GEOLOGICAL SURVEY OF CANADA
OPEN FILE 5989

Marine geology and paleoceanography of Baffin Bay and adjacent areas
Nain, NL to Halifax, NS
August 28-September 23, 2008

D.C. Campbell and A. de Vernal

2009

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CCGS Hudson Expedition 2008029

Marine geology and paleoceanography of Baffin Bay and adjacent areas

Nain, NL to Halifax, NS
August 28-September 23, 2008

Senior Scientist: D. Calvin Campbell, Geological Survey of Canada
2nd Scientist: Anne de Vernal, GEOTOP-UQAM
Master: Capt. David Munn

Report by scientific staff of CCGS Hudson Expedition 2008-029 and compiled by Calvin Campbell

Geological Survey of Canada Open File 5989

Photo by Fergus Francey

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0. Acknowledgements

The 2008 expedition to Baffin Bay and Davis Strait was supported by the Canadian Foundation for Climate and Atmospheric Science (CFCAS) through a special allocation to the Polar Climate Stability Network (PCSN). Complementary funding was also obtained from the Natural Sciences and Engineering Research Council (NSERC) of Canada. The scientific activities related to the expedition were part of the research program of the Geochemistry and Geodynamic Research Center (GEOTOP), which is supported by the *Fonds Québécois de la Recherche sur la Nature et les Technologies* (FQRNT), the *Université du Québec à Montréal* (UQAM) and McGill University. Special thanks are due to Jennifer McKay, Josée Savard, Jacques Labrie and Taoufik Radi (GEOTOP) who contributed to prepare the expedition jointly with Calvin Campbell of the Geological Survey of Canada (GSC).

On behalf of the scientific staff of Hudson 2008-029 and the Atlantic division of the Geological Survey of Canada at the Bedford Institute of Oceanography (BIO), we would like to thank the Commanding Officer (David Munn) and those who contributed to the success of the mission, especially David MacLean and crew, the engineering staff, as well as the entire ship's complement, for continuous support in execution of the scientific objectives and flexibility in adapting to an ever-changing itinerary.

1. Context

Hudson expedition 2008-029 was a joint effort undertaken by the Geological Survey of Canada (GSC) and an academic group led by the Geochemistry and Geodynamic Research Center (GEOTOP) and a number of other national and international research groups (herein referred to as the GEOTOP group). The 27-day mission left from Nain, NL on August 28th and returned to the Bedford Institute of Oceanography in Dartmouth, NS on September 23rd 2008. Both groups have a shared interest in conducting marine geological research in Baffin Bay and adjacent areas. The scientific objectives of the GSC during this mission fall under the general umbrella of improved understanding of the surficial geology and seabed conditions, while the scientific objectives of the GEOTOP group fall under the general category of paleoceanography.

1.1 The Geological Survey of Canada

The work was conducted by the Geological Survey of Canada during Hudson 2008-029 under the Geoscience for Oceans Management Program and falls within projects 'X39- Seabed and Coastal Geoenvironmental Issues Constraining Economic Development of the Northwest Passage', 'X35-Regional geological assessment of seabed conditions in frontier areas', and 'X36- Geohazards and Constraints to Development'.

With regards to surficial geology and seabed conditions, the GSC has a long-standing mandate to collect regional surficial geological data on Canada's continental margins in order to facilitate sound management of these offshore areas. Since 2002, the Geoscience for Ocean Management program of the GSC has conducted research expeditions to study deepwater geohazards and constraints to development on the Scotian Slope (Hudson 2002-046, Hudson 2004-030, Hudson 2007-020), the Grand Banks margin (Hudson 2003-033, Hudson 2007-020), Orphan Basin (Hudson 2003-033, Hudson 2004-024), and the Labrador Sea (Hudson 2005-033B, Hudson 2006-040, Hudson 2008-027). Hudson mission 2008-029 allows extension of this deepwater geohazards research into Baffin Bay.

In the Eastern Arctic, and in particular Lancaster Sound, research into shallow seabed conditions and seafloor mapping by the GSC onboard CCGS Amundsen has identified a number of sites worthy of detailed geophysical and geological investigation in order to meet the scientific objectives of the GSC project 'Seabed and Coastal Geoenvironmental Issues Constraining Economic Development of the Northwest Passage'. The objectives of this project are to remove impediments to economic development in the Passage (i.e. ice scour, seabed foundation conditions, etc.) through the investigation of seabed features and sediment properties.

1.2 The GEOTOP Group

The 2008 expedition to Baffin Bay and Davis Strait has been planned as a major activity of the Polar Climate Stability Network (PCSN), which is supported by the Canadian Foundation for Climate and Atmospheric Science (CFCAS). It constitutes a Canadian contribution to international paleoceanographic research undertaken within the context of the International Marine Past Global Change Study (IMAGES) and is an important Canadian contribution to the International Polar Year (IPY) supported by the Natural Sciences and Engineering Research Council (NSERC) through the Special Research Opportunity (SRO) and Ship-Time programs. The Baffin Bay expedition complements other initiatives concerning the paleoceanography of the Arctic, in particular those led by Norwegians within the framework of the IPY project n°36 in Fram Strait (WarmPast), by the Canadians within the framework of ArcticNet in the Beaufort Sea and Northwest passage, and by the Americans and Swedish within the framework of the Healy-Oden trans-Arctic expedition in 2005 (HOTRAX; Darby et al., 2005).

The paleoceanography of Baffin Bay deserves special attention because it is a large transitional basin between the Arctic Ocean and the North Atlantic. In particular, fresh water (from terrestrial meltwater and melting sea-ice) conveyed from the Arctic through the Canadian Arctic Archipelago, Baffin Bay and Davis Strait affects the formation of Labrador Sea Water, and thus the overall rate of North Atlantic Deep Water production. Furthermore, satellite observations have revealed that over the last few decades there has been a significant decrease of sea-ice in the Arctic, though this is spatially variable due to complex dynamics (e.g., Comiso and Parkinson, 2004). Similarly, the rare paleoenvironmental records of sea-ice cover in the Western Arctic and sub-Arctic seas adjacent to the North Atlantic, indicate large changes over the last few thousands of years, with trends that seem to be opposite in the western Arctic and the

eastern Canadian Arctic (e.g., Fisher et al., 2006; de Vernal et al., 2008). It is thus important to determine sea-ice cover changes during the recent geological past, especially during episodes that were warmer than present at the hemispheric scale (e.g., the early Holocene, about 8000 years ago).

Little is known about the natural variability of sea-surface conditions, regional climate and Greenland ice margin dynamics at the scale of the last centuries or millennia. Sea-ice dynamics is an important issue because of its role on albedo and energy budget at the surface of the ocean. The mass balance of Greenland that may play a role on sea-level is another important issue. Floating tongues of fast flowing Greenland outlet glaciers and ice streams are susceptible to catastrophic break-up. More specifically, the Jakobshavns Isbrae glacier in central west Greenland flows into Baffin Bay and accounts for about 7% of the total ice drainage from Greenland, thus exerting a major influence on the mass balance of the ice sheet. It is unclear whether recent changes to the mass balance of the Greenland Ice Sheet are part of the natural variability of the ice-sheet's dynamics, or if they relate to anthropogenically-induced climate warming. Key to resolving this question is an understanding of the longer-term changes in ice sheet behaviour during the Late Quaternary. Reconstruction of late Pleistocene and Holocene ice stream dynamics will be linked to the changing paleoceanography of Baffin Bay. The results of the multidisciplinary research will directly contribute to the understanding of ice, sea-ice and climate dynamics on centennial to millennial time scales and will also help in the development of paleoclimate models of coupled ocean-ice-atmosphere systems in extreme situations (e.g., Vavrus and Harrison, 2003; Goosse et al., 2007).

The reconstruction of past hydrographic conditions in the Arctic basins including Baffin Bay is, however, very difficult for several reasons. First, the scarcity of regional data from surface sediment or the water column makes the calibration of micropaleontological and geochemical proxies a difficult task. Second, extremely low sedimentation rates at most offshore sites result in condensed records unsuitable for high time resolution analyses (e.g., Hillaire-Marcel et al., 1989, 2004). Third, due to low biogenic fluxes, except in polynyas, and particular hydrographic conditions (e.g., low surface salinity and reverse thermocline), most common paleoceanographic proxies cannot be used in a straightforward manner in Arctic settings (e.g., Hillaire-Marcel et al., 2004; Hillaire-Marcel and de Vernal, 2008). Finally, in Baffin Bay, a very shallow lysocline results in poor preservation of $CaCO_3$ (cf. de Vernal et al., 1992), which imposes a severe limitation for both the establishment of chronologies using ^{14}C measurements and the reconstruction of hydrographic parameters from isotopic analyses in foraminiferal shells. Thus, Baffin Bay still lacks accurate paleoceanographic records, and it seems time to revisit this critical area given the tremendous technical and methodological progresses made in paleoceanography over the last 20 years, since ODP Leg 105 notably (Srivastava, Arthur, Clement et al., 1987).

2. Objectives

2.1 The Geological Survey of Canada

The GSC has a mandate to provide sound advice to government, regulatory agencies and industry on offshore geohazard issues and aid in decision making processes. This advice is used to ensure safe and sustainable development of Canada's offshore regions. The science activities are conducted for delivery to the Earth Science Sector's (ESS) Geosciences for Ocean Management (GOM) program, 'Geohazards and Constraints to Offshore Development' and 'Seabed and Coastal Geoenvironmental Issues Constraining Economic Development of the Northwest Passage' projects. Hudson expedition 2008-029 marks the first Hudson expedition by the GSC to Baffin Bay since the early 1990s. The mission objectives were to begin the process of extending the current generation of high quality high resolution geophysics and geological sample data into Baffin Bay and Lancaster Sound, as well as to ground-truth data collected by the CCGS Amundsen in Lancaster Sound.

The GSC objectives for this mission were to collect high quality piston cores and high resolution seismic reflection data. The high resolution seismic reflection data consists of 1 x 210 cu in GI Gun seismic reflection and Huntec DTS systems. The data are used to resolve the shallow seismic stratigraphy and acoustic character of the upper few hundred metres of sediment, and identify seismic reflection acoustic facies and geometries indicative of geohazards, such as ice scour, submarine landslides, gas-charged sediments, faults, etc. The piston cores are used to ground-truth observations from the geophysical data and allow discrete measurement of the physical properties of the seabed and shallow subsurface. The piston cores also allow the development of a lithostratigraphic framework for the shallow subsurface, and in combination with the geophysical data, allow predictive capability of the physical properties of a given area, recognition of variations in depositional rates and event stratigraphy.

2.1.1 Objectives specific to the main working areas

Four main areas are distinguished as follows, each of them having specific objectives:

(1) North Atlantic Mid-Ocean Channel (NAMOC) proximal to Hudson Strait. A site was selected on the flank of NAMOC to sample gravity driven events (turbidity currents and hyperpycnal flows) that flowed down the channel and were sourced from outer Hudson Strait during the late Pleistocene and Holocene.

(2) Lancaster Sound is an area of competing interests with potential future hydrocarbon exploration, marine transport through the Northwest Passage, and the proposed establishment of a marine park within the area. The Geological Survey of Canada has had a long-standing mandate to collect regional surficial geological data on Canada's continental margins in order to facilitate sound management of these offshore areas. This fundamental information is sorely missing in this area, with no seismic reflection data collected since 1974, and only two piston cores collected as part of the Arcticnet program in 2004 and 2005.

(3) Continental Slope in northern Baffin Bay. Regional seismic reflection data and piston cores were collected in northern Baffin Bay in order to investigate the seismic reflection architecture of the slope seaward of Lancaster Sound and to investigate whether the shallow mass-transport deposits recognized from the area are related to the 1933 M7.3 earthquake on the slope (Bent, 2002). The work compliments similar work by Aksu and Piper (1987), Aksu and Hiscott (1989) and Hiscott and Aksu (1994) on the continental slope off central Baffin Island.

(4) Repetitive sidescan survey off Disko Bugt. Because of scheduling, there was an opportunity to conduct a repetitive sidescan survey off Disko Bugt. The area was first survey by the Danish Geological Survey in 1978 and the 2008 survey will allow quantification of iceberg scour frequency and intensity. This will be the longest repeat survey interval north of 65°N in the Greenland-Labrador iceberg corridor.

2.2 The GEOTOP Group

The general objectives of the expedition to Baffin Bay and Davis Strait for the GEOTOP group are to collect water column and sediment samples to (i) quantify the relationship between particle fluxes (biogenic and detrital) to the sea floor and ocean conditions (productivity, current, temperature, salinity, etc.), (ii) develop proxies for the reconstruction of changes in sea-surface conditions or currents from sediment cores, and (iii) evaluate changes in both the climate and ocean in the eastern Canadian Arctic and sub-Arctic on time scales ranging from hundreds to thousands of years.

The water column sampling aims more specifically at a better understanding of the distribution of phyto- and zooplantonic organisms in the Canadian Arctic. A series of vertical plankton tows in the photic zone and below the pycnocline were thus performed at various locations in the northern Labrador Sea, Baffin Bay and North Water Polynya in order to:

1) determine the distribution and composition of dinoflagellate assemblages in various areas of the Eastern Canadian Arctic;
2) establish a link between the dinoflagellate assemblages in the upper part of the water column and the dinoflagellate cyst assemblages in surface sediments;
3) collect planktonic foraminifers from their living habitat for further isotopic analyses and for taxonomical observations;
4) collect plankton samples in order to establish plankton cultures;
5) collect plankton samples to determine the presence of toxic dinoflagellate species in the area.

Pumping in the water column was also performed for further analyses of the isotopic composition of the dissolved Nd and Th in the different water masses of central Baffin Bay in order to identify the signature of the inflowing water sources (i.e., Arctic vs. North Atlantic). Pumping was also conducted to analyze the Si isotope signature of biogenic silica produced in the photic layer in central Baffin Bay and the North Water Polynya.

The aim of surface sediment sampling using box cores, is to calibrate the proxies, while trigger weight and piston cores will be used to develop a time series of

hydrographical and productivity changes. The methodological approaches of the studies to be conducted onshore will include micropaleontological and palynological analyses, notably the study of dinocyst assemblages to reconstruct sea-surface conditions and sea-ice from transfer functions. They will include stable isotope measurements in planktonic foraminifer shells collected in different size fractions and benthic foraminifer shells in order to reconstruct the structure of water masses. The nature and origin of particulate fluxes will be determined from geochemical analyses (^{13}C, ^{15}N of organic matter, grain size, trace element, etc.). Sediment cores will also be sampled for U-series studies (^{238}U, ^{234}U, ^{230}Th), and possibly ^{231}Pa, as a means of determining sedimentation rates. In parallel, paleomagnetic analysis of the sediments and measurement of ^{231}Pa and ^{230}Th, and $^{3}He/^{4}He$ should help to evaluate particle fluxes and sedimentation rates for defining as precisely as possible a chronological framework and to develop tools to normalize biogenic fluxes and better estimate changes in productivity relative to paleoclimate conditions (cf. Schlosser and Winckler, 2002). Other methodological approaches to be explored include biomarkers such as dinosterols and IP_{25}.

2.2.1 Objectives specific to the main working areas

Four main areas are distinguished as follows, each of them having specific objectives:

(1) Davis Strait is critical with respect to thermohaline circulation since it channels the exchanges of Arctic waters flowing southward from Baffin Bay and Atlantic Water flowing northward. The main station is located on the sill (section 7.2). However, the lysocline in Baffin Bay and Davis Strait is shallow and results in poor preservation of biogenic $CaCO_3$ in Holocene sediments (de Vernal et al., 1992). Therefore, coring on the southern edge of Davis Strait in Labrador Sea (section 7.2) was planned. Recovery of correlative sequences containing preserved planktonic foraminifera assemblages will allow ^{14}C dating and establishment of a chronostratigraphy, which will serve as a reference for the regional calibration of paleointensity variations in the geomagnetic field (cf. Stoner et al., 2000).

(2) The second region is Disko Bugt, Greenland (section 7.2) where coring of Holocene and late Pleistocene sediment will allow the reconstruction of the Late Quaternary behaviour of the fastest ice stream to drain the modern Greenland Ice Sheet: Jakobshavns Isbrae. Analyses of these cores will allow linkages to be made between the marine, ice-core, and terrestrial records, as well as paleoclimate and sea-level curves from Greenland (cf. Long et al., 2006).

(3) The third area is central Baffin Bay (section 7.2) near ODP Site 645 (cf. Proceedings of the Ocean Drilling Program, Leg 105), where we aim to collect cores that provide an integrated picture of the hydrography (at a basin scale) for an interval spanning at least 130 000 years in order to reconstruct conditions during two “warmer than the present” intervals (i.e., the early Holocene and especially the last interglacial) (e.g., Otto-Bliesner et al., 2006).

(4) The fourth region lies at the northern extremity of Baffin Bay and includes the North Water Polynya (section 7.2) where the high biogenic fluxes should allow establishment of high resolution records of productivity vs. sea-surface condition changes (cf. Hamel et al., 2002). In the vicinity of the North Water Polynya, sites with exceptionally high sediment accumulation rates (section 7.2) have been identified (Levac et al., 2001; Mudie et al., 2006). We aim to collect long cores at these locations, thus allowing the documentation of natural decadal to centennial oscillations in the hydrographic regime and to evaluate the long-term stability of the North Water Polynya during a time interval that encompasses the early Holocene thermal optimum.

3. Scientific Personnel

Last	First	Position	Affiliation	
Campbell	Calvin	Chief Scientist	GSC- Natural Resources Canada	
de Vernal	Anne	2nd Scientist	GEOTOP-*Université du Québec à Montréal*	
Asprey	Ken	Scientific Staff	GSC- Natural Resources Canada	
Bennett	Robbie	Scientific Staff	GSC- Natural Resources Canada	
Bringué	Manuel	Scientific Staff	GEOTOP-*Université du Québec à Rimouski*	Aug 28-Sept 10
Crawford	Kevin	Scientific Staff	Ohio State University	
Faubert	Etienne	Scientific Staff	GEOTOP-*Université du Québec à Rimouski*	Aug 28-Sept 10
Gibb	Olivia	Scientific Staff	Dalhousie University	
Jarrett	Kate	Scientific Staff	GSC- Natural Resources Canada	Aug 28-Sept 10
Kilfeather	Aoibheann	Scientific Staff	Durham University	
Labrie	Jacques	Scientific Staff	GEOTOP-*Université du Québec à Rimouski*	
Lisé-Pronovost	Agathe	Scientific Staff	GEOTOP-*Université du Québec à Rimouski*	
Manning	Des	Scientific Staff	GSC- Natural Resources Canada	
Meslin	Patrick	Scientific Staff	GSC- Natural Resources Canada	
Murphy	Bob	Scientific Staff	GSC- Natural Resources Canada	
Ortiz	Joseph	Scientific Staff	Kent State University	
Pitre	Fabien	Scientific Staff	GEOTOP-*Université du Québec à Montréal*	
Poirier	André	Scientific Staff	GEOTOP-*Université du Québec à Montréal*	
Quillmann	Ursula	Scientific Staff	The Institute of Arctic and Alpine Research	
Radi	Taoufik	Scientific Staff	GEOTOP-*Université du Québec à Montréal*	
Robertson	Angus	Scientific Staff	GSC- Natural Resources Canada	
Rochon	André	Scientific Staff	GEOTOP-*Université du Québec à Rimouski*	Aug 28-Sept 10
Simon	Quentin	Scientific Staff	GEOTOP-*Université du Québec à Montréal*	
Standen	Graham	Scientific Staff	GeoForce	Aug 28-Sept 10
St-Onge	Marie-Pier	Scientific Staff	GEOTOP-*Université du Québec à Rimouski*	Aug 28-Sept 10
St-Onge	Guillaume	Scientific Staff	GEOTOP-*Université du Québec à Rimouski*	Aug 28-Sept 10

Trommer	Gabriele	Scientific Staff	University of Tubingen
Zheleznov	Alexey	Scientific Staff	Alfred Wegener Institute (AWI)

Back row, L-R: A. Kilfeather, A. Zheleznov, Q. Simon, K. Crawford, K. Jarrett, M-P St-Onge, T. Radi, M. Bringué, A. Poirier, E. Faubert. *Front row, L-R:* J. Ortiz, F. Pitre, U. Quillmann, D. Manning, O. Gibb, J. Labrie, G. St-Onge, P. Meslin, K. Asprey, A. de Vernal, G. Trommer, C. Campbell, A. Rochon, A. Lisé-Pronovost, G. Standen, B. Murphy, R. Bennett, A. Robertson.

4. Summary of Accomplishments and Activities

26 piston cores (PC)
15 box cores (BC)
14 CTD casts (CTD)
11 Plankton tows (PT)
5 water pumping stations (WS)

90 hours of Seismic Reflection data

Table 4.1 Summary table of activities during Hudson 2008-029. Blue rows indicate GSC objectives and yellow rows indicate GEOTOP objectives.

Hudson 2008-029 activities

Date	Day/night	Location	Activity	Notes
28	day	Nain	steam	

Hudson 2008-029 activities

Date	Day/night	Location	Activity	Notes
28	night		steam	
29	day	NAMOC	sampling	PC01
29	night	Northern Labrador Sea	seismic	
30	day	Northern Labrador Sea	sampling	BC 02, CTD 03, PC 04, PT 05
30	night	Southern Davis Strait	steam	
31	day	Southern Davis Strait	sampling	BC 06, CTD 07, PC 08, PT 09
31	night	Davis Strait	steam	
1	day	Davis Strait	sampling	BC 10, CTD 11, PC 12, PT 13
1	night	Southern Baffin Bay	steam	
2	day	Baffin Bay	sampling	BC 14, CTD 15, PC 16, PT 17, WS 18
2	night	Central Baffin Bay to North Water	steam	
3	day	Central Baffin Bay to North Water	steam	
3	night	Central Baffin Bay to North Water	huntec survey	
4	day	North Water Polynya	sampling	BC 19, CTD 20, PC 21, PT 22, WS 23
4	night	North Water Polynya	3.5 kHz survey	
5	day	North Water Polynya	sampling	BC 24, CTD 25, PC 26, PT 27, BC 28, CTD 29, PC 30, PT 31
5	night	North Water Polynya	3.5 kHz survey	
6	day	North Water Polynya	sampling	BC 32, CTD 33, PC 34, PT 35, BC 36, CTD 37, PC 38, PT 39
6	night	North Water Polynya	steam/3.5 kHz survey	
7	day	Jones Sound	sampling	BC 40, CTD 41, PC 42, PT 43, PC 44, WS 45
7	night	Lancaster Sound	seismic	
8	day	Lancaster Sound	sampling	PC 46, BC 47, CTD 48, PC 49, PC 50, PC 51, PC 52
8	night	Lancaster Sound	seismic	

Hudson 2008-029 activities

Date	Day/night	Location	Activity	Notes
9	day	Lancaster Sound	sampling	PC 53, PC 54, BC 55, CTD 56, PC 57, WS 58
9	night	Lancaster Sound/Pond Inlet	steam	
10	ay	Pond Inlet	standby	
10	night	Pond Inlet/ Lancaster Sound	steam	
11	day	Lancaster Sound	seismic	
11	night	Lancaster Sound	seismic	
12	day	Lancaster Sound	sampling	PC 59, WS 60, PC 61, PC 62
12	night	Lancaster Sound	steaming	
13	day	Slope off Lancaster Sound	seismic	
13	night	Slope off Lancaster Sound	seismic	
14	day	Northern Baffin Bay	sampling	BC 63, CTD 64, PC 65, BC 66, PC 67
14	night		steaming	
15	day		steaming	
15	night	Disko Bugt	seismic	sidescan repetitve mapping
16	day	Disko Bugt	sampling	BC 68, CTD 69, PC 70, PT 71

After September 16th, began steaming south back to Halifax. Planned sampling at location of core HU-84-030-021 was abandoned due to poor weather conditions.

5. Daily Narrative

The daily narrative is an edited dialogue of the daily activities during the mission. All times are given in shiptime which was Atlantic Standard Time (AST).

JD 240 Aug 27, 2008 Nain, NL

All scientific staff was onboard Hudson by 1400. Conducted ship familiarization and had a general science meeting at 1900. Captain informs us that the ship has not received clearance for work in Greenland waters.

JD 241 Aug 28, 2008 Labrador Sea

Sailed from Nain at 0700 towards first piston core site on the northern flank of NAMOC. Fire and boat drill at 1300. At 1600, began regular watch keeping and ran the 3.5 kHz at full steam towards core site. Captain informs us that we have received verbal confirmation that clearance will be granted but we have to receive the faxed copy of the clearance papers.

JD 242 Aug 29, 2008 Near NAMOC

At 0430, ship slowed to 5 kts to conduct site survey over core site one with 3.5 kHz. Ran lines 01-03. On core site 001 at 0700 hours. Rigged corer for 12 m core based on "sandy" appearance of the 3.5 kHz record. Recovered ~11 m of sediment which ranged from soupy olive grey mud to sand. Sandy interval at top of core. Still no Greenland clearance, so steam towards "site 12" while running the 3.5 kHz and try to find and an alternative site for "site 13". At 1500, surveyed over what may be a 10-m thick hemipelagic drape on a ridge north of a major channel. At 1800, deployed seismic gear, GI gun and Huntec in order to find an appropriate alternate site for 13.

JD 243 Aug 30, 2008 Northern Labrador Sea

Recovered seismic gear ~0630 and steamed to alternate site for site 13, a transparent interval approximately 8-metres thick over a possible debris flow. Collected box core 002 and CTD 003. Piston core 004 at same site recovered ~8.5 metres of sediment with some damage to the top of the core. Conducted plankton tow 005. Steamed North towards site 12 in order to find an alternate site in Canadian waters and ran the 3.5 kHz.

JD 244 Aug 31, 2008 Southern Davis Strait

Conducted short 3.5 kHz survey for an alternate site for site 12. Targeted a stratified interval with a 8-m thick upper transparent interval. At site at 0610. Conducted box core 006, CTD 007, piston core 008, and plankton tow 009. At 1030, began steaming towards site 2b, approximately 210 nmi. At 1400, changed plans and steamed to site 2c, 55 nmi further north than 2b.

JD 245 Sept 1, 2008 Davis Strait

Visibility became poor overnight, so steaming speed was reduced to 8-10 kts. Arrived at site 2c at 0800. 3.5 kHz showed a well-imaged acoustically stratified interval. Collected box core 10, ctd 11, piston core 12 and plankton tow 13. Began steaming towards site 3. Tested water filtration pumps for deployment from the winch room. At 1545, continued steaming towards site 3 at 10 kts due to heavy fog.

JD 246 Sept 2, 2008 Baffin Bay

Arrived at site 3 (ODP site 645) at 0630. Conducted box core 14. Tilt pinger did not shut off when on bottom, so raised the box core a few metres off the bottom and lowered it

again. Box core surface slightly disturbed. Took CTD 15 and piston core 16. Performed plankton tow 17 and water pumping station 18. Completed pumping at 1815. Began 325 nmi steam towards site 5 in the North Water Polynya.

JD 247 Sept 3, 2008 Northern Baffin Bay

Steaming towards site 5. Speed reduced to 8 kts in heavy fog. Weekly science meeting held at 1300 reviewed what has been completed to date, plan for the next week, cruise report contributions, staff list for Pond Inlet shore call, and open discussion. A. Lisé-Pronovost presented MSCL and spectrophotometer results. In Greenland waters, deployed Huntec DTS and surveyed line 11 towards GEOTOP site 5.

JD 248 Sept 4, 2008 South of North Water Polynya

Recovered Huntec DTS at 0745. GEOTOP site 5 was based on a previous box core collected without sub-bottom data. Huntec data showed hummocky relief and little penetration interpreted as iceberg-turbated seafloor. Sampling location was a small area of smooth relief which showed approximately 3 m of acoustically stratified material over probable till. Conducted box core 19, CTD 20, piston core 21, plankton tow 22 and water pumping station 23. No recovery on TWC or PC. Piston core stuck, heavily damaged liner and bent cutter. Decision was made to search for core sites in the troughs around the area for coring targets. At ~1500 began 3.5 kHz survey of troughs aroundNorth Water Polynya. Ran lines 12-17.

JD 249 Sept 5, 2008 North Water Polynya

Surveyed over a number of excellent coring targets over night with 3.5 kHz. Zone of deposition limited to deeper than 670 m. At 0500, terminated line 17 and back tracked to first sampling site of the day, near GEOTOP site 8 which showed ~20 m of acoustically stratified sediments over a highly reflective subsurface interval. Recovered excellent box core 24, CTD 25. Some expansion of push cores due to gas. Recovered piston core 26, rigged at 50 ft and had full apparent penetration. Conducted plankton tow 27. At 1230, steamed to next site, approximately GEOTOP site 7. Target was a ~20-m thick acoustically transparent interval over highly reflective subsurface. Recovered box core 28 and CTD 29. Good recovery on the box core. Collected piston core 30, rigged for 12 m and recovered about 11 m. Conducted plankton tow 31. At 1730, began 3.5 kHz survey of the polynya, picking up from the previous night in order to find coring sites for the following day.

JD 250 Sept 6, 2008 North Water Polynya

Ran lines 18-21 at about 8-10 kts running the 3.5 kHz sounder. Some course alterations overnight due to ice. At 0530 terminated 3.5 survey and steamed to first core site, just to the eastern part of the polynya. 3.5 kHz showed ~12 m of acoustically transparent sediment over a more reflective area. Recovered box core 32, CTD 33, piston core 34. Piston core had some damage, liner cracking, near the top. Recovery of about 24 ft. Did

plankton tow 35. Steamed to next sampling location in the central part of the polynya with about 12 m of sediment over strong reflection. Conducted box core 36, CTD 37, piston core 38 and plankton tow 39. Piston core penetrated to red beds associated with latest glacial sediments. At 1700 began 3.5 kHz survey towards Jones Sound. Polar bear sighted on ice flow at 1830. Ran 3.5 kHz at 10-12 kts overnight into Jones Sound.

JD 251 September 7, 2008 Jones Soun

Arrived at GEOTOP site 10 at 0630. Site is for A. Rochon and is approximately a duplicate of core 83015 051. 3.5 kHz showed about 12-15 metres of soft sediment. Conducted box core 40, CDT 41, piston core 42 and plankton tow 43. Approximately 33 ft of recovery in piston core. Steamed 4 nmi towards the West to take a piston core in a condensed section. Took piston core 44 and water pump station 45. Steamed 47 nmi south to deploy GI Gun and Huntec. Deployed GI Gun and Huntec DTS at 1700. Operational by 1720. Ran lines 28-30.

JD 252 September 8, 2008 Lancaster Sound

Terminated line 30 at 0700. Steamed to piston core site 46, approximately 5 metres of smooth stratified material over harder substrate away from an iceberg scour. Recovered 4.5 m piston core with ~40 cm of dark brown stiff sediment at the base. Collected box core 47 and CTD 48 at the same site. Steamed to adjacent scour. Recovered piston core 49 from what seems to be within the ice scour. Good station keeping by the bridge. Core recovered approximately 4.5 m of sediment. The base surface appears to be iceberg-turbated. Steamed North to an area of thinned but well-stratified sediment. Recovered 4.5 metres of mud and sandy mud (piston core 50). Sandy at the base. Steamed to large "rip-up" feature to the North. Attempted piston core 51 within pit, good trigger weight core but little recovery in the piston core, possibly stopped in sand. Attempted second piston core 52 at same site and recovered approximately 4.5 metres of mud and muddy sand. Steamed to start of line 028 approximately 4 nmi Northeast. Ran lines 31-32. Informed by captain that the shore call to Pond Inlet has to be moved up to Sept 10 to disembark an ill crew member.

JD 253 September 9, 2008 Lancaster Sound

Surveyed until the end of line 32 just North of Navy Board Inlet. Recovered GI Gun and Huntec DTS at 0800. Steamed to first piston core site 53. Huntec showed a lenticular debris flow draped by ~2 m of sediment. Core recovered ~3.5 m of fine sand and muddy sand. Continued to piston core 54 taken at a ridge with a stratified surface and an incoherent core. Piston core recovered just less than 4 m of mud with ice rafted debris. Steamed 30 nmi to the northeast to an area of thick stratified sediment. Took box core 55, ctd 56, piston core 57 and pumping station 58. At 1720, began steaming to Pond Inlet to disembark staff A. Rochon, G. St-Onge, M-P. St-Onge, E. Faubert, M. Bringué, K. Jarrett, and G. Standen.

JD 254 September 10, 2008 Pond Inlet

Steamed overnight to Pond Inlet. Dropped anchor at 0630. Disembarked seven staff and one crew member. Replacement crew member arrived on schedule at 1820. Sailed from Pond Inlet at 1900. Steamed overnight through Navy Board Inlet back to Lancaster Sound.

JD 255 September 11, 2008 Lancaster Sound

Arrived at start of line 33 at 0600. Winds blew up overnight and there was some swell and white caps. Deployed Huntec DTS and GI Gun at 0600. Had second science meeting, reviewed what had been done to date and what the plan was for the following week. Ran seismic lines 33, 34. Recovered Huntec at end of lines 34 at 1930 for maintenance. Near the start of line 35, Huntec DTS stopped working. Recovered Huntec at 2230. Ran 3.5 kHz for remainder of night along with GI Gun.

JD 256 September 12, 2008 Lancaster Sound

Recovered GI Gun and streamer at 0630. Steamed to piston core site 059. Target was an area of acoustically stratified sediment recognized in Huntec profiles. Recovered ~ 8 m of sediment with dark grey sediment at the base with a sharp contact to light tan or grey sediments grading up to olive gray. Conducted pumping station 060 at same location. Steamed to core site 061 over one of several diapiric structures identified on line 034. Core appears to have recovered similar lithologies to core 59. Steamed to piston core site 62. Huntec showed a couple metres of stratified sediment over a number of thin stacked mass transport deposits. Good trigger weight core, however piston core recovered less than a metre of sediment and likely fell over. Bottom-most barrel on the piston corer was bent. At 1630 began steaming 160 nmi towards the slope of Lancaster Sound.

JD 257 September 13, 2008 Slope off Lancaster Sound

Arrived at start of line 37 at 0620. Huntec DTS repaired by D. Manning previous day. Deployed GI Gun, Teledyne streamer and Huntec DTS. Began surveying long regional dip line across the 1933 epicentre and tying in a number of vintage seismic reflection lines and cores. At 1030 winds increased to 25-30 kts and swell developed. Recovered Huntec at 1900 in order to trim the sparker tips.

JD 258 September 14, 2008 Northern Baffin Bay

Recovered seismic reflection equipment at 0800. Huntec data quality not great overnight due to the weather and vessel motion. Steamed to first core site, very shallow mass transport deposit. Took box core 63, CTD 64, and piston core 65. Poor recovery on box core with damage to the box (rock stuck in spade). Piston core recovered ~4.5 m of sediment. Steamed to area 3 nmi away where shallow mass transport deposit thinned and deeper sediments were exposed. Collected box core 66. Box corer fell over and there was some deformation of the sample (sheared). Piston core 67 at same site recovered ~5.2 m of sediment. Began steaming towards Disko Bugt at 1630.

JD 259 September 15, 2008 Transit to Disko Bugt

Steamed all day towards Disko Bugt. Arrived at survey area at 1700. Deployed Huntec DTS and sidescan in order to resurvey a 1970s vintage sidescan survey for ice scour frequency. Ran lines 38 and 39.

JD 260 September 16, 2008 Off Disko Bugt

Recovered sidescan and Huntec at 0700. Sidescan records show abundant ice scour. Steamed to trough near GEOTOP site 2B off Disko. Ran 3.5 kHz at full speed down trough in order to find a coring site. Took box core 68 and CTD 69 in an area with ~ 4 m of transparent drape over a highly reflective subsurface. Good quality box core. Collected piston core 70 which had 3.1 m of apparent penetration and recovered ~2.5 m of sediment. Full trigger weight core (~ 2 m). Did plankton tow 71. At 1600 began steaming south towards site p21.

JD 261 September 17, 2008 Davis Strait

Steaming towards site p21. 13-14 kts when visibility is good, speed dropped to 10 kts overnight. Swell developed at midday. 45 kts winds by 1700 then speed slowed to 6 kts by 1900.

JD 262 September 18, 2008 Davis Strait and Northern Labrador Sea

Did not make much headway overnight. Speeds reduced to 3-5 kts. Heavy seas and winds 45 kts from the East coming around to 35 kts from the South in the afternoon. Speed increased to 80-90 kts by 1000. Slowed again to 50-70 kts in the afternoon while traveling into the sea.

JD 263 September 19, 2008 Northern Labrador Sea

Speed increased to 10-13 kts after 0300. Winds strengthened to storm force but from the Northwest. Seas too heavy to sample to site P21, thus abandoned. Continued steaming south in the Labrador Sea back to BIO.

6. Equipment and Procedures

6.1 Temperature-salinity- measurement in the water column

Physical properties of the water column were measured with an Applied Microsystems CTD plus v2 attached to the wireline about 10 m above the Box corer for joint deployment. The CTD was calibrated for water depth from zero to 4000 m (4000 dbars). The error in depth with this calibration is ± 2 m.

The parameters measured with the CTD include conductivity, temperature, sound velocity, density and pressure, which are used to calculate water depth after correction for latitude. These measurements allow the structure of the water column to be determined and the identification of the main water masses to be sampled with plankton tows and water pumping (see below). Salinity and temperature profiles are illustrated in the resulting section and the raw data tables are available in appendix.

6.2 Plankton tows

The depth of the thermocline/pycnocline is ascertained using CTD (conductivity, temperature, depth) casts and these data are used to determine the sampling depths of the plankton tows. Usually, one or two plankton tows were performed in the upper 100 m of the water column. These were done for plankton culturing purposes, determination of the presence of toxic dinoflagellate species, to determine dinoflagellate assemblage composition and to verify the presence/absence of planktonic foraminifers. A series of two or more tows were also performed at greater depths (200-500 m, depending on the pycnocline depth) to collect planktonic foraminifers for taxonomy and further isotopic measurements.

A plankton net 30 cm wide with a 20 µm mesh size was used for all casts in order to collect samples as follows:

1) ~150 ml (0-100 m) for dinoflagellate assemblages and fixed in formalin 5% (A. Rochon, ISMER)
2) ~150 ml (0-100 m) for toxic dinoflagellates and fixed with formalin 5% + preserved in ethanol (M. Bringué, ISMER; D. Anderson, WHOI)
3) ~100 ml (0-100 m) for plankton culturing (C. Marskallen, CNRC-Halifax)
4) ~10 ml (0-100 m) for geochemical analysis (C, N, Corg) (A. Mucci, GEOTOP, McGill)
5) ~20 ml (0-100 m) for foraminifers sieved for direct observation (A. de Vernal, GEOTOP, UQAM)
6) ~15 ml (0-500 m) for foraminifers and preserved in buffered water/ethanol and stained with rose Bengal (A. de Vernal and C. Hillaire-Marcel, GEOTOP, UQAM)
7) ~15 ml (0-500 m) for foraminifers and preserved in buffered water/ethanol and stained with rose Bengal1 (K. Husum, U. of Tromsø, Norway)
8) ~20 ml (0-500 m) for foraminifers sieved for direct observation (A. de Vernal, GEOTOP, UQAM)
9) ~10 ml (0-500 m) for stable isotope analysis (C, N, Corg) (A. Mucci, GEOTOP, McGill)
10) ~20 ml (0-500 m) for foraminifers with 5% buffered formalin (G. Trommer and M. Kucera, U. of Tubingen, Germany)

On a few occasions, a 150 ml sample (0-100 m) within the North Open Water Polynya was collected for biogenic silica analysis (Q. Simon, GEOTOP-UQAM). The water depths of sampling indicated above were adjusted depending upon the structure of the upper water masses.

6.3 Water sampling and filtration

Pumping and filtering of sea water was done using two submersible McLane WTS-142 pumps. The pumps were cast simultaneously at two different depths on the same wire in order to sample two water masses in a single cast, each filtering 200 litres of water. The protocol used is designed for further analyses of the isotopic composition of Nd, Th, and Si. The pumps were equipped with a 0.7 µm Glass fiber filter (GF/F) to filter out the particulate matter and two Manganese oxide cartridges to scavenge dissolved Nd and Th. For the Si measurements (n=3), 0.4 µm Isopore polycarbonate filters were used instead of GF/F ones. Chemical processing of MnO_2 cartridges to recover the Nd and Th will be carried out subsequently at GEOTOP.

The sampling depths were determined from temperature and salinity profiles(see above) in order to collect material from the Arctic-Baffin Bay water and the underlying North Atlantic water mass as determined from CTD profiles.

6.4 Coring Operations

Coring sites were selected based on previously published sites and new seismic surveys generally conducted at night during the cruise using 3.5 kHz, 12 kHz and/or Huntec.

6.4.1 Piston Coring

The piston coring system used was the AGC Long Corer (Figure 6.1). This device obtains a core sample with an inside diameter (ID) of 99.2 mm and an outside diameter (OD) of 106 mm. Barrel lengths are 10 ft (305 cm) and the system is typically rigged to a maximum of 5 barrels. During this cruise, the system was rigged with three and four barrels depending upon the seismic interpretation of the sediment. The core head is 3 m long, 0.6 m in diameter and weighs approximately 3000 lb (1350 kg). Each barrel has an ID of 4.25” (10.8 cm), a 3/8” (9.5 mm) wall thickness, and exterior couplings secured by set screws. The liner was a CAB plastic in 10 ft (305 cm) lengths. A split piston with two O-rings and variable orifice size was used and a standard core catcher was used at all coring sites. The trip arm supported a 4.25” (10.8 cm) diameter gravity corer with a single 7 ft (2.14 m) 10” barrel and 300 lb (135 kg) head. The corer used ¾” wire cable on the Pengo winch. The corer was operated using a handling system that includes a rotating core-head cradle, outboard support brackets, a monorail transport system, a lifting winch and a processing half-height sea going container. Each recovered core was broken down at the barrel joints and moved to a processing half-height container, where each 10 ft (305 cm) section of liner was extruded from the barrel and cut in half and labelled.

Piston coring was successful at 25 of the 26 attempted sites. Liner implosions occurred in piston cores 0004, 0008, 0044, 0052, and the split piston orifice used was either 0.127 cm or 0.238 cm in size.

Figure 6.1 Recovering the Piston Corer.

6.4.2 Box Coring

The box corer (Figure 6.2) consists of a 50 by 50 cm box and provides relatively undisturbed samples of the seafloor. Push cores using a 10.0 cm diameter CAB plastic core liner were taken using a vacuum backpressure technique to prevent sample compression.

On average, 5 push cores were taken from each box cores for a total of 76 push cores being taken. Upon recovery all push cores were taped, labeled and the liner cut down to the sediment surface. The push cores were stored horizontally and brought up to ambient temperature in the Geochem Lab. All push cores were run thorough the MSCL for high resolution analysis of bulk density and magnetic susceptibility. NRCan push cores were then sealed with wax at both ends to prevent water loss. The GEOTOP cores were subsampled and processed in the GP Lab or sealed and stored vertically as described below.

Figure 6.2 Box corer on deck.

6.5 Onboard core processing and subsampling

A total of 20552 cm of sediment was obtained from 52 cores including 26 piston cores (PC) and 26 trigger weight cores (TWC). All cores were processed according to standard GSC Atlantic core procedures (refer to GSC Open File #1044). All cores were identified alphabetically by section at the time of dismantling individual 10 ft core barrels from the bottom to the top, commencing with the bottom-most core barrel and proceeding to the uppermost barrel containing sediment. Each 10 ft length of liner was extruded from the barrel and cut in half, using a modified pipe cutter, in the half height container (Figure 6.3). The sediment in the liner was cut using a wire saw and the section ends were carefully capped to minimise disturbance to the sediment surface. The top end cap was labelled with the cruise number, station number, section label and top. The base of the core is designated with the letter A and the top of the base section is designated as B. The base section is AB. Each section was brought into the GP Lab and stored horizontally on the benches. Each core, starting with the base section AB, was processed using the following procedure. The core liner was labelled with an up arrow, cruise number, station number, section label and the top and base of the section were labelled with the appropriate letter. End caps were removed if the sediment was not too fluid, and the section length was recorded.

The sealed core sections were stored upright in the refrigerated reefer container and maintained at 4°C. All core cutters and catchers were measured, labelled, placed in split liners, waxed and stored upright in buckets in the refrigerated container. All extruded core sections due to sediment expansion or core processing methods were likewise labeled and stored. All samples and subsamples were catalogued and their location information within the container was recorded in an excel spreadsheet.

All station location information, core section lengths, extruded pieces and cutter/catcher lengths, sediment description and core performance information have been documented on deck sheets and then input into the ED (Expedition) database. The ED database has been backed up and will be verified before downloading into the main ORACLE sample database.

Figure 6.3 Cutting a 10 ft liner section in the half height container.

6.5.1 Undrained shear strength measurements and constant volume sampling

Undrained shear strength measurements and constant volume samples were taken at the top and base of each section where possible. Inert packing was placed in the voids created by the constant volume sampling, and the ends of each core section were re-capped, taped and taken down to the Geochem Lab for MSCL measurements (see section 6.5.2).

Undrained shear strength measurements and constant volume samples were taken at the ends of each section if the condition of the sediment allowed (Table 6.1). The constant volume sampler was inserted into the end of the section, the undrained shear strength measurement was taken and then the constant volume sampler was removed (Figure 6.4).

The undrained shear strength was measured using a hand-held Hoskin Scientific Torvane according to ASTM Test Method D2573-94 Standard Test Method for Field Vane Shear Test in Cohesive Soil. The dial on the Torvane was zeroed, the fins on the vane was gently pushed into the sediment until they were completely inserted. The dial was rotated

Figure 6.4 Taking a Torvane measurement.

at a constant rate until the sediment failed (Figure 3).

The Torvane dial reading ranges from 0 to 1 and reports values in kg-force/cm^2 units (1 kg/cm^2 = 98.07 kPa). The Torvane has three adapter vanes as described below:

L - Sensitive vane has a range of 0 to 0.2 kg-force/cm^2
Su = dial reading * 0.2 kg-force/cm^2

M - Regular vane has a range of 0 to 1.0 kg-force/cm^2
Su = dial reading * 1 kg-force/cm^2

S - High capacity vane has a range of 0 to 2.5 kg-force/cm^2
Su = dial reading * 2.5 kg-force/cm^2

The L - Sensitive vane and the M – Regular vane were used for a total of 150 undrained shear strength measurements taken during the cruise.

Constant volume samples for bulk density and water content determinations were taken by inserting stainless steel samplers of a known volume. Prior to insertion, the sampler was lightly sprayed with Pam cooking oil and gently wiped with a small Kimwipe tissue. The bevelled edge of the sampler was placed on the flat sediment surface and the carefully inserted into the sediment at a constant rate using two flat headed spatulas (Figure 6.5). The sampler is inserted at a constant rate to minimize compression of the sediment within the sampler. The sampler was then carefully removed and the sediment was trimmed using a wire saw and extruded into a pre-weighed 1 oz screw-top glass bottle. The bottle cap was then labelled and sealed using electrical tape to prevent the lid from loosening. A total of 225 constant volume samples were taken during the cruise. The samples are weighed, dried at 105°C for 24 hours and re-weighed to determine bulk density, dry density and water content according to the standard ASTM test method D 2216-90 (revision of 2216-63, 2216-80) for laboratory determination of water (moisture) content of soil and rock. All relevant information for the Torvane measurements and constant volumes was recorded on data sheets and input into Excel spreadsheets and will be incorporated into the physical property database.

Figure 6.5 Inserting the constant volume sampler.

Table 6.1 Summary of 2008029 Physical Property sampling

Station Number	Sample Type	Number of constant volume samples	Number of Torvane Measurements
0001	TWC	2	1
0001	PC	8	8
0004	TWC	-	-
0004	PC	9	5
0008	TWC	1	1
0008	PC	8	6
0010B	Push	1	-
0012	TWC	3	2
0012	PC	11	115
0016	TWC	-	-
0016	PC	7	3
0026	TWC	-	-
0026	PC	13	11
0030	TWC	1	2
0030	PC	14	11
0034	PC	8	7
0038	TWC	1	1
0038	PC	11	9
0042	TWC	-	-
0042	PC	14	11
0044	TWC	1	-
0044	PC	12	12
0046	TWC	3	2
0046	PC	4	4
0049	TWC	2	1
0049	PC	7	7
0050	TWC	1	-
0050	PC	5	5
0051	TWC	2	2
0051	PC	-	-
0052	TWC	3	2
0052	PC	4	1
0053	PC	-	-
0054	TWC	1	-
0054	PC	-	-
0057	TWC	2	2
0057	PC	11	11
0059	TWC	3	2
0059	PC	11	11
0061	TWC	2	2
0061	PC	2	2
0062	TWC	-	-
0062	PC	-	-
0065	TWC	1	-
0065	PC	3	2
0067	TWC	-	-
0067	PC	6	5
0070	TWC	2	20
0070	PC	2	24

6.5.2 Multi Sensor Core Logger (MSCL) measurements

Once at room temperature, all the box (BC), trigger weight (TWC) and piston cores (PC) were run through a GEOTEK Multi Sensor Core Logger (MSCL) to determine their wet bulk density by gamma ray attenuation and their volumetric magnetic susceptibility using a Bartington MS2 magnetic susceptibility sensor. The MSCL was calibrated every morning using an aluminum calibration piece of known diameter inserted into a water-filled core liner to provide a five-point density calibration. The measurement intervals and counting times were respectively 1 cm and 1 s for the TWC and PC and 0.5 cm and 5 s for the BC. NRCan cores were then sealed with wax at both ends to prevent water loss. The GEOTOP group cores were split and processed in the GP Lab as described below.

6.5.3 Core image scanning and spectrophotometry

The cores were split lengthwise into working and archive halves. The working half was subsampled and the archive half was photographed at 500 dpi using a high resolution Smartcube SmartCIS core scanner. The archive section was then measured for diffuse spectral reflectance (DSR) using a hand-held Minolta CM-2600d spectrophotometer (400-700 nm range; 10 nm resolution; 3 mm spot size). The spectrophotometer was calibrated before each section and the measurements were performed through a plastic film (Glad Cling Wrap™) to protect the instrument's integration sphere from contamination (Mix et al, 1995, 1999; Harris et al 1999). We employ Gladwrap™ for this purpose as is standard practice in the Ocean Drilling Program and Integrated Ocean Drilling Program because it has been shown to absorb less toward the UV-end of the spectrum than other commercially available wraps (Balsam and Deaton, 1991). This also allows our data to be easily compared with other results generated by the Kent State paleoceanography lab (Ortiz et al, 1999; Ortiz et al, 2004). The box and trigger weight cores were scanned at 0.5 cm resolution to capture the structure of the near surface sediments. The piston cores were scanned at 1 cm resolution due to time constraints. In this cruise report, the DSR data are expressed in the CIE L*, a*, b* color space: a color space often used in paleoceanography which specifies colors based on the brightness which ranges from black to white (L*), their green to red contrast (a*) and their blue to yellow contrast (b*). A summary diagram of the physical properties of each core is provided in the results section. Further processing of the full reflectance spectra will be conducted post cruise by J. Ortiz at Kent State University to estimate sediment lithology.

6.5.4 Core description

The core description followed the general principles described in Hillaire-Marcel et al. (1999). Split sections were first cleaned to expose fresh sediment. Sediment texture was estimated by rubbing it between the fingers, or by mouth-feel. Textural components are described as clay (<2 μm), silt (2-63 μm) or sand (63-2000 μm). Sediment textural names used in the description logs are defined in table 6.2, whereas the symbols used to characterize the sedimentary structures and coring disturbances are illustrated in Figure 6.6. Color was described using the Munsell chart. Finally, when observed, shell and rock fragments were sampled for radiocarbon dating or further observation (see subsample table in digital appendix). The descriptive log of each core was scanned and is presented in Appendix.

Table 6.2 : Sediment textural names used in the description logs

Sediment textural class	Definition	Core log symbol
Clay	>80% clay	c
Silt	>80% silt	st
Sand	>80% sand	s
Silty clay	clay>silt; <80% silt or clay; <10% sand	st-c
Clayey silt	silt>clay; <80% silt or clay; <10% sand	c-st
Sandy mud	<80% silt or clay; 10-50% sand	s-md
Muddy sand	<80% silt or clay or sand; 50-80% sand	md-s

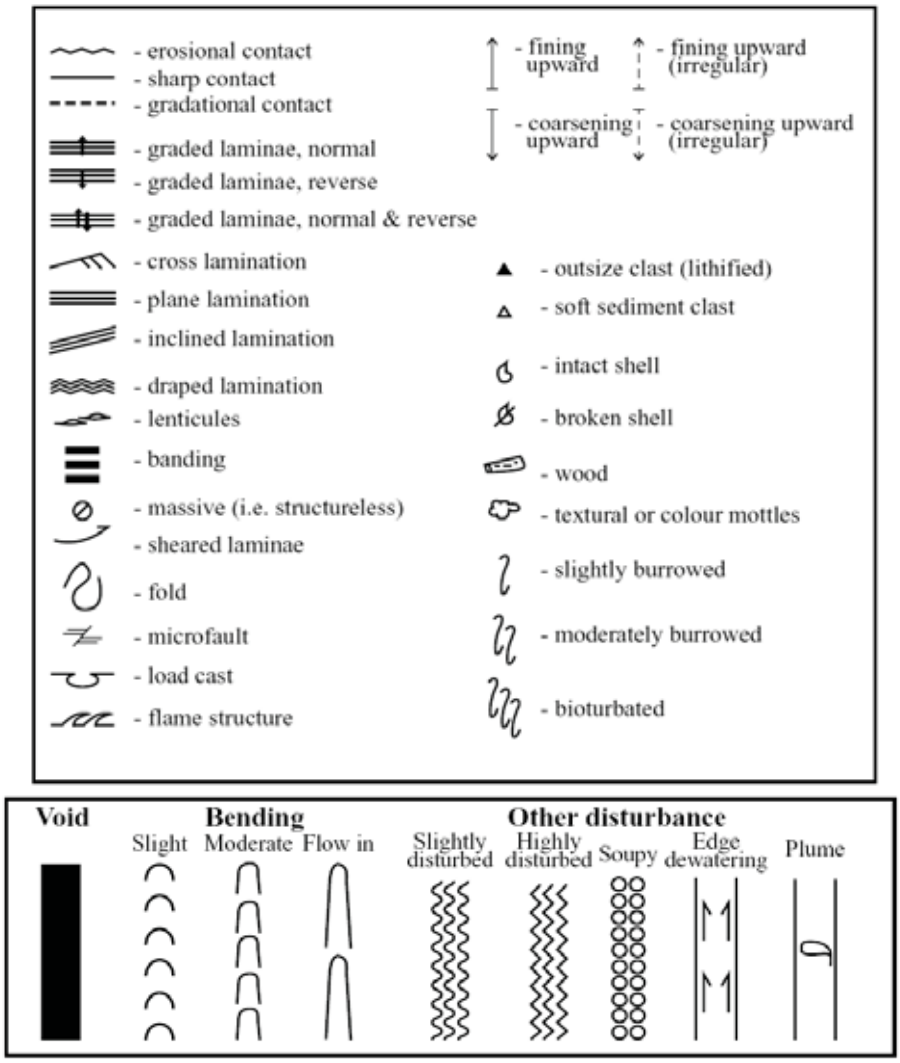

Figure 6.6 - Symbols used to characterize the sedimentary structures and coring disturbances

6.5.5 Sediment sampling

A central strip of the working half of all cores (box-, trigger weight- and piston-cores) split onboard was sampled using a u-channel. These u-channel samples will be used for paleomagnetism measurements at the *Institut des sciences de la mer de Rimouski* (ISMER). Several cm^3 of sediments were then sampled at various intervals and for various purposes. All the discrete samples were collected using 1-cm thick slices (0-1 cm). The sampling scheme is explained below.

Box cores

The surface of each box core was photographed before and after the push cores were introduced. Five push cores were collected at each station. They were labeled A toE

or F. All push cores were analyzed through the MSCL for the determination of bulk density and magnetic susceptibility.

The surface sediment, which consists in the upper few millimeters (about 0-3 mm) of soft mud were collected with a spoon after the push cores were introduced. The surface sediment sample was divided in aliquots as listed below:

1) About 20 cm^3 was processed immediately onboard by sieving at 63 µm and drying. This sample will be used for the examination of foraminifers and for further evaluation of the differential calcium carbonate preservation after different sampling procedures (sampling done for A. de Vernal, GEOTOP, UQAM).

2) About 50 cm^3 was frozen for biomolecular analyses (sampling done for Y. Gélinas, GEOTOP, Concordia U.).

3) About 10 cm^3 was frozen for further ^{13}C, ^{15}N and Corg analyses (sampling done for A. Mucci, GEOTOP, McGill).

4) About 50 cm^3 was stored in the cold room for palynology, micropaleontology, geochemistry, clay mineralogy, etc. (sampling done for A. de Vernal, C. Hillaire-Marcel and others, GEOTOP, UQAM)

5) About 10 cm^3 was saved for morphological analyses of planktic foraminifers (sampling done for M. Kucera, U. Tubingen)

6) About 50 cm^3 was saved in plastic bags for the excystment of living dinoflagellate cysts (sampling for A. Rochon, ISMER & GEOTOP)

7) About 50 cm^3 was saved in ethanol stained with rose Bengal for analyses of living foraminifers (sampling done for K. Husum, U. of Tromsø).

8) About 20 cm^3 was saved in ethanol stained with rose Bengal for Mg/Ca analyses of benthic foraminifers (sampling done for U. Quillman, INSTAAR, U. of Colorado)

9) About 20 cm^3 was saved in ethanol stained with rose Bengal for isotope analyses in foraminifers (sampling done for C. Hillaire-Marcel, GEOTOP, UQAM)

10) About 10 cm^3 was collected for XRD, grain-size, magnetic characteristics, etc. (sampling done for J. Andrews, INSTAAR, U. of Colorado)

11) 5-10 cm^3 was stored in the cold room for the analysis of IP25 biomarkers (sampling done for G. Massé, U. of Plymouth)

12) 10-20 cm^3 was frozen for DNA analyses in *Elphidium* spp. (sampling done for O. Gibb, Dalhousie U.)

13) In Baffin Bay, about 10 cm^3 was frozen for geochemical analyses (sampling done for R. Stein, Alfred Wegener Institute).

One push core (the longest) was split to collect a u-channel in the working half. When time permitted, the working half was subsampled at 1-cm interval (see sampling report).

One or two push cores were subsampled by extrusion at 1-cm interval. The 1-cm thick slices were subdivided in aliquots. At least one aliquot was frozen, another was stored in the cold room and a third was mixed with ethanol-rose Bengal solution. Further analyses to be performed include micropaleontology, palynology, geochemistry (^{13}C, ^{15}N and Corg, ^{210}Pb, etc.), biomarkers, clays minerals, etc. It is of note that a discrepancy was sometimes observed between the length of the core before sampling, as measured from the liner, and after sampling, i.e., the sampling depth of the samples (see sampling summary section). This discrepancy is likely an artifact due to compression during the process of extrusion and/or accuracy of the thickness of the sediment slices sampled.

Other push cores were sealed and archived vertically.

Trigger weight and piston cores

In addition to u-channel sampling, three TWC and one PC were sampled at 1 cm intervals (2008 029 004PC, 2008 029 008 TWC, 2008 029 016 TWC, 2008 029 067 TWC), and two PC and one TWC (2008 029 012PC, 2008 029 070 TWC and 2008 029 070 PC) were sampled for geochemical, isotopic, micropaleontological and grain size analyses at 10 cm intervals. In some cores, shells were observed during description. They were subsampled for further AMS-^{14}C analyses (see sampling summary).

6.5.6 Sediment and data archiving

The whole cores which were not split onboard are archived at the Geological Survey of Canada (GSC) in Dartmouth (N.S.), whereas the split cores and the u-channels will be archived at ISMER or at GEOTOP-UQAM. Discrete samples collected on board will be distributed to the principal investigators.

Data produced onboard are summarized in the result section. Most raw data are available as tables or figures in the appendices.

6.6 Seismic reflection and acoustic systems

During Hudson 2008-029 a suite of standard seismic surveying tools were used. Most days, surveying occurred on a nightly basis. On a few occasions we ran for longer periods of time.

The following seismic systems were used during this cruise:

1. Single channel seismic system consisting of a pneumatic sound source and hydrophone streamer;
2. Huntec DTS (sparker);
4. Knudsen 12 khz ram mounted and 3.5 khz hull-mounted transducer;
5. Klein 3000 Digital Sidescan Sonar.

6.6.1 Single Channel Seismic System

The seismic reflection profiling system consists of a pneumatic source, supplied with pressurized air from two onboard compressors, a firing system, a receiving hydrophone array, a digital data recorder, an analogue recorder and a hardcopy recorder.

The sound source for seismic operations on Hudson 2008-029 was the Seismic Systems Inc. Generator Injector (GI) Gun – 1*210 cu in gun. The concept behind the GI Gun is that an initial pressure wave is generated by the release of compressed air (the generator), as in a conventional air gun. This blast of compressed air produces the

primary pulse and the resulting volume of air (the bubble) starts to expand. When the bubble approaches its maximum size, it encompasses the injector ports and its internal pressure is far below the outside hydrostatic pressure. In a conventional air gun, the bubble would now collapse and it is this expansion and collapse that gives rise to the bubble pulse. In the GI Gun, the injector is fired at this time, injecting air directly inside the bubble, increasing the internal pressure of the bubble and preventing its violent collapse. The oscillations of the bubble and the resulting secondary pressure pulses are reduced and reshaped, therefore.

There are several modes of operation of the GI Gun. For this expedition, the gun was operated in Harmonic mode (recommended for high resolution surveying). In harmonic mode, the generator and injector volumes are each 105 in^3. The GI Gun is equipped with a blast phone and through monitoring the blast phone and varying the delay between the generator and injector pulses, the optimum bubble cancellation was achieved. The gun was mounted horizontally below a short I-beam, hung by chains. The beam was suspended from a single Norwegian float. Calibrated source signature data for the array are shown in the figure 6.7 below.

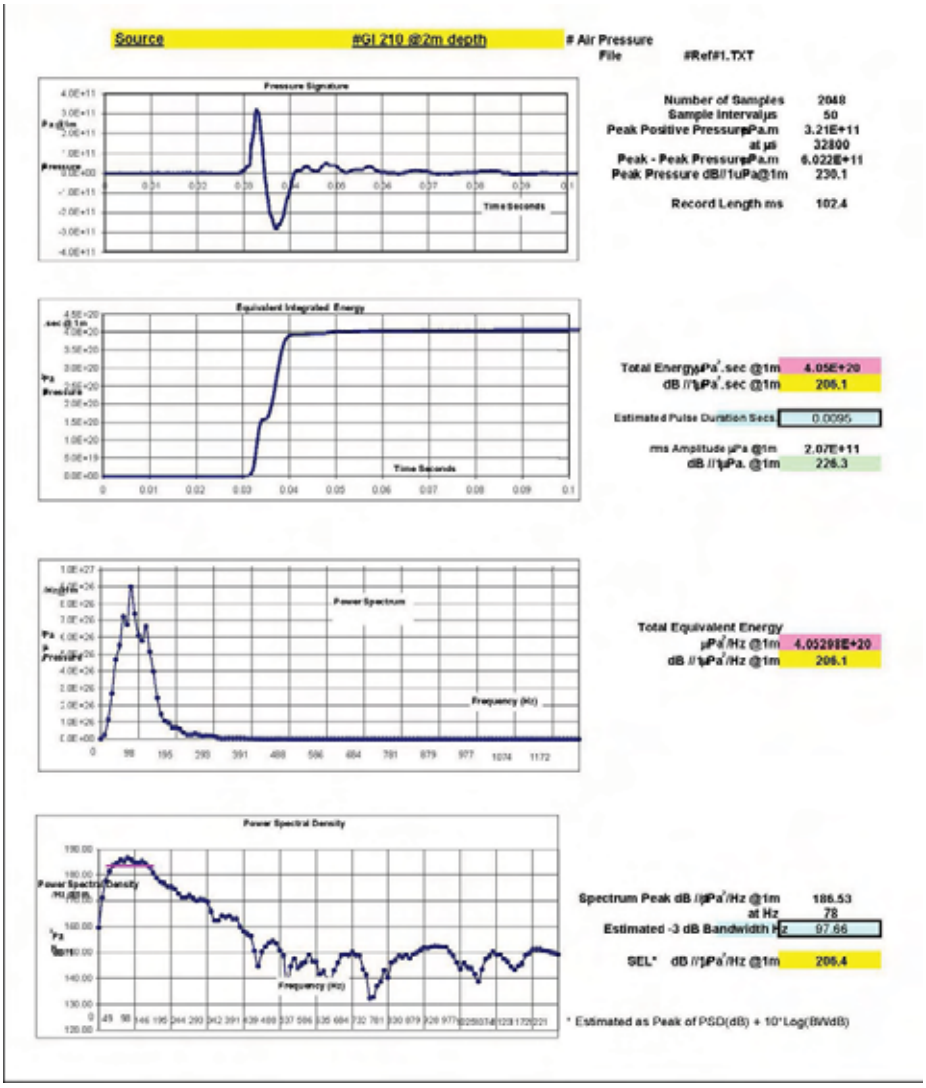

Figure 6.7- Calibrated source signature data for GI Gun

Seismic Sources:

One Sercel 210 GI gun was mounted on the small single beam. See figure 6.8 for gun towing.

This Primary Sources were towed from a cleat on the port side rail or towed from the portside iron board to insure separation of the gear during turns. See figure 6.9 Hudson Quarter Deck

1500-1600 psi air was supplied by one of two Price Air Compressors. One compressor was mounted mid-ship on the flight deck (GSC-A Diesel Price model WII). The second was the GSC-A Electric Price mounted in a container on the Starboard Side of the Flight Deck. A 1250 litre fuel tank was mounted just forward of the GSC-A Diesel Compressor. Fuel was supplied by the ships engine room staff. Only one compressor was needed to fire the GI gun. The Electric Price was the Primary compressor as the Diesel was only a stand-by. These compressors were monitored continuously by a watch keeper whenever they were in operation. See figure 6.10 Hudson Flight Deck

The GI gun was triggered by the MITS using the LongShot Seismic Source Controller and the Four Shot Seismic Source Power Supply unit.

Hydrophone Streamer:

The streamer was deployed from a winch on the starboard quarterdeck through a roller block on the starboard stern rail. The streamer was recently re-fitted by Swain Geophysical in Texas. During the refit, the streamer was outfitted with two coils for operating two DigiBird streamer birds. The Streamer has a 27 ft dead section at the head and a 16 ft dead section at the tail. The active section is approximately 150 ft long containing 48 Teledyne B-1 acceleration canceling hydrophone cartridges. As in previous years the streamer was towed approximately 100 metres behind the ship. The average depth of the streamer was 3 metres. A cloth drogue was towed about 50 ft behind the tail for stability. A small float with about 2 metres lead was attached about 50 ft after the eel. The streamer worked well with two DigiBirds. The Birds had no problem to operate in the programmed depth zone. The streamer has series of hydrophones connected to form a total of 6 groups. These 6 groups are summed together, amplified and the sent to the GSCDIGS for digitizing and storage. The signal is also sent to a Krohn-Hite filter and then to an EPC 9801 Thermal Recorder for a hardcopy.

Data Acquisition, Display, Storage and Processing

See figure 6.11 for wiring diagram

Filters- Krohn-Hite Model 3323 Filter

Settings	High Pass	20 db 80Hz
	Low Pass	0 db 500Hz

Applies filtered Acoustic signal to the EPC Model 9801 Thermal Hardcopy

EPC- Model 9801 Thermal Hardcopy
Settings 1 to 2 Second Sweep

GSC Digs- GDAIMS Ver 1.4_18

GI Guns
Sample rate set to 250 uS 2-2.5 second window, number of samples ~8000

In deep water, delays were managed on the fly through software window and recorded in the segy header. Data were written to the internal hard drive and backed up on DVD-R media.

For most lines, seismic and trigger channels were also continuously recorded to Sony 9-channel DAT tape as an analogue backup. Channel 1 is trigger and Channel 2 the raw seismic signal.

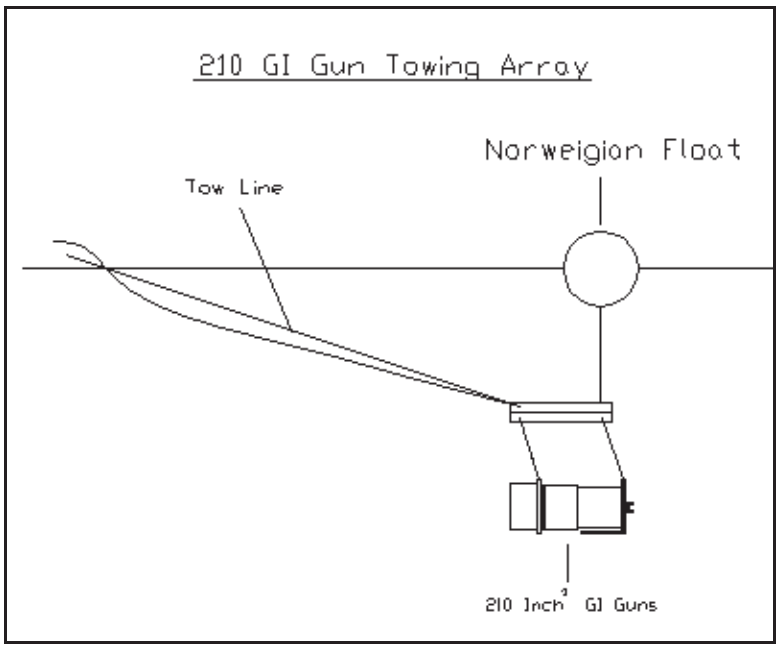

Figure 6.8 GI Gun towing configuration during Hudson 2008-029

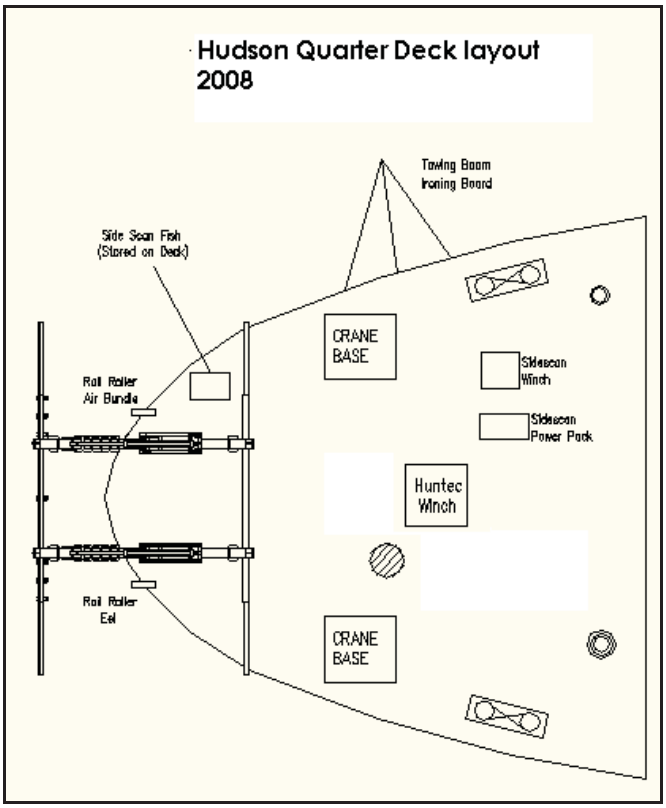

Figure 6.9 Quarter deck layout during Hudson 2008-029

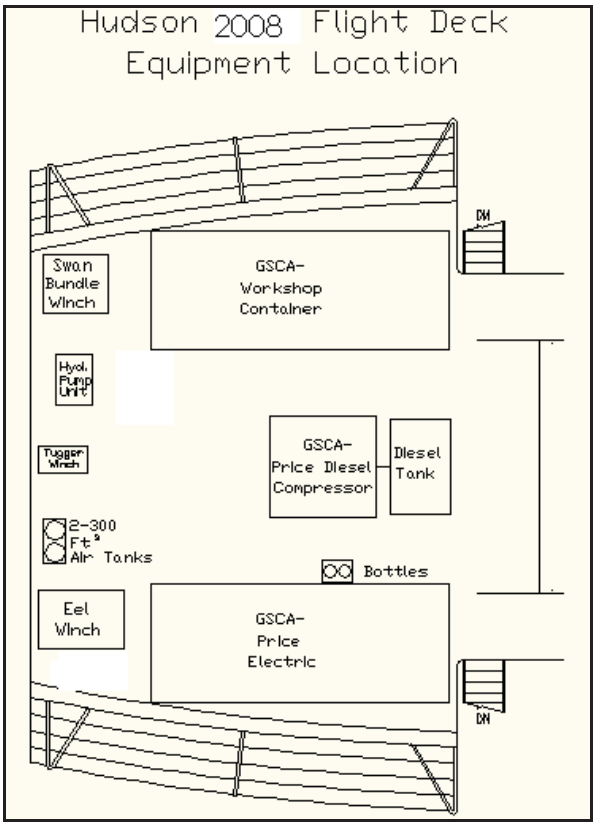

Figure 6.10 Flight deck layout during Hudson 2008-029

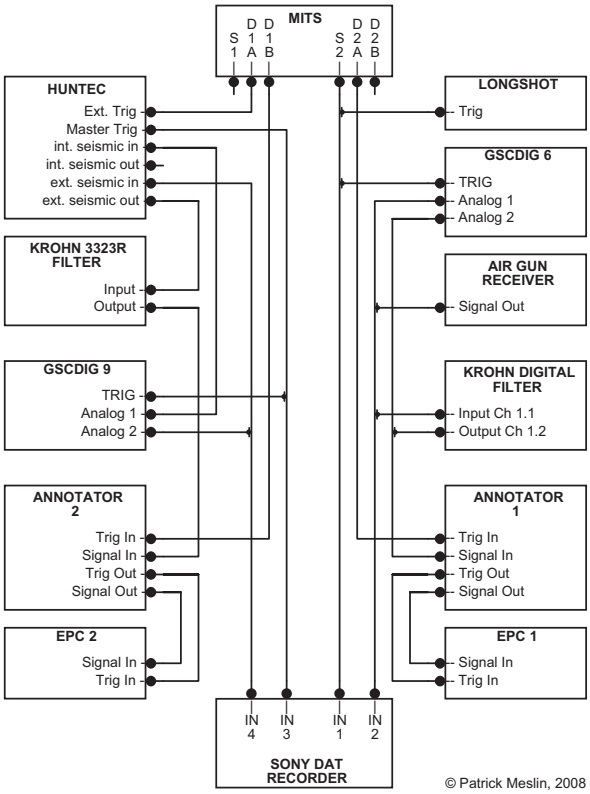

Figure 6.11 Electronics wiring diagram during Hudson 2008-029

Data Processing

The data acquired at sea were processed to transform the raw seismic lines into coherent stratigraphic cross-sections of the earth's subsurface. In-house software GdBatch 2, v. 1.40, build 0010, Gedco's Vista 7.0 and SMT Kindom suite v. 8.2 software were used to process and generate line images. Teledyne streamer raw seismic lines were concatenated into line sections and delay changes were adjusted via GDBatch. In Vista, lines were processed with band pass filtering between 25-40-250-300 Hz, time-varying gain compensation and F-K migration on water velocity. Where necessary, trace de-jittering was applied if sea conditions caused unwarranted record heave and incoherency. Processed SEG-Y seismic data were imported into SMT Kingdom Suite where each line was displayed in its appropriate geographic location and scaled images were produced for inclusion in this report.

6.6.2 Huntec Deep Towed System

(Also see GeoForce Consulting Client Report)

The Huntec (DTS) (Figure 6.12) typically uses a boomer source, but for deep water or hard seafloor substratum a sparker attachment is used to increase the source energy (Figure 6.13). Higher frequencies and source repeatability are sacrificed as a result. The sparker tip was used during this cruise. The particular Huntec towbody and winch system used for this mission was recently donated to the GSC by the USGS Menlo Park and refurbished by GeoForce. This was the first trial of this system. The system was

typically towed around 100 m below sea surface. Deep-towing the sparker improves source characteristics and repeatability. The source was operated at 480 Joules output (4 kVolt setting). The figure below shows the calibrated source characteristics for the sparker at these settings and atypical tow depth of 100 m.

Signals were received on the internal hydrophone and on a 24 ft-long, 24-element (AQ-16 cartridges), oil filled streamer towed behind the fish. The hydrophone elements were arranged with a section of 10 x 1 ft hydrophone spacing wired in parallel, and a section of 14 cartridges with 1 ft spacing, in parallel. The two sections are wired in parallel. The signals were displayed in analogue hard copy on an EPC9800 thermal chart recorder typically with a 500 ms sweep rate and filtered between 500 and 3500 Hz for the sparker data. Only the external hydrophone received signal was printed for the deep water work. Firing rates varied but were typically 1-1.5 s for the slope and 0.6 s for the shelf. Data were recorded digitally on the GSCDIGS system using GDAim software version 1.50. They were digitized at 100 ms for a record length of 500 ms and written to hard drive and DVD media. Section 7.3 shows the Huntec Digital DVD Log. Digitized data were broadcast over the ships network using MCast and were displayed as waterfall in real time with GDRemote version 1.7Beta, running from a second computer. This display proved to be invaluable for tracking seismic signals and managing deep water delays, particularly when signal to noise ratios were low.

