Institut Polaire Français

Paul-Émile Victor

Les rapports de campagnes à la mer

MD 126 / MONA

(Marges Ouest Nord Américaines)

IMAGES VIII

à bord du Marion Dufresne

Leg 1 : Vancouver (Canada), 30/05/2002
to San Diego (USA), 06/06/2002

Leg 2 : San Diego (USA), 07/06/2002
to Panama, 26/06/2002

Chef de Mission : Luc Beaufort (France)

Réf : OCE/2002/03

The International Marine Past Global Changes Study
images

Institut Polaire Français - Paul-Emile Victor (IPEV)
Technopôle Brest-Iroise - B.P. 75 - 29280 Plouzané - France -
Tél : 33 (0)2 98 05 65 00 - Fax : 33 (0)2 98 05 65 55

IPEV
INSTITUT POLAIRE FRANÇAIS
Paul Emile Victor

Institut Polaire Français
Paul-Émile Victor

Les rapports des campagnes à la mer

Cruise Report

<u>Leg 1 :</u> **Vancouver (Canada), 30/05/2002**
To San Diego (USA), 06/06/2002

<u>Leg 2 :</u> **San Diego (USA), 08/06/2002**
To Panama 24/06/2002

Luc Beaufort and the members of the scientific party, edited by Stefan Rothe

Institut Polaire Français Paul-Emile Victor (IPEV)
Technopôle Brest-Iroise – B.P. 75 – 29280 Plouzané – France
Tél : 0033 (0)298 05 65 00 – Fax : 0033 (0)298 05 65 55

Table of Content

1. Introduction

The MONA (**M**argins **O**f **N**orth **A**merica) Cruise from Vancouver (Canada) to Panama on board the French research vessel “Marion Dufresne” took place between May 27 and June 24. One port call was held in San Diego (USA). A third of the shipboard scientific party was changed there. Co-chief scientists were L. Beaufort and T. Pedersen for the first part and L. Beaufort and M.-L. Machain-Castillo for the second part. The ship and scientific technology for the cruise were provided by IPEV (Institut polaire Paul Emile Victor), and the scientific program was strongly supported by a team from the IPEV under the direction of Yvon Balut. The MONA cruise was organised within the framework of the international IMAGES program, and was partly financed by complementary contribution from Canada, Mexico, United Kingdom, and European Community. The scientific party was composed of Frenchs, Canadians, Mexicans, Americans, Russian, Germans, Netherlanders, and British’s.

Fig 1: The members of the scientific party

1.1 Rationale

The prime objective of the MONA cruise was to recover high-resolution seafloor archives to decipher past climatic and oceanographic changes on decadal to millenial timescales over periods ranging from 10,000 to about 200,000 years. The scientific goals include a high resolution reconstruction of the recent changes of the Current of California and the associated upwelling systems that are thought to be of crucial importance for the understanding of the ocean/atmosphere exchanges. Changes in oceanic and continental inputs to the sediments will be quantified, and diagenesis and export of organic matter to the bottom will be analyzed. Two resolutions can be reach on the collected cores. A high resolution on laminated sediments in shalow cores (600-1500 m) and lower in longer records taken deeper (2000-3000 m). This latitudinal transect (3° to 50°N) will permit a better understanding of the relations between low and high latitude in this area of climatic variability related to the ENSO dynamics.

Recent research has shown that the accumulation rate of organic matter in the upper- and lower-slope sediments of the western margins of the Americas has changed dramatically on time scales ranging from decades to tens of millenia. In conjunction with records of numerous associated or independent proxies, such observations are important on many levels. They permit links to be drawn between climate variations and ecosystem shifts; they illustrate variability in water mass distribution and structure in the ocean; they contribute to the construction of global-scale climate records and the understanding of the relationships between climate forcing and effects; and they yield insight into the magnitude and direction of exchange of climatically important gases between ocean and atmosphere

1.2 Specific questions of interest

Dentritification : Eastern boundary current systems off Western America induce the most intense and probably the best investigated oceanic fertility seen in the modern ocean (Berger, 1989). Phytoplankton productivity along the Pacific margins of North, Central and South America is on average very high with increasing primary production rates in the well-known upwelling areas. These zones of high carbon fixation and enhanced export production extend to the North and South, reaching into western Canadian waters off British Columbia and in to the coastal regions of Central America. Water-column oxygen minima are recognized in productive areas because the high productivity is associated to a weak ventilation of intermediate-depth waters originating in higher latitudes. The deeper oxygen minimum (in the 800-1100 m range) is restricted to the northeast Pacific. It is, however, of particular interest because past fluctuations in its intensity are more likely to have been caused by changes in large-scale deep ocean circulation. Accumulation rate of organic matter in the upper- and lower-slope sediments has changed dramatically on time scales ranging from decades to tens of millennia. Variations of this accumulation rate permit to link climate variations and ecosystems shifts; they illustrate variability in water mass distribution and structure in the ocean; they contribute to the construction of global-scale climate records and the understanding of the relationships between climate forcing and effects; they yield insight into the magnitude and direction of exchange of important gases between ocean and atmosphere. This exchange is important because the large pools of oxygen-poor intermediate waters, north and south of the Equator, are major sites of denitrification and represent the largest sink for nitrogen in the world's oceans. Along with the Arabian Sea these regions can act as climate rheostats by altering the fertility and, thus, the rate of CO^2 fixation. Temporal variations in export production off northwestern Mexico, off Peru, and in the Arabian Sea (major upwelling areas) do appear to have modulated the oxygen content in upper intermediate-depth waters and the intensification of denitrification during the Late Quaternary. Whether or not such variations occurred on a broad scale over long time periods remains an open question that could be satisfactorily answered by a high-resolution study of new long piston cores collected from areas in which existing data are absent.

Anoxia and laminated sediments : The piston coring the western America margins lies in the fact that combination at close sites of restricted circulation, high settling fluxes of organic matter, and high rates of pelagic and terrigenous inputs has produced thick sedimentary sections which are yielding remarkable high-resolution archives of climatic, oceanographic, and continental variability in the eastern Pacific area (ODP Leg 167). Millennial-scale variations of deep circulation would imply sensitive coupling between the North Atlantic and North Pacific deep circulation which is transmitted quickly throughout the oceans. Sedimentary records preserved in anoxic basins may help to

recognize variability over interdecadal time scales which are associated with an "ENSO-like" signature.

History of primary production and upwelling dynamics: These cores will help to reach a detailed understanding of regional and global interrelationships among the histories of primary production, upwelling intensity, surface-water and thermocline ecology, nutrient inventories, oceanic circulation, ocean-atmosphere gas exchanges, and carbon burial.

El Niño Southern Oscillation : The Pacific climate exhibits considerable variability over interdecadal time scales which are associated with an "ENSO-like" signature (Zhang, et al., 1997). This occurs as the climate shifts between regime states of tropical warming and cooling that persist for several decades. It appears that such an ENSO like behaviour exist on long time scale linked with precession (Beaufort et al., 2001). The dynamical gap existing between long term ENSO like behaviour and modern ENSO cycles will be filled by studying how the ENSO variability may be reconstructed in laminated sediments preserved in anoxic coastal basins that present an annual to decadal resolution.

Large latitudinal coverage: All these studies will be proceed with a large latitudinal coverage between 50°N where the influence of high latitude will be the strongest to 5°N in the Panama Basin off the California current and therefore where we may expect the purest tropical signal.

Vapour exchange between Atlantic and Pacific : In Tehuantepec and Nicargua strong winds blow from the Gulf of Mexico. These winds bring a lot of moisture to the Pacific, keeping salt in the Atlantic. The strength of these winds and the salinity of the surface water, could help to monitor the thermohaline circulation.

1.3 Time Log of MONA cruise

Date [UTC]	Station	Time [UTC]	Latitude N	Longitude W	Water depth[m]	Operations
30.05.2002		**18:00**				**Departure from Vancouver**
31.05.2002	**1**	**02:00**	048º35.43	123º30.20		**Arrival Station 1**
		02:12	048º35.44	123º30.20		**Gravity Core MD02-2490G**
		02:20			229	Touch down
		02:26				Core on top
						core on deck, length: 10.16 m
		04:03	048º35.37	123º30.17		**Calypso Core MD02-2490**
		04:20			226	Trigger
		04:40				Core at surface
		05:00				Core on deck, Length: 51.00 m
		05:05				**Departure Station 1**
	2	**15:37**	049º02.47	125º09.13		**Arrival Station 2, Outer Effingham Inlet**
		15:48	049º02.47	125º09.13		**Gravity Core MD02-2491G**
		16:00			201	Touch down
		16:20				Core on top, length:7.23 m
		18:05	049º02.50	125º09.09		**Calypso Core MD02-2492**
		18:16	049º02.50	125º09.09	199	Trigger
		18:22				Core dragged
		19:09				Core on deck, length: 51.03 m
		19:05				**Departure Station 2**
	3	**21:49**				**Arrival Station 3, Inner Effingham Inlet**
		22:04				**Gravity Core MD02-2493G**
		22:15	049º04.21	125º09.34	118	Touch down
		22:30				Core on deck, length: 7.00 m
		23:35				**Calypso Core MD02-2494**
01.06.2002		00:01	049º04.28	125º09.55	117	Trigger
		01:05				Core on deck, length:40.34 m
		01:08				**Departure Station 3**
	4	**10:40**	048º58.87	127º02.05	1229	**Arrival Station 4, offshore Vancouver Island**
		10:43				**Gravity Core MD02-2495G**
		11:30	048º58.69	127º02.08	1238	Touch down
		12:22				Core on deck, length: 7.33 m
		13:48	048º58.83	127º02.32	1186	Site Survey for Calypso Core
		14:11				**Calypso Core MD02-2496**
		14:38	048º58.47	127º02.14	1243	Trigger
		16:14				Core on deck, length: 38.38 m
						Core bent at 15 m
		16:20				**Departure Station 4**

Date [UTC]	Station	Time [UTC]	Latitude N	Longitude W	Water depth[m]	Operations
	5	**20:18**	048°54.66	126°53.80	916	**Arrival Station 5**
		20:27				Gravity Core MD02-2497G
						Core empty and bent, not counted
02.06.2002		00:45	048°55.14	126°53.00	905	**Calypso Core MD02-2497**
		01:07	048°55.18	126°52.83	900	Trigger
		01:58				Core at top, Length: 26.13 m
						Core bent at top but filled
		02:00	048°53.75	126°50.70		**CTD MD02-CTD1**
						Deployment Depth:
						# of bottles: 24 (8@56m,8@31m,8@Alkenone
		03:05	048°53.95	126°50.28		**Plankton Tow MD02-PT01**
						15 min at 30 m depth
		03:20				**Departure Station 5**
	6	**22:21**	044°50.41	125°08.40	1830	**Arrival Station 6: Newport 1**
		23:07			1767	**Calypso Core MD02-2498**
		23:16	044°50.41	125°08.39	1827	Trigger
03.06.2002		00:28				Core on deck, length: 36.16 m
		00:30				**Departure Station 6**
	7	**02:00**	044°34.80	124°45.00		**Arrival Station 7: Newport 2**
						1. bathymetric survey
		04:00				survey finished, no suitable coring site found
		11:00	042°31.00	124°45.00		2. Bathymetric survey
						south of original position
		14:00				survey finished, no suitable coring site found
		14:00				**Departure Station 7**
	8	**16:47**	041°40.02	124°55.98		**Arrival Station 8 Eel River**
		16:50	041°40.00	124°56.25	952	Station shifted south to a better position
		18:30				Boat positioned 0.2 mi off coring site
						due to strong current
		18:52				**Calypso Core MD02-2499**
		19:12	041°39.10	124°56.25	947	Trigger
		20:19				Core on deck, bent at 30 m
						Core length: 34.50
		20:30				**Departure Station 8**
04.06.2002	**9**	**02:00**	040°54.55	126°32.54	3066	**Arrival Station 9 Gorda Ridge**
		02:20	040°52.63	126°33.16		**CTD MD02-CTD02**
						Bottles: 2@subsurface, 2@15m,20@30m
						Temp:12.2C, Sal: 31.61
		02:54				**Plankton Tow MD02-PT02**
						Deployment depth: 30m, duration: 15 min
		04:39	040°46.04	126°32.54	3115	**Calypso Core MD02-2500**
		05:41	040°55.43	126°32.63	3118	Trigger
						Core length: 26.15 m
						Departure Station 9
05.06.2002	**10**	**07:35**	035°45.95	122°07.41		**Station 10: Pt. Arguello 1 (deep)**
						Bathymetric research
		15:17	034°20.73	121°15.26	1679	**Calypso Core MD02-2501**
		16:06	034°20.77	121°15.23	2001	Trigger
						Core length: 31.82 m
						Core bent at 10 m
						Departure Station 10

Date [UTC]	Station	Time [UTC]	Latitude N	Longitude W	Water depth[m]	Operations
	11	**20:30**	034º39.96	120º58.04		**Arrival Station 11 Pt. Arguello 2 (shallow)**
		20:53				**Calypso core MD02-2502**
		20:59	034º39.94	120º58.03	440	Touch down
		22:50				Core on deck, multi directional bent
						Recovery: 20.30 m
						Departure Station 11
06.06.2002	**12**	**03:30**	034º17.19	120º02.22	572	**Arrival Station 12 Santa Barbara Basin 1**
		04:46				**Calypso core MD02-2503**
		04:51	034º17.17	120º02.19	569	Trigger
		06:03				Core on deck, length: 46.75 m
		06:05				**Departure Station 12**
	13	**08:39**	034º14.00	119º52.00		**Arrival Station 13 Santa Barbara Basin 2**
		08:41			489	**Calypso core MD02-2504**
		09:06	034º14.00	119º52.12	481	Trigger
		09:12				Core on deck, length: 38.67 m
		10:22	034º14.06'	119º52.14'		**CTD MD02-CTD03** T:14.4°C, Sal: 33.82 ppm
						deployment: 200m, 23 bottles
						3 bottles at 60m, 3 bottles at 15m, 3 bottles at 10 m
		11:10				Plankton Tow, 15 min at 25 m. T: 9C at 25m
		11:35				**Departure Station 13**
						San Diego
09.06.2002	**14**	**14:55**	025º10.80	112º43.00		**Arrival Station 14, San Lazaro 1**
						Bathymetric Survey
		15:35	025º08.51	112º43.00		Site chosen
		15:45	025º10.25			Methane Diapir, returned to 25°12.07'
		16:44			540	**Calypso Core MD02-2505**
		16:55	025º10.07	112º43.04	539	Trigger
		17:45				Core on deck, length: 36.73 m
		18:11	025º12.18	112º42.91		**CTD MD02-CTD04,** Deployment: 250m
						23 bottles, 8*100m, 5*20m, 10* 15m
						T: 17.3°C, S: 34.04 ppm
		19:40	025º12.05	112º43.08	540	**Square Calypso Core MD02-2506C²**
		19:56	025º12.05	112º43.08	547	Trigger
		20:43				Core on deck
						Departure Station 14
	15	**22:00**				**Arrival Station 15, San Lazaro 2**
						Survey, new site chosen
10.06.2002	**15**	01:10	025º07.99	112º42.92	492	**At new site**
		01:41				**Calypso Core MD02-2507**
		01:48	025º08.00	112º42.09	595	Trigger
		02:25				Core on deck, length: 36.51 m
						Departure Station 15
	16	**12:27**	**023º27.58**	**111º35.86**	**702**	**Arrival Station 16**
		12:51				**Calypso Core MD02-2508**
		13:04	023º27.91	111º35.74	710	Trigger
		13:10				Core at top, length: 40.42 m
						Departure Station 16
11.06.2002	**17**	11:35	024º38.98	110º34.03	399	**Arrival Station 17, Alfonso 1**
		11:58			395	**Calypso Core MD02-2509**
		12:07	024º39.11	110º34.08	402	Trigger
		12:50				Core on deck, length:
						Departure Station 17

Date [UTC]	Station	Time [UTC]	Latitude N	Longitude W	Water depth[m]	Operations
	18	13:20	024°38.78	110°36.03	405	**Arrival Station 18, Alfonso 2**
		13:41				**Calypso Square Core,**
		13:54	024°38.77	110°36.00	409	Trigger
		14:32				Core on deck, empty. Core not counted
		16:00				New Station for Calypso Core
		16:12				**Calypso Core MD02-2510**
		16:23	024°38.84	110°36.00	410	Trigger
		17:09				Core on deck, length:
		19:25				On station for CASQ
		19:38				**CASQ MD02-2511C²**
			024°38.74	110°36.12	413	Trigger
		20:18				Core on deck, length:
						Departure Station 18
12.06.2002	**19**	11:38	027°56.08	111°46.42	524	**Arrival Station 19, Guaymas 1**
		12:10				**Calypso Core MD02-2512**
		12:23	027°56.07	111°46.45	530	Trigger
						Core on deck, length:
						Departure Station 19
	20	15:15	027°54.29	111°40.20	638	**Arrival Station 20, Guaymas 2**
						West of DSDP Site 480, seismic shows existance of a hiathus and a nearby canyon
		16:19				**Calypso Core MD02-2513, tube length: 65 m!**
		16:31	027°54.29	111°40.25	641	Trigger
		16:39				Pull up
		17:55				Core on deck, length:
		18:45				**CASQ MD02-2514C²**
		19:01	027°54.51	111°40.07	644	Trigger
		20:05				Core on deck
						Departure Station 20
13.06.2002	**21**	04:02	027°28.95	112°04.52	875	**Arrival Station 21**
		04:35				**Calypso Core MD02-2515, Tube length: 74 m!**
		04:53	027°29.01	112°04.46	881	Trigger
		05:02				Pull up
		06:30				Core on deck, length: 64.40 m. World record!
		10:04				**CASQ MD02-2517C**
		10:22	027°29.10	112°04.46	887	Trigger
		10:50				Core on deck, sediment recovery: 5.60m
						Departure Station 21
		20:15	026°39.98	110°08.87		**CTD MD02-CTD05, 200m, 24 bottles**
						T: 25.0°C, S: 35.55
						Samples: 100m/40m/20m
14.06.2002	**22**	01:10	026°16.12	109°56.62	613	**Arrival Station 22, Carmen Basin**
		01:18				**Calypso Core MD02-2516**
		01:30	026°16.12	109°56.66	620	Trigger
		02:00				Core on deck, length: 40.44 m
						Departure Station 22
15.06.2002	**23**	00:51				**Arrival Station 23, Mazatlan 1**
		01:20				**Calypso Core MD02-2518**
		01:29	022°40.39	106°29.19	454	Trigger
		03:38				Core on deck, length: 40.76 m
						Departure Station 23

Date [UTC]	Station	Time [UTC]	Latitude N	Longitude W	Water depth[m]	Operations
	24	04:33	022º30.90	106º39.00		**Arrival Station 24, Mazatlan 2**
		05:10				**Calypso Core MD02-2519**
		05:26	022º30.89	106º39.00	1016	Trigger
		07:08				Core on deck, bent. Length: 40.90 m
						Departure Station 24
		23:19	018º57.54	104º46.51		**CTD MD02-CTD06, 23 Bottles**
						T:28.7°C, S: 34.78
						100m/35/25/
17.06.2002	**25**		015º39.04	095º16.83	740	Bathymetric Survey for good coring site
		17:40	015º40.16	095º17.95		**Arrival Station 25, Tehuantepec 1**
		18:24			712	**Calypso Core MD02-2520**
		19:00	015º40.14	095º18.00	719	Trigger
		19:45				Core on deck, length: 40.60 m ?
		20:20				**Square Calypso Core MD02-2521C²**
		20:48	015º40.25	095º18.00	718	Trigger
						Core on deck, length: 36.74 m
						Departure Station 25
18.06.2002	**26**		015º39.48	095º13.42		**Arrival Station 26, Tehuantepec 2**
		01:58				**Calypso Core MD02-2522**
		02:11	015º39.37	095º13.46	732	Trigger
		02:57				Core on deck, length:
						Departure Station 26
	27	07:30	015º25.80	094º14.43		**Arrival Station 267 Tehuantepec 3**
		07:45				**Calypso Core MD02-2523**
		07:50	015º25.74	094º14.33	245	Trigger
		09:00				Core on deck, bent. Length: 24.74 m
						Departure Station 27
	28	22:43	014º12.43'	009º24.30'		**CTD MD02-CTD07**
						T: 28.6°C, S 32.2
						100m/55/25/4
20.06.2002	**29**	01:48	012º13.34	088º10.64	450	**Arrival Station 29 Nicaragua 1**
						Survey for good coring site started
		08:24	011º52.17	087º34.64	320	Survey finished, coring site found
		16:40	012º00.55	087º54.83	863	**Calypso Core MD02-2524**
		17:14	012º00.49	087º54.95	896	Trigger
		17:30				Core on deck, length: 30.26 m
		18:56			870	**Calypso Square Core MD02-2525C²**
		19:08	012º00.47	087º54.44	874	Trigger
		19:30				Core on deck, length:
		21:57			846	**Calypso Core MD02-2526**
		22:20	012º00.46	087º54.06	849	Trigger, full pentration
		22:40				Core on deck, length: 30.15 m
						Departure Station 29
21.06.2002	**30**	00:15	011º56.76	087º45.77	560	**Arrival Station 30, Nicaragua 2**
		01:50	011º56.99	087º45.41		Surveying
		02:29	011º56.87	087º45.42	535	**Calypso Core MD02-2527**
		02:53	011º56.98	087º45.69	536	Trigger
		03:20				Core on deck, length: 32.89 m
						Departure Station 30

Date [UTC]	Station	Time [UTC]	Latitude N	Longitude W	Water depth[m]	Operations
	31	18:00	011º27.88	087º22.07	850	**Arrival Station 31**
		18:20				**Calypso Core MD02-2528**
		18:38	011º27.95	087º22.45	894	Trigger
		19:36				Core on deck, length: 29.76 m
						Departure Station 31
		03:20	008º12.24'	084º07.05'		**CTD MD02-CTD08, 200m, 24 Bottles**
						T: 30.2°C, S: 34.74
						120m/45/30/2
23.06.2002	**32**	03:09	008º12.24	084º07.16		**Arrival Station 32**
		03:20	008º12.24	084º07.05		**CTD MD02-CTD08, 200m, 24 Bottles**
						T: 30.2°C, S: 34.74
						120m/45/30/2
		04:18	008º12.19	089º07.87	1648	**CTD**
		04:37				**Calypso Core MD02-2529**
		05:05	008º12.33	084º07.32	1661	Trigger
		06:03				Core on deck, length: 35.12 m
						Departure Station 32
24.06.2002	**33**	01:17				**Arrival Station 33**
		01:35	006º14.93	080º14.05		**Calypso Core MD02-2530**
		02:25	006º14.97	080º14.02	3045	Trigger
		03:35				Core on deck, length: 35.98 m
						Departure Station 33
	34	14:13	007º26.42	079º33.22	690	**Arrival Station 34**
		14:26	007º26.43	079º33.22	691	**Calypso Square Core MD02-2531C²**
						Core on deck, length: 5.3 m
						Departure Station 34
24.06.2002	**Fin**	24:00				**End of Campaign**
						Anchorage in Balboa, Panama

1.4 Core positions and archive information

Station	Core	Water [m]	Latitude ° N	Longitude ° W	Latitude dec deg N	Longitude dec deg W	Core length [m]	PI	Repository Working Half	Archive Half
1	MD02-2490G	229	048°35.44	123°30.20	048.5907°	123.5033°	10.16	Carlo Laj	CNRS, Gif sur Yvette	CNRS, Gif sur Yvette
	MD02-2490	226	048°35.37	123°30.17	048.5895°	123.5028°	51.00	Carlo Laj	CNRS, Gif sur Yvette	CNRS, Gif sur Yvette
2	MD02-2491G	201	049°02.47	125°09.13	049.0412°	125.1522°	7.23	Tom Pedersen	UBC, Canada	UBC, Canada
	MD02-2492	199	049°02.50	125°09.09	049.0417°	125.1515°	51.03	Tom Pedersen	UBC, Canada	UBC, Canada
3	MD02-2493G	118	049°04.21	125°09.34	049.0702°	125.1557°	7.00	Tom Pedersen	UBC, Canada	UBC, Canada
	MD02-2494	117	049°04.28	125°09.55	049.0713°	125.1592°	40.34	Tom Pedersen	UBC, Canada	UBC, Canada
4	MD02-2495G	1238	048°58.69	127°02.08	048.9782°	127.0347°	7.33	Tom Pedersen	UBC, Canada	UBC, Canada
	MD02-2496	1243	048°58.47	127°02.14	048.9745°	127.0357°	38.38	Tom Pedersen	UBC, Canada	UBC, Canada
5	MD02-2497	900	048°55.18	126°52.83	048.9197°	126.8805°	26.13	Tom Pedersen	UBC, Canada	UBC, Canada
6	MD02-2498	1827	044°50.41	125°08.39	044.8402°	125.1398°	36.16	Tom Pedersen	UBC, Canada	UBC, Canada
8	MD02-2499	947	041°39.10	124°56.25	041.6517°	124.9375°	34.50	Tom Pedersen	UBC, Canada	UBC, Canada
9	MD02-2500	3118	040°55.43	126°32.63	040.9238°	126.5438°	26.15	Philippe Bertrand	Univ de Bordeaux	Univ de Bordeaux
10	MD02-2501	2001	034°20.77	121°15.23	034.3462°	121.2538°	36.81	Philippe Bertrand	Univ de Bordeaux	Univ de Bordeaux
11	MD02-2502	440	034°39.94	120°58.03	034.6657°	120.9672°	20.30	L. Beaufort/C. Robert	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
12	MD02-2503	569	034°17.17	120°02.19	034.2862°	120.0365°	46.75	L. Beaufort/C. Robert	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
13	MD02-2504	481	034°14.00	119°52.12	034.2333°	119.8687°	38.67	L. Beaufort/C. Robert	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
14	MD02-2505	539	025°10.07	112°43.04	025.1678°	112.7173°	36.73	Juan Carlos Herguera	CICESE, Mexico	CICESE, Mexico
14	MD02-2506C²	547	025°12.05	112°43.08	025.2008°	112.7180°	4.5	L. Beaufort/J.C. Herguera	CEREGE, Aix en Pr.	CICESE, Mexico
15	MD02-2507	595	025°08.00	112°42.09	025.1333°	112.7015°	36.51	L. Beaufort/J.C. Herguera	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
16	MD02-2508	710	023°27.91	111°35.74	023.4652°	111.5957°	40.41	Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
17	MD02-2509	402	024°39.11	110°34.08	024.6518°	110.5680°	30.47	L. Beaufort/E. Nava/M. Cremer	Univ de Bordeaux/CICIMAR	CEREGE, Aix en Pr.
18	MD02-2510	410	024°38.84	110°36.00	024.6473°	110.6000°	47.34	L. Beaufort/E. Nava/M. Cremer	Univ de Bordeaux/CICIMAR	CEREGE, Aix en Pr.
18	MD02-2511C²	413	024°38.74	110°36.12	024.6457°	110.6020°	5.9	L. Beaufort/E. Nava/M. Cremer	Univ de Bordeaux/CICIMAR	CEREGE, Aix en Pr.
19	MD02-2512	530	027°56.07	111°46.45	027.9345°	111.7742°	48.32	Jürgen Thurow	Univ. of Southampton	Univ. of Southampton
20	MD02-2513	641	027°54.29	111°40.25	027.9048°	111.6708°	58	Jürgen Thurow	Univ. of Southampton	Univ. of Southampton
20	MD02-2514C²	644	027°54.51	111°40.07	027.9085°	111.6678°	5.6	Jürgen Thurow	Univ. of Southampton	Univ. of Southampton
21	MD02-2515	881	027°29.01	112°04.46	027.4835°	112.0743°	64.4	J. Thurow/R. Ganeshram	Univ. of Southampton	Univ. of Edinborough
21	MD02-2517C²	887	027°29.10	112°04.46	027.4850°	112.0743°	5.6	Jürgen Thurow	Univ. of Southampton	Univ. of Southampton
22	MD02-2516	620	026°16.12	109°56.66	026.2687°	109.9443°	40.44	Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
23	MD02-2518	454	022°40.39	106°29.19	022.6732°	106.4865°	40.76	L. Beaufort/R. Ganeshram	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
24	MD02-2519	1016	022°30.89	106°39.00	022.5148°	106.6500°	40.9	Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
25	MD02-2520	719	015°40.14	095°18.00	015.6690°	095.3000°	40.6	L. Beaufort/M.L.Machain-Castillo	CEREGE, Aix en Pr.	UNAM, Mexiko
25	MD02-2521C²	718	015°40.25	095°18.00	015.6708°	095.3000°	5.8	L. Beaufort/M.L.Machain-Castillo	CEREGE, Aix en Pr.	UNAM, Mexiko
26	MD02-2522	732	015°39.37	095°13.46	015.6562°	095.2243°	36.74	L. Beaufort/M.L.Machain-Castillo	CEREGE, Aix en Pr.	UNAM, Mexiko
27	MD02-2523	245	015°25.74	094°14.33	015.4290°	094.2388°	24.74	M.L. Machain-Castillo	UNAM, Mexiko	UNAM, Mexiko
29	MD02-2524	896	012°00.55	087°54.83	012.0092°	087.9138°	30.26	Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
29	MD02-2525C²	874	012°00.47	087°54.44	012.0078°	087.9073°		Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
29	MD02-2526	849	012°00.46	087°54.06	012.0077°	087.9010°	30.15	Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
30	MD02-2527	536	011°56.87	087°45.42	011.9478°	087.7570°	32.89	Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
31	MD02-2528	894	011°27.95	087°22.45	011.4658°	087.3742°	29.76	Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
32	MD02-2529	1661	008°12.33	084°07.32	008.2055°	084.1220°	35.12	Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
33	MD02-2530	3045	006°14.97	080°14.02	006.2495°	080.2337°	35.98	Luc Beaufort	CEREGE, Aix en Pr.	CEREGE, Aix en Pr.
34	MD02-2531	691	007°26.43	079°33.22	007.4405°	079.5537°	5.3	Claire Waelbroeck	Gif sur Yvette	Gif sur Yvette

1.5 CTD positions

Station	CTD No	CTD Reference	Deployment depth [m]	Bottles No	Latitude ° N	Longitude ° W	Latitude dec deg N	Longitude dec deg W
5	MD02-CTD01	Cf012000MD	250	24	048°53.75	126°50.70	048.8958°	126.8450°
9	MD02-CTD02	Cf031921MD	250	24	040°52.63	126°33.16	040.8772°	126.5527°
13	MD02-CTD03	Cf060320M	200	24	034°14.06'	119°52.14'	034.2343°	119.8690°
15	MD02-CTD04	Cf091114D	200	23	025°12.18'	112°42.90'	025.2030°	112.7150°
22/23	MD02-CTD05	Cf132015D	200	24	026°39.98	110°08.87	026.6663°	110.1478°
24/25	MD02-CTD06	Cf152319D	200	24	018°57.54	104°46.51	018.9590°	104.7752°
28	MD02-CTD07	Cf182243D	200	24	014°12.43'	009°24.30'	014.2072°	009.4050°
32	MD02-CTD08	Cf220320D	200	24	008°12.24'	084°07.05'	008.2040°	084.1175°

1.6 List of participants

The Scientific Team of "MONA" Cruise

Leg 1 and Leg 2, in alphabetical order

Surname	First Name	Laboratory
ARELLANO-TORRES	Elsa	Coyoacan University
BALUT	Yvon	IFRTP, Brest
BEAUFORT	Luc	CEREGE Aix en Provence
BEHL	Rich	Long Beach University
BERTRAND	Philippe	University Bordeaux
BUCHET	Noelle	CEREGE Aix en Provence
CALVERT	Stephen E.	U.of British Colombia-Vancouver
CARRE	Matthieu	Montpellier University
CETIN	Fethye	LSCE - Gif sur Yvette
CHARLIER	Karine	Bordeaux University
COOMBS	Mary Jane	Santa Barbara University
CREMER	Michel	Bordeaux University
CUESTA-CASTILLO	Lara Barbara	University of Mexico
DELVISCIO	Jeff	Middletown University
DESMAZES	Franck	Bordeaux University
DESMET	Marc	Savoie University
DEWILDE	Fabien	LSCE - Gif sur Yvette
DROXLER	André W.	Rice University
EMILE-GEAY	Julien	University of Colombia
ESPARZA ALVAREZ	Maria Auxilio	University de Ensenada
ESPIC	Katia	Marseille University
EZAT	Ula	LSCE - Gif sur Yvette
FRANCUS	Pierre	Amherst University
GALBRAITH	Eric	U.of British Colombia-Vancouver
GANESHRAM	Raja	University of Edinburgh
HENDY	Ingrid	U.of British Colombia-Vancouver
HERGUERA	Juan Carlos	University of Mexico
HILL	Tessa	Santa Barbara University
HUNT	Ashley	Rice University
IVANOCHKO	Tara	University of Edinburgh
IVANOVA	Helena	Moscow University
JACCARD	Samuel	ETHZ Zurich
KENNETT	James Peter	Santa Barbara University
LAJ	Carlo	LSCE - Gif sur Yvette
LOPES	Christina	Oregon University
MACHAIN CASTILLO	Maria Luisa	Mexico University
MACKIN	Jonathan	U.of British Colombia-Vancouver
MARTING GIL	Isabelle	Institut de Mineiro, Lisboa
MOSER	John C.	Oregon University
NARDOZZA	Sabrina	LSCE - Gif sur Yvette
NAVA-SANCHEZ	Enrique	University of Mexico
NEDERBRAGT	Alexandra	University college London
O'CONNELL	Susan	Hartford College
ORTIZ	Joseph	Kent University

Scientific Team, contd.

Surname	First Name	Laboratory
PAK	Dorothy	Santa Barbara University
PEDERSEN	Thomas F.	U.of British Colombia-Vancouver
PEIGNE	Charlotte	LSCE - Gif sur Yvette
PERRIQUET	Marie	LSCE - Gif sur Yvette
PICHEVIN	Laeticia	Bordeaux University
RADI	Taouik	Geotop-Uqam Montréal
ROBERT	Christian	Marseille University
RODRIGUEZ-CEJA	Maria Guadalupe	University of Mexico
ROTHE	Stefan	IMAGES Office, Kiel University
SAHER	Margot	University of Amsterdam
SOLIGNAC	Sandrine	Geotop-Uqam Montréal
SOON	Maureen	U.of British Colombia-Vancouver
ST. ONGE	Guillaume	Geotop-Uqam Montréal
TERNOIS	Yann	CEREGE Aix en Provence
THUROW	Jürgen	University college London
VADEBOIN	Fabienne	CEREGE Aix en Provence
VIDAL	Laurence	CEREGE Aix en Provence
WAELBROECK	Claire	LSCE - Gif sur Yvette
WRIGHT	Cindy	Institut of ocean sciences-Sidney

The Crew of R/V "Marion Dufresne"

Surname	First Name	Position
NICOLAS	Jean-Michel	Capitaine
MARTIN	Sébastien	Second Capitaine observateur
PHILIPPE	YANNICK	Second Capitaine
IMBERT	Bernard	Chef mécanicien
MARCEL	Gaetan	Secon mécanicien
REGGIO	Cyrille	Lieutenant pont
SIEGWALD	Jérôme	Chef Radio
BLOT	Guilhem	Lieutenant polyvalent
GUEZENNEC	Loïc	Lieutenant polyvalent
DO	Gia Linh	Lieutenant polyvalent
BECHADE	Basile	Eomm cnt qualification
JEFFRAY	Yves	Assistant mécanicien
ROLLANDO	Georges	Assistant électricien
COLIN	Eric	Assistant mécanicien
HERVE	Jean-Charles	Assistant Maître d'hôtel
BOURLES	René	Assistant d'entretien
LE CAM	Sébastien	Ouvrier mécanicien
TERRASSON	Nicolas	Ouvrier mécanicien
MOLINA	Benjamin	Ouvrier mécanicien
CONNAN	Christophe	Chef charge
COLIN	Paul	Maître d'entretien
BURGUIN	Guenael	Maître d'entretien
MERLEN	Vincent	Ouvrier d'entretien
YEVE	Charles	Ouvrier d'entretien
NIVELLE	Philippe	Ouvrier d'entretien
COMBE	François	Garçon

Crew, contd.

Surname	First Name	Position
GARGAM	Dominique	Garçon
SCIAS	Jacques	Garçon
CALATAYUD	Bernard	Second cuisinier
MORCET	Xavier	Second cuisinier

2. Coring and Sampling Methods, Core Handling

2.1 Coring

Piston Cores: Most of the cores, taken during cruise, are piston cores. The Calypso piston corer, developed on board Marion Dufresne, can be fitted with a tube up to 75 m in length. The corer is deployed with an Aramide cable, virtually weightless in water, which significantly enhances the traction security margin and weight lifting capacity of the winch.

During the cruise, one core was taken with the full-length tube (75 m). The sediment recovery of this core (MD02-1515) was 64.4 m, which is a new world record.

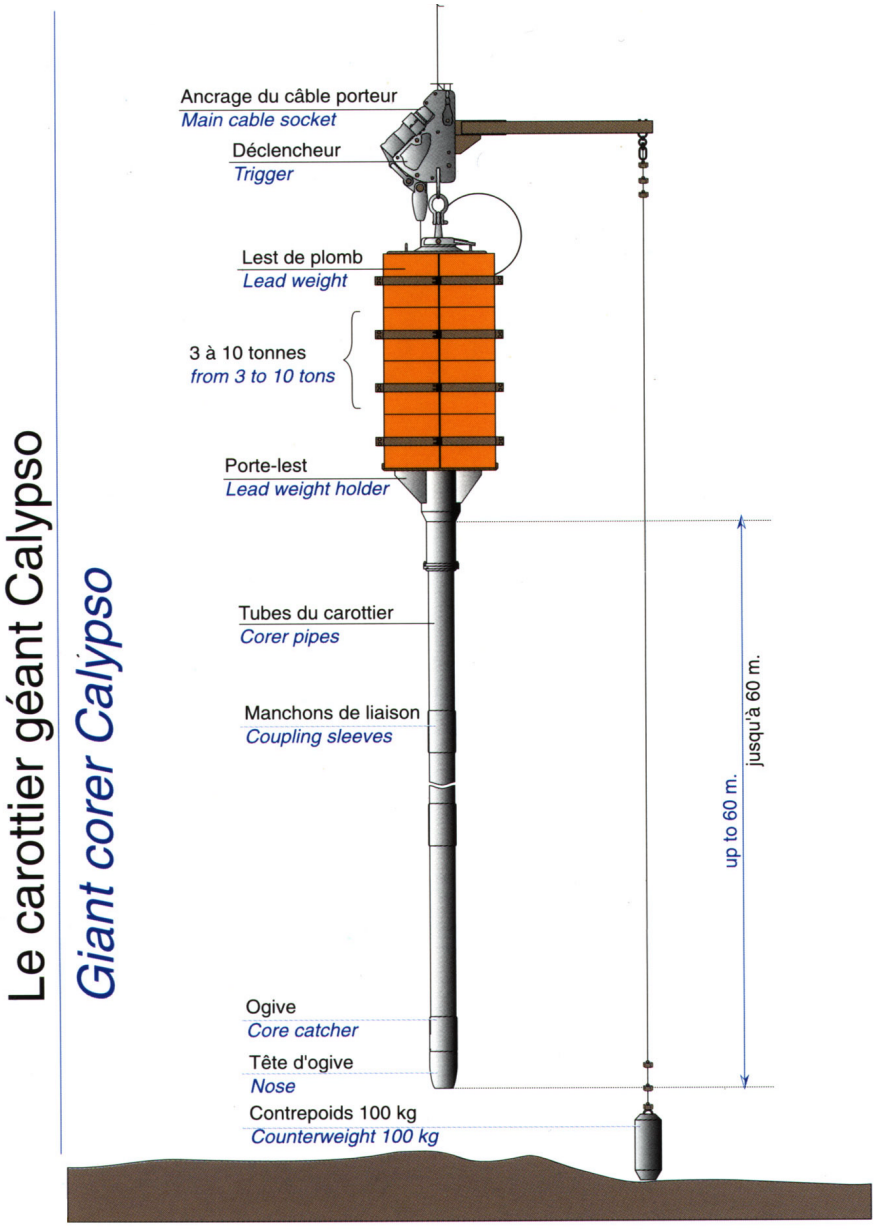


Fig. 2: Calypso piston coring system

Gravity Cores: At some sites, complementary gravity cores were taken in addition to the regular piston cores. The tube used for gravity cores was the same then the one used for Piston coring, just shorter and without the triggerarm.

Calypso Square Cores: A new coring system was used for the first time during this cruise: The calypso square-core system combines the piston coring mechanism of the calypso system with the huge core diameter (25 * 25 cm) of a boxcore. Cores, gained with this system reached lengths up to six meter and acquired a huge amount of sediment. Particularly these cores contained a nearly undisturbed core top with very few sediment missing, and the large surface of the opened core allowed improved studies of structures and textures. Thus, these cores were described before segments were cut.

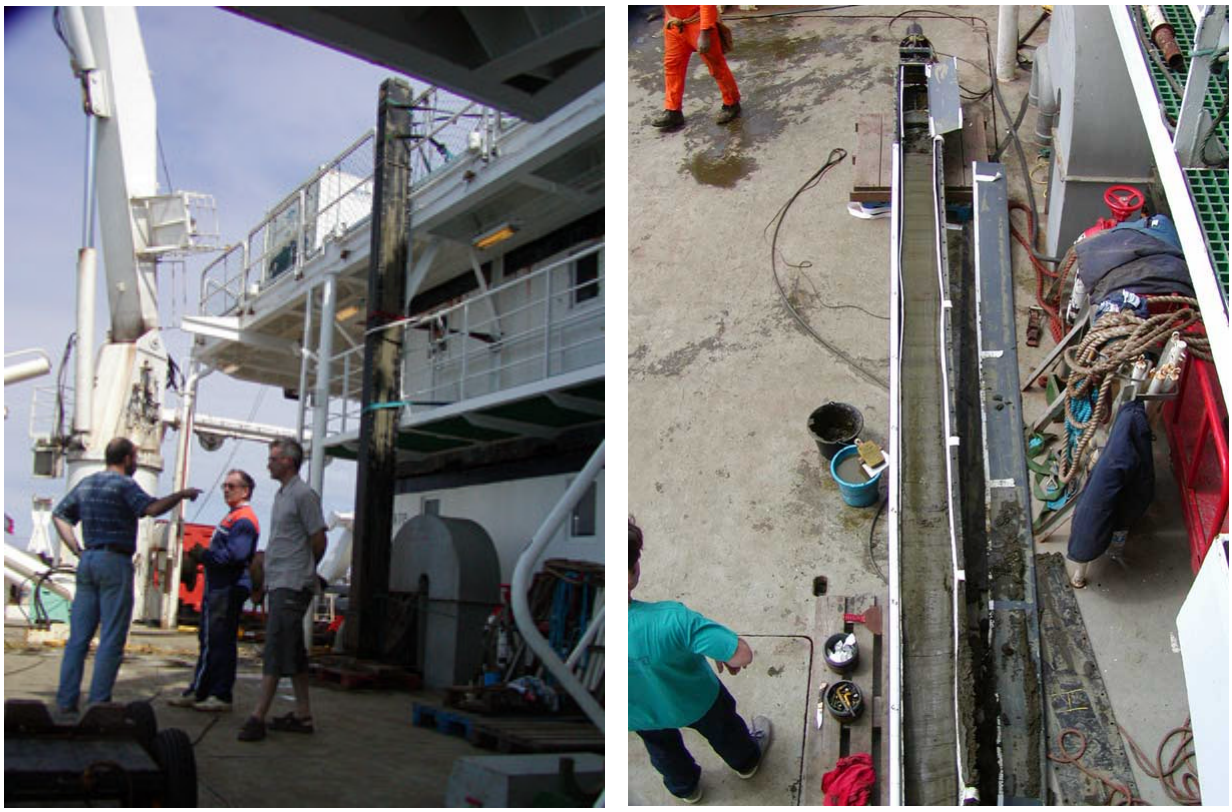


Fig 3: The new calypso square-core system.
Left photo: with cruise chief Luc Beaufort, CEREGE, Aix-en Provence (right) chief of operations Yvon Balut, IPEV, Brest (middle) and Michel Cremer, scientist
Right Photo: opened square core with scraped surface

2.2 Core handling (Claire Waelbroeck)

The core liners of the piston and gravity cores were cut into sections of 1.5 m length, starting at the top. Each section was cut lengthwise into a working half and an archive half. The surface of the sediment of each half was cleared of plastic splinters (from sawing the liners) and then covered with plastic film. Each core half was stowed in a plastic D-tube and stored in a cooled container at ~9°C, not later than 2 days after core recovery.

Labelling of core liners and D-tubes

The top and base of each section were marked with a "T" and "B", respectively, and the continuous depth of the core. Moreover, liners and D-Tube caps contain the following information:

- core number (MD01-2xxx for piston cores; appendix G for gravity cores, PC for pilot cores)

- section number (circled)

- "A" for archive half, "W" for work half.

Square cores were sampled by pressing D-tubes in the sediment. 4 sets of tubes were taken from each core, labelled with core number, section number and an appendix (A-D), identifying the set.

Core gaps / expanding sediment

Core gaps were filled with styrofoam and documented in both technical and sedimentological core description sheets. Sediment expanding beyond core sections after cutting of the liner, due to high gas pressure, was caught in an extra liner or plastic bag and recorded in the core description sheets. Adjacent core sections retained original labelling of 150 cm intervals.

2.3 Plankton net hauls and seawater sampling

Living plankton were collected with a WP2 plankton net. The mesh size of the net is 200 µm and the diameter of the opening is 57 cm, resulting in a mouth area of 0.25 m^2.

Based on temperature profiles (CTD, FSI, XBT) of the upper water column the sampling depth down to 10-50 m was specifically defined for each site according to the top of the thermocline which marks the base of the mixed layer. The net was lowered to the defined maximum water depth at a cable speed of 0.5 m/s from the rear side of the ship, remained there for 5-30 minutes and was finally raised at low speed. During the deployment time of the net the ship sailed with a constant speed of 0.5-1 knots. On board samples were collected over a 150 µm sieve, then rinsed with sea water before deep-freezing at -20°C.

Parallel with each plankton net haul a seawater sample was taken either from 7 m water depth by the ship's internal seawater pump. During Leg1 the upper water column was sampled from 10-50 m water depth with a CTD device.

2.4 CTD FSI (Ezatullah Ezat)

Eight CTD deployments were made during MONA cruise1 with the SEA BIRD SBE 911Plus System, which was equipped with a 24x12l bottles carousel water sampler (SBE32). The data acquisition rate was 24 scans/s, the cable vertical linear speed was 1 m/s. Bottles were only closed during upward profiles. Water was sampled at selected depths through the water column, depending on the temperature gradient. Samples will be extracted using organic solvents with increasing polarity, then analysed by chromatography. Coccoliths will also be used as biomarkers (in particular E. huxleyi) to reconstruct paleohydrologic and paleoclimatic events. Alkenones, which are insoluble in seawater and precipitate with organic and mineral particles, will provide a crucial archive of past events.

Sensors of the IFRTP/"Marion-Dufresne" SBE CTD (Serial Number: 09P11670-0402):

- **Pressure :** Sensor Paroscientific Inc. Digiquartz (Serial Number: 59934)
- With incorporated temperature sensor (to correct pressure measure)
- Range: 0 – 6885 d-Bar
- Accuracy: 0.015% full scale (1 d-Bar)
- Stability: 0.1 d-Bar / Month
- Resolution: 0.001 % full scale – 0.068 d-Bar
- Time response: 0.06 Sec
- **Temperature :** SBE Model 3-04/F (Serial Number: 031820)
- Range: -5.0 to +35 °C
- Accuracy/ Stability : 0.01 °C / 6 Months
- Resolution: 0.0003 °C at 24 scans / Second

- Time response: 0.072 Sec
- Last calibration: 15 April 2000 (see calibration report)
- **Conductivity :** SBE Model 4-04/O (Serial Number: 041491)
- Range: 0 – 7 Siemens/Meter (S/M)
- Accuracy: 0.001 S/M / Month
- Resolution: 0.00004 S/M at 24 scans/Sec
- Time response: 0.04 Sec
- Last calibration: 20 April 2000 (see calibration report)
- **Dissolved O_2 :** SBE Model 13-02-B (Serial Number: 130380).
- With Beckman sensor N° 97017 UPMC
- Time response: 2 Sec (25°C)/5 Sec(0°C) Range: 0 – 15 mL/L.
- Accuracy: 0.1 mL/L.
- Resolution: 0.01 mL/L
- Time response: 2 Sec (25°C)/5 Sec(0°C)

3. Shipboard Data Acquisition and Handling

3.1 Multibeam bathymetry and sub-bottom profiling (Xavier Morin)

The multibeam deep-water echosounder Thomson Seafalcon 11, installed on board "Marion-Dufresne" in 1995, is used for cartography and sediment profiling. It runs on two operating modes: the "bathymetry and imaging" mode and the "sub-bottom profiler" mode. Both modes can be run simultaneously, but only at low speeds (less than 4 knots).

Bathymetry and imagery In this operating mode, the echosounder uses transmitted frequencies around a 12 KHz carrier. The range of depths on which this mode can operate is 80 to 11000 metres. Five cross-track swaths are simultaneously created in order to generate a data redundancy (as if five multibeam echosounders were simultaneously used). These swaths are separated by the use of active digital filters. Thus, measurement gaps are avoided. These five swaths are separated (along the boat-track axis) from each other by a 1.4 degree angle. The central swath is vertical. The large antenna 3 dB attenuation level (at transmission) and beam forming at reception allow images to be built and measure bathymetry at 120 degrees from the track axis of the boat (60 degrees to starboard and 60 degrees to portside). For bathymetry, the resolution across-track depends upon the measured depth H. The length across-track of a resolution cell is typically equal to H/100. The number of created soundings for one measurement is typically equal to 2000 (400 per swath).

The imaging system uses the reflectivity extracted from the five separated frequency swaths. A mosaic is created, geographically representing sea bottom level in the studied area. This mosaic is fed by the five sets of backscattered signal. The huge number of data for each swath (18.000) and their redundancy allow a large geographic coverage and the relative increase of the signal-to-noise ratio.

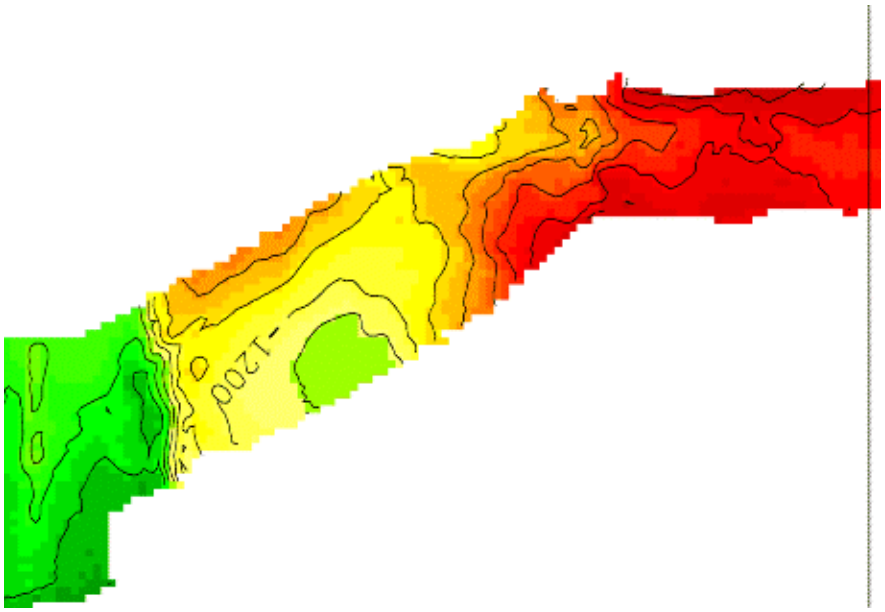


Fig 4: Part of bathymetric map created during an Images cruise (processed with Caraibes software).

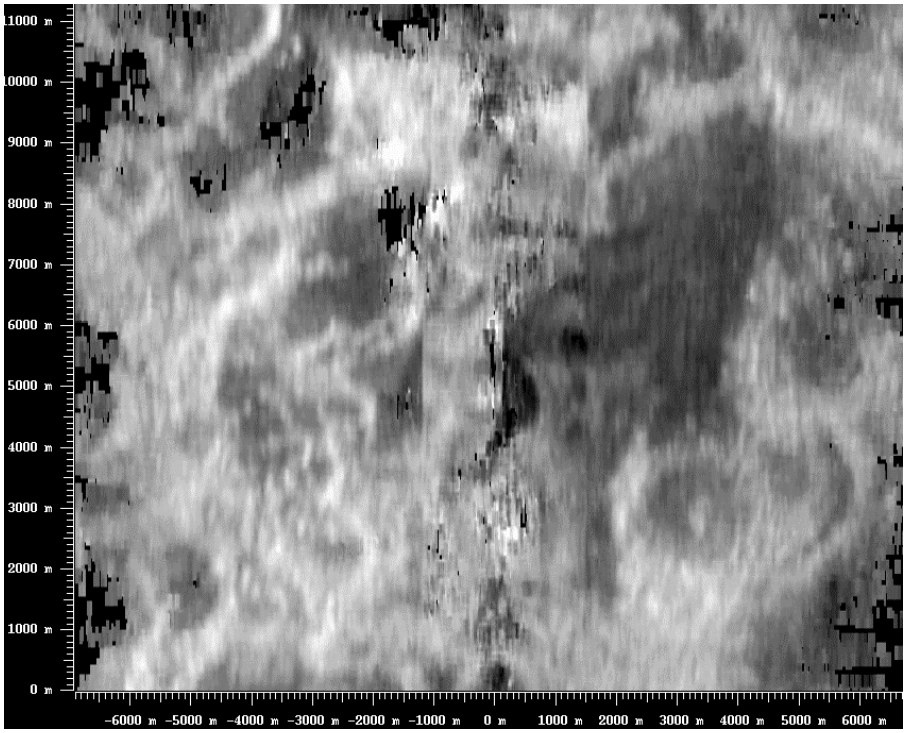


Fig 5: Raw image acquired with Seafalcon 11 echosounder (without post-processing)

Sub-bottom profiler The Seafalcon 11 echosounder also includes a sub-bottom profiler. This system is able to create reflectivity slices of the sub-bottom sea floor as a function of the geographical position of the boat. The central frequency used for this system is equal to 3.75 KHz. As for the "bathymetry and imaging" mode, the transmitted wave is linearly frequency modulated. The corresponding correlation gain is equal to 23 dB. The large transmitted bandwidth (1.6 KHz) achieves a small spatial resolution (0.31 metres).

As described above, beam forming from many signals received on each sensor provides a very narrow antenna diagram (high directivity), during emission (4.8 degrees) and reception (5.8 degrees). This beam formation also achieves a high acoustic signal level.

Five beams are created on reception (the central beam is vertical), separated from each other by 5 degrees. This diversity provides an opportunity to record good quality profiles when the across-track slope is steep. Typically, 100 metres penetrations are achieved for a 4000 metres depth.

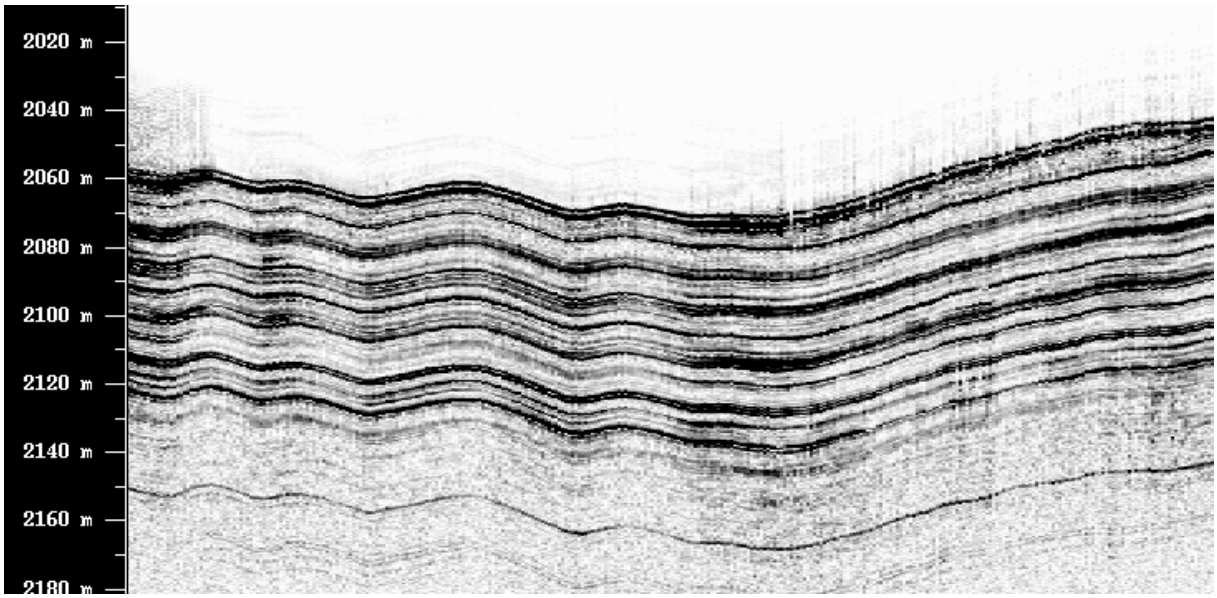


Fig 6: Sub-bottom profiling chart created during the Images 7 cruise.

Post-processing The post-processing of bathymetry and imaging data is carried out with the "Caraibes" software, developed by I.F.R.E.M.E.R. This program enables:

- The creation of geographical digital data grids for bathymetry. Contour extraction, "spline" curves filtering and bi-dimensional digital filtering are examples of tools that can be used to remove any possible artefact. Three-D representations are possible.
- The creation of reflectivity mosaics for images. Filtering and contrast enhancement can then be applied. A version for real time display is also installed aboard " Marion Dufresne".
- To view sub-bottom profiles, the IFRTP has also developed a Unix-based software that uses gmt and is freely available to interested scientific teams.

During this cruise, the IFRTP-Software "Rejeu" was used to replay the seismic profiles and to create images in Postscript- format from them. These were then converted to JPEG format, clipped into documents with additional information and finally stored in PDF-format.

3.2 Station and area maps (Stefan Rothe)

For each station maps were created with GMT (the Generic Mapping Tools). The coastline was created with the "pscoast" command. Bathymetry was added on the basis of the ETOPO2 dataset,

which provides 2'-gridded elevation data. The ship's track data was included, using the automatic GPS-logfile data from the ship's automatic logging devices. Core positions and labels were then plotted. All maps were produced in Postscript format, and converted to PDF format.

3.3 MST (Fabien Dewilde)

High-resolution logging of physical properties was carried out on half cores (working half sections) on board the R/V *Marion Dufresne* using a GEOTEK Ltd Multi Sensor Core Logger (or MST, Multi Sensor Track). Plots of selected MST data are shown for each core in this report.

The Multi-Sensor-Core-Logger (from Geotek) used is the split core logging system that is floor mounted and measures P-Wave Velocity and Gamma Density vertically through split cores. It features a moving vertical slide onto which is mounted the upper P-Wave transducer.

The split core version enables a number of geophysical measurements to be made on split sediment cores encased in semi-cylindrical plastic core liners. Core sections (with plastic end caps sometimes for liquid sediments) up to 150 cm long and from 50 to 100 mm diameter can be used.

The system is designed to be operated under computer control. The sampling interval chosen is 2 cm.

Sensors:

- .Ultrasonic Transducers to measure the velocity of compressional waves in the core.
- A Gamma Ray Source and Detector for measuring the attenuation of gamma rays through the core, providing density and porosity values.
- . A Magnetic Susceptibily Sensor to determine the amount of magnetically susceptible material present in the sediment.
- A secondary measurement sensor enables measurements to be corrected for changes in core diameter. The core diameter of the core is measured with a pair of displacement transducers connected to the spring loaded compressional wave transducers. This enables the compressional wave velocity and density to be calculated, and in addition, allow for changes in core diameter.

Method and calibrations of the sensors.

Gamma density A gamma ray source and detector are mounted across the core on a sensor stand that aligns them with the centre of the core. A narrow beam of gamma rays (5 mm diameter) is emitted from a Cs-137 source with energies principally at 0.662 Mev. These photons pass through the core and are detected on the other side.

The small Cs capsule is securely housed inside a 150 mm diameter lead filled

The gamma ray detector comprises a scintillator and integral photo multiplier tube. The tube also contains the internal voltage supply and electronics to window the primary gamma rays. Pulses from the detector unit are sent continously to a counter board in the main electronics rack. The count period and count rate are determined through the software control and the internal microprocessor.

The basic equation for calculating bulk density is $\rho = (1/\mu * d) * \ln (I0/I)$ where

ρ = sediment bulk density

d = sediment thickness

μ = the Compton attenuation coefficient

I0 = the gamma source intensity

I = the measured intensity through the sample.

Beam spreading, attenuation through the liner or the effect of the water have a significantly different attenuation coefficient for sediment minerals. The technique relies on calibrating the system using both the liner in which the core is contained and the fluid which the sediment contains. For example, when using a split core, the calibration should be done with pieces of aluminium of varying thickness surrounded completely by water in a sealed liner.

Gamma counts should be taken through the calibration sample at different aluminium thickness and plotted as a graph of average ρ *d versus ln I where ln I is the natural log of the measured intensity counts per second and ρ *d is the average density * thickness of the aluminium and water.

The resulting graph may deviate from the theoretical straight line because of the factors cited above. To accommodate this, a second order polynomial equation can be fitted to the graph:

Y = AXX + BX +C where X = ρ *d and y = ln I.

On the Mona cruise: A= -0.0027, B=-0.0238 et C=10.038

The count time for gamma attenuation is 2 second

Porosity can be calculated directly from sediment density if the following is known or can be assumed:

. the sediment is fully saturated

. mineral grain density (MGD = 2.75)

. fluid density (WD = 1.026)

Then the fractional porosity is FP = (MGD-ρ)/(MGD-WD)

Pwave Velocity System The upper PWT is raised or lowered by the motor 1. When logging split cores the upper PWT is lowered onto the split core surface to take a measurement and raised prior to the core moving to the next increment along the track.

The transducers used are oil filled Acoustic Rolling Contact transducers. The active element is a piezo-electric crystal.

A short P-wave pulse is produced at the transmitter. This pulse propagates through the core and is detected by the receiver. Pulse timing circuitry is used to measure the travel time of the pulse with a resolution of 50 ns. After suitable calibration procedures have been followed, the P-Wave velocity can be calculated with a resolution of about 1.5 m/s. The accuracy of the measurements will largely depend on any variations in sediment or liner thickness.

For horizontally split cores, it is necessary for the upper PWT to be lowered onto the split surface at each measurement increment. To avoid any contamination along the core in soft sediments, it is normal to cover the split surface with a layer of thin plastic film. A few drops of water spread along the surface of this film will provide the acoustic contact if necessary.

The P Wave velocity of the pulse through the sediments inside the core liner is given by:

V= X / TT where X is the sediment thickness and TT the pulse travel time in the sediment.

The measured total travel time in the sediment is TOT = TT + PTO, where PTO is the P Wave Travel time Offset which represents all the additional time delays.

PTO includes the pulse travel time through the liner and the transducers faces, the delay caused by picking a point on the wave form which is about one cycle after the onset, as well as a small electronic delays in the system circuitry.

Determining PTO: In a short length of liner of the type being logged, we put distilled water and place it between the P wave transducers as if logging a normal core. The upper transducer should be inserted just beneath the water surface. The following numbers should be recorded:

T = water temperature

D = distance between the transducers faces and W = liner thickness

TOT = total travel time recorded

The velocity V of the distilled water at the given temperature T should be looked up from a standard reference source.

PTO = TOT – (D-W)/V

On the Mona cruise: PTO=17.24

Sediment velocity can be processed with salinity, temperature and depth corrections. Geotek use an empirically formulation to apply a factor to the measured P Wave velocity. All the data provided are processed with:

T=20°, S=0 and D=0 where T is temperature, S salinity and D depth

The acoustic impedance which is the product of the P Wave velocity and density can also be obtained.

Core Thickness Measurements: Core thickness is the distance between the active faces of the two P Wave transducers (PWT). This is measured by mounting a rectilinear displacement transducer (DT) on each of the PWT mountings. Each DT precisely follows the movement of each PWT. In practice the core thickness is measured with reference to a known thickness (RCT = reference core thickness) and it is the deviation from that reference that is recorded.

On the Mona-Page cruise: RCT=5.25

The sediment thickness is calculated using the following equation:

X=RCT-W+CTD/10

where W is the total liner thickness (0.7 cm) and CTD is core thickness deviation (raw data, mm)

To calibrate the DT, we select two suitables round calibration bars of know diameter (with a difference of about 20 mm). We place the smaller one between the transducers and adjust the zero. Then the larger piece is inserted and the span is adjusted to obtain the difference of diameter.

Magnetic Susceptibility The Bartington loop sensor is mounted in such a way that no magnetic or metallic components come close to the sensor. An oscillator circuit in the sensor produces a low intensity alternating magnetic field. Any material in the near vicinity of the sensor , which has a magnetic susceptibility, will cause a change in the oscillator's frequency. The electronics convert this pulsed frequency information into magnetic susceptibility values.

This system is calibrated absolutely. A calibration sample is provided which can be used only to check the long term consistency of the calibration.

To obtain the corrected volume specific magnetic susceptibility, K, the data must be corrected for the effect of the core and the size of the loop sensor being used. This effect has been determined experimentally. The volume specific magnetic susceptibility takes no account of the density of the sample being measured. It is possible to have variations in K down the length of a core that reflect changes in density. Mass specific magnetic susceptibility overcomes this problem by taking into account the density.

$\chi = K / \rho$

The sampling time is 10 second. A zero is made 10 cm before core.

The data provided don't take into account the density.

3.4 Colour reflectance using Minolta 2022 (Min-Te-Chen, Andrew Hatch)

Diffuse spectral reflectance measurements on sediment surfaces provide a rapid, high-resolution and non-invasive tool for estimating sediment compositions such as carbonate, organic carbon, and opal concentrations, which are essential information for high-resolution paleoceanographic research. The Minolta spectrophotometer 2022 used during the MONA cruise is a compact, handheld, sea-going instrument for measuring spectral reflectance. This device measures spectral data 1) by flashing light from an internal, pulsed, xenon arc lamp through a circular aperture (diameter of aperture = 11 mm, measurement area diameter = 8 mm) at the base of the instrument off the surface of the specimen, and 2) by recording the levels of light reflected back through the aperture to its sensor at various wavelengths within the visible range of the electromagnetic spectrum (400-700nm).

During the first leg of this cruise a Minolta 2002 was used instead of the 2022 model. The Minolta 2002 provides wavelength with increments of 20 nm, whilst the Minolta 2022 delivers values with a wavelength increment of 10 nm.

During the cruise, measurements were taken from the sediment surface of split working halve core sections either at 5cm intervals, or for the purpose of analyzing high-resolution records, at 2cm intervals. Before measuring reflectance data for sediment cores, the spectrophotometer was first calibrated against open space for a minimum reflectance reading and then against a white standard (Spectralon) for a maximum reflectance reading. Specimen measurements result in 31 channels of averaged percentage reflectance values for every 10-nm wavelength interval. These reflectance data can be interpreted as compositional changes of sediment through calibration against ground truth core measurements of sediment compositions.

The spectrophotometer also automatically calculates five parameters: L* (lightness), a* (red/green attributes), b* (yellow/blue attributes), C* (chroma/saturation), and h (Hue-angle). The output Excel files of the color reflectance data measured in this cruise contain data of measurement depths, values for these five parameters and 31 channels of 10-nm wavelength percentage reflectance data.

3.5 Photography

Photography of 0.5 m segments of the core sections was done with an OLYMPUS digital camera with a 5 Megapixel CCD unit. 3 Photos were taken from each core section. All individual photos were combined to one “section photo” and these were compiled to sheets, covering 15 sections of a core. The combined section photos remained their original resolution, the resolution for the compiled sheets was reduced in order to optimize filesize.

3.6 Sedimentology (Mary Jane Coombs, Ingrid Hendy)

Lithology, sedimentary structures, texture and coring disturbances where described for each core section. All original sedimentology descriptions were scanned after cruise and are available as PDF-files on CD or at www.images-pages.org/ftp/pub/.

A generalised stratigraphic description for each core based on the individual core-section descriptions was then compiled, using Adobe Illustrator 8.0 . Lithological symbols were created as Adobe Illustrator “swatches,” and structure and drilling-disturbance symbols were primarily created as Adobe Illustrator “brushes.” These sets of brushes and swatches are available at www.images-pages.org/ftp/pub/. To use these symbols, open the file legend.ai and copy and paste the swatches and brushes into your own files; this will add these features to your own swatches and brushes palettes within Adobe Illustrator.

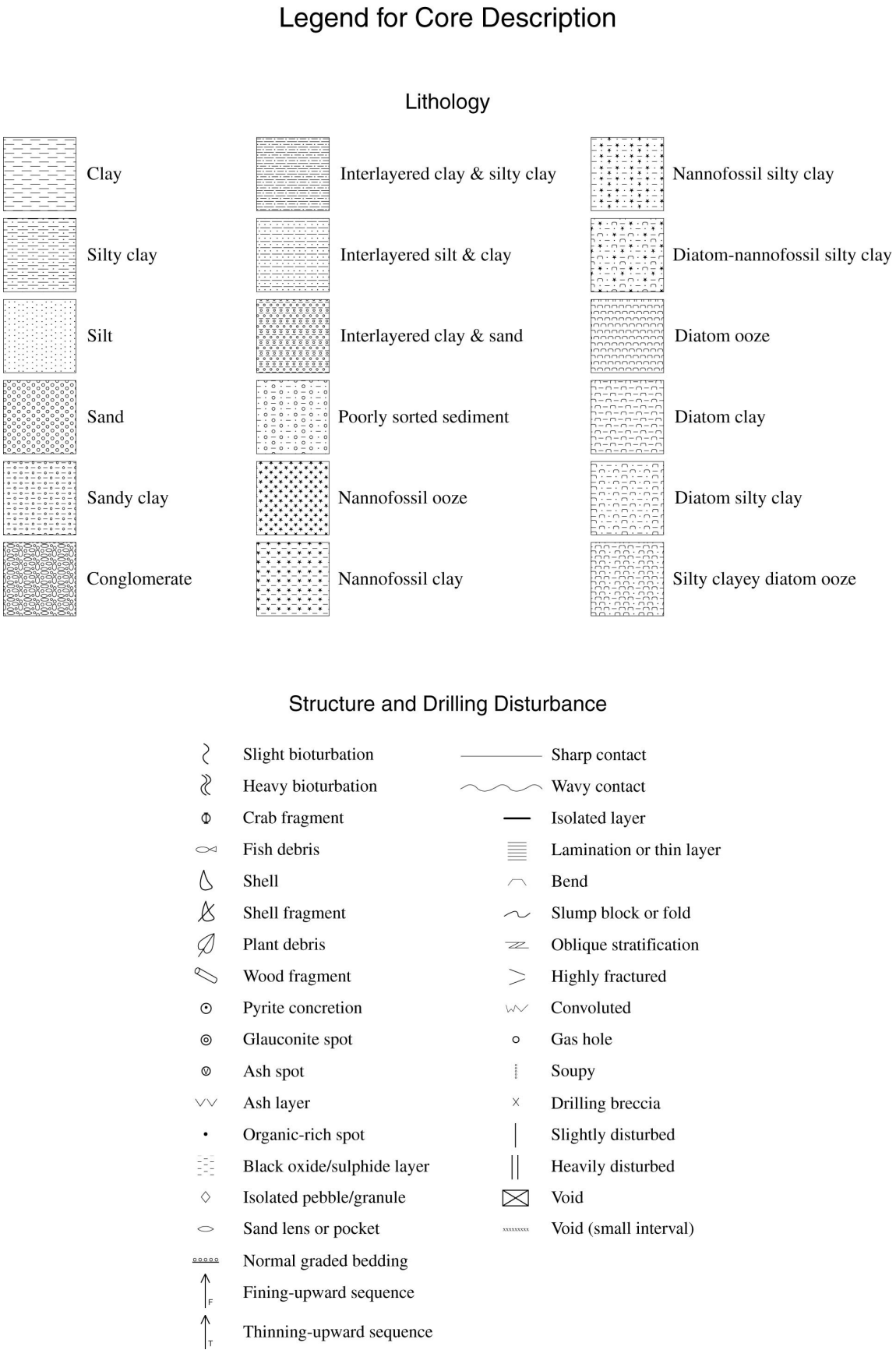


Fig. 7: Legend for core description files in this report.

3.7 Data management

All shipboard data was created and plotted on board. Documentation for each core consists of a station map, seismic lines, sedimentology description, corre photo, MST-data and color reflectivity data,. The complete documentation is part of this report. It is also available in PDF format at

www.images-pages.org/ftp/pub/

For some cores individual files are missing, due to missing data.

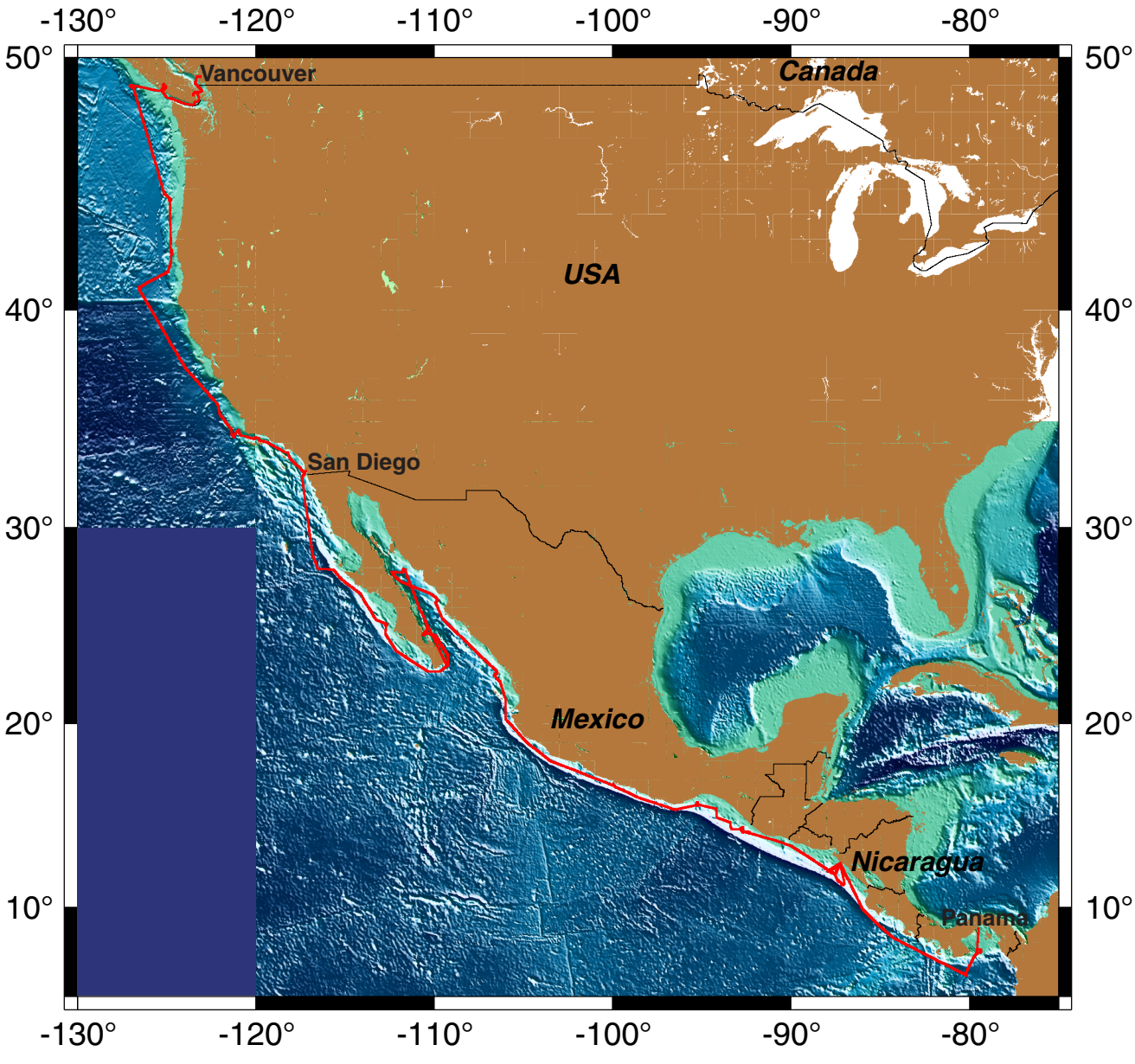
All shipboard data will also be archived as numeric data at the world data center **WDC Mare, Bremen**. The data can be retrieved from www.wdc-mare.org, www.pangaea.de with PangaVista, or www.images-pages.org/ (database section) from a core list.

All shipboard data will be exclusively available to the scientific shipboard party for the next two years. From July, 2004 the shipboard data will be open to the scientific community. Contact the principal investigator of a core to obtain collaboration within the 2-year moratorium period or to get access to the data.

3.8 Finally…

Fig 8: Chief scientist Luc Beaufort, on watch for the next site?

IMAGES VIII/MD126, MONA
Cruise Overview Map



GMT 2002 Sep 26 17:00:10

4. Site Reports and Core documentation

4.1 Vancouver Island, British Columbia Margin

Although the southern British Columbian margin is highly productive during the summer upwelling season, very little modern biogenic sediment accumulates on the shelf off Vancouver Island. This reflects intense scouring of the shelf by winter storm waves and the transport of fine-grained detritus offshore to deposcentres on the upper slope. Because the fjord-indented coastline of southern B.C. and Vancouver Island restricts the flux of terrestrial sediments to the shelf, Holocene sedimentation rates are relatively low on the upper slope, but can be extremely high within the fjords themselves, typically 10 m per kyr. This situation was radically different during the last deglaciation when sedimentation rates on the upper slope off southern Vancouver Island were very high (on the order of 1 m per kyr) and the fjords were ice-filled. No published information on slope sediments deposited prior to the Last Glacial Maximum (LGM) exists at present .

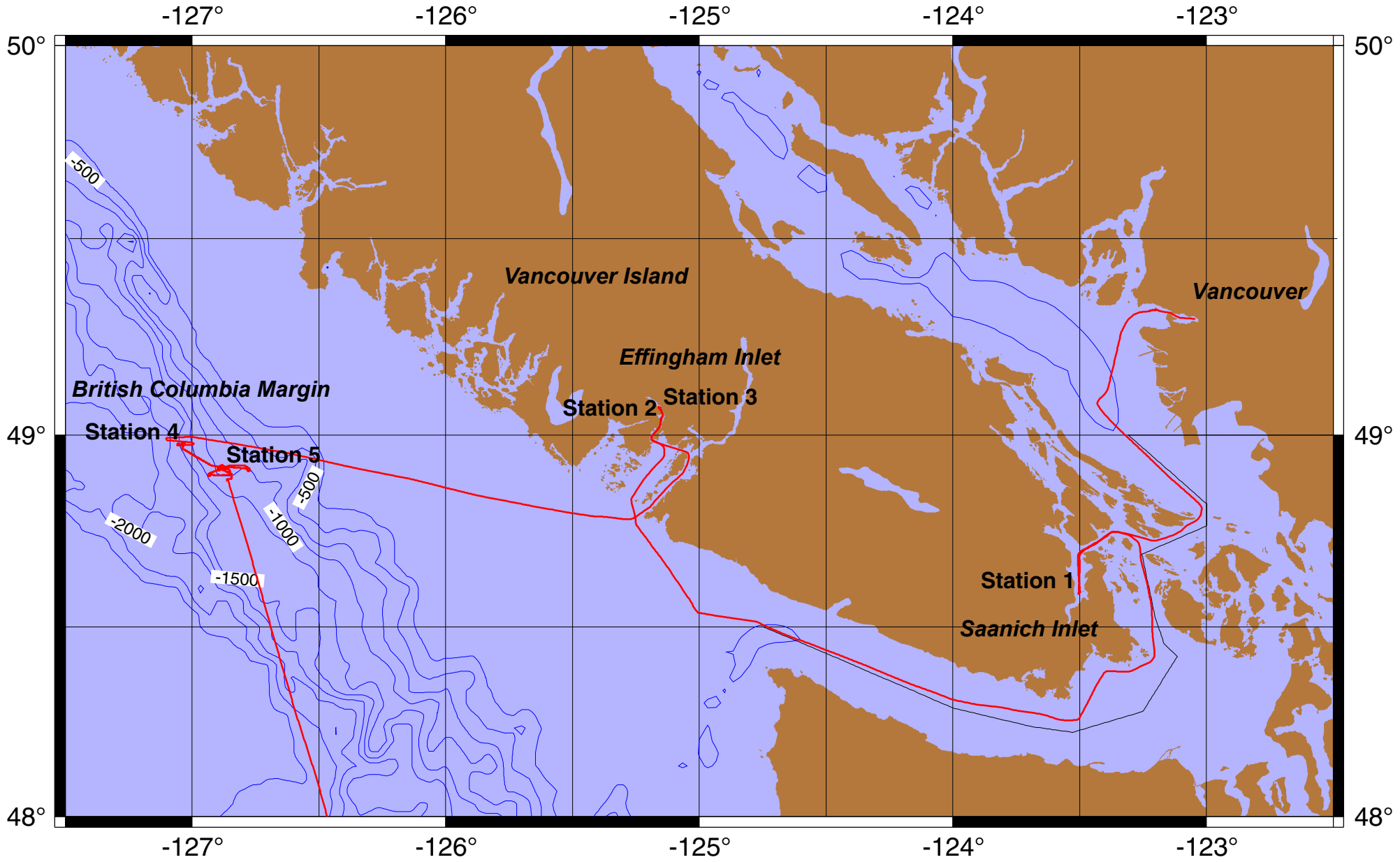
Three main sites were cored on 5 different stations: Sannish inlet (Station 1 Calypso MD022490 and Gravity MD022490G), Effingham Inlet (Station 2 : Gravity MD022491G and Calypso MD022492; and Station 3 Gravity MD022493G and Calypso MD022494) and the upper to lower slope west of Barkley Sound (Station 4: Gravity MD022495G and Calypso MD022496 and Station 5 Calypso MD022497).

Effingham Inlet is a recently-discovered anoxic basin on the western coast of central Vancouver Island that hosts laminated sediments. We cored in its outer and inner basins providing a nice way to study the influence of the open ocean on these restricted area. Saanich Inlet sediments are influenced by the Fraser River and the inland waters of Georgia Strait. The cores are all well laminated in the two inlets. The retrieved cores are long (40 to 51 m) and therefore should provide material to study at least the younger part of the Holocene and has the potential to offer near-annual resolution over that time.

The continental slope west of Vancouver Island offered a second desirable coring area. Piston and box cores were collected from the slope off Barkley Sound during a Canadian JGOFS cruise in 1996. A combination of limited coring equipment and the intersection of a thick (two to perhaps several metres), cohesive, compact glacial to deglacial gray clay limited penetration of the piston corer to about 5 m. Although sediments along the western margin of British Columbia are known to host abundant turbidites, such deposits were not a complicating issue in most of the cores raised in 1996, due to judicious selection of the coring sites. Thus, the turbidite problem can be minimized without difficulty.

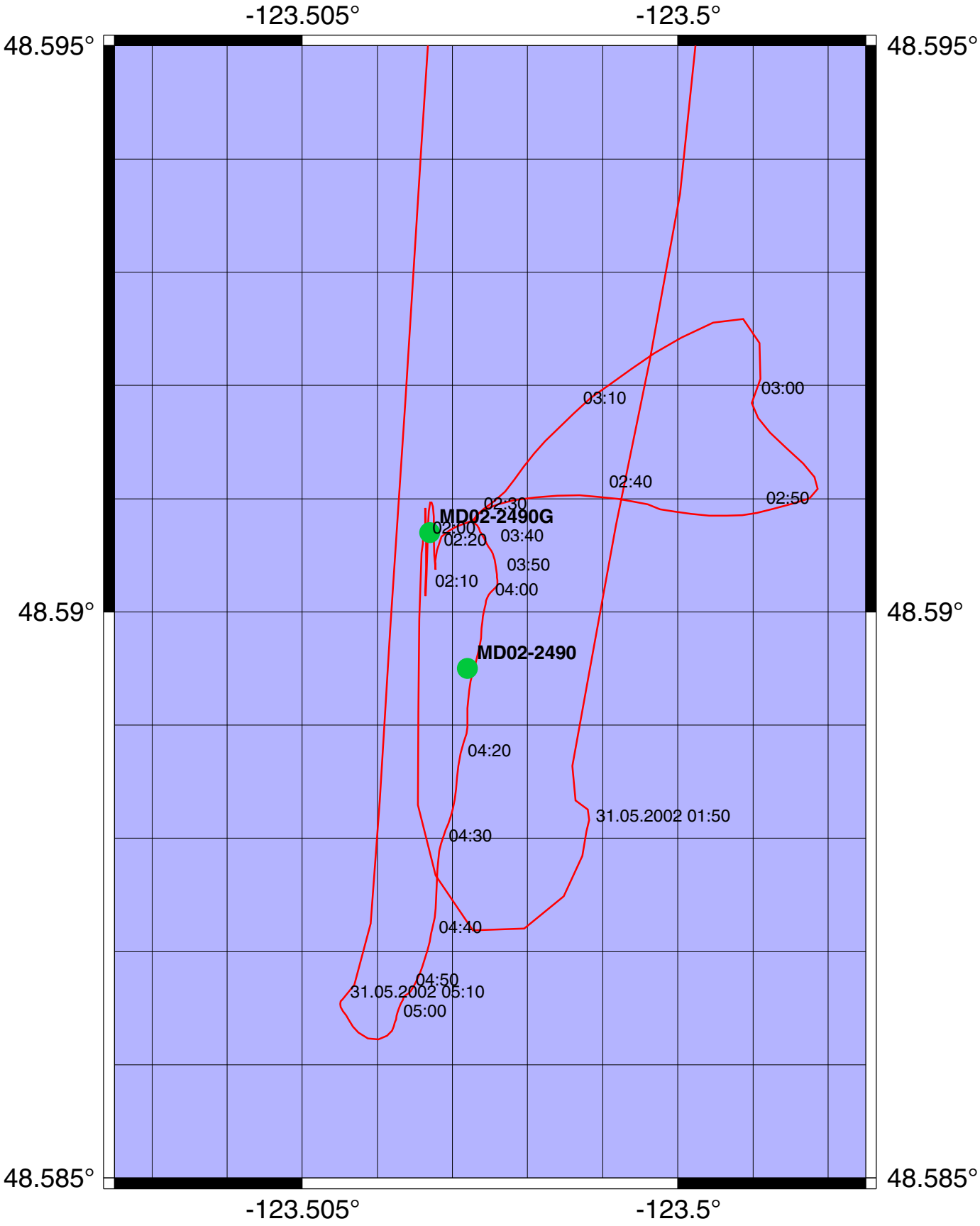
Preliminary data on previous core on that area show that intermediate waters in the region may have been nearly anoxic episodically in the past. Such episodes may have broad geographic expression across the northern Pacific, although this remains to be shown definitively, and will be one of many questions to be tackled with the three cores taken.

IMAGES VIII/MD126, MONA
Vancouver Island & British Columbia Margin, Overview



GMT 2002 Sep 19 17:45:36

IMAGES VIII/MD126
Station 1, Saanich Inlet



GMT 2002 Jun 16 17:27:35

NOM DE LA CAMPAGNE

MD 126 MONA

Date : **31.05.2002**

N° de station **1**

Météo : (force) / Direction
Vent : **0**
Mer : **0**
Variation tension (maxi) : **0**

CAROTTE (N°) :

MD 02-2490

(MD - année - milles - centaines)

CAROTTE (longueur) :

51 m

POSITION :

Latitude : **48° 35,37 N**

Longitude : **123° 30,17 W**

CAROTTIER (type) [1] : **CALYPSO**

Poids total (air) : **4.90** **t**

Poids total (eau) : **4.60** **t**

REGLAGES :

Tubes (longueur) : **51.17** **m**

Câbles :
Chute libre : **m**

Boucle : **1.60** **m**

LC poids : **m**

CONTREPOIDS :

Type (2) : **Cylindrique**

Longueur PVC : **m**

Pénétration : **Totale** **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **224** **m**

Ligne filée : **175** **m**

Arrachement/total *(tonne)* : **6.70** **t**

Arrachement/différentiel *(tonne)* : **2.30** **t**

Pénétration/apparente *(m)* : **>51,17** **m**

Pénétration/tensiomètre *(m)* : **>51,17** **m**

HEURES (GMT)

En station : **02:00**

Début manœuvre : **03:39**

Déclenchement **04:20**

Fin de manœuvre : **05:10**

Durée de manœuv **01:20**

Départ station : **05:05**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger : /

Flux de chaleur : /

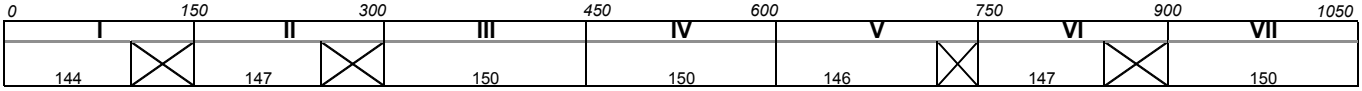
CTD (hydro) : /

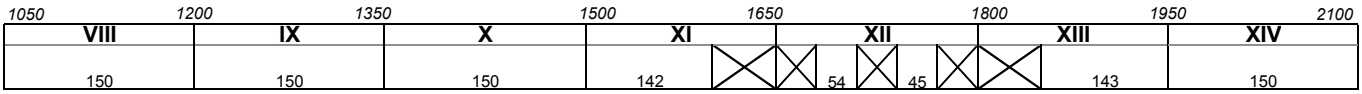
CTD (bouteilles) : /

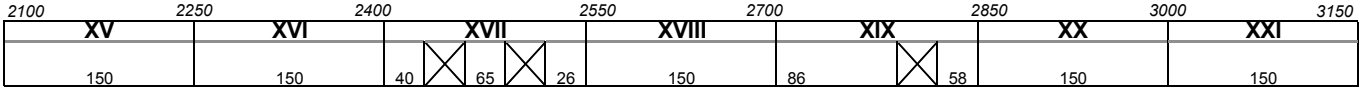
Filet à plancton : /

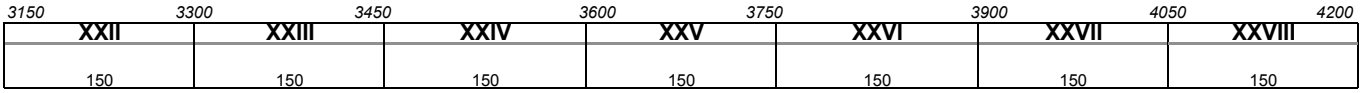
Autres : /

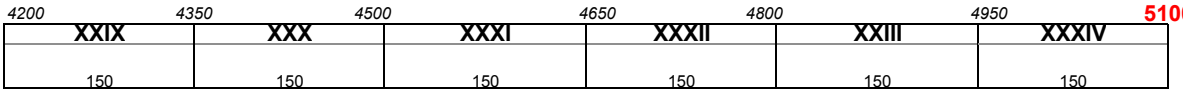
Description / incidents : **Violent choc en fin de pénétratio**











(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MD02-2490

Calypso core MD02-2490 recovered a total of 51.07 m of sediments. The dominant lithology throughout the core is dark olive grey clay with variable silt and diatom content. The section consists of laminated intervals interbedded with massive layers. Laminations change from distinct in the top 30 m to progressively more irregular and faint towards the bottom of the core. Plant / wood debris and shells / shell fragments are abundant below ~41 m. A 1 cm thick ash layer is found at 35.89 m (Mazama Ash). A ~1 m thick massive black clayey silt is present between 47-48 m.

Coring disturbance is extensive in the top 4m of the core. Sediments are olive grey to olive diatom silty clay. Laminations are visible in several parts, but the texture of the sediment in most of this interval is obscured by gas disruption.

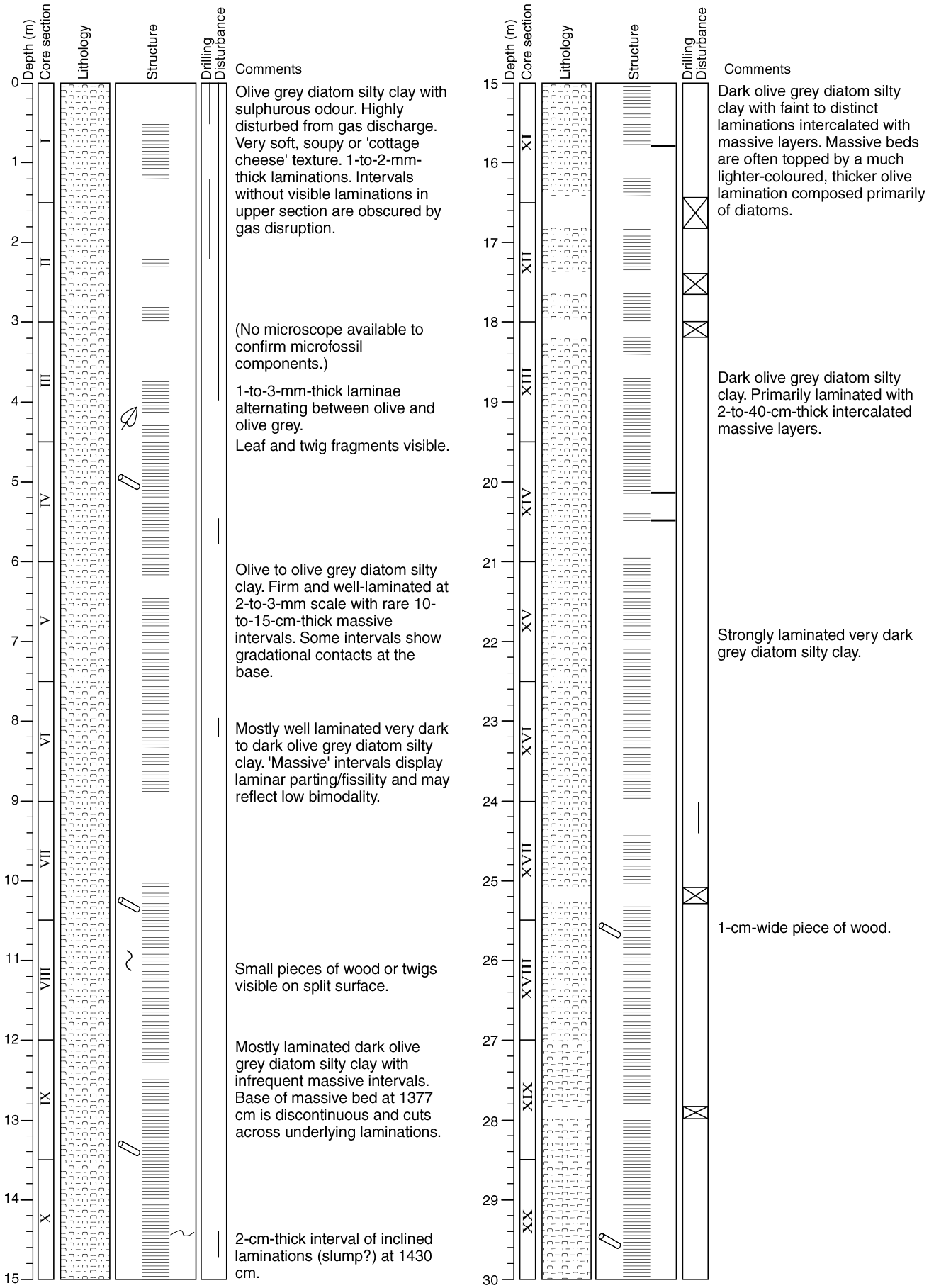
Sediments between 4 and ~30 m consist predominantly of dark olive grey diatom silty clay. Laminated intervals are interbedded with massive layers, which have the same lithology as the laminated intervals. Laminae are usually 2-3 mm thick. Massive layers range in thickness from a few cm to 1.1 m. Some have an erosive base. Massive beds are often topped by a thin, much lighter lamina consisting primarily of diatoms. Wood debris is occasionally present. One 2 cm thick interval with inclined laminations at 14.3 m may represent a slump.

The interval from 30 to 40 m, consists mainly of alternating distinctly and indistinctly dark olive grey diatom silty clay. Massive beds occur sparsely in this interval. A 1 cm thick, white, 2-part vitric ash is present at 35.89 cm.

Below 40 m, laminations become progressively more discontinuous and faint, grading to massive to indistinctly laminated sediments at the base of the core. Massive intervals are intercalated with the laminated intervals. Sediments are mostly made up of dark olive grey diatom silty clay. Plant and wood debris, and shells and shell fragments are abundant in this part of the core. Sediments between 42.9 to 48 m are inclined at a 20° to 40° angle. A ~ 1 m thick massive black clayey silt is present between 47-48 m; the contact with sediments below and above is sharp.

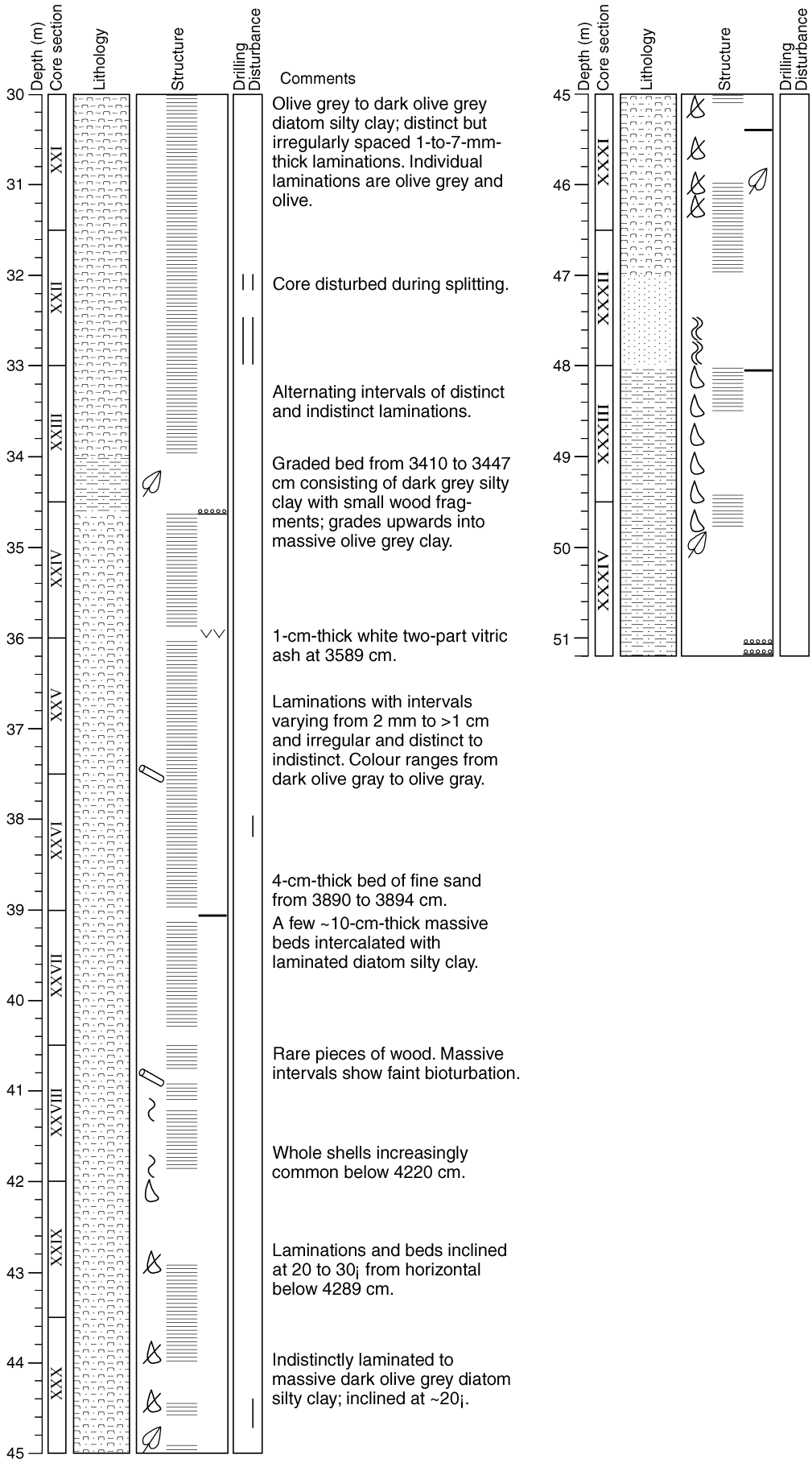
MONA

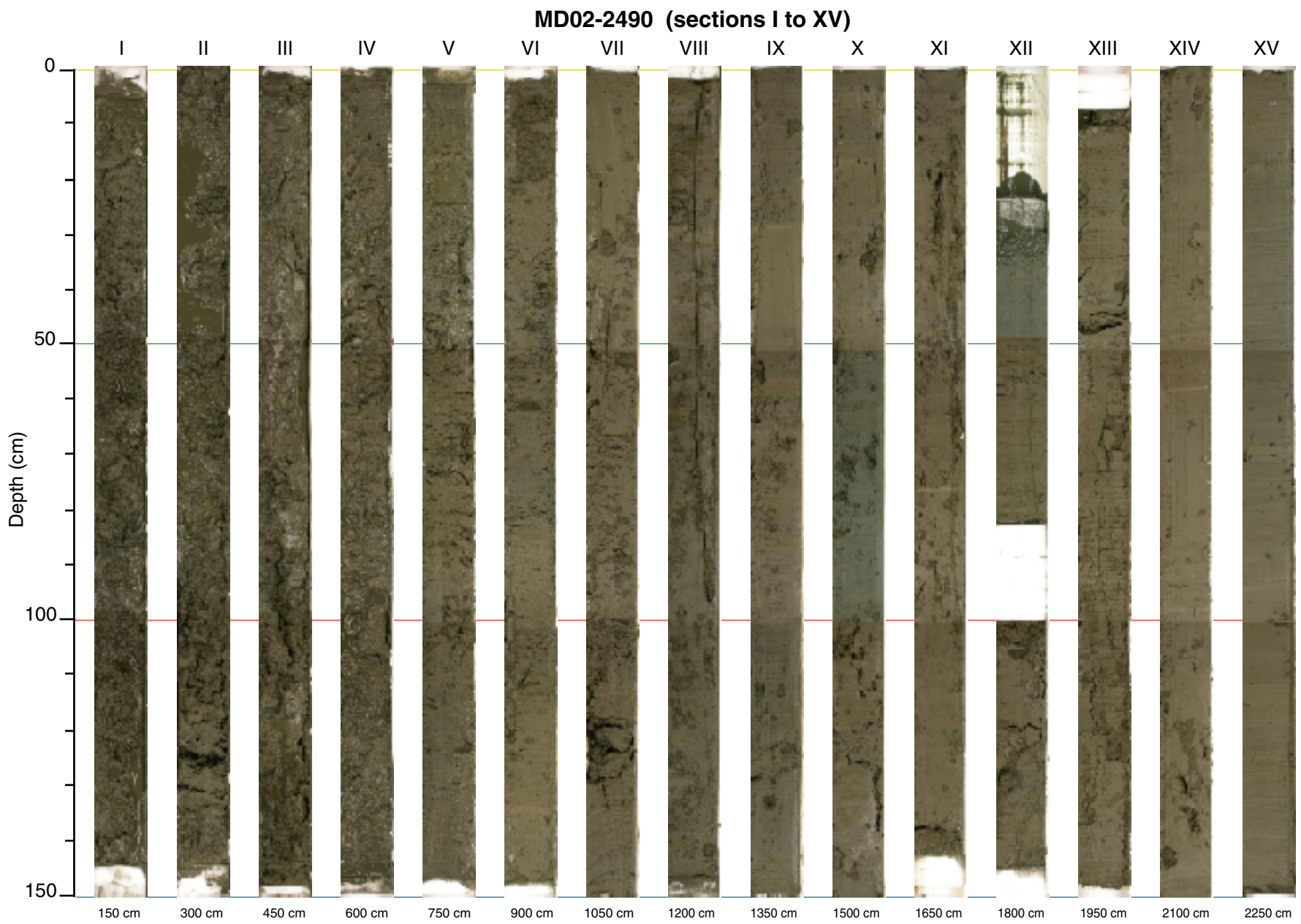
Core: MD02-2490

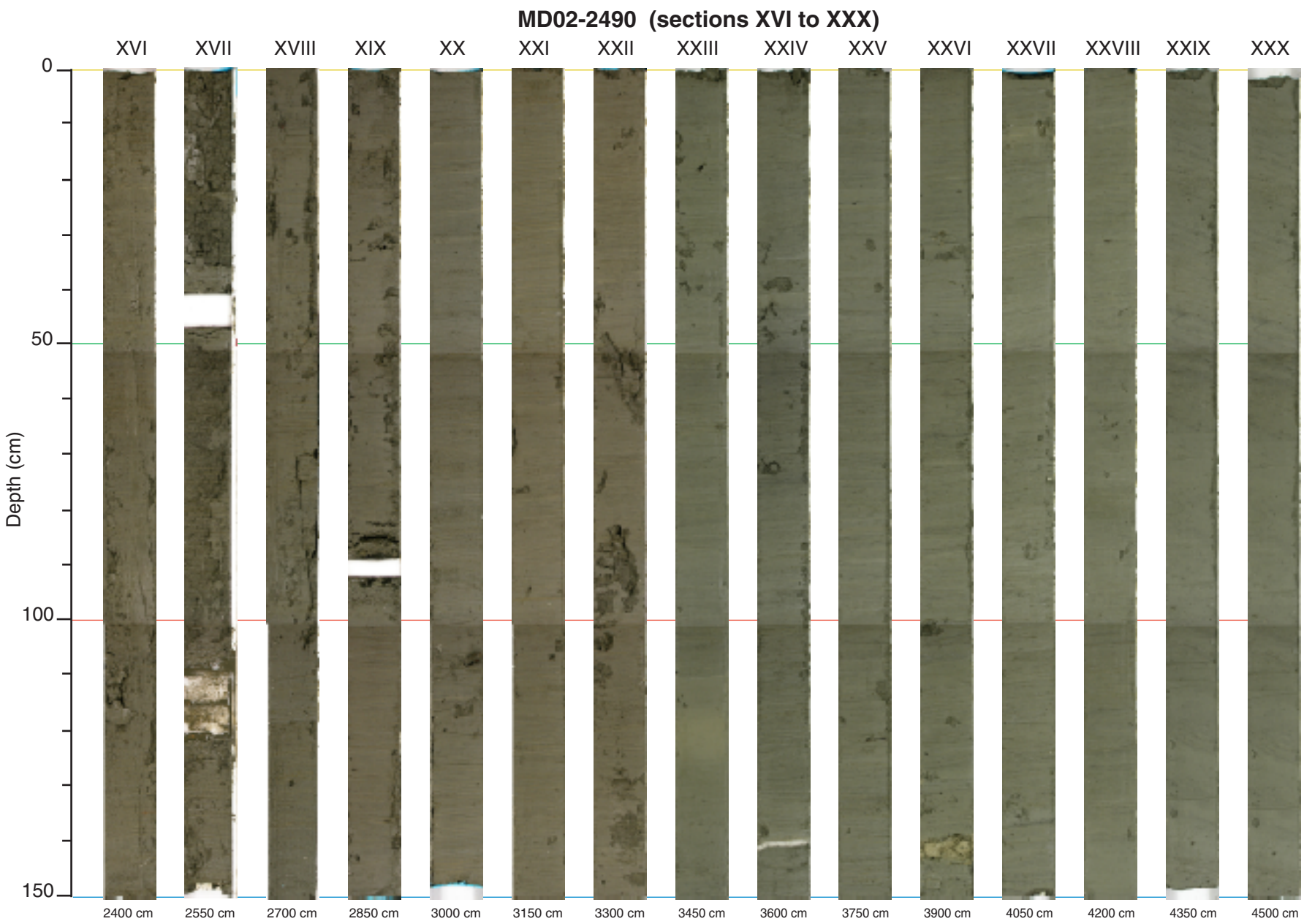


MONA

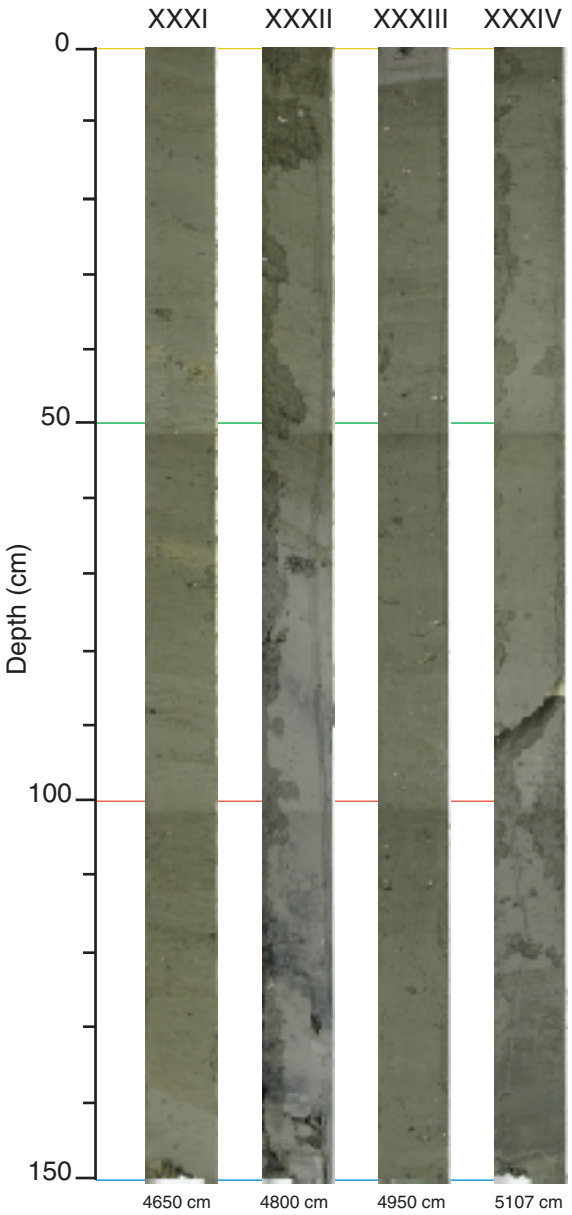
Core: MD02-2490 (cont.)




MD02-2490 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2490 (sections XVI to XXX)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
XXIX
XXX
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3750 cm
3900 cm
4050 cm
4200 cm
4350 cm
4500 cm

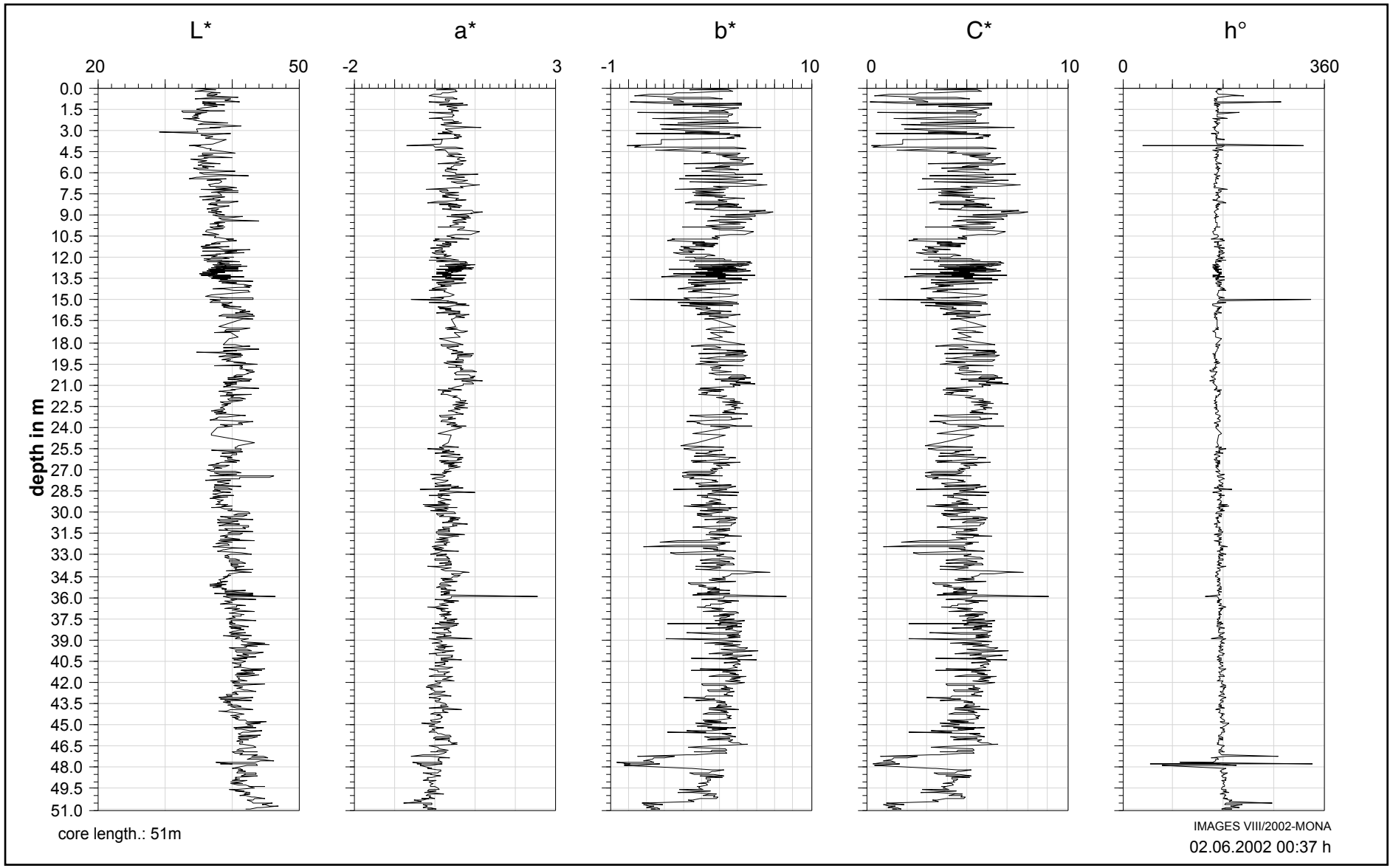
MD02-2490 (sections XXXI to XXXIV)



IMAGES VIII, 2002
MONA

Colour Reflectivity

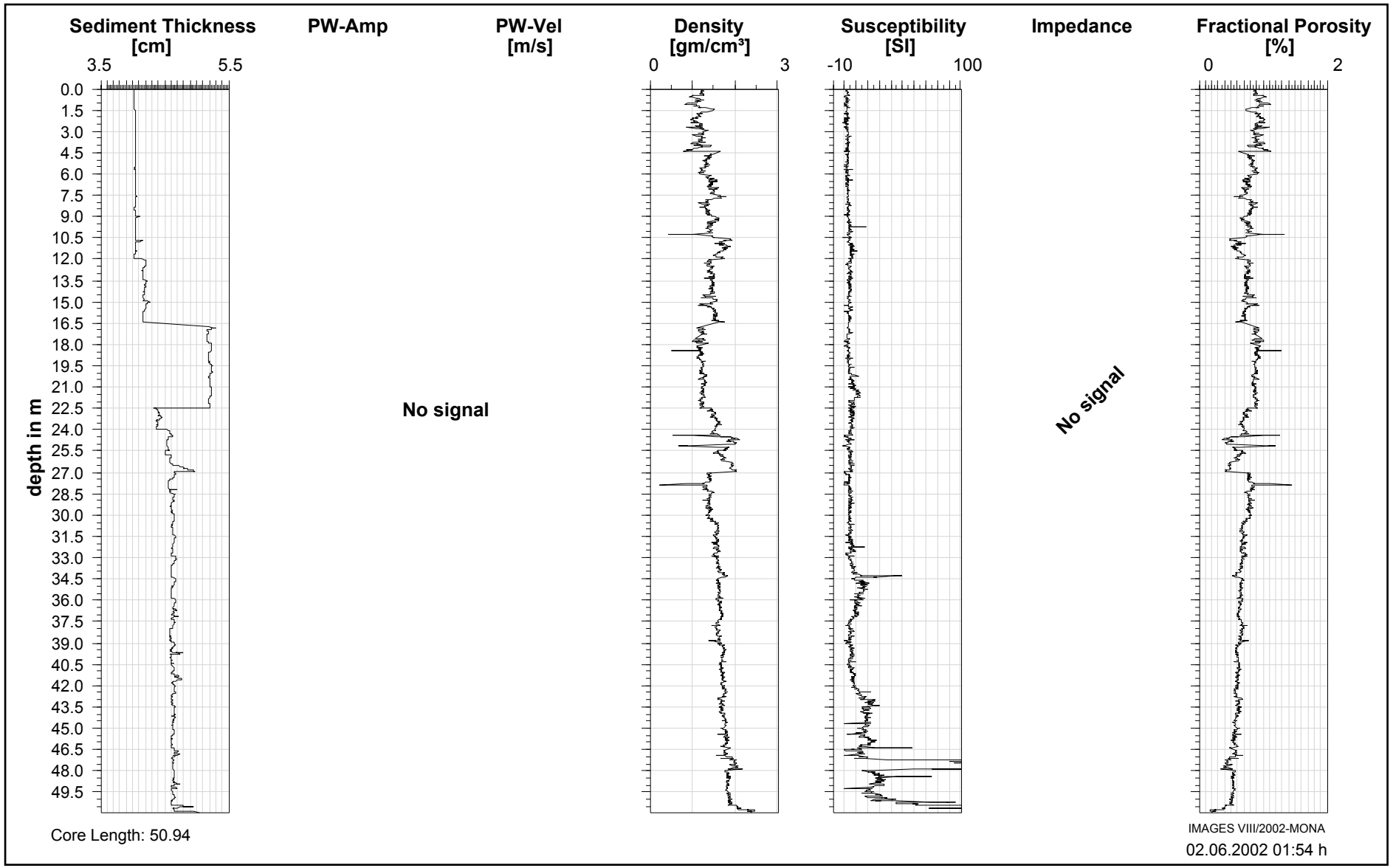
Station 1
Core MD02-2490



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 1
Core MD02-2490



NOM DE LA CAMPAGNE

MD 126/ MONA

Date : **31.05.2002**

N° de station : **1**

Météo : (force) / Direction
Vent : **0**
Mer : **0**
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2490-G

(MD - année - milles - centaines)

CAROTTE (longueur) :

10.16 m

POSITION :

Latitude : **048°35,44 N**

Longitude : **123°30,20 W**

CAROTTIER (type) (1) **:** **GRAVITE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **20.00** **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :

Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **210** **m**

Ligne filée : **m**

Arrachement/tota *(tonne)* : **t**

Arrachement/différentiel*(tonne)* : **t**

Pénétration/apparente*(m)* : **m**

Pénétration/tensiomètre*(m)* : **m**

HEURES (GMT)

En station : **02:00**

Début manœuvre : **02:12**

Déclenchement : **02:20**

Fin de manœuvre : **02:26**

Durée de manœuvre : **00:14**

Départ station :

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger : /

Flux de chaleur : /

CTD (hydro) : /

CTD (bouteilles) : /

Filet à plancton : /

Autres : /

Description / incidents :

0 *150* *300* *450* *600* *750* *900* ***1016***

I	II	III	IV	V	VI	VII

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

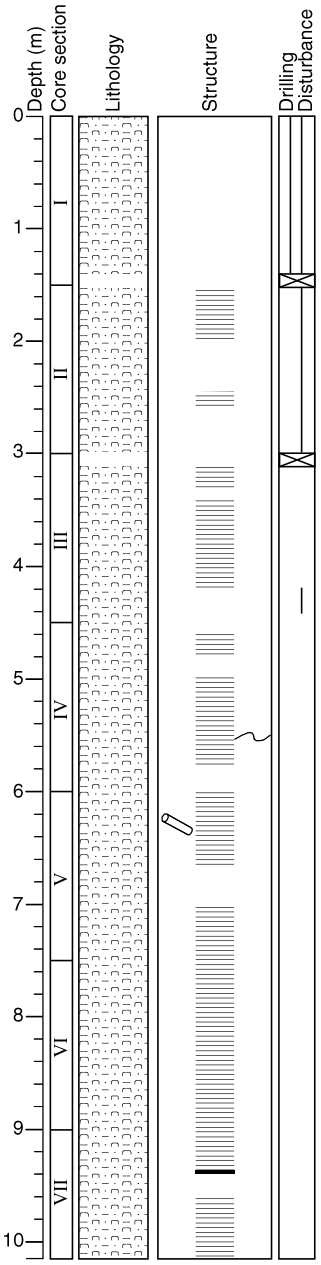
(2) Cylindrique 100 kg / Plat / Préleveur

MD02-2490G

Gravity core MD02-2490G recovered a total of 10.15 m of sediments. The dominant lithology throughout the core is dark olive grey clay with silt and diatoms. The top three meters of the core are disturbed, but faint laminations are visible in some intervals. The remainder of the sequence is faintly to distinctly laminated, and interbedded with massive intervals, which are commonly topped by a light coloured lamina consisting of diatoms. Lamina in a four cm interval at 5.5 m are inclined and may represent a slump.

MONA

Core: MD02-2490G



Comments

0-150 cm: liquified and collected in a bag.

Dark olive grey clay with silt or silty clay with diatoms. Very disrupted by gas. Faint laminations are visible locally.

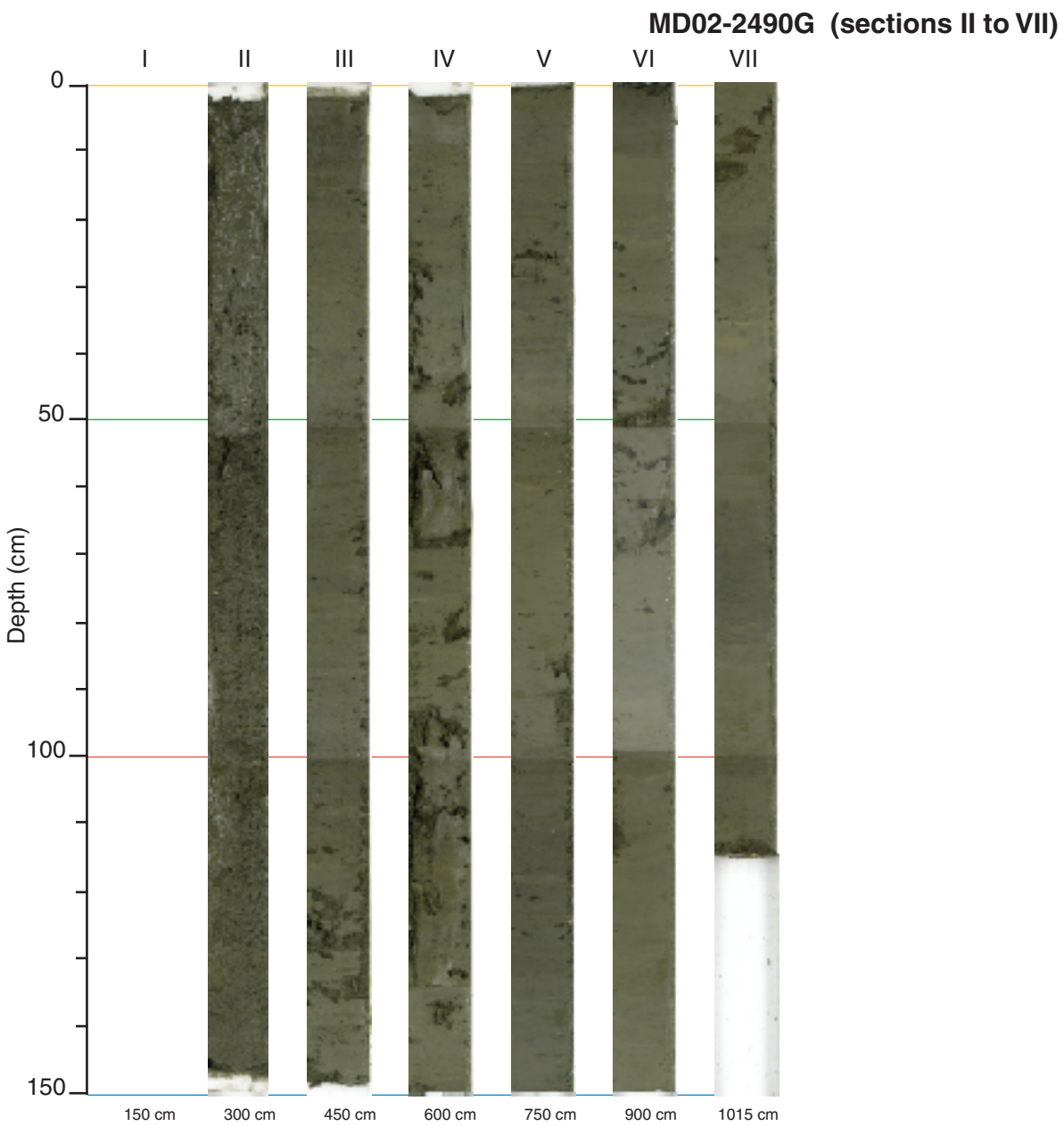
Dark olive grey clay with silt and diatoms, mostly distinctly laminated with intercalated massive layers. Massive intervals are commonly topped with a thick, light-coloured lamination composed of ~100% diatoms.

4-cm-thick interval of inclined laminations (slump?) at 549 to 553 cm.

Piece of wood at 627 cm.

Dark olive grey diatom silty clay to clay with silt and diatoms with 1-to-4-mm-thick indistinct laminations. Infrequent, 2-to-10-cm-thick massive intervals.

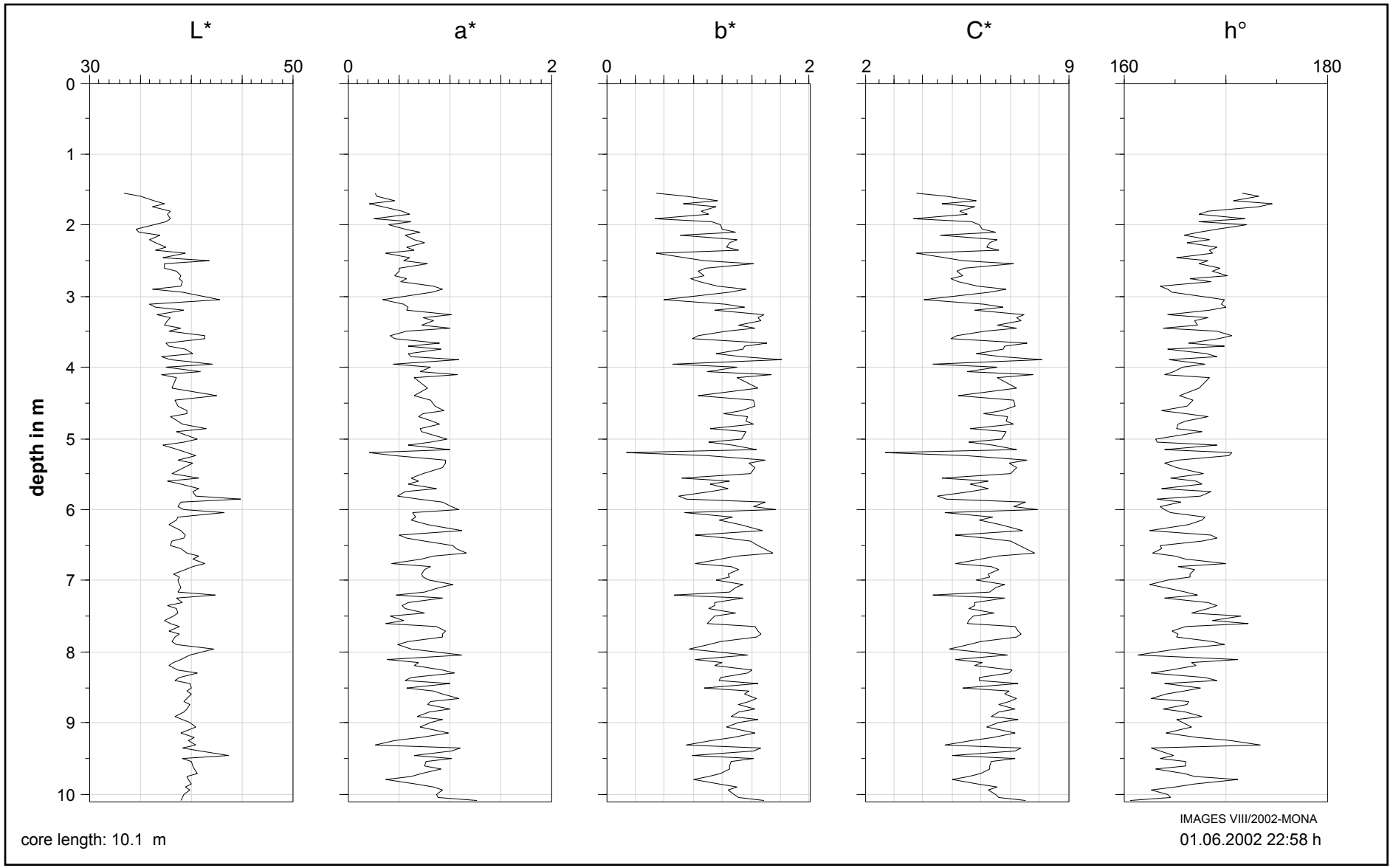
End of core, 1015 cm.


MD02-2490G (sections II to VII)
I
II
III
IV
V
VI
VII
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1015 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

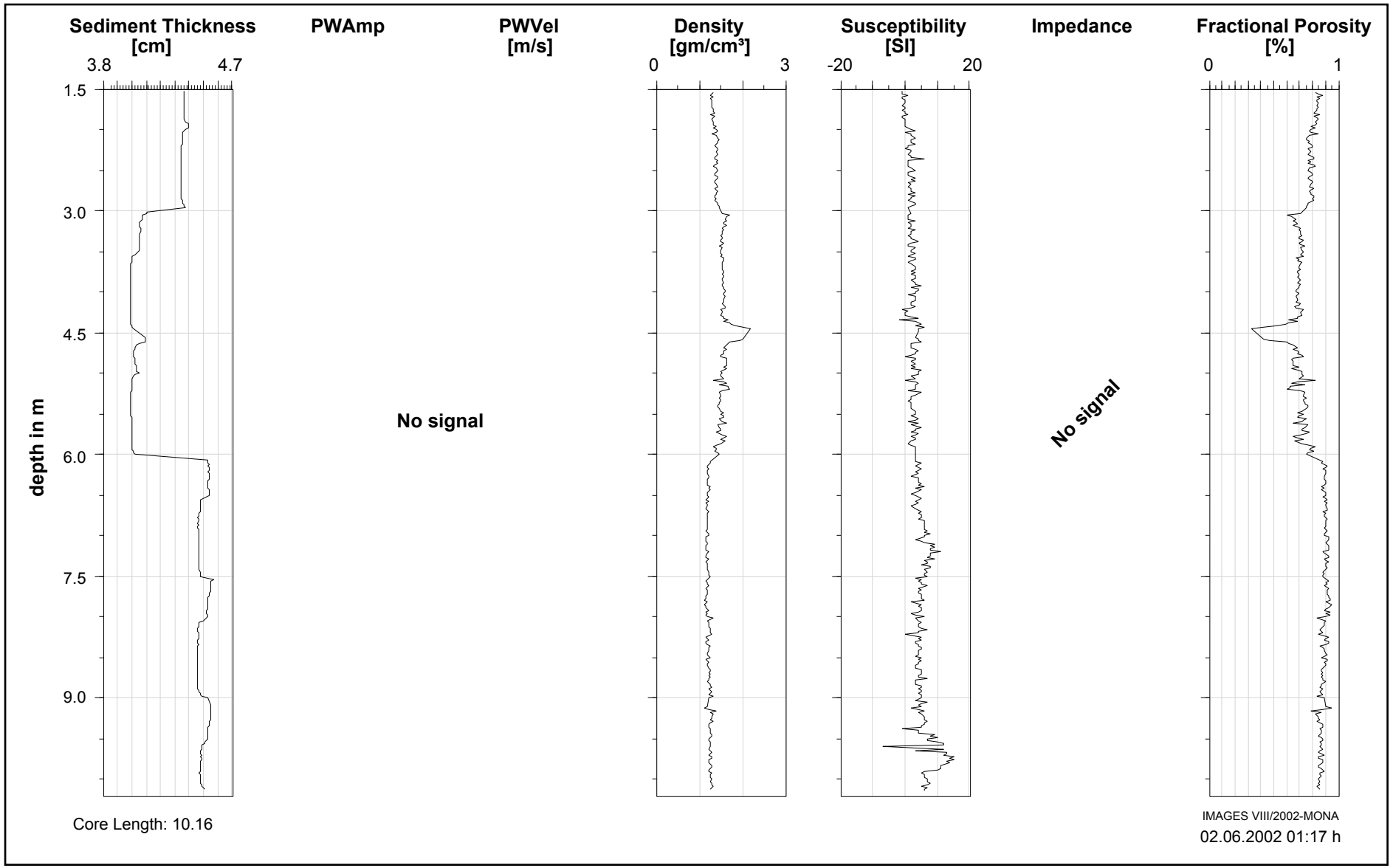
Station 1
Core MD02-2490G



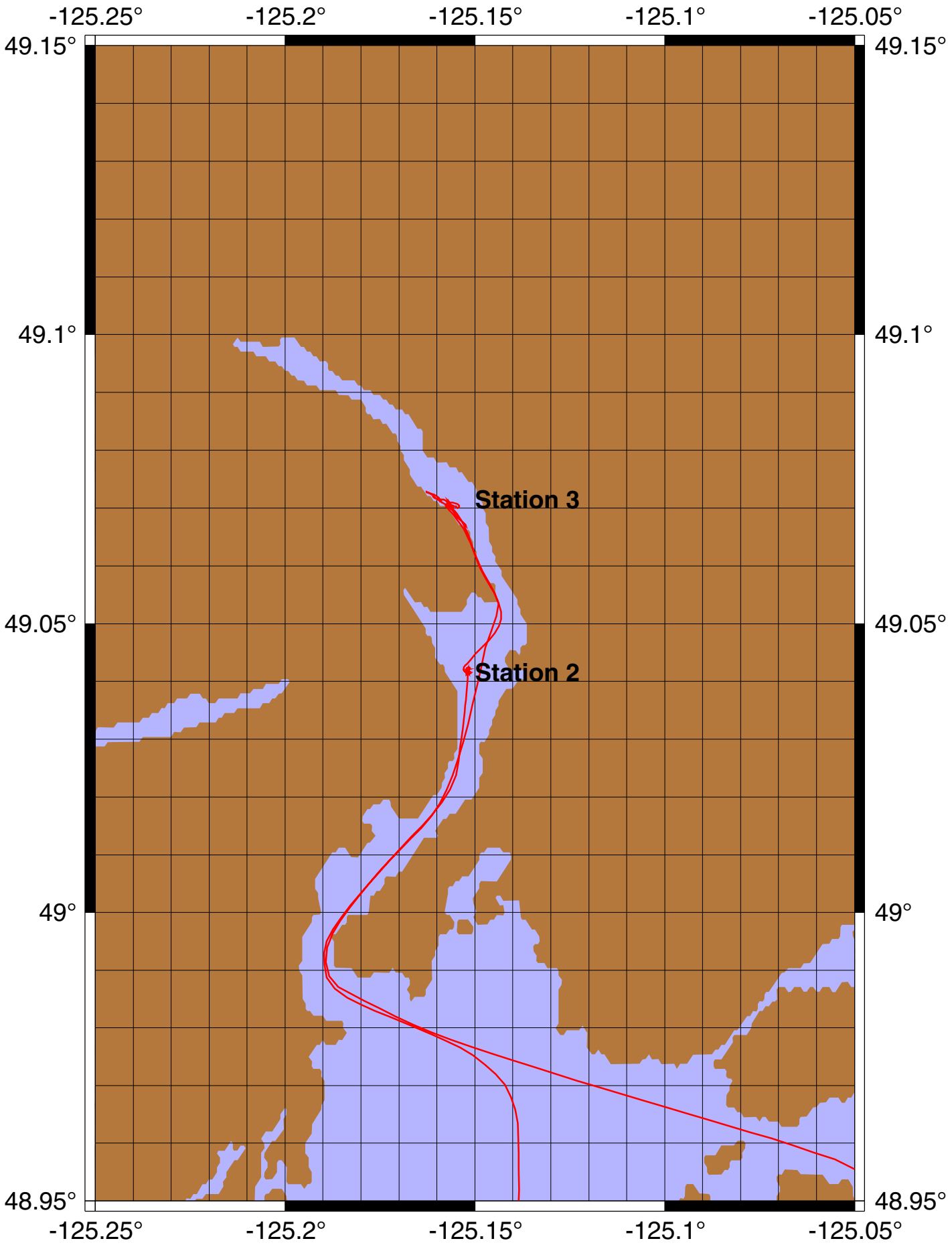
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 1
Core MD02-2490G

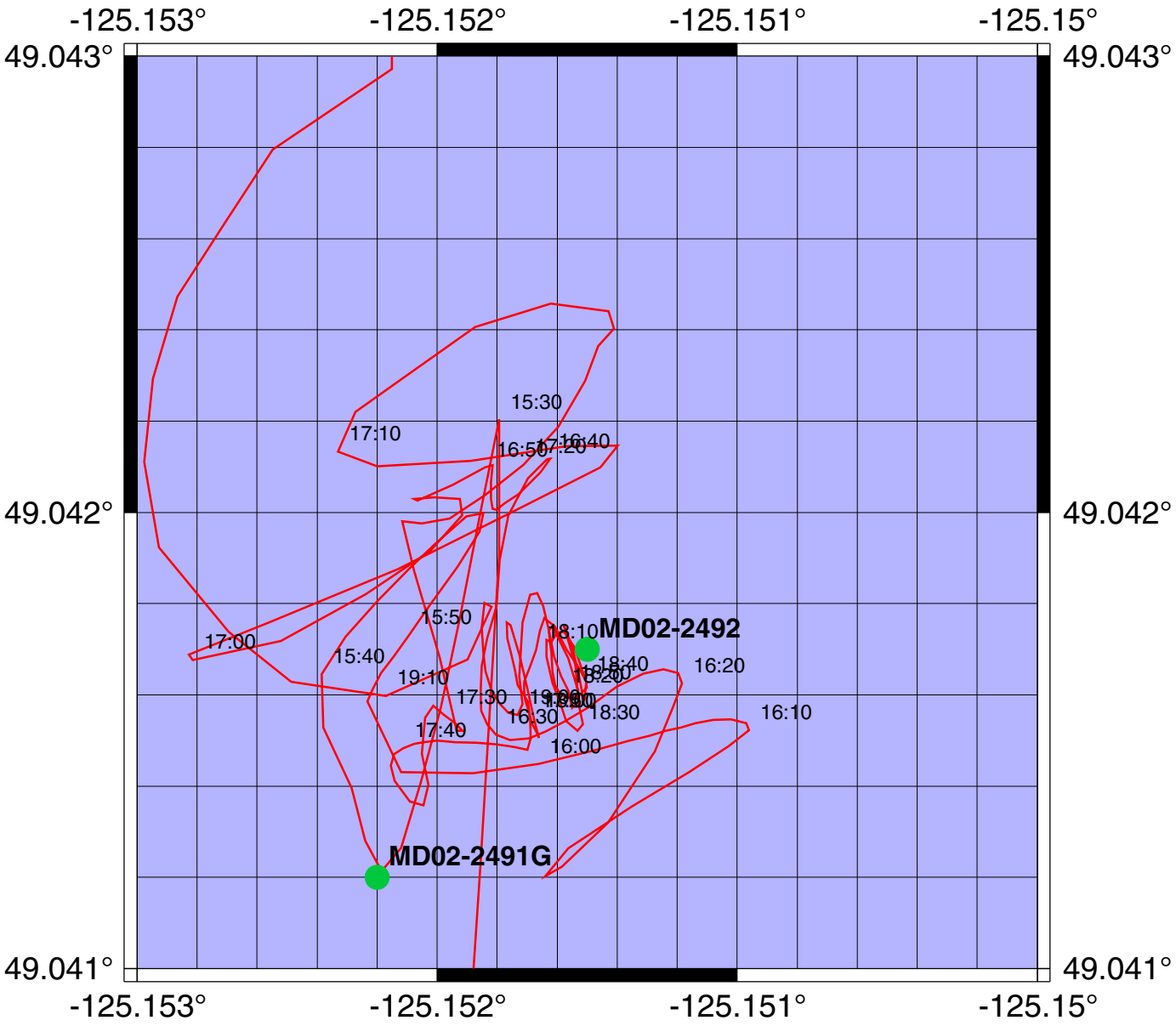


IMAGES VIII/MD126, MONA
Effingham Inlet Overview



GMT 2002 Jun 16 23:36:42

IMAGES VIII/MD126, MONA
Station 2, Outer Effingham Inlet



GMT 2002 Jun 17 00:01:17

NOM DE LA CAMPAGNE

MD 126/ MONA

Date : **31.05.2002**

N° de station : **2**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2491 G

(MD - année - milles - centaines)

CAROTTE (longueur) :

7.23 m

POSITION :

Latitude : **049°02.47 N**

Longitude : **125°09.13 W**

CAROTTIER (type) (1) : **GRAVITE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :

Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **15:37**

Début manœuvre : **15:48**

Déclenchement : **16:00**

Fin de manœuvre : **16:20**

Durée de manœuvre : **00:32**

Départ station : **resté en station pour carottage suivant**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger : /

Flux de chaleur : /

CTD (hydro) : /

CTD (bouteilles) : /

Filet à plancton : /

Autres : /

Description / incidents :

0 *150* *300* *450* *600* ***723***

I	II	III	IV	V

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

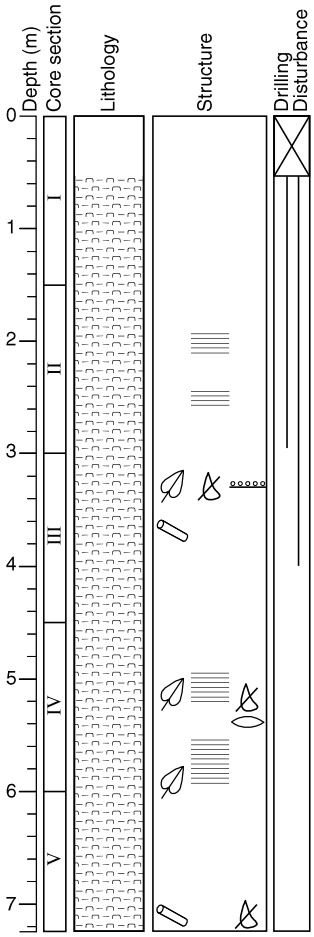
(2) Cylindrique 100 kg / Plat / Préleveur

MD02-2491G

Gravity core MD02-2491G recovered 7.23 m of sediment. The sediments consist of very dark grey to dark olive grey diatom clay. The top three metre of the core is disturbed, but shows faint laminations in some intervals. The rest of the sequence shows faintly laminated intervals alternating with massive beds. Plant and wood debris occur throughout the core. Shell fragments occur at the base of a graded deposit between 3.30 to 3.35 m.

