under nitrogen atmosphere:

1. Redox potential measurements (figure 77, p. 259)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	142	10-11	108	20-21	26
1-2	156	11-12	123	21-22	35
2-3	175	12-13	103	22-23	25
3-4	170	13-14	99	23-24	38
4-5	166	14-15	87	24-25	27
5-6	159	15-16	101	25-26	-40
6-7	154	16-17	102	26-27	23
7-8	156	17-18	101		
8-9	130	18-19	58		
9-10	140	19-20	77		

HU-91-045-093: Box coring (continued)

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
0-2	X	X	A-23
2-4	X	X	A-24
4-6	X	X	A-25
6-8	X	X	A-26
8-10	X	X	A-27
10-12	X	X	A-32
12-14	X	X	A-33
14-16	X	X	A-34

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
0-2	5	4 x 2	5	8	5	2	3
2-4	5	4 x 2	5	8	5	1	---
4-6	5	4 x 2	5	2	---	---	---
6-8	5	4 x 2	5	8	4	---	---
8-10	5	4 x 2	5	8	2	---	---
10-12	5	4 x 2	5	2	---	---	---
12-14	5	4 x 2	5	2	---	---	---
14-16	5	4 x 2	5	6	---	---	---

Note: squeezed sediments are saved in separate bags.

HU-91-045-093: Box coring (continued)

On-Board measurements and sub-sampling of 10 cm-diameter core under nitrogen atmosphere

1. Redox potential measurements (figure 77, p. 259)

Depth (cm)	Eh	Depth (cm)	Eh	Depth (cm)	Eh
0-1	168	10-11	139	20-21	112
1-2	174	11-12	125	21-22	76
2-3	172	12-13	146	22-23	73
3-4	159	13-14	129	23-24	48
4-5	156	14-15	136	24-25	9
5-6	136	15-16	134	25-26	4
6-7	132	16-17	74	26-27	29
7-8	136	17-18	131	27-28	-8
8-9	132	18-19	112	28-29	-4
9-10	125	19-20	116	29-30	-36
30-31	13	40-41	-19		
31-32	-67	41-42	-32		
32-33	-33	42-43	99		
33-34	-30	43-44	19		
34-35	-47				
35-36	-49				
36-37	-41				
37-38	-45				
38-39	-52				
39-40	-19				

2. Sub-sampling of sediments

depth (cm)	amino-acids (1cc frozen)	micropal. (*ca.* 30cc)	porosity (5cc; vial #)
14-17	X	X	A-37
17-20	X	X	A-38
20-23	X	X	A-40
23-26	X	X	A-45
26-29	X	X	A-147
29-32	X	X	A-148
32-35	X	X	A-149

HU-91-045-093: Box coring (continued)

3. Sub-sampling of pore waters

depth (cm)	U (ml)	nutrients (ml)	TM (ml)	DIC/DOC (ml)	Alkalinity (ml)	Ca2+ (ml)	^{13}C (ml)
14-17	5	4 x 2	5	---	---	---	---
17-20	5	4 x 2	5	5	---	---	---
20-23	5	4 x 2	---	---	---	---	---
23-26	5	4 x 2	4	---	---	---	---
26-29	5	4 x 2	2	---	---	---	---
29-32	5	4 x 2	5	3	---	---	---
32-35	5	4 x 2	4	---	---	---	---

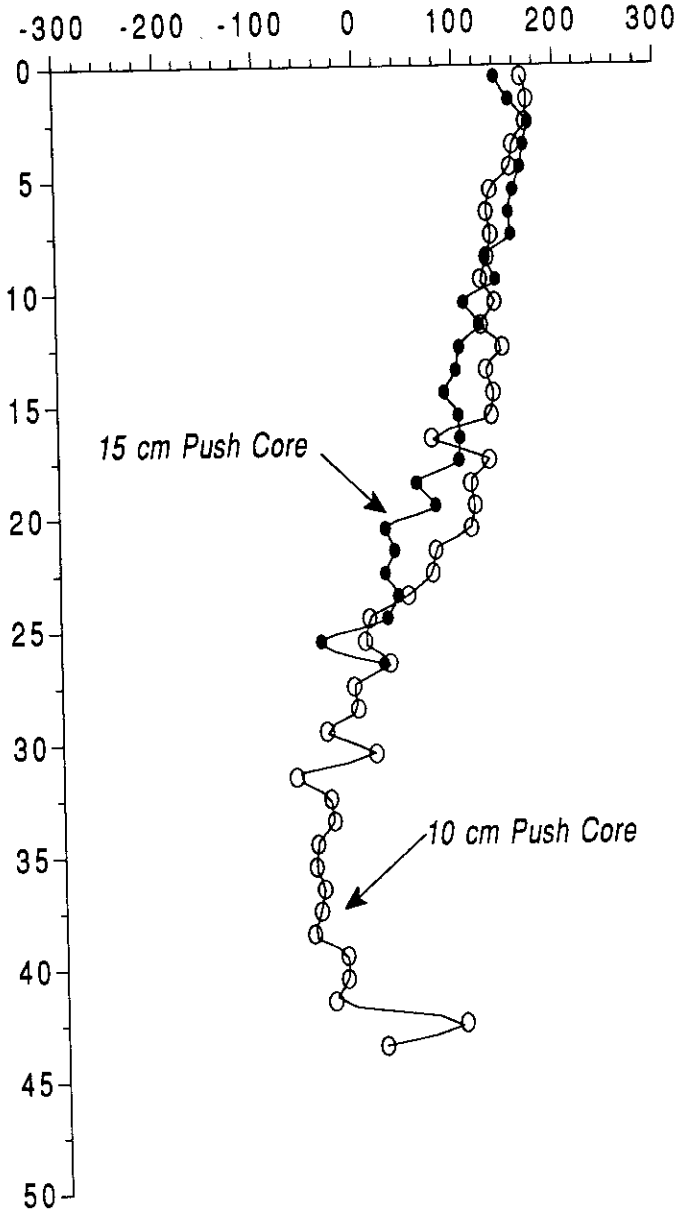
Note: squeezed sediments are saved in separate bags.

Onboard sub-sampling of 10 cm-diameter push core

Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 78, p. 263). The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Continuous sampling was also done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at 2 cm intervals.

Eh Measurement on Box Core
Cruise Number: HU-91-045
Site Number: 28
Location: Western Labrador Sea
Station Number: 093 BC

Figure 77: Redox potential



Julian Day: 310
GMT: 13:00
Water Depth: 3448 m
Latitude: 50° 12.28
Longitude: 45° 41.15

HU-91-045-094: TW & P coring

Julian day:	310	GMT Time:	15:44
Latitude:	50° 12.26 N	Longitude:	45 °41.14 W
Water depth:	3448 m		
Location:	Western Labrador Sea		

Trigger Weight Core (TWC)

App. penetr.: full
Core length: 137 cm (+ cutter)

Description: Surface sediment (0-~5 cm) consists of olive brown (2.5Y 4/4) mud. Subsurface sediment (~5-11 cm) consists of brown-dark brown (10YR 4/3-2) bioturbated mud overlying gray mud (11-137 cm)

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (Figure78, p. 263).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) at about 10 cm intervals as follows:

Sampling depth (cm)

4-5	94.5-96.5
9-11	104.5-106.5
19-21	114-116
28.5-30.5	124-126
38.5-40.5	133.5-135.5
47.5-49.5	
57-59	
66-68	
76-78	
85-87	

HU-91-045-094: TW & P coring (continued)

Piston Core

Corer length: 2400 cm
App. penetr.: full
Core length: 1099 cm (8 sections + cutter)

Description: Sediment in the upper part of the core (0-173 cm) consists of gray (5Y 5/1) to dark gray (5Y 4/1) mud.
Sediments of the lower part of the core contain sand, gravel and common pebbles. They are characterized by an alternance of gray-dark gray and brownish mud as follows:
173-182 cm: grayish brown (2.5Y 5/2) mud;
217-228 cm: dark gray (5Y-10YR 4/1) mud;
228-248 cm: dark grayish brown (2.5Y 4/2) to grayish brown (2.5Y 5/2) mud;
248-290 cm: dark gray (10YR 4/1) to very dark grayish brown (10YR 3/2) mud;
290-312 cm: dark gray (10YR 4/1) to very dark grayish brown (10YR 3/2) mud;
338-365 cm: dark gray (10YR 4/1) mud;
365-381 cm: grayish brown (2.5Y 5/2) silty mud;
381-401 cm: dark gray (10YR 4/1) to very dark grayish brown (10YR 3/2) clayey mud;
401-463 cm: dark gray (5Y-10YR 4/1) mud;
463-560 cm: gray (5Y 5/1) silty mud grading to dark gray (5Y 4/1) mud;
560-589 cm: grayish brown (2.5Y 5/2) silty mud;
589-691 cm: dark gray (5Y 4/1) mud grading to gray (5Y 5/1) sandy mud;
691-803 cm: alternance of dark gray (5Y 4/1) and gray (5Y 5/1) mud;
803-810 cm: turbidite sequence of foraminiferal sand to coarse sand over an erosional surface;
810-833 cm: dark gray (10YR 4/1) mud;
833-841 cm: turbidite sequence of silt to foraminiferal sand over an erosional surface;
841-1099 cm: gay-dark gray (5Y 4-5/1) mud.