All Huntec seismic files were converted to image files for this report using GDShow version 1.40, Build 0168. These image files provide a visual fileby file catalogue of data acquired.

Figure 6.12 Huntec DTS being deploye

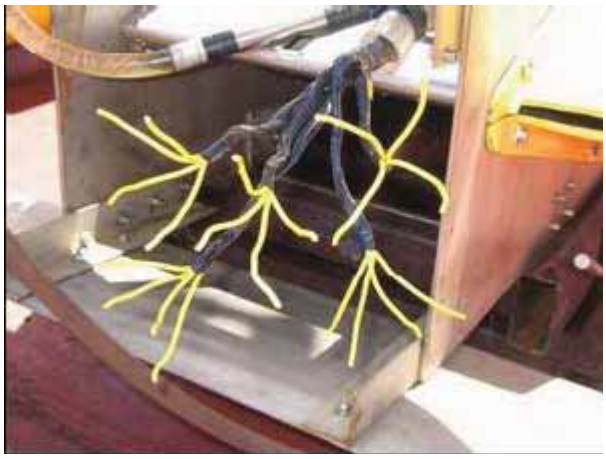

Figure 6.13 Huntec DTS sparker

Calibrated source signature data for the Huntec are shown in the figure 6.14. Raw (unfiltered and no gain) Huntec DTS sparker records (internal and external hydrophones) were recorded by the GDAim software in files of 1 hour and start and end of lines at the watchkeepers discretion. External hydrophone files were concatenated into line segments using GDBatch version 1.4 build 0010. No delay fixes were implemented at the time of concatenation because of file size constraints. Images of these line segments were generated with GDShow version 1.4, build 0159. For line image production, records were padded for delay changes, filtered at 250-5000 Hz and displayed at 26 dB gain amplification for bipolar phase data and 23 dB gain for envelop display. Images were produced of both bipolar and envelop displays and saved as bitmap files. Bitmap files were converted to JPEG format for inclusion in this report.

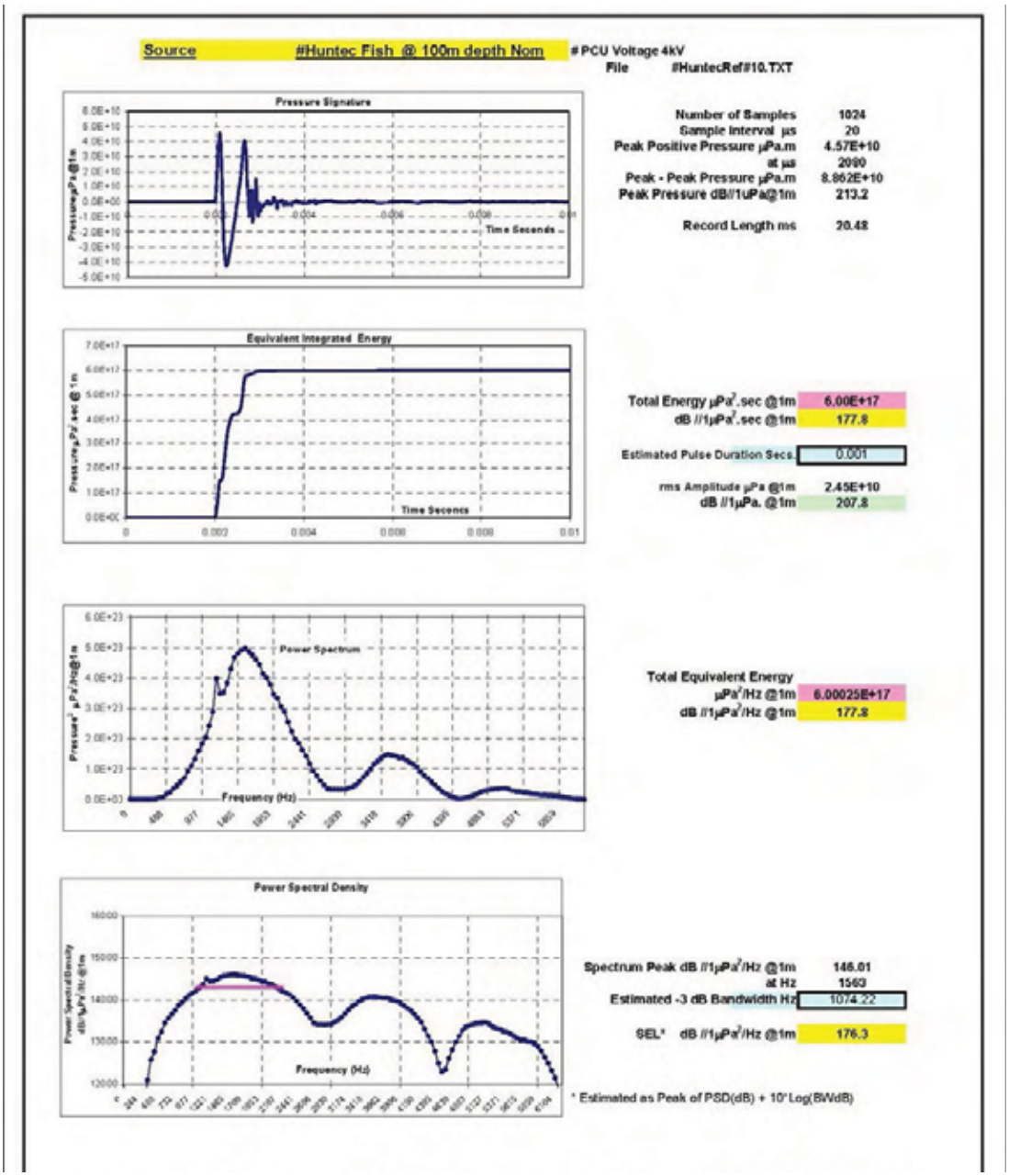

Figure 6.14 Calibrated source signature data for Huntec DTS sparker.

6.6.3 Knudsen Sounder

The Knudsen 12 kHz sounder and 3.5 kHz chirp subbottom profiler are new hull-mounted additions to the Hudson (Figure 6.15). The 3.5 kHz chirp mode was operated and logged for most of the mission except when the Huntec DTS was deployed due to interference with the Huntec system. Data are displayed in graphic mode to a monitor and bottom tracking is automatic with the value displayed for the watchkeepers. The 12 kHz transducer is mounted on the ship's ram and should be extended during survey operations.

The sounder logs files as ascii (.kea) format, its own native binary format (.keb) and as SEG-Y files; industry seismic format. Time and position is logged with these data. It is important to note that the chart display does not clearly indicate whether or not the data are being logged. Under the "Recording" menu, if start line is "greyed out" then it is logging. If it is black, then it is not logging. Also, the ascii log files must be configured to record desired parameters. Default parameters do not include day, time, or position. Rebooting the system apparently returns these parameters to default selections.

Data from the sounder are broadcast on the ship's intranet and recorded and rebroadcast by the Baytech Multiplexer navigation logging computer. The depth string is recorded by the general logging software, but NOT by the Regulus navigation logging computers. This is because it would create a conflict with the bridge's sounder broadcast that Regulus is logging.

It is important to note that inspection of the automatic bottom pick on the *.keb files shows a high percentage of bottom mispicks. For quality control, these data should be repicked or severe data editing needs to be performed before data release.

Figure 6.15 Knudsen chirp console and logging

6.6.4 Timing

The Lab triggers for the Knudsen Dual Frequency sounder, the Huntec DTS, the GI gun and the data recorders were handled by the GSCA-MITS Trigger unit. This kept the individual systems from interfering with each other and allowed delaying for depth to an accuracy of one millisecond. The Master timing for the 4 Channel TSS 312B Record Annotator originates from the Ships Clock system and gets its delay timing for the EPC recorders from the appropriate GSCA-MITS channel.
The GSCA-MITS supplied the timing for the Huntec EPC recorder (Chan 1B) through a TSS 312B Record Annotator channel, and the Air gun EPC (Chan 2A) recorder through a TSS 312B Record Annotator channel.

The GSCA-MITS (Chan 2) supplied the timing for the LongShot Seismic Source Controller and the Four Shot Seismic Source Power Supply units, which generate the Generator and Injector Fire Pulses required to fire the GI Guns efficiently. The GSCA-MITS (Chan 2) also provides the trigger for the GSC Digs Data handling system.

Sercel 210 GI Gun (2)

The GSCA-MITS (Chan 2) time interval set for the GI Guns was appox. 6 seconds. The air volume was set to 105 for thegun. The Injector timing for the gun was 55 ms with an 80 ms Bubble. All settings were adjusted during the course of the survey but the best data quality came from these settings.

The LongShot Seismic Source Controller and the Four Shot Seismic Source Power Supply units worked well during the survey period.

Huntec DTS
The GSCA-MITS (Chan 1A) timing for the Huntec DTS was supplied by the GSCA-MITS. To keep the Huntec from interfering with the Air Gun Data, the time interval and corresponding EPC delay (Chan 1B), was adjusted as needed. The GSCA-MITS (Chan 1A) also provides the trigger for the GSC Digs Data handling system.

6.6.5 Performance

One Sercel 210 GI gun was used on a single beam and fired a total of 53,803 shots. The LongShot Seismic Source Controller and the Four Shot Seismic Source Power Supply units were used to minimize the Bubble by controlling the timing of the generatorand injector pulses. The data was stored on the GSC Digs unit and a filtered signal was sent to an EPC 9801 Thermal Recorder.

6.6.6 Mechanical Equipment

As mentioned previously under the section “Seismic Systems” two Compressors were used. The GSC-A Price Gun Master WII compressors deliveries

185SCFM@2500rpm. Once the scientific program was completed a complete service was performed on both compressors (see details in Compressor Logs). This phase experienced virtually no down time due to equipment failure.

6.6.7 Klein 3000 sidescan sonar

The Klein 3000 side scan sonar system was used on the Hudson during the 2008029 cruise (Figure 6.16). It is a completely digital system with no paper record. Data were acquired with SonarPro 11.2 and stored in .SDF and .XTF file format on the hard drive of the Klein PC and then backed up on DVD-R media. The Klein Internal Responder was used with the TrackPoint II system to accurately position the towfish. The Klein responder was set to ping rate divide by 8 with a reply of 24 kHz and the Trackpoint II was set to external key in order to interface with the Klein 3000. Data were acquired in both high (500 kHz) and low frequencies (100 kHz) at a 400 m range.

The fish was towed with neutral buoyancy package and depressor weight. The system was used with 800 metres of cable on remotely controlled Markey winch. The towfish was towed between 30 and 50 metres above the seabed at most times. However, in some of the deeper water areas the fish was towed up to 70 m above the seabed when the maximum depth of the towfish was reached. Survey speed when the side scan sonar was used varied between 4 to 4.5 knots.

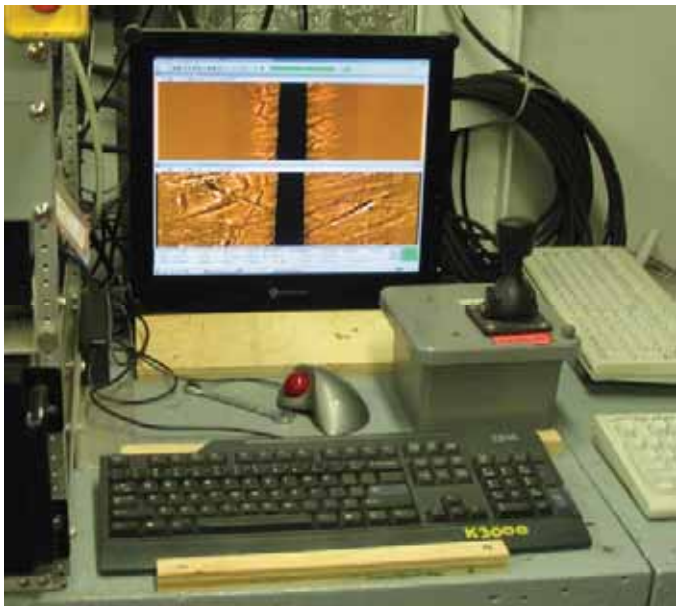

Figure 6.16 Klein sidescan console and logging computer.

The Klein 3000 sidescan system functioned very well with no problem. The system gave very high quality images of the seabed and was easy to use. The winch was fast in both Pay out and Haul in positions and the TOTCO cable counter worked well.

The cable was easily spooled neatly on the drum during recovery with minimal time or effort. There was no post-processing of the side scan data performed onboard during 2008 029.

6.7 Navigation

GPS navigation was provided by a Thales ADU5 3D position and attitude determination system. The ADU5 was located on monkey's island 2.35 m to the port side of the ship's centerline and 53.1 m forward of the stern of the vessel. Real time differential corrections were received from Coast Guard radio beacon Rigolet, NL early in the expedition but were lost during the remainder of the survey where the ship was without corrections as there were no transmitters further north. Navigational data consisted of NMEA sentences from the ADU5 which were combined with NMEA sentences from the ship's log, gyro and depth sounder through a Baytech multiplexer in the computer room. Data from the multiplexer were then forwarded to a Black box line splitter for distribution throughout the ship at 9600 baud. A laptop running WinFltrNMEA was used in the computer room to rebroadcast selected NMEA sentences at 4800 baud.

Four Regulus II navigation software computers were in use on the ship to view and log the scientific navigation data and to provide waypoint information to the bridge. All systems were running the latest version of Regulus, Build 28938 (May, 2007). These systems were set up in the Drawing room (license 4), Winch room (license 6), the Forward lab (license 3) and the Geophysics lab (GP lab) (license 5). A second monitor was attached to the GP lab Regulus system via a video splitter which allowed for the concurrent display of the navigation data for the benefit of the Huntec operator. All four computers were set to logging mode and the data from all were backed up on a daily basis. The GP lab computer data was used predominately for navigation processing and it was configured as a data server to provide navigation data to the GSCDIGS computers over the ship's LAN. All computers were provided with both network and serial feeds. Navigation data were cleaned and merged using custom tools in ArcGIS to generate decimated A-format files from the raw NMEA E format files. Both 10-sec and 60-sec A-files were produced using these Arc tools written by an NRCAN GIS specialist. One stack error was noted early in the survey but apart from that these conversion tools were excellent and a vast improvement over anything used in the recent past. The produced files were archived and merged on a daily basis and used to produce the final running nav file which was bounded by the parameter file.

During the previous expedition (2008 027) the ADU5 stopped outputting positional information twice so it was recommended that the system be reset daily which appeared to alleviate this problem. A timing GPS, attitude and wind logging system located in the computer room which ran independently was backed up on a daily basis as well to produce an archive if lost or detailed data were ever required.

Unfortunately, we realized after sailing north out of the Labrador Sea that we did not have electronic navigation charts available on any of the Regulus machines for these northern waters. The Bridge was also without these charts loaded but did have a package

of charts that they tried several times to load but experienced license issues. Finally, after further correspondence with the Regulus parent company ICAN they were able to solve the license issue and load charts for the northern waters of this survey on the two bridge navigation computers. We discovered through correspondence with the NRCAN office that we had never purchased these charts for our four science navigation computers and with the loss of our internet signal any attempts to rectify the situation while at sea were abandoned.

An in-house developed digital logging system (version 2.0, May 2008) was used for the second time on this expedition, in addition to the conventional log keeping activities (log book entry). The interface allowed for digital logs to be created while underway and was provided with an automatic navigational feed greatly reducing typing or absent readings. The watch keeper could manually add line numbers and general comment data allowing user input to specific fields regarding survey activities as well as general comments. The GPS NMEA navigation data was split to a system (GSC Nav Net Suite of applications) that multicast the data on non-disclosed multicast ports. The logging computer subscribed to this port and received this multicast of navigation data, including position, time and water depth; water depth being provided from the science Knudsen 12 kHz sounder. The system often did not receive depth depending on which sounder was on so it was felt that a dedicated depth window should be provided in future to allow the watch keeper to manually enter this where feed was not provided.
A multicast socket (231.31.31.32) was opened on the following ports:

Navigation:3400(GGA,RMC,GLL)
Heading:3500(HDT)
Sounding:3600(DBT)
Log: 3900 (VHW)

The software was written using LabVIEW Version 8.5 and ran under Windows XP Professional. The executable file was named DigitalGeneralLogVer 2.exe. This version of the software used a system run time engine and an “Installer” CD was provided which contained the setup.exe file. Both the executable and a desktop shortcut were installed on the previous expedition. Note that accurate time for this application was dependant on a Network Service Client being present. The host computer had this client installed which set the computer system time on a regular interval. The system interface appears as below.

The digital general log was closed and restarted daily producing a comma-delimited text file with header information that was imported and appended daily in an Excel spreadsheet. This log was used to attain SOL and EOL times in conjunction with paper records. Several other spreadsheets were created listing these times, positions and associated records, tapes and DVD’s.

6.8 Digital Cruise Log

An in-house developed digital logging system was trialed on this expedition, in addition to the conventional log keeping activities (log book entry)(Figure 6.17). The

interface allows for digital logs to be created while underway, reading navigation data and allowing user input to specific fields regarding survey activities as well as general comments. The GPS NMEA navigation data is split to a system (GSC Nav Net Suite of applications) that multicasts the data on non-disclosed multicast ports. The logging computer subscribes to this port and receives this multicast of navigation data, including position, time and water depth; water depth being provided from the science Knudsen 12 kHz sounder (see below).

A multicast socket (231.31.31.32) is opened on the following ports:
Navigation: 3400 (GGA, RMC, GLL)
Heading: 3500 (HDT)
Sounding: 3600 (DBT)
Log: 3900 (VHW)

The software was written using LabVIEW Version 8.0 and runs under Windows XP Professional. The executable file is named DigitalGeneralLogVer1.2.exe. This version of the software uses a system run time engine. An "Installer" CD is provided which contains a setup.exe file. Run this file to install the runtime engine, the executable file and a Desktop shortcut. Also note that accurate time for this application is dependant on a Network Service Client being present. The host computer must have this client installed which will set the computer system time on a regular interval. The system interface appears as below.

The output file format is a comma-delimited text file with header information that is readily imported to spreadsheet software.

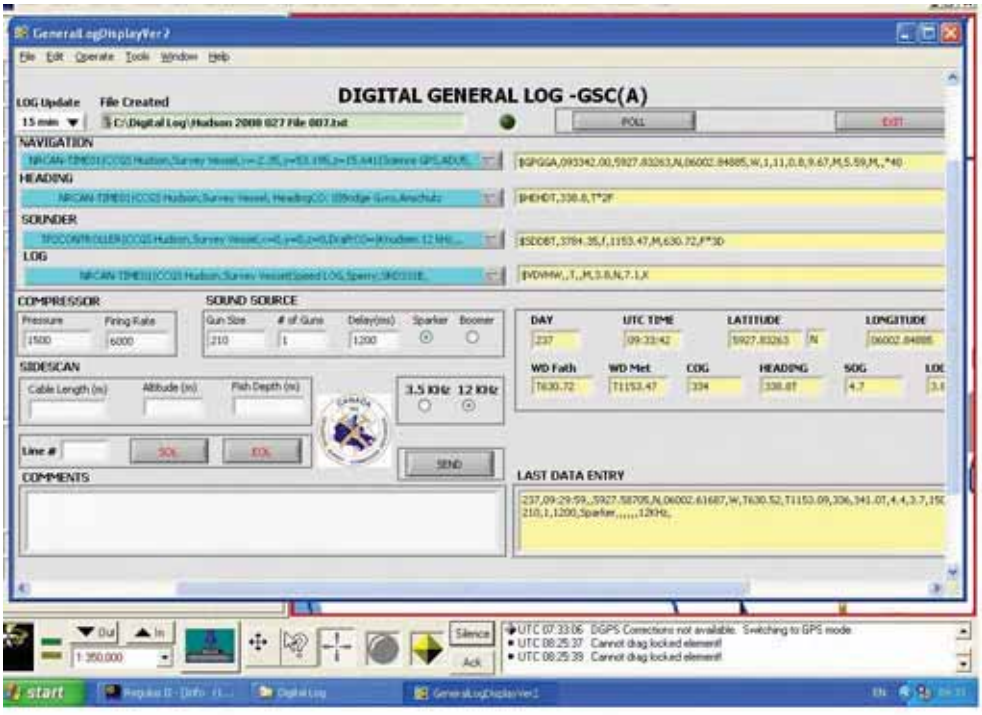

Figure 6.17 Screen grab of the digital log software in use.

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7.0 Results

7.1 Summary of Preliminary Results

Geological Survey of Canada Results-

During 2008-029, the Geological Survey of Canada was able to collect over 600 km of GI Gun seismic reflection data, over 500 km of Huntec DTS seismic reflection data, over 500 km of 3.5 kHz / 12 kHz Knudsen sub-bottom profiler data, 13 piston cores, and 3 box cores to improve the data coverage and data quality in the Lancaster Sound and Baffin Bay areas. This is the first targeted geoscience expedition into Lancaster Sound since industry hydrocarbon exploration surveys in 1974.

In addition to acquiring regional geophysical and geotechnical data, several seafloor features were investigated. In Lancaster Sound, an ice scour at 850 m water depth (see core data for 046PC and 049PC), a large depression interpreted to be some sort of glacial "rip-up" feature (see core data for 051PC and 052PC), a lenticular debris flow (see core data for 053PC), stacked mass transport deposits (see core data for 062PC),and a seabed mount interpreted to be sediment draped over tilted strata (see core data for 061PC) were investigated. In the deepwater areas of Baffin Bay and the northern Labrador Sea, 065PC and 067PC show that recent landslides in the area are likely much older than the 1933 M 7.3 earthquake in Baffin Bay, and 001PC will provide a record on downslope flows in this area. These data will be worked up in more detail when the cores are processed at the Bedford Institute of Oceanography.

Sediments encountered in core samples from Lancaster Sound were generally comprised of post-glacial gray brown mud overlying an extremely cohesive dark gray silt-sand-mud that the piston corer could only penetrate 20-40 cm. The cohesive dark gray material is interpreted to be glacio-marine or ice-contact sediments from the core samples and the accompanying seismic reflection data. Post-glacial sediment thickness varied from 0 to ~15 m. High sand concentrations were observed in the cores collected in and around the interpreted glacial "rip-up" feature as well as the lenticular debris flow.

GEOTOP Group Results-

Cruise 2008-029 on the CCGS-Hudson was very successful and permitted the collection of sediments cores to be analysed within the framework of projects dealing with climate, ice and ocean changes along the eastern margins of Canada. In addition to visual descriptions, magnetic susceptibility, MSCL and spectrophotometry data led to define the main stratigraphical features. In the northern Baffin Bay, cores from the Nares Strait and Jones Sound contain thick organic-rich sequences of Holocene sediment, which will help documenting the exchanges between the Arctic and Baffin Bay and their impact on the thermohaline properties of surface waters feeding the southward Labrador Current. Other cores collected to the South, in Davis Strait and off Hudson Strait in the northern Labrador Sea, cover the late glacial and the Holocene. Together, these coreswill help to constrain the variations of the Arctic outflow to the North Atlantic that is exported through the western routes of the Canadian Arctic Archipelago. Cores collected in central

Baffin Bay, including one close to ODP Site 645, exhibit alternating layers of light to dark gray, yellowish, olive and brownish to reddish mud with various gain sizes from sandy mud to clay. The sediments of these cores illustrate variations in the sources of debris related to ice advances and their study will serve to track back in time the dynamics of the Greenland ice sheet vs. Inuitian ice sheet and help to document the potential role of ice surges on the ocean conditions and thermohaline behaviour of the northwest North Atlantic during the last glacial cycle.

The following section presents preliminary results from Hudson 2008-029. In addition, a digital appendix is included which contains the following data:

1. Box core photographs.
2. CTD data tables
3. Scanned copies of the deck sheets
4. Jpegs and pdfs of the geophysical lines
5. MSCL data
6. Ships navigation and digital logs
7. Sample locations and Expedition Database files
8. Sampling tables
9. Scanned copies of the visual core descriptions

7.2 Summary Table of Sample Locations and Performance

2008029 Station Summary

Vessel: CCGS Hudson **Chief Scientist: Calvin Campbell** **Date: August 27th to September 23, 2008**

Sample loacation information							Sesimic Record			Cumulative sample	Core		
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0001	Piston	242/1136	60.539028	-58.320971	2675	Labrador Sea	2008029	242/0848	3.5 kHz	1	1219	204.5	1074
0002	Box	243/1128	61.463678	-58.035843	2668	Labrador Sea	2008029	243/0922	Huntec	1			
0003	CTD	243/1128	61.463678	-58.035843	2668	Labrador Sea	2008029	243/0922	Huntec	1			
0004	Piston	243/1320	61.463855	-58.036481	2674	Labrador Sea	2008029	243/0922	Huntec	2	1219	57	919
0005	Plankton	243/1549	61.461150	-58.031083	2671	Labrador Sea	2008029	243/0922	Huntec	1			
0006	Box	244/0946	64.393146	-58.134710	857	Davis Strait	2008029	244/0838	3.5 kHz	2			
0007	CTD	244/0946	64.393146	-58.134710	857	Davis Strait	2008029	244/0838	3.5 kHz	2			
0008	Piston	244/1054	64.393105	-58.134518	863	Davis Strait	2008029	244/0838	3.5 kHz	3	1219	156	963.5
0009	Plankton	244/1210	64.391585	-58.143859	857	Davis Strait	2008029	244/0838	3.5 kHz	2			
0010	Box	245/1201	68.666540	-59.999950	1479	Baffin Bay	2008029	2451126	3.5 kHz	3			
0011	CTD	245/1201	68.666540	-59.999950	1479	Baffin Bay	2008029	2451126	3.5 kHz	3			
0012	Piston	245/1314	68.666620	-60.000440	1475	Baffin Bay	2008029	2451126	3.5 kHz	4	1219	114	1151.5
0013	Plankton	245/1505	68.666660	-60.002160	1470	Baffin Bay	2008029	2451126	3.5 kHz	3			
0014	Box	246/1019	70.461806	-64.657438	2060	Baffin Bay	2008029	2460931	3.5 kHz	4			
0015	CTD	246/1019	70.461806	-64.657438	2060	Baffin Bay	2008029	2460931	3.5 kHz	4			
0016	Piston	246/1148	70.461921	-64.657765	2063	Baffin Bay	2008029	2460931	3.5 kHz	5	1219	155	766.0
0017	Plankton	246/1316	70.461414	-64.659867	2063	Baffin Bay	2008029	2460931	3.5 kHz	4			
0018	Water	246/1507	70.462960	-64.681533	2050	Baffin Bay	2008029	2460931	3.5 kHz	1			
0019	Box	248/1212	75.468720	-70.634565	602	Baffin Bay	2008029	2480916	Huntec	5			
0020	CTD	248/1212	75.468720	-70.634565	602	Baffin Bay	2008029	2480916	Huntec	5			
0021	Piston	248/1258	75.468650	-70.634340	604	Baffin Bay	2008029	2480916	Huntec	6	914.4	0	0
0022	Plankton	248/1345	75.468626	-70.634195	604	Baffin Bay	2008029	2480916	Huntec	5			
0023	Water	248 /1553	75.469273	-70.656936	604	Baffin Bay	2008029	2480916	Huntec	2			
0024	Box	249 /1113	77.287903	-74.342653	728	North Water Polynya	2008029	2490511	3.5kHz	6			
0025	CTD	249 /1113	77.287903	-74.342653	728	North Water Polynya	2008029	2490511	3.5kHz	6			

2008029 Station Summary

Vessel: CCGS Hudson **Chief Scientist: Calvin Campbell** **Date: August 27th to September 23, 2008**

Sample loacation information							Sesimic Record			Cumulative sample	Core		
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0026	Piston	248 /1159	77.287618	-74.343983	725	North Water Polynya	2008029	2490511	3.5kHz	7	1524	131	1091.5
0027	Plankton	248 /1240	77.287638	-74.343613	725	North Water Polynya	2008029	2490511	3.5kHz	6			
0028	Box	249/1805	76.978858	-71.890510	1048	North Water Polynya	2008029	2490200	3.5kHz	7			
0029	CTD	249/1805	76.978858	-71.890510	1048	North Water Polynya	2008029	2490200	3.5kHz	7			
0030	Piston	249/1900	76.978650	-71.890001	1048	North Water Polynya	2008029	2490200	3.5kHz	8	1219	185	1129.3
0031	Plankton	249/1935	76.978038	-71.891921	1050	North Water Polynya	2008029	2490200	3.5kHz	7			
0032	Box	250/1001	76.328783	-71.421055	696	North Water Polynya	2008029	2500745	3.5kHz	8			
0033	CTD	250/1001	76.328783	-71.421055	696	North Water Polynya	2008029	2500745	3.5kHz	8			
0034	Piston	250/1048	76.329050	-71.418998	696	North Water Polynya	2008029	2500745	3.5kHz	9	1219	46	710
0035	Plankton	250/1131	76.327951	-71.425746	696	North Water Polynya	2008029	2500745	3.5kHz	8			
0036	Box	250/1641	76.573003	-73.955386	680	North Water Polynya	2008029	2500309	3.5kHz	9			
0037	CTD	250/1641	76.573003	-73.955386	680	North Water Polynya	2008029	2500309	3.5kHz	9			
0038	Piston	250/1728	76.573490	-73.955535	678	North Water Polynya	2008029	2500309	3.5kHz	10	1219	175	845.5
0039	Plankton	250/1807	76.573960	-73.962768	680	North Water Polynya	2008029	2500309	3.5kHz	9			
0040	Box	251/0958	75.579385	-78.629585	580	Jones Sound	2008029	2510917	3.5kHz	10			
0041	CTD	251/0958	75.579385	-78.629585	580	Jones Sound	2008029	2510917	3.5kHz	10			
0042	Piston	251/1044	75.579390	-78.629571	580	Jones Sound	2008029	2510917	3.5kHz	11	1524	105	1059
0043	Plankton	251/1123	75.579071	-78.632278	581	Jones Sound	2008029	2510917	3.5kHz	10			

2008029 Station Summary

Vessel: CCGS Hudson **Chief Scientist: Calvin Campbell** **Date: August 27th to September 23, 2008**

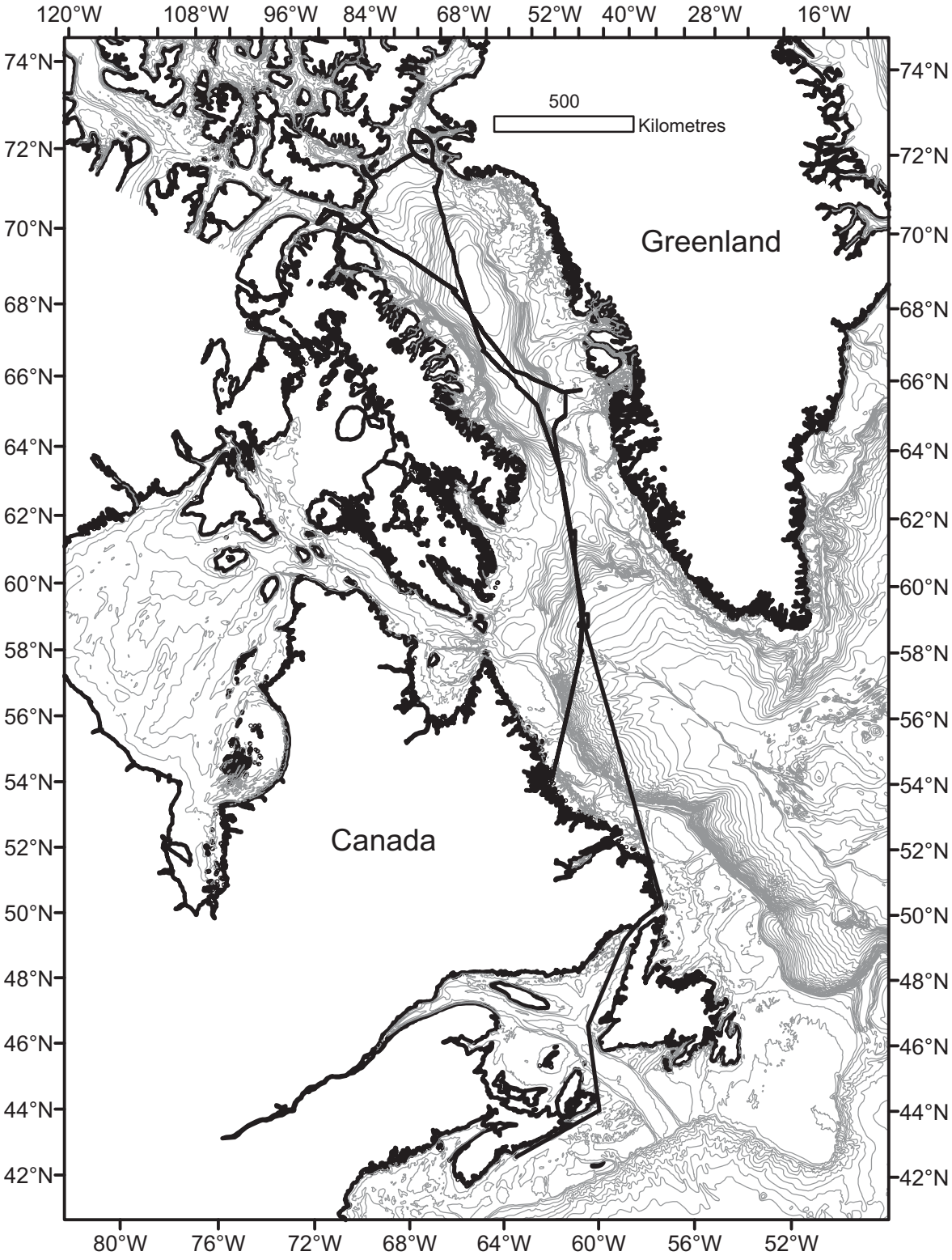
Sample loacation information							Sesimic Record			Cumulative sample	Core		
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0044	Piston	251/1340	75.600915	-78.918681	571	Jones Sound	2008029	2510902	3.5kHz	12	1524	163	1137.5
0045	Water	251/1425	75.600680	-78.919807	570	Jones Sound	2008029	2510902	3.5kHz	3			
0046	Piston	252/1122	74.023275	-77.116198	870	Lancaster Sound	2008029	2520914	Huntec	13	914.4	208	464.5
0047	Box	252/1228	74.023168	-77.116335	870	Lancaster Sound	2008029	2520914	Huntec	11			
0048	CTD	252/1228	74.023168	-77.116335	870	Lancaster Sound	2008029	2520914	Huntec	11			
0049	Piston	252/1318	74.026178	-77.125263	868	Lancaster Sound	2008029	2520911	Huntec	14	914.4	185	608.5
0050	Piston	252/1518	74.112343	-77.400833	853	Lancaster Sound	2008029	2520744	Huntec	15	914.4	61.5	321.5
0051	Piston	252/1715	74.307295	-78.020038	735	Lancaster Sound	2008029	2520432	Huntec	16	914.4	102.5	78
0052	Piston	252/1852	74.307075	-78.019601	734	Lancaster Sound	2008029	2520432	Huntec	17	914.4	209.5	488.5
0053	Piston	253/1247	73.840550	-80.394580	918	Lancaster Sound	2008029	2530815	Huntec	18	914.4	0	480
0054	Piston	253/1409	73.838971	-80.312078	887	Lancaster Sound	2008029	2530755	Huntec	19	914.4	53	249.5
0055	Box	253/1718	74.092063	-78.718643	866	Lancaster Sound	2008029	2530028	Huntec	12			
0056	CTD	253/1718	74.092063	-78.718643	866	Lancaster Sound	2008029	2530028	Huntec	12			
0057	Piston	253/1814	74.092035	-78.718158	866	Lancaster Sound	2008029	2530028	Huntec	20	1219	189.5	1092
0058	Water	253/1920	74.091956	-78.743400	865	Lancaster Sound	2008029	2530028	Huntec	4			
0059	Piston	256/1309	74.259623	-82.384150	800	Lancaster Sound	2008029	2551928	Huntec	21	1219	197.5	734
0060	Water	256/1413	74.252358	-82.379960	805	Lancaster Sound	2008029	2551928	Huntec	5			
0061	Piston	256/1641	74.258208	-82.230353	791	Lancaster Sound	2008029	2551855	Huntec	22	914.4	171.5	451
0062	Piston	256/1906	74.252531	-81.634845	822	Lancaster Sound	2008029	2551648	Huntec	23	1219	113.5	76
0063	Box	258/1240	72.406388	-67.716695	2375	Baffin Bay	2008029	2581030	Huntec	13			
0064	CTD	258/1240	72.406388	-67.716695	2375	Baffin Bay	2008029	2581030	Huntec	13			
0065	Piston	258/1411	72.406403	-67.716385	2374	Baffin Bay	2008029	2581030	Huntec	24	1219	134.5	402
0066	Box	258/1633	72.434508	-67.878181	2357	Baffin Bay	2008029	2580945	Huntec	14			
0067	Piston	258/1755	72.434431	-67.877178	2357	Baffin Bay	2008029	2580945	Huntec	25	1219	135	545.5
0068	Box	260/1642	68.228150	-57.618065	437	Off Disko Bugt	2008029	2601402	3.5kHz	15			
0069	CTD	260/1642	68.228150	-57.618065	437	Off Disko Bugt	2008029	2601402	3.5kHz	14			
0070	Piston	260/1718	68.227880	-57.617460	444	Off Disko Bugt	2008029	2601402	3.5kHz	26	1219	212	249.5

2008029 Station Summary

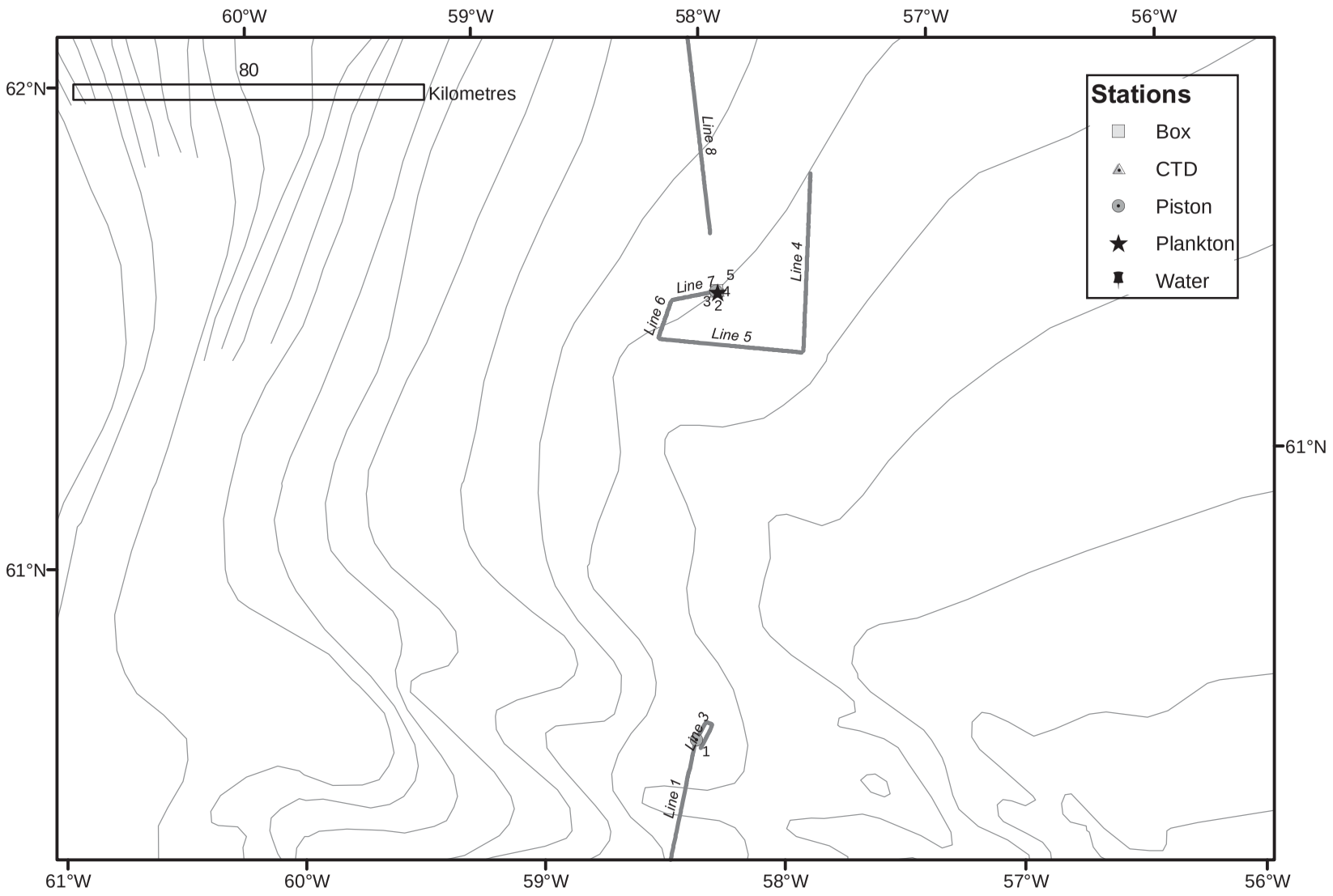
Vessel: CCGS Hudson **Chief Scientist: Calvin Campbell** **Date: August 27th to September 23, 2008**

Sample loacation information							**Sesimic Record**			Cumulative sample	**Core**		
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0071	Plankton	260/1806	68.228068	-57.624530	441	Off Disko Bugt	2008029	2601402	3.5kHz	11			
								TOTALS				**3465**	**17087**

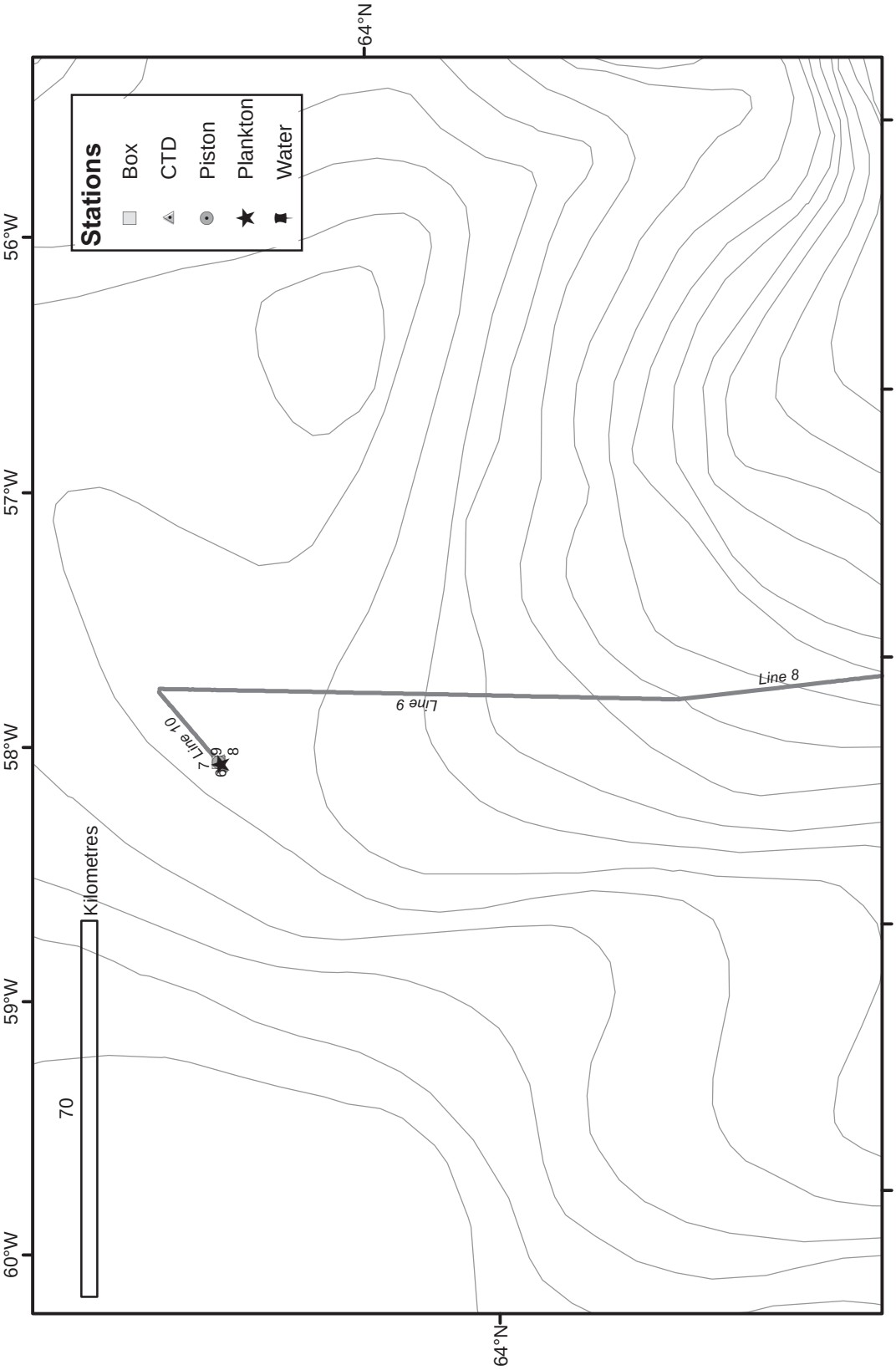
7.3 Maps of survey tracks and sample locations



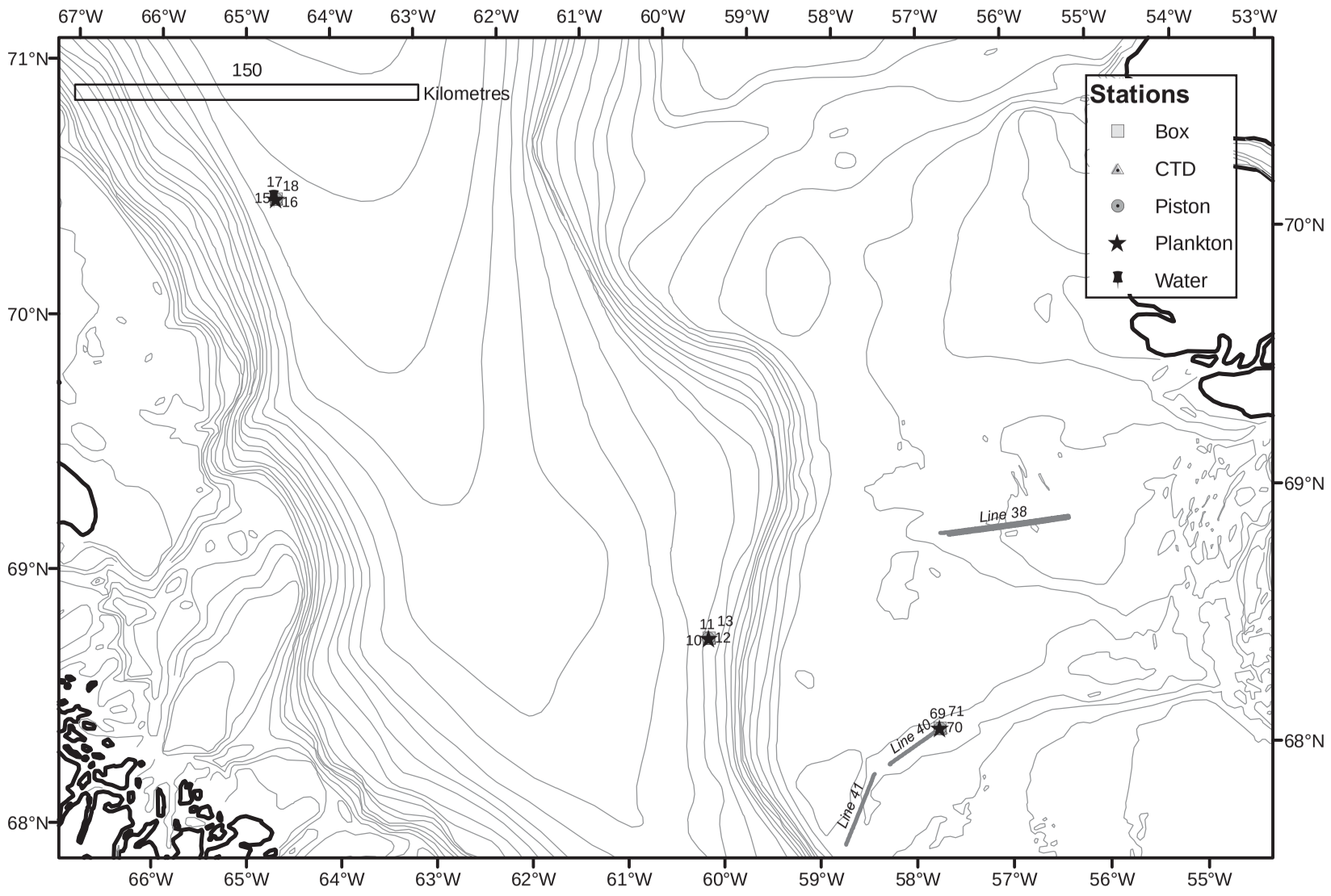
Map of ship's survey tracks, Hudson 2008-029.



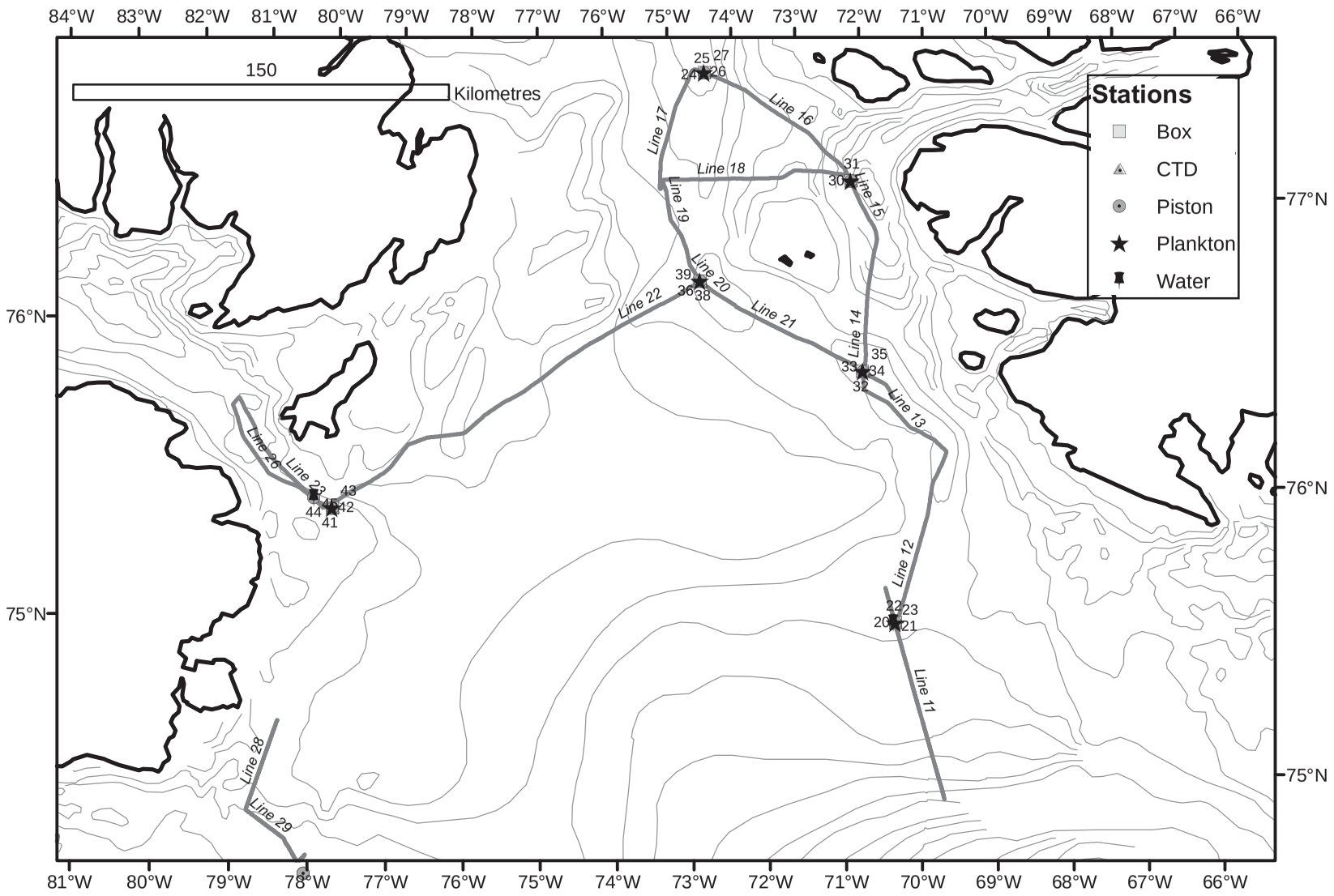
Map of samples and survey lines from northern Labrador Sea.



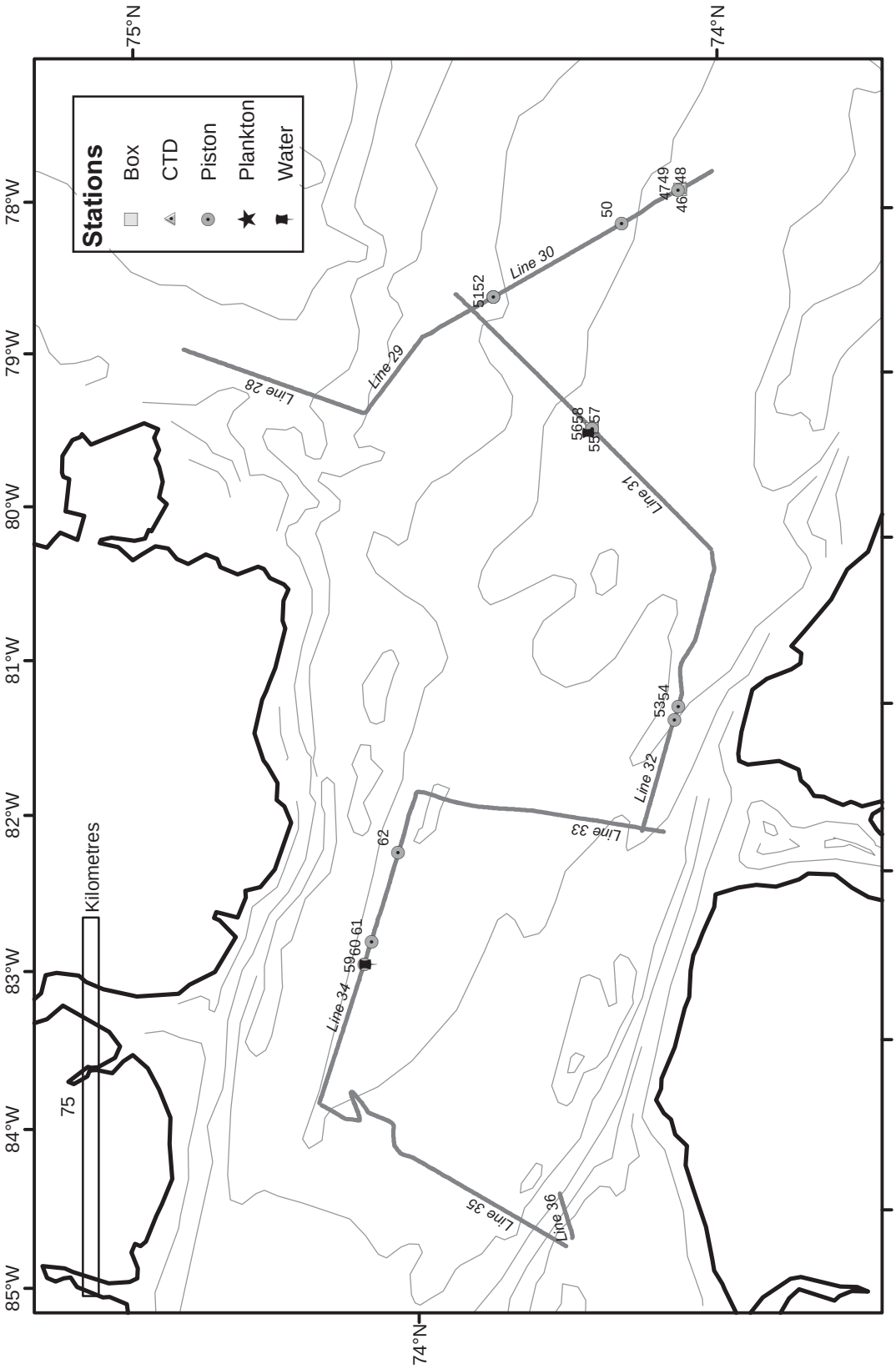
Map of samples and survey lines from Davis Strait.



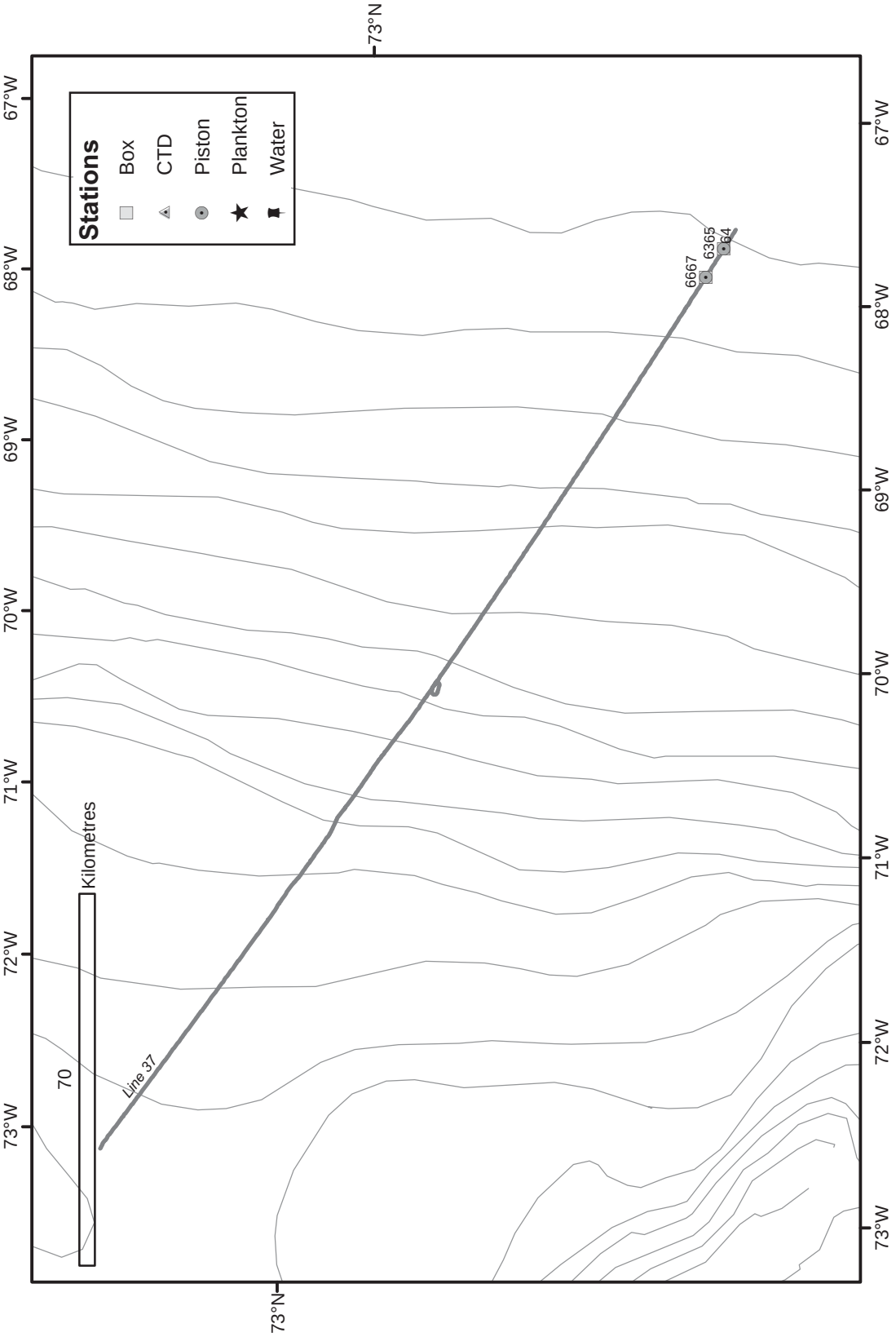
Map of samples and survey lines from entral affin ay and Dis o u t.



Map of samples and survey lines from t e ort ater olynya and ones Sound.



Map of samples and survey lines from an aster Sound.



Map of samples and survey lines off an aster Sound.

7.4 Geophysical survey start and end times, parameters, and record numbers

HUDSON 2008029														
Line	Start	End	Seismics				Huntec			Sidescan		12 KHz	3.5 KHz
			Teledyne			Gun							
			Rec. #	DVD #	Tape #	Vol.	Rec. #	DVD #	Tape #	DVD #	Tape #	DVD #	DVD #
1	2411920	2420918											1
2	2420918	2420926											1
3	2420926	2421009											1
4	2422134	2430222	1	1		G.I. 210 x 1	1	1				1	
5	2430227	2430650	1	1		G.I. 210 x 1	1	1				1	
6	2430653	2430805	1	1		G.I. 210 x 1	1	1				1	
7	2430809	2430931	1	1		G.I. 210 x 1	1	1				1	
8	2431715	2440234											1
9	2440234	2440700											1
10	2440704	2440849											1
11	2480106	2481045					2	2				1	
12	2481714	2482024											1
13	2482024	2482214											1
14	2482214	2490105											1,2
15	2490105	2490231											2
16	2490231	2490521											2
17	2490521	2490806											2
18	2492105	2500017											2
19	2500019	2500239											2
20	2500239	2500341											2
21	2500341	2500845											2
22	2501934	2510400											2
23	2510400	2510531											2
24	2510531	2510631											2
25	2510632	2510642											2
26	2510643	2510806											2
27	2510806	2510941											2
28	2512019	2520031	2	1	1-2	G.I. 210 x 1	3	3	1-2			2	
29	2520031	2520243	2	1	2	G.I. 210 x 1	3	3	2			2	
30	2520243	2521003	2	1	2-5	G.I. 210 x 1	3	3	2,3,4,5			2	
31	2522014	2530415	3	1	5-8	G.I. 210 x 1	4	4	5,6,7,8			2	
32	2530420	2531055	3	1	8-10	G.I. 210 x 1	4	4	8,9,10			2	
33	2550950	2551522	4	1	10-12	G.I. 210 x 1	5	5	10,11,12			3	
34	2551522	2552240	4	1	12-14	G.I. 210 x 1	5	5	12,13,14			3	
35	2552334	2560807	4	1	14-17	G.I. 210 x 1	5	5	14,15			3	
36	2560824	2560922	4	1	17	G.I. 210 x 1						3	
37	2570932	2581101	5	1	18-26	G.I. 210 x 1	6	6-7	18-26			3	
38	2592038	2600327					7	8		1		4	
39	2600341	2601000					7	8		1-2		4	
40	2601358	2601512											4
41	2602042	2602203											4

HUDSON 2008029

Teledyne 2K Records

Record #	Start Time	End Time	Line #	Record #	Start Time	End Time	Line #
1	2422134	2430940	4 to 7	5	2570925	2572205	37
2	2512010	2520030	28		2572205	2572223	break
	2520030	2520242	29		2572223	2581059	37
	2520242	2521000	30				
3	2522009	2530415	31				
	2530420	2531053	32				
4	2550948	2551522	33				
	2551522	2552240	34				
	2552240	2552249	break				
	2552249	2560805	35				
	2560824	2560922	36				

Huntec Records

Record #	Start Time	End Time	Line #	Record #	Start Time	End Time	Line #
1	2422118	2430220	4	4	2522008	2530415	31
	2430225	2430651	5		2530416	2531054	32
	2430653	2430710	6	5	2550948	2551522	33
	2430710	2430719	break		2551522	2552240	34
	2430719	2430805	6		2552334	2560018	35
	2430805	2430944	7	6	2570929	2572202	37
2	2480008	2480237	11		2572202	2572227	break
	2480237	2480244	break		2572227	2581059	37
	2480244	2480441	11	7	2592029	2600327	38
	2480441	2480443	break		2600341	2601000	39
	2480443	2481045	11				
3	2512009	2520029	28				
	2520029	2520242	29				
	2520242	2521000	30				

Teledyne 2K & Huntec DAT Tapes

Tape #	Start Time	End Time	Line #	Tape #	Start Time	End Time	Line #
1	2512047	2512350	28	14	2552109	2560013	34-35
2	2512350	2520255	28-30	15	2560013	2560316	35
3	2520255	2520557	30	16	2560316	2560622	35
4	2520558	2520903	30	17	2560622	2560925	35-36
5	2520903	2522205	30-31	18	2570931	2571236	37
6	2522205	2530109	31	19	2571236	2571542	37
7	2530109	2530413	31	20	2571542	2571845	37
8	2530413	2530715	31-32	21	2571845	2572152	37
9	2530715	2531017	32	22	2572152	2580116	37
10	2531017	2551157	32-33	23	2580116	2580420	37
11	2551157	2551505	33	24	2580420	2580724	37
12	2551505	2551806	33-34	25	2580724	2581032	37
13	2551806	2552106	34	26	2581032	2581059	37

DVD's

Huntec

DVD #	Start Time	End Time	Line #
1	2422118	2430944	4-7
2	2480008	2481045	11
3	2512009	2521000	28-30
4	2522008	2531054	31-32
5	2550948	2560018	33-35
6	2570929	2572100	37
7	2572100	2581059	37
8	2592029	2601000	38-39

Knudsen 3.5 & 12 kHz

DVD #	Start Time	End Time	Line #
1	2411927	2490037	1-14
2	2490037	2521535	14-31
3	2521535	2580929	31-37
4	2580929	2620307	37-41
5	2580930	2640000	na

Teledyne 2K

DVD #	Start Time	End Time	Line #
1	2422134	2581101	4-7,28-37

Sidescan

DVD #	Start Time	End Time	Line #
1	2592040	2600444	38-39
2	2600459	2600959	39

HUDSON 2008029					
Line	**Start**	**Stop**	**Latitude**	**Longitude**	**Instruments**
1	2411920	2420918	57 58.49362 N 60 34.36618 N	59 54.35935 W 58 16.34464 W	Knudsen 3.5kHz
2	2420918	2420926	60 34.36618 N 60 34.11799 N	58 16.34464 W 58 15.08660 W	Knudsen 3.5kHz
3	2420926	2421009	60 34.11799 N 60 31.21499 N	58 15.08660 W 58 18.44590 W	Knudsen 3.5kHz
4	2422134	2430222	61 41.06032 N 61 19.19999 N	57 34.38234 W 57 41.37424 W	Knudsen 12kHz, Huntec, GI_Gun x1
5	2430227	2430650	61 19.06031 N 61 22.63571 N	57 41.91675 W 58 18.18234 W	Knudsen 12kHz, Huntec, GI_Gun x1
6	2430653	2430805	61 22.86540 N 61 27.16327 N	58 18.37613 W 58 14.18921 W	Knudsen 12kHz, Huntec, GI_Gun x1
7	2430809	2430931	61 27.28813 N 61 27.87749 N	58 13.81157 W 58 00.52666 W	Knudsen 12kHz, Huntec, GI_Gun x1
8	2431715	2440234	61 35.27357 N 63 36.70867 N	58 02.21202 W 58 04.68701 W	Knudsen 3.5kHz
9	2440234	2440700	63 36.70867 N 64 28.79154 N	58 04.68701 W 57 49.45052 W	Knudsen 3.5kHz
10	2440704	2440849	64 28.85732 N 64 22.93380 N	57 50.13915 W 58 10.31741 W	Knudsen 3.5kHz
11	2480106	2481045	74 52.09778 N 75 35.32546 N	69 46.35581 W 70 48.70153 W	Knudsen 12kHz, Huntec
12	2481714	2482024	75 28.97147 N 76 04.53385 N	70 35.59669 W 70 06.30682 W	Knudsen 3.5kHz
13	2482024	2482214	76 04.58946 N 76 16.10734 N	70 06.38526 W 71 22.30247 W	Knudsen 3.5kHz
14	2482214	2490105	76 16.10734 N 76 49.44503 N	71 22.30247 W 71 27.02805 W	Knudsen 3.5kHz
15	2490105	2490231	76 49.44503 N 77 03.25480 N	71 27.02805 W 72 13.15303 W	Knudsen 3.5kHz
16	2490231	2490521	77 03.25480 N 77 17.57452 N	72 13.15303 W 74 29.39963 W	Knudsen 3.5kHz

Line	Start	Stop	Latitude	Longitude	Instruments
17	2490521	2490806	77 17.57452 N 76 52.47035 N	74 29.39963 W 74 44.46459 W	Knudsen 3.5kHz
18	2492105	2500017	76 58.5720 N 76 54.1731 N	71 52.6299 W 74 43.0419 W	Knudsen 3.5kHz
19	2500019	2500239	76 53.7895 N 76 37.2620 N	74 43.7374 W 74 08.0819 W	Knudsen 3.5kHz
20	2500239	2500341	76 37.2435 N 76 32.2158 N	74 08.0106 W 73 40.9198 W	Knudsen 3.5kHz
21	2500341	2500845	76 32.2158 N 76 14.9753 N	73 40.9198 W 70 56.9206 W	Knudsen 3.5kHz
22	2501934	2510400	76 34.20644 N 75 34.45713 N	73 56.82312 W 78 44.74241 W	Knudsen 3.5kHz
23	2510400	2510531	75 34.45713 N 75 44.01259 N	78 44.74241 W 79 43.81340 W	Knudsen 3.5kHz
24	2510531	2510631	75 44.01259 N 75 53.01436 N	79 43.81340 W 80 14.18404 W	Knudsen 3.5kHz
25	2510632	2510642	75 53.02793 N 75 51.45151 N	80 14.98472 W 80 18.41428 W	Knudsen 3.5kHz
26	2510643	2510806	75 51.20066 N 75 39.01584 N	80 18.17104 W 79 35.78685 W	Knudsen 3.5kHz
27	2510806	2510941	75 39.01584 N 75 34.75237 N	79 35.78685 W 78 37.88888 W	Knudsen 3.5kHz
28	2512019	2520031	74 48.91049 N 74 29.24140 N	78 45.77888 W 78 55.42512 W	Knudsen 12kHz, Huntec, GI_Gun x1
29	2520031	2520243	74 29.24140 N 74 24.86614 N	78 55.42512 W 78 21.76553 W	Knudsen 12kHz, Huntec, GI_Gun x1
30	2520243	2521003	74 24.85901 N 73 58.42743 N	78 21.73424 W 76 57.98710 W	Knudsen 12kHz, Huntec, GI_Gun x1
31	2522014	2530415	74 22.27033 N 73 50.67493 N	78 02.97215 W 79 18.10081 W	Knudsen 12kHz, Huntec, GI_Gun x1
32	2530420	2531055	73 50.50778 N 73 50.96871 N	79 19.25349 W 81 07.38288 W	Knudsen 12kHz, Huntec, GI_Gun x1
33	2550950	2551522	73 48.77312 N 74 14.60246 N	81 05.54962 W 81 13.43409 W	Knudsen 12kHz, Huntec, GI_Gun x1

Line	Start	Stop	Latitude	Longitude	Instruments
34	2551523	2552240	74 14.86407 N 74 16.24639 N	81 14.38762 W 83 19.49838 W	Knudsen 12kHz, Huntec, GI_Gun x1
35	2552334	2560807	74 15.88009 N 73 47.1924 N	83 19.72174 W 83 45.3630 W	Knudsen 12kHz & 3.5kHz partial, Huntec partial, GI_Gun x1
36	2560824	2560927	73 46.8780 N 73 49.4418 N	83 41.5100 W 83 26.9156 W	Knudsen 3.5kHz, GI_Gun x1
37	2570932	2581101	73 19.26167 N 72 23.21762 N	73 04.68961 W 67 36.32268 W	Knudsen 12kHz, Huntec, GI_Gun x1
38	2592038	2600327	68 59.56962 N 68 59.77761 N	57 22.48009 W 55 57.39724 W	Knudsen 12kHz, Huntec
39	2600341	2601000	68 59.33114 N 68 58.94790 N	55 57.39774 W 57 17.41688 W	Knudsen 12kHz, Huntec
40	2601358	2601512	68 14.08035 N 68 06.54820 N	57 34.96567 W 58 11.38640 W	Knudsen 3.5kHz
41	2602042	2602203	68 04.42607 N 67 48.36688 N	58 21.91282 W 58 44.12231 W	Knudsen 3.5kHz

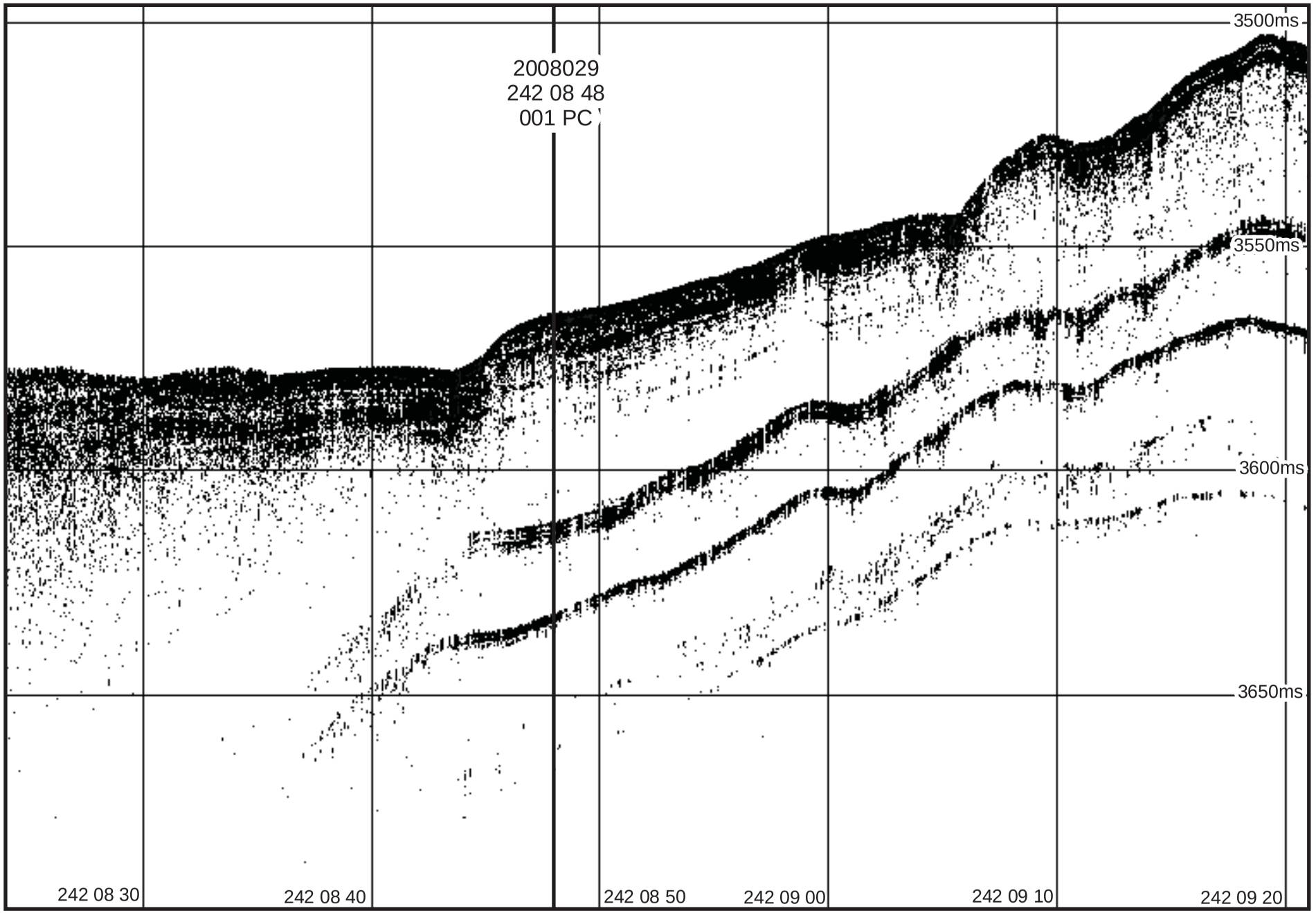
HUDSON 2008029									
GI Gun 4GB Data Tapes									
Ch.1 - GI Gun Trigger									
Ch.2 - GI Gun Signal									
CH.3 Huntec Trigger									
CH. 4 Huntec Sparker External									
Tape #	Start Time	End Time	Day	Line #	Tape #	Start Time	End Time	Day	Line #
1	20:47:00	23:50:00	251	28	14	21:09:00	00:13:00	255-256	34-35
2	23:50:00	02:55:00	251-252	28-30	15	00:13:00	03:16:00	256	35
3	02:55:00	05:57:00	252	30	16	03:16:00	06:22:00	256	35
4	05:58:00	09:03:00	252	30	17	06:22:00	09:25:00	256	35-36
5	09:03:00	22:05:00	252	30-31	18	09:31:00	12:36:00	257	37
6	22:05:00	01:09:00	252-253	31	19	12:36:00	15:42:00	257	37
7	01:09:00	04:13:00	253	31	20	15:42:00	18:45:00	257	37
8	04:13:00	07:15:00	253	31-32	21	18:45:00	21:52:00	257	37
9	07:15:00	10:17:00	253	32	22	21:52:00	01:16:00	257-258	37
10	10:17:00	11:57:00	253-255	32-33	23	01:16:00	04:20:00	258	37
11	11:57:00	15:05:00	255	33	24	04:20:00	07:24:00	258	37
12	15:05:00	18:06:00	255	33-34	25	07:24:00	10:32:00	258	37
13	18:06:00	21:06:00	255	34	26	10:32:00	10:59:00	258	37

7.5 Sample Site Summaries

For each sample site, diagrams illustrating the seismic reflection character at the site, CTD if taken, sediment physical properties, and core photographs for split box cores and piston cores.