MONA

Core: MD02-2491G



Comments

Faintly laminated to structure-less black to very dark grey diatom clay; color mottled and soupy in consistency. Highly disturbed by coring and core splitting processes.

330 to 335 cm: graded deposit with sand and shell fragments grading upwards into silty sand with wood and plant fragments.

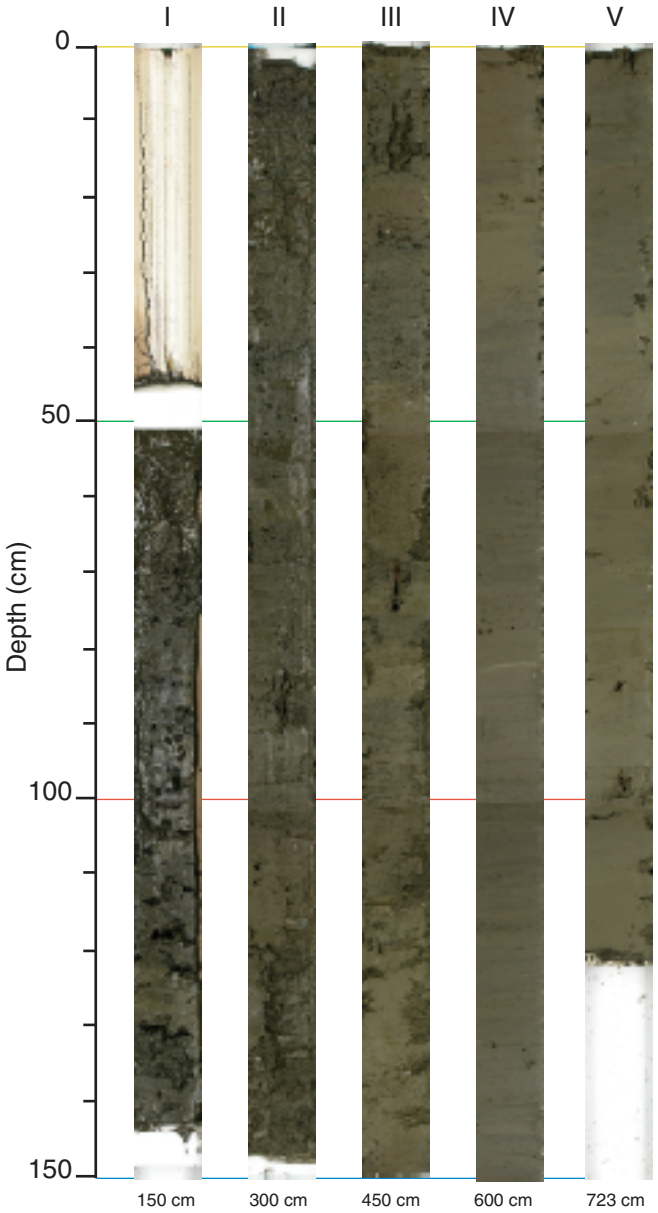
Very dark grey to dark olive grey diatom clay with alternating intervals of faint laminations and massive beds.

Thin white lens at 526 cm.

Massive diatom clay with wood chunks and plant debris.

End of core, 723 cm.

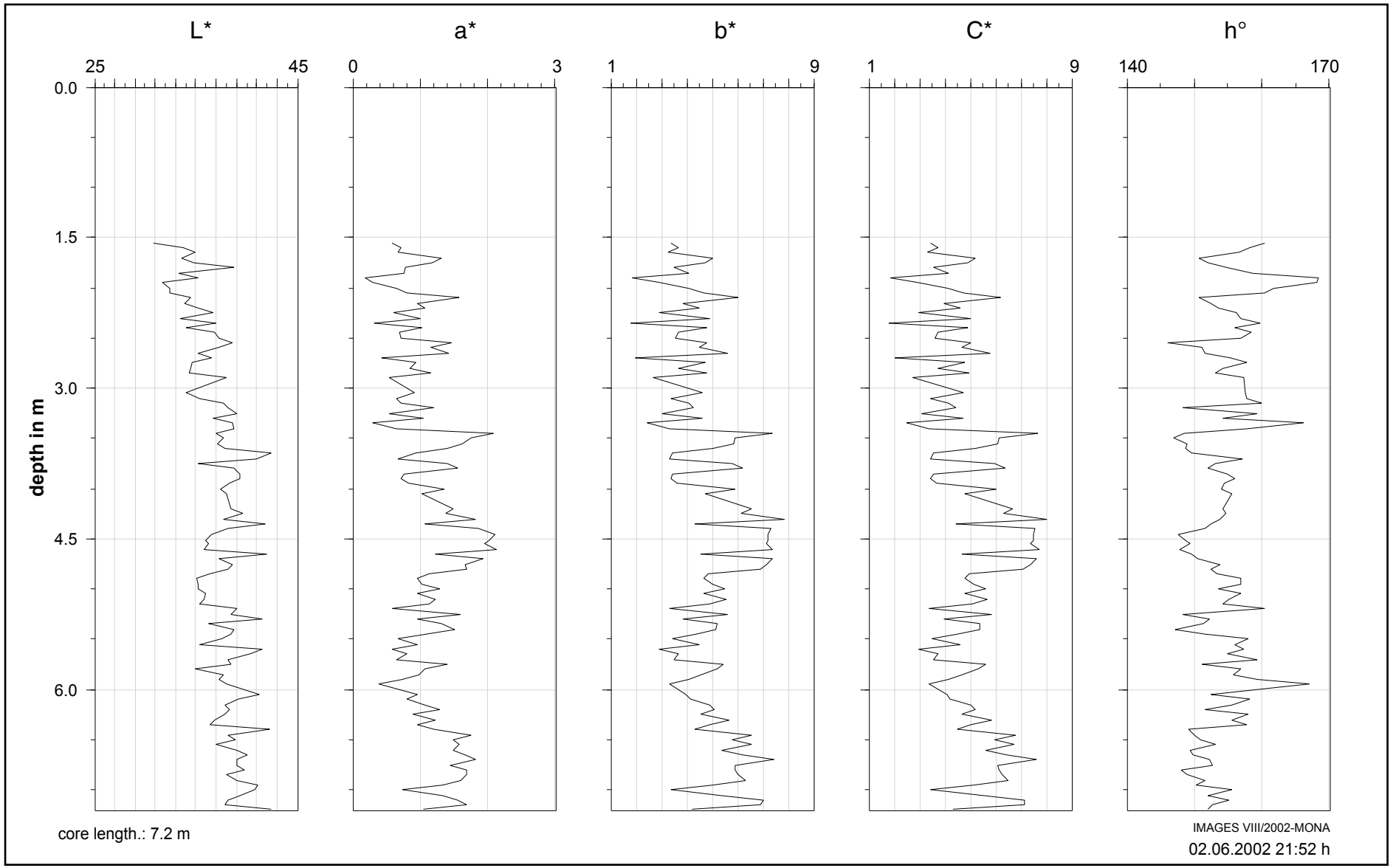
MD02-2491G (sections I to V)



IMAGES VIII, 2002
MONA

Colour Reflectivity

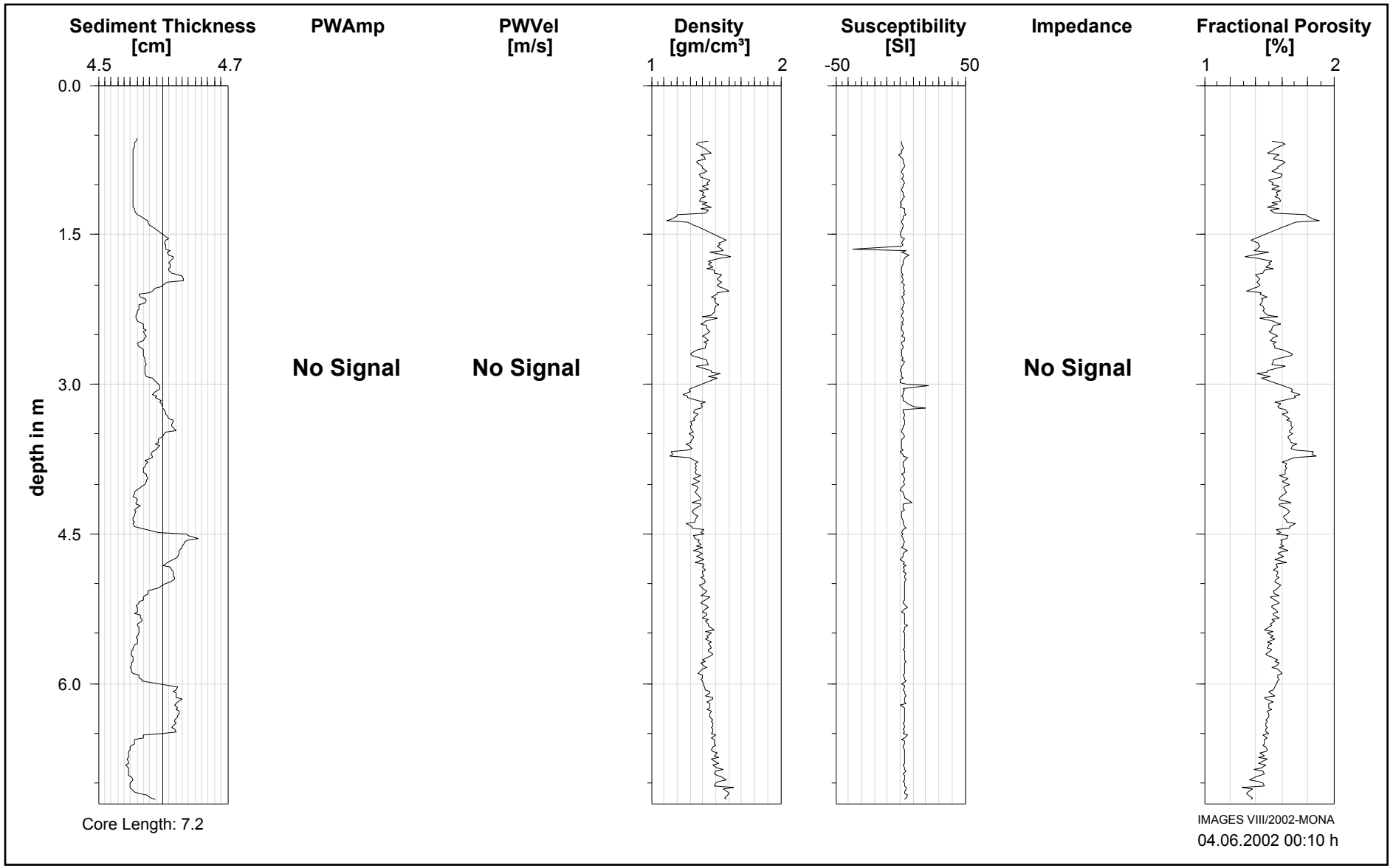
Station 2
Core MD02-2491G



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 2
Core MD02-2491G



NOM DE LA CAMPAGNE

MD 126 MONA

Date : **31.05.2002**

N° de station : **2**

Météo : (force) / Direction
Vent : **Beau**
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2492

(MD - année - milles - centaines)

CAROTTE (longueur) :

51.03 m

POSITION :

Latitude : **49°02 50 N**

Longitude : **125°09 09 W**

CAROTTIER (type) [1] **:** **CALYPSO**

Poids total (air) : **4.90 t**

Poids total (eau) : **4.50 t**

REGLAGES :

Tubes (longueur) : **51.20 m**

Câbles :
Chute libre : **1.50 m**
Boucle : **1.60 m**
LC poids : **56.00 m**

CONTREPOIDS :

Type (2) : **CYLINDRIQUE**

Longueur PVC : **m**

Pénétration : **Totale** **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **146 m**

Arrachement/total *(tonne)* : **7.30 t**

Arrachement/différentiel *(tonne)* : **2.30 t**

Pénétration/apparente *(m)* : **>51,20 m**

Pénétration/tensiomètre *(m)* : **>51,20 m**

HEURES (GMT)

En station : **15:37**

Début manœuvre : **18:05**

Déclenchement : **18:16**

Fin de manœuvre : **19:09**

Durée de manœuvre : **01:04**

Départ station : **19:05**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger : /

Flux de chaleur : /

CTD (hydro) : /

CTD (bouteilles) : /

Filet à plancton : /

Autres : /

Description / incidents : **A partir de la fraction 2700-2830 décalage systématique de 20 cm des sections à suivre**

0	150	300	450	600	750	900	1050
I	II	III	IV	V	VI	VII	
144	143	148	148	150	148	150	

1050	1200	1350	1500	1650	1800	1950	2100
VIII	IX	X	XI	XII	XIII	XIV	
150	150	63 82	52 86	40 98	150	150	

2100	2250	2400	2550	2700	2829	2950	3100
XV	XVI	XVII	XVIII	XIX		XX	XXI
150	150	150	150	129		121	150

3100	3250	3400	3550	3700	3850	3980	4100
XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII	
150	150	150	150	150	130	120	

4100	4250	4400	4550	4700	4850	5000	5103
XXIX	XXX	XXXI	XXXII	XXXIII	XXXIV	XXXV	
150	150	150	150	150	150	103	

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MD02-2492

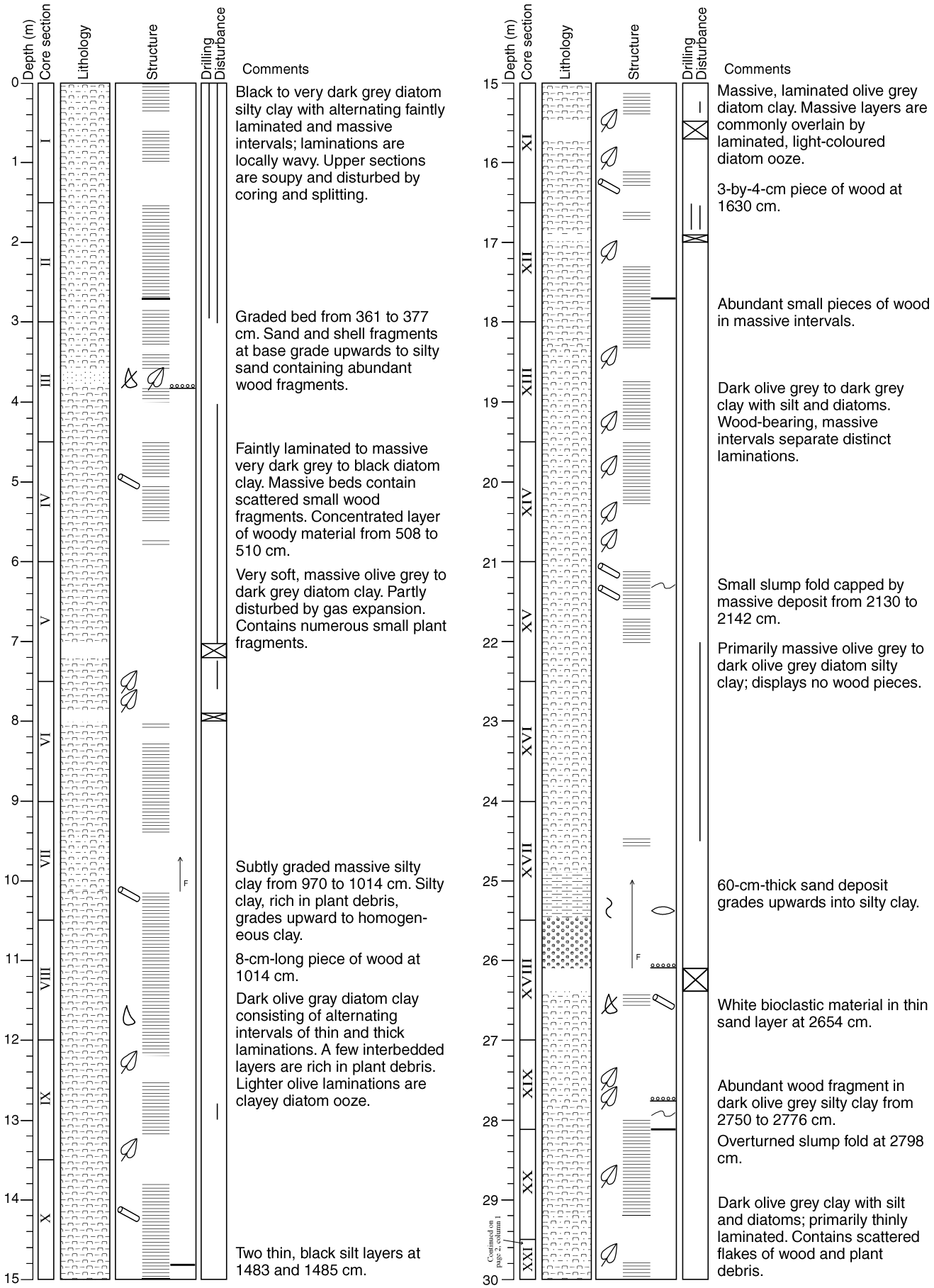
A total of 51 m was recovered by Calypso Core MD02-2492. The section consist of interbedded laminated and massive intervals, with relatively little downcore variation. The dominant lithology is diatom silty clay. Plant and wood debris are abundant throughout most of the core, and are commonly concentrated near the base of the massive intervals. Graded beds increase in frequency towards the bottom of the core.

The top 6 m of the core consist of black to very dark grey diatom silty clay, and show an alternation between faintly laminated and massive intervals. Coring disturbance is present in the top 3 m. Plant and wood fragments are relatively rare.

Sediments below 6m, down to the end of the core at 51 m, are predominantly olive grey to dark olive grey diatom silty clays. Laminated sediments alternate with massive and graded intervals. Fine to very coarse plant and wood debris are abundant throughout this part of the sequence, but especially so in the massive and graded beds. Laminae thickness is variable, ranging from thin to thick (up to 6 mm). Massive beds usually are less than 70 cm thick. Two ~2 m massive beds occur between 5.8 - 7.9 m and between 22.1 - 24.4 m. Towards the bottom of the core, massive beds become less frequent and are replaced by fining upward sequences. Most fining upward sequences are formed by plant / wood debris at the base, grading into diatom silty clay, but sand layers showing normal grading are present also. Fish debris was found at 41.2 m. Shell fragments are occasionally incorporated in the base of sandy (graded) layers.

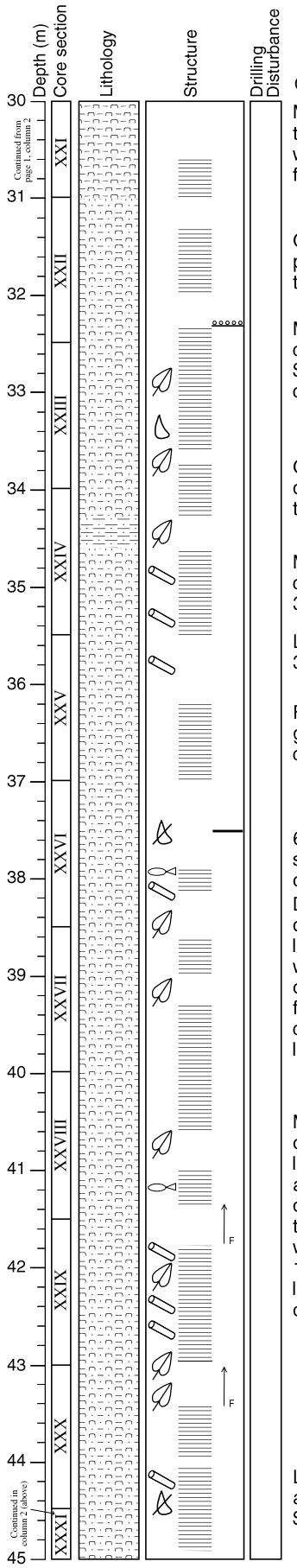
MONA

Core: MD02-2492



MONA

Core: MD02-2492 (cont.)



Massive to laminated olive grey to dark olive grey diatom clay with silt; common small wood fragments.

Olive grey diatom silty clay, predominantly laminated at 2-to-6-mm scale.

Medium sand to sandy, silty clay graded bed at 3230 cm. Sand contains wood and light-coloured shell fragments.

Olive grey to dark olive grey diatom silty clay with variable-thickness laminations.

Massive dark olive grey silty clay with sand from 3434 to 3458 cm.

Large chunk of wood from 3563 to 3570 cm.

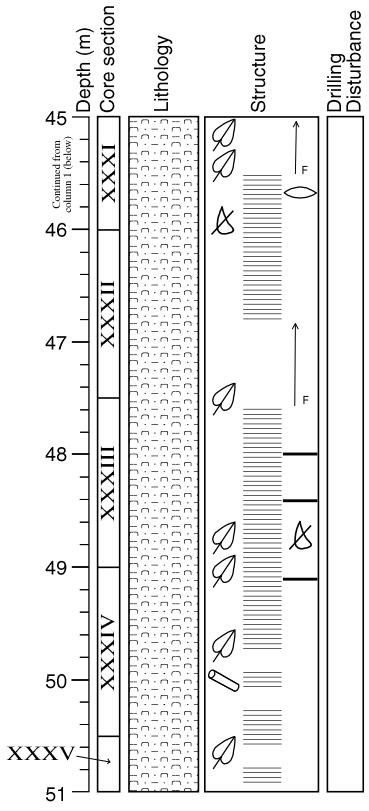
Finely laminated, dark olive grey diatom silty clay or silty clay with diatoms.

6-cm-thick black-sand and shell-fragment deposit at 3750 cm.

Dark olive grey silty clay with diatoms, alternating finely laminated to massive intervals with plant and fish debris. Tops of massive intervals are frequently marked by light-coloured, diatomaceous laminations.

Massive, very dark grey to dark olive grey diatom silty clay layers from 4129 to 4173 cm and 4295 to 4338 cm displaying normal grading in texture and in size of small wood flakes.
1-to-2-mm thick, mostly finely laminated dark olive grey diatom silty clay.

Large wood fragments at 4420 and 4425 cm.
Shell fragment at 4443 cm.



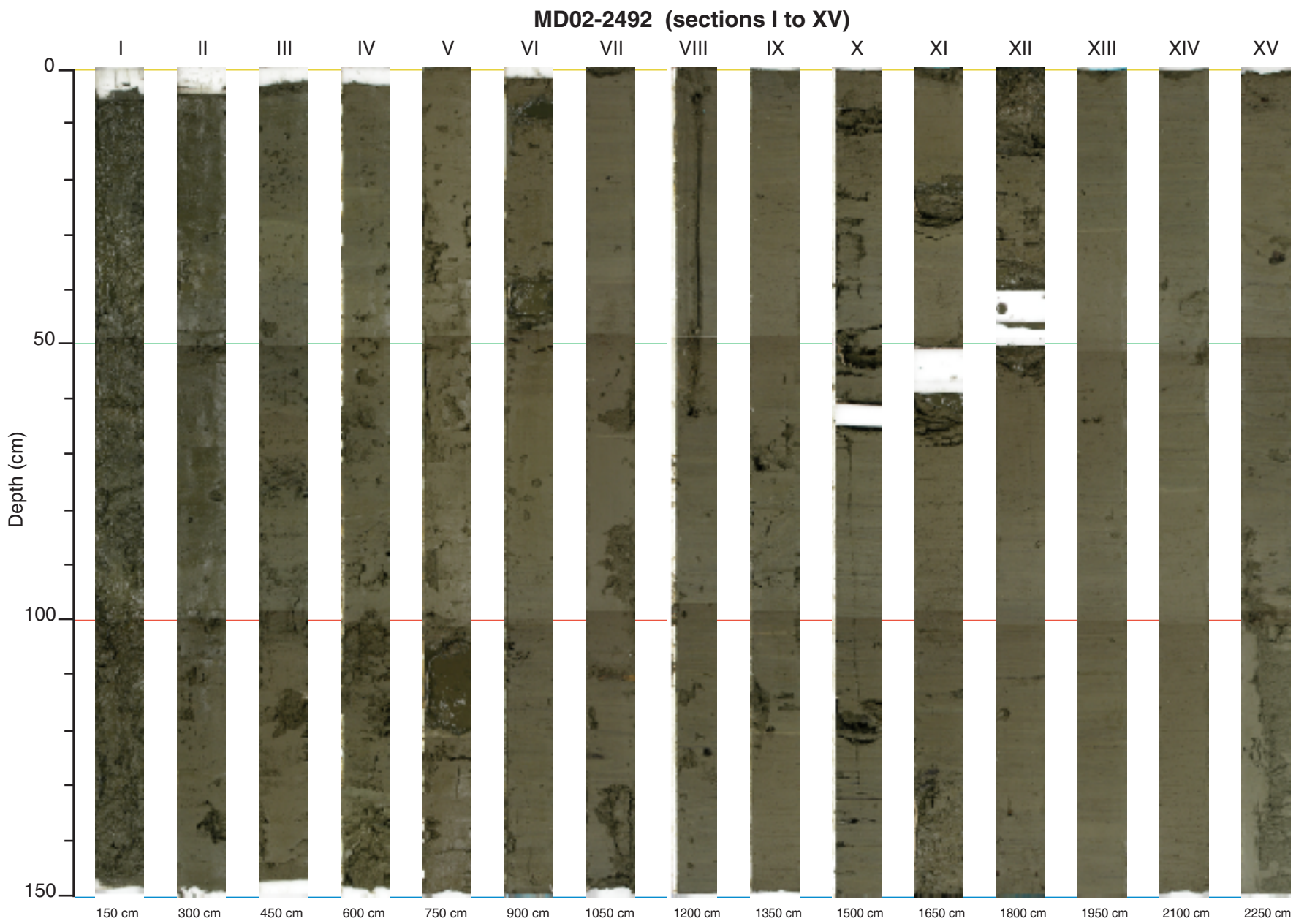
Olive, coarse sand pocket at 4578 cm.

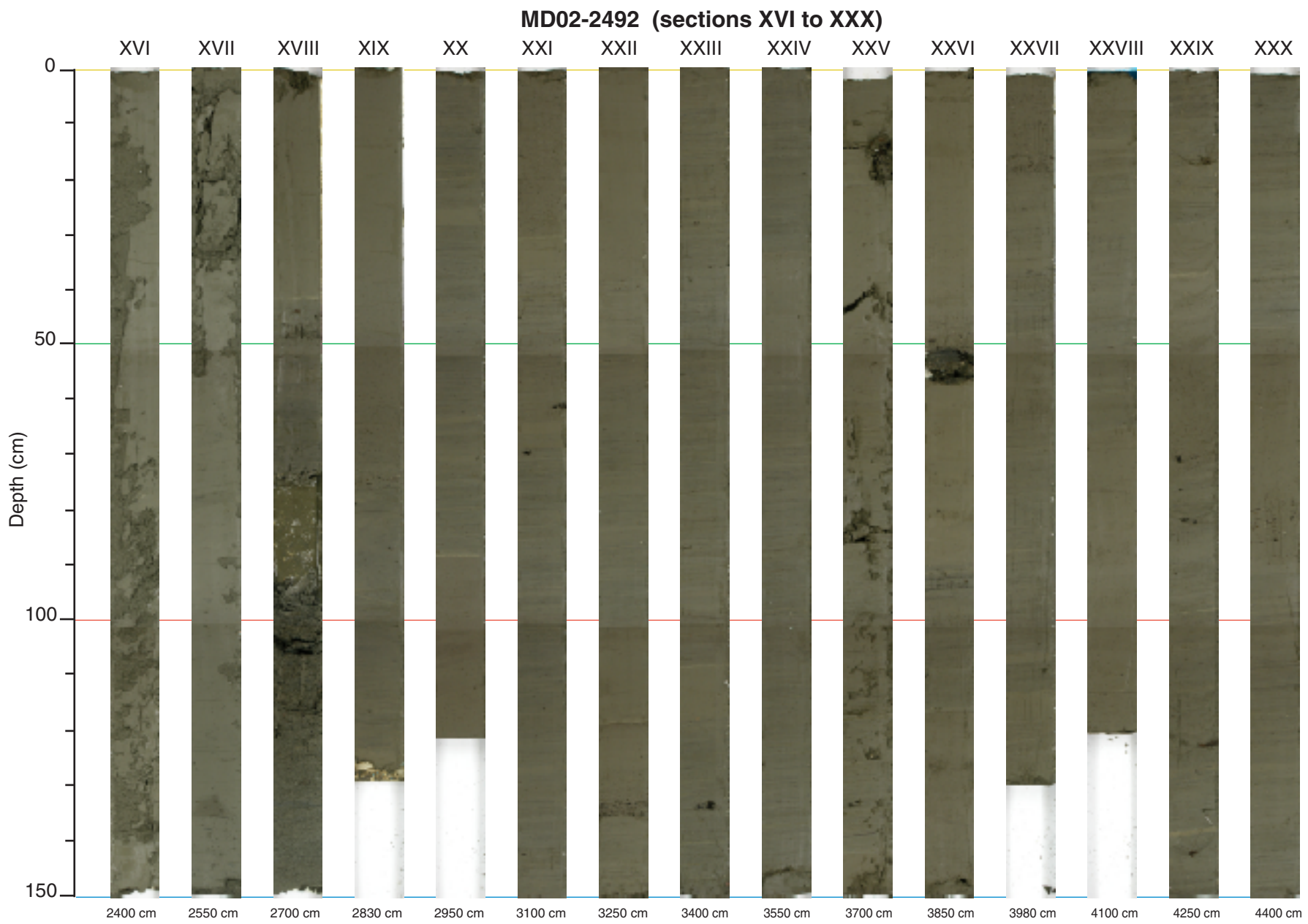
Dark olive grey diatom silty clay; primarily faintly laminated, containing rare small wood flakes. Massive intervals contain abundant, normally graded wood fragments.

Laminated, 2-to-3-cm-thick olive diatomaceous bands. Woody lens at 4800 cm; charcoal layer at 4808 cm.

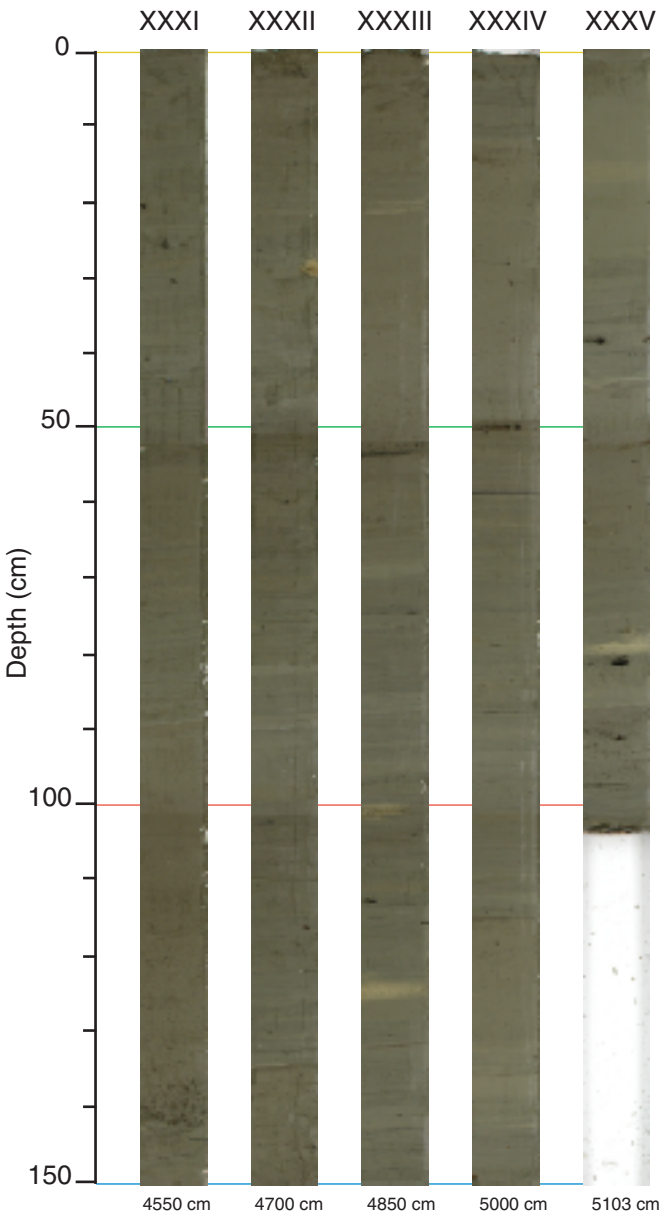
Large wood piece at 4998 cm.

End of core, 5103 cm.


MD02-2492 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2492 (sections XVI to XXX)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
XXIX
XXX
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2830 cm
2950 cm
3100 cm
3250 cm
3400 cm
3550 cm
3700 cm
3850 cm
3980 cm
4100 cm
4250 cm
4400 cm

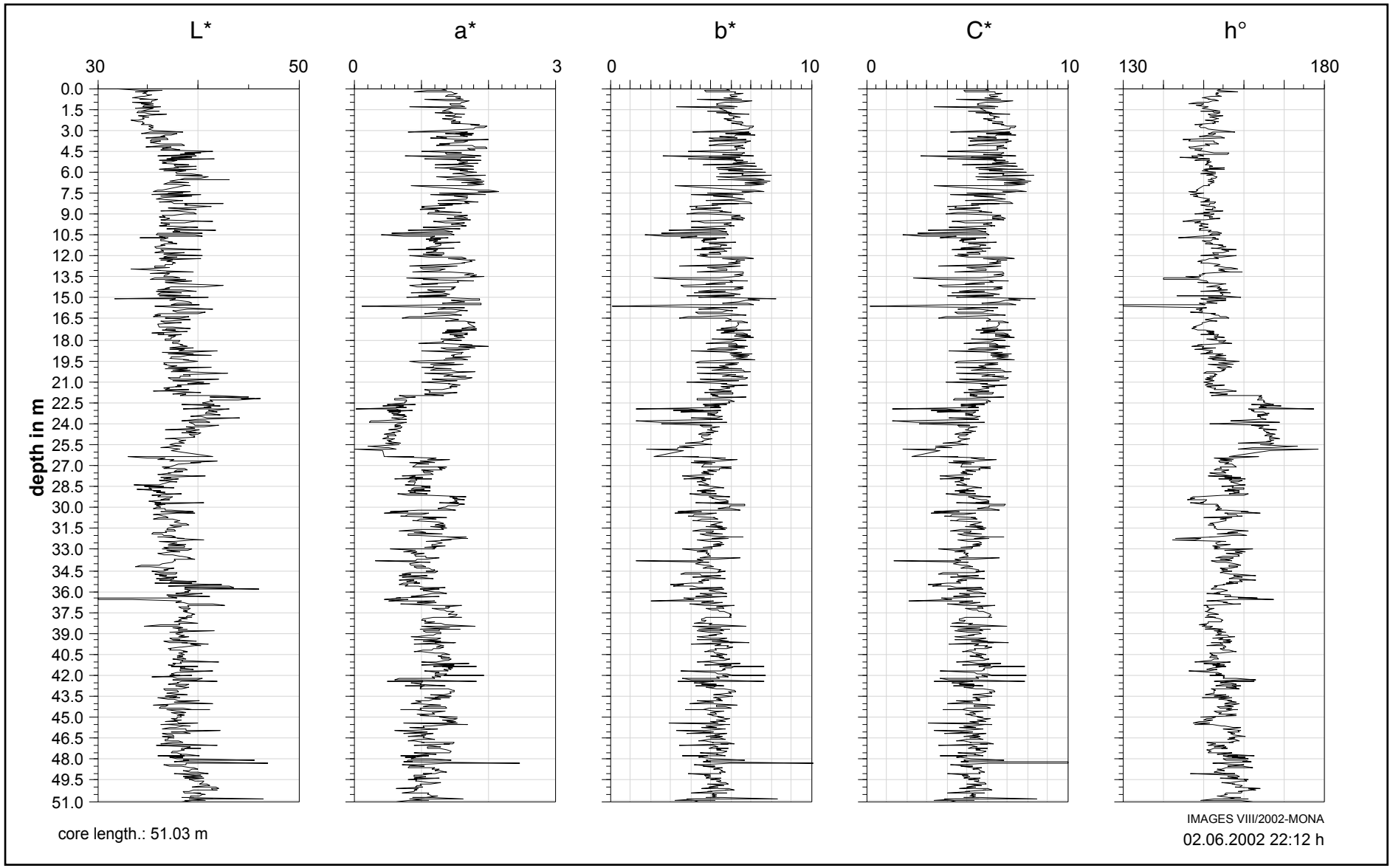
MD02-2492 (sections XXXI to XXXV)



IMAGES VIII, 2002
MONA

Colour Reflectivity

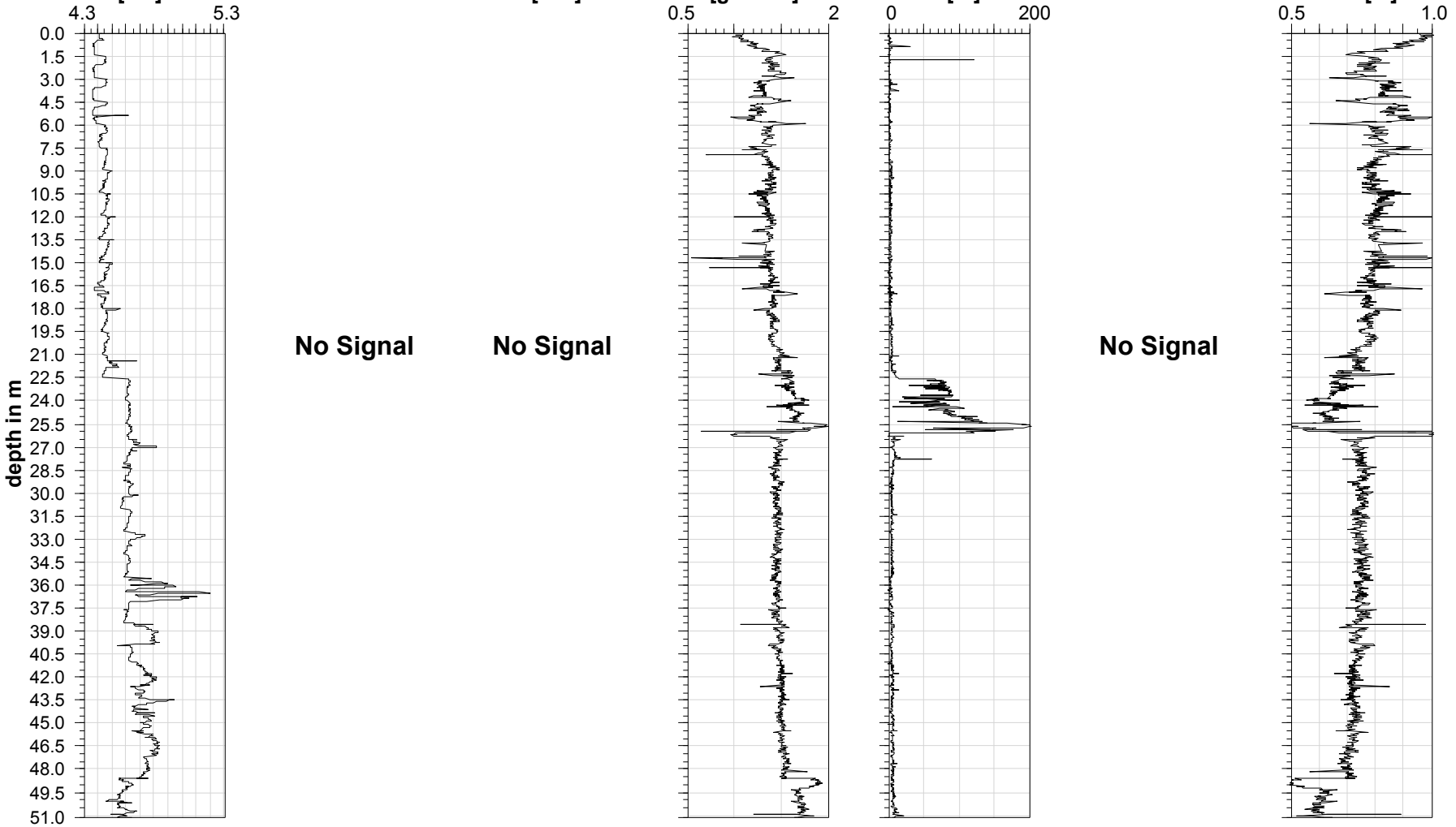
Station 2
Core MD02-2492



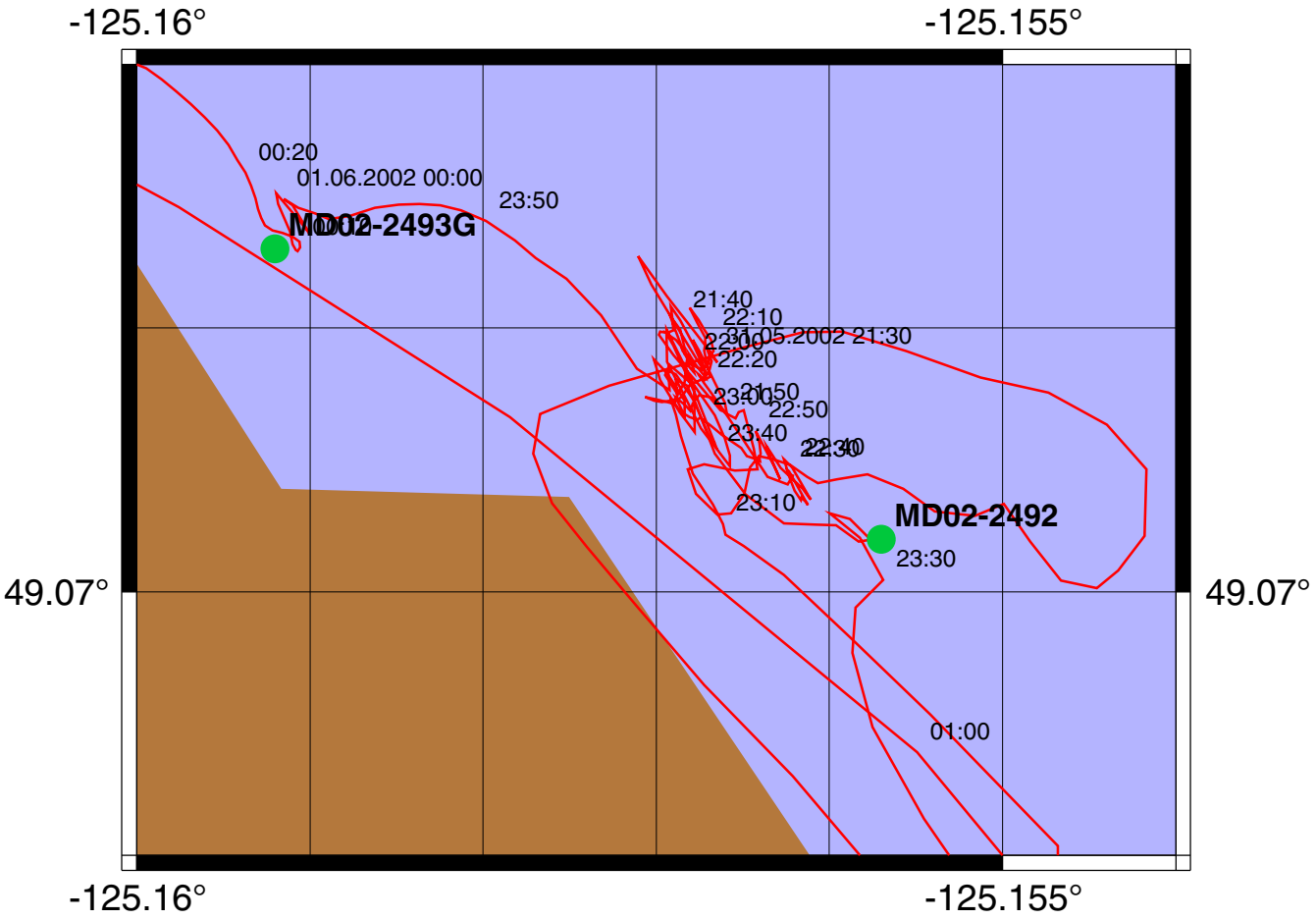
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 2
Core MD02-2492



IMAGES VIII/MD126, MONA
Station 3, Inner Effingham Inlet



GMT 2002 Jun 17 02:00:42

NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **31.05.2002**

N° de station : **3**
inner effingham inle

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2493 G

(MD - année - milles - centaines)

CAROTTE (longueur) :

7.00 m

POSITION :

Latitude : **049° 04.21 N**

Longitude : **125° 09.34 W**

CAROTTIER (type) (1) : **GRAVITE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **124** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **21:49**

Début manœuvre : **22:04**

Déclenchement : **22:15**

Fin de manœuvre : **22:30**

Durée de manœuvre : **00:26**

Départ station : **Resté en station pour carottage suivant**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

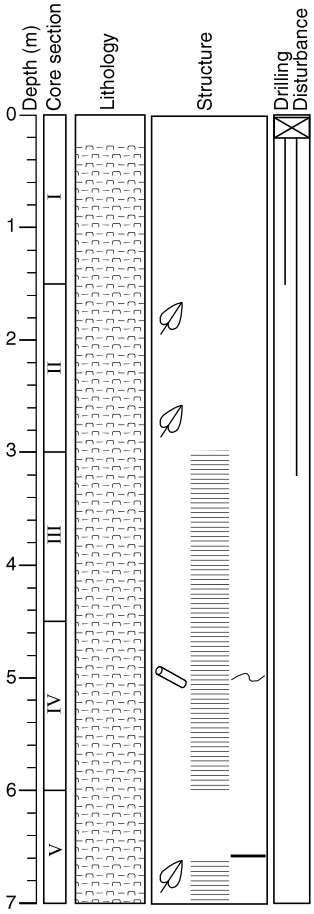
(2) Cylindrique 100 kg / Plat / Préleveur

MD02-2493G

Gravity core MD02-2493G recovered 7.00 m sediments in total. The section consists of laminated and homogeneous dark olive grey diatom clay. Wood and plant debris are present throughout the section. The top 3 m. has been disturbed by coring and is massive to colour-banded. Sediments between 3 and 7 m. show mostly discontinuous laminations of alternating diatom clay and diatom ooze. Intervals with inclined laminations are present around 5 m.

MONA

Core: MD02-2493G



Comments

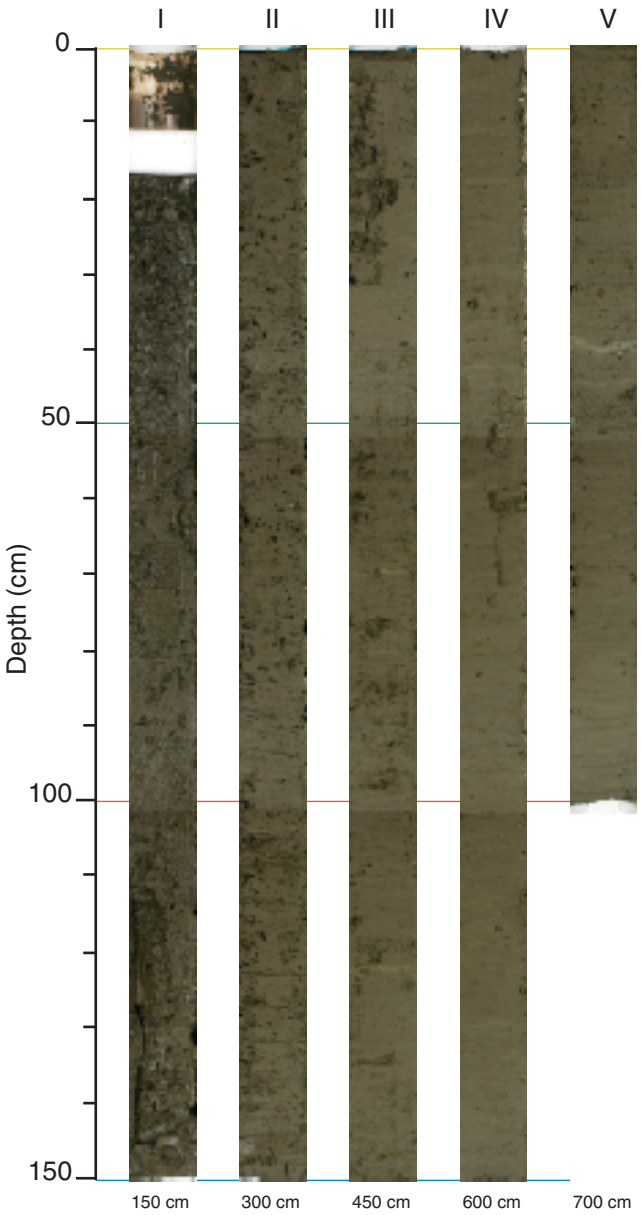
Very soft and gassy dark olive grey diatom clay; massive to colour-banded at the top. Indistinct thin laminations visible by section III. Laminations and pockets of pure diatom ooze with trace forams.

Mostly irregular discontinuous laminations of diatom clay and diatom ooze.

Intervals of inclined (slumped) laminations at 500 cm.

End of core, 700 cm.

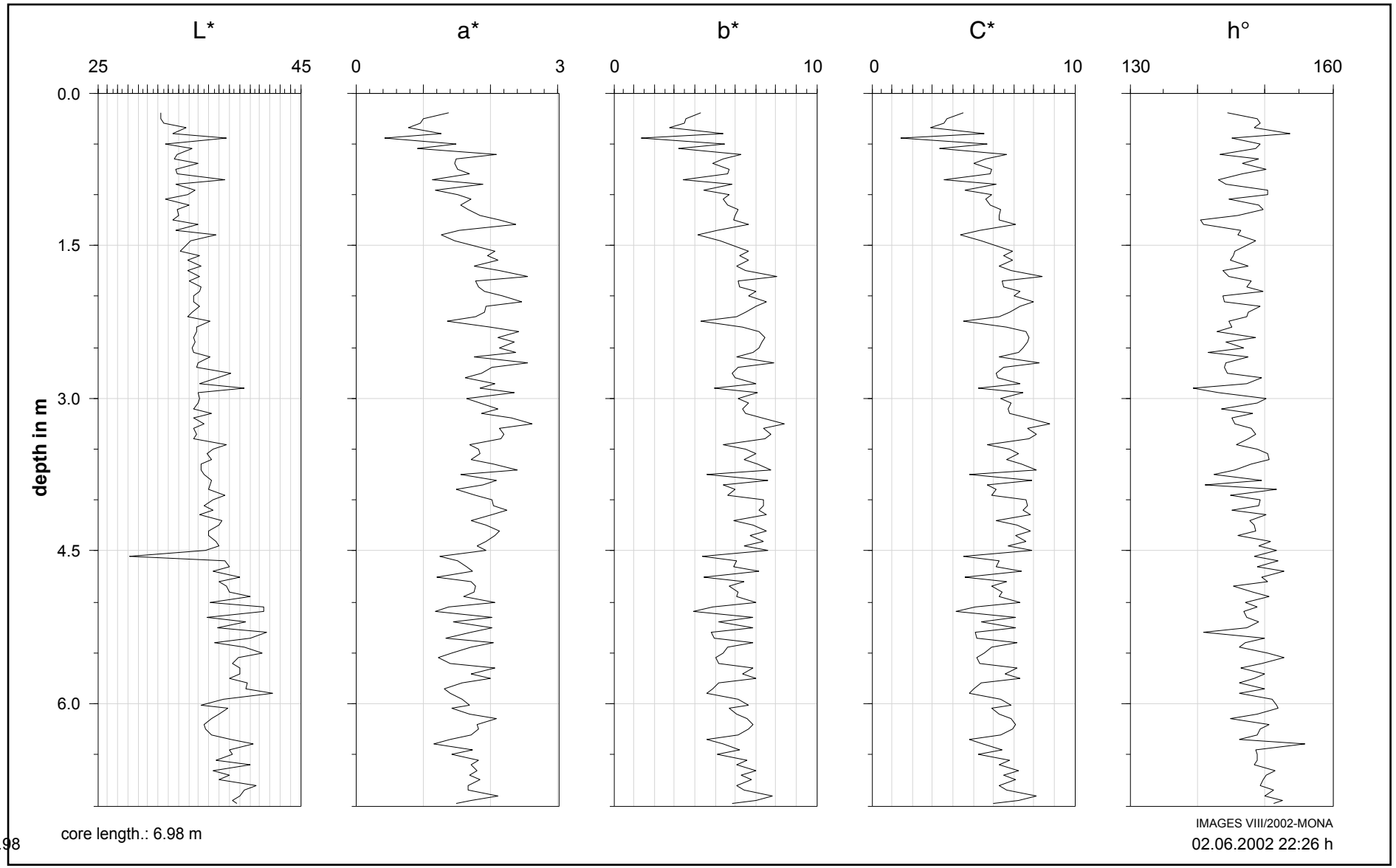
MD02-2493G (sections I to V)



IMAGES VIII, 2002
MONA

Colour Reflectivity

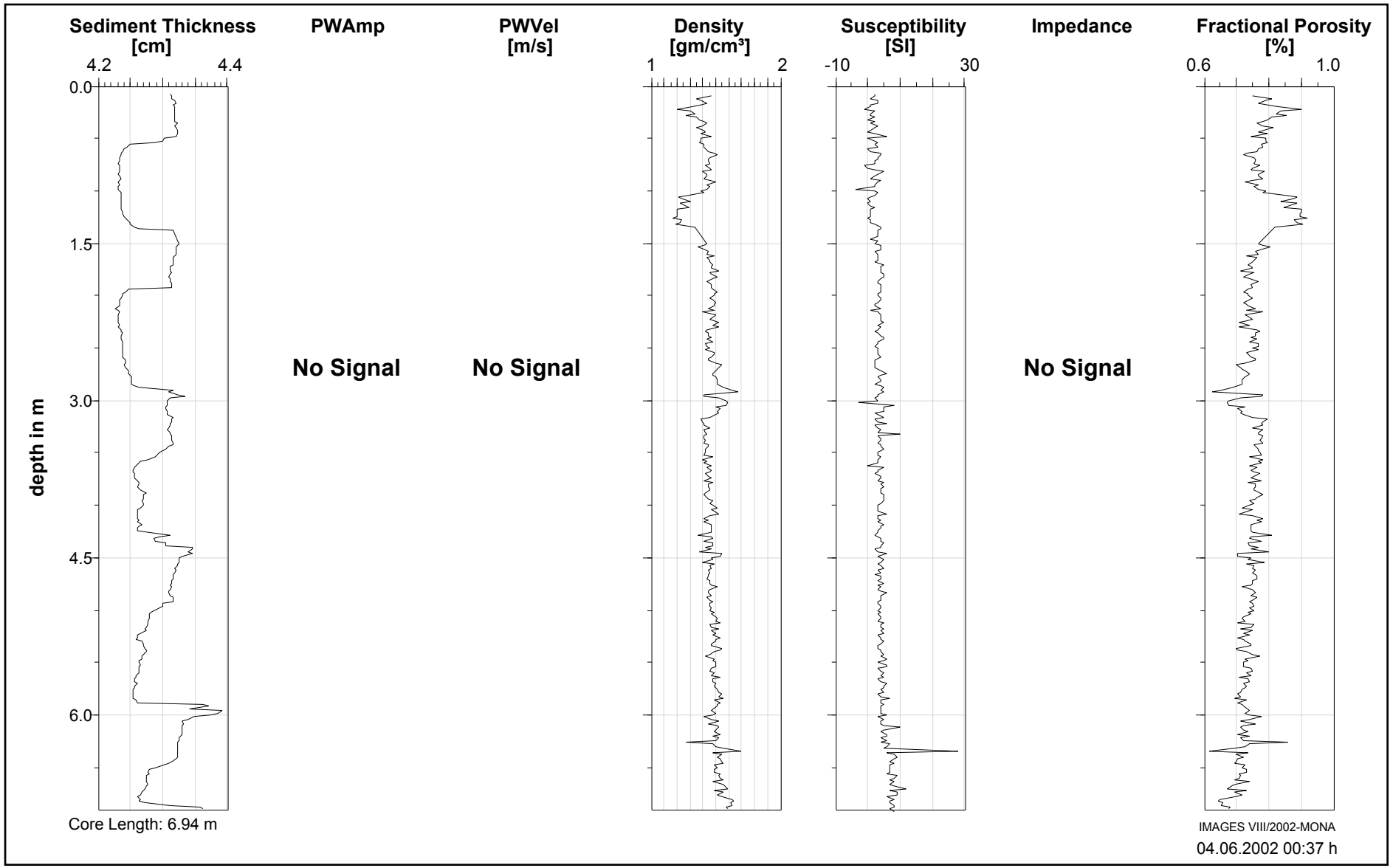
Station 3
Core MD02-2493G



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 3
Core MD02-2493G



NOM DE LA CAMPAGNE

MD 126 MONA

Date : ########

N° de station : 3 Effingham 2

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2494
(MD - année - milles - centaines)

CAROTTE (longueur) :

40.34 m

POSITION :

Latitude : 49° 04.28 N

Longitude : 125° 09.55 W

CAROTTIER (type) (1) : CALYPSO

Poids total (air) : 4.90 t

Poids total (eau) : 4.30 t

REGLAGES :

Tubes (longueur) : 40.90 m

Câbles : 1.50
Chute libre : m

Boucle : 1.60 m

LC poids : 46.00 m

CONTREPOIDS :
Type (2) : CYLINDRIQUE

Longueur PVC : X m

Pénétration : X m

Longueur de carotte : X m
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : 120 m

Ligne filée : 76 m

Arrachement/total *(tonne)* : 8.40 t

Arrachement/différentiel *(tonne)* : 4.00 t

Pénétration/apparente *(m)* : 40.90 m

Pénétration/tensiomètre *(m)* : 40.90 m

HEURES (GMT)

En station : 23:35

Début manœuvre : 23:35

Déclenchement : 00:01

Fin de manœuvre : 01:08

Durée de manœuvre : 01:23

Départ station :

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

0	150	300	450	600	750	900	1050
I	II	III	IV	V	VI	VII	
X ooooo ooooo	Laminated			145 X			

1050	1200	1350	1500	1650	1800	1950	2100
VIII	IX	X	XI	XII	XIII	XIV	
					X 147	oooo	

2100	2250	2400	2550	2700	2850	3000	3150
XV		XVI	XVII	XVIII	XIX	XX	XXI
101 X 20 X 22		106 X 36	70 X 30				

3150	3300	3450	3600	3750	3900	4034
XXII	XXIII	XXIV	XXV	XXVI	XXVII	
	X 146		113 X 32 X		134	

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MD02-2494

Calypso core MD02-2494 recovered a total of 40.94 m of sediment. The core length is 40.64 m, but an additional 30 cm extruded from the liner when the core was opened. The top part of the core consists predominantly of laminated dark olive grey diatom silty clays with abundant wood, plant, and fish debris. Around ~32 m the lithology changes very gradually into laminated or bioturbated to massive dark grey silty clay. The basal 0.3 m of the core consist of a very poorly sorted cobbly conglomerate with a clay matrix. A thin light grey ash layer is present at 16.4 m.

The top 3.5 m of the core consist of very soft dark olive grey diatom clay with a strong sulphorous smell. Sediments alternate between laminated and massive and contain common plant and wood debris.

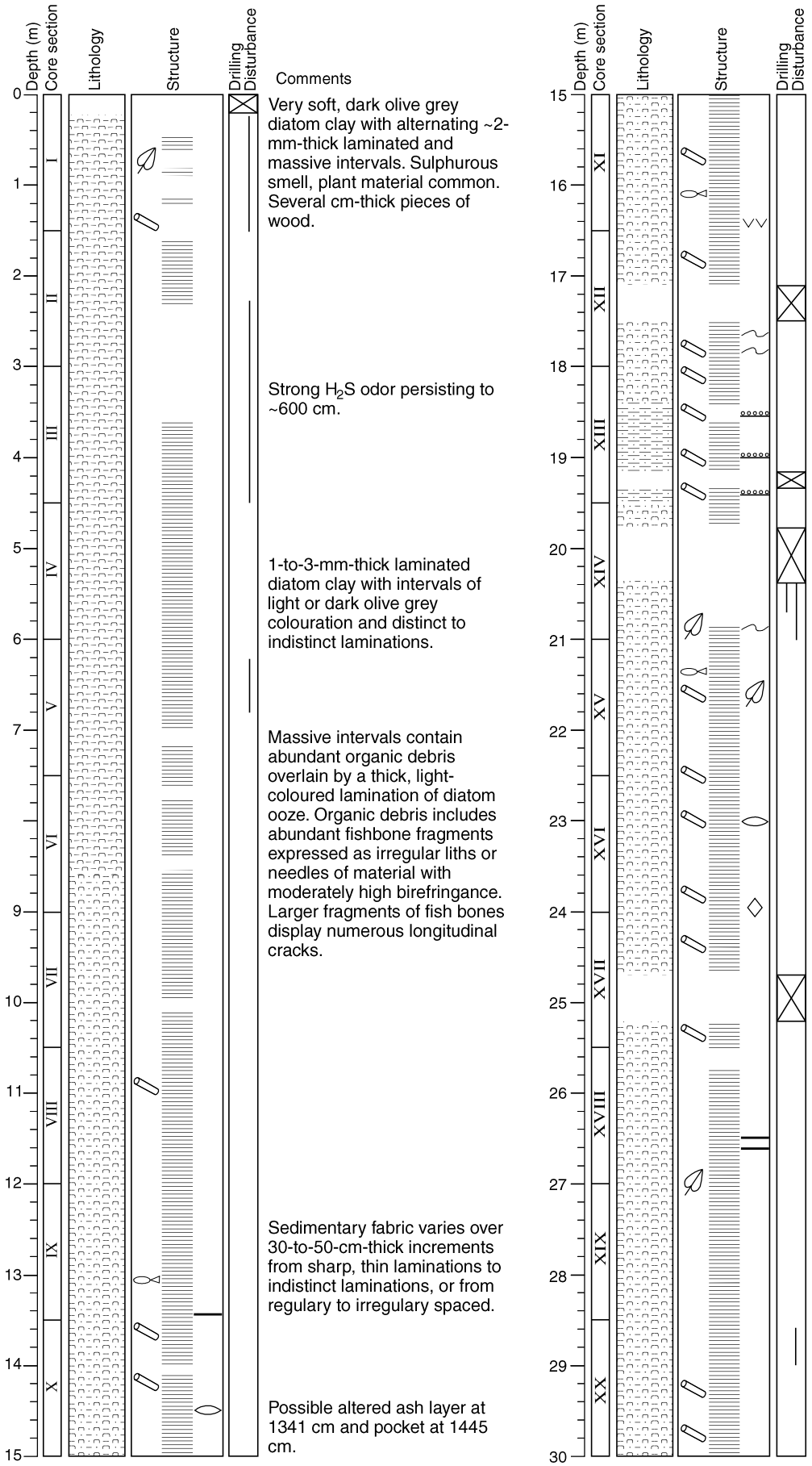
Sediments between 3.5 and 13 m. are mostly thinly laminated olive grey and dark olive grey diatom clays. Thin (<20cm) massive intervals are present, which contain abundant microscopic fish debris. The massive intervals are generally overlain by a thick, light coloured lamina of diatom ooze.

Between 13 and ~31 m, sediments consist mainly of olive grey to very dark greyish brown diatom silty clay. Most of this interval is laminated, with laminations varying between thin and thick (6mm) and between distinct and indistinct at different intervals. Wood debris is abundant, plant and macroscopic fish debris are present. This interval contains numerous graded sand / silt beds. A slump folded and faulted bed at 21 m is topped by a large gas void and highly disturbed olive grey clayey silt. A thin, light grey volcanic ash (vitric tuff) is present at 16.4 m.

The interval from 31 m. to the base of the core shows a gradual transition from olive grey diatom clay, via laminated to massive dark grey silty clays, to grey thin interbedded sands and clays. About half of the interval is slightly bioturbated. Wood debris is present down to 34 m. Two ~10 cm thick shelly pebbly layers are present at 31.5 and 34.5 m. Numerous “dropstones” are present between 36 and 38 m (some are composed of hard clay). The basal 30 cm of the core consists of a cobbly, poorly sorted conglomerate with a clay matrix.

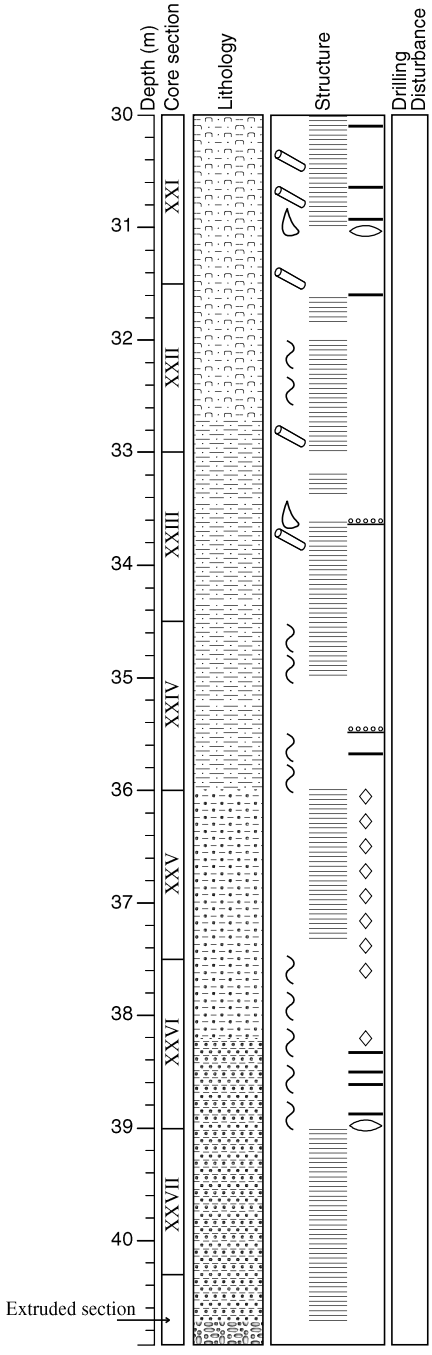
MONA

Core: MD02-2494



MONA

Core: MD02-2494 (cont.)



Comments

Dark grey to black to olive grey diatom silty clay, alternately laminated or massive. Olive grey laminae are diatom rich.

12-cm-thick shelly, pebbly sand at 3150 to 3162 and 3343 to 3350 cm.

Light to dark grey silty clay or clay with minor silt, faintly to distinctly laminated with minor massive intervals.

Massive light-to-dark-grey-mottled clay with fine silt; intercalated 1-to-14-cm-thick sand deposits. Graded sand bed from 3530 to 3544 cm.

Poorly laminated dark grey sandy clay. Numerous 'dropstones', some composed of hard clay.

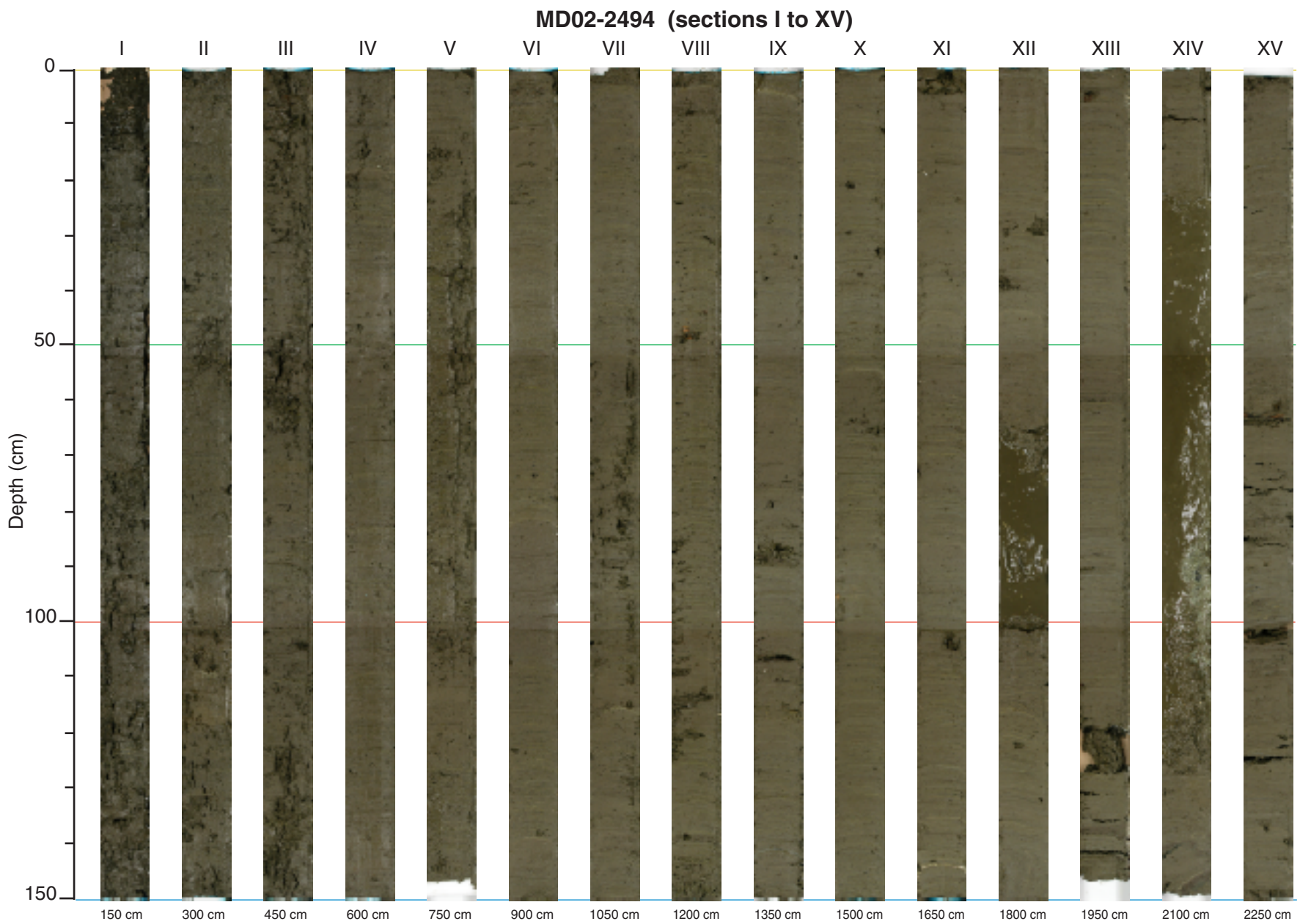
Thin (~1-cm-thick) sand layers spaced at ~15-to-20-cm intervals in mottled clay.

Alternating 1-to-2-cm-thick 'laminations' of sand and clay at 3900 to 4034 cm.

Additional 60 cm extruded from core below measured section.

End of core, 4034 cm.

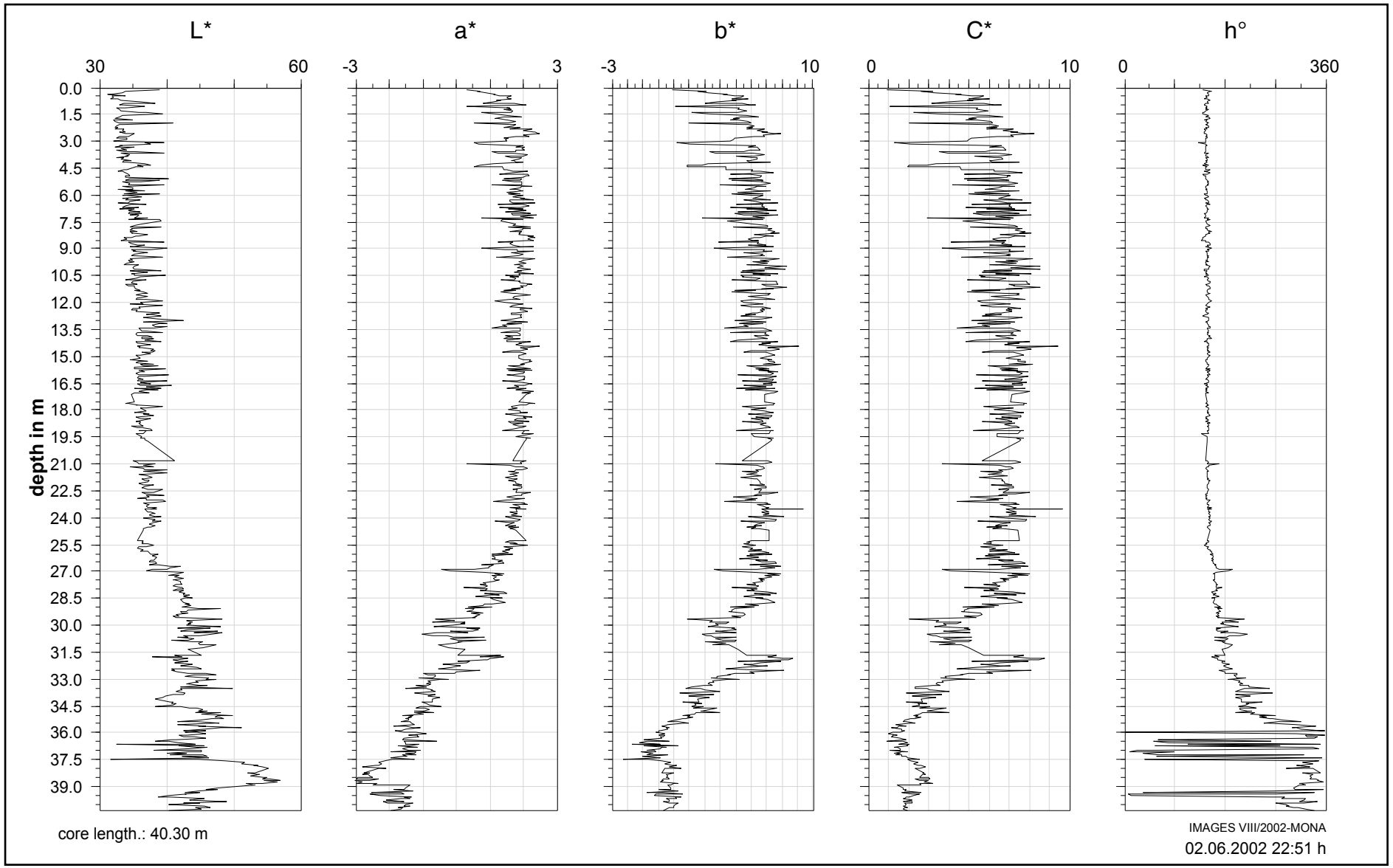
End of measured section, 4094 cm.

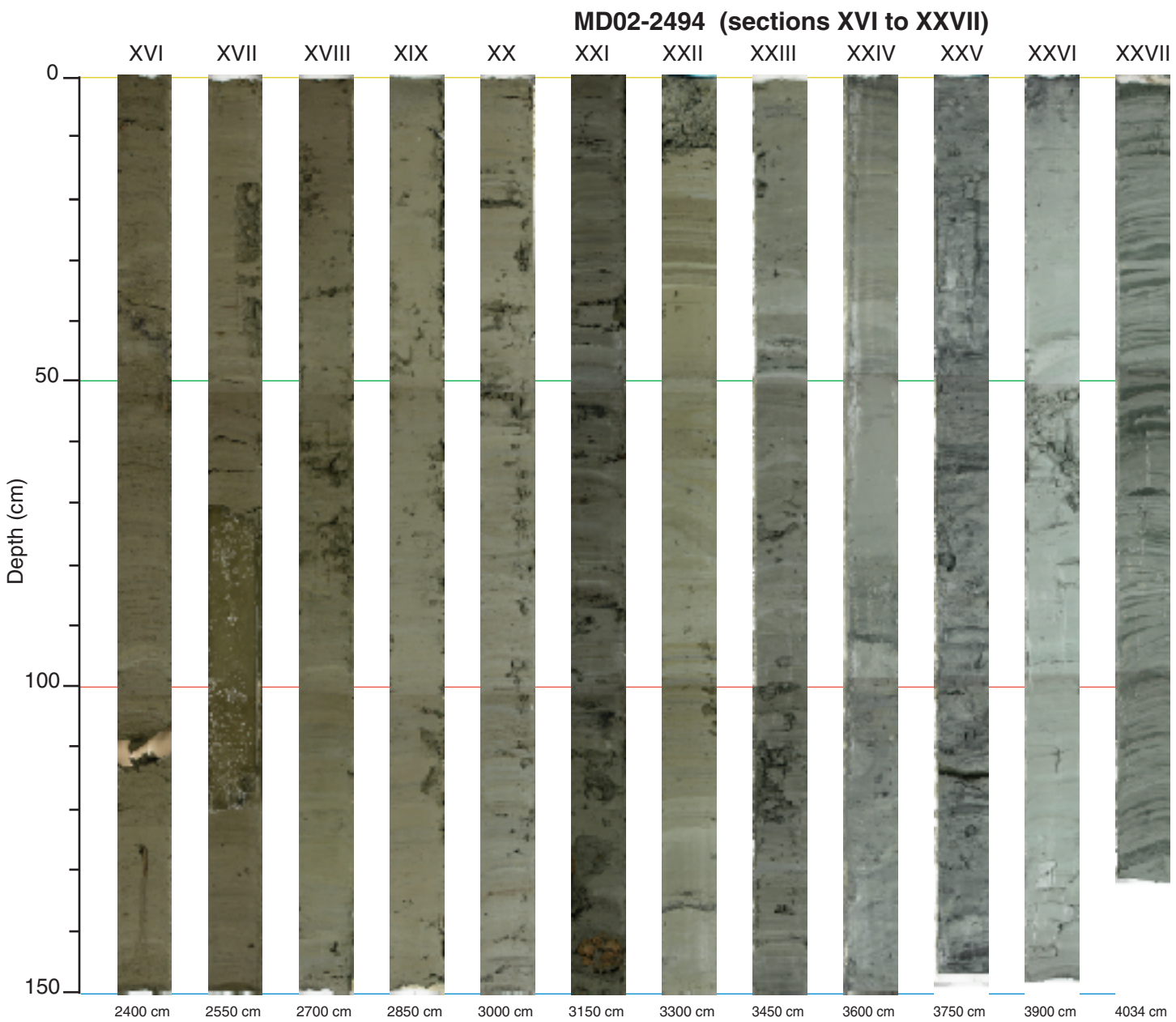

MD02-2494 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

Station 3
Core MD02-2494

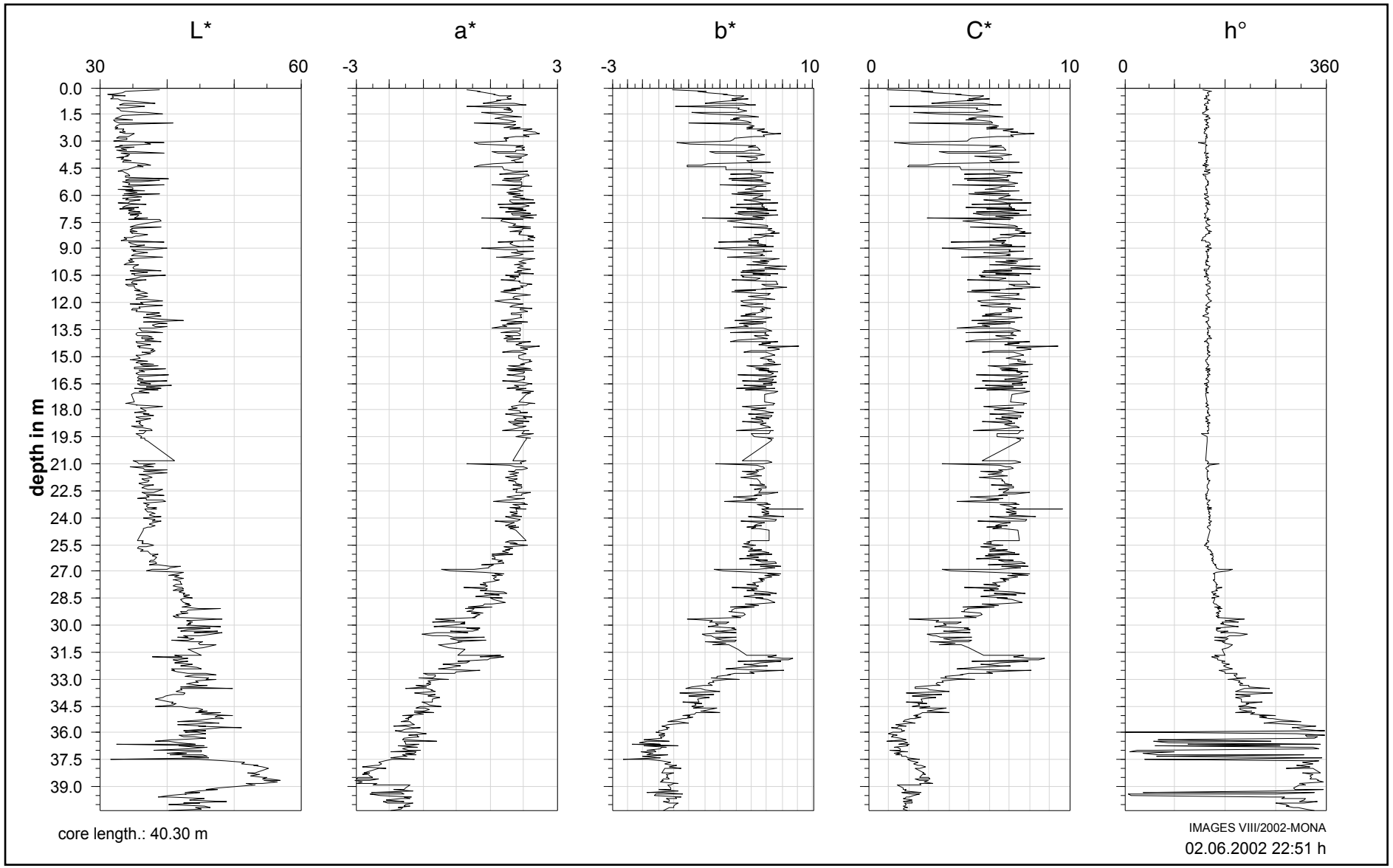



MD02-2494 (sections XVI to XXVII)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3750 cm
3900 cm
4034 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

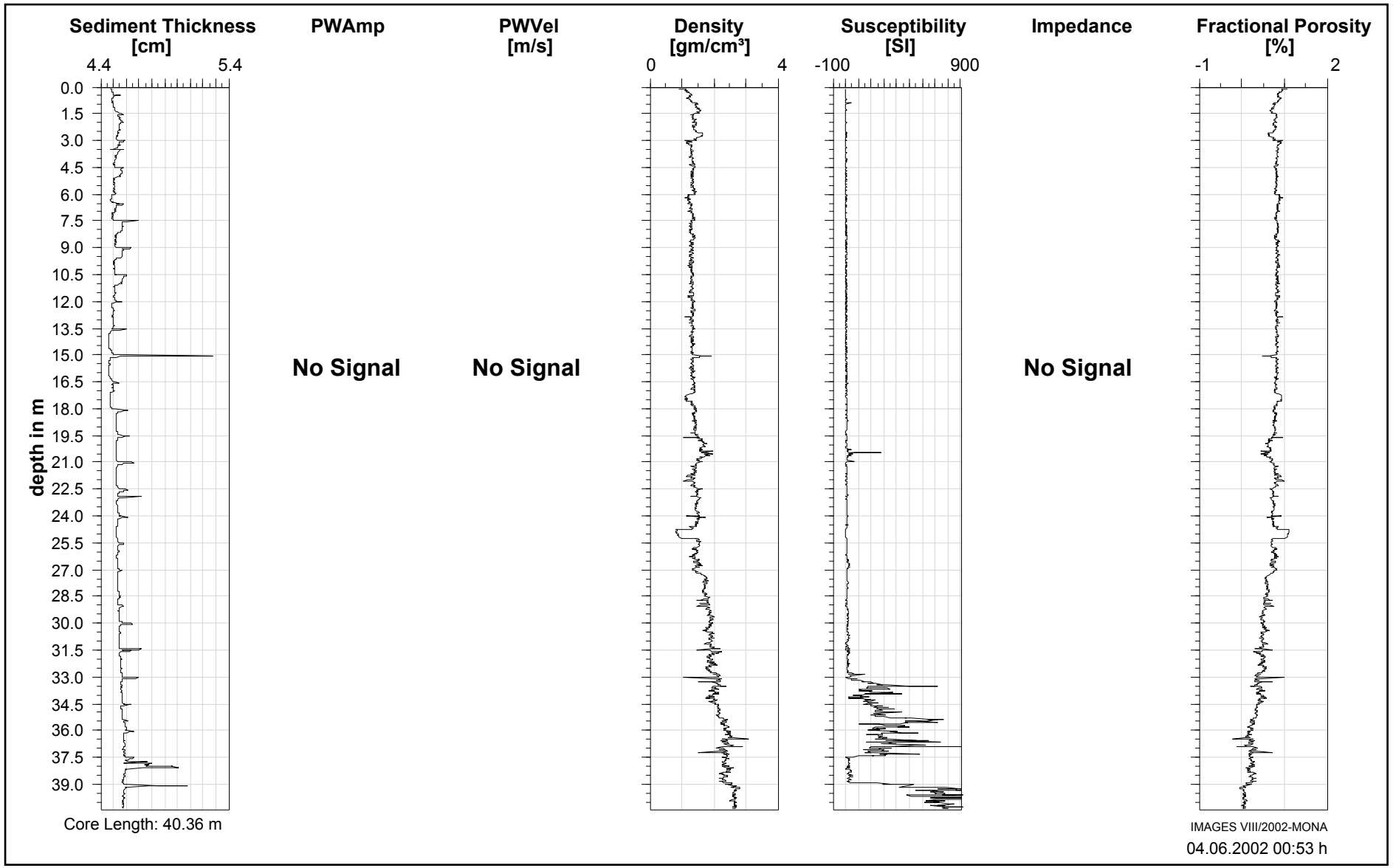
Station 3
Core MD02-2494

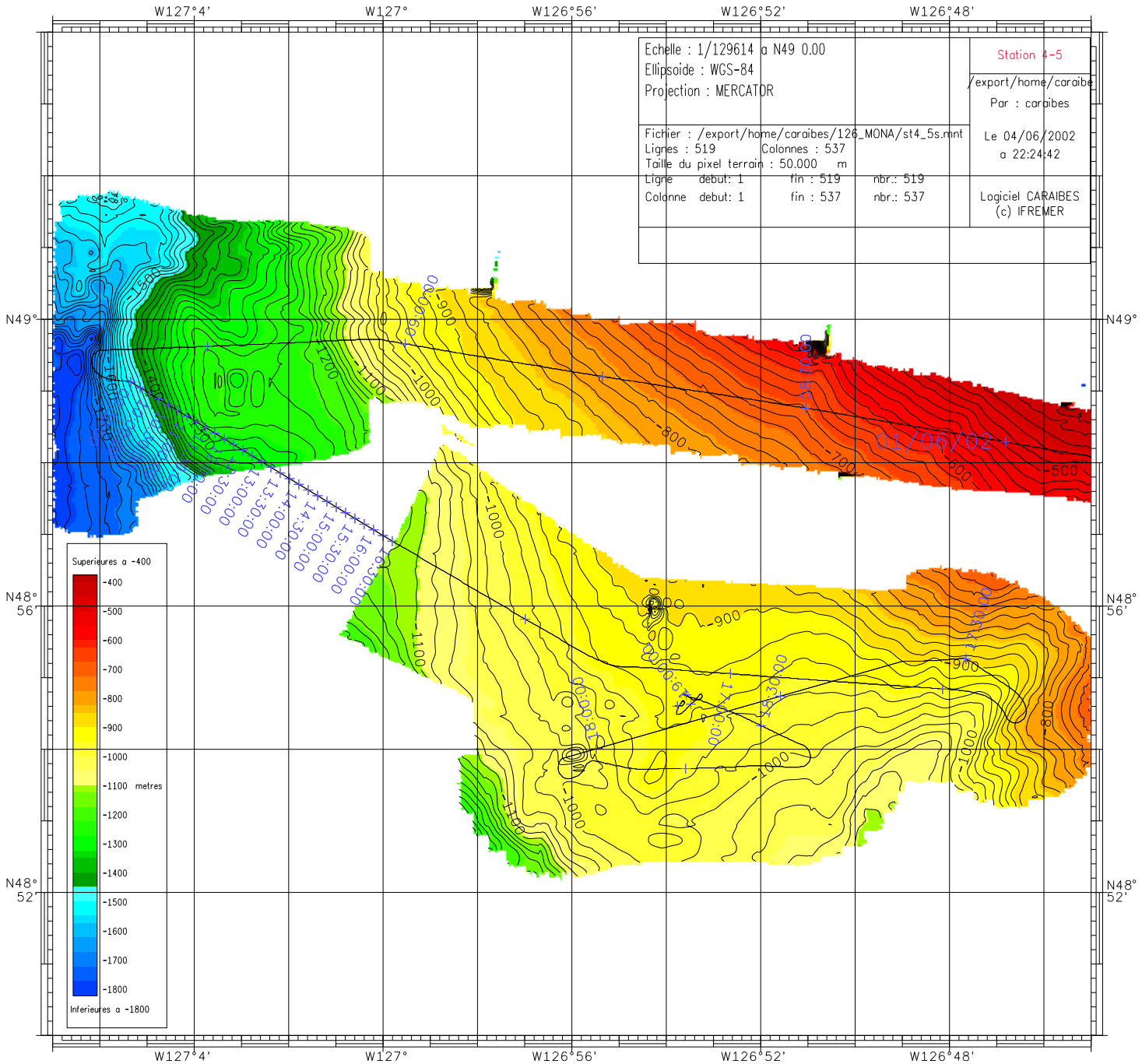


IMAGES VIII, 2002
MONA

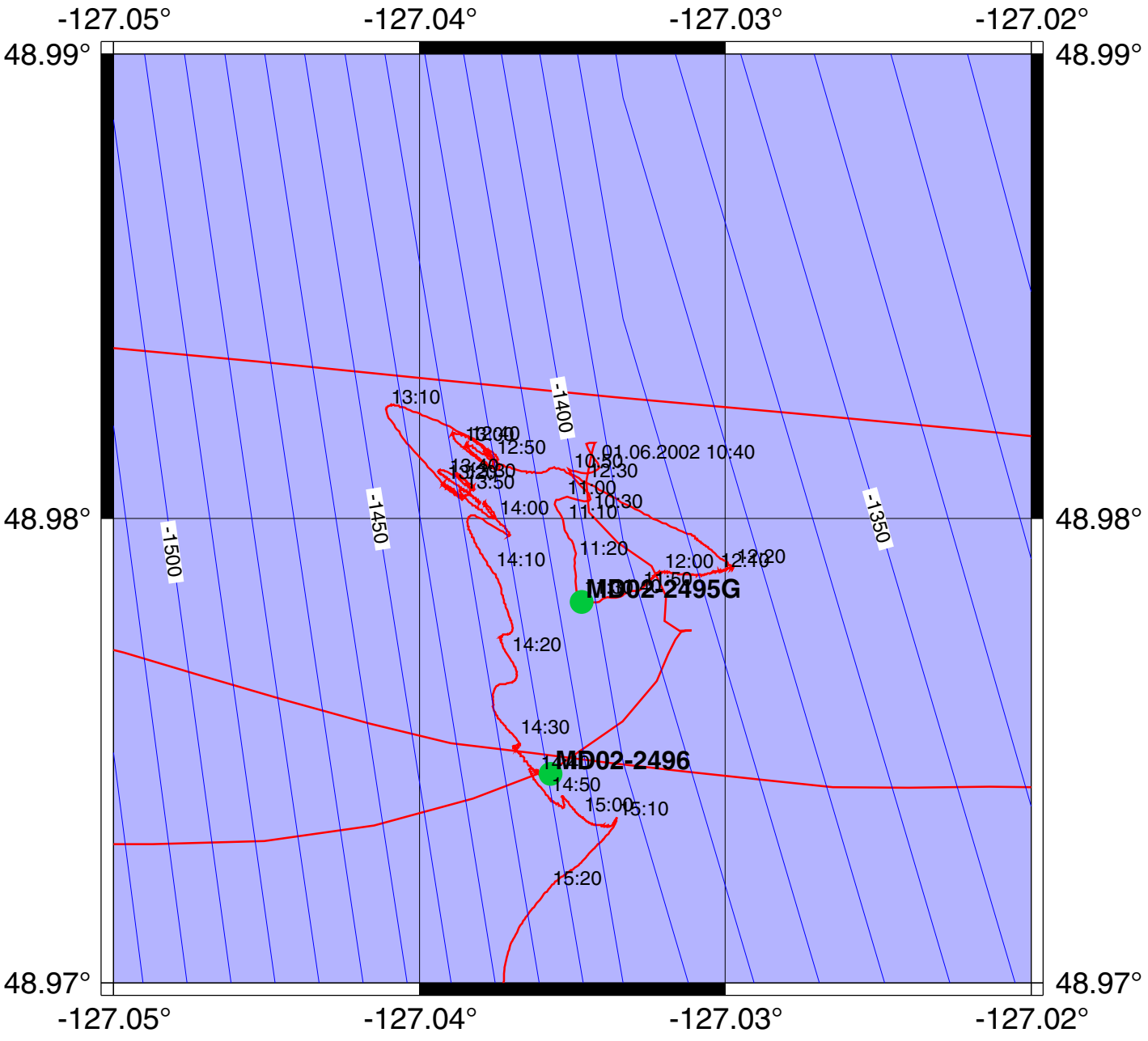
Multi Sensor Core Logger

Station 3
Core MD02-2494




W127°4'
W127°
W126°56'
W126°52'
W126°48'
N49°
N48° 56'
N48° 52'
Echelle : 1/129614 a N49 0.00
Ellipsoide : WGS-84
Projection : MERCATOR
Station 4-5
/export/home/caraibe
Par : caraibes
Fichier : /export/home/caraibes/126_MONA/st4_5s.mnt
Lignes : 519 Colonnes : 537
Taille du pixel terrain : 50.000 m
Ligne debut: 1 fin : 519 nbr.: 519
Colonne debut: 1 fin : 537 nbr.: 537
Le 04/06/2002
a 22:24:42
Logiciel CARAIBES
(c) IFREMER
Superieures a -400
-400
-500
-600
-700
-800
-900
-1000
-1100 metres
-1200
-1300
-1400
-1500
-1600
-1700
-1800
Inferieures a -1800

IMAGES VIII/MD126, MONA
British Columbia Margin 1



GMT 2002 Jun 18 22:35:00

NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **01.06.2002**

N° de station : **4**

MARGE VC 2

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2495 G

(MD - année - milles - centaines)

CAROTTE (longueur) :

7.33 m

POSITION :

Latitude : **48° 58 69 N**

Longitude : **127° 02 08 W**

CAROTTIER (type) (1) **:** **GRAVITE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **20.00** **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids :

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **10:40**

Début manœuvre : **10:43**

Déclenchement : **11:30**

Fin de manœuvre : **12:22**

Durée de manœuvre : **42 mn**

Départ station : **Resté en station**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents : **RAS**

0 *150* *300* *450* *600* *733*

I	II	III	IV	V

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

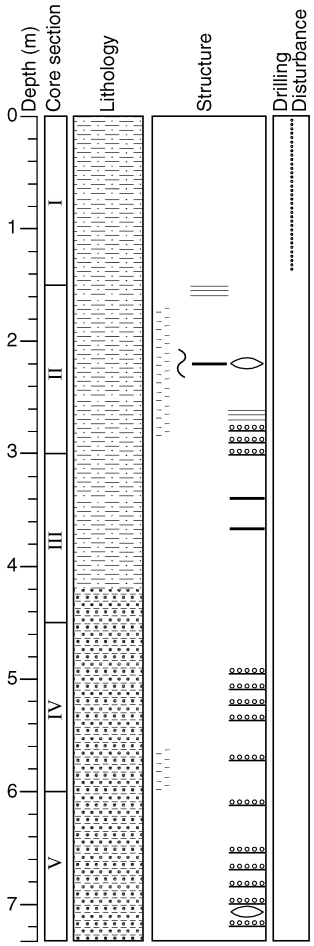
(2) Cylindrique 100 kg / Plat / Préleveur

MD02-2495G

A total of 7.33 m of sediment was recovered in gravity core MD02-2495G. The section consists mainly of massive olive grey to grey silty clay. Below 2.5 m, the silty clays are interbedded with thin graded silt and sand layers and thin black layers. The silty clay in the top 1.5 m is dark olive grey. Black oxide / sulfide flecks and mottles are abundant from 0 to 3 m and between 5.5 to 6 m.

MONA

Core: MD02-2495G



Comments

Dark olive grey silty clay mottled with dark streaks.

Olive grey silty clay with biosilica, rare forams, and scattered black flecks interbedded with grey fine-sand graded layers.

Massive grey silty clay with light gray clay, 2-to-5-cm-thick beds, and fine black layers.

Black silt laminae.

Interbedded massive grey silty clay with silt and sand layers; traces of diatoms and detrital carbonates.

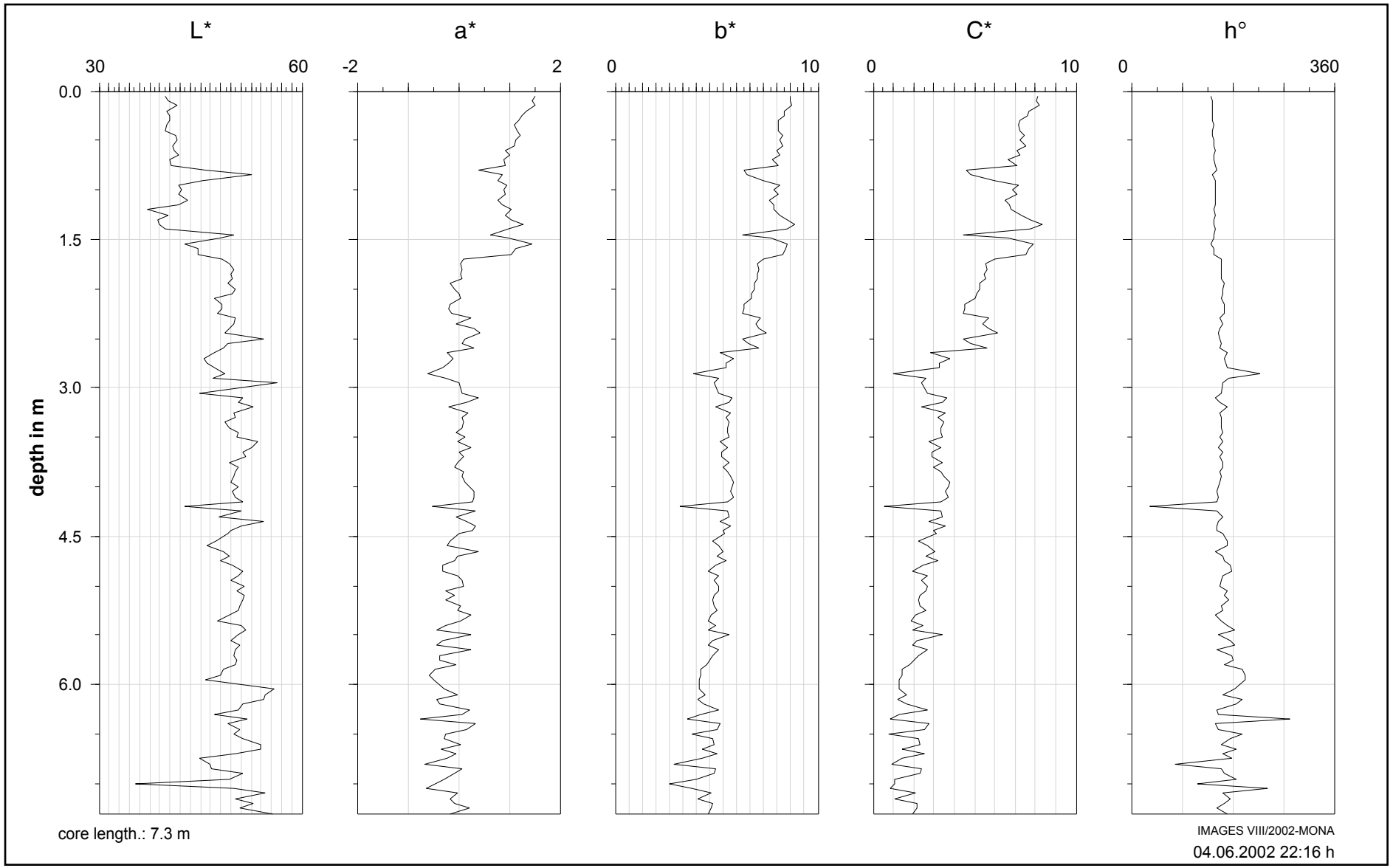
Sandy layers are ~1-cm thick at about 5-cm intervals.

Forams and quartz sand pocket.
End of core, 733 cm.

IMAGES VIII, 2002
MONA

Colour Reflectivity

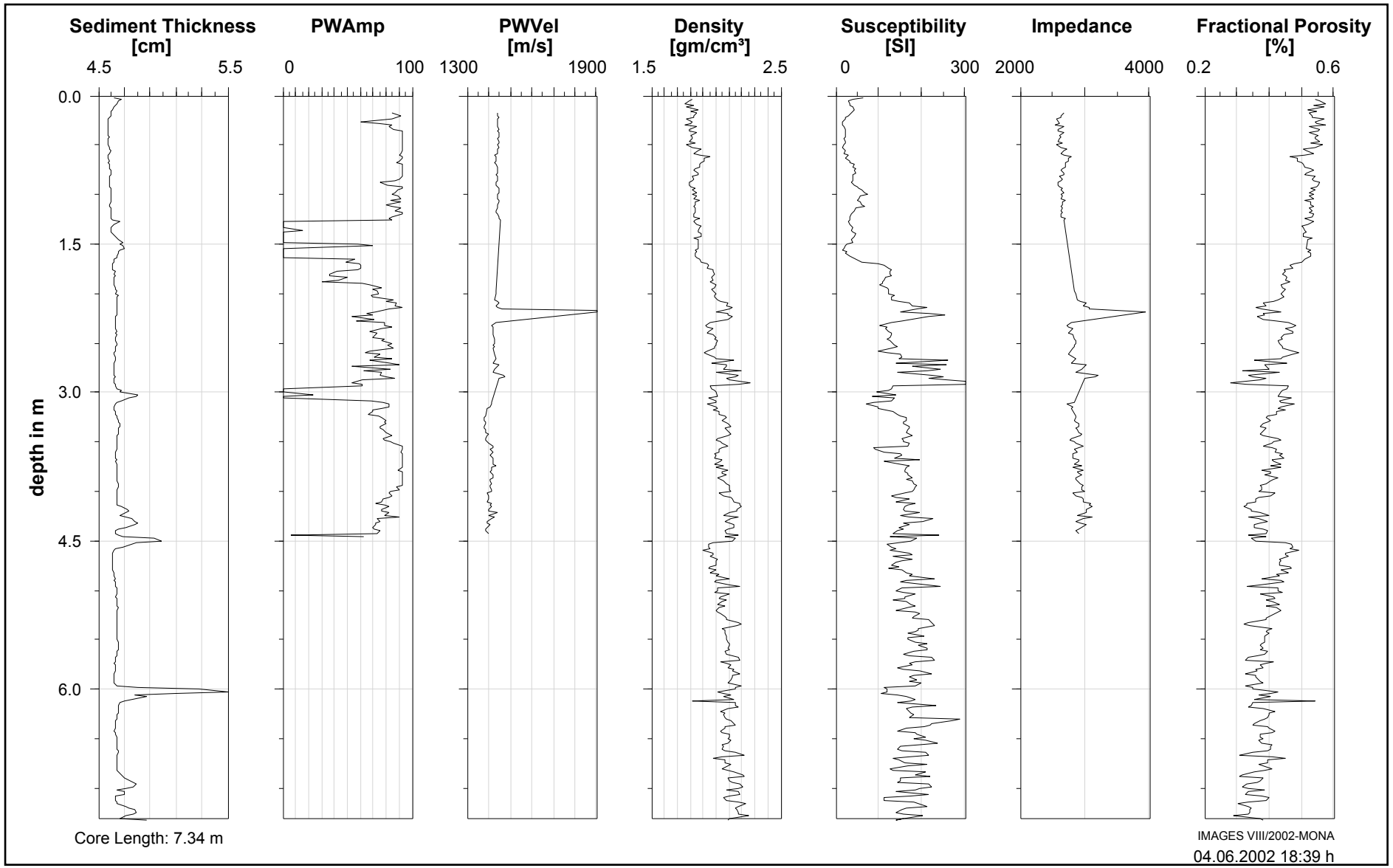
Station 4
Core MD02-2495G



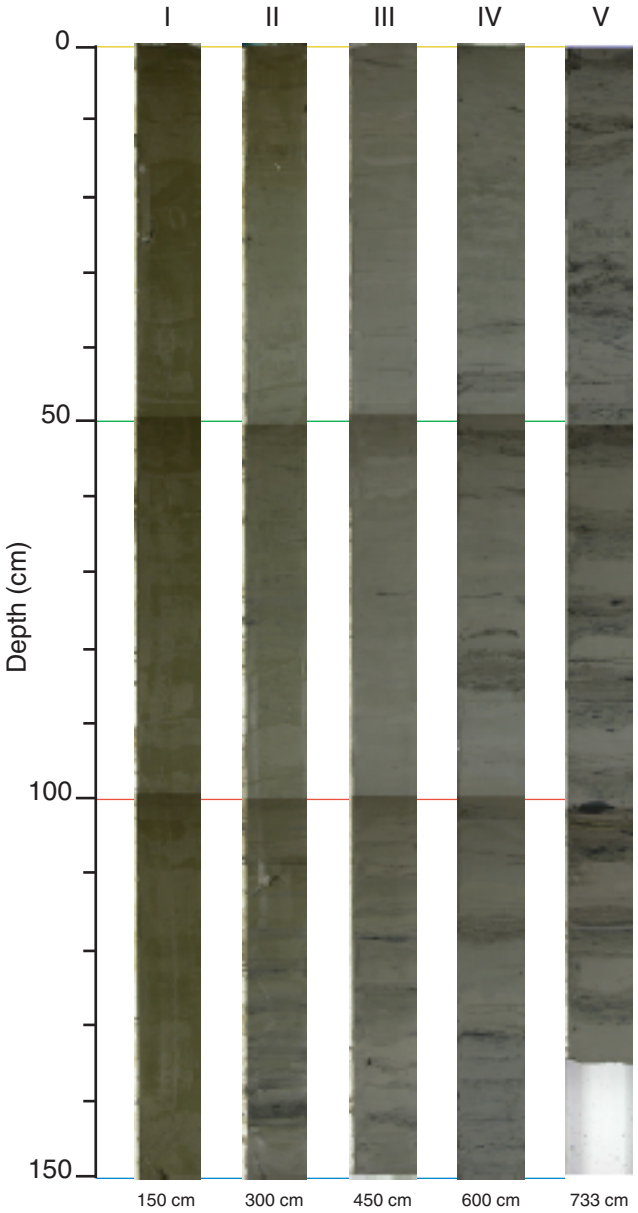
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 4
Core MD02-2495G



MD02-2495G (sections I to V)



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **01.06.2002**

N° de station : **4**
MARGE VC 2

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2496

(MD - année - milles - centaines)

CAROTTE (longueur) :

38.38 m

POSITION :

Latitude : 48° 58 47 N

Longitude : 127° 02 14 W

CAROTTIER (type) (1) : CALYPSO II

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids :

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station :	**13:48**
Début manœuvre :	**13:48**
Déclenchement :	**14:38**
Fin de manœuvre :	**16:14**
Durée de manœuvre :	**02:26**
Départ station :	**16:20**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

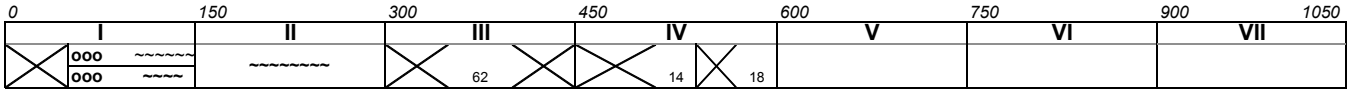
CTD (bouteilles) :

Filet à plancton :

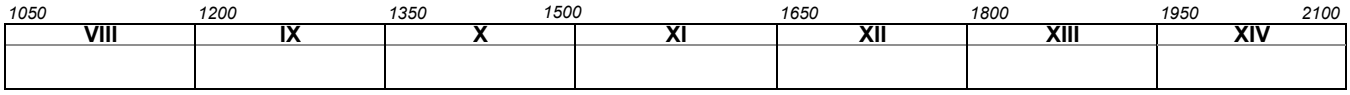
Autres :

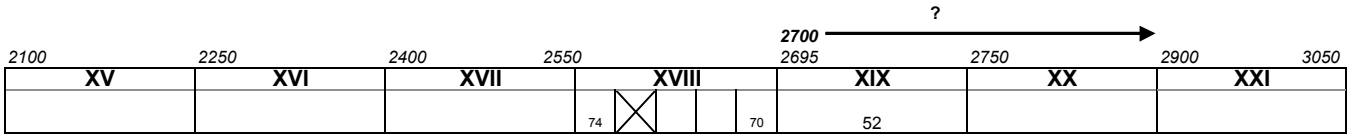
Description / incidents : **Barrel bent**

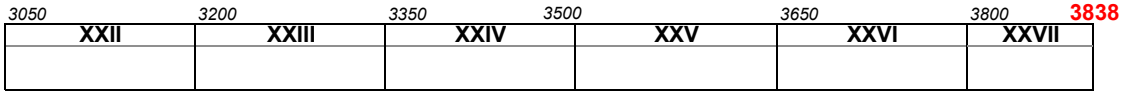
Barrel cut off in 2 sections (I & II



Fell out---> plastig bag







(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MD02-2496

A total of 38.38 m was recovered in core MD02-2496. The sequence consists predominantly of dark grey to dark olive grey silty clay with variable amounts of silt and fine sands, which occur in thin laminae and lenses. Very dark grey to black flecks or mottles of oxides / sulfides are abundant in several intervals.

The top 8.6m of the core consists of soft olive grey silty clay. Coring disturbance is extensive near the top, and large voids are present. The sediments appear mostly homogeneous, but scattered sulfide / oxide flecks occur below 6m.

Between 8.6 and 19.2 m the sequence consists of silty clays that are interlayered with very fine sands or silts. In most of this interval, the sediments consist of repeated fining upward cycles of sand / silt-silty clay-clay, which coincide with cyclic colour variation from very dark grey to olive grey. The sand / silts are present as thin laminae of 1 mm, grouped into packages of 1-8 cm thick. Some sand layers contain abundant foraminifera.

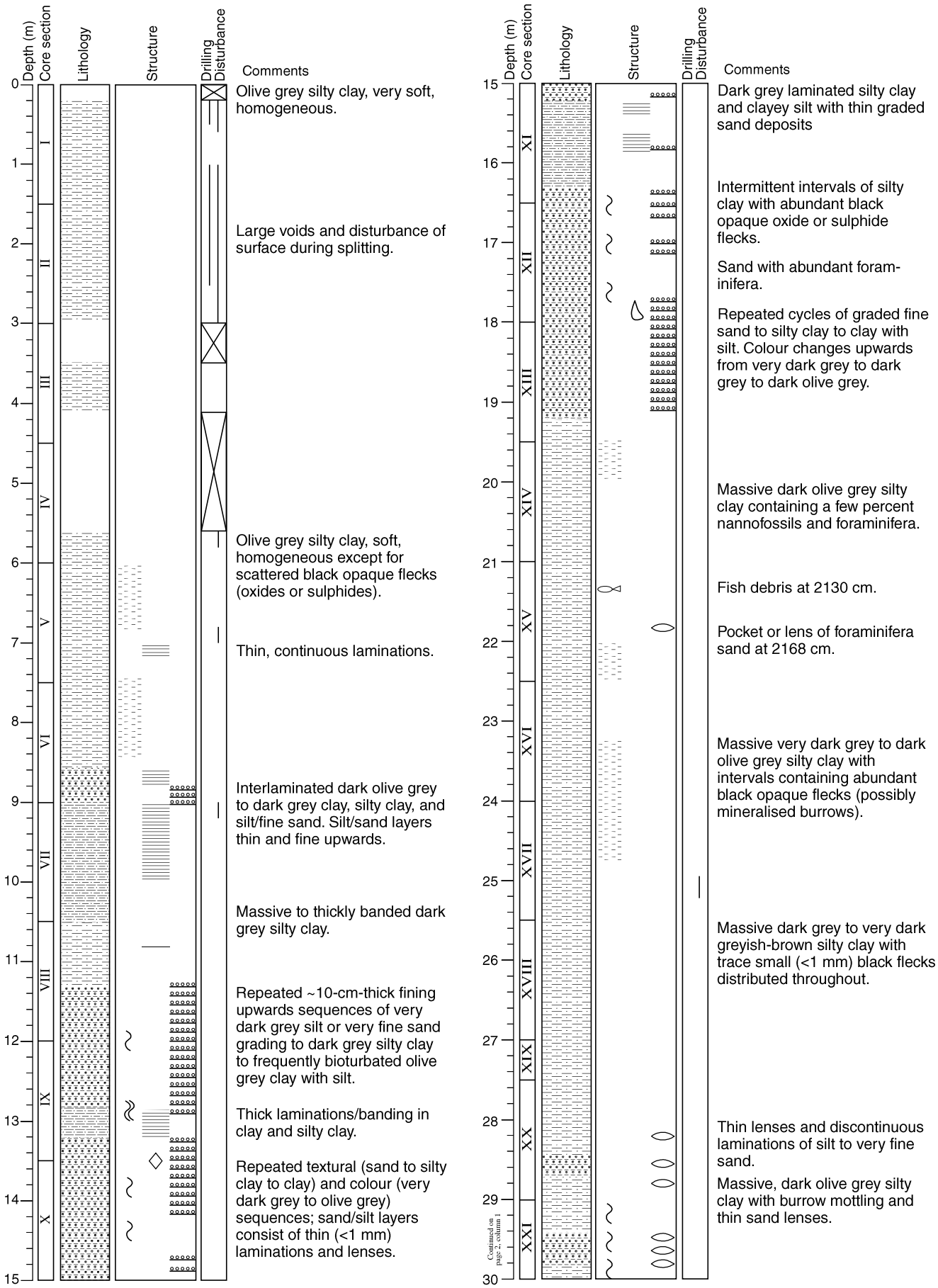
From 19.2 to 28.4 m, the lithology is massive silty clay, which varies in colour between very dark grey, very dark grayish brown, and dark olive grey. Scattered black sulfide / oxide flecks are common to abundant in most of this interval. One sand pocket or lens consisting of foraminifera was found at 21.68 m.

The massive silty clays between 28.4 and 33.0 m are mostly dark olive grey. Very fine sand or silt lenses or laminae are common.

Below 33 m, sediments consist mainly of dark grey massive clays with rare sand lenses. Dropstones of up to 2.5 cm were found in several levels. Dark grey to black flecks are common between 33 to 35.5 m.

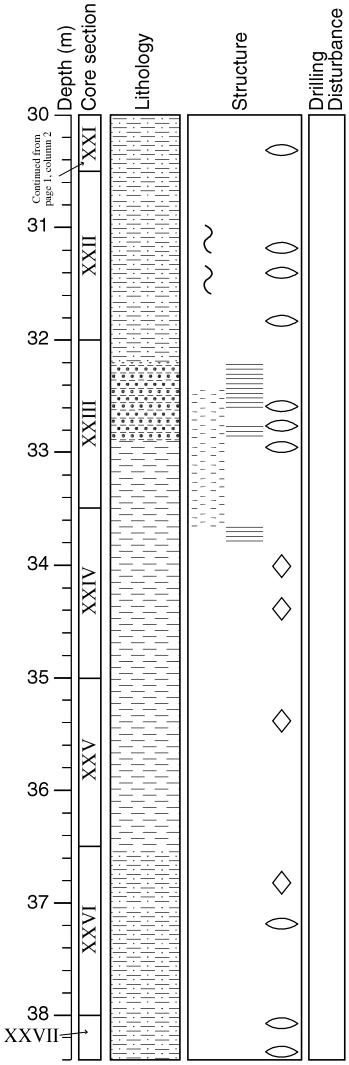
MONA

Core: MD02-2496



MONA

Core: MD02-2496 (cont.)



Massive dark olive grey silty clay; scattered sand lenses and disseminated black opaque flecks. Local burrow mottling.

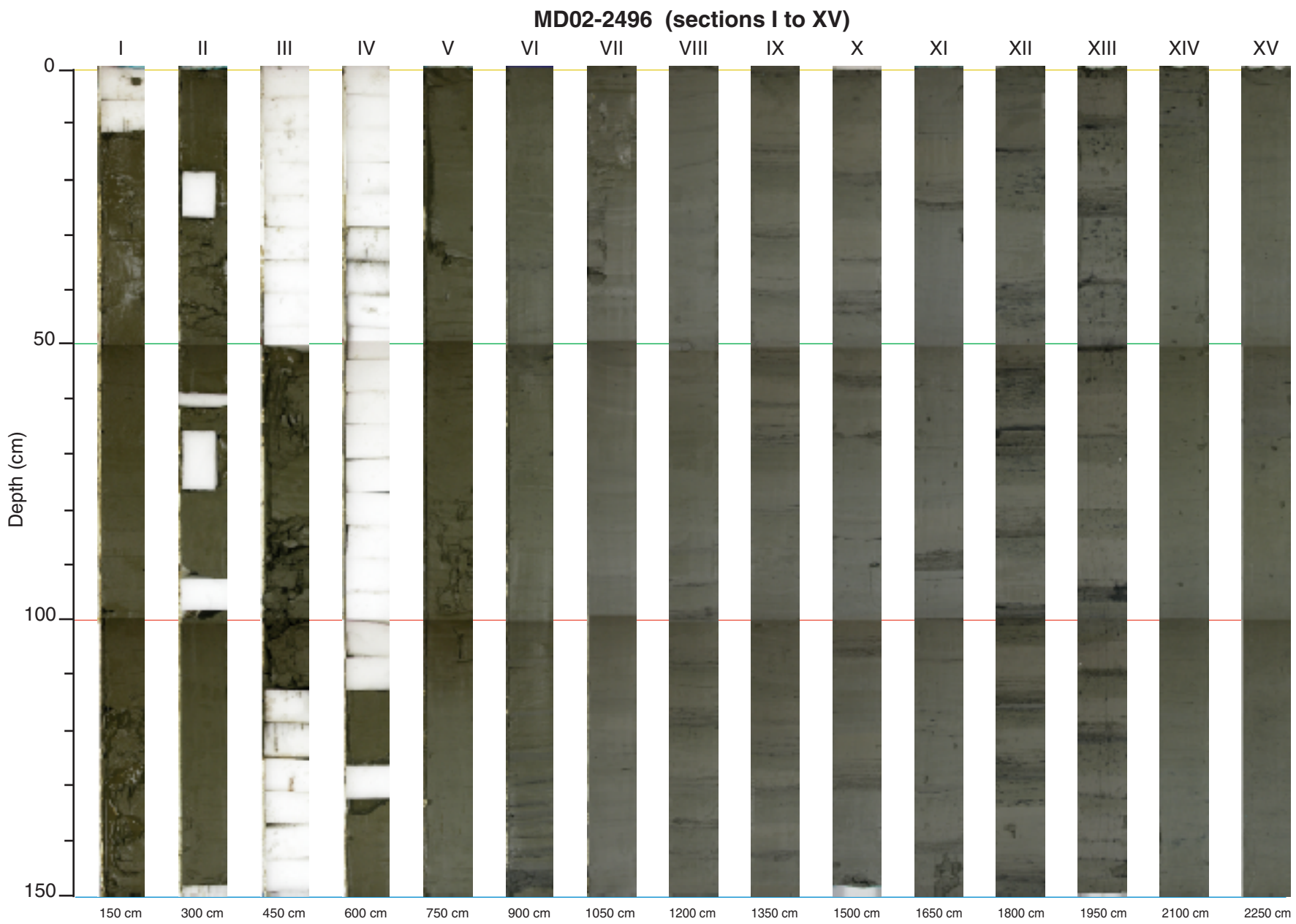
Dark to very dark grey silty clay interlayered with 1-to-2-cm sand laminations and lenses. Scattered black opaque flecks.

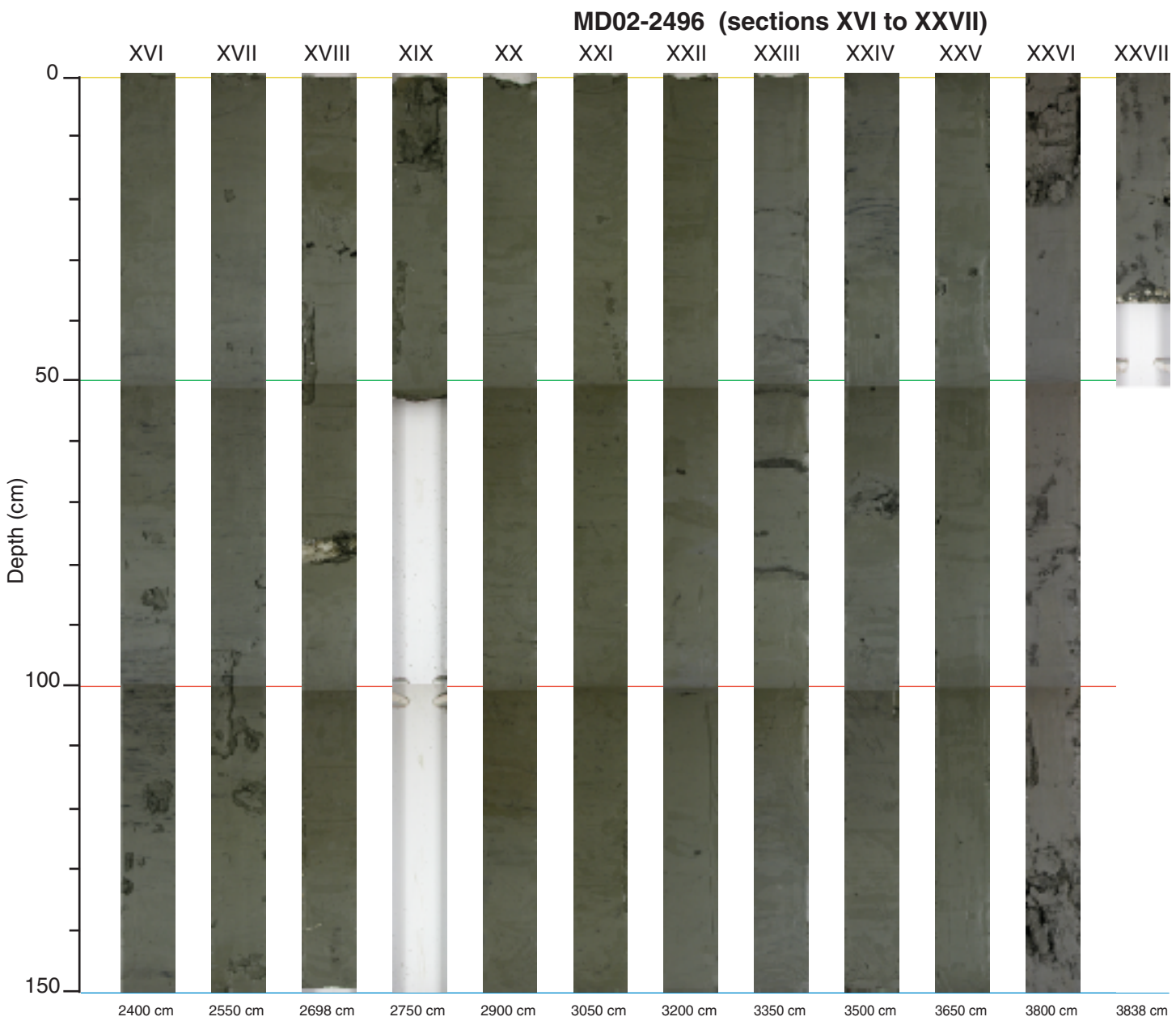
Scattered 'dropstones' up to 2.5 cm in size.

Massive, darker grey clay with black flecks.

Dark grey silty clay with 'dropstones' and thin sand lenses.

End of core, 3838 cm.

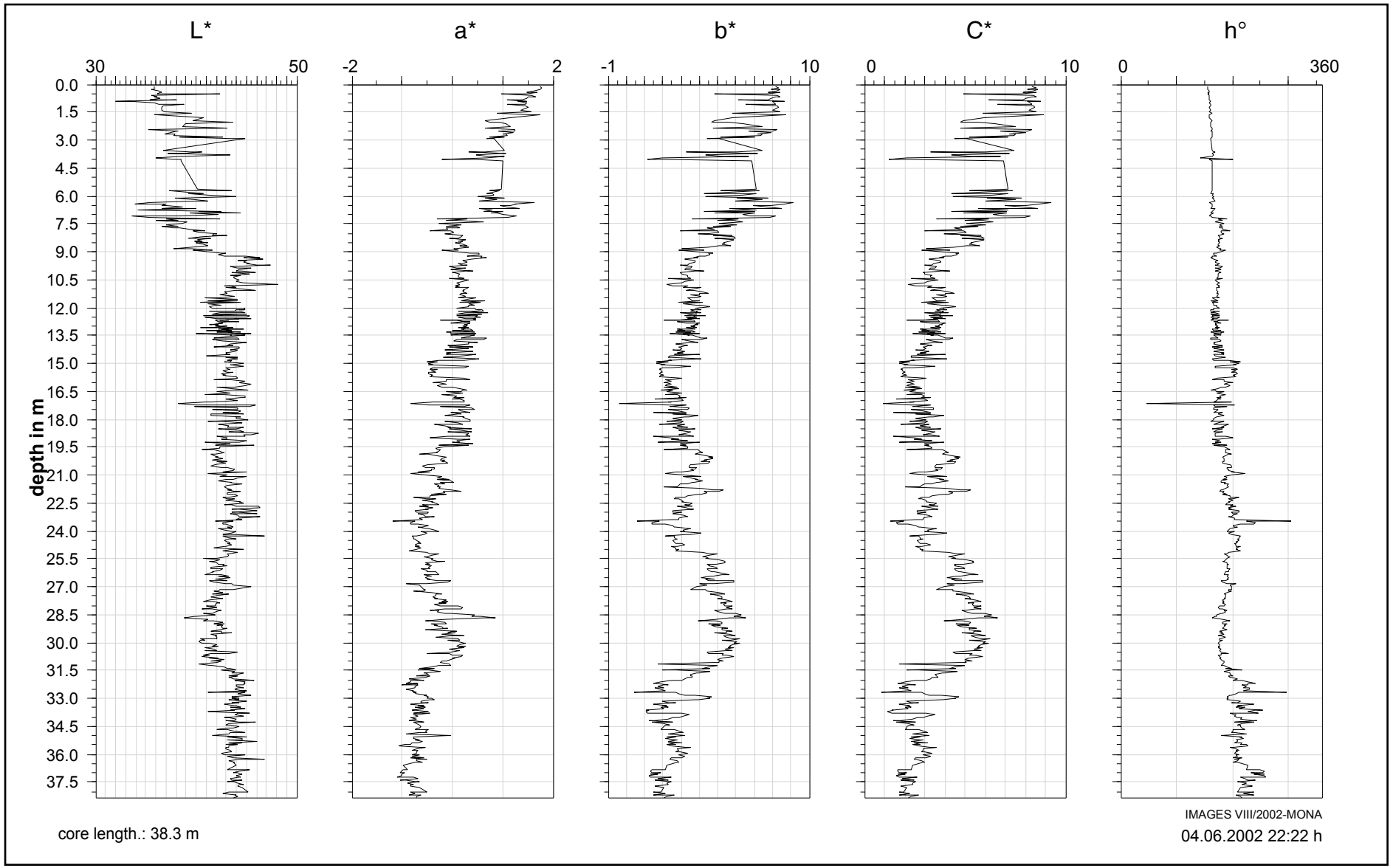

MD02-2496 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2496 (sections XVI to XXVII)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2698 cm
2750 cm
2900 cm
3050 cm
3200 cm
3350 cm
3500 cm
3650 cm
3800 cm
3838 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

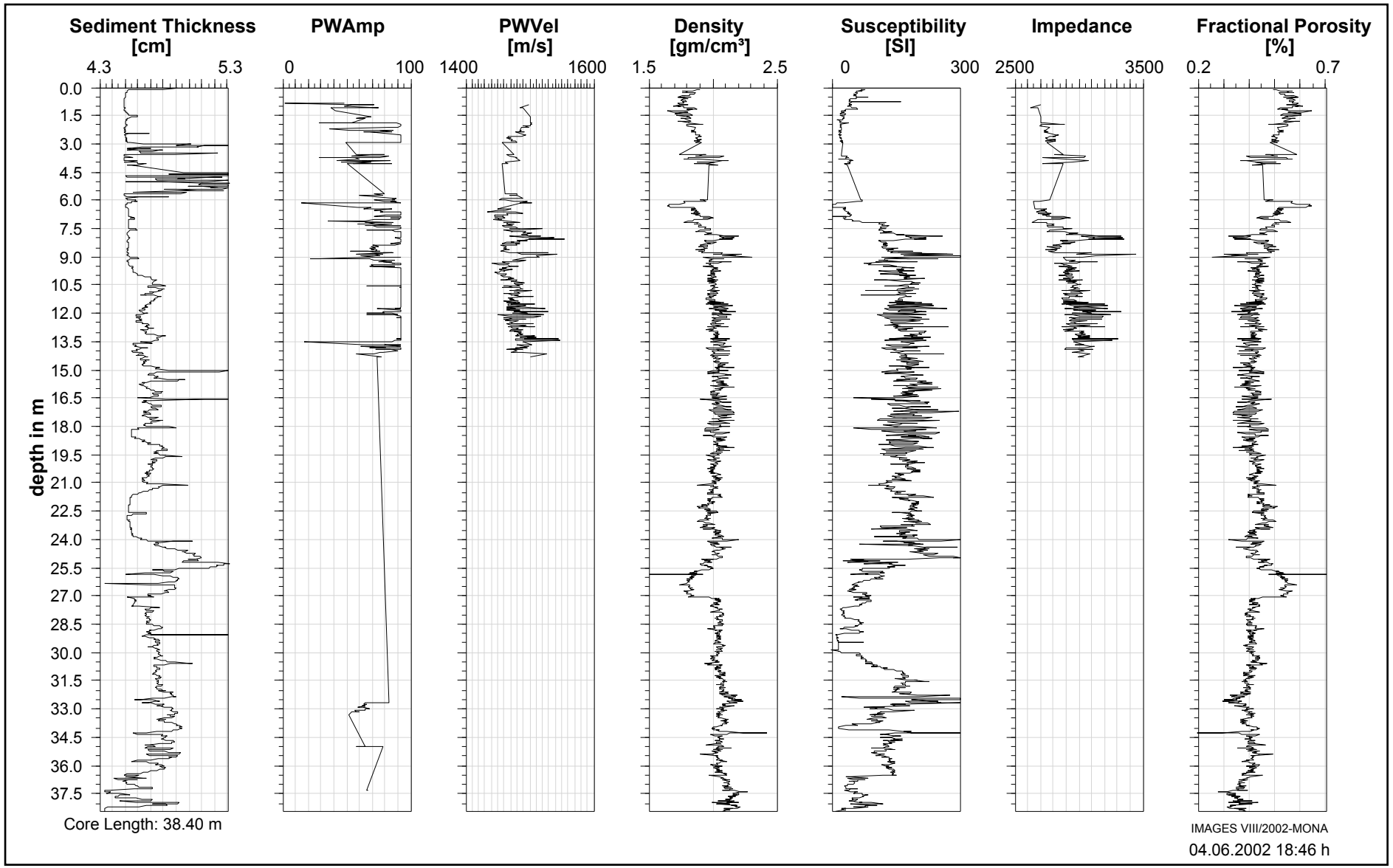
Station 4
Core MD02-2496



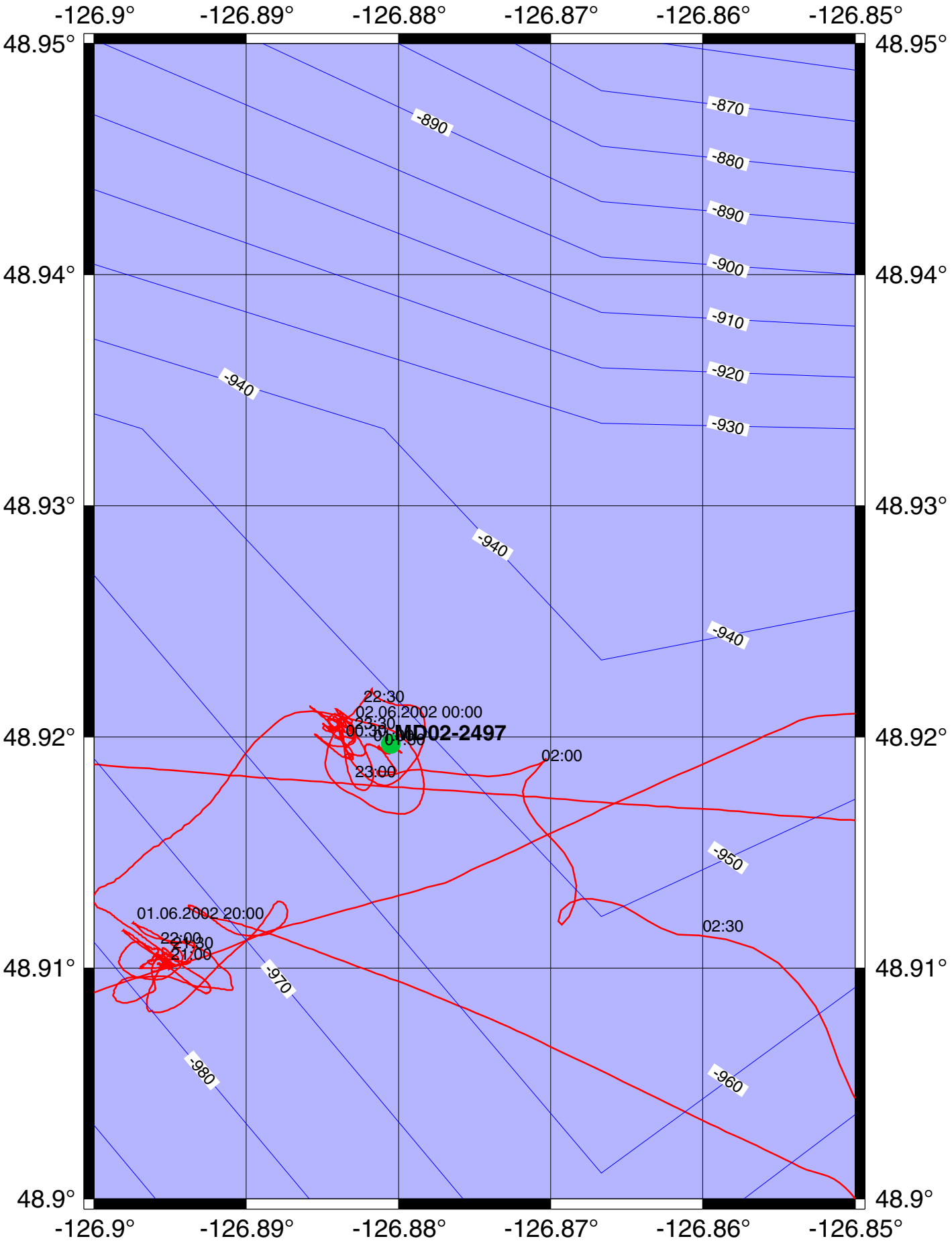
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 4
Core MD02-2496

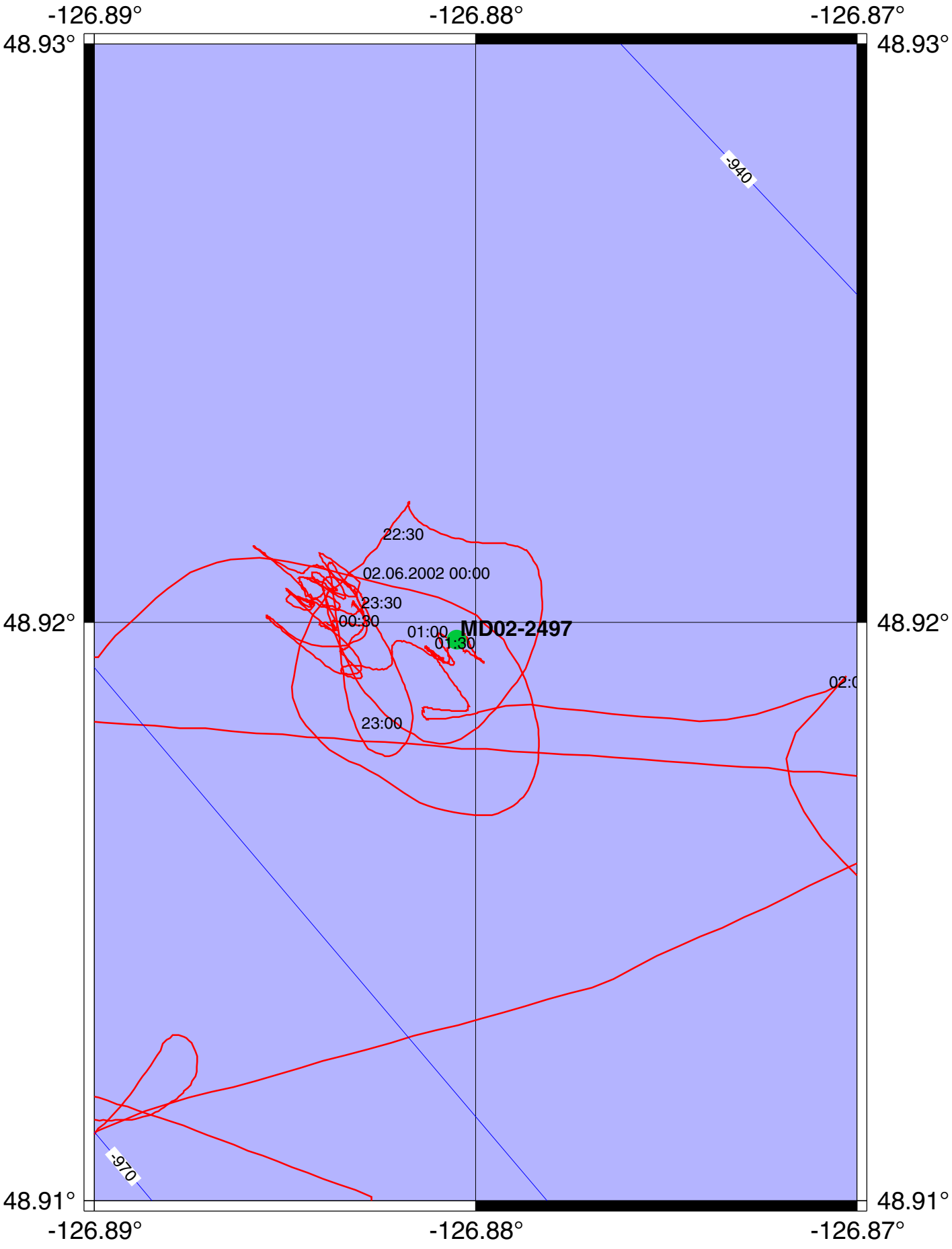


IMAGES VIII/MD126, MONA
British Columbia Margin 2



GMT 2002 Jun 19 01:48:03

IMAGES VIII/MD126, MONA
British Columbia Margin 2



GMT 2002 Jun 19 01:42:18

NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **02.06.2002**

N° de station : **5**

Météo : (force) / Direction
Vent : **(5 nœuds)**
Mer : **Forte**
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2497

(MD - année - milles - centaines)

CAROTTE (longueur) :

26.13 m

POSITION :

Latitude : **48° 55,18' N**

Longitude : **126° 52,83' W**

CAROTTIER (type) [1] **:**	**CALYPSO II**	
Poids total (air) :	**6.90**	**t**
Poids total (eau) :	**6.20**	**t**

REGLAGES :

Tubes (longueur) :	**31.05**	**m**
Câbles :	**1.50**	
Chute libre :		**m**
Boucle :	**1.60**	**m**
LC poids :	**35.90**	

CONTREPOIDS :
Type (2) : Cylindre

Longueur PVC :	**m**
Pénétration :	**m**
Longueur de carotte : + Ogive (+ 0,15 m)	**m**

PARAMETRES MESURES :

Sonde corrigée :	**912**	**m**
Ligne filée : 910=880+30		**m**
Arrachement/total *(tonne)* :	**15.00**	**t**
Arrachement/différentiel *(tonne)* :	**8.70**	**t**
Pénétration/apparente *(m)* :		**m**
Pénétration/tensiomètre *(m)* :	**-3.00**	**m**

HEURES (GMT)

En station :	**20:18**
Début manœuvre :	**00:45**
Déclenchement :	**01:07**
Fin de manœuvre :	**01:58**
Durée de manœuvre :	**01:13**
Départ station :	**03:20**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents : **Bent barrel at 5 m**

0	150	300	450	600	750	900	1050
I	II	III	IV	V	VI	VII	
83	24 24	78					

1050	1200	1350	1500	1650	1800	1950	2100
VIII	IX	X	XI	XII	XIII	XIV	

2100	2250	2400	2550
XV	XVI	XVII	XVIII
		7 71	63

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MD02-2497

A total of 26.13 m of sediment was recovered in calypso core MD02-2497. The sequence consists mainly of dark olive silty clays, with diatoms and/or nannos and forams in several levels. Repetitive sequences, of thin silt laminae and silty clay that grades from grey to greenish grey, are abundant in the interval between 7 and 15 m, and common between 15 and 26 m.

