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Marine geophysical/geological cruise in the
Northern Barents Sea 1987 - Cruise report

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POLARINSTITUTT

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SUMMARY

The main objectives of a marine geological/geophysical cruise in the northern Barents Sea in July and August 1987, were: Shallow geological objectives related to bedrock geology, unlithified sediment distribution, glacial history, shallow gas and pockmarks, iceberg ploughing and late Holocene/recent glaciomarine sedimentation. The cruise was divided in two seperate legs. Leg I carried a high frequency acoustic, single channel profiling equipment package, consisting of small air guns, sparkers, boomers, 3.5 kHz PDR, side scan sonar and multi-beam echo sounder. Main study areas were the southern flank of Spitsbergenbanken east and northeast of Bjørnøya and the northern part of Bjørnøyrenna, including the Olga Basin (structural term). Additional stdies were carried out in Isfjorden, Kongsfjorden and Krossfjorden, on the western coast of Spitsbergen. Total production during Leg I was 4500 km of 3.5 kHz profiles, 3900 km of air gun/sparker profiles and 2300 km of side scan sonar profiles. This data set provided the necessary background for selecting sites for geological sampling during Leg II. Main sampling equipment used during this part was a 3.5 m vibrocorer, 3 and 6 m gravity corers and a 0.5 x 0.5 x 0.5 m box corer. Additionally, bottom photographs were taken at most sites. A total of 144 sites were sampled during Leg II. Weather conditions were excellent during most of the cruise, and the total production of both legs exceeded what was planned.

Preliminary interpretations of the field data confirm the thin (generally < 10 m) of unlithified sediments above the sedimentary bedrock in the northern Barents Sea. The excisting grid of seismic lines was supplemented and, in particular, there is now a better data base for correlating the deep, exploration seismic results with the shallow, subcropping geology. Several potential sites for light-weight, shallow bedrock drilling were identified, and probable in-situ sandstone was sampled at three sites. Extensive vibrocoring of assumed Late Weicselian till provided clast material of more local origin than what has previously been studied, in particular from the Olga Basin.

The vibrocorer recovered overconsolidated diamicton underlying normally consolidated glaciomarine sediments. Emphasis will be placed on obtaining datable material at the top and base of the glaciomarine sequence to bracket the deglaciation of the Barents Sea. Locally thicker sediment accumulations on Spitsbergenbanken and Storbanken were mapped and sampled. On Spitsbergenbanken the survey was tied to shallow stratigraphic drillings from 1985.

Side scan profiling gave good records of various morphological features. Pockmarks and iceberg plough marks are widespread in the Barents Sea. An area of large sea floor depressions, incised 20-30 m into the bedrock, was encountered in the southern part of the study area. Large areas of the northern Bjørnøyrenna had a parallel pattern of lineations, interpreted to be flute marks from the base of a grounded ice sheet.

OBJECTIVES

The marine geological and geophysical cruise with R/V Lance in the central, northern Barents Sea, 1987, consisted of two legs. During Leg I, high resolution acoustic profiling was carried out, while the program during Leg II was sediment sampling at selected sites, based on Leg I results. The main study areas were a) the southeastern flank of Spitsbergenbanken and b) the northern part of Bjørnøyrenna, including parts of Storbanken and Sentralbanken (Fig. 1). The following objectives were adressed:

- Origin, distribution, stratigraphy, lithology and geotechnical properties of the unlithified (Quaternary) sediments.

- Glacial history of the northern Barents Sea.

- Structure, lithology and stratigraphy of the upper (0-300 m) bedrock in the northern Barents Sea, with main emphasise on the northerly and westerly extention of the Olga Basin (Fig. 1). This also includes localization of potential sites for shallow stratigraphic drillings.

- Organic geochemical differences in the Quaternary sediments, related to bedrock boundaries ("geochemical sniffing"), in particular across the boundaries of the Olga Basin.

- Distribution of pockmarks and shallow gas in the northern Barents Sea.

- Nature and distribution of of iceberg ploughing in the northern Barents Sea.

In addition to the main Barents Sea program, the cruise also included three short (1-2 days) programs in Isfjorden, Kongsfjorden and Krossfjorden on the west and northwest coast of Spitsbergen. Here the following objectives were adressed:

- Weichselian glacial history of the west coast of Svalbard.
- Recent and late Holocene sedimentation outside tidewater glaciers in Krossfjorden, northwest Spitsbergen.

BACKGROUND

Bedrock geology

Due to the generally thin (<10 m) cover of unlithified sediments in the northern Barents Sea, valuable information on the bedrock can be obtained from shallow seismic data combined with surface samples and shallow drilling. Recently published maps of the shallow bedrock geology have shown a complex subcrop pattern of Triassic and Late

Jurassic - Early Cretaceous rocks in the central northern Barents Sea (Elverhøi et al. 1988). However, shallow data coverage from the Olga Basin, the only area within this region with an assumed thick Late Jurassic - Early Cretaceous sequence, is very limited. Therefore, it was considered important to fill this data gap and tie the shallow stratigraphy and structure to the adjacent areas.

Previous sparker data have generally had too poor penetration to be tied directly to the deep seismic data. By applying a somewhat stronger source than the traditionally used 1 kJ sparker (e.g. a small air gun), new single channel seismic data could provide valuable support to the deep data, which mostly are of poor resolution in the top few hundered milliseconds. In addition, shallow refraction measurements (sonobuoys) would aid in defining subcrop lithology. Furthermore, essentially all age determinations and lithologic analyses of bedrock material in the northern Barents Sea have been performed on clasts dredged from the Late Weichselian glaciomarine sediments (with the exception of four in-situ shallow rock cores on Storbanken, off Abeløya and south of Kvitøya). Core penetration into the underlying till (Elverhøi & Solheim 1983a) utilizing a heavy duty vibrocorer, would most likely give more locally derived clast material, and as such give better basis for mapping and dating the subcropping bedrock on a regional scale.

The thin cover of unlithified sediments which is characteristic for the northern Barents Sea, gives the region a great potential for shallow stratigraphic drillings. These may be done either with a drill-ship, or with a small drill rig that can be placed on the sea floor ("B.I.O. drill") or equivalent (Elverhøi & Solheim 1983b). A grid of well navigated, high resolution seismic lines would also provide important data for defining suitable locations for future drilling.

Unlithified sediments and glacial history in the Barents Sea.

Although several lines of evidence strongly point towards a Late Weichselian Barents Sea ice sheet (Elverhøi & Solheim 1983a, Vorren & Kristoffersen 1986, Solheim et al. in press.), the maximum extent and exact timing for deglaciation are still unknown. To address these questions, a better understanding of the deglaciation in the bank areas is considered important. A detailed knowledge on the glacial history is essential for understanding the present distribution of glacigenic sediments and their sedimentological and geotechnical characteristics.

Previous sampling programs have mainly recovered the upper, usually < 3 m, soft glaciomarine sediments, while the underlying, stiff, pebbly mud has not been sufficiently sampled by the gravity corers used. The stiff sediments have been interpreted to represent the Late Weichselian basal till, or a glaciomarine sequence overrun and compacted by the Late Weichselian ice sheet. By extensive use of a heavy duty vibrocorer we hoped to be able to get through the glaciomarine cover and well into the till, thereby to be able to date

onset of glaciomarine sedimentation. Additionally, good vibrocores would be used for a geotechnical characterization of the stiff, pebbly mud as well as of the soft cover.

Local accumulations of glacigenic sediments occur in the northern Barents Sea, either as moraine ridges or as (ice proximal) glaciomarine sediment lenses (Kristoffersen et al 1983, Solheim et al. 1988). A better knowledge of the distribution and character of these accumulations is considered important for interpreting the glacial history of the Barents Sea. Approximately 50 m overconsolidated, pebbly mud have been drilled by the Continental Shelf and Petroleum Technology Research Institute A/S (IKU) on a local accumulation northeast of Bjørnøya (Fig.1). A more detailed program of seismic lines and vibrocoring was designed to obtain a better control of the areal extent of this feature, and to relate the acoustic character to the drill core information. Furthermore, semi-regional lines connecting this accumulation on the shallow Spitsbergenbanken with the deep trough of Bjørnøyrenna would cross an assumed past ice margin, either representing the Late Weichselian maximum extent, or, more likely a stage during deglaciation.

Iceberg ploughing, pockmarks and shallow gas.

Previous side scan sonar surveys in a few, widely spaced locations in the northern Barents Sea have shown extensive iceberg ploughing. (Elverhøi & Solheim 1983b, Solheim et al. 1988). The character and frequency dstribution of these features may be important for understanding the deglaciation history. Additionally, plough marks pose a problem for offshore engineering work, and their size and distribution are important to know also for this reason.

Pockmarks have been reported from two regions in the Northern Barents Sea, southeast of Hopen and in Erik Eriksenstretet (Solheim & Elverhøi 1985, Solheim in prep.) They are expected to have a much wider distribution, however, but the lack of side scan coverage in the area has prevented detection of larger pockmark fields.

Shallow gas presents a major hazard to offshore drilling operations. Seismic anomalies indicating shallow gas have been reported from several regions of the northern Barents Sea, both in the unlithified sediments and in the upper sedimentary bedrock (Solheim & Larsson 1987). However, the density of the existing seismic grid is largely variable, and the data quality partly poor. Hence, more high resolution data are needed for mapping of shallow gas indications.

The continuous use of all on board acoustic systems would provide valuable new information on all these features.

Isfjorden and Kongsfjorden.

Recent years' glacial geological studies along the west coast of Svalbard have shown the Late Weichselian ice margin to extend almost to the present-day coastline (Landvik et al. 1987). These studies

have, however, been localized onshore, and the marine continuation of the ice margin has not been investigated. The 1987 cruise therefore included a seismic survey of parts of Isfjorden and Kongsfjorden, to identify sites with a condensed Late Quaternary sedimentary sequence, for subsequent sampling by 6 m gravity corer. A main goal of this work was to identify the lithofacies of the fjord sediments and, in particular, to obtain datable material for a chronological reconstruction of the Late Weichselian ice recession. The work is a part of the ongoing studies of the Late Weichselian Svalbard/Barents Sea ice sheet, and is carried out jointly with the University of Bergen and Institute for Arctic and Alpine Research (INSTAAR), Boulder, Colorado.

Krossfjorden.

The Svalbard area offers good opportunities to study interactions between different glacier regimes and the marine environment, and as such presents an excellent laboratory for the study of processes representative for past glaciations. Previous studies have been carried out off the Austfonna ice cap, Nordaustlandet, in open marine environment (Solheim & Pfirman 1985, Solheim 1986, Solheim in prep.) and in fjord environments on the west coast of Spitsbergen (Elverhøi et al. 1983). A cooperative project between NP and the University College of Wales, Aberystwyth, is a continuation of these studies. The project aims towards a better understanding of recent and latest Holocene processes of glacier - marine interactions in Krossfjorden, NW Spitsbergen. In addition to high resolution acoustic profiling and gravity coring, these studies also involve water sampling and glaciological investigations.

CRUISE PARTICIPANTS

Leg 1.

Name:	Position:	Institution:
Anders Solheim	Chief scientist	NPRI
Øyvind Finnekåsa	Computer/navigation	NPRI
Dag Helliksen	Geologist	NPD
Alf Nilsen	Technician	UiO
Thomas Martinsen	Technician	UiO
Mona Nyland Berg	Assistant	UiO/NPRI
Frank R. Larsson	Assitant	UiO

Leg 2.

Name:	Position:	Institution:
Anders Elverhøi	Chief scientist	NPRI
Martin Hamborg	Geologist	IKU
Øyvind Finnekåsa	Computer/navigation	NPRI
Bernt Egeland	Geologist	NPD

Øistein How	Technician	IKU
Thomas Martinsen	Technician	UiO
Bengt Bjarne Larsen	Assistant	NPRI
David Poole	Assistant	UiT
Ellinor Nesse	Assistant	UiT
Lars Russwurm	Assistant	UiO/NPRI
Per Ivar Steinsund	Assistant	UiT
Tor Kristian Danielsen	Assistant	UiT
Jon Inge Svendsen	Geologist (*)	UiB
Julian A. Dowdeswell	Geologist (**)	UCW
David Sexton	Geologist (**)	UCW

NPRI - Norwegian Polar Research Institute
NPD - Norwegian Petroleum Directorate
IKU - Continental Shelf and Petroleum research Institute A/S
UiO - University of Oslo
UiT - Unioversity of Tromsø
UiB - University of Bergen
UCW - University College of Wales, Aberystwyth

(*) - Participation only in Isfjorden.
(**) - Participation only in Krossfjorden and Kongsfjorden.

ORGANIZING, FUNDING AND COOPERATIVE INSTITUTIONS

The Norwegian Polar Research Institute (NPRI) planned and organized the cruise in cooperation with the Norwegian Petroleum Directorate (NPD). The cruise was organized in two legs. The geophysical leg (Leg I) started in Longyearbyen, Svalbard 21/7 and ended in Hammerfest 12/8, while the geological sampling part (Leg II) departed from Hammerfest 12/8 and ended in Longyearbyen 26/8. Scientists, technicians, assistants and ship´s crew rotated in Hammerfest.

NPRI carried the main expenses of the cruise, including the vessel, while NPD provided funding for equipment rental and assistants. Additional support came from the University of Oslo (U.i O.) (one technician) and the Office of Naval Research (ONR) (sonobuoys). The Continental Shelf and Petroleum Technology Research Institute A/S (IKU) carried the expenses for two days ship time spent on the southeast slope of Spitsbergenbanken. Assistants came from the universities of Tromsø and Oslo and from NPRI.

The cruise was carried out in cooperation with various institutions. The cooperative institutions, the programs and areas of main interest are briefly outlined below:

Cooperative institutions

Institution	Programme	Area
NPD	Shallow bedrock geology/ Geochemical survey	Central, northern Barents Sea
IKU	Geotechnical investigations/ Sea floor conditions	East of Bjørnøya
UiO	Glacial geology/ Shallow bedrock geology	Central, northern Barents Sea
UiB	Glacial history	Isfjorden
INSTAAR	Glacial history	Kongsfjorden
UCW	Recent and late Holocene glaciomarine sedimentation	Krossfjorden
UiT	Distribution of foraminifers	Central, northern Barents Sea

VESSEL

M/S Lance is owned by the Hydrographic Survey of Norway (NSKV), and is used by NPRI two months every summer. The ship is 200 ft long and ice-strengthened. Two crew shifts, each 15 persons, operate the ship. During Leg I, Captain Jan Jansen and his crew were on board, while Captain Jan Olsen and his crew took over during the port call in Hammerfest between the two legs. The cooperation between the scientific personnell and the ship´s crew was excellent and was a main factor in the success of the cruise.

On board scientific facilities include two wet labs, a chemistry lab, an electronics lab, map-room and office space. Geophysical data recording facilities are situated in the aft part of the bridge, with a view to the aft deck. The ship is equipped with various navigational equipment, including Magnawox satellite (Transit system) receiver integrated with Omega, GPS Navstar, Loran C and Decca. On board geophysical profiling equipment includes echo sounders, multi-beam echo sounder, hull mounted sonar, deep-towed side scan sonar and 3.5 kHz echo sounder. Most of this equipment was used during the cruise, and will be further discussed below, as will also the ship´s computer system, a VAX 11/730.

The vessel is not equipped with dynamic positioning system, but by means of fore and aft thrusters, it is possible to keep the position during station work reasonably well in favourable weather conditions.

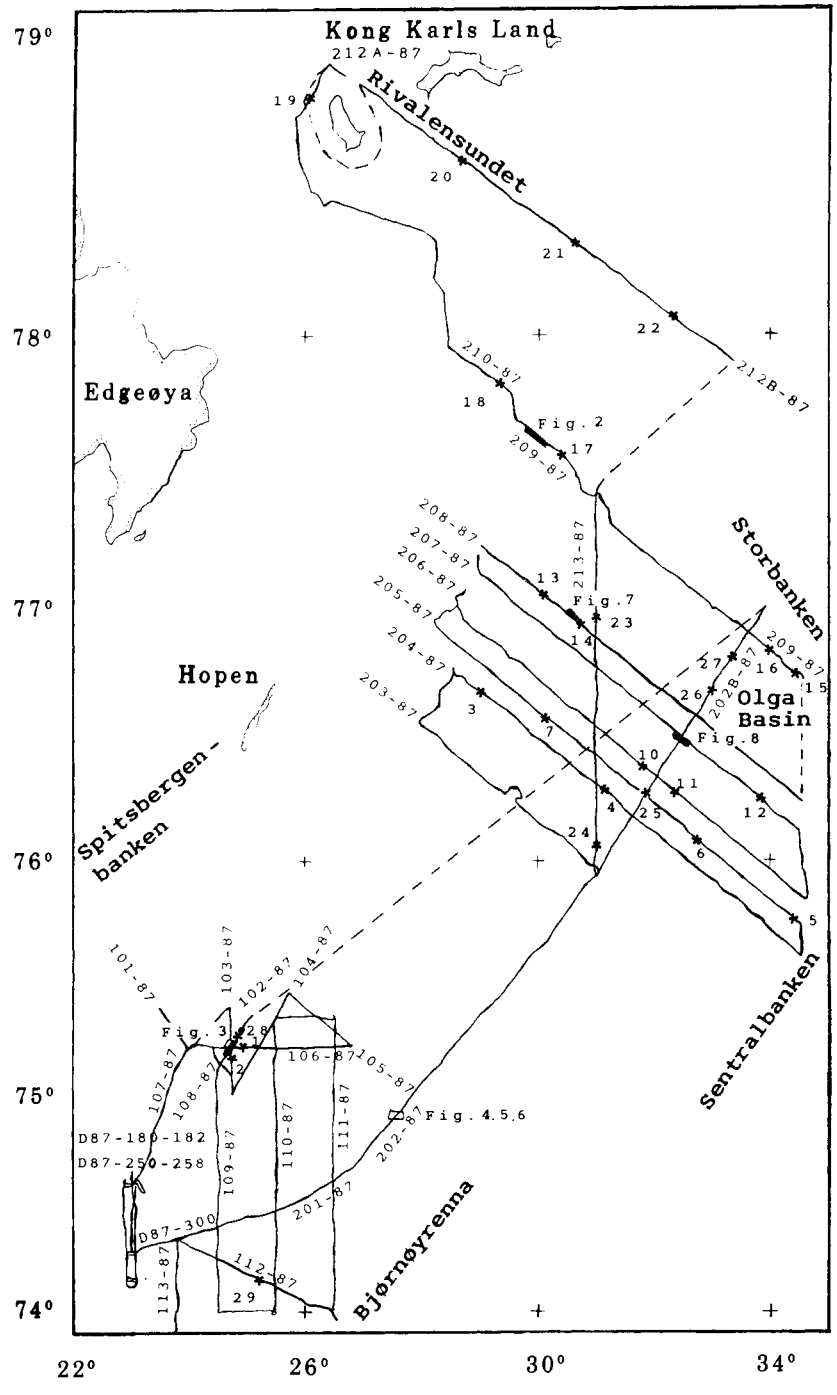

Fig.1a. Acoustic profiles, Leg I. Stippled lines mark full speed (10-12 knots) transits with only 3.5 kHz profiling. Sonobuoy drops are marked with star and number. Figures shown later in the text are marked with figure number.

