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IMAGES 5
à bord du *Marion Dufresne*
2e Leg du 30 juin au 24 juillet 1999

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

C. Hillaire-Marcel et J.-L. Turon (chefs de mission)
et les participants scientifiques

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and the scientific participants

Compilé par / Compiled by D. L. Dreger

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Natural Resources
Canada

Ressources Naturelles
Canada

Canada 



The scientific party on board the Marion Dufresne during Leg 2 (Quebec - Reykjavik) of IMAGES V in July 1999 (photo taken by Claude Hillaire-Marcel)

Table of contents

1. RAPPORT SOMMAIRE SUR LA MISSION	1
1.1 CRUISE SUMMARY	3
2. IMAGES V LEG 2 PARTICIPANTS	6
3. SCIENTIFIC OBJECTIVES OF THE LEG AND HIGHLIGHTS.....	10
3.1 IMAGES objectives.....	10
3.2 Coring sites and their scientific rationale	10
3.2.1 Blue ocean sites	10
3.2.2 Fjord and shelf sites.....	12
3.3 Alkenone measurements in sea water.....	14
3.3.1 Methods and material.....	14
3.3.2 Analysis.....	14
3.4 Other studies	14
3.4.1 The SIGNATURE-GINS Program: tracing and evolution of water circulation	14
3.4.2 The North Atlantic Mid-Ocean Channel System and Deposits on the Floor of the Labrador Sea	16
3.5. A mud volcano on the south Greenland upper slope.....	16
3.6. Lectures and seminars on board	20
4. OPERATIONS	21
4.1 Seismic lines	21
4.2 Summary of operations tables.....	21
5. ONBOARD CORE PROCESSING AND STUDIES	34
5.1 Core handling.....	34
5.2 Physical Property Whole Core Measurements.....	34
5.3 Spectrophotometry	38
5.4 Anisotropy of the low field magnetic susceptibility	39
5.5 Other studies	40
5.5.1.Constant volume sampling.....	40
5.6 Sediment Description	40
5.7 Regional Sedimentary Signatures	42
5.7.1 Fjord Sites	42
5.7.2 Western and Central Labrador Sea Sites	43
5.7.3 South Greenland and Davis Strait Sites	43
5.7.4 East Greenland Irminger Basin Sites	44
5.7.5 Reykjanes Ridge Sites.....	44
5.8 Coring Labrador Sea sediments	44
5.8.1 Difficulties encountered.....	44
5.8.2 The stretching/compaction issue	45
6.1 Cores & U-channels, samples & working halves.....	52
6.2 Seismic records, Multibeam data	52
6.3 Open files (for site databases).....	52
7. SITE REPORTS.....	53
8.1 Essais d'utilisation du spectrophotomètre Colortron II.....	215
8.2 The TSM 5265B Deep Water Multibeam Echosounder	217
8.2.1 Introduction	217
8.2.2 Multibeam echosounder.....	217
8.2.3 Sub-bottom profiling.....	217
8.2.4 Usage and encountered problems	218

8.2.5 Collected data	218
8.2.6 Conclusion.....	218
8.3 Problèmes techniques à bord.....	219
8.5. MST data logging sheets (and core lengths).....	220
8.6 Anisotropy data	235
8.7 Water sampling sheets	239
8.8 Weather conditions.....	244
9. REFERENCES.....	245
10. ACKNOWLEDGEMENTS	246

1. RAPPORT SOMMAIRE SUR LA MISSION (English follows)

by C. Hillaire-Marcel¹ and J.- L. Turon² and M. Chapman³ (¹GEOTOP, Montréal, Canada;

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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, taiwanais 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 (dus 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 à 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 sismique légère, analyses MST, sonde CTD, etc.) grâce à la collaboration du commandant du Marion Dufresne, des personnels de l'Institut Français pour la Recherche et la Technologie Polaires (IFRTP) et des scientifiques à bord.

1.1 CRUISE SUMMARY

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 the UK, Taiwan and U.S.A.. 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 other 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, downcore.

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.

Onboard, 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 sub-sampled continuously at 1cm interval to avoid possible stratigraphic mixing during transport.

Finally, during the cruise, a series of lectures and technical seminars was organised for students and interested researchers with the help of the master of the Marion Dufresne, of the

IFRTP (Institut Français pour la Recherche et la Technologie Polaire) personnel and on-board scientists. Topics included navigation, coring, high-resolution seismic sounding, MST principles, CTD measurements et cetera.

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*chief scientists

Table 2.2 *Marion Dufresne* crew.

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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
YOUSOUF	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	Boulangier
FADY	Thierry	Second cuisinier

Table 2.2 (continued) *Marion Dufresne crew.*

Name	First name	Function
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
RAOELIARIMANITR	Marcel	journalier
A		
CHAN KA SING	Jean de Dieu	journalier

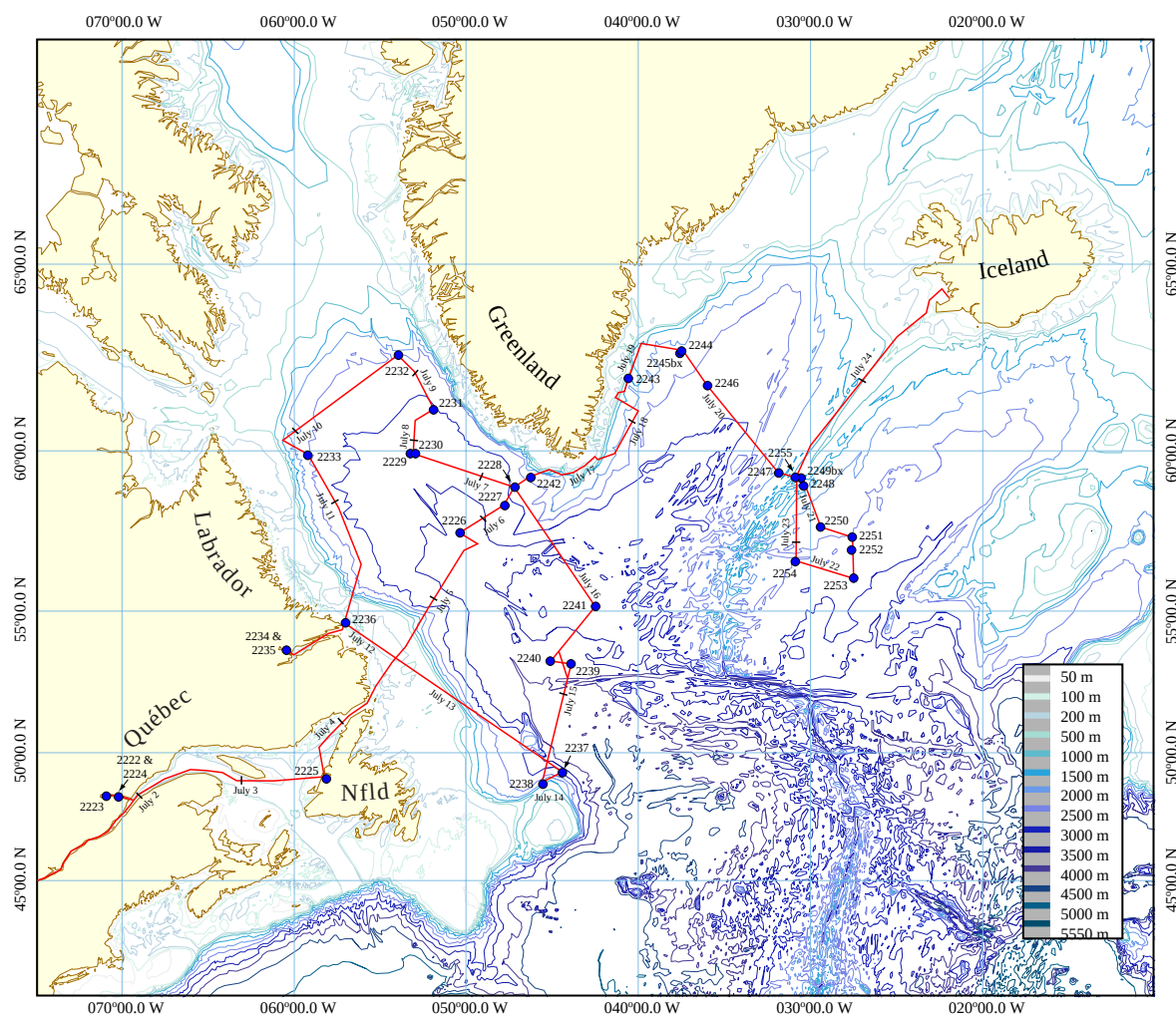


Figure 3.1 Route taken by the RV Marion Dufresne during the second leg of the IMAGES V cruise (June 30th - July 24th, 1999). Blue circles indicate coring sites.

3. SCIENTIFIC OBJECTIVES OF THE LEG AND HIGHLIGHTS

by C. Hillaire-Marcel¹ and J.- L. Turon² and M. Chapman³ (¹GEOTOP, Montréal, Canada;

²Univ. Bordeaux, France)

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 Mediterranean, 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.

The present report concerns the record leg of the campaign (Northeastern North Atlantic, Labrador, Irminger, Iceland Seas; see chart, Figure 3.1).

3.2 Coring sites and their scientific rationale

by C. Hillaire-Marcel¹ and J.- L. Turon² and M. Chapman³ (¹GEOTOP, Montréal, Canada;

²Univ. Bordeaux, France; ³Univ. Cambridge, UK)

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 recognisable 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 Cambridge (U.K.). Gardar 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 forth 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 years 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 behaviour 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. Ezat¹ and C. Bournot-Marec² (¹LMCE, Gif/Yvette, France; ²IFREMER, Brest, France)

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 particles, 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.

3.3.1 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 25 cm centimer path) and a Chelsea fluorometer (for chlorophyll *a* determination) and other logistic material.

3.3.2 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-Marec¹ and Matthieu Roy-Barman² (¹IFREMER, Brest, France; LEGOS, Toulouse, France)

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 equipped with CTD, fluorometer, 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 decadal time scale in response to changes in atmospheric forcing (North Atlantic Oscillation, Arctic Oscillation). Since 5 years, a systematic survey of these water masses has been started. It includes oceanic cruises, profiling 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 paleocirculation. The aims of this study are (1) to characterise 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 controlling 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 cartridges 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 litres) of seawater. Hf extraction and purification will be done in Toulouse (PI : Catherine Jeandel, LEGOS, Toulouse).

Iodine 129

^{129}I is an anisotropic 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 sub-sampled 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. Alberta, Canada)

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

3.5. A mud volcano on the south Greenland upper slope

by C. Hillaire-Marcel (GEOTOP, Montréal, Canada)

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 thorough 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 latter becoming thinner and truncated at the contact with the dome (see Figures 3a, b and c). A few fractures are also observed in these units

in the bulges surrounding the dome. The structure seems presently active, since no filling of the peripheral rims has been seen.

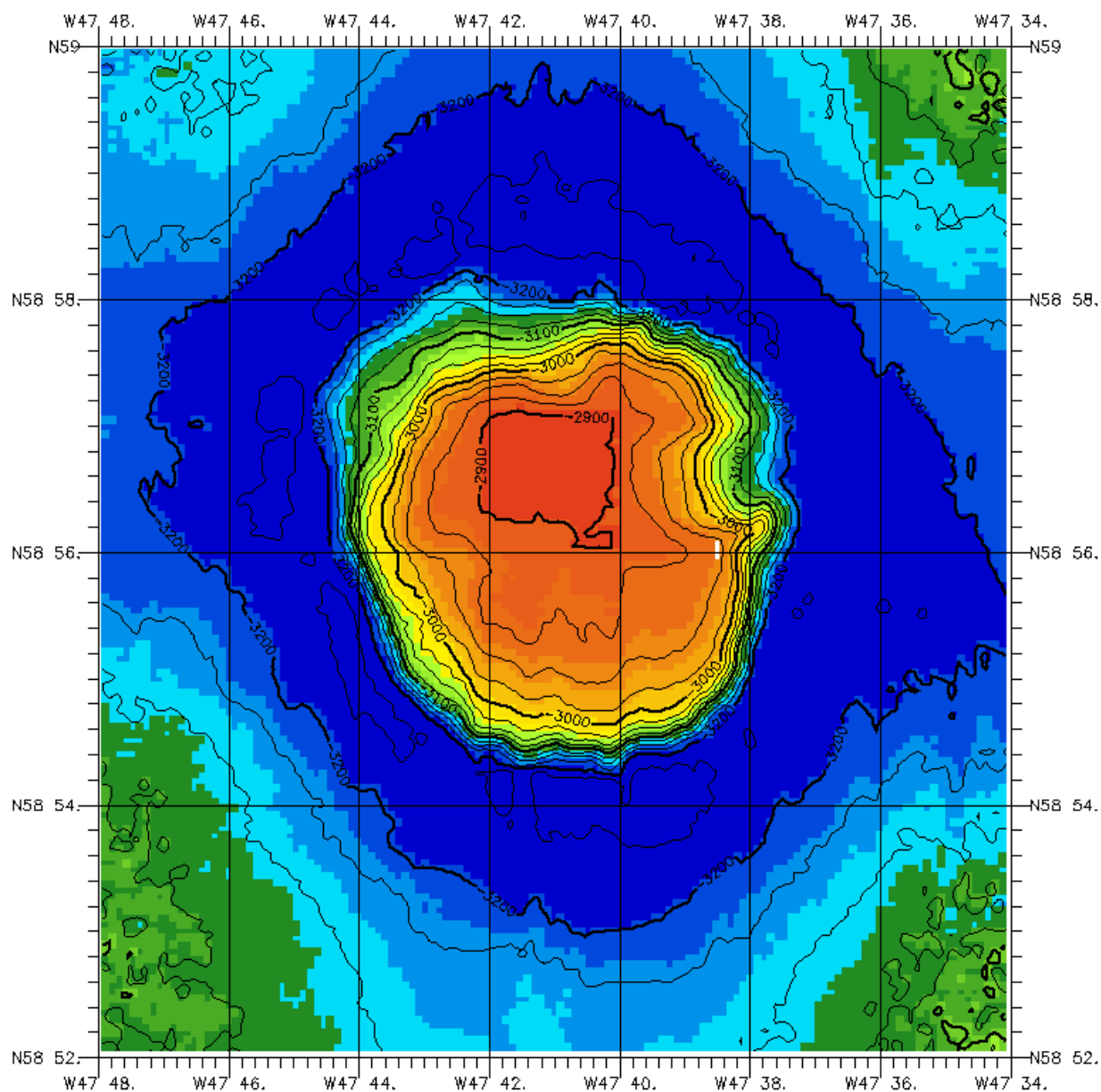


Figure 3.5a. ‘Mud volcano’ off south Greenland slope. Bathymetric profile from multibeam survey.

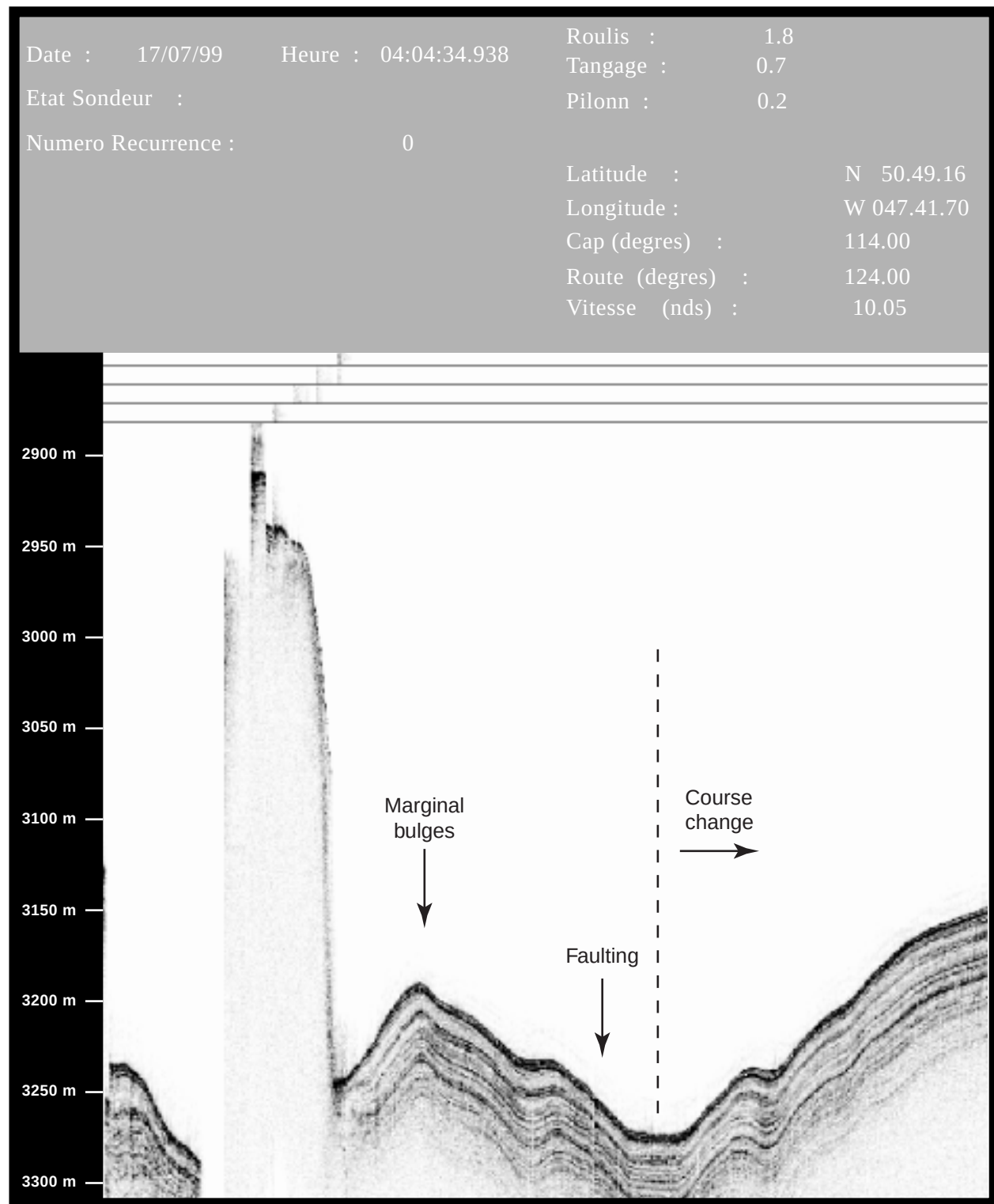


Figure 3.5b. A ‘mud volcano’ off south Greenland slope. 3.5 kHz digital recording along an East-West transect.

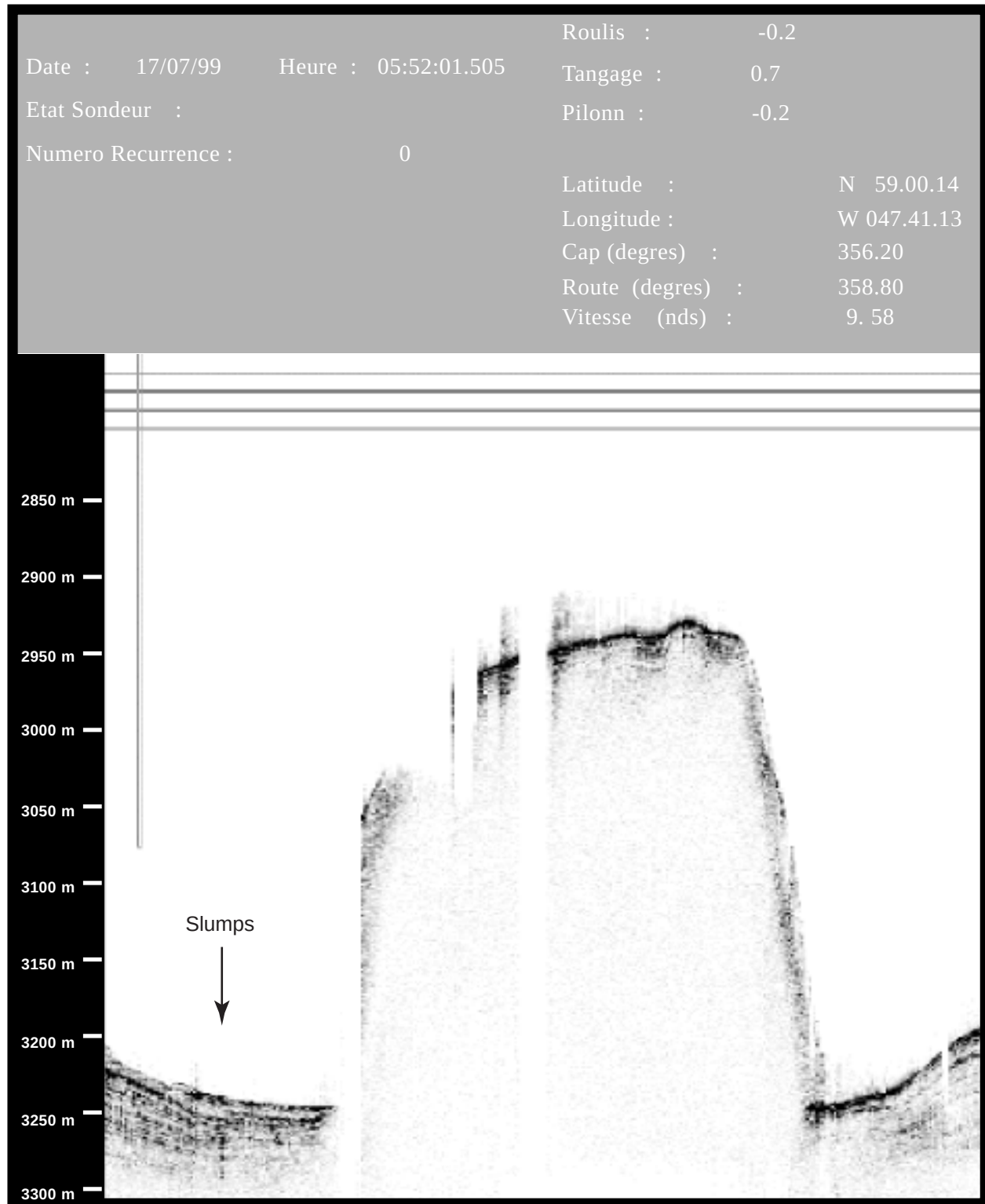


Figure 3.5c. A 'mud volcano' off south Greenland slope. 3.5 kHz digital recording along a South-North transect.

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 IF RTP, Yvon Balut), on high resolution seismology (by Xavier Morin from IF RTP), 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. OPERATIONS

4.1 Seismic lines

Available on CD upon request from :

Iris Hardy
Geological Survey of Canada (Atlantic)
1 Challenger Drive
P.O. Box 1006
Dartmouth, Nova Scotia
B2Y 4A2
Canada.
email: Iris Hardy (hardy@agc.bio.ns.ca)

4.2 Summary of operations tables

Table 4.2a: Summary of shipboard operations

Date (GMT)	Site	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
07.01.99		01h15				Departure from Quebec
07.01.99	1	13h18 13h48 14h10 14h15	48°18.28	070°15.44	271	Arrived at site (<i>Saguenay, Baie Éternité</i> ; equiv. Sag30) Triggering (<u>Calypso</u> ; MD 99-2222 ; 37.72m) Core on deck Departure for site 2
07.01.99	2	17h13 17h34 19h05 19h05	48°20.93	070°49.11	141	Arrived at site (<i>Saguenay, Baie des Ha! Ha!</i>) Triggering (<u>Calypso</u> ; MD 99-2223 ; 28.63m) Core on deck Departure for site 3
07.01.99	3	22h07 22h55 00h27 00h30	48°18.28	070°15.43	271	Arrived at site (<i>Saguenay, Baie Éternité</i> ; equiv. MD 99-2222) Triggering (<u>Calypso</u> ; MD 99-2224 ; 58.54 m; <u>Record !!</u>) Core on deck Departure for site 4
07.03.99	4	13h29 13h50 14h50 14h55	48°59.88	058°05.08	104	Arrived at site (<i>Bay of Islands</i>) Triggering (<u>Calypso</u> ; MD 99-2225 ; 37.53m) Core on deck Departure for site 5
07.03.99	5	21h07 21h36 22h09 22h45	50°15.14	058°26.11	336	Arrived at site (<i>Esquiman channel</i>) Triggering (<u>Calypso</u> ; core empty) Core broken when pulled out after approx. 30 m penetration; lower section and core cutter lost Departure for site 6

Table 4.2a (continued): Summary of shipboard operations

Date (GMT)	Site	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations		
07.05.99	6	01h55	50°02.00	052°08.38	2716	Arrived at site (<i>Southern Labrador Slope</i>)		
		01h07				<u>Rosette and CTD</u> deployed down to 200 m for alkenones		
		01h35				<u>Rosette and CTD</u> on deck		
		01h55			2690	Arrived at coring site (<i>Southern Labrador Slope</i> ; equiv. HU91 045-025)		
		03h06			50°01.23	052°08.70	Triggering (<u>Calypso</u> ; core empty)	
04h40	Core broken when pulled out after approximately 25 m penetration;							
04h40	Lower section and core cutter lost (core empty)							
					Departure for site 7			
07.05.99	7	22h18	57°03.71	050.37.70	3580	Arrived at site (<i>Levee Crest</i> ; equiv. HU90 013-13)		
		23h46				Triggering (<u>Calypso</u> ; MD 99-2226 ; 32.14 m)		
		01h41				Core on deck		
		01h41				Departure for site 8		
07.06.99	8	10h15	58°12.64	048°22.38	3460	Arrived at site (<i>Greenland Rise</i>)		
		11h54				Triggering (<u>Calypso</u> ; MD 99-2227 ; 42.96 m)		
		13h06				Core on deck		
		13h06				Departure for site 9		
07.06.99	9	19h00	58°55.26	047°06.96	2901	Arrived at site (<i>Greenland Slope</i>)		
		20h00				<u>Rosette and CTD</u> deployed down to 2875 m		
		22h15				<u>Rosette and CTD</u> on deck		
		22h50				Arrived at coring site (<i>Greenland Slope</i> ; equiv. HU90 013-12)		
07.07.99	9	00h6	58°55.59	047°08.45	2900	Triggering (<u>Calypso</u> ; MD 99-2228 ; 27.06 m)		
		01h35				Core on deck		
		02h00				58°55.81	047°10.53	2900
		02h25			<u>Rosette and CTD</u> on deck			
		02h30			Departure for site 10			
07.07.99	10	15h10	59°05.62	053°03.38	3400	Arrived at site (<i>Braid Plain 1 Namoc</i>)		
		16h30				Triggering (<u>Calypso</u> ; MD 99-2229 ; 36.28 m)		
		18h47				Core on deck		
		20h03				Departure for site 11		
07.07.99	11	21h25	59°05.35	052°48.84	3430	Arrived at site (<i>Braid Plain 2 Namoc</i>)		
		23h25				Triggering (<u>Calypso</u> ; MD 99-2230 ; 34.76 m)		
		03h17				Core on deck		
		03h27				Departure for site 12		
07.08.99	12	11h28	60°34.72	051°48.49	3190	Arrived at site (<i>SW Greenland Rise</i>)		
		13h11				Triggering (<u>Calypso</u> ; MD 99-2231 ; 34.29 m)		
		14h49				Core on deck		
		14h55				Departure for site 13		
		02h09				Arrived at site (<i>SW Greenland Rise</i>)		

Table 4.2a (continued): Summary of shipboard operations

Date (GMT)	Site	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
07.08.99	13	02h40 04h30 05h06	62°38.90	053°54.24	2476	<u>Rosette and CTD</u> deployed down to 2430 m <u>Rosette and CTD</u> on deck Arrived at coring site (<i>SW Greenland Rise</i> ; equiv.site 2400)
07.09.99	13	06h15 07h55 08h13 08h38 08h40	62°38.99 62°39.86	053°53.98 053°54.58	2455 2493	Triggering (<u>Calypso</u> ; MD 99-2232 ; 30.32 m) Core on deck <u>Rosette and CTD</u> deployed down to 200 m for alkenones <u>Rosette and CTD</u> on deck Departure for site 14
07.10.99	14	07h00 08h16 09h00 09h05	 59°42.01	 060°14.28	 1120	Arrived at site (<i>Saglek Bank</i>) Triggering (<u>Calypso</u> ; core empty) Core broken when pulled out after approx. 30 m penetration; lower section and core cutter lost Departure for site 15
07.10.99	15	12h57 13h55 15h10 15h15	 59°49.46	 059°09.35	 2350	Arrived at site (<i>Saglek Lower Slope</i>) Triggering (<u>Calypso</u> ; MD 99-2233 ; 24.62 m) Core on deck Departure for site 16
07.10.99	16	22h22 23h26	 58°22.01	 057°30.54	 2910	Arrived at site (<i>Labrador Slope</i> ; equiv. HU84-030-021) Cancelled site due to thin (<15m) sediment cover; departure for site 17
07.11.99	17	23h10 23h49 00h55	 53°50.81	 059°03.05		Arrived at site (<i>Lake Melville</i>) Triggering (<u>Calypso</u> ; MD 99-2234 ; 39.3 m) Core on deck
07.12.99	18	03h05 03h52 04h00	53°50.86	059°03.05		Triggering (<u>Calypso</u> ; MD 99-2235 ; 25.37 m) Core on deck Departure for site 19
07.12.99	19	13h33 14h05 15h00 15h05	 54°37.00	 056°10.57	 520	Arrived at site (<i>Cartwright Saddle</i>) Triggering (<u>Calypso</u> ; MD 99-2236 ; 21.15 m) Core on deck Departure for site 20
07.13.99	20	21h15 22h36 00h15 00h46 03h07 03h41 03h51 04h55	 50°11.93 50°11.90 50°11.55	 045°41.03 045°40.86 045°40.68	 3530 3572 3540	Arrived at site (<i>Orphan Knoll</i>) Triggering (<u>Calypso</u> ; MD 99-2237 ; 30.74 m) Core on deck <u>Rosette and CTD</u> deployed down to 3542 m <u>Rosette and CTD</u> on deck <u>Rosette and CTD</u> deployed down to 200 m for alkenones <u>Rosette and CTD</u> on deck Departure for site 21
		09h12				Arrived at site (<i>Orphan Basin</i>)

Table 4.2a (continued): Summary of shipboard operations

Date (GMT)	Site	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
07.14.99	21	10h27 12h05 12h10	49°51.12	046°38.20	3080	Triggering (<u>Calypso</u> ; MD 99-2238 ; 18.24 m) Core on deck Departure for site 22
		03h25				Arrived at site (equiv. ODP 647)
07.15.99	22	04h47 06h52 06h55	53°27.03	045°15.04	3770	Triggering (<u>Calypso</u> ; MD 99-2239 ; 23.77 m) Core on deck Departure for site 23
		10h31				Arrived at potential coring site (<i>SW Gloria Drift</i>)
07.15.99	23	11h05 13h20 14h41 16h21 16h25	54°00.32 54°00.60	046°11.12 046°11.68	3470 3525	Cancelled site due to thin (< 20 m) sediment cover Arrived at site (<i>SW Gloria Drift</i> ; equiv. VEMA v.2720) Triggering (<u>Calypso</u> ; MD 99-2240 ; 25.50 m) Core on deck Departure for site 24
		00h36				Arrived at site (<i>Gloria Drift</i>)
07.16.99	24	01h41 03h15 03h28 06h10 06h42	55°32.95 55°33.13	043°57.88 043°58.00	3280 3280	Triggering (<u>Calypso</u> ; MD 99-2241 ; 25.35 m) Core on deck <u>Rosette and CTD</u> deployed down to 3270 m <u>Rosette and CTD</u> on deck
07.16.99	24	07h03 07h05	55°32.66	043°56.96	3225	<u>Rosette and CTD</u> deployed down to 200 m for alkenones <u>Rosette and CTD</u> on deck Departure for site 25
		22h05				Arrived at site (<i>Greenland Slope</i> ; equiv. HU 90 013-12 & MD99-2228)
07.16.99	25	23h17	58°55.06	047°07.49	2895	Triggering (<u>Calypso</u> ; MD 99-2242 ; 35.36 m)
07.17.99		00h52 00h59 06h08				Core on deck Start <u>3.5 kHz survey</u> of 'diapiric' feature (to 47°59 W) End <u>3.5 kHz survey</u> ; switch to multibeam; departure for site 26
		11h25				Arrived at site (<i>East Greenland Slope</i>)
07.18.99	26	12h24 13h30 13h53 14h37 15h30 15h50	62°04.37	040°11.57	1290	<u>Rosette and CTD</u> deployed down to 1258 m <u>Rosette and CTD</u> on deck Arrived at coring site (<i>East Greenland Slope</i>)
			55°32.66	043°56.96	3225	Triggering (<u>Calypso</u> ; MD 99-2243 ; 9.43 m) Core on deck Departure for site 27
		21h05				Arrived at site (<i>Greenland Slope</i>)
07.18.99	27	21h40 23h27	63°03.35	039°54.78	1408	Triggering (<u>Gravity</u> ; core empty) Departure for site 28
		04h35				Arrived at site (<i>SE Greenland Slope, Irminger Basin</i>)
07.19.99	28	04h44	62°41.89	037°35.13	2125	<u>Rosette and CTD</u> deployed down to 2103 m

Table 4.2a (continued): Summary of shipboard operations

Date (GMT)	Site	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
		06h50				<u>Rosette and CTD</u> on deck
		07h35				Arrived at coring site (<i>SE Greenland Slope, Irminger Basin</i>)
		08h34	62°41.99	037°33.73	2110	Triggering (<u>Calypso</u> ; MD 99-2244 ; 24.71 m)
		10h10				Core on deck
		10h49				Arrived at box core site (<i>SE Greenland Slope, Irminger Basin</i>)
		12h09	62°41.93	037°35.49	2125	Triggering (<u>Box core</u> ; MD 99-2245 Bx)
		13h10				Core on deck
		13h29				Departure for site 29
		18h47				Arrived at site (<i>Lower SE Greenland Slope, Irminger Basin</i>)
07.19.99	29	19h00	61°54.74	036°21.29	2750	<u>Rosette and CTD</u> deployed down to 200 m
		19h29				<u>Rosette and CTD</u> on deck
		19h53				Arrived at coring site (<i>Lower SE Greenland Slope, Irminger Basin</i>)
07.19.99	29	22h36	61°54.73	036°21.52	2750	Triggering (<u>Calypso</u> ; MD 99-2246 ; 35.77 m)
		23h54				Core on deck
		23h59				Departure for site 30
		17h27				Arrived at site (<i>West Reykjanes Ridge</i>)
07.20.99	30	18h14	59°04.61	031°28.34	1690	Triggering (<u>Calypso</u> ; MD 99-2247 ; 24.50 m)
		19h16				Core on deck
		19h20				Departure for site 31
07.20.99		23h35				Arrived at site (<i>East Reykjanes Ridge</i>)
07.21.99	31	00h30	58°57.32	030°23.33	1724	Triggering (<u>Calypso</u> ; MD 99-2248 ; 38.22 m)
		01h37				Core on deck
		01h40				Arrived at box core site (<i>East Reykjanes Ridge</i>)
		03h00	58°57.44	030°22.99	1710	Triggering (<u>Box core</u> ; MD 99-2249 Bx)
		04h53				Core on deck
07.21.99	31	05h19	61°54.74	036°21.29	2750	<u>Rosette and CTD</u> deployed down to 200 m
		05h44				<u>Rosette and CTD</u> on deck
		05h50				Departure for site 32
		11h36				Arrived at site (<i>South Iceland Basin</i>)
07.21.99	32	12h43	57°42.71	029°25.27	2310	Triggering (<u>Calypso</u> ; MD 99-2250 ; 36.48 m)
		13h58				Core on deck
		14h00				Departure for site 33
		18h45				Arrived at site (<i>Iceland Basin</i>)
07.21.99	33	19h49	57°26.87	027°54.47	2620	Triggering (<u>Calypso</u> ; MD 99-2251 ; 36.58 m)
		21h24				Core on deck
		22h18				Arrived at Karsten core site (<i>Iceland Basin</i>)
		23h44	57°26.84	027°55.83	2610	Triggering (<u>Karsten</u> ; MD 99-2252 ; 3.25 m)
07.22.99		00h59				Core on deck
		01h07				Departure for site 34

Table 4.2a (continued): Summary of shipboard operations

Date (GMT)	Site	GMT time	Latitude (N)	Longitude (W)	Water depth (m)	Operations
07.22.99	34	06h50				Arrived at site (<i>Gardar Drift, Iceland Basin</i>)
		08h02	56°21.78	027°48.95	2840	Triggering (<u>Calypso</u> ; MD 99-2253 ; 32.75 m)
		10h45				Core on deck
		10h00	56°22.09	027°49.04	2840	<u>Rosette and CTD</u> deployed down to 2830 m
		11h57				<u>Rosette and CTD</u> on deck
		12h03				Departure for site 35
07.22.99	35	19h10				Arrived at site (<i>East Bight Fracture Zone</i>)
		20h11	56°47.78	030°39.86	2440	Triggering (<u>Calypso</u> ; MD 99-2254 ; 36.21 m)
		21h50				Core on deck
		22h00	56°47.87	030°40.00	2430	<u>Rosette and CTD</u> deployed down to 200 m
		22h14				<u>Rosette and CTD</u> on deck
		22h16				Departure for site 35
07.23.99	36	09h10				Arrived at site (<i>East Reykjanes Ridge</i>)
		09h56	58°58.41	030°39.10	1490	Triggering (<u>Calypso</u> ; MD 99-2255 ; 25.03 m)
		11h55				Core on deck
		12h00				Departure for Reykjavik

Table 4.2b: Coring log

Date (GMT)	Site	Water depth (m)	Latitude (N)	Longitude (W)	Location	Core	Length (m)	Sections	Comments
07.01.99	1	271	48°18.28	070°15.44	<i>Saguenay Fjord Baie Éternité</i>	MD 99-2222	37.72	XXVI	Calypso core Full penetration; some gas; sediment extruded from both ends of the 1500 cm cut
07.01.99	2	141	48°20.93	070°49.11	<i>Saguenay Baie des Ha! Ha!</i>	MD 99-2223	28.63	XX	Calypso core Core bent; core cutter damaged; at 900cm very soupy gravel, sand with mud balls lost
07.01.99	3	271	48°18.28	070°15.43	<i>Saguenay Fjord Baie Éternité (equiv. MD 99- 2222)</i>	MD 99-2224	58.54	XXXIX	Calypso core Core cut from bottom upperwards; section 1 is only 146 cm long; numbered from top to bottom as usual; section VIII : the 84 top cm lost on deck = in bags
07.03.99	4	104	48°59.88	058°05.08	<i>Bay of Islands (Humber Arm)</i>	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

Table 4.2b (continued): Coring log

Date (GMT)	Site	Water depth (m)	Latitude (N)	Longitude (W)	Location	Core	Length (m)	Sections	Comments
07.03.99	5	336	50°15.14	058°26.11	<i>Esquiman Channel</i>	-	-	-	Core broken when pulled out after approx. 30 m penetration; lower section and core cutter lost (core empty; no sediment recovered)
07.05.99	6	2690	55°01.23	052°08.70	<i>Southern Labrador Slope</i> (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)
07.05.99	7	3580	57.03.71	050.37.70	<i>Levee Crest</i> <i>(Braid Plain)</i>	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
07.06.99	8	3460	58°12.64	048°22.38	<i>Greenland Rise</i>	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)
07.06.99	9	2900	58°55.59	047°08.45	<i>Greenland Slope</i>	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
07.07.99	10	3400	59°05.62	053°03.38	<i>Braid Plain 1</i> <i>Namoc</i>	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)
07.07.99	11	3430	59°05.35	053°48.84	<i>Braid Plain 2</i> <i>Namoc</i>	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
07.08.99	12	3190	60°34.72	051°48.49	<i>SW Greenland Rise</i>	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'

Table 4.2b (continued): Coring log

Date (GMT)	Site	Water depth (m)	Latitude (N)	Longitude (W)	Location	Core	Length (m)	Sections	Comments
07.09.99	13	2455	62°38.99	053°53.98	<i>SW Greenland Rise</i> (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
07.10.99	14	1120	59°42.01	060°14.28	<i>Saglek Bank</i>	-	-	-	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)
07.10.99	15		59°49.46	059°09.35	<i>Saglek Lower Slope</i>	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.
07.10.99	16	2910	58°22.01	057°30.54	<i>Labrador Slope</i> (equiv. HU84-030-021)	-	-	-	Broke off search due to thin sediment cover (<15 m)
07.11.99	17	230	53°50.81	059°03.05	<i>Lake Melville</i>	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
07.12.99	18	233	53°50.86	059°03.05	<i>Lake Melville</i> (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
07.12.99	19	520	54°37.00	056°10.57	<i>Cartwright Saddle</i>	MD 99-2236	21.15	XV	Calypso core Corer stopped at 25 m by resistant layer; core cutter damaged; imploded and pierced 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'
07.13.99	20	3530	50°11.93	045°41.03	<i>Orphan Knoll</i>	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

Table 4.2b (continued): Coring log

Date (GMT)	Site	Water depth (m)	Latitude (N)	Longitude (W)	Location	Core	Length (m)	Sections	Comments
07.14.99	21	3080	49°51.12	046°38.20	<i>Orphan Basin</i>	MD 99-2238	18.24	XIII	Calypso core Core cutter slightly damaged; pierced 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
07.15.99	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
07.15.99	23	3525	54°00.60	046°11.68	<i>SW Gloria Drift</i> (equiv. VEMA 27-20)	MD 99-2240	25.50	XVII	Calypso core Full penetration; core cutter slightly damaged: possibly at previous site, where the same core cutter was used, according to the deck crew
07.16.99	24	3280	55°32.95	043°57.88	<i>Gloria Drift</i>	MD 99-2241	25.35	XVII	Calypso core Full penetration; core cutter slightly damaged
07.16.99	25	2895	58°55.06	047°07.49	<i>Greenland Slope</i> (equiv. HU 90 013-12 & MD99-2228)	MD 99-2242	35.36	XXIV	Calypso core Full penetration; sediment spilled on deck between sections III & IV, IV & V
07.18.99	26	1280	62°04.51	040°11.26	<i>East Greenland Slope</i>	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
07.18.99	27	1408	63°03.35	039°54.78	<i>Greenland Slope</i>	-	-	-	Gravity core Empty; one large clast and some gravel recovered in bag
07.19.99	28	2110	62°04.99	037°33.73	<i>SE Greenland Slope</i> <i>Irminger Basin</i>	MD 99-2244	24.71	XVII	Calypso core Triggering in water? apparent penetration 36 m; core in good condition
07.19.99	28	2125	62°41.93	037°35.49	<i>SE Greenland Slope</i> <i>Irminger Basin</i>	MD 99-2245 Bx	-	-	Box core Very little sediment (green black); sediment swashed and spread on bottom of corer; 2 surface samples in bags
07.19.99	29	2750	61°54.73	036°21.52	<i>Lower SE Greenland Slope</i> <i>Irminger Basin</i>	MD 99-2246	35.77	XXIV	Calypso core Full penetration; apparent penetration 37 m
07.20.99	30	1690	59°04.61	031°28.34	<i>West Reykjanes Ridge</i>	MD 99-2247	24.50	XVII	Calypso core

Table 4.2b (continued): Coring log

Date (GMT)	Site	Water depth (m)	Latitude (N)	Longitude (W)	Location	Core	Length (m)	Sections	Comments
									Full penetration, up to the weights; use longer core next time!! sections I and IV liquidy; rest ok
07.20.99	31	1724	58°57.32	030°23.33	<i>East Reykjanes Ridge</i>	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'
07.21.99	31	1710	58°57.44	030°22.99	<i>East Reykjanes Ridge</i>	MD 99-2249 Bx	-	-	Box core good
07.21.99	32	2310	57°42.71	029°25.27	<i>South Iceland Basin</i>	MD 99-2250	36.48	XXV	Calypso core Full penetration; good core
07.21.99	33	2620	57°26.87	027°54.47	<i>Iceland Basin</i>	MD 99-2251	36.58	XXI	Calypso core Full penetration; good core
07.21.99	33	2610	57°06.84	027°55.83	<i>Iceland Basin</i>	MD 99-2252	3.25	-	Karsten core good
07.22.99	34	2840	56°21.78	027°48.95	<i>Gardar Drift, Iceland Basin</i>	MD 99-2253	32.75	XXII	Calypso core Full penetration, up to the weights; use longer core next time!!
07.22.99	35	2440	56°47.78	030°39.86	<i>East Bight Fracture Zone</i>	MD 99-2254	36.21	XXV	Calypso core Full penetration, up to the weights; use longer core next time!!
07.23.99	36	1490	58°58.41	030°39.10	<i>East Reykjanes Ridge</i>	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

Table 4.2c: Calypso coring site locations (*= boxcore)

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

Table 4.2d: Coring statistics (Calypso corer)

Site	Core	Water depth (m)	Wire length (m)	Difference (m)	Core length (m)	Tube length (m)	Recovery coefficient	Time on site (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 99-2226	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
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

Table 4.2e: Water sampling and CTD measurement sites

Site	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°

5. ONBOARD CORE PROCESSING AND STUDIES

5.1 Core handling

by G. Bilodeau¹ and A. Rochon² (¹GEOTOP, Montréal, Canada; ²GSC Dartmouth, Canada)

As soon as the corer arrived onboard, the core cutter and catcher were immediately bagged. The core lining was then pulled out of the barrel 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 line 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 centimetres. 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 when required. 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 (GSC, Dartmouth, Canada)

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 sub-samples 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 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 Caesium-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 minimise 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 minimise 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 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.

Bulk density was calculated as follows:

$$\text{Bulk density} = (\ln \text{ counts} - m_o) / (m_1 * D)$$

where:

$\ln \text{ counts}$ = the normalised sample gamma ray attenuation counts

m_o = the calibration intercept

m_1 = the calibration slope

D = 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 in situ values after Wilson (1960), Wyllie et.al (1956) and Mackenzie (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 where 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.

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

by A. Jegou (LMCE, Gif-sur-Yvette, France)

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 an 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

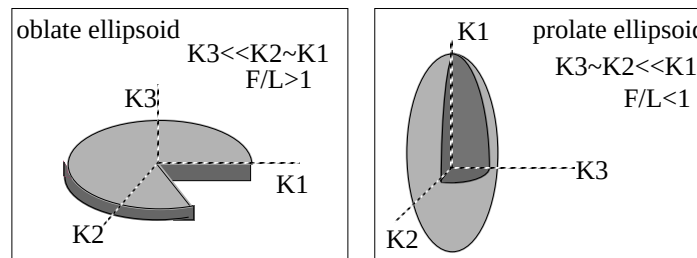
characterise the true colour of the sediment. On the other hand, spectral reflectance in the longer wavelengths is useful in distinguishing layers of detrital carbonate (light colour) that occurred in several other cores.

5.4 Anisotropy of the low field magnetic susceptibility

by C. Kissel (LSCE, Gif/Yvette, France)

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 visualised as an ellipsoid defined by the length and the orientation of its three principal axes ($K_1 = K_2 = K_3$ or $K_{\max} = K_{\text{int}} = K_{\min}$) 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 alignment of the magnetic particles.



In marine cores, a depositional fabric is characterised 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 ($K_1 = K_2 \gg K_3$). 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 was 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 perfectly sedimentary fabric (oblate shape and K_3 vertical) all along the sedimentary column.

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 characterises 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.

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 sub-sample will be weighed, dried at 105° C for 24 hrs and re-weighed. Bulk density, dry density and water content will be calculated. One hundred and twenty-nine constant volume samples were taken at regular intervals from 10 cores.

5.6 Sediment Description

by R. Hiscott¹ and M. Cremer² (¹Memorial Univ., St. John's, Canada; ²C.N.R.S., Bordeaux, France)

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 summarised in Figure 5.6a. 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.

Figure 5.6a. Textural names and symbols. Symbols for mixtures offset to right.

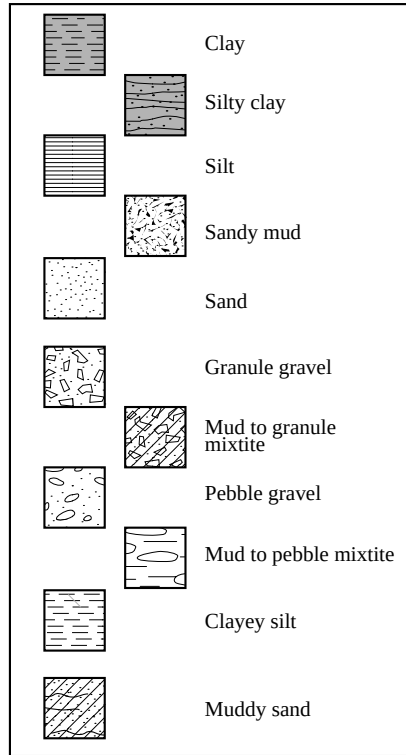


Figure 5.6c. Structure symbols.

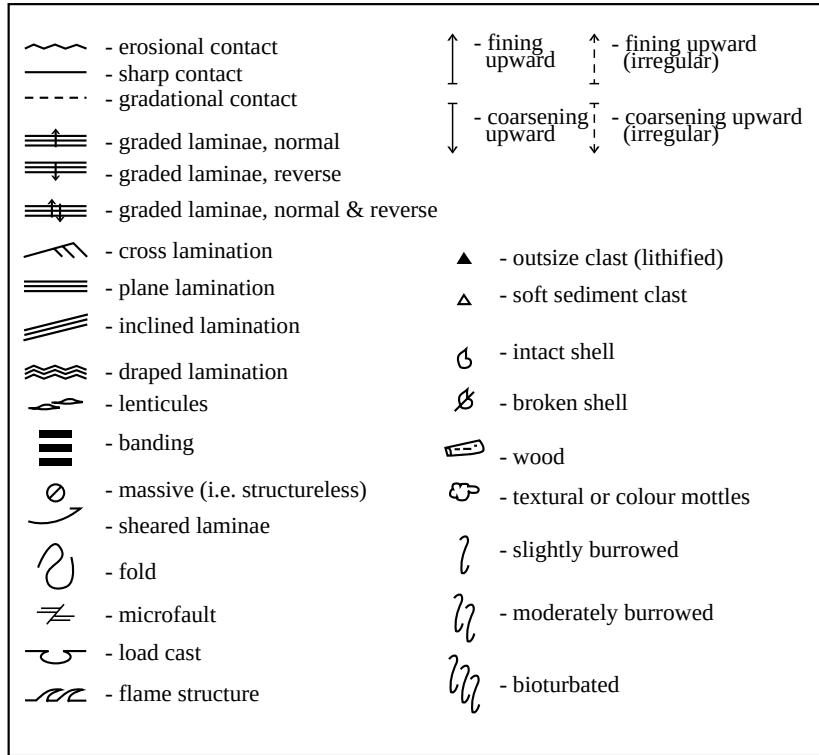


Figure 5.6b. Compositionally distinctive components.

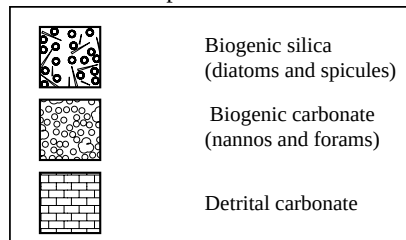
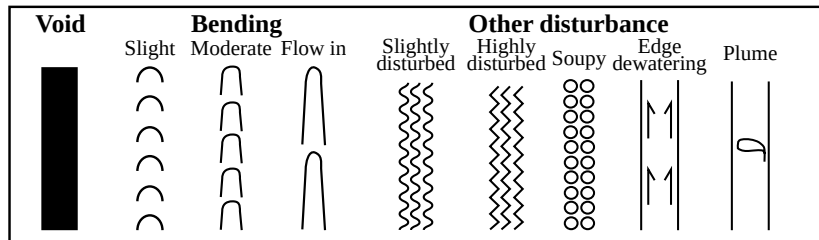


Figure 5.6d. Coring disturbance



Biogenic or other genetically significant sediment components (e.g., detrital carbonate) are recorded (§7.2) in a separate column with the appropriate symbols (Figure 5.6b), 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 grey-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 5.6c; some of these symbols are only used on primary description forms (open file). Coring disturbance is also indicated by symbols in Figure 5.6d, and colour is designated using Munsell codes.

5.7 Regional Sedimentary Signatures

by R. Hiscott¹ and M. Cremer² (¹Memorial Univ., Canada; ²C.N.R.S., Bordeaux, France)

For reasons of geographic setting, source differences, or distinct physical processes controlling deposition, the coring sites (**bold** cores were opened at sea) can be organised 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 **MD99-2222**, -2223, -2224)

Bay of Islands (core **MD99-2225**)

Lake Melville (cores **MD99-2234**, -2235)

b. western and central Labrador Sea sites

Orphan Basin & Orphan Knoll (cores **MD99-2237**, -2238)

Saglek slope and Cartwright Saddle (cores **MD99-2233**, -2236)

NAMOC levee and braidplain (cores **MD99-2226**, -2229, -2230)

Gloria Drift area (cores **MD99-2239**, -2240, -2241)

c. south Greenland and Davis Strait sites

Eirik Ridge (sediment drift) (cores **MD99-2227**, -2228, -2242)

d. east Greenland slope and rise (Irminger Basin) (cores **MD99-2243**, -2244, -2246)

e. Reykjanes Ridge, Iceland Basin and Bight Fracture Zone (cores **MD99-2247**, -2248, box core -2249, cores MD99-2250, -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 characterise 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 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 moulded 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 scarce.

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

5.8 Coring Labrador Sea sediments

by C. Hillaire-Marcel¹ and J.- L. Turon² and M. Chapman³ (¹GEOTOP, Montréal, Canada;

²Univ. Bordeaux, France)

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 latter 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 occasionally 2, between them (see Figs. 5.8.2a, b, c, d). 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 (Table 5.8.2)
- 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 (Table 5.8.2)
- iii) attempts at matching high resolution digital (or analog) 3.5 kHz profiles on coring site with observed lithologies and physical properties of the sediment (density, magnetic susceptibility, etc.),
- 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, etc.)
- 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).

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 in chapter 7). 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 between cores remains inconclusive. 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 Figs. 5.8.2a, b and c), 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 (Fig. 5.8.2b), 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 (inconclusive offsets of $\pm 10\%$ 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 (section 8.5), indicate the preservation of magnetic fabrics in some cores, and its alteration in the upper 10 to 15 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 hypothesise some reorientation of magnetic grains with or without actual stretching.

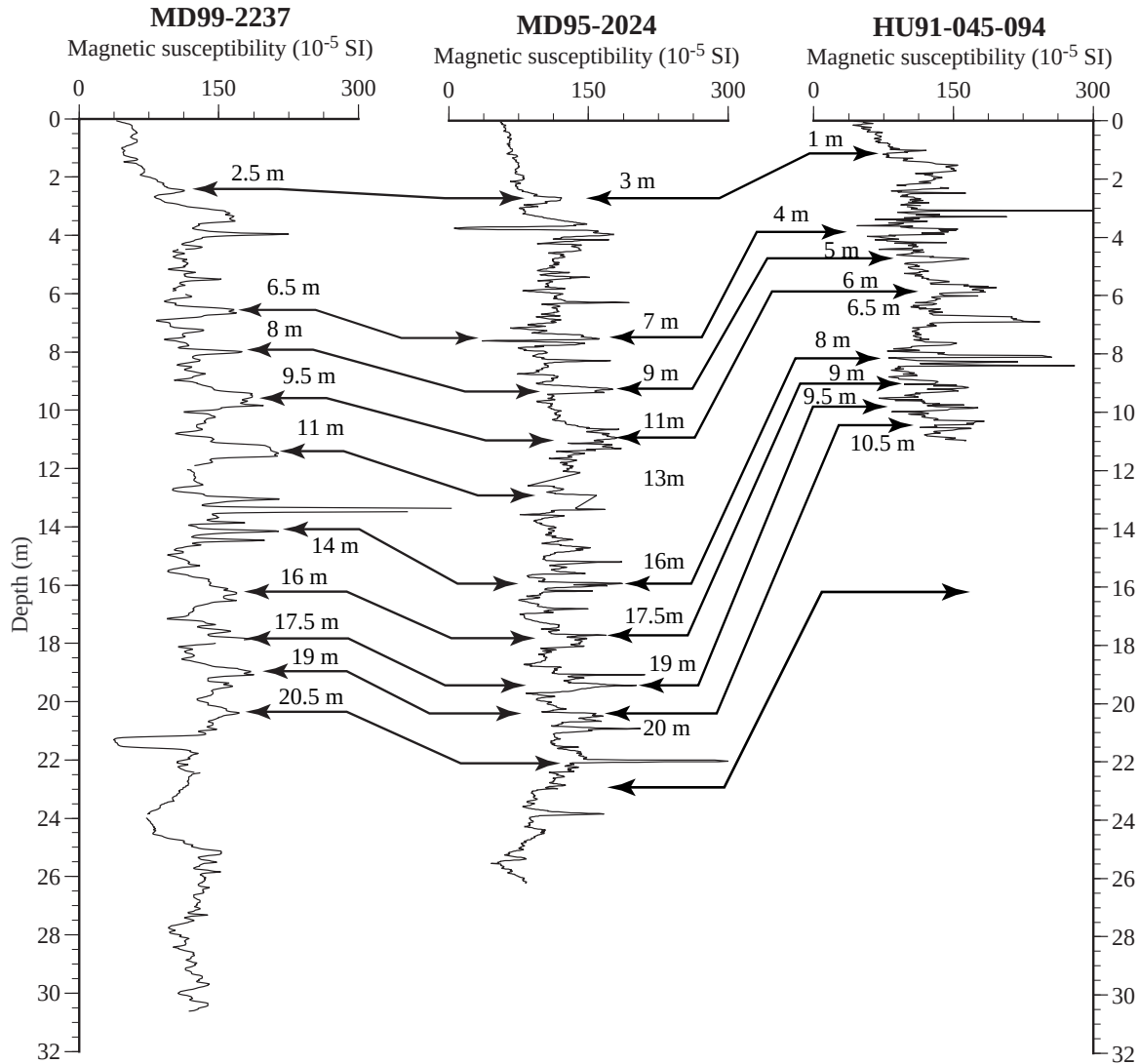


Figure 5.8.2a Comparison of magnetic susceptibility records from MD99-2237, MD95-2024, and HU91-045-094 plotted versus depth. All cores are taken from the same location ($53^{\circ}27.03$ N, $45^{\circ}41.03$ W; water depth 3530 m). From left to right, the MST derived wholecore magnetic susceptibility of MD99-2237 (See section 7.2) compared with the u-channel derived volumetric magnetic susceptibility record from MD95-2024 (J. S. Stoner unpublished data) and discrete sample volumetric magnetic susceptibility for HU91-045-094 (Stoner et al., 1996). Lines with arrows are used to indicate correlative features within the susceptibility records. Similar features are found at different depths in all three cores. Number indicate approximate depth of correlative features in each record

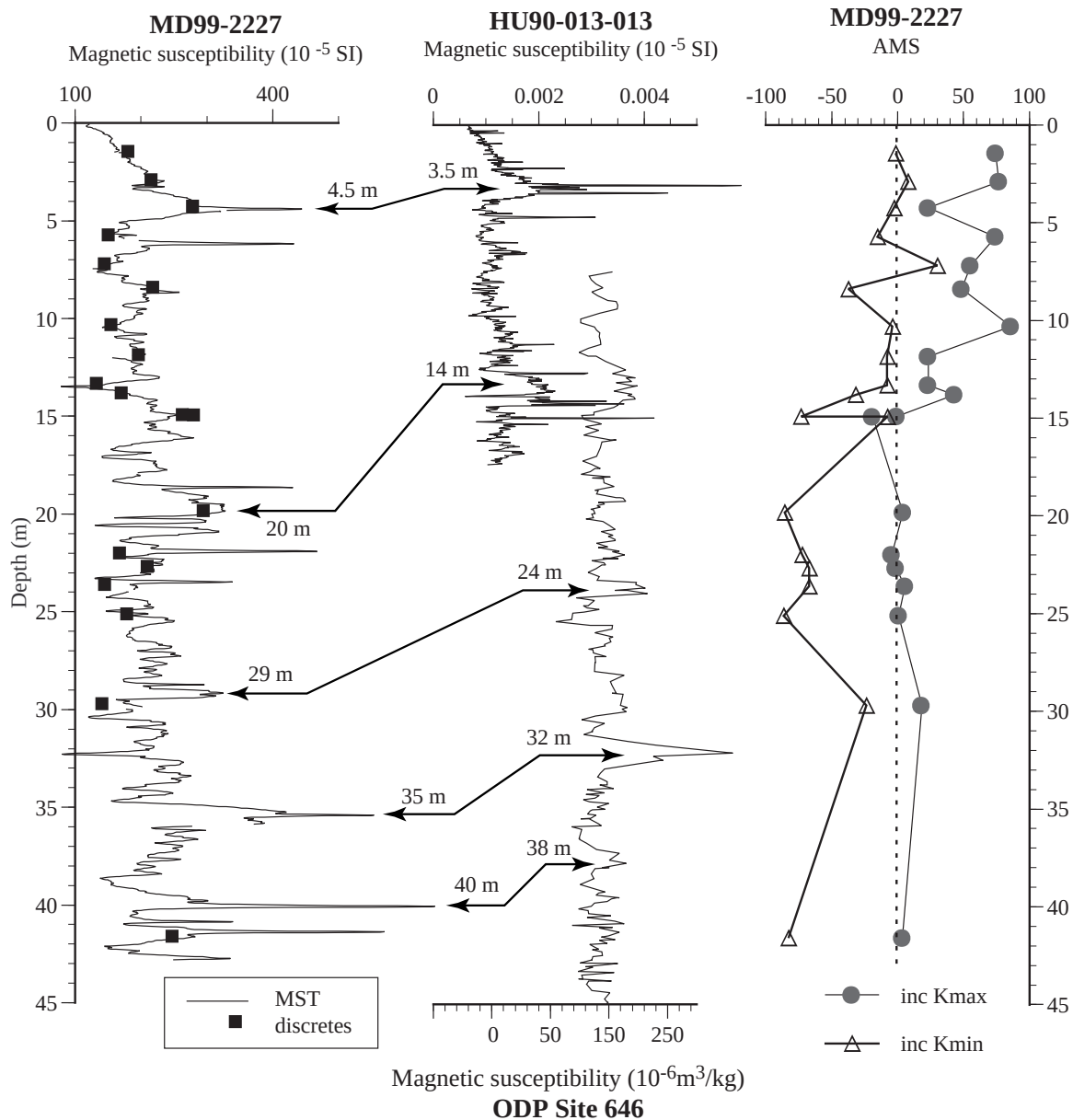


Figure 5.8.2b Comparison of magnetic susceptibility records from MD99-2227, HU90-013-012, and ODP Site 646. All cores taken from the same location ($58^{\circ}12.64$ N, $48^{\circ}22.38$, water depth 3460 m). From left to right, the MST derived wholecore and discrete sample volumetric magnetic susceptibility of MD99-2227 (See section 7.2) compared with the discrete sample volumetric magnetic susceptibility for HU90-013-013 (Stoner et al., 1994) and the mass specific magnetic susceptibility data from ODP Site 646 (Hall et al., 1989). A constant offset of 3.6 m was added to the meters below sea floor depth of Site 646 in order to align the susceptibility high found at approximately 14 m in HU90-13-013. This feature has been identified as occurring within oxygen isotopic substage 5e in both records (Aksu et al., 1989; Hall et al., 1989; Hillaire-Marcel et al., 1994; Stoner et al., 1994). Lines with arrows are used to indicate correlative features within the susceptibility records. Differences are observed in the depths of correlative features in all three records. The panel to the right show anisotropy of magnetic susceptibility (AMS) data from MD99-2227 (See section 5.4), illustrating a return to normal sedimentary fabric at about 15 m depth.