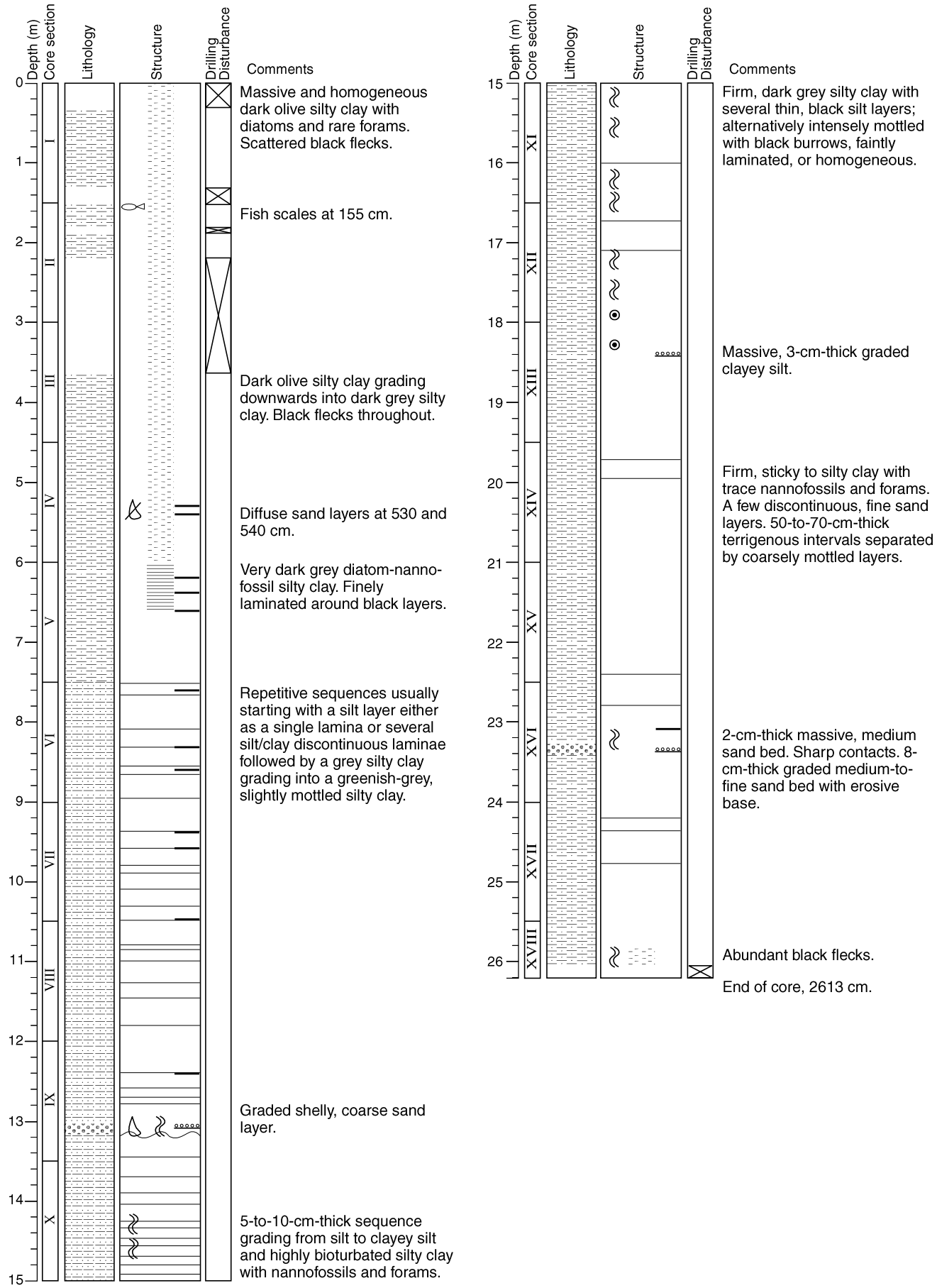
The top 6.5 m of the core consist mainly of homogeneous dark olive silty clay with diatom and rare foraminifera. Black flecks are scattered throughout this interval. Between 6 and 6.5 m, finely laminated dark grey silty clay is present around black laminae.

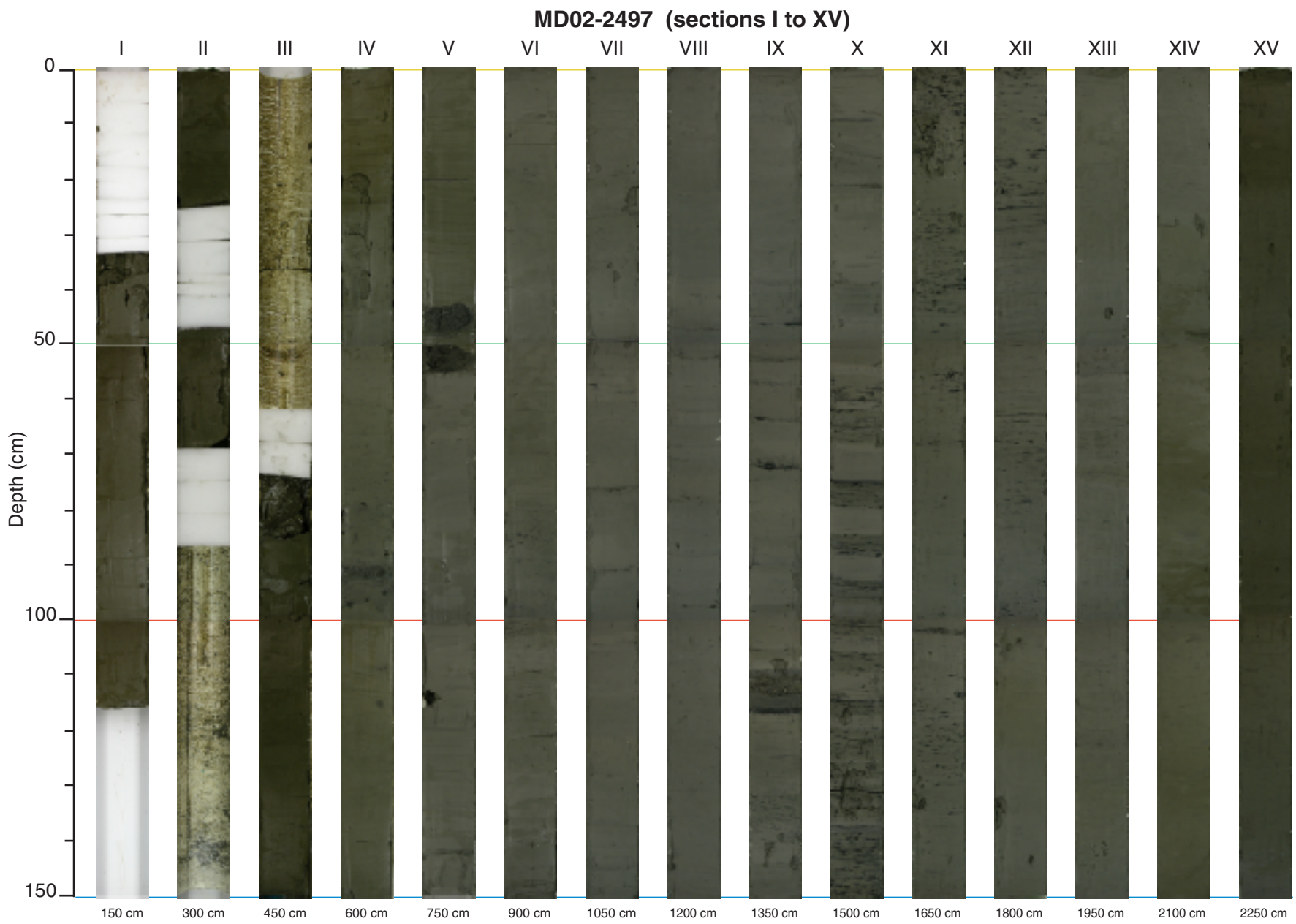
The interval between 7 and 15 m consists of repetitive sequences of 5 to ~40 cm thick, starting with one or several continuous or discontinuous silt laminae, followed by a grey silty clay that grades into a greenish silty clay. A ~15 cm thick graded shelly coarse sand layer is found around 13.1 m. Some bioturbation is evudent between 14 and 15 m.

From 15 m to the base of the core at 26 m, sediments are mostly silty clay, varying between grey, dark grey, and dark olive grey. Between 15 to 18 m, several thin black silt layers are found, and the silty clays in this interval intensely motled with black burrows. Thin graded sand layers occur infrequently.

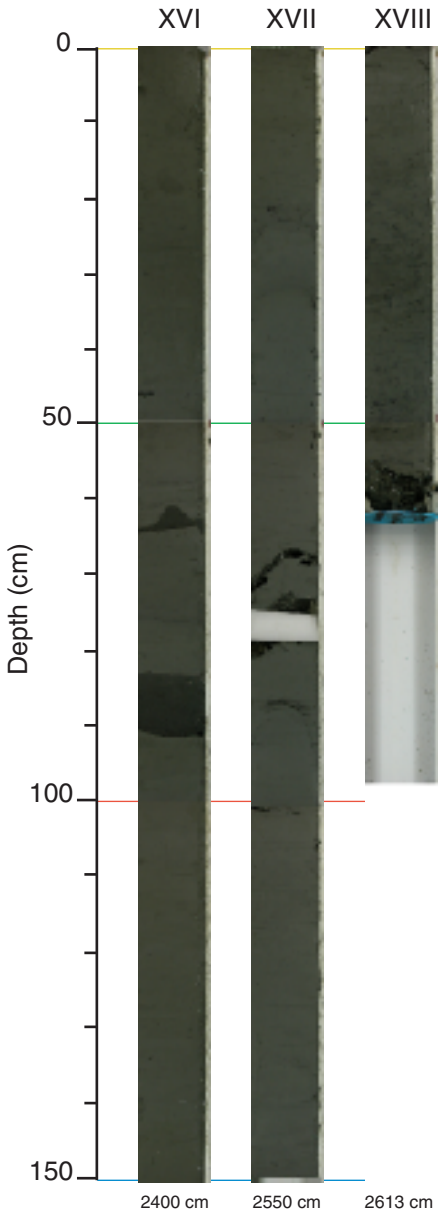
MONA

Core: MD02-2497




MD02-2497 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm

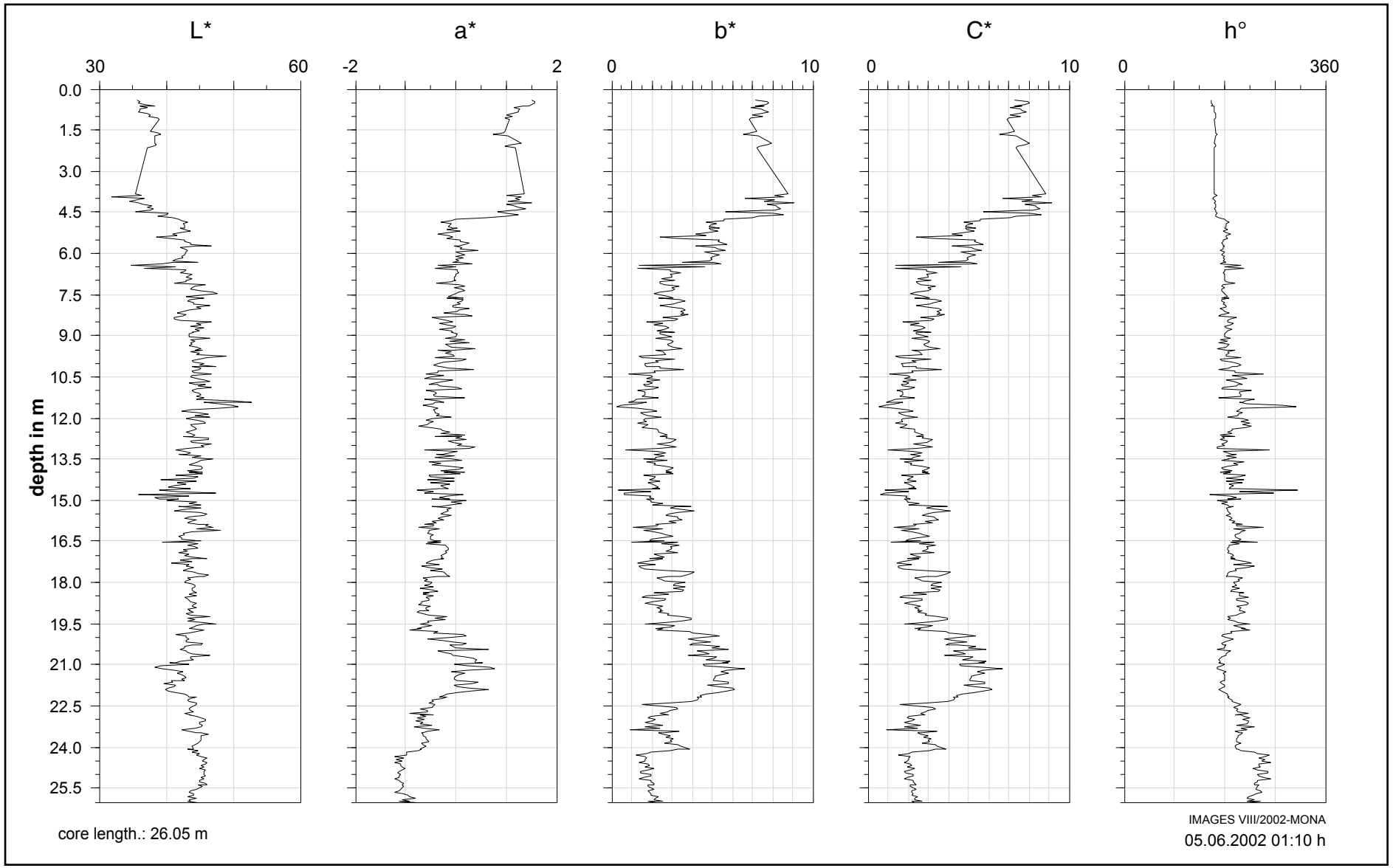
MD02-2497 (sections XVI to XVIII)



IMAGES VIII, 2002
MONA

Colour Reflectivity

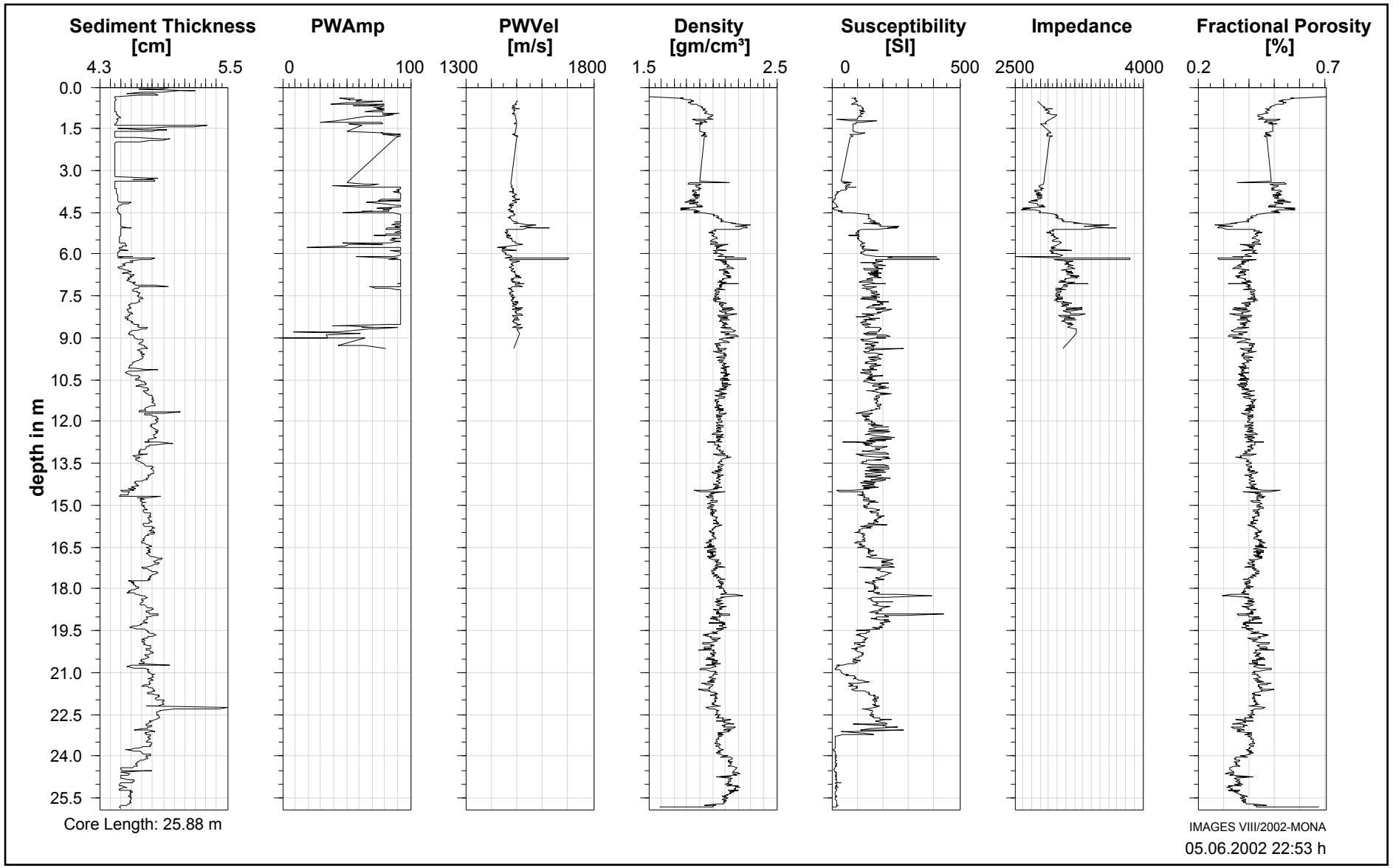
Station 5
Core MD02-2497



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 5
Core MD02-2497



4.2 Oregon-Northern Californian Margin

The Oregon and Northern California margins are well positioned to assess climate mechanisms that transmit rapid climate changes around the globe, because they span strong climatic gradients from the subpolar north Pacific into the subtropical gyre, and monitor key storm tracks associated with the mid-latitude westerlies. Furthermore, these areas also provide excellent opportunities to monitor deep watermasses of the Pacific with very high temporal resolution. Key observations in the region include:

1) Late Pleistocene oscillations of anoxia at depths of a few hundred metres off California, with a pattern visually similar to climate oscillations of the N. Atlantic and Greenland (e.g. Behl and Kennett, 1996)

2) The discovery of similar oscillations in a $\delta^{13}C$ record of the deep (2700 m) Pacific (Lund and Mix, 1998).

Evidence from cores such as ODP Site 1019, located at 41°N reveals rapid changes in upper ocean properties and export production on these time scales with higher productivity occurring in the warm intervals - the same time that laminations are found in Santa Barbara Basin. Thus a first working hypothesis is that wind forcing related to North Atlantic climate changes drives changes N. Pacific export productivity, and these biotic changes drive changes in the intensity of the oxygen minimum zone (OMZ).

Alternatively, intervals of OMZ oxygenation (which occur during cold events) may reflect changes in the character or intensity of intermediate water formation. Thus a second working hypothesis is that changes in Pacific intermediate water formation drive observed changes in the OMZ, and that organic carbon maxima in the laminated intervals (near 14.7 ka and 11.5 ka in Fig. 2) reflect preservation, rather than local productivity.

Four margin sites are detailed below. They correspond to isolated basins acting as sediment trap away from turbidites or to deep sites showing nice sediment draping.

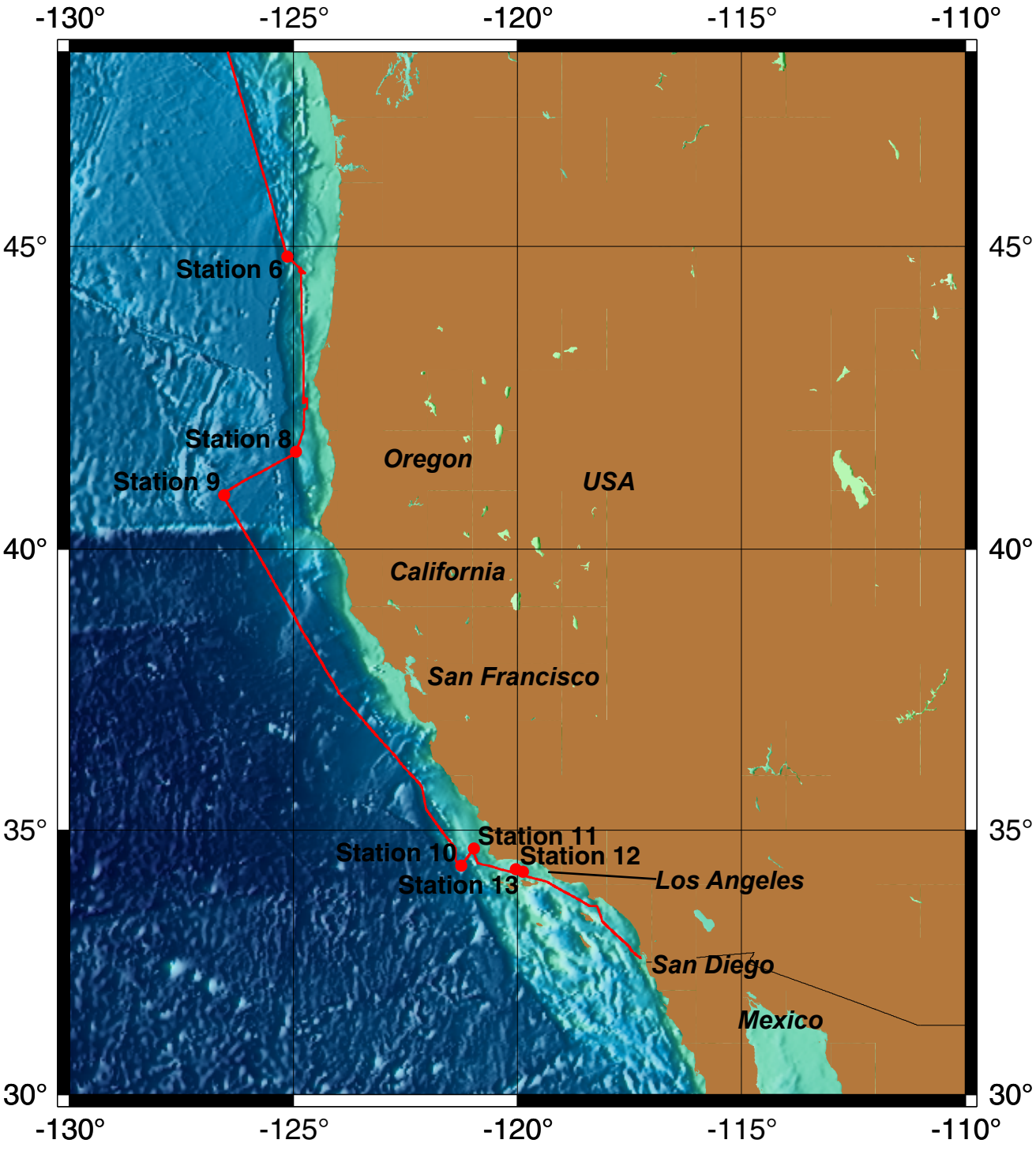
Station 6: At 44°50.41N, 125°08.40W this site lies in an isolated basin at 1830 m depth just north of the ODP Site 892. OSU cored this site in 1977. Sedimentation rates are very high, about 120 cm per 1000 years as documented by an array of 11 radiocarbon dates in gravity cores W7710-26 and W7710-27, which reach 4500 years at about 300 cm depth (Karlin, 1984; Karlin and Levi, 1985). We retrieved core MD02-2498. It is 36.16m long.

Station 7: We try to locate a suitable area around Newport at a shallower depth than station 6. We did not find a suitable topography (see bathymetric map) and sediments (3.5 KHz). We tried south of that position with more success.

Station 8 : Off the Northern California Margin, ODP Site 1019 has yielded an excellent record of the last deglaciation, with sedimentation rates of ~50 cm/ka based on a high-resolution stable isotope record, and radiocarbon dates (Mix et al, in prep). Unfortunately, a hiatus at Site 1019 removed part of oxygen isotope stages 3, 4 and 5, ~50-100 ka. An opportunity exists in the Eel River Basin nearby to obtain better material. The site sits off Eureka, California about 0.9 nm south of ODP Site 1019. By moving the site 0.9 nm south (where survey line CA-1-9 crosses line CA-1-3; Lyle et al., 1995) we hopped to avoid the hiatus and get a better record of the last glacial cycle.

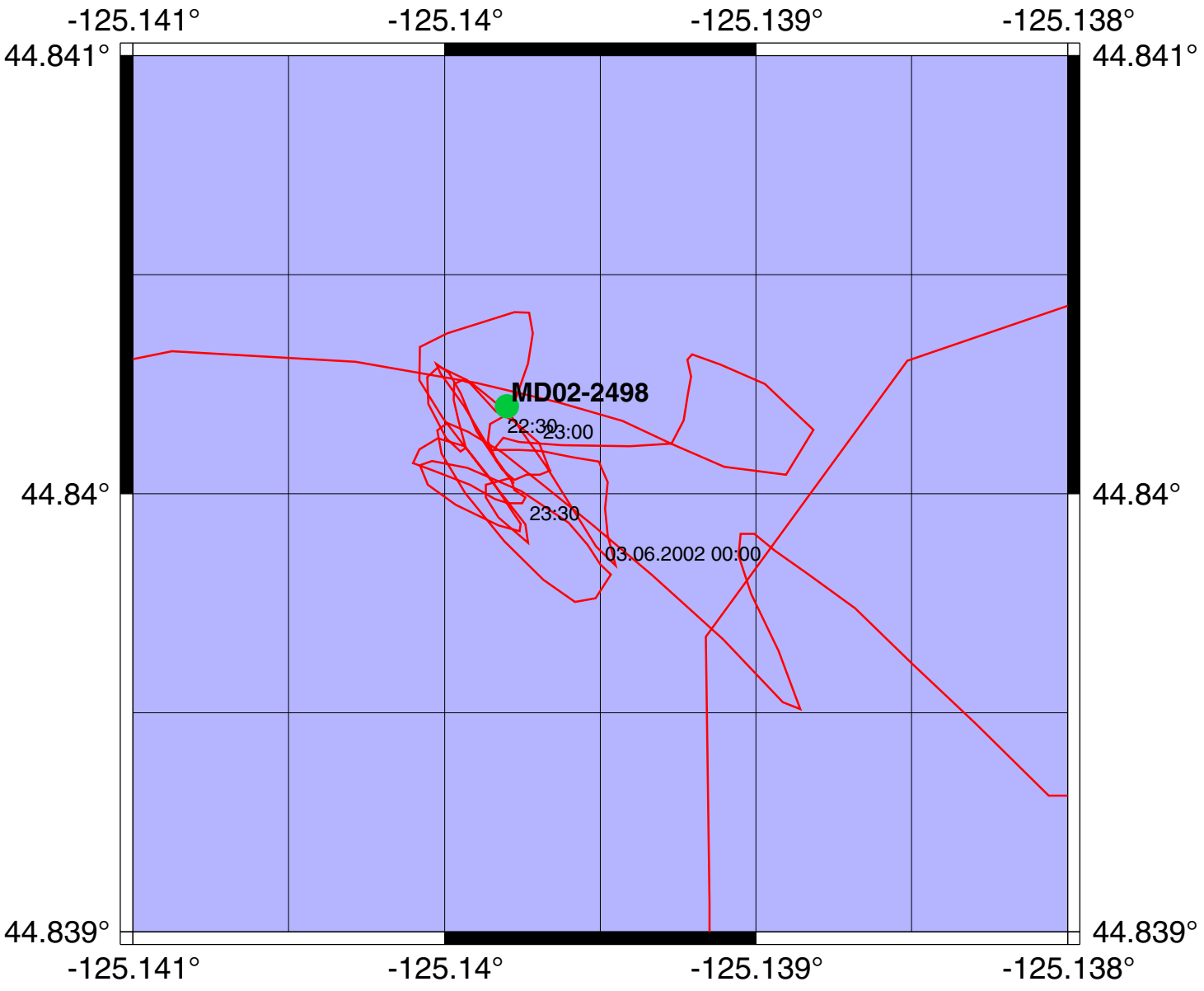
Station 9 : This site is located south of the ODP Site 1020. The depth (3115m) will permit to study pelagic sedimentation close to the upwelling area and on longer time scale than the cores located closer to the margin at shallower depth.

IMAGES VIII/MD126, MONA
Oregon, California Margin, San Diego



GMT 2002 Sep 20 16:19:09

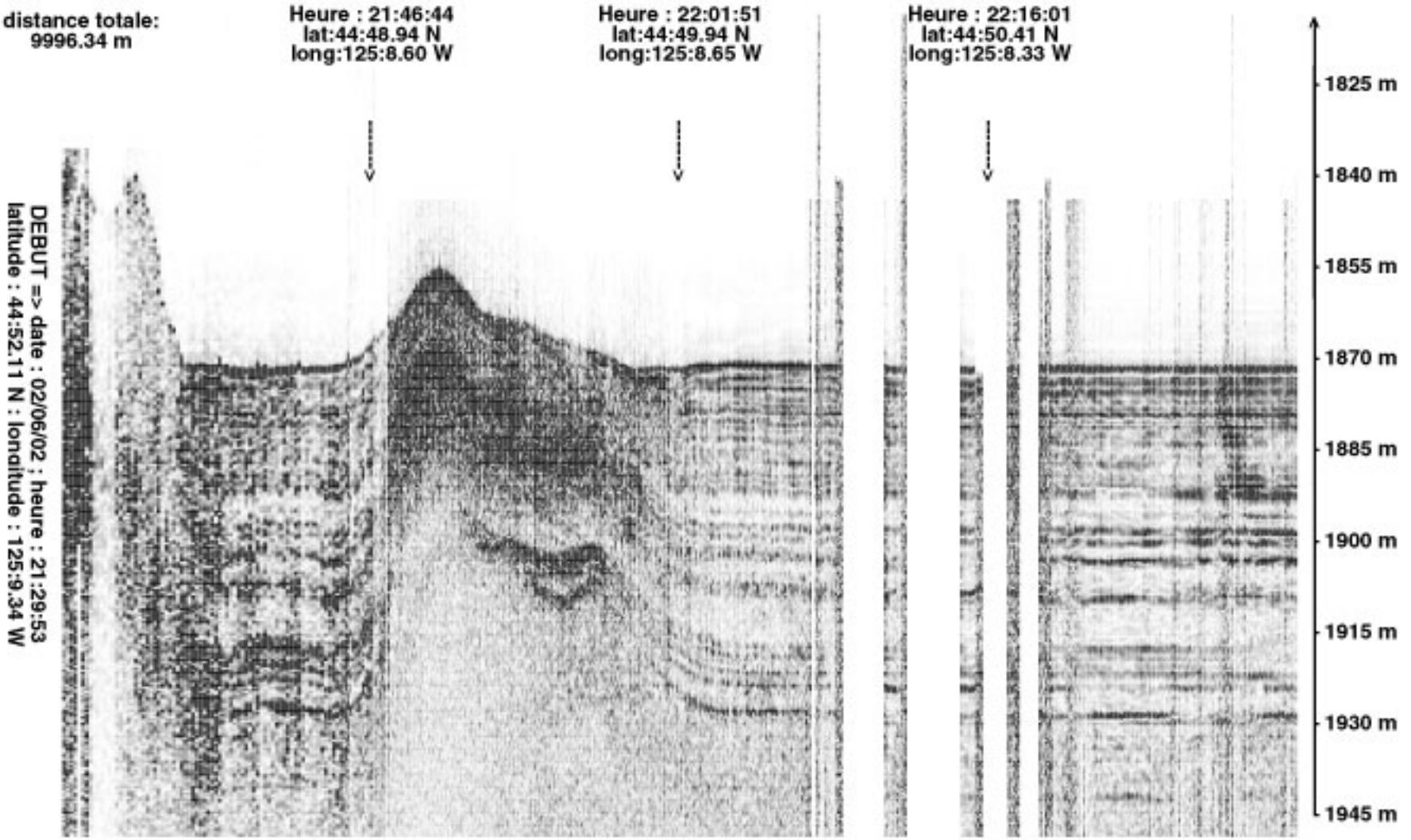
IMAGES VIII/MD126, MONA
Station 6, Newport 1



GMT 2002 Jun 19 23:22:17

3.5 kHz Seismic Replay

Station 6, Approach

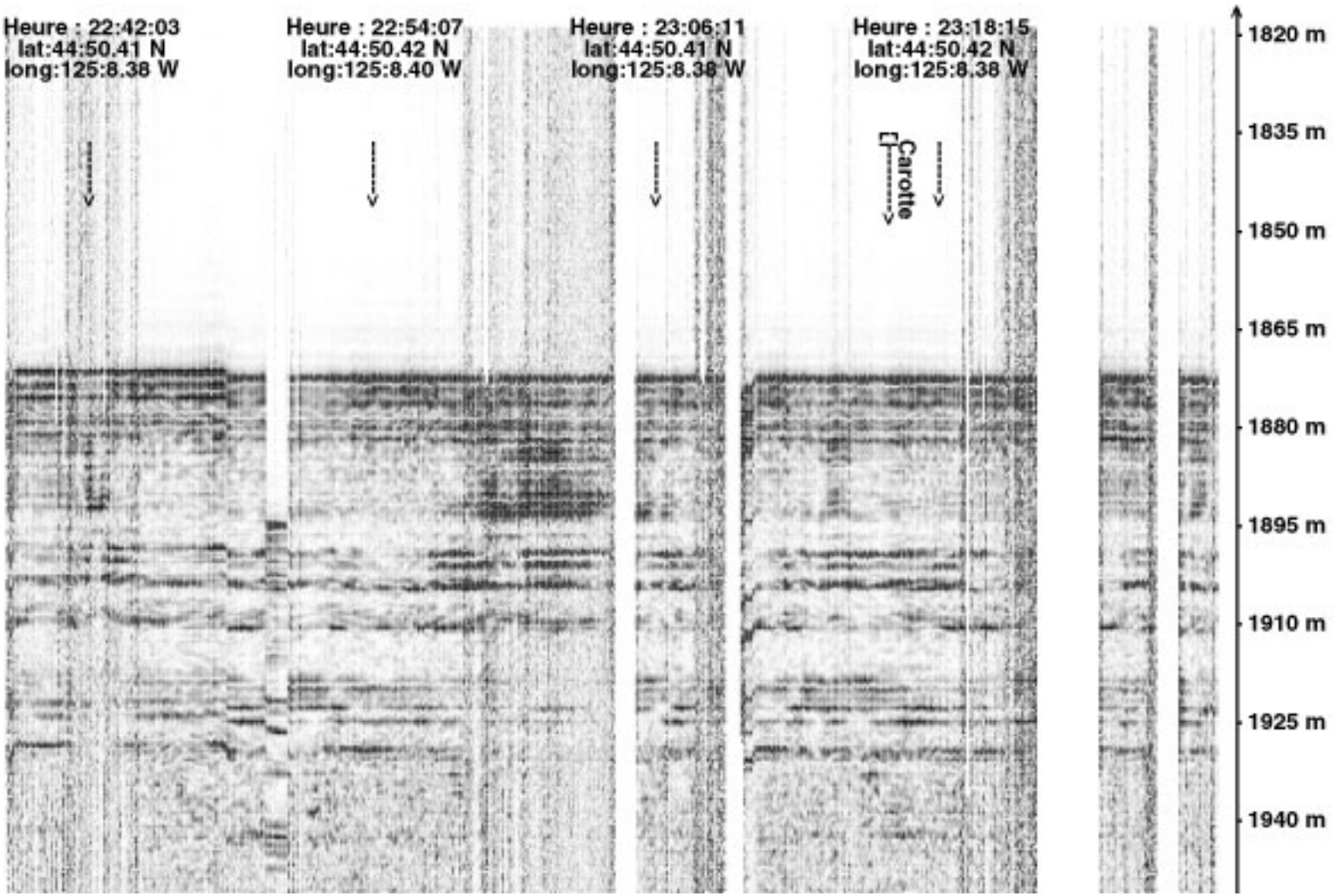


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 6
Core MD02-2498

Station 6,Coring operation



Calypso Core MD02-2498

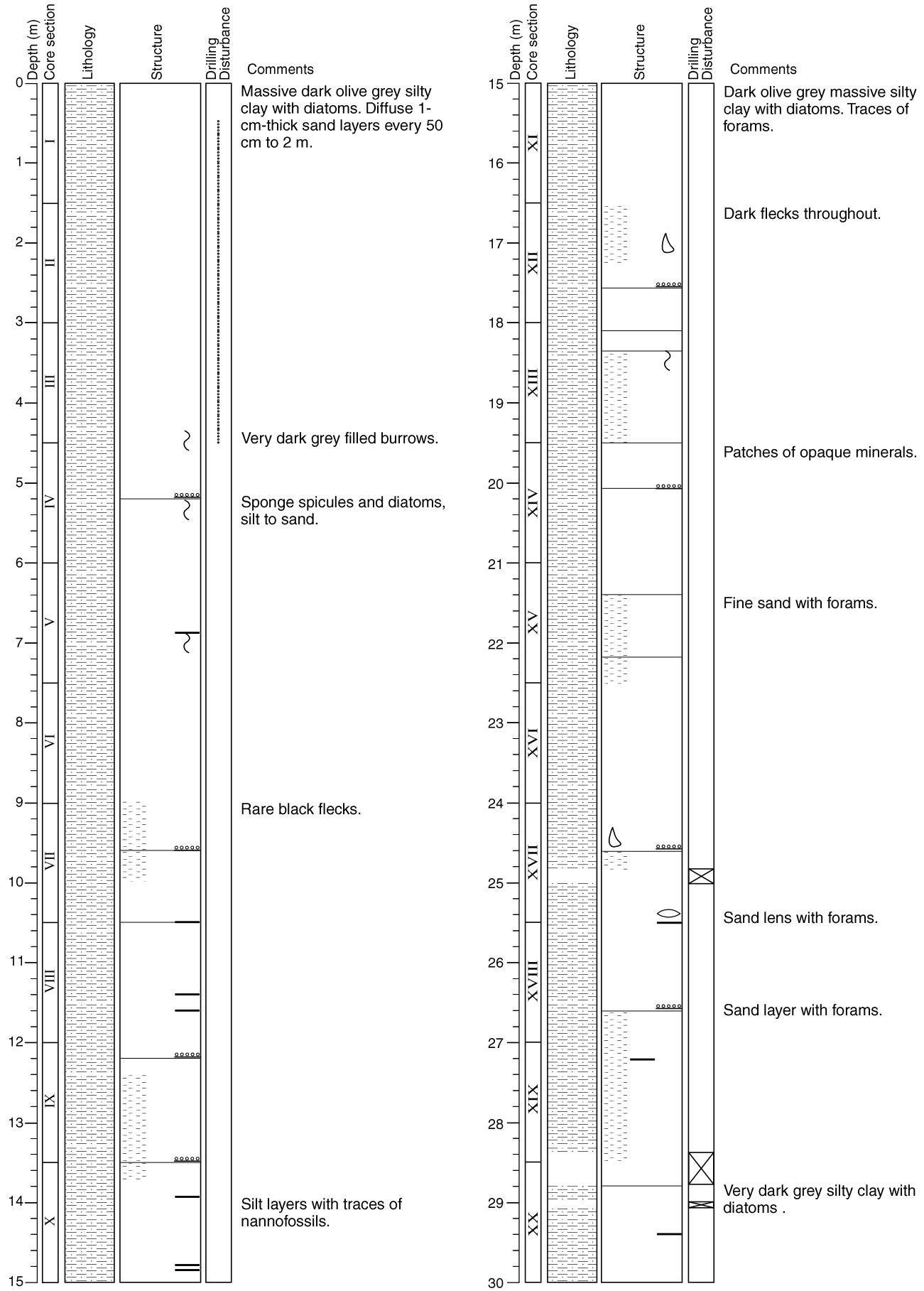
(Station 6, Newport 1; Latitude : 44° 50. 41N ; Longitude : 125° 08. 39W ; 1785m water depth) recovered a total of 36.16m of sediments. The sedimentary sequence has been slightly disturbed by coring from 0.20m (Section II) to 4.50m (bottom of Section IV). Some intervals below 24.80m (Section XVIII) are empty.

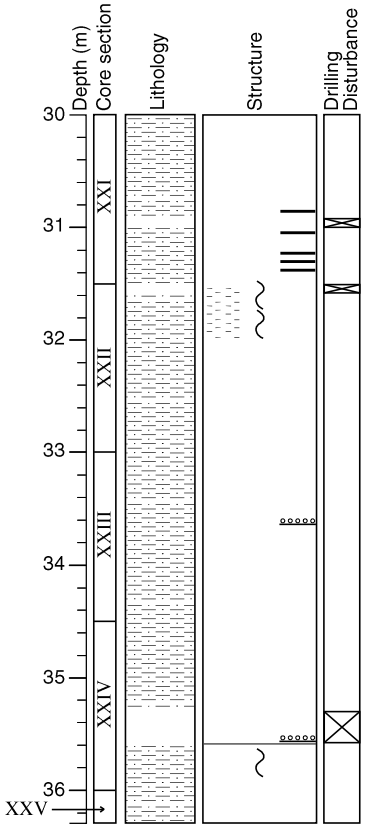
The dominant lithology consists of silty clay with diatoms, dark olive grey to very dark grey in color. The sediment is generally massive but intervals of faint laminations (up to 1.90m long) are observed below 9m (Section VIII). A few slightly bioturbated intervals are present from 4.40m (Section IV) to 7.10m (Section VI), and from 31.50m (Section XXII) to bottom. Isolated burrows are occasionnally present. Normal graded beddings (turbidites ?) occur throughout the core, and dark to black flecks of probable oxides or sulfides are observed occasionnally.

Minor lithologies include :
- Faint, regularly spaced (about 50cm) centimeter thick sandy layers from top to 2.0m (Section III).
- Isolated silty layers, that sometimes include nannofossils, from 6.90m (Section VI) to 14.90m (Section XI), and from 27.20m (Section XX) to bottom.
- Sandy layers and lenses with foraminifers, from 21.40m (Section XVI) to 26.60m (Section XIX).

MONA

Core: MD02-2498





Comments

Dark olive grey silty clay.

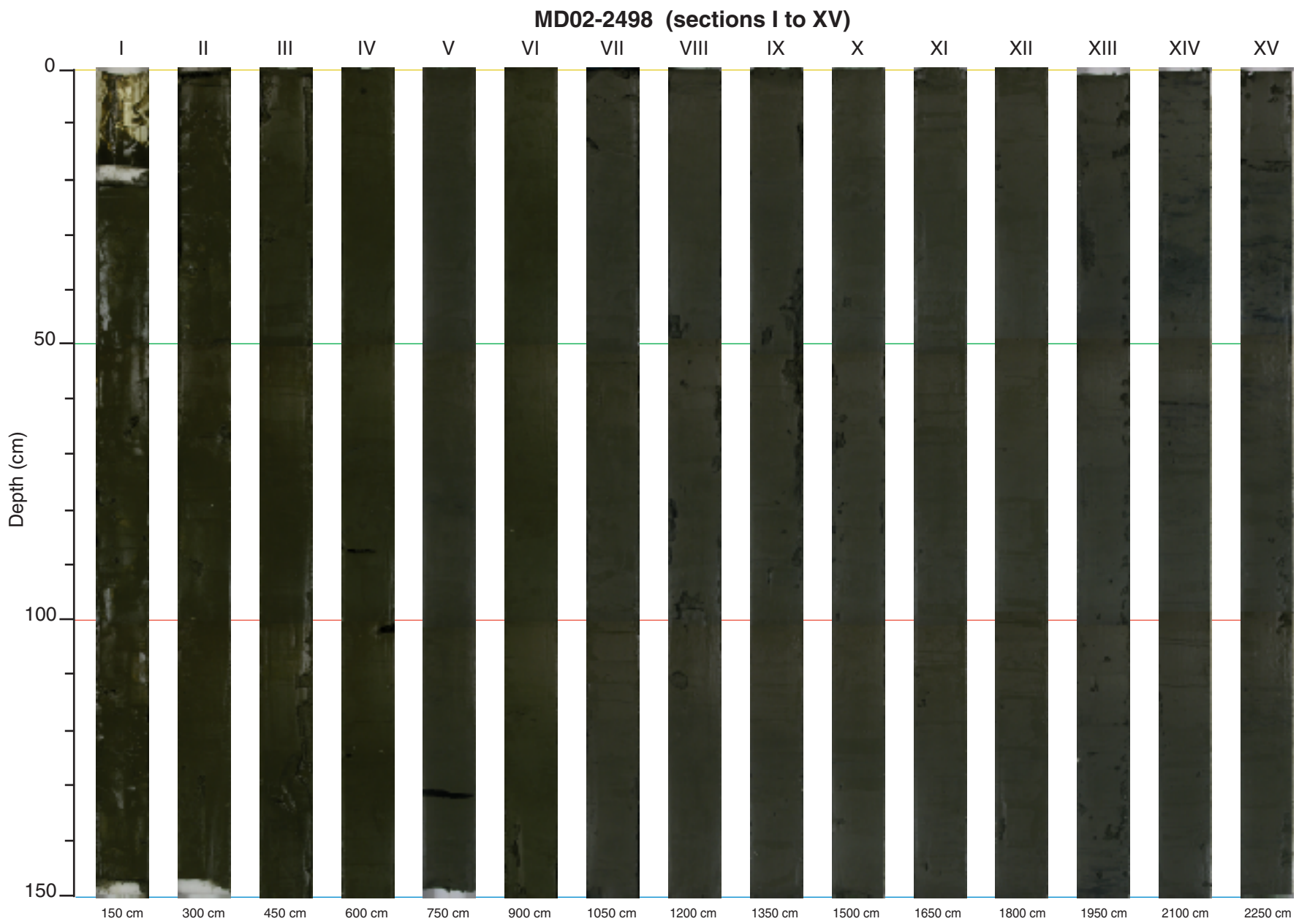
Several dark grey silt layers. Intercallation of two decimeter-thick clay layers and two mottled layers rich in black flecks.

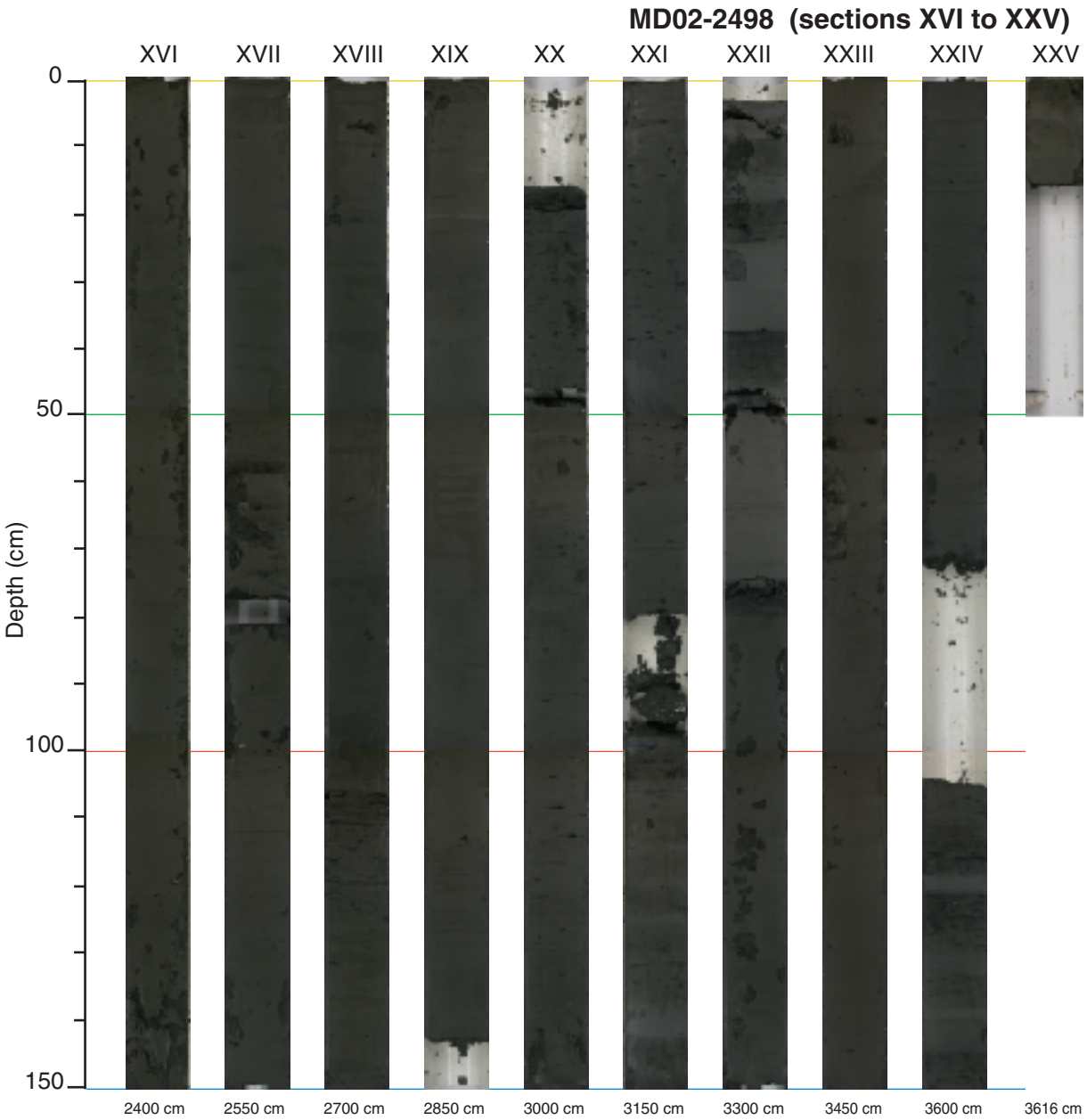
I-cm-thick air bubble

Dark olive grey silty clay with diatoms and dark flecks.

Mottled dark grey silty clay.

End of core, 3616 cm.

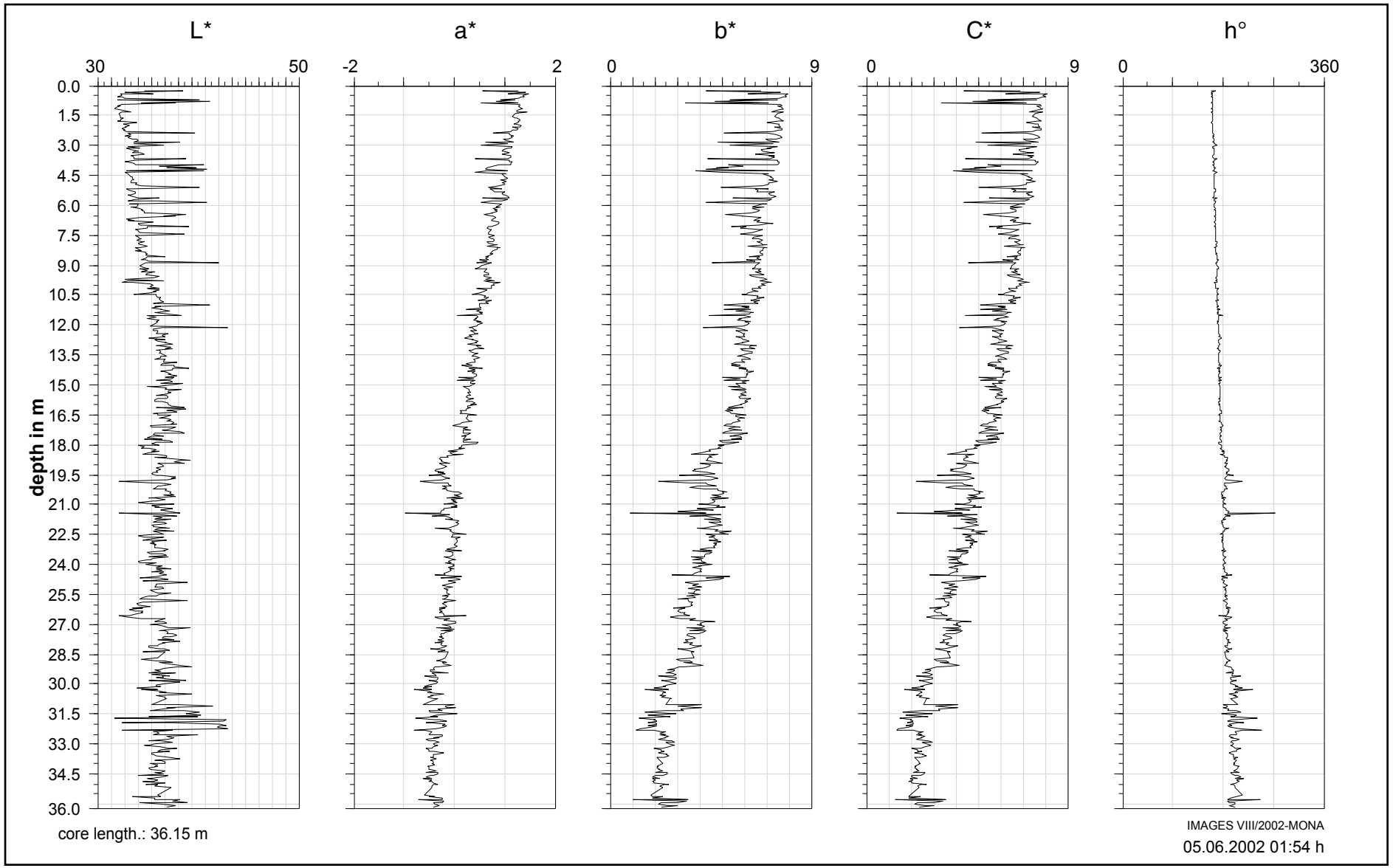

MD02-2498 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2498 (sections XVI to XXV)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3616 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

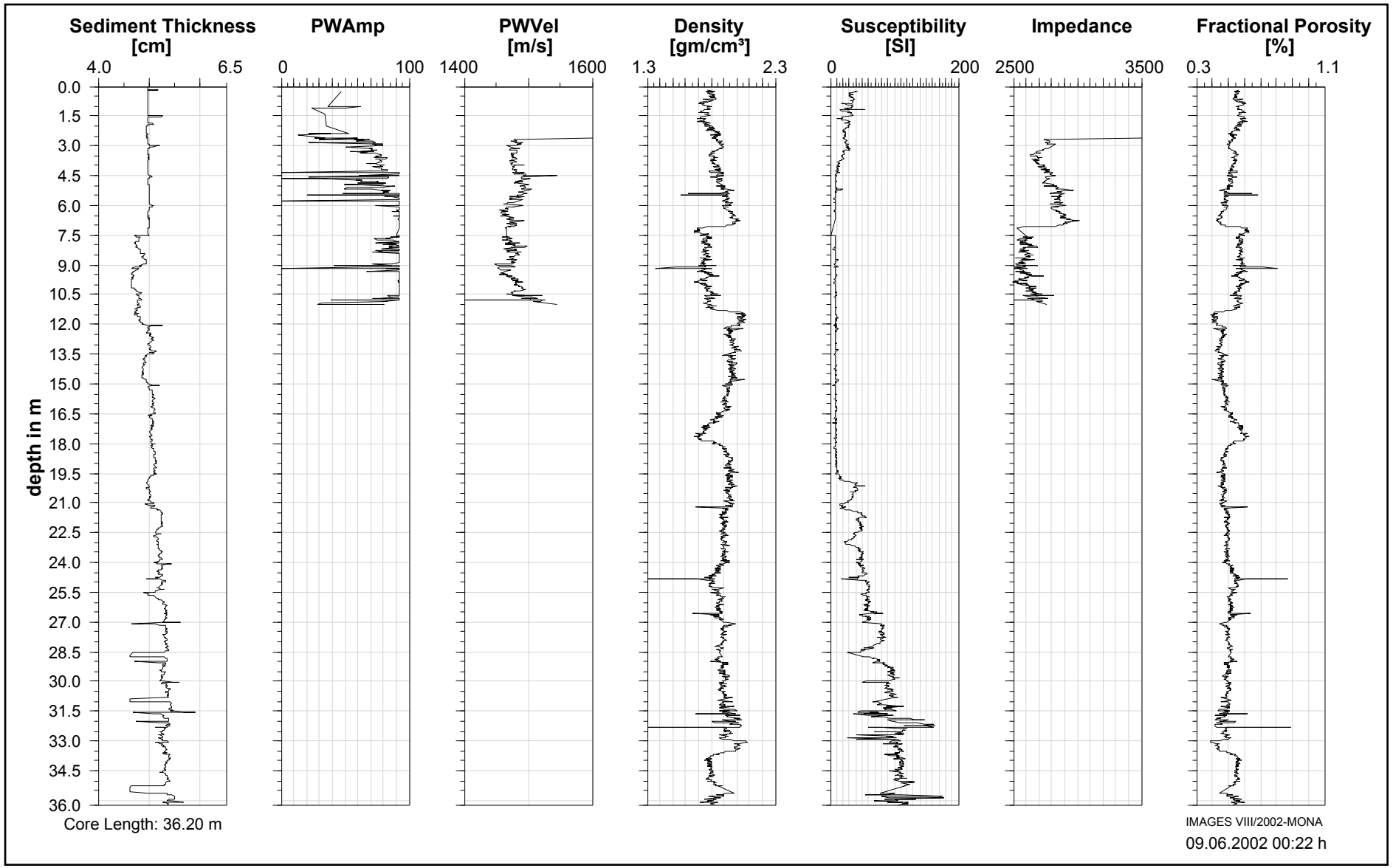
Station 6
Core MD02-2498



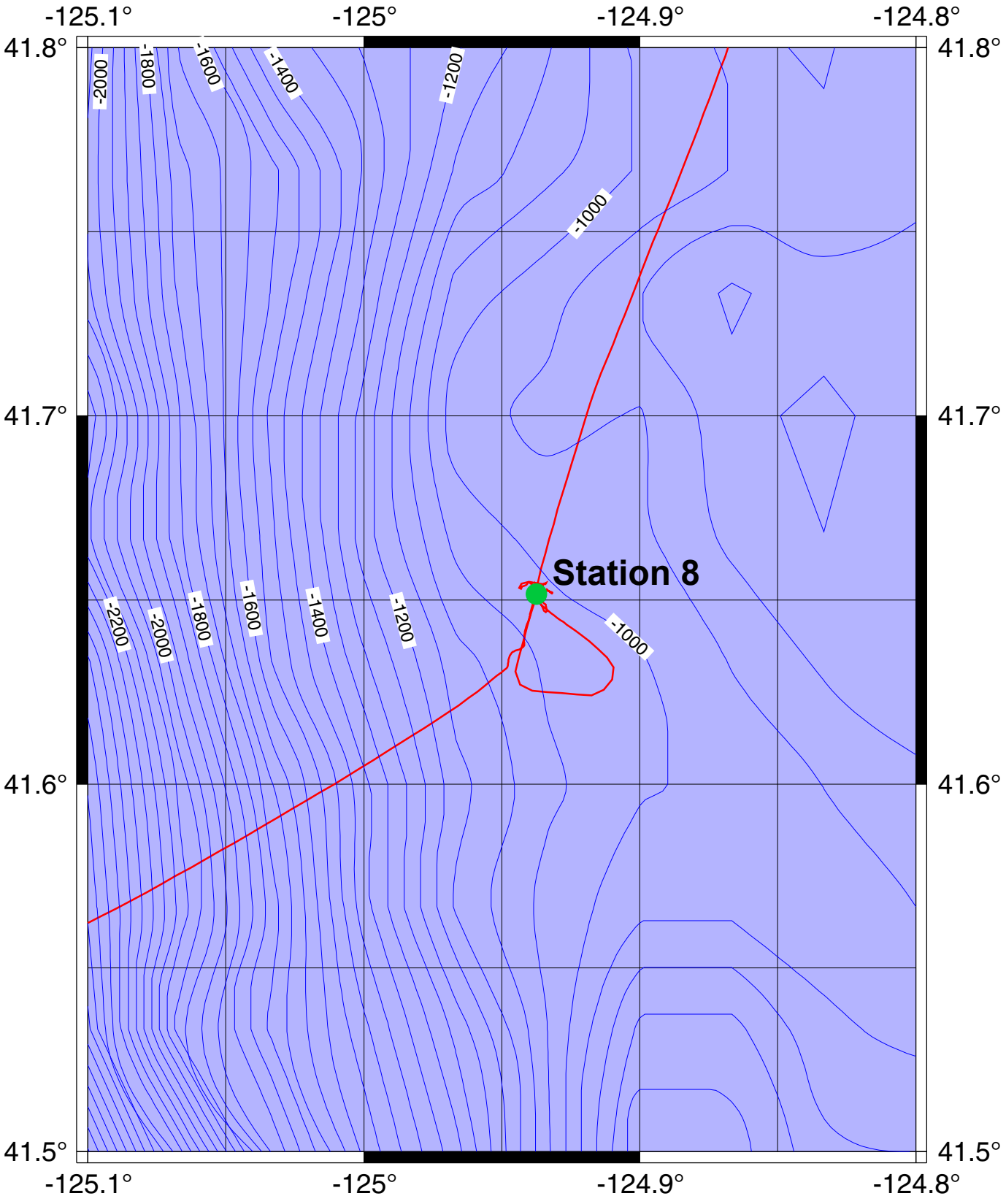
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 6
Core MD02-2498

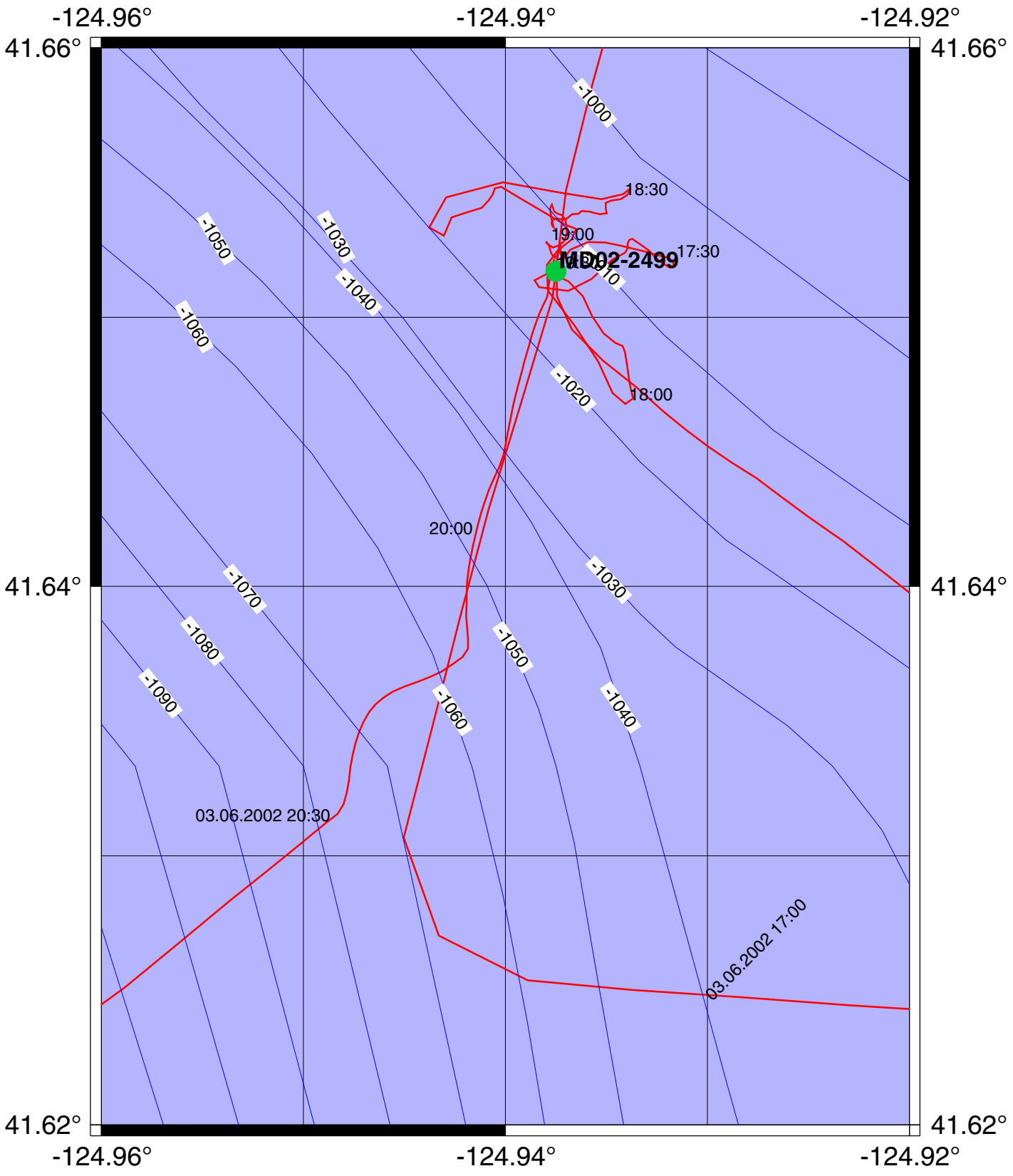


IMAGES VIII/MD126, MONA
Station 8, Eel River Region



GMT 2002 Sep 25 13:03:13

IMAGES VIII/MD126, MONA
Station 8, Eel River, Detail



GMT 2002 Sep 25 13:10:56

Calypso Core MD 02-2499

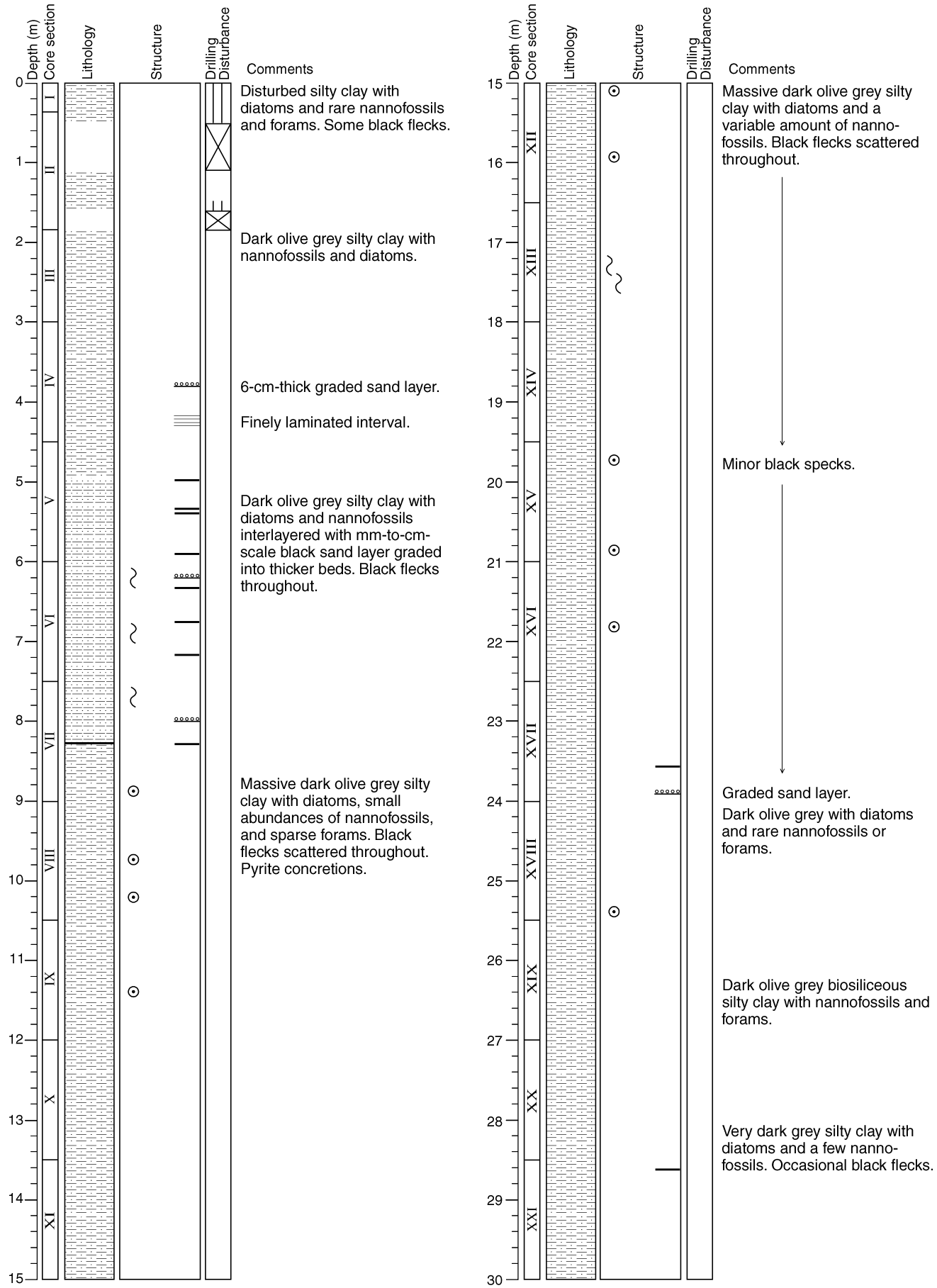
(Station 8 : Eel River ; Latitude : 41° 39. 10N ; Longitude : 124° 56. 25W ; 905m water depth) recovered a total of 34.50m of sediments. The upper part of the sedimentary sequence (top to 1.82m, Section II) has been mostly heavily disturbed by coring and includes empty intervals.

The dominant lithology consists of silty clay with diatoms, dark olive grey to dark olive, and dark grey in color. Minor abundances of nannofossils and foraminifers are occasionnally present. The sediment is almost exclusively massive, with a finely laminated interval in Section IV. Slightly bioturbated intervals are observed from 6.0m (Section VI) to 8.0m (Section VII). Small pyrite concretions and black flecks of probable oxide or sulfide are scattered throughout the core.

Minor lithologies include :
- Frequent isolated sandy layers from 4.0m (Section IV) to 8.30m (Section VII), and from 23.50m (Section XVII) to bottom, some of them with normal graded bedding.
- Nannofossil silty clay with diatoms, dark grey, Section XIV.
- Biosiliceous silty clay with nannofossils and foraminifers, dark olive grey, Section XIX.

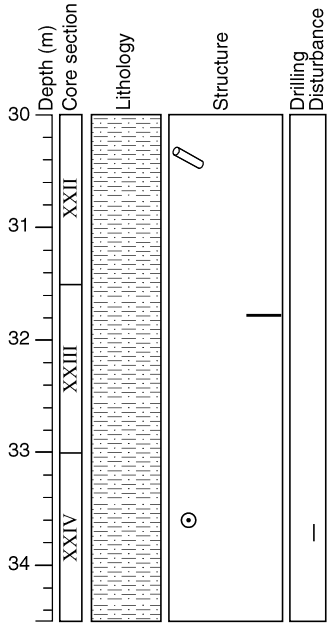
MONA

Core: MD02-2499



MONA

Core: MD02-2499 (cont.)



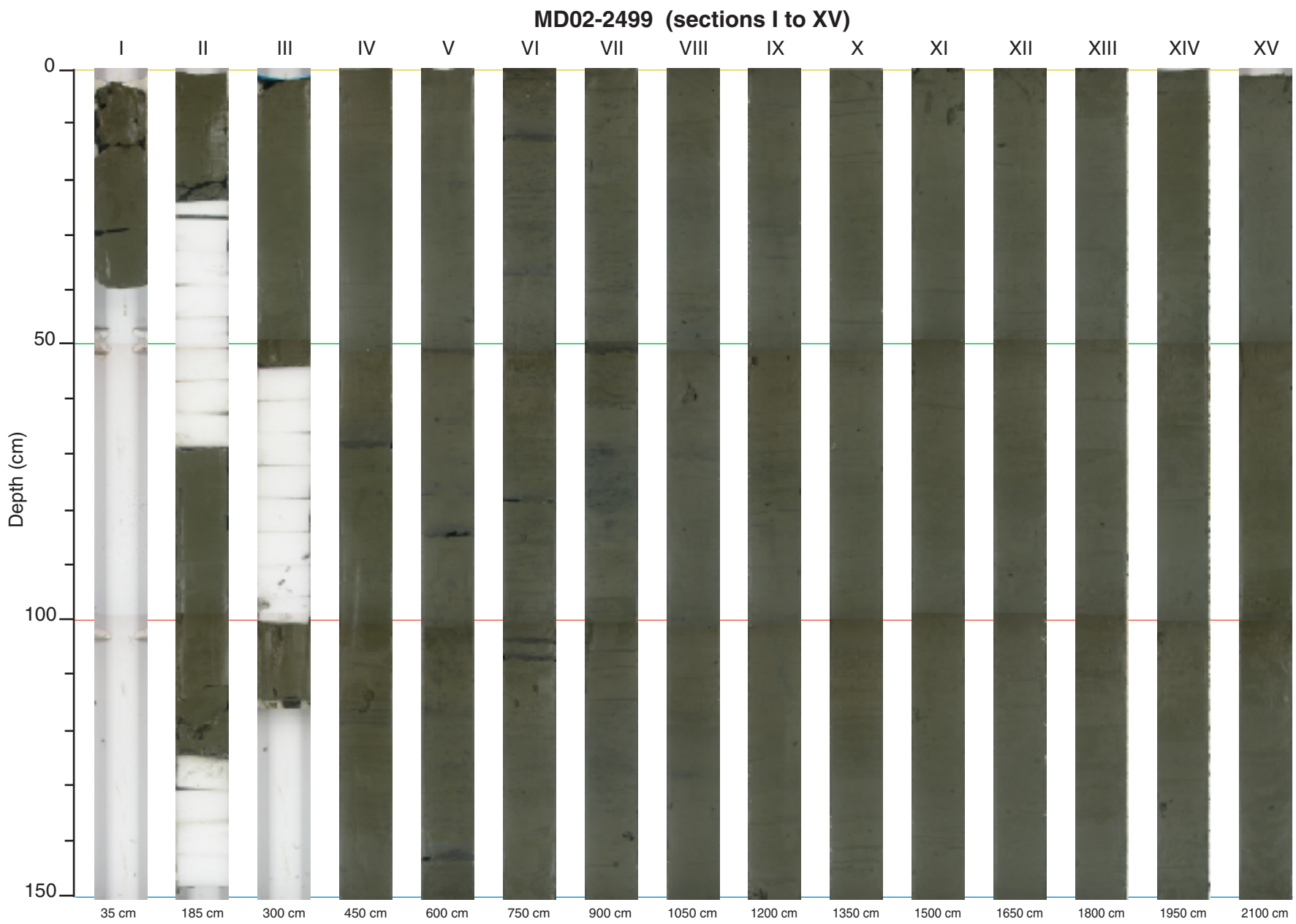
Comments

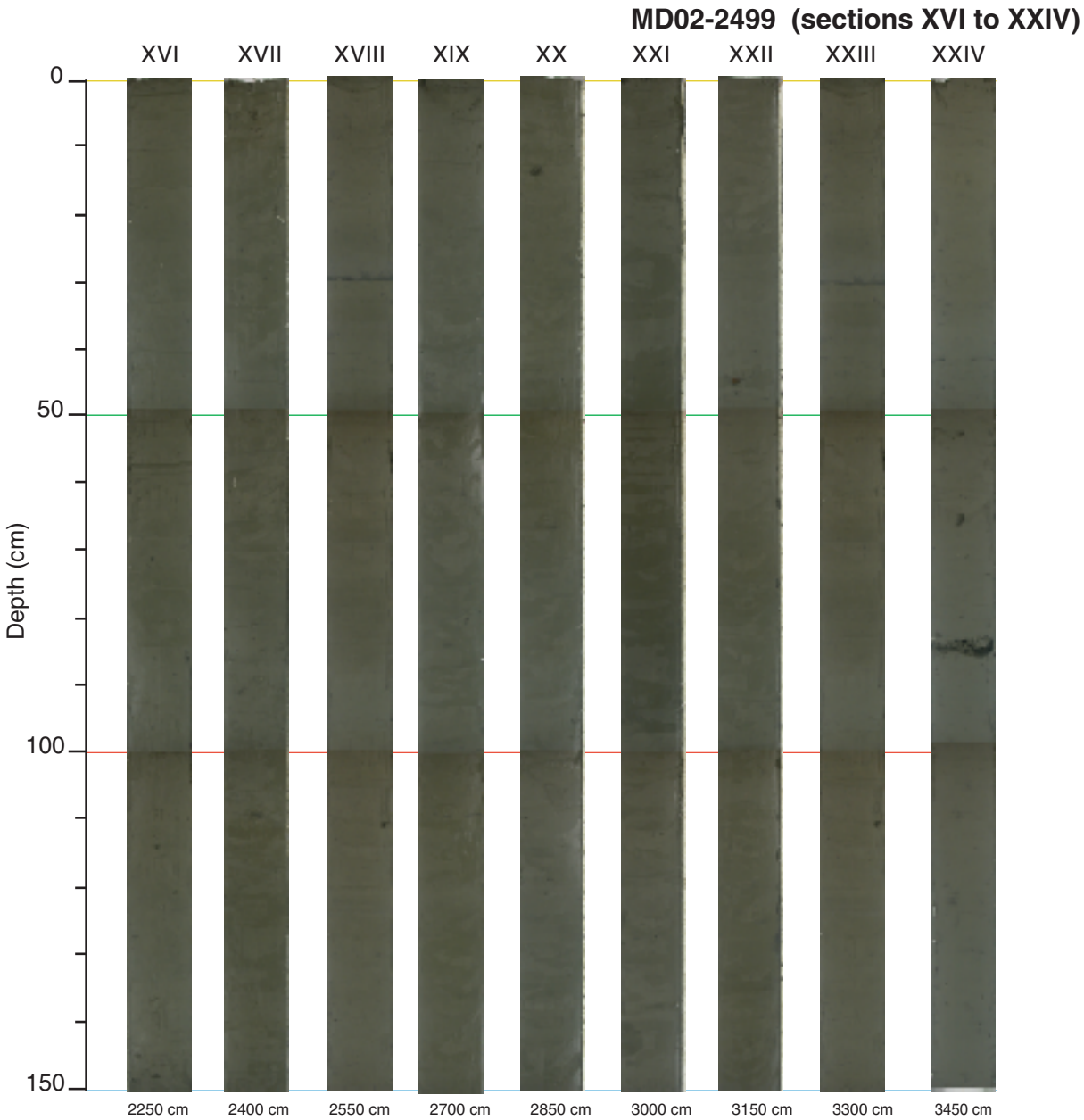
Dark olive grey with diatoms and nannofossils. Occasional black flecks.

Sand layer, <1 cm.
Diatom silty clay.

Dark grey nannofossil silty clay with diatoms. Black flecks, sometimes in pockets.

End of core, 3450 cm.

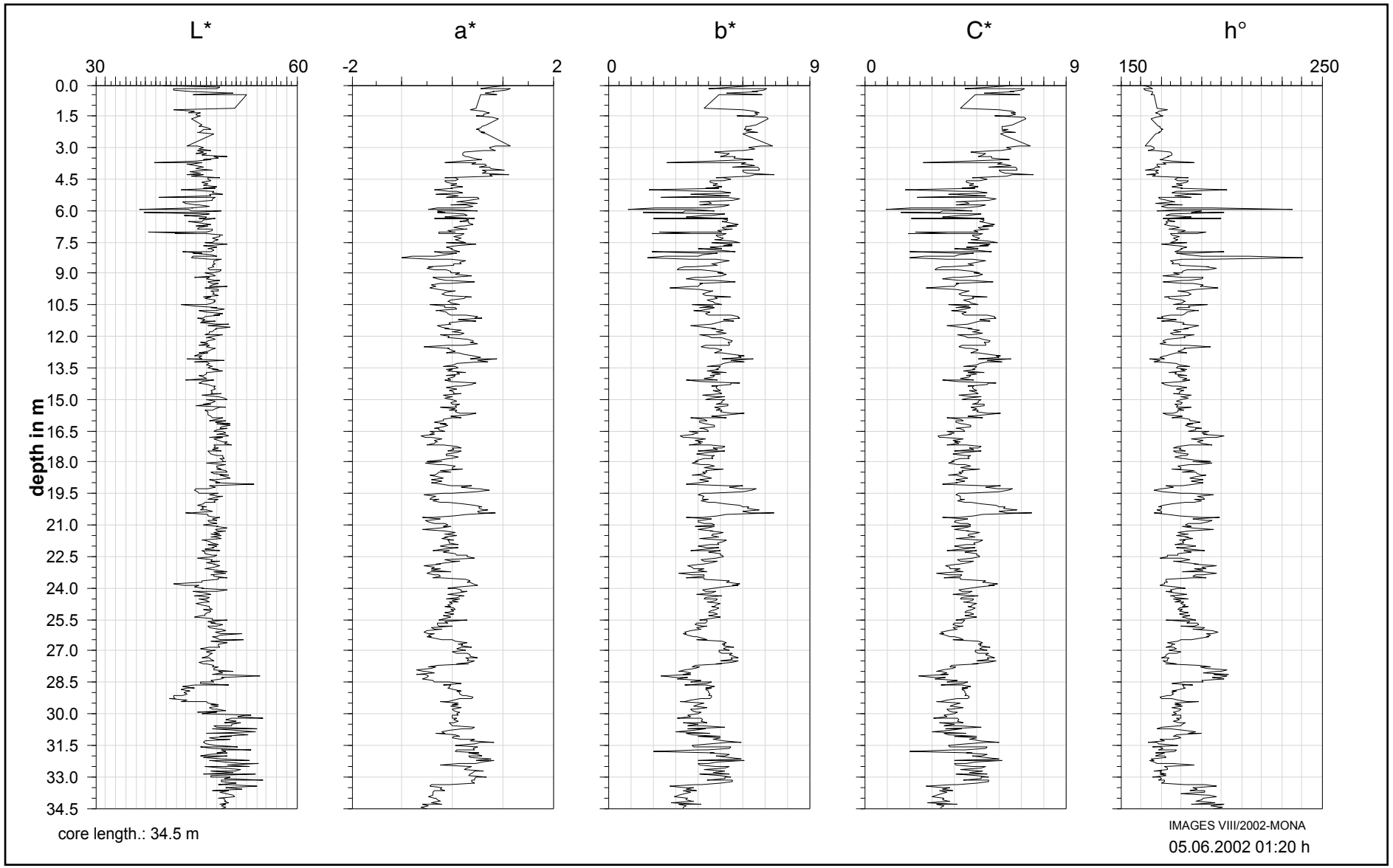

MD02-2499 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
35 cm
185 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm


MD02-2499 (sections XVI to XXIV)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
0
50
100
150
Depth (cm)
2250 cm
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

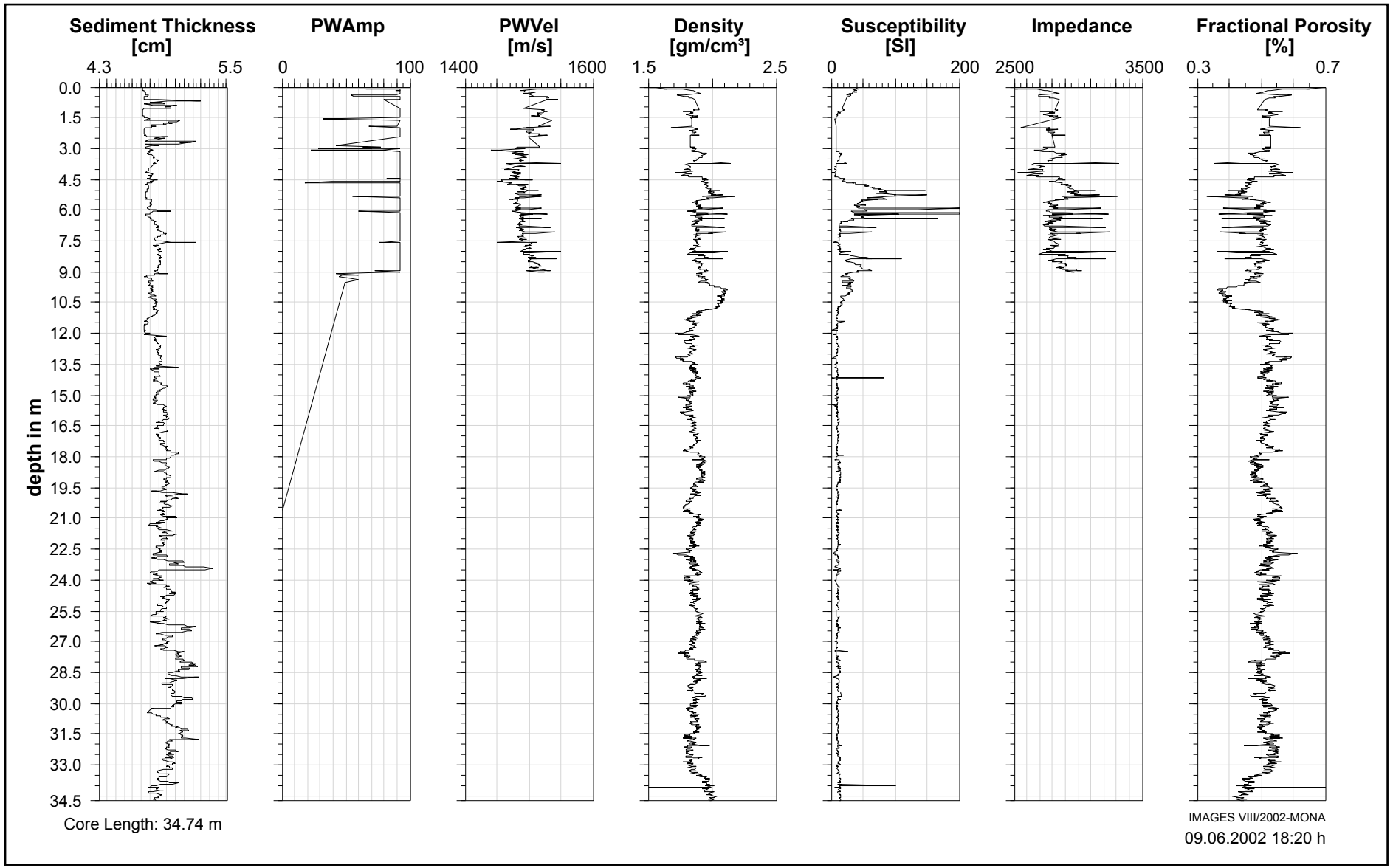
Station 8
Core MD02-2499



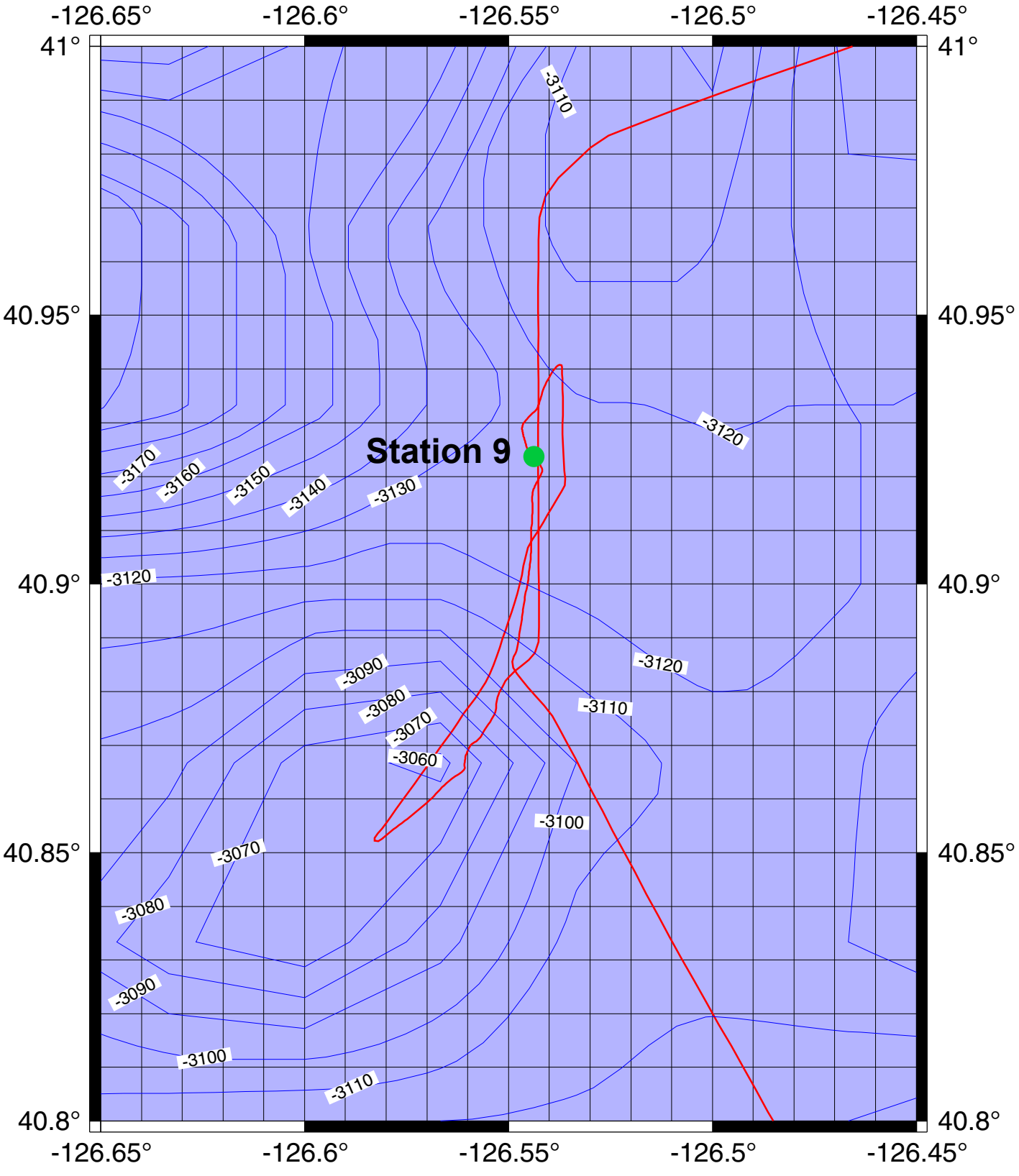
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 8
Core MD02-2499

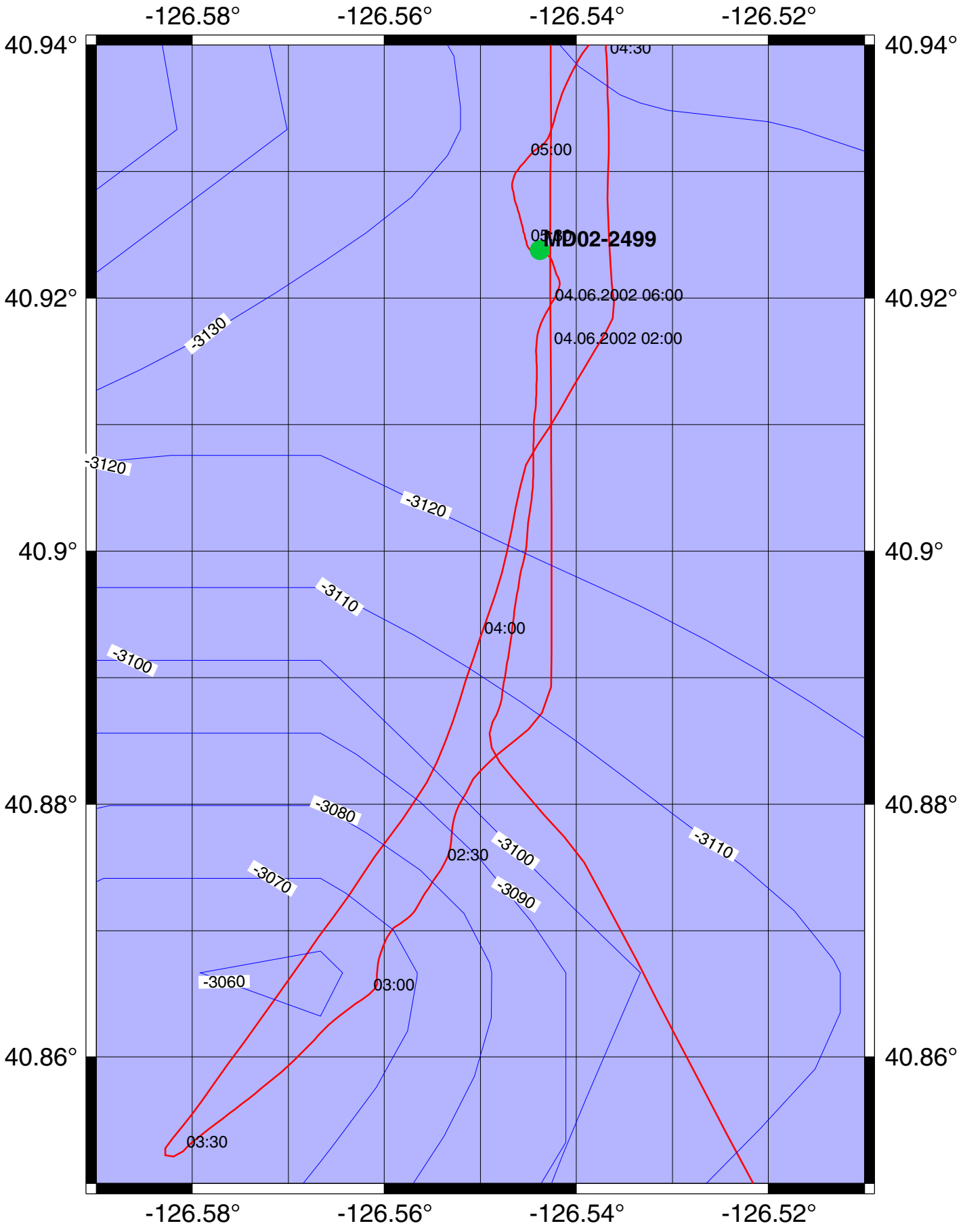


IMAGES VIII/MD126, MONA
Gorda Ridge Area



GMT 2002 Sep 25 13:14:10

IMAGES VIII/MD126, MONA
Station 9, Gorda Ridge



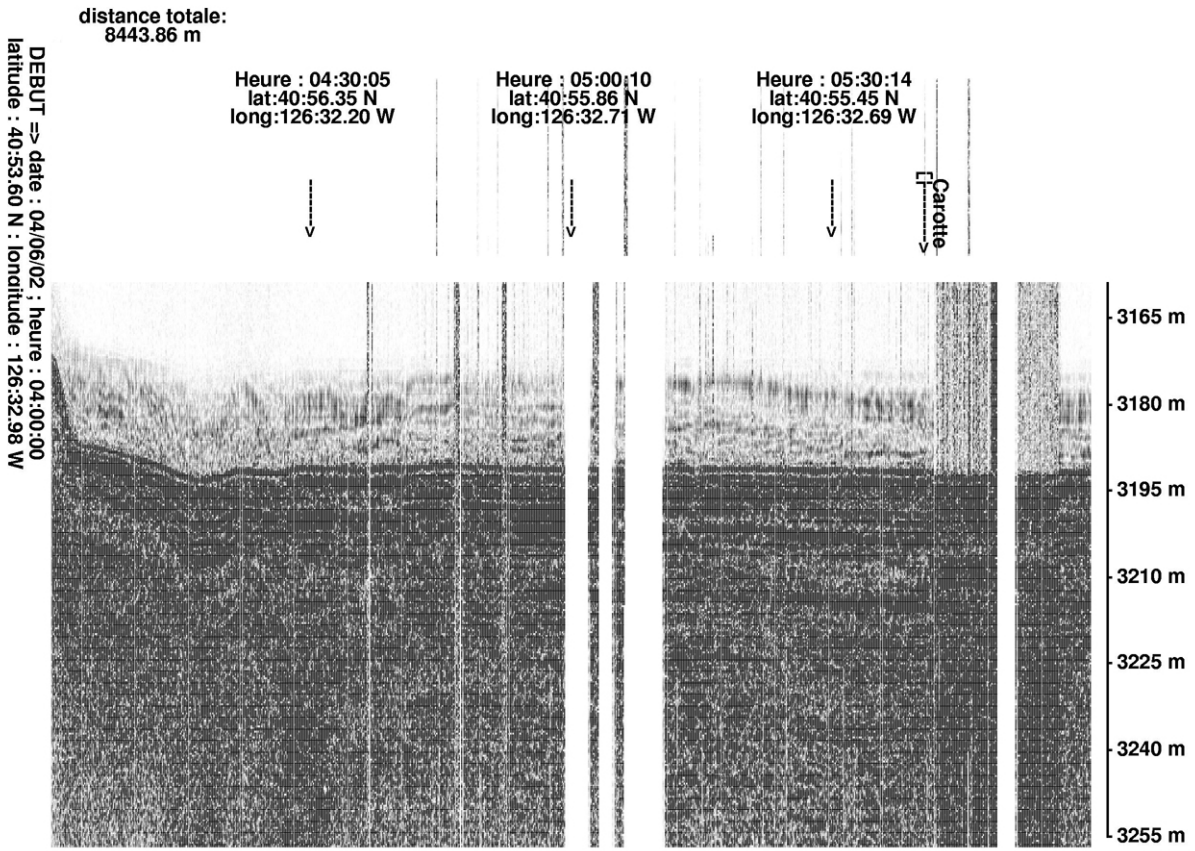
GMT 2002 Sep 25 13:13:09

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 9
Core MD02-2500

Station 9,Coring operation



Calypso Core MD02-2500

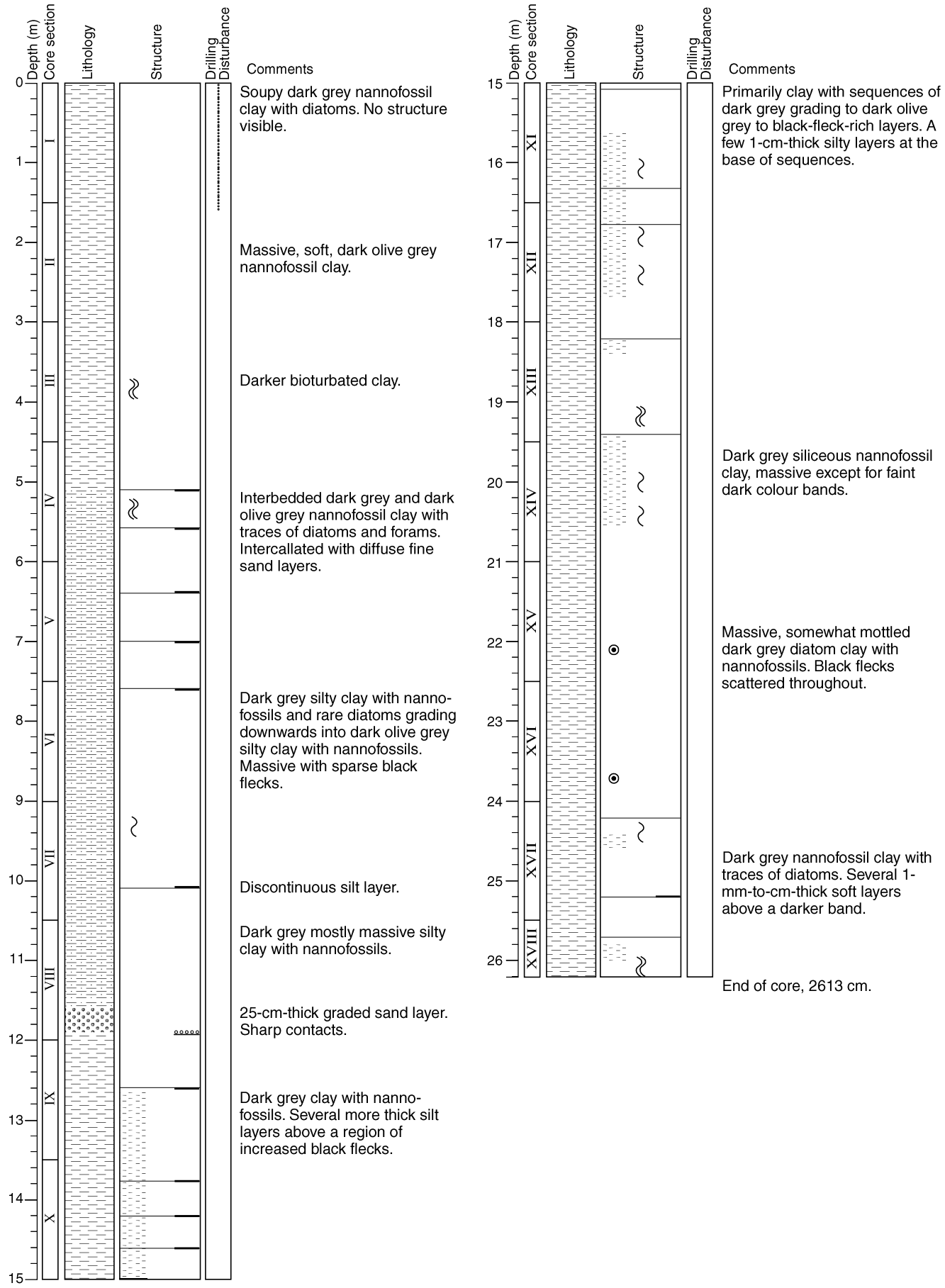
(Station 9, Gorda Ridge ; Latitude : 40° 55. 43N ; Longitude : 126° 32. 63W ; 3082m water depth) retrieved a total of 26.13m of sediments. The upper part of the core is soupy to slightly disturbed, down to 1.60m (Section II).

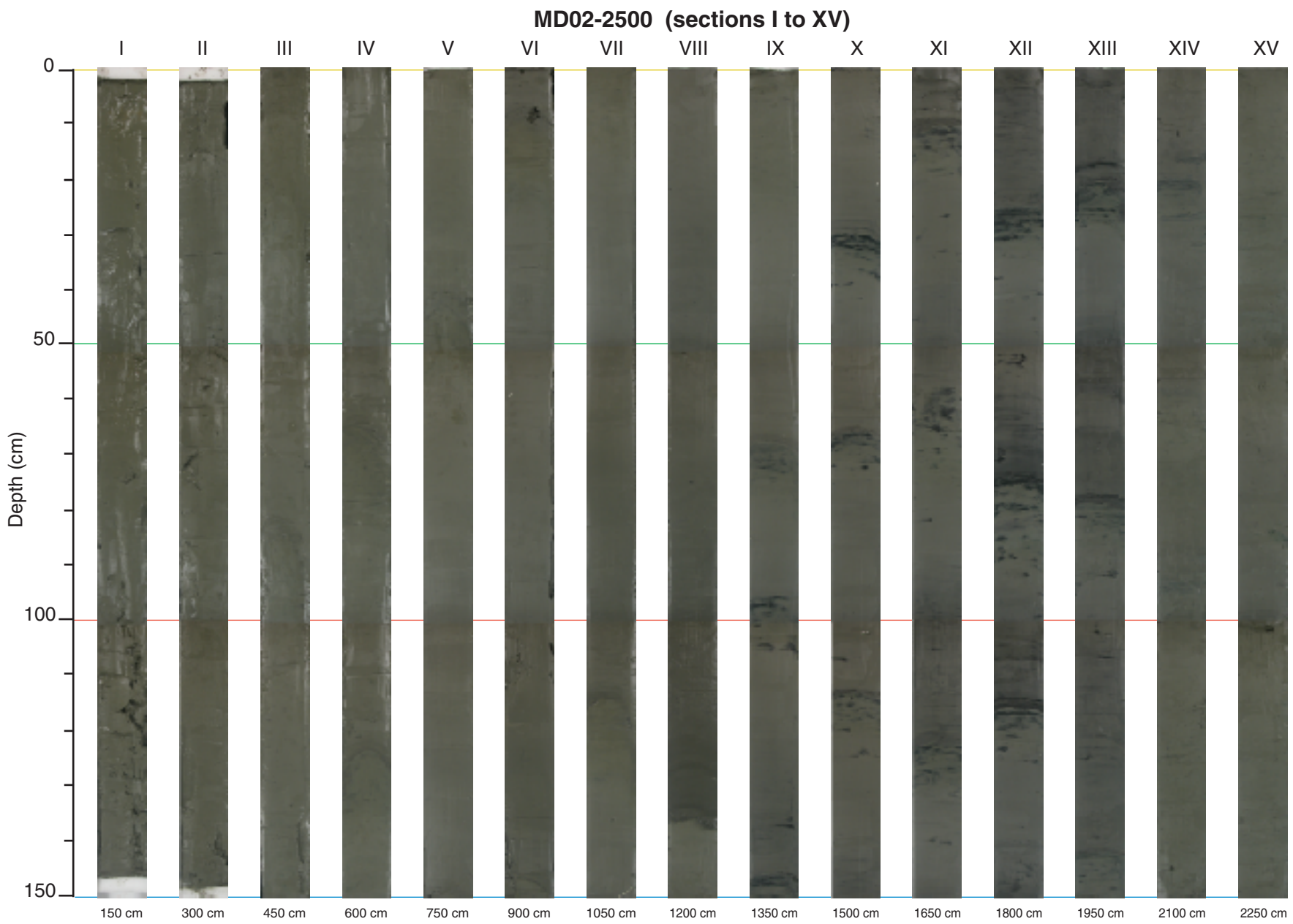
The dominant lithology consists of alternating nannofossil clay with diatoms, nannofossil clay, diatom clay with nannofossils, and clay and silty clay with nannofossils. Color ranges from dark grey to dark olive grey. The sediment is generally massive from top to 12.50m (Section IX). Faintly laminated intervals are frequent from 12.50m (Section IX) to bottom. Slightly to heavily bioturbated intervals (mainly mottles) occur throughout the core.

Minor lithology :
- Layers of fine sand to silt, from 5.0m (Section IV) downcore.

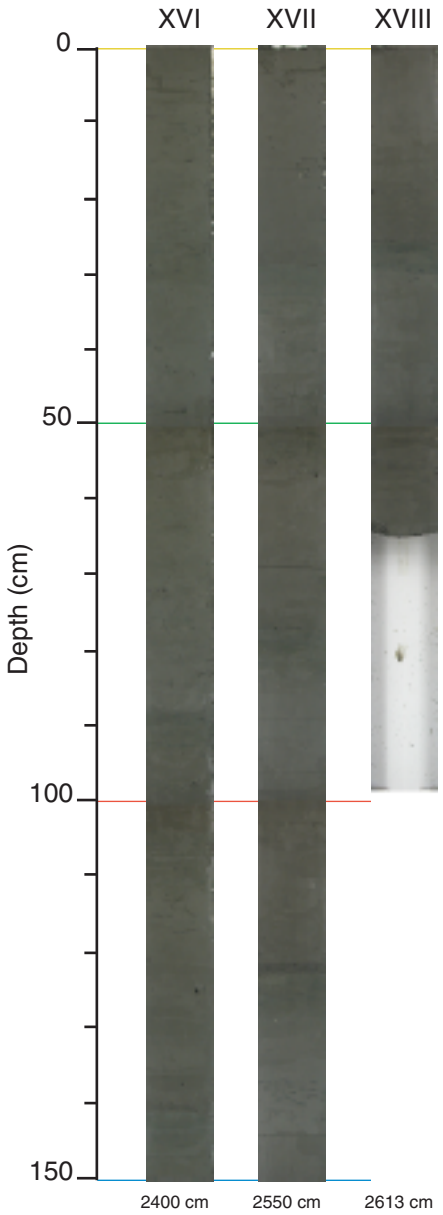
MONA

Core: MD02-2500




MD02-2500 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm

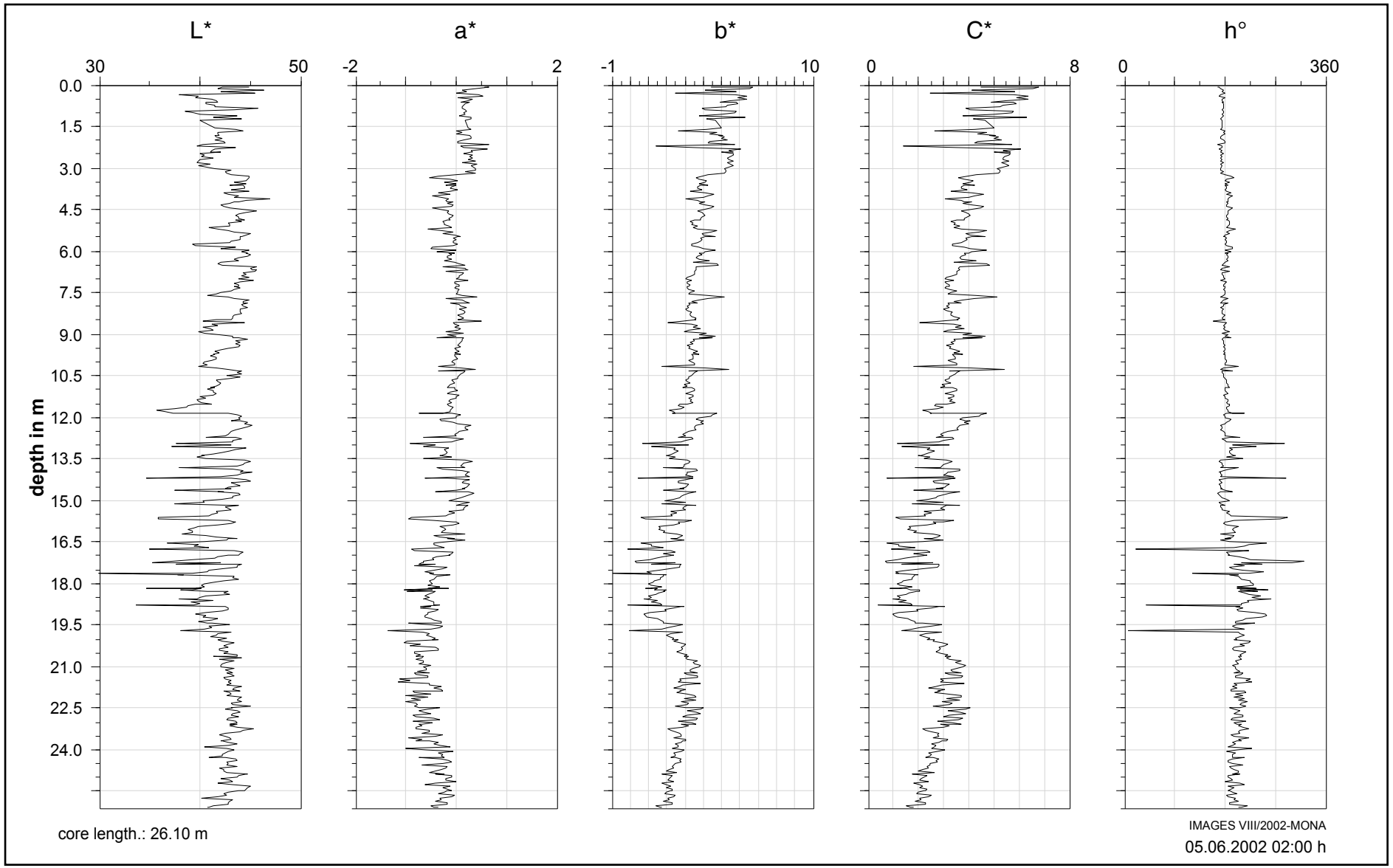
MD02-2500 (sections XVI to XVIII)



IMAGES VIII, 2002
MONA

Colour Reflectivity

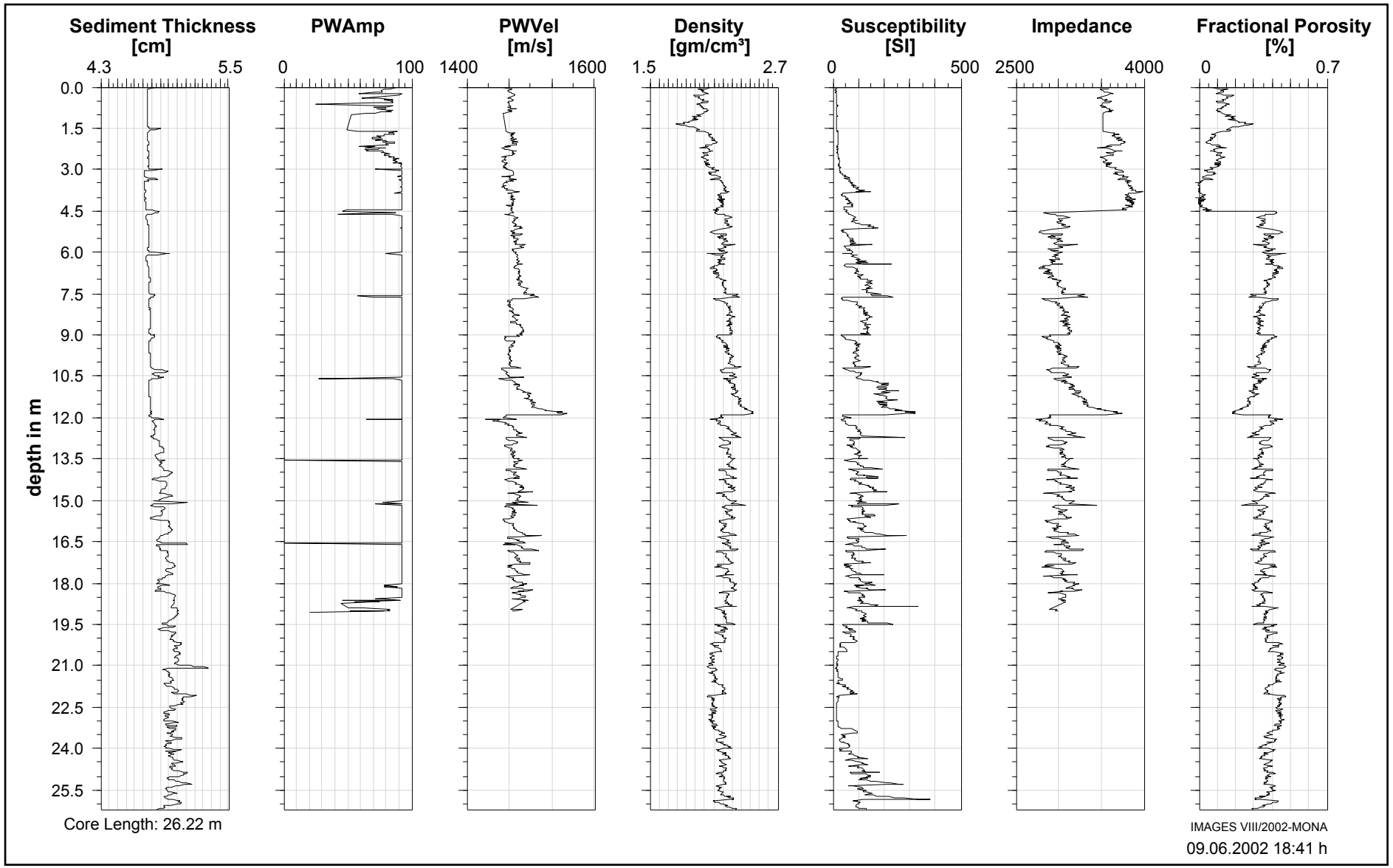
Station 9
Core MD02-2500



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 9
Core MD02-2500



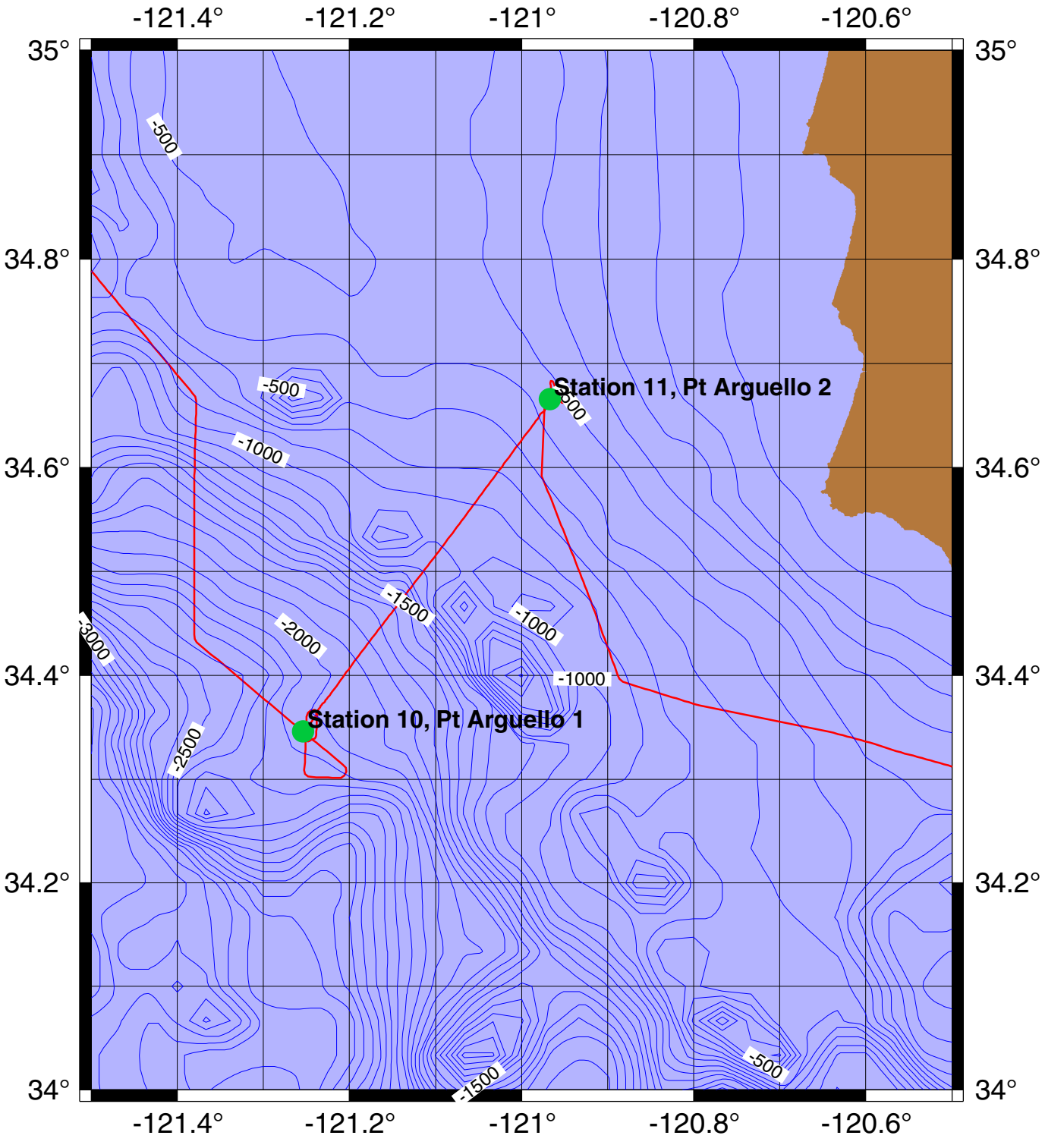
4.3 Southern Californian Borderlands and Margin

Recent investigations have been conducted at very high chronological resolution of the late Quaternary paleoclimatic/paleoceanographic sequence of Santa Barbara Basin (ODP 893A; 600 m water depth: Behl and Kennett, 1996) and the upper continental slope of Southern California (Site ODP 1017E; 950 m water depth: Kennett et al., unpublished data). These sites are providing critically needed paleoclimatic information at the highest known resolution from the world's oceans and at resolution close to that of the Greenland Ice Sheet (GISP). Clearly exhibited in these marine records is a history of bistable oscillatory behavior in surface and upper intermediate waters and the biosphere. The climatic record of the sea surface is very similar to that of the Greenland Ice Core, exhibiting large (up to up to 8˚C) average sea surface temperature changes that occurred in just decades. A full sequence of Dansgaard/Oeschger (D/O) cycles is revealed in both sections. D/O cycling at shallower depths on the California Continental Margin has been intimately associated with oscillations in ventilation state and of strengths of the oxygen minimum zone. Climatic flickering represented by the D/O cycles is also reflected by ventilation flickering within the oxygen minimum zone and associated major biotic changes in the California Borderland basins and the oxygen minimum zone on the margin.

A range of paleoenvironmental proxy data strongly suggests that the oscillation and ventilation state on the California Margin between cool (glacial/stadial episodes) and warm (interglacial and interstadial episodes) has largely resulted from changes in the origin of upper intermediate waters on the upper continental slope of California shallower than 1000 m. Warm intervals are marked by poorly oxygenated, older, nutrient-rich, and warmer upper intermediate waters derived from the south in the Pacific. In contrast, cold intervals are marked by well oxygenated, younger, nutrient -poor, and colder Pacific Intermediate Water derived from the northwest Pacific.

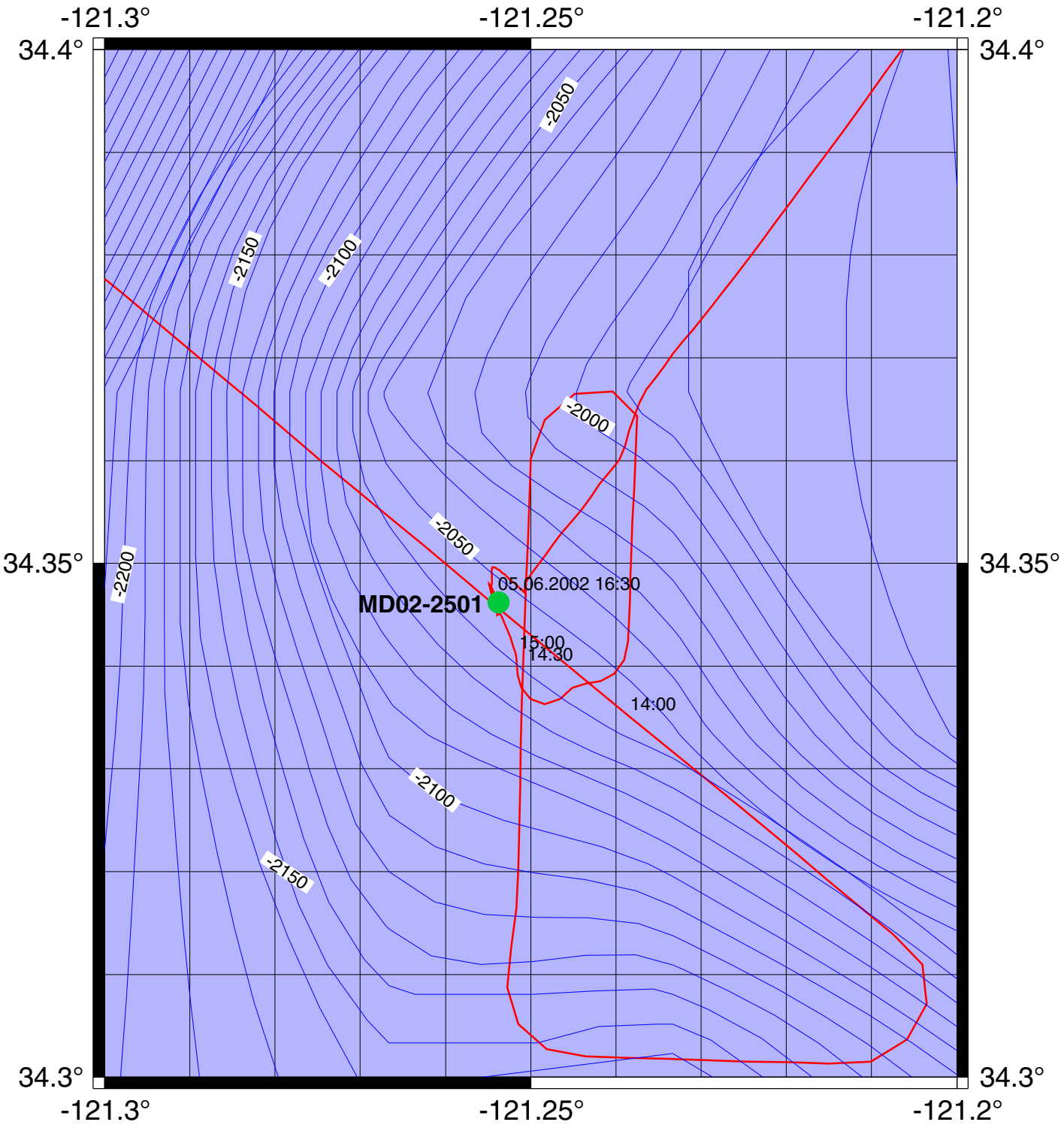
A key question requiring resolution is the relative roles of both of these processes as they affect ventilation switching on the continental margin. The two previous available sites appear to be insufficient in themselves to resolve these questions. The record in ODP Site 1017 at about 1000 m water depth suggests that the effects of ventilation switching do not extend much deeper than about 1000 m along the margin. The effects of ventilation switching from changes in upper intermediate waters, as recorded in Santa Barbara Basin, are in contrast extremely amplified and indicate large changes at depths of 500-600 m on the margin. We predict that large changes in ventilation history and the strength of the oxygen minimum zone resulting from intermediate water oscillations during the D/O cycling should be conspicuous at depths between ~500 and 800 m on the open continental margin, shallower than Site 1017. To confirm this we retreived Core MD02-2502 by 441 m water depths to the west of Point Arguello. A deep site was also collected by 2005m of water depth to continue the transect deeper (MD02-2501). We retrieved also additional two long cores within the Santa Barbara Basin. One of these cores (MD02-2503) at the same location as Site 893 in order to provide additional material for high resolution analysis of the sequence (existing core materials are highly depleted). Core MD02-2504 was taken close to sill depth (~482 m) to determine the effect of D/O climatic cycling at shallower depths within the Santa Barbara Basin.