HU-91-045-094: TWC & P coring (continued)

Subsampling: Magnetic susceptibility has been measured on the core at 5 cm intervals (figure 79, p. 264).The core was split into 2 longitudinal half-sections. One half was described, then labelled as usual and stored for archives. The other half-section was subsampled. Continuous sampling in 2 cm-edge plastic cubes was made all along the core for paleomagnetic measurements. Additional sampling was done for micropaleontology and geochemistry (*ca.* 40 cc. in vial stored in cold room; *ca.* 1 cc. in a bag stored in freezer) in the upper 5 sections at about 10 cm intervals as follows:

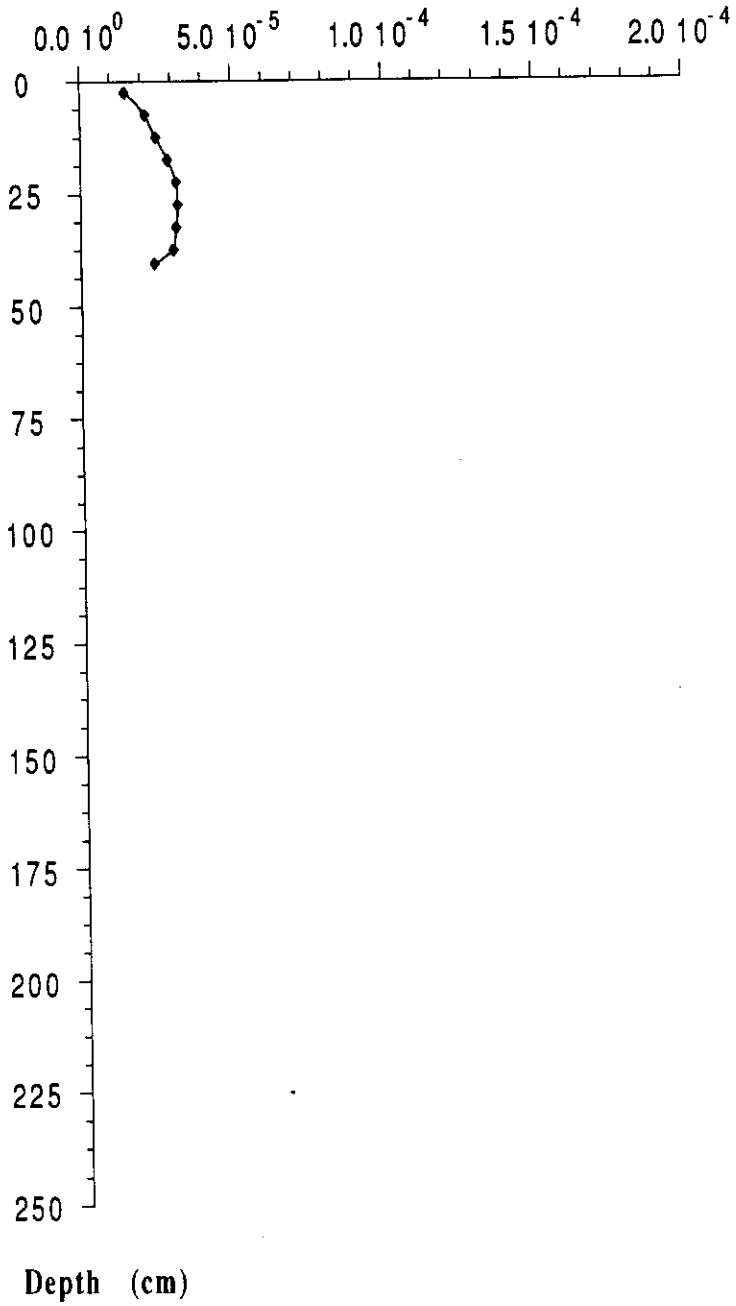
Sampling depth (cm)

0-2	87.5-89.5	178-180	275-277	359-361
4.5-6.5	96.5-98.5	192-194	282-284	368-370
14.5-16.5	105.5-107.5	201.5-203.5	291-293	377-379
24-26	114.5-116.5	211-213	300.5-302.5	386.5-388.5
33.5-35.5	123.5-125.5	227.5-229.5	310-312	396-398
42-44	132.5-134.5	237-239	319-321	403-405
51-53	142-144	245.5-247.5	328-330	412-414
60-62	151-153	254.5-256.5	336-338	421.5-423.5
69.5-71.5	160-162	264-266	343-345	430.5-432.5
78-80	169-171	273-275	350-352	440-442

449.5-451.5	556-558
458.5-460.5	565-567
468-470	574.5-576.5
488-490	584-586
500-502	593-596
509.5-511.5	602-604
519-521	611-613
528-530	620.5-622.5
537.5-539.5	630-632
547-549	639.5-641.5

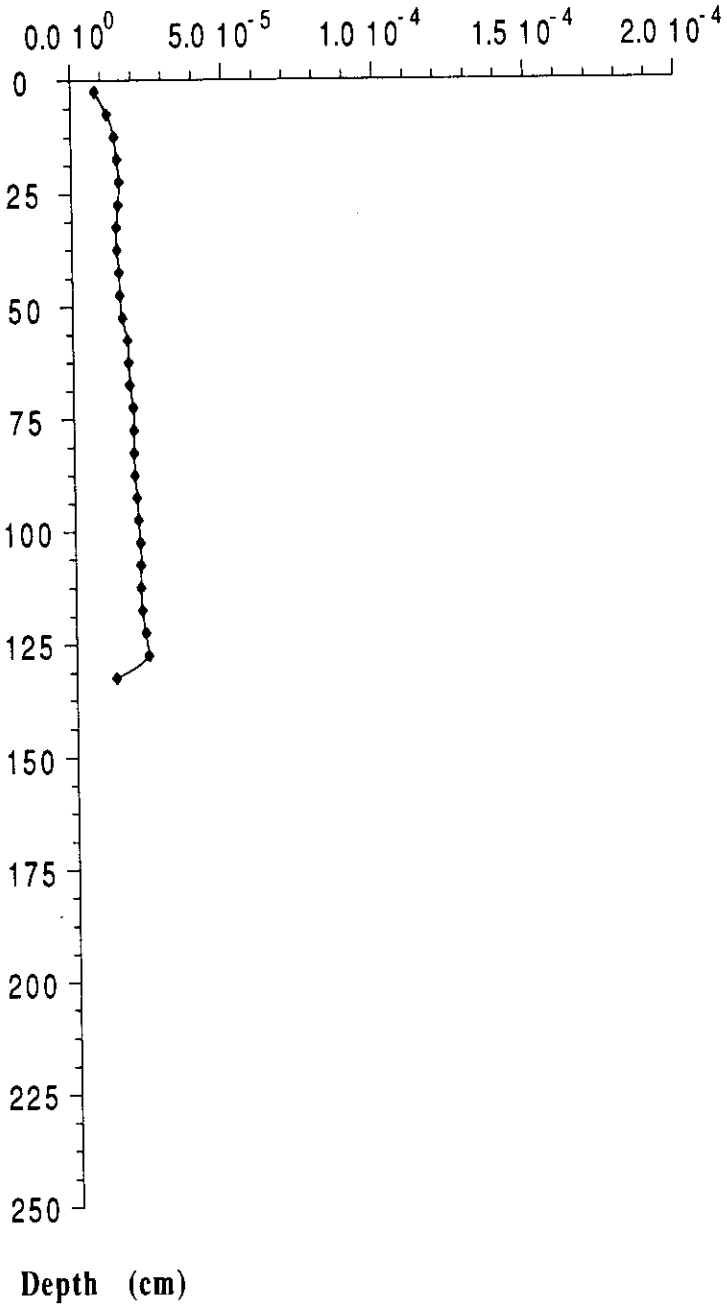
MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 28
Location: Western Labrador Sea
Station Number: 093 BC

Figure 78



Julian Day: 310
GMT: 13:00
Water Depth: 3448 m
Latitude: 50° 12.28
Longitude: 45° 41.15