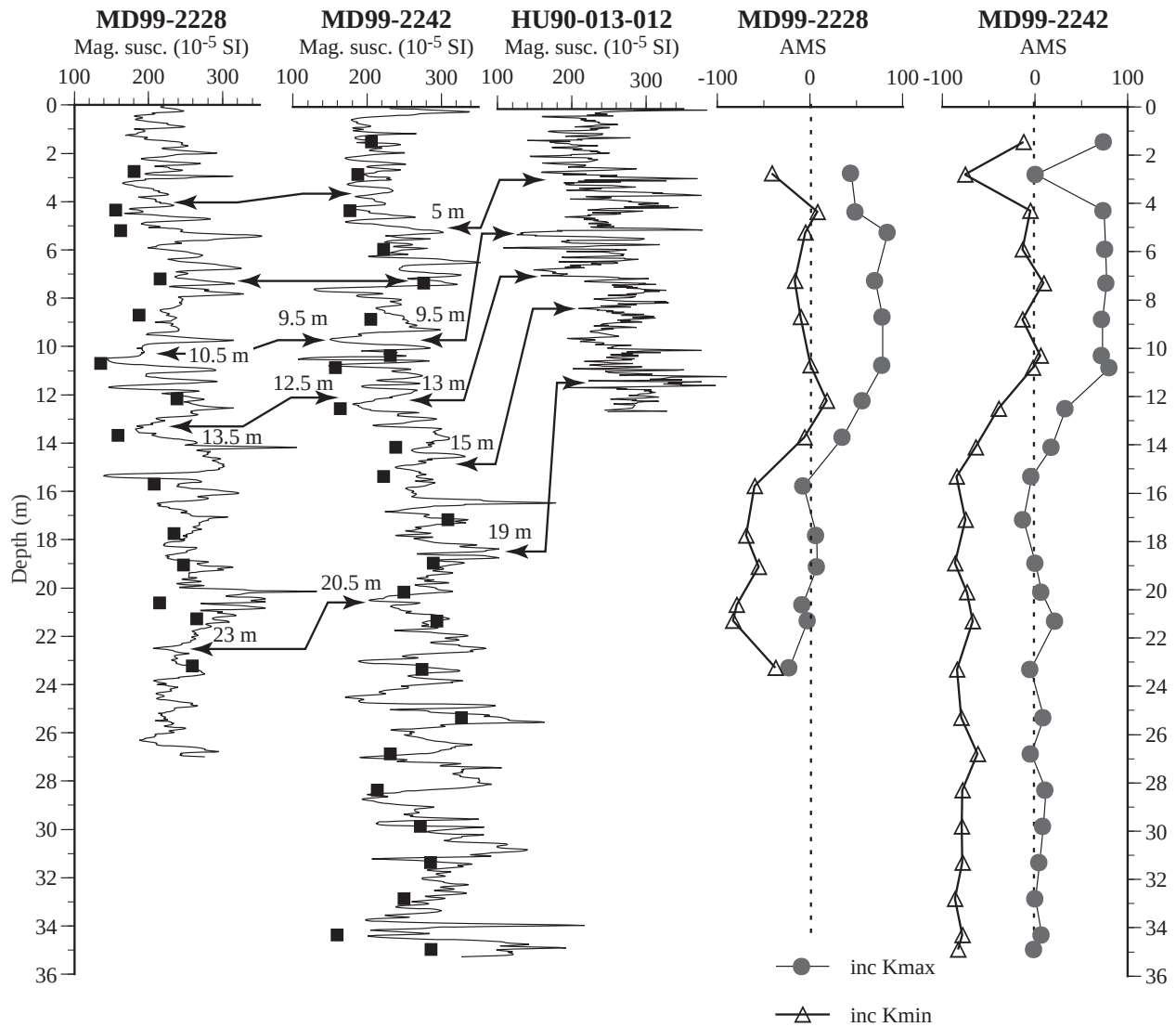


Figure 5.8.2c Comparison of magnetic susceptibility records from MD99-2228, MD99-2242, and HU90-013-012. All cores taken from the same location ($58^{\circ}55.26$ N, $47^{\circ}06.96$, water depth 2901 m). From left to right, the MST derived wholecore and discrete sample volumetric magnetic susceptibility of MD99-2228 and MD99-2242 (See section 7.2) compared with the discrete sample volumetric magnetic susceptibility for HU90-013-012 (Stoner et al., 1995). Lines with arrows are used to indicate correlative features within the susceptibility records. Differences are observed in the depths of correlative features in all three records. The two panels to the right show anisotropy of magnetic susceptibility (AMS) data from MD99-2228 and MD99-2242 (see section 5.4), illustrating a returning to normal sedimentary fabric at about 14 m depth. Comparison of discrete sample with MST derived volumetric susceptibility shows a discrepancy in the two data sets in MD99-2228 which could be due to core deformation and movement of silty and sandy sediments between the core and the liner.

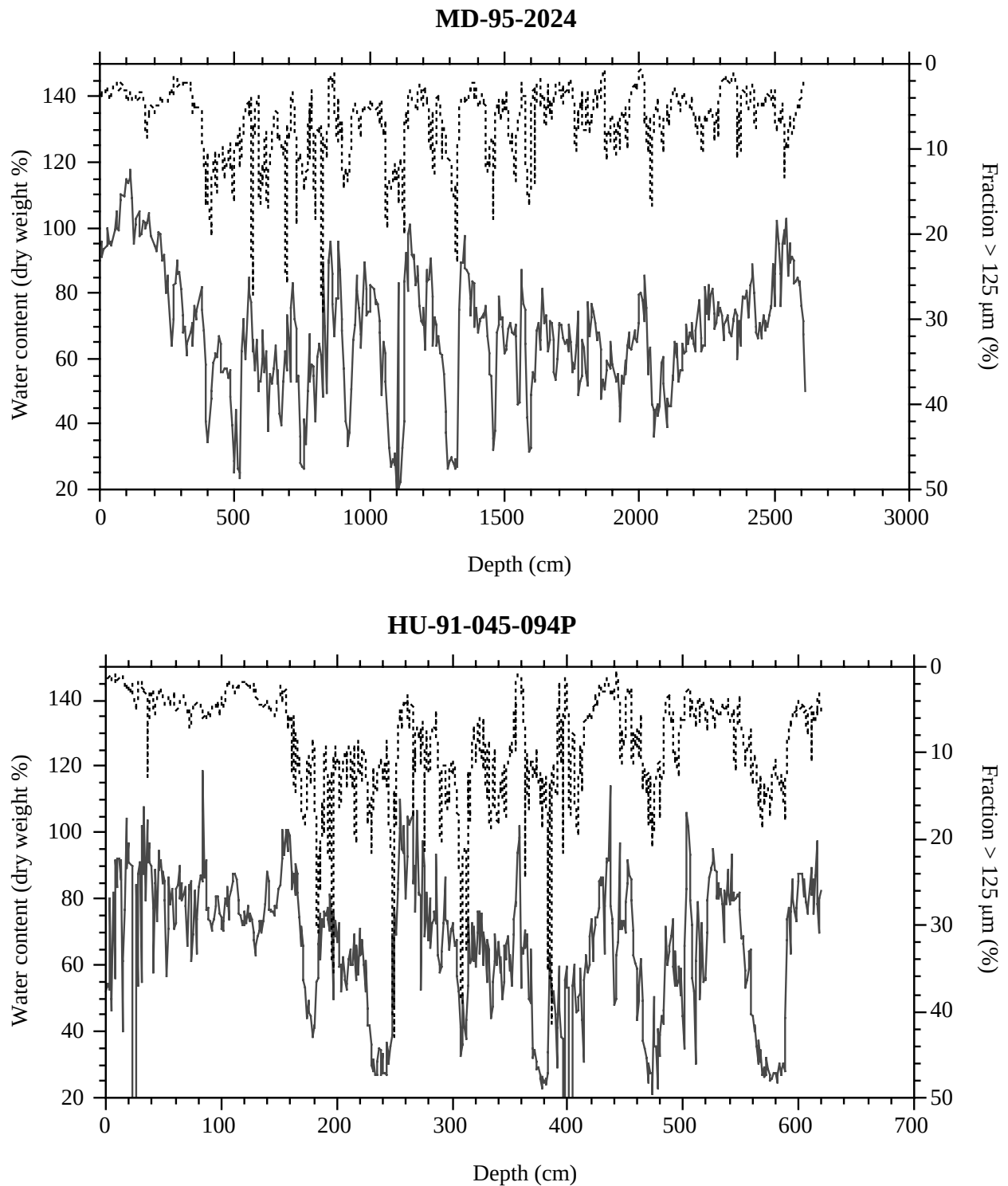


Figure 5.8.2d Comparison of water and coarse fraction contents from two MD and LPC cores at the same Labrador Rise site

Table 5.8.2 Coring statistics pertinent to the stretching issue.

Core	A Corer Length (m)	B Position of bend (m)	C Core length (m)	D Apparent penetration (m)	E C/D (%)	B/D (%)
MD99-2222	41	-	37.7	41	91.95	-
MD99-2223*	35	25	28.6	28	102.14	114.4
MD99-2224	61	-	58.5	60	97.5	-
MD99-2225*	41.5	36.5	37.5	41	91.46	102.74
MD99-2226	41	-	32	30	106.67	-
MD99-2227	51	-	43	40	107.5	-
MD99-2228	51	-	27	40	67.5	-
MD99-2229	51	-	36	36	100	-
MD99-2230	41	-	35	-	-	-
MD99-2231	41	-	34	36	94.44	-
MD99-2232	41	-	30	35	85.71	-
MD99-2233	31	-	25	-	-	-
MD99-2234*	45	35	39	-	-	111.43
MD99-2235	31	-	25	29	86.21	-
MD99-2236*	31	25	21	27	77.78	84
MD99-2237*	44	33	31	36	86.11	93.94
MD99-2238	42	-	18	35	51.42	-
MD99-2239*	44	36	24	37	64.86	66.67
MD99-2240	31	-	25	30	83.33	-
MD99-2241	31	-	25	30	83.33	-
MD99-2242	42	-	35	40	87.5	-
MD99-2243*	32	22	9	20	45	40.91
MD99-2244	42	-	25	36	69.44	-
MD99-2246	42	-	36	37	97.3	-
MD99-2247	29	-	25	29	86.21	-
MD99-2248	42	-	38	41	92.68	-
MD99-2250	42	-	37	-	-	-
MD99-2251	42	-	37	-	-	-
MD99-2253	42	-	33	42	78.57	-
MD99-2254	42	-	36	42	85.71	-
MD99-2255*	42	20	25	-	-	115
Minimum	29	20	9	20	45	40.9
Maximum	61	36.5	58.5	60	107.5	115
Sum	1254.5	232.5	978.3	898	2154.6	729.1
Points	31	8	31	25	25	8
Mean	40.5	29.1	31.56	35.9	86.2	91.1
Median	42	29	32	36	86.2	98.3
Std. Deviation	6.8	6.8	8.6	7.6	13.9	26.3

* bent core

6. ARCHIVE AND SAMPLE MAHAGEMENT

6.1 Cores & U-channels, samples & working halves

- See tables in section 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 the proper IMAGES access code number).

6.3 Open files (for site databases)

- 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, NS (hardy@agc.bio.ns.ca)

7. SITE REPORTS

when available:

- track chart
- 3.5 kHz profile
- core description
- physical properties
- CTD results



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 processing:

- U-channel were taken on every sections (to be processed at UCD).
- The working halves of the core were sampled at a 1 cm interval (to be processed at GEOTOP).
- The archives will be processed at GEOTOP.
- Several bags of sediments were recovered: 1 core cutter (cône d'ogive), 1 core catcher (ogive), 1 top, 1 from section I between Ia and Ib (50-60cm, to be processed 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 processed 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

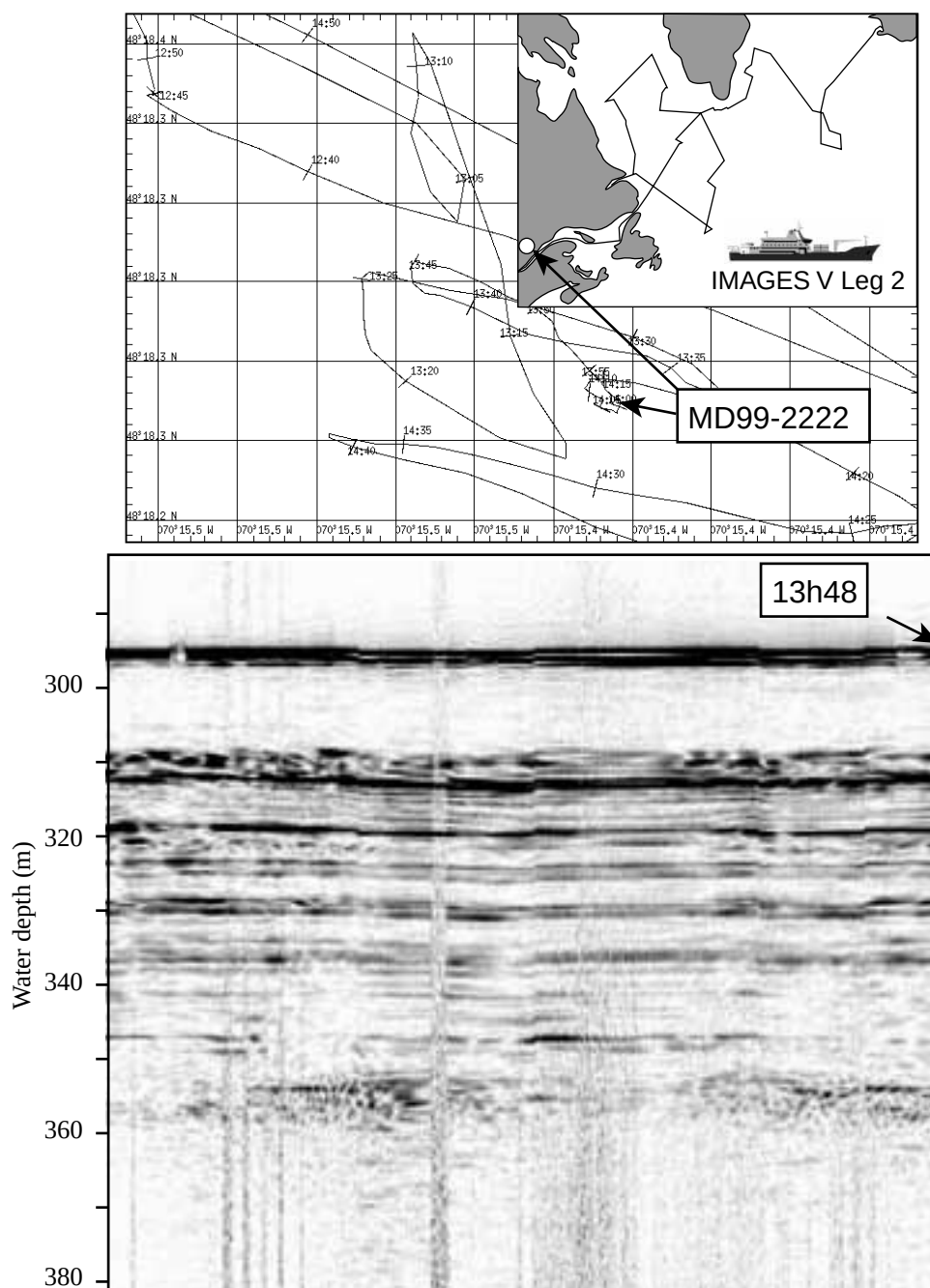
A lower unit (15.80-37.62 m) characterized by an alternation on a scale of decimetres to metres of clayey silt (locally sandy) and silty clay; contacts commonly sharp, some graded sequences with planar laminations at the base, variable intensity of burrowing, common biogenic silica

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/m³. 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.

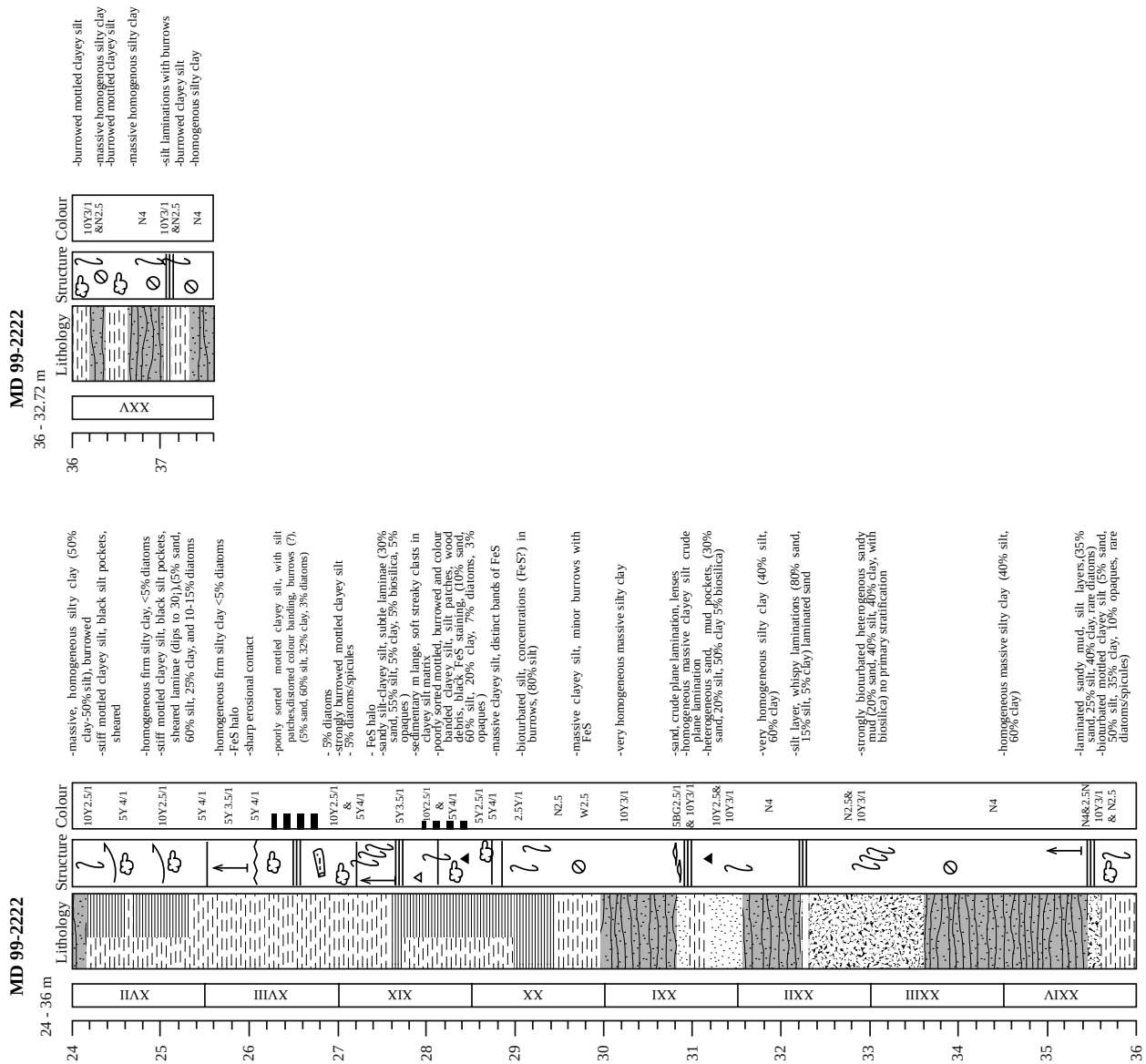
MD99-2222
Length: 32.72 m

Latitude: 48°18'30 N
Longitude: 070°15'44 W

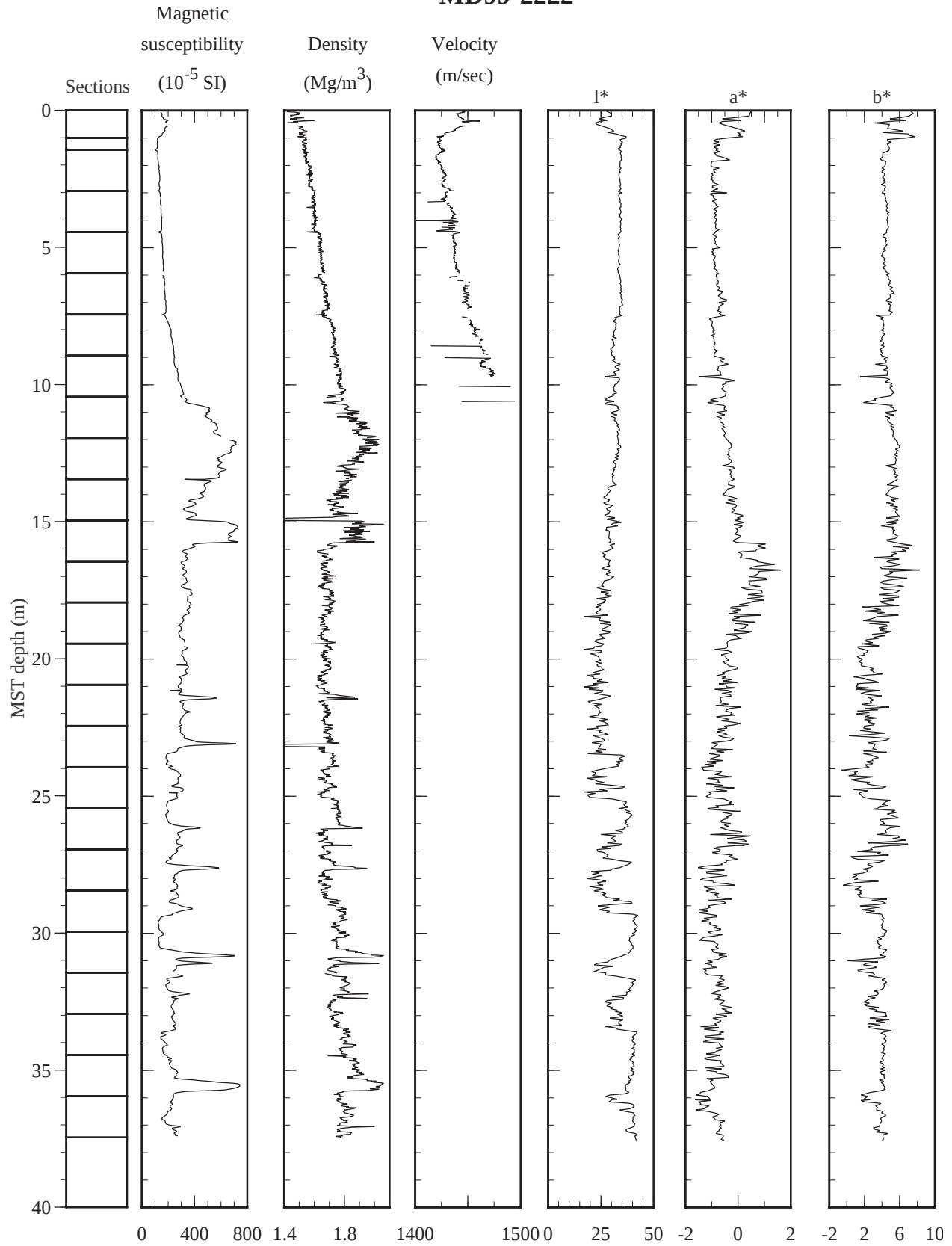
Water depth: 223.8m
Date: 01 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)



MD99-2222



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 processing:

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

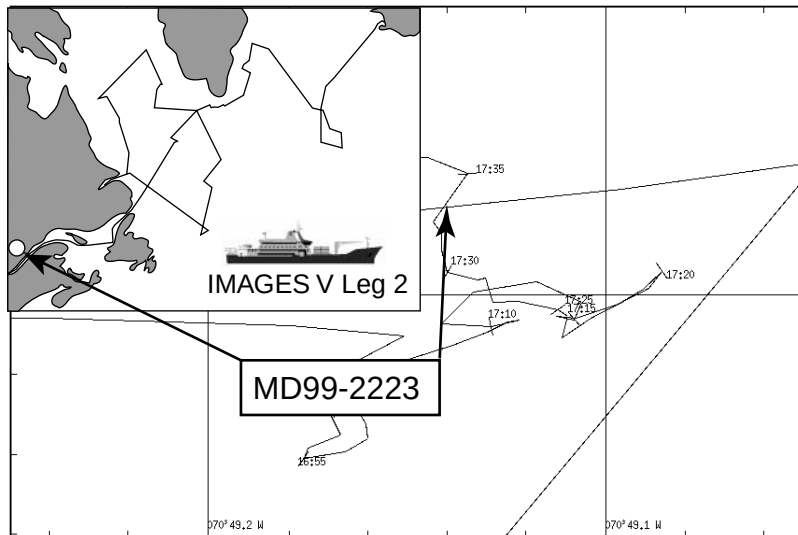
Summary of physical and sedimentological observations

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/m³. As a result of gas expansion p-wave velocity measurements were sporadic and range in value from approximately 1420 to 1600 m/sec.

MD99-2223
Length: 28.63m

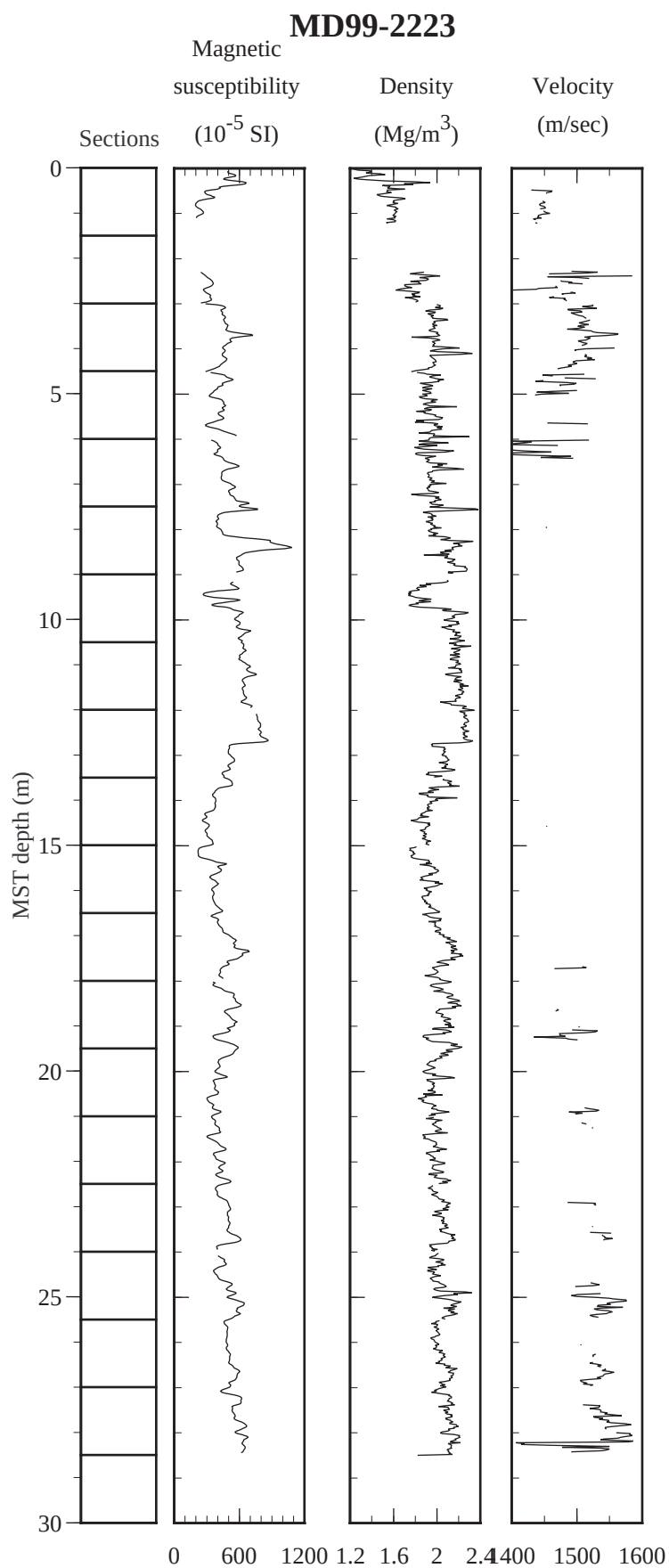
Latitude: 48°20'93 N
Longitude: 070°49'11 W

Water depth: 141 m
Date: 01 July 1999



PROFILE
UNAVAILABLE

Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)



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 processing:

- 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 processed at GEOTOP.

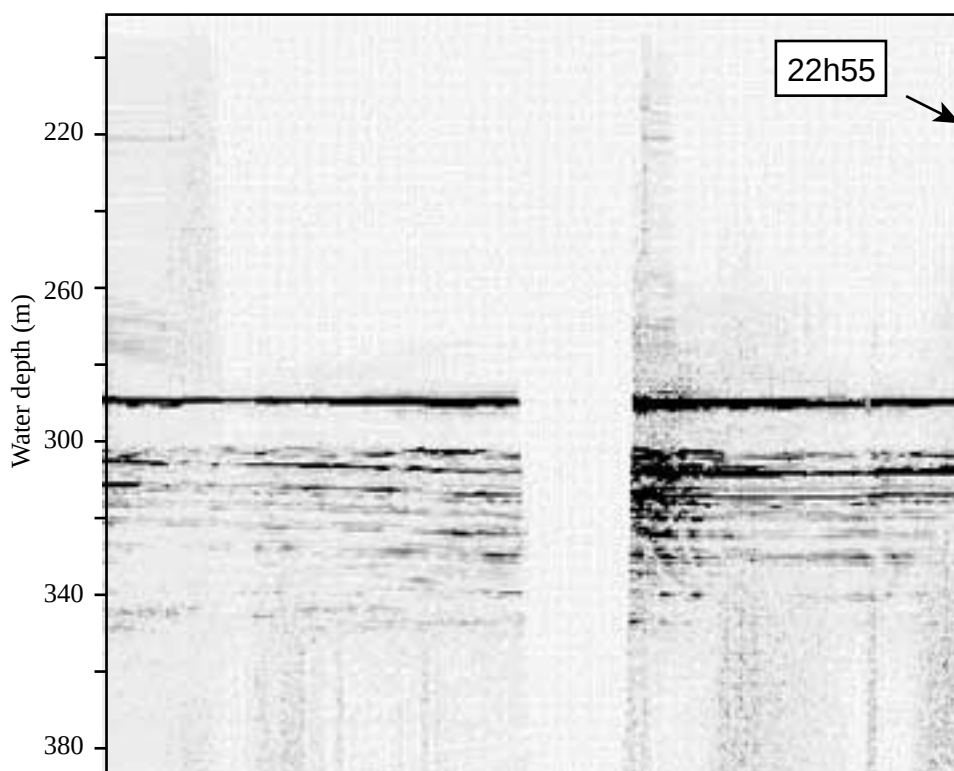
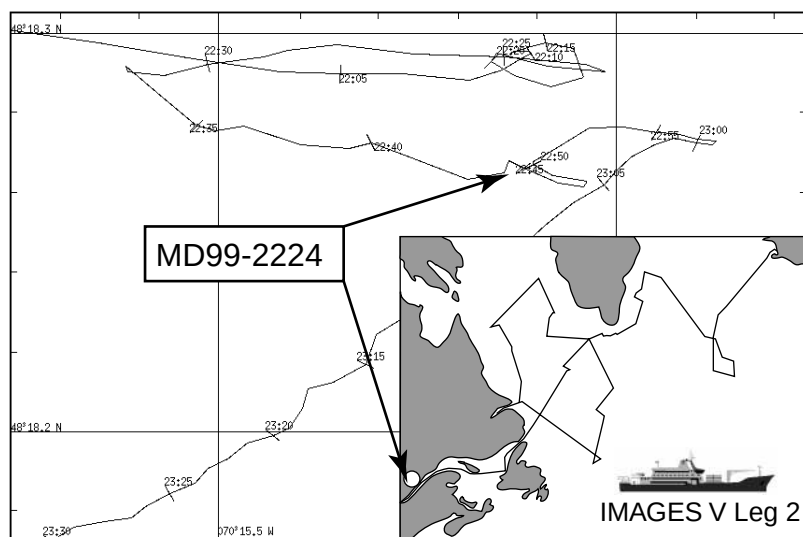
Summary of physical and sedimentological observations

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/m³. 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.

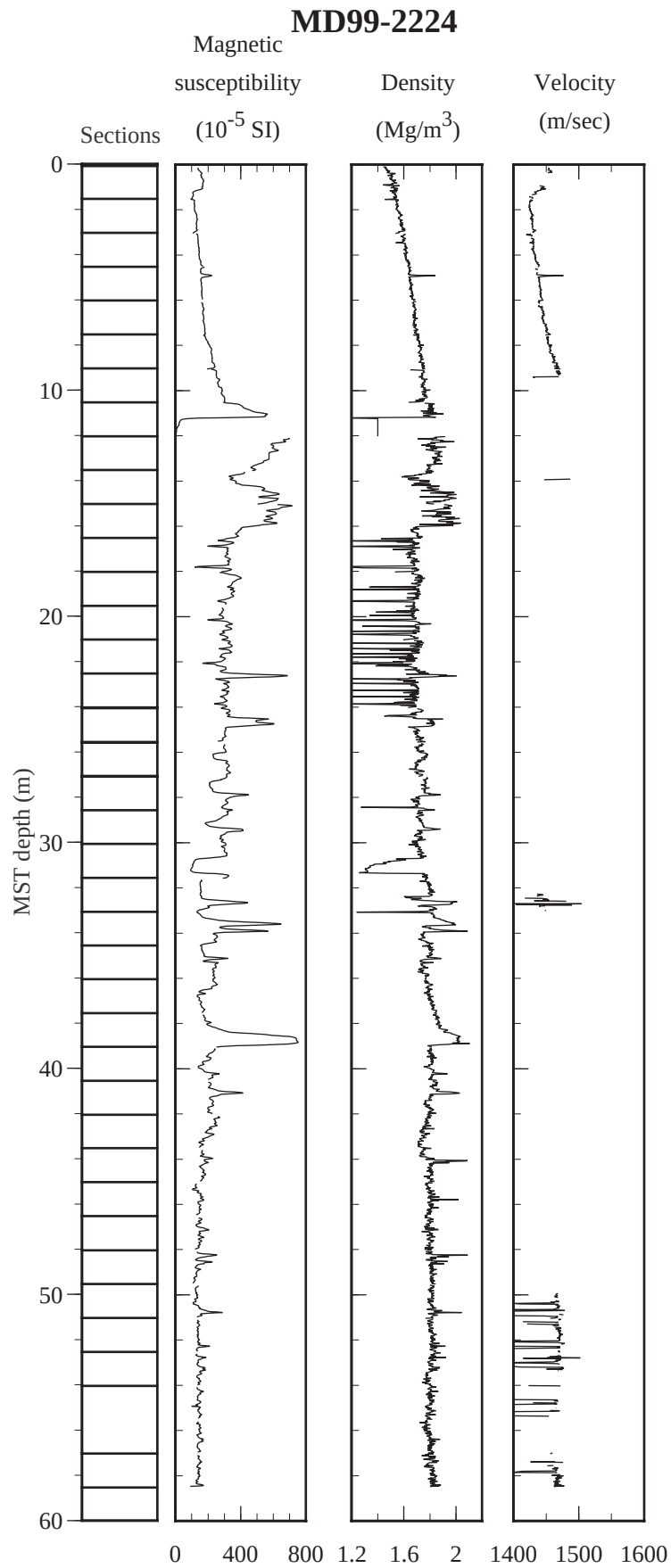
MD99-2224
Length: 28.63m

Latitude: 48°20'93 N
Longitude: 070°49'11 W

Water depth: 141 m
Date: 01 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)



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 broke 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 processing:

- The core was split onboard, archive and working halves will be processed 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 processed 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

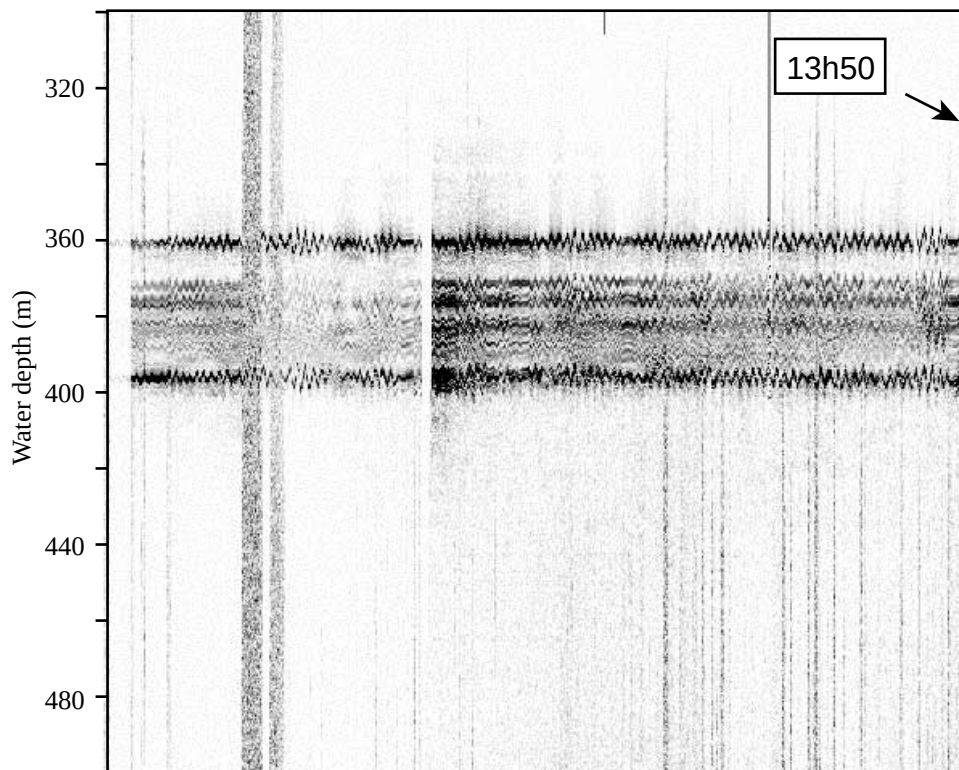
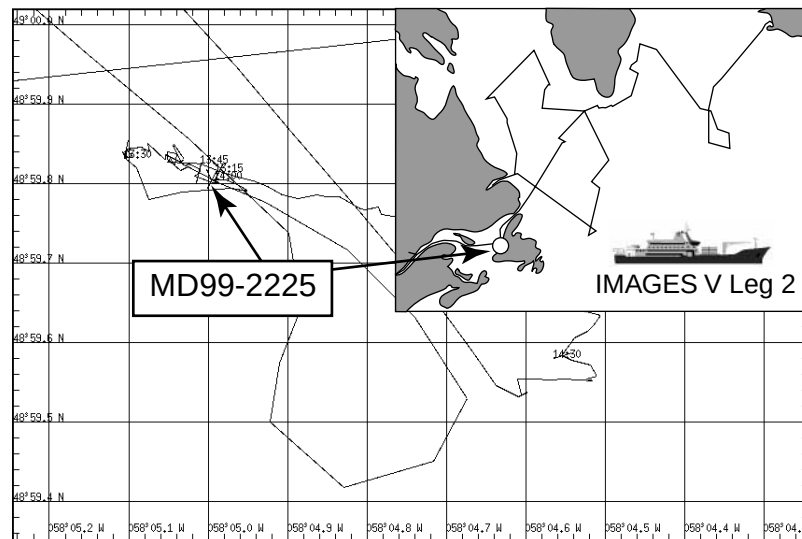
A lower unit (25.40-37.08 m) characterized by a centimetre-scale alternation of clayey silt or sandy mud, and reddish brown clay; contacts are sharp, minor burrowing.

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/m³. 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.

MD99-2225
Length: 37.53 m

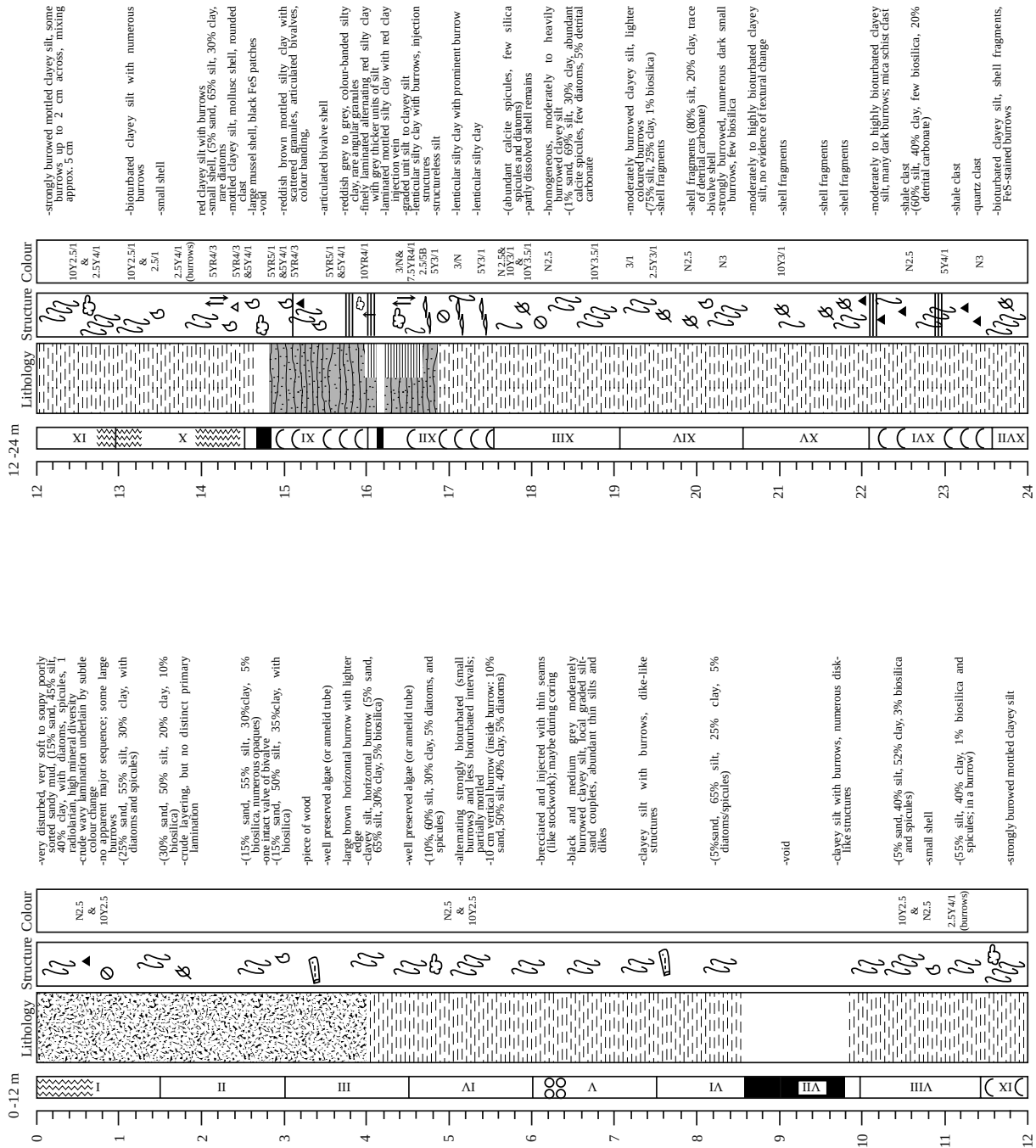
Latitude: 48°59'88 N
Longitude: 058°05'08 W

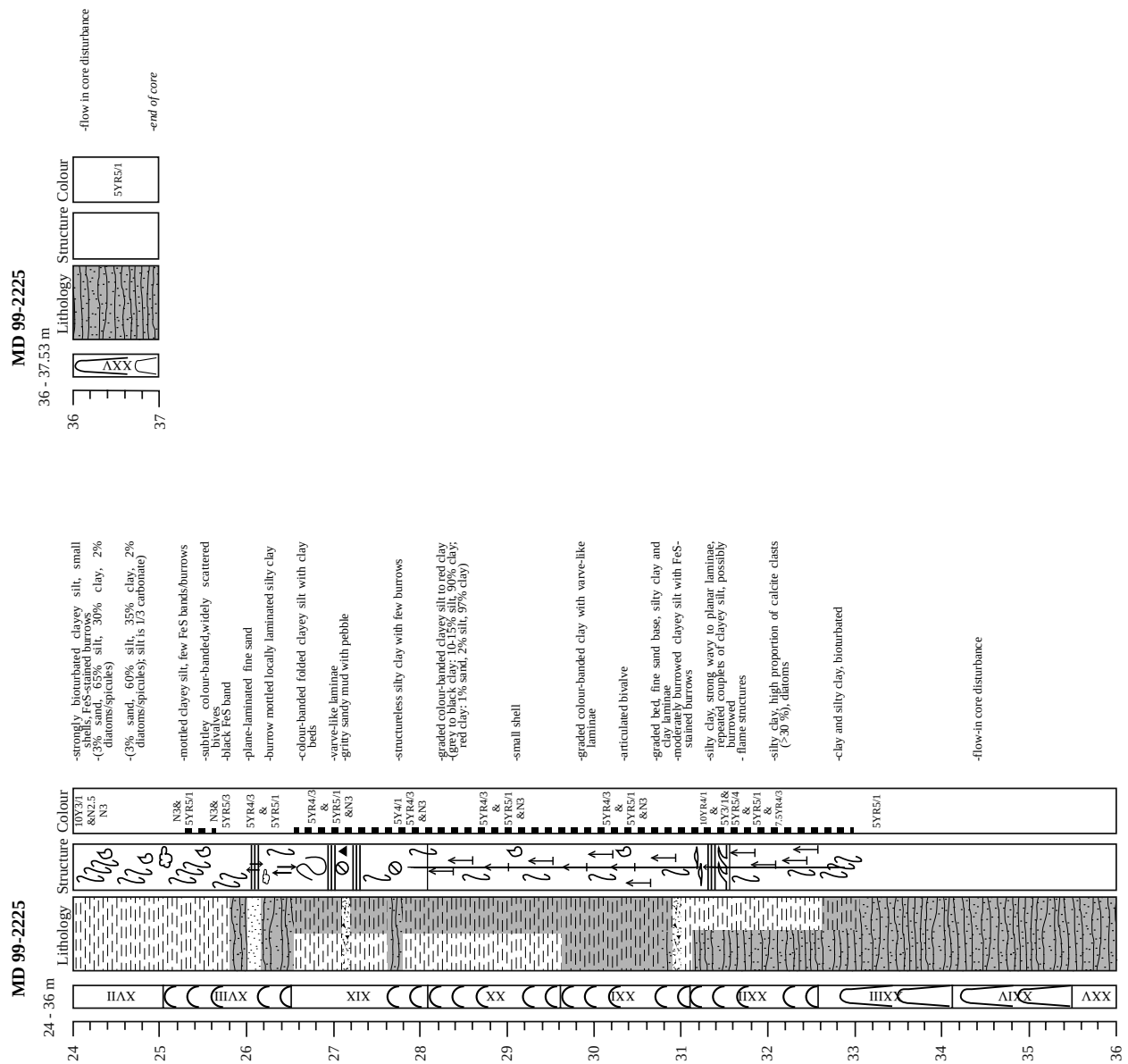
Water depth: 104 m
Date: 03 July 1999



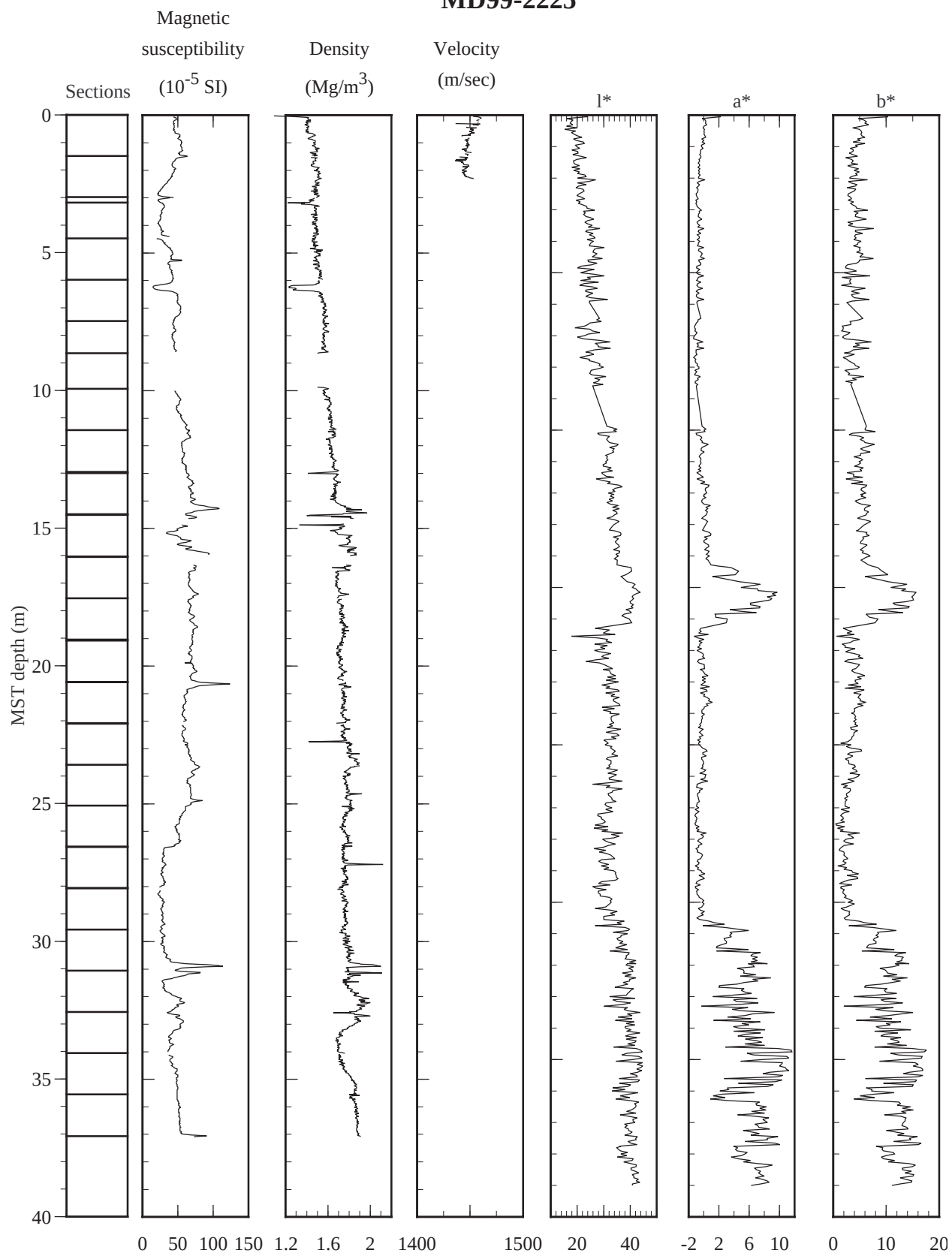
Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2225 Bay of Islands, Humber Arm (site 4; water depth 104 m)





MD99-2225



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 processing:

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 processing:

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

Rosette and CTD cast 0-200 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

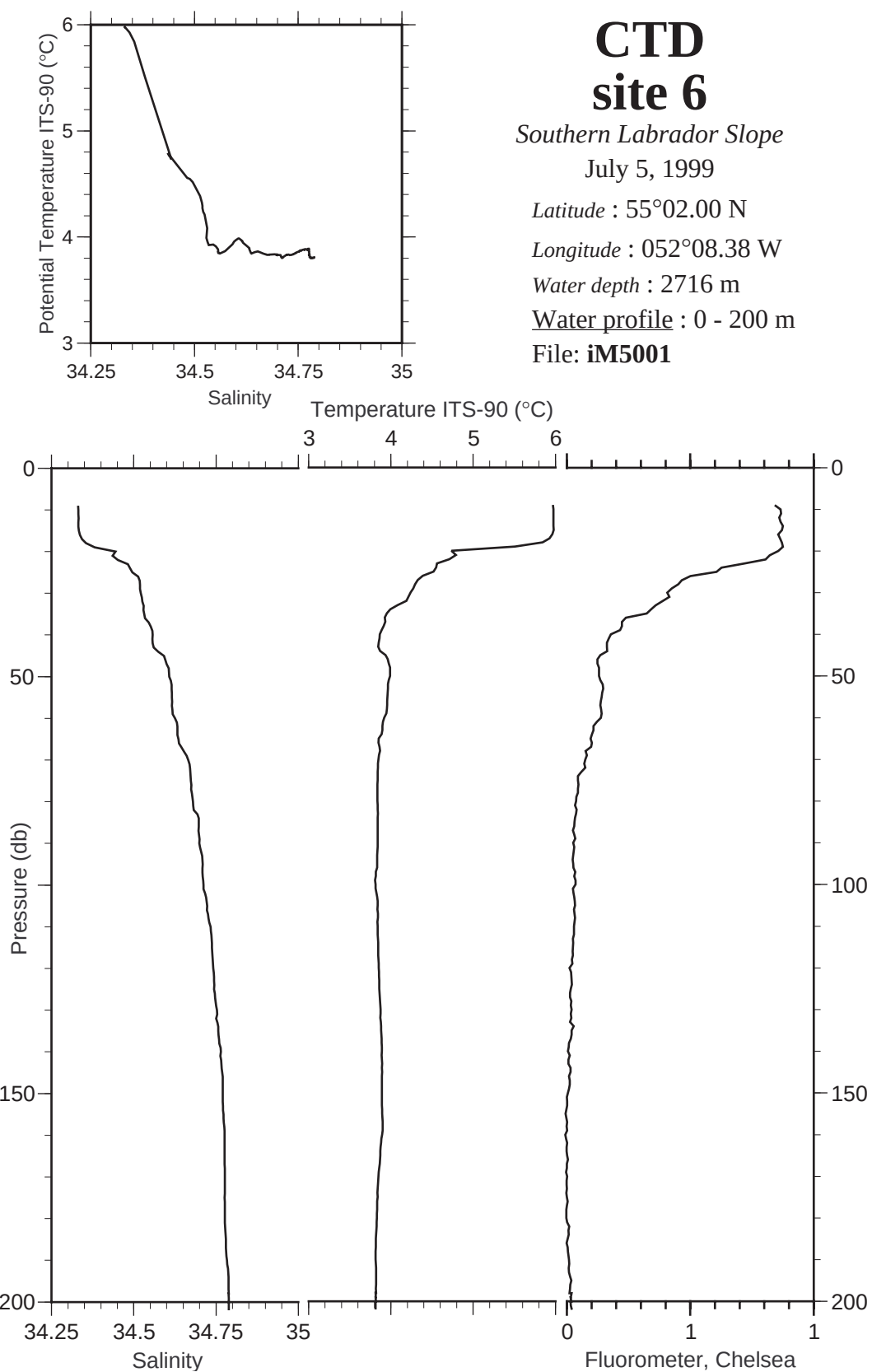
Water sampling: Twelve Niskin bottles of 12 litres allowed to recover samples of the water column at 200 m (2), 45 m (1) and 20 m (9).

Sampling

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

Summary of CTD profile

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



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 processing:

- 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 processed 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

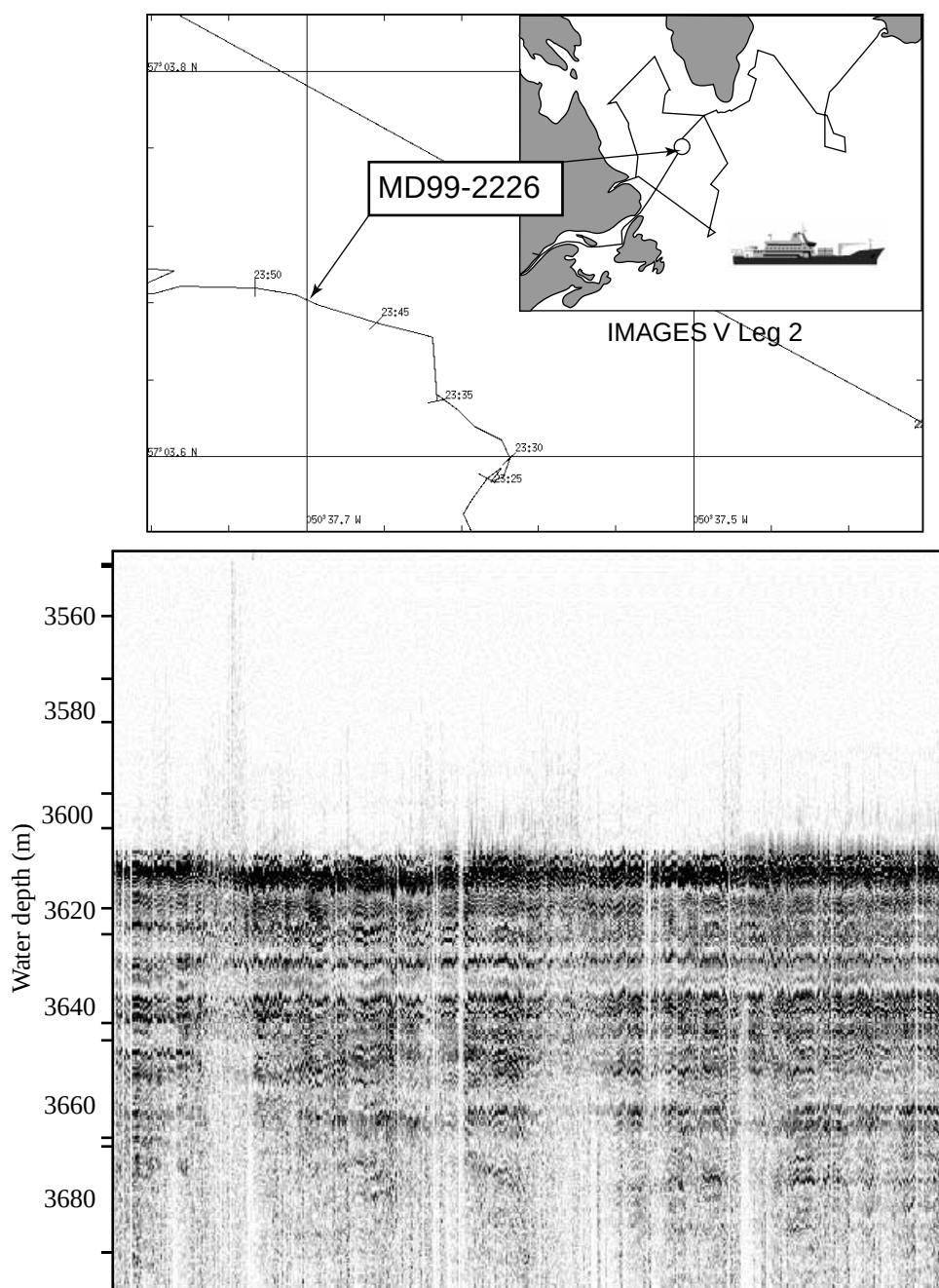
A lower unit (8.50-32.05 m) of laminated, commonly graded, centimetre-scale couplets of silt to silty clay formed of 30-80% detrital carbonate; exception is a quartzitic sand layer from 25.00-25.40 m

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/m³ with occasional intervals ranging up to 2.2 Mg/m³. P-wave velocity values range from 1440 to 1550 m/sec.