IMAGES VIII/MD126, MONA
Pt. Arguello 1 & 2 Overview Map



GMT 2002 Sep 25 14:01:01

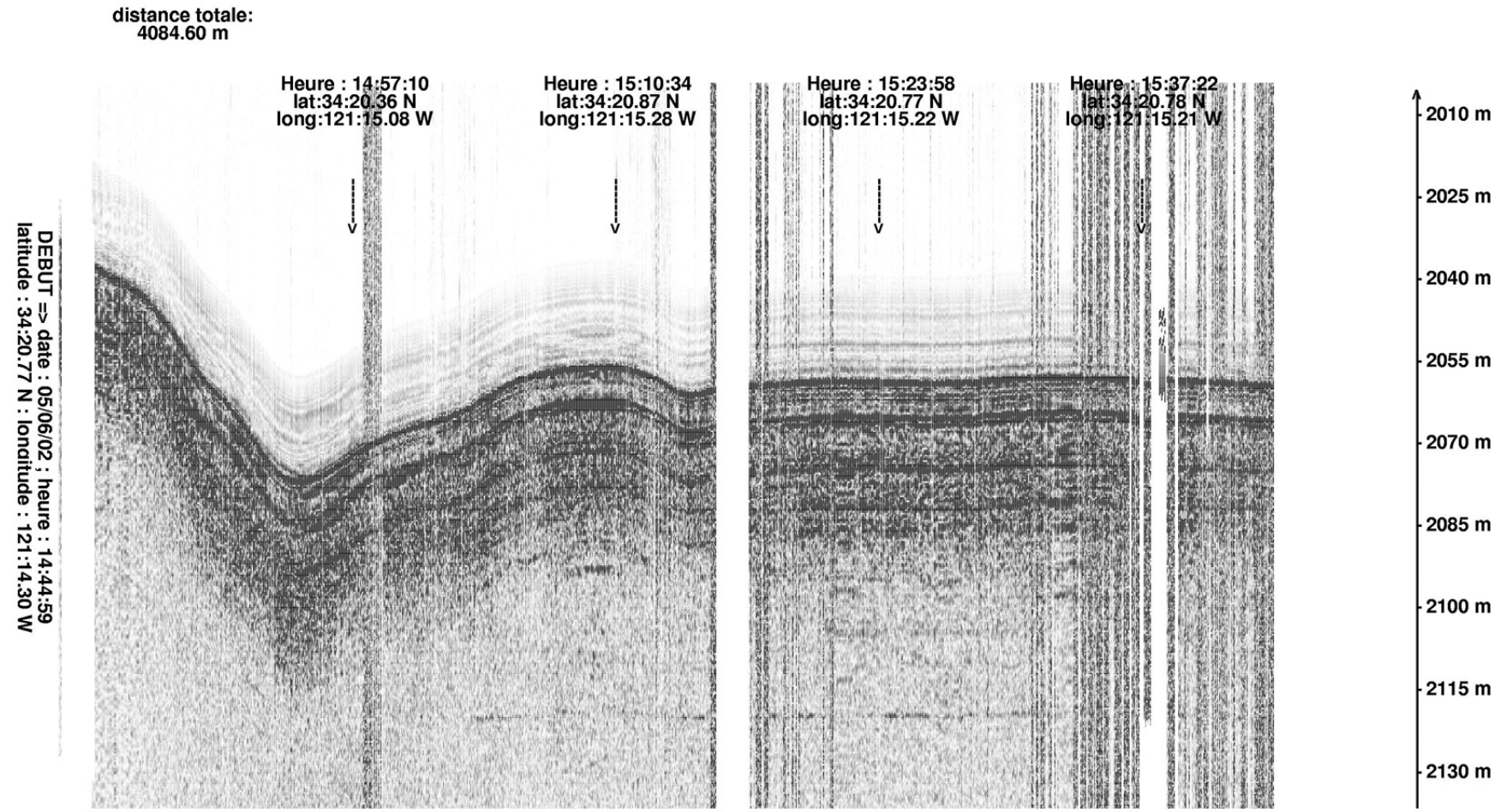
IMAGES VIII/MD126, MONA
Station 10, Pt. Arguello 1 (deep)



GMT 2002 Sep 25 13:15:49

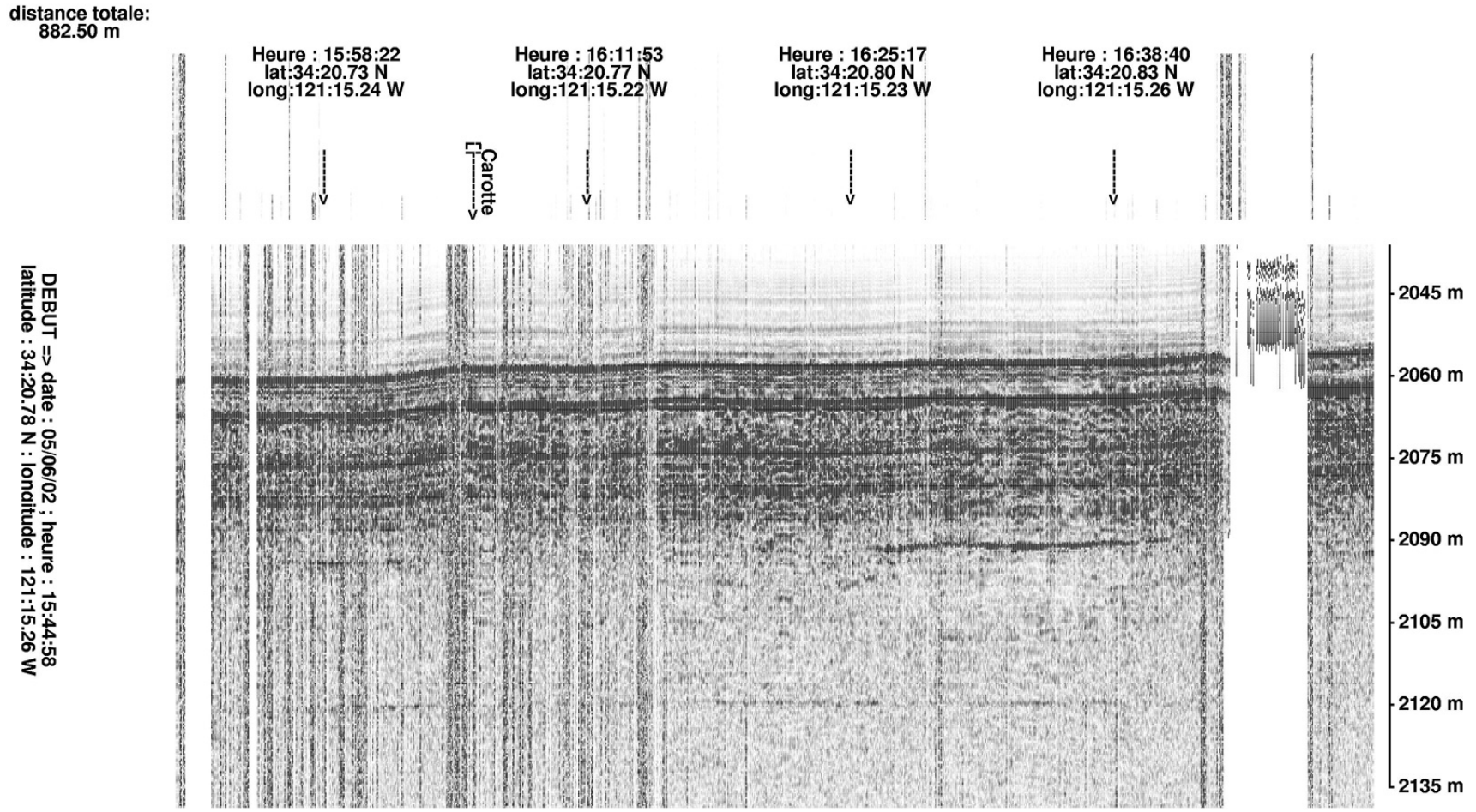
3.5 kHz Seismic Replay

Station 10, Approach



3.5 kHz Seismic Replay

MD02-2501 coring operation



Calypso Core MD02-2501

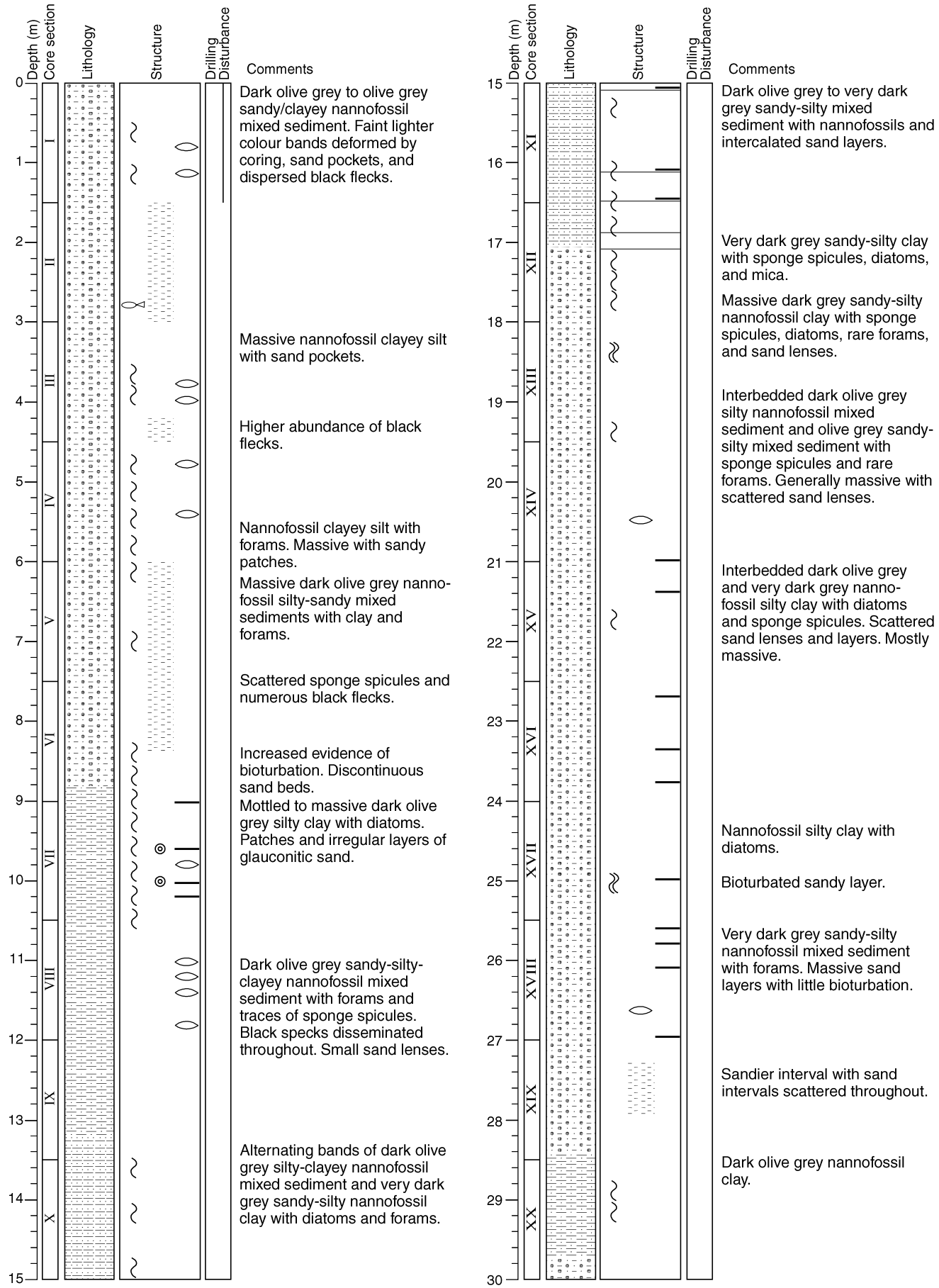
(Station 10, Point Arguello ; Latitude : 34° 20. 77N ; Longitude : 121° 15. 23W ; 2008m water depth) recovered a total of 34.50m of sediment. The uppermost part of the core, down to 1.50m (Section I) has been slightly disturbed by coring. An empty interval occurs in Section XXI, near bottom of core.

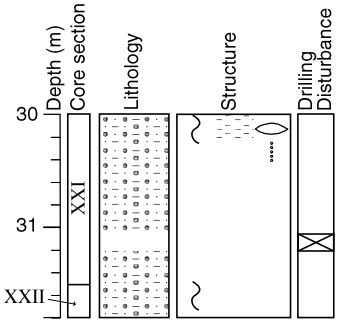
The dominant sediment consists of sandy clayey to silty clayey nannofossil mixed sediments, nannofossil clayey silt to nannofossil silty clay, and silty clay with diatoms to silty nannofossil clay with diatoms and foraminifers. Colors range from olive grey and dark olive grey to dark grey and very dark grey. Alternating bands of dark olive grey and very dark grey are observed in Sections IX and X. Slightly bioturbated intervals (mottles) are frequent throughout the core. Faint dark laminations of probable oxide/sulfide occur from 1.50m (Section II) to 8.40m (Section VI). Glauconitic sand layers are present from 9.0m to 10.30m (Section VII).

Minor lithology :
- Sand lenses and layers throughout the core.

MONA

Core: MD02-2501

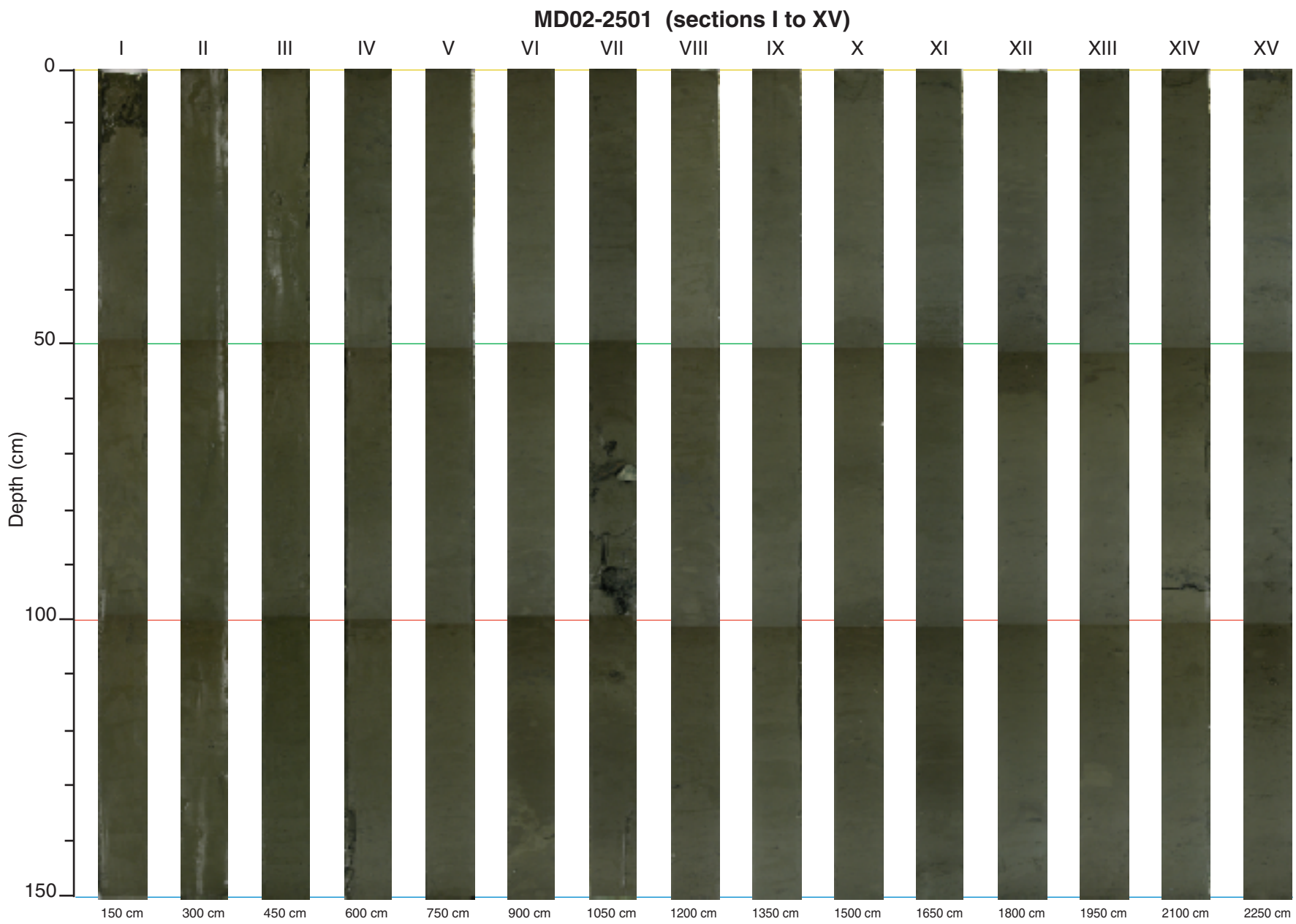


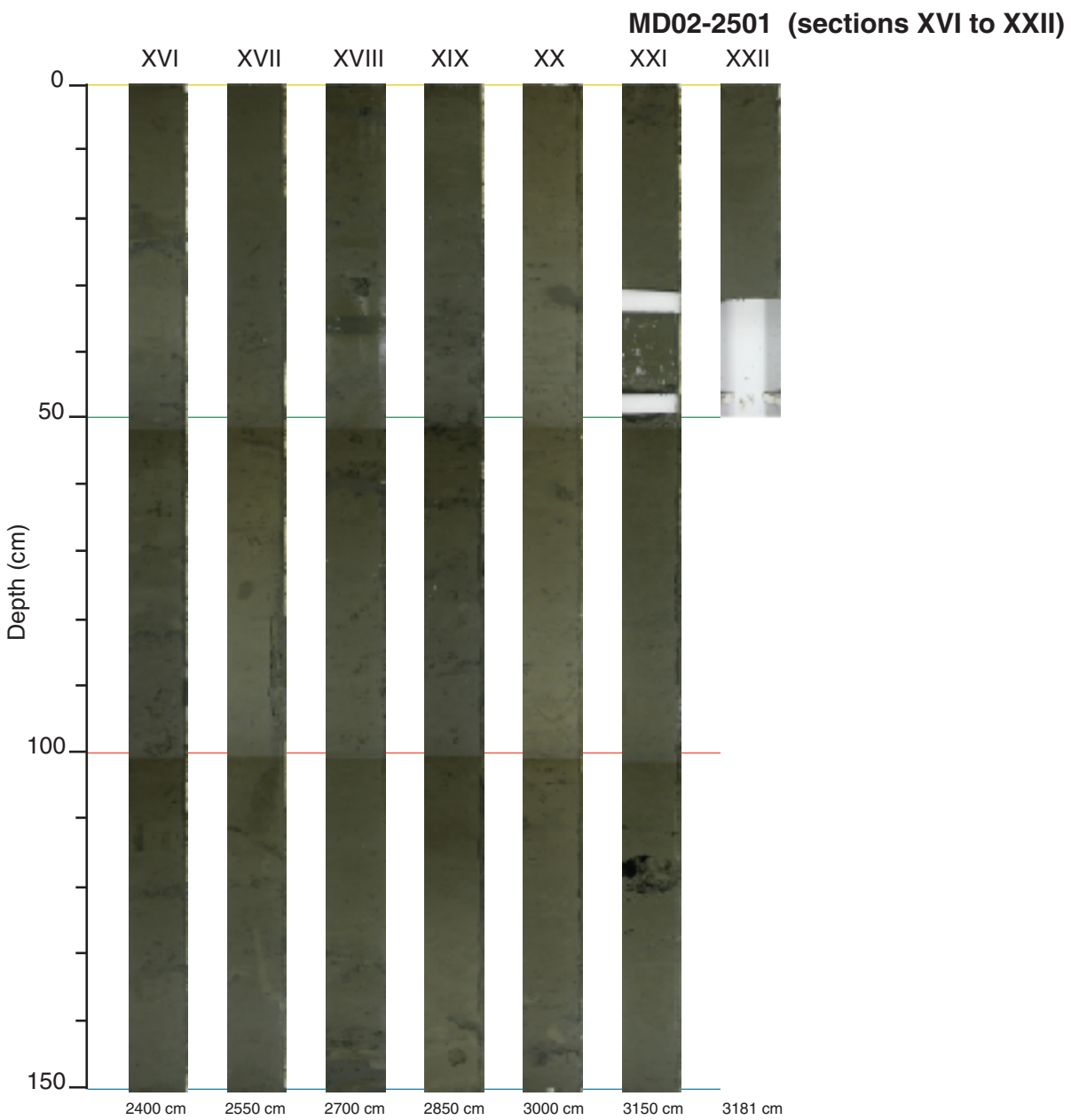


Comments

Massive, very dark olive grey silty-sandy nannofossil mixed sediment with diatoms.

End of core, 3450 cm.

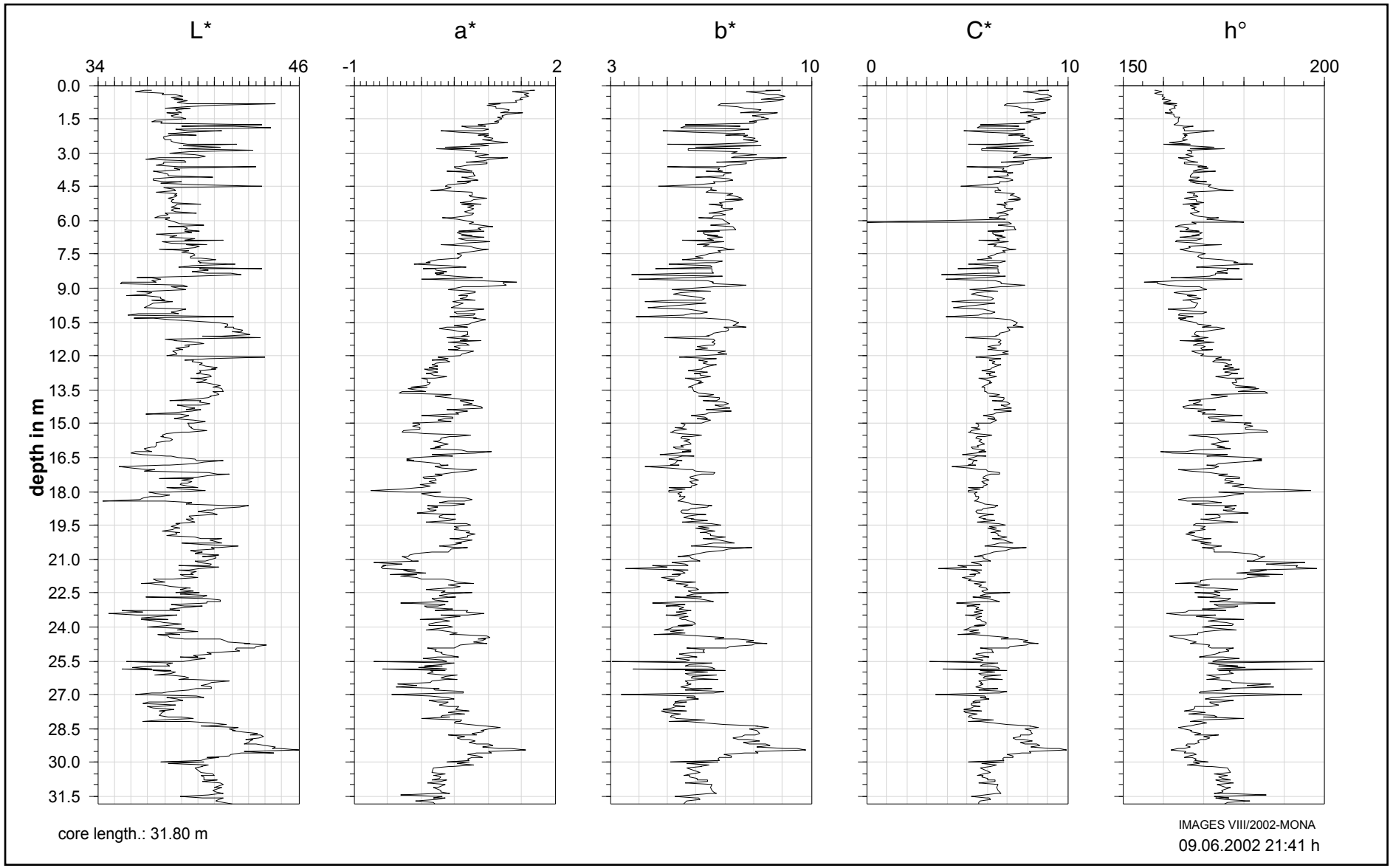

MD02-2501 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2501 (sections XVI to XXII)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3181 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

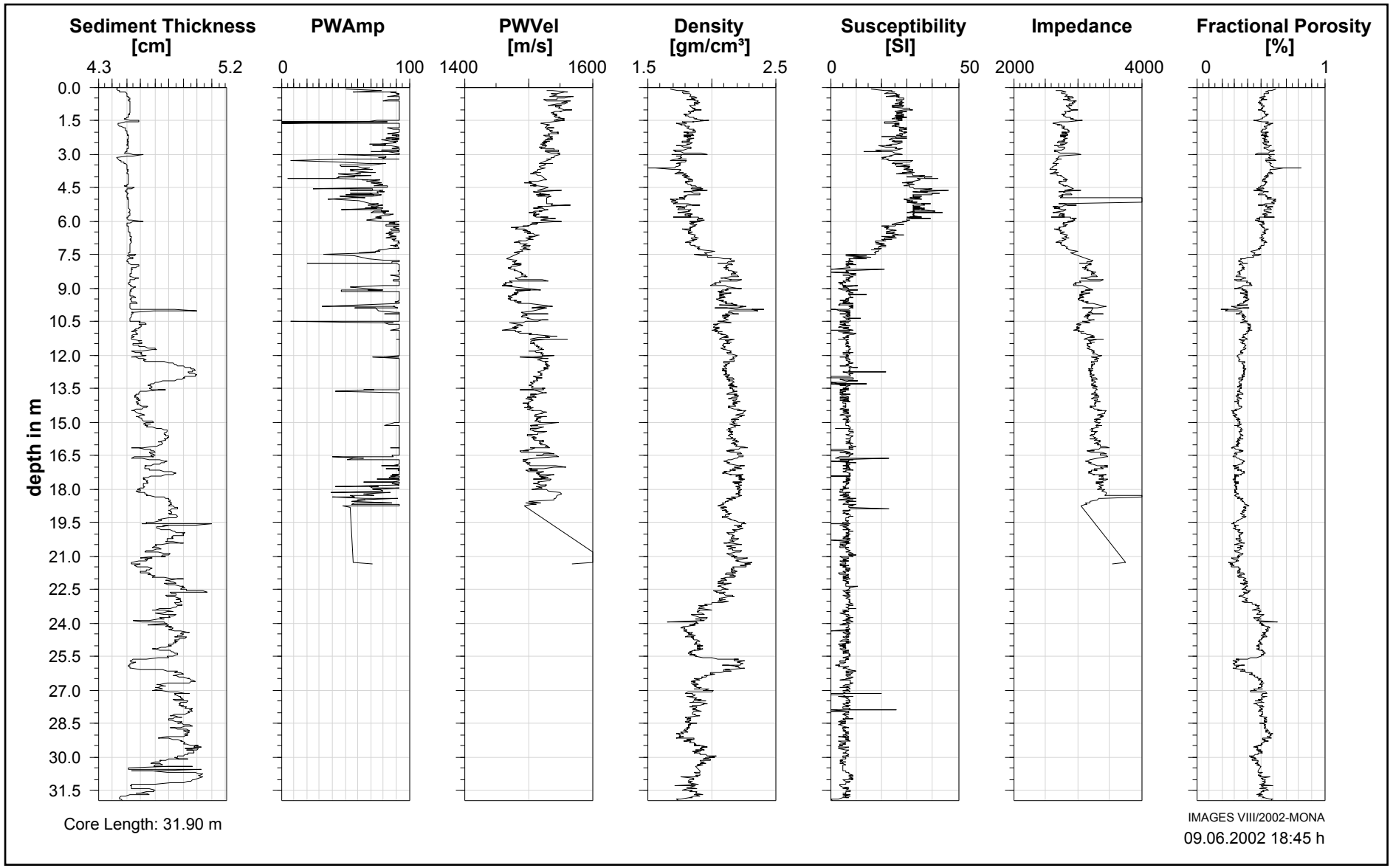
Station 10
Core MD02-2501



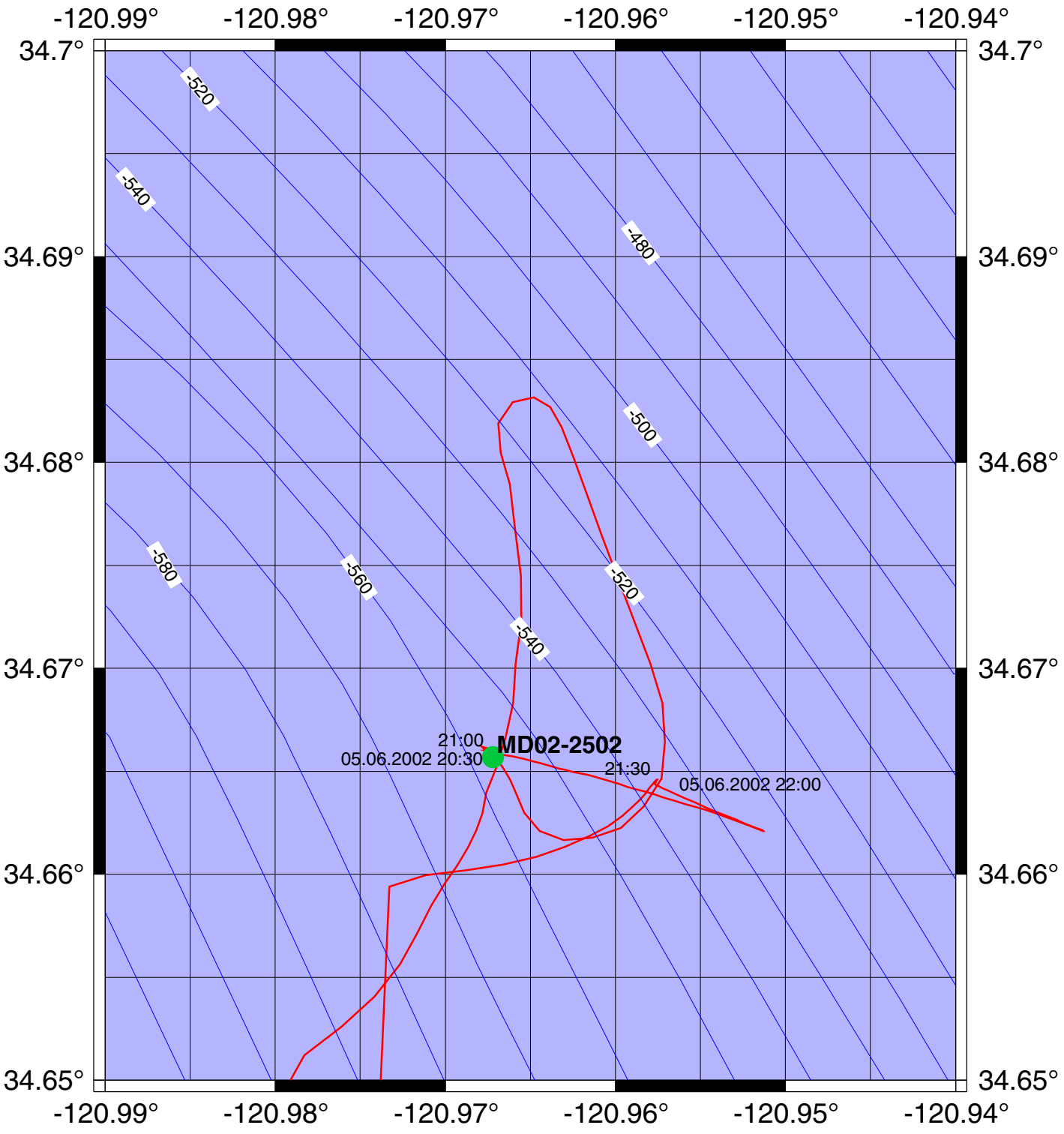
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 10
Core MD02-2501



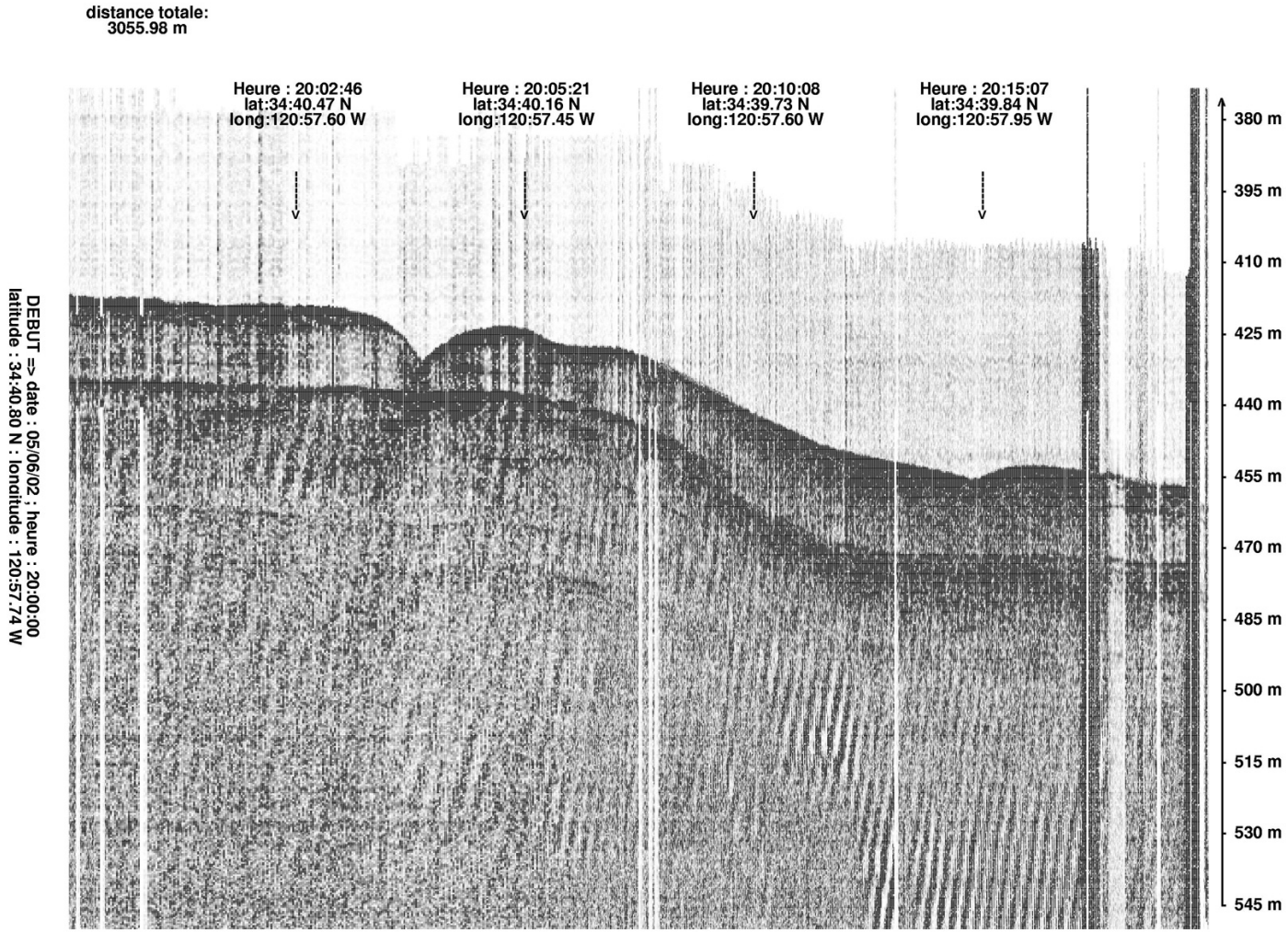
IMAGES VIII/MD126, Mona
Station 11, Pt. Arguello 2 (shallow)



GMT 2002 Sep 25 14:02:44

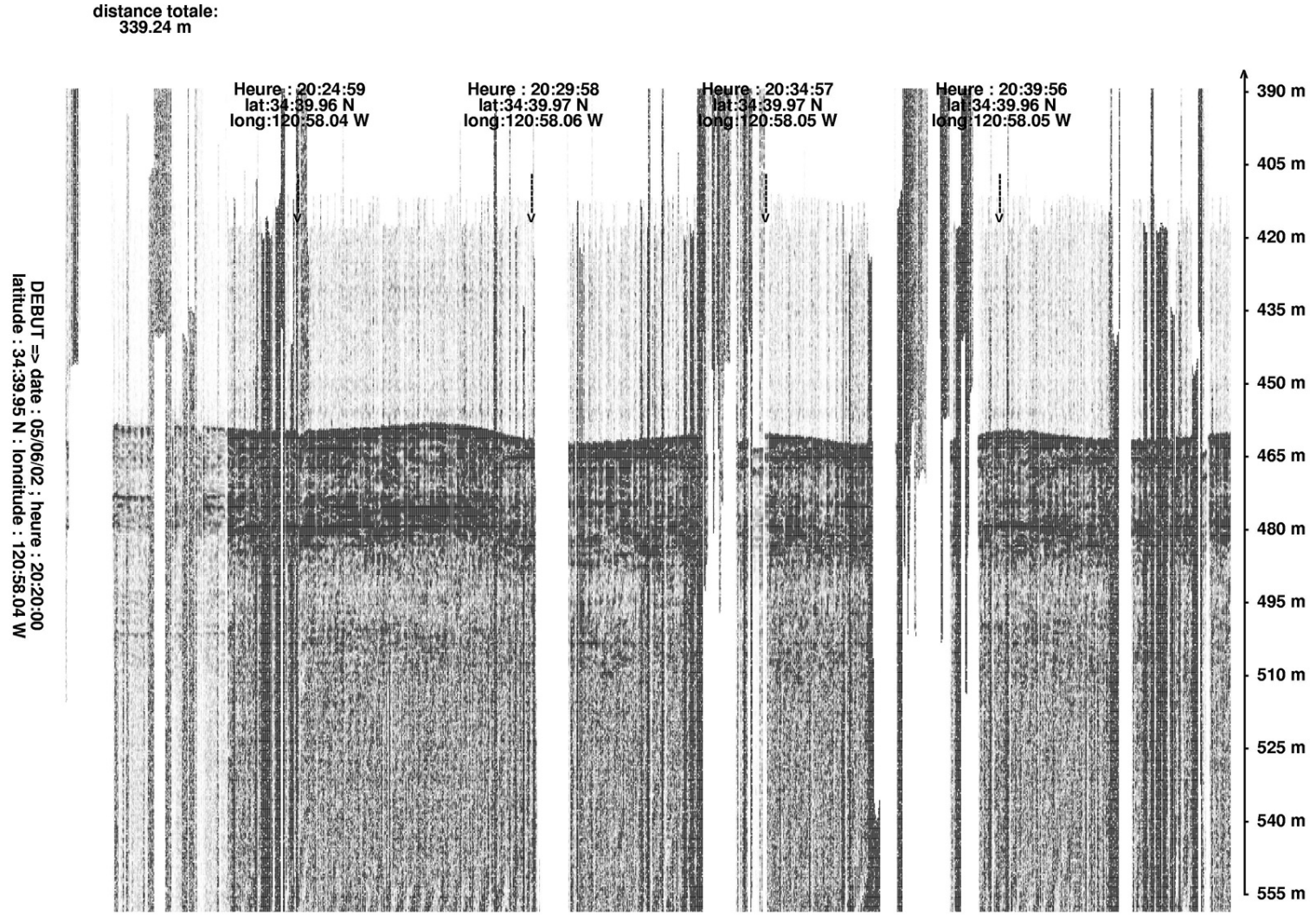
3.5 kHz Seismic Replay

Station 11, approach 1



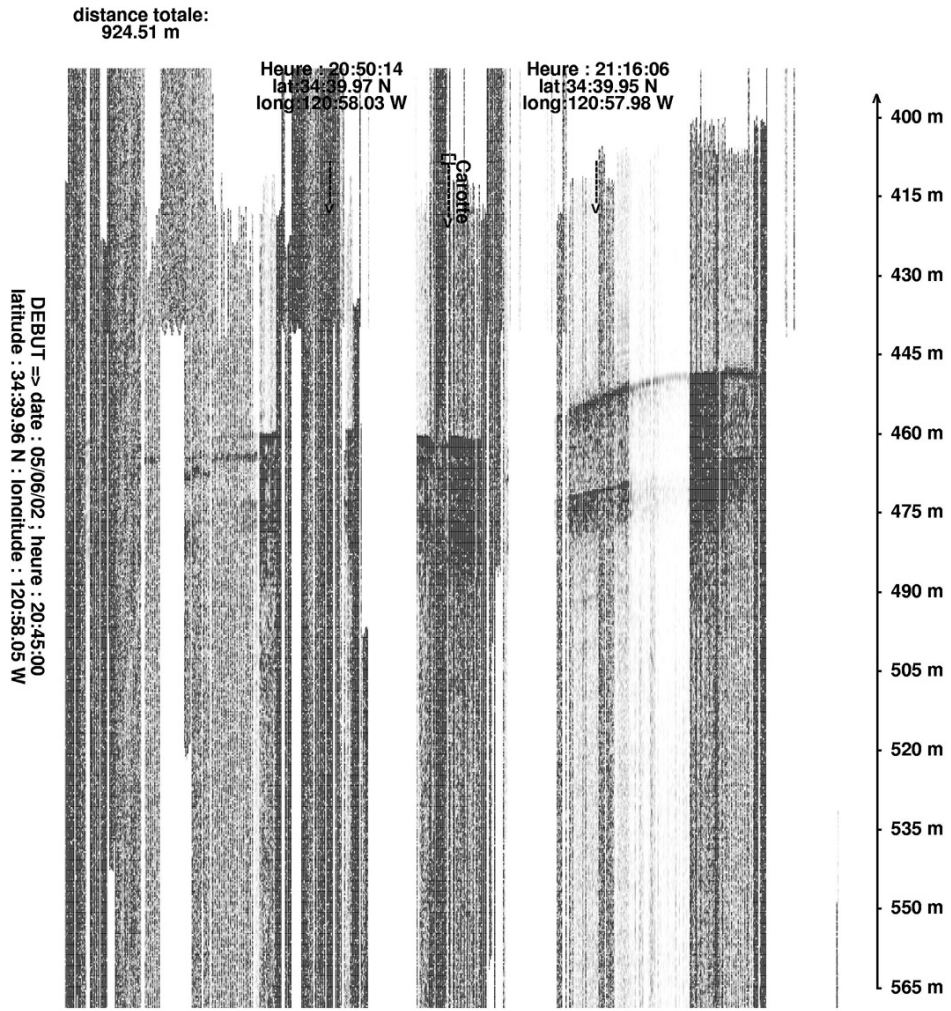
3.5 kHz Seismic Replay

Station 11, approach 2



3.5 kHz Seismic Replay

MD02-2502 coring operation



Calypso Core MD02-2502

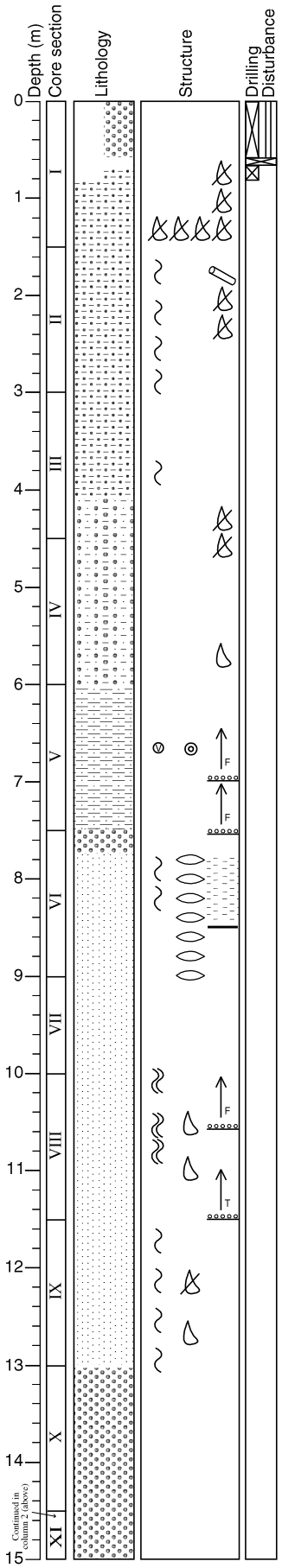
(Station 11, PointArguello; Latitude 34° 39.94N ; Longitude 120° 58.03W ; 404m water depth) recovered a total of 20.30m of sediments. The upper part of the core, down to 0.90m (Section I) has been heavily disturbed by coring and includes empty intervals.

The dominant sediment consists of sandy clay and sandy nannofossil mixed sediments, grading to clayey silt and silt downcore. Slightly to heavily bioturbated intervals are present from 1.60m (Section II) to 13.0m (Section X). Some faint laminations of probable oxide/sulfide are observed from 7.80m to 8.50m (Section VI). Shell fragments are scatterred throughout the upper part of the core down to 5.80m (Section IV) and from 10.40m (Section VIII) to 11.20m (Section IX).

Minor lithologies include:
- Black sand and silty sand on top of the core, down to 0.60m (Section I).
- Upward fining intervals that may correspond to turbidite deposits from 6.40m to 7.50m (Section V) where they contain some detrital glauconite, and from 10.00m to 11.50m (Section VIII).
- Sand lenses from 7.70m (Section VI) to 9.10m (Section VII).
- Homogeneous, massive fine sand with shell fragments, Section X.

MONA

Core: MD02-2502



Comments

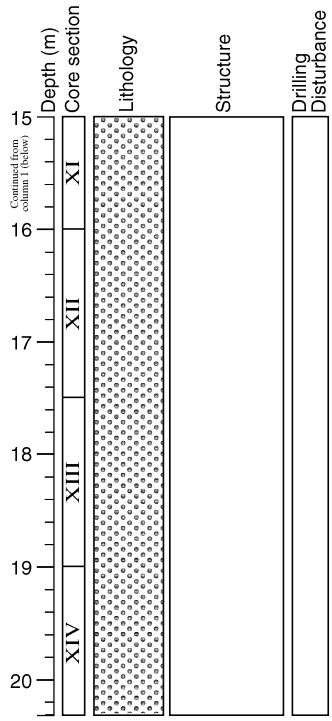
Black sand with forams and nannofossils to silty sand with nannofossils and diatoms.

Very dark grey mottled sandy clay with shell fragments.

Dark grey slightly bioturbated sandy clay with small shell fragments. Becomes darker at 260 cm.

Very dark grey sandy clay with nannofossils and rare forams.

Sandy nannofossil mixed sediments with trace diatoms. A large gastropod at 565 cm.



Comments

Homogeneous soft, wet, clayey coarse silt with medium sand-sized particles; few nanno-fossils, radiolaria, sponge spicules, and foram fragments.

End of core, 2030 cm.

Homogeneous dark grey clayey silt with lighter patches.

Very dark grey fine sand grading to slightly clayey silt. Poorly sorted silt with abundant nannofossils, glass, and glauconite at 690 cm.

Grey clayey silt grading downwards into dark grey fine sand. Well sorted, very fine sand, few sponge spicules, and nannofossils at 710 cm.

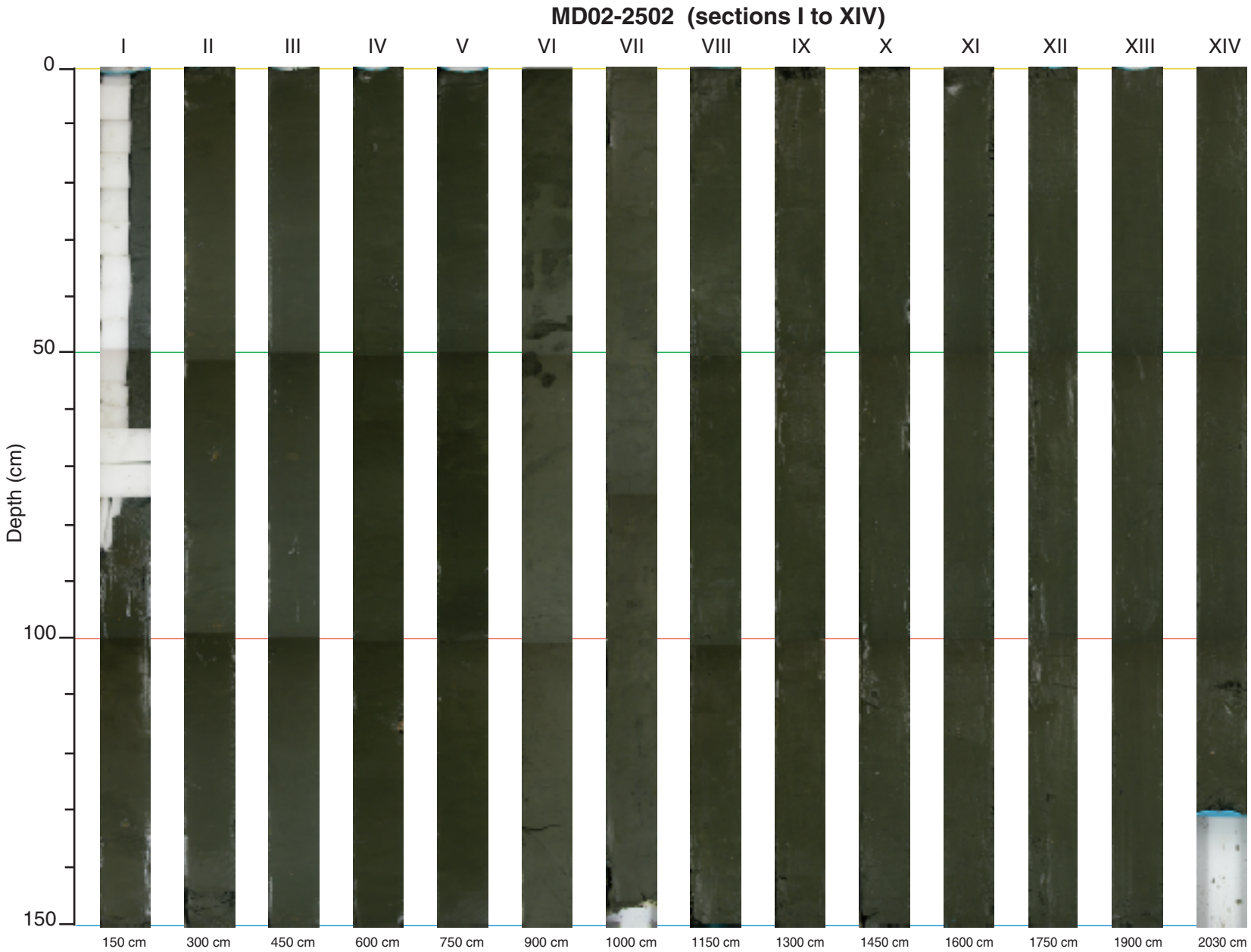
Very fine mottled sand.

Dark grey to grey silt with coloured diffuse patches, sand pockets, and scattered black flecks. Discontinuous black silt layer at 845 cm.

Dark grey silt with sparse nannofossils and forams grading downwards into fine sand with lighter diffuse patches of fine sand and shell fragments.

Mottled, dark grey slightly clayey silt to very fine sand with massive dewatering.

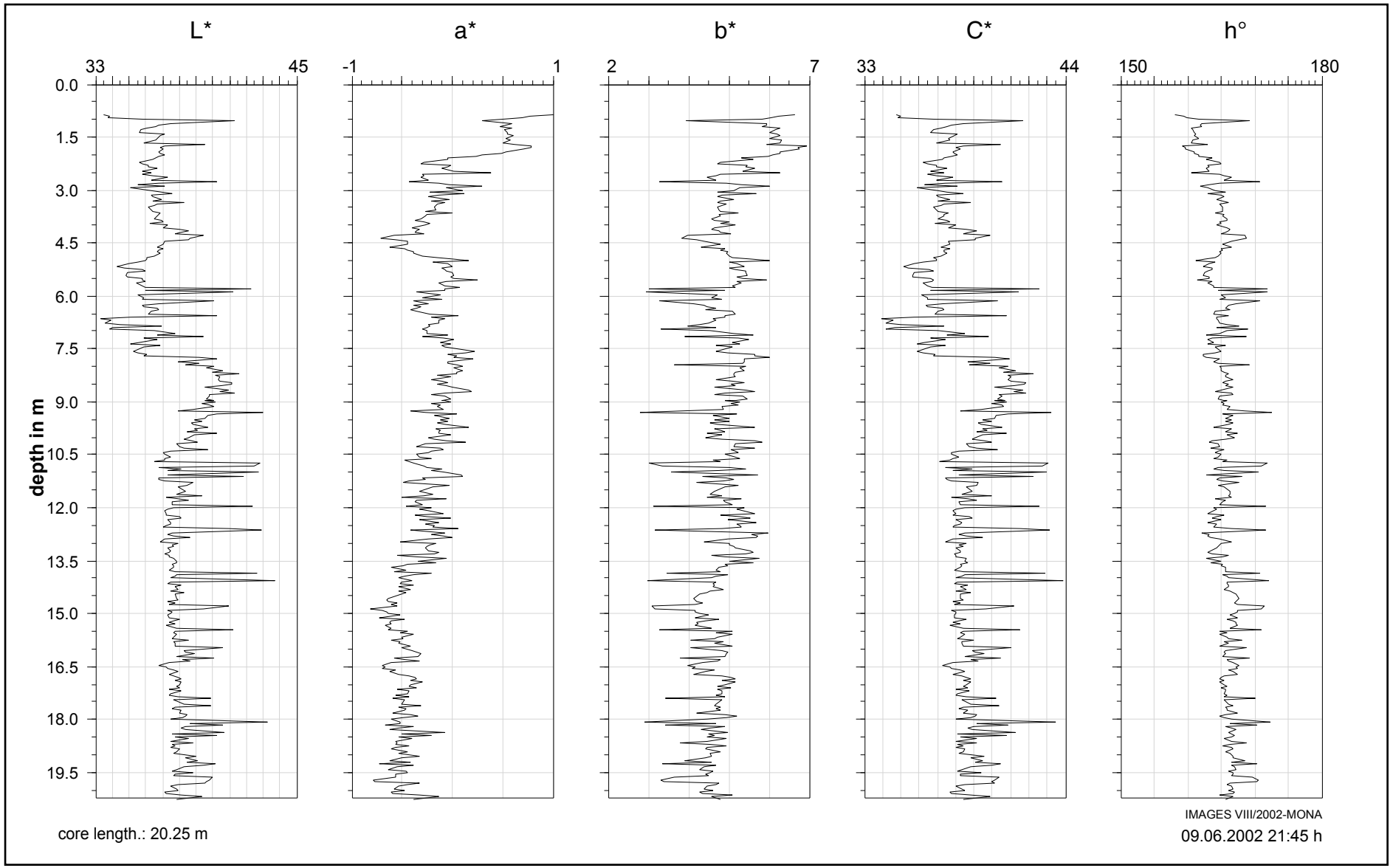
Homogeneous fine sand with shell fragments, nannofossils, forams, detrital carbonate, and glauconite; massive dewatering.


MD02-2502 (sections I to XIV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1000 cm
1150 cm
1300 cm
1450 cm
1600 cm
1750 cm
1900 cm
2030 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

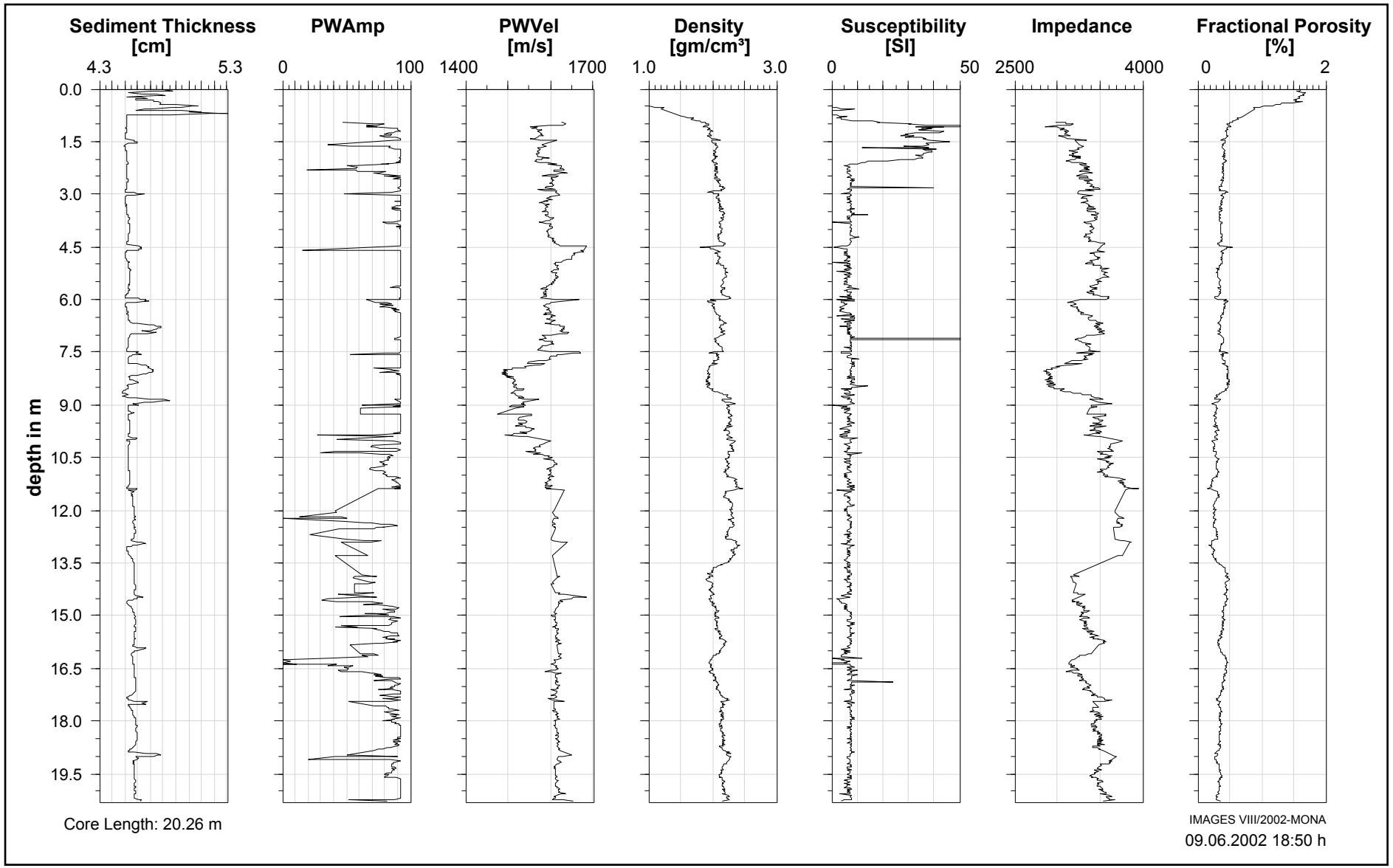
Station 11
Core MD02-2502



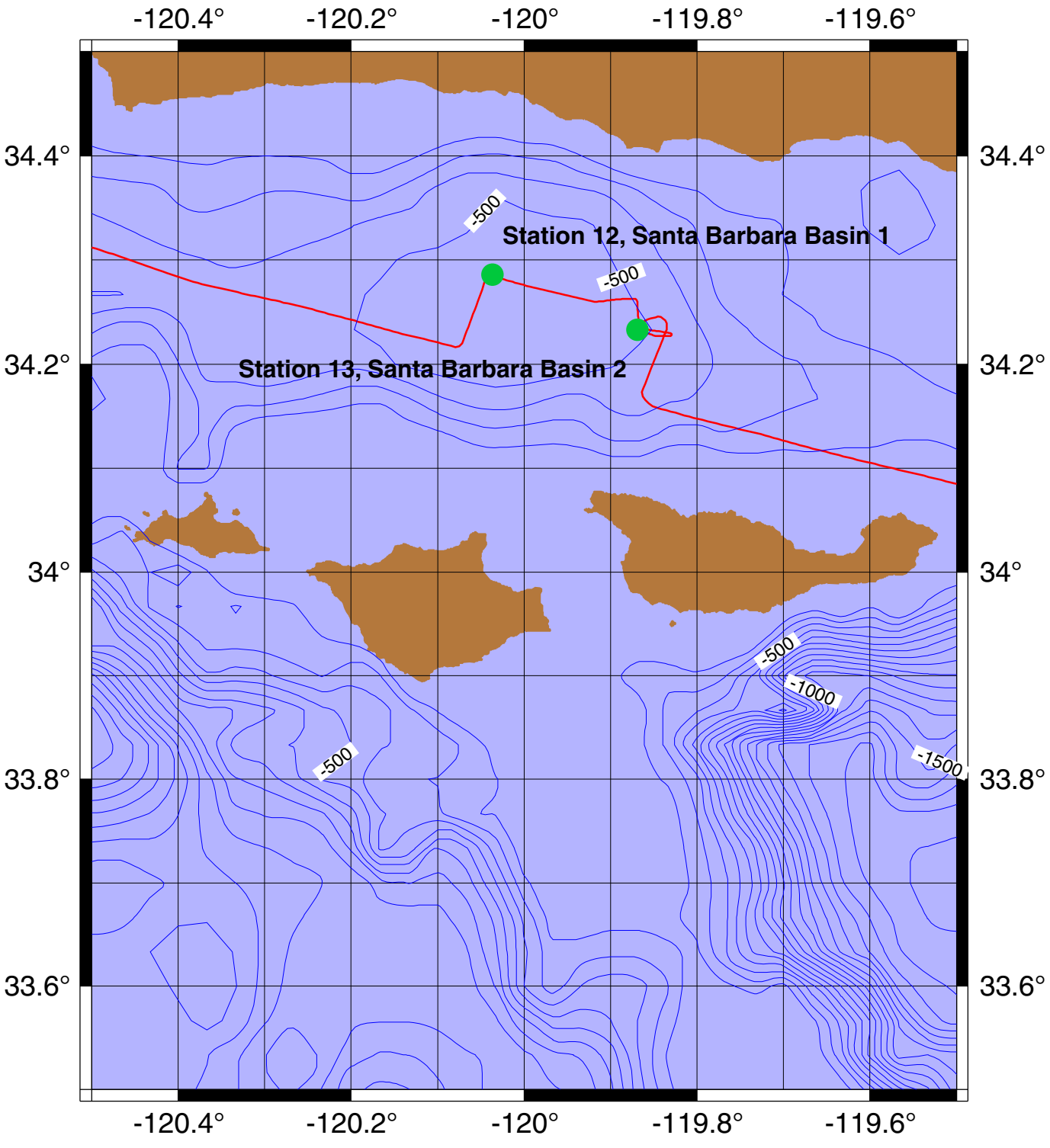
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 11
Core MD02-2502

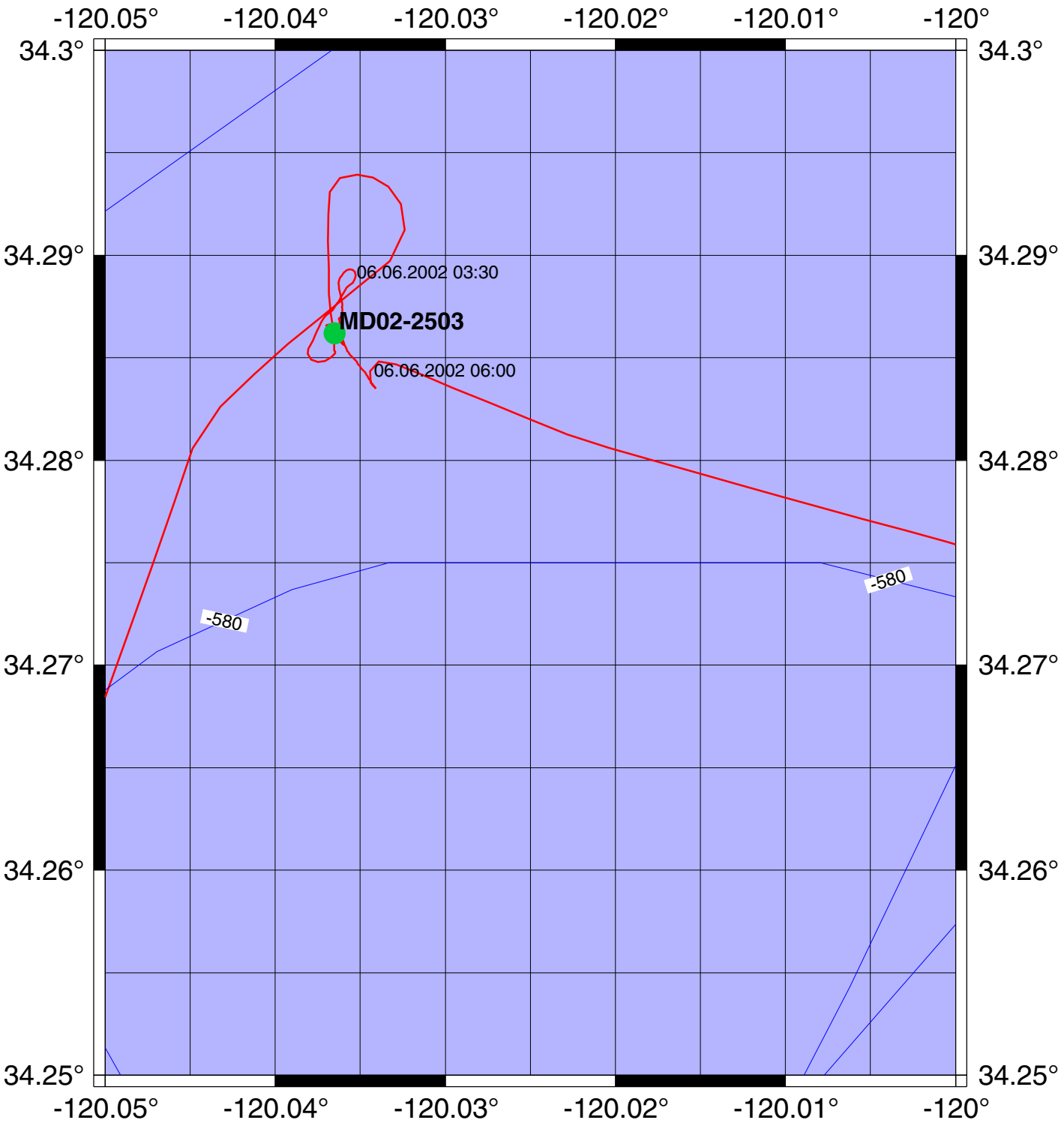


IMAGES VIII/MD126, Mona
Santa Barbara Basin Overview



GMT 2002 Sep 25 15:45:02

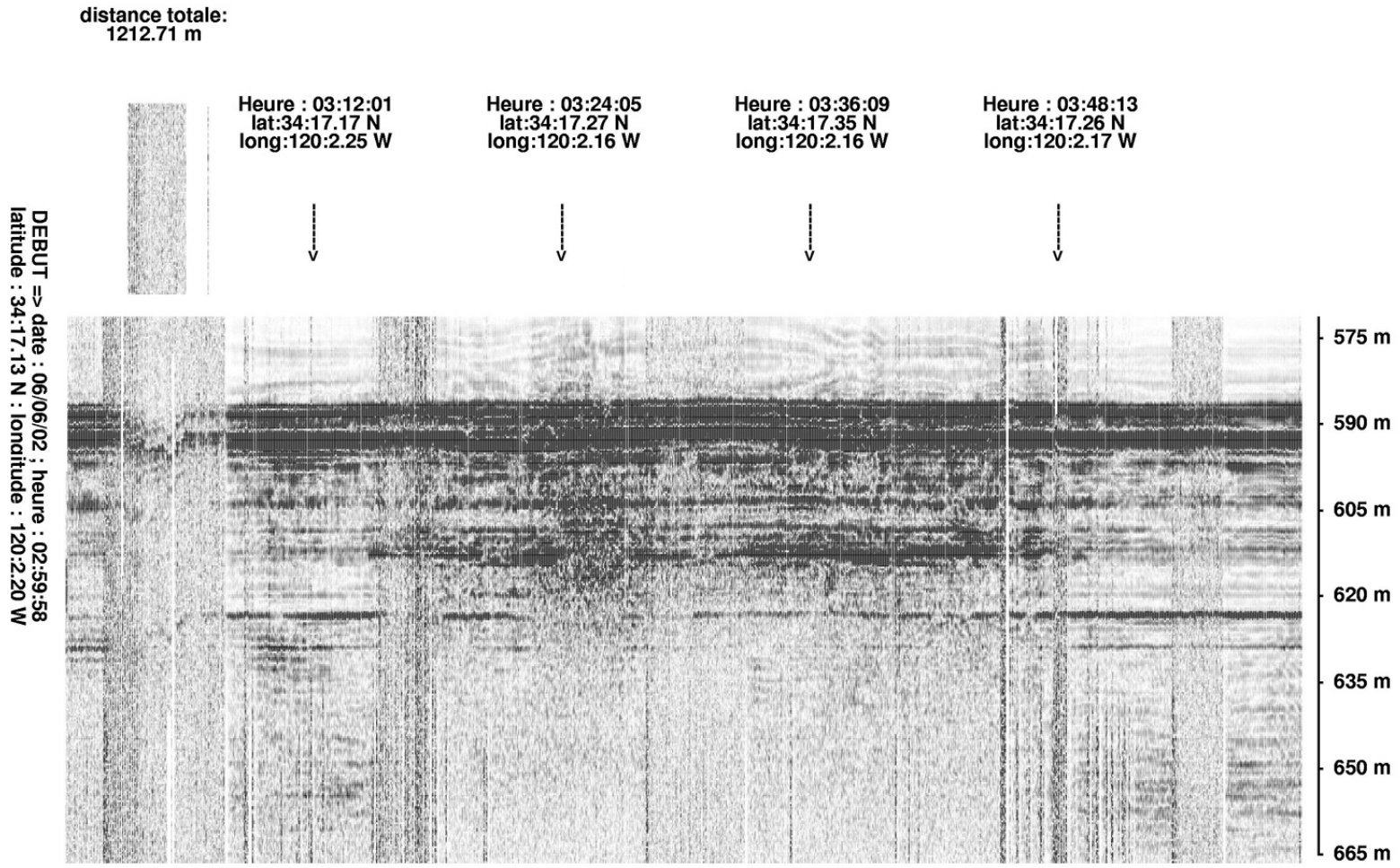
IMAGES VIII/MD126, Mona
Station 12, Santa Barbara Basin 1



GMT 2002 Sep 25 15:37:49

3.5 kHz Seismic Replay

Station 12, approach



Calypso Core MD 02-2503

(Station 12, Santa Barbara Basin; Latitude: 34° 17.17N ; Longitude: 120° 02. 19W; 569m water depth) has recoverd a total of 46.78m of sediments. During opening operations on the deck, 0.68m of sediments were extruded from the top of Section XI (Section XA), and 0.20cm from the top of Section XIX (Section XVIIIA). The sediment has generally not been significantly disturbed by coring, with the exception of Section XII (16.50m to 18.00m) which has been heavily disturbed and contains empty intervals. A few 0.10m to 0.40m long empty intervals are present from 15.20m (Section XI) to 18.50m (Section XIII), from 24.20m (Section XVII) to 26.70m (Section XVIII), and from 31.10m (Section XXI) to 32.90m (Section XXII).

The dominant sediment consists of silty clay, nannofossil silty clay, and nannofossil clay, ranging from dark olive and dark olive grey to dark grey and very dark grey. The sediment is mostly laminated from top to 15.00m (Section X), with some short intervals which are either massive or slightly bioturbated. A few layers with normal graded beddings are observed from top to 5.60m (Section IV). Isolated layers of grey color occur throughout the upper part of the core, from top to 13.20m (Section IX). A probable slumped interval is present between 10.50m and 11.20m, Section VIII.

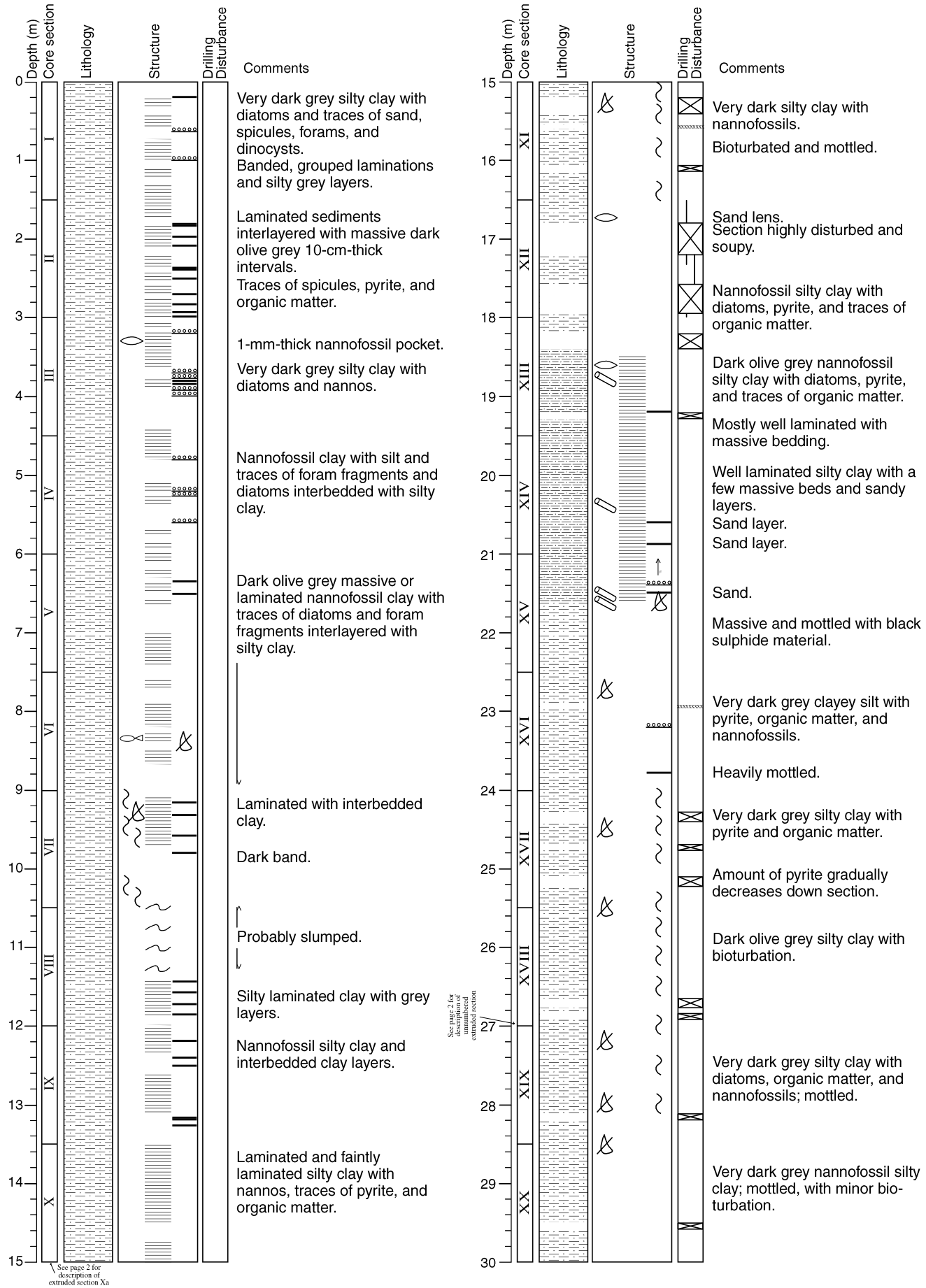
The sediment is mostly massive to slightly bioturbated from 15.00m (Section XI) to 18.50m (Section XIII). This is followed by an interval of continuous, distinct laminations from 18.50m (Section XIII) to 21.60m (Section XV). The laminated interval contains some isolated sandy layers, and plant fragments.

The lower part of the core, from 21.60m (Section XV) to 46.78m (Section XXXII, bottom of the core) is generally slightly to heavily bioturbated. Some intervals of massive, and of laminated sediments are present. A few shell fragments, and isolated silty to sandy layers (most of them with graded bedding), occur throughout.

Minor lithology includes :
- Black, very dark, and dark grey clayey silt in Sections XVI, XXVI, and XXIX.

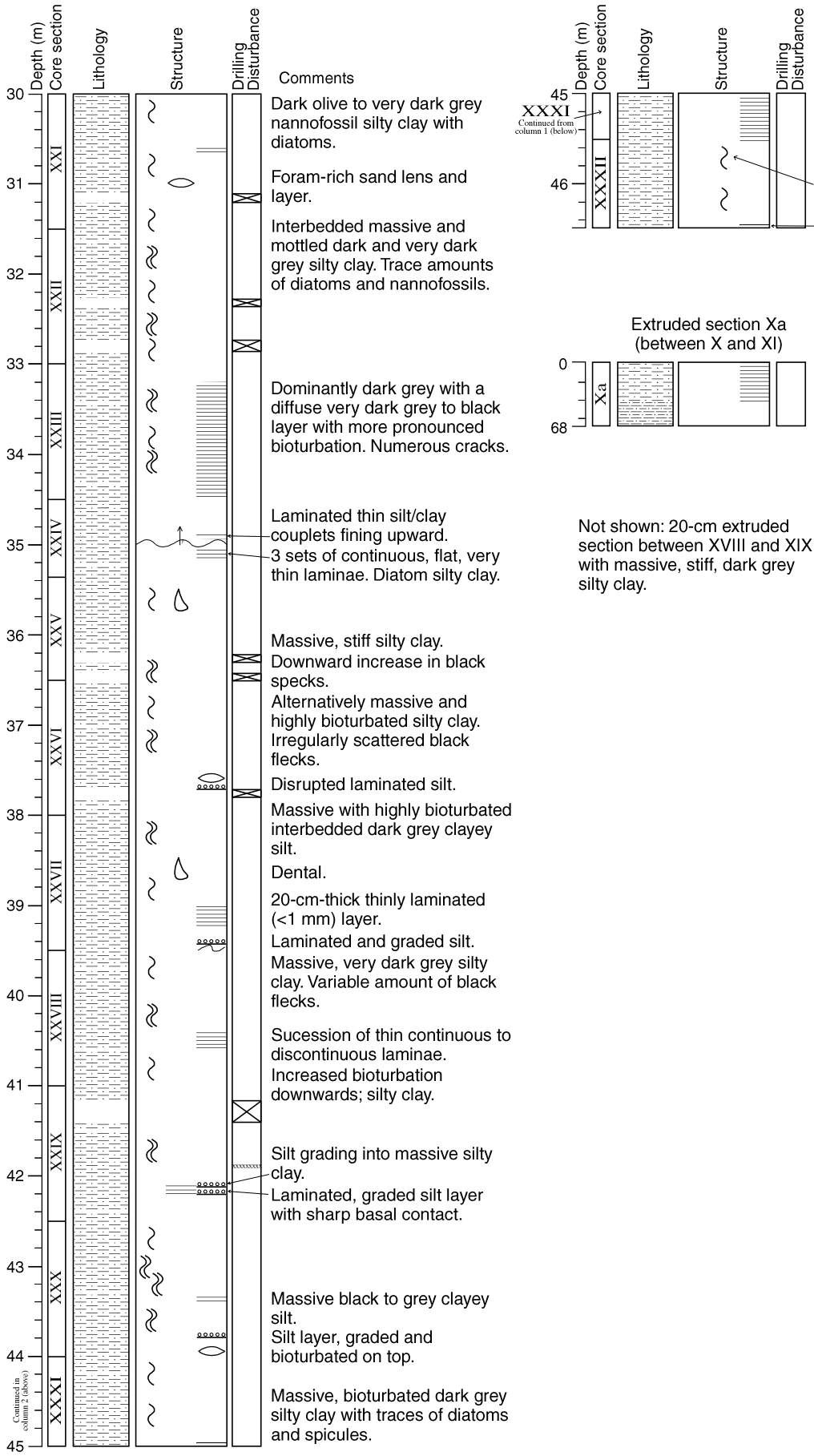
MONA

Core: MD02-2503



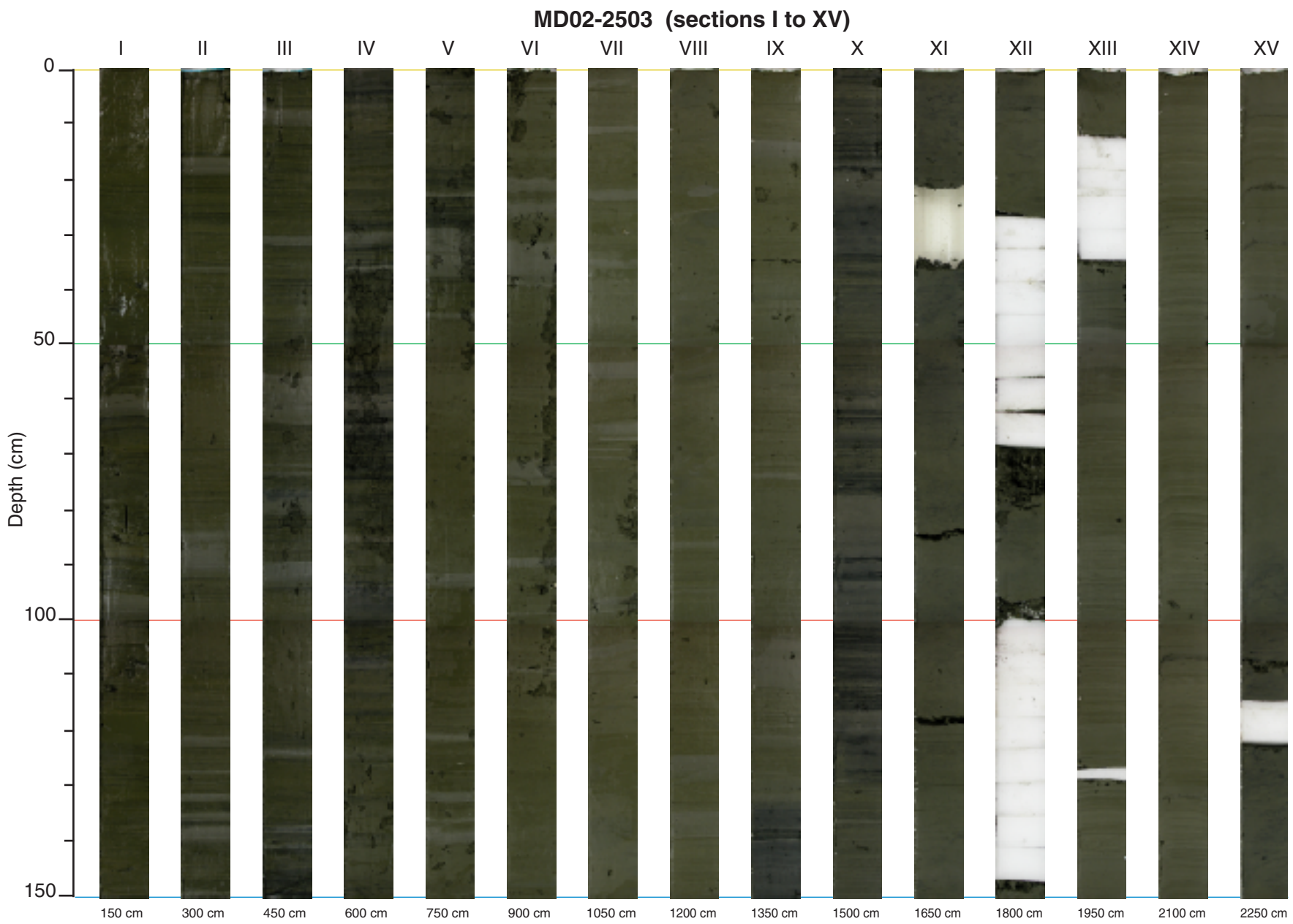
MONA

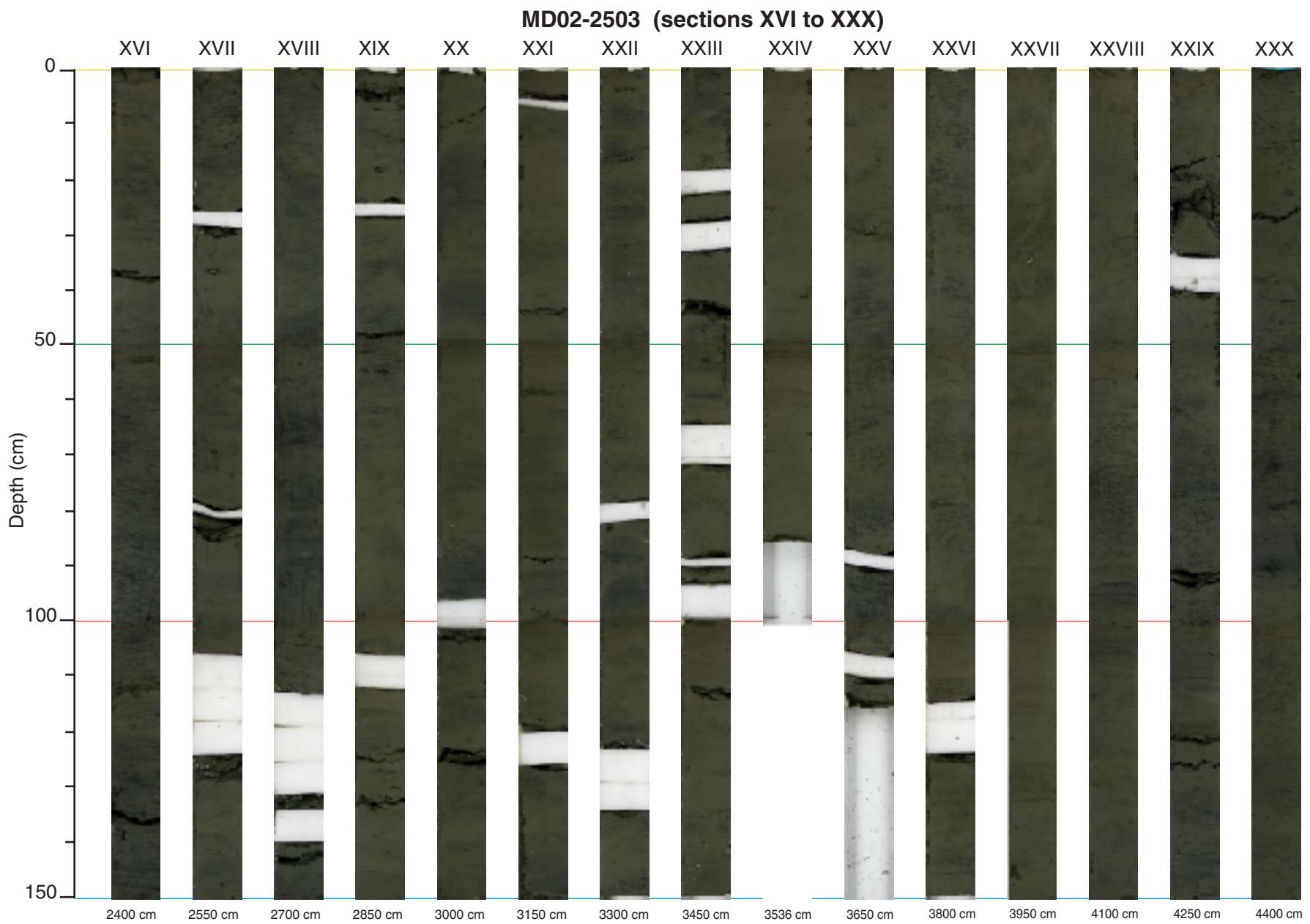
Core: MD02-2503 (cont.)



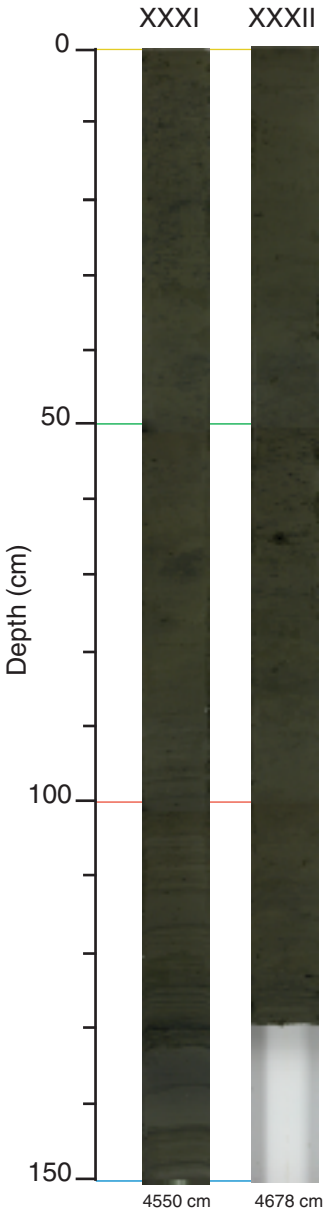
Extruded section Xa
(between X and XI)

Not shown: 20-cm extruded section between XVIII and XIX with massive, stiff, dark grey silty clay.


MD02-2503 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2503 (sections XVI to XXX)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
XXIX
XXX
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3536 cm
3650 cm
3800 cm
3950 cm
4100 cm
4250 cm
4400 cm

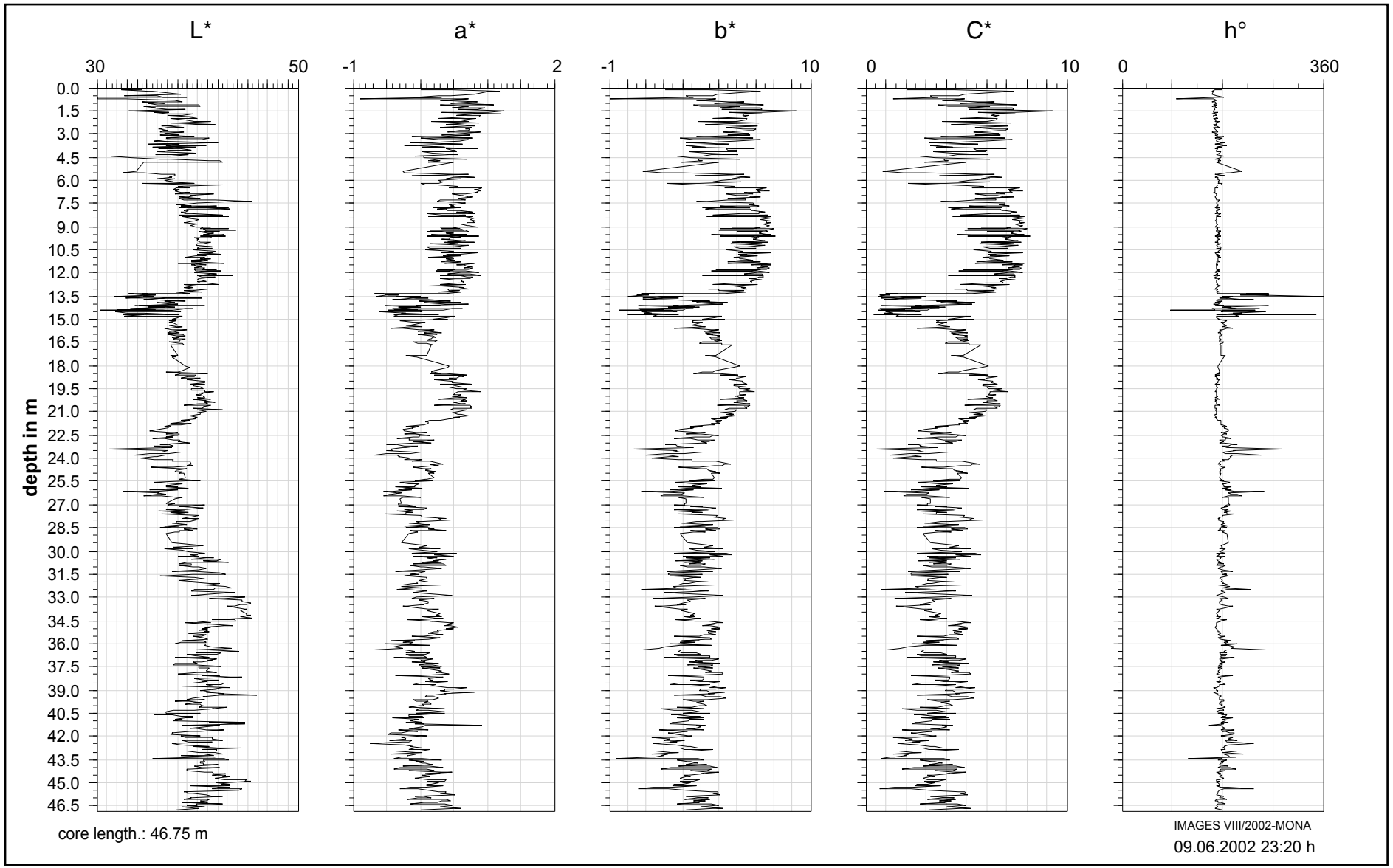
MD02-2503 (sections XXXI to XXXII)



IMAGES VIII, 2002
MONA

Colour Reflectivity

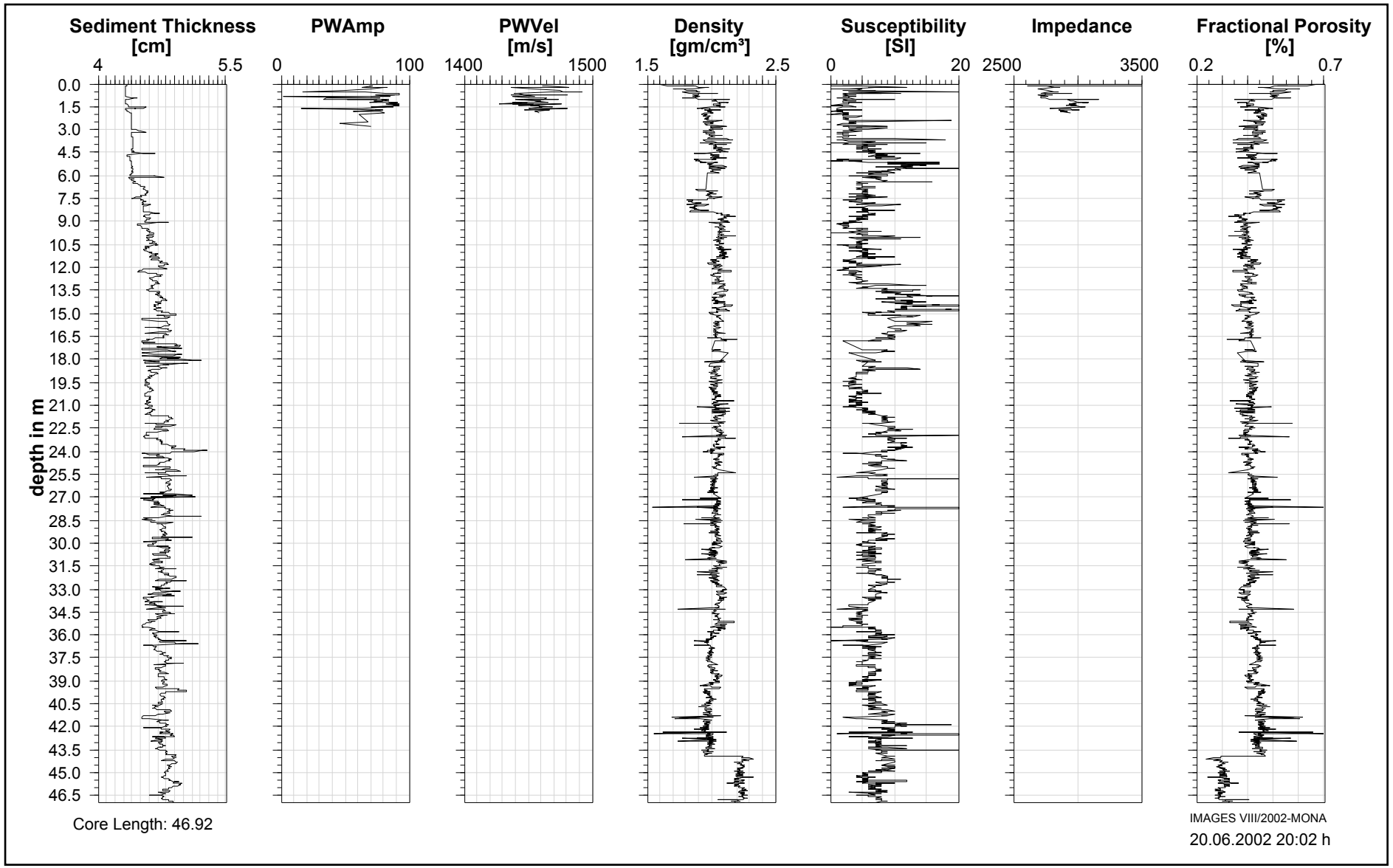
Station 12
Core MD02-2503



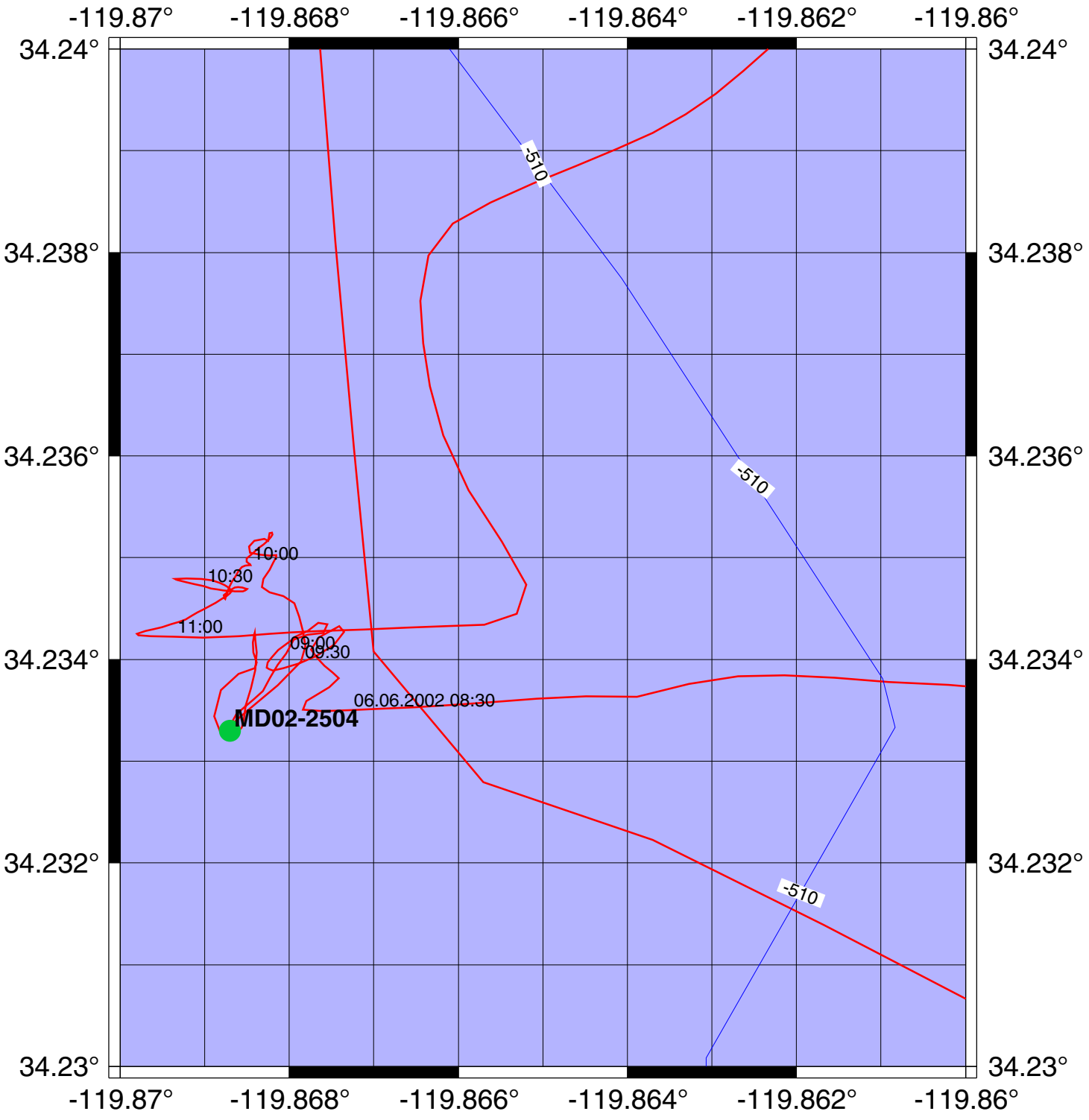
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 12
Core MD02-2503



IMAGES VIII/MD126, Mona
Station 13, Santa Barbara Basin 2



GMT 2002 Sep 25 15:46:37

Calypso Core MD02-2504

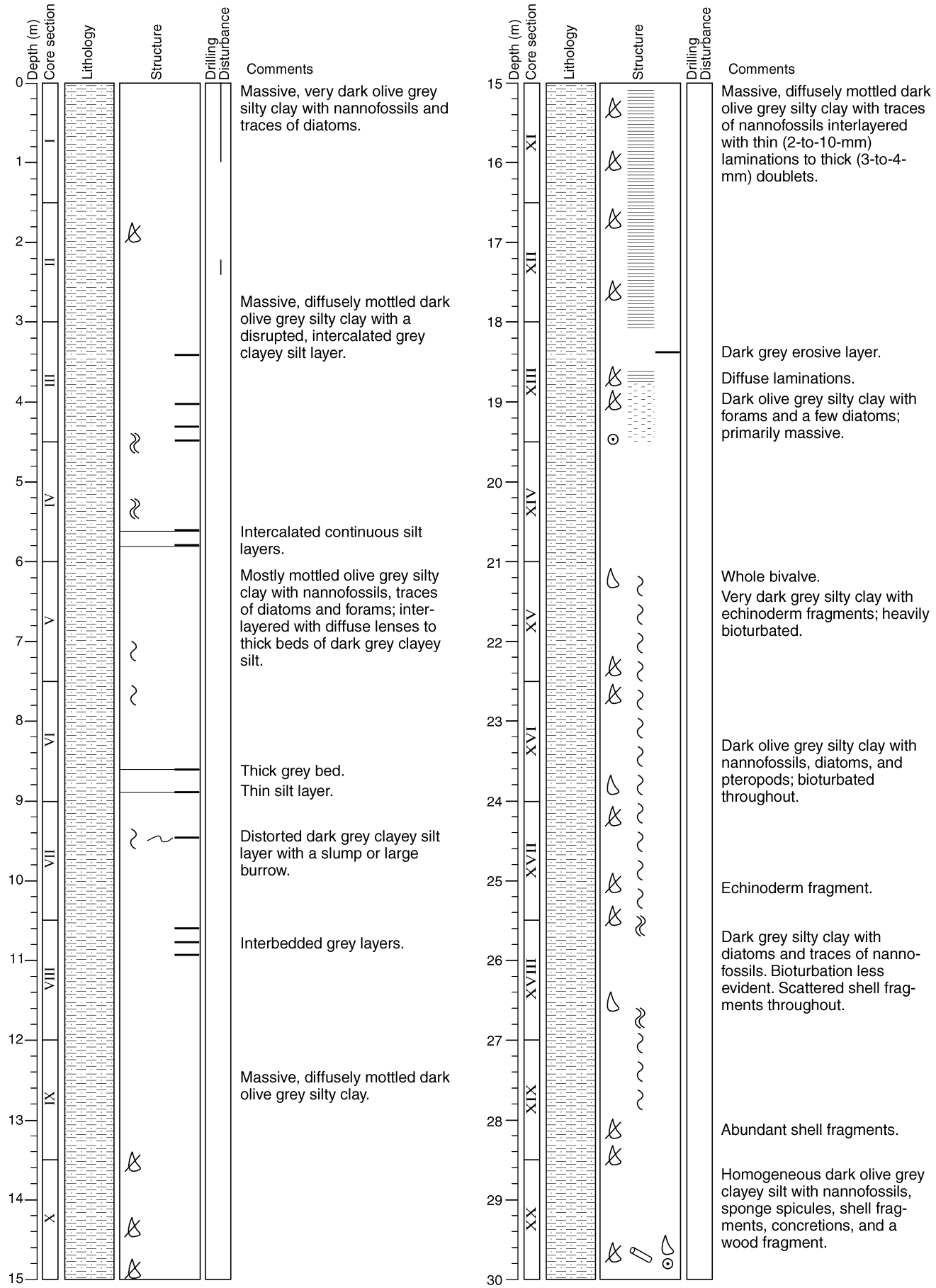
(Station 13, Santa Barbara Basin ; Latitude 34° 14. 00N ; Longitude 34° 23. 33N ; 440m water depth) recovered a total of 38.66m of sediment. The sedimentary sequence has been only slightly disturbed by coring in the upper part, down to 1.00m (Section I).

The dominant sediment consists of silty clay with nannofossils and foraminifers, grading from very dark olive grey and dark olive grey to olive grey and to very dark grey. The sediment is mostly massive in the upper part of the core, down to 15.00m (Section X), with rare bioturbated intervals. Finely laminated intervals are present from 15.05m (Section XI) to 19.50m (Section XIII), and from 35.60m to 36.00m (Section XXIV). The sediment from 21.00m (Section XV) to bottom is mostly bioturbated. Isolated silt layers (including grey beds) are observed from 3.40m (Section III) to 11.00m (Section VIII)., and a slump is present at 9.50m (Section VII). Shell fragments are scatterred from 13.60m (Section X) downcore.

Minor lithologies include:
- Clayey silts with nannofossils, sponge spicules, shell fragments, wood fragment and pyrite concretions in Section XX.
- Rare sand lenses from 31.40m (Section XXII) downcore.

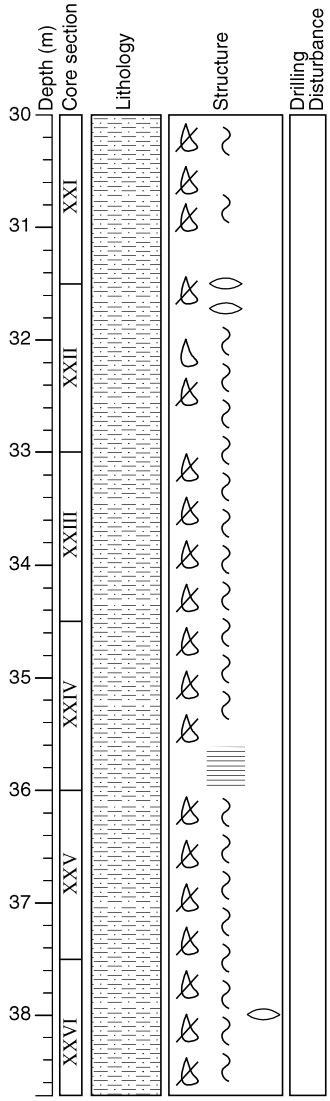
MONA

Core: MD02-2504



MONA

Core: MD02-2504 (cont.)



Comments

Mottled dark olive grey silty clay with traces of nanno-fossils, diatoms, and forams. Light bioturbation throughout.

Homogeneous to slightly bioturbated with isolated shells and shell fragment lenses.

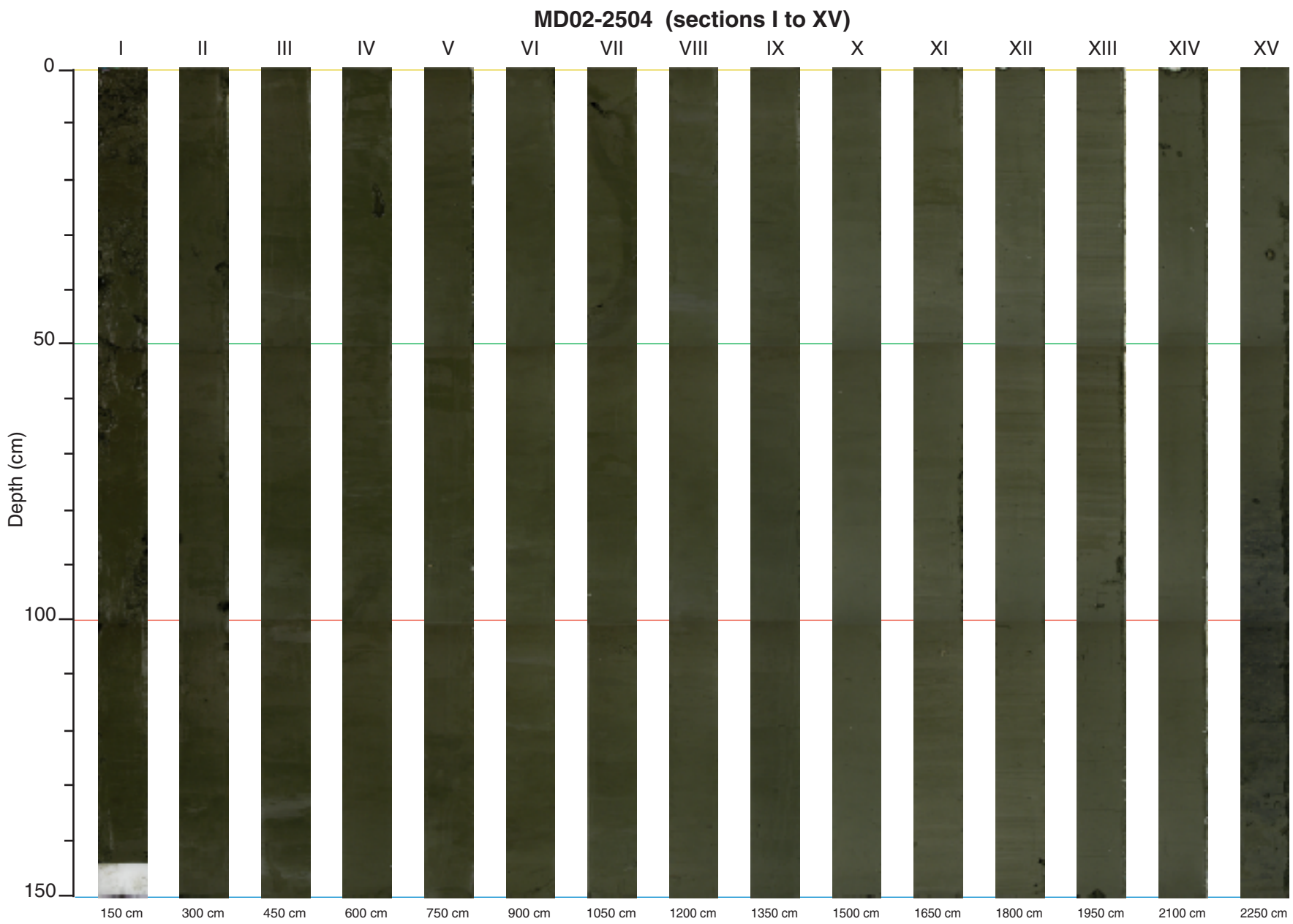
Slightly mottled dark olive grey silty clay with traces of diatoms and forams. Numerous scattered shell fragments.

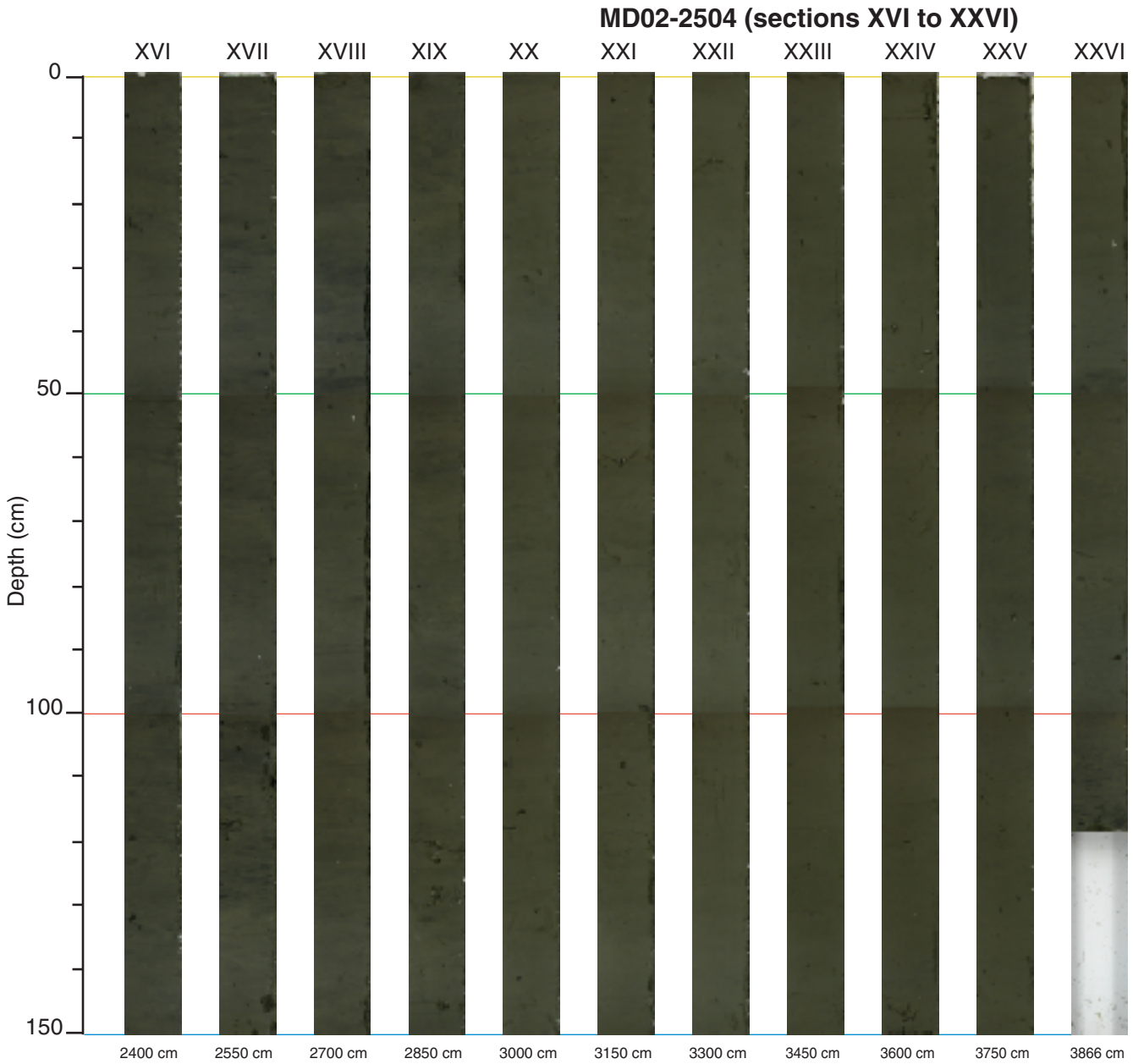
2-cm-thick laminated layer grading to 50-cm-thick diffuse laminated bed.

Dark olive grey mottled silty clay with traces of diatoms and nannofossils.

Sand lens.

End of core, 3866 cm.

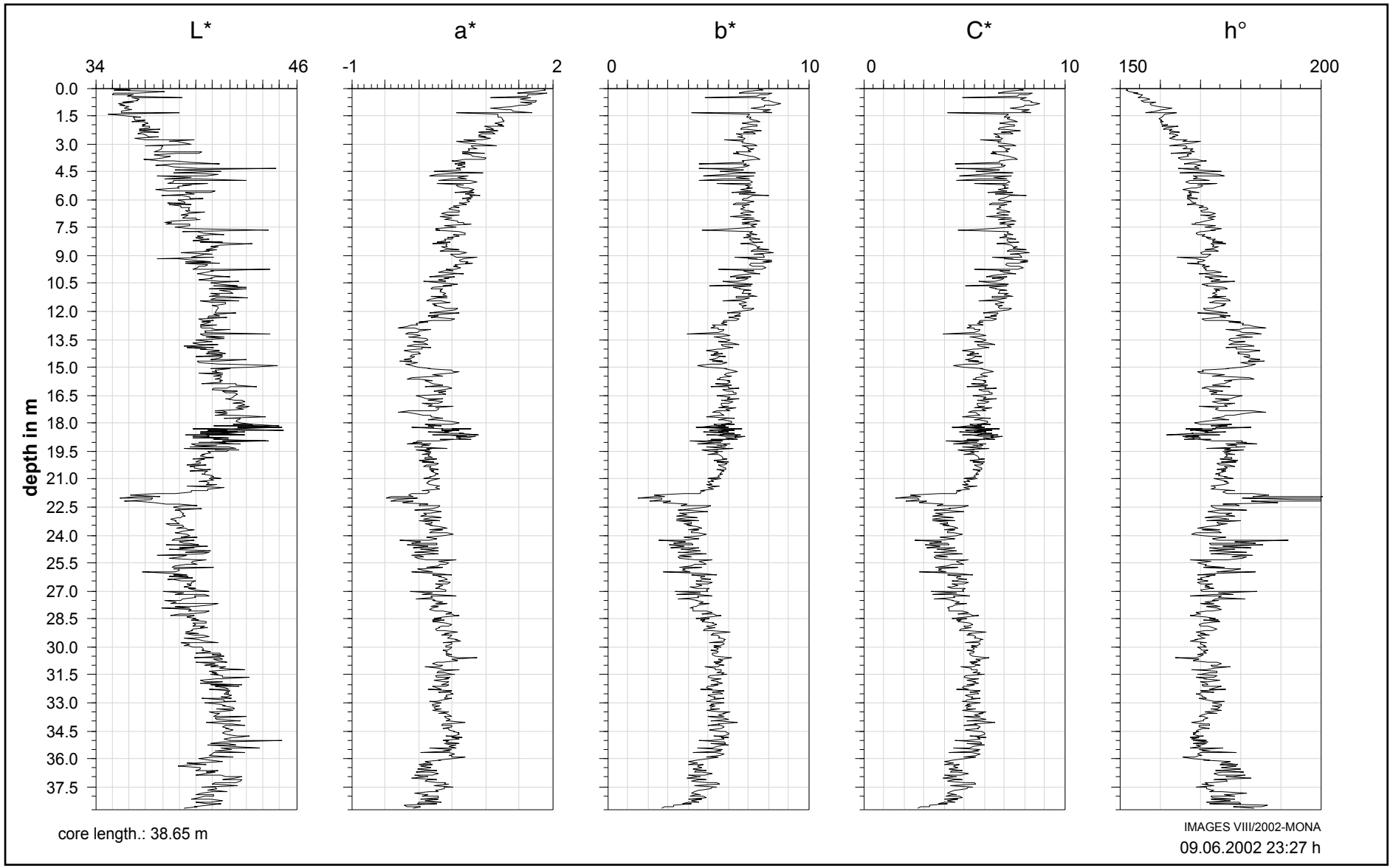

MD02-2504 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2504 (sections XVI to XXVI)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3750 cm
3866 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

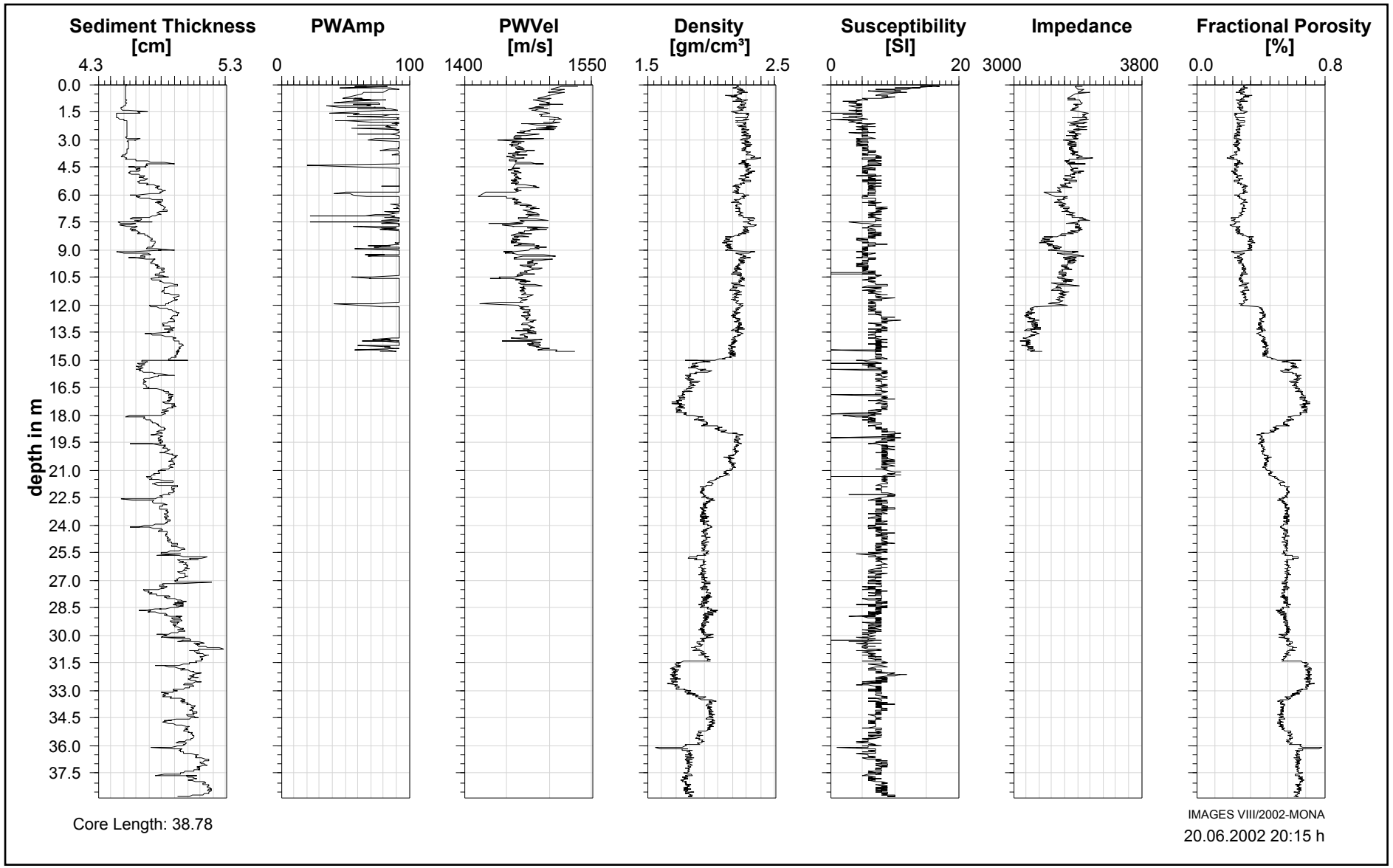
Station 13
Core MD02-2504



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 13
Core MD02-2504



4.4 The Baja California Margin

Gulf of California Basins During the MONA cruise we cored at three sites in the Guaymas Basin and one site in Carmen Basin (Northern Gulf of California, Mexico) to study long Late Glacial/Holocene records with annual or near-annual resolution to understand a) the history of mean-state, frequency, and amplitude of El Nino Southern Oscillation-cycles, b) history of decadal/ multi-decadal climate cycles, c) the role of ocean circulation in climate change during the Holocene in this area and d) to see if high resolution climate signals can be correlated with similar records in the East Pacific and Gulf of Mexico. The Guaymas and Carmen Basins are perfectly located to record changes in amplitude and frequency of these cycles and circulation because both the eastern monsoonal mode controlling climate in the Gulf of Mexico and the western monsoonal mode (causing e.g. El Niño) are contributing to the sediment flux into the basin. During the winter season strong winds blow from the east (Sierra Madre Occidental), bring rain and dust, and drive upwelling and high primary and export productivity in the basin. Sediments deposited within the local oxygen minimum layer are characterised by a laminated fabric (annual varves).

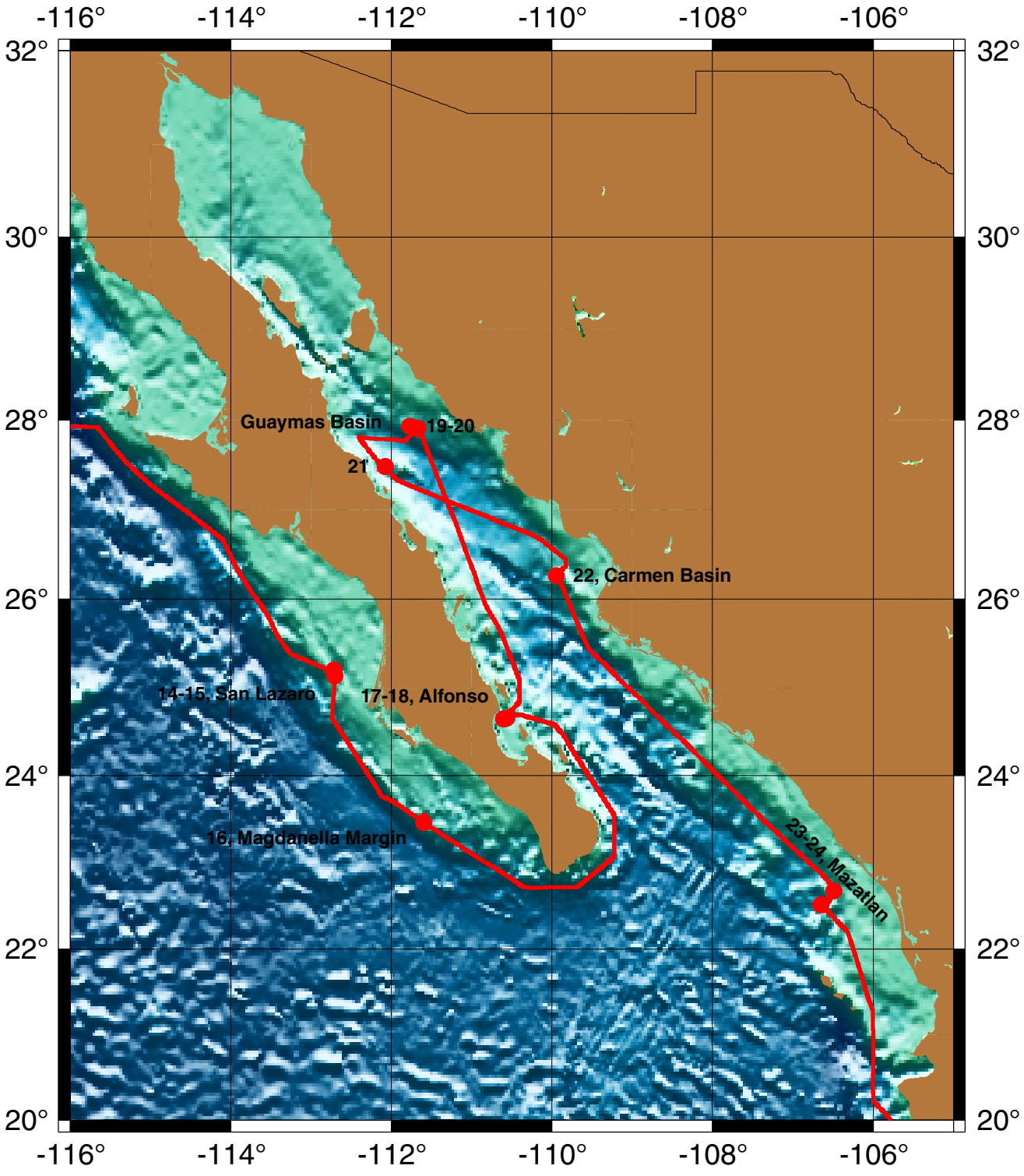
We took 2 long piston cores (48m and 58m, MD-02 2512,13) and 1 boxcore (5.6m with sediment/water interface intact, MD-02 2514c2) in the eastern part of the basin at water depth of 447m and 642m respectively. Both sites are well within the present oxygen minimum layer. Long parts of the cores are well laminated. Individual laminae consist of either silt- or diatom-rich clays. Pure diatom oozes up to 3mm thick (diatom mats?) are frequently intercalated. In between the laminated intervals (Younger Dryas, Last Glacial Maximum) the sediments consist of homogeneous diatom-silty clays. The laminated parts are arranged in 3 intervals, the first and second of which are corresponding to the Holocene and the Bolling/Allerod. Gas expansion affects some sections but the 2 piston cores can be easily correlated with each other using colour reflectance data.

A third long piston core (MD 02 2515) and a complimentary boxcore (MD 02 2517c2) were taken in the western part of the basin at a water depth of 881m in the lower part of the oxygen minimum layer. The sedimentary column retrieved reached a length of 64.4m and is so far the longest piston cored sedimentary section ever retrieved from the oceans. The sediment is similar to the eastern part of the basin but the carbonate content in this core is distinctly higher. Again the core shows 3 distinct intervals of which the upper two can be assigned to the Holocene and the Boelling/Allerod.

We took also one core in the Carmen Basin (MD02-2516) in order to have a record which can serve for a latitudinal comparative study with Guaymas Basin. That core taken by a water depth of 613 m show also nice lamination equivalent to those seen in Guaymas.

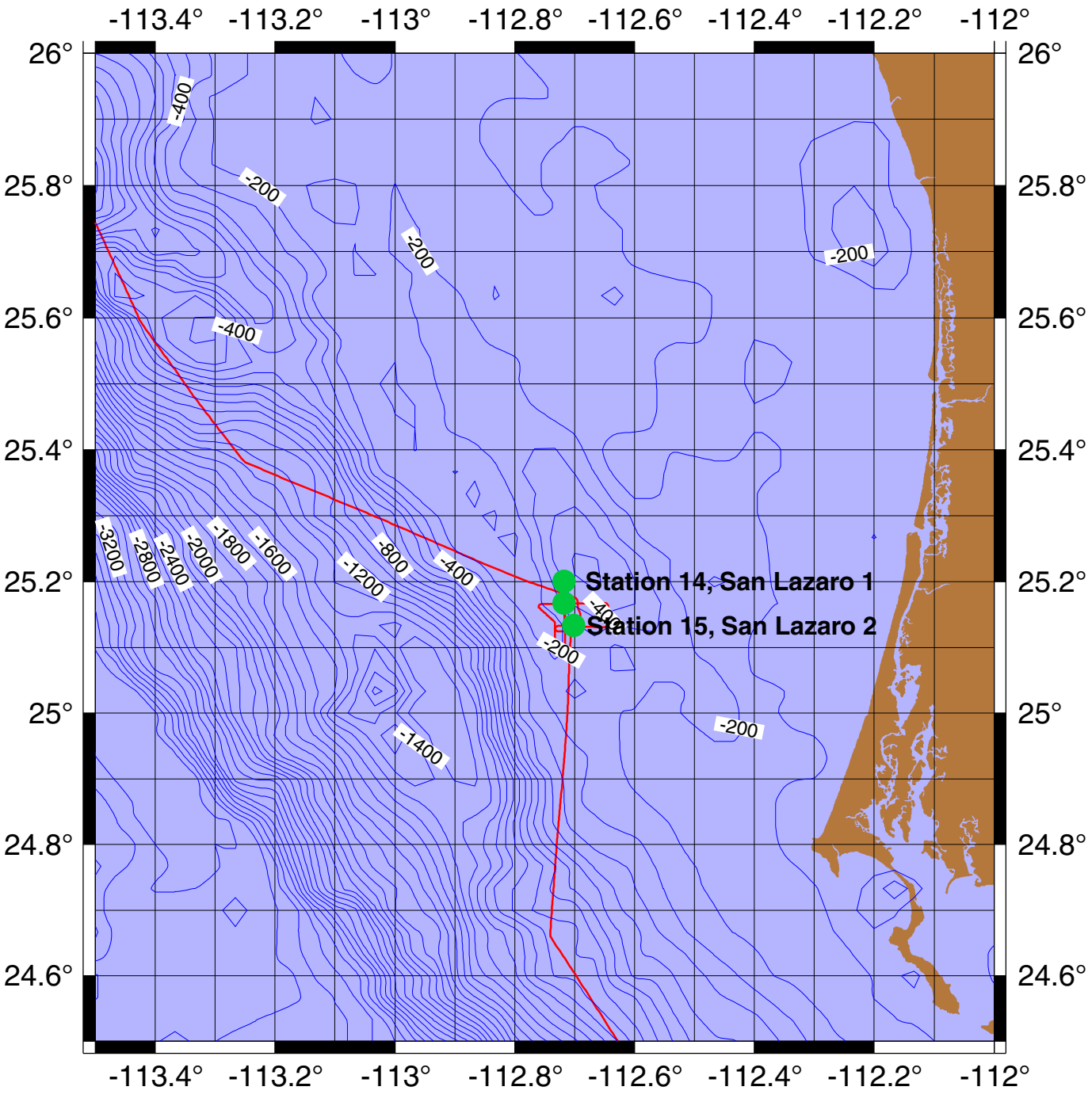
Mazatlan Margin The Mazatlan margin is situated off the Mexican mainland South of the Gulf of California. This is a key location with several scientific interests. First, this area is located on the heart of the denitrifying zone of the Eastern Tropical North Pacific. Secondly, the seasonal shifts in the Sonoran Low Pressure Centre causes upwelling in winter months. Thirdly, the surface waters in this area are alternatively influenced both by the California Current and the Eastern Tropical Surface Water due to seasonal shift in the water-mass boundary to the North and South of the study area. Finally, the upper slope off Mazatlan has been reported to host modern phosphogenic sediments. The relatively moderate gradient of the continental slope this area is ideal to study a suite of cores on a shore-normal transect. Accordingly, two cores were collected during the MONA Campaign. Core MD02-2518 was raised from the heart of the modern oxygen minimum at450m water depth and Core MD02-2519 raised from the lower boundary of the OMZ from 954.8m depth. Both cores comprise predominantly of silty clays to clayey silts and are intermittently laminated.