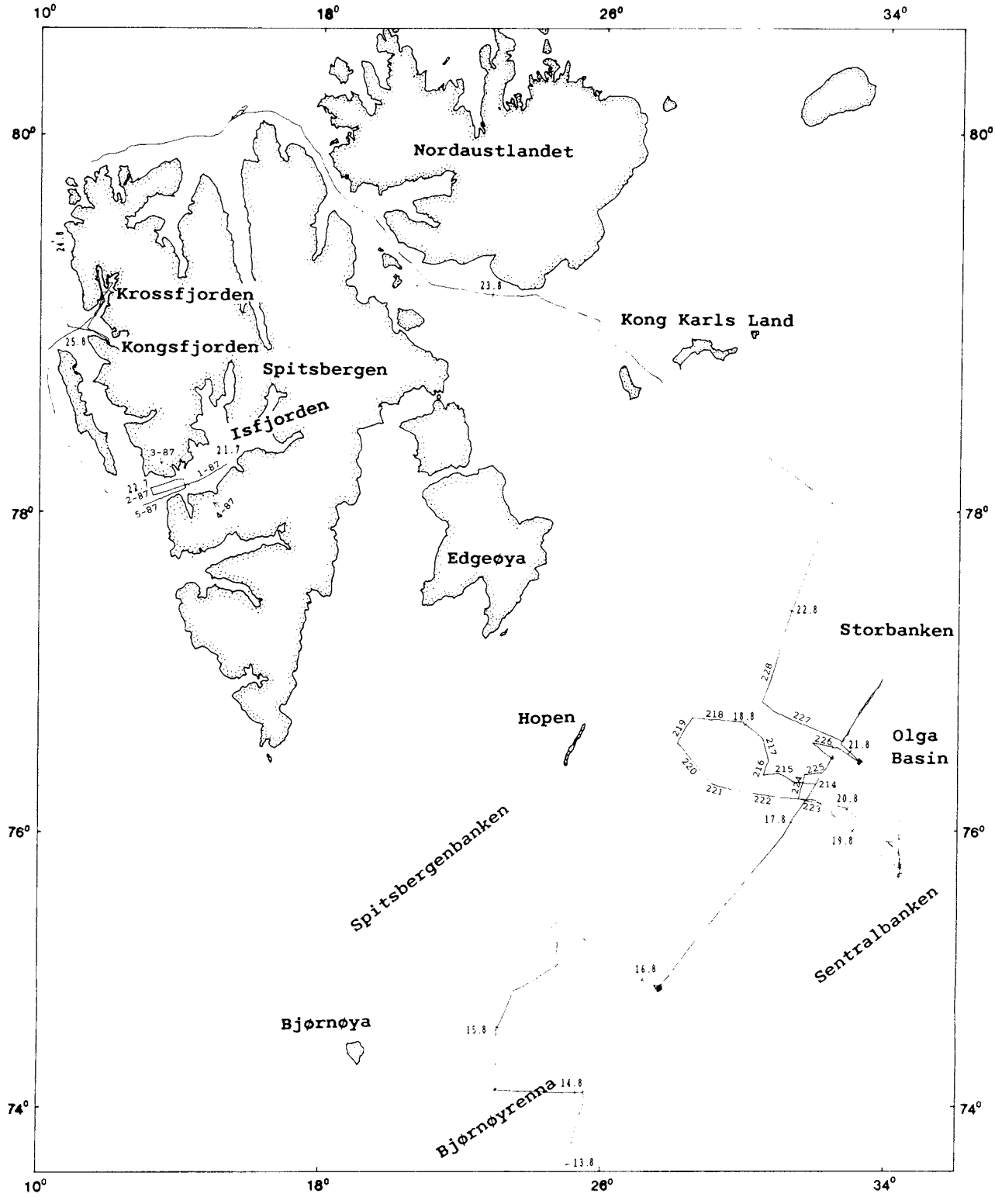

Fig.1b. Cruise route during Leg II. The start of each new day is marked with a tickmark and the date. The 3.5 kHz PDR was run continuously. Lines in the Olga Basin are given line numbers 214-228. Lines 1,2,3,4 and 5-87 in Isfjorden were run during Leg I.

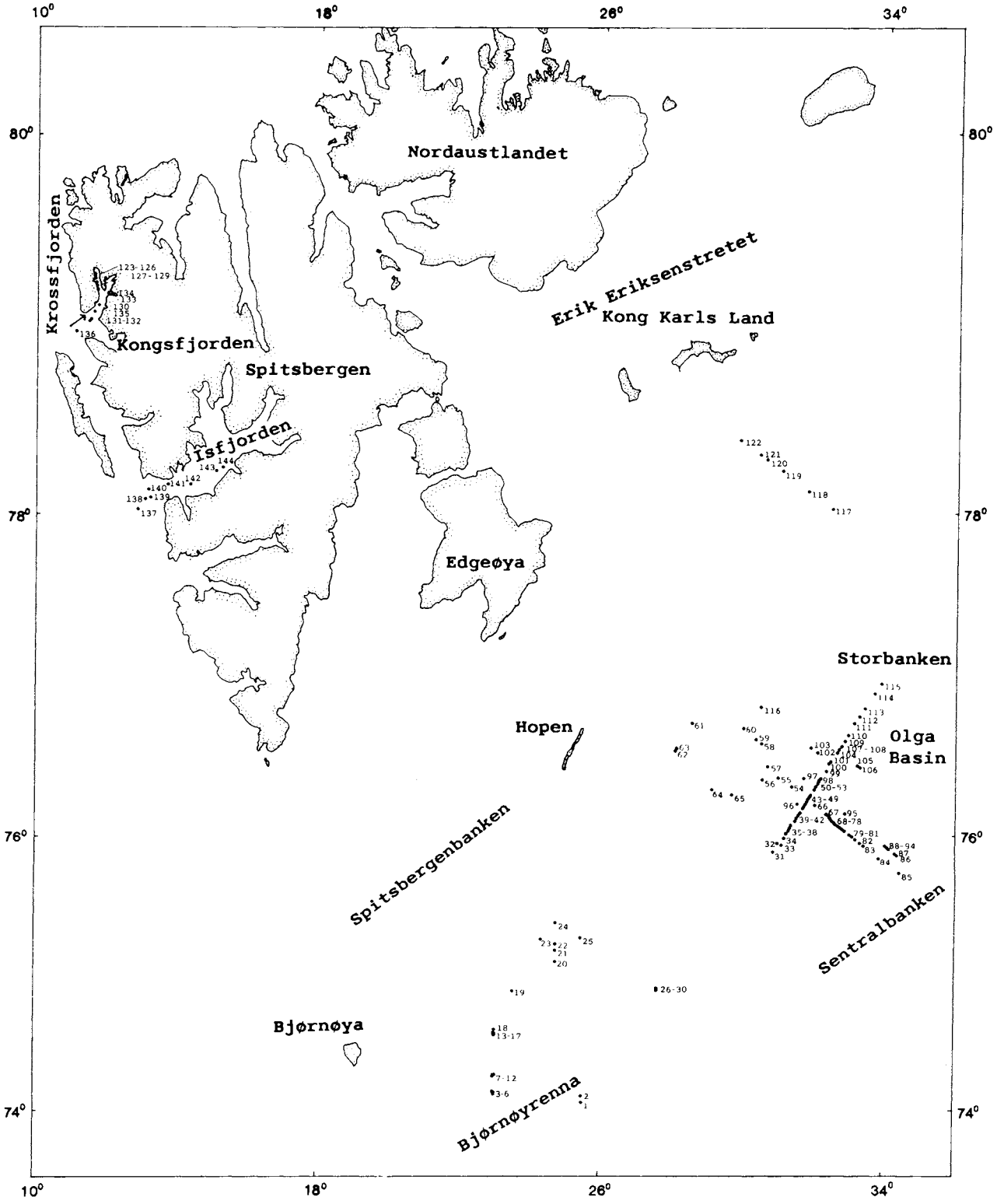

Fig.1c. Stations cored during Leg II. The stations are particularly dense where the geochemical survey was carried out, over the boundaries of the Olga Basin.

NAVIGATION AND SHIPBOARD COMPUTER SYSTEM

The main computer-equipment onboard is based on a VAX 730 with 500 Mb disc capacity and two 1600/6250 tapedrives, terminals, printers and one HP 7580 plotter. During the cruise two IBM-compatible personal computers, (Toshiba T3100) were added for word processing and database work.

Because shipboard navigation did not meet the required accuracy of at most 100 m, a complete system was hired from O. Øverland A/S, Molde. The system consisted of three main components; MAGNAVOX MX4400 GPS, INTERNAV LC408 LORAN-C and one rubidium oscillator. In addition a RACAL colour-screen from Kongsberg Navigation was connected to the system.

Due to the combination of GPS, LORAN-C and external oscillator, it is possible to navigate on two sattelites, thus expanding the periode of GPS operation. Furthermore the oscillator simulates a master station in the LORAN-C chain. This is essential in the northern areas where the system has poor coverage. The LORAN-C system was used during the periode where no satellites were available, and the positions were updated from the MAGNAVOX near the end of each activ GPS-periode.

GPS and LORAN were connected to the ship navigation- and steering system through the VAX-computer. The software, developed by NSKV, gives the posibility to log data from each navigation system, and choose the best system for navigation input to the DATABRIDGE-autopilot.

On July 25. the power unit of the system disc on the VAX-computer failed. The result was breakdown of the logging and navigation facilities. Logging of GPS/LORAN data was then done on the two PCs during the rest of the leg. The auto-pilot was reset to the TRANSIT navigation system. Manual correction was done by means of the displayed GPS-data.

During rest of the cruise, the required accuracy proved difficult to keep. The reason for this is probably a combination of the following:

- The difference between observed positions in GPS and LORAN systems is called "accuracy", i.e. GPS-positions is evaluated to be correct. This is strictly spoken not correct since this demands ideal conditions with respect to the number and individual distance between the satellites.

- The updating of positions on the LORAN-C terminal had to be done manually, and was difficult as the ship was moving at a speed of 5 to 10 knots. This means that the drift in LORAN-positions given in tables 2 & 3 will deviate from the result in a fixed position.

- Chosing ground- or skywave on LORAN-C signals may influent on the result. This depends on the light conditions, and may therefore be more significant during Leg II than during Leg I.

- By means of a program on the VAX-computer (ALERT), it is possible to find the best constellation of the satellites in the GPS-system. As mentioned the computer was down during most of the first leg, and this resulted in non-optimal satellite combinations.

Table 1.

Differences between GPS and LORAN-C positions.

Neg. latitude when LORAN position south of GPS.
Neg. longitude when LORAN position west of GPS.

Leg I

Date	Time	Latitude	Difference Lat min. (m)	Longitude	Difference Long min. (m)
2307	1200	75 40	0.01 (20)	15 27	0.05 (20)
2307	2005	75 19	0.07 (130)	24 08	-0.02 (- 10)
2407	1050	75 17	-0.04 (- 70)	23 48	-0.53 (-250)
2407	2240	75 11	0.04 (70)	25 11	-0.35 (-170)
2507	0834	75 12	-0.02 (- 40)	26 02	0.20 (90)
-					
2607	0800	74 20	0.03 (50)	23 03	0.30 (150)
2607	2040	74 34	-0.10 (-180)	22 52	-0.11 (- 50)
2707	0900	74 21	0.01 (20)	23 57	-0.34 (-170)
2707	2110	74 51	-0.06 (-110)	27 24	0.05 (20)
2807	1100	75 23	-0.10 (-180)	29 10	0.08 (40)
2807	2030	75 03	-0.10 (-180)	30 36	0.50 (240)
2907	0935	76 45	-0.05 (- 90)	28 32	-0.32 (-130)
2907	2030	76 16	0.02 (40)	31 09	-0.25 (-110)
3007	0830	75 36	-0.26 (-480)	32 05	1.04 (480)
3007	2250	76 27	-0.13 (-240)	30 47	0.03 (10)
3107	0850	77 03	-0.26 (-480)	28 42	-0.40 (-170)
3107	2000	76 22	0.05 (92)	31 51	-0.15 (- 60)
0108	0900	76 14	0.00 (0)	33 50	-0.35 (-150)
0108	2245	77 04	-0.05 (90)	29 18	0.45 (190)
0208	0750	76 50	-0.10 (-180)	31 10	0.10 (40)
0208	2250	76 46	0.02 (40)	34 37	-0.30 (-130)
0308	0810	77 02	0.08 (150)	32 44	0.02 (10)
0308	2050	77 50	-0.28 (-520)	29 17	-0.11 (- 40)
0408	0915	78 33	-0.01 (- 20)	25 57	-0.70 (-260)
0408	2235	78 40	-0.10 (-180)	28 10	-0.25 (- 90)
0508	0730	78 10	0.03 (50)	31 31	0.19 (72)
0508	1930	77 06	-0.16 (-300)	30 59	-1.20 (-500)
0608	0850	75 57	0.25 (460)	31 04	0.31 (140)
-					
0708	2330	74 22	0.09 (170)	24 30	-0.47 (-230)
0808	0900	74 14	0.01 (20)	25 28	-0.10 (- 50)
0808	2205	75 19	-0.10 (180)	26 27	0.03 (10)
0908	0900	74 33	0.03 (50)	26 29	-0.68 (-340)
0908	2145	74 05	0.00 (0)	25 42	-0.43 (-220)

Table 1 contd.

Leg II

Date	Time	Latitude	Difference Lat min. (m)	Longitude	Difference Long min. (m)
1308	1155	73 31	-0.02 (- 40)	25 02	0.10 (50)
1308	2245	74 07	0.02 (40)	25 29	0.02 (10)
1408	0700	74 08	-0.08 (-150)	22 59	1.20 (610)
1408	1955	74 35	-0.16 (-300)	22 59	0.14 (70)
1508	0715	74 36	-0.02 (- 40)	23 00	-0.79 (-390)
1508	2040	75 17	-0.04 (- 70)	25 25	-0.20 (- 90)
1608	2245	75 06	0.00 (0)	26 25	0.09 (40)
1708	0815	76 23	0.00 (0)	30 09	-0.42 (-180)
1708	1905	76 28	0.09 (170)	30 41	0.07 (30)
1808	0730	76 26	-0.01 (20)	28 41	-0.10 (- 40)
1808 - 2008	1940 0930	76 06 76 26	0.12 (220) -0.04 (- 70)	32 37 32 21	-0.49 (-310) -0.15 (- 60)
2008	1825	76 32	-0.06 (-110)	32 49	-0.33 (-140)
2108 - 2408	0725 2105	76 56 79 12	-0.01 (- 20) -0.06 (-110)	33 43 11 45	-0.23 (- 90) 0.76 (260)
2508	0645	79 12	0.18 (330)	12 07	-1.45 (-500)

Total No. of obs: 49

Mean difference in latitude : 35 m

Mean difference in longitude: 47 m

GEOPHYSICAL EQUIPMENT AND PROCEDURES

Seismic sources:

Bolt Mod.600B air guns, with chambers 10,20,30 (with wave shape kit) & 44 cu.inch.
Air was supplied by two Bauer electrical compressors.
E.G.& G. sparker system with 3-electrode and multi-tip (144) arrays.
Hartley HML Sparker system with 9-electrode array.
O.R.E. Geopulse boomers, mounted in both surface towed catamaran and sub-towed vehicle.

Seismic recording:

Benthos Mod. 25/50P single channel seismic streamer, with a 7.5 m active section with 50 elements.
O.R.E. Mod.5110 streamer.
Teledyne Expl. Mod.28420 60m 2 trace streamer.
EPC graphic recorders, Mods. 4800, 3200S and 3200.
Krohn-Hite Band pass filter
O.R.E. Geopulse Mod.5210A receiver with TVG and band pass filter.
TSS Mod. 307B TVG amplifier.
Tandberg Mods.115 and TD20A analogue tape recorders.

O.R.E. 3.5 kHz echo sounder, hull mounted, with Mod.140 tranceiver and analogue recording on a EPC Mod.3200S graphic recorder.

Klein Mod.531T side scan sonar with 50 kHz transducers and analogue, slant-range corrected recording.

Simrad Mod. EM100 multi-beam echo sounder.

Sonobuoys, Military type, mod. AN/SSQ 57, with recording time set to 1 hour and hydrophone depth 60 feet.

Teletron Ind. Mod. WARX3B, 24 channel sonobuoy receiver.

Various parts of the instrument package were kindly lent to us from A/S Geoteam, UiO, UiB, UiT and the Norwegian Defense Research Establishment (FFI). Other parts were rented commercially.

Different air gun chambers were tried, at different tow depths. However, the 30 cu.inch chamber equipped with wave shape kit, was found to give the best results, in particular in terms of eliminating the bubble pulse. After the initial trials, this chamber was used throughout the cruise. It was towed suspended in a floatation buoy, at a tow depth of approximately 0.8 - 1.0 m, and at a distance of 20 m behind the vessel. Air pressure was kept at 100 - 120 kg/cm2.