MD99-2226
Length: 32.14 m

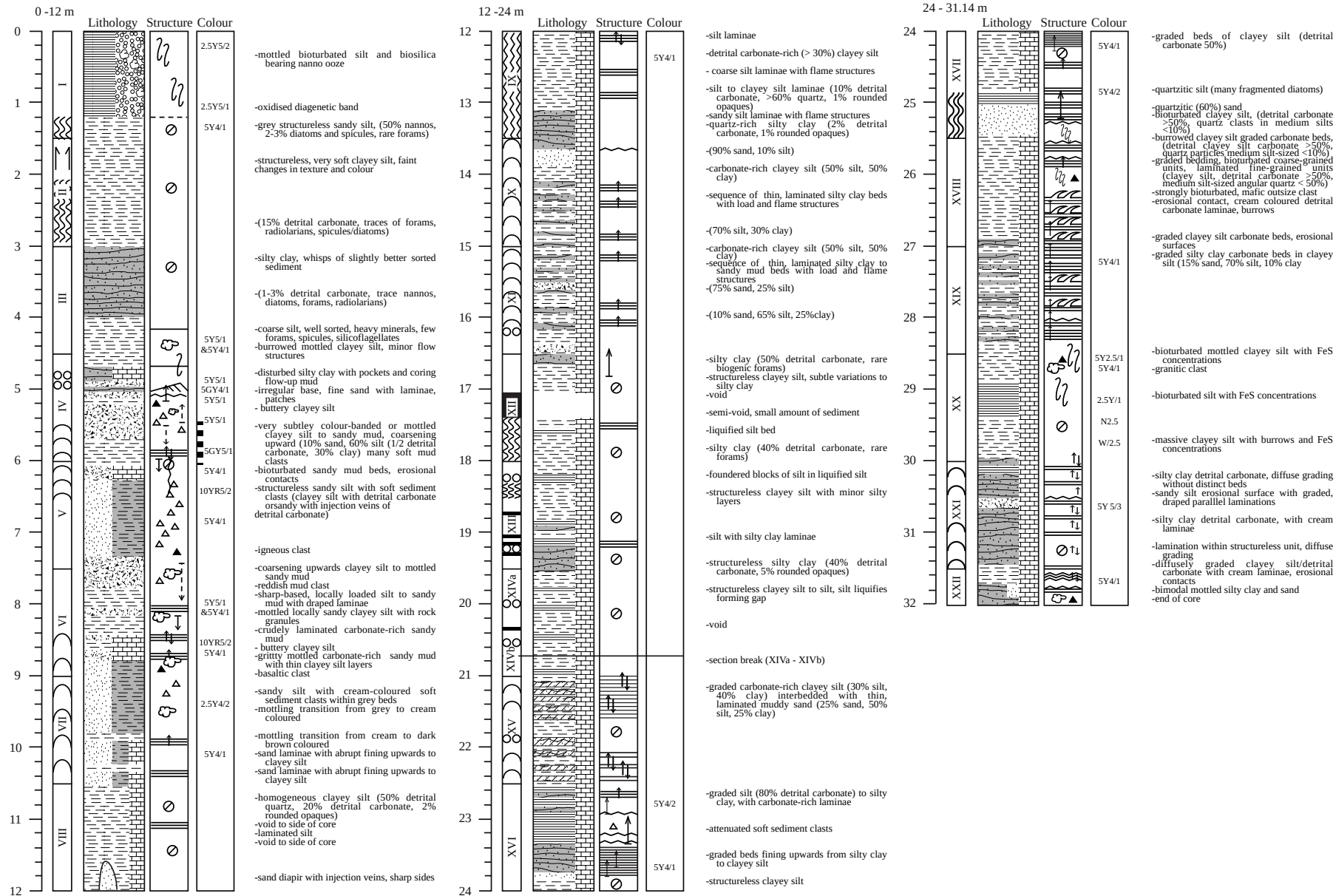
Latitude: 57°03'71 N
Longitude: 050°37'70 W

Water depth: 3580 m
Date: 05 July 1999

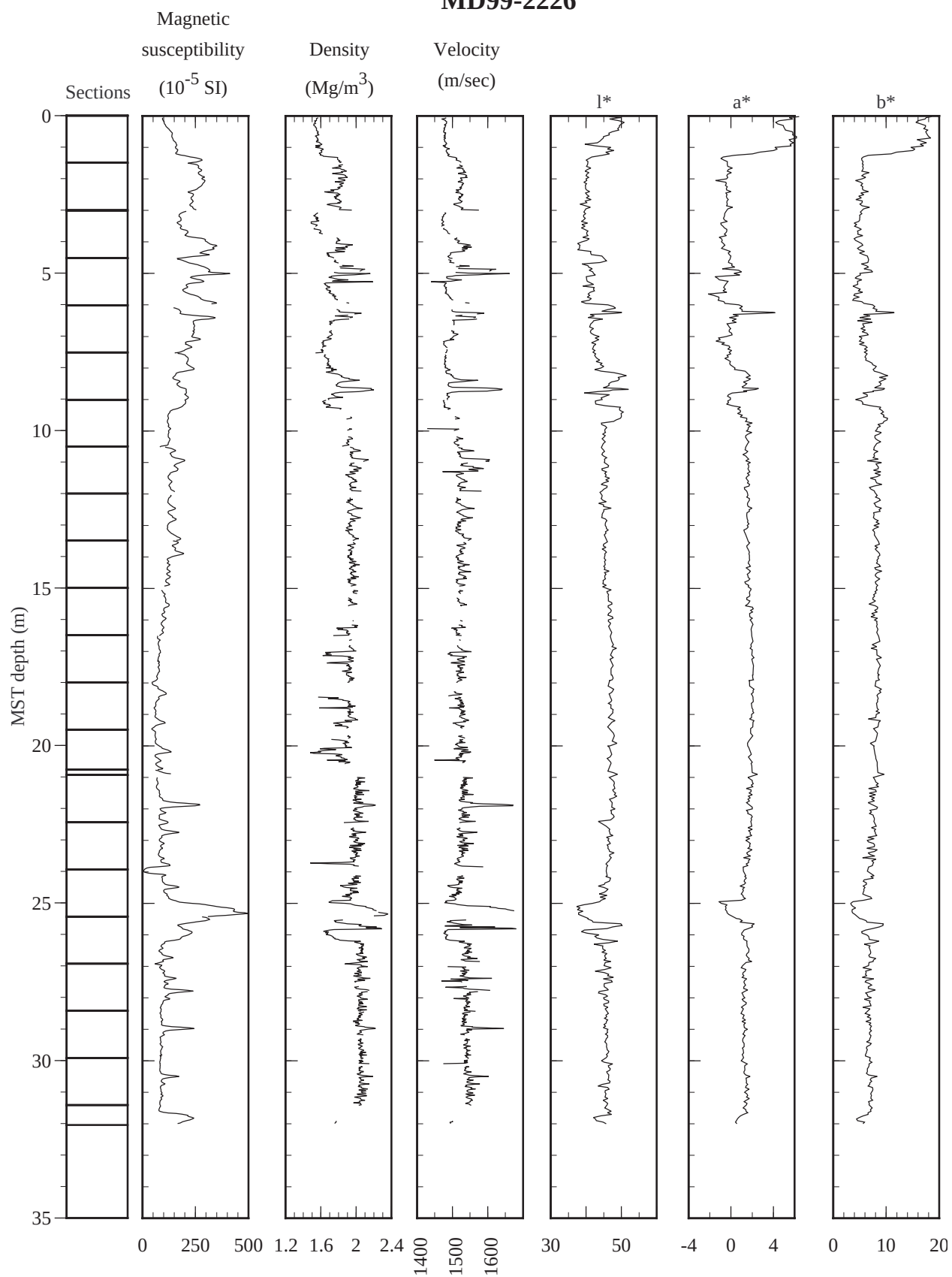


Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2226 NAMOC Levee Crest (site 7; water depth 3580 m)



MD99-2226



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 processing:

- U-channels were taken on every sections and will be processed at GEOTOP after they have been measured at UCD.
- Both the archive and working halves will be processed at GEOTOP.
- Several bags of sediments were recovered: 1 core 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 processed 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 processed 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/m³ with occasional density spikes of 1.9 to 2.3 Mg/m³. P-wave velocities range from about 1465 to 1485 m/sec with distinct peaks of up to 1600 m/sec.

MD99-2227

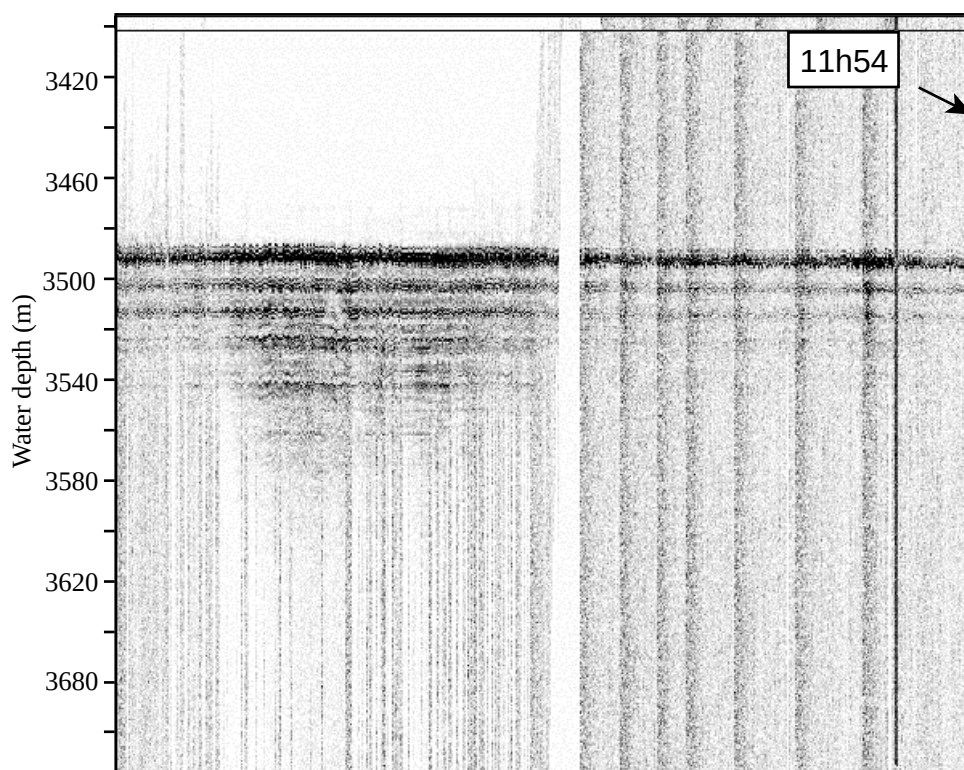
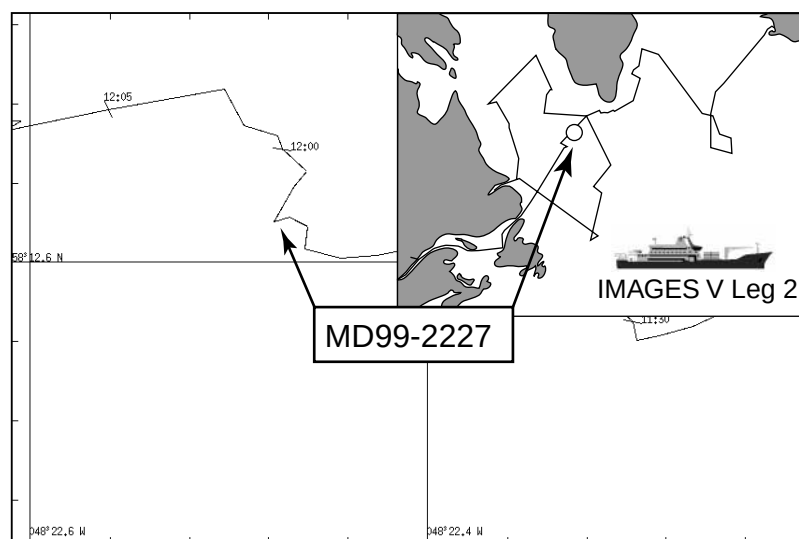
Latitude: 58°12'64 N

Water depth: 3460 m

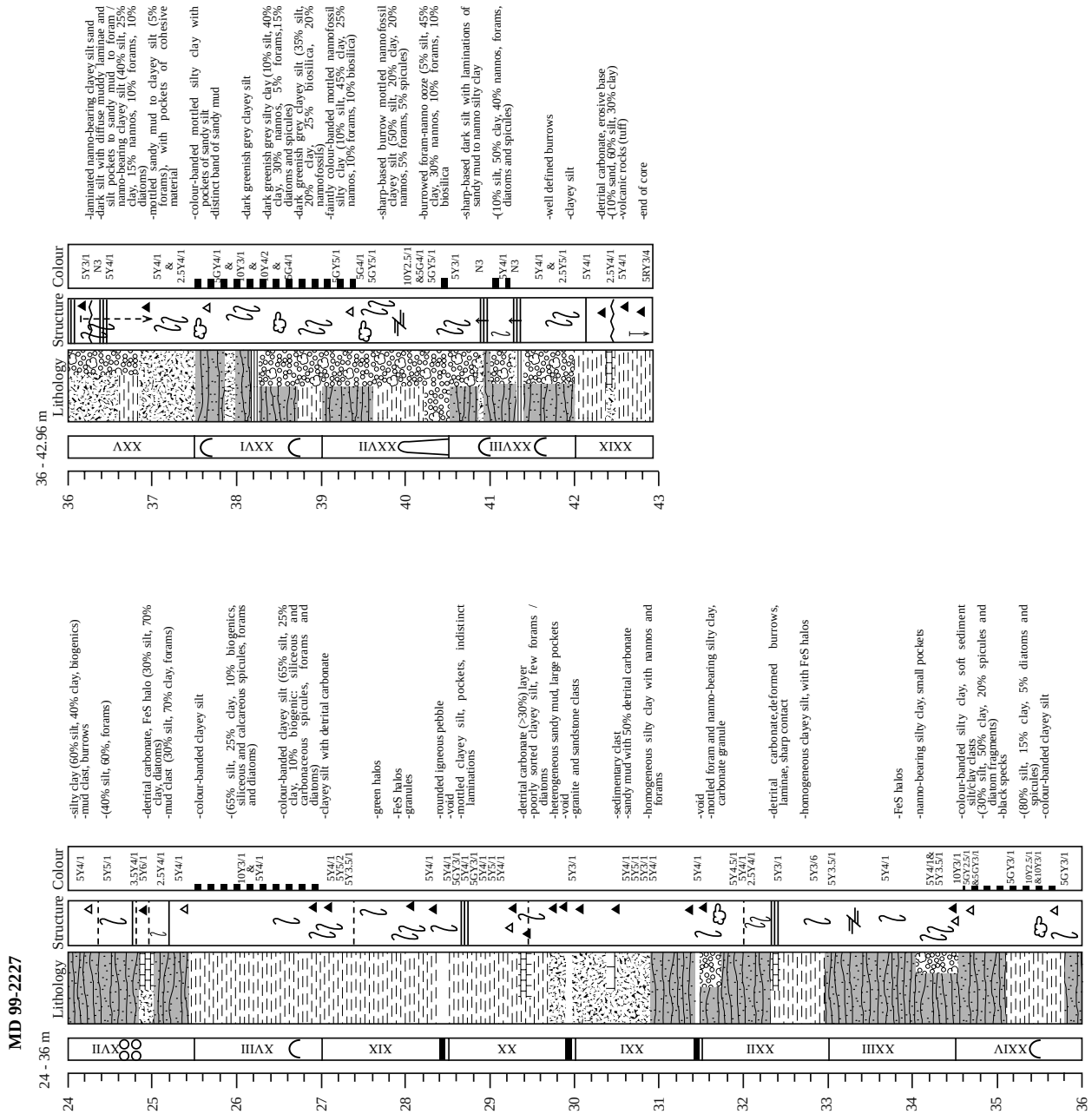
Length: 42.96 m

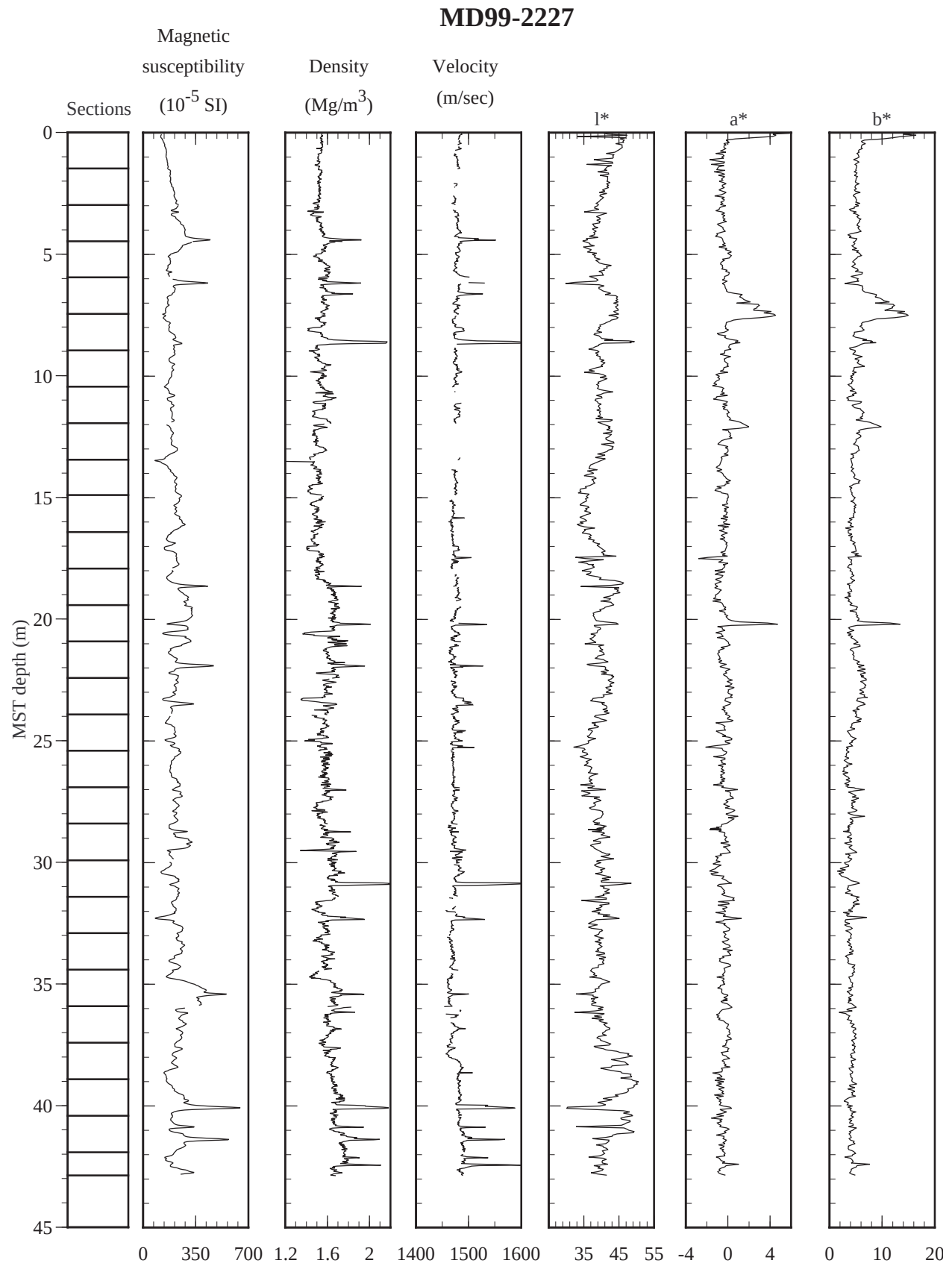
Longitude: 048°22'32 W

Date: 06 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)





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 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 processing:

- U-channels were taken on every section, they will be processed at Gif-sur-Yvette.
- Both working and archive halves will be processed at GEOTOP.
- One sample per section was taken with a paleomagnetic cube in the first 14 sections of the core. The cubes will be processed 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

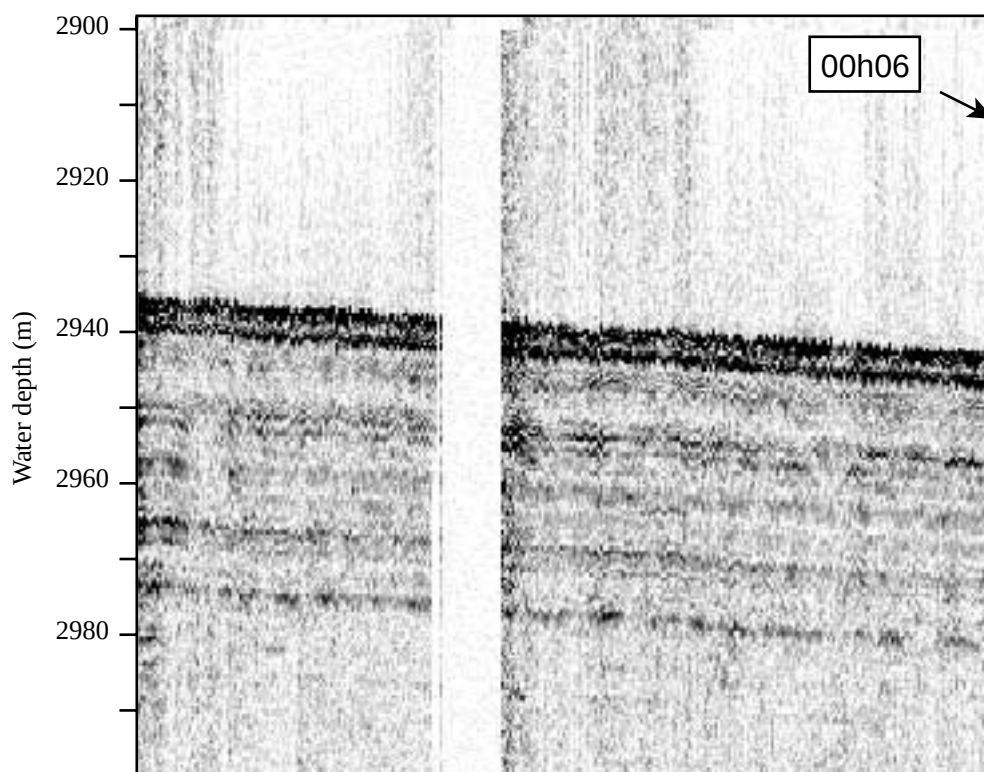
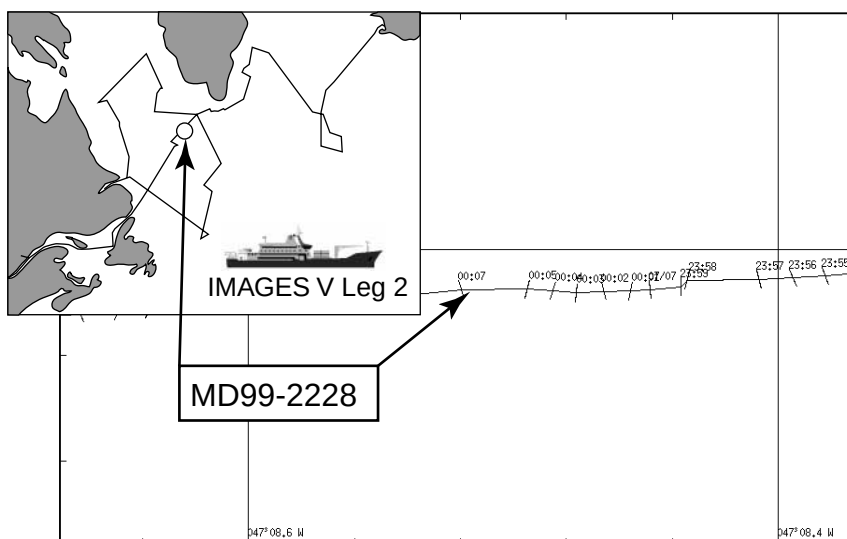
Except for faint colour banding and two sandy layers (one rich in detrital carbonate and the other in siliciclastic detritus), the core consists of structureless silty clay, clayey silt, and sandy mud containing scattered bedrock clasts and soft mudclasts. Biogenic silica skeletons (diatoms and spicules) 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/m³ with occasional values of greater than 1.8 Mg/m³. Generally very consistent P-wave velocities are observed ranging from about 1460 to 1475 m/sec with occasional values greater than 1500 m/sec.

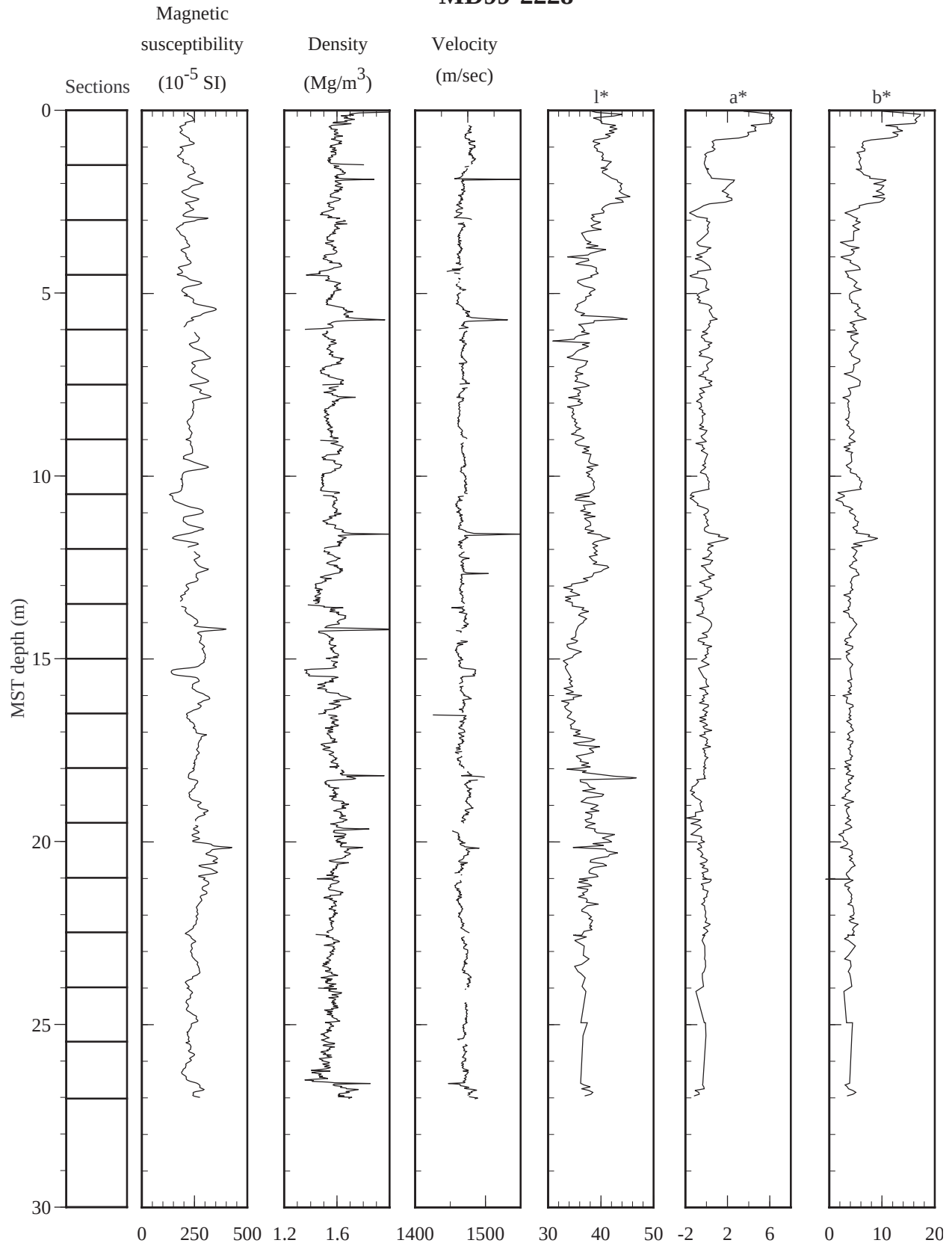
MD99-2228
Length: 27.06 m

Latitude: 58°55'59 N
Longitude: 047°80'45 W

Water depth: 2900 m
Date: 07 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2228

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

Rosette and CTD cast 0 - 200 m

Observations

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

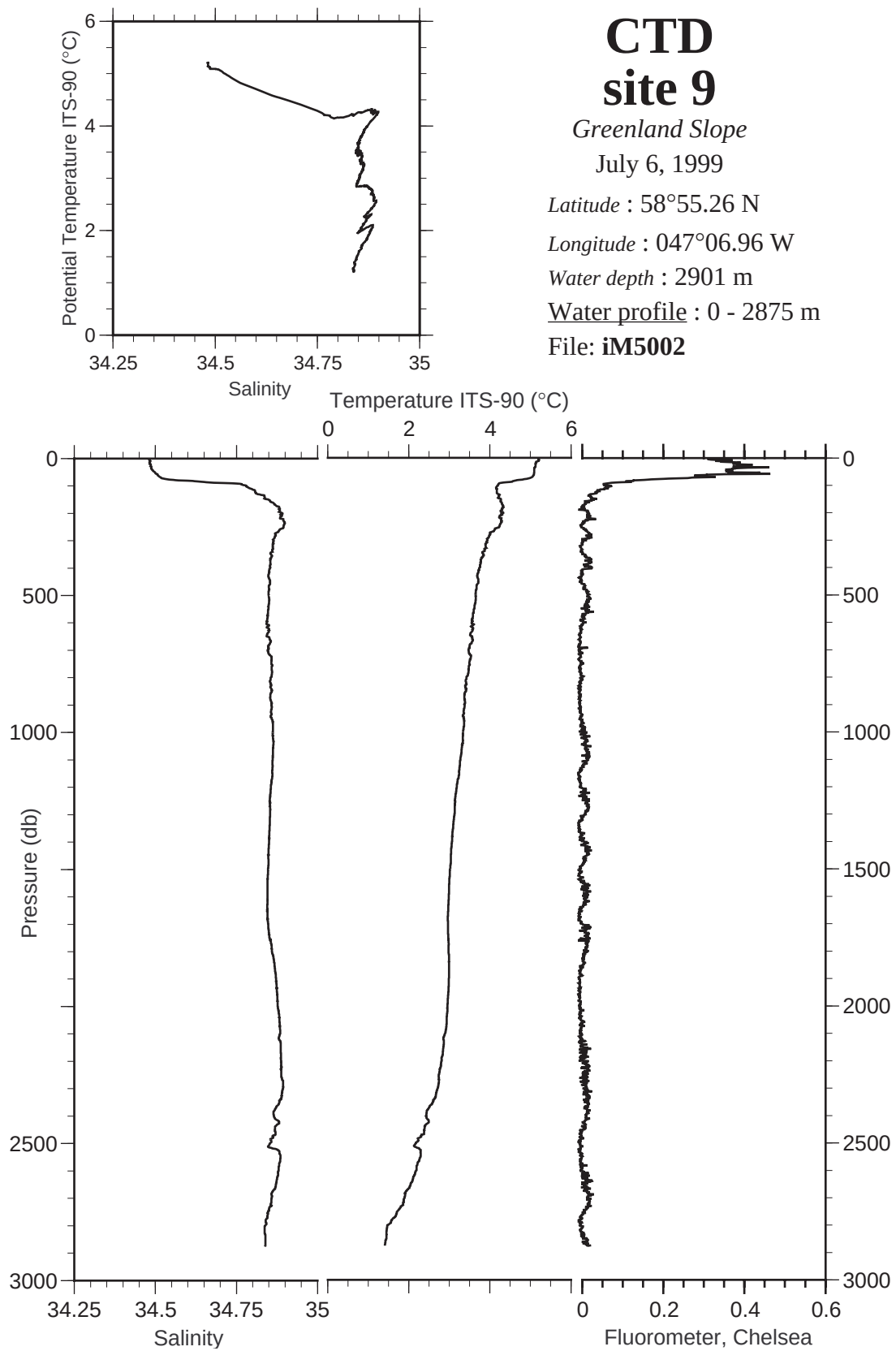
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 50 m and 30 m.

Sampling

The water samples will be analysed for alkenone.

Summary of CTD profile

- The surface water temperature was 5.10°C.



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

Rosette and CTD cast 0 - 2874 m

Observations

CTD ee: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), 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

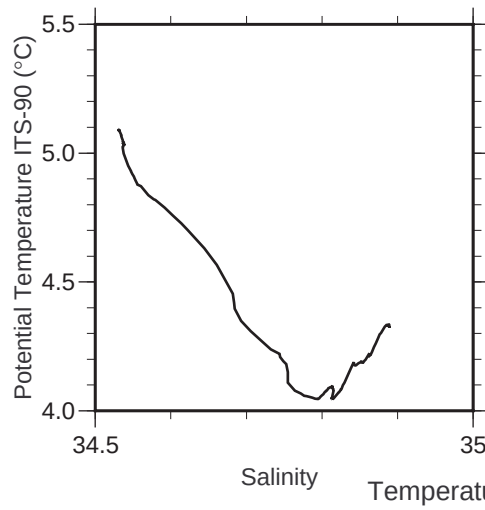
- The water samples will be analysed for Iodine 129, Neodinium (Nd) and salinity (for CTD calibration).

Summary of CTD profile

- Because of mechanical problems the winch stopped while going down. The profile was therefore made in two parts.

- A pinger was used to locate the rosette at all time and the profile stopped at 30 m from the bottom.

- The surface water temperature was 5.20°C.



CTD site 9

Greenland Slope

July 6, 1999

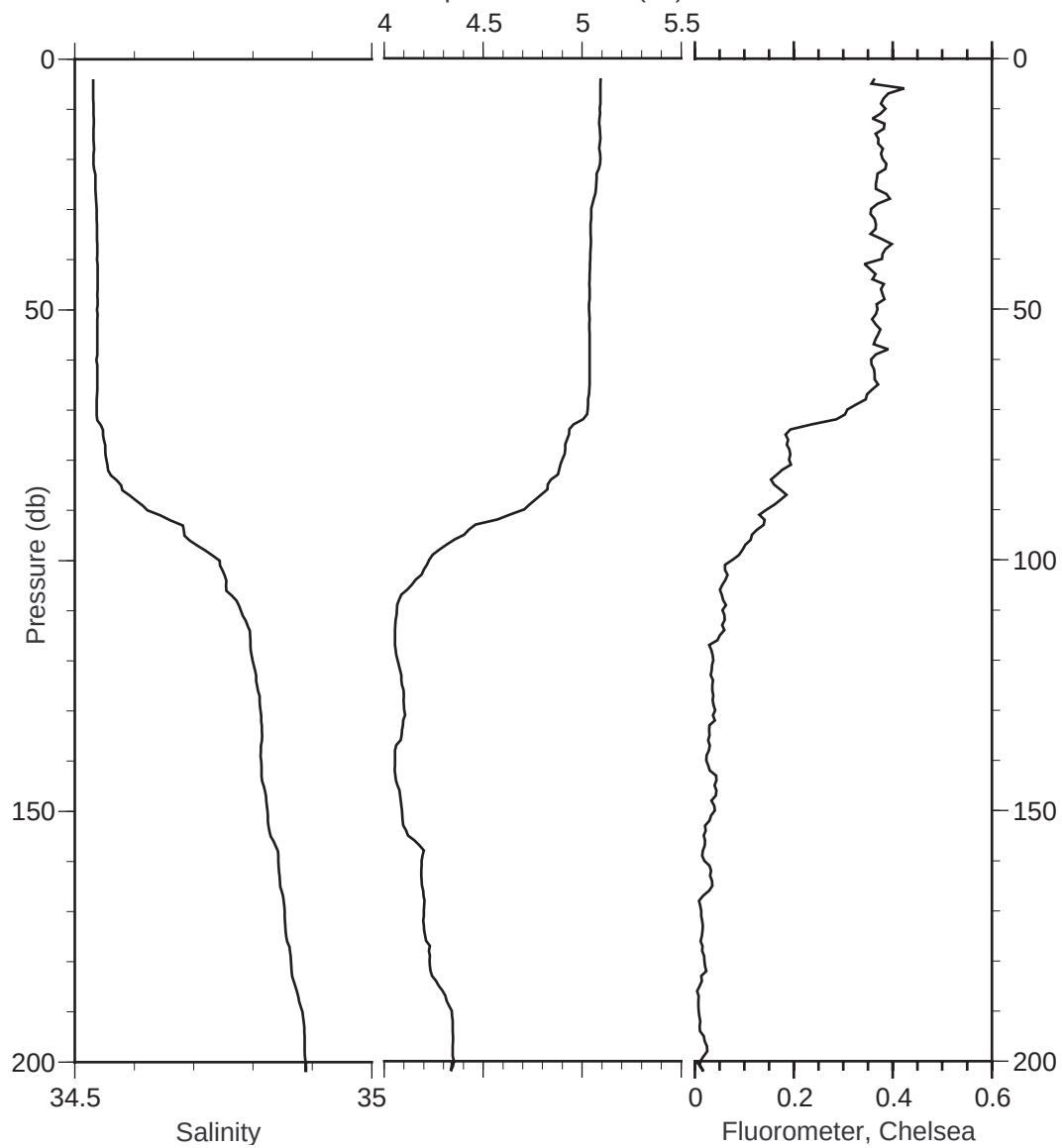
Latitude : 58°55.81 N

Longitude : 047°10.53 W

Water depth : 2900 m

Water profile : 0 - 200 m

File: **iM5003**



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 processing:

- The core was not split onboard. Every section was waxed at both end to avoid oxydation of organic matter. The core will be processed 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.

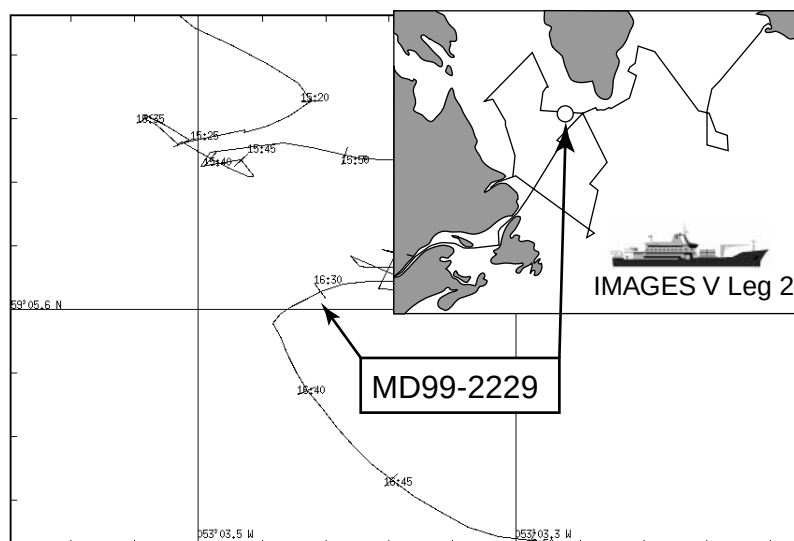
This core is characterized by thick intervals of structureless (except colour banding) clayey silt and silty clay, interbedded with sandier intervals showing successions tens of centimetres thick of sharp-based structureless sandy mud, laminated very fine sand to silt, and bioturbated clayey silt. Some 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/m³ interspersed with low density intervals of less than 1.6 Mg/m³. 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.

MD99-2229
Length: 36.28 m

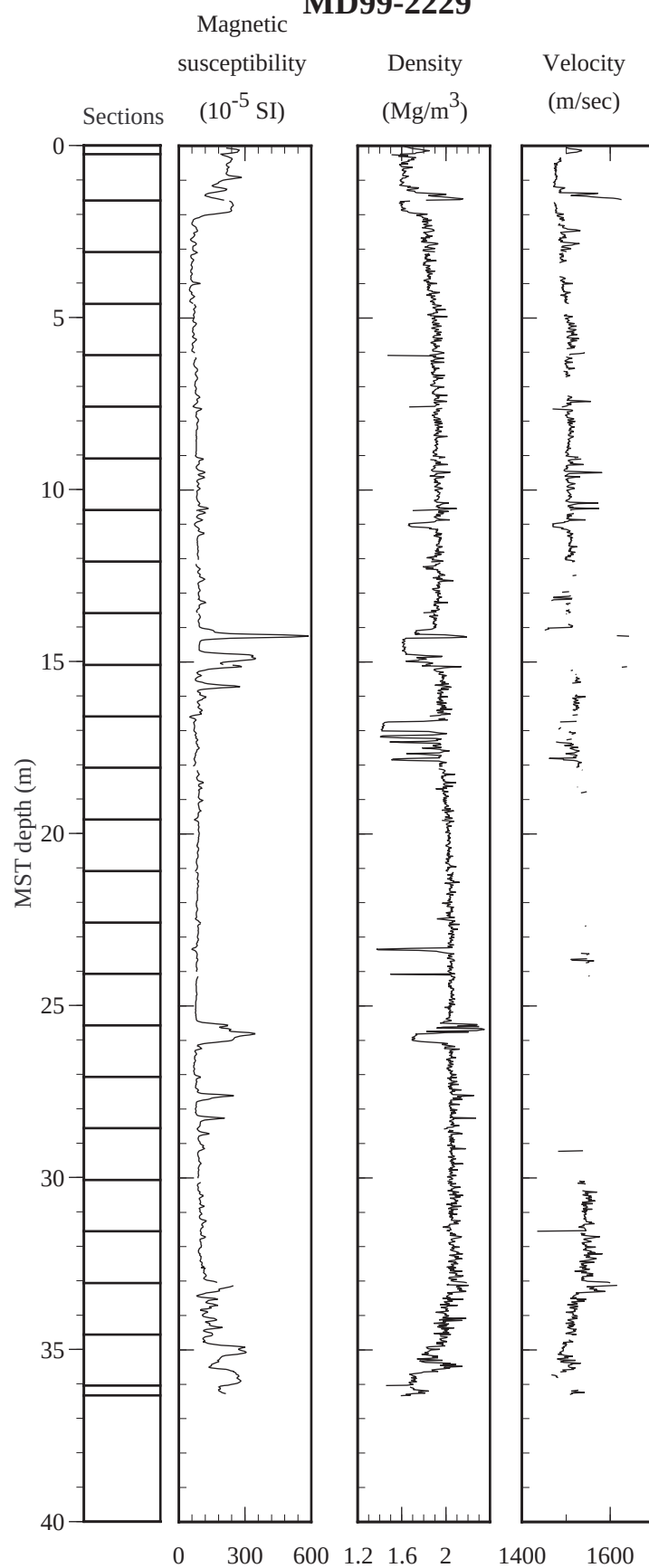
Latitude: 59°05'62 N
Longitude: 053°03'38 W

Water depth: 3400 m
Date: 07 July 1999



PROFILE
UNAVAILABLE

Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2229

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 processing:

- The core was split onboard and described. No sampling was done, both archive and working halves will be processed 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 processed 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 striking colour changes, several sharp to erosional bed bases, graded bedding from sand or sandy mud to clay, and burrow mottling at bed tops.

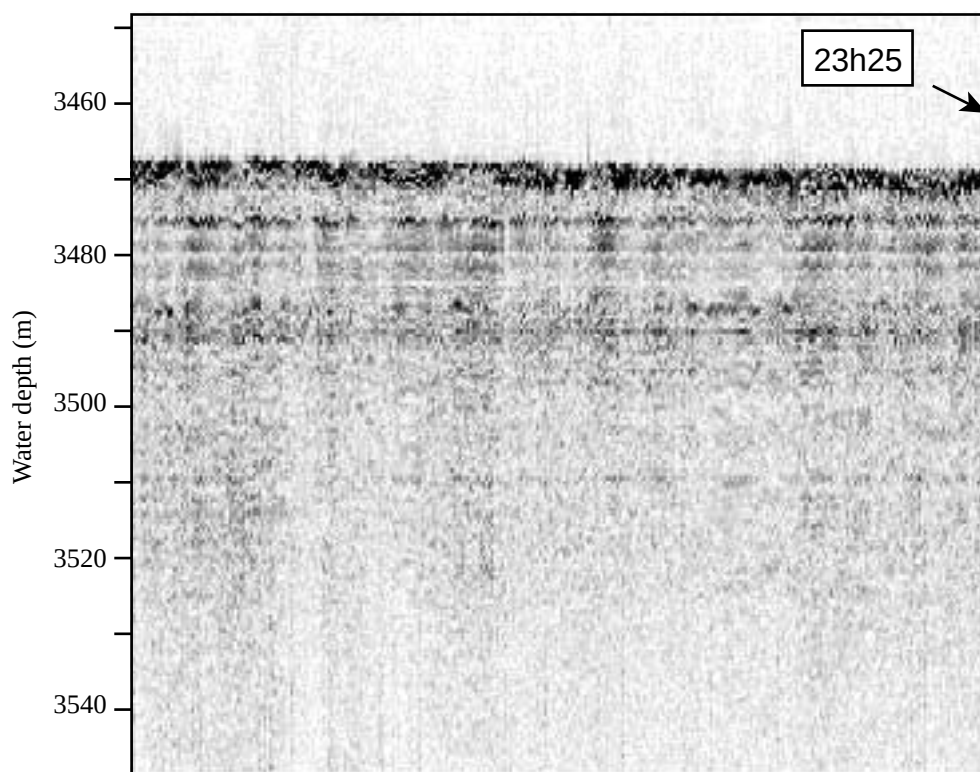
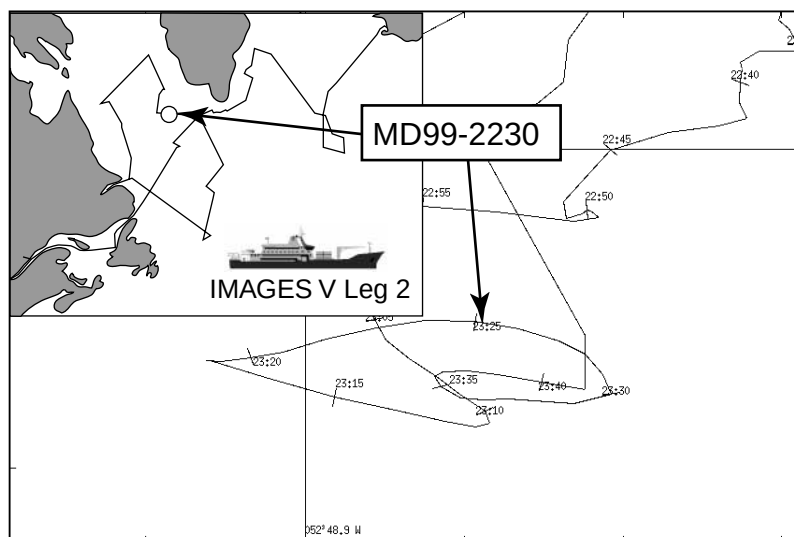
MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values occur in two modes those that vary from 50 to 150 x 10⁻⁵ SI and those varying from 100 to 400 x 10⁻⁵ SI. Bulk density values also show 2 modes, one ranging from 1.85 to 2.0 Mg/m³ and one from 1.5 to 1.7 Mg/m³. 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 I* 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.

MD99-2230
Length: 34.76 m

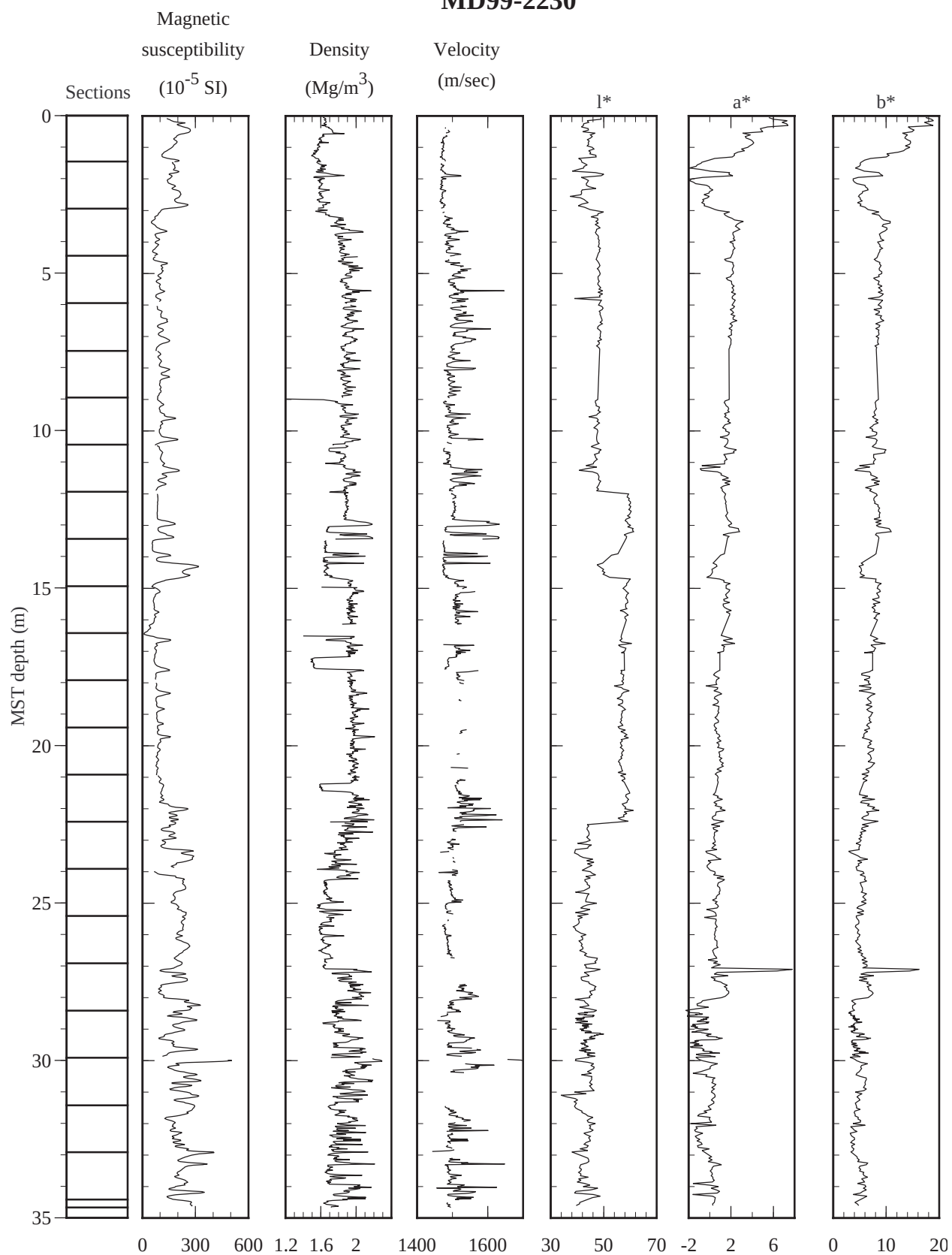
Latitude: 59°05'35 N
Longitude: 052°42'24 W

Water depth: 3400 m
Date: 07 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2230



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 processing:

- The core was split onboard and described. No sampling was done, both archive and working halves will be processed 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 processed 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.

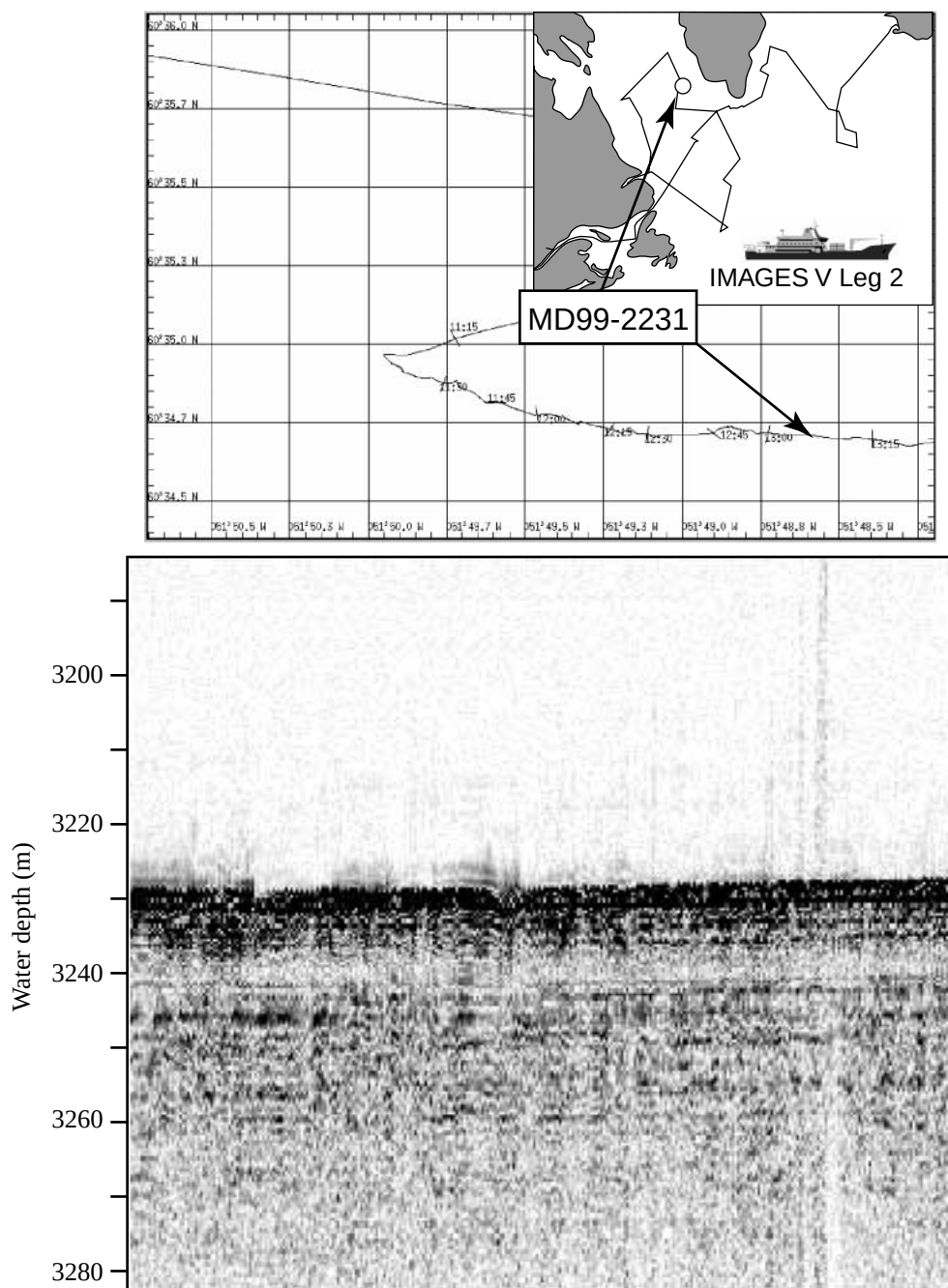
This core is characterized by thick intervals of structureless (except colour banding) clayey silt and silty clay, interbedded with sandier intervals showing successions tens of centimetres thick of sharp-based structureless sandy mud, laminated very fine sand to silt, and bioturbated clayey silt. Most 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/m³ and p-wave velocity values range from about 1500 to 1750 m/sec.

MD99-2231
Length: 34.29 m

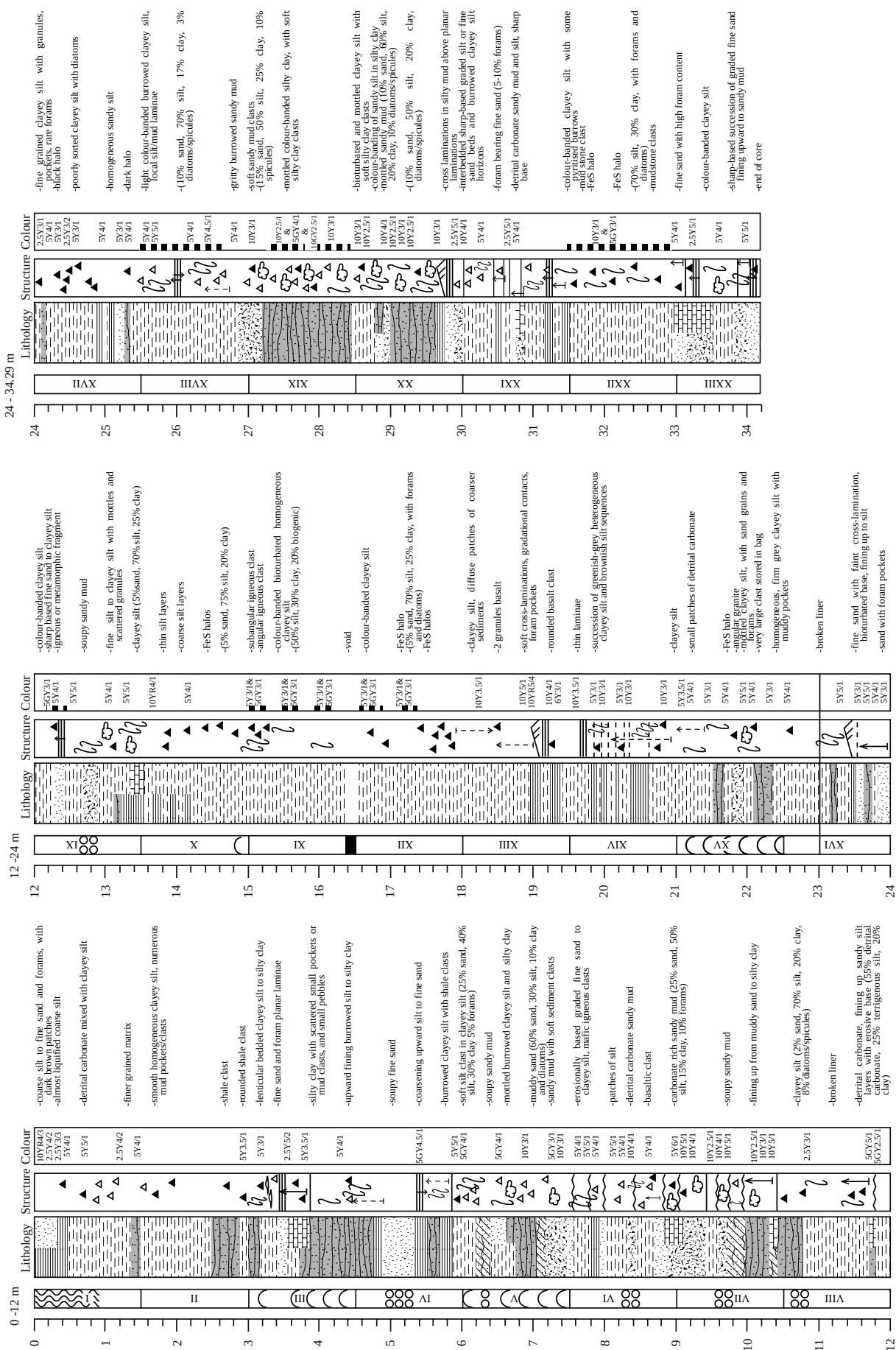
Latitude: 60°34'72 N
Longitude: 051°48'49 W

Water depth: 3190 m
Date: 08 July 1999

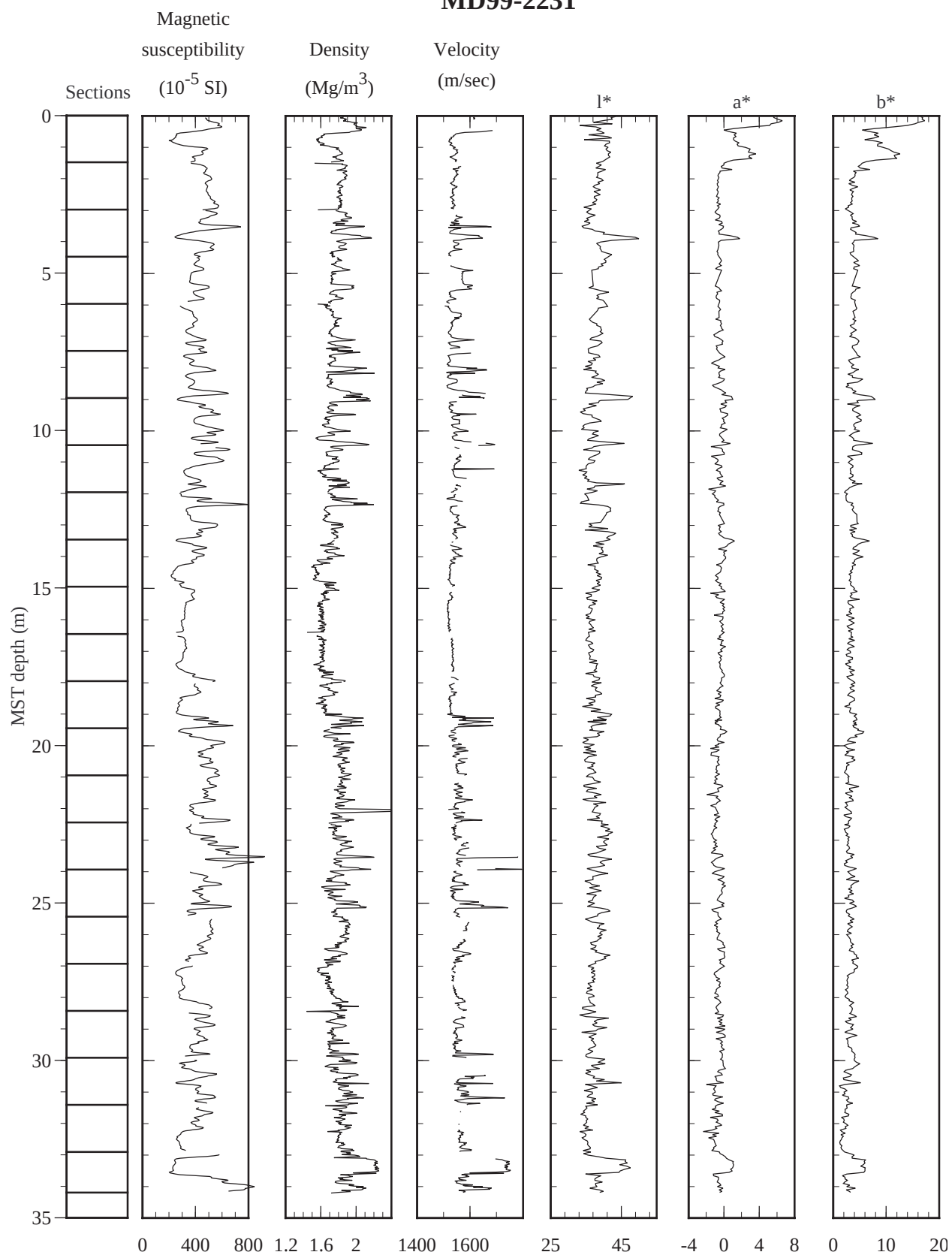


Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2231 SW Greenland Rise (site 12; water depth 3190 m)



MD99-2231



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 processing:

- 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 processed at Gif-sur-Yvette.
- Several 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

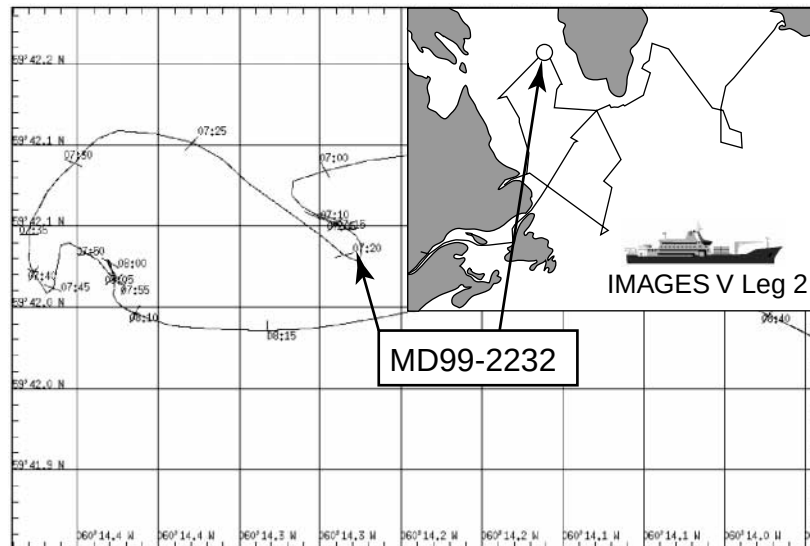
This core is very disturbed throughout and consists of apparently structureless silty clay, clayey silt, and sandy mud.