IMAGES VIII/MD126, MONA
Gulf of California Overview



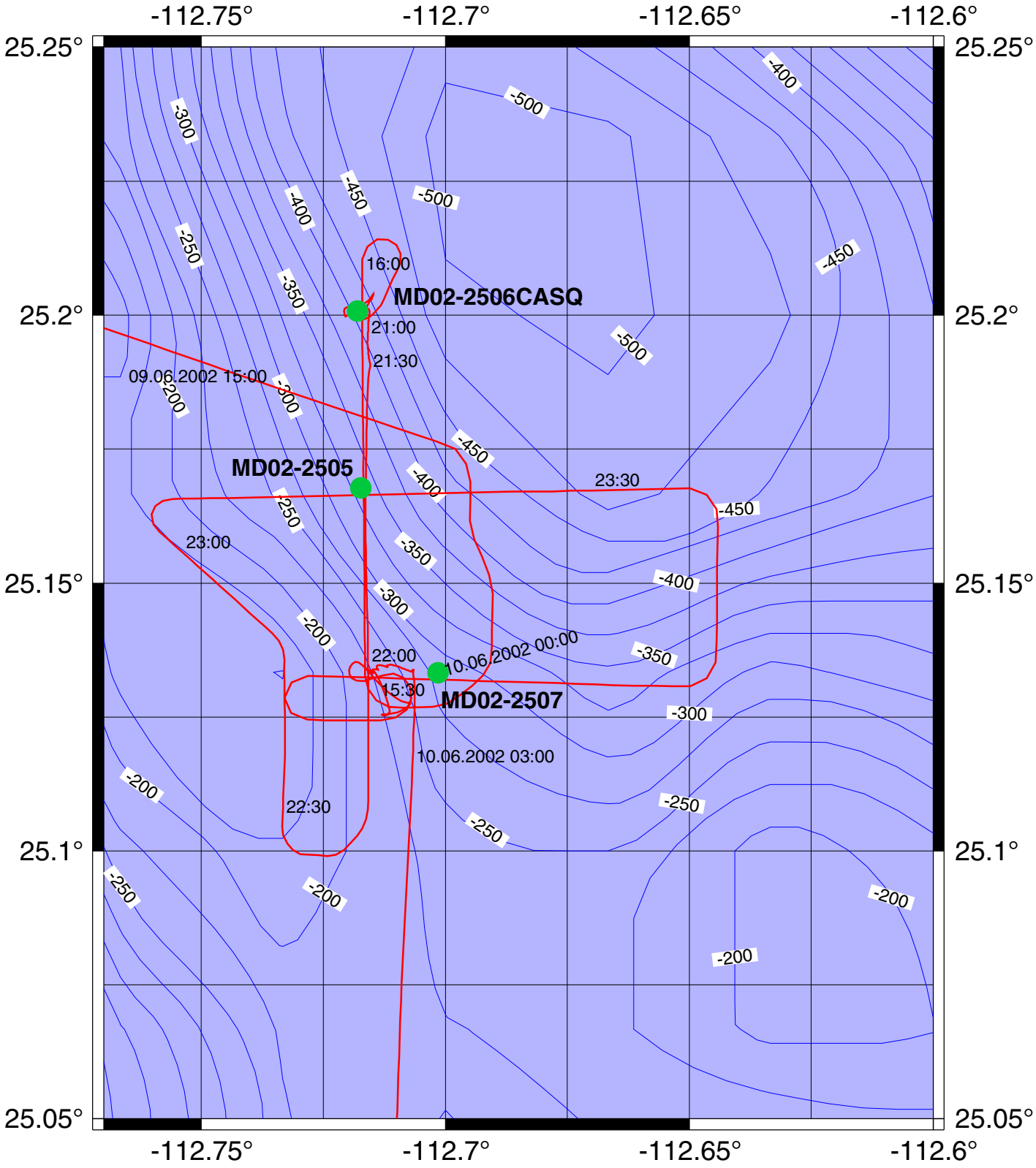
GMT 2002 Sep 26 13:20:43

IMAGESVIII/MD126, MONA
San Lazaro 1 & 2



GMT 2002 Sep 25 16:04:38

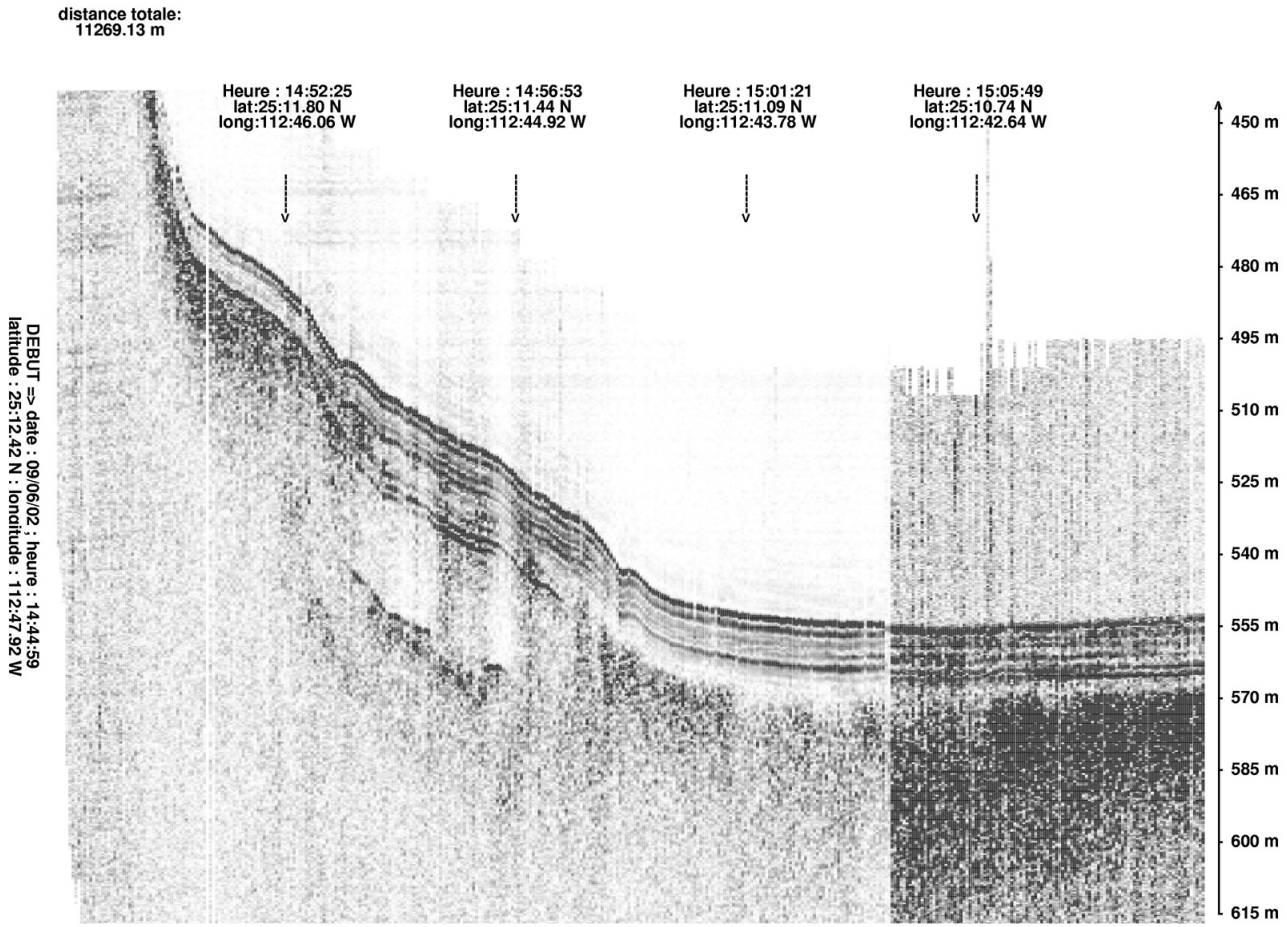
IMAGES VIII/MD126, Mona
San Lazaro 1 & 2, Detail Map



GMT 2002 Sep 25 16:07:34

3.5 kHz Seismic Replay

Approach to Station 14, a

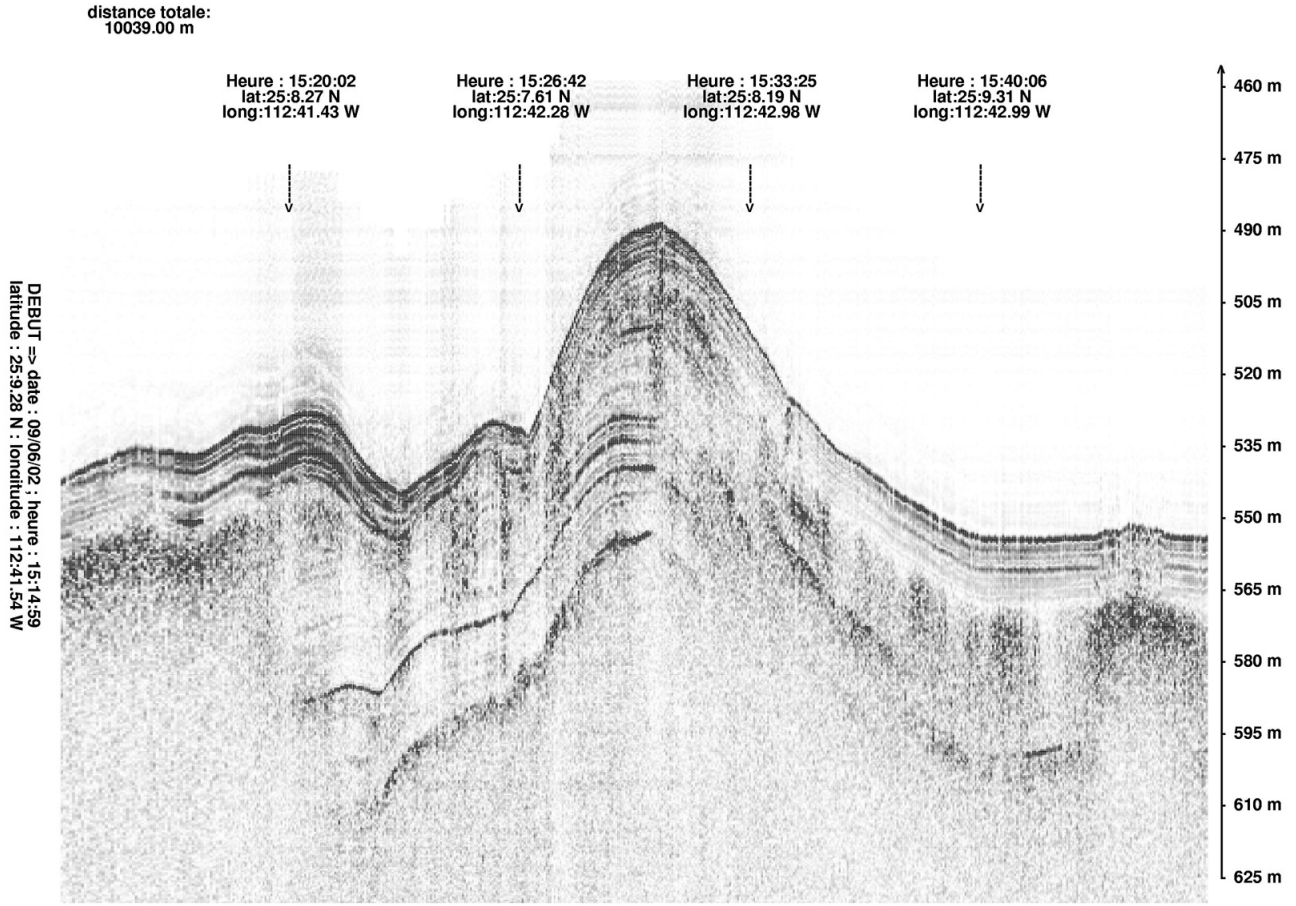


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 14
Core MD02-2505
MD02-2506C²

Approach to Station 14, b



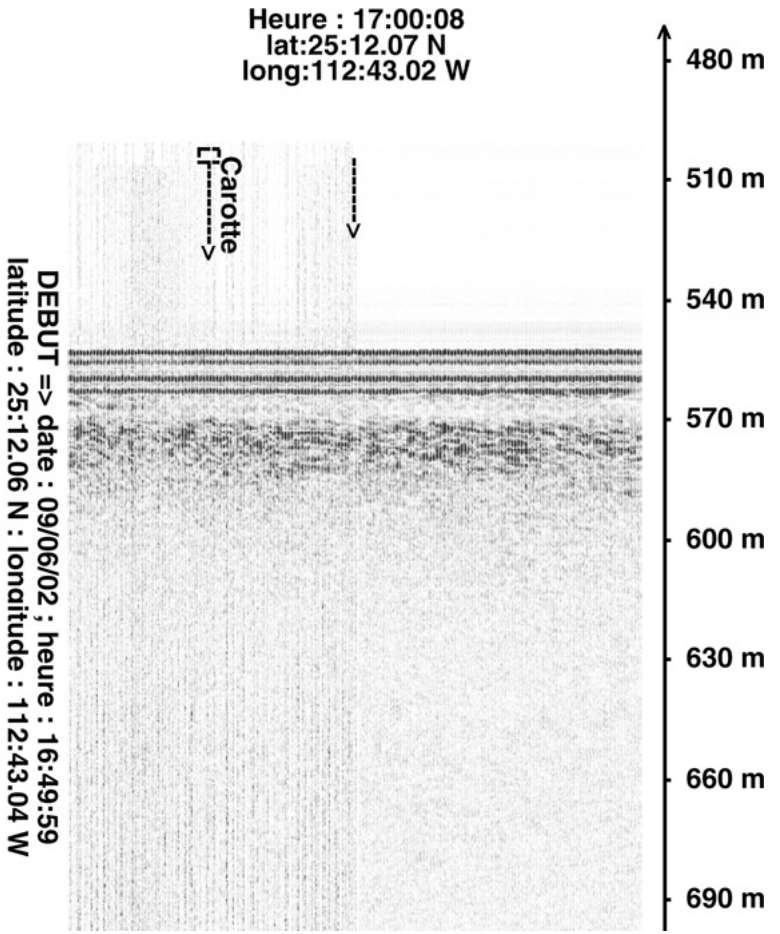
IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 14
Core MD02-2505
MD02-2506C²

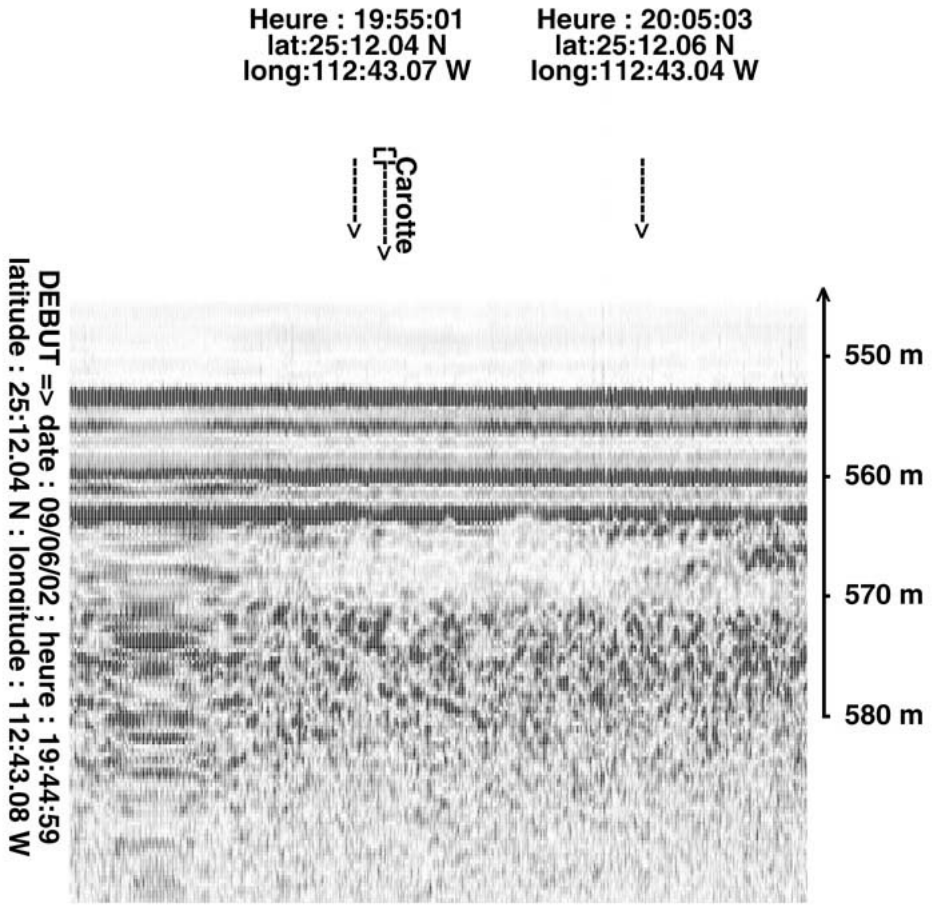
MD02-2505 coring operation

distance totale:
148.33 m



MD02-2506C² coring operation

distance totale:
298.32 m



INSTITUT PAUL EMILE VICTOR — MARION DUFRESNE

NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **09.06.2002**

N° de station : **14**
SAN LAZARO

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2505

(MD - année - milles - centaines)

CAROTTE (longueur) :

36.73 m

POSITION :

Latitude : **25° 10.07 N**

Longitude : **112° 43.04 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : t

Poids total (eau) : t

REGLAGES :

Tubes (longueur) : **41.16** m

Câbles :
Chute libre : **1.50** m

Boucle : **1.60** m

LC poids : **?** m

CONTREPOIDS :
Type (2) :

Longueur PVC : m

Pénétration : m

Longueur de carotte : m
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : m

Ligne filée : **503** m

Arrachement/total *(tonne)* : **15.70** t

Arrachement/différentiel *(tonne)* : **9.00** t

Pénétration/apparente *(m)* : **36.00** m

Pénétration/tensiomètre *(m)* : **37.00** m

HEURES (GMT)

En station : **16:25**

Début manœuvre : **16:44**

Déclenchement : **16:55**

Fin de manœuvre : **17:45**

Durée de manœuvre : **01:01**

Départ station : **20:43**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) : **OUI**

Filet à plancton :

Autres :

Description / incidents : **TORDUE A 5 M**

END OF CORE 3673 CM

SECTIONS 2,3, 11 AND 12 SHORTER THAN 1,50 M

0	150	300	450	600	750	900	1050
I	II	III	IV	V	VI	VII	VIII
150	241	59	150	150	150	150	150

1050	1200	1350	1391	1450	1600	1750	1900	2050
IX	X		XI	XII	XIII	XIV	XV	XVI
150	131	13	41	107	150	150	150	150

2050	2200	2350	2500	2545	2650	2800	2950
XVII	XVIII	XIX	XX	XXI	XXII		XXIII
150	150	150	45	100	120	10	10 64 71

2950	3100	3250	3400	3550	3673
XXIV	XXV	XXVI	XXVII	XXVIII	
144	150	150	76 33 22	18 27	

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD02-2505

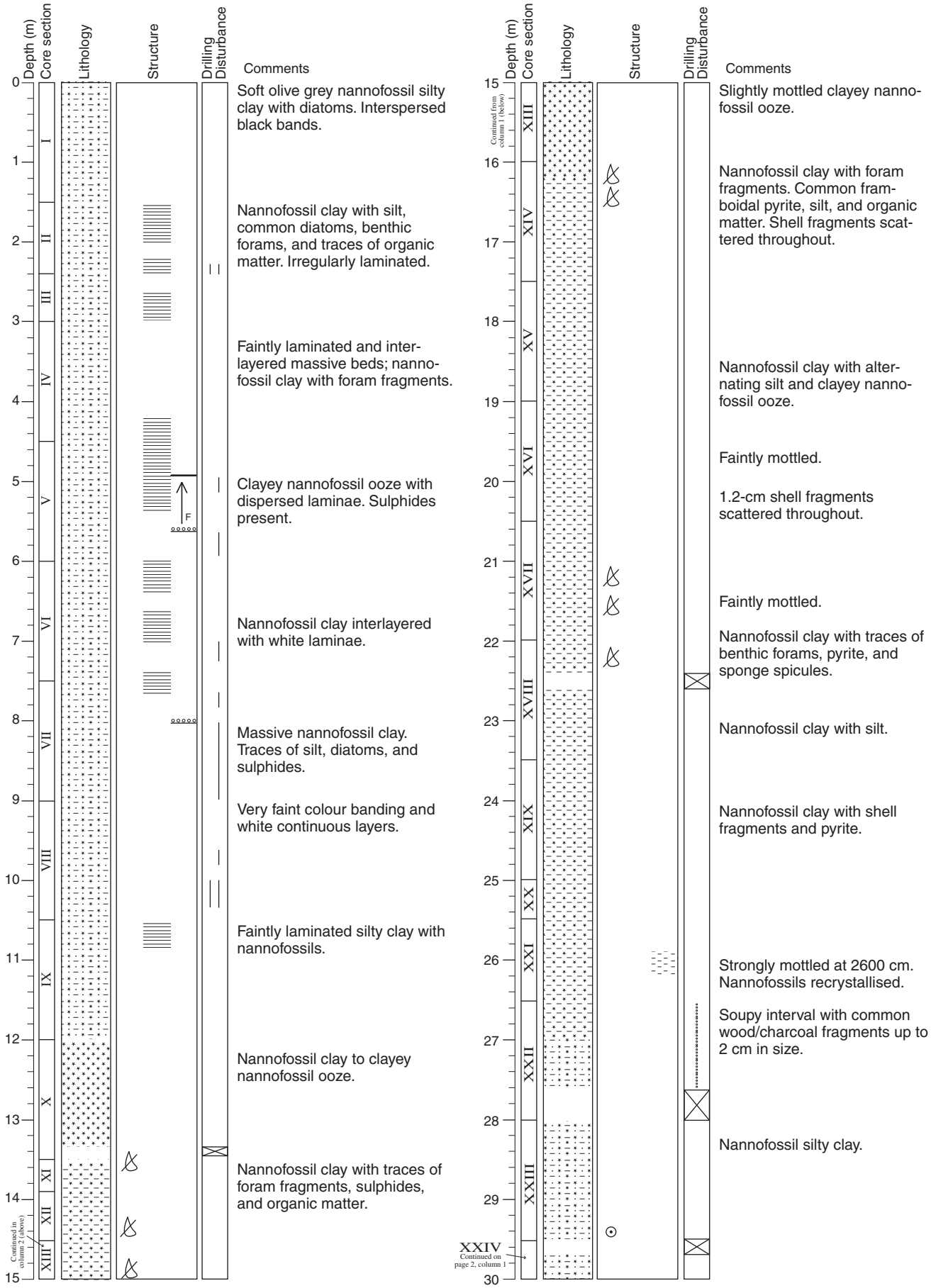
(Station 14, San Laguro 1 ; Latitude 25° 12. 05N ; Longitude 112° 43. 08W ; 541m water depth) has recovered a total of 36.73m of sediments. Some rare intervals have been disturbed by coring in the upper part in Section II, and from Section V to Section VIII. Minor empty intervals are observed in Sections X, XVIII, XXI, and XXIII. The lowermost part of the core (bottom of Section XXVII and Section XXVIII) has been heavily disturbed by coring and is mostly empty.

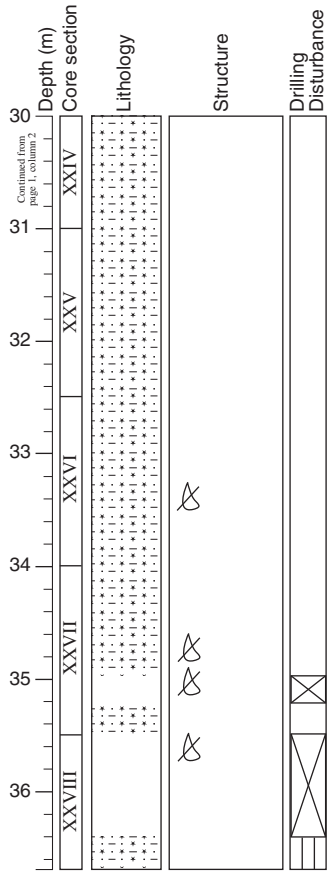
The dominant sediment mostly contains nannofossils and clays in variable amounts, and consists of nannofossil clay, nannofossil silty clay and clayey nannofossil ooze. The color is mostly within the olive grey range. The sediment is generally massive, homogeneous. Laminated intervals are present in the upper part of the core, down to 10.80m (Section IX). Shell fragments occur in the lower part of the core, from 13.50m (Section XI) to the bottom. Common wood and charcoal fragments in Section XXI.

Minor lithology includes :
- Silty clay with nannofossils, laminated, in Section IX.
- Nannofossil clayey silt, with shell fragments, from Section XXVII to bottom.

MONA

Core: MD02-2505





Massive olive grey.

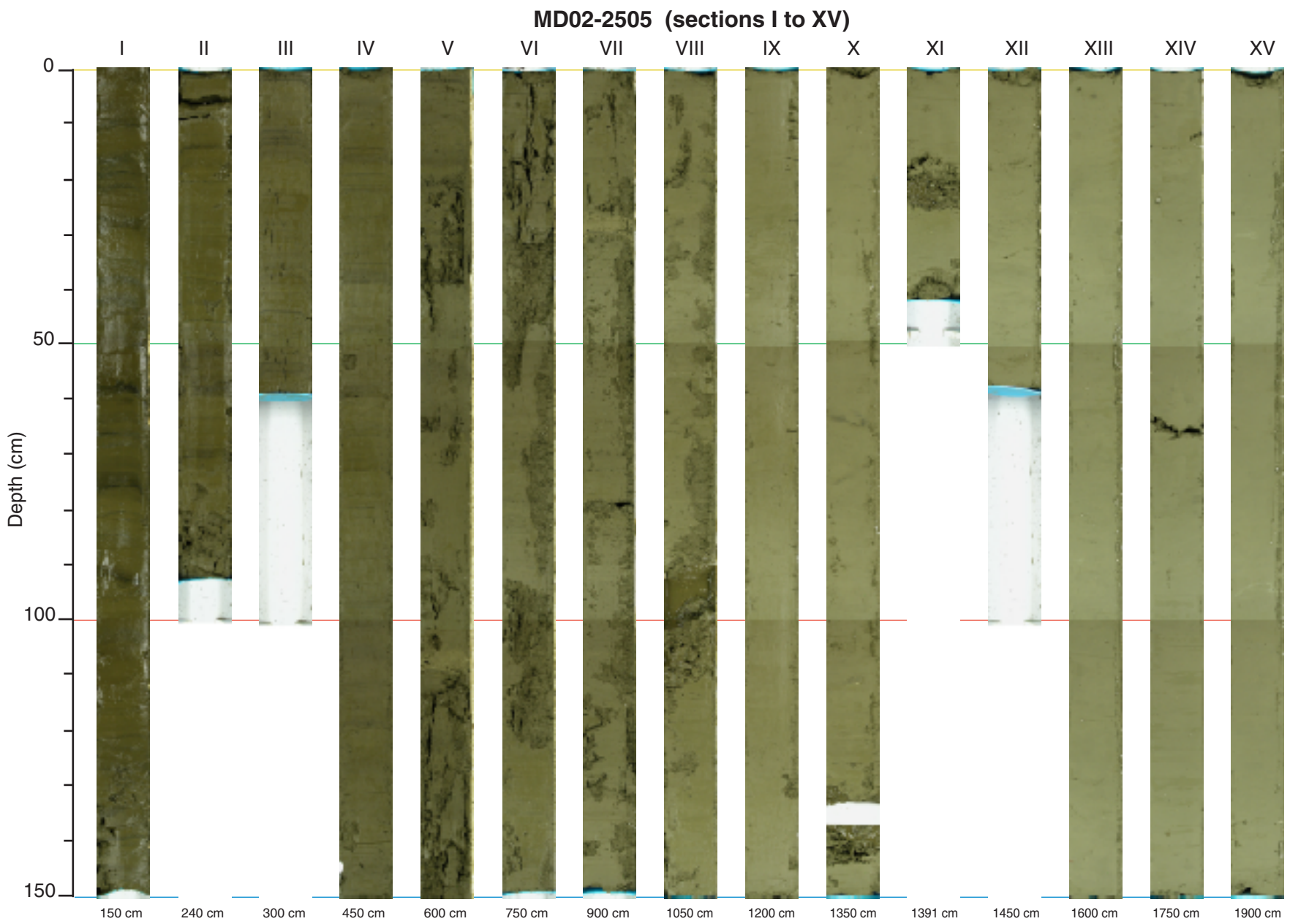
Nannofossil silty clay with traces of detrital carbonate, opaques, forams, and diatoms.

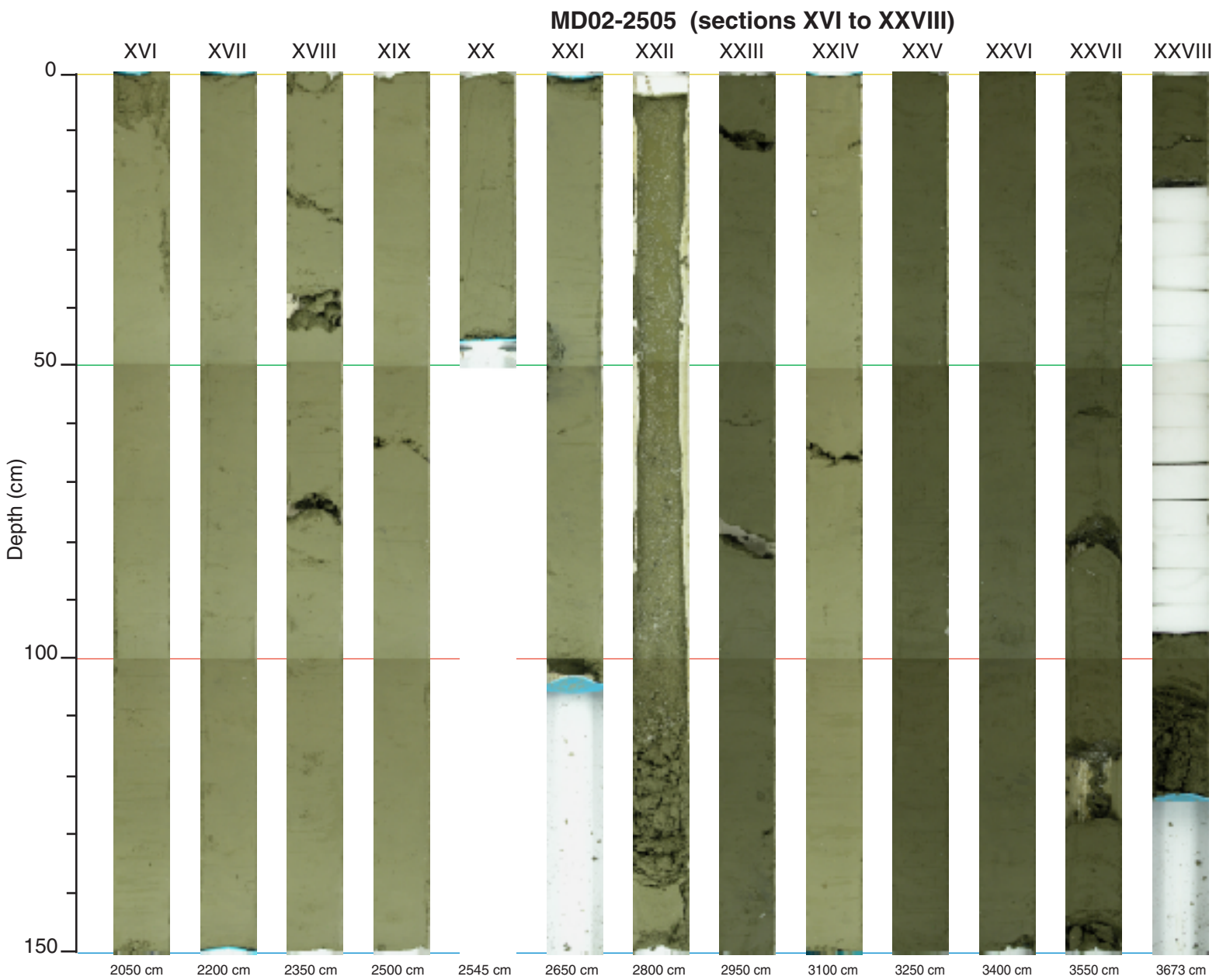
Gastropod.

Nannofossil clayey silt.

Massive nannofossil clayey silt.

End of core, 3673 cm.

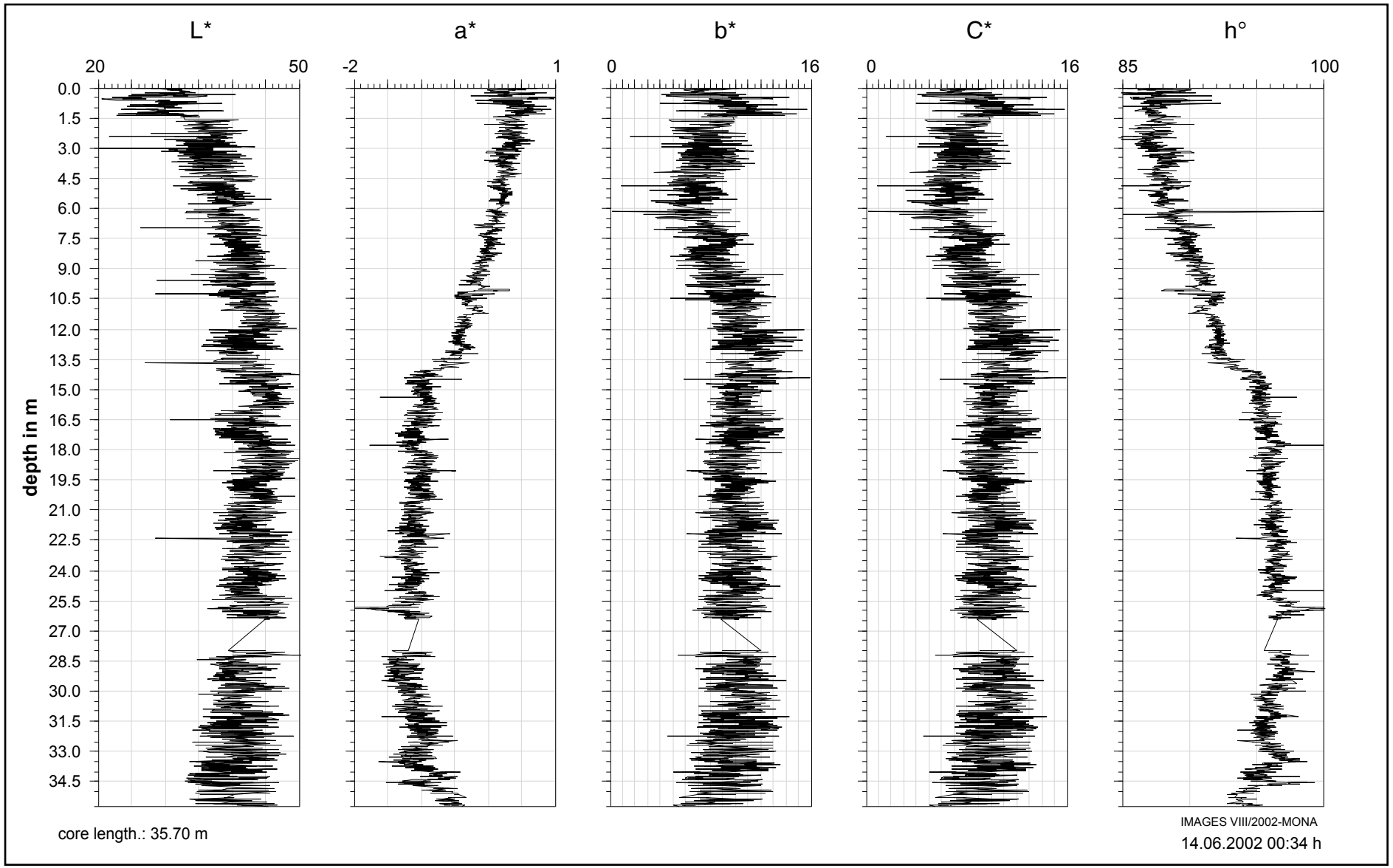

MD02-2505 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
240 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1391 cm
1450 cm
1600 cm
1750 cm
1900 cm


MD02-2505 (sections XVI to XXVIII)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
0
50
100
150
Depth (cm)
2050 cm
2200 cm
2350 cm
2500 cm
2545 cm
2650 cm
2800 cm
2950 cm
3100 cm
3250 cm
3400 cm
3550 cm
3673 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

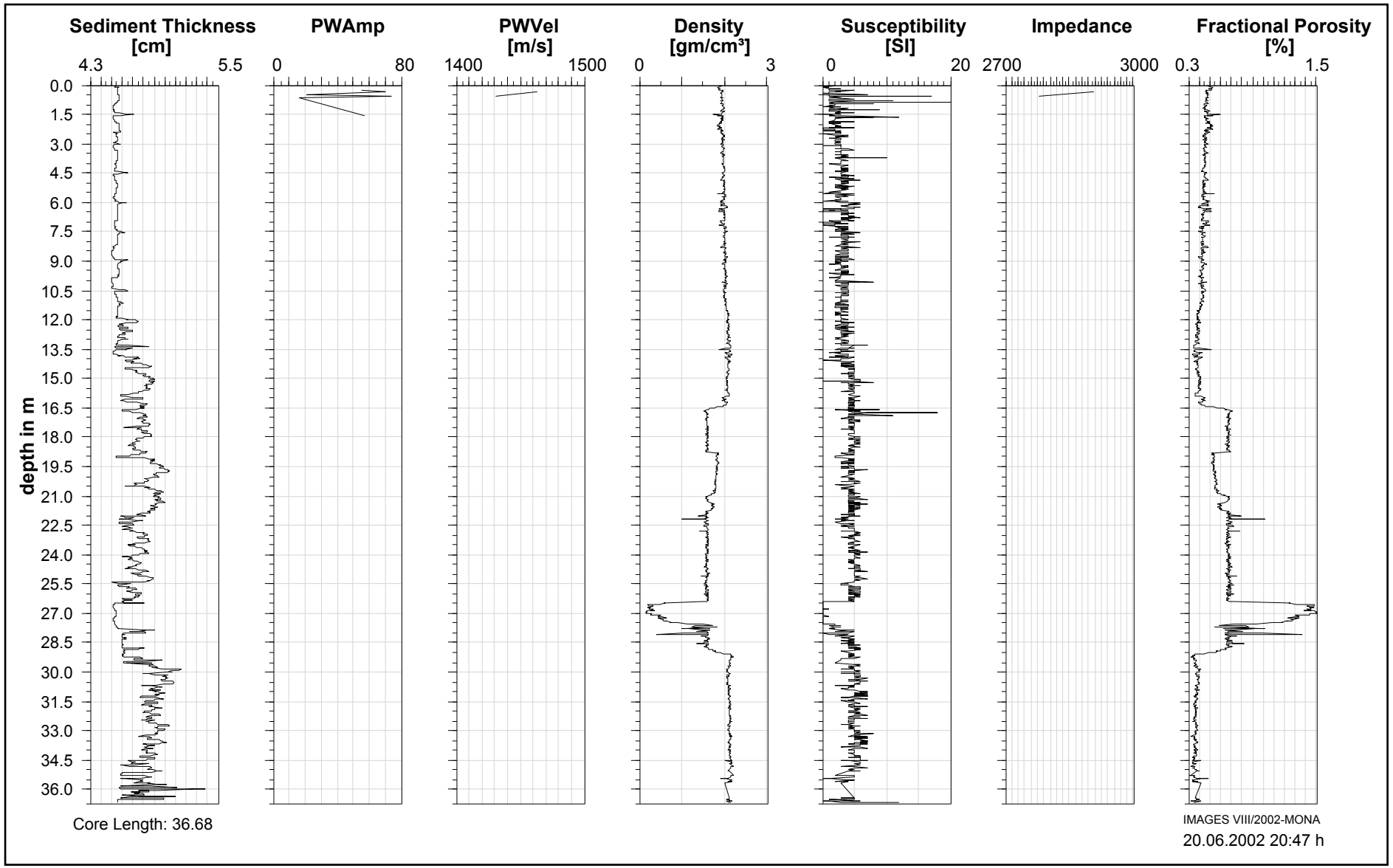
Station 14
Core MD02-2505



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 14
Core MD02-2505



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **09.06.2002**

N° de station : **14**
San Lazaro 1

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2506 C2

(MD - année - milles - centaines)

CAROTTE (longueur) :

m

POSITION :

Latitude : **25° 12.05 N**

Longitude : **112° 43.08 W**

CAROTTIER (type) (1) : **CAROTTIER CARRE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **541** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **Déjà en station**

Début manœuvre : **19:40**

Déclenchement : **19:56**

Fin de manœuvre : **20:43**

Durée de manœuvre : **01:03**

Départ station : **20:43**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

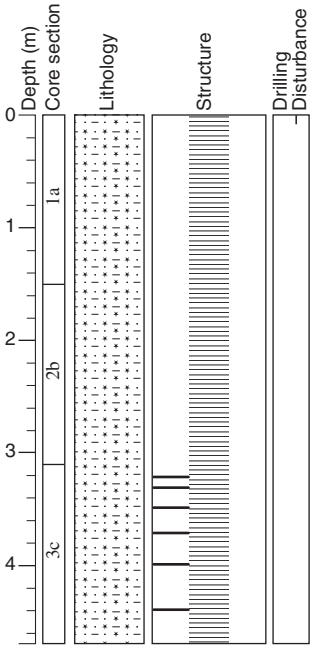
Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MONA

Core: MD02-2506 C^2

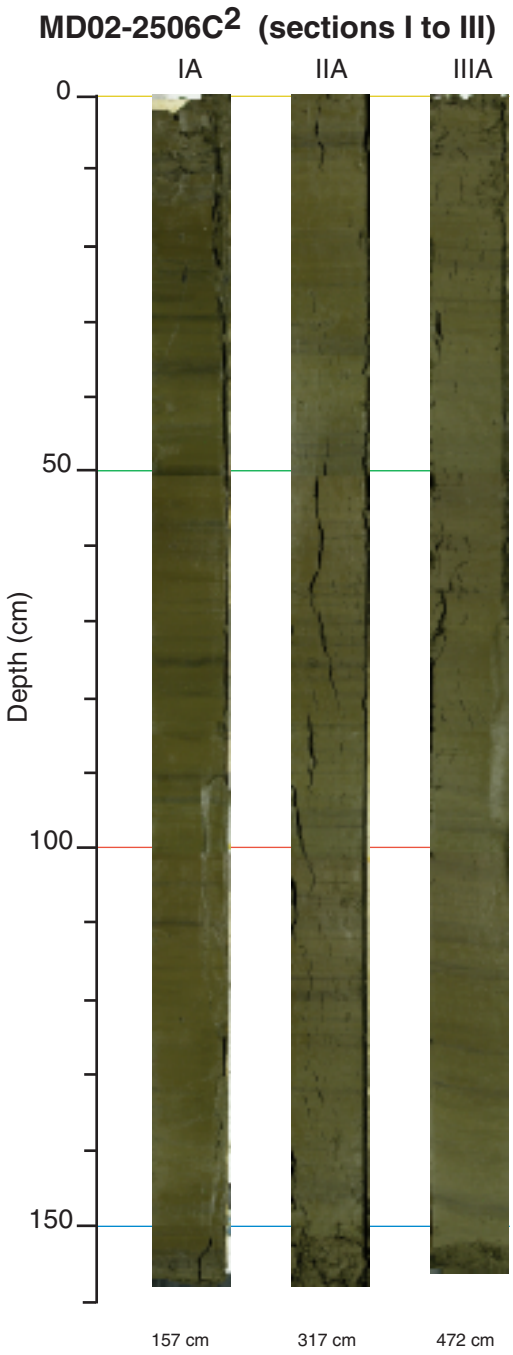


Comments

Dark olive grey grading to olive grey nannofossil sity clay. Faint laminations throughout.

Irregularly placed dark grey bands.

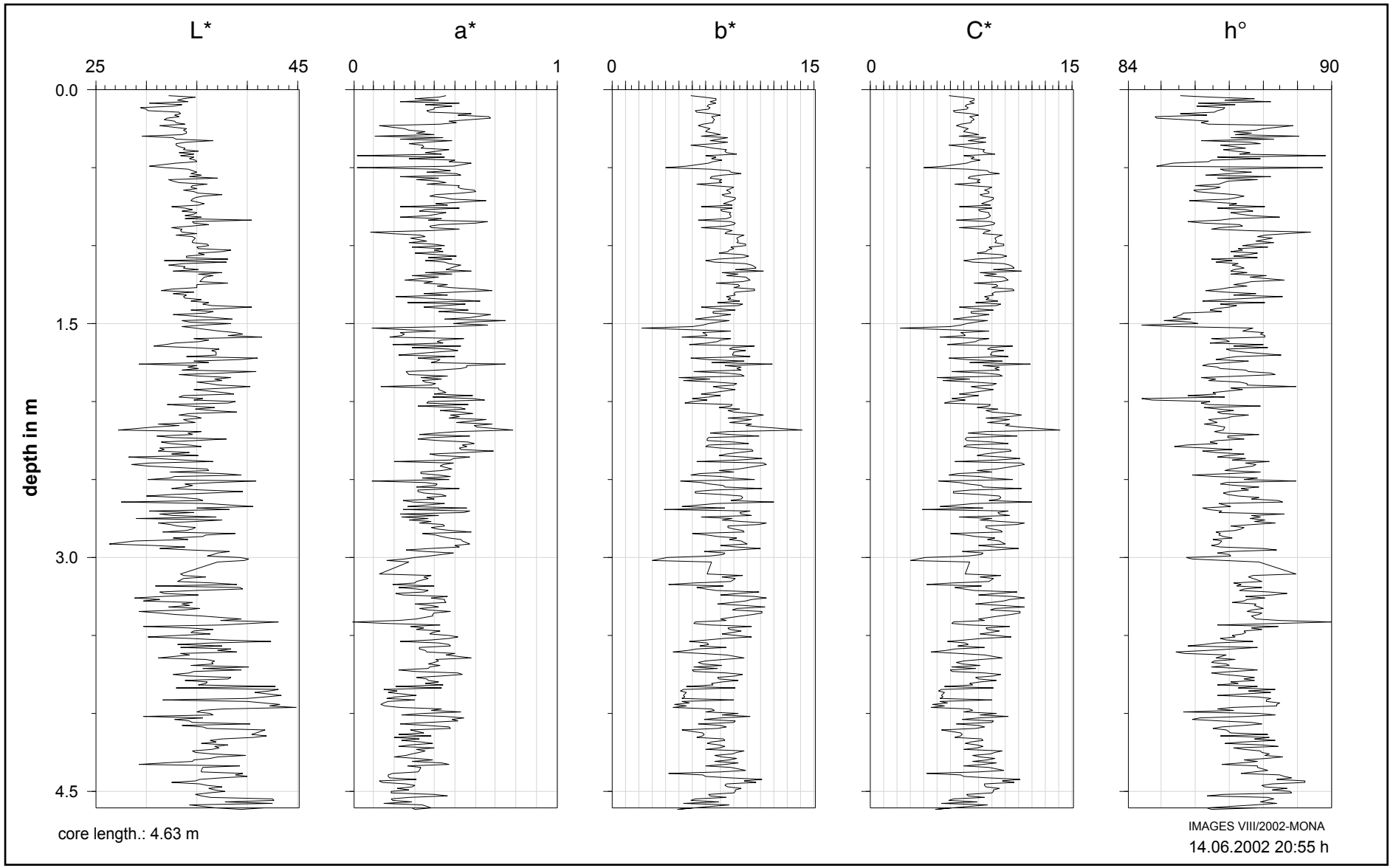
End of core, 465 cm.


MD02-2506C2 (sections I to III)
IA
IIA
IIIA
0
50
100
150
Depth (cm)
157 cm
317 cm
472 cm

IMAGES VIII, 2002
MONA

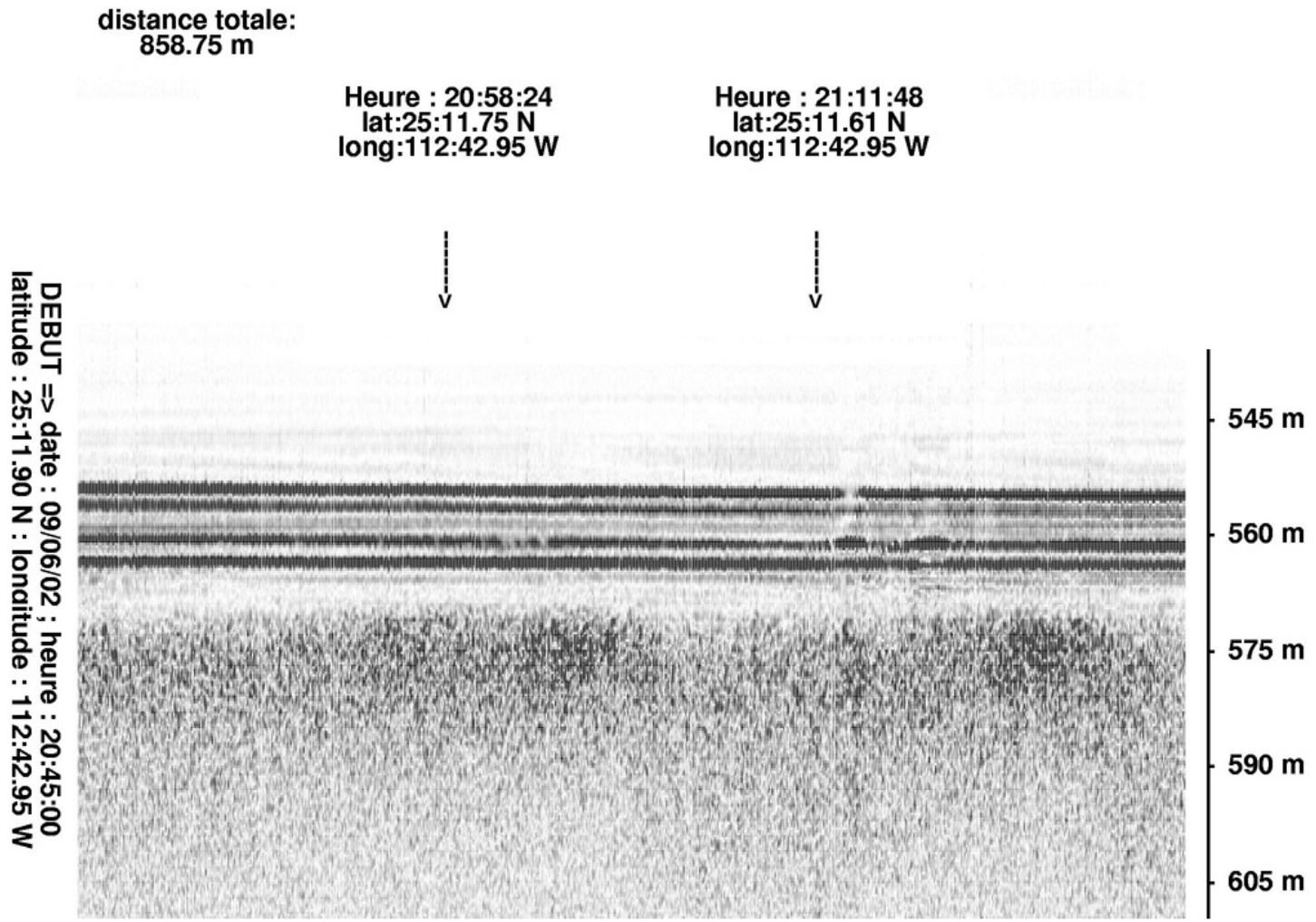
Colour Reflectivity

Station 14
Core MD02-2506C



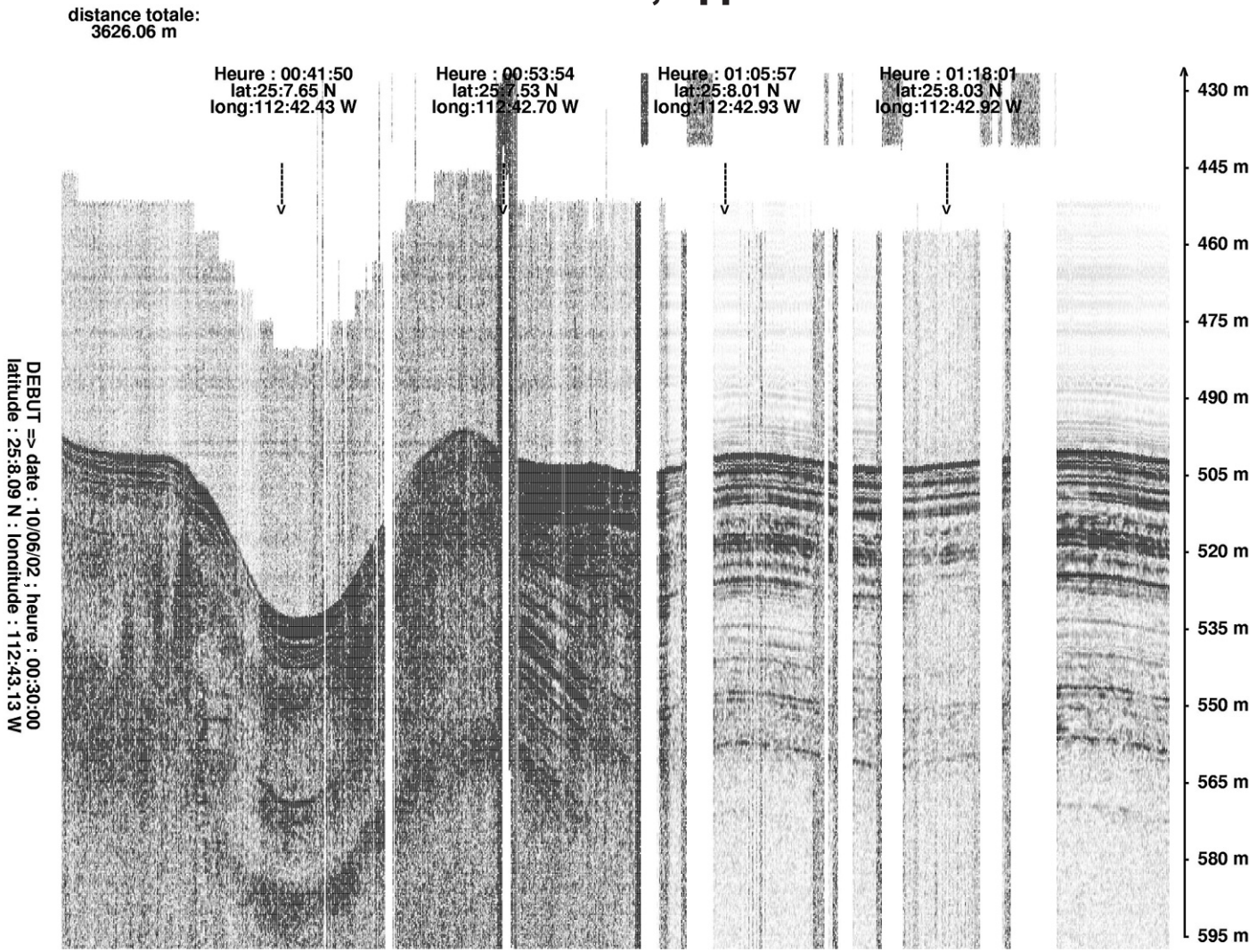
3.5 kHz Seismic Replay

Station 14 , Departure



3.5 kHz Seismic Replay

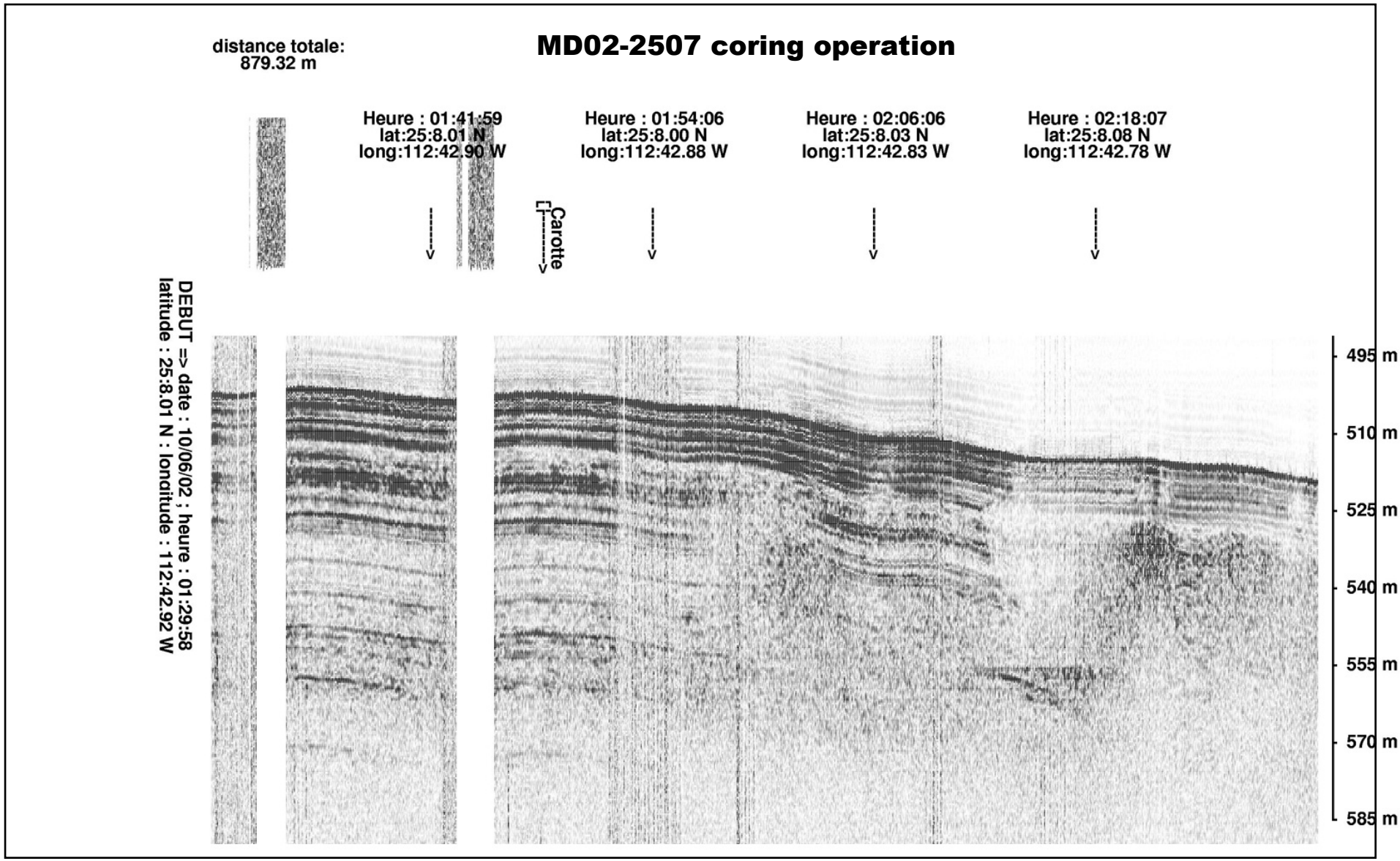
Station 15 , Approach



IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 15
Core MD02-2507



INSTITUT PAUL EMILE VICTOR — MARION DUFRESNE

NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **10.06.2002**

N° de station : **15**
San Lazaro 2

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2507

(MD - année - milles - centaines)

CAROTTE (longueur) :

36.51 m

POSITION :

Latitude : **25° 08.00 N**

Longitude : **112° 42.09 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **492** **m**

Ligne filée : **449.00** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **01:10**

Début manœuvre : **01:41**

Déclenchement : **01:48**

Fin de manœuvre : **02:25**

Durée de manœuvre : **00:44**

Départ station : **?**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents : **tordue à 5 m**

end of the core : 3651 m

0	150	300	450	600	750	900	1050
I	II	III	IV	V	VI	VII	
X 137	150	150	150	150	150	150	

1050	1200	1350	1500	1650	1800	1950	2100
VIII	IX	X	XI	XII	XIII	XIV	
150	150	150	150	150	15 X 100	150	

2100	2250	2400	2550	2700	2850	3000	3150
XV	XVI	XVII	XVIII	XIX	XX	XXI	
90	X 94	150	150	150	150	150	

3150	3300	3450	3600	*3651*
XXII	XXIII	XXIV	XXV	
150	100 X 43	150	50	

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

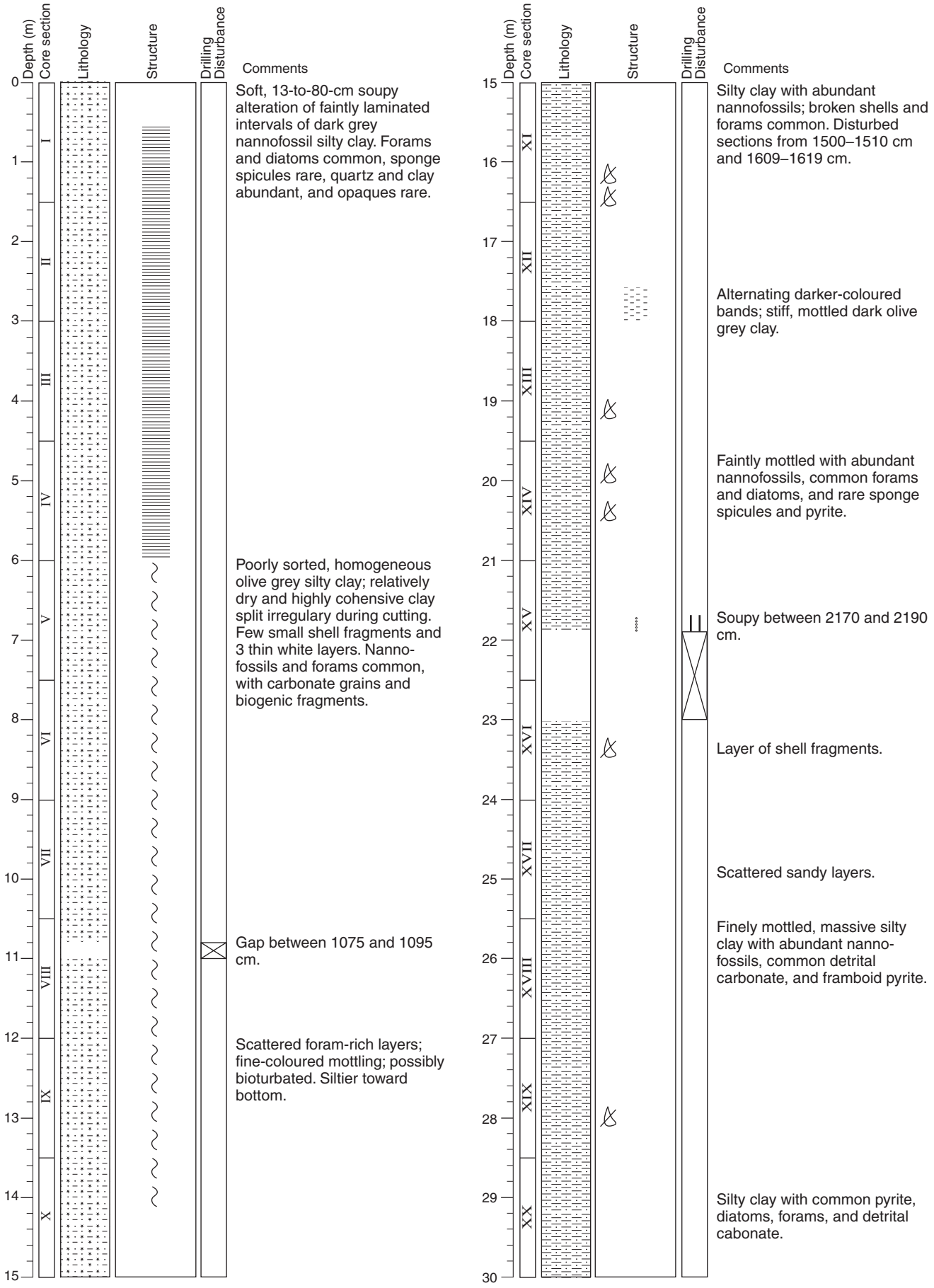
Calypso Core MD 02-2507

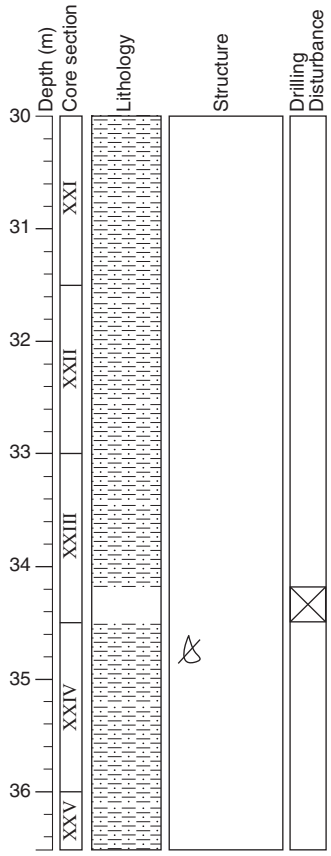
(Station 15, San Laguro 2 ; Latitude 25° 07. 99N ; Longitude : 112° 42. 92W ; 495m water depth) has recovered a total of 36.50m of sediment. The sediment has generally not been disturbed by coring, with the exception of short soupy intervals from 0.13m to 0.80m (Section I) and from 21.70m to 21.90m (Section XV), and of empty intervals from 10.75m to 10.95m (Section VIII), 21.90m to 23.00m (Sections XV and XVI) and from 34.20m to 34.50m (Section XXIII).

The dominant sediment consists of nannofossil silty clay and silty clay, olive grey, dark olive grey and dark grey in color. The upper part of the core, down to 6.00m (bottom of Section IV) is faintly but continuously laminated. From 6.00m (top of Section V) to14.00m (Section X) the sediment is homogeneous and slightly bioturbated, with occasional foraminifer rich layers. The lower part of the core from 14.00m (Section X) to bottom is mostly massive with rare bioturbated intervals and shell fragments. A short laminated interval occurs from 17.50m to 18.00m (Section XII). Sandy layers are present in Section XVII.

MONA

Core: MD02-2507





Comments

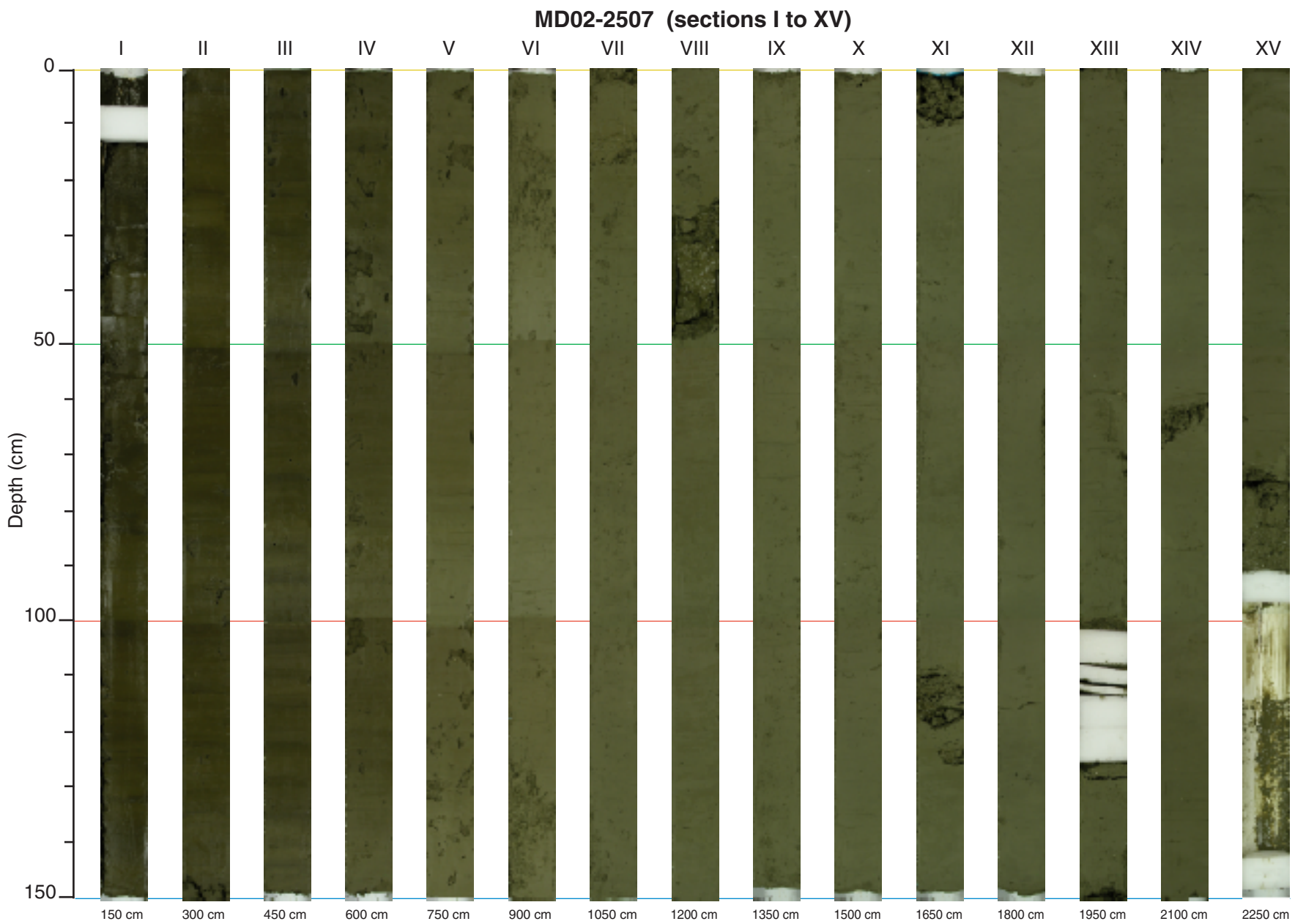
Faintly mottled silty clay with traces of bioturbation, large burrows, rare fish scales, and shell fragments.

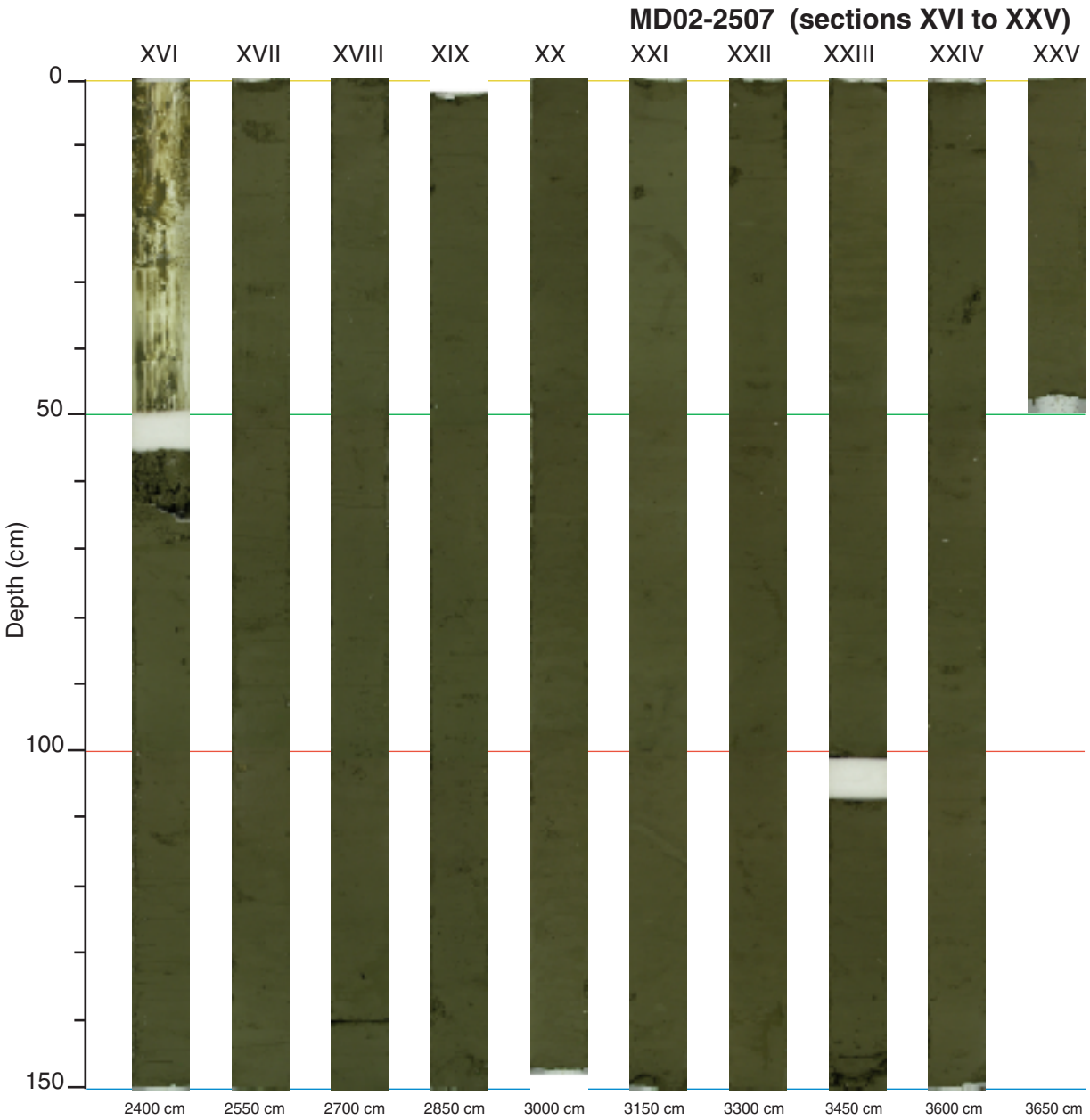
Faint burrows and mottling, abundant nannofossils, common shell fragments, diatoms, sponge spicules, and pyrite.

Abundant nannofossils, detrital carbonates, benthic foraminifera and fish scales.

Faintly mottled with framboidal pyrite, sponge spicules, and detrital carbonate.

End of core, 3650 cm.

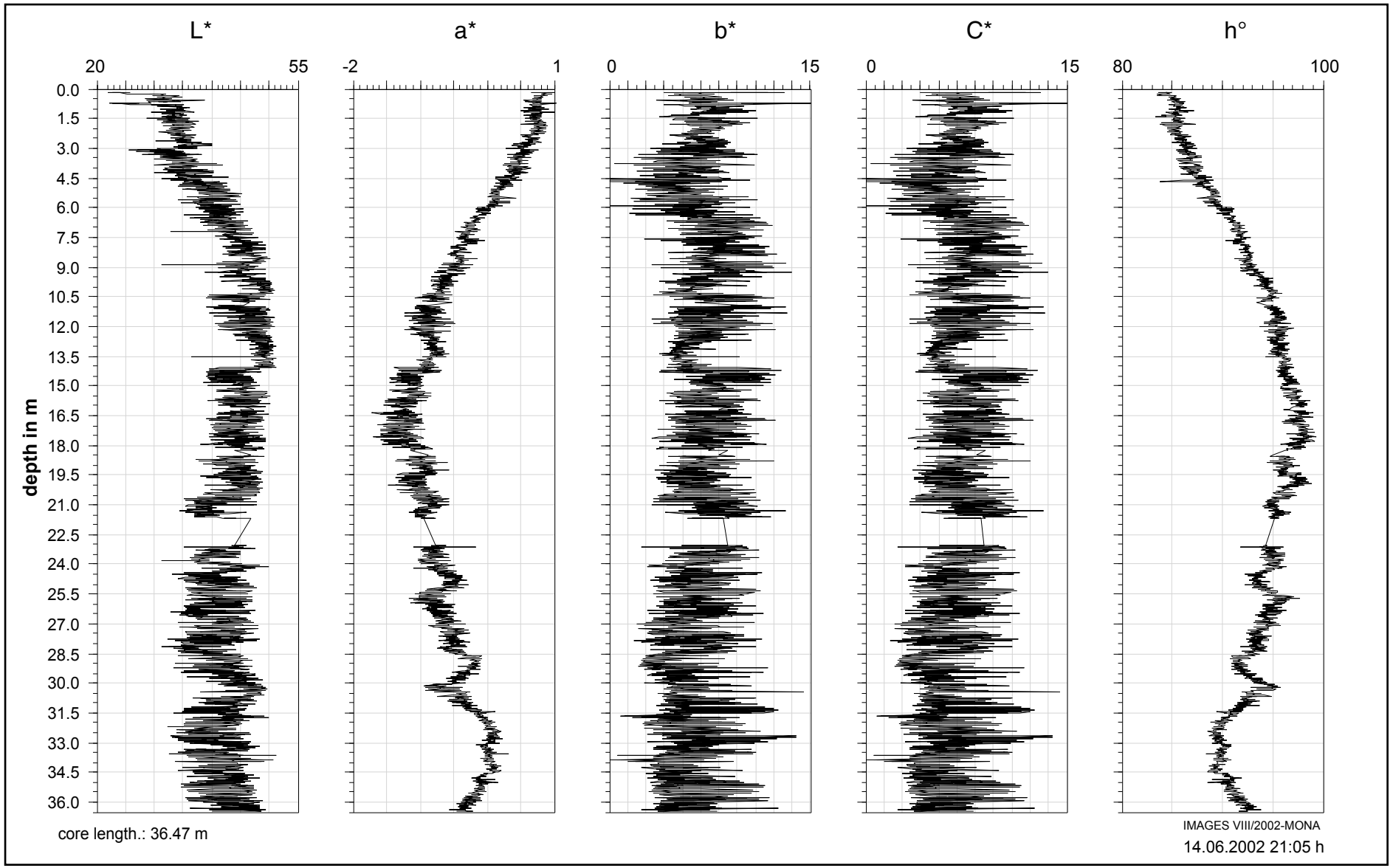

MD02-2507 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2507 (sections XVI to XXV)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3650 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

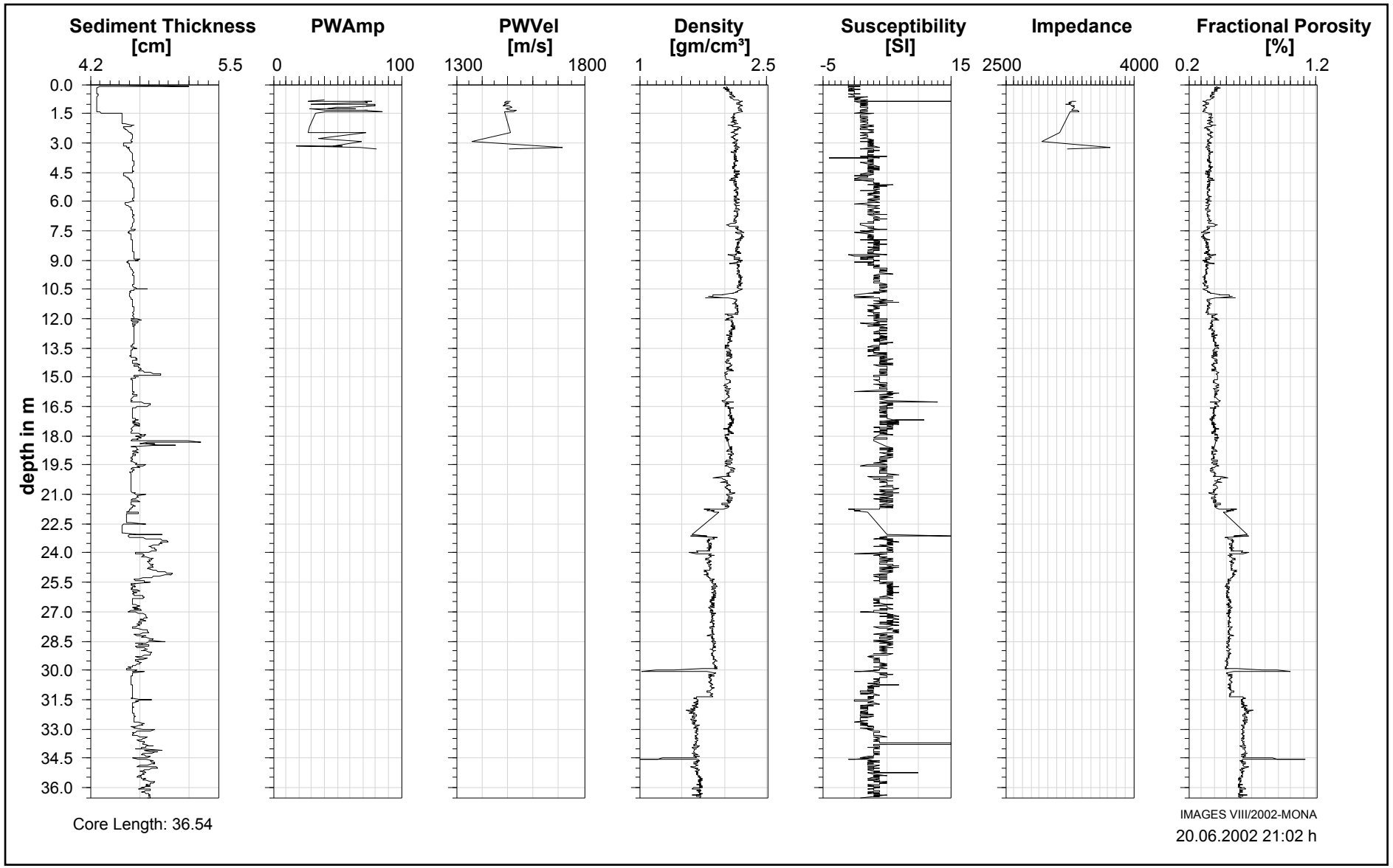
Station 15
Core MD02-2507



IMAGES VIII, 2002
MONA

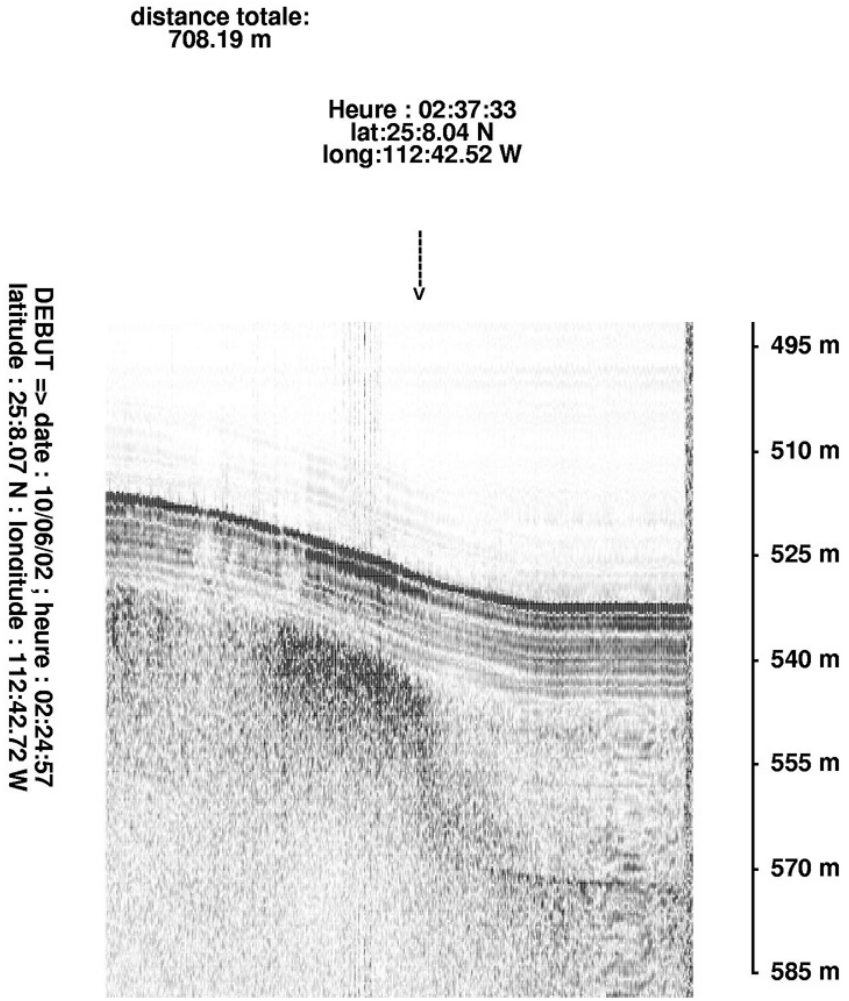
Multi Sensor Core Logger

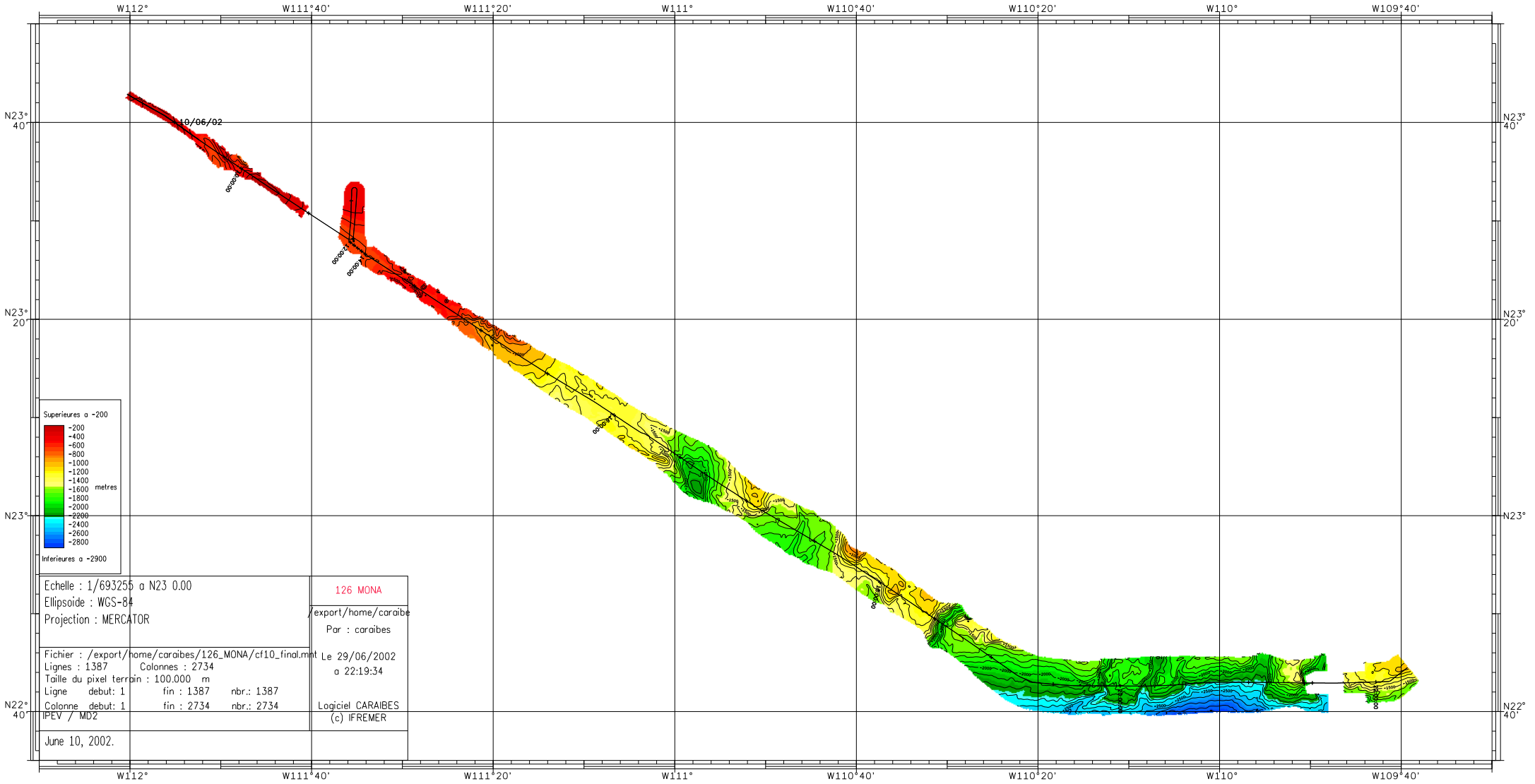
Station 15
Core MD02-2507



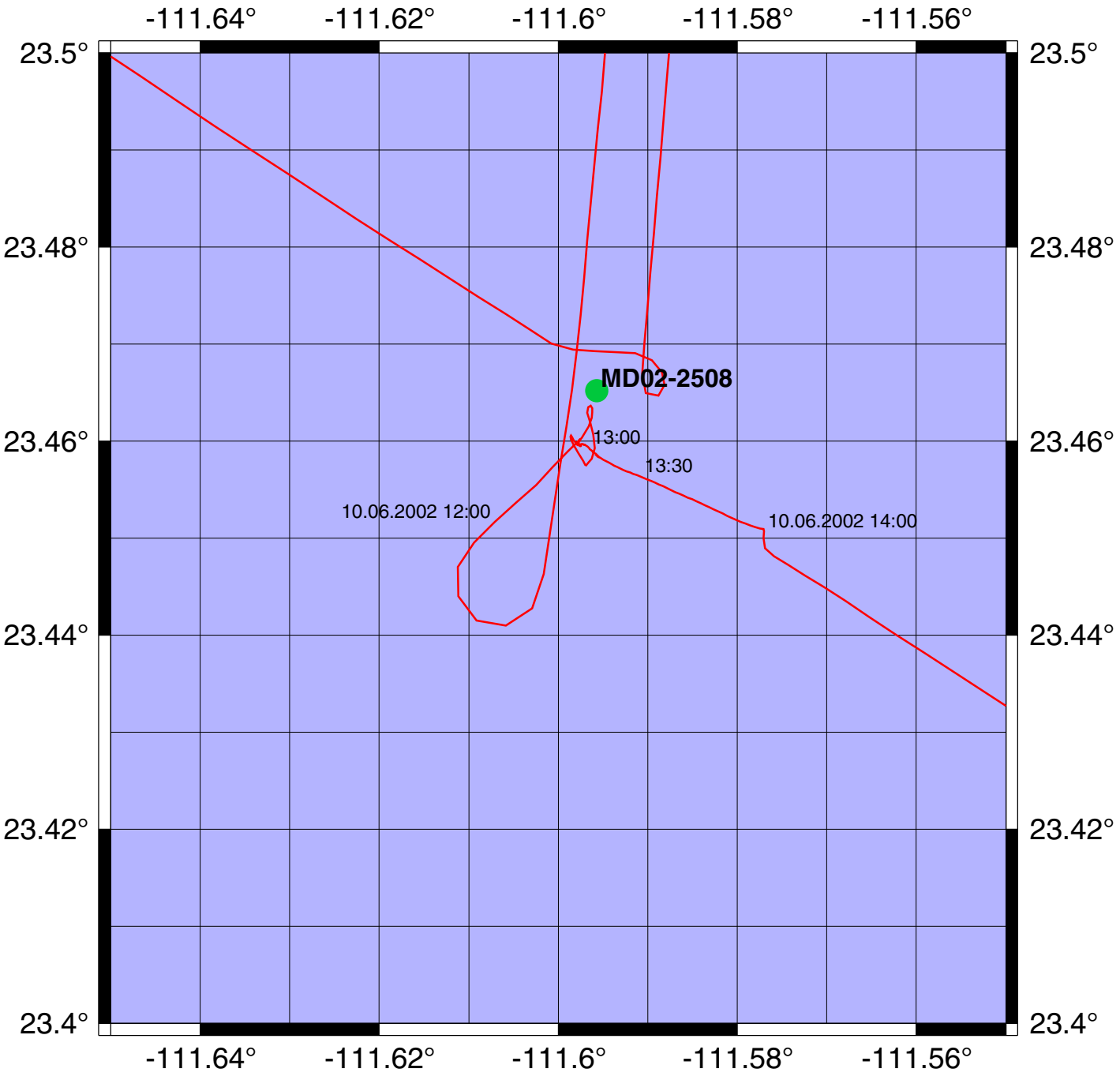
3.5 kHz Seismic Replay

Station 15 , Departure




W112°
W111°40'
W111°20'
W111°
W110°40'
W110°20'
W110°
W109°40'
N23° 40'
N23° 20'
N23°
N22° 40'
10/06/02
Superieures a -200
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
-2000
-2200
-2400
-2600
-2800
metres
Inferieures a -2900
Echelle : 1/693255 a N23 0.00
Ellipsoide : WGS-84
Projection : MERCATOR
Fichier : /export/home/caraibes/126_MONA/cf10_final.mnt
Lignes : 1387 Colonnes : 2734
Taille du pixel terrain : 100.000 m
Ligne debut: 1 fin : 1387 nbr.: 1387
Colonne debut: 1 fin : 2734 nbr.: 2734
IPEV / MD2
June 10, 2002.
126 MONA
/export/home/caraibe
Par : caraibes
Le 29/06/2002
a 22:19:34
Logiciel CARAIBES
(c) IFREMER

IMAGES VIII/MD126, MONA
Station 16, Magdanella Margin



GMT 2002 Sep 25 16:09:09

NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **10.06.2002**

N° de station : **16**
Magdanella Margin

Météo : (force) / Direction
Vent : **faible**
Mer : **2**
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2508

(MD - année - milles - centaines)

CAROTTE (longueur) :

40.42 m

POSITION :

Latitude : **23° 27.91 N**

Longitude : **111° 35.74 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **7.00** t

Poids total (eau) : **6.60** t

REGLAGES :

Tubes (longueur) : **41.90** m

Câbles :
Chute libre : **1.50** m

Boucle : **1.60** m

LC poids : **46.60** m

CONTREPOIDS :
Type (2) : **Cylindre**

Longueur PVC : m

Pénétration : m

Longueur de carotte : m
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **702** m

Ligne filée : **666** m

Arrachement/total *(tonne)* : **18.60** t

Arrachement/différentiel *(tonne)* : **12.00** t

Pénétration/apparente *(m)* : **39.00** m

Pénétration/tensiomètre *(m)* : **39,90 ?** m

HEURES (GMT)

En station : **12:27**

Début manœuvre : **12:27**

Déclenchement : **13:04**

Fin de manœuvre : **13:10**

Durée de manœuvre : **00:43**

Départ station : **13:10**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

Pénétration non totale (-2,50)
Tordu dans sédiment (-2,50)
Cassure du liner au niveau du manchon +- 2 cm de sédiment
Extrudé à ce niveau (2698) recupére en ordre imparfait

0	*150*	*300*	*450*	*600*	*750*	*900*	*1050*
I	II	III	IV	V	VI	VII	

1050	*1200*	*1350*	*1500*	*1650*	*1800*	*1950*	*2100*
VIII	IX	X	XI	XII	XIII	XIV	

2100	*2250*	*2400*	*2550*	***2698***	*2900*	*3050*
XV	XVI	XVII	XVIII	XIX	XX	
				EXTRUDED		

3050	*3200*	*3350*	*3500*	*3650*	*3800*	*3950*	***4042***
XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII	

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2508

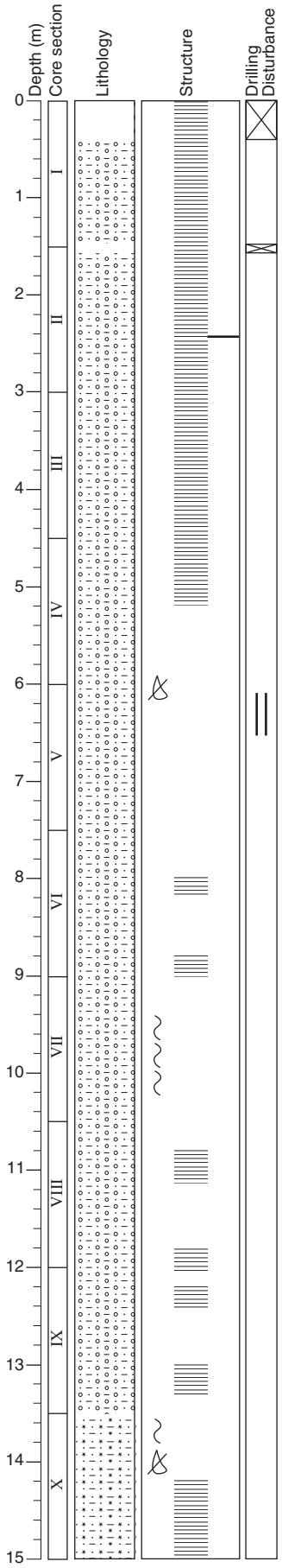
(Station 16 ; Latitude 23° 27. 91N ; Longitude : 111° 35. 74W ; 606m water depth) recovered a total of 40.42m of sediment. During opening operations on the deck, 1m of sediment was extruded from the top of Section XX (Section XIXA). Some empty intervals are present from top to 1.50m (Section I) and from 24.00m (Section XVII) to 35.50m (Section XXIV). Other intervals have been disturbed by coring, in Section V and Section XXIV.

The dominant sediment consists of biogenic and terrigenous mixed sediments : nannofossil diatom silty clay, clayey nannofossil diatom mixed sediments, clayey nannofossil foraminifer mixed sediments, foraminifer and nannofossil silty clay, and nannofossil clay. Colors range from olive gray and dark olive gray to very dark gray. The upper part of the core, down to 5.00m (Section IV) is continuously laminated, with some isolated layers enriched in foraminifers. From 5.00m (Section IV) to 24.00m (bottom Section XVI) the sediment is mostly massive, with some bioturbated and some laminated intervals. From 24.00m (top of Section XVII) to the bottom of the core, the sediment is mostly laminated. Some intervals contain distinct evidence of slope unstability : slumps and cross-beddings.

Minor lithologies include :
- Silty clay, olive grey to dark grey, in Section X, and sections XII and XIII.
- Clay, in Section XV.

MONA

Core: MD02-2508



Comments

Faintly laminated alternating layers of dark olive grey and very dark grey nannofossil-diatom silty clay with diffuse contact.

Clayey nannofossil-diatom mixed sediments to clayey, organic nannofossil-diatom mixed sediments.

Isolated layers of clayey nanno-fossil-diatom ooze with forams.

Forams and organic debris common.

Very dark grey laminations to 527 cm. Very dark intervals are thinner than those in upper section.

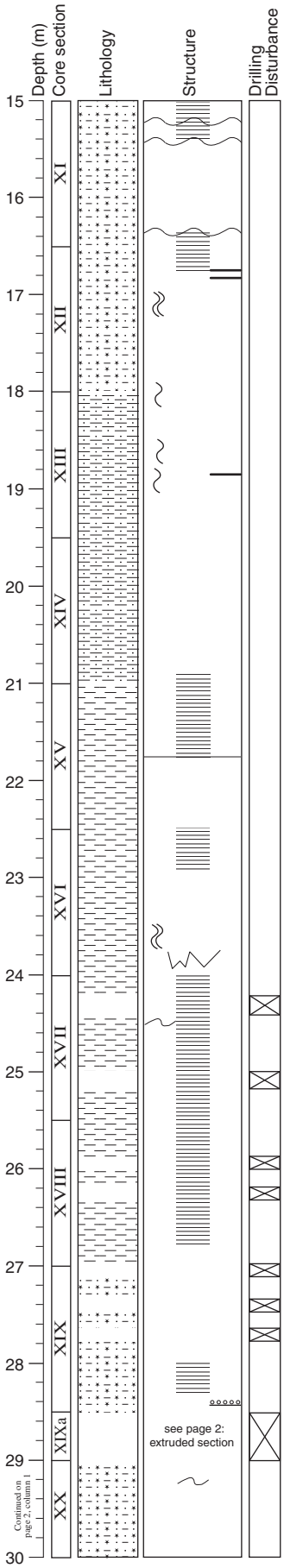
Slightly mottled dark olive grey to olive grey clayey foram-nannofossil mixed sediments with bioclasts and quartz.

Dark olive grey to very dark grey with a gradational contact. Slight bioturbation with a few dark flecks and lenses.

Generally massive with intervals of very dark grey to black laminations.

Minor lithology at 1280 cm: clayey foram-nannofossil mixed sediments with quartz and organic debris.

Dark olive grey silty clay with pockets of scattered forams throughout.



Comments

Clayey foram-nannofossil-diatom ooze with a methane odour. Forams common throughtout. Minor lithology consists of black layers, diatoms, clays, radiolaria; no nannofossils present.

Silty clay grading from dark grey to olive grey with shell fragments and forams present.

Silty clay with dark grey patches.

Isolated layer of diagenetic clay to foram-nannofossil ooze.

Graded olive grey to dark olive grey banded sediments; light band includes foram clay with nannofossils. Dark band includes clay with organic matter.

Clay with forams and nanno-fossils.

Sharp contact, darkening with depth, with faint large bands at the base.

Homogeneous silty nannofossil clay.

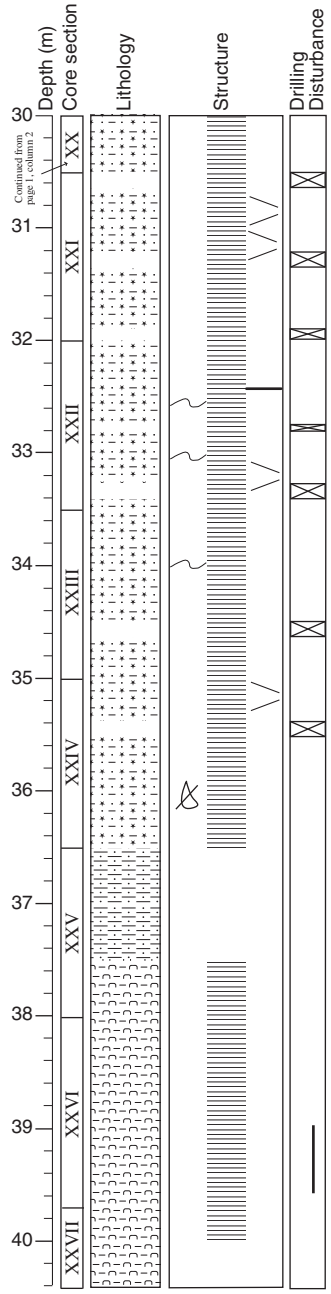
Slumped.

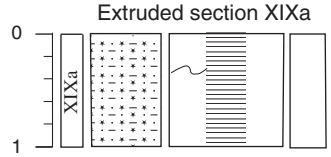
Alternating olive grey to very dark grey bands; contacts sharp and banded; without laminations.

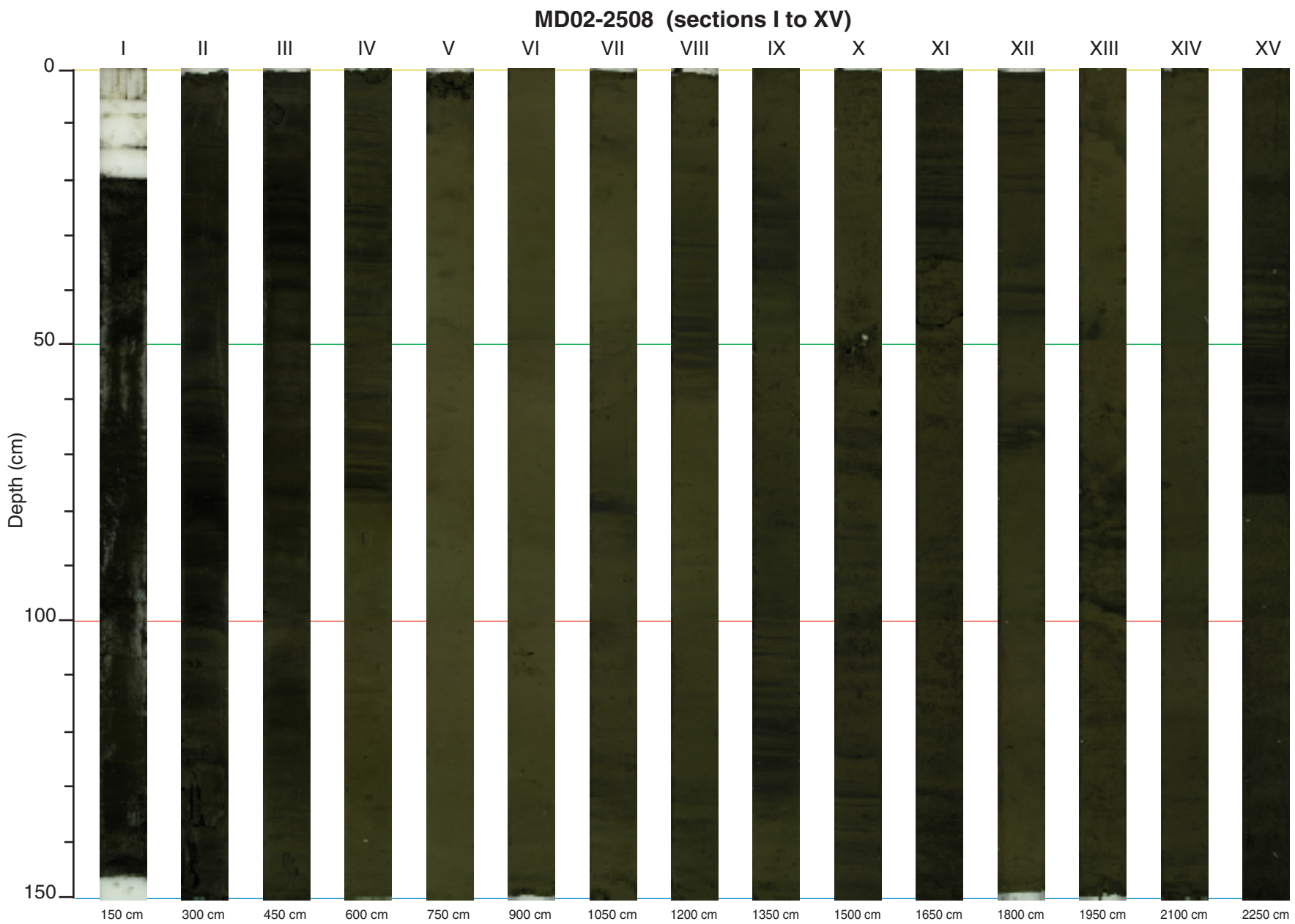
Regular light and dark banding and intervals with a slightly sandy appearance.

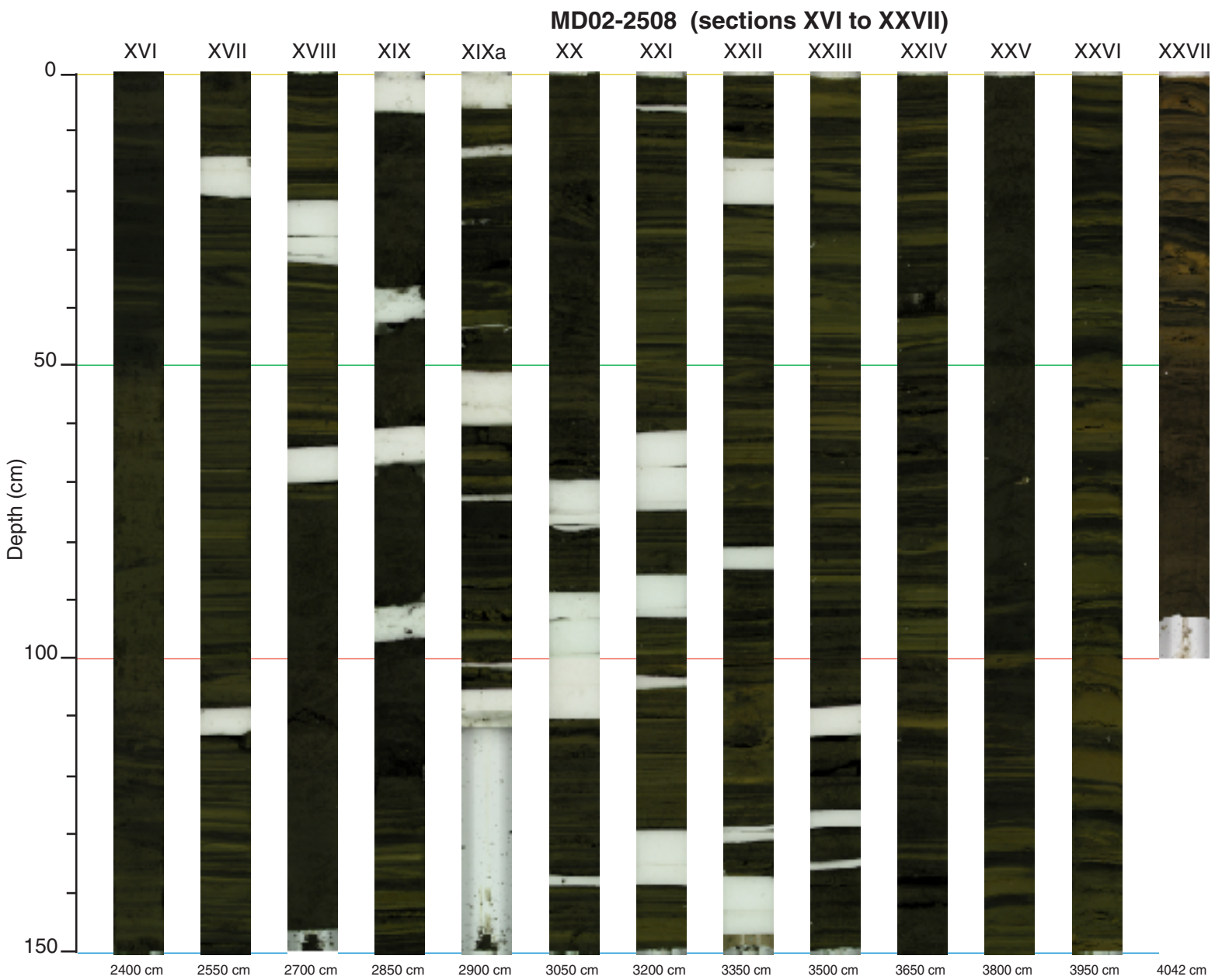
Banded layers.

Alternating layers of light and dark foram and nannofossil-silty-clay mixed sediments with bioclasts.


Depth (m)
Core section
Lithology
Structure
Drilling Disturbance
Comments
30
31
32
33
34
35
36
37
38
39
40
Continued from page 1, column 2
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
Banded and finely laminated from 3162 to 3175 cm.
Nannofossil-clay mixed sediments with diatoms.
Alternating layers of light and dark.
Cross bedding.
Nannofossil-clay mixed sediment with diatoms.
Cross bedding and irregular banding.
Massive silty clay with forams and nannofossils below 3634 to 3750 cm.
Irregular banding thickness. Diatom ooze with clays.
Laminations disturbed by coring.
Massive structure.
End of core, 4042 cm.


Extruded section XIXa
0
1
XIXa
Silty diatom-rich clay; faintly laminated.

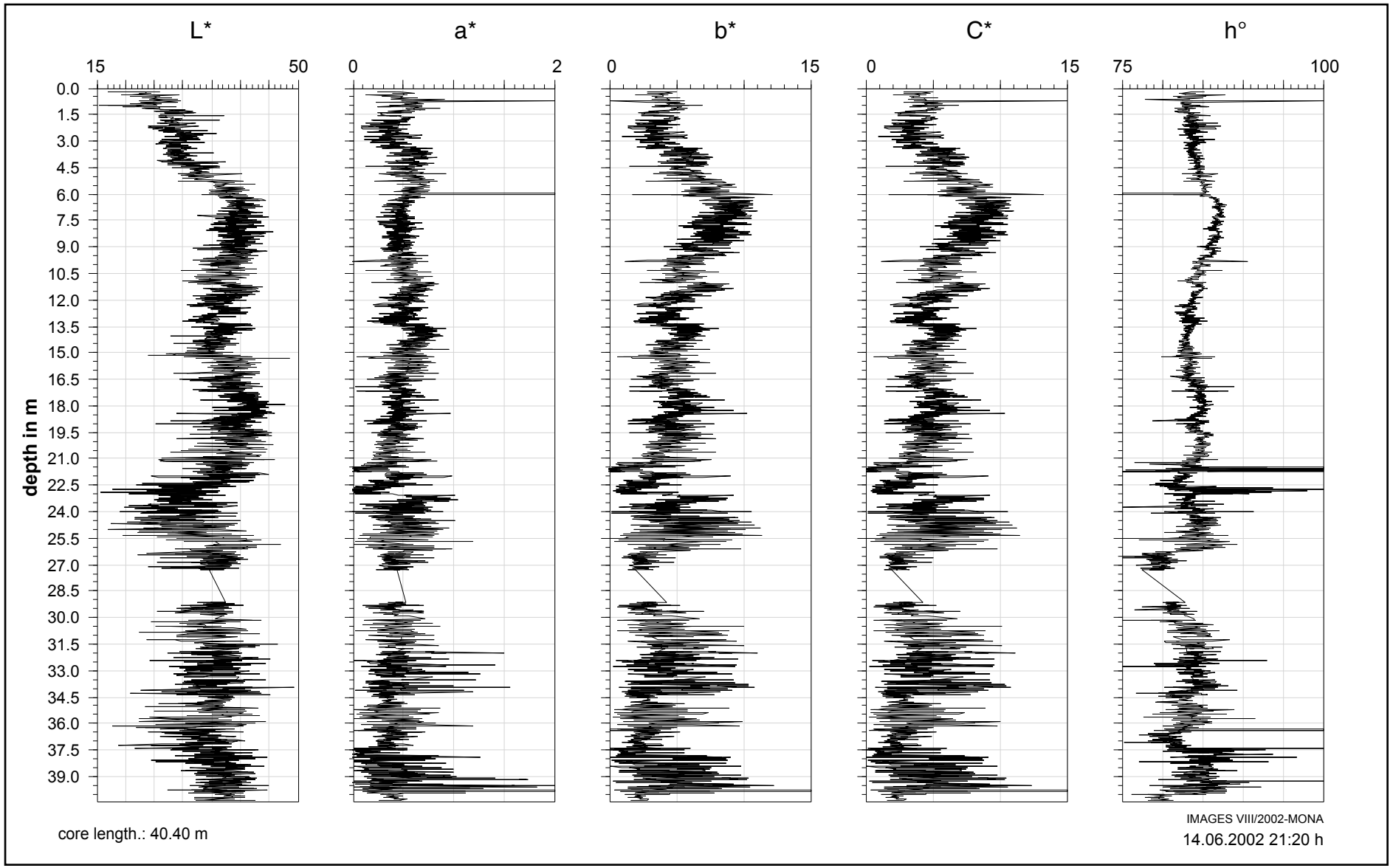

MD02-2508 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2508 (sections XVI to XXVII)
XVI
XVII
XVIII
XIX
XIXa
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
2900 cm
3050 cm
3200 cm
3350 cm
3500 cm
3650 cm
3800 cm
3950 cm
4042 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

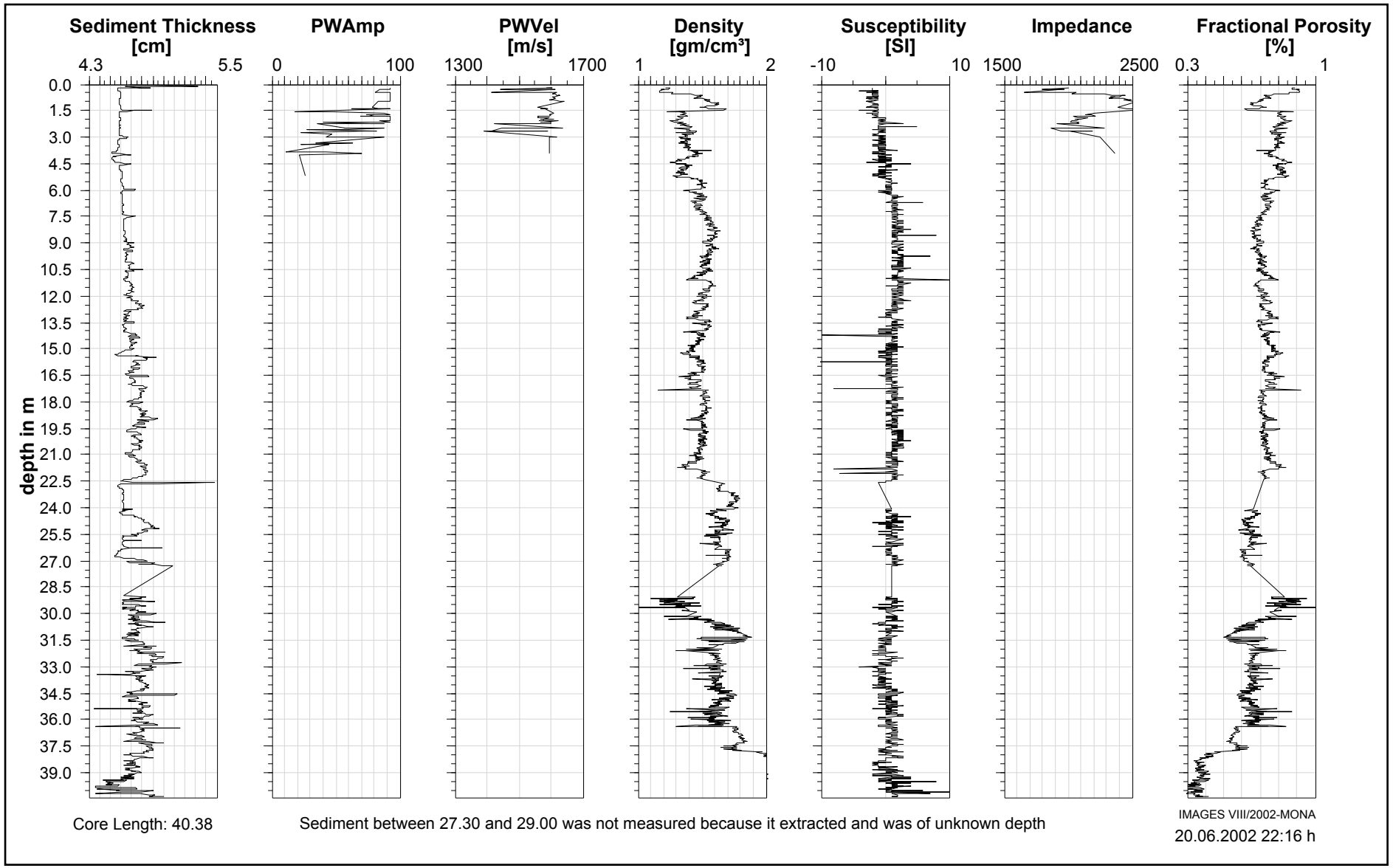
Station 16
Core MD02-2508



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 16
Core MD02-2508

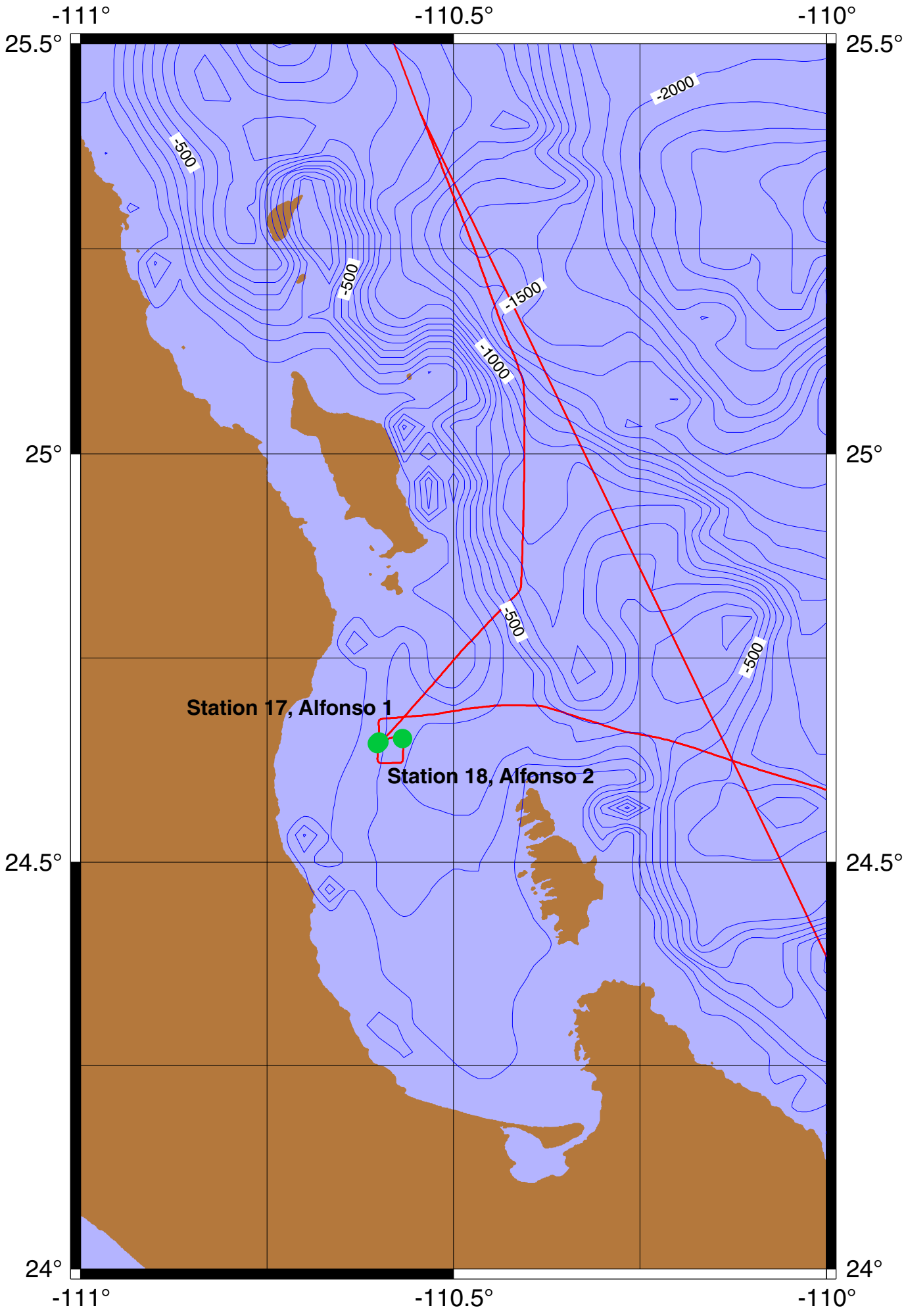


Core Length: 40.38

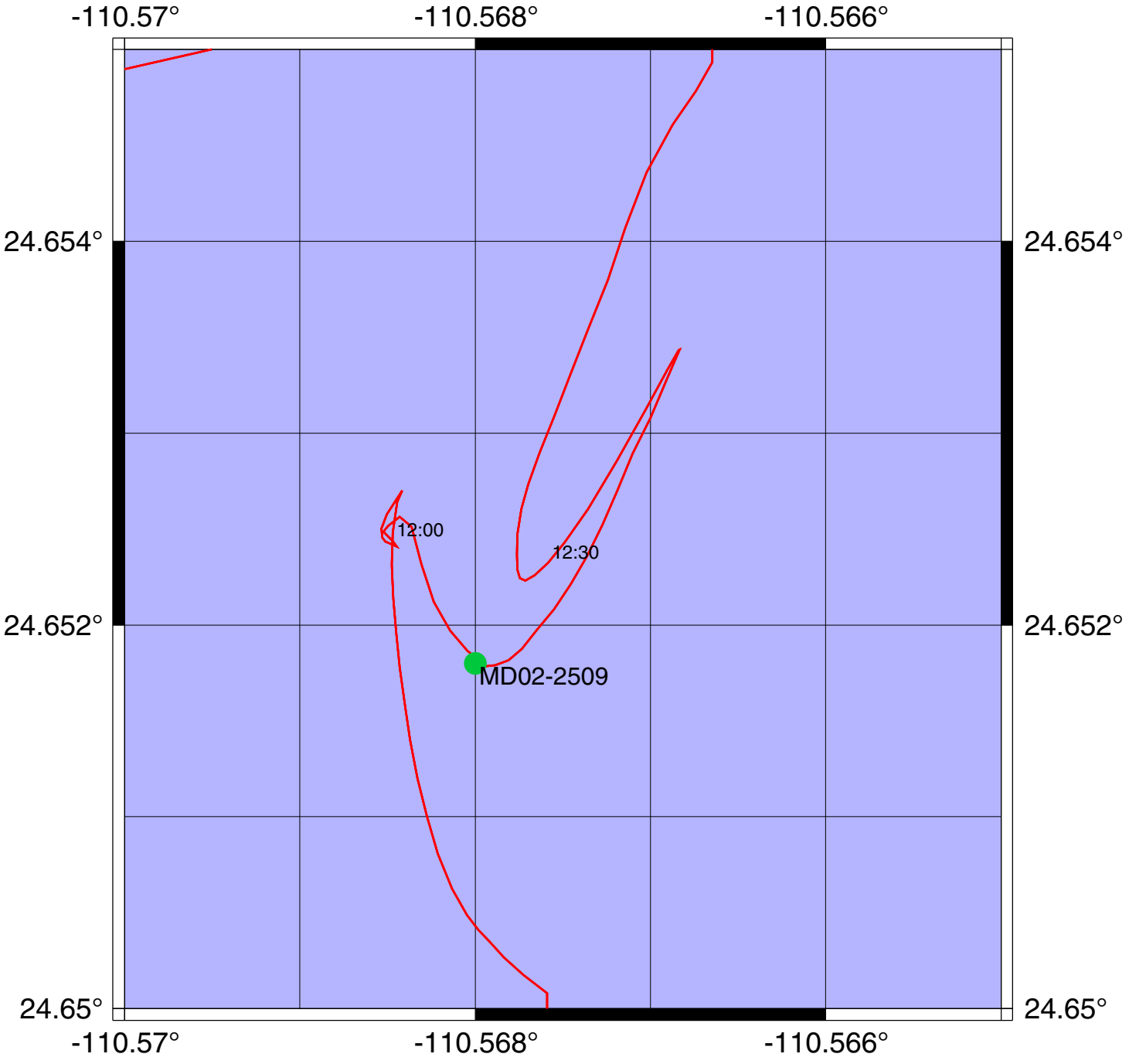
Sediment between 27.30 and 29.00 was not measured because it extracted and was of unknown depth

IMAGES VIII/2002-MONA
20.06.2002 22:16 h

IMAGES VIII/MD126, Mona
Alfonso 1 & 2



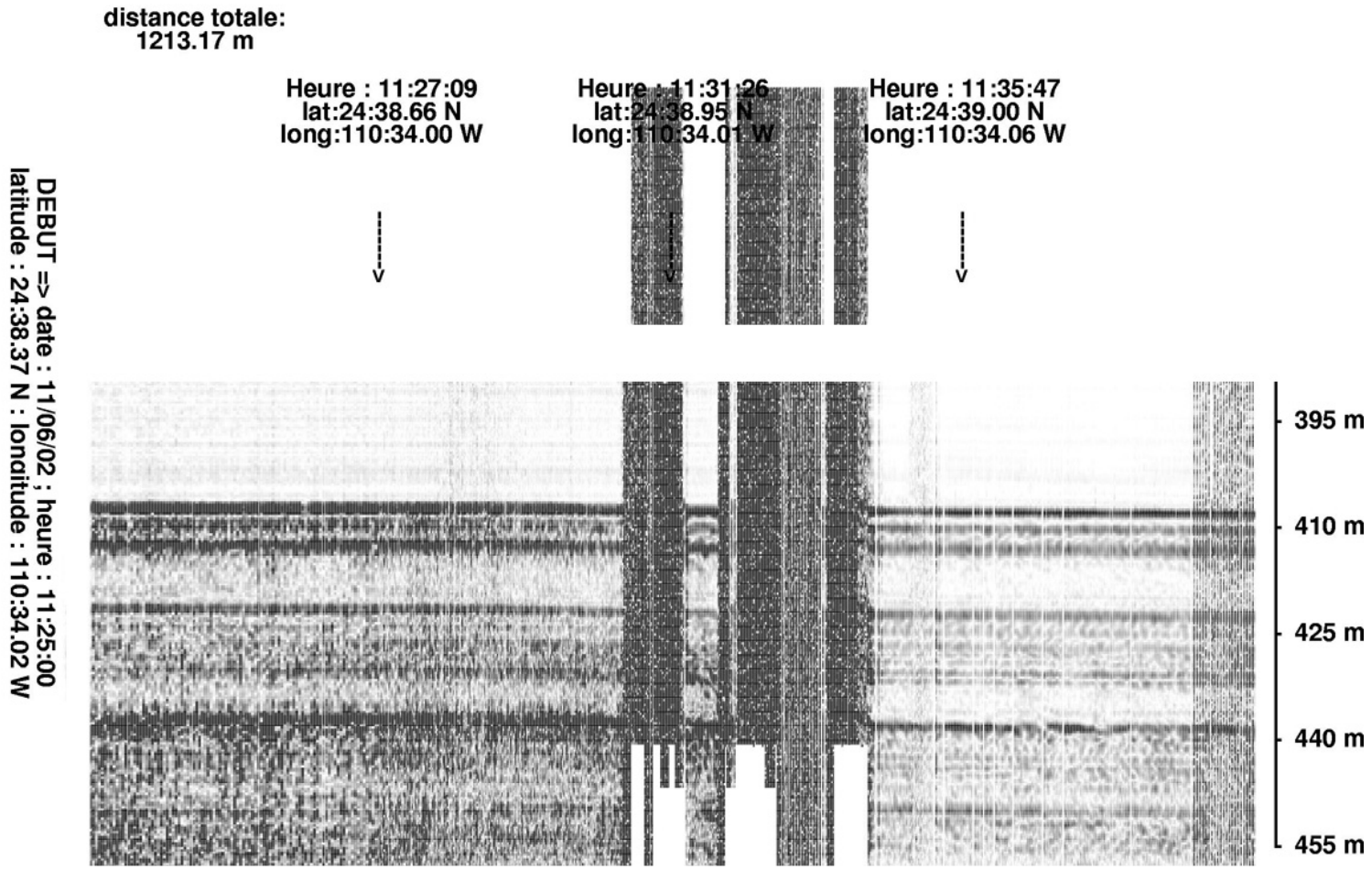
IMAGES VIII/MD126, Mona
Station 17, Alfonso 1



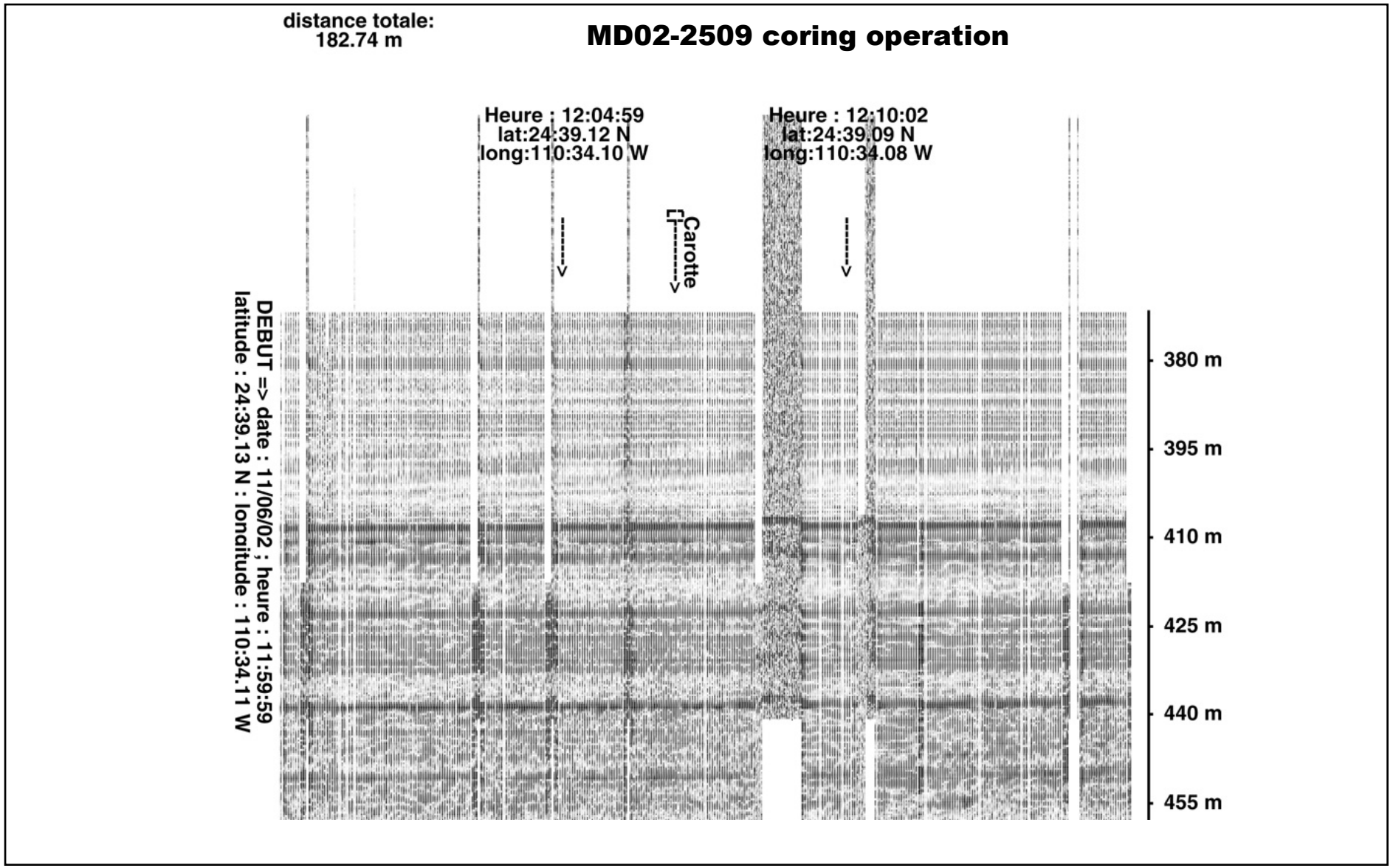
GMT 2002 Sep 18 11:12:23

3.5 kHz Seismic Replay

Station 17 , Approach



3.5 kHz Seismic Replay



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **11.06.2002**

N° de station : **17**
Alfonso 1

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2509

(MD - année - milles - centaines)

CAROTTE (longueur) :

30.47 m ?

POSITION :

Latitude : **24° 39.11 N**

Longitude : **110° 34.08 W**

CAROTTIER (type) (1) : **CALYPSO II**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) : **Cylindre**

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée :	**399**	**m**
Ligne filée :	**364**	**m**
Arrachement/total *(tonne)* :		**t**
Arrachement/différentiel *(tonne)* :		**t**
Pénétration/apparente *(m)* :		**m**
Pénétration/tensiomètre *(m)* :		**m**

HEURES (GMT)

En station :	**11:35**
Début manœuvre :	**11:35**
Déclenchement :	**12:07**
Fin de manœuvre :	**12:50**
Durée de manœuvre :	**01:15**
Départ station :	**12:50**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

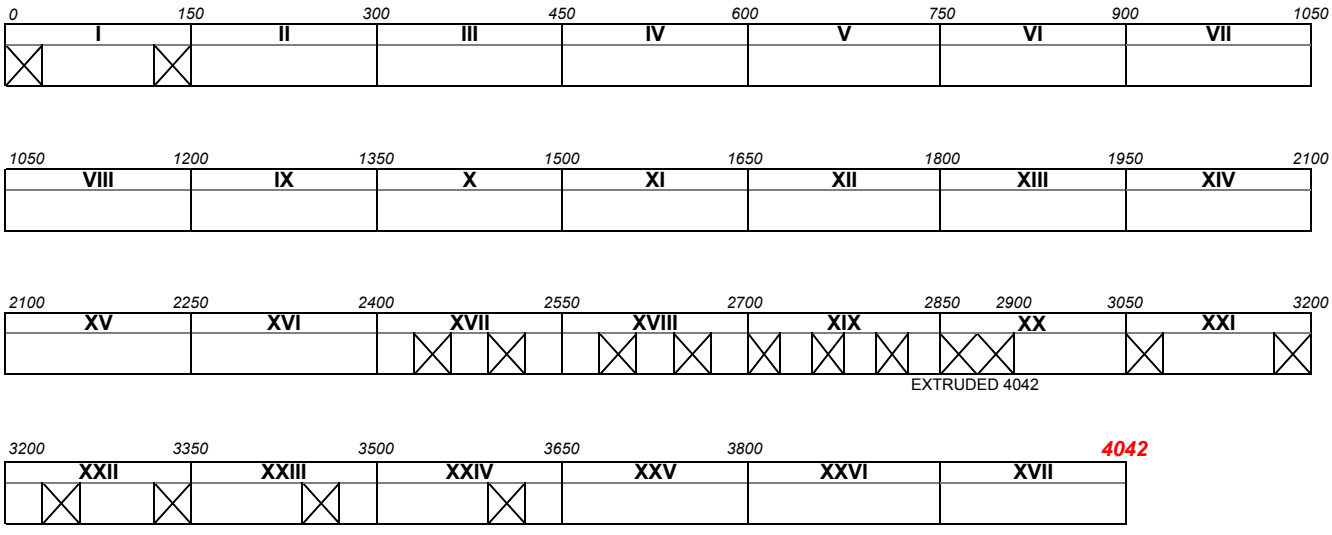
CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents : **Extruded section between XIX and XX**

end of core 4042 cm ?



(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2509

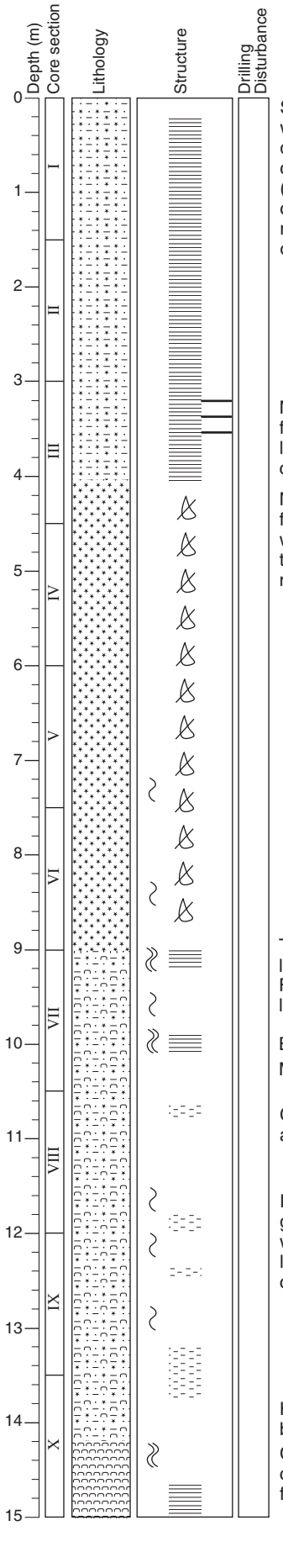
(Station 17, Alfonso 1 ; Latitude : 24° 39. 11 N ; Longitude : 110° 34. 08 W ; 364m water depth) has recovered a total of 30.50m of sediment. The sediment has not been disturbed by coring and the core is complete.

The dominant sediment mostly consists of terrigenous components with various amounts of biogenic components. Some intervals are significantly enriched in biogenic components. The lithologies range from silty clay, diatom clay, nannofossil clay, and diatom-nannofossil clay, to clayey silty diatom ooze, clayey nannofossil ooze, clayey diatom ooze, and nannofossil-diatom ooze. The colors range from olive and olive grey to dark olive grey and very dark grey.

The upper part of the core is continuously laminated, down to 4.00m (Section III). Other predominantly laminated intervals are recorded from 14.60m (Section X) to 16.80m (Section XII), and from 24.00m (Section XVII) to 26.50m (Section XVIII). From 4.00m (Section III) to 14.60m (Section X), and from 16.80m (Section XII) to 24.00m (Section XVII), the sediment is mostly massive, sometimes bioturbated, with faintly laminated intervals. Shell fragments are scatterred from 4.00m (Section III) to 8.60m (Section VI), and from 18.60m (Section XIII) to 21.20m (Section XV). The lowermost part of the core, from 26.50m (Section XVIII) to 30.50m (Section XXI) consists of massive sediment.

MONA

Core: MD02-2509



Comments

Soupy dark olive grey silty clay with nanno fossils grading down-wards into 1 to 3 cm colour banded with thick (<1mm) discontinuous to continuous laminae silty nannoclay and clayey nanno ooze. No seque-ntial

Mainly colour banded with a few short intervals of thin laminations with highly variable colours.

Massive olive grey (5Y 4/2) foram silty, clayey nanno ooze with scattered shell fragments throughout. Faint colour mottling in lower part.

Thinly laminated layer cut by a large burrow.
Faintly colour banded with large burrows.

Burrowed laminated interval.

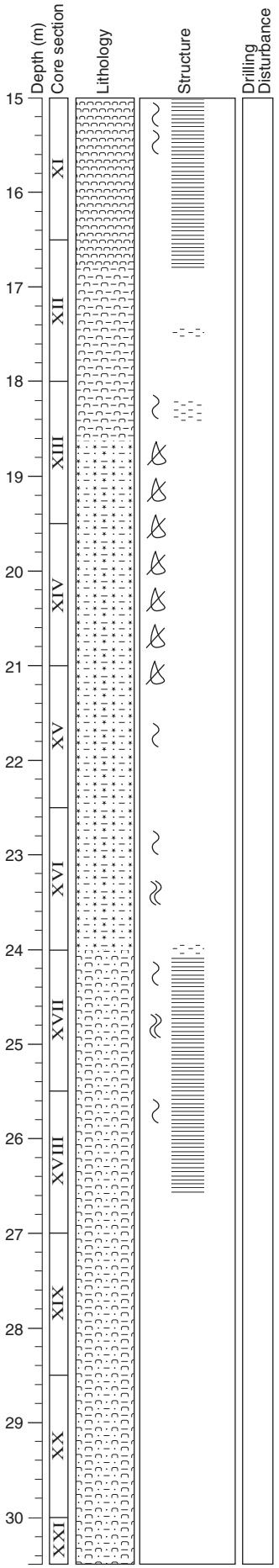
Massive diatom nanno clay.

Colour banded with thin lamin-ations.

Interbedded homogenous olive grey nannofossil diatom ooze with forams and darker faintly laminated diatom nannofossil clay with silt.

Homogenous, distinctly mottled bioturbated.

Colour banded to laminated clayey diatom ooze with nanno fossils.



Comments

Olive grey clayey silty diatom ooze with nannofossils. Colour banded and laminated through out. Distinct large burrows 1 mm to <1mm continuous flat lamination.

Homogenous, mottled with faint banding.

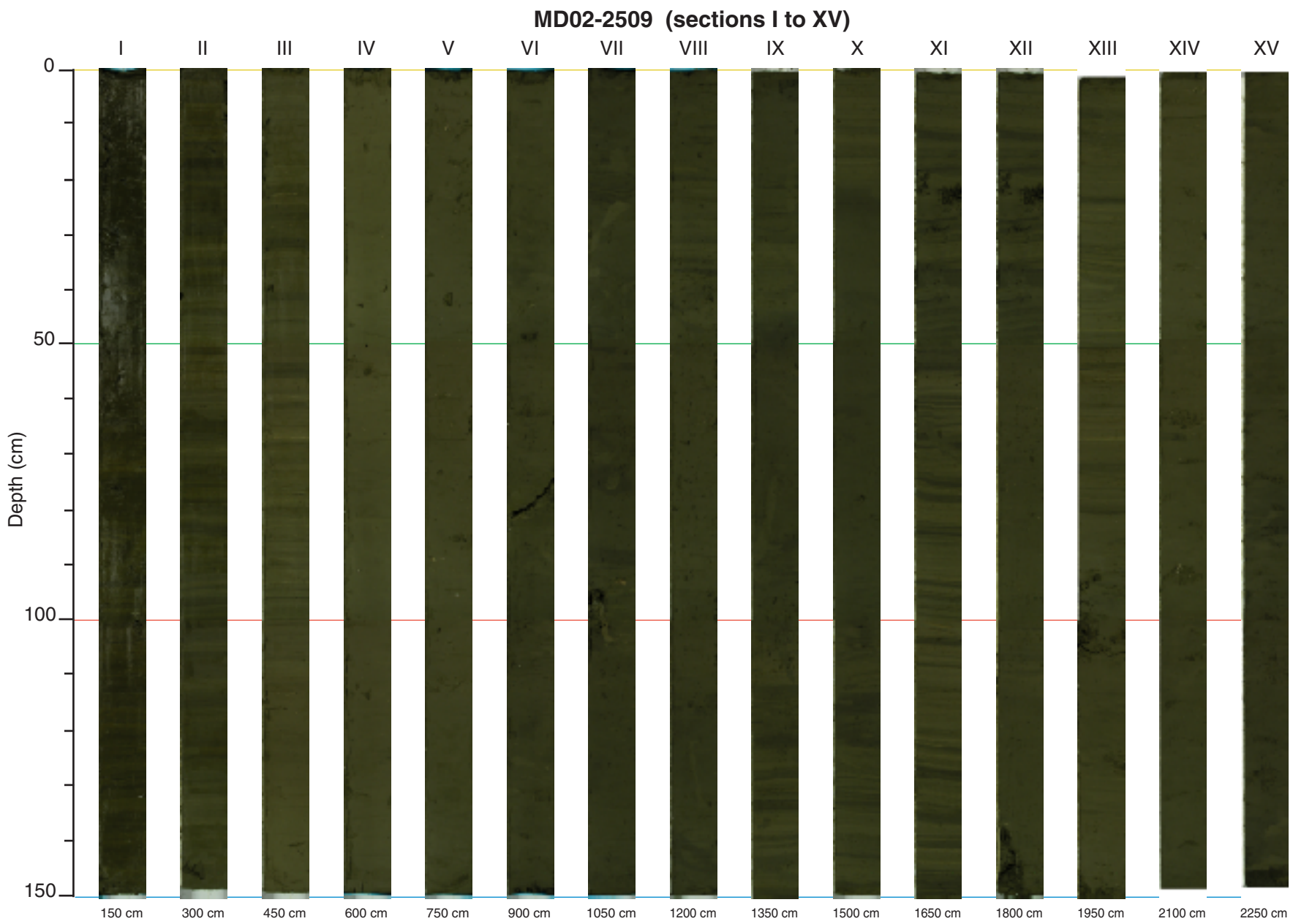
Colour banded intermittently thinly laminated diatom clay with nanno fossils.

Homogenous, faintly inter-mittently laminated diatom clay grading downwards to a nanno fossil clay with diatoms, more distinct mottles and scattered shell fragments.