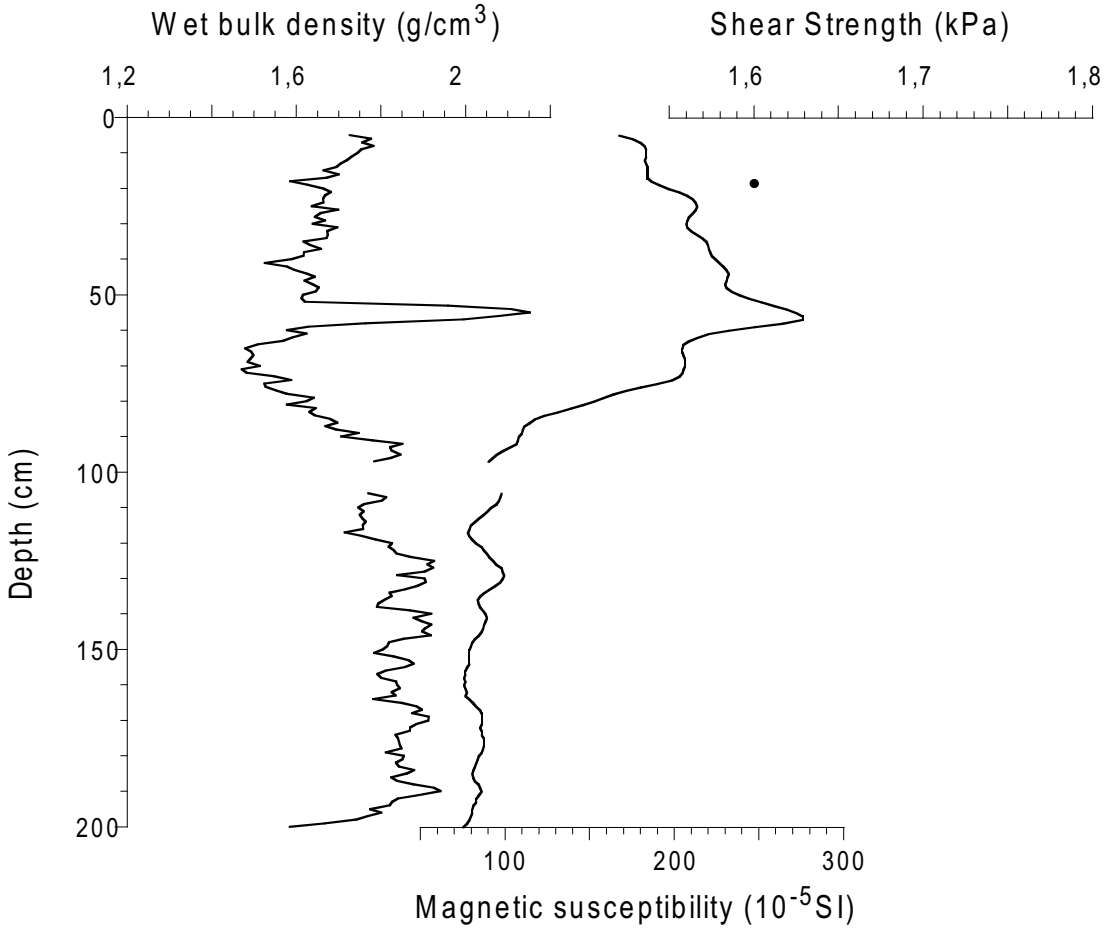
Sample loacation information							Sesimic Record			Cumulative sample	Core		
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0001	Piston	242/1136	60.539028	-58.320971	2675	Labrador Sea	2008029	242/0848	3.5 kHz	1	1219	204.5	1074

GSC Piston core collected for David Piper. Not split.

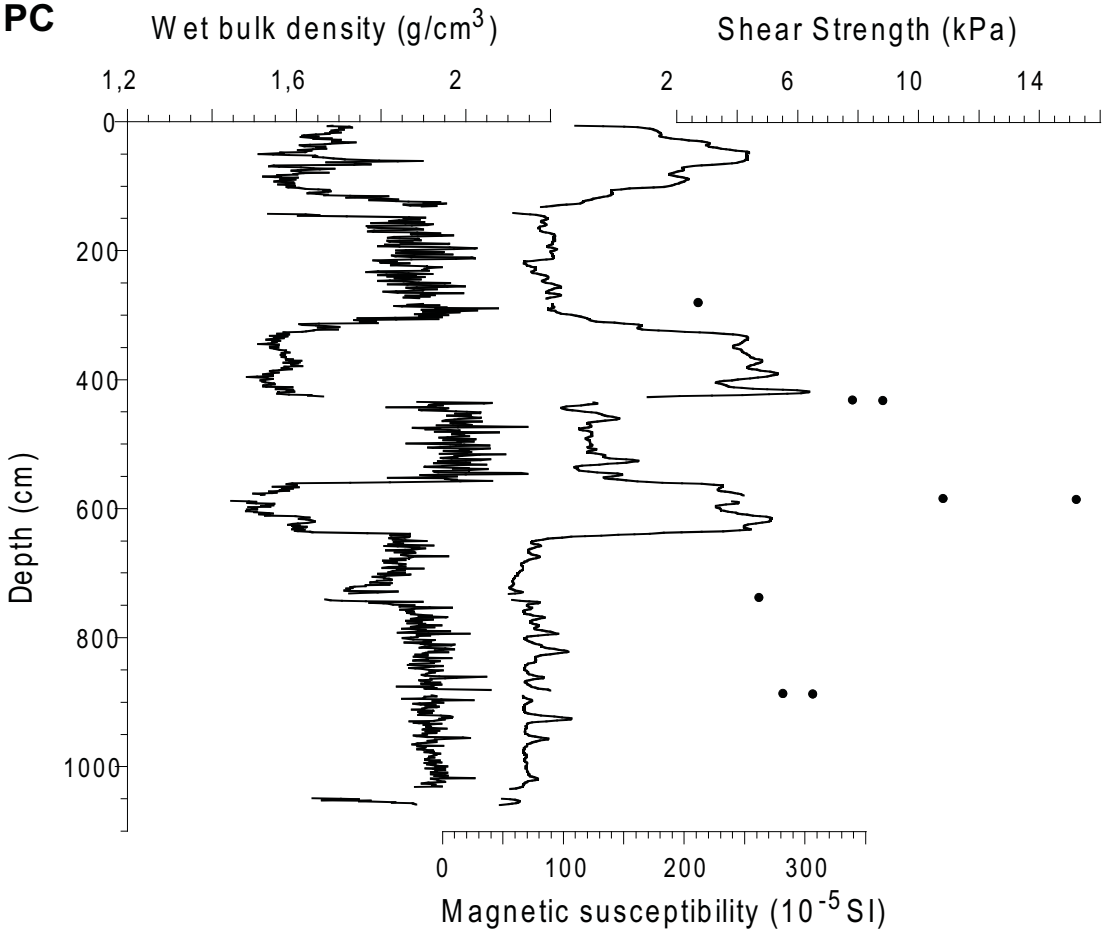


3 5k re or or lo ation o 2008029 001 PC at 242 08 48 2675m W D

2008029 001TWC



2008029 001PC



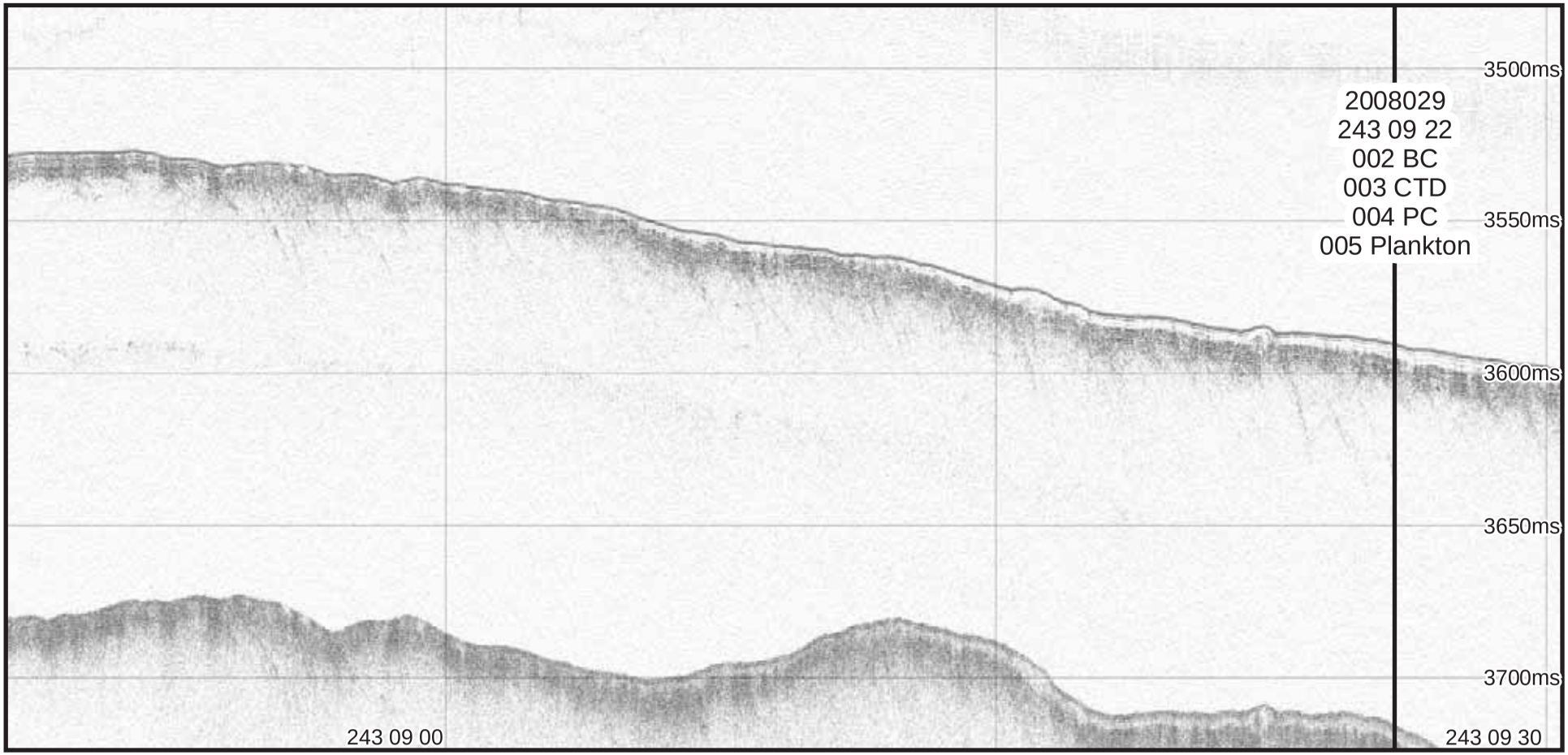
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0002	Box	243/1128	61.463678	-58.035843	2668	Labrador Sea	2008029	243/0922	Huntec	1			
0003	CTD	243/1128	61.463678	-58.035843	2668	Labrador Sea	2008029	243/0922	Huntec	1			
0004	Piston	243/1320	61.463855	-58.036481	2674	Labrador Sea	2008029	243/0922	Huntec	2	1219	57	919
0005	Plankton	243/1549	61.461150	-58.031083	2671	Labrador Sea	2008029	243/0922	Huntec	1			

Core 2008 029 002 BC (maximum length = 36 cm)
Visual description :
The surface consists in olive brown silty clay with worm tubes.
The upper olive brown layer is about 7 cm deep and overlies a brownish to olive grey clayey silts.
Sampling summary :
-Surface sediment: 0-3 mm
- Push core A : sampling by extrusion, from 0 to 33 cm at 1 cm interval
- Push core C : sampling by extrusion, from 0 to 33 cm at 1 cm interval (note: the original length of the liner was 34 cm; the 1 cm difference may correspond to a sampling artefact)
- Push core B : working half sampled for paleomagnetism (u-channel) and from 0 to 36 cm at 1 cm interval
- Push cores D and E sealed and archived vertically

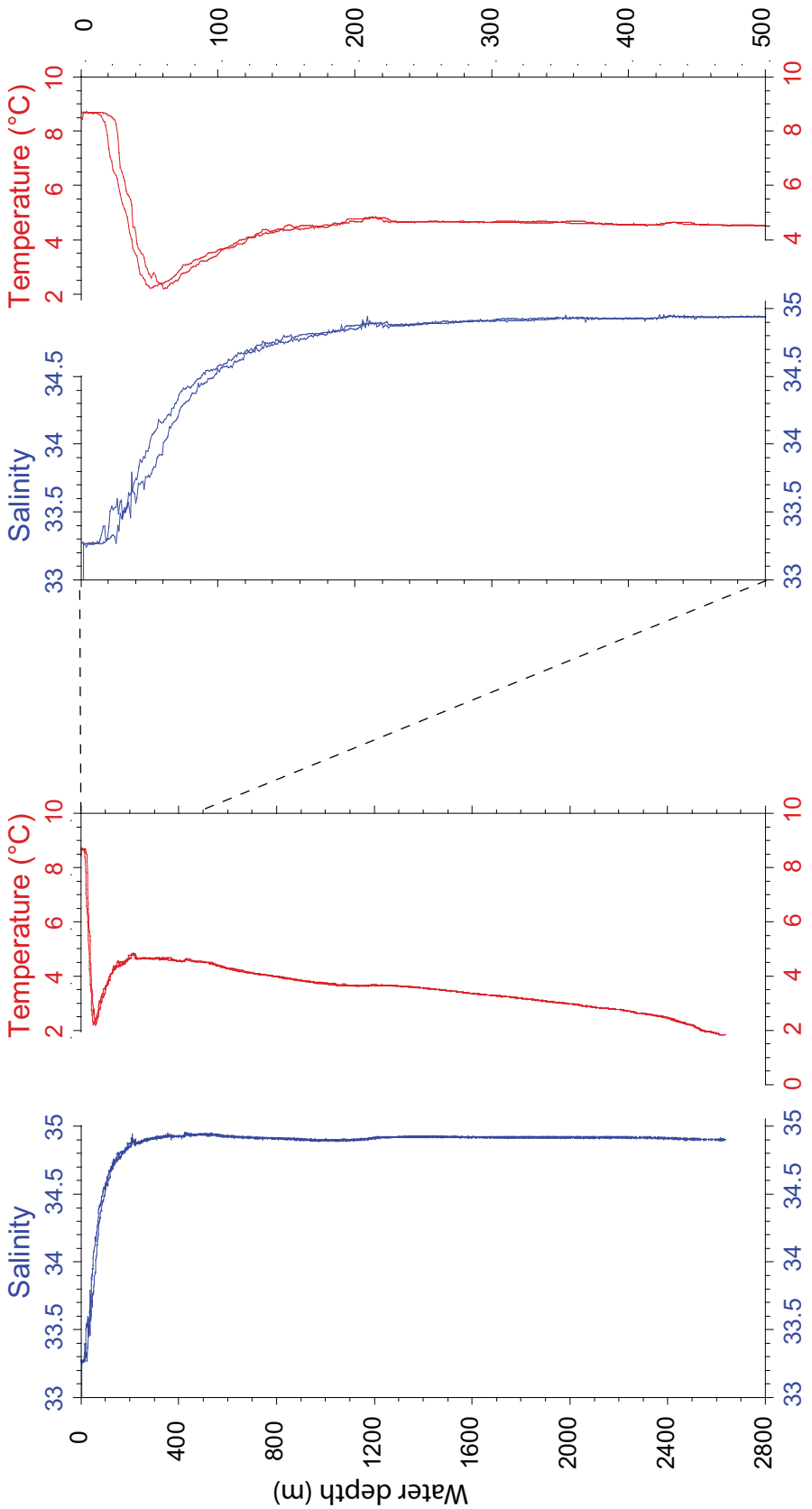
Core 2008 029 004 TWC (length = 52 cm)
Description summary : The surface consists in olive brown silty clay (down to 6 cm) overlying brownish to olive grey clayey silts and silty clay down to 54 cm.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 54 cm.

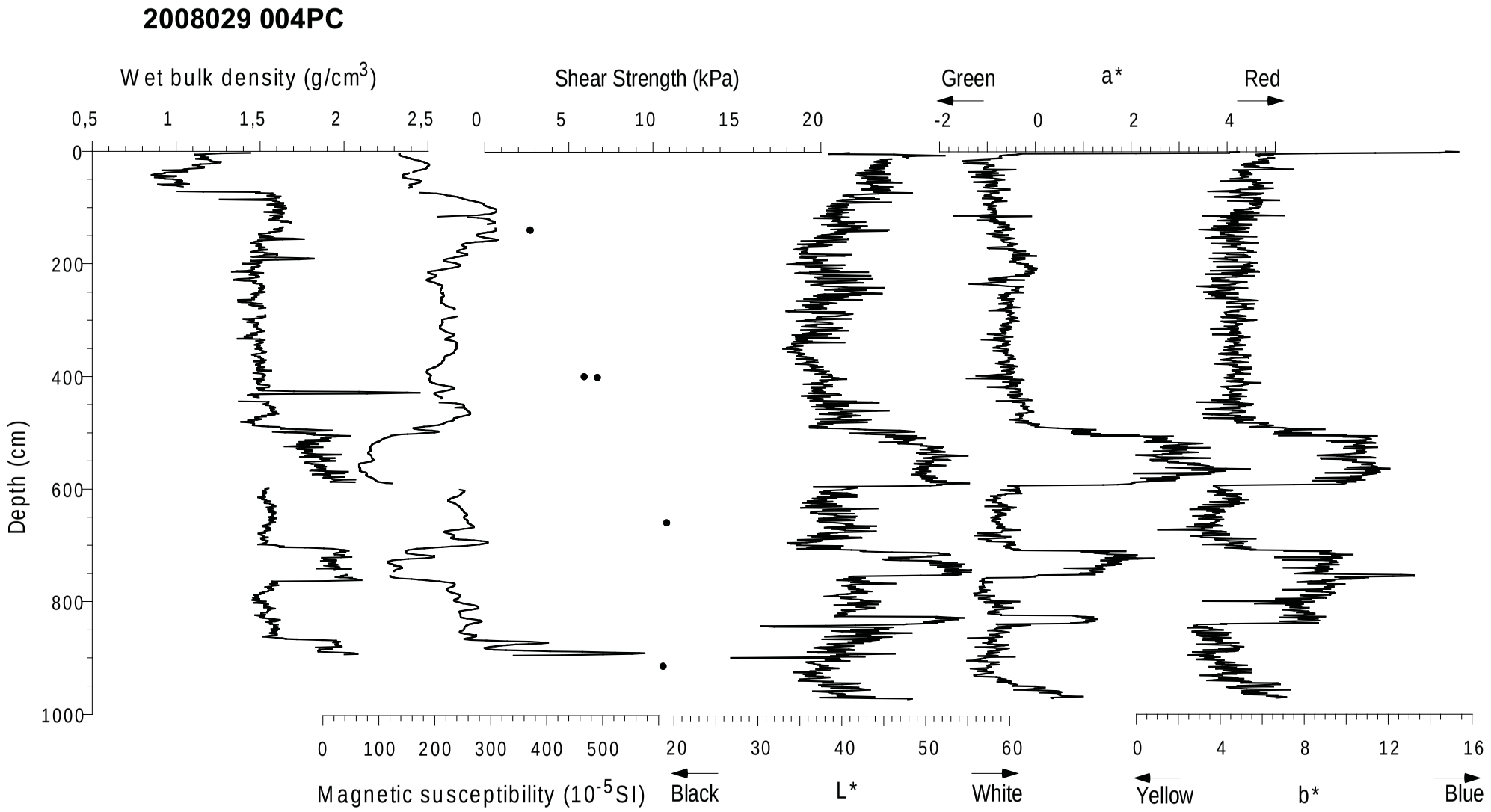
Core 2008 029 004 PC (length = 895 cm)
Description summary: The surface consists in 3 cm of oxidized silty clay overlying dark grey silty clay to clayey silts with mottles down to 440 cm. Gravels and pebbles are occasional below 384 cm. A few silica rich laminations are observed between 440 and 488 cm. In the lower part of the core two series of turbiditic-like layers are recorded: one (series of gray sand layers at the base grading to reddish silty clay) is from 503 to 589 cm; the other (series of sandy layers at the base grading to clayey silt) is characterized by light brownish color and is recorded from 704 to 748 cm.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) down to the base of the core at 895 cm.
- Sampling at 1-cm interval for micropaleontology and geochemistry (A. de Vernal, C. Hillaire-Marcel et al., ~ 30 cc) and grain-size analyses (J. Ortiz, ~ 5 cc.) down to 895 cm.
- Note that samples at depths of 131-132 cm were collected both in section FG and EF (mislabelling).
- Pebble at 189-194 cm.

2008 029 0005 PT
A (45-0 m)
B-C (100-0 m)
D-E (200-0 m)

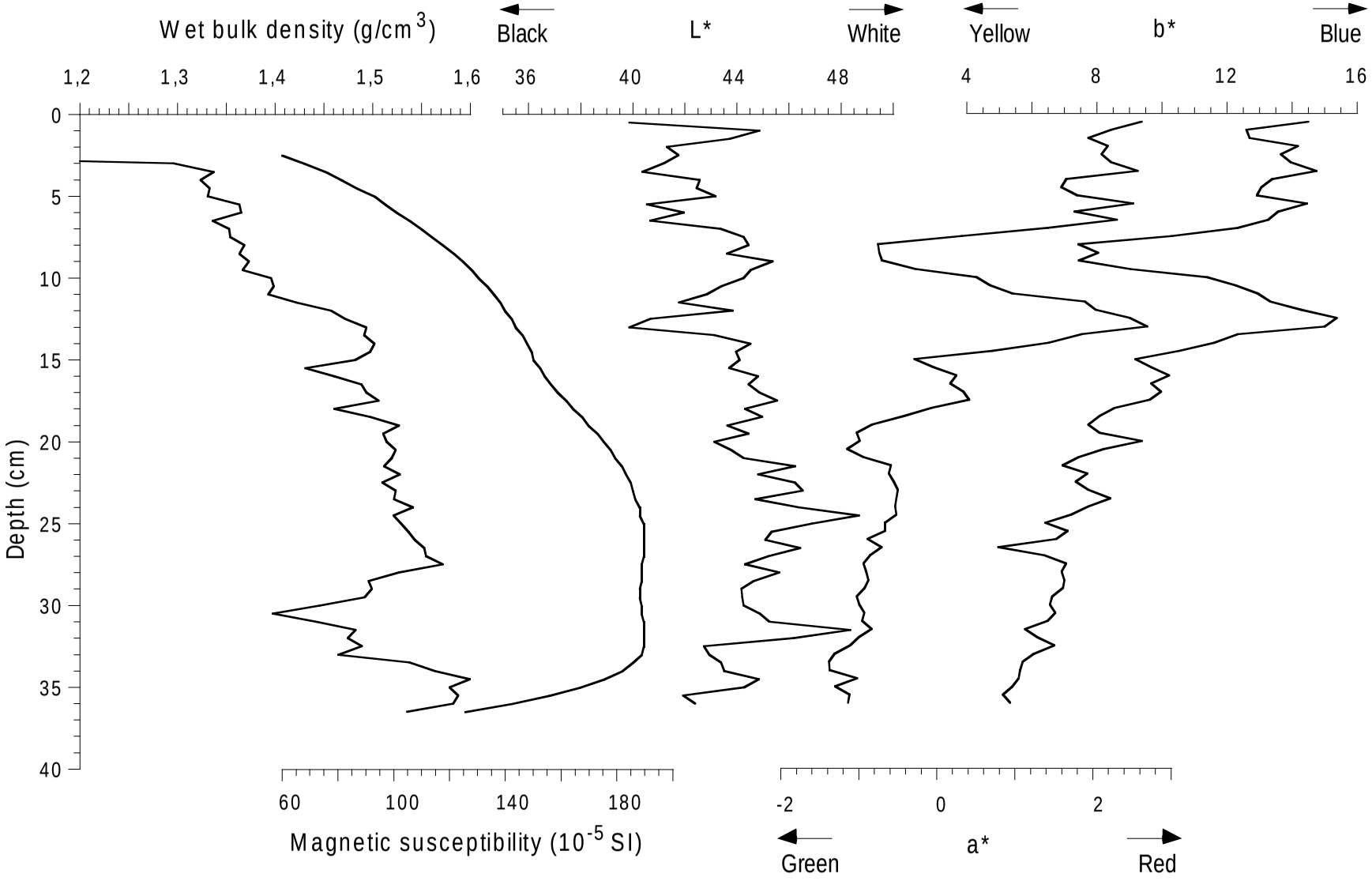


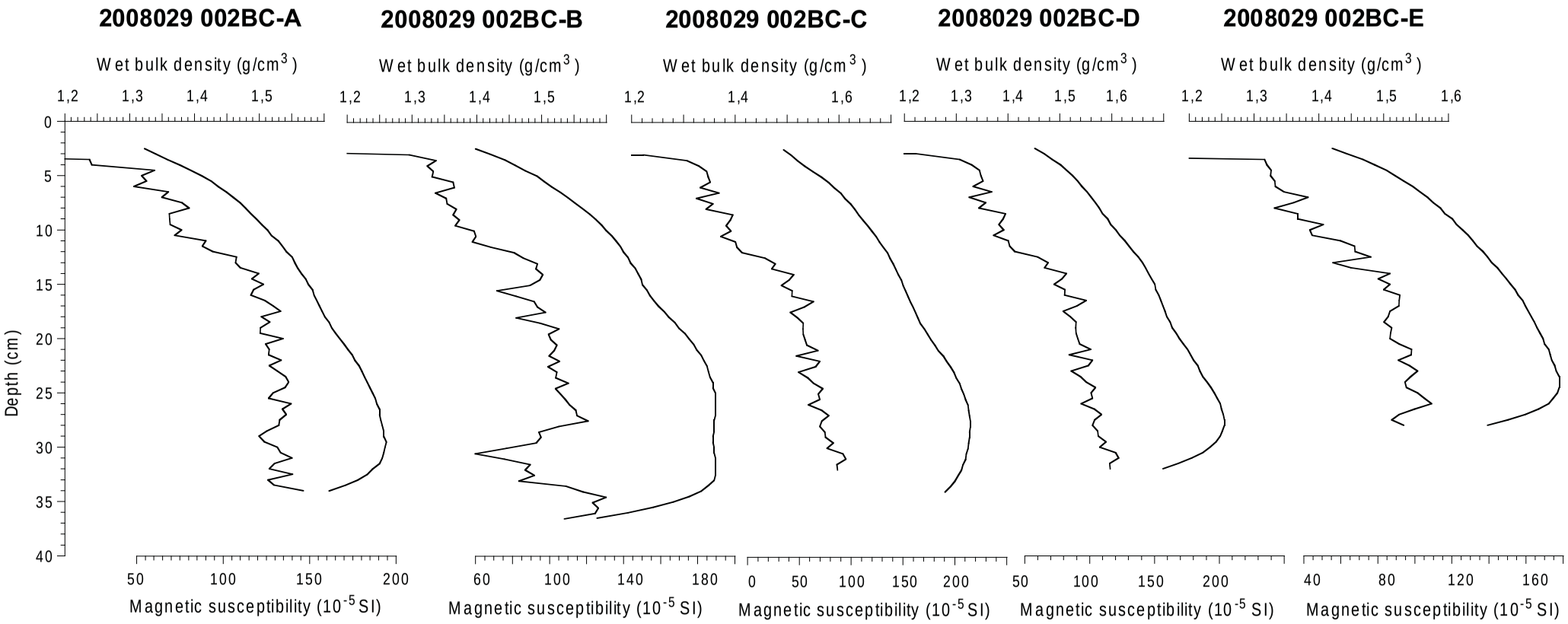
nte re or or lo ation o 2008029 002BC 003 CTD 004PC 005 lankton to at 243 09 22 2668m W D

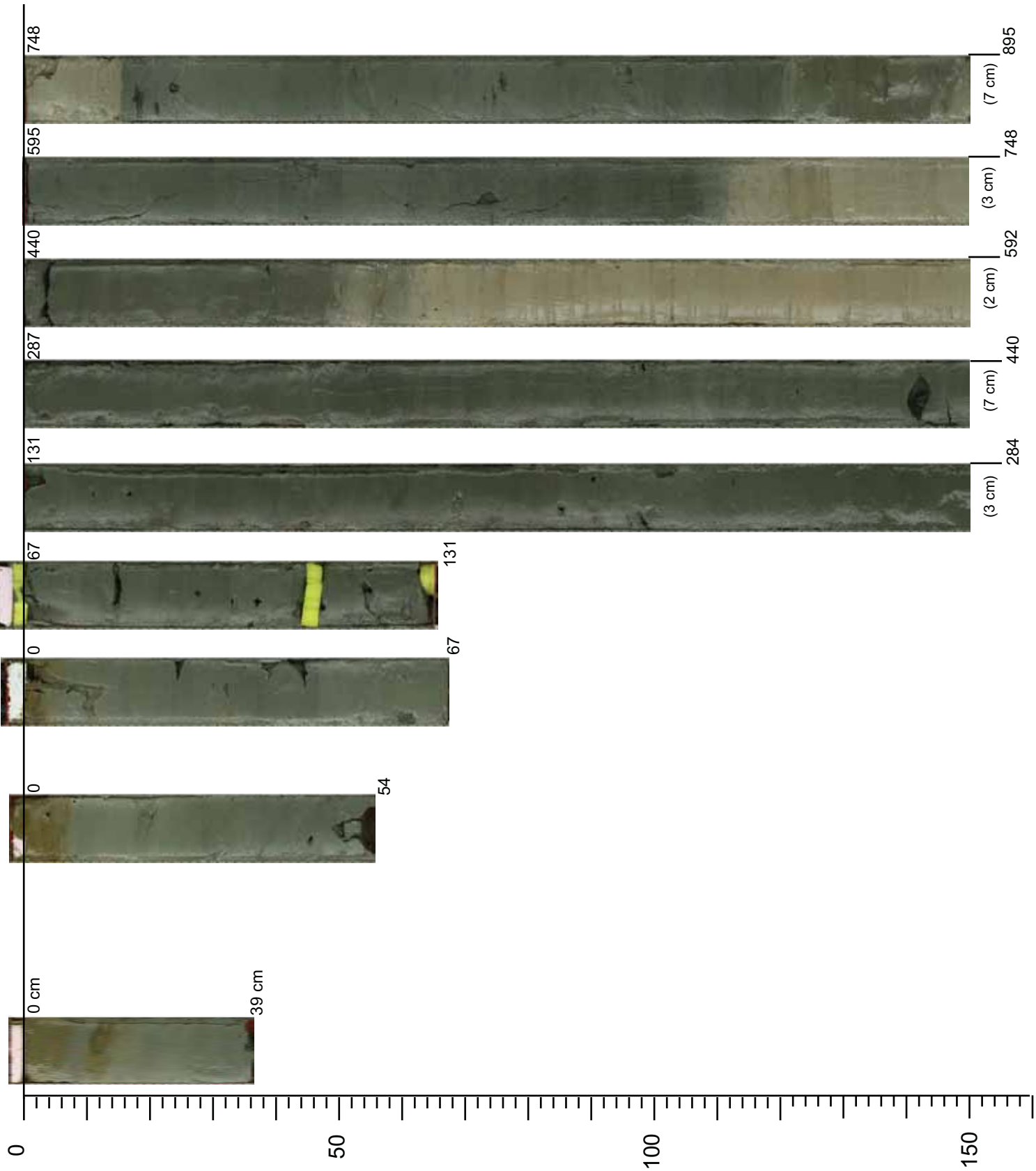

Water depth (m)
0
400
800
1200
1600
2000
2400
2800
Salinity
33
33.5
34
34.5
35
Temperature (°C)
2
4
6
8
10
0
100
200
300
400
500


2008029 004PC
Wet bulk density (g/cm3)
0,5
1
1,5
2
2,5
Shear Strength (kPa)
0
5
10
15
20
Green
a*
Red
-2
0
2
4
Depth (cm)
0
200
400
600
800
1000
0
100
200
300
400
500
Magnetic susceptibility (10-5SI)
20
30
40
50
60
Black
L*
White
0
4
8
12
16
Yellow
b*
Blue

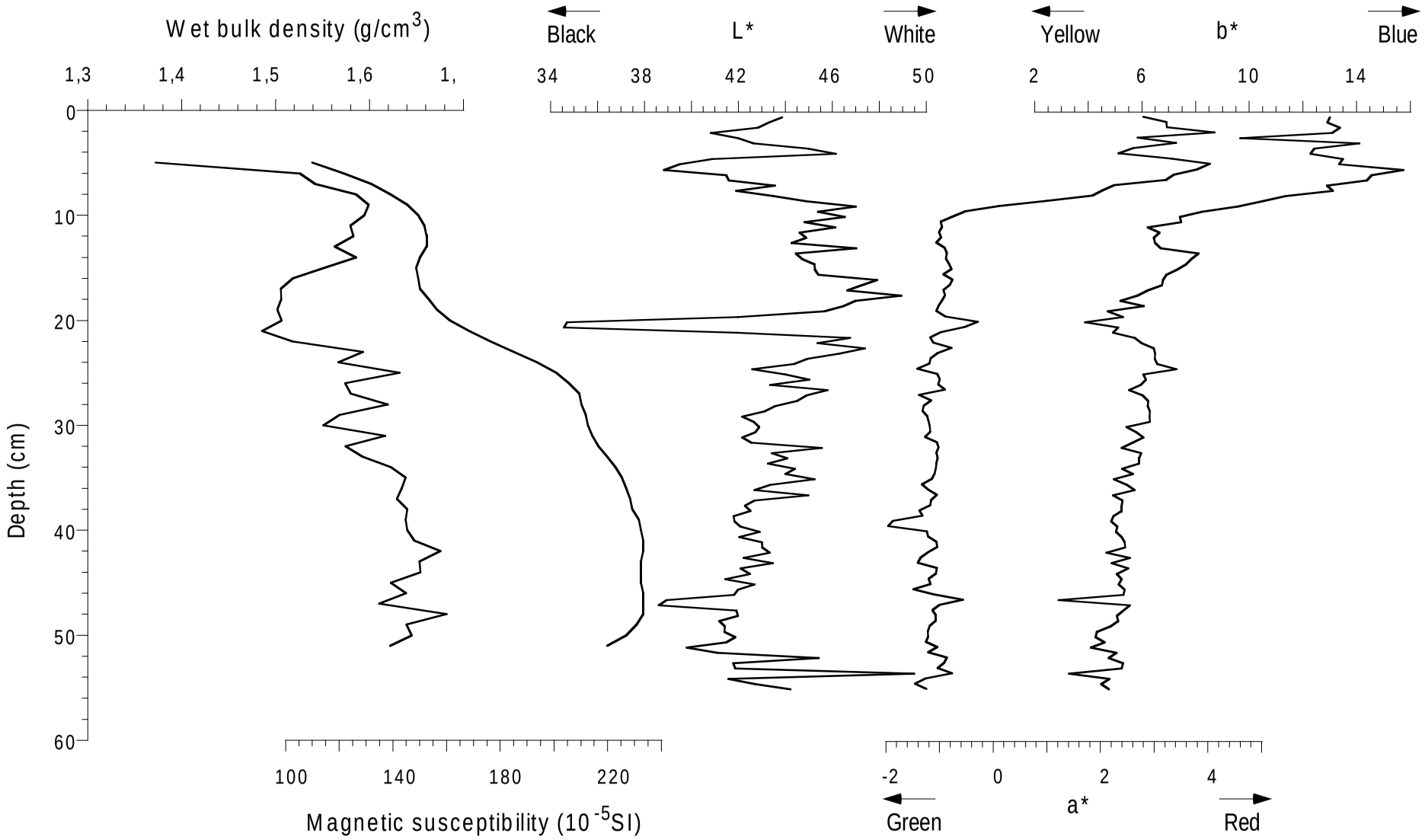
2008029 002BC-B




2008029 002BC-A
2008029 002BC-B
2008029 002BC-C
2008029 002BC-D
2008029 002BC-E
Wet bulk density (g/cm3)
Depth (cm)
Magnetic susceptibility (10-5 SI)


2008029 002
2008029 004
BC -B
TWC
PC -GH
PC -FG
PC -EF
PC -DE
PC -CD
PC -BC
PC -AB
0 cm
39 cm
0
54
0
67
67
131
131
284
287
440
440
592
595
748
748
895
(3 cm)
(7 cm)
(2 cm)
(3 cm)
(7 cm)
0
50
100
150

2008029 004TWC



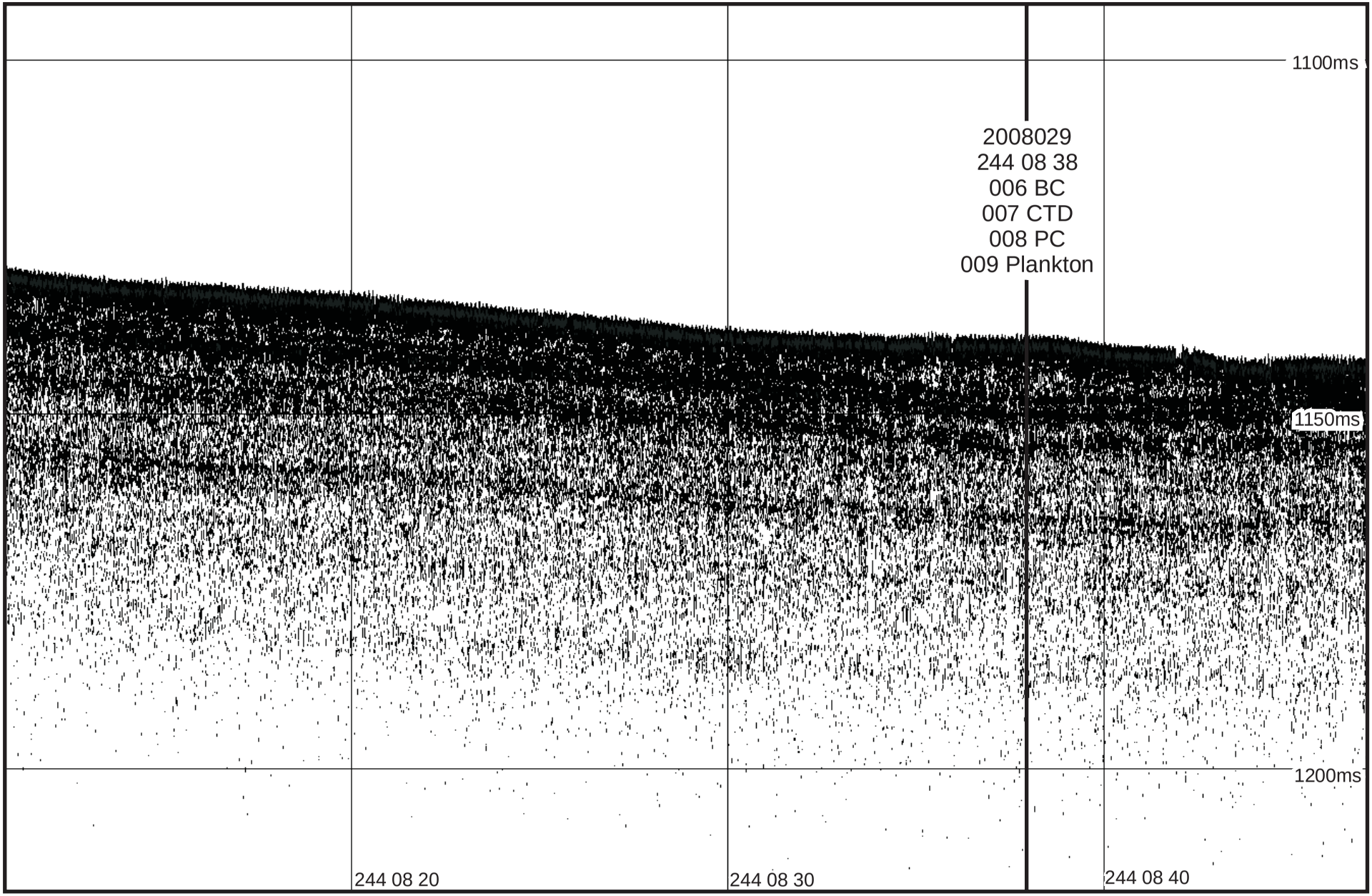
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0006	Box	244/0946	64.393146	-58.134710	857	Davis Strait	2008029	244/0838	3.5 kHz	2			
0007	CTD	244/0946	64.393146	-58.134710	857	Davis Strait	2008029	244/0838	3.5 kHz	2			
0008	Piston	244/1054	64.393105	-58.134518	863	Davis Strait	2008029	244/0838	3.5 kHz	3	1219	156	963.5
0009	Plankton	244/1210	64.391585	-58.143859	857	Davis Strait	2008029	244/0838	3.5 kHz	2			

Core 2008 029 006BC (maximum length = 36 cm)
Visual description :
The surface consists in dark gray sandy and silty mud with abundant fauna (ophiurids, clams, worms, etc.) and appears heavily bioturbated.
The active worm tubes are seen down to 15 cm.
The upper dark gray sandy silty mud layer is about 22 cm thick and overlies pebbly-gravelly silty mud. (The upper olive brown layer is about 7 cm deep and overlies a brownish to greyish clayey silts.
Sampling summary :
- Surface sediment: 0-5 mm
- Push core A : sampling by extrusion, from 0 to 30 cm at 1 cm interval
- Push core E : sampling by extrusion, from 0 to 29 cm at 1 cm interval (note: the original length of the liner was 32 cm; the 3 cm difference may correspond to a sampling artefact)
- Push core C : working half sampled for paleomagnetism (u-channel) and from 0 to 36 cm at 1 cm interval
- Push cores B and D sealed and archived vertically

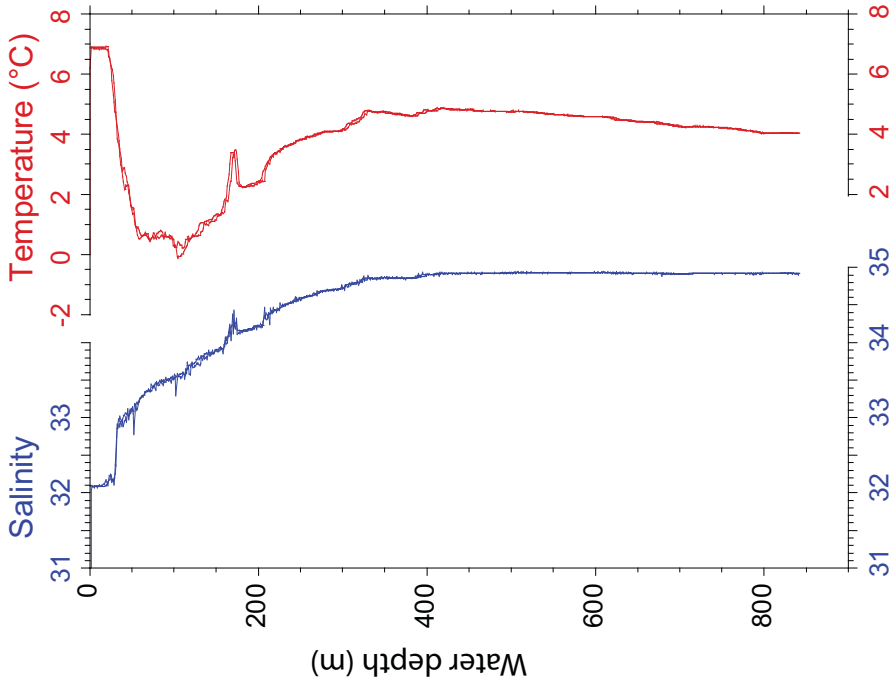
Core 2008 029 008 TWC (length = 153 cm)
Description summary: The upper part of the core (0-40) consists in dark greyish brown mud with sand and pebbles below 18 cm. The base of the core (40-173 cm) consists in dark olive gray mud with sandy lenses and occasional pebbles.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 153 cm.
- Sampling at 1-cm interval of the remaining sediment in the working half down to 153 cm (about 30 cc store in cold room and 10 cc stored in the freezer).

Core 2008 029 008 PC (length = 926.5 cm)
Description summary: The core sediment consists in dark grey to dark olive gray silty clay with scattered clasts, pebbles and sandy lenses. Sandy and sandy silt layers are observed at 90-116, 163- 390 cm.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 926 cm.

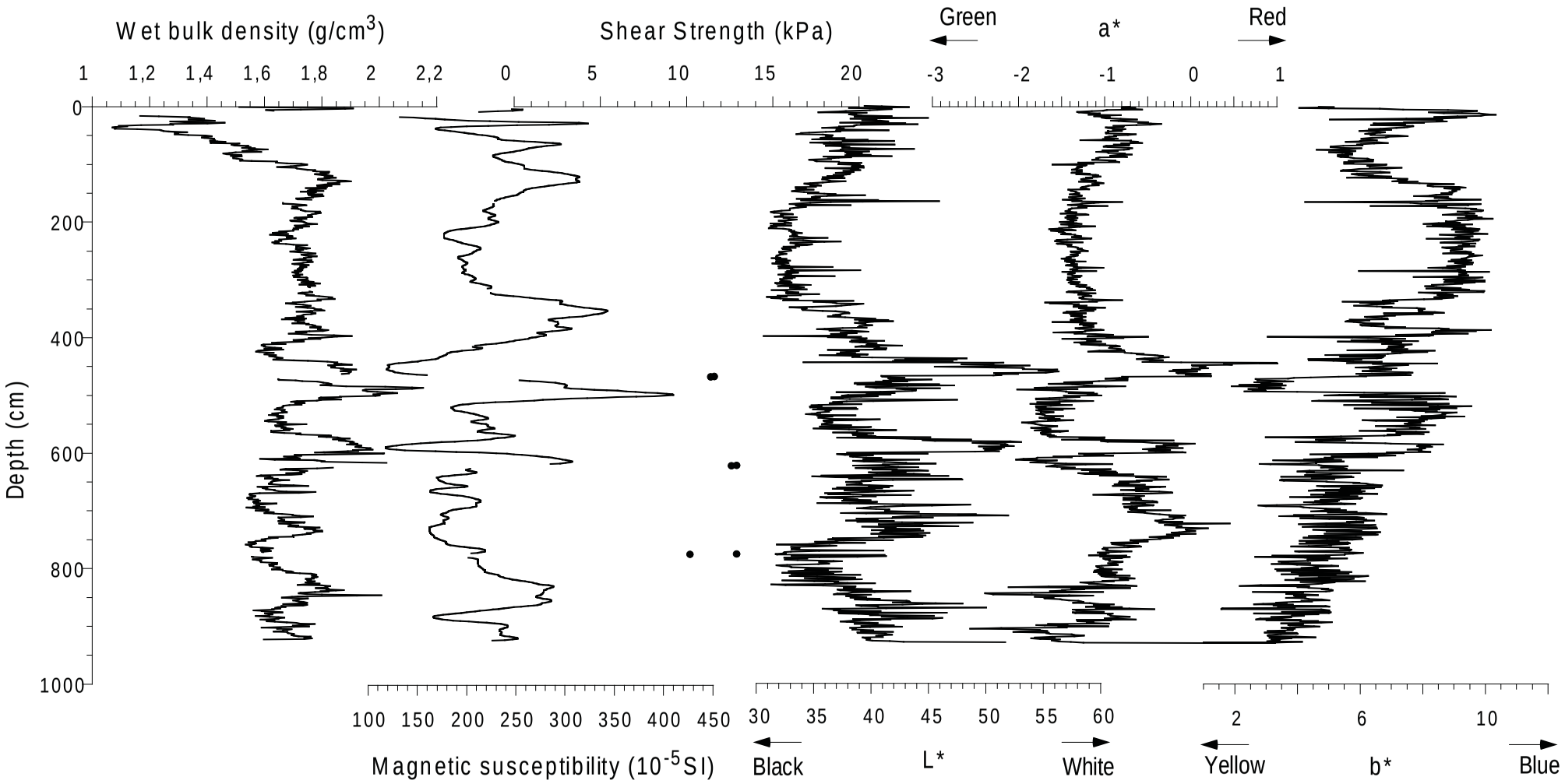
2008 029 0009 PT
A-B (100-0 m)
C-D (300-0 m)



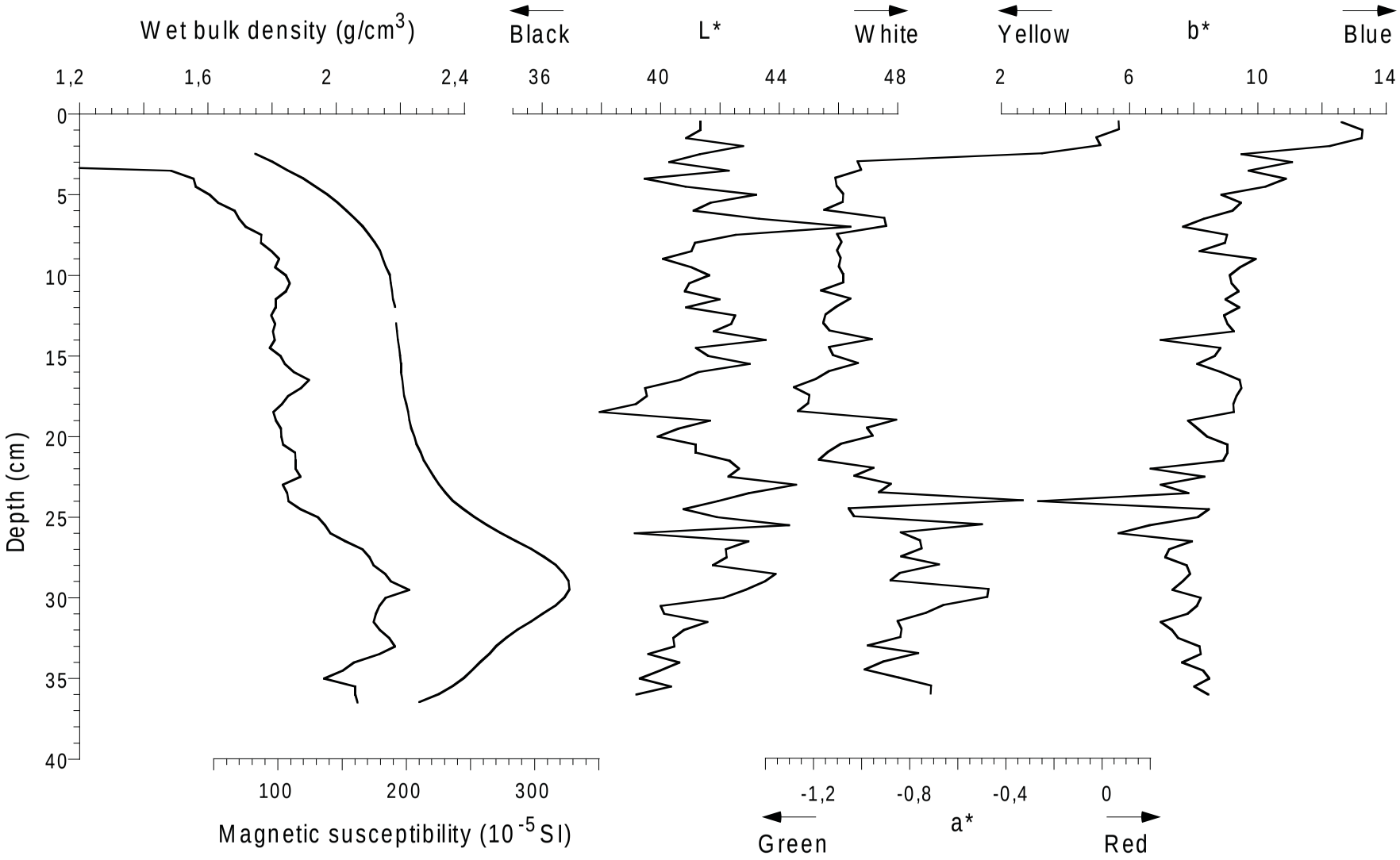
3 5k re or or lo ation o 2008029 006BC 007CTD 008PC 009 lankton to at 244 08 38 857m W D


Temperature (°C)
-2
0
2
4
6
8
Salinity
31
32
33
34
35
Water depth (m)
0
200
400
600
800

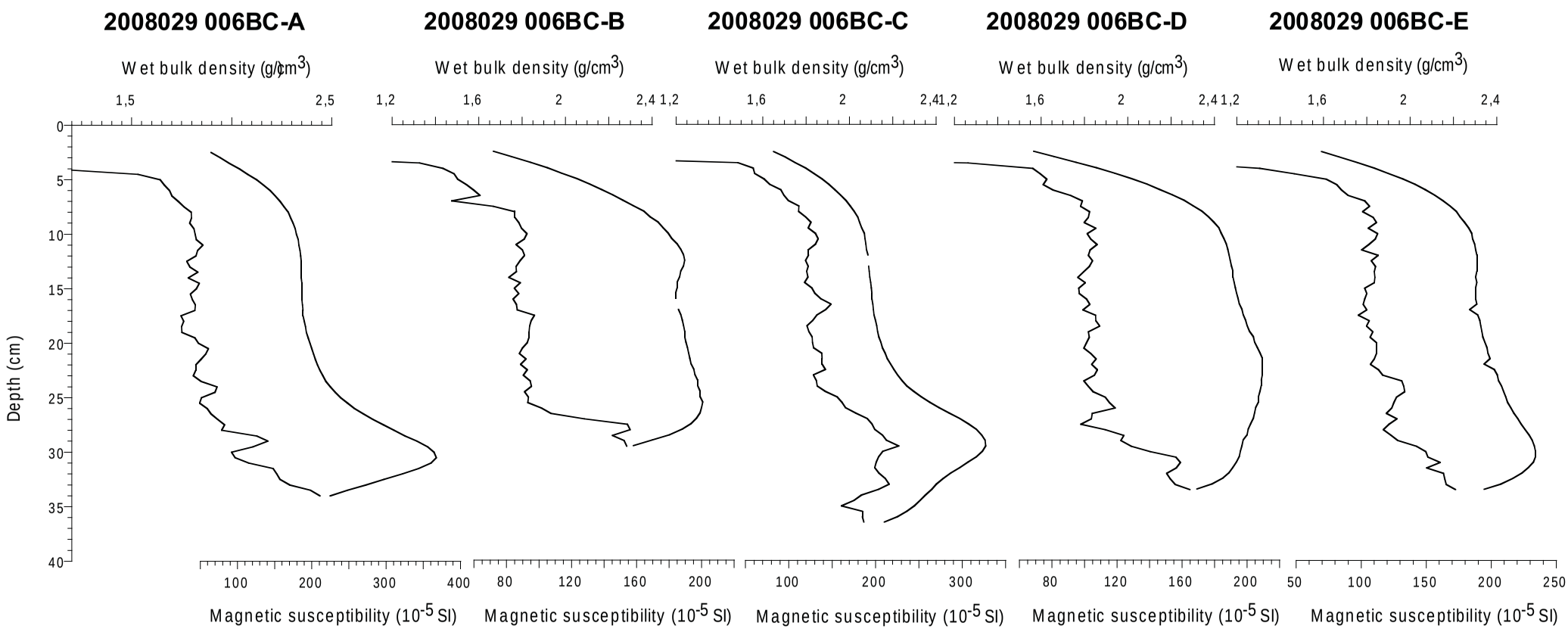
2008029 08PC



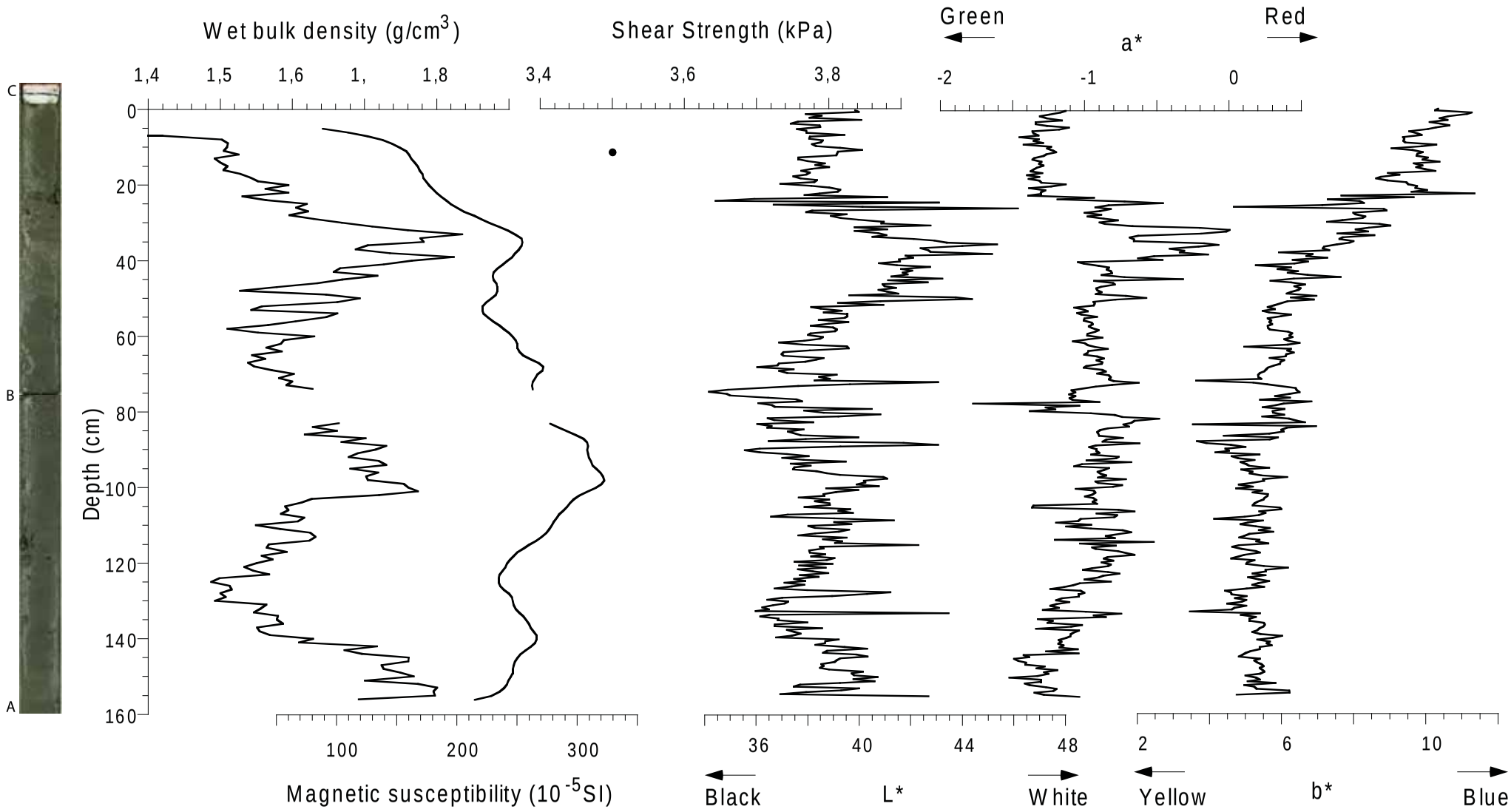
2008029 006BC-C




2008029 006
2008029 008
BC-C
TWC-BC
TWC-AB
PC-GH
PC-FG
PC-EF
PC-DE
PC-CD
PC-BC
PC-AB
0
50
100
150
0 cm
36 cm
0
73
73
153
0
12
12
163
163
316
316
468
468
621.5
621
775
775
926.5
(1 cm)
(3 cm)
(2 cm)
(3 cm)
(3.5 cm)
(1.5 cm)


2008029 006BC-A
2008029 006BC-B
2008029 006BC-C
2008029 006BC-D
2008029 006BC-E
Wet bulk density (g/cm3)
Depth (cm)
0
5
10
15
20
25
30
35
40
1,5
2,5
1,2
1,6
2
2,4
100
200
300
400
80
120
160
200
50
150
250
Magnetic susceptibility (10-5 SI)

2008029 008TWC



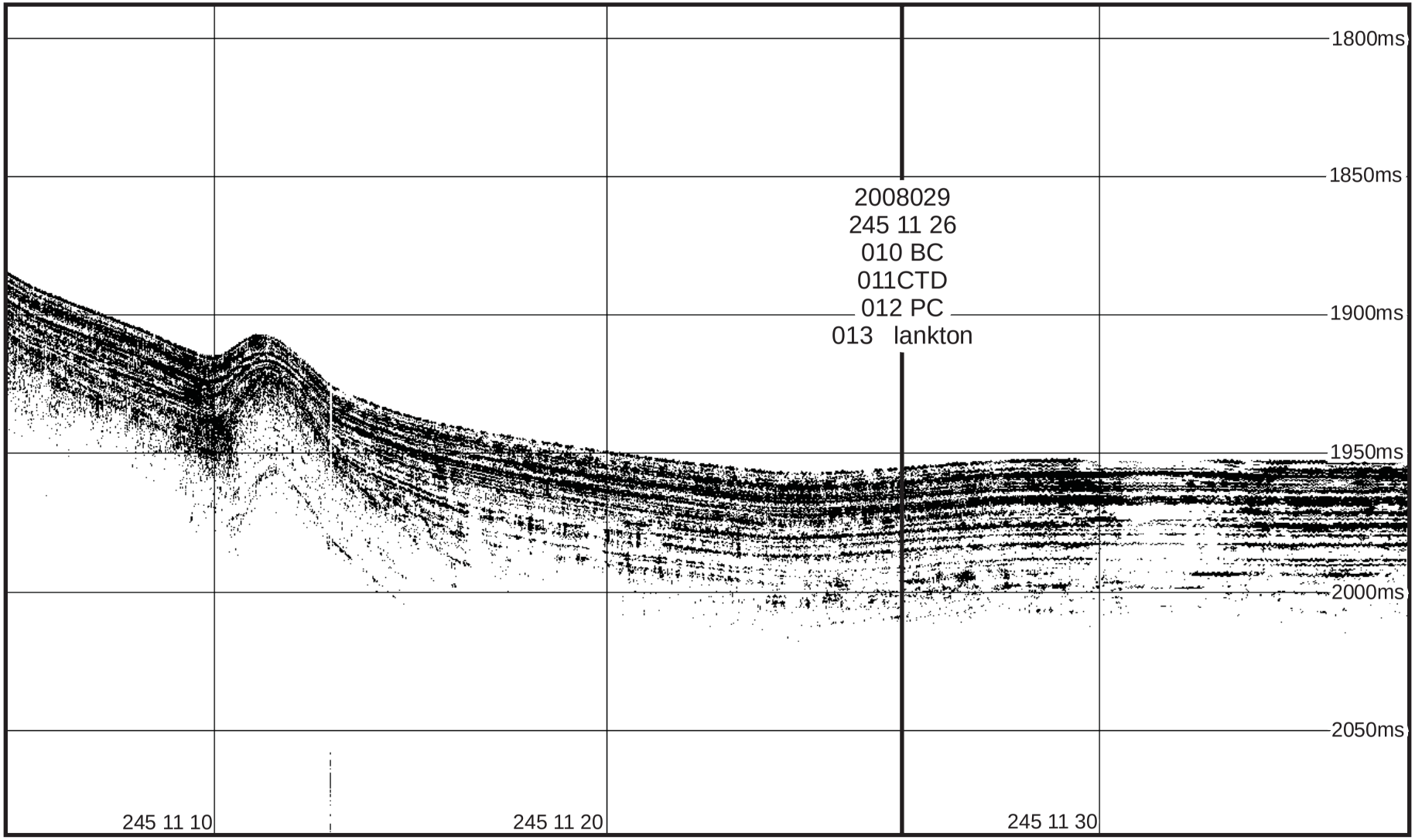
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0010	Box	245/1201	68.666540	-59.999950	1479	Baffin Bay	2008029	2451126	3.5 kHz	3			
0011	CTD	245/1201	68.666540	-59.999950	1479	Baffin Bay	2008029	2451126	3.5 kHz	3			
0012	Piston	245/1314	68.666620	-60.000440	1475	Baffin Bay	2008029	2451126	3.5 kHz	4	1219	114	1151.5
0013	Plankton	245/1505	68.666660	-60.002160	1470	Baffin Bay	2008029	2451126	3.5 kHz	3			

Core 2008 029 010 BC (maximum length = 53 cm)
Visual description :
The surface consists in dark brown clayey mud with some worm tubes down to 3 cm overlying olive gray clayey mud. The transition from olive to brown clayey mud takes place between 3 and 13 cm, with some mottling.
Sampling summary :
- Surface sediment: 0-5 mm
- Push core A : sampling by extrusion, from 0 to 50 cm at 1 cm interval
- Push core B : sampling by extrusion, from 0 to 50 cm at 1 cm interval
- Push core C : working half sampled from 0 to 53 cm at 1 cm interval (U-channel was not sampled because the sediment is too soopy)
- Push cores D, F, E sealed and archived vertically

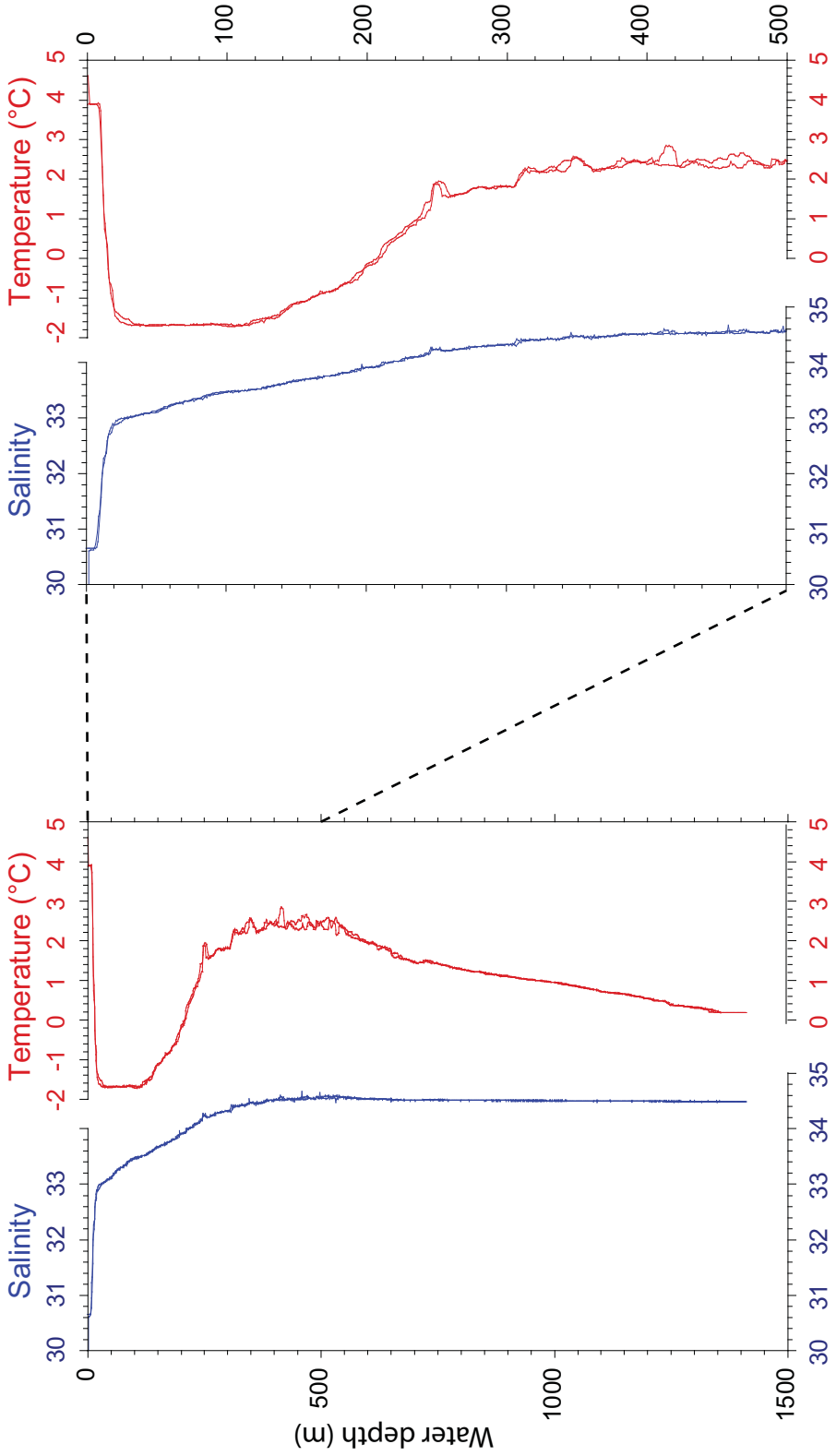
Core 2008 029 012 TWC (length = 213 cm)
Description summary: The core sediment consists in mottled olive gray to dark grey silty clay with scattered pebbles.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 213 cm.

Core 2008 029 012 PC (length = 1127 cm)
Description summary: The core sediment consists in mottled olive gray to dark grey silty clay and mud with scattered pebbles.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 1127 cm.
- Sampling at 10-cm interval (slices of 1 cm over 2 cm) in the working half. Samples taken for foraminifers and their geochemical composition (U. Quillman; 40 cc + 10 cc), XRD and grain size (J. Andrews;10 cc), palynology (A. de Vernal; 10 cc), particle size (E. Kilfeather; 10 cc), and Re-Os (A. Poirier; 5 cc).