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/m³. P-wave velocity was measured for most of the core and values range from about 1475 to 1530 m/sec.

MD99-2232
Length: 30.32 m

Latitude: 62°38'99 N
Longitude: 053°53'98 W

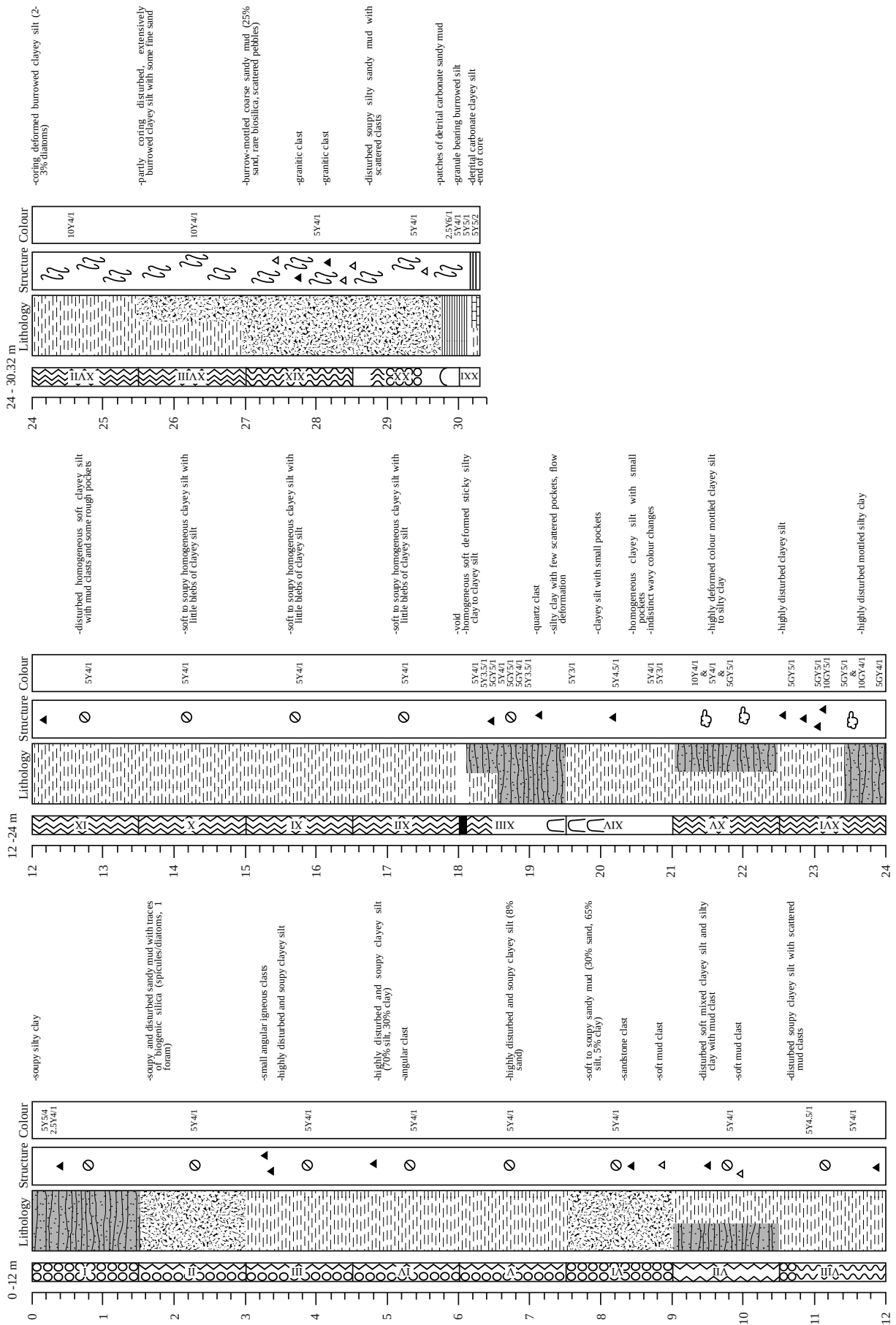
Water depth: 2455 m
Date: 09 July 1999



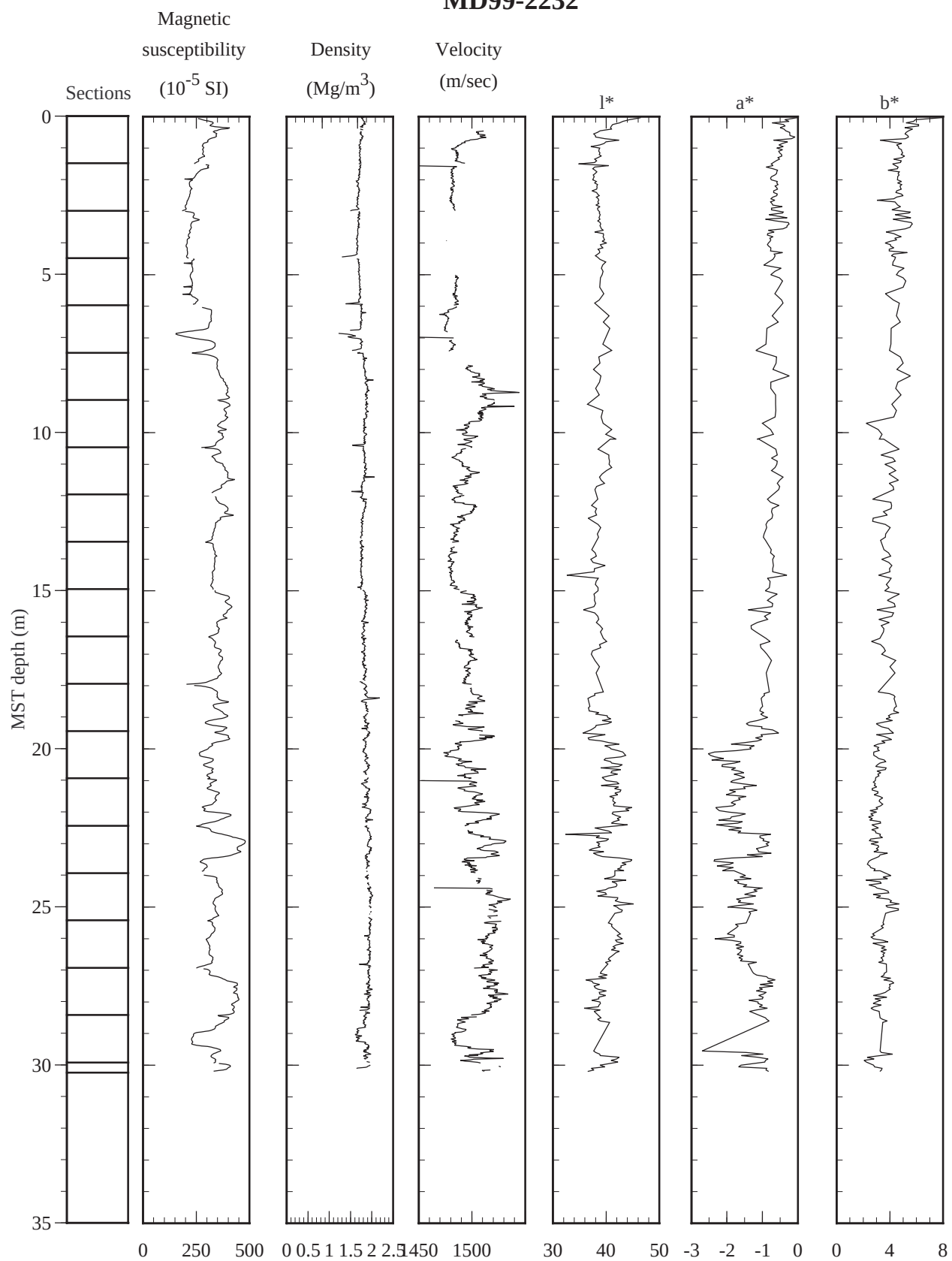
PROFILE
UNAVAILABLE

Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2232 SW Greenland Rise (site 13; water depth 2455 m)



MD99-2232



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

Rosette and CTD cast 0 - 200 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

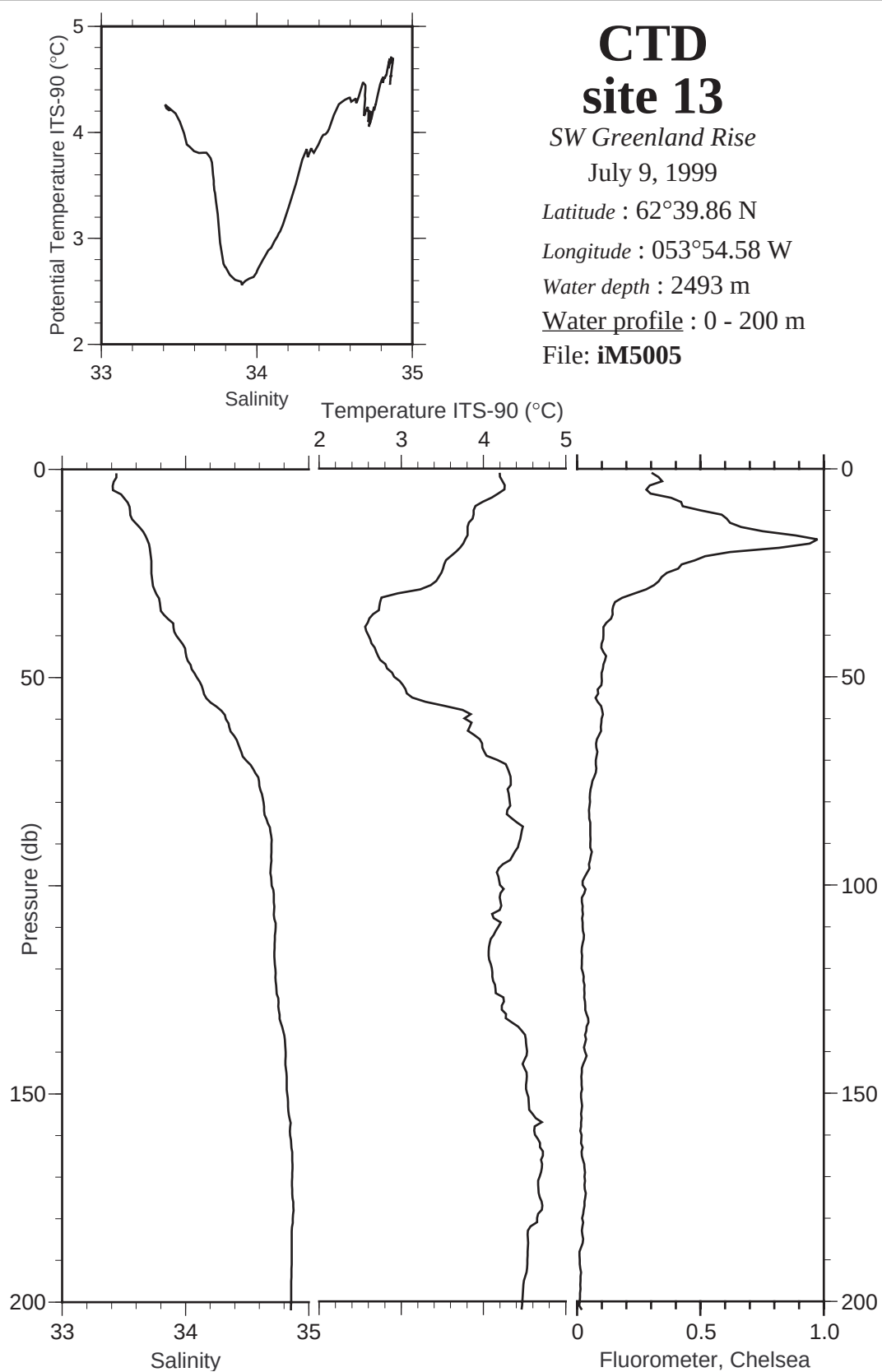
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 15 m (maximum fluorescence) and below the surface.

Sampling

The water samples will be analysed for alkenone.

Summary of CTD profile

- The surface water temperature was 4.22°C.



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

Rosette and CTD cast 0 - 2431 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

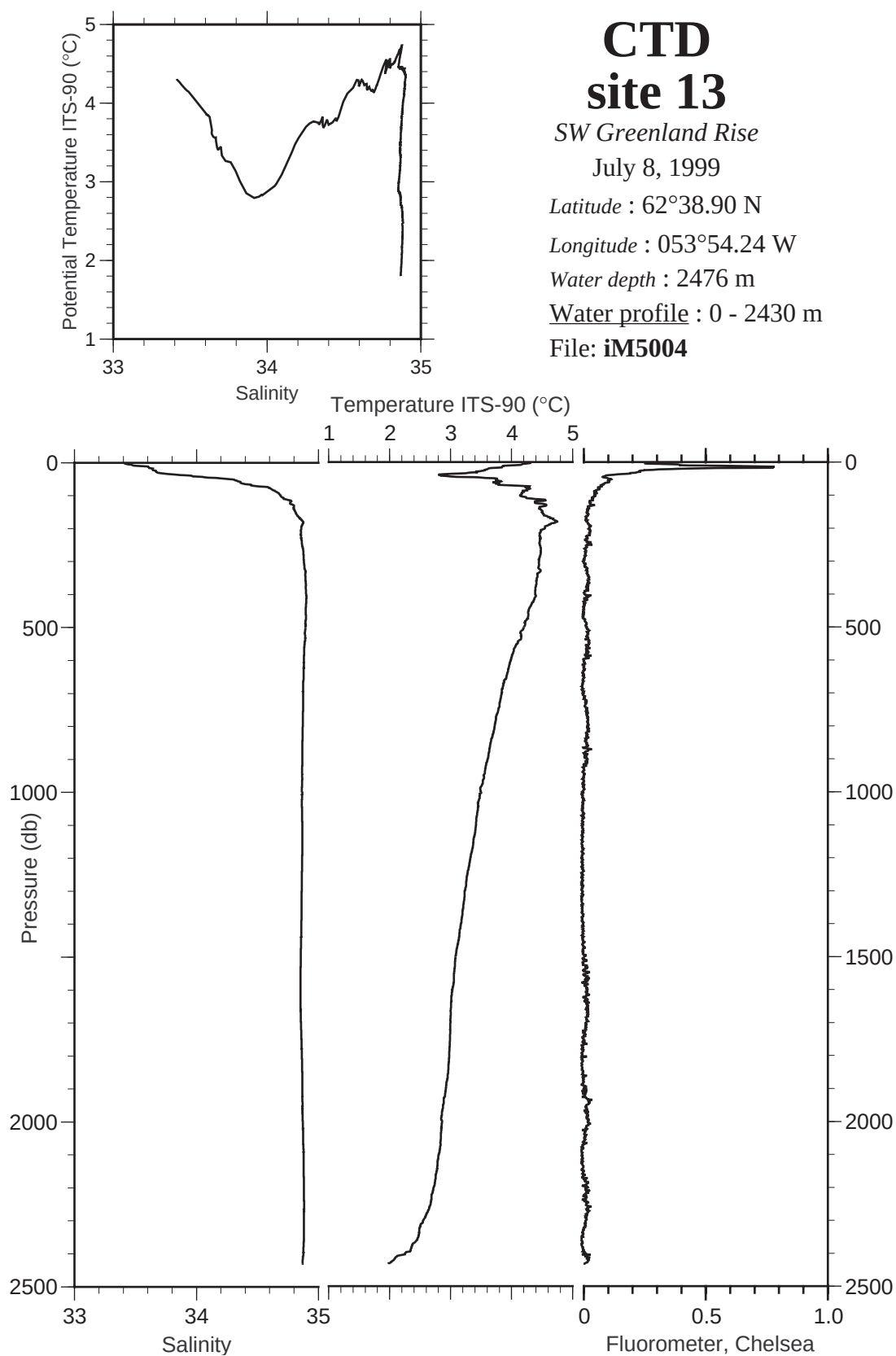
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 2430 m, 2250 m, 1950 m, 1700 m, 1000 m, 400 m, 180 m, 40 m, 15 m.

Sampling

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

Summary of CTD profile

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



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 barrels was broken near the weight, several barrels were lost.

Core condition: No core.

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 processing:

- The core was split and described onboard, no sampling was done. The core will be processed at AGC-BIO.
- Several samples were recovered: 1 top, core cutter, 1 core catcher, 1 from top of section V. These bags will be processed 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/m³. P-wave velocity was measured for most of the core and values range from about 1450 to 1700 m/sec.

MD99-2233

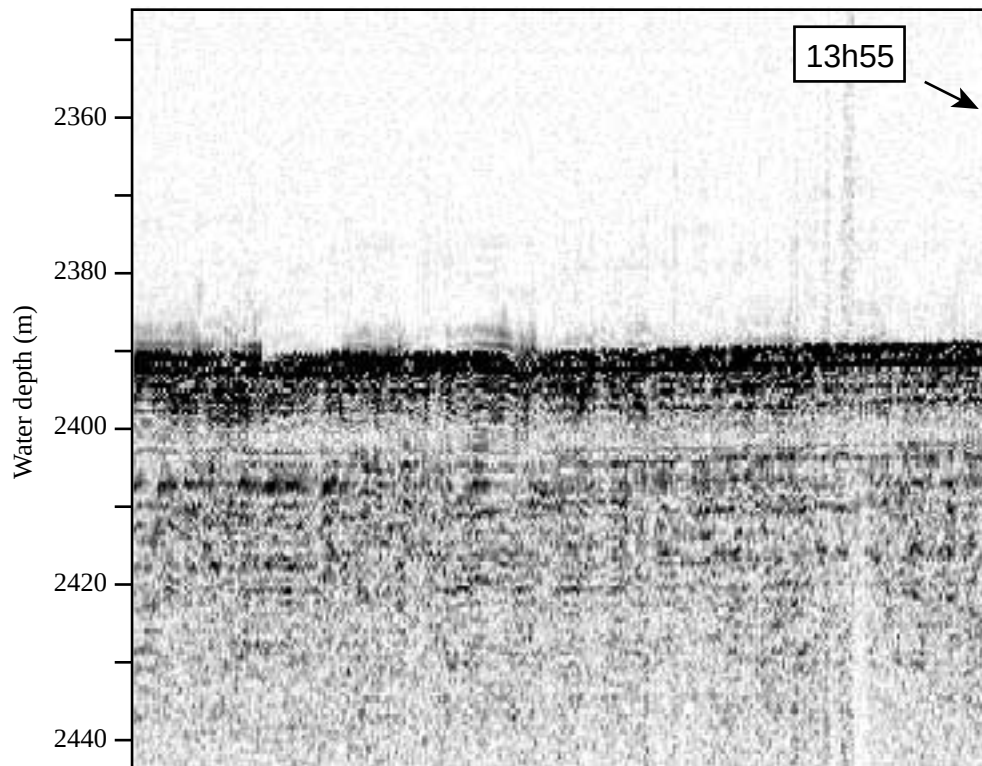
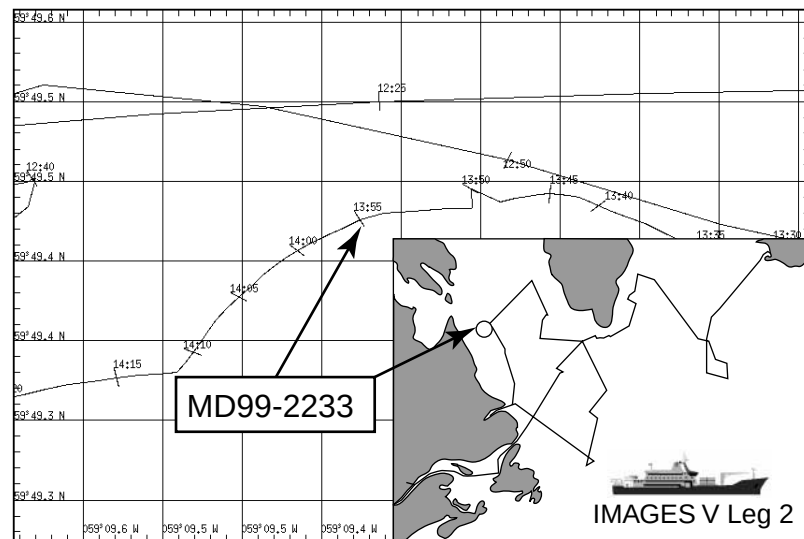
Latitude: 59°49'46 N

Water depth: 2350 m

Length: 24.62 m

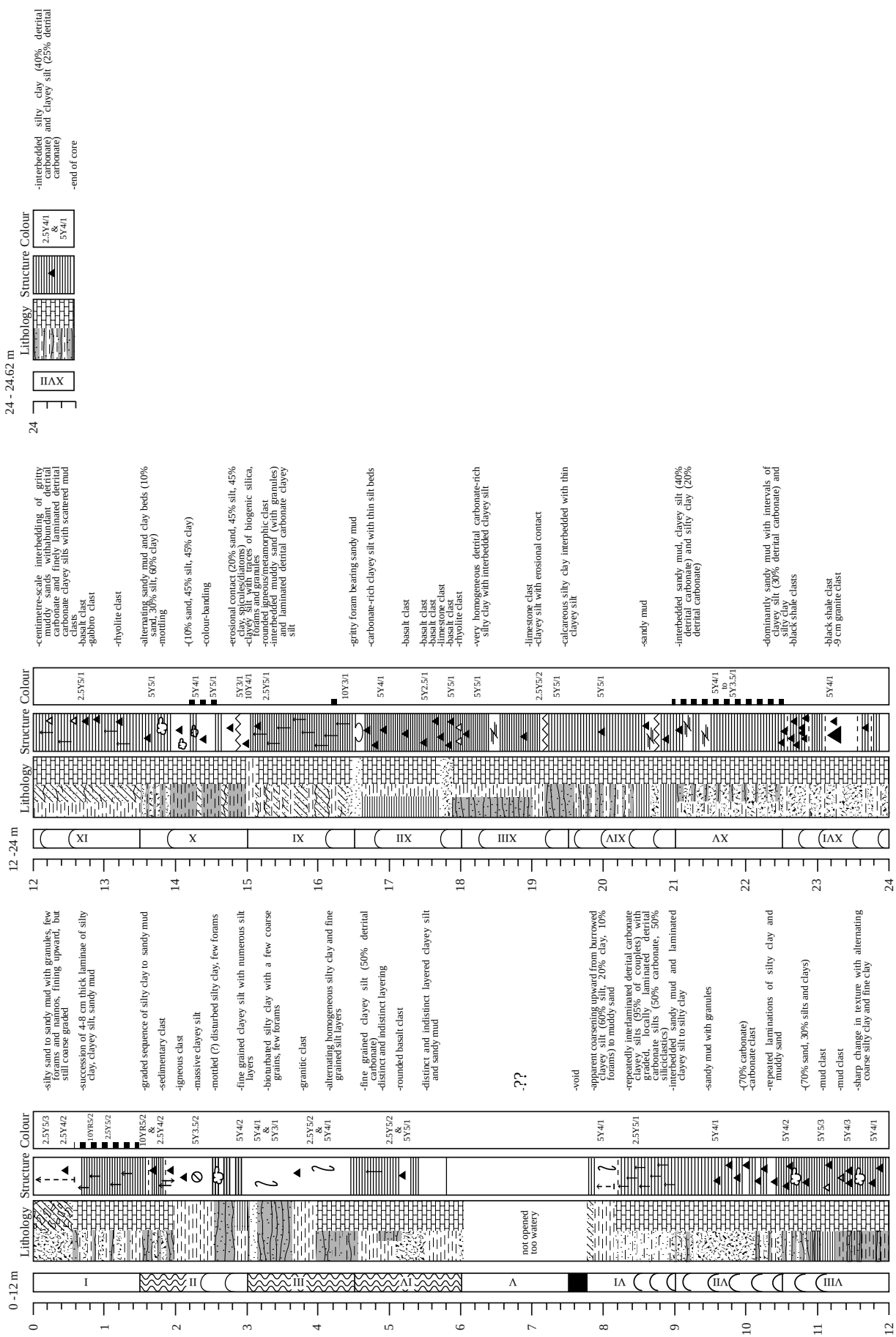
Longitude: 059°09'35 W

Date: 10 July 1999

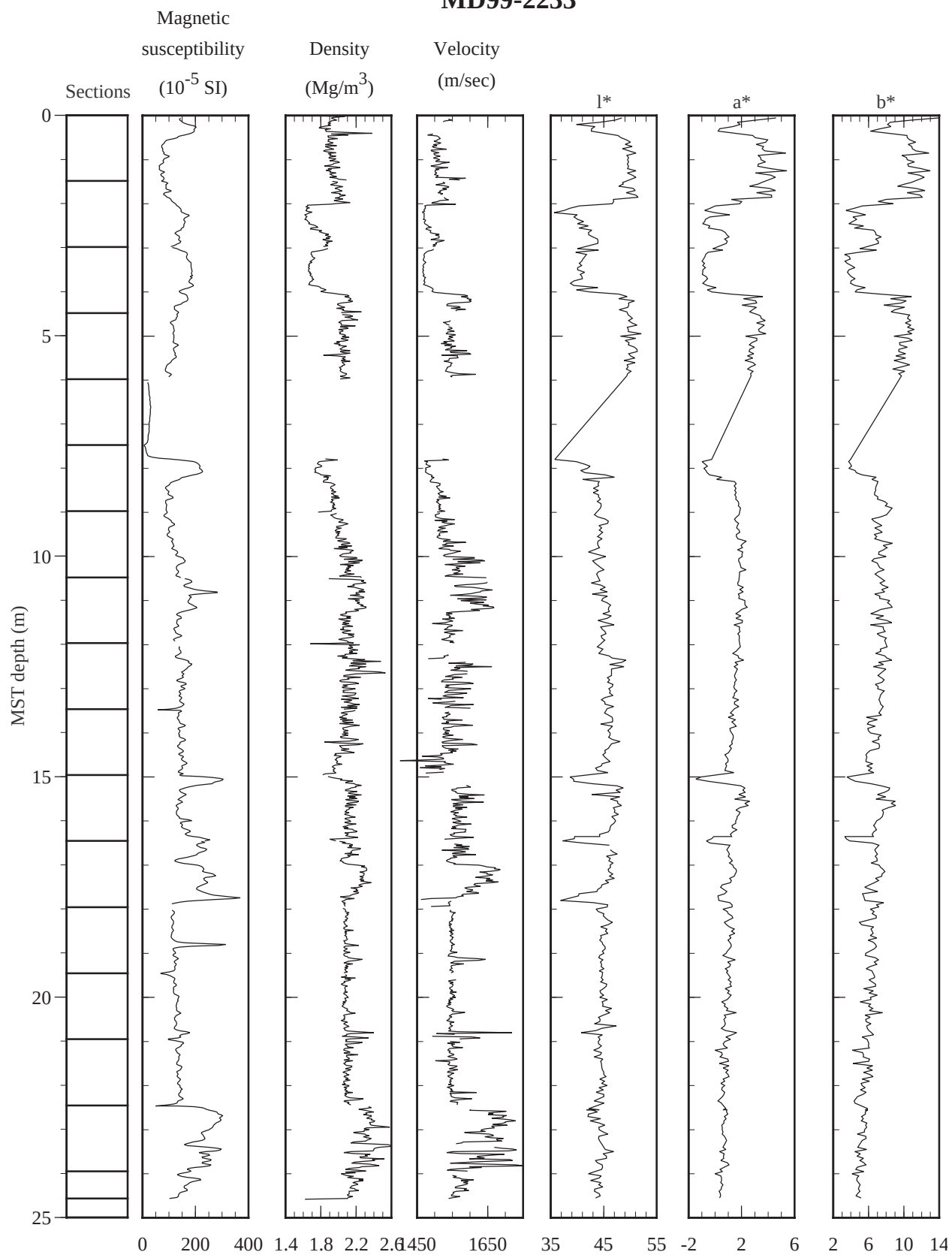


Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2233 Saglek Lower Slope (site 15; water depth 2350 m)



MD99-2233



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

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 bent (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 processing:

- The core was split and described onboard, the archive halves will be processed at AGC-BIO.
- U-channel were made on the working halves, they will be processed at UCD.
- Constant volume samples were taken on several sections, they will be processed at AGC-BIO.
- Paleomagnetic cubes sampling have been performed, the cubes will be processed at AGC-BIO.
- The working halves was sampled at a 1cm interval. These sediments will be processed 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)

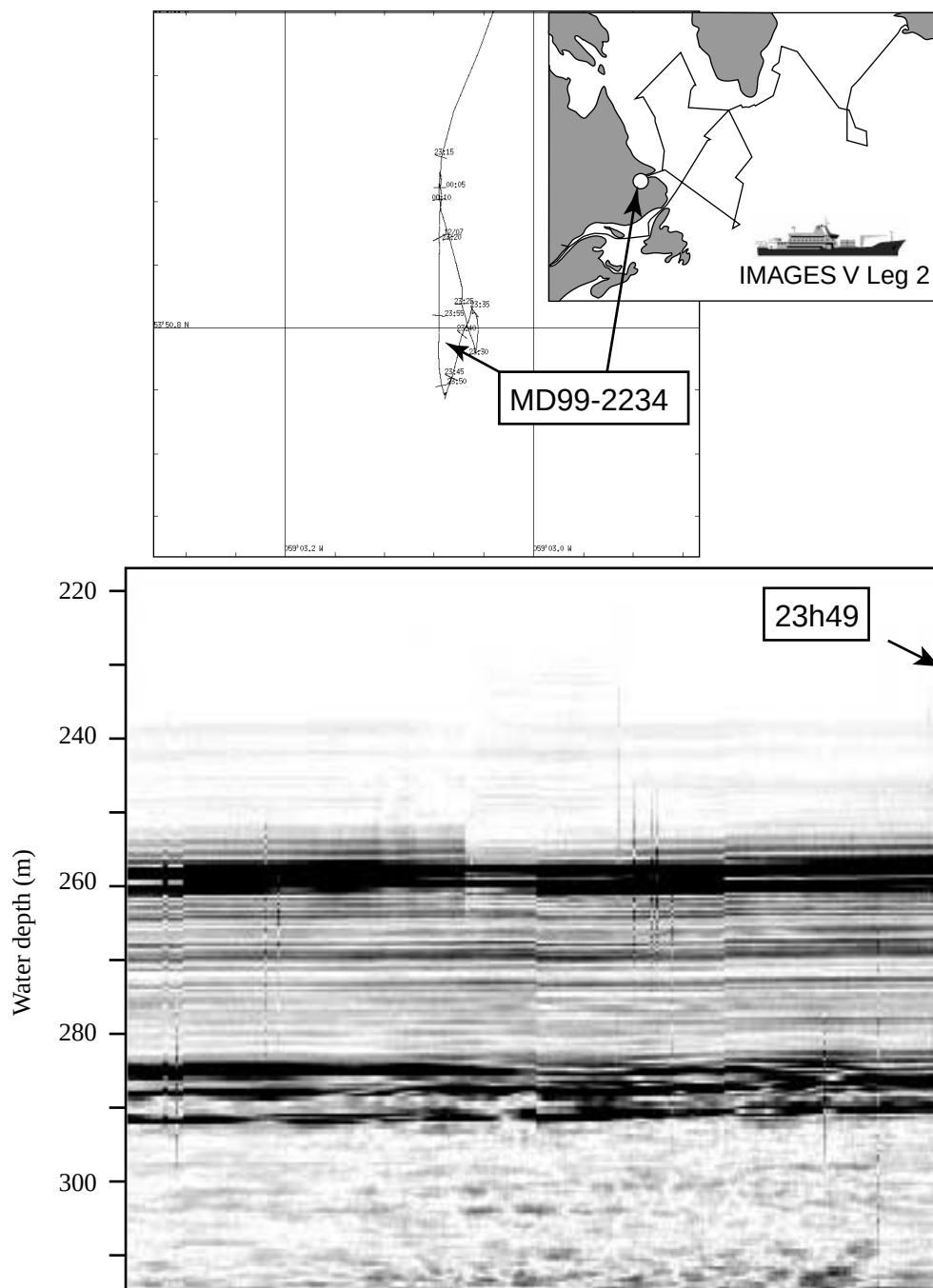
A lower upward fining unit (28.30-39.10 m) of fine sand, sandy mud, and clayey silt with common bioturbation and local crude lamination to distinct cross lamination

MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values increase downcore from 100×10^{-5} SI at the top to 540×10^{-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/m³. At approx 26m there is an increase in values up to 2.2 Mg/m³. 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.

MD99-2234
Length: 39.30 m

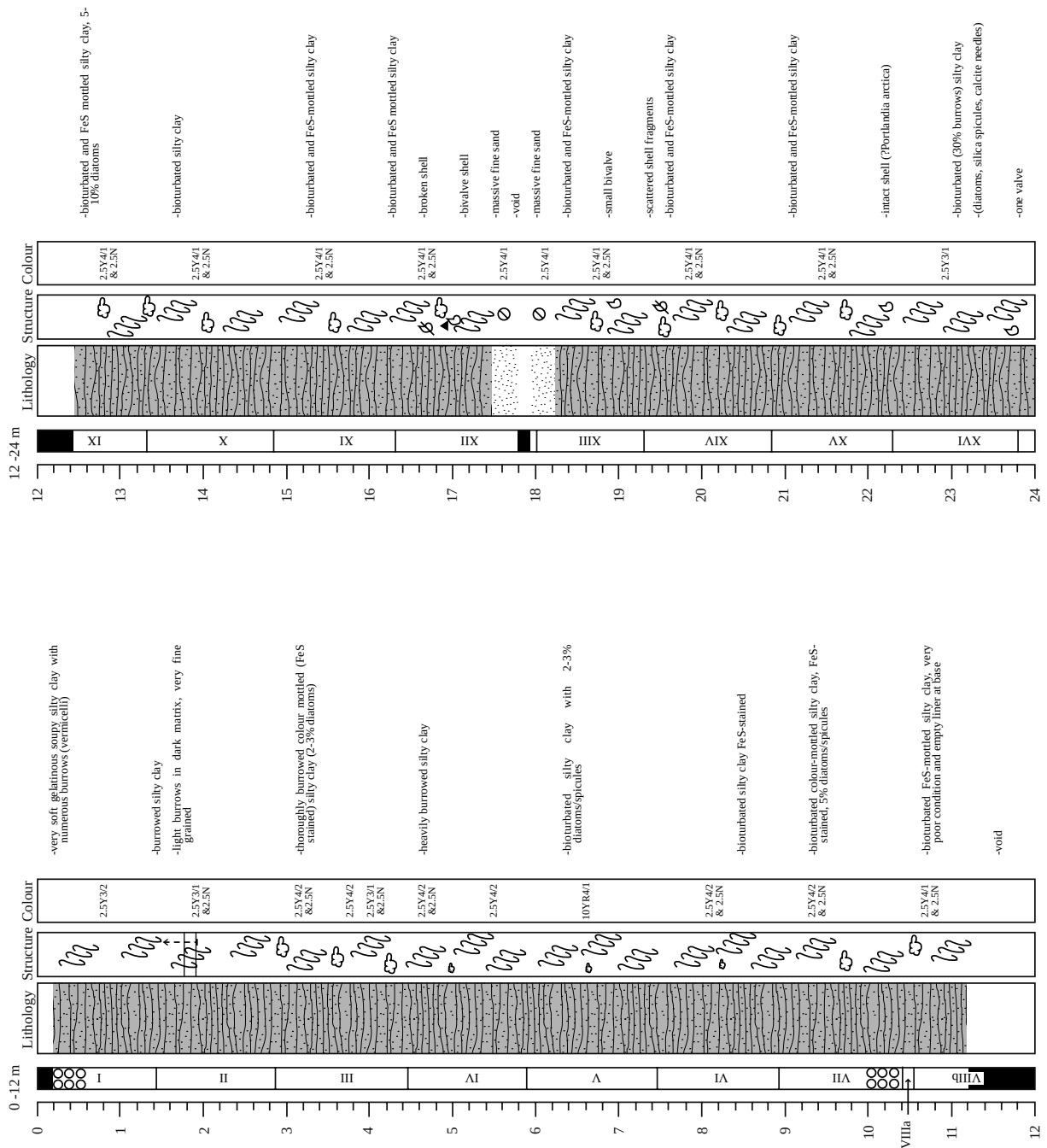
Latitude: 53°50'81 N
Longitude: 059°03'08 W

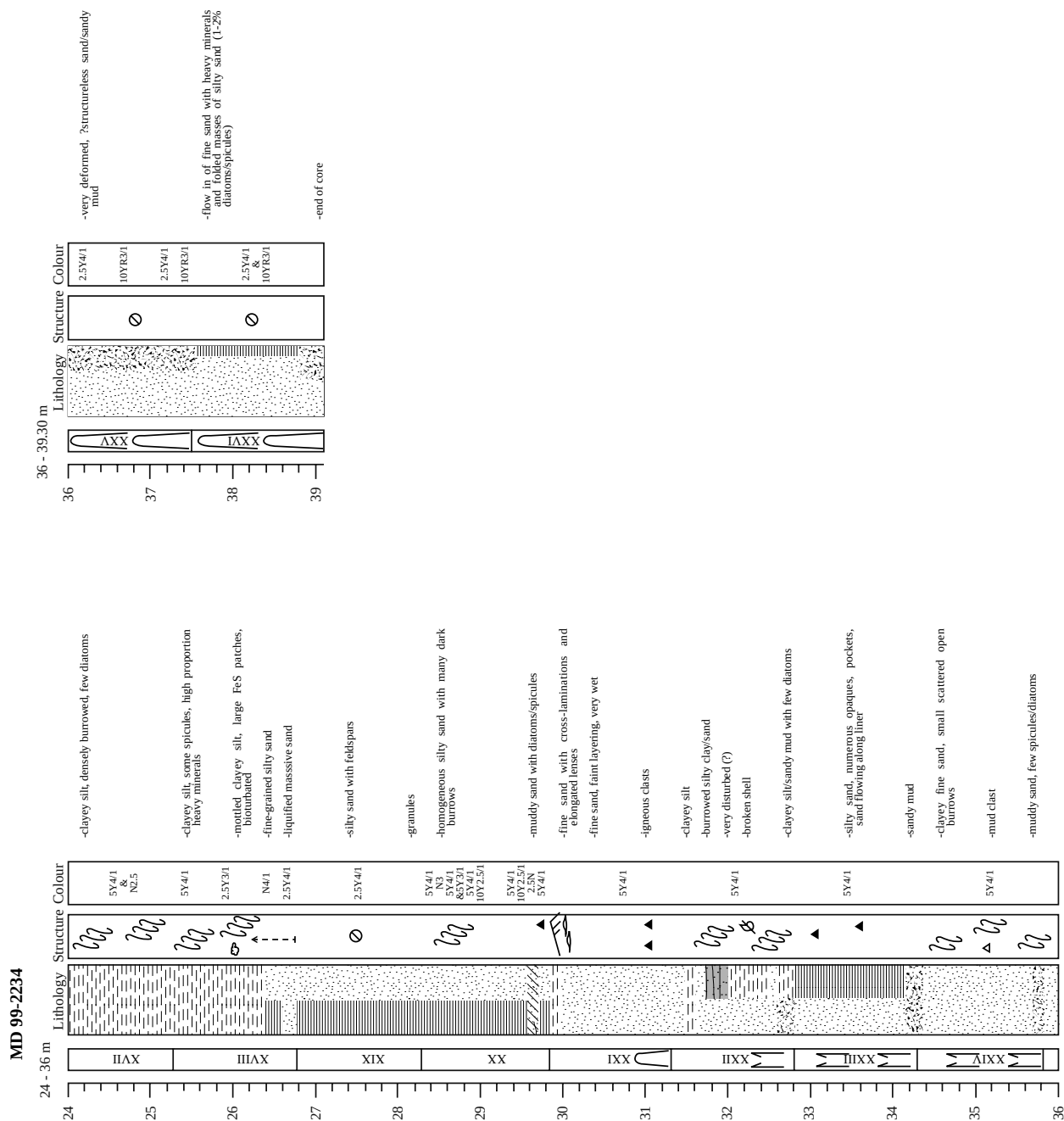
Water depth: 230 m
Date: 11 July 1999



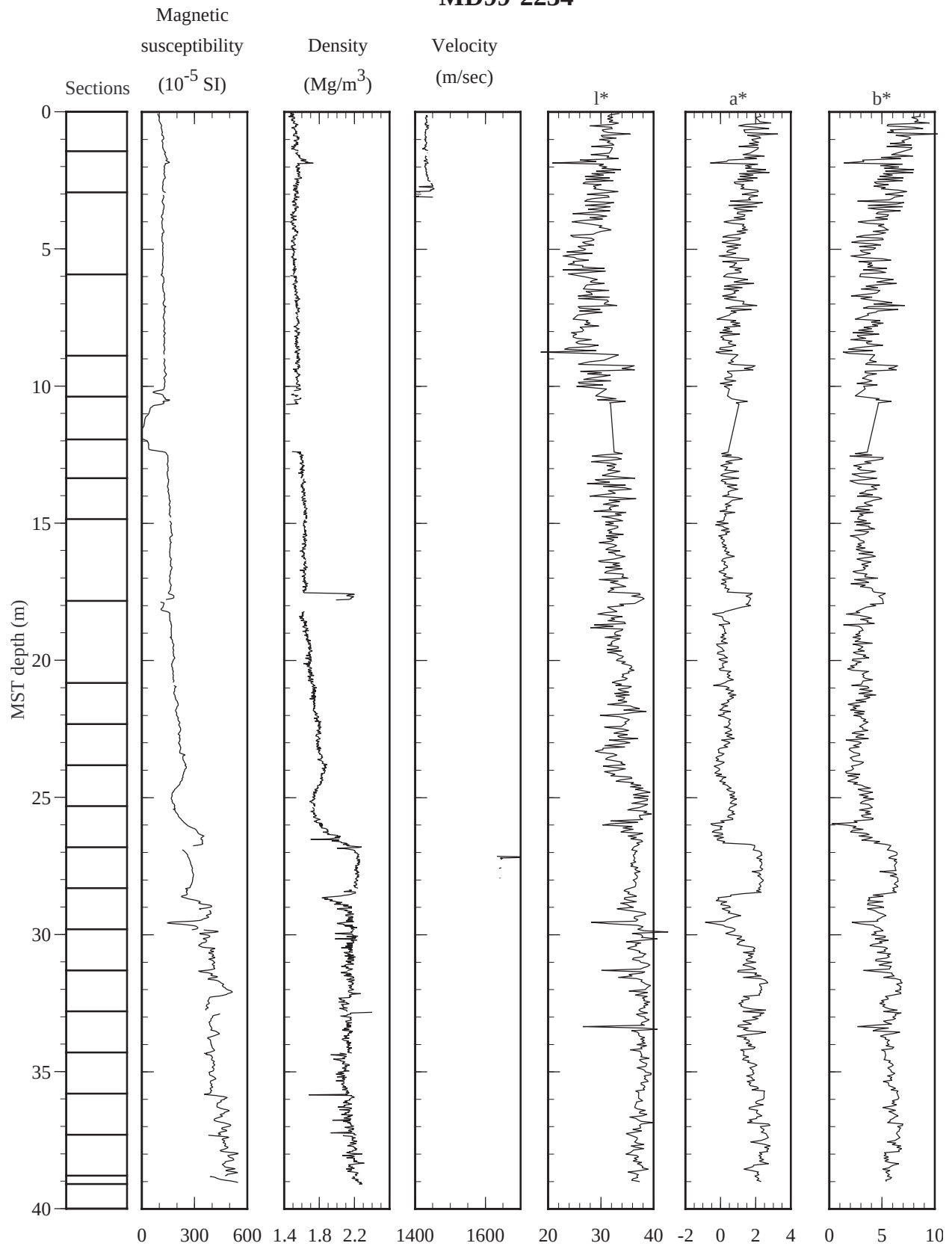
Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2234 Lake Melville (site 17; water depth 230 m)





MD99-2234



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 processing:

- All sections were stored unsplit after being waxed to avoid oxydation. They will be processed at AGC-BIO.

-Several 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 processed at AGC-BIO.

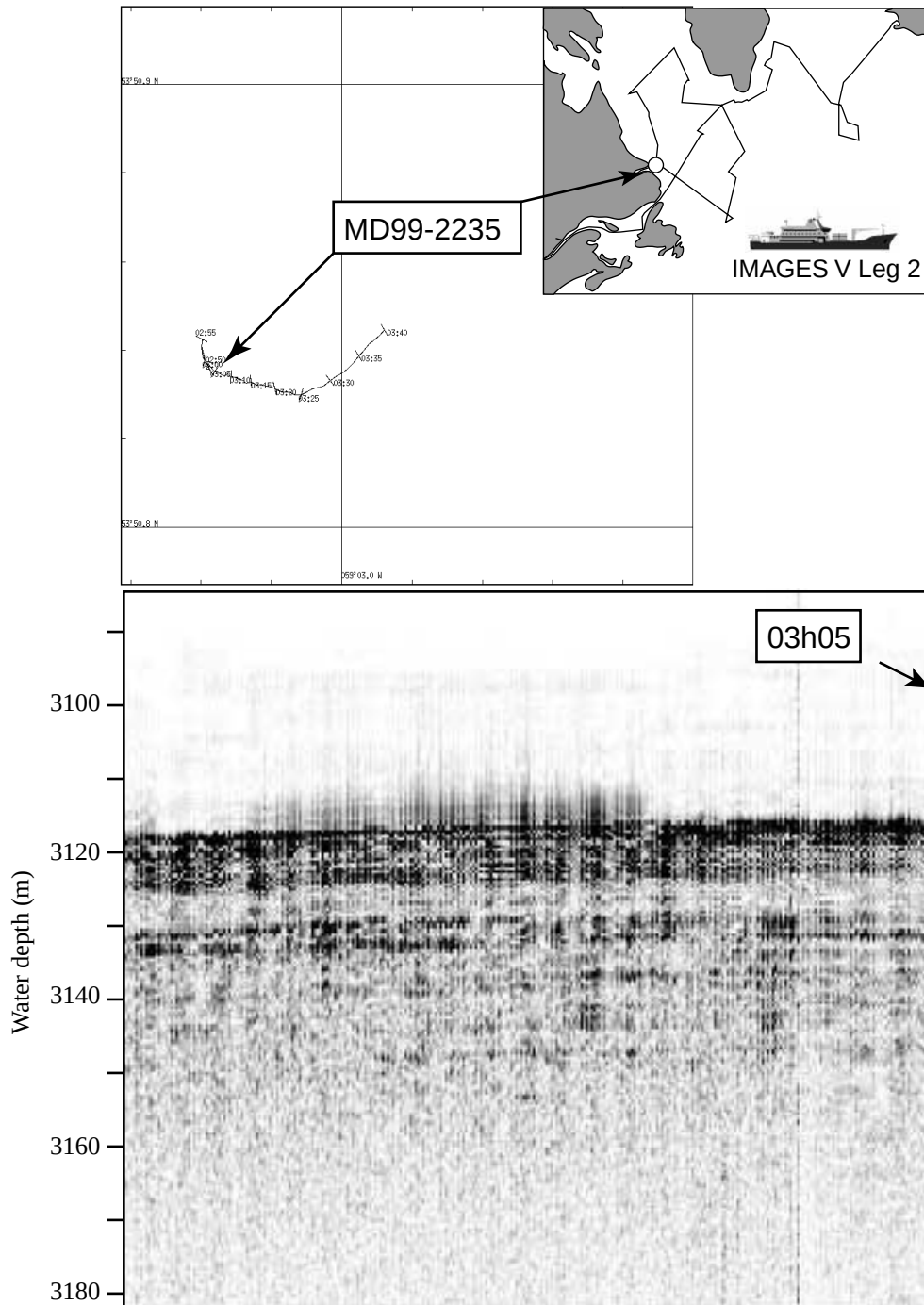
Summary of physical and sedimentological observations

MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values increase downcore from 125×10^{-5} SI at the top to 440×10^{-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/m³. At 23m the density increases to 2.1 Mg/m³. 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.

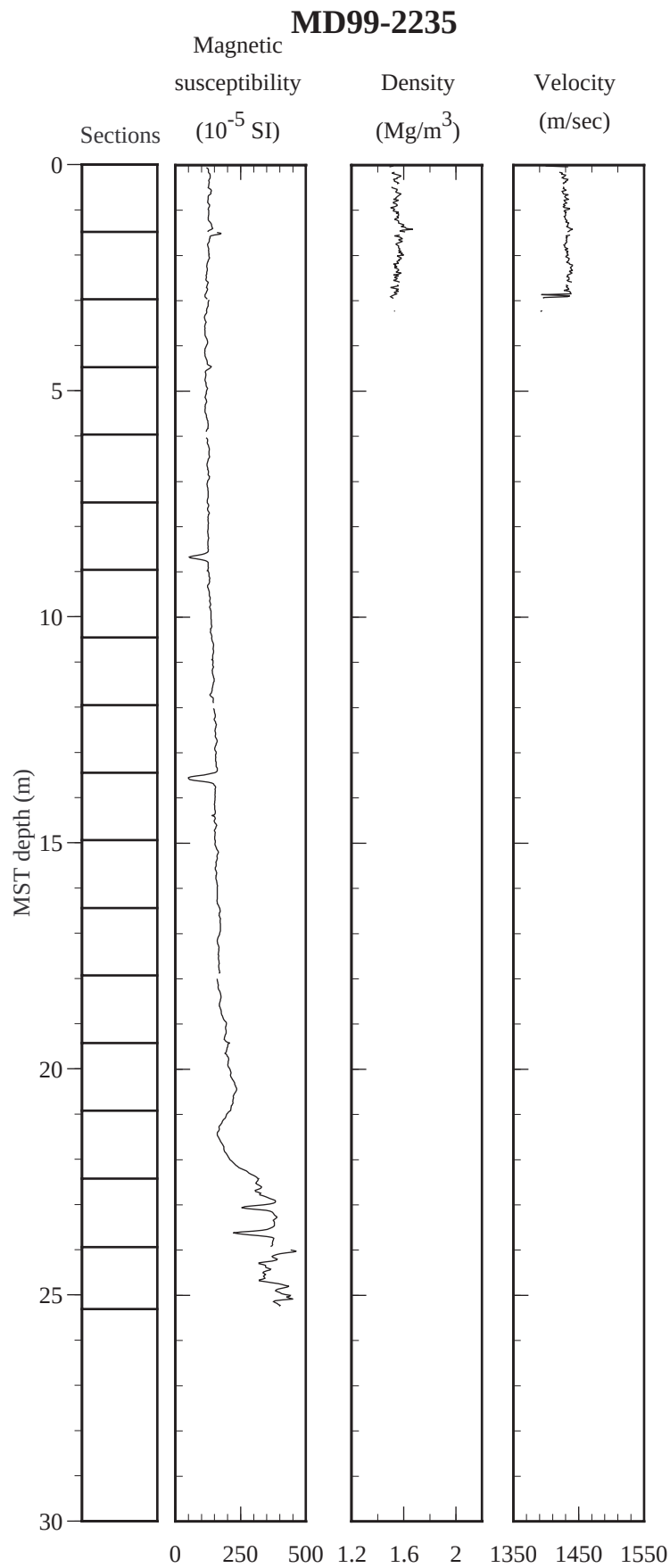
MD99-2235
Length: 25.37 m

Latitude: 53°50'86 N
Longitude: 059°03'05 W

Water depth: 235 m
Date: 12 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)



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 processing:

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

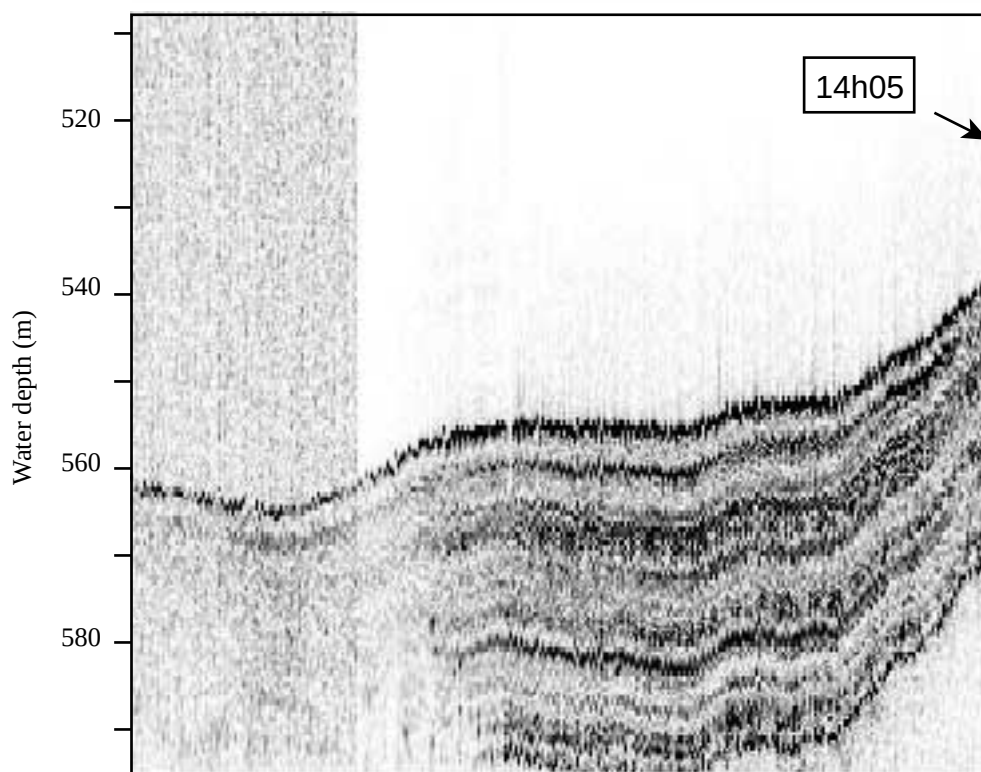
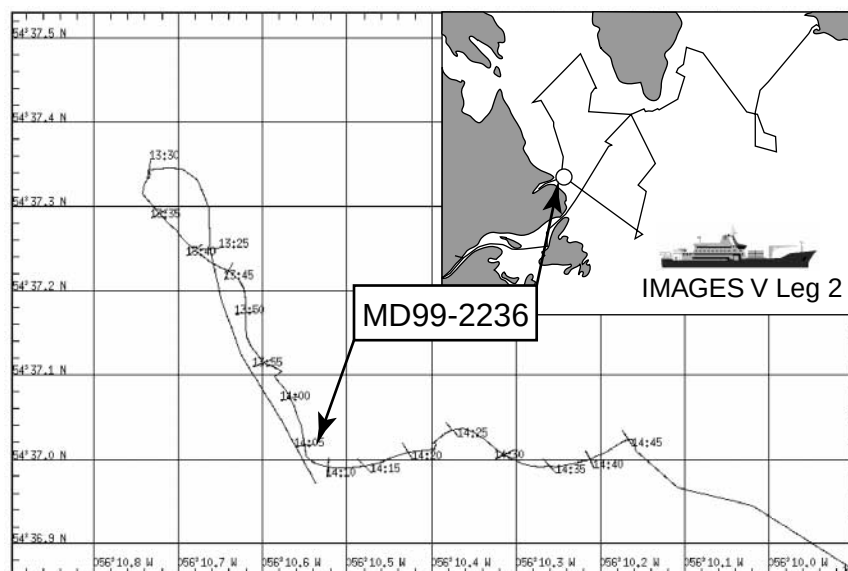
A lower unit (13.00-21.10 m) of clayey silt and silty clay with a few diatoms, scattered mollusc shells, and rare forams

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/m³. P-wave velocities were obtained for the upper 10 m and range in value from about 1445 to 1550 m/sec.