The 9-electrode sparker was used during all sparker operations. Energy varied from 1.0 to 4.5 kJ. In most of the profiles 3.6 or 4.5

kJ was used. The array was towed approximately 20 m behind the vessel.

The Benthos streamer was used throughout the cruise. Tow depth were in the order of 1-2 m and distance behind the ship 60 m. The O.R.E streamer was only used during trials with the Geopulse boomer (see under "General comments to field operations").

Sonobuoys were mainly shot with the air gun, although some were also used with sparker as the source. No reversed profiles were shot.

GEOLOGICAL SAMPLING EQUIPMENT AND ONBOARD PROCEDURES

Gravity corer, mainly used with 3.0 m x 0.11 m barrel, while 6.0 m x 0.11 m barrel was used in very soft sediments.

Vibro corer, 3.0 m x 0.09 m barrel.

Box corer, 0.5 m x 0.5 m x 0.5 m barrel.

Piston corer, 6.0 m x 0.063 m barrel.

Bottom camera system, Benthos Mod. 371 / 381 camera and flash.

The core liners were rutinely cut in one meter sections and lithology and Munsell color described for most of the section ends. A hand held vane was used for undrained shear strength (Su) measurements in section ends. The box corer provided excellent, undisturbed sections of the upper 0.5 m of the sea floor sediments. The box cores were therefore described in great detail as well as photographed. Samples for later analyses were taken with 0.11 m core liners pushed carefully into the box cores (two pr. core). Furthermore, bulk samples from each 10 cm interval of the box cores were taken out and bagged for later processing for ^{14}C datable material. Cores used for organic geochemistry analyses ("geochemical sniffing") were split and processed within 15 minutes after recovery, and then stored frozen at -85 ^{0}C.

The 3.5 kHz PDR was run continuosly during Leg II, and the Simrad multi beam echo sounder was used for detailed surveys in some selected areas.

The universities of Tromsø and Bergen kindly provided the box corer and piston corer, respectively. The vibro corer was rented from IKU.

FIELD OPERATIONS

Leg I.

Date: Activity:

21/7 Scientific crew arrives Longyearbyen. Finish equipment mobilization. Depart Longyearbyen at 15.00, testing of

Geopulse boomer and multielectrode sparker in Adventfjorden. Start line 1-87 in Isfjorden with 9-electrode sparker and PDR, while testing other equipment. Weather: calm sea, cloudy.

22/7 Finish Isfjorden lines , while still testing the boomer, which has signal strength problems. Heding south at 12.30. Putting archaeologist party ashore in Hornsund 19.00. Departure and equipment tests 21.00. Weather: Strong breeze, cloudy.

23/7 02.30-18.00: Sailing towards Spitsbergenbanken. 18.00-24.00 searching for lost instrument mooring, with side scan sonar and dredge. Weather: Good, some swell.

24/7 00.00-10.45: Continue equipment tests. Shooting lines 101-87, 102-87 and 103-87 with side scan sonar, PDR and air gun/sparker. Some problems with EPC recorder. Weather: Fair, calm sea.

25/7 Lines 104 87, 105-87 and 106-87, with same equipment. Sonobuoy test, and shooting of sonobuoys 1 and 2. Changed air gun shot interval from 2-4 secs. due to compressor problems. VAX 11/730 went down at 14.56. Testing of surface towed Geopulse boomer. Weather: Fair, calm sea.

26/7 Lines 107-87, D87-182 and D87-180B. Surface towed boomer in use, but with rather poor results. Some problems with the air gun, used only 9-electrode sparker after 05.00. Sonobuoy 2 shot. Sparker maintenance performed. Weather: Fair, calm sea.

27/7 Lines D87-180C,D, 251, 252, 254, 255, 257, 258, 281, 300, 201-87 and start 202-87. Boomer stopped 14.30. Changed from sparker to airgun at 23.00. Weather: Fair, wind increasing from calm to strong westerly breeze.

28/7 Lines 202-87and 203-87. Observed depressions in the sea floor, and carried out a detailed survey including side scan sonar, lines 202-X1-X8. First observation of heavy sea ice. Weather: Fair, calm sea.

29/7 Lines 203-87 and 204-87, sonobuoys 3 and 4. Some zig-zagging and cut of the NW part of line 204-87 due to ice. Air gun maintenance after collision with ice. Some problems with EPC recorder. Weather: Fair, but rather heavy swell from SE.

30/7 Lines 204-87 and 205-87, PDR and air gun/sparker. Side scan sonar in line 205-87. Sonobuoys 5 & 6. Data quality somewhat reduced due to rough sea. Weather: Rough sea, heavy swell, but decreasing during the day.

31/7 Lines 205 and 206-87. Side scan sonar, PDR and air gun. Side scan retrieved 07.30 because of ice. Sonobuoys 7, 8, 9, 10 & 11. New tests of Geopulse sub tow boomer and multielectrode sparker. Still very weak signal. Weather: Cloudy, calm sea.

1/8 Lines 206-87 and 207-87. Side scan sonar, PDR, air gun. Sonobuoy 12. Some testing of multi-electrode sparker and sub-towed Geopulse boomer, but with poor results. The running systems give good data. Weather: Cloudy, some fog, calm sea.

2/8 Lines 207-87, 208-87, 209-87, Side scan sonar, PDR and sparker. Sonobuoys 13 & 14. Some sparker problems. Weather: Cloudy, wind increasing to fresh breeze from SE.

3/8 209-87 and 210-87, side scan sonar, PDR, sparker and air gun. Sonobuoys 15, 16, 17 and 18. Side scan sonar retrieved 14.35 due to ice. Final testing of Geopulse boomer and multi-electrode sparker confirms either severe system errors or that these units are highly inadequate for the purposes of the cruise. Some compressor problems. Some heavy ice, and the end of line 209-87 and start of 210-87 is approximately 5 n.miles NE of planned lines. Weather: Fair, calm sea.

4/8 Lines 210-87, 212A-87 and 212B-87, PDR, air gun. Sonobuoy 19. Good air gun data, PDR shows little penetration. Some ice problems cause frequent course changes. Rivalensundet (Fig. 1 a) was closed by ice, so line 212A is the north end end of line 212 and line 212B is the rest of the line, from Kong Karls Land and southeastwards. Weather: Cloudy, calm sea.

5/8 Lines 212B-87 and 213-87. Steaming 4 hours between 212B and 213-87. Side scan sonar, PDR, air gun. Sonobuoys 20, 21, 22 and 23. Weather: Fair, calm sea.

6/8 Lines 213-87 and 202B-87 (continuation of 202-87 northeastwards towards Storbanken), side scan sonar, PDR, air gun and sparker. Sonobuoys 24, 25, 26 and 26. End line 202B-87 21.30 and steaming towards Spitsbergenbanken. Weather: Fair, calm sea.

7/8 Start profiling at 14.35, shooting lines 108-87 and 109-87, side scan sonar, PDR and air gun. Sonobuoy 28. Weather: Fair, calm sea.

8/8 Lines 109-87 and 110-87, side scan sonar, PDR and air gun. Side scan sonar retrieved at 03.00 because of too deep water. Sparse PDR penetration, most likely due to geological reasons. Weather: Fair, calm sea.

9/8 Lines 111-87 and 112-87, side scan sonar, PDR, air gun and sparker. Recorded outgoing signals from PDR, 9-electrode sparker and air gun. Weather: Fair, calm sea.

10/8 Lines 112-87 and 113-87, PDR, air gun. Sonobuoy 29. Complete profiling program. Steaming towards Hammerfest. Weather: cloudy, calm sea.

11/8 Arriving Hammerfest 02.00. Unloading and start repair of VAX computer.

12/8 Crew change, cont. VAX repair, demob. profiling equipment and mob. of coring equipment.

Leg II.

Date: Activity:

12/8 Crew change and mobilization, Hammerfest. Repair of VAX-computer on the vessel. Departure Hammerfest.

13/8 Transit Hammerfest - study area south off Hopen. Weather: Strong breeze, cloudy.

13/8 Arrival study area at 14.00, sampling at station 1 and 2. Piston corer released during lowering. Station: 1-2. Weather: strong breeze, cloudy.

14/8 Start work east of Bjørnøya at 03.00, gravity corer, box corer, vibrocorer and bottom camera. Station: 3-14. Weather: 2-3 m wave height, breeze, cloudy.

15/8 Continue work east of Bjørnøya with full sampling programme. Vibrocorer cable was repaired. Start sampling programme on moraine ridge south of Hopen. Station: 15-25. Weather: Breeze, cloudy.

16/8 Transit to location with "deep surface depressions", inner part of Bjørnøyrenna. Diving to mobilize the multibeam echo sounder system. Sampling and multibeam survey. Station: 26-34. Weather: Breeze, sunny.

17/8 Start sampling programme in the Storbanken area. Weather: breeze and cloudy. Start of intensive sampling programme for hydrocarbon analyses, "sniffing". Mainly use of gravity corer. Station: 35-60. Weather: breeze, cloudy.

18/8 Sampling, mainly by vibrocorer, in the western part of the

study area south of Storbanken. Intensive sampling for hydrocarbon analyses, "sniffing". Station: 61-79. Weather: Breeze.

19/8 Continue sampling for "hydrocarbon sniffing" and general sampling programme in the eastern part of the study area. Navigation out of order for 6 hours. Station: 80-94. Weather: breeze.

20/8 Start sampling programme on the southern slope of Storbanken. Frequent use of vibrocorer. Station: 95-106. Weather: breeze.

21/8 Sampling in the areas west of Storbanken. Frequent use of vibrocorer. Station: 107-116. Weather: breeze.

22/8 Sampling between Storbanken and Kong Karls Land. Station: 117-122. 20.00 start on transit to the west coast of Svalbard/ Ny-Ålesund. Weather: fair, some sea ice at Kong Karls Land.

23/8 Transit to Ny-Ålesund. Some sea ice north of Svalbard. Fair weather.

24/8 Arrival Kongsfjorden 4.00. Seismic surveying, sparker and side scan sonar from the outer part of the fjord to Ny-Ålesund. Arrival Ny-Ålesund 14.00. Pick-up of J. Dowdeswell/Sexton from University College of Wales, Aberystwyth. Departure Ny-Ålesund 18.00. Start seismic and sampling programme in Krossfjorden. Station: 123-125. Weather: fair.

25/8 Continue seismic and sampling programme in Krossfjorden and outer part of Kongsfjorden. Station: 126-136. Transit to Isfjord Radio for pick-up of Jon Inge Svendsen, University of Bergen. Start sampling programme in outer part of Isfjorden. Station: 137-140. Weather: fair.

26/8 Continue sampling programme in Isfjorden, ending at 06.00. Arrival Longyearbyen 8.00. Demobilization and departure for scientific crew by air at 17.00. End of cruise.

GENERAL COMMENTS TO THE FIELD OPERATIONS.

Weather/ice conditions and equipment performance.

Leg I.

The weather conditions were exceptionally good throughout the cruise. With the exception of a 1-2 days during the first week, the sea state was generally calm, and we had several days with absolutely flat sea. During the 23 days of the cruise, there was never need to close down operations because of weather reasons.

1987 was in general a bad ice-year, with the pack ice extending unusually far to the south. Ice maps produced immediately before the cruise, showed relatively dense ice (>5/10) in most of the main study area. However, this situation improved rapidly, due to a period of southerly winds. As can be seen from the navigation plot (Fig.1), some lines have been zig-zagged because of ice. Furthermore a few of the lines had to be cut some kilometers in the nortwestern end, but altogether the ice caused little deviation from the originally planned program. Erik Eriksenstredet was essentially covered with ice, so a short line northeastwards towards Nordaustlandet (line 211-87) had to be left out. Rivalenstredet was also closed, and this is the reason for the lines around Svenskøya.The side scan sonar was not used in icy waters because of the danger of getting the cable hooked up in heavy ice floes.

Most of the profiling equipment performed well, with the exception of the multi-tip sparker array and the O.R.E. Geopulse boomer source. Neither of these two proved adequate. Whether these problems were caused by technical problems or the physical environment under which they were operated (ship noise, hard sea floor, deep water etc.) is uncertain. Several tests were made during the first half of the cruise, but as the results were generally poor, we decided to stop the tests and concentrate on optimizing the other systems. The combination of air gun/sparker, 3.5 kHz PDR and side scan sonar proved to be highly adequate to meet the cruise objectives, and it is doubtful wether more coud be achieved with the boomer and multi-tip sparker operational.

The two Bauer compressors had slightly too small capacity for maintaining the desired shot interval of 2 s for more then a few hours. Therefore a shot interval of 4 s was used most of the time, but with 2 s in particlar areas of interest, and during sonobuoy recording.

Air gun maintenance was carried out approximately 1-2 times per day (mainly change of O-rings and springs). As only a single gun was towed, the sparker was deployed during these periods to avoid breaks in the record. Some lines were shot only with sparker. This occurred mainly in the beginning of the cruise, during a period of some technical problems, and during operations in sea ice. The air gun system is more vulnerable to even small pieces of ice then the sparker array.

The side scan sonar was retrieved whenever there was ice in the area. Furthermore, due to limitations in cable length, the deepest parts of some of the lines (deeper than approximately 400 m) do not have side scan coverage.

The Simrad multi beam echo sounder was used in lines 101-87 - 106-87 (Fig.1). This system is, however dependant upon the shipboard VAX computer, and as this system went down due to hardware problems on the 25 of July, the multi beam echo sounder was not used for the rest of Leg I. Due to the open transducer well in the ship´s hull, extra care had to be taken during operations in sea ice.

A general problem with M/S Lance is that it creates relatively severe acoustic noise. This is largely reduced by reducing the speed of the main engine from 600 r.p.m. to 500 r.p.m.. This was done on most of the lines, thanks to cooperative spirit from the ship's engineers. During part of the line segments between main lines, the seismic equipment and side scan sonar were hauled in, and the ship was cruising with full speed for 2-4 hours.

Leg II.

In general the weather conditions were characterized by breeze and calm sea, and, except for the first day, the sampling programme was not influenced by strong winds/high seas. The sea ice which caused problems during Leg I had disappeared, and only during the transit from the Barents Sea to the west coast of Svalbard the speed of the vessel was reduced due to sea ice.

The success of the sampling programme was strongly dependent on efficiency at the navigation system and the possibilities to locate the stations identified from the seismic data obtained during Leg I. Additionally to the navigation, the 3.5kHz echo-sounder was used to identify the proposed locations. In general, the accuracy of the navigation was within 100 m, and especially in periods with GPS operating, the planned sites were easily localized. For some of the locations, the sample target was within a plough mark, and for such detailed work, the thrusters of the ship are too weak to keep the boat on position in strong currents and wind. These conditions caused serious problems for the very detailed sampling during the programme east of Bjørnøya. The lack of dynamic positioning represents a serious problem for the use of LANCE to sample well defined targets. However, for regional and less detailed objectives the capacity of LANCE is sufficient.

The 3-m gravity corer was used routinely at each location and, for most of the investigated areas in the Barents Sea, the 3 m barrel is long enough to penetrate the soft Holocene and Late Weichselian glaciomarine sediments. In soft sediments, particularly in Kongsfjorden and Isfjorden, the 6 m barrel was used, providing 4-5 m long samples. The piston corer was used only once, and due to the relatively high content of coarse material it was decided not to use the system further.

The vibro corer was used for extensive sampling of overconsolidated till deposits. The system worked excellently and was only out of function once, when it had been used at water depth above 400 m and the power cable broke. The penetration varied, and in very sticky sediments, the core catcher was not strong enough to keep the samples in the liner during pull-out. At three sites probably in situ porous and poorly consolidated sandstones were sampled.

The box-corer provided excellent samples of the upper half meter below sea floor, and also in relatively gravelly diamiction, samples were obtained. The system was easy to operate and the surface as well

as the vertical section exposed when realising the corer, was very well preserved and apparently undisturbed.

The sea floor camera was routinely used, and except for minor trouble the system worked satisfactory.

Field program relative to the planned program.

Leg I.

Only minor deviations from the originally planned program were necessary, and the total production (Fig. 1, Tables 2 & 3) was larger than expected. This results mainly from the favourable weather, as 4 days were set off for bad weather and tecnical problems. In the case of the latter, these caused little delay in the program as we were able to profile with the operational equipment as repair and maintenance were carried out on other systems.

The Isfjorden lines were run according to the program, with the exception of use of the Geopulse boomer, which was considered particularly important in this area. However, the 3.5kHz PDR records, combined with the sparker, covered the entire unconsolidated section down to the bedrock, and gave e resolution in the upper part that was adequate for planning of gravity core stations. Two proposed lines in the Bellsund area were skipped.

After spending approximately 6 hours on dredging for a lost current meter mooring on Spitsbergenbanken, the program on the southwestern slope of Spitsbergenbanken was carried out. Somewhat more time was spent here than originally planned. Lines 101-87 - 107-87 covers a local sediment accumulation, previously mapped by Solheim and Kristoffersen (1984), and adjacent areas. Lines 103 and 106 cross in the position of a shallow drilling (55 m, site O-85) carried out by IKU in 1985. Line 106-87 circles and cross the drill site twice. Line 107-87 ties the region of the local accumulation to the bank slope east of Bjørnøya. The grid of lines run in this area fill in previous profiles run by IKU, and provided the background for picking three coring locations at different depths down the slope. Line D87-300 ties this area to another shallow drill site (site N-85). All together approximately 3.5 days were spent in this area. A more regional grid of N-S lines down the slope were, however, considered desireable if time permitted at the end of the cruise.

Lines 201 and 202-87 tie the southwestern study area to the main area in the northern part of Bjørnøyrenna. In line 202-87, 6 extra hours were spent on a detailed investigation of a small area of depressions in the sea floor.

