Natural Resources Canada | Ressources naturelles Canada

IMAGES 5
on board the Marion Dufresne
2nd leg 30 June - 24 July 1999

Report compiled by the Chief Scientists
and
the Scientific Participants

Geological Survey of Canada Open File # 3782

Canada

PRELIMINARY REPORT

IMAGES V mission on the *Marion Dufresne*
2nd leg, 30 June - 24 July 1999

prepared by the Co-Chief Scientists, C. Hillaire Marcel and J.-L. Turon and the scientific participants.

This report provides a preliminary summary of the activities of Leg 2 of the IMAGES V mission to the Gulf of St Lawrence, Labrador Sea and Northwest Atlantic Ocean, including detailed information on all core sites and logs of all cores collected and described on board. A final report will be issued at a later date by l'Institut Françaios pour la Recherche et la Technologie Polaires. The objective of the international IMAGES program is to obtain high-resolution marine paleoclimate records in order to understand the dynamics of the global climate system. The Canadian participation in the IMAGES V mission was funded largely by the Natural Sciences and Engineering Research Council and the Geological Survey of Canada.

IMAGES5 MD 114 - LEG 2 - IFRTP

01 - 24/07/99

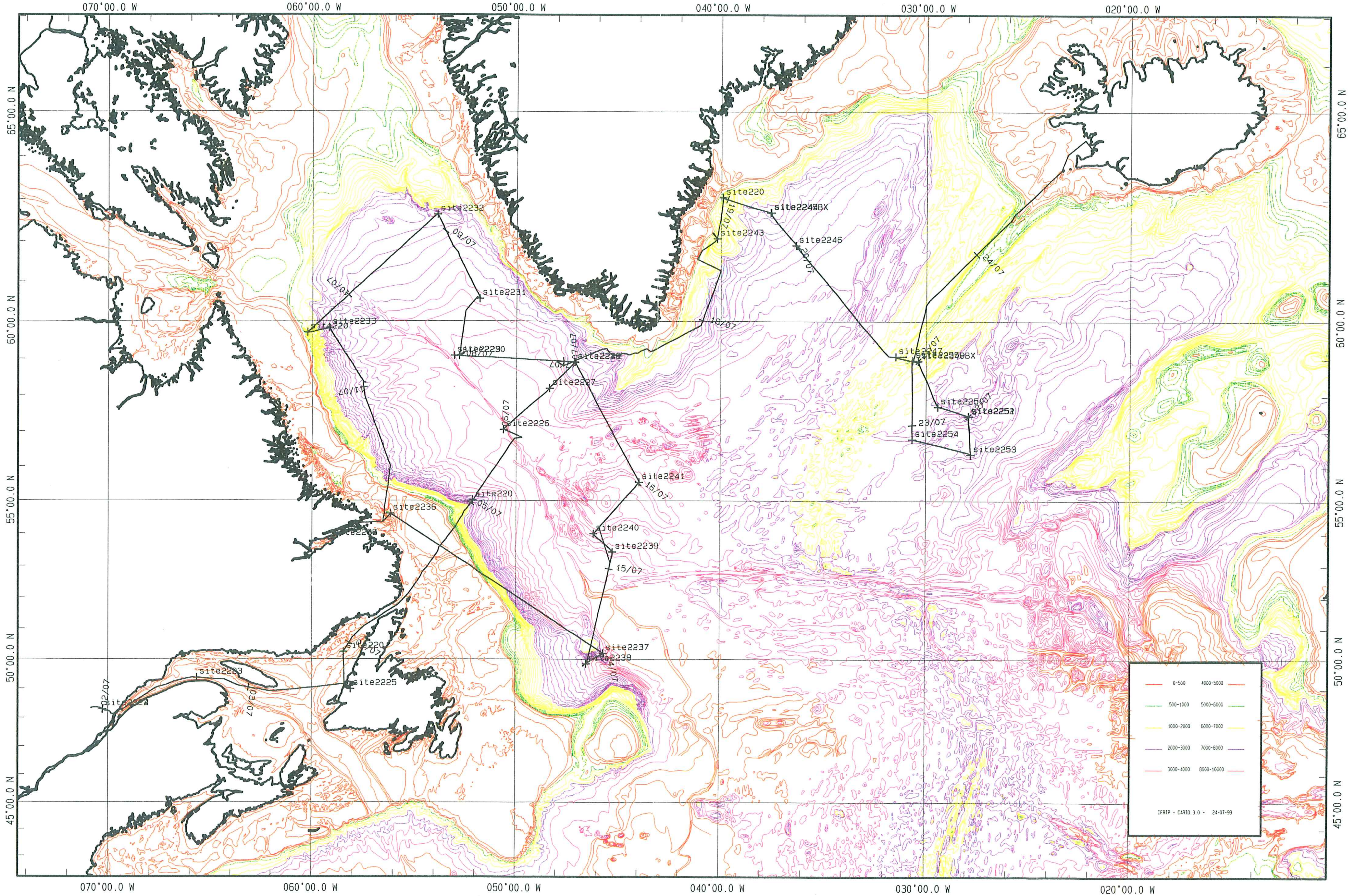
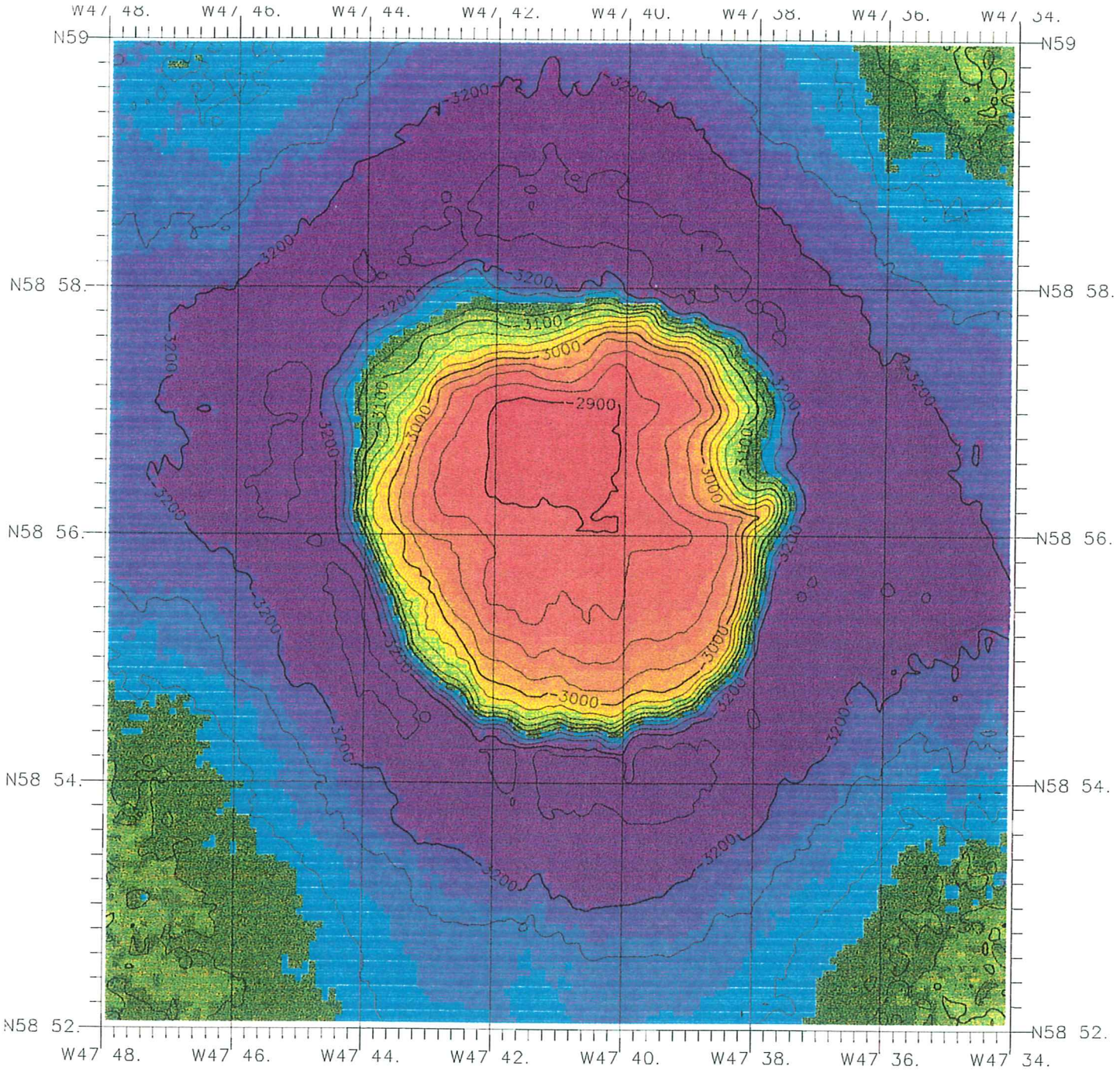
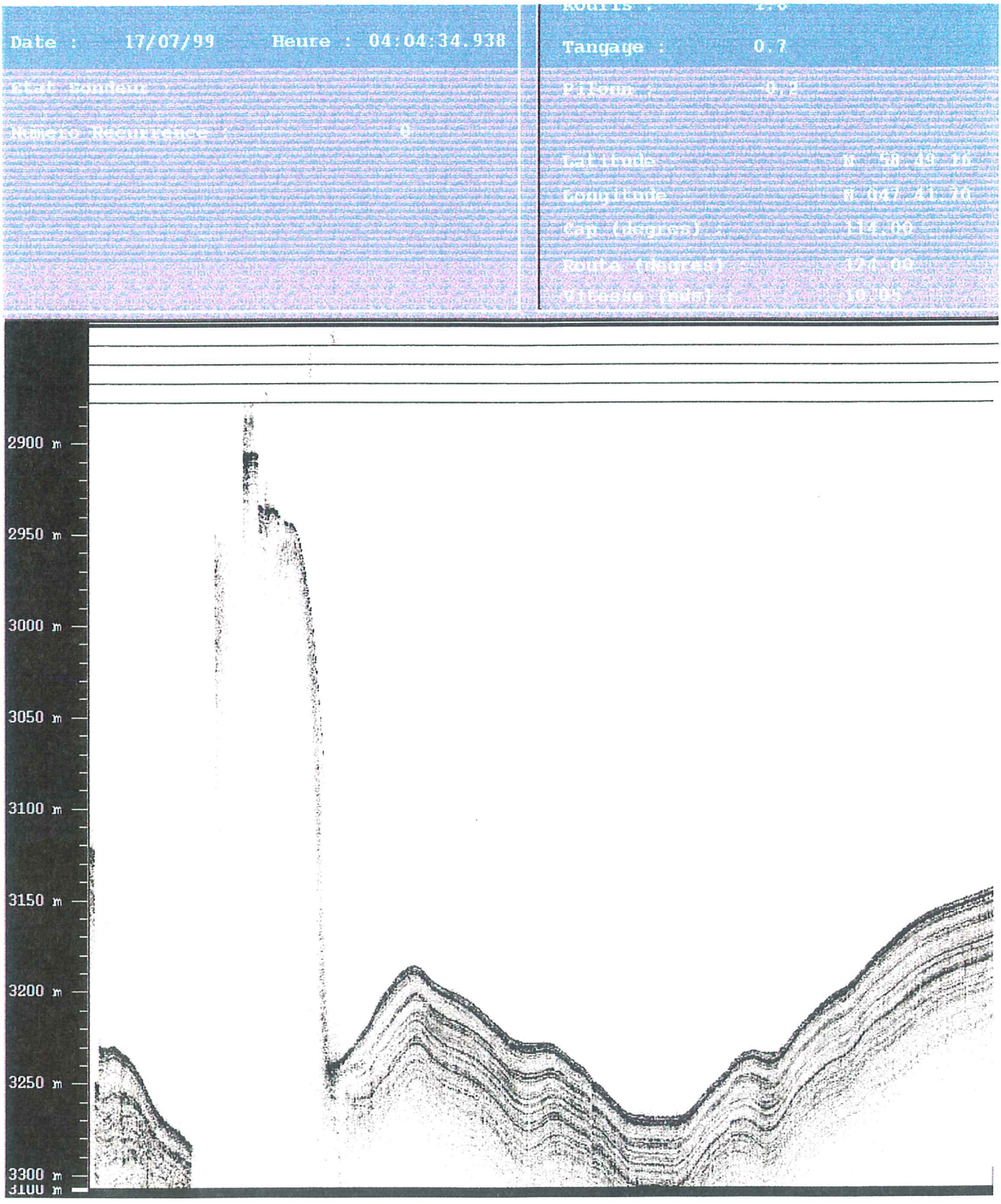


Table of contents


W47 48.
W47 46.
W47 44.
W47 42.
W47 40.
W47 38.
W47 36.
W47 34.
N59
N58 58.
N58 56.
N58 54.
N58 52.
3200
3100
3000
2900

Mg1704cs


Date : 17/07/99 Heure : 04:04:34.938
Tangage : 0.7
2900 m
2950 m
3000 m
3050 m
3100 m
3150 m
3200 m
3250 m
3300 m

1. RAPPORT SOMMAIRE SUR LA MISSION/CRUISE SUMMARY

Le second leg de la campagne IMAGES V (Ginna) s'est déroulé du 30 juin au 24 juillet 1999, entre Québec et Reykjavik. L'équipage scientifique, principalement composé de scientifiques et d'étudiants français et canadiens avec une participation de chercheurs britanniques, taïwanais et américains, a été solidement appuyé par l'équipe de l'Institut Polaire français, sous la responsabilité d'Yvon Balut. Une quinzaine d'étudiants de premier cycle universitaire français ont effectué un stage dans le cadre de ce leg.

Le programme de travail comprenait un volet carottage appuyé par une acquisition d'image par balayage multifaisceaux, l'enregistrement de données acoustiques (3.5 kHz) et bathymétriques en continu, ainsi qu'un volet hydrographique et d'échantillonnage d'eau.

Les carottages ont été réalisés dans cinq régions avec des objectifs en partie complémentaires. Plusieurs fjord et régions côtières canadiennes avaient été ciblés dans le but d'établir des séries chronologiques des changements climatiques et des accidents géologiques holocènes avec une résolution chronologique aussi fine que possible. Le succès des opérations consacrées à ce volet est satisfaisant. Dans trois régions (Bay of Islands, Terre Neuve; Cartwright Saddle et Lac Melville, côte du Labrador), des carottages d'une trentaine de mètres ont livré des séries post-glaciaires complètes. Une quatrième région, le fjord du Saguenay, a livré une série couvrant probablement les 6 derniers milliers d'années, avec une résolution annuelle à décennale. Un seul échec a été rencontré, dans le chenal des Esquimans (partie orientale du Golfe du St-Laurent), à la suite de la perte de l'ogive du carottier.

En milieu plus profond, les objectifs principaux des recherches concernent les changements de la circulation océanique et les instabilités qu'elle a connues. Diverses échelles de temps allant du post-glaciaire au stade isotopique 11 (environ 400 ka) étaient visées, selon les équipes concernées. Les carottages plus profonds ont rencontré un succès inégal, en particulier à la suite de difficultés de carottage des sédiments de la mer du Labrador (dues à l'abondance des blocs largués par les icebergs, notamment). Le long du talus du Labrador, plusieurs échecs ont ainsi été rencontrés, avec pertes des tubes et ogive à plusieurs reprises. La région d'Orphan Knoll a toutefois livré deux carottes relativement longues, mais dont l'état des couches interglaciaires, en particulier, limitera l'exploitation. Dans la région centrale de la mer du Labrador, soit dans la zone d'influence du North-West Atlantic Mid-Ocean Channel (NAMOC), quatre carottages, effectués en partie en marge du projet IMAGES, ont livré des informations sédimentologiques intéressantes sur les événements de Heinrich de la dernière glaciation. Sur la marge groenlandaise, des carottes de bonne longueur ont généralement été recueillies, mais avec, ici encore, des problèmes de liquéfaction partielle de certaines unités sédimentaires, en particulier vers le sommet des séquences carottées. L'une des carottes au moins, au sud du cap Farewell, apportera les informations escomptées en ce qui a trait aux interglaciaires des stades isotopiques 5e à 11, en particulier.

Dans le bassin d'Irminger, de bons carottages ont pu être réalisés le long du talus groenlandais avec, en général, une excellente conservation des propriétés physiques des sédiments; la présence, ici encore, de galets largués par les icebergs a pu occasionnellement restreindre la qualité de certaines carottes. Le passage à un sédiment plus biogéniques et siliceux, dans la zone de la ride de Reykjanes, s'est accompagné d'une légère détérioration de la préservation du sédiment dans la partie sommitale des carottes. Toutefois, de bons enregistrements d'ensemble du dernier grand cycle climatique semblent avoir été recueillis de part et d'autre de la ride de Reykjanes, vers 62°N. En règle générale, et quelle que soit la région considérée, les sédiments carottés semblent avoir conservé l'ensemble de leurs propriétés physiques au-delà de 10 à 15 m de profondeur dans les carottes, laissant espérer, dans plusieurs cas, d'excellents enregistrements sédimentaires des derniers interglaciaires, par exemple.

Au total, un peu plus d'une trentaine de carottes ont pu être recueillies pour une longueur moyenne de l'ordre de 30 m qui, eu égard aux difficultés de carottage rencontrées, constitue une longueur moyenne assez satisfaisante. L'ensemble représente près de 1 km de sédiment carotté, incluant une carotte record de plus de 58 m, dans le Fjord du Saguenay.

Parallèlement au programme de carottages, des échantillonnages des masses d'eau et mesures de profils de salinité, température et oxygène dissous ont pu être réalisés dans sept stations des bassins du Labrador, d'Irminger et d'Islande. Ces échantillonnages étaient destinés soit à l'analyse de traceurs isotopiques des masses d'eau de l'Atlantique Nord, soit à la calibration des relations entre les alkénones et les conditions de surface océanique.

En outre, des saisies d'images et profils acoustiques de 3.5 kHz ont été réalisés avec notamment de bons enregistrements dans le système du NAMOC, à travers la terminaison occidentale de la fracture de Gibbs, sur un volcan de boue de 350 m de hauteur et environ 8 km de diamètre, situé sur la marge groenlandaise, enfin, selon un transect NW-SE à travers le bassin d'Irminger et la ride de Reykjanes.

A bord, les propriétés physiques des sédiments carottés ont été systématiquement déterminées (MST et spectrophotométrie) et les carottes ont été photographiées (photographie digitalisée). La plupart des carottes ont fait l'objet de descriptions sédimentologiques, quelques unes, de prélèvements discrets (e.g., U-channels pour mesures paléomagnétiques fines, cubes pour détermination de l'anisotropie magnétique, mesures de teneur en eau, extraction de l'eau porale aux fins d'analyse isotopique, etc.). Deux d'entre elles, relativement peu consolidées, ont été sous-échantillonnées systématiquement 1 cm d'intervalle et quelques tests complémentaires ont parfois été réalisés sur quelques unes des carottes (e.g., pénétrométrie).

Enfin, au cours du leg, plusieurs séries de séminaires techniques ont été organisés à l'intention des étudiants et des chercheurs intéressés (navigation, carottage, sondage par séismique légère, analyses MST, sonde CTD, etc.) grâce à la collaboration du commandant du Marion-Dufresne, des personnels de l'IFRTP et des scientifiques à bord.

The second leg of the IMAGES 1999 campaign (GINNA) took place June 30 to July 24, between Québec City and Reykjavik. The scientific crew was primarily composed of French and Canadian scientists and students, and also included participants from U.K., Taiwan and The U.S. The program was strongly supported by a team from the French Polar Institute, under M. Yvon Balut's direction. About fifteen undergraduate students from French universities were also present for a training program at sea

The scientific program consisted of coring, multibeam mapping, high resolution seismic profiling (3.5 kHz), 12 kHz bathymetric surveys, a few hydrographic measurements, and collection of water samples.

Cores were recovered in five distinct working areas linked by a number of common objectives. Several fjords and coastal areas of eastern Canada were selected with the aim of establishing high resolution time series for paleoclimate reconstruction and the establishment of a chronological framework for geological hazards. Coring at these shallow sites was quite successful. In three areas (Bay of Islands, Newfoundland; Lake Melville and Cartwright Saddle, Labrador Coast), about 30 m-long cores completely sampled the post-glacial sequences. A fourth site, the Saguenay Fjord (Québec), yielded an exceptional core spanning approximately the last six thousand years, with an annual to decadal time resolution. Only one coring attempt failed, in Esquiman Channel, when the core cutter was lost and no sediment was recovered.

In deeper water sites, the major research objectives concern instabilities and changes in oceanic circulation. Several time-slices were targeted by different working groups, from the post-glacial to isotopic stage 11 (ca. 400 ka). Core recovery was inconsistent in deep-water sites, notably in the Labrador Sea, due to the abundance of ice-rafted material. Along the Labrador Slope, a few total failures occurred when the core barrels and the cutter were lost twice. In the Orphan Knoll area, two relatively long cores were recovered. Poor preservation of interglacial sediments in these cores, however limits their future use. In the central Labrador Sea, within the flood-plain of the Northwest Atlantic Mid-Ocean Channel (NAMOC) spreading area, four cores were raised for projects with in part non-IMAGES objectives. These cores contain interesting sedimentological information on the origin and mode of deposition of the Heinrich layers of the last ice age. Along the Greenland margin, several relatively long cores were raised, but these show partly liquefied layers, notably toward core tops. At least one of these Greenland margin cores, off Cape Farewell, sampled the targeted interglacial intervals of isotopic stages 5e to 11.

In the Irminger Sea, relatively good cores were recovered along the southeastern Greenland margin with excellent preservation of the physical properties of the sediments. Scattered drop stones may have been responsible for the poor quality of a few cores. In the Reykjanes Ridge area, the softness of widespread biogenic silica-rich layers is believed to account for a lesser quality of some upper core sections. This problem aside, good records of the last climatic cycles have likely been recovered on both sides of the Reykjanes Ridge, at about 62°N.

In summary, slightly more than 30 cores were recovered, with an average length of 30 m (empty cores included). In view of the coring difficulties encountered, this average length is satisfying. Almost 1 km of sediment was cored during Leg 2 of IMAGES 1999. Generally speaking and independent of the coring area, sediments mostly preserved their overall physical properties below 10-15 m, downcores.

Water sampling and measurements of salinity, temperature, dissolved oxygen, bathymetric distribution of chlorophyll, etc., were performed at seven sites from the Labrador, Irminger and Iceland basins. Water samples were recovered for the purpose of identifying North Atlantic water masses using isotopic tracers (e.g., Nd isotopes), and for the calibration of transfer functions between alkenones and surface water conditions.

The multibeam imagery and 3.5 kHz digital records provided excellent data sets for the NAMOC system, the western end of the Charlie Gibbs Fracture Zone, a 350 m-high and about 8 km-wide mud-volcano off the Greenland Slope, a NW-SE transect across the Irminger basin and the Reykjanes Ridge, etc.

On board, the physical properties of the cored sediments were systematically determined (MST and spectrophotometry) and all cores were digitally photographed. Most were also described for their composition and sedimentological properties, and samples were taken from a few of them (U-channels for high-resolution magnetic measurements, cubes for magnetic anisotropy determinations or density and water content calibrations, etc.). Two cores showing very soft sediment were subsampled continuously at 1cm interval to avoid possible stratigraphic mixing during transport.

Finally, during the cruise, a series of lectures and technical seminars was organized for students and interested researchers with the help of the master of the Marion Dufresne, of the IFRTP personnel and on-board scientists. Topics included navigation, coring, high resolution seismic sounding, MST principles, CTD measurements, etc.

2. ON-BOARD PARTICIPANTS

2.1. On board scientists & IFRTP staff

Name, First name, Organisation, E-mail

AMORENA, Pantxoa, ENSIETA, Brest, amorenpa@ensieta.fr
BALUT, Yvon, IFRTP, Brest, oceanopol@ifrtp.ifremer.fr
BAUER, Hugo, Faculté d'Orsay,
BILODEAU, Guy, GEOTOP-UQAM, r21360@er.uqam.ca
BOURNOT, Claudie, INSU, Brest, cbournot@ifrtp.ifremer.fr
CANDON, Laurence, GEOTOP-UQAM, m315704@er.uqam.ca
CASTERA, Marie-Hélène, Université Bordeaux I, mh.castera@geocean.u-bordeaux.fr
CATTANI, Olivier, LSCE, Gif/Yvette, cattani@lsce.saclay.cea.fr
CHAPMAN, Mark, University of Cambridge, m.chapman@esc.cam.ac.uk
CHAPRON, Emmanuel, Université Lille I, chapron@univ-savoie.fr
CREMER, Michel, Université Bordeaux I, cremer@geocean.u-bordeaux.fr
DAUX, Valérie, Université Paris VI, daux@ccr.jussieu.fr
DAVID, Flora, IPG Strasbourg, fdavid@engees-e.u-strasbg.fr
DELBART, Franck, IFRTP, fdelbart@ifrtp.ifremer.fr
DIMITROV , Dimitri, Indépendant,
DREGER, Derek, GEOTOP-UQAM, c2506@er.uqam.ca
DUBOIS, Frederic, Université Rennes I,
ELIPOT, Shane, ENSIETA, Brest, elipotsh@ensieta.fr
EZAT , Ullah, LSCE, Gif/Yvette, ezat@lsce.cnrs-gif.fr
GALIA, Marc, Faculté d'Orsay,
GIRAULT, Aurélie , Faculté d'Orsay, girault@granite.ens.fr
GOURRIER, Aline, Faculté d'Orsay,
GOUZY, Aurélien, Faculté d'Orsay, Aurelien.Gouzy@wanadoo.fr
HANNION, Muriel, Faculté d'Orsay,
HEWITT, Antony, University of New Brunswick, ahewitt@omg.unb.ca
HILLAIRE-MARCEL Claude*, GEOTOP-UQAM, chenv@uqam.ca
HISCOTT, Richard, Memorial Univ. Newfoundland, rhiscott@sparky2.esd.mun.ca
HUITOREL, Benoît, IFRTP, Brest,
HUNDERT, Thian, Natural Resources Canada, thian@istar.ca
JAOUEN, Alain, IFRTP, Brest, ajaouen@ifrtp.ifremer.fr
JARRETT, Catherine Anne, Bedford Inst. of Oceanography, jarrett@agc.bio.ns.ca
JEGOU , Alain, LSCE, Gif/Yvette, Alain.Jegou@lsce.cnrs-gif.fr
KISSEL, Catherine, LSCE, Gif/Yvette, kissel@lsce.cnrs-gif.fr
LEDUC, Julie, GEOTOP-UQAM, m210750@er.uqam.ca
LEE, Shih-Yu, National University of Taiwan, spring99@ms6.hinet.net
LESEMANN , Jerome, University of Alberta, jerome.lesemann@ualbertta.ca
MORIN, Xavier, IFRTP, Brest, xmorin@ifrtp.ifremer.fr
OGGIAN, Georges, Université Bordeaux I, g.oggian@geocean.u-bordeaux.fr
OUAHDI, Rabia, LSCE, Gif/Yvette, rabia@hermes.lodyc.jussieu.fr
PEDEMAY, Philippe, Université Bordeaux I, pedemay@geocean.u-bordeaux.fr
PFUHL, Helen, Univ. of Cambridge, Godwin Lab., hap21@cus.cam.ac.uk
POULIN, Patrick, GEOTOP - UQAM, poulinp@hotmail.com
ROCHON, André, Com. Géol. Canada, Dartmouth, rochon@agc;bio.ns.ca
ROY-BARMAN, Matthieu, LEGOS, Toulouse, barman@pontos.cst.cnes.fr
SAINT ONGE, Guillaume , GEOTOP-UQAM, m363574@er.uqam.ca
SBAFFI, Laura, Univ. of Cambridge, Godwin Lab., ls230@cus.cam .ac.uk
SHAW, John , University of Alberta, john.shaw@ualberta.ca
STONER, Joseph, University of California, Davis, stoner@geology.ucdavis.edu
TURON, Jean-Louis* Université Bordeaux I, turon@geocean.u-bordeaux.fr
YU, Ein Fen, National University of Taiwan, efyu@cc.ntnu.edu.tw

(*) : chief scientists

2.2. Ship's staff

FOUBERT, Gilles, Commandant
PHILIPPE, Yannick, Second Capitaine
PIOTEYRY, Francois, Officier
MATHIEU, Vincent, Officier
GOBERT, Gilles, Officier
PRUD'HOMME, Francois, Officier
IMBERT, Bernard, Chef mécanicien
GRAUSO, Sébastien, Second mécanicien
SIEGWALD, Jérôme, Chef Radio
MEUNIER, Aurélien, Elève stagiaire
DENOUAL, Lucien, Assistant pont
CHAMPALAUNE, Robert, Maître d'équipage
BLANQUART, Jean-Luc, Maître d'équipage
MIQUEL, Bernard, Assistant électricien
JEFFRAY, Yves, Assistant mécanicien
MORENO-RUIZ, Joseph, Ouvrier mécanicien
MARCOTTE, Didier, Ouvrier mécanicien
YOUSSOUF, Ismaila, Ouvrier mécanicien
DIAKITE, Boulaye, Ouvrier mécanicien
GLACON, Franck, Ouvrier électricien
CHOUX, Julien, Ouvrier mécanicien
COQUET, Christian, Assistant Maître d'hôtel
CAPARD, Jean-Claude, Assistant Maître d'hôtel
HERVE, Jean-Charles, Assistant Maître d'hôtel
LEJEUNE, Philippe, Maître d'hôtel
KIEFER, Patrick, Assistant cuisinier
CALATAYUD, Bernard, Boulanger
FADY, Thierry, Second cuisinier
VELO, Gilbert, Caporal journalier
JAOSAO, Bakary, Caporal journalier
TELOLAHY, Gervais, Caporal journalier
ALFRED, , journalier
RAVOLONA, Berard, journalier
RAMANANKILANA, Soloniaina, journalier
CHOW, Emilien, journalier
BERTHIN, , journalier
RAJAONARIVO, Seth , journalier
BAKO, Bruno, journalier
ARTHUR, Jean de dieu, journalier
RAKOTONINDRINA, Roger, journalier
MADI, Ali, Caporal charpentier
LETODY, Etienne, journalier
RAKOTONIAINA, Olivier, journalier
BABA CARDIA, Sulleman, journalier
RATOVONASY, Michel, journalier
CHAN PAO WANE, Nicolas, journalier
TOTOMENA, Jacques, journalier
RAOELIARIMANITRA, Marcel, journalier
CHAN KA SING, Jean de Dieu, journalier

3. SCIENTIFIC OBJECTIVES OF THE LEG & HIGHLIGHTS

3.1. IMAGES objectives

The *International Marine Global Change Study* (IMAGES), a program responsible for quantifying climatic and hydrographic variability of the ocean on a scale of centuries to thousands of years, falls under the umbrella of the *Past Global Changes* (PAGES) of the International Council of Scientific Unions (ICSU). Indeed, scientific issues concerning the linkage between major changes in oceanic circulation and of the Earth's climate system require an international effort to design and execute carefully planned oceanographic field coring programs. Cores of sediments accumulating on the sea floor preserve a record in their fossils, chemistry, mineralogy and physical properties of past hydrographic and climatic conditions, with a resolution of years to decades. The new field effort of 1999 planned from June to September, includes five successive cruises in the Caribbean, the Western North Atlantic, the Labrador-Irminger-Iceland seas, the Nordic Seas, the Eastern North Atlantic-Western Mediterranea, including coastal regions of these oceanic basins.

Major scientific objectives of the 1999 campaign concern instabilities of the oceanic circulation. Coring sites were selected in order to document oscillations on time scales of decades to thousands of years of climate and oceanic productivity as well as of thermohaline circulation, the data needed to complement paleoclimate information obtained from ice cores in Greenland and Antarctica Ice Sheets. These archives will be used to calibrate and refine computer-based climate models needed to predict future climate change.

3.2. Coring sites and their scientific rationale

3.2.1.. Blue ocean sites

The second leg was seen as a unique opportunity to collect long cores from the Labrador, Irminger and Iceland seas, in order to address major scientific problems. These include investigations on the rates of outflow of deep/bottom waters across the Greenland strait and the Iceland-Faeroe rise during the last climatic cycle, investigations on the relationship between Laurentide Ice meltwater pulses and the North Atlantic ocean thermohaline circulation (e.g., Clarke et al., 1998; de Vernal et al., 1996), the latter being a key element of the climate-ocean system (e.g., Tziperman, 1997). Indeed, surface conditions in sub-Arctic basins control the production rates of the deep and intermediate North Atlantic waters, namely the two components of the North Atlantic Deep Water -NADW- (i.e., The Denmark Strait Overflow Water -DSOW, and the North-East Atlantic Deep Water -NEADW), and the Labrador Sea Water (LSW), (McCartney, 1992; Lazier, 1988; Sy et al., 1997; Clarke and Gaskard, 1983). Due to the depth distribution of these water masses along the Iceland, Irminger and Labrador sea margins (cf. Lucotte et Hillaire-Marcel, 1994), long cores from these margins allow the determination of paleoceanographic time series extremely sensitive to changes in the North Atlantic thermohaline circulation (e.g., Innocent et al., 1997; Vidal et al., 1997; Revel et al., 1996; Yu et al., 1996).

From this viewpoint, the Labrador Sea presents exceptional features. Firstly, all the water masses involved in the renewal processes of the deep and intermediate waters of the North Atlantic, are present and still recognizable in the basin (Lucotte and Hillaire-Marcel, 1994), notably the components of the NADW, which is carried along the gyre of the strong Western Boundary Undercurrent and sweeps the lower continental slopes. Secondly, the Labrador Sea has been a major conduit for the evacuation of meltwaters of the Laurentide Ice Sheet into the North Atlantic ocean; the study of its sedimentary records thus provides unique insights on the response of the thermohaline circulation to fresh water pulses into the North Atlantic. Thirdly, the high sedimentation rates prevailing along its continental rises allow the preservation of exceptionally high-resolution time series (e.g., Hillaire-Marcel et al., 1994).

One of the specific questions justifying the choice of some of the coring sites from this basin concerns the relative importance of ice meltwater inputs through the Gulf of St. Lawrence versus those from the Hudson Strait area, and their respective influence on the upper ocean thermohaline properties (e.g., Manabe and Stouffer, 1995; Broecker and Denton, 1989; de Vernal et al., 1997), thus their influence on the rate of production of intermediate and deep oceanic waters. Researchers from the GEOTOP-UQAM, the Geological Survey of Canada (Atlantic), the Universities of Memorial and of New Brunswick are involved in this project, with close collaboration with scientists from INSTAAR, UCD and LMCE. A series of cores recovered in the estuary of the St. Lawrence, on the Labrador Slope, near Saglek Bank, and in the vicinity of Orphan Knoll (see chart) are likely to provide some material to document this issue.

In the Irminger and Iceland basins, coring across the Greenland slope and the Reykjanes ridge was seen as a mean to establish time series documenting changes in the rate of outflows of the DSOW and NEADW, respectively through the Denmark Strait and Iceland-Faeroe ridge, during the last glacial cycle, with special attention to Heinrich-Dansgaard-Oeschger oscillations Elliott et al., 1999; Vidal et al., 1997; Grousset et al., 1993; Cortijo et al., 1997). Magnetic properties of the sediment were particularly looked, here, as a promising way to determine correlative changes in grain size and mineralogy of the sediments deposited along major deep current pathways. The leg has been successful in these basins, with almost 100% of the coring objectives encountered. The on-shore subsequent studies will be primarily conducted by researchers from LMCE (Gif/Yvette) and DGO (Bordeaux), with some collaboration from GEOTOP (for the Bight Fracture Zone area).

A couple of coring sites were also selected in the Gardar Drift area, based on a proposal from the University of Cabridge (U.K.). Guardar Drift is a sedimentary deposit that has already yielded numerous high resolution palaeoceanographic records documenting millennial- and Milankovitch–scale variability through the late Quaternary. Coring sites were selected on the basis of results from such previously collected cores and are characterised by exceptionally high accumulation rates during the Holocene (30-40 cm/kyr). In particular, it is envisaged that the acquisition of long cores from this region will permit detailed comparisons to be made between surface and deep ocean circulation patterns during the Holocene with those of the two previous interglacial periods. Two calypso cores and one Kasten core were retrieved successfully.

The second leg of the 1999 campaign was also seen as an opportunity to recover cores from critical sites where records are missing or where coring problems were encountered in the past, either during the first IMAGES cruise of 1995 (e.g., site MD-95-2016, in the Irminger Basin), or during other cruises. For example, coring failed on the Labrador Slope, off Hudson Strait (cf. Site 84-030-021) on two campaigns of the CSS-Hudson (90-13; 97-48), for a different technical reason each time. However, records from this site are absolutely needed to constrain meltwater pulses and ice surges from the active Hudson Strait ice margin. Unfortunately, the coring success was thin along the Labrador Slope, primarily due to the abundance of large ice rafted boulders resulting in damaged corers and cutters.

In a similar way, one of the major objectives of Canadian researchers, in terms of long coring possibilities, was the recovery of sediment spanning the isotopic stage 11, as a mean to document oceanic circulation patterns during warm interglacials. Here, the success has been mitigated with one, possibly two cores only encompassing this interval in the Labrador Sea margins.

Nevertheless, the selection of sites in Labrador, Irminger and Iceland Seas has been made for maximum scientific recovery, i.e., with special attention to all the above objectives put forthward in Canadian or French programs as well as to a few complementary ones listed as IMAGES priorities. For example, some of the cored sequences in the deep Labrador Sea,

proposed by Canadian researchers, also show high sedimentation rate Holocene records (e.g., 2 to 4 m thick) which will be of interest for the French LMCE group.

3.2.2. - Fjord and shelf sites

Coring site selection for this component of the second leg put forth by Canadians has been made with three complementary scientific objectives: i) for high resolution studies of Holocene paleoclimates, (ii) for investigations on geological hazards (paleoseismicity, paleoflood, landslide layers, and their frequencies), and (iii) to complement the "Labrador Sea" study above, by a study of the Gulf-of-St. Lawrence "outlet" of the Laurentide Ice Sheet, providing information about meltwater pulses from this sector of the Ice Sheet. This part of the campaign was also thought as a further survey of sites proposed to the Ocean Drilling Programme for a Leg along the Eastern Canadian margin.

The first objective aims at establishing very high resolution time series (up to annual/seasonal resolution) spanning the last few thousand years, from long cores raised from high sedimentation rate fjords. In Canada, this contribution falls under the Climate System, History and Dynamics project funded by NSERC. Paleoclimate proxies will be used to document environmental changes in a few eastern Canadian fjords. These studies will be the eastern Canadian counterpart of those already undertaken on the West Coast, at Saanich Inlet (e.g., Collins, 1996; Sancetta, 1992). The coring targets included Lake Melville on the Labrador Coast (Syvitski and Lee, 1997.; Vilks et al., 1987), the Bay of Islands, on the Western Newfoundland coast, and the Saguenay Fjord (Syvitski and Praeg, 1988). Coring at these three sites was more than successful: full Holocene recovery was achieved in Lake Melville and Bay of Islands and the Saguenay yielded about 6000 yr of sedimentation in a long core raised from slightly east of Baie Eternité.

The second objective concerns more specifically the Saguenay fjord cores, which represent very sensitive records of seismic activity in the Saguenay Graben (e.g., Tuttle, 1991; Ouellet, 1990; Syvitski and Schafer, 1996), as well as of other geological hazards such as floods and landslides (e.g., Locat and Leroueil, 1988). The setting of high resolution time series will allow statistical studies and spectral analyses for risk assessments. At this very site, a complementary research track has geotechnical implications (through a strategic research program of NSERC-Canada). It concerns the behavior of the thick sedimentary layer deposited during the major 1996 flood in the Saguenay, as an example of a potential geochemical barrier for the chemical pollutants of the underlying sediments. By getting access to series of such layers, deposited in the past, a closer look on their evolution through time under benthic activity pressure, and redox changes, is now possible.

The third objective of the shallow site corings concerns a Canadian proposal (# 455), which has been made by Piper et al., to the Ocean Drilling Programme (ODP), in January 1997. This proposal aims at documenting the ice-sheet forcing of high latitude climate and sedimentation systems, through high resolution surveys of the Laurentide Ice-Sheet outlets. While the objectives of this proposal have been very highly ranked by the ODP review system,

a better assessment of some of the proposed sites will be essential for the final acceptance of this proposal, notably of sites in the Saguenay Fjord and St. Lawrence Estuary areas, where coring was successful. The MD-II long cores are likely to provide grounds for adding or replacing some of the sites for the ODP proposal. In this way, the transect through the Gulf of St. Lawrence-Laurentian Channel outlet of the Laurentide Ice Sheet, complements the transect along the southeastern Labrador Sea meltwater outlet of the Ice Sheet.

3.3. Alkenone measurements in sea water

by U. Ezat (LMCE, Gif/Yvette) and C. Bournot-Marec (IFREMER)

In the frame of IMAGE V cruise, samples were collected from 9 sampling sites between QUEBEC and REYKJAVIK. The aim of this work is the reconstruction of paleohydrologic and paleoclimatic events. For this, we are using coccolithophores, which are marine micro-organisms used as biomarkers, with special emphasis on E heuxleyi to reconstruct paleoclimatic conditions based on alkenones. The determination of the alkenones allows us to calculate with a good precision the sea surface water temperature.

Alkenones are insoluble in sea water, and they precipitate with organic and mineral particules, and therefore, they constitute a precious archive for a given period.

In addition to that, we also collected samples for microscopic determination of foraminiferal studies.

Methods and material:

Water was sampled at various depths in the water column, between about 4 to 72 meters. The criteria for the depth selection is the maximum of chlorophyllian development (determined by fluorometry methods) and the water temperature between 4.5 °C and 12.6°C. The equipment used for water sampling is a 12 bottle rosette with 12 litre Niskin bottles . A Seabird CTD, is coupled to the rosette and includes temperature , conductivity, and dissolved oxygen sensors, also a transmissiometer (measuring beam attenuation in a 25cm centimer path) and a Chelsea fluorometer (for chlorophyll *a* determination) and other logistic material.

Analysis:

Samples will be extracted using organic solvents with an increasing polarity, and subsequently will be analysed by chromatography methods

3.4. Other studies

3.4.1. The SIGNATURE-GINS Program: tracing and evolution of water circulation

by C. Bournot-Marec (IFREMER) and Matthieu Roy-Barman (Univ. Toulouse)

Waters from the Labrador sea and from the Irminger sea are rapidly renewed by (1) warm and salty surface waters from the tropical Atlantic, (2) cold and less saline waters from the Arctic as well as by (3) intermediate waters newly formed in the West of the Labrador Sea that invades the Arctic gyre over a few year time scale. Deep and bottom waters are also rapidly renewed in particular by dragging of overlying waters by bottom currents around the straits that separates these basins from the nordic seas. These waters contribute to the formation of the North Atlantic Deep Water that represents a cornerstone of the conveyor belt.

During the Leg 2 of the IMAGES 5 cruise, parameter measurements and water sampling were made to study these water circulations with different tracers: Temperature, Salinity, ^{129}I, Nd isotopes and Hf isotopes. Water samples were collected with a 12 bottle rosette equiped with CTD, fluorimeter, transmissiometer, and dissolved O_2 sensor. Surface temperature and Salinity were measured continuously along the track of the ship with a thermosalinometer.

Temperature and Salinity : Due to the short residence time of the water masses, the circulation pattern may show strong variability at the decenal time scale in response to changes in the atmospheric forcings (North Atlantic Oscillation, Arctic Oscillation). Since 5 years, a systematic survey of these water masses has been started. It includes oceanic cruises, profilling drifters, surface temperature and salinity measurements... The CTD and Thermosalinometer data obtained during the signature program will contribute to complete this data base. Seawater was regularly sampled to calibrate salinity data (PI : Gilles Reverdin, LEGOS, Toulouse).

Nd and Hf isotopes:

Neodymium isotopic composition (IC)is a tracer of source and mixing of water masses. A good knowledge of the Nd IC of the different water masses in the Labrador and Irminger seas has strong implications for the reconstruction of the paleocirculations. The aims of this study are (1) to characterize the Nd IC of the different water masses contributing to the North Atlantic Deep Water and to (2) to get a better understanding of the processes controling the Nd IC of seawater (with special interest for the interaction between water masses and continents). Ten litre samples were collected along vertical profiles. Nd was extracted from unfiltered and filtered samples on small cartriges loaded with a complexing agent. Small aliquots of selected samples were saved to measure Rare Earth Element concentrations. Hf IC is a potential tracer of water masses. At present, there is no direct measurement of the Hf IC on seawater samples. In order to develop this new tracer , we collected large samples (20 liters) of seawater. Hf extraction and purification will be done in Toulouse (PI : Catherine Jeandel, LEGOS, Toulouse).

Iodine 129:

^{129}I is an antropic isotope released by the nuclear reprocessing plants of La Hague and Sellafield. It is proposed to use ^{129}I as a transitory tracer of water mass circulation. The samples collected for Nd were subsampled for ^{129}I in order to determine ^{129}I concentration in the different water masses. These samples will be analysed by accelerator mass spectrometry in Gif (PI : Yiou and Raisbeck, CSNSM, Orsay).

3.4.2. The North Atlantic Mid-Ocean Channel System and Deposits on the Floor of the Labrador Sea

by J. Shaw (Univ. of Alberta)

The North Atlantic Mid-Ocean Channel extends the length of the Labrador Sea and south into the Atlantic Ocean. A system of paleochannels north of the Charlie Gibbs Fracture Zone dissects thick drift . The drift is believed to be a depositional zone for Heinrich submarine flows as they expanded from the Labrador Sea into the North Atlantic. By analogy with the terrestrial parts of these floods, the dissection probably represents a late stage of the flows.

The NAMOC Channel in the Labrador Sea Reach once had prominent levees and an active channel. Today, side-scan images indicate that the levees are dissected by scars and, in places, the channel is infilled by linguoid, delta-like bars. The flanks of the levees were strongly fluted by powerful, southward flowing erosional currents. These currents showed broad sweeping meanders and extended at least 150 km across the floor of the Labrador Sea. 3.5 MHz seismic profiles indicate thick deposits on the levee crests and an increasing number of internal reflectors towards the flanks. As well beds are cut out towards the flanks of the levees where erosion exposes older sediment. A future core to the east of MD9930 is recommended to examine this older sediment.

Sediment in the levee (MD9926 and 9930) includes thick (~ 14 m) silt beds in detrital carbonate. These are the proximal parts of Heinrich events. Core MD9926 probably includes a complete record the last interglacial and terminates in a Heinrich deposit.

The morphology and detrital carbonate deposits indicate huge sediment-laden submarine flows swept the floor of the Labrador Sea . Such flows must have originated by outbursts from the Laurentide Ice Sheet

3.4.3. Pore water studies

To be completed

3.5. A mud volcano on the south Greenland upper slope

During a transit between two coring sites, off southern Greenland, the multibeam imagery revealed the presence of a round-shaped relief of about 350 m of elevation above sea floor, and of about 8 km of diameter. It is surrounded by a series of two rims and bulges. A more thoroughful survey of this morphological unit, combining 3.5 kHz recordings and multibeam imagery, indicates that it was likely due to the vertical spreading of subsurface soft sediments through sedimentary units of the last couple of ice ages, the latters getting thinner and truncated at the contact with the dome (see figures in following pages). A few fractures are also observes in these units in the bulges surrounding the dome. The structure seems presently active, since no filling of the peripheral rims has been seen.

3.6. Lectures and seminars on board

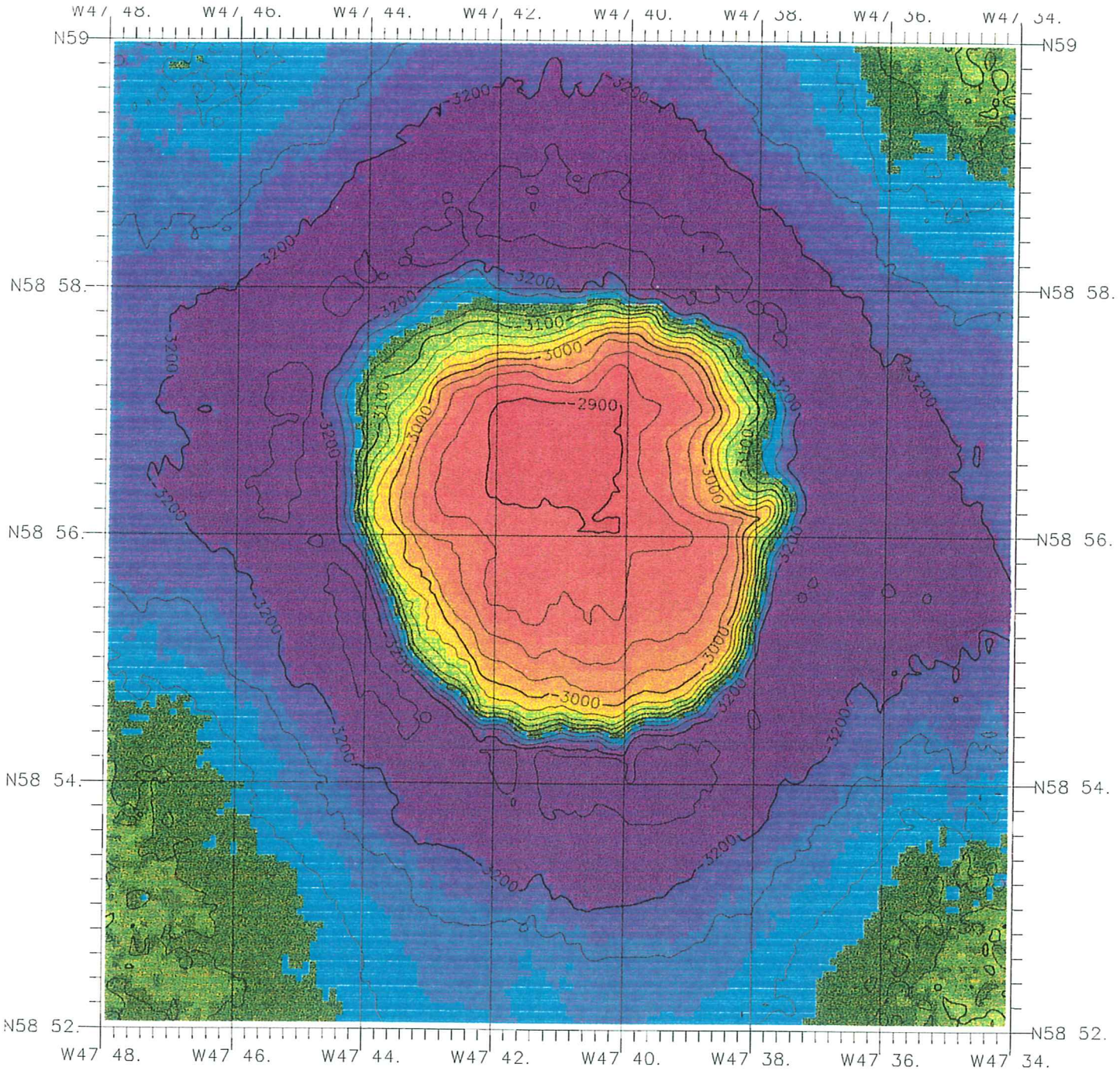
Starting from the second week of the leg, series of lectures and technical seminars were offered to the students and all interested scientists. These activities were scheduled in the morning from 9 to 10, and in the evening from 18 to 19. Groups of five or six participants were set for each seminar. Seminars on navigation (by the master Cdt Gilles Foubert), on coring techniques (by the chief of operation from IFRTP, Yvon Balut), on high resolution seismics (by Xavier Morin from IFRTP), and on various other techniques, by on-board scientists (MST, by Kate Jarrett, geological Survey of Canada; CTD, by Claudie Bournot, IFREMER; spectrophotometry, by Alain Jegou, LMCE) attracted much interest from the students and elders.

4. Summary of operations (tables)

4.1. Seismic lines

A summary chart follows. Daily tracks are in appendix 8.4.

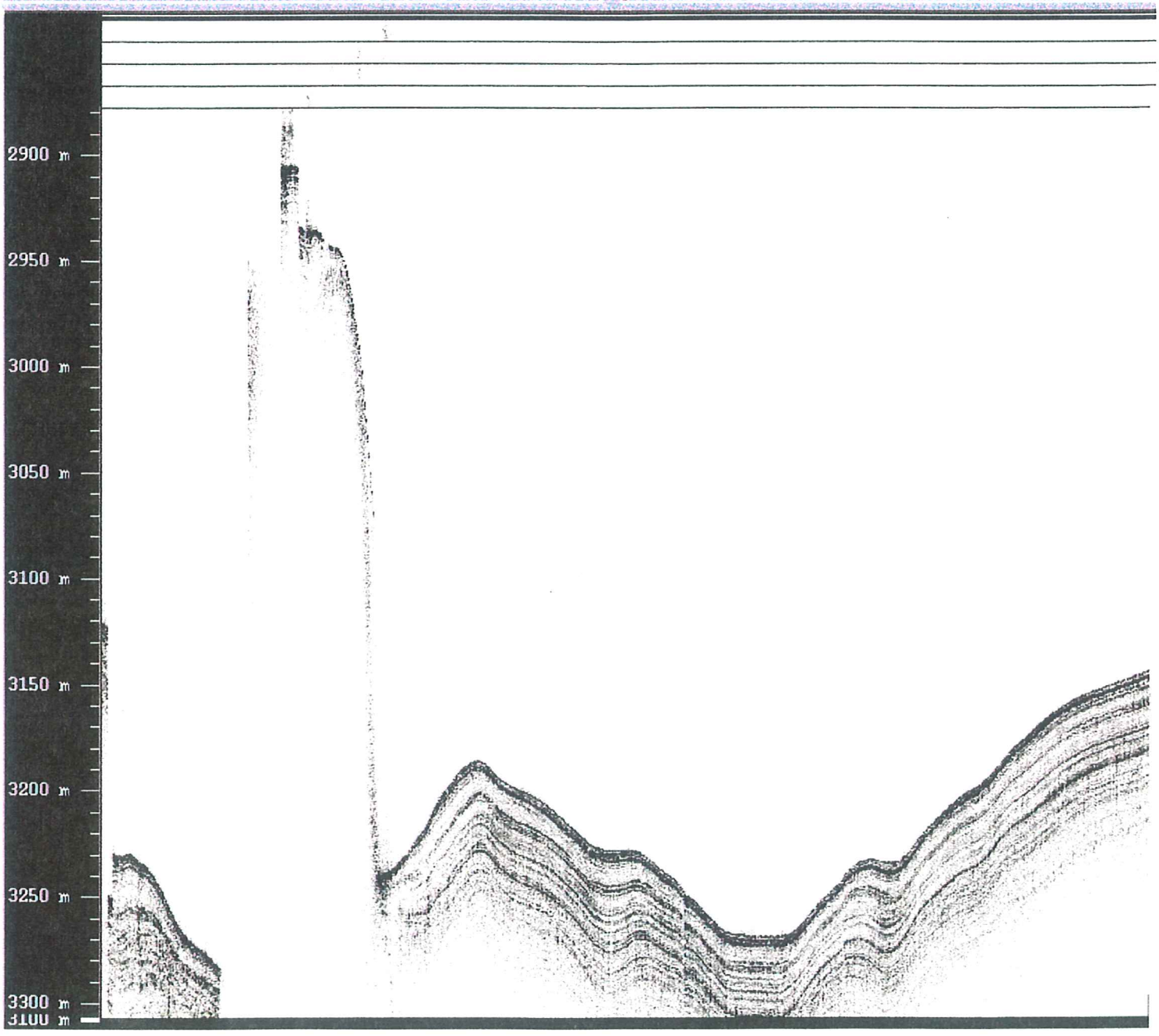
Table of contents


W47 48.
W47 46.
W47 44.
W47 42.
W47 40.
W47 38.
W47 36.
W47 34.
N59
N58 58.
N58 56.
N58 54.
N58 52.
3200
3100
3000
2900

Mg170405.jl

Date : 17/07/99 Heure : 04:04:34.938

Tangage : 0.7



M9g170552.gif

Roulis : -0.2

Date : 17/07/93 Heure : 05.52.01.505

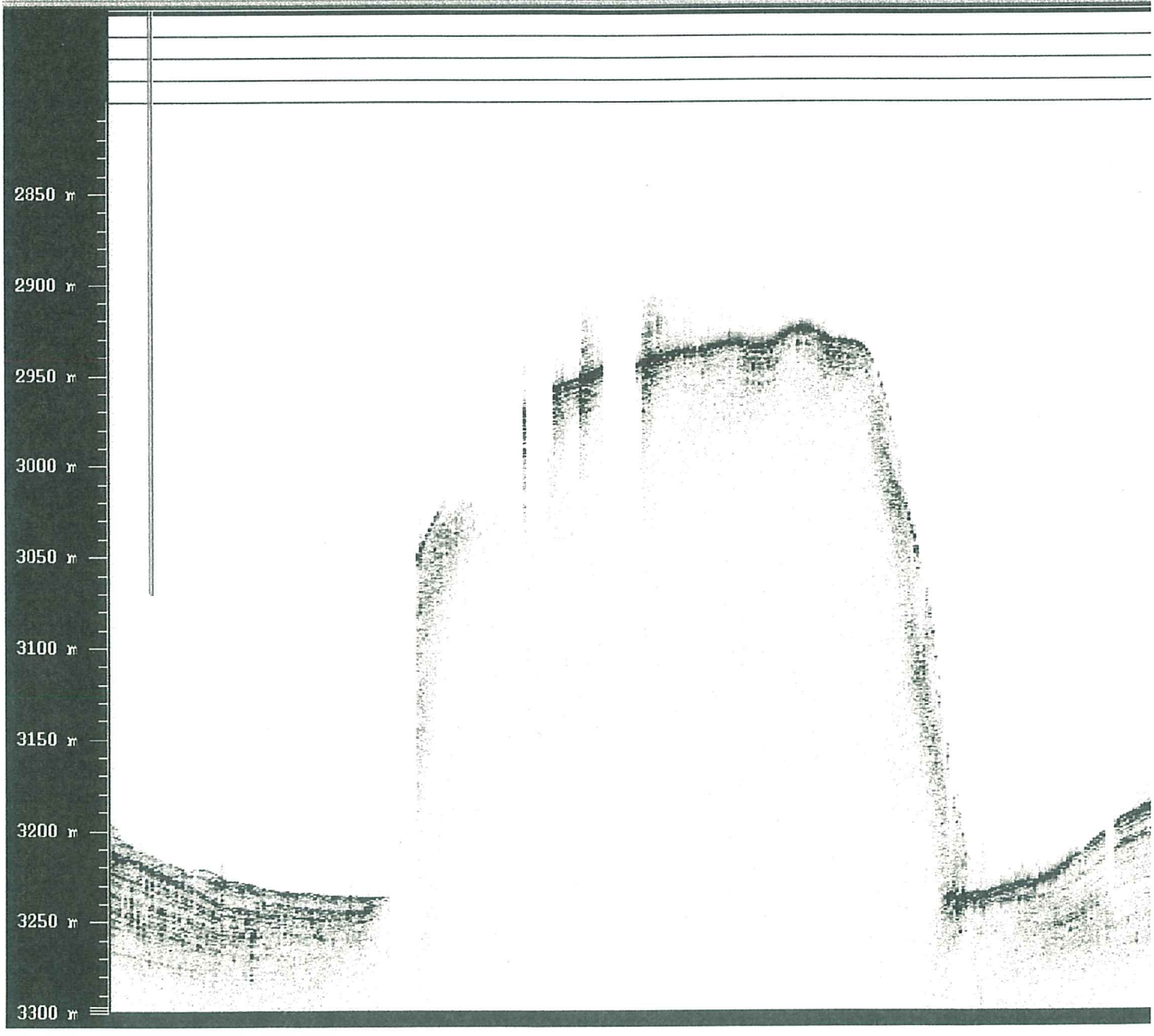
Tangage : 0.7

Etat Sondeur :

Pilonn : -0.2

Numero Recurrence : 0

Cap (degres) : 356.20



4.2. Tables of coring sites and of CTD measurements

Date (GMT)	Station	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
		13h06				Departure for station 9
		19h00				Arrived at station *(Greenland Slope)*
6 07/1999	9	20h00	58°55.26	047°06.96	2901	Rosette and CTD deployed down to 2875 m
		22h15				Rosette and CTD on deck
		22h50				Arrived at coring site (*Greenland Slope;* equiv. HU90 013-12)
7 07/1999	9	00h6	58°55.59	047°08.45	2900	Triggering (Calypso; **MD 99-2228**; 27.06 m)
		01h35				Core on deck
		02h00	58°55.81	047°10.53	2900	Rosette and CTD deployed down to 200 m for alkenones
		02h25				Rosette and CTD on deck
		02h30				Departure for station 10
		15h10				Arrived at station *(Braid Plain 1 Nanoc)*
7 07/1999	10	16h30	59°05.62	053°03.38	3400	Triggering (Calypso; **MD 99-2229**; 36.28 m)
		18h47				Core on deck
		20h03				Departure for station 11
		21h25				Arrived at station *(Braid Plain 2 Nanoc)*
7 07/1999	11	23h25	59°05.35	052°48.84	3430	Triggering (Calypso; **MD 99-2230**; 34.76 m)
8 07/1999		03h17				Core on deck
		03h27				Departure for station 12
		11h28				Arrived at station *(SW Greenland Rise)*
8 07/1999	12	13h11	60°34.72	051°48.49	3190	Triggering (Calypso; **MD 99-2231**; 34.29 m)
		14h49				Core on deck
		14h55				Departure for station 13
		02h09				Arrived at station *(SW Greenland Rise)*
8 07/1999	13	02h40	62°38.90	053°54.24	2476	Rosette and CTD deployed down to 2430 m
		04h30				Rosette and CTD on deck
		05h06				Arrived at coring site (*SW Greenland Rise* ; equiv.site 2400)
9 07/1999	13	06h15	62°38.99	053°53.98	2455	Triggering (Calypso; **MD 99-2232**; 30.32 m)
		07h55				Core on deck
		08h13	62°39.86	053°54.58	2493	Rosette and CTD deployed down to 200 m for alkenones
		08h38				Rosette and CTD on deck
		08h40				Departure for station 14
		07h00				Arrived at station *(Saglek Bank)*
10 07/1999	14	08h16	59°42.01	060°14.28	1120	Triggering (Calypso; **core empty**)
		09h00				Core broken when pulled out after approx. 30 m penetration; lower section and core cutter lost
		09h05				Departure for station 15
		12h57				Arrived at station *(Saglek Lower Slope)*
10 07/1999	15	13h55	59°49.46	059°09.35	2350	Triggering (Calypso; **MD 99-2233**; 24.62 m)
		15h10				Core on deck

Table 1: Summary of shipboard operations

Date (GMT)	Station	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
1.07/1999		01h15				Departure from Quebec
1.07/1999	1	13h18 13h48 14h10 14h15	48°18.28	070°15.44	271	Arrived at station *(Saguenay, Baie Eternité;* equiv. Sag30) Triggering (Calypso; **MD 99-2222**; 37.72m) Core on deck Departure for station 2
1.07/1999	2	17h13 17h34 19h05 19h05	48°20.93	070°49.11	141	Arrived at station *(Saguenay, Baie des Ha! Ha!)* Triggering (Calypso; **MD 99-2223**; 28.63m) Core on deck Departure for station 3
1.07/1999	3	22h07 22h55 00h27 00h30	48°18.28	070°15.43	271	Arrived at station (*Saguenay, Baie Eternité;* equiv. MD 99-2222) Triggering (Calypso; **MD 99-2224**; 58.54 m; Record !!) Core on deck Departure for station 4
3.07/1999	4	13h29 13h50 14h50 14h55	48°59.88	058°05.08	104	Arrived at station *(Bay of Islands)* Triggering (Calypso; **MD 99-2225**; 37.53m) Core on deck Departure for station 5
3.07/1999	5	21h07 21h36 22h09 22h45	50°15.14	058°26.11	336	Arrived at station *(Esquiman channel)* Triggering (Calypso; **core empty**) Core broken when pulled out after approx. 30 m penetration; lower section and core cutter lost Departure for station 6
5.07/1999	6	01h55 01h07 01h35 01h55 03h06 04h40 04h40	50°02.00 50°01.23	052°08.38 052°08.70	2716 2690	Arrived at station *(Southern Labrador Slope)* Rosette and CTD deployed down to 200 m for alkenones Rosette and CTD on deck Arrived at coring site *(Southern Labrador Slope;* equiv. HU91 045-025) Triggering (Calypso; **core empty**) Core broken when pulled out after approximately 25 m penetration; Lower section and core cutter lost (core empty) Departure for station 7
5.07/1999	7	22h18 23h46 01h41 01h41	57°03.71	050.37.70	3580	Arrived at station (*Levee Crest;* equiv. HU90 013-13) Triggering (Calypso; **MD 99-2226**; 32.14 m) Core on deck Departure for station 8
6.07/1999	8	10h15 11h54 13h06	58°12.64	048°22.38	3460	Arrived at station *(Greenland Rise)* Triggering (Calypso; **MD 99-2227**; 42.96 m) Core on deck

Date (GMT)	Station	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
		06h42	55°32.66	043°56.96	3225	Rosette and CTD deployed down to 200 m for alkenones
		07h03				Rosette and CTD on deck
		07h05				Departure for station 25
		22h05				Arrived at station *(Greenland Rise;* equiv. HU 90 013-12)
16 07 1999	25	23h17	58°55.06	047°07.49	2895	Triggering (Calypso; **MD 99-2242**; 35.36 m)
17 07 1999		00h52				Core on deck
		00h59				Start 3.5 kHz survey of 'diapiric' feature (to 47°59 W)
		06h08				End 3.5 kHz survey; switch to multibeam; departure for station 26
		11h25				Arrived at station *(East Greenland Slope)*
18 07 1999	26	12h24	62°04.37	040°11.57	1290	Rosette and CTD deployed down to 1258 m
		13h30				Rosette and CTD on deck
		13h53				Arrived at coring site *(East Greenland Slope)*
		14h37	55°32.66	043°56.96	3225	Triggering (Calypso; **MD 99-2243**; 9.43 m)
		15h30				Core on deck
		15h50				Departure for station 27
		21h05				Arrived at station *(Greenland Slope)*
18 07 1999	27	21h40	63°03.35	039°54.78	1408	Triggering (Gravity; **core empty**)
		23h27				Departure for station 28
		04h35				Arrived at station *(SE Greenland Slope, Irminger Basin)*
19 07 1999	28	04h44	62°41.89	037°35.13	2125	Rosette and CTD deployed down to 2103 m
		06h50				Rosette and CTD on deck
		07h35				Arrived at coring site *(SE Greenland Slope, Irminger Basin)*
		08h34	62°41.99	037°33.73	2110	Triggering (Calypso; **MD 99-2244**; 24.71 m)
		10h10				Core on deck
		10h49				Arrived at box core site *(SE Greenland Slope, Irminger Basin)*
		12h09	62°41.93	037°35.49	2125	Triggering (Box core; **MD 99-2245 Bx**)
		13h10				Core on deck
		13h29				Departure for station 29
		18h47				Arrived at station *(Lower SE Greenland Slope, Irminger Basin)*
19 07 1999	29	19h00	61°54.74	036°21.29	2750	Rosette and CTD deployed down to 200 m
		19h29				Rosette and CTD on deck
		19h53				Arrived at coring site *(Lower SE Greenland Slope, Irminger Basin)*
19 07 1999	29	22h36	61°54.73	036°21.52	2750	Triggering (Calypso; **MD 99-2246**; 35.77 m)
		23h54				Core on deck
		23h59				Departure for station 30
		17h27				Arrived at station *(West Reykjanes Ridge)*
20 07 1999	30	18h14	59°04.61	031°28.34	1690	Triggering (Calypso; **MD 99-2247**; 24.50 m)
		19h16				Core on deck
		19h20				Departure for station 31
20 07 1999		23h35				Arrived at station *(East Reykjanes Ridge)*
21 07 1999	31	00h30	58°57.32	030°23.33	1724	Triggering (Calypso; **MD 99-2248**; 38.22 m)

Date (GMT)	Station	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
		15h15				Departure for station 16
		22h22				Arrived at station *(Labrador Slope;* equiv. HU84-030-021)
10/07/1999	16	23h26	58°22.01	057°30.54	2910	Cancelled site due to thin (<15m) sediment cover; departure for station 17
		23h10				Arrived at station *(Lake Melville)*
11/07/1999	17	23h49	53°50.81	059°03.05		Triggering (Calypso; **MD 99-2234**; 39.3 m)
		00h55				Core on deck
12/07/1999	18	03h05	53°50.86	059°03.05		Triggering (Calypso; **MD 99-2235**; 25.37 m)
		03h52				Core on deck
		04h00				Departure for station 19
		13h33				Arrived at station *(Cartwright Saddle)*
12/07/1999	19	14h05	54°37.00	056°10.57	520	Triggering (Calypso; **MD 99-2236**; 21.15 m)
		15h00				Core on deck
		15h05				Departure for station 20
		21h15				Arrived at station *(Orphan Knoll)*
13/07/1999	20	22h36	50°11.93	045°41.03	3530	Triggering (Calypso; **MD 99-2237**; 30.74 m)
		00h15				Core on deck
		00h46	50°11.90	045°40.86	3572	Rosette and CTD deployed down to 3542 m
		03h07				Rosette and CTD on deck
		03h41	50°11.55	045°40.68	3540	Rosette and CTD deployed down to 200 m for alkenones
		03h51				Rosette and CTD on deck
		04h55				Departure for station 21
		09h12				Arrived at station *(Orphan Basin)*
14/07/1999	21	10h27	49°51.12	046°38.20	3080	Triggering (Calypso; **MD 99-2238**; 18.24 m)
		12h05				Core on deck
		12h10				Departure for station 22
		03h25				Arrived at station (equiv. ODP 647)
15/07/1999	22	04h47	53°27.03	045°15.04	3770	Triggering (Calypso; **MD 99-2239**; 23.77 m)
		06h52				Core on deck
		06h55				Departure for station 23
		10h31				Arrived at potential coring site *(SW Gloria Drift)*
15/07/1999	23	11h05	54°00.32	046°11.12	3470	Cancelled site due to thin (< 20 m) sediment cover
		13h20				Arrived at station *(SW Gloria Drift;* equiv. VEMA v.2720)
		14h41	54°00.60	046°11.68	3525	Triggering (Calypso; **MD 99-2240**; 25.50 m)
		16h21				Core on deck
		16h25				Departure for station 24
		00h36				Arrived at station *(Gloria Drift)*
16/07/1999	24	01h41	55°32.95	043°57.88	3280	Triggering (Calypso; **MD 99-2241**; 25.35 m)
		03h15				Core on deck
		03h28	55°33.13	043°58.00	3280	Rosette and CTD deployed down to 3270 m
		06h10				Rosette and CTD on deck

Table 2: Coring log

IMAGES V, Leg 2: Québec-Reykjavik, June 30th - July 24th, 1999

Date (GMT)	Station	Water depth (m)	Latitude (N)	Longitude (W)	Location	Core	Length (m)	Sections	Comments
1/07/1999	1	271	48°18.28	070°15.44	*Saguenay Fjord* *Baie Éternité*	MD 99-2222	37.72	XXVI	**Calypso core** Full penetration; some gas; sediment extruded from both ends of the 1500 cm cut
1/07/1999	2	141	48°20.93	070°49.11	*Saguenay* *Baie des Ha! Ha!*	MD 99-2223	28.63	XX	**Calypso core** Core bent; core cutter damaged; at 900cm very soupy gravel, sand with mud balls lost
1/07/1999	3	271	48°18.28	070°15.43	*Saguenay Fjord* *Baie Éternité* (equiv. MD 99-2222)	MD 99-2224	58.54	XXXIX	**Calypso core** Core cut from bottom upperwards; section I is only 146 cm long; numbered from top to bottom as usual; section VIII : the 84 top cm lost on deck = in bags
3/07/1999	4	104	48°59.88	058°05.08	*Bay of Islands* *(Humber Arm)*	MD 99-2225	37.53	XXV	**Calypso core** Core bent; Sections X to XVI with gas; water from 861 cm (top of section VI) to 1012 cm (section VII): sections VI and VII are short (111 cm and 38 cm respectively; bent tube): sediments from 1500-1502 and from 1650-1652 cm in bags
3/07/1999	5	336	50°15.14	058°26.11	*Esquiman Channel*	-	-	-	Core broken when pulled out after approx. 30 m penetration; lower section and core cutter lost (core empty; no sediment recovered)
5/07/1999	6	2690	55°01.23	052°08.70	*Southern Labrador Slope* (equiv. HU91-045-025)	-	-	-	Core broken when pulled out after approx. 25 m penetration; lower section and core cutter lost (core empty; no sediment recovered)
5/07/1999	7	3580	57.03.71	050.37.70	*Levee Crest* *(Braid Plain)*	MD 99-2226	32.14	XXII	**Calypso core** Plastic liner pulled apart at join inside corer (at 20.78 m; between sections XIVa and XIVb); no sediment lost; however, minor amounts of soupy sediment from sections XIII-XVII fell on deck; 3 cm from top of section III in bag
6/07/1999	8	3460	58°12.64	048°22.38	*Greenland Rise*	MD 99-2227	42.96	XXIX	**Calypso core** Minor amount of sediment spilled on deck between section III and IV; core too long to pull out completely, median cut made at 14.96 m (Section XI = 14.96-16.5m)
6/07/1999	9	2900	58°55.59	047°08.45	*Greenland Slope*	MD 99-2228	27.06	XVIII	**Calypso core** Core liner imploded below 27.06 m after apparent penetration of 40 m; rest of core recovered; section XVIII (25.5-27.06 m) = 1.56 m
7/07/1999	10	3400	59°05.62	053°03.38	*Braid Plain 1 Namoc*	MD 99-2229	36.28	XXV	**Calypso core** Full penetration; joint in section II broke on deck; no sediment lost; water in section XII (17.5-18 m)
7/07/1999	11	3430	59°05.35	053°48.84	*Braid Plain 2 Namoc*	MD 99-2230	34.76	XXIV	**Calypso core** Full penetration; 3 cm sediment between sections IV and V collected in bag; partial loss of soupy sediment from sections X, XI, XII
8/07/1999	12	3190	60°34.72	051°48.49	*SW Greenland Rise*	MD 99-2231	34.29	XXIII	**Calypso core** Full penetration; piston covered with a lot of sediment, especially sand (placed in bag); broken join in section VIII (no sediment lost); water between sections XXI and XII replaced with foam 'noodle'

Date (GMT)	Station	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
		01h37				Core on deck
		01h40				Arrived at box core site *(East Reykjanes Ridge)*
		03h00	58°57.44	030°22.99	1710	Triggering (Box core; **MD 99-2249 Bx**)
		04h53				Core on deck
21/07/1999	31	05h19	61°54.74	036°21.29	2750	Rosette and CTD deployed down to 200 m
		05h44				Rosette and CTD on deck
		05h50				Departure for station 32
		11h36				Arrived at station *(South Iceland Basin)*
21/07/1999	32	12h43	57°42.71	029°25.27	2310	Triggering (Calypso; **MD 99-2250**; 36.48 m)
		13h58				Core on deck
		14h00				Departure for station 33
		18h45				Arrived at station *(Iceland Basin)*
21/07/1999	33	19h49	57°26.87	027°54.47	2620	Triggering (Calypso; **MD 99-2251**; 36.58 m)
		21h24				Core on deck
		22h18				Arrived at Karsten core site *(Iceland Basin)*
		23h44	57°26.84	027°55.83	2610	Triggering (Karsten; **MD 99-2252**; 3.25 m)
22/07/1999		00h59				Core on deck
		01h07				Departure for station 34
		06h50				Arrived at station *(Gardar Drift, Iceland Basin)*
22/07/1999	34	08h02	56°21.78	027°48.95	2840	Triggering (Calypso; **MD 99-2253**; 32.75 m)
		10h45				Core on deck
		10h00	56°22.09	027°49.04	2840	Rosette and CTD deployed down to 2830 m
		11h57				Rosette and CTD on deck
		12h03				Departure for station 35
		19h10				Arrived at station *(East Bight Fracture Zone)*
22/07/1999	35	20h11	56°47.78	030°39.86	2440	Triggering (Calypso; **MD 99-2254**; 36.21 m)
		21h50				Core on deck
		22h00	56°47.87	030°40.00	2430	Rosette and CTD deployed down to 200 m
		22h14				Rosette and CTD on deck
		22h16				Departure for station 35
		09h10				Arrived at station *(East Reykjanes Ridge)*
23/07/1999	36	09h56	58°58.41	030°39.10	1490	Triggering (Calypso; **MD 99-2255**; 25.03 m)
		11h55				Core on deck
		12h00				Departure for Reykjavik

Date (GMT)	Station	Water depth (m)	Latitude (N)	Longitude (W)	Location	Core	Length (m)	Sections	Comments
19/07/1999	28	2110	62°04.99	037°33.73	*SE Greenland Slope Irminger Basin*	MD 99-2244	24.71	XVII	**Calypso core** Triggering in water? apparent penetration 36 m; core in good condition
19/07/1999	28	2125	62°41.93	037°35.49	*SE Greenland Slope Irminger Basin*	MD 99-2245 Bx	-	-	**Box core** Very little sediment (green black); sediment swashed and spread on bottom of corer; 2 surface samples in bags
19/07/1999	29	2750	61°54.73	036°21.52	*Lower SE Greenland Slope Irminger Basin*	MD 99-2246	35.77	XXIV	**Calypso core** Full penetration; apparent penetration 37 m
20/07/1999	30	1690	59°04.61	031°28.34	*West Reykjanes Ridge*	MD 99-2247	24.50	XVII	**Calypso core** Full penetration, up to the weights; use longer core next time!! sections I and IV liquidy; rest ok
20/07/1999	31	1724	58°57.32	030°23.33	*East Reykjanes Ridge*	MD 99-2248	38.22	XXVI	**Calypso core** Full penetration; use longer core next time!! approximately 5 cm of sediment lost on deck from lower end of section VI (8.95 m) and top section VII (9 m); replaced with foam 'noodle'
21/07/1999	31	1710	58°57.44	030°22.99	*East Reykjanes Ridge*	MD 99-2249 Bx	-	-	**Box core** good
21/07/1999	32	2310	57°42.71	029°25.27	*South Iceland Basin*	MD 99-2250	36.48	XXV	**Calypso core** Full penetration; good core
21/07/1999	33	2620	57°26.87	027°54.47	*Iceland Basin*	MD 99-2251	36.58	XXI	**Calypso core** Full penetration; good core
21/07/1999	33	2610	57°06.84	027°55.83	*Iceland Basin*	MD 99-2252	3.25	-	**Karsten core** good
22/07/1999	34	2840	56°21.78	027°48.95	*Gardar Drift, Iceland Basin*	MD 99-2253	32.75	XXII	**Calypso core** Full penetration, up to the weights; use longer core next time!!
22/07/1999	35	2440	56°47.78	030°39.86	*East Bight Fracture Zone*	MD 99-2254	36.21	XXV	**Calypso core** Full penetration, up to the weights; use longer core next time!!
23/07/1999	36	1490	58°58.41	030°39.10	*East Reykjanes Ridge*	MD 99-2255	25.03	XVII	**Calypso core** Odd triggering; tube bent right at weights (really twisted); 50 cm of sediment absent between sections Xa and Xb (40 cm lost to the sea after barrels were cut; 10 cm placed in a bag

Date (GMT)	Station	Water depth (m)	Latitude (N)	Longitude (W)	Location	Core	Length (m)	Sections	Comments
									section VIII (no sediment lost); water between sections XXI and XII replaced with foam 'noodle'
9/07/1999	13	2455	62°38.99	053°53.98	*SW Greenland Rise* (equiv. site 2400)	MD 99-2232	30.32	XXI	**Calypso core** Core cutter damaged; empty liner above recovered sediment imploded after passage of piston; soupy sediment immediately above core cutter; separated joint at 7.51 m, lost sediment (10 cm) recovered in bag
10/07/1999	14	1120	59°42.01	060°14.28	*Saglek Bank*	-	-	-	Core broken when pulled out after approx. 30 m penetration; 41.51 m tube length too ambitious for site sections below first join under the weights and core cutter lost (core empty; no sediment recovered)
10/07/1999	15		59°49.46	059°09.35	*Saglek Lower Slope*	MD 99-2233	24.62	XVII	**Calypso core** Full penetration; sections I, II, III, IV, VI very soft;water in top 10 cm of section VI replaced with foam 'noodle'; section V liquid; top 10 cm around piston in bag.
10/07/1999	16	2910	58°22.01	057°30.54	*Labrador Slope* (equiv. HU84-030-021)	-	-	-	Broke off search due to thin sediment cover (<15 m)
11/07/1999	17	230	53°50.81	059°03.05	*Lake Melville*	MD 99-2234	39.30	XXVII	**Calypso core** Core bent; core cutter damaged; broken liner at 10.62 m (sections VIIIa and VIIIb) after metal tube; sediment spilled on deck between sections VIIIb and IX, and from XIII; section XIX watery
12/07/1999	18	233	53°50.86	059°03.05	*Lake Melville* (equiv. MD 99-2234)	MD 99-2235	25.37	XXVII	**Calypso core** Full penetration; 2 cm of sediment from base of section XVI placed in bag
12/07/1999	19	520	54°37.00	056°10.57	*Cartwright Saddle*	MD 99-2236	21.15	XV	**Calypso core** Corer stopped at 25 m by resistant layer; core cutter damaged; imploded and piereed liner at several points between 22 and 25 m; liner spliced at breaks in sections II, III, IV and V with plastic tubing; lost sediment between sections II and III replaced with foam 'noodle'
13/07/1999	20	3530	50°11.93	045°41.03	*Orphan Knoll*	MD 99-2237	30.74	XXI	**Calypso core** Core cutter damaged; upper 11 m of liner split by piston and empty; rest of liner intact; sediment ok
14/07/1999	21	3080	49°51.12	046°38.20	*Orphan Basin*	MD 99-2238	18.24	XIII	**Calypso core** Core cutter slightly damaged; piereed and torn liner between 4.5 and 7 m (sections IV and V); liquid spilled on deck between sections I & II, II & III, III & IV
15/07/1999	22	3770	53°27.03	045°15.04	(equiv. ODP 647)	MD 99-2239	23.77	XVI	**Calypso core** Core bent 8 m below the top, no sediment lost; rest of core ok
15/07/1999	23	3525	54°00.60	046°11.68	*SW Gloria Drift* (equiv. VEMA 27-20)	MD 99-2240	25.50	XVII	**Calypso core** Full penetration; core cutter slightly damaged: possibly at previous station, where the same core cutter was used, according to the deck crew
16/07/1999	24	3280	55°32.95	043°57.88	*Gloria Drift*	MD 99-2241	25.35	XVII	**Calypso core** Full penetration; core cutter slightly damaged
16/07/1999	25	2895	58°55.06	047°07.49	*Greenland Rise* (equiv. HU 90 013-12)	MD 99-2242	35.36	XXIV	**Calypso core** Full penetration; sediment spilled on deck between sections III & IV, IV & V
18/07/1999	26	1280	62°04.51	040°11.26	*East Greenland Slope*	MD 99-2243	9.43	VII	**Calypso core** Core bent by at least 40° after 20 m of apparent penetration; imploded liner 2 m below free piston; foam placed at base of sections I, II and III and top of section VII
18/07/1999	27	1408	63°03.35	039°54.78	*Greenland Slope*	-	-	-	**Gravity core** Empty; one large clast and some gravel recovered in bag

Table 4: Coring statistics (Calypso)

Station	Core	Water depth (m)	Wire length (m)	Difference (m)	Core length (m)	Tube length (m)	Recovery coefficient	Time on Station (min)
1	MD 99-2222	271	223.8	47.2	37.72	41.00	0.92	68
2	MD 99-2223	141	107.0	34.0	28.63	34.90	0.82	34
3	MD 99-2224	271	206.0	65.0	58.54	61.35	0.95	140
4	MD 99-2225	104	63.0	41.0	37.53	41.50	0.90	81
7	MD 99-2225	3580	3523.0	57.0	32.14	41.22	0.78	166
8	MD 99-2227	3460	3394.0	66.0	42.96	51.51	0.83	269
9	MD 99-2228	2900	2841.0	59.0	27.06	51.51	0.53	155
10	MD 99-2229	3400	3347.7	52.3	36.28	51.51	0.70	360
11	MD 99-2230	3430	3386.0	44.0	34.76	41.51	0.84	632
12	MD 99-2231	3190	3141.0	49.0	34.29	41.51	0.83	201
13	MD 99-2232	2455	2395.0	60.0	30.32	41.51	0.73	169
15	MD 99-2233	2350	2293.0	57.0	24.62	31.00	0.79	133
17	MD 99-2234	230	182.3	47.7	39.30	45.00	0.87	95
18	MD 99-2235	233	197.5	35.5	25.37	31.00	0.82	187
19	MD 99-2236	520	482.5	37.5	21.15	31.00	0.68	92
20	MD 99-2237	3530	3482.0	48.0	30.74	44.00	0.70	180
21	MD 99-2238	3080	3027.0	53.0	18.24	42.00	0.43	173
22	MD 99-2239	3770	3717.0	53.0	23.77	44.00	0.54	207
23	MD 99-2240	3525	3483.5	41.5	25.50	31.00	0.82	184
24	MD 99-2241	3280	3238.0	42.0	25.35	31.00	0.82	164
25	MD 99-2242	2895	2837.0	58.0	35.36	42.25	0.84	174
26	MD 99-2243	1280	1238.0	42.0	9.43	31.65	0.30	97
28	MD 99-2244	2110	2040.0	70.0	24.71	42.25	0.58	155
28	MD 99-2245*	-	-	-	-	-	-	-
29	MD 99-2246	2750	2680.7	69.3	35.77	42.25	0.85	181
30	MD 99-2247	1690	1661.0	29.0	24.50	29.00	0.84	108
31	MD 99-2248	1724	1675.0	49.0	38.22	42.20	0.91	122

Table 3: Coring locations

Core	Water depth (m)	Latitude (N)	Longitude (W)	Latitude (N)	Longitude (W)	Length (m)
MD 99-2222	271	48°18.28	070°15.44	48.3047°	-070.2573°	37.72
MD 99-2223	141	48°20.93	070°49.11	48.3488°	-070.8185°	28.63
MD 99-2224	271	48°18.28	070°15.43	48.3047°	-070.2572°	58.54
MD 99-2225	104	48°59.88	058°05.08	48.9980°	-058.0847°	37.53
MD 99-2226	3580	57°03.71	050°37.70	57.0618°	-050.6283°	32.14
MD 99-2227	3460	58°12.64	048°22.38	58.2107°	-048.3730°	42.96
MD 99-2228	2900	58°55.59	047°08.45	58.9265°	-047.1408°	27.06
MD 99-2229	3400	59°05.62	053°03.38	59.0937°	-053.0563°	36.28
MD 99-2230	3430	59°05.35	052°48.84	59.0892°	-052.8140°	34.76
MD 99-2231	3190	60°34.72	051°48.49	60.5787°	-051.8082°	34.29
MD 99-2232	2455	62°38.99	053°53.98	62.6498°	-053.8997°	30.32
MD 99-2233	2350	59°49.46	059°09.35	59.8243°	-059.1558°	24.62
MD 99-2234	230	53°50.81	059°03.05	53.8468°	-059.0508°	39.30
MD 99-2235	233	53°50.86	059°03.05	53.8477°	-059.0508°	25.37
MD 99-2236	520	54°37.00	056°10.57	54.6167°	-056.1762°	21.15
MD 99-2237	3530	50°11.93	045°41.03	50.1988°	-045.6838°	30.74
MD 99-2238	3080	49°51.12	046°38.20	49.8520°	-046.6367°	18.24
MD 99-2239	3770	53°27.03	045°15.04	53.4505°	-045.2507°	23.77
MD 99-2240	3525	54°00.60	046°11.68	54.0100°	-046.1947°	25.50
MD 99-2241	3280	55°32.95	043°57.88	55.5492°	-043.9647°	25.35
MD 99-2242	2895	58°55.06	047°07.49	58.9177°	-047.1248°	35.36
MD 99-2243	1238	62°04.51	040°11.26	62.0752°	-040.1877°	9.43
MD 99-2244	2110	62°41.99	037°33.73	62.6998°	-037.5622°	24.71
MD 99-2245*	2125	62°41.93	037°35.49	62.6988°	-037.5915°	-
MD 99-2246	2750	61°54.73	036°21.52	61.9122°	-036.3587°	35.77
MD 99-2247	1690	59°04.61	031°28.34	59.0768°	-031.4723°	24.50
MD 99-2248	1724	58°57.32	030°23.33	58.9553°	-030.3888°	38.22
MD 99-2249*	1710	58°57.44	030°22.99	58.9573°	-030.3832°	-
MD 99-2250	2310	57°42.71	029°25.27	57.7118°	-029.4212°	36.48
MD 99-2251	2620	57°26.87	027°54.47	57.4478°	-027.9078°	36.58
MD 99-2252*	2610	57°06.84	027°55.83	57.1140°	-027.9305°	-
MD 99-2253	2840	56°21.78	027°48.95	56.3630°	-027.8158°	32.75
MD 99-2254	2440	56°47.78	030°39.86	56.7963°	-030.6643°	36.21
MD 99-2255	1490	58°58.41	030°39.10	58.9735°	-030.6517°	25.03

* = box core

Table 5: Water sampling locations (CTD)

Station	CTD #	Water depth (m)	Deployment depth (m)	Latitude (N)	Longitude (W)	Latitude (N)	Longitude (W)
6	iM5001	2716	200	55°02.00	052°08.38	55.0333°	-052.1397°
9	iM5002	2901	2875	58°55.26	047°06.96	58.9210°	-047.1160°
9	iM5003	2900	200	58°55.81	047°10.53	58.9302°	-047.1755°
13	iM5004	2476	2430	62°38.90	053°54.24	62.6483°	-053.9040°
13	iM5005	2493	200	62°39.86	053°54.58	62.6643°	-053.9097°
20	iM5006	3572	3542	50°11.90	045°40.86	50.1983°	-045.6810°
20	iM5007	3540	200	50°11.55	045°40.68	50.1925°	-045.6780°
24	iM5008	3280	3270	55°33.13	043°58.00	55.5522°	-043.9667°
24	iM5009	3225	200	55°32.66	043°56.96	55.5443°	-043.9493°
26	iM5010	1290	1258	62°04.37	040°11.57	62.0728°	-040.1928°
28	iM5011	2125	2103	62°41.89	037°35.13	62.6982°	-037.5855°
29	iM5012	2750	200	61°54.74	036°21.29	61.9123°	-036.3548°
31	iM5013	1766	200	58°57.20	030°23.13	58.9533°	-030.3855°
34	iM5014	2840	2830	56°22.09	027°49.04	56.3682°	-027.8173°
35	iM5015	2716	200	56°47.87	030°40.00	56.7978°	-030.6667°

Table 4: Coring statistics (Calypso)

31	MD 99-2249*	-	-	-	-	-	-	-
32	MD 99-2250	2310	2256.0	54.0	36.48	42.25	0.86	144
33	MD 99-2251	2620	2568.0	52.0	36.58	42.25	0.87	145
33	MD 99-2252*	-	-	-	-	-	-	-
34	MD 99-2253	2840	2785.5	54.5	32.75	42.25	0.78	235
35	MD 99-2254	2440	2380.0	60.0	36.21	42.25	0.86	160
36	MD 99-2255	1490	1433.0	57.0	25.03	42.25	0.59	165

* = box core

through the magnetic susceptibility coil. After each increment of travel readings from each sensor are taken.

Compressional Wave Velocity

The p-wave logger system consists of two spring loaded compressional wave transducers (PWT) and two rectilinear displacement transducers attached to the PWT mountings. The PWT's are located on either side of the core and are easily moved to accommodate cores of varying diameter. Each PWT comprises a thickness mode 500 kHz piezoelectric crystal mounted in epoxy resin and housed in a stainless steel cylinder. A filled epoxy resin backing is used to shape the transmitted pulse. A short 500 kHz compressional wave pulse is produced at the transmitting transducer at a repetition rate of 1 kHz. This wave pulse travels through the core and is detected by the receiving transducer and the time of flight of the wave pulse is measured. The two rectilinear displacement transducers measure the displacement of the active faces of the PWT transducers from a known standard. Using this measured distance and knowing the thickness of the core liner the diameter of the sediment core can be calculated assuming that the core liner is full of sediment. The p-wave travel time is corrected for the P-wave travel time delay caused by the core liner and the electronics of the system.

Gamma Ray Attenuation

The gamma ray attenuation unit comprises a 10 millicurie Cesium-137 capsule (housed in a 150 mm diameter primary lead shield with both 2.5 and a 5 mm collimators) and a sodium iodide scintillation detector (housed in a 150 mm diameter collimated lead shielding to minimize any background radiation). The source and detector are mounted diametrically across the diameter of the core. A narrow (pencil size) beam of gamma rays with energies principally at 0.662 MeV is emitted from the Cesium -137 source and passes through the diameter of the sediment core. At these energy levels Compton scattering is the primary mechanism for the attenuation of the gamma rays in most sedimentary material. The incident photons are scattered by collision with electrons encountered in the core and there is a partial energy loss. This attenuated gamma beam is measured by the Sodium Iodide detector. The Compton scattering of the photons is directly related to the number of electrons in the path of the gamma ray beam. The bulk density of the core is calculated by comparing the attenuation of gamma rays through the whole core to the attenuation of the gamma rays through aluminium. The calculated bulk density is corrected for the presence of hydrogen in the pore water. (Boyce, 1976).

Magnetic Susceptibility

The magnetic susceptibility Bartington loop sensor (MS2B) is mounted to minimize the effects of magnetic or metallic components of the MST system. A low intensity non-saturating, alternating magnetic field is produced by an oscillator circuit in the sensor loop. Changes in the

5. On board core processing and studies

5.1. Core handling

As soon as the corer arrived onboard, the core cutter and catcher were immediately bagged. The core lining was then pulled out of the barrell and the ends capped. A meter tape was used to measure the length of the core and to mark each 1.5 m section. Using the orientation as a guide, the starboard side of each core was identified as the "Working" half and the port side as the "Archive" half. Each section was identified with the core number, section number (roman) and the depth of the top and bottom in centimeters. The sections were then cut with a section cutter, capped, and transported in the MST container to warm up. At some occasion, holes were drilled in the core lining to evacuate the gases from the sediments. When sediment spilled on the deck during section cutting, it was laced in an identified bag. After the MST measurements were done, each section was split along the orientation line using two rotating saws mounted on a moving bench. Both the archive and working halves were scrapped and cleaned. The archive was used for description while the working half was sampled. After description and sampling, both halves were wrapped in plastic and packed in a rectangular tube and were finally stored in a refrigerated container.

5.2. Physical Property Whole Core Measurements

by C. Jarrett (Geological Survey of Canada, Dartmouth, NS)

High resolution sediment physical property measurements were taken using the Geotek MultiSensor Track (MST) at a downcore resolution of 2 cm. These measurements comprise compressional p-wave velocity, bulk density and magnetic susceptibility. Sediment physical property measurements and subsamples obtained from the split core included spectral reflectance, penetrometer, discrete bulk density and water content. A summary description of the MST system is given below and a more detailed description of the system and software can be found in the GEOTEK MSCL Manual.

Multi Sensor Track (MST)

The MST consists of a conveyor system, a central unit assembly, a microprocessor and a pc computer. The conveyor system has two track sections, mounted and aligned on either side of the central unit, and a belt driven pusher block which is driven in either direction by a stepper motor and gear box assembly.

The central unit assembly incorporates a compressional wave (p-wave) logger, a gamma ray attenuation logger and a magnetic susceptibility loop. A reference position is located 12 cm to the right of the p-wave logger. The gamma ray attenuation logger and magnetic susceptibility loop are offset to the left of a reference position 26cm and 77cm respectively.

Each 1.5m core section is placed on the right hand track with top located at the reference position and travels incrementally past the p-wave logger, gamma ray attenuation logger and

Bulk density was calculated as follows:

Bulk density = (ln counts - m_o)/(m_1 * D)

where:

ln counts is the normalized sample gamma ray attenuation counts
m_o is the calibration intercept
m_1 is the calibration slope
D is the calculated sediment diameter

The p-wave travel time offset caused by the liner and the electronics of the system was measured. P-wave velocity was calculated using the measured travel time, travel time offset and the assumed diameter of the core. This processed data was then copied to another sheet and the bulk density was corrected for the presence of pore water after Boyce (1976) and the p-wave velocity measurements were corrected back to insitu values after Wilson (1960), Wyllie et.al (1956) and MacKensie(1981).

The MST core depths were edited to account for the temporary plastic end caps and to correct any discrepancies between the measured MST metre tape length and the MST software measured core section lengths.

When running core sections through the MST the temperature probe is taken out of a section before all measurements have been completed for that section and is placed in the next downcore section. Any obvious temperature variations at the end of each section were edited.

This edited processed data was then copied to the final sheet. The final data sheet was saved as an excel 4.0 file and imported into Kaleidagraph 3.08c were data was masked before plotting. Magnetic susceptibility measurements were masked for the top 6 cm and bottom 6 cm for a series of four core sections. P-wave velocity measurements were masked where the amplitude of the signal was less than 80. Density data were masked at section breaks if necessary. Measurements taken on voids in the core were not masked. The section breaks, MST and spectrophotometer data were then plotted on one page.

The distilled water standard data was not edited out and it is recommended these values be used to further correct the data.

MST Problems

The diameter deviation measurement was incorrect for essentially the entire length of the mission. We were unable to solve the problem as it was intermittent and appears to be a software problem. The LCD display of the diameter was always correct and when the Geotek utilities was used to test the diameter deviation measurement it always gave the correct measurement. This resulted in considerable time being spent processing the raw data.

oscillator frequency caused by material that has a magnetic susceptibility is measured and converted into magnetic susceptibility values (SI units).

The quality of the bulk density and velocity values are dependent on: 1) an accurate measure of sediment thickness; 2) degree of sediment saturation; and 3) the presence of air voids between sediment and plastic core liner. The magnitude of the magnetic susceptibility values are dependent on the type of sediment and the volume of material within the coil. Identical cores of varying diameters will give different magnetic susceptibility values but will show the same downcore profile.

MST Logging Procedure

The 1.5m sections of whole core were brought into the MST container and brought up as close to ambient container temperature as possible to prevent drift of the magnetic susceptibility measurements. After reaching ambient temperature the core section end caps were removed to allow core sections to pass through the magnetic susceptibility coil. Where the top sections of the cores were soupy a temporary plastic end cap was inserted in the end of the liner and taped in place. Where the core was stiff enough a thin piece of plastic was used to separate the core section sediment ends. Metre tape was placed along the length of the section and deck section and measured section length were recorded on the MST Logging sheets (Appendix). The final MST length measurement procedure was established after processing core MD99-2225. All extruded and bagged sediment as a result of either gas expansion or sediment loss due to cutting on deck was included in the MST metre tape length.

The core section was then placed on the track to the right of the p-wave transducer and the top of the core section was aligned with the reference zero position. A temperature probe was inserted in the core section to record core temperature. To ensure a good acoustic couple for the p-wave velocity measurement the section liner was wiped down with a wet sponge and distilled water was sprayed on the p-wave transducers.

Four sections of core and a distilled water standard were run through the MST at a time as a new core with a filename designation of 2222A, 2222B etc. Core sections were sometimes too heavy or sandy for the pusher system to increment the sections at the 2cm interval. Therefore four sections were run at a time to prevent large errors in measurement depths. The distilled water standard was run at the end of the four sections as a check on the MST system. All relevant notes regarding pusher problems, imploded liner etc. were recorded in the MST logging notes.

MST Data Processing

Due to the problem encountered with the diameter deviation measurement the processed data .out files produced by the software were all incorrect. The .raw datafiles for each series of four sections was imported into an excel workbook and compiled on one sheet. The raw data was then copied to another sheet and an internal diameter of 10.04 mm was assumed for the calculation of uncorrected bulk density and uncorrected p-wave velocity.

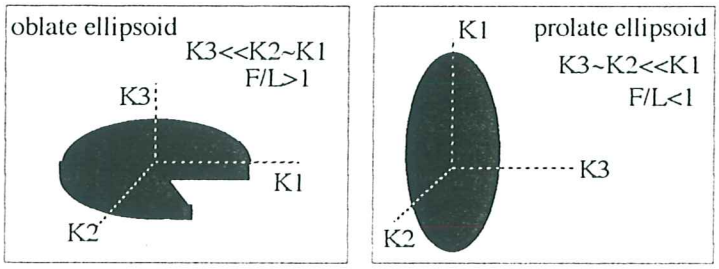
5.4. Anisotropy of the low field magnetic susceptibility

by C. Kissel (LMCE, Gif/Yvette)

Principle

The anisotropy of the low-field magnetic susceptibility (AMS) is a powerful method giving access to the preferred orientation of anisotropic magnetic minerals in sediments (« magnetic fabric »). It is represented by a symmetrical second rank tensor and visualized as an ellipsoid defined by the length and the orientation of its three principal axes ($K_1 \geq K_2 \geq K_3$ or $K_{max} \geq K_{int} \geq K_{min}$) corresponding to the eigenvectors of the tensor. The intensities of the axes define the shape of the ellipsoid which, in turn, indicates the degree of preferential alignement of the magnetic particles.

In marine cores, a depositional fabric is characterized by a grouping of the minimum axes of susceptibility K_3 perpendicular to the deposition plane, the two other axes being randomly oriented within the deposition plane. The ellipsoid has an oblate shape ($K_1=K_2>>K_3$). Grouping of K_1 axes within the depositional plane may arise from active bottom currents while grouping of K_1 along the core axis indicates coring perturbation. In this case, the ellipsoid has a prolate shape.



The AMS analyses were conducted on board to check the sedimentary origin of the magnetic fabric and to detect possible coring effects. Cubic samples (2 x 2 x 2 cm) have been taken at regular intervals (one to two cubes per section) in some of the cores and measured on board using the susceptibility bridge KLY-2 (manufactured by AGICO) from the LSCE.

The results are reported in following pages as downcore variations of the inclination of K_1 and K_3 axes and of the F/L ratio where F is the foliation parameter ($=K_2/K_3$) and L the lineation parameter ($=K_1/K_2$). F/L > 1 (<1) indicates oblateness (prolateness).

Results

A total of 8 cores have been analysed:

- MD99-2227, MD99-2228, MD99-2234, MD99-2242 from the Labrador sea
- MD99-2244, MD99-2246 from the Irminger basin
- MD99-2247, MD99-2251 from the Reykjanes ridge

Two cores (MD99-2234 and MD99-2244) exhibit a prefectly sedimentary fabric (oblate shape and K_3 vertical) all along the sedimentary column.

Calibration of the MST gamma attenuation system is done using 8 aluminium plates and a section of core liner. An empty section of core liner is placed between the source and detector. Each aluminium plate is placed in the liner and gamma counts are measured. The density x diameter values are plotted vs ln gamma counts and the resulting slope and intercept are used to calculate bulk density. These values then have to be corrected for the presence of pore water in the core. It is difficult to hold the aluminium plates perpendicular to the source and detector. An aluminium calibration standard in a water filled core liner would simplify the calibration procedure and eliminate the need for the Boyce correction.

5.3. Spectrophotometry

A Minolta CM-2002 handheld spectrophotometer was used to measure properties of the reflected light from sediment cores split on board. It has a 8 mm diameter optical sensor. Spectral reflectance is measured in the frequency band between 400-700 nm, and divided into 31 channels, each 10 nm in length. Reflectance was measured after the core was split, described, and photographed (an elapsed time of about 40 minutes). Measurements were made every 5 cm down the length of the core, where ever possible, and a white calibration was performed at the end of each section. The reflectance measurement also provides and estimate of the sediment colour in the L*a*b colour difference system and in Munsell notation.

Caution should be used in using estimates of the colour since the actual value is an average of a 8 mm diameter section of sediment. In the case of core 2234 for example, in which colour varied markedly on less than 1 cm scales, the minolta colour does not properly characterize the true colour of the sediment. On the other hand, spectral reflectance in the longer wavelenths is useful in distinguishing layers of detrital carbonate (light colour) that occured in several other cores.

5.5. Other studies

5.5.1.Constant volume sampling

A stainless steel cylinder of known volume was gently introduced into the core sediment at a constant rate. The cylinder was then carefully removed from the core and trimmed using a wire saw. The sediment was extruded from the cylinder, placed in a 1 oz screw top glass bottle and sealed. The subsample will be weighed, dried at 105° C for 24 hrs and reweighed. Bulk density, dry density and water content will be calculated.

129 constant volume samples were taken at regular intervals from 10 cores.

5.5.2. Penetrometer measurements

not yet available

The other cores have undergone a coring effect at the top (K_1 parallel to the core axis).This effect is clear down to a depth varying between 9 and 11 meters. Then a transitional zone of about 2-3 meters is observed (grey area on plots below). A well defined sedimentary fabric characterizes the rest of the cores. The coring effect on the orientation of the elongated magnetic grains seems to be independent from the length of the cores.

Fig. 5.6.1. Textural names and symbols. Symbols for mixtures offset to right.