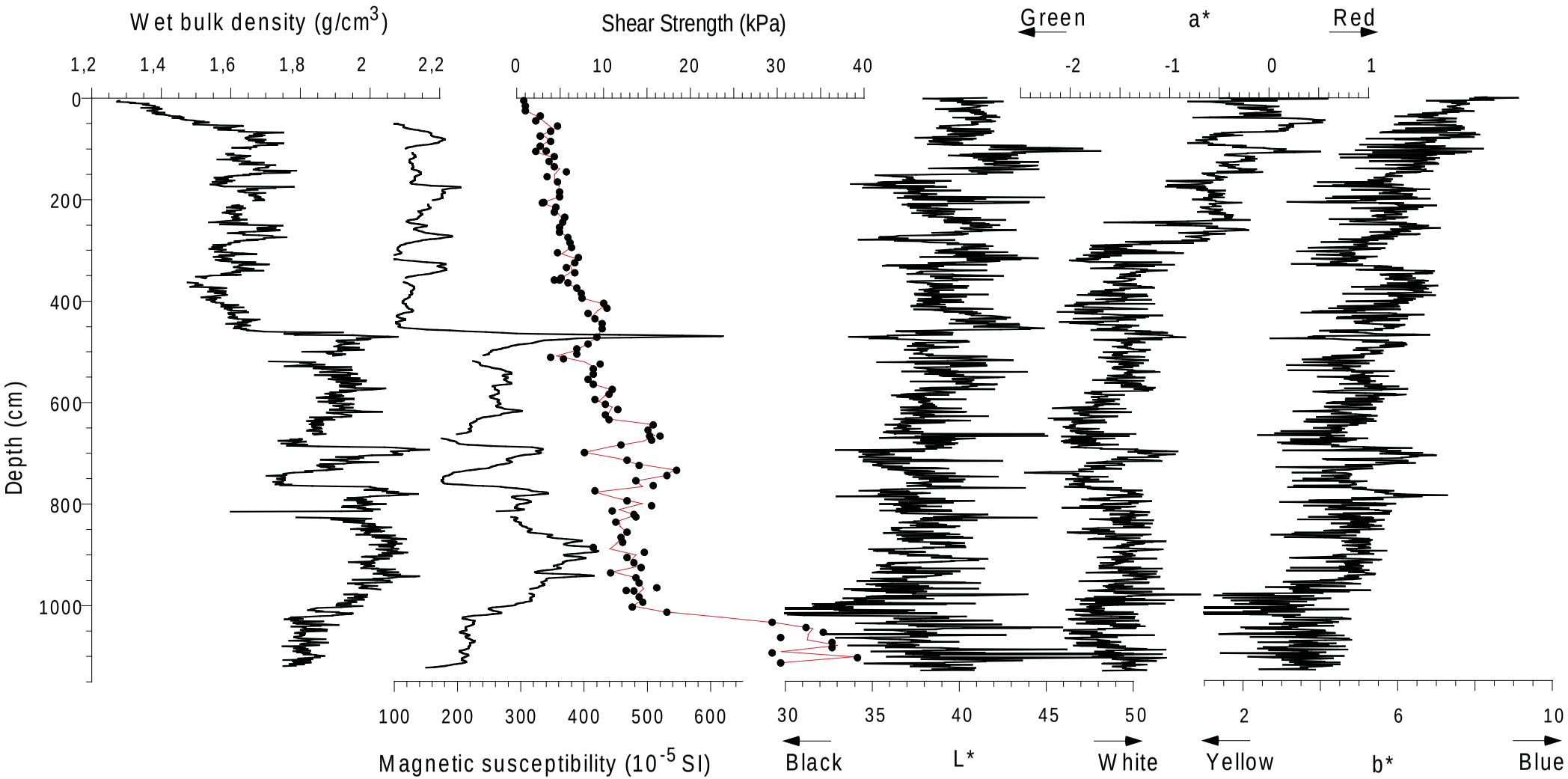
2008 029 0013 PT
A-B (100-0 m)
C-D (500-0 m)



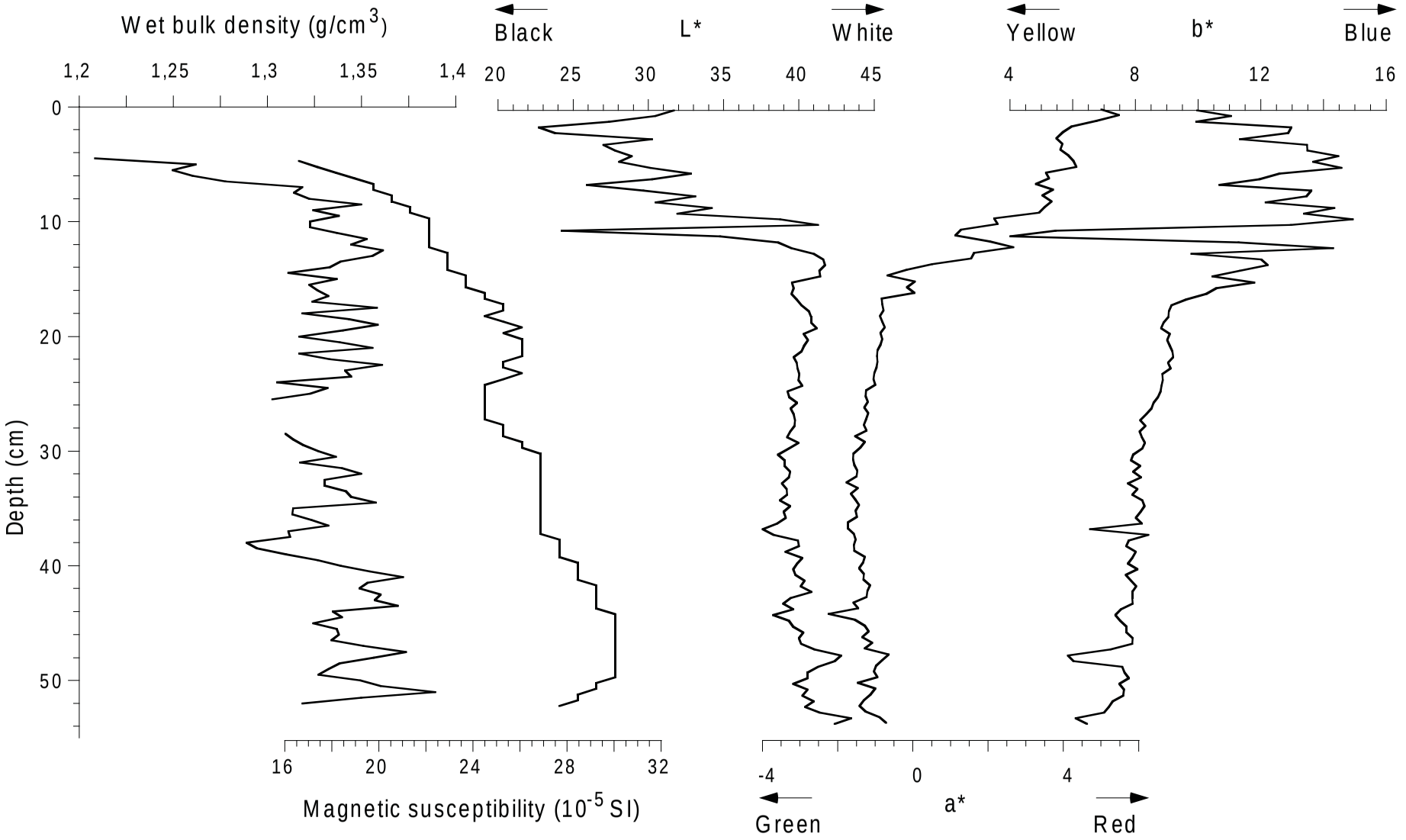
3 5k re or or lo ation o 2008029 010 BC 011 CTD 012 PC 013 lankton to at 245 11 46 1479m W D


Water depth (m)
0
500
1000
1500
Salinity
30 31 32 33 34 35
Temperature (°C)
-2 -1 0 1 2 3 4 5
0 100 200 300 400 500

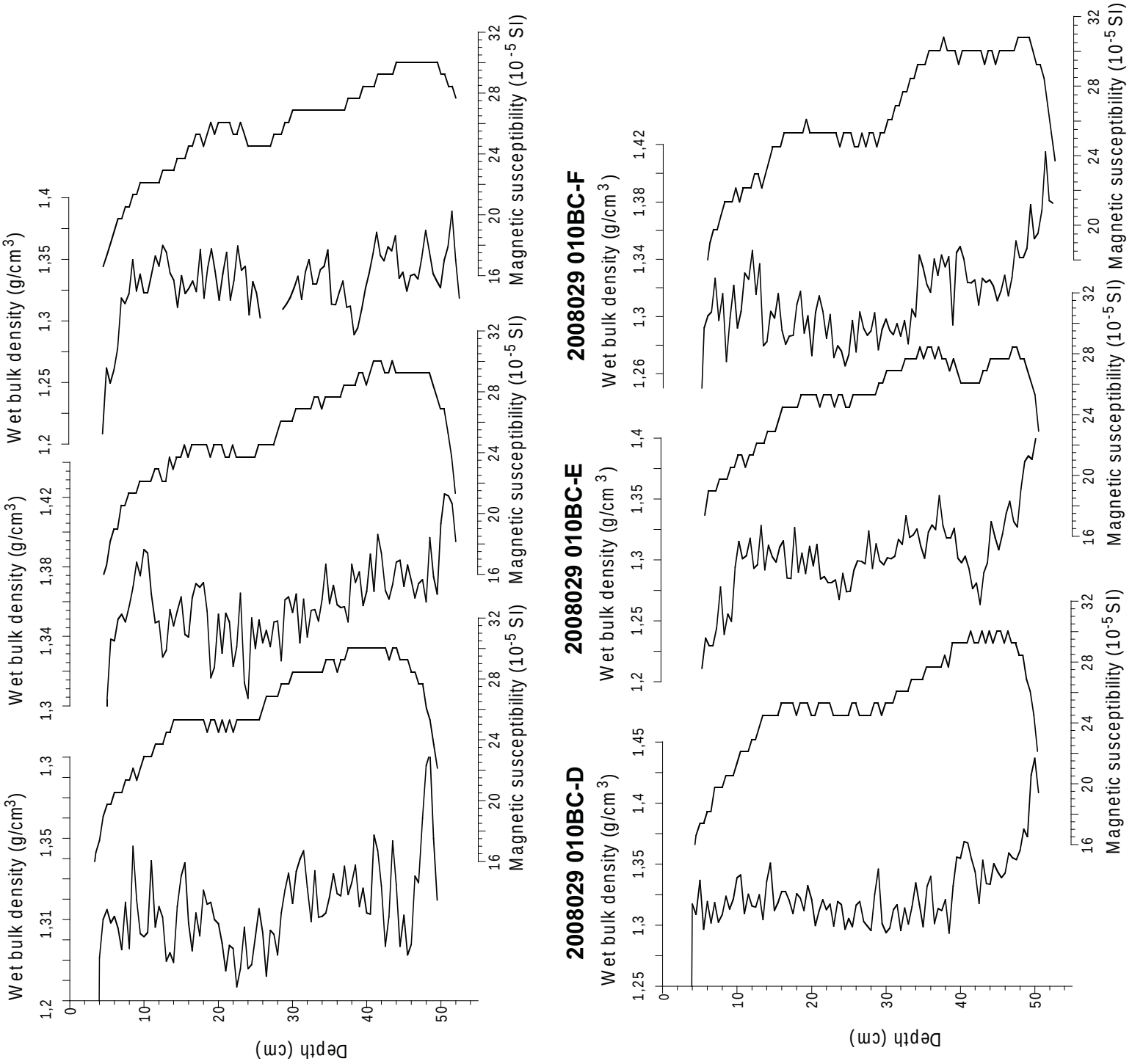
2008029 012PC



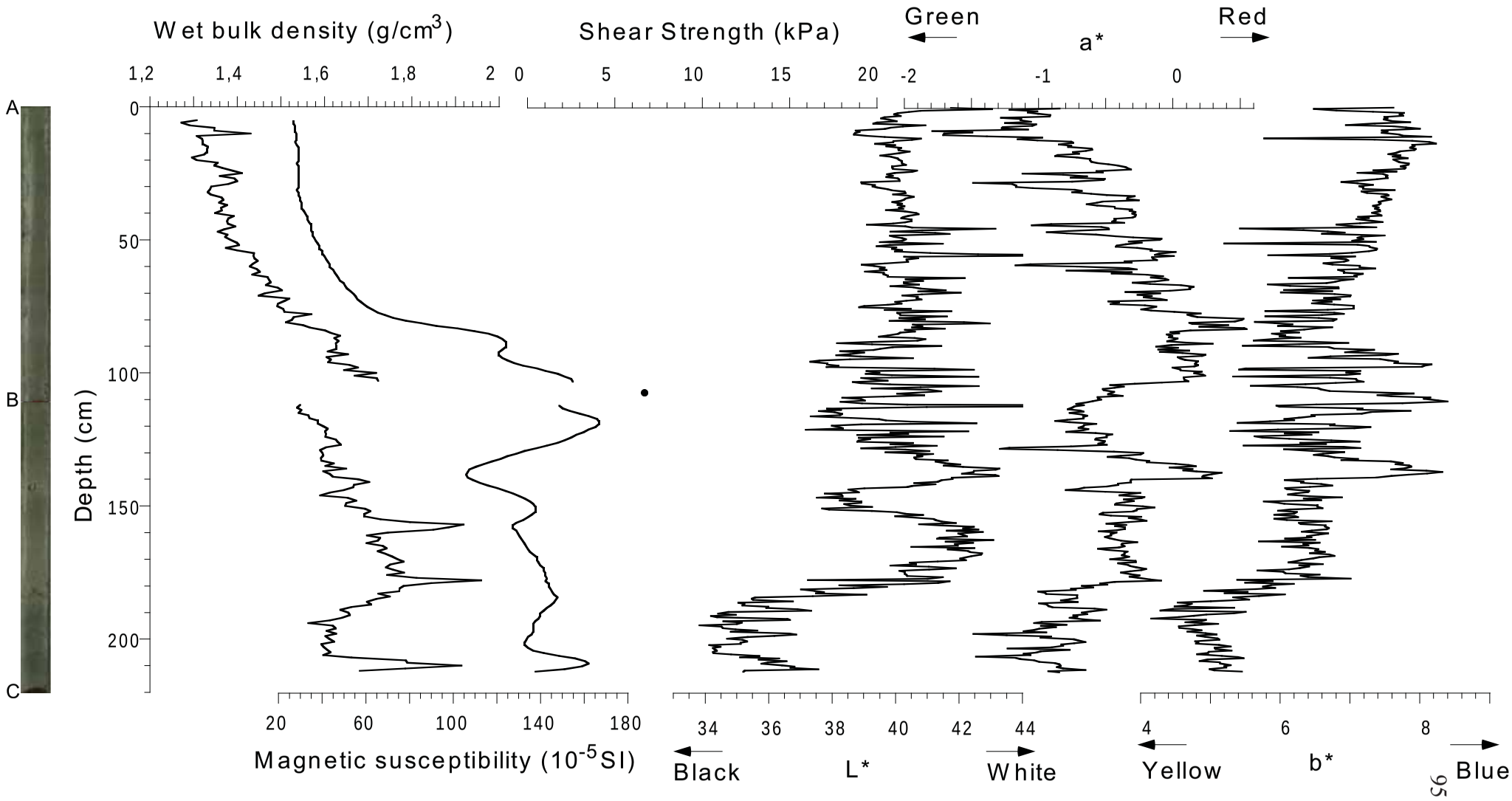
2008029 010BC-C




2008029 010
2008029 012
BC-C
TWC-BC
TWC-AB
PC-HI
PC-GH
PC-FG
PC-EF
PC-DE
PC-CD
PC-BC
PC-AB
0
50
100
150
0 cm
56 cm
0
107
107
213
0
105
105
207
207
359.5
359.5
512.5
515
667
667
819
822
973
973
1127
93


2008029 010BC-A
2008029 010BC-B
2008029 010BC-C
2008029 010BC-D
2008029 010BC-E
2008029 010BC-F
Wet bulk density (g/cm3)
Magnetic susceptibility (10-5 SI)
Depth (cm)

2008029 012TWC



Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0014	Box	246/1019	70.461806	-64.657438	2060	Baffin Bay	2008029	2460931	3.5 kHz	4			
0015	CTD	246/1019	70.461806	-64.657438	2060	Baffin Bay	2008029	2460931	3.5 kHz	4			
0016	Piston	246/1148	70.461921	-64.657765	2063	Baffin Bay	2008029	2460931	3.5 kHz	5	1219	155	766.0
0017	Plankton	246/1316	70.461414	-64.659867	2063	Baffin Bay	2008029	2460931	3.5 kHz	4			
0018	Water	246/1507	70.462960	-64.681533	2050	Baffin Bay	2008029	2460931	3.5 kHz	1			

Core 2008 029 014 BC (maximum length = 35 cm)

Visual description :

The surface consists in dark yellowish brown clayey mud with abundant clasts and gravels. The upper brown layer is about 9 cm thick. It overlies massive pale brown sandy mud down to 18 cm and brownish gray sandy mud down to the base of the core. Pebbles are abundant at the base of the core

Sampling summary :

- Surface sediment: 0-5 mm
- Push core C : sampling by extrusion, from 0 to 34 cm at 1 cm interval
- Push core E : sampling by extrusion, from 0 to 34 cm at 1 cm interval; pebbles recovered and sub-sampled at 18-20 and 34-35 cm
- Push core B : working half sampled for paleomagnetism (u-channel) and from 0 to 35 cm at 1 cm interval (except lower sample from 33-35 cm)
- Push cores C and D sealed and archived vertically
- Pebbles and cobbles from the base of the core were sampled.

Core 2008 029 016 TWC (153 cm)

Description summary: The upper 16 cm of the sediment is a dark yellowish brown mud. It overlies a complex sedimentary sequence with alternating layers of mud characterized by different colors (ranging from brown to olive and dark to light grey) and various gain-size from sandy mud to clay. Gravel to pebble size ice rafted debris (IRD) is common.

Sampling summary:

- Working half sampled for paleomagnetism (u-channel) from 0 to 153 cm.
- Sampling at 1-cm interval for micropaleontology and geochemistry (A. de Vernal, C. Hillaire-Marcel et al., ~ 30 cc) and grain-size analyses (J. Ortiz, ~ 5 cc.) down to 153 cm.
- Pebbles at 19-21, 55-57, 58-60, 62-63, 69-70, 85-88, 93-94, 96, 100-102 cm

Core 2008 029 016 PC (length = 741 cm)

Description summary: The upper 12 cm of the core sediment is a dark yellowish brown mud. It overlies sediment with alternating layers of brownish, grey and reddish mud with common gravel to pebble size ice rafted debris (IRD).

Sampling summary:

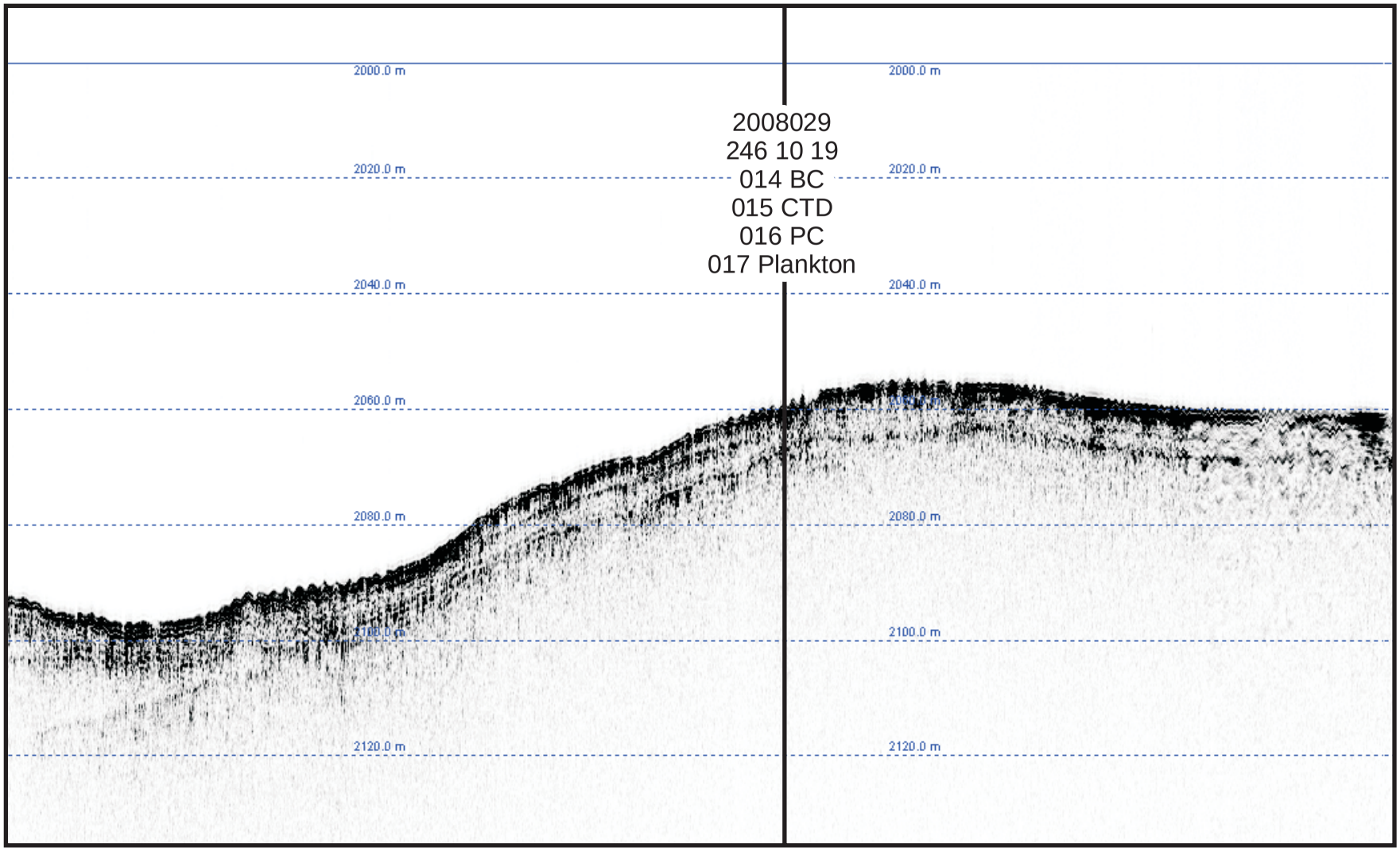
- Working half sampled for paleomagnetism (u-channel) from 0 to 741 cm.
- Pebbles sampled at 218-221 cm (section D-E)
- Pebbles sampled at 310 cm (section C-D)

2008 029 0017 PT

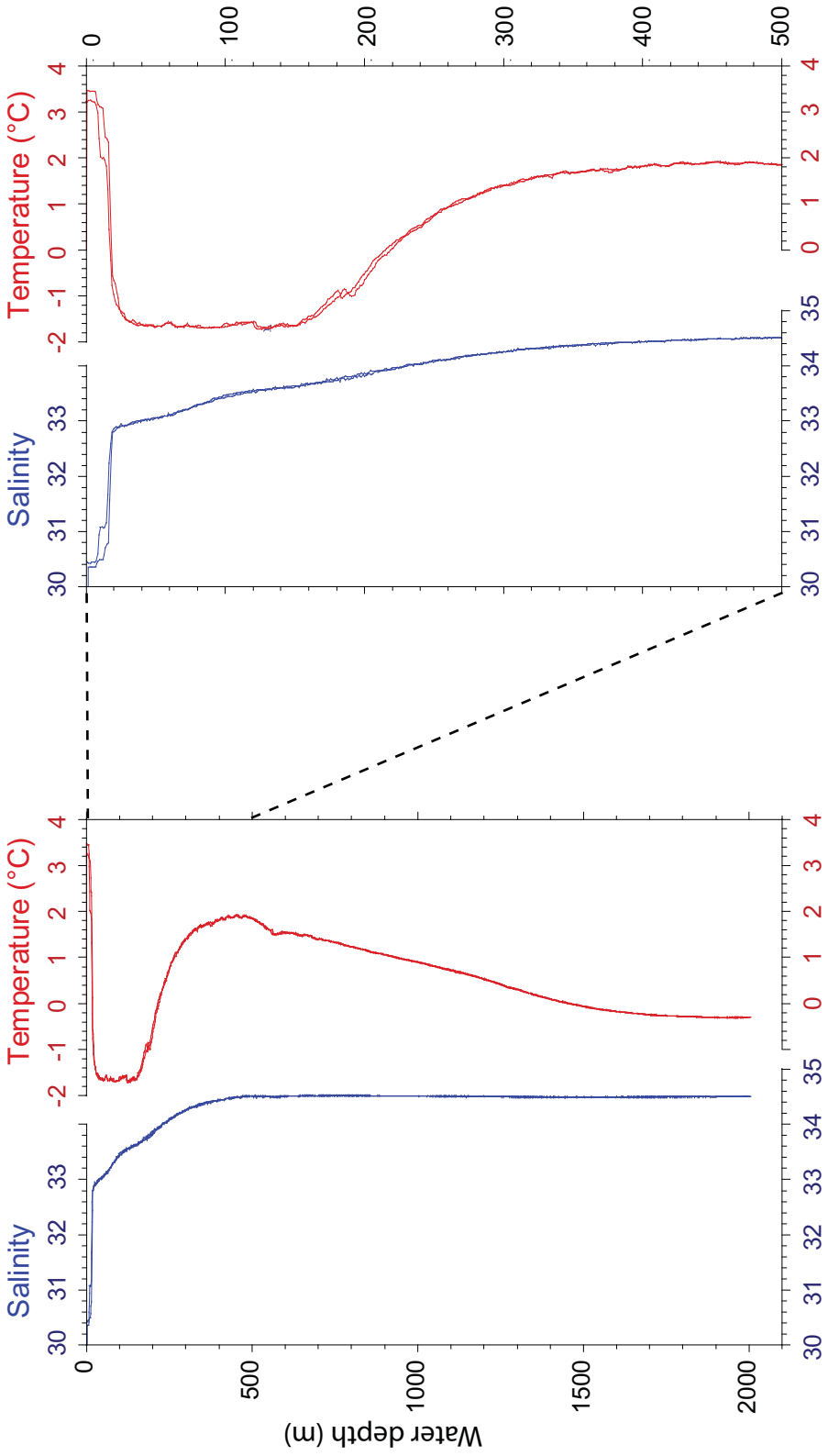
A-B (50-0 m)
C-D (500-0 m)

2008 029 018 WS

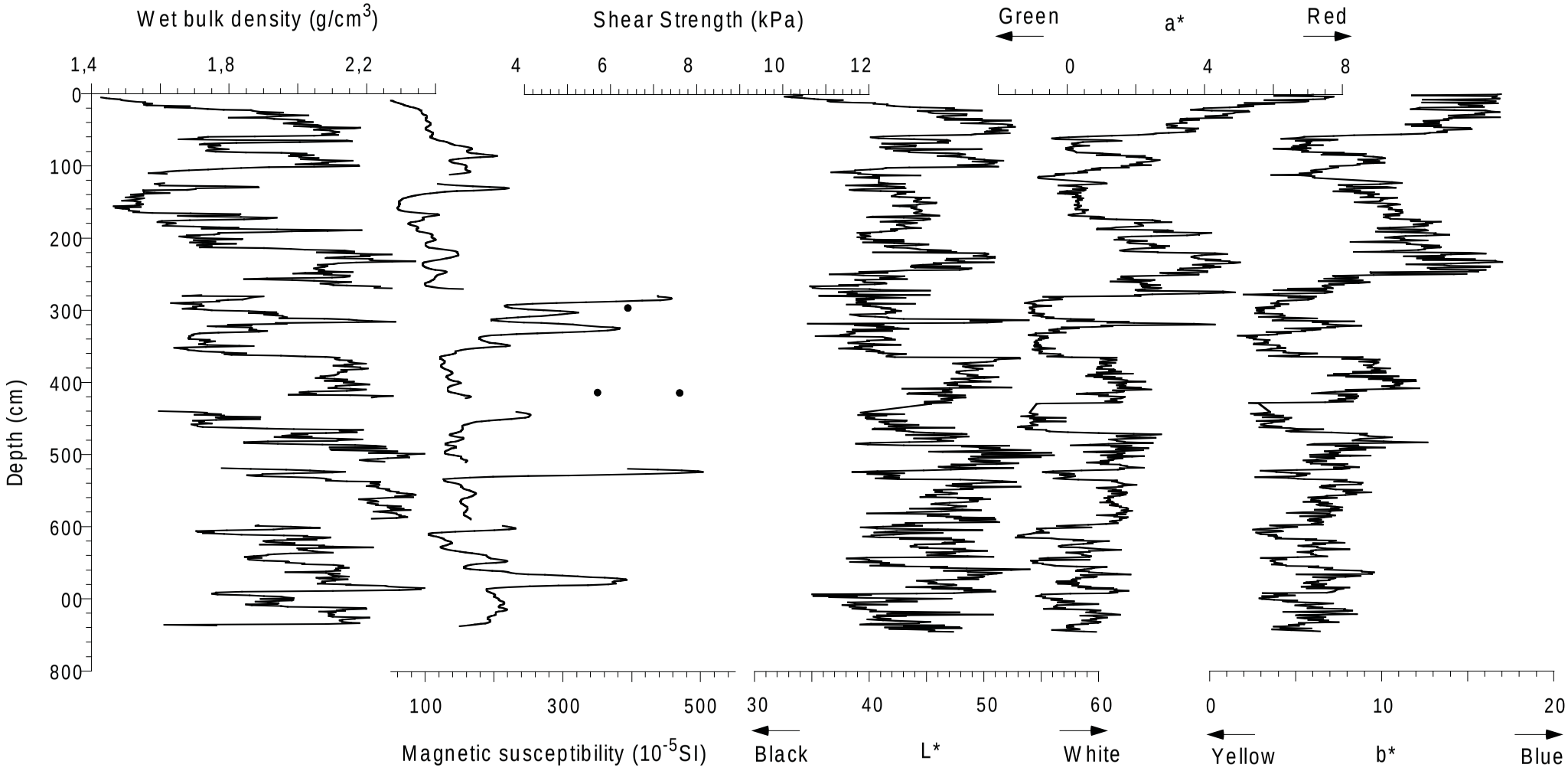
Three casts (A, B, C) with two pumps were made at 10, 100 (x 2), 400, 1000 and 1900 m.
All filtrations were made for Nd and Th. One at 100 m was made for Si.



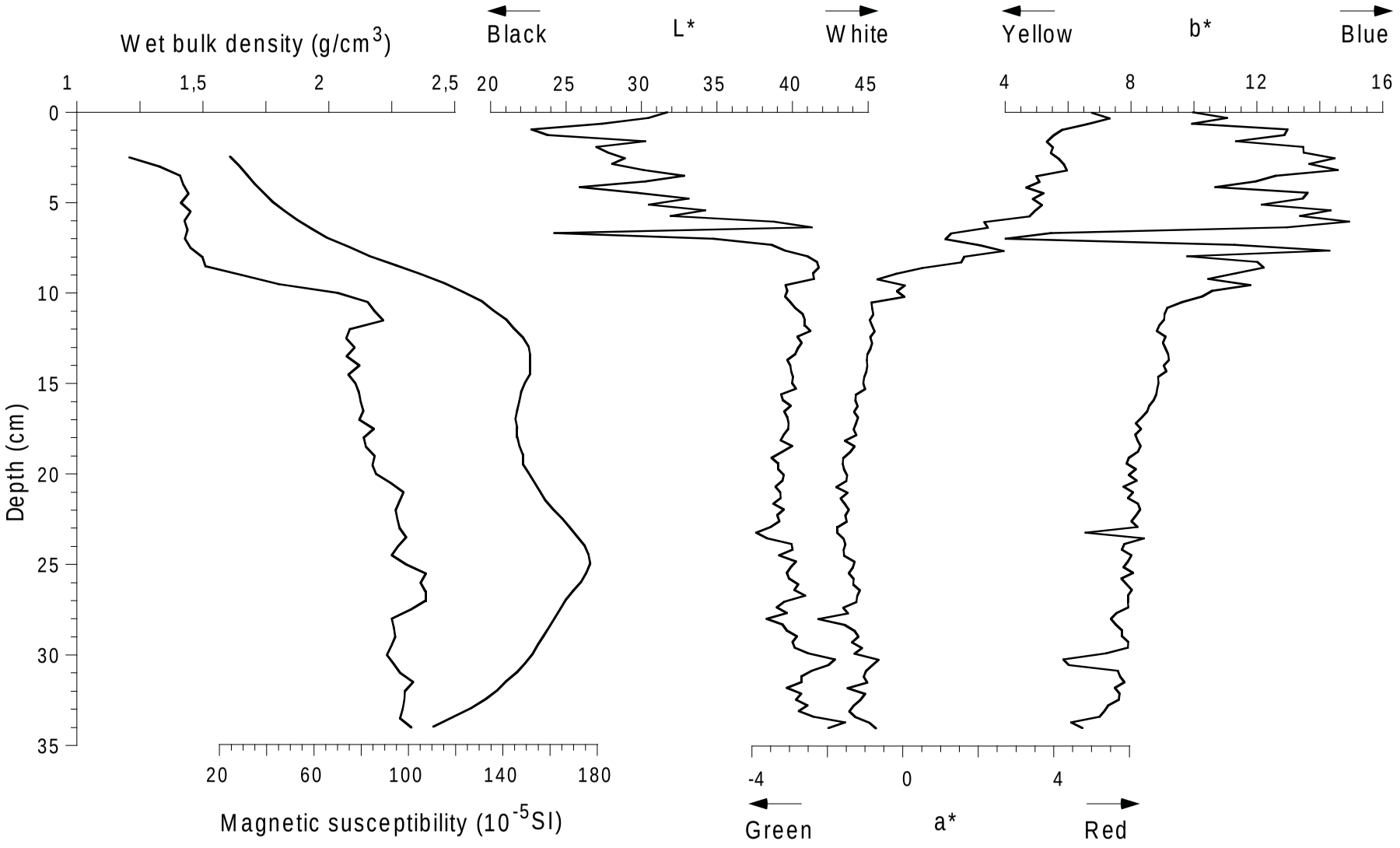
3 5k re or or lo ation o 2008029 014BC 015CTD 016PC 017 lankton to at 246 10 19 2060m W D

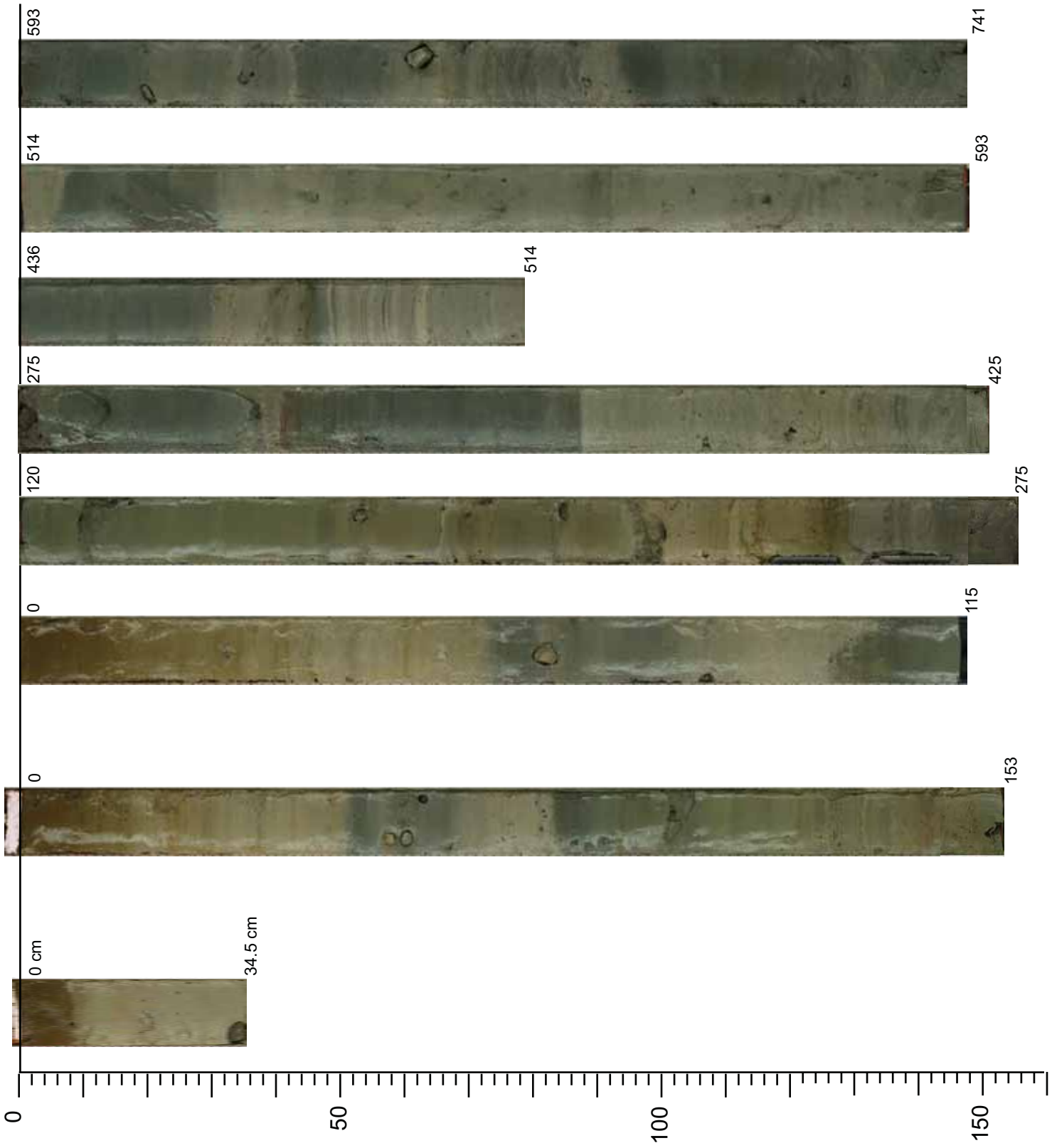

Water depth (m)
0
500
1000
1500
2000
Salinity
30
31
32
33
34
35
Temperature (°C)
-2
-1
0
1
2
3
4
0
100
200
300
400
500

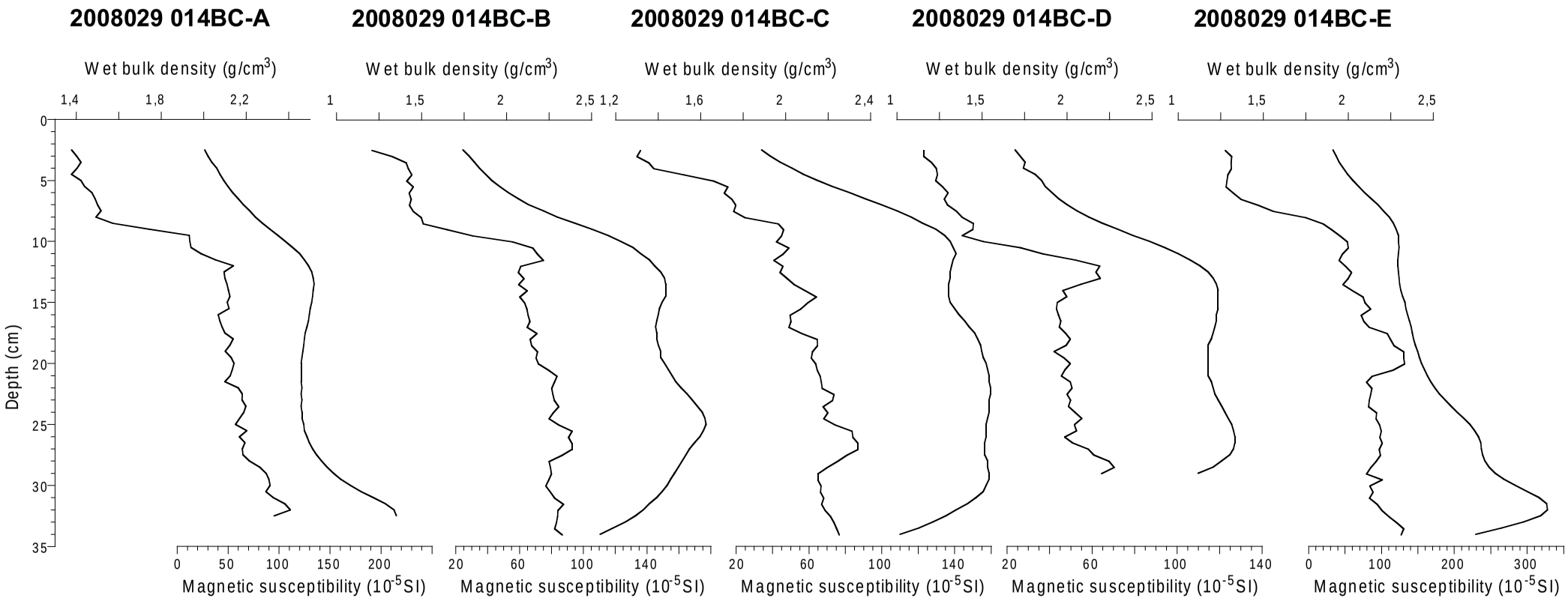
2008029 016PC



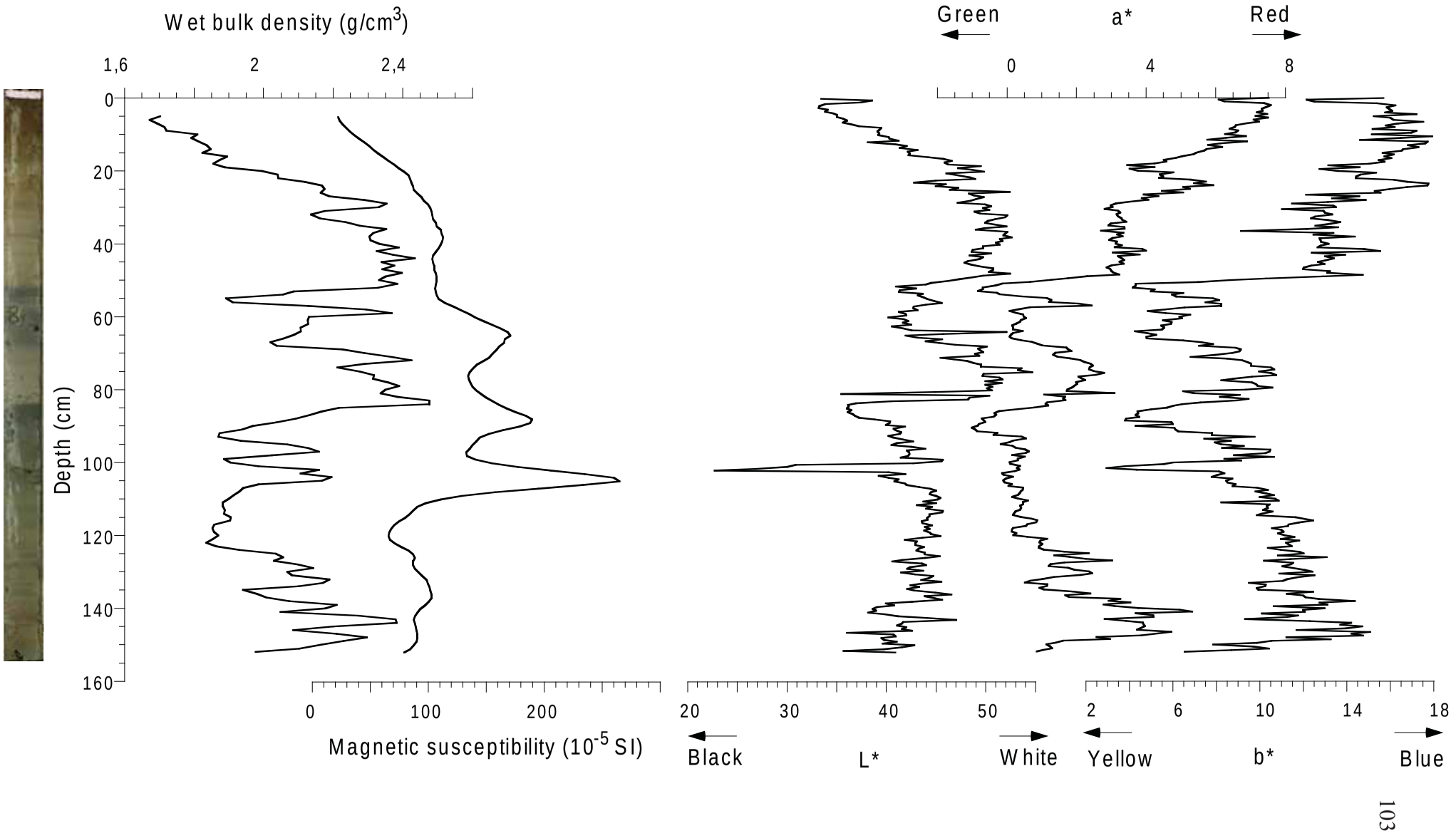
2008029 014BC-B




2008029 014
2008029 016
BC-B
TWC-AB
PC-EF
PC-DE
PC-CD
PC-B'C
PC-BB'
PC-AB
0 cm
34.5 cm
0
153
0
115
120
275
275
425
436
514
514
593
593
741
0
50
100
150


2008029 014BC-A
2008029 014BC-B
2008029 014BC-C
2008029 014BC-D
2008029 014BC-E
Wet bulk density (g/cm3)
Depth (cm)
Magnetic susceptibility (10-5SI)

2008029 016TWC

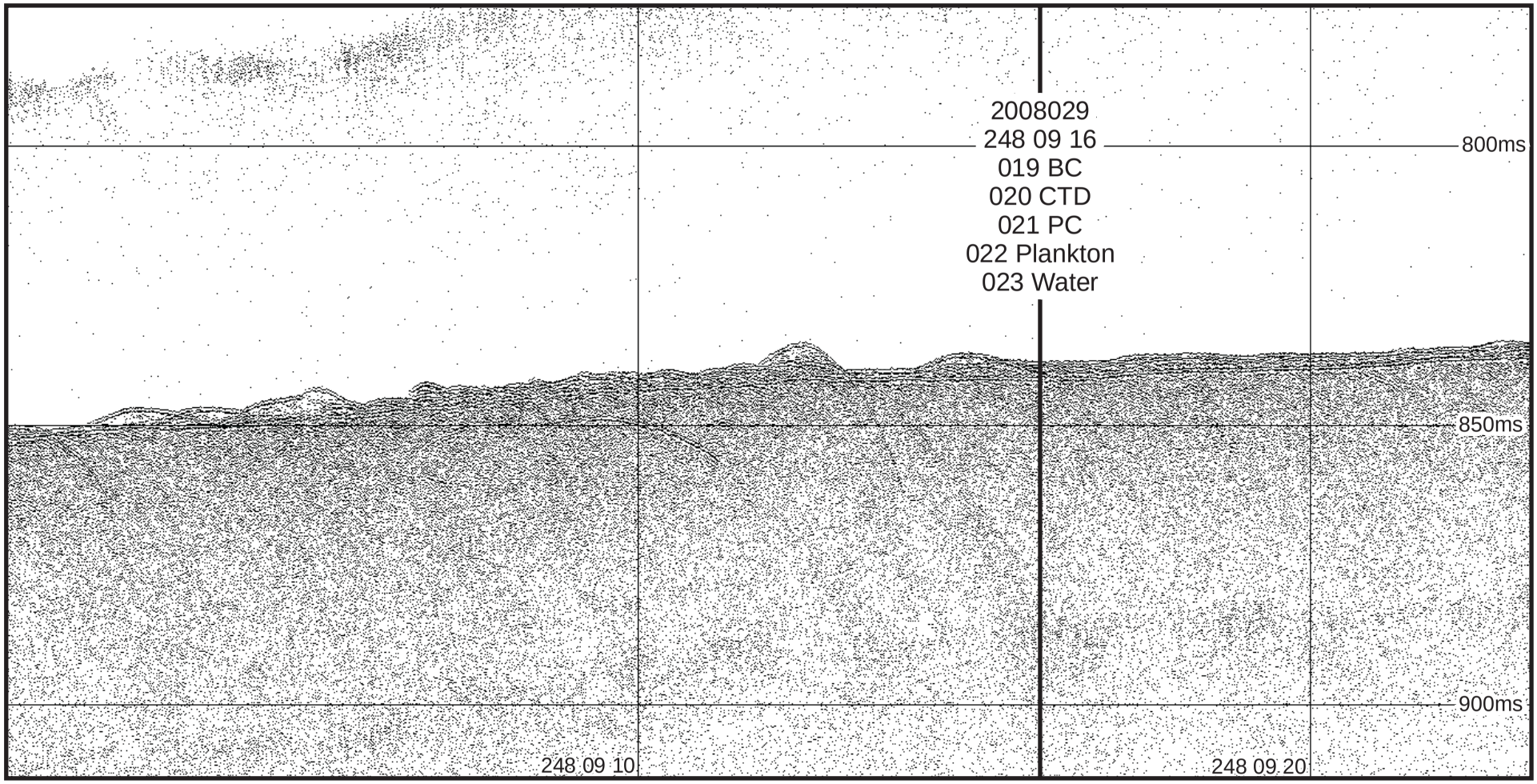


Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0019	Box	248/1212	75.468720	-70.634565	602	Baffin Bay	2008029	2480916	Huntec	5			
0020	CTD	248/1212	75.468720	-70.634565	602	Baffin Bay	2008029	2480916	Huntec	5			
0021	Piston	248/1258	75.468650	-70.634340	604	Baffin Bay	2008029	2480916	Huntec	6	914.4	0	0
0022	Plankton	248/1345	75.468626	-70.634195	604	Baffin Bay	2008029	2480916	Huntec	5			
0023	Water	248 /1553	75.469273	-70.656936	604	Baffin Bay	2008029	2480916	Huntec	2			

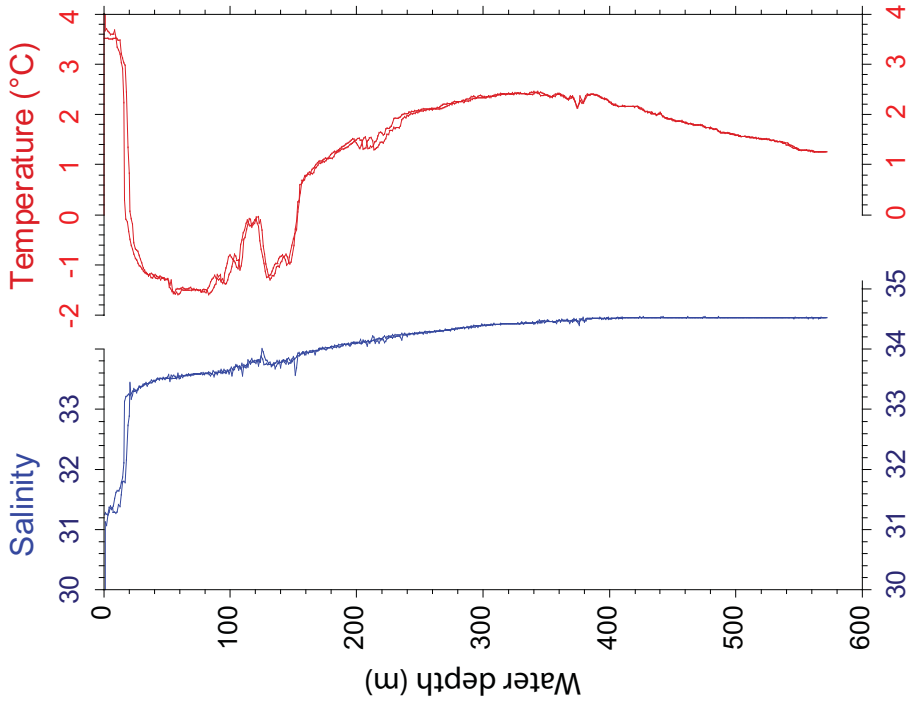
Core 2008 029 019 BC (maximum length = 28 cm)
Visual description :
The surface consists in light brownish mud with worm tubes. The upper brown layer is about 5 cm thick. A color transition toward olive gray is recorded down to 11 cm. Below 11 cm, the sediment is dark gray massive silty mud with sand.
The penetration of the box corer was stopped by a large block
Sampling summary :
- Surface sediment: 0-5 mm
- Push core A : sampling by extrusion, from 0 to 24 cm at 1 cm interval
- Push core C : sampling by extrusion, from 0 to 24 cm at 1 cm interval
- Push core B : working half sampled for paleomagnetism (u-channel) and from 0 to 28 cm at 1 cm interval.
- Push cores D and E sealed and archived vertically
- The block and pebbles from the base of the core are stored in a bag.

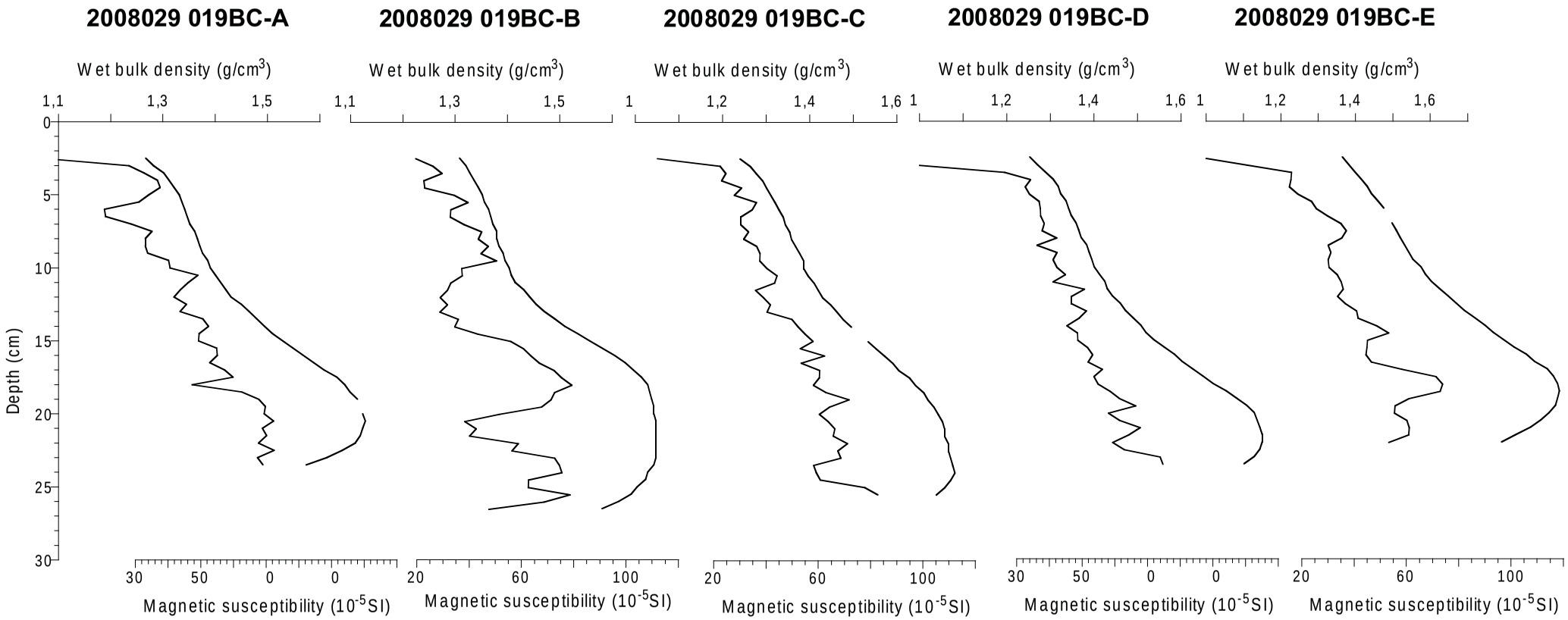
2008 029 0022 PT
A-B (100-0 m)
C-D (500-0 m)

2008 029 023
One casts with two pumps was made at 75 and 300 m. Filtrations were made for Nd and Th. The cast at 75 m failed (no pumping).

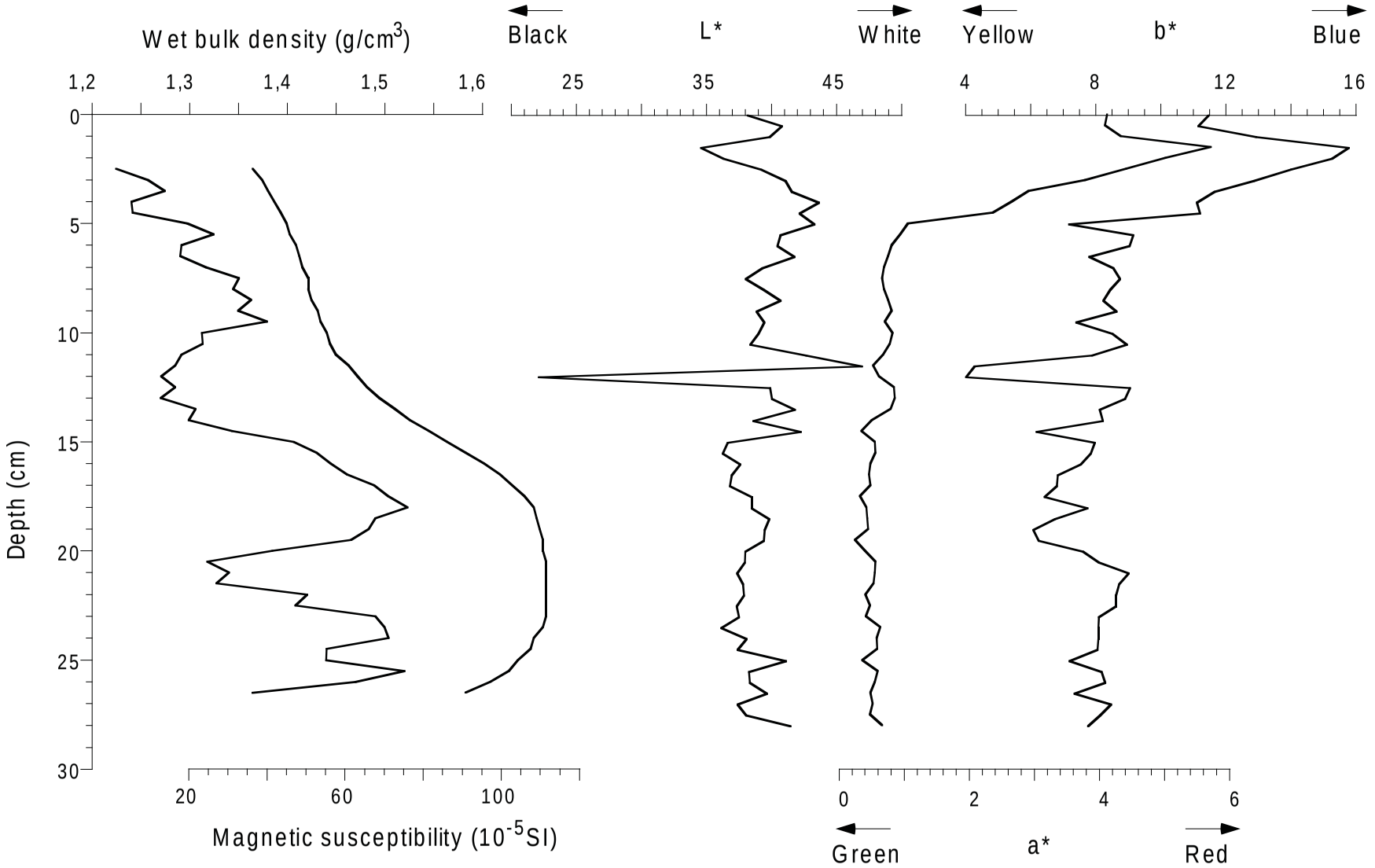


nte re or or lo ation o 2008029 019BC 020CTD 021PC 022 lankton to 023 ater at 248 09 16 602m W D


Temperature (°C)
-2
-1
0
1
2
3
4
Salinity
30
31
32
33
34
35
0
100
200
300
400
500
600
Water depth (m)


2008029 019BC-A
2008029 019BC-B
2008029 019BC-C
2008029 019BC-D
2008029 019BC-E
Wet bulk density (g/cm3)
Depth (cm)
Magnetic susceptibility (10-5SI)

2008029 019BC-B



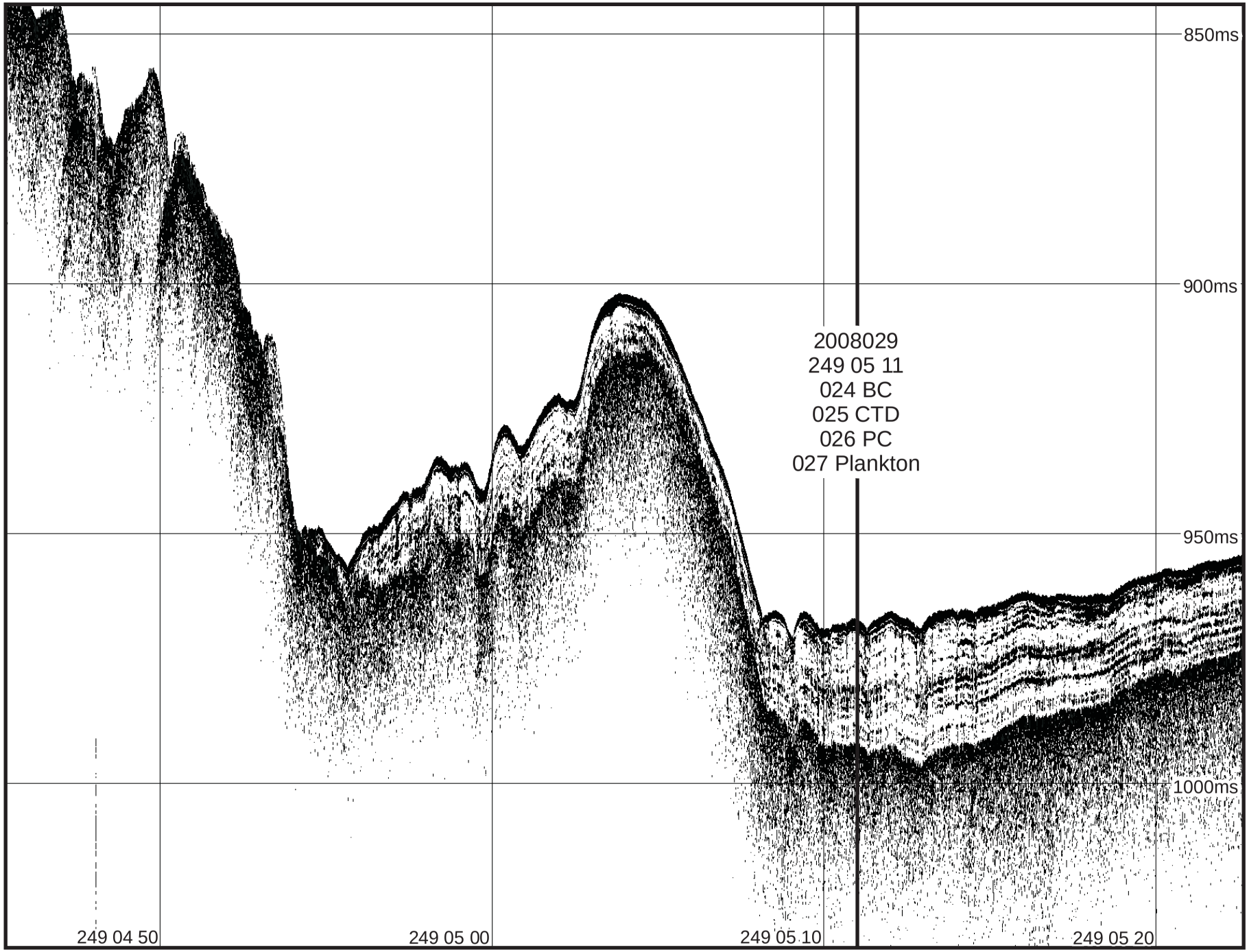
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0024	Box	249 /1113	77.287903	-74.342653	728	North Water Polynya	2008029	2490511	3.5kHz	6			
0025	CTD	249 /1113	77.287903	-74.342653	728	North Water Polynya	2008029	2490511	3.5kHz	6			
0026	Piston	248 /1159	77.287618	-74.343983	725	North Water Polynya	2008029	2490511	3.5kHz	7	1524	131	1091.5
0027	Plankton	248 /1240	77.287638	-74.343613	725	North Water Polynya	2008029	2490511	3.5kHz	6			

Core 2008 029 024 BC (maximum length = 51 cm)
Visual description :
The surface consists in brownish mud with some worms. It overlies very dark greyish mud with iron sulphide.
The sediment is soft with an odour of methane and degrading organic matter.
Push core A is disturbed by degassing.
Sampling summary :
- Surface sediment: 0-5 mm
- Push core B: sampling by extrusion, from 0 to 47 cm at 1 cm interval
- Push core E : sampling by extrusion, from 0 to 46 cm at 1 cm interval (note: the original length of the liner was 48 cm; the 2 cm difference may correspond to a sampling artefact)
- Push core C : working half (0-51 cm) sampled for paleomagnetism (u-channel) and archived horizontally.
- Push cores A, D and F sealed and archived vertically.

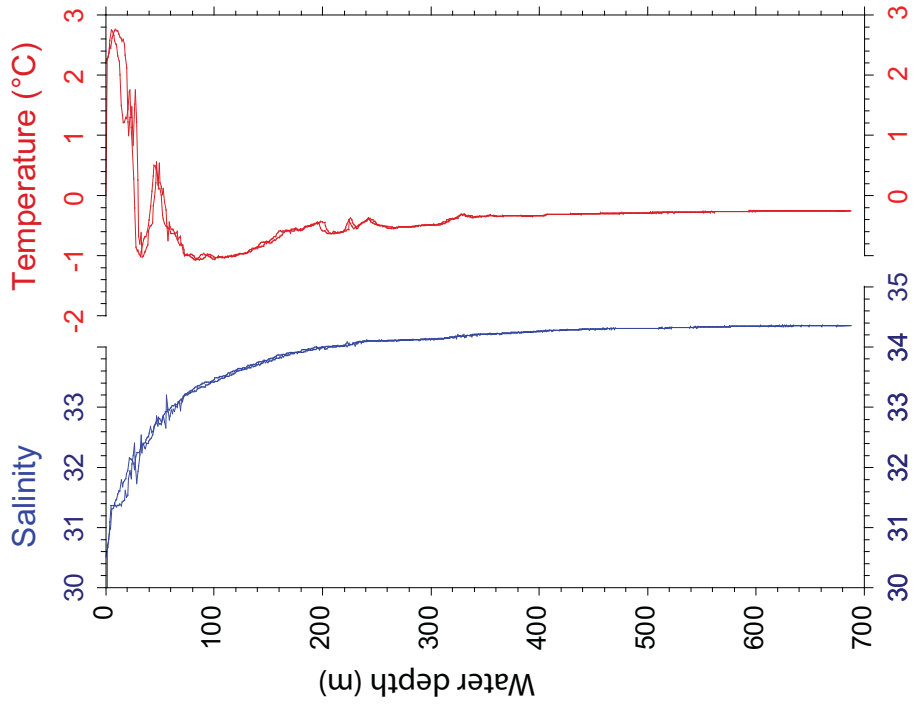
Core 2008 029 026 TWC (length = 130 cm)
Description summary: The upper 4 cm of the core consists in dark grey silty clay overlying mottled very dark gray silty clay.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 130 cm.

Core 2008 029 026 PC (length = 1052 cm)
Description summary: The core sediments consist in olive grey to dark olive gray silty clay with abundant black mottles. Note that the entire core is affected by degazing (sediment cracks).
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 1052 cm.
- Small shell fragments at 668 cm (section C-D)
- About 2 cm large valve of pelecypod at 985-986 cm (section A-B; archive half)

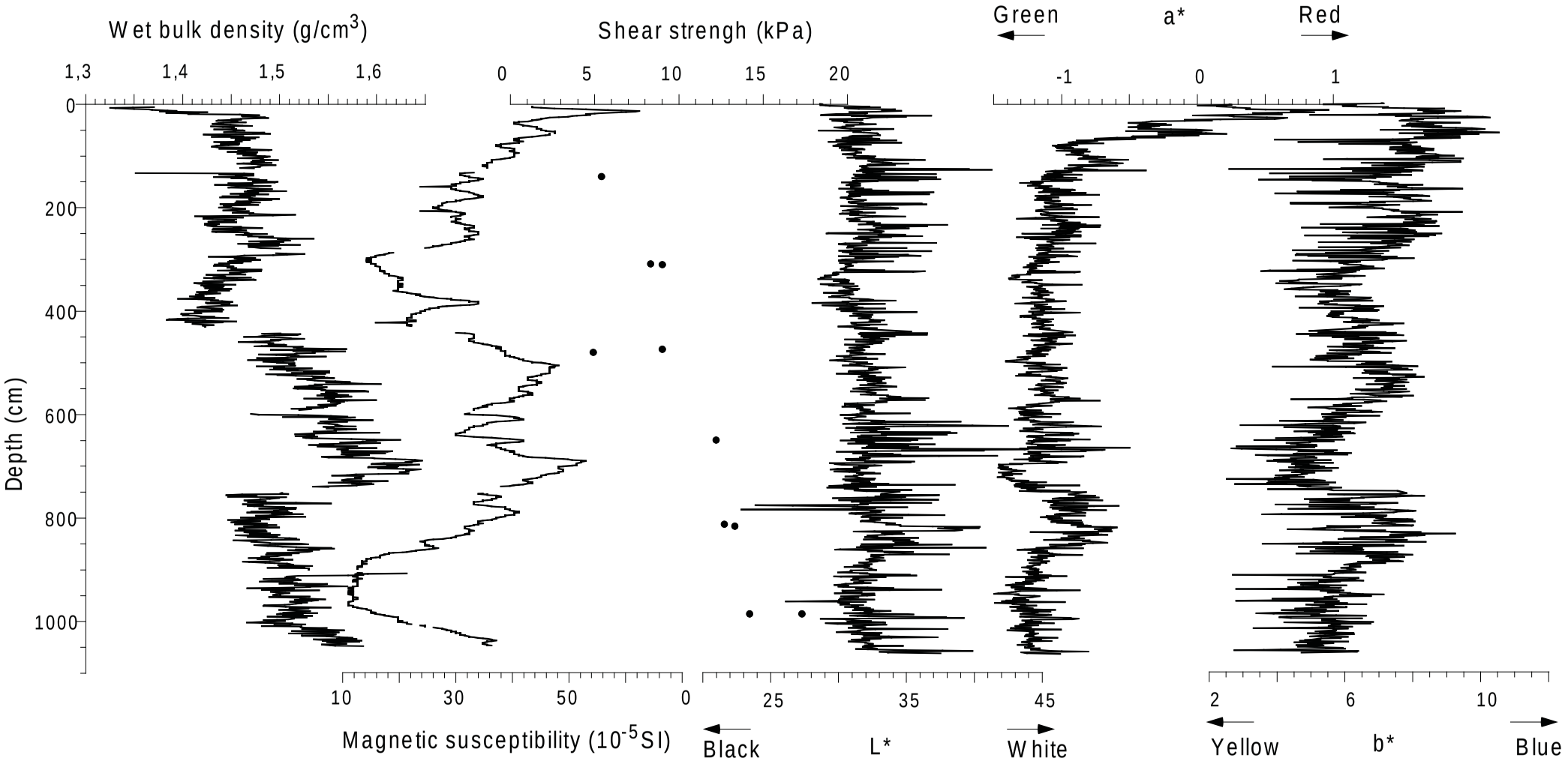
2008 029 0027 PT
A-B-C (100-0 m)
D-E (500-0 m)



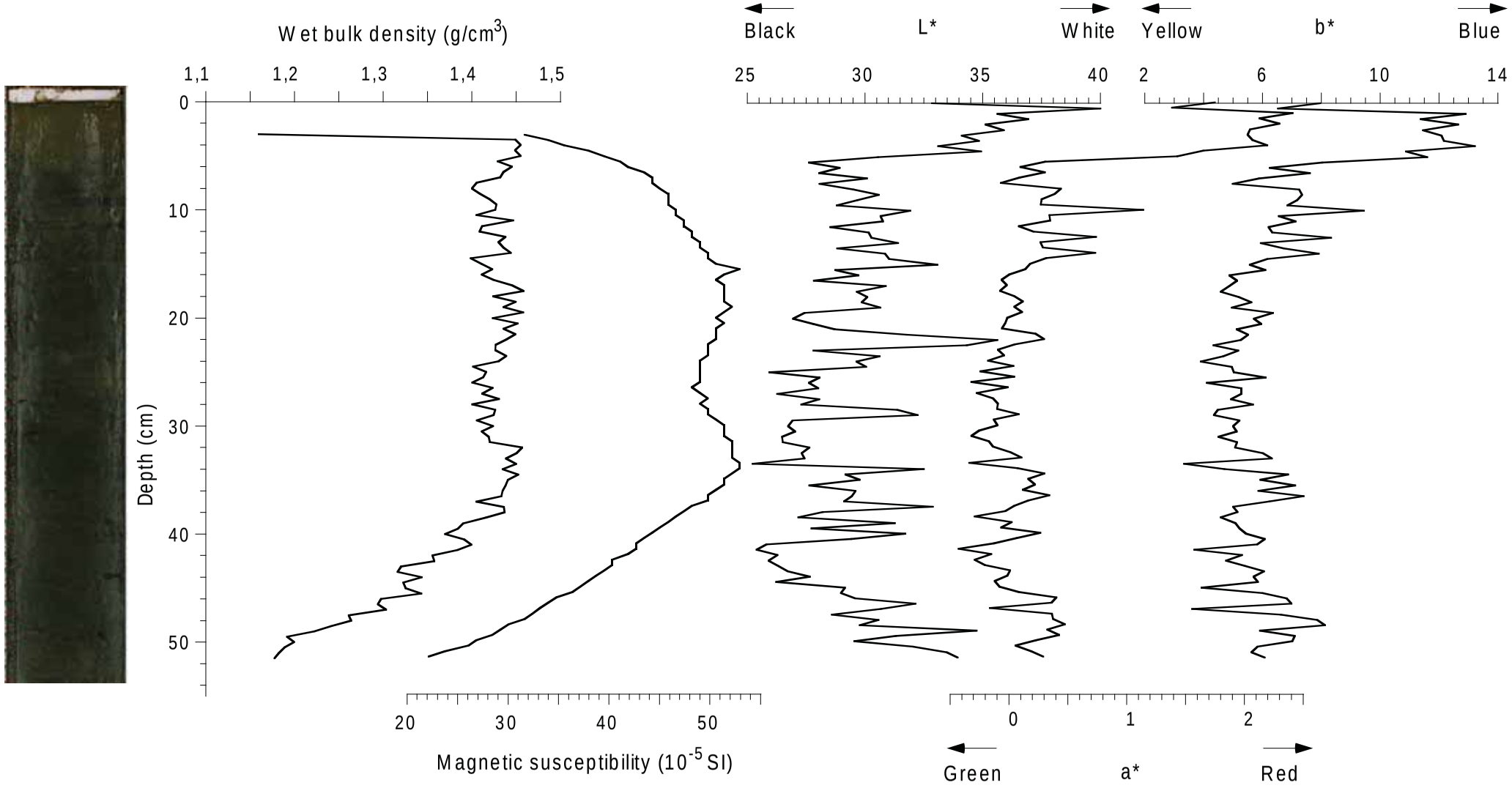
3 5k re or or lo ation o 2008029 024BC 025CTD 026PC 027 lankton to at 249 05 11 728m W D

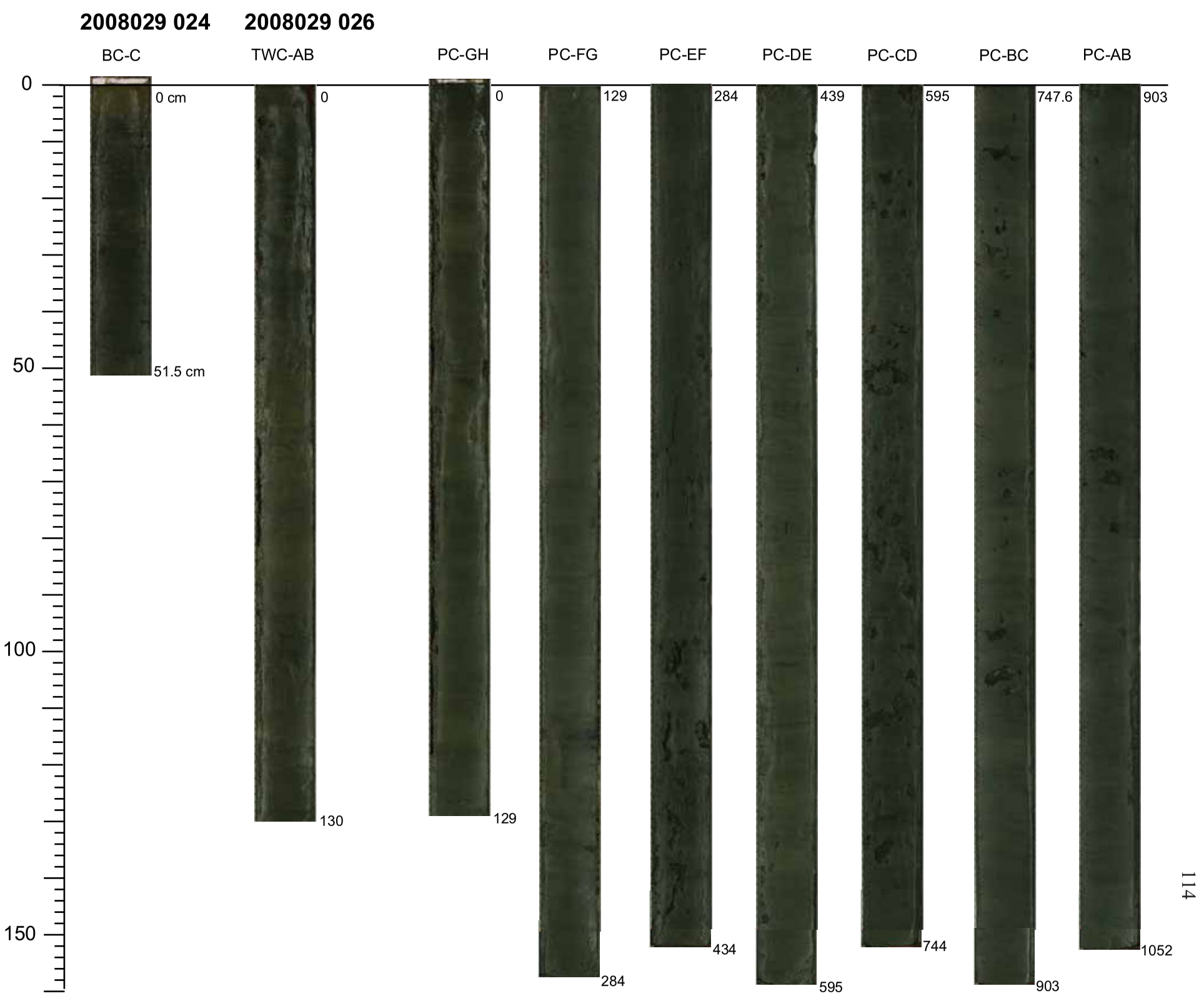

Temperature (°C)
-2
-1
0
1
2
3
Salinity
30
31
32
33
34
35
0
100
200
300
400
500
600
700
Water depth (m)

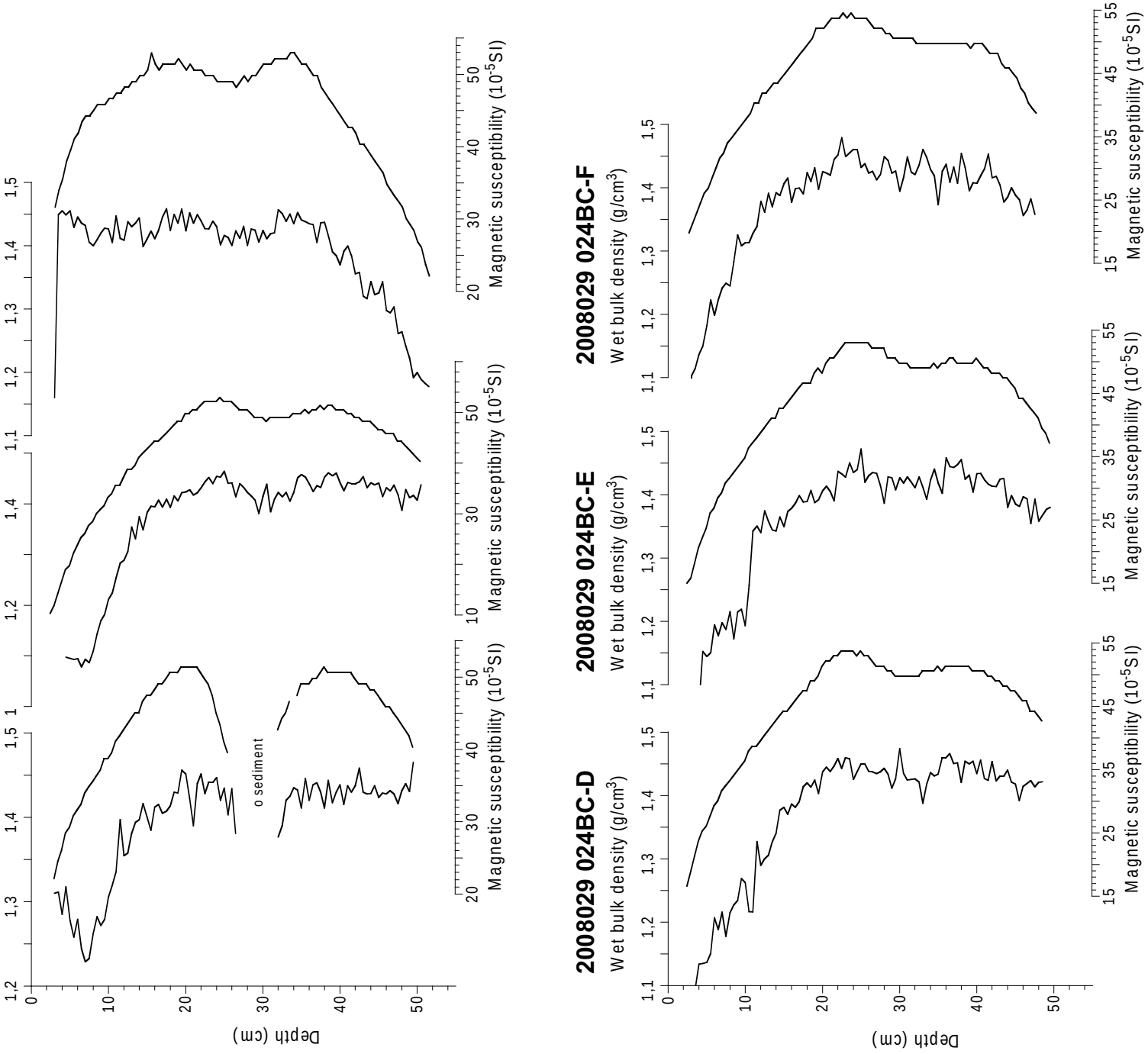
2008029 026PC



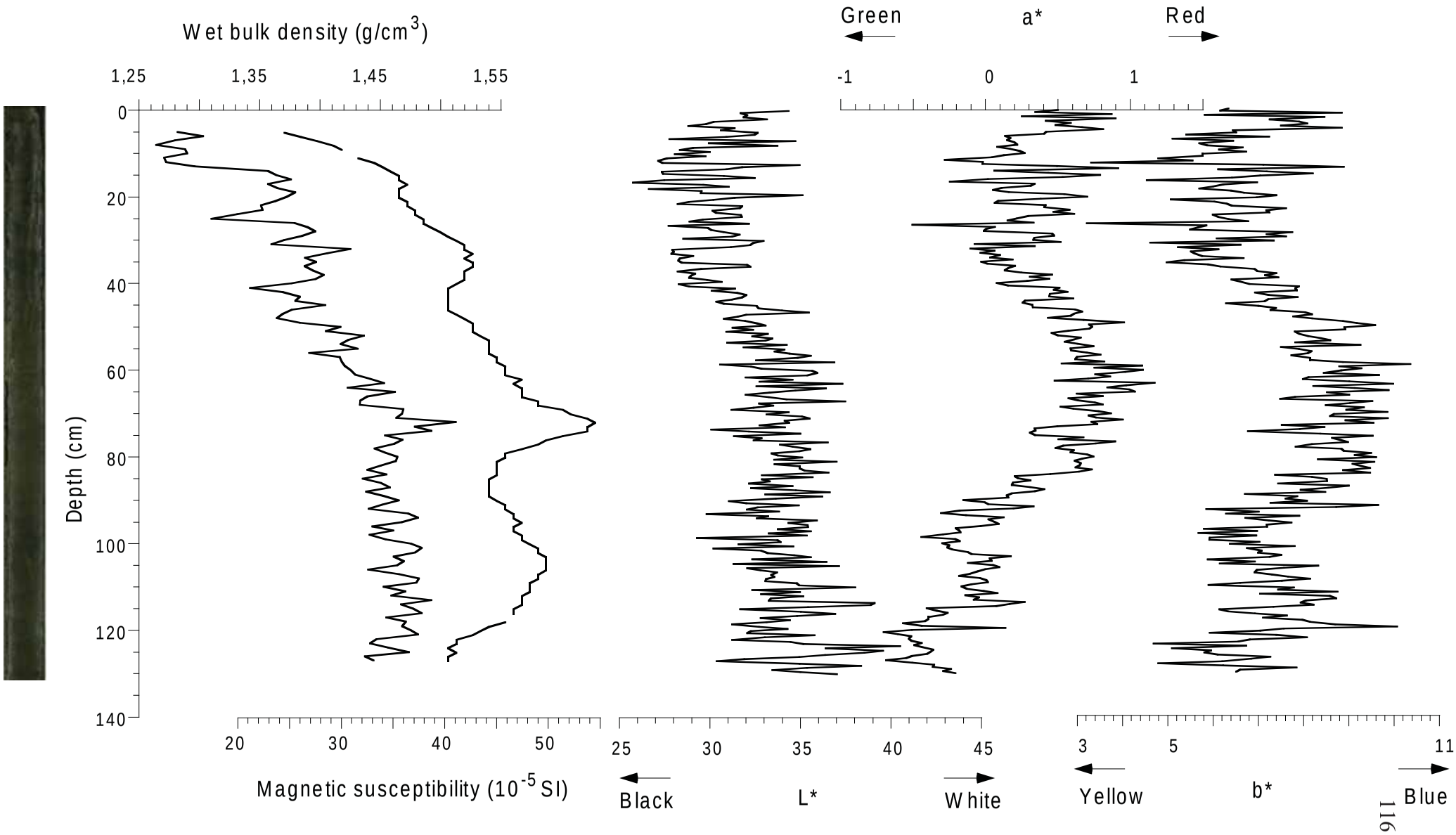
2008029 024BC-C




2008029 024
2008029 026
BC-C
TWC-AB
PC-GH
PC-FG
PC-EF
PC-DE
PC-CD
PC-BC
PC-AB
0
50
100
150
0 cm
51.5 cm
0
130
0
129
129
284
284
434
439
595
595
744
747.6
903
903
1052


2008029 024BC-A
2008029 024BC-B
2008029 024BC-C
2008029 024BC-D
2008029 024BC-E
2008029 024BC-F
Wet bulk density (g/cm3)
Magnetic susceptibility (10-5SI)
Depth (cm)
o sediment

2008029 026TWC



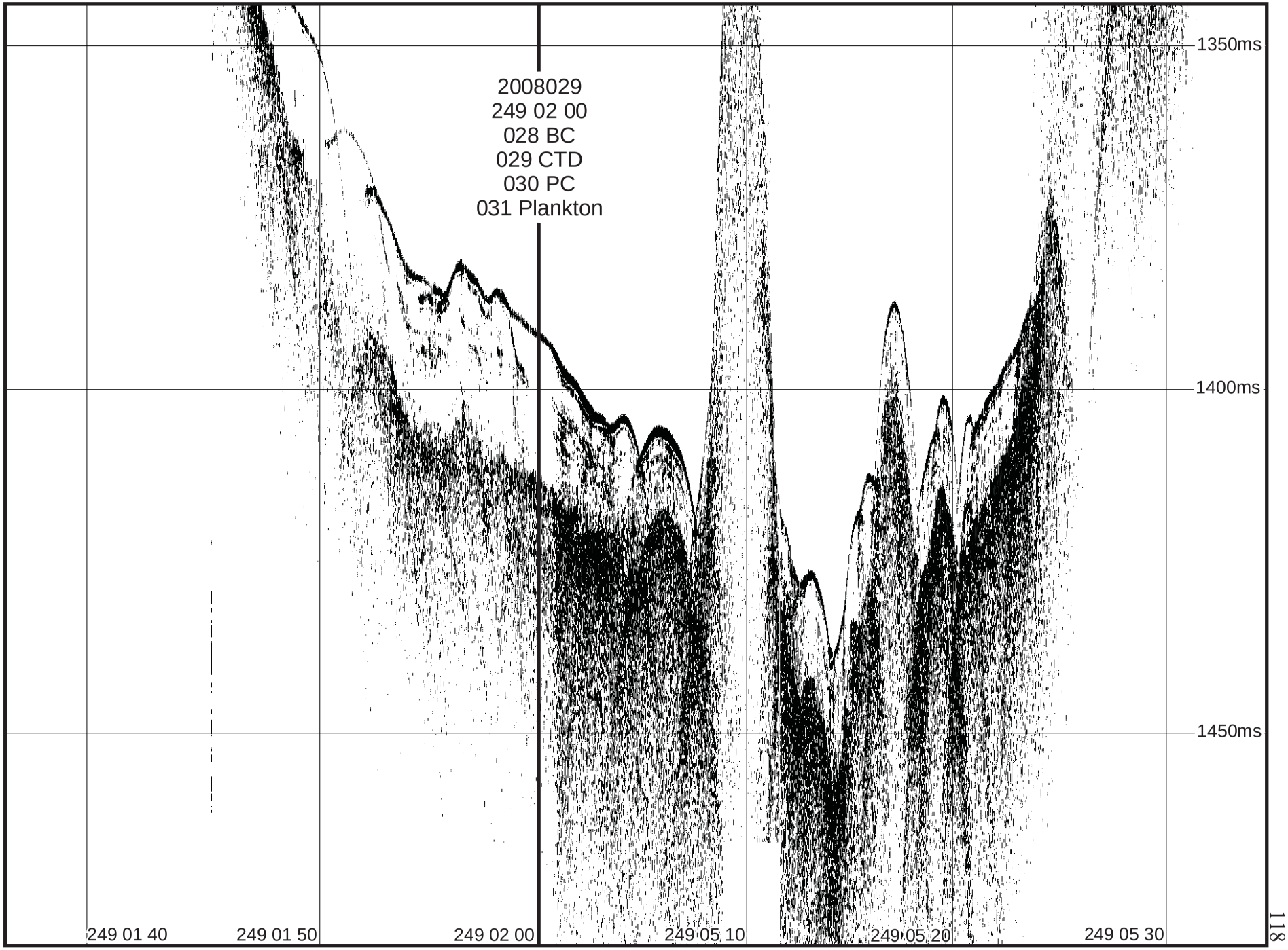
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0028	Box	249/1805	76.978858	-71.890510	1048	North Water Polynya	2008029	2490200	3.5kHz	7			
0029	CTD	249/1805	76.978858	-71.890510	1048	North Water Polynya	2008029	2490200	3.5kHz	7			
0030	Piston	249/1900	76.978650	-71.890001	1048	North Water Polynya	2008029	2490200	3.5kHz	8	1219	185	1129.3
0031	Plankton	249/1935	76.978038	-71.891921	1050	North Water Polynya	2008029	2490200	3.5kHz	7			

Core 2008 029 028 BC (maximum length = 51 cm)
Visual description :
The surface consists in brownish gray mud with abundant fauna (crinoids, worms, etc.). The surface layer is about 5 cm and overlies dark greyish mud with mottles.
Sampling summary :
- Surface sediment: 0-5 mm
- Push core A: sampling by extrusion, from 0 to 43 cm at 1 cm interval (note: the original length of the liner was 47 cm; the 4 cm difference may correspond to a sampling artefact)
- Push core C : working half (0-51 cm) sampled for paleomagnetism (u-channel) and archived horizontally.
- Push cores B, D and E sealed and archived vertically.