Lines 203 - 213-87 and 202B-87 cover the main study area. These are essentially as planned, except for the northwestern part, where heavy ice made it necessary to deviate from straight courses, and to skip the proposed line 211-87 in Erik Eriksenstredet. All the other lines were run progressively northwards, and ending with lines 213 and

Table 2. Production, Leg I - 1987

Line no.	Date	3.5 kHz PDR		Sparker/Airg.		Side Scan		Sonob. no.
		time	km	time	km	time	km	
1-87	21/7	1730 2340	122	1800 2340	113			
2-87	21-22/7	2340 0027	11	2340 0027	11			
3-87	22/7	0027 0333	55	0027 0333	55			
4-87	22/7	0333 0410	11	0333 0410	11			
5-87	22/7	0410 0740	64	0410 0710	64			
101-87	24/7	0840 1148	39	0850 1146	38	0840 1146	38	
102-87	24/7	1148 1520	38	1146 1519	38	1258 1518	25	
103-87	24/7	1530 2001	56	1530 2002	56	1530 2002	56	
104-87	24-25/7	2012 0205	74	2012 0200	73	2012 0207	74	
105-87	25/7	0238 0553	46	0230 0553	47	0238 0553	46	
106-87	25/7	0639 2014	94	0639 2014	94	0707 1548	60	1-2
107-87	25-26/7	2145 0314	52	2016 0432	78			
108-87	07/8	1230 1523	23	1235 1523	23	1230 1523	23	28
109-87	07-08/8	1526 0414	120	1526 0414	120	1526 0308	110	
110-87	08/8	0640 2035	140	0640 2034	140	1111 2035	100	
110B-87	08/8	2050 2337	27					
111-87	08-09/8	2337 1624	140	2337 1624	140	2335 1618	140	
112-87	09-10/8	1925 0415	80	1925 0415	80	0310 0408	9	29
113-87	10/8	0430 0835	47	0430 0835	47	0435 0705	21	
201-87	27/7	1508 1840	42	1448 1840	44			
202-87	27-28/7	1843 1847	210	1845 1845	210	2230 0835	73	
202B-87	06/8	0830 2128	43	0830 2128	150	0830 2128	150	25-27
203-87	28-29/7	1859 0600	120	1859 0600	120	2000 2330	42	
203B-87	29/7	0620 0842	32	0620 0842	32			
204-87	29-30/7	1000 0824	210	1000 0825	210			3-4
204B-87	30/7	0826 1033	15	0845 1033	15			
205-87	30-31/7	1034 0651	200	1033 0651	210	1040 0530	200	5-7
205B-87	31/7	0653 0921	16					
206-87	31/7-1/8	0921 0457	220	0921 0457	220	1045 0457	200	10-11
206B-87	01/8	0459 0655	33					
207-87	01/8	0659 2338	190	0658 2300	180	1150 2340	130	12
207B-87	01-02/8	2355 0054	13					

Table 2. Production, Leg I - 1987, cont.

Line no.	Date	3.5 kHz PDR		Sparker/Airg.		Side Scan		Sonob. no.
		time	km	time	km	time	km	
208-87	02/8	0054 1903	200	0057 1903	200	0052 1825	190	13-14
209-87	03/8	0225 1838	180	0225 1858	190	0225 1158	110	15-17
210-87	03-04/8	1850 1225	220	1858 1300	230			18-19
210B-87	04/8	1233 1300	6					
212A-87	04/8	1300 1357	120					
212B-87	04-05/8	1920 1201	230	1920 1201	230	2000 1200	210	20-22
213-87	05-06/8	1610 0822	180	1610 0822	180	1545 0830	180	23-24
Transit								
208-209	02-03/8	1904 0224	55					
Transit								
212A-212B	04/8	1357 1920	100					
Transit								
212B-213	05/8	1202 1609	80					
Transit								
202B-108	06-07/8	2128 1225	300					
D87-180A	26/7	1117 1136	3	1117 1136	3			
D87-180B	26/7	1318 1443	14	1318 1443	14	1318 1444	14	
D87-180C	26/7	1720 2056	35	1720 2056	35	1720 2056	35	
D87-180D	27/7	0023 0036	2	0023 0036	2			
D87-181	27/7	0201 0548	37	0201 0548	37	0201 0246	7	
D87-182	26/7	0503 1033	48	0503 1033	48	0503 0919	37	
D87-250	26/7	1035 1116	5	1035 1116	5			
D87-251	26/7	1152 1222	5	1152 1222	5			
D87-252	26/7	1231 1259	5	1231 1259	5			
D87-254	26/7	1500 1530	5	1500 1530	5	1500 1526	5	
D87-255	26/7	1553 1635	5	1553 1635	5			
D87-257	26/7	2245 2319	5	2245 2319	5	2245 2319	5	
D87-258	26-27/7	2332 0003	5	2332 0003	5			
D87-300	27/7	0616 1416	73	0616 1416	73			
Total km:		4501		3896		2290		

Table 3. Sonobuoys, Leg I - 1987

No.	Date	Time	Line	Lat. (^{0}N)	Lon. (^{0}E)
1	25/7	0900 - 0950	106-87	75 12.48	26 05.25
2	25/7	1610 - 1645	106-87	75 10.35	24 43.11
3	29/7	1204 - 1310	204-87	76 39.38	29 07.48
4	29/7	2015 - 2055	204-87	76 17.46	31 05.05
5	30/7	1052 - 1125	205-87	75 45.31	34 26.60
6	30/7	1719 - 1835	205-87	76 07.09	32 32.55
7	31/7	0102 - 0208	205-87	76 34.50	30 07.90
10	31/7	1948 - 2000	206-87	76 23.14	31 46.24
11	31/7	2100 - 2200	206-87	76 19.35	32 07.75
12	1/8	0925 - 1005	207-87	76 16.50	33 43.13
13	2/8	0422 - 0445	208-87	77 03.28	30 02.61
14	2/8	0610 - 0659	208-87	76 57.37	30 36.85
15	3/8	0226 - 0252	209-87	76 44.10	34 29.40
16	3/8	0412 - 0500	209-87	76 49.95	33 57.95
17	3/8	1655 - 1735	209-87	77 35.18	30 19.10
18	3/8	2040 - 2132	210-87	77 49.53	29 20.80
19	4/8	1136 - 1223	210-87	78 47.54	25 27.72
20	4-5/8	2354 - 0045	212B-87	78 36.13	28 40.10
21	5/8	0454 - 0501	212B-87	78 19.92	30 31.93
22	5/8	0922 - 1048	212B-87	78 04.14	32 15.35
23	5/8	2145 - 2255	213-87	76 54.98	30 58.90
24	6/8	0646 - 0713	213-87	76 04.85	31 00.35
25	6/8	1243 - 1345	202B-87	76 16.07	31 52.29
26	6/8	1748 - 1855	202B-87	76 40.92	32 58.23
27	6/8	1901 - 1939	202B-87	76 47.21	33 15.93
28	7/8	1414 - 1520	108-87	75 12.58	24 43.83
29	9-10/8	2348 - 0035	112-87	74 10.12	25 02.35

202B-87. Due to reasons mentioned above, most of the short line segments between main lines do not have side scan or sparker/air gun coverage. The 3.5kHz PDR, however, was used continuosly, also while running full speed (10-12 knots). 9 days were used in this region.

After completion of 202B-87, it was still time for more work in the region east of Bjørnøya. Line 108-87 crosses IKU site 0-85 again, while lines 109 - 113-87 defines a more regional grid covering a zone of the slope from Spitsbergenbanken down into the Bjørnøyrenna trough. This last part of the cruise can be considered as extra lines, relative to the proposed program. Approximately 3 days were spent shooting these lines.

Leg II.

Due to the good weather conditions and no major failure on the navigation system or on the sampling equipment, the 144 stations (123 in the Barents Sea) provide sufficient samples for the main purpose of the cruise. The total number of samples was higher than originally planned.

Initially, the analytical programme on board was planned to include detailed description of the cores and geotechnical index property analyses, such as water content, grain size distribution and shear strength measurements by fall-cone. The number of assistants (and the budget!) was however too low to carry out the planned analytical programme. Additionally, more priority was given to increase the number of vibro core samples from the overconsolidated till, as very few samples are available from this sediment type in the Barents Sea.

PRELIMINARY RESULTS

Bedrock geology

In general, the sediment cover above the bedrock rarely exceeds 10 msec, (Fig. 2). Several apparent outcrops, as identified from the seismic data, were found from the vibrocorer to be covered by less than 0,5 m sediments. At three locations, porous, probably *in situ* sandstone was sampled. Preliminary dating of microfossils indicate an Early Cretaceous age. The sites are located at the flanks of the Olga

Basin (Fig. 1), suggesting a relatively thick Early Cretaceous sequence in this region. Two of the samples were obtained at the southern, and one at the northern flank of the basin, and a similar litholgy indicates that the same subcropping strata may have been dated.

The main part of the samples, from approximately 90 stations, were taken within the Olga Basin, which now has a good data base (samples and shallow seismic data) for interpretation of the shallow bedrock geology of this aea. A shallow bedrock map in a scale of 1:500 000 will be prepared, based on all available bedrock information from this area.

An additional purpose of the programme was to identify areas for future shallow bedrock drilling. The bedrock is within reach of a drill ship in all parts of the surveyed area. The thin sedimet cover also favours the use of an electric drill lowered to the sea floor (B.I.O. drill or equivalent). In the Olga Basin, where subcropping strata can be followed to several seconds depth by combining shallow and deep seismic data, the use of shallow techniques can provide valuable information also for deeper parts of the sedimentary sequence.

As the sonobuoy records are spread over the entire region of the survey, they should provide velocities of several different seismic sequences within the Mesozoic rocks, despite the limited penetration (150-250 msec) of the air gun/sparker system.

Sediment distribution and glacial history

The vibrocorer gave, for the first time, the opportunity for extensive sampling of the overconsolidated diamicton in the Barents Sea. In general two types of overconsolidated materials were obtained: 1) very stiff and pebbly, with core length rarely exceeding 0.5 m, and 2) slightly overcompacted sediment with a sticky appearance. Type 2 was the most frequently sampled sediment type. Preliminary geotechnical analyses show shear strength values of type 2 in the range of 30 - 60 kPa.

These slightly overconsolidated sediments were cored just at the sea floor, most likely reflecting a former loading history. The extensive vibrocoring, also at waterdepths down to 400 m, showed these sediment to have a wide distribution. A possible origin of the over-compaction is ice loading, hence reflecting that the entire northern

Barents Sea have been covered by ice in the Late Weichselian.

Compared to previous shallow seismic surveys in the area, we were, for the first time, able to estimate the thickness of various unlithified sediment units. The total thickness was identified from the air gun and sparker records, while the boundary between the over-compacted sediments and the overlying soft Holocene and Late Weichselian glaciomarine deposits was commonly seen as a well defined reflector on the 3.5 kHz records.

Particular attention was given to local sediment accumulations, suggested to represent ice marginal features. Sediment sampling with vibrocorer showed that these accumulations consisted of sticky, over-consolidated deposits in their upper part. Good quality air gun records were obtained over a local accumulation northeast of Bjørnøya (Fig 3). The accumulation was shown to mainly run in a N-S direction, and to be of a more local character than previously mapped (Solheim & Kristoffersen 1984). An internal reflector was identified at approximately 25 msec (Fig. 3) and this reflector correlates with a distinct lithological change at 23 m found in a drill core obtained by IKU in 1985. From the 3,5 kHz records, a reflector is also seen at 5 msec, suggested to correspond to the change in shear strength, from the overlaying slightly overcompated, sticky sediments to the underlying very stiff sediments.

Local sediment accumulations are also found on the outer part of Storbanken. However, these features differ from the accumulations east of Bjørnøya in being: 1) heavily/intensively ice ploughed and 2) acoustically transparent to the 3.5 kHz acoustic signal. According to the latter observation the Storbanken accumulation is suggested to consist of relatively fine grained material, possibly reworked glaciomarine sediments.

A basic problem in interpretation of the glacial history of the Barents Sea is the lack of chronostratigraphic tie points. An important aspect of the sampling programme was to obtain datable material from base and top of the Late Weichselian glaciomarine sediments, and thereby date the onset and termination of the deglaciation event at the end of the Late Weichselian. Preliminary analyses of the box cores showed that minor in situ shells and also foraminifers were present in sufficient amounts for ^{14}C datings (accelerator). The overcompacted sediments seem, however, to be mostly barren, and datable material have, so far, not been identified.

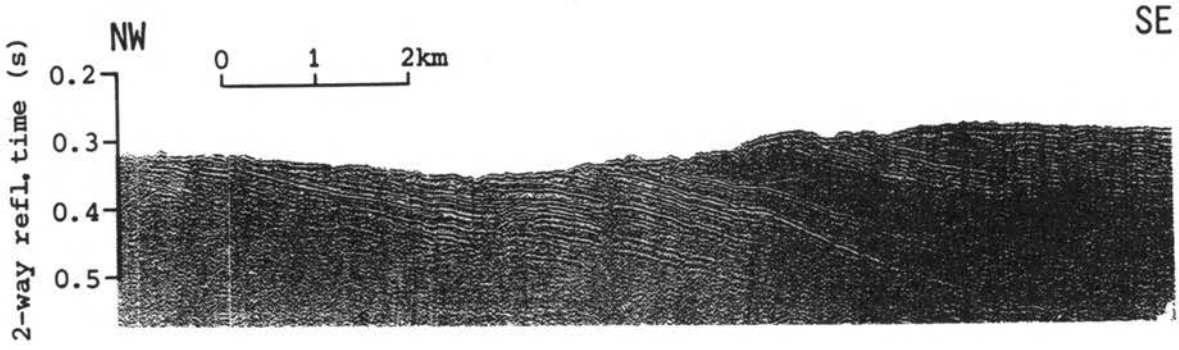

Fig.2. Seismic record (30 cu.inch air gun), showing nearly outcropping sedimentary bedrock in the northern part of the study area. For location, see Fig.1a.

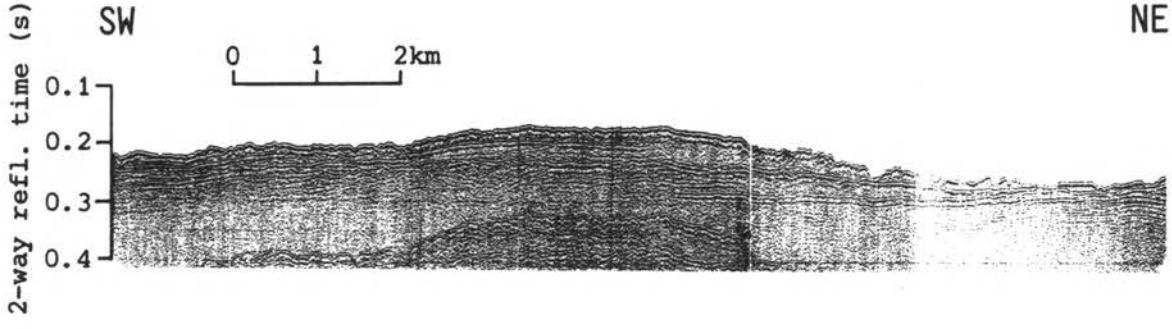

Fig.3. Seismic record (30 cu.inch air gun) over local accumulation of Quaternary sediments northeast of Bjørnøya. For location, see Fig.1a.

In the two main study areas in the Barents Sea, the 1987 field data combined with previous years data will be compiled in maps of surface sediment distribution and composition in addition to isopach maps of unlithified sediment thickness. This is done as parts of master theses at UiO.

In Isfjorden and Kongsfjorden, acoustically transparent sediment thickness increases in the outer part of the fjord. The topography also becomes smoother. However, condensed Late Quaternary sedimentary sequences were successfully sampled at local highs in the mouth of both fjords (4-5 meters long gravity cores). Preliminary analyses of these cores indicate continuously open glaciomarine/marine sedimentation back to 13 - 15 ka. The cores were not able to penetrate the entire sequence of soft sediments and the problem of defining the maximum extension of the Late Weichselian ice sheet on the west margin can not be finally solved from these cores.

Sea floor depressions

On line 202-87 (Fig. 1a), an area with a number of large sea floor depressions were encountered. The side scan sonar revealed that these are closed, semi-circular features (Fig. 4), as opposed to elongate, channel-like features as first was suspected. Their dimensions vary, but they are in the order of 20-30 m deep and have cross sectional distances of 150 - 1500 m. They usually have no elevated rims, and are incised into the bedrock (Fig. 5). Some of the depressions show seismic indications of acoustically transparent sediment mounds in the troughs. During Leg II a multibeam echo sounder survey was carried out over a part of this area, and Fig. 6 shows a three-dimensional view of the surveyed area. Until more data are collected, theories of the origin of these depressions remain speculative. They are clearly to big to be classified as pockmarks in the traditional use of the term. However, the structures may resemble gas craters found in other regions, caused by explosive blow-outs. (Bryant & Roemer 1983).