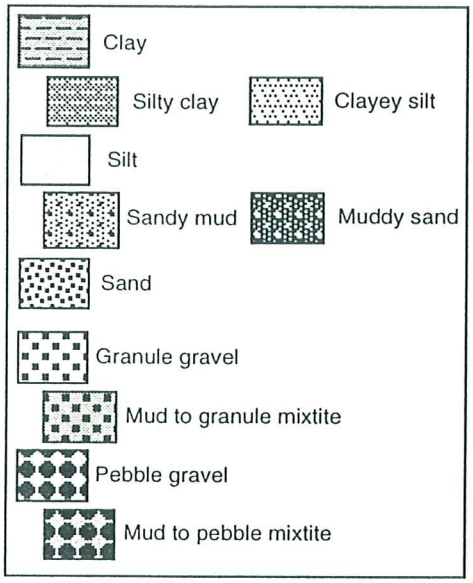


Fig. 5.6.2. Compositionally distinctive components

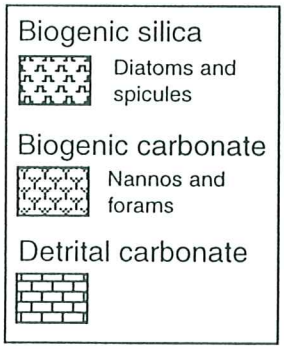


Fig. 5.6.3. Structure symbols

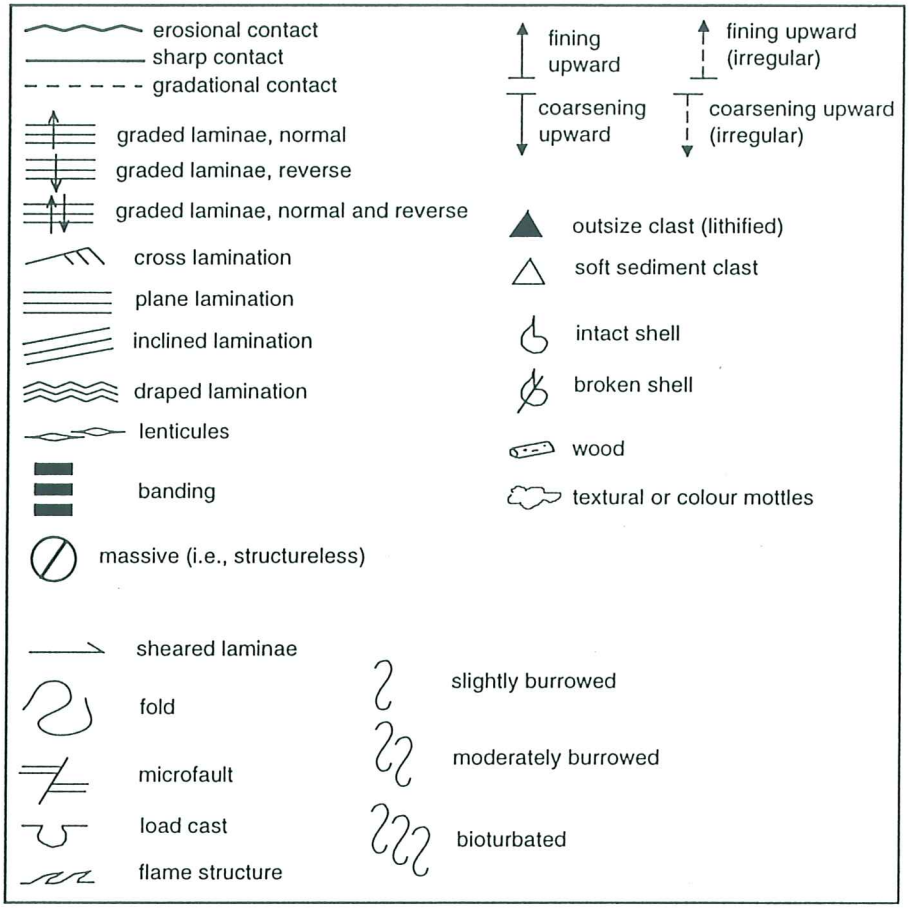
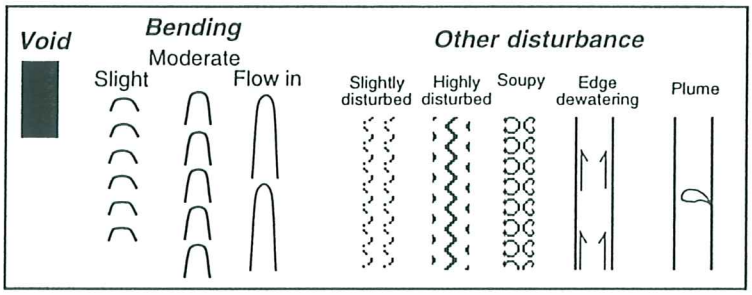


Fig. 5.6.4. Coring disturbance



5.6. Sediment Description

Split sections were first cleaned to expose fresh sediment. Touching and biting, and smear slides, were used to estimate texture. Textural components are described as clay (<2 μm), silt (2-63 μm), or sand (63-2000 μm). Sediment textural names are *clay* (>80% clay), *silt* (>80% silt), *sand* (>80% sand), *silty clay* (clay>silt; <80% silt or clay; <10% sand), *clayey silt* (silt>clay; <80% silt or clay; <10% sand), *sandy mud* (<80% silt or clay; 10-50% sand) and *muddy sand* (<80% silt or clay or sand; 50-80% sand). Multimodal mixtures span a range of size classes. Both unimodal and multimodal sediment names and associated patterns used on summary columns (§7.2) are summarized in Figure 5.6.1. On primary descriptions (open file), the following shorthand is used for textures: clay = c; silt = st; sand = s; silty clay = st-c; clayey silt = c-st; muddy sand = md-s; sandy mud = s-md.

Biogenic or other genetically significant sediment components (e.g., detrital carbonate) are recorded (§7.2) in a separate column with the appropriate symbols (Figure 5.6.2), where this component exceeds 10-20%. In such cases, no vertical line separates the terrigenous textural symbol from the biogenic symbol. The implication is that the components are intimately mixed in the sediment. Those sediments with significant biogenic content have names that include the more abundant fossils (e.g., foraminiferal silty clay, diatomaceous sandy mud); if biogenics exceed 50%, the sediment is called an ooze. Carbonate-rich layers are light coloured and are readily identified by colour spectrophotometry where the gray-scale reflectance value (L) exceeds 45%.

Interlaminated units with laminations too small to be differentiated are indicated using a split lithologic column with a vertical dividing line. Sedimentary structures, contacts, and grading are indicated using the symbols of Figure 5.6.3; some of these symbols are only used on primary description forms (open file). Coring disturbance is also indicated by symbols in Figure 5.6.4, and colour is designated using Munsell codes.

burrowed, indicating slower sedimentation. The high silt content of most of the succession in this area, combined with high water contents, resulted in numerous partially liquefied core sections that needed special attention during splitting and description (e.g., draining of excess water and drying of split-core faces).

On the adjacent slopes of Labrador, around Gloria Drift (including vicinity of ODP Site 647) and Orphan Knoll, Heinrich layers are much thinner, still rapidly deposited units that punctuate a predominantly bioturbated siliciclastic succession of clayey silts and silty clays. Saglek slope is most strongly influenced by Hudson Strait meltwater pulses, and contains alternating laminated and sandy/pebbly units rich in detrital carbonate. The presence of coarse ice-rafted cobbles and likely boulders is believed to be responsible for failed coring attempts in this area.

5.7.3. South Greenland and Davis Strait Sites

The south Greenland sites are in the vicinity of ODP Site 646, where the Western Boundary Undercurrent has molded mainly muddy sediments (silty clays and clayey silts) into sediment drifts including Eirik Ridge. Sandy mud beds rich in detrital carbonate (Heinrich layers) punctuate a predominantly siliciclastic burrowed succession. The siliciclastic sediments contain abundant soft and semi-consolidated mud clasts, and basaltic pebbles, both inferred to have a Greenland source in Tertiary volcanic and sedimentary successions. Biogenic carbonate and silica are mostly limited to the upper few metres at each site.

In the Davis Strait area, core sites lie seaward of slope canyons, and the sediments are consequently rich in downslope-transported silt and sand, including graded sand to silt beds interpreted as turbidites. Biogenic material is scarse.

5.7.4. East Greenland Irminger Basin Sites

On the east Greenland rise, siliciclastic sediments with minor biogenic contents were recovered. Sedimentary textures and structures indicate a glacial supply (outsized bedrock and soft sedimentary clasts), downslope transport (sharp-based graded sandy beds), and winnowing by bottom currents (thick, bioturbated, moderately well sorted medium to coarse silt sequences that coarsen upward into fine sand rich in biogenic skeletons).

5.7.5. Reykjanes Ridge Sites

Cores taken in the Iceland Basin, Gardar Drift, and Bight Fracture Zone were not described. They were, however, split, cleaned by members of the sedimentological team, then photographed. This preliminary peak at these cores indicates that they contain thick alternating sequences of biogenic oozes (forams, nannos, spicule mats, rarely abundant diatoms), and spaced gritty and sandy intervals likely emplaced in part by ice rafting.

At Reykjanes Ridge sites, burrowed sediments predominate. Silty clay with sparse forams and diatoms alternate with foram-nanno ooze and/or siliceous ooze (sponge spicules). Climatic changes likely account for the high variability in biogenic content and composition.

5.7. Regional Sedimentary Signatures

by R. Hiscott (MUN) and M. Cremer (C.N.R.S., Bordeaux)

For reasons of geographic setting, source differences, or distinct physical processes controlling deposition, the coring sites (**bold** cores were opened at sea) can be organized into five groups:

a. fjord sites along the St. Lawrence Estuary and Labrador coast where a thick Holocene record is preserved above proximal glaciomarine or glaciolacustrine (e.g., varved) successions

Saguenay Fjord (cores **99-2222**, -2223, -2224)

Bay of Islands (core **99-2225**)

Lake Melville (cores **99-2234**, -2235)

b. western and central Labrador Sea sites

Orphan Basin & Orphan Knoll (cores **99-2238**, **-2239**)

Saglek slope and Cartwright Saddle (cores **99-2233**, **-2236**)

NAMOC levee and braidplain (cores **99-2226**, -2229, **-2230**)

Gloria Drift area (cores **99-2240**, **-2241**)

c. south Greenland and Davis Strait sites

Eirik Ridge (sediment drift) (cores **99-2227**, **-2228**, **-2242**)

d. east Greenland slope and rise (Irminger Basin) (cores **99-2243**, **-2244**, **-2246**)

e. Reykjanes Ridge, Iceland Basin and Bight Fracture Zone (cores **99-2247**, **-2248**, box core –2249, -2250, -2251, -2252, -2253, -2254)

5.7.1. Fjord Sites

In Saguenay Fjord, Bay of Islands, and Lake Melville, inferred Holocene successions >10 m thick were recovered. These sediments are mainly bioturbated muds. Black FeS stains the Saguenay and Lake Melville cores. Diatoms are the main biogenic component at all these sites. Numerous bivalve shells characterize the Bay of Islands core. The narrowest of these coastal inlets is the Saguenay Fjord where muddy mass-flow deposits (*homogenites*, or mudflows) attest to failures from its steep sidewalls. The deglacial pre-Holocene sediments encountered at the base of the Lake Melville and Bay of Islands sites are thick sands and reddish varves, respectively.

5.7.2. Western and Central Labrador Sea Sites

Along the axis of the Labrador Sea, rapidly deposited (unburrowed) detrital carbonate clays through muddy sands of the NAMOC levees and braidplain dominate the succession. These are thick and complex Heinrich layers in terms of their composition and inferred origin as the deposits of short-duration (catastrophic) meltwater discharges from the Laurentide ice sheet, via Hudson Strait. Erosional surface morphology (SeaMARC side-scan images) and erosional surfaces in the deposits (seismic and core evidence) attest to vigorous erosional events. Non-carbonate interbeds are predominantly siliciclastic (Greenland or Labrador source) and

5.8. Coring Labrador Sea sediments

5.8.1. Difficulties encountered

In the Labrador Sea, and to a lesser extent in the Irminger Basin, serious difficulties were encountered when coring. They fall into two categories. First, the abundance of IRD resulted in systematic damages to core cutters, and to occasional losses of the barrels and cutter. By comparison with current Kullenberg coring devices, the Calypso corer shows a much deeper penetration (with approximately a 3 fold increase). Therefore, it is not much of a surprise to observe more frequent damages to the corer, since it penetrates into a thicker series of sediments with abundant boulders (notably the Heinrich layers and the surface layer along the high velocity axis of the WBUC, i.e., where fines are winnowed resulting in a concentration of boulders and drop-stones).

A second type of problems was due to the alternation of compacted- and soft layers, the latters often composed of tyxothropic silts, in the sedimentary sequences. Such fine silts are frequently associated with detrital carbonate rich Heinrich-layers and other rapidly deposited units. This often resulted in partly liquefied layers in core sections.

5.8.2.- The stretching/compaction issue

Since the first coring campaign of the Marion Dufresne II in the North Atlantic (IMAGES I of 1995), concerns were raised about possible coring artefacts: either stretching of the sediments by the Calypso corer, or compaction of the sediment with other Kullenberg devices. Indeed the comparison of cores recovered at various sites, through these two coring systems, shows a length ratio varying between 1.5 and occationally 2, between them (see examples below). Several sets of data were compared, during the present leg, in order to arrive at a conclusion about such coring artefacts. They include:

i) comparison of apparent penetrations and core lengths

ii) examination of sediment height in bent cores, above the bent barrel, assuming that the later represented the actual penetration of the corer into the sediment

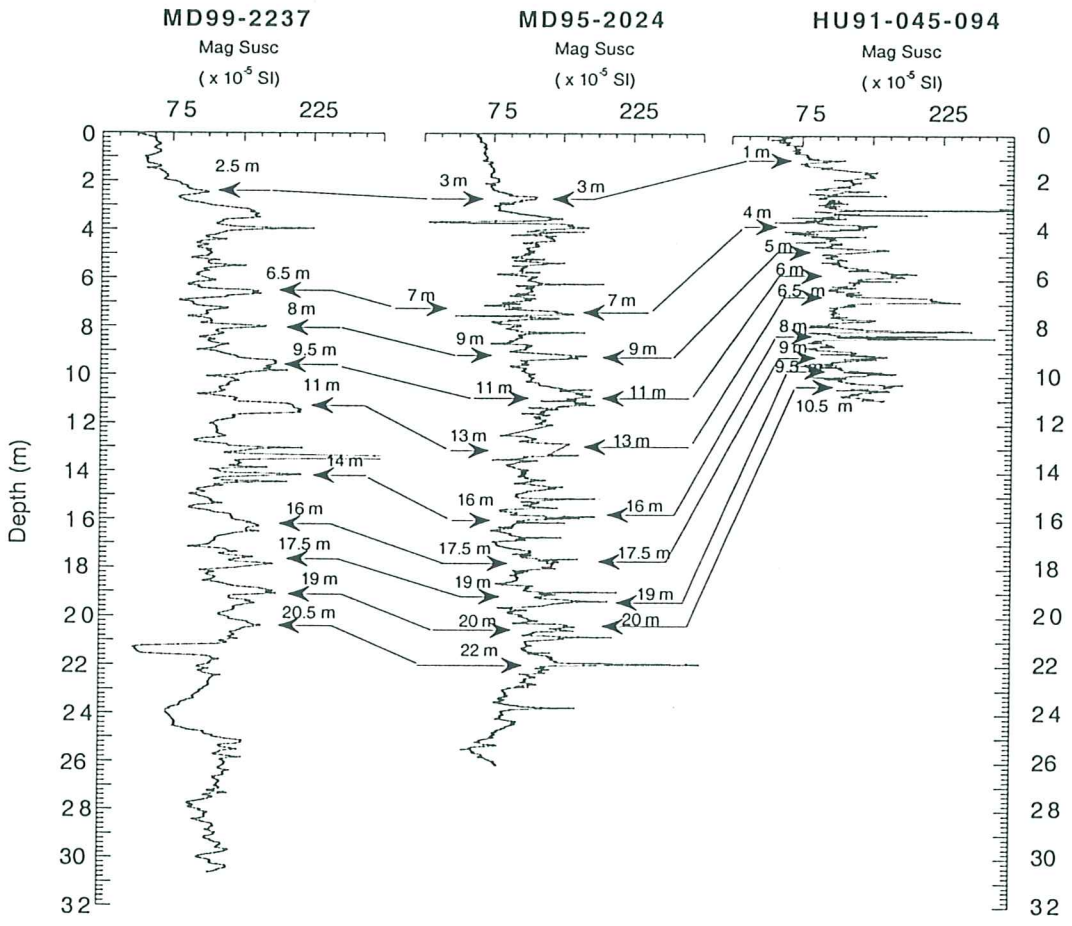
iii) attemps at matching high resolution digital (or analogic) 3.5 kHz profiles on coring site with observed lithologies and physical properties of the sediment (density, magnetic susceptibility...),

iv) comparison of apparent thicknesses of sedimentary layers at given sites, based on distinct coring devices (Calypso, Long-Coring-Facility –LCF- of the Atlantic Geoscience Centre, in Canada, ODP-Leg 105 apparent piston corer (APC) and between pairs of Calypso cores, when available

v) comparison of physical properties from such pairs of cores (density, water content, thickness ratios between water-rich and water-poor layers, ec.)

vi) finally, on board magnetic anisotropy measurements on Calypso cores giving insights into post-depositional reorientation of long magnetic grains (i.e., vertically oriented instead of the normal horizontal sedimentary fabrics).

There are a few intervals with primary structures indicative of resedimentation by turbidity currents and soft-sediment sliding (e.g., core MD99-2248, 33.50-38.15 m).

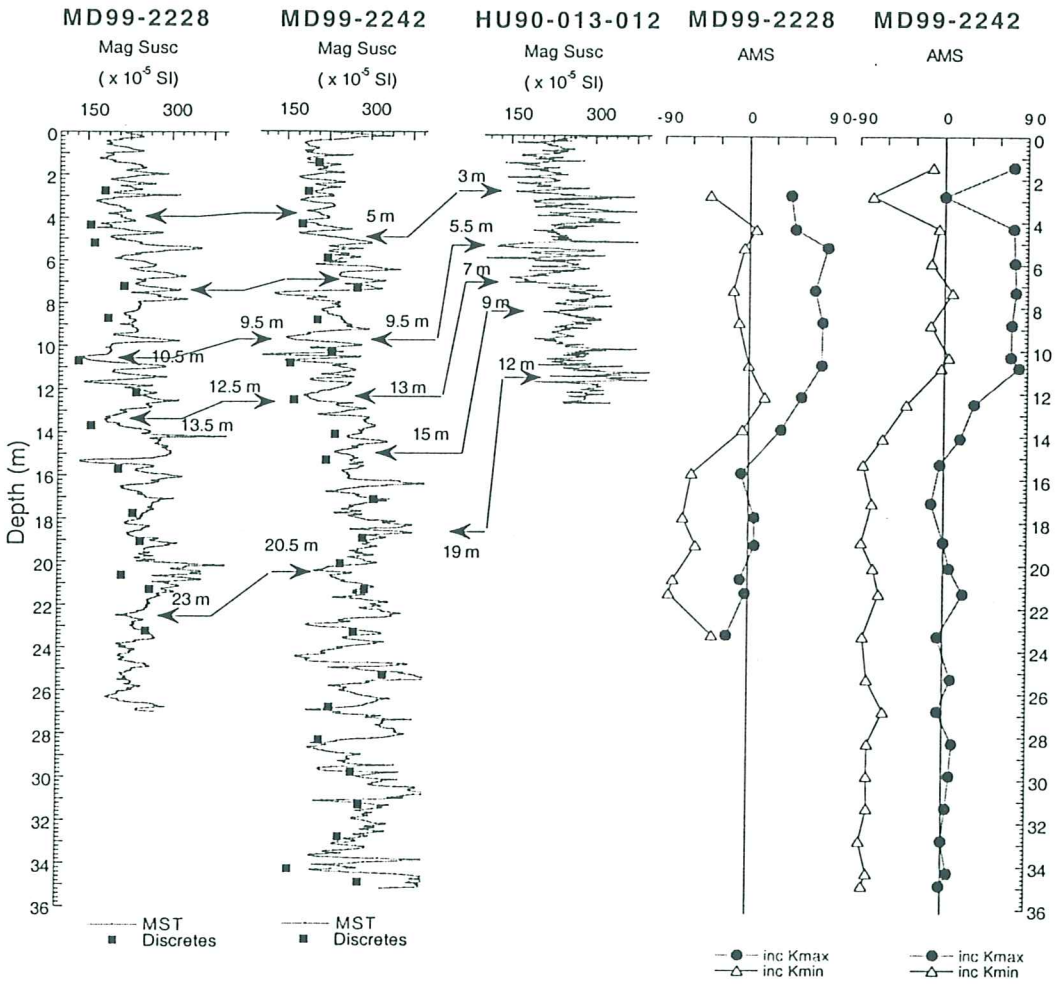


Comparison of two MD cores
and one LPC-core from a
Labrador Rise site

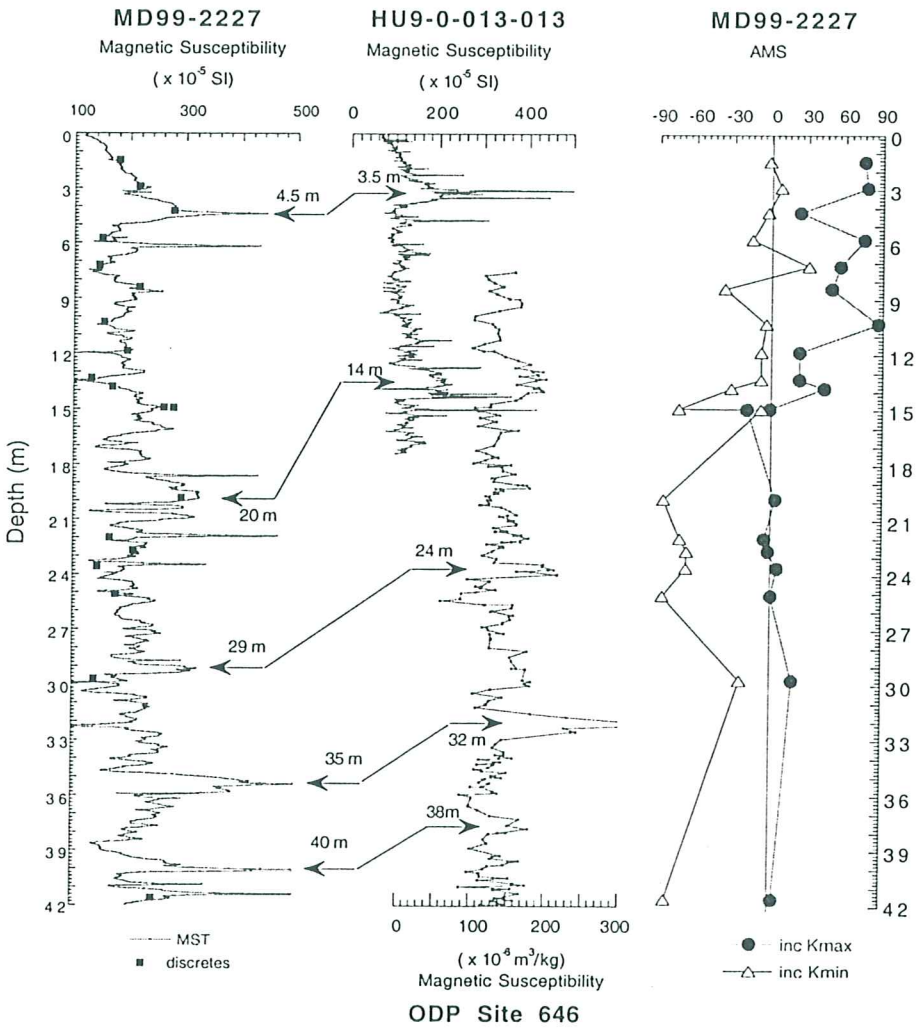
Based on discussions on board, it has been concluded that none of the above parameters was yet conclusive. In one case only, it has been possible to link with some probability the depth of two acoustically strongly reflective layers to their depth in a Calypso core, at Bay of Islands (MD-99-2225; see figures). Here, these layer are found at approximately 15-18 and 32-33 m in the 3.5 kHz record, respectively, and at approximately the same depths, downcore.

The comparison of physical properties of pairs of cores is still also unconclusive. There is no difference in the relative thicknesses of "soft" vs "hard" layers in Calypso cores vs LCF-cores). Their sediment densities compare well, and on rare occasions only, they show differences in their magnetic susceptibility. In such cases, the difference does not necessarily indicate stretching or compaction, but could simply reflect the penetration of more sandy material along the sliding surfaces of the linings of the larger Calypso corer. Pair-core lengths shows more systematic deviations, as mentioned above, with a Calypso-core/LCF-core ratio averaging 1.5 (see examples, based on high resolution matching of magnetic susceptibility profiles), evenly preserved along cores (i.e., without significant changes between subsurface and deeper sediment in cores). However, when comparing a Calypso core raised from ODP site 646 to the composite record obtained during the ODP leg (figure), one can note a almost perfect matching of sedimentary unit thicknesses between both within the lower 20 m of core. Thus, the issue of the relative compaction or stretching of these different devices is far from being ascertained on these grounds. The comparison of short vs long Calypso cores from a given site, does not show either major differences in the depths of precise layers (unconclusive offsets of ±10% only were observed between cores MD-99-2222 and –2224, from the same spot, in the Saguenay Fjord, the first one being much shorter than the second one).

Finally, magnetic anisotropy measurements (see appendix), indicate the preservation of magnetic fabrics in some cores, and its alteration in the upper 10 to15 m of some others, independent of the total length of the core. Since the upper 10-15 m of sediment, notably in the studied sites, show a very high water content and softness (with the sediment often close to liquefaction threshold), one could indifferently hypothezise some reorientation of magnetic grains with or without actual stretching.



Comparison of two MD cores and one LPC-core from a Greenland slope site



Comparison of a MD core, a LPC core and a composite ODP core from the same Greenland Rise site

6. Archive and sample management (location and access)

6.1. Cores & U-channels, samples & working halves

- See tables in chapter 7.2.

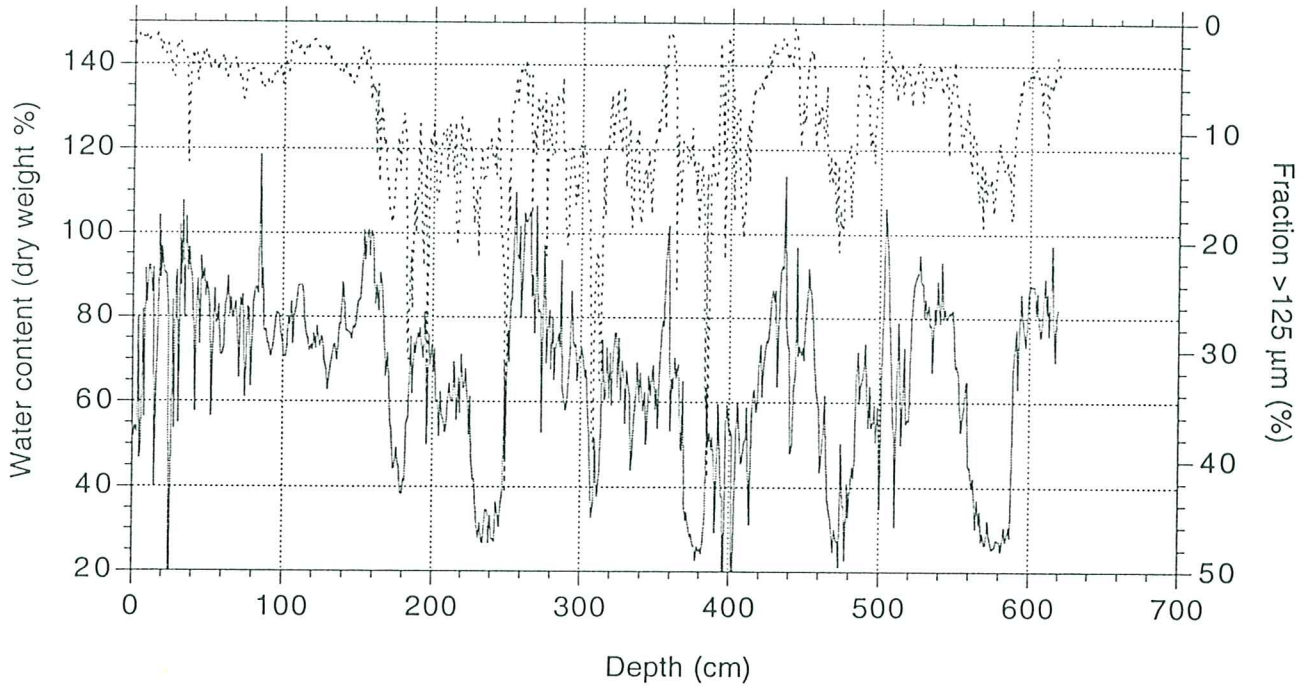
6.2. Seismic records, Multibeam data

- Paper copies could be obtained at the addresses below. Most information is also stored on CDs to be made available through net (with proper IMAGES access code number).

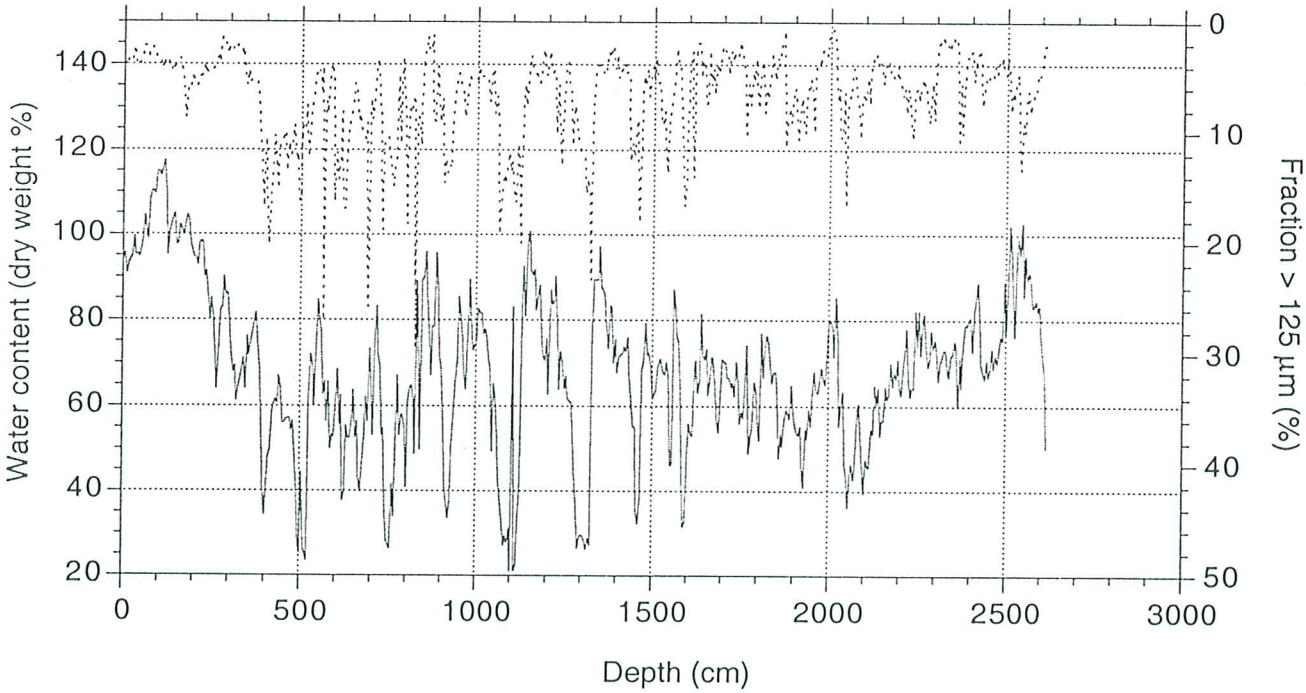
6.3. Open files (for site data bases)

- In France: Sacha de Rijk, LMCE, Gif/Yvette (Sacha.de-Rijk@lsce.cnrs-gif.fr)
- In Canada: Iris Hardy, Geological Survey of Canada-Atlantic, Dartmouth N.S. (hardy@agc.bio.ns.ca)

HU-91-045-094P(HR)



MD-95-2024



Comparison of one MD and one LPC core from the same Labrador Rise site

7. Site reports

7.1. On site 3.5 kHz sheets & track charts

7.2. Site data sheets and core studies

- Sedimentological description
- Physical properties

Julian day:	182	GMT time:	14h10
Latitude:	48°18.30N	Longitude:	070°15.44W
Water depth:	271 m	Location:	Saguenay Fjord

Core number:	MD 99-2222	Corer length:	41.00 m
		Apparent penetration:	41.00 m
		Core length:	37.72 m

Observations

Corer condition:
Good

Core condition:
Important amount of gas in sediment but overall good conditions.

Sections and sampling

Number of sections recovered and conditions:
Section I in 3 parts, from top to bottom Ia, bagged sediment and Ib. Bottom of section XI and top of section XII fell on the deck. Archive of section II is in a poor condition. Sections IX and X very liquid. Sections III to VIII and XII to XXVI are in good conditions. The core has 26 sections.

Onboard sampling and post cruise curation:
- U-channel were taken on every sections (curation at UCD).
- The working halves of the core were sampled at a 1 cm interval (curation at GEOTOP).
- The archives will be curated at GEOTOP.
- Several bags of sediments were recovered: 1core cutter (cône d'ogive), 1core catcher (ogive), 1 top, 1 from section I between Ia and Ib (50-60cm, curation at GEOTOP.
- The sediment in contact with the core liner were collected in 50 cm intervals and sieved at 63 µm. The residue was left to dry in Whatman filters and collected in 15 ml Nalgene vials. They will be curated at GEOTOP.

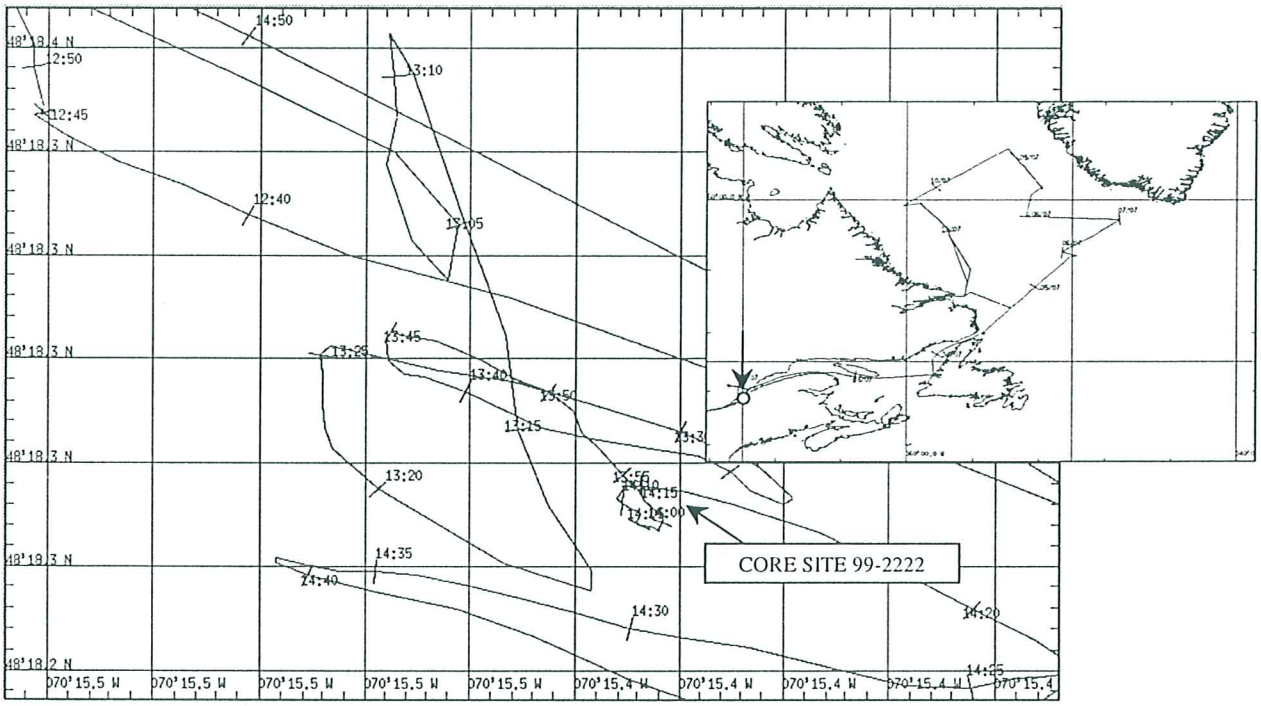
Summary of physical and sedimentological observations

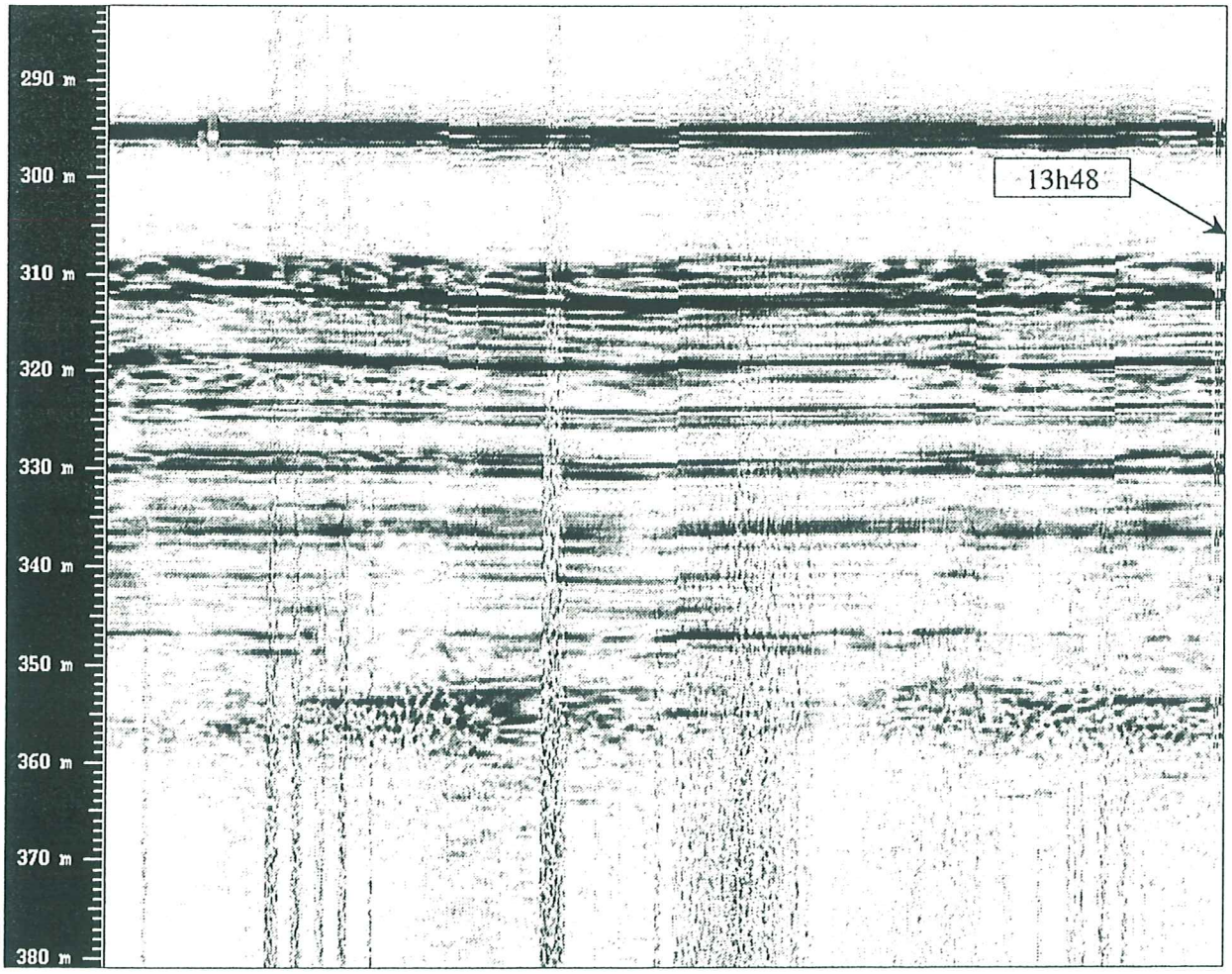
- An upper unit (0-10.70 m) of apparently structureless clayey silt, containing plant debris and biogenic silica (diatoms and sponge spicules).
- A middle unit (10.70-15.80 m) of cross-laminated sand underlain by structureless silty sand; this sediment is liquefied in sections VIII and IX
- A lower unit (15.80-37.62 m) characterized by an alternation on a scale of decimetres to metres of clayey silt (locally sandy) and silty clay; contacts commonly sharp, some graded sequences with planar laminations at the base, variable intensity of burrowing, common biogenic silica
- MST magnetic susceptibility, gamma ray attenuation and p-wave velocity measurements were made at a downcore resolution of 2cm. High magnetic susceptibility values were observed throughout the core, ranging from about 100 to 750 x 10-5 SI units. Bulk density values range from approximately 1.46 to 2.05 Mg/m^3. As a result of gas expansion p-wave velocity was measured in the upper 10 m of core and ranges in value from approximately 1420 to 1470 m/sec.

MD 99-2222

lat. : 48°18'30 N long. : 070°15'44 W

01 july 1999 Core length : 32.72 m Water depth : 223.8 m

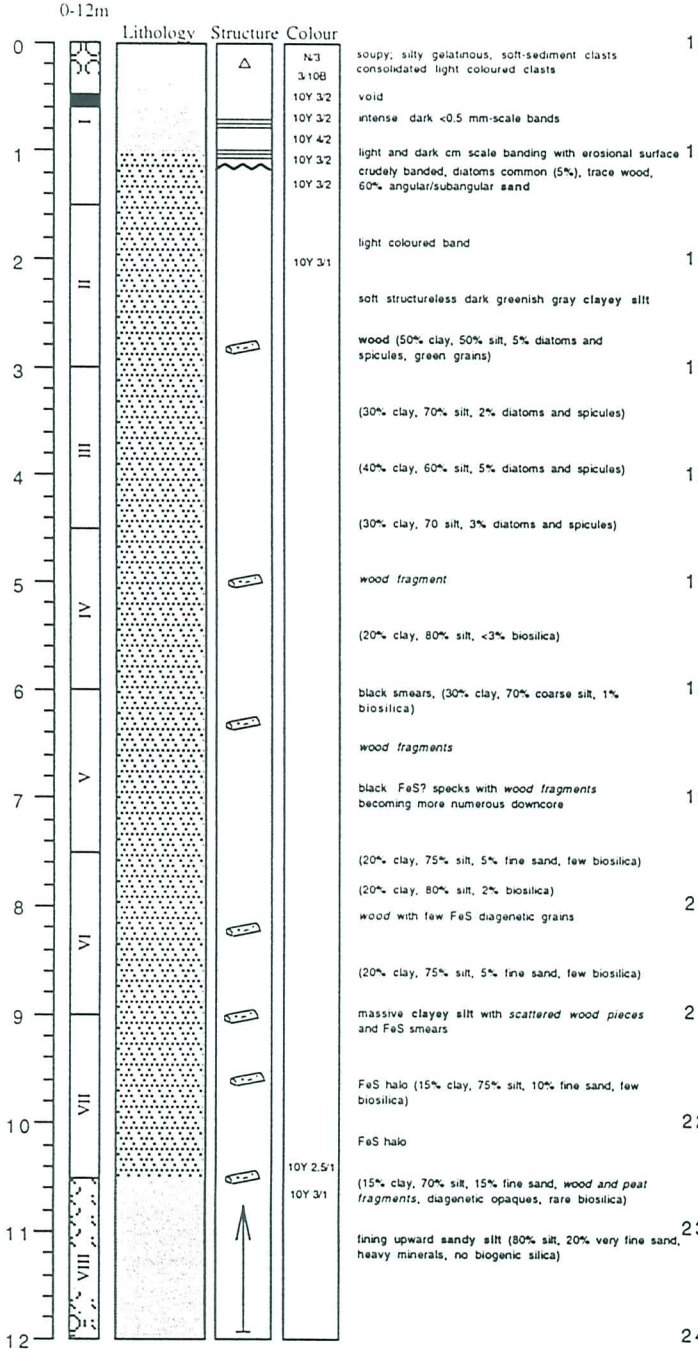




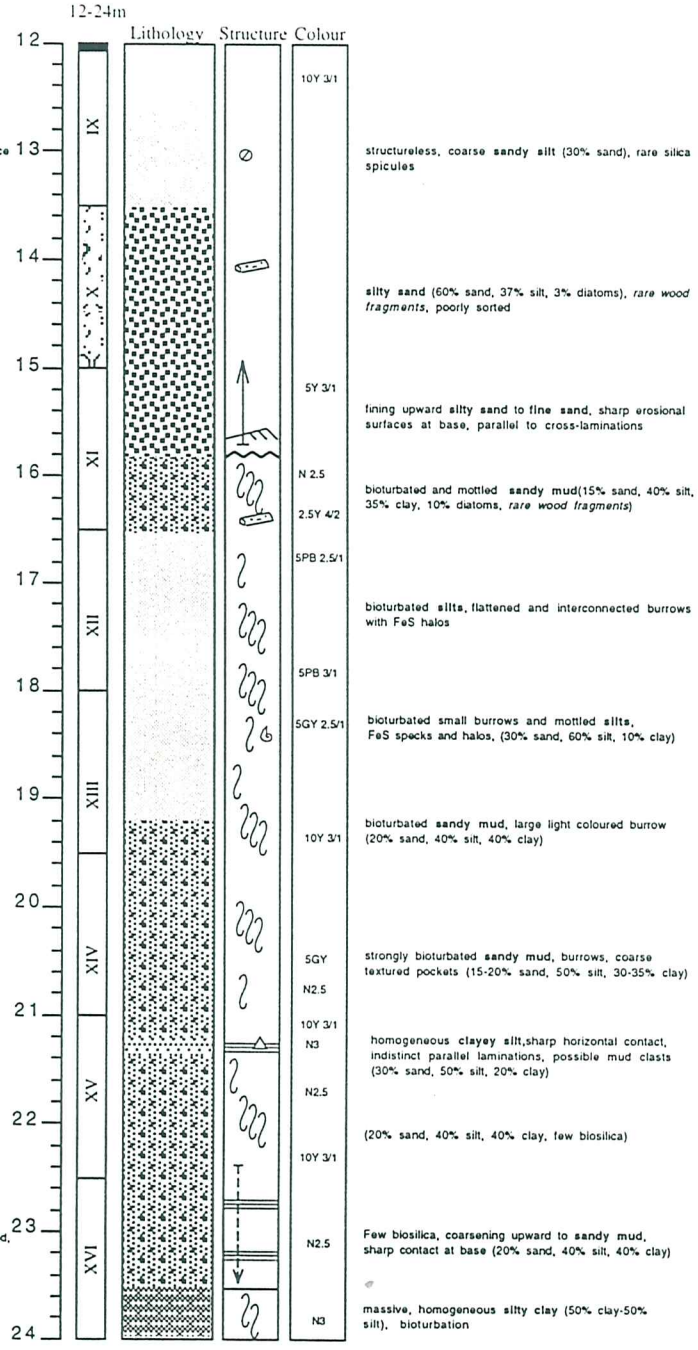
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

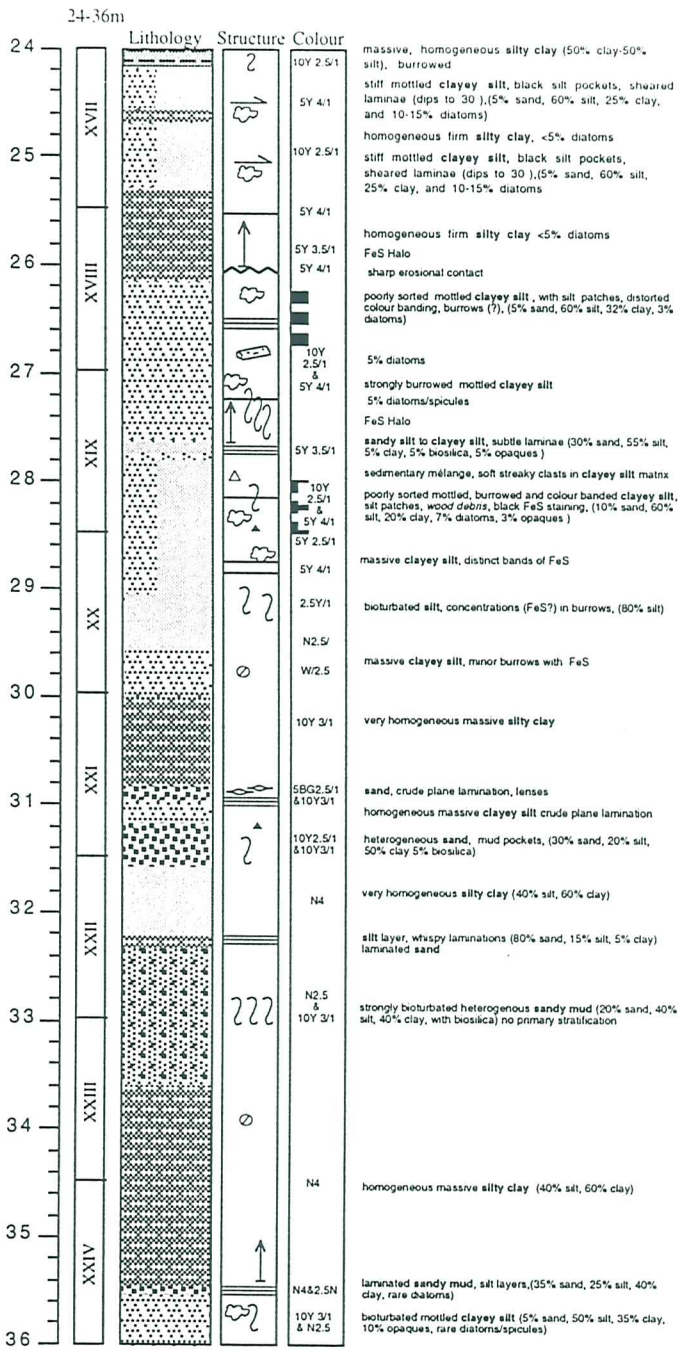
MD 99-2222 Saguenay (271 m)



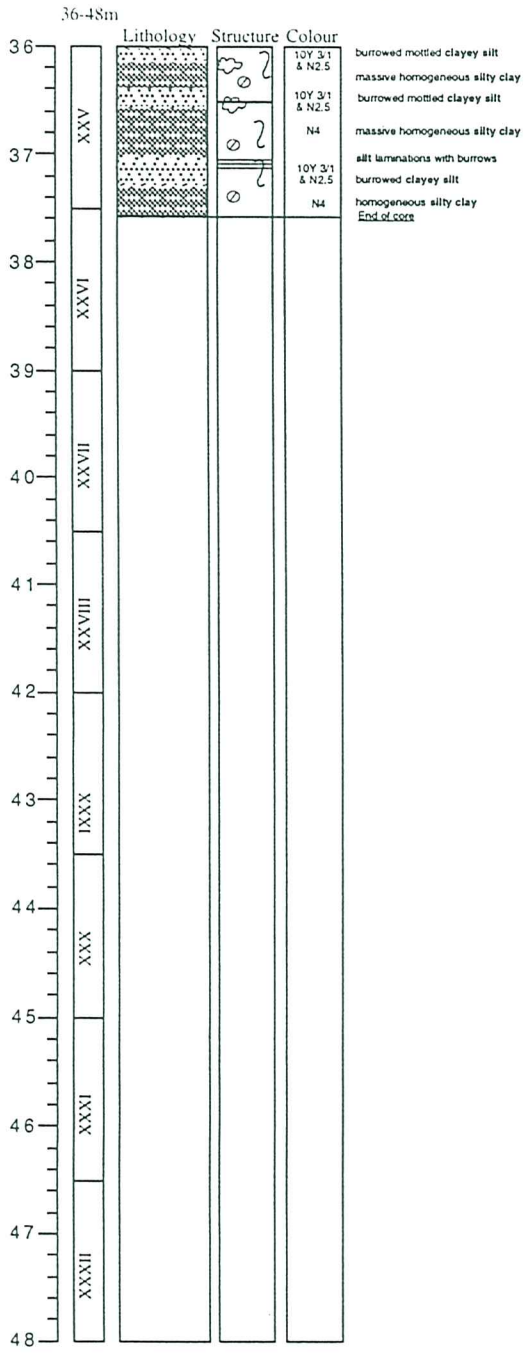
MD 99-2222



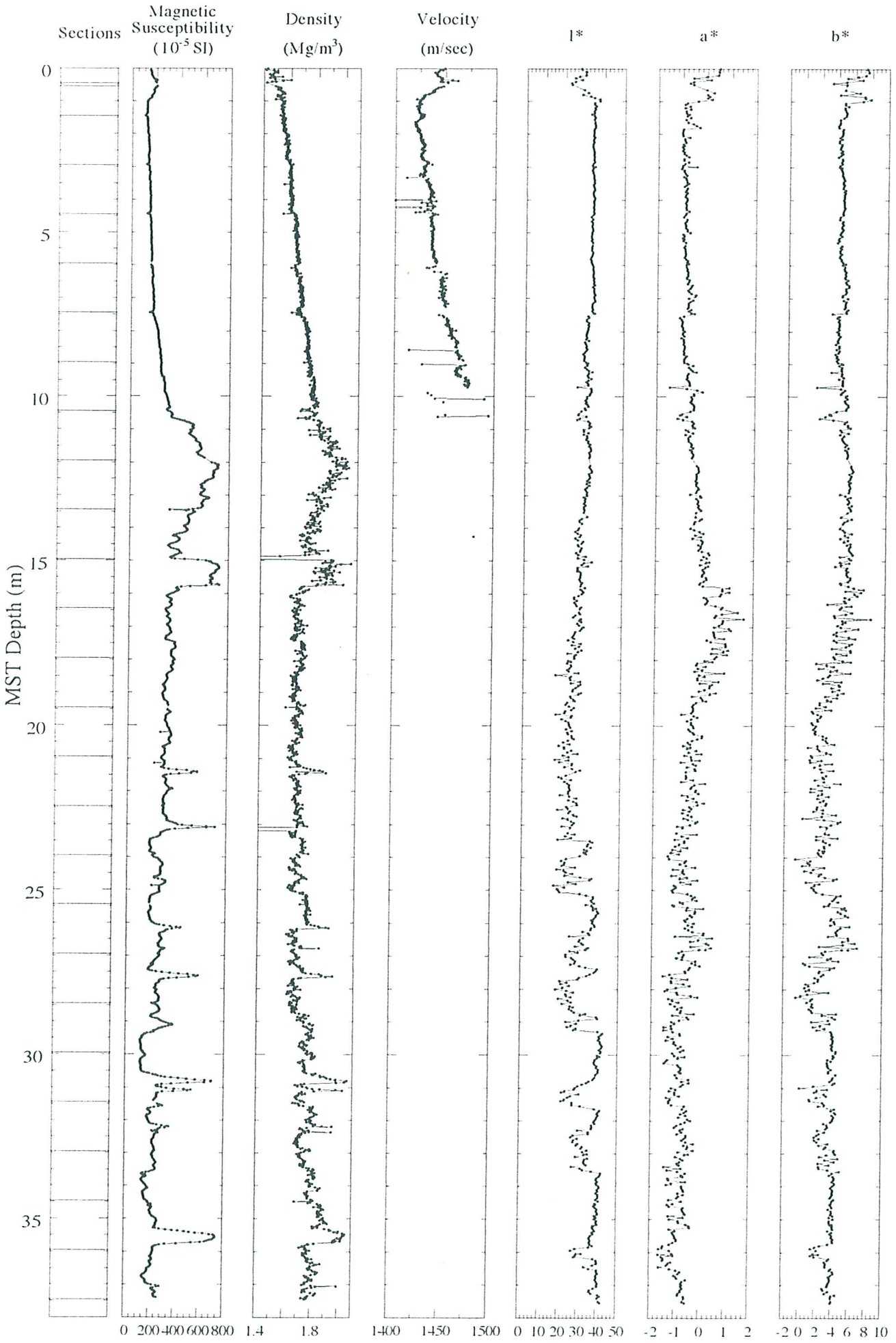
MD 99-2222



MD 99-2222


36-48m
Lithology
Structure
Colour
36
37
38
39
40
41
42
43
44
45
46
47
48
XXV
XXVI
XXVII
XXVIII
IXXX
XXX
XXXI
XXXII
10Y 3/1 & N2.5
burrowed mottled clayey silt
massive homogeneous silty clay
10Y 3/1 & N2.5
burrowed mottled clayey silt
N4
massive homogeneous silty clay
silt laminations with burrows
10Y 3/1 & N2.5
burrowed clayey silt
N4
homogeneous silty clay
End of core

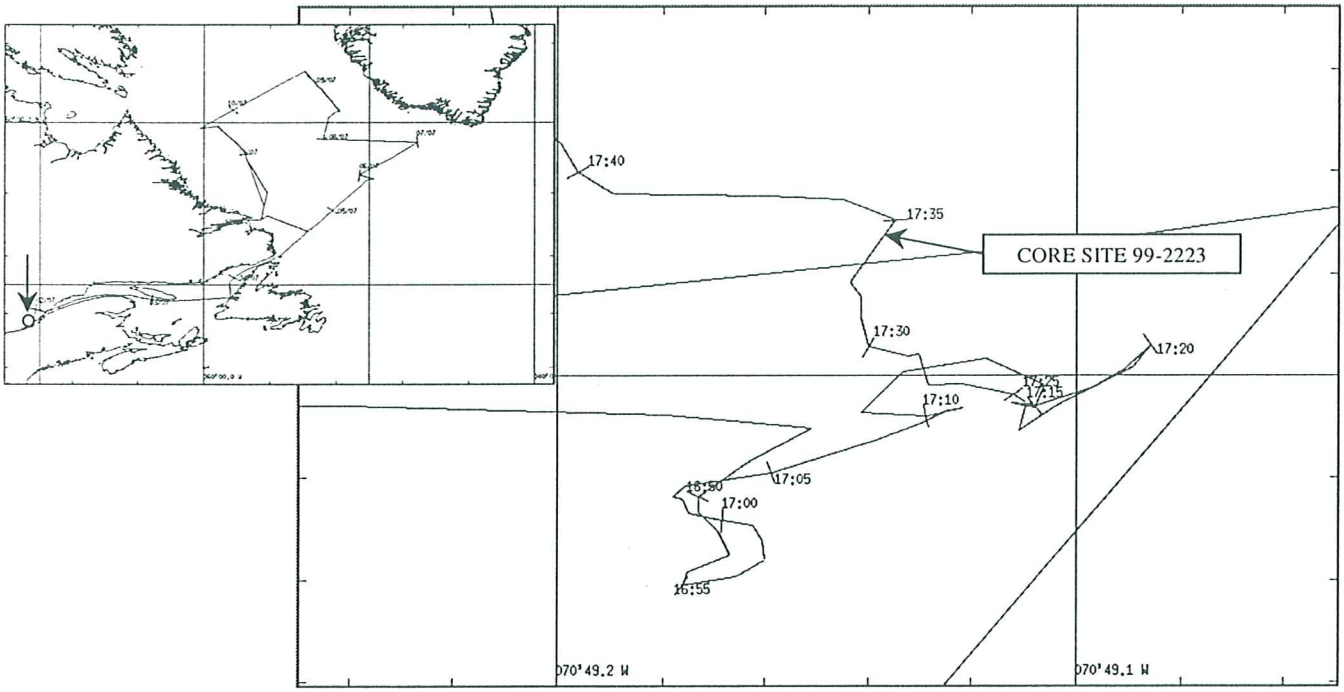
MD99 2222


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0 200 400 600 800
1.4 1.8
1400 1450 1500
0 10 20 30 40 50
-2 -1 0 1 2
-2 0 2 4 6 8 10

MD 99-2223

lat. : 48°20'93 N long. : 070°49'11 W

01 july 1999 Core length : 28.63 m Water depth : 141 m



Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	182	GMT time:	19h04
Latitude:	48°20.93N	Longitude:	070°49.11W
Water depth:	141 m	Location:	Baie des Ha! Ha!, Saguenay Fjord

Core number:	MD 99-2223	Corer length:	34.90 m
		Apparent penetration:	28.00 m
		Core length:	28.63 m

Observations

Corer condition:

The corer was bent at a 30° angle approximately 10 m below the weight.

Core condition:

Important amount of gas in sediments but overall good conditions.

Sections and sampling

Number of sections recovered and conditions:

Very liquid between section I and II, lost about 10 cm of sediment on deck. Also very liquid at the top of section VII, lost approximately 10 cm of sediment. Section III to VI and VII to XX (base) are in good conditions.

Onboard sampling and post cruise curation:

- No section will be opened; they will all be waxed at both ends to avoid oxydation of sediment (curation at GEOTOP).
- Several bags of sediments were recovered: 1 top, 1 core catcher, 1 core cutter, 1 for the base of the core.

Summary of physical and sedimentological observations

- MST magnetic susceptibility, gamma ray attenuation and p-wave velocity measurements were made at a downcore resolution of 2cm. Very high magnetic susceptibility values were observed throughout the core ranging from about 200 to 1100 x 10-5 SI units. Bulk density values range from about 1.45 to 2.3 Mg/m^3. As a result of gas expansion p-wave velocity measurements were sporadic and range in value from approximately 1420 to 1600 m/sec.

Julian day:	183	GMT time:	00h27
Latitude:	48°18.28N	Longitude:	070°15.43W
Water depth:	271 m	Location:	Saguenay Fjord

Core number:	MD 99-2224	Corer length:	61.35 m
		Apparent penetration:	61.35 m
		Core length:	58.54 m

Observations

Corer condition:

The corer was in good condition.

Core condition:

Because of the exceptionnal length of the core, the liner was extruded and cut into 150 cm sections starting from the base up. Therefore, labelling does not follow the usuall numbering (0-150, 150-300...). The general condition of the core is good.

Sections and sampling

Number of sections recovered and conditions:

The top 8 cm fell on the deck when removing the piston. Section I is only 146 cm long after being cut on the wrong line. The bottom 84 cm of section VIII fell on the deck, they were put in 3 separate bags. Sections XXI and XXIX contain important amount of gas. Sections II to VII, IX to XX, XXII to XXVIII and XXX to XXXIX are normal. The core is composed of 39 sections.

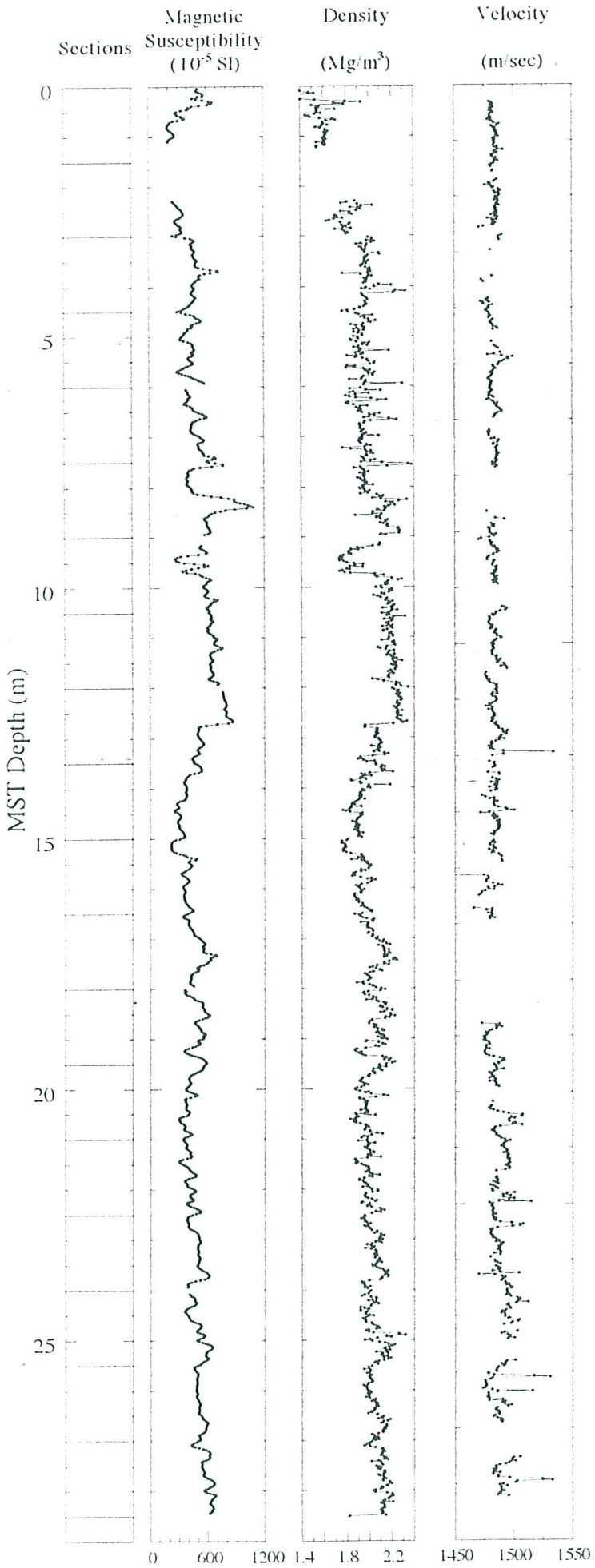
Onboard sampling and post cruise curation:

- Several bags of sediments were recovered: 1 core cutter, 1 core catcher, 2 for the 0-8 cm interval, 3 for the sediments which fell from the base of section VIII, 1 for 2404 cm, 1 for 2554 cm, 1 for 2702 cm and 1 for 2704 cm.
- All the section were left unsplit and were waxed at both end to avoid a potential oxydation of the sediment. The core and all other samples will be curated at GEOTOP.

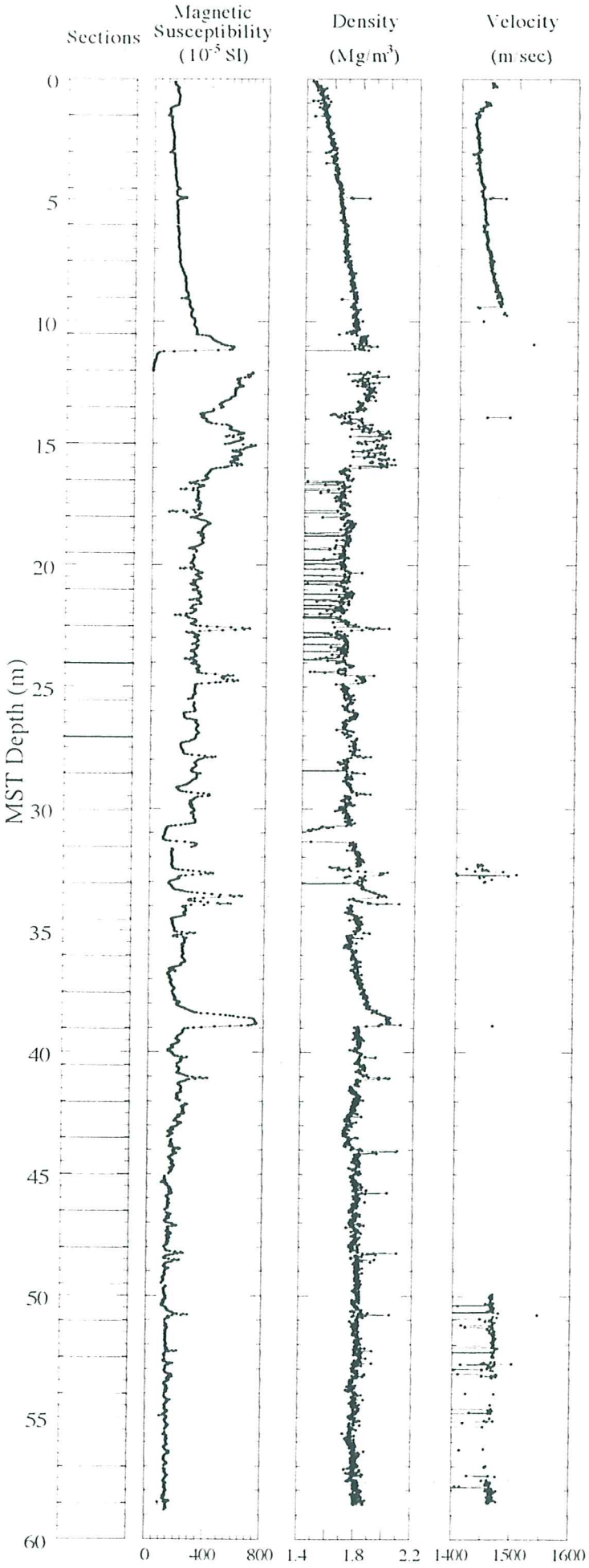
Summary of physical and sedimentological observations

- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. High magnetic susceptibility values were observed throughout the core ranging from about 100 to 750 x 10-5 SI units. Bulk density values range from approximately 1.46 to 2.05 Mg/m^3. As a result of gas expansion p-wave velocities were measured for the upper 9 and lower 8 m of core and range in value from 1420 to 1470 m/sec.

MD99 2223


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
MST Depth (m)
0
5
10
15
20
25
0
600
1200
1.4
1.8
2.2
1450
1500
1550

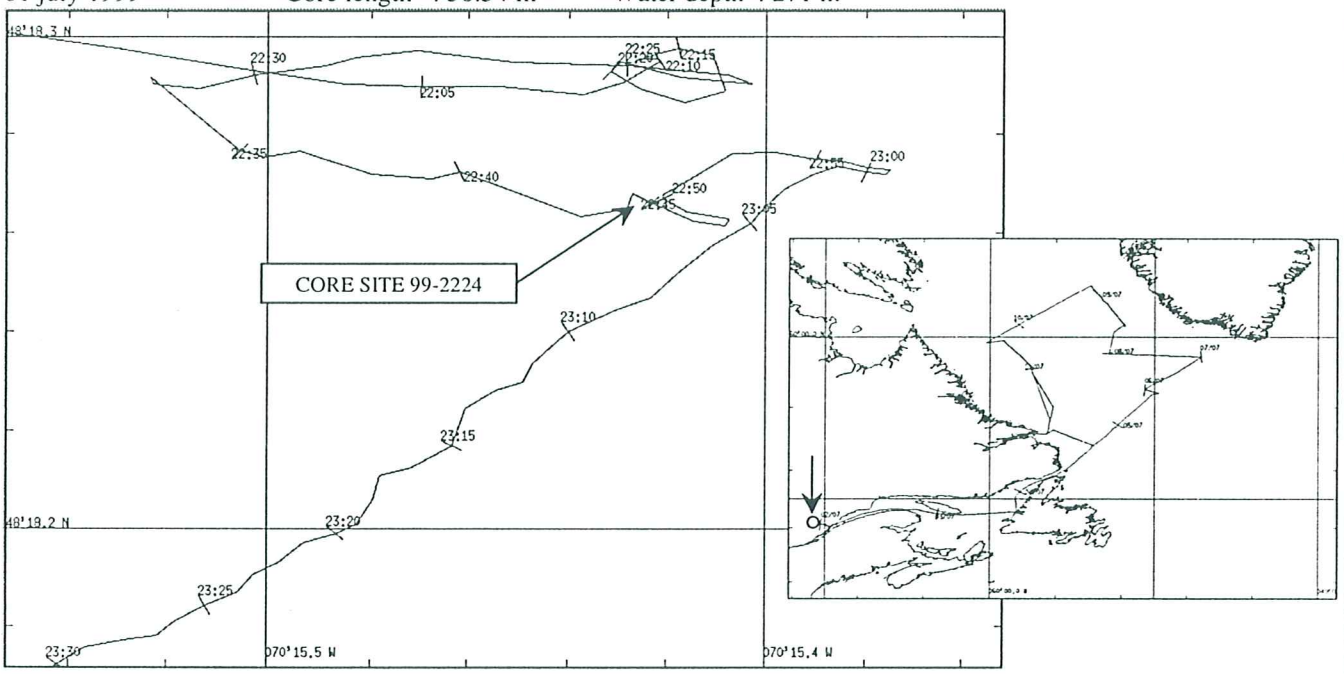
MD99 2224

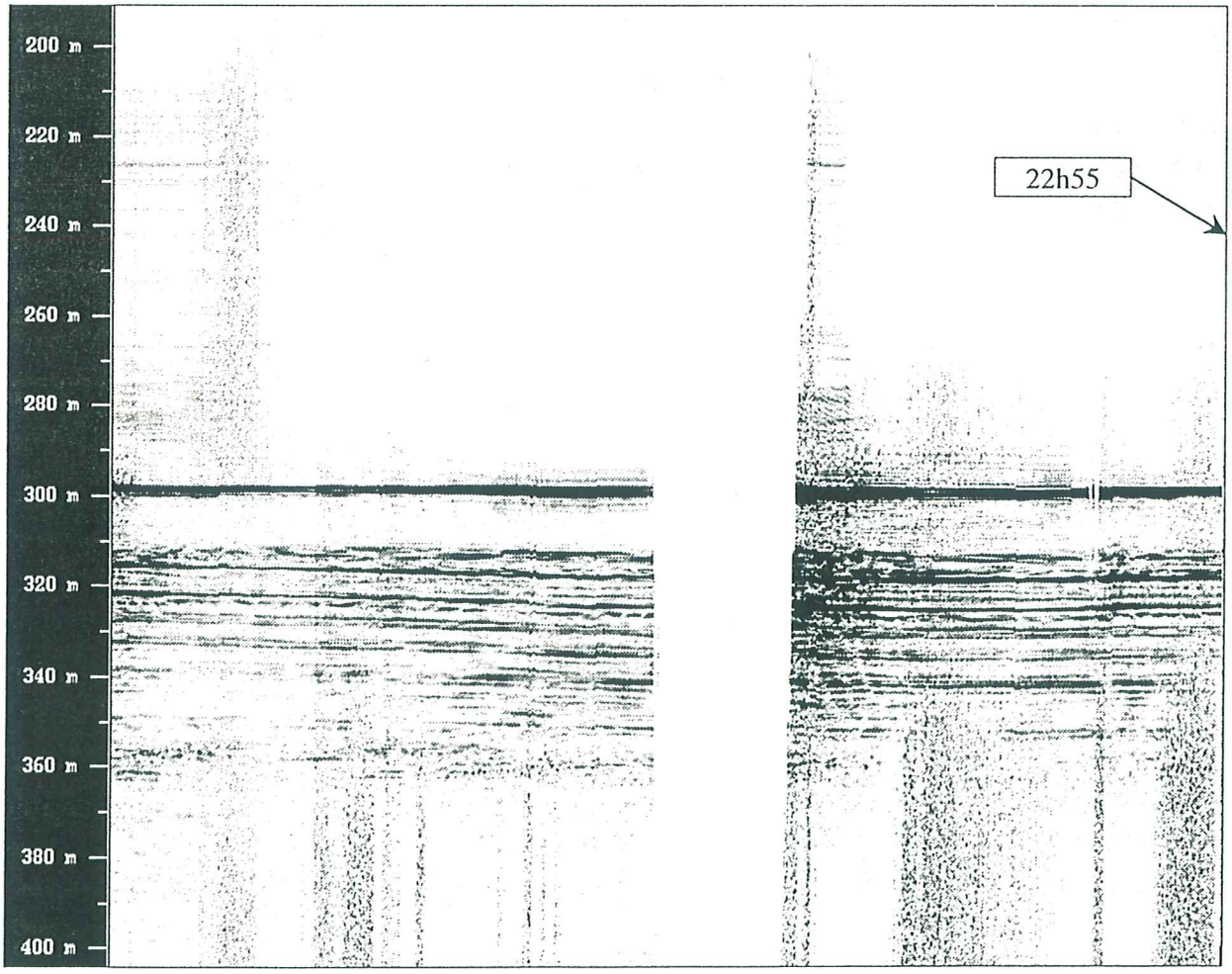

Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
MST Depth (m)
0
5
10
15
20
25
30
35
40
45
50
55
60
0
400
800
1.4
1.8
2.2
1400
1500
1600

MD 99-2224

lat. : 48°18'22 N long. : 070°15'28 W

01 july 1999 Core length : 58.54 m Water depth : 271 m





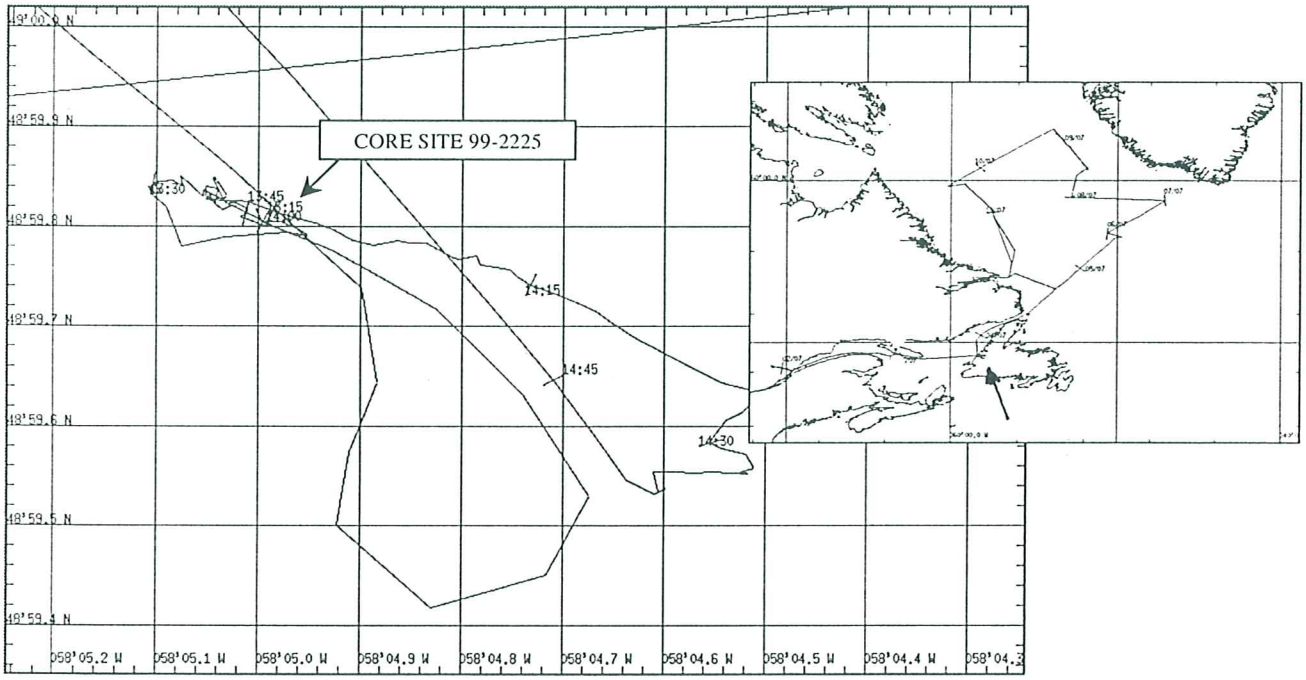
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

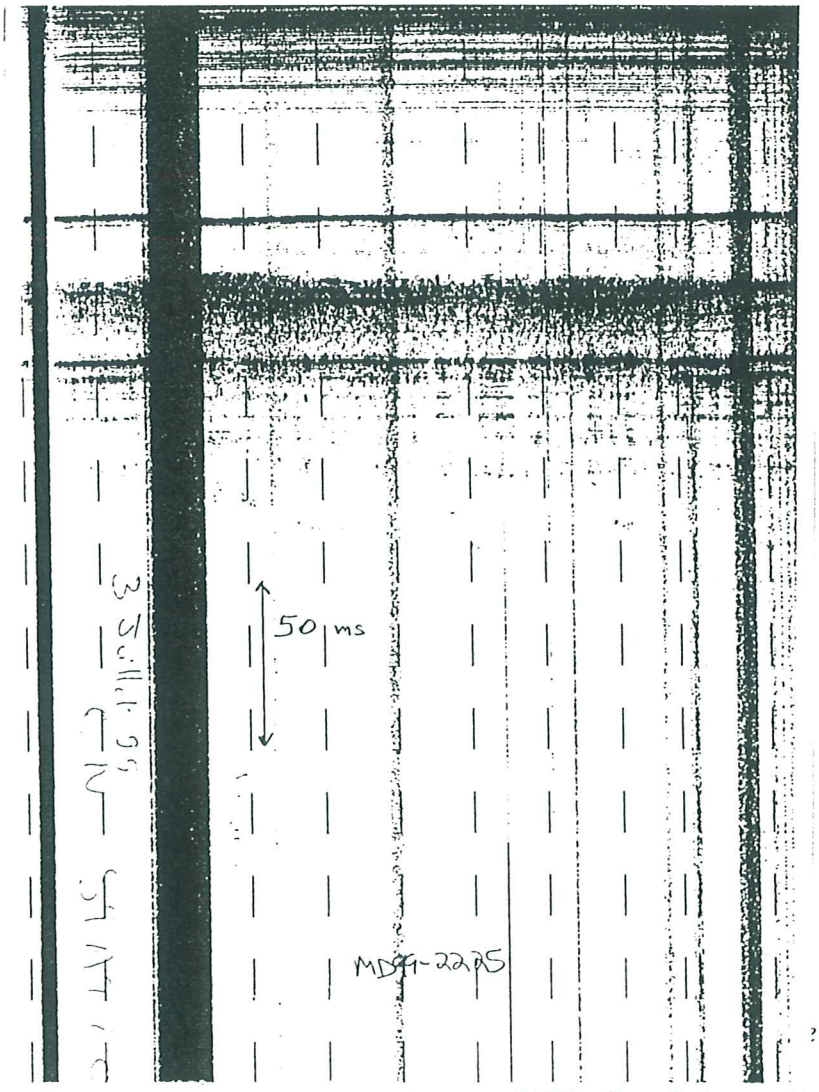
Document IFRTP – Dept. Océanographie

MD 99-2225

lat. : 48°59'88 N long. : 058°05'08 W

03 july 1999 Core length : 37.53 m Water depth : 104 m





Document IFRTP – Dept. Océanographie

Julian day:	184	GMT time:	14h50
Latitude:	48°59.88N	Longitude:	058°05.08W
Water depth:	104 m	Location:	Bay of Islands

Core number:	MD 99-2225	Corer length:	41.50 m
		Apparent penetration:	------- m
		Core length:	37.53 m

Observations

Corer condition:

The corer was bent approximately 5 meters below the weight.

Core condition:

One of the join between two liners broked when extruding the core from the barrels. There was no lost of sediments. The core is in good condition.

Sections and sampling

Number of sections recovered and conditions:

The core is composed of 25 sections. When cutting between sections VI and VII, a water pocket drained out. Therefore the 39 cm void at the base of section VI and 112 cm void at the top of section VII have been filled with foam. Sections XV and XVI very gassy.

Onboard sampling and post cruise curation:

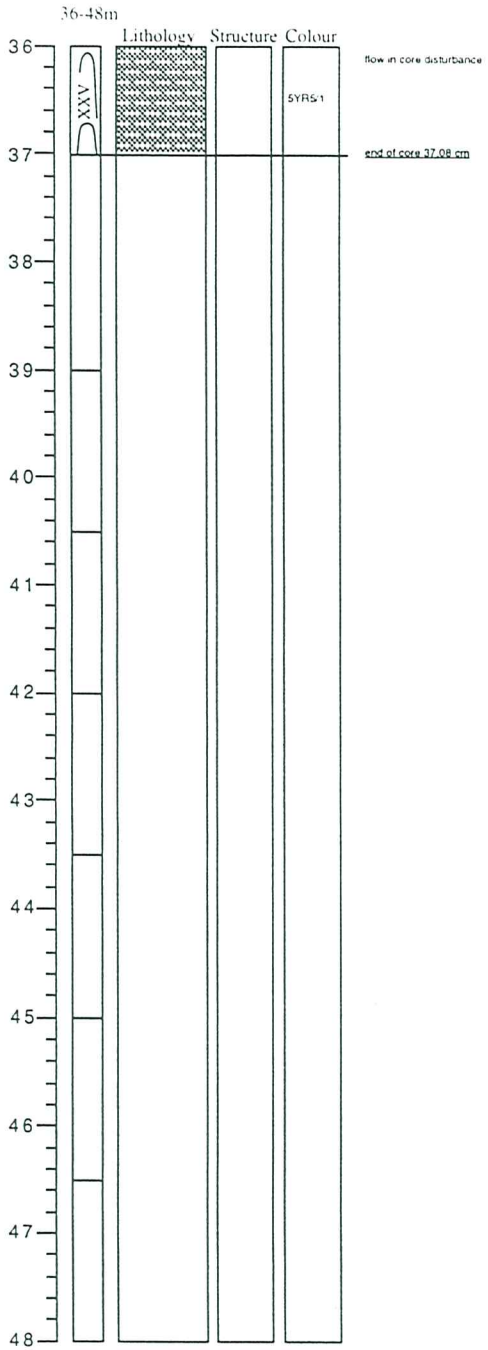
- The core was split onboard, archive and working halves will be curated at AGC-BIO.
- No sampling was performed onboard, however, several bags of sediments were recovered: 1 top, 1 core cutter, 1 core catcher, 1 top of section XI, 1 top of section XII (1500-1502), 1 top of section XII (1650-1652), 1 top of section XIV (1950-1952), 1 top of section XV (2100-2102), 1 top of section XVI, 1 top of section XXI, 1 base of section XIX, 1 top of section XX, 1 top of section X and 1 top of section XIX. All the samples will be curated at AGC-BIO.

Summary of physical and sedimentological observations

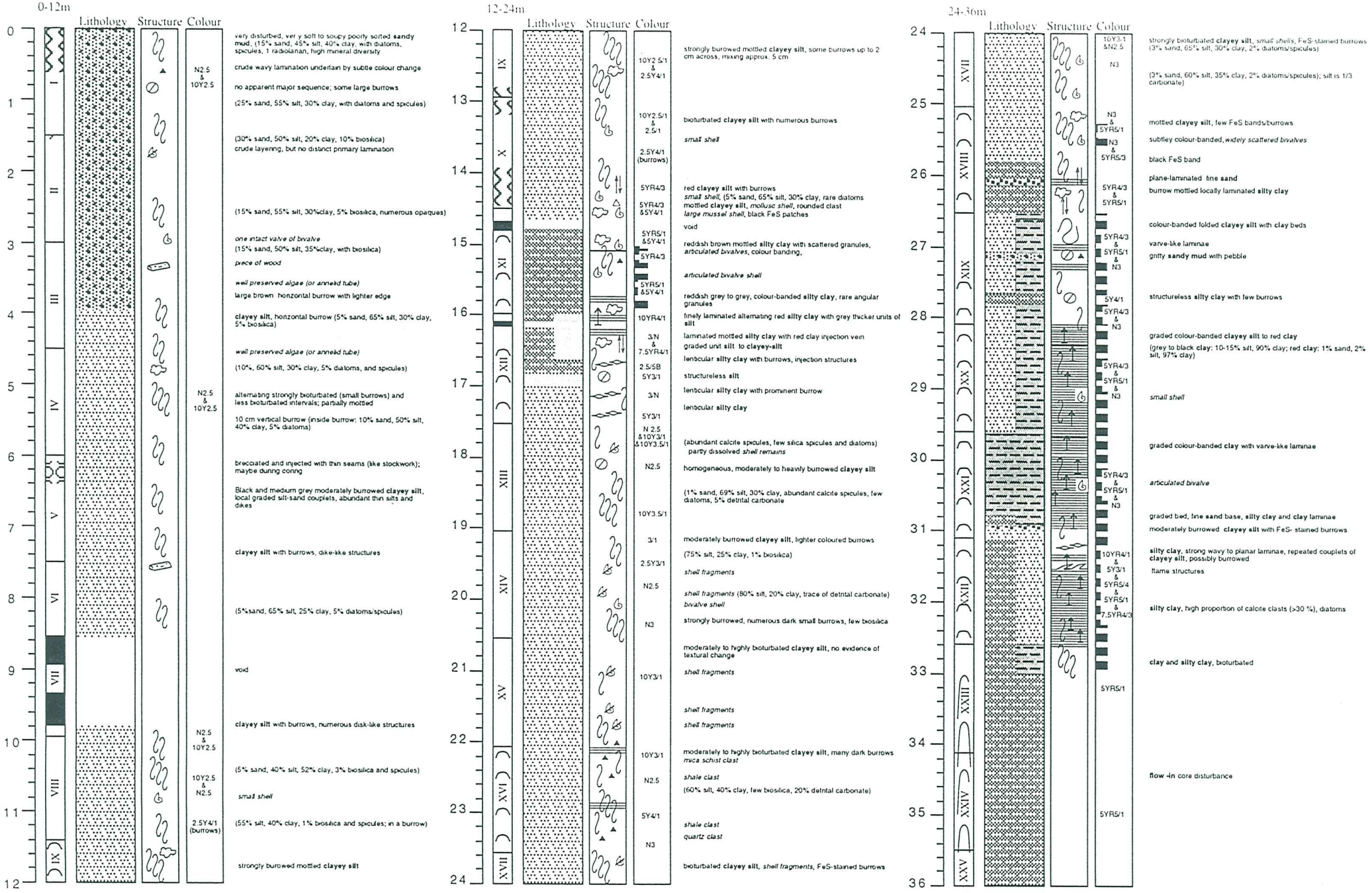
- This core contains several voids, bowed laminations, and below 32 m consists entirely of flow-in.
- An upper unit (0-14.70 m) of dark grey to black clayey silt, becoming more sandy toward to the top; locally important bioturbation, lamination and grading locally present, biogenic silica locally reaches 10%
- A unit (14.70-16.60 m) of clayey silt banded in colours of grey and reddish brown; local laminations and graded sequences
- A unit (16.60-25.40 m) of bioturbated clayey silt like the upper unit
- A lower unit (25.40-37.08 m) characterized by a centimetre-scale alternation of clayey silt or sandy mud, and reddish brown clay; contacts are sharp, minor burrowing.

- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Relatively low magnetic susceptibility values were observed, ranging from about 25 to 70 x 10^{-5} SI units, with occasional peaks above 100 x 10^{-5} SI units. Bulk density values vary from 1.4 to 1.9 Mg/m^3. As a result of gas expansion P-wave velocity could be measured for the upper 2 m of core and values were approximately 1450 m/sec.

MD 99-2225


36-48m
Lithology
Structure
Colour
36
37
38
39
40
41
42
43
44
45
46
47
48
XXV
5YR5/1
flow in core disturbance
end of core 37.08 cm

MD 99-2225 Bay of Islands, Humber Arm (104 m)



SITE 5

Julian day:	184	GMT time:	22h09
Latitude:	50°14.98N	Longitude:	058°26.15W
Water depth:	336 m	Location:	Esquiman Channel

Core number:	Corer length:	36.85 m
	Apparent penetration:	35.00 m
	Core length:	------ m

Observations

Corer condition:

Penetration up to 1 meter below weights but core cutter stayed at the bottom when pulled out of sediment.

Core condition:

No sediment recovery.

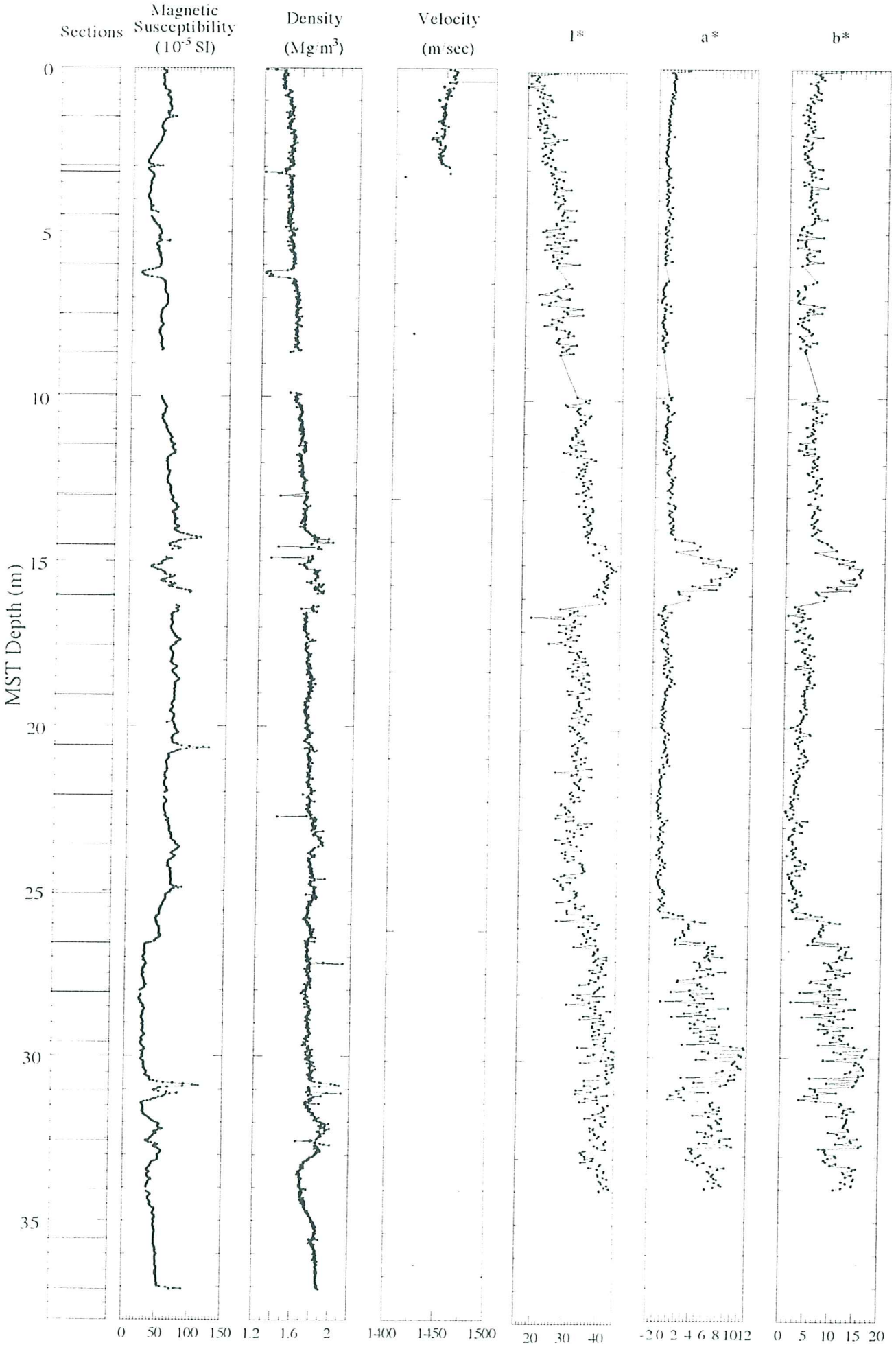
Sections and sampling

Number of sections recovered and conditions:

Onboard sampling and post cruise curation:

Summary of physical and sedimentological observations

MD99 2225


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0 50 100 150
1.2 1.6 2
1400 1450 1500
20 30 40
-2 0 2 4 6 8 10 12
0 5 10 15 20

Julian day:	186	GMT time:	01h30
Latitude:	55°02.00N	Longitude:	052°08.38W
Water depth:	2716 m	Location:	Southern Labrador slope
CTD profil:	0 - 200m		

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

Twelve Niskin bottles of 12 litres allowed to recover samples of the water column at 200 m (2), 45 m (1) and 20 m (9).

Sampling

The water samples will be analysed for alkenones, Neodinium (Nd) and salinity (for CTD calibration).

Summary of CTD profil

The profil started at 9 m deep and the surface water temperature was 5.97° C.

SITE 6

Julian day:	186	GMT time:	4h40
Latitude:	55°01.23N	Longitude:	052°08.70W
Water depth:	2690 m	Location:	Southern Labrador slope

Core number:	Corer length:	41.20 m
	Apparent penetration:	------- m
	Core length:	------- m

Observations

Corer condition:

The corer broke at the junction between 2 barrels and only the upper portion of the corer was recovered.

Core condition:

No sediment recovery.

Sections and sampling

Number of sections recovered and conditions:

Onboard sampling and post cruise curation:

Summary of physical and sedimentological observations

Julian day:	187	GMT time:	01h41
Latitude:	57°03.71N	Longitude:	050°37.70W
Water depth:	3580 m	Location:	NAMOC right levée (site E)

Core number:	MD 99-2226	Corer length:	41.22 m
		Apparent penetration:	30.00 m
		Core length:	32.14 m

Observations

Corer condition:

Corer is in good condition.

Core condition:

Overall good condition.

Sections and sampling

Number of sections recovered and conditions:

The upper 3 cm of section III fell out of lining and were bagged . Sections XII to XVII had high water content and "soupy" sediment fell on the deck during core cutting. Section XIV is in two parts, XIVa (1950-2078cm), and XIVb (2078-2150cm). There are XXII sections, the last one measuring 64 cm.

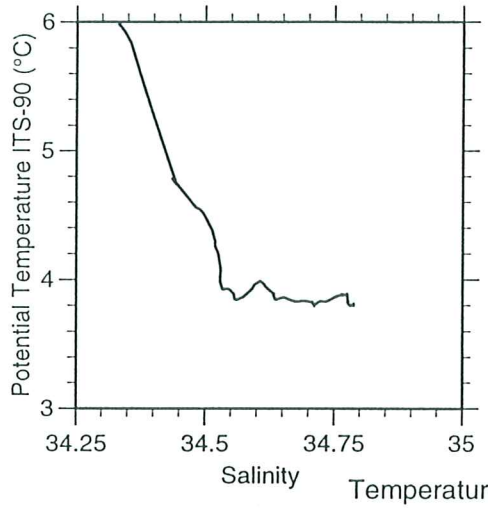
Onboard sampling and post cruise curation:

-One U-channels was taken by mistake on section XIX and was stored with those of core MD99-2227.
- The archive and working halves will be curated at AGC-BIO.
- Several bags of sediments were recovered: 1core cutter (cone d'ogive), 1core catcher (ogive), 1 top, 1 for section III.

Summary of physical and sedimentological observations

- Coring disturbance is moderate to strong depending on sediment type.
- An upper unit (0-1.20 m) of nannofossil ooze
- A middle unit (1.20-8.50 m) of interbedded structureless clayey silt, mudclast-rich sand mud, and sandy to clayey deposits rich in detrital carbonate
- A lower unit (8.50-32.05 m) of laminated, commonly graded, centimetre-scale couplets of silt to silty clay formed of 30-80% detrital carbonate; exception is a quartzitic sand layer from 25.00-25.40 m

♦ MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Relatively high magnetic susceptibility values were observed, ranging from about 50 to 450 x 10^{-5} SI units. Bulk density values range from 1.5 to 2.0 Mg/m^3 with occasional intervals ranging up to 2.2 Mg/m^3. P-wave velocity values range from 1440 to 1550 m/sec.