MD99-2236
Length: 21.15 m

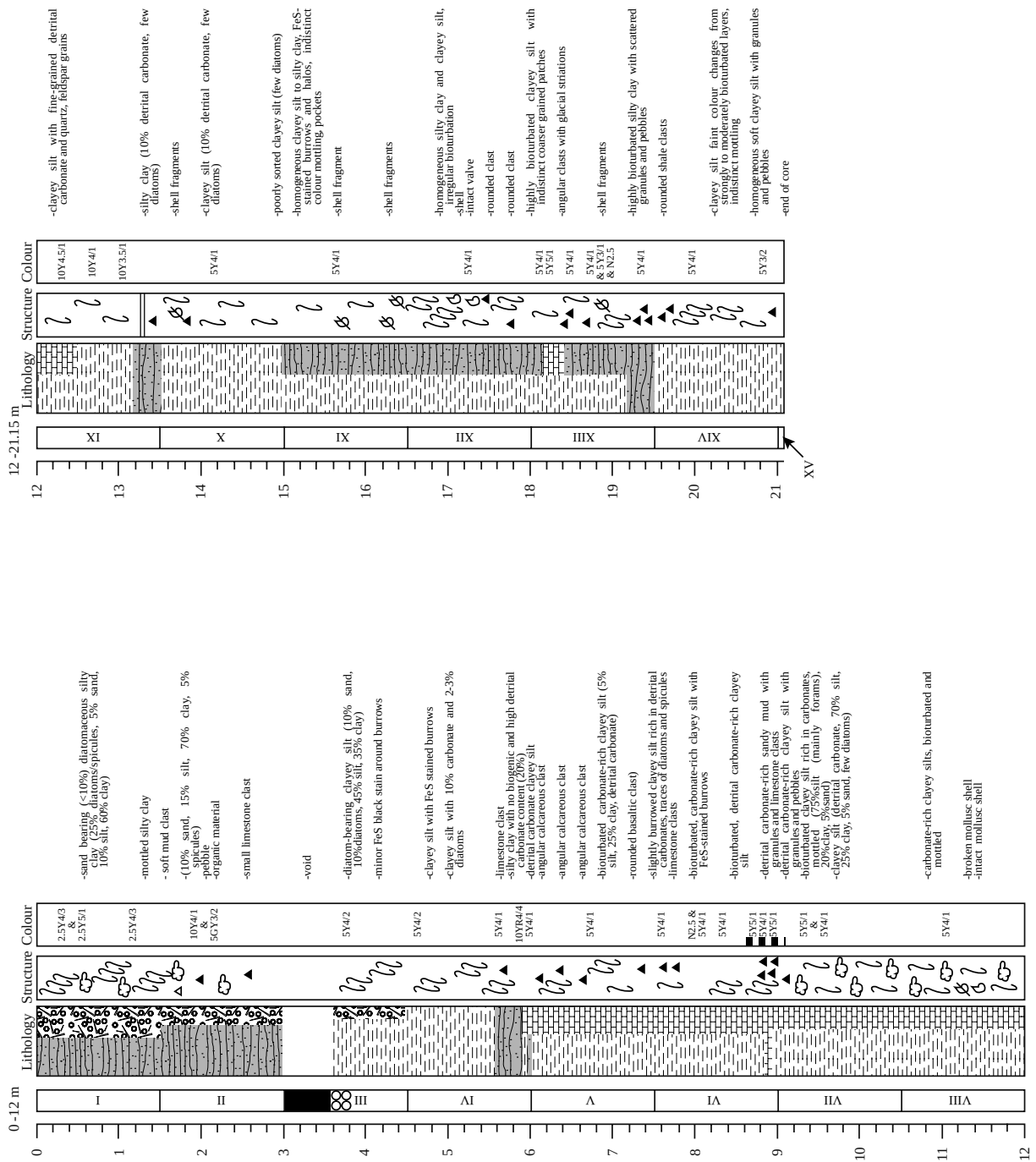
Latitude: 54°37'00 N
Longitude: 056°10'57 W

Water depth: 520 m
Date: 12 July 1999

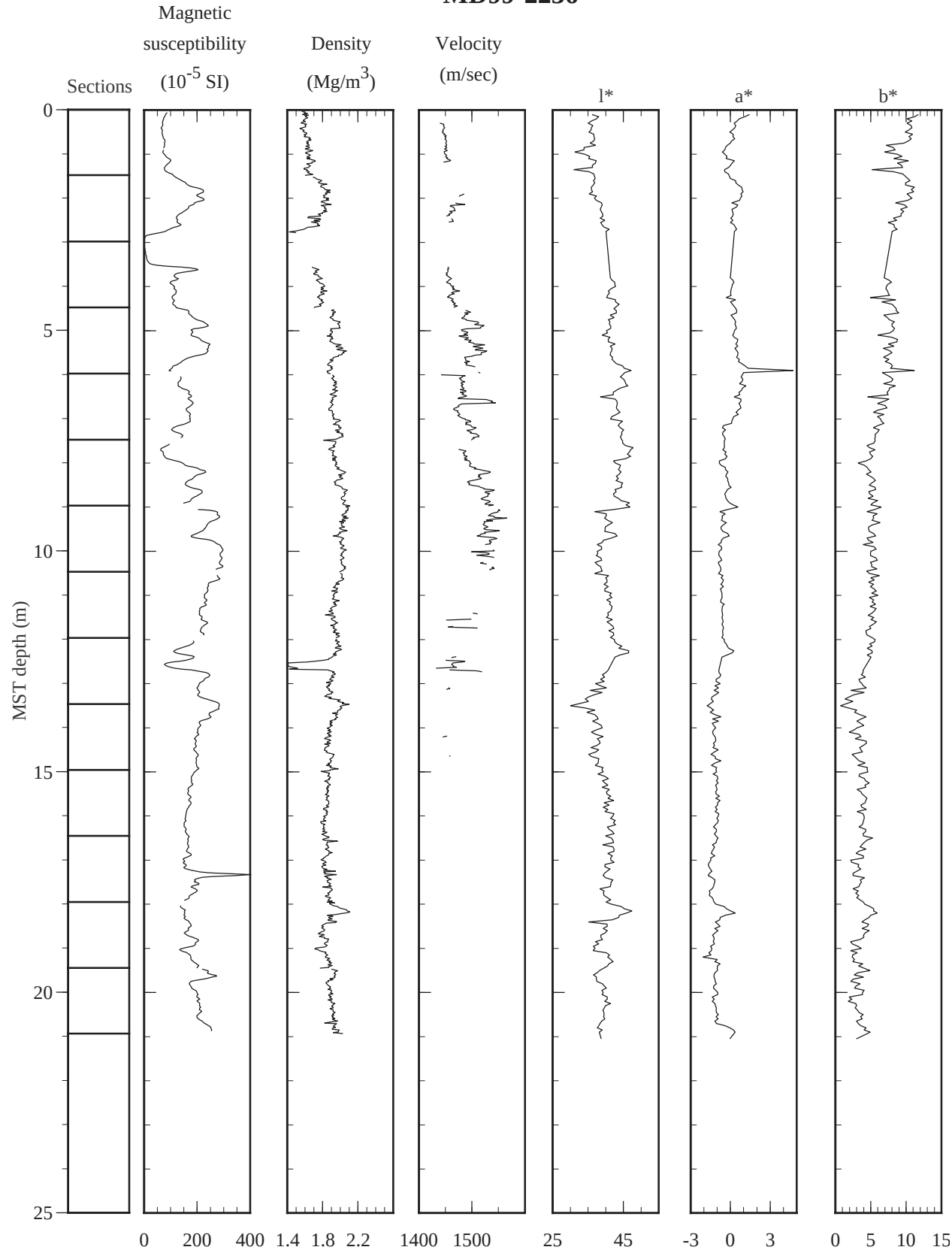


Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2236 Cartwright Saddle (site 19; water depth 520 m)



MD99-2236



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 processing:

- The sections were split and described onboard, both working and archive halves will be processed at GEOTOP.
- Constant volume sampling have been taken every other section starting at I. These samples will be processed 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 both the archive and working (probably re-inject from the side). The bags will be processed at GEOTOP.

Summary of physical and sedimentological observations

The core is moderately disturbed down to 21 m, with flow-in below).

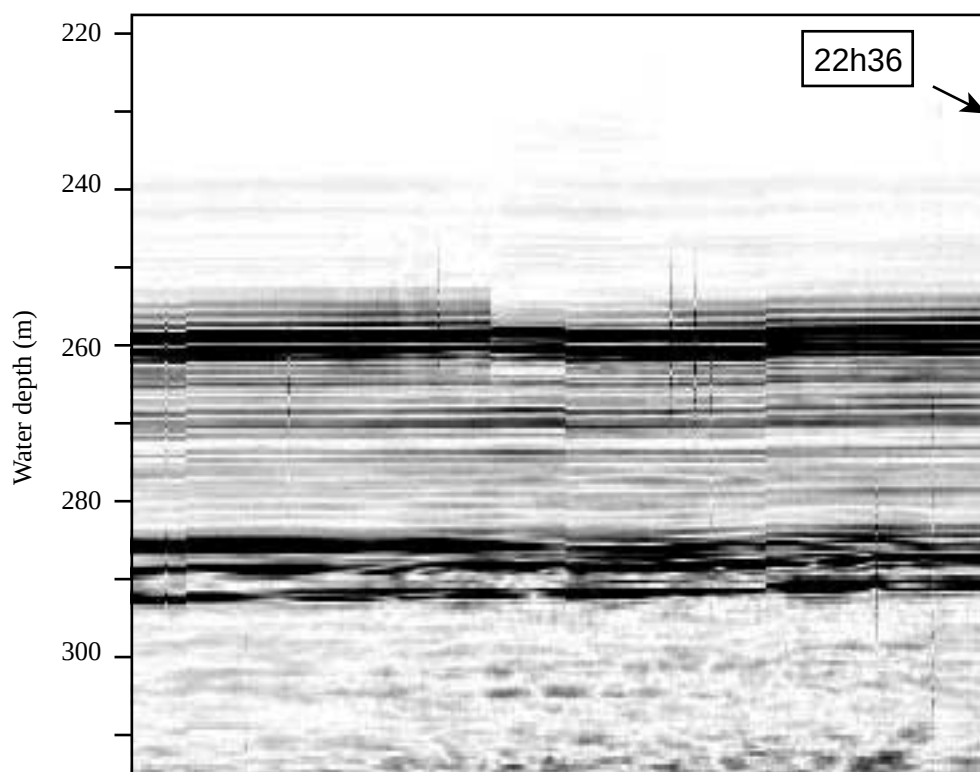
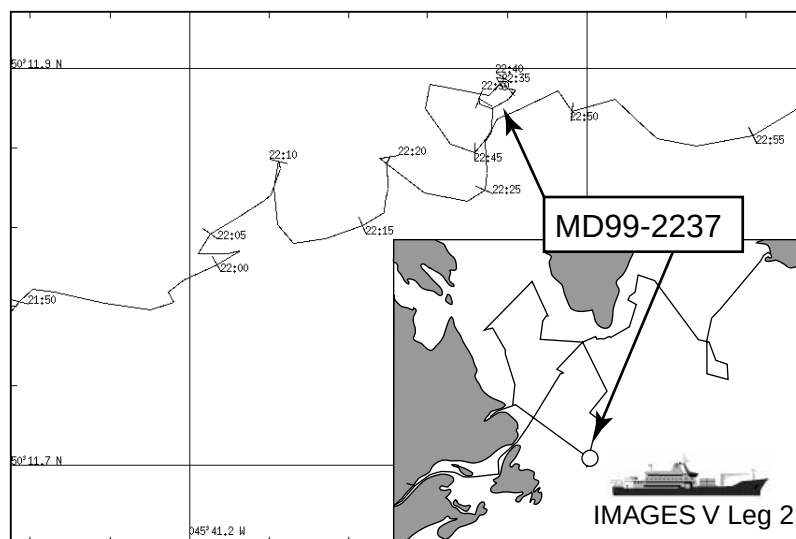
The core consists mainly of structureless or mottled clayey silt with variable amounts of sand and outsize pebbles and cobbles, either scattered or concentrated in sandy mud layers. Detrital carbonate is locally abundant in sharp-based, structureless beds of sandy mud or clayey silt. Biosilica is common; 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/m³. P-wave velocities were obtained for part of the core and range in value from about 1445 to 1620 m/sec.

MD99-2237
Length: 30.74 m

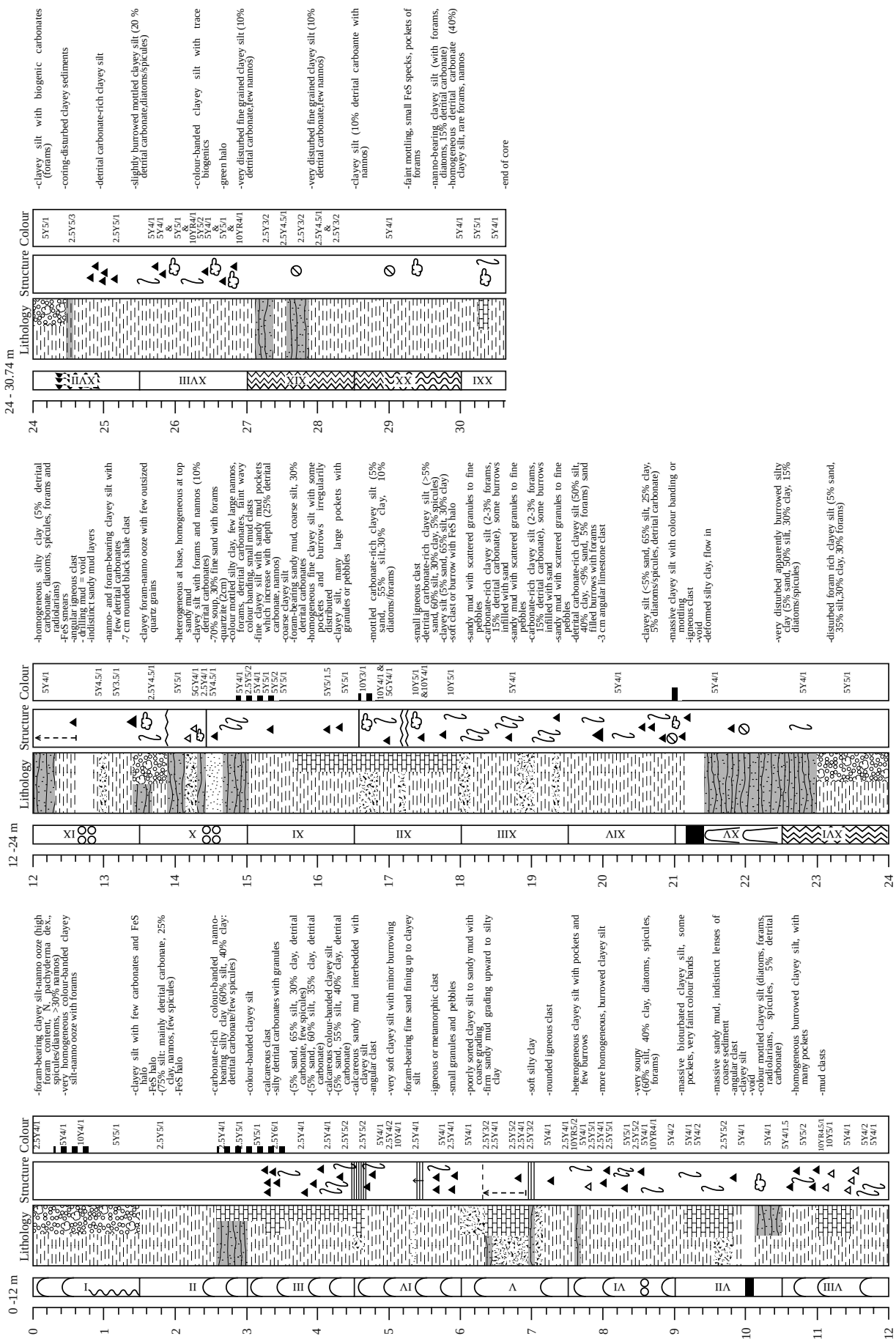
Latitude: 50°11'93 N
Longitude: 045°41'03 W

Water depth: 3530 m
Date: 13 July 1999

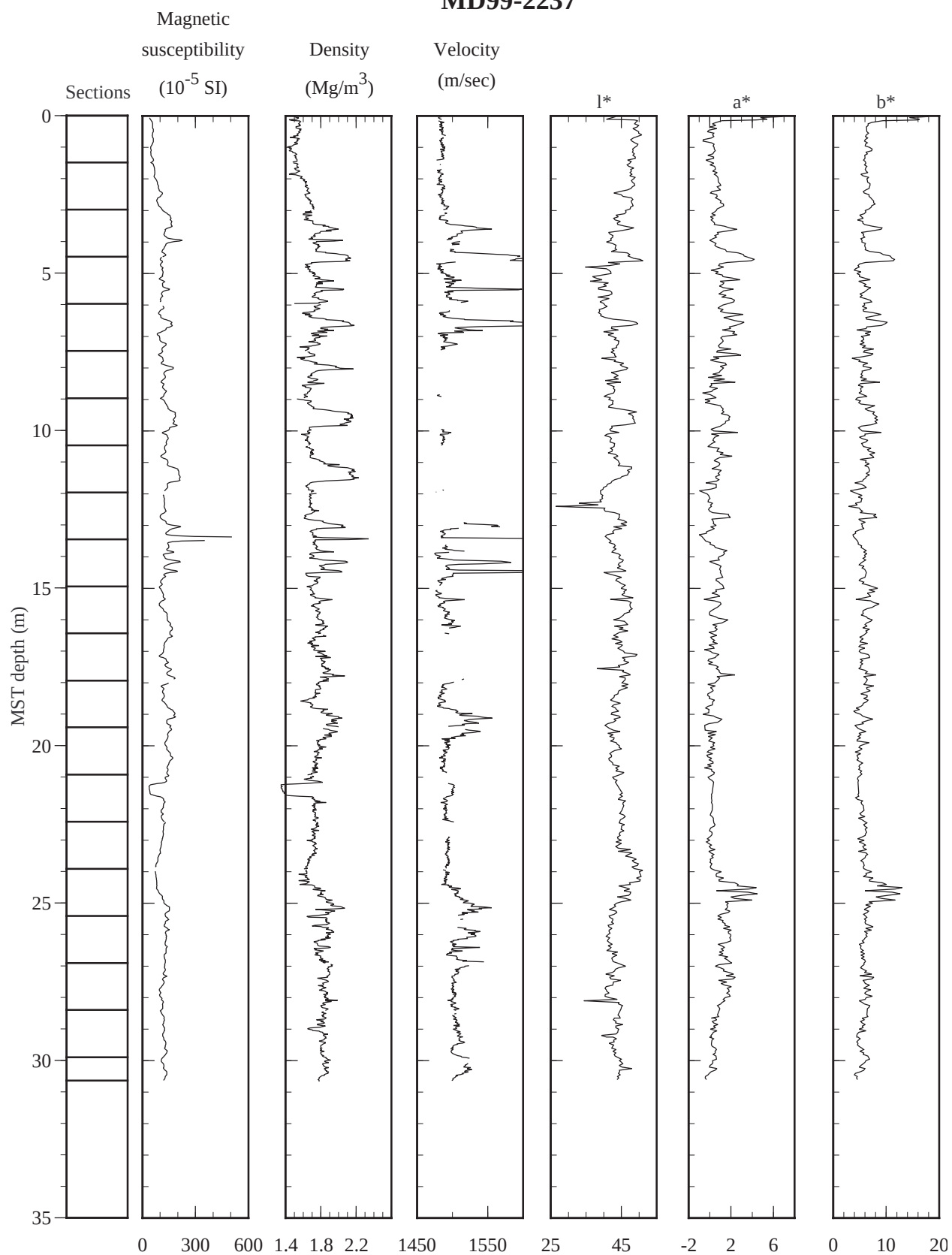


Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2237 Orphan Knoll (site 20; water depth 3530 m)



MD99-2237



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

Rosette and CTD cast 0 - 200 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

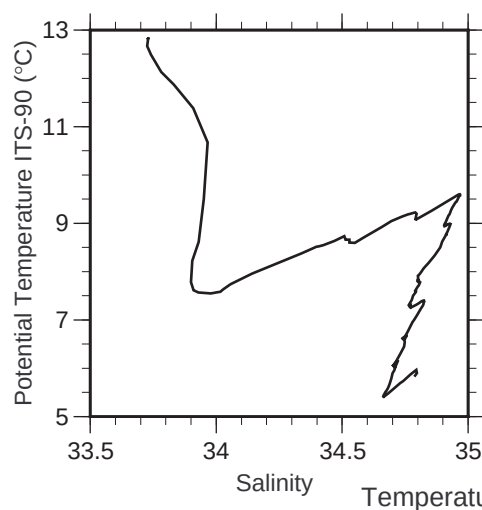
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 26 m (maximum fluorescence) and near surface.

Sampling

The water samples will be analysed for alkenone.

Summary of CTD profile

- The surface temperature was 12.83°C.



CTD site 20

Orphan Knoll

July 14, 1999

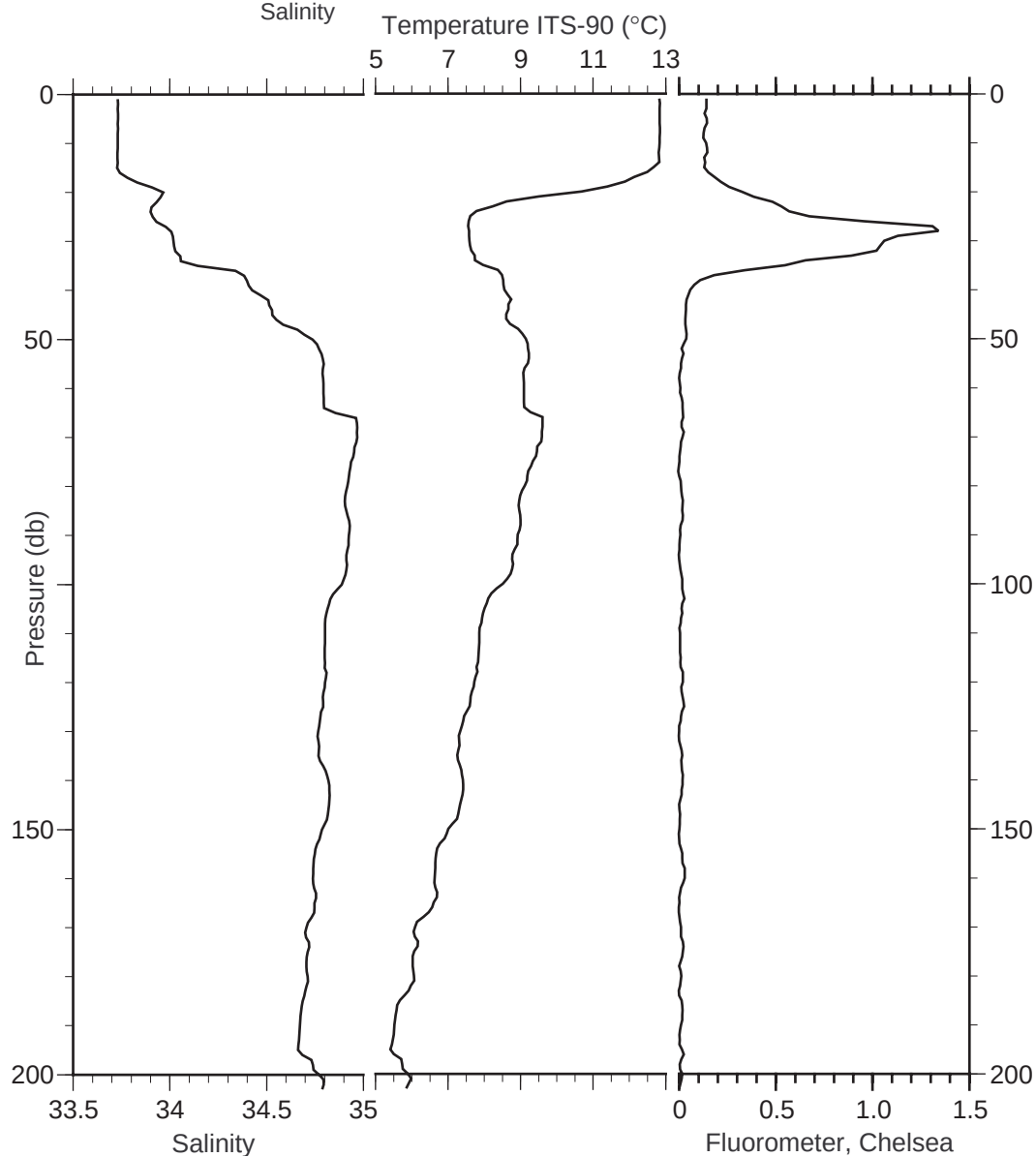
Latitude : 50°11.55 N

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

Rosette and CTD cast 0 - 3542 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

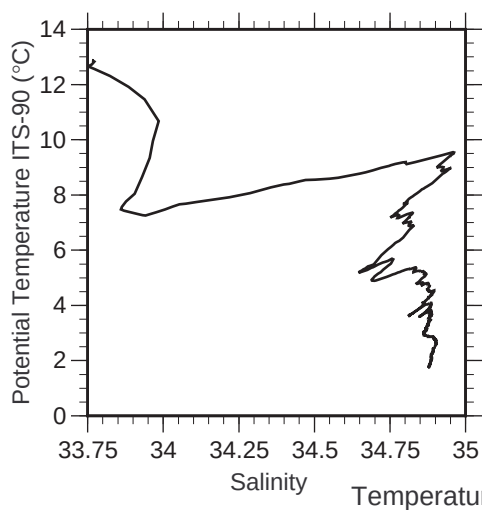
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sadow allowed to sample the water column at 3500 m, 2500 m, 2150 m and 1650 m.

Sampling

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

Summary of CTD profile

- The surface temperature was 12.9 °C.



CTD site 20

Orphan Knoll

July 13, 1999

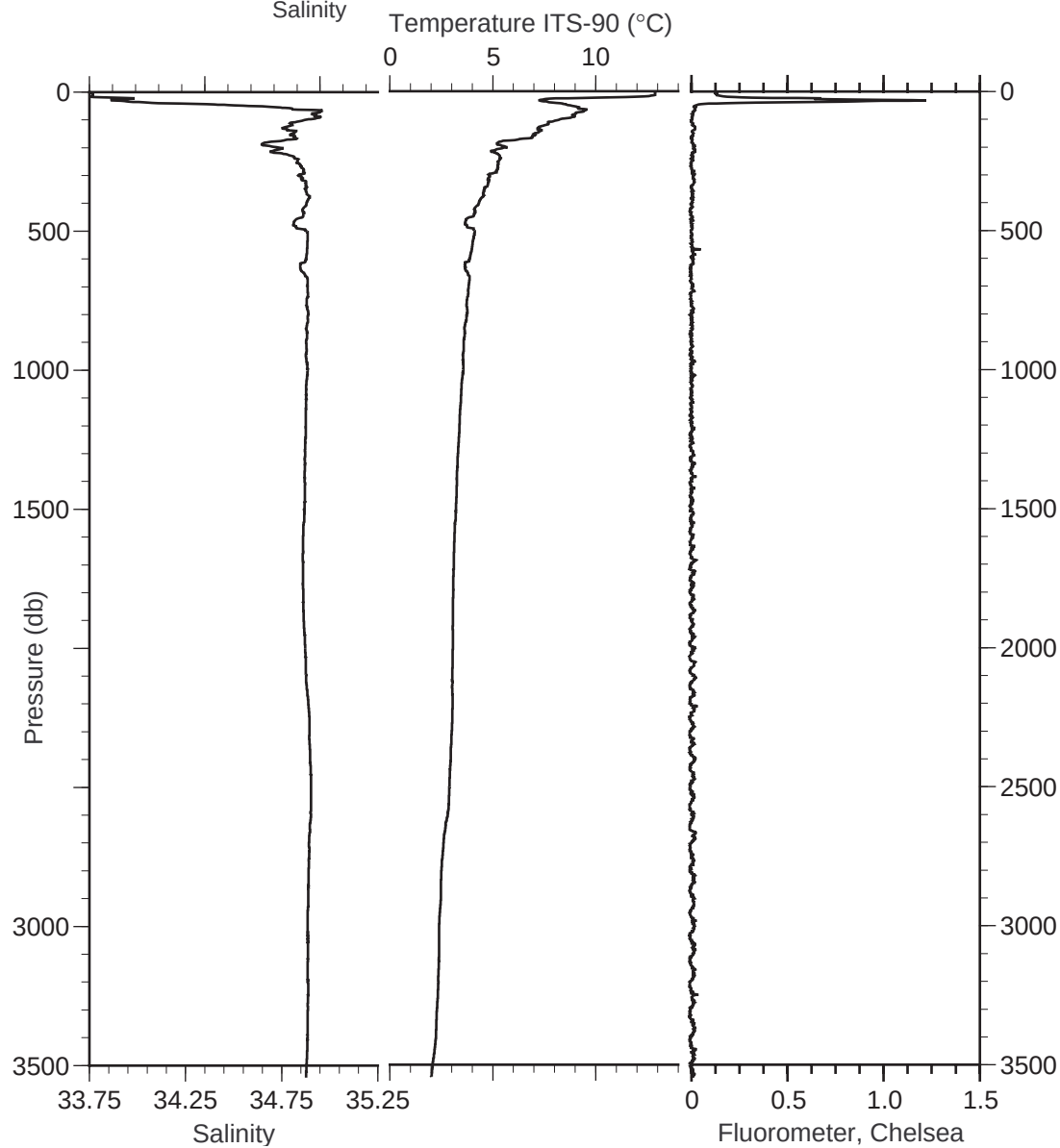
Latitude : 50°11.90 N

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 processing:

- The sections were split and described onboard, both working and archive halves will be processed at GEOTOP.
- Constant volume sampling have been performed every other section starting at I. These samples will be processed 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 processed at GEOTOP.

Summary of physical and sedimentological observations

The first two sections are very disturbed.

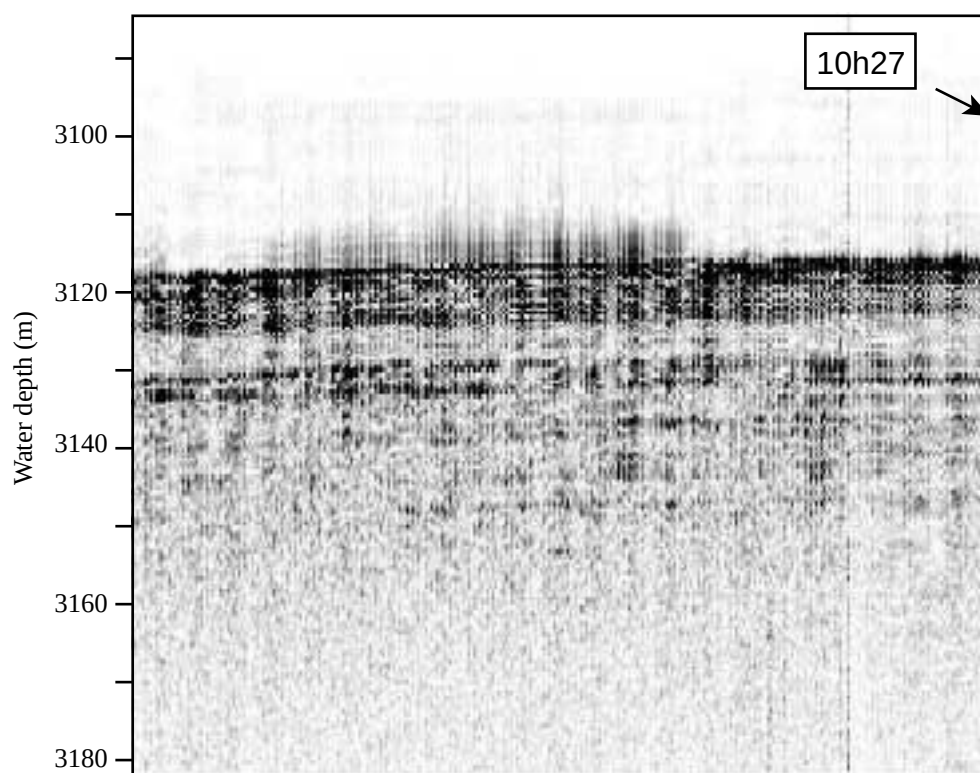
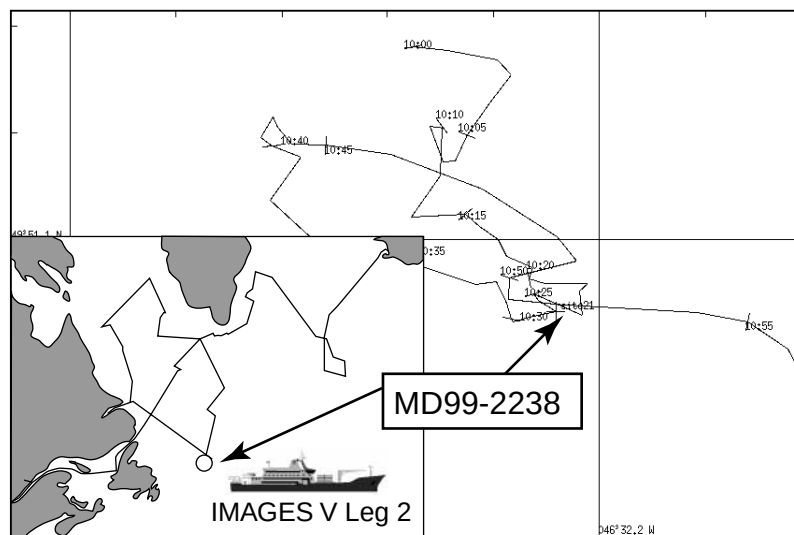
The succession in this core is heterolithic with a large range of compositions and textures from clay to granule-bearing sandy mud. Units are either structureless with gradational contacts or occur as thinly laminated, graded sequences.

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/m³. P-wave values were determined for part of the core and the values range from about 1440 to 1600 m/sec.

MD99-2238
Length: 18.24 m

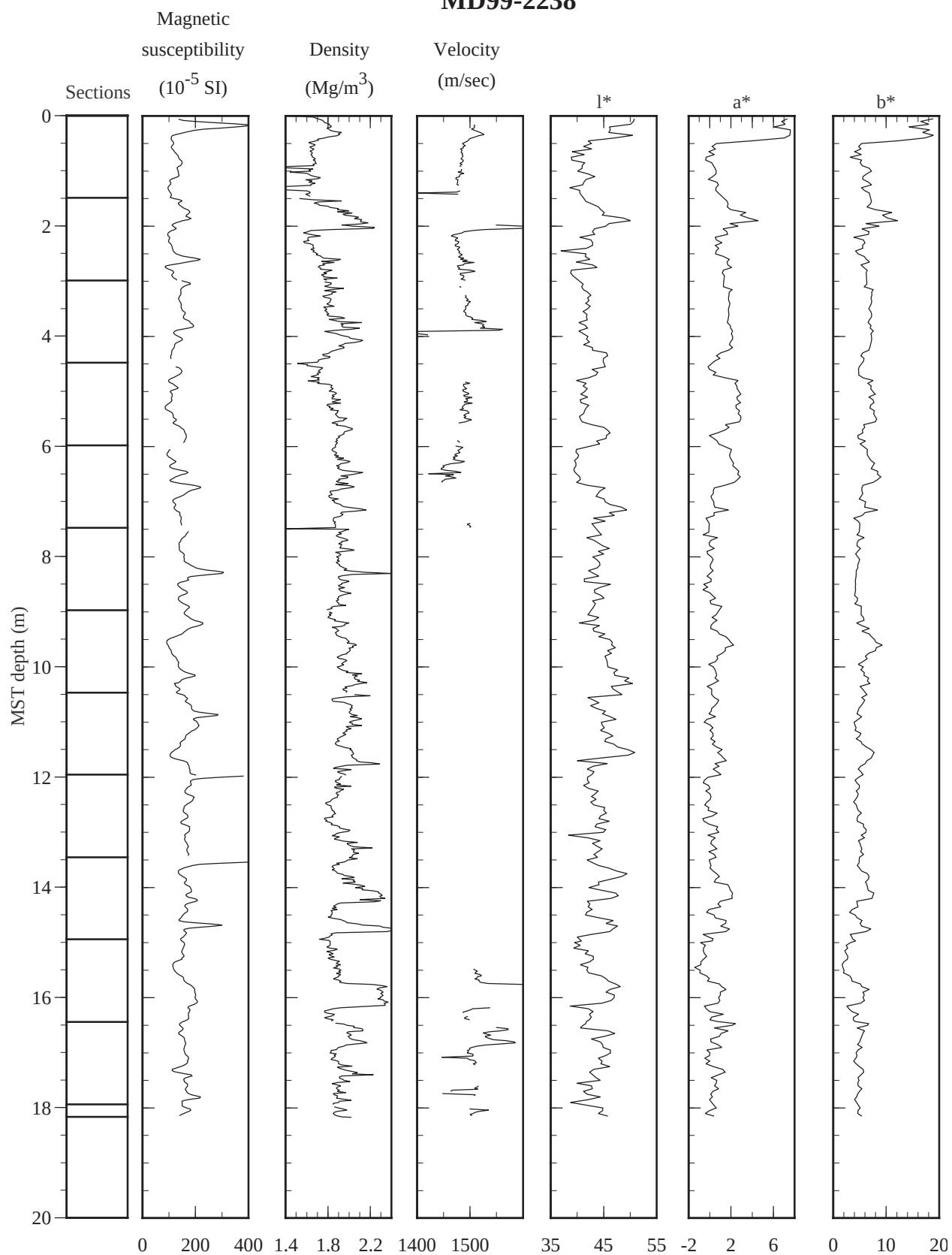
Latitude: 49°51'12 N
Longitude: 046°32'20 W

Water depth: 3080 m
Date: 14 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2238



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 processing:

- The sections were split and described onboard. Working and archive halves will be processed at GEOTOP.
- Constant volume sampling have been performed every other section starting at I. These samples will be processed 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

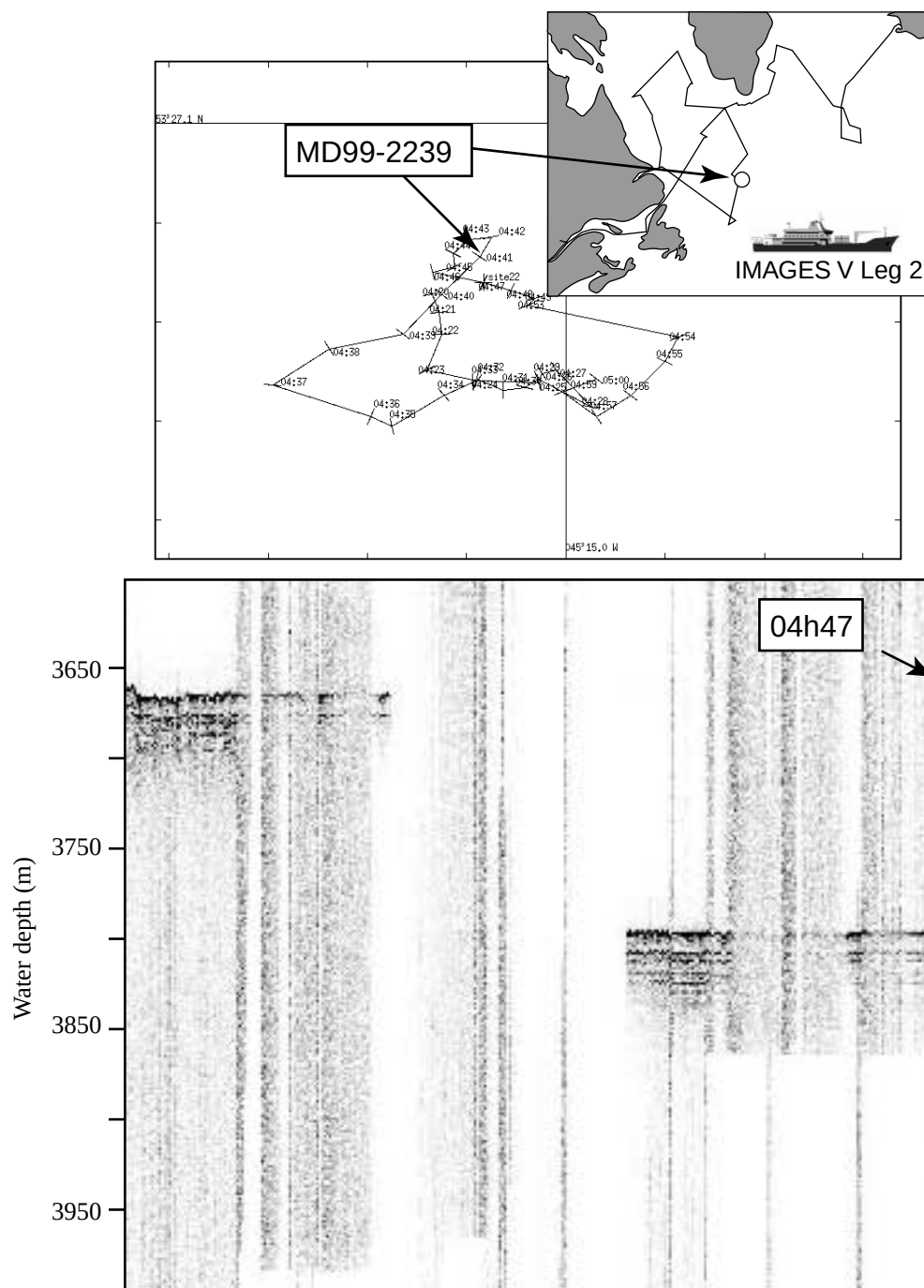
- Liner was partially empty in the upper 8 m; otherwise, bedding is gently bowed.
- Except for two structureless intervals rich in biogenic carbonate (0-0.40 m, sandy mud; 2.00-4.00 m, silty clay), the core consists of interbedded muddy sand (locally crudely laminated with mafic-igneous and sedimentary 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 185×10^{-5} SI. Bulk density values vary from about 1.6 to 2.5 Mg/m³. P-wave velocity values range from about 1480 to 1515 m/sec.

MD99-2239
Length: 23.77 m

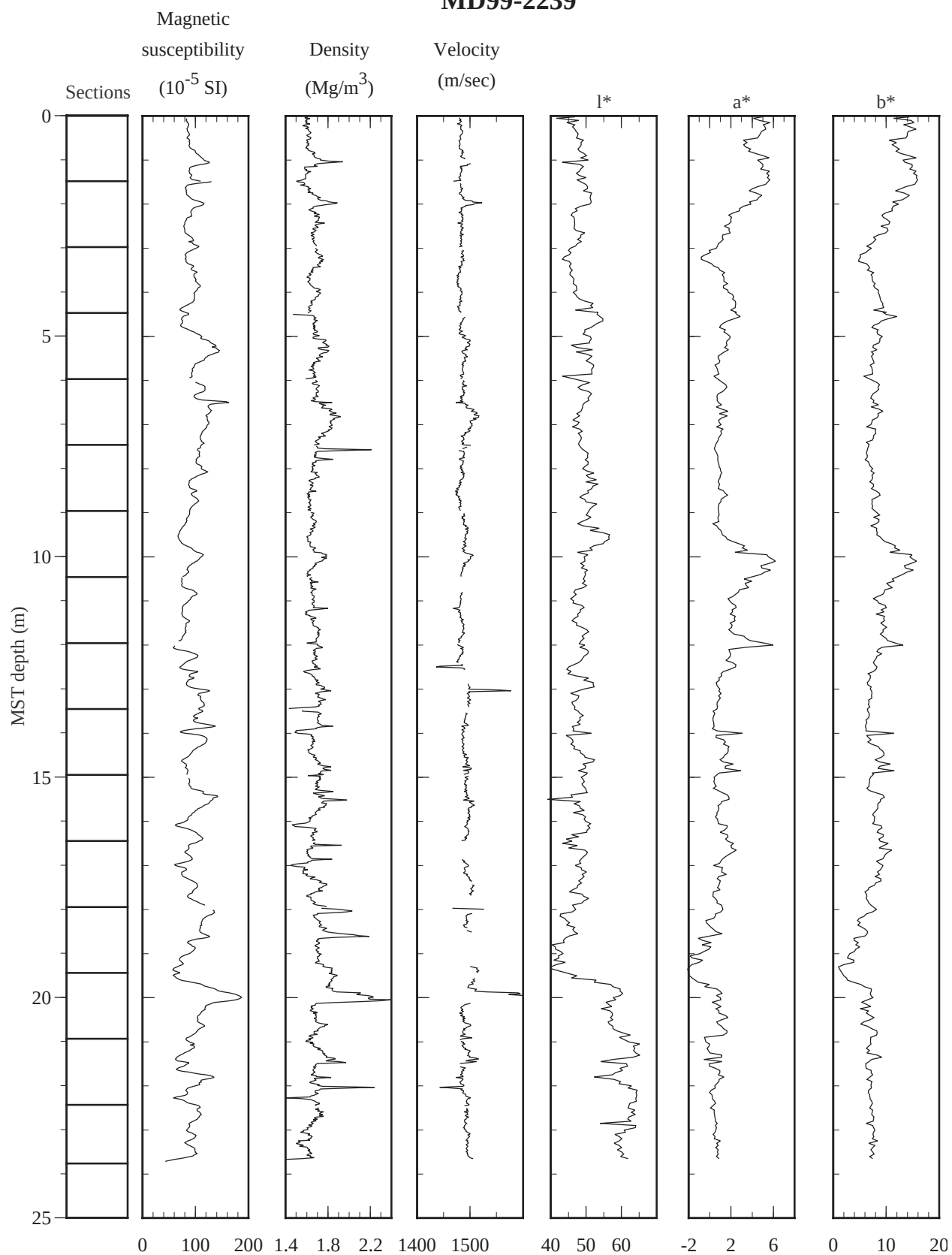
Latitude: 52°27'03 N
Longitude: 045°15'04 W

Water depth: 3770 m
Date: 15 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2239



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 processing:

- The sections were split and described onboard. Both the archive and working halves will be processed at AGC-BIO.
- Constant volume sampling have been performed on every working halves. They will be processed at AGC-BIO.
- U-channels have been taken on every working halves. They will be processed at AGC-BIO after they have been measured for the paleomagnetic intensity at UCD.
- Several 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 processed 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.

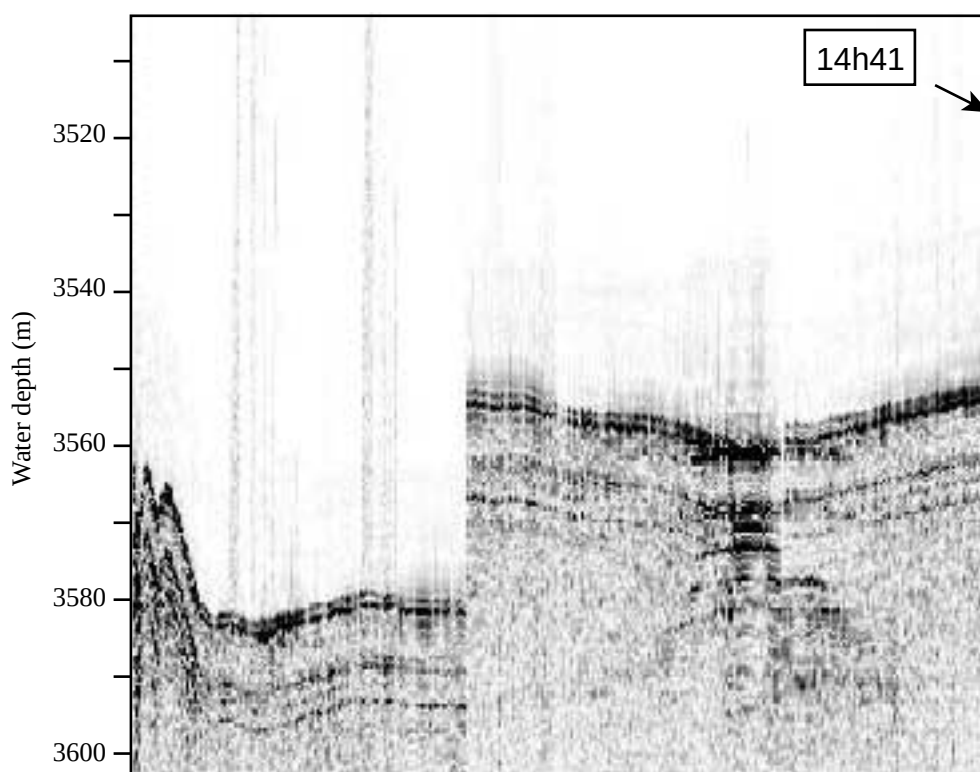
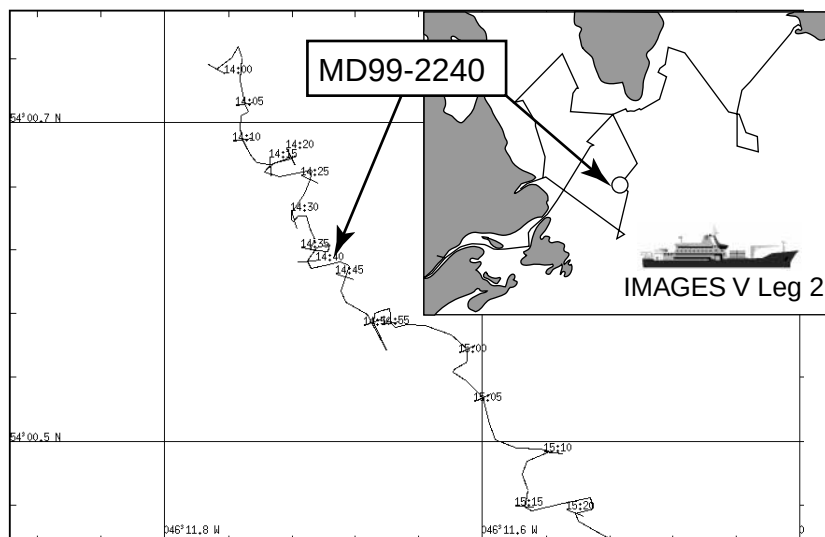
The core consists mainly of interbedded clayey silt, silty clay, and nanno-foram ooze.

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 160×10^{-5} SI. Bulk density values range from about 1.5 to 2.2 Mg/m³ and p-wave velocities range from about 1465 to 1550 m/sec.

MD99-2240
Length: 25.50 m

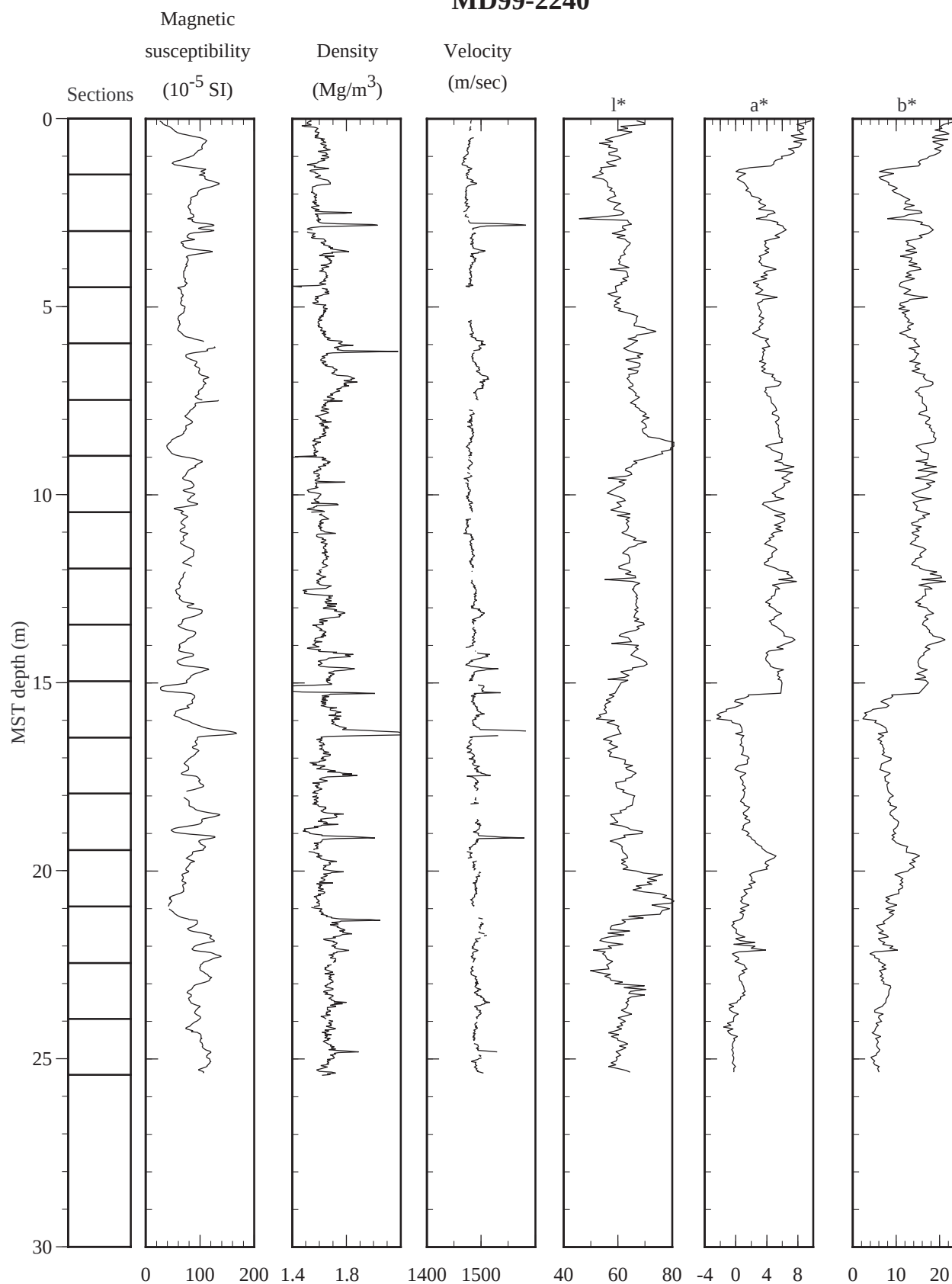
Latitude: 54°00'66 N
Longitude: 046°11'68 W

Water depth: 3525 m
Date: 15 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2240



Julian day: 197
Latitude: 55°32.95N
Water depth: 3280 m

GMT time: 03h15
Longitude: 043°57.88W
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 processing:

- The sections were split and described onboard. Both the archive and working halves will be processed at Gif-sur-Yvette.
- Constant volume sampling have been performed on the archive halves every other section starting at I. These samples will be processed at AGC-BIO.
- A measure of the sediment density was made on the archive 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 processed at Gif-sur-Yvette.

Summary of physical and sedimentological observations

Moderately disturbed to about 12 m.

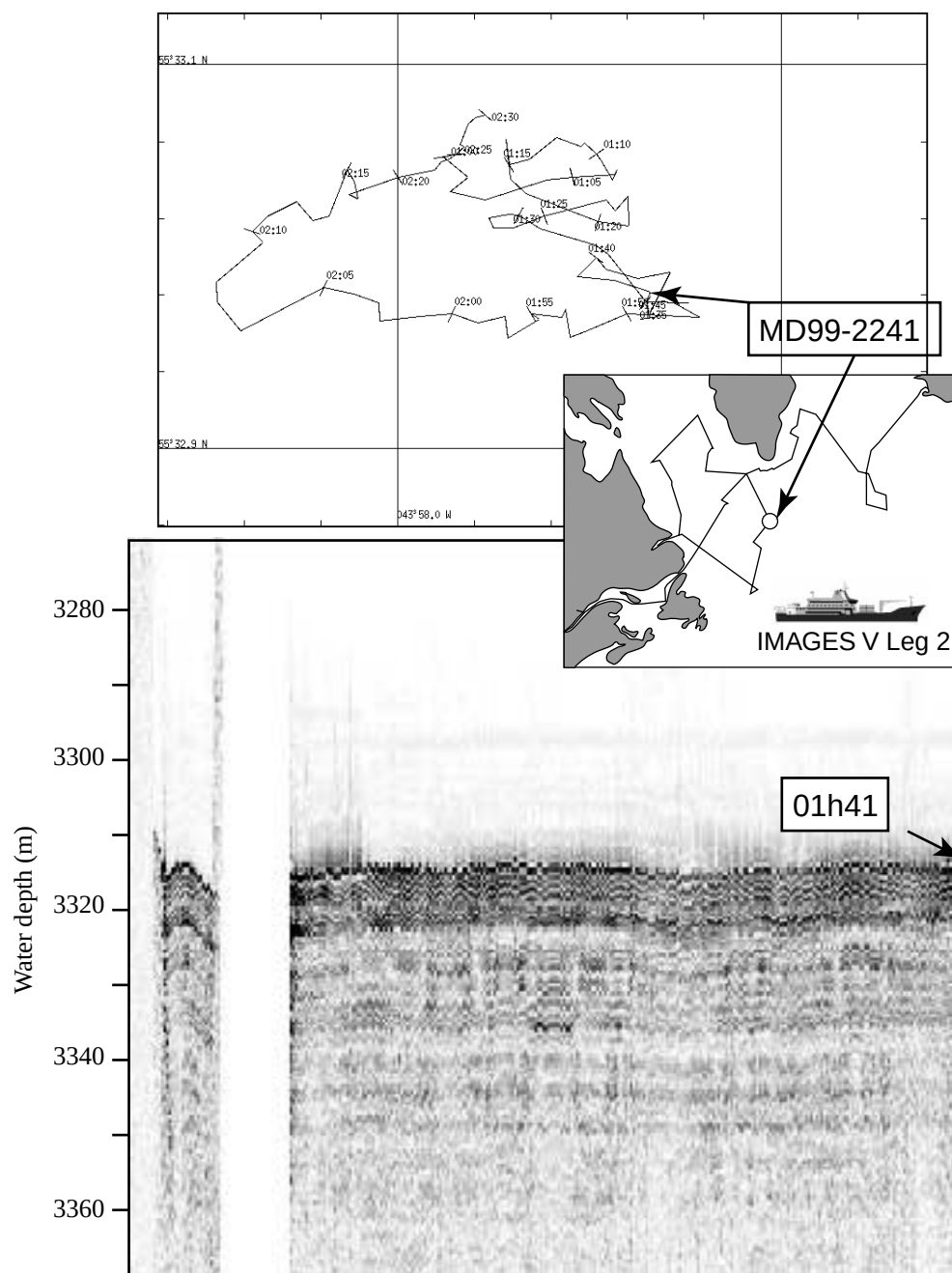
The core consists of clayey silt (less commonly sandy mud) interbedded with foram- and nanno-bearing silty clay to foram-nanno ooze. Bed contacts are commonly gradational thanks to pervasive bioturbation. A single thin laminated silt bed occurs at 18.4 m.

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 180×10^{-5} SI. Bulk density values vary from about 1.4 to 1.8 Mg/m³ and p-wave velocities range from about 1470 to 1530 m/sec.

MD99-2241
Length: 25.35 m

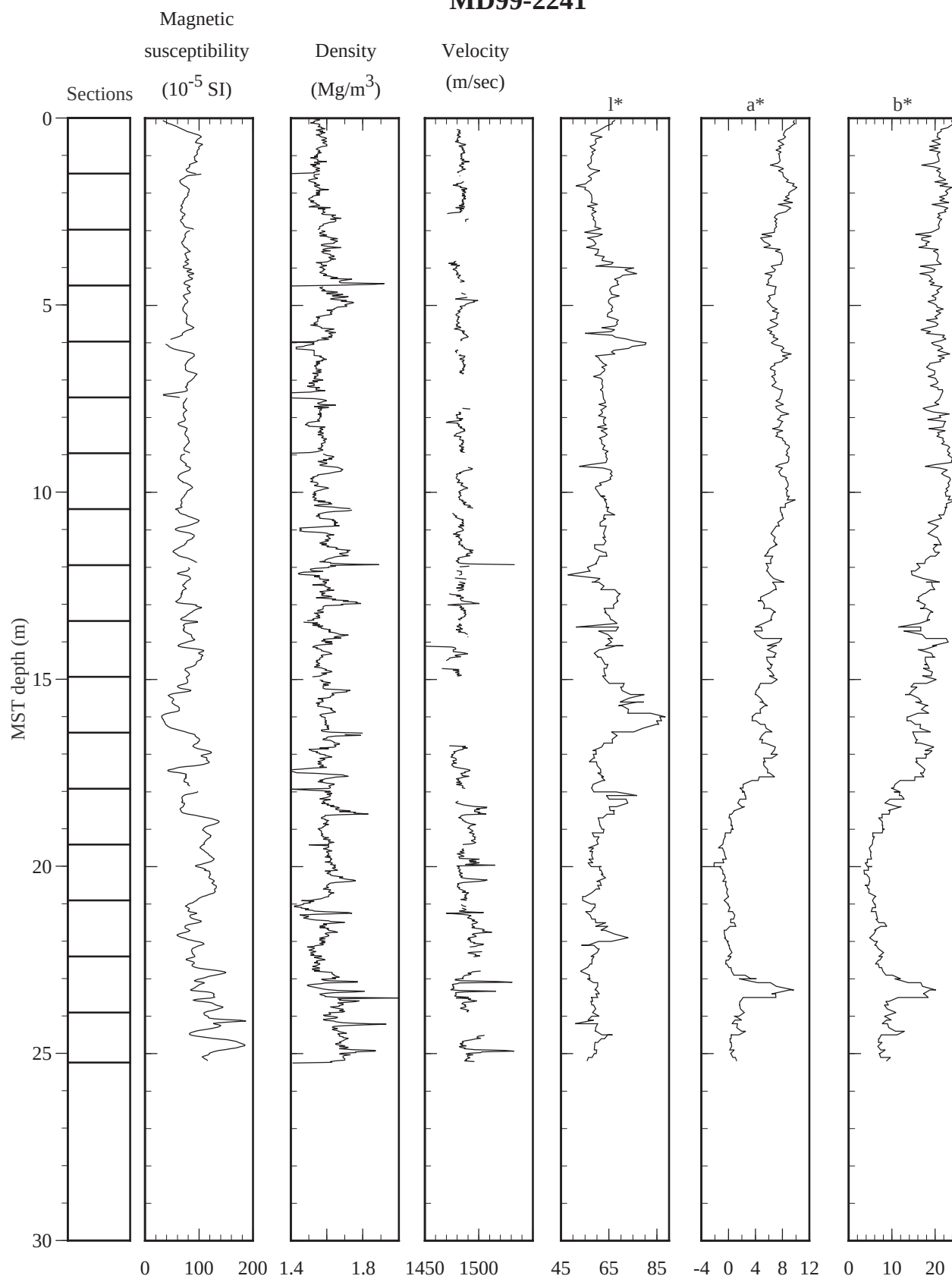
Latitude: 55°32'95 N
Longitude: 043°57'88 W

Water depth: 3280 m
Date: 16 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2241



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

Rosette and CTD 0-200 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

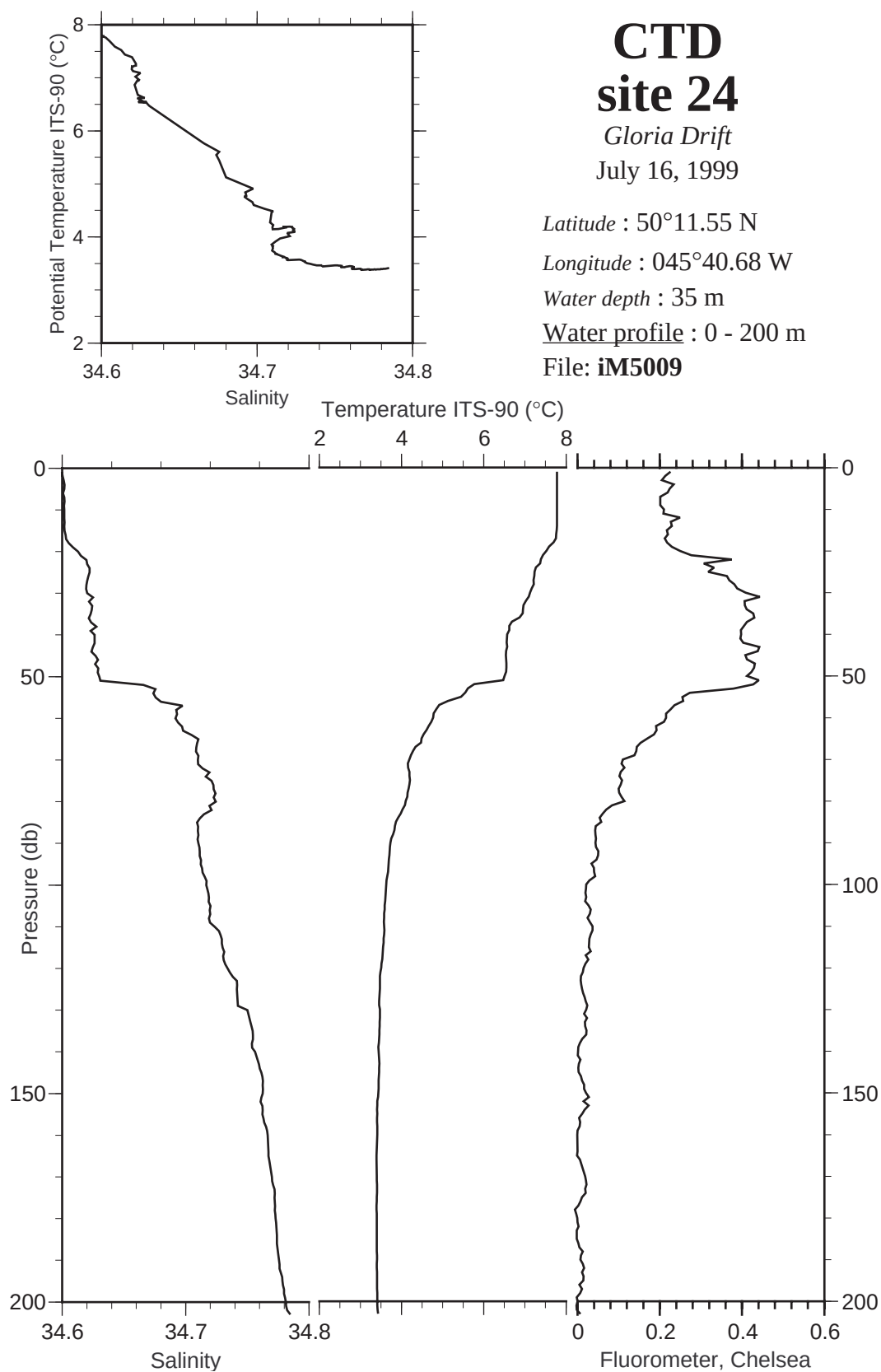
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 65 m and near surface.