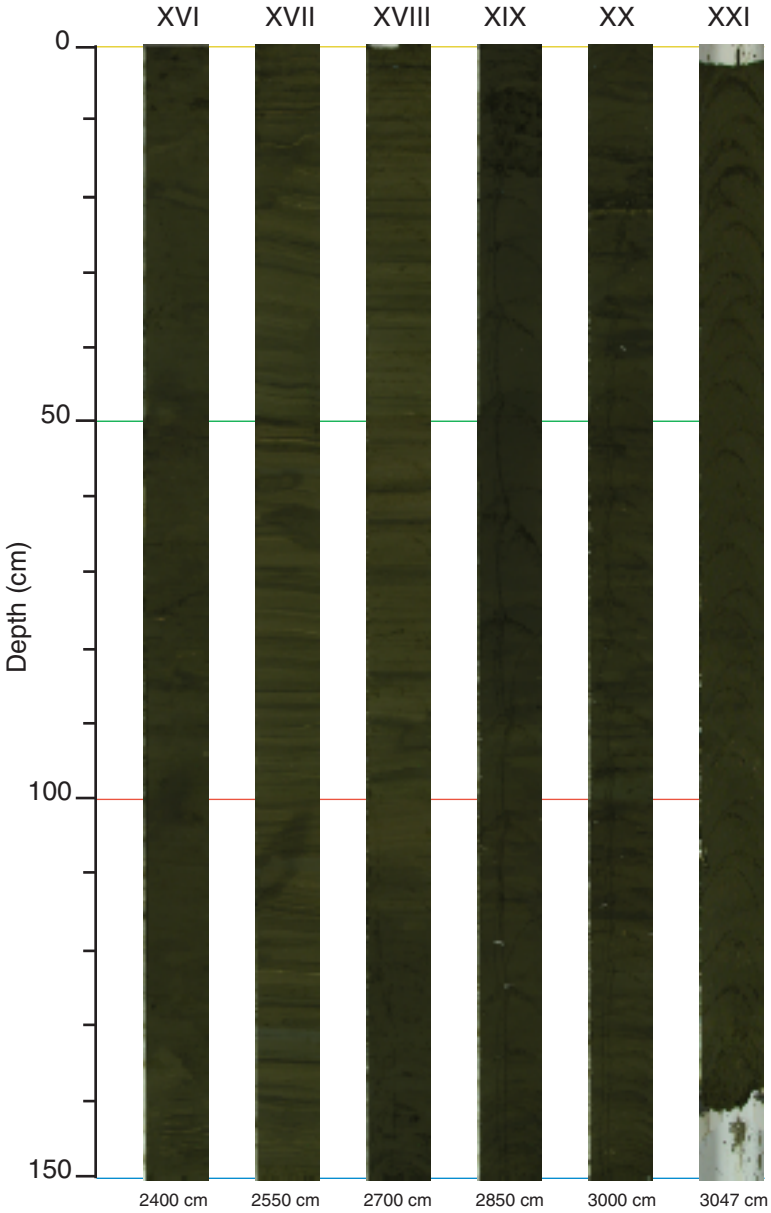
Nannoclay with silt intervals and distinct bioturbation.

Alternating layers of olive grey and olive diatom clay with nanno fossils. Colour banded to laminated throughout.

Massive very dark grey silty clay with diatoms. Rare packets of colour banding and halos.


MD02-2509 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm

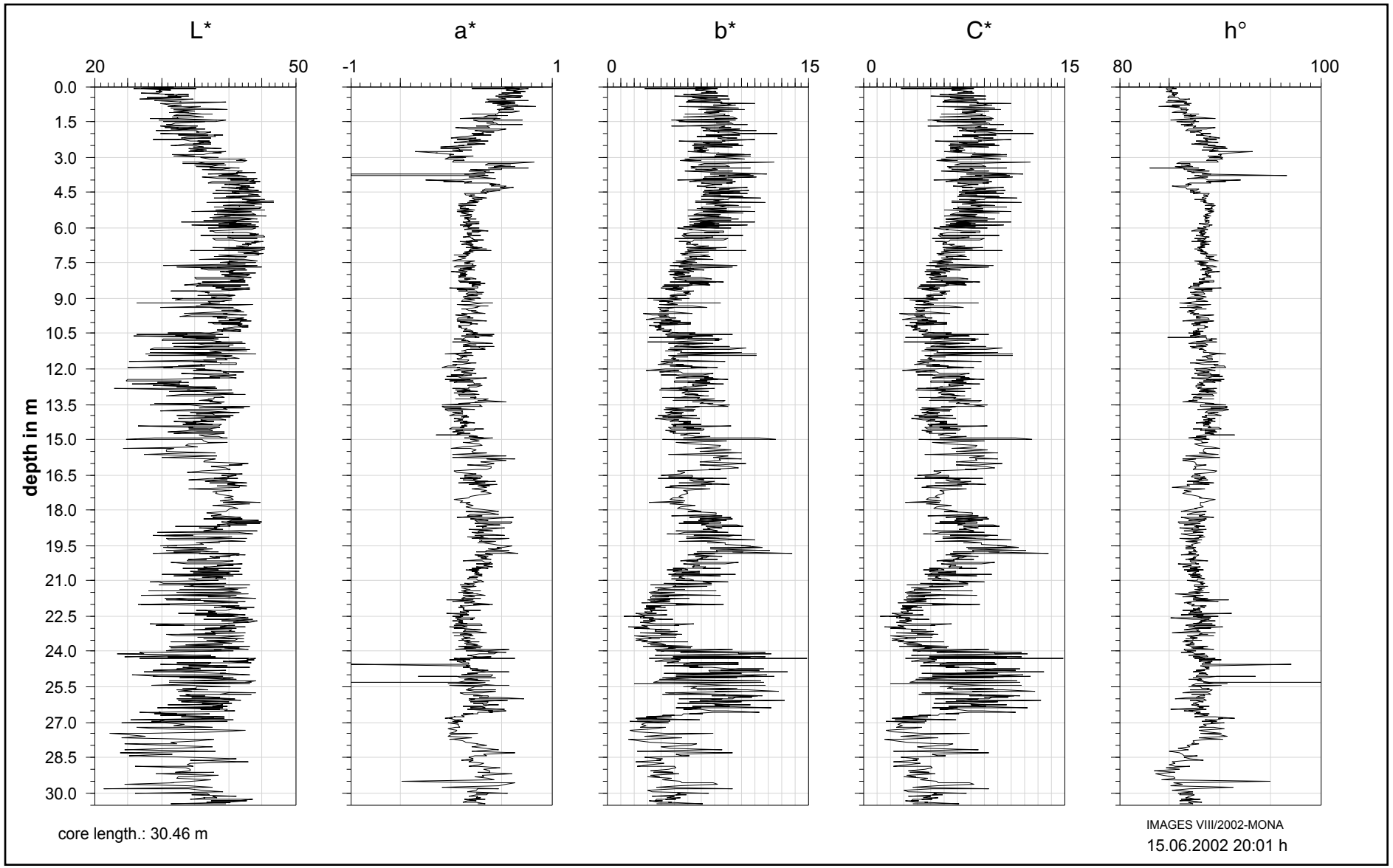
MD02-2509 (sections XVI to XXI)



IMAGES VIII, 2002
MONA

Colour Reflectivity

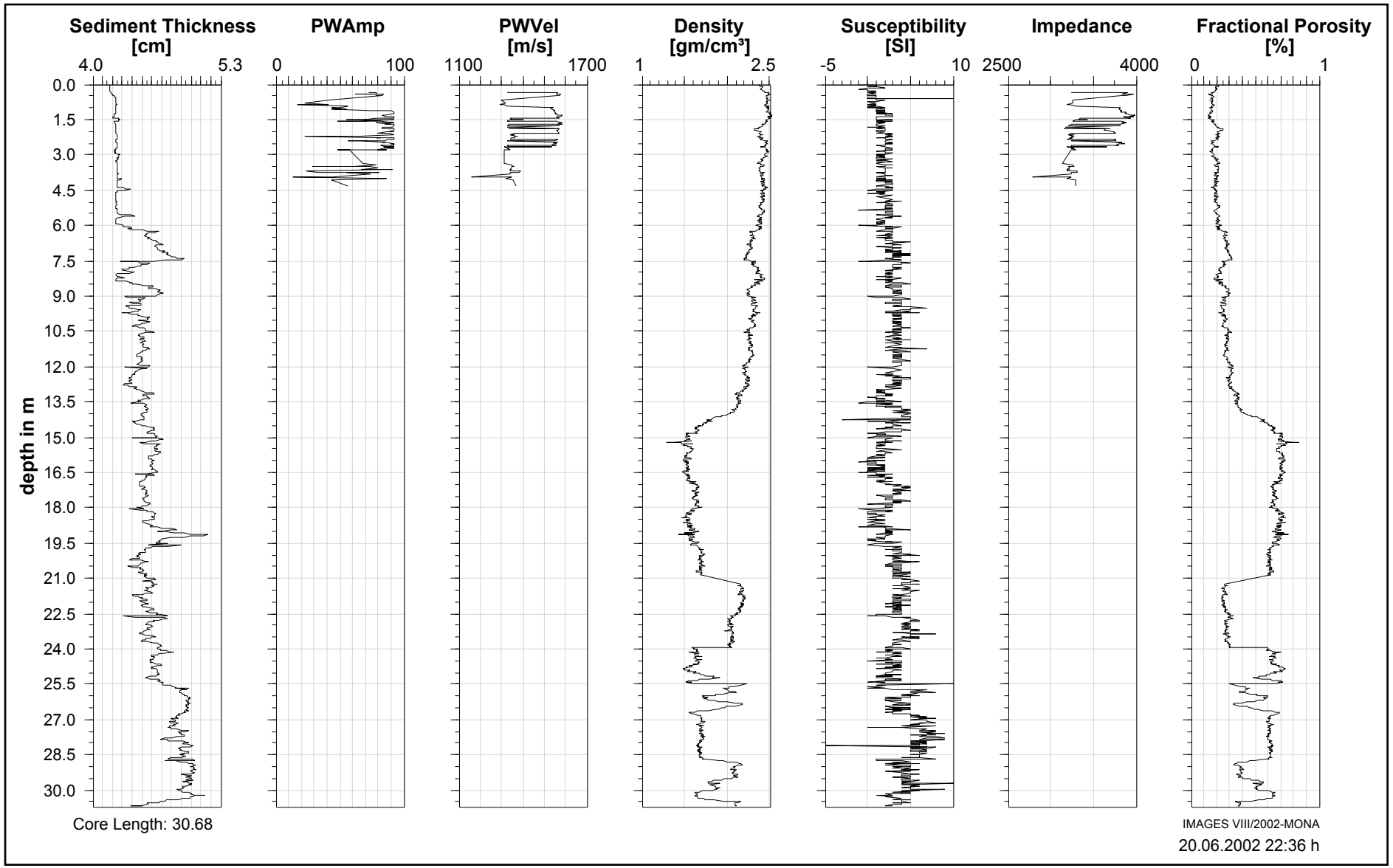
Station 17
Core MD02-2509



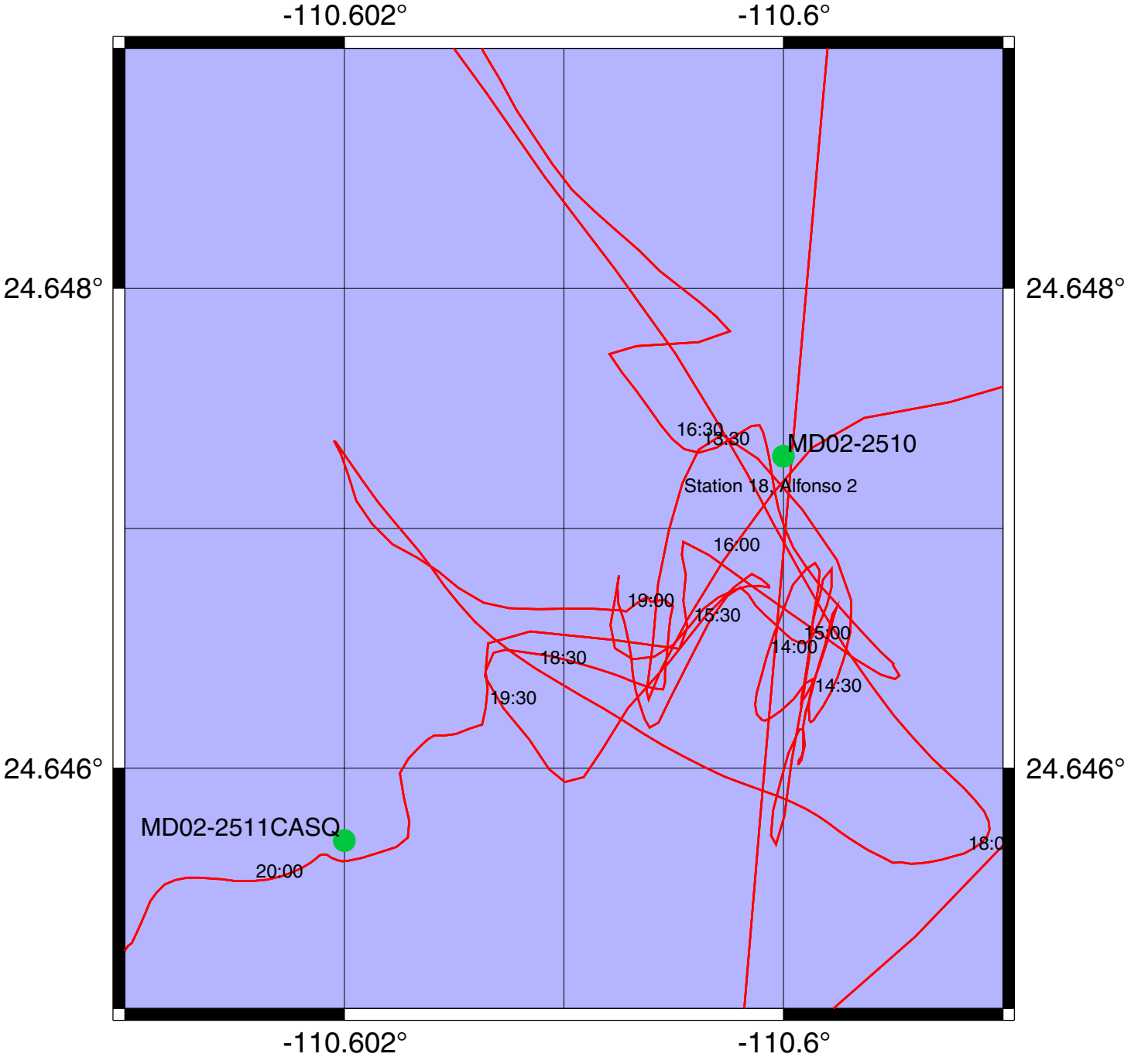
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 17
Core MD02-2509



IMAGES VIII/MD126, Mona
Station 18 Alfonso 2



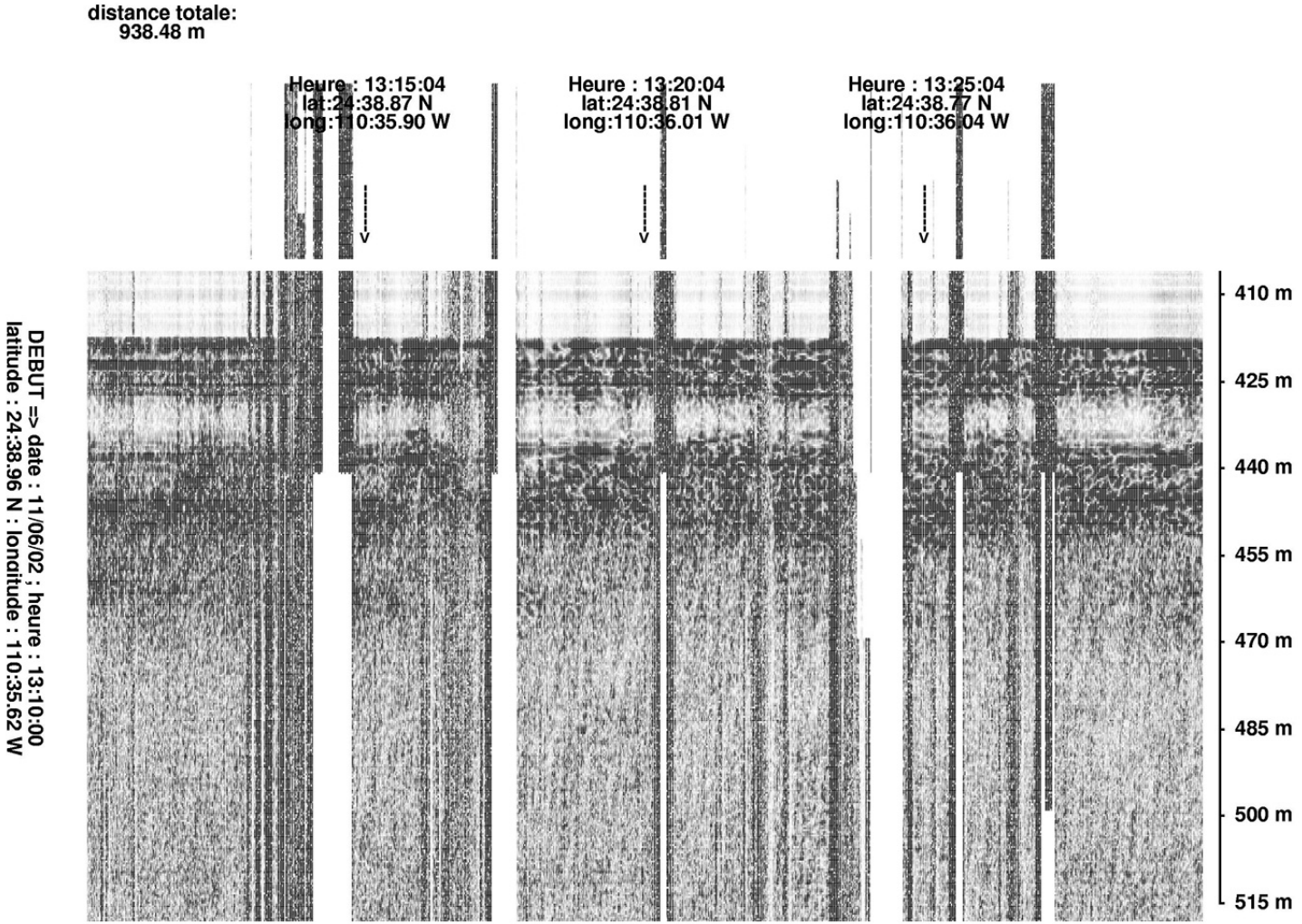
GMT 2002 Sep 18 11:12:27

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 18
Core MD02-2510
MD02-25011C2

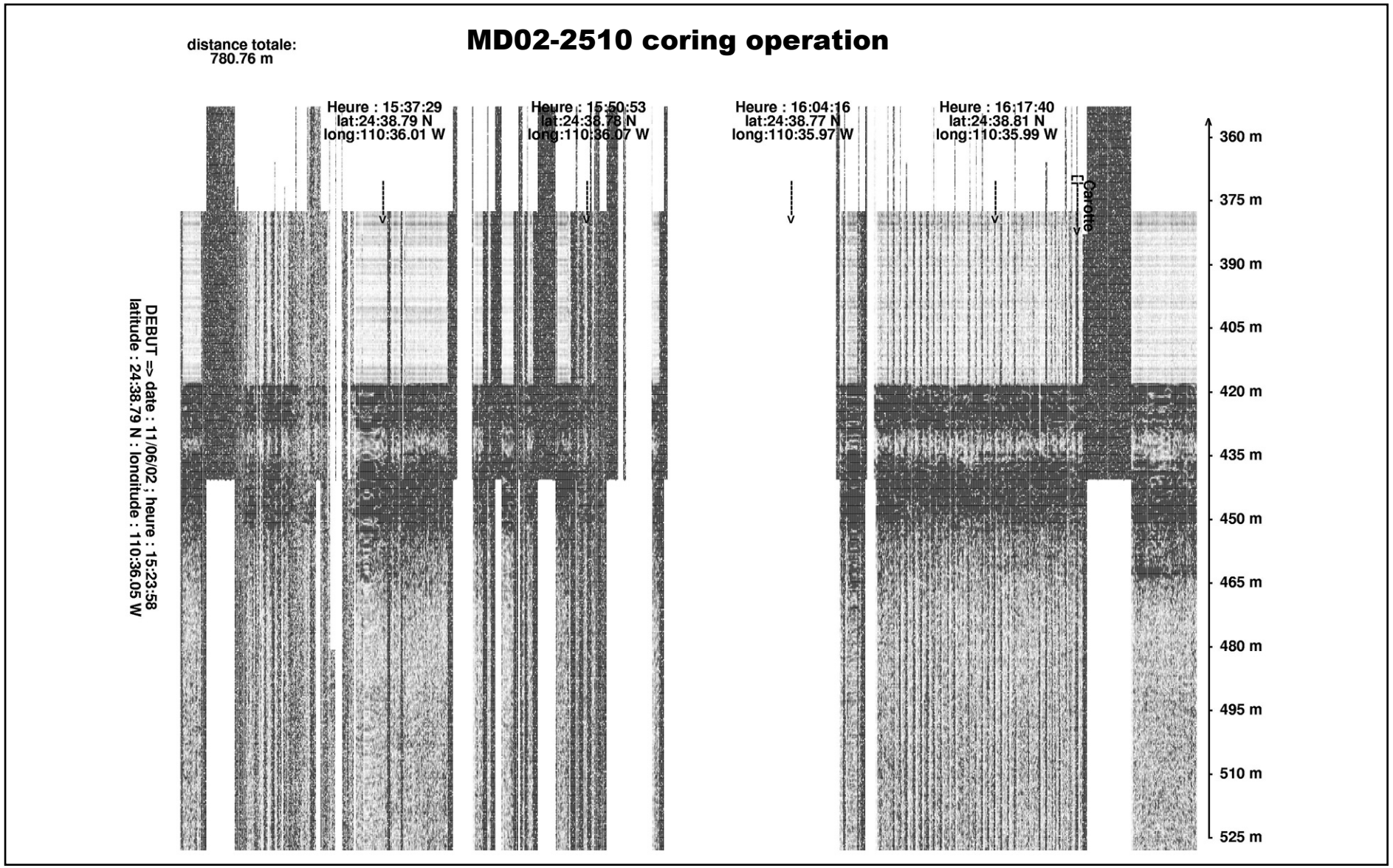
Station 18 , Approach



IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 18
Core MD02-2510
MD02-25011C2



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **11.06.2002**

N° de station : **18**
Alfonso 2

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2510

(MD - année - milles - centaines)

CAROTTE (longueur) :

47.34 m

POSITION :

Latitude : **24° 38.84 N**

Longitude : **110° 36.00 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids :

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **410 m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **16:00**

Début manœuvre : **16:12**

Déclenchement : **16:23**

Fin de manœuvre : **17:09**

Durée de manœuvre : **00:57**

Départ station : **Resté en station pour carottage suivant**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2510

(Station 18, Alfonso 2 ; Latitude : 24° 38. 84N ; Longitude : 110° 36. 00W ; 410m water depth) has recovered a total of 47.76m of sediment. The sediment has generally not been disturbed by coring, with the exception of the uppermost part of the core from top to 1.50m (Section I) and of an empty interval from 45.00m to 45.10m (Section XXXI).

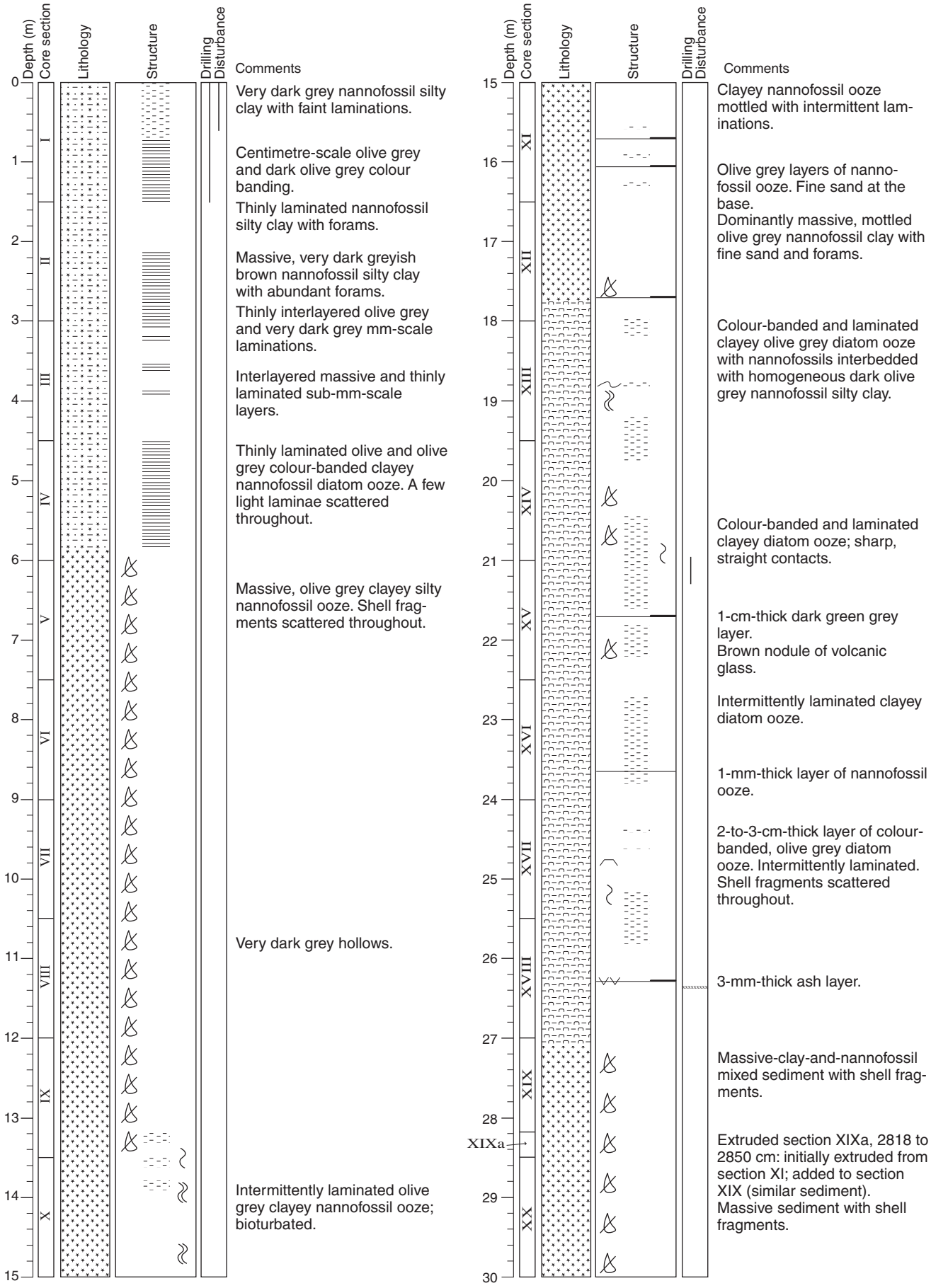
The dominant sediment mostly includes terrigenous components, associated with various amounts of biogenic components, calcareous or siliceous. It consists of silty clay, nannofossil silty clay, clayey silty nannofossil ooze, clayey nannofossil ooze, and clayey diatom ooze. Highest abundances of biogenic components are recorded from 6.00m (Section IV) to 33.00m (Section XXVI). The colors range from olive and olive grey to grayish brown and to very dark grey.

The upper part of the core is mostly laminated, down to 6.00m (Section IV). From 6.00m (Section V) to 35.00m (Section XXIV) the sediment is mostly massive, with abundant shell fragments. Some intervals are bioturbated, while others show very faint laminations. A slump is observed at 18.80m (Section XIII). The lower part of the core, below 35.00m (Section XXIV), includes alternating intervals of massive and laminated sediment. A few sandy layers with graded bedding occur at 37.50m and 38.00m (Section XXVI) and at 45.50m (Section XXI). A slump is present at 42.10m (Section XXIX).

Minor lithologies include :
- Olive grey nannofossil ooze, as isolated layers from 15.70m (Section XI) to 23.60m (Section XVI).
- Olive grey diatom ooze, as isolated layers in Section XXI.
- Massive nannofossil ooze, very dark grey, in Section XXI.
- Lenses and layers of volcanic glass, Sections XV to XVIII.

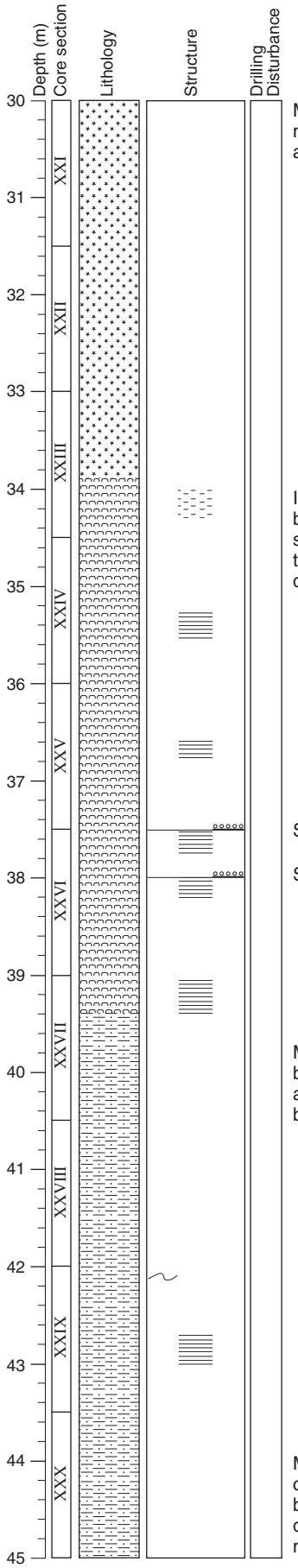
MONA

Core: MD02-2510



MONA

Core: MD02-2510 (cont.)



Comments

Massive, dark olive grey nannofossil ooze with quartz and clay-mixed sediments.

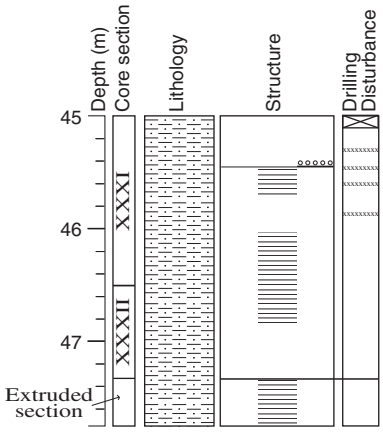
Interlayered massive, colour-banded very dark grey cm-scale diatom ooze and <1-mm-thick laminations of clayey diatom ooze with nannofossils.

Sandy, graded layers.

Sandy, graded layers.

Massive, very dark grey to black silty clay with diatoms and nannofossils. Very faint banding.

Massive, very dark grey silty clay with very faint colour banding, nannofossils, diatoms, quartz, and clay-mixed sediments.

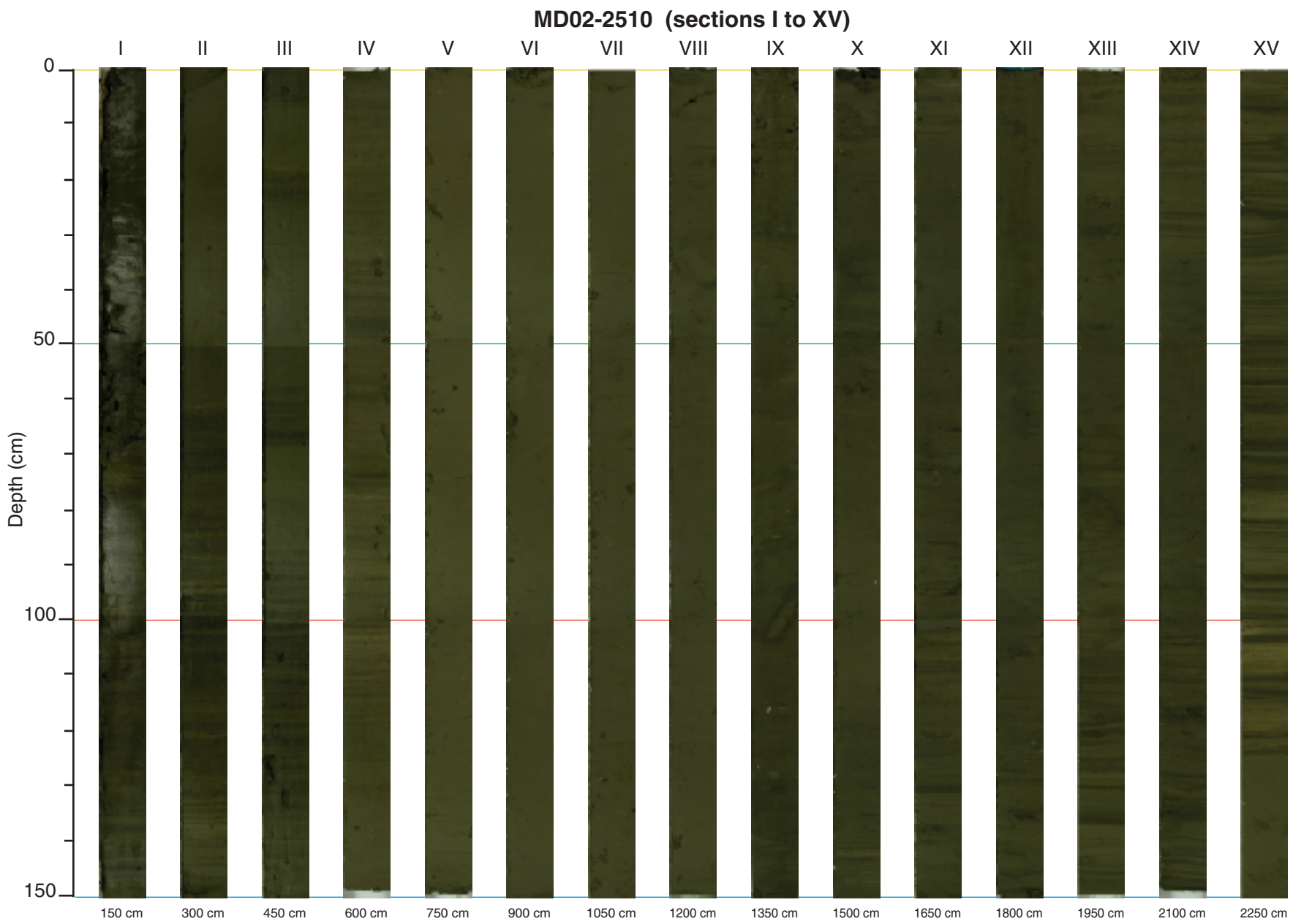


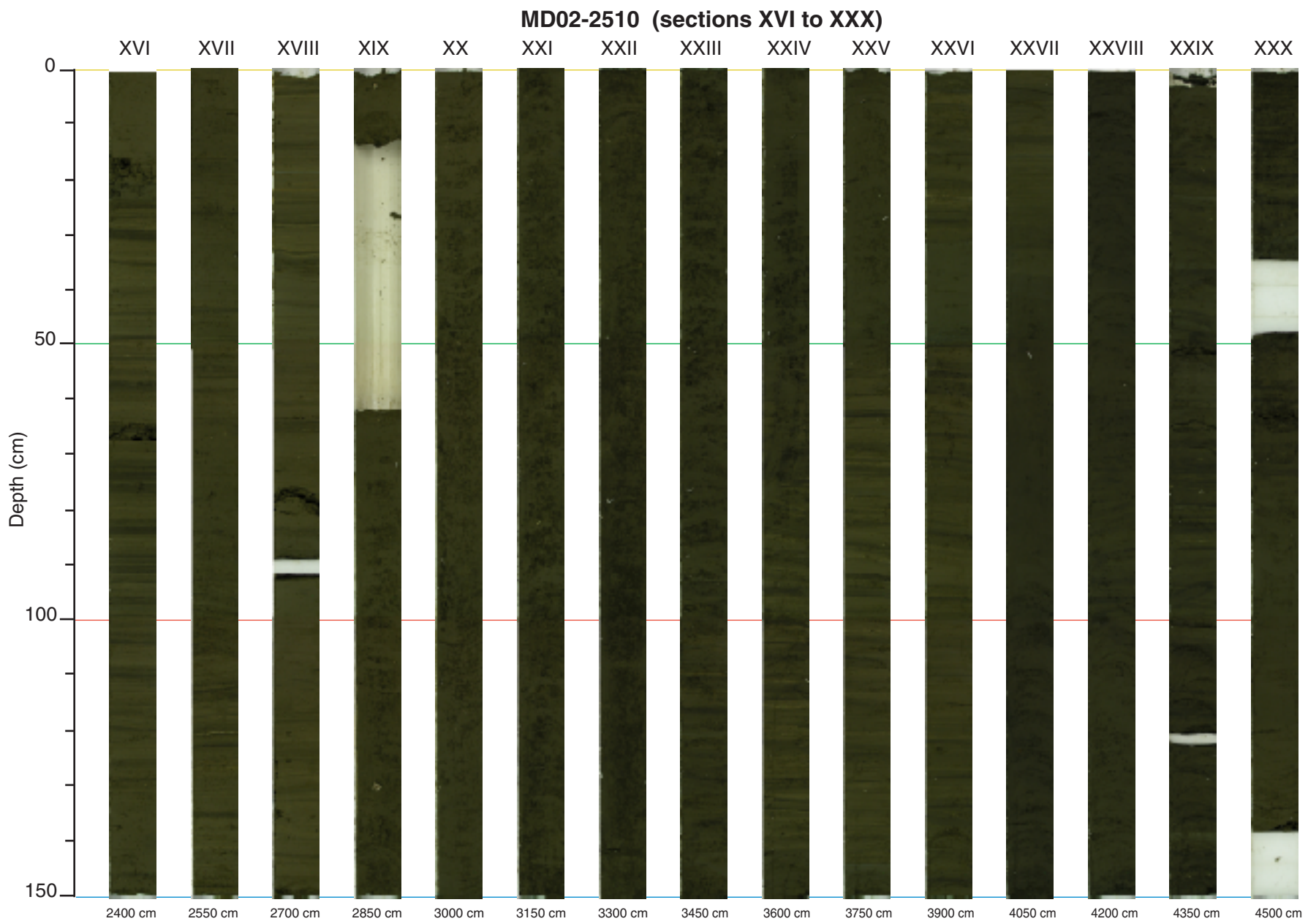
Comments

Massive, graded sand-silt-clay layer.

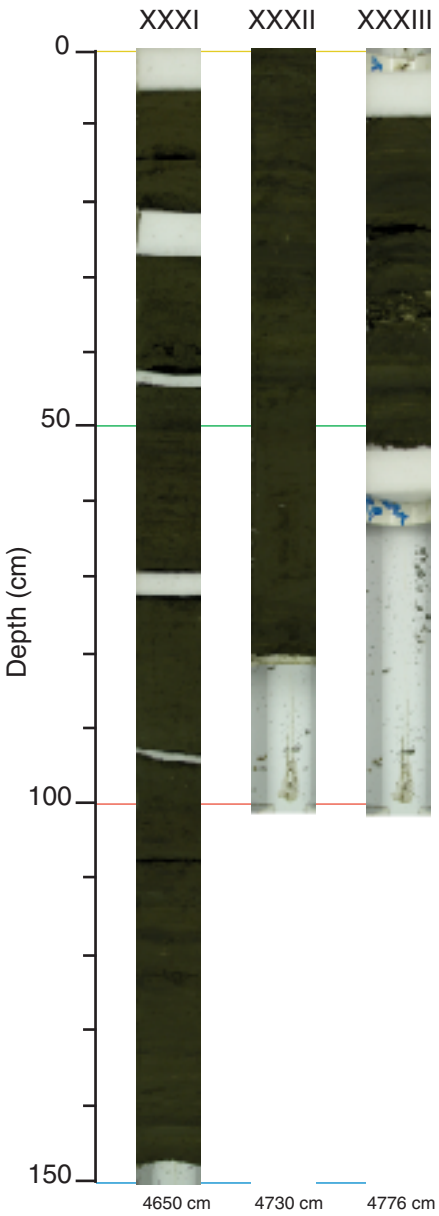
Irregularly laminated, very dark grey silty clay. Stiff, dry, and colour banded.

Section extruded from base of core: massive, consolidated, very dark grey silty clay with colour banding and light brown, thin, irregularly spaced laminae.
End of core, 4776 cm.


MD02-2510 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2510 (sections XVI to XXX)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
XXIX
XXX
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3750 cm
3900 cm
4050 cm
4200 cm
4350 cm
4500 cm

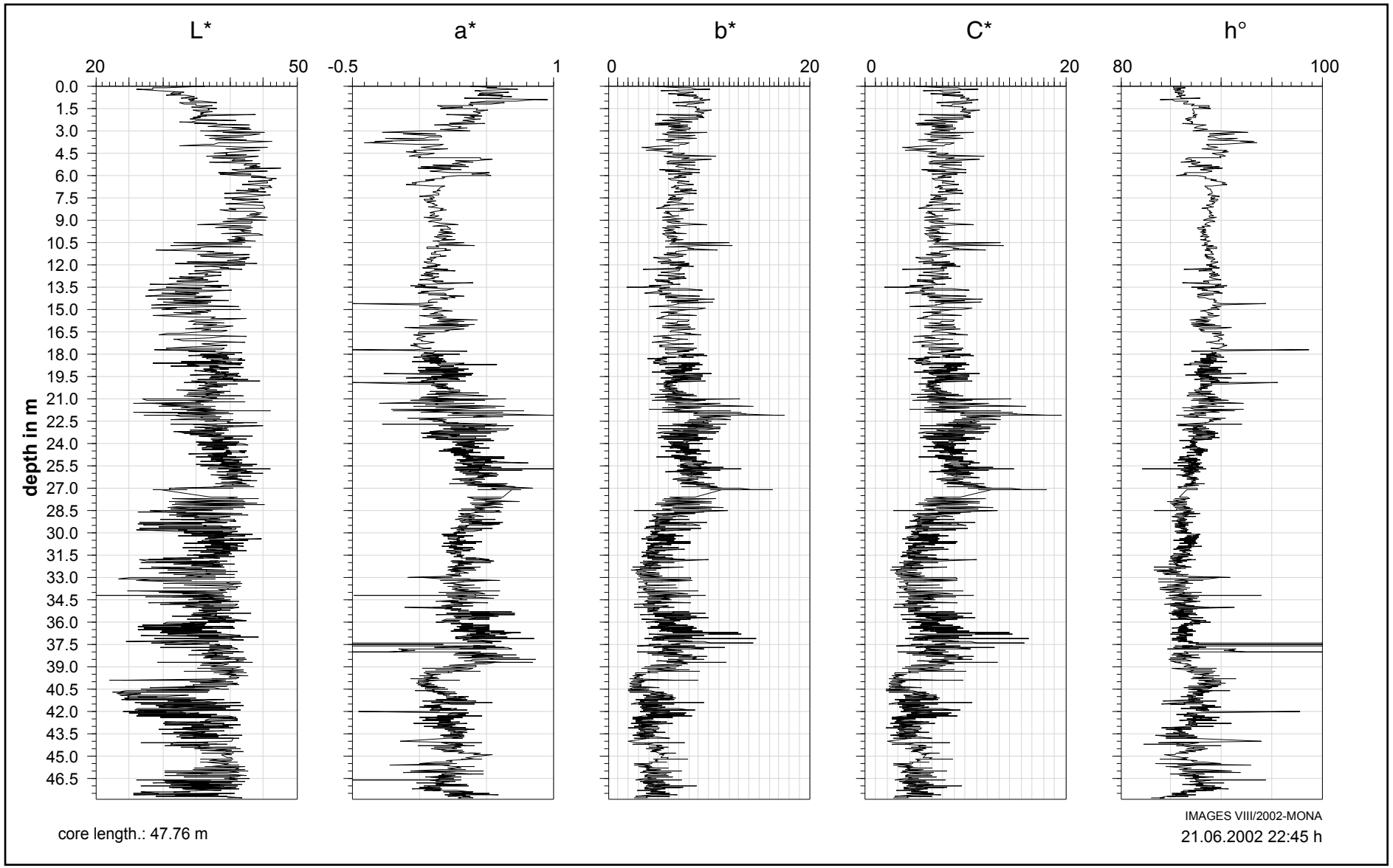
MD02-2510 (sections XXXI to XXXIII)



IMAGES VIII, 2002
MONA

Colour Reflectivity

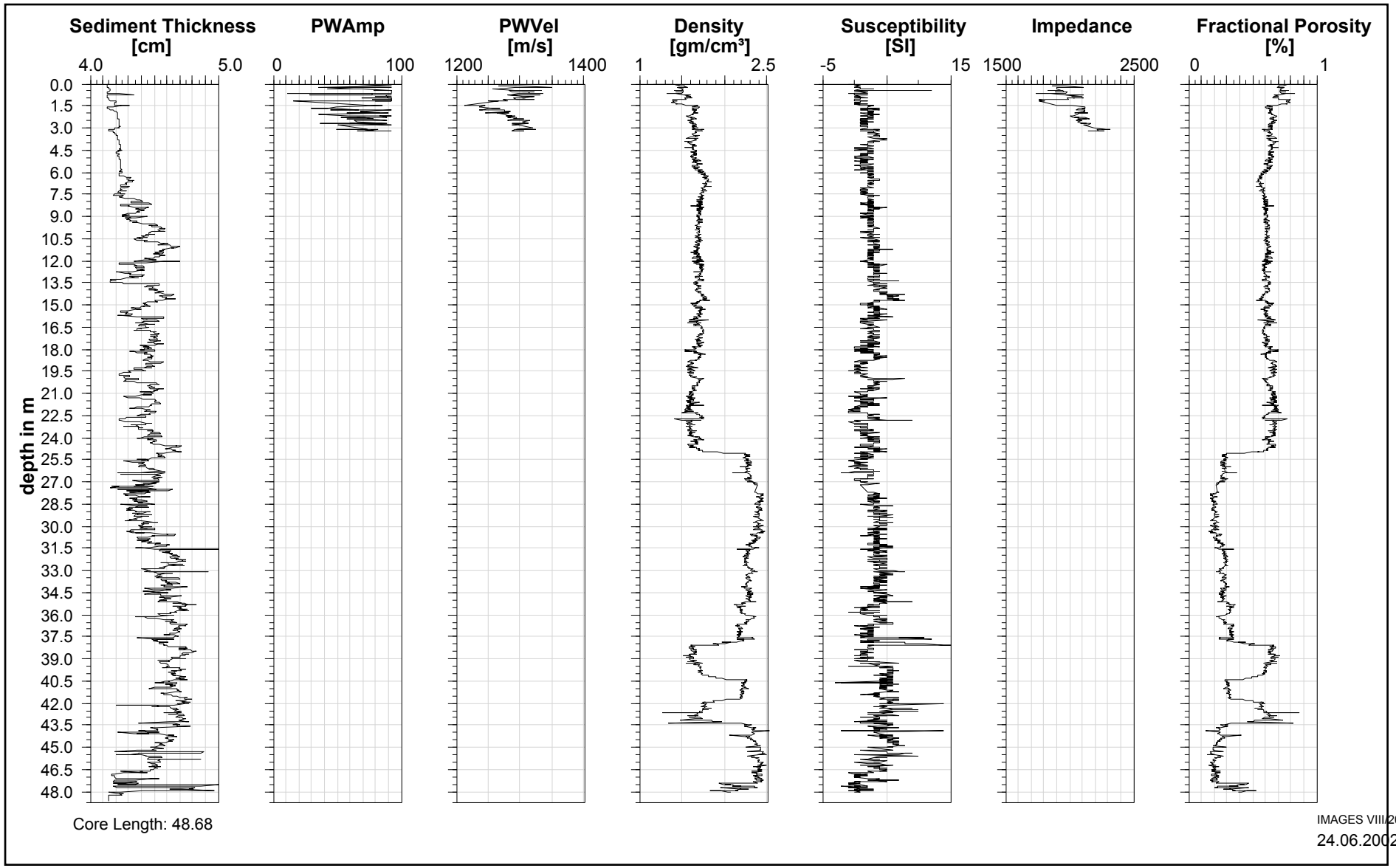
Station 18
Core MD02-2510



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 18
Core MD02-2510

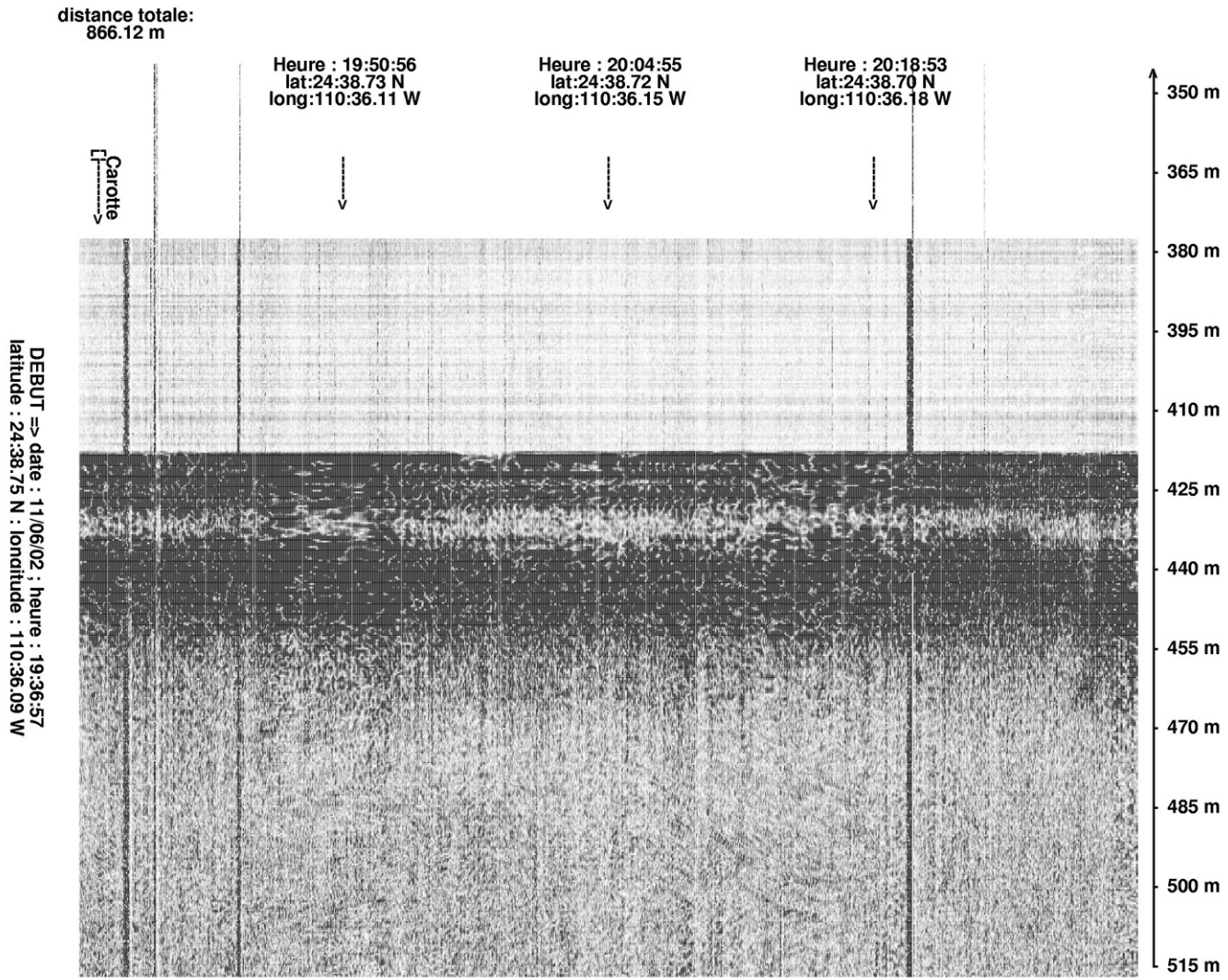


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 18
Core MD02-2510
MD02-25011C2

MD02-2511C2 coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **11.06.2002**

N° de station : **18 Alfonso 2**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2511 C²

(MD - année - milles - centaines)

CAROTTE (longueur) :

5.90 m

POSITION :

Latitude : **24° 38.74 N**

Longitude : **110° 36.12 W**

CAROTTIER (type) (1) : **CAROTTIER CARRE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids :

CONTREPOIDS :
Type (2) : **Cylindre**

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **417 m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **Déjà en station**

Début manœuvre : **19:38**

Déclenchement :

Fin de manœuvre : **20:18**

Durée de manœuvre : **00:40**

Départ station : **20:18**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

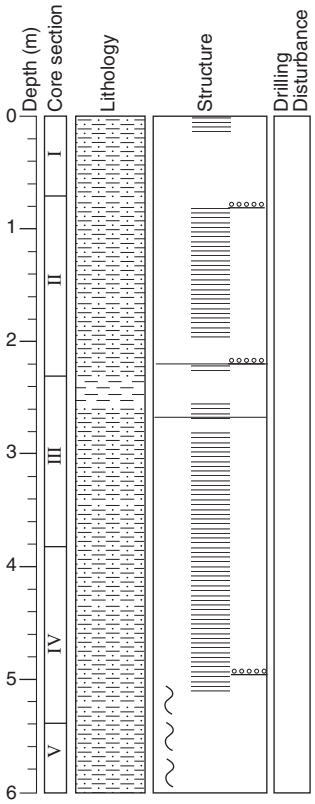
Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MONA Core: MD02-2511 C2



Comments

Thinly laminated grading to colour banded (5Y 3/1 & 5Y 4/3) with thin yellowish & bluish isolated laminae.

Massive 5Y 4/2 with scattered shell fragments.

Thinly laminated with some thicker colour bands, but no organisation. Volcanic glass, diatoms, sponge spicules and pyrite common

Massive, faint grading with a sharp contact.

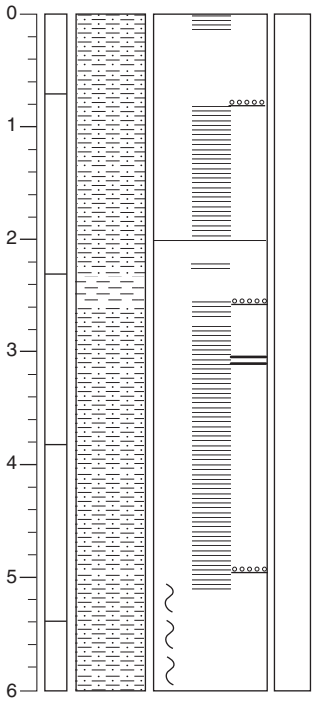
Massive, ungraded clay.

Massive with sharp upper contact.

Thinly laminated olive grey (5Y 4/2) with 2cm thick banding and thin white laminae. Forams present with scarce broken shell.

Light olive grey (5Y 6/2) 2cm thick silty clay .

Homogenous olive grey (5Y 4/4) silty clay with scarce broken shells and forams.



Thinly laminated grading to colour banded (5Y 3/1 & 5Y 4/3) with thin yellowish & bluish isolated laminae.

Massive 5Y 4/2 with scattered shell fragments.

Thinly laminated with some thicker colour bands, but no organisation. Volcanic glass, diatoms, sponge spicules and pyrite common

Massive with a sharp contact.

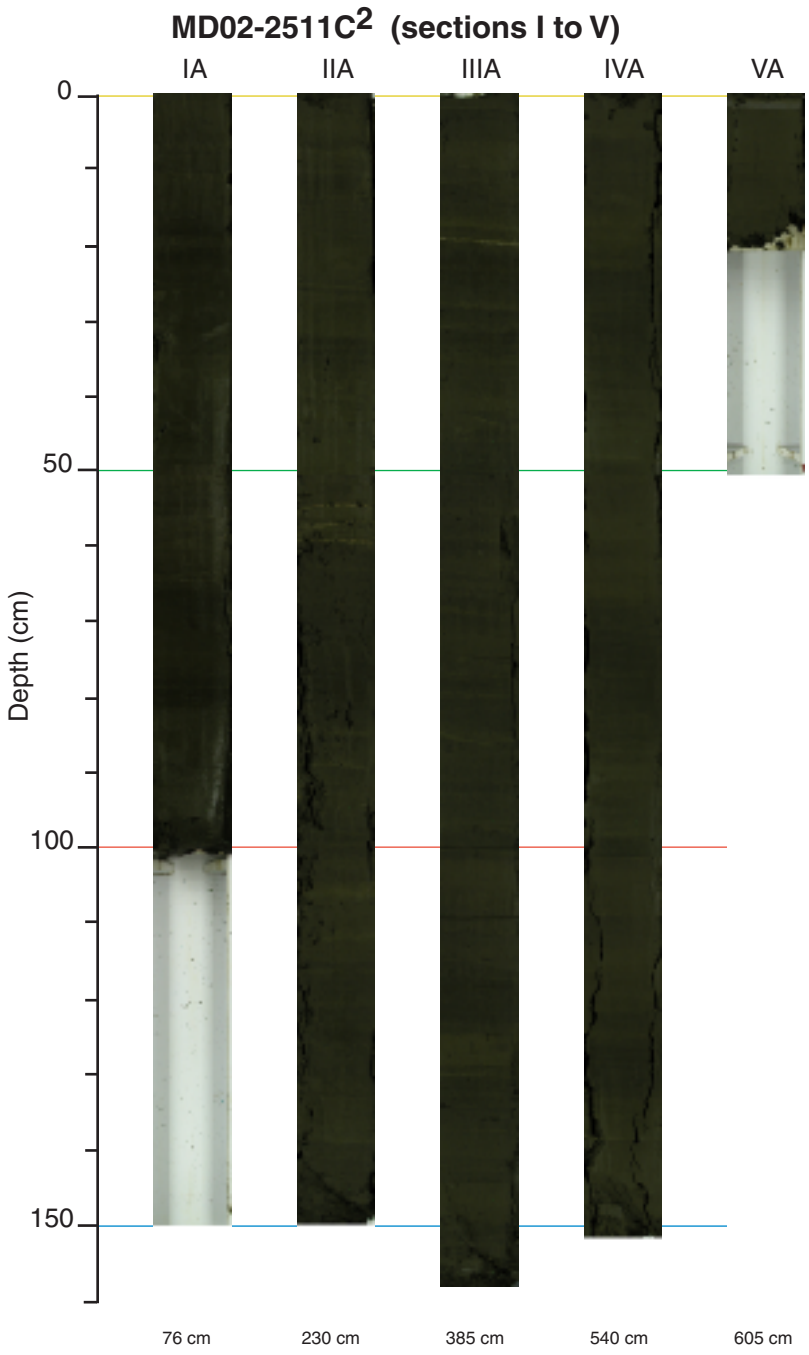
Massive, faint grading.

4 light thin layers.

Thinly laminated olive grey (5Y 4/2) with 2cm thick banding and thin white laminae. Forams present with scarce broken shell.

Light olive grey (5Y 6/2) 2cm thick silty clay .

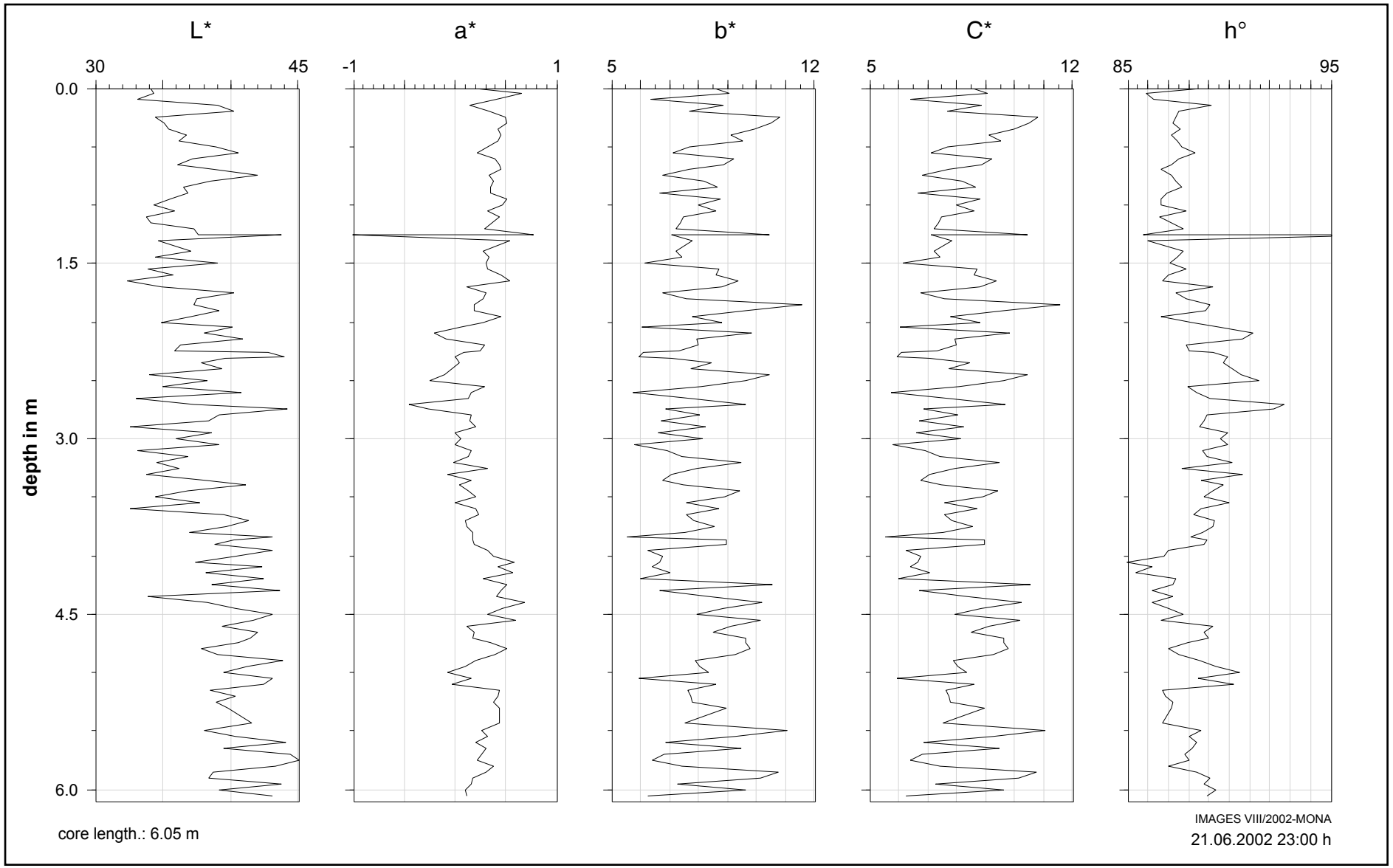
Homogenous olive grey (5Y 4/4) silty clay with scarce broken shells and forams.


MD02-2511C2 (sections I to V)
IA
IIA
IIIA
IVA
VA
0
50
100
150
Depth (cm)
76 cm
230 cm
385 cm
540 cm
605 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

Station 18
Core MD02-2511C²

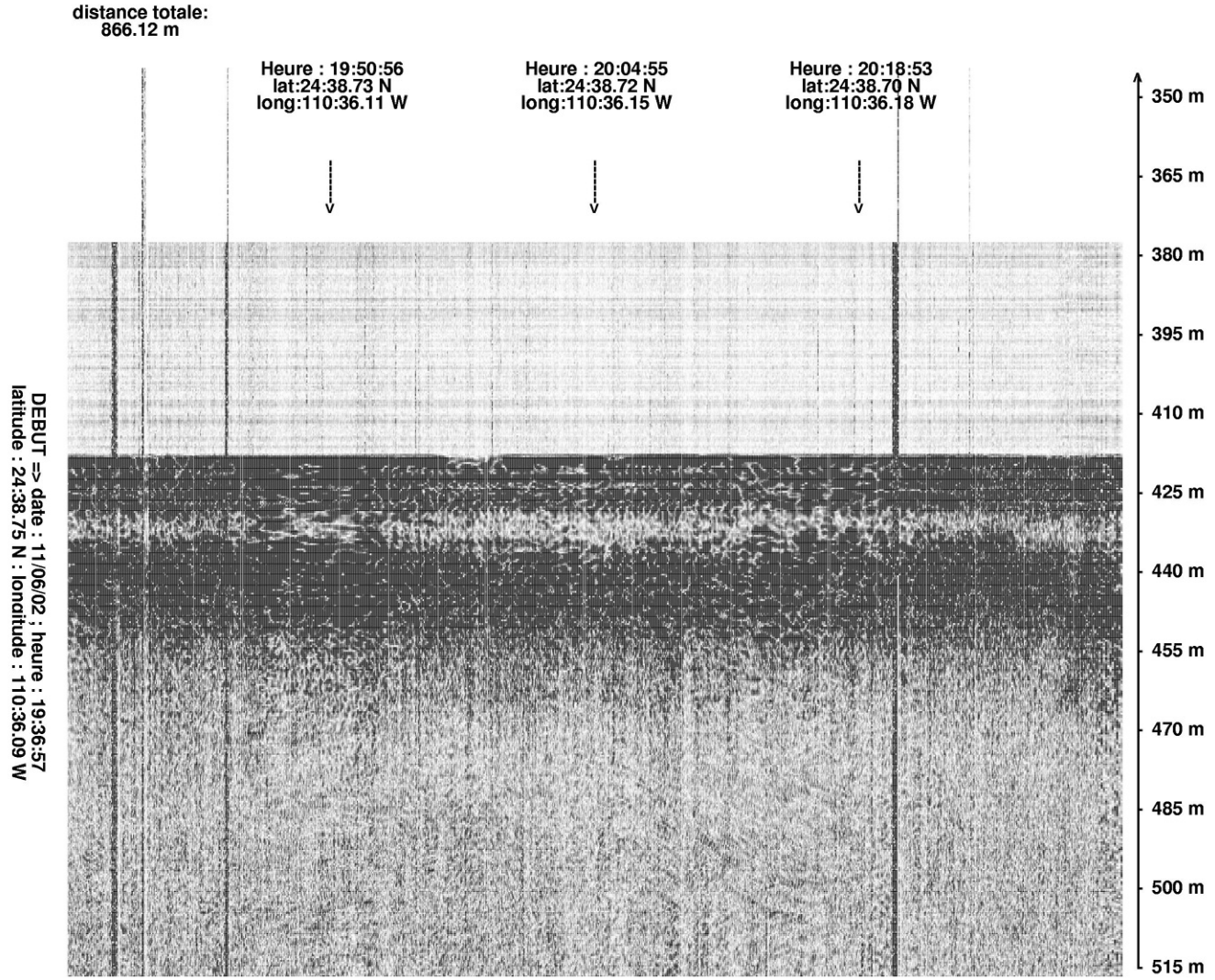


IMAGES VIII, 2002
MONA

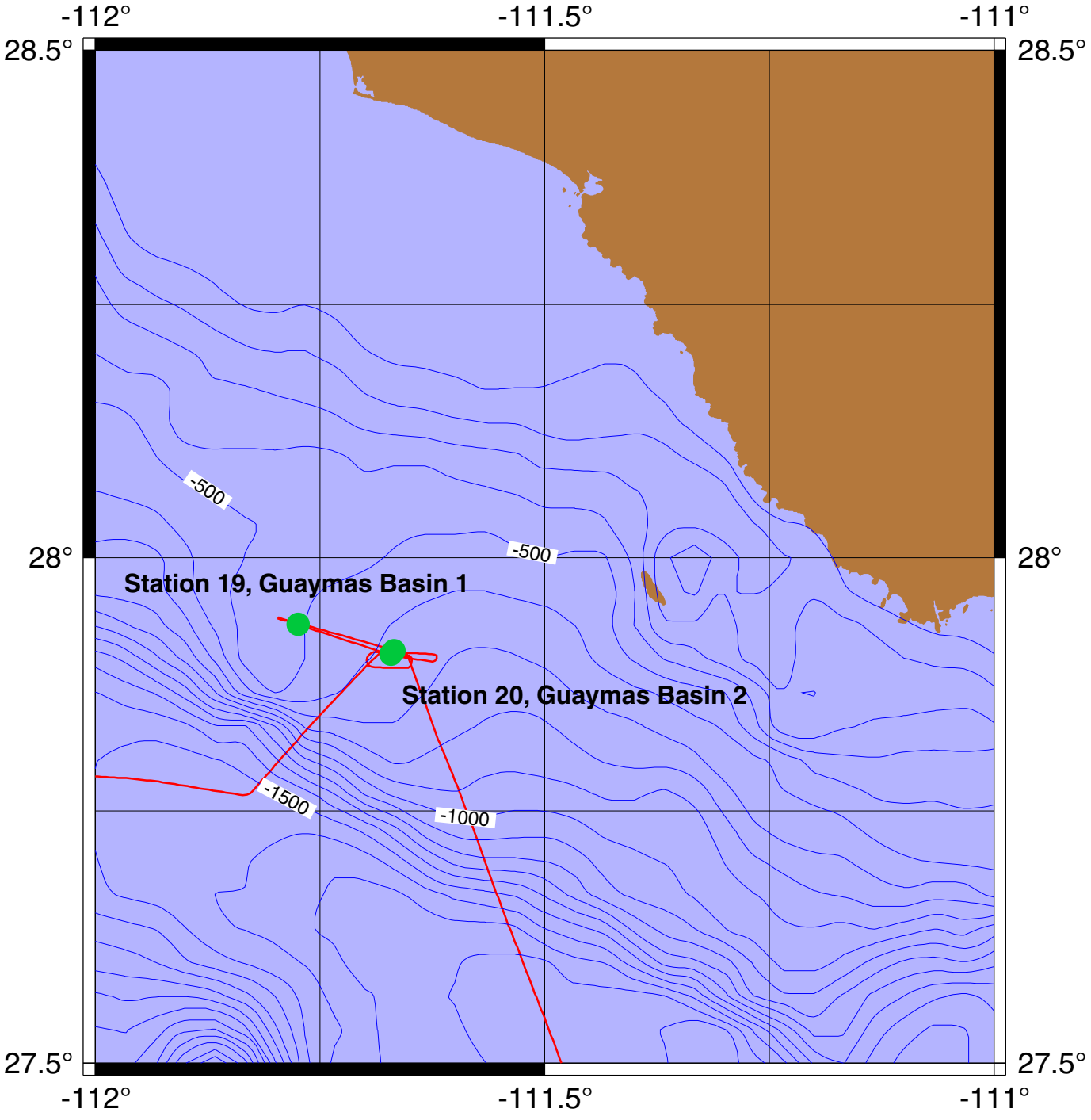
3.5 kHz Seismic Replay

Station 18
Core MD02-2510
MD02-25011C2

Station 18 , Departure

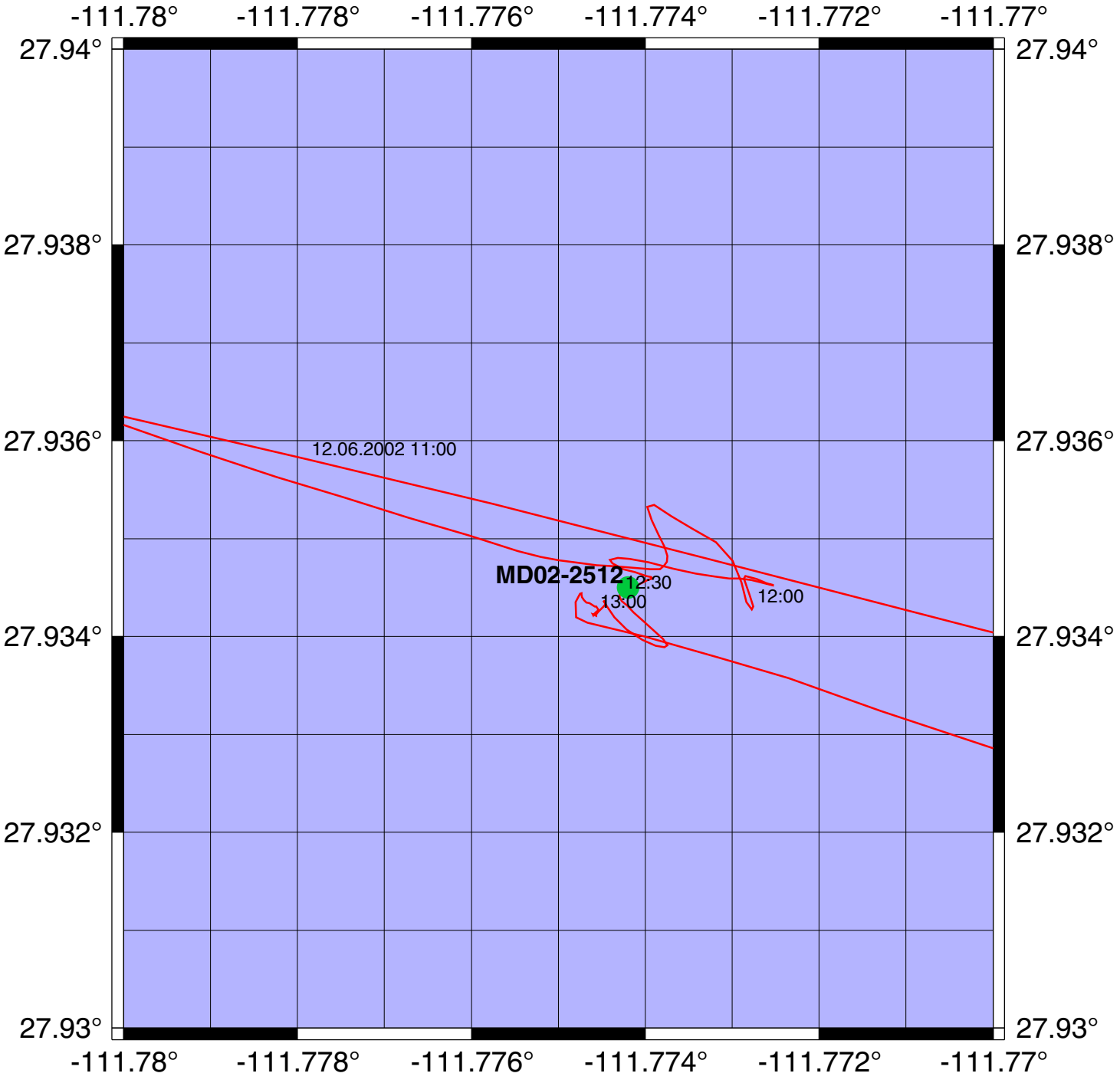


IMAGES VIII/MD126, Mona
Guaymas Basin 1 & 2



GMT 2002 Sep 25 16:22:42

IMAGES VIII/MD126, Mona
Station 19, Guaymas Basin 1



GMT 2002 Sep 25 16:24:32

3.5 kHz Seismic Replay

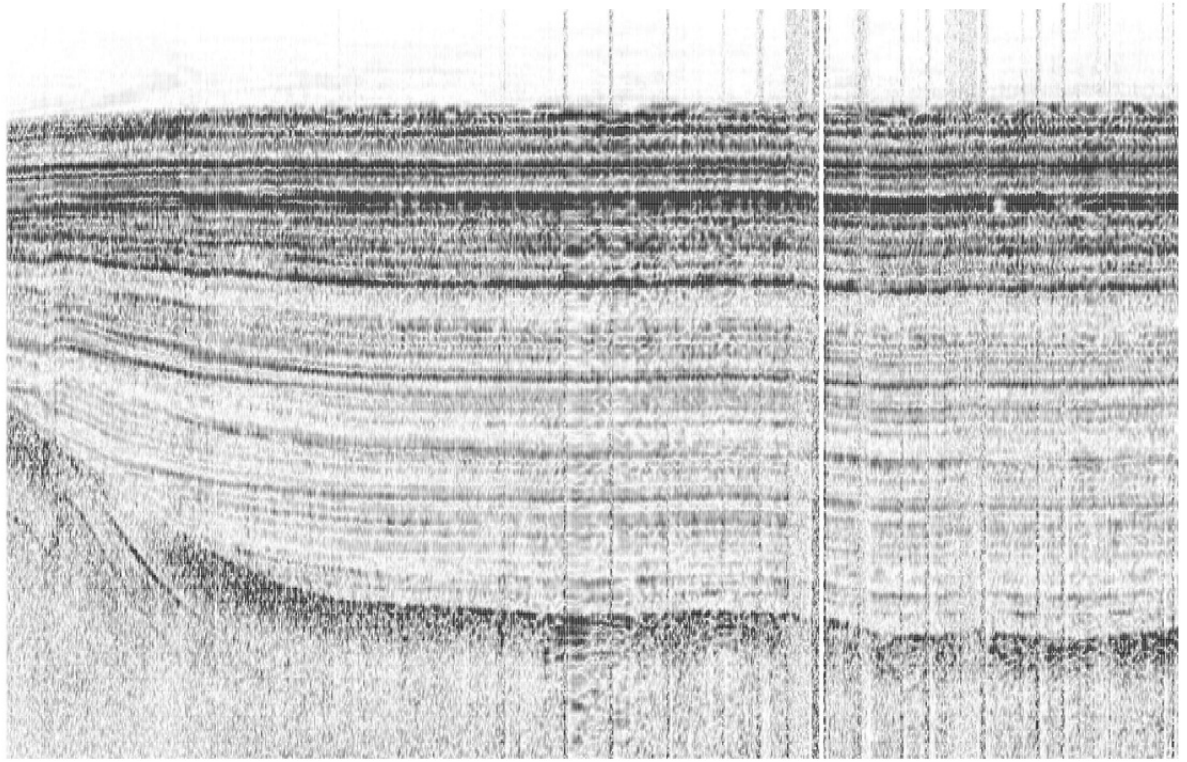
Station 19 , Approach

distance totale:
2538.52 m

Heure : 11:32:47
lat:27:56.12 N
long:111:46.64 W

Heure : 11:45:36
lat:27:56.07 N
long:111:46.41 W

Heure : 11:58:25
lat:27:56.04 N
long:111:46.36 W

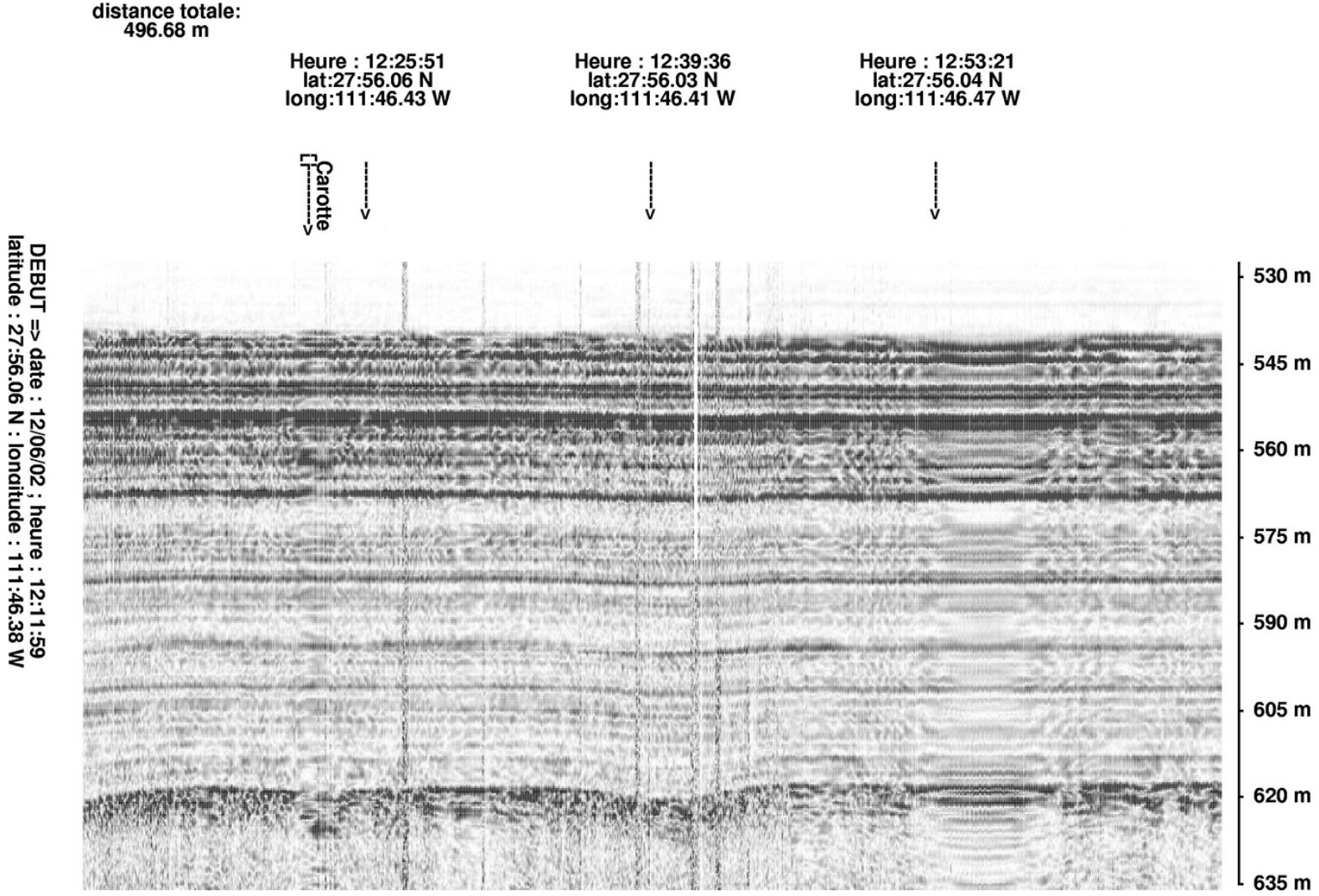


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 19
Core MD02-2512

MD02-2512 coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **12.06.2002**

N° de station : **19 Guaymas 1**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2512

(MD - année - milles - centaines)

CAROTTE (longueur) :

48.32 m

POSITION :

Latitude : **27° 56.07 N**

Longitude : **111° 46.45 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **7.00** **t**

Poids total (eau) : **6.80** **t**

REGLAGES :

Tubes (longueur) : **51.55** **m**

Câbles :
Chute libre : **1.50** **m**

Boucle : **1.60** **m**

LC poids : **16.30** **m**

CONTREPOIDS :
Type (2) : **Cylindre**

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **525.00** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **11:38**

Début manœuvre : **12:10**

Déclenchement : **12:23**

Fin de manœuvre : **?**

Durée de manœuvre :

Départ station : **?**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents : **Total recovery 4785 cm**

0	*150*	*300*	*450*	*600*	*750*	*900*	*1050*
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	
135	150	150	150	150	150	150	

1050	*1200*	*1350*	*1500*	*1650*	*1800*	*1950*	*2100*
VIII	**IX**	**X**	**XI**	**XII**	**XIII**	**XIV**	
150	150	150	150	150	150	150	

2100	*2250*	*2400*	*2550*	*2700*	*2850*	*3000*	*3150*
XV	**XVI**	**XVII**	**XVIII**	**XIX**	**XX**	**XXI**	
150	135	130	150	150	150	150	

3150	*3300*	*3450*	*3600*	*3685*	*3682*	*3800*	*3950*	*4100*
XXII	**XXIII**	**XXIV**	**XXV**		**XXVI**	**XXVII**	**XXVIII**	
150	150	150	85		120	150	150	

4100	*4250*	*4400*	*4550*	*4700*	***4832***
XXIX	**XXX**	**XXXI**	**XXXII**	**XXXIII**	
150	150	150	150	130	

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2512

(Station 19, Guayamas 1 ; Latitude : 27° 56. 07N ; Longitude : 111° 46. 45W ; 477m water depth) recovered a total of 48.32m of sediment. The sediment has not been disturbed by coring, with the exception of a short interval, from 23.80m (Section XVI) to 24.40m (Section XVII).

The dominant sediment principally consists of diatoms with various abundances of terrigenous components : diatom ooze, clayey diatom ooze, clayey silty diatom ooze, silty clayey diatom ooze, diatom silty clay, and diatom nannofossil silty clay. The colors range from olive to olive grey and to dark olive grey.

The upper part of the core is continuously laminated, down to 18.60m (Section XIII). Some truncated laminae and traces of bioturbation are observed.

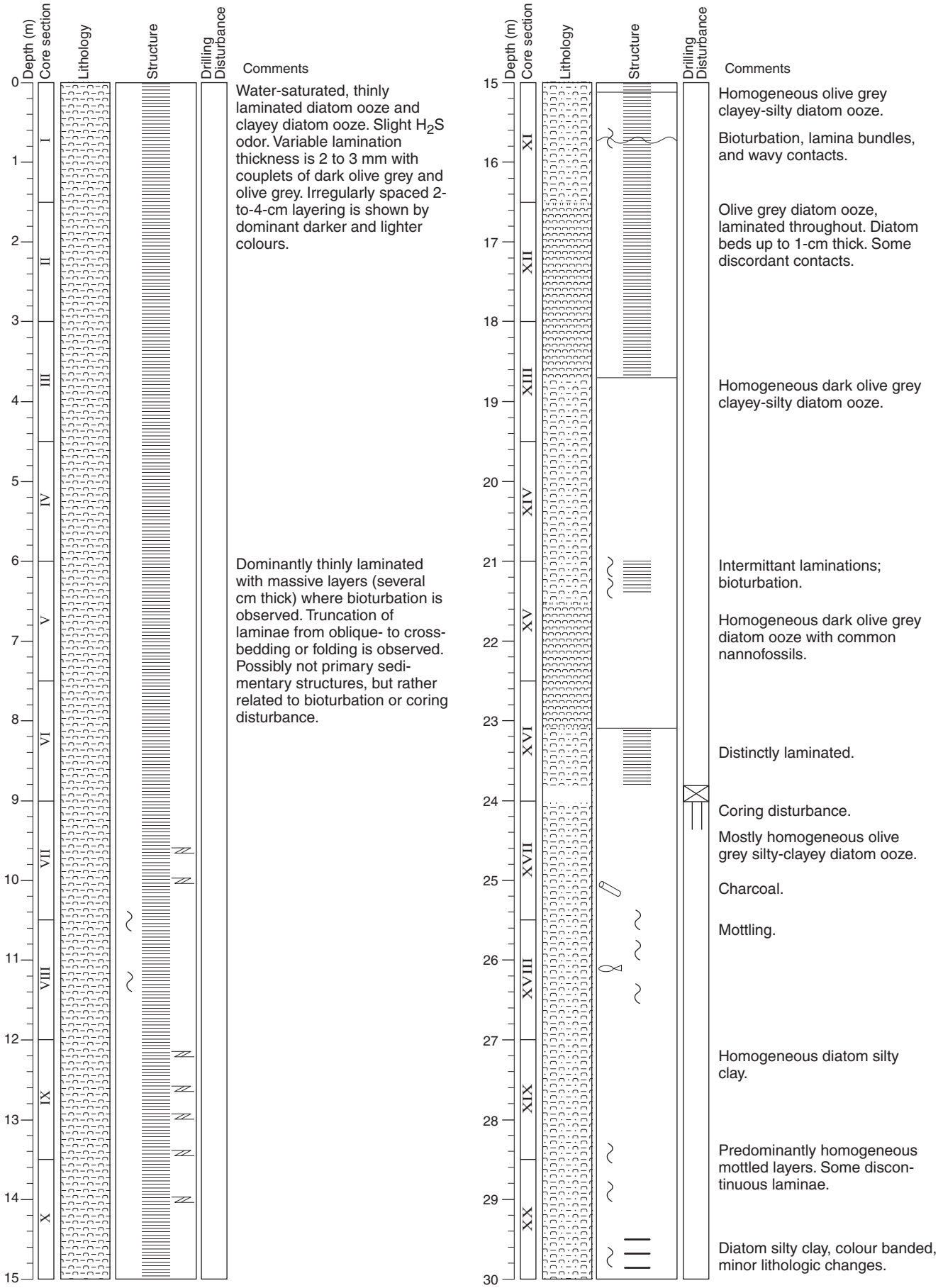
From 18.60m (Section XIII) to 30.00m (bottom of section XX) the sediment is mostly massive. However, some laminated, and some bioturbated intervals, are present.

From 30.00m (top of Section XXI) to 44.00m (bottom of Section XXX) the sediment is continuously laminated with a few truncated laminae and traces of bioturbation. Centimeter scale layers contain smaller scale, very fine lamination. Generally, lighter laminae are enriched in diatoms, while darker laminae contain more clay and silt.

From 44.00m (top of Section XXXI) to the bottom of the core, the sediment is mostly massive, with a sandy layer at 45.30m (Section XXXI) and slight bioturbation below 46.70m (Section XXXII).

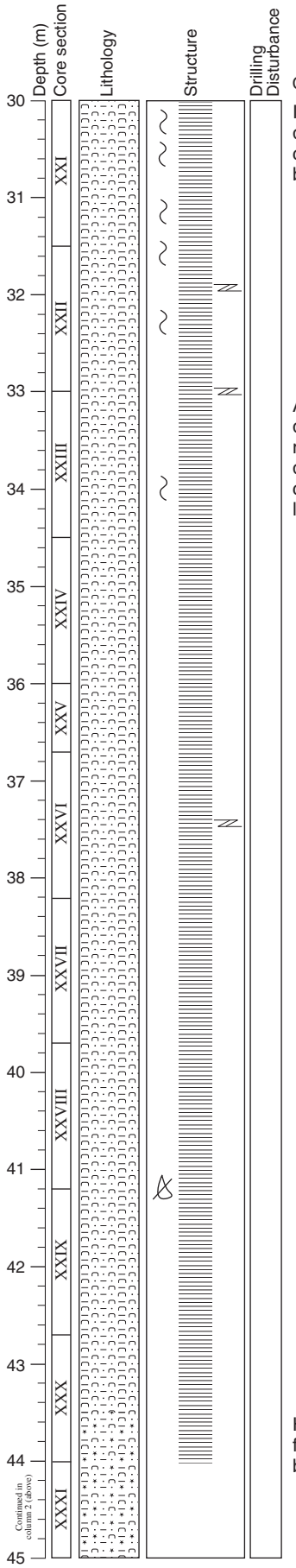
MONA

Core: MD02-2512



MONA

Core: MD02-2512 (cont.)

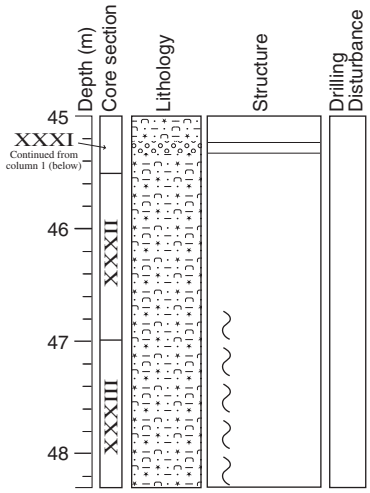


Comments

Interbedded nannofossil diatom ooze and diatom silty clay. Thinly laminated with burrows cutting laminations.

Alternating layers of olive grey diatom ooze (commonly <1 mm) and dark olive grey diatom silty clay (up to 2 cm) containing mm to sub-mm laminae. Traces of bioturation.

Homogeneous diatom-nanno-fossil silty clays with traces of bioturbation and mottling.

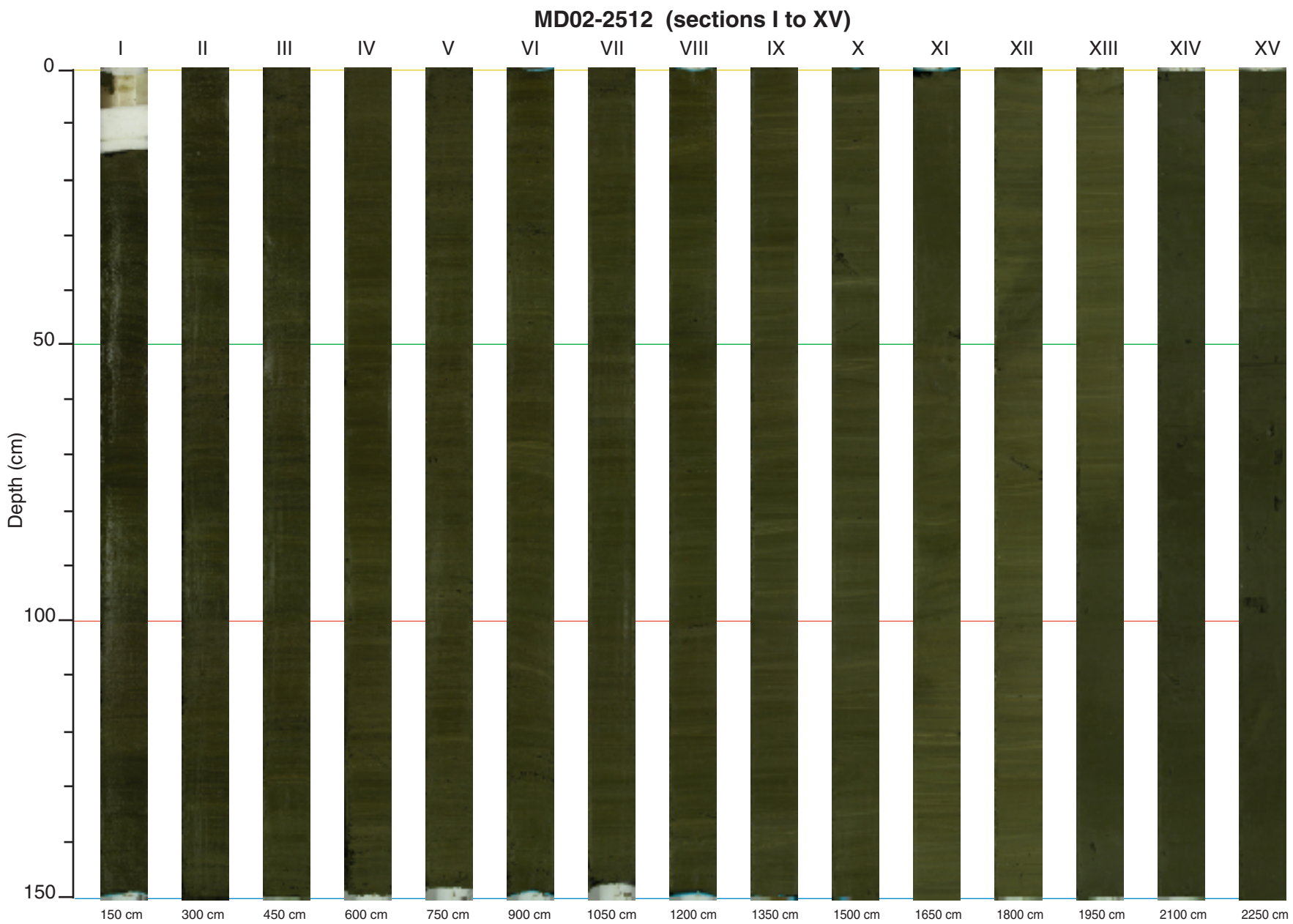


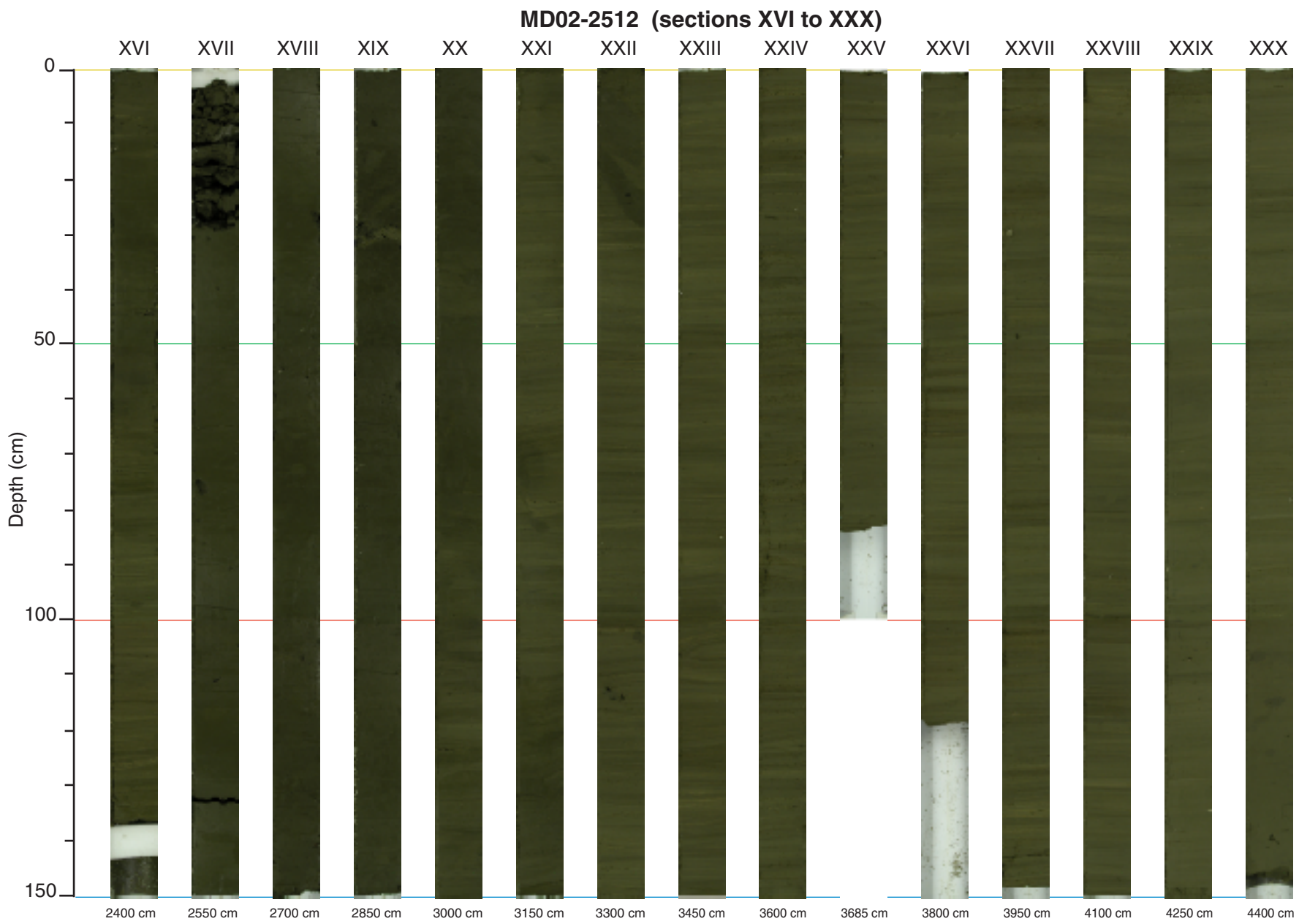
Comments

Sandy layer, rich in quartz opaques.

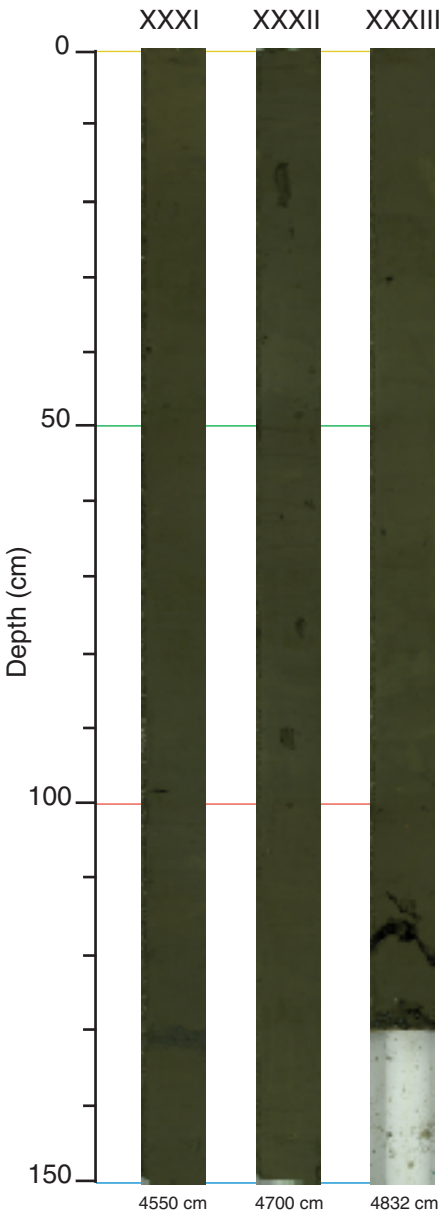
Burrows increasing towards the bottom.

End of core, 4832 cm


MD02-2512 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2512 (sections XVI to XXX)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
XXIX
XXX
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3685 cm
3800 cm
3950 cm
4100 cm
4250 cm
4400 cm

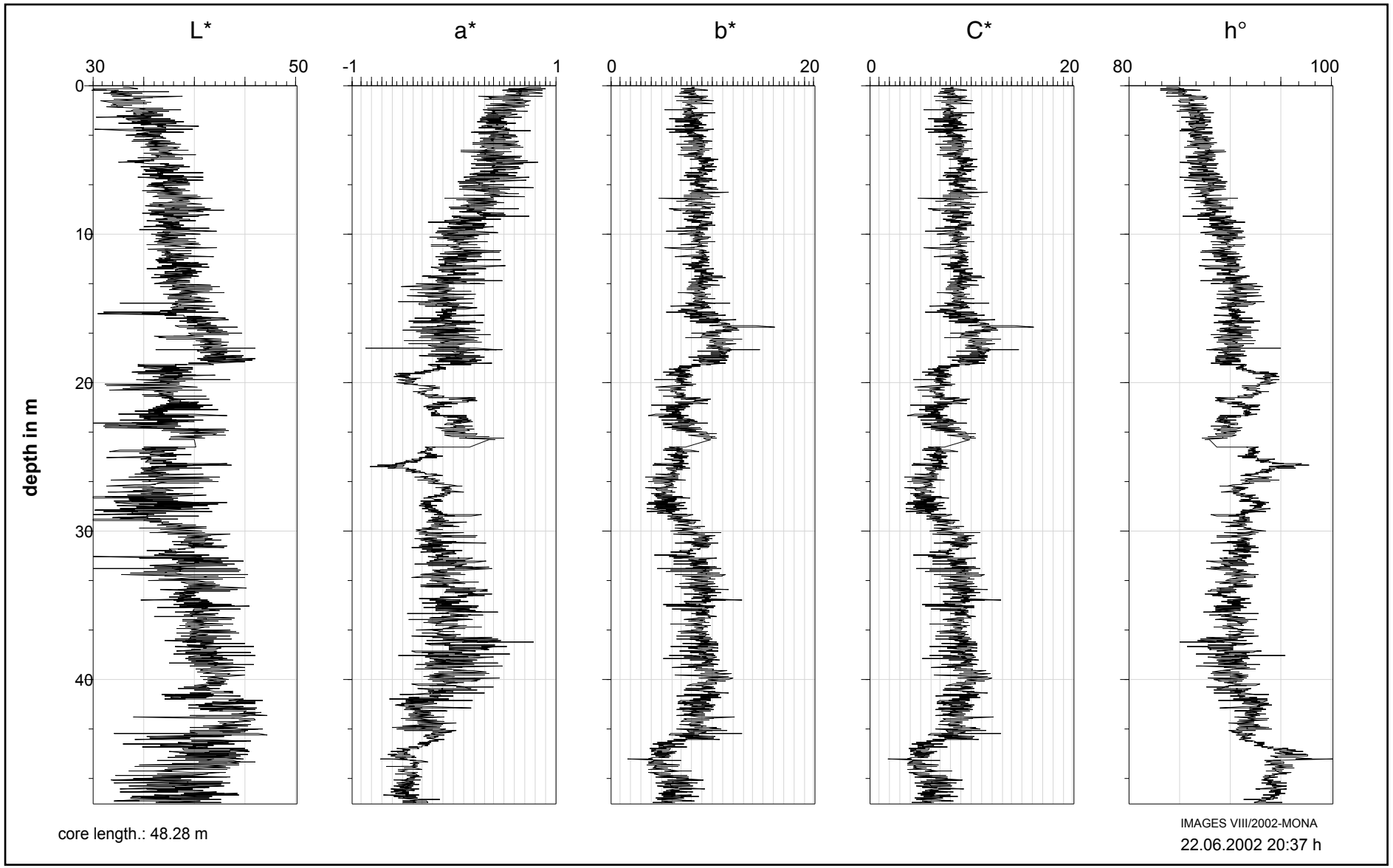
MD02-2512 (sections XXXI to XXXIII)



IMAGES VIII, 2002
MONA

Colour Reflectivity

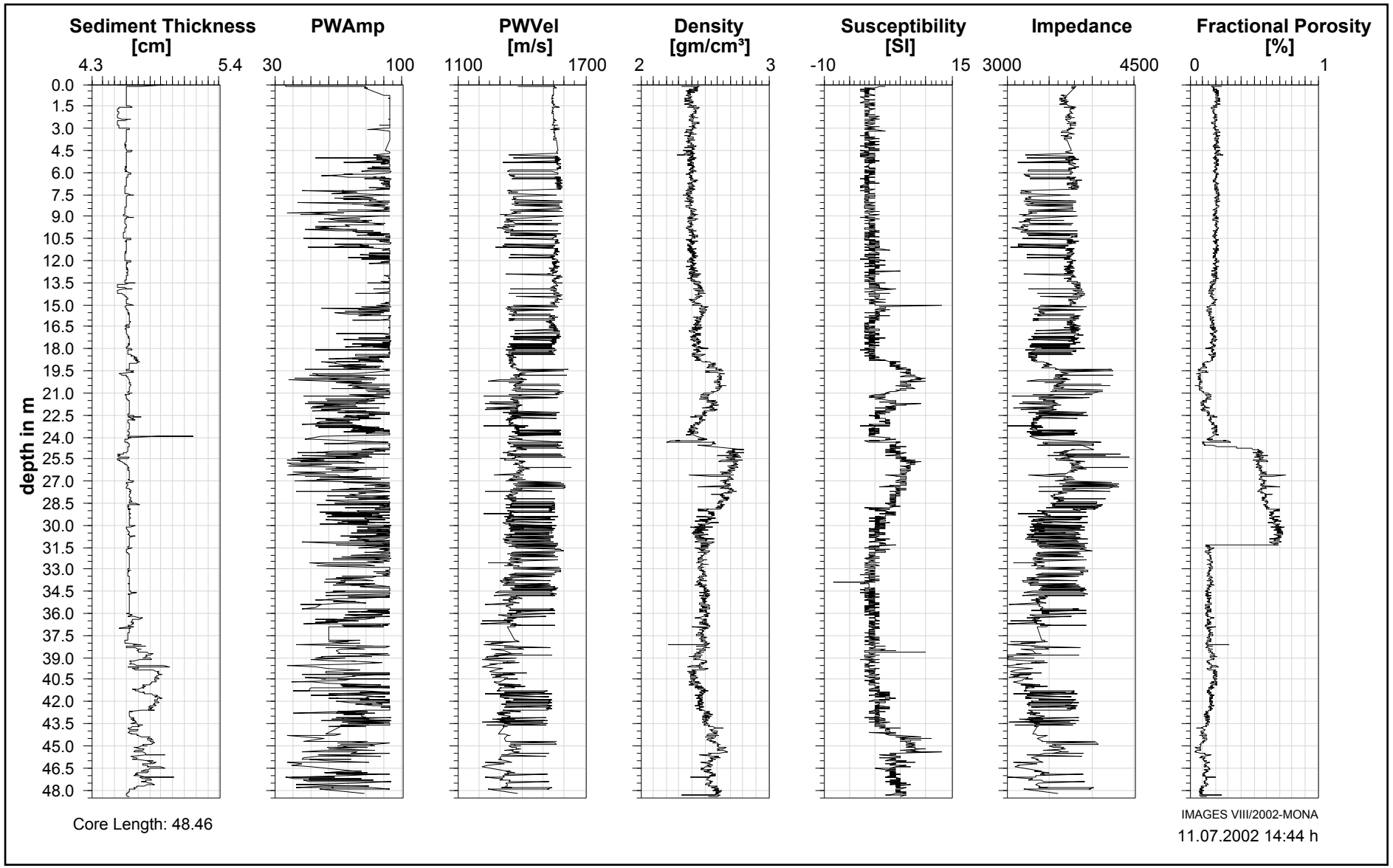
Station 19
Core MD02-2512



IMAGES VIII, 2002
MONA

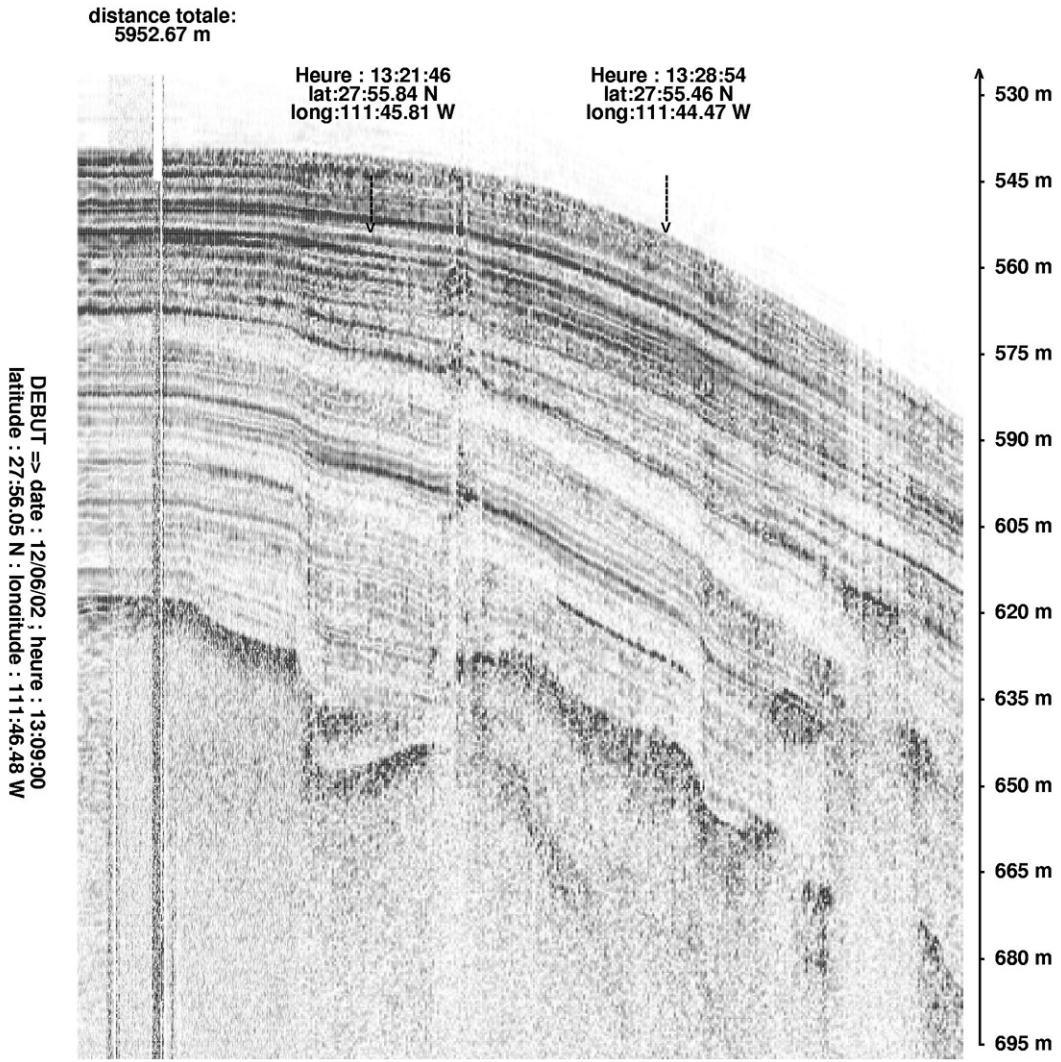
Multi Sensor Core Logger

Station 19
Core MD02-2512

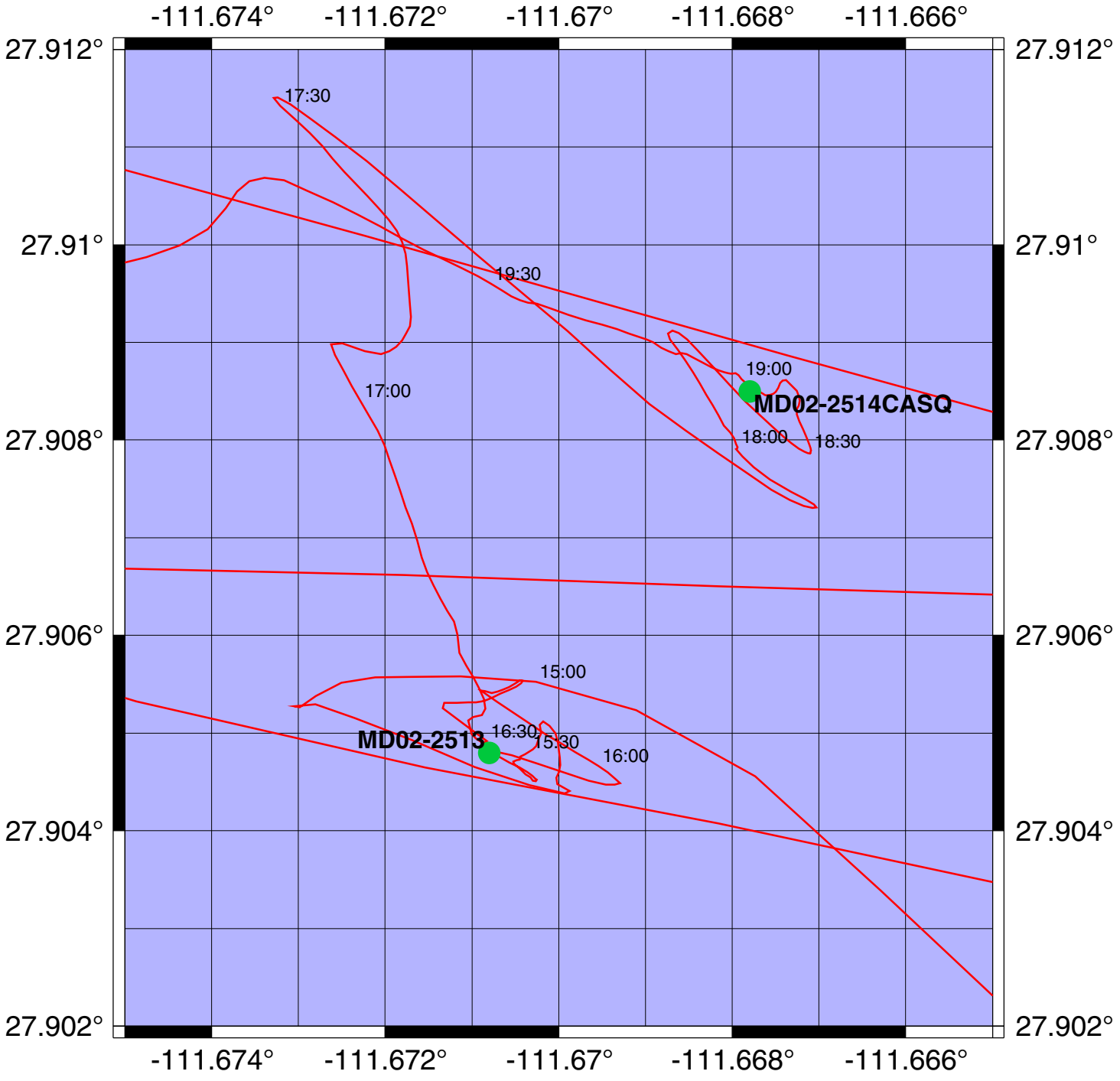


3.5 kHz Seismic Replay

Station 19 , Departure



IMAGES VIII/MD126, Mona
Station 20 Guaymas Basin 2



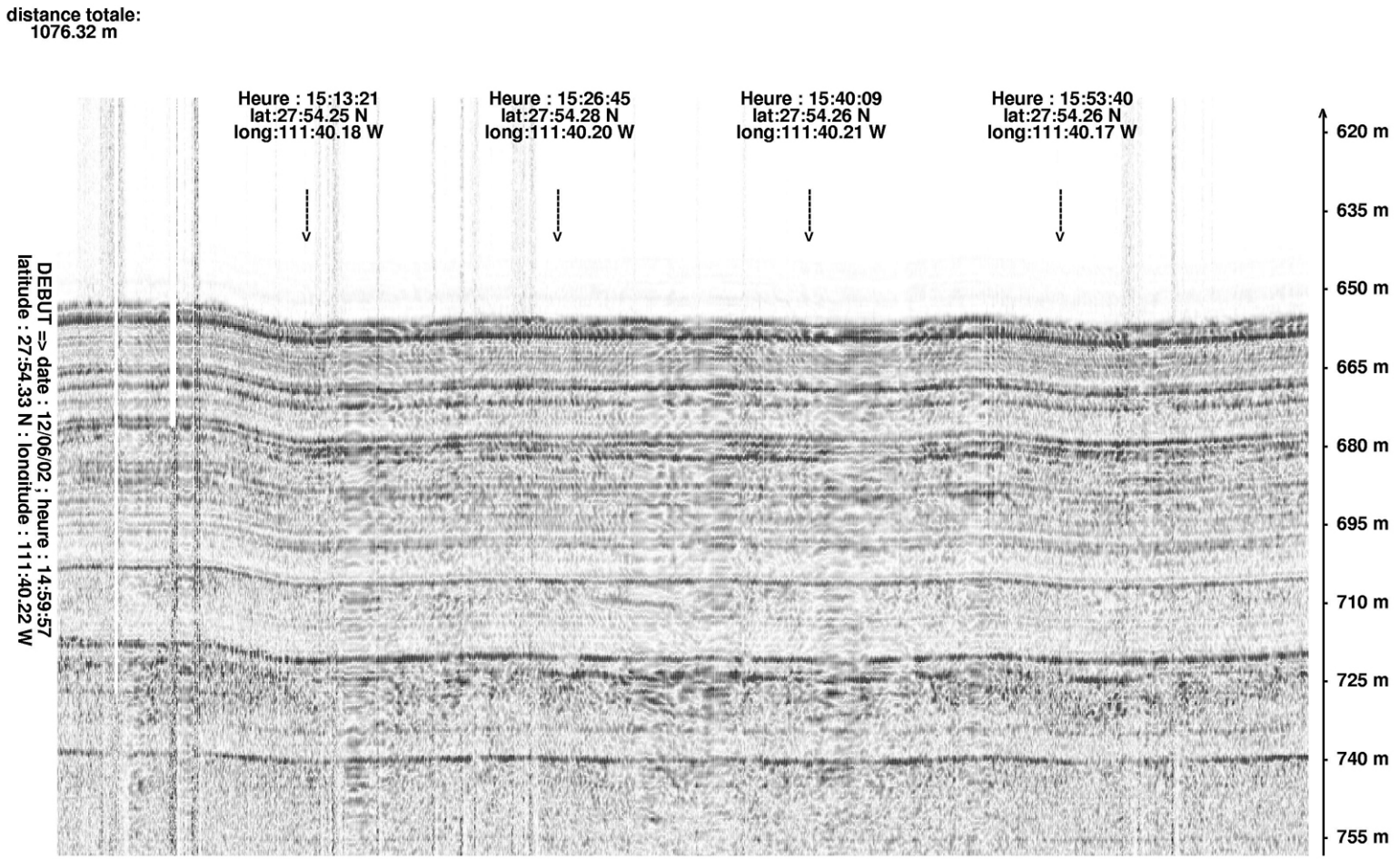
GMT 2002 Sep 18 11:25:22

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 20
Core MD02-2513
MD02-2514C²

Station 20, Arrival to Station

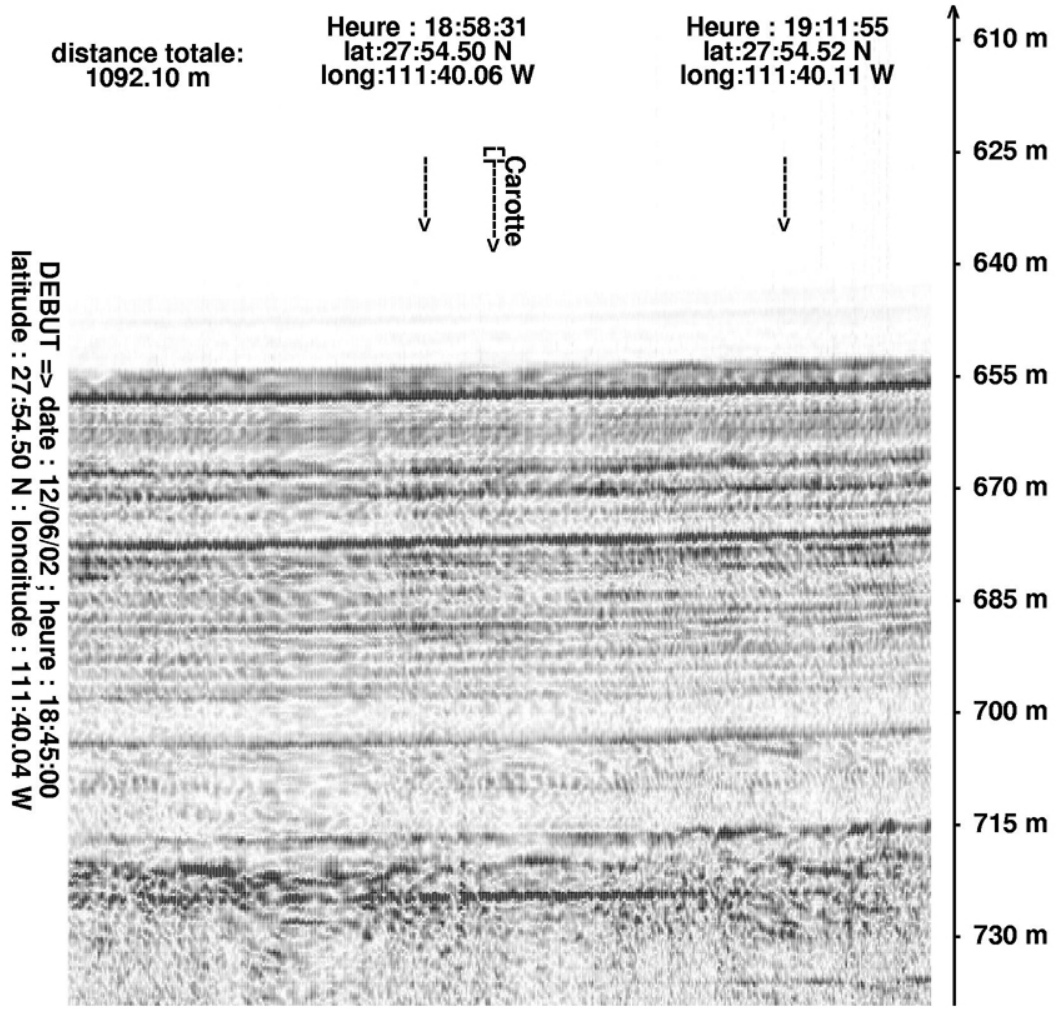


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 20
Core MD02-2513,
MD02-2514C2.

Station 20,Coring operation MD02-2513



NOM DE LA CAMPAGNE

MD 126 MONA

MAGES I

Date : **12.06.2002**

N° de station : **20 Guaymas 2**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2513

(MD - année - milles - centaines)

CAROTTE (longueur) :

58 m

POSITION :

Latitude : 27° 54.29 N

Longitude : 111° 40.25 W

CAROTTIER (type) (1) : CALYPSO II

Poids total (air) : **7.00 t**

Poids total (eau) : **6.80 t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) : Cylindre

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : 638 m

Ligne filée : 574.80 m

Arrachement/total *(tonne)* : t

Arrachement/différentiel *(tonne)* : t

Pénétration/apparente *(m)* : m

Pénétration/tensiomètre *(m)* : m

HEURES (GMT)

En station : **15:15**

Début manœuvre : **16:19**

Déclenchement : **16:31**

Fin de manœuvre : **17:55**

Durée de manœuvre : **01:36**

Départ station : **Resté en station pour carottage suivant**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

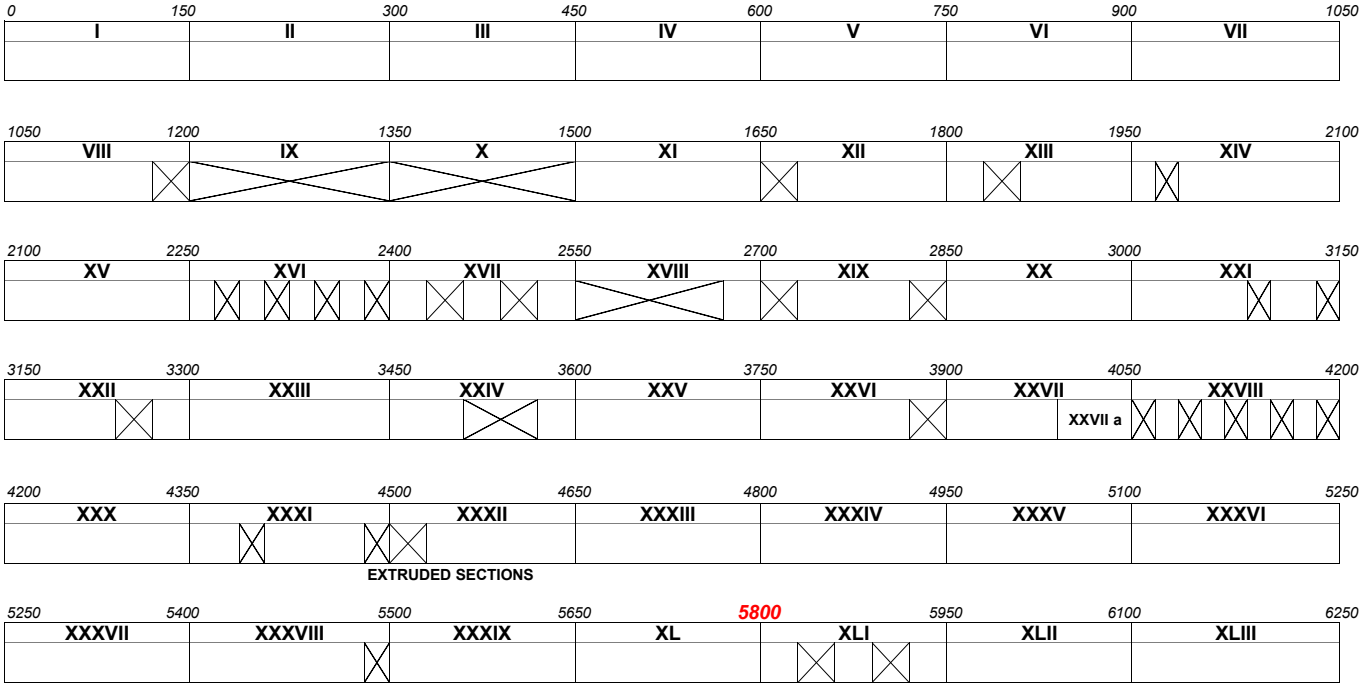
CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents : **Section X 2/3 empty, extruded sections from the top I and II**
extruded sections between XXXI and XXXII
end of core at XXXI a and XXXI a bis
BE CARREFUL : XXXI a bis is above XXXI a



Extruded from the top	**I**	**0** ☐
Extruded from the top I	**II**	**0** ☒ **60** ☐ **110**
Extruded between	**XXXI a XXX and XXXI**	**0** ☐ ☒ ☒ **75**
	XXXI a bis	☐ **environ 30 cm**

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2513

(Station 20, DSDP Site 435; Latitude : 27° 54. 29N ; Longitude :111° 40. 25W ; 642m water depth) has recovered a total of 65.06m of sediment. During operations on the deck, holes were punched in the liner to allow methane to escape. Methane escape was associated with some loss of sediment and may account for some of the empty intervals. Empty intervals are generally less than 20cm long and mostly occur from 8.00m (Section VI) and 45.20m (Section XXXII). More important voids are observed between 11.40m (Section VIII) and 15.00m (Section X), from 25.50m to 26.60m (Section XVIII), from 35.00m to 35.70m (Section XXIV) and from 54.60m to 55.00m (Section XXXVIII). About 10 cm of sediment was extruded from the top of Section XXVIII (Section XXVIIA).

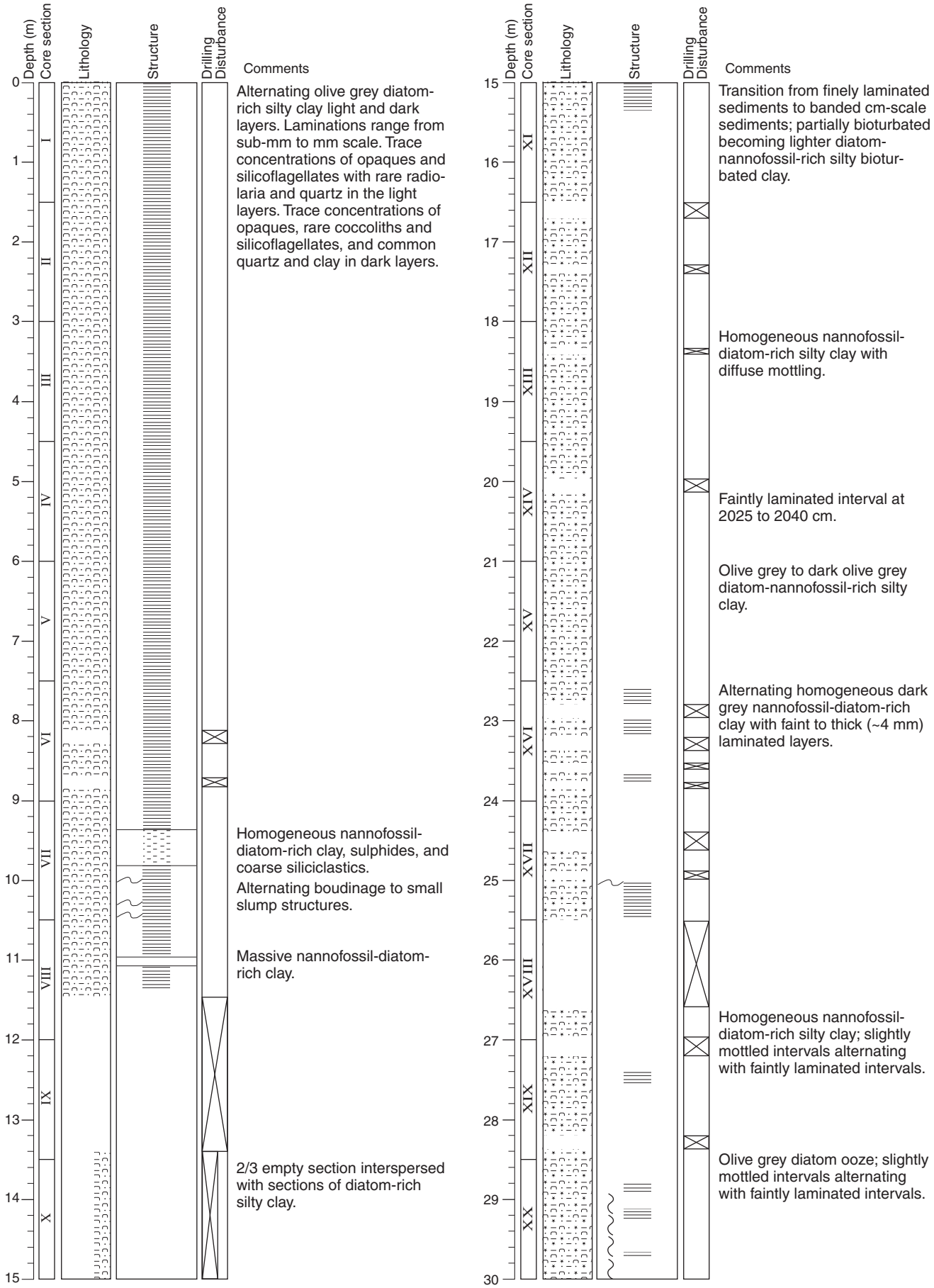
The dominant sediment consists of terrigenous particles associated with changing amounts of biogenic components, from top to 59.00m (Section XLI): diatom silty clay, nannofossil diatom silty clay, and nannofossil diatom clay. The proportion of biogenic components increases below 59.00m to clayey diatom ooze and diatom ooze. The color of the sediment ranges from olive and olive grey to dark olive grey and very dark grey.

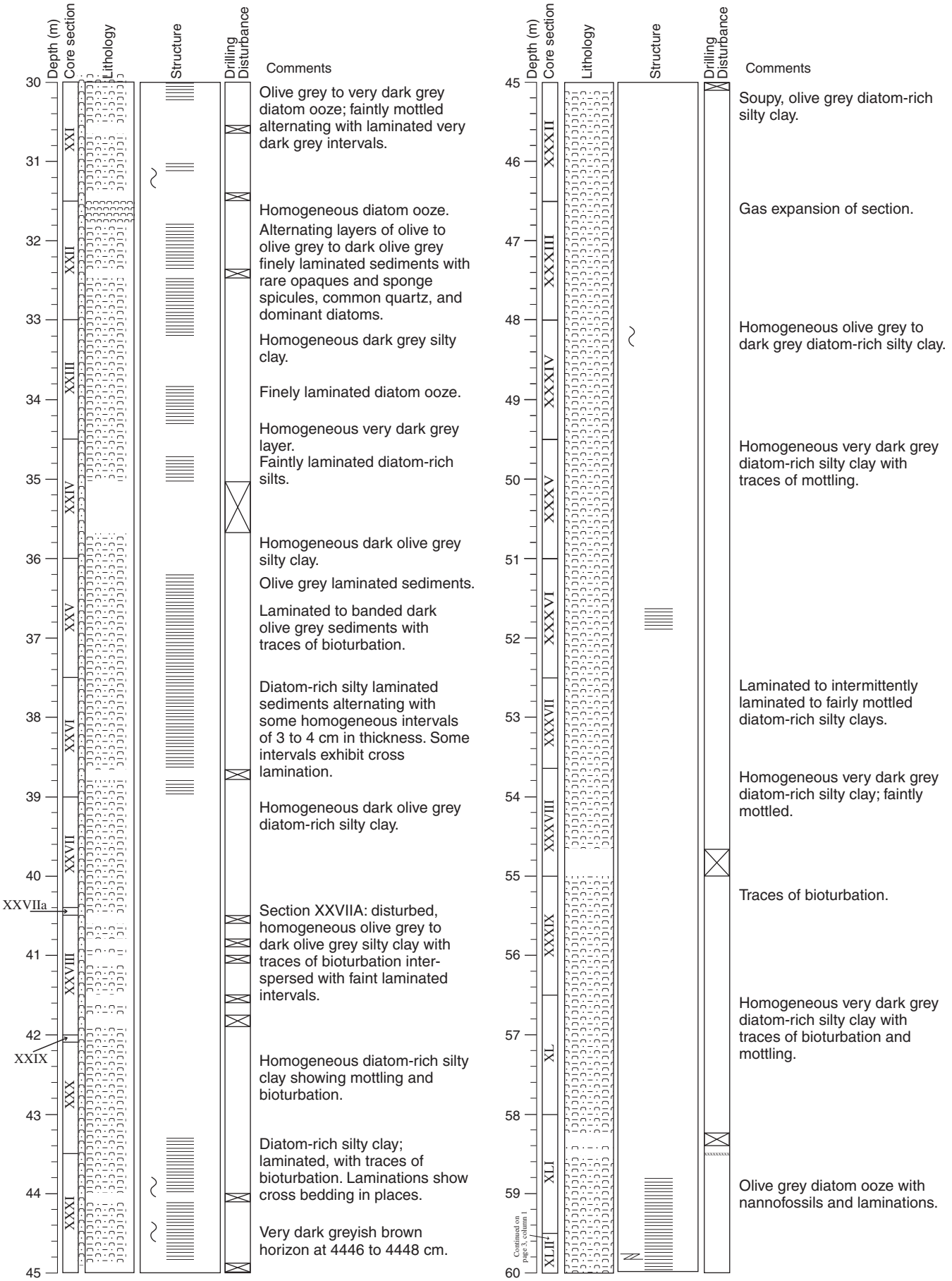
The upper part of the core down to 11.40m (Section VIII) is almost continuously laminated, with slump structures between 9.90m and 10.50m (Section VII). From 15.00m (Section XI) to 58.80m (Section XLI) the sediment is mostly massive with rare traces of bioturbation. The sediment includes significantly laminated and banded intervals, and some cross-beddings are obseerved. Below 58.00m (Section XLI) and to the bottom of the core, the sediment is almost continuously laminated. Centimeter scale color banding contains millimeter scale very fine laminations. Light layrs are generally enriched in biogenic components (diatoms) whereas dark layers contain more terrigenous components (clay or silty clay).

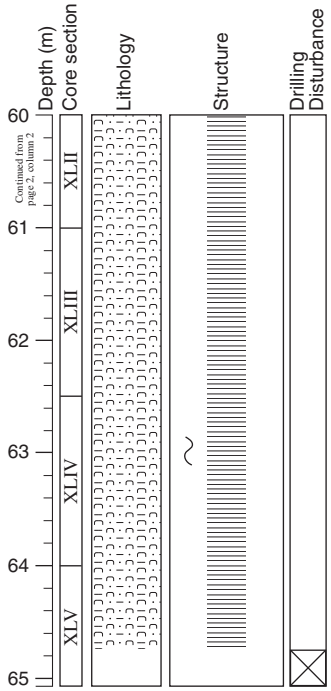
Minor lithology includes:
- Silty clay, dark grey, in Sections XXIII and XXVIIA.