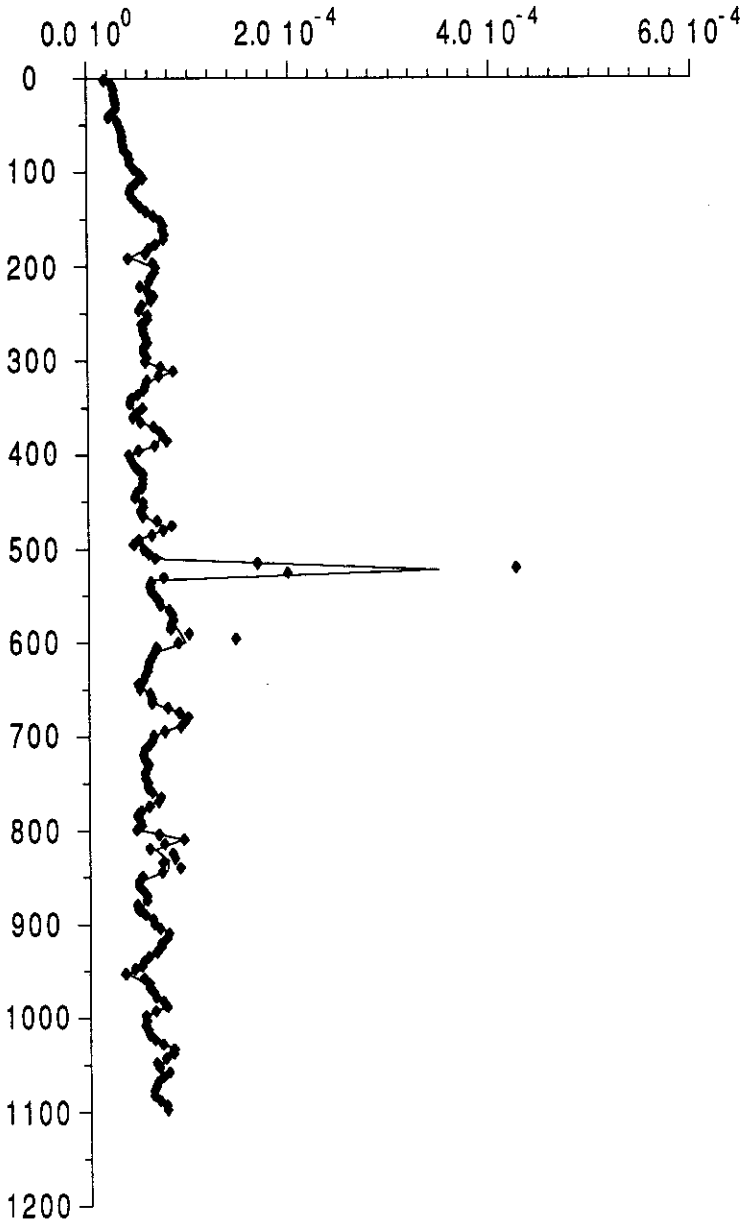
Station Number: 094 TWC



Julian Day: 310
GMT: 15:44
Water Depth: 3448 m
Latitude: 50° 12.26
Longitude: 45° 41.14

MAGNETIC SUSCEPTIBILITY (cgs)
Cruise Number: HU-91-045
Site Number: 28
Location: Western Labrador Sea
Station Number: 094 PC

Figure 79



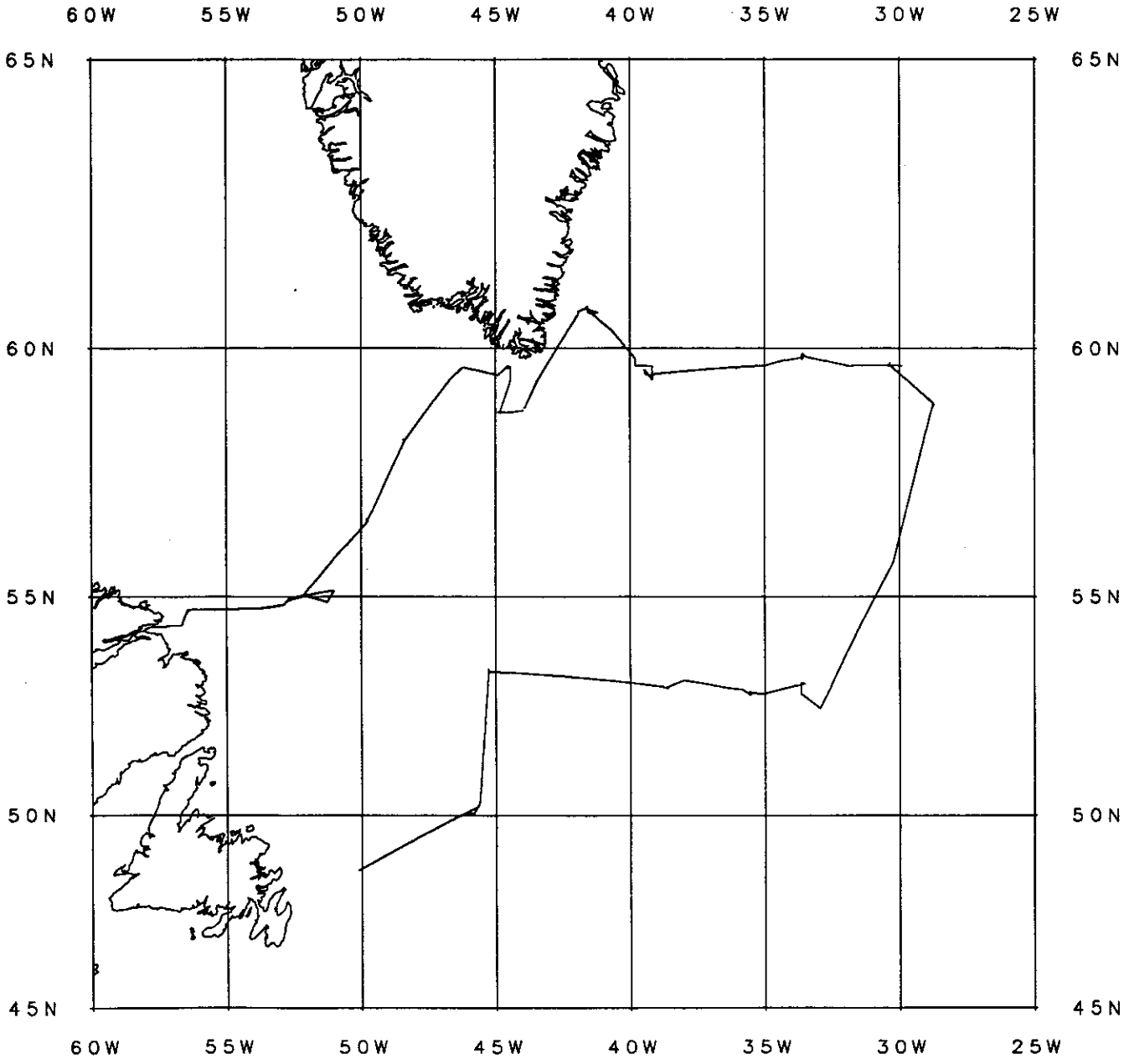
Julian Day: 310
GMT: 15:44
Water Depth: 3448 m
Latitude: 50° 12.26
Longitude: 45° 41.14