Other sea floor features

As side scan sonar hardly has been used in the northern Barents Sea up to now (Elverhøi & Solheim 1983 a, Solheim et al. 1988), the good quality side scan records provided much new information about the sea floor in this part of the Barents Sea. A main finding is that pocmarks

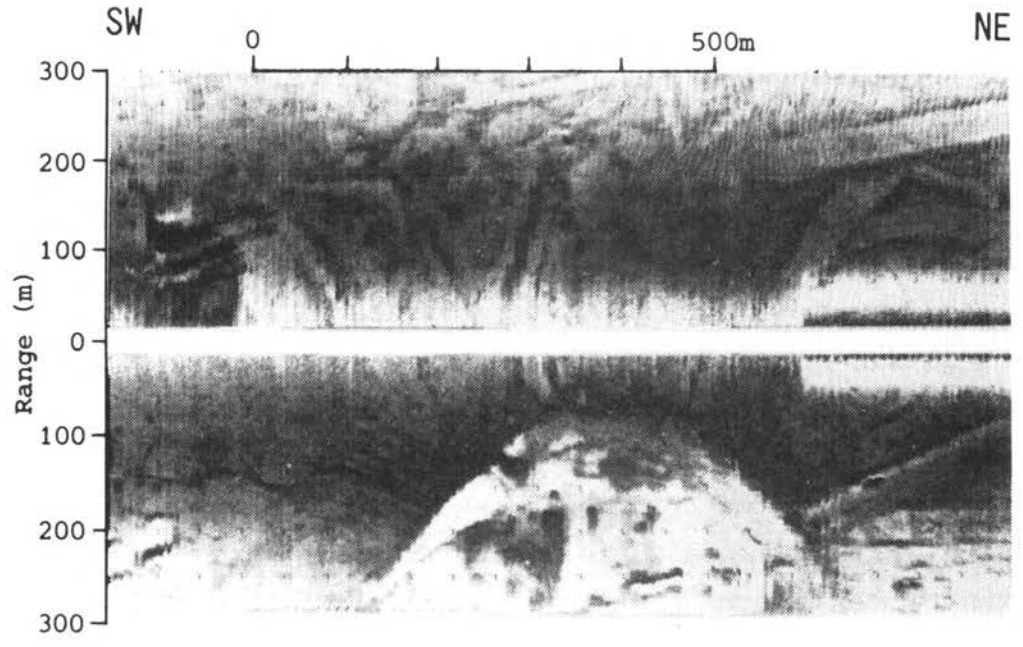

Fig.4. Side scan sonograph showing one of the sea floor depressions found in a small area in Bjørnøyrenna, southeast of Hopen. For location, see Fig.1a.

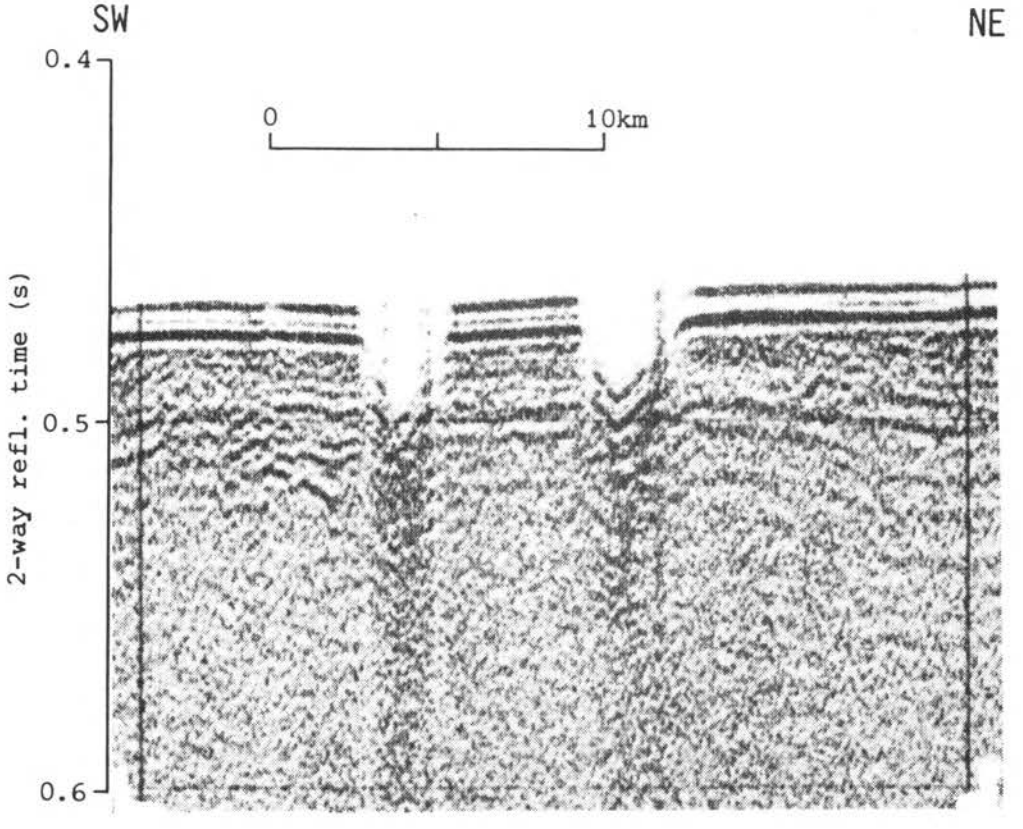

Fig.5. Seismic record (4.5 kJ sparker) over two of the sea floor depressions southeast of Hopen. For location, see Fig.1a.

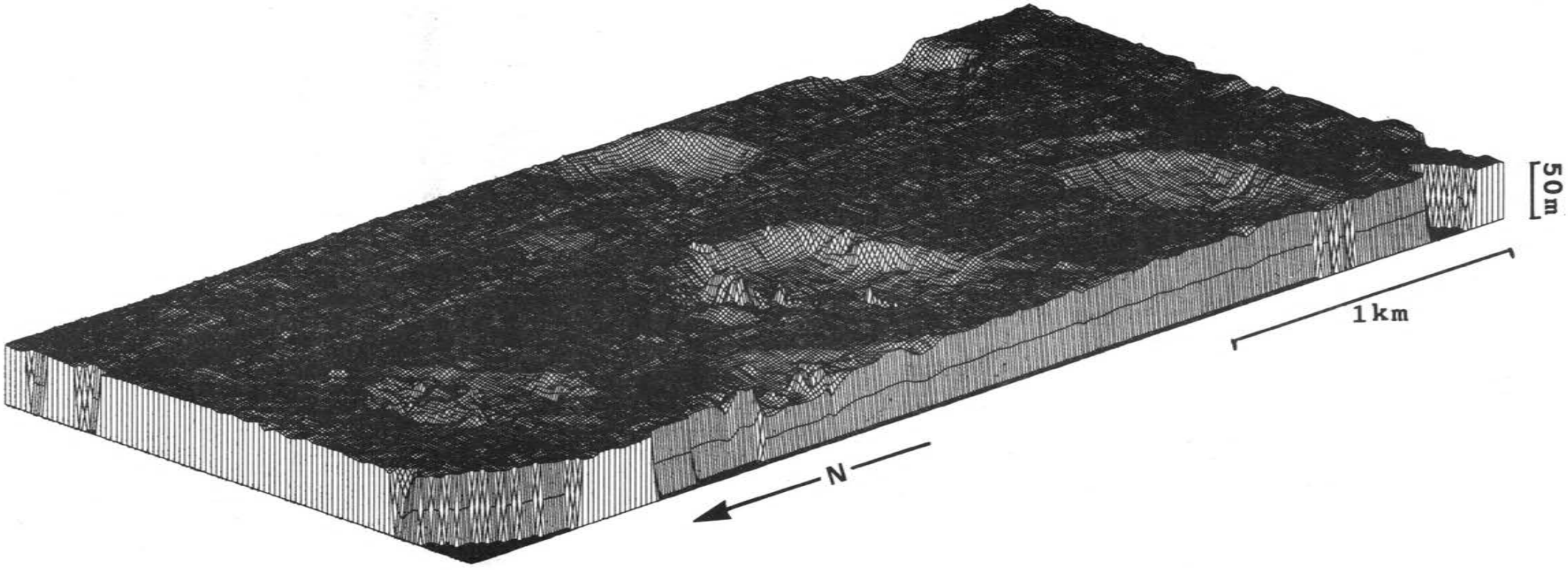

Fig.6. Three dimensional plot of a part of the sea floor depression area southeast of Hopen, based on data from the Simrad hull mounted multi-beam echo sounder.

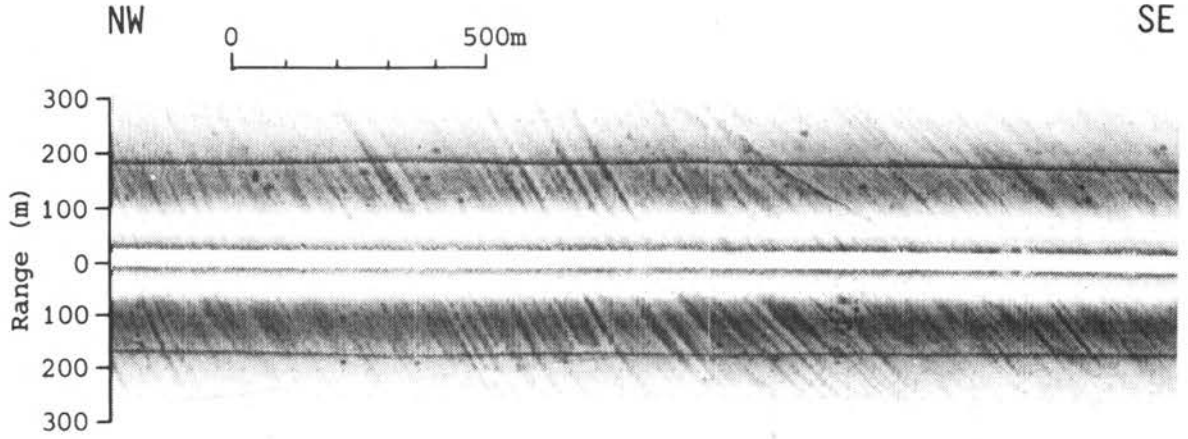

Fig.7. Side scan sonograph from northern Bjørnøyrenna, showing pattern of parallel lineations, interpreted to be flute marks from the base of a grounded ice sheet. For location, see Fig.1a.

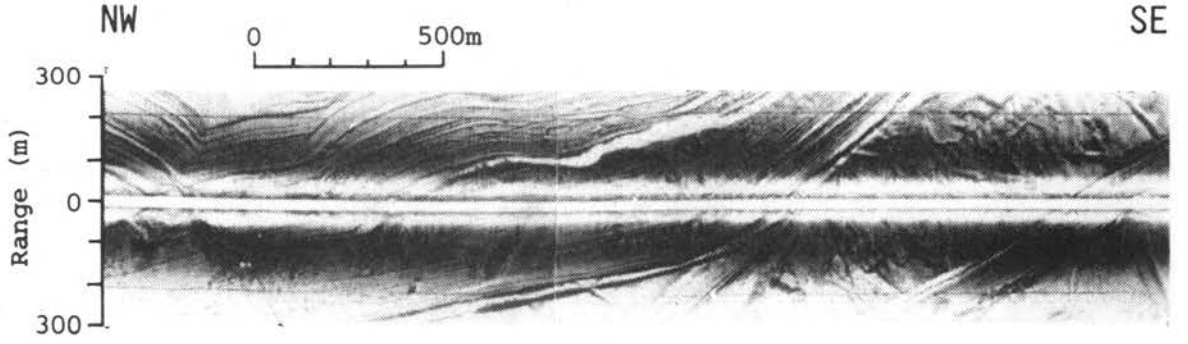

Fig.8. Side scan sonograph showing iceberg plough marks southwest of Storbanken. For location, see Fig.1a.

are widespread over the entire study area. The pockmarks are small and shallow, as also found by Solheim and Elverhøi (1985) in a small area SE of Hopen. This may be a function of the generally thin cover of soft muds in the Barents Sea, as soft, cohesive muds most likely are needed as a recording medium.

The side scan sonar also revealed a large area to the north, covered by several of the lines, that have long, straight, parallel lineations running mainly in a N-S direction (Fig. 7). In the northernmost part, they seem to have two directions; NNW and NNE. The lineatios are cut at various angles by iceberg plough marks. They have no or hardly any topographic relief within the resolution of the shipboard echo sounders. Coring during Leg II showed that this entire area has very little soft mud above a hard moraine. Hence, at this stage, we feel that the most likely explanation for the parallel lineations is that they represent flute marks, scoured by the base of a grounded ice sheet in a firm basal moraine. As such, this pattern represents a strong evidence for the existence of a grounded Late Weichselian Barents Sea ice sheet.

Extensive iceberg ploughing, both relict and recent, is seen over large parts of the study area. An example of gouges after large, multi-keeled bergs is showed in Fig. 8.

Glaciomarine sedimentation

The programme on the west coast of Svalbard also included a study of modern glaciomarine fjord sedimentatio in Krossfjorden. This fjord runs parallel to the general bedrock strike of the region, and in contrast to the Kongsfjorden, the Krossfjorden therefore provide good opportunity to study the primary glaciomarine sediment composition and distribution in a fjord setting, most likely without significant secondary reworking. The sediment distribution from close to the ice front of Liljehøkbreen and further down-fjord is shown in Fig. 9. The "recent" maximum extension of the front is seen at a well defined till ridge. The acoustic character changes gradually fjordwards, reflecting the more coarse grained proximal deposits, grading into the fine grained distal mud. Side scan sonar and 3,5 kHz echosounder both showed few evidences of secondary reworking, and slump feature were only observed on the slope of the outer sill towards the southern end of the profile. The work in Krossfjorden is part of an ongoing programme of studies of modern glaciomarine sedimentary processes in

this area. Previously, similar studies have been conducted in the inner part of Kongsfjorden, and the work is planned to continue with a monitoring programme involving long-term time series for achieving a better quantitative understanding of the various sedimentary processes.

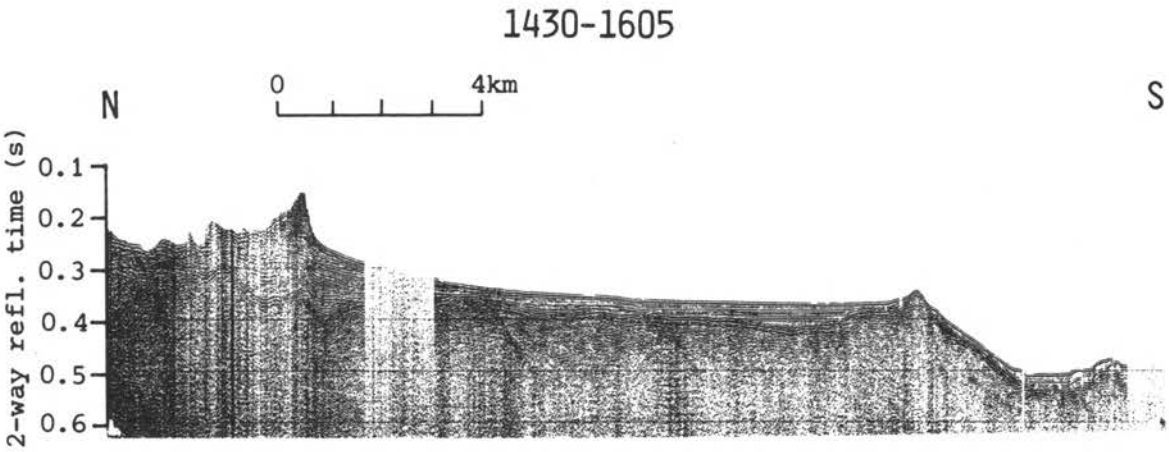

Fig.9. Seismic record (4.5 kJ sparker) from Krossfjorden. The location of Krossfjorden is seen in Fig.1b, and the profile is the line running into the nothwestern branch of the fjord.

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APPENDIX

Leg II, station work.

VC Vibrocorer
GC Gravitycorer
BC Boxcorer
PC Pistoncorer
BP Bottom photograph

STATION NP87-1
DATE 870813

TIME (GMT) 15 40
LATITUDE (^{0}N) 74 04.74
LONGITUDE (^{0}E) 25 30.42
WATERDEPTH (m) 445

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES			1	1	1
PENETRATION (m)					
SAMPLE LENGHT (m)					

COMMENTS: bioturbation through the whole core
colour: 5YR 4/1
samples from the 10 lowest cm

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STATION NP87-2
DATE 870813

TIME (GMT) 22 15
LATITUDE (^{0}N) 74 07.668
LONGITUDE (^{0}E) 25 29.218
WATERDEPTH (m) 445

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		3.6			
SAMPLE LENGTH (m)		1.1			

COMMENTS:

Top: olive green, sandy clayey silt

Bottom: olive grey, gravelly clayey silt

STATION NP87-3
DATE 870814

TIME (GMT) 04 30
LATITUDE (^{0}N) 74 09.00
LONGITUDE (^{0}E) 23 00.00
WATERDEPTH (m) 395

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		2.1			
SAMPLE LENGHT (m)		0.97	0.30		

COMMENTS:

Top: olive green, sandy silt with gravel and macrobenthos and bioturbation.
Bottom: blue grey, sandy-gravelly silt with some stones and shell fragments.

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STATION NP87-4
DATE 870814

TIME (GMT) 04 58
LATITUDE (^{0}N) 74 09.013
LONGITUDE (^{0}E) 22 59.989
WATERDEPTH (m) 395

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		2.0			
SAMPLE LENGTH (m)		0.44	0.40		

COMMENTS:

Top: olive green sandy silt w/gravel and pebbles.

Bottom: blue grey clayey silt, abundant gravels and pebbles.

STATION NP87-5
DATE 870814

TIME (GMT) 06 45
LATITUDE (^{0}N) 74 08.989
LONGITUDE (^{0}E) 22 59.612
WATERDEPTH (m) 395

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		2.30			
SAMPLE LENGHT (m)		1.10			

COMMENTS:

Top: olive grey, gravelly sand w/pebbles.

Bottom: blue grey clayey silt, w/gravell and pebbles.

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STATION NP87-6
DATE 870814

TIME (GMT) 10 56
LATITUDE (^{0}N) 74 09.35
LONGITUDE (^{0}E) 22 59.629
WATERDEPTH (m) 400

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	3.0				
SAMPLE LENGTH (m)	2.93				

COMMENTS: Su lm: 0,9 kPa, 2m: 1.8 kPa, 3m: 4.8 kPa.

Bottom: overconsolidated blue grey silty clay, abundant pebbles.

STATION NP87-7
DATE 870814

TIME (GMT) 12 52
LATITUDE (^{0}N) 74 16.588
LONGITUDE (^{0}E) 22 59.791
WATERDEPTH (m) 243

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES			1		1
PENETRATION (m)			0.35		
SAMPLE LENGHT (m)					

COMMENTS: Su 0.2m: 0.5 kPa, 0.25m: 0.7 kPa, 0.35m: 1.8 kPa

Top: olive grey sandy silt, abundant gravel and pebbles.
Bottom: grey silty clay, abundant pebbles.