CTD
Station 6

Southern Labrador Slope

July 5, 1999

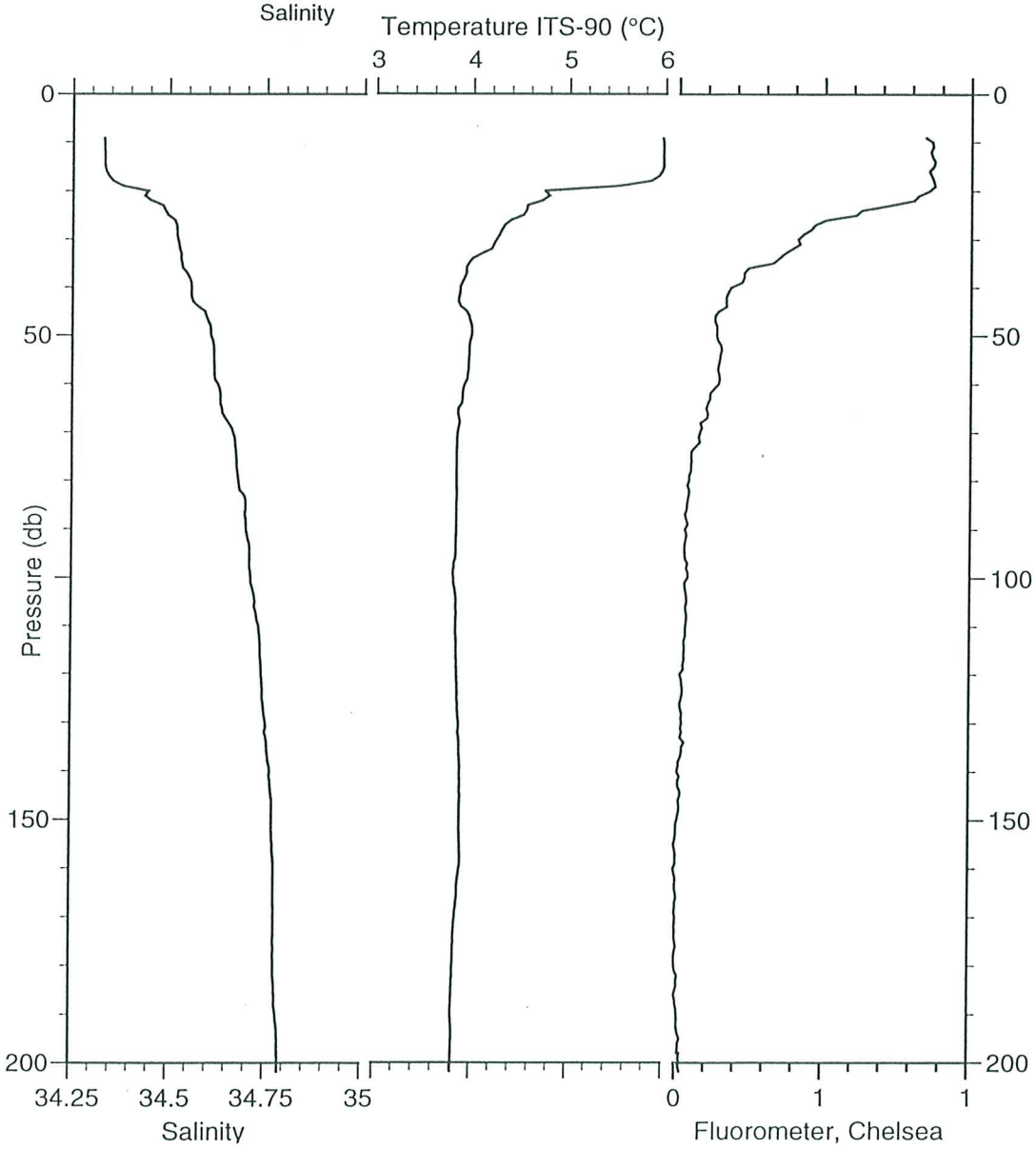
Latitude : 55°02.00 N

Longitude : 052°08.38 W

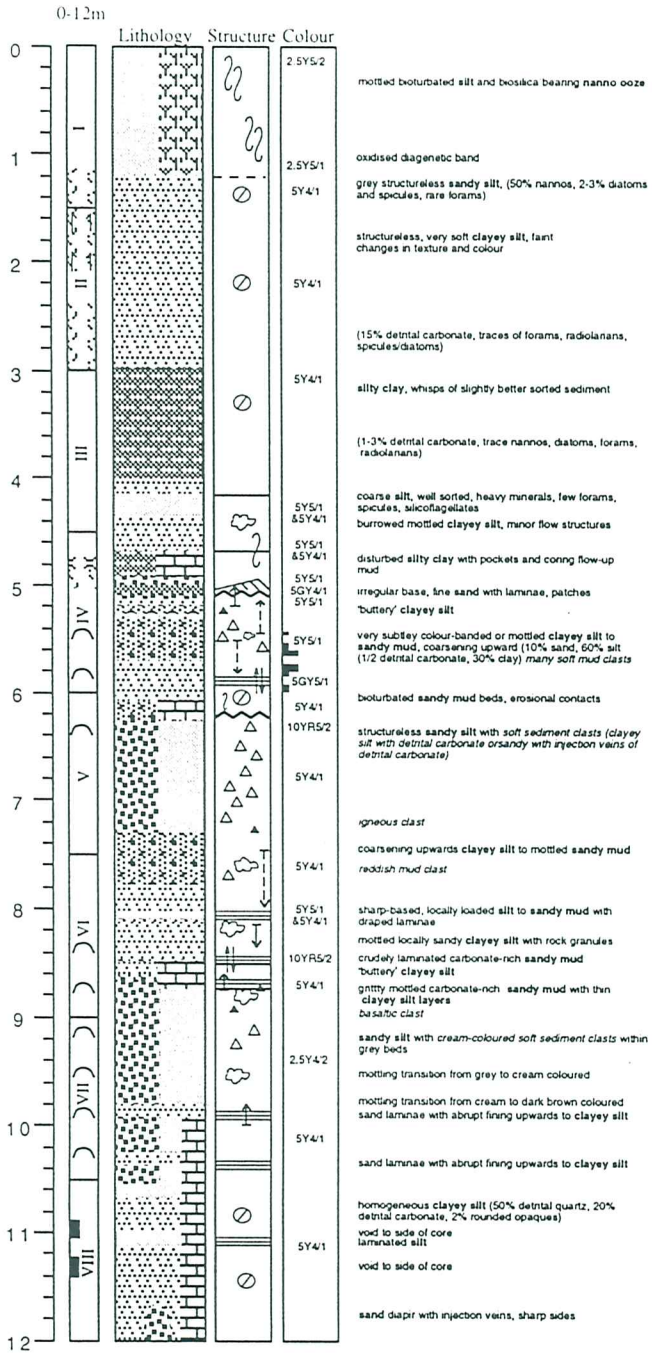
Water depth : 2716 m

Water profile : 0 - 200 m

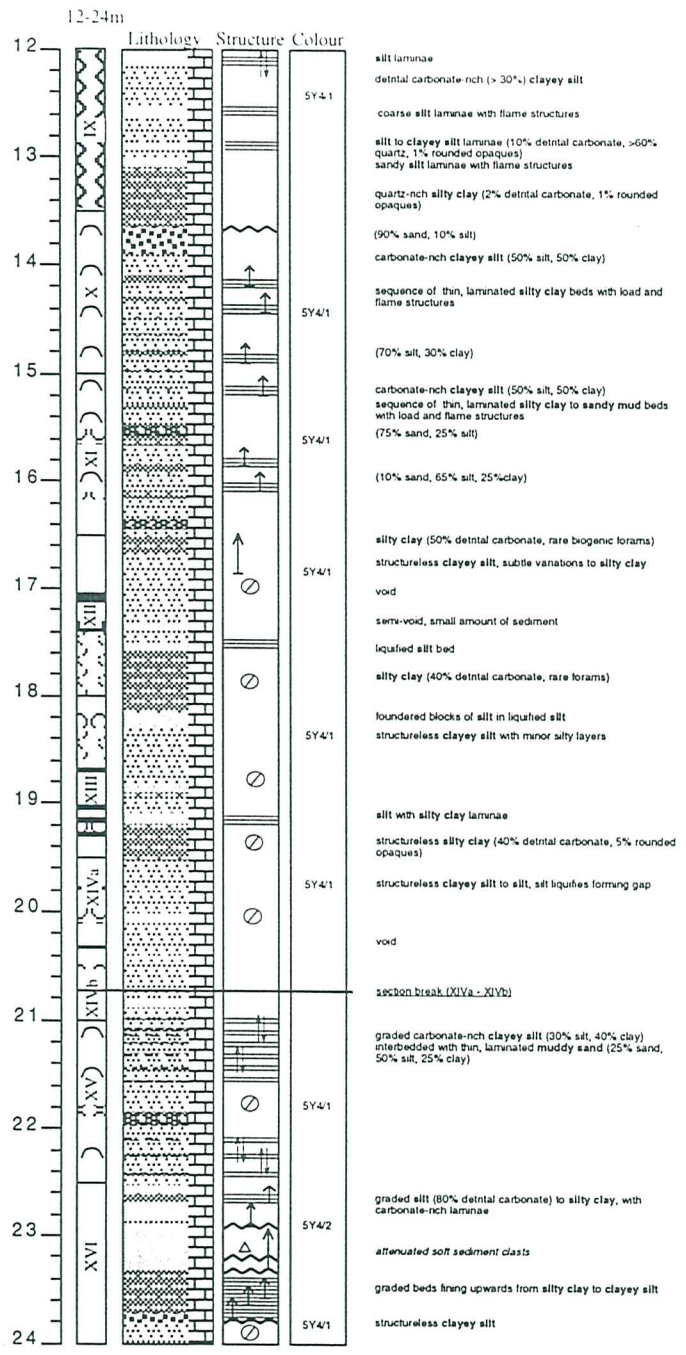
File: **iM5001**



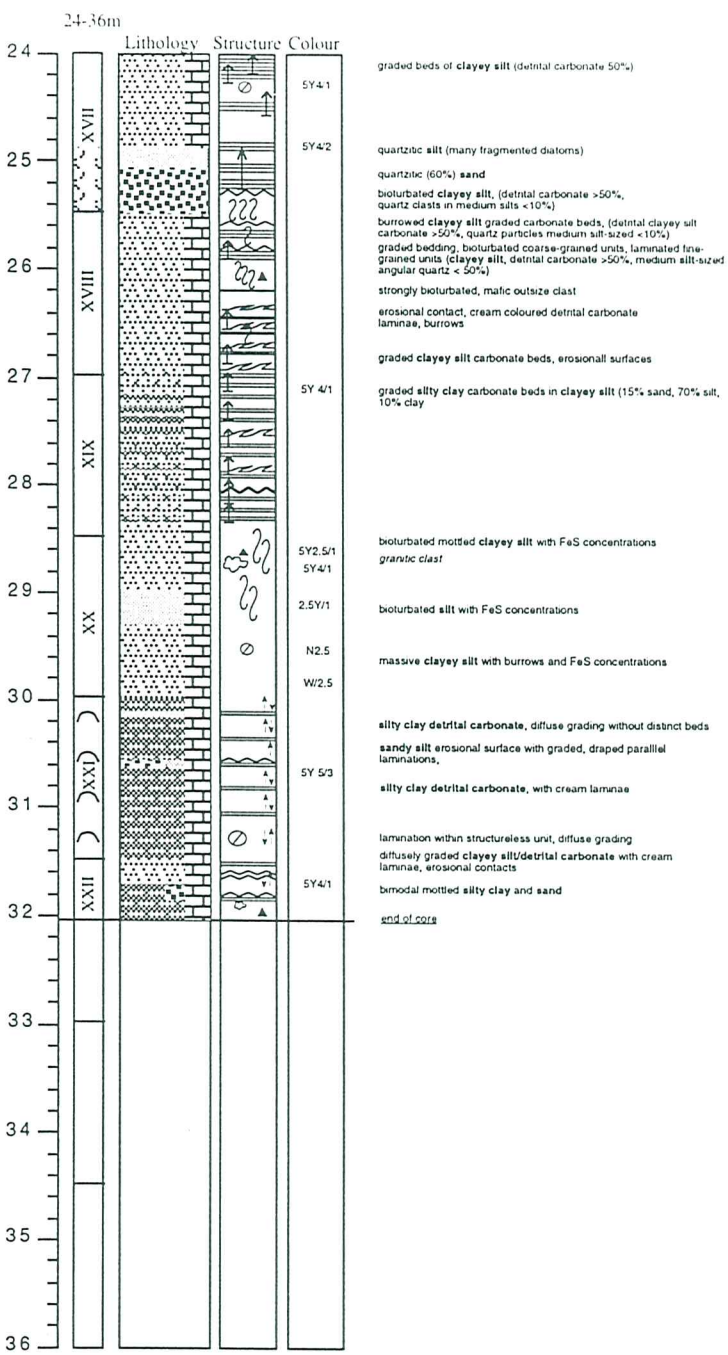
MD 99-2226 NAMOC Levee Crest (3580 m)



MD 99-2226

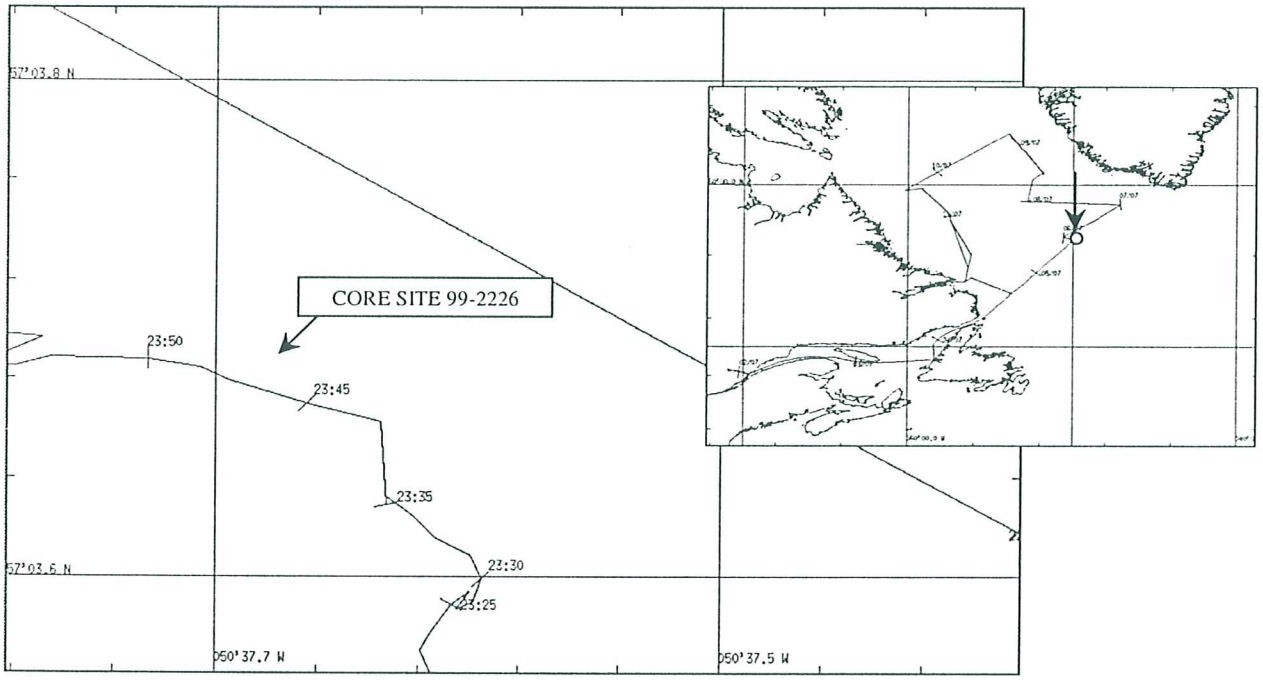


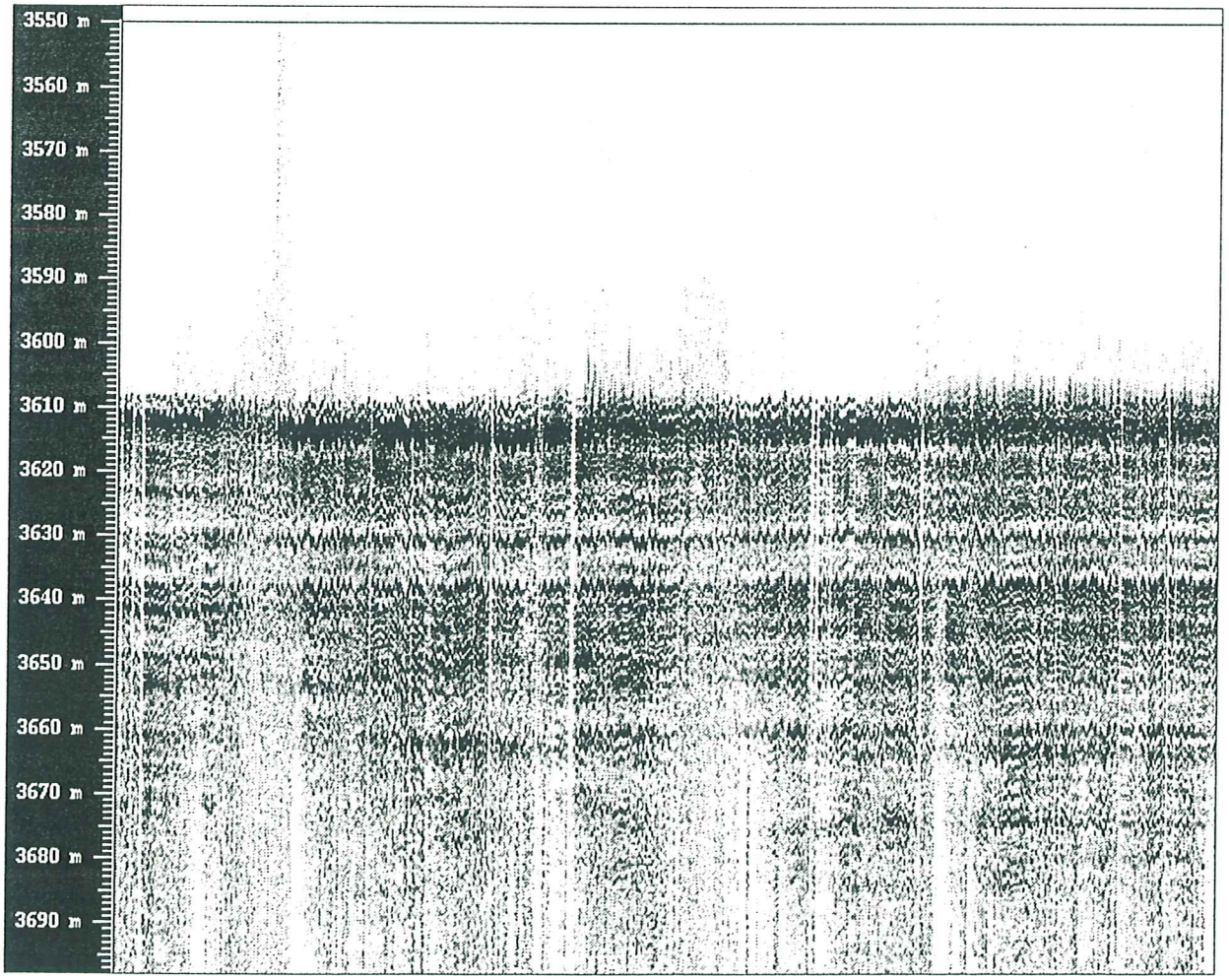
MD 99-2226



MD 99-2226

Lat. : 57°03'71 N Long. : 050°37'70 W
05 july 1999 Core length : 31.14 m Water depth : 3580 m





Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	187	GMT time:	13h44
Latitude:	58°12.64N	Longitude:	048°22.38W
Water depth:	3460 m	Location:	Greenland Rise

Core number:	MD 99-2227	Corer length:	51.51 m
		Apparent penetration:	40.00 m
		Core length:	42.96 m

Observations

Corer condition:
Good

Core condition:
Good

Sections and sampling

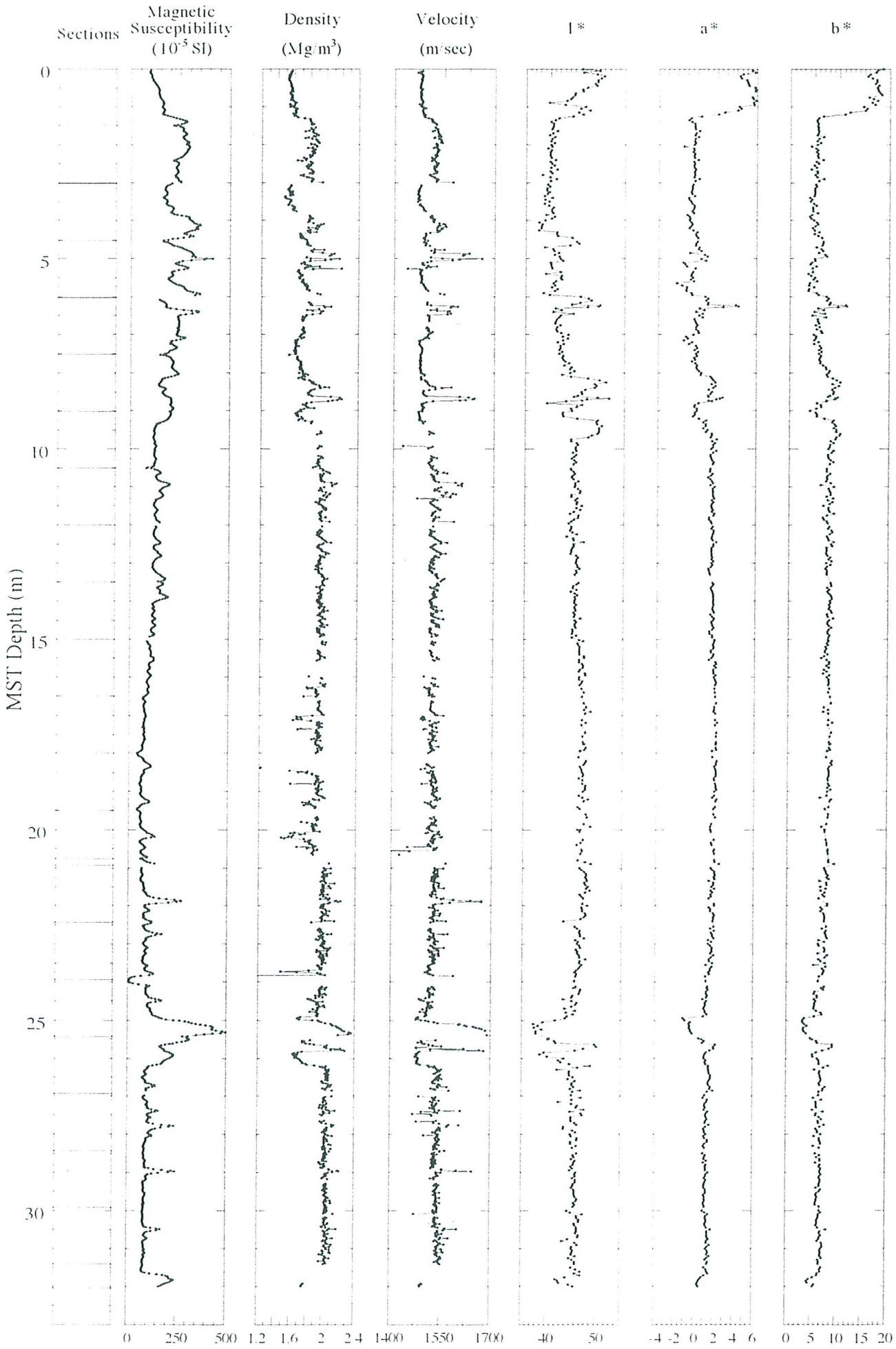
Number of sections recovered and conditions:
Lost of sediments on the deck between sections III and IV due to high water content. Upper few cm of section X were also lost due to high water content. Section X measures 146 cm (1350-1496 cm) and section XI measures 154 cm (1496-1650 cm).There are XXIX sections, the last one measuring 96 cm.

Onboard sampling and post cruise curation:
- U-channels were taken on every sections and will be curated at GEOTOP after they have been measured at UCD.
- Both the archive and working halves will be curated at GEOTOP.
- Several bags of sediments were recovered: 1core cutter (cône d'ogive), 1 core catcher (ogive), 1 top.
- One sample per section was taken with a paleomagnetic cube in the upper 15 meters of the core and will be curated at UCD.
- One constant volume sample was taken at the top of each section (between PVC lining and U-channel hole) for density measurements and will be curated at AGC-BIO.

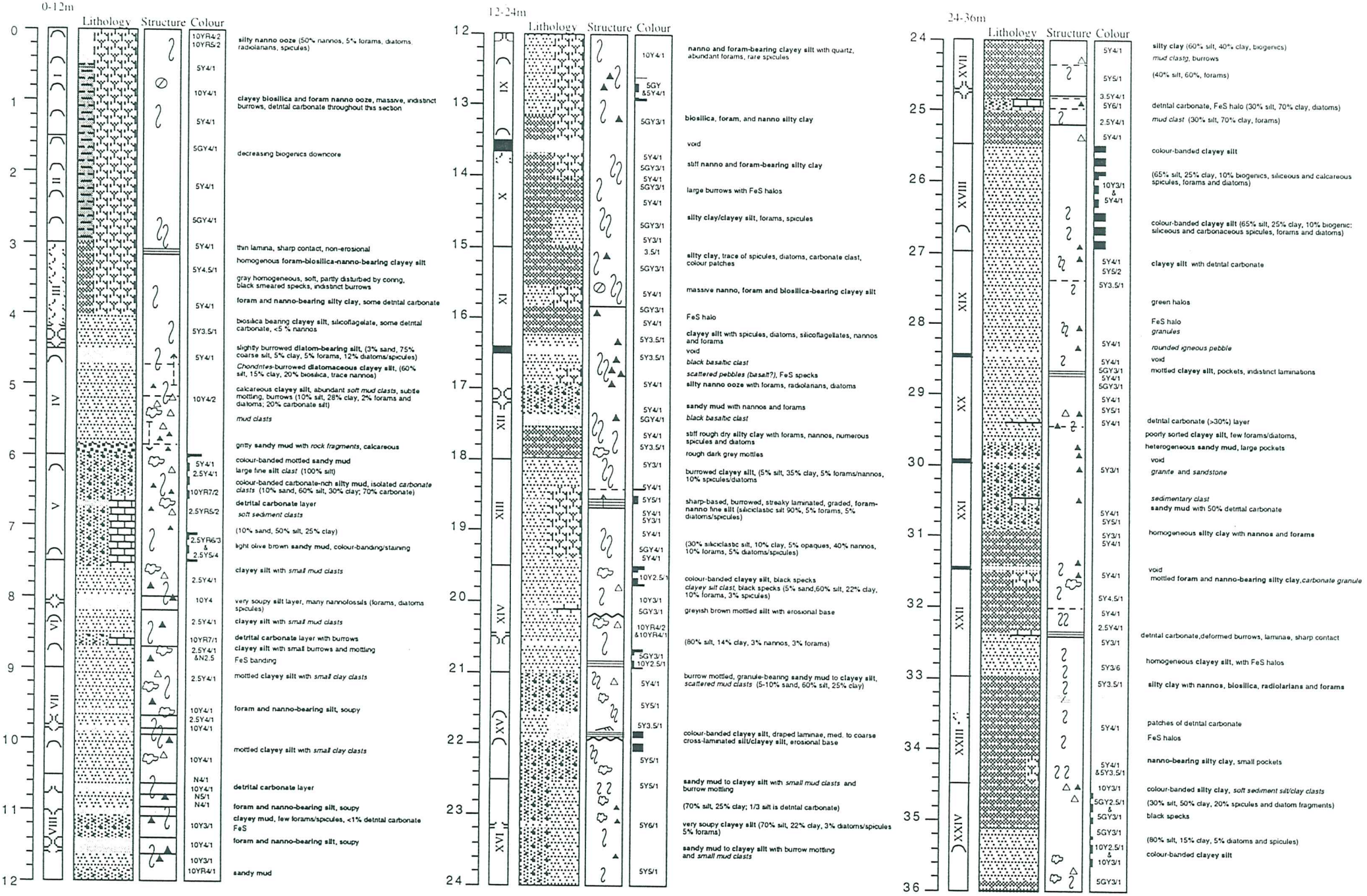
Summary of physical and sedimentological observations

- The core is moderately disturbed with bowed layers in the upper 24 m.
- *Dominant lithologies*: dark grey, structureless, burrowed silty clay with biogenic silica skeletons; clayey silt to sandy mud with outsized bedrock clasts and soft mud clasts; grey nannofossil- and foram-rich clayey silt to nannofossil and foram ooze.
- *Minor lithologies:* centimetre-scale sandy mud beds rich in detrital carbonate; thinly laminated beds of quartzitic sand and silt.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Relatively high magnetic susceptibility values were observed, ranging from about 100 to 350 x 10^{-5} SI units, with occasional peaks above 400 x 10^{-5} SI units. Bulk density values vary from about 1.45 to 1.7 Mg/m^3 with occasional density spikes of 1.9 to 2.3 Mg/m^3. P-wave velocities range from about 1465to 1485 m/sec with distinct peaks of up to 1600 m/sec.

MD99 2226

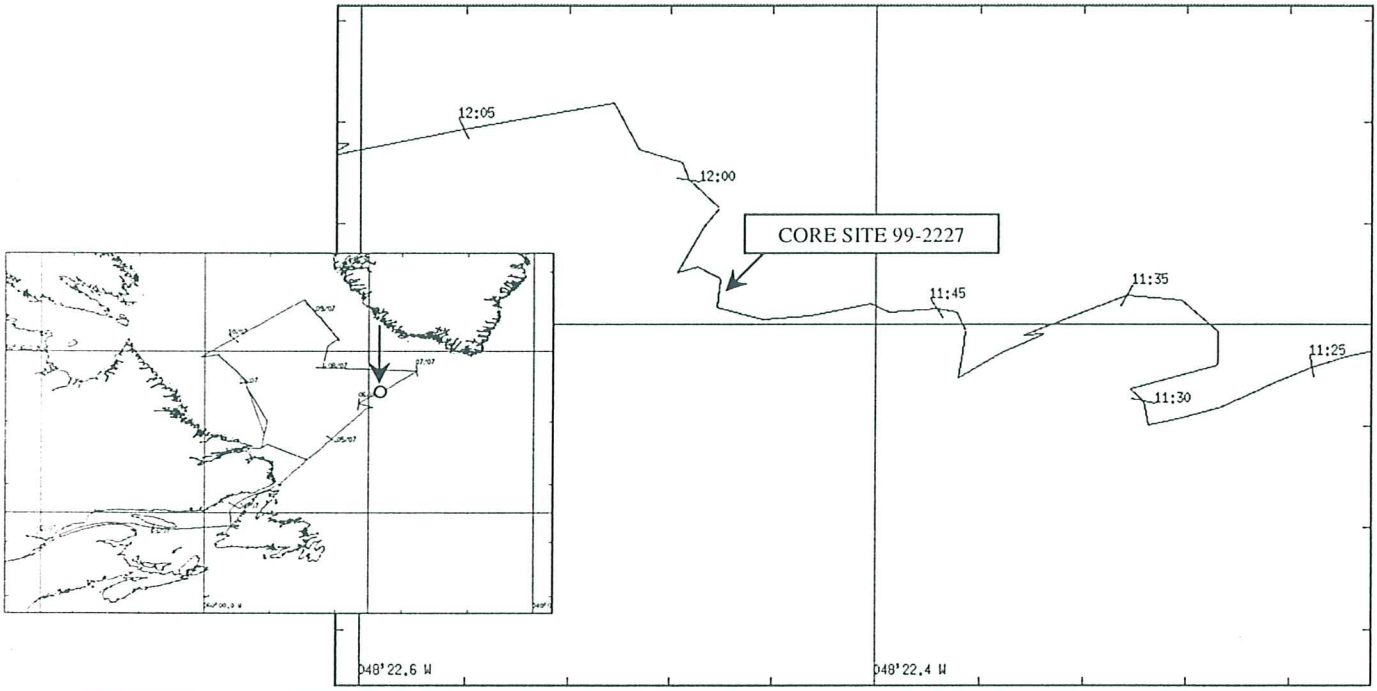

Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
0 250 500
1.2 1.6 2 2.4
1400 1550 1700
40 50
-4 -2 0 2 4 6
0 5 10 15 20

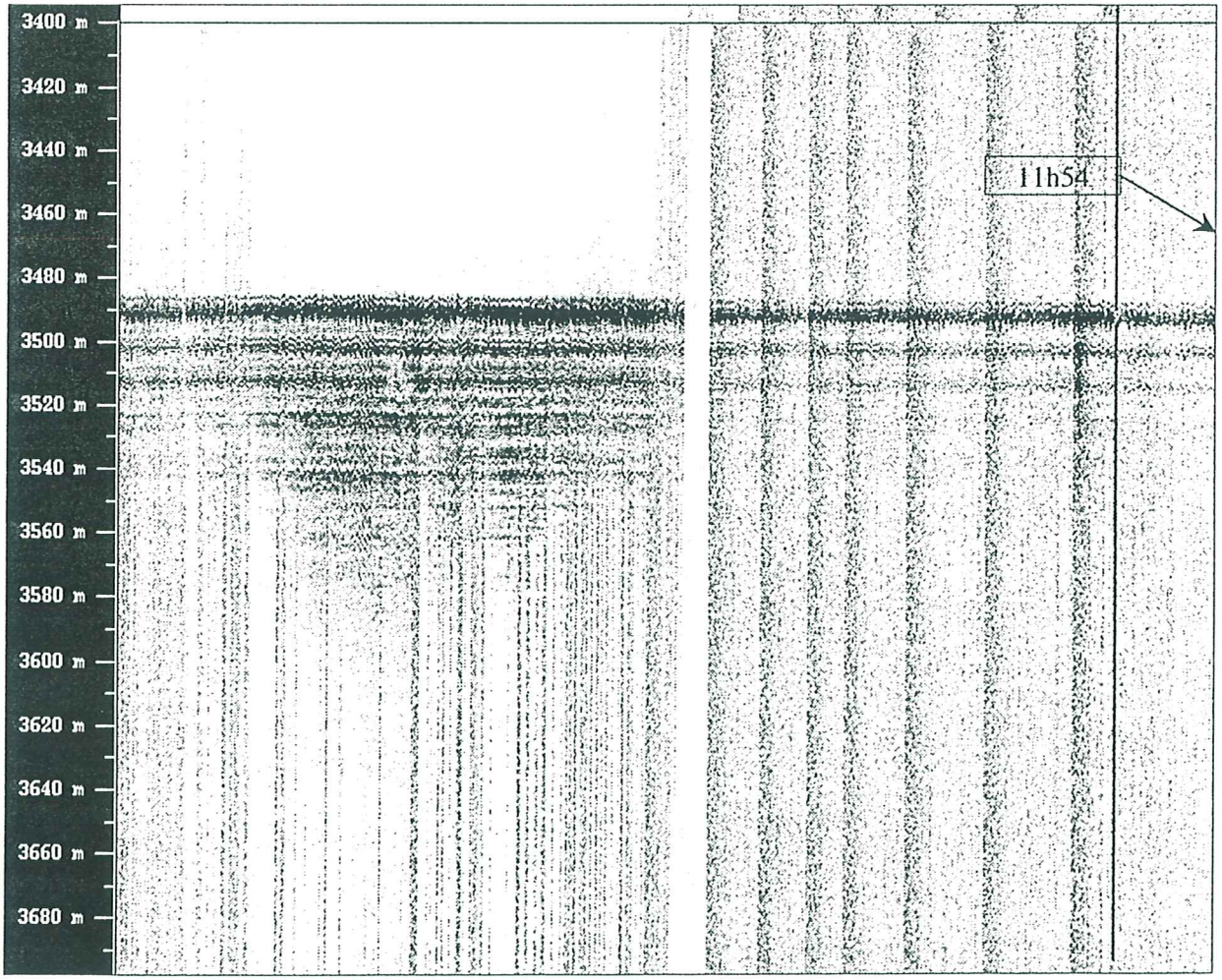
MD 99-2227 Greenland Rise (3460 m)



MD 99-2227

lat. : 58°12'64 N long. : 048°22'32 W
06 july 1999 Core length : 42.96 m Water depth : 3460 m

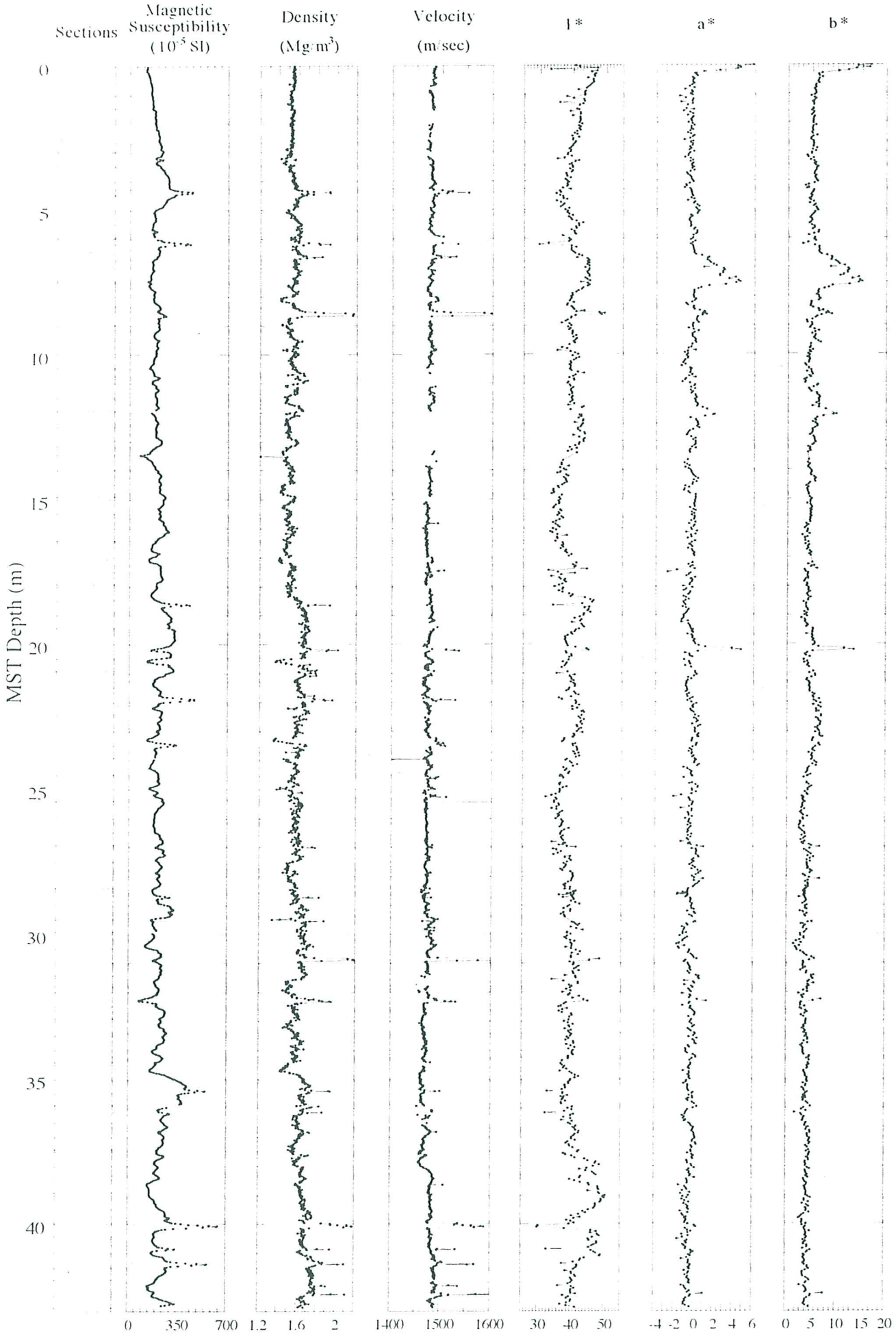




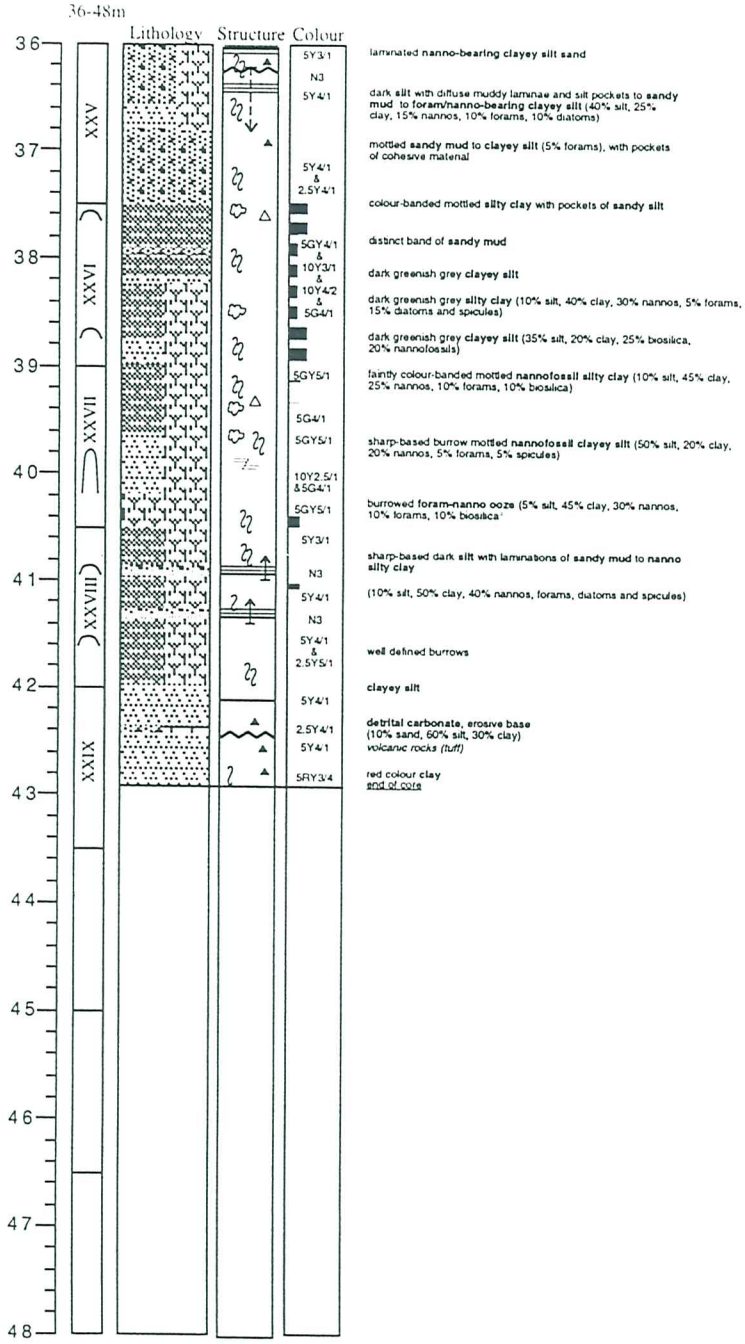
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD99 2227


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
L*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
40
0 350 700
1.2 1.6 2
1400 1500 1600
30 40 50
-4 -2 0 2 4 6
0 5 10 15 20

MD 99-2227



laminated **nanno-bearing clayey silt sand**

dark **silt** with diffuse muddy laminae and silt pockets to **sandy mud** to **foram/nanno-bearing clayey silt** (40% silt, 25% clay, 15% nannos, 10% forams, 10% diatoms)

mottled **sandy mud** to **clayey silt** (5% forams), with pockets of cohesive material

colour-banded mottled **silty clay** with pockets of **sandy silt**

distinct band of **sandy mud**

dark greenish grey **clayey silt**

dark greenish grey **silty clay** (10% silt, 40% clay, 30% nannos, 5% forams, 15% diatoms and spicules)

dark greenish grey **clayey silt** (35% silt, 20% clay, 25% biosilica, 20% nannofossils)

faintly colour-banded mottled **nannofossil silty clay** (10% silt, 45% clay, 25% nannos, 10% forams, 10% biosilica)

sharp-based burrow mottled **nannofossil clayey silt** (50% silt, 20% clay, 20% nannos, 5% forams, 5% spicules)

burrowed **foram-nanno ooze** (5% silt, 45% clay, 30% nannos, 10% forams, 10% biosilica)

sharp-based dark **silt** with laminations of **sandy mud** to **nanno silty clay**

(10% silt, 50% clay, 40% nannos, forams, diatoms and spicules)

well defined burrows

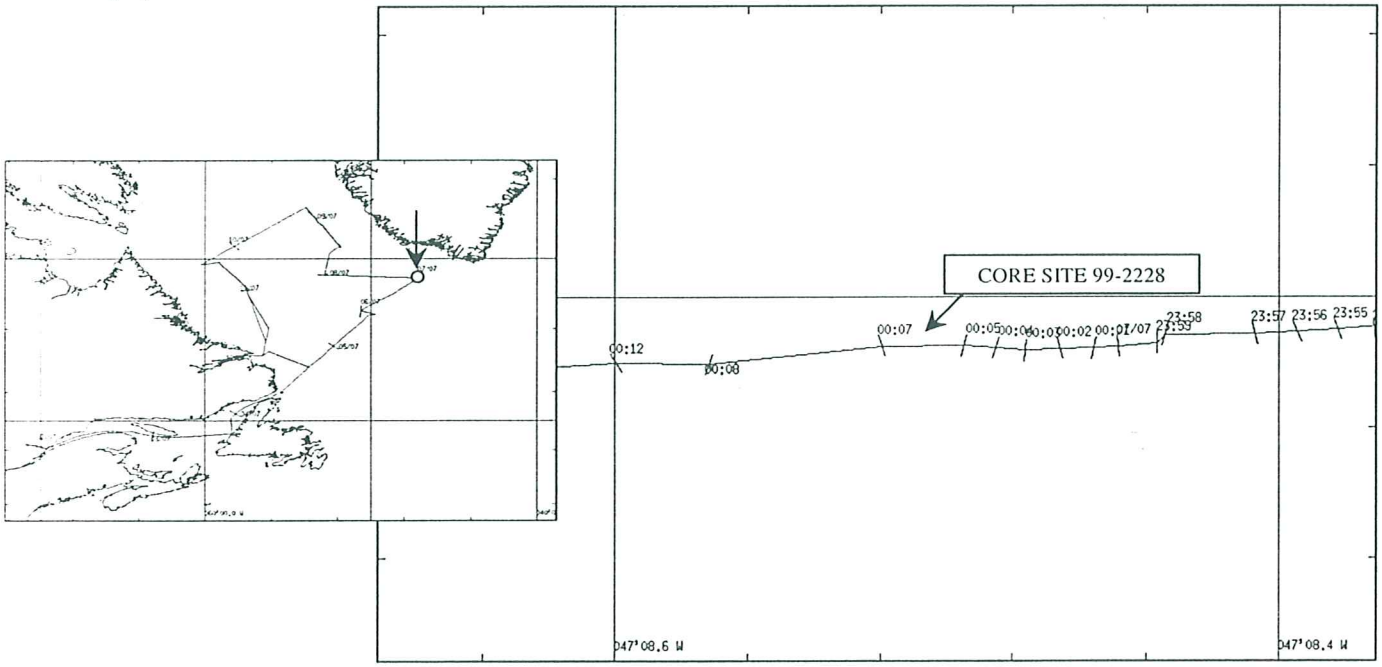
clayey silt

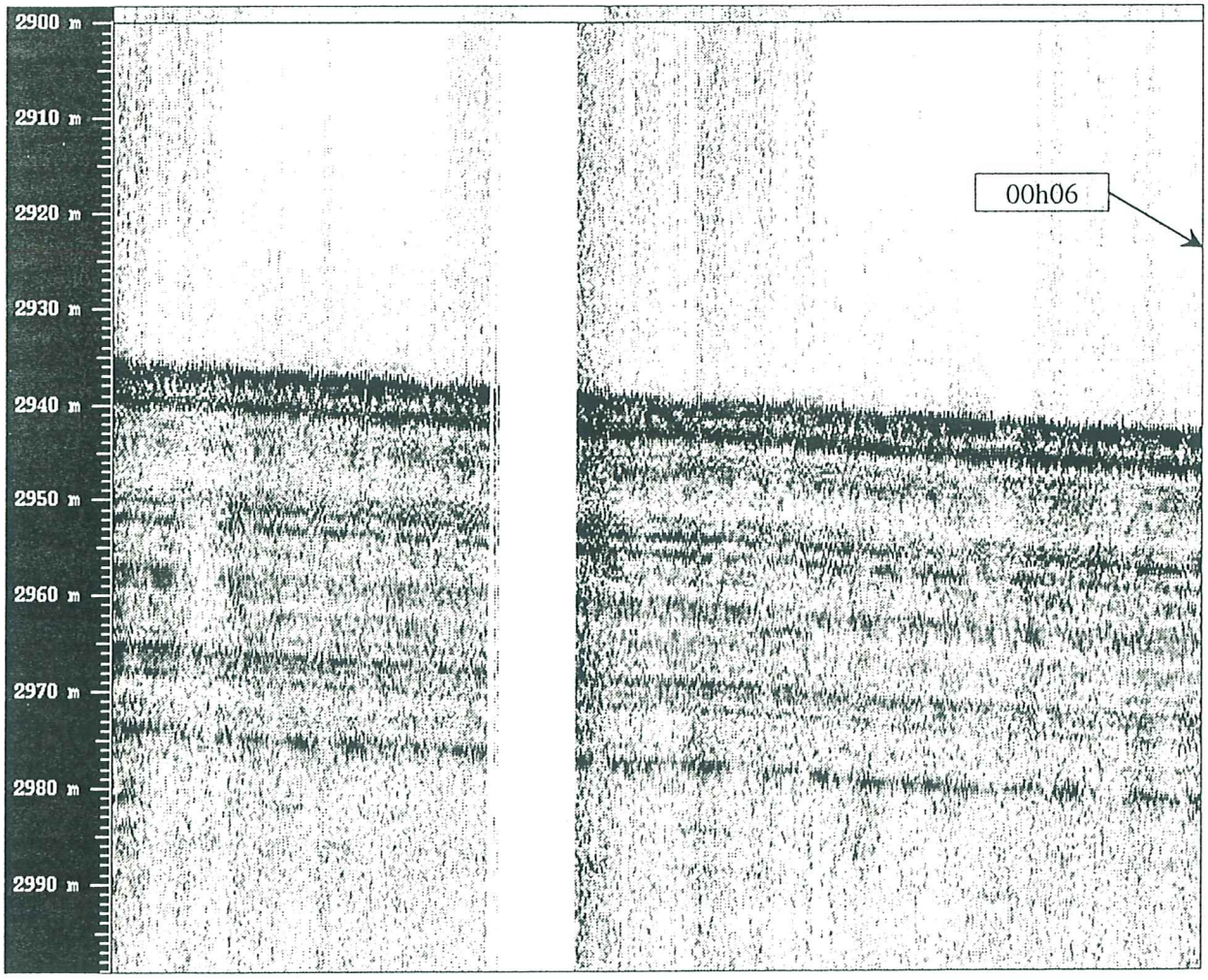
detrital carbonate, erosive base
(10% sand, 60% silt, 30% clay)
volcanic rocks (tuff)

red colour **clay**
end of core

MD 99-2228

lat. : 58°55'59N long. : 047°80'45 W
07 july 1999 Core length : 27.06 m Water depth : 2900 m





Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	188	GMT time:	01h35
Latitude:	58°55.59N	Longitude:	047°08.45W
Water depth:	2900 m	Location:	Greenland Slope

Core number:	MD 99-2228	Corer length:	51.51 m
		Apparent penetration:	40.00 m
		Core length:	27.06 m

Observations

Corer condition:
Good.

Core condition:
The PVC lining has imploded above the free piston.

Sections and sampling

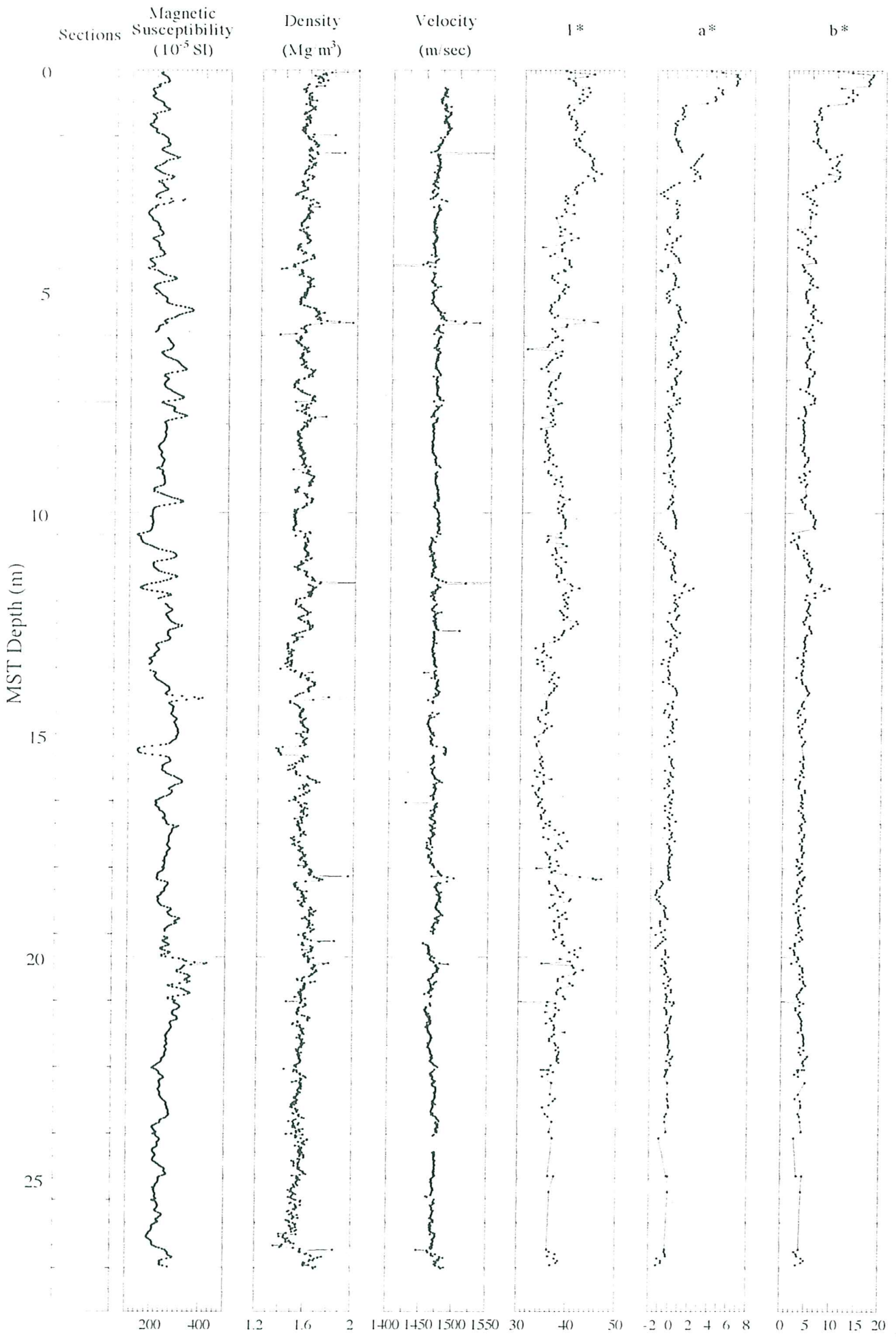
Number of sections recovered and conditions:
There are XVII sections, the last one measuring 156 cm.

Onboard sampling and post cruise curation:
- U-channels were taken on every section, they will be curated at Gif-sur-Yvette.
- Both working and archive halves will be curated at GEOTOP.
- One sample per section was taken with a paleomagnetic cube in the first 14 sections of the core. The cubes will be curated at Gif-sur-Yvette.
- Two bags of sediments have been recovered: 1 core cutter and 1 core catcher. They will be archive at GEOTOP.

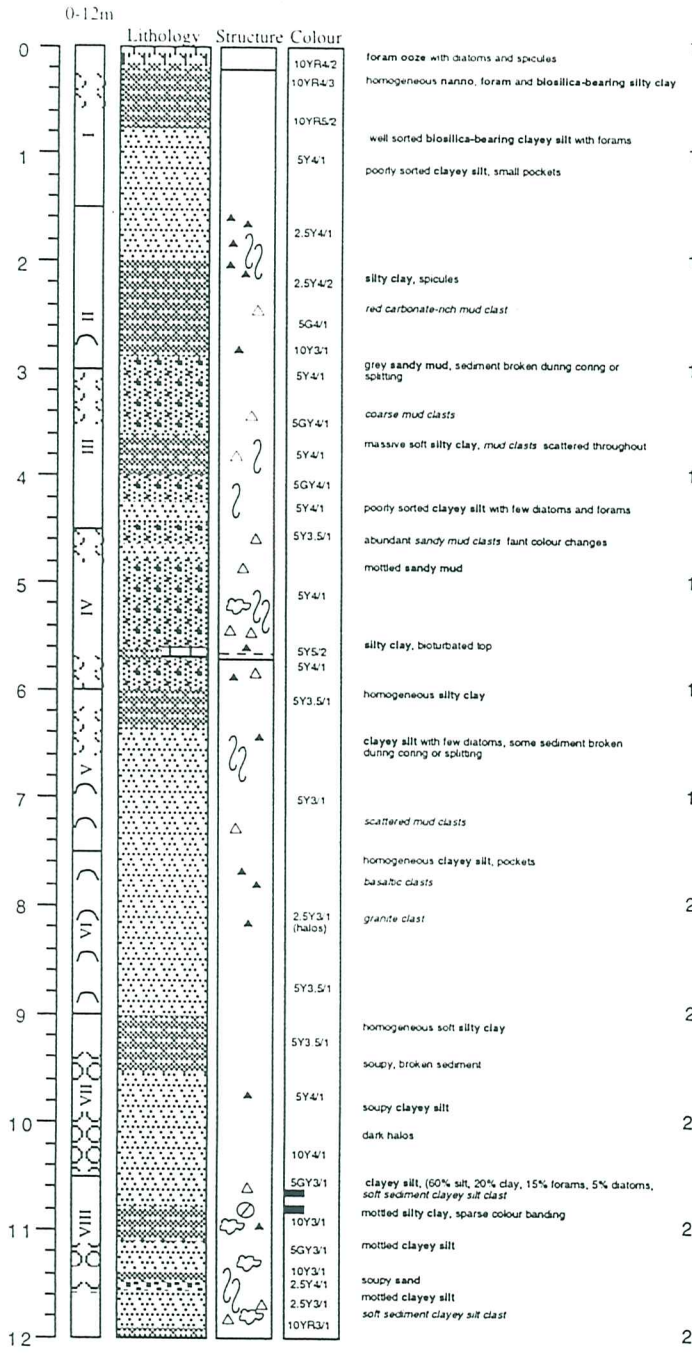
Summary of physical and sedimentological observations

- Except for faint colour banding and two sandy layers (one rich in detrital carbonate and the other in siliciclastic detritus), the core consists of structureless silty clay, clayey silt, and sandy mud containing scattered bedrock clasts and soft mudclasts. Biogenic silica skeletons (diatoms and spicules) occur throughout. Nannofossils and forams are dominant at the core top, but are minor (<20%) or absent downcore.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Strong, but variable magnetic susceptibility values are observed, ranging from about 150 to 350 x 10^{-5} SI units. Bulk densities vary from about 1.5 to 1.7 Mg/m^3 with occasional values of greater than 1.8 Mg/m^3. Generally very consistent P-wave velocities are observed ranging from about 1460 to 1475 m/sec with occasional values greater than 1500 m/sec.

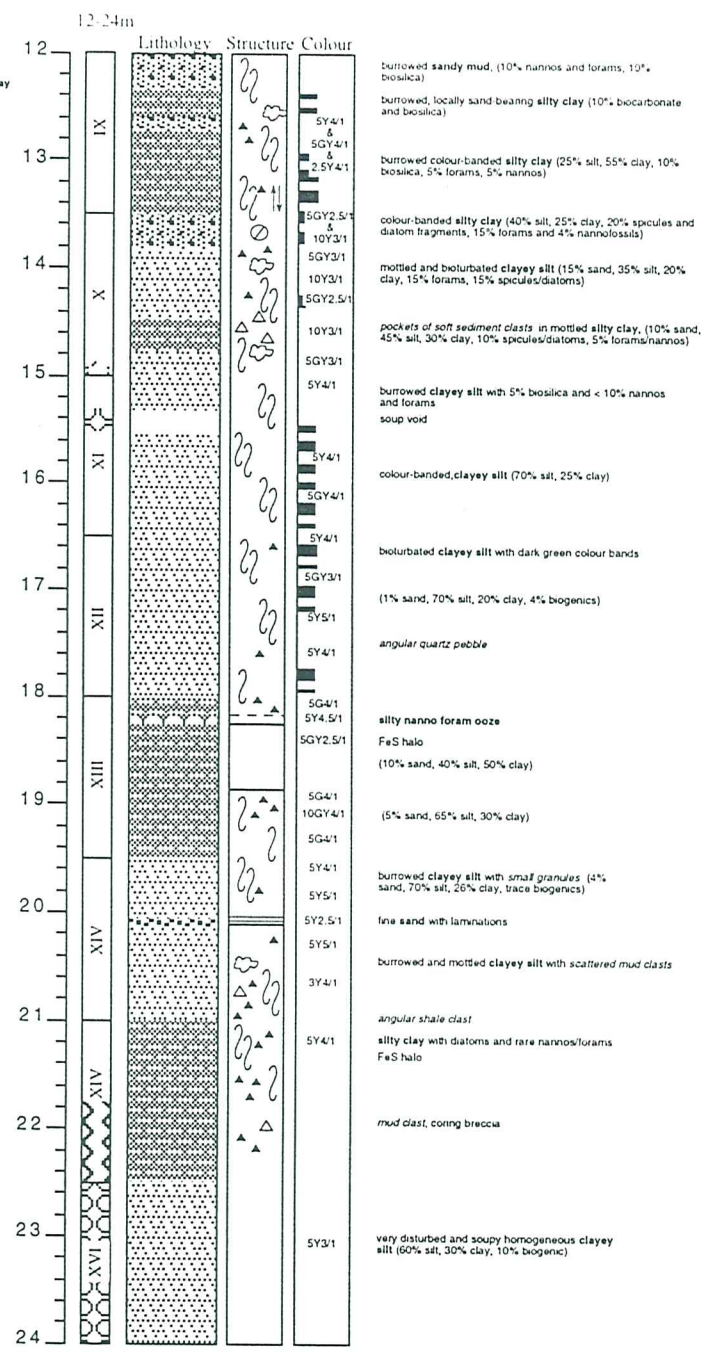
MD99 2228


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
L*
a*
b*
MST Depth (m)
0
5
10
15
20
25
200
400
1.2
1.6
2
1400
1450
1500
1550
30
40
50
-2
0
2
4
6
8
0
5
10
15
20

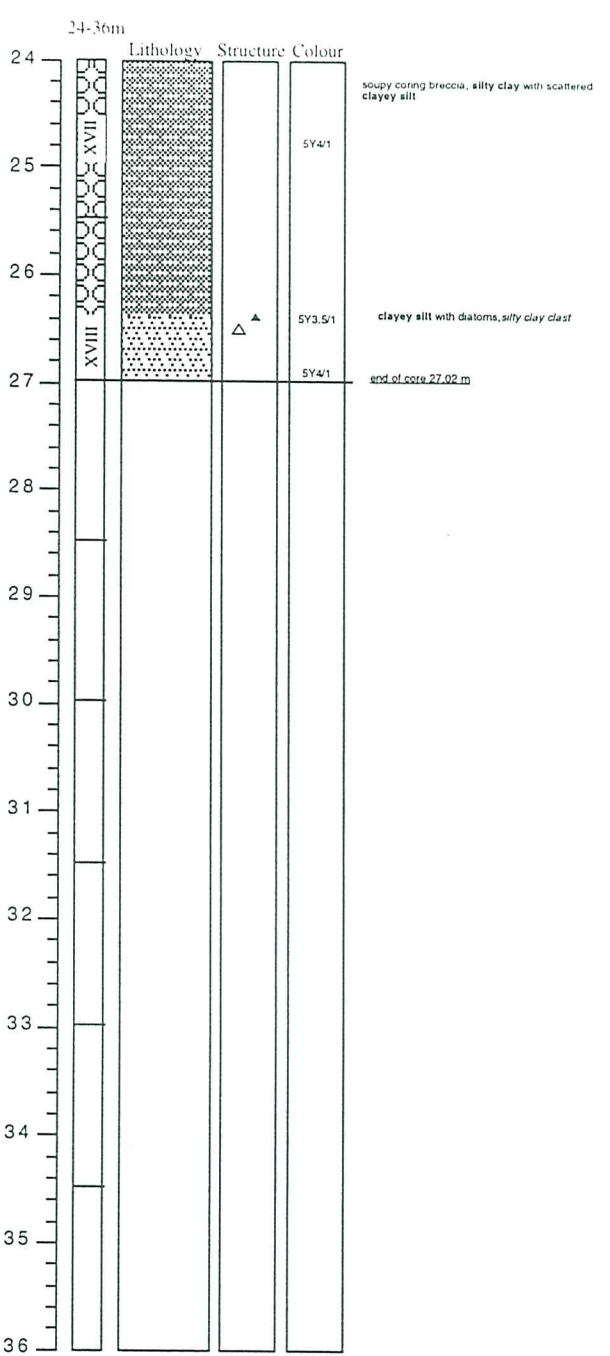
MD 99-2228 Greenland Slope (2900 m)

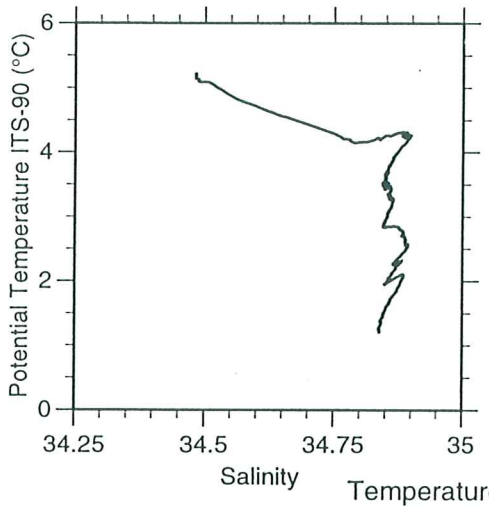


MD 99-2228



MD 99-2228





CTD
Station 9

Greenland Slope

July 6, 1999

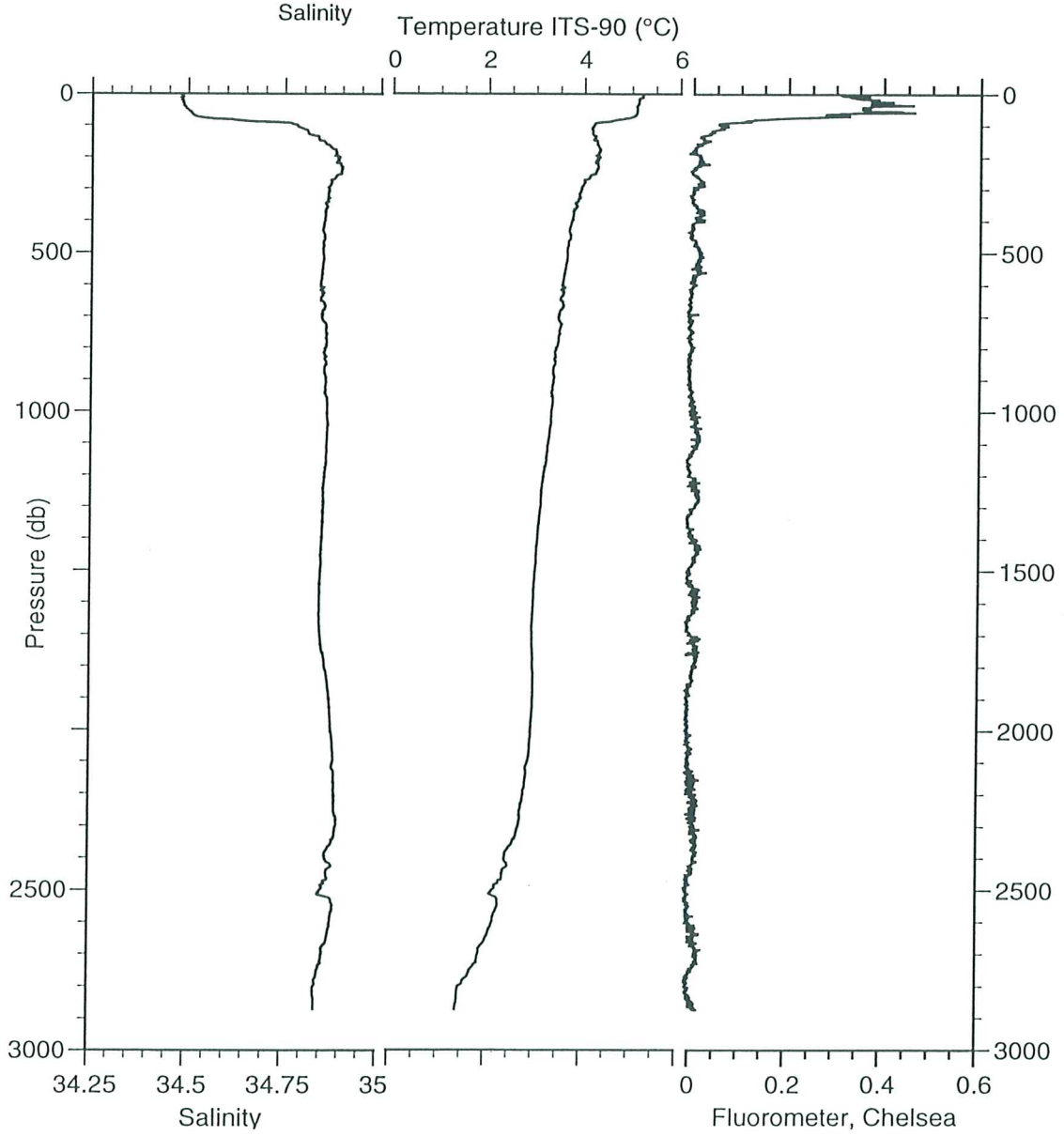
Latitude : 58°55.26 N

Longitude : 047°06.96 W

Water depth : 2901 m

Water profile : 0 - 2875 m

File: **iM5002**



Rosette and CTD cast
0 - 2874 m

Julian day:	187	GMT time:	22h12
Latitude:	58°55.26N	Longitude:	047°06.96W
Water depth:	2900 m	Location:	Greenland Slope

CTD depth: 2874 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

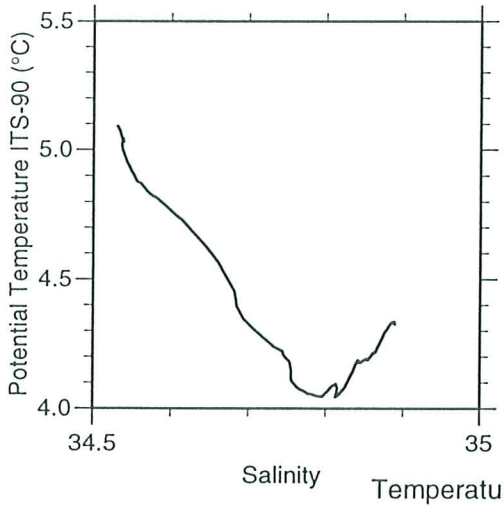
Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 2875 m, 2800 m, 2550 m, 2270 m, 1850 m, 1600 m, 1000 m, 600 m, 230 m, 100 m and 30 m.

Sampling

- The water samples will be analysed for Iodine 129, Neodinium (Nd) and salinity (for CTD calibration).

Summary of CTD profil

- Because of mechanical problems the winch stopped while going down. The profil was therefore made in two parts.
- A pinger was used to locate the rosette at all time and the profil stopped at 30 m from the bottom.
- The surface water temperature was 5.20°C.



CTD Station 9

Greenland Slope

July 6, 1999

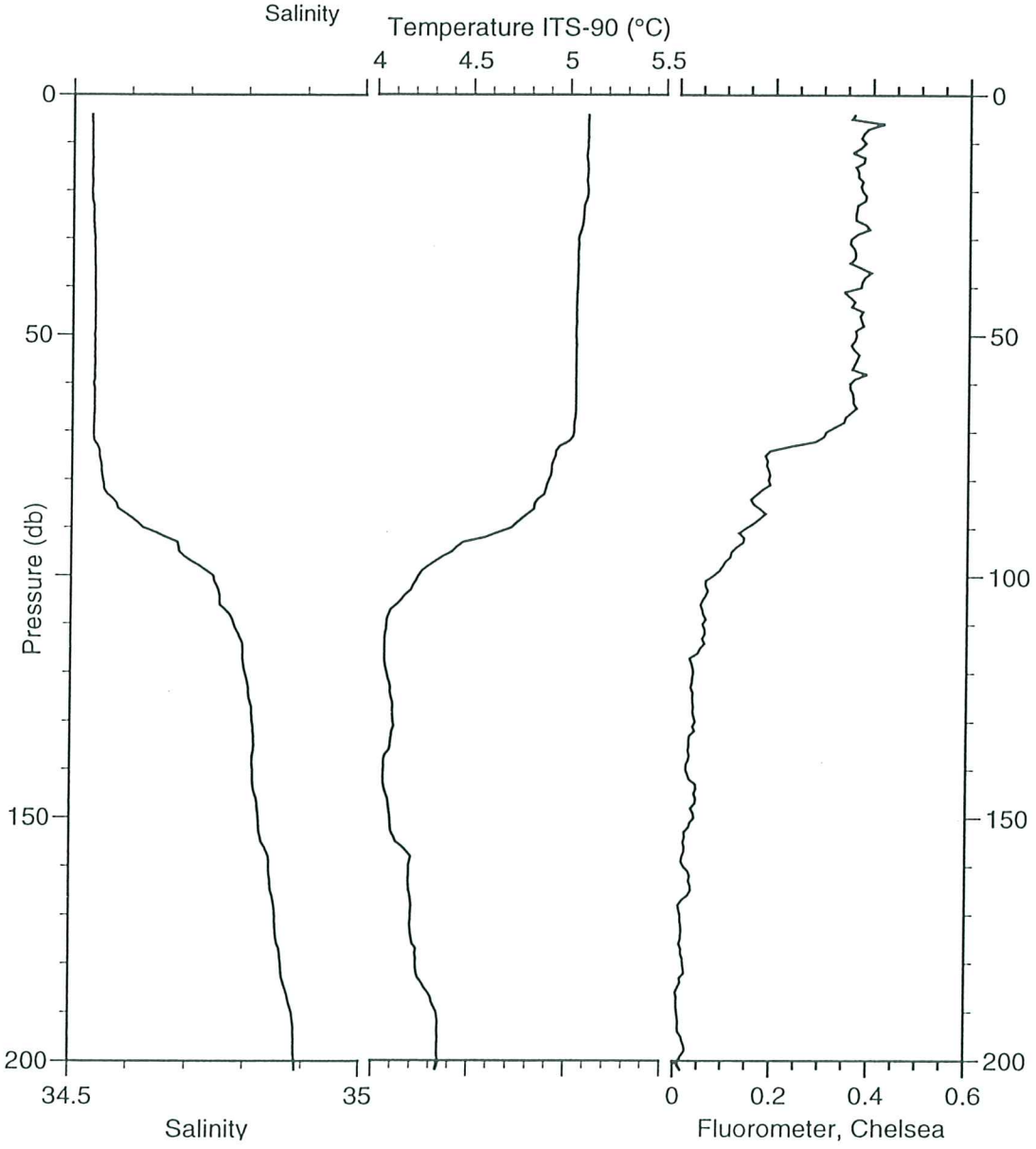
Latitude : 58°55.81 N

Longitude : 047°10.53 W

Water depth : 2900 m

Water profile : 0 - 200 m

File: **iM5003**



SITE 9

Rosette and CTD cast
0 - 200 m

Julian day:	188	GMT time:	02h25
Latitude:	58°55.81N	Longitude:	047°10.53W
Water depth:	2900 m	Location:	Greenland Rise

CTD depth: 0-200 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 50 m and 30 m.

Sampling

The water samples will be analysed for alkenone.

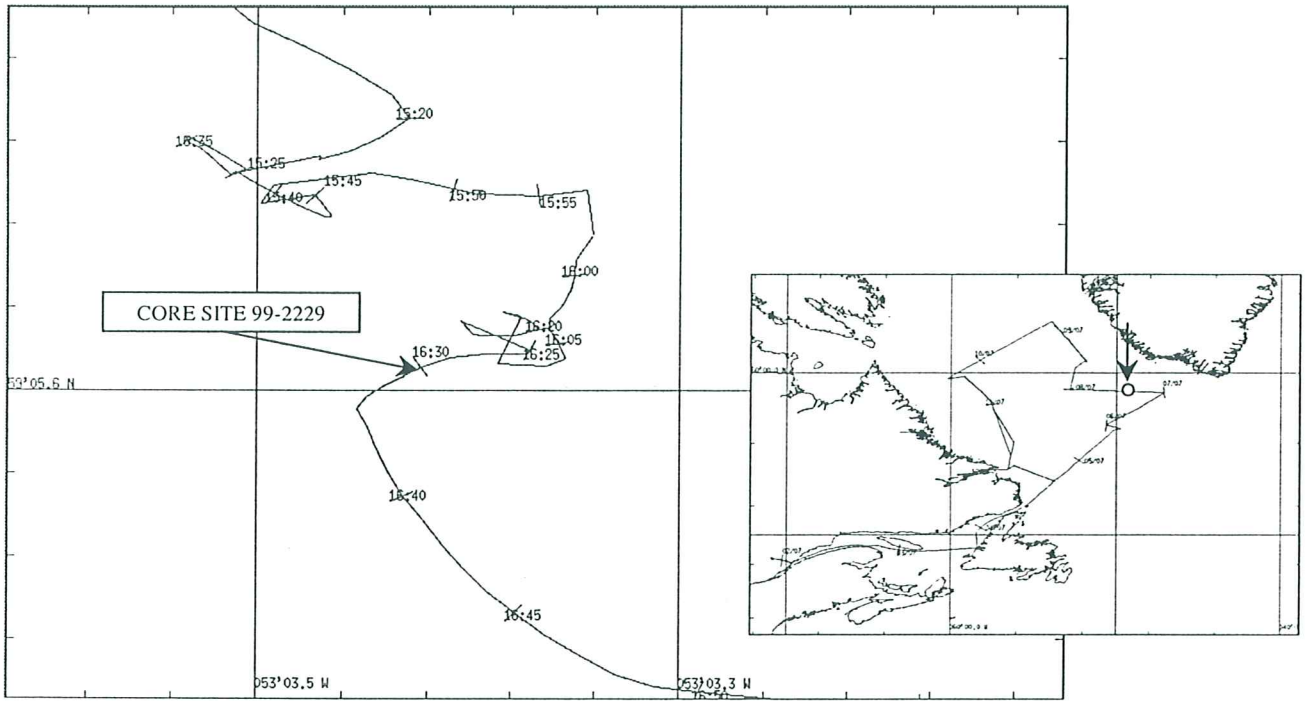
Summary of CTD profil

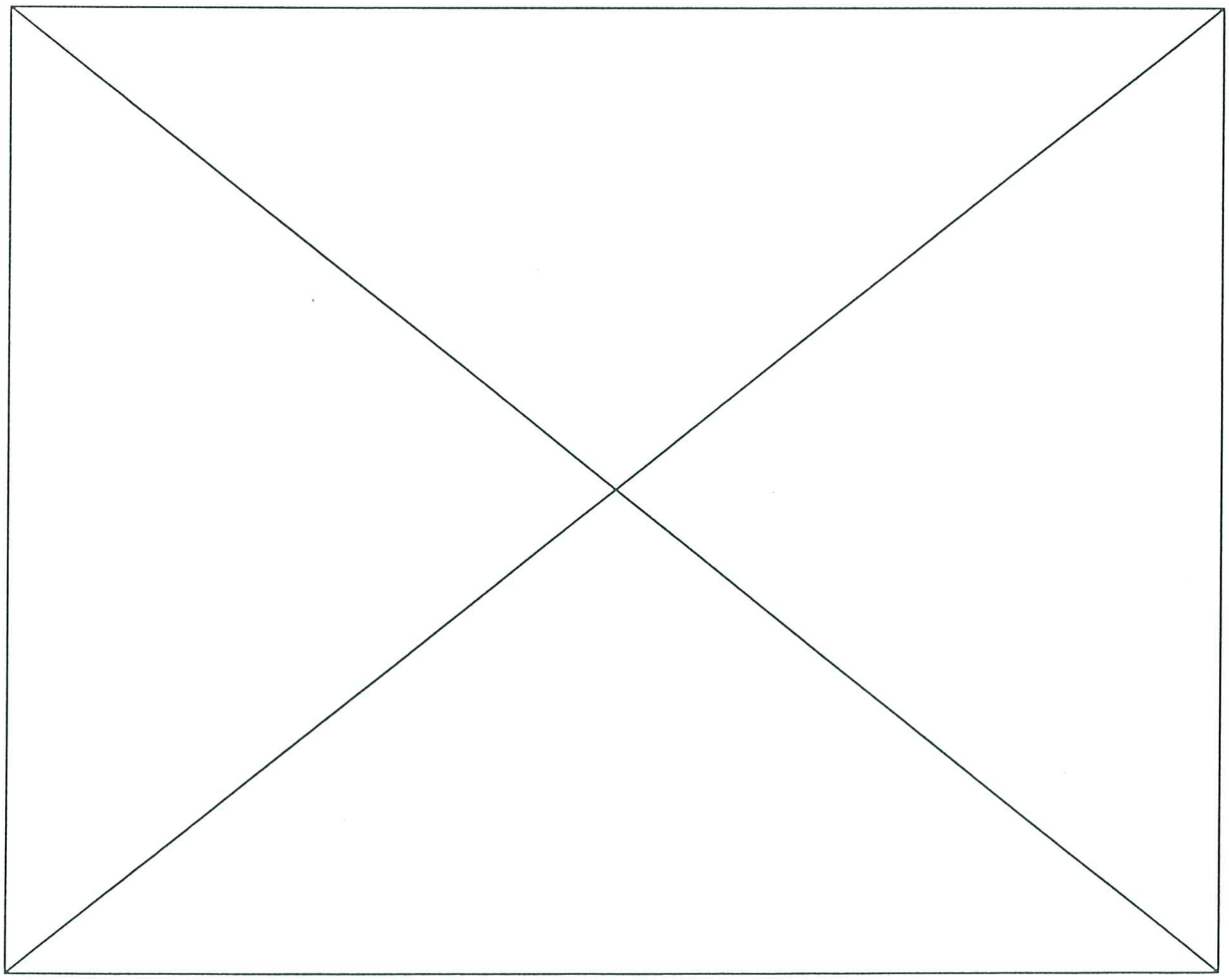
- The surface water temperature was 5.10°C.

MD 99-2229

lat. : 59°05'62N long. : 053°03'38 W

07 july 1999 Core length : 36.28 m Water depth : 3400 m





Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	188	GMT time:	18h47
Latitude:	59°05.62N	Longitude:	053°03.38W
Water depth:	3400 m	Location:	Braid Plain, NAMOC

Core number: MD 99-2229	Corer length:	41.51 m
	Apparent penetration:	36.00 m
	Core length:	36.28 m

Observations

Corer condition:
Good.

Core condition:
A joint in the PVC liner broke when retrieving the core from the barrels, but all the sediment was recovered.

Sections and sampling

Number of sections recovered and conditions:
Section I is in two parts, Ia (0-15cm) and Ib (15-150cm). The bottom 50 cm of section XII has high water content. There are XXV sections, the last one measuring 28 cm.

Onboard sampling and post cruise curation:
- The core was not split onboard. Every section was waxed at both end to avoid oxydation of organic matter. The core will be curated at AGC-BIO.
- Several bags of sediment were recovered: 1 core catcher, 1 core cutter.

Summary of physical and sedimentological observations

- Core is moderately disturbed as shown by bowed contacts and voids down to 23 m and liquefied sandy beds.
- This core is characterized by thick intervals of structureless (except colour banding) clayey silt and silty clay, interbedded with sandier intervals showing successions tens of centimetres thick of sharp-based structureless sandy mud, laminated very fine sand to silt, and bioturbated clayey silt. Some of these sequences are siliciclastic, whereas others are formed mainly of detrital carbonate detritus. Biogenic silica is common; forams and nannofossils are minor.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Generally low magnetic susceptibility values are observed, ranging from about 50 to 100 x 10^{-5} SI units, punctuated by intervals of much greater magnetic susceptibilities with values greater than 200 x 10^{-5} SI and as high as 600 x 10^{-5} SI. Bulk density values for most intervals vary from about 1.8 to 2.05 Mg/m^3 interspersed with low density intervals of less than 1.6 Mg/m^3. Due to core deformation , accurate P-wave velocities could not be determined through the entire core and the measured values range from about 1475 to 1600 m/sec.

Julian day:	189	GMT time:	03h17
Latitude:	59°05.35N	Longitude:	052°48.84W
Water depth:	3430 m	Location:	Braid Plain 2, NAMOC

Core number:	MD 99-2230	Corer length:	41.51 m
		Apparent penetration:	------- m
		Core length:	34.76 m

Observations

Corer condition:

Serious problem with the winch when pulling up the core, it took 4 hours to bring it back on the deck. Corer in good condition.

Core condition:

Good.

Sections and sampling

Number of sections recovered and conditions:

Top of section V fell off, it was recovered and bagged. Very liquid in between sections X - XI and XI - XII. Sections I to IV, VI to IX and XII to XXIV are in good condition. There are XXIV sections.

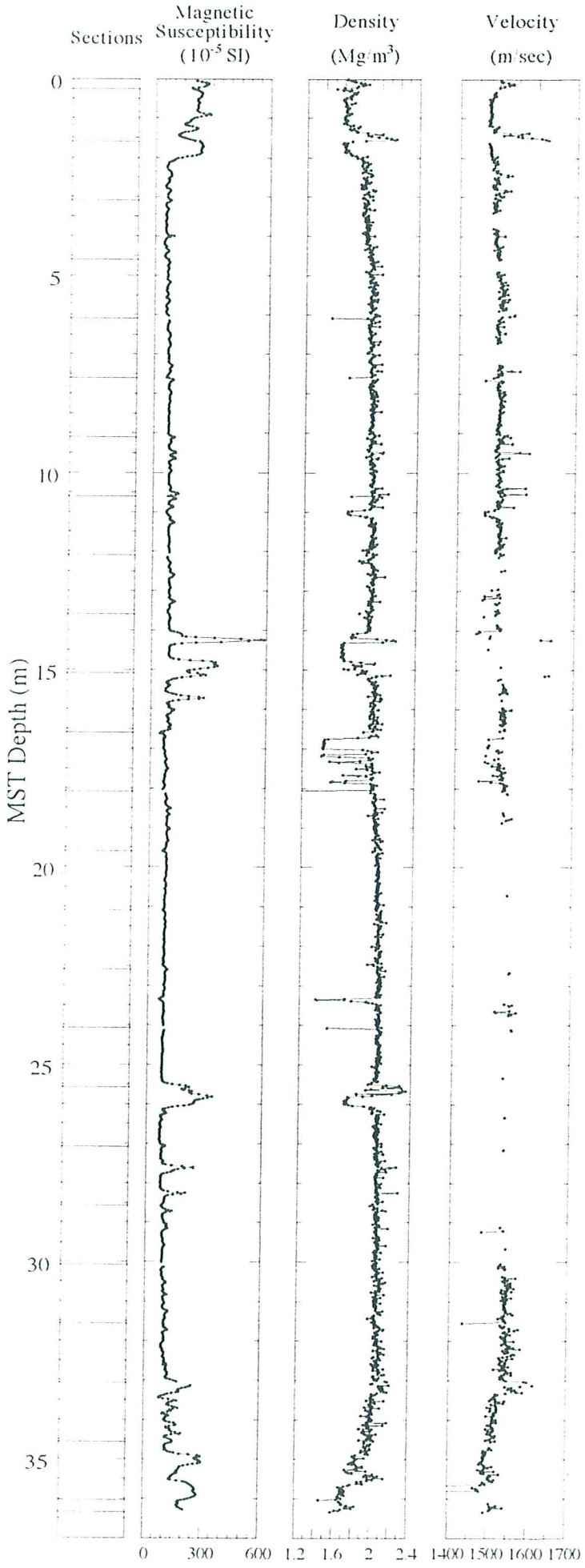
Onboard sampling and post cruise curation:

- The core was split onboard and described. No sampling was done, both archive and working halves will be curated at AGC-BIO.
- Several bags of samples were recovered: 1 core catcher, 1 core cutter, 1 for top of section XV (very soupy ~ 2120-2144 cm), 2 from section X (very soupy, probably injected from below, 1350-1384 cm and 1395-2144 cm), 1 for 1611-1650 cm (very soupy, probably injected from below) and 1 from section XV (very soupy, probably injected from below 2120-2144). They will be curated at AGC-BIO.

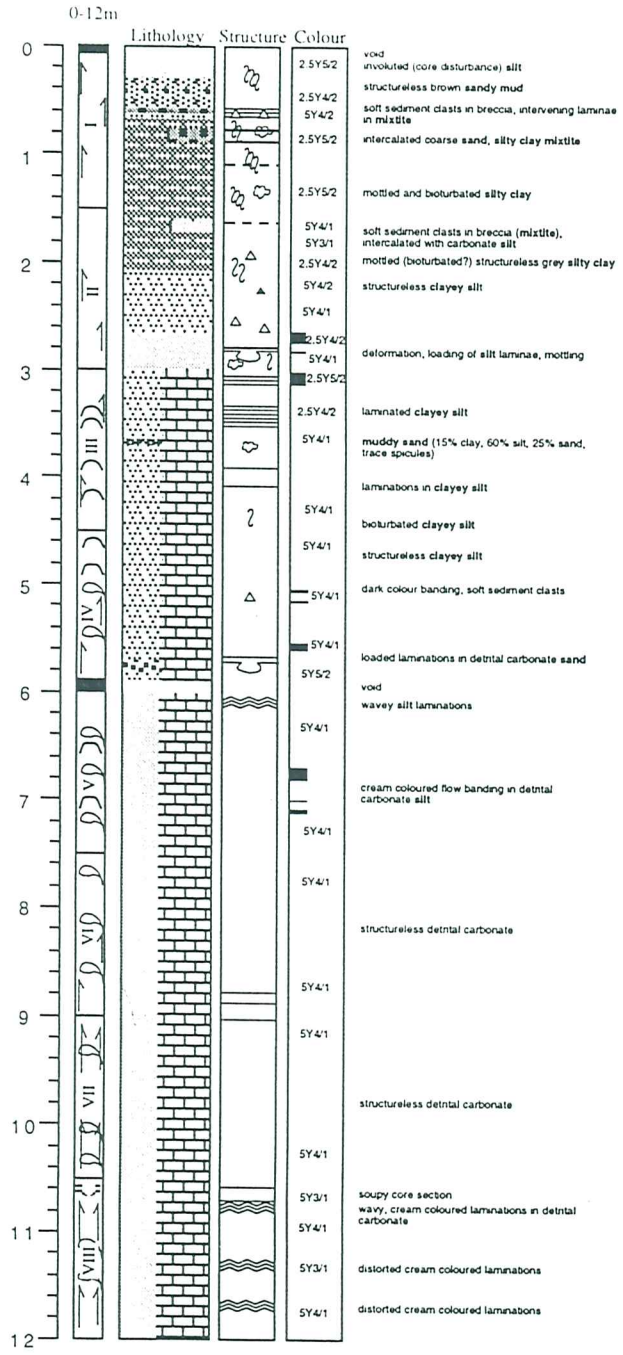
Summary of physical and sedimentological observations

- Very disturbed by coring, with mud injection into the sediment from the edges of the core down to 24m.
- The core is dominated by thick intervals of silty clay and clayey silt rich in detrital carbonate. These intervals mainly occurs as apparently structureless deposits, but locally show thin, irregularly spaced silt laminae. Repetitive, more siliciclastic sequences occur deeper in the core. They are marked by strikingcolour changes, several sharpto erosional bed bases, graded bedding from sand or sandy mud to clay, and burrow mottling at bed tops.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values occur in two modes those that vary from 50 to 150 x 10^{-5} SI and those varying from 100 to 400 x 10^{-5} SI. Bulk density values also show 2 modes, one ranging from1.85 to 2.0 Mg/m^3 and one from 1.5 to 1.7 Mg/m^3. Due to core deformation, accurate P-wave measurements could not be taken for the entire length of the entire core. P-wave velocity values observed range from about 1475 to 1630 m/sec.
- **NB** spectrophotometer l* values show a distinct shift in values from section IX to XV. These sections were dried with a hair dryer prior to the measurements being made.

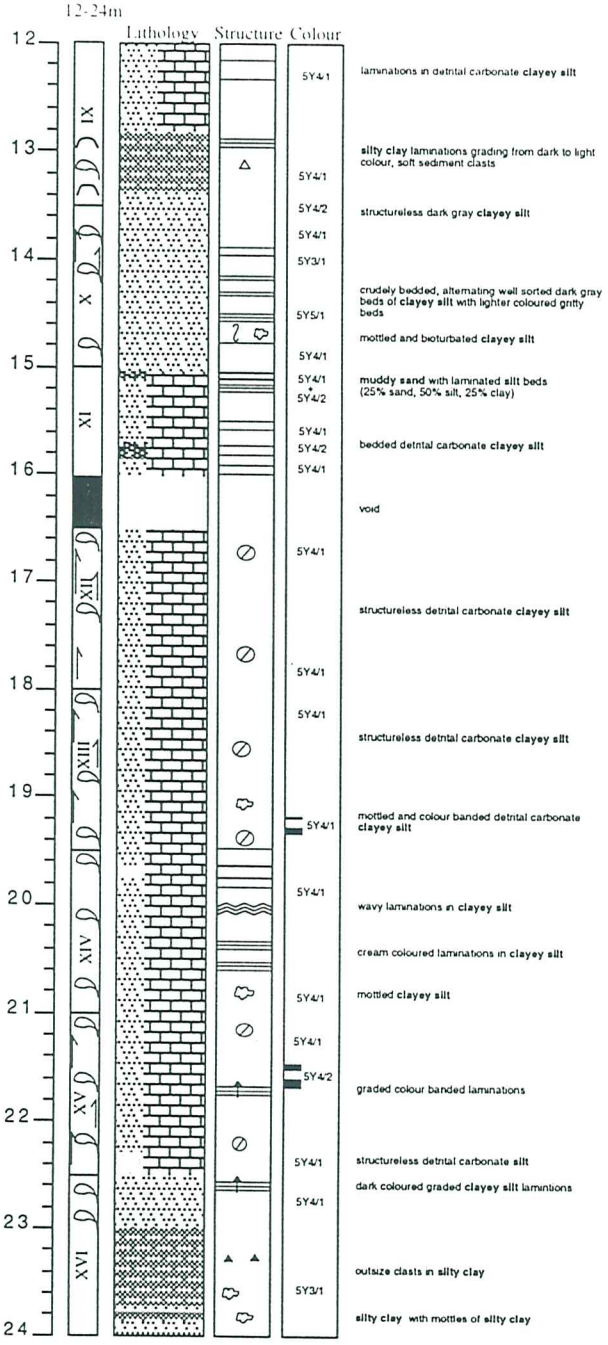
MD99 2229


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
MST Depth (m)
0
5
10
15
20
25
30
35
0
300
600
1.2
1.6
2
2.4
1400
1500
1600
1700

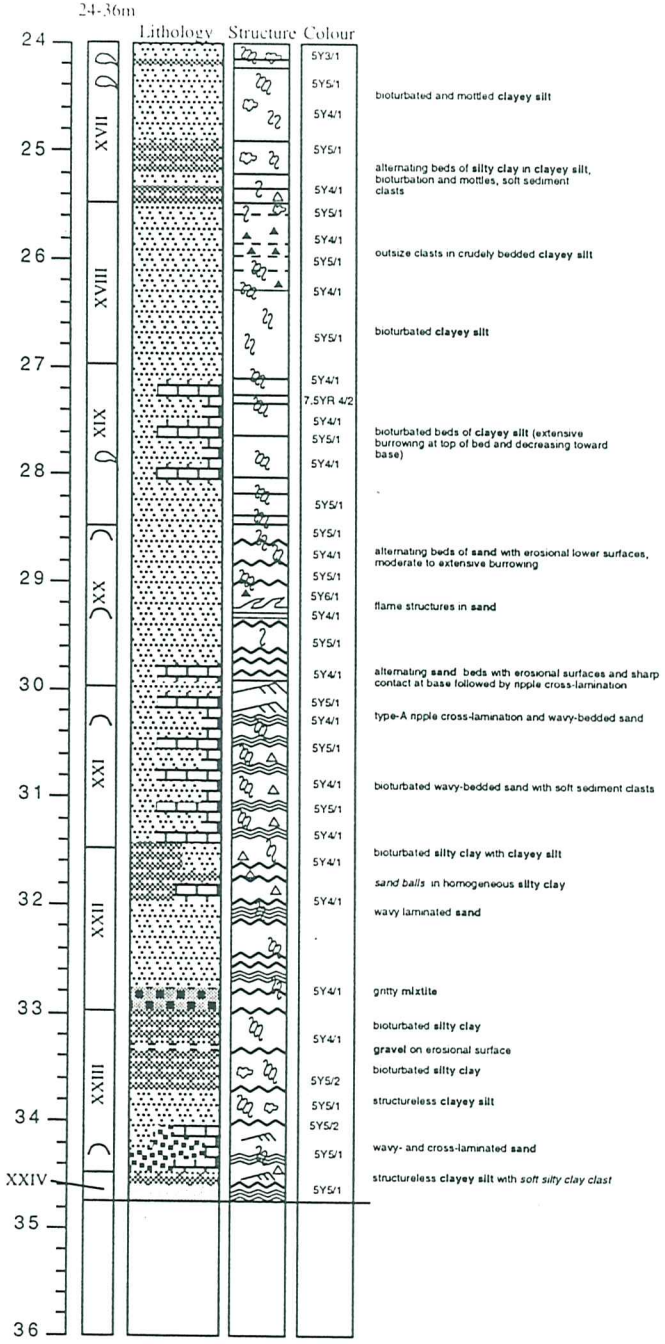
MD 99-2230 NAMOC Braid Plain (3430 m)



MD 99-2230



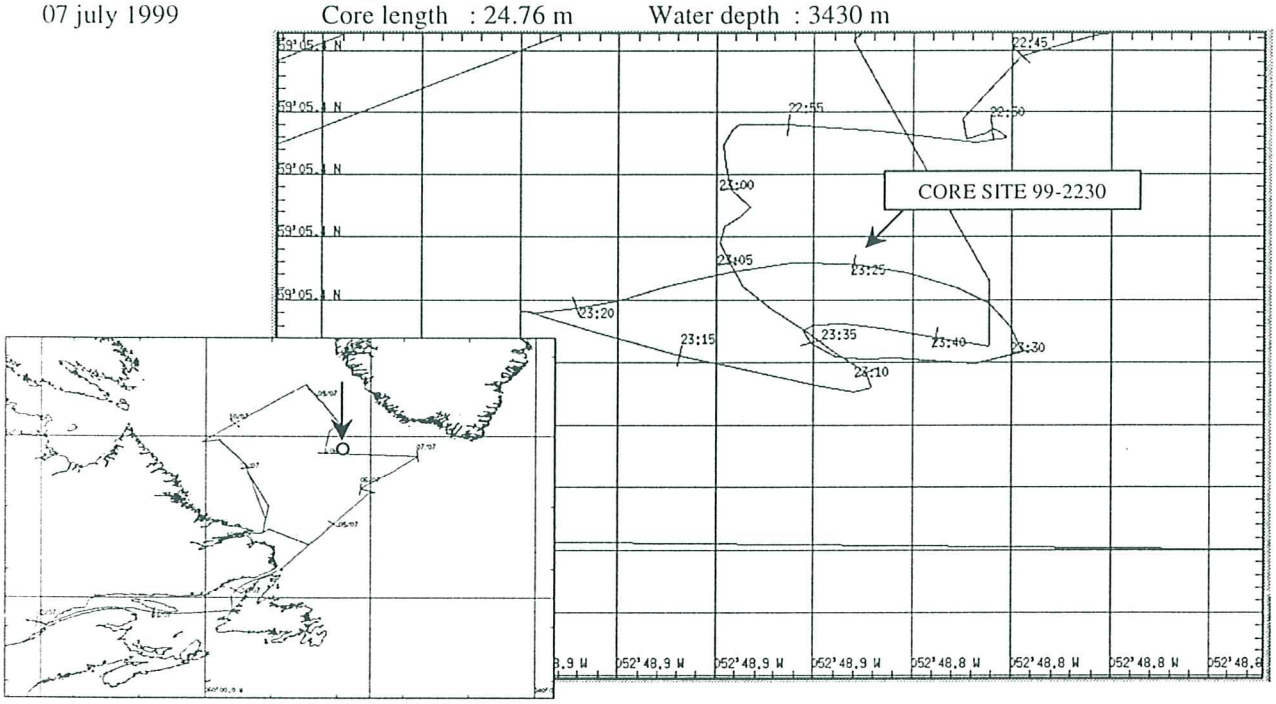
MD 99-2230

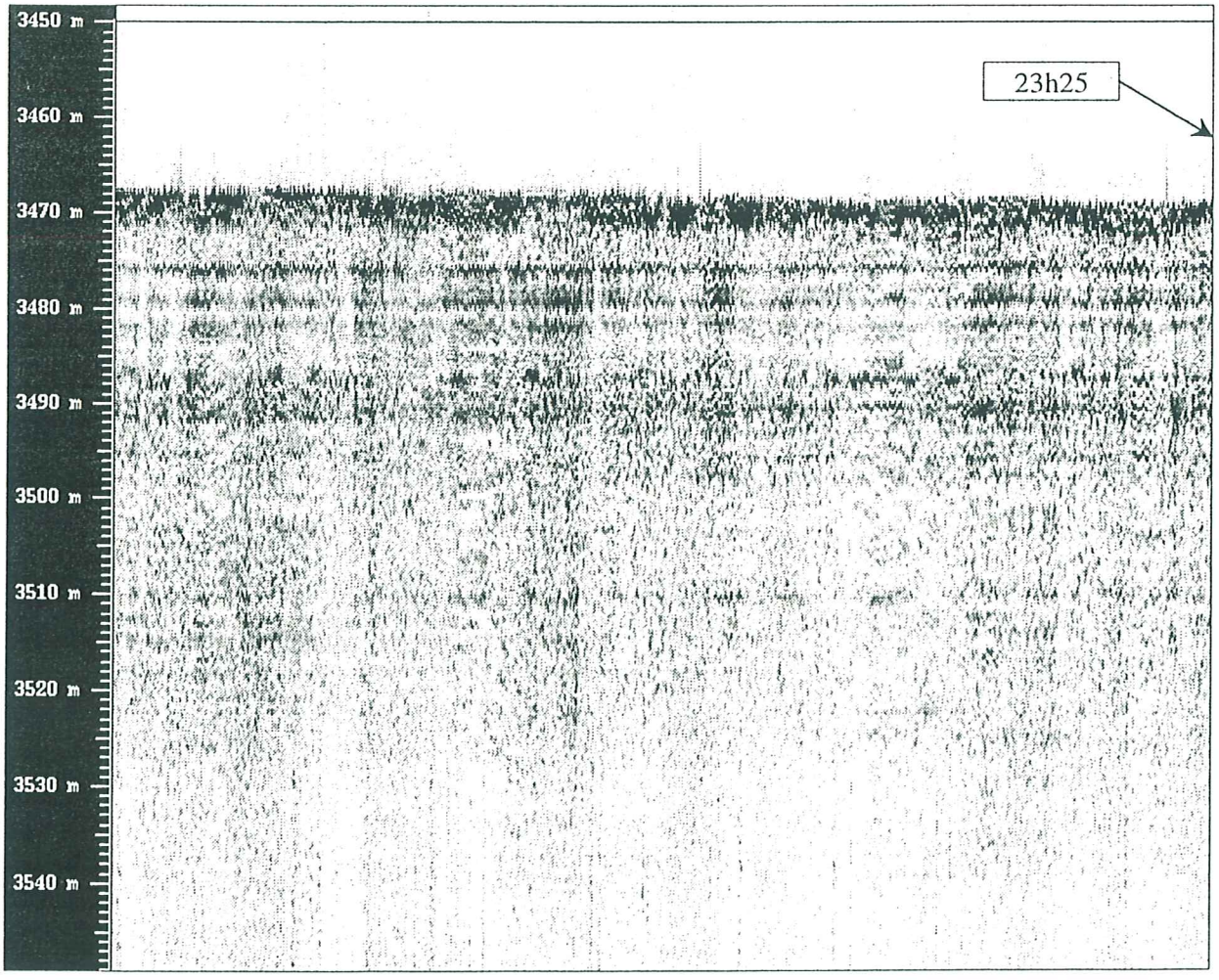


MD 99-2230

lat. : 59°05'35N long. : 052°42'24 W

07 july 1999 Core length : 24.76 m Water depth : 3430 m





Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	189	GMT time:	14h49
Latitude:	60°34.72N	Longitude:	051°48.49W
Water depth:	3430 m	Location:	Southwest Greenland Rise

Core number:	MD 99-2231	Corer length:	41.51 m
		Apparent penetration:	36.00 m
		Core length:	34.29 m

Observations

Corer condition:

Good.

Core condition:

Core liner cracked from side to side on sections X, XI, XII, XV and XVIII. All other sections in good condition.

Sections and sampling

Number of sections recovered and conditions:

There was sediment above the piston, it has been recovered and bagged. Very liquid between sections XI and XII, some foam was placed in to fill the void. Sections I to X, XII to XXIII are in good conditions. There are XXIII sections, the last one is 129 cm.

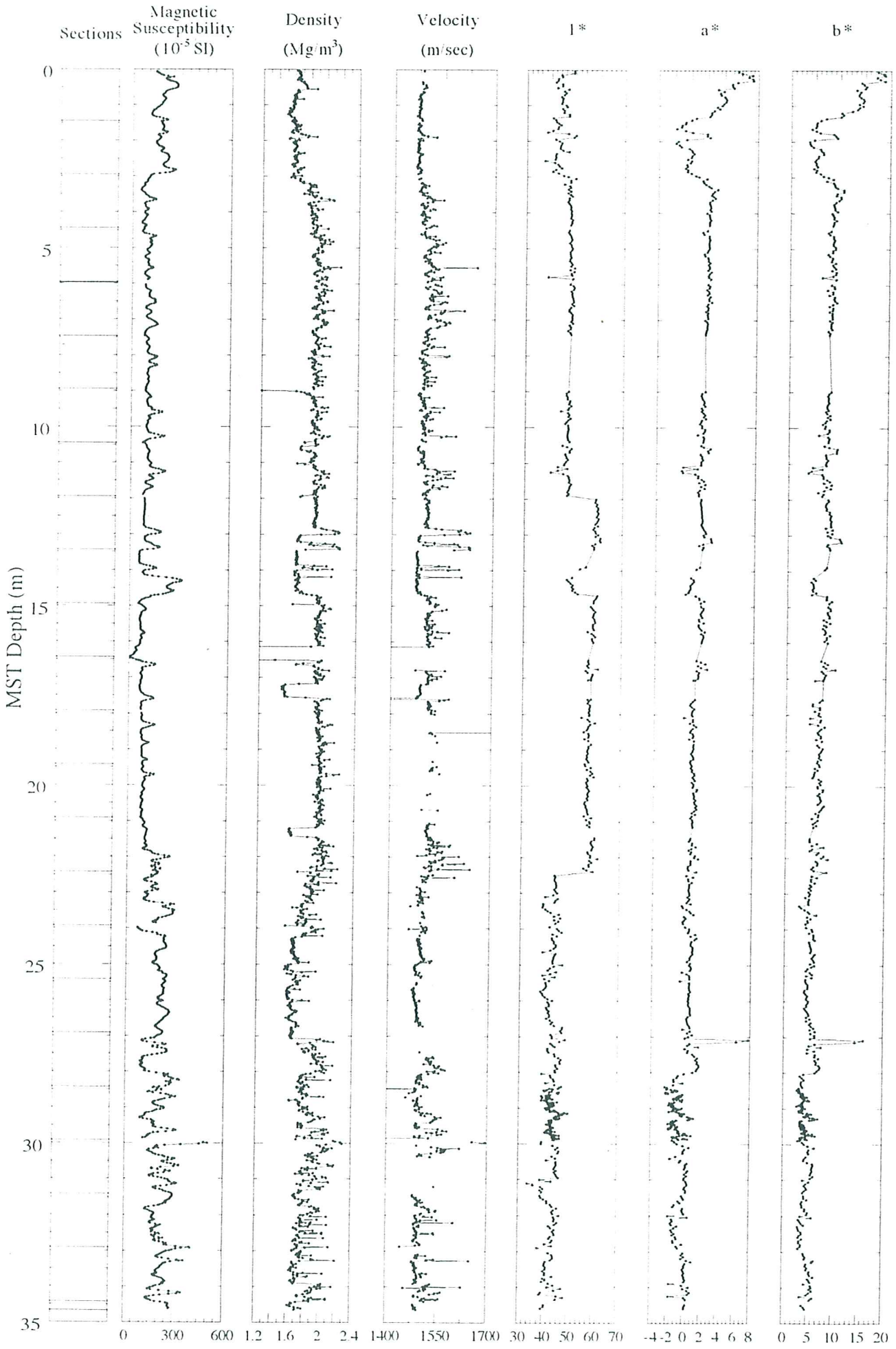
Onboard sampling and post cruise curation:

- The core was split onboard and described. No sampling was done, both archive and working halves will be curated at Gif-Sur-Yvette.
- Several bags of sediment were recovered: 1 for the sediment found above the piston, 1 core catcher, 1 core cutter. They will be curated at Gif-sur-Yvette.

Summary of physical and sedimentological observations

- Core is moderately disturbed as shown by bowed contacts and voids down to 23 m and liquefied sandy beds.
- This core is characterized by thick intervals of structureless (except colour banding) clayey silt and silty clay, interbedded with sandier intervals showing successions tens of centimetres thick of sharp-based structureless sandy mud, laminated very fine sand to silt, and bioturbated clayey silt. Most of these sequences are siliciclastic, a few thin intervals are formed mainly of detrital carbonate detritus. Biogenic silica is common; forams and nannofossils are minor.
- ♦ MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Strong but variable magnetic susceptibility values are observed ranging from 200 to 800 x 10^{-5} SI units. Bulk density values vary from about 1.5 to 2.2 Mg/m^3 and p-wave velocity values range from about 1500 to 1750 m/sec.