Sampling

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

Summary of CTD profile

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



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

Rosette and CTD 0-3270 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

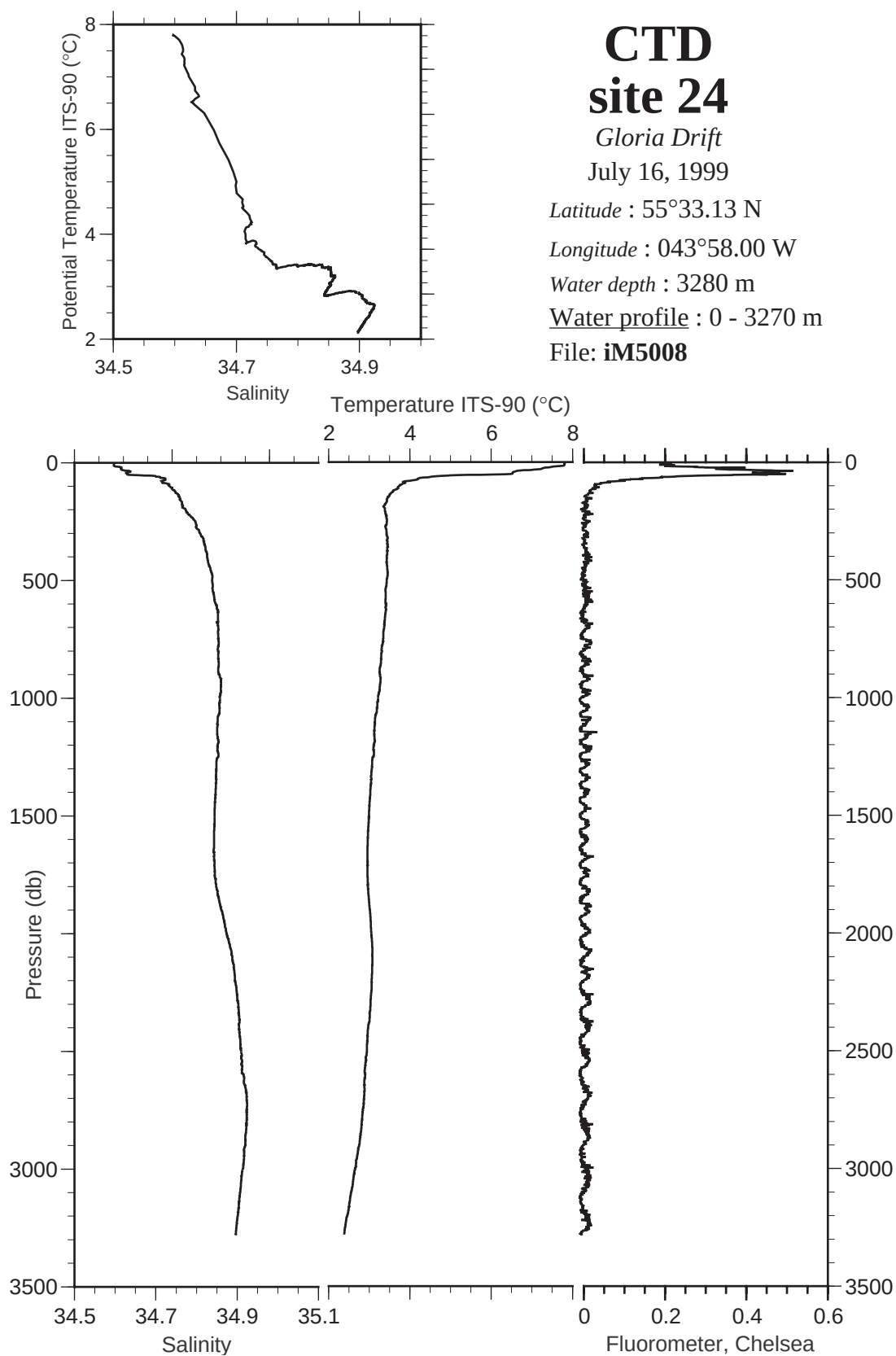
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 3270 m, 2750 m, 2100 m, 1650 m, 925 m, 475 m, 325 m.

Sampling

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

Summary of CTD profile

- The surface temperature was 7.92°C.



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 processing:

- The sections were split and described onboard. Both the archive and working halves will be processed at GEOTOP.
- A constant volume sampling was made on all working halves. The samples will be processed at AGC-BIO.
- U-channels were made on all working halves, they will be processed 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. (Processed 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.

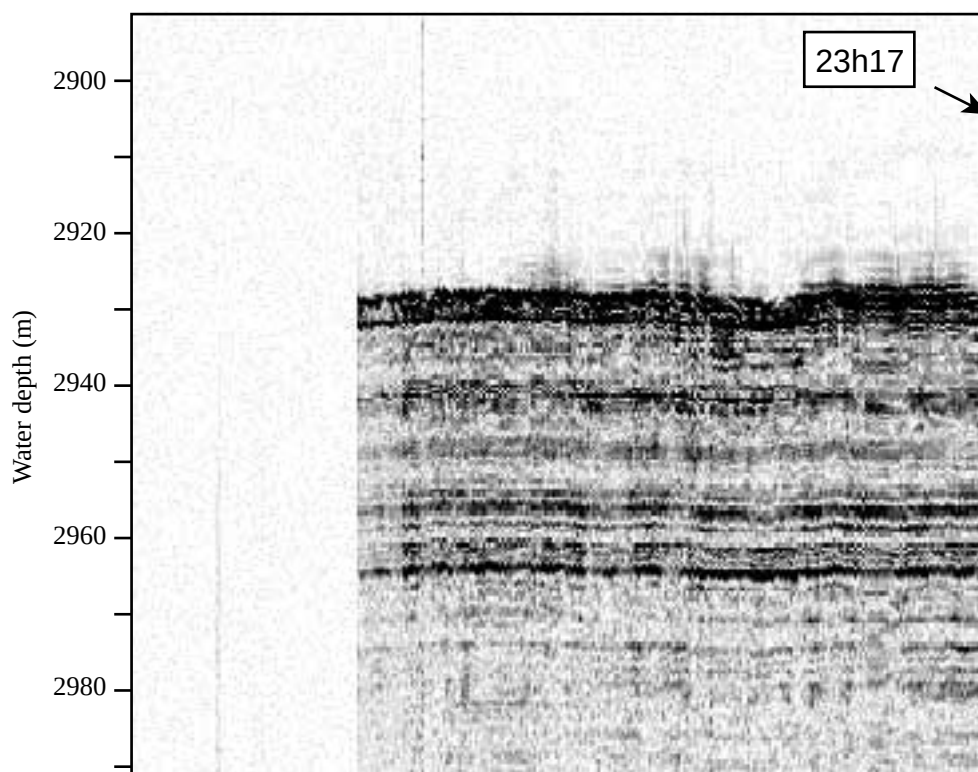
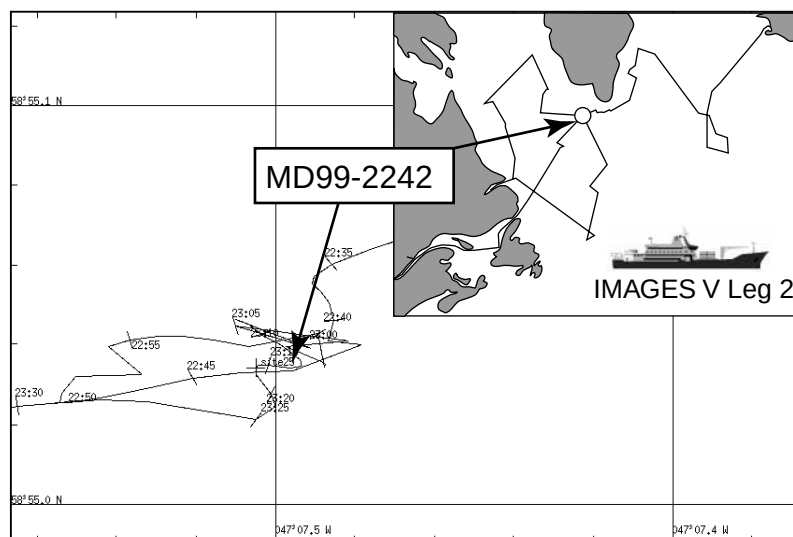
MST magnetic susceptibility, gamma ray attenuation and p-wave measurements were made at a downcore resolution of 2cm. Magnetic susceptibility values vary from 125 to 500 x 10⁻⁵ SI. Bulk density values vary from about 1.45 to 1.9 Mg/m³ and p-wave velocities range from about 1450 to 1540 m/sec.

MD99-2242 Latitude: 58°55'06 N
Length: 35.36 m Longitude: 047°07'49 W

MD99-2242 Latitude: 58°55'06 N
Length: 35.36 m Longitude: 047°07'49 W

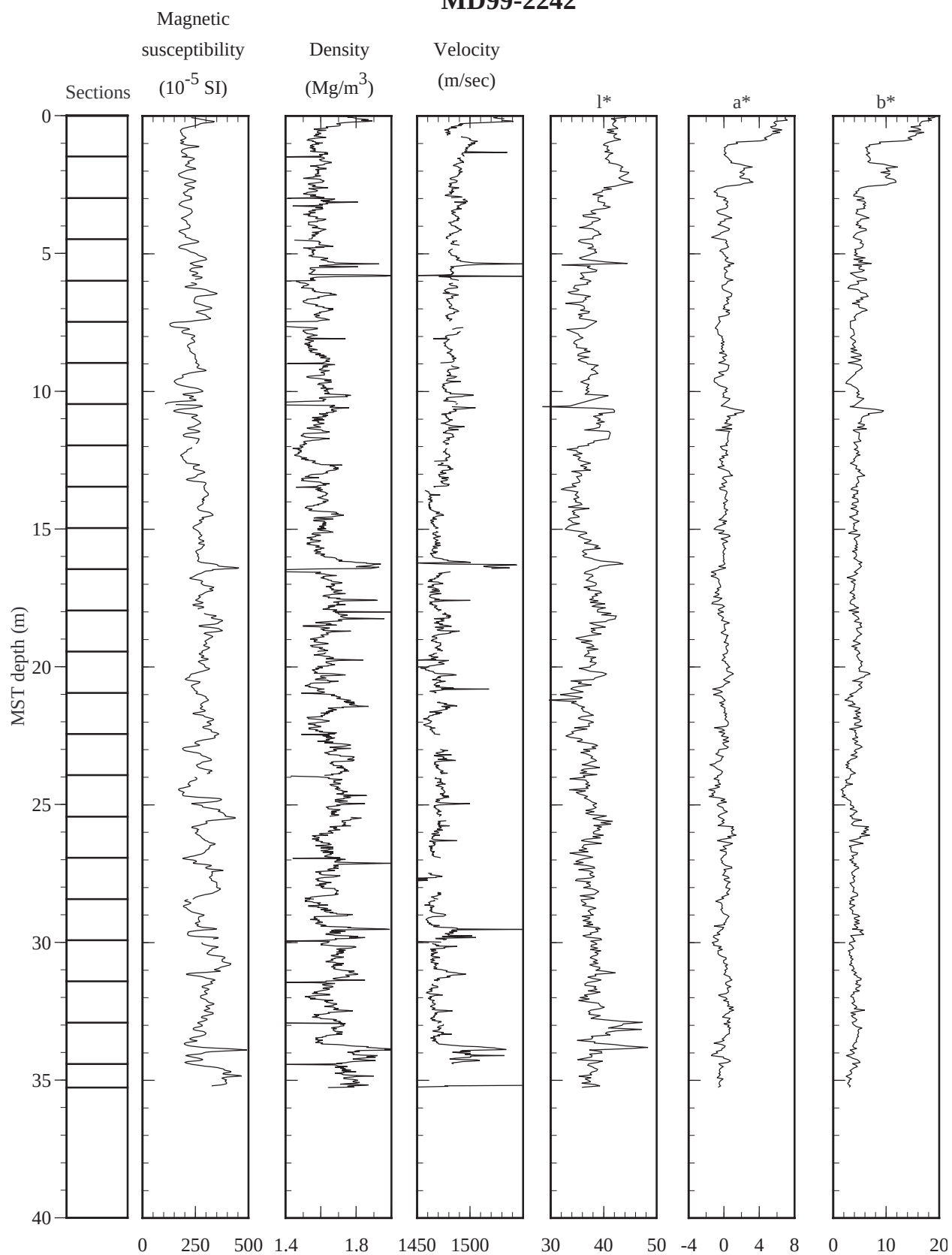
MD99-2242	Latitude: 58°55'06 N	Water depth: 2895 m
Length: 35.36 m	Longitude: 047°07'49 W	Date: 16 July 1999

MD99-2242	Latitude: 58°55'06 N	Water depth: 2895 m
Length: 35.36 m	Longitude: 047°07'49 W	Date: 16 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2242



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 processing:

- The sections were split and described onboard. Both the archive and working halves will be processed 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 section VII and 1 from base of VII. They will be processed at Gif-sur-Yvette.

Summary of physical and sedimentological observations

Strongly disturbed throughout – very soft to soupy.

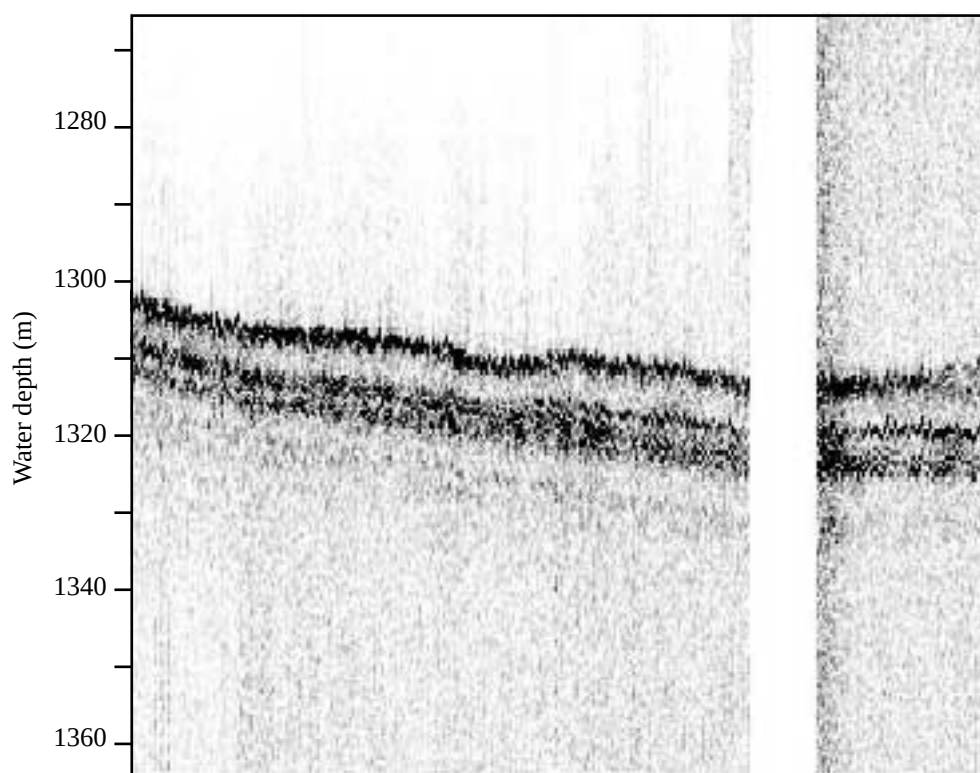
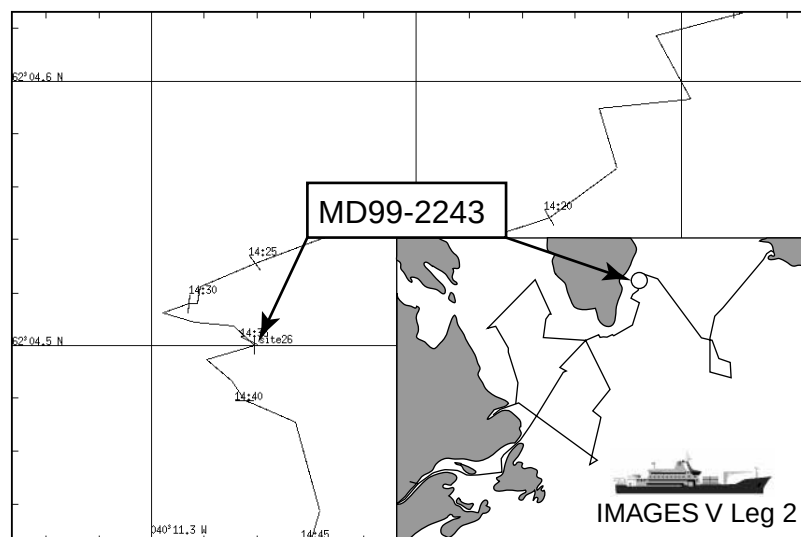
A 10 cm cobble marks the boundary between an oxidized upper sandy mud and a lower dark gray clayey silt.

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 $\times 10^{-5}$ SI. Bulk density values vary from about 1.75 to 2.05 Mg/m³ except for density values of greater than 2.1 Mg/m³ at approximately 1m. P-wave velocity values obtained range from 1465 to 1530 m/sec.

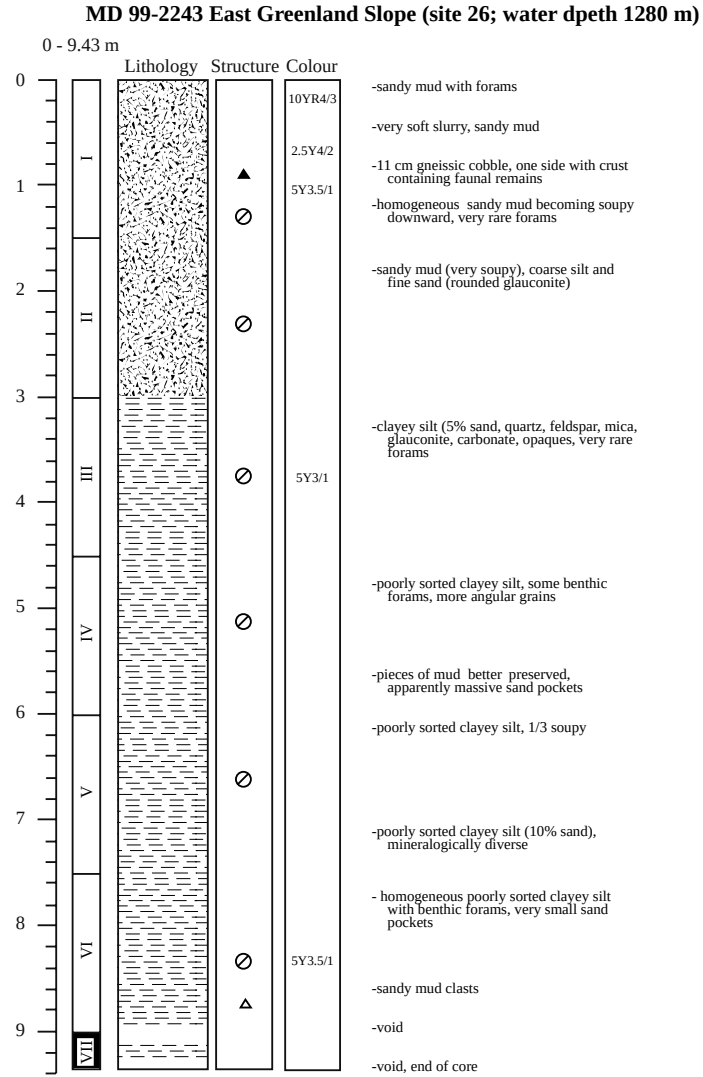
MD99-2243
Length: 9.43 m

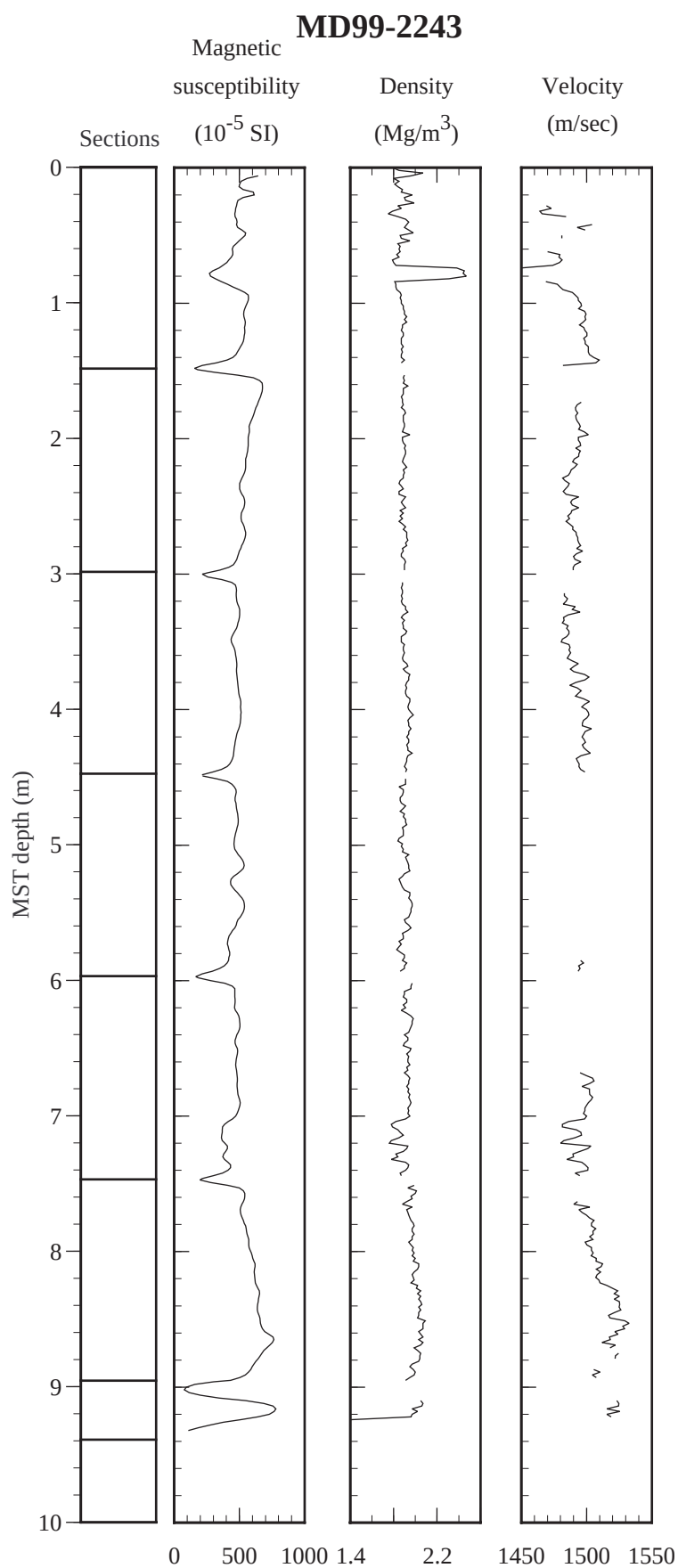
Latitude: 62°04'51 N
Longitude: 040°11'26 W

Water depth: 1280 m
Date: 18 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)





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

Rosette and CTD cast 0 - 1256 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

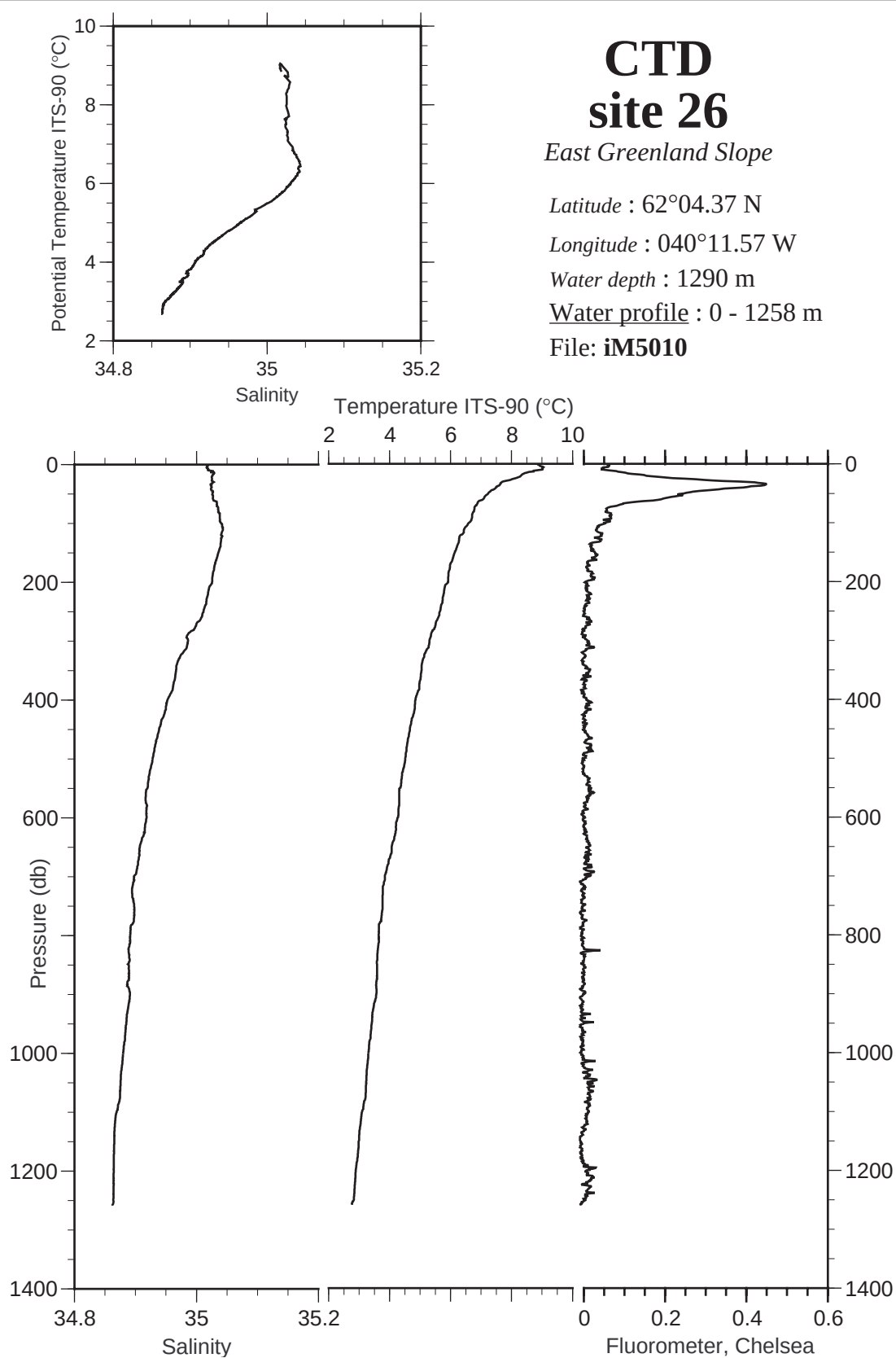
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sadow allow to sample the water column at 1256 m, 900 m, 650 m, 200 m, 110 m and 30 m.

Sampling

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

Summary of CTD profile

- The surface temperature was 9.02 °C.



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

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 processing:

- The sections were split and described onboard. Both archive and working halves will be processed at Gif-sur-Yvette.
- U-channels were taken out of all the working halves. They will be processed at Gif-sur-Yvette.
- Paleomagnetic cube samples were made on the archive. They will be processed 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 processed at Gif-sur-Yvette.

Summary of physical and sedimentological observations

The core is predominantly dark gray to very dark gray 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/m³ with a single interval with density greater than 2.2 Mg/m³ at the top of the core. P-wave velocities values obtained range from 1450 to 1550 m/sec.

MD99-2244

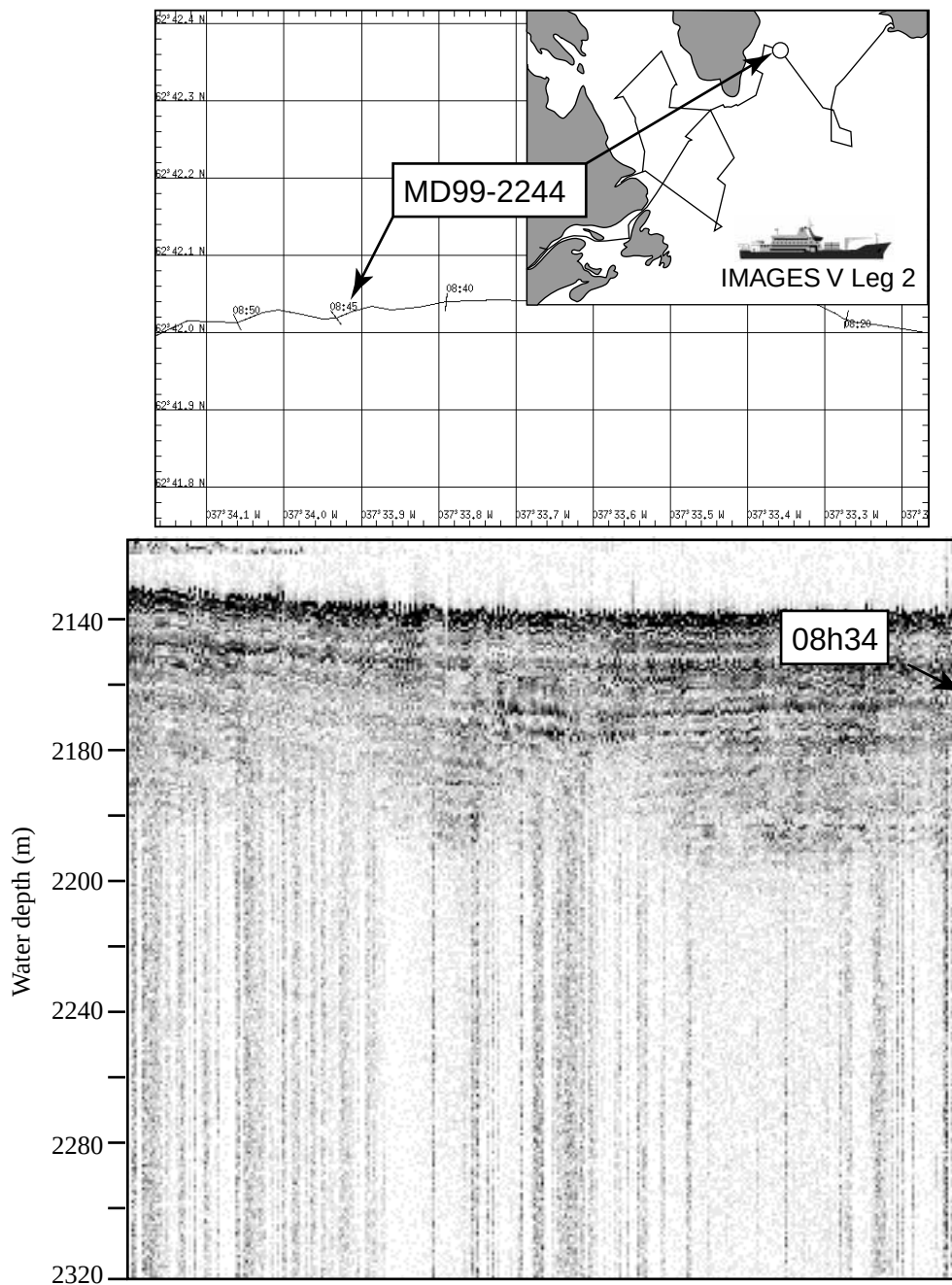
Latitude: 62°41'99 N

Water depth: 2110 m

Length: 24.71 m

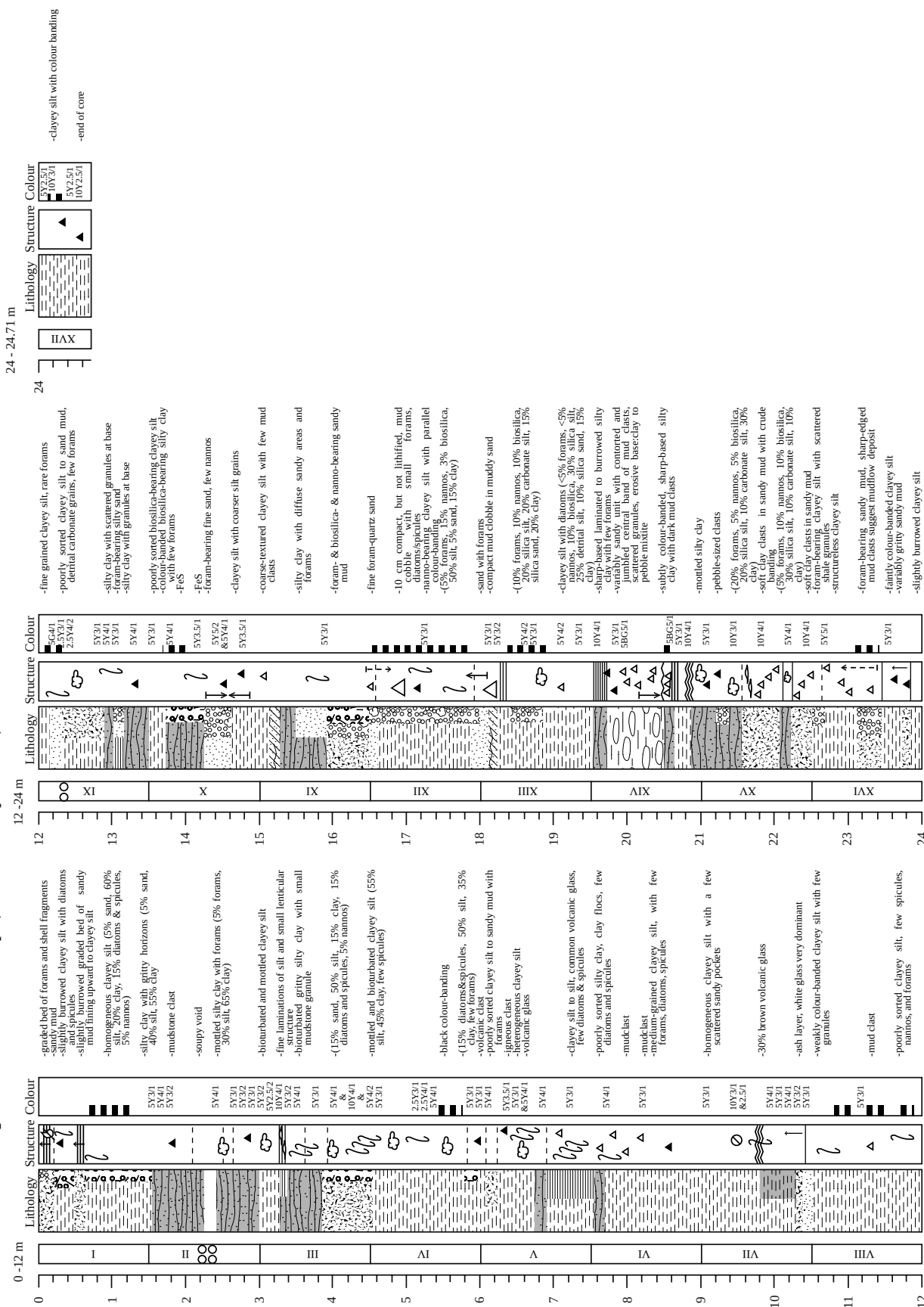
Longitude: 037°33'73 W

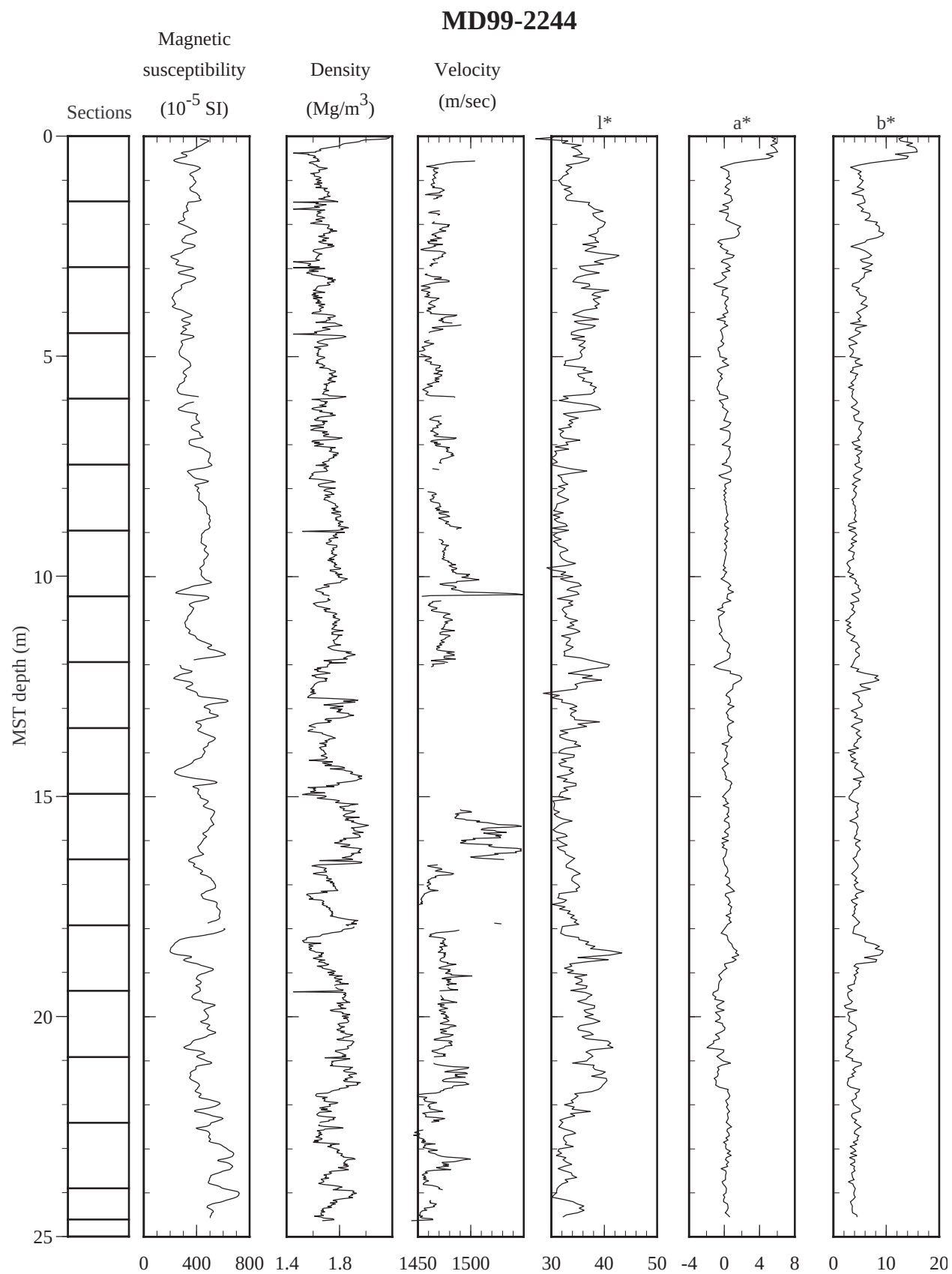
Date: 19 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2244 Irminger Basin, SE Greenland Slope (site 28; water depth 2750 m)





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:

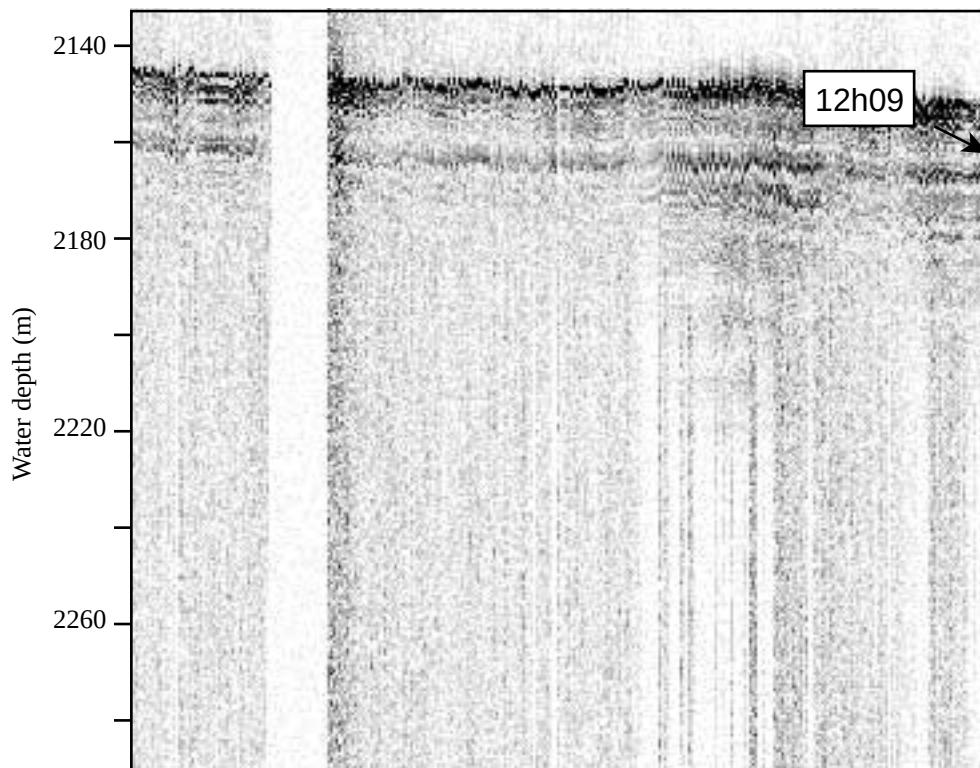
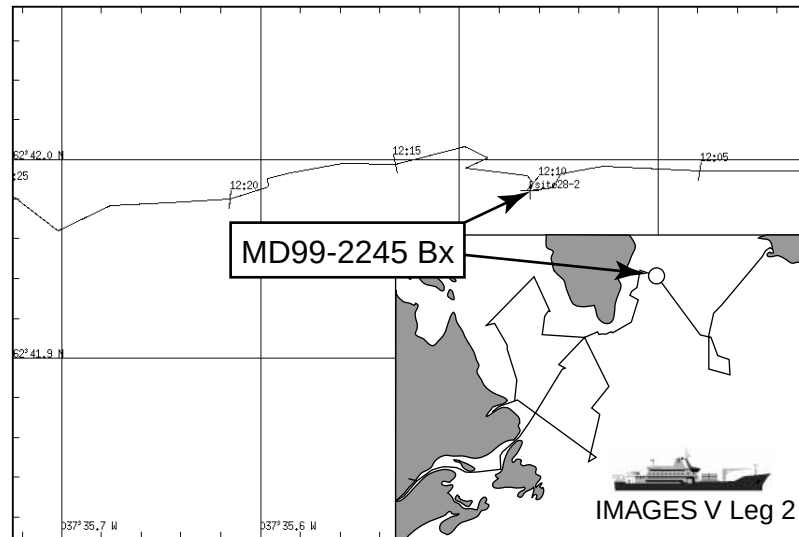
Onboard sampling and post cruise processing:

- Two surface samples were recovered, one will be processed at Bordeaux, the other one at AGC-BIO.
- One bulk sample was recovered and will be processed at Bordeaux.

MD99-2245 Bx

Latitude: 62°41'93 N
Longitude: 037°35'49 W

Water depth: 2125 m
Date: 19 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

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

Rosette and CTD cast 0 - 2100 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

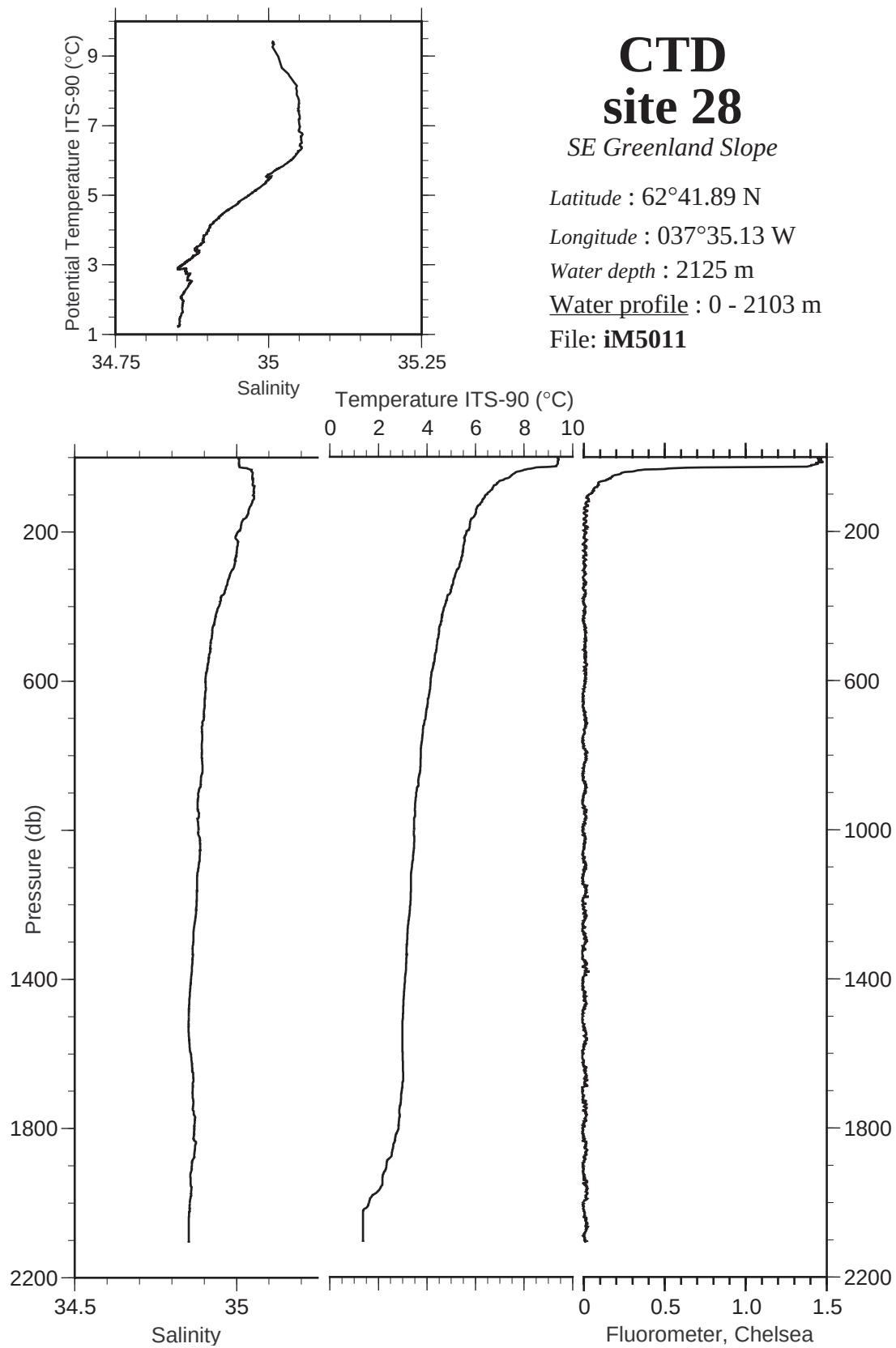
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allow to sample the water column at 2103 m, 1900 m, 1800 m, 1710 m, 1520 m, 1025 m, 600 m, 210 m, 100 m and 25 m.

Sampling

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

Summary of CTD profile

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



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 processing:

- The sections were split and described onboard. Both archive and working halves will be processed at Gif-sur-Yvette.
- U-channels were taken out of all the working halves. They will be processed at Gif-sur-Yvette.
- Paleomagnetic cube samples were made on the archive. They will be processed 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 processed at Gif-sur-Yvette.

Summary of physical and sedimentological observations

The core was slightly disturbed by coring.

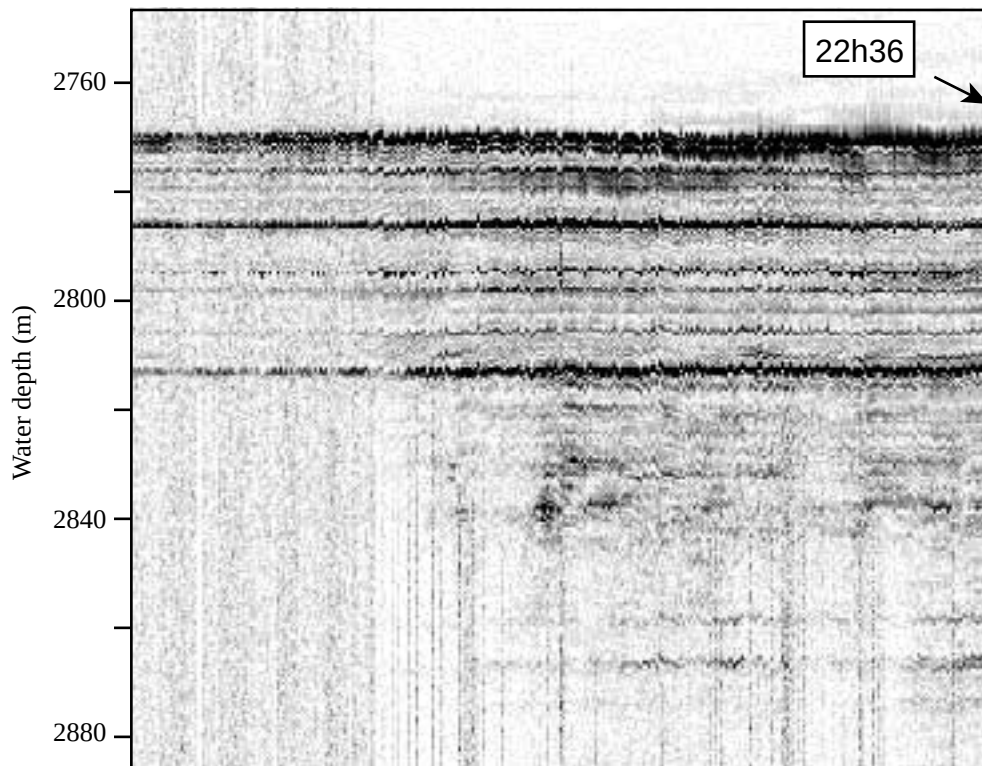
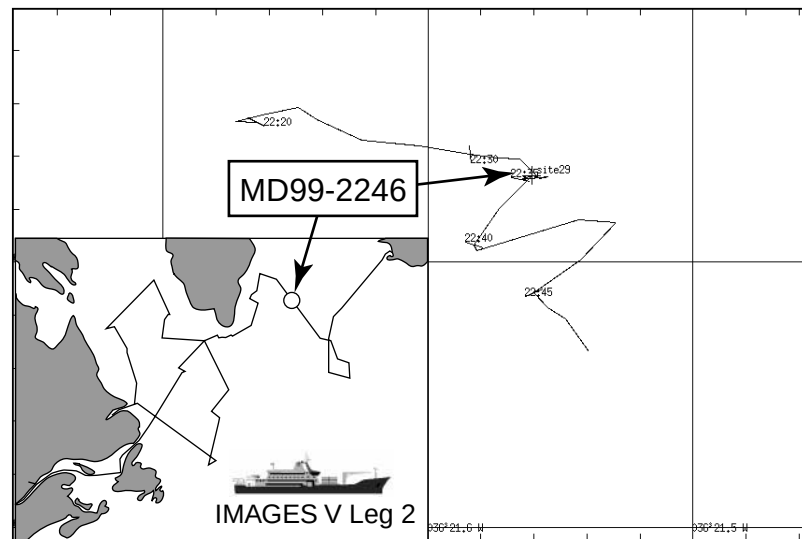
The core consists predominantly of siliciclastic sediment with only minor biogenic material. Clayey silt is generally less burrowed and more structureless than silty clay. Silty clay is richer in biogenic silica. Sharp-based, laminated, graded sand and silt beds, and upward coarsening sandy beds, are 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/m³ with occasional intervals of density values greater than 2.00 Mg/m³. P-wave velocities values obtained range from 1450 to 1510 m/sec, with peaks greater than 1530 m/sec corresponding to the density peaks.

MD99-2246
Length: 35.77 m

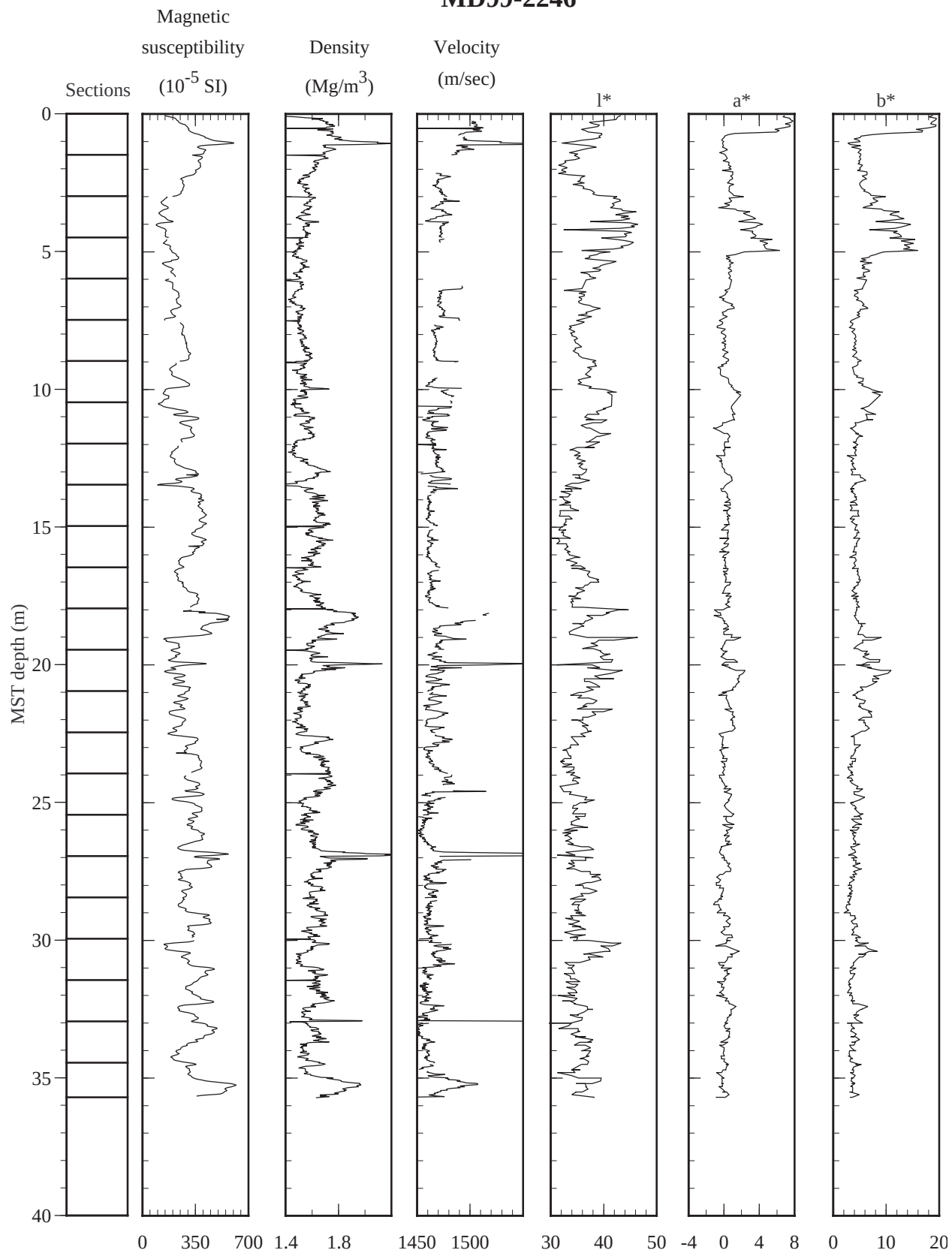
Latitude: 61°54'73 N
Longitude: 036°21'52 W

Water depth: 2750 m
Date: 19 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2246



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

Rosette and CTD cast 0 - 200 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

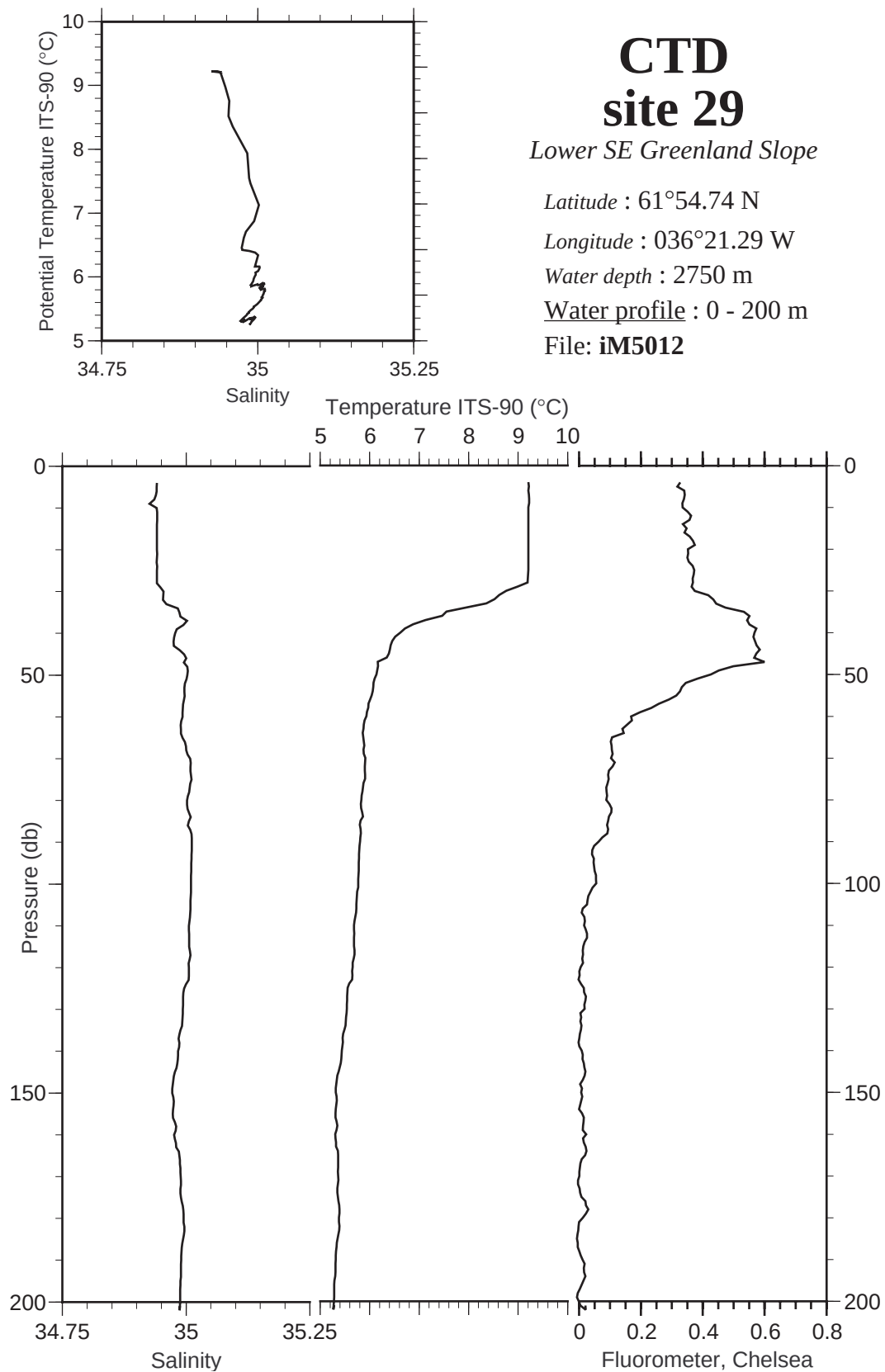
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 45 m and 5 m.