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STATION NP87-8
DATE 870814

TIME (GMT) 15 00
LATITUDE (^{0}N) 74 16.493
LONGITUDE (^{0}E) 23 00.002
WATERDEPTH (m) 245

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	2.60				
SAMPLE LENGTH (m)	1.60				

COMMENTS: Su 0.1m: 0.4 kPa, 1.0m: 6.2 kPa.

Top: blue grey silty clay.

Bottom: blue grey silty clay, abundant pebbles overconsolidated.

STATION NP87-9
DATE 870814

TIME (GMT) 16 04
LATITUDE (^{0}N) 74 16.72
LONGITUDE (^{0}E) 23 01.519
WATERDEPTH (m) 245

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		1.90			
SAMPLE LENGHT (m)		0.90			

COMMENTS:

Top: olive grey sandy silt w/large pebbles.

Bottom: olive grey, clayey silt abundant gravel

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STATION NP87-10
DATE 870814

TIME (GMT) 16 35
LATITUDE (^{0}N) 74 16.492
LONGITUDE (^{0}E) 23 00.084
WATERDEPTH (m) 235

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		3.10			
SAMPLE LENGTH (m)		2.10			

COMMENTS:

Top: olive grey, clayey silt, abundant pebbles.

Bottom: olive grey, clayey silt, abundant pebbles.

STATION NP87-11
DATE 870814

TIME (GMT) 17 00
LATITUDE (^{0}N) 74 16.508
LONGITUDE (^{0}E) 22 59.562
WATERDEPTH (m) 241

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		1.68			

COMMENTS:

Top: olive brown, clayey silt, abundant gravel and pebbles.
Bottom: olive brown, sandy clayey silt, abundant pebbles.

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STATION NP87-12
DATE 870814

TIME (GMT) 17 40
LATITUDE (^{0}N) 74 16.594
LONGITUDE (^{0}E) 22 59.955
WATERDEPTH (m) 243

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		1.70			
SAMPLE LENGTH (m)		1.03			

COMMENTS:

Top: dark olive brown, clayey silty sand w/gravel.

Bottom: dark olive grey, sandy clayey silt, scattered pebbles.

STATION NP87-13
DATE 870814

TIME (GMT) 19 55
LATITUDE (°N) 74 35.629
LONGITUDE (°E) 23 00.018
WATERDEPTH (m) 95

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1		1		1
PENETRATION (m)	1.60				
SAMPLE LENGHT (m)	0.87		0.22		

COMMENTS:
BC: dark olive grey, silty sand w/pebbles, bioturbation.
Su 0.1m: <1.0 kPa
VC: Top: dark grey, silty clay, scattered pebbles.
Bottom: blue grey clayey silt, abundant pebbles, overconsolidated. Su 0.8m: >10 kPa.

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STATION NP87-14
DATE 870814

TIME (GMT) 23 20
LATITUDE (°N) 74 35.617
LONGITUDE (°E) 22 59.474
WATERDEPTH (m) 102

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				1
PENETRATION (m)	3.00				
SAMPLE LENGTH (m)	2.98				

COMMENTS: Su 0.1m: 1.9 kPa, 1.0m: 3.0 kPa, 2.0m: 1.5 kPa

Top: olive green, silty clay w/pebbles.

Bottom: blue grey, clayey silt w/pebbles

STATION NP87-15
DATE 870815

TIME (GMT) 00 05
LATITUDE (^{0}N) 74 35.502
LONGITUDE (^{0}E) 22 59.468
WATERDEPTH (m) 101

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				1
PENETRATION (m)	2.95				
SAMPLE LENGHT (m)	2.15				

COMMENTS:

Top: olive grey, silty clay, abundant pebbles.

Bottom: blue grey, silty clay w/pebbles.

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STATION NP87-16
DATE 870815

TIME (GMT) 02 11
LATITUDE (^{0}N) 74 35.579
LONGITUDE (^{0}E) 23 00.424
WATERDEPTH (m) 107

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				1
PENETRATION (m)	2.40				
SAMPLE LENGTH (m)	1.40				

COMMENTS: Su 0.1m: 4.4 kPa, 0.8m: 3.4 kPa, 1.4m: 4.6 kPa

Top: olive green, silty clay, abundant pebbles.

Bottom: blue grey silty clay w/pebbles.

STATION NP87-17
DATE 870815

TIME (GMT) 03 31
LATITUDE (^{0}N) 74 35.838
LONGITUDE (^{0}E) 22 59.998
WATERDEPTH (m) 106

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				1
PENETRATION (m)	>2.73				
SAMPLE LENGHT (m)	2.73				

COMMENTS: Su: 0.1m: <1 kPa, 1.0m: 4.8 kPa.

Top: olive brown, silty sand w/ gravel and pebbles

Bottom: dark grey clay, overconsolidated.

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STATION NP87-18
DATE 870815

TIME (GMT) 04 50
LATITUDE (^{0}N) 74 36.930
LONGITUDE (^{0}E) 23 00.528
WATERDEPTH (m) 122

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	2				1
PENETRATION (m)	3.00				
SAMPLE LENGTH (m)	2.18 2.83				

COMMENTS: Su 1.0m: 3.5 kPa, 2.0m: 3.2 kPa, 2.8m: 6.2 kPa.

Top: dark olive grey layer of gravel and pebbles.

Bottom: Firm dark grey diamicton.

STATION NP87-19
DATE 870815

TIME (GMT) 09 36
LATITUDE (^{0}N) 74 54.351
LONGITUDE (^{0}E) 23 30.554
WATERDEPTH (m) 141

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES			1		1
PENETRATION (m)					
SAMPLE LENGHT (m)			0.25		

COMMENTS:

Top: outwashed material, sand,gravel and pebbles bioturbation.

Bottom: silty clay, scattered sandlenses and pebbles

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STATION NP87-20
DATE 870815

TIME (GMT) 12 46
LATITUDE (^{0}N) 75 07.354
LONGITUDE (^{0}E) 24 43.944
WATERDEPTH (m) 148

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		1.38			
SAMPLE LENGTH (m)		1.35			

COMMENTS:

Top: olive grey silty clay, abundant pebbles, pyrite

Bottom: grey silty clay, scattered pebbles

STATION NP87-21
DATE 870815

TIME (GMT) 14 30
LATITUDE (^{0}N) 75 12.37
LONGITUDE (^{0}E) 24 43.47
WATERDEPTH (m) 110

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	3.00				
SAMPLE LENGHT (m)	3.00				

COMMENTS: Su 0.5m: 2.6 kPa, 1.5m: 1.4 kPa, 2.5m: 3.0 kPa.

Top: olive grey sandy silt macrobenthos.

Bottom: blue grey silty clay, scattered pebbles.

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STATION NP87-22
DATE 870815

TIME (GMT) 15 28
LATITUDE (^{0}N) 75 15.190
LONGITUDE (^{0}E) 24 43.782
WATERDEPTH (m) 178

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)					
SAMPLE LENGTH (m)	1.14				

COMMENTS:

Top: olive grey, soft sandy silty clay w/gravel and pebbles.
Bottom: dark grey, soft silty clay w/pebbles.

STATION NP87-23
DATE 870815

TIME (GMT) 16 54
LATITUDE (^{0}N) 75 17.078
LONGITUDE (^{0}E) 24 18.550
WATERDEPTH (m) 140

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	2.20				
SAMPLE LENGHT (m)	1.37				

COMMENTS: Su 1.3m: 3.0 kPa

Top: olive grey, sandy clay w/gravel and pebbles.

Bottom: dark grey, sandy clay w/pebbles.

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STATION NP87-24
DATE 870815

TIME (GMT) 18 30
LATITUDE (^{0}N) 75 23.992
LONGITUDE (^{0}E) 24 44.100
WATERDEPTH (m) 135

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	3.00				
SAMPLE LENGTH (m)	2.28				

COMMENTS: Su 2.2m: 3 kPa

Top: pebble layer with olive grey clayey sand.

Bottom: dark grey semi-overconsolidated silty clay, abundant gravel and pebbles

STATION NP87-25
DATE 870815

TIME (GMT) 20 26
LATITUDE (°N) 75 17.591
LONGITUDE (°E) 25 25.884
WATERDEPTH (m) 191

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	3.05				
SAMPLE LENGHT (m)	1.67				

COMMENTS:

Top: olive grey, sandy clay w/pebbles, semi overconsolidated.
Bottom: dark grey, silty clay w/pebbles, semi overconsolidated.

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STATION NP87-26
DATE 870816

TIME (GMT) 03 02
LATITUDE (°N) 74 55.436
LONGITUDE (°E) 27 35.171
WATERDEPTH (m) 341

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		3*			1
PENETRATION (m)					
SAMPLE LENGTH (m)		-			

COMMENTS: Empty cores

STATION NP87-27
DATE 870816

TIME (GMT) 04 14
LATITUDE (^{0}N) 74 55.001
LONGITUDE (^{0}E) 27 35.253
WATERDEPTH (m) 380

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)					
SAMPLE LENGHT (m)		-			

COMMENTS: Empty core

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STATION NP87-28
DATE 870816

TIME (GMT) 05 03
LATITUDE (^{0}N) 74 55.092
LONGITUDE (^{0}E) 27 35.181
WATERDEPTH (m) 357

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		
PENETRATION (m)					
SAMPLE LENGTH (m)		-	-		

COMMENTS: Empty cores

STATION NP87-29
DATE 870816

TIME (GMT) 12 08
LATITUDE (^{0}N) 74 55.342
LONGITUDE (^{0}E) 27 35.269
WATERDEPTH (m) 341

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES			1		1
PENETRATION (m)					
SAMPLE LENGHT (m)			0.22		

COMMENTS: Su 0.15m: 1.2 kPa

Top: olive grey silty clay, abundant organic material.

Bottom: blue grey silty clay, abundant shale fragments.

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STATION NP87-30
DATE 870816

TIME (GMT) 13 11
LATITUDE (^{0}N) 74 54.871
LONGITUDE (^{0}E) 27 35.101
WATERDEPTH (m) 367

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES			1		1
PENETRATION (m)					
SAMPLE LENGTH (m)			0.35		

COMMENTS: Su 0.12m: 1.5 kPa,

0-2cm: lightbrown silty sand surface.
2-8cm: olive grey clayey silt - bioturbation.
8-35cm: olive grey silty clay.

STATION NP87-31
DATE 870816

TIME (GMT) 22 00
LATITUDE (^{0}N) 75 54.480
LONGITUDE (^{0}E) 30 51.370
WATERDEPTH (m) 329

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		1.40			
SAMPLE LENGHT (m)		0.56			

COMMENTS:

Dark grey clayey silt.

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STATION NP87-32
DATE 870816

TIME (GMT) 22 39
LATITUDE (^{0}N) 75 58.175
LONGITUDE (^{0}E) 30 58.683
WATERDEPTH (m) 355

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.65			

COMMENTS: Su 0.1m: 0.4 kPa, 1.0m: 0.5 kPa, 1.65m: 1.0 kPa

Top: olive grey, silty clay.

Bottom: dark grey clayey silt.

STATION NP87-33
DATE 870816

TIME (GMT) 23 07
LATITUDE (^{0}N) 75 57.532
LONGITUDE (^{0}E) 31 05.205
WATERDEPTH (m) 323

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		1.63			

COMMENTS:

dark grey silty clay, abundant pebbles - glacimarine clay.

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STATION NP87-34
DATE 870816

TIME (GMT) 23 37
LATITUDE (^{0}N) 76 00.203
LONGITUDE (^{0}E) 31 09.518
WATERDEPTH (m) 328

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.50			

COMMENTS:

dark grey silty clay w/gravel, pyrite.

STATION NP87-35
DATE 870817

TIME (GMT) 00 05
LATITUDE (^{0}N) 76 02.242
LONGITUDE (^{0}E) 31 14.248
WATERDEPTH (m) 338

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		1.65			

COMMENTS:

115-145cm: firm dark grey clayey silt w/gravel

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STATION NP87-36
DATE 870817

TIME (GMT) 00 30
LATITUDE (^{0}N) 76 03.482
LONGITUDE (^{0}E) 31 17.312
WATERDEPTH (m) 333

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.80			

COMMENTS:

140-170cm: soft dark grey, clayey silt w/pebbles and organic material.

STATION NP87-37
DATE 870817

TIME (GMT) 00 56
LATITUDE (°N) 76 04.256
LONGITUDE (°E) 31 19.331
WATERDEPTH (m) 331

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		2.00			

COMMENTS:

0-55cm: olive green marine clay.
55-100cm: dark grey clay w/pebbles.
100-200cm: soft dark grey clayey silt w/gravel.

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STATION NP87-38
DATE 870817

TIME (GMT) 01 21
LATITUDE (°N) 76 05.137
LONGITUDE (°E) 31 21.462
WATERDEPTH (m) 328

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		?			

COMMENTS:

STATION NP87-39
DATE 870817

TIME (GMT) 01 54
LATITUDE (°N) 76 07.394
LONGITUDE (°E) 31 27.849
WATERDEPTH (m) 322

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		1.65			

COMMENTS:

0-17cm: olive grey clay
17-65cm: dark grey sandy silty clay - glasimarine.
65-155cm: soft blue grey silty clay w/gravel and pebbles - glasimarine.

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STATION NP87-40
DATE 870817

TIME (GMT) 02 20
LATITUDE (°N) 76 08.536
LONGITUDE (°E) 31 26.050
WATERDEPTH (m) 313

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.85			

COMMENTS:

0-15cm: olive grey clay.
15-145cm: grey sandy silty clay w/gravel.
145-185cm: soft grey silty clay w/gravel.

STATION NP87-41
DATE 870817

TIME (GMT) 02 43
LATITUDE (°N) 76 09.561
LONGITUDE (°E) 31 34.072
WATERDEPTH (m) 312

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		2.13			

COMMENTS:

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STATION NP87-42
DATE 870817

TIME (GMT) 03 06
LATITUDE (°N) 76 10.453
LONGITUDE (°E) 31 36.901
WATERDEPTH (m) 313

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.81			

COMMENTS:

STATION NP87-43
DATE 870817

TIME (GMT) 03 31
LATITUDE (^{0}N) 76 12.246
LONGITUDE (^{0}E) 31 42.114
WATERDEPTH (m) 320

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		1.95			

COMMENTS:

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STATION NP87-44
DATE 870817

TIME (GMT) 03 55
LATITUDE (^{0}N) 76 13.207
LONGITUDE (^{0}E) 31 45.094
WATERDEPTH (m) 317

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.49			

COMMENTS:

STATION NP87-45
DATE 870817

TIME (GMT) 04 20
LATITUDE (^{0}N) 76 14.500
LONGITUDE (^{0}E) 31 48.205
WATERDEPTH (m) 331

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		0.20			

COMMENTS:

Top: olive grey gravelly clay - bioturbation.

Bottom: dark grey overconsolidated diamicton.

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STATION NP87-46
DATE 870817

TIME (GMT) 04 49
LATITUDE (^{0}N) 76 15.191
LONGITUDE (^{0}E) 31 49.937
WATERDEPTH (m) 308

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.49			

COMMENTS:

STATION NP87-47
DATE 870817

TIME (GMT) 05 12
LATITUDE (^{0}N) 76 15.826
LONGITUDE (^{0}E) 31 51.791
WATERDEPTH (m) 305

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.50			
SAMPLE LENGHT (m)		1.57			

COMMENTS: Glacimarine clay, abundant gravel and pebbles.

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STATION NP87-48
DATE 870817

TIME (GMT) 05 34
LATITUDE (^{0}N) 76 16.451
LONGITUDE (^{0}E) 31 53.536
WATERDEPTH (m) 298

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.70			

COMMENTS: blue grey pelitt w/gravel and pebbles

STATION NP87-49
DATE 870817

TIME (GMT) 06 00
LATITUDE (^{0}N) 76 17.175
LONGITUDE (^{0}E) 31055.105
WATERDEPTH (m) 291

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2			
PENETRATION (m)		- 2.80			
SAMPLE LENGHT (m)		1.25			

COMMENTS: overconsolidated diamicton.

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STATION NP87-50
DATE 870817

TIME (GMT) 06 43
LATITUDE (^{0}N) 76 19.916
LONGITUDE (^{0}E) 32 02.211
WATERDEPTH (m) 283

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	2*	3 (1 & 2 / 3)			
PENETRATION (m)	2.78 3.00	2.80 2.50			
SAMPLE LENGTH (m)	0.30 1.23	0.30 0.55			

COMMENTS: Bioturbated glacimarine sediments.

0-40cm: soft silty clay, abundant gravel and pebbles.
40-55cm: stiff olive grey silty clay, with less gravel and pebbles.

STATION NP87-51
DATE 870817

TIME (GMT) 07 25
LATITUDE (^{0}N) 76 20.667
LONGITUDE (^{0}E) 32 04.018
WATERDEPTH (m) 287

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		1.00			
SAMPLE LENGHT (m)		0.80			

COMMENTS: Soft, olive grey, gravelly sandy pelitt w/pebbles

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STATION NP87-52
DATE 870817

TIME (GMT) 07 52
LATITUDE (^{0}N) 76 22.035
LONGITUDE (^{0}E) 32 07.313
WATERDEPTH (m) 286

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1*	1			
PENETRATION (m)	2.10				
SAMPLE LENGTH (m)	1.25	0.14			

COMMENTS:

Top: soft gravelly and pebbly clay.

Bottom: overconsolidated blue grey diamicton.

STATION NP87-53
DATE 870817

TIME (GMT) 08 17
LATITUDE (°N) 76 23.094
LONGITUDE (°E) 32 09.393
WATERDEPTH (m) 282

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2*	1		
PENETRATION (m)		2.35			
SAMPLE LENGHT (m)		1.49 1.30	-		

COMMENTS:

Top: olive grey silty clay.

Bottom: dark grey pelitt w/gravel and pebbles.

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STATION NP87-54
DATE 870817

TIME (GMT) 14 49
LATITUDE (°N) 76 20.542
LONGITUDE (°E) 31 23.286
WATERDEPTH (m) 318

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.70	0.35		

COMMENTS: Su 0.0m: 0.8 kPa, 0.8m: 0.3 kPa, 1.6m: 1.0 kPa.