MONA

Core: MD02-2513



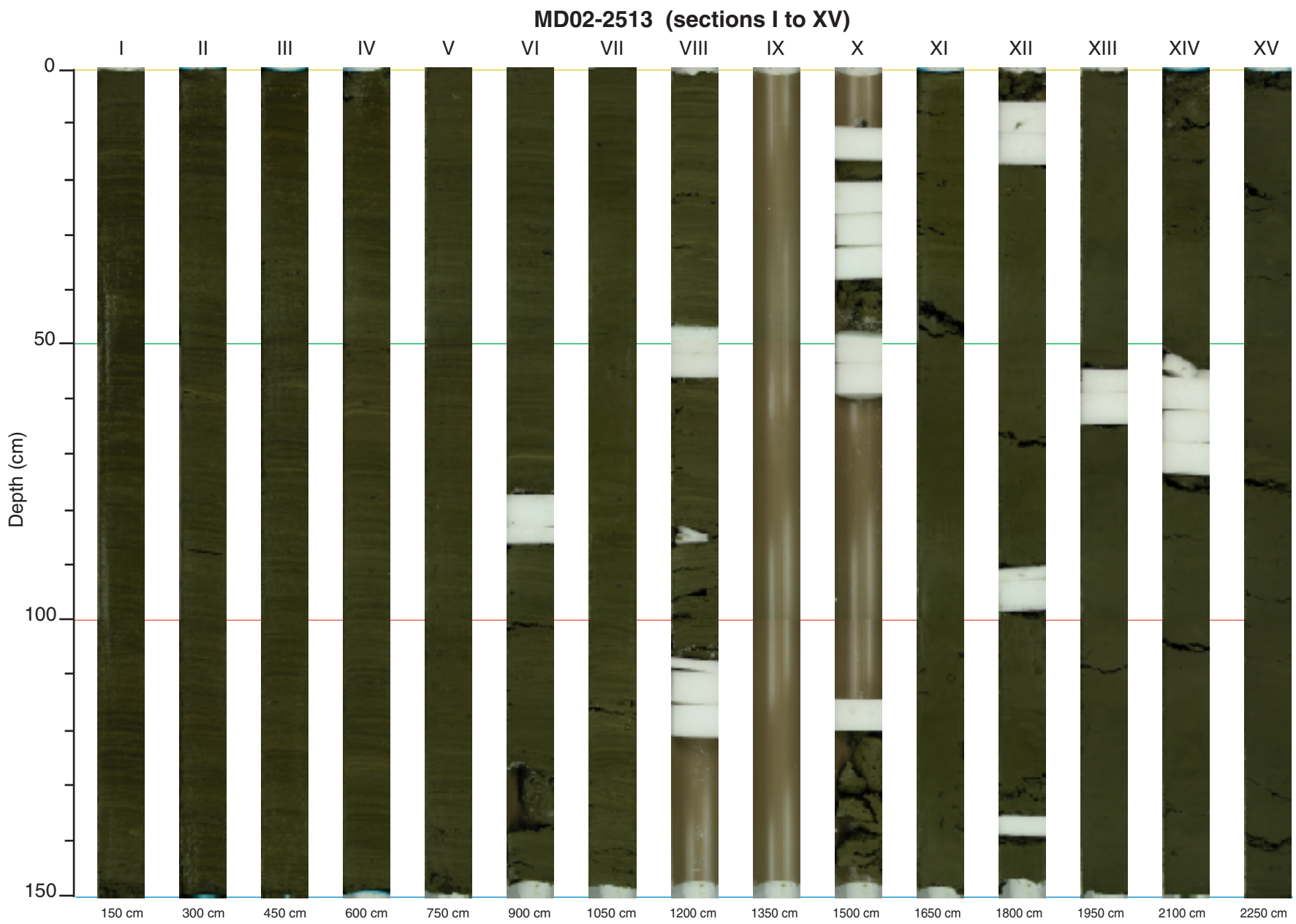

Depth (m)
Core section
Lithology
Structure
Drilling Disturbance
Comments
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
XXXI
XXX
XXIX
XXVIII
XXVII
XXVI
XXV
XXIV
XXIII
XXII
XXI
XXVIIa
Olive grey to very dark grey diatom ooze; faintly mottled alternating with laminated very dark grey intervals.
Homogeneous diatom ooze.
Alternating layers of olive to olive grey to dark olive grey finely laminated sediments with rare opaques and sponge spicules, common quartz, and dominant diatoms.
Homogeneous dark grey silty clay.
Finely laminated diatom ooze.
Homogeneous very dark grey layer.
Faintly laminated diatom-rich silts.
Homogeneous dark olive grey silty clay.
Olive grey laminated sediments.
Laminated to banded dark olive grey sediments with traces of bioturbation.
Diatom-rich silty laminated sediments alternating with some homogeneous intervals of 3 to 4 cm in thickness. Some intervals exhibit cross lamination.
Homogeneous dark olive grey diatom-rich silty clay.
Section XXVIIA: disturbed, homogeneous olive grey to dark olive grey silty clay with traces of bioturbation inter-spersed with faint laminated intervals.
Homogeneous diatom-rich silty clay showing mottling and bioturbation.
Diatom-rich silty clay; laminated, with traces of bioturbation. Laminations show cross bedding in places.
Very dark greyish brown horizon at 4446 to 4448 cm.
Depth (m)
Core section
Lithology
Structure
Drilling Disturbance
Comments
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
XLII
XLI
XL
XXXIX
XXXVIII
XXXVII
XXXVI
XXXV
XXXIV
XXXIII
XXXII
Continued on page 3, column 1
Soupy, olive grey diatom-rich silty clay.
Gas expansion of section.
Homogeneous olive grey to dark grey diatom-rich silty clay.
Homogeneous very dark grey diatom-rich silty clay with traces of mottling.
Laminated to intermittently laminated to fairly mottled diatom-rich silty clays.
Homogeneous very dark grey diatom-rich silty clay; faintly mottled.
Traces of bioturbation.
Homogeneous very dark grey diatom-rich silty clay with traces of bioturbation and mottling.
Olive grey diatom ooze with nannofossils and laminations.

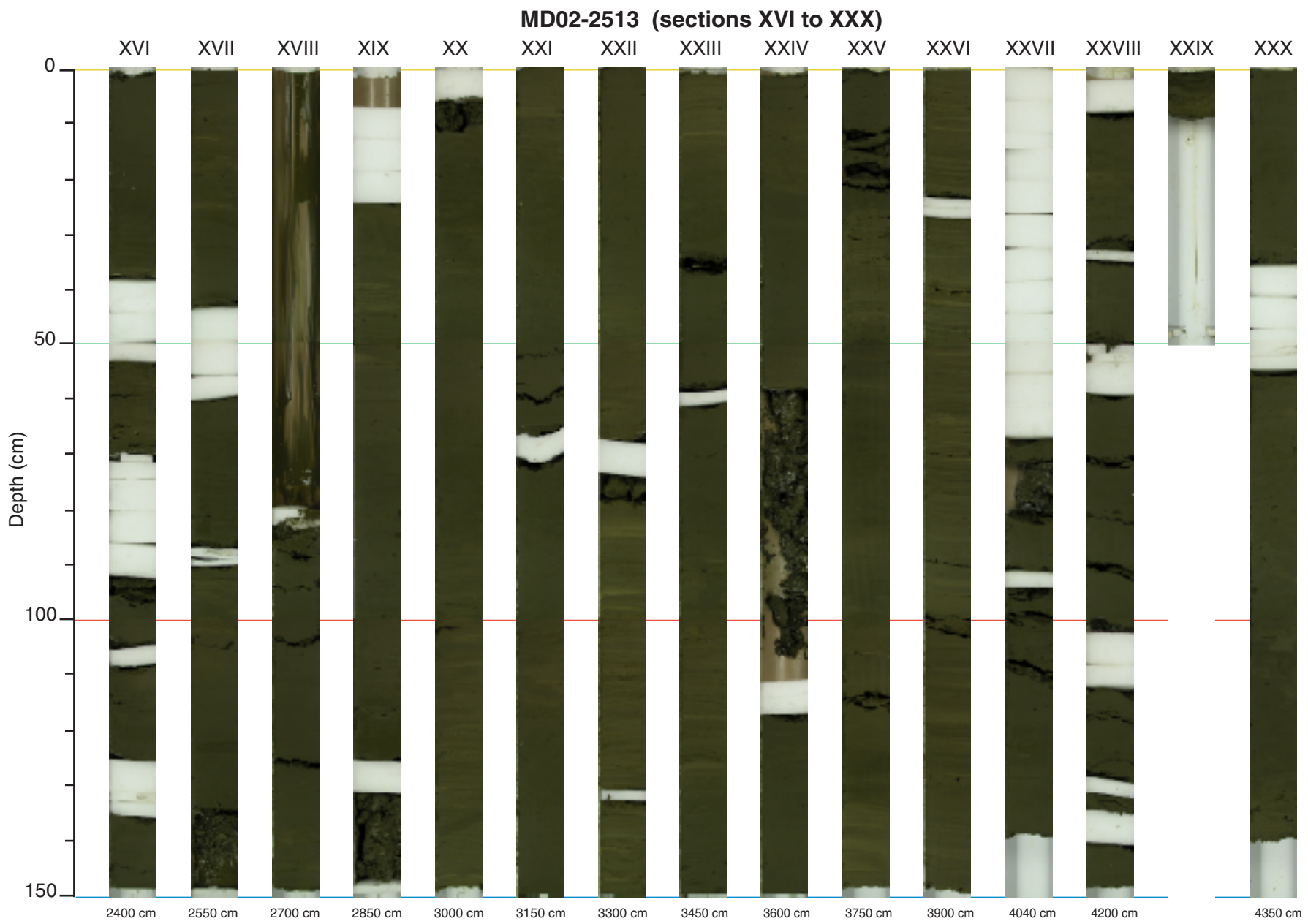


Comments

Interlayered olive grey diatom ooze and clayey dark olive grey diatom ooze. Very finely laminated throughout; mm-to-cm-scale colour banding.

End of core, 6506 cm.


MD02-2513 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm

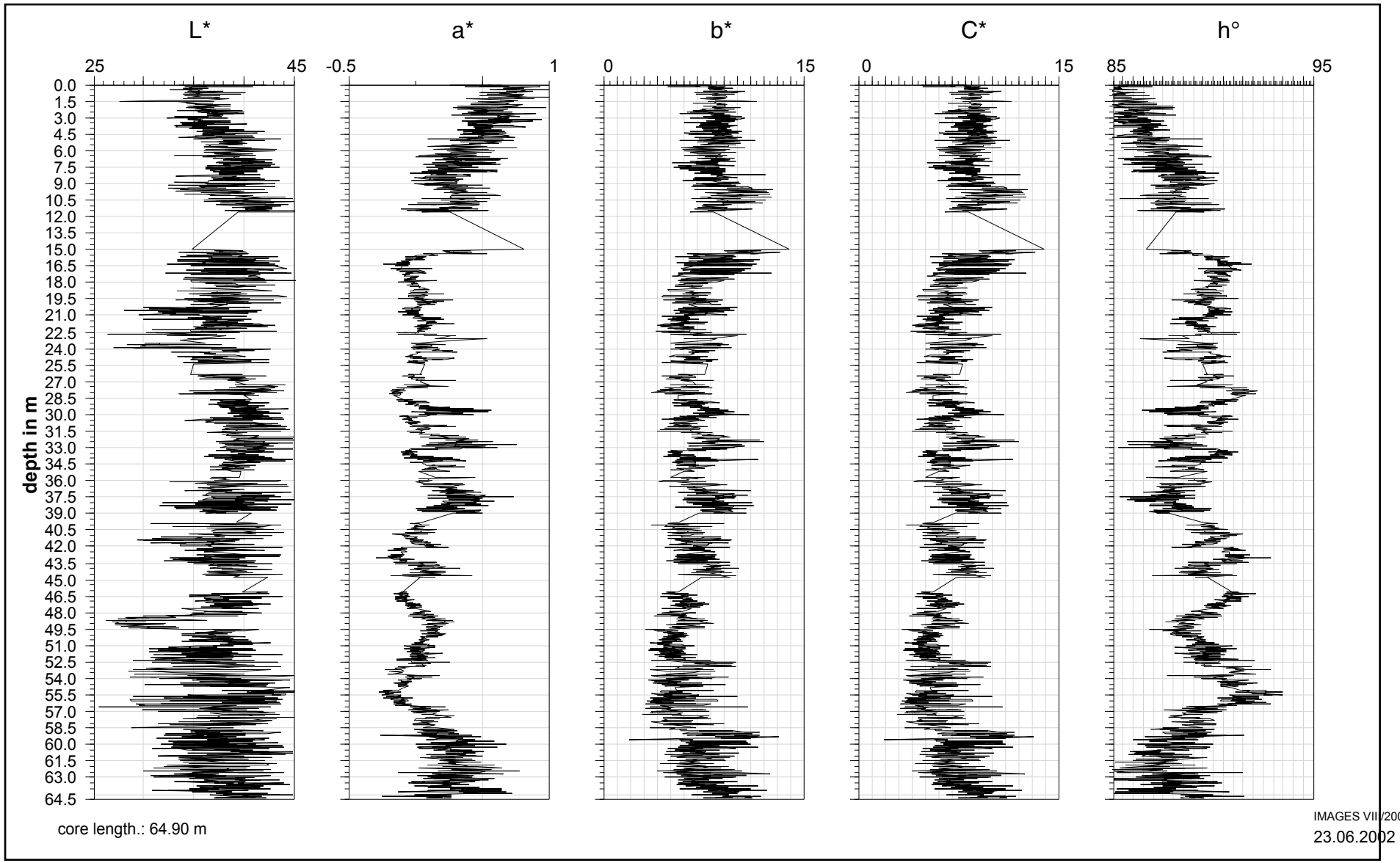

MD02-2513 (sections XVI to XXX)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
XXIX
XXX
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3750 cm
3900 cm
4040 cm
4200 cm
4350 cm


MD02-2513 (sections XXXI to XLV)
XXXI
XXXII
XXXIII
XXXIV
XXXV
XXXVI
XXXVII
XXXVIII
XXXIX
XL
XLI
XLII
XLIII
XLIV
XLV
0
50
100
150
Depth (cm)
4500 cm
4650 cm
4800 cm
4950 cm
5100 cm
5250 cm
5400 cm
5500 cm
5650 cm
5800 cm
5950 cm
6100 cm
6250 cm
6400 cm
6500 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

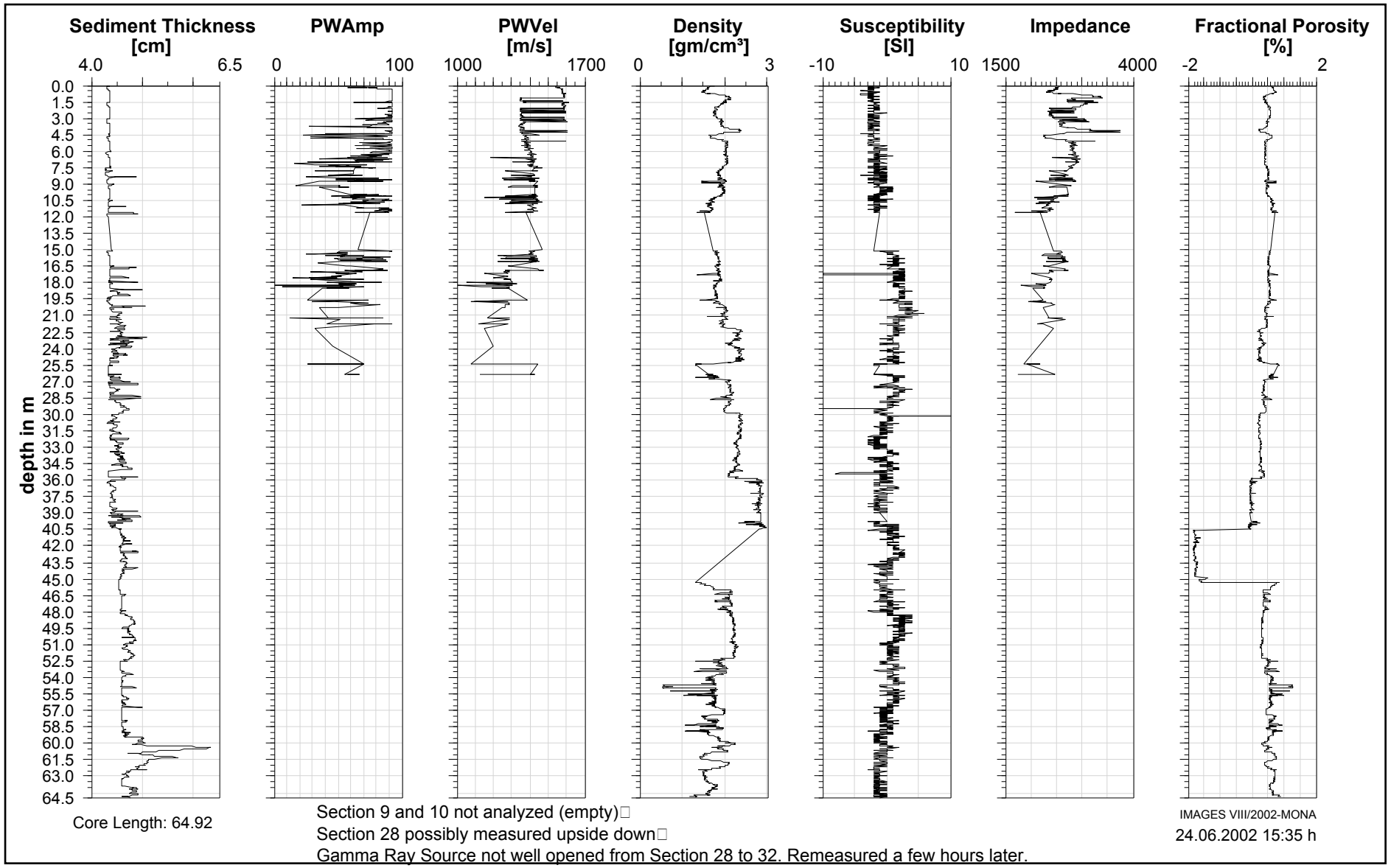
Station 20
Core MD02-2513



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 20
Core MD02-2513



Core Length: 64.92

Section 9 and 10 not analyzed (empty)□
Section 28 possibly measured upside down□
Gamma Ray Source not well opened from Section 28 to 32. Remeasured a few hours later.

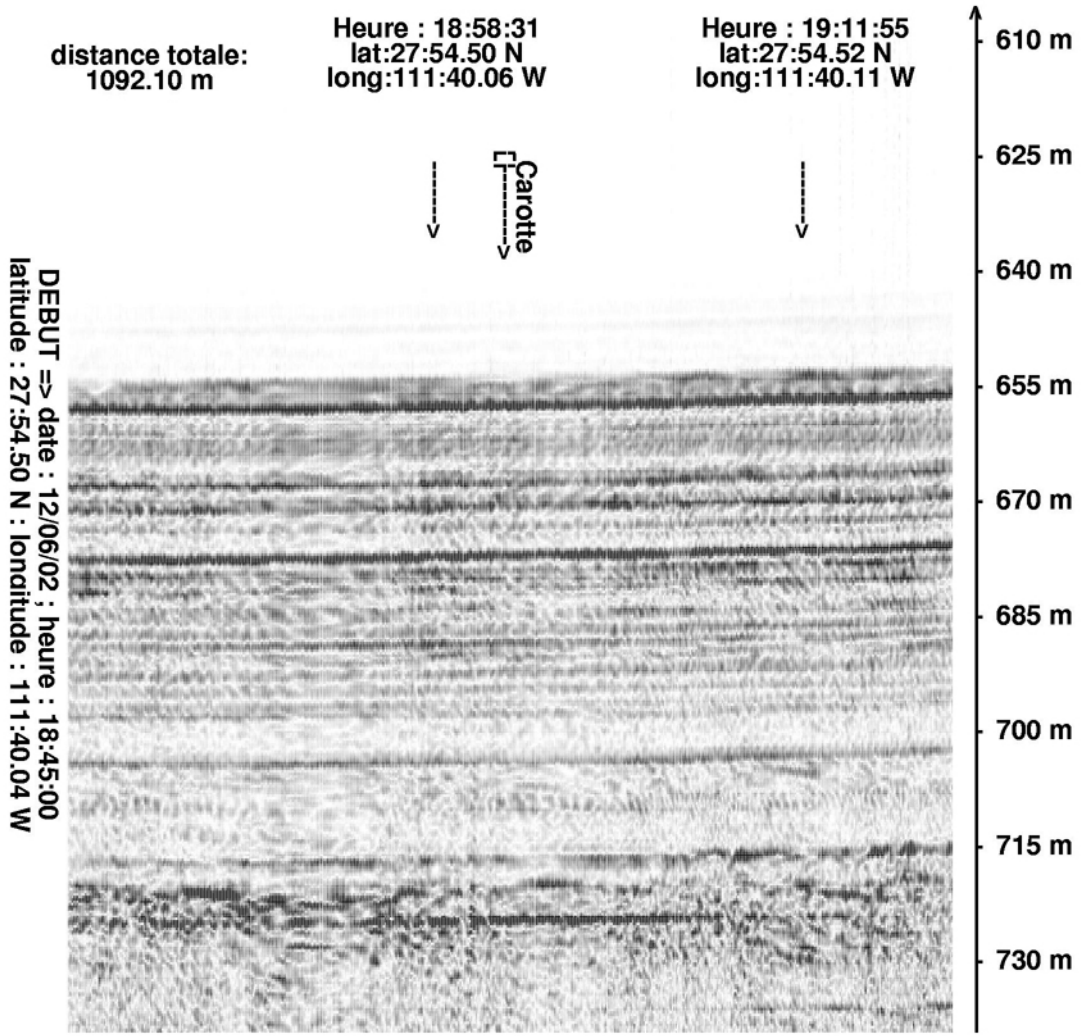
IMAGES VIII/2002-MONA
24.06.2002 15:35 h

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 20
Core MD02-2513
MD02-2514C^2

Station 20,Coring operation MD02-2514C^2



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **12.06.2002**

N° de station : **20 Guaymas 2**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2514 C²

(MD - année - milles - centaines)

CAROTTE (longueur) :

5.6 m

POSITION :

Latitude : **27° 54.51 N**

Longitude : **111° 40.07 W**

CAROTTIER (type) (1) : **CAROTTIER CARRE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **642** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **Déjà en station**

Début manœuvre : **18:45**

Déclenchement : **19:01**

Fin de manœuvre : **20:05**

Durée de manœuvre : **01:20**

Départ station : **20:05**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

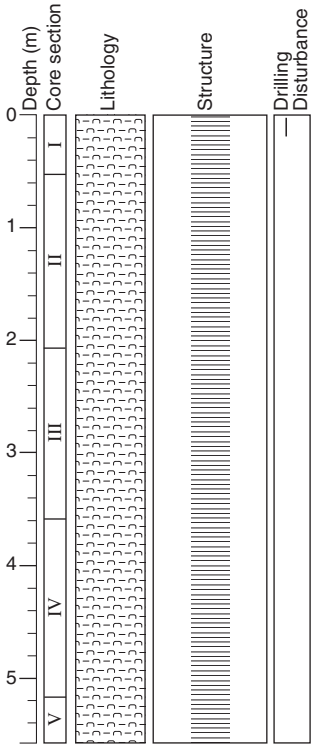
Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MONA

Core: MD02-2514c2



Comments

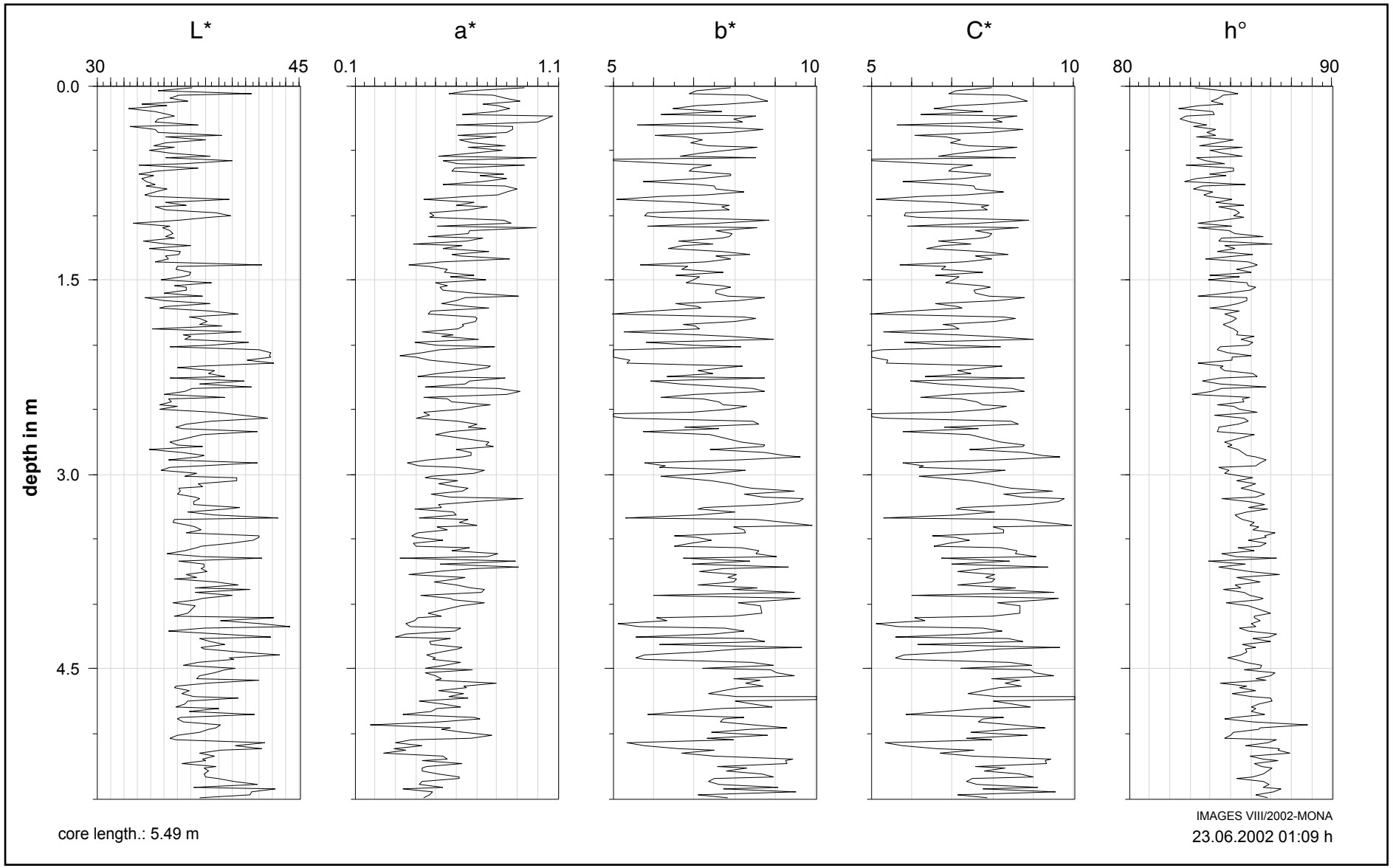
Diatom clay, diatom ooze, and diatom silty clay alternate on a 1-to-several-mm-per-lamina scale. 100-percent-diatom layers, up to 3-mm thick and slightly 'nodular' in appearance, occur throughout the core.

End of core, 558 cm.

IMAGES VIII, 2002
MONA

Colour Reflectivity

Station 20
Core MD02-2514C

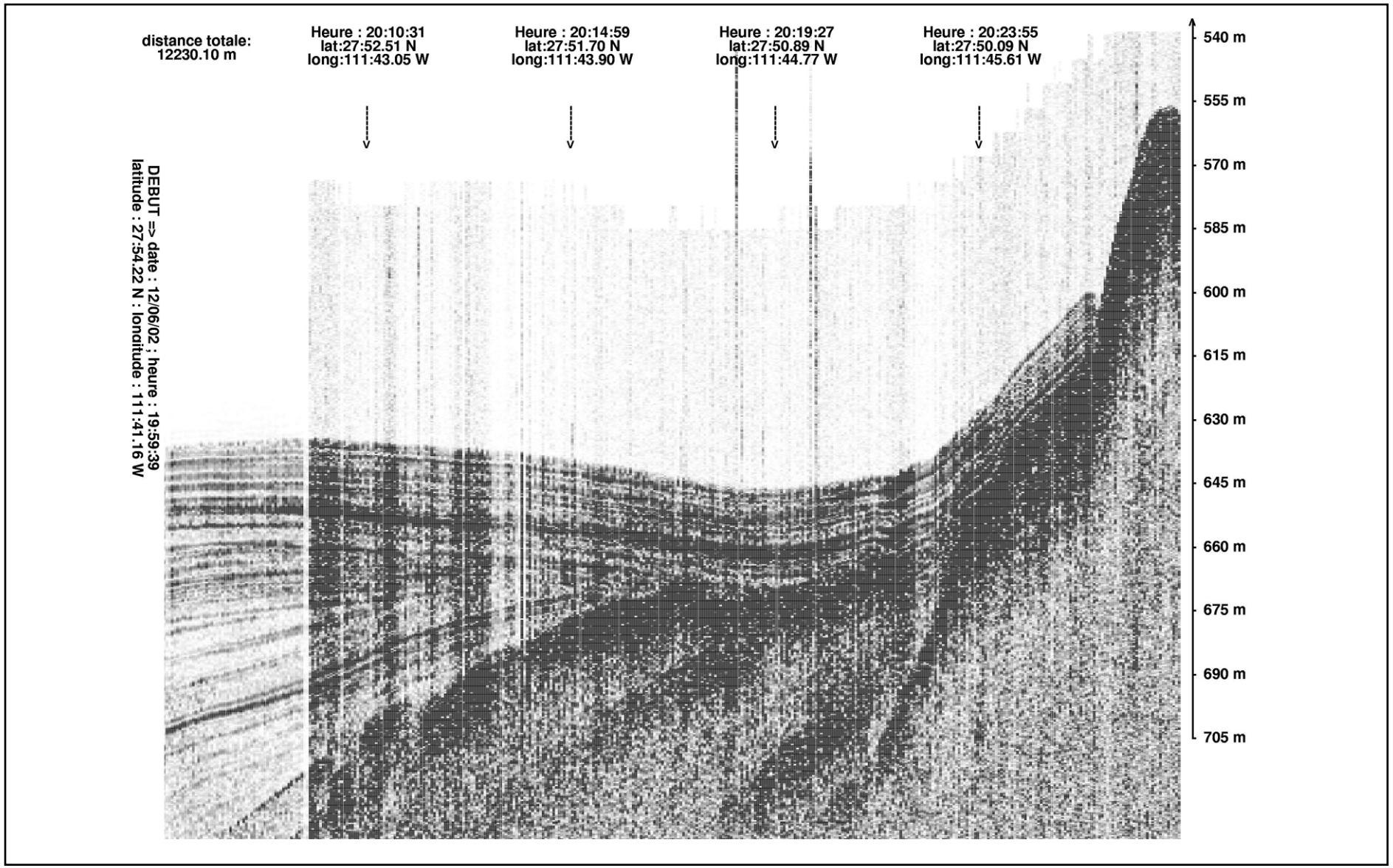


IMAGES VIII, 2002
MONA

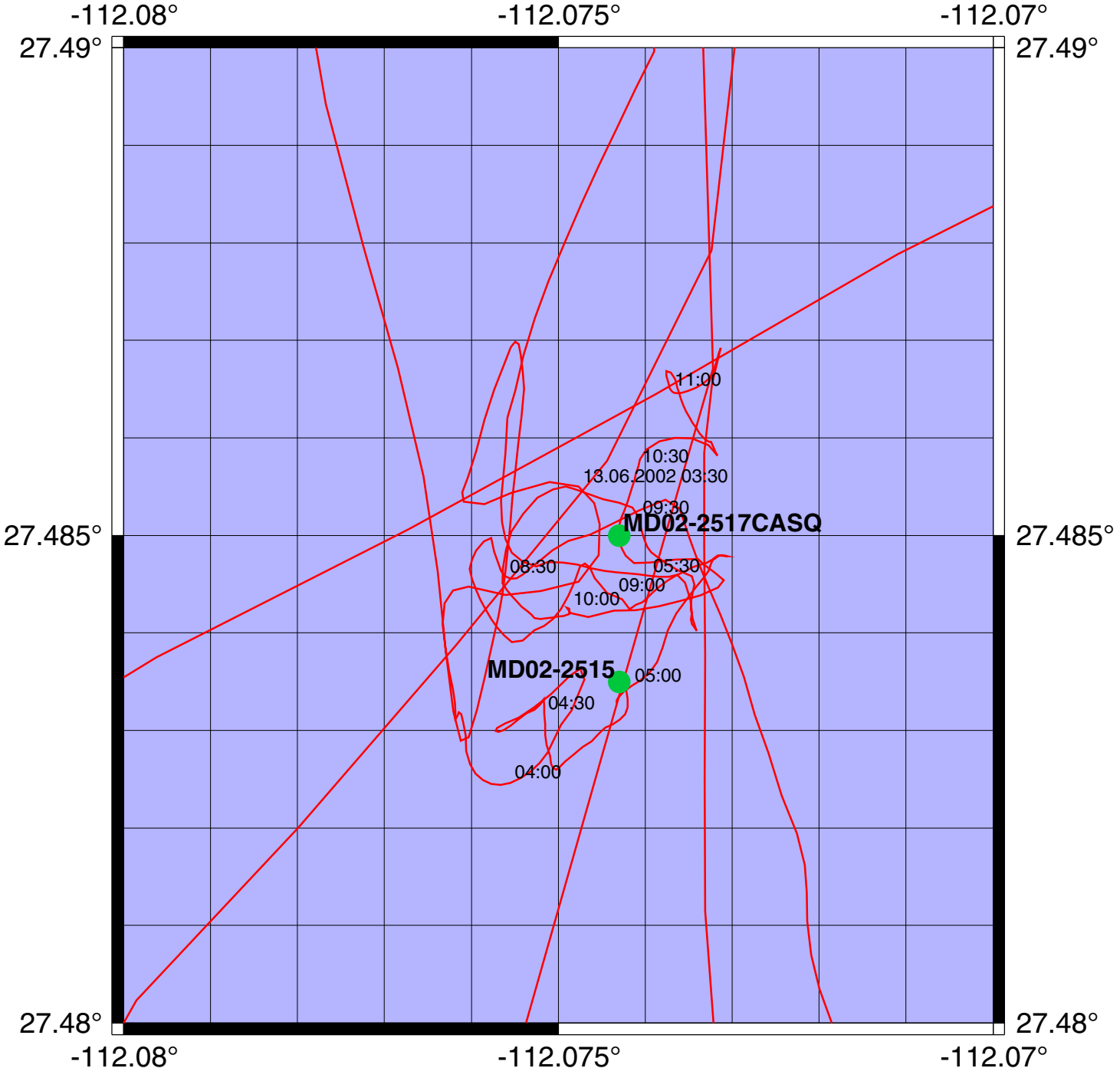
3.5 kHz Seismic Replay

Station 20
Core MD02-2513
MD02-2514C^2

Station 20, Depature from Station



IMAGES VIII/MD126, Mona
Station 21, Guaymas Basin 3



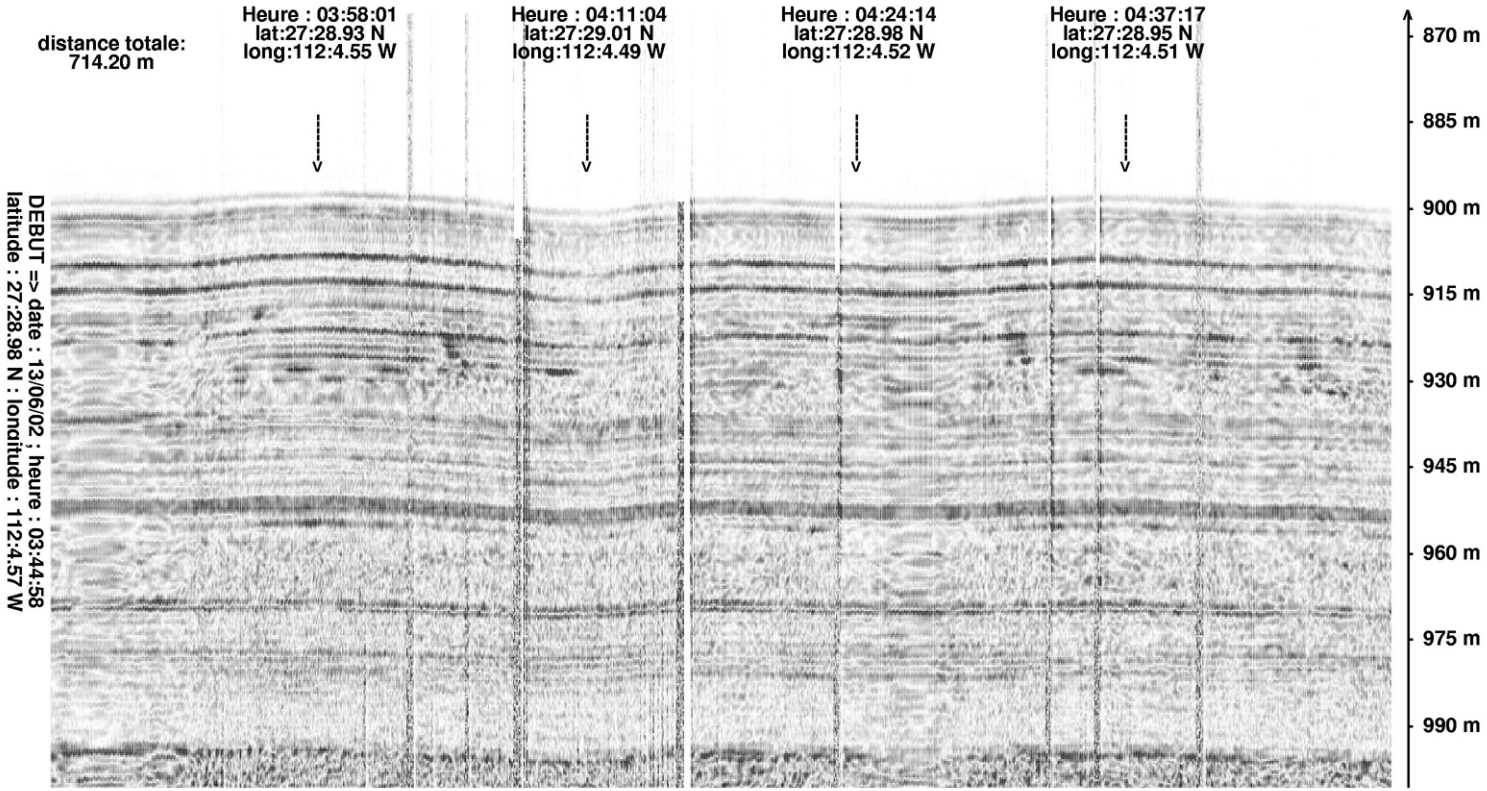
GMT 2002 Sep 26 11:33:50

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 21
Core MD02-2515
MD02-2517C

Station 21, Arrival to Station

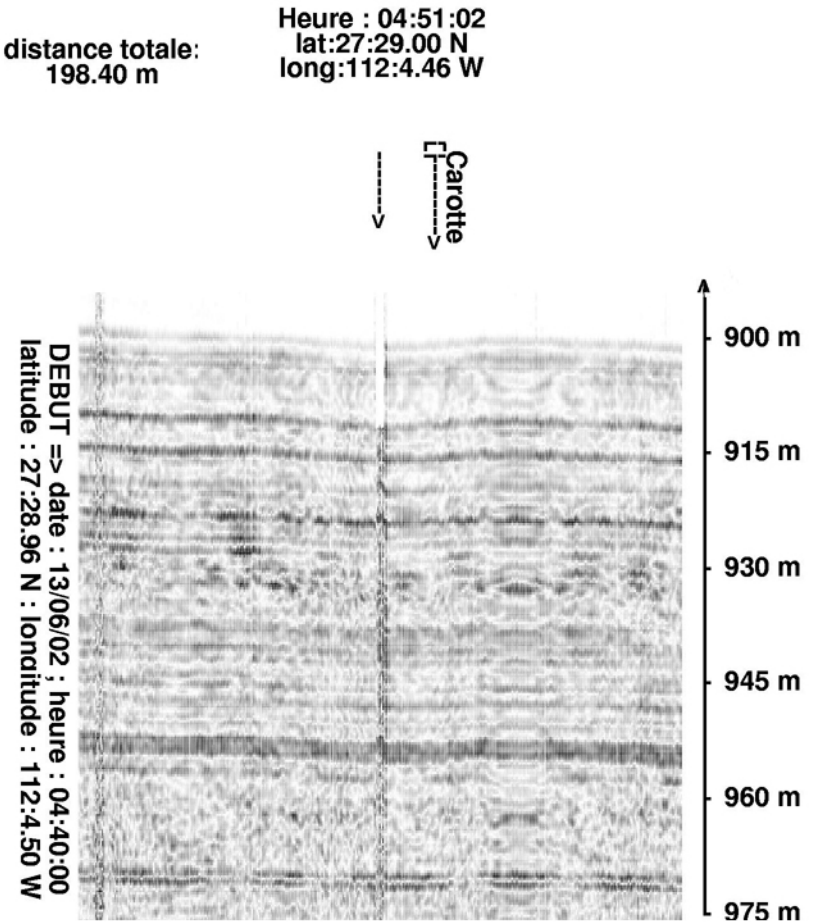


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 21
Core MD02-2515,
MD02-2517C[2].

Station 20,Coring operation MD02-2515



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **13.06.2002**

N° de station : **21 Guaymas Basin 3**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2515

(MD - année - milles - centaines)

CAROTTE (longueur) :

64,40 m

POSITION :

Latitude : **27° 29.01 N**

Longitude : **112° 04.46 W**

CAROTTIER (type) [1] : **CALYPSO II**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **74.45** **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **876** **m**

Ligne filée : **807** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **04:02**

Début manœuvre : **04:02**

Déclenchement : **04:53**

Fin de manœuvre : **06:30**

Durée de manœuvre : **02:28**

Départ station : **Resté en station pour carottage suivant**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

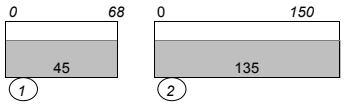
Filet à plancton :

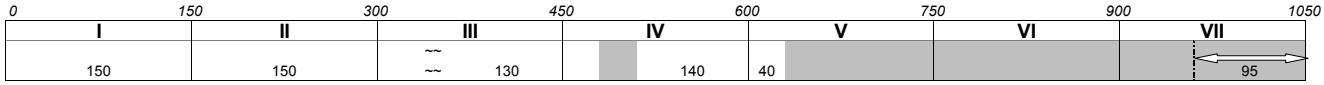
Autres :

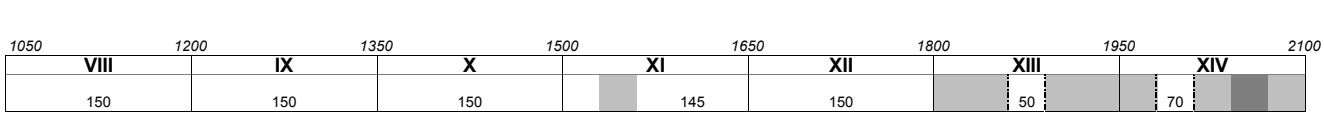
Description / incidents : **sections avec gaz**

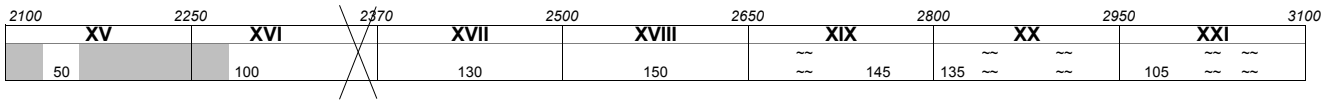
sections extrudées du sommet de la carotte

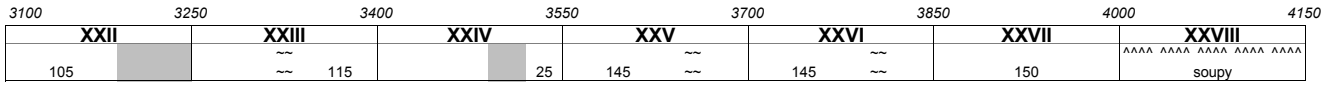
pas de section XXX vide sortie de la section trop longue

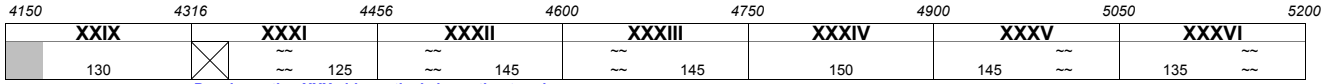




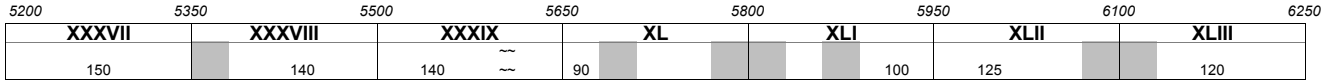


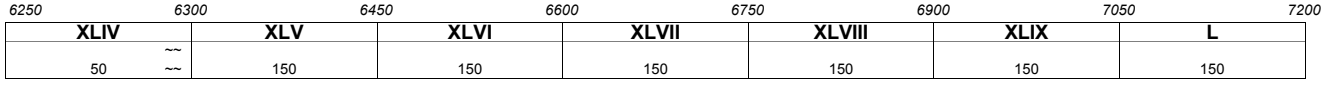


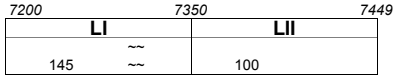




Pas de section XXX vide sortie de la section trop longue







TOTAL RECOVERY : 64,20 M

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2515

(Station 21 ; Latitude : 27° 29. 01N ; Longitude : 12° 04. 46W ; 881m water depth) has recovered a total of 74.49m of sediment. The core contains empty intervals, 0.10m to 1.60m long, from 3.40m (Section III) to 9.50m (Section VII), from 18.00m (Section XIII) to 22.60m (Section XVI), and from 30.20m (Section XXI) to 61.00m (Section XLII). The whole Section XXX is missing. Some intervals have been disturbed by coring, between 36.00m (Section XXV) and 63.00m (Section XLIV).

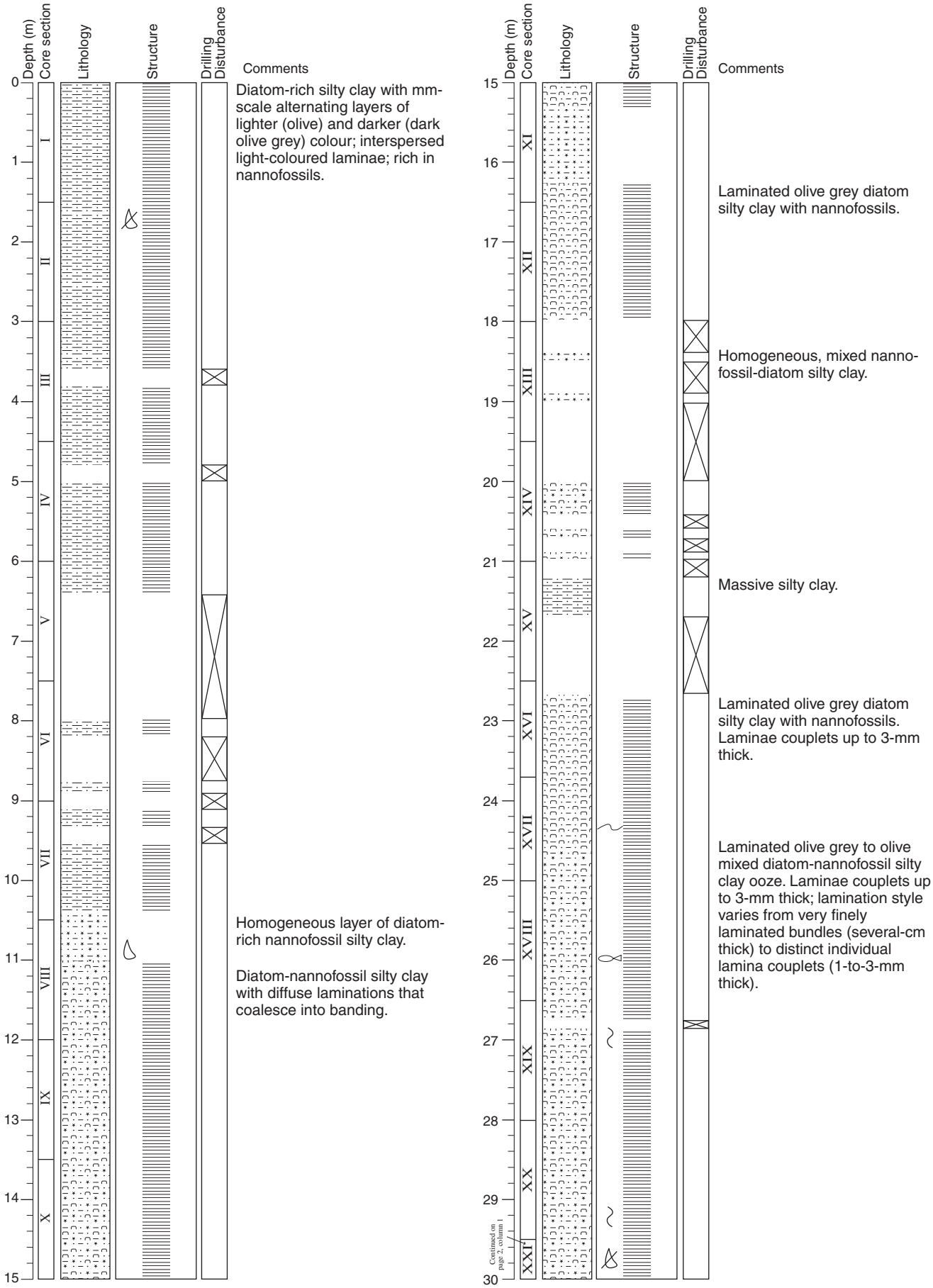
The dominant sediment consists mostly of terrigenous components with various amounts of biogenic components. It ranges from silty clay, diatom silty clay, nannofossil silty clay and diatom-nannofossil silty clay, to silty clayey diatom ooze, clayey diatom ooze, and diatom ooze. Highest contents of biogenic components are recorded from 45.00m (Section XXXII) to 69.00m (Section XLVIII). The colors range from olive and olive grey to dark olive grey and very dark grey.

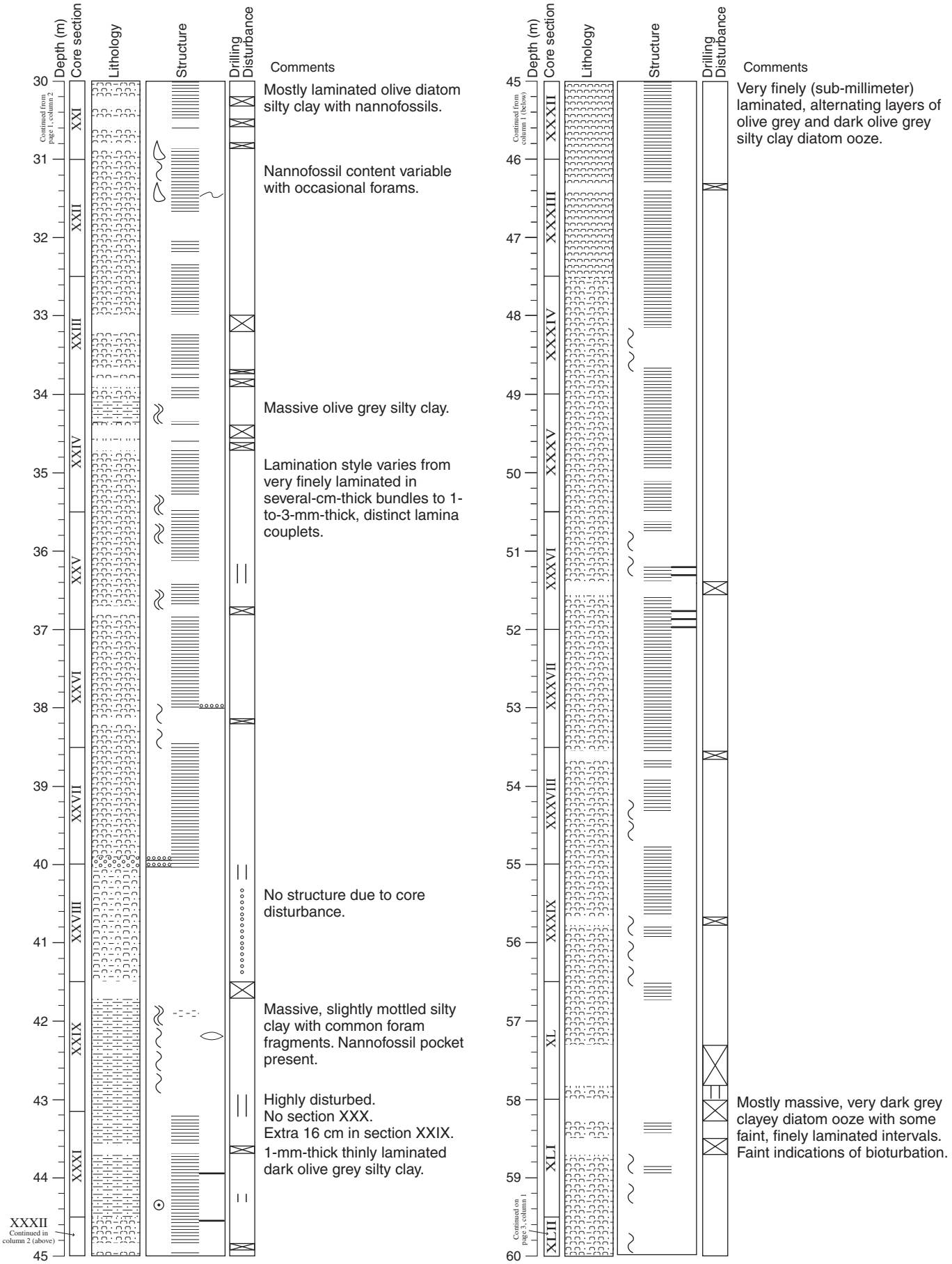
The sediment is mostly laminated throughout the core. The lamination style sometimes varies from very finely laminated bundles up to several centimeters thick, to individual millimetric lamina couplets. Some intervals are massive, sometimes bioturbated, especially below 30.00m (Section XXI). A few slumps and graded beddings are obseved between 24.00m (Section XVII) and 40.00m (Section XXVII).

Minor lithology includes :
- Isolated layers of homogeneous clay, grey to olive grey, from 51.2m to 52.00m (Section XXXVI), at 63.60m (Section XLV), and from 69.00m (Section IL) to 72.40m (Section LI).

MONA

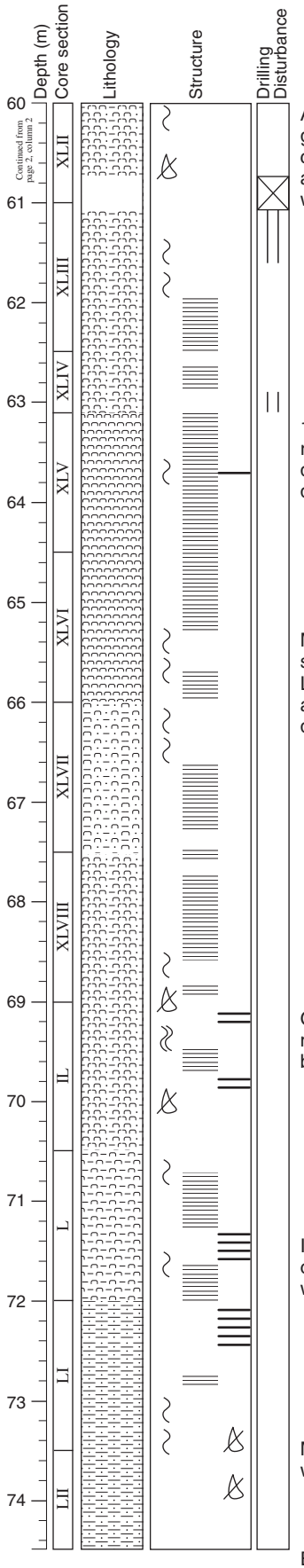
Core: MD02-2515




Depth (m)
Core section
Lithology
Structure
Drilling Disturbance
Comments
Continued from page 1, column 2
XXXII
Continued in column 2 (above)
Mostly laminated olive diatom silty clay with nannofossils.
Nannofossil content variable with occasional forams.
Massive olive grey silty clay.
Lamination style varies from very finely laminated in several-cm-thick bundles to 1-to-3-mm-thick, distinct lamina couplets.
No structure due to core disturbance.
Massive, slightly mottled silty clay with common foram fragments. Nannofossil pocket present.
Highly disturbed.
No section XXX.
Extra 16 cm in section XXIX.
1-mm-thick thinly laminated dark olive grey silty clay.
Continued from column 1 (below)
Very finely (sub-millimeter) laminated, alternating layers of olive grey and dark olive grey silty clay diatom ooze.
Continued on page 3, column 1
Mostly massive, very dark grey clayey diatom ooze with some faint, finely laminated intervals. Faint indications of bioturbation.

MONA

Core: MD02-2515 (cont.)



Alternating, relatively homogeneous layers with minor colour banding and bioturbation. Olive grey diatom ooze with clay.

1-to-2-mm-thick thinly and regularly laminated, 25¡-dipping, olive grey to pale olive diatom ooze.

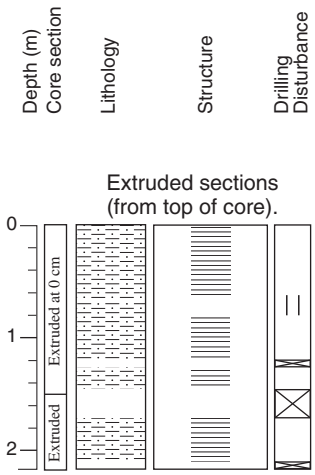
Massive olive grey interval with slight bioturbation.
Laminated interval; olive layers are significantly thicker than dark olive grey layers.

Olive grey silty clay, mostly massive with some colour banding.

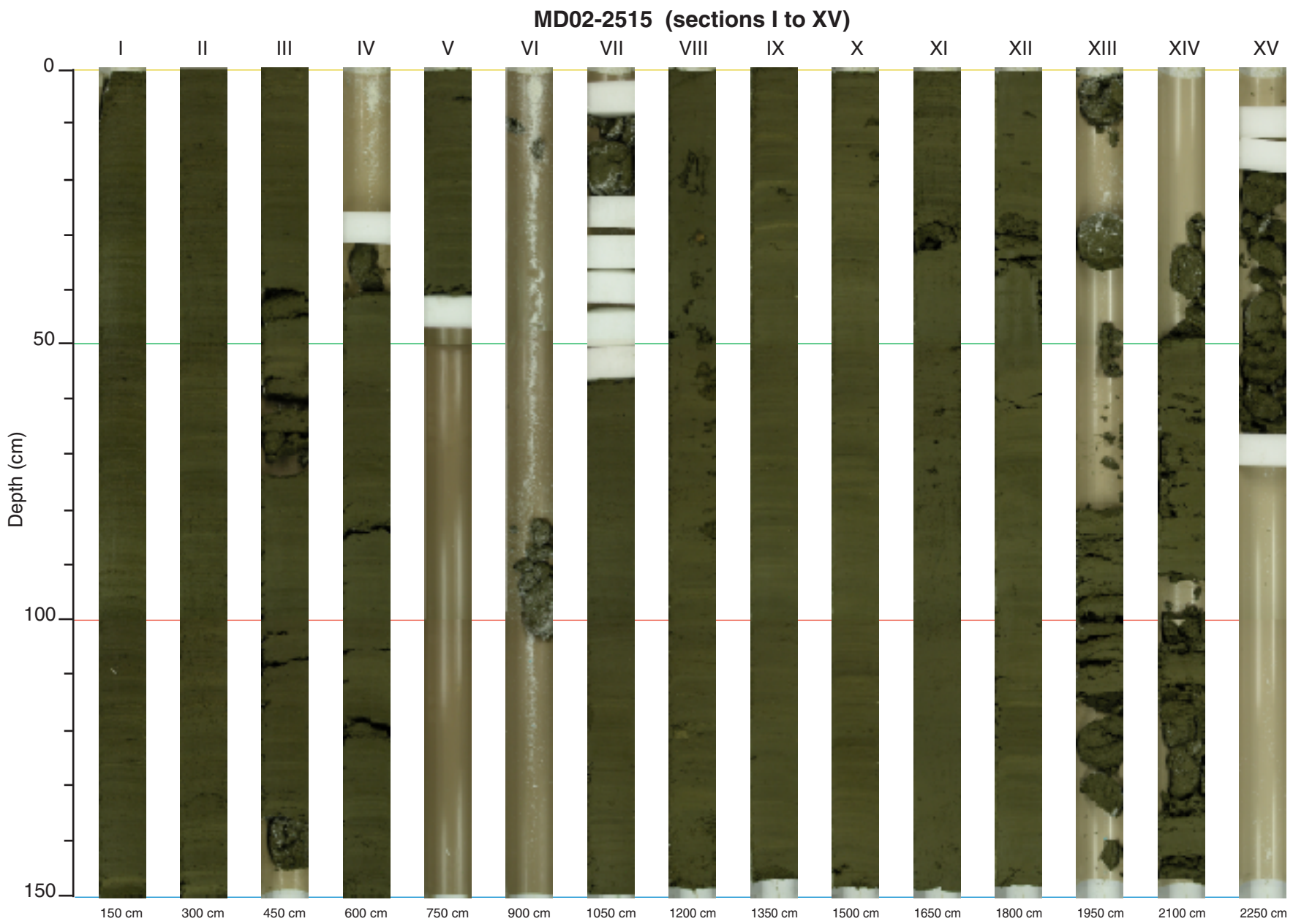
Interlayered, 3-to-5-cm-thick olive and dark olive grey bands with homogeneous clays.

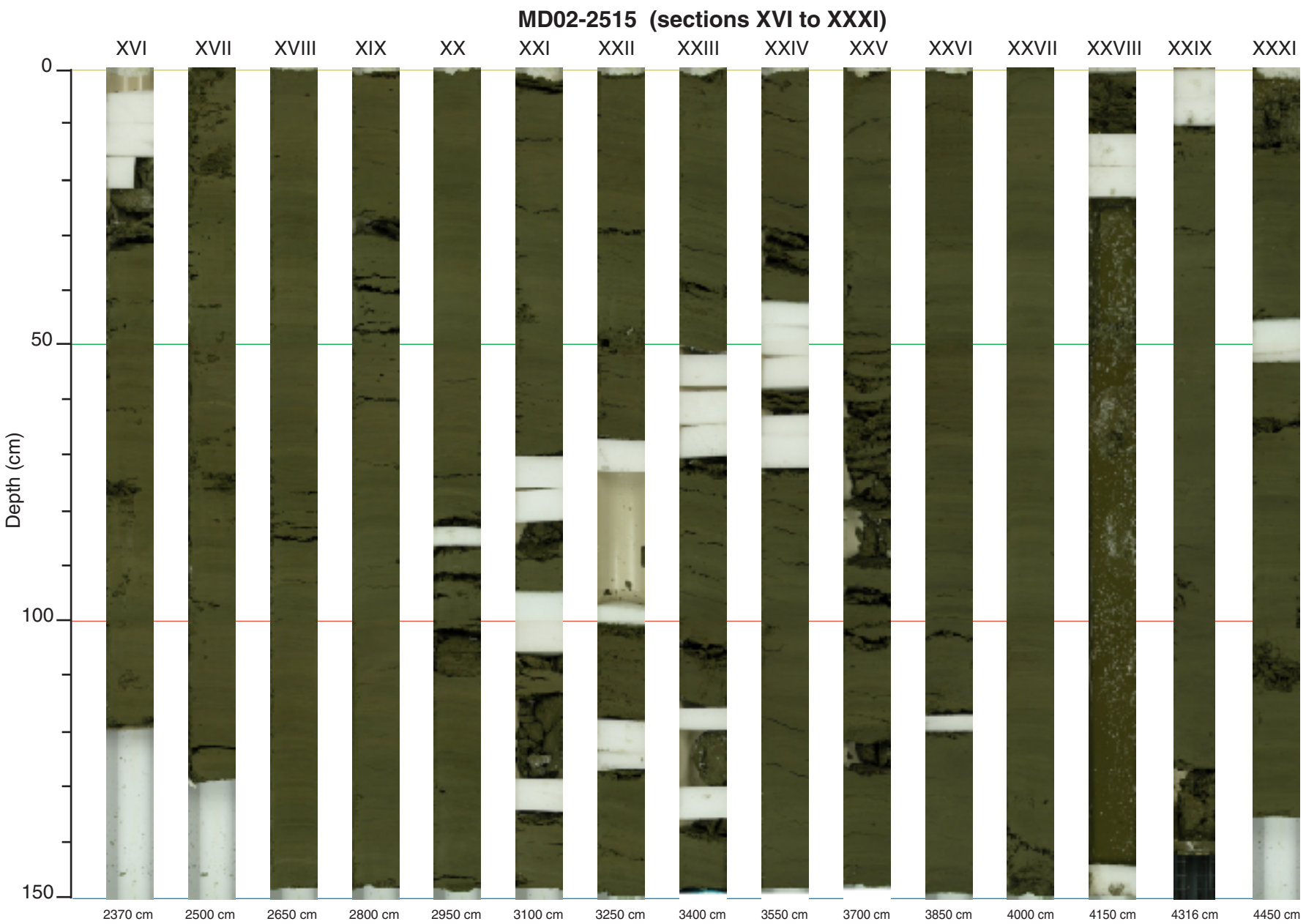
Mostly massive, hard silty clay with distinct bioturbation.

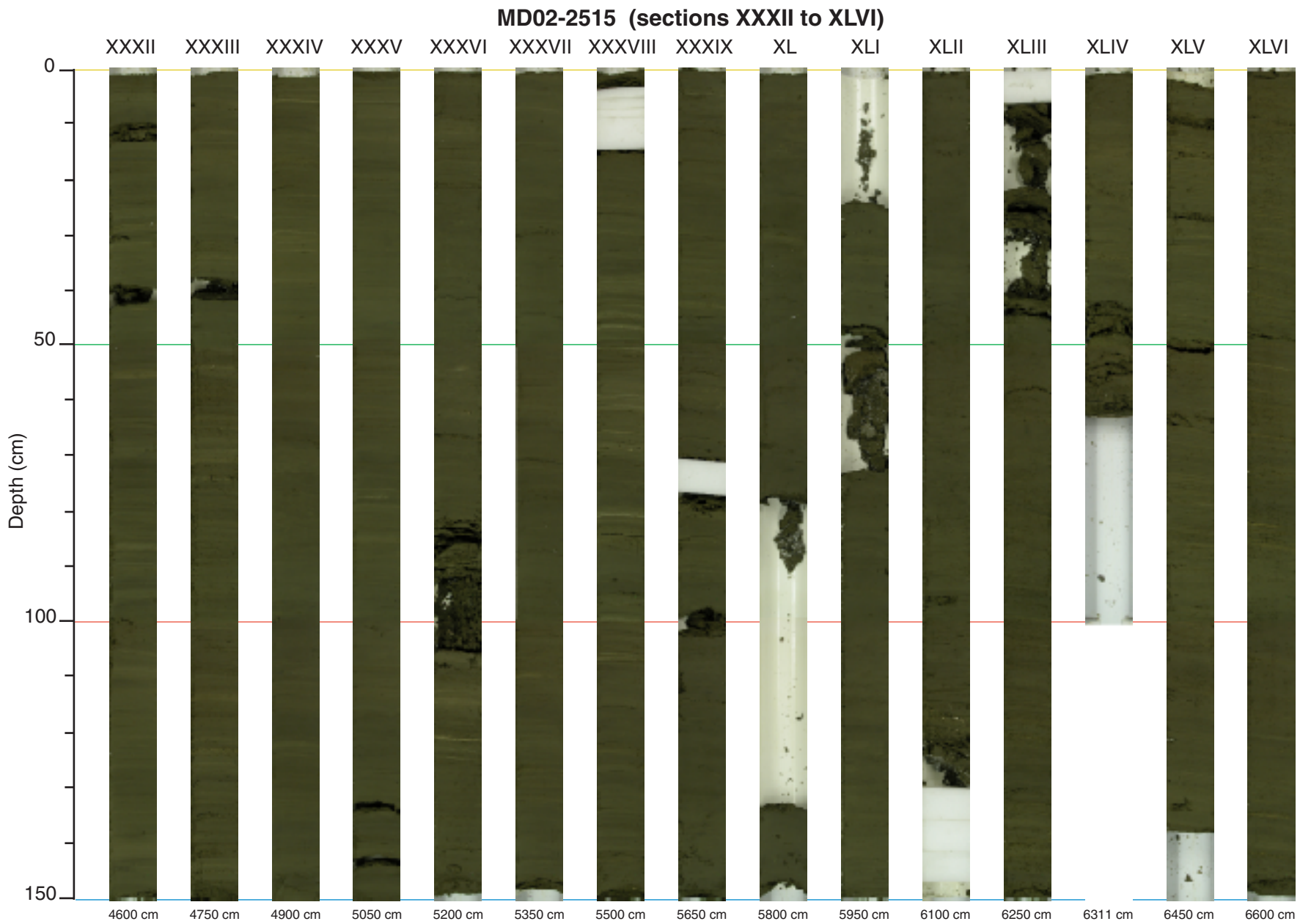
End of core, 7449 cm.

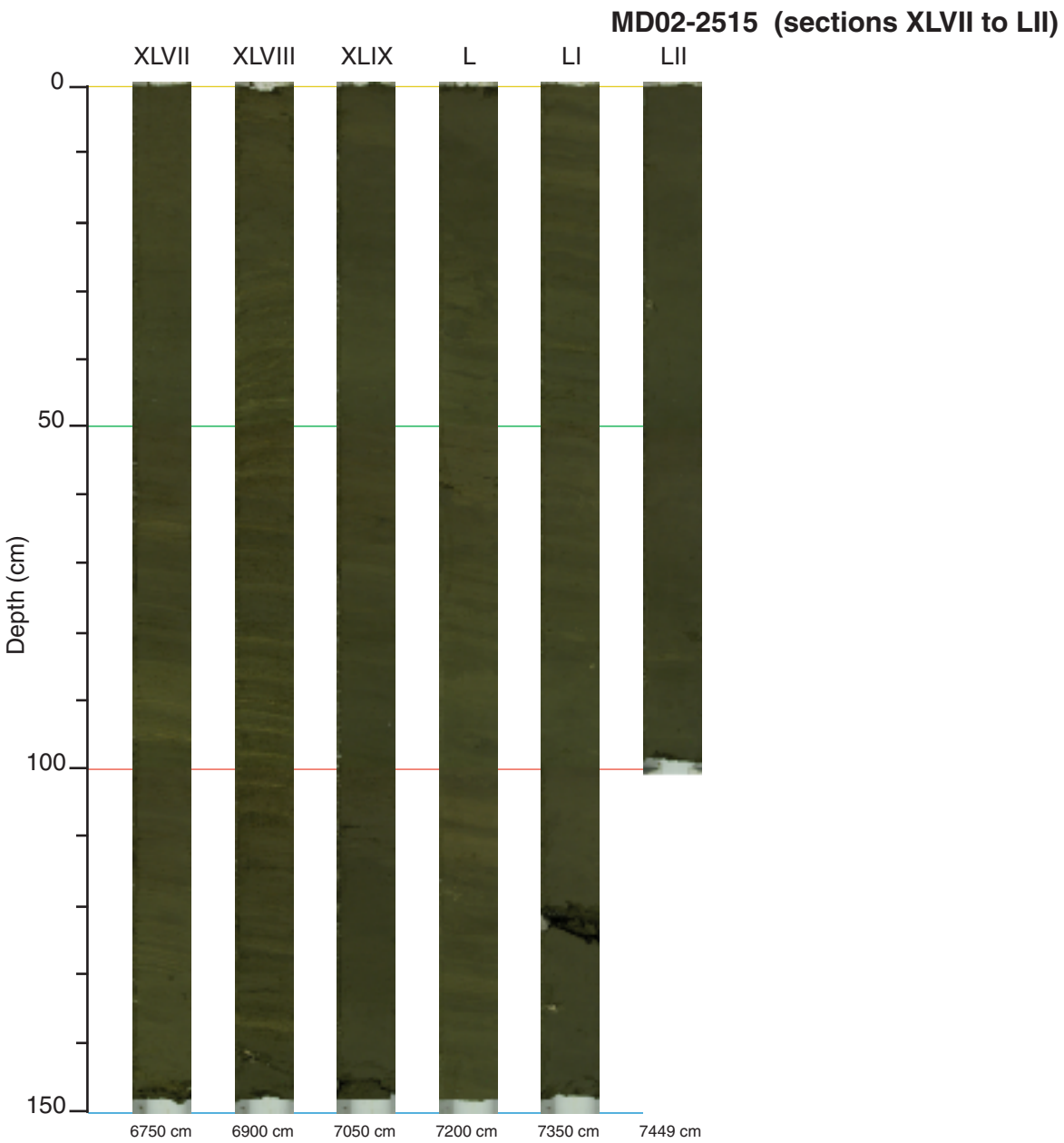


Diatom-rich silty clay with mm-scale alternating layers of lighter (olive) and darker (dark olive grey) colour with some interspersed light-coloured laminae. Rich in nannofossils.


MD02-2515 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2515 (sections XVI to XXXI)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
XXIX
XXXI
0
50
100
150
Depth (cm)
2370 cm
2500 cm
2650 cm
2800 cm
2950 cm
3100 cm
3250 cm
3400 cm
3550 cm
3700 cm
3850 cm
4000 cm
4150 cm
4316 cm
4450 cm

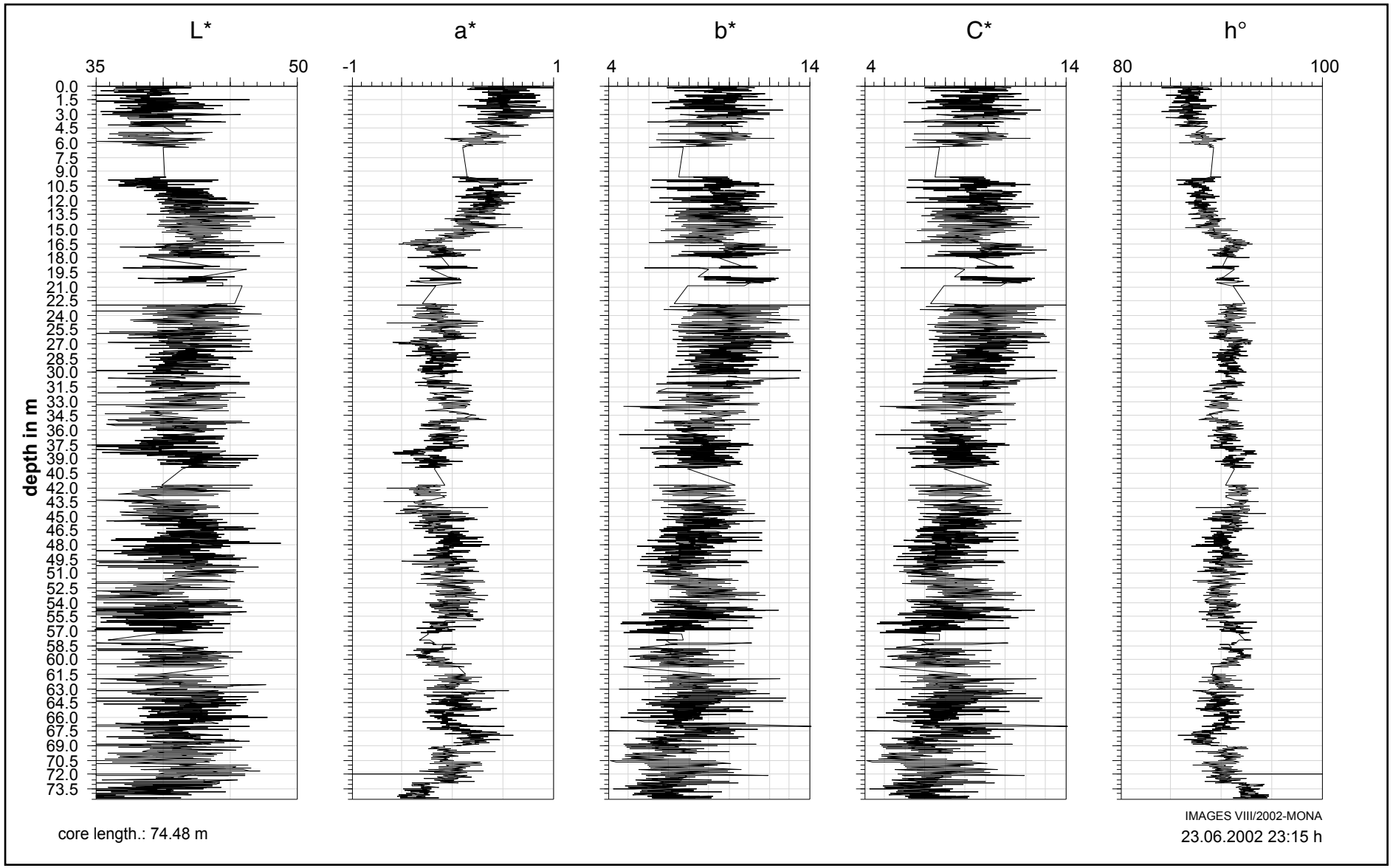

MD02-2515 (sections XXXII to XLVI)
XXXII
XXXIII
XXXIV
XXXV
XXXVI
XXXVII
XXXVIII
XXXIX
XL
XLI
XLII
XLIII
XLIV
XLV
XLVI
0
50
100
150
Depth (cm)
4600 cm
4750 cm
4900 cm
5050 cm
5200 cm
5350 cm
5500 cm
5650 cm
5800 cm
5950 cm
6100 cm
6250 cm
6311 cm
6450 cm
6600 cm


MD02-2515 (sections XLVII to LII)
XLVII
XLVIII
XLIX
L
LI
LII
0
50
100
150
Depth (cm)
6750 cm
6900 cm
7050 cm
7200 cm
7350 cm
7449 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

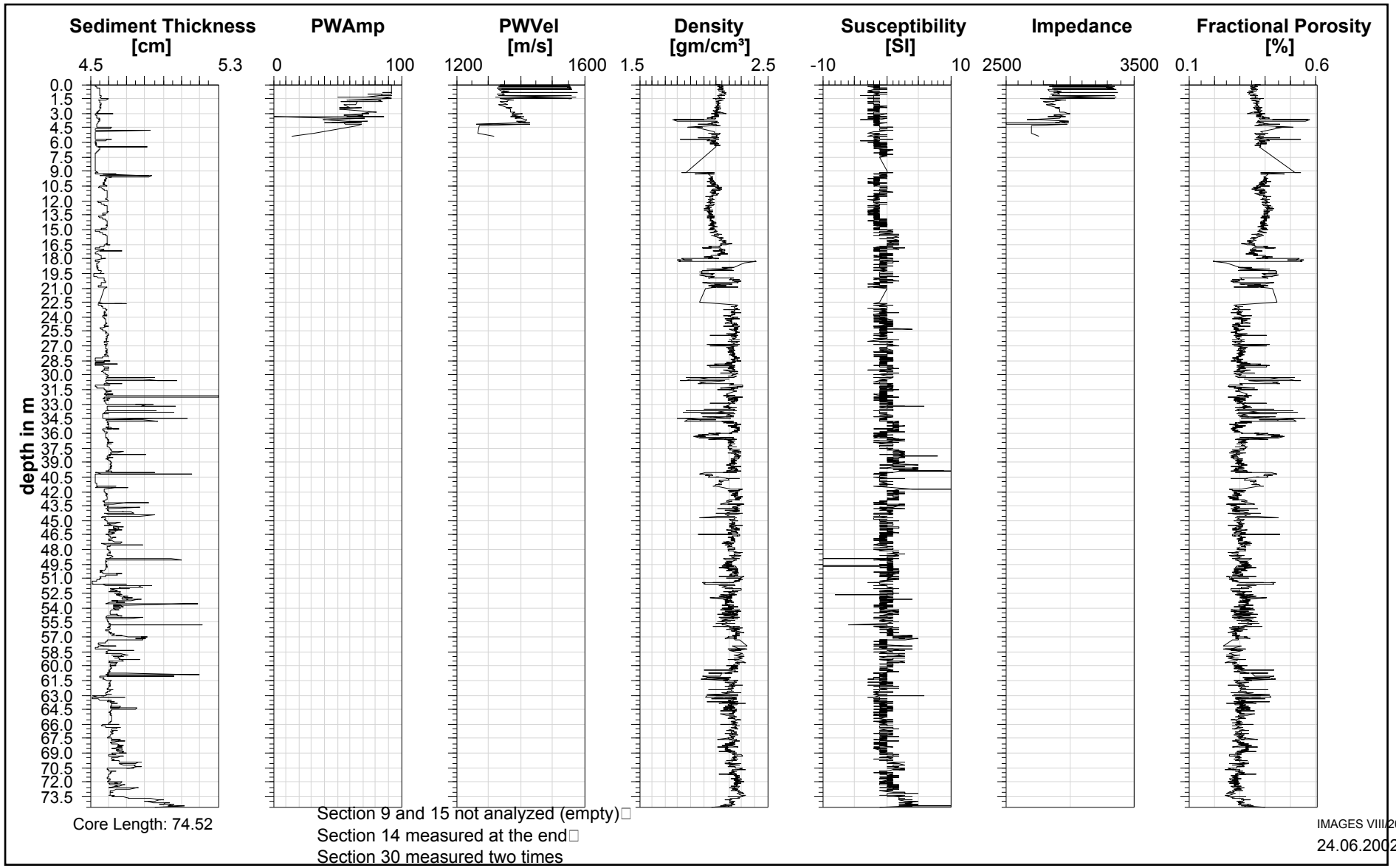
Station 21
Core MD02-2515



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 21
Core MD02-2515



Core Length: 74.52

Section 9 and 15 not analyzed (empty)
Section 14 measured at the end
Section 30 measured two times

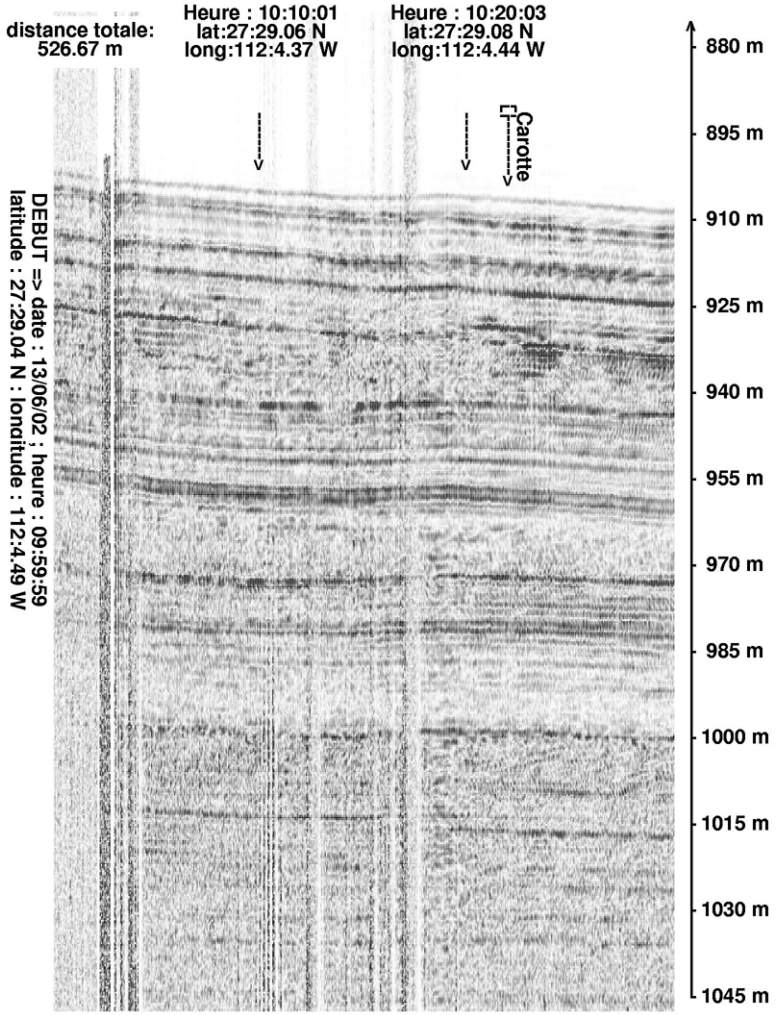
IMAGES VIII/2002-MONA
24.06.2002 15:55 h

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 21
Core MD022515,
Core CASQ MD02-2517C

Station 21,Coring operation MD02-2517C



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **13.06.2002**

N° de station : **21 Guaymas Basin 3**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2517 C^2

(MD - année - milles - centaines)

CAROTTE (longueur) :

5.60 m

POSITION :

Latitude : **27° 29.10 N**

Longitude : **112° 04.46 W**

CAROTTIER (type) (1) : **CAROTTIER CARRE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **888.50** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **Déjà en station**

Début manœuvre : **10:04**

Déclenchement : **10:22**

Fin de manœuvre : **10:50**

Durée de manœuvre : **00:46**

Départ station : **10:50**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

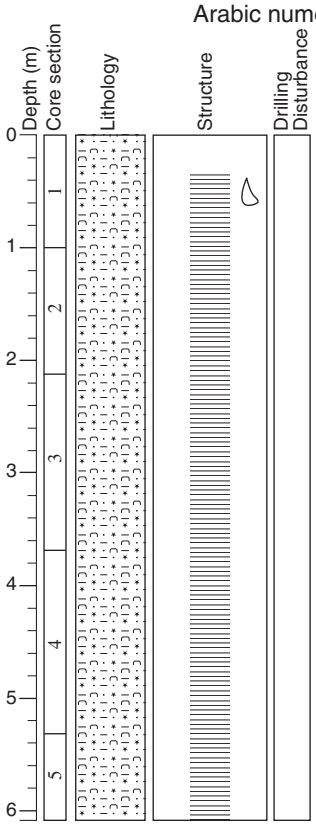
(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MONA

Core: MD02-2517c2

Arabic numeral set



Comments

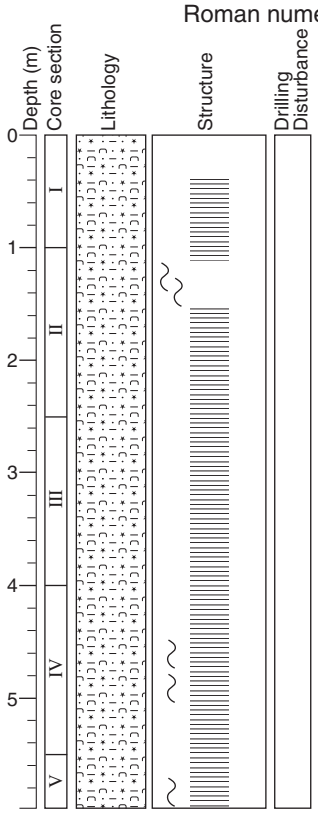
Very soft, dark grey to very dark grey diatom ooze with nannofossils and silty clay. Colour banding developing into laminations consisting of lighter and darker laminae. Lighter laminae consist of diatom ooze or diatom mats. Darker laminae consist of clay with silt and nannofossils.

Colour changes to olive grey and then to olive. Distinct laminations.

Bundling of laminae in several-cm-thick olive and olive grey layers.

End of this half of the core, 607 cm.

Roman numeral set



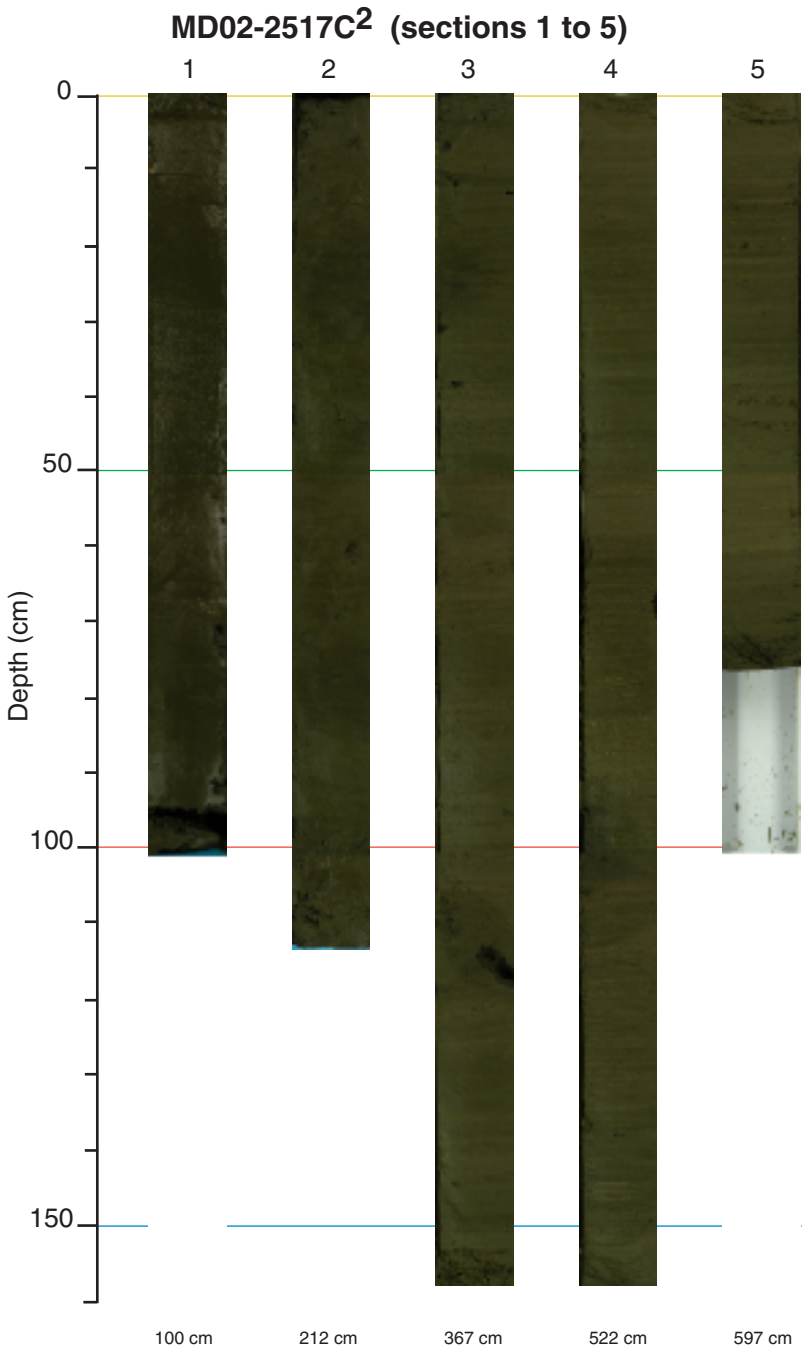
Comments

Very soft, dark grey to very dark grey diatom ooze with nannofossils and silty clay. Colour banding developing into laminations consisting of lighter and darker laminae. Lighter laminae consist of diatom ooze or diatom mats. Darker laminae consist of clay with silt and nannofossils.

Colour changes to olive grey and then to olive. Distinct laminations.

Bundling of laminae in several-cm-thick olive and olive grey layers. Occasional bioturbation that does not destroy the laminations.

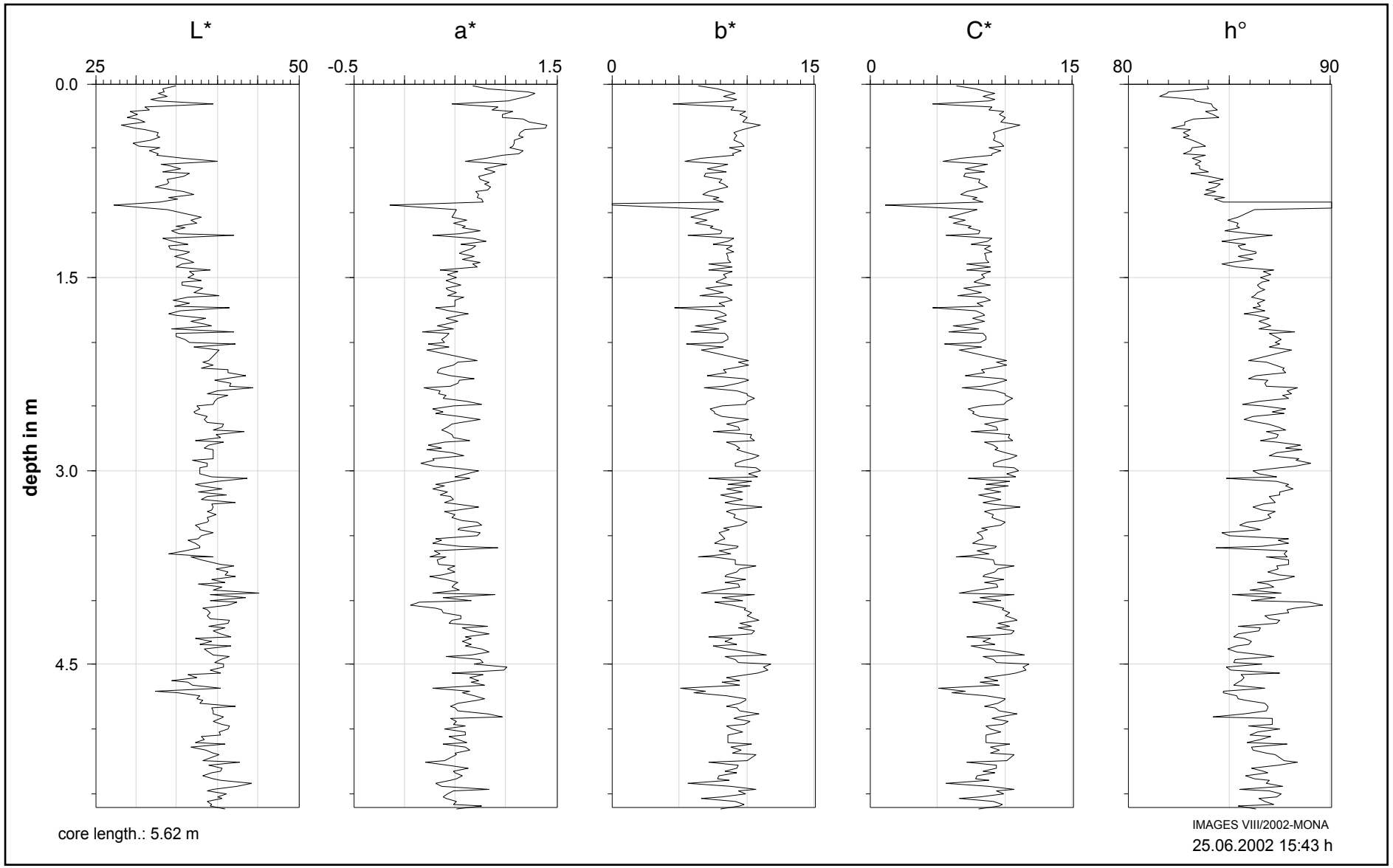
End of this half of the core, 597 cm.


MD02-2517C2 (sections 1 to 5)
1
2
3
4
5
0
50
100
150
Depth (cm)
100 cm
212 cm
367 cm
522 cm
597 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

Station 21
Core MD02-2517C²

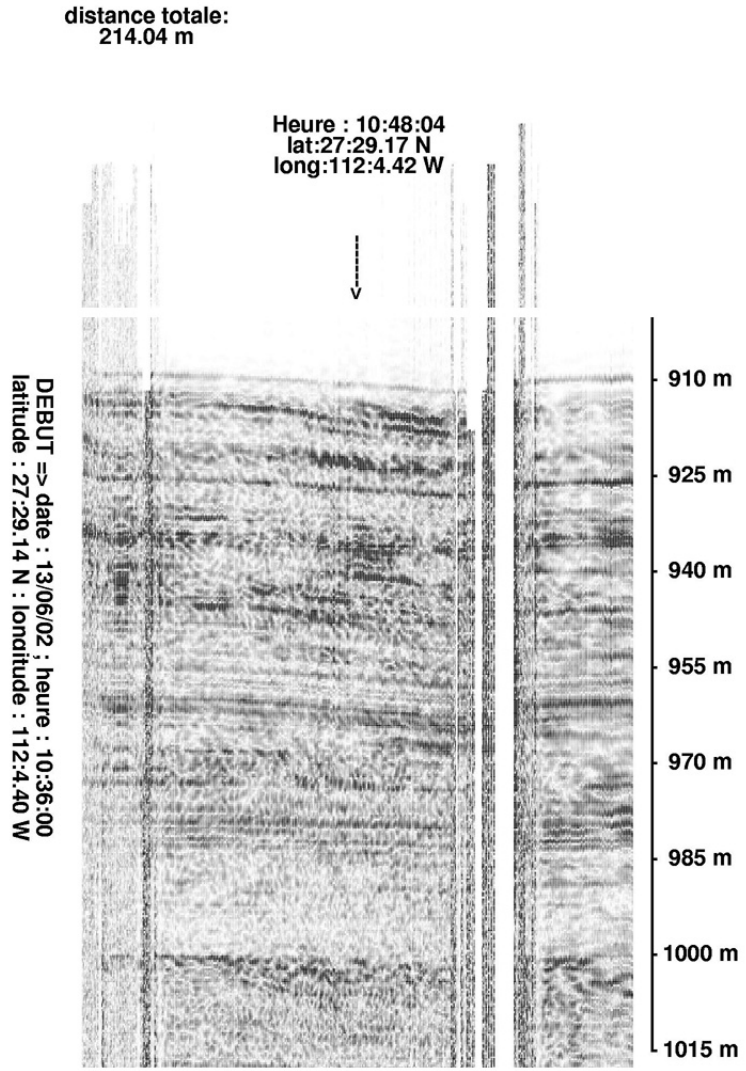


IMAGES VIII, 2002
MONA

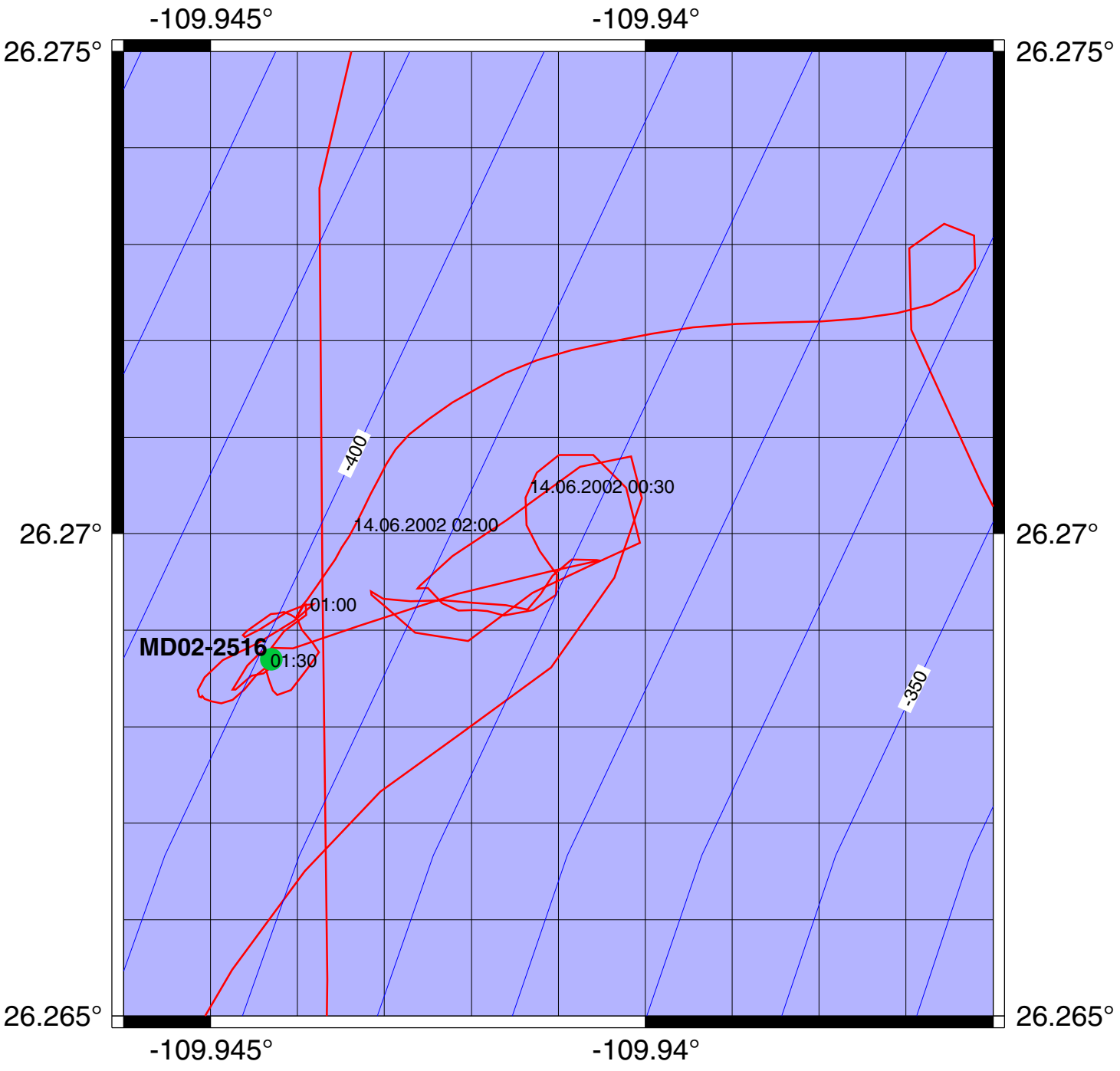
3.5 kHz Seismic Replay

Station 21
Core MD02-2515
MD02-2517C2

Station 21 , Departure



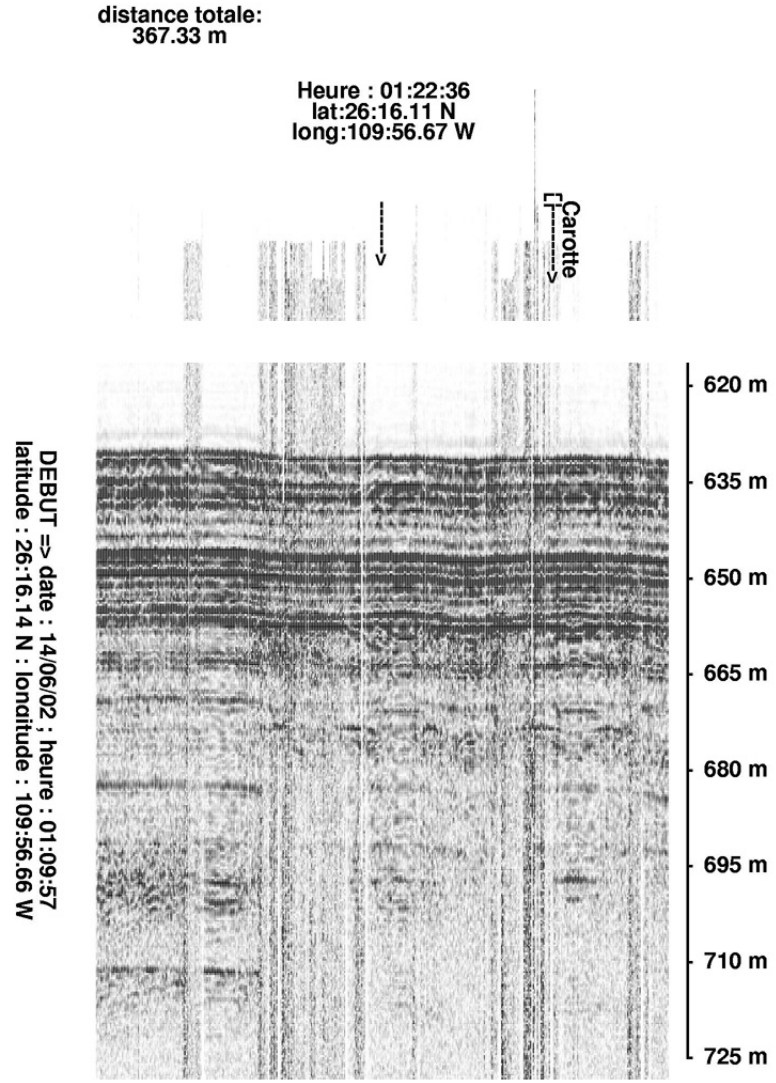
IMAGES VIII/MD126, Mona
Station 22, Carmen Basin



GMT 2002 Sep 26 11:34:54

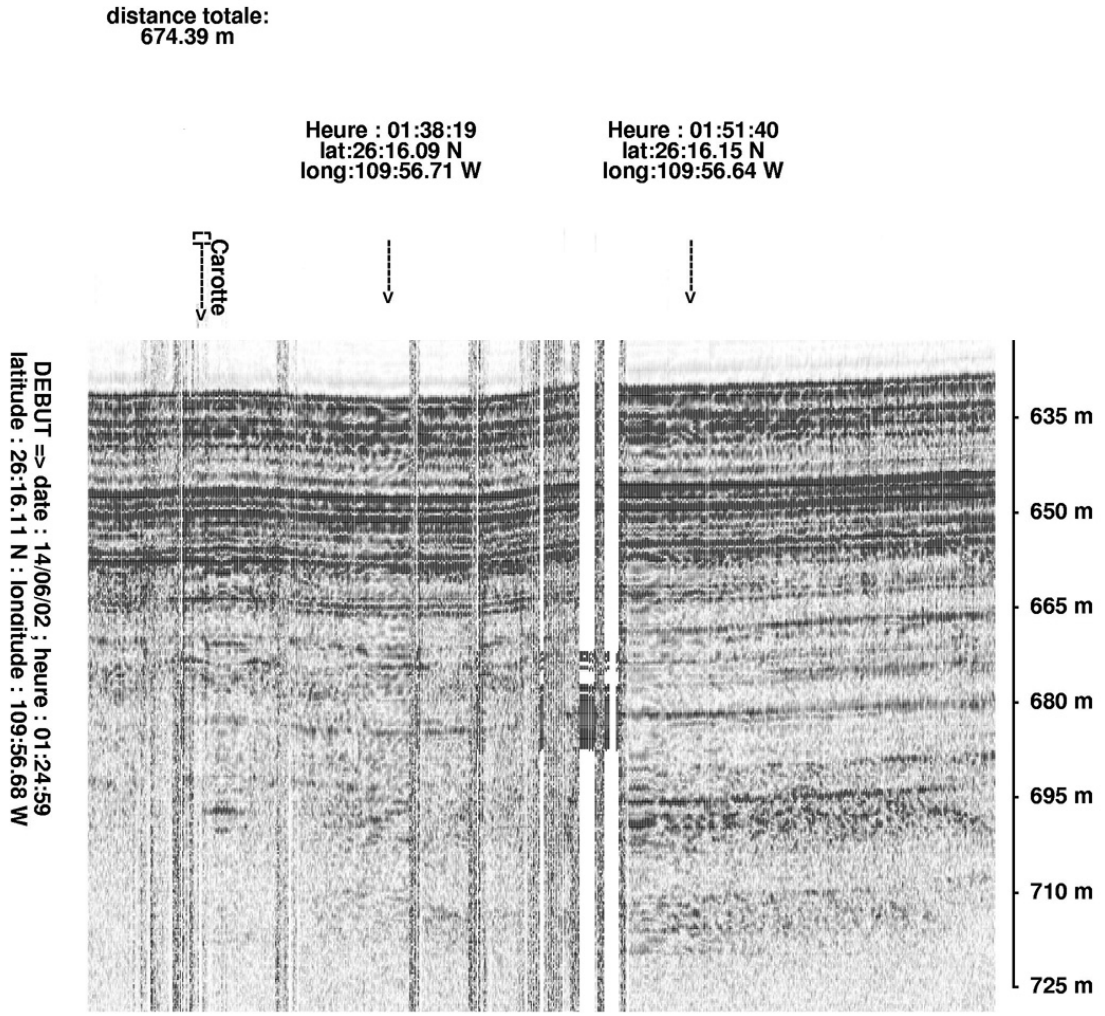
3.5 kHz Seismic Replay

Station 22 , Approach



3.5 kHz Seismic Replay

MD02-2516 coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **14.06.2002**

N° de station : **22**
Carmen basin

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2516

(MD - année - milles - centaines)

CAROTTE (longueur) :

33,28 ou 40,44 m ?

POSITION :

Latitude : **26° 16.12 N**

Longitude : **109° 56.66 W**

CAROTTIER (type) (1) : **CALYPSO II**

Poids total (air) : **7.20** **t**

Poids total (eau) : **6.50** **t**

REGLAGES :

Tubes (longueur) : **40.62** **m**

Câbles :
Chute libre : **1.50** **m**

Boucle : **1.60** **m**

LC poids : **45.30** **m**

CONTREPOIDS :
Type (2) : **Cylindre**

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **613** **m**

Ligne filée : **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **01:10**

Début manœuvre : **01:18**

Déclenchement : **01:30**

Fin de manœuvre : **02:00**

Durée de manœuvre : **00:42**

Départ station : **02:00**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

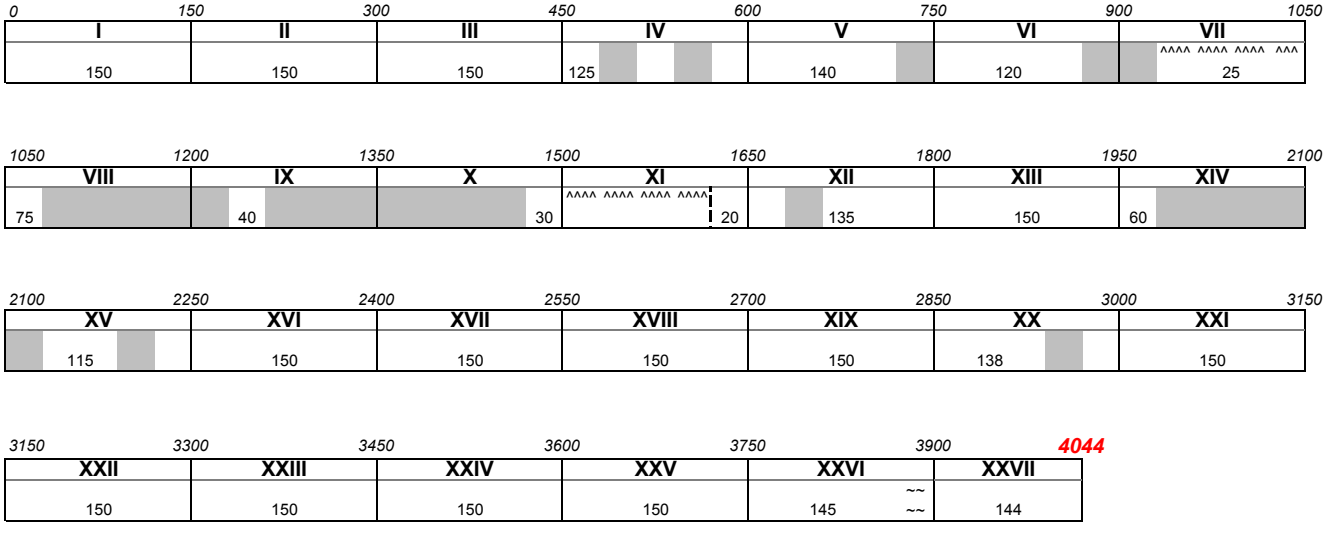
Filet à plancton :

Autres :

Description / incidents : **1 à 2 cm de sédiment extrudé au sommet de la carotte mais récupéré**

Lenght recovered : 3328 cm

Longueur 40,44 m ?



(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2516

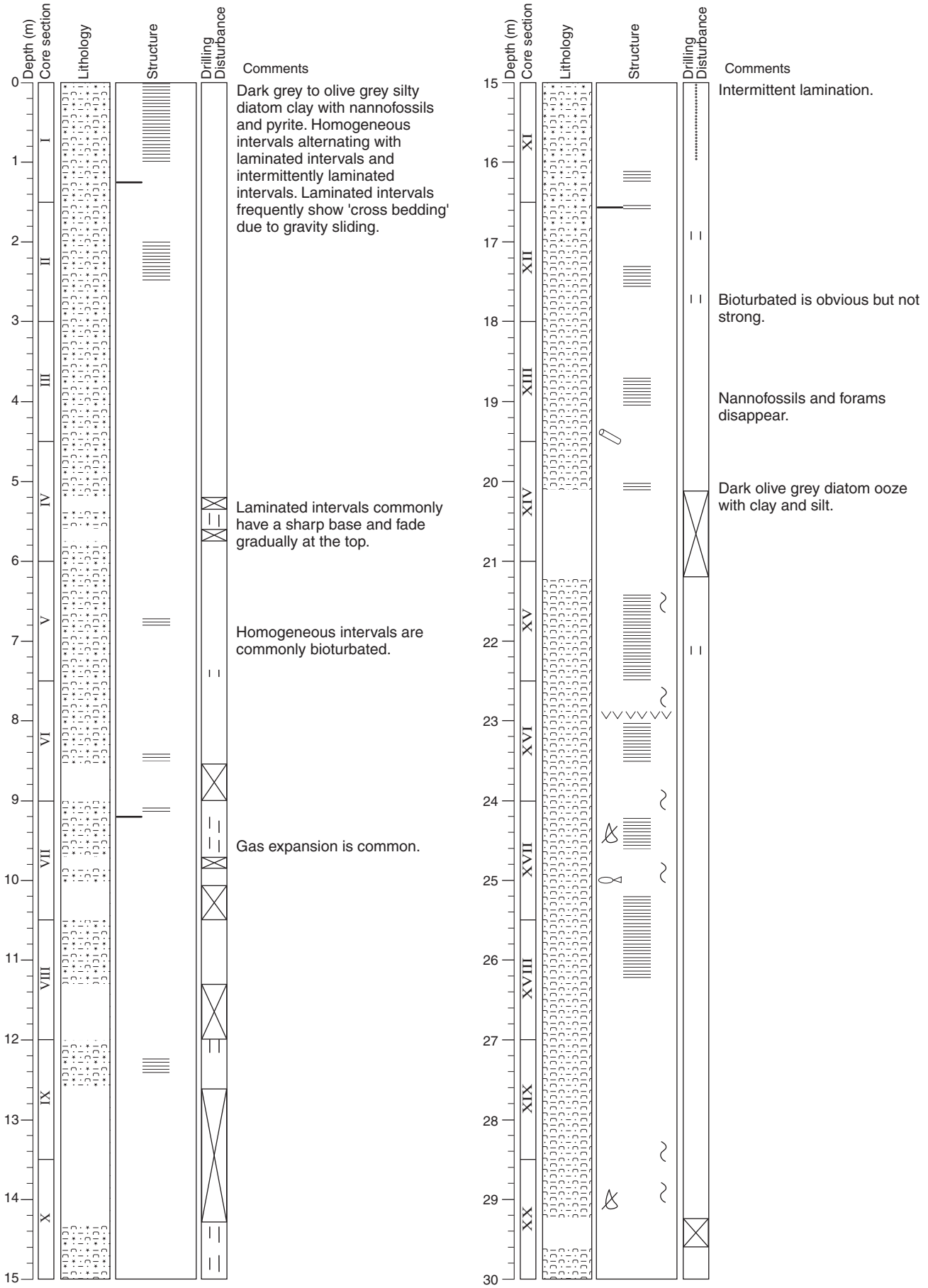
(Station 22, Carmen Basin ; Latitude 26° 16. 12N ; Longitude : 109° 56. 66W ; 613m water depth) has recovered a total of 40.45m of sediment. Coring disturbances, and empty intervals 10cm to 160cm long are present between 5.00m (Section IV) and 29.60m (Section XX).

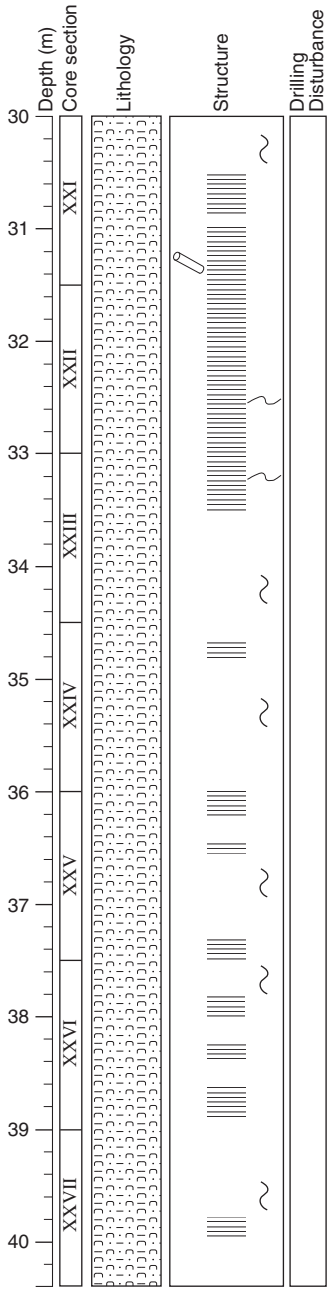
The dominant sediment grades from silty diatom clay in the upper part of the core, to diatom ooze and silty diatom ooze below 20m (Section XIV). Its color ranges from olive grey and dark olive grey to very dark grey.

Laminated intervals alternate with massive sediments, sometimes bioturbated, throughout the core. Cross-bedding and slump structures are present, in probable relation to slope unstability. A few shell, fish and wood fragments are scatterred.

MONA

Core: MD02-2516

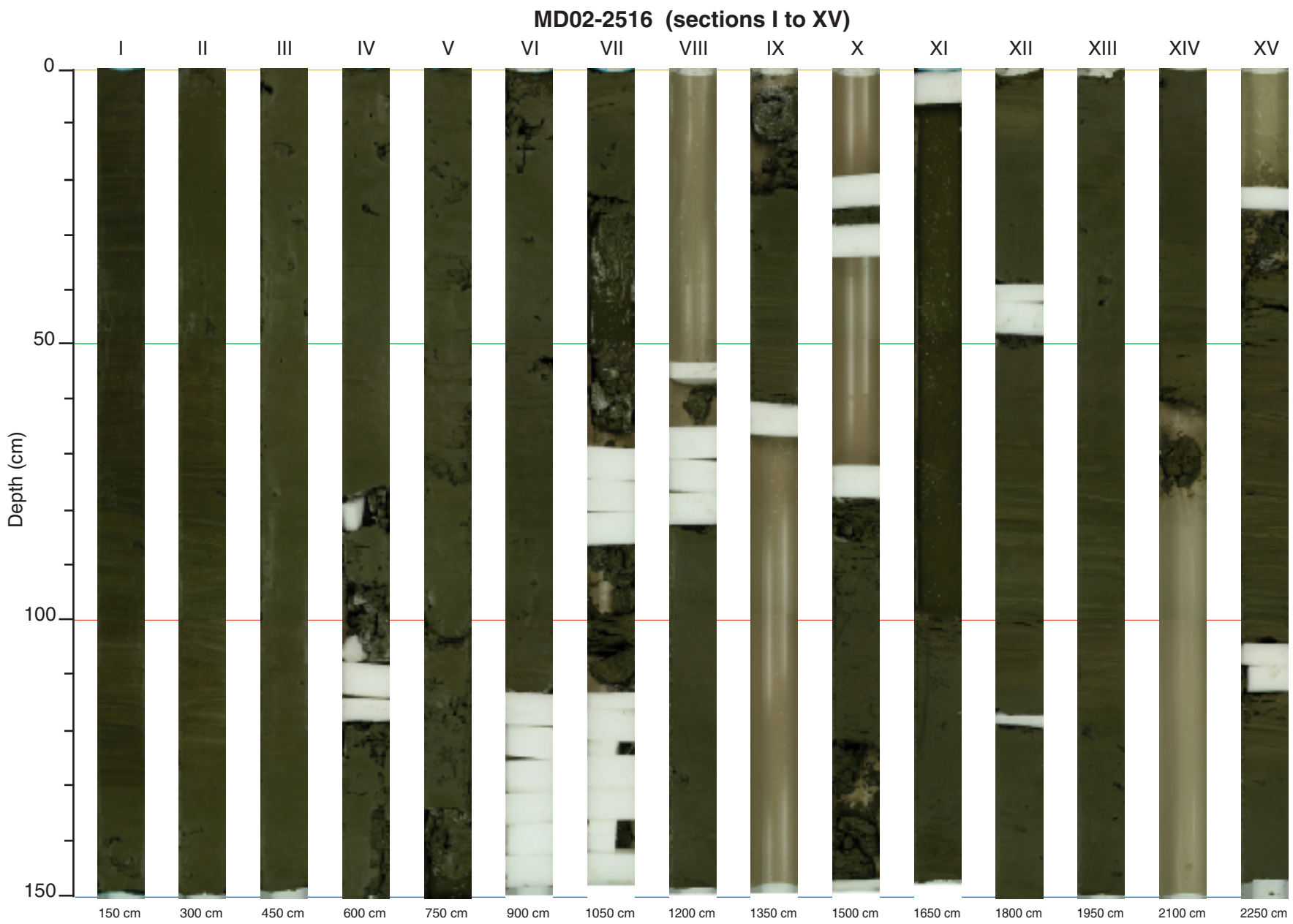


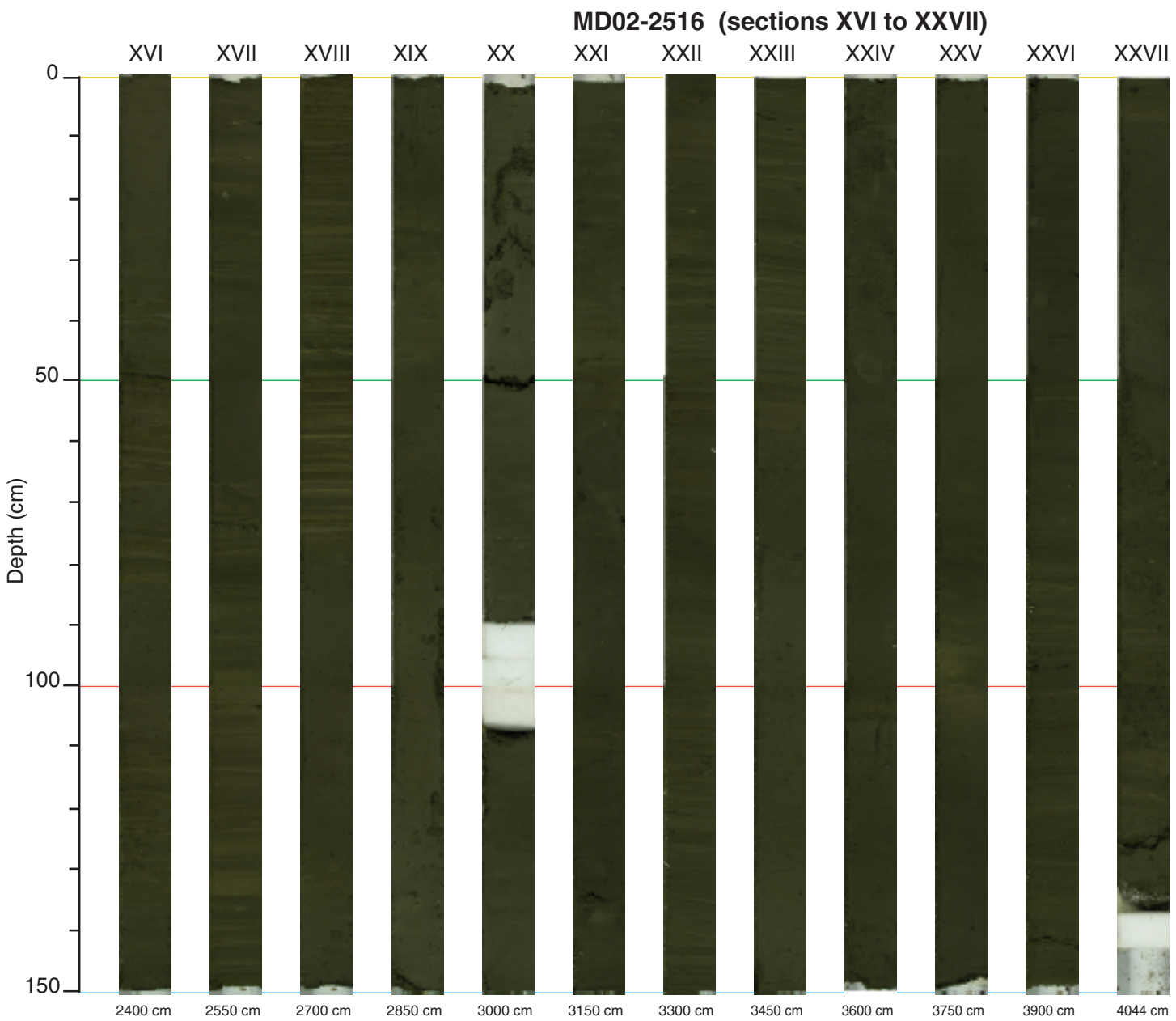


Comments

Olive grey to very dark grey silty diatom ooze with varying amounts of clay. Primarily mottled and bioturbated, but also laminated to intermittently laminated.

End of core, 4045 cm.