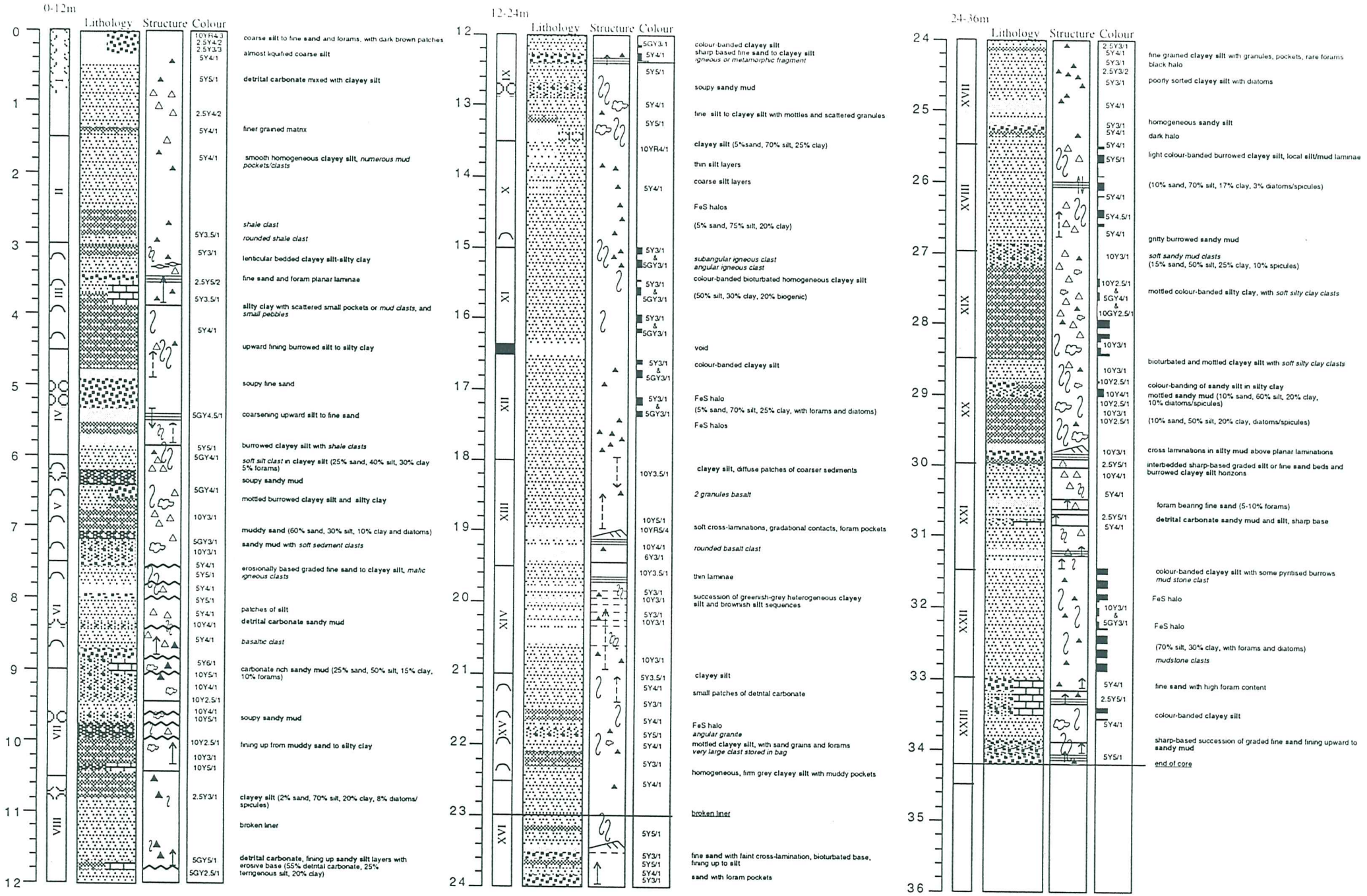
MD99 2230


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0 300 600
1.2 1.6 2 2.4
1400 1550 1700
30 40 50 60 70
-4 -2 0 2 4 6 8
0 5 10 15 20

MD 99-2231 SW Greenland Rise (3190 m)

MD 99-2231

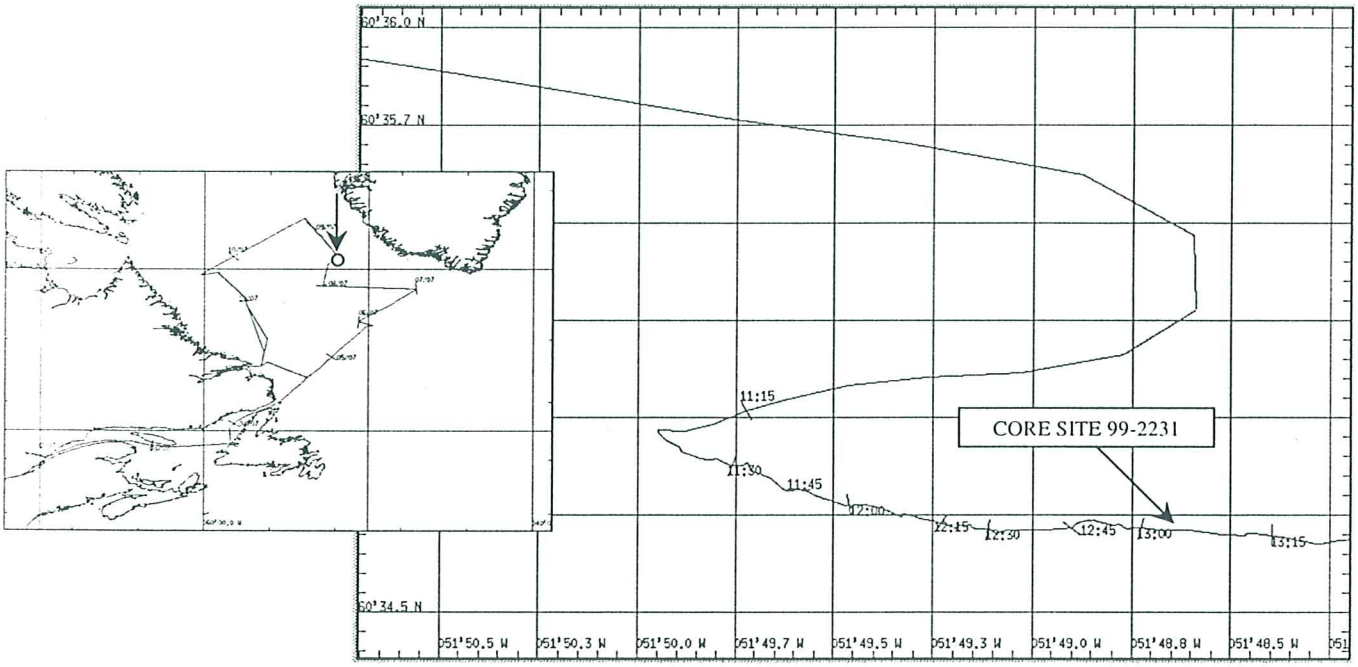
MD 99-2231

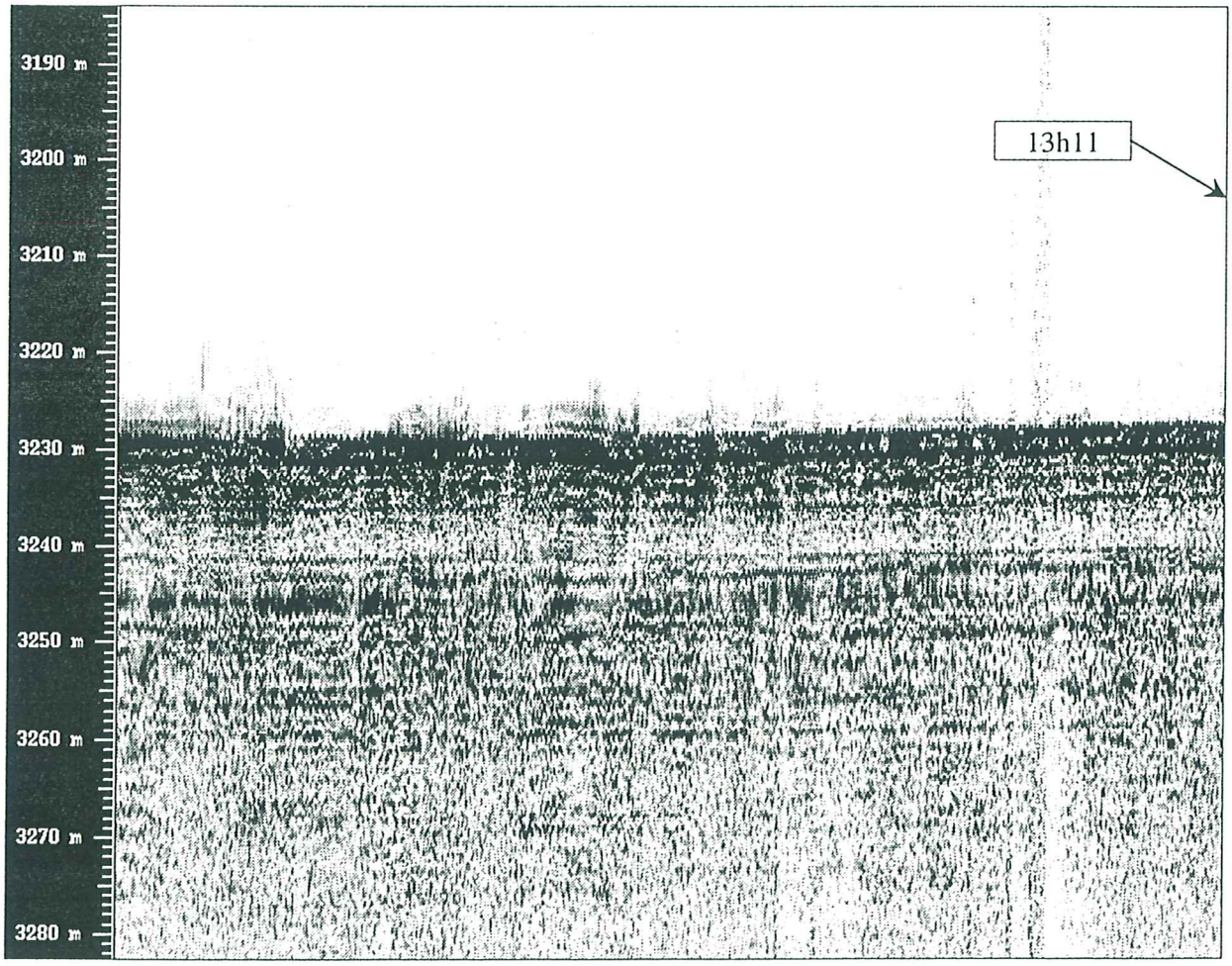


MD 99-2231

lat. : 60°34'72 N long. : 051°48'49 W

8 july 1999 Core length : 34.29 m Water depth : 3190 m





Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	190	GMT time:	07h55
Latitude:	62°38.99N	Longitude:	053°53.98W
Water depth:	2455 m	Location:	SW Greenland Rise

Core number:	MD 99-2232	Corer length:	41.51 m
		Apparent penetration:	36.00 m
		Core length:	30.32 m

Observations

Corer condition:

The core cutter was damaged, otherwise corer in good condition.

Core condition:

Core liner imploded above the free piston.

Sections and sampling

Number of sections recovered and conditions:

Some sediment fell from the top of section II and VI, both were bagged. Sections I, III to V and VII to XXI (base) are in good condition. There are XXI sections, the last one is 32 cm long.

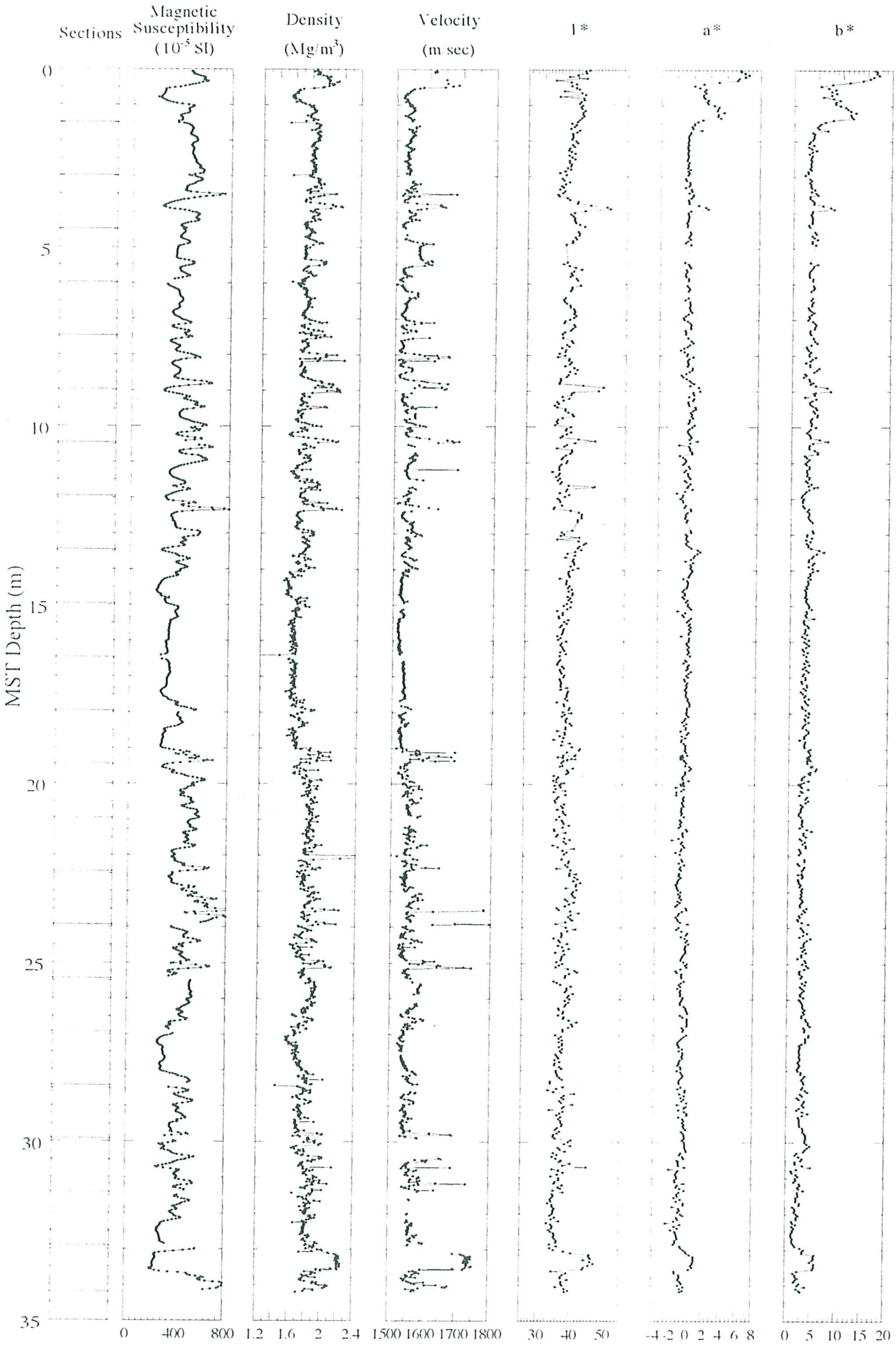
Onboard sampling and post cruise curation:

- The core was split onboard and described. Consolidation test were made on the first 10 sections. No sampling was done, both archive and working halves will be curated at Gif-sur-Yvette.
- Severals bags of sediments were recovered: 1 core cutter, 1 core catcher, 1 for the base of section I (150cm), 1 for the top of section XIII (1795-1802 cm) and 1 for section XX (2898-2933 cm).

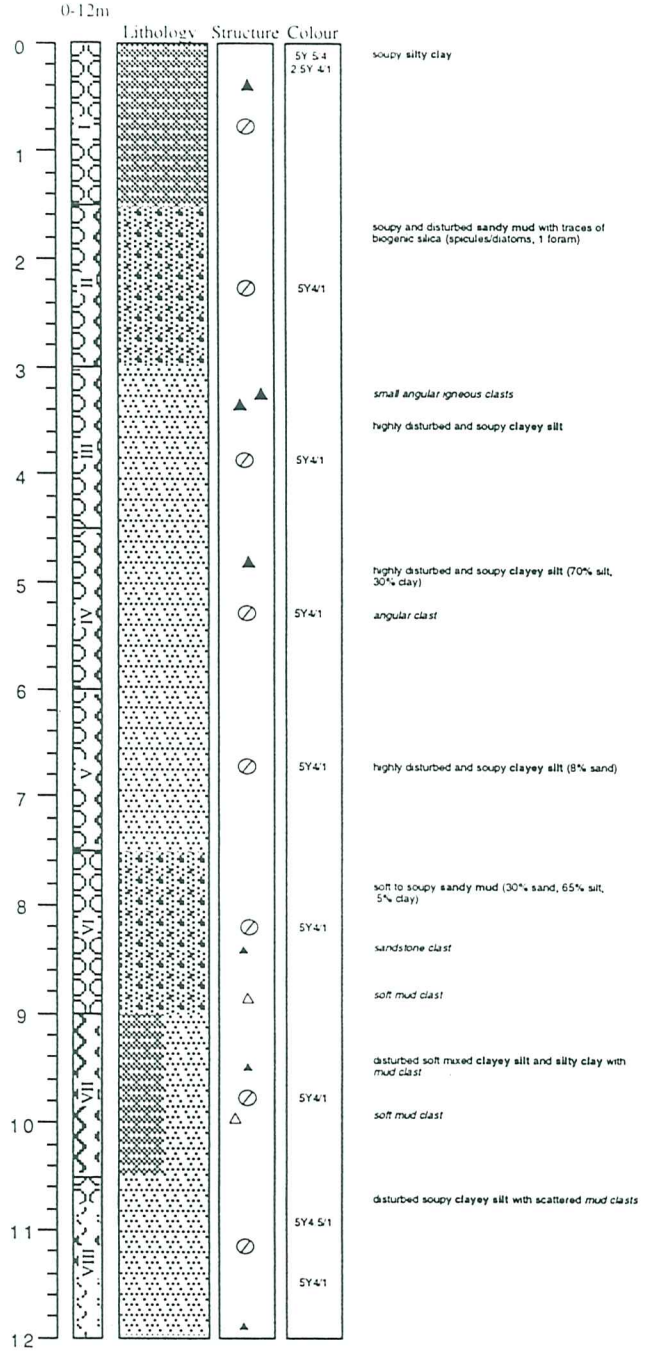
Summary of physical and sedimentological observations

- This core is very disturbed throughout and consists of apparently structureless silty clay, clayey silt, and sandy mud.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Strong magnetic susceptibility values are observed ranging between 200 to 500 x 10^{-5} SI units. Bulk density values range from about 1.6 to 2.0 Mg/m^3. P-wave velocity was measured for most of the core and values range from about 1475 to 1530 m/sec.

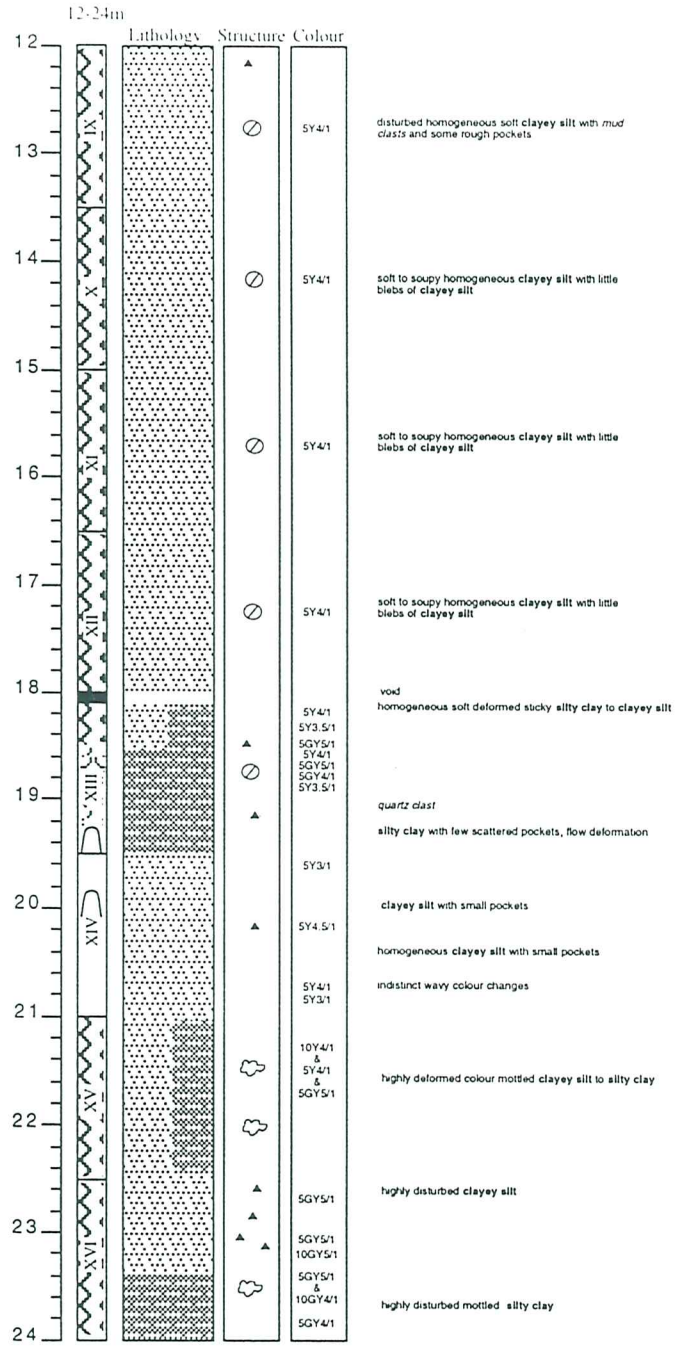
MD99 2231


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0 400 800
1.2 1.6 2 2.4
1500 1600 1700 1800
30 40 50
-4 -2 0 2 4 6 8
0 5 10 15 20

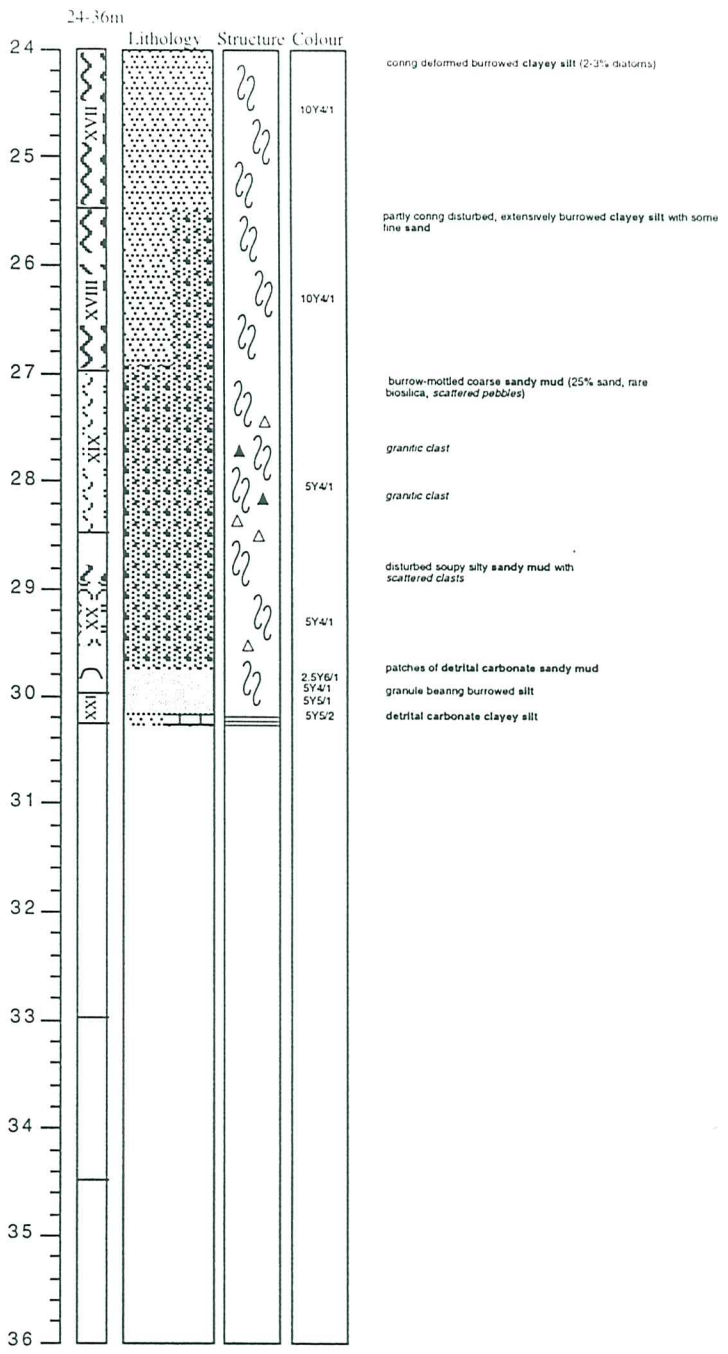
MD 99-2232 SW Greenland Rise (2455 m)



MD 99-2232



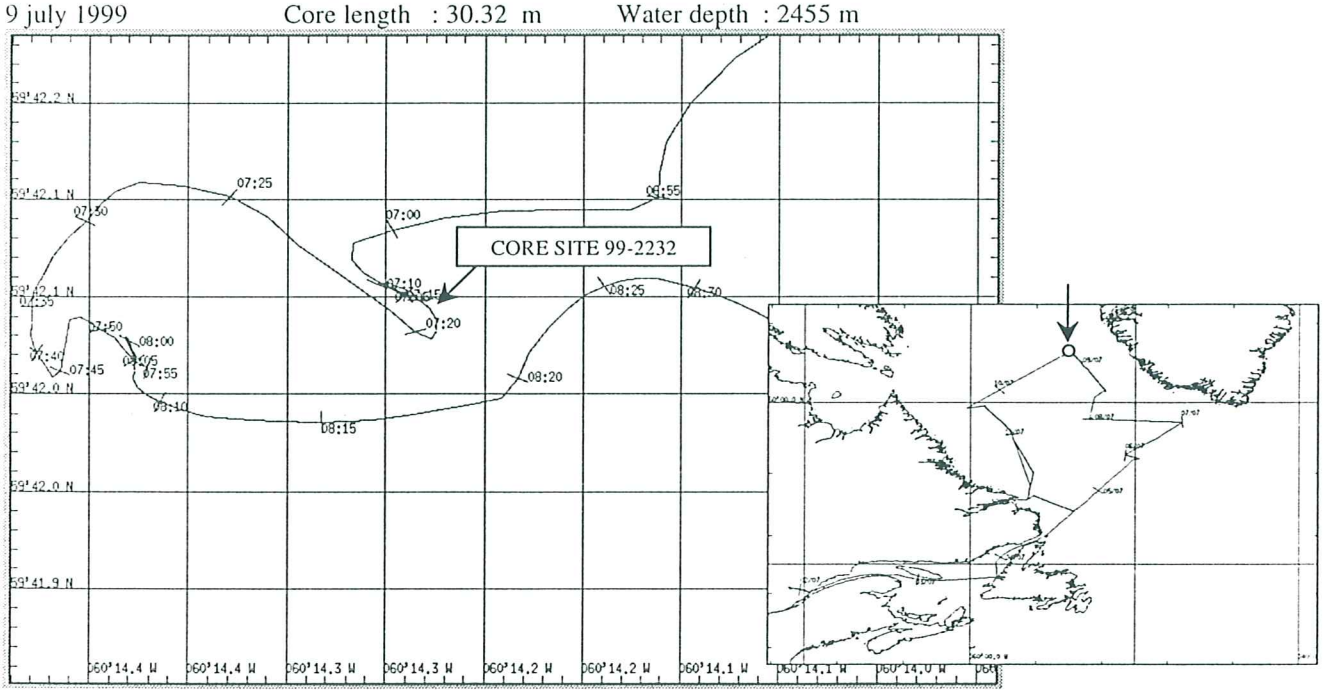
MD 99-2232



MD 99-2232

lat. : 62°38'99 N long. : 53°53'098 W

9 july 1999 Core length : 30.32 m Water depth : 2455 m



Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	190	GMT time:	08h31
Latitude:	62°39.86N	Longitude:	053°54.58W
Water depth:	2493 m	Location:	SW Greenland rise
CTD profil:	0 - 200 m		

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 15 m (maximum fluorescence) and below the surface.

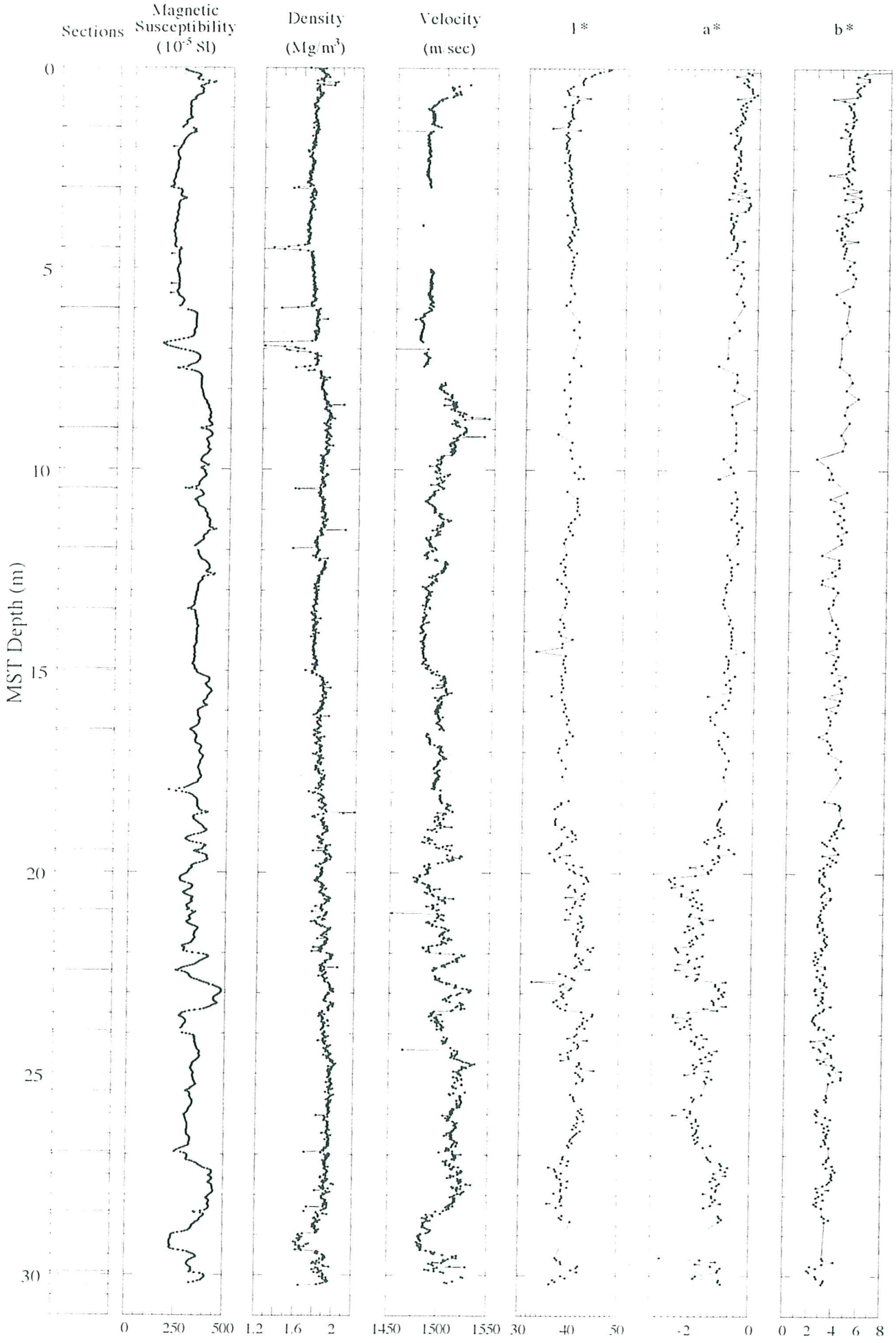
Sampling

The water samples will be analysed for alkenone.

Summary of CTD profil

- The surface water temperature was 4.22°C.

MD99 2232


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
0 250 500
1.2 1.6 2
1450 1500 1550
30 40 50
-2 0
0 2 4 6 8

SITE 13 **Rosette and CTD cast 0 - 2431 m**

Julian day:	190	GMT time:	04h21
Latitude:	62°38.90N	Longitude:	053°54.24W
Water depth:	2476 m	Location:	SW Greenland rise
CTD profil:	0 - 2431 m		

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

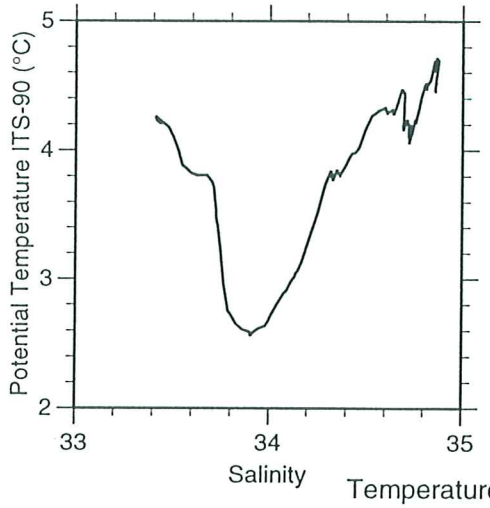
Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 2430 m, 2250 m, 1950 m, 1700 m, 1000 m, 400 m, 180 m, 40 m, 15 m.

Sampling

- The water samples will be analysed for salinity (CTD calibration), Iodine 129 and Neodinium.

Summary of CTD profil

- The surface water temperature was 4.27°C
- A pinger was used to locate the rosette at all time and the profil stopped at 30 m from the bottom.



CTD
Station 13

SW Greenland Rise

July 9, 1999

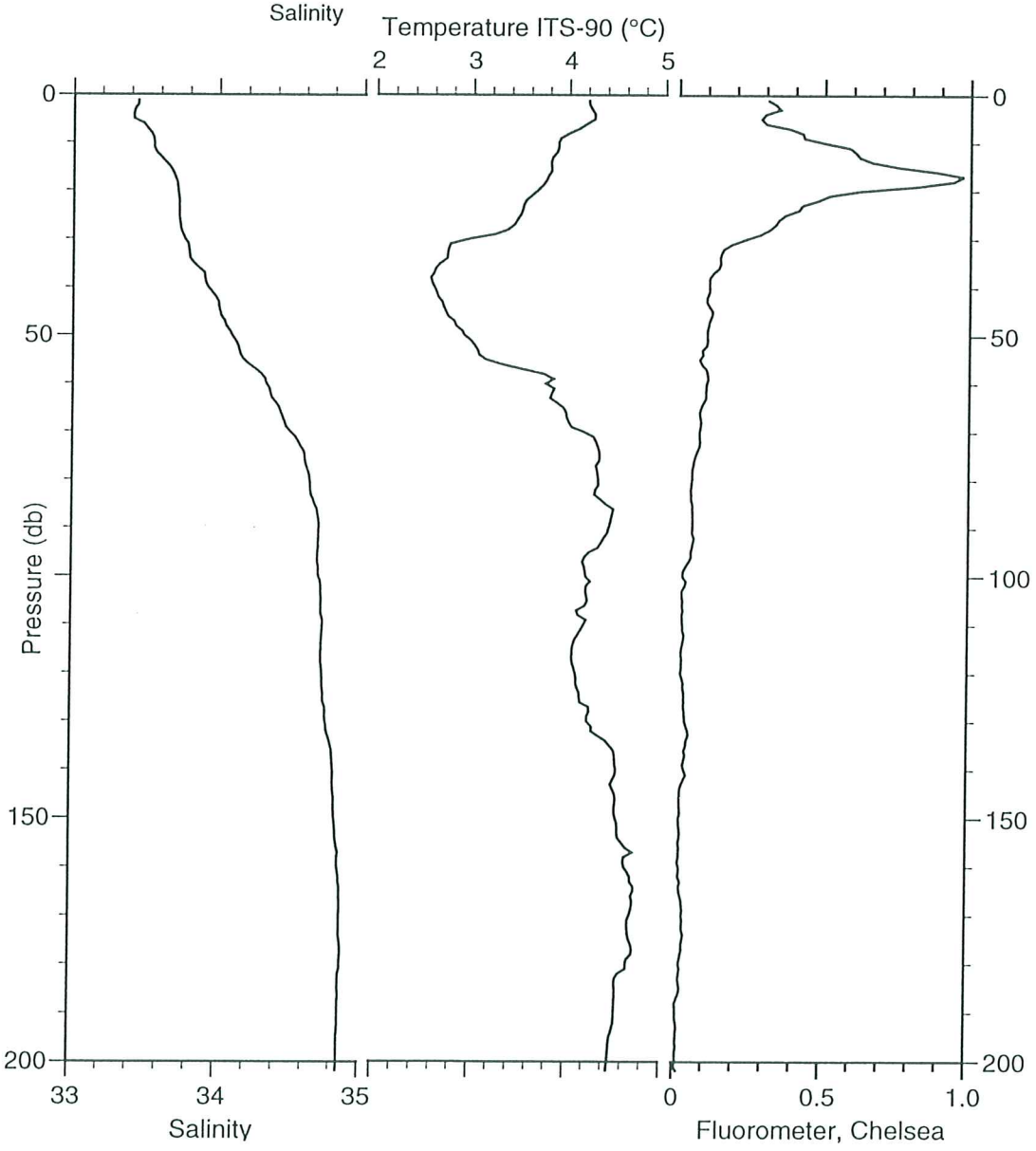
Latitude : 62°39.86 N

Longitude : 053°54.58 W

Water depth : 2493 m

Water profile : 0 - 200 m

File: **iM5005**



SITE 14

Julian day:	191	GMT time:	09h00
Latitude:	59°42.01N	Longitude:	060°14.28W
Water depth:	1120 m	Location:	Saglek Bank, upper slope

Core number:	Corer length:	41.51 m
	Apparent penetration:	------- m
	Core length:	------- m

Observations

Corer condition:

One of the corer barrel was broken near the weight, several barrels were lost.

Core condition:

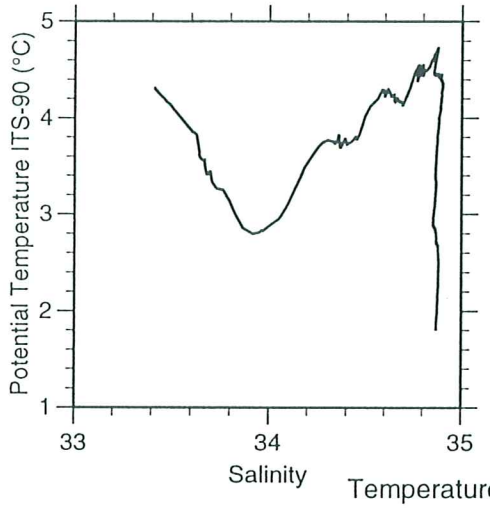
No core.

Sections and sampling

Number of sections recovered and conditions:

Onboard sampling and post cruise curation:

Summary of physical and sedimentological observations



CTD
Station 13

SW Greenland Rise

July 8, 1999

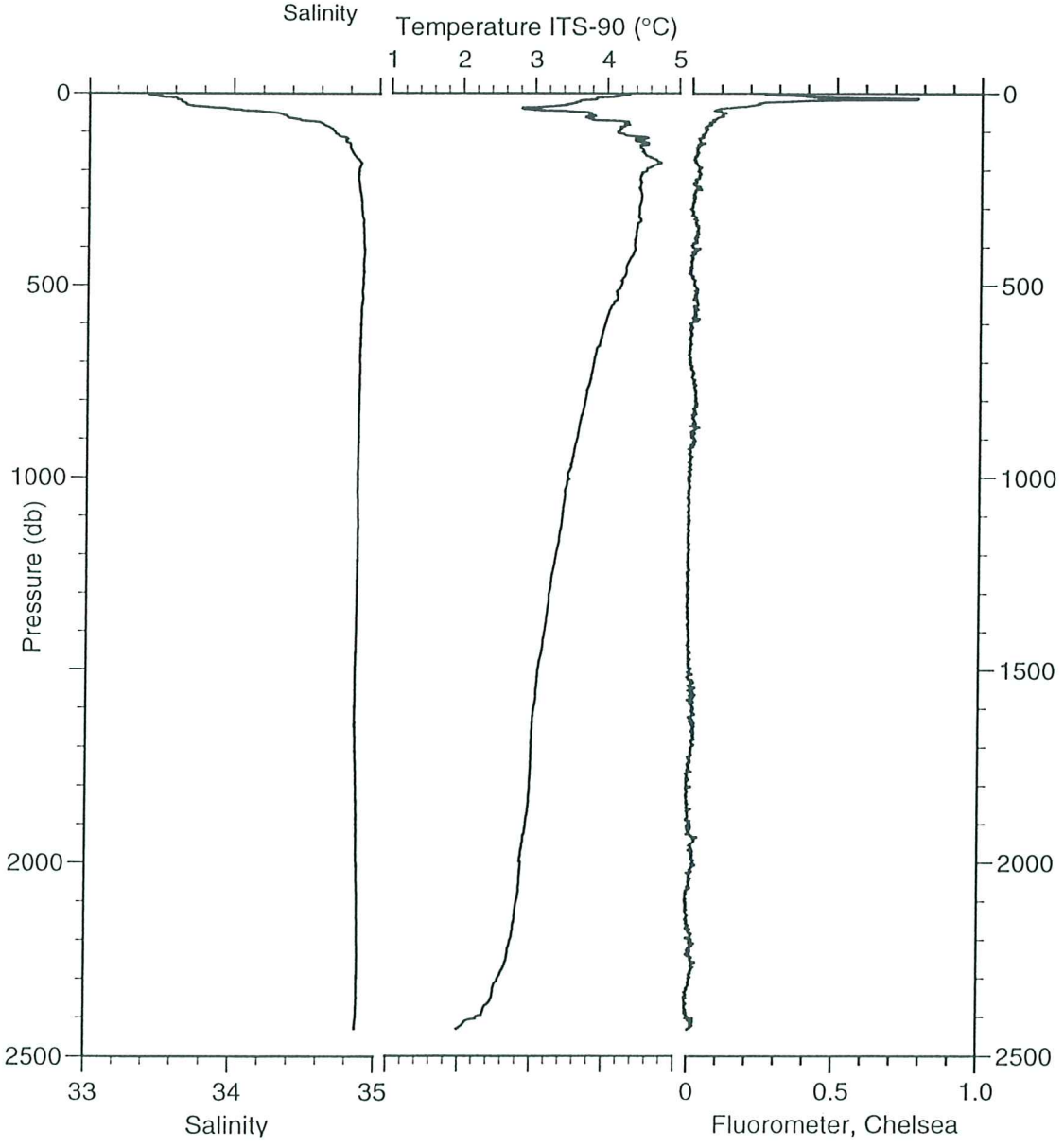
Latitude : 62°38.90 N

Longitude : 053°54.24 W

Water depth : 2476 m

Water profile : 0 - 2430 m

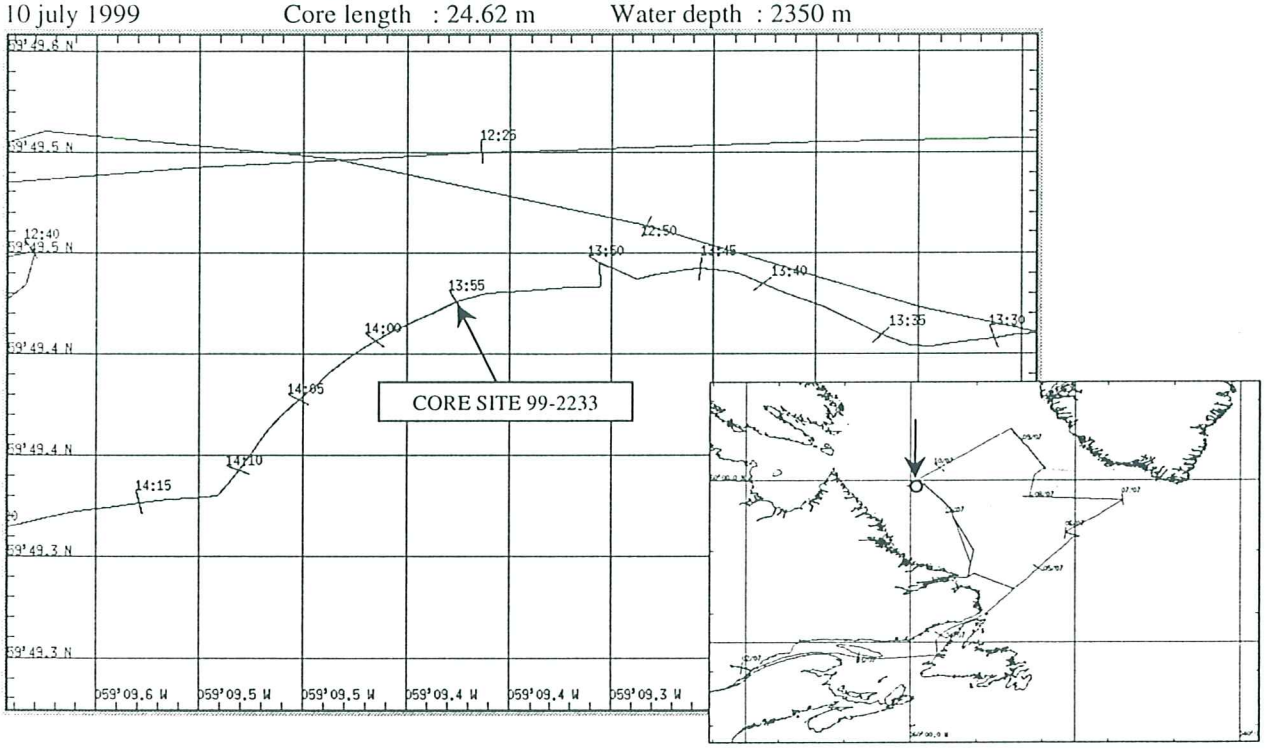
File: **iM5004**

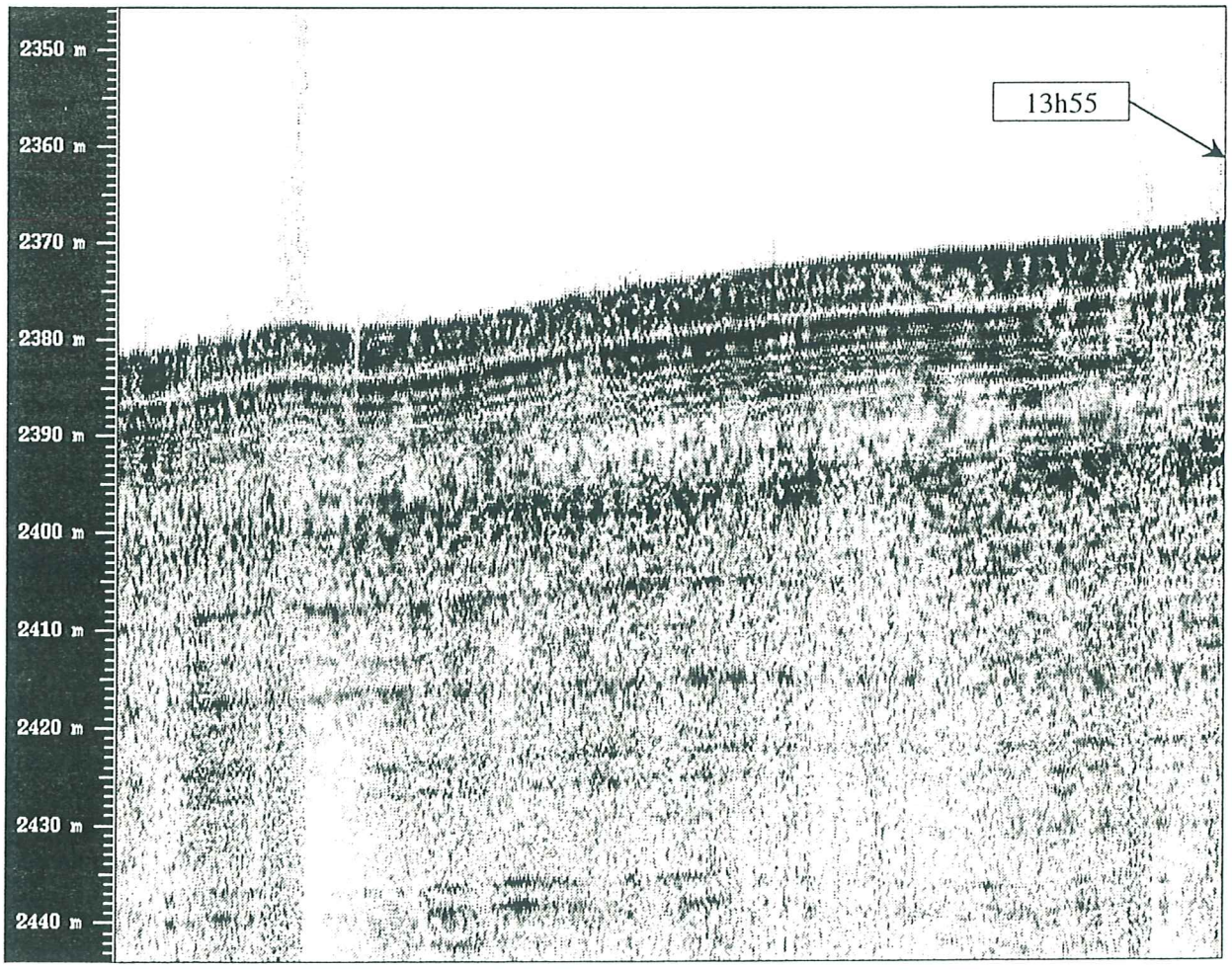


MD 99-2233

lat. : 59°49'46 N long. : 059°09'35 W

10 july 1999 Core length : 24.62 m Water depth : 2350 m





Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	191	GMT time:	15h10
Latitude:	59°49.46N	Longitude:	059°09.35W
Water depth:	2350 m	Location:	Saglek Bank, lower slope

Core number:	MD 99-2233	Corer length:	31.00 m
		Apparent penetration:	27.00 m
		Core length:	24.62 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

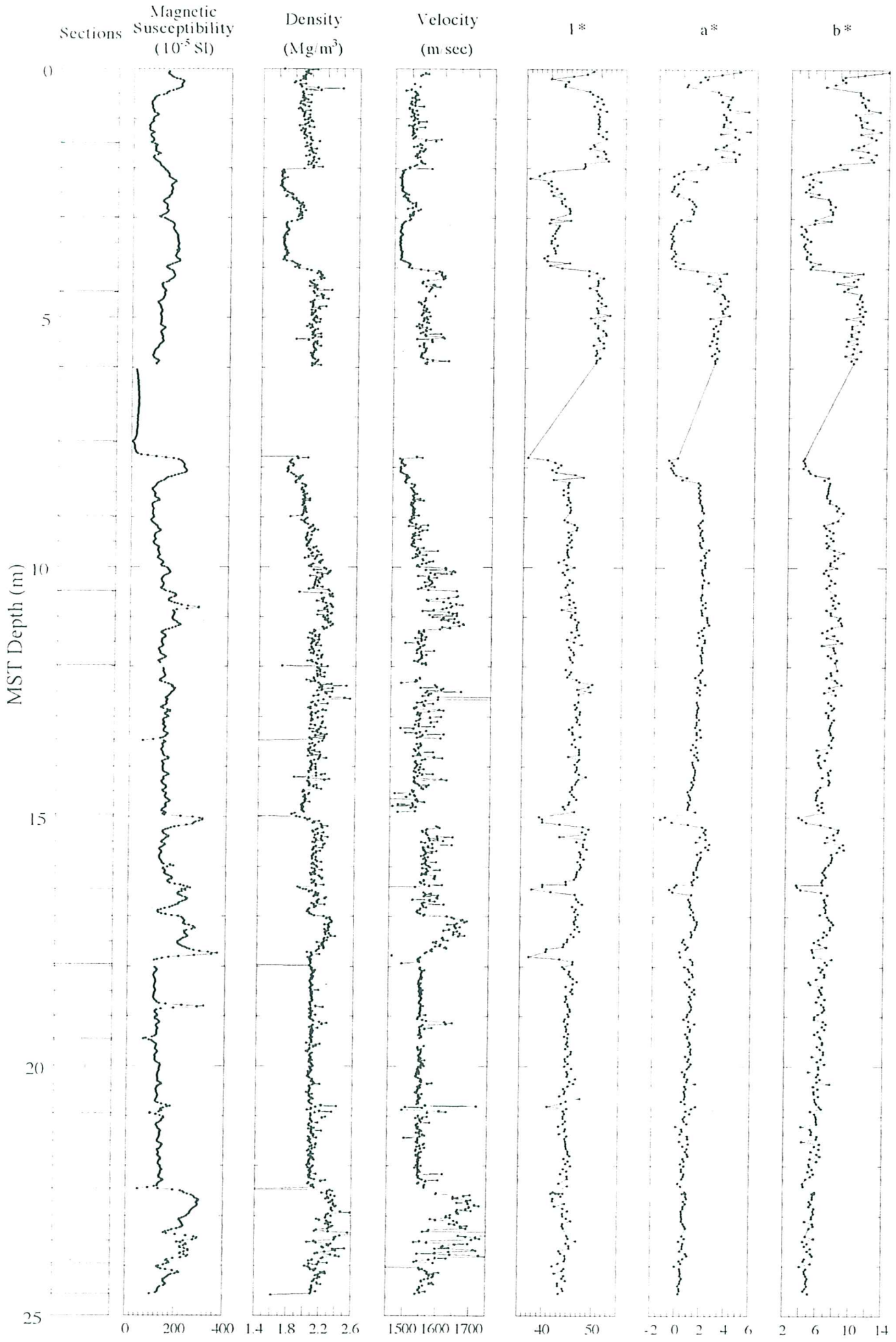
Number of sections recovered and conditions:
Section V and the top 15 cm of section VI are water only. Sections I to IV and VII to XVII are in good condition. There are XVII sections, the last one is 62 cm long.

Onboard sampling and post cruise curation:
- The core was split and described onboard, no sampling was done. The core will be curated at AGC-BIO.
- Several samples were recovered: 1 top, core cutter, 1 core catcher, 1 from top of section V. These bags will be curated at AGC-BIO.

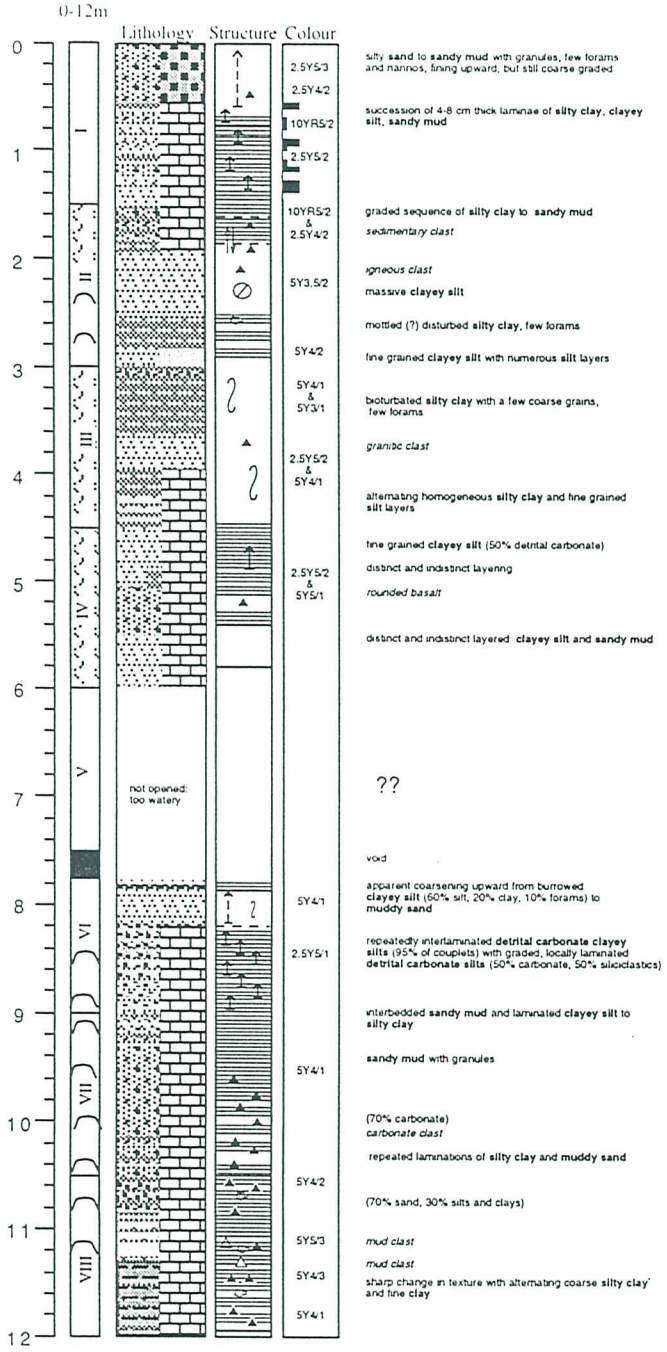
Summary of physical and sedimentological observations

- Liner was partially empty in the upper 8 m; otherwise, bedding is gently bowed.
- Except for two structureless intervals rich in biogenic carbonate (0-0.40 m, sandy mud; 2.00-4.00 m, silty clay), the core consists of interbedded muddy sand (locally crudely laminated with mafic-igneous and sedimentary rock granules), and detrital-carbonate-rich sequences of laminated silt and/or clayey silt and structureless silty clay.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 70 to 300 x 10^{-5} SI units. Bulk density values vary from about 1.6 to 2.3 Mg/m^3. P-wave velocity was measured for most of the core and values range from about 1450 to 1700 m/sec.

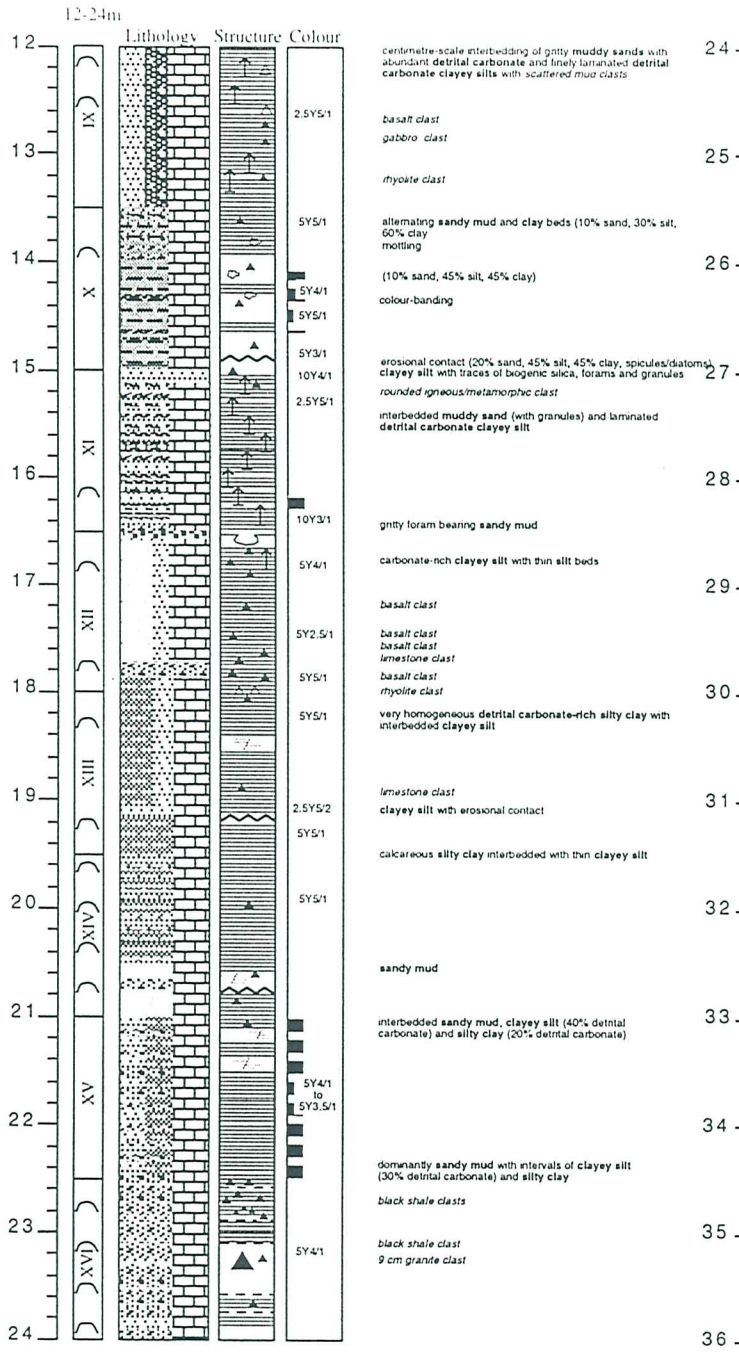
MD99 2233


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
0
200
400
1.4
1.8
2.2
2.6
1500
1600
1700
40
50
-2
0
2
4
6
2
6
10
14

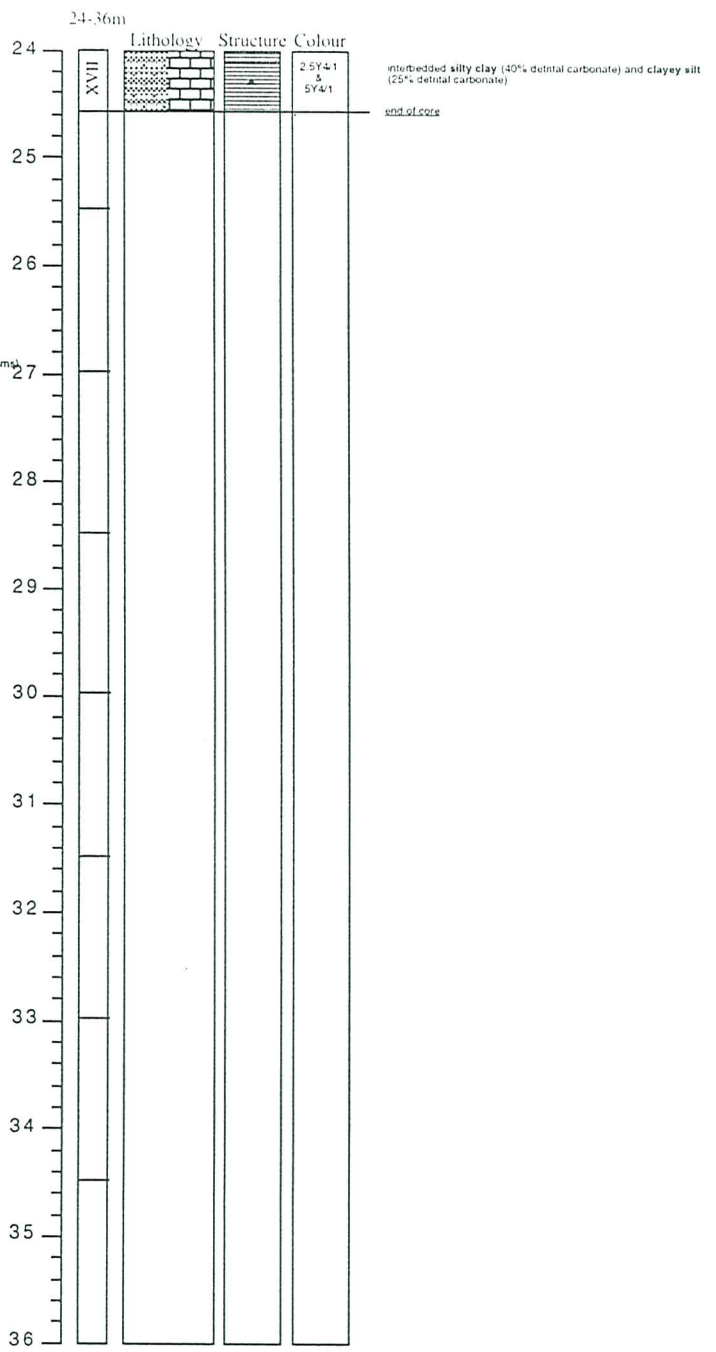
MD 99-2233 Saglek Lower Slope (2350 m)



MD 99-2233



MD 99-2233



Julian day:	193	GMT time:	00h45
Latitude:	53°50.81N	Longitude:	059°03.05W
Water depth:	230 m	Location:	Lake Melville

Core number:	MD 99-2234	Corer length:	45.00 m
		Apparent penetration:	30.00 m
		Core length:	39.30 m

Observations

Corer condition:

Corer badly bended (S), the cutter is deformed.

Core condition:

The plastic liner imploded in the corer at 1062cm from top, above the free piston.

Sections and sampling

Number of sections recovered and conditions:

Section VIII in two parts (a and b) and section XIX was filled with water. Section I to VII, IX to XVIII and XX to XXX are in good condition. There are XXVII sections, the last one is 30 cm long.

Onboard sampling and post cruise curation:

- The core was split and described onboard, the archive halves will be curated at AGC-BIO.
- U-channel were made on the working halves, they will be curated at UCD.
- Constant volume samples were taken on several sections, they will be curated at AGC-BIO.
- Paleomagnetic cubes sampling have been performed, the cubes will be curated at AGC-BIO.
- The working halves was sampled at a 1cm interval. These sediments will be curated at AGC-BIO.
- Several bags of sediments were recovered: 1 core catcher, 1 top and 1 from top section XIII.

Summary of physical and sedimentological observations

- Below 31 m the core is highly disturbed by sand flow along the liner.
- An upper unit (0-20.70 m) of bioturbated (small, black FeS-stained burrows), very dark silty clay
- A middle unit (20.70-28.30 m) of structureless sand (?liquefied and flowed in)
- A lower upward fining unit (28.30-39.10 m) of fine sand, sandy mud, and clayey silt with common bioturbation and local crude lamination to distinct cross lamination
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values increase downcore from 100 x 10^{-5} SI at the top to 540 x 10^{-5} SI units at the base. Bulk density increases downcore to a depth of 26 m and values range from 1.5 to 1.8 Mg/m^3. At approx 26m there is an increase in values up to 2.2 Mg/m^3. Due to gas expansion p-wave velocities could only be determined for upper 3.0 m of core and values range from about 1425 to 1450 m/sec.

SITE 16

Julian day:	191	GMT time:	23h26
Latitude:	58°22.02N	Longitude:	057°30.57W
Water depth:	~ 2950 m	Location:	Labrador slope

Core number:

Corer length: ------- m
Apparent penetration: ------- m
Core length: ------- m

Observations

Corer condition:

Coring cancelled, not enough sediment.

Core condition:

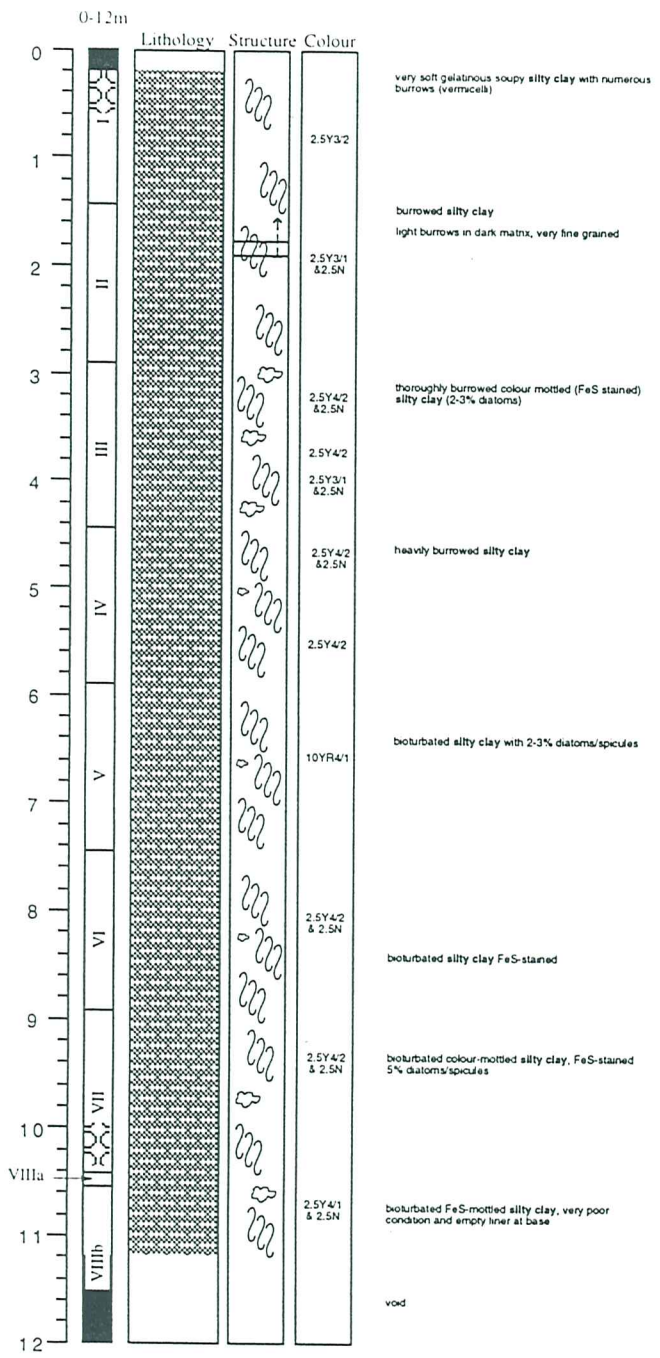
Sections and sampling

Number of sections recovered and conditions:

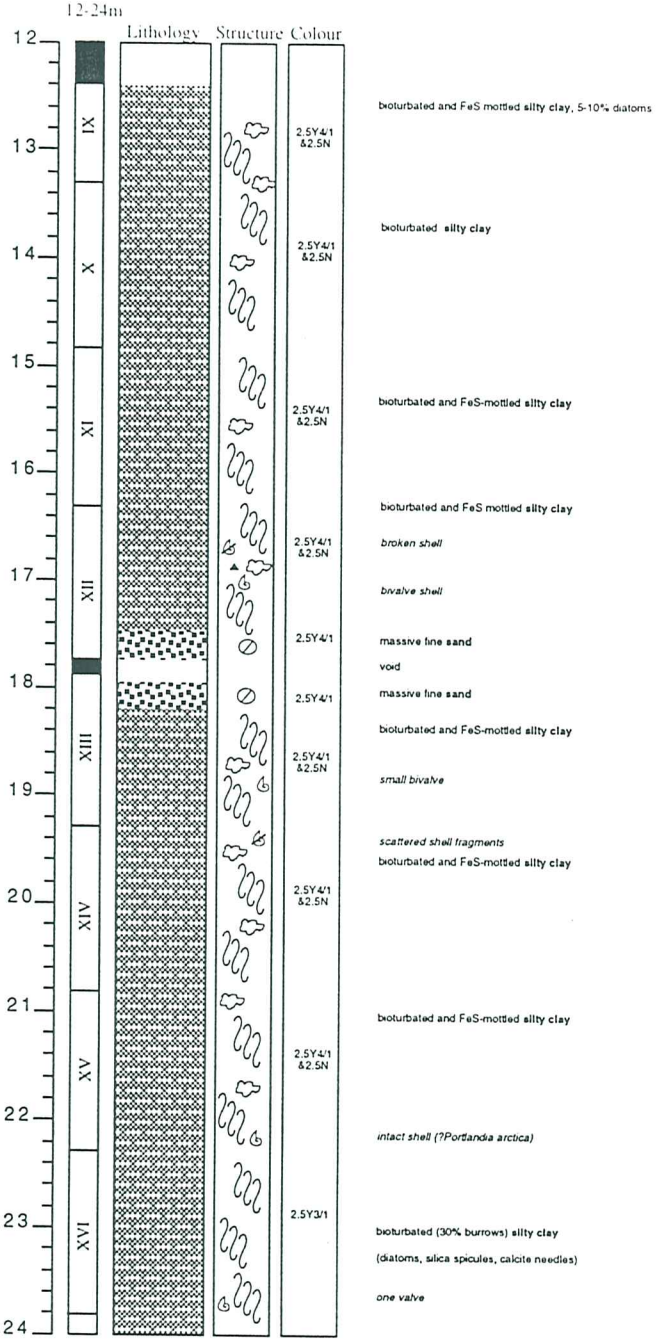
Onboard sampling and post cruise curation:

Summary of physical and sedimentological observations

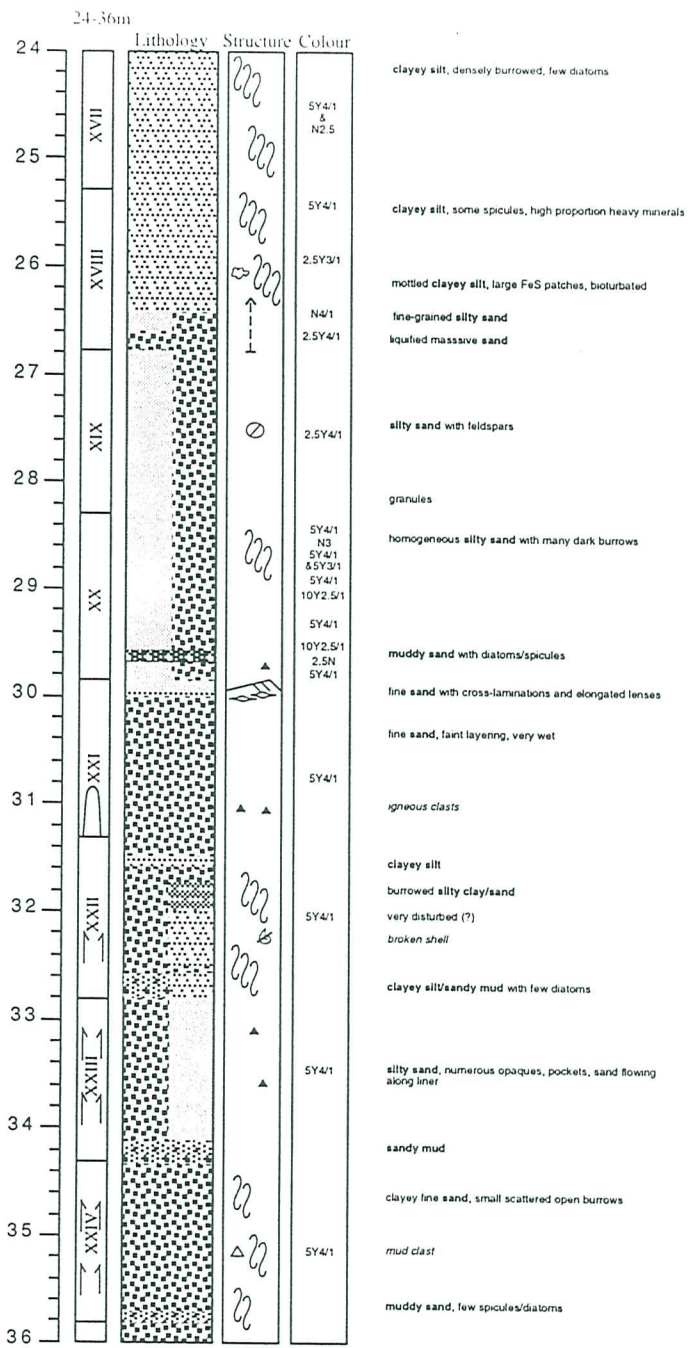
MD 99-2234 Lake Melville (230 m)



MD 99-2234

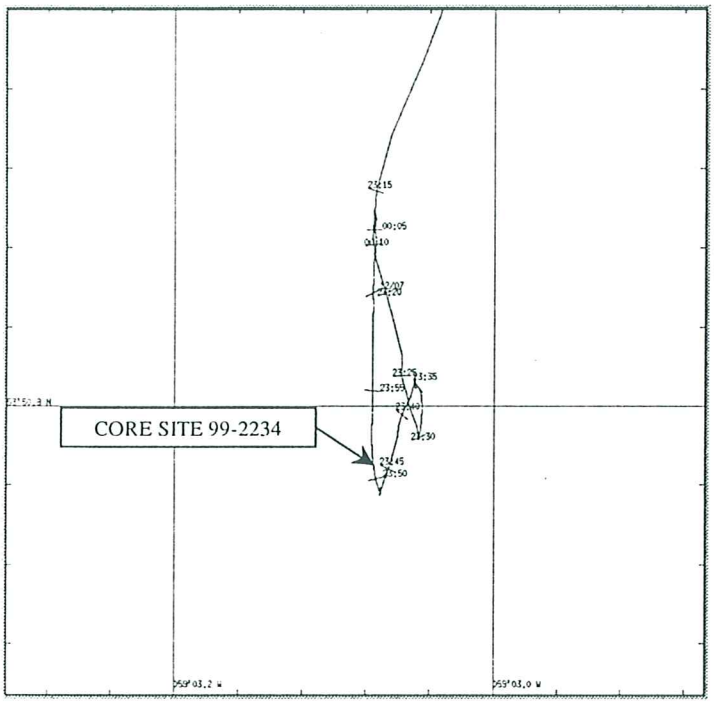


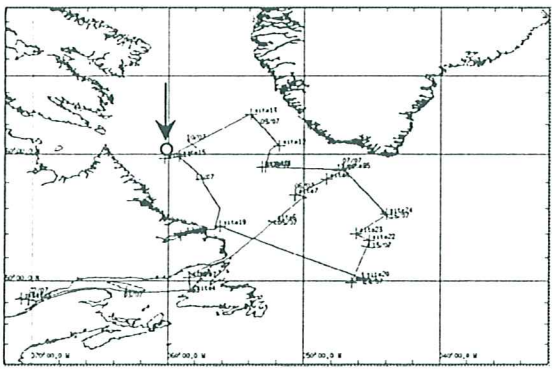
MD 99-2234

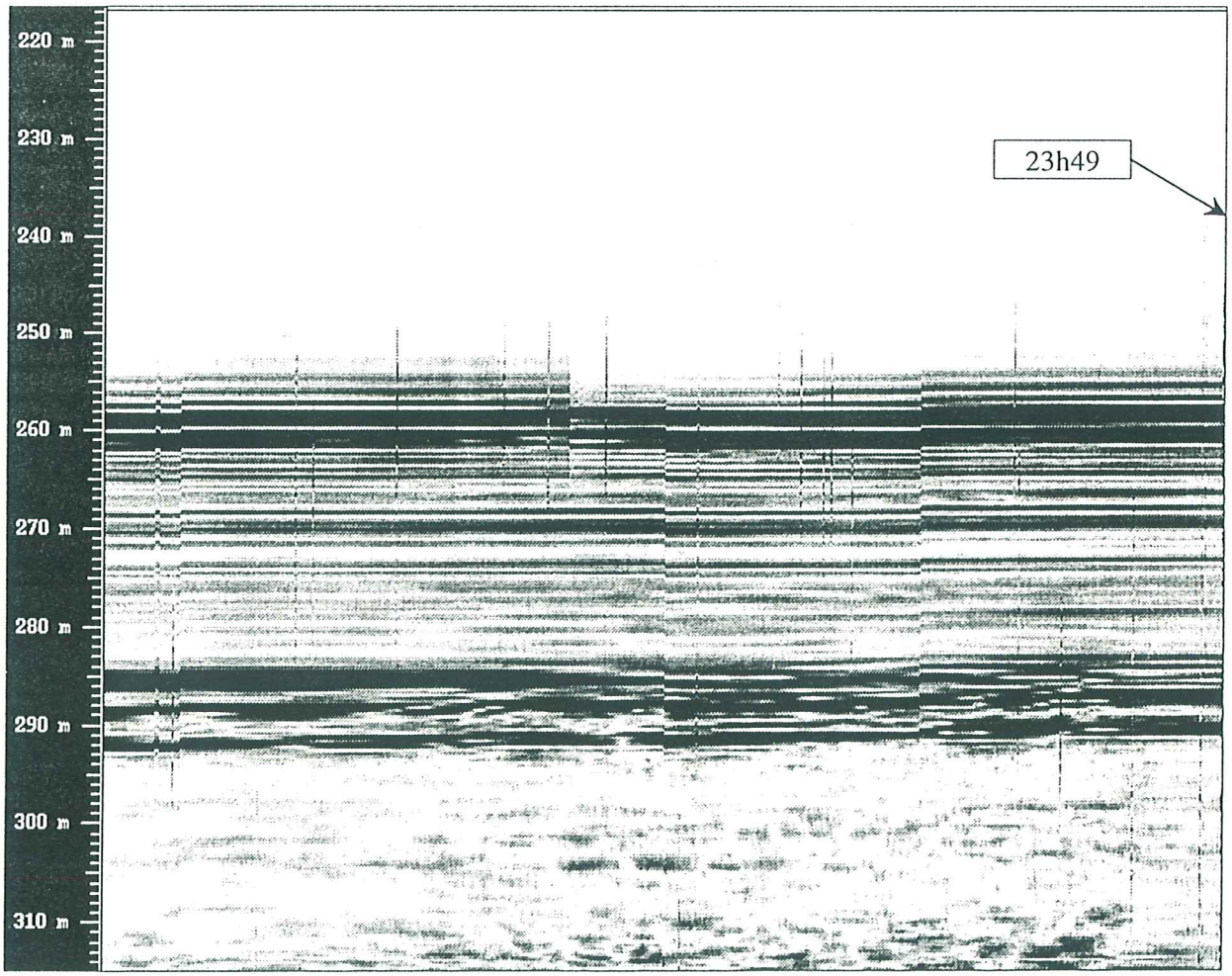


MD 99-2234

lat. : 53°50'81 N long. : 059°03'08 W
11 july 1999 Core length : 39.30 m Water depth : 230 m



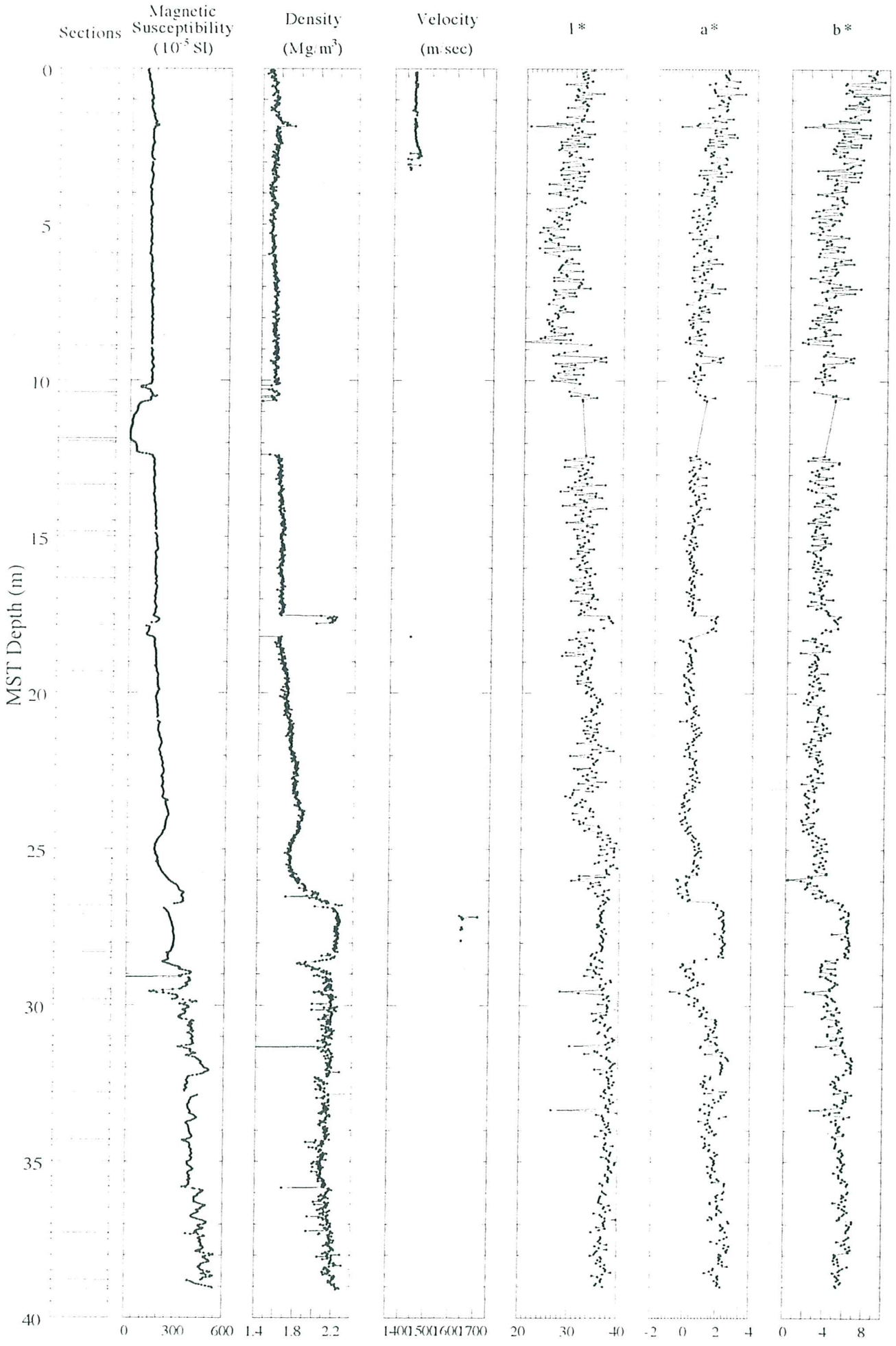




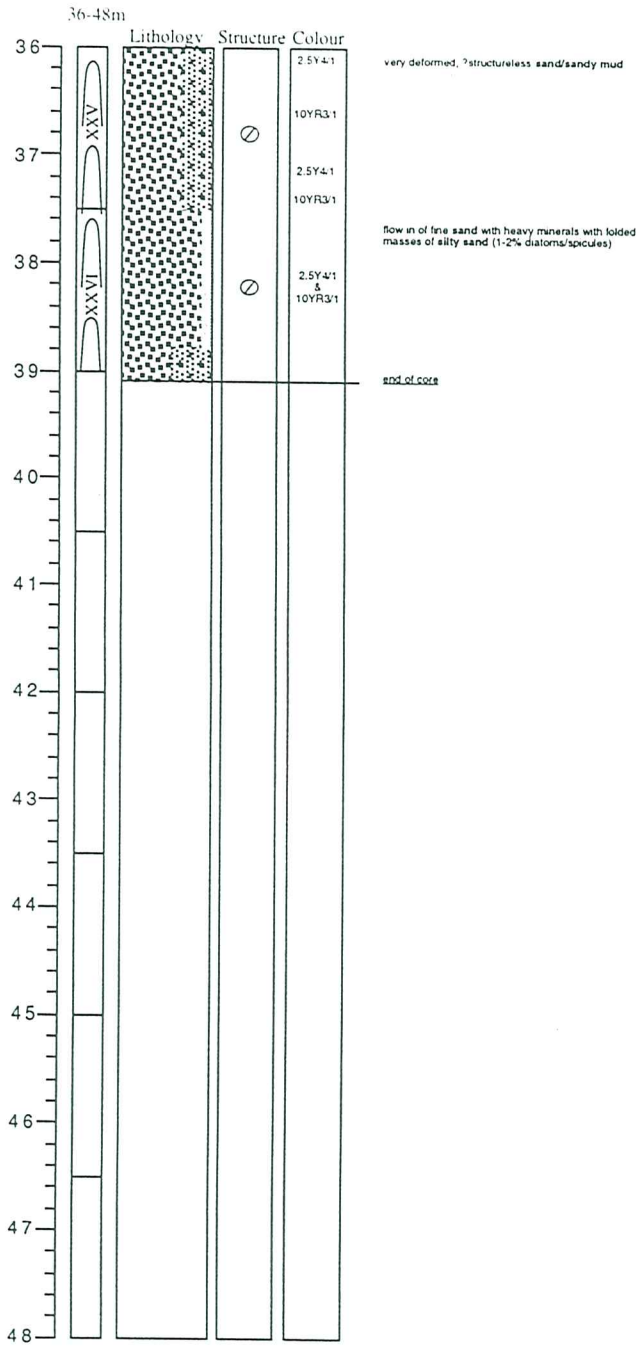
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD99 2234

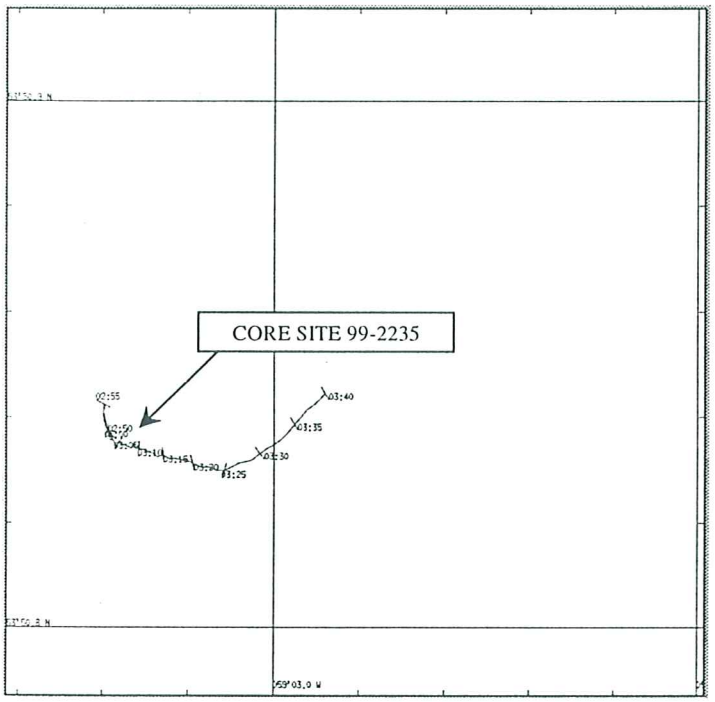

Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
40
0
300
600
1.4
1.8
2.2
1400
1500
1600
1700
20
30
40
-2
0
2
4
0
4
8

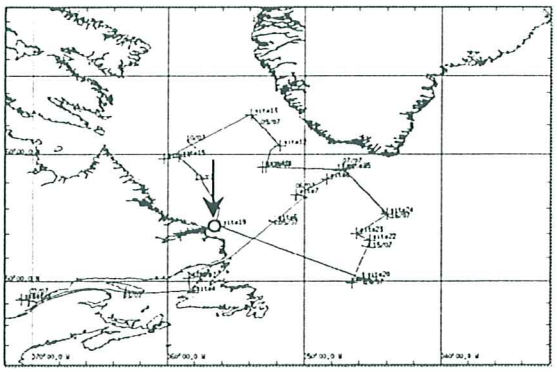
MD 99-2234

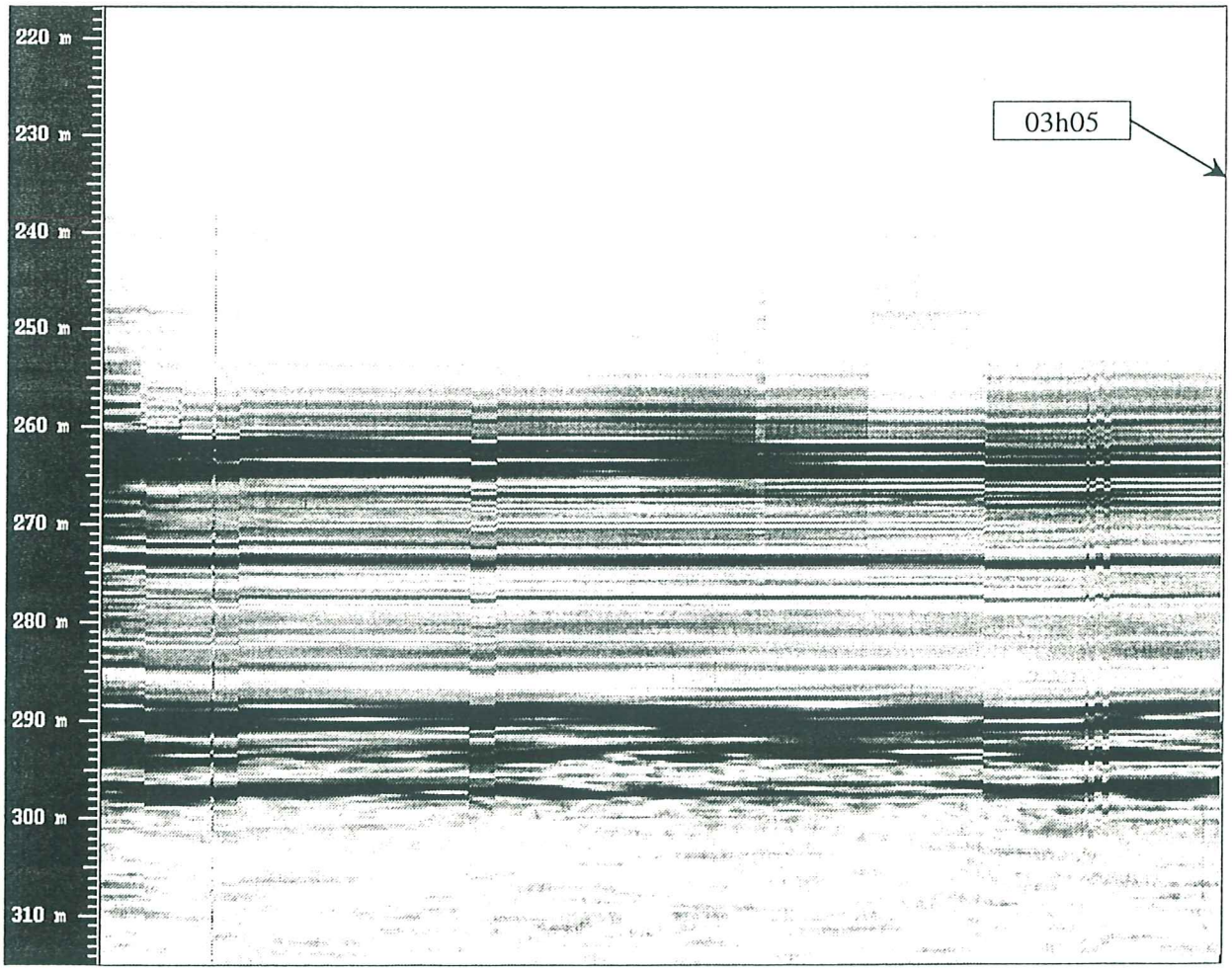

36-48m
Lithology
Structure
Colour
36
37
38
39
40
41
42
43
44
45
46
47
48
XXV
XXVI
2.5Y4/1
10YR3/1
2.5Y4/1
10YR3/1
2.5Y4/1
&
10YR3/1
very deformed, ?structureless sand/sandy mud
flow in of fine sand with heavy minerals with folded masses of silty sand (1-2% diatoms/spicules)
end of core

MD 99-2235

lat. : 53°50'86 N long. : 059°03'05 W
12 july 1999 Core length : 25.37 m Water depth : 235 m







Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	193	GMT time:	03h52
Latitude:	53°50.86N	Longitude:	059°03.05W
Water depth:	233 m	Location:	Lake Melville

Core number:	MD 99-2235	Corer length:	31.00 m
		Apparent penetration:	29.00 m
		Core length:	25.37 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

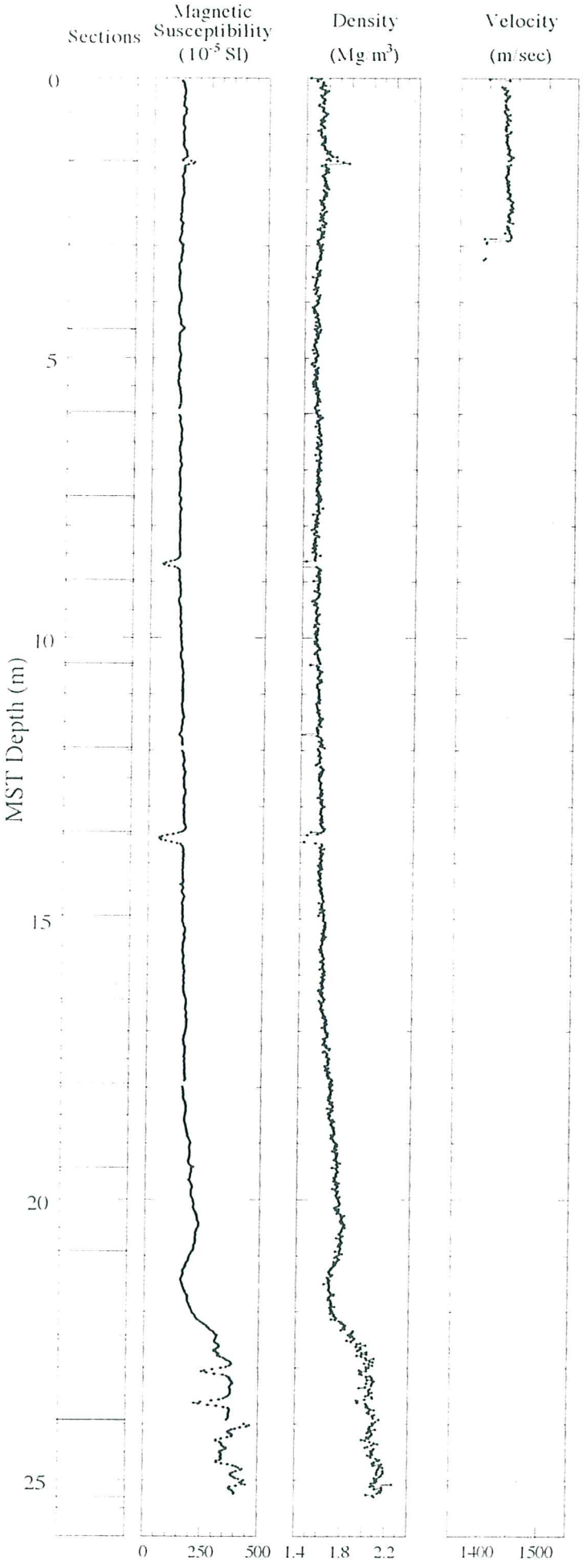
Number of sections recovered and conditions:
Two cm of sediments fell off the base of section XVI, they were bagged, otherwise all sections in good condition. There are XVII sections, the last one is 137 cm long.

Onboard sampling and post cruise curation:
- All sections were stored unsplit after being waxed to avoid oxydation. They will be curated at AGC-BIO.
-Severals bags of sediments were recovered: 1 core catcher, 1 for the base, 1 top and 1 bag from the base of section XVI. They will be curated at AGC-BIO.

Summary of physical and sedimentological observations

- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values increase downcore from 125 x 10^{-5} SI at the top to 440 x 10^{-5} SI units at the base. Bulk density gradually increases to an depth of 23 m and range in value from 1.5 to 1.8 Mg/m^3. At 23m the density increases to 2.1 Mg/m^3. P-wave measurements could only be obtained for approximately the upper 3 m of core and values range from about 1425 to 1435 m/sec.

MD99 2235


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg m^3)
Velocity (m/sec)
MST Depth (m)
0
5
10
15
20
25
0
250
500
1.4
1.8
2.2
1400
1500

Julian day:	193	GMT time:	15h00
Latitude:	54°37.00N	Longitude:	056°10.57W
Water depth:	520 m	Location:	Cartwright Saddle

Core number:	MD 99-2236	Corer length:	31.00 m
		Apparent penetration:	27.00 m
		Core length:	21.15 m

Observations

Corer condition:

Cutter damaged but the barrels are in good condition.

Core condition:

The liner imploded between 285 and 350cm and between 560-610cm, the PVC is not visible (may be higher in the sediment).

Sections and sampling

Number of sections recovered and conditions:

Sections II to V damaged by coring, sections I and VI to XV in good condition. There are XV sections, the last one is 15cm long.

Onboard sampling and post cruise curation:

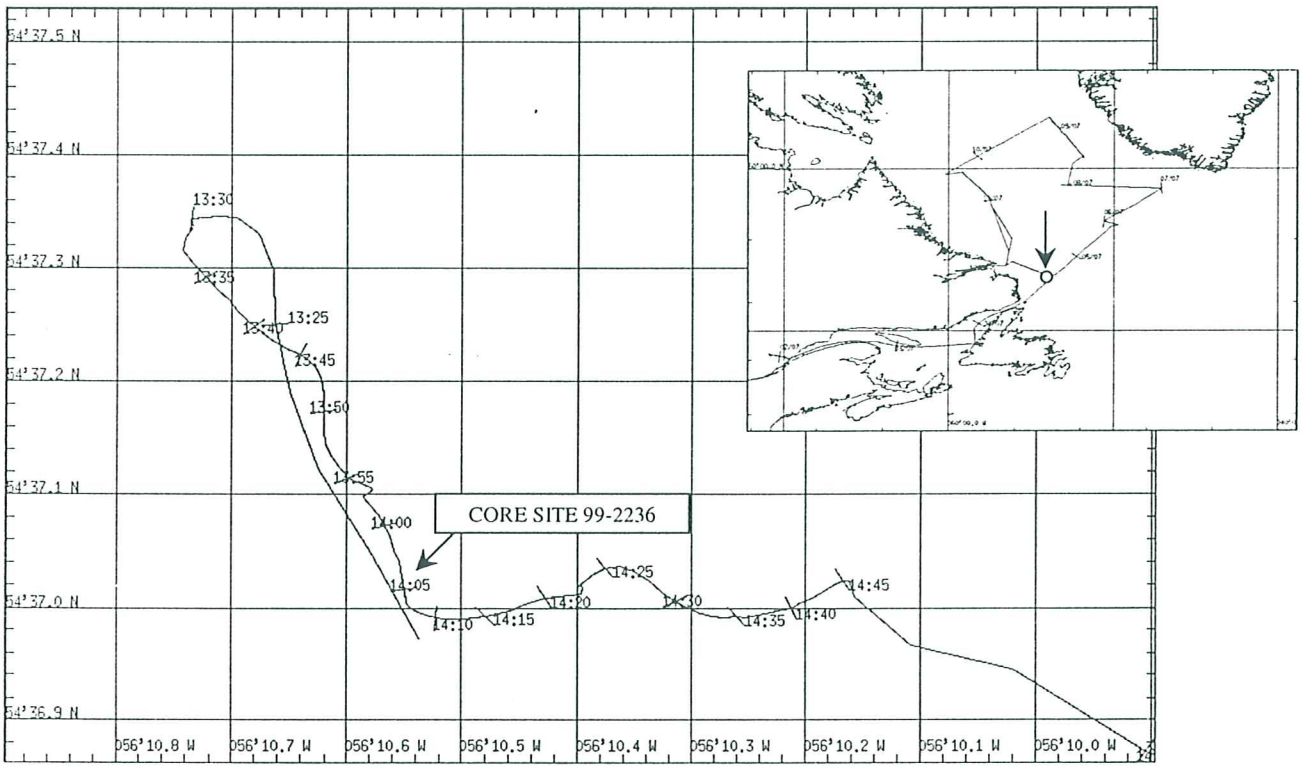
- The sections were split and described onboard. The archive halves will be curated at AGC-BIO while the working halves will be curated at INSTAAR.
- Three bags of sediments were recovered: 1 top, 1 core cutter and 1 core catcher. They will be curated at AGC-BIO.

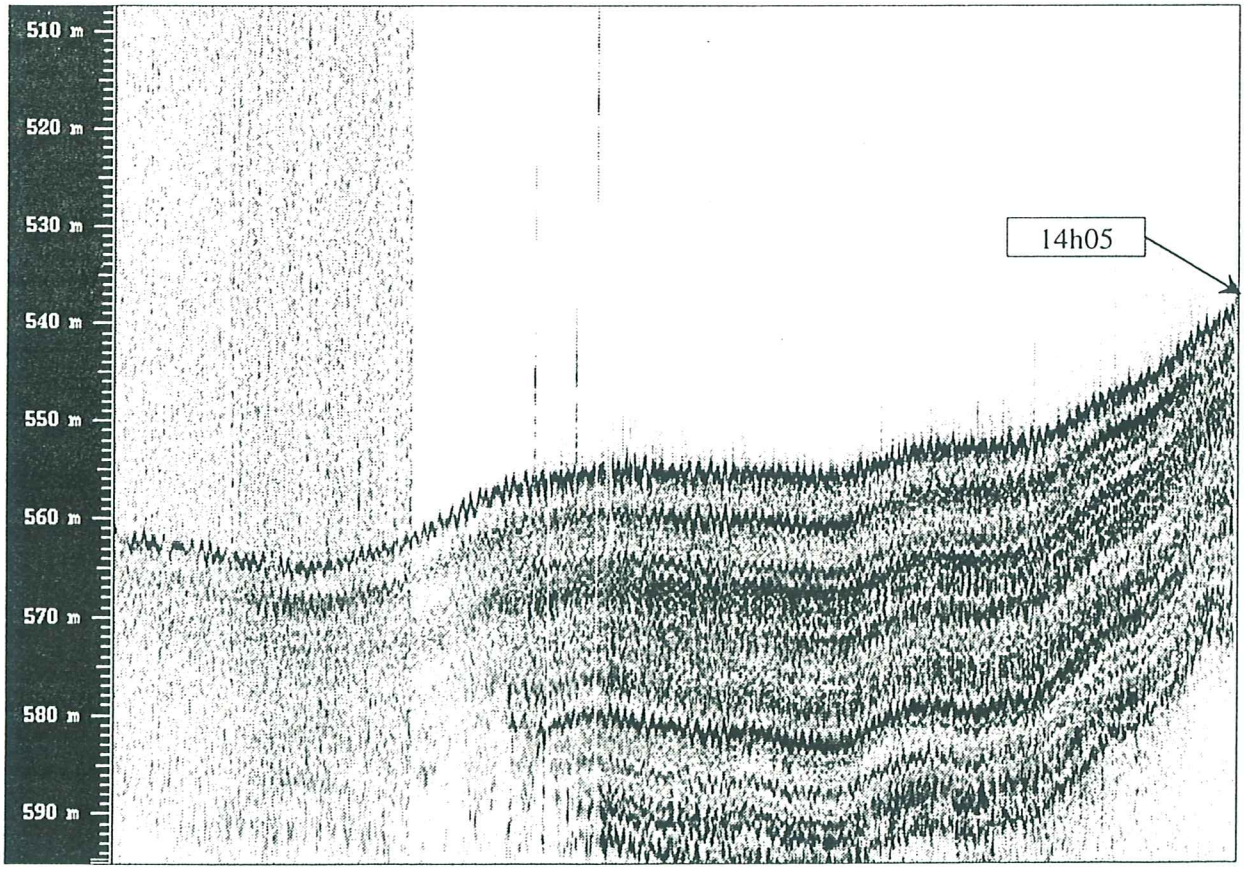
Summary of physical and sedimentological observations

- An upper unit (0-4.50 m) of bioturbated silty clay with decreasing amounts of biosilica downcore
- A middle unit (4.50-13.00 m) of detrital-carbonate-rich clayey silt with few or no microfossils and many outsize bedrock clasts
- A lower unit (13.00-21.10 m) of clayey silt and silty clay with a few diatoms, scattered mollusc shells, and rare forams
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 60 to 300 x 10^{-5} SI. Bulk density values vary from about 1.5 to 2.1 Mg/m^3. P-wave velocities were obtained for the upper 10 m and range in value from about 1445 to 1550 m/sec.