APPENDIX 1

TRACK CHARTS

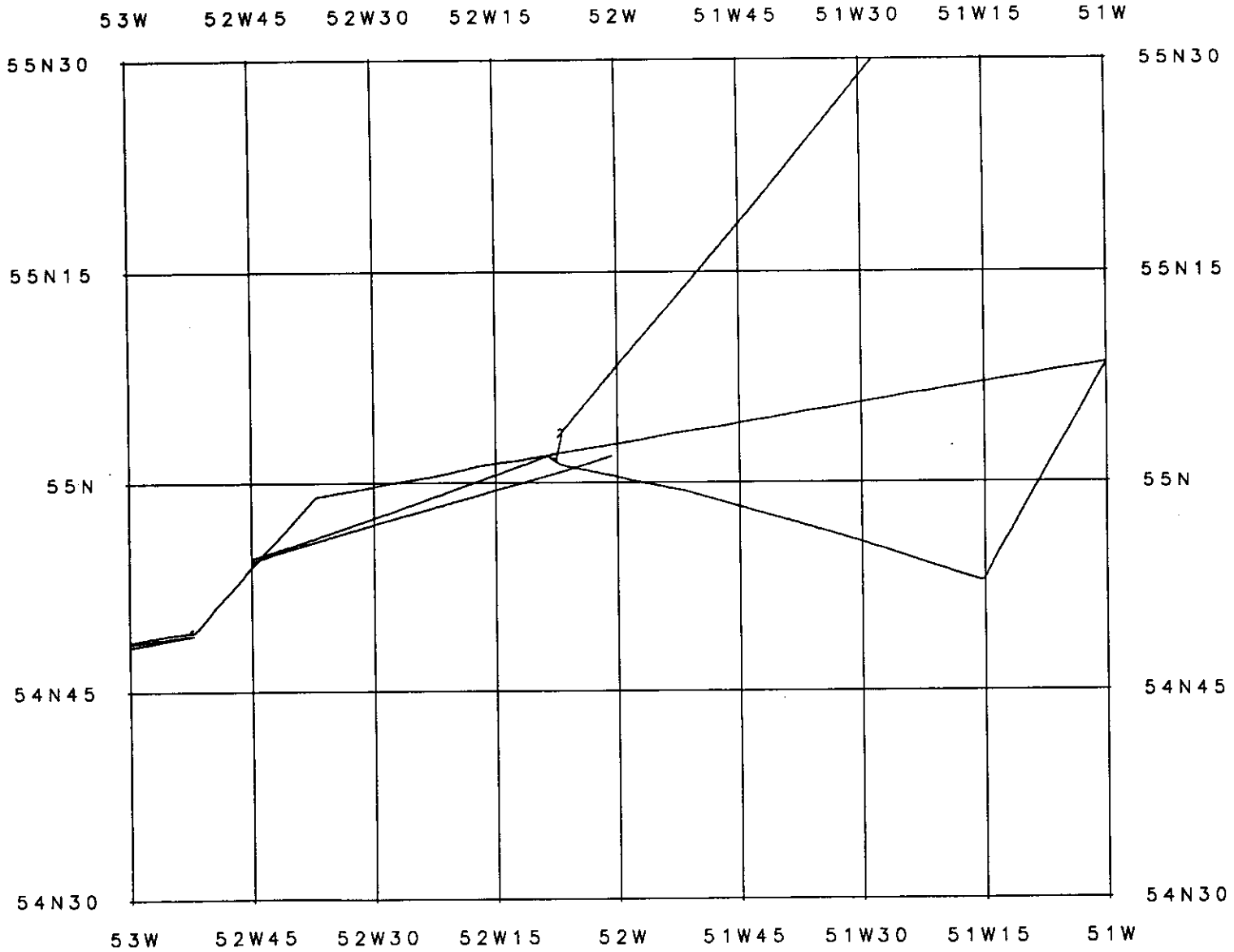
(Cruise HU 91-045)

91-045 (Day 287 - 311)



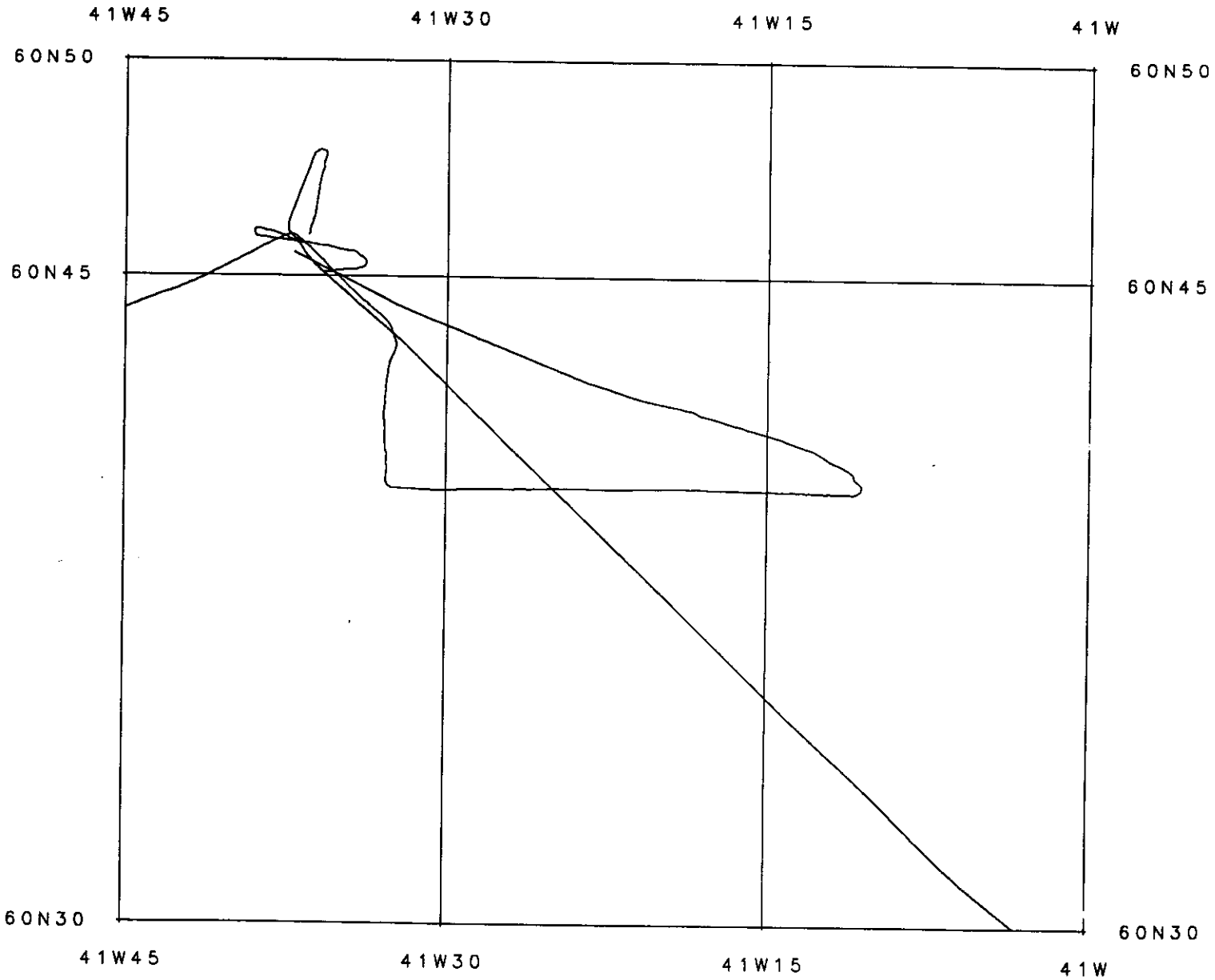
Scale 15000000:1
Projection Mercotor Ref Lat=55N

91-045



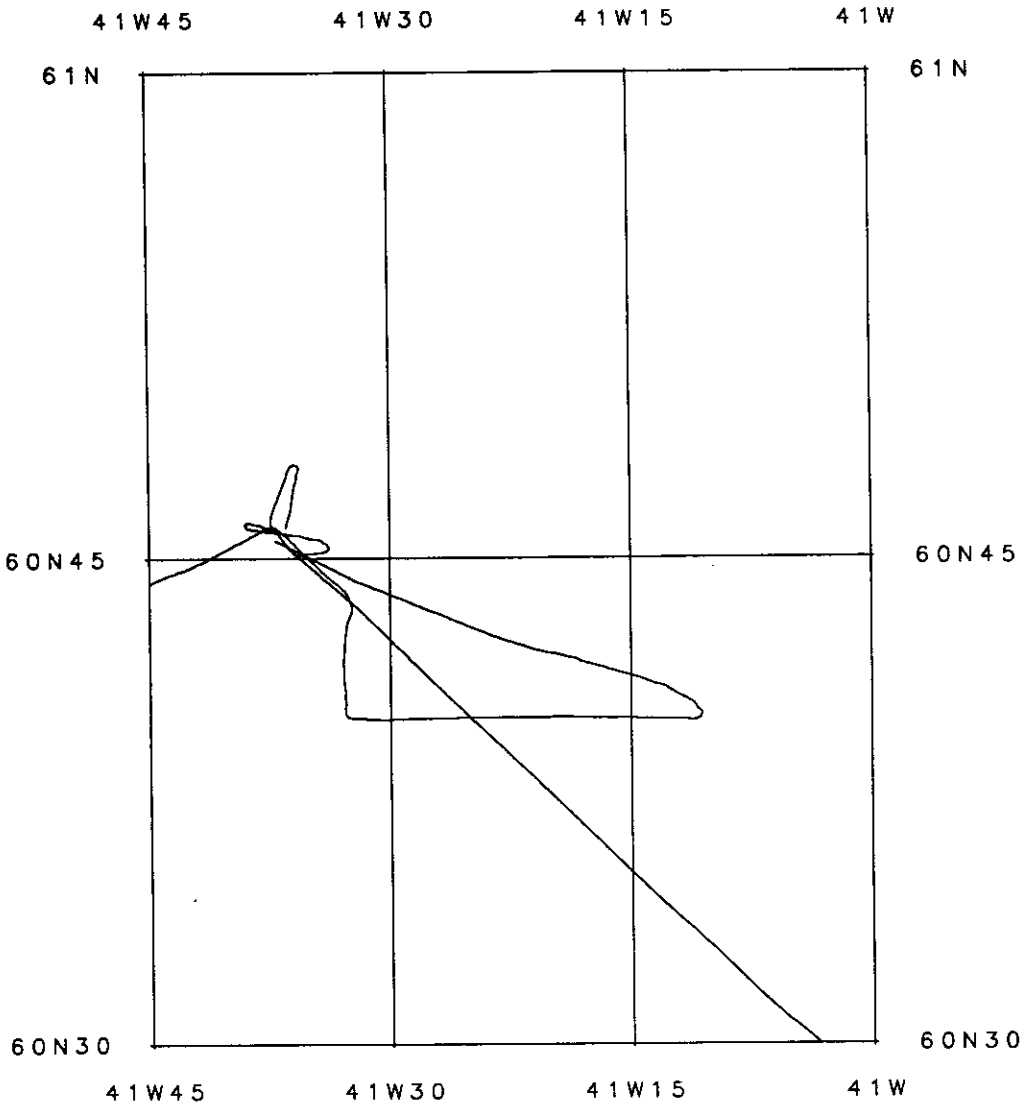
Scale 800000:1
Projection Mercator Ref Lat=55N