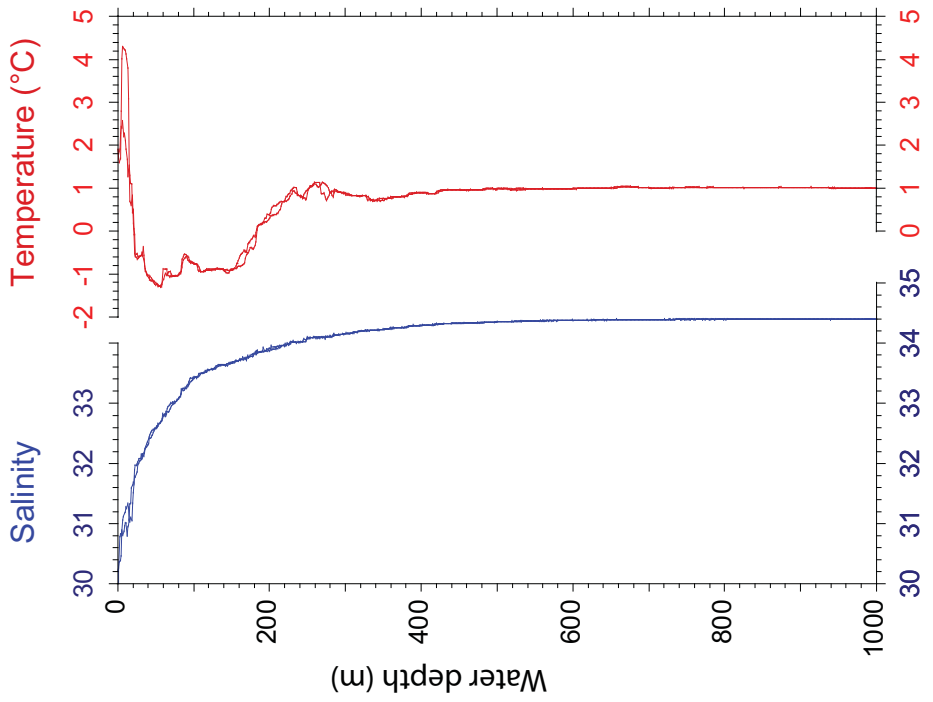
Core 2008 029 030 TWC (length = 180.5 cm)
Description summary: The sediment core consists in dark greyish brown silty clay with black mottles.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 180.5 cm.

Core 2008 029 030 PC (length = 1094)
Description summary: The sediment core consists in dark greyish brown to dark olive grey silty clay with abundant black mottles.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 1094 cm.
- Pebbles sampled at 48-50 cm (section H-I)
- Shell fragment (gastropod) at 85 cm (section H-I; archive half)
- Shell fragments at 581 cm (section D-E)
- Shell fragments at 803 cm (section B-C)

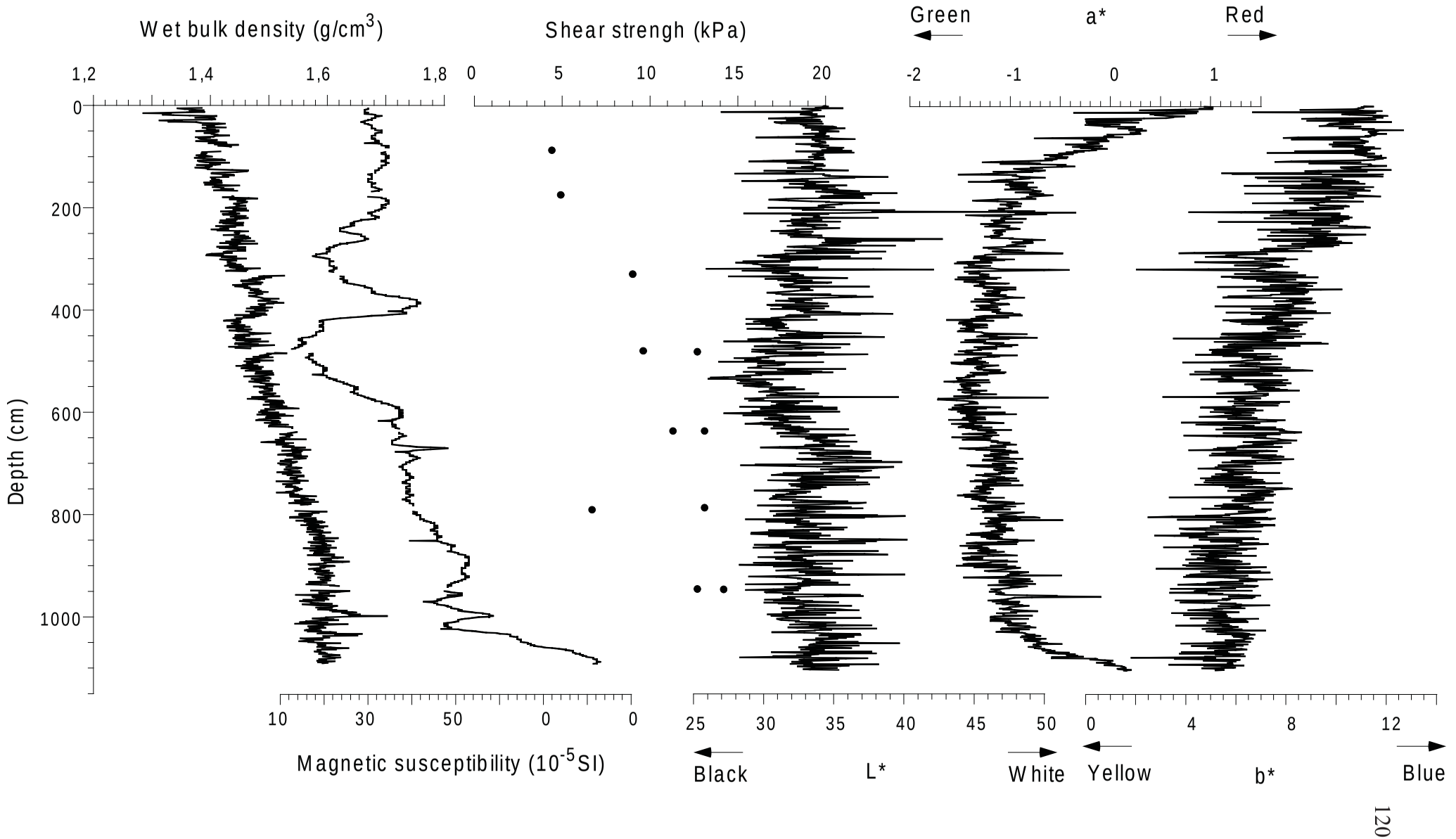
2008 029 0031 PT
A-B-C (50-0 m)
D-E (400-0 m)



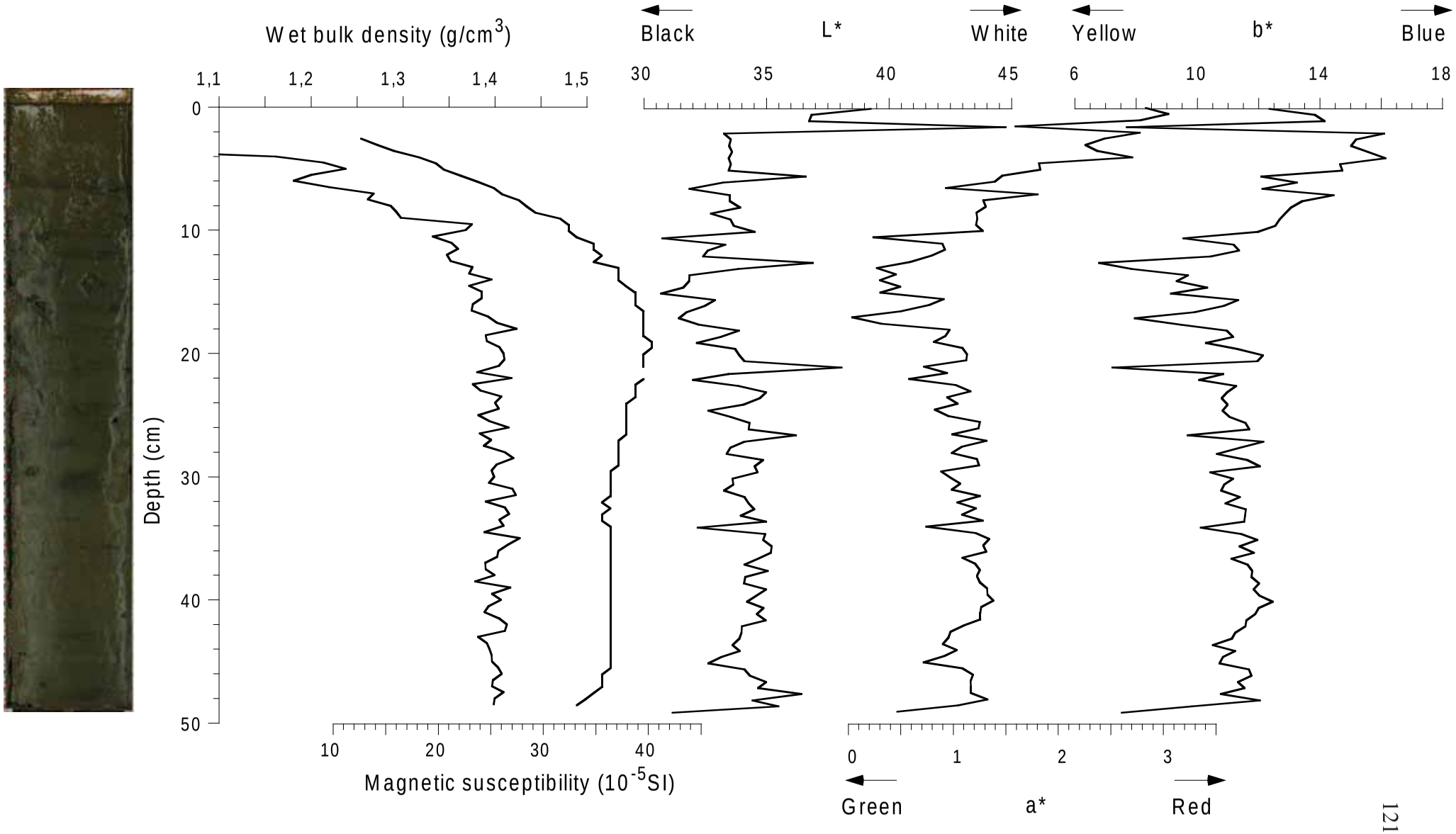
3 5k re or or lo ation o 2008029 028BC 029CTD 030PC 031 lankton to at 249 02 00 1048m W D


Salinity
Temperature (°C)
Water depth (m)
0
200
400
600
800
1000
30
31
32
33
34
35
-2
-1
0
1
2
3
4
5

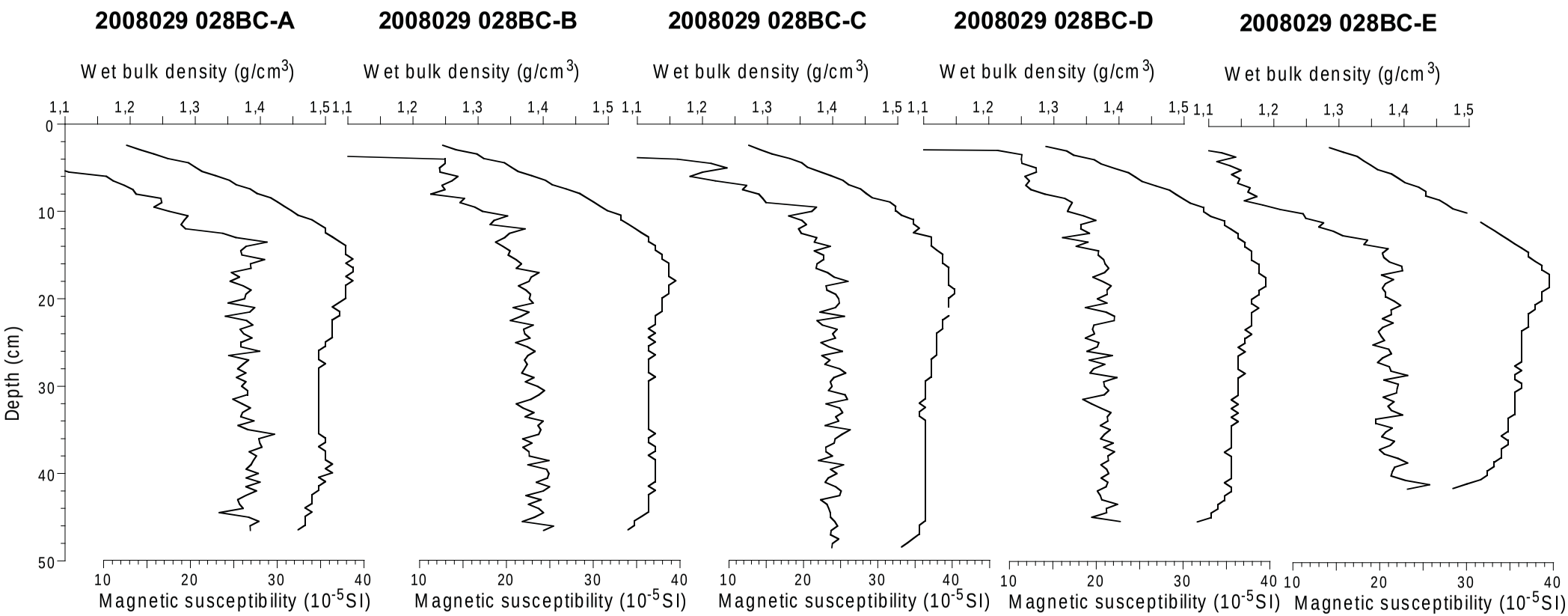
2008029 030PC



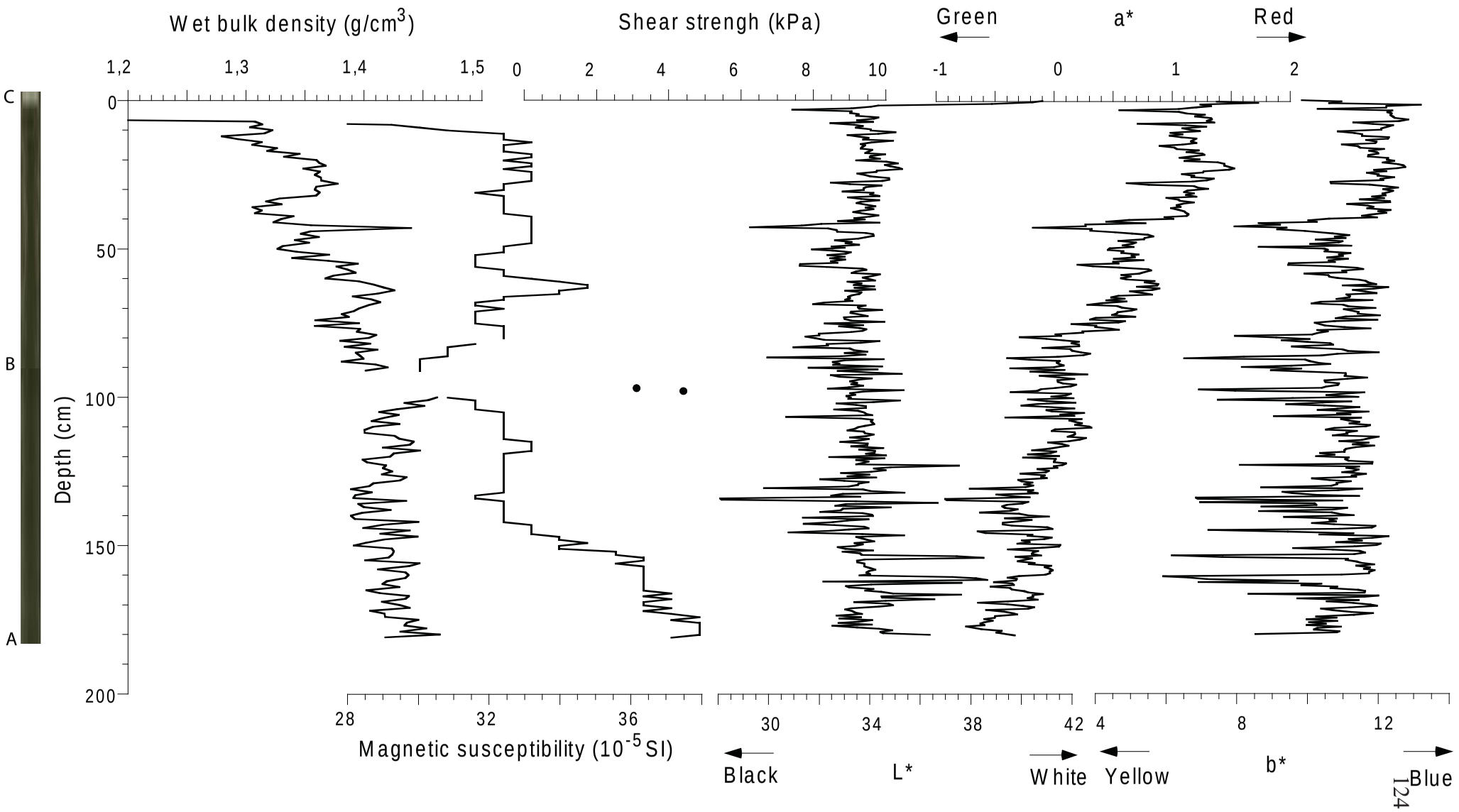
2008029 028BC-C




2008029 028
2008029 030
BC-C
TWC-BC
TWC-AB
PC-HI
PC-GH
PC-FG
PC-EF
PC-DE
PC-CD
PC-BC
PC-AB
0
50
100
150
0 cm
49.5 cm
0
92
95
180,5
0
86
86
171
173.5
329
329
478.5
479.5
635
635
785
789
944.5
944.5
1094
122


2008029 028BC-A
2008029 028BC-B
2008029 028BC-C
2008029 028BC-D
2008029 028BC-E
Wet bulk density (g/cm3)
1,1
1,2
1,3
1,4
1,5
Depth (cm)
0
10
20
30
40
50
Magnetic susceptibility (10-5SI)

2008029 030TWC



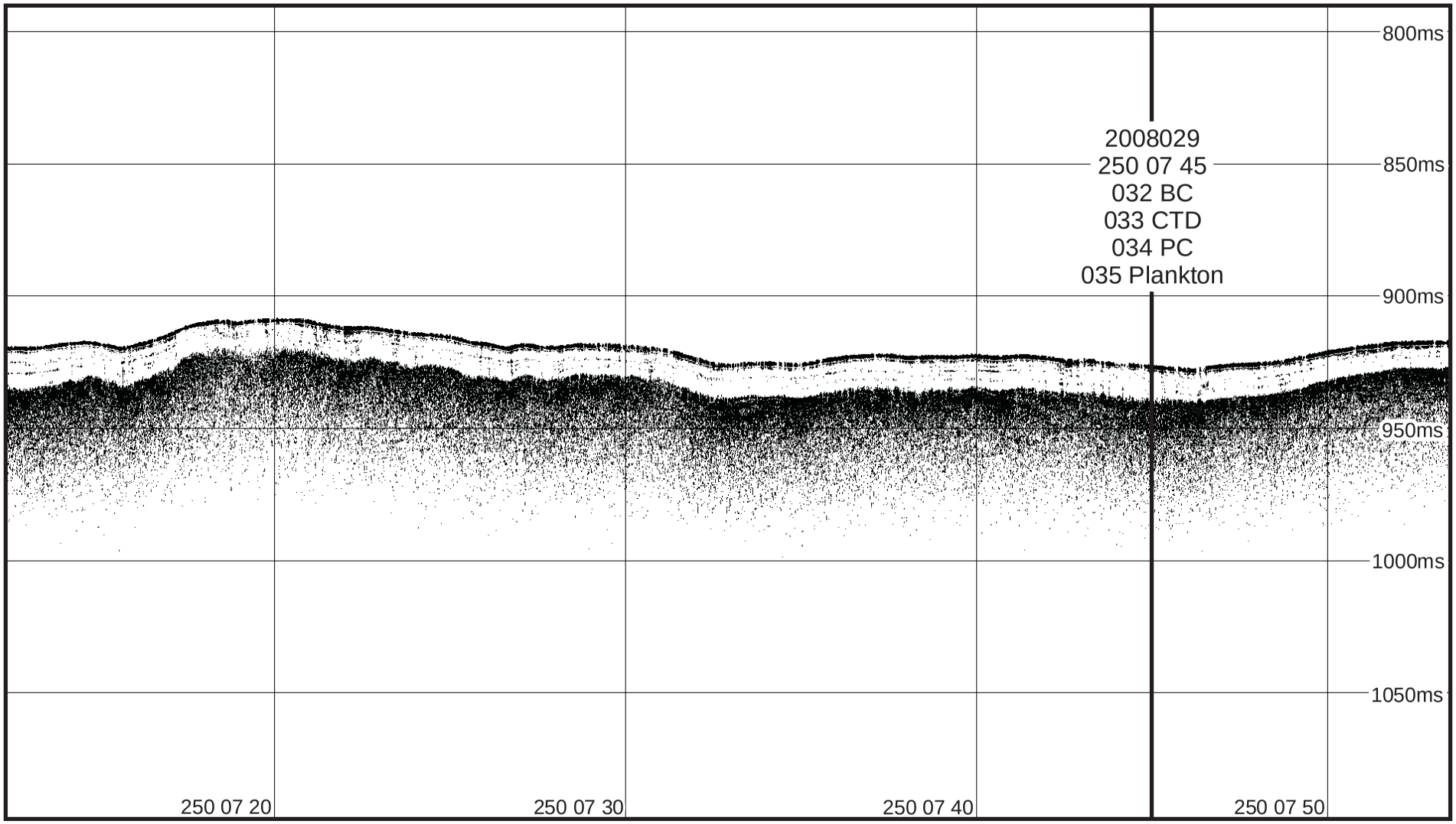
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0032	Box	250/1001	76.328783	-71.421055	696	North Water Polynya	2008029	2500745	3.5kHz	8			
0033	CTD	250/1001	76.328783	-71.421055	696	North Water Polynya	2008029	2500745	3.5kHz	8			
0034	Piston	250/1048	76.329050	-71.418998	696	North Water Polynya	2008029	2500745	3.5kHz	9	1219	46	710
0035	Plankton	250/1131	76.327951	-71.425746	696	North Water Polynya	2008029	2500745	3.5kHz	8			

Core 2008 029 032 BC (maximum length = 45 cm)
Visual description :
The surface consists in brownish mud (thin layer) with abundant fauna (ophiurids, worms, etc.). It overlies dark olive grey mud with iron sulphide dots and mottling.
Sampling Summary :
- Surface sediment: 0-5 mm
- Push core A : sampling by extrusion, from 0 to 39 cm at 1 cm interval (note: the original length of the liner was 41 cm; the 2 cm difference may correspond to a sampling artefact)
- Push core C : working half (0-45 cm) sampled for paleomagnetism (u-channel) and archived horizontally.
- Push cores B, D and E sealed and archived vertically.

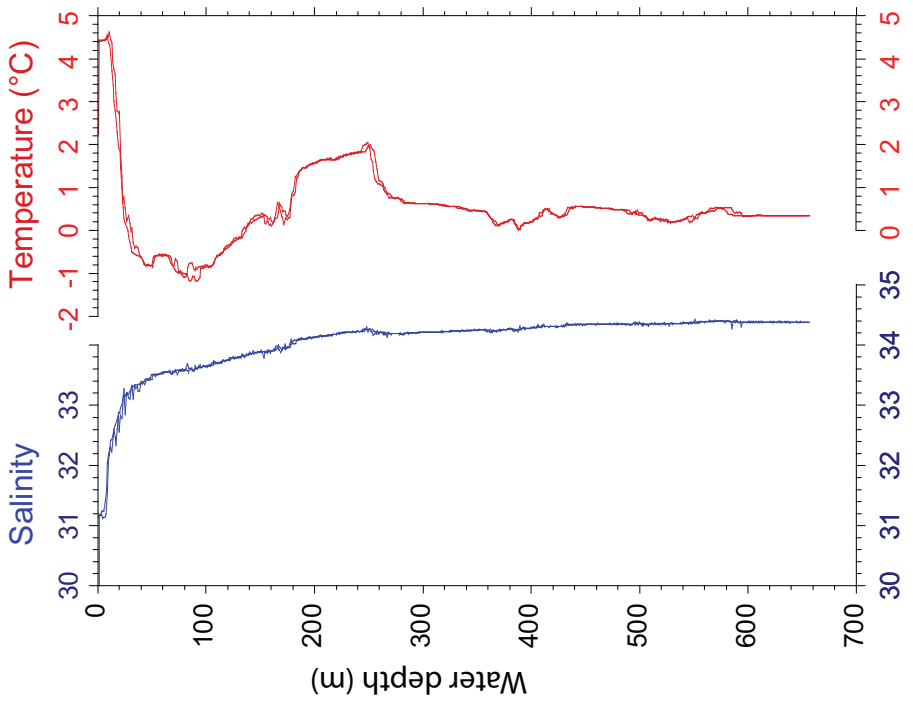
Core 2008 029 034 TWC (length = 45.5 cm)
Description summary: The sediment core consists in bioturbated olive grey silty clay.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 45 cm.

Core 2008 029 034 PC (length = 680 cm)
Description summary: The top of the the core sediment is dark grayish brown silty clay. It overlies olive gray silty clay down to about 534 cm. The section from 534 cm to the base of the core consists of dark gray silty mud grading to reddish sandy mud (605 to 680 cm). Ice rafted pebbles and gravels occur below 570 cm.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 680 cm.
- Shell fragment at 157 cm
- Shell (entire gastropod) at 280 cm (section C-D)
- Pebbles from the cutter.

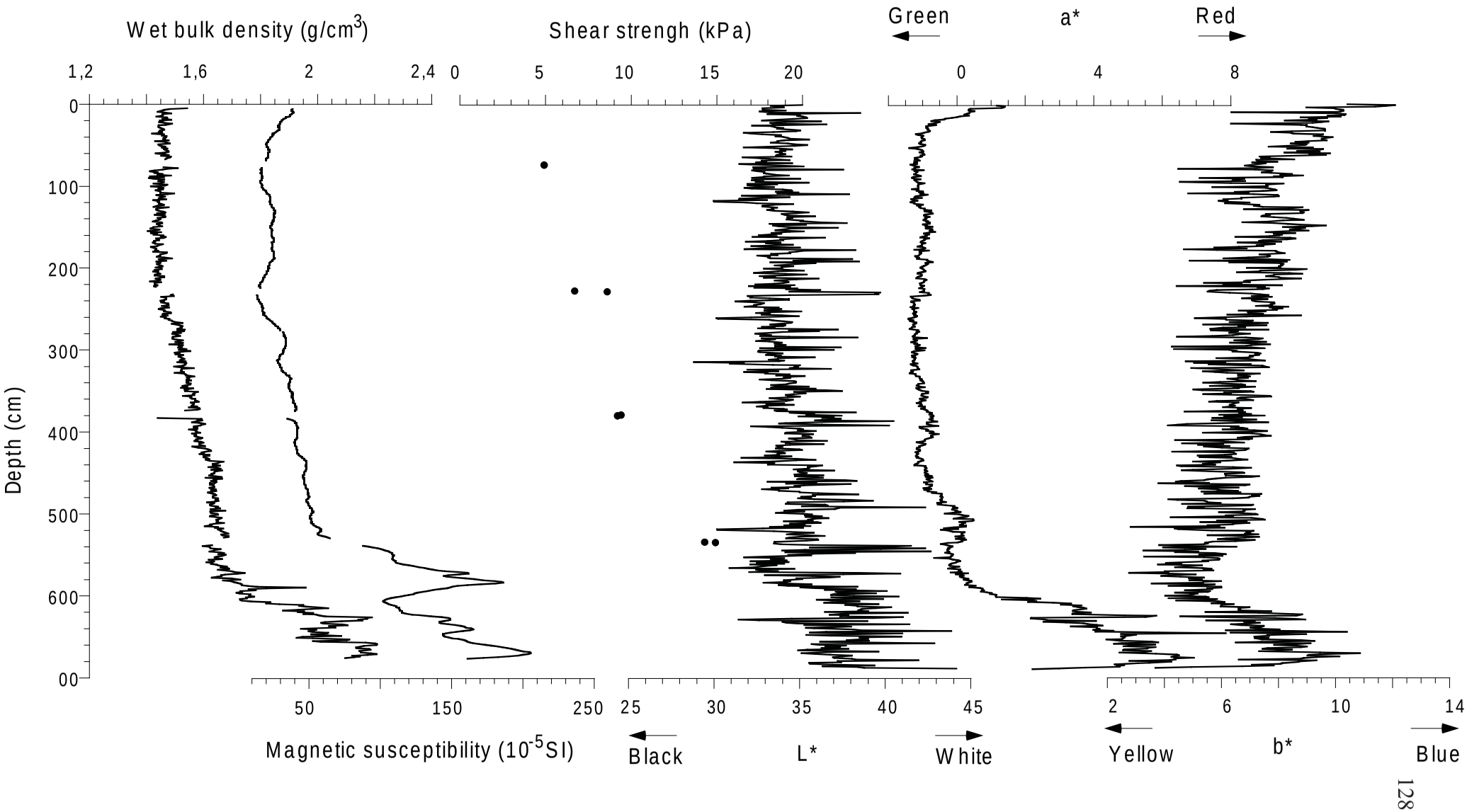
2008 029 0035 PT
A-B-C (50-0 m)
D-E (400-0 m)

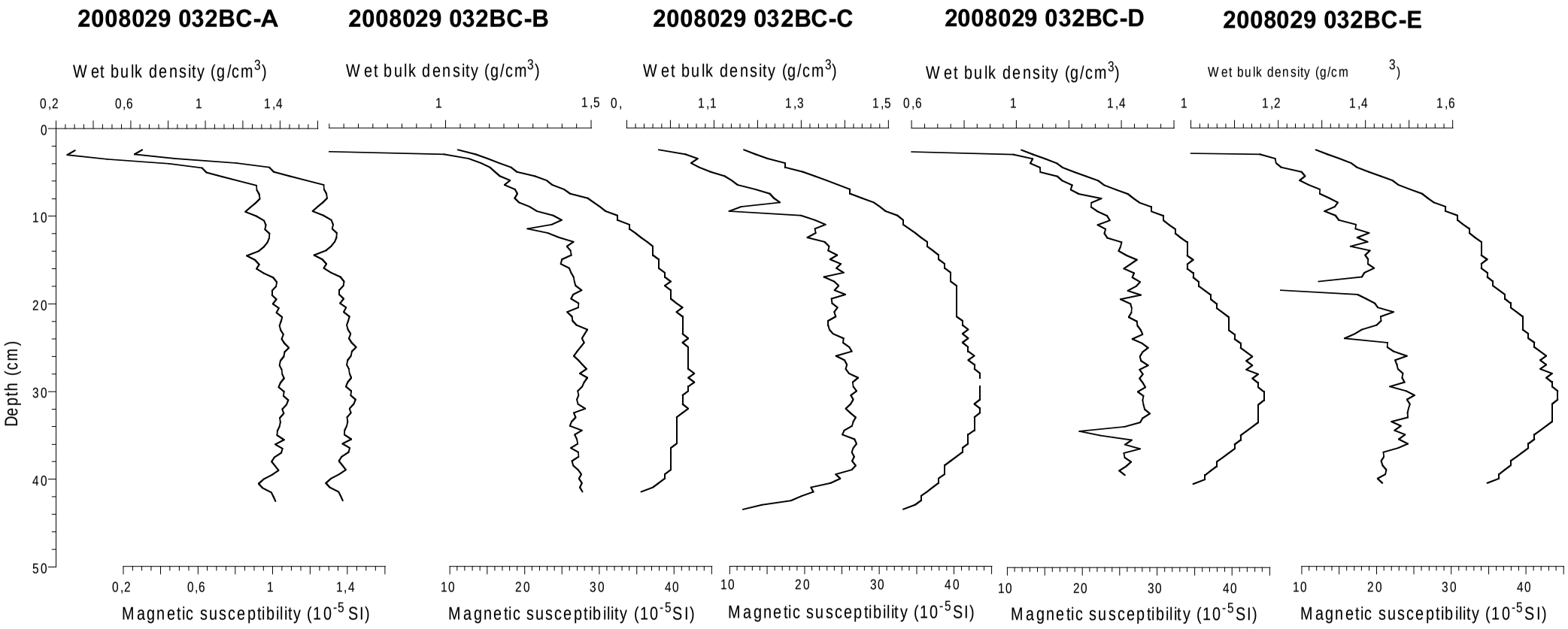


3 5k re or or lo ation o 2008029 032BC 033CTD 034PC 035 lankton to at 250 07 45 696m W D

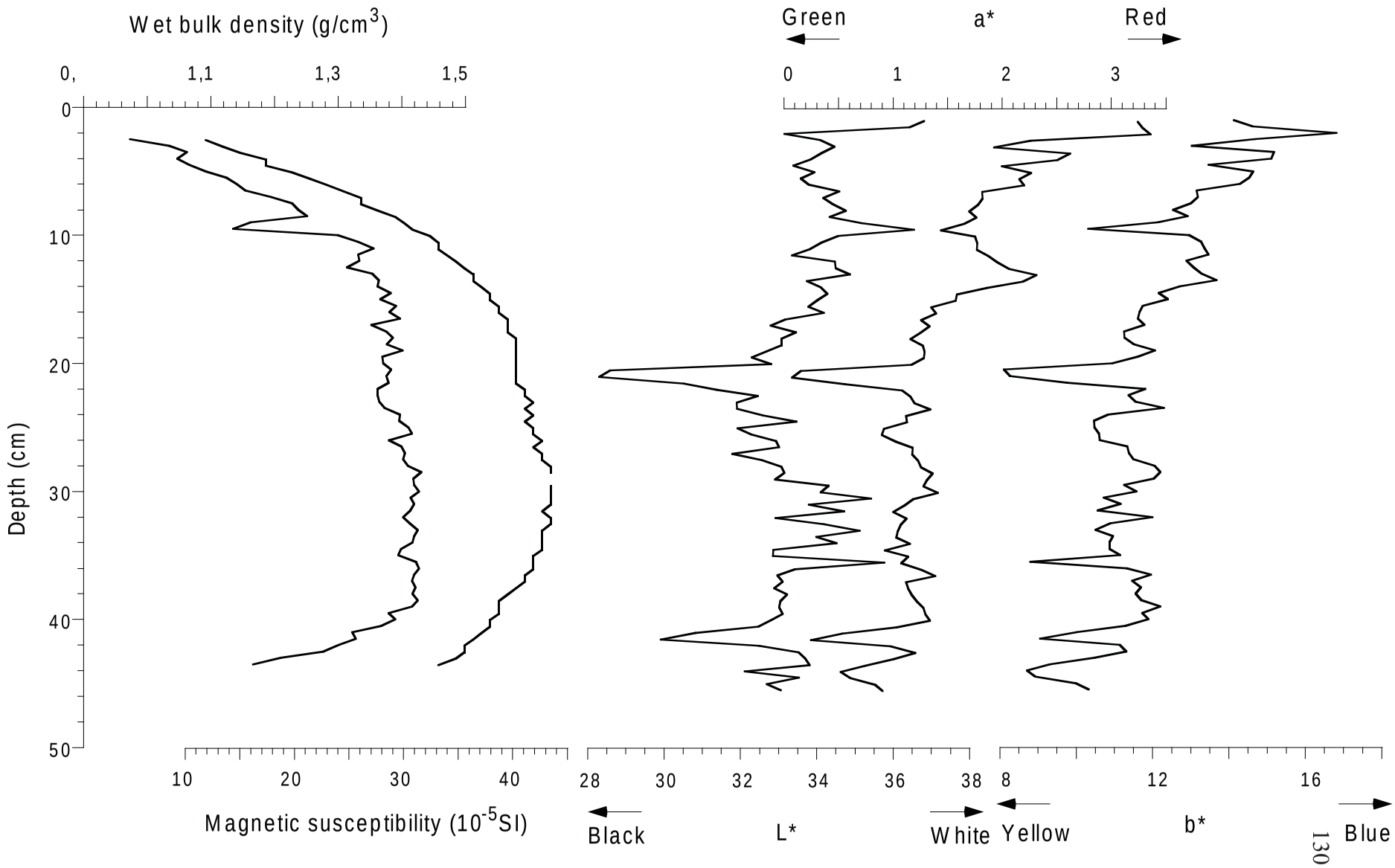

Temperature (°C)
-2 -1 0 1 2 3 4 5
Salinity
30 31 32 33
30 31 32 33 34 35
0 1 2 3 4 5
0 100 200 300 400 500 600 700
Water depth (m)

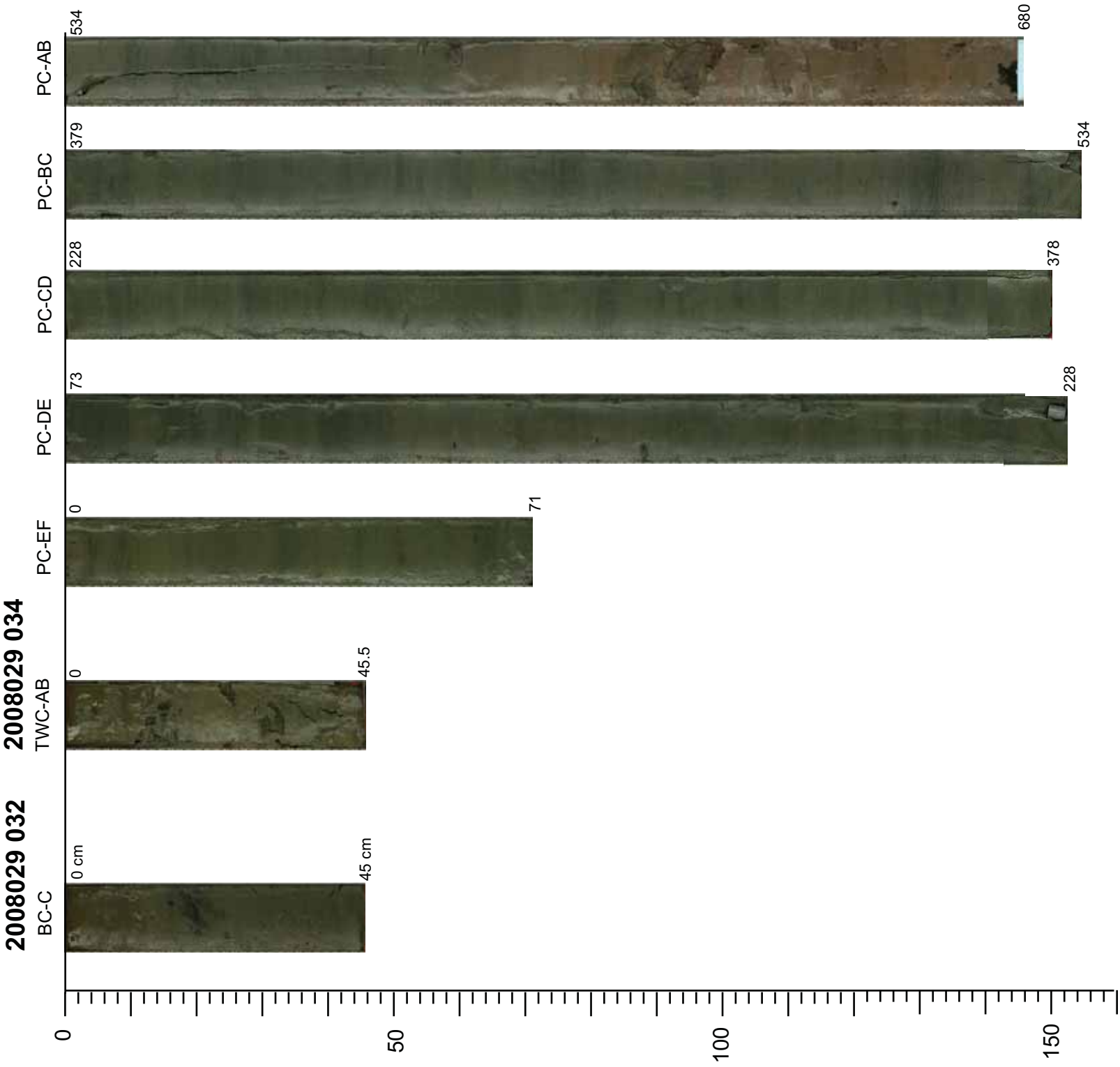
2008029 034PC



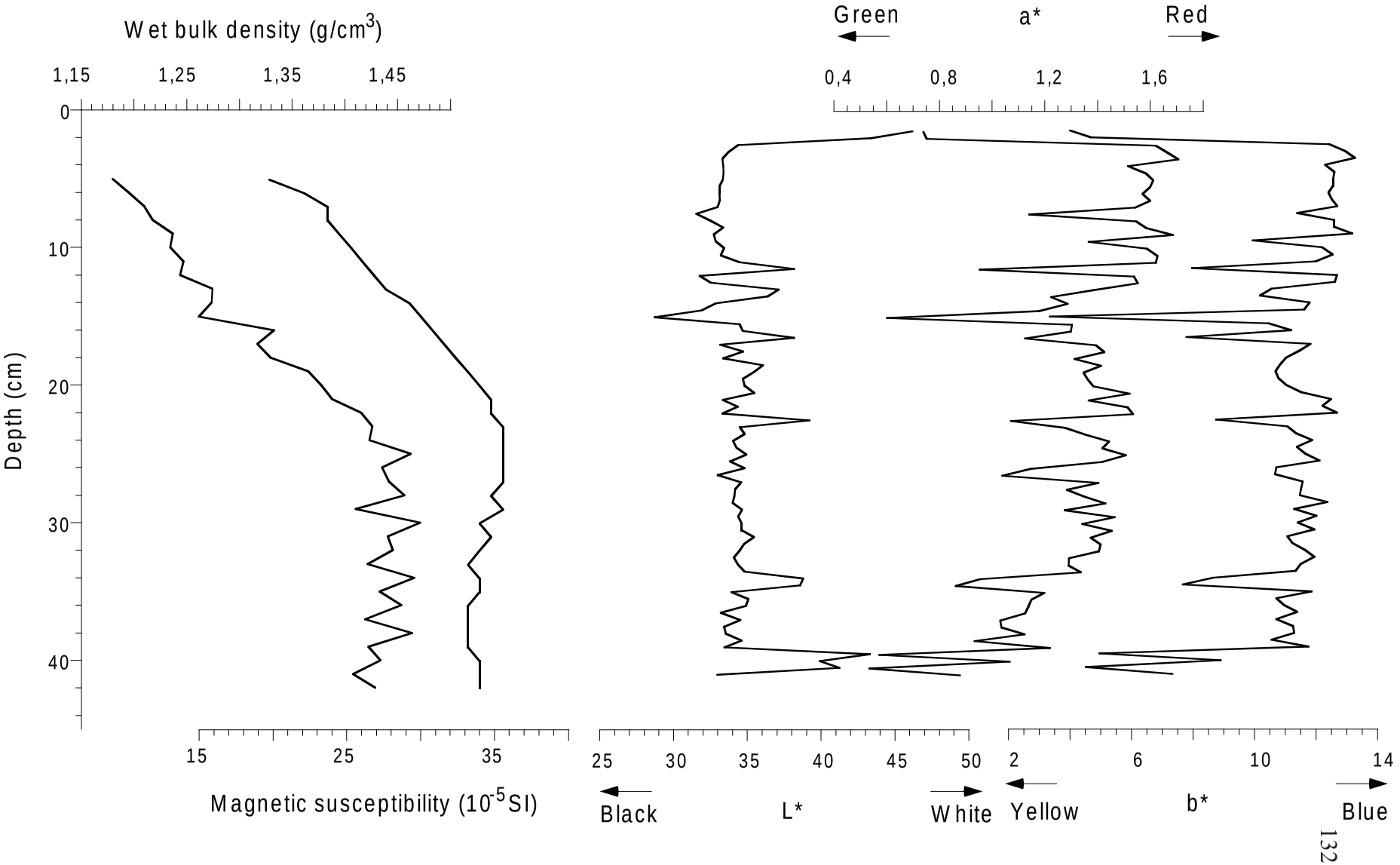

2008029 032BC-A
2008029 032BC-B
2008029 032BC-C
2008029 032BC-D
2008029 032BC-E
Wet bulk density (g/cm3)
Depth (cm)
Magnetic susceptibility (10-5 SI)

2008029 032BC-C




2008029 032
2008029 034
BC-C
TWC-AB
PC-EF
PC-DE
PC-CD
PC-BC
PC-AB
0 cm
45 cm
0
45.5
0
71
73
228
228
378
379
534
534
680
0
50
100
150

2008029 034TWC



Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0036	Box	250/1641	76.573003	-73.955386	680	North Water Polynya	2008029	2500309	3.5kHz	9			
0037	CTD	250/1641	76.573003	-73.955386	680	North Water Polynya	2008029	2500309	3.5kHz	9			
0038	Piston	250/1728	76.573490	-73.955535	678	North Water Polynya	2008029	2500309	3.5kHz	10	1219	175	845.5
0039	Plankton	250/1807	76.573960	-73.962768	680	North Water Polynya	2008029	2500309	3.5kHz	9			

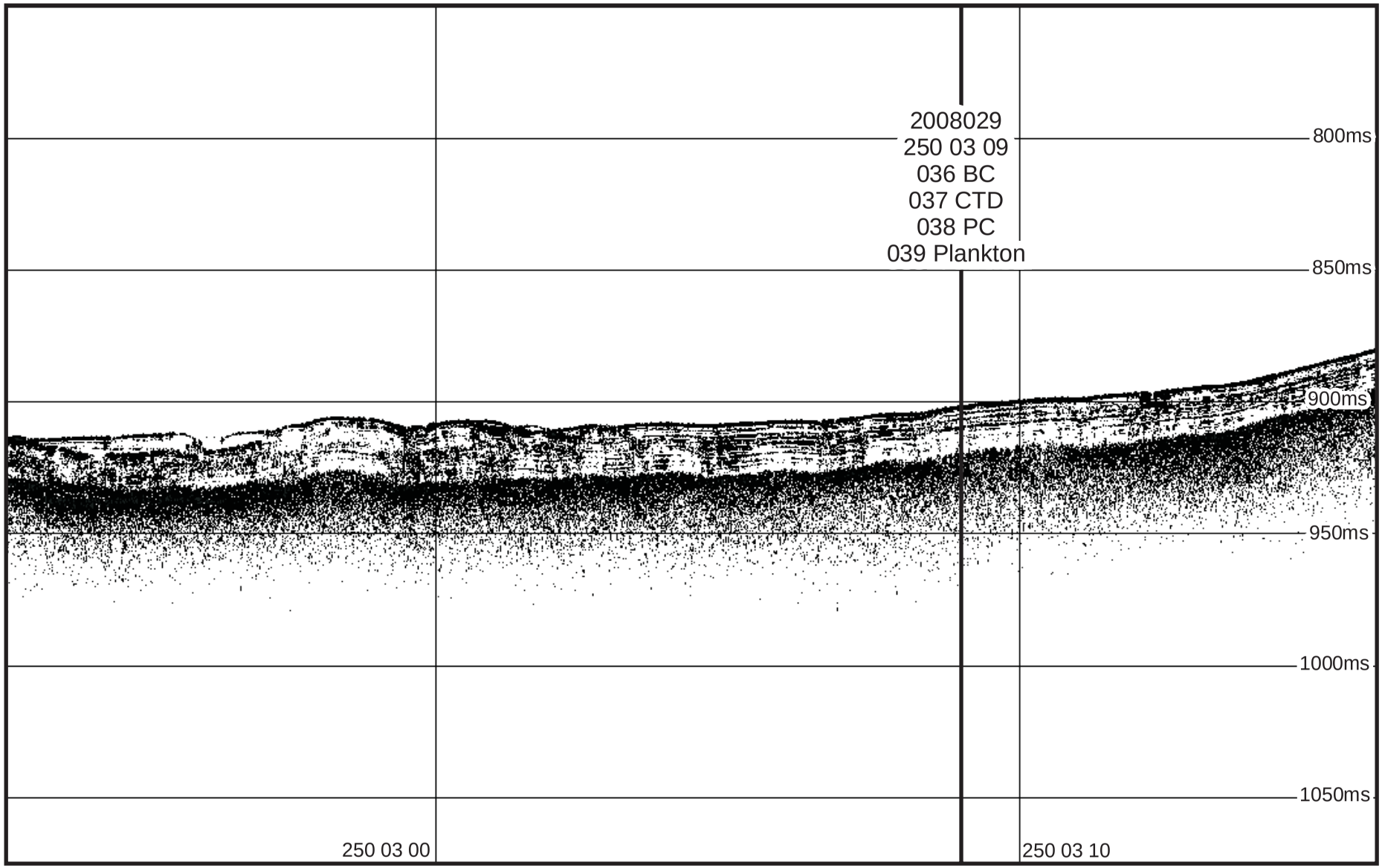
Core 2008 029 036 BC (maximum length = 47.5 cm)
Visual description :
The surface consists in brownish mud with abundant fauna (ophiurids, worms, worm tubes, crinoids, etc.). It overlies dark olive grey mud with iron sulphide dots and mottling. Note that the worm tube 91 mm in diameter) network goes down to the base of the box core. Lining worm recovered down to 16 cm in push core A.
Sampling Summary :
- Surface sediment: 0-5 mm
- Push core A : sampling by extrusion, from 0 to 43 cm at 1 cm interval (note: the original length of the liner was 46 cm; the 2 cm difference may correspond to a sampling artefact)
- Push core B : working half (0-47.5 cm) sampled for paleomagnetism (u-channel) and archived horizontally.
- Push cores C, D and E sealed and archived vertically.

Core 2008 029 038 TWC (length = 175 cm)
Visual description :
The core sediment consists in dark olive grey mud with iron sulphide dots and mottling.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 175 cm.
- Entire shell (2 valves of pelecypods) at 167 cm (section AB)

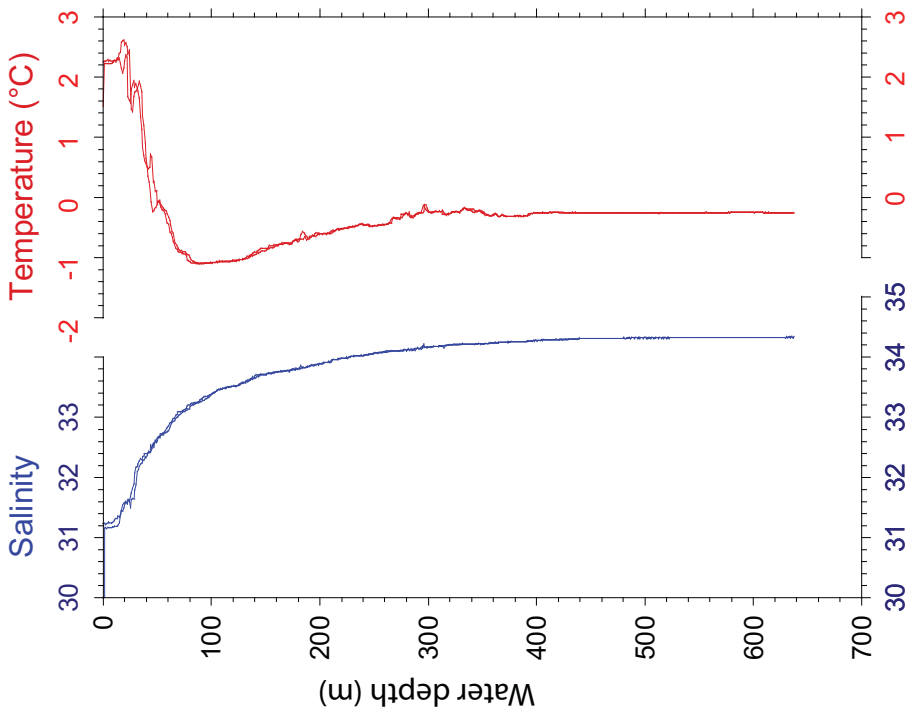
Core 2008 029 038 PC (length = 840 cm)
Visual description :
The core sediment consists in dark olive grey mud with black mottling and scattered shells.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 840 cm.
- Pelecypod shell at 195 cm (section EF)
- Pelecypod shell at 253 cm (section DE)
- Pelecypod shell fragment at 286 cm (section BC)
- Pelecypod shell at 509-510 cm (section CD)
- Pelecypod shell fragment at 528 cm
- Pelecypod shell fragment at 543 cm (section BC)
- Pelecypod shell fragment at 548 cm (section BC)
- Pelecypod shell at 586 cm (section BC)
- Pelecypod shell fragment at 629 cm (section BC)
- Pelecypod shell fragment at 740 cm (section BC)

- Pelecypod shell fragment at 793 cm (section AB)
- Pelecypod shell fragment at 801 cm (section AB)
- Pelecypod shell fragment at 816 cm (sectionAB)
- Pelecypod shell fragment at 830.5 cm (section AB)
- Shell fragment at the bottom of section BC (sampled when dividing core in sections)

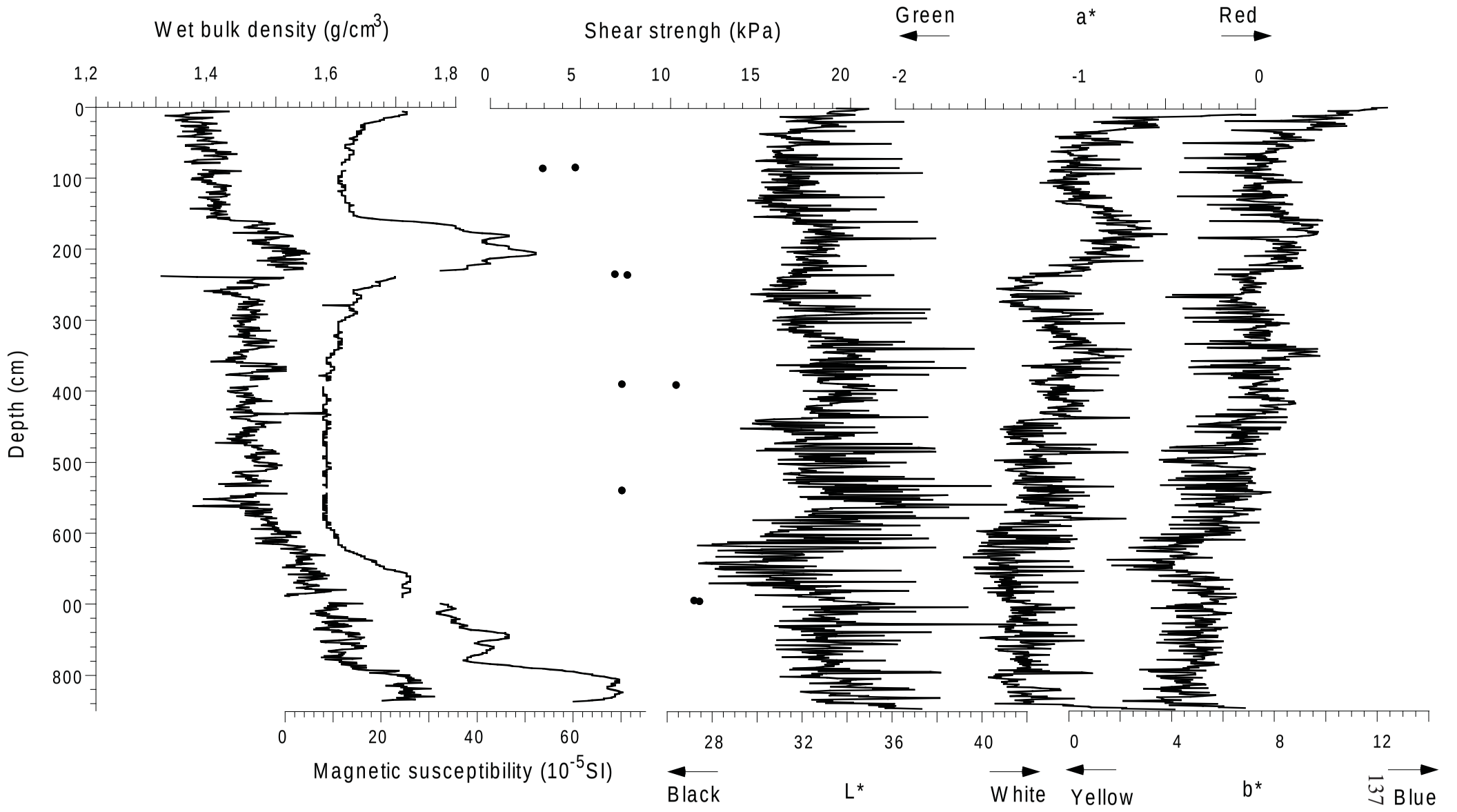
2008 029 0039 PT
A-B (100-0 m)
C-D (400-0 m)



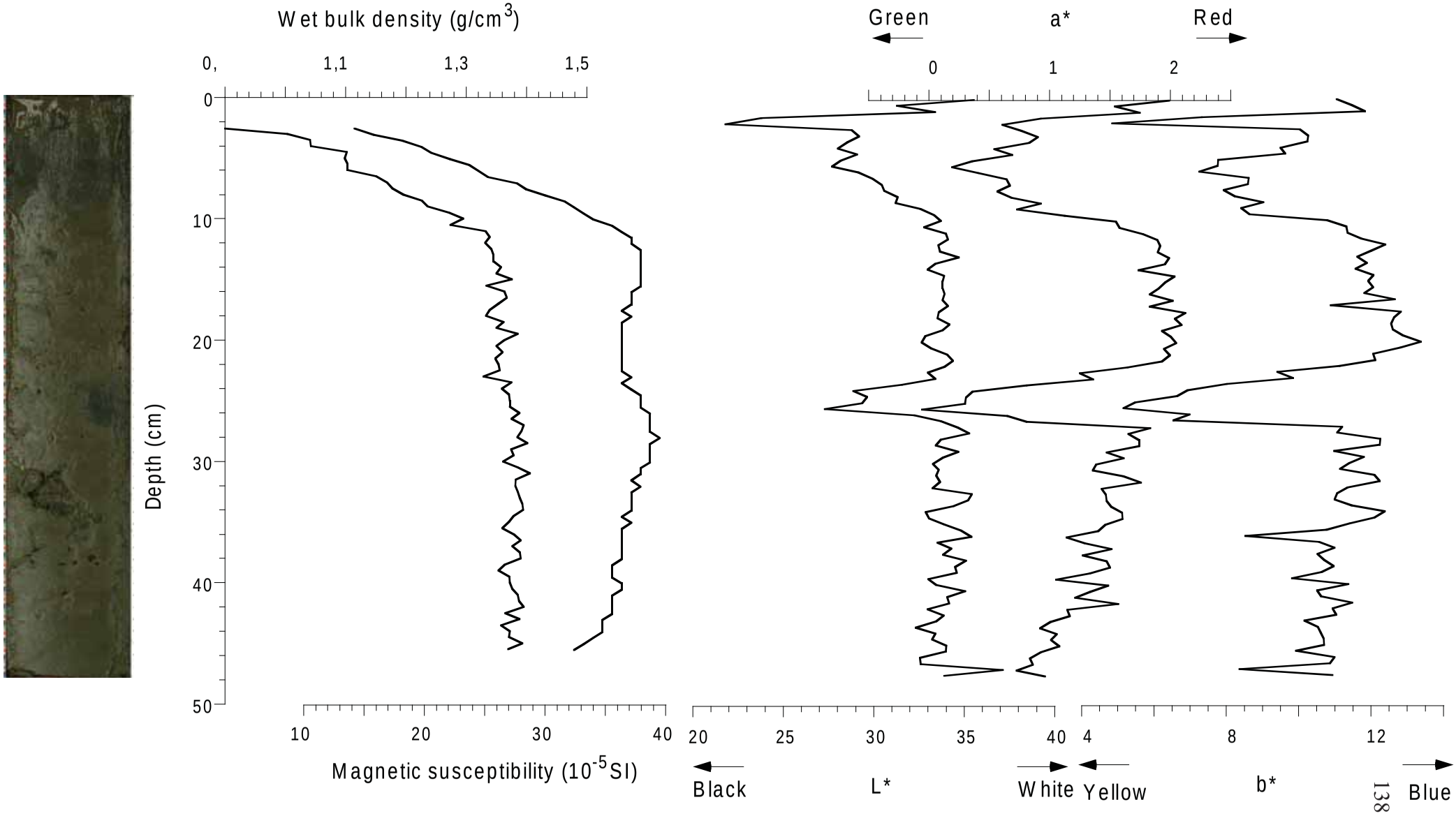
3 5k re or or lo ation o 2008029 036BC 037CTD 038PC 039 lankton to at 250 03 09 680m W D

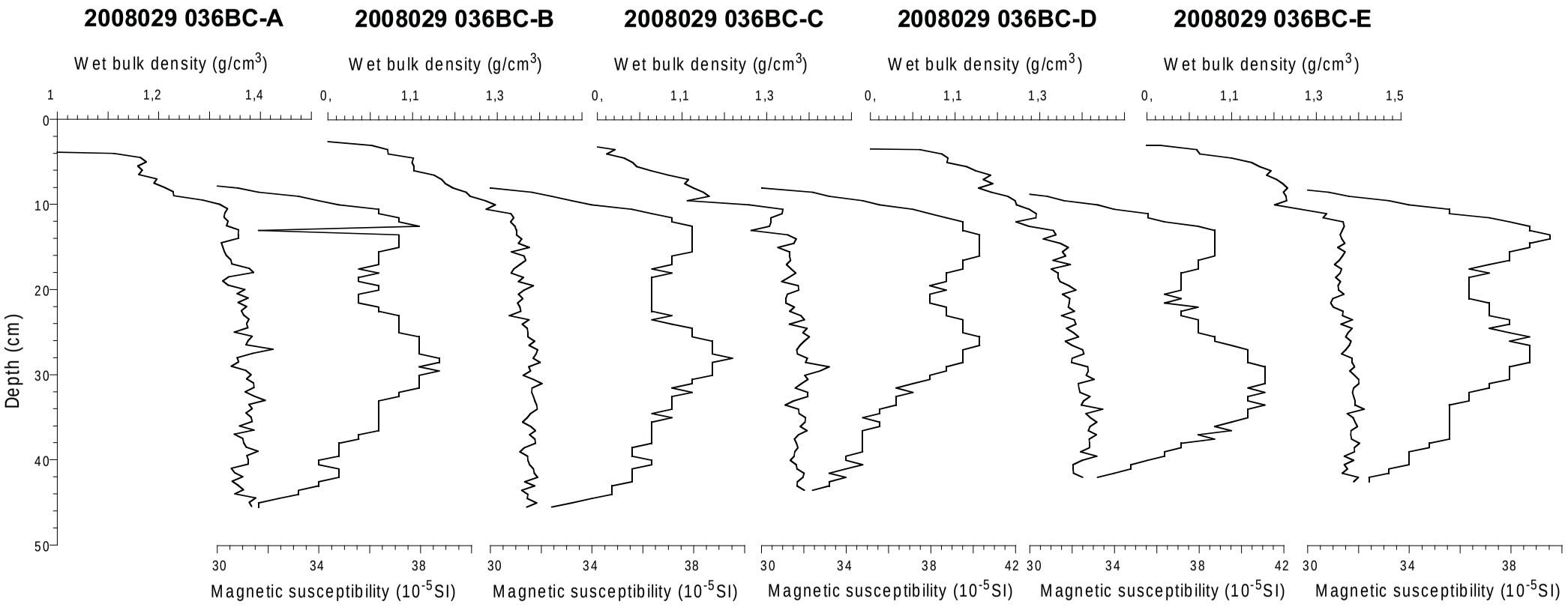

Temperature (°C)
-2
-1
0
1
2
3
Salinity
30
31
32
33
34
35
Water depth (m)
0
100
200
300
400
500
600
700

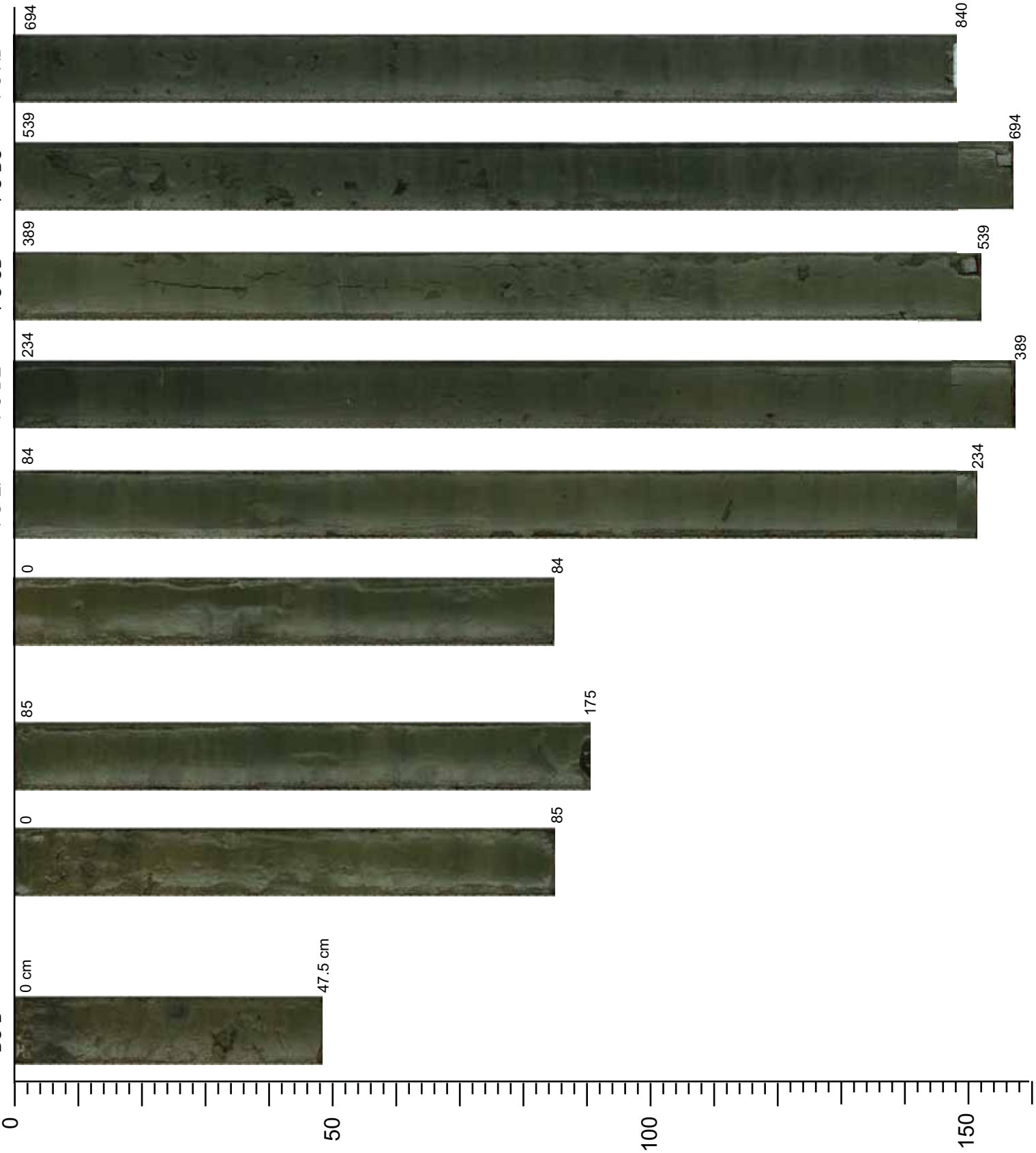
2008029 038PC



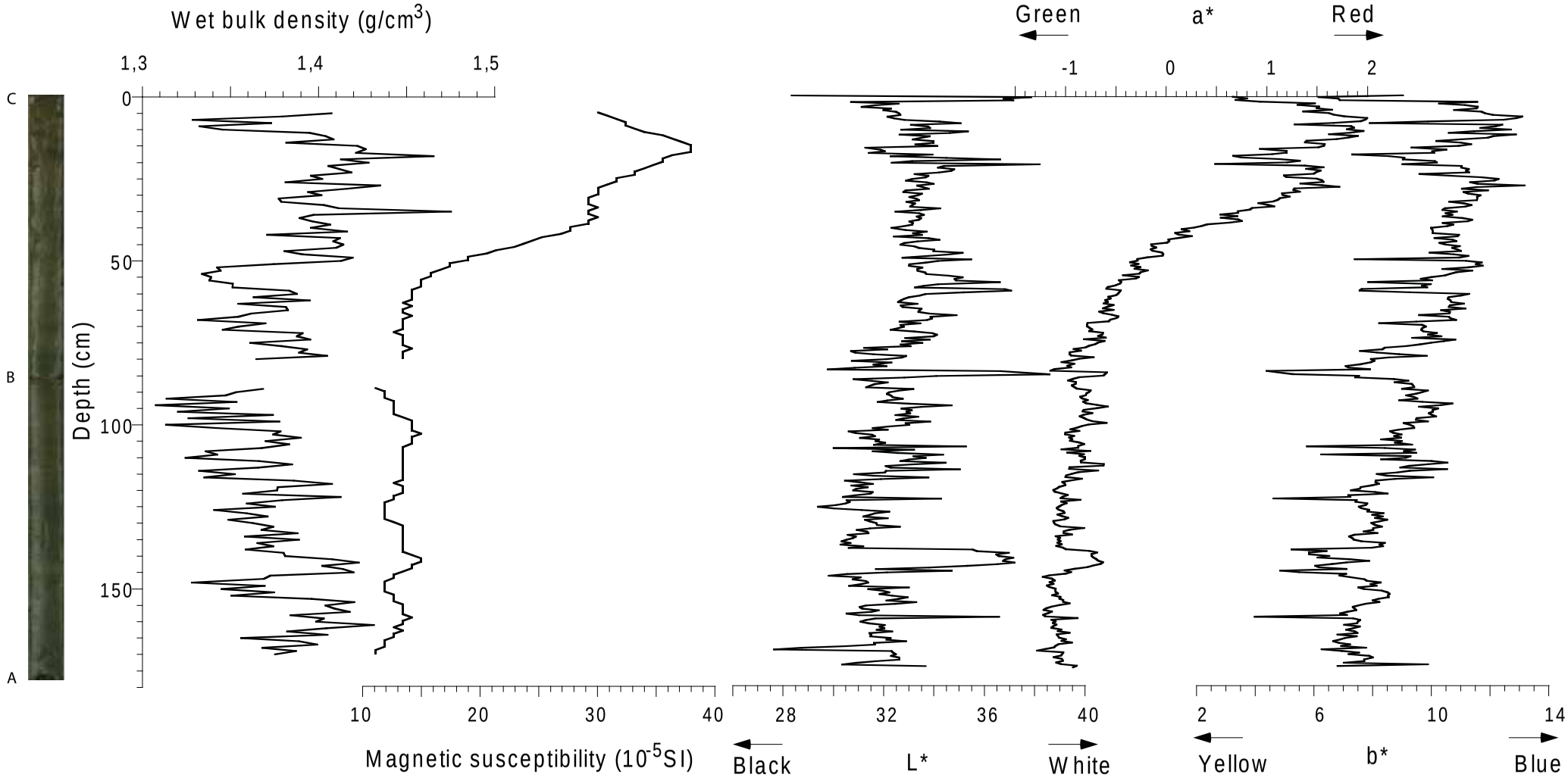
2008029 036BC-B




2008029 036BC-A
2008029 036BC-B
2008029 036BC-C
2008029 036BC-D
2008029 036BC-E
Wet bulk density (g/cm3)
Depth (cm)
Magnetic susceptibility (10-5SI)


2008029 036
2008029 038
BC-B
TWC-BC
TWC-AB
PC-FG
PC-EF
PC-DE
PC-CD
PC-BC
PC-AB
0 cm
47.5 cm
0
85
85
175
0
84
84
234
234
389
389
539
539
694
694
840
0
50
100
150

2008029 038TWC



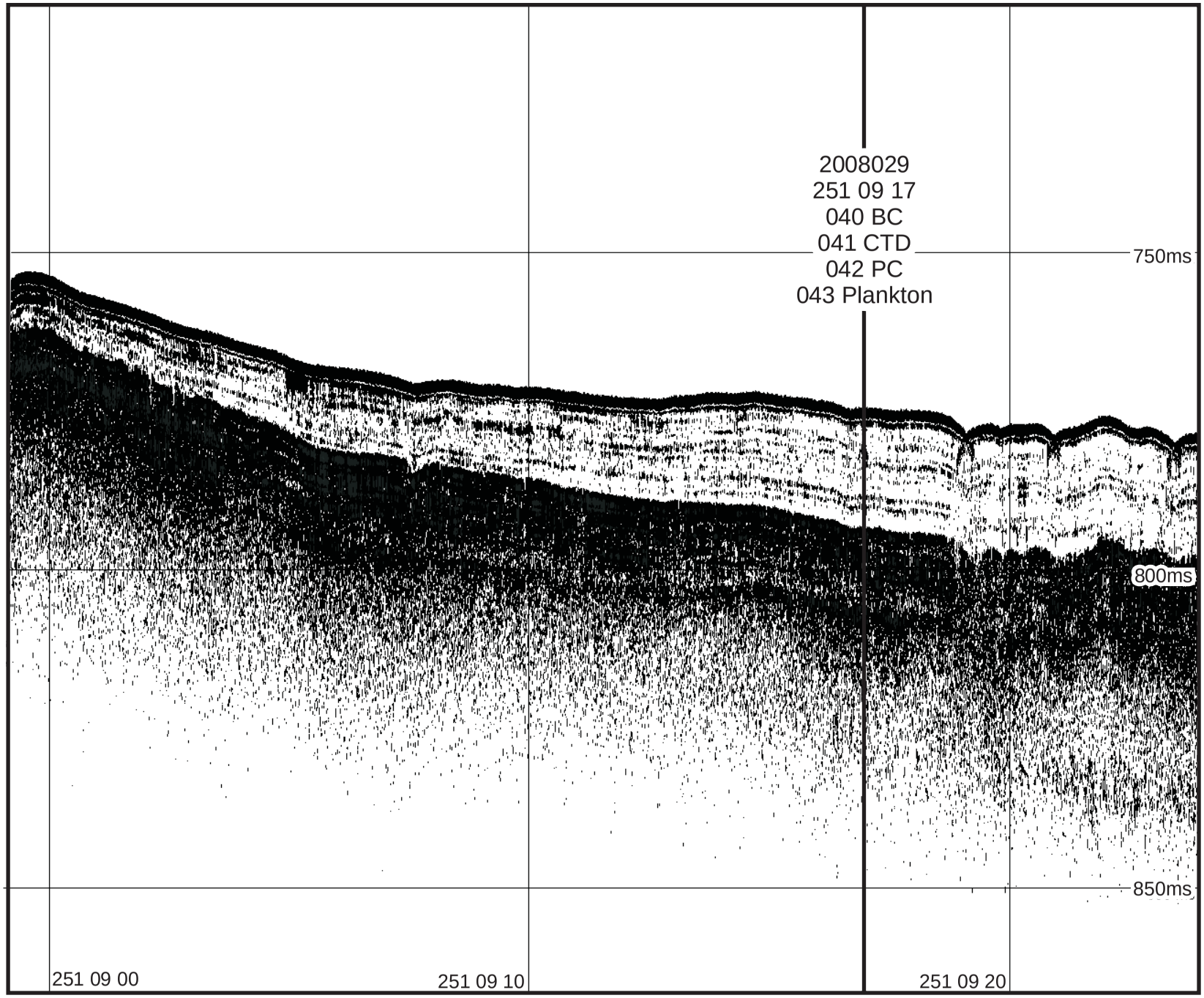
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0040	Box	251/0958	75.579385	-78.629585	580	Jones Sound	2008029	2510917	3.5kHz	10			
0041	CTD	251/0958	75.579385	-78.629585	580	Jones Sound	2008029	2510917	3.5kHz	10			
0042	Piston	251/1044	75.579390	-78.629571	580	Jones Sound	2008029	2510917	3.5kHz	11	1524	105	1059
0043	Plankton	251/1123	75.579071	-78.632278	581	Jones Sound	2008029	2510917	3.5kHz	10			

Core 2008 029 040 BC (maximum length = 53 cm)
Visual description :
The surface consists in brownish mud with abundant fauna (worms, worm tubes, shells, etc.). It overlies olive grey mud with black mottles.
Sampling Summary :
- Surface sediment: 0-3 mm
- Push core B : sampling by extrusion, from 0 to 49 cm at 1 cm interval (note: the original length of the liner was 53 cm; 3 cm from the base were lost when installing the push core on te device; the remaining 1 cm difference between the lining and sampling depth may correspond to compaction of the mud that was very soupy at the surface)
- Push core A : working half (0-47.5 cm) sampled for paleomagnetism (u-channel) and archived horizontally.
- Push cores C, D and E sealed and archived vertically.
- Small pelecypod shell (both valves) at 42 cm (working half of push core A).