MD 99-2236

lat. : 53°50'86 N long. : 059°03'05 W
12 july 1999 Core length : 21.15 m Water depth : 520 m

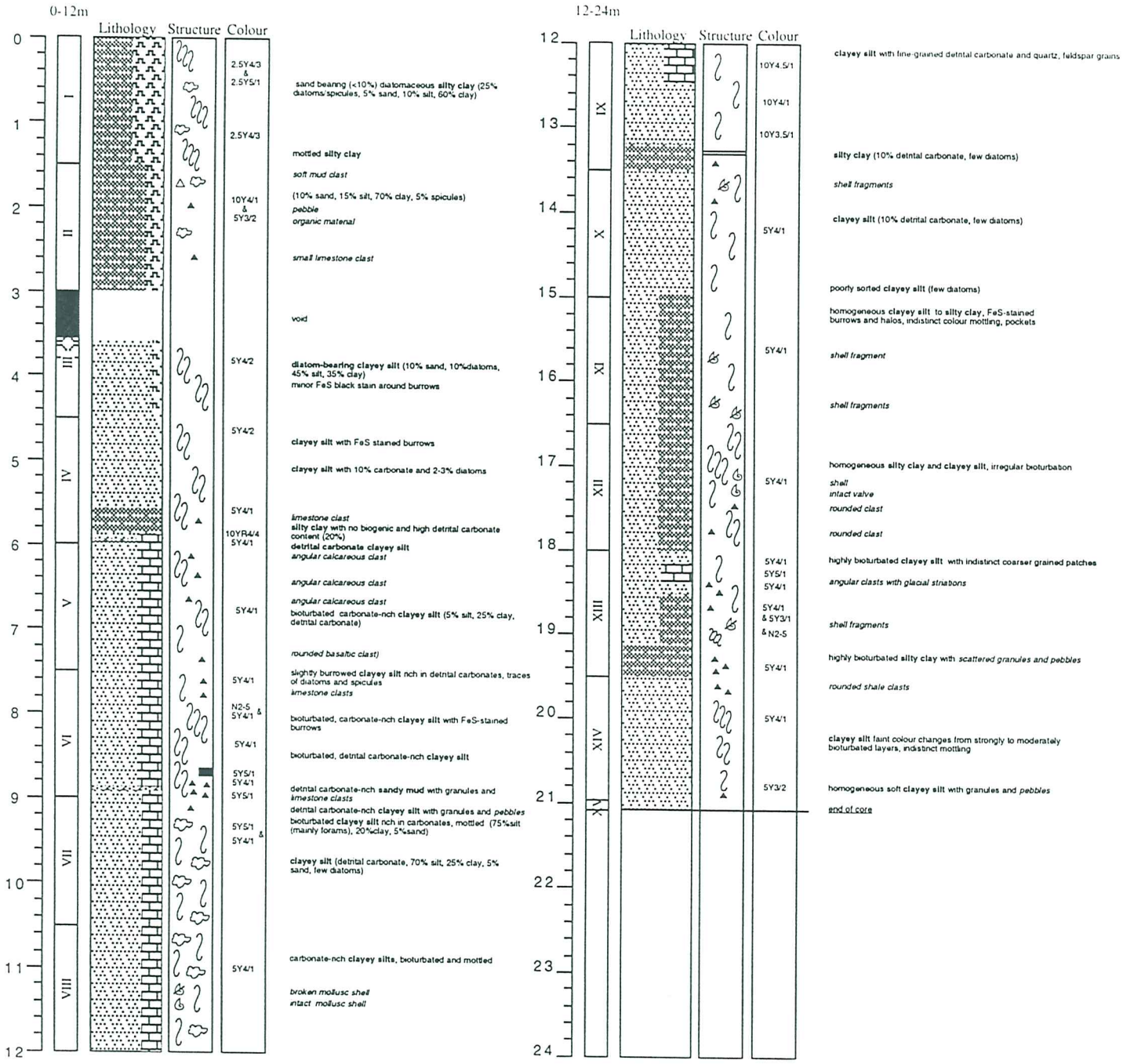




Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

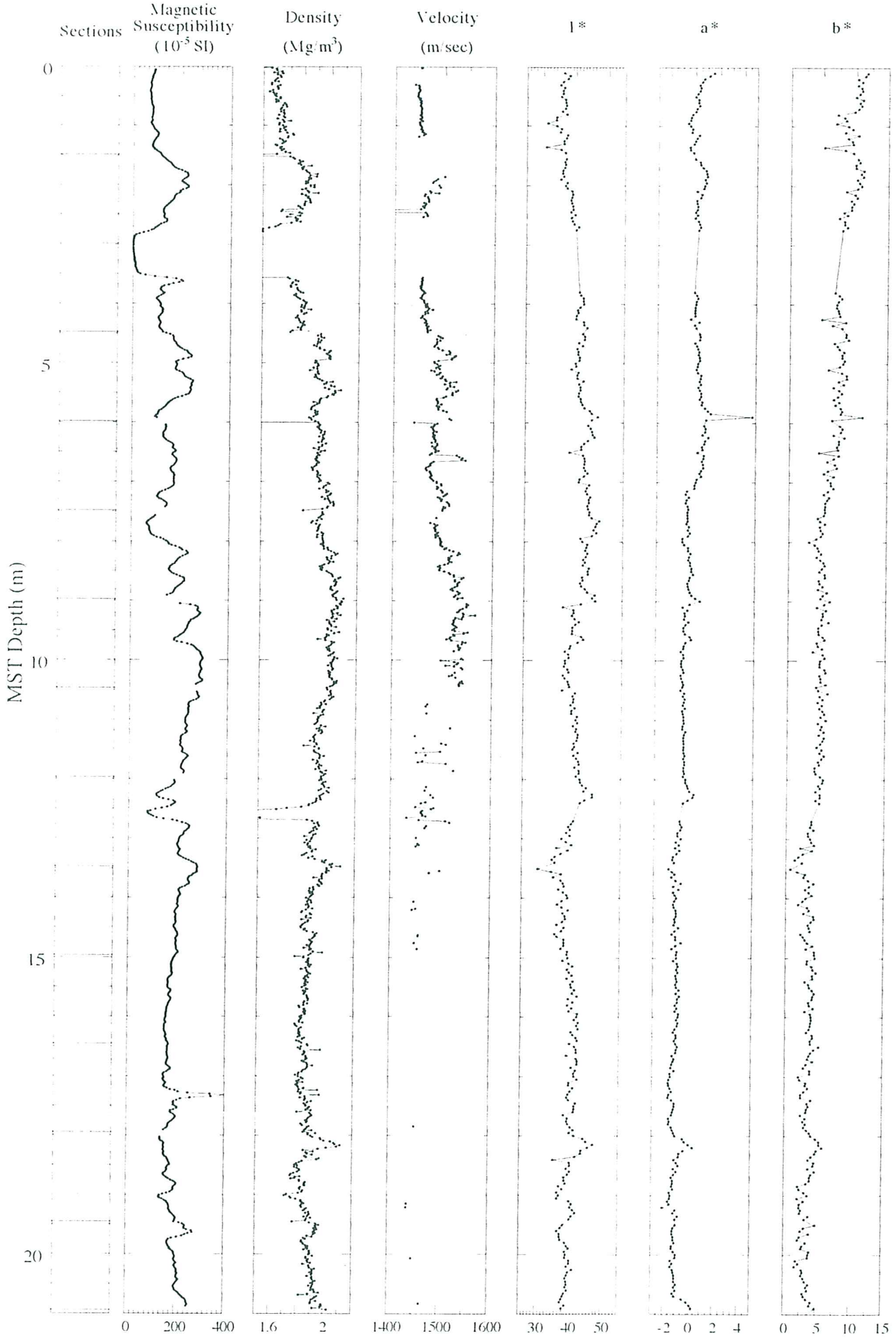
Document IFRTP – Dept. Océanographie

MD 99-2236 Cartwright Saddle (520 m)



MD 99-2236

MD99 2236


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
0
200
400
1.6
2
1400
1500
1600
30
40
50
-2
0
2
4
0
5
10
15

Julian day:	195	GMT time:	00h15
Latitude:	50°11.93N	Longitude:	045°41.03W
Water depth:	3530 m	Location:	Orphan Knoll

Core number:	MD 99-2237	Corer length:	44.00 m
		Apparent penetration:	36.00 m
		Core length:	30.74 m

Observations

Corer condition:

Cutter damaged but the barrels are in good conditions.

Core condition:

The liner imploded on a 5m length above the free piston.

Sections and sampling

Number of sections recovered and conditions:

All XXI sections in good conditions. There are XXI sections, the last one is 74 cm long.

Onboard sampling and post cruise curation:

- The sections were split and described onboard, both working and archive halves will be curated at GEOTOP.
- Constant volume sampling have been taken every other section starting at I. These samples will be curated at AGC-BIO.
- Several bags of sediments have been recovered: 1 core catcher, 1 core cutter, 1 top, 1 for a rock found at 1265-81 cm, 1 for soupy sediment between 1265 - 1281 cm (probably re-inject from the side), 1 bag of soupy sediment between 1443 - 1462 cm from bothe archive and working (probably re-inject from the side). The bags will be curated at GEOTOP.

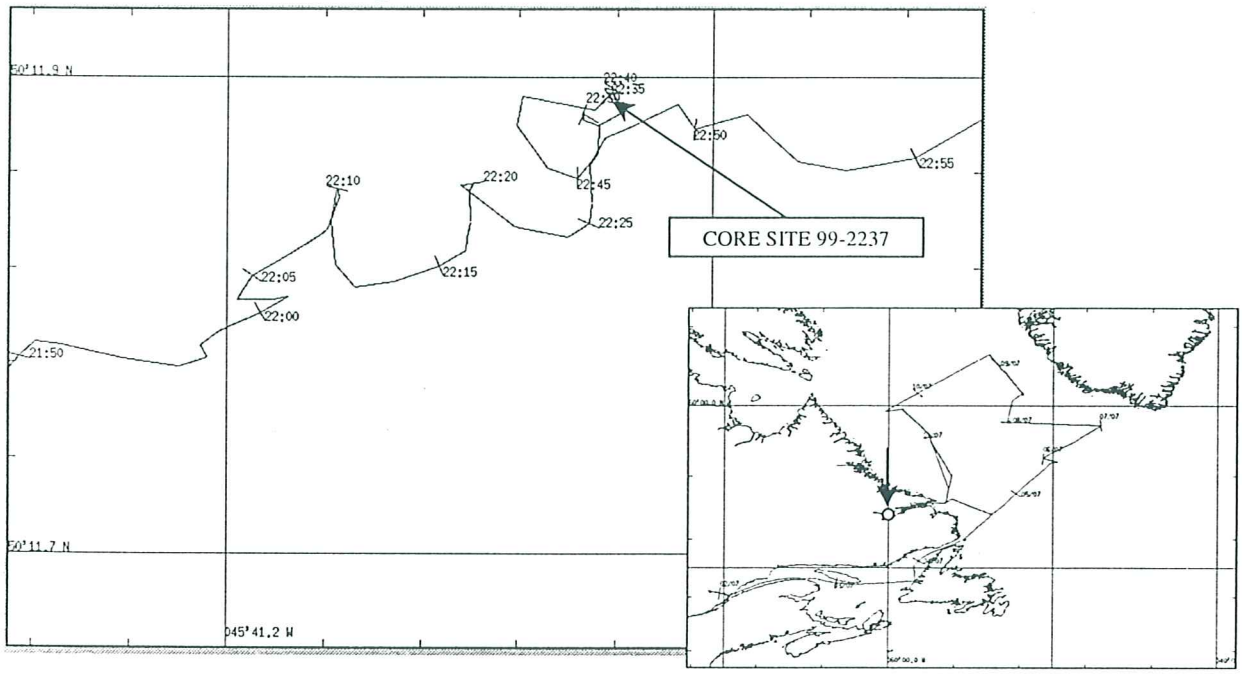
Summary of physical and sedimentological observations

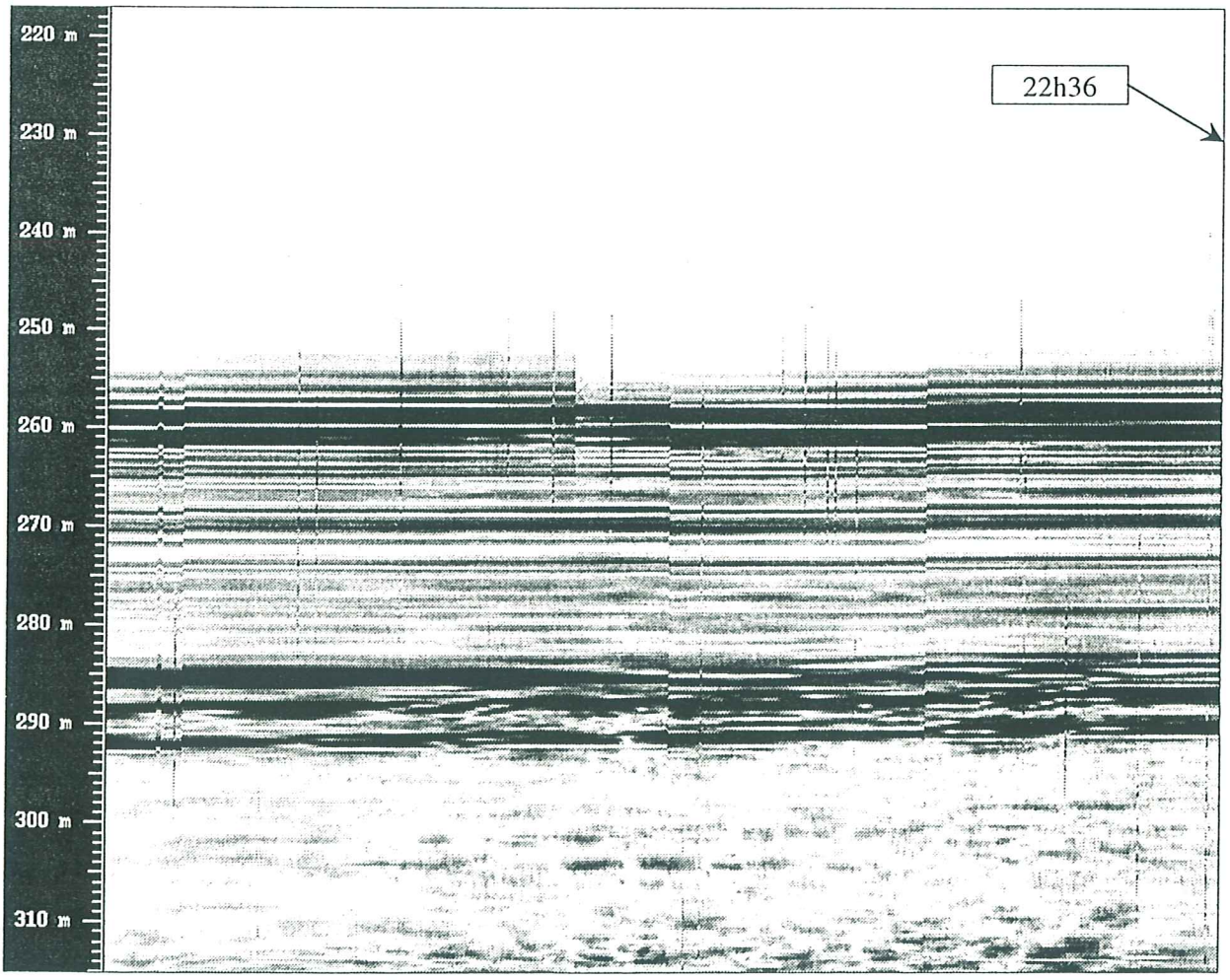
- The core is moderately disturbed down to 21 m, with flow-in below).
- The core consists mainly of structureless or mottled clayey silt with variable amounts of sand and outsize pebbles and cobbles, either scattered or concentrated in sandy mud layers. Detrital carbonate is locally abundant in sharp-based, structureless beds of sandy mud or clayey silt. Biosilica is common; Biogenic carbonate is abundant in only a few intervals.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values generally vary from 50 to 250 x 10^{-5} SI with a single peak showing values of more than 1200 x 10^{-5} SI. Bulk density values vary from about 1.5 to 2.15 Mg/m^3. P-wave velocities were obtained for part of the core and range in value from about 1445 to 1620 m/sec.

MD 99-2237

lat. : 53°50'81 N long. : 059°03'05 W

11 july 1999 Core length : ? Water depth : 3530 m





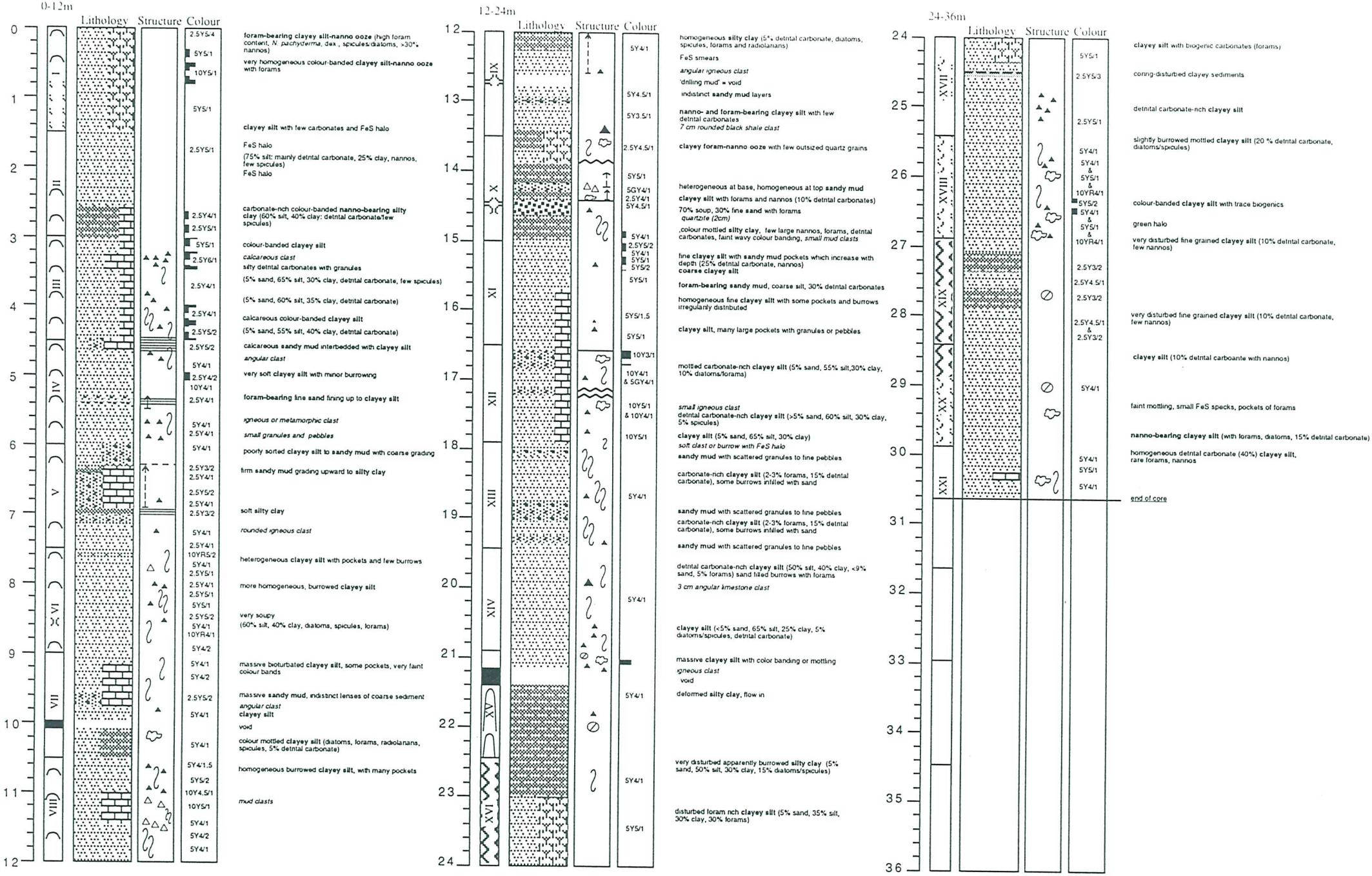
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

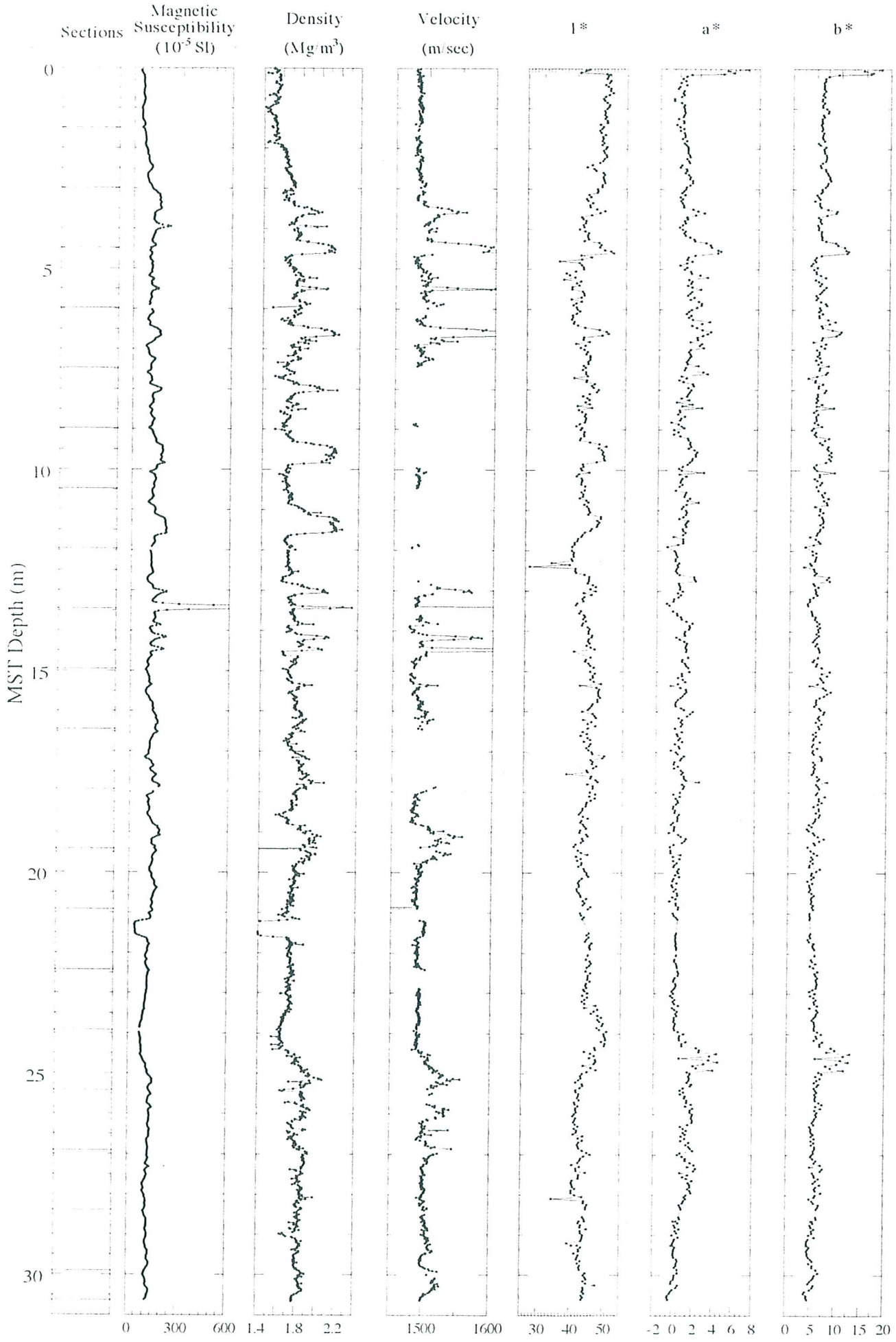
MD 99-2237 Orphan Knoll (3530 m)

MD 99-2237

MD 99-2237



MD99 2237


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
0 300 600
1.4 1.8 2.2
1500 1600
30 40 50
-2 0 2 4 6 8
0 5 10 15 20

Julian day:	195	GMT time:	03h36
Latitude:	50°11.55N	Longitude:	045°40.68W
Water depth:	3530 m	Location:	Orphan Knoll

CTD depth: 0 - 200 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

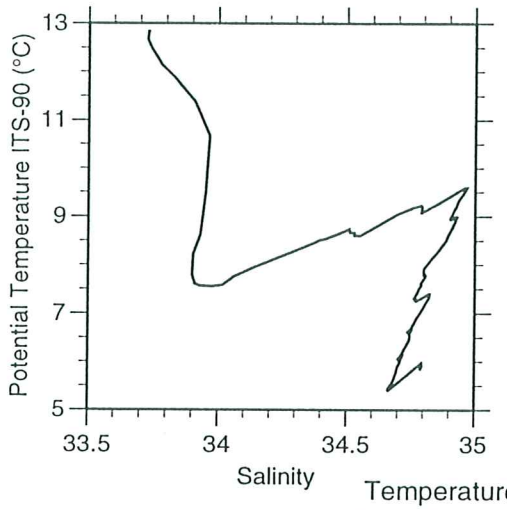
Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 26 m (maximum fluorescence) and near surface.

Sampling

The water samples will be analysed for alkenone.

Summary of CTD profil

- The surface temperature was 12.83°C.



CTD
Station 20

Orphan Knoll

July 14, 1999

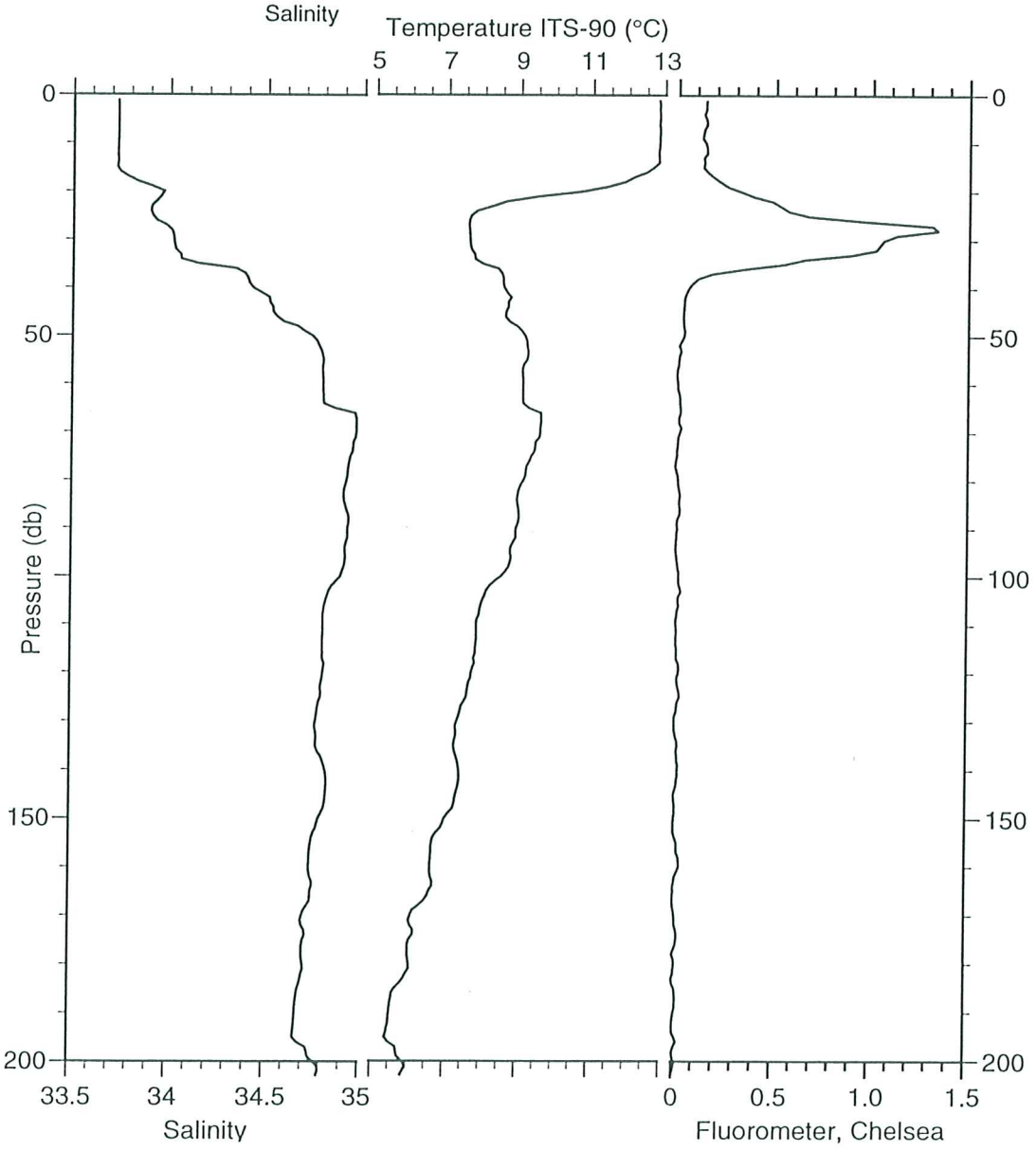
Latitude : 50°11.55 N

Longitude : 045°40.68 W

Water depth : 3540 m

Water profile : 0 - 200 m

File: **iM5007**



Julian day:	195	GMT time:	03h10
Latitude:	50°11.90N	Longitude:	045°40.86W
Water depth:	3572 m	Location:	Orphan Knoll

CTD depth: 0 - 3542 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

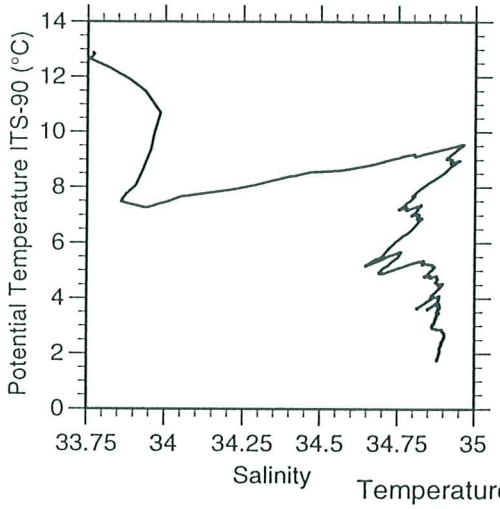
Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 3500 m, 2500 m, 2150 m and 1650 m.

Sampling

The water samples will be analysed for salinity (for CTD calibration), Iodine 129, Hafnium and Neodinium.

Summary of CTD profil

- The surface temperature was 12.9 °C.



CTD
Station 20

Orphan Knoll

July 13, 1999

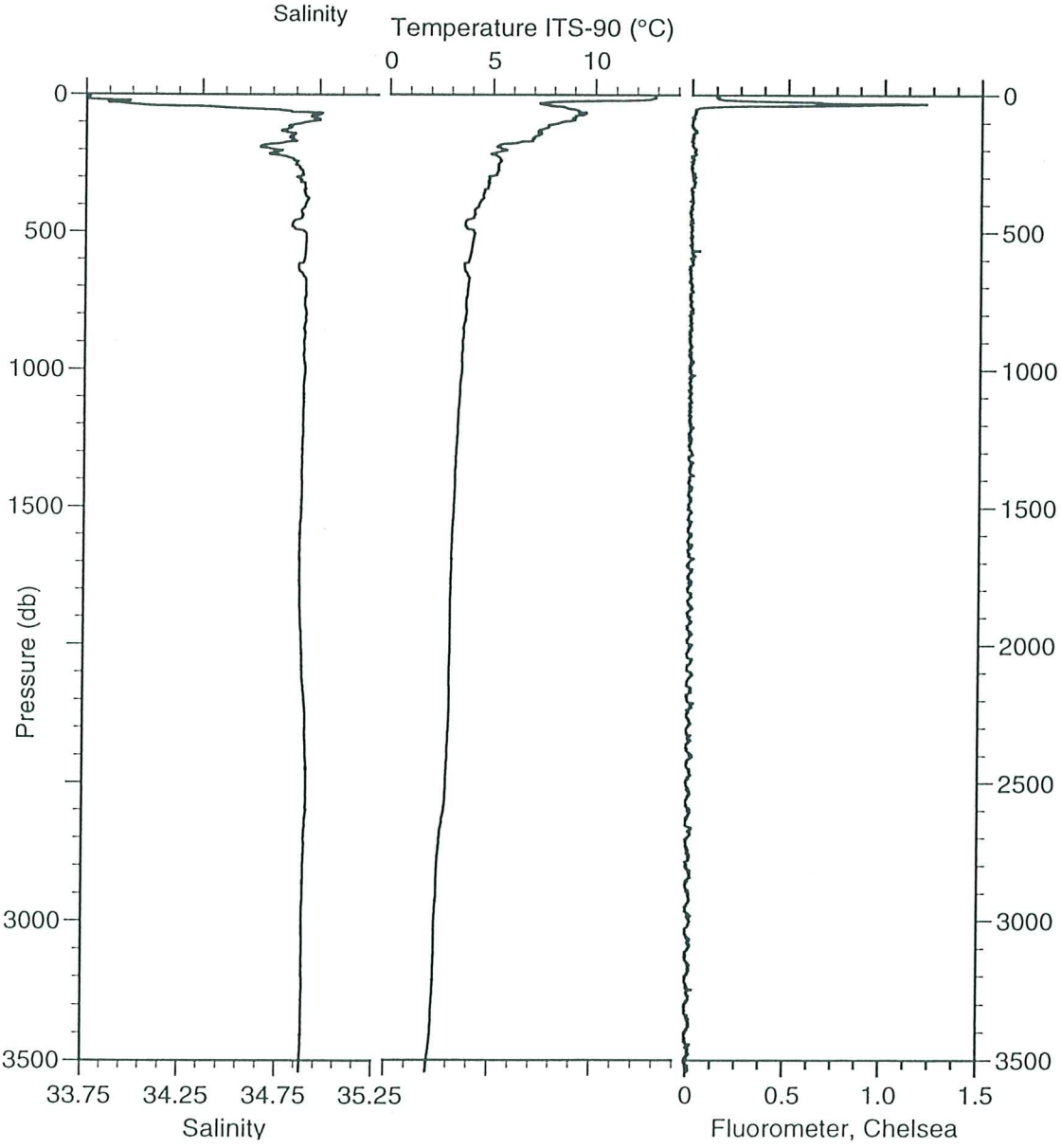
Latitude : 50°11.90 N

Longitude : 045°40.86 W

Water depth : 3540 m

Water profile : 0 - 3500 m

File: **iM5006**



Julian day:	195	GMT time:	12h05
Latitude:	49°51.12N	Longitude:	046°32.20W
Water depth:	3080 m	Location:	Orphan Basin

Core number:	MD 99-2238	Corer length:	42.00 m
		Apparent penetration:	35.00 m
		Core length:	18.24 m

Observations

Corer condition:

Cutter damaged but the barrels are in good conditions.

Core condition:

The liner imploded on a 2m length at 11.44 meters from the base of the core.

Sections and sampling

Number of sections recovered and conditions:

All XIII sections in good conditions except for sections IV and V which have cracks and a hole. The last section is 24 cm long.

Onboard sampling and post cruise curation:

- The sections were split and described onboard, both working and archive halves will be curated at GEOTOP.
- Constant volume sampling have been perfomed every other section starting at I. These samples will be curated at AGC-BIO.
- Several bags of sediments were recovered: 1 for the sediment recovered above the free piston, 1 core catcher, 1 core cutter, 1 top and 1 for a rock found at 1475 - 1480 cm. All the bags will be curated at GEOTOP.

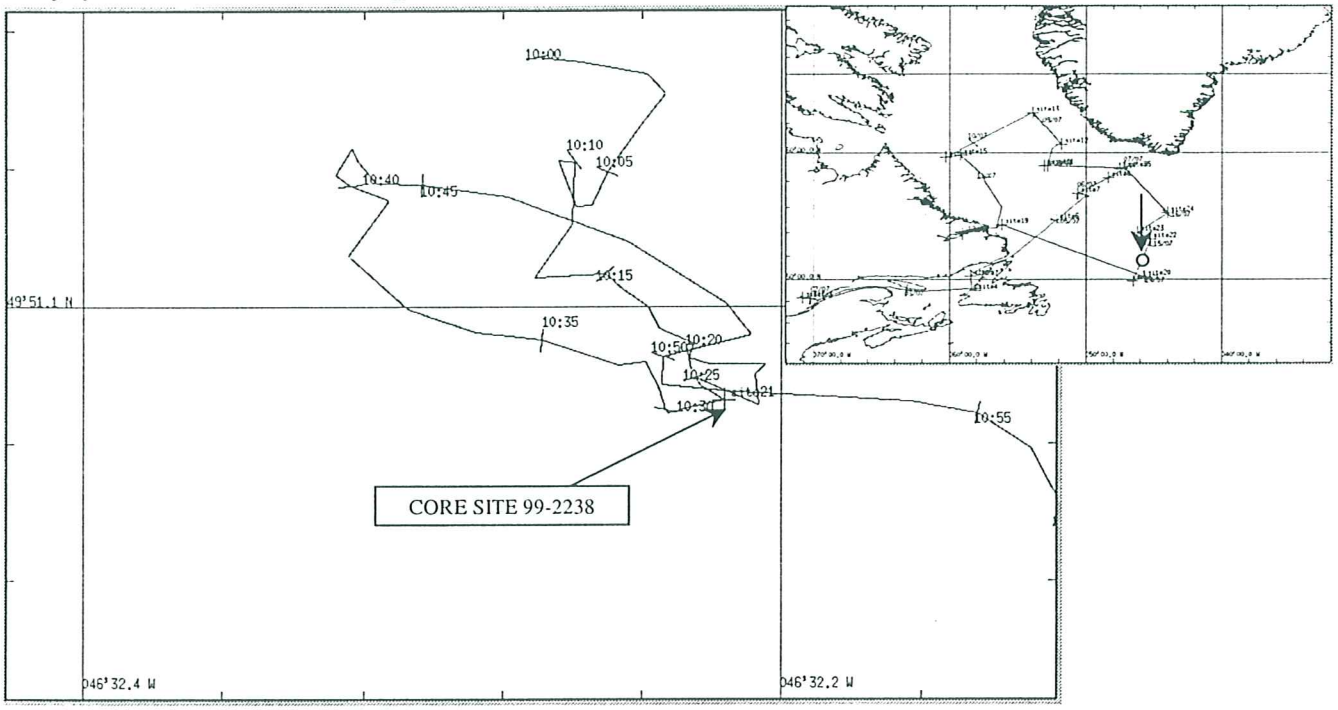
Summary of physical and sedimentological observations

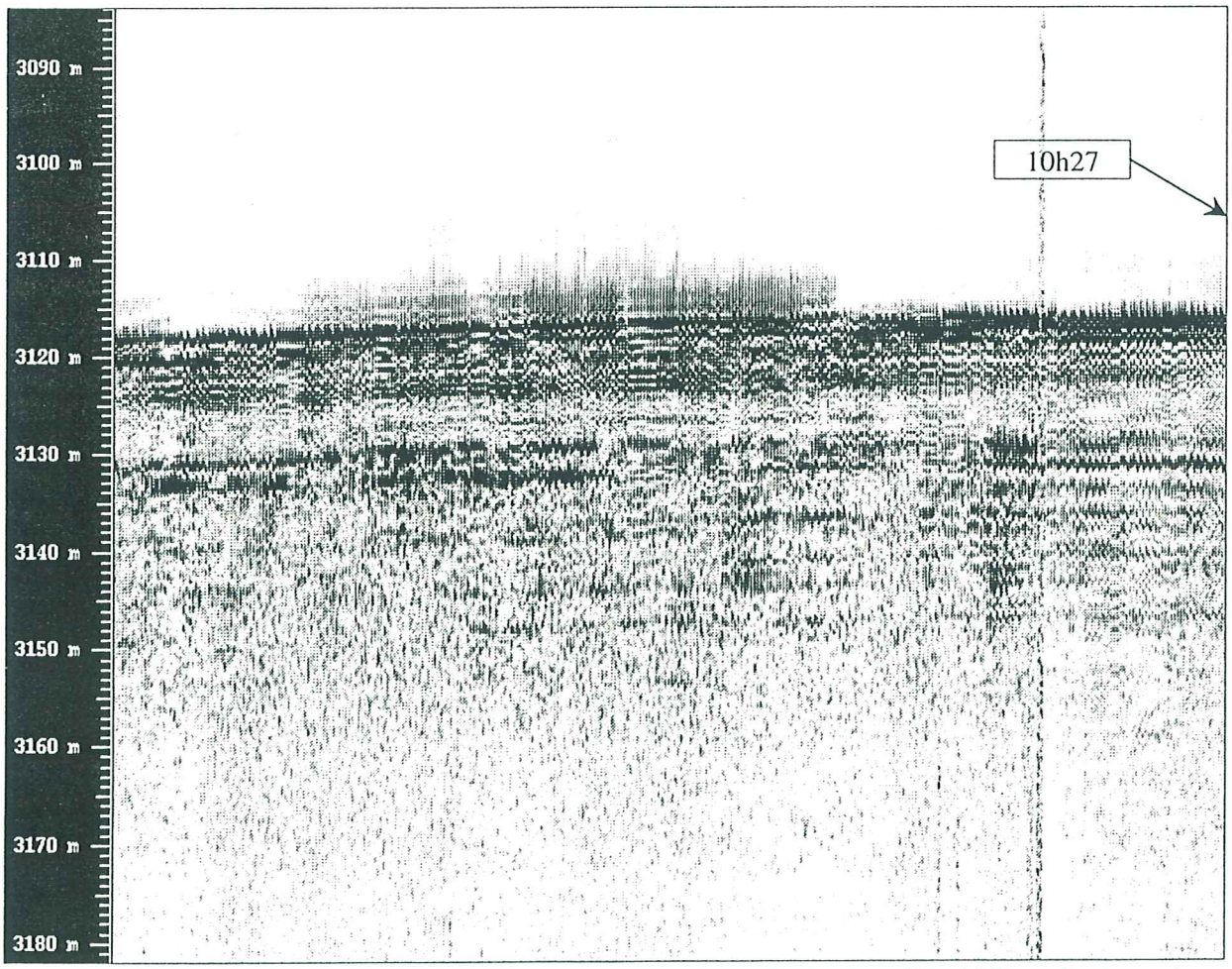
- The first two sections are very disturbed.
- The succession in this core is heterolithic with a large range of compositions and textures from clay to granule-bearing sandy mud. Units are either structureless with gradational contacts or occur as thinly laminated, graded sequences.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 100 to 400 x 10^{-5} SI. Bulk density values vary from about 1.6 to 2.5 Mg/m^3. P-wave values were determined for part of the core and the values range from about 1440 to 1600 m/sec.

MD 99-2238

lat. : 49°51'12 N long. : 046°32'20 W

14 july 1999 Core length : 18.24 m Water depth : 3080 m

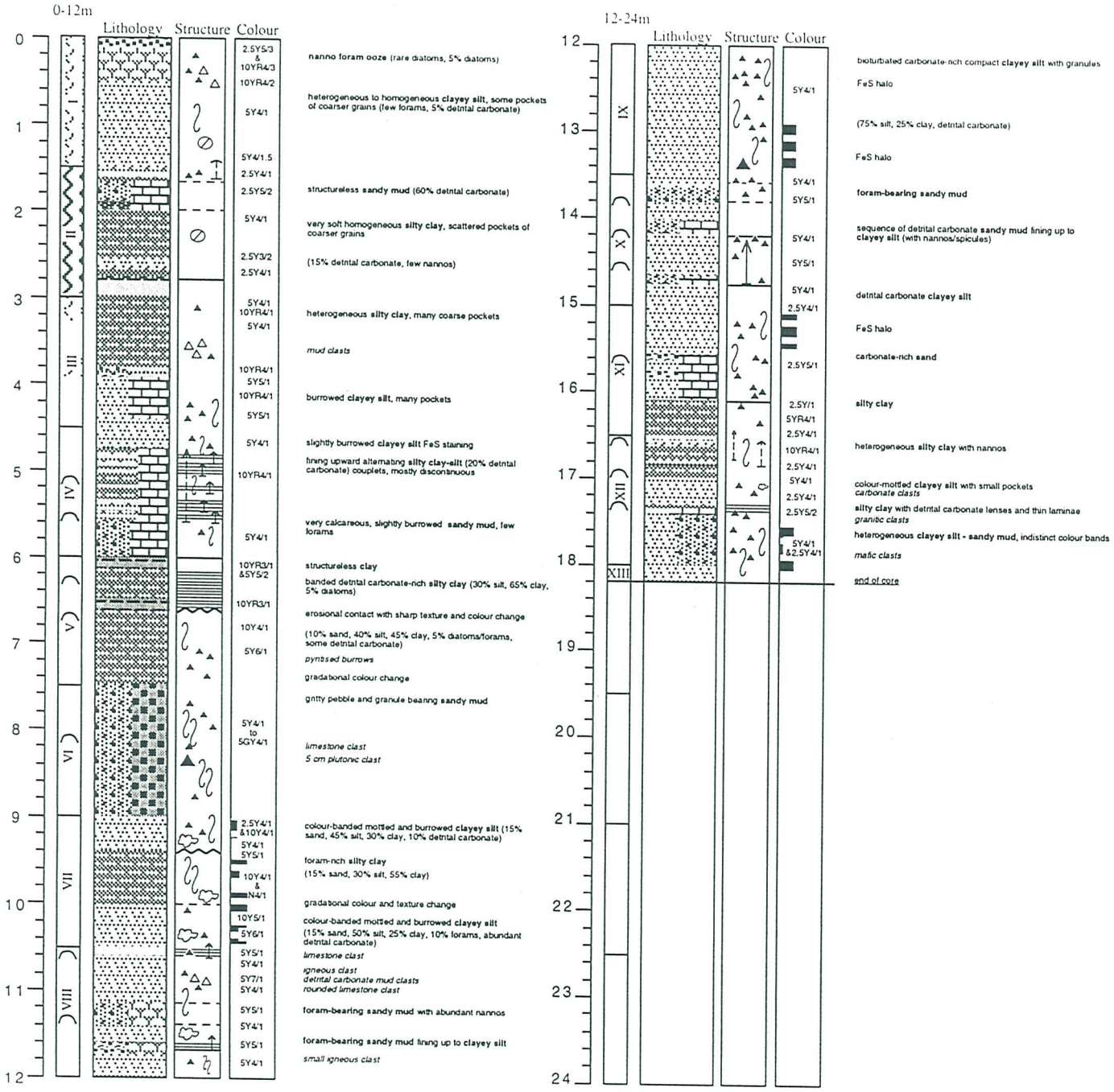




Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

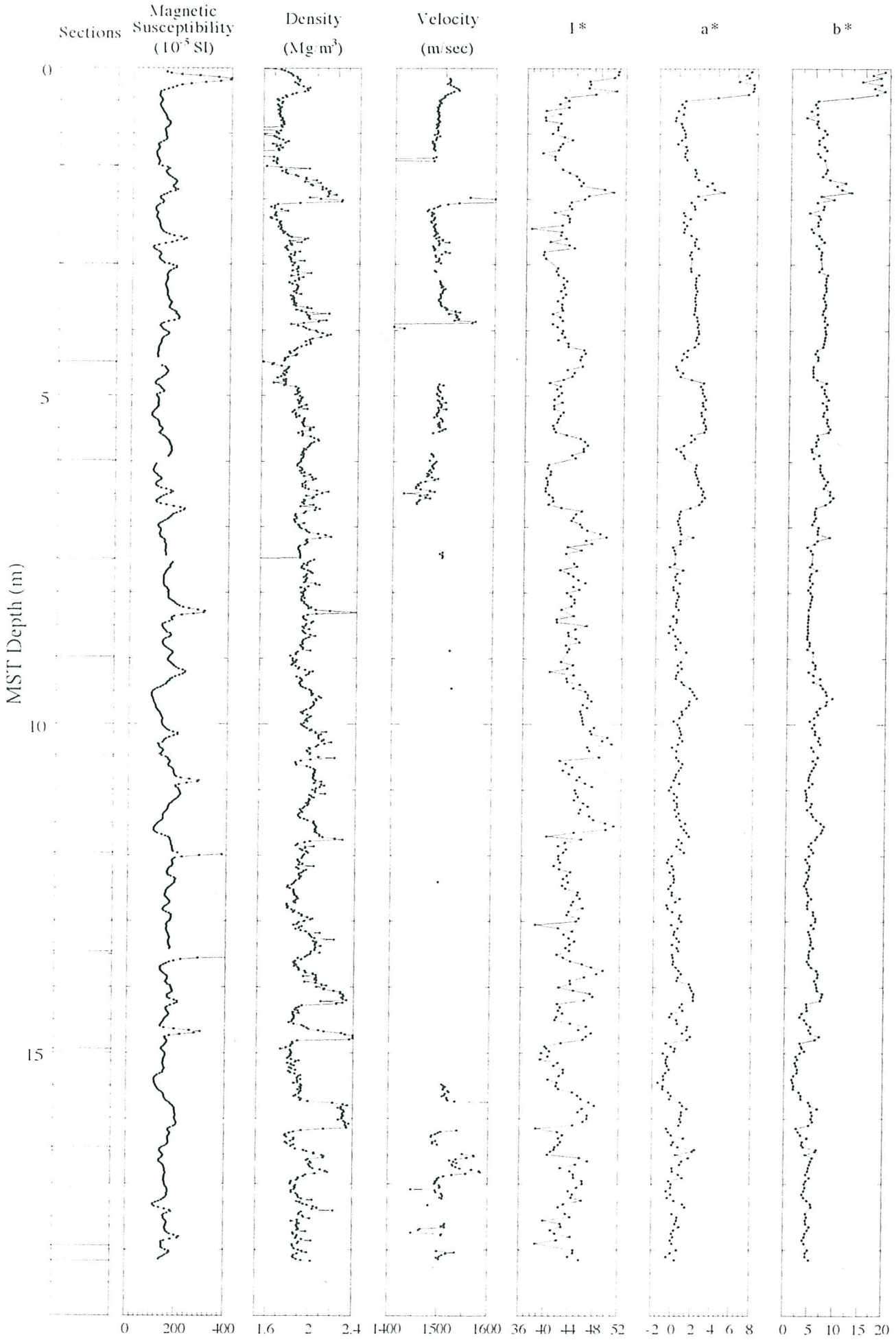
Document IFRTP – Dept. Océanographie

MD 99-2238 Orphan Basin (3080 m)



MD 99-2238

MD99 2238


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
0 200 400
1.6 2 2.4
1400 1500 1600
36 40 44 48 52
-2 0 2 4 6 8
0 5 10 15 20

Julian day:	196	GMT time:	06h52
Latitude:	53°27.03N	Longitude:	045°15.04W
Water depth:	3770 m	Location:	ODP 647

Core number:	MD 99-2239	Corer length:	44.00 m
		Apparent penetration:	37.00 m
		Core length:	23.77 m

Observations

Corer condition:
Cutter intact but corer bent 8 meters below the weight.

Core condition:
Good

Sections and sampling

Number of sections recovered and conditions:
All XIII sections in good conditions except for sections IV and V which have a crack and a hole. The last section is 127 cm long.

Onboard sampling and post cruise curation:
- The sections were split and described onboard. Working and archive halves will be curated at GEOTOP.
- Constant volume sampling have been perfomed every other section starting at I. These samples will be curated at AGC-BIO.
- Several bags of sediment were recovered: 1 core catcher, 1 core cutter, 1 top, 1 at ~ 1795 cm and 1 for section XV (2239 cm).

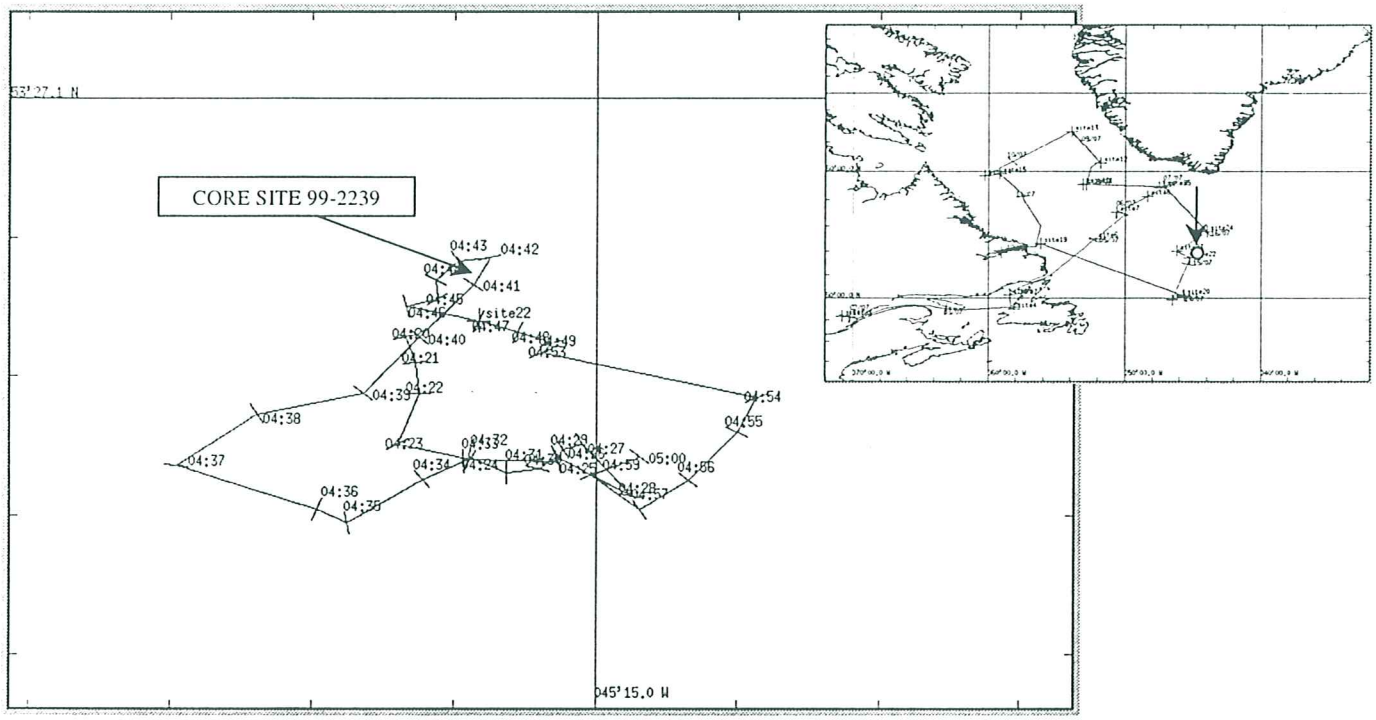
Summary of physical and sedimentological observations

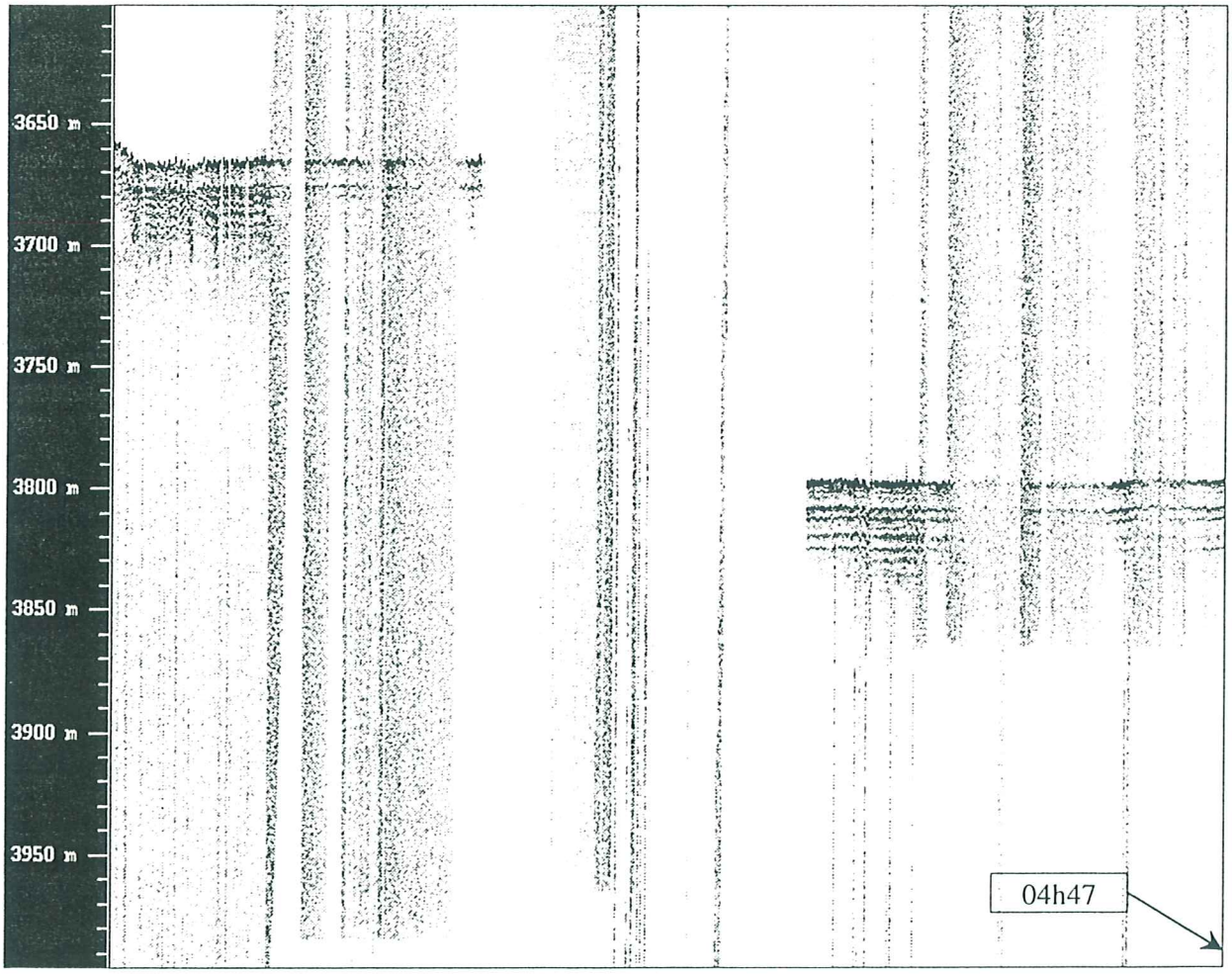
- Liner was partially empty in the upper 8 m; otherwise, bedding is gently bowed.
- Except for two structureless intervals rich in biogenic carbonate (0-0.40 m, sandy mud; 2.00-4.00 m, silty clay), the core consists of interbedded muddy sand (locally crudely laminated with mafic-igneous and sedimentary rock granules), and detrital-carbonate-rich sequences of laminated silt and/or clayey silt and structureless silty clay.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 50 to 185 x 10^{-5} SI. Bulk density values vary from about 1.6 to 2.5 Mg/m^3. P-wave velocity values range from about 1480 to 1515 m/sec.

MD 99-2239

lat. : 52°27'03 N long. : 045°15'04 W

15 july 1999 Core length : 23.77 m Water depth : 3770 m



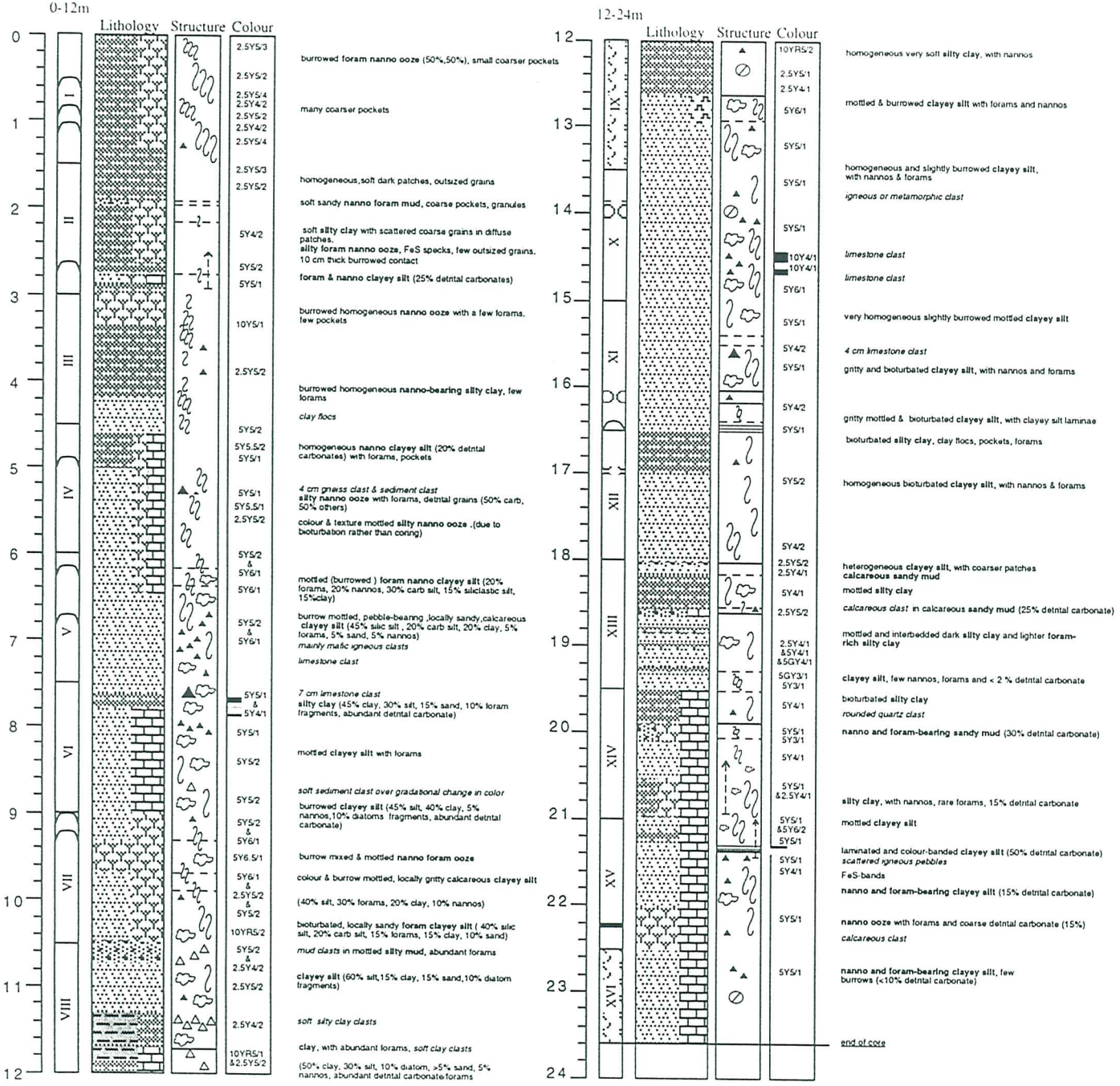


Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD 99-2239 equiv. ODP 647 (3770 m)

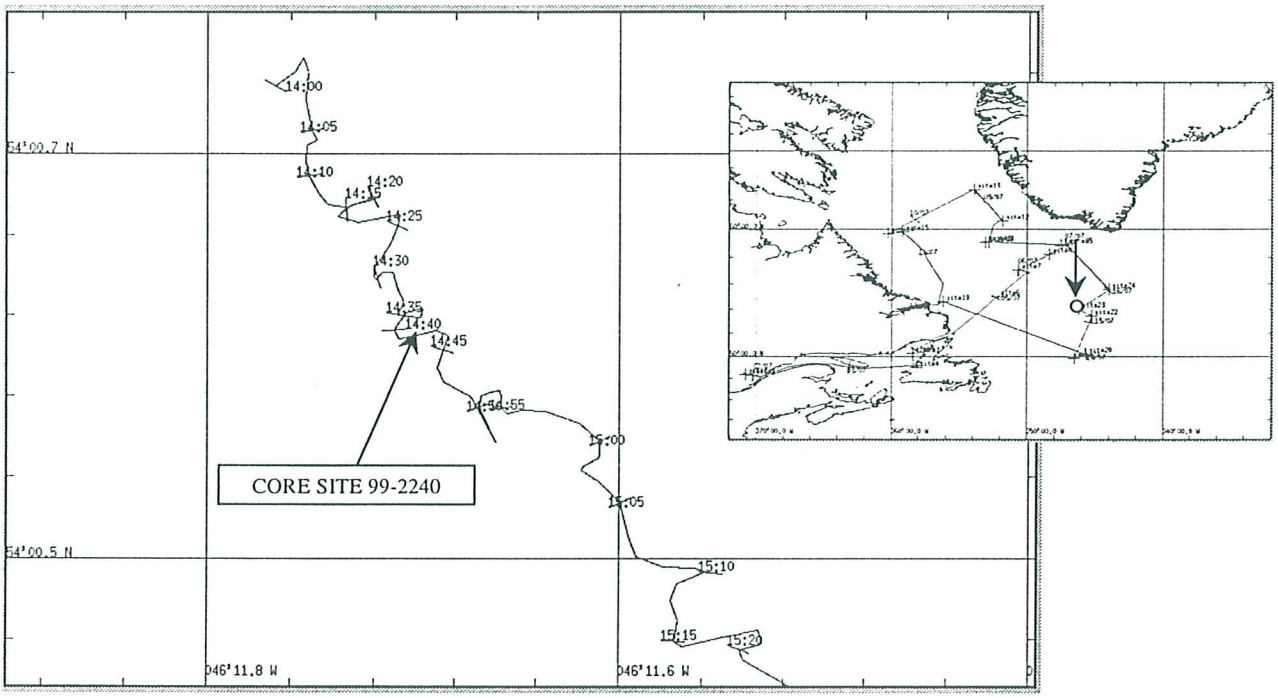
MD 99-2239

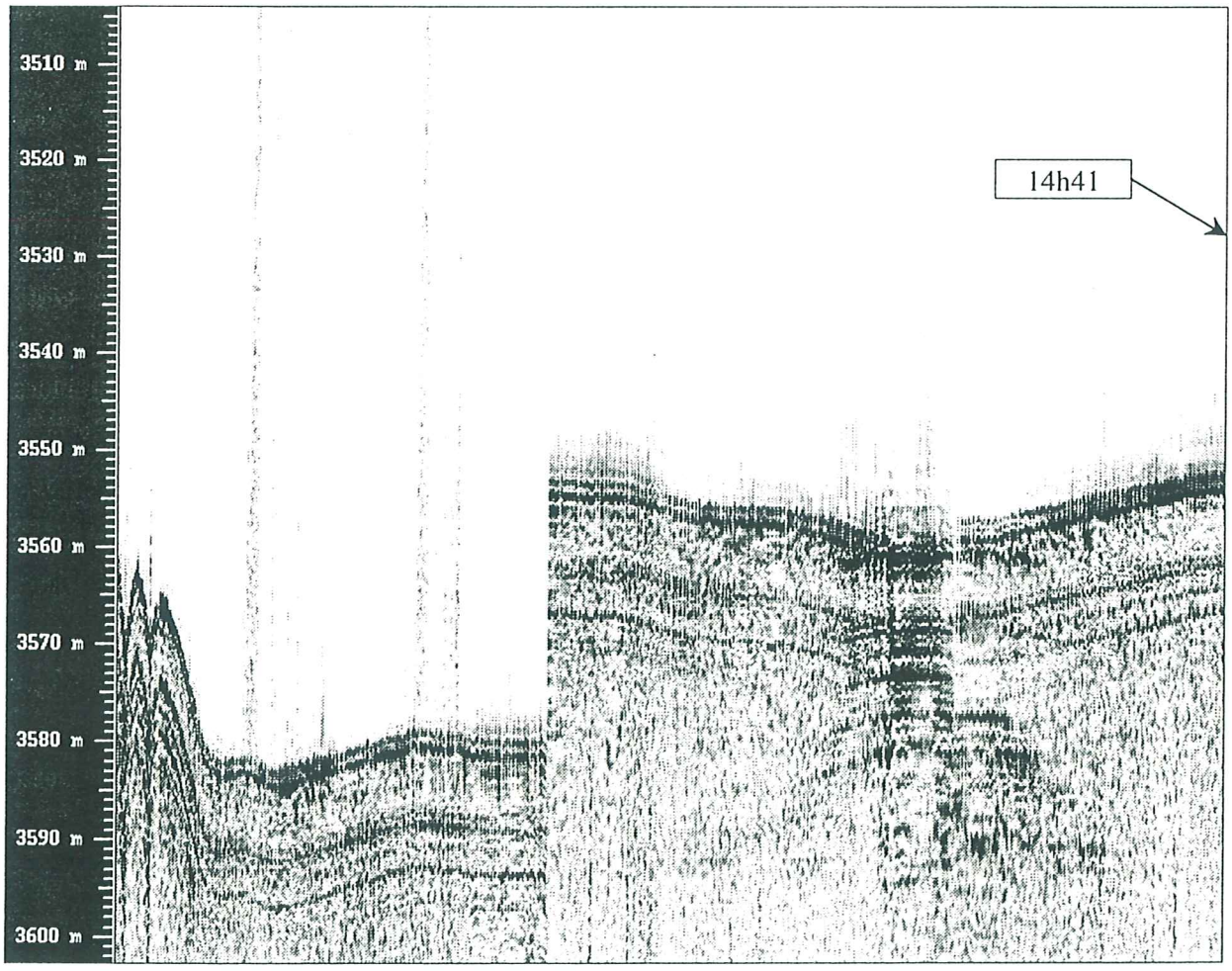


MD 99-2240

lat. : 54°00'66 N long. : 046°11'68 W

15 july 1999 Core length : 25.50 m Water depth : 3525 m





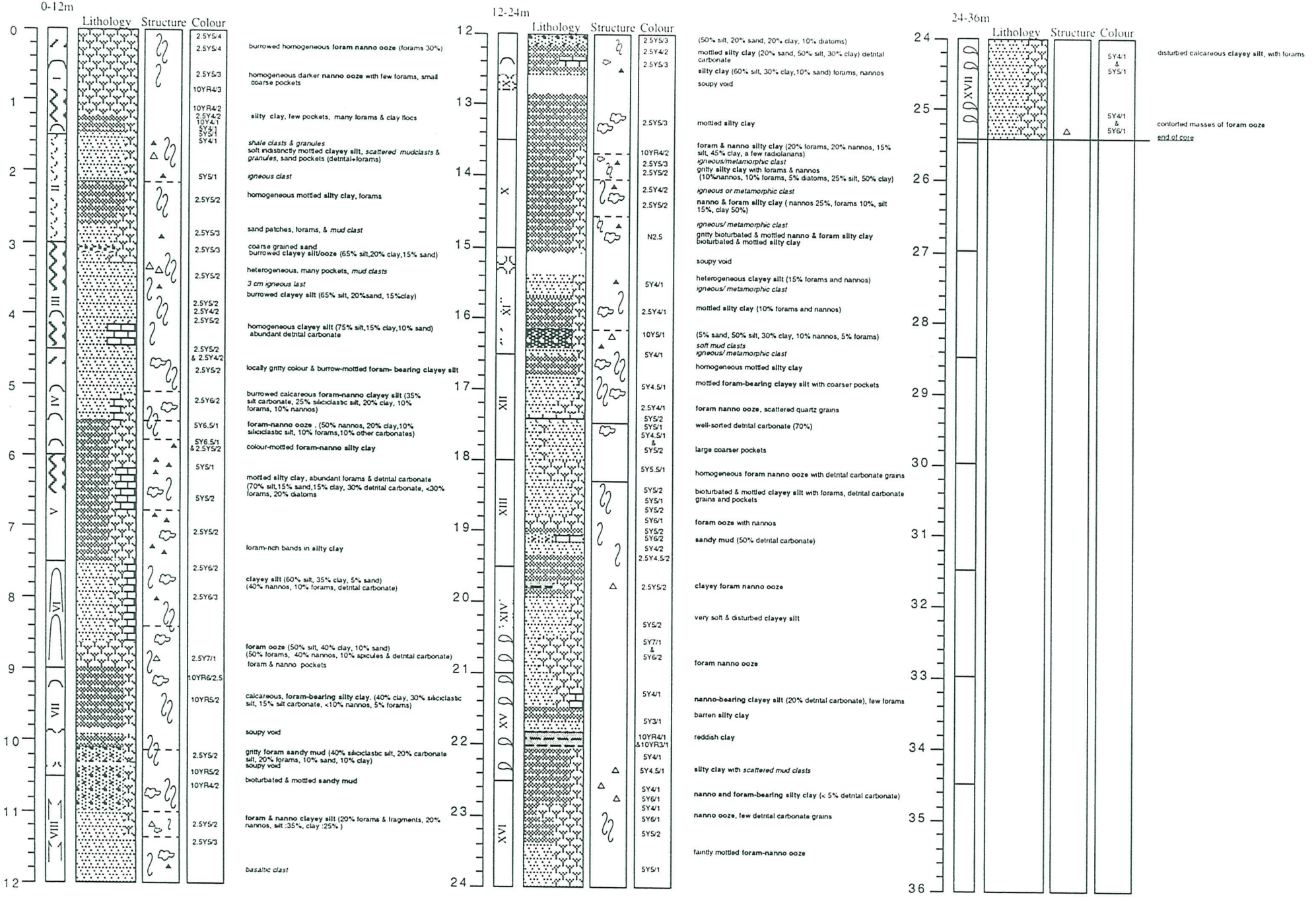
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

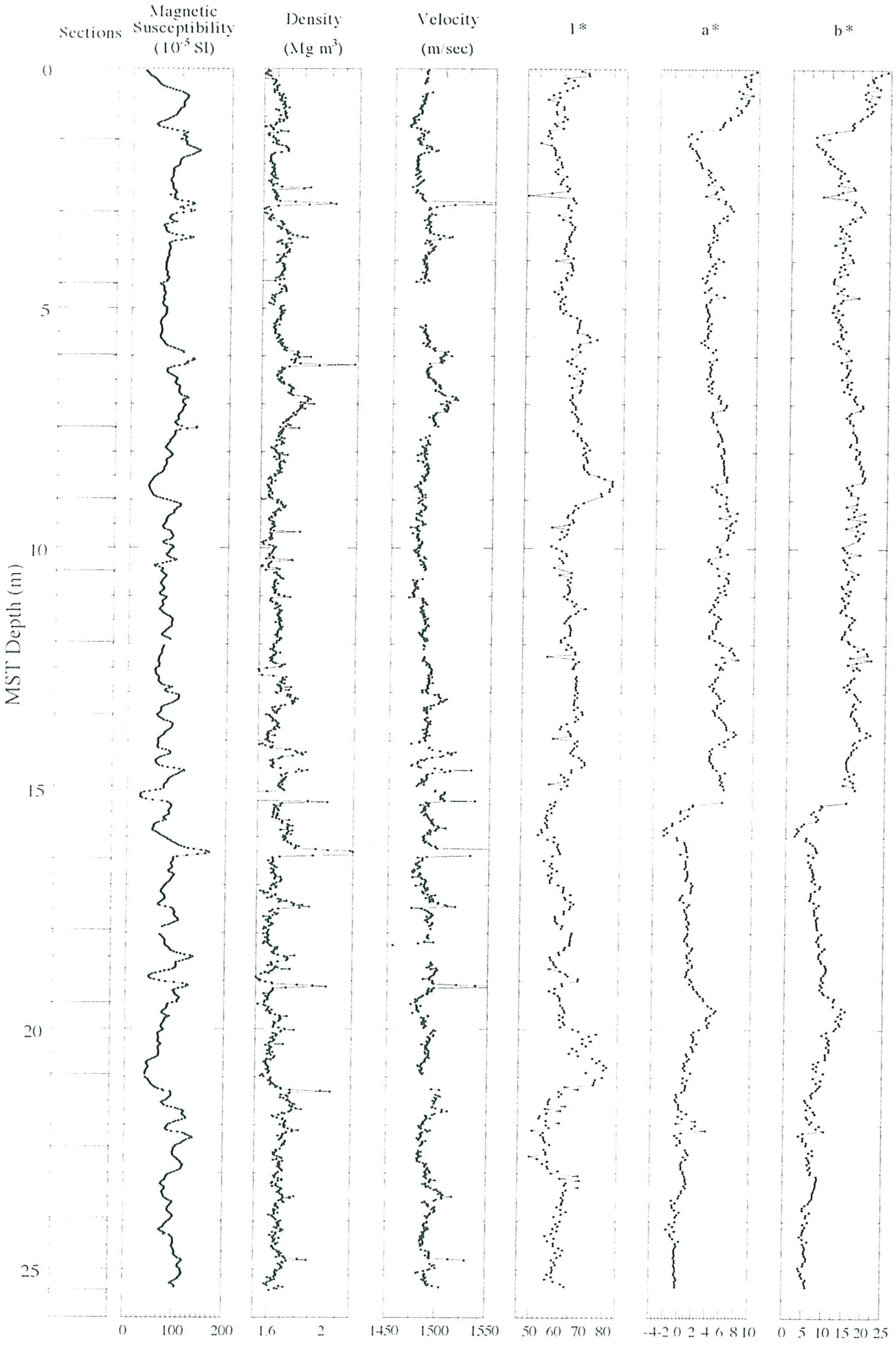
MD 99-2240 SW Gloria Drift (3525 m)

MD 99-2240

MD 99-2240



MD99 2240


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
0 100 200
1.6 2
1450 1500 1550
50 60 70 80
-4 -2 0 2 4 6 8 10
0 5 10 15 20 25

Julian day:	197	GMT time:	03h15
Latitude:	55°32.95N	Longitude:	043°57.88W
Water depth:	3280 m	Location:	Gloria Drift

Core number:	MD 99-2241	Corer length:	31.00 m
		Apparent penetration:	31.00 m
		Core length:	25.35 m

Observations

Corer condition:

Cutter damaged but corer is in good condition.

Core condition:

Good

Sections and sampling

Number of sections recovered and conditions:

All XVII sections in good condition. The last one is 135 cm long.

Onboard sampling and post cruise curation:

- The sections were split and described onboard. Both the archive and working halves will be curated at Gif-sur-Yvette.
- Constant volume sampling have been perfomed on the archive halves every other section starting at I. These samples will be curated at AGC-BIO.
- A measure of the sediment density was mad on the archives halves using a penetrometer. Several bags of sediments have been recovered: 1 core cutter, 1 core catcher, 1 top, 1 for the sediments lost between sections V and VI, 2 bags of soupy material have been made at 1090-1102cm and 1210-1215cm (probably re-inject from the base). They will be curated at Gif-sur-Yvette.

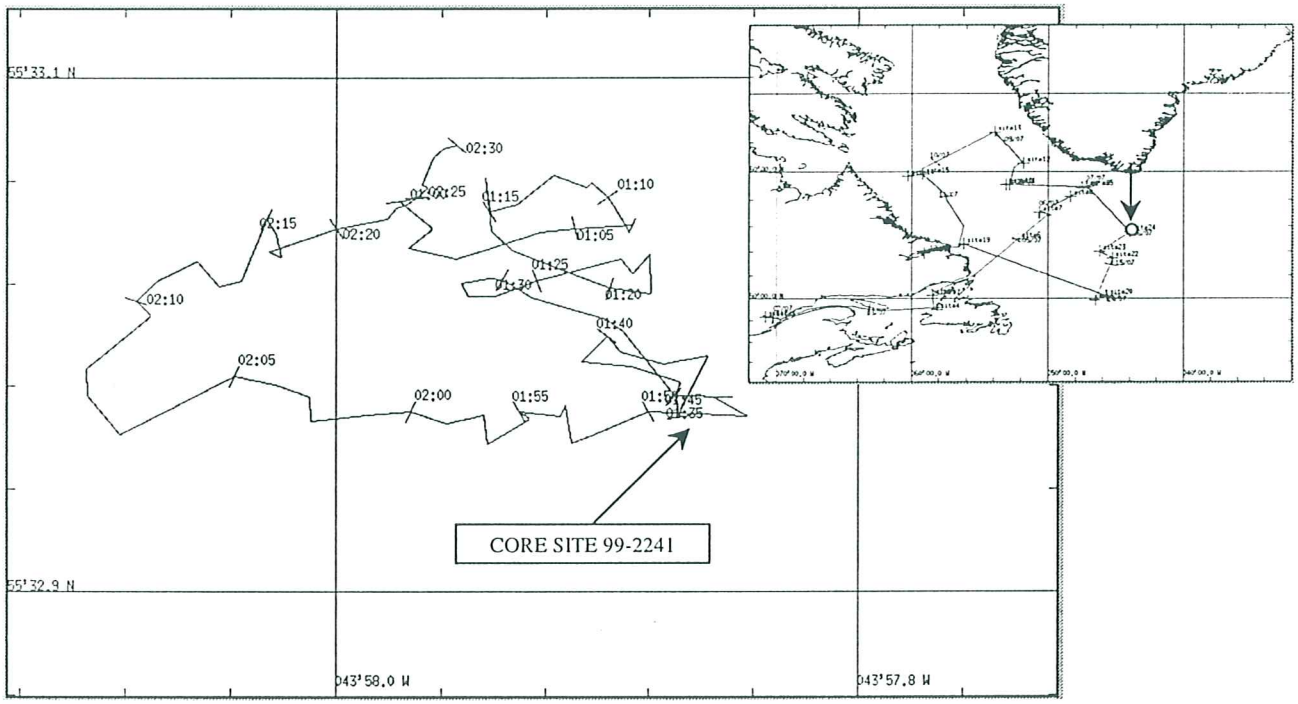
Summary of physical and sedimentological observations

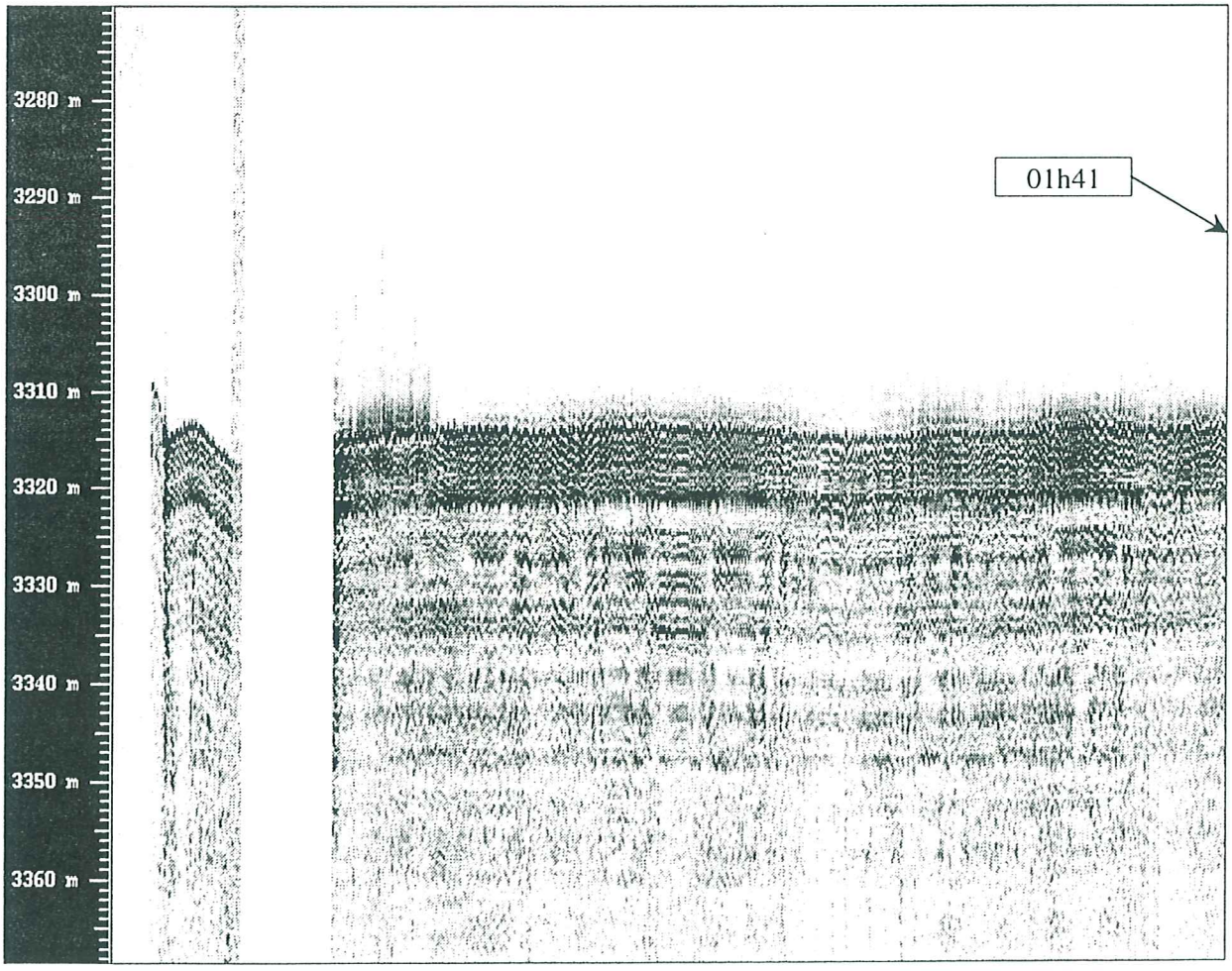
- Moderately disturbed to about 12 m.
- The core consists of clayey silt (less commonly sandy mud) interbedded with foram- and nanno-bearing silty clay to foram-nanno ooze. Bed contacts are commonly gradational thanks to pervasive bioturbation. A single thin laminated silt bed occurs at 18.4 m.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 30 to 180 x 10^{-5} SI. Bulk density values vary from about 1.4 to 1.8 Mg/m^3 and p-wave velocities range from about 1470 to 1530 m/sec.

MD 99-2241

lat. : 55°32'95 N long. : 043°57'88 W

16 july 1999 Core length : 25.35 m Water depth : 3280 m





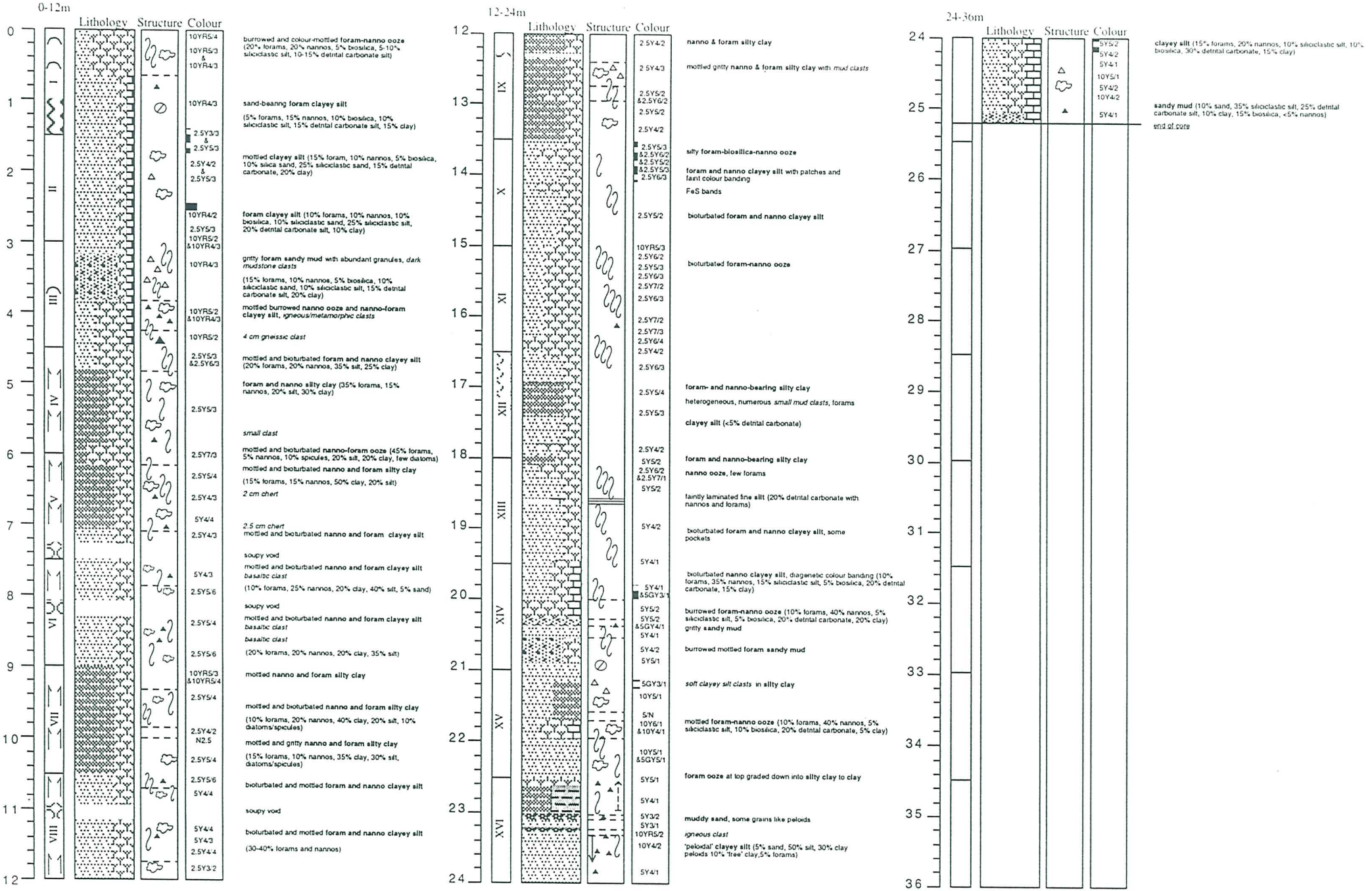
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

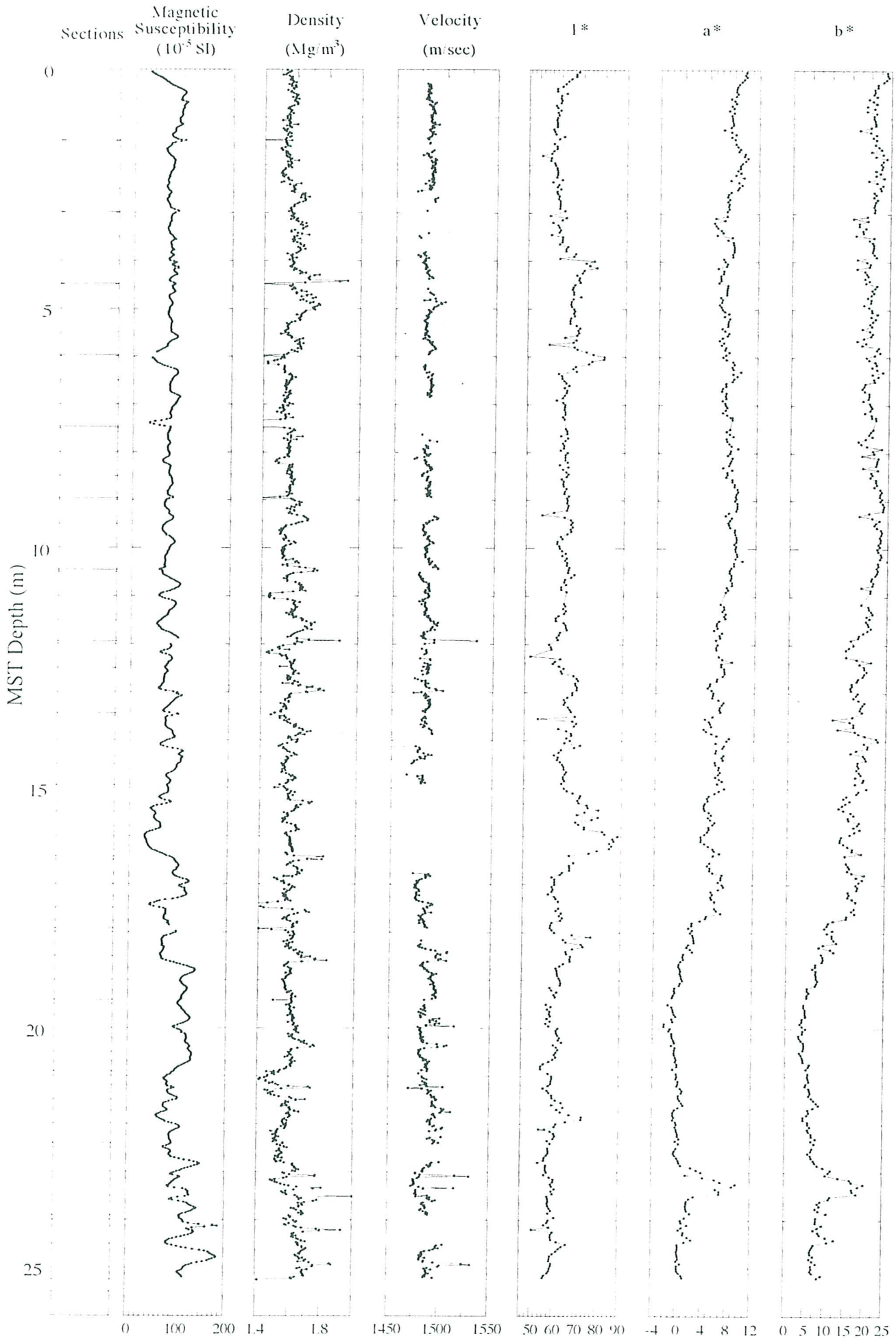
MD 99-2241 Gloria Drift (3280 m)

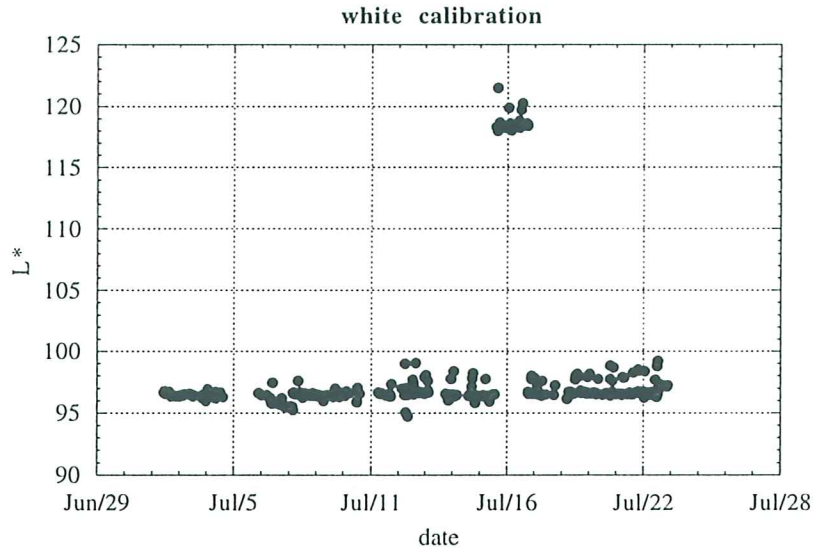
MD 99-2241

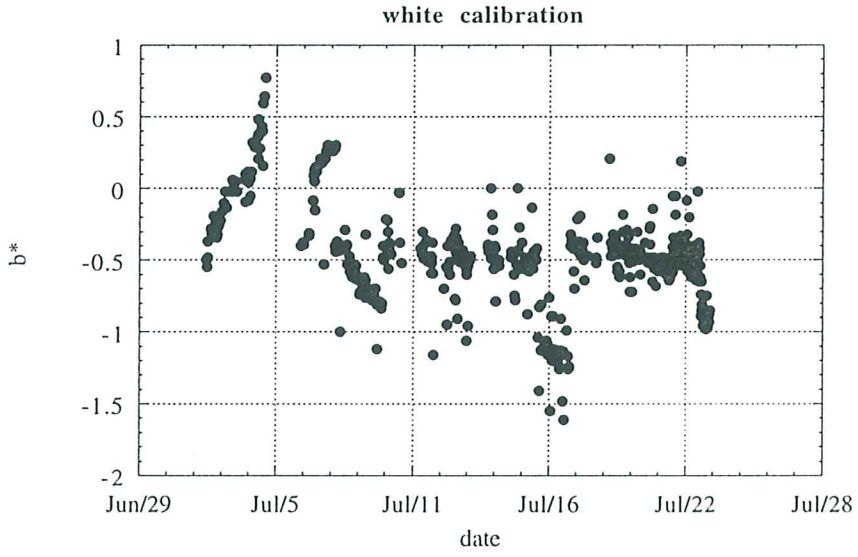
MD 99-2241

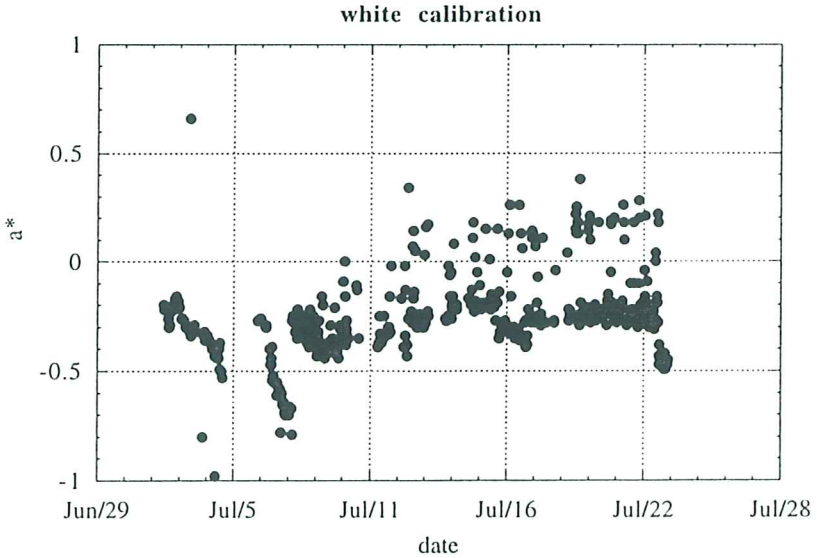


MD99 2241


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
0 100 200
1.4 1.8
1450 1500 1550
50 60 70 80 90
-4 0 4 8 12
0 5 10 15 20 25


white calibration
125
120
115
110
105
100
95
90
L*
Jun/29
Jul/5
Jul/11
Jul/16
Jul/22
Jul/28
date


white calibration
1
0.5
0
-0.5
-1
-1.5
-2
b*
Jun/29
Jul/5
Jul/11
Jul/16
Jul/22
Jul/28
date


white calibration
1
0.5
0
-0.5
-1
a*
Jun/29
Jul/5
Jul/11
Jul/16
Jul/22
Jul/28
date

Julian day:	197	GMT time:	07h03
Latitude:	55°32.66N	Longitude:	043°56.96W
Water depth:	3225 m	Location:	Gloria Drift

CTD depth: 0 - 200 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

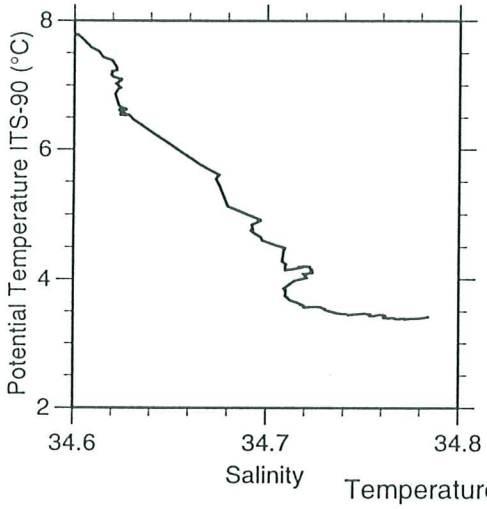
Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 65 m and near surface.

Sampling

The water samples will be analysed for alkenone, Iodine 129 and Neodimium.

Summary of CTD profil

- The surface temperature was 7.78°C.
- The Niskin bottle number 7 (40 m deep) did not close, no sample.



CTD Station 24

Gloria Drift

July 16, 1999

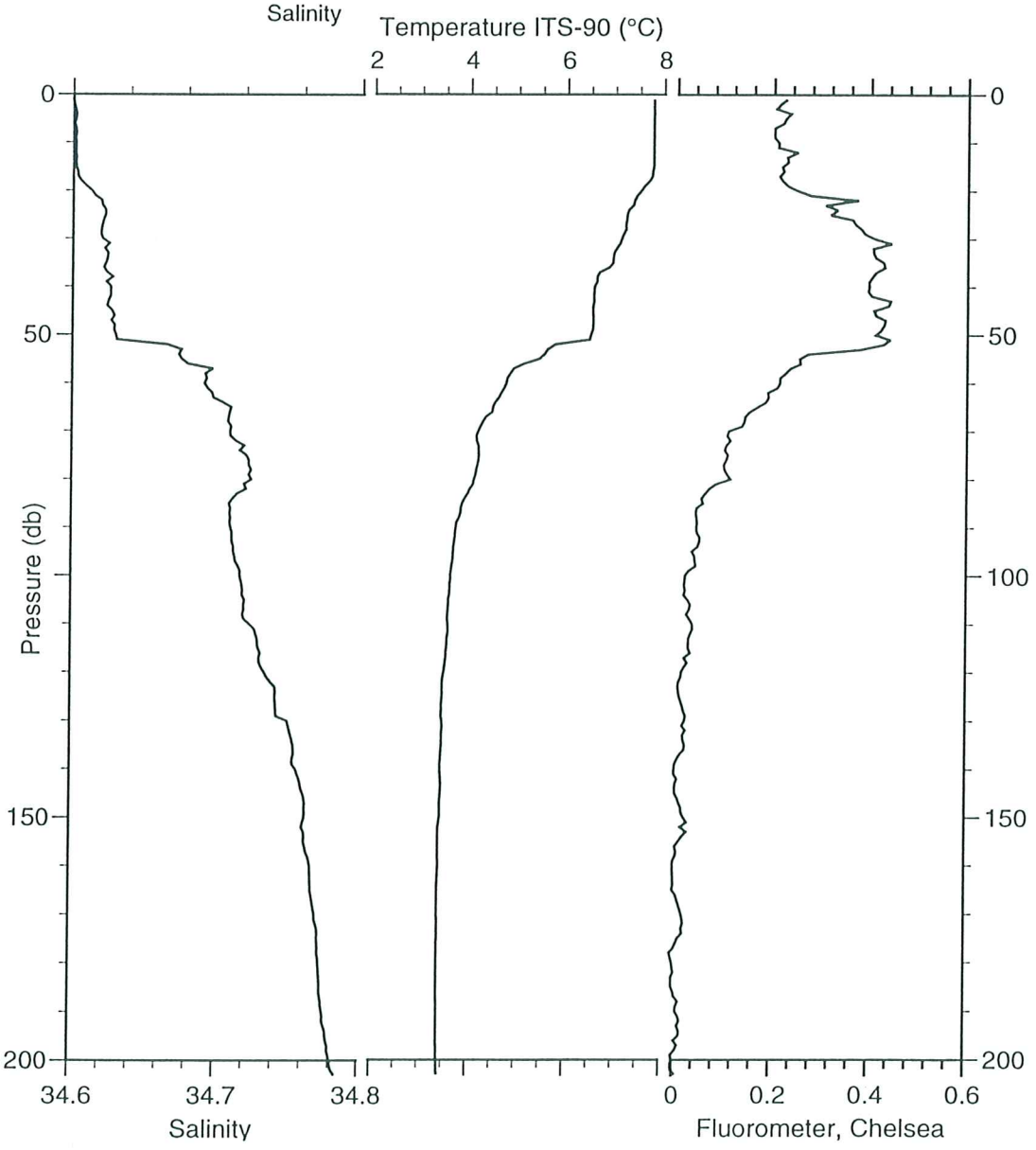
Latitude : 50°11.55 N

Longitude : 045°40.68 W

Water depth : 35 m

Water profile : 0 - 200 m

File: **iM5009**



SITE 24

Rosette and CTD
0-3270 m

Julian day:	197	GMT time:	03h15
Latitude:	55°33.13N	Longitude:	043°58.00W
Water depth:	3280 m	Location:	Gloria Drift

CTD depth: 0 - 3270 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

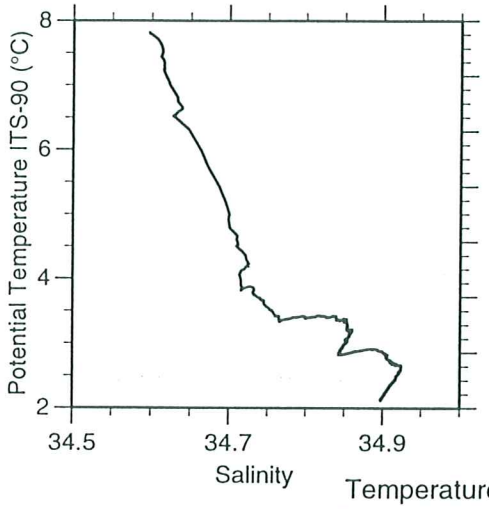
Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water colomn at 3270 m, 2750 m, 2100 m, 1650 m, 925 m, 475 m, 325 m.

Sampling

The water samples will be analysed for salinity (for CTD calibration), Iodine 129 and Neodinium.

Summary of CTD profil

- The surface temperature was 7.92°C.



CTD
Station 24

Gloria Drift

July 16, 1999

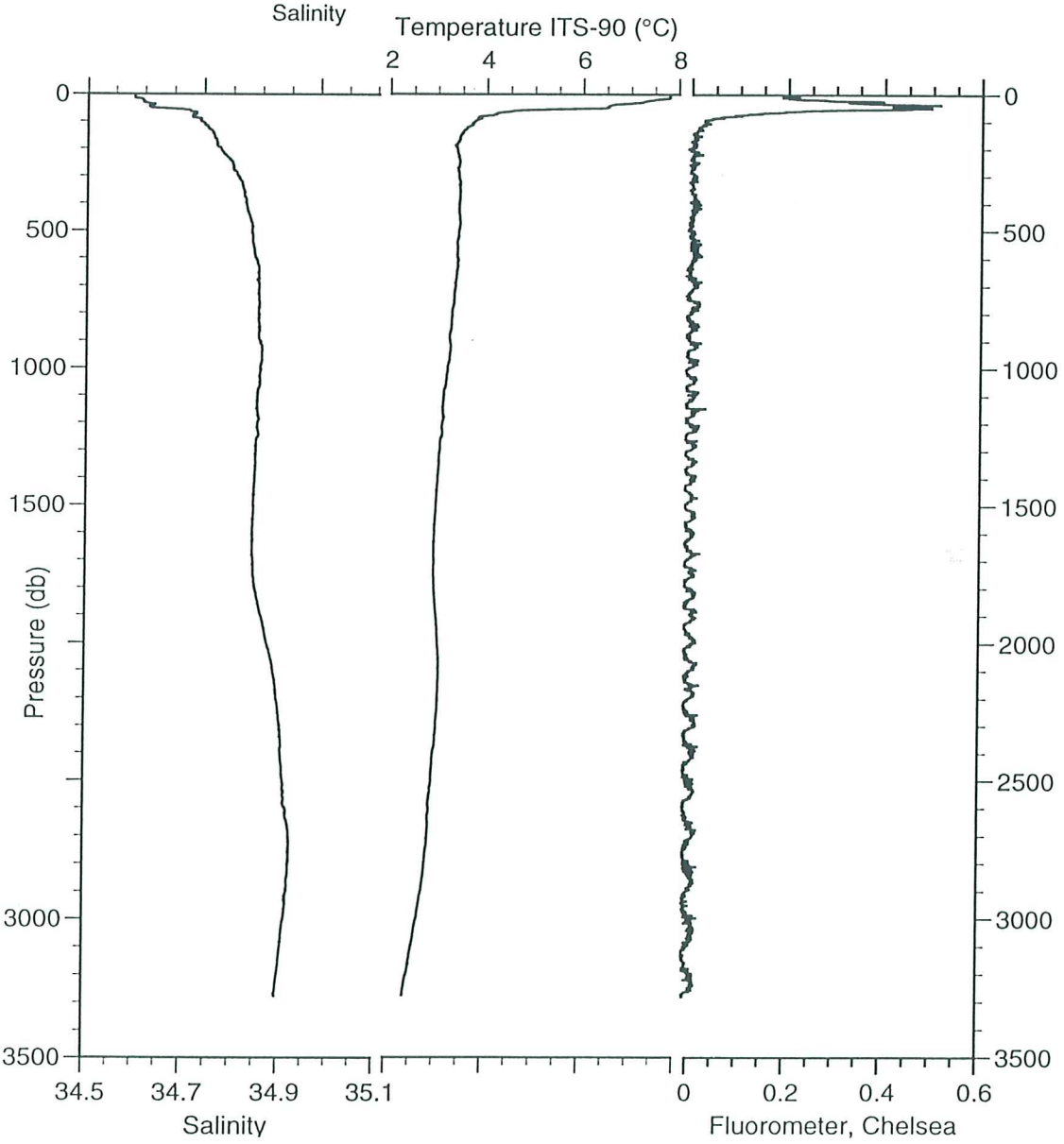
Latitude : 55°33.13 N

Longitude : 043°58.00 W

Water depth : 3280 m

Water profile : 0 - 3270 m

File: **iM5008**



Julian day:	198	GMT time:	00H52
Latitude:	58°55.065N	Longitude:	047°07.49W
Water depth:	2895 m	Location:	Greenland Rise

Core number:	MD 99-2242	Corer length:	42.25 m
		Apparent penetration:	42.25 m
		Core length:	35.36 m

Observations

Corer condition:
Good.

Core condition:
Good

Sections and sampling

Number of sections recovered and conditions:
All XXIV sections in good condition, the last one is 96 cm long.