91-045



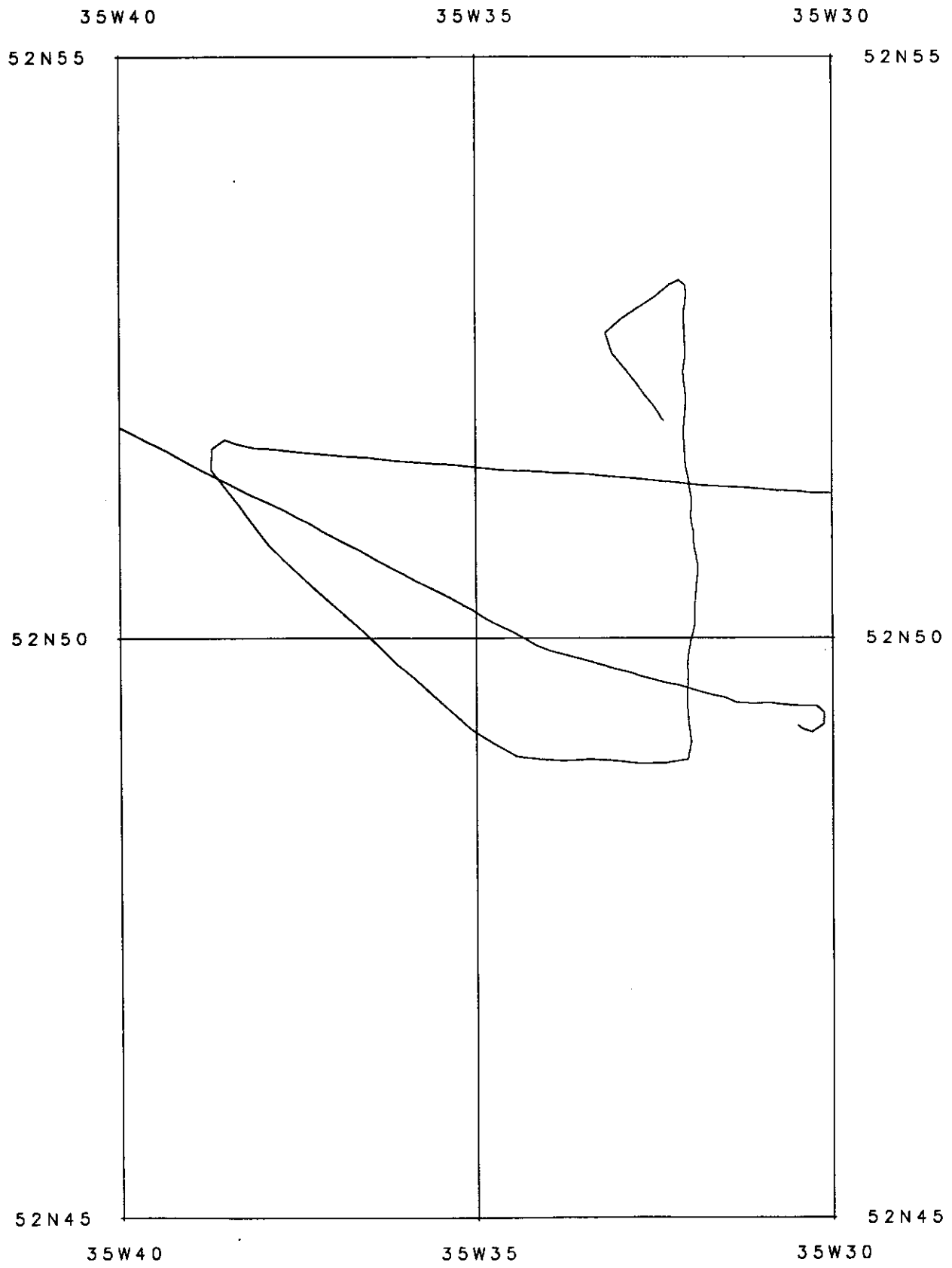
Scale 300000:1
Projection Mercator Ref Lat=55N

91-045



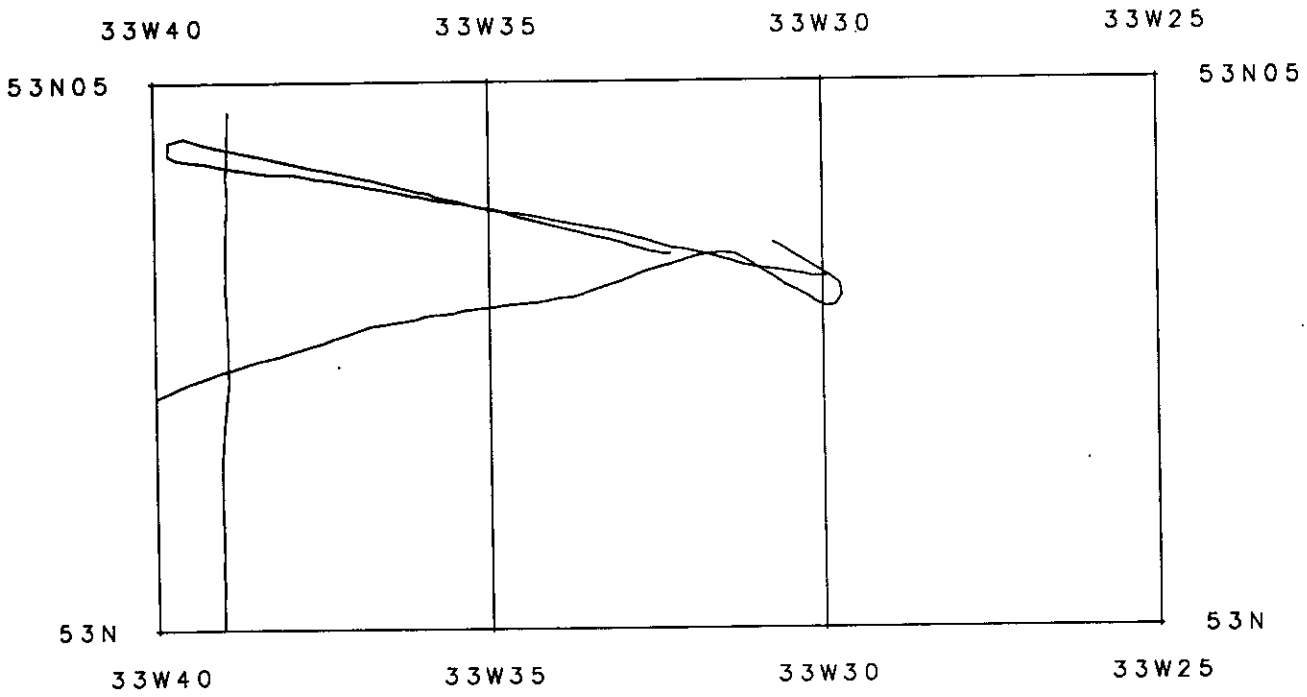
Scale 500000:1
Projection Mercator Ref Lat=55N

270



Scale 85000:1
Projection Mercator Ref Lat=55N

91-045



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APPENDIX 2

ON BOARD SAMPLING PROCEDURES

(Cruise HU 91-045)

APPENDIX 2.2.: Water sampling procedures (chemistry)

Based on casts with 12 L, 30 L and 50 L-Niskin bottles.