Sampling

The water samples will be analysed for alkenones.

Summary of CTD profile

- The surface temperature was 9.21 °C.



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 processing:

- The sections were split and described onboard. Both archive and working halves will be processed at Gif-sur-Yvette.
- U-channels were taken out of all the working halves. They will be processed at Gif-sur-Yvette.
- Paleomagnetic cube samples were made on the archive. They will be processed 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 processed at Gif-sur-Yvette.

Summary of physical and sedimentological observations

The core is significantly disturbed by coring from 0-12 m.

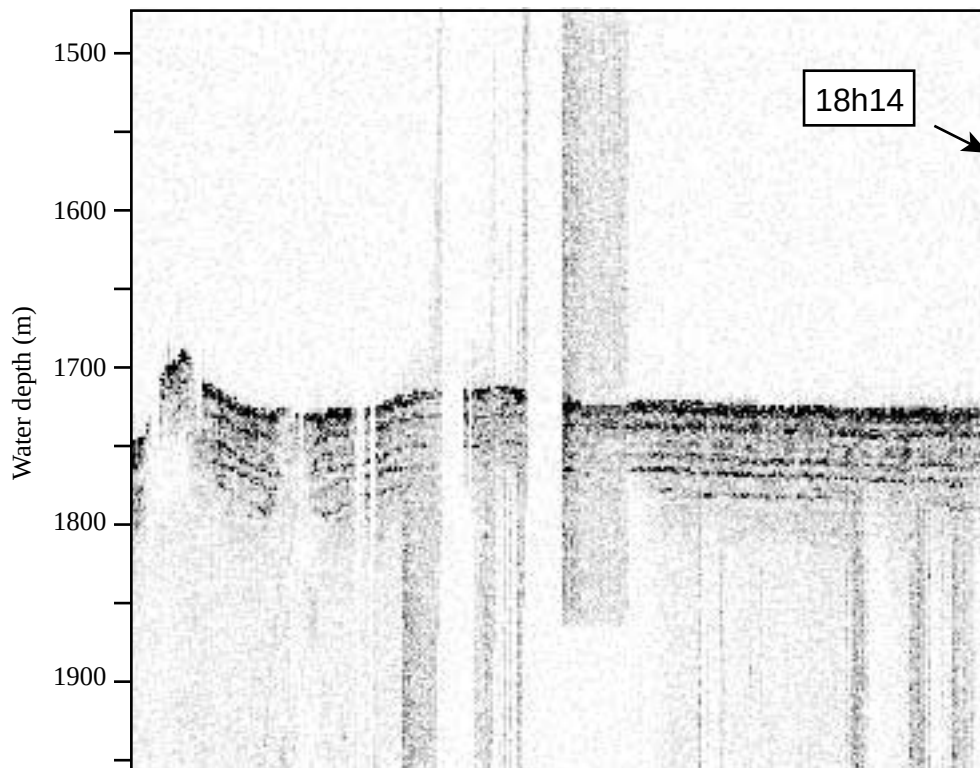
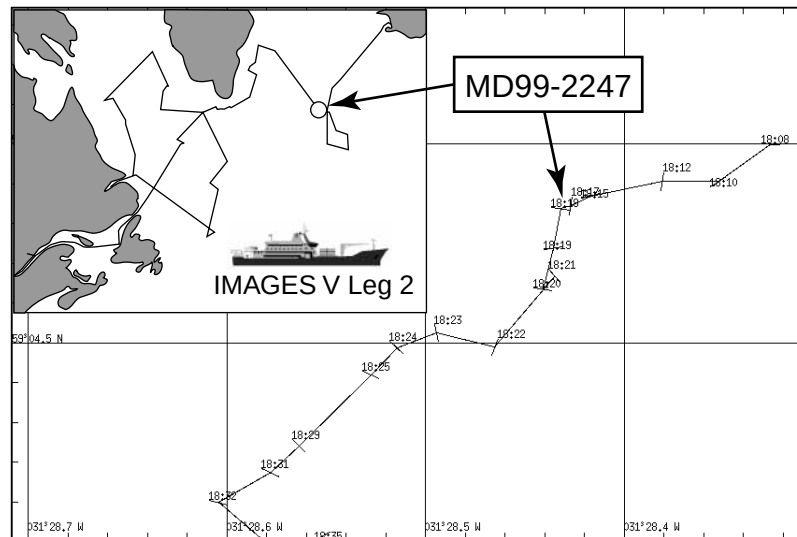
The sediment in this core varies from silty clay to ooze according to the amount of biogenic carbonate skeletons (forams, nannofossils) and biosilica (diatoms and sponge spicules). Biogenic carbonate everywhere exceeds biogenic silica. A few scattered outsized clasts are present. Burrowing, most evident 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 250×10^{-5} SI. Bulk densities vary from about 1.35 to 1.7 Mg/m³ and p-wave velocity values obtained range from 1460 to 1500 m/sec.

MD99-2247
Length: 24.50 m

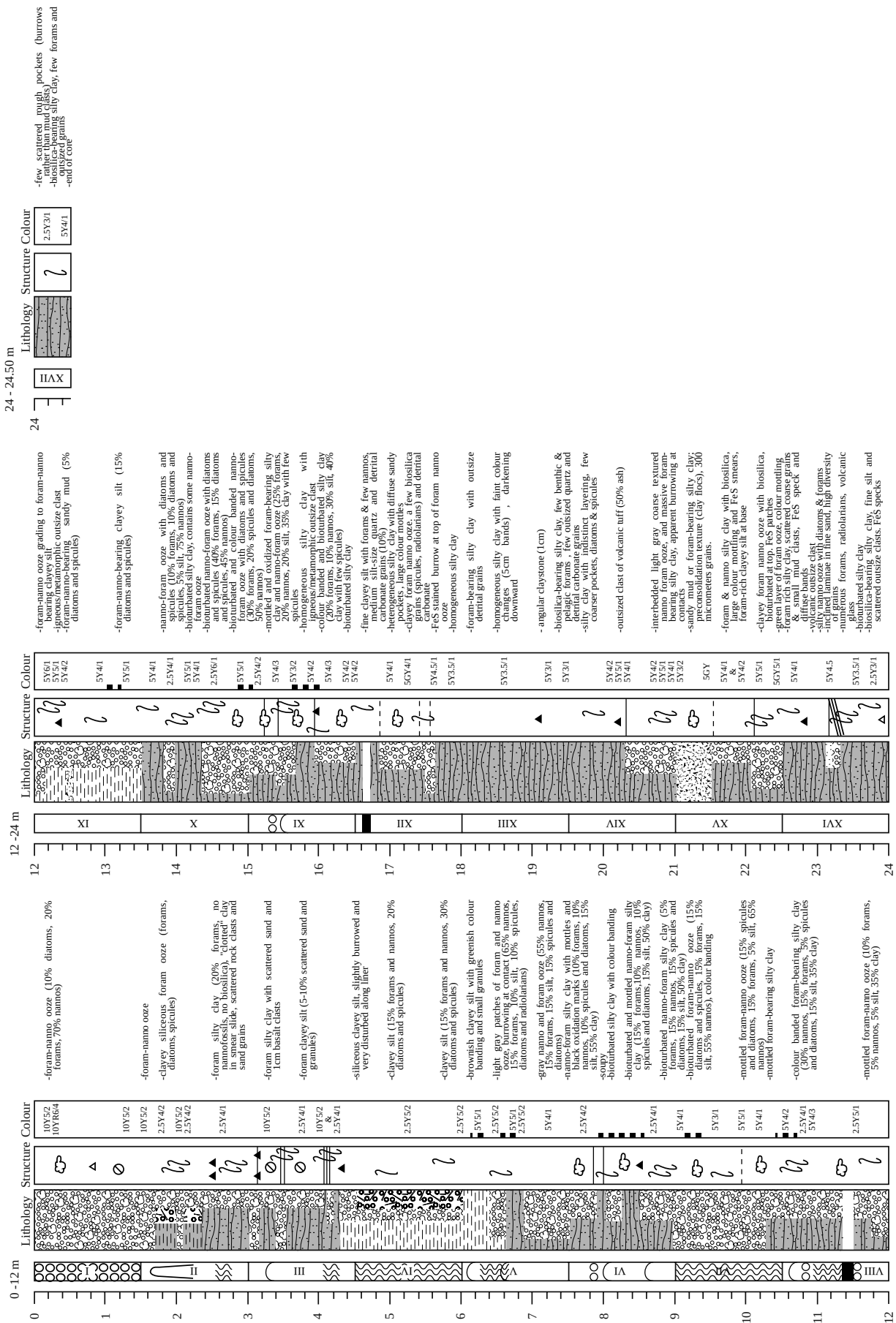
Latitude: 59°04'61 N
Longitude: 031°28'34 W

Water depth: 1690 m
Date: 20 July 1999

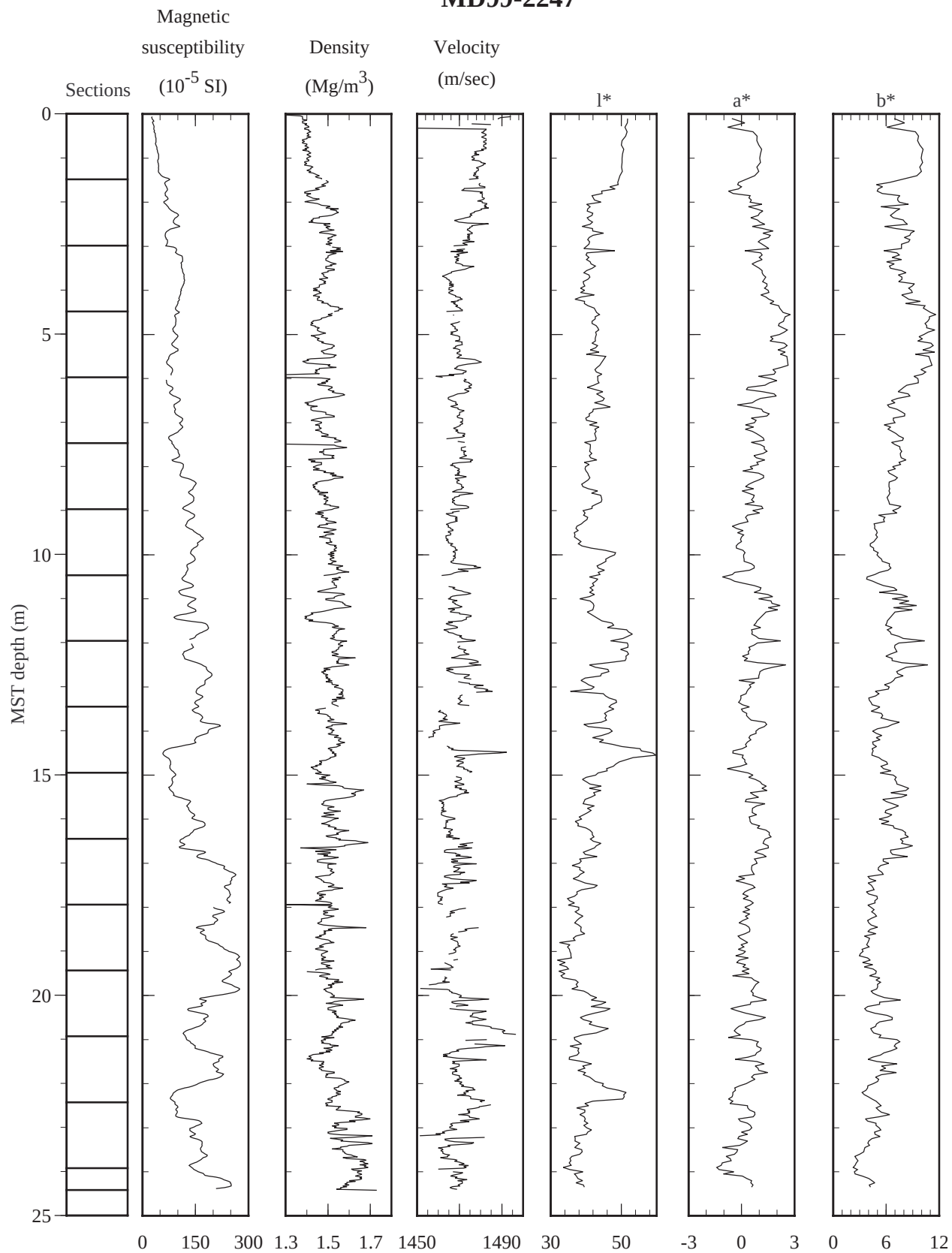


Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2247 West Reykjanes Ridge (site 30; water depth 1690 m)



MD99-2247



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 processing:

- The sections were split and described onboard. Both archive and working halves will be processed at Gif-sur-Yvette.
- U-channels were taken out of all the working halves. They will be processed at Gif-sur-Yvette.
- Paleomagnetic cube samples were made on the working halves. They will be processed 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 processed at Gif-sur-Yvette.

Summary of physical and sedimentological observations

0-3 m very disturbed and soupy; 3-9 m moderately disturbed with voids.

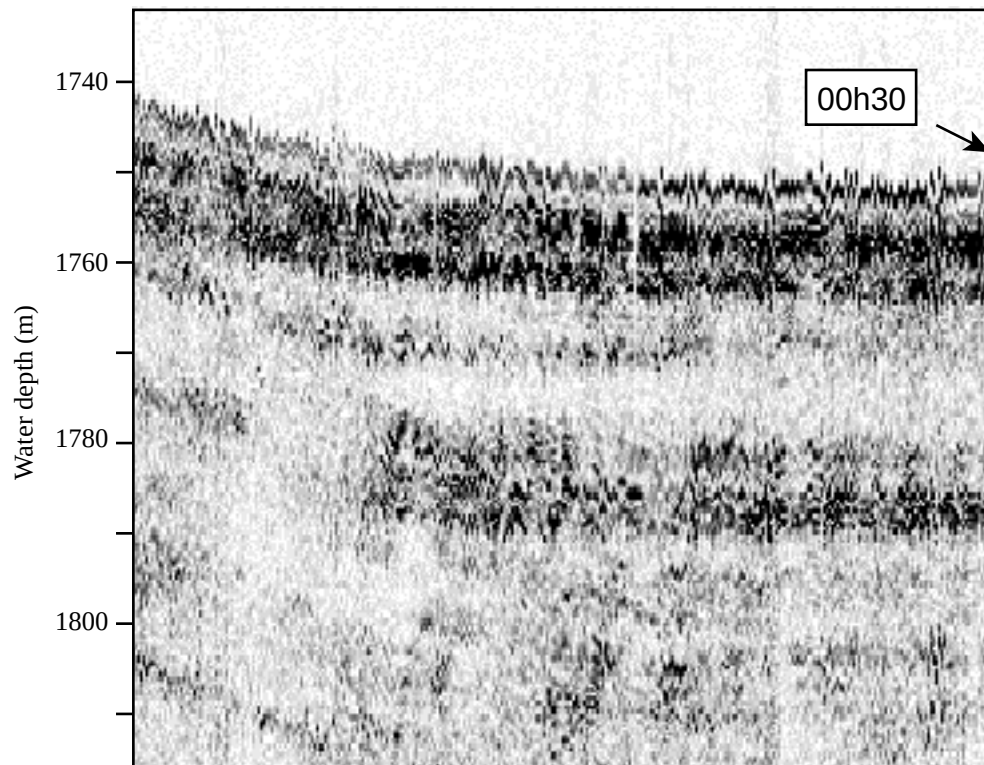
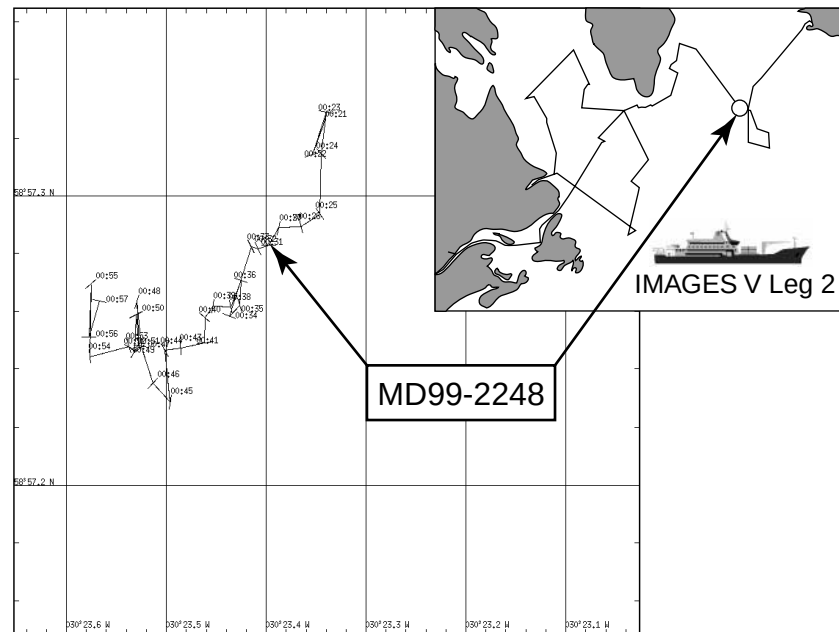
The core lithology is highly variable according to the relative amounts of calcareous and siliceous skeletons. Biogenics, mostly forams, are sparse in heterogeneous sandy muds and mottled silty clay. Biogenic components are dominant in colour-banded siliceous (sponge spicule) and nanno ooze intervals. 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 400×10^{-5} SI. Bulk density values vary from about 1.25 to 1.75 Mg/m³ and p-wave velocity values range from 1460 to 1550 m/sec.

MD99-2248
Length: 38.22 m

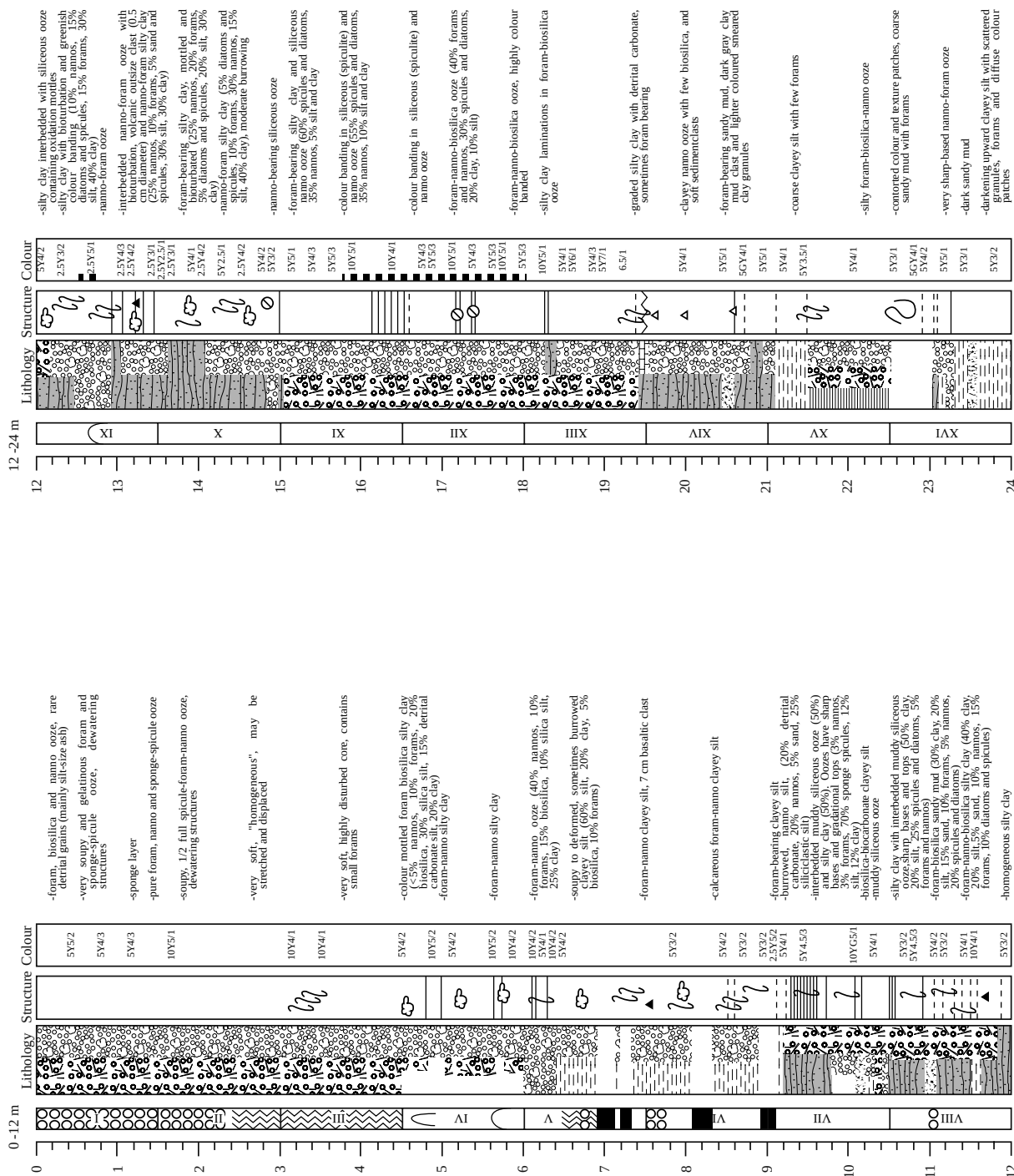
Latitude: 58°57'32 N
Longitude: 030°23'33 W

Water depth: 1724 m
Date: 21 July 1999

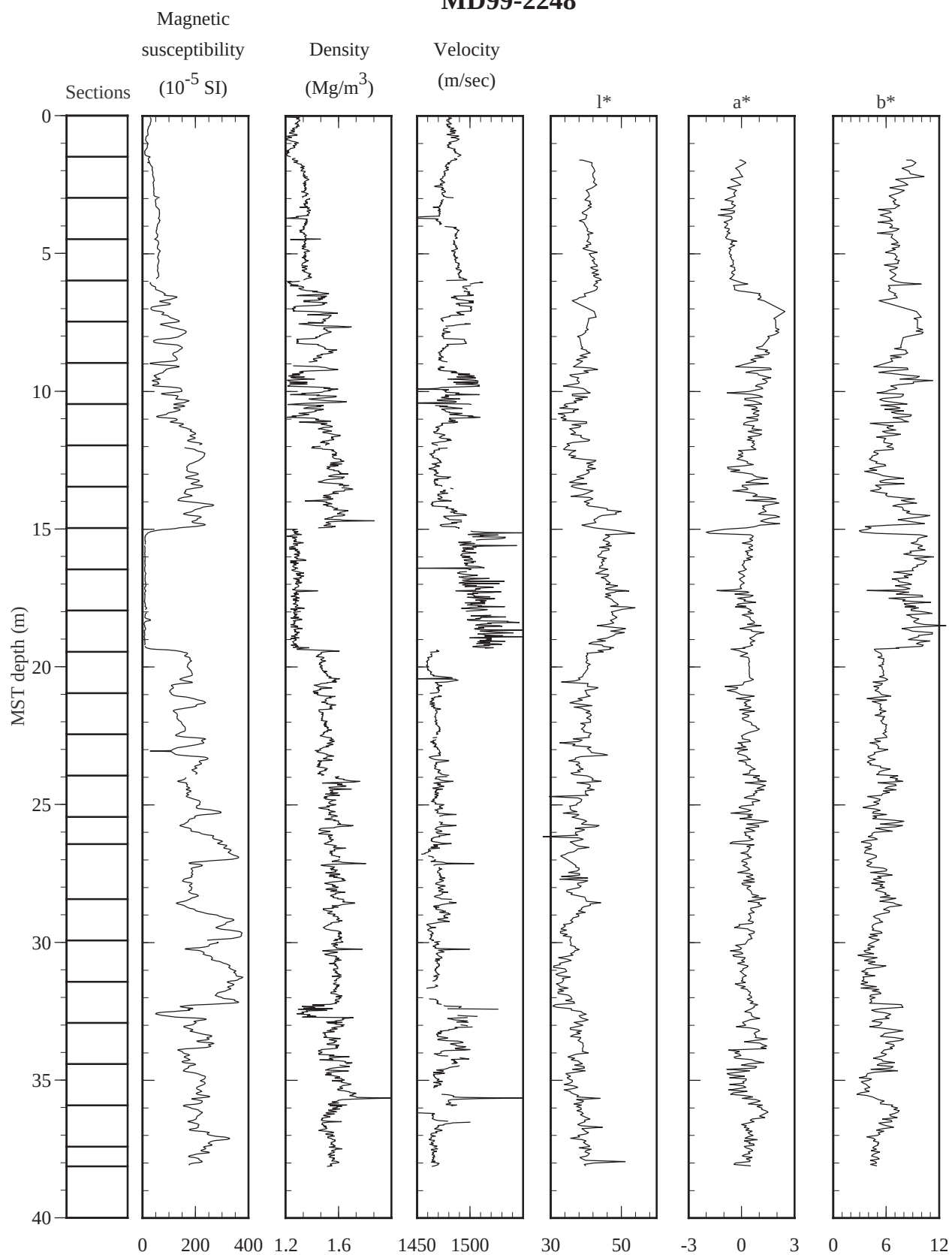


Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD 99-2248 Reykjanes Ridge (site 31; water depth 1724 m)



MD99-2248



Julian day:	202	GMT time:	01h37
Latitude:	58°57.44N	Longitude:	030°22.99W
Water depth:	1710	Location:	Reykjanes 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 processed 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 processed at GEOTOP. The rest will be processed at Gf-sur-Yvette. Core b only measures 68 cm long.

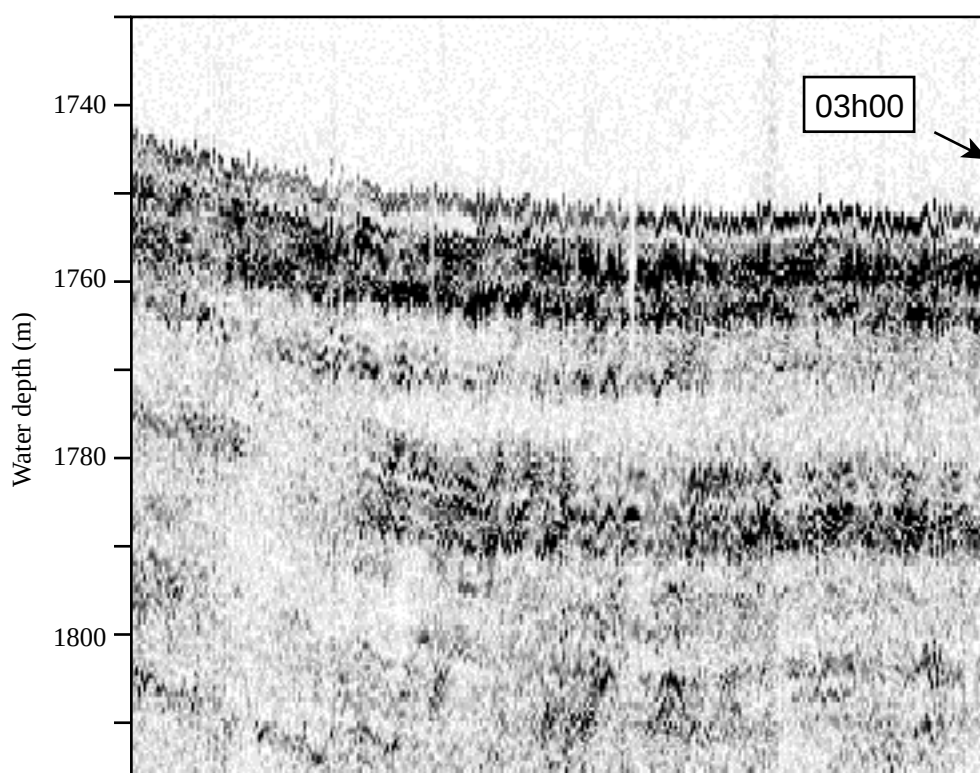
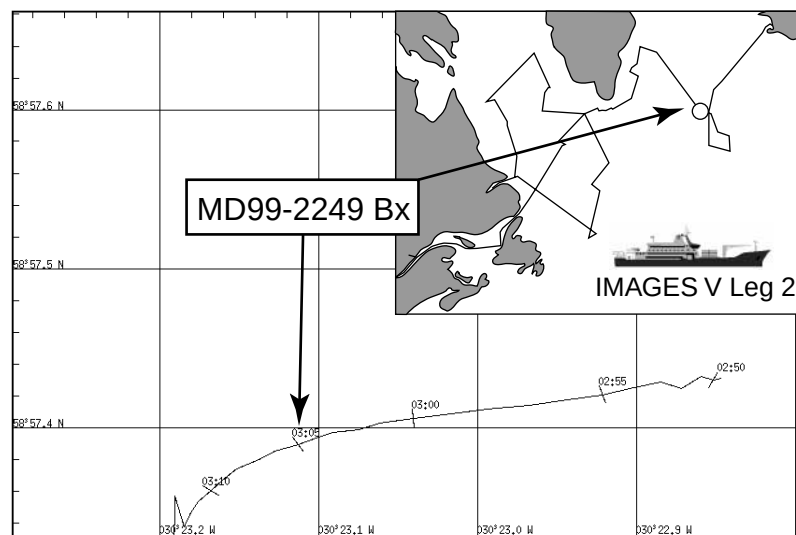
Onboard sampling and post cruise processing:

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

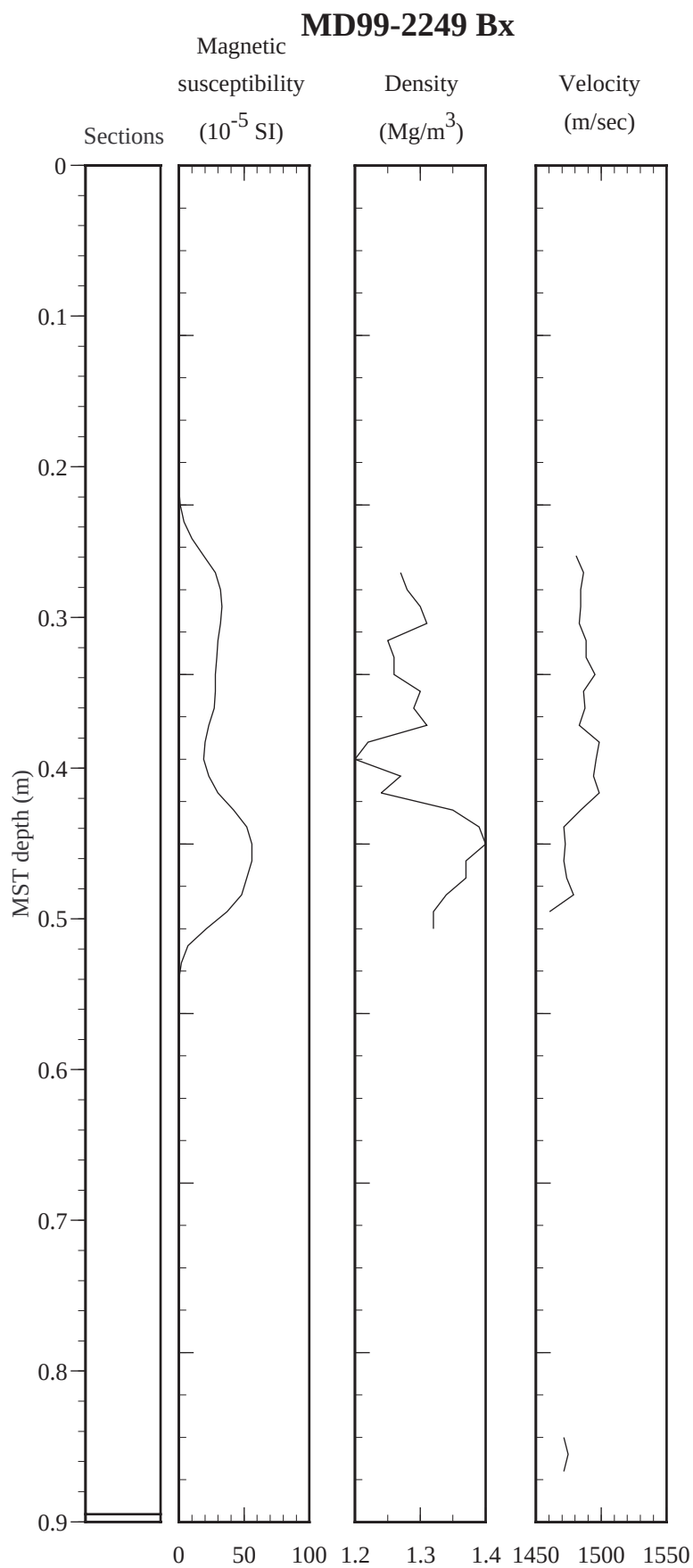
MD99-2249 Bx

Latitude: 58°57'44 N
Longitude: 030°23'99 W

Water depth: 1710 m
Date: 21 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)



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

Rosette and CTD cast 0 - 200 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

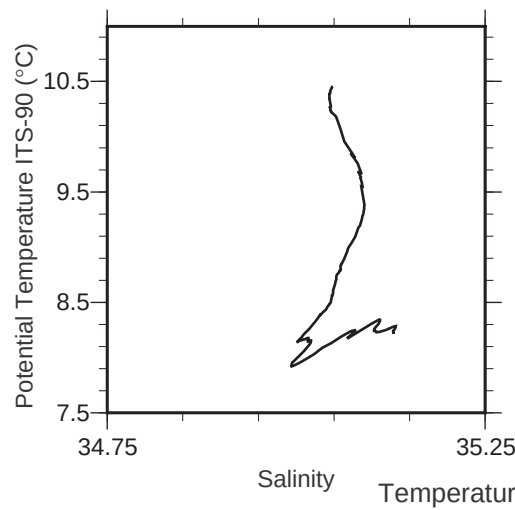
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 200 m, 140 m, 10 m and near surface.

Sampling

The water samples will be analysed for alkenone and Neodinium.

Summary of CTD profile

- The surface temperature was 10.46 °C.



CTD site 31

East Reykjanes Ridge

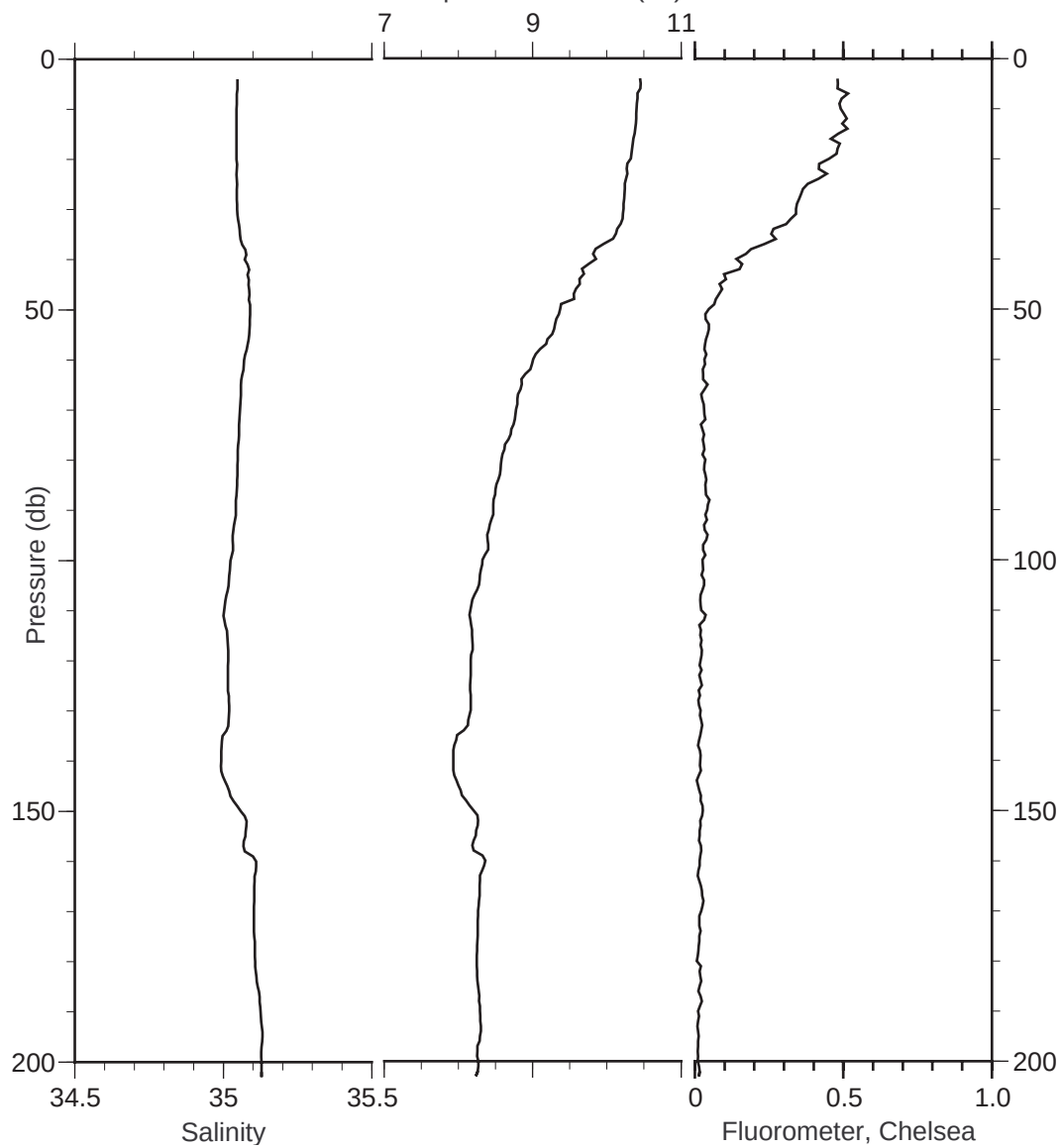
Latitude : 58°57.20 N

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 processing:

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

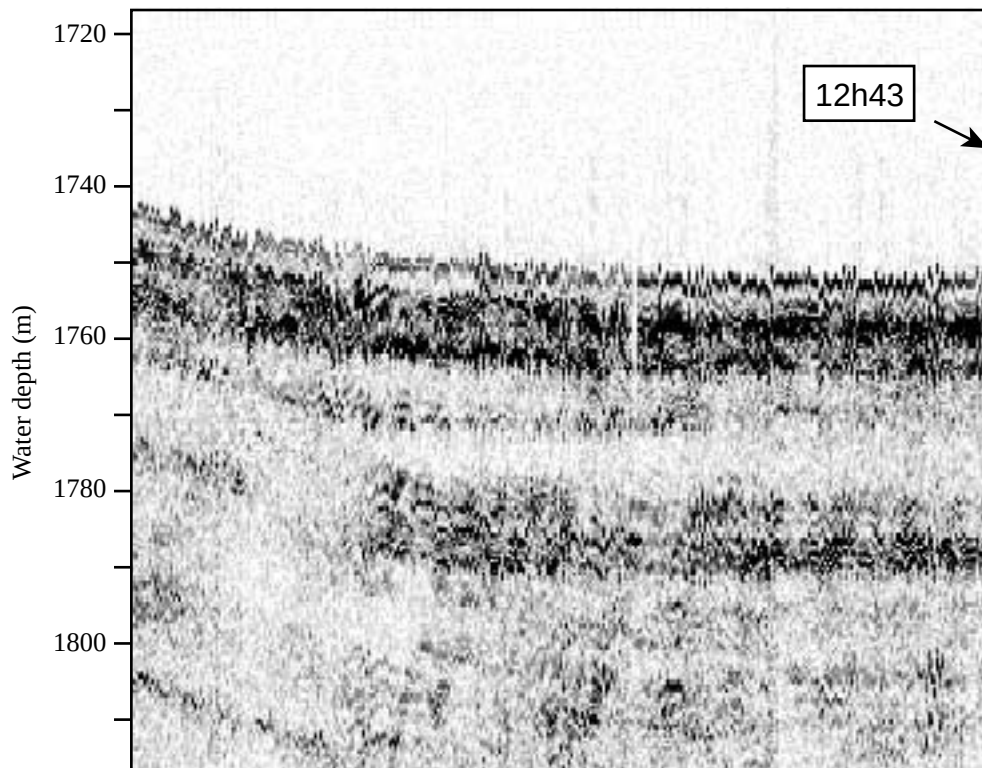
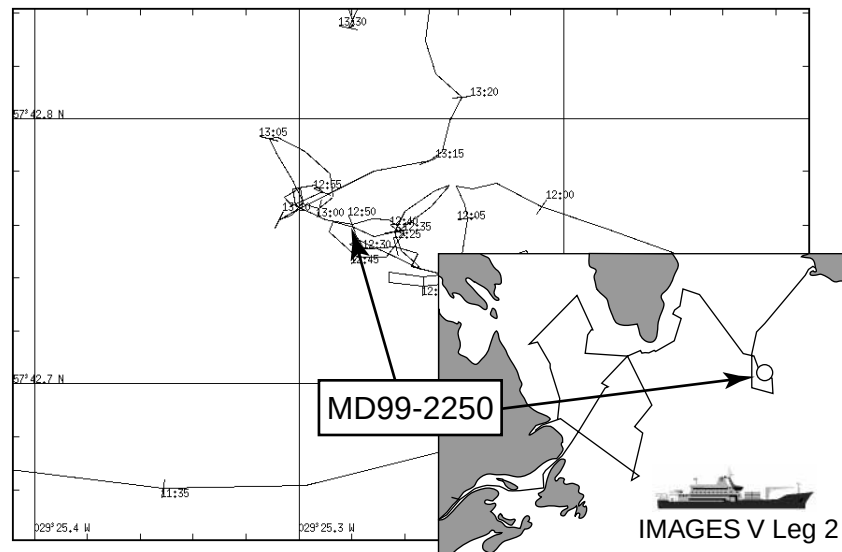
Summary of physical and sedimentological observations

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 225×10^{-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 1600 m/sec.

MD99-2250
Length: 36.98 m

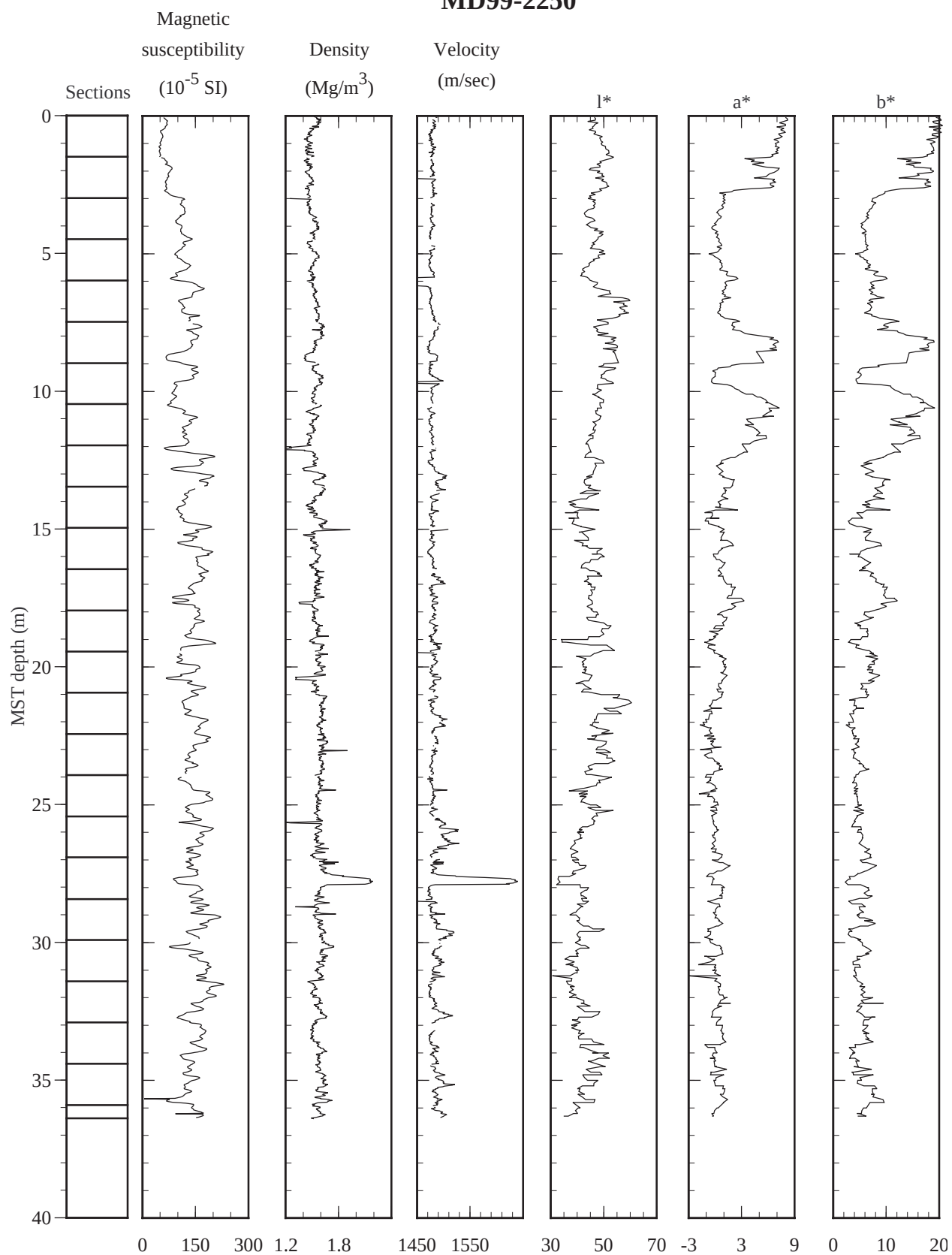
Latitude: 57°42'71 N
Longitude: 029°25'27 W

Water depth: 2310 m
Date: 21 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2250



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 processing:

- The sections were split onboard but not described. Both archive and working halves will be processed at Gif-sur-Yvette.

U-channel have been made on all working halves, they will be processed 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 processed at Gif-sur-Yvette.

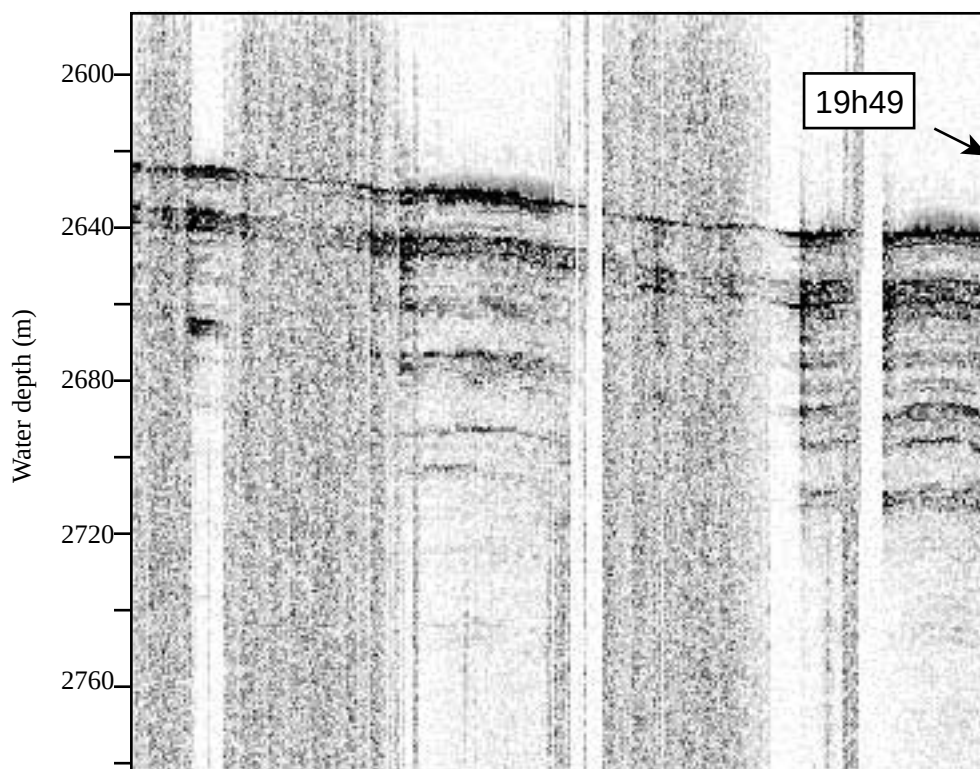
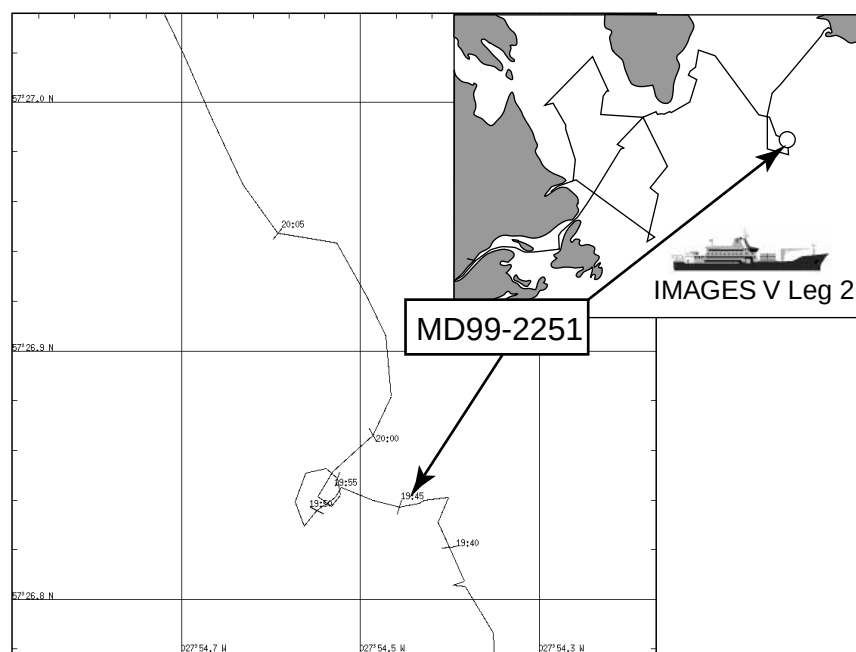
Summary of physical and sedimentological observations

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 250×10^{-5} SI. Bulk density values vary from about 1.35 to 1.55 Mg/m³ and p-wave velocities values range from 1475 to 1500 m/sec.

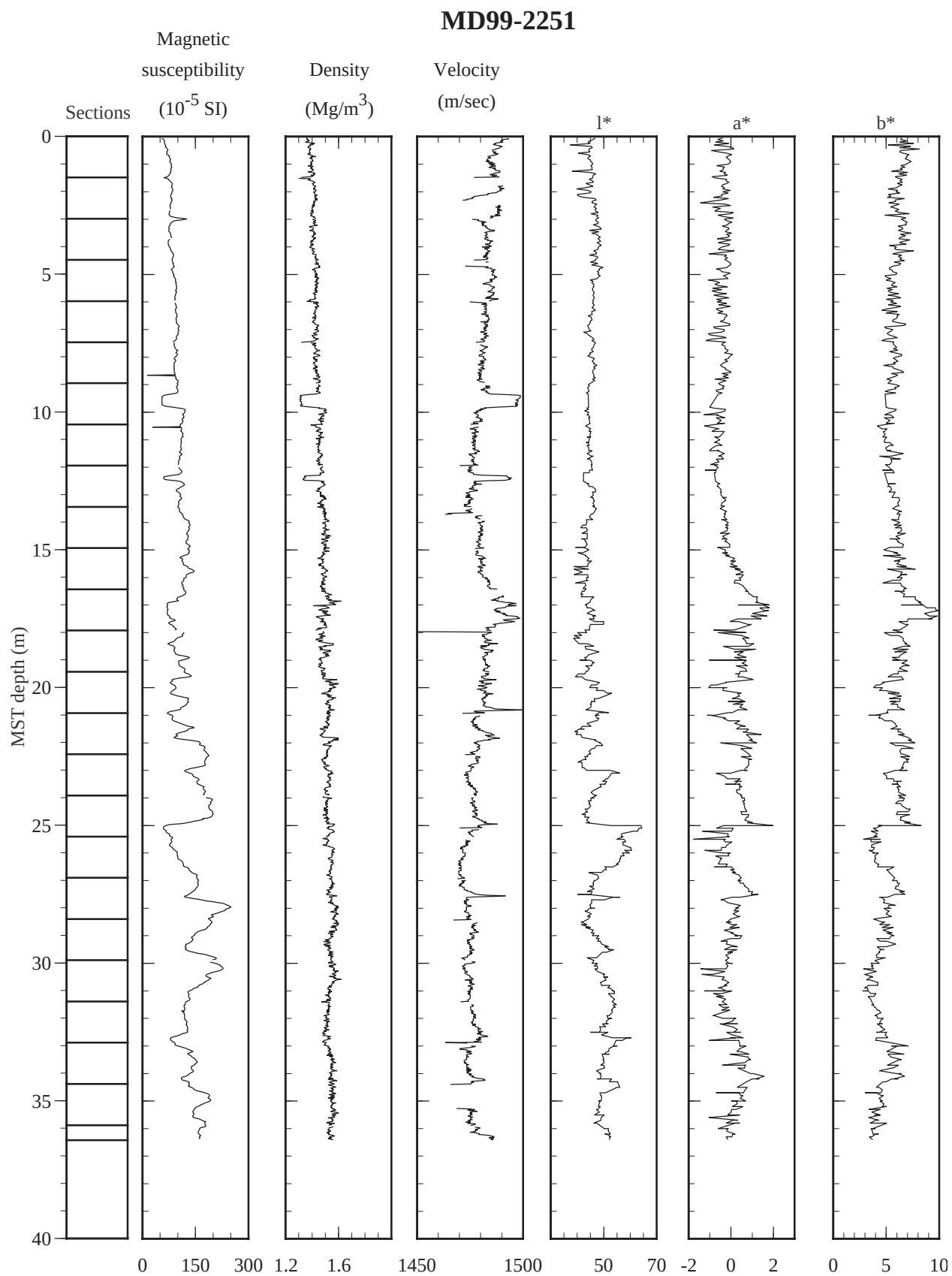
MD99-2251
Length: 25.68 m

Latitude: 57°26'87 N
Longitude: 027°54'47 W

Water depth: 2620 m
Date: 21 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)



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

Karsten Core 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

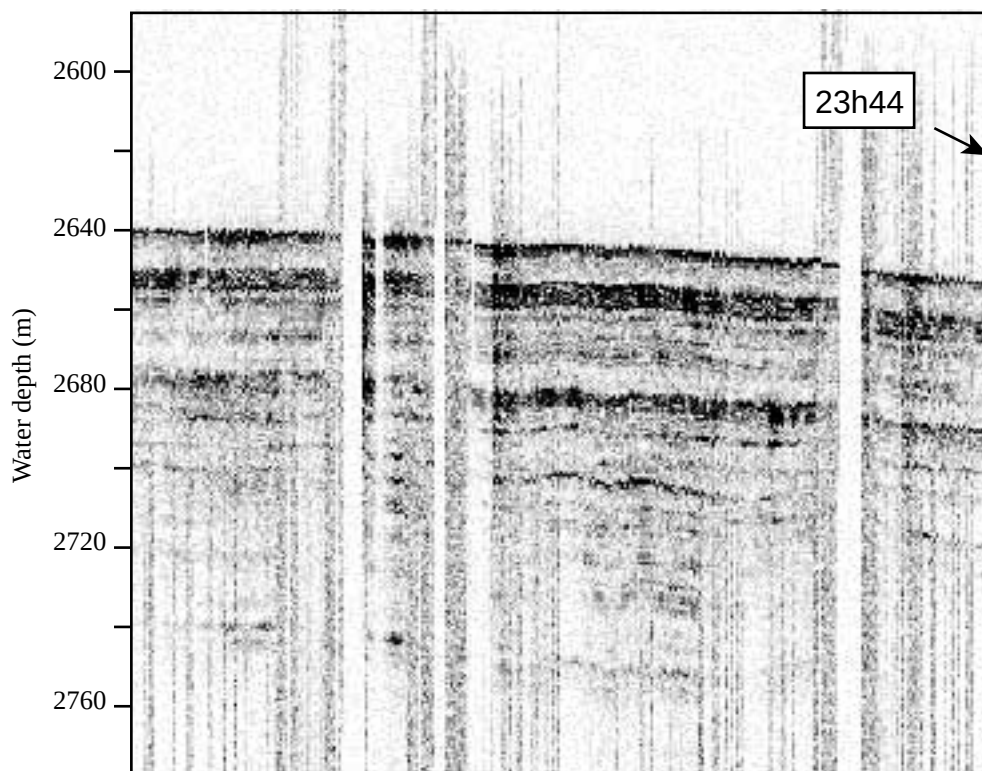
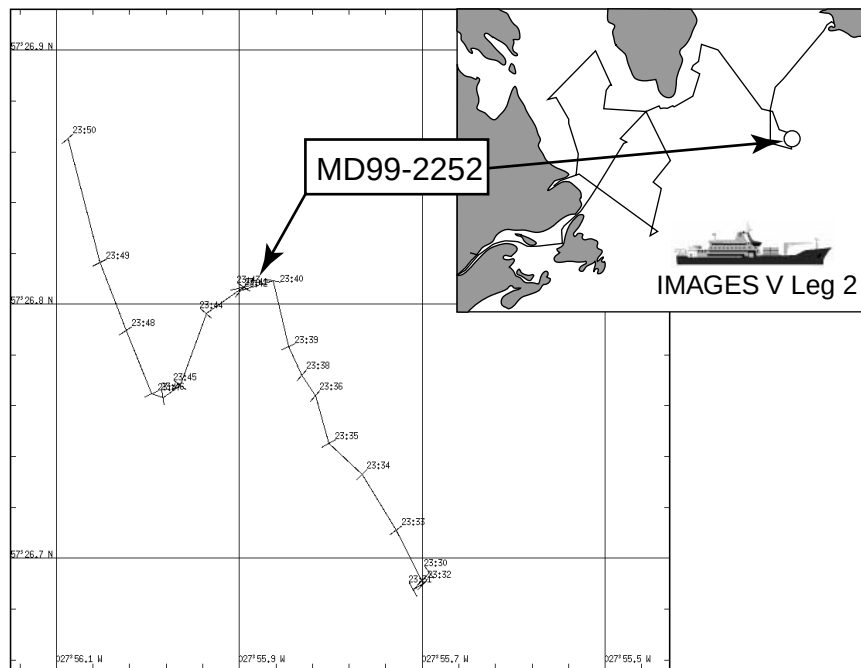
Number of sections recovered and conditions:

All XXV sections are in good conditions. The last one measures 58 cm long.

Onboard sampling and post cruise processing:

- The core was slab, 10 pieces were recovered. They will be processed at Cambridge.
- Several bags of sediment were recovered:

MD99-2252 (Karsten) Latitude: 57°26'84 N Water depth: 2610 m
Length: 3.25 m Longitude: 027°55'83 W Date: 21 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

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 processing:

- The sections were split onboard but not described. Both archive and working halves will be processed at Gif-sur-Yvette.
- U-channel have been mad on the working halves, they will be processed at UCD.
- Several bags of sediment were recovered: 1 top that will be processed 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 processed at Gif-sur-Yvette. Liquid sediment from section X (1383-1403cm) was lost on the deck during splitting.