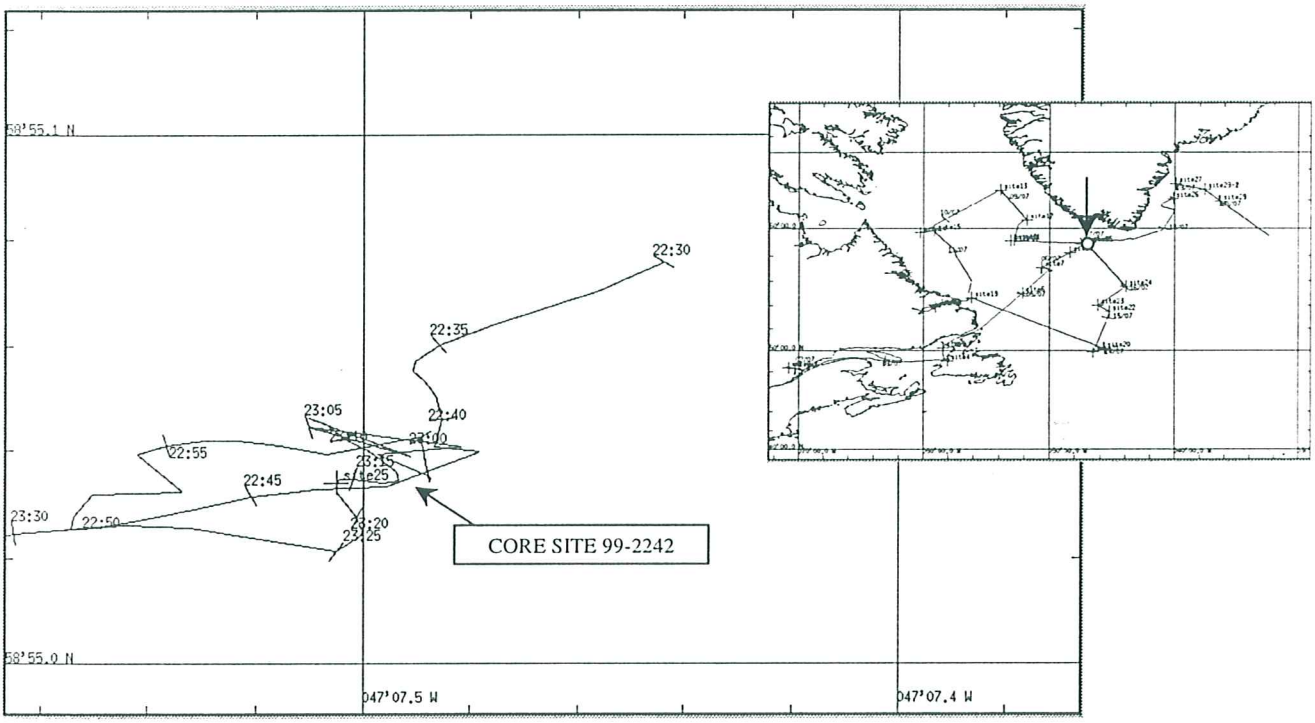
Onboard sampling and post cruise curation:
- The sections were split and described onboard. Both the archive and working halves will be curated at GEOTOP.
- A constant volume sampling was made on all working halves. The samples will be curated at AGC-BIO.
- U-channels were made on all working halves, they will be curated at GEOTOP after they have been measured for the paleomagnetic intensity at UCD.
- Measure of the sediment density has been done using a penetrometer.
- Several bags of sediment were recovered: 1 core cutter, 1 core catcher, 1 top, 1 for a rock found at 525cm, 1 from 575 cm, 1 from 618-624 cm, 1 from 750-773 (very soupy, probably injected by coring process), 1 from 780-790 cm (very soupy, probably injected by coring process), 1 for a rock found at 805 cm, 1 from 945-950 cm (very soupy, probably injected by coring process), 1 from 1035-1050 cm (very soupy, probably injected by coring process), 1 from 1153-1170 cm (very soupy, probably injected by coring process), 1 from base of section XVI. (Curated at GEOTOP)

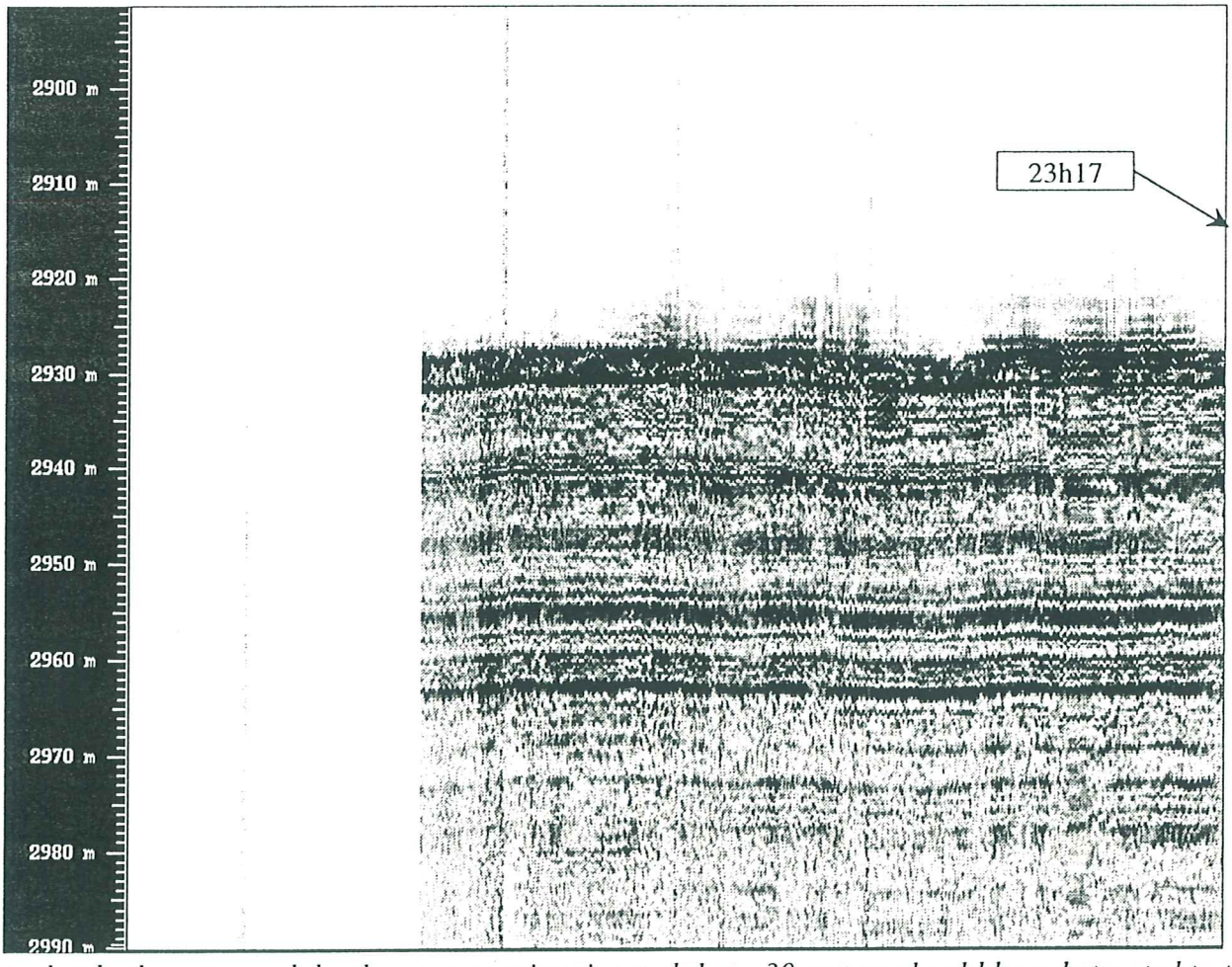
Summary of physical and sedimentological observations

- Moderately disturbed to 1.5 m; several voids to 15 m.
- Except for faint colour banding and four sandy mud layers rich in detrital carbonate, the core consists of poorly sorted sandy mud, alternating with structureless, moderately burrowed sequences of silty clay to clayey silt with variable, generally small, amounts of biogenic material. Outsized bedrock and soft-sediment clasts are common.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 125 to 500 x 10^{-5} SI. Bulk density values vary from about 1.45 to 1.9 Mg/m^3 and p-wave velocities range from about 1450 to 1540 m/sec.

MD 99-2242

lat. : 58°55'06 N long. : 047°07'49 W
16 july 1999 Core length : 35.36 m Water depth : 2895 m

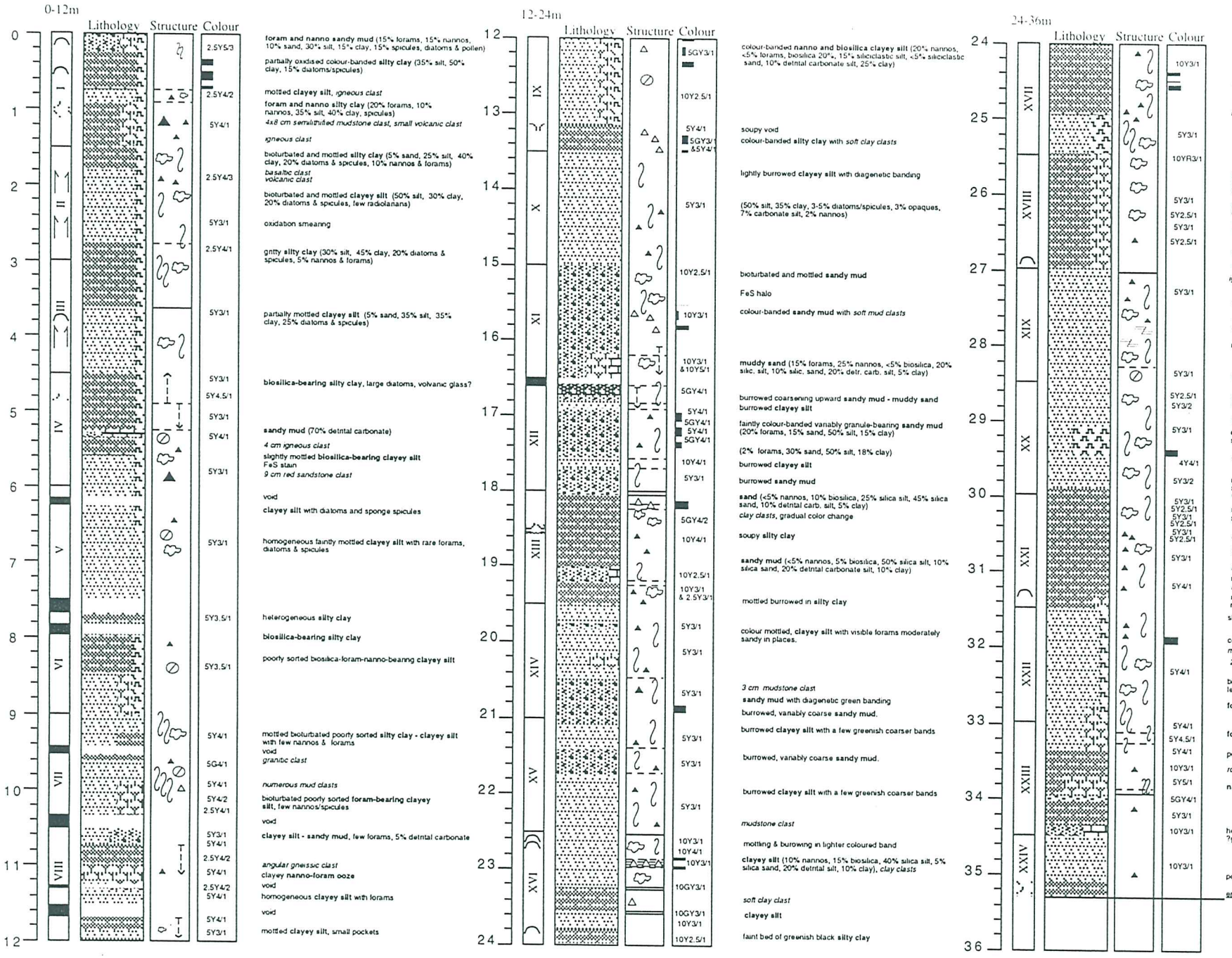




Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

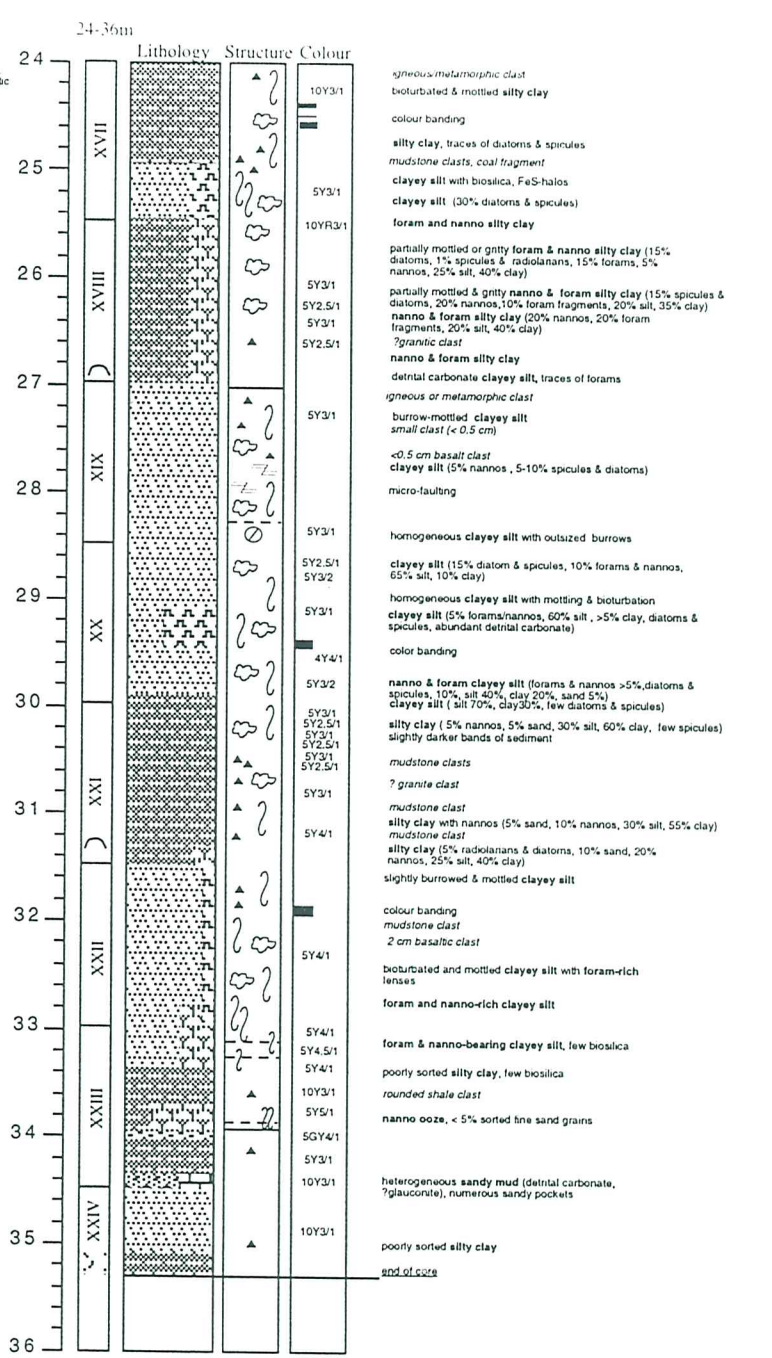
Document IFRTP – Dept. Océanographie

MD 99-2242 Greenland Rise (2895 m)

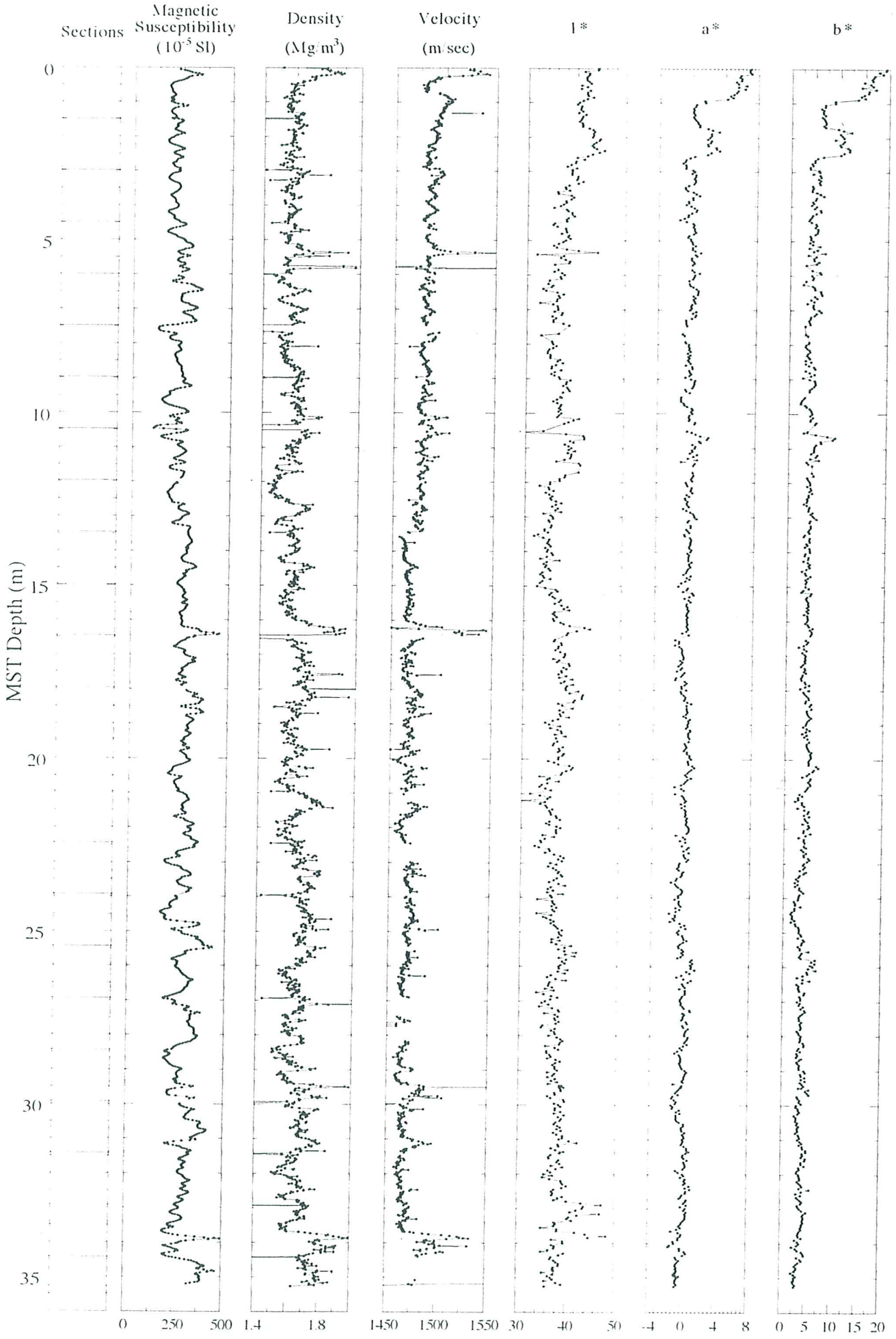


MD 99-2242

MD 99-2242



MD99 2242


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0
250
500
1.4
1.8
1450
1500
1550
30
40
50
-4
0
4
8
0
5
10
15
20

Julian day:	199	GMT time:	15H30
Latitude:	62°04.51N	Longitude:	040°11.26W
Water depth:	1280 m	Location:	Eastern Greenland Rise

Core number: MD 99-2243	Corer length:	31.65 m
	Apparent penetration:	20.00 m
	Core length:	09.43 m

Observations

Corer condition:

The corer was bent at a ~40° angle 10 m below the weight.

Core condition:

The PVC imploded 2 m above the free piston which is about ~ 20 m below the weight.

Sections and sampling

Number of sections recovered and conditions:

All VII sections appear to be in good condition, but plastic was found at the top of section I. The last section is 43 cm long. All the sediment present in the liner is completely disturbed by coring processes. Therefore, the core is not suitable for any scientific objectives.

Onboard sampling and post cruise curation:

- The sections were split and described onboard. Both the archive and working halves will be curated at Gif-sur-Yvette.
- Several bags of sediment were recovered: 1 core cutter, 1 core catcher, 1 for sediment between section I and II, 1 for top of sectionVII and 1 from base of VII. They will be curated at Gif-sur-Yvette.

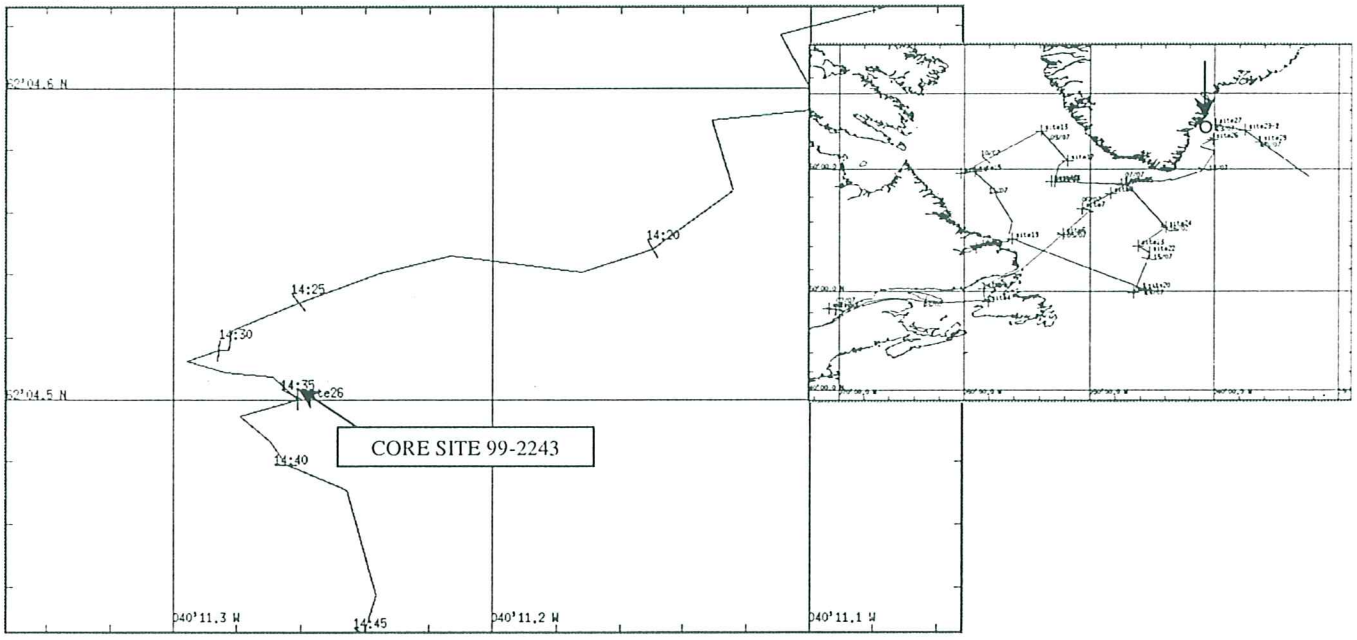
Summary of physical and sedimentological observations

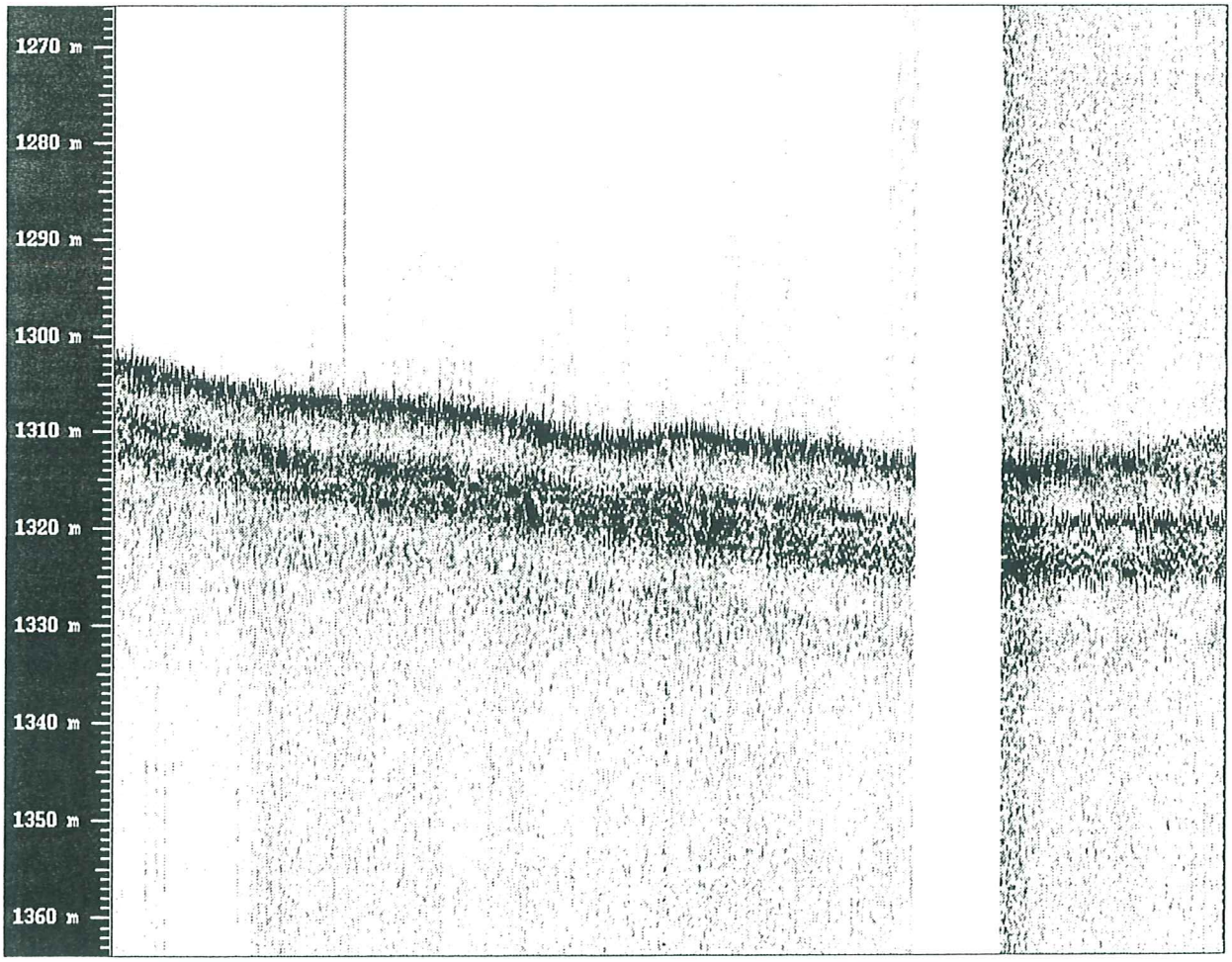
- Strongly disturbed throughout – very soft to soupy.
- A 10 cm cobble marks the boundary between an oxidized upper sandy mud and a lower dark gray clayey silt.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 300 to 750 x 10^{-5} SI. Bulk density values vary from about 1.75 to 2.05 Mg/m^3 except for density values of greater than 2.1 Mg/m^3 at approximately 1m. P-wave velocity values obtained range from 1465 to 1530 m/sec.

MD 99-2243

lat. : 62°04'51 N long. : 040°11'26 W

18 july 1999 Core length : 09.43 m Water depth : 1280 m

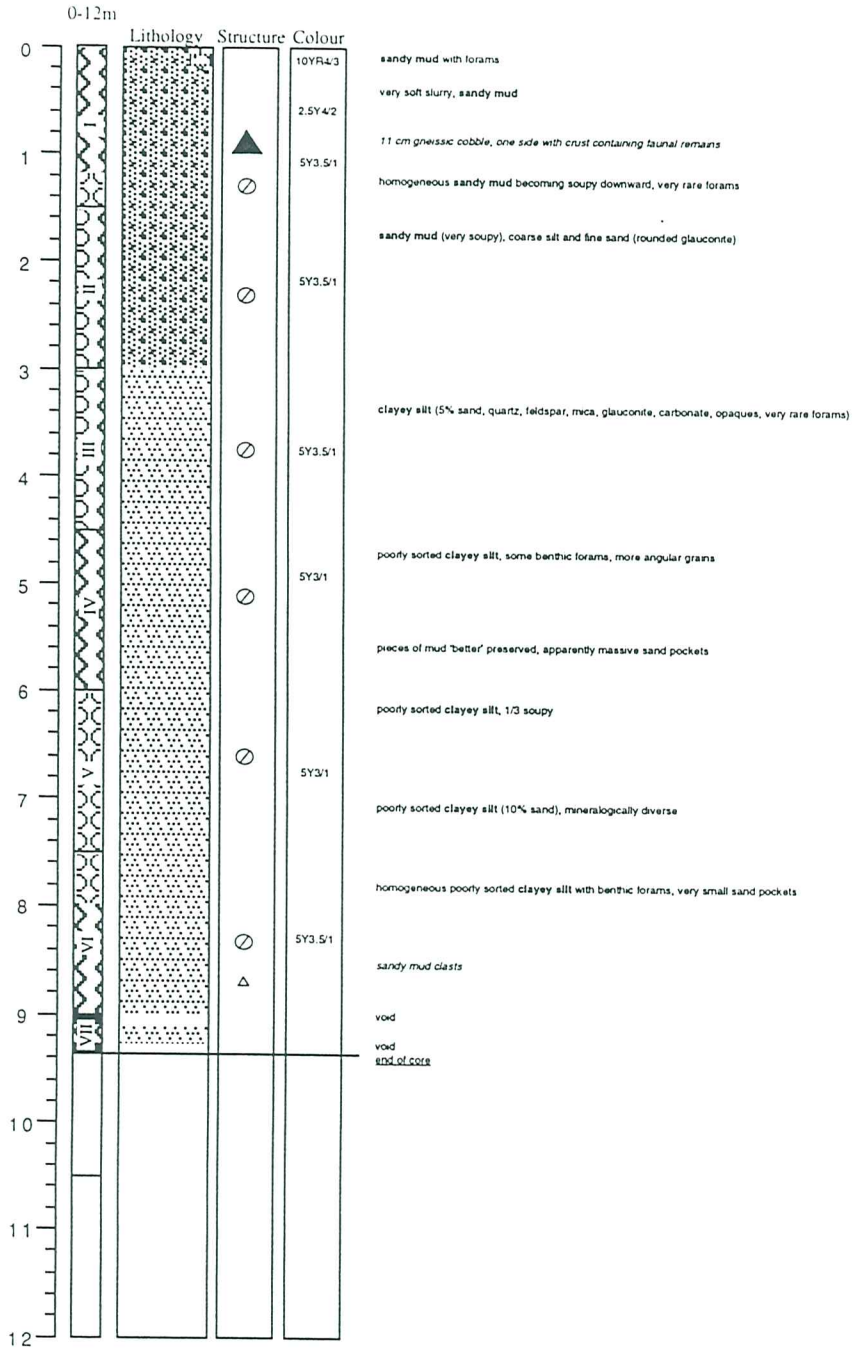




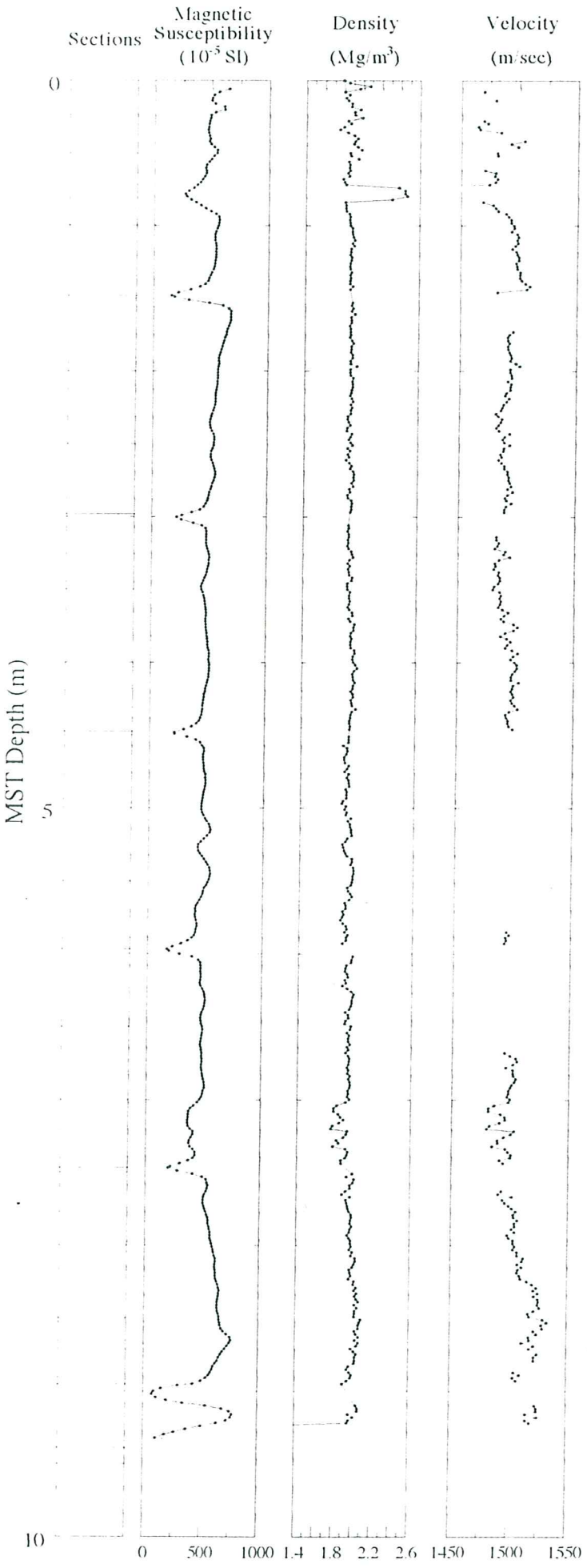
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD 99-2243 East Greenland Slope (1280 m)



MD99 2243


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
MST Depth (m)
0
5
10
0
500
1000
1.4
1.8
2.2
2.6
1450
1500
1550

SITE 26 **Rosette and CTD cast**
0 - 1256 m

Julian day:	199	GMT time:	12h24
Latitude:	62°04.37N	Longitude:	040°11.57W
Water depth:	1256	Location:	Eastern Greenland Slope

CTD depth: 0 - 1256 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

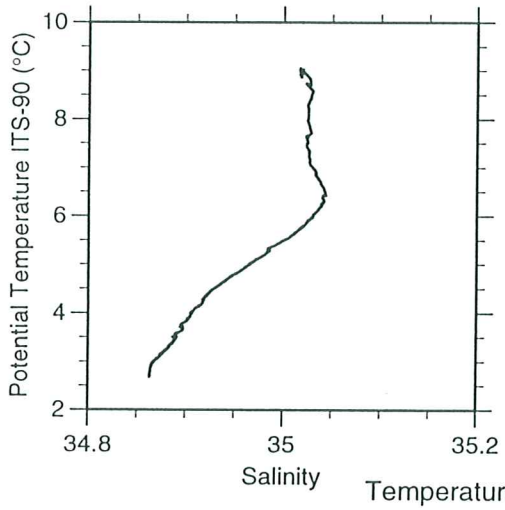
Twelve Niskin bottles of 12 litres with silicone Sandow allow to sample the water colomn at 1256 m, 900 m, 650 m, 200 m, 110 m and 30 m.

Sampling

The water samples will be analyses for salinity (for CTD calibration), Iodine 129, Hafnium and Neodinium.

Summary of CTD profil

- The surface temperature was 9.02 °C.



CTD
Station 26

East Greenland Slope

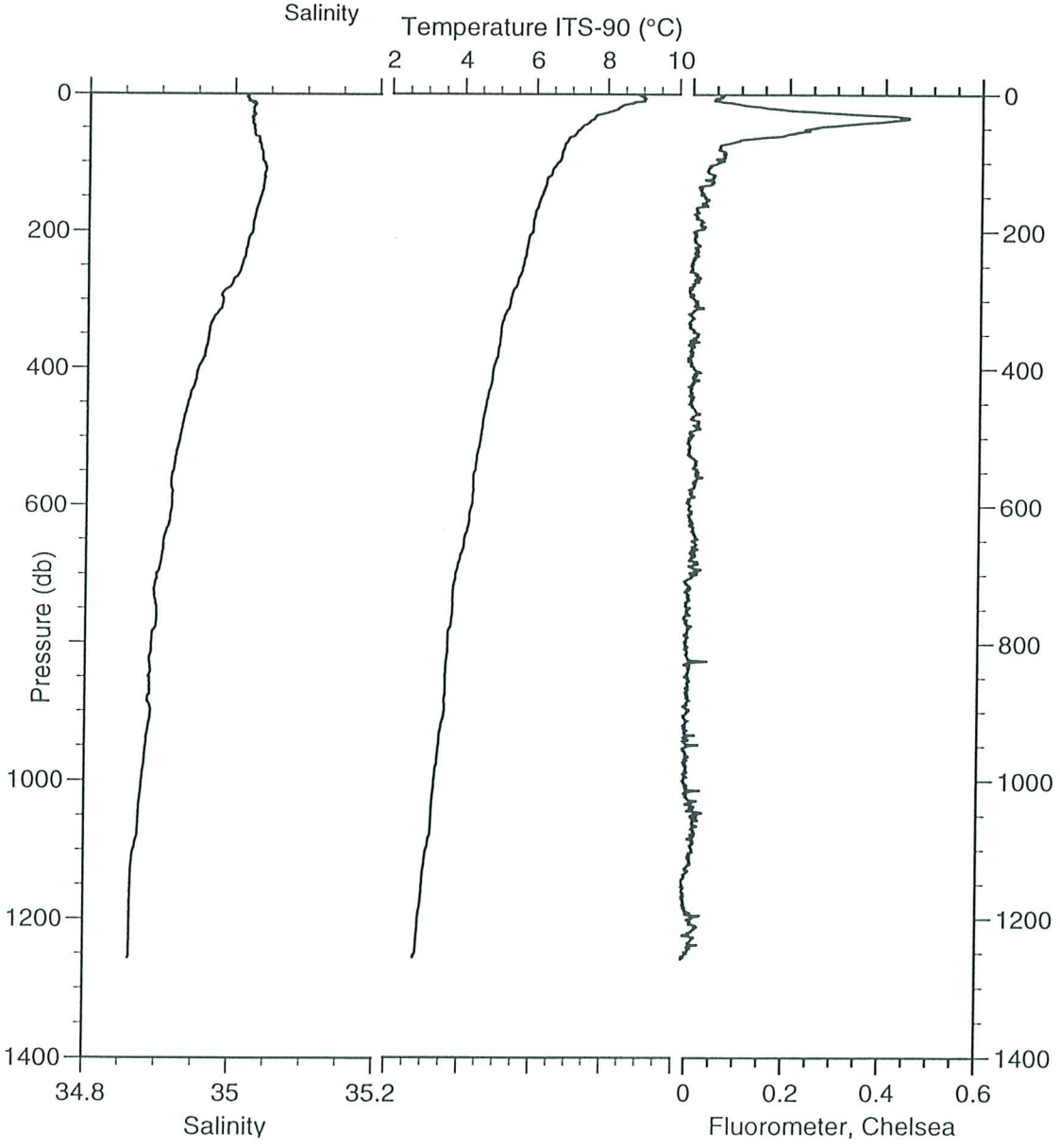
Latitude : 62°04.37 N

Longitude : 040°11.57 W

Water depth : 1290 m

Water profile : 0 - 1258 m

File: **iM5010**



SITE 27

Julian day:	199	GMT time:	23H00
Latitude:	63°03.35N	Longitude:	039°54.78W
Water depth:	1408 m	Location:	Eastern Greenland Slope

Core number:

Corer length:	05.00 m
Apparent penetration:	00.00 m
Core length:	00.00 m

Observations

Corer condition:

One boulder found in the core catcher, the gravity corer was empty.

Core condition:

No core

Sections and sampling

Number of sections recovered and conditions:

Onboard sampling and post cruise curation:

Summary of physical and sedimentological observations

Julian day:	200	GMT time:	10h10
Latitude:	62°41.99N	Longitude:	037°33.73W
Water depth:	2110m	Location:	Eastern Greenland Slope

Core number:	MD 99-2244	Corer length:	42.25 m
		Apparent penetration:	36.00 m
		Core length:	24.71 m

Observations

Corer condition:

Good. The corer was left 4 hours on the deck (because of other operations) before the liner was taken out the barrels.

Core condition:

Good.

Sections and sampling

Number of sections recovered and conditions:

Section 1 is in two parts, Ia (0-39 cm) and Ib (39-150 cm). The are XVII sections, all in good conditions, the last one being 71 cm long.

Onboard sampling and post cruise curation:

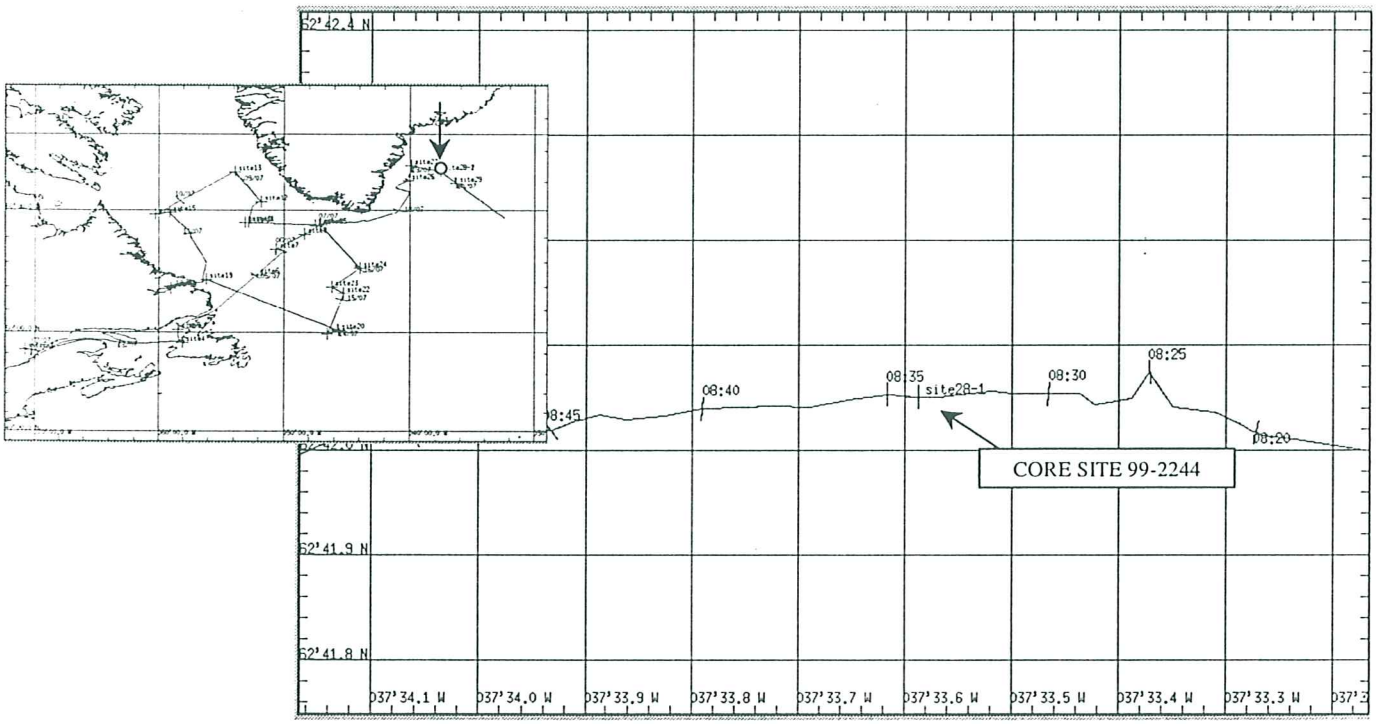
- The sections were split and described onboard. Both archive and working halves will be curated at Gif-sur-Yvette.
- U-channels were taken out of all the working halves. They will be curated at Gif-sur-Yvette.
- Paleomagnetic cube samples were made on the archive. They will be curated at Gif-sur-Yvette.
- Measure of the sediment density were performed on the working halves.
- Several bags of sediment were recovered: 1 top, 1 core cutter and 1 core catcher. They will be curated at Gif-sur-Yvette.

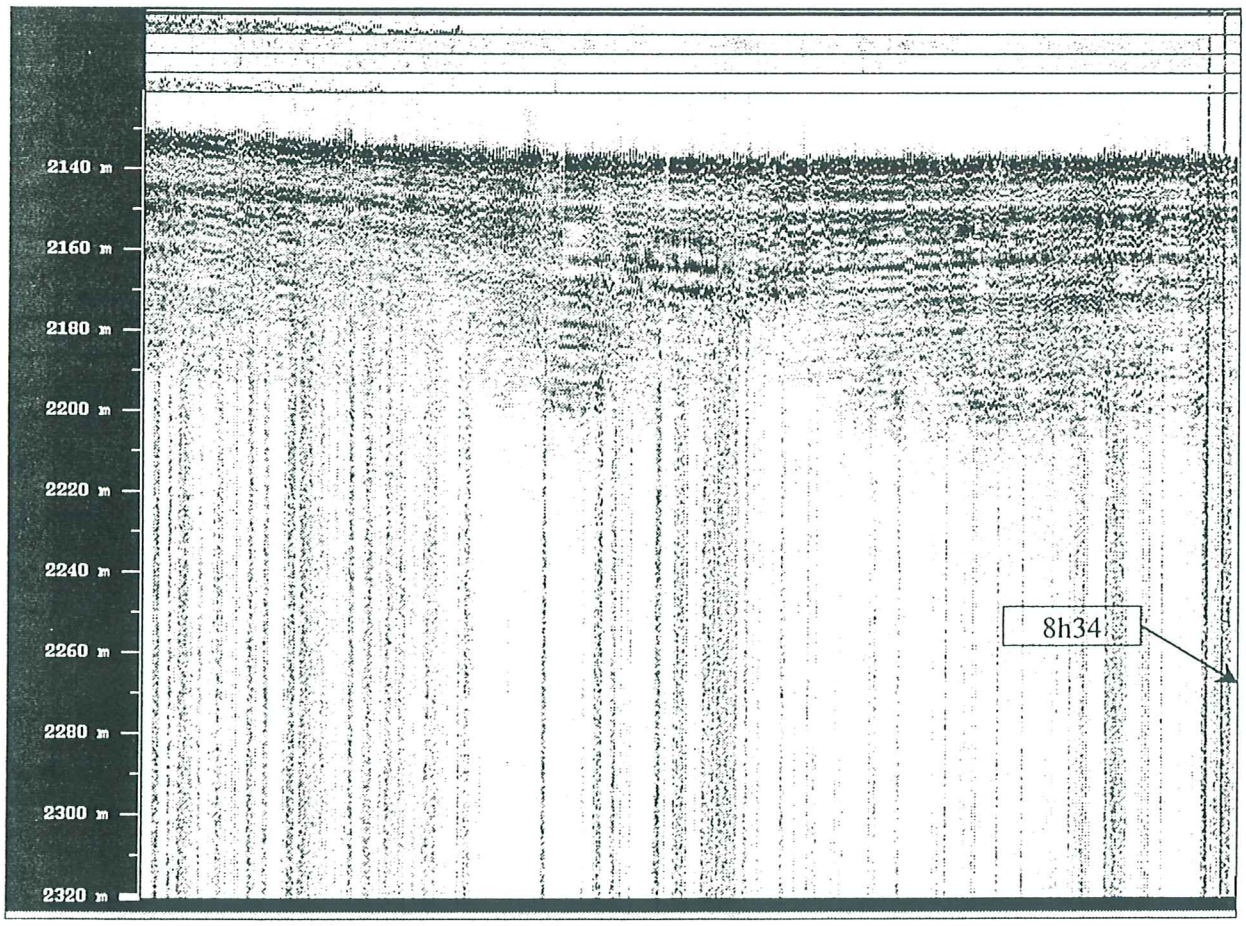
Summary of physical and sedimentological observations

- The core is predominantly dark gray to very dark grey siliciclastic sediment with only minor biogenic material. Silty clay intervals are commonly more intensely burrowed and mottled than clayey silts, which are either thick and homogeneous or thinly laminated within graded intervals. Sandy muds include both "clayey fine-grained sand", commonly associated with forams, and poorly sorted sediment which contains soft outsized clasts. There is a sandy ash layer at 10.40 m and abundant dispersed volcanic glass at 9.8 m.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 200 to 720 x 10^{-5} SI. Bulk density values vary from about 1.55 to 2.0 Mg/m^3 with a single interval with density greater than 2.2 Mg/m^3 at the top of the core. P-wave velocities values obtained range from 1450 to 1550 m/sec.

MD 99-2244

lat. : 62°41'99 N long. : 037°33'73 W
19 july 1999 Core length : 24.71 m Water depth : 2110 m





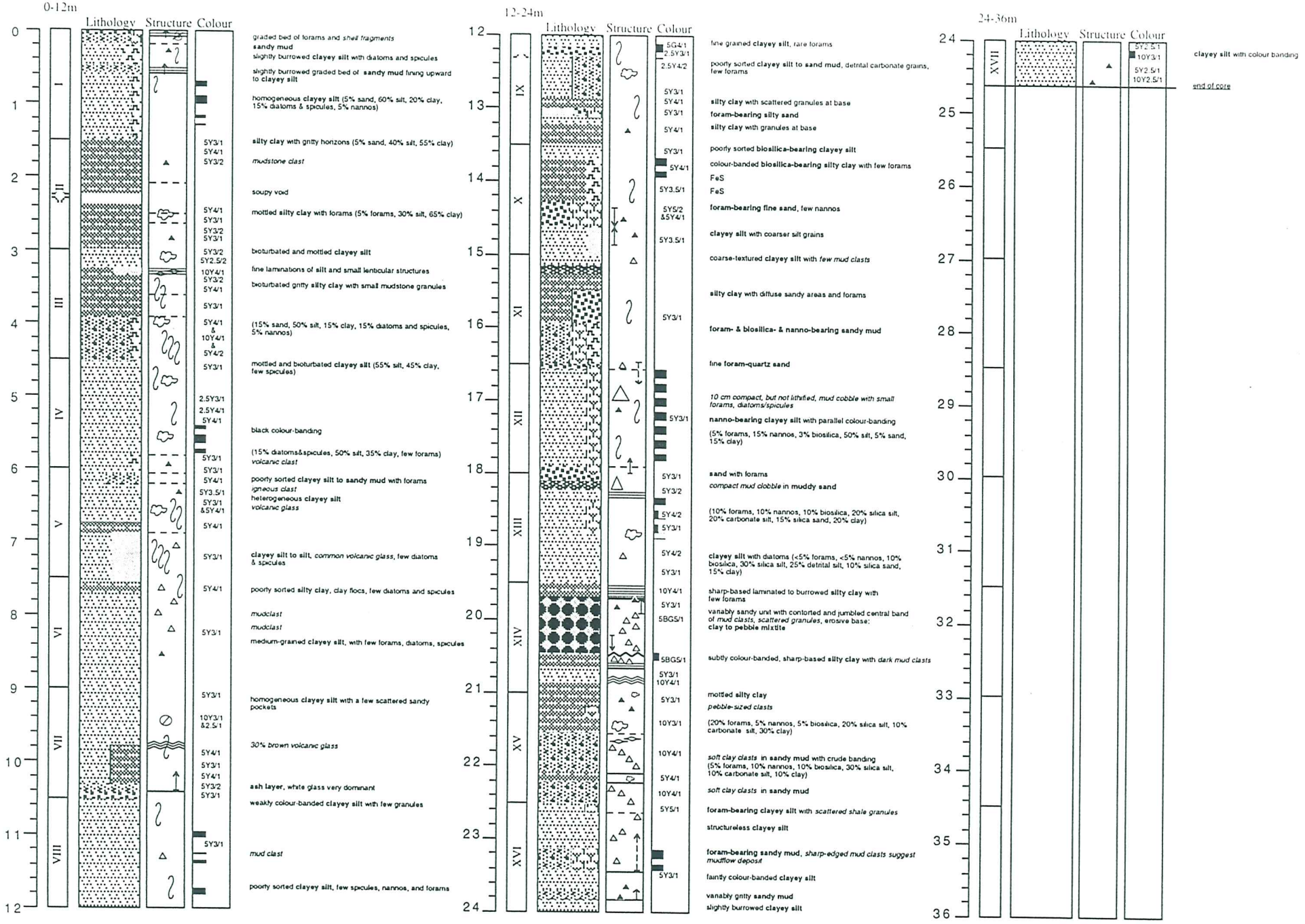
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

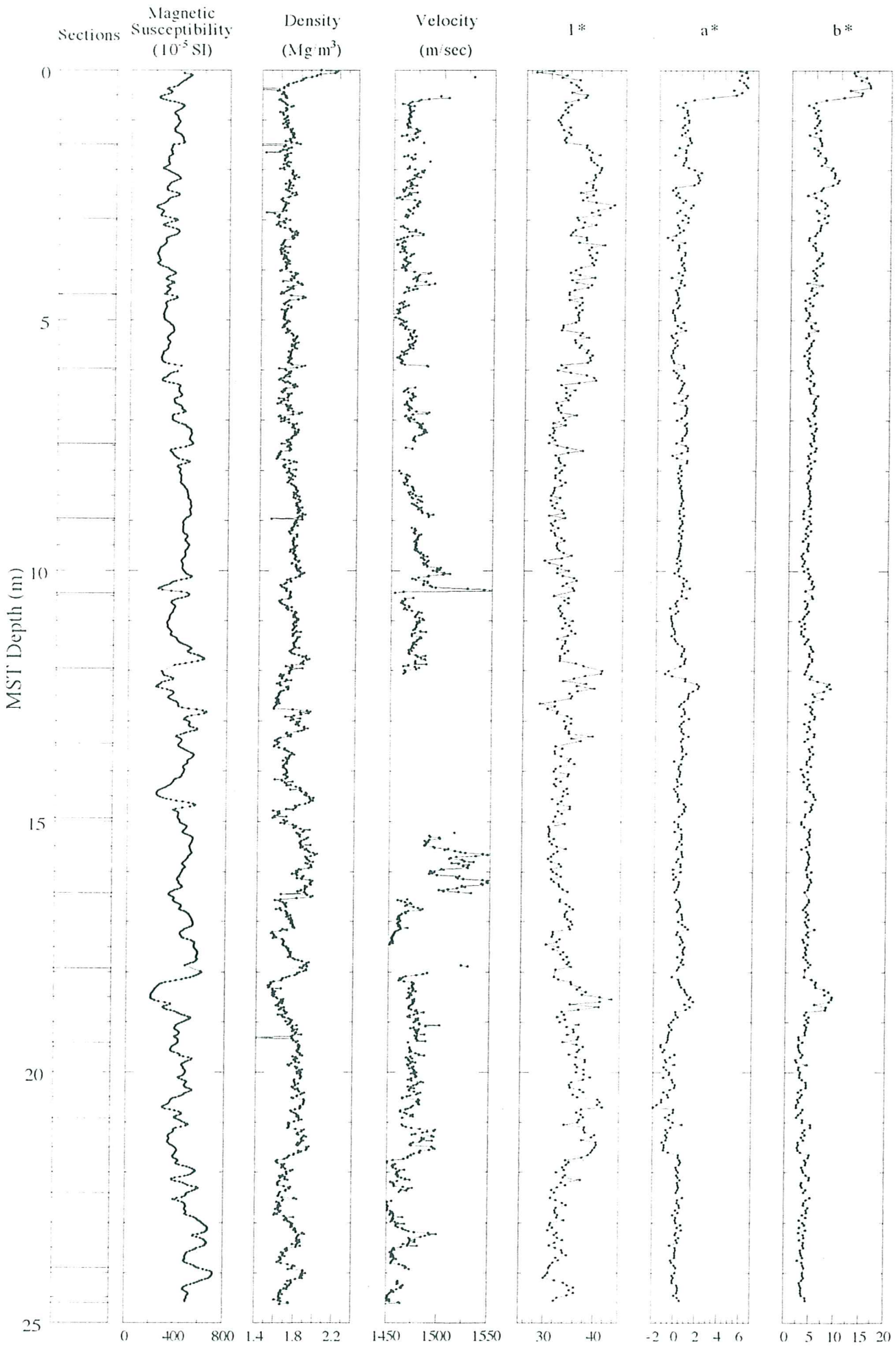
MD 99-2244 Irminger Basin, SE Greenland Slope (2750 m)

MD 99-2244

MD 99-2244



MD99 2244


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
0
400
800
1.4
1.8
2.2
1450
1500
1550
30
40
-2
0
2
4
6
0
5
10
15
20

Julian day:	200	GMT time:	13h10
Latitude:	62°41.93N	Longitude:	037°35.49W
Water depth:	2110m	Location:	Eastern Greenland Slope
Core number:	MD 99-2245 BX	Corer length:	Box-core

Observations

Corer condition:
Good.

Core condition:
Poor, only about 5 cm of sediment recovery, disturbed by coring processes.

Sections and sampling

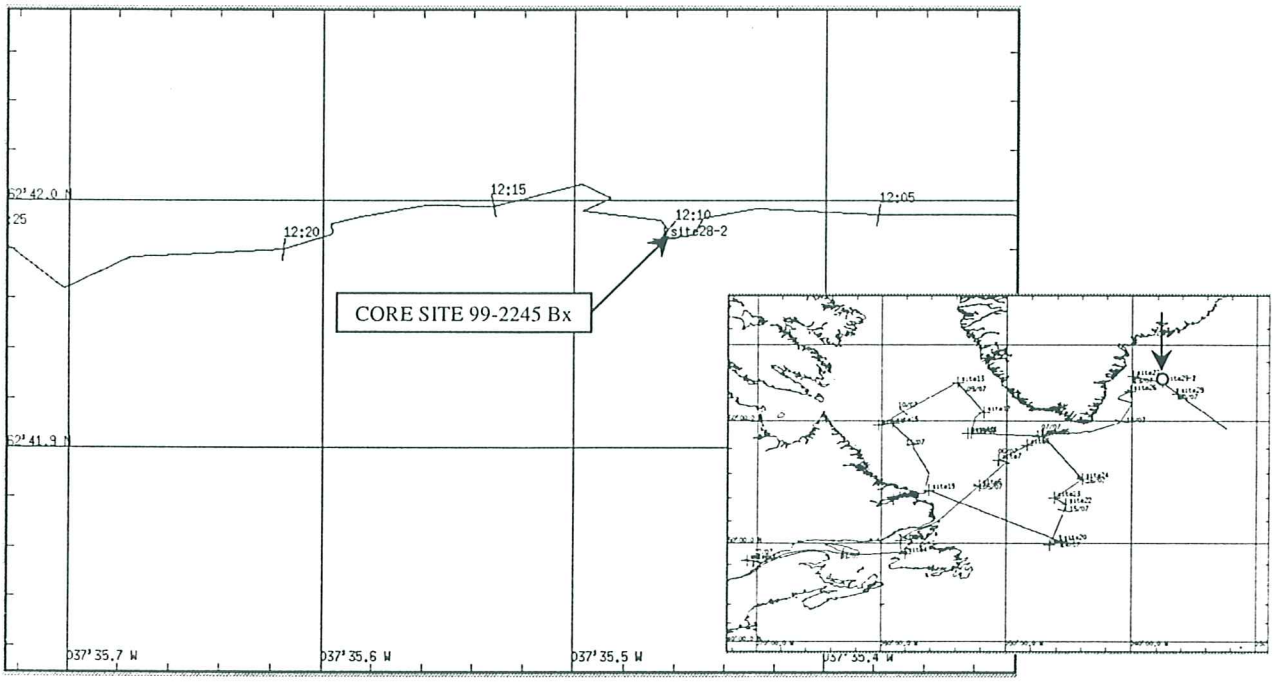
Number of sections recovered and conditions:

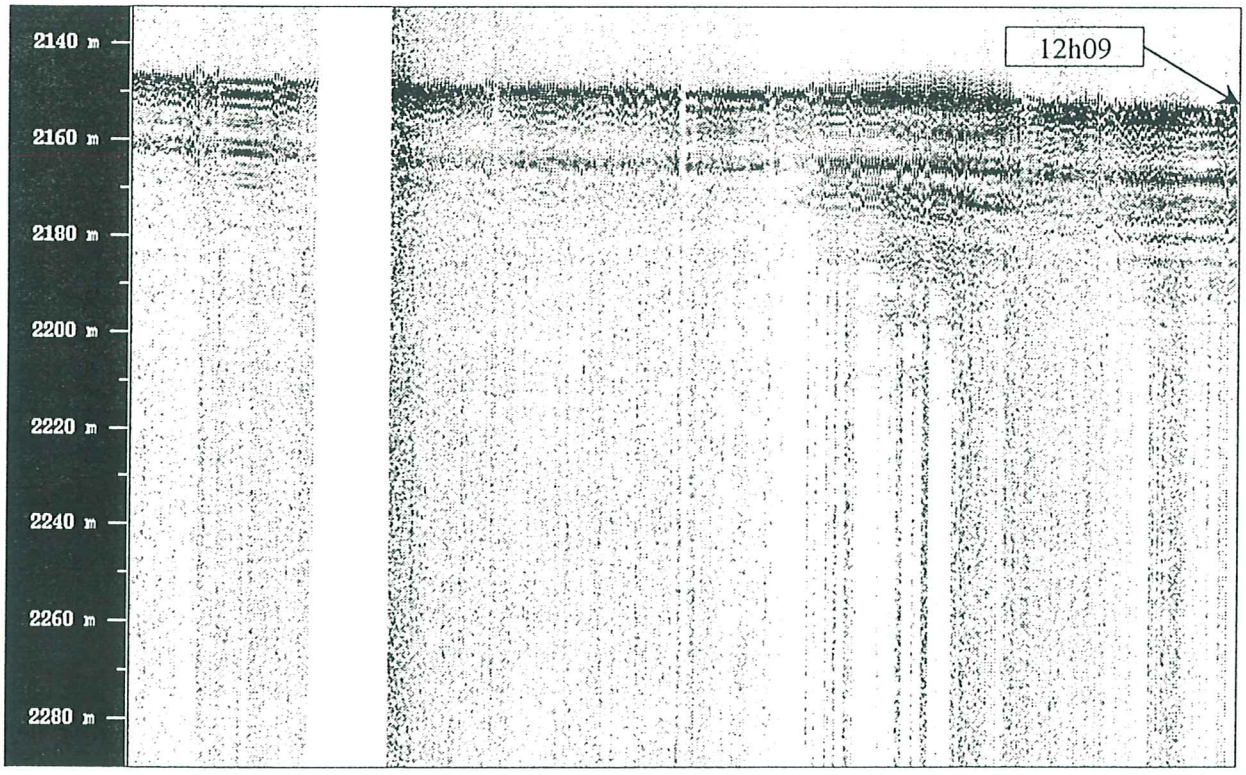
Onboard sampling and post cruise curation:
- Two surface samples were recovered, one will be curated at Bordeaux, the other one at AGC-BIO.
- One bulk sample was recovered and will be curated at Bordeaux.

Summary of physical and sedimentological observations

MD 99-2245 Bx

lat. : 62°41'93 N long. : 037°35'49 W
19 july 1999 Water depth : 2125 m





Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

SITE 28 **Rosette and CTD cast 0 - 2100 m**

Julian day:	200	GMT time:	06h50
Latitude:	62°41.89N	Longitude:	037°35.13W
Water depth:	2125 m	Location:	Eastern Greenland Slope

CTD depth: 0 - 2103 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

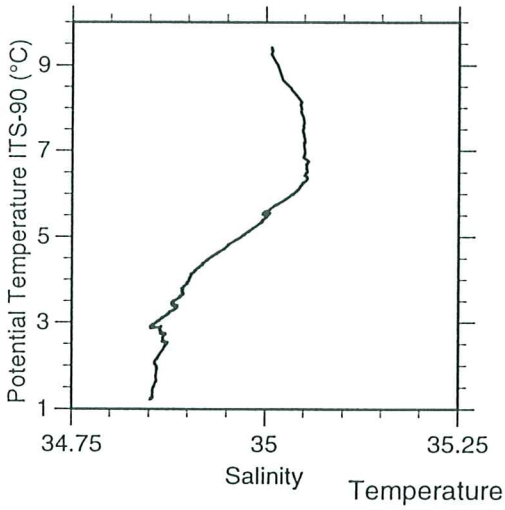
Twelve Niskin bottles of 12 litres with silicone Sandow allow to sample the water colomn at 2103 m, 1900 m, 1800 m, 1710 m, 1520 m, 1025 m, 600 m, 210 m, 100 m and 25 m.

Sampling

The water samples will be analyses for salinity (for CTD calibration), Iodine 129, Hafnium and Neodinium.

Summary of CTD profil

- The surface temperature was 9.39 °C.
- A new transmissiometer was installed to replaced a broken one.



CTD
Station 28

SE Greenland Slope

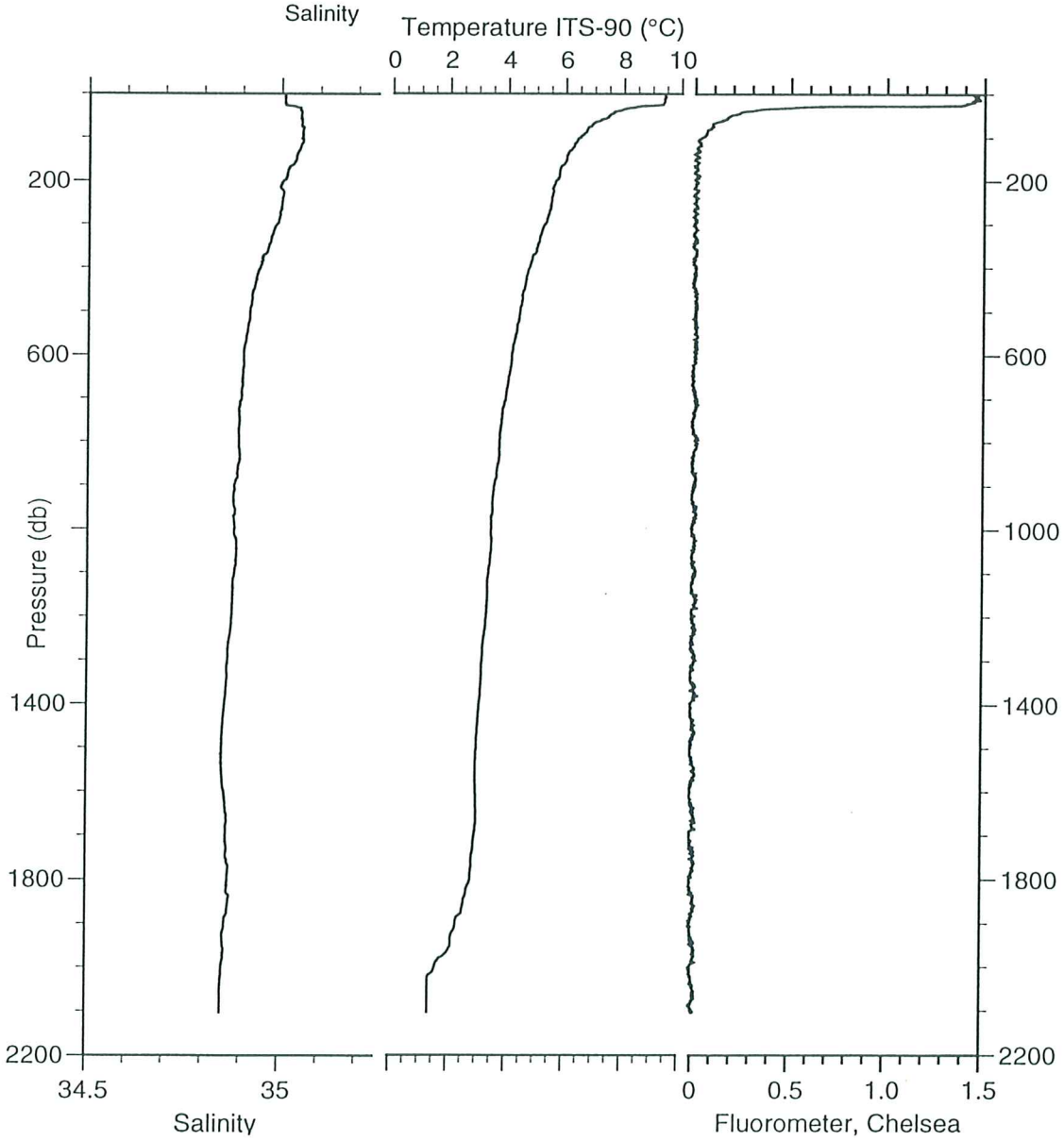
Latitude : 62°41.89 N

Longitude : 037°35.13 W

Water depth : 2125 m

Water profile : 0 - 2103 m

File: **iM5011**



Julian day:	200	GMT time:	10h10
Latitude:	61°54.73N	Longitude:	036°21.52W
Water depth:	2750m	Location:	Lower SE Greenland Slope

Core number:	MD 99-2246	Corer length:	42.25 m
		Apparent penetration:	37.00 m
		Core length:	35.77 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

Number of sections recovered and conditions:
All XXIV sections are in good conditions. The last one measures 127 cm long.

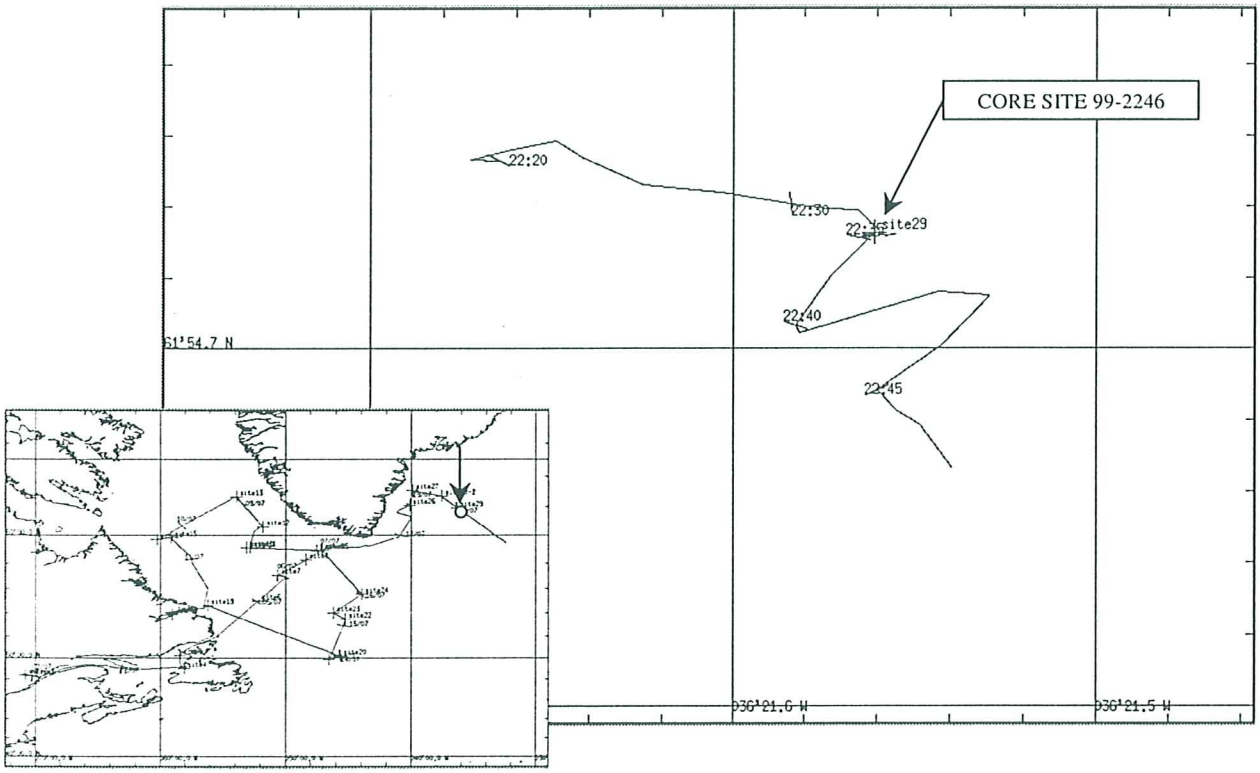
Onboard sampling and post cruise curation:
- The sections were split and described onboard. Both archive and working halves will be curated at Gif-sur-Yvette.
- U-channels were taken out of all the working halves. They will be curated at Gif-sur-Yvette.
- Paleomagnetic cube samples were made on the archive. They will be curated at Gif-sur-Yvette.
- Measure of the sediment density were performed on the working halves.
- Several bags of sediment were recovered: 1 top, 1 core cutter, 1 core catcher, several with liquid sediment in section V (606-630cm), section VII (928-940;.1018-1023; 1030-1050cm), and section VIII (1982-1090cm). They will be curated at Gif-sur-Yvette.

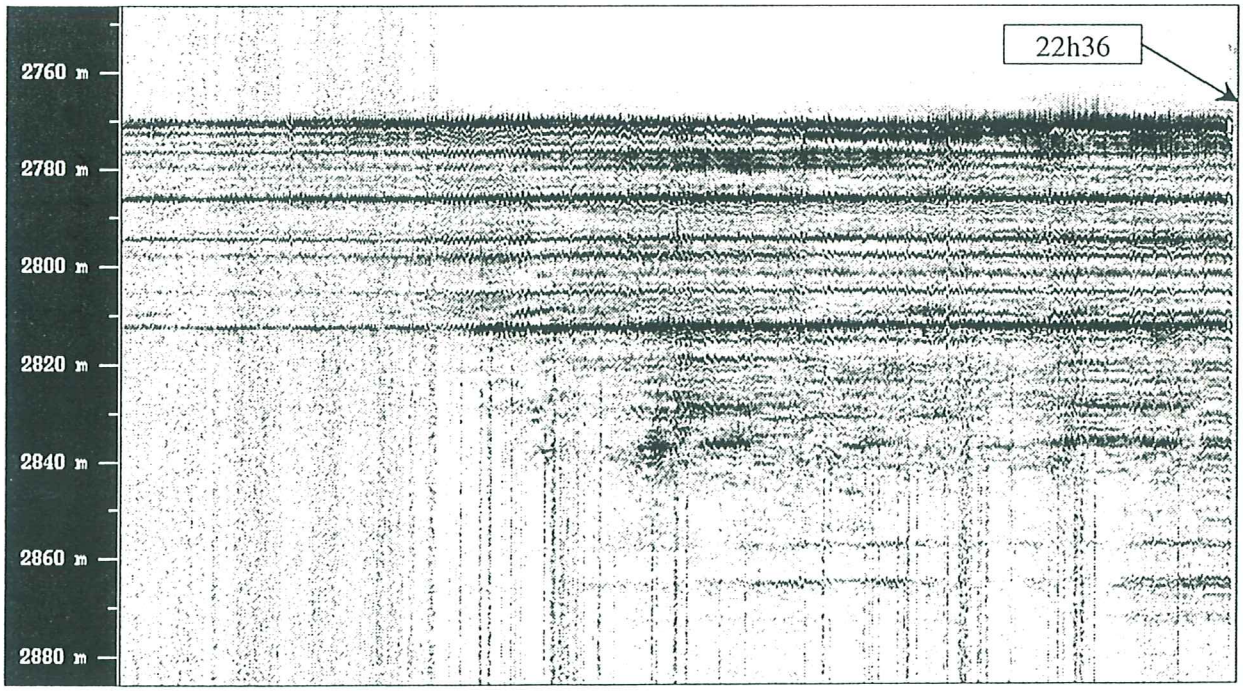
Summary of physical and sedimentological observations

- The core was slightly disturbed by coring.
- The core consists predominantly of siliciclastic sediment with only minor biogenic material. Clayey silt is generally less burrowed and more structureless than silty clay. Silty clay is richer in biogenic silica. Sharp-based, laminated, graded sand and silt beds, and upward coarsening sandy beds, are both present.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 100 to 600 x 10^{-5} SI. Bulk densities vary from about 1.45 to 1.95 Mg/m^3 with occasional intervals of density values greater than 2.00 Mg/m^3. P-wave velocities values obtained range from 1450 to 1510 m/sec, with peaks greater than 1530 m/sec corresponding to the density peaks.

MD 99-2246

lat. : 61°54'73 N long. : 036°21'52 W
19 july 1999 Core length : 35.77 m Water depth : 2750 m

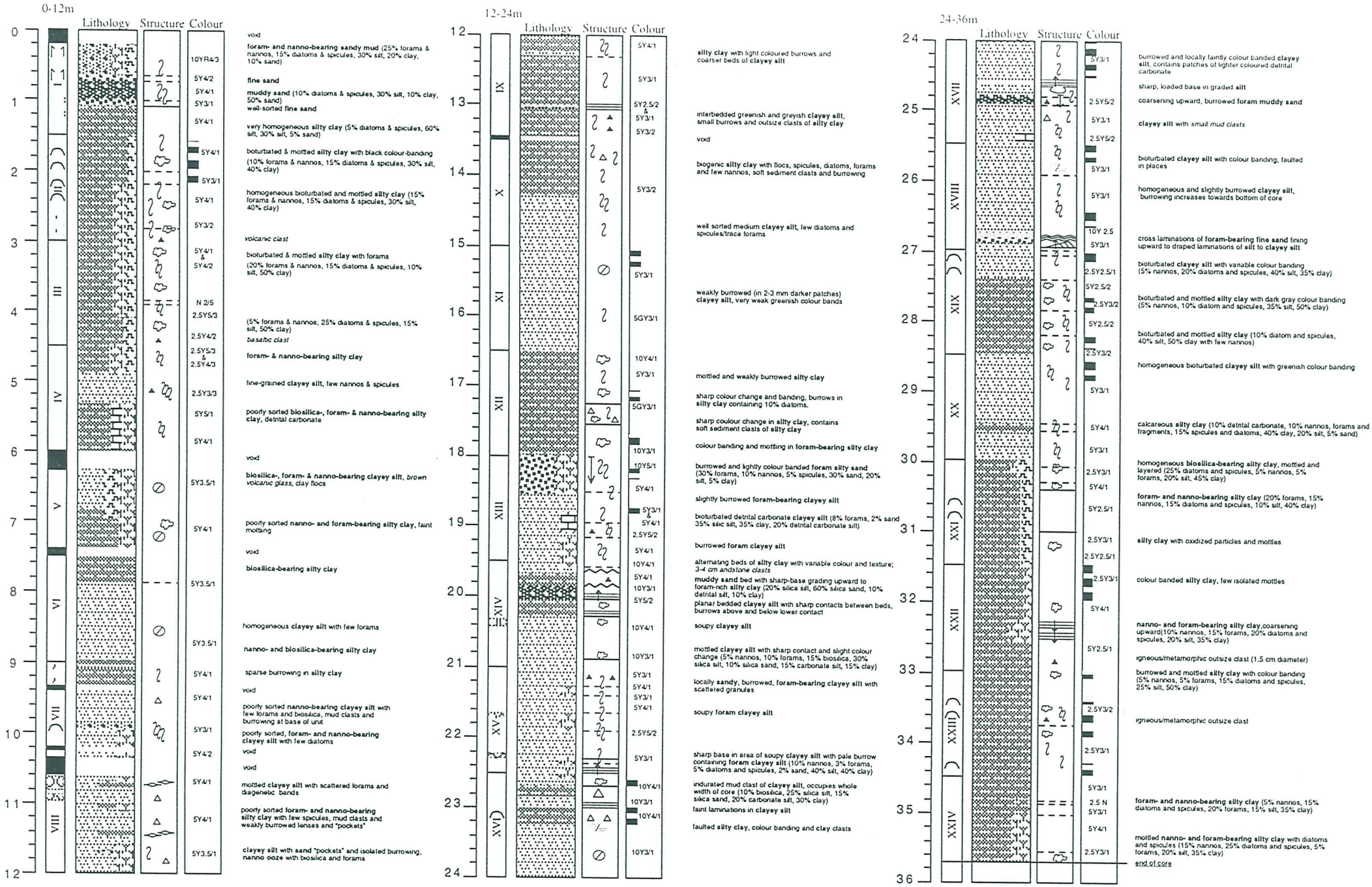




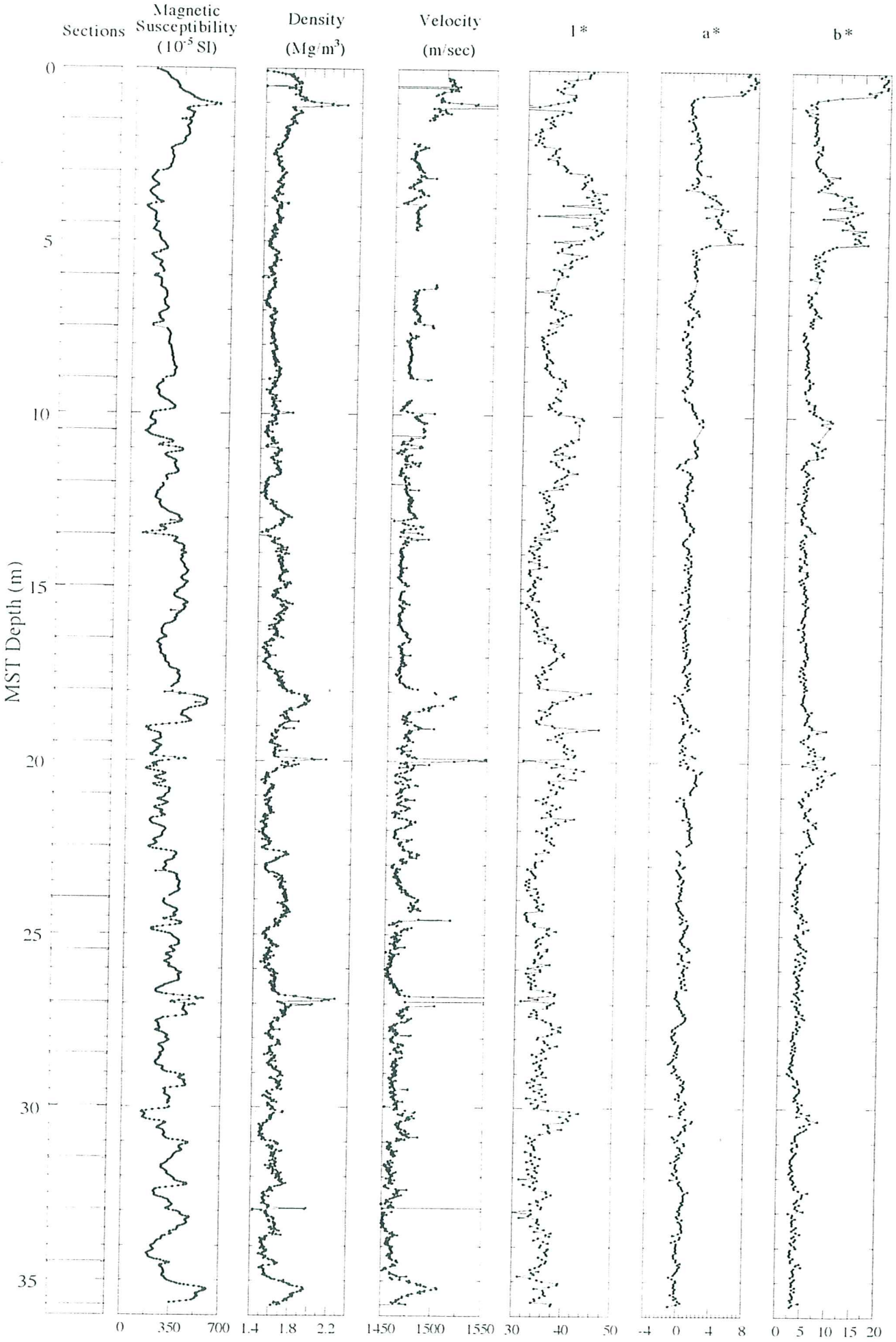
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD 99-2246 Lower SE Greenland Slope, Irminger Basin (2750 m)



MD99 2246


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0 350 700
1.4 1.8 2.2
1450 1500 1550
30 40 50
-4 0 4 8
0 5 10 15 20

Julian day:	200	GMT time:	19h03
Latitude:	61°54.74N	Longitude:	036°21.29W
Water depth:	2750m	Location:	Southeast lower Greenland Slope

CTD depth: 0 - 200 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

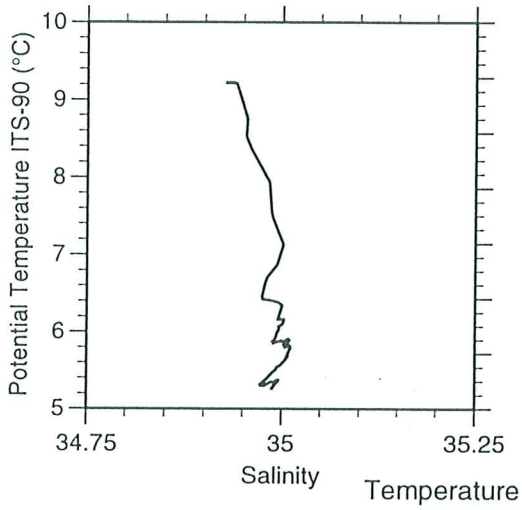
Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water colomn at 45 m and 5 m.

Sampling

The water samples will be analysed for alkenones.

Summary of CTD profil

- The surface temperature was 9.21 °C.



CTD
Station 29

Lower SE Greenland Slope

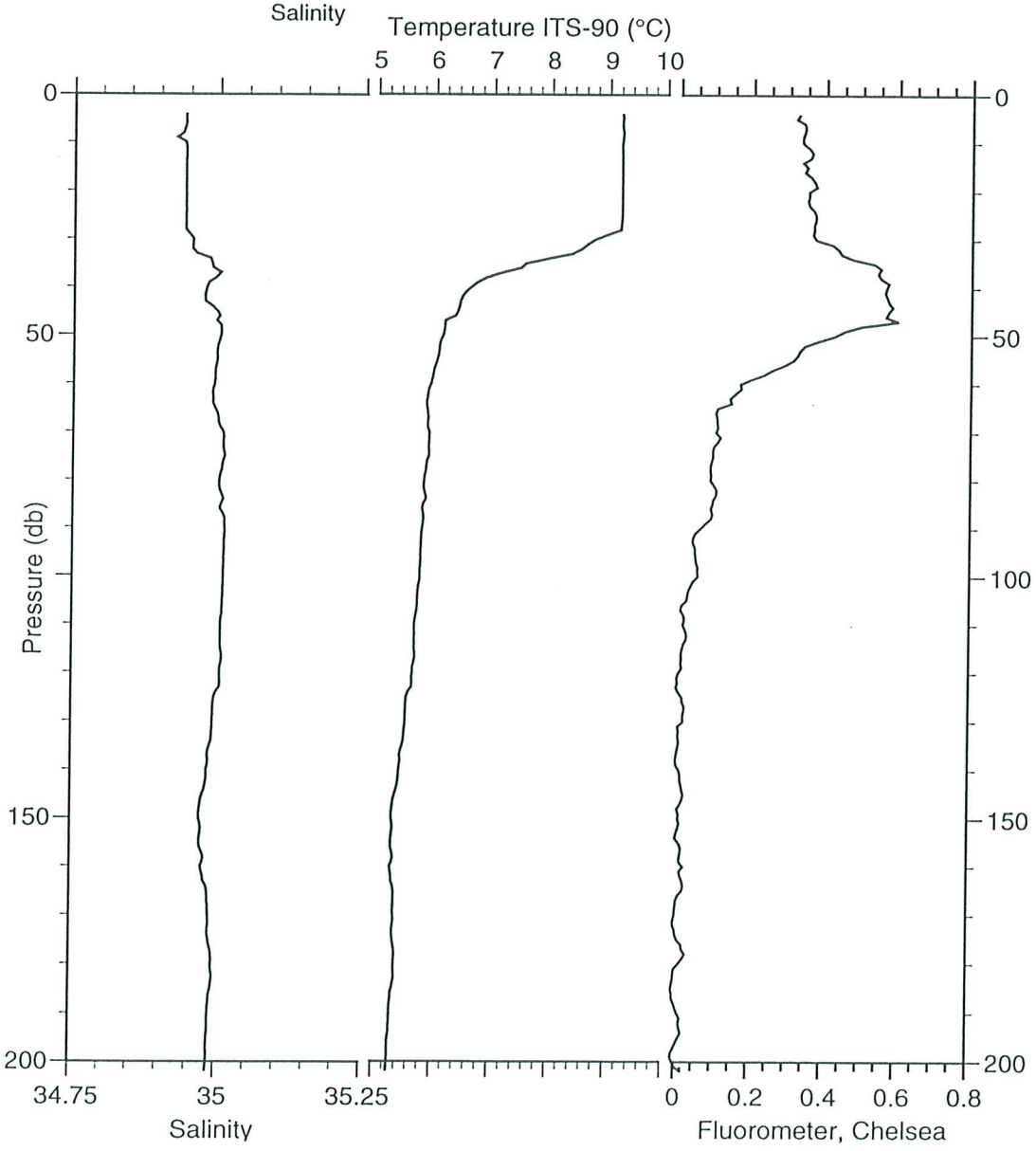
Latitude : 61°54.74 N

Longitude : 036°21.29 W

Water depth : 2750 m

Water profile : 0 - 200 m

File: **iM5012**



Julian day:	201	GMT time:	19h15
Latitude:	59°04.61N	Longitude:	031°28.34W
Water depth:	1690m	Location:	

Core number:	MD 99-2247	Corer length:	29.10 m
		Apparent penetration:	29.10 m
		Core length:	24.50 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

Number of sections recovered and conditions:
All XVII sections are in good conditions. The last one measures 50 cm long.

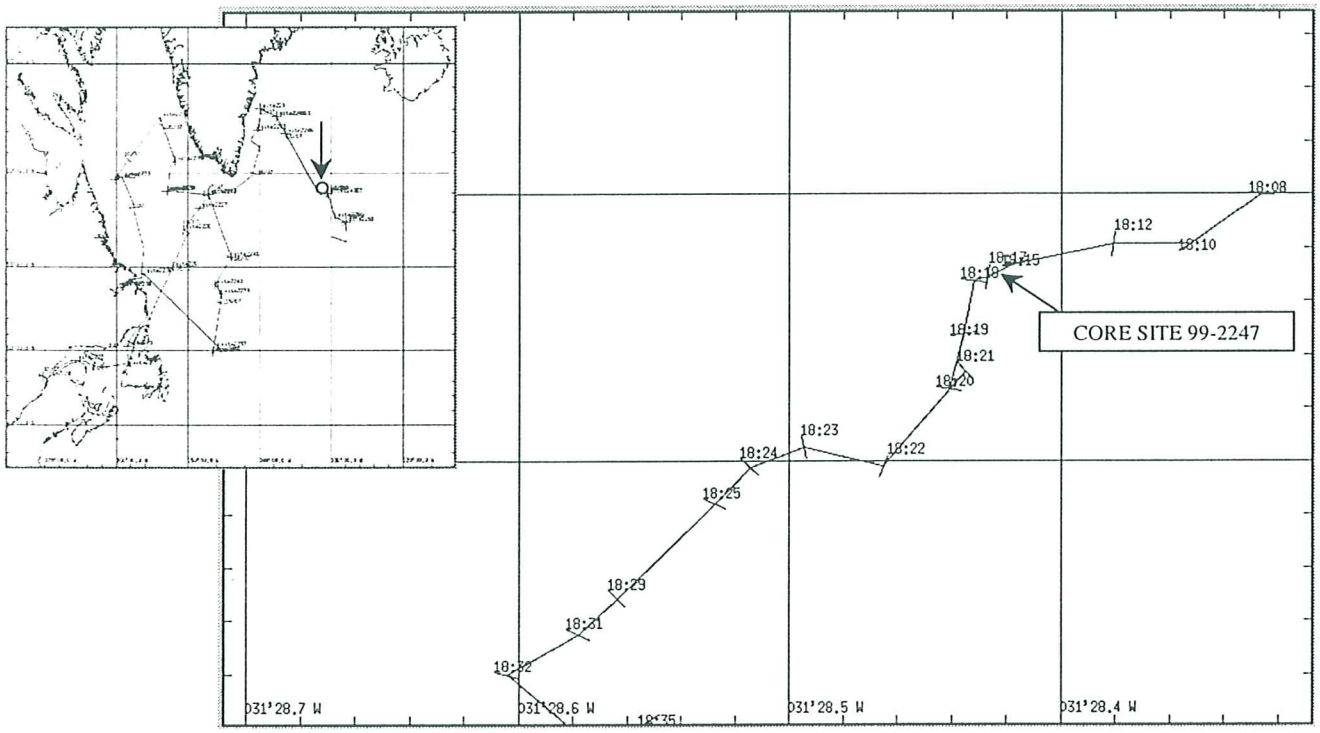
Onboard sampling and post cruise curation:
- The sections were split and described onboard. Both archive and working halves will be curated at Gif-sur-Yvette.
- U-channels were taken out of all the working halves. They will be curated at Gif-sur-Yvette.
- Paleomagnetic cube samples were made on the archive. They will be curated at Gif-sur-Yvette.
- Measure of the sediment density were performed on the working halves.
- Several bags of sediment were recovered: 1 top, 1 core cutter, 1 core catcher. They will be curated at Gif-sur-Yvette.

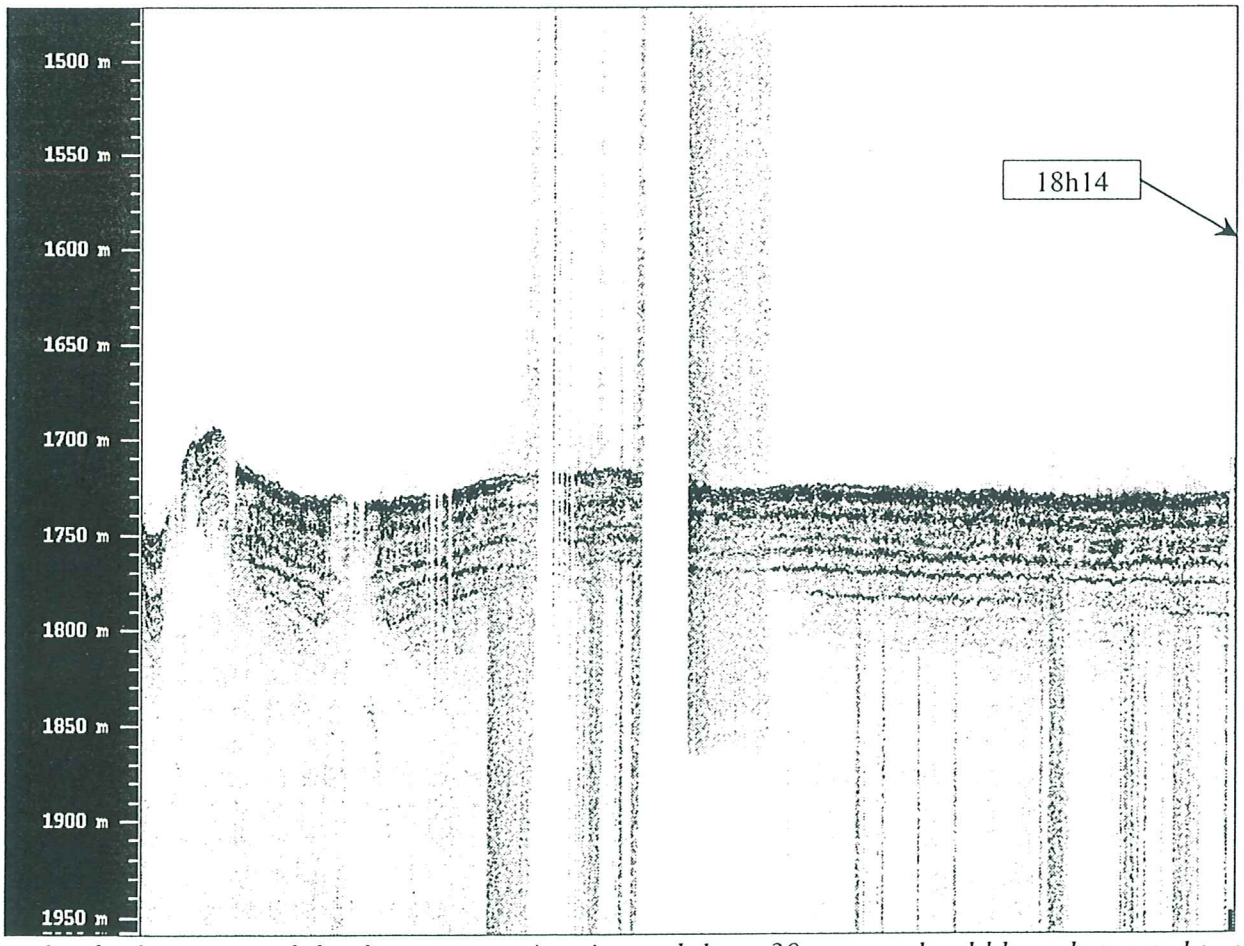
Summary of physical and sedimentological observations

- The core is significantly disturbed by coring from 0-12 m.
- The sediment in this core varies from silty clay to ooze according to the amount of biogenic carbonate skeletons (forams, nannofossils) and biosilica (diatoms and sponge spicules). Biogenic carbonate everywhere exceeds biogenic silica. A few scattered outsized clasts are present. Burrowing, most evident at contacts of different coloured sediments, is moderate. Changes in lithology are gradational. Only one sand layer with inclined laminae possesses primary physical structure.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 25 to 250 x 10^{-5} SI. Bulk densities vary from about 1.35 to 1.7 Mg/m^3 and p-wave velocity values obtained range from 1460 to 1500 m/sec.

MD 99-2247

lat. : 59°04'61 N long. : 031°28'34 W
20 july 1999 Core length : 24.50 m Water depth : 1690 m

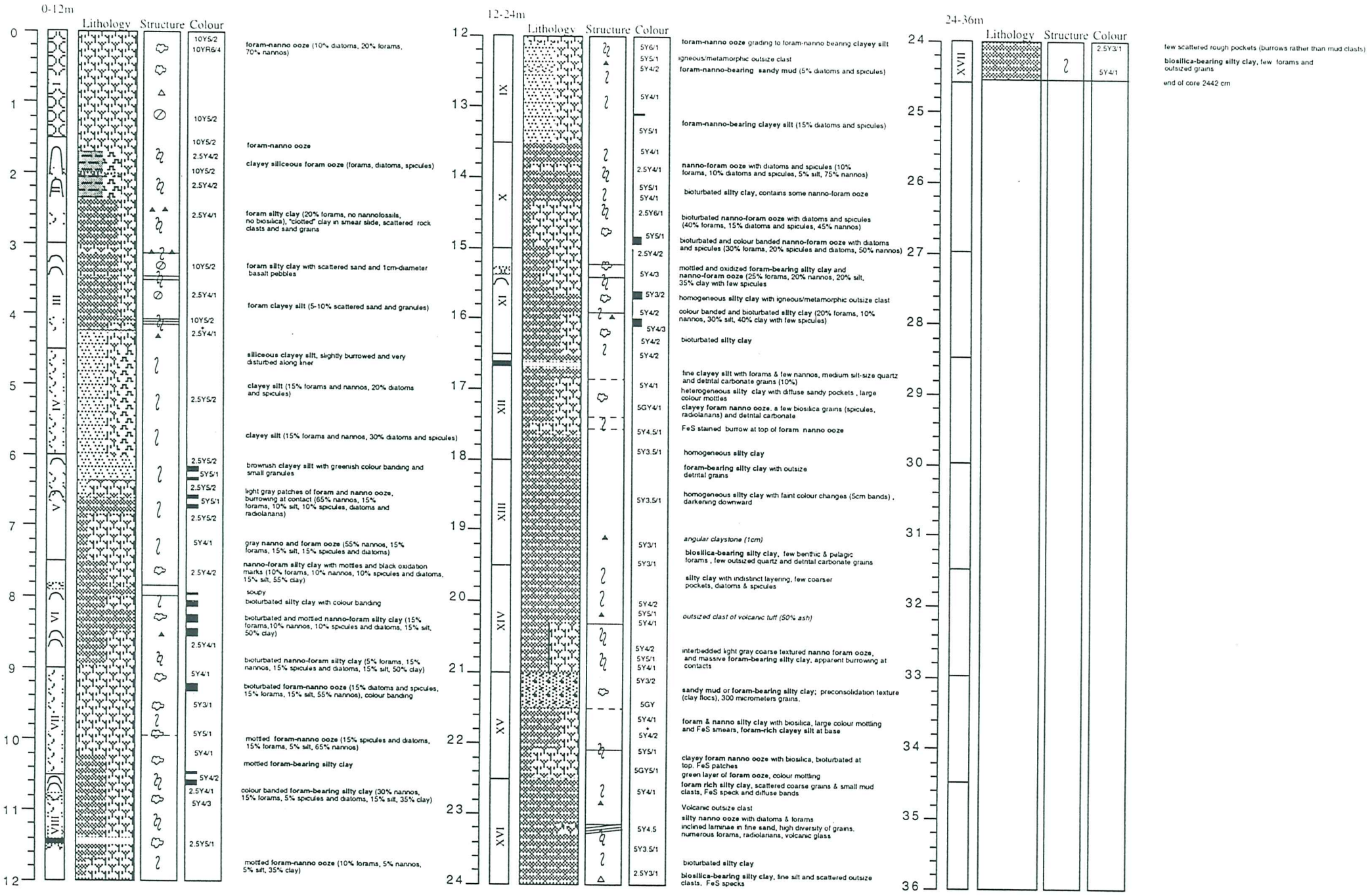




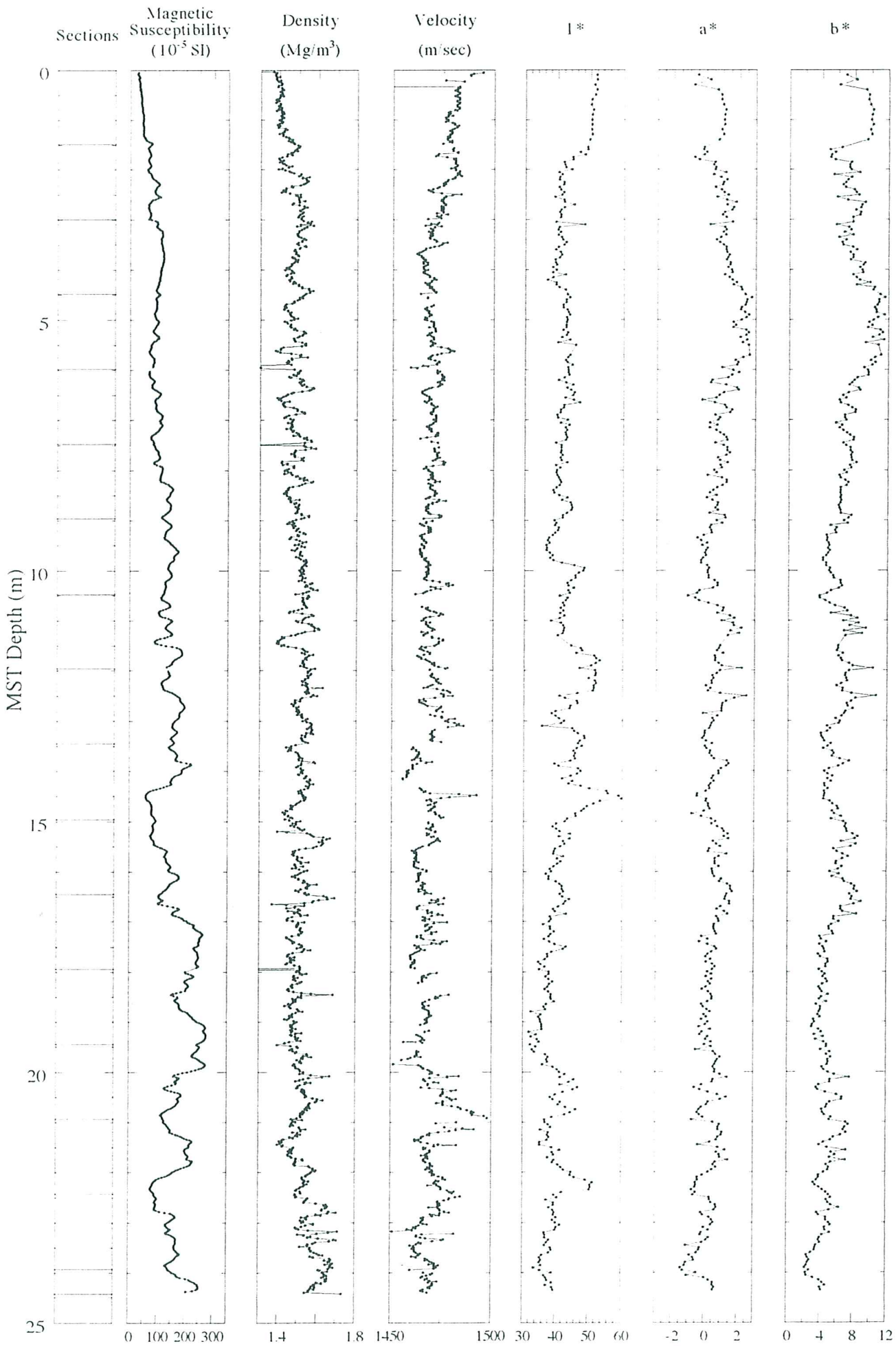
Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD 99-2247 West Reykjanes Ridge (1690 m)



MD99 2247


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
0 100 200 300
1.4 1.8
1450 1500
30 40 50 60
-2 0 2
0 4 8 12

Julian day:	202	GMT time:	01h37
Latitude:	58°57.32N	Longitude:	030°23.33W
Water depth:	1724 m	Location:	Reykjan Ridge east side

Core number:	MD 99-2248	Corer length:	42.20 m
		Apparent penetration:	42.20 m
		Core length:	38.22 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

Number of sections recovered and conditions:
All XXVI sections are in good conditions. The last one measures 72 cm long.

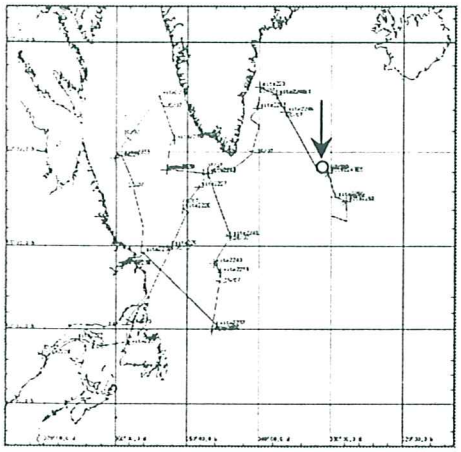
Onboard sampling and post cruise curation:
- The sections were split and described onboard. Both archive and working halves will be curated at Gif-sur-Yvette.
- U-channels were taken out of all the working halves. They will be curated at Gif-sur-Yvette.
- Paleomagnetic cube samples were made on the working halves. They will be curated at Gif-sur-Yvette.
- Measure of the sediment density were performed on the working halves down to .
- Several bags of sediment were recovered: 1 top, 1 core cutter, 1 core catcher,and two with liquid "soupy" sediments in sections IV (555-565cm) and VIII (1136-1146). They will be curated at Gif-sur-Yvette.