Top: olive grey silty clay, abundant macrobenthos.

Bottom: blue grey silty clay w/pebbles.

STATION NP87-55
DATE 870817

TIME (GMT) 16 42
LATITUDE (^{0}N) 76 24.035
LONGITUDE (^{0}E) 30 59.535
WATERDEPTH (m) 305

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		
PENETRATION (m)		2.60			
SAMPLE LENGHT (m)		1.32	0.39		

COMMENTS:

Top: soft olive grey silty clay.

Bottom: blue grey glacimarine clay (rel. soft).

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STATION NP87-56
DATE 870817

TIME (GMT) 17 55
LATITUDE (^{0}N) 76 23.249
LONGITUDE (^{0}E) 30 33.453
WATERDEPTH (m) 297

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	2.40				
SAMPLE LENGTH (m)	0.35				

COMMENTS: olive grey silty clay (rel. soft).

STATION NP87-57
DATE 870817

TIME (GMT) 19 24
LATITUDE (^{0}N) 76 28.398
LONGITUDE (^{0}E) 30 42.027
WATERDEPTH (m) 288

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	0.82				
SAMPLE LENGHT (m)	0.23				

COMMENTS:

Top: soft olive grey silty clay.

Bottom: firm diamicton.

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STATION NP87-58
DATE 870817

TIME (GMT) 21 29
LATITUDE (^{0}N) 76 37.081
LONGITUDE (^{0}E) 30 31.780
WATERDEPTH (m) 276

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	2.80				
SAMPLE LENGTH (m)	1.50				

COMMENTS:

Top: olive grey clay.

Bottom: overconsolidated dark grey clayey sand w/pebbbles.

STATION NP87-59
DATE 870817

TIME (GMT) 22 20
LATITUDE (^{0}N) 76 39.016
LONGITUDE (^{0}E) 30 22.035
WATERDEPTH (m) 281

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	2.43				
SAMPLE LENGHT (m)	0.75				

COMMENTS: Su 0.1m: 0.6 kPa, 0.75m: 1.3 kPa.

Top: olive green silty clay.

Bottom: blue grey clayey silt, scattered clasts.

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STATION NP87-60
DATE 870817

TIME (GMT) 23 43
LATITUDE (^{0}N) 76 43.196
LONGITUDE (^{0}E) 30 00.173
WATERDEPTH (m) 261

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	1.80				
SAMPLE LENGTH (m)	1.12				

COMMENTS: Su 0.0m: 0.6 kPa, 0.45m: 6.2 kPa,
1.12m: >10.0 kPa.

0.0m: olive green clayey silt w/organic material.
0.45m: blue grey clayey silt w/sand and gravel (dry).
1.12m: blue grey clayey silt w/sand and gravel (dry).

STATION NP87-61
DATE 870818

TIME (GMT) 03 03
LATITUDE (^{0}N) 76 45.174
LONGITUDE (^{0}E) 28 33.149
WATERDEPTH (m) 156

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	1.90				
SAMPLE LENGHT (m)	1.60				

COMMENTS: Su 1.0m: 1.8/2.2/4.0 kPa, 1.6m: 10.0 kPa.

0.0m: olive grey, clayey gravelly sand w/organic material.
1.0m: blue grey, clayey gravelly sand.
1.6m: blue grey, gravelly sandy silty clay (till-material).

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STATION NP87-62
DATE 870818

TIME (GMT) 05 45
LATITUDE (^{0}N) 75 35.042
LONGITUDE (^{0}E) 28 06.112
WATERDEPTH (m) 162

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	1.80				
SAMPLE LENGTH (m)	1.19				

COMMENTS:

Top: very soft olive grey sandy clay.

Bottom: very soft dark grey sandy clay.

STATION NP87-63
DATE 870818

TIME (GMT) 05 58
LATITUDE (°N) 76 35.223
LONGITUDE (°E) 28 07.263
WATERDEPTH (m) 167

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		3.00			
SAMPLE LENGHT (m)		2.00			

COMMENTS:

Top: soft olive grey, sandy silty clay.

Bottom: soft dark blue grey silty clay.

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STATION NP87-64
DATE 870818

TIME (GMT) 08 40
LATITUDE (°N) 76 19.498
LONGITUDE (°E) 29 07.158
WATERDEPTH (m) 220

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	0.80				
SAMPLE LENGTH (m)	-				

COMMENTS: soft olive grey clay.

STATION NP87-65
DATE 870818

TIME (GMT) 10 19
LATITUDE (°N) 76 17.525
LONGITUDE (°E) 29 40.848
WATERDEPTH (m) 286

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	1.80				
SAMPLE LENGHT (m)	0.80				

COMMENTS: Su 0.0m: 1.0 kPa, 0.8m: 2.0 kPa.

Top: olive grey clayey silt, pyrite.

Bottom: blue grey clayey silt, abundant pebbles.

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STATION NP87-66
DATE 870818

TIME (GMT) 14 32
LATITUDE (°N) 76 13.316
LONGITUDE (°E) 32 01.740
WATERDEPTH (m) 301

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2*			
PENETRATION (m)		2.40 2.80			
SAMPLE LENGTH (m)		1.00 1.60			

COMMENTS: Su 0.0m: 1.0 kPa.

0.0m: olive green, silty clay.
1.0m: blue grey, silty clay w/clasts.
1.6m: blue grey, clayey silt, abundant clasts.

STATION NP87-67
DATE 870818

TIME (GMT) 15 46
LATITUDE (^{0}N) 76 09.808
LONGITUDE (^{0}E) 32 21.545
WATERDEPTH (m) 318

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		1.40			

COMMENTS:

0-0.3m: olive grey clay.

0.3-1.4m: blue grey clay w/sand,gravel and scattered pebbles. Rel. soft Su: 1.0 kPa

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STATION NP87-68
DATE 870818

TIME (GMT) 16 28
LATITUDE (^{0}N) 76 08.773
LONGITUDE (^{0}E) 32 28.284
WATERDEPTH (m) 322

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		3.00			
SAMPLE LENGTH (m)		2.11			

COMMENTS:

Top: soft olive grey clay.

Bottom: soft dark grey clay.

STATION NP87-69
DATE 870818

TIME (GMT) 16 28
LATITUDE (^{0}N) 76 07.960
LONGITUDE (^{0}E) 32 29.859
WATERDEPTH (m) 319

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.90			
SAMPLE LENGHT (m)		1.49			

COMMENTS: Su 0.0m: <1.0 kPa, 1.0m: 1.0 kPa.

Top: very soft olive grey clay.

Bottom: rel. soft dark grey clay w/gravel and pebbles.

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STATION NP87-70
DATE 870818

TIME (GMT) 17 21
LATITUDE (^{0}N) 76 07.395
LONGITUDE (^{0}E) 32 31.434
WATERDEPTH (m) 319

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1*				
PENETRATION (m)	2.85				
SAMPLE LENGTH (m)	1.51				

COMMENTS:

0.0-1.1m: soft olive grey clay.

1.1-1.5m: dark grey gravelly clay.

STATION NP87-71
DATE 870818

TIME (GMT) 17 49
LATITUDE (^{0}N) 76 06.980
LONGITUDE (^{0}E) 32 33.039
WATERDEPTH (m) 331

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2*			
PENETRATION (m)		3.05 3.07			
SAMPLE LENGHT (m)		2.04 2.12			

COMMENTS:

Top: soft olive grey silty clay.

Bottom: dark blue grey clay w/gravel and pebbles.

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STATION NP87-72
DATE 870818

TIME (GMT) 18 08
LATITUDE (^{0}N) 76 06.468
LONGITUDE (^{0}E) 32 35.901
WATERDEPTH (m) 298

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2	1		1
PENETRATION (m)		2.94 ?			
SAMPLE LENGTH (m)		- 0.55	-		

COMMENTS:

0.0-0.4m: glacimarine and Holocene clay.

Bottom: overconsolidated diamicton.

STATION NP87-73
DATE 870818

TIME (GMT) 19 31
LATITUDE (^{0}N) 76 06.212
LONGITUDE (^{0}E) 32 37.726
WATERDEPTH (m) 309

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.85			
SAMPLE LENGHT (m)		1.30			

COMMENTS:

Lower part: dark grey clay w/gravel and pebbles.

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STATION NP87-74
DATE 870818

TIME (GMT) 19 53
LATITUDE (^{0}N) 76 05.814
LONGITUDE (^{0}E) 32 39.541
WATERDEPTH (m) 321

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*	1		1
PENETRATION (m)		1.85			
SAMPLE LENGTH (m)		1.25	-		

COMMENTS:

Lower part: dark grey clay w/gravel and pebbles.

STATION NP87-75
DATE 870818

TIME (GMT) 20 24
LATITUDE (^{0}N) 76 05.454
LONGITUDE (^{0}E) 32 41.093
WATERDEPTH (m) 317

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		3.05			
SAMPLE LENGHT (m)		1.92			

COMMENTS:

0.0-0.45m: olive grey clay.

0.45-1.92m: dark grey clay, scattered gravel.

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STATION NP87-76
DATE 870818

TIME (GMT) 20 51
LATITUDE (^{0}N) 76 04.838
LONGITUDE (^{0}E) 32 44.164
WATERDEPTH (m) 321

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		3.05			
SAMPLE LENGTH (m)		0.95			

COMMENTS:

Lower part: soft dark grey clay, scattered gravel and pebbles.

STATION NP87-77
DATE 870818

TIME (GMT) 21 24
LATITUDE (°N) 76 03.899
LONGITUDE (°E) 32 49.753
WATERDEPTH (m) 316

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.95			
SAMPLE LENGHT (m)		1.51			

COMMENTS:

Lower part: soft dark grey clay, scattered gravel and pebbles.

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STATION NP87-78
DATE 870818

TIME (GMT) 21 43
LATITUDE (°N) 76 03.353
LONGITUDE (°E) 32 51.950
WATERDEPTH (m) 316

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2*			
PENETRATION (m)		- 2.80			
SAMPLE LENGTH (m)		- 1.57			

COMMENTS:

0.0-0.2m: olive grey clay.

0.2-1.57m: grey, silty clay, scattered clasts.

STATION NP87-79
DATE 870818

TIME (GMT) 22 32
LATITUDE (^{0}N) 76 01.754
LONGITUDE (^{0}E) 33 01.183
WATERDEPTH (m) 318

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		3*	1		1
PENETRATION (m)		2.8			
SAMPLE LENGHT (m)		$0^1.85$ $1.^236$ $1.^375$	0.35		

COMMENTS: Su 0.0m: 1.2 kPa, 1.0m: 0.4 kPa,

0.0m: olive green clayey silt.
1.0m: blue grey clayey silt.
1.75m: blue grey silt w/clasts.

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STATION NP87-80
DATE 870819

TIME (GMT) 00 28
LATITUDE (^{0}N) 76 00.894
LONGITUDE (^{0}E) 33 06.039
WATERDEPTH (m) 316

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		2.80			
SAMPLE LENGTH (m)		1.66			

COMMENTS:

0.0-0.25m: olive grey clay, sulphids.
0.25-1.36m: very soft, grey glasimarine clay.
1.36-1.66m: dark grey, gravelly silty clay.

STATION NP87-81
DATE 870819

TIME (GMT) 01 01
LATITUDE (^{0}N) 75 59.723
LONGITUDE (^{0}E) 33 11.728
WATERDEPTH (m) 313

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		1.98			
SAMPLE LENGHT (m)		1.34			

COMMENTS:

0.0-0.23m: olive grey clay, w/org. material.
0.23-1.14m: soft, olive grey clay.
1.14-1.34m: silty sand.

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STATION NP87-82
DATE 870819

TIME (GMT) 01 28
LATITUDE (^{0}N) 75 58.252
LONGITUDE (^{0}E) 33 18.745
WATERDEPTH (m) 292

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2*			
PENETRATION (m)		1[1].40 [2]-			
SAMPLE LENGTH (m)		1.00 -			

COMMENTS:

0.0-0.05m: grey clay, marine.
0.05-0.6m: grey gravelly clay, glacimarine.
0.6-0.9m: soft, blue grey, gravelly silty clay.
0.9-1.0m: soft, blue grey clay, glacimarine/marine.

STATION NP87-83
DATE 870819

TIME (GMT) 02 46
LATITUDE (^{0}N) 75 57.224
LONGITUDE (^{0}E) 33 24.438
WATERDEPTH (m) 273

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		3	1		1
PENETRATION (m)		$0^1.90$ $1^2.00$ $2^3.15$			
SAMPLE LENGHT (m)		0.45 0.60 0.70	0.35		

COMMENTS:

0.0-0.25m: soft, olive grey marine clay.
0.25-0.4m: soft, grey silty clay, pyrite.
0.4-0.7m: soft, blue grey, gravelly, pebbly marine clay.

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STATION NP87-84
DATE 870819

TIME (GMT) 05 00
LATITUDE (^{0}N) 75 51.780
LONGITUDE (^{0}E) 33 51.040
WATERDEPTH (m) 244

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		2.40			
SAMPLE LENGTH (m)		1.00	0.45		

COMMENTS:

Top: olive grey, silty clay.

Bottom: dark blue grey, silty clay w/gravel.

STATION NP87-85
DATE 870819

TIME (GMT) 06 58
LATITUDE (°N) 75 45.528
LONGITUDE (°E) 34 25.793
WATERDEPTH (m) 198

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2	1		1
PENETRATION (m)		-	-		
SAMPLE LENGHT (m)		-	-		

COMMENTS: Empty.

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STATION NP87-86
DATE 870819

TIME (GMT) 08 20
LATITUDE (°N) 75 53.532
LONGITUDE (°E) 34 19.988
WATERDEPTH (m) 245

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES			1		
PENETRATION (m)					
SAMPLE LENGTH (m)			-		

COMMENTS: Empty.

STATION NP87-87
DATE 870819

TIME (GMT) 08 38
LATITUDE (^{0}N) 75 53.931
LONGITUDE (^{0}E) 34 18.746
WATERDEPTH (m) 248

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES			1		1
PENETRATION (m)					
SAMPLE LENGHT (m)			-		

COMMENTS: Empty

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STATION NP87-88
DATE 870819

TIME (GMT) 09 26
LATITUDE (^{0}N) 75 55.698
LONGITUDE (^{0}E) 34 09.023
WATERDEPTH (m) 269

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		1.67			
SAMPLE LENGTH (m)		0.90			

COMMENTS:

0.0-0.5m: soft, grey silty clay.
0.5-0.9m: soft, dark grey, silty clay w/gravel.

STATION NP87-89
DATE 870819

TIME (GMT) 09 54
LATITUDE (^{0}N) 75 56.314
LONGITUDE (^{0}E) 34 06.138
WATERDEPTH (m) 280

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		0.85			
SAMPLE LENGHT (m)		0.70			

COMMENTS: -

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STATION NP87-90
DATE 870819

TIME (GMT) 10 47
LATITUDE (^{0}N) 75 56.685
LONGITUDE (^{0}E) 34 04.183
WATERDEPTH (m) 266

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1*			
PENETRATION (m)		1.70			
SAMPLE LENGTH (m)		0.60			

COMMENTS:

0.0-0.1m: olive grey, silty clay.

0.1-0.6m: blue grey, gravelly clayey silt.

STATION NP87-91
DATE 870819

TIME (GMT) 12 20
LATITUDE (^{0}N) 75 56.380
LONGITUDE (^{0}E) 34 05.651
WATERDEPTH (m) 273

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1*				
PENETRATION (m)	2.90				
SAMPLE LENGHT (m)	1.37				

COMMENTS:

0.0-1.0m: olive grey, silty clay, pyrite.

1.0-1.37m: diamicton.

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STATION NP87-92
DATE 870819

TIME (GMT) 13 09
LATITUDE (^{0}N) 75 56.492
LONGITUDE (^{0}E) 34 04.666
WATERDEPTH (m) 280

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	2*				
PENETRATION (m)	1^1.82 1^2.40				
SAMPLE LENGTH (m)	0.92 0.76				

COMMENTS:

^{1}: mostly soft consolidated coarse grained grey sandstone.

^{2}: top: soft olive grey, silty clay.

bottom: dark grey, clayey gravelly sand, rel. firm diamicton.

STATION NP87-93
DATE 870819

TIME (GMT) 19 00
LATITUDE (^{0}N) 75 56.954
LONGITUDE (^{0}E) 34 02.518
WATERDEPTH (m) 260

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	2				
PENETRATION (m)	1.82 [1] 1.40 [2]				
SAMPLE LENGHT (m)	0.92 0.76				

COMMENTS: 1) mainly grey, coarse grained, relative unconsolidated sandstone.

2) Top: olive grey, soft silty clay
Lover part: dark grey, clayey gravelly sand (stiff).

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STATION NP87-94
DATE 870819

TIME (GMT) 21 40
LATITUDE (^{0}N) 75 57.015
LONGITUDE (^{0}E) 34 02.069
WATERDEPTH (m) 265

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	2.95				
SAMPLE LENGHT (m)	1.46				

COMMENTS:

Upper part: clay

Lower part: grey rel. unconsolidated sandstone

STATION NP87-95
DATE 870820

TIME (GMT) 00 14
LATITUDE (°N) 76 10.135
LONGITUDE (°E) 32 53.573
WATERDEPTH (m) 306

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		1.70			
SAMPLE LENGTH (m)		0.90	0.45		

COMMENTS: Su 0.0m: 0.8 kPa, 0.9m. 0.6 kPa.

Top: olive grey, silty clay.

Bottom: blue grey, silty clay, glacimarine.

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STATION NP87-96
DATE 870820

TIME (GMT) 03 19
LATITUDE (°N) 76 13.800
LONGITUDE (°E) 31 32.741
WATERDEPTH (m) 323

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		2.90			
SAMPLE LENGHT (m)		1.93	0.40		

COMMENTS: Su 0.0m: 1.2 kPa, 1.0m: 0.2 kPa, 1.93m: 0.6 kPa.

0.0m: grey, gravelly sandy silt.
1.0m: blue grey sandy silt.
1.9m: blue grey sandy silt.