Scientific objective: 1) to analyse the chemical and isotopic composition of dissolved matter (nutrients, metals, carbon, etc.);
2) to analyse the chemical and isotopic composition of suspended particulate matter (nutrients, metals, carbon, etc.)

Rationale: basic studies of water mass properties, of particulate and dissolved organic matter. [Ref.: Lucotte (1989a), *Can J. Fish. Aquat. Sci.* 46, 59-65; (1989b): *Estuar. Coastal Shelf Sci.* 29, 293-304; Lucotte *et al.* (1991), *Estuar. Coastal Shelf Sci.*, 32, 297-312].

Sampling objective: to collect sample large enough for analyses of organic and inorganic components and for stable isotope determinations; to avoid (when necessary) isotopic exchange with atmospheric water vapor, or CO_2, during storage; to restrict (when necessary) bacterial activity during storage.

Material needed: Continuous flow centrifuge
Nalgene™ vials (250 ml, 30 ml, 13 ml)
Glass vials with teflon caps (40 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 at Site:

Two sampling protocoles will alternately be followed.

1) Routine water column sampling: (Protocole for stations where the suspended particulate matter is **not** sampled with the contifuge)

Choose the depths at which the water samples should be taken from the STD profiles. The surface water samples (5 to 10 m in depth) can be taken with the peristaltic pump and tygon hose), whereas all the deep water samples will be simultaneously collected with the Go Flo bottles during a single cast. **50 litres** of water approximatively are required for each sampled depth (using the appropriate combination of the 12, 20 and 50 litres bottles, the big 50 l bottle should always be the last one on a multi-depths cast).

1.1. Filtration on 0.45 µm preweighed filters

- Filter 4 times 3 litres (or bigger volumes and less filters if water is very clear) of non centrifuged water in precleaned erlenmeyers. Keep the filtered water for further sampling (see section 1.3). Write the exact filtered volume.
- Filter 4 x ? litres (until the filters begin to clug) of centrifuged water. Write the exact filtered volume.
- Dry the filters in the dessication chamber.

1.2. Filtration on glass fiber preweighed filters

- Filter 4 times 3 litres (or bigger volumes and less filters if water is very clear) of non centrifuged water. Write the exact filtered volume.
- Filter 4 x ? litres (until the filters begin to clug) of centrifuged water. Write the exact filtered volume.
- Dry the filters in the dessication chamber.

1.3. Filtered (0.45 µm) but non centrifuged water samples

- 4 times 40 ml samples (BDH glass flasks with teflon stopper) for immediate analysis of dissolved nutrients. Freeze these samples if they cannot be processed right away.
- 3 x 40 ml samples (BDH glass flasks) thouroughly filled (no air space) for alkalinity, DOC (Dohrman) and ^{13}C analyses. Add 40 µl of molar $HgCl_2$ and close hermetically. Refrigerate at 4°C in the dark.
- 2 x 40 ml sample (polyethylene flasks) for trace metal analyses. Add 40 µl of concentrated distilled HCl. Keep frozen.
- 4 x 1000 ml samples (Nalgene bottles) thouroughly filled (no air space) for ^{14}C and DOC analyses. Add 1 ml of molar $HgCl_2$ and close hermetically. Refrigerate at 4°C in the dark.

1.4. Unfiltered water samples

- 1 x 250 ml polyethylene Nalgene bottle hermetically closed for salinity analysis. Refrigerate at 4 °C in the dark.
- 1 x 40 ml samples for DIC analyses (BDH flasks) thouroughly filled (no air space) and close hermetically. Add 40 µl of molar $HgCl_2$. Refrigerate at 4°C in the dark.
- 2 x 40 ml samples for isotopic ^{2}H and ^{18}O analyses (polyethylene flasks) thouroughly filled (no air space) and close hermetically. Add 40 µl of molar $HgCl_2$. Refrigerate at 4°C in the dark.

2) **Suspended particulate matter:** (Protocole for stations selected for the exclusive sampling of the suspended particulate matter)

Choose the depths at which the water samples should be taken from the STD profiles. The surface water samples (5 to 10 m in depth) will be taken with the peristaltic pump and tygon hose), whereas all the deep water samples will be collected with the Go Flo bottles. **200 litres** of water approximatively are required for each sampled depth (using the appropriate combination of the 12, 20 and 50 litres bottles, the big 50 l bottle should always be the last one on a multi-depths cast).

2.1. Continuous flow centrifugation (with the "contifuge")

- Preclean the contifuge baskets with HCl bath, thouroughly rinced distilled water.
- Centrifuge 180 liters of water as soon as possible after collection.
- Fill two precleaned wash bottles with centrifuged water for collecting the particulate matter in the contifuge basket.
- Transfer all the particulate matter found in the internal basket of the contifuge into 40 ml teflon centrifuge tubes (maximum 3 tubes) with the help of water jets with the wash bottles. Recentrifuge these tubes and throw the supernatant water.
- Immediately freeze 1 or 2 teflon tubes with the concentrated particulate matter. Dry the last tube in the dessication chamber.

2.2. Filtration on 0.45 µm preweighed filters

- Filter 2 times 3 litres (or bigger volumes and less filters if water is very clear) of non centrifuged water in precleaned erlenmeyers. Keep the filtered water for further sampling (see section 2.4). Write the exact filtered volume.
- Filter 4 x ? litres (until the filters begin to clug) of centrifuged water. Write the exact filtered volume.
- Dry the filters in the dessication chamber.

2.3. Filtration on glass fiber preweighed filters

- Filter 2 times 3 litres (or bigger volumes and less filters if water is very clear) of non centrifuged water. Write the exact filtered volume.
- Filter 4 x ? litres (until the filters begin to clug) of centrifuged water. Write the exact filtered volume.
- Dry the filters in the dessication chamber.

2.4. Filtered (0.45 μm) but non centrifuged water samples

- 4 times 40 ml samples (BDH glass flasks with teflon stopper) for immediate analysis of dissolved nutrients. Freeze these samples if they cannot be processed right away.
- 3 x 40 ml samples (BDH glass flasks) thouroughly filled (no air space) for alkalinity, DOC (Dohrman) and ^{13}C analyses. Add 40 μl of molar $HgCl_2$ and close hermetically. Refrigerate at 4°C in the dark.
- 2 x 40 ml sample (polyethylene flasks) for trace metal analyses. Add 40 μl of concentrated distilled HCl. Keep frozen.

2.5. Unfiltered water samples

- 1 x 250 ml polyethylene Nalgene bottle hermetically closed for salinity analysis. Refrigerate at 4 °C in the dark.
- 1 x 40 ml samples for DIC analyses (BDH flasks) thouroughly filled (no air space) and close hermetically. Add 40 μl of molar $HgCl_2$. Refrigerate at 4°C in the dark.
- 2 x 40 ml samples for isotopic ^{2}H and ^{18}O analyses (polyethylene flasks) thouroughly filled (no air space) and close hermetically. Add 40 μl of molar $HgCl_2$. Refrigerate at 4°C in the dark.

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 2.2: Water Sampling Procedures for Nd Isotopes & ^{14}CITD Analysis

Based on casts with 12 L Niskin bottles (2 bottles/sample)

Scientific objective: To analyse the Nd isotopic signature of the water and suspended particular matter with special attention to the North Atlantic Deep Water mass; to obtain information on ^{14}C activity of Total Inorganic Dissolved Carbon in water masses.

Rationale: To characterize the Nd isotopic composition of the NADW and the currents which feed it from Greenland and Norwegian Seas. If the NADW can be easily identified, then a search for a similar isotopic signature in foraminifera from sediment cores from the same location will be undertaken. This will allow us to trace any fluctuation in the current over several thousand years and to compare those fluctuations with climatic fluctuations. The study is designed to test the theory of Broecker and Denton (1989) who suggest that changes in the circulation of the world's "conveyor belts" (i.e. NADW) would result in rapid climatic shifts and that such shifts could result in glacial periods. [Refs.: Broecker and Denton (1989) *Geochim. Cosmochim. Acta* 53, 2465-2501.; Piepgras and Wasserburg (1987) *Geochim. Cosmochim. Acta* 51,1257- 1271.].

Sampling Objective: To collect samples large enough for Nd isotopic analyses by Thermal Ionisation Mass Spectrometry and for ^{14}C measurements by Tandem Accelerator Mass Spectrometry. All materials and containers used for water collection (Nd sub-project) are to be pre-cleaned (while on the ship). To take every precaution to avoid cross-contamination between successive water samples. To take steps to restrict bacterial growth in sample during storage.