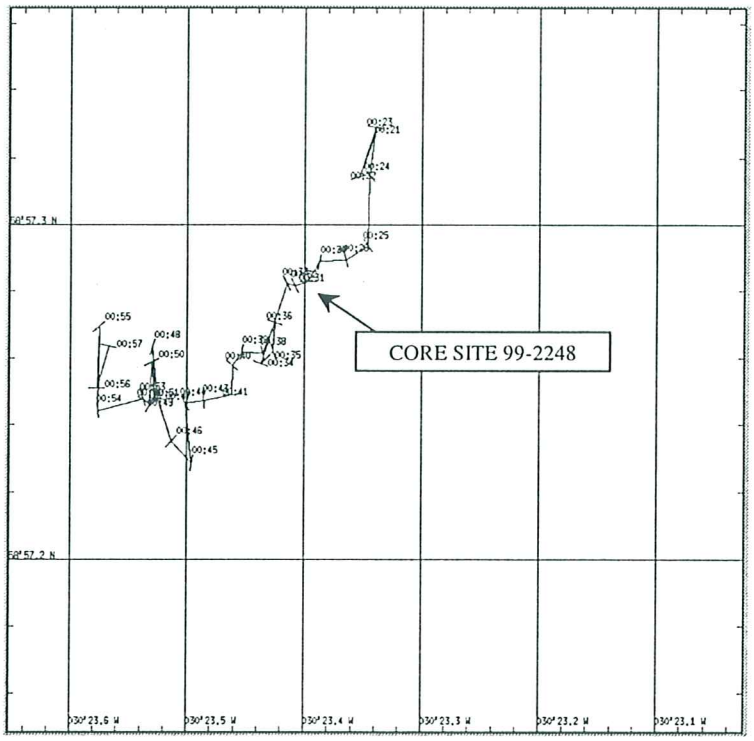
Summary of physical and sedimentological observations

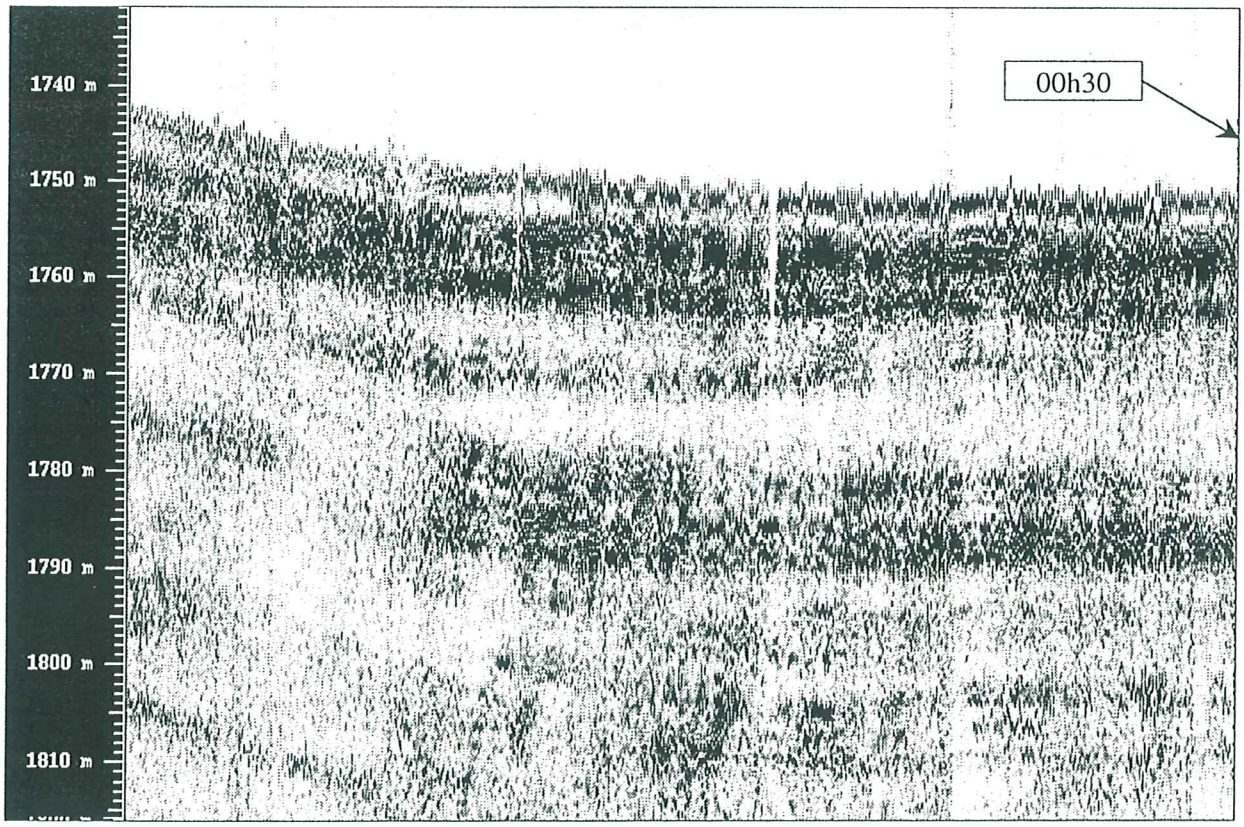
- 0-3 m very disturbed and soupy; 3-9 m moderately disturbed with voids.
- The core lithology is highly variable according to the relative amounts of calcareous and siliceous skeletons. Biogenics, mostly forams, are sparce in heterogeneous sandy muds and mottled silty clay. Biogenic components are dominant in colour-banded siliceous (sponge spicule) and nanno ooze intervals. Sharp-based graded beds, contorted layers, mudclast mélange, or tilted beds indicate gravitational instability and repeated failure events.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 6 to 400 x 10^{-5} SI. Bulk density values vary from about 1.25 to 1.75 Mg/m^3 and p-wave velocity values range from 1460 to 1550 m/sec.

MD 99-2248

lat. : 58°57'32 N long. : 030°23'33 W
21 july 1999 Core length : 38.22 m Water depth : 1724 m



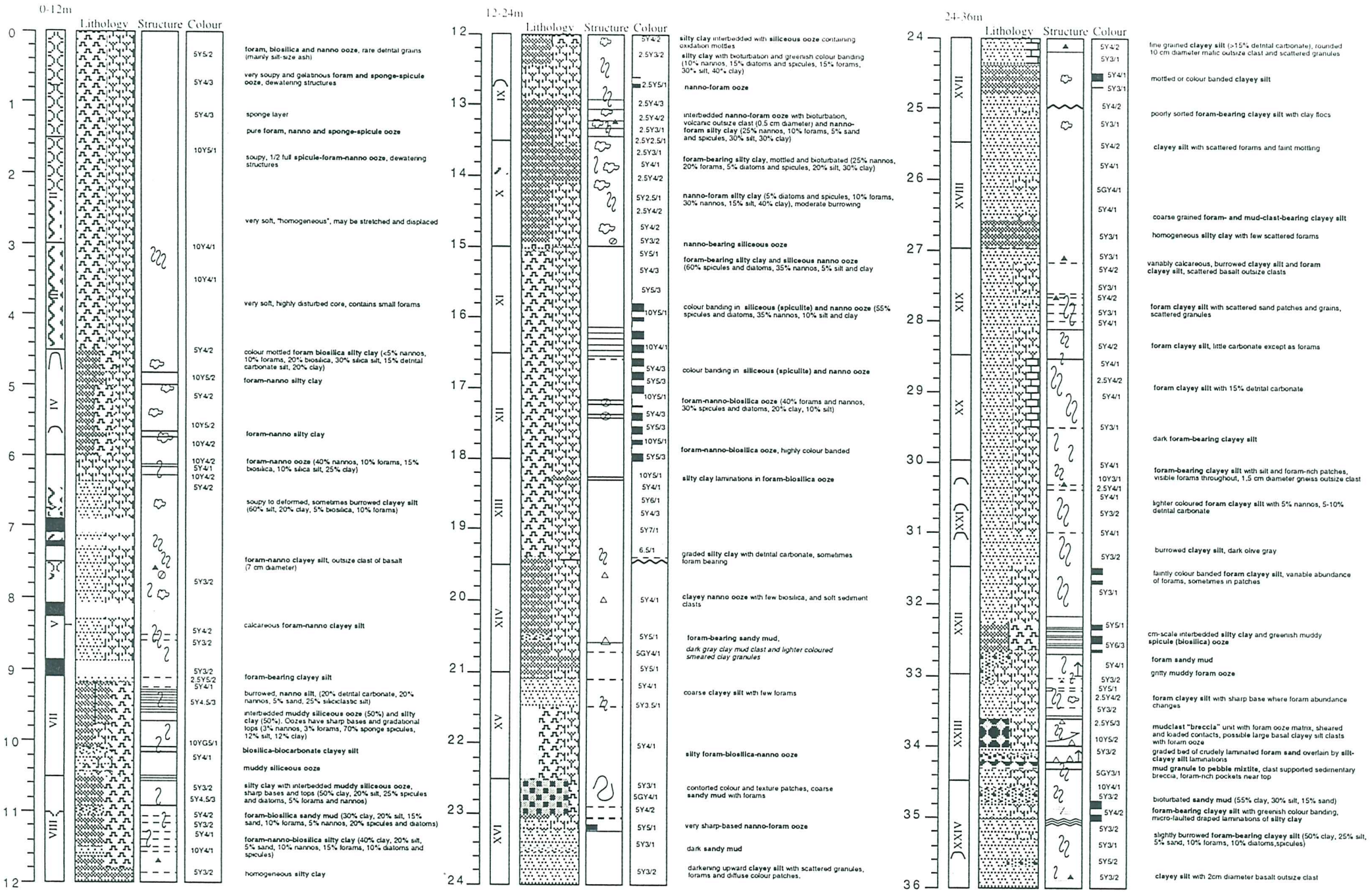


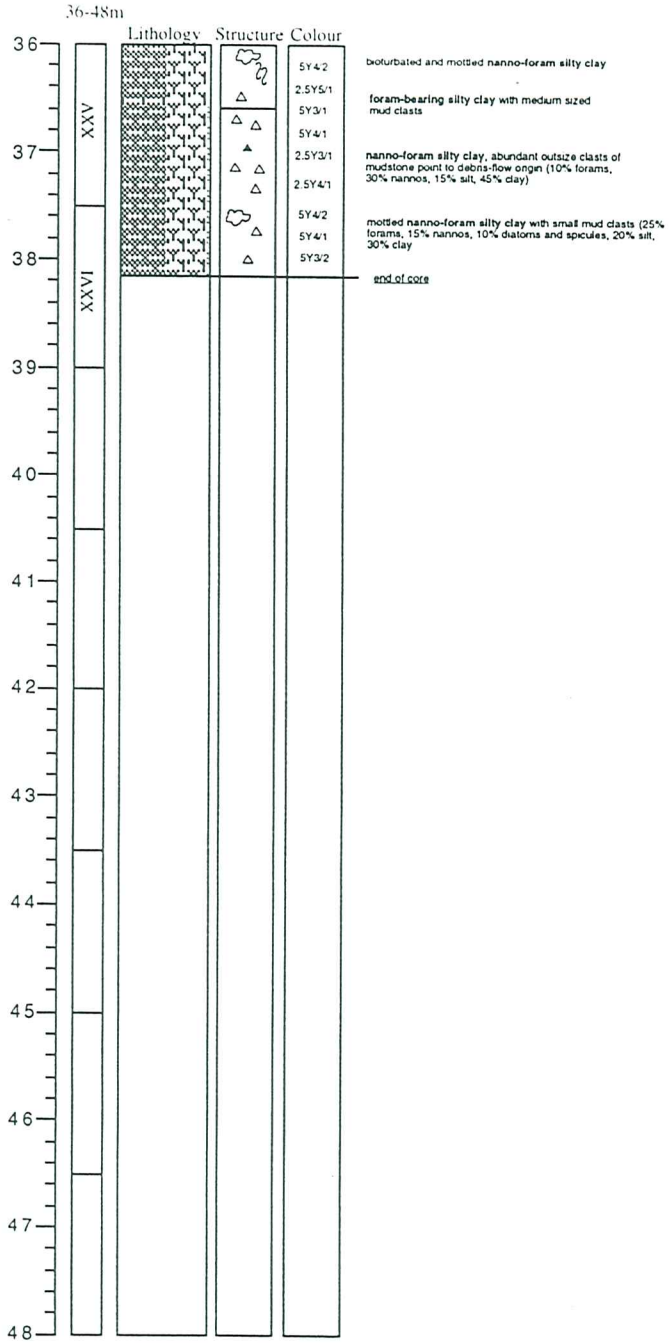


Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

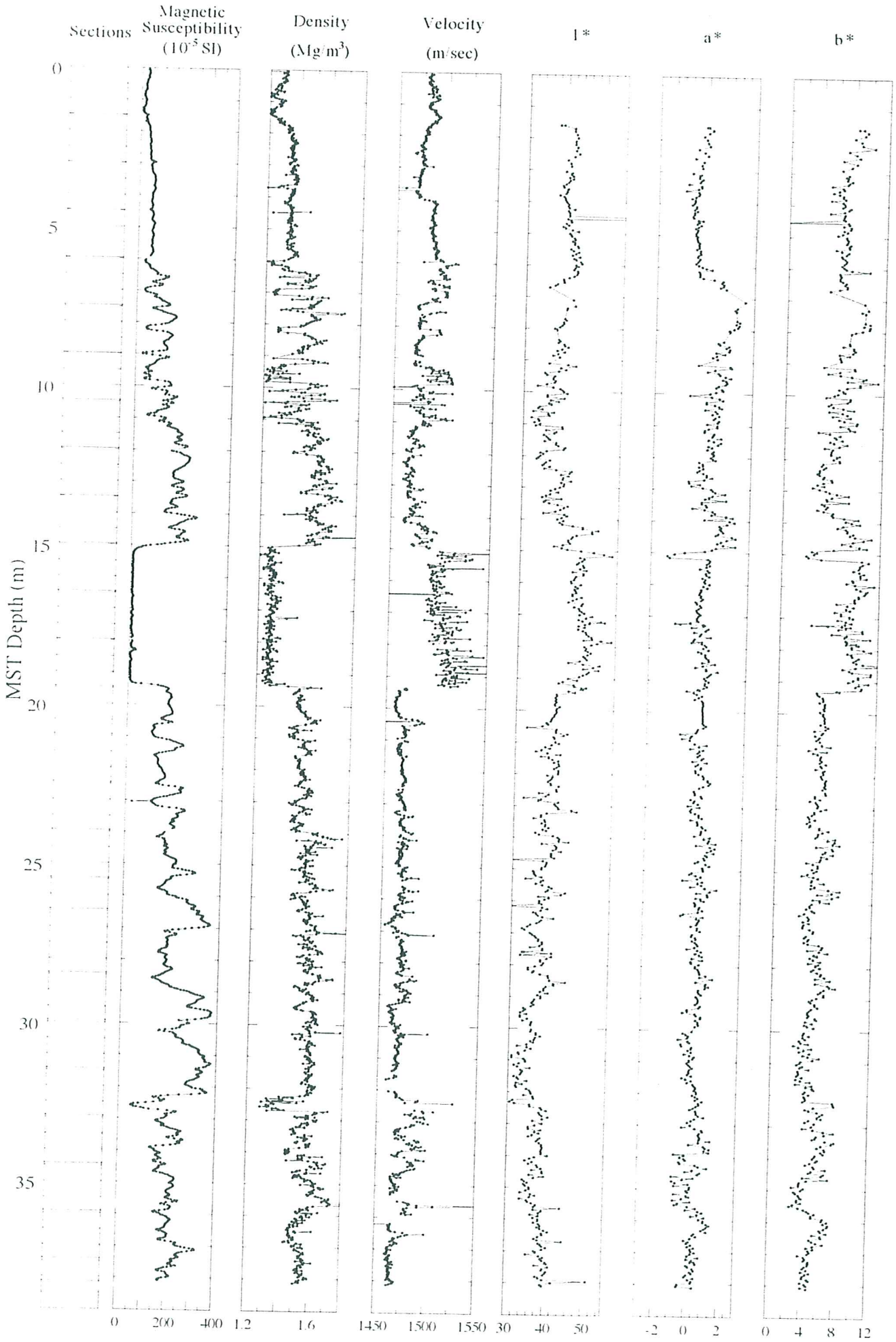
Document IFRTP – Dept. Océanographie

MD 99-2248 Reykjanes Ridge (38.14 m)




36-48m
Lithology
Structure
Colour
36
37
38
39
40
41
42
43
44
45
46
47
48
XXV
XXVI
5Y4/2
2.5Y5/1
5Y3/1
5Y4/1
2.5Y3/1
2.5Y4/1
5Y4/2
5Y4/1
5Y3/2
bioturbated and mottled nanno-foram silty clay
foram-bearing silty clay with medium sized mud clasts
nanno-foram silty clay, abundant outsize clasts of mudstone point to debris-flow origin (10% forams, 30% nannos, 15% silt, 45% clay)
mottled nanno-foram silty clay with small mud clasts (25% forams, 15% nannos, 10% diatoms and spicules, 20% silt, 30% clay
end of core

MD99 2248


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0
200
400
1.2
1.6
1450
1500
1550
30
40
50
-2
0
2
0
4
8
12

Julian day:	202	GMT time:	01h37
Latitude:	58°57.44N	Longitude:	030°22.99W
Water depth:	1710	Location:	Reykjan Ridge east side

Core number: MD 99-2249 BX Corer length: 90cm Box-core

Observations

Corer condition:

Good.

Core condition:

Good. The box was filled to the top.

Sections and sampling

Number of sections recovered and conditions:

- One push core was recovered and will be curated at GEOTOP. Five cores were recovered by means of "lab boxes" inserted from the side of the boxcore. There is one large core (a) (23cm wide, 9 cm deep and 85 cm long), and four small (b, c, d, e) (11.5 cm wide, 7 cm deep and 85 cm long), one of which will be curated at GEOTOP. The rest will be curated at Gf-sur-Yvette. Core b only measures 68 cm long.

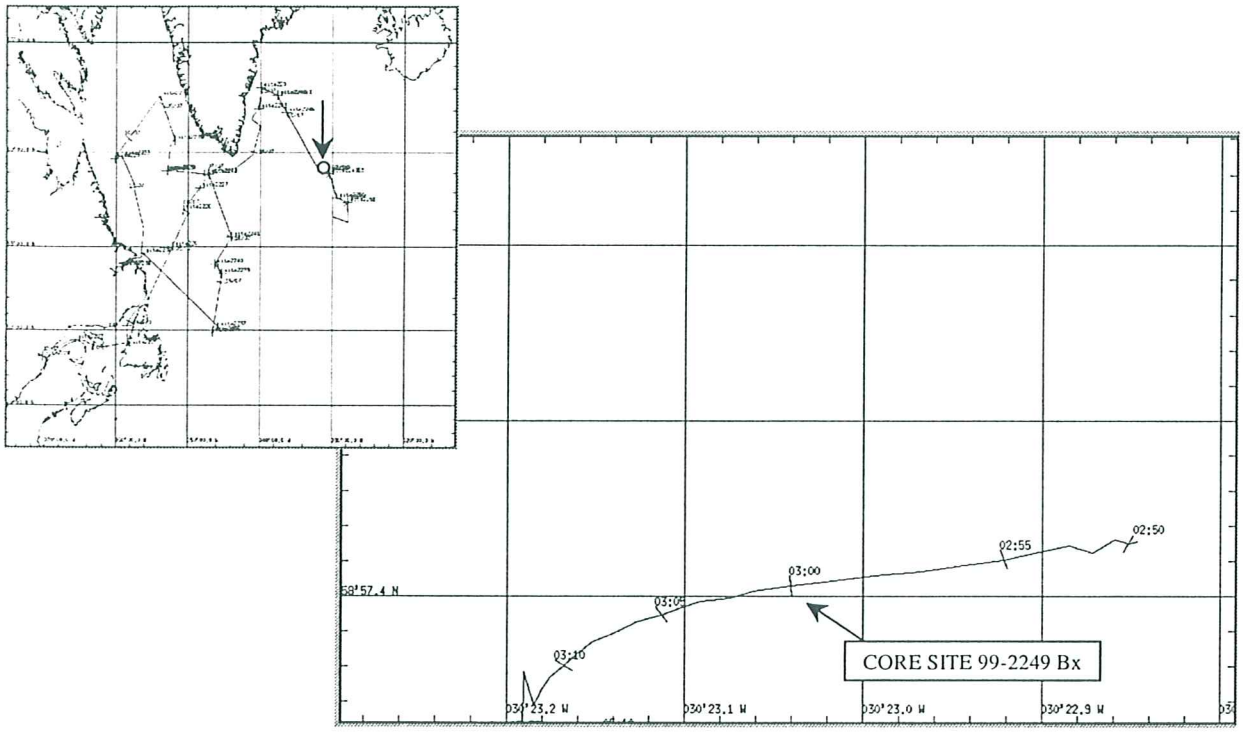
Onboard sampling and post cruise curation:

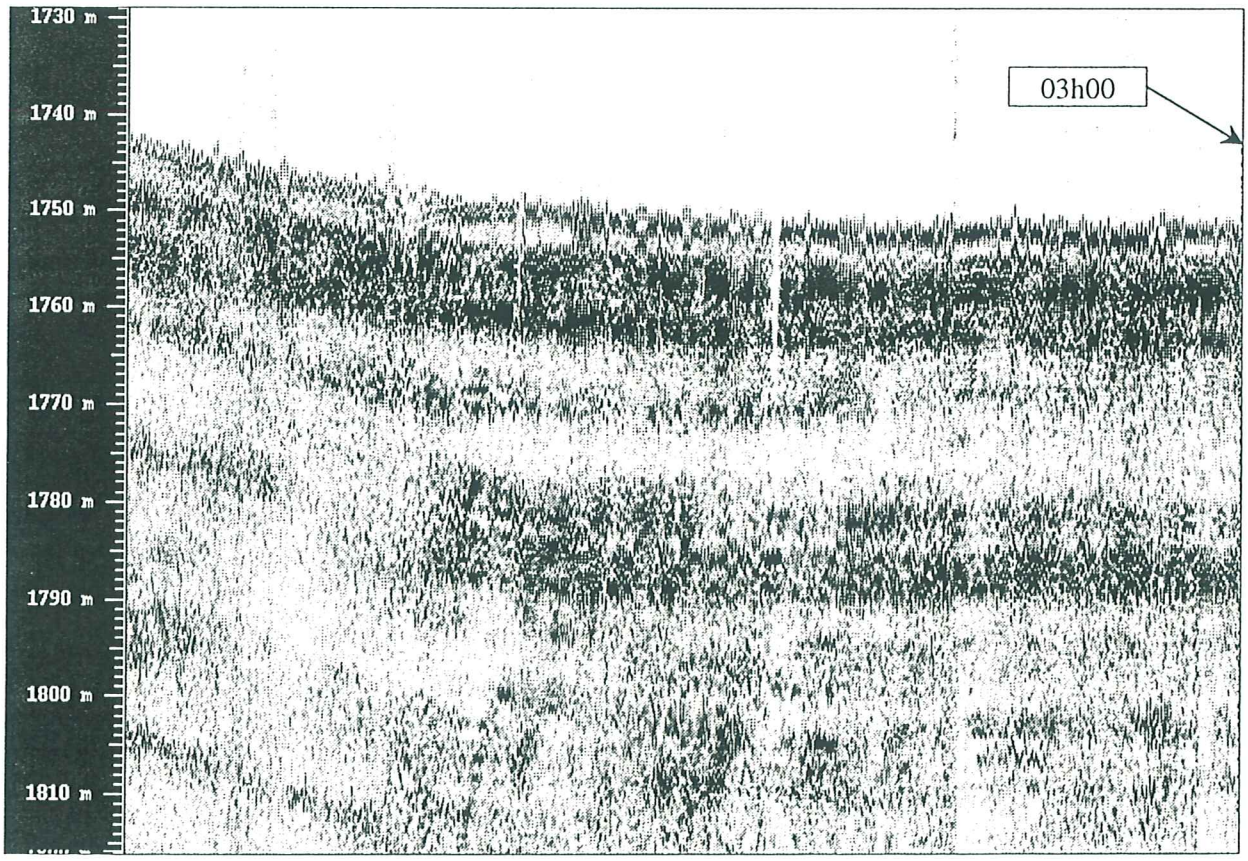
- Six surface samples were recovered, three will be curated at Bordeaux, one at AGC-BIO, and two were frozen and will be curated in Barcelona.

Summary of physical and sedimentological observations

MD 99-2249 Bx

lat. : 58°57'44 N long. : 030°23'99 W
21 july 1999 Core length : Full Water depth : 1710 m

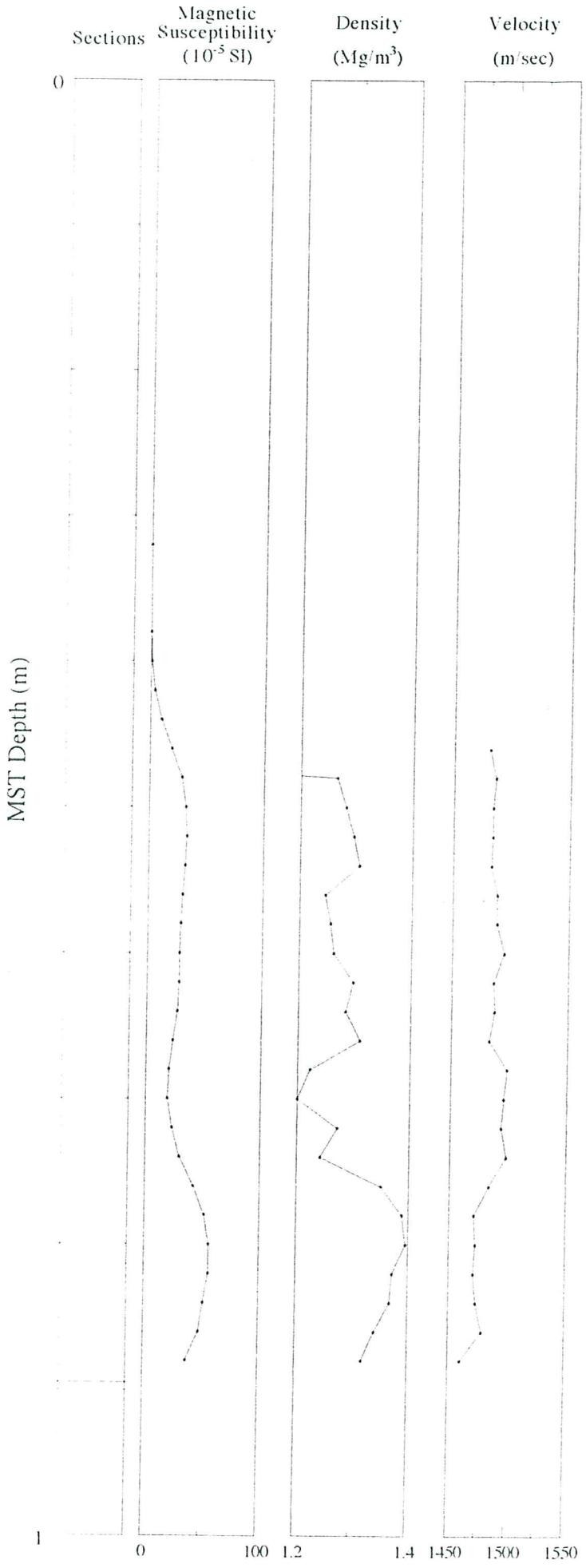




Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD99 2249


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
MST Depth (m)
0
1
0
100
1.2
1.4
1450
1500
1550

SITE 31 **Rosette ans CTD cast 0 - 200 m**

Julian day:	202	GMT time:	05h20
Latitude:	58°57.25N	Longitude:	030°23.13W
Water depth:	1766 m	Location:	Reykjan Ridge east side

CTD depth: 0 - 200 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

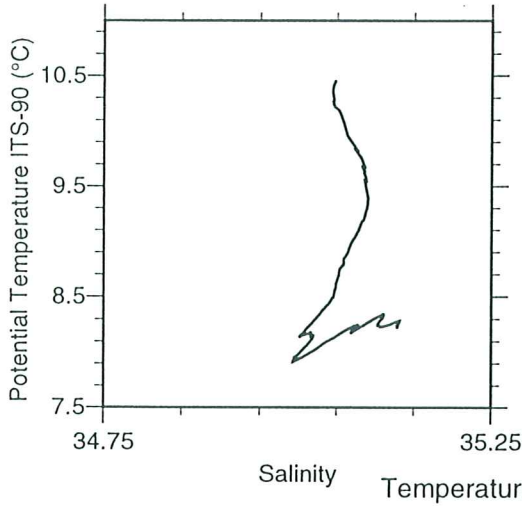
Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 200 m, 140 m, 10 m and near surface.

Sampling

The water samples will be analysed for alkenone and Neodinium.

Summary of CTD profil

- The surface temperature was 10.46 °C.



CTD
Station 31

East Reykjanes Ridge

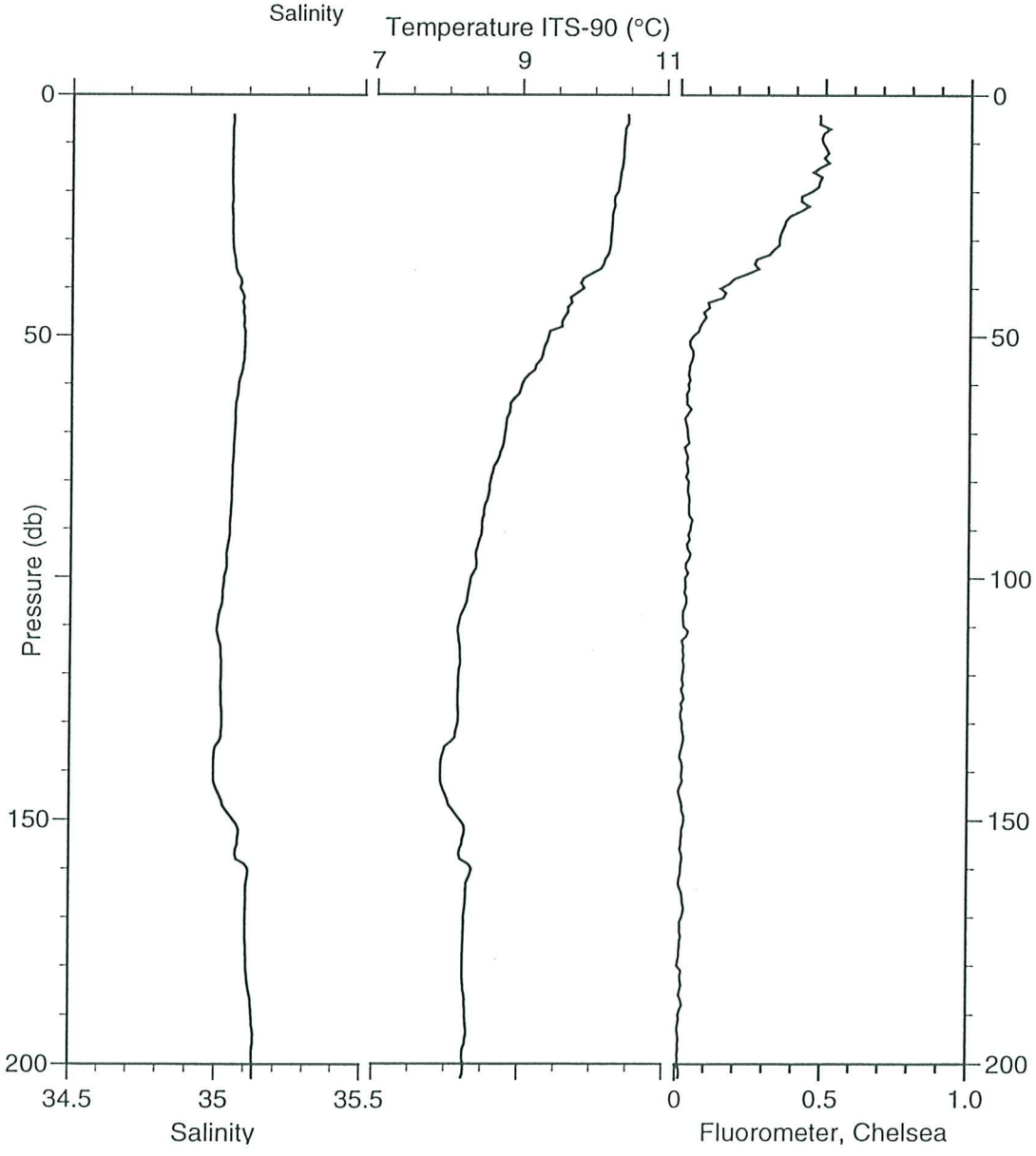
Latitude : 58°57.20 N

Longitude : 030°23.13 W

Water depth : 1766 m

Water profile : 0 - 200 m

File: **iM5013**



Julian day:	202	GMT time:	13h58
Latitude:	57°42.71N	Longitude:	029°25.27W
Water depth:	2310 m	Location:	South Iceland Basin

Core number:	MD 99-2250	Corer length:	42.25 m
		Apparent penetration:	42.25 m
		Core length:	36.48 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

Number of sections recovered and conditions:
All XXV sections are in good conditions. The last one measures 48 cm long.

Onboard sampling and post cruise curation:
- The sections were split onboard but not described. Both archive and working halves will be curated at Gif-sur-Yvette.
- Several bags of sediment were recovered: 2 tops, 1 core cutter, 1 core catcher. They will be curated at Gif-sur-Yvette.

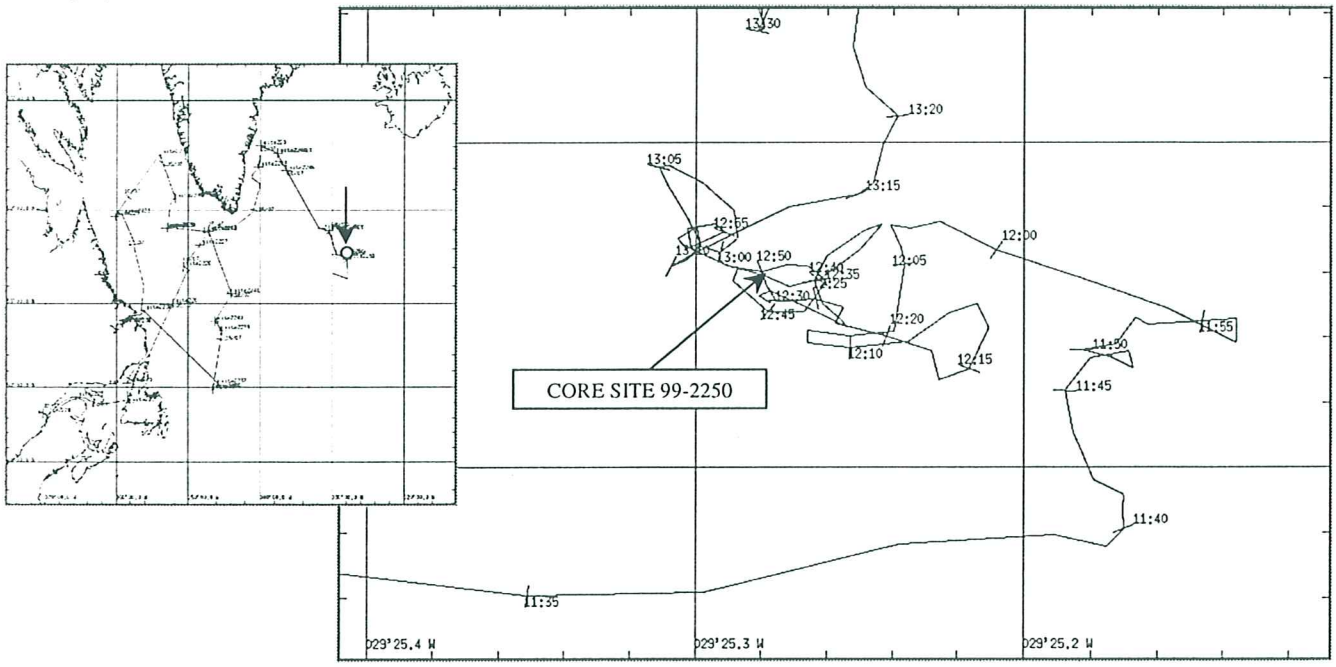
Summary of physical and sedimentological observations

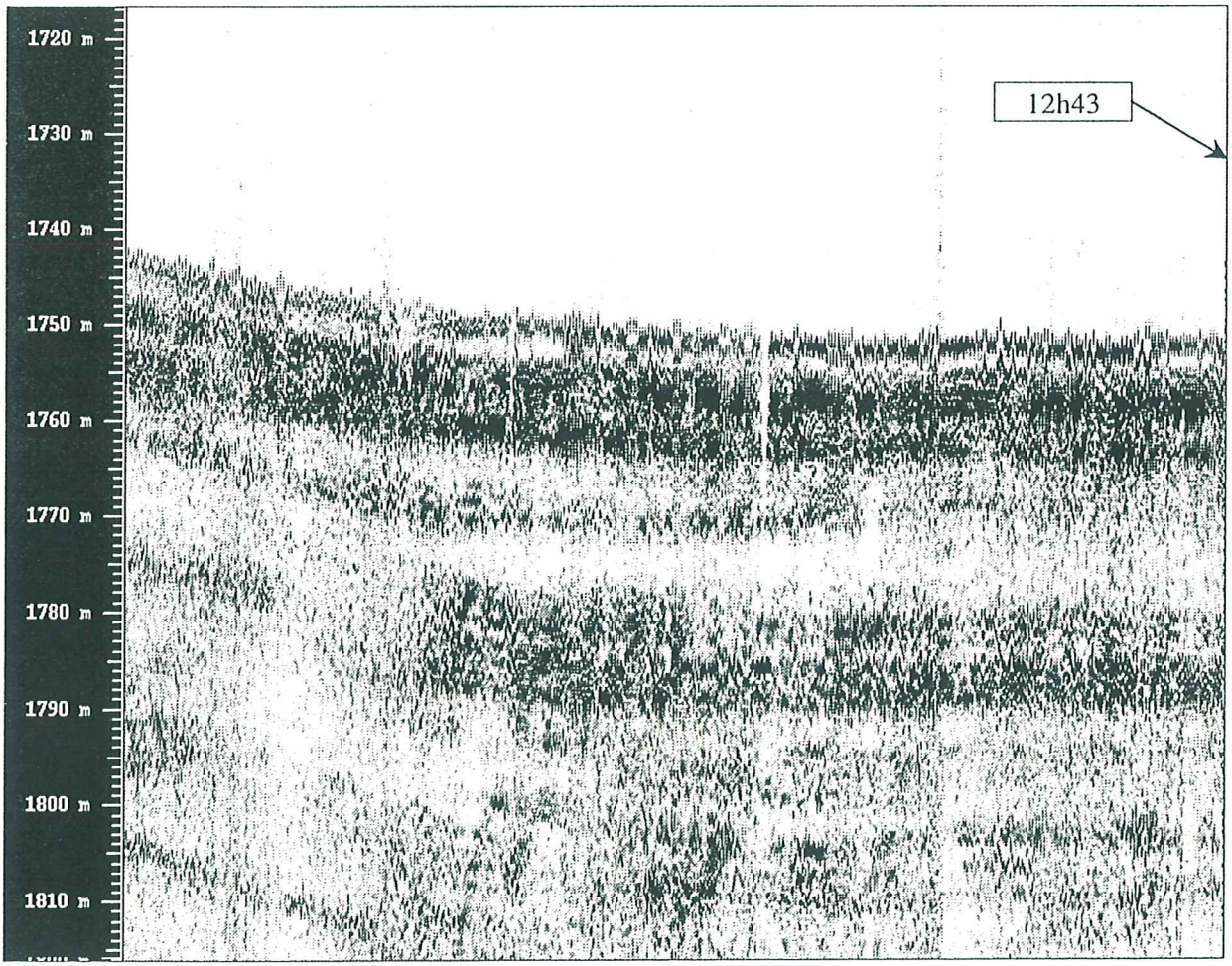
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 50 to 225 x 10^{-5} SI. Bulk density values vary from about 1.4 to 1.7 Mg/m^3, with a single peak greater than 2.1 Mg/m^3. P-wave velocity values range from 1475 to 1510 m/sec, with a corresponding single peak greater than to 1600 m/sec.

MD 99-2250

lat. : 57°42'71 N long. : 029°25'27 W

21 july 1999 Core length : 36.98 m Water depth : 2310 m

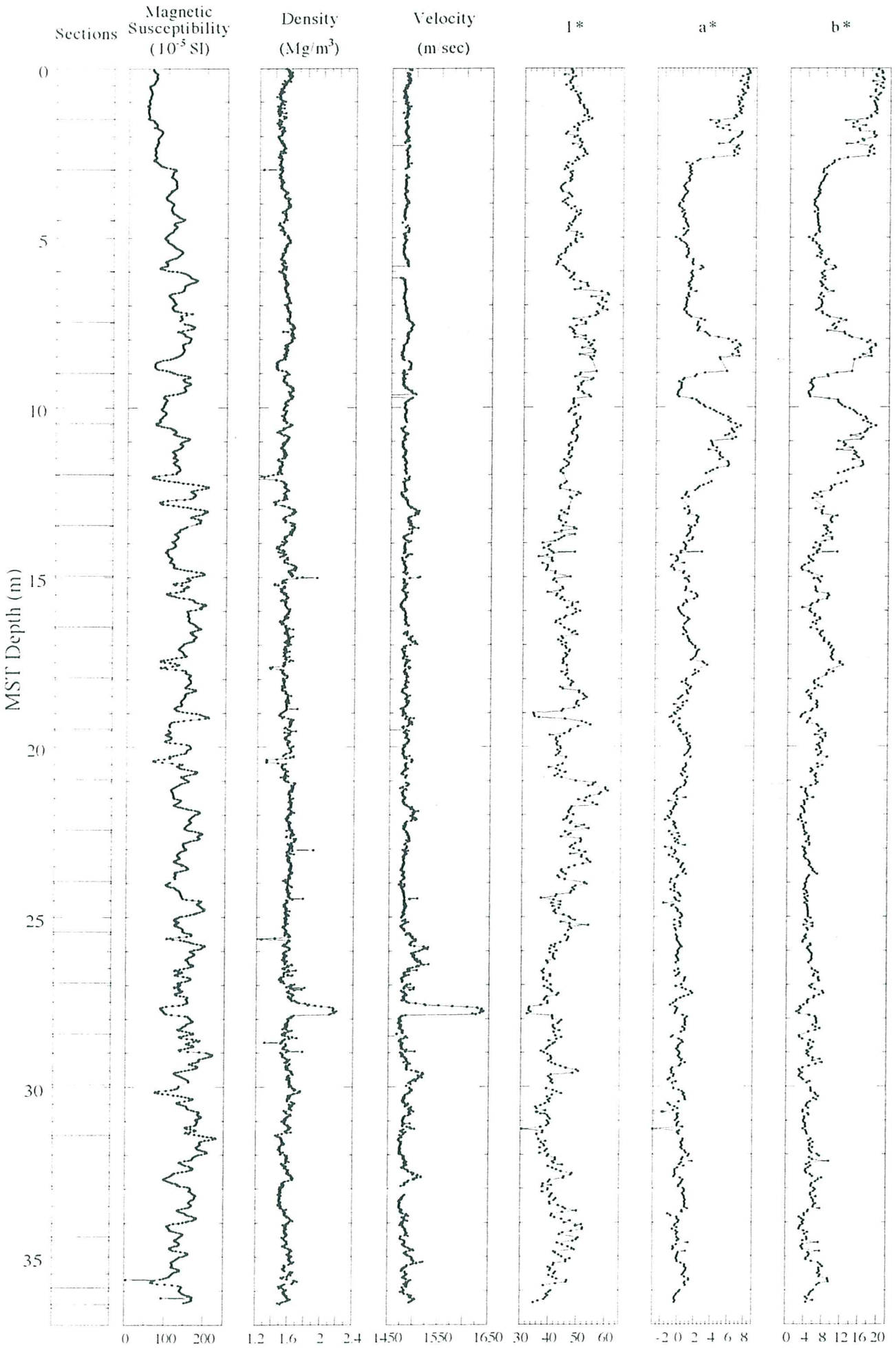




Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD99 2250


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0 100 200
1.2 1.6 2 2.4
1450 1550 1650
30 40 50 60
-2 0 2 4 6 8
0 4 8 12 16 20

Julian day:	202	GMT time:	21h24
Latitude:	57°26.87N	Longitude:	027°54.47W
Water depth:	2620 m	Location:	Iceland Basin

Core number:	MD 99-2251	Corer length:	42.25 m
		Apparent penetration:	36.00 m
		Core length:	36.58 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

Number of sections recovered and conditions:
All XXV sections are in good conditions. The last one measures 58 cm long.

Onboard sampling and post cruise curation:
- The sections were split onboard but not described. Both archive and working halves will be curated at Gif-sur-Yvette.

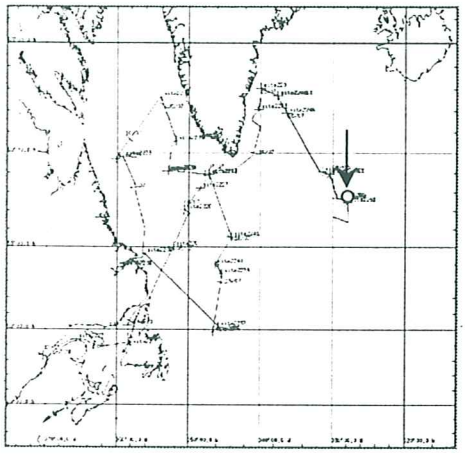
U-channel have been made on all working halves, they will be curated at Gif-sur-Yvette.
- Several bags of sediment were recovered: 2 tops, 1 core cutter, 1 core catcher, and in section VI (863-889cm), section IX (1200-1215cm, 1230-1248cm and 1272-1286cm), section XI (1519-1523cm), section XII (1762-1770cm), and section XIV (2034-2045cm). They will be curated at Gif-sur-Yvette.

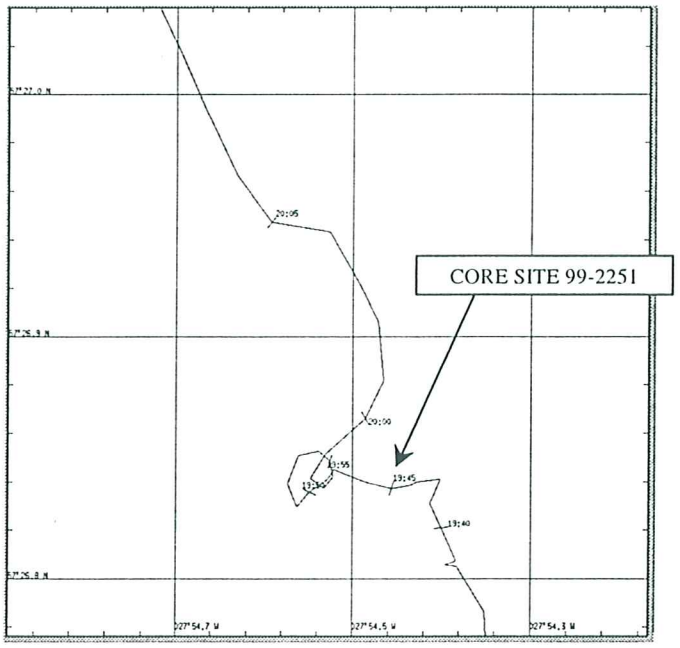
Summary of physical and sedimentological observations

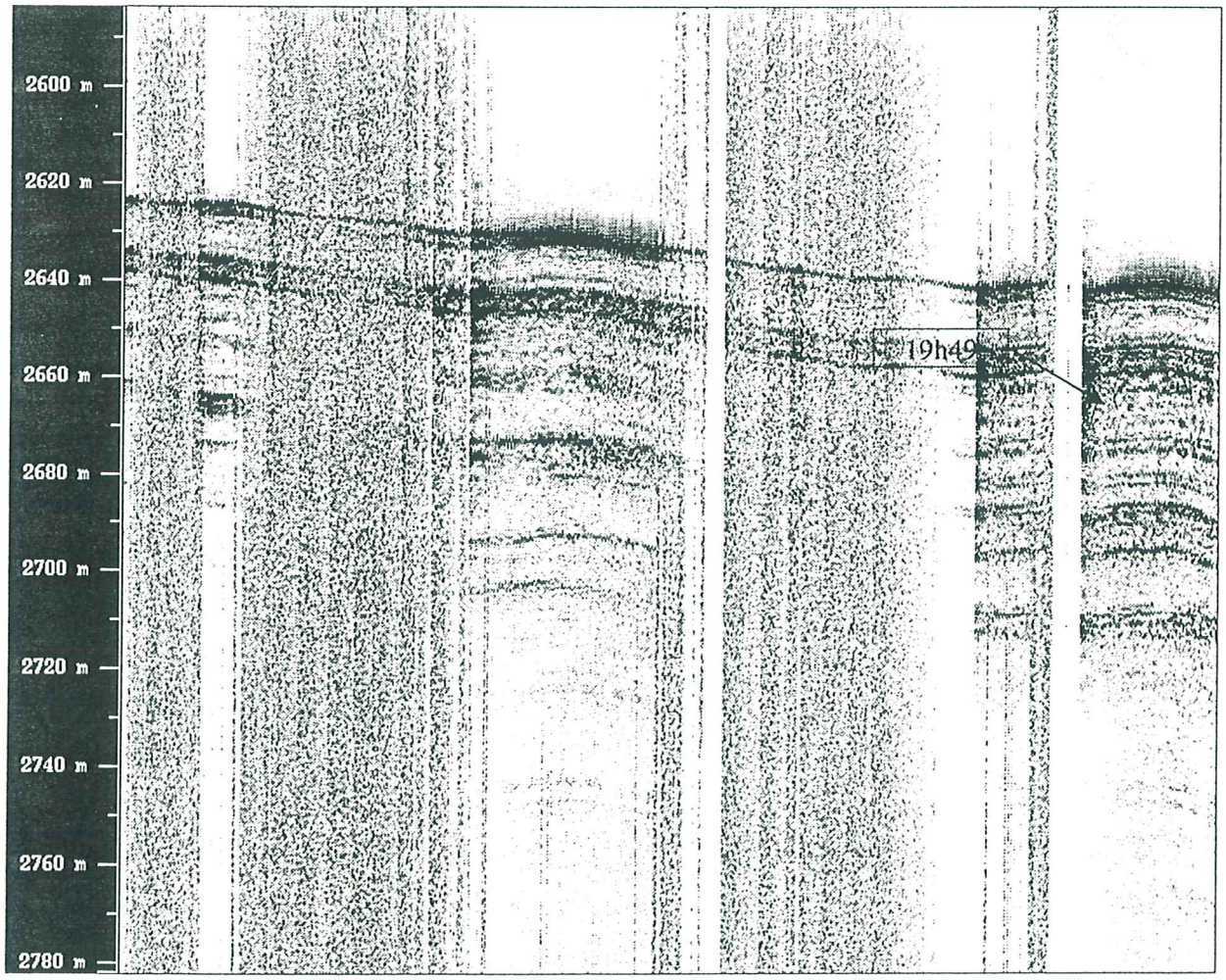
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 50 to 250 x 10^{-5} SI. Bulk density values vary from about 1.35 to 1.55 Mg/m^3 and p-wave velocities values range from 1475 to 1500 m/sec.

MD 99-2251

lat. : 57°26'87 N long. : 027°54'47 W
21 july 1999 Core length : 25.68 m Water depth : 2620 m



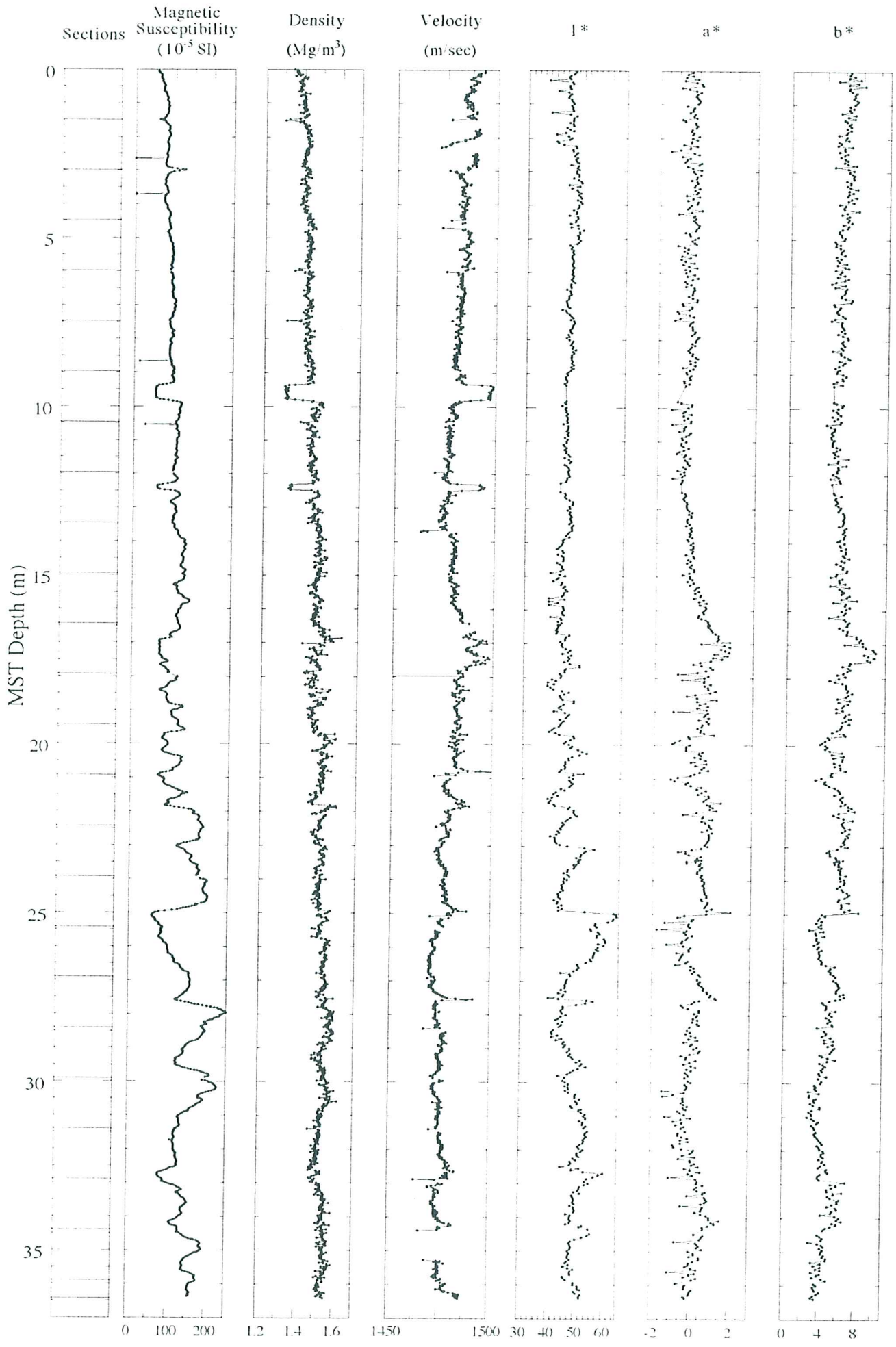




Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD99 2251


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0
100
200
1.2
1.4
1.6
1450
1500
30
40
50
60
-2
0
2
0
4
8

Julian day:	203	GMT time:	00h59
Latitude:	57°26.84N	Longitude:	027°55.83W
Water depth:	2600 m	Location:	Iceland Basin

Core number:	MD 99-2252	Corer length:	04.00 m
		Apparent penetration:	------- m
		Core length:	03.25 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

Number of sections recovered and conditions:
All XXV sections are in good conditions. The last one measures 58 cm long.

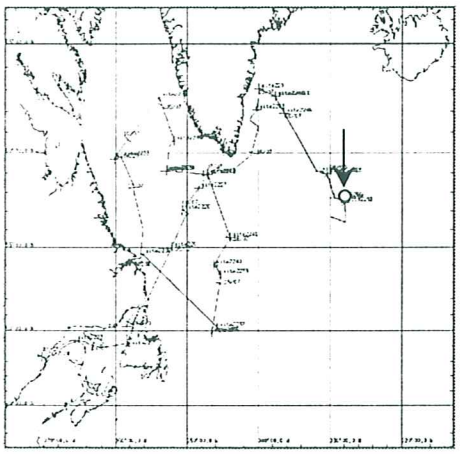
Onboard sampling and post cruise curation:
- The core was slab, 10 pieces were recovered. They will be curated at Camridge.
- Several bags of sediment were recovered:

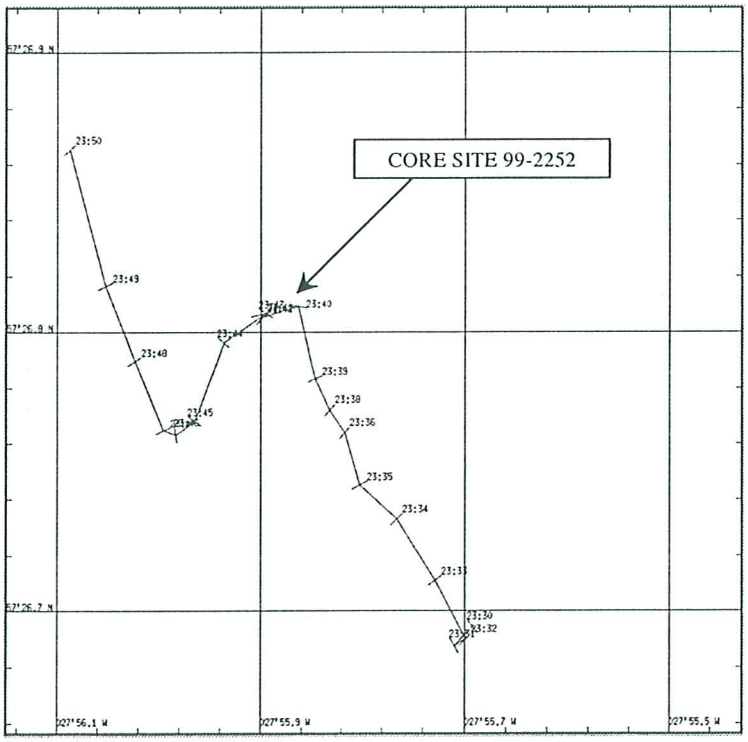
Summary of physical and sedimentological observations

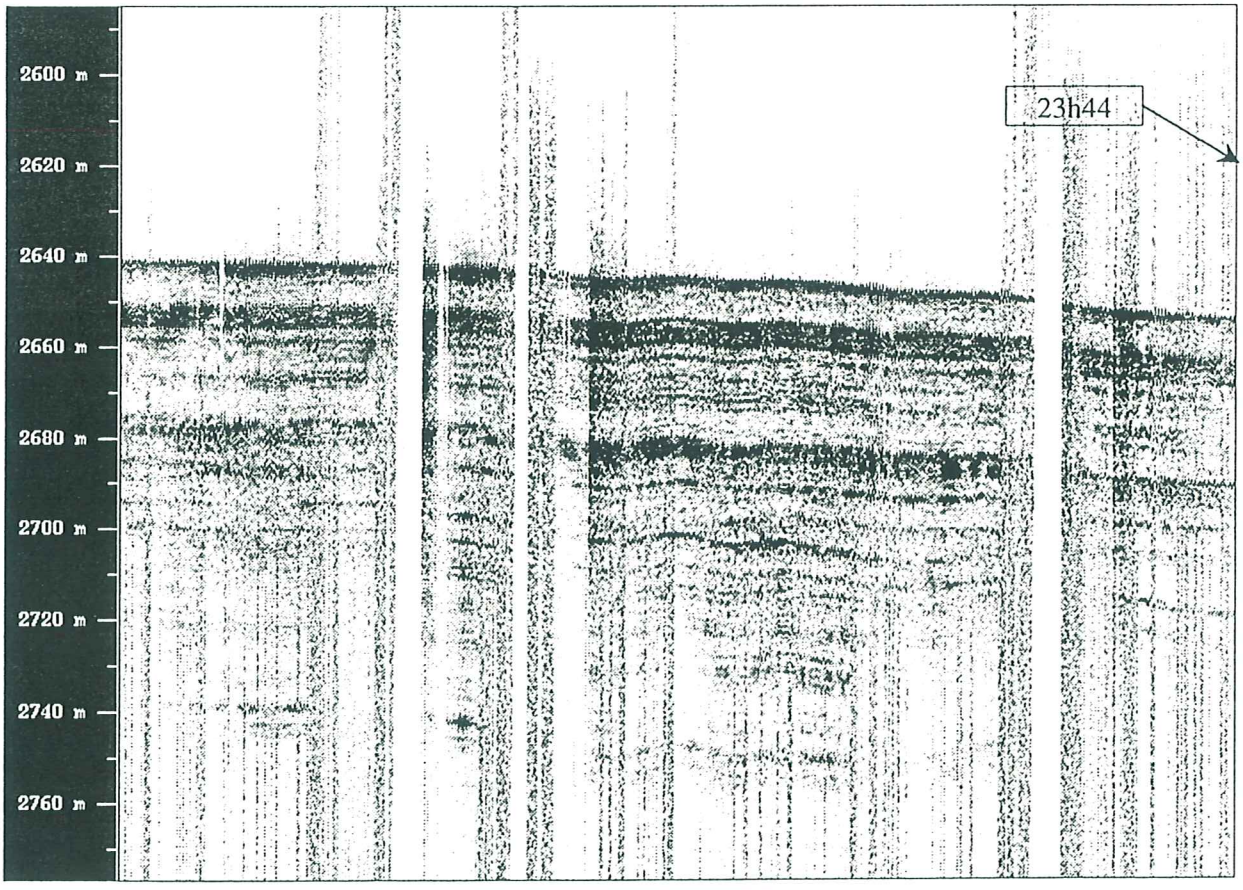
MD 99-2252

lat. : 57°26'84 N long. : 027°55'83 W

21 july 1999 Core length : 3.25 m Water depth : 2610 m







Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

Julian day:	203	GMT time:	10h45
Latitude:	56°21.87N	Longitude:	027°48.95W
Water depth:	2840 m	Location:	Iceland Basin, Gardar Drift

Core number:	MD 99-2253	Corer length:	41.90 m
		Apparent penetration:	41.90 m
		Core length:	32.75 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

Number of sections recovered and conditions:
All XXII sections are in good conditions. The last one measures 125 cm long.

Onboard sampling and post cruise curation:
- The sections were split onboard but not described. Both archive and working halves will be curated at Gif-sur-Yvette.
- U-channel have been mad on the working halves, they will be curated at UCD.
- Several bags of sediment were recovered: 1 top that will be curated at Bordeaux, 1 core cutter, 1 core catcher, and sediment bags from sections VI (812-822cm), VII (1020-1030cm), VIII (1137-1150cm; 1082-1085cm), all of which will be curated at Gif-sur-Yvette. Liquid sediment from section X (1383-1403cm) was lost on the deck during splitting.

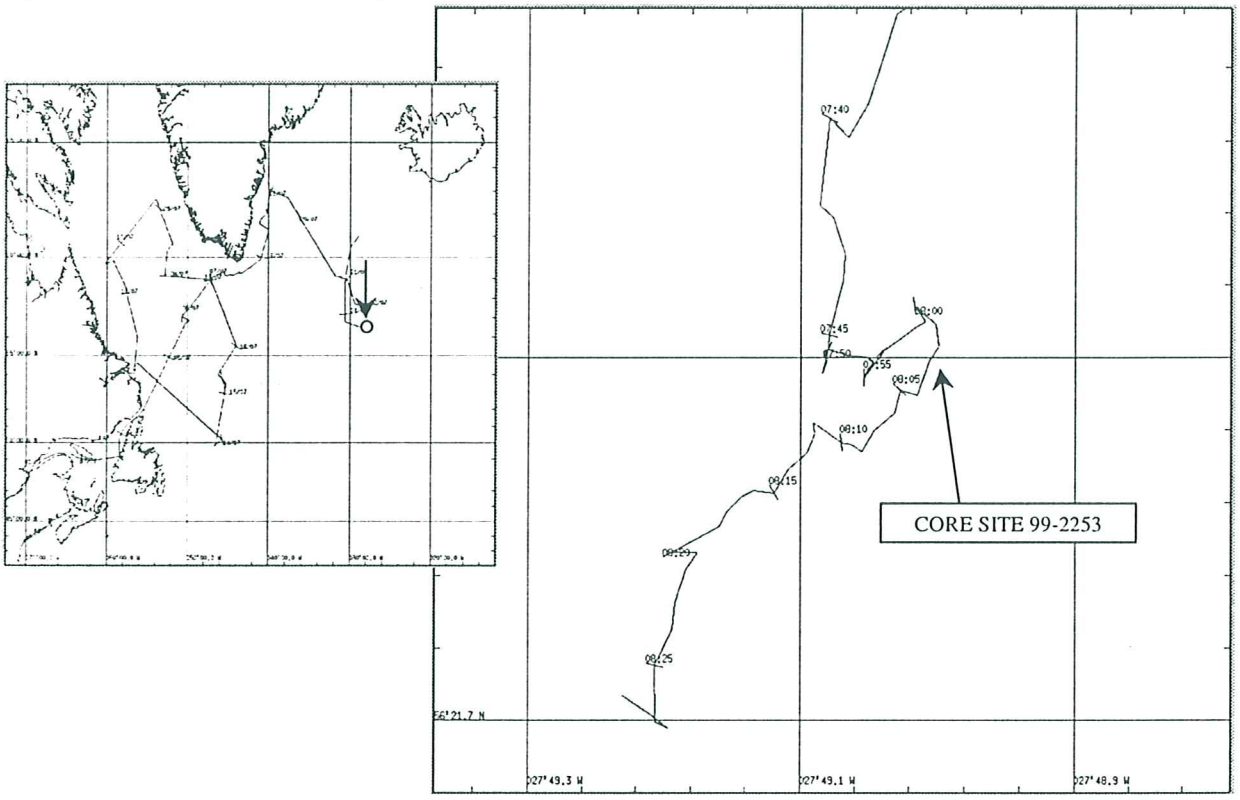
Summary of physical and sedimentological observations

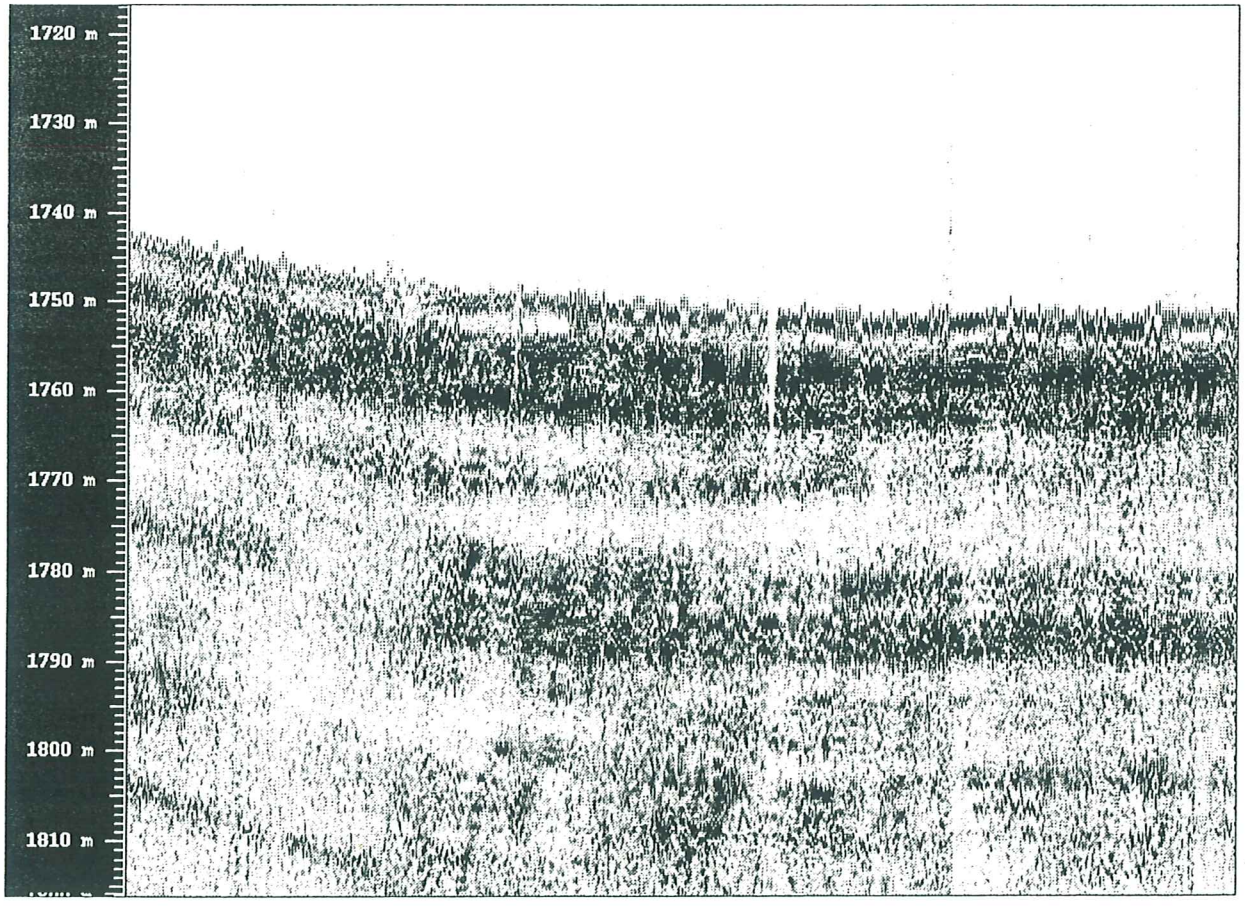
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 20 to 170 x 10^{-5} SI. Bulk density values vary from about 1.35 to 1.70 Mg/m^3 and p-wave velocity values range from 1475 to 1500 m/sec.

MD 99-2253

lat. : 56°21'78 N long. : 027°48'95 W

22 july 1999 Core length : 32.75 m Water depth : 2840 m

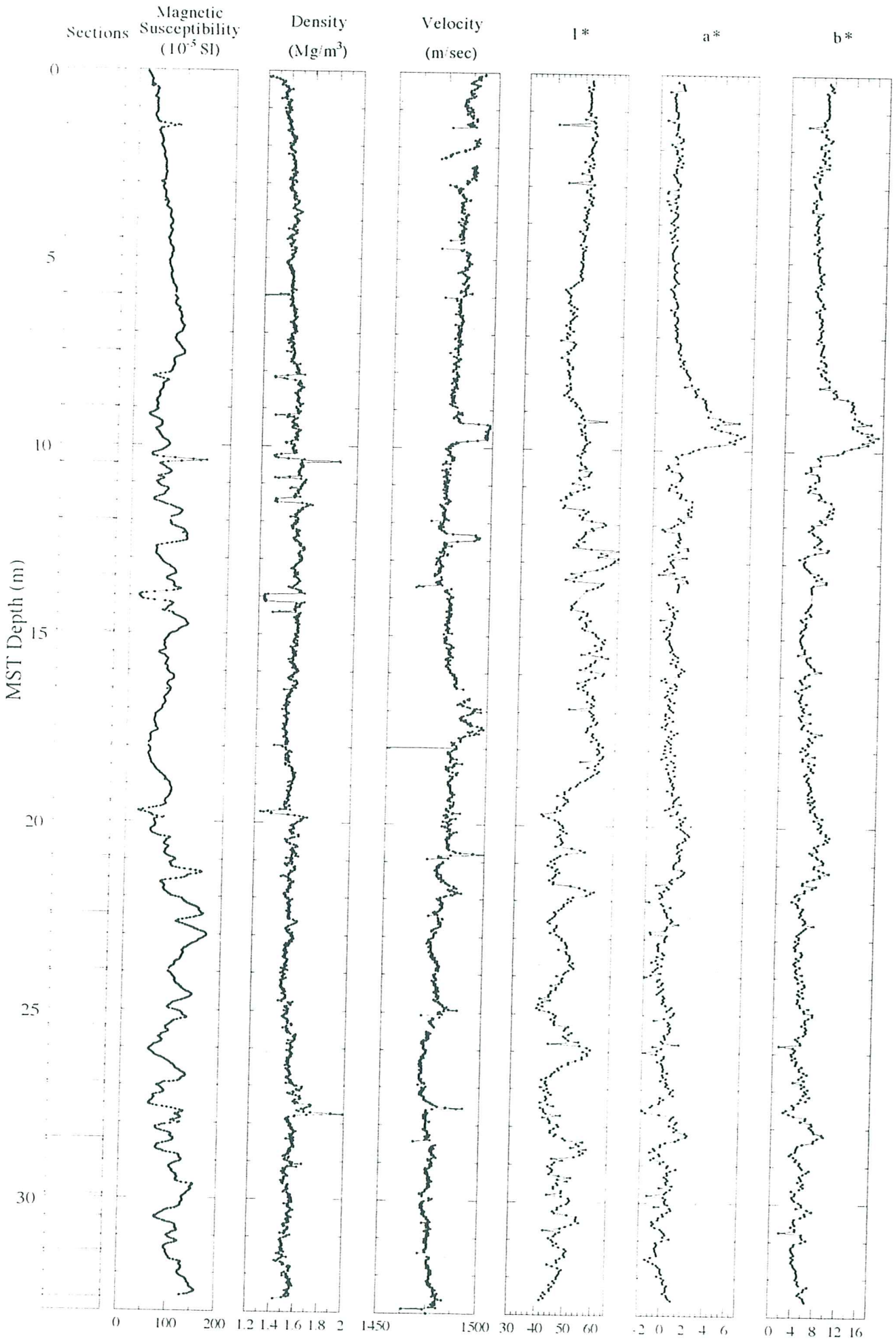




Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD99 2253


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
0 100 200
1.2 1.4 1.6 1.8 2
1450 1500
30 40 50 60
-2 0 2 4 6
0 4 8 12 16

Julian day:	203	GMT time:	11h57
Latitude:	56°22.09N	Longitude:	027°49.24W
Water depth:	2840 m	Location:	Iceland Basin, Gardar Drift

CTD depth: 0 - 2830 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

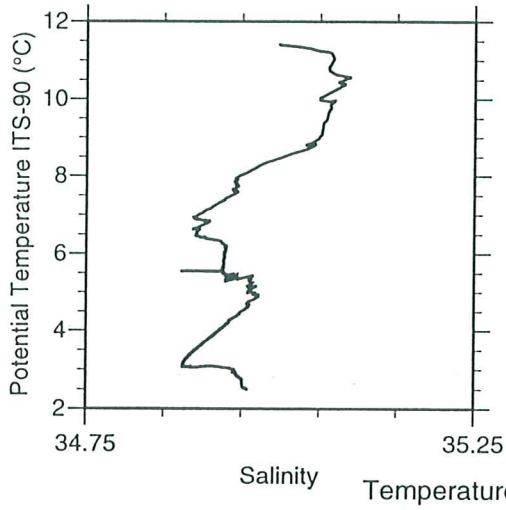
Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 2830 m, 2500 m, 2020 m, 1750m, 1100m, 650 m, 500 m, 350 m, 250m, 75 m and 20 m.

Sampling

The water samples will be analysed for salinity (CTD calibration), alkenone, Iodine 129, Hafnium, Neodinium.

Summary of CTD profil

- The surface temperature was 11.41 °C.



CTD
Station 34

Gardar Drift, Iceland Basin

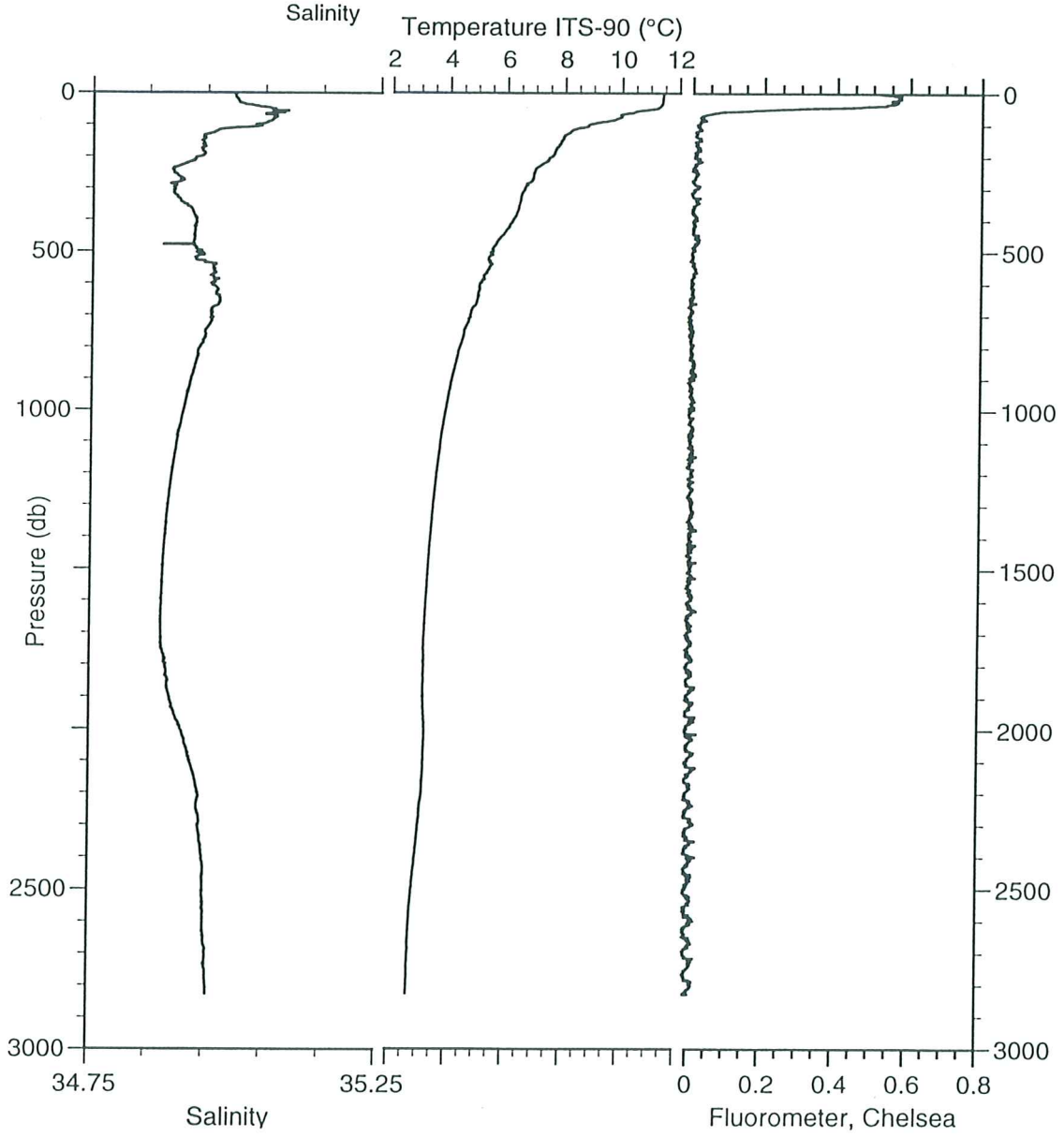
Latitude : 56°22.09 N

Longitude : 027°49.04 W

Water depth : 2840 m

Water profile : 0 - 2830 m

File: **iM5014**



Julian day:	203	GMT time:	21h50
Latitude:	56°47.78N	Longitude:	030°39.86W
Water depth:	2440 m	Location:	Bight Fracture Zone/East

Core number:	MD 99-2254	Corer length:	42.25 m
		Apparent penetration:	42.25 m
		Core length:	36.21 m

Observations

Corer condition:
Good.

Core condition:
Good.

Sections and sampling

Number of sections recovered and conditions:
All XXV sections are in good conditions. The last one measures 21 cm long.

Onboard sampling and post cruise curation:
- The sections were split onboard but not described. The working halves will be curated in Gif-sur-Yvette
- U-channel were made on all the working halves, they will be curated at Gif-sur-Yvette.
- The archives havles will be curated at GEOTOP.
- Several bags of sediment were recovered: 1 top that will be curated at Bordeaux, 1 core cutter, 1 core catcher, and sediment bags from sections V (676-710cm), VII (941-945cm; 1177-1181cm), all of which will be curated at Gif-sur-Yvette.

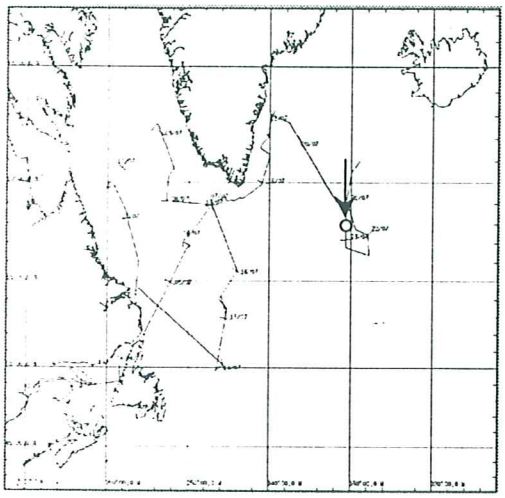
Summary of physical and sedimentological observations

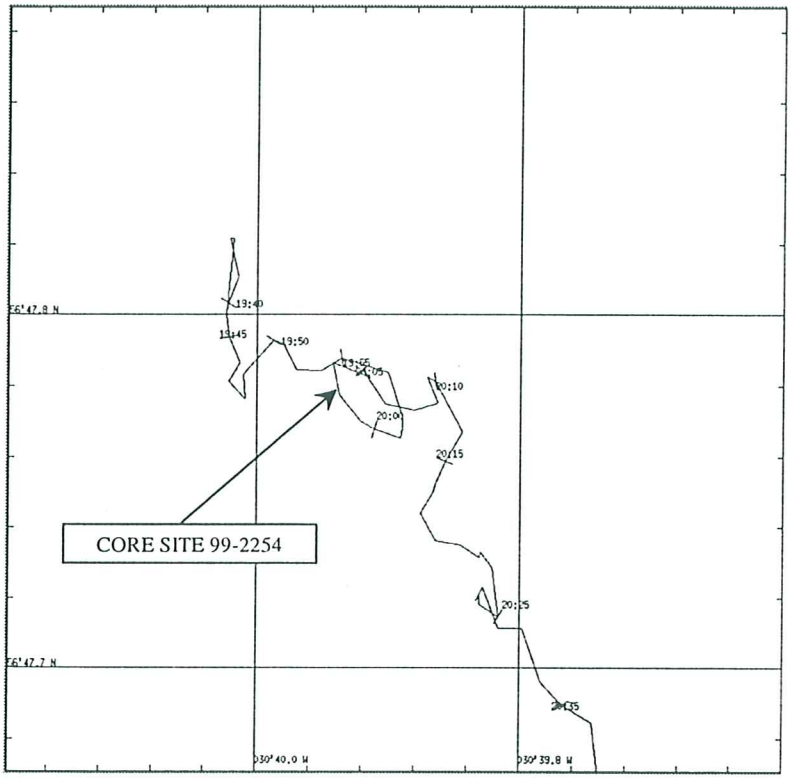
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 50 to 200 x 10^{-5} SI. Bulk density values vary from about 1.4 to 1.80 Mg/m^3 and p-wave velocity values range from 1450 to 1500 m/sec.

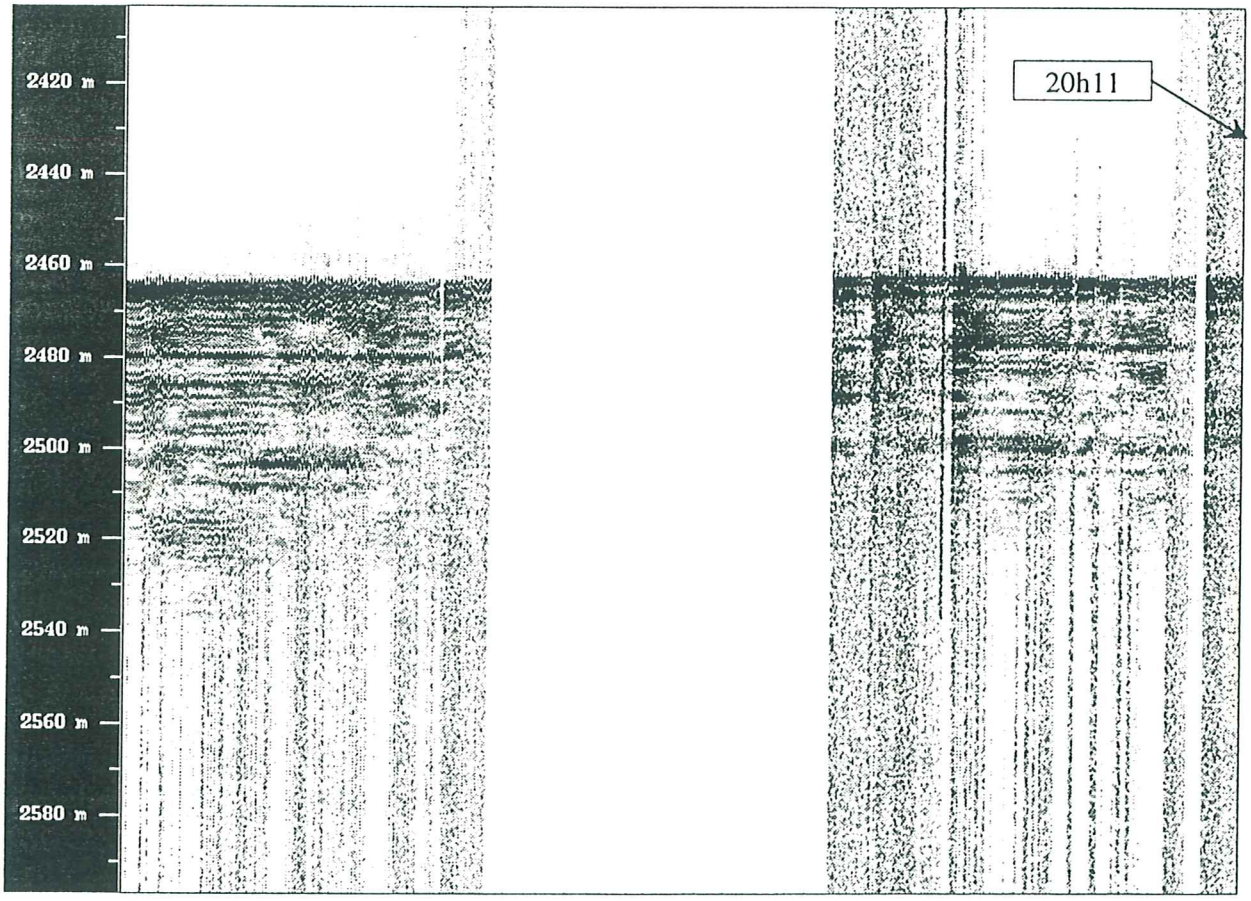
MD 99-2254

lat. : 56°47'78 N long. : 030°39'86 W

23 july 1999 Core length : 36.21 m Water depth : 2440 m



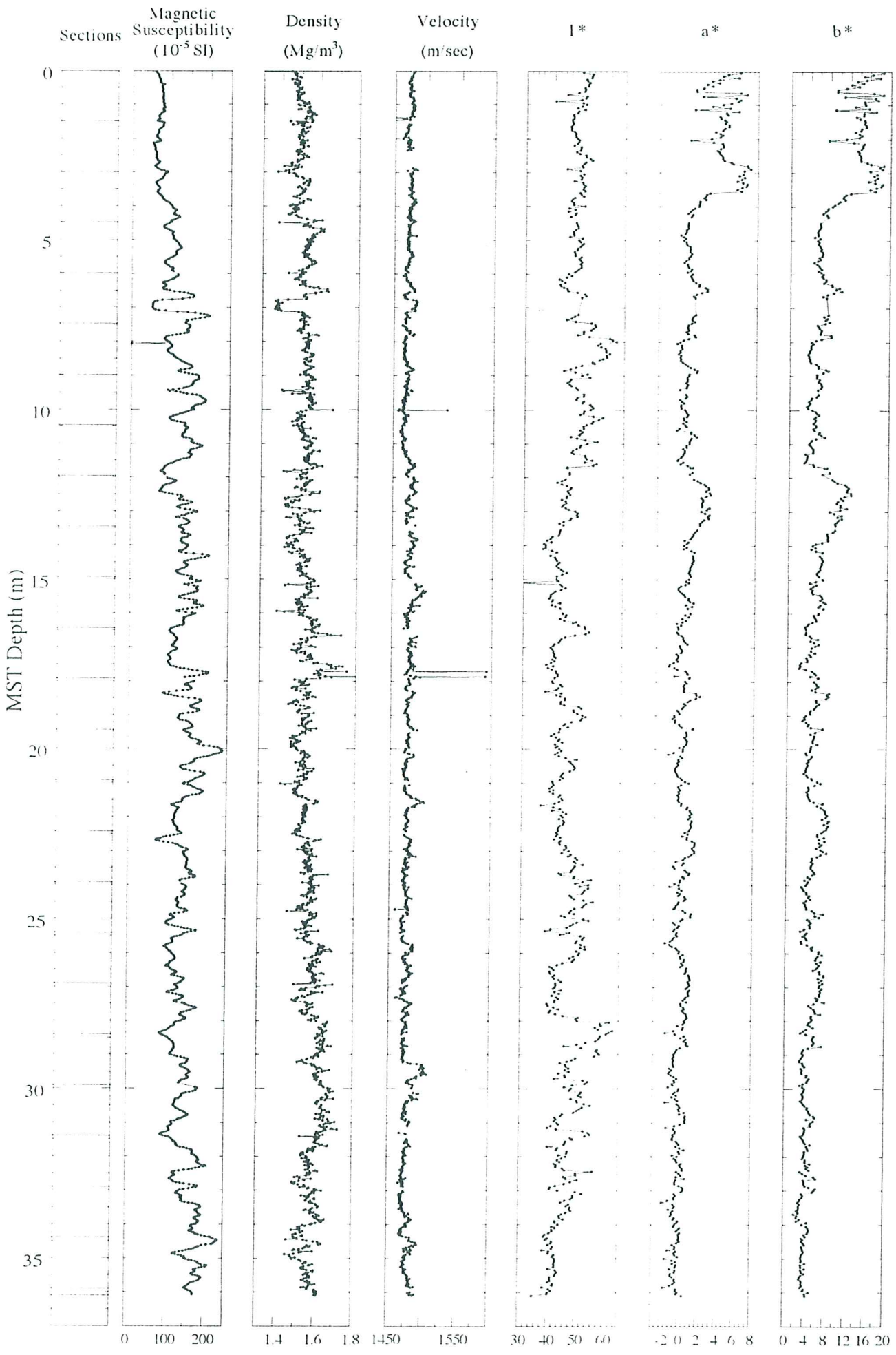




Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

MD99 2254


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
25
30
35
0 100 200
1.4 1.6 1.8
1450 1550
30 40 50 60
-2 0 2 4 6 8
0 4 8 12 16 20

Julian day:	203	GMT time:	22h00
Latitude:	56°47.87N	Longitude:	030°40.00W
Water depth:	2840 m	Location:	Iceland Basin, Gardar Drift

CTD depth: 0 - 200 m

Observations

CTD profil:

6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O_2), fluorimeter and transmissiometer.

Water sampling:

Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 25 m and near surface.

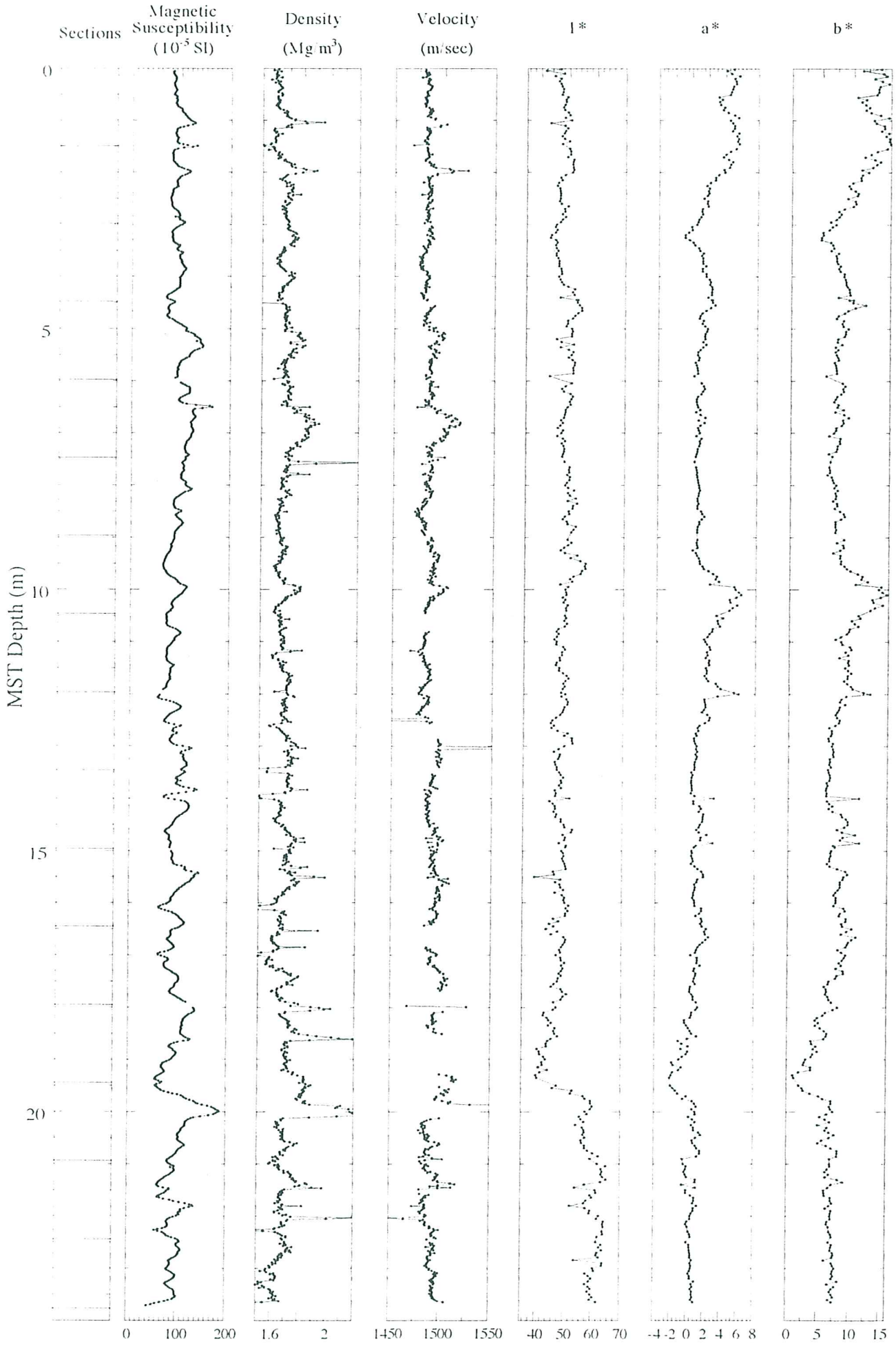
Sampling

The water samples will be analysed for salinity (CTD calibration), alkenone and Neodinium.

Summary of CTD profil

- The surface temperature was 10.51 °C.

MD99 2239


Sections
Magnetic Susceptibility (10^{-5} SI)
Density (Mg/m^3)
Velocity (m/sec)
l*
a*
b*
MST Depth (m)
0
5
10
15
20
0 100 200
1.6 2
1450 1500 1550
40 50 60 70
-4 -2 0 2 4 6 8
0 5 10 15

Julian day:	196	GMT time:	16h21
Latitude:	54°00.60N	Longitude:	046°11.68W
Water depth:	3280 m	Location:	S/W Gloria Drift (Vema 27-20)

Core number:	MD 99-2240	Corer length:	31.00 m
		Apparent penetration:	30.00 m
		Core length:	25.50 m

Observations

Corer condition:
Good.

Core condition:
Good

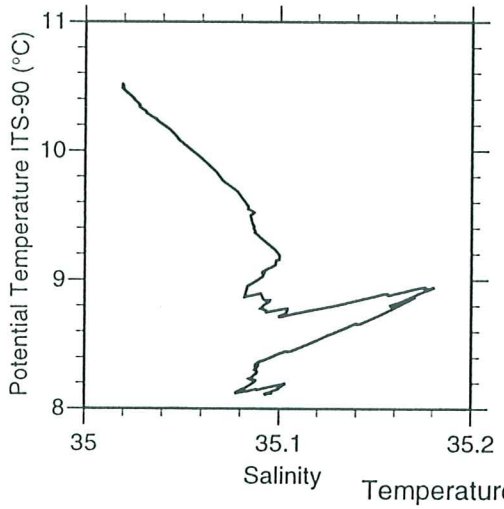
Sections and sampling

Number of sections recovered and conditions:
All XVII sections in good condition.

Onboard sampling and post cruise curation:
- The sections were split and described onboard. Both the archive and working halves will be curated at AGC-BIO.
- Constant volume sampling have been performed on every working halves. They will be curated at AGC-BIO.
- U-channels have been taken on every working halves. They will be curated at AGC-BIO after they have been measured for the paloemagnetic intensity at UCD.
- Severals bags of sediments have been recovered: 1 core cutter, 1 top and 1 bag of soupy sediment (probably injected from below) between 1253 and 1275 cm. They will all be curated at AGC-BIO.

Summary of physical and sedimentological observations

- Highly bowed beds and imperfectly filled liner down to 12 m; coring-induced mud injections repeatedly disrupt and cut the column below 20 m to the base of the core at 25.42 m. THIS CORE IS HIGHLY DISTURBED.
- The core consists mainly of interbedded clayey silt, silty clay, and nanno-foram ooze.
- MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 40 to 160 x 10^{-5} SI. Bulk density values range from about 1.5 to 2.2 Mg/m^3 and p-wave velocities range from about 1465 to 1550 m/sec.



CTD
Station 35

East Bight Fracture Zone

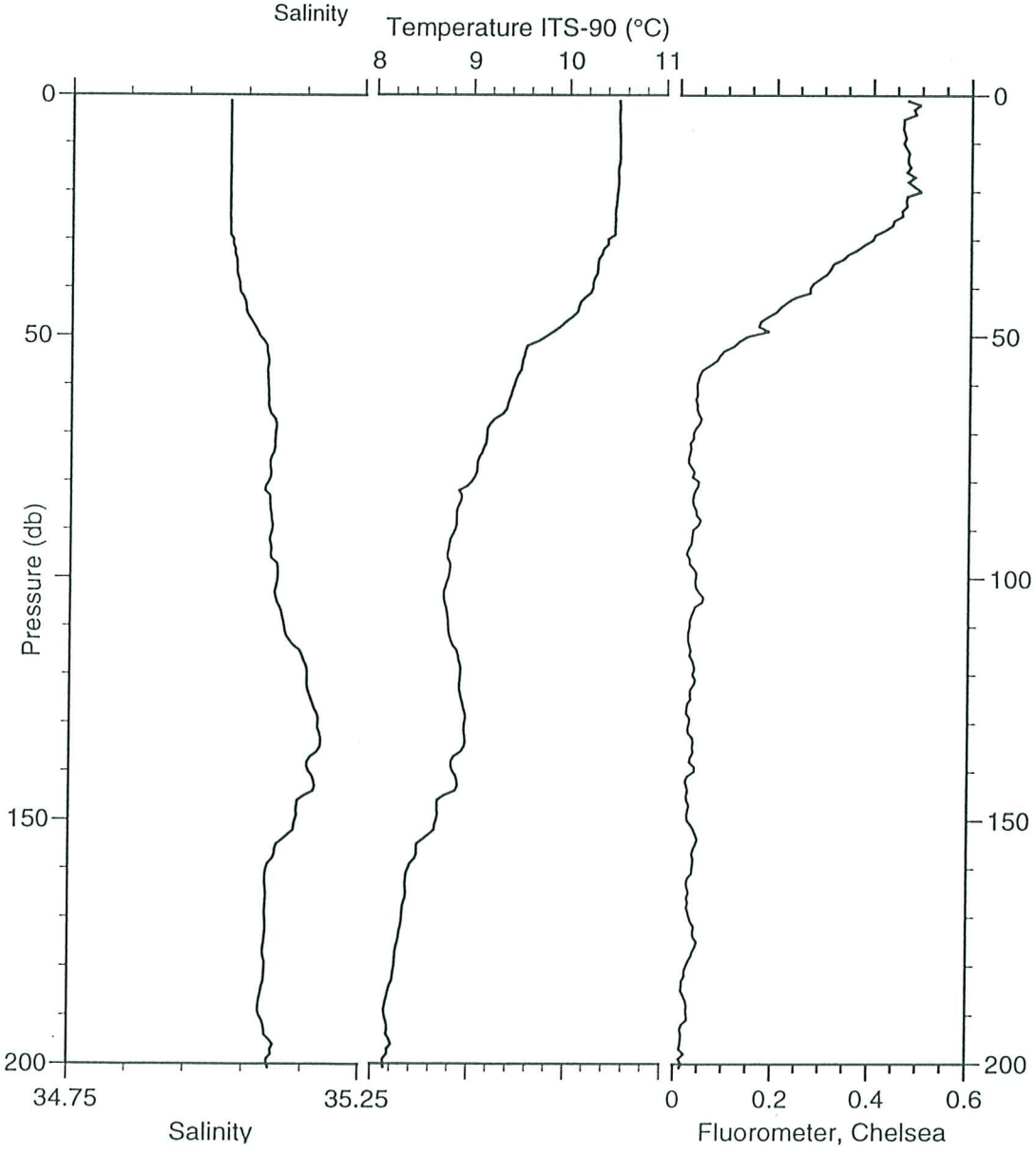
Latitude : 56°47.87 N

Longitude : 030°40.00 W

Water depth : 2430 m

Water profile : 0 - 200 m

File: **iM5015**



Julian day:	204	GMT time:	11h55
Latitude:	58°58.41N	Longitude:	030°39.10W
Water depth:	1490 m	Location:	East Reykjane Ridge

Core number:	MD 99-2255	Corer length:	42.25 m
		Apparent penetration:	------- m
		Core length:	25.03 m

Observations

Corer condition:

The corer was bent in two places and the core cutter was missing.

Core condition:

The core liner seems in good condition.

Sections and sampling

Number of sections recovered and conditions:

The sediment in sections I were stretch, we slightly push them back in place. Section II is in 2 part, IIa (150-209cm) and IIb (209-300 cm). Section X is in two parts, Xa (1350-1360 cm) and Xb (1360-1500 cm). Between Xa and Xb approximately 50 cm of sediment were lost, 40 cm at sea an 10 cm were recovered in a bag. There are XVII sections, the 3 last contain waters.

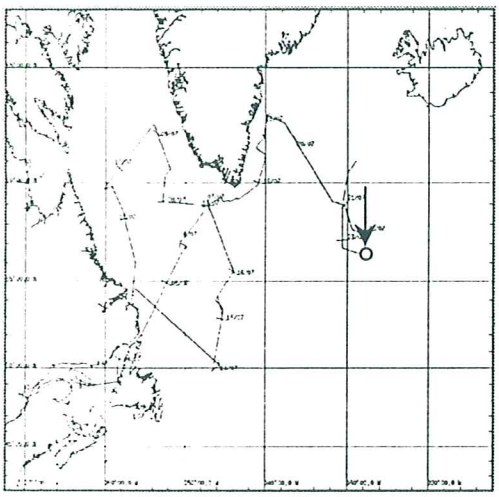
Onboard sampling and post cruise curation:

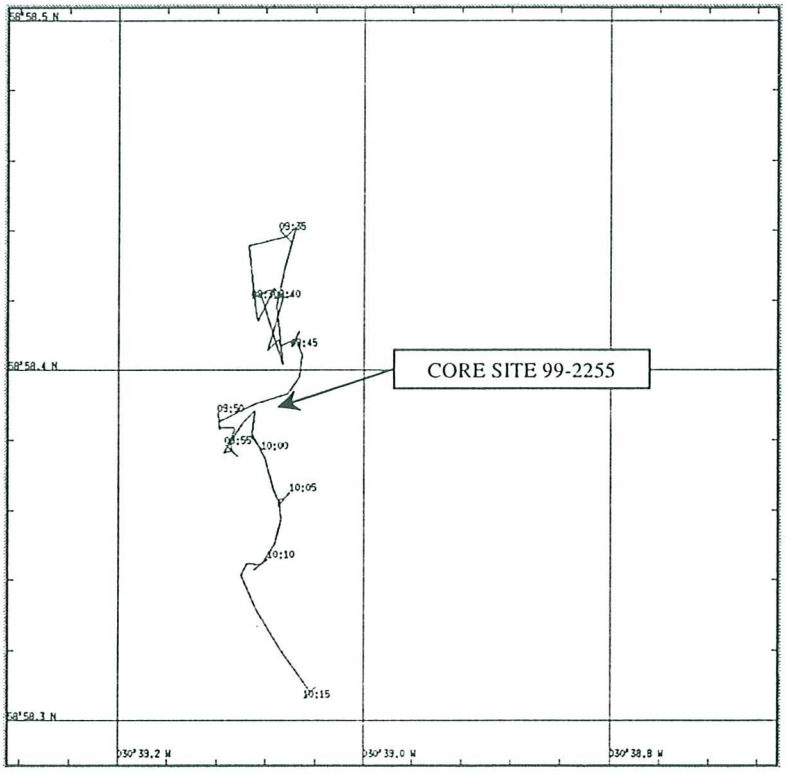
Summary of physical and sedimentological observations

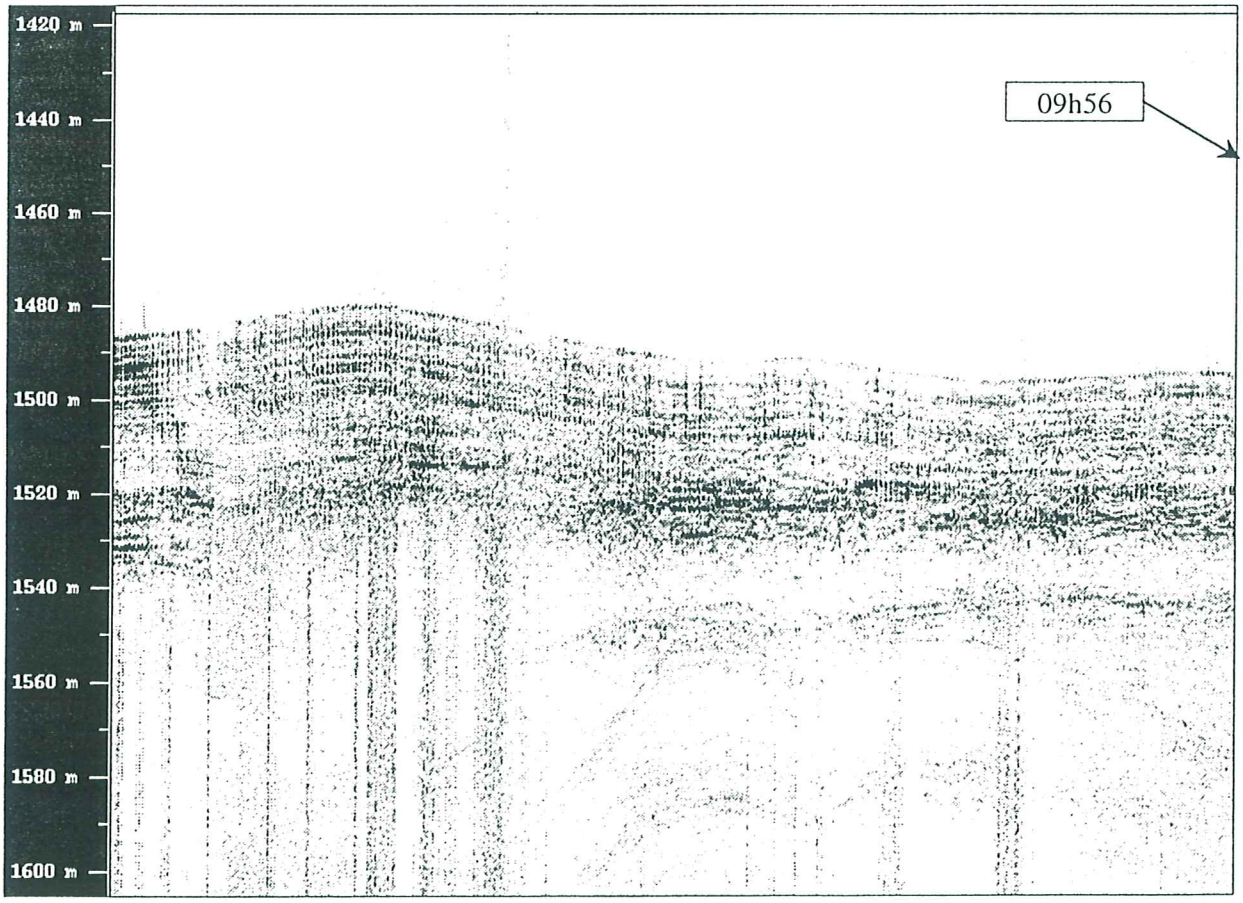
MD 99-2255

lat. : 58°58'41 N long. : 030°39'10 W

23 july 1999 Core length : ? m Water depth : 1490 m







Note that bathymetry and depth are approximative and that ~30 meters should be substracted to the value indicated.