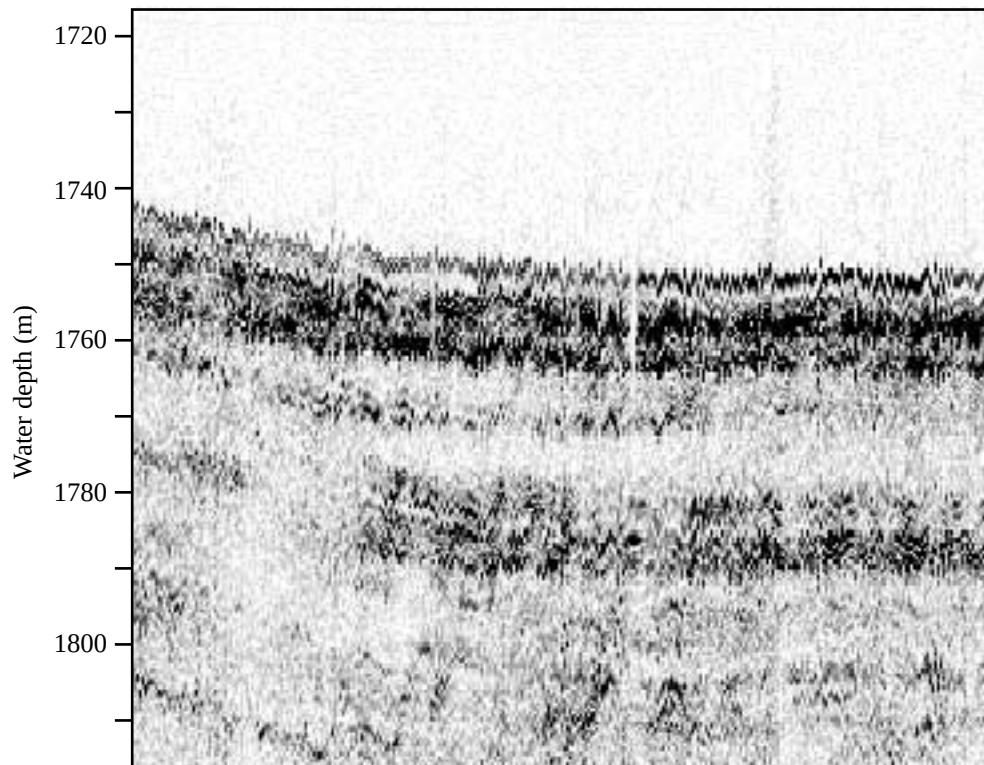
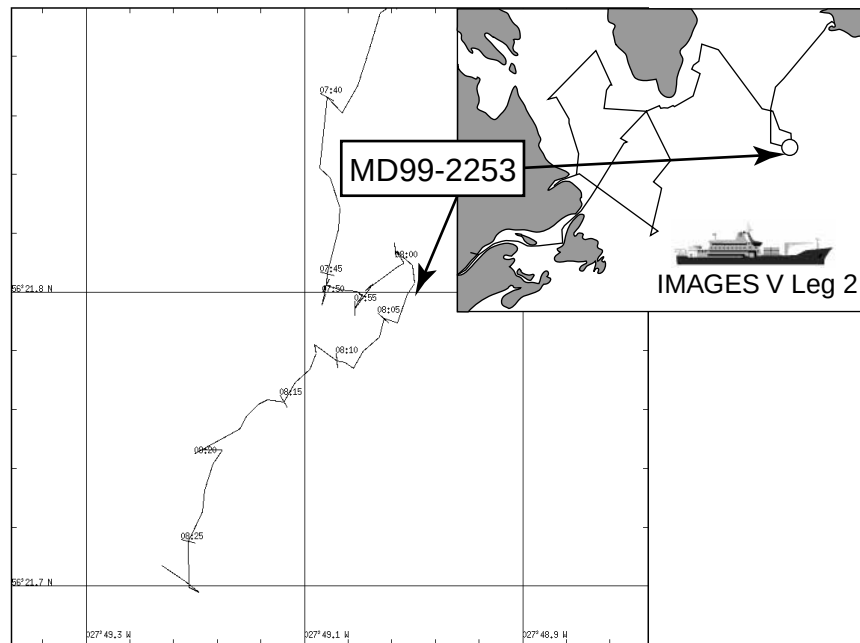
Summary of physical and sedimentological observations

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 170×10^{-5} SI. Bulk density values vary from about 1.35 to 1.70 Mg/m³ and p-wave velocity values range from 1475 to 1500 m/sec.

MD99-2253
Length: 32.75 m

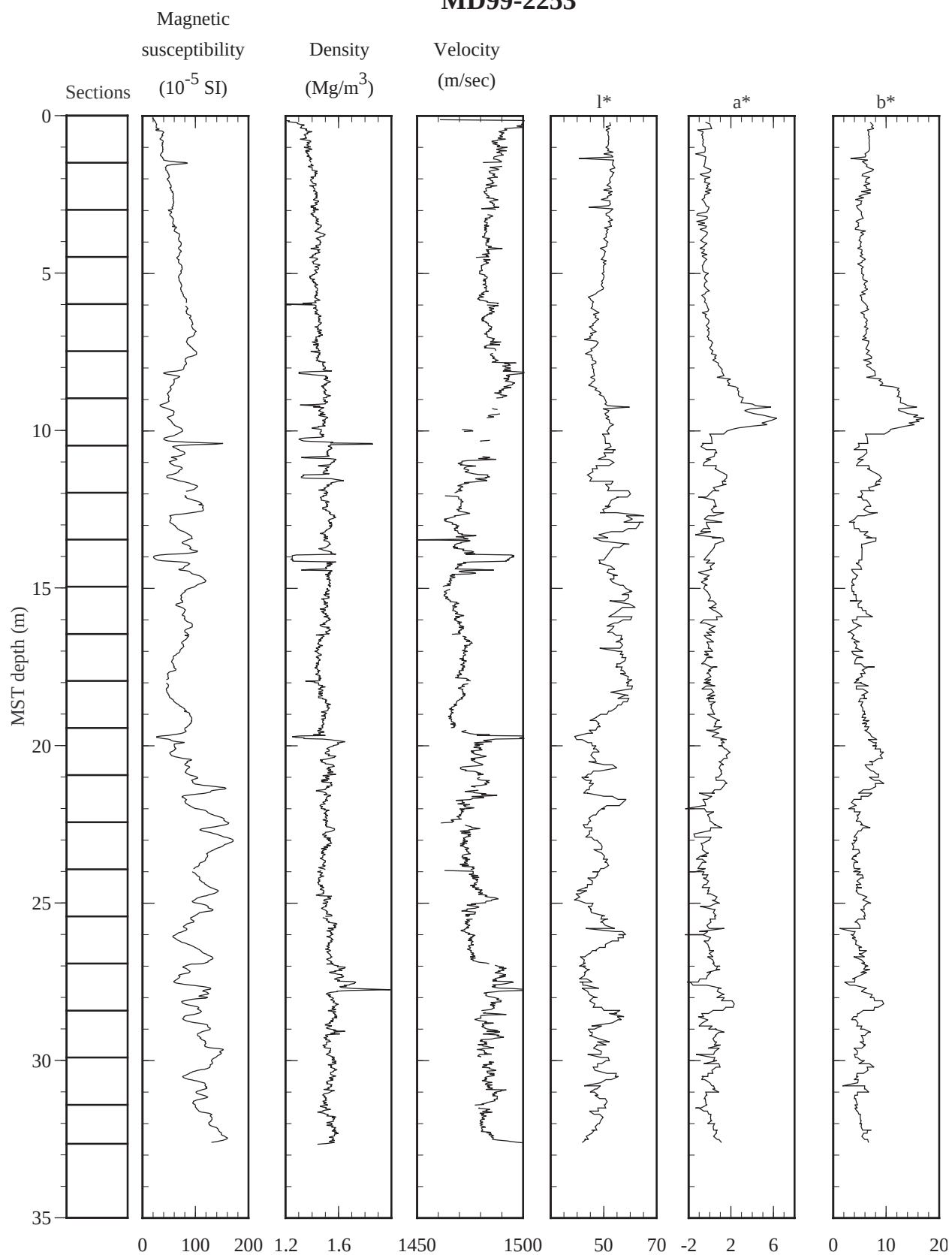
Latitude: 56°21'78 N
Longitude: 027°48'95 W

Water depth: 2840 m
Date: 22 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2253



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

Rosette and CTD cast 0 - 2830 m

Observations

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

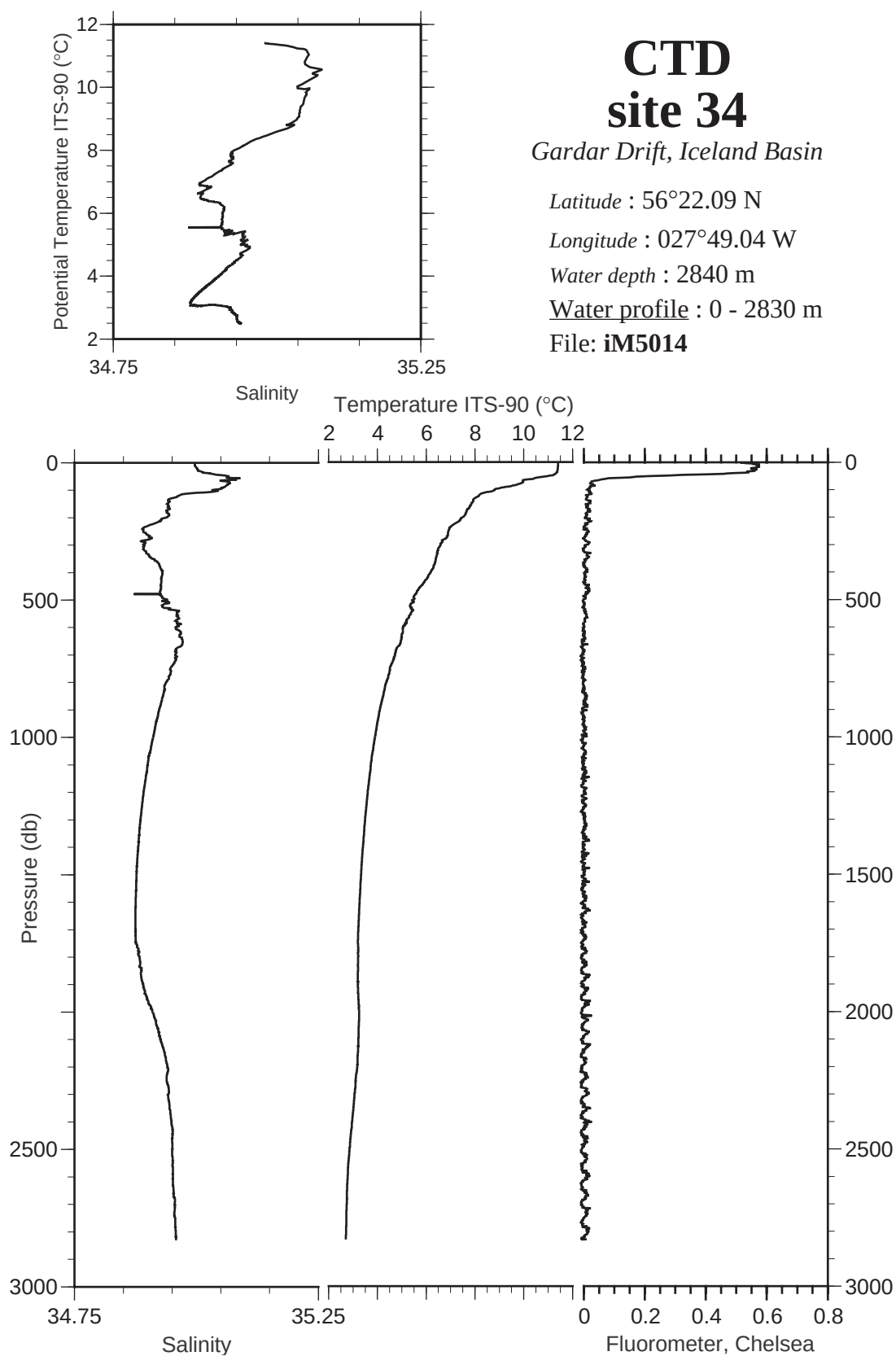
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sadow allowed to sample the water column at 2830 m, 2500 m, 2020 m, 1750m, 1100m, 650 m, 500 m, 350 m, 250m, 75 m and 20 m.

Sampling

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

Summary of CTD profile

- The surface temperature was 11.41 °C.



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 processing:

- The sections were split onboard but not described. The working halves will be processed in Gif-sur-Yvette
- U-channel were made on all the working halves, they will be processed at Gif-sur-Yvette.
- The archives halves will be processed at GEOTOP.
- Several bags of sediment were recovered: 1 top that will be processed 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 processed at Gif-sur-Yvette.

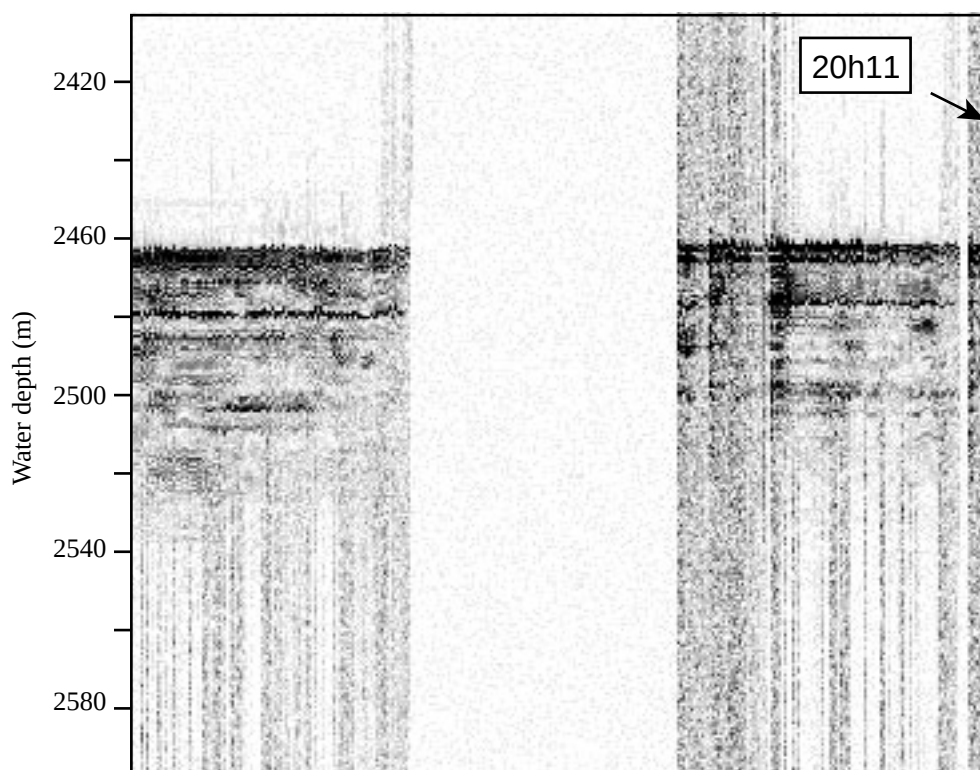
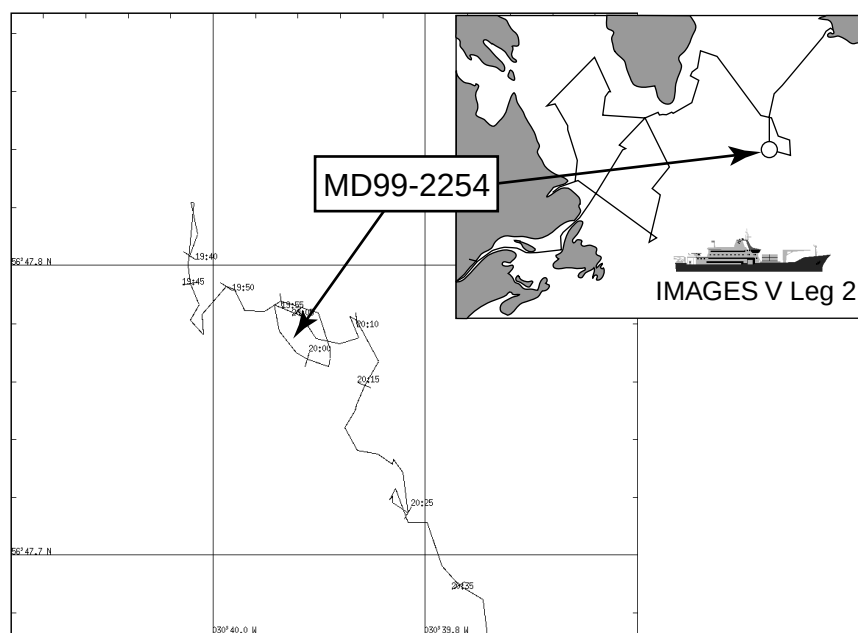
Summary of physical and sedimentological observations

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 200×10^{-5} SI. Bulk density values vary from about 1.4 to 1.80 Mg/m³ and p-wave velocity values range from 1450 to 1500 m/sec.

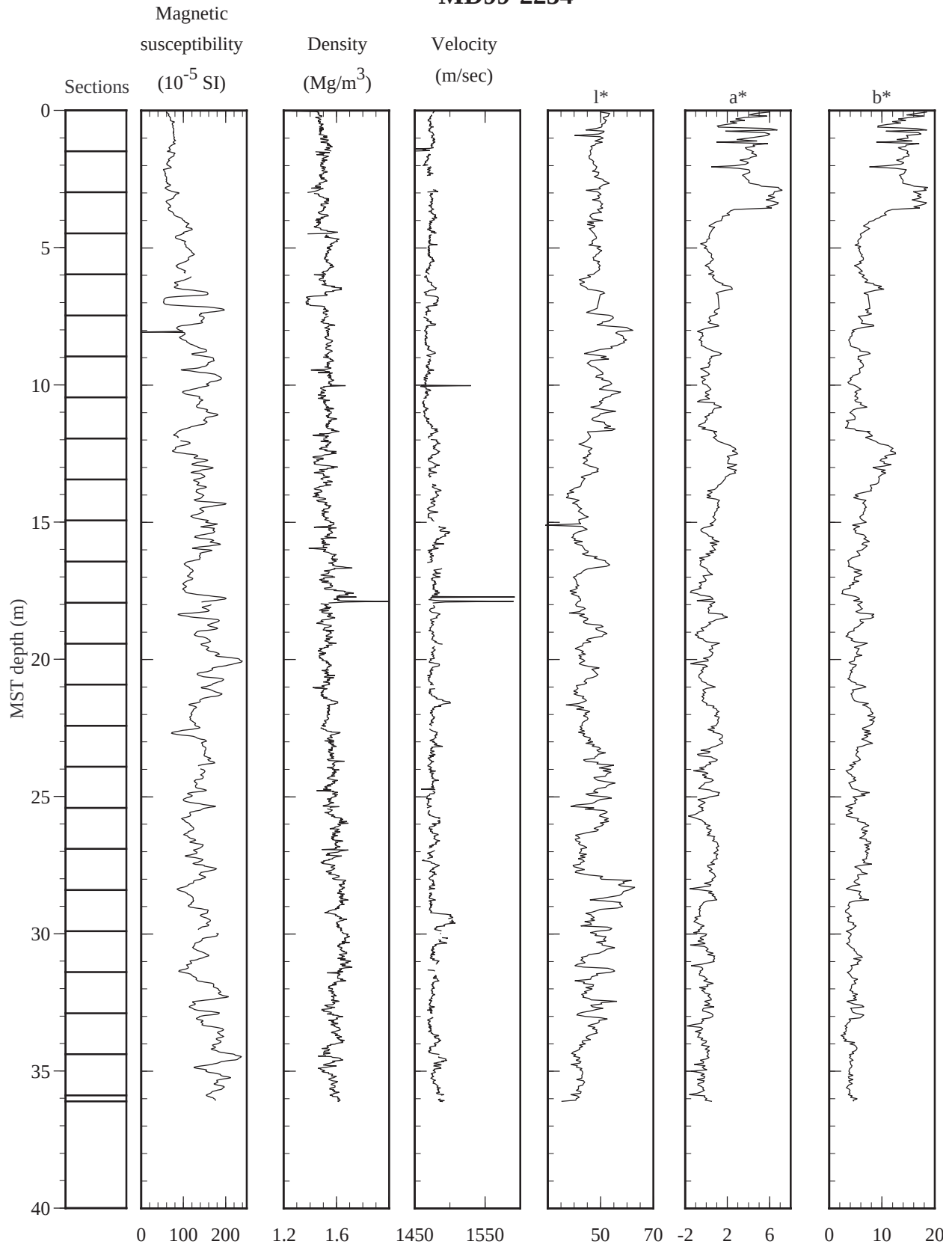
MD99-2254
Length: 36.21 m

Latitude: 56°47'78 N
Longitude: 030°39'86 W

Water depth: 2440 m
Date: 23 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

MD99-2254

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

Rosette and CTD cast 0 - 200 m**Observations**

CTD profile: 6 sensors were in operation simultaneously, pressure (D), conductivity (C), temperature (T), dissolved oxygen (O₂), fluorimeter and transmissiometer.

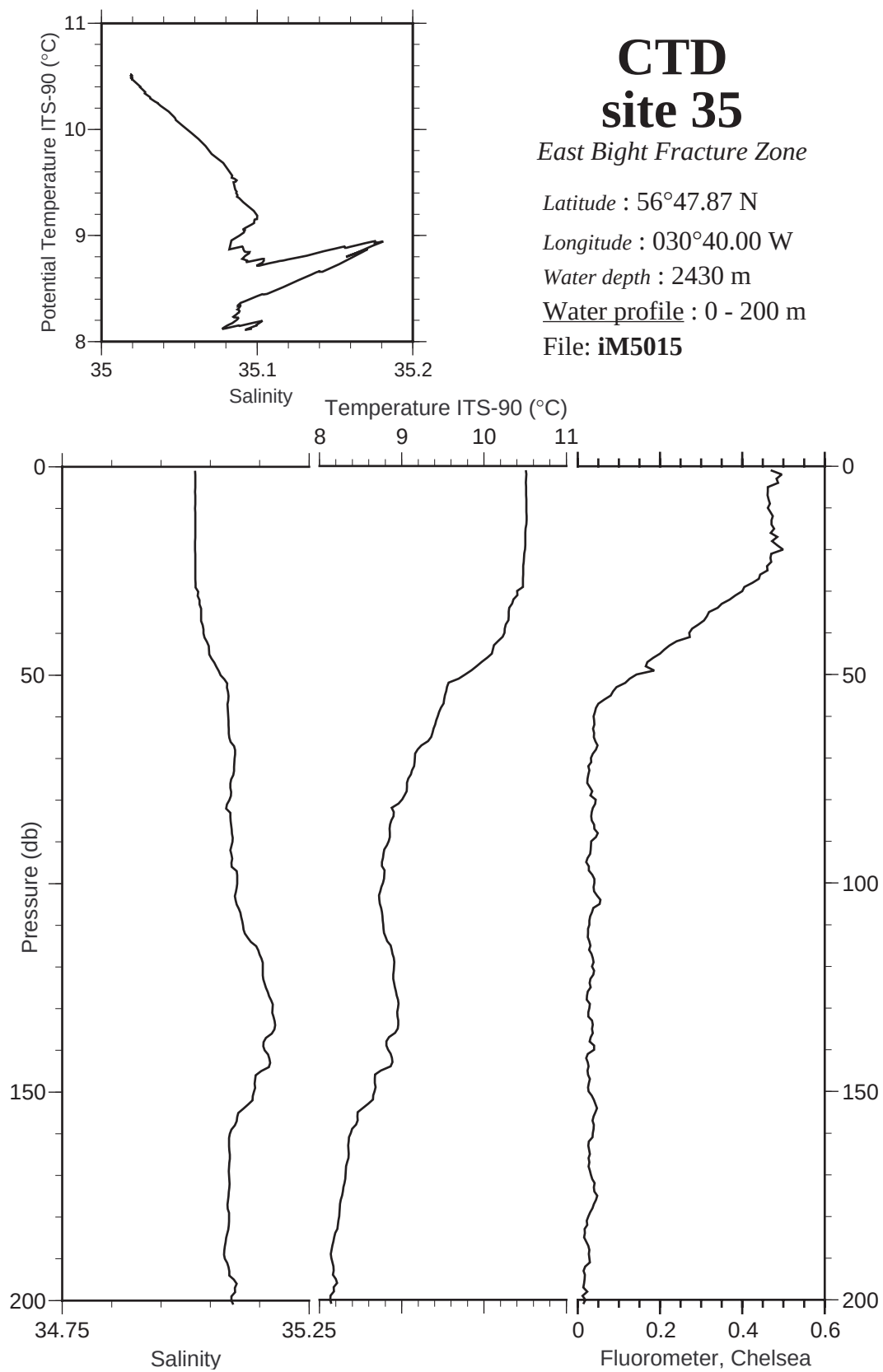
Water sampling: Twelve Niskin bottles of 12 litres with silicone Sandow allowed to sample the water column at 25 m and near surface.

Sampling

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

Summary of CTD profile

- The surface temperature was 10.51 °C.



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

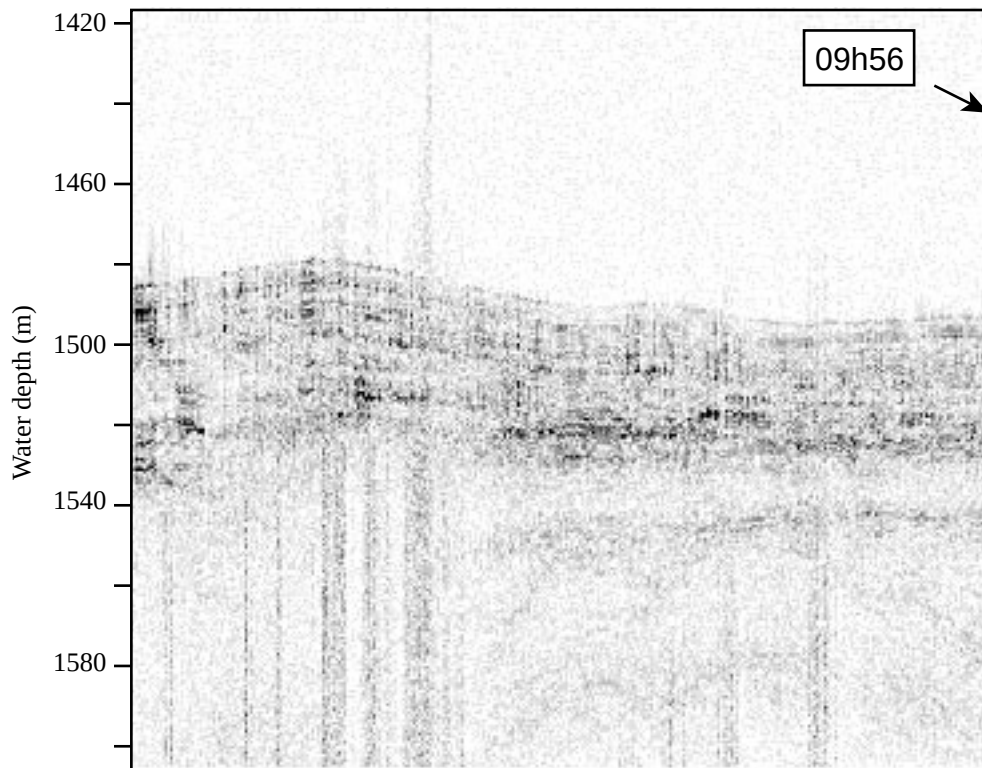
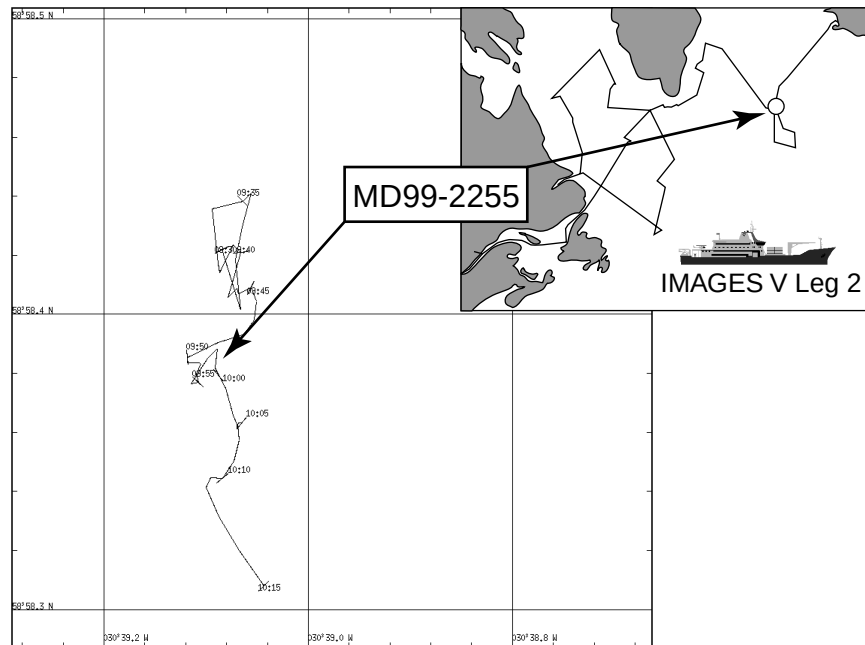
The sediment in sections I were stretch, we slightly push them back in place. Section II is in 2 part, IIa (150-209cm) and IIb (209-300 cm). Section X is in two parts, Xa (1350-1360 cm) and Xb (1360-1500 cm). Between Xa and Xb approximately 50 cm of sediment were lost, 40 cm at sea an 10 cm were recovered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

Onboard sampling and post cruise processing:

MD99-2255
Length: 25.03 m

Latitude: 58°58'41 N
Longitude: 030°39'10 W

Water depth: 1490 m
Date: 23 July 1999



Note: bathymetry and depth are approximate (subtract ~ 30 m from value shown)

8. APPENDIX

8.1 Essais d'utilisation du spectrophotomètre Colortron II

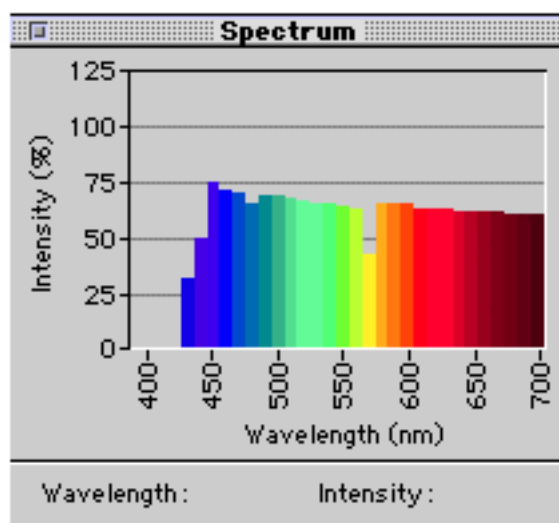
by A. Jegou (LSCE, Gif/Yvette, France)

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 câble 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 à 7.6.1. J'ai donc réalisé l'installation sur un PowerMac 7600/132 OS 8.5.1 de l'IFRTP.

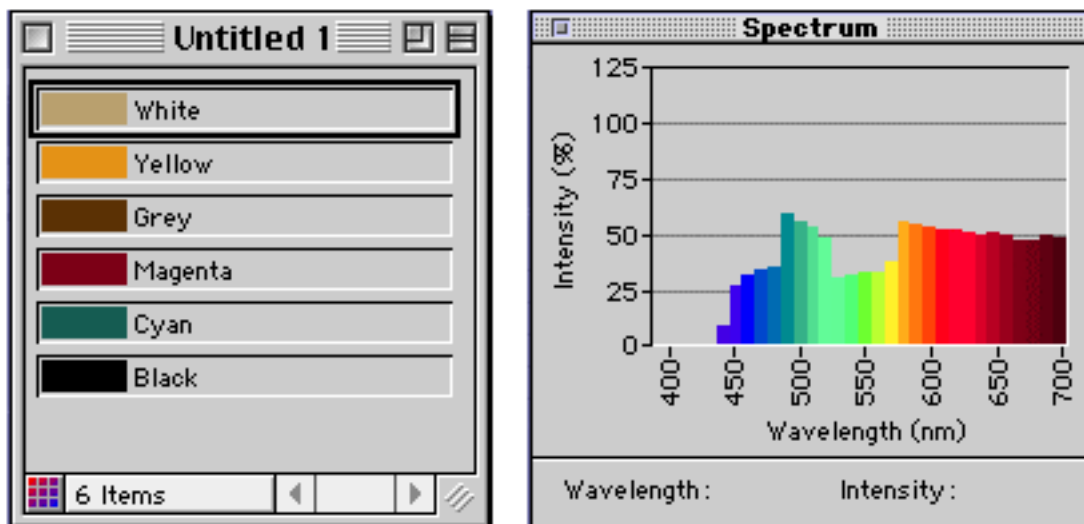
Après cette installation, je me suis rendu compte que les couleurs affichées à l'écran ne correspondaient pas aux couleurs réelles. J'ai donc utilisé l'option "diagnostics" du logiciel Colorshop. Lorsque l'on effectue "Set absolute References" dans le logiciel Colorshop, Absolute Black et Absolute White sont effectués sans problème mais les diagnostics 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'après les essais que j'ai effectué, le spectre paraît décalé vers les longueurs d'ondes les plus hautes, ce qui devrait se traduire par une perte d'information difficile à récupérer.

Ce modèle de spectrophotomètre semble délicat à utiliser dans les conditions de manipulation à bord d'un bateau. D'après 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 détérioration très sensible du spectre.



8.2 The TSM 5265B Deep Water Multibeam Echosounder by X. Morin (IFRTP, Brest, France)

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 reconnaissance, 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.

Note: Information in this section 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 Anthony 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 déficience 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 plusieurs reprises des passages successifs en station, avec chacun des systèmes, pour disposer des informations indispensables à un bon carottage.

8.5. MST data logging sheets (and core lengths)

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		
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	
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			Comments	Operator
									T	B	No		
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 B 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						
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 B 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; overmudge 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, overmudge 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					
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 B 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 B 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 x 1		
III	300-450	149	298	447	2227A	3			x 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 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 x 1		
water								-1			
XIII	1800-1950	150	1793	1943	2227D	1	0		x 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 overnuded	
XXIV	3450-3600	150	3441.5	3591.5	2227F	4					
water								-2			
XXV	3600-3750	150	3591.5	3741.5	2227G	1	-1				js
XXVI	3750-3900	150	3741.5	3891.5	2227G	2					
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 T B No	Comments	Operator
I	0-150	149.5	0	149.5	2228A	1	1		x 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 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 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 x 1		
water								-2			

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 B 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 B No	Comments	Operator
I	0-150	149	0	149	2232A	1	0		x x 2		ck
II	150-300	149	150	299	2232A	2			x x 2		
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	kj
XIV	1950-2100	149	1945	2094	2232D	2				at the top 7 cm sediment flowed out while running and were bagged	
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 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			Comments	Operator
									T	B	No		
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	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			Comments	Operator
									T	B	No		
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 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 B 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	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 B 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 B No	Comments	Operator
I	0-150	149	0	149	2241A	1	0		x x 2		js
II	150-300	149.5	149	298.5	2241A	2			x x 2	liner join at 257 cm, temperature probe in at 106 cm	
III	300-450	149.5	298.5	448	2241A	3			x x 2	temperature probe in at 83.5 cm	
IV	450-600	149.5	448	597.5	2241A	4			x x 2	temperature probe in at 31 cm	
water								0			
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				ck
XIV	1950-2100	149	1942	2091	2241D	2					
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 T B No	Comments	Operator
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					
XX	2850-3000	149.5	2843	2992.5	2242E	4				one nudge too many	
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 T B No	Comments	Operator
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	styrofoam at the top and at the bottom	

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 B 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 T B No	Comments	Operator
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				js
XIV	1950-2100	149.5	1946	2095.5	2248D	2					
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								-2			

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 T B No	Comments	Operator
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			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
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							kj
XV	2100-2250	149.5	2093	2242.5	2251D	3							
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 T B No	Comments	Operator
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 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	

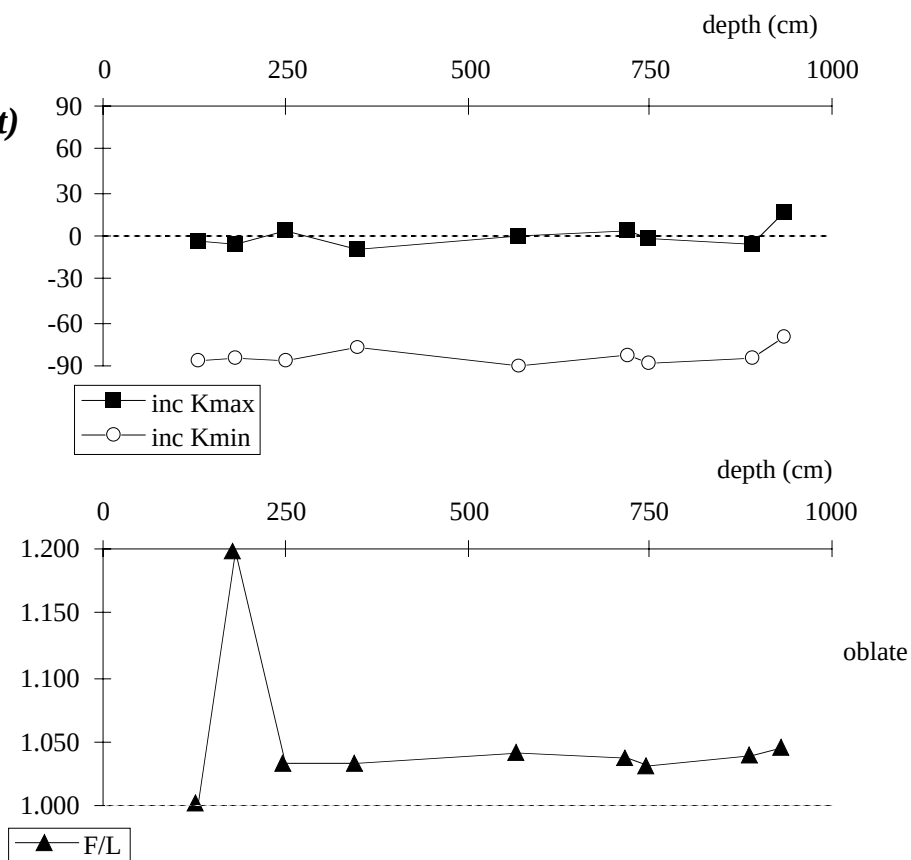
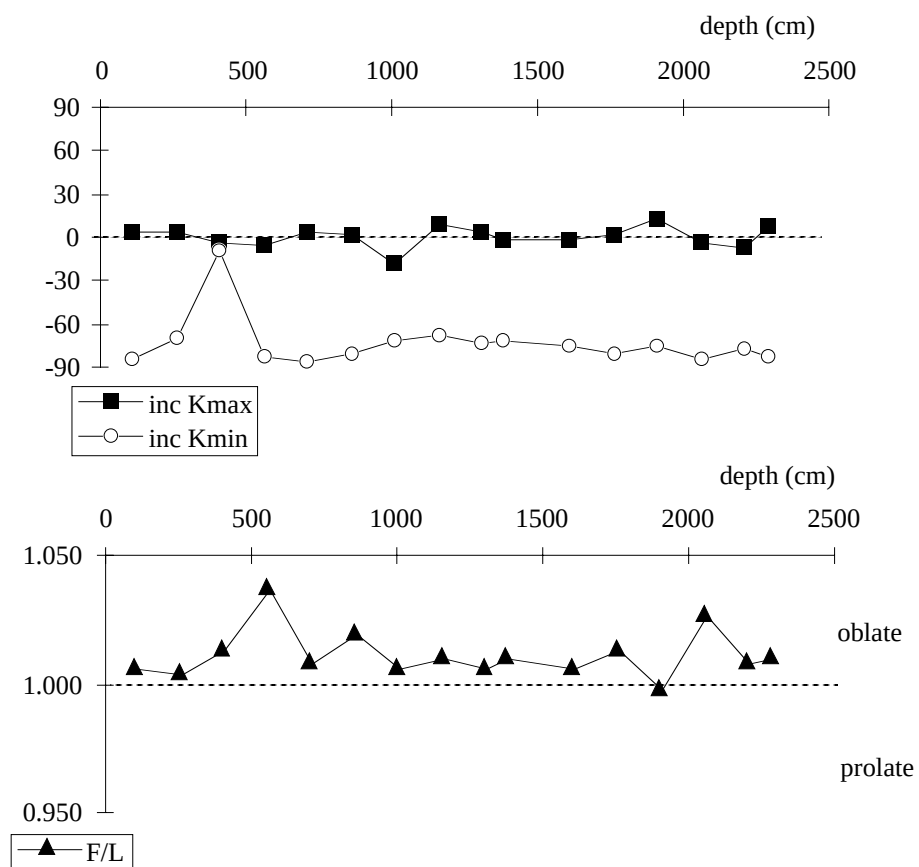
July 23/99

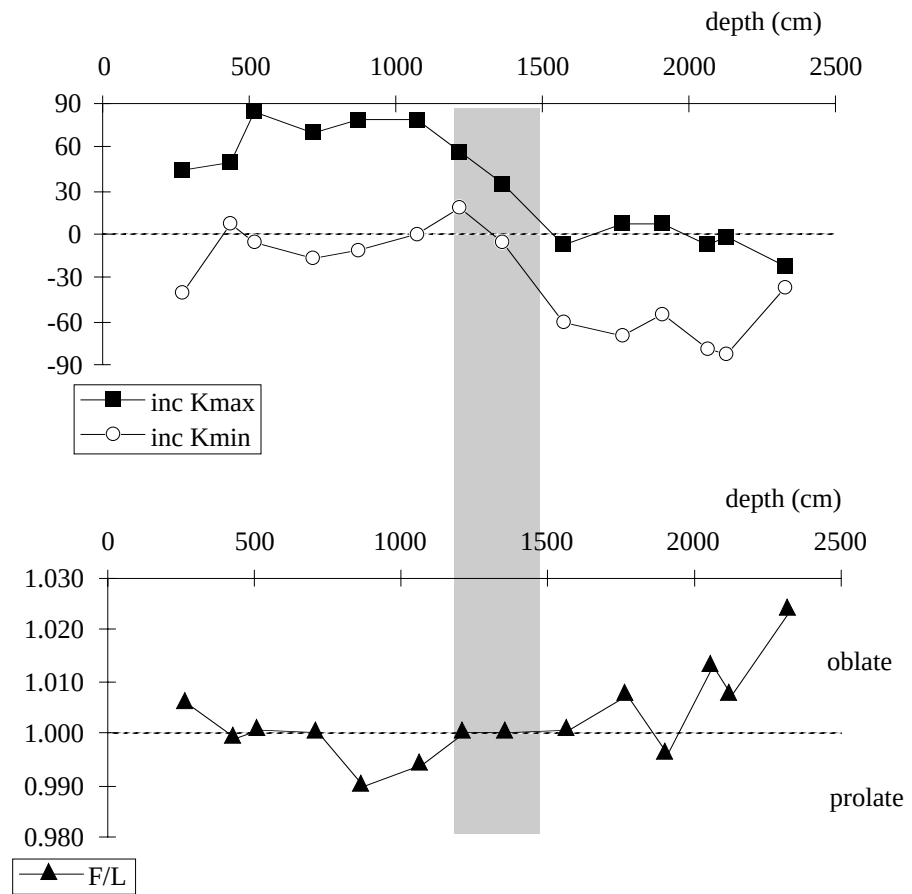
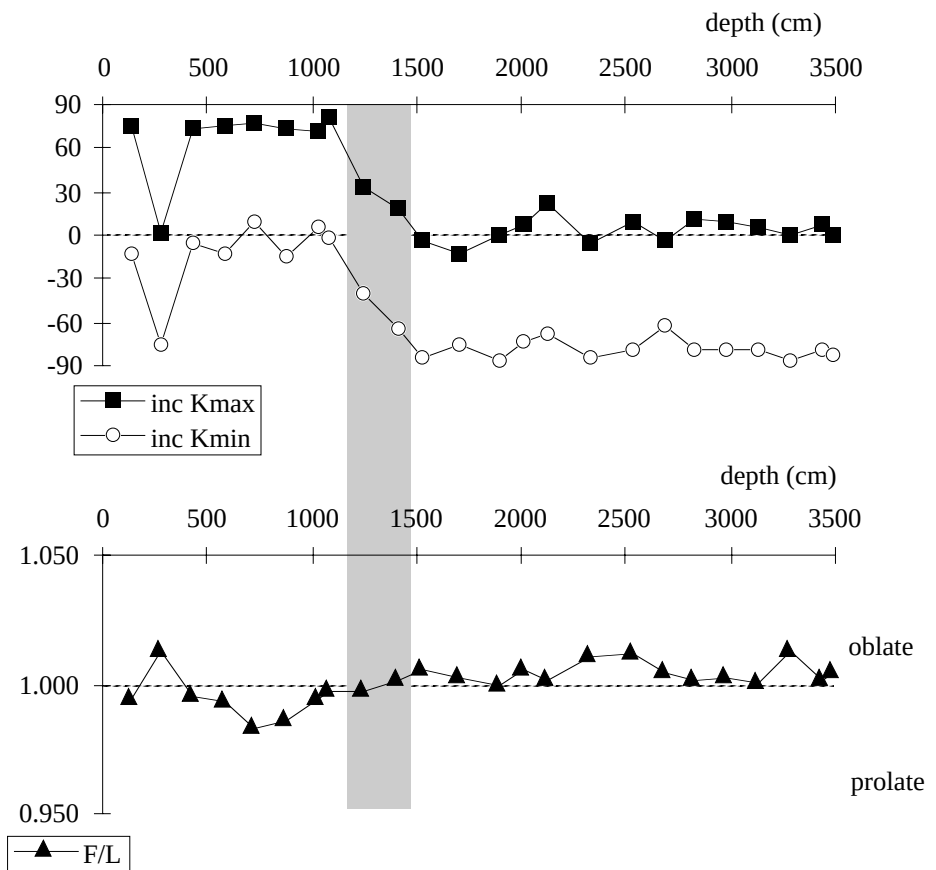
Liner Type 1.36cm

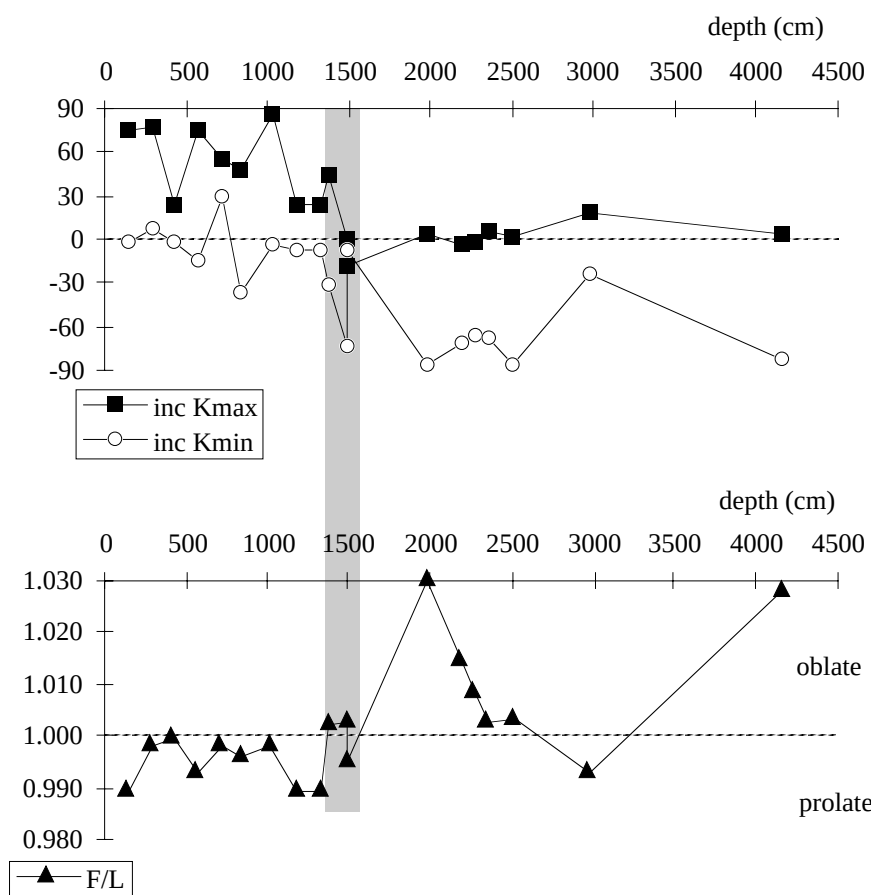
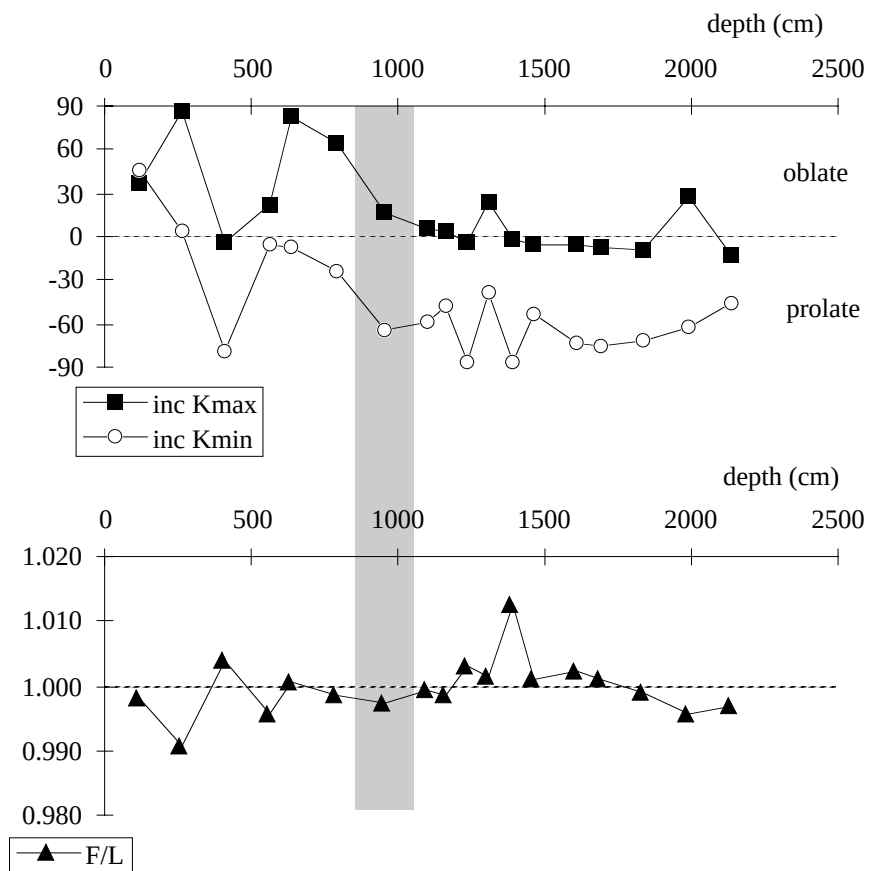
MD99-2254

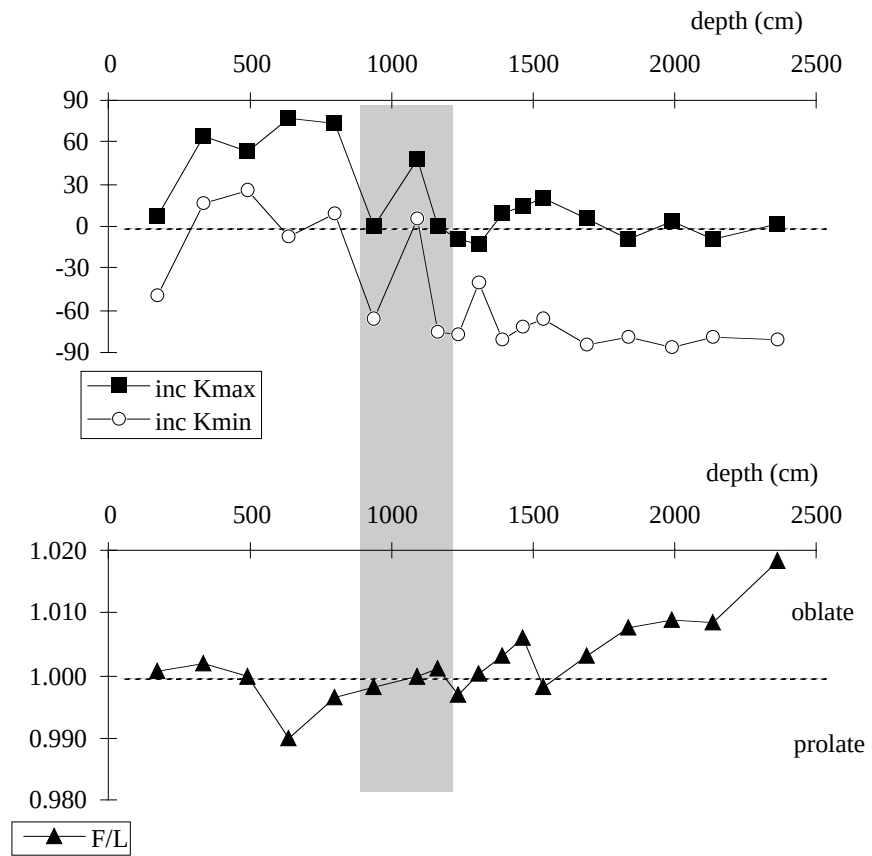
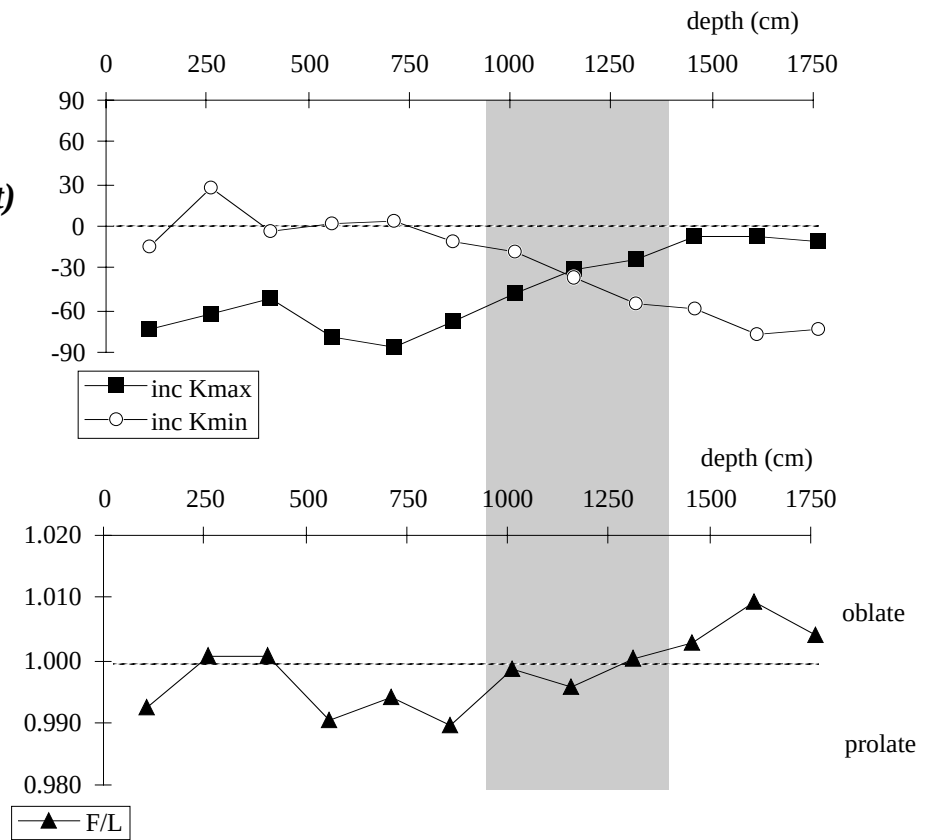
Section No.	Deck section length	Measured section length	MST section top	MST section bottom	Assigned MST Filename	MST section No.	Susc Air Beg	Susc Air End	Endcaps T B No	Comments	Operator
I	0-150	149	0	149	2254A	1	-4		x x 2		js
II	150-300	149.5	149	298.5	2254A	2			x x 2	liner join at 201 cm	
III	300-450	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			

8.6 Anisotropy

MD99-2234 (top part)**MD99-2244**

MD99-2228**MD99-2242**

MD99-2227**MD99-2246**

MD99-2247**MD99-2251 (top part)**

8.7 Water sampling sheets

Station SGN 1 Latitude: 58°55.26 N
Date 05-Jul-99 Longitude: 047°06.96 W
Palanquée:1 référence Claudie: IM5002

bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 11	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: station longue remplacée par une station courte de Ullah; échantillon récupéré sur une bouteille de ullah après filtration sur fibre de verre

Station SGN 2 Latitude: 55°02.00 N
Date 06-Jul-99 Longitude: 052°08.38 W
Palanquée:1 référence Claudie: IM5001

bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 11	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 NF					oui
10	20							oui
11	20							oui
12	20							oui

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 être prélevée sur la bouteille 1)

Station SGN 3 Latitude: 62°38.90 N
Date 08/ 09-Jul-99 Longitude: 053°54.24 W
Palanquée 1 référence Claudie: IM5004

bouteille	profondeur	Conc. Nd	Eps. Nd Hf	Salinité	Iode 250 cc	Iode 11	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		b6 nf	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		b11 af	23	143		
12	15		b12 nf	24	144		

remarques: pour 1 et 9: 7-8 litres seulement; pour 12 et 8?? Prélèvent de l'aliquote sur le bidon CI après acidification; pour 7, à la fin de la préconcentration les cartouches ont été rincées à l'eau MQ (250cc) à cause d'une erreur de tuyaux

Prélèvement à la sortie du thermo-salinographe

Date: 10-Jul-99	Date TU: 11-Jul-99	
Station: SGN 4	début	fin
heure	1h01'11"	1h11'51"
Latitude	57°58.71 N	57°55.94 N
Longitude	057°24.54 W	057°22.84 W

	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

remarques: T= 6.0° C; S = 34.0; on doit avoir une forte influence de la baie d'Hudson

Prélèvement à la sortie du thermo-salinographe

Date: 11-Jul-99	Date TU: 11-Jul-99	
Station: SGN 4	début	fin
heure	12h36'01"	1h11'51"
Latitude	55°01.90	54°59.76
Longitude	056°23.65W	056°24.26 W
	T= 1.9° C	T= 1.07° C
	S = 30.4	S = 30.8

	profondeur	Conc. Nd	Eps. Nd
bidon 1	pompe bateau	TS 1 F	TS 1 F

remarques: échantillon pris sur le plateau cont.

Station SGN 6 Latitude: 50°11.55 N
Date 14-Jul-99 Longitude: 045°40.68 W
Palanquée 2 référence Claudie: IM5007

bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 11	alkénones
1	26			b1 A NF				
2	26	nf	b3 A	NF		149		
3	26			b3 A NF				
4								oui
5								oui
6								oui
7								oui
8								oui
9	sub-surface		b4A fu					oui
10								oui
11								oui
12								oui

Station SGN 7 Latitude: 55°33.13 N
Date 15-Jul-99 Longitude: 043°58.00 W
Palanquée 1 référence Claudie: IM5008

bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 11	alkénones
1	3270		af				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		

Station SGN 8 Latitude: 62°04.37 N
Date/heure 18-Jul-99/12h24 TU Longitude: 040°11.57 W
Palanquée 1 référence Claudie: IM5010

bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 11	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 Latitude: 62°41.89 N
Date/heure 18-Jul-99/0h43 TU Longitude: 037°35.13 W
Palanquée 1 référence Claudie: IM5011

bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 11	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			

Station SGN 10 Latitude: 61°54.74 N
Date/heure 19-Jul-99/19h10 TU Longitude: 036°21.29 W
Palanquée 1 référence Claudie: IM5012

bouteille	profondeur	Conc. Nd	Eps. Nd	Hf	Salinité	Iode 250 cc	Iode 11	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

8.8 Weather conditions

Table 8.8.1 Weather conditions during IMAGES V, Leg 2.

Date	Cloud cover	Ocean	Air temperature (°C)	Water temperature (°C)
30-Jun-99	8	1	20.0	21.0
01-Jul-99	2	7	22.0	15.0
02-Jul-99	7	4	17.0	13.0
03-Jul-99	5	3	13.1	12.0
04-Jul-99	8	4	5.9	6.3
05-Jul-99	8	5	6.0	5.9
06-Jul-99	6	2	5.1	5.2
07-Jul-99	8	3	3.6	5.2
08-Jul-99	8	1	1.6	2.0
09-Jul-99	8	1	3.4	5.0
10-Jul-99	8	2	3.3	6.2
11-Jul-99	2	1	16.6	11.6
12-Jul-99	1	2	5.0	4.0
13-Jul-99	8	2	8.7	12.8
14-Jul-99	7	4	9.0	9.0
15-Jul-99	1	3	8.8	8.0
16-Jul-99	8	3	3.9	6.2
17-Jul-99	8	3	8.3	7.7
18-Jul-99	5	2	8.3	8.6
19-Jul-99	8	4	8.8	9.2
20-Jul-99	8	3	9.5	10.5
21-Jul-99	8	5	10.9	10.4
<u>Ocean:</u>	1 = calm		7 = rough	
<u>Cloud cover:</u>	1 = covered		8 = clear	

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Other suggested readings

ODP-Leg 105 (vols. 105 A and B)

DNAG volume on the Geology of the Labrador Sea

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