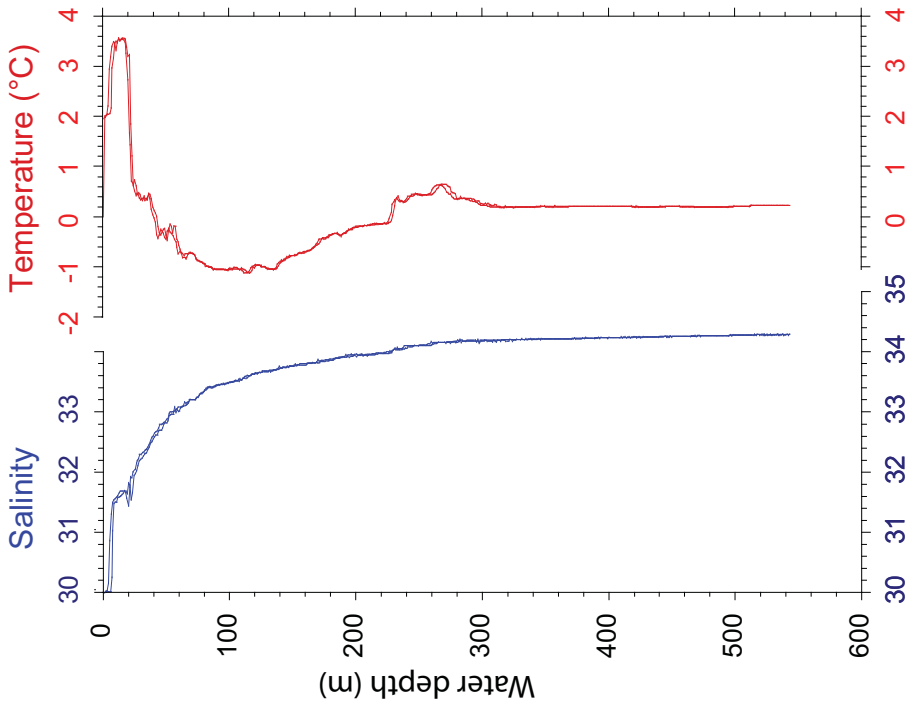
Core 2008 029 042 TWC (length = 103.5 cm)
Visual description :
The core sediment consists in olive grey silty clay with black mottles.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 103.5 cm.

Core 2008 029 042 PC (length = 1035 cm)
Visual description :
The core sediment consists in olive grey to dark olive grey silty clay with black mottles down to about 940 cm, below which there is a transition towards very dark brown sandy mud. Shell fragments and ice-rafted gravels and pebbles are occasionally observed, especially in the lower half of the core. The upper occurrence of gravel is recorded at 799 cm.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 1035 cm.
- Pelecypod shell at 547 cm (section DE).
- Shell fragment at 571 cm (section DE).
- Large shell fragments at 766 cm (section BC).
- Large shell fragments at 774 cm (section BC)
- Pelecypod valve at 777 cm (section BC)
- Small shell fragment at 961 cm (section AB)
- Pebbles sampled at 1014, 1015 and 1024 cm (section A-B)

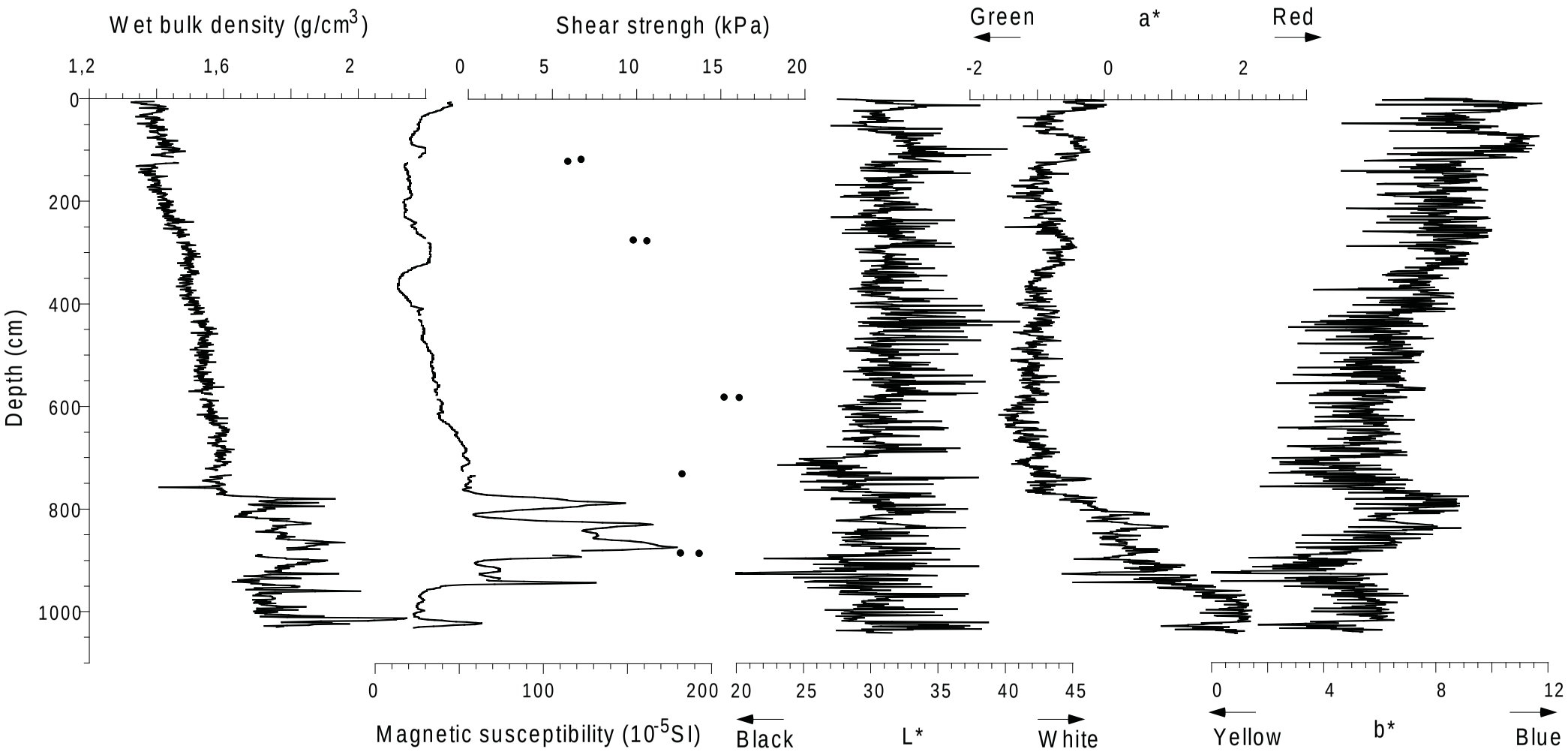
2008 029 0043 PT
A-B (100-0 m)
C-D (400-0 m)



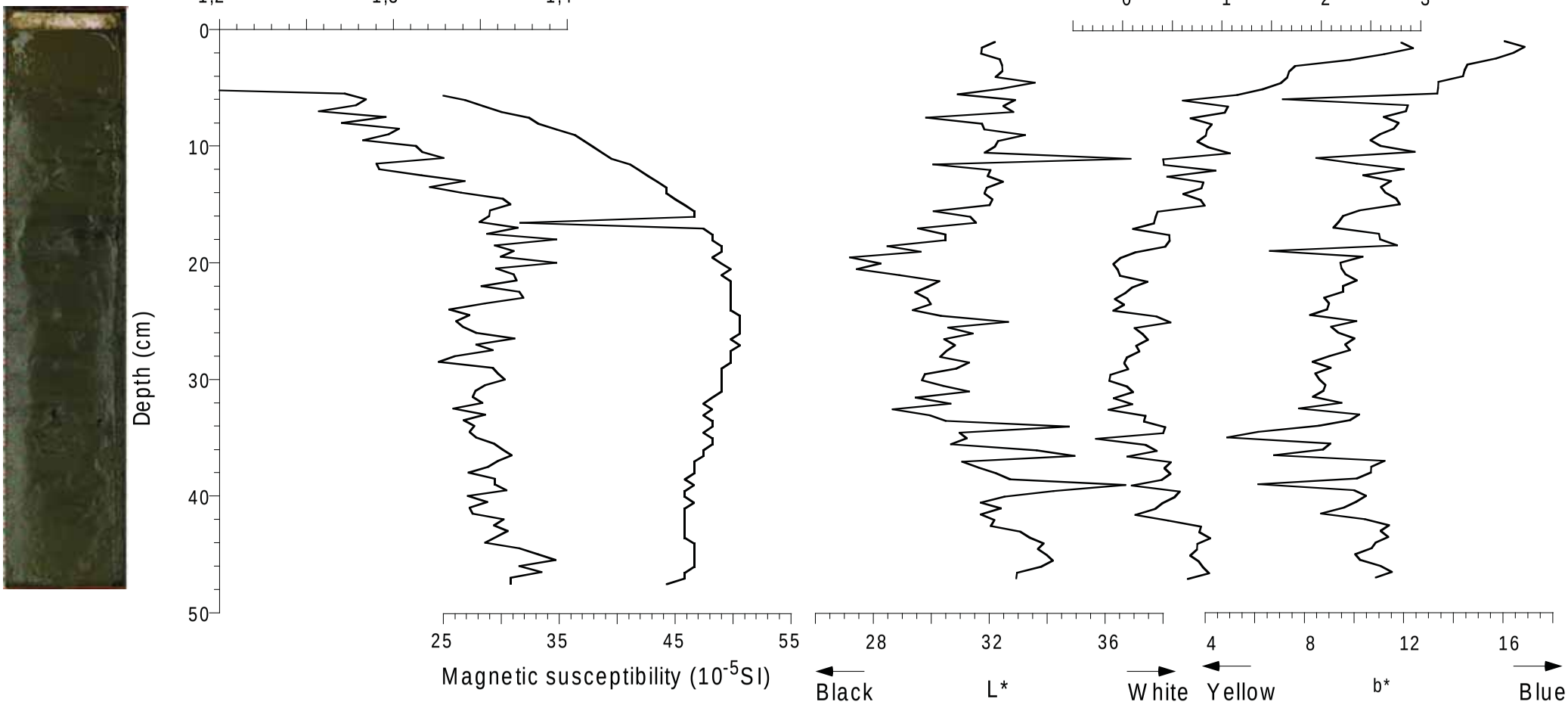
3 5k re or or lo ation o 2008029 040BC 041CTD 042PC 043 lankton to at 251 09 17 580m W D

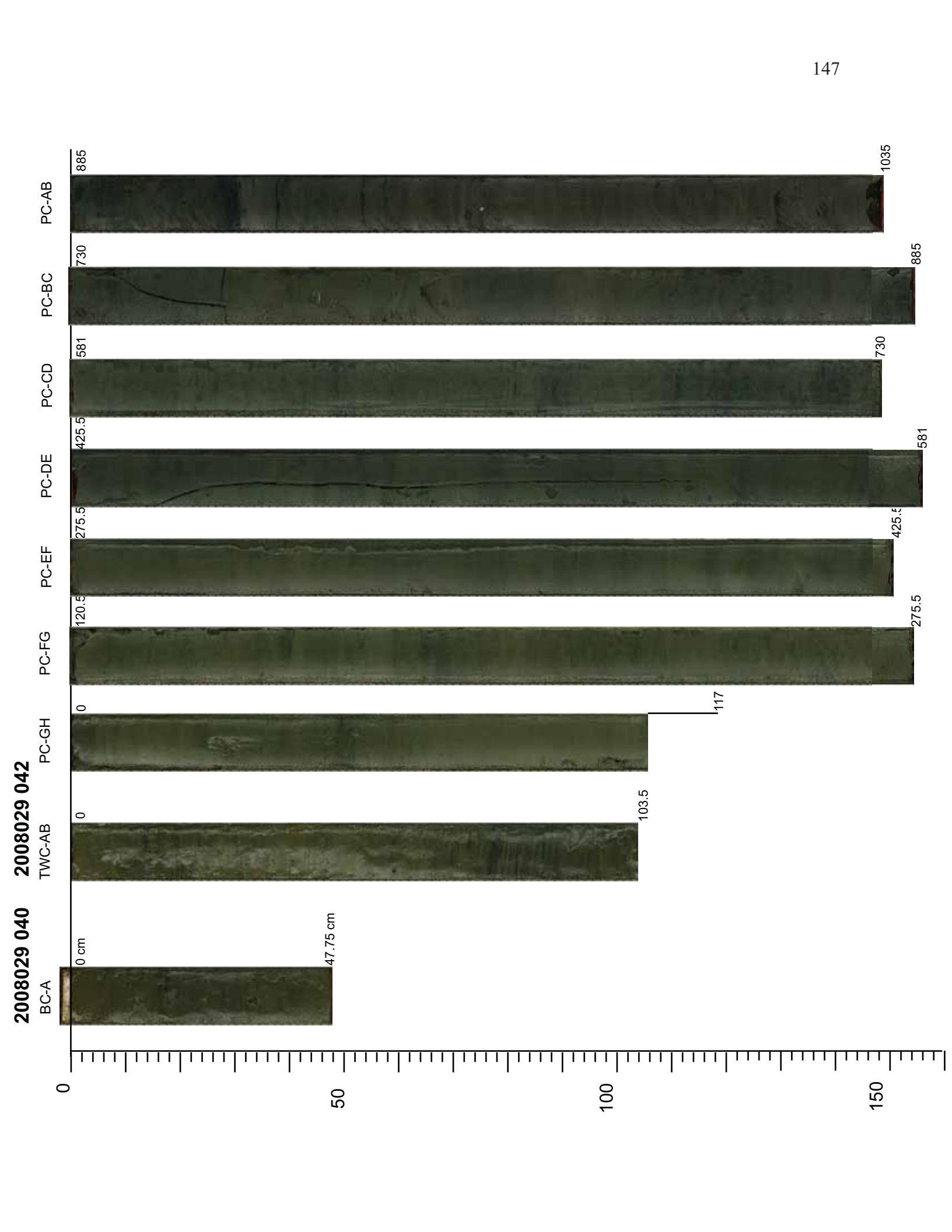

Temperature (°C)
-2
-1
0
1
2
3
4
Salinity
30
31
32
33
34
35
Water depth (m)
0
100
200
300
400
500
600

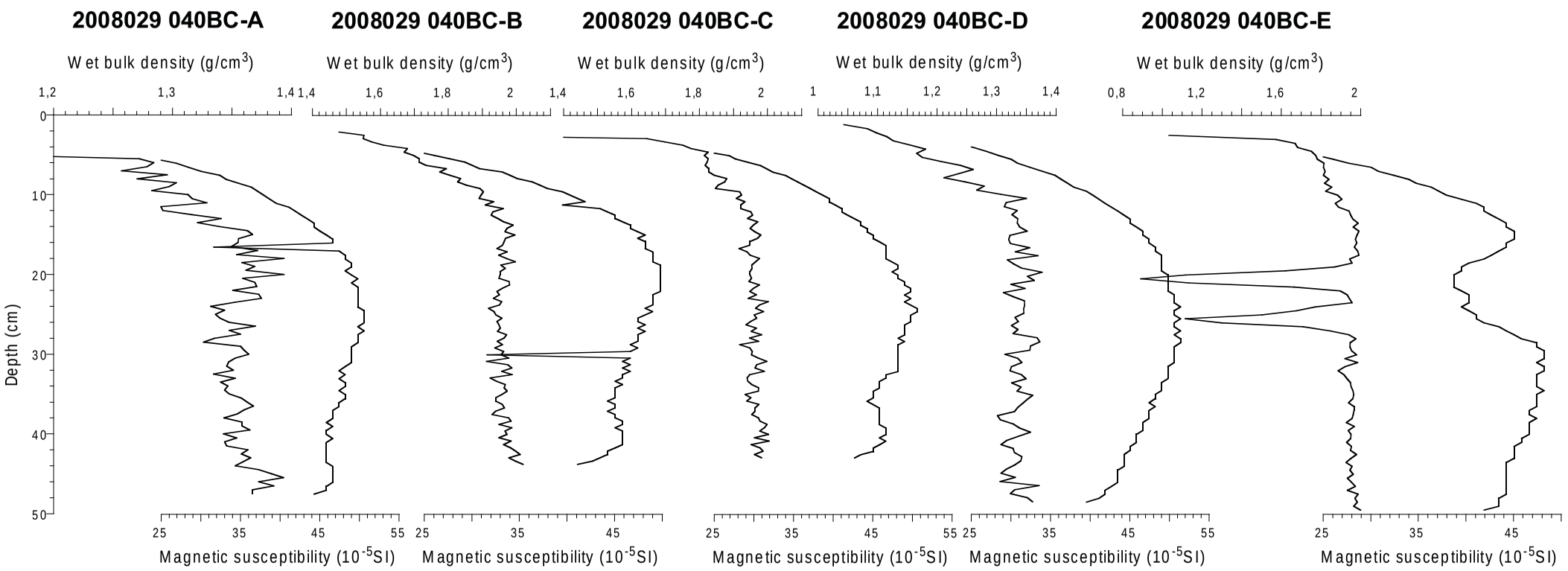
2008029 042PC



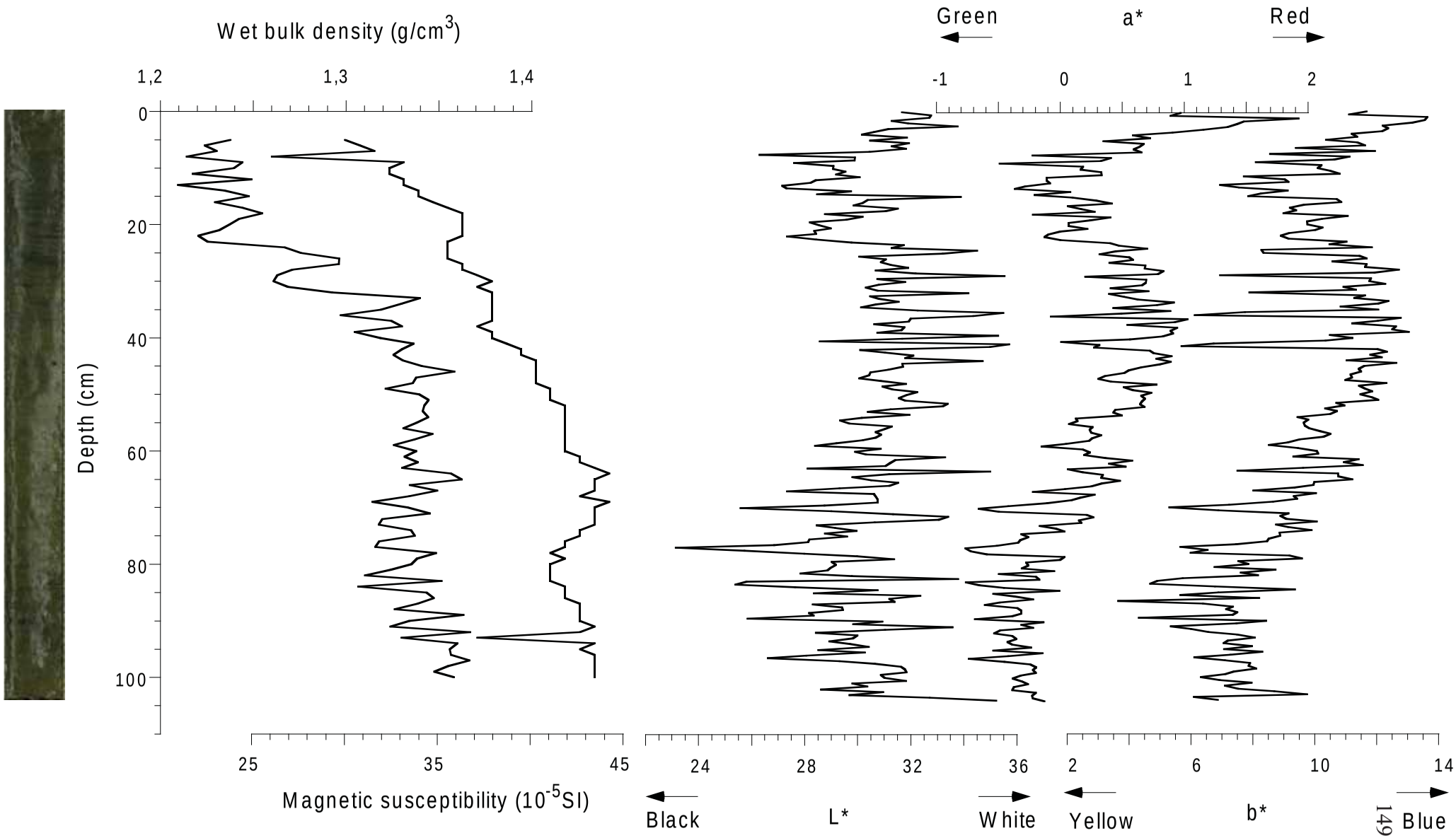
2008029 040BC-A




2008029 040
2008029 042
BC-A
TWC-AB
PC-GH
PC-FG
PC-EF
PC-DE
PC-CD
PC-BC
PC-AB
0 cm
47.75 cm
0
103.5
0
117
120.5
275.5
275.5
425.5
425.5
581
581
730
730
885
885
1035
0
50
100
150


2008029 040BC-A
2008029 040BC-B
2008029 040BC-C
2008029 040BC-D
2008029 040BC-E
Wet bulk density (g/cm3)
Depth (cm)
Magnetic susceptibility (10-5SI)

2008029 042TWC

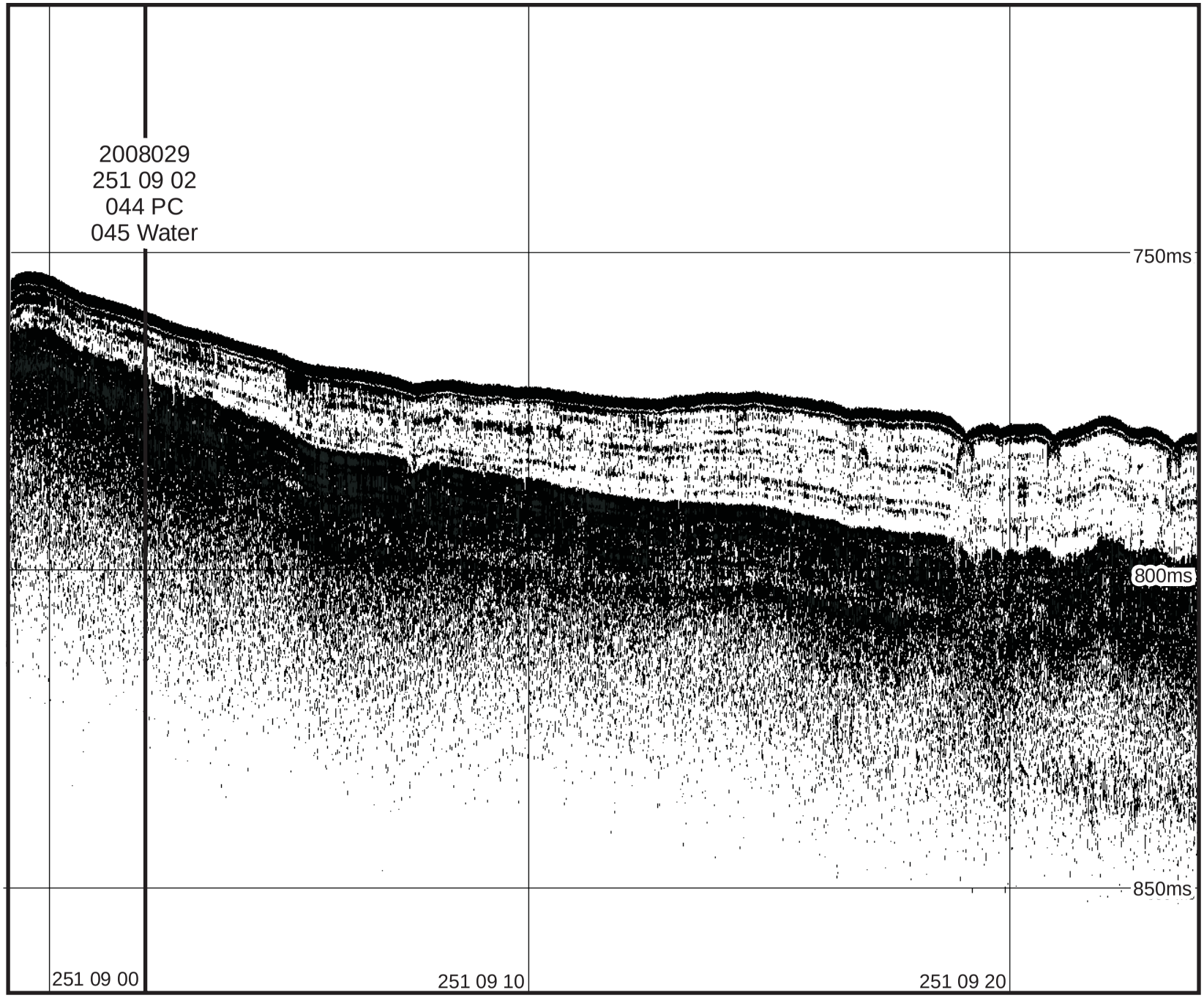


Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0044	Piston	251/1340	75.600915	-78.918681	571	Jones Sound	2008029	2510902	3.5kHz	12	1524	163	1137.5
0045	Water	251/1425	75.600680	-78.919807	570	Jones Sound	2008029	2510902	3.5kHz	3			

Core 2008 029 044 TWC (length = 161 cm)
Visual description :
The core sediment consists in olive grey silty clay with black mottles.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 161 cm.

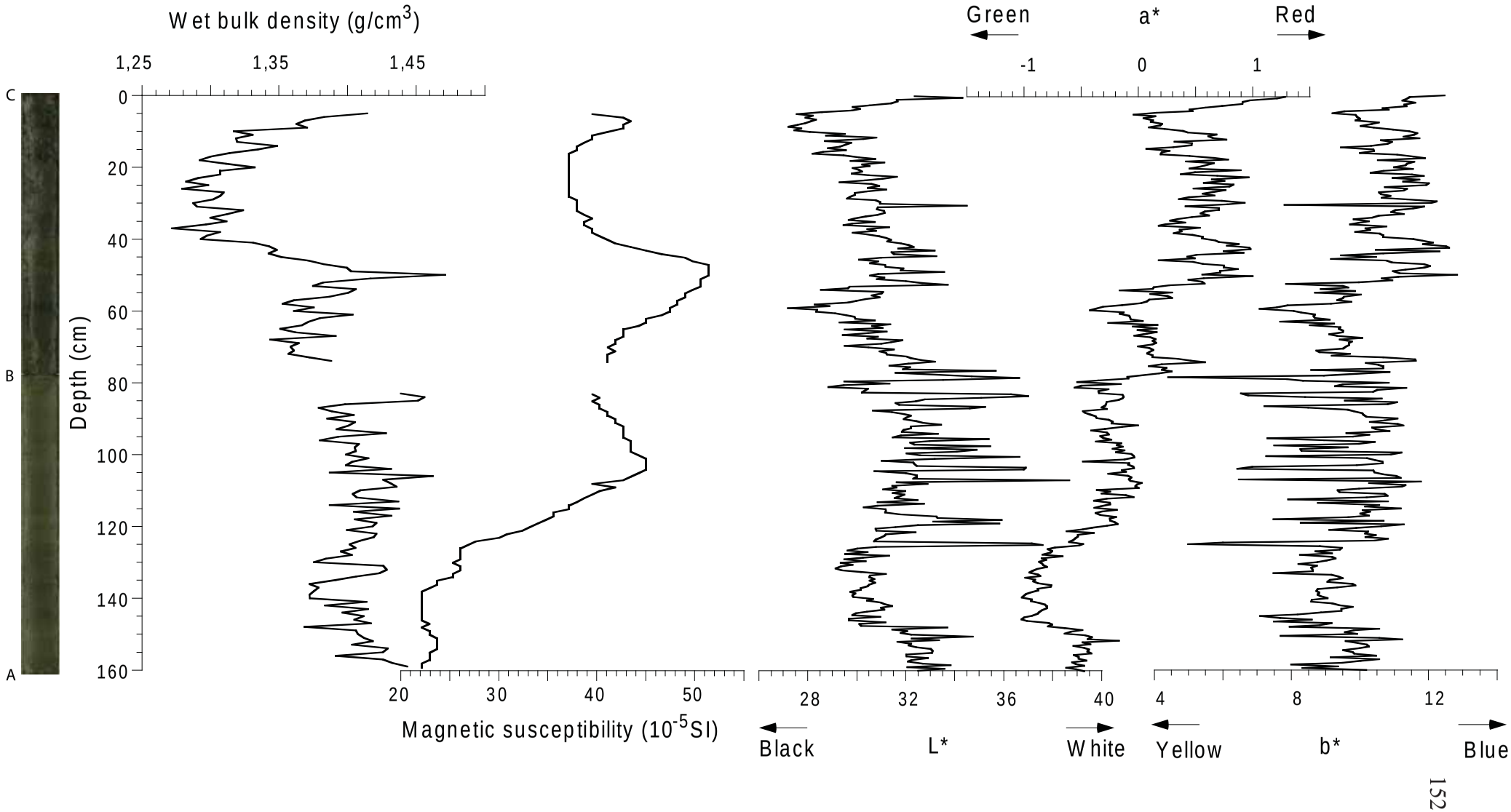
Core 2008 029 044 PC (length = 1133 cm)
Visual description :
The core sediment consists in olive grey silty clay with black mottles down to about 467 cm, below which there is a transition towards very dark gray clayey mud. Shell fragments and ice-rafted gravels and pebbles are occasionally observed, especially in the lower half of the core. The upper occurrence of gravel is recorded at 332 cm. Diffuse lamination (clayey band with slight color changes) are observed in the lower part of the core, below about 700 cm,
.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 1133 cm.
- Pelecypod shell (2 valves) at 326 cm (section GH)
- Pelecypod shell fragment and gasterod shell at 397 cm (section E-F)
- Pelecypod shell fragments at 398 cm (section E-F)
- Long pelecypod shell (2 valves) at 398 cm (section E-F)
- Pelecypod shell fragments at 399 cm (section E-F)
- Large pelecypod shell fragments at 422 cm (section E-F)
- Pelecypod shell fragments at 422 cm (section E-F)
- Pelecypod shell fragments at 437 cm (section E-F)
- Gasteropod shell at 490 cm (section E-F)
- Large (7cm) pebble at 322-327 cm (section FG)
- Pebbles at 467-469 cm (section E-F)
- Pebble at 459 cm (section E-F)

2008 029 045 WP
One casts with two pumps was made at 30 and 100 m. Filtrations were made for Nd and Th at 100 m. Filtrations were made for Nd, Th and Si at 30 m

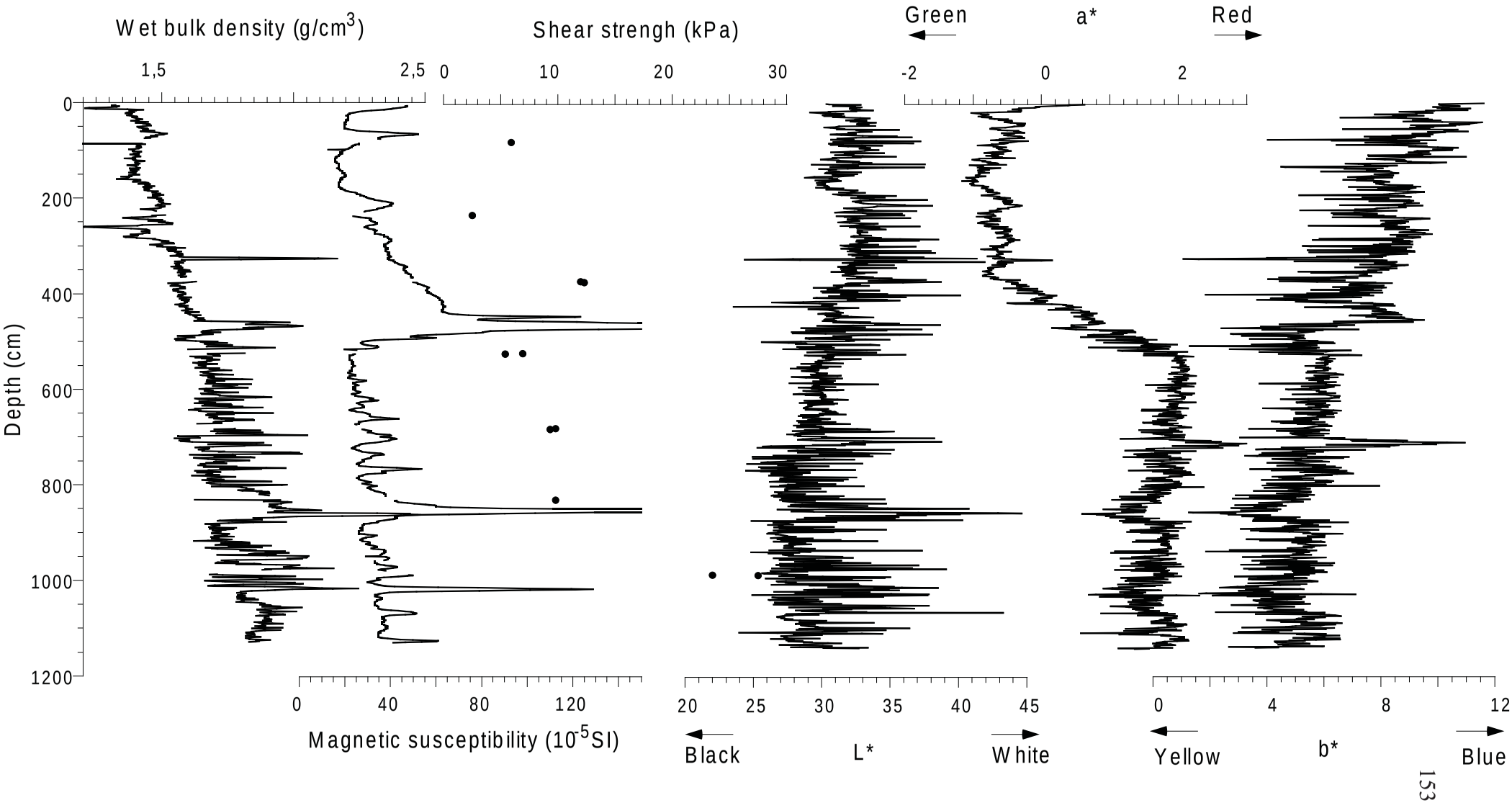


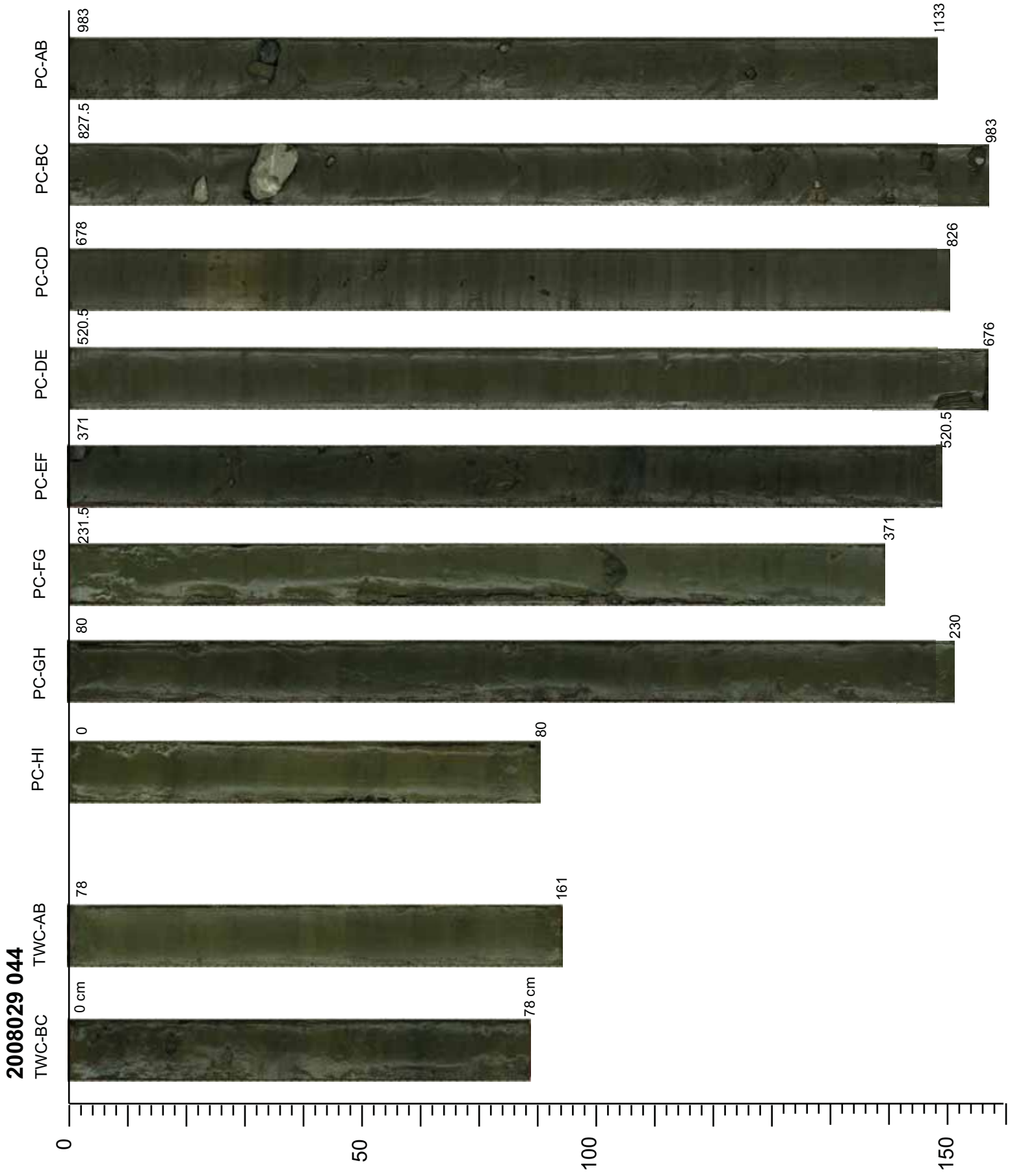
3 5k re or or lo ation o 2008029 044PC 045 ater m in at 251 09 02 571m W D

2008029 044TWC



2008029 044PC




2008029 044
TWC-BC
TWC-AB
PC-HI
PC-GH
PC-FG
PC-EF
PC-DE
PC-CD
PC-BC
PC-AB
0 cm
78 cm
78
161
0
80
80
230
231.5
371
371
520.5
520.5
676
678
826
827.5
983
983
1133
0
50
100
150

Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0046	Piston	252/1122	74.023275	-77.116198	870	Lancaster Sound	2008029	2520914	Huntec	13	914.4	208	464.5
0047	Box	252/1228	74.023168	-77.116335	870	Lancaster Sound	2008029	2520914	Huntec	11			
0048	CTD	252/1228	74.023168	-77.116335	870	Lancaster Sound	2008029	2520914	Huntec	11			

GSC Piston core not split.

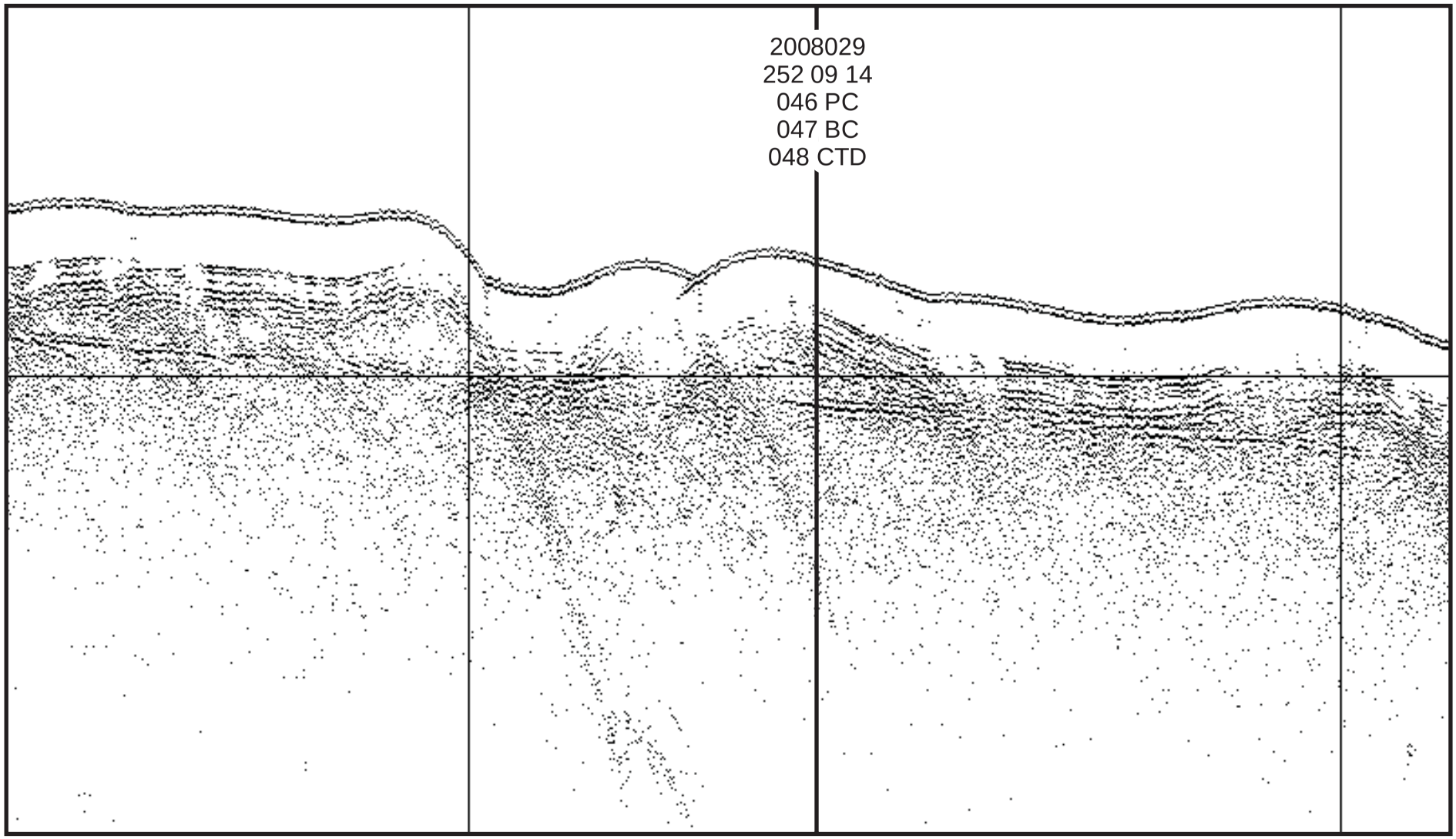
Core 2008 029 047 BC (maximum length = 46 cm)

Visual description :

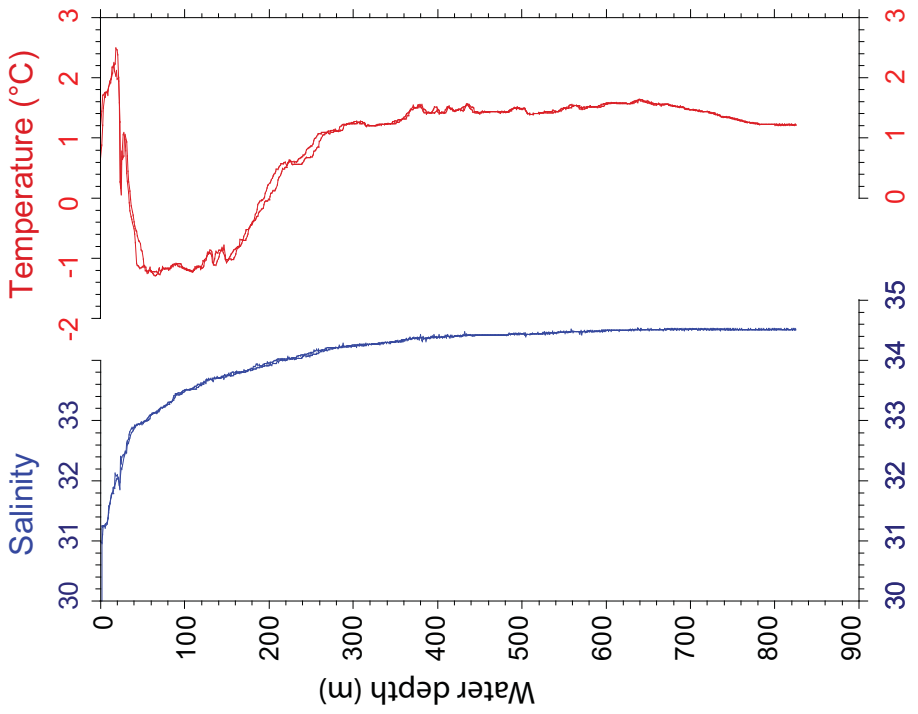
The surface consists in brownish mud with abundant fauna (worms, worm tubes). It overlies mottled dark olive grey clay.

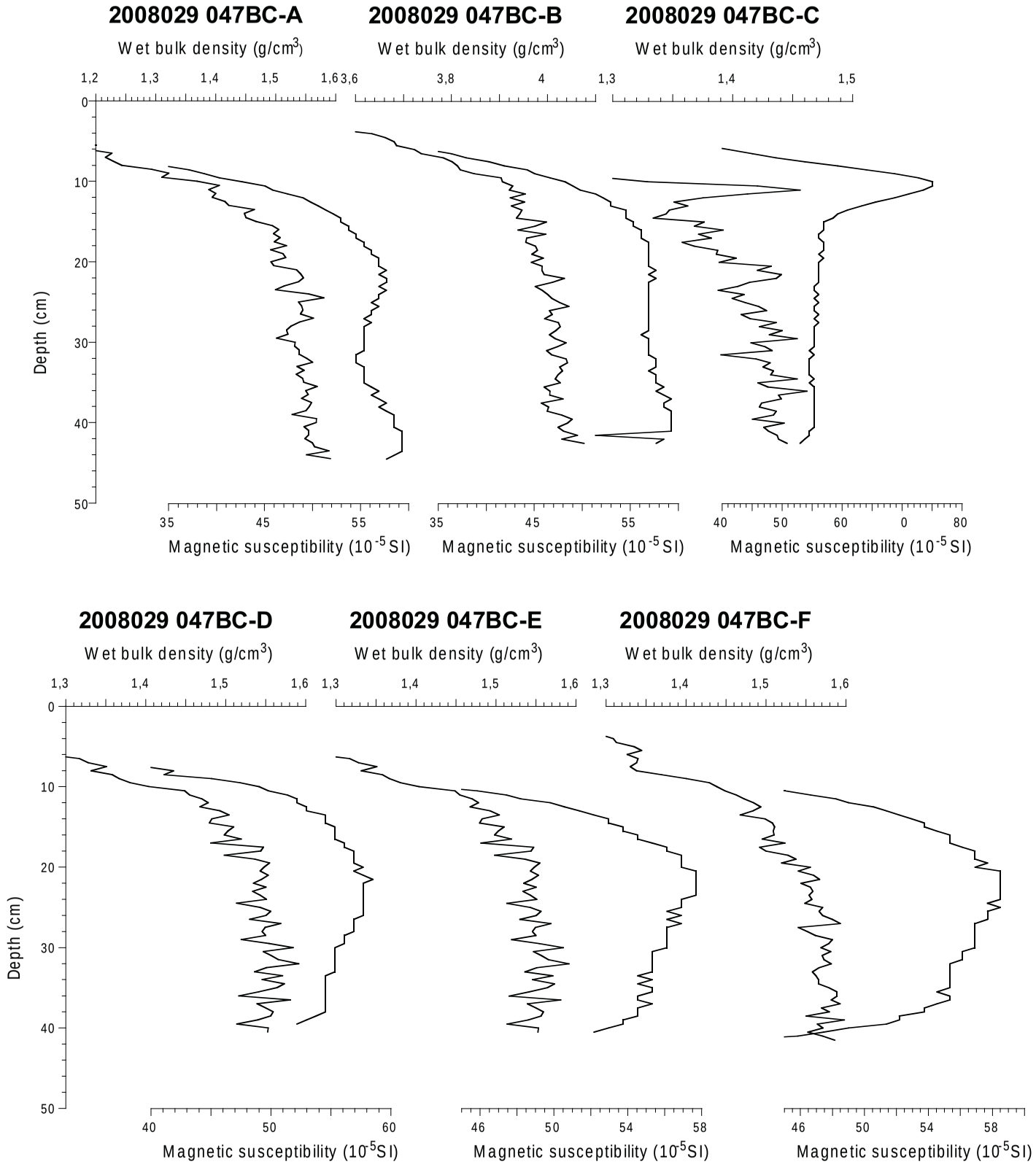
Sampling Summary :

- Surface sediment: 0-5 mm
- Push core C : sampling by extrusion, from 0 to 42 cm at 1 cm interval (note: the original length of the liner was 43 cm). Note that open worm tubes (1-2 mm in diameter) were observed down to the bottom of the core and that living worms were recovered at 4-5 cm.
- Push core A : working half (0-45 cm) sampled for paleomagnetism (u-channel) and archived horizontally.
- Push cores B, D, E and F sealed and archived vertically.

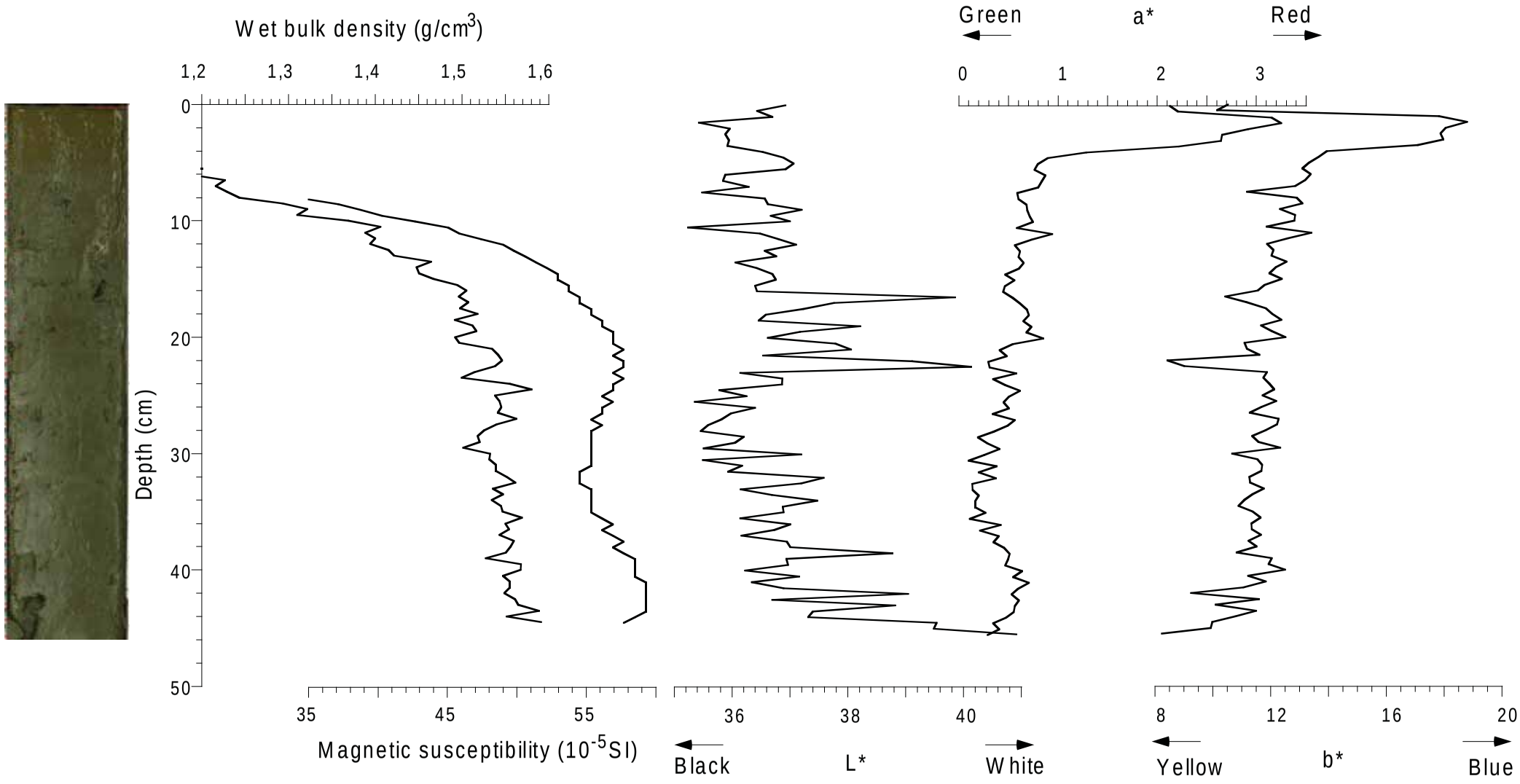


nte re or or lo ation o 2008029 046PC 047 BC 048 CTD at 252 09 14 870m W D


Temperature (°C)
-2
-1
0
1
2
3
Salinity
30
31
32
33
34
35
Water depth (m)
0
100
200
300
400
500
600
700
800
900

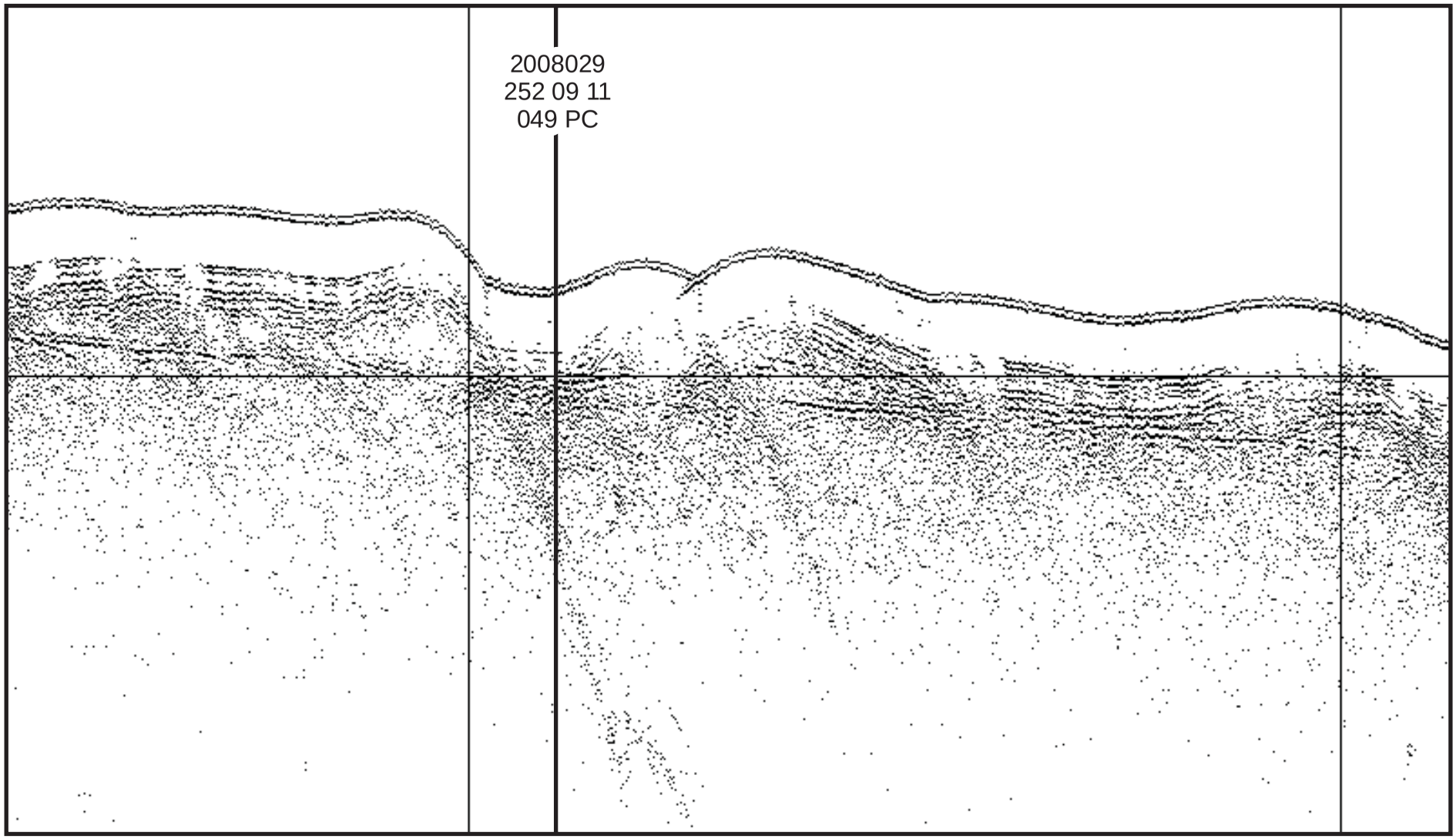

2008029 047BC-A
Wet bulk density (g/cm3)
1,2
1,3
1,4
1,5
1,6
2008029 047BC-B
Wet bulk density (g/cm3)
3,6
3,8
4
2008029 047BC-C
Wet bulk density (g/cm3)
1,3
1,4
1,5
Depth (cm)
0
10
20
30
40
50
35
45
55
Magnetic susceptibility (10-5 SI)
35
45
55
Magnetic susceptibility (10-5 SI)
40
50
60
0
80
Magnetic susceptibility (10-5 SI)
2008029 047BC-D
Wet bulk density (g/cm3)
1,3
1,4
1,5
1,6
2008029 047BC-E
Wet bulk density (g/cm3)
1,3
1,4
1,5
1,6
2008029 047BC-F
Wet bulk density (g/cm3)
1,3
1,4
1,5
1,6
Depth (cm)
0
10
20
30
40
50
40
50
60
Magnetic susceptibility (10-5SI)
46
50
54
58
Magnetic susceptibility (10-5SI)
46
50
54
58
Magnetic susceptibility (10-5SI)

2008029 047BC-A



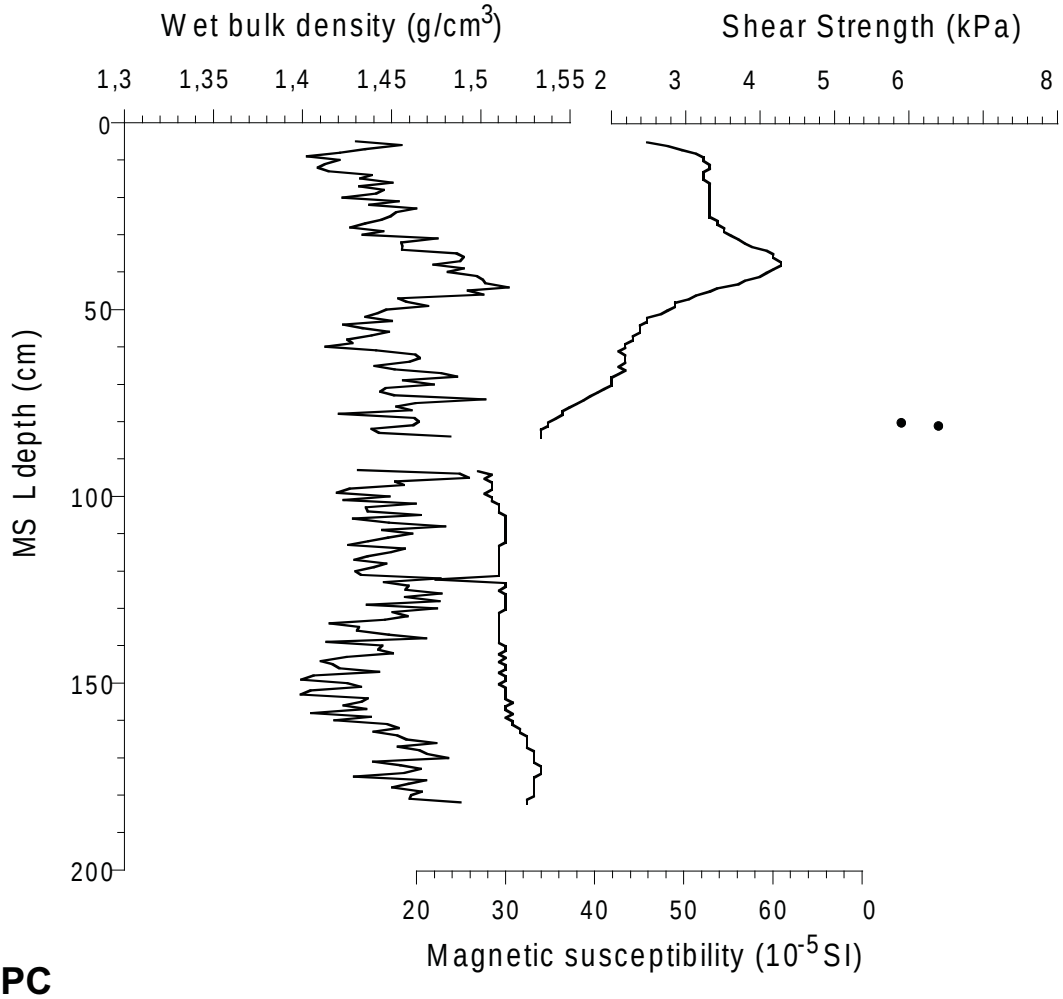
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0049	Piston	252/1318	74.026178	-77.125263	868	Lancaster Sound	2008029	2520911	Huntec	14	914.4	185	608.5

GSC Piston core not split.

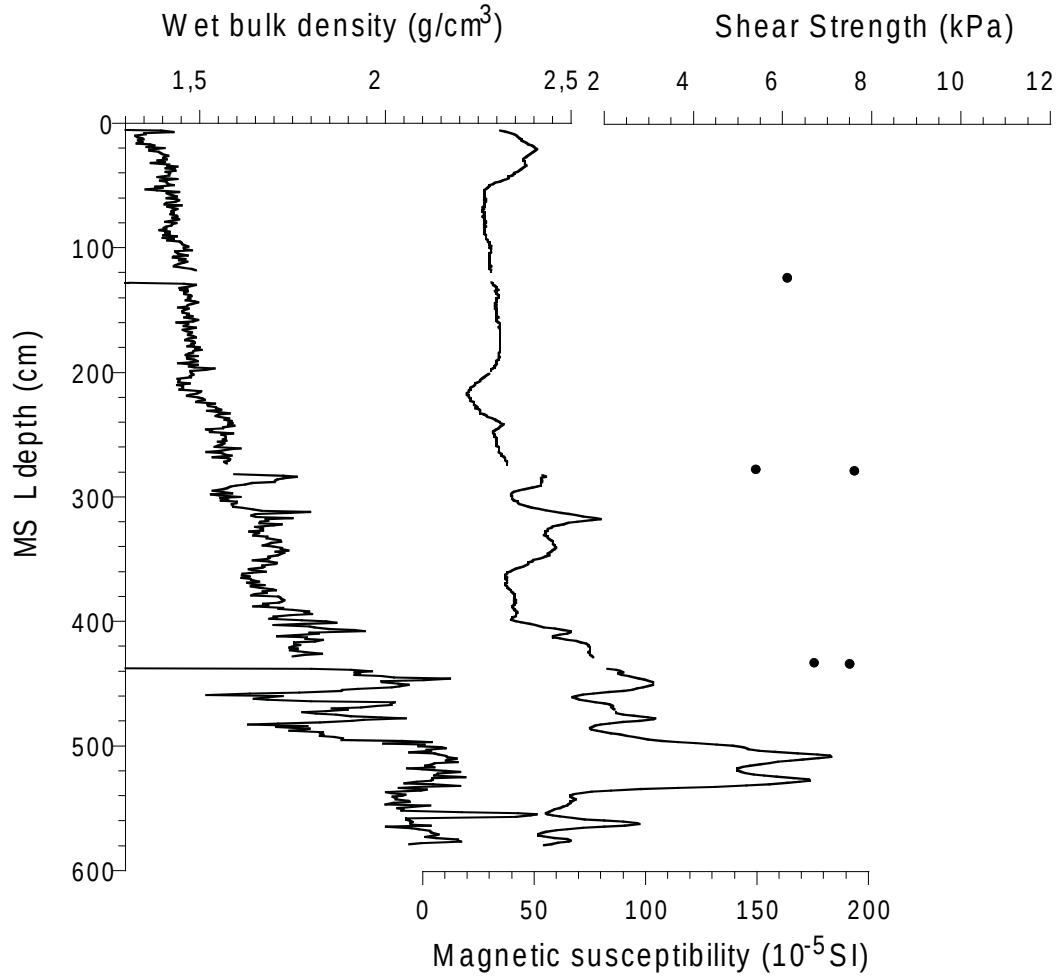


nte re or or lo ation o 2008029 049PC at 252 09 11 868m W D

2008029 049TWC

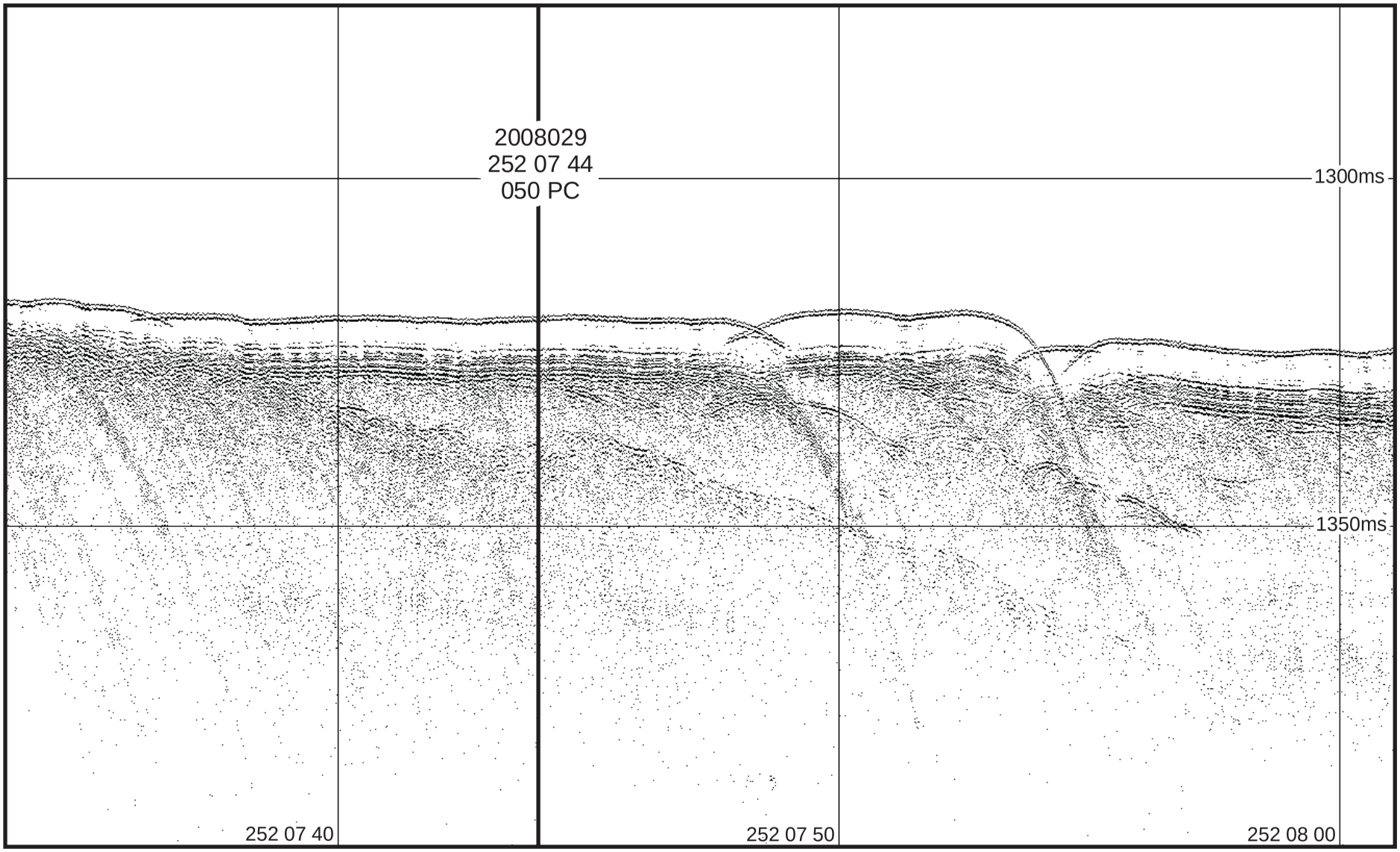


2008029 049PC



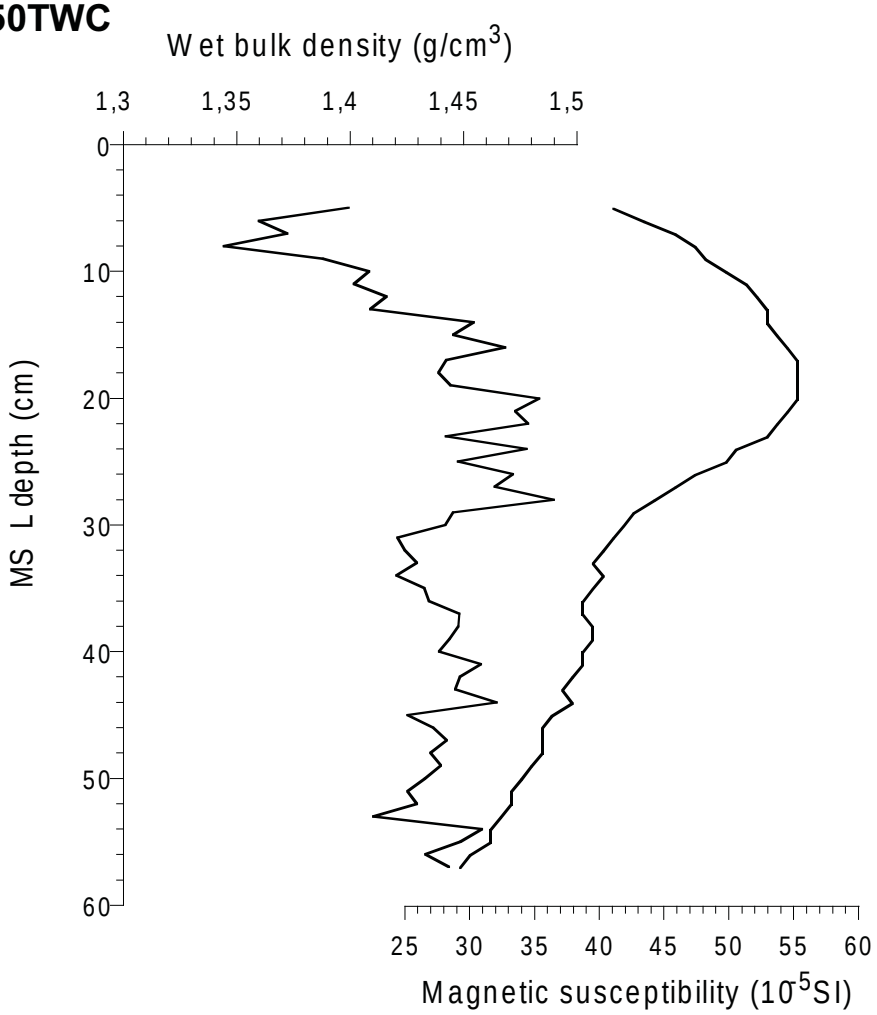
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0050	Piston	252/1518	74.112343	-77.400833	853	Lancaster Sound	2008029	2520744	Huntec	15	914.4	61.5	321.5

GSC Piston core not split.