Material Needed: Pre-cleaned 20 L jerry cans; distilled water rinced and dried 250 ml vials; Distilled 6 M HCl Acetic Acid, Distilled water Black marker, Sample Log Book Saran Wrap™, Duct Tape

Procedures:

1. Cleaning of jerry cans: 1 day in advance of use.

a. Fill can with about 5 litres of tap water, cover with lid and shake for about 5 minutes. Empty can of this water and then rinse out with tap water

b. Fill can with 10 L of tap water and add 200 ml of acetic acid and shake for 5 minutes. Add more tap water until can is three quarters full and let sit for 24 hours.

c: At least 4 hours before sampling: drain acid and rinse out twice with 1 to 2 L of distilled water.

d: Add 5 ml of distilled 6 M HCl to each clean can. This will retard bacterial growth in samples. Screw on lid and wrap the lid and mouth of can with Saran Wrap™ and store.

e: The can is now ready for a "Nd" water sample.

2. Sample Collection

a: Remove Saran Wrap™ and cap (keep cap clean by wrapping it in the Saran Wrap™ and place it in a clean area) and fill can with sea water from the 2 Niskin bottles; fill 3 x 250 ml Nalgene™ vials with the water left, add mercury chloride (0.4 ml of molar $HgCl_2$/vial) to avoid bacterial activity in samples (as for ^{13}C measurements); label and store the Nalgene™ vials at 4°C.

b: Replace cap on can and seal cap to container with Duct Tape.

c: Label each sample on the cap and twice on the bottle with marker. Record sample in sample Log Book.

d: Clean area between samples to avoid cross contamination and at end of sampling.

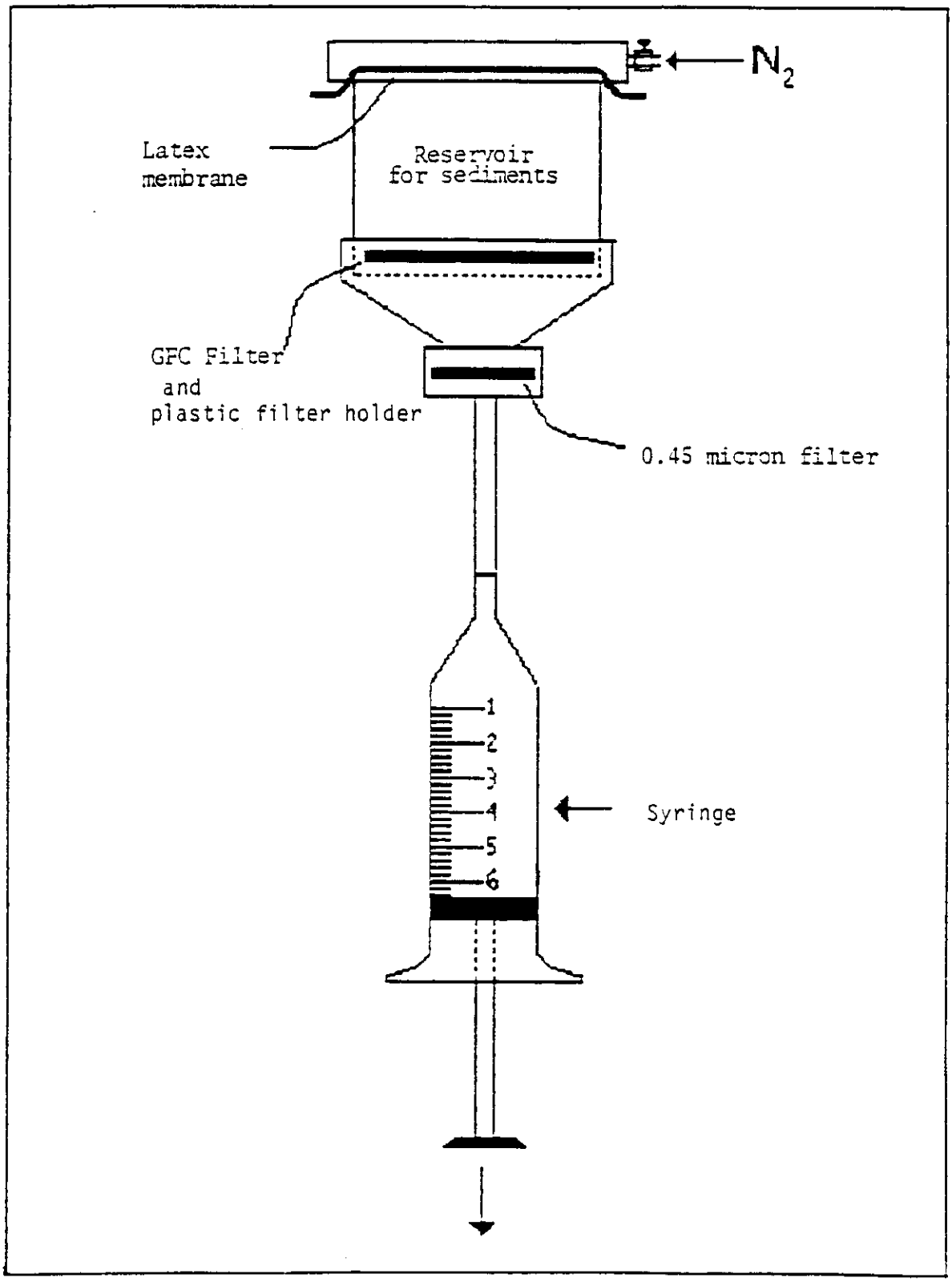


Figure 1: Squeezing equipment for box-core sampling

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 nearby neritic zones.

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 (or 10 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 2);
pH meter, Eh meter; probe for dissolved oxygen and Eh measurements;
hermetic plastic vials; towels; plastic bags; a plastic cutter to slice the sediment;
plexiglass and wood blocks with 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 7 "push corers" (1 X 1 cm ø, 5 X 7 cm or 10 cm ø, 1 X 15 cm ø).

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 cores 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 cores (wax); one should be labelled for archives and one should be frozen for Neodyme and the others 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 5 ml 10% Ethanol; refrigerate for further bacterial counting.

07. All other operations will be done in the glove box; most sampling operations will then 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); alternate Eh and O_2 measurements every odd and even centimeters.

09. By using the extruding device (jack and blocks), 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 5 cc for porosity measurements and refrigerate in pre-weighted scintillation vials.

11. Take as much as possible of each 1 cm-thick slice of sediment by using a plastic cutter and avoid using 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; syringes must be precleaned and thouroughly rinced with bottom seawater before use; squeeze again maximum volume of pore water is obtained.

13. Pore water subsampling:

    Subsample pore water in the following priority order:

    a) 5 ml for U isotope measurements, add 5 µl of Q-distilled HCl 6N (8 ml pre-acid washed polypropylene vial);

    b) 4 x 2 ml for nutrient analyses (PO_4, NO_3^-, NO_2^-, NH_4^+); freeze if cannot be processed immediately (Ca_2^+, B if pore waters are left over) (2 ml polypropylene vial);

    c) 5 ml for trace metals (Fe^{2+} & Mn^{2+}), add 5 µl of Q-distilled HCl 6N (8 ml pre-acid washed polypropylene vial);

    d) 8 ml for DIC and DOC (alkalinity, $\partial^{13}C$ and SO_4^{2-} if volume of pore water is limited); close hermetically after adding 10 µl of a 1M $HgCl_2$ solution (8 ml polypropylene vial);

    e) 5 ml for alkalinity and sulfates analyses; add 5 µl of a 1M $HgCl_2$ solution (8 ml polypropylene vial);

    f) 2 ml for Ca^{2+} and salinity analyses; no treatment (2 ml pre-acid washed polypropylene vial)

    g) 5 ml for $\partial^{13}C$ measurements; add 5 µl of a 1M $HgCl_2$ solution, close hermetically (8 ml polypropylene vial);

N.B.: *If pore waters are left over, repeat subsampling from the top of the priority list skipping # 1 and # 2*

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.

APPENDIX 2.4. Procedures for paleomagnetic susceptibility measurements

Scientific objective: to measure the down core magnetic susceptibility changes of the sediments in order to construct a magnetic susceptibility log.

Rationale: (1) basic studies of high resolution paleomagnetic changes;
(2) correlation of cores using magnetic suscpetibility logs. [Ref. Hall and King (1989), *Proc. ODP*, Sci. Results, 105, 843-859.];
(3) possible correlations between variations in magnetic susceptibility and IRM, and the oxygen and calcium carbonate records. [Ref. Bloemendal et al., (1988), *Paleoceanography 3, 61-87.];*
(4) as a magnetic parameter in determining spatial andtemporal changes in magnetic particle size that are indicative of transport mechanisms. [Ref. Hall et al.,(1989), *Proc. ODP*, Sci. Results, 105, 837-841.Sachs andEllwood, (1988), *Deep Sea Res.*, 35, 929-942.].