STATION NP87-97
DATE 870820

TIME (GMT) 05 10
LATITUDE (^{0}N) 76 23.777
LONGITUDE (^{0}E) 31 43.063
WATERDEPTH (m) 309

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		3.08			
SAMPLE LENGTH (m)		1.68	0.30		

COMMENTS: Su, whole core <1 kPa.

0.0-1.0m: soft olive grey clay.

1.0-1.67m: soft blue grey, sandy silty clay, scattered clasts.

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STATION NP87-98
DATE 870820

TIME (GMT) 06 50
LATITUDE (^{0}N) 76 23.951
LONGITUDE (^{0}E) 32 11.660
WATERDEPTH (m) 200

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		2.95			
SAMPLE LENGHT (m)		1.73	0.40		

COMMENTS:

Top: soft olive grey clay.

Bottom: blue grey clay, w/ gravel and sand.

STATION NP87-99
DATE 870820

TIME (GMT) 08 26
LATITUDE (^{0}N) 76 26.632
LONGITUDE (^{0}E) 32 21.886
WATERDEPTH (m) 265

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2	1		1
PENETRATION (m)		½ 2.95			
SAMPLE LENGTH (m)		0.20 1.60	0.40		

COMMENTS: : The whole sample was silty clay w/ scattered clasts.[2]

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STATION NP87-100
DATE 870820

TIME (GMT) 10 07
LATITUDE (^{0}N) 76 29.859
LONGITUDE (^{0}E) 32 26.854
WATERDEPTH (m) 271

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		0.5			
SAMPLE LENGHT (m)		0.28	0.40		

COMMENTS: GC - blue grey, overconsolidated silty clay, scattered clasts.

STATION NP87-101
DATE 870820

TIME (GMT) 11 24
LATITUDE (°N) 76 30.005
LONGITUDE (°E) 32 29.078
WATERDEPTH (m) 235

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		
PENETRATION (m)		-			
SAMPLE LENGTH (m)		-	0.32		

COMMENTS:

0.0-0.5m: partly outwashed surface, gravelly.
0.5-0.32m: blue grey clayey silt, w/sandlenses.

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STATION NP87-102
DATE 870820

TIME (GMT) 15 48
LATITUDE (°N) 76 33.798
LONGITUDE (°E) 32 06.729
WATERDEPTH (m) 265

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		2.90			
SAMPLE LENGHT (m)		1.78			

COMMENTS: Su 1.0m: 0.2 kPa, 1.78m: 0.6 kPa.

0.0m: olive grey clayey silt.
1.0m: blue grey silty sand, scattered clasts.
1.78m: blue grey silty sand, scattered clasts.

STATION NP87-103
DATE 870820

TIME (GMT) 16 23
LATITUDE (^{0}N) 76 35.722
LONGITUDE (^{0}E) 31 55.625
WATERDEPTH (m) 285

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		3.09			
SAMPLE LENGTH (m)		1.70			

COMMENTS: Su <1 kPa (whole sample)

Top: soft olive grey, silty clay.

Bottom: soft blue grey, gravelly clay.

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STATION NP87-104
DATE 870820

TIME (GMT) 17 47
LATITUDE (^{0}N) 76 33.699
LONGITUDE (^{0}E) 32 40.269
WATERDEPTH (m) 235

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			1
PENETRATION (m)		0.5			
SAMPLE LENGHT (m)		0.15			

COMMENTS:

Top: olive brown, gravelly sand.

Bottom: dark grey, overconsolidated clay w/gravel and pebbles.

STATION NP87-105
DATE 870820

TIME (GMT) 23 05
LATITUDE (^{0}N) 76 28.523
LONGITUDE (^{0}E) 33 15.510
WATERDEPTH (m) 224

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		0.78			
SAMPLE LENGTH (m)		0.15			

COMMENTS: Blue grey silty sand.

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STATION NP87-106
DATE 870820

TIME (GMT) 23 21
LATITUDE (^{0}N) 76 28.218
LONGITUDE (^{0}E) 33 17.336
WATERDEPTH (m) 269

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		2.80			
SAMPLE LENGHT (m)		0.95			

COMMENTS: Su 0.0m: 0.8 kPa, 0.95m: 1.6 kPa.

Top: blue grey silty clay.

Bottom: blue grey silty clay.

STATION NP87-107
DATE 870821

TIME (GMT) 00 48
LATITUDE (^{0}N) 76 35.164
LONGITUDE (^{0}E) 32 44.045
WATERDEPTH (m) 253

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		1.50			
SAMPLE LENGTH (m)		0.50	0.35		

COMMENTS:

GC: soft, blue grey sandy silt, scattered clasts.

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STATION NP87-108
DATE 870821

TIME (GMT) 02 02
LATITUDE (^{0}N) 76 36.213
LONGITUDE (^{0}E) 32 47.768
WATERDEPTH (m) 235

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1	1			1
PENETRATION (m)	3.05	2.05			
SAMPLE LENGHT (m)	1.27	0.20			

COMMENTS:

Top: olive grey, sandy silt.

Bottom: grey sandstone.

STATION NP87-109
DATE 870827

TIME (GMT) 02 57
LATITUDE (^{0}N) 76 38.262
LONGITUDE (^{0}E) 32 52.571
WATERDEPTH (m) 178

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			1
PENETRATION (m)		1.75			
SAMPLE LENGTH (m)		0.70			

COMMENTS:

Top: grey clayey silt.

Bottom: blue grey clayey silt, stiffer.

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STATION NP87-110
DATE 870821

TIME (GMT) 04 04
LATITUDE (^{0}N) 76 40.519
LONGITUDE (^{0}E) 32 58.823
WATERDEPTH (m) 183

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		0.50			
SAMPLE LENGHT (m)		-			

COMMENTS: stiff diamicton.

STATION NP87-111
DATE 870811

TIME (GMT) 05 00
LATITUDE (°N) 76 45.084
LONGITUDE (°E) 33 09.149
WATERDEPTH (m) 135

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1	1			1
PENETRATION (m)	2.80	1.50			
SAMPLE LENGTH (m)	1.78	0.80			

COMMENTS:

Top: stiff olive grey, silty clayey sand, scattered clasts.
Bottom: blue grey, silty clayey sand.

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STATION NP87-112
DATE 870821

TIME (GMT) 05 40
LATITUDE (°N) 76 47.536
LONGITUDE (°E) 33 17.048
WATERDEPTH (m) 118

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1	1			1
PENETRATION (m)	2.80	2.55			
SAMPLE LENGHT (m)	2.23	1.66			

COMMENTS: Su 2.23m: >10 kPa.

VC-Top: soft dark grey, sandy silt w/clasts.

VC-Bottom: overconsolidated blue grey, sandy silt.

STATION NP87-113
DATE 870821

TIME (GMT) 06 30
LATITUDE (°N) 76 50.599
LONGITUDE (°E) 33 26.337
WATERDEPTH (m) 119

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			1
PENETRATION (m)		1.00			
SAMPLE LENGTH (m)		0.38			

COMMENTS: Rel. firm, dark grey silty clay, w/gravel and pebbles. Su: 3.0 kPa.

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STATION NP87-114
DATE 870821

TIME (GMT) 07 27
LATITUDE (°N) 76 56.179
LONGITUDE (°E) 33 43.284
WATERDEPTH (m) 138

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1	1			1
PENETRATION (m)	1.80	0.50			
SAMPLE LENGHT (m)	1.28	0.18			

COMMENTS:

VC-Top: soft, dark grey silty sand, abundant clasts (angular shale fragments).
VC-Bottom: stiff, dark grey silty sand.

STATION NP87-115
DATE 870821

TIME (GMT) 08 42
LATITUDE (^{0}N) 77 00.050
LONGITUDE (^{0}E) 33 54.575
WATERDEPTH (m) 162

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	1.65				
SAMPLE LENGTH (m)	0.48				

COMMENTS: Soft, blue grey silty clay. stiff diamicton on the outside.

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STATION NP87-116
DATE 870821

TIME (GMT) 19 57
LATITUDE (^{0}N) 76 51.233
LONGITUDE (^{0}E) 30 31.270
WATERDEPTH (m) 227

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				1
PENETRATION (m)	2.95				
SAMPLE LENGHT (m)	2.86				

COMMENTS:

Top: olive grey, gravelly and pebbly clay.

The rest: rel. firm, dark grey silty clay, w/gravel and pebbles. Su: 3.0 kPa.

STATION NP87-117
DATE 870822

TIME (GMT) 04 20
LATITUDE (°N) 78 02.331
LONGITUDE (°E) 32 28.769
WATERDEPTH (m) 159

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		0.50			
SAMPLE LENGTH (m)		0.39	0.34		

COMMENTS: Su 0.0m: 2-3 kPa.

GC-Top: rel. firm, olive grey silty clay.

GC-Bottom: blue grey silty clay.

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STATION NP87-118
DATE 870822

TIME (GMT) 06 06
LATITUDE (°N) 78 08.351
LONGITUDE (°E) 31 48.159
WATERDEPTH (m) 205

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		3.30			
SAMPLE LENGHT (m)		2.05	0.40		

COMMENTS:
GC-0.0m: olive grey, silty sandy clay.
1.0m: soft, olive grey, silty clay.
2.0m: blue grey clay, w/gravel and pebbles.

STATION NP87-119
DATE 870822

TIME (GMT) 07 51
LATITUDE (^{0}N) 78 15.079
LONGITUDE (^{0}E) 31 04.490
WATERDEPTH (m) 248

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		3.10			
SAMPLE LENGTH (m)		2.30	0.48		

COMMENTS: GC-soft, olive grey clay, through the whole sequence.

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STATION NP87-120
DATE 870822

TIME (GMT) 09 26
LATITUDE (^{0}N) 78 19.145
LONGITUDE (^{0}E) 30 37.097
WATERDEPTH (m) 263

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1				
PENETRATION (m)	0.80				
SAMPLE LENGHT (m)	-				

COMMENTS: Empty core.

STATION NP87-121
DATE 870822

TIME (GMT) 10 57
LATITUDE (°N) 78 20.639
LONGITUDE (°E) 30 26.309
WATERDEPTH (m) 286

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	2				
PENETRATION (m)	0.65 1.05				
SAMPLE LENGTH (m)	0.20 0.25				

COMMENTS: Olive grey silty clay.

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STATION NP87-122
DATE 870822

TIME (GMT) 13 44
LATITUDE (°N) 78 25.470
LONGITUDE (°E) 29 53.119
WATERDEPTH (m) 246

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES	1	1			
PENETRATION (m)	1.70	2.60			
SAMPLE LENGHT (m)	0.40	1.10			

COMMENTS: Su 0.0m: 1.6 kPa.

GC-Top: olive green, clayey silt.
Bottom: grey blue, glacimarine clay.

STATION NP87-123
DATE 880824

TIME (GMT) 22 56
LATITUDE (^{0}N) 79 18.850
LONGITUDE (^{0}E) 11 38.376
WATERDEPTH (m) 158

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		2.90			
SAMPLE LENGTH (m)		0.60			

COMMENTS: Soft, buff grey clay w/monosulphides.

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STATION NP87-124
DATE 870824

TIME (GMT) 23 14
LATITUDE (^{0}N) 79 18.476
LONGITUDE (^{0}E) 11 38.245
WATERDEPTH (m) 144

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		2.90			
SAMPLE LENGHT (m)		2.00			

COMMENTS: Grey/buff clay, w/monosulphid patches.

STATION NP87-125
DATE 870824

TIME (GMT) 23 34
LATITUDE (^{0}N) 79 18.419
LONGITUDE (^{0}E) 11 37.808
WATERDEPTH (m) 143

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		?			
SAMPLE LENGTH (m)		1.16			

COMMENTS: Grey sloppy clay, w/sand layers.

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STATION NP87-126
DATE 870825

TIME (GMT) 00 45
LATITUDE (^{0}N) 79 17.831
LONGITUDE (^{0}E) 11 38.350
WATERDEPTH (m) 207

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		6.00			
SAMPLE LENGHT (m)		5.80			

COMMENTS: Grey at base, sandy clay.

STATION NP87-127
DATE 870825

TIME (GMT) 01 04
LATITUDE (^{0}N) 79 16.317
LONGITUDE (^{0}E) 11 40.379
WATERDEPTH (m) 233

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		6.00			
SAMPLE LENGTH (m)		4.50			

COMMENTS: Monosulphide layers in clay.

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STATION NP87-128
DATE 870825

TIME (GMT) 01 25
LATITUDE (^{0}N) 79 15.529
LONGITUDE (^{0}E) 11 41.382
WATERDEPTH (m) 262

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		6.00			
SAMPLE LENGHT (m)		4.90			

COMMENTS: -

STATION NP87-129
DATE 870825

TIME (GMT) 01 48
LATITUDE (°N) 79 14.049
LONGITUDE (°E) 11 42.921
WATERDEPTH (m) 272

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		6.00			
SAMPLE LENGTH (m)		5.63			

COMMENTS: -

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STATION NP87--130
DATE 870825

TIME (GMT) 02 28
LATITUDE (°N) 79 09.364
LONGITUDE (°E) 11 45.552
WATERDEPTH (m) 358

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		6.00			
SAMPLE LENGHT (m)		4.00			

COMMENTS: Very compact base.

STATION NP87-131
DATE 870825

TIME (GMT) 03 37
LATITUDE (^{0}N) 79 04.409
LONGITUDE (^{0}E) 11 29.672
WATERDEPTH (m) 312

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		1
PENETRATION (m)		4.35			
SAMPLE LENGTH (m)		3.05	0.50		

COMMENTS: BC-shells and numerous burrows present.

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STATION NP87-132
DATE 870825

TIME (GMT) 04 53
LATITUDE (^{0}N) 79 04.757
LONGITUDE (^{0}E) 11 31.509
WATERDEPTH (m) 261

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2			
PENETRATION (m)		$4^{1}.53$ $5.1^{2}8$			
SAMPLE LENGHT (m)		- 3.88			

COMMENTS: Very stiff olive grey, silty mud clogging core catcher.

STATION NP87-133
DATE 870825

TIME (GMT) 06 55
LATITUDE (^{0}N) 79 11.889
LONGITUDE (^{0}E) 12 08.510
WATERDEPTH (m) 90

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		-			
SAMPLE LENGTH (m)		-			

COMMENTS: Only one pebble in core catcher.

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STATION NP87-134
DATE 870825

TIME (GMT) 07 03
LATITUDE (^{0}N) 79 12.184
LONGITUDE (^{0}E) 12 05.930
WATERDEPTH (m) 75

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES					1
PENETRATION (m)					
SAMPLE LENGHT (m)					

COMMENTS:

STATION NP87-135
DATE 870825

TIME (GMT) 10 10
LATITUDE (^{0}N) 79 07.087
LONGITUDE (^{0}E) 11 37.454
WATERDEPTH (m) 329

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1	1		
PENETRATION (m)		6.00			
SAMPLE LENGTH (m)		3.02	0.50		

COMMENTS: Very stiff at base.

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STATION NP87-136
DATE 870825

TIME (GMT) 11 52
LATITUDE (^{0}N) 79 01.060
LONGITUDE (^{0}E) 11 06.735
WATERDEPTH (m) 279

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2			
PENETRATION (m)		4.90 5.60			
SAMPLE LENGHT (m)		3.32 4.75			

COMMENTS: -

STATION NP87-137
DATE 870825

TIME (GMT) 22 17
LATITUDE (^{0}N) 78 02.278
LONGITUDE (^{0}E) 12 52.885
WATERDEPTH (m) 271

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		5.50			
SAMPLE LENGTH (m)		4.27			

COMMENTS:

Top: brown clay.
3.3m: shell.
Bottom: clay w/sulphides.

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STATION NP87-138
DATE 870825

TIME (GMT) 22 52
LATITUDE (^{0}N) 78 05.726
LONGITUDE (^{0}E) 13 04.704
WATERDEPTH (m) 271

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		5.50			
SAMPLE LENGHT (m)		4.30			

COMMENTS: Dark grey clay w/sulphides.

STATION NP87-139
DATE 870825

TIME (GMT) 23 16
LATITUDE (^{0}N) 78 06.320
LONGITUDE (^{0}E) 13 13.378
WATERDEPTH (m) 247

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		5.50			
SAMPLE LENGTH (m)		4.77			

COMMENTS:

Bottom: rel. stiff brown grey, clayey silt.

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STATION NP87-140
DATE 870825

TIME (GMT) 23 40
LATITUDE (^{0}N) 78 08.750
LONGITUDE (^{0}E) 13 09.641
WATERDEPTH (m) 272

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		2			
PENETRATION (m)		$5^1.50$ 5.50^2			
SAMPLE LENGHT (m)		4.05			

COMMENTS:

Bottom: grey silty clay w/pebbles.

STATION NP87-141
DATE 870826

TIME (GMT) 00 46
LATITUDE (°N) 78 10.663
LONGITUDE (°E) 13 42.847
WATERDEPTH (m) 337

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		5.50			
SAMPLE LENGTH (m)		3.14			

COMMENTS: -

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STATION NP87-142
DATE 870826

TIME (GMT) 01 48
LATITUDE (°N) 78 10.807
LONGITUDE (°E) 14 21.673
WATERDEPTH (m) 212

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		5.50			
SAMPLE LENGHT (m)		2.00			

COMMENTS: -

STATION NP87-143
DATE 870826

TIME (GMT) 02 44
LATITUDE (^{0}N) 78 15.234
LONGITUDE (^{0}E) 15 04.842
WATERDEPTH (m) 235

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		5.50			
SAMPLE LENGTH (m)		4.00			

COMMENTS: -

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STATION NP87-144
DATE 870826

TIME (GMT) 03 07
LATITUDE (^{0}N) 78 16.603
LONGITUDE (^{0}E) 15 15.633
WATERDEPTH (m) 228

STATION WORK:

	VC	GC	BC	PC	BP
NUMBER OF SAMPLES		1			
PENETRATION (m)		5.50			
SAMPLE LENGHT (m)		3.77			

COMMENTS: -