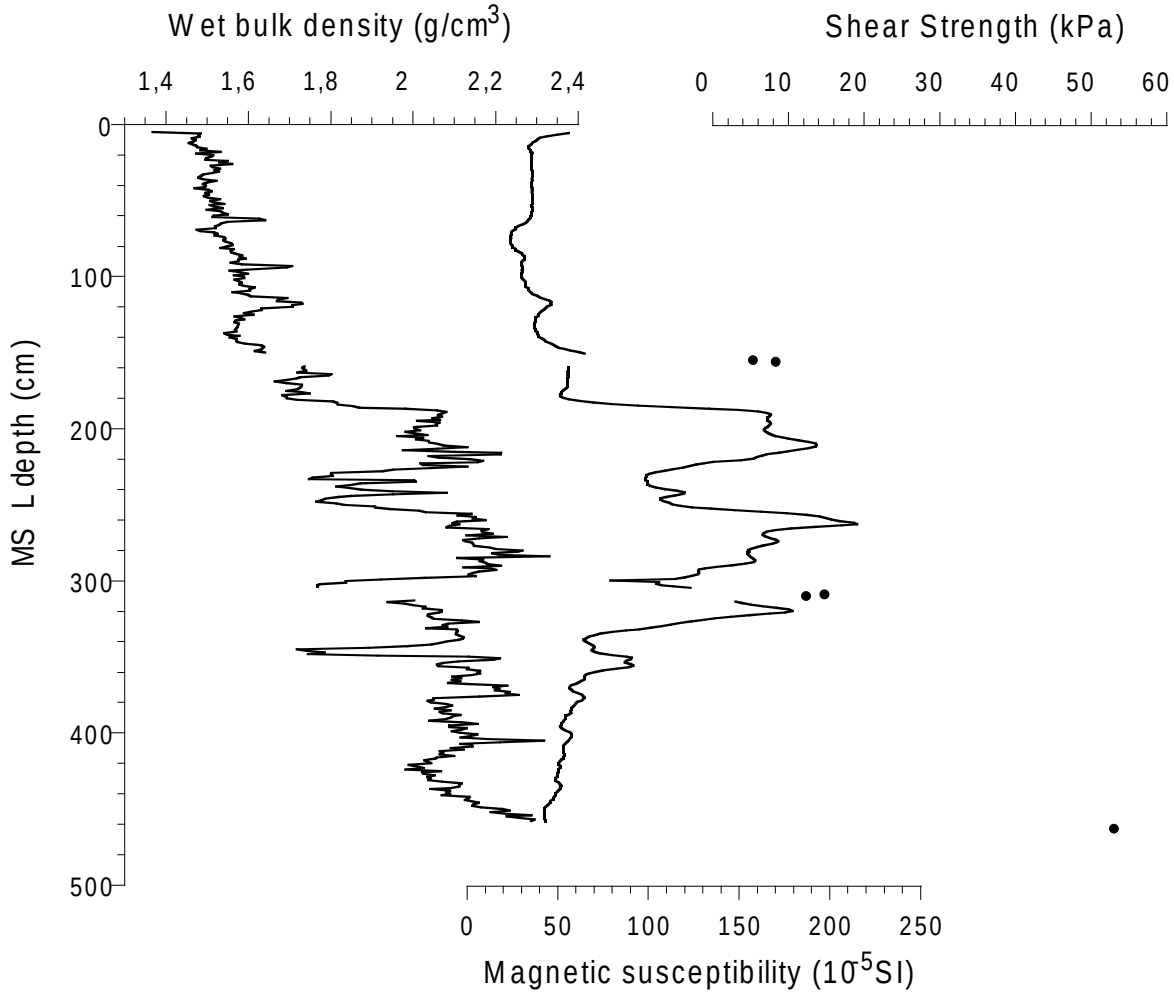


nte re or or lo ation o 2008029 050PC at 252 07 44 853m W D

2008029 050TWC



2008029 050PC

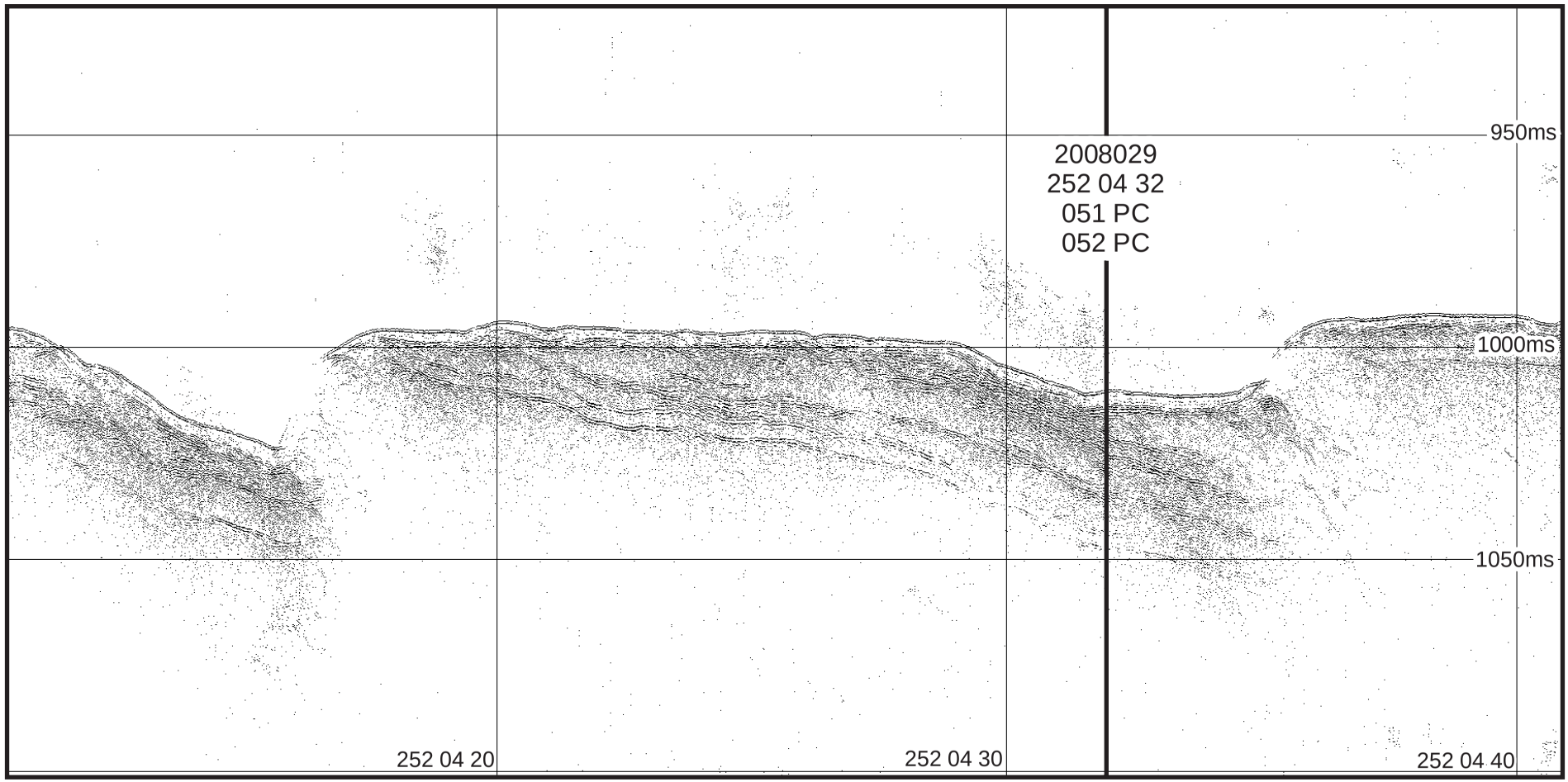


Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0051	Piston	252/1715	74.307295	-78.020038	735	Lancaster Sound	2008029	2520432	Huntec	16	914.4	102.5	78

GSC Piston core not split.

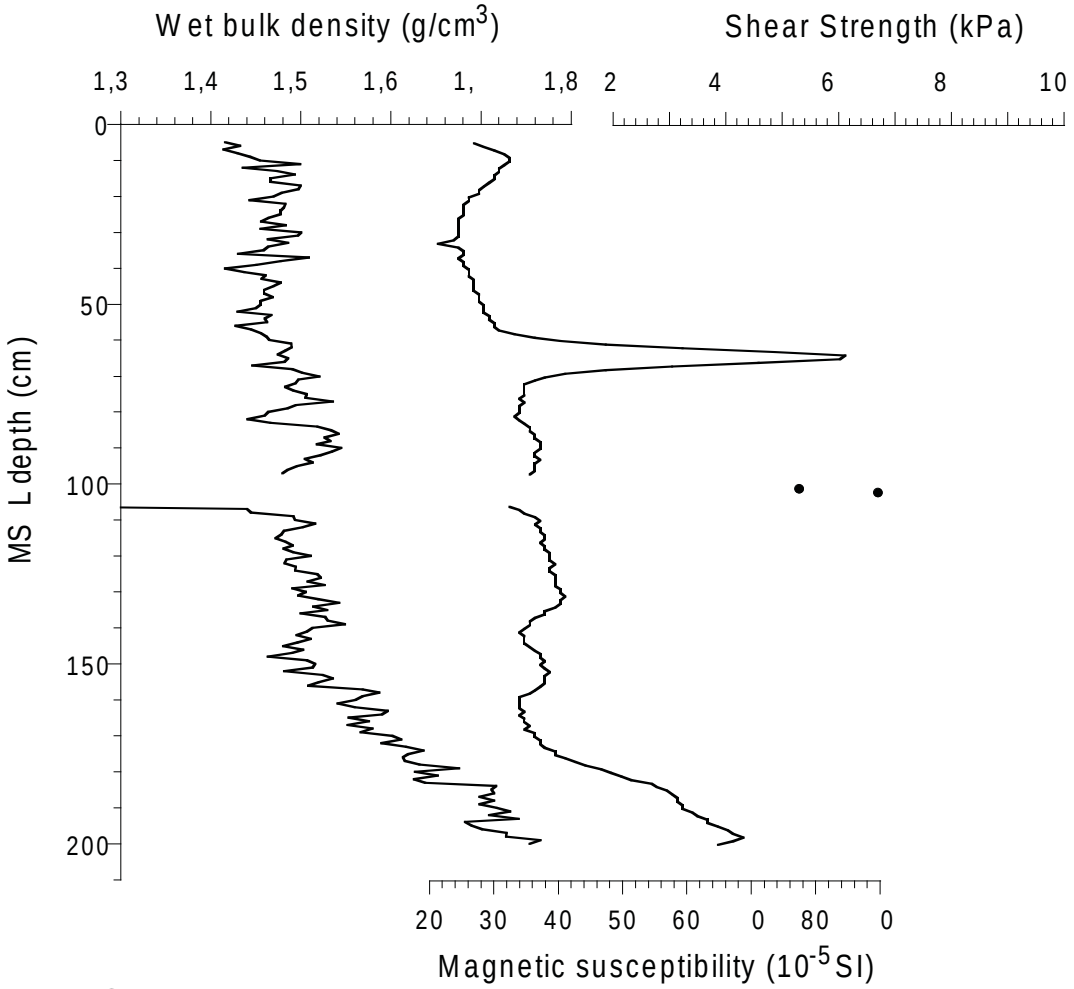
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0052	Piston	252/1852	74.307075	-78.019601	734	Lancaster Sound	2008029	2520432	Huntec	17	914.4	209.5	488.5

GSC Piston core not split.

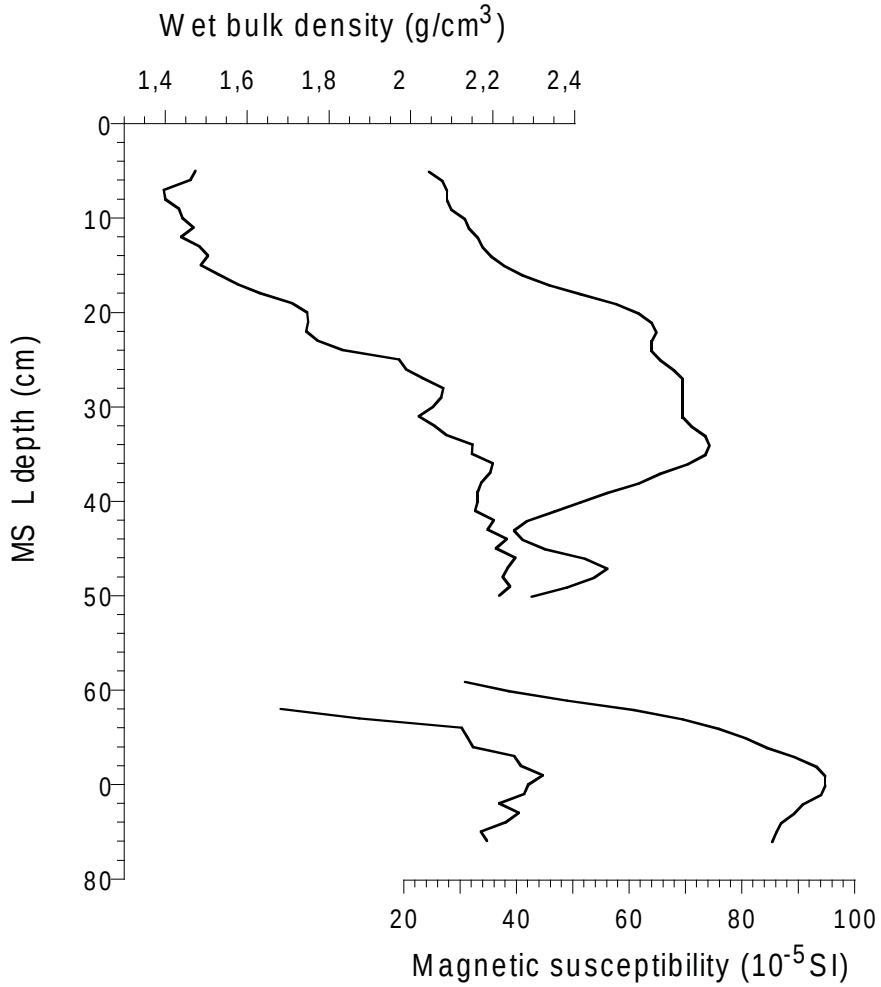


nte re or or lo ation o 2008029 051PC 052PC at 252 04 32 735m W D

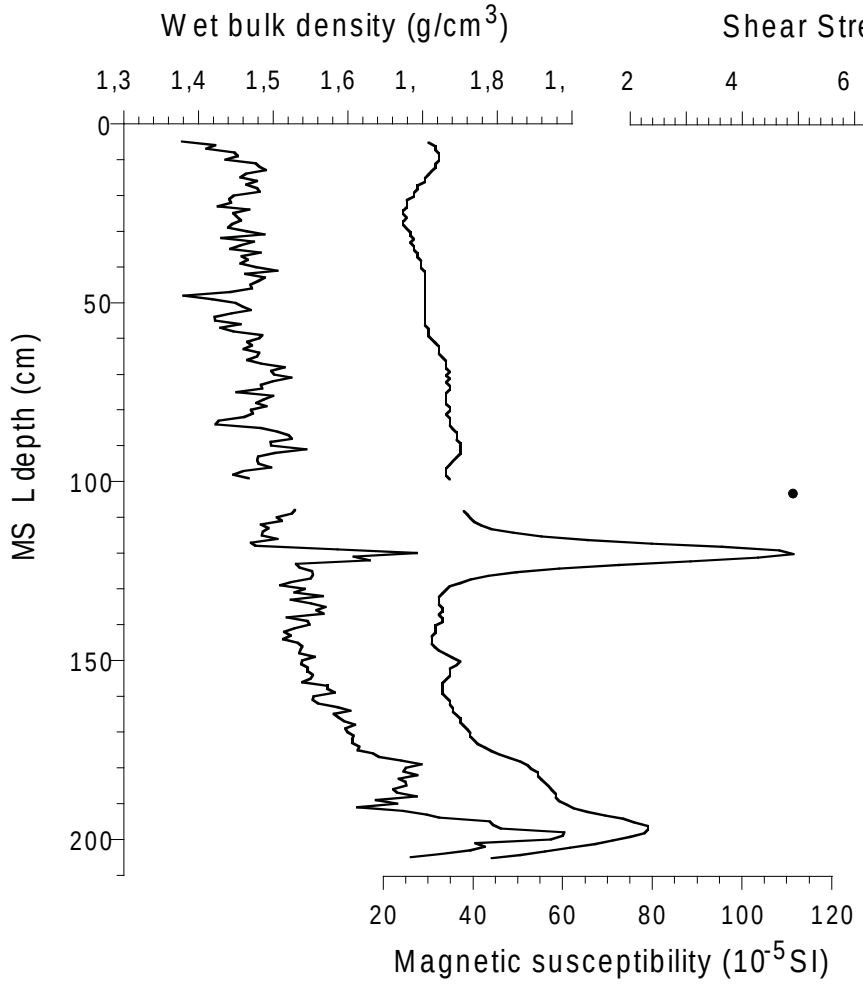
2008029 051TWC



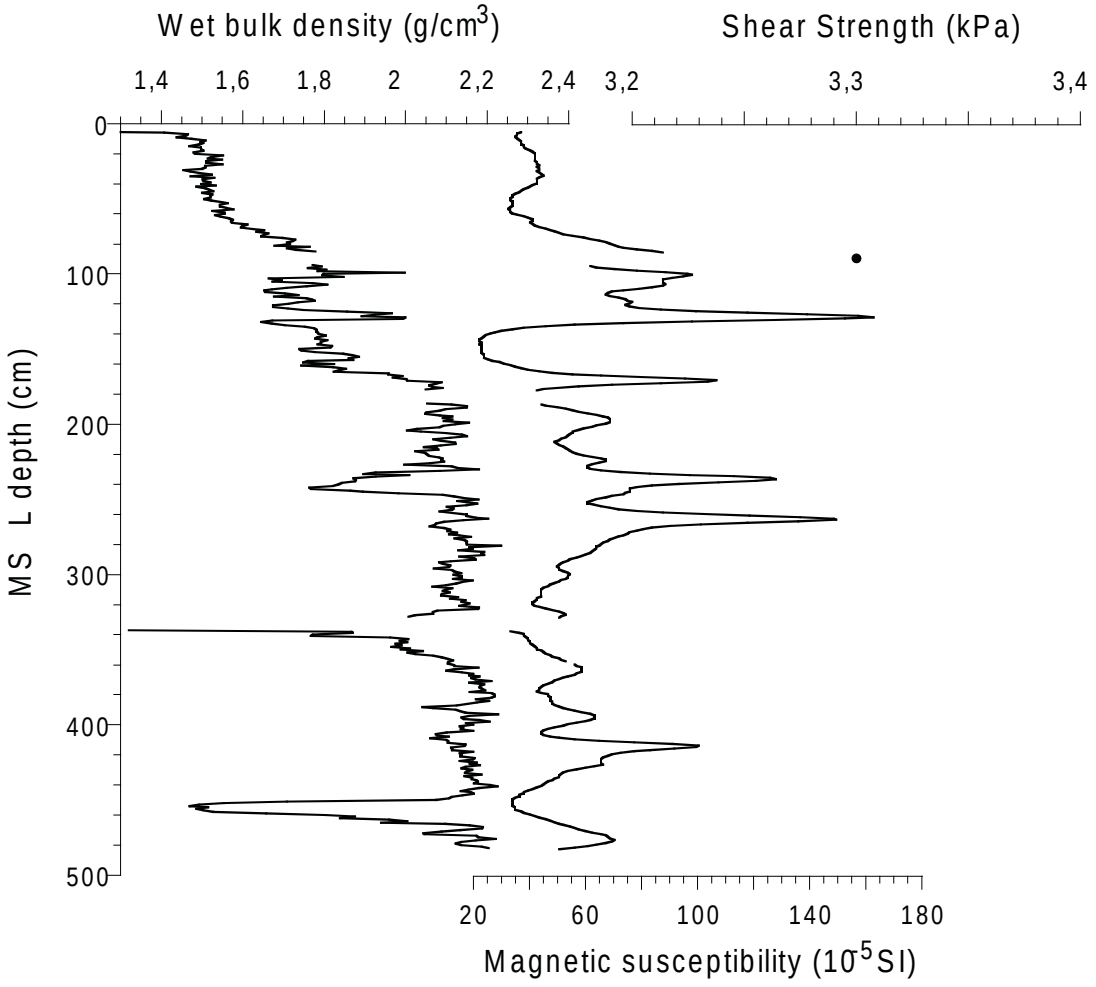
2008029 051PC



2008029 052TWC

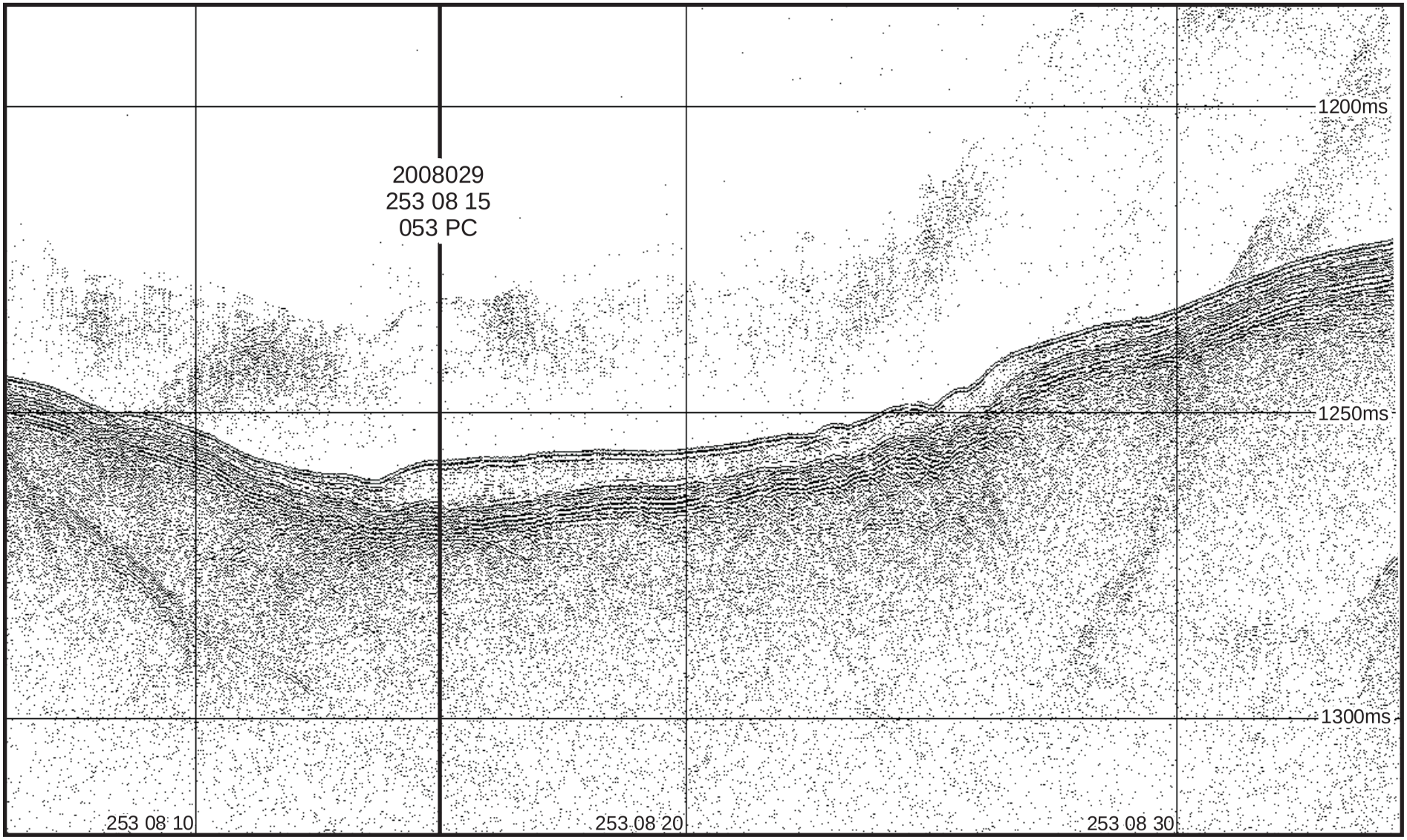


2008029 052PC



Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0053	Piston	253/1247	73.840550	-80.394580	918	Lancaster Sound	2008029	2530815	Huntec	18	914.4	0	480

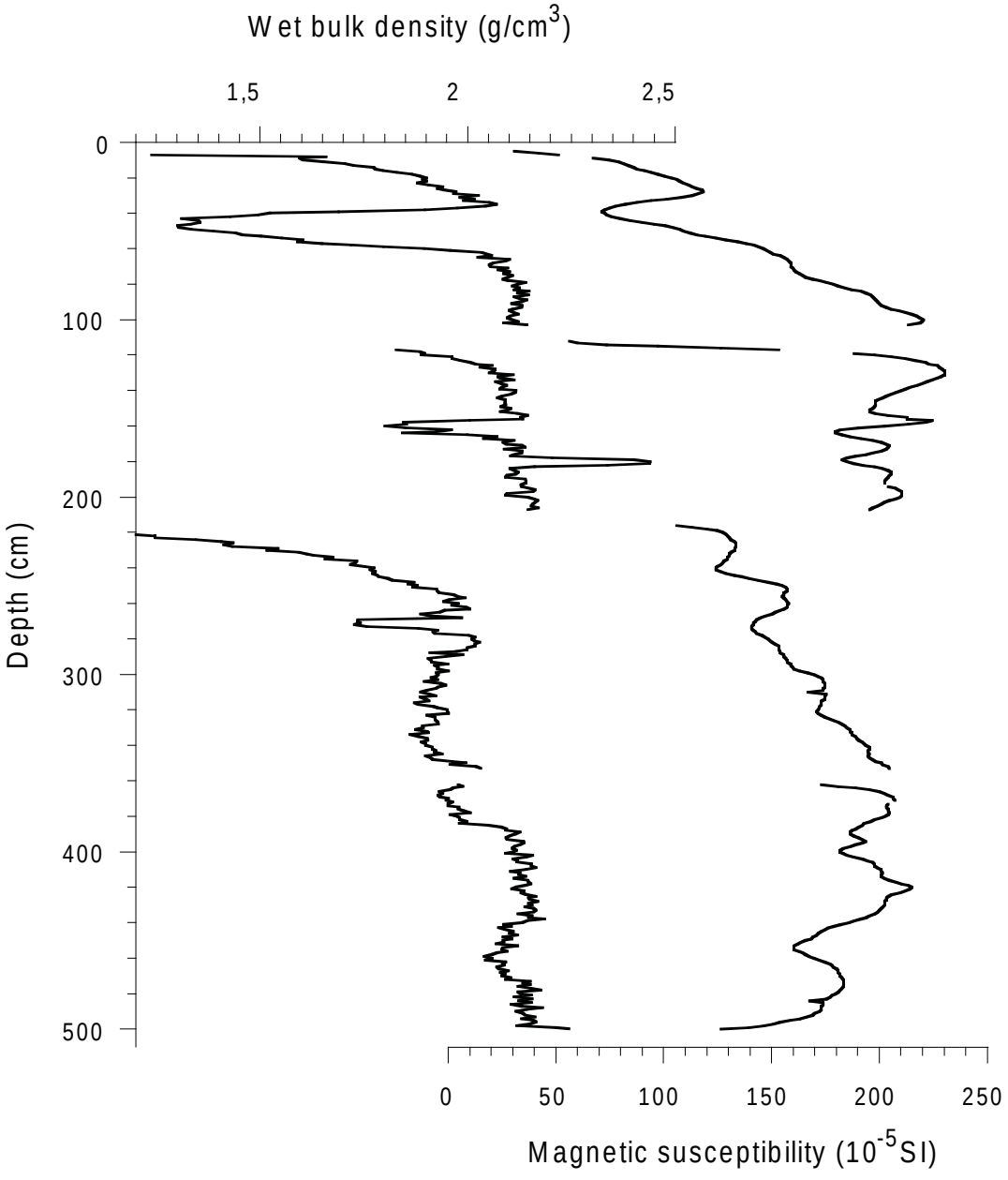
GSC Piston core not split.



nte re or or lo ation o 2008029 053PC at 253 08 15 918m W D

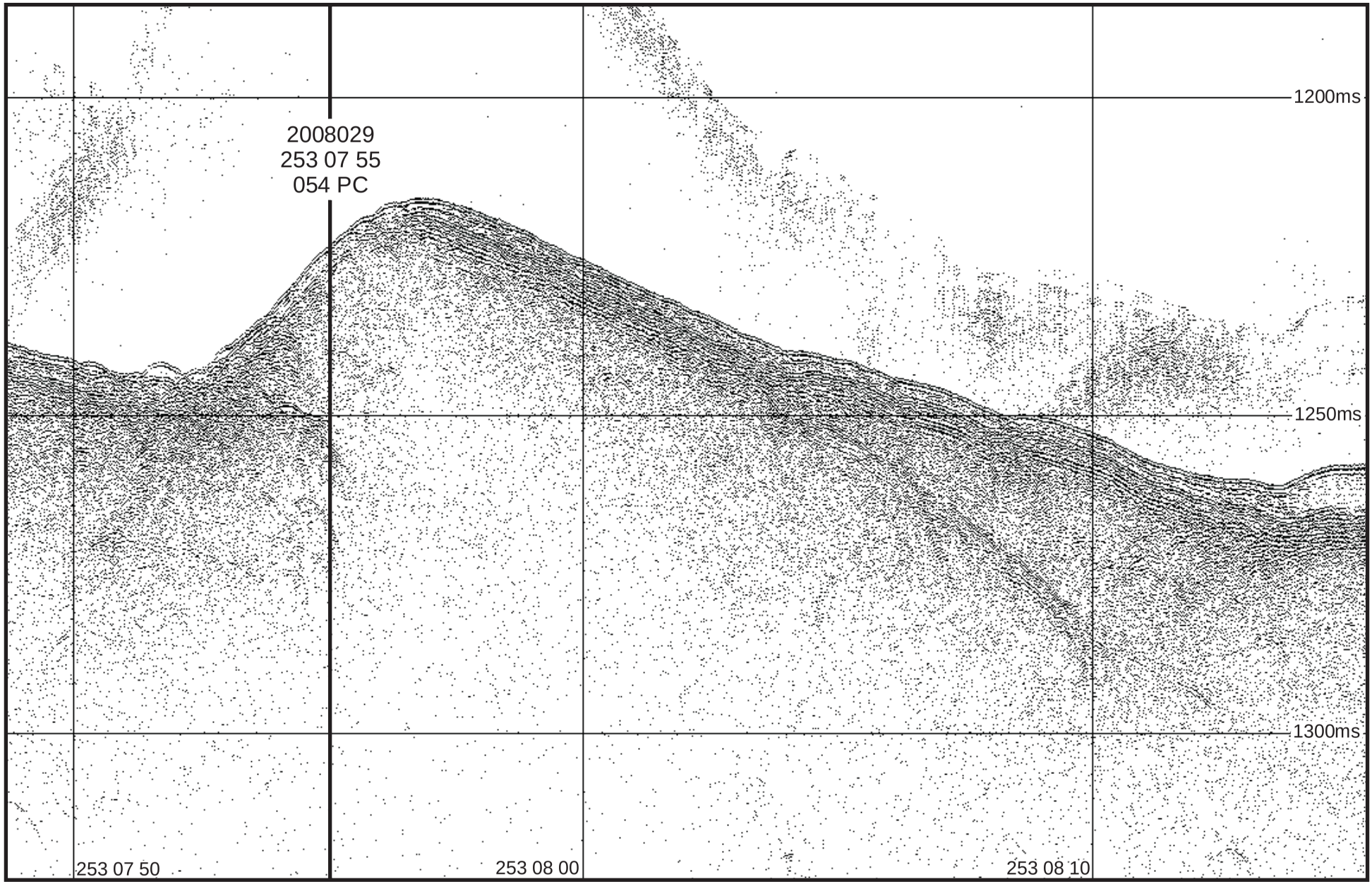
Note: 053TWC was empty.

2008029 053PC



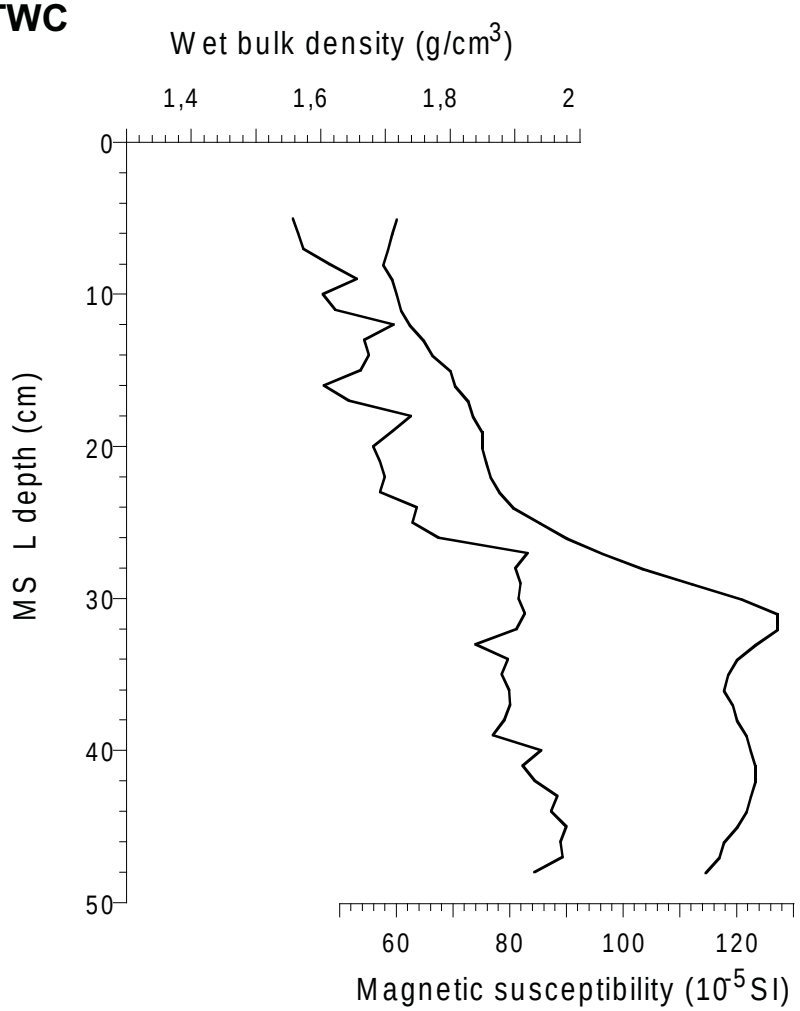
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0054	Piston	253/1409	73.838971	-80.312078	887	Lancaster Sound	2008029	2530755	Huntec	19	914.4	53	249.5

GSC Piston core not split.

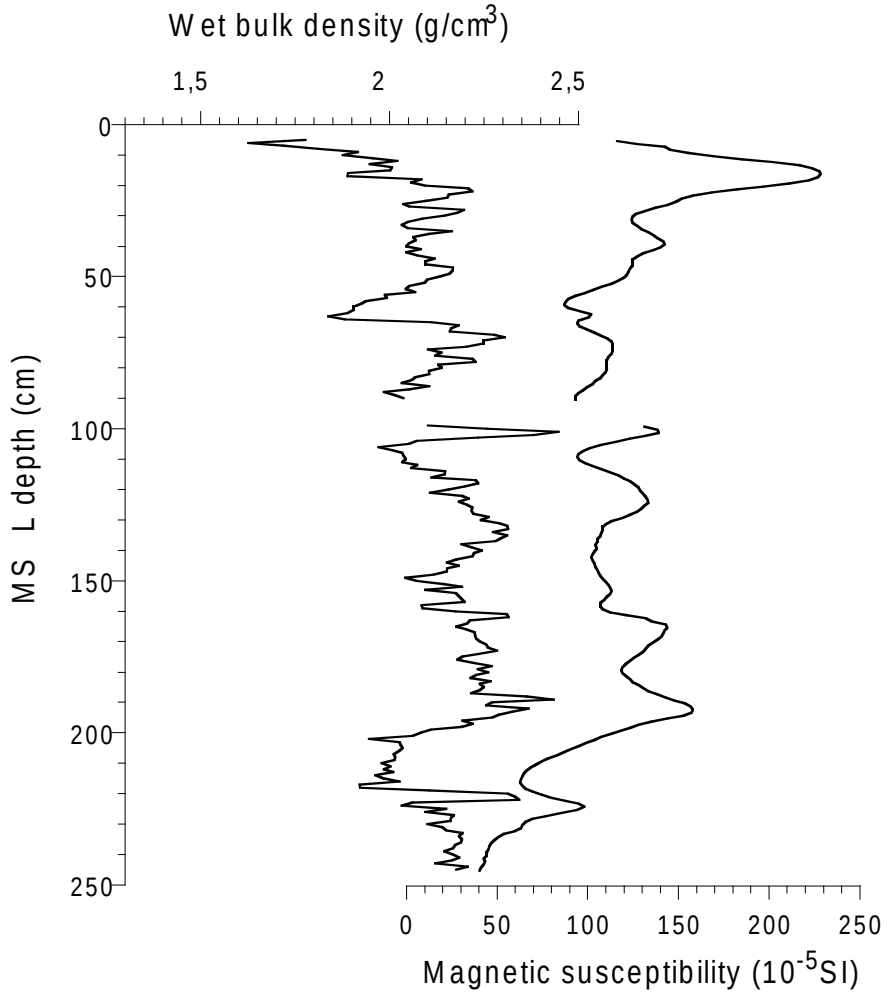


nte re or or lo ation o 2008029 054PC at 253 07 55 887m W D

2008029 054TWC



2008029 054PC

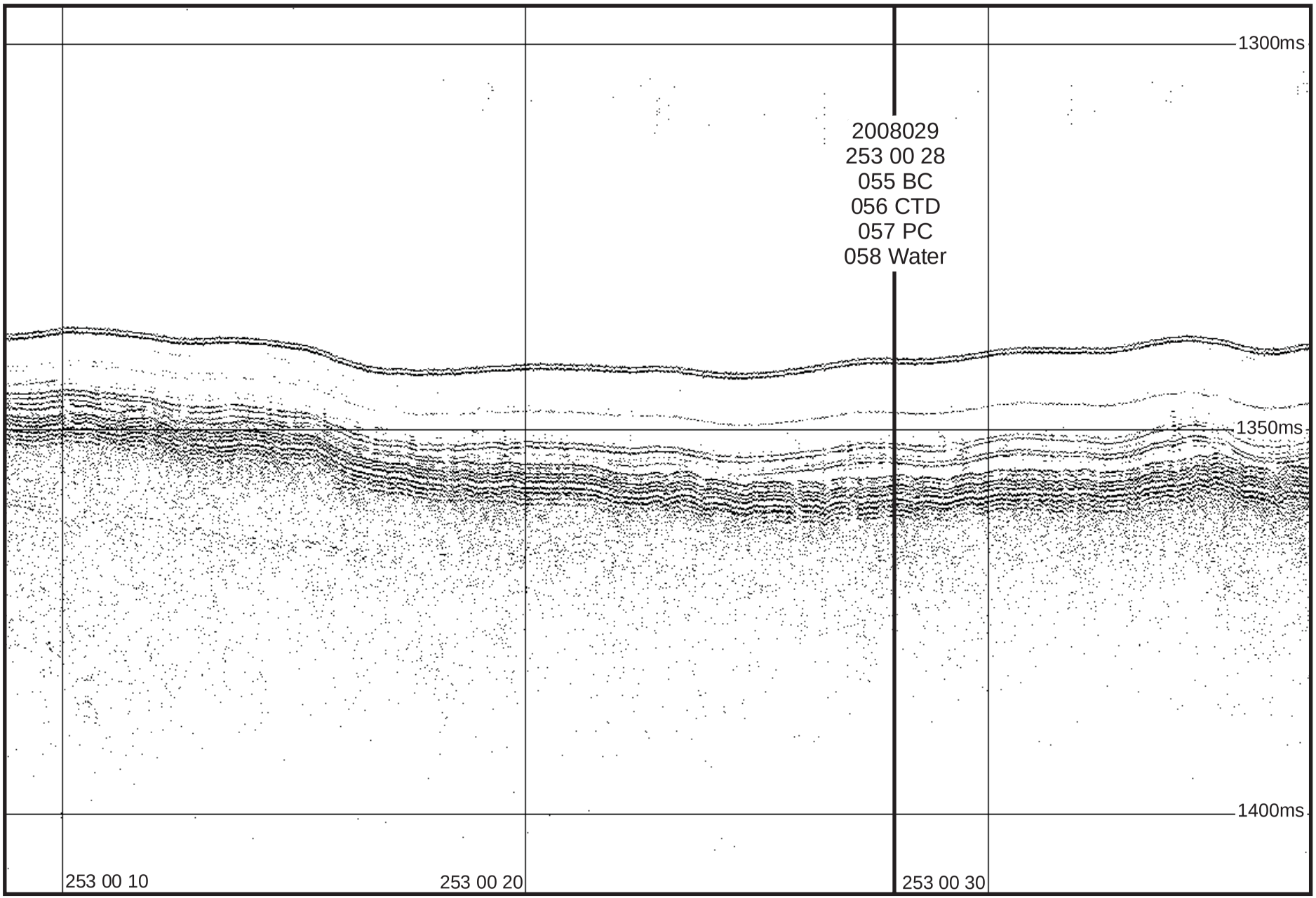


Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0055	Box	253/1718	74.092063	-78.718643	866	Lancaster Sound	2008029	2530028	Huntec	12			
0056	CTD	253/1718	74.092063	-78.718643	866	Lancaster Sound	2008029	2530028	Huntec	12			
0057	Piston	253/1814	74.092035	-78.718158	866	Lancaster Sound	2008029	2530028	Huntec	20	1219	189.5	1092
0058	Water	253/1920	74.091956	-78.743400	865	Lancaster Sound	2008029	2530028	Huntec	4			

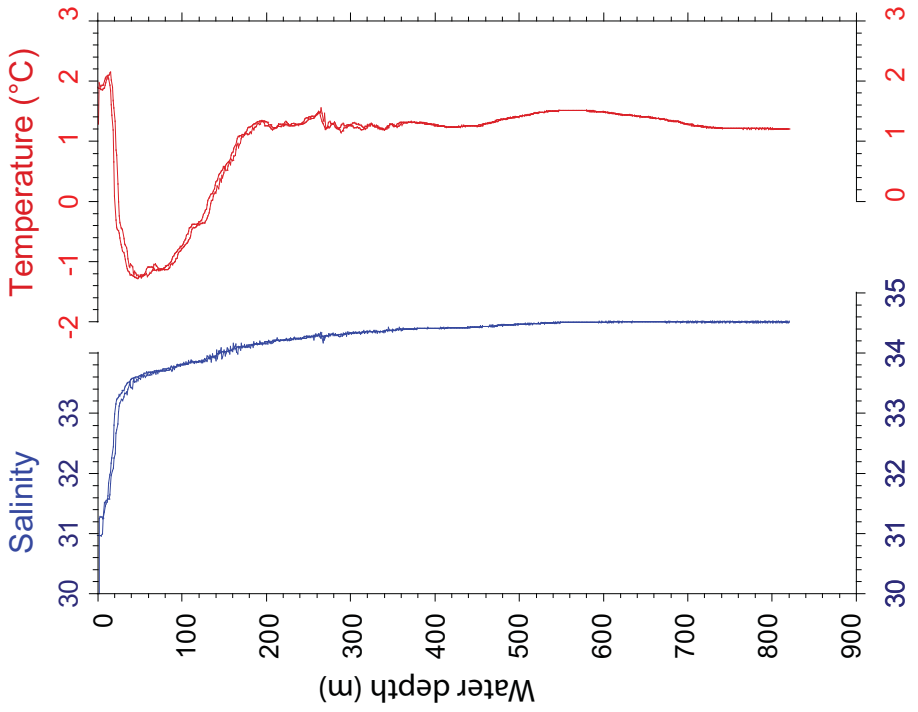
GSC Piston core not split.

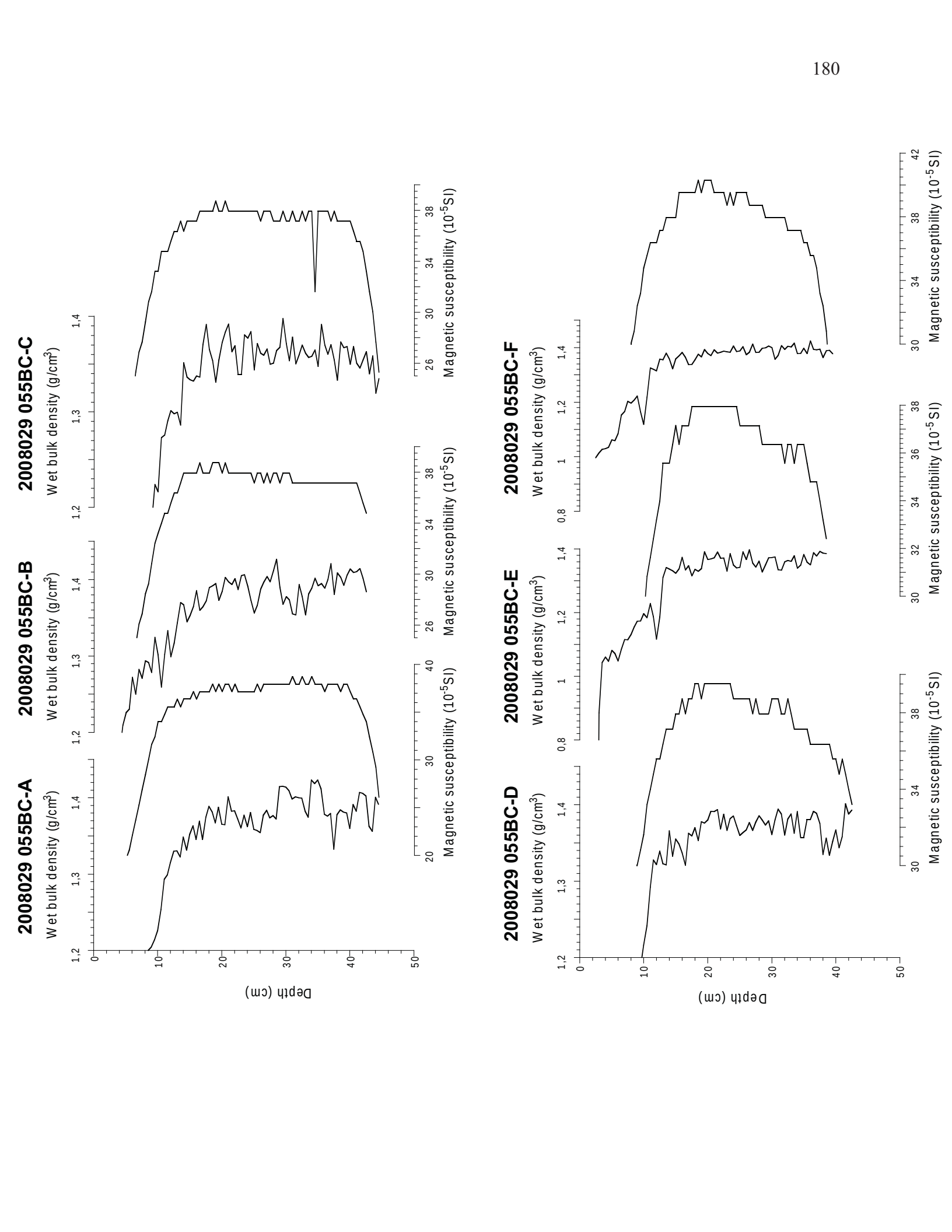
Core 2008 029 055 BC (maximum length = 46 cm)
Visual description :
The surface consists in brownish mud with abundant fauna (worms, worm tubes). It overlies olive to olive grey mud.
Sampling Summary :
- Surface sediment: 0-5 mm
- Push core C : sampling by extrusion, from 0 to 43 cm at 1 cm interval.
- Push core A : working half (0-46 cm) sampled for paleomagnetism (u-channel) and archived horizontally.
- Push cores B, D, E and F sealed and archived vertically.

2008 029 058 WP
One cast was made at 10 and 70 m. Both pumping failed

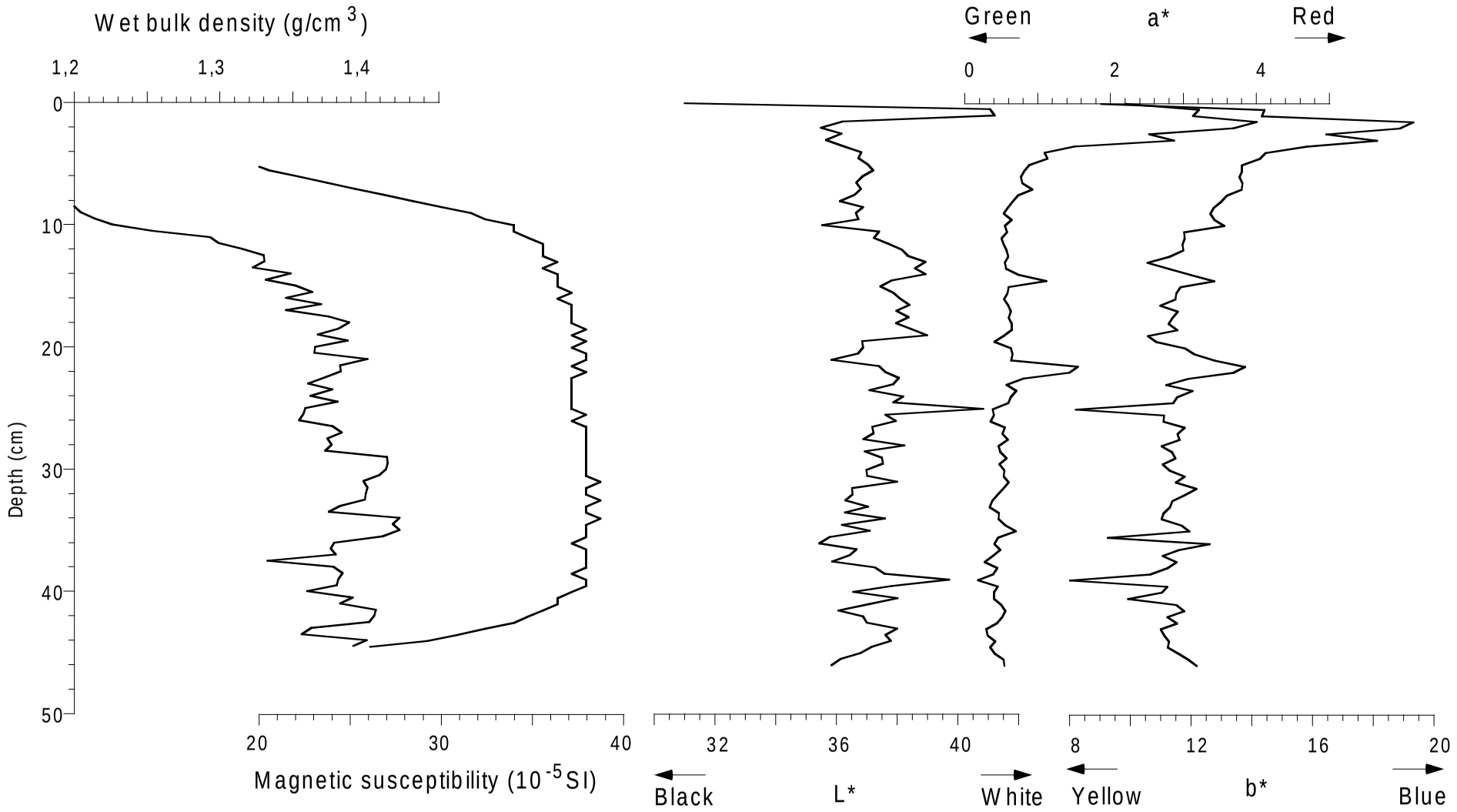


nte re or or lo ation o 2008029 055BC 056CTD 057PC 058 ater m in at 253 00 28 866m W D


Temperature (°C)
-2
-1
0
1
2
3
Salinity
30
31
32
33
34
35
Water depth (m)
0
100
200
300
400
500
600
700
800
900


2008029 055BC-A
2008029 055BC-B
2008029 055BC-C
2008029 055BC-D
2008029 055BC-E
2008029 055BC-F
Wet bulk density (g/cm3)
Magnetic susceptibility (10-5SI)
Depth (cm)

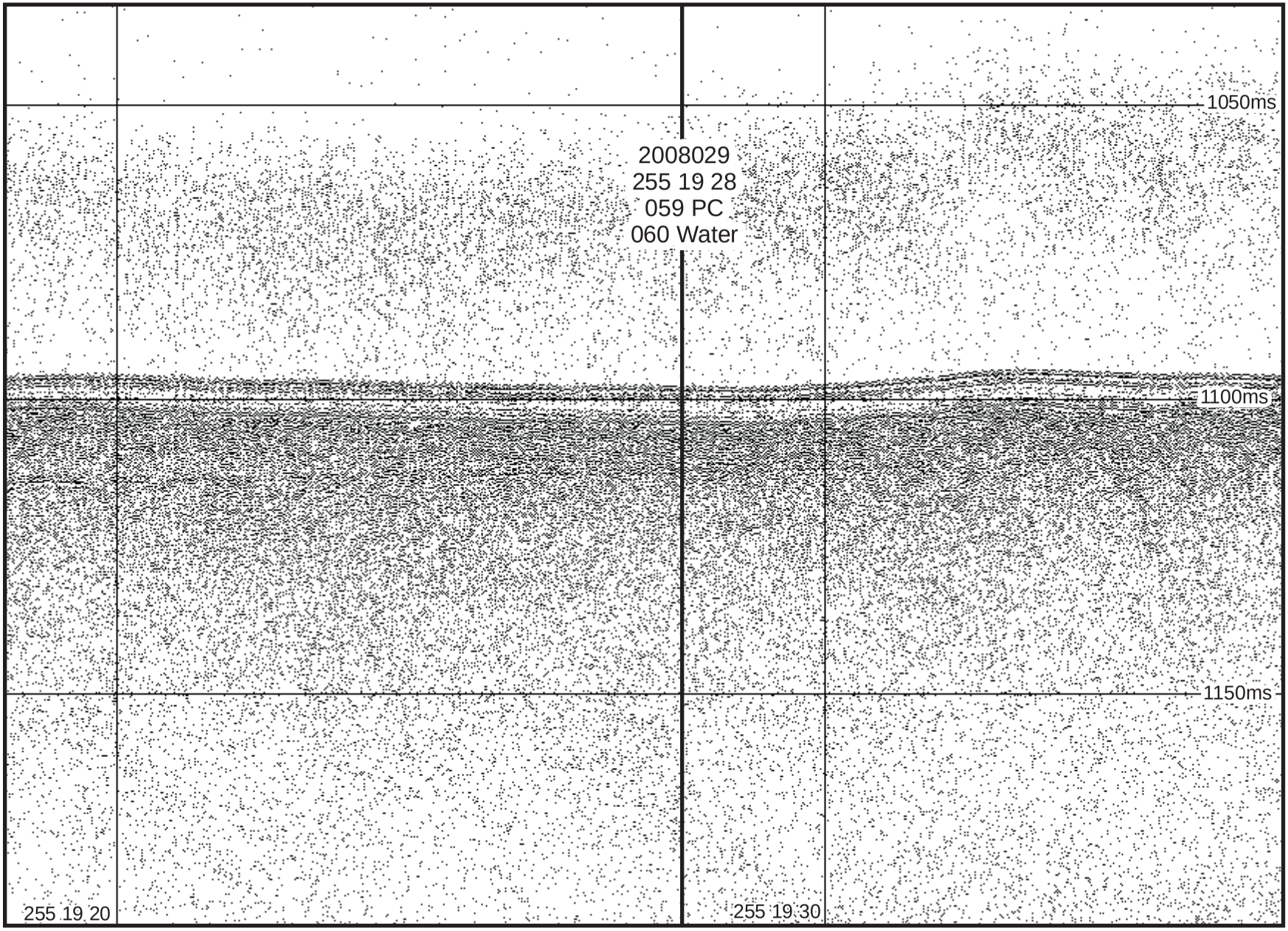
2008029 055BC-A



Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0059	Piston	256/1309	74.259623	-82.384150	800	Lancaster Sound	2008029	2551928	Huntec	21	1219	197.5	734
0060	Water	256/1413	74.252358	-82.379960	805	Lancaster Sound	2008029	2551928	Huntec	5			

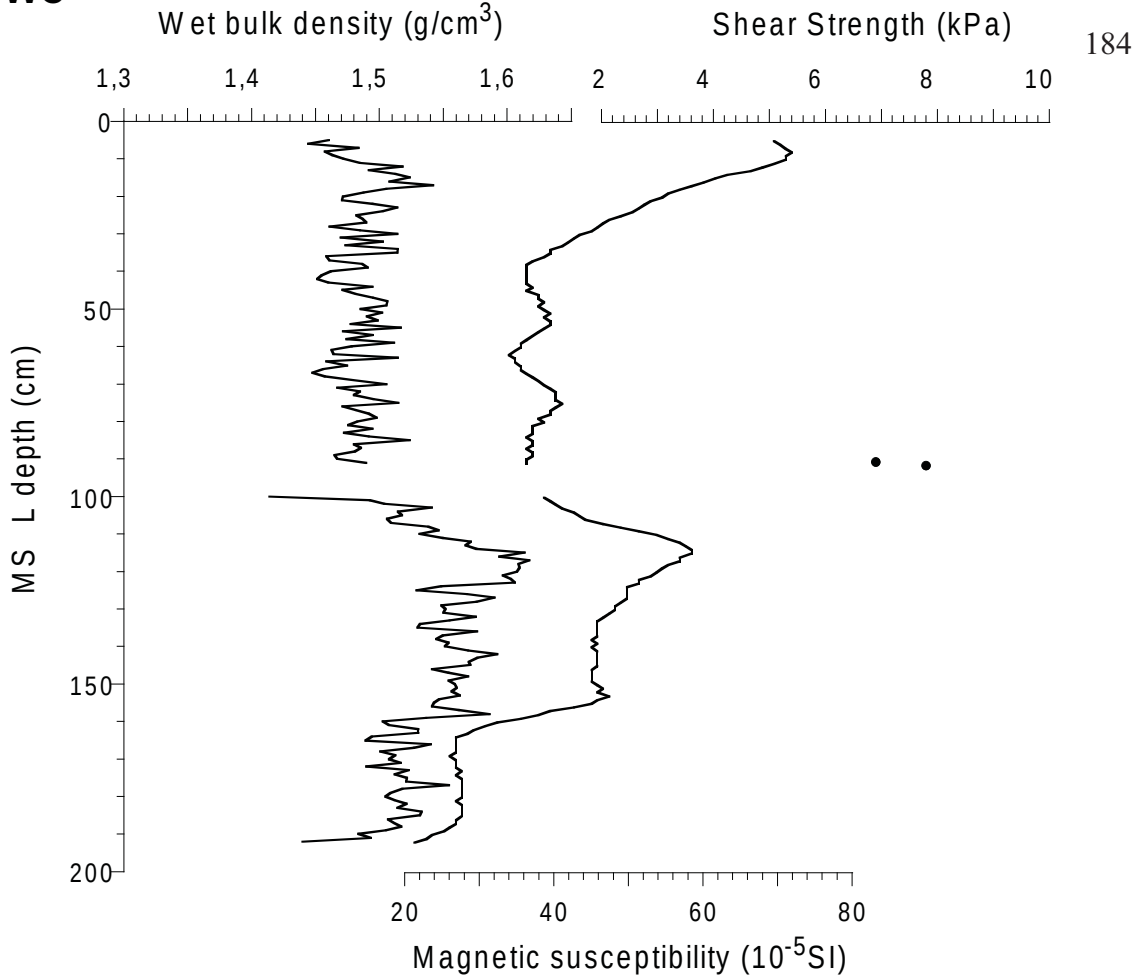
GSC Piston core not split.

2008 029 060 WP
One cast was made at 10. Filtrations were made for Nd and Th.

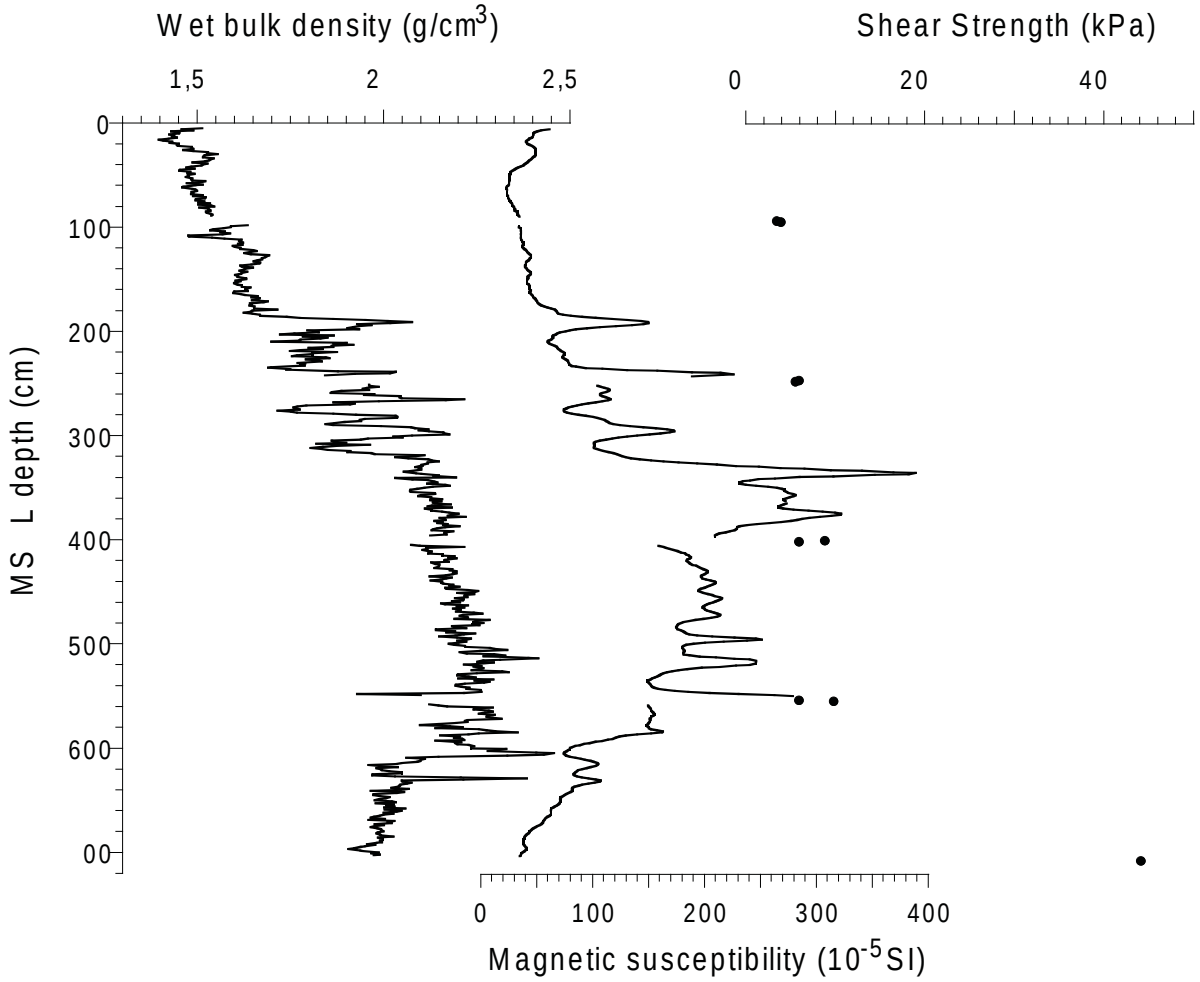


nte re or or lo ation o 2008029 059PC 060 ater m in at 255 19 28 800m W D

2008029 059TWC

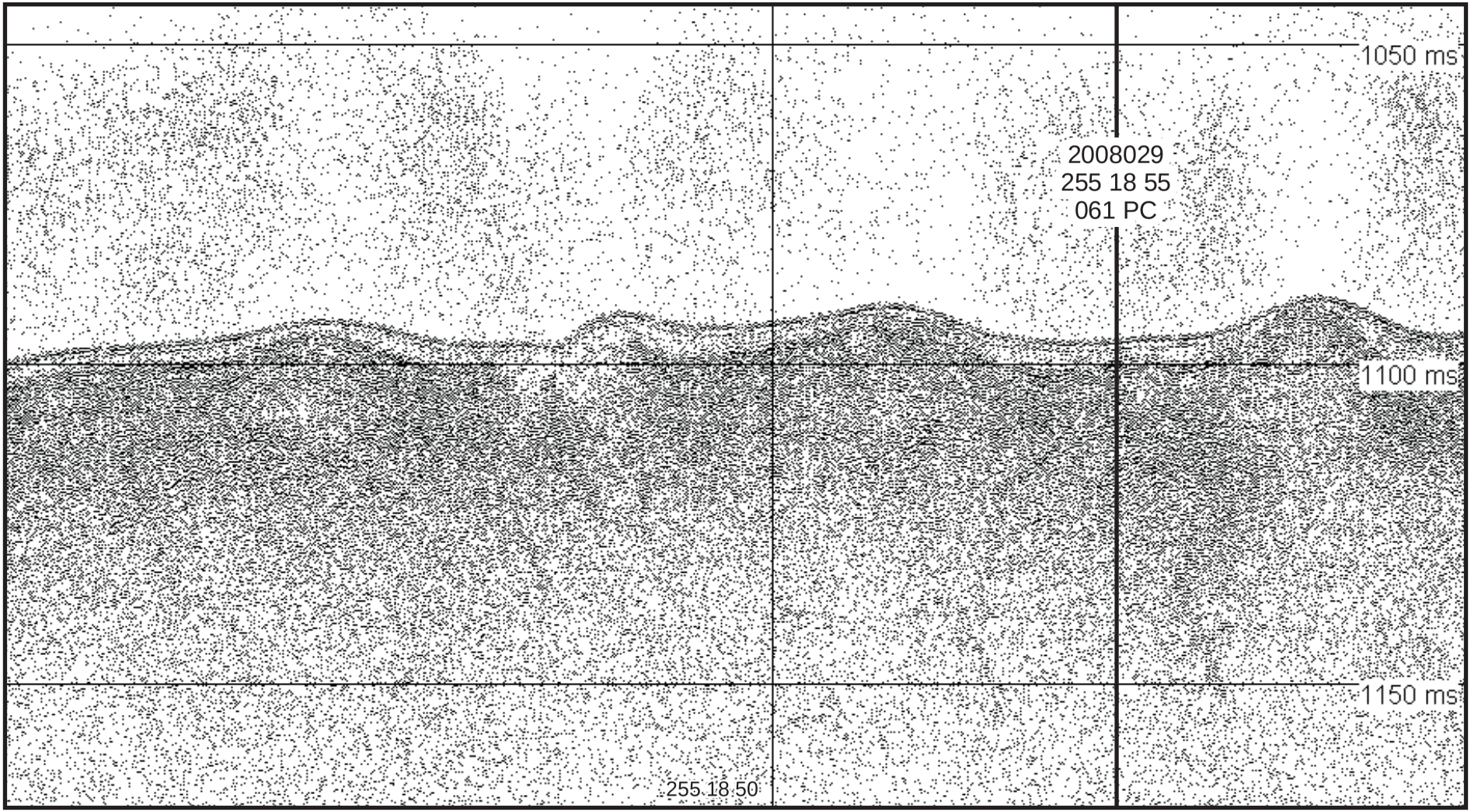


2008029 059PC



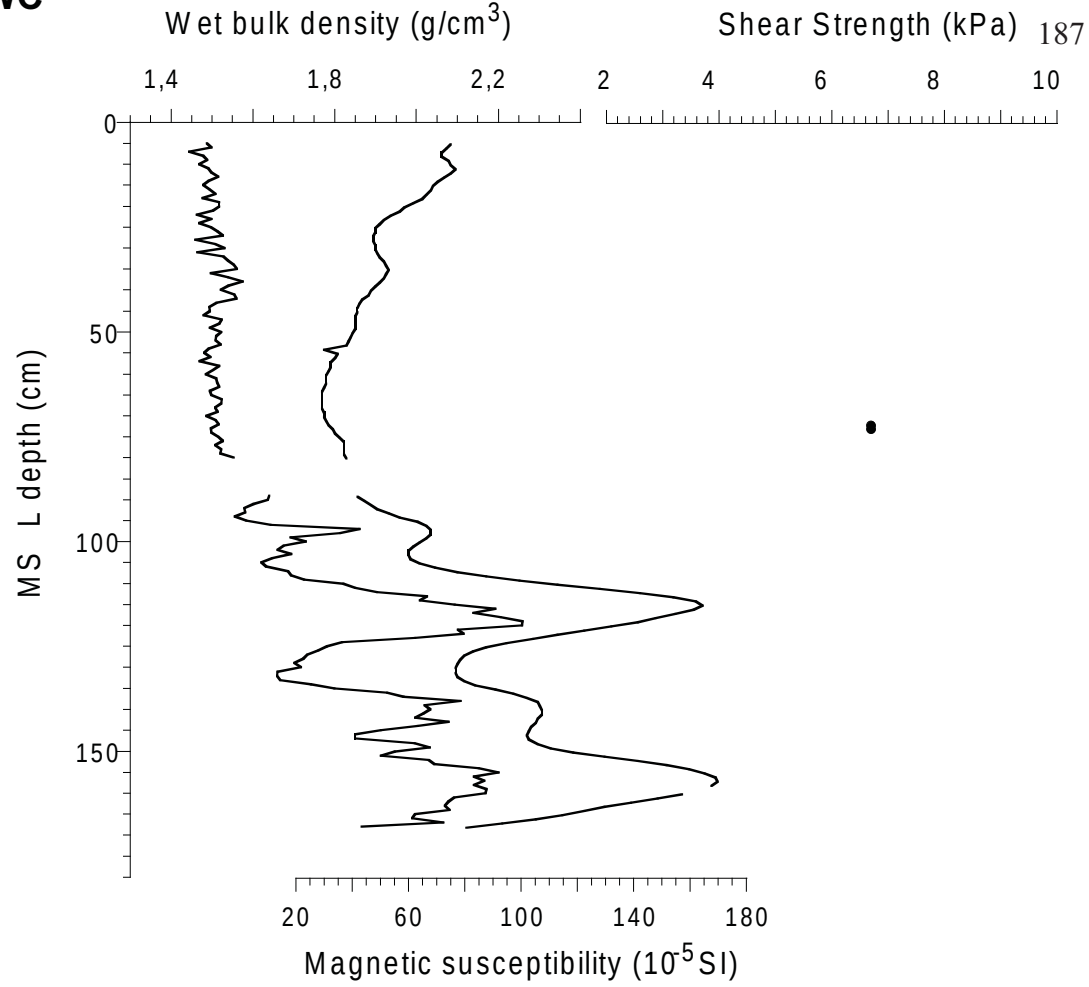
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0061	Piston	256/1641	74.258208	-82.230353	791	Lancaster Sound	2008029	2551855	Huntec	22	914.4	171.5	451

GSC Piston core not split.

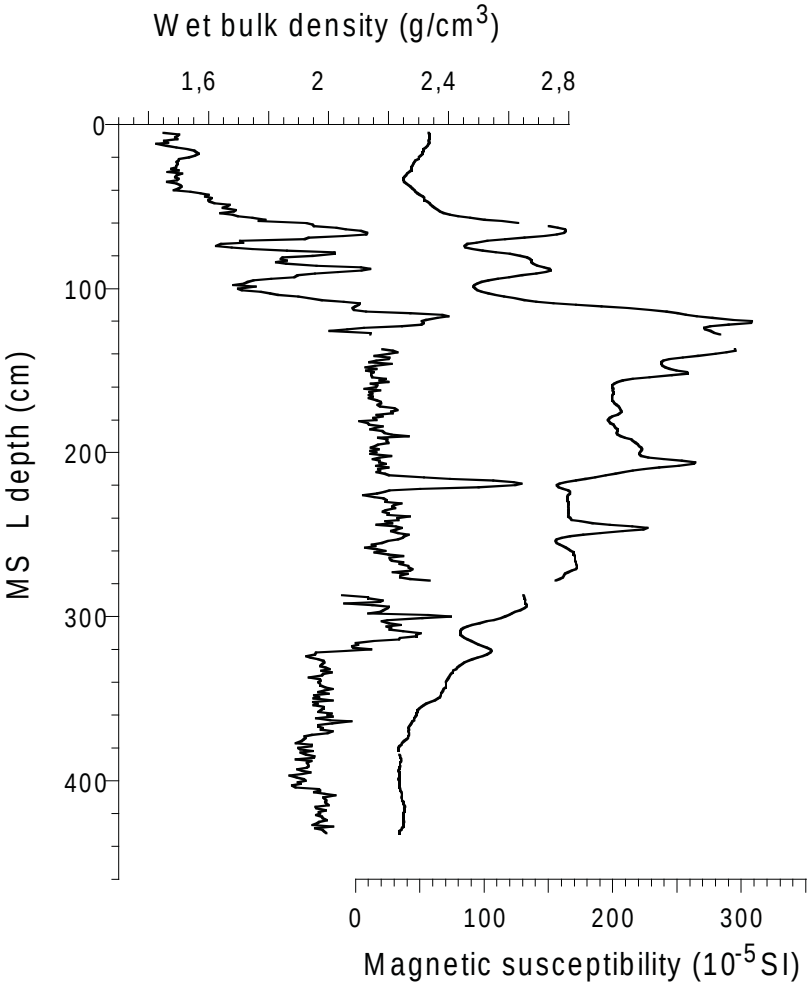


nte re or or lo ation o 2008029 061PC at 255 18 55 791m W D

2008029 061TWC

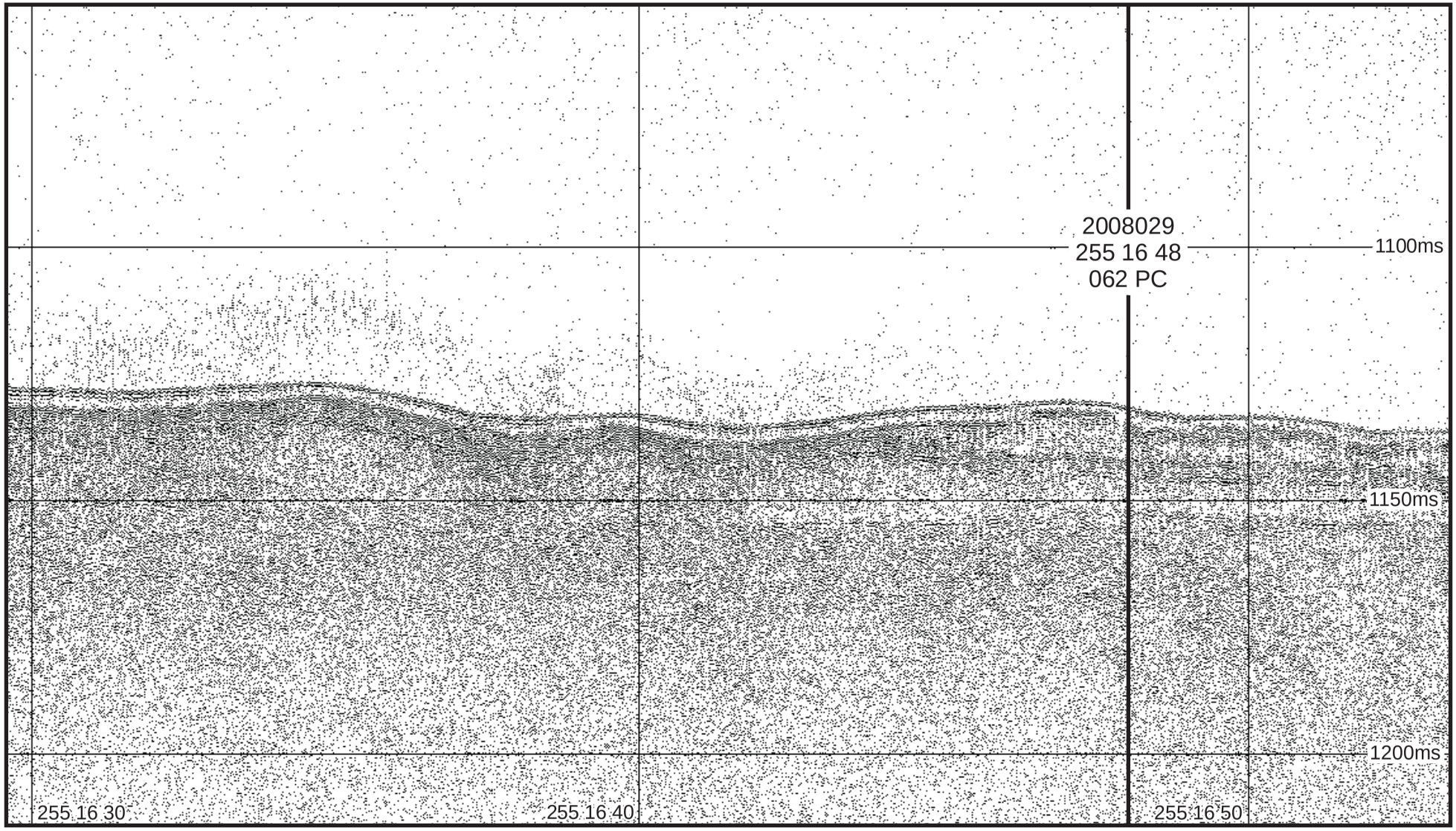


2008029 061PC



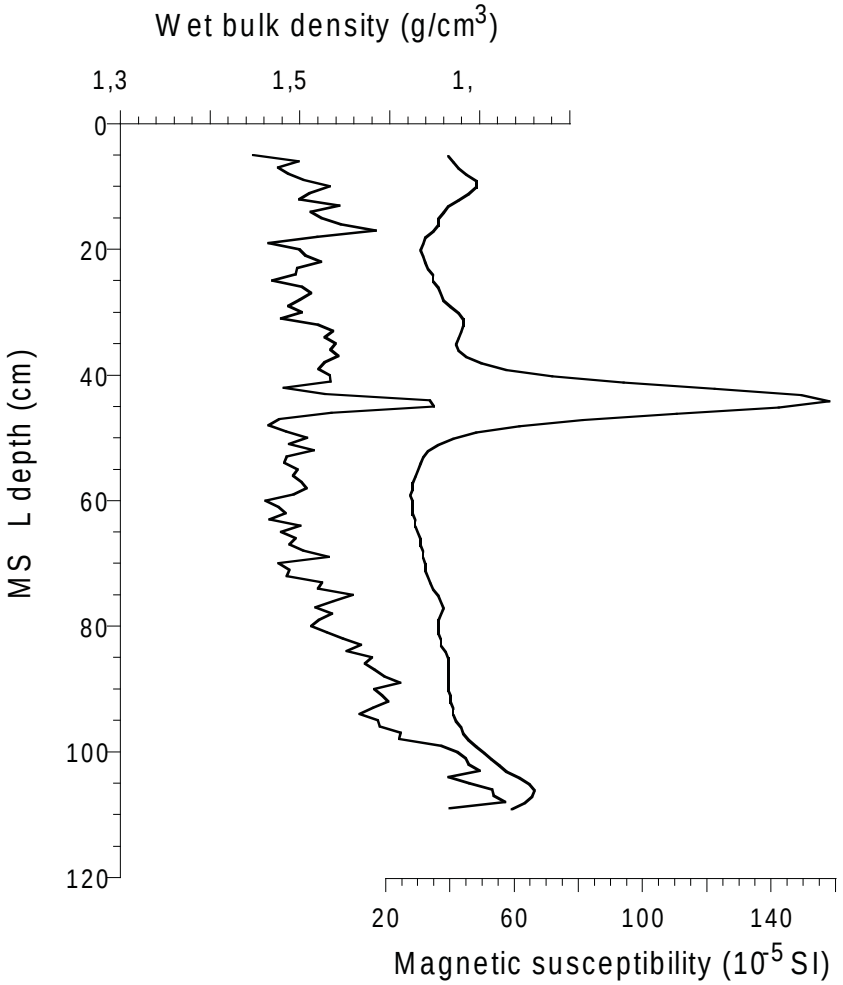
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0062	Piston	256/1906	74.252531	-81.634845	822	Lancaster Sound	2008029	2551648	Huntec	23	1219	113.5	76

GSC Piston core not split.