Document IFRTP – Dept. Océanographie

8. Appendix

8.1. Essais d'utilisation du spectrophotomètre Colortron II

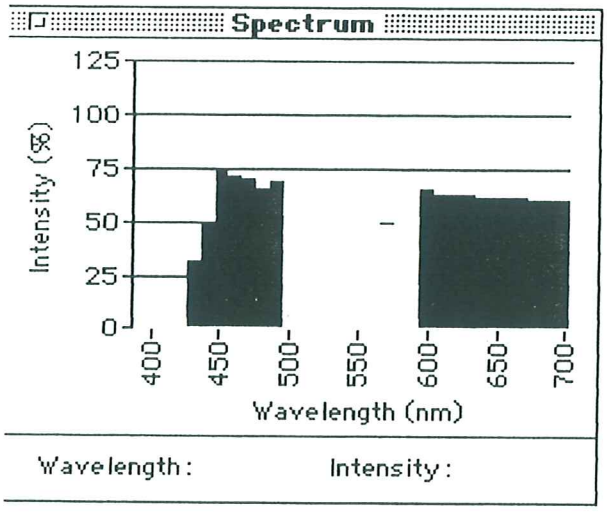
by A. Jegou (LMCE, Gif/Yvette)

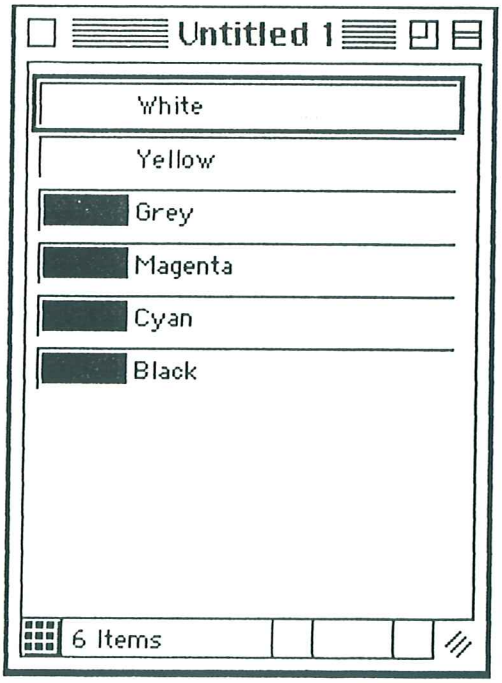
Suite à une panne d'un premier spectrophotomètre lors du leg 1 de la campagne IMAGES V, nous avons embarqué sur le Marion Dufresne à Québec un Colortron II.

Cet appareil a été livré avec un cable d'interface ADB (clavier, souris) pour MacIntosh et fonctionne avec le logiciel Colorshop. Ce logiciel ne peut être installé que si ColorSync est présent dans le système d'exploitation du MacIntosh. ColorSync 2., disponible sur la distribution de Colorshop en notre possession, ne peut être utilisé qu'avec des systèmes d'exploitation MacIntosh de version supérieure ou égale a 7.6.1. J'ai donc réalisé l'installation sur un PowerMac 7600/132 OS 8.5.1 de l'IFRTP.

Après cette installation, je me suis rendu compte que les couleurs affichées à l'écran ne correspondaient pas aux couleurs réelles. J'ai donc utilisé l'option "diagnostics" du logiciel Colorshop. Lorsque l'on effectue "Set absolute References" dans le logiciel Colorshop, Abolute Black et Absolute White sont effectués sans problème mais les diagnostiques réalisés avec le "color calibration target" ne passent pas. Le White passe bien, mais les Cyan, Magenta, Grey, Black, Yellow sont barres d'une croix rouge.

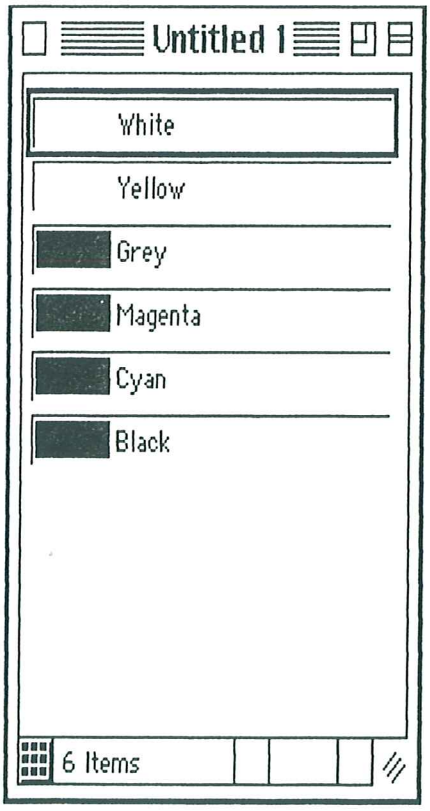
En refaisant une mesure de la couleur White sur le "color calibration target", nous obtenons un gris.. Le spectre de couleur semble décalé vers les valeurs hautes, et a une intensité moyenne d'environ 60%.

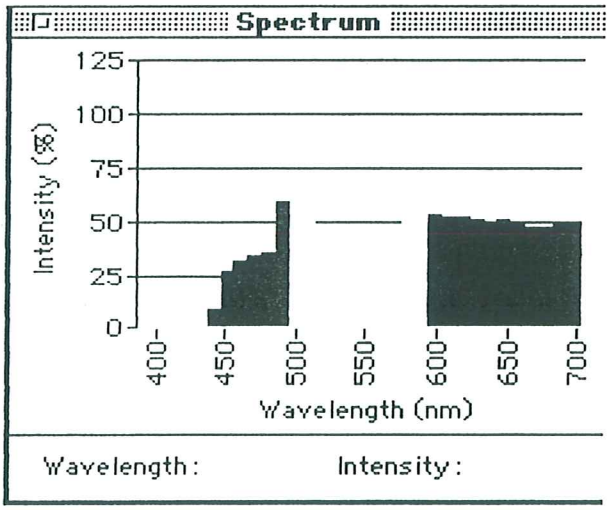




Suite à un échange de courrier avec Olivier Herzog d'X-rite, fournisseur du Colortron II, sa réponse ne m'a pas paru très satisfaisante. Il préconise d'utiliser le Colortron tel quel et de faire un réétalonnage après la campagne. D'apres les essais que j'ai effectué, le spectre parait décalé vers les logueurs d'ondes les plus hautes, ce qui devrait se traduire par une perte d'information difficile à récupérer.

Ce modèle de spectrophotomètre semble délicat a utiliser dans les conditions de manipulation à bord d'un bateau. D'apres ce que j'ai constaté lors de mesures de routine en utilisant le spectrophotomètre canadien, le Colortron II sera très difficile ou impossible à nettoyer sur des carottes humides. Afin d'évaluer la possibilité d'utiliser un écran de protection, des essais à travers une lamelle de verre montrent une déterioration très sensible du spectre.





8.2. The TSM 5265B Deep Water Multibeam Echosounder

by X. Morin (IFRTP)

8.2.1. Introduction

The THOMSON TSM 5265B deep water multibeam echosounder was used intensively during the GINNA cruise in water depths between 200 and 4000 m. It operates in two different configurations:

1. Multibeam echosounder configuration.

Centre frequency	12 KHz.
Swath width	120° at 5000 m.
Transmission beam width	1.4° x 140°.
Reception beam width	3.6° x 24°.

2. Sub-bottom profiler configuration.

Centre frequency	3.75 KHz.
Number of reception beams	5.
Beamwidth	5° x 5°.

Both systems are fully motion compensated, and navigation is through DGPS (Differential Global Positioning System).

8.2.2. Multibeam echosounder

In multibeam configuration, the system collects both bathymetric soundings and backscatter intensity. The system generates 151 beams in a 120 swath (14 km swath width in 4000 m of water), and has 92 receiving channels. Performance is optimised through the use of two operational modes : deep water and shallow water. In deep water mode, it employs five simultaneous, independent pulses, with different frequencies, projected in adjacent along-track areas. This produces a high density of soundings, and improves the quality of the data through redundancy. In shallow water mode, the system uses a large bandwidth transmission beam. For leg2 the switch between modes was typically at 1000 m water depth. Refraction solutions for the water velocity structure were based on Levitus tables.

8.2.3. Sub-bottom profiling

In sub-bottom profiler configuration, the system uses a narrow, high-energy beam, which yields deep penetration and good horizontal resolution. The system uses a chirp source with a centre frequency of 3.75 KHz. The return signal is received on 92 channels and combined to form the beam, reduce the relative second side lobes level and improve the signal to noise ratio. Vertical resolution is approximately 0.3 m.

Although 40 m penetration was routinely achieved, 80 m penetration on the Saguenay Fjord (stations 1 & 3) and in the Irminger Basin (stations 29 & 31) and 100 m penetration for station 34 was also obtained. The resolution and penetration depth of the sub-bottom profiler

are much higher than the onboard analogue 3.5 KHz system, which is limited by a much broader beamwidth, a continuous wave (CW) mode and a smaller penetration distance.

8.2.4. Usage and encountered problems

The sub-bottom profiler configuration was used for 60 percent of Leg 2, whereas the multibeam echosounder configuration was used 30 percent of the time. However, the sounder could not be used on the Saguenay river and occasionally in Lake Melville due to shallow depths. This is a limitation of the sub-bottom profiler, which cannot operate in water depths shallower than 190 metres at present time.

It was possible to configure the multibeam echosounder and sub-bottom profiler to operate simultaneously, and thus collect both bathymetric and 3.5 sub-bottom data. However, this mixed mode could not be used for speeds faster than 4 knots due to poor along-track resolution. Nevertheless, the technique was successfully used while on station at several core sites.

8.2.5. Collected data

Nine compact discs comprising 6 Gigabytes of data measured by the TSM 5265B echosounder were recorded during Leg 2 of the IMAGES V campaign.

The data include bathymetry measurements, which can be viewed using the new CARAIBES software developed by IFREMER, and screen captures (*.gif format) of the sediment profiles. At the time of this report, no means exist to view the imaging data (except the THOMSON playback video and thermal plotter), although it is expected that CARAIBES should soon be able to perform this function. Similarly, the IFRTP team is developing a program to view the sediment files, which is still not available.

8.2.6. Conclusion

The TSM 5265B sub-bottom profiler has proven to be a very useful tool not only for coring site reconaissance, but also for characterising sediment layers. The multibeam echosounder was also used on several occasions to obtain high quality backscatter imagery and bathymetry data. It was particularly useful for mapping a possible diapiric feature encountered at station 25, and the large bedforms in the Labrador Sea.

In summary, there was a strong demand from the scientific team for the use of both modes at all speeds.

Notes: Information in this paragraph is largely derived from the paper " Seafalcon11 : Deep water multibeam echo sounder product description ". Thomson Marconi Sonar. Brest department. 25/03/99. Thanks are due to Antony HEWITT and Derek DREGER for their help and support in making the present appendix.

8.3. Problèmes techniques à bord

Dans l'ensemble, le leg s'est avéré très satisfaisant, du point de vue des réalisations techniques à bord. Deux point particuliers doivent cependant être mentionnés. Le premier concerne le cable en Kevlar du treuil hydrographique (ILOT). L'état déficiant de la gaine conduit à des arrêts fréquents de l'embobinage ou du débobinage pour protéger les filaments de Kevlar par des rubans adhésifs. Cette déficiance a conduit à réduire certaines opérations requérant l'emploi de ce treuil afin d'éviter les pertes de temps. C'est en particulier le cas des carottages par gravité et par carottier-boîte qui seraient pourtant très utiles pour compléter les séries sédimentaires carottées par leCalypso.

Le second problème un peu irritant, en particler en recherche de station, est l'impossibilité d'effectuer simultanément une saisie d'image par balayage multifaisceau et des profils séismiques grâce au sondeur de 3.5 kHz digital. Le système analogique e peut en effet remplacer, a vu de sa piètre qualité, ce dernier. En conséquence, il a fallu efecuer à plusiers reprises des passages successifs en station, avec chacun des systèmes, pour disposer des informations indispensables à un bon carottage.

8.4. Daily track charts
See archive section.

8.5. MST data logging sheets (and core lengths)
Next pages

July 1/99 Liner Type 1.36cm

MD99-2222

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
IA	0-50	45	0	45	2222A	1	0			x	1	IA and IB run through as one section; 5 cm missing from the very top of the core and not included in the core length	js
IB	60-150	90	55	145	2222A	1			x	x	2		
II	150-300	150	145	295	2222A	2			x	x	2	NB no temperature probe in the core	
III	300-450	150	295	445	2222A	3			x	x	2	NB no temperature probe in the core	
IV	450-600	150	445	595	2222A	4			x	x	2	NB no temperature probe in the core	
water								0				pusher moved twice without moving the core	
V	600-750	150	595	745	2222B	1	0		x	x	2	reduced p-wave signal due to poor cable connection	ck
VI	750-900	150	745	895	2222B	2			x	x	2		
VII	900-1050	150	895	1045	2222B	3							kj
VIII	1050-1200	150	1045	1195	2222B	4				x	1	water lost at the base of section and base is disturbed; beginning of section nudged one too many; very poor velocity signal	
water								-9					
IX	1200-1350	150	1195	1345	2222C	1	0		x	x	2	transducers not pulled back and nudged; zeroed the diameter LCO; no temperature probe until 1295 cm	
X	1350-1500	150	1345	1495	2222C	2			x	x	2	lost water at the base of the section; no velocity signal; core liner join 16 cm from the base	
XI	1500-1650	150	1495	1645	2222C	3			x		1	problem with the movement of the core sections on the track; rerun sections X and XI	
water													
X	1350-1500	150	1345	1495	2222D	1			x	x	2	rerun	
XI	1500-1650	150	1495	1645	2222D	2			x		1	rerun; one nudge too many	
XII	1650-1800	150	1645	1795	2222D	3							
XIII	1800-1950	150	1795	1945	2222D	4							
water								-3					
XIV	1950-2100	150	1945	2095	2222E	1	0					NB no temperature probe in core	js
XV	2100-2250	150	2095	2245	2222E	2						no complete temperature record	
XVI	2250-2400	150	2245	2395	2222E	3				x	1		
XVII	2400-2550	150	2395	2545	2222E	4							
water								-3					
XVIII	2550-2700	150	2545	2695	2222F	1	0			x	1	1.5 cm between section XVIII and XIX due to sediment expansion	
XIX	2700-2850	150	2695	2845	2222F	2				x	1	2.0 cm between section XIX and XX due to sediment expansion	
XX	2850-3000	150	2845	2995	2222F	3			x		1	1cm gap due to sediment expansion	
XXI	3000-3150	150	2995	3145	2222F	4				x	1		
water								-5					
XXII	3150-3300	150	3145	3295	2222G	1	0			x	1	3 cm gap between XXII and XXIII	js
XXIII	3300-3450	150	3295	3445	2222G	2			x		1	2 cm gap between XXIII and XXIV	

July 1/99 Liner Type 1.36cm **MD99-2222**

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
XXIV	3450-3600	150	3445	3595	2222G	3			x		1	temperature probe put in at 82 cm	
XXV	3600-3750	150	3595	3745	2222G	4						1 cm between sections - approx last 5 cm not read by mag susc	ck
water													

NB MST depths are not calculated using final procedure, metre tape depths do not include extruded sediment.

July 2/99 Liner Type 1.36cm

MD99-2223

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	150	0	150	2223A	1			x		1	bottom 20 cm empty; p-wave signal very poor at the base of the core	ck
II	150-300	150	150	300	2223A	2			x	x	2	void at the top of the section	
III	300-450	150	300	450	2223A	3			x	x	2	1.5 cm gap between sections	
IV	450-600	150	450	600	2223A	4			x	x	2	1.5 cm gap between sections	
water													
V	600-750	150	600	750	2223B	1	0						
VI	750-900	150	750	900	2223B	2				x	1	some sediment (gravel) lost at the base of the section.	
VII	900-1050	150	900	1050	2223B	3			x		1	styrofoam insert - 1 cm gap; motor failed to move the core (approx. 5 measurements affected) at the beginning of the section; base of the core offset by 5 cm from zero position	
VIII	1050-1200	150	1050	1200	2223B	4				x	1	base of the section off by 1 cm	kj
water								-5					
IX	1200-1350	150	1200	1350	2223C	1	0		x		1		
X	1350-1500	150	1350	1500	2223C	2							
XI	1500-1650	150	1500	1650	2223C	3							
XII	1650-1800	150	1650	1800	2223C	4							
water								-2				base of the water section was 0.5 cm too far along the track	
XIII	1800-1950	150	1800	1950	2223D	1	0						
XIV	1950-2100	149	1950	2099	2223D	2						forgot temperature probe in the top 2/3 of the section; high p-wave signal at the bottom	
XV	2100-2250	150	2100	2250	2223D	3						lost a little water at both ends of the section as end caps were removed	
XVI	2250-2400	150	2250	2400	2223D	4						lost a little water at the beginning of the section	
water								1				end of water section is offset by 1.5 cm at the end of the run	
XVII	2400-2550	149.5	2400	2549.5	2223E	1	0					lost a little water at the top of the section	
XVIII	2550-2700	150	2549.5	2699.5	2223E	2						lost a little water at the top of the section	
XIX	2700-2850	149	2699.5	2848.5	2223E	3							
water													

NB MST depths are not calculated using final procedure, metre tape depths do not include extruded sediment.

July 2/99 Liner Type 1.36cm

MD99-2224

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	8-154	145.5	8	153.5	2224A	1	0	0	x	x	2	1 bag of sediment (4 cm); core liner originally thought to start at 4 cm, but another bag containing 4 cm of sediment was found - top of core was relabelled as 8 cm	js
II	154-304	150.5	153.5	304	2224A	2			x	x	2		
III	304-454	149.5	304	453.5	2224A	3			x	x	2	NB no temperature probe in the core	
IV	454-604	150	453.5	603.5	2224A	4			x		1		
water													
V	604-754	150	603.5	753.5	2224B	1			x	x	2		ck
VI	754-904	150	753.5	903.5	2224B	2						0.5 cm gap between sections	
VII	904-1054	150	903.5	1053.5	2224B	3							
VIII	1054-1204	150	1053.5	1203.5	2224B	4						styrofoam at the base of the core; according to the deck sheets the void is at the top of the section; as processing the MST data the void was at the base of the section	
water													
IX	1204-1354	150	1203.5	1353.5	2224C	1	-1		x	x	2	water came out at both ends. NB forgot temp probe therefore need to correct the temperature data	kj
X	1354-1504	150	1353.5	1503.5	2224C				x	x	2	2 mm short of 150 cm; a little water out of both ends; nudged 1 mm extra; section stopped at the wrong place - had to rerun the section	
water													
X	1354-1504	150	1353.5	1503.5	2224D	1	0		x	x	2	rerun	
XI	1504-1654	150	1503.5	1653.5	2224D	2			x		1	water came out at top; sediment squeezed back in at the top	
XII	1654-1804	150	1653.5	1803.5	2224D	3			x		1	disturbed at the base of the section	js
XIII	1804-1954	150	1803.5	1953.5	2224D	4							
water								-1					
XIV	1954-2104	150	1953.5	2103.5	2224E	1	0					sediment extruded 0.5 cm at top	
XV	2104-2254	150	2103.5	2253.5	2224E	2						core liner 2 mm short	
XVI	2254-2404	150	2253.5	2405.5	2224E	3						both ends disturbed, bottom 2 cm sticking out - cut off and bagged; bagged portion not included in length of core	
XVII	2404-2554	150	2405.5	2558.5	2224E	4						1 cm cut off from top and bagged. 2 cm cut off from base and bagged; NB bagged portion not included in length of core	
water								-2					
XVIII	2554-2704	147.5	2558.5	2708	2224F	1	0					liner 2.5 cm short, top of core slightly extruded; 2 cm cut off the bottom and bagged; bagged portion not included in the metre tape length; the metre tape length did not correct for measured length of section	
XIX	2704-2854	149.5	2709	2858.5	2224F	2						1 cm cut off top and bagged; bagged portion not included in length of core	
XX	2854-3004	149	2858.5	3007.5	2224F	3						core liner 1 cm short	ck
XXI	3004-3154	150	3007.5	3157.5	2224F	4							
water								-2					
XXII	3154-3304	150	3157.5	3307.5	2224G	1	0						

July 2/99 Liner Type 1.36cm

MD99-2224

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
XXIII	3304-3454	149	3307.5	3456.5	2224G	2							
XXIV	3454-3604	149	3456.5	3605.5	2224G	3							
XXV	3604-3754	150	3605.5	3755.5	2224G	4							
water								-1					
XXVI	3754-3904	149.5	3755.5	3905	2224H	1	0						
XXVII	3904-4054	150	3905	4055	2224H	2						section jammed so measurement at 3863 replicated 3 times; aborted section run as core too heavy	js
water								-3					
XXVII	3904-4054	150	3905	4055	2224I	1	0					rerun; spacer liner run through in between each section as sections are too heavy	
XXVIII	4054-4204	150	4055	4205	2224I	2							
XXIX	4204-4354	148.5	4205	4353.5	2224I	3							
XXX	4354-4504	150	4353.5	4503.5	2224I	4							
water													
XXXI	4504-4654	150	4503.5	4653.5	2224J	1	0						kj
XXXII	4654-4804	151.5	4653.5	4805	2224J	2							
XXXIII	4804-4954	149.5	4805	4954.5	2224J	3						metre tape is 4949-5099 cm	
XXXIV	4954-5104	150	4954.5	5104.5	2224J	4							
water								-2					
XXXV	5104-5254	150	5104.5	5254.5	2224K	1						metre tape is 5099-5249 cm; bottom 0.5 cm sticking out	
XXXVI	5254-5404	150	5254.5	5404.5	2224K	2						metre tape 5249-5399 cm; 1 mm pushed too far	
XXXVII	5404-5554	150	5404.5	5554.5	2224K	3							
XXXVIII	5554-5704	150	5554.5	5704.5	2224K	4							
XXXIX	5704-5854	150	5704.5	5854.5	2224K	5						1 cm sediment missing at the bottom; temperature probe pulled out	
water								-2					

NB MST depths are not calculated using final procedure, metre tape depth incorrect
Core will need to be relabelled with the metre tape, as some sections were shorter than 150 cm but this was not taken into account.

July 3/99 Liner Type 1.36cm

MD99-2225

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149	0	149	2225A	1	0	0	x	x	2	pusher position 150.4 cm	ck
II	150-300	149.5	149	298.5	2225A	2			x	x	2	pusher position 151.2 cm; 1 cm gap due to end caps	
IIIA	300-320	20.5	298.5	319	2225A	3						pusher position 150.8 cm; 1 cm gap between IIIA and IIIB, possibly extruded mud because of core liner split	
IIIB	320-450	130	318	448	2225A	3						top of IIIB core was extruding out; tried to run it through with a plate but the core squished	
water													
IV	450-600	150	448	598	2225B	1	-1					no p-wave signal	kj
V	600-750	150	598	748	2225B	2						NB one nudge too many	
VI	750-900	117	748	865	2225B	3						void at the bottom of the section (33cm) not included in the section length but should have been; mistake in metre tape	
VII	900-1050	129	865	994	2225B	4						21 cm void at the top of the section that was not included in the length of the core; mistake in metre tape	
water													
VIII	1050-1200	150	994	1144	2225C	1							
IX	1200-1350	152	1144	1296		2			x		1	1 cm extruding out of the top of the liner; end cap plate placed at the top; 1 cm extruding from the base was included in the MST depth and then placed in the end cap before running section X	
X	1350-1500	150	1300	1450	2225C	3				x	1	top 4 cm 1296 -1300 were bagged; at the bottom of the section 2 cm were bagged on deck	
XI	1500-1650	151	1452	1603	2225C	4						top 1 cm not full of sediment due to bad cutting angle; one nudge too many	
water													
XII	1650-1800	150	1605	1755	2225D	1						2 cm at the top of section bagged on deck	
XIII	1800-1950	150	1755	1905	2225D	2						over push at start by 1 mm	
XIV	1950-2100	150	1908	2058	2225D	3						2 cm at top bagged on deck and the top of section 1907-1908 was bagged in MST container	
XV	2100-2250	150	2059	2209	2225D	4						1.5 cm bagged on the deck; overnudge by 1 mm	
water													
XVI	2250-2400	149	2210	2359	2225E	1						1 cm at top bagged	js
XVII	2400-2550	149	2359	2508	2225E	2						0.4 cm gap between liners, overnudge by 1 mm	
XVIII	2550-2700	149	2508	2657	2225E	3						0.2 cm over the end	
XIX	2700-2850	149	2658	2807	2225E	4						1 cm top and 0.5 cm bottom bagged, base of liner cut (approx 0.5 cm) over nudged; missed pause, ran extra liner	
water													
XX	2850-3000	150	2808	2958	2225F	1						0.5 cm top bagged	
XXI	3000-3150	149	2958	3107	2225F	2							
XXII	3150-3300	149.5	3107	3256.5	2225F	3							

July 3/99 Liner Type 1.36cm

MD99-2225

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
XXIII	3300-3450	149.5	3256.5	3406	2225F	4							
water													
XXIV	3450-3600	150	3406	3556	2225F	1						temperature probe only at the end of the section	
XXV	3600-3750	152	3556	3708	2225F	2							
water													

July 6/99 Liner Type 1.36cm **MD99-2226**

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149.5	0	149.5	2226A	1	0		x	x	2		ck
II	150-300	150	149.5	299.5	2226A	2			x	x	2	water flowed out from the top and the base	
III	300-450	150	302.5	452.5	2226A	3			x	x	2	3 cm sediment bagged at the top of the section	
IV	450-600	149.5	452.5	602	2226A	4			x	x	2		
water								-4					
V	600-750	150	602	752	2226B	1	0		x	x	2		
VI	750-900	150	752	902	2226B	2			x	x	2		
VII	900-1050	148.5	902	1050.5	2226B	3			x	x	2		
VIII	1050-1200	149.5	1050.5	1200	2226B	4			x	x	2		
water								-1					
IX	1200-1350	149.5	1200	1349.5	2226C	1	0		x	x	2		kj
X	1350-1500	150.5	1349.5	1500	2226C							one nudge too many; pusher did not move and there was a 3 cm offset at the end of the section; transducers were re-zeroed before the next section	
water								-1					
XI	1500-1650	149.5	1500	1649.5	2226D	1			x	x	2	lots of water out from the top	
XII	1650-1800	150	1649.5	1799.5	2226D	2			x	x	2		
XIII	1800-1950	149.5	1799.5	1949	2226D	3			x	x	2		
XIVA	1950-2078	128	1949	2077	2226D	4			x	x	2		
XIVB	2078-2100	17	2077	2094	2226D	5			x	x	2	break at the liner join and put 2.5 cm styrofoam at the top of the section	
water								-2					
XV	2100-2250	150	2094	2244	2226E	1	-1		x	x	2		
XVI	2250-2400	149.5	2244	2393.5	2226E	2			x		1	lots of water out from the bottom; approximately 14 cm void in the bottom of the section filled with styrofoam	
XVII	2400-2550	149.5	2393.5	2543	2226E	3			x		1	approximately 14 cm void at the top filled with styrofoam; one nudge too many	
XVIII	2550-2700	149.5	2543	2692.5	2226E	4			x	x	2	one nudge too many	
water								3					
XIX	2700-2850	150	2692.5	2842.5	2226G	1	0		x		1		
XX	2850-3000	149.5	2842.5	2992	2226G	2							js
XXI	3000-3150	149.5	2992	3141.5	2226G	3							
XXII	3150-3214	63.5	3141.5	3205	2226G	4							
water								0					

July 6/99 Liner Type 1.36cm

MD99-2227

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	148	0	148	2227A	1	0		x	x	2		ck
II	150-300	150	148	298	2227A	2				x	1		
III	300-450	149	298	447	2227A	3				x	1		
IV	450-600	149	447	596	2227A	4			x	x	2		
water								-2					
V	600-750	150	596	746	2227B	1	0		x	x	2		
VI	750-900	150	746	896	2227B	2				x	1		
VII	900-1050	149	896	1045	2227B	3							
VIII	1050-1200	150	1045	1195	2227B	4							
water								-2					
IX	1200-1350	150	1195	1345	2227C	1	0		x	x	2		kj
X	1350-1496	145	1345	1490	2227C	2						2 cm styrofoam at the top of the section	
XI	1496-1650	153	1490	1643	2227C	3							
XII	1650-1800	150	1643	1793	2227C	4				x	1		
water								-1					
XIII	1800-1950	150	1793	1943	2227D	1	0			x	1		
XIV	1950-2100	149	1943	2092	2227D	2						liner join at 2011 cm	
XV	2100-2250	150	2092	2242	2227D	3						temperature probe at 2145 cm	
XVI	2250-2400	150	2242	2392	2227D	4							
water								1					
XVII	2400-2550	149.5	2392	2541.5	2227E	1	0						
XVIII	2550-2700	150	2541.5	2691.5	2227E	2							
XIX	2700-2850	149.5	2691.5	2841	2227E	3							
XX	2850-3000	149.5	2841.5	2991	2227E	4							
water								-1				one overnudge for the dummy - mag effected only	
XXI	3000-3150	150	2991.5	3141.5	2227F	1	-1						
XXII	3150-3300	150	3141.5	3291.5	2227F	2							
XXIII	3300-3450	150	3291.5	3441.5	2227F	3						slightly overnudged	
XXIV	3450-3600	150	3441.5	3591.5	2227F	4							
water								-2					
XXV	3600-3750	150	3591.5	3741.5	2227G	1	-1						
XXVI	3750-3900	150	3741.5	3891.5	2227G	2							js
XXVII	3900-4050	150	3891.5	4041.5	2227G	3							
XXVIII	4050-4200	150	4041.5	4191.5	2227G	4							
XXIX	4200-4296.5	96	4191.5	4287.5	2227G	5							
water								-5					

July 7/99 Liner Type 1.36cm

MD99-2228

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
I	0-150	149.5	0	149.5	2228A	1	1		x		1	little water out of bottom of section	kj
II	150-300	150.5	149.5	300	2228A	2			x	x	2		
III	300-450	150	300	450	2228A	3			x	x	2	liner join at 425 cm; little water out from the top; one nudge too many; temperature probe put in at 20 cm	
IV	450-600	150	450	600	2228A	4			x	x	2		
water								-1					
V	600-750	150.5	600	750.5	2228B	1	-1						
VI	750-900	149.5	750.5	900	2228B	2			x		1	one nudge too many	
VII	900-1050	150	900	1050	2228B	3			x	x	2	bottom 3 cm disturbed as end cap taken off; one nudge too many	
VIII	1050-1200	150	1050	1200	2228B	4						one nudge too many	
water								-1					
IX	1200-1350	150	1200	1350	2228C	1	-1						
X	1350-1500	150	1350	1500	2228C	2							
XI	1500-1650	149.5	1500	1649.5	2228C	3						liner join at 1568 cm; one nudge too many; 2 measurements no movement of core therefore will rerun	
spacer													
X	1350-1500	150	1350	1500	2228D	1	0					rerun	
XI	1500-1650	149.5	1500	1649.5	2228D	2						liner join at 1568 cm	
XII	1650-1800	149.5	1649.5	1799	2228D	3							
XIII	1800-1950	150	1799	1949	2228D	4							
water								-2					
XIV	1950-2100	150	1949	2099	2228E	1	0						js
XV	2100-2250	149.5	2099	2248.5	2228E	2			x		1		
XVI	2250-2400	150	2248.5	2398.5	2228E	3			x	x	2		
XVII	2400-2550	149	2398.5	2547.5	2228E	4			x	x	2	one nudge too many	
XVIII	2550-2706	155.5	2547.5	2703	2228E	2			x		1		
water								-2					

July 8/99 Liner Type 1.36cm

MD99-2229

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
IA	0-15	25	0	25	2229A	1	0		x	x	2		
IB	15-150	135	25	160	2229A	2			x	x	2	gamma source was closed - sections rerun	js
IA	0-15	25	0	25	2229B	1	0		x	x	2	rerun	
IB	15-150	135	25	160	2229B	2			x	x	2	rerun	
II	150-300	150	160	310	2229B	3			x	x	2	cracked liner caused the top to be displaced; transducers held open to move sample through	
III	300-450	150	310	460	2229B	4			x	x	2		
IV	450-600	149.5	460	609.5	2229B	5			x	x	2		
water								-5					
V	600-750	150	609.5	759.5	2229C	1	0		x	x	2		
VI	750-900	150	759.5	909.5	2229C	2			x	x	2		
VII	900-1050	150	909.5	1059.5	2229C	3			x	x	2		
VIII	1050-1200	150	1059.5	1209.5	2229C	4			x	x	2		
water								-3					
IX	1200-1350	150	1209.5	1359.5	2229D	1	0		x	x	2		
X	1350-1500	150	1359.5	1509.5	2229D	2			x	x	2		
XI	1500-1650	150	1509.5	1659.5	2229D	3			x	x	2		
XII	1650-1800	149.5	1659.5	1809	2229D	4						lots of water poured out of both ends and styrofoam in both ends	ck
water													
XIII	1800-1950	150	1809	1959	2229E	1	0		x	x	2		
XIV	1950-2100	150	1959	2109	2229E	2			x		1		
XV	2100-2250	150	2109	2259	2228E	3			x	x	2		
XVI	2250-2400	149	2259	2408	2228E	4							
water													
XVII	2400-2550	150	2408	2558	2228F	1							
XVIII	2550-2700	150	2558	2708	2228F	2				x	1		
XIX	2700-2850	149	2708	2857	2228F	3							
XX	2850-3000	150	2857	3007	2228F	4							
water													
XXI	3000-3150	149.5	3007	3156.5	2228G	1							
XXII	3150-3300	150	3156.5	3306.5	2228G	2				x	1		kj
XXIII	3300-3450	150	3306.5	3456.5	2228G	3							
XXIV	3450-3600	148.5	3456.5	3605	2228G	4						core did not move for three measurements; rerun sections XXIII and XXIV	
XXIII	3300-3450	150	3306.5	3456.5	2228H	1	0					rerun	

July 8/99 Liner Type 1.36cm **MD99-2229**

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
XXIV	3450-3600	148.5	3456.5	3605	2228H	2						rerun; bottom 2 cm crumbly and partially missing	
XXV	3600-3628	28.5	3605	3633.5	2228H	3						top of section disturbed and partially missing	
water								-1					

July 8/99 Liner Type 1.36cm

MD99-2230

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
I	0-150	145.5	0	145.5	2230A	1	0		x		1	liner join at 56 cm; top 4 cm styrofoam; bottom 2 cm disturbed	kj
II	150-300	149.5	145.5	295	2230A	2			x	x	2	little water out from the top of the section	
III	300-450	150	295	445	2230A	3			x	x	2	one nudge too many	
IV	450-600	150	445	595	2230A	4			x	x	2		
water								-3					
V	600-750	149	598	747	2230B	1	0		x	x	2		
VI	750-900	148	747	895	2230B	2			x	x	2		
VII	900-1050	150	895	1045	2230B	3			x	x	2		js
VIII	1050-1200	149.5	1045	1194.5	2230B	4			x	x	2	approx. 4-5 cm flowed out, as top end cap was taken off	
water								-3					
IX	1200-1350	149.5	1194.5	1344	2230C	1	0		x	x	2		
X	1350-1500	150	1344	1494	2230C	2			x	x	2	approx. 4-5 cm flowed out, when top end cap was taken off	
XI	1500-1650	149	1494	1643	2230C	3			x	x	2		
XII	1650-1800	150	1643	1793	2230C	4				x	1	top 7 cm styrofoam	
water													
XIII	1800-1950	150	1793	1943	2230D	1	0		x		1		ck
XIV	1950-2100	149.5	1943	2092.5	2230D	2							
XV	2100-2250	149.5	2092.5	2242	2230D	3			x		1	lots of water	
XVI	2250-2400	150	2242	2392	2230D	4			x		1		
water													
XVII	2400-2550	149.5	2392	2541.5	2230E	1	0						
XVIII	2550-2700	150	2541.5	2691.5	2230E	2							
XIX	2700-2850	150.5	2691.5	2842	2230E	3							
XX	2850-3000	150	2842	2992	2230E	4							
water								-2					
XXI	3000-3150	150.5	2992	3142.5	2230F	1							kj
XXII	3150-3300	149	3142.5	3291.5	2230F	2							
XXIII	3300-3450	150.5	3291.5	3442	2230F	3							
XXIV	3450-3476	25.5	3442	3467.5	2230F	4							
water													

July 8/99 Liner Type 1.36cm **MD99-2231**

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	148	0	148	2231A	1	0		x	x	2	liner join at 16 cm; temperature probe not in core at the beginning	kj
II	150-300	150	148	298	2231A	2			x	x	2	one nudge too many	
III	300-450	150	298	448	2231A	3			x	x	2	little water out of top	
IV	450-600	149.5	448	597.5	2231A	4			x	x	2		
water								-1					
V	600-750	149.5	597.5	747	2231B	1	-1		x	x	2		
VI	750-900	150	747	897	2231B	2			x		1		
VII	900-1050	149.5	897	1046.5	2231B	3						2 measurements no movement of core	
water								0					
VIII	1050-1200	149.5	1046.5	1196	2231C	1	0		x		1	liner join at 1157 cm	
IX	1200-1350	150	1196	1346	2231C	2							
X	1350-1500	150	1346	1496	2231C	3						one nudge too many	
XI	1500-1650	150	1496	1646	2231C	4						3 cm at the base of section filled with styrofoam	
water								-3					
XII	1650-1800	149.5	1646	1795.5	2231D	1	0					3 cm styrofoam at the top of the section	js
XIII	1800-1950	150	1795.5	1945.5	2231E	1	0						
XIV	1950-2100	149.5	1945.5	2095	2231E	2							
XV	2100-2250	149.5	2095	2244.5	2231E	3							
XVI	2250-2400	149.5	2244.5	2394	2231E	4				x	1		
water								0					
XVII	2400-2550	149.5	2394	2543.5	2231F	1	0					run one at a time with 100 cm spacer between	
XVIII	2550-2700	149.5	2543.5	2693	2231F	3							
XIX	2700-2850	149.5	2693	2842.5	2231F	5							
water								0					
XX	2850-3000	149.5	2842.5	2992	2231G	1						run one at a time with 100 cm spacer between	ck
XXI	3000-3150	149	2992	3141	2231G	3							
XXII	3150-3300	150	3141	3291	2231G	5							
XXIII	3300-3429	129	3291	3420	2231G	7							
water													

July 9/99 Liner Type 1.36cm

MD99-2232

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149	0	149	2232A	1	0		x	x	2		
II	150-300	149	150	299	2232A	2			x	x	2		ck
III	300-450	150	299	449	2232A	3			x	x	2		
IV	450-600	149	449	598	2232A	4			x	x	2		
water													
V	600-750	150	598	748	2232B	1	0		x	x	2		
VI	750-900	149	748	897	2232B	2			x	x	2		
VII	900-1050	150	897	1047	2232B	3			x	x	2		
VIII	1050-1200	149	1047	1196	2232B	4			x	x	2		
water													
IX	1200-1350	150	1196	1346	2232C	1	0		x	x	2		
X	1350-1500	149.5	1346	1495.5	2232C	2			x		1	soupy ends	
XI	1500-1650	149.5	1495.5	1645	2232C	3							
XII	1650-1800	150	1645	1795	2232C	4				x	1		
spacer													
XIII	1800-1950	150	1795	1945	2232D	1		-2				liner join at 1894 cm	
XIV	1950-2100	149	1945	2094	2232D	2						at the top 7 cm sediment flowed out while running and were bagged	kj
XV	2100-2250	150	2094	2244	2232D	3			x	x	2	a little water came out from the bottom	
XVI	2250-2400	149.5	2244	2393.5	2232D	4			x	x	2	one nudge too many	
water								-3					
XVII	2400-2550	149.5	2393.5	2543	2232E	1	-1		x	x	2		
XVIII	2550-2700	150	2543	2693	2232E	2			x	x	2		
XIX	2700-2850	149.5	2693	2842.5	2232E	3			x	x	2		
XX	2850-3000	150.5	2842.5	2993	2232E	4			x	x	2	a little water came out from the bottom and from top while running	
XXI	3000-3032	32	2993	3025	2232E	5			x	x	2		
water								-2					

July 10/99 Liner Type 1.36cm **MD99-2233**

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149	0	149	2233A	1	0		x	x	2		ck
II	150-300	149.5	149	298.5	2233A	2			x	x	2		
III	300-450	150	298.5	448.5	2233A	3			x	x	2		
IV	450-600	150	448.5	598.5	2233A	4			x	x	2		
water													
V	600-750	149.5	598.5	748	2233B	1	0					styrofoam at both ends; water in sediment flowed out from top and was bagged	
VI	750-900	150	748	898	2233B	2			x	x	2		
VII	900-1050	150	898	1048	2233B	3			x	x	2		
VIII	1050-1200	149	1048	1197	2233B	4			x	x	2		
water													
IX	1200-1350	150	1197	1347	2233C	1	0		x	x	2	100 cm spacer used between each section; join at 1323 cm	
X	1350-1500	149.5	1347	1496.5	2233C	3			x		1		
XI	1500-1650	149.5	1496.5	1646	2233C	5							
XII	1650-1800	150	1646	1796	2233C	7							
water													
XIII	1800-1950	150	1796	1946	2233D	1							kj
XIV	1950-2100	149.5	1946	2095.5	2233D	3							
XV	2100-2250	150.5	2095.5	2246	2233D	5						spacer nudged one too many	
XVI	2250-2400	149.5	2246	2395.5	2233D	7							
XVII	2400-2462	61.5	2395.5	2457	2233D	8							
water													

July 12/99 Liner Type 1.36cm

MD99-2234

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	144	0	144	2234A	1	-1			x	1	top 4 cm filled with styrofoam	kj
II	150-300	150	144	294	2234A	2			x	x	2	join at 254 cm; strong p-waves	
III	300-450	149.5	294	443.5	2234A	3			x	x	2	weak p-wave signals; finished 1 cm off the line	
III	300-450	149.5	294	443.5	2234B	1			x	x	2		
IV	450-600	149.5	443.5	593	2234B	2				x	1	one nudge too many; top 5 cm came out with endcap; join at 495 cm	
V	600-750	147.5	593	740.5	2234B	3						liner join at 708.5 cm	
VI	750-900	149.5	740.5	890	2234B	4	0		x		1	one nudge too many	
water								-2				one nudge too many	
VII	900-1050	149	890	1039	2234C	1	-1						
VIIIA,B	1050-1200	147.5	1039	1186.5	2234C	2						section A+B run as one (liner join at 1051 cm); A+B crack in liner; B lost a little water at the top; B at the top filled with styrofoam; no sediment at bottom section to put temperature probe in	
IX	1200-1350	149.5	1195	1336	2234C	3						lots of water lost at the top; styrofoam at top; one nudge too many	
X	1350-1500	149	1336	1485	2234C	4							js
water								-4					
XI	1500-1650	149.5	1485	1634.5	2234D	1	-1						
XII	1650-1800	149.5	1634.5	1784	2234D	2			x		1	styrofoam at base	
XIII	1800-1950	149.5	1784	1933.5	2234D	3							ck
XIV	1950-2100	149.5	1933.5	2083	2234D	4							
water								-1					
XV	2100-2250	150	2083	2233	2234E	1	0						
XVI	2250-2400	149.5	2233	2382.5	2234E	2							
XVII	2400-2550	149.5	2382.5	2532	2234E	3							
XVIII	2550-2700	150	2532	2682	2234E	4				x	1	pusher stuck for 2-3 movements	
water													
XIX	2700-2850	149.5	2682	2831.5	2 234 F	1	0		x	x	2	half full of water	
XX	2850-3000	150	2831.5	2981.5	2 234 F	2			x	x	2		
XXI	3000-3150	149.5	2981.5	3131	2 234 F	3			x	x	2		
XXII	3150-3300	149.5	3131	3280.5	2 234 F	4			x	x	2	pusher stuck, about 4 cm short at end of the run	
water								-2					
XXIII	3300-3450	150	3280.5	3430.5	2234G	1			x	x	2		
XXIV	3450-3600	149.5	3430.5	3580	2234G	2			x	x	2	pusher stuck, end of core short by 4 cm	
XXV	3600-3750	150	3580	3730	2234G	3			x	x	2		
XXVI	3750-3900	150	3730	3880	2234G	4			x	x	2	water came out at the top	
XXVII	3900-3930	30	3880	3910	2234G	5			x	x	2		

July 12/99 Liner Type 1.36cm **MD99-2234**

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
water													

July 12/99 Liner Type 1.36cm **MD99-2235**

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	148.5	0	148.5	2235A	1	0		x	x	2		ck
II	150-300	149.5	148.5	298	2235A	2			x	x	2		
III	300-450	150	298	448	2235A	3			x	x	2		
IV	450-600	149	448	597	2235A	4							
water													
V	600-750	150	597	747	2235B	1							
VI	750-900	149.5	747	896.5	2235B	2							
VII	900-1050	149.5	896.5	1046	2235B	3							
VIII	1050-1200	149.5	1046	1195.5	2235B	4							
water													
IX	1200-1350	149.5	1195.5	1345	2235C	1							
X	1350-1500	149	1345	1494	2235C	2							
XI	1500-1650	150	1494	1644	2235C	3							
XII	1650-1800	149.5	1644	1793.5	2235C	4							
water													
XIII	1800-1950	149.5	1793.5	1943	2235D	1							
XIV	1950-2100	149.5	1943	2092.5	2235D	2							kj
XV	2100-2250	150	2092.5	2242.5	2235D	3							
XVI	2250-2400	149.5	2242.5	2392	2235D	4			x		1	2 cm of the bottom bagged	
XVII	2400-2537	137	2394	2531	2235D	5			x	x	2	top 2 cm disturbed; sediment loss at 2530 and 2528 cm through the holes; finished 4 cm off the line	
XVII	2400-2537	137	2394	2531	2235E	1			x	x	2		
water								0					

July 12/99 Liner Type 1.36cm

MD99-2236

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	148.5	0	148.5	2236A	1	0		x	x	2		kj
II	150-300	150	148.5	298.5	2236A	2			x		1	bottom filled with 19,5 cm of styrofoam; large crack in liner between 248-298,5 cm (i.e. bottom)	
III	300-450	149.5	298.5	448	2236A	3						long stack at top; large crack in liner between 298,5-318,5 cm	
IV	450-600	150	448	598	2236A	4			x		1	one nudge too many; large crack in liner from 560-598 cm at the top	
water								1					
V	600-750	150	598	748	2236B	1	0					large crack in liner between 598-612 cm at the top	
VI	750-900	149.5	748	897.5	2236B	2			x		1	3 measurements around 78 cm didn't take	
V	600-750	150	598	748	2236C	1	0					rerun	
VI	750-900	149.5	748	897.5	2236C	3			x		1	rerun	
VII	900-1050	149.5	897.5	1047	2236C	5			x		1	liner join at 986,5 cm	
VIII	1050-1200	150	1047	1197	2236C	7						no p-wave signal until the last 40 cm, but the signal is weak	
water													
IX	1200-1350	150	1197	1347	2236D	1	0						js
X	1350-1500	149.5	1347	1496.5	2236D	2							
XI	1500-1650	149.5	1496.5	1646	2236D	3							
XII	1650-1800	149.5	1646	1795.5	2236D	4							
water								-2					
XIII	1800-1950	149.5	1795.5	1945	2236E	1	0						
XIV	1950-2100	149	1945	2094	2237E	2							
XV	2100-2115	ca. 15	2094		2238E							too short to run	
water								-3					

July 14/99 Liner Type 1.36cm

MD99-2237

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	148.5	0	148.5	2237A	1	0		x	x	2		
II	150-300	150	148.5	298.5	2237A	2			x		1		js
III	300-450	149.5	298.5	448	2237A	3							
IV	450-600	149.5	448	597.5	2237A	4			x	x	2		
water								-7					
V	600-750	149.5	597.5	747	2237B	1	0		x		1		
VI	750-900	150.5	747	897.5	2237B	2							
VII	900-1050	149.5	897.5	1047	2237B	3							
VIII	1050-1200	150	1047	1197	2237B	4							
water													
IX	1200-1350	148.5	1197	1345.5	2237C	1							
X	1350-1500	149.5	1345.5	1495	2237C	2							ck
XI	1500-1650	149	1495	1644	2237C	3			x	x	2	one nudge too many	
XII	1650-1800	150	1644	1794	2237C	4			x	x	2		
wter													
XIII	1800-1950	148	1794	1942	2237D	1							
XIV	1950-2100	150.5	1942	2092.5	2237D	2							
XV	2100-2250	149.5	2092.5	2242	2237D	3			x	x	2		
XVI	2250-2400	150	2242	2392	2237D	4			x	x	2		
water													
XVII	2400-2550	149.5	2392	2541.5	2237E	1							kj
XVIII	2550-2700	149.5	2541.5	2691	2238E	2						stopped pushing correctly at 2608 cm for the velocity measurement, i.e. 2620 cm at the zero position	
XVII	2400-2550	149.5	2691	2840.5	2237F	1			x		1		
XVIII	2550-2700	149.5	2840.5	2990	2237F	2						rerun due to extruding sediment and end cap was added	kj
XIX	2700-2850	149.5	2691	2840.5	2237F	3						rerun, pusher at times did not move smoothly	
XX	2850-3000	150	2840.5	2990.5	2237F	4			x		1	waterloss at top of the section	
XXI	3000-3074	73.5	2990.5	3064	2237F	5							
water													

July 14/99 Liner Type 1.36cm

MD99-2238

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
I	0-150	149	0	149	2238A	1	0		x	x	2		js
II	150-300	150	149	299	2238A	2			x	x	2		
III	300-450	149.5	299	448.5	2238A	3			x		1		
water								-2					
IV	450-600	150	448.5	598.5	2238B	1	0					crack in liner; base of liner cut unevenly (45°), bottom edge stopped at zero, top edge at 4.5 cm	
dummy						2						used to push through section 4 (stack between sections)	
V	600-750	149.5	598.5	748	2238B	3						top of liner cut unevenly (see IV); bottom edge starts at zero, top at 4.5 cm	
water													
VI	750-900	149.5	748	897.5	2238C	1	0						
VII	900-1050	149.5	897.5	1047	2238C	2							
VIII	1050-1200	149	1047	1196	2238C	3							
IX	1200-1350	150	1196	1346	2238C	4							
X	1350-1500	148.5	1346	1494.5	2238D	1	0					on the tracks for 9 hours	js
XI	1500-1650	150	1494.5	1644.5	2238D	2							
XII	1650-1800	149.5	1644.5	1794	2238D	3							
XIII	1800-1824	23	1794	1817	2238D	4							
water													

July 15/99 Liner Type 1.36cm

MD99-2239

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149	0	149	2239A	1			x	x	2	liner join at 101 cm	kj
II	150-300	149	149	298	2239A	2			x	x	2		
III	300-450	149.5	298	447.5	2239A	3			x	x	2		
IV	450-600	150	447.5	597.5	2239A	4			x		1	one nudge too many	
water								0					
V	600-750	149.5	597.5	747	2239B	1							
VI	750-900	149.5	747	896.5	2239B	2							
VII	900-1050	150	896.5	1046.5	2239B	3							
VIII	1050-1200	150	1046.5	1196.5	2239B	4							
water								-1					
IX	1200-1350	149.5	1196.5	1346	2239C	1	0						js
X	1350-1500	149.5	1346	1495.5	2239C	2							
XI	1500-1650	149.5	1495.5	1645	2239C	3						due to program loop the measurement had to be aborted	
XII	1650-1800	150	1645	1795	2239C	4							
XI	1500-1650	149.5	1795	1944.5	2239D	1						rerun	
XII	1650-1800	150	1944.5	2094.5	2239D	2						rerun	
water								-1					
XIII	1800-1950	149.5	1795	1944.5			0						
XIV	1950-2100	149.5	1944.5	2094									
XV	2100-2250	150	2094	2244								one nudge too many; no temperature measured	
XVI	2250-2388	133	2244	2377					x		1	temperature probe inserted halfway through ; soupy sediment at the top; very soupy sediment at the bottom; void of ca. 15 cm length, i.e. liner only half full	
water													

July 15/99 Liner Type 1.36cm

MD99-2240

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149	0	149	2240A	1			x	x	2		ck
II	150-300	150	149	299	2240A	2			x	x	2		
III	300-450	149.5	299	448.5	2240A	3			x		1		
IV	450-600	149.5	448.5	598	2240A	4			x		1		
water													
V	600-750	150	598	748	2240B	1	0		x	x	2		
VI	750-900	149	748	897	2240B	2			x		1		
VII	900-1050	150	897	1047	2240B	3							
VIII	1050-1200	149.5	1047	1196.5	2240B	4			x		1		
water													
IX	1200-1350	149.5	1196.5	1346	2240C	1							
X	1350-1500	150	1346	1496	2240C	2						liner join at 1408 cm	kj
XI	1500-1650	150	1496	1646	2240C	3							
XII	1650-1800	149.5	1646	1795.5	2240C	4						temperature probe inserted deeper into the sediment halfway through the section	
water													
XIII	1800-1950	150	1795.5	1945.5	2240D	1						a little water came out at the top	
XIV	1950-2100	149.5	1945.5	2095	2240D	2						one nudge too many; foraminiferal ooze at the base	
XV	2100-2250	149.5	2095	2244.5	2240D	3						3 measurements did not take	
XV	2100-2250	149.5	2095	2244.5	2240E	1						rerun	
XV	2100-2250	149.5	2095	2244.5	2240F	1						rerun; did some wire or transducer movements in order to check core thickness deviation, as the core diameter changed scale for no apparent reason	
XVI	2250-2400	149.5	2244.5	2394	2240F	2							
XVII	2400-2550	148.5	2394	2542.5	2240F	3							
water								-1					

July 16/99 Liner Type 1.36cm

MD99-2241

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149	0	149	2241A	1	0		x	x	2		
II	150-300	149.5	149	298.5	2241A	2			x	x	2		js
III	300-450	149.5	298.5	448	2241A	3			x	x	2	liner join at 257 cm, temperature probe in at 106 cm	
IV	450-600	149.5	448	597.5	2241A	4			x	x	2	temperature probe in at 83.5 cm	
water								0				temperature probe in at 31 cm	
V	600-750	149.5	597.5	747	2241B	1	0		x	x	2		
VI	750-900	149	747	896	2241B	2			x	x	2		
VII	900-1050	149.5	896	1045.5	2241B	3			x	x	2		
VIII	1050-1200	149.5	1045.5	1195	2241B	4			x		1		
water								-1					
IX	1200-1350	149.5	1195	1344.5	2241C	1	0						
X	1350-1500	149.5	1344.5	1494	2241C	2							
XI	1500-1650	149	1494	1643	2241C	3							
XII	1650-1800	150	1643	1793	2241C	4							
water													
XIII	1800-1950	149	1793	1942	2241D	1	0						
XIV	1950-2100	149	1942	2091	2241D	2							ck
XV	2100-2250	150	2091	2241	2241D	3							
XVI	2250-2400	150	2241	2391	2241D	4							
XVII	2400-2535	133.5	2391	2524.5	2241D	5							
water													

July 17/99 Liner Type 1.36cm

MD99-2242

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
I	0-150	148.5	0	148.5	2242A	1	0		x	x	2	liner join at 71.5 cm	kj
II	150-300	150.5	148.5	299	2242A	2			x	x	2		
III	300-450	149.5	299	448.5	2242A	3			x	x	2	no temperature probe in the last few cm	
IV	450-600	150.5	448.5	599	2242A	4			x	x	2		
water								0				one nudge too many	
V	600-750	149	599	748	2242B	1	-1						
VI	750-900	149.5	748	897.5	2242B	2			x		1	top of the section soupy; little sediment came out; one nudge too many	
VII	900-1050	149.5	897.5	1047	2242B	3				x	1	the bottom of the sediment is soupy	
VIII	1050-1200	150	1047	1197	2242B	4			x		1	the top of the sediment is soupy; one nudge too many	
water								-2					
IX	1200-1350	149.5	1197	1346.5	2242C	1	0					liner join at 1256 cm	js
X	1350-1500	150	1346.5	1496.5	2242C	2							
XI	1500-1650	149	1496.5	1645.5	2242C	3				x	1	the bottom of the sediment is soupy; one nudge too many	
XII	1650-1800	150	1645.5	1795.5	2242C	4			x		1	the top of the sediment is soupy	
water								-2					
XIII	1800-1950	149.5	1795.5	1945	2242D	1	0						
XIV	1950-2100	149.5	1945	2094.5	2242D	2							
XV	2100-2250	149.5	2094.5	2244	2242D	3						NB no temperature probe in core	
XVI	2250-2400	149.5	2244	2393.5	2242D	4						1 cm of sediment bagged off the bottom	
water								-2					
spacer												aborted	
XVII	2400-2550	149.5	2394.5	2544	2242E	1	0					added 1 cm at the beginning of the metre tape for bagging bottom of section XVI	
XVIII	2550-2700	149.5	2544	2693.5	2242E	2							
XIX	2700-2850	149.5	2693.5	2843	2242E	3						one nudge too many	
XX	2850-3000	149.5	2843	2992.5	2242E	4							
water													
XXI	3000-3150	149.5	2992.5	3142	2242F	1	0						ck
XXII	3150-3300	150	3142	3292	2242F	2							
XXIII	3300-3450	150	3292	3442	2242F	3							
XXIV	3450-3536	85.5	3442	3527.5	2242F	4							
water													

July 18/99 Liner Type 1.36cm

MD99-2243

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
I	0-150	148.5	0	148.5	2243A	1	0		x	x	2	NB no temperature probe; styrofoam at the bottom	kj
II	150-300	150	148.5	298.5	2243A	2			x	x	2	sediment came out from the top - bagged; styrofoam at the top and at the bottom	
III	300-450	149	298.5	447.5	2243A	3			x	x	2	styrofoam at the top and at the bottom	
IV	450-600	149.5	447.5	597	2243A	4			x	x	2	styrofoam at the top and at the bottom	
V	600-750	150	597	747	2243A	5			x	x	2	styrofoam at the top and at the bottom	
VI	750-900	148.5	747	895.5	2243A	6			x	x	2	styrofoam at the top and at the bottom	
VII	900-943	43.5	895.5	939	2243A	7			x	x	2		

July 19/99 Liner Type 1.36cm **MD99-2244**

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
Ia	0-39	38	0	38	2244A	1	0		x	x	2	Ia and Ib ran together; this section is 149.5 cm long because of the end caps between Ia and Ib	js
Ib	39-150	110.5	38	148.5	2244A	1			x	x	2		
II	150-300	149	148.5	297.5	2244A	2			x	x	2		
III	300-450	150	297.5	447.5	2244A	3				x	1		
IV	450-600	149	447.5	596.5	2244A	4			x	x	2		
water													
V	600-750	150	596.5	746.5	2244B	1	0		x		1		ck
VI	750-900	149.5	746.5	896	2244B	2							
VII	900-1050	149.5	896	1045.5	2244B	3							
VIII	1050-1200	149.5	1045.5	1195	2244B	4							
water													
IX	1200-1350	150	1195	1345	2244C	1	0						
X	1350-1500	150	1345	1495	2244C	2							
XI	1500-1650	150	1495	1645	2244C	3							
XII	1650-1800	150	1645	1795	2244C	4							
water													
XIII	1800-1950	150	1795	1945	2244D	1	0						
XIV	1950-2100	150	1945	2095	2244D	2							
XV	2100-2250	150	2095	2245	2244D	3							
XVI	2250-2400	150	2245	2395	2244D	4							
XVII	2400-2550	150	2395	2545	2244D	5							
water													

July 20/99 Liner Type 1.36cm **MD99-2246**

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149.5	0	149.5	2246A	1	0		x	x	2	foam at the top	ck
II	150-300	150	149.5	299.5	2246A	2			x	x	2		
III	300-450	149.5	299.5	449	2246A	3			x	x	2		
VI	750-900	149	748.5	897.5	2246A	4			x		1	section VI run instead of section IV	
water													
IV	450-600	149.5	449	598.5	2246B	1							
V	600-750	150	598.5	748.5	2246B	2			x	x	2	4 cm short at the end of the run	
VII	900-1050	150	897.5	1047.5	2246B	3			x		1	note this is section VII instead of VI	
VIII	1050-1200	150	1047.5	1197.5	2246B	4			x		1		
water													
IX	1200-1350	149.5	1197.5	1347	2246C	1						styrofoam at base	
X	1350-1500	150	1347	1497	2246C	2			x		1		
XI	1500-1650	149.5	1497	1646.5	2246C	3							
XII	1650-1800	149.5	1646.5	1796	2246C	4							kj
water								-1					
XIII	1800-1950	150	1796	1946	2246D	1	-1						
XIV	1950-2100	149.5	1946	2095.5	2246D	2							
XV	2100-2250	150	2095.5	2245.5	2246D	3							
XVI	2250-2400	149.5	2245.5	2395	2246D	4							
water								0					
XVII	2400-2550	150.5	2395	2545.5	2246E	1	0					liner join at 2451 cm	
XVIII	2550-2700	150	2545.5	2695.5	2246E	2							
XIX	2700-2850	149.5	2695.5	2845	2246E	3							
XX	2850-3000	150.5	2845	2995.5	2246E	4							
water								0					
XXI	3000-3150	149.5	2995.5	3145	2246F	1	0						
XXII	3150-3300	150	3145	3295	2246F	2							
XXIII	3300-3450	150	3295	3445	2246F	3							
XXIV	3450-3577	126	3445	3571	2246F	4							
water													

July 20/99 Liner Type 1.36cm

MD99-2247

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149	0	149	2247A	1	-1			x	1	a little soupy at the top; styrofoam at the top	kj
II	150-300	150	149	299	2247A	2			x	x	2	water came out at both ends; liner join at 173.5 cm	
III	300-450	149.5	299	448.5	2247A	3			x	x	2	soupy at both ends	
IV	450-600	149.5	448.5	598	2247A	4			x	x	2	one nudge too many	
water								-1					
V	600-750	149.5	598	747.5	2247B	1	0			x	1		js
VI	750-900	149.5	747.5	897	2247B	2							
VII	900-1050	150	897	1047	2247B	3							
VIII	1050-1200	149	1047	1196	2247B	4							
water								-2					
IX	1200-1350	149.5	1196	1345.5	2247C	1	0						
X	1350-1500	150	1345.5	1495.5	2247C	2							
XI	1500-1650	149.5	1495.5	1645	2247C	3							
XII	1650-1800	149.5	1645	1794.5	2247C	4							
water								-2					
XIII	1800-1950	149.5	1794.5	1944	2247D	1	0						
XIV	1950-2100	149.5	1944	2093.5	2247D	2							
XV	2100-2250	149.5	2093.5	2243	2247D	3							
XVI	2250-2400	149.5	2243	2392.5	2247D	4							
XVII	2400-2450	49.5	2392.5	2442	2247D	5				x	1		
water													

July 21/99 Liner Type 1.36cm

MD99-2248

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
I	0-150	149	0	149	2248A	1	0		x	x	2	styrofoam at the top; soupy sediment	kj
II	150-300	149.5	149	298.5	2248A	2			x	x	2	styrofoam at the top; soupy sediment	
III	300-450	150	298.5	448.5	2248A	3			x	x	2	liner join at 397 cm; one nudge too many	
IV	450-600	149.5	448.5	598	2248A	4			x	x	2	one nudge too many	
water								0					
V	600-750	149.5	598	747.5	2248B	1	0		x	x	2	styrofoam at the top	
VI	750-900	150	747.5	897.5	2248B	2			x		1	styrofoam at the bottom; one nudge too many	
VII	900-1050	149.5	897.5	1047	2248B	3						styrofoam at the top	
VIII	1050-1200	150	1047	1197	2248B	4							
water								0					
IX	1200-1350	149.5	1197	1346.5	2248C	1	-1						
X	1350-1500	150	1346.5	1496.5	2248C	2				x	1		
XI	1500-1650	150	1496.5	1646.5	2248C	3			x		1	liner join at 1539.5 cm	
XII	1650-1800	149.5	1646.5	1796	2248C	4							
water													
XIII	1800-1950	150	1796	1946	2248D	1	0						
XIV	1950-2100	149.5	1946	2095.5	2248D	2							js
XV	2100-2250	149.5	2095.5	2245	2248D	3							
XVI	2250-2400	150	2245	2395	2248D	4							
water													
XVII	2400-2550	150	2395	2545	2248E	1	0						
XVIII	2550-2700	149	2545	2694	2248E	2							
XIX	2700-2850	149.5	2694	2843.5	2248E	3							
XX	2850-3000	150	2843.5	2993.5	2248E	4							
water								-2					
XXI	3000-3150	149.5	2993.5	3143	2248F	1	0						
XXII	3150-3300	149.5	3143	3292.5	2248F	2							
XXIII	3300-3450	149.5	3292.5	3442	2248F	3							
XXIV	3450-3600	149.5	3442	3591.5	2248F	4							
XXV	3600-3750	150	3591.5	3741.5	2248F	5							
XXVI	3750-3822	72	3741.5	3813.5	2248F	6							
water													

July 22/99 Liner Type 1.36cm

MD99-2249

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
I	-	89.5	0	89.5	2249	1						boxcore; styrofoam at the top; one nudge too many	js
water								-2					

July 21/99 Liner Type 1.36cm

MD99-2250

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149.5	0	149.5	2250A	1	0		x	x	2		ck
II	150-300	149.5	149.5	299	2250A	2			x	x	2		
III	300-450	149.5	299	448.5	2250A	3			x	x	2		
IV	450-600	149.5	448.5	598	2250A	4			x	x	2		kj
V	600-750	150	598	748	2250A	5			x		1		
water								0					
VI	750-900	150	748	898	2250B	1	-1						
VII	900-1050	149	898	1047	2250B	2							
VIII	1050-1200	150	1047	1197	2250B	3							
IX	1200-1350	149.5	1197	1346.5	2250B	4			x		1		
water								0					
X	1350-1500	149.5	1346.5	1496	2250C	1	-1					liner join at 1363 cm	
XI	1500-1650	150	1496	1646	2250C	2							
XII	1650-1800	149.5	1646	1795.5	2250C	3							
XIII	1800-1950	149.5	1795.5	1945	2250C	4							
water								-1					
XIV	1950-2100	149.5	1945	2094.5	2250D	1	-1						
XV	2100-2250	149.5	2094.5	2244	2250D	2							
XVI	2250-2400	149.5	2244	2393.5	2250D	3							
water													
XVII	2400-2550	150	2393.5	2543.5	2250E	1	0						js
XVIII	2550-2700	149	2543.5	2692.5	2250E	2						stopped less than 1 cm before the end of the section	
XIX	2700-2850	150.5	2692.5	2843	2250E	3							
XX	2850-3000	149	2843	2992	2250E	4							
water								0					
XXI	3000-3150	149.5	2992	3141.5	2250F	1							
XXII	3150-3300	149.5	3141.5	3291	2250F	2							
XXIII	3300-3450	150	3291	3441	2250F	3							
XXIV	3450-3600	149.5	3441	3590.5	2250F	4							
XXV	3600-3648	48.5	3590.5	3639	2250F	5							
water													

July 22/99 Liner Type 1.36cm

MD99-2251

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
I	0-150	149.5	0	149.5	2251A	1	0		x	x	2		ck
II	150-300	149.5	149.5	299	2251A	2			x	x	2		
III	300-450	149	299	448	2251A	3			x		1		
IV	450-600	150	448	598	2251A	4							
water													
V	600-750	149	598	747	2251B	1	0						
VI	750-900	149	747	896	2251B	2							
VII	900-1050	150	896	1046	2251B	3							
VIII	1050-1200	149	1046	1195	2251B	4							
water													
IX	1200-1350	150	1195	1345	2251C	1	0						
X	1350-1500	149	1345	1494	2251C	2							
XI	1500-1650	150	1494	1644	2251C	3							
XII	1650-1800	149.5	1644	1793.5	2251C	4							
water													
XIII	1800-1950	149.5	1793.5	1943	2251D	1	-1						
XIV	1950-2100	150	1943	2093	2251D	2							
XV	2100-2250	149.5	2093	2242.5	2251D	3							kj
XVI	2250-2400	150	2242.5	2392.5	2251D	4							
water								-2					
XVII	2400-2550	149.5	2392.5	2542	2251E	1	-1					liner join at 2511.5 cm	
XVIII	2550-2700	149	2542	2691	2251E	2							
XIX	2700-2850	149.5	2691	2840.5	2251E	3							
XX	2850-3000	149.5	2840.5	2990	2251E	4							
water								-1					
XXI	3000-3150	150	2990	3140	2251F	1							
XXII	3150-3300	149	3140	3289	2251F	2							
XXIII	3300-3450	150.5	3289	3439.5	2251F	3							
XXIV	3450-3600	149.5	3439.5	3589	2251F	4							
XXV	3600-3654	53	3589	3642	2251F	5							
water								-3					

July 22/99 Liner Type 1.36cm

MD99-2253

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps			Comments	Operator
									T	B	No		
I	0-150	149.5	0	149.5	2253A	1	0		x	x	2	soupy; lost part of the sediment at the top - bagged; section partially empty	js
II	150-300	150	149.5	299.5	2253A	2			x	x	2		
III	300-450	149.5	299.5	449	2253A	3			x		1		
IV	450-600	149.5	449	598.5	2253A	4						one nudge too many	
water								-2					
V	600-750	149.5	598.5	748	2253B	1	0						
VI	750-900	149.5	748	897.5	2253B	2							
VII	900-1050	150	897.5	1047.5	2253B	3						liner join at 991.5 cm; the orientation-line on the lower part is offset by 1 cm towards the working half	
VIII	1050-1200	150	1047.5	1197.5	2253B	4							
water								-2					
IX	1200-1350	149	1197.5	1346.5	2253C	1	0						ck
X	1350-1500	149.5	1346.5	1496	2253C	2							
XI	1500-1650	150	1496	1646	2253C	3							
XII	1650-1800	149	1646	1795	2253C	4							
water													
XIII	1800-1950	149.5	1795	1944.5	2253D	1	0						
XIV	1950-2100	149.5	1944.5	2094	2253D	2							
XV	2100-2250	150	2094	2244	2253D	3							
XVI	2250-2400	149.5	2244	2393.5	2253D	4							
water													
XVII	2400-2550	149.5	2393.5	2543	2253E	1							
XVIII	2550-2700	149.5	2543	2692.5	2253E	2							
XIX	2700-2850	149.5	2692.5	2842	2253E	3							
XX	2850-3000	149	2842	2991	2253E	4							
XXI	3000-3150	150	2991	3141	2253E	5							
XXII	3150-3275	124	3141	3265	2253E	6							
water								-1				one nudge too many	

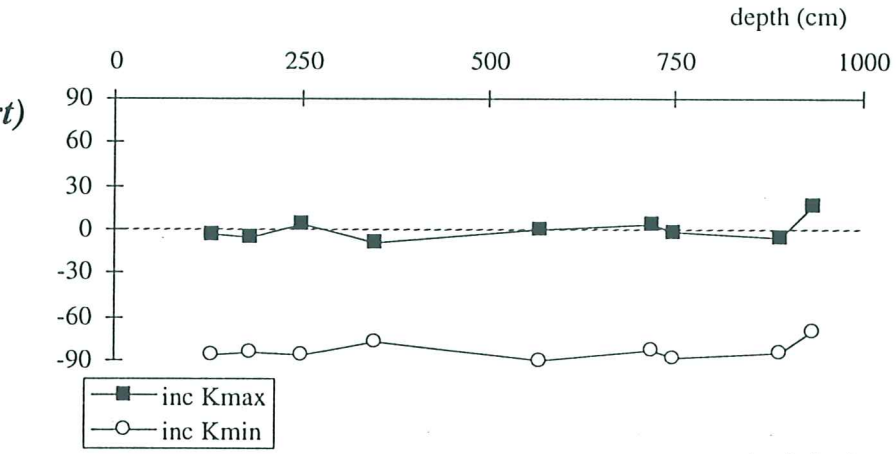
July 23/99 Liner Type 1.36cm

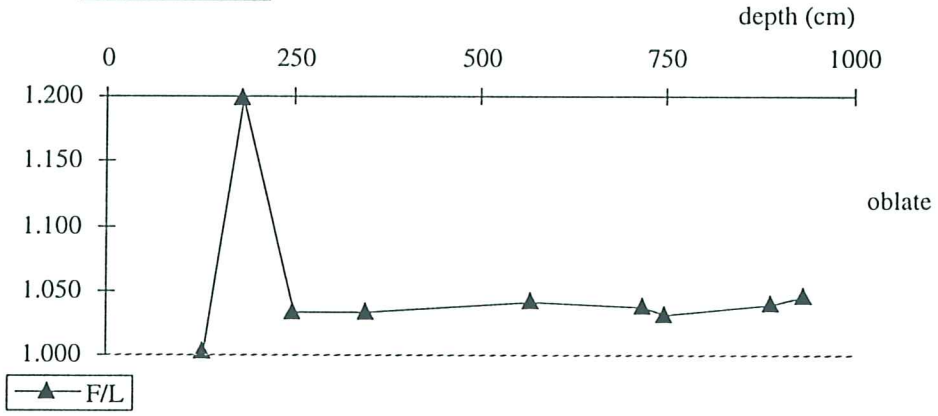
MD99-2254

Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T	Endcaps B	Endcaps No	Comments	Operator
I	0-150	149	0	149	2254A	1	-4		x	x	2		js
II	150-300	149.5	149	298.5	2254A	2			x	x	2	liner join at 201 cm	
III	300-450	149.5	298.5	448	2254A	3			x	x	2		
IV	450-600	149.5	448	597.5	2254A	4			x	x	2		
water													
V	600-750	150	597.5	747.5	2254B	1	0					stopped 0.5 cm before the zero position	
VI	750-900	149.5	747.5	897	2254B	2							
VII	900-1050	149	897	1046	2254B	3							
VIII	1050-1200	149.5	1046	1195.5	2254B	4							
water													
IX	1200-1350	149.5	1195.5	1345	2254C	1	0						ck
X	1350-1500	149.5	1345	1494.5	2254C	2							
XI	1500-1650	149.5	1494.5	1644	2254C	3							
XII	1650-1800	150	1644	1794	2254C	4							
water													
XIII	1800-1950	149.5	1794	1943.5	2254D	1	0						
XIV	1950-2100	149	1943.5	2092.5	2254D	2							
XV	2100-2250	149.5	2092.5	2242	2254D	3							
XVI	2250-2400	150	2242	2392	2254D	4							
water													kj
XVII	2400-2550	149.5	2392	2541.5	2254E	1	0						
XVIII	2550-2700	149.5	2541.5	2691	2254E	2							
XIX	2700-2850	150	2691	2841	2254E	3							
XX	2850-3000	149.5	2841	2990.5	2254E	4							
water								-2					
XXI	3000-3150	149.5	2990.5	3140	2254F	1							
XXII	3150-3300	150	3140	3290	2254F	2							
XXIII	3300-3450	149.5	3290	3439.5	2254F	3							
XXIV	3450-3600	149.5	3439.5	3589	2254F	4						one nudge too many	
XXV	3600-3621	21.5	3589	3610.5	2254F	5							
water								-1					

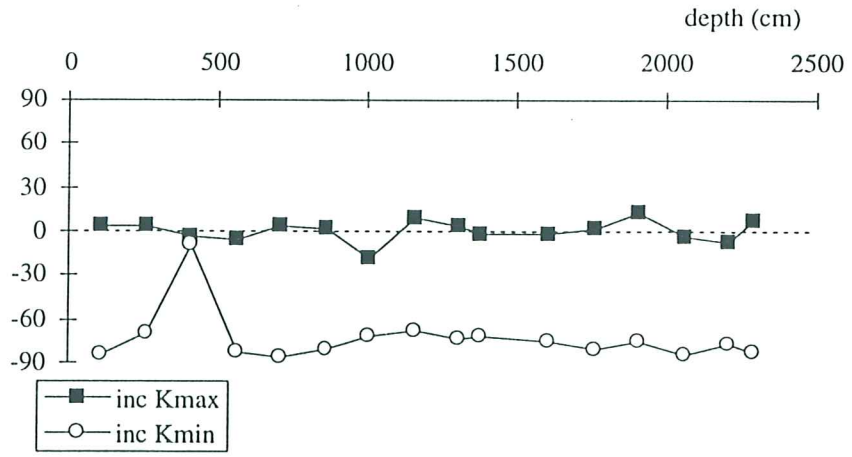
Anisotropy data

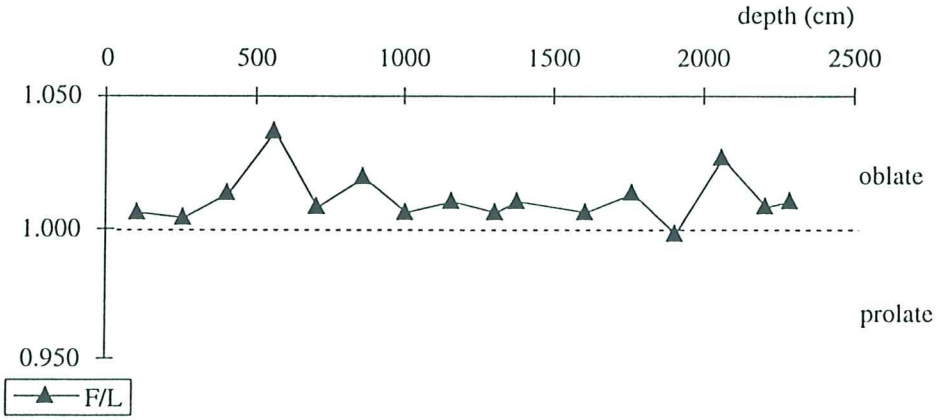
MD99-2234 (top part)



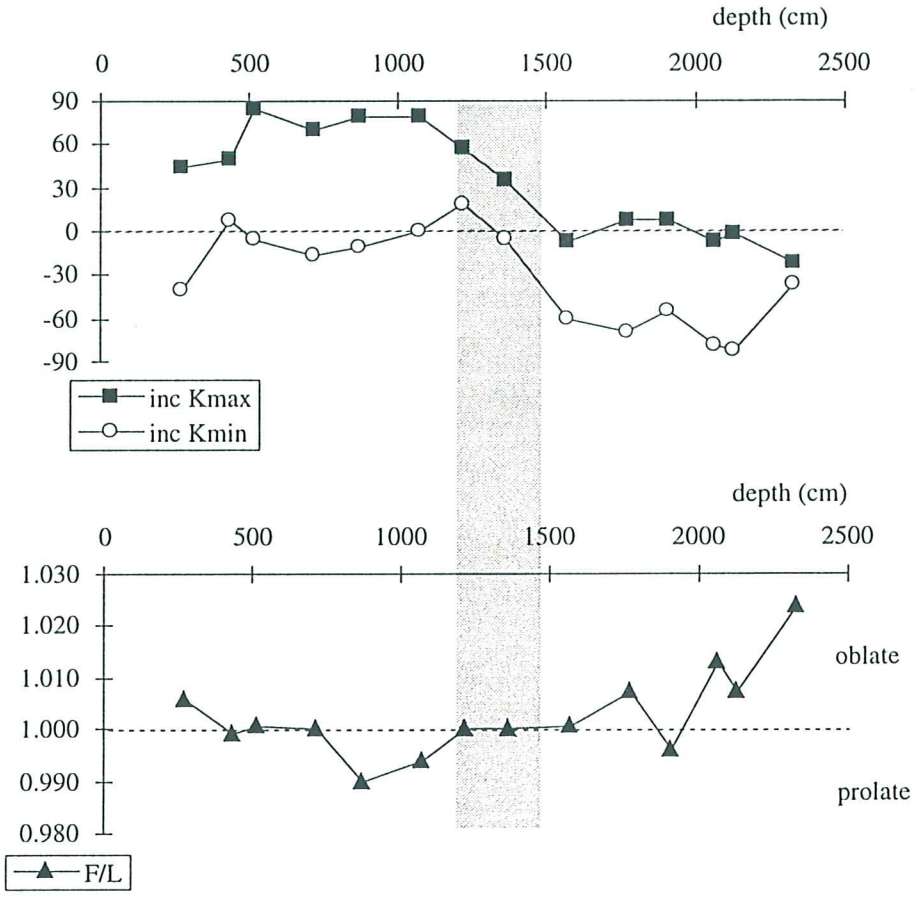


MD99-2244

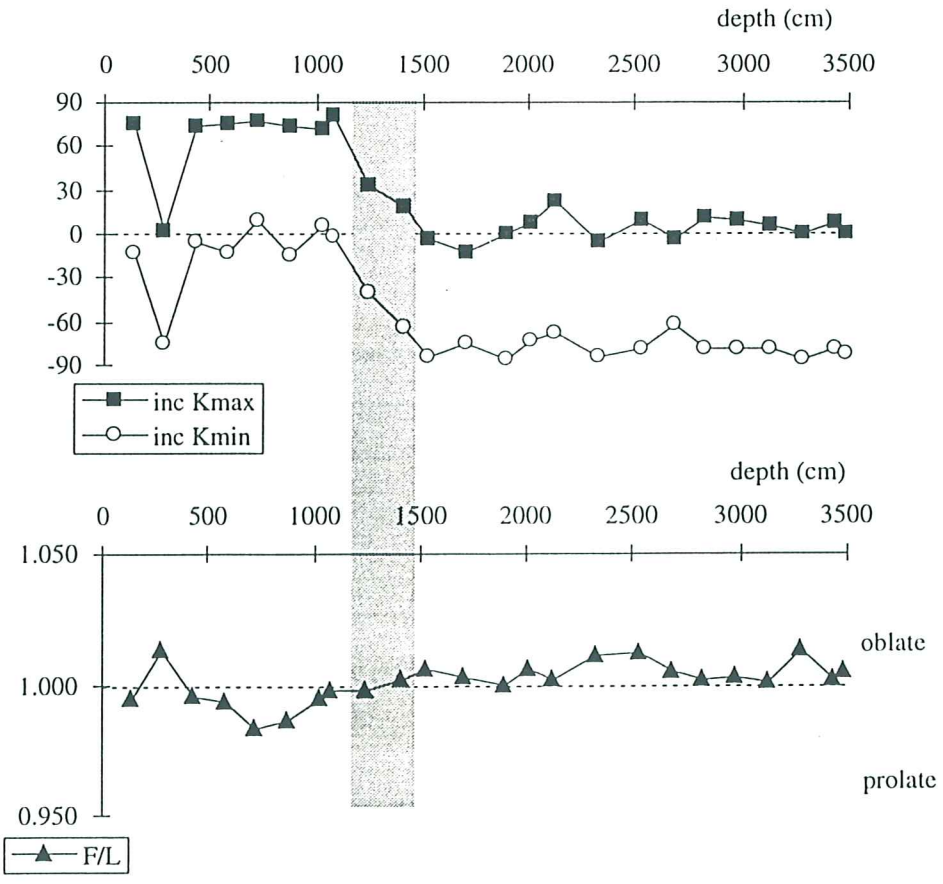




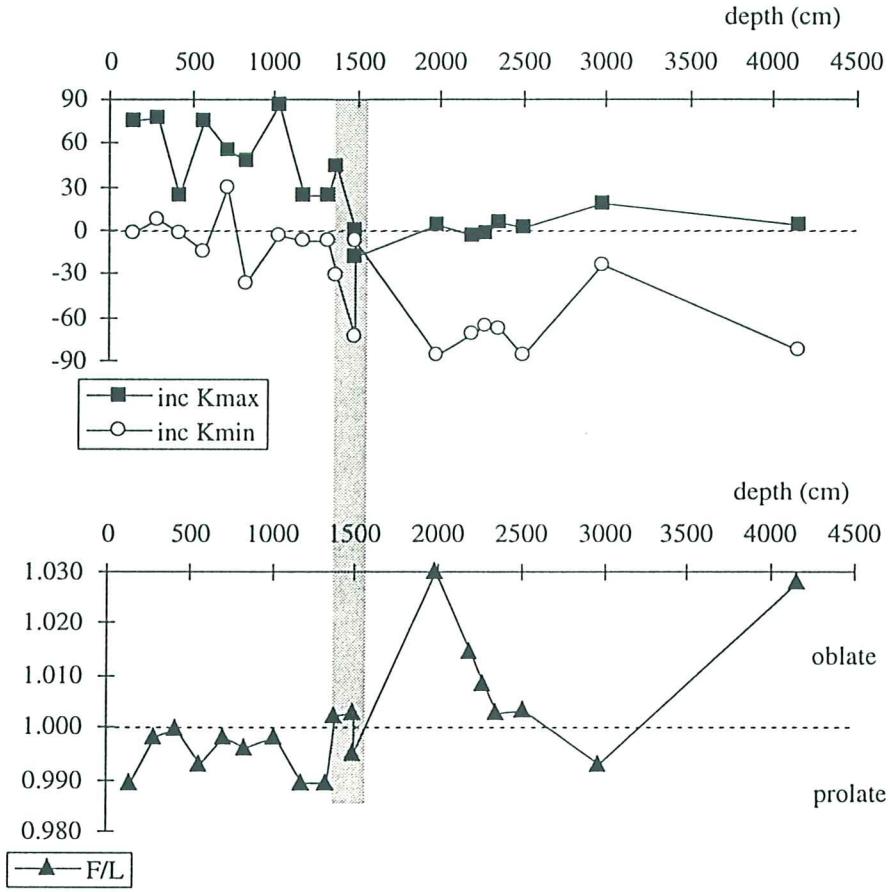
MD99-2228



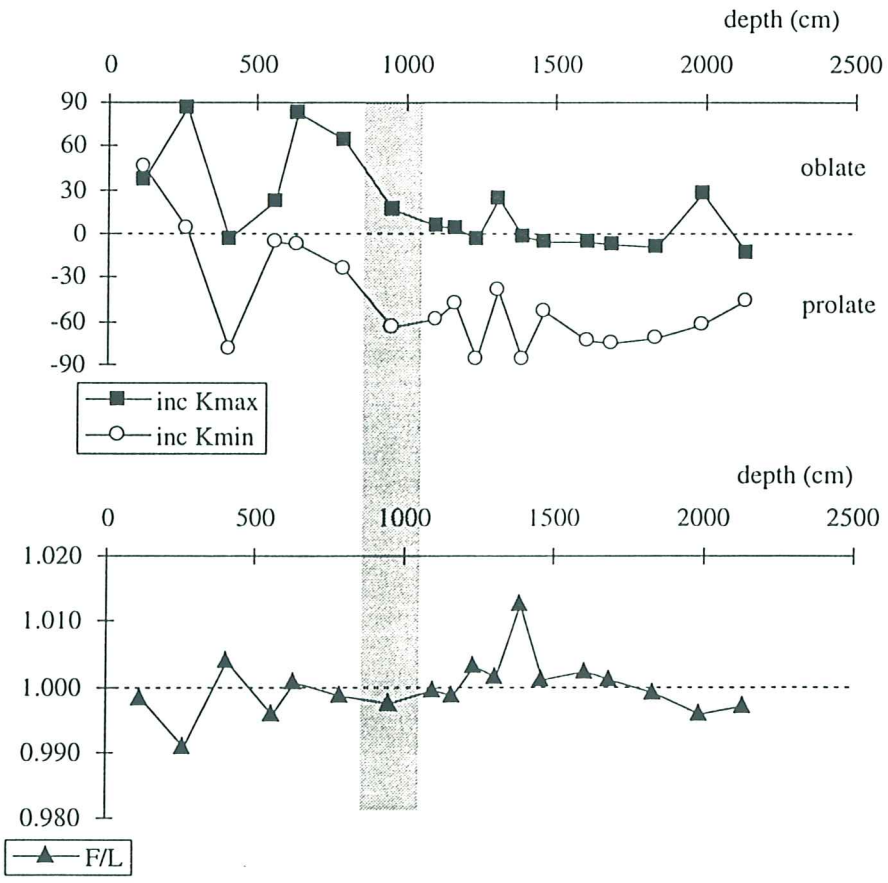
MD99-2242



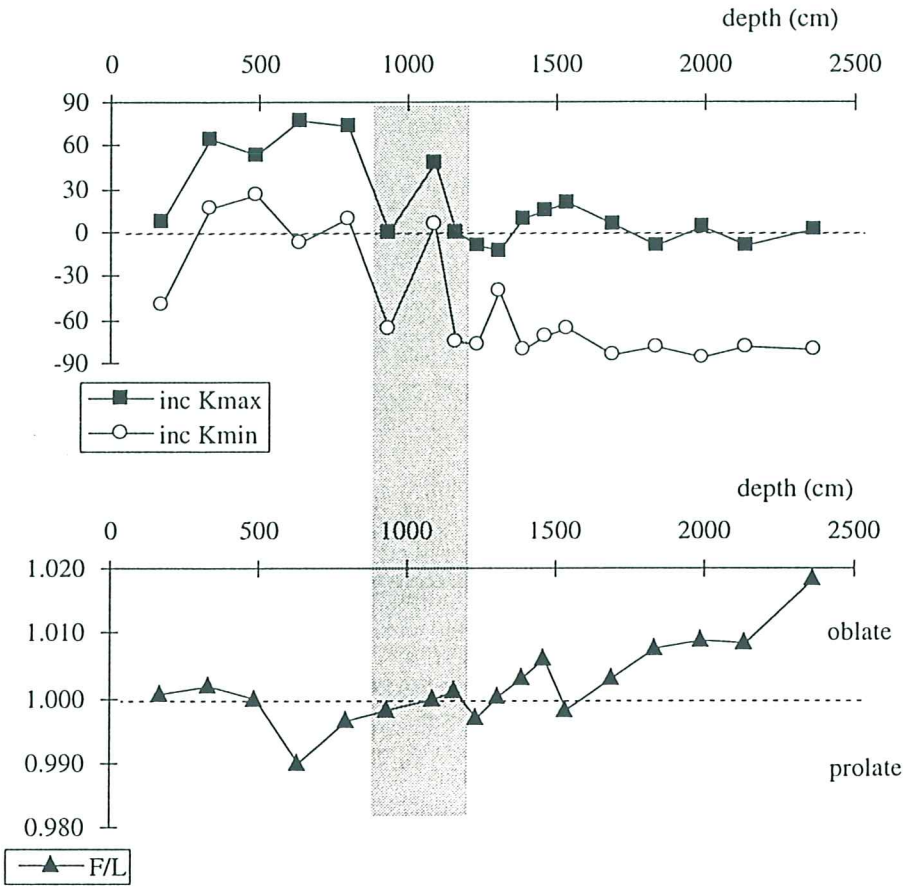
MD99-2227



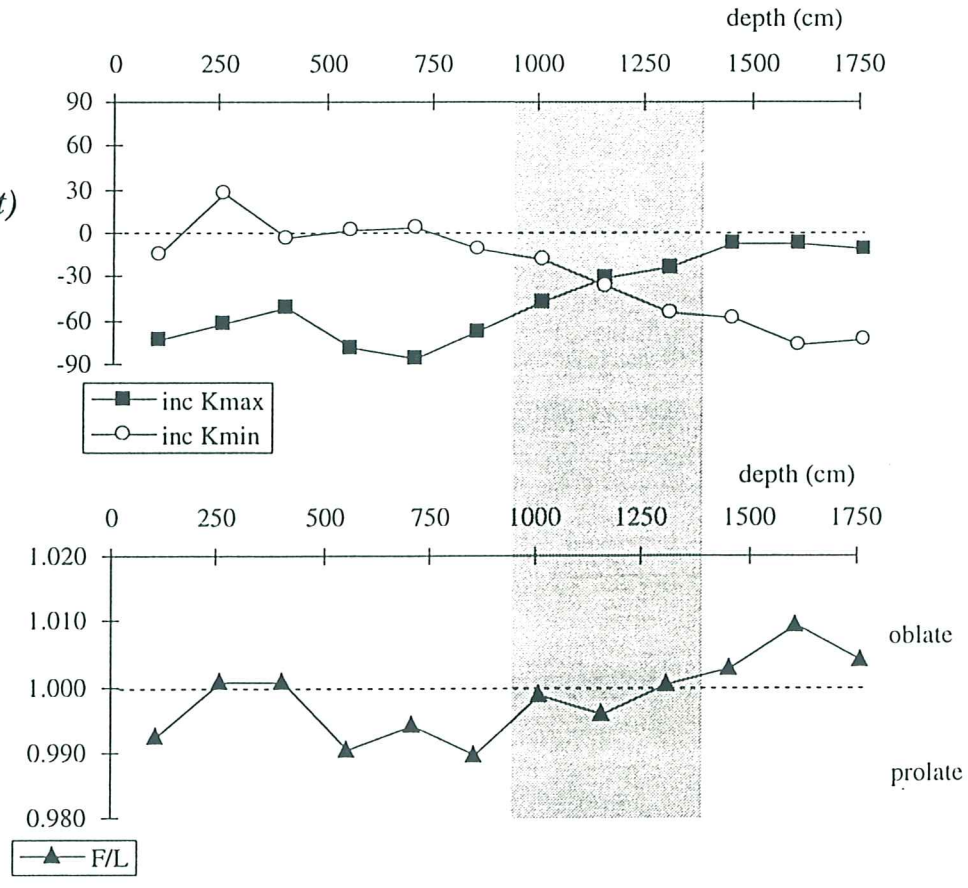
MD99-2246



MD99-2247



MD99-2251 (top part)



8.6. Water sampling sheets
Next pages

Station SGN 1 Palanquée 1
Date 05/06/99
Latitude 55°02,00 N
Longitude 52°08,38 W
référence Claudie: IM5001

bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1	200		b1 F					
2	200		b2 NF					
3	45		b3 NF					
4	20		b4 NF					
5	20							oui
6	20							oui
7	20							oui
8	20							oui
9	20		b9 F					oui
10	20							oui
11	20							oui
12	20							oui

remarques
station longue rempacée par une station courte de Ullah
échantillon récupéré sur une bouteille de ullah apres filtraion sur fibre de verre

Station	SGN 2	Palanquée	1
Date	06/06/99		
Latitude	&²		
Longitude	47°06,96 W		
référence Claudie: IM5002			

bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1	2875	1	b1 af		1	121	838	
2	2800	2	b2 nf		2	122	837	
3	2550	3	b3 nf		3	123		
4	2270	4	b4 nf		4	124		
5	1850	5	b5 nf		5	125		
6	1600	6	b6 nf		6	126		
7	1000		b7 nf		7	127		
8	600		b8 nf		8	128		
9	230		b9 nf		9	129		
10	100		b10 nf		10	130		
11	30	11 F et NF	b11 af		11	131		
12	30	12	b12 nf		12	132		

remarques
pour 1 et 5: 5-6 litres seulement.
pour l'iode 129: confusion possible (mais pas certaine sur l'échantillon 12 (qui a pu etre prélevée surla bouteille1

Station	SGN 3	Palanquée	1					
Date	08-09/7/99							
Latitude	62°38,90,00 N							
Longitude	53°54,24 W							
référence Claudie: IM5004								
bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1	2430	b1 F	b1 F		13	133	839	
2	2430		b2 NF		14	134		
3	2250		b3 nf		15	135		
4	1950		b4 nf		16	136		
5	1700	b5 nf	b5 nf		17	137		
6	1000	6	b6 af		18	138		
7	1000		b7 nf		19	139		
8	400	b8 nf	b8 nf		20	140		
9	180		b9 F		21	141		
10	40		b10 nf		22	142		
11	15	11 F	b 11 af		23	143		
12	15	12	B 12 nf		24	144		
remarques								
pour 1 et 9: 7-8 litres seulement.								
pour 12 et 8 ?? : prélèvelent de l'aliquote sur le bidon Cl après acidification								
pour 7, à la fin de la préconcentration les cartouches ont été rincées à l'eau MQ(250cc) à cause d'une erreu de tuyaux.								

	SGN 4	prélèvement à la sortie du thermo-salinographe			
Date	10/07/99				
date TU	11/07/99				
heure TU	début	fin			
	1h 01' 11"	1h 11' 51"			
Latitude	57° 58,71	57° 55,94			
Longitude	57° 24,54	57° 22,84			
référence Claudie: aucune					
	profondeur	Conc. Nd	Eps. Nd		
bidon 1	pompe bateau	TS 1 F	TS 1 F		
bidon 2	pompe bateau	TS 2 NF	TS 2 NF		
remarque					
T = 6.0°C					
S = 34.0					
on doit avoir une forte influence de la baie de l'Udson.					
remarques					

	SGN 5	prélèvement à la sortie du thermo-salinographe			
Date	11/07/99				
date TU	11/07/99				
heure TU	début	fin			
	12h 36' 01"	1h 11' 51"			
Latitude	55° 01,90	54° 59,76			
Longitude	56° 23,65	56° 24,26			
référence Claudie: aucune					
	profondeur	Conc. Nd	Eps. Nd		
bidon 1	pompe bateau	TS 1 F	TS 1 F		
remarque					
début	fin				
T =1,9 °C	T =1,07 °C	Tavant			
S = 30,4	S = 30,8				
echantillon pris sur le plateau cont.					

Station	SGN 6	Palanquée	1 et 2					
Palanquée	1							
Date	13-14/09/7/99							
Latitude	50°11,00 N							
Longitude	45°40,86 W							
référence Claudie: IM5006								
bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1	3500			b1 NF	25			
2	3500			b2 NF		145		
3	3500	nf	b3 nf				940	
4	2500			b4 nf	26			
5	2500			b5 nf		146		
6	2500	nf	b6 fa					
7	2150		b7 fa		27			
8	2150		b8 fa			147		
9	2150	nf	b9 af					
10	1650	nf	b10 nf					
11	1650			b 11	28	148		
12	1650			B 12				
Palanquée	2							
Date	14/09/7/99							
Latitude	50°11,55 N							
Longitude	45°40,68 W							
référence Claudie: IM5007								
bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1	26			b1A NF				
2	26	nf	b2A NF			149		
3	26			b3A NF				
4								oui
5								oui
6								oui
7								oui
8								oui
9	sub-surface		b4A fu					oui
10								oui
11								oui
12								oui
								oui

Station	SGN 7	Palanquée	1 et 2					
Palanquée	1							
Date	15-16/09/7/99							
Latitude	55°33,13 N							
Longitude	43°58,00 W							
référence Claudie: IM5008								
bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1	3270		af			150	941	
2	3270		nf		29			
3	2750		fa		30			
4	2750		af			151		
5	2100		nf		31			
6	2100		nf			152		
7	2100			nf				
8	1650			nf	32	153		
9	925		af		33			
10	925		nf			154		
11	475		nf					
12	325		nf			156		
Palanquée	2							
Date	16/09/7/99							
Latitude	55°32,06 N							
Longitude	43°56,26 W							
référence Claudie: IM5008								
bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1	60							
2								
3	40							
4								
5								
6								
7								
8								
9								
10	subsurface		b22 FU			157		
11								
12								

Station	SGN 8	Cast	1					
Date	18/07/99	12h24 TU						
Latitude	62° 04,37							
Longitude	40° 11,57							
référence Claudie: IM5010								
bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1	1258	nf	nf		35	160		
2	1258	af	af				942	
3	900	nf	nf		34	161		
4	650	nf	nf			162		
5	200							
6	200	nf	nf					
7	110		nf		33 bis	164		
8	30					165		
9	30	nf	lavage syst U					oui
10	30		nf					
11	30	fa	fa					
12	30	fu	fu					oui
remarques								
les bouteilles 5 et 8 n'ont pas été échantillonnées. 9 a été utilisée pour précontaminer le système de Ullah.								

Station	SGN 9	Cast	1					
Date	19/07/99	04h43 TU						
Latitude	62° 41,89							
Longitude	37° 35,13							
référence Claudie: IM5011								
bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1	2103	af	af		36			
2	2103	nf	nf			166	943	
3	1900		nf			167		
4	1800		nf			168		
5	1710		nf		37	169		
6	1520		nf		38	170		
7	1005		nf		39	171		
8	600		nf			172		
9	210		nf			173		
10	100		nf		40	174		
11	25	nf	nf			175		
12	25	af	af		41			
remarques								

Station	SGN 10	Cast	1					
Date	19/07/99	19h10 TU						
Latitude	61° 54,74							
Longitude	36° 21,29							
référence Claudie: IM5012								
bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 1 l	alkénones
1								oui
2	45		fu					oui
3								oui
4								oui
5								oui
6								oui
7								oui
8								oui
9								oui
10	5		fu					oui
11								oui
12								oui
remarques								
palanquée Ullah								

IMAGES V - LEG II (30 Juin au 24 Juillet)

Jour	Etat du ciel	Etat de la mer	Temperature air-eau
30/06/99	8	1	20-21
1/07/99	2	7	22-15
2	7	4	17-13
3	5	3	13.1-12
4	8	4	5.9-6.3
5	8	5	6.0-5.9
6	6	2	5.1-5.2
7	8	3	3.6-5.2
8	8	1	1.6-2.0
9	8	1	3.4-5.0
10	8	2	3.3-6.2
11	2	1	16.6-11.6
12	1	2	5.0-4.0
13	8	2	8.7-12.8
14	7	4	9.0-9.0
15	1	3	8.8-8.0
16	8	3	3.9-6.2
17	8	3	8.3-7.7
18	5	2	8.3-8.6
19	8	4	8.8-9.2
20	8	3	9.5-10.5
21	8	5	10.9-10.4

Etat de la mer 1 = calme 7 = agitée

Etat du ciel 1 = couvert 8 = clair

9. References

Broecker and Denton, 1989: Geochim. Cosmochim. Acta 53: 2465.
Bond et al., 1997: Science 278: 1257.
Clarke et al., 1998: Proc. Chapman conference, Am Geophys. Union (in the press).
Clarke and Gaskard, 1983: J. Phys. Oceanogr. 13: 1764.
Collins, 1996: Geol. Ass. Can. Ann. (Abstr.).
de Vernal et al., 1997: Geobios 30: 905.
de Vernal et al., 1996: Nature 381: 774.
Hillaire-Marcel et al., 1994: Can. J. Earth Sci. 31: 63.
Hiscott and Aksu, 1996: Quaternary Res. 45: 160.
Innocent et al., 1997: Earth Planet. Sci. Lett. 146: 607.
Lazier, 1988: Deep Sea Res. 35: 1247.
Locat and Leroueil, 1988: Can. Geotech. J. 25: 382.
Lucotte et Hillaire-Marcel, 1994: Can. J. Earth Sci. 31: 5.
Manabe and Stouffer, 1995: Nature 378: 165.
McCartney, 1992: Progr. Oceanogr. 29: 283.
Ouellet, 1990: Nature 348: 492.
Piper and Skene, 1998: Paleoceanography 13: 205.
Revel et al., 1996: Marine Geol. 131: 233.
Sancetta, 1992: EOS 72: 53.
Savard et al., 1998 & Saint-Onge et al., 1998: Geol. Ass. Can. Ann. (Abstr.).
Smith and Schafer, 1987: Quaternary Res. 27: 232.
Sy et al., 1997: Nature 386: 675.
Syvitski and Lee, 1997: Marine Geol. 143: 55.
Syvitski and Schafer, 1996: Sedim. Geol. 104: 127.
Tuttle et al., 1991: Seismol. Res. Lett. 62: 188.
Tziperman, 1997: Nature 386: 592-595.
Vidal et al., 1997: Earth Planet. Sci. Lett. 146: 13-27.
Vilks et al., 1987: Geol. Surv. Can. Paper 87-22.
Yu et al., 1996: Nature 379: 689-694.

Other readings suggested

ODP-Leg 105 (vols. 105 A and B)
DNAG volume on the Geology of the Labrador Sea

Acknowledgements

The strong dedication of the master, Cdt Gilles Foubert, and of the officers and crew of the Marion Dufresne to the scientific program has been essential for the success of this second leg of the 1999 IMAGES campaign. The technical staff of IFRTP, under Yvon Balut's direction, has been at the forefront of all scientific activities and deserves major credit for each scientific achievement. On shore, Elsa Cortijo (LMCE-Gi/Yvette) has been the fairy whose magic wand has solved all planning difficulties, always in time, allowing the program to be carried on without major problems. Pre-cruise, the scientific leadership of Eystein Jansen (Univ. of Bergen) and Laurent Labeyrie (LMCE) were essential to implementation and success of the 1999 campaign of the Marion Dufresne. Financial support for the second leg comes from various sources, the most important of them being IFRTP. The Natural Sciences and Engineering Research Council and the Geological Survey of Canada supported Canadian participation in the cruise.