Sampling objective: to measure whole cores as quickly and as accurrately as possible.

Material needed: Pass through susceptibility meter; Core carriage; Compaq™ portable computer with printer; Systems and storage disks; MnO_2 calibration core; Centimetric tape; Markers.

Pre-measurement procedures:

01. Remove susceptibility meter and carriage from storage, connect with Compaq™ portable computer in the Geophysics lab.

02. The susceptibility program is on the hard drive of the Compaq portable computer, program is located under sub-directory *Paleomag*.A formated disk should be placed in drive A for data storage.

03. Note weight in grams of MnO_2 in calibration core and inside diameter (ID) of susceptibility meter in centimeters.

04. Run test using calibration core.
(1) Call up program *Paleomag* under *Paleomag* sub-directory. The program is menu driven.
(2) At first screen sellect 1 [AMS and CMS measurement programs].
(3) At second screen select 5 [CP] during first test run, select 6 [TP] for all subsequent test runs.Imput weight in grams of MnO_2. Press caplock C to imput test parameters: N=5, T=10.4, C= ID of coil, M= slow mode, U= cgs, V = volume of core measured on board, and Q = Quit. Press space bar to take measurements. Data are stored on disk and on hard copy.Type [system] to leave program.
(4) A test run using the calibration core should be made at the begining of each shift.

Measurementss:

05. Retrieve core sections to be sampled from cold room.

06. Allow core sections time to warm up to ambient temperature.

07. Run test using calibration core (at beginning of shift).

Magnetic susceptibility measurements (Cont'd)

08. Start measuring sequence on core section.
    (1) At first screen sellect 1 [AMS and CMS measurement programs].
    (2) At second screen select 2 [CMS].
    (3) Imput test parameters: N=1, T=2.6, C= ID of coil, M= fast mode, U= cgs, V = volume of core measured onboard, and Q = Quit.Imput core name [5 digits] and the number of the core section being measured. Press space bar to take measurements.
    (4) Take measurement every 5 cm from beginning to end of each core section and note the depth of the first and last measurement of each section on the hard copy.

09. After core sections measurements are completed, Type [system] to exit program.

10. Return core sections to cold room until further processing.

APPENDIX 2.5: 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 mm^2 squares
8-cc plastic cubes (2 cc-edge) and covers for sampling
Hermetic plastic box for storage

Procedures:

01. Drill a hole (*ca.* 1mm^2) 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 mm^2 sqares on the aluminum plate).

05. Indicate the core top direction with an arrow on each cube (*cf.* figure 3); 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 (see below) 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 of each section in cm. Note sampling hiatuses if any (*e.g.*, disturbance 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.

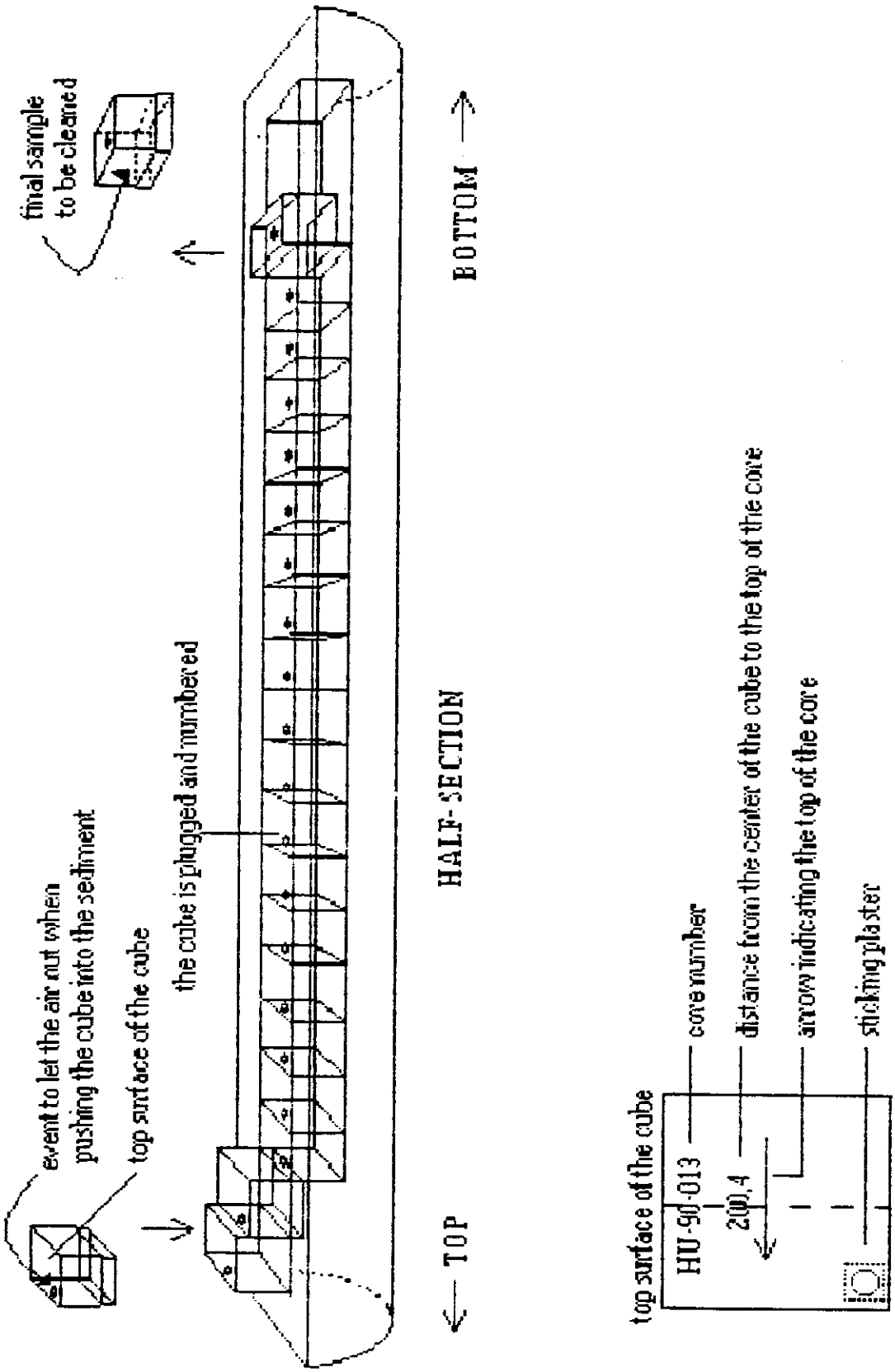


Figure 2: Sampling procedures for paleomagnetic measurements

APPENDIX 2.6.: 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) assesment 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, spatulas (plastic)
Permanent markers	Plastic vials and bags
Paper towels	Munsen color charts, etc.

Pre-sampling procedures:

01. Check apparent penetration indicators 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 lining and secure it.

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 1.

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

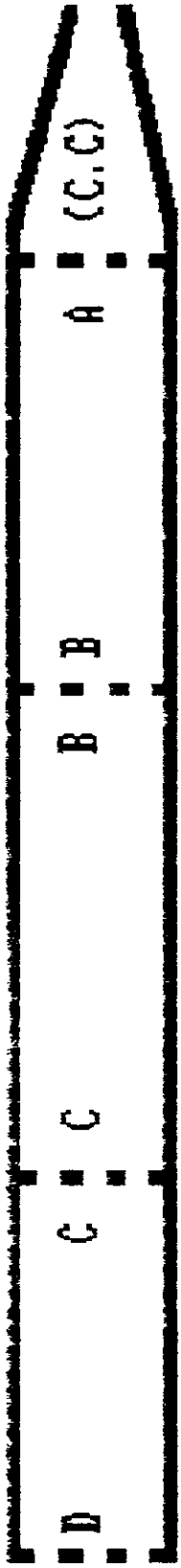
07. If by mistake any mud falls out from a lining, recover it, get rid of the contaminated part and store the balance in a labelled bag; take note in the log book (this may unfortunately happen during deck processing operations of the core).

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).

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 cutter (if available), otherwise, a saw; be careful during further operations (the liner has lost its rigidity).Long Piston- and

Figure 3: Numbering of core sections



Trigger Weight core sampling procedures (Cont'd)

10. Cut the mud with a thin nylon wire (fishing or guitar 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- see Munsell charts-, 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 (with plastic tools) should be as follows:
    - firstly, clean the mud surface by removing a thin layer of sediments (which may have been contaminated during cutting operation);
    - set a continuous track of plastic cubes for paleomagnetic measurements (as in appendix 2.5.);
    - 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 core 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 vacuums 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.