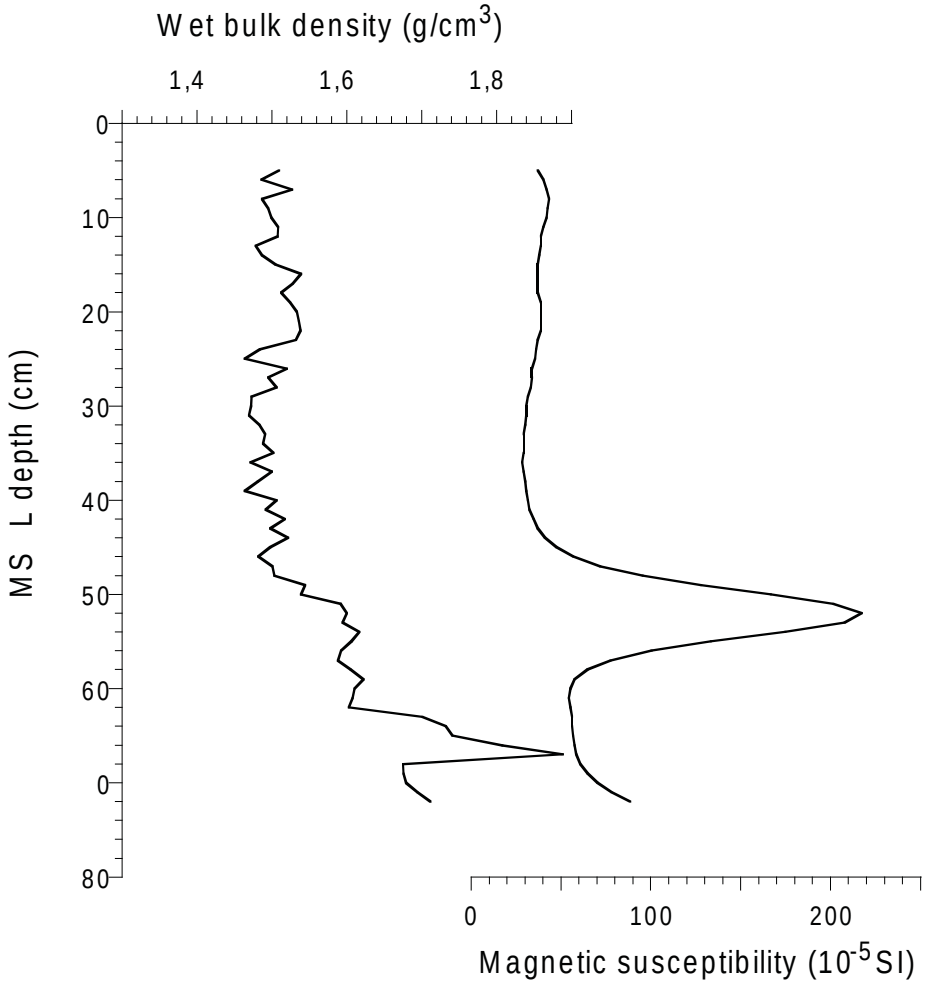


nte re or or lo ation o 2008029 062PC at 255 16 48 822m W D

2008029 062TWC



2008029 062PC

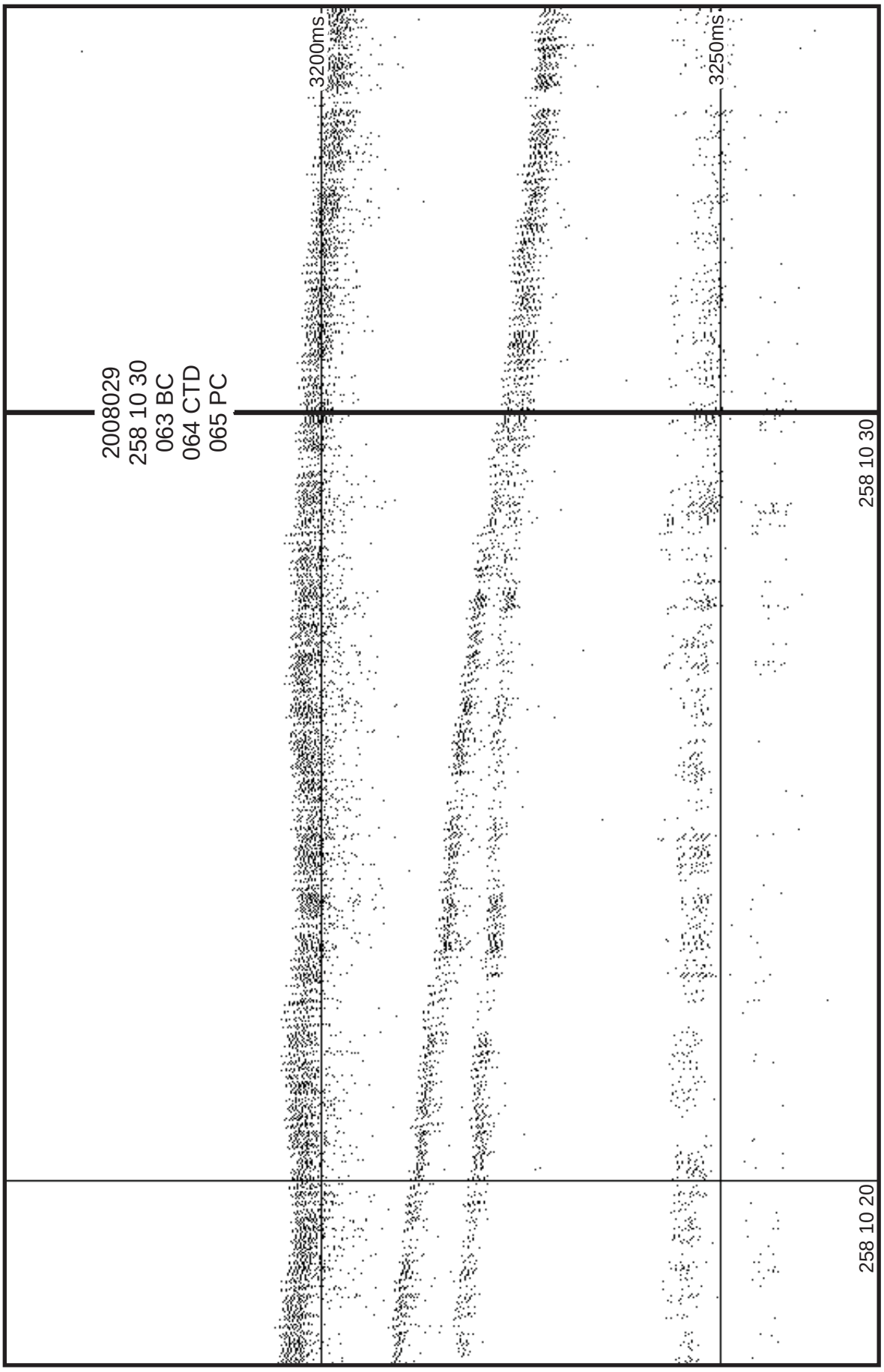


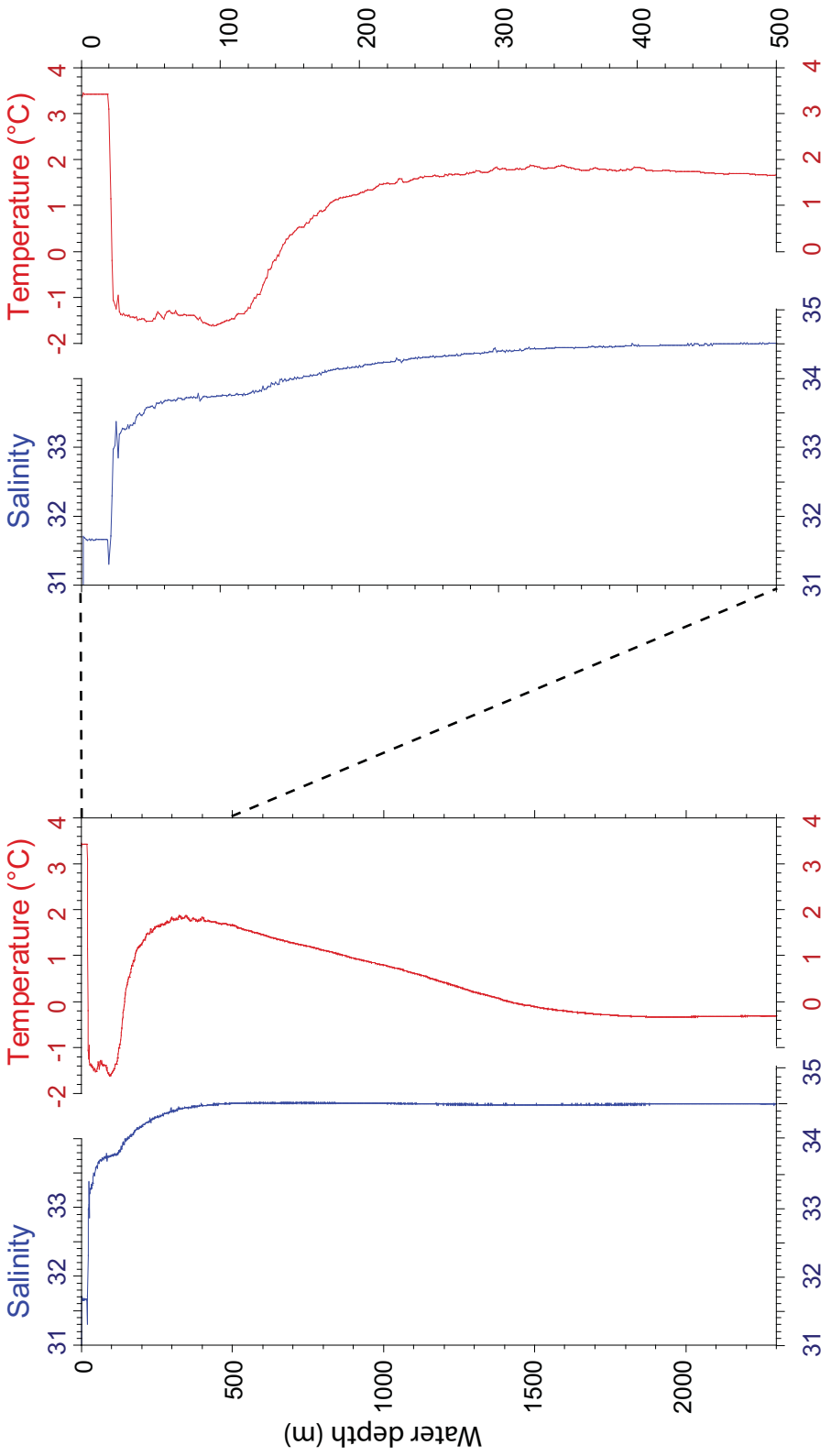
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0063	Box	258/1240	72.406388	-67.716695	2375	Baffin Bay	2008029	2581030	Huntec	13			
0064	CTD	258/1240	72.406388	-67.716695	2375	Baffin Bay	2008029	2581030	Huntec	13			
0065	Piston	258/1411	72.406403	-67.716385	2374	Baffin Bay	2008029	2581030	Huntec	24	1219	134.5	402

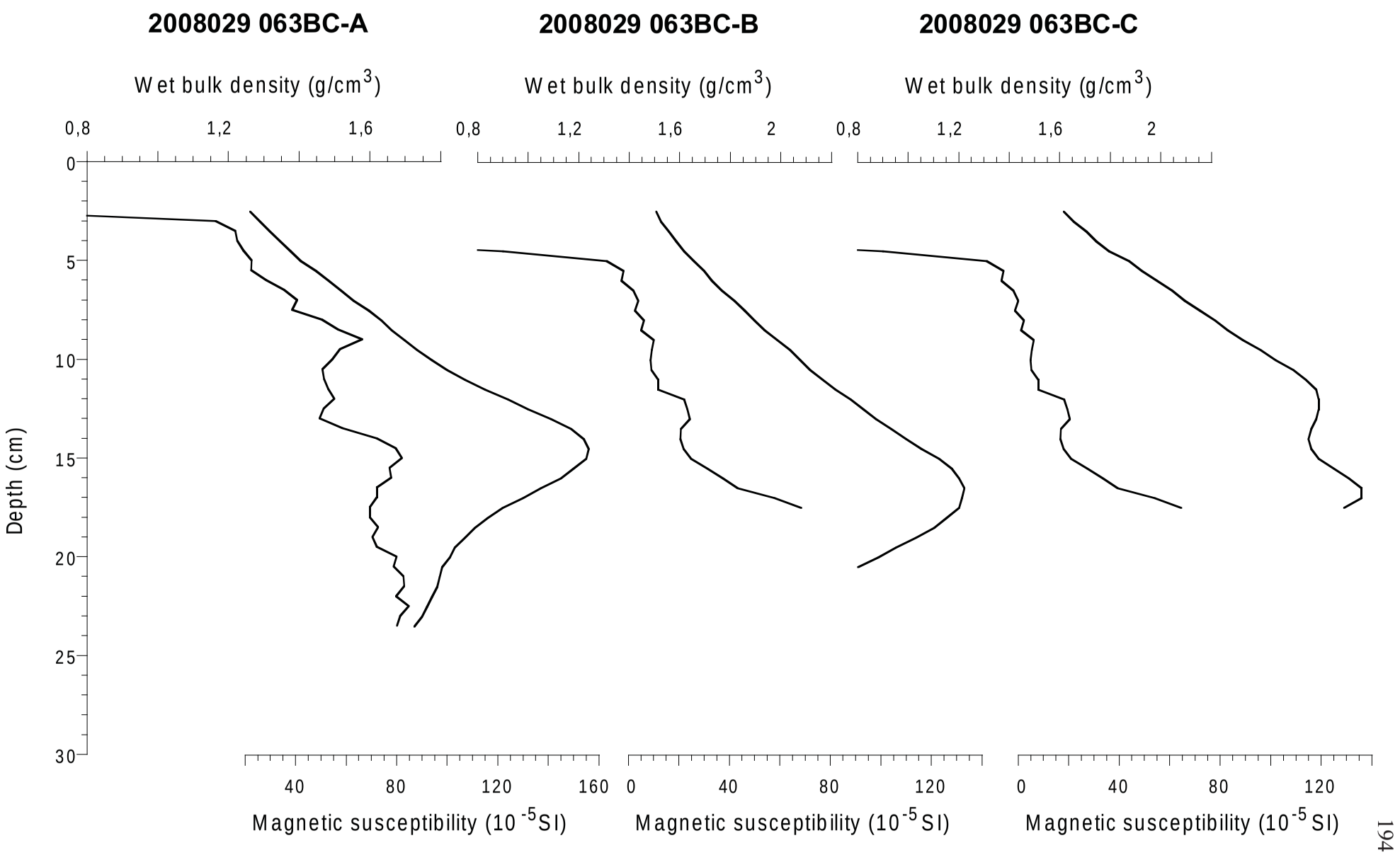
GSC Piston core not split.

Core 2008 029 063 BC (maximum length = 25.5 cm)
Visual description:
The surface consists in brownish mud with sand and gravel. The brownish layer is 10 cm thick and overlies dark greyish brown silty-sandy clay.
Sampling summary;
- Surface sediment : 0-3 mm
- Push core A: working half (0 -25.5 cm) sampled for paleomagnetism (u-channel) and at one cm for further micropaleontological and geochemical analyses.
- Push cores B and C sealed and archived vertically.

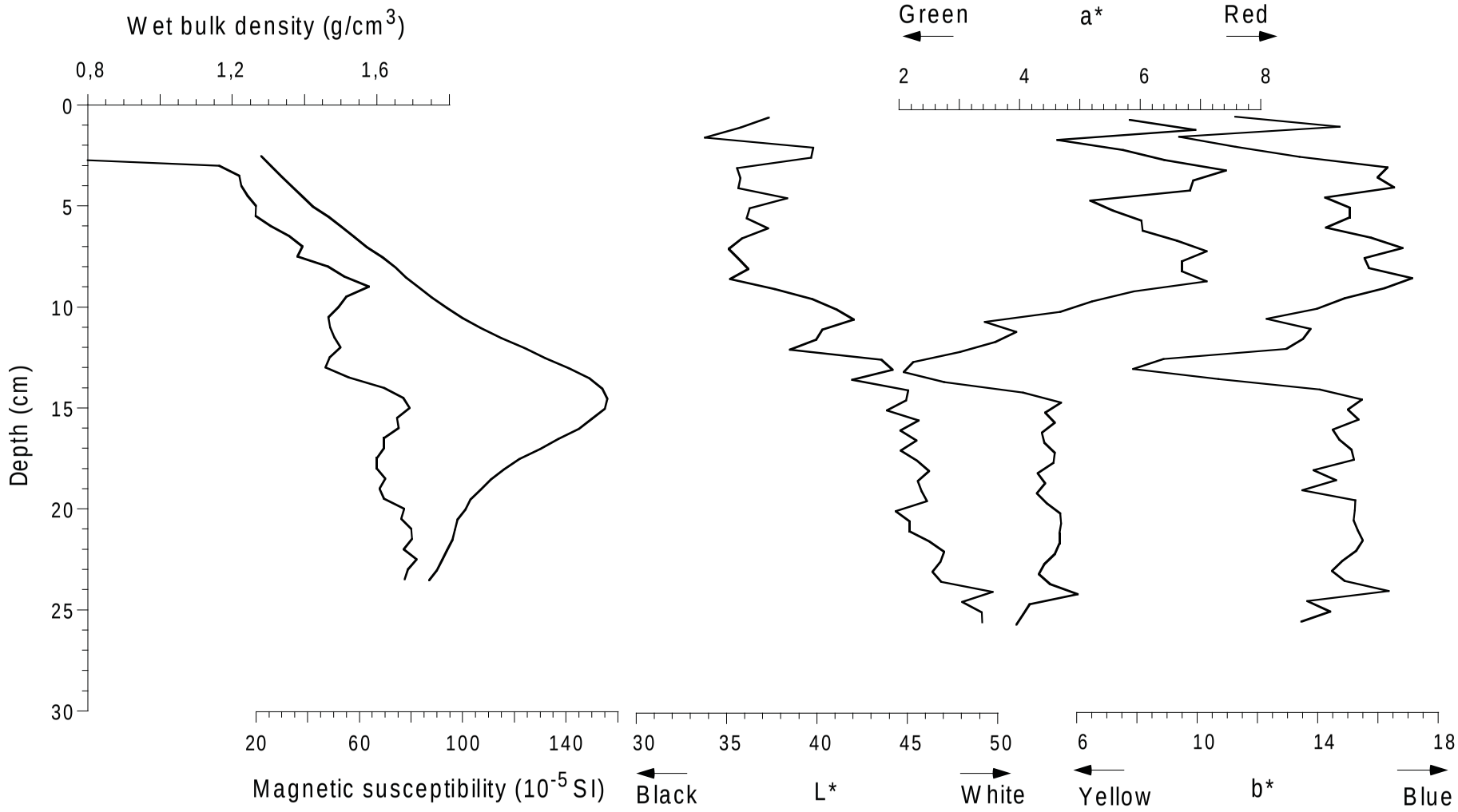
Core 2008 029 065 TWC (length = 135 cm)
Visual description:
The surface consists in dark yellowish brown mud overlying pale brown to brown silty clay down to about 29 cm. The lower part of the core consists in decimetric layers of massive sandy mud alternating with clayey mud.
Sampling summary:
- Working half sampled for paleomagnetism (u-channel) from 0 to 135 cm.


2008029
258 10 30
063 BC
064 CTD
065 PC
3200ms
3250ms
258 10 20
258 10 30
nte re or or lo ation o 2008029 063BC 064CTD 065PC at 258 10 30 2375m W D

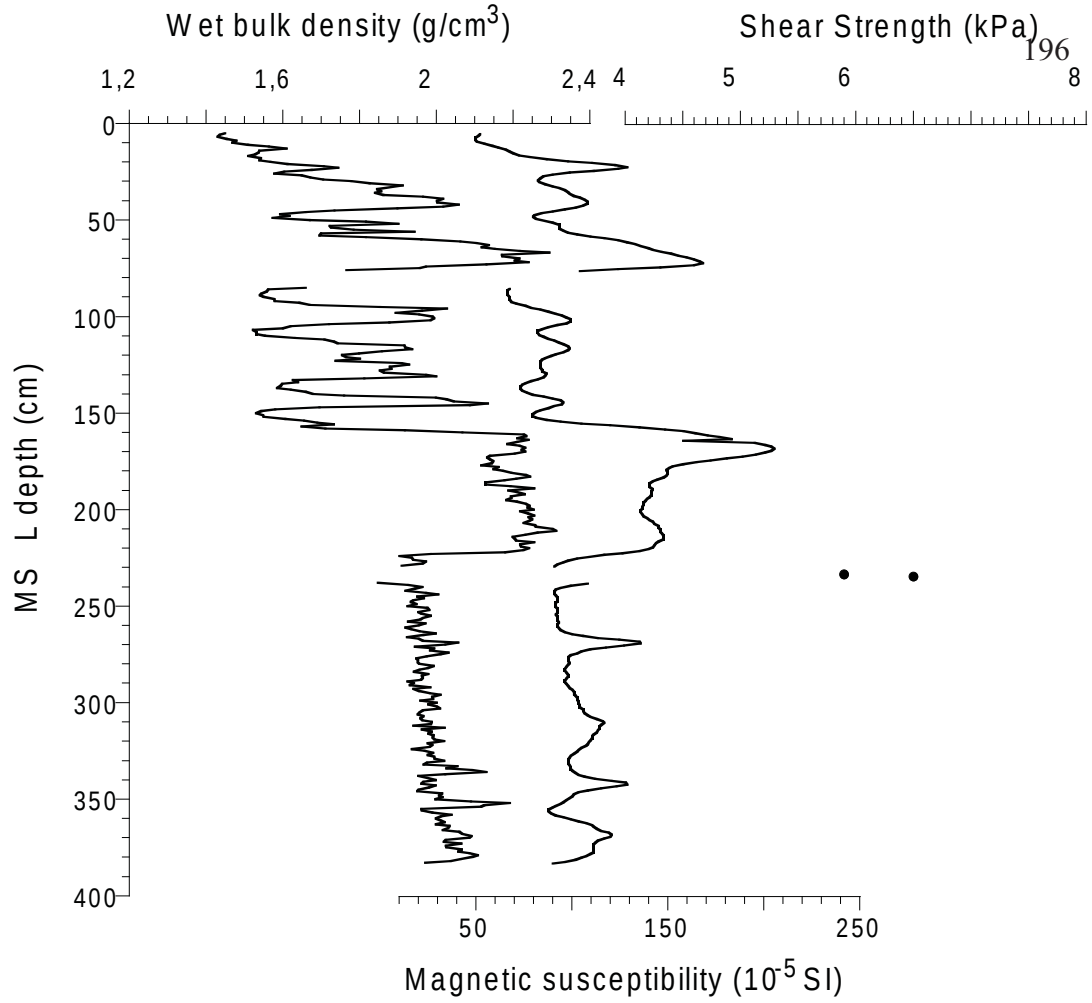

Temperature (°C)
Salinity
Water depth (m)
0
500
1000
1500
2000
100
200
300
400
500
-2
-1
0
1
2
3
4
31
32
33
34
35


2008029 063BC-A
2008029 063BC-B
2008029 063BC-C
Wet bulk density (g/cm3)
Wet bulk density (g/cm3)
Wet bulk density (g/cm3)
0,8
1,2
1,6
0,8
1,2
1,6
2
0,8
1,2
1,6
2
Depth (cm)
0
5
10
15
20
25
30
40
80
120
160
0
40
80
120
0
40
80
120
Magnetic susceptibility (10-5SI)
Magnetic susceptibility (10-5SI)
Magnetic susceptibility (10-5SI)

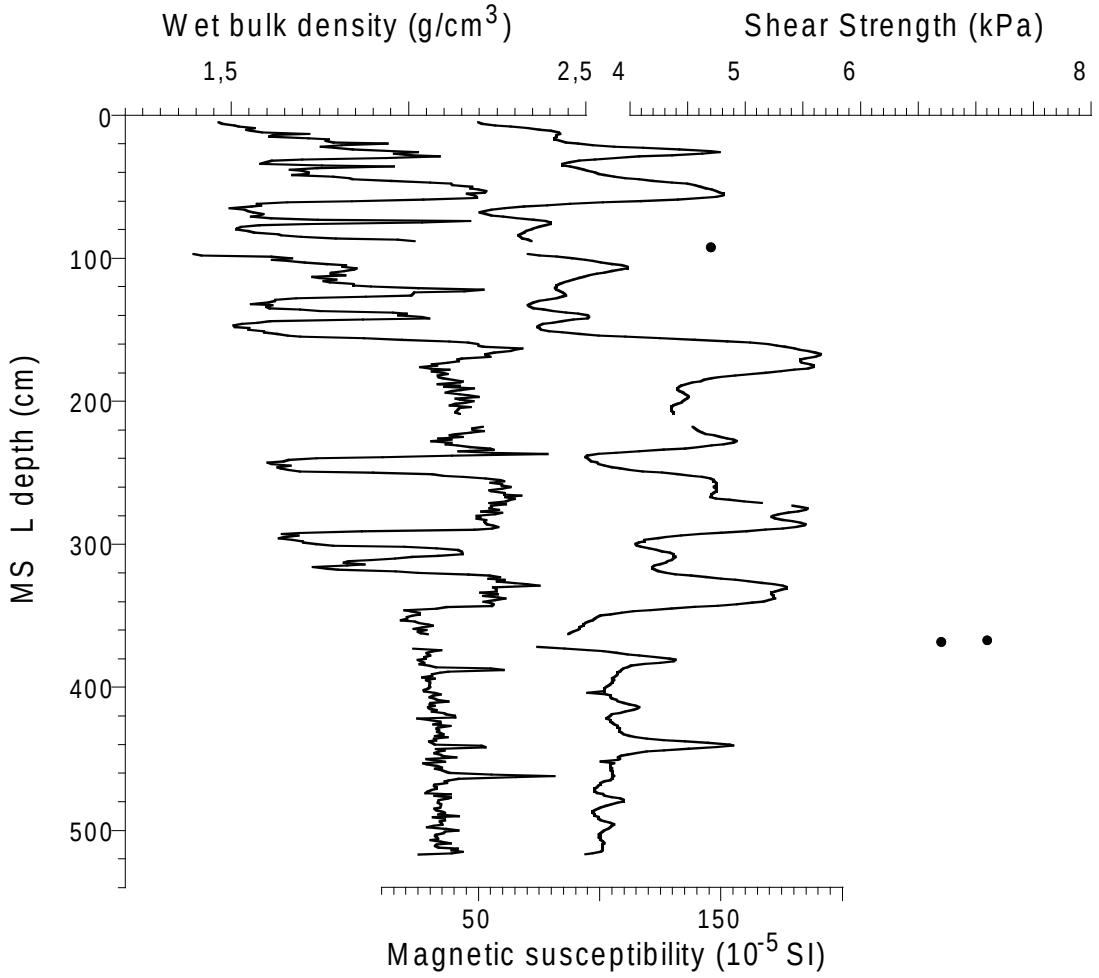
2008029 063BC-A



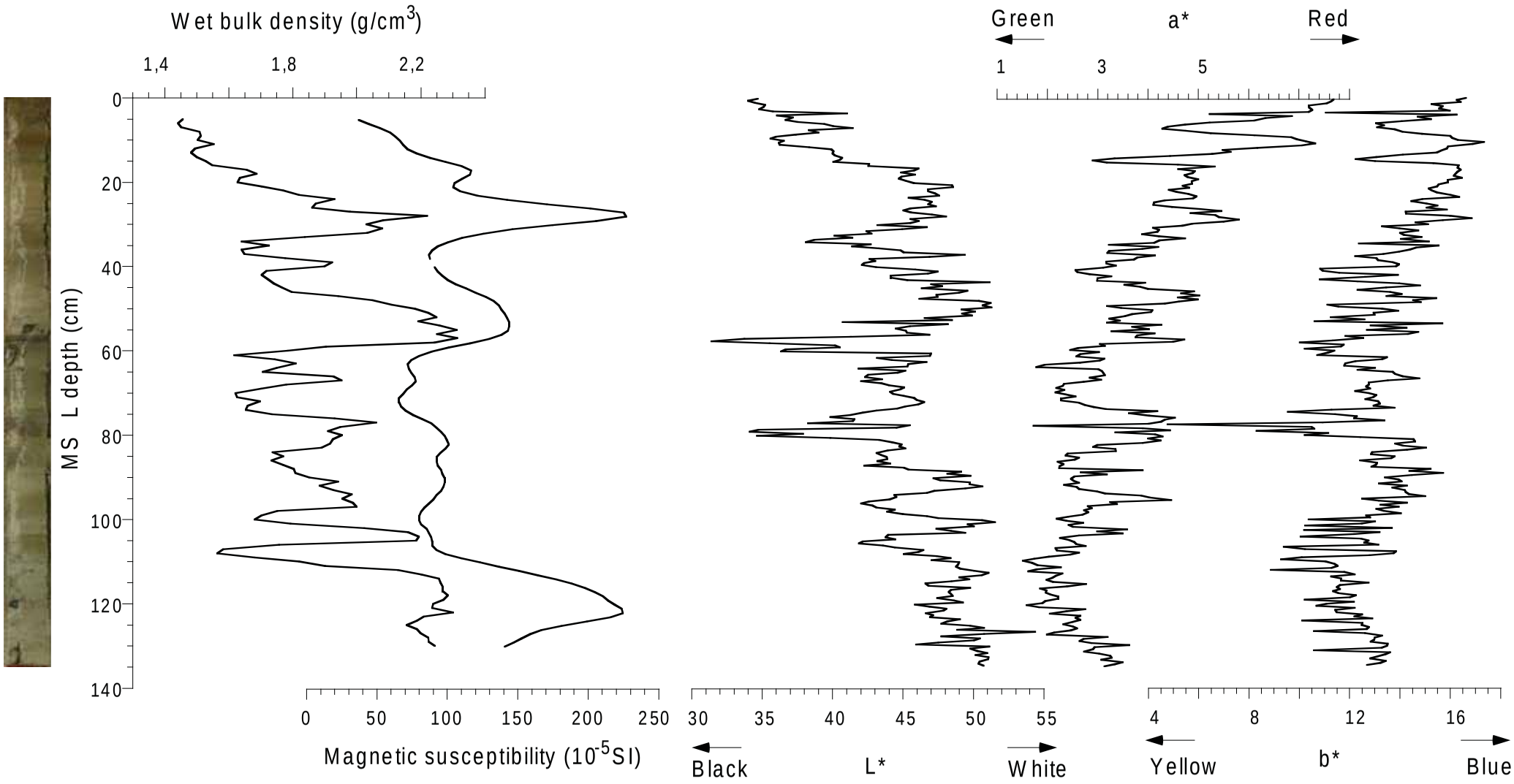
2008029 065PC



2008029 067PC



2008029 065TWC



Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0066	Box	258/1633	72.434508	-67.878181	2357	Baffin Bay	2008029	2580945	Huntec	14			
0067	Piston	258/1755	72.434431	-67.877178	2357	Baffin Bay	2008029	2580945	Huntec	25	1219	135	545.5

GSC Piston core not split.

Core 2008 029 066 BC (maximum length = 46.5 cm)

Visual description:

The surface consists in brownish mud with sand and gravel. The brownish layer in about 10 cm thick and overlies dark brown silty clay and greyish silty-sandy mud. .

The sediment in the core is deformed. The box corer was damaged when closing on rocks. In all push cores, a duplication of the brown surface layer is seen on the side between 19 and 31 cm. Because it is not possible to assess the part below 19 cm was not disturbed, only the upper 19 cm were subsampled at 1 cm interval.

Sampling summary;

- Surface sediment : 0-3 mm
- Push core A: working half (0 -46 cm) sampled for paleomagnetism (u-channel) and at one cm interval down to 19 cm for further micropaleontological and geochemical analyses.
- Push cores B: working half (0 -46 cm) sampled for paleomagnetism (u-channel) and at one cm interval down to 19 cm for further analyses.
- Push core C sealed and archived vertically.

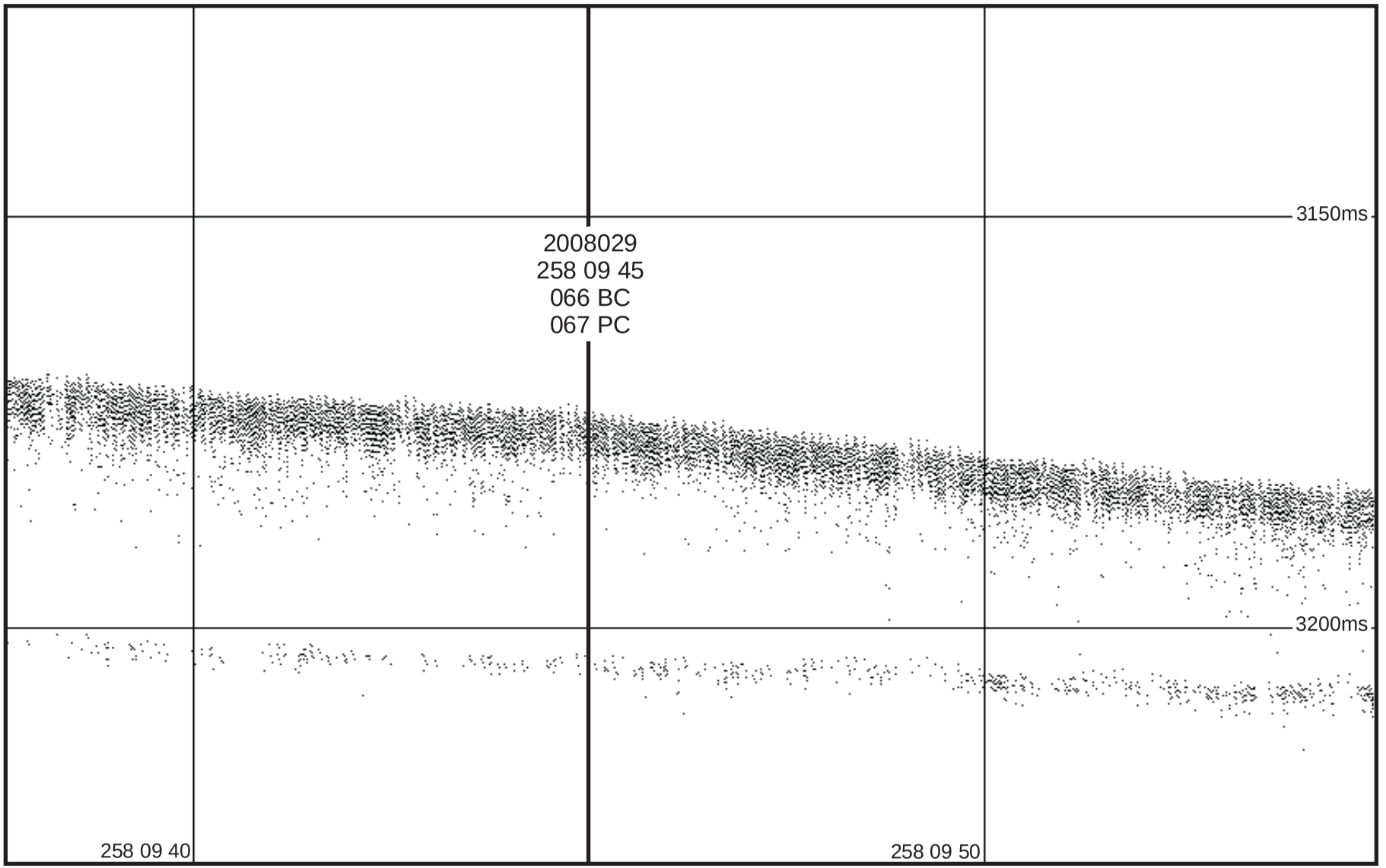
Core 2008 029 067 TWC (length = 134 cm)

Visual description:

The surface consists in dark yellowish brown mud over 4 cm overlying pale brown to brown silty clay down to about 33 cm. The lower part of the core consists in decimetric layers of massive sandy mud alternating with clayey mud.

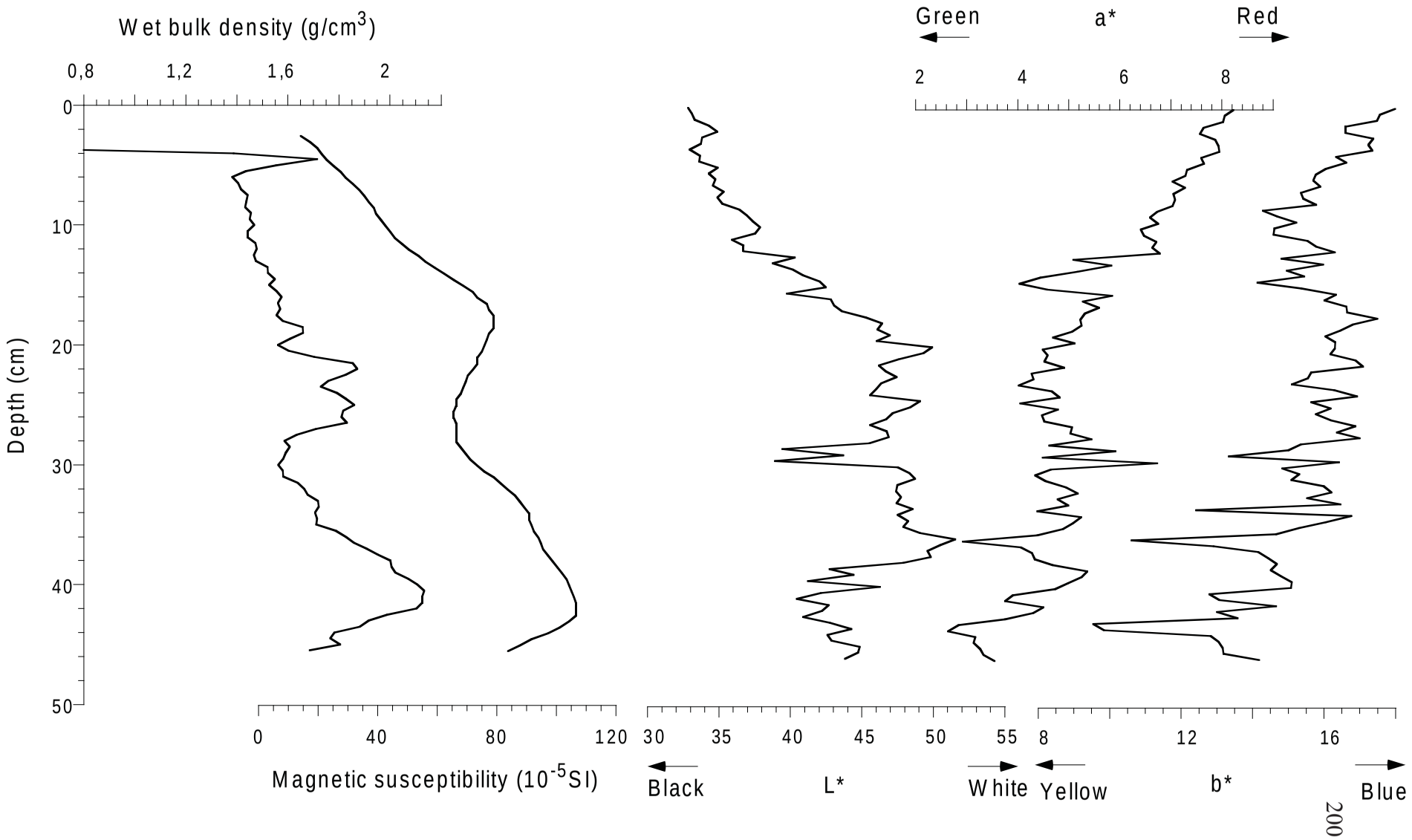
Sampling summary:

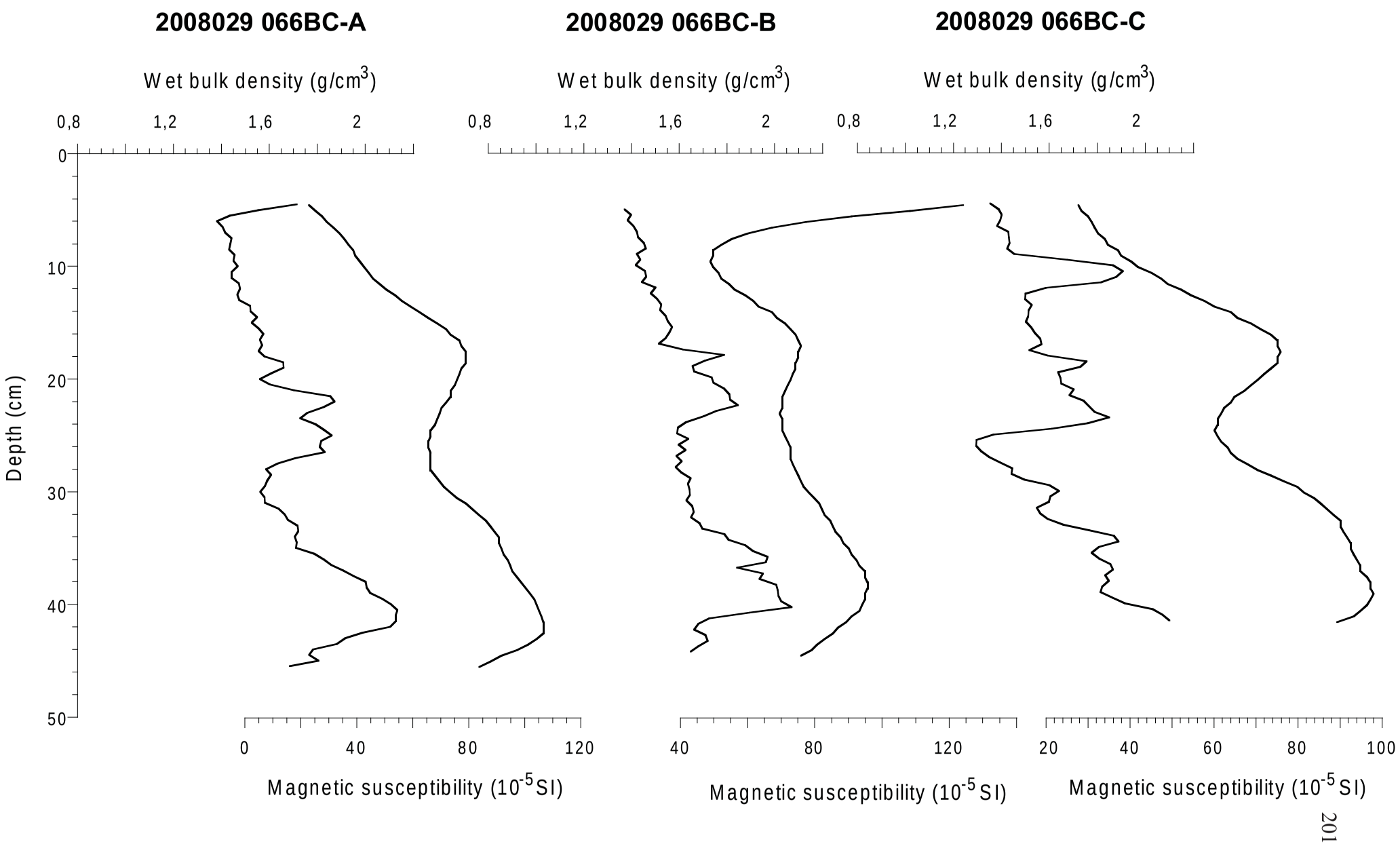
- Working half sampled for paleomagnetism (u-channel) from 0 to 134 cm.
- Sampling at 1-cm interval for micropaleontology and geochemistry (A. de Vernal, C. Hillaire-Marcel et al., ~ 30 cc) down to 134 cm. Note that 2 samples collected between 56 and 59 cm represent slices of 1.5 cm each.
- Pebbles at 77-79, 115-116, 128-129 cm



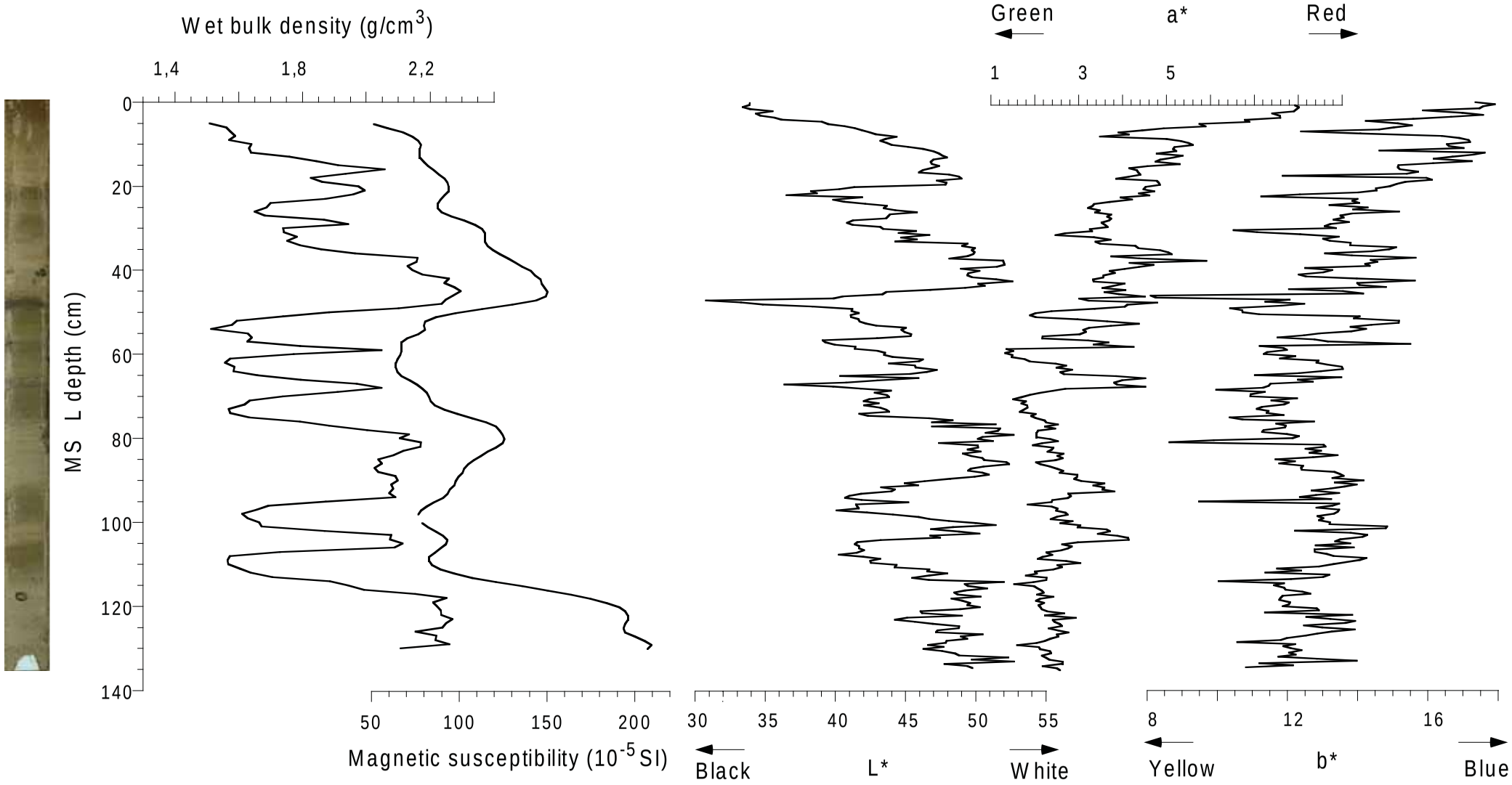
nte re or or lo ation o 2008029 066BC 067PC at 258 09 45 2357m W D

2008029 066BC-A




2008029 066BC-A
2008029 066BC-B
2008029 066BC-C
Wet bulk density (g/cm3)
0,8
1,2
1,6
2
Depth (cm)
0
10
20
30
40
50
0
40
80
120
Magnetic susceptibility (10-5 SI)
20
60
100

2008029 067TWC



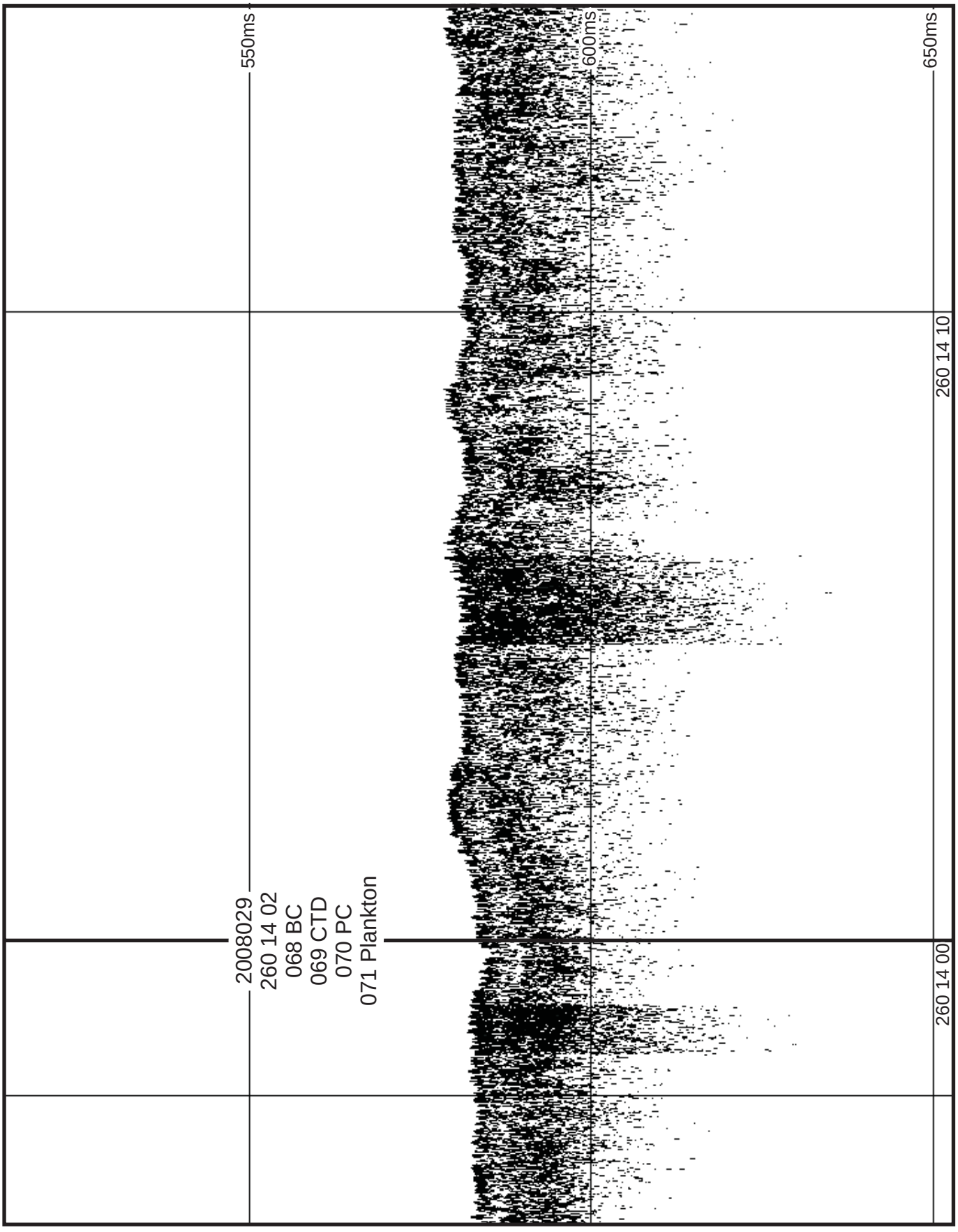
Station No.	Sample Type	Day/Time (UTC)	Latitude	Longitude	Water Depth (m)	Location	Cruise	Day/Time (UTC)	Seismic Instr		Corer Length (cm)	TWC length (cm)	PC length (cm)
0068	Box	260/1642	68.228150	-57.618065	437	Off Disko Bugt	2008029	2601402	3.5kHz	15			
0069	CTD	260/1642	68.228150	-57.618065	437	Off Disko Bugt	2008029	2601402	3.5kHz	14			
0070	Piston	260/1718	68.227880	-57.617460	444	Off Disko Bugt	2008029	2601402	3.5kHz	26	1219	212	249.5
0071	Plankton	260/1806	68.228068	-57.624530	441	Off Disko Bugt	2008029	2601402	3.5kHz	11			

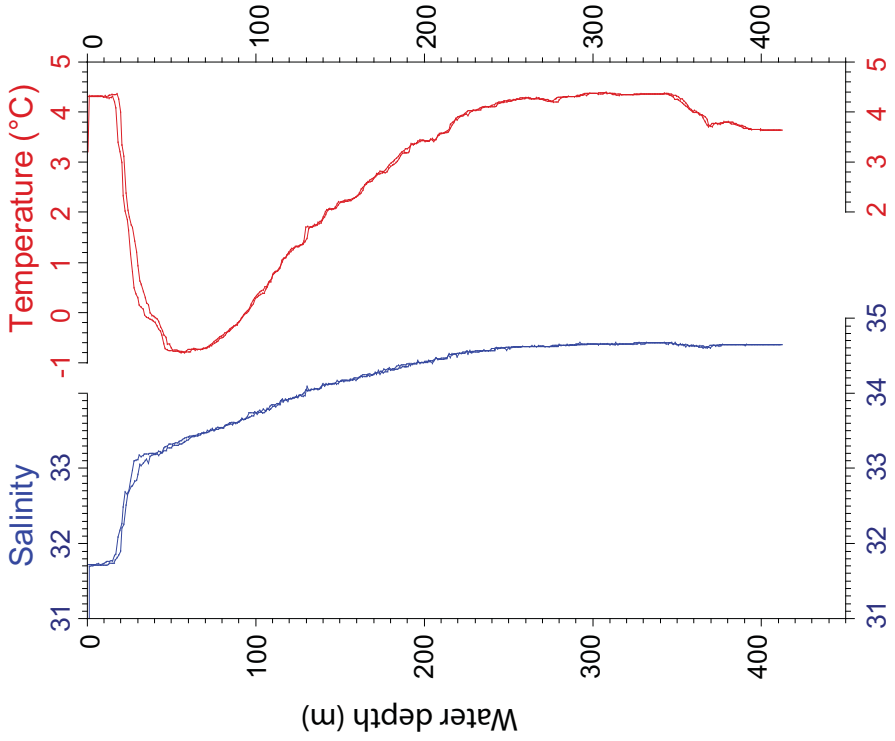
Core 2008 029 068 BC (maximum length = 41 cm)
Visual description :
The surface consists in olive grey clayey mud with worm tubes. Below the surface, the sediment is uniform and consists in olive gray silty clay. Living worms observed down to 26 cm when doing subsampling by extrusion.
Sampling summary :
- Surface sediment: 0-3 mm
- Push core E : sampling by extrusion, from 0 to 39 cm at 1 cm interval
- Push core F : sampling by extrusion, from 0 to 40 cm at 1 cm interval
- Push core B : working half sampled for paleomagnetism (U-channel) from 0 to 41 cm.
- Push cores A, C, D sealed and archived vertically

Core 2008 029 070 TWC (length = 210.5 cm)
Visual description :
The sediment consists in olive gray silty clay with black mottles.
Sampling summary :
- working half sampled for paleomagnetism (U-channel) from 0 to 210.5 cm.
- Sampling at 10-cm interval (slices of 1 cm over 2 cm) in the working half. Samples taken for foraminifers and their geochemical composition (U. Quillman; 40 cc + 10 cc), XRD and grain size (J. Andrews;10 cc), palynology (A. de Vernal; 10 cc) and particle size (E. Kilfeather; 10 cc).
- Shell fragments at 81-82, 83-84 and 84 cm
- Entire pelecypod shell at 172 cm

Core 2008 029 070 PC (length = 254 cm)
Visual description :
The sediment consists in olive gray to dark olive gray silty clay with black mottles down to 210 cm. The lower part of the core consists in sand layers alternating with dark olive gray silty clay.
Sampling summary :
- working half sampled for paleomagnetism (U-channel) from 0 to 250 cm.
- Sampling at 10-cm interval (slices of 1 cm over 2 cm) in the working half. Samples taken for foraminifers and their geochemical composition (U. Quillman; 40 cc + 10 cc), XRD and grain size (J. Andrews;10 cc), palynology (A. de Vernal; 10 cc) and particle size (E. Kilfeather; 10 cc).
- Two valves of pelecypod shell at 208-210 cm
- Shell fragments at 142-144.5, 169-170, 186-187, 188-189, 209-211 cm.

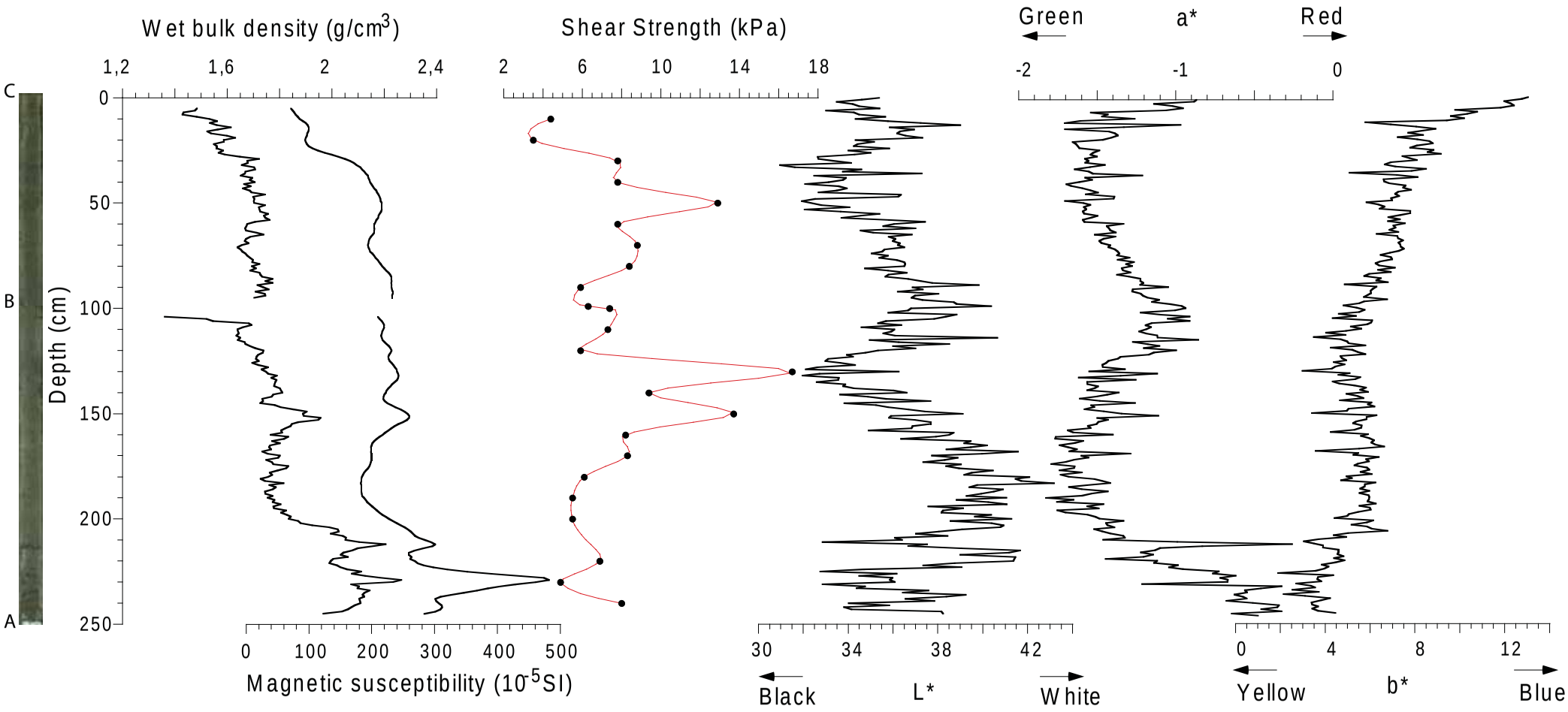
2008 029 0071 PT
A-B (50-0 m)
C-D (300-0 m)

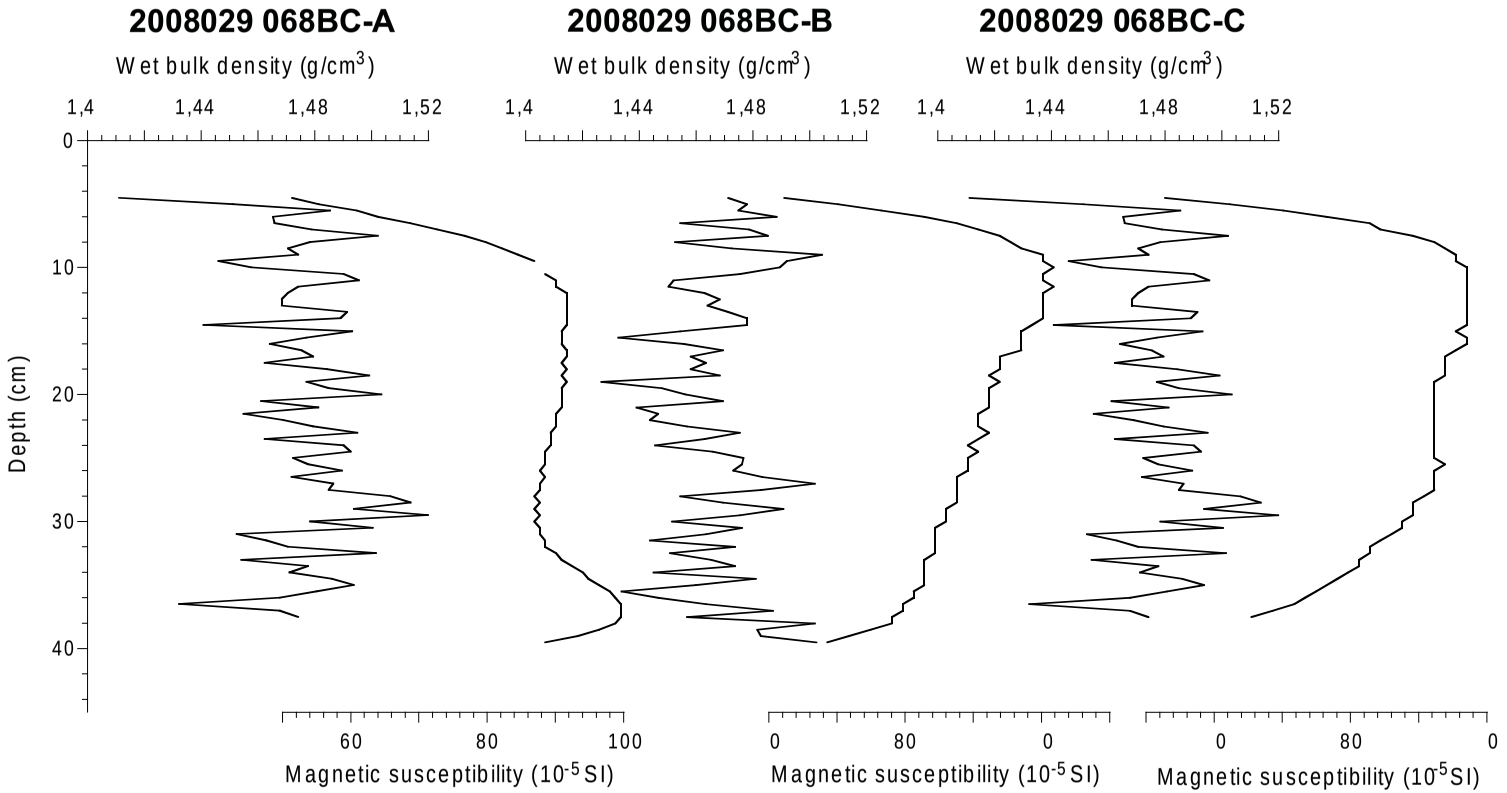

550ms
600ms
650ms
2008029
260 14 02
068 BC
069 CTD
070 PC
071 Plankton
260 14 00
260 14 10
nte re or or lo ation o 2008029 068BC 069CTD 070PC 071 lankton to at 260 14 02 437m W D

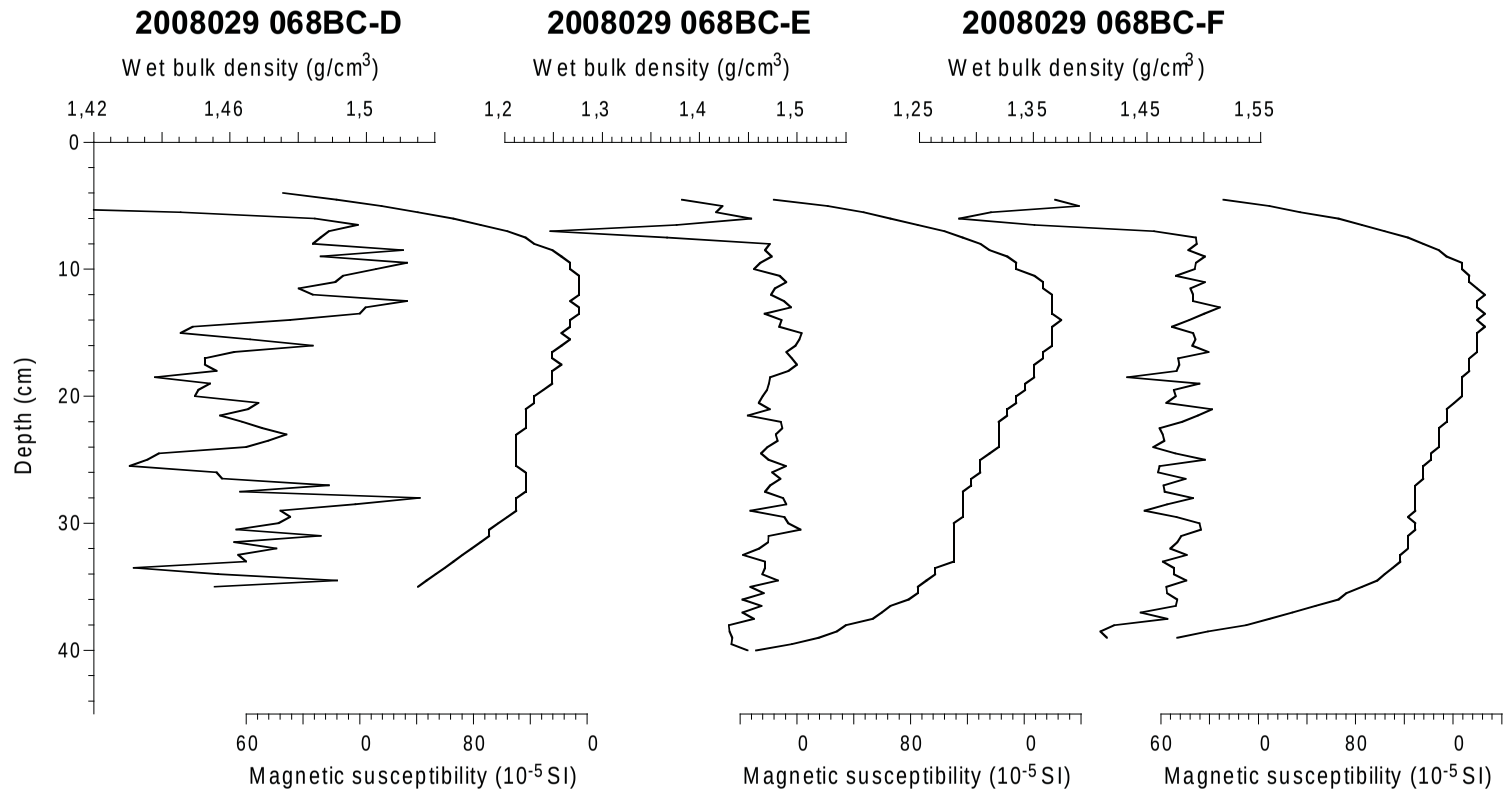

Temperature (°C)
Salinity
Water depth (m)
0
100
200
300
400
-1
0
1
2
3
4
5
31
32
33
34
35


2008029 070
TWC-BC
TWC-AB
PC-BC
PC-AB
0 cm
103
0
99
103 cm
208
99
245
0
50
100
150

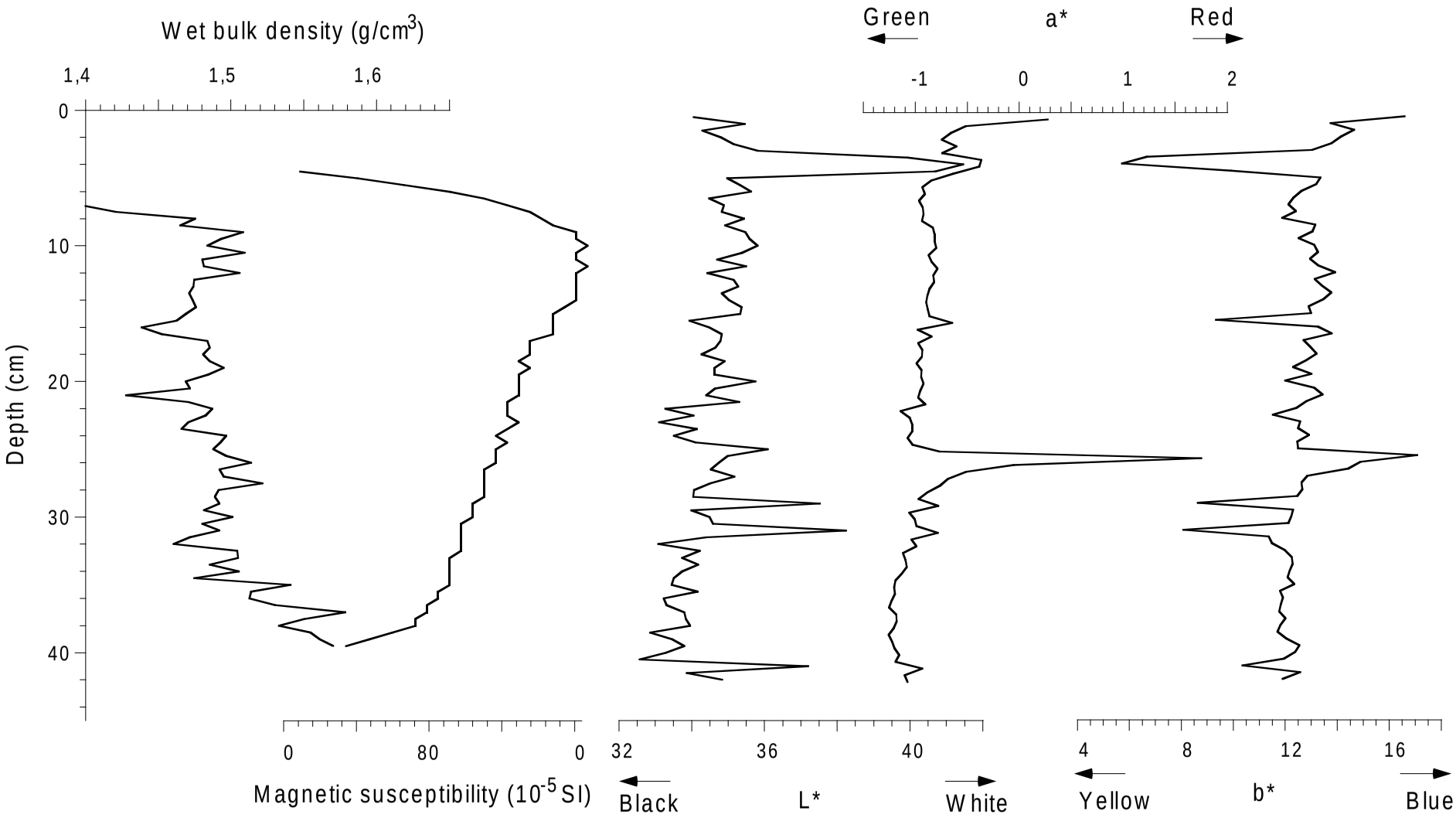
2008029 070PC




2008029 068BC-A
2008029 068BC-B
2008029 068BC-C
Wet bulk density (g/cm3)
1,4
1,44
1,48
1,52
Depth (cm)
0
10
20
30
40
60
80
100
0
Magnetic susceptibility (10-5 SI)


2008029 068BC-D
2008029 068BC-E
2008029 068BC-F
Wet bulk density (g/cm3)
1,42
1,46
1,5
1,2
1,3
1,4
1,25
1,35
1,45
1,55
Depth (cm)
0
10
20
30
40
60
80
0
Magnetic susceptibility (10-5 SI)

2008029 068BC-B



2008029 070TWC