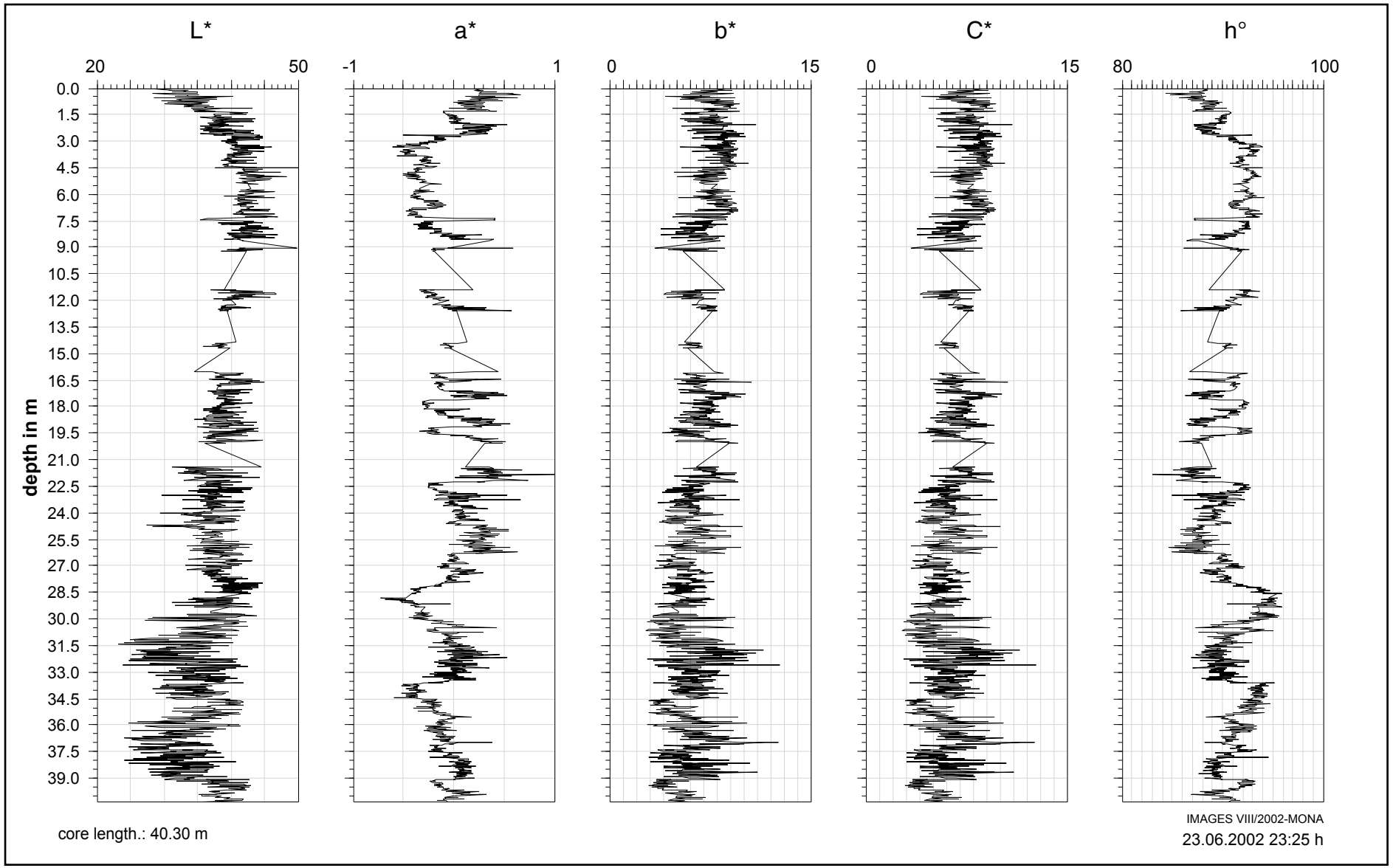

MD02-2516 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2516 (sections XVI to XXVII)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3750 cm
3900 cm
4044 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

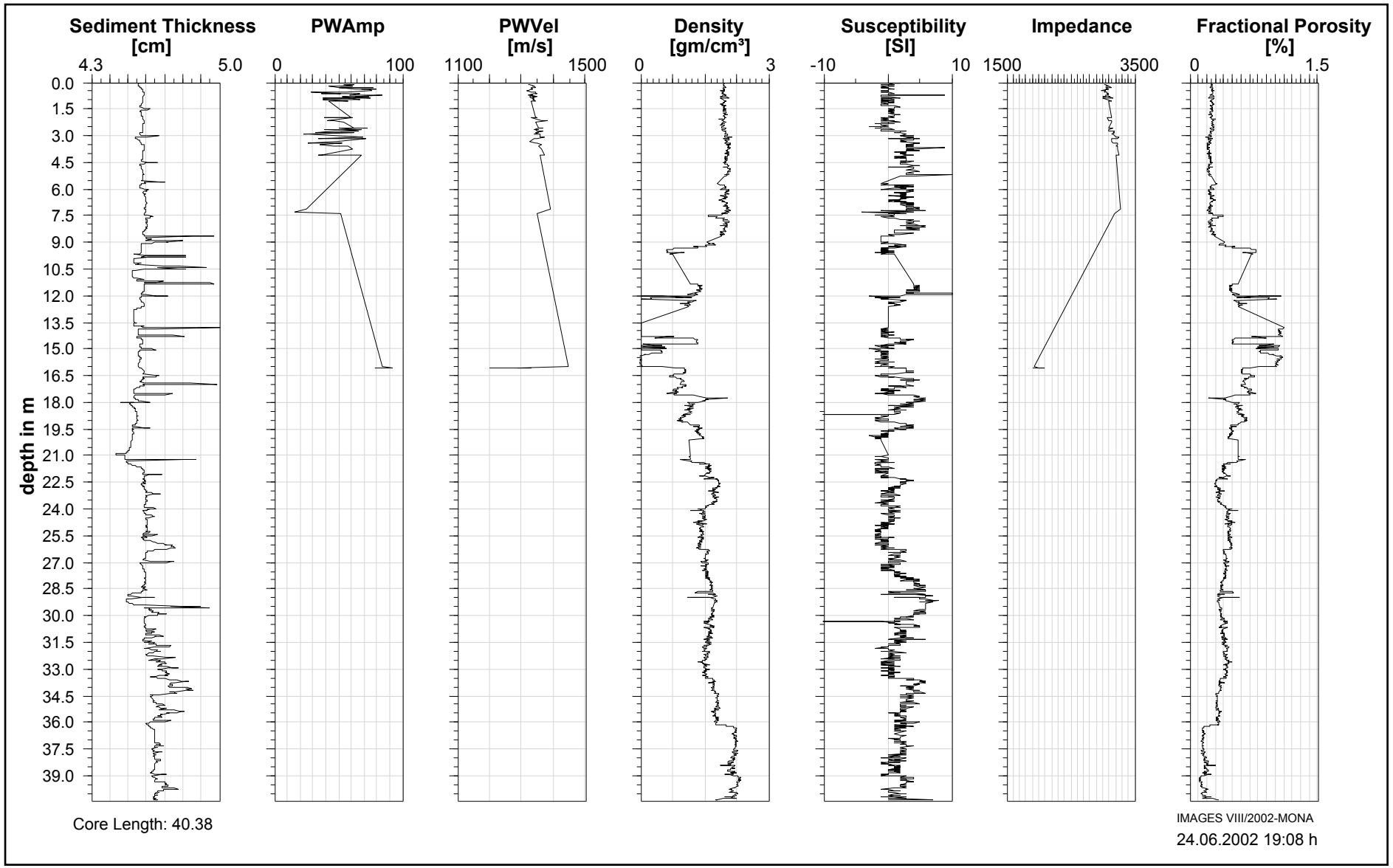
Station 22
Core MD02-2516



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 22
Core MD02-2516

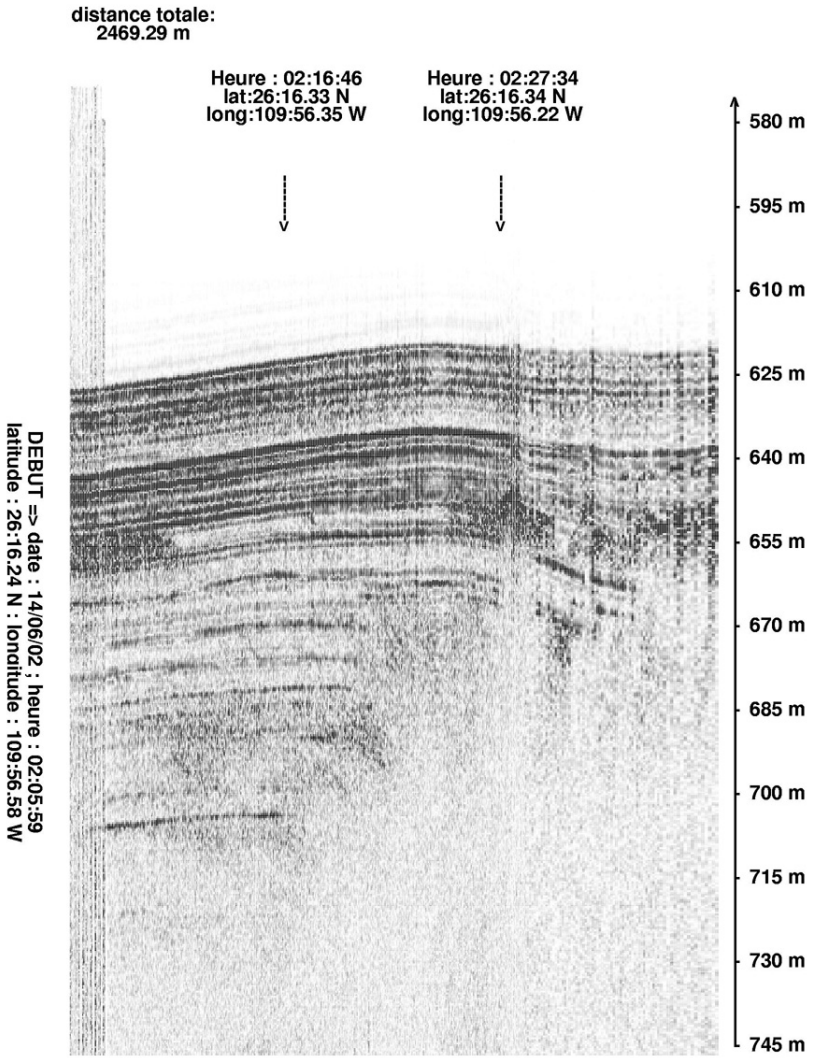


IMAGES VIII, 2002
MONA

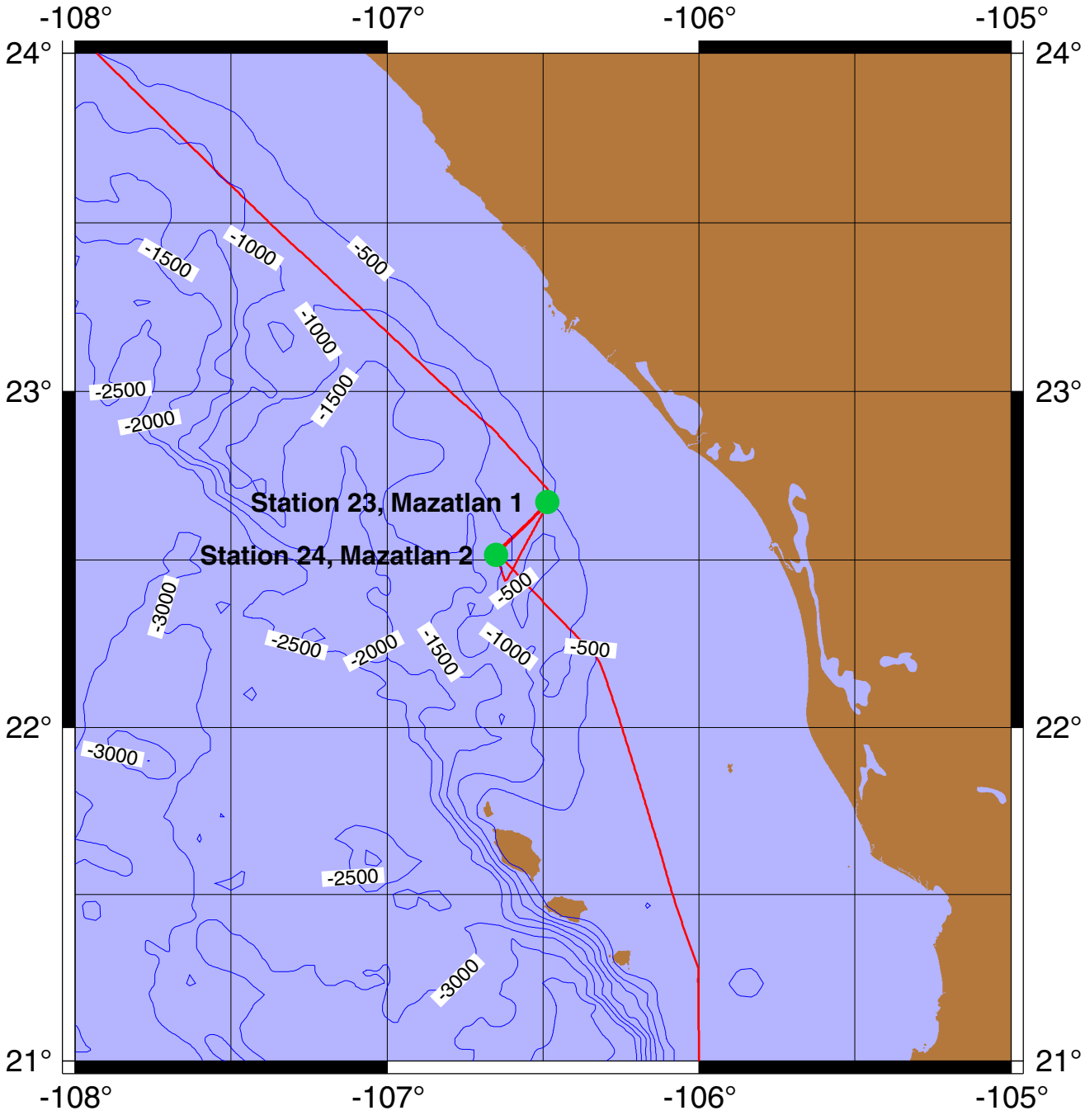
3.5 kHz Seismic Replay

Station 22
Core MD02-2516

Departure from Station

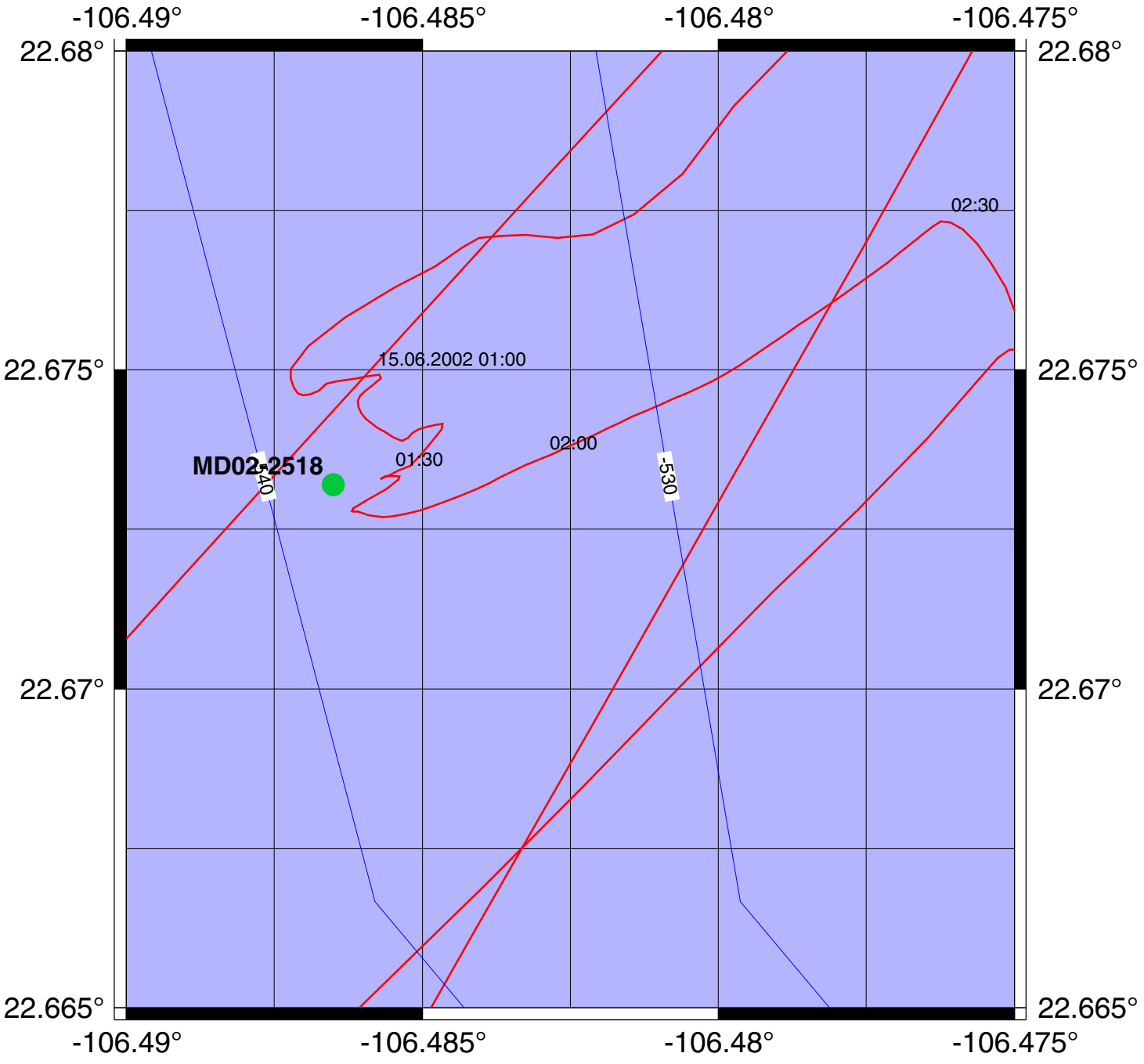


IMAGES VIII/MD126, Mona
Mazatlan Area



GMT 2002 Sep 26 11:36:52

IMAGES VIII/MD126, Mona
Station 23 Mazatlan 1



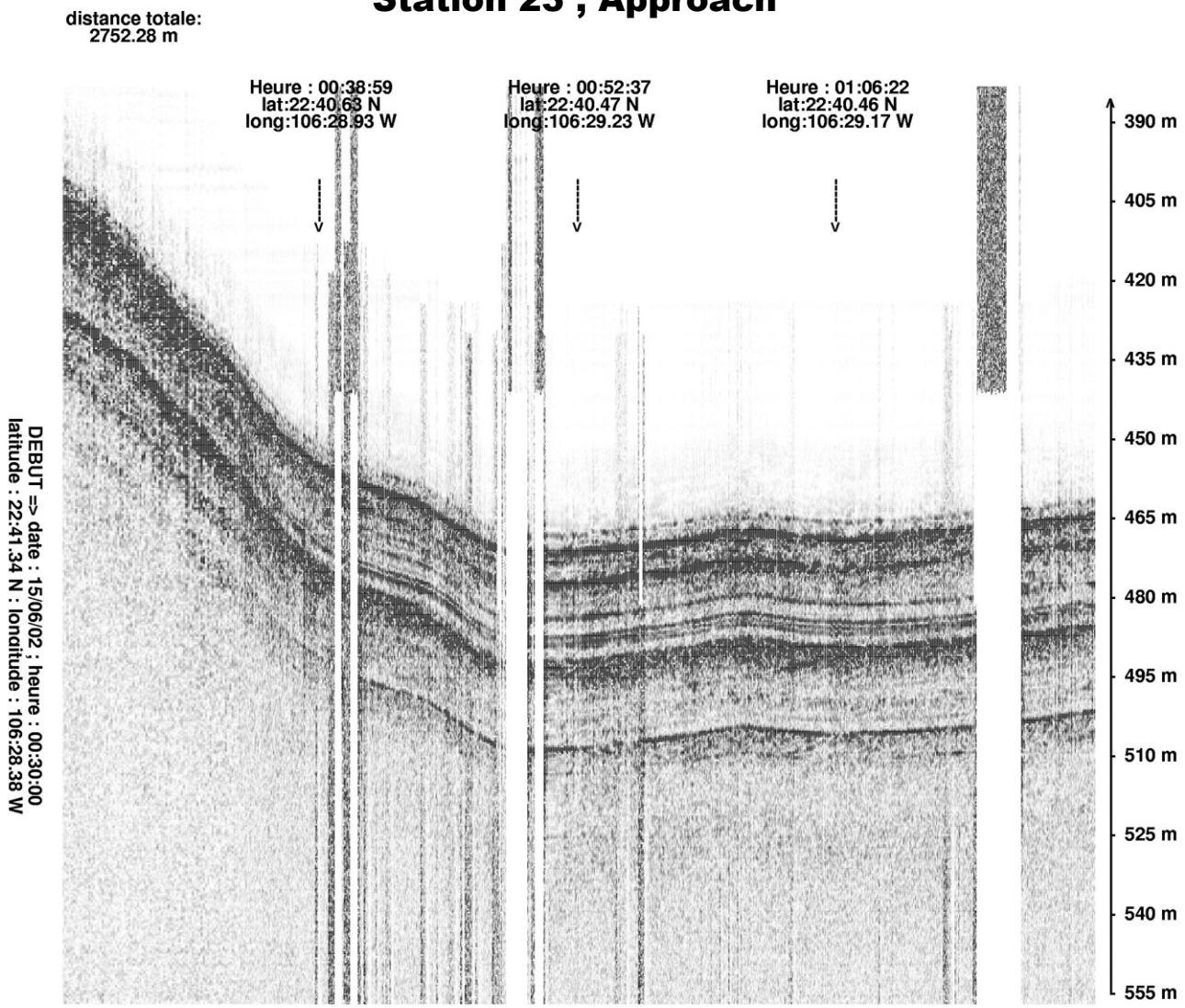
GMT 2002 Sep 26 12:07:06

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

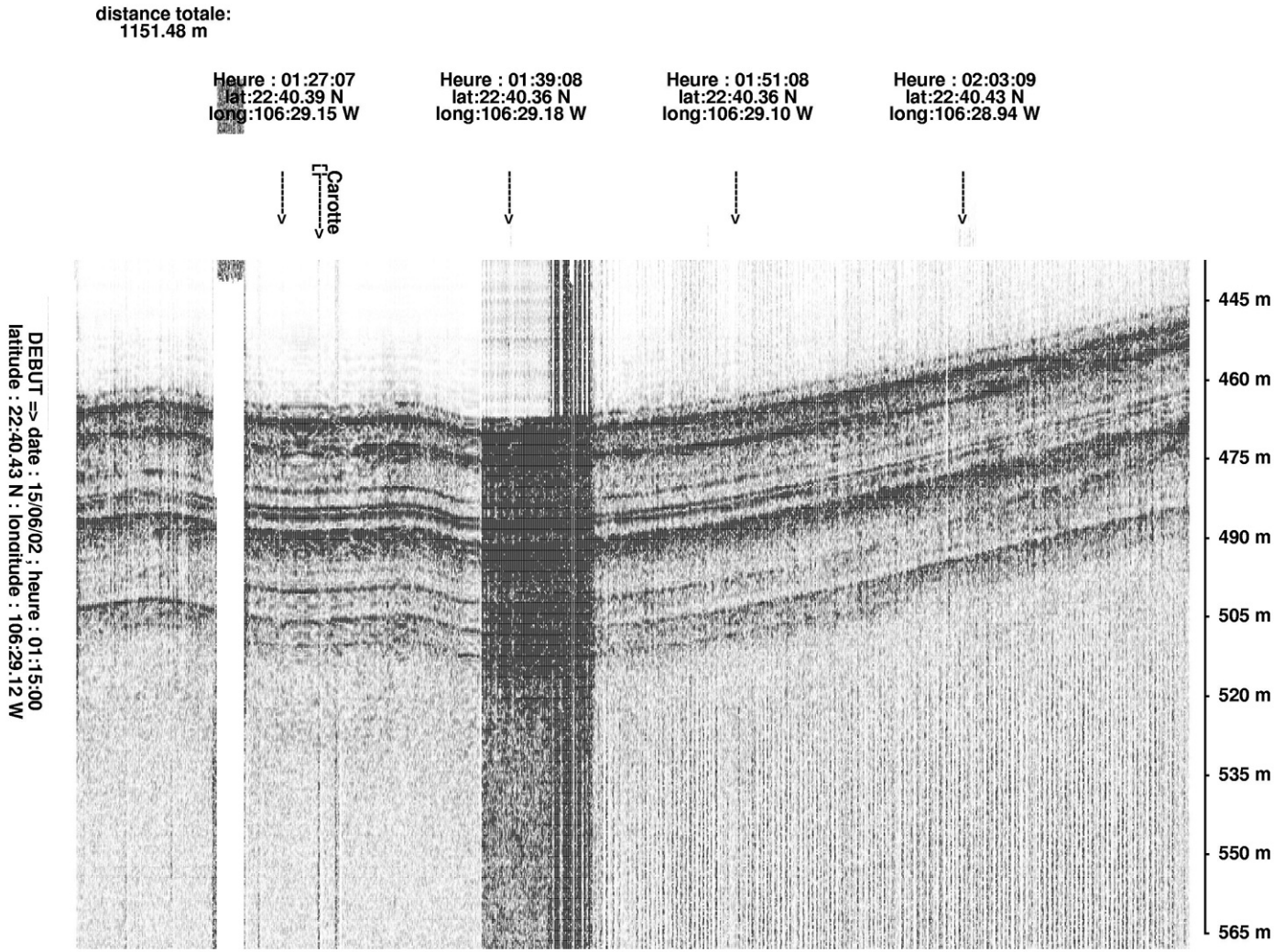
Station 23
Core MD02-2518

Station 23 , Approach



3.5 kHz Seismic Replay

MD02-2518 coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **15.06.2002**

N° de station : **23**
Mazatlan 1

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2518

(MD - année - milles - centaines)

CAROTTE (longueur) :

40.76 m

POSITION :

Latitude : **22° 40.39 N**

Longitude : **106° 29.19 W**

CAROTTIER (type) (1) : **CALYPSO II**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **51.55** **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) : **Cylindre**

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **450** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **00:51**

Début manœuvre : **01:20**

Déclenchement : **01:29**

Fin de manœuvre : **03:38**

Durée de manœuvre : **02:18**

Départ station : **03:38**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents : **TUBE TORDU A 10 M**
(le reste illisible)

0	150	300	450	600	750	900	1050
I	II	III	IV	V	VI	VII	
145	150	150	150	150	150	150	

1050	1200	1350	1500	1650	1800	1950	2100
VIII	IX	X	XI	XII	XIII	XIV	
150	150	150	150	150	150	150	

2100	2250	2400	2550	2700	2850	2933	3000	3150
XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	
150	150	150	150	150	83	67	150	

3150	3300	3450	3600	3750	3900	4076
XXIII	XXIV	XXV	XXVI	XXVII	XXVIII	
150	150	150	150	145 ~~ ~~	40	

Section 21 ou erreur de n°

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2518

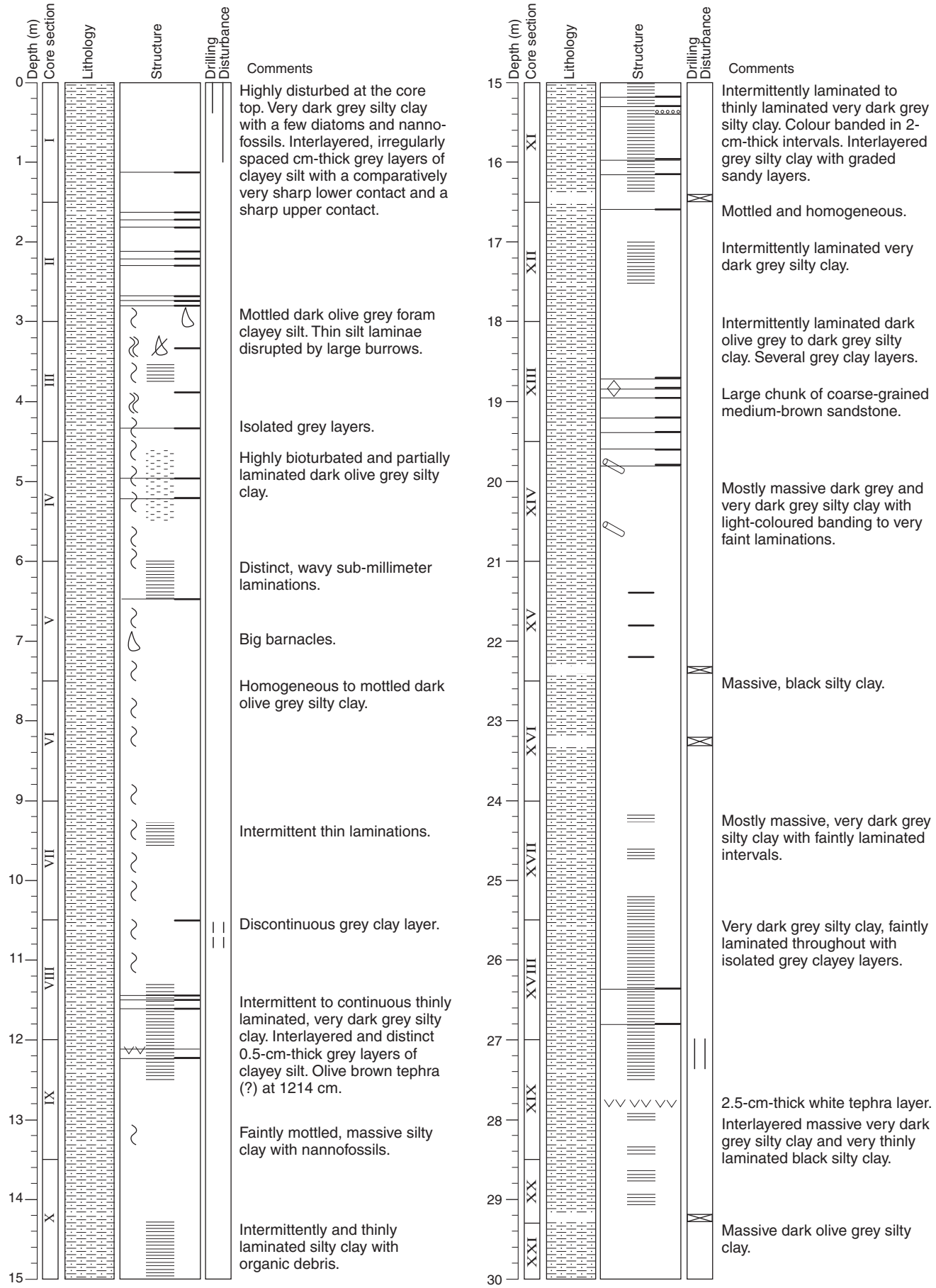
(Station 23, Mazatlan 1 ; Latitude : 22° 40. 39N ; Longitude : 106° 29.19W ; 450m water depth) recovered a total of 40.76m of sediment. The sediment has been disturbed by coring from top to 1.00m (Section I), from 27.00m to 27.40m (Section XIX), and from 38.80m (Section XXVI) to the bottom of the core at 40.76m (Section XXVIII). Some empty intervals, 5 to 10cm long, are occasionnally present in Sections XI, XV, XVI and XX.

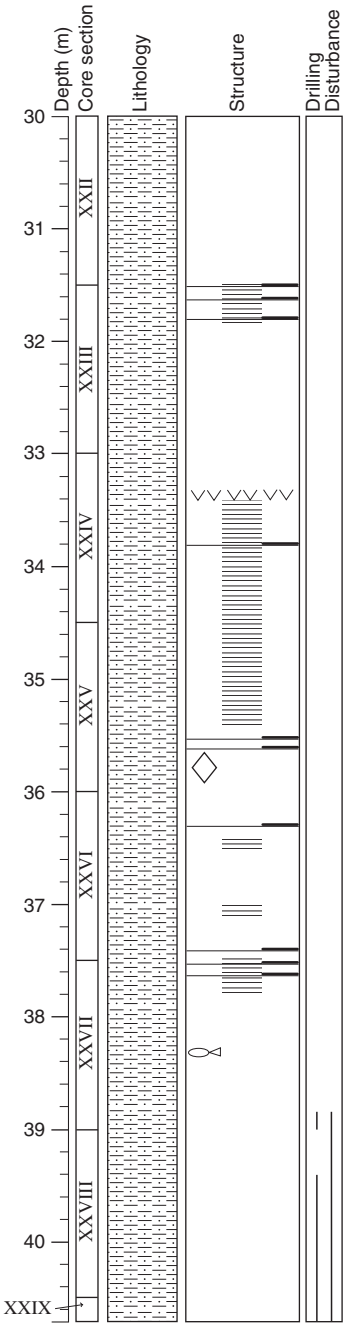
The dominant sediment consists of silty clay, with minor amounts of diatoms and/or nannofossils. The colors range from olive grey and dark olive grey to very dark grey. Massive, sometimes bioturbated intervals alternate with laminated intervals throughout the core. A few shell fragments, fish scales, wood fragments, are locally present, and a large angular cobble of limestone occurs at 35.80m (Section XXIV).

Minor lithologies include :
- foraminifer clayey silt, olive grey, in Section III ;
- grey layers of clayey silt, 0.5cm to 1cm thick, throughout the core ;
- tephra layers, olive brown and white, at 12.20m (Section IX), 27.80m (Section XIX), and 33.40m (Section XXIII).

MONA

Core: MD02-2518





Comments

Dark olive to very dark olive grey silty clay with nanno-fossils. Faint banding. Some laminated intervals.

Laminated with distinct light grey/grey clayey layers.

Mostly massive; very dark grey.

White tephra layer.
Stiff, thinly laminated (0.5-to-2-mm couplets) dark olive grey silty clay.

Massive, bioturbated silty grey clay grading downwards into a very dark grey silty clay with continuous laminations. Hori-zontal greyish brown/light olive brown colour bands.

Large angular limestone cobble.

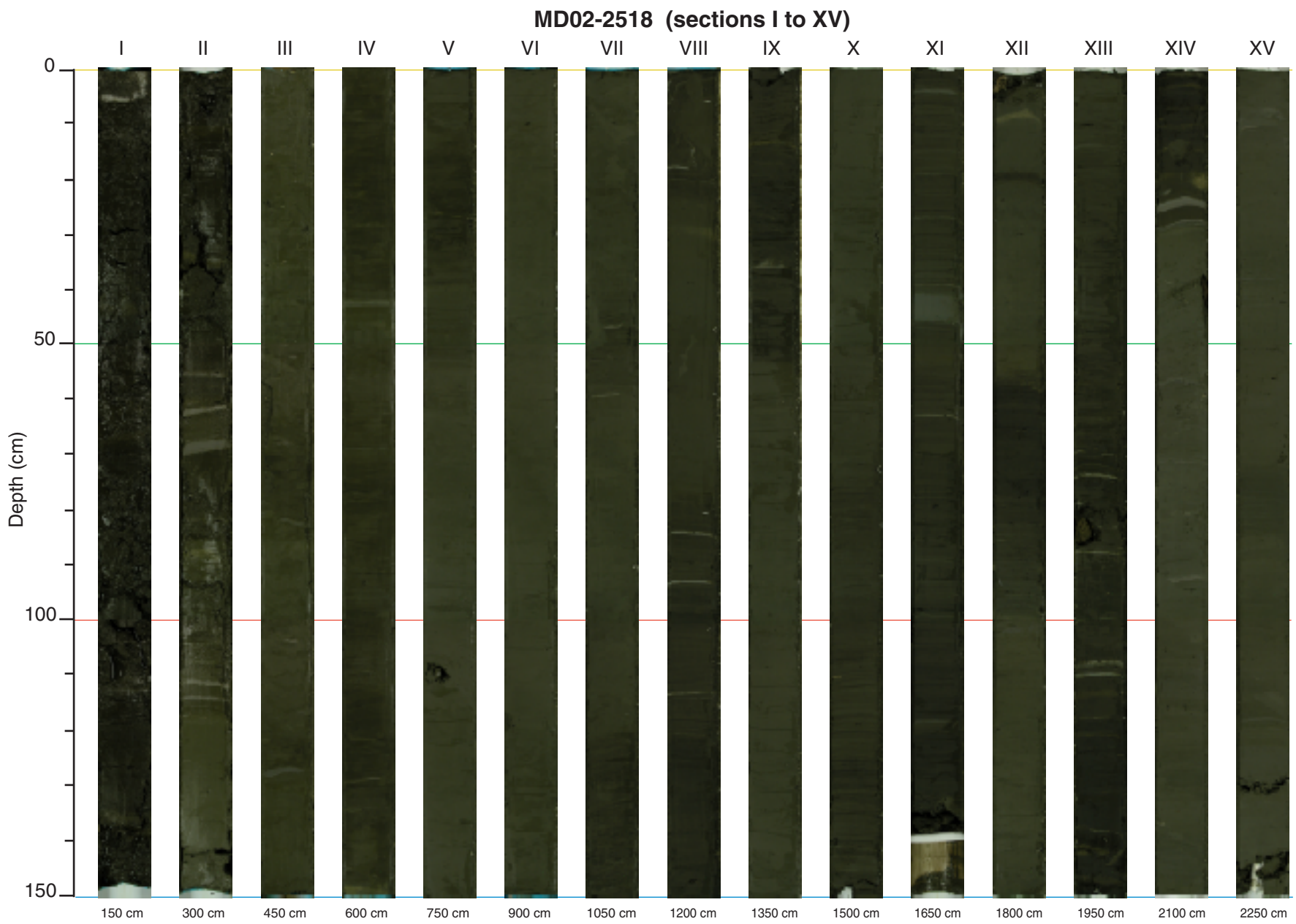
Interbedded massive dark olive grey silty clay and thinly (<1 mm) laminated very dark grey silty clays. 1-cm-thick grey clayey silt layers.

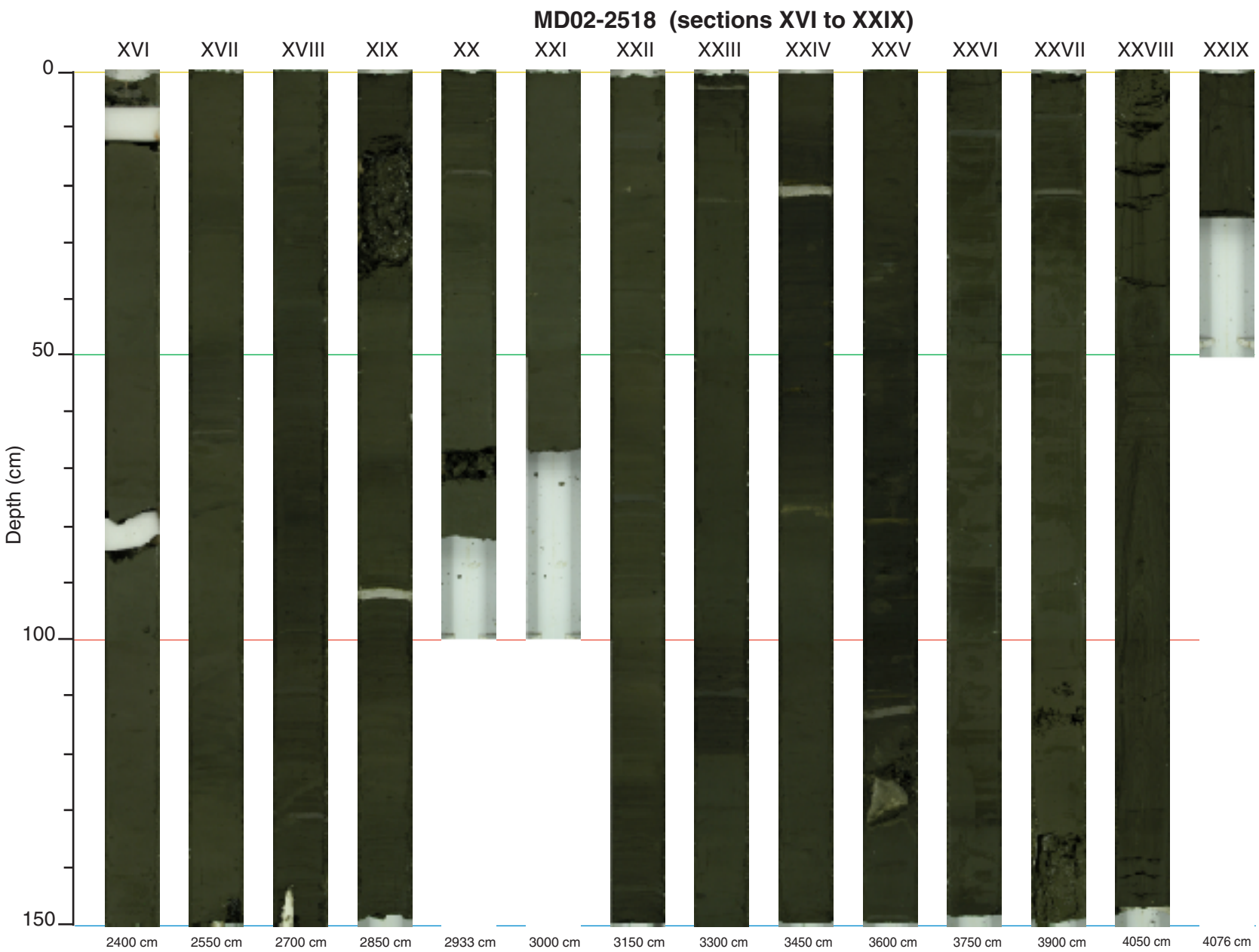
Massive silty clay with nanno-fossils and forams. Fish scales present.

Soft disturbed clayey silt.

Firm clayey silt with vertical smeared, dark thin layers.

End of core, 4076 cm

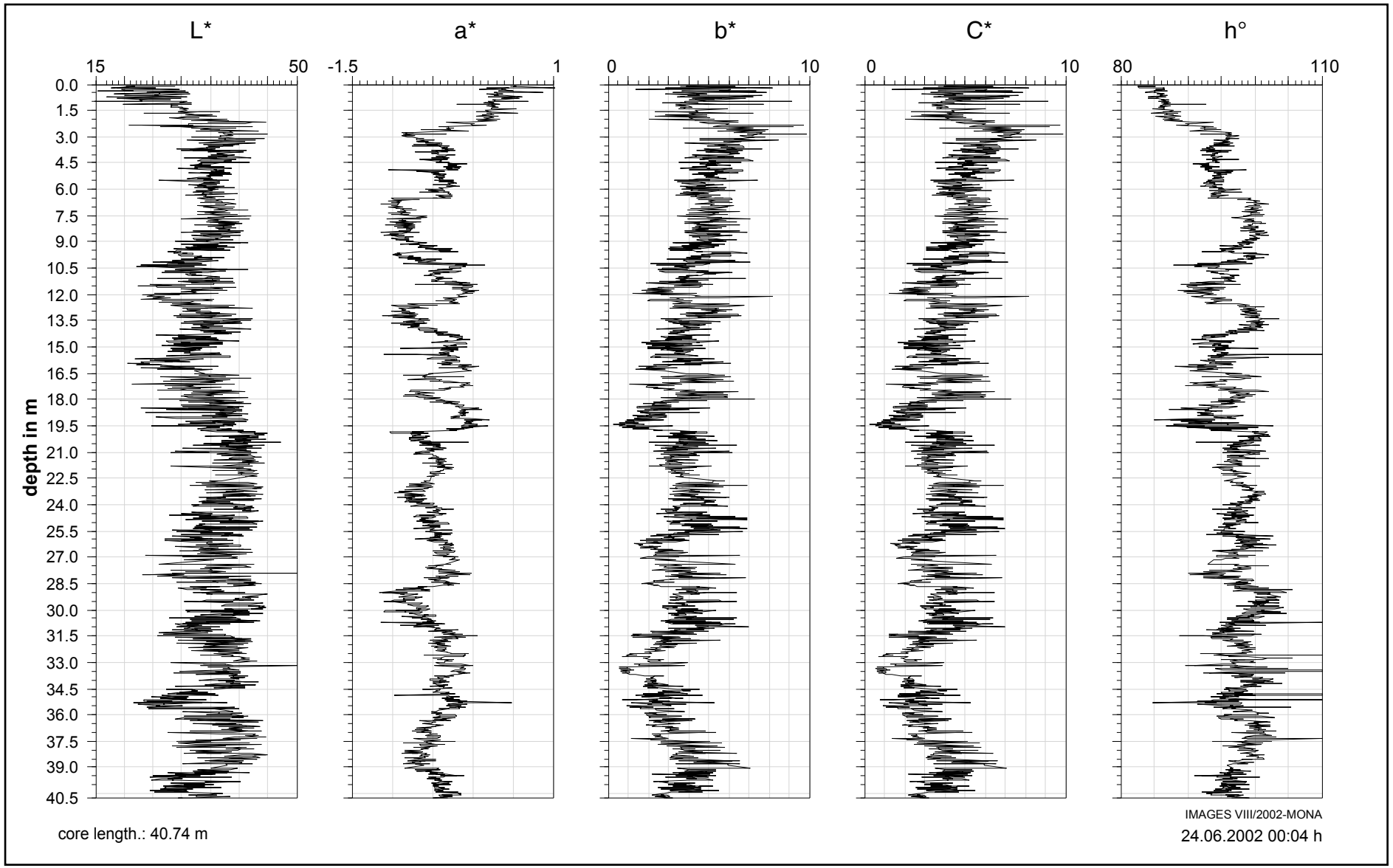

MD02-2518 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2518 (sections XVI to XXIX)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
XXIX
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
2933 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3750 cm
3900 cm
4050 cm
4076 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

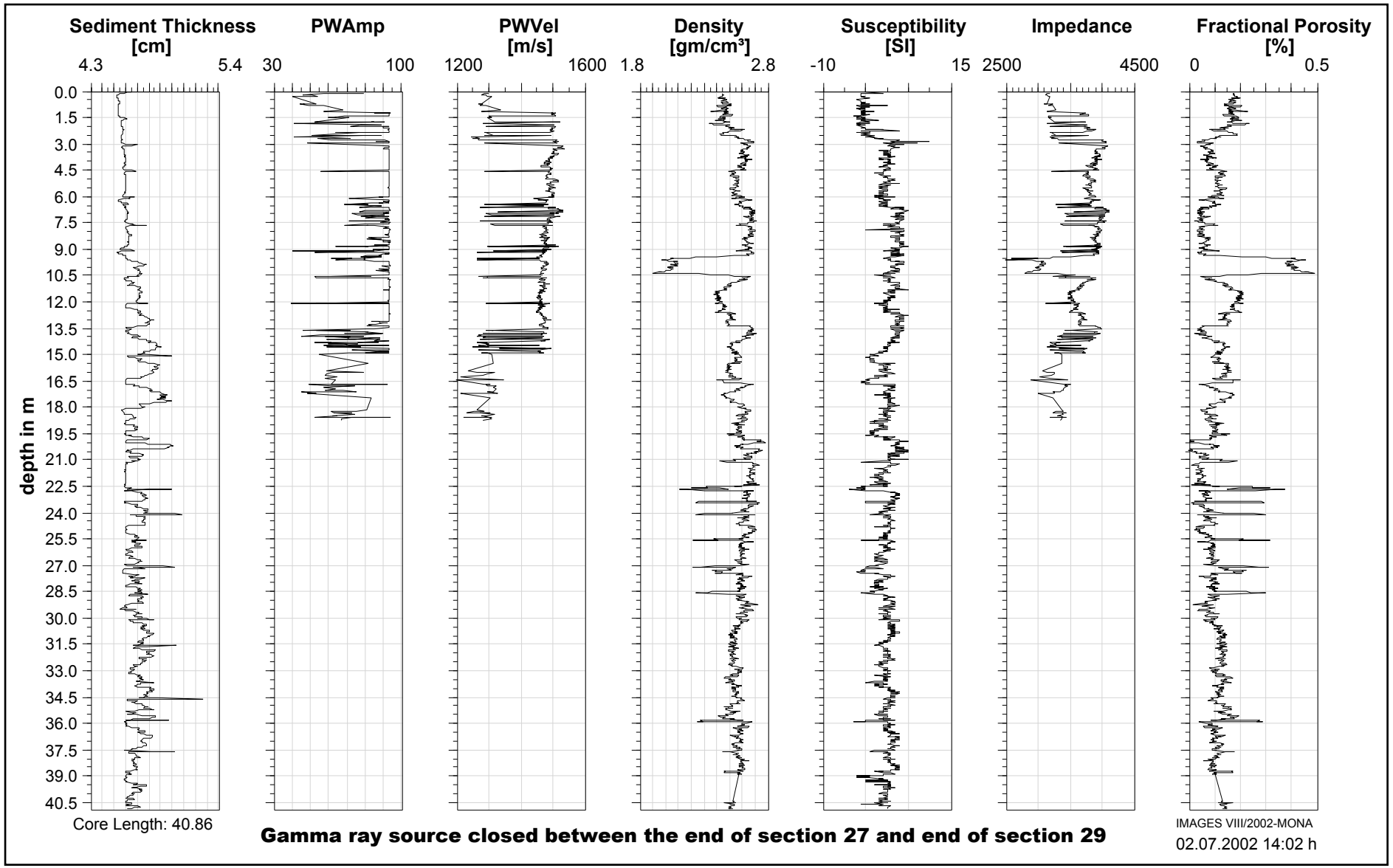
Station 23
Core MD02-2518



IMAGES VIII, 2002
MONA

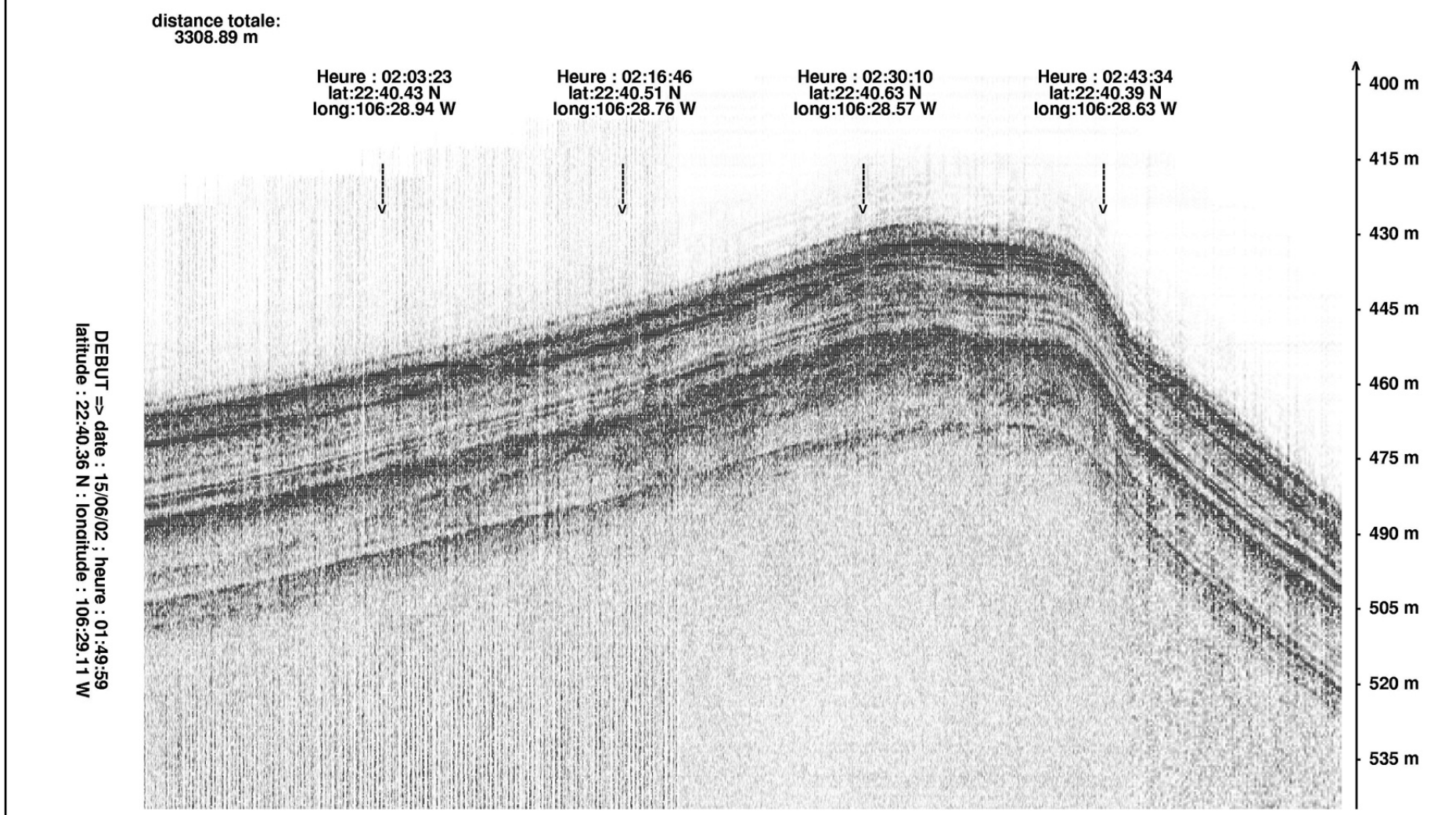
Multi Sensor Core Logger

Station 23
Core MD02-2518

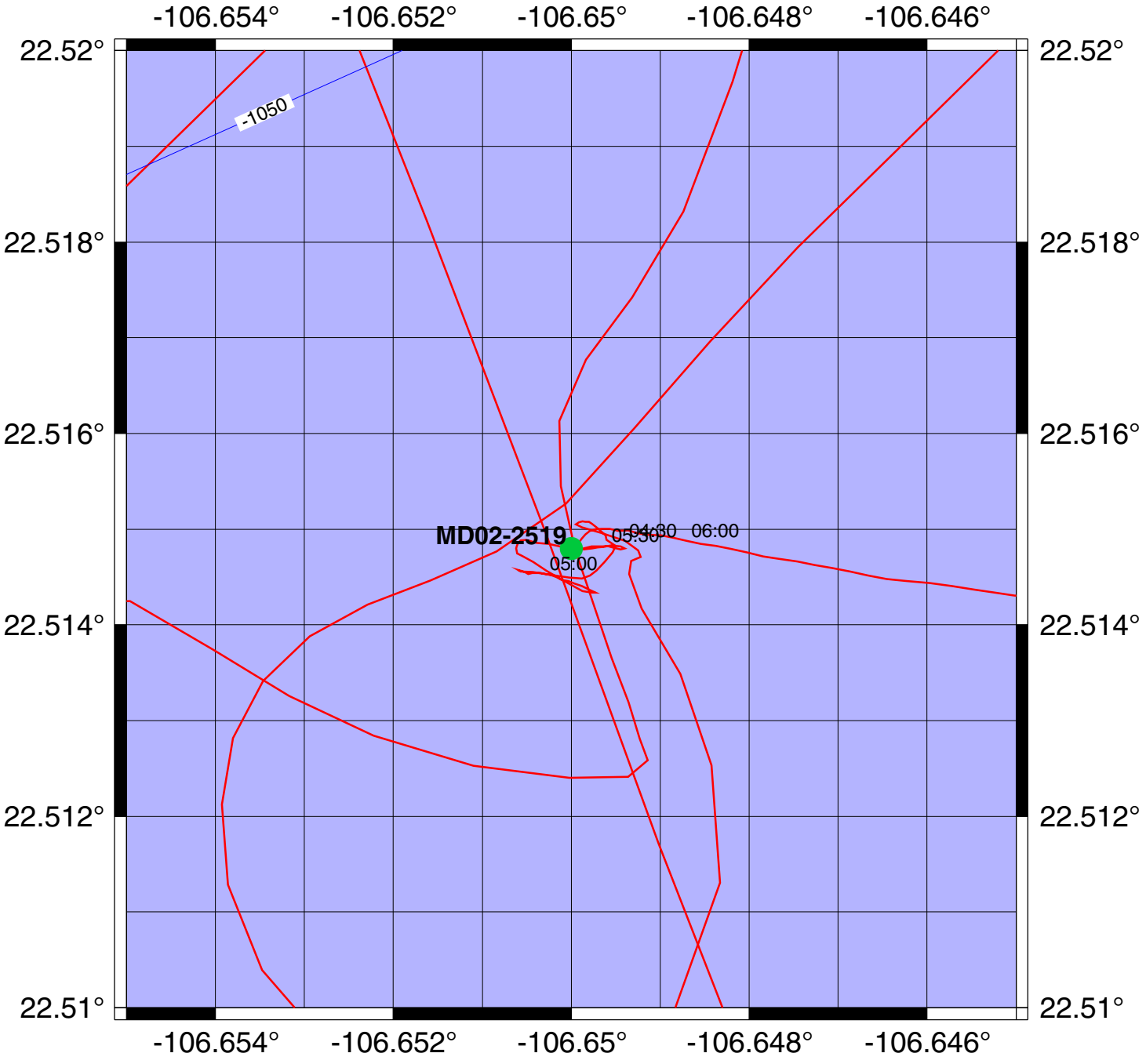


3.5 kHz Seismic Replay

Station 23 , Departure



IMAGES VIII/MD126, Mona
Station 24 Mazatlan 2



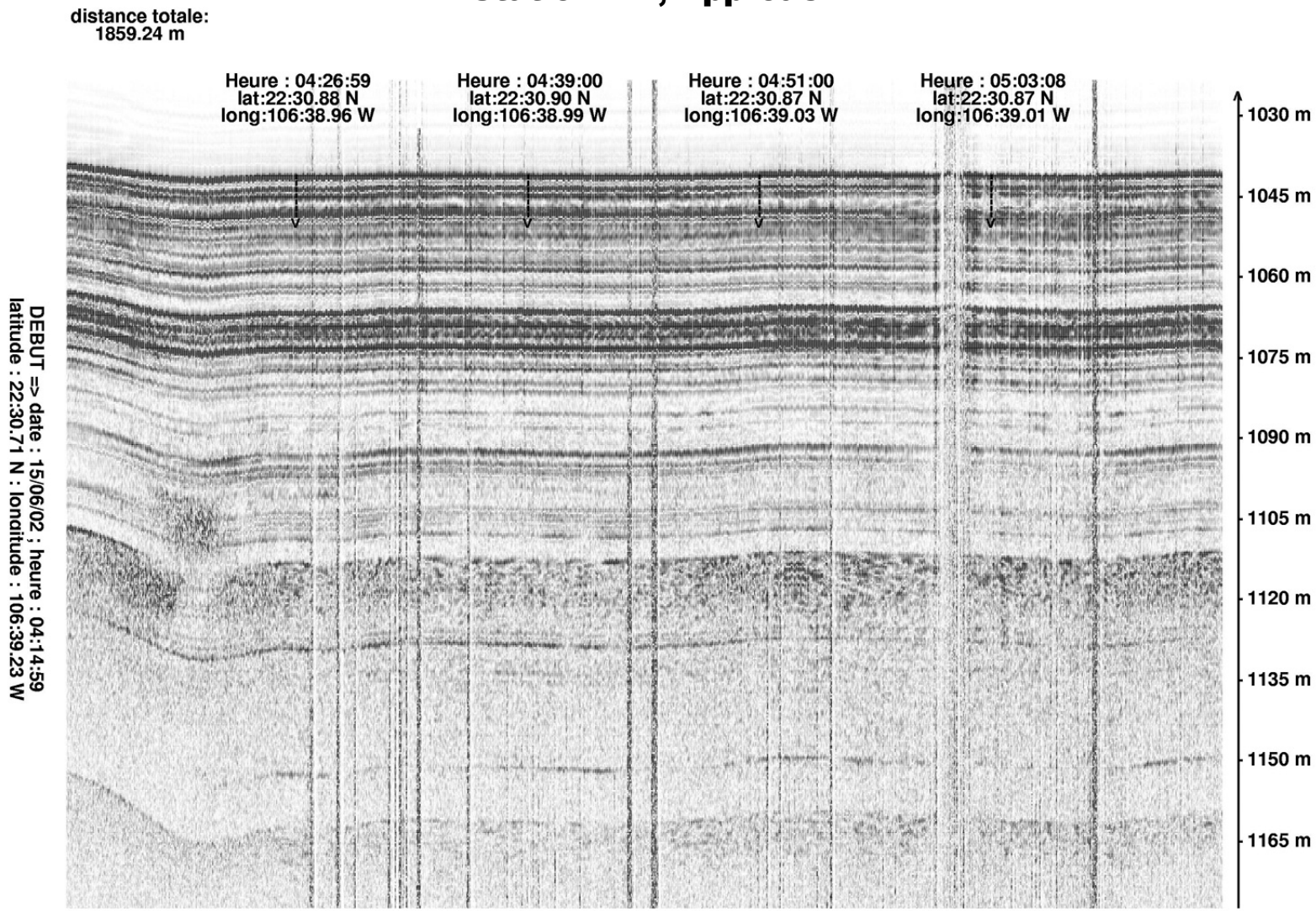
GMT 2002 Sep 26 12:08:27

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 24
Core MD02-2519

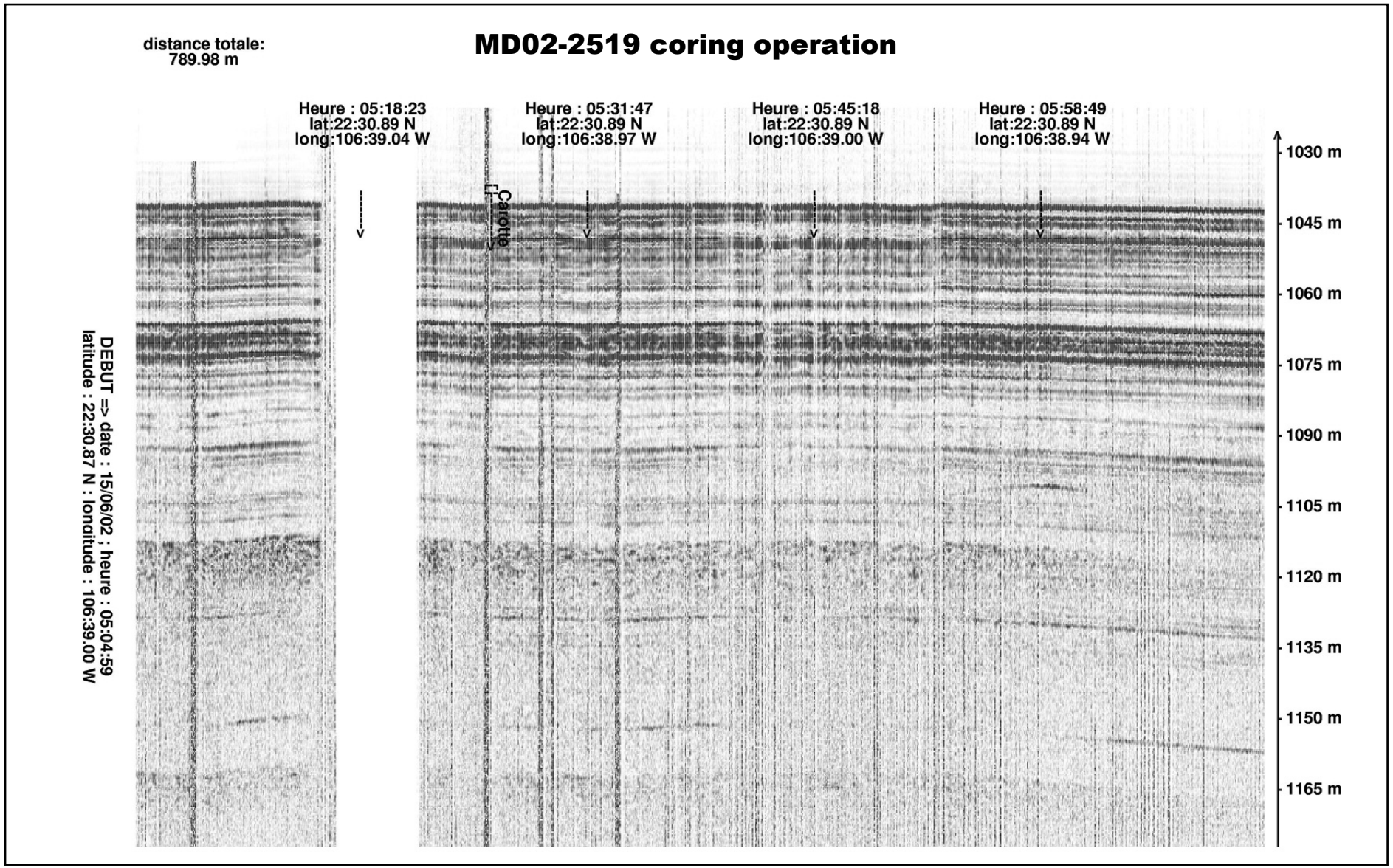
Station 24 , Approach



IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 24
Core MD02-2519



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **15.06.2002**

N° de station : **24 Mazatlan 2**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2519

(MD - année - milles - centaines)

CAROTTE (longueur) :

39,98 ou 40,90 m

POSITION :

Latitude : **22° 30.89 N**

Longitude : **106° 39.00 W**

CAROTTIER (type) (1) : **CALYPSO II**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **40.44** **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) : **Cylindre**

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **955** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **04:33**

Début manœuvre : **04:38** **ou 05:10**

Déclenchement : **05:26**

Fin de manœuvre : **07:08**

Durée de manœuvre : **02:30** **?**

Départ station : **07:08**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

0	*150*	*300*	*450*	*600*	*750*	*900*	*1050*
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	
150	150	150	150	150	150	150	

1050	*1200*	*1350*	*1500*	*1650*	*1800*	*1950*	*2100*
VIII	**IX**	**X**	**XI**	**XII**	**XIII**	**XIV**	
150	153	155	152	152	153	150	

2100	*2250*	*2400*	*2550*	*2700*	*2850*	*3000*	*3150*
XV	**XVI**	**XVII**	**XVIII**	**XIX**	**XX**	**XXI**	
150	150	150	150	150	70	50	

Extruded put back in liner not in order

3150	*3300*	*3450*	*3600*	*3750*	*3900*	***3998***
XXII	**XXIII**	**XXIV**	**XXV**	**XXVI**	**XXVII**	
~~ ~~ 145	150	140	~~ 145	~~ 130	100	

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2519

(Station 24, Mazatlan 2 ; Latitude : 22° 30. 89N ; Longitude : 106° 39. 00W ; 955m water depth) has recoverred a total of 40.00m of sediment. The upper part of the core has not been disturbed by coring, down to 29.00m (Section XX). Below 29.00m, soupy, heavily disturbed and empty intervals are common.

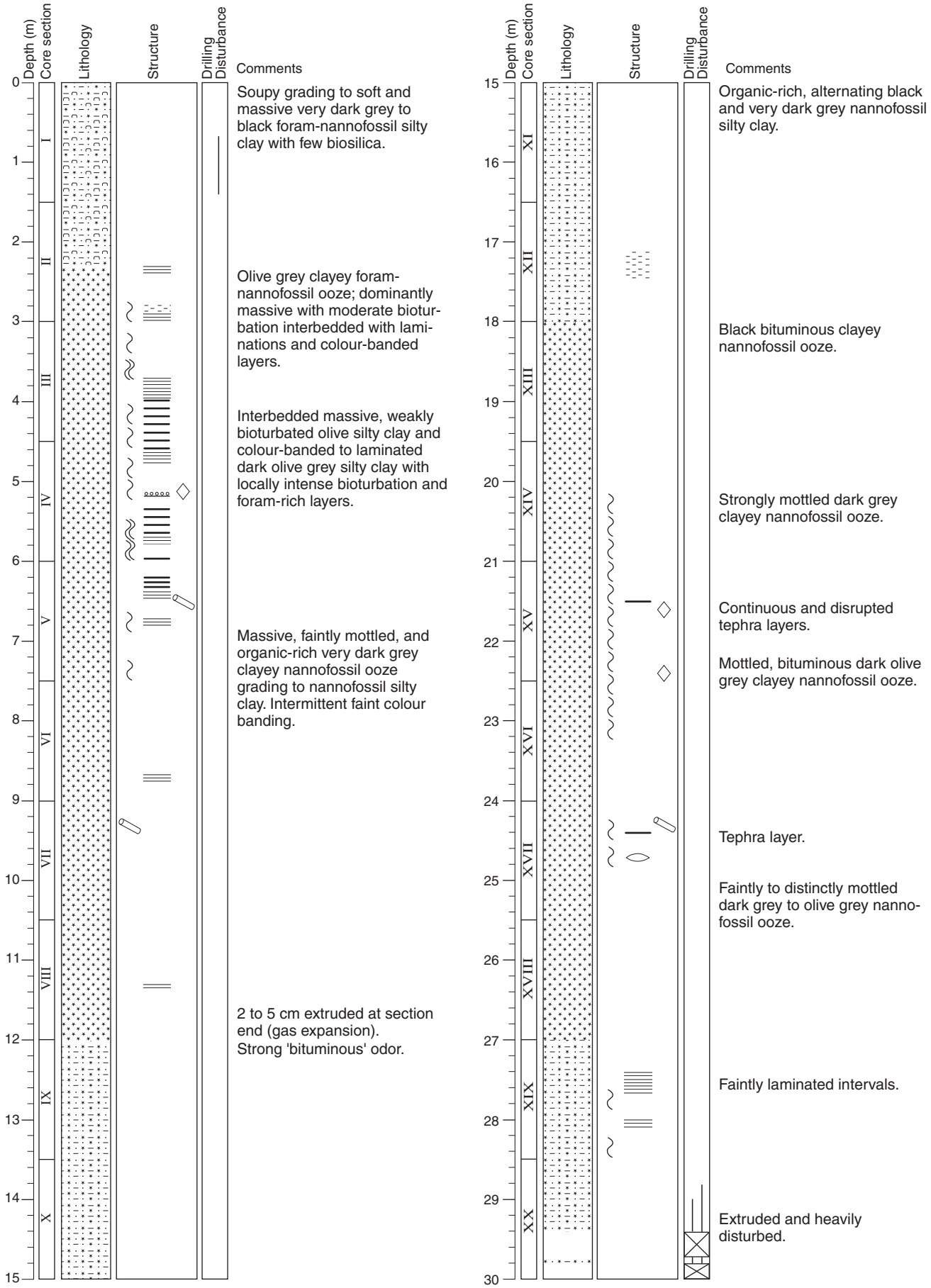
The dominant sediment mostly consists of terigenous components, with various amounts of biogenic components : silty clay, foraminifer-nannofossil silty clay, nannofossil silty clay, nannofossil clay, clayey foraminifer-nannofossil ooze, clayey nannofossil ooze, and nannofossil ooze. The colors range from olive grey and dark olive grey to very dark grey and black.

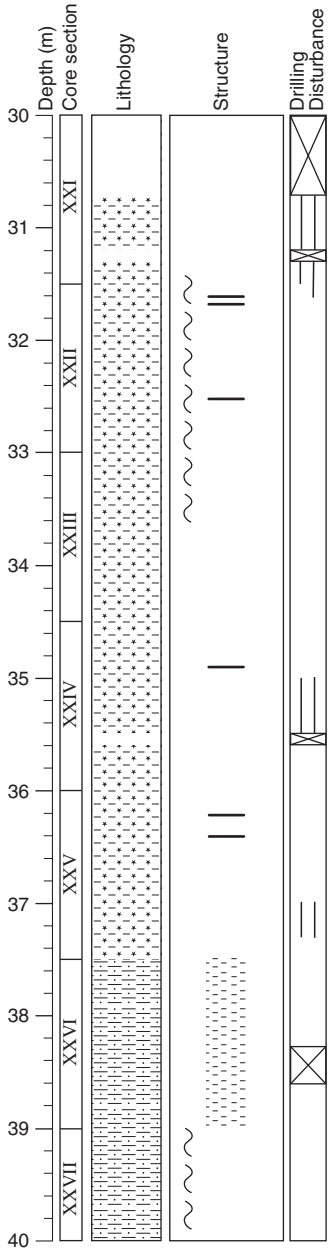
The sediment is mostly massive throughout the core. From 2.20m (Section II) to 6.30m (Section V), distinct laminations and color bands alternate with bioturbated intervals. Bioturbation is common in the lower part of the core, from 20.00m (Section XIV) to 23.20m (Section XVI), from 31.30m (Section XXI) to 33.60m (Section XXIII), and from 39.00m (Section XXVII) to the bottom. Faintly laminated intervals are also present, in Sections XII, XIX, and XXVI.

Minor lithology includes :
- Tephra layers, from Section XV downcore.

MONA

Core: MD02-2519



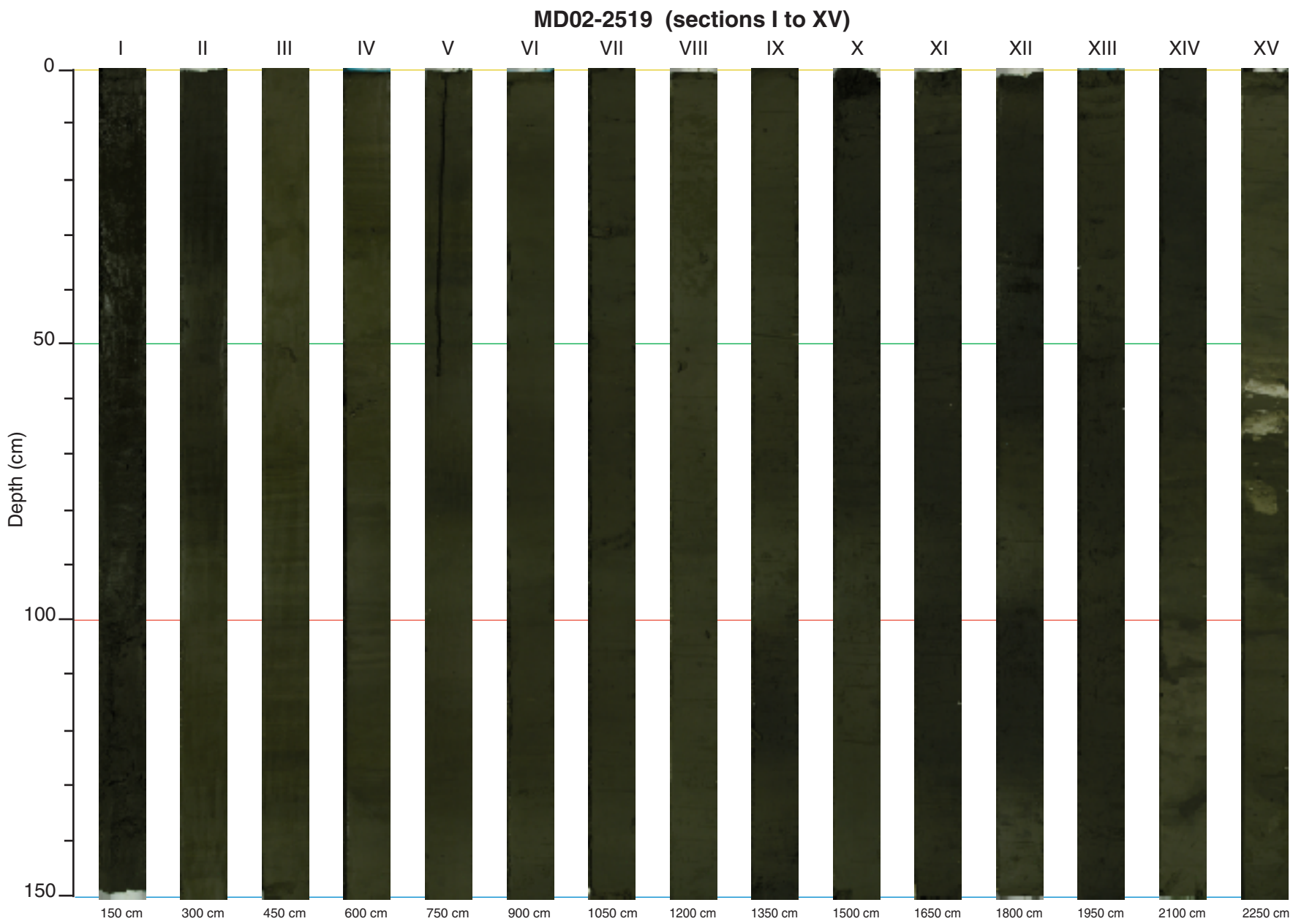


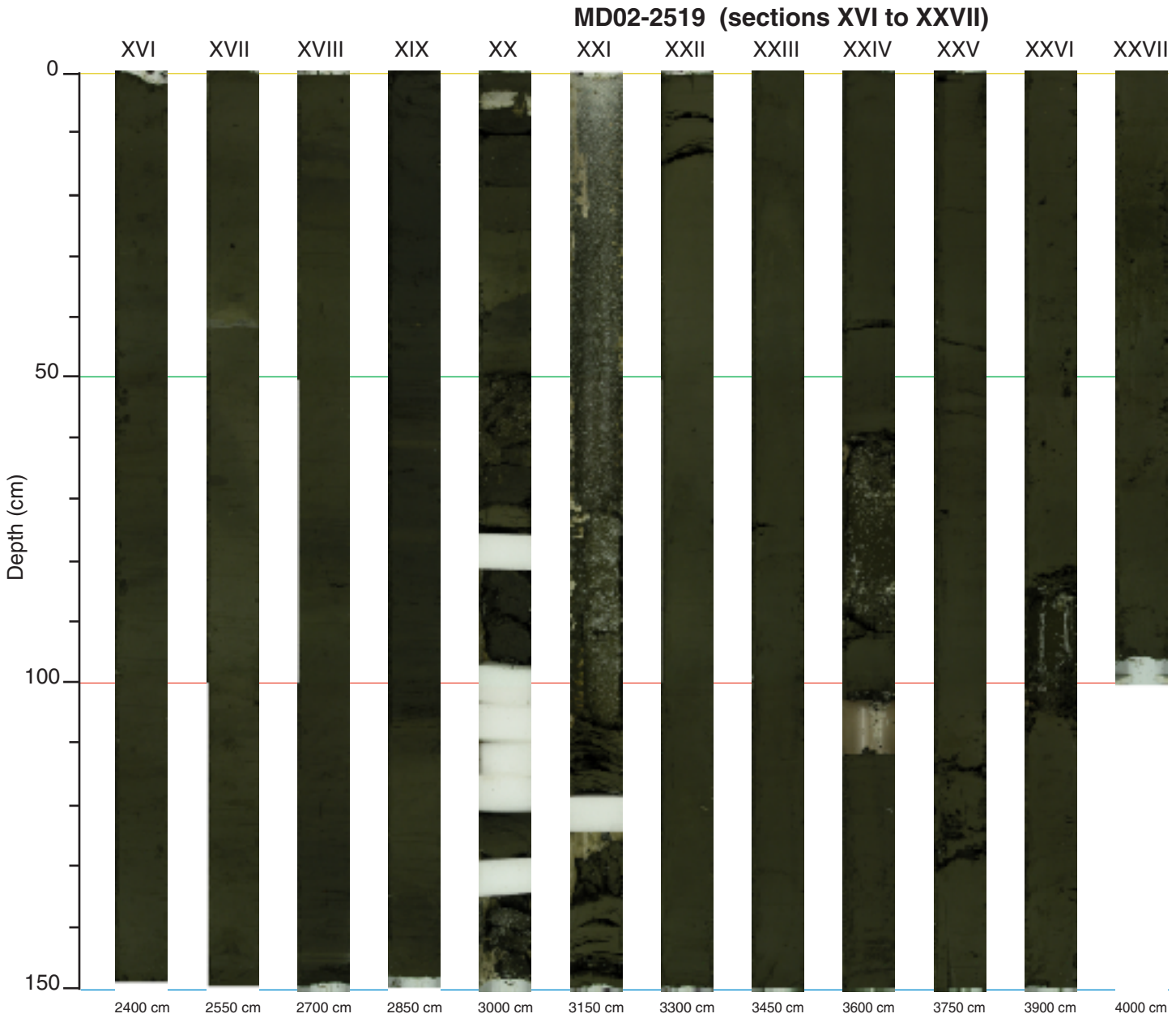
Massive, homogeneous, very slightly bioturbated, very dark grey to black nannofossil clay.

Soupy.

Very dark grey silty clay with few nannofossils; homogeneous except for faint mottling.

End of core, 4000 cm.

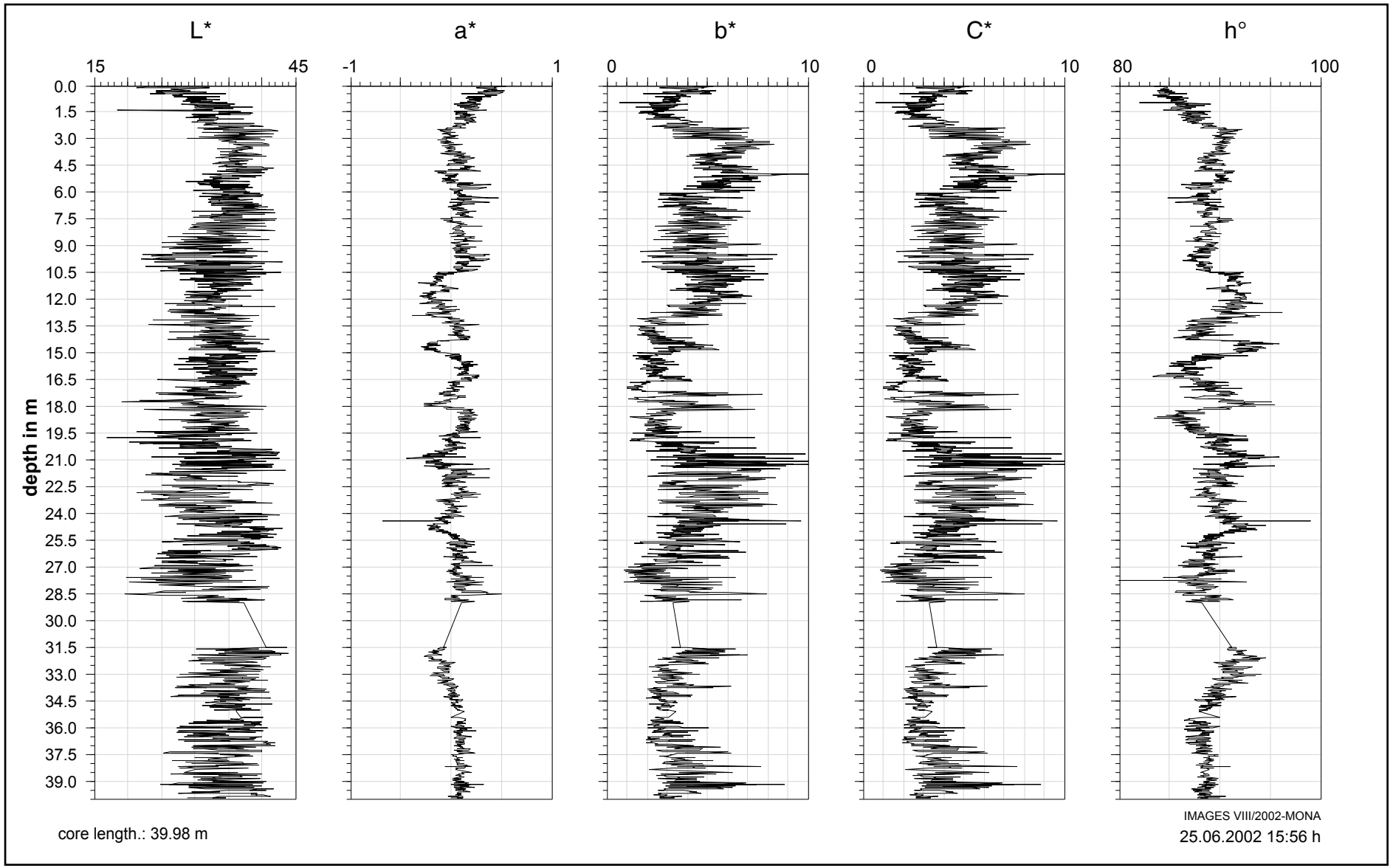

MD02-2519 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2519 (sections XVI to XXVII)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3750 cm
3900 cm
4000 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

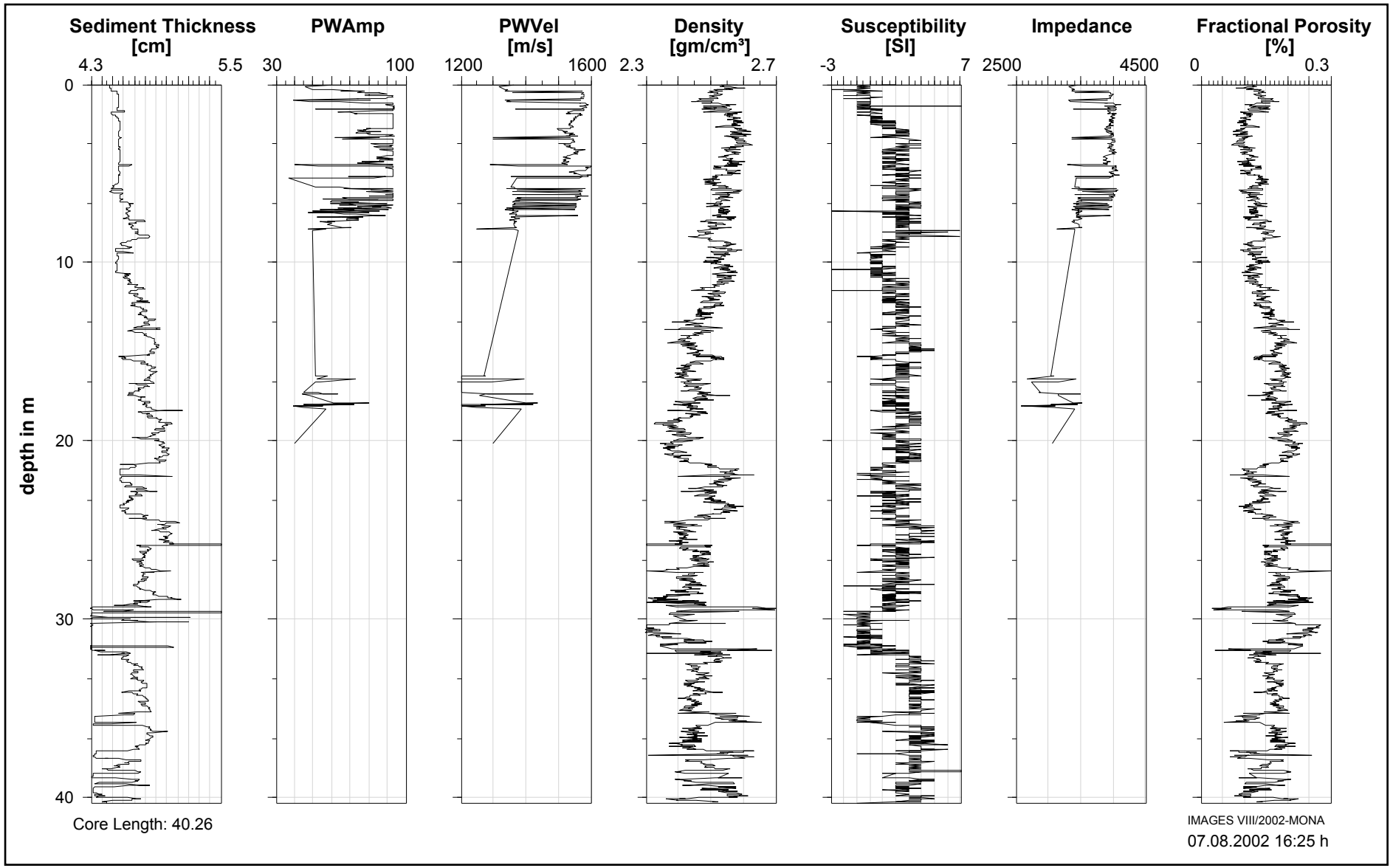
Station 24
Core MD02-2519



IMAGES VIII, 2002
MONA

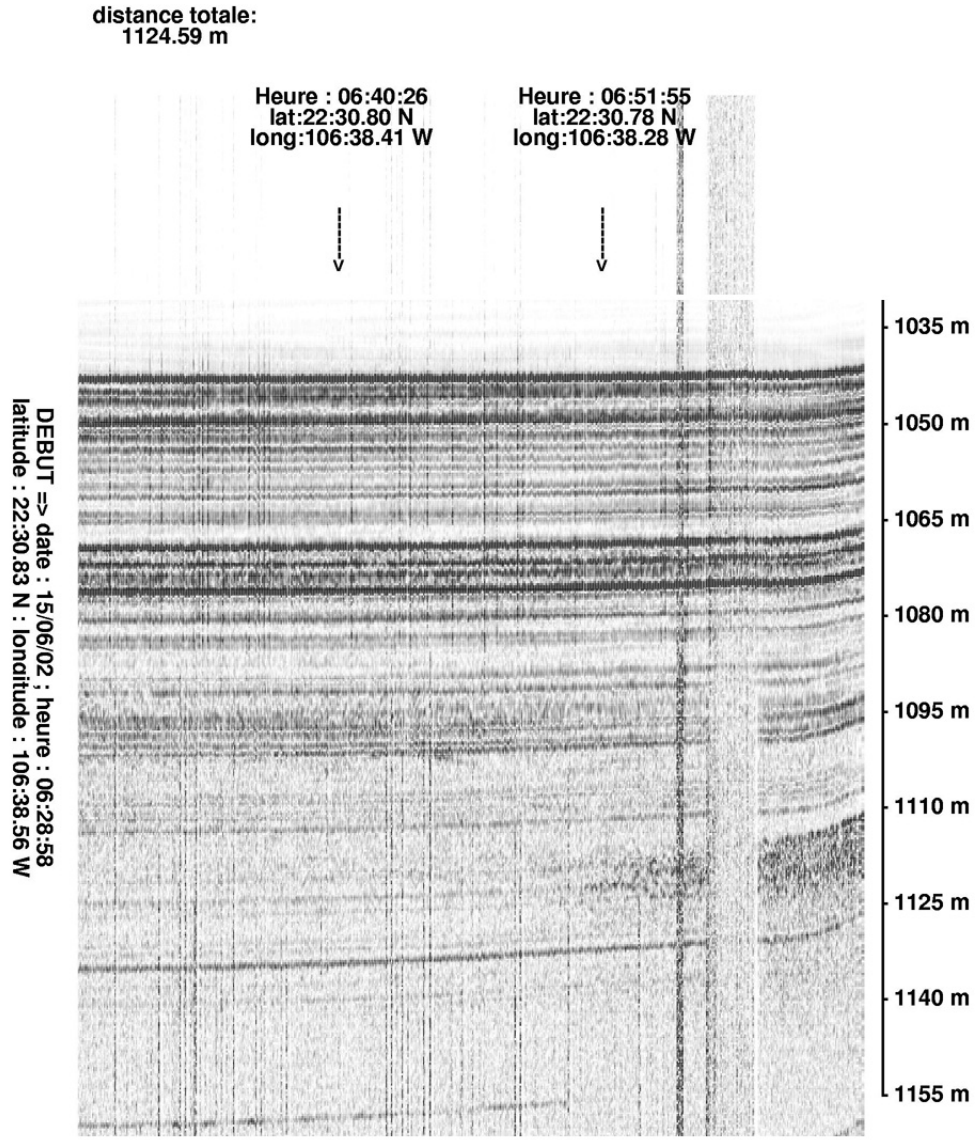
Multi Sensor Core Logger

Station 24
Core MD02-2519



3.5 kHz Seismic Replay

Station 24 , Departure



4.5 Gulf of Tehuantepec

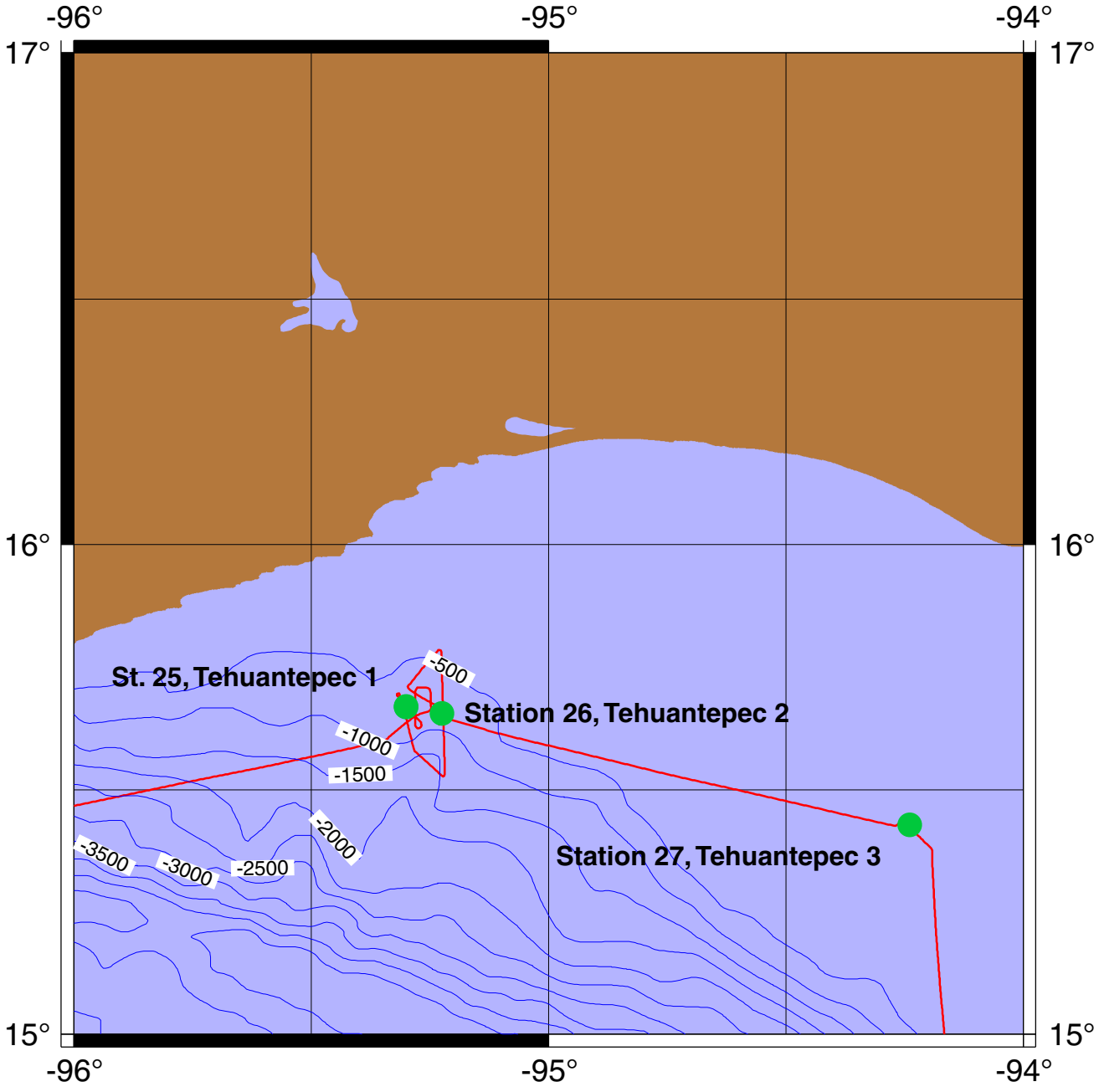
The Guatemala Basin is the northernmost of the eastern tropical Pacific basins and an important paleoceanographic target. It has an intense oxygen minimum zone (<0.2 ml/l O_2 between 200 and 900 m, as compared to a minimum of about 0.5 ml/l in the California Borderlands) with active denitrification between 300 and 600 m along a transect at 88 degrees W.

Despite the low oxygen there is evidence that water exchange into the oxygen minimum zone is high, and that the low oxygen is maintained by the high levels of primary productivity and organic matter degradation (Tsuchiya and Talley, 1998). Waters from the eastern tropical Pacific oxygen minimum zone are exported to the north along the North American margin and westward beneath the north equatorial Current. These low oxygen waters flow northward in the California Undercurrent and strengthen the oxygen minimum zone along the California margin. It is hypothesized that replacement of these waters by highly oxygenated NW Pacific intermediate waters may cause the changes in oxygenation observed in Santa Barbara Basin in the last 60 kyr (Behl and Kennett, 1996).

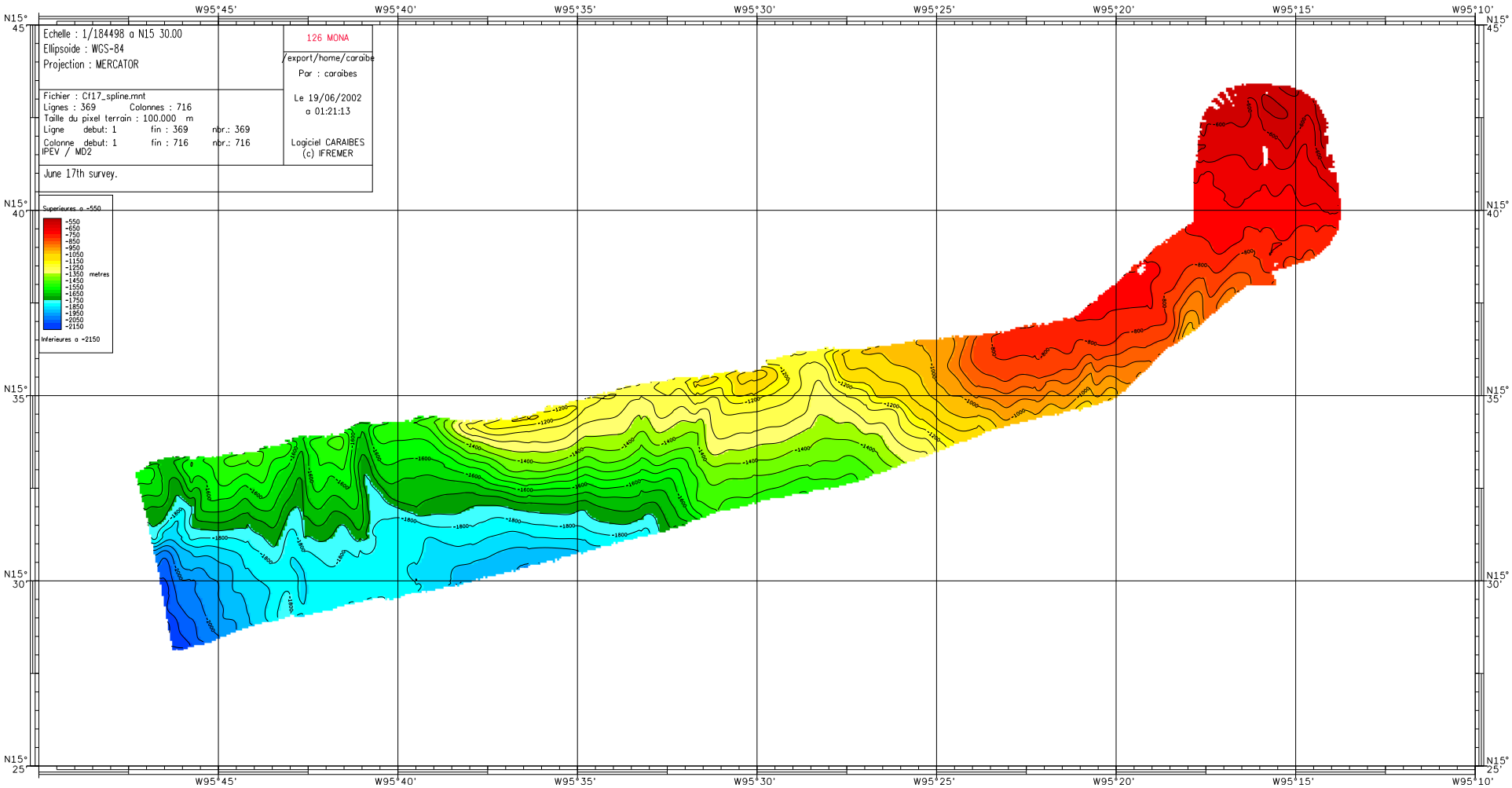
The deep waters in the Guatemala Basin are unique; they arise from spillover at 3 km depth across the East Pacific Rise from the unbounded Pacific Ocean. There is essentially no exchange of bottom waters with the Panama or Peru Basins to the south, based on salinity, temperature, and nutrient distributions. Oxygen and nutrient contents are significantly modified from the deep Pacific waters, because of the degradation at depth of organic carbon that rains from the surface waters. Monitoring the differences in nutrients and oxygen content between the Guatemala Basin and the region west of the East Pacific Rise provides a measure of the regional export productivity in the basin. In addition, the Gulf of Tehuantepec provides an opportunity to monitor the strength of winter high-pressure buildup in North America (Hurd, 1929; Clarke, 1988). The air masses ("Alberta Clippers" or "Nortes") originate in the high plains of Canada and the United States. The arrival of the cold dry air causes a pressure difference across Central America that can cause winds greater than 100 km/hr (the “Tehuantepecanos”) to blow through gaps in the mountains, in particular at the Gulf of Tehuantepec, Gulf of Papagayo, and in the Panama Canal region. Upwelling associated with the events can depress sea surface temperature by 10 deg. C (Legeckis, 1988), and inducing a very shallow oxygen minimum zone, with dissolved oxygen concentrations below 0.1ml/l at 50 - 75m water depth. Such events will affect the surface plankton community composition, alkenone SST measures, and planktonic foraminiferal stable isotopes. Foraminiferal and radiolarian microfossils are very abundant in this region and their distributions have been studied in surface sediments by Perez-Cruz and Machain-Castillo (1990) and Molina-Cruz and Martinez-Lopez (1994). They provide paleoceanographic proxies for downcore. Gravity cores have been collected from the region and suggest that sedimentation rates in the central part of the Gulf are 0.5 mm/year, and higher in its western part. They also provide a record of upwelling and its associated oceanographic dynamics. (Arellano-Torres and Machain-Castillo, 2001, Machain-Castillo et al,(2001).

We took three cores. Two are located north of the modern path of the Tehuantepecanos. The two cores are taken at about 700m of water depth one in a restricted basin (MD02-2520 + -2521C²), and the other (MD02-2523) on a slope that showed a nice draping. The difference between the two locations would serve to avoid possible local sediment problems (e.g. turbidites, hiatuses, slump..) that may occur in that region. We would have preferred to take the cores at different depths but our survey did not provide sedimentary structures beautiful enough for coring: deeper we found evidence of slumps and at shallower depth we evidenced erosion features. The third core (MD02-2523) is located South East of the two others, on the margin, and just below the modern path of the Tehuantepecanos. We tried to find another good location for about 10 hours further South-East on the slopes of margin. Unfortunately that area appears to lack of a good sediment draping, thick enough for long piston coring.

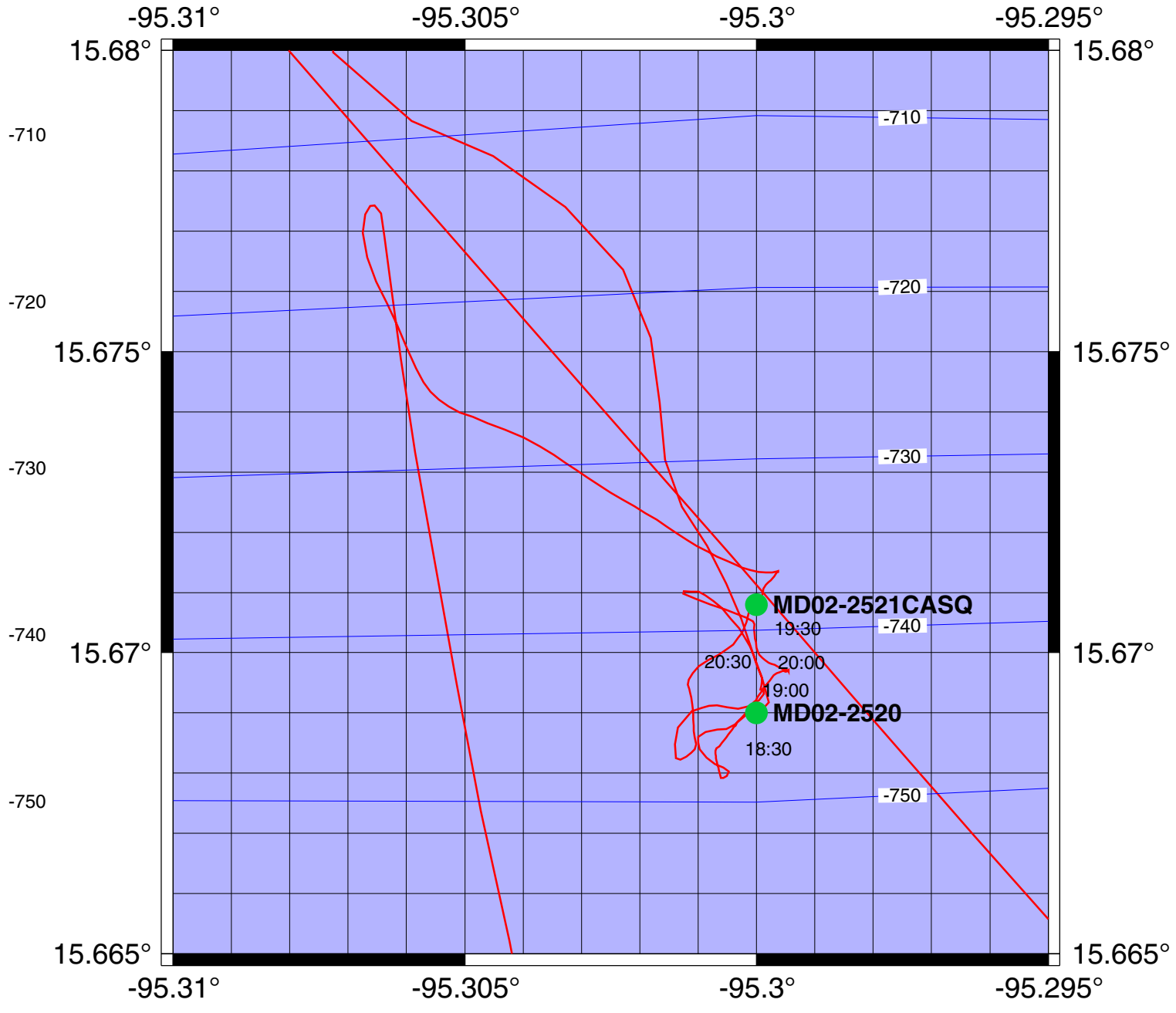
IMAGES VIII/MD126, Mona
Tehuantepec 1 - 3



GMT 2002 Sep 26 12:11:13


Echelle : 1/184498 a N15 30.00
Ellipsoide : WGS-84
Projection : MERCATOR
126 MONA
/export/home/caraibe
Par : caraibes
Le 19/06/2002
a 01:21:13
Logiciel CARAIBES
(c) IFREMER
Fichier : Cf17_spline.mnt
Lignes : 369 Colonnes : 716
Taille du pixel terrain : 100.000 m
Ligne debut: 1 fin : 369 nbr.: 369
Colonne debut: 1 fin : 716 nbr.: 716
IPEV / MD2
June 17th survey.
Superieures a -550
-550
-650
-750
-850
-950
-1050
-1150
-1250
-1350
-1450
-1550
-1650
-1750
-1850
-1950
-2050
-2150
metres
Inferieures a -2150
W95°45'
W95°40'
W95°35'
W95°30'
W95°25'
W95°20'
W95°15'
W95°10'
N15° 45'
N15° 40'
N15° 35'
N15° 30'
N15° 25'

IMAGES VIII/MD126, Mona
Station 25 Tehuantepec 1



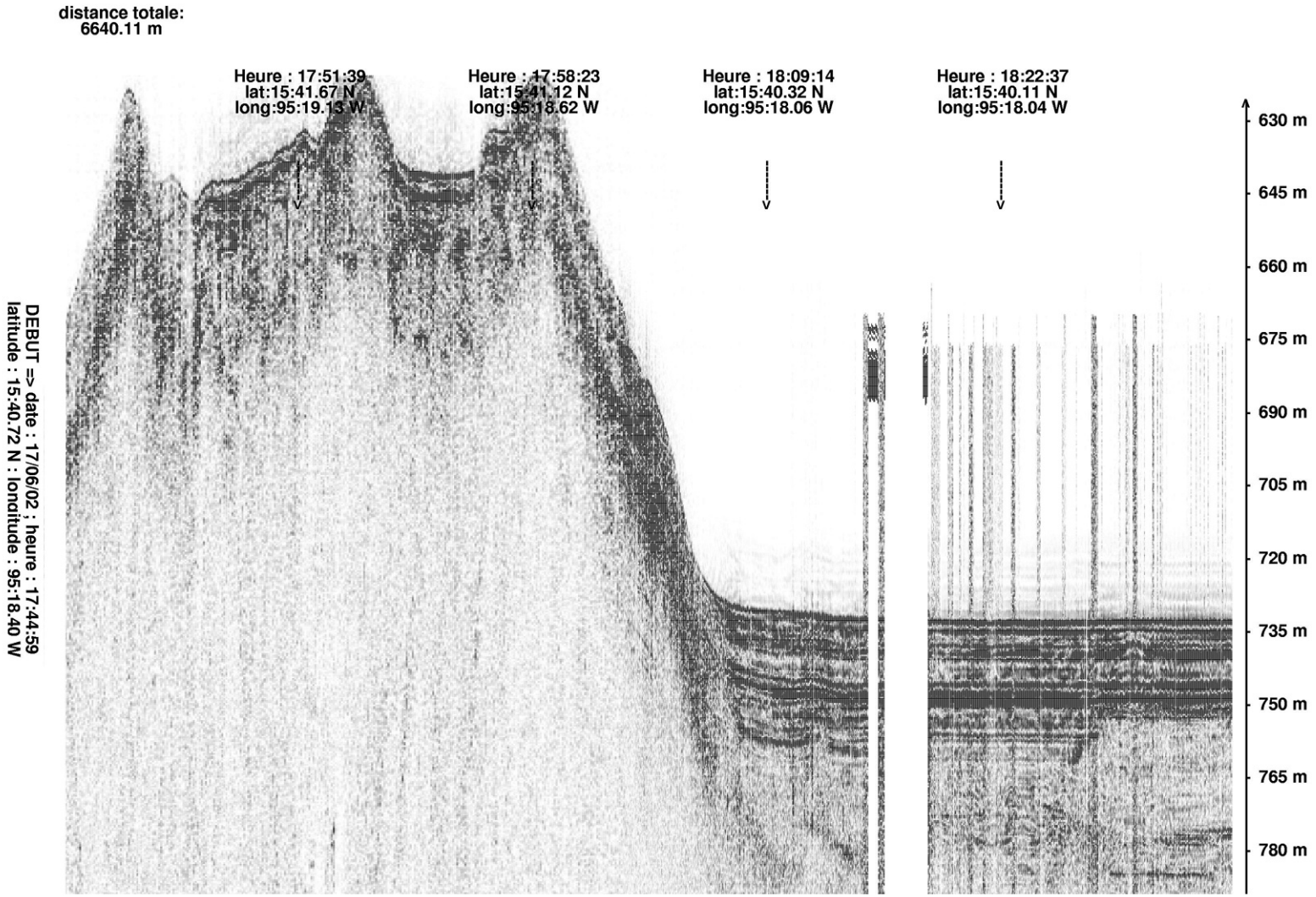
GMT 2002 Sep 26 12:12:49

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 25
Core MD02-2520
MD02-2521C2

Station 25 , Approach

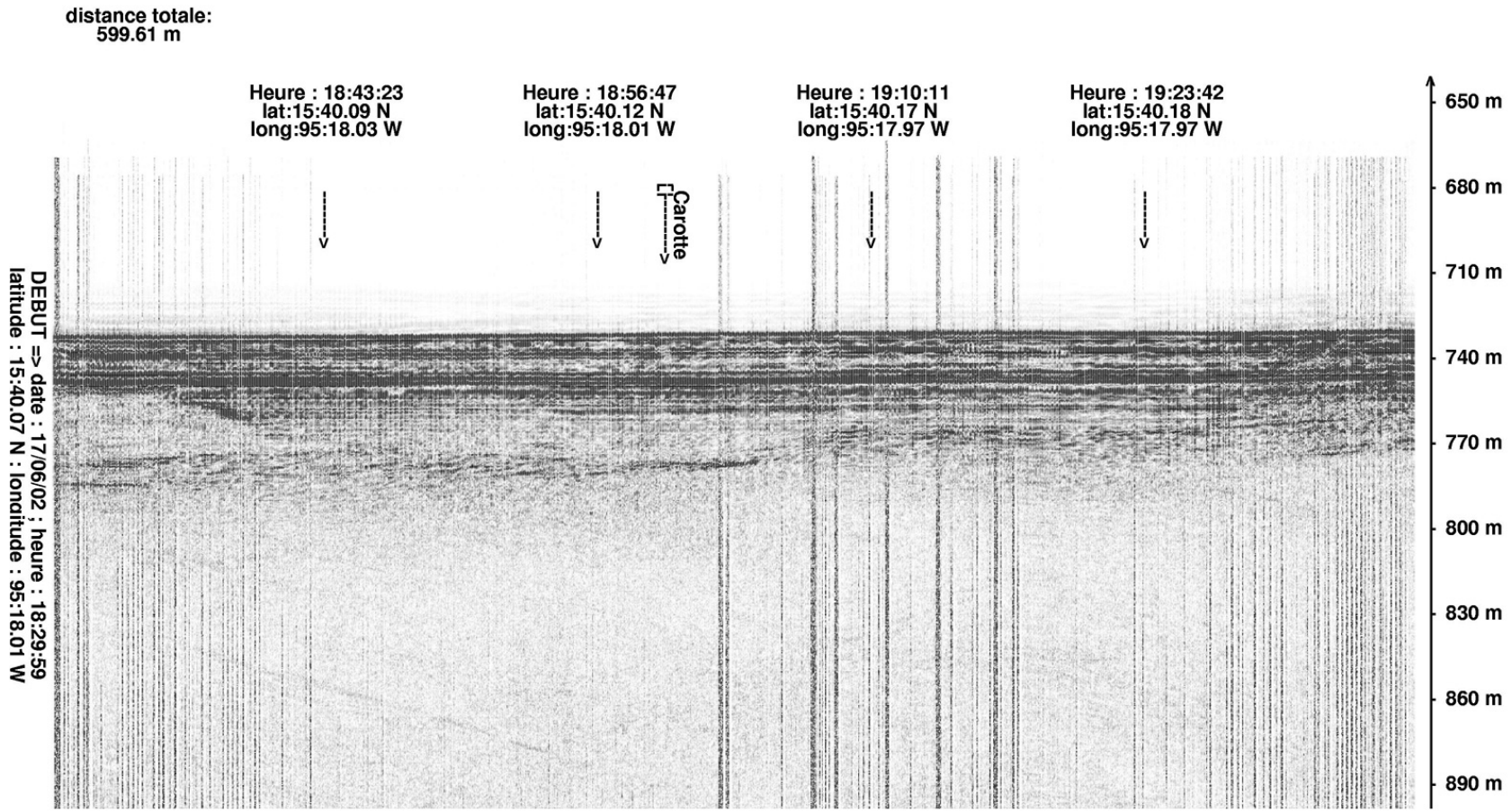


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 25
Core MD02-2520
MD02-2521C2

MD02-2520 coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **17.06.2002**

N° de station : **25 Tehuantepec 1**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2520

(MD - année - milles - centaines)

CAROTTE (longueur) :

37.06 m

POSITION :

Latitude : **15° 40.14 N**

Longitude : **095° 18.00 W**

CAROTTIER (type) (1) : **CALYPSO II**

Poids total (air) : t

Poids total (eau) : **6.60** t

REGLAGES :

Tubes (longueur) : **40.62** m

Câbles :
Chute libre : **1.50** m

Boucle : **1.60** m

LC poids : **45.30** m

CONTREPOIDS :
Type (2) : **Cylindre**

Longueur PVC : m

Pénétration : m

Longueur de carotte : m
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée :	**712**	**m**
Ligne filée :	**676**	**m**
Arrachement/total *(tonne)* :	**13.00**	**t**
Arrachement/différentiel *(tonne)* :	**6.40**	**t**
Pénétration/apparente *(m)* :	**40.60**	**m**
Pénétration/tensiomètre *(m)* :	**40.60**	**m**

HEURES (GMT)

En station :	**17:40**
Début manœuvre :	**18:24**
Déclenchement :	**19:00**
Fin de manœuvre :	**19:45**
Durée de manœuvre :	**01:21**
Départ station :	**Resté en station pour carottage suivant**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents : **2 sections extruded between IX and X, and between X and XI**

end of the core 3706 cm

0	*150*	*300*	*450*	*600*	*750*	*900*	*1050*
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	
150	150	153	150	150	150	150	

1050	*1200*	*1350*	*1500*	*1650*	*1800*	*1950*	*2100*
VIII	**IX**	**X**	**XI**	**XII**	**XIII**	**XIV**	
150	150	150	99	150	150	150	

2100	*2250*	*2400*	*2550*	*2700*	*2850*	*3000*	*3150*
XV	**XVI**	**XVII**	**XVIII**	**XIX**	**XX**	**XXI**	
150	150	150	150	150	150	150	

3150	*3300*	*3450*	*3600*	***3706***
XXII	**XXIII**	**XXIV**	**XXV**	
150	150	150	106	

extruded between IX and X (from X) **1350** 40 **1390**

extruded between X and XI (from X) **1490** 10 **1500**

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2520

(Station 25, Tehuantepec 1 ; Latitude 15° 40. 14N ; Longitude : 95° 18. 00W ; 712m water depth) recovered a total of 37.06m of sediment. The sediment has not been disturbed by coring, with the exception of an empty interval from 16.00m to 16.50m (Section XI).

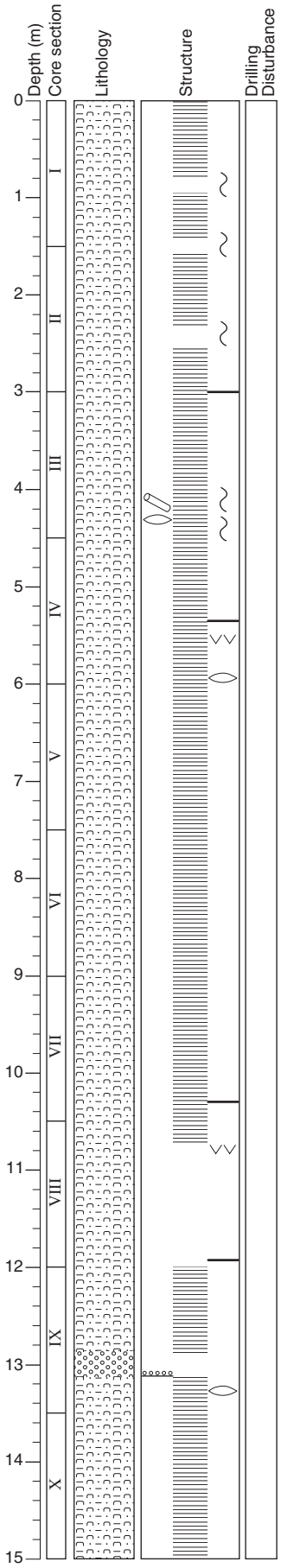
The dominant sediment consists of silty clay. Its color is olive grey and olive green to dark olive grey in the upper part of the core, but grades to very dark grey and black from 12.00m (Section IX) to 30.00m (Section XX), and to dark olive and dark olive grey in the lower part of the core.

The sediment is mostly laminated throughout the core. Laminations are very fine, and sometimes a thicker banding is superposed. Rare slightly bioturbated intervals are present. A few fine, light sandy layers are present from 3.00m (Section III) to 12.00m (Section VIII).

Minor lithology includes :
- grey to brown coarse tephra layers, throughout the core.

MONA

Core: MD02-2520



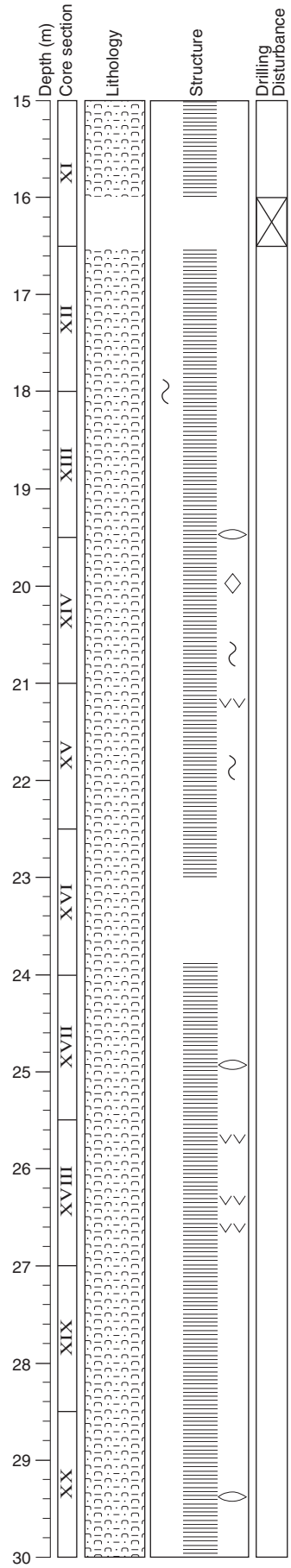
Comments

Alternating layers of homogeneous and very thinly laminated sediments. Colours alternate between dark olive grey in the laminated intervals to olive in homogeneous sediments. Laminated intervals show sub-millimeter scale laminae. Occasional thin, lighter-coloured sandy layers. Rich in quartz feldspar and heavy minerals. A few layers show flaser lamination. At times the sediments appear sandy, but there are no discrete sand layers.

Faint laminations grade into homogeneous olive grey silty clay.

Dark olive interval.

Centimetre-to-millimetre-scale colour banding. Darker layers show thicker banding alternating black with dark grey and olive grey.

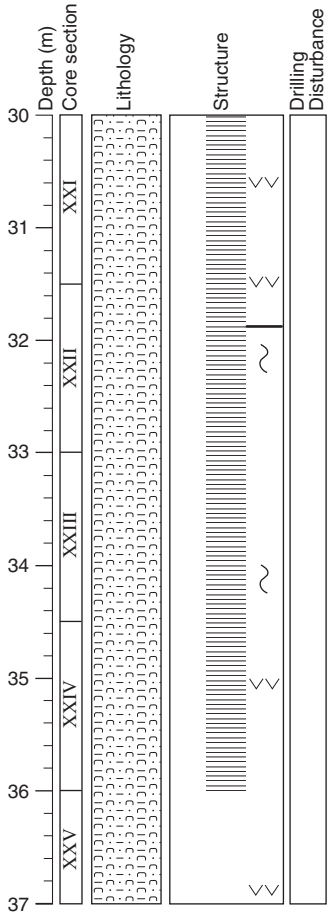


Comments

Alternating layers of homogeneous, faint, and thinly laminated sediments.

Darker silty clay showing laminae and colour bands. Some dark grey to very dark grey to black laminae.

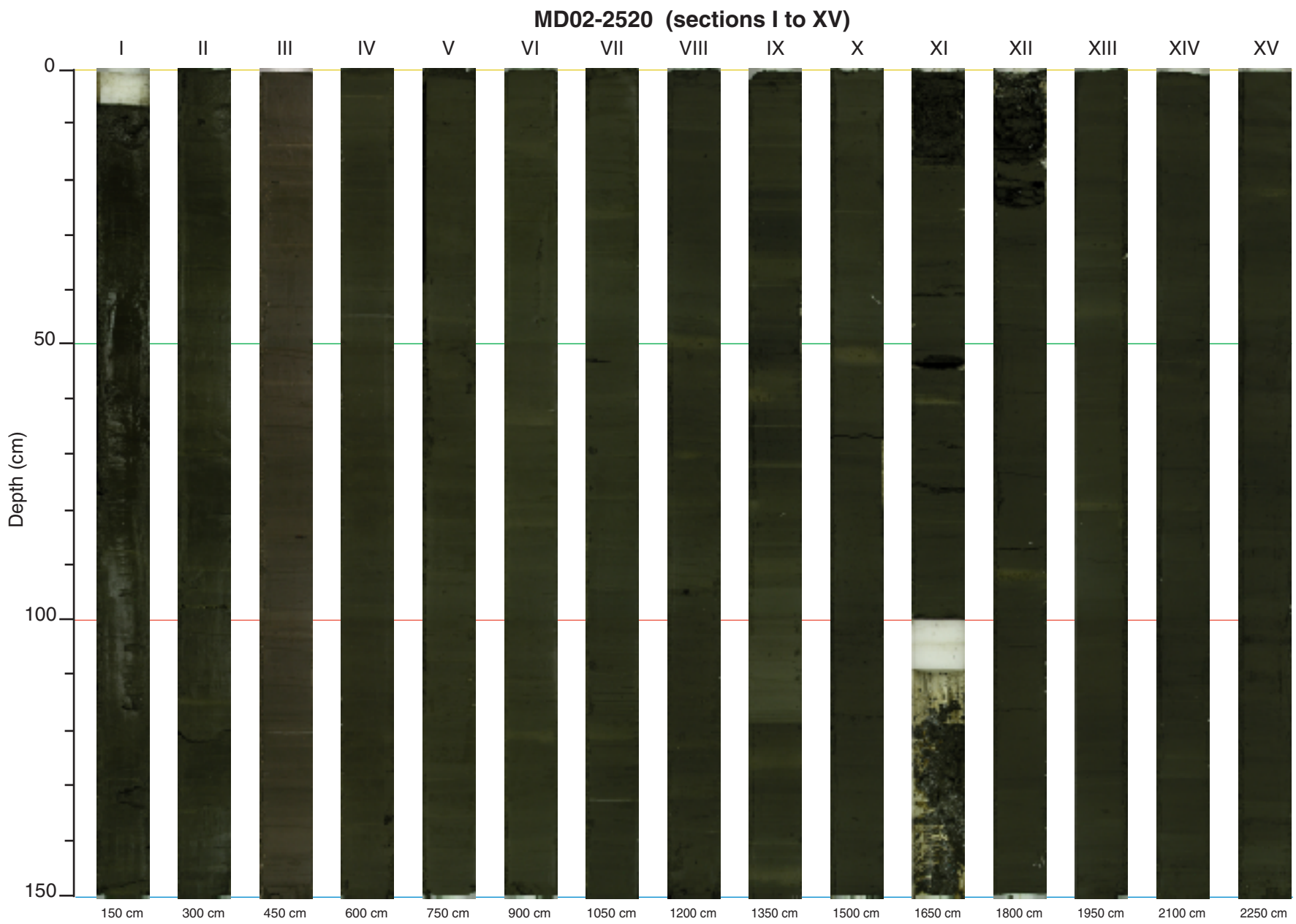
Occasional interbedded grey brown layers of coarse-grained tephra.

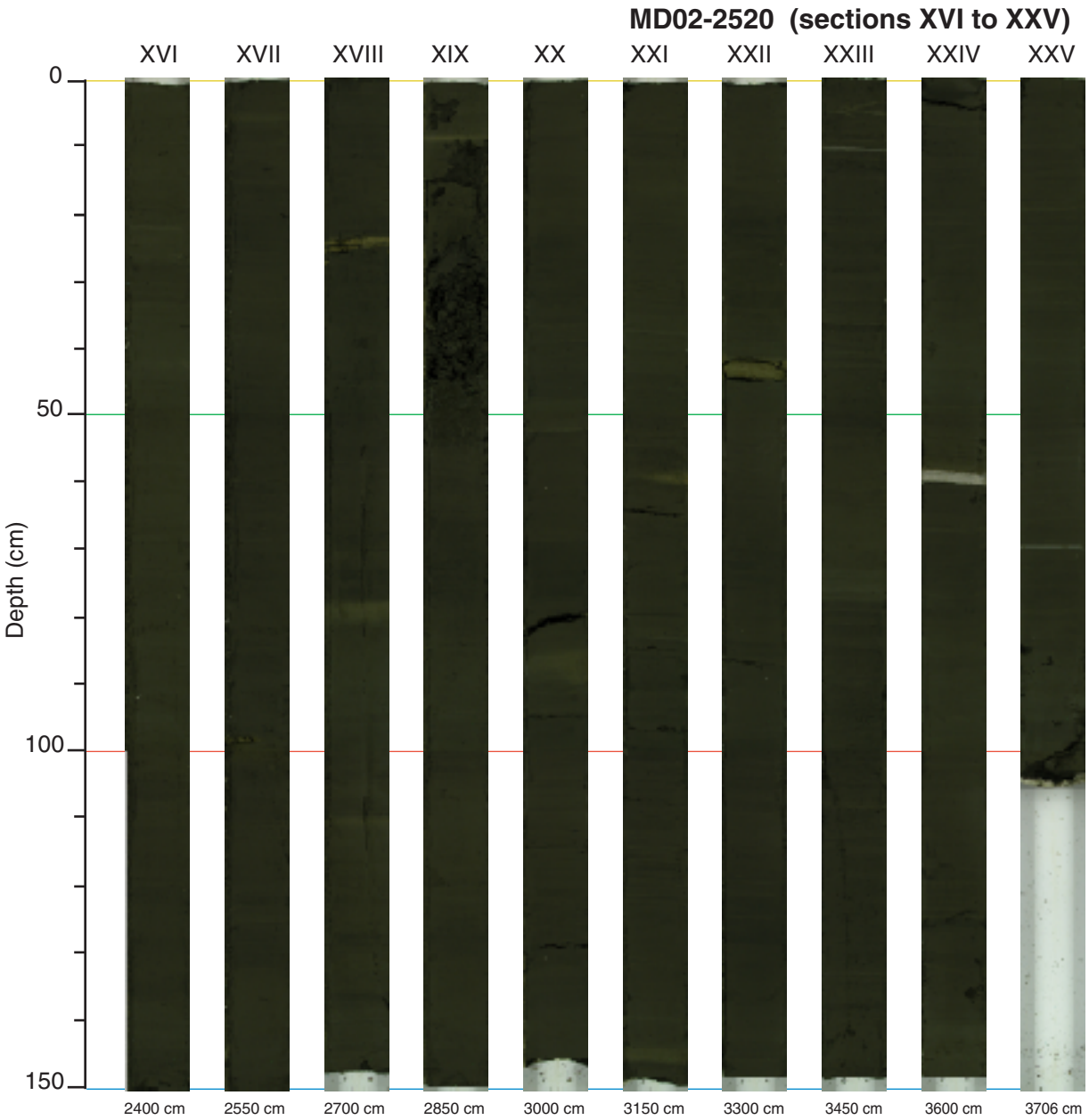


Comments

Alternating layers of homogeneous dark olive silty clay and faint, thinly laminated dark olive grey silty clay. A few apatite-rich layers. Silty clays become stiffer with depth. Ammonia odor present.

End of core, 3706 cm.

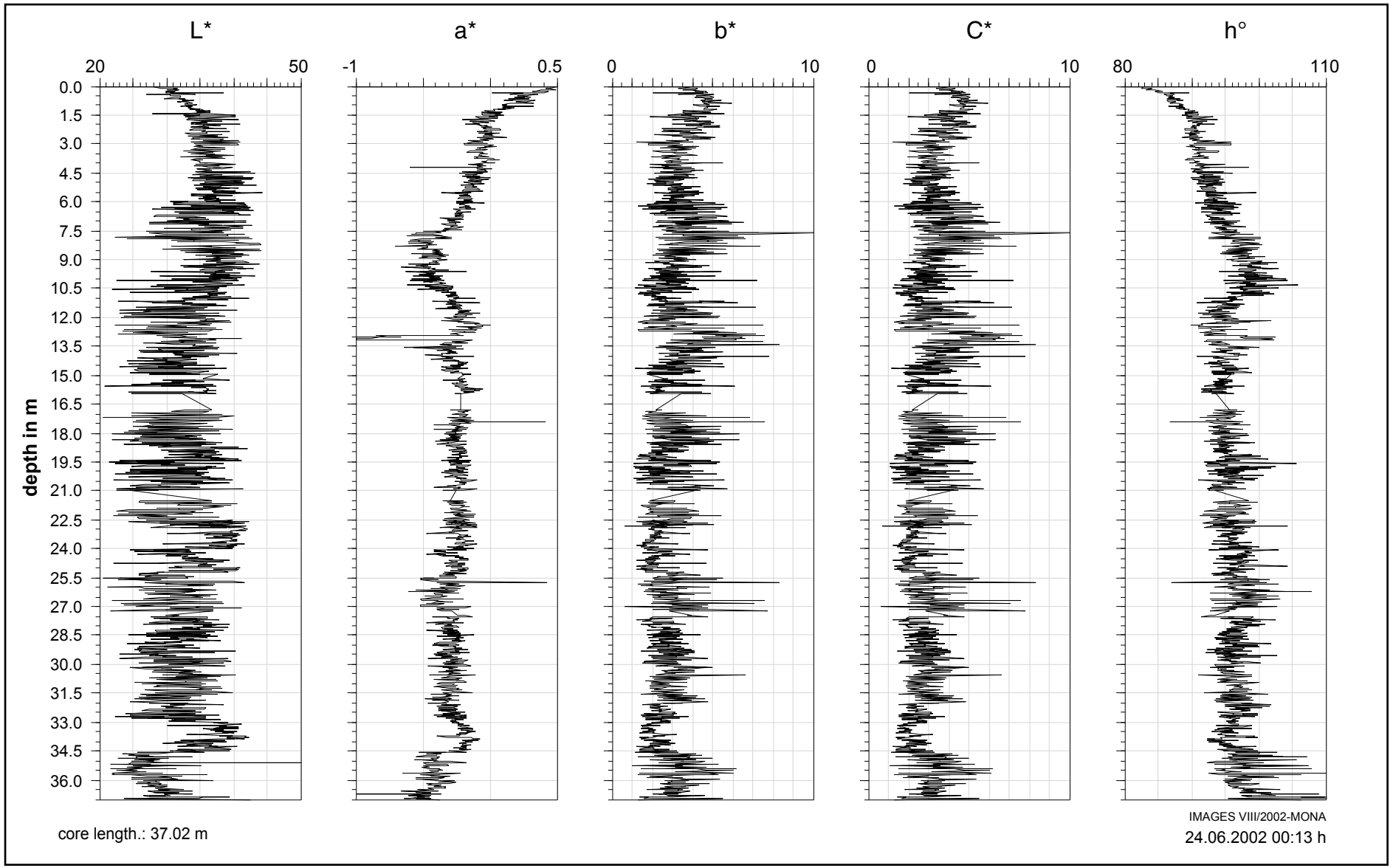

MD02-2520 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2520 (sections XVI to XXV)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3600 cm
3706 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

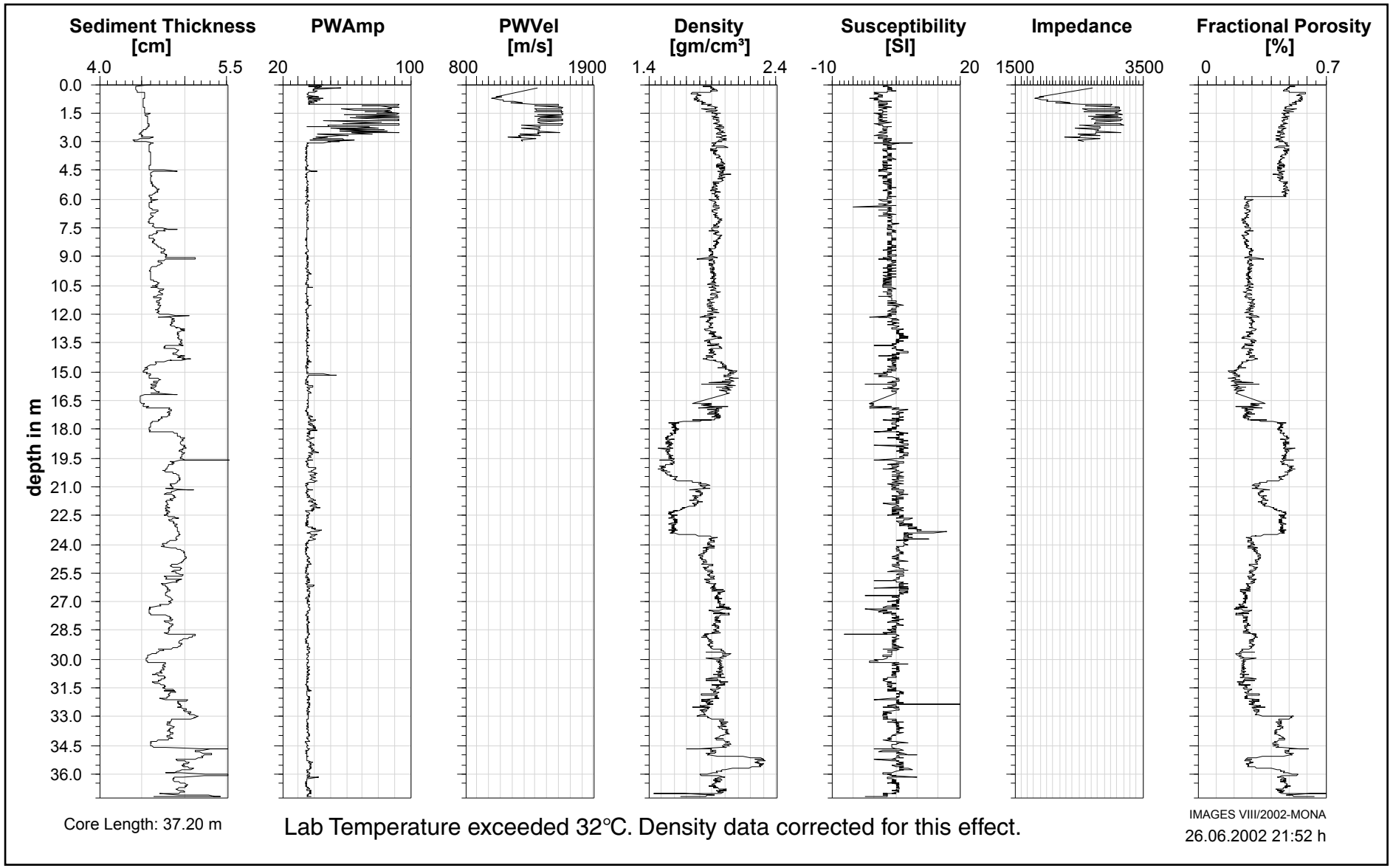
Station 25
Core MD02-2520



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 25
Core MD02-2520



Core Length: 37.20 m

Lab Temperature exceeded 32°C. Density data corrected for this effect.

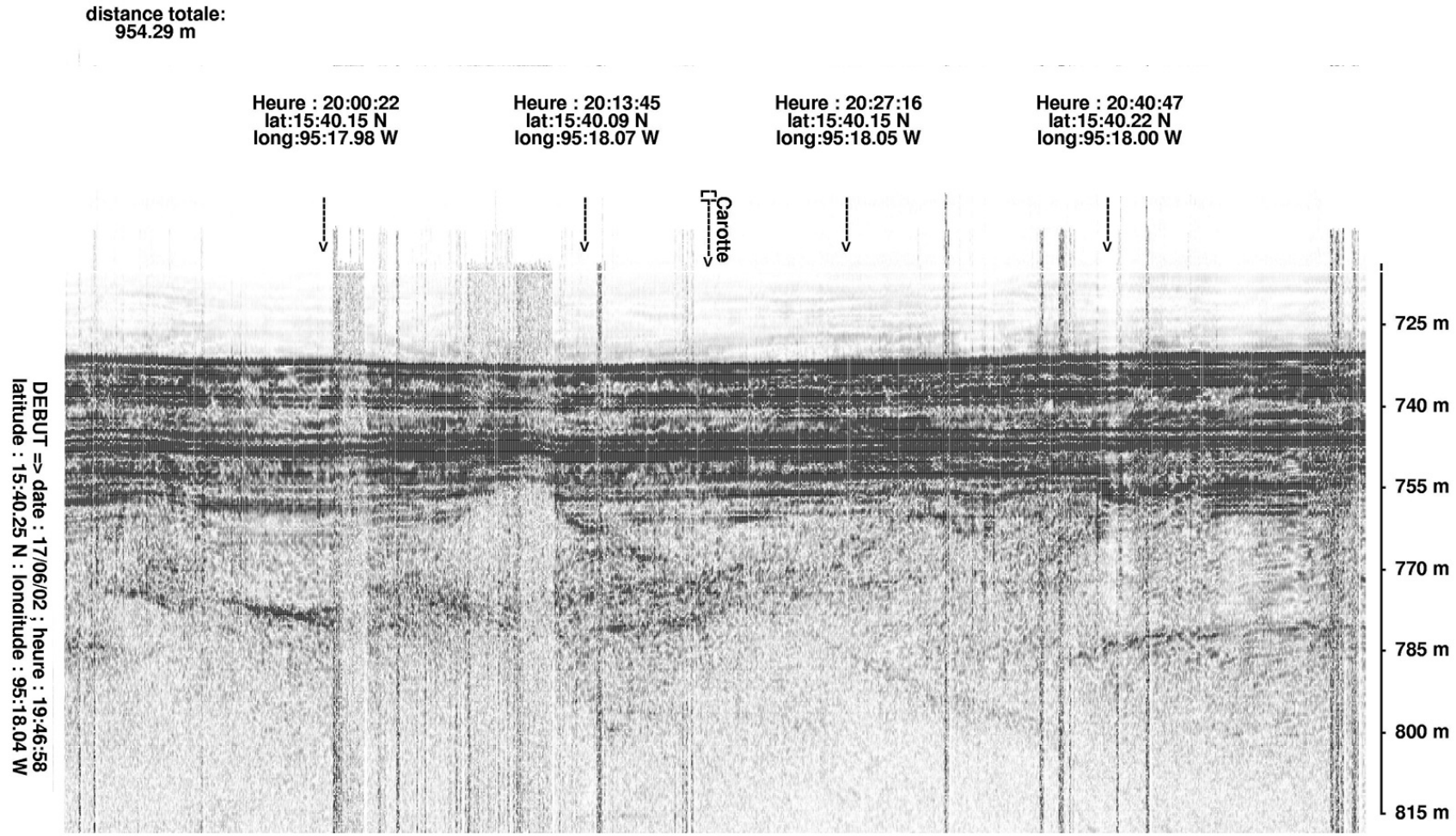
IMAGES VIII/2002-MONA
26.06.2002 21:52 h

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 25
Core MD02-2520
MD02-2521C2

MD02-2521C2 coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **17.06.2002**

N° de station : **25 Tehuantepec 1**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2521 C²

(MD - année - milles - centaines)

CAROTTE (longueur) :

5.80 m

POSITION :

Latitude : 015° 40.25 N

Longitude : 095° 18.00 W

CAROTTIER (type) (1) : CAROTTIER CARRE

Poids total (air) : t

Poids total (eau) : t

REGLAGES :

Tubes (longueur) : m

Câbles :
Chute libre : m

Boucle : m

LC poids : m

CONTREPOIDS :
Type (2) :

Longueur PVC : m

Pénétration : m

Longueur de carotte : m
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : m

Ligne filée : 718.70 m

Arrachement/total *(tonne)* : t

Arrachement/différentiel *(tonne)* : t

Pénétration/apparente *(m)* : m

Pénétration/tensiomètre *(m)* : m

HEURES (GMT)

En station : **Déjà en station**

Début manœuvre : **20:20**

Déclenchement : **20:48**

Fin de manœuvre : **?**

Durée de manœuvre :

Départ station : **?**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

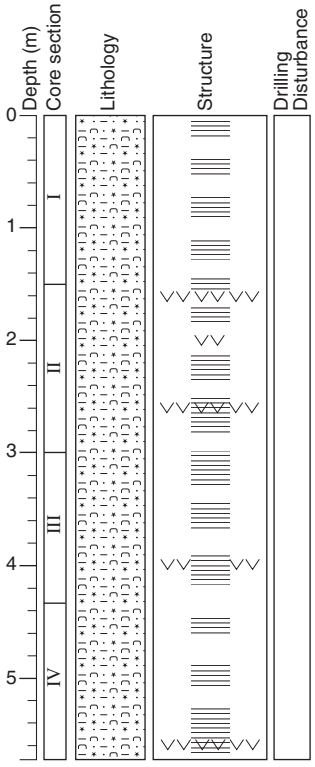
Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MONA

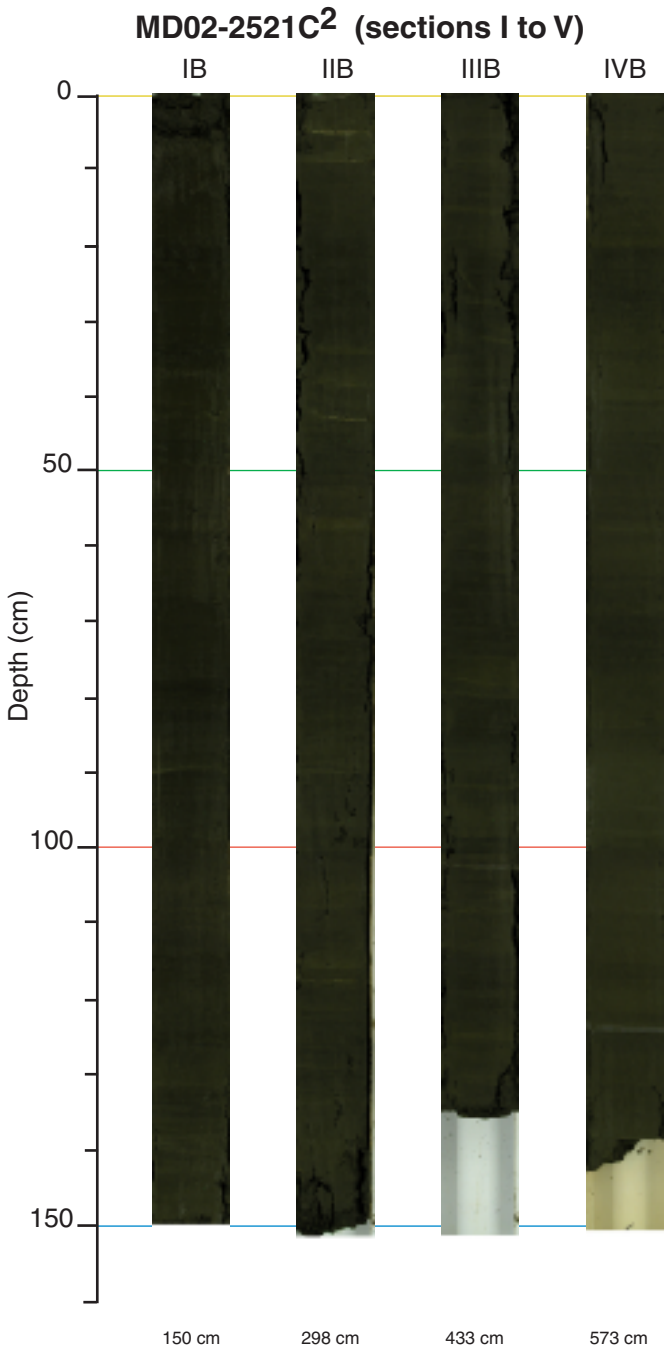
Core: MD02-2521c2



Comments

Alternating intervals of homogeneous olive grey silty clay with diatoms, nannofossils, foram fragments, sponge spicules, and organic material with very finely laminated dark olive grey silty clay. Some of the homogeneous intervals have a distinctly coarser base. Distinct bioturbation is rare. Pale olive to grey layers (<=1-cm thick) are clayey, altered volcanic ash.

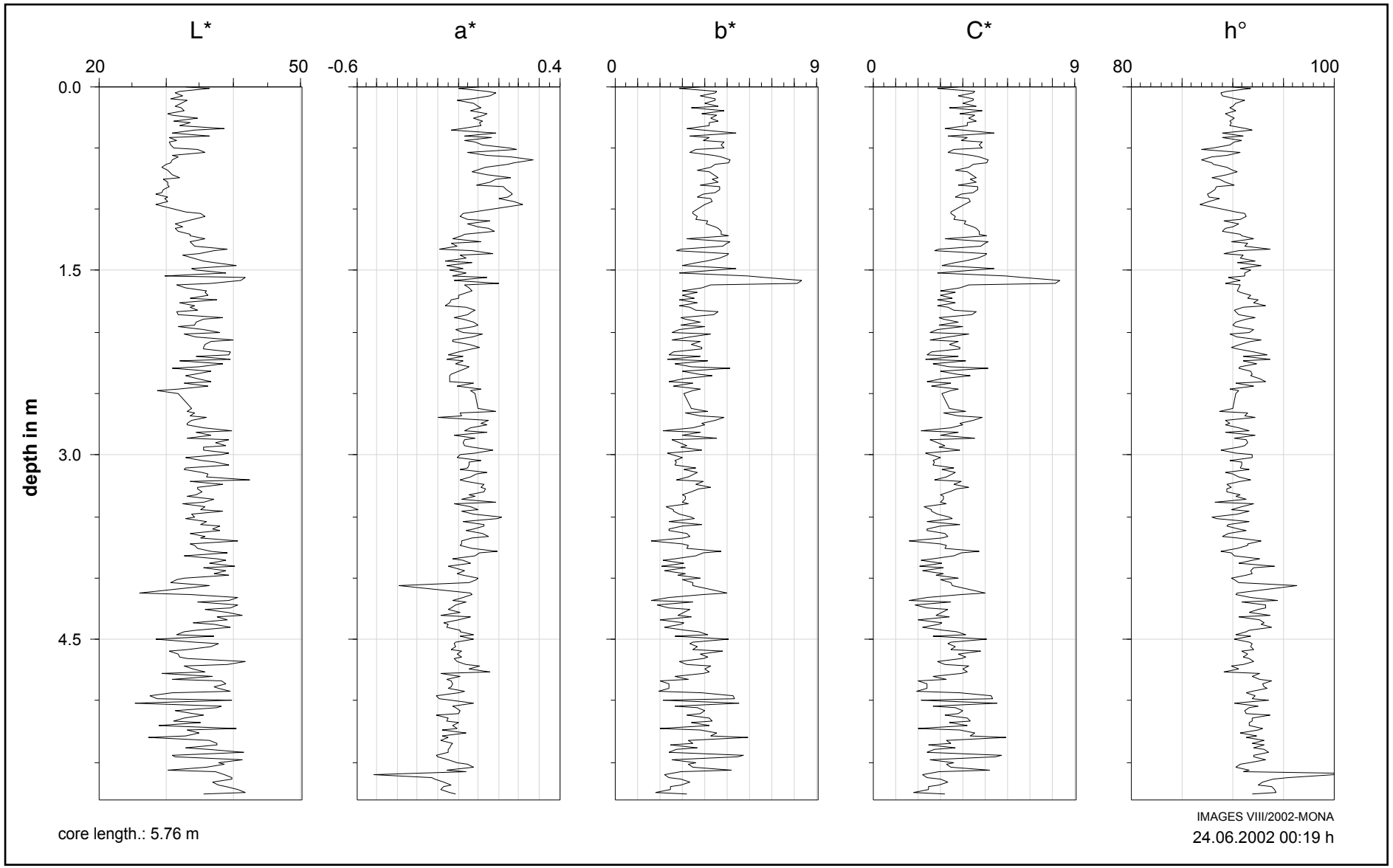
End of core, 575 cm.


MD02-2521C2 (sections I to V)
IB
IIB
IIIB
IVB
0
50
100
150
Depth (cm)
150 cm
298 cm
433 cm
573 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

Station 25
Core MD02-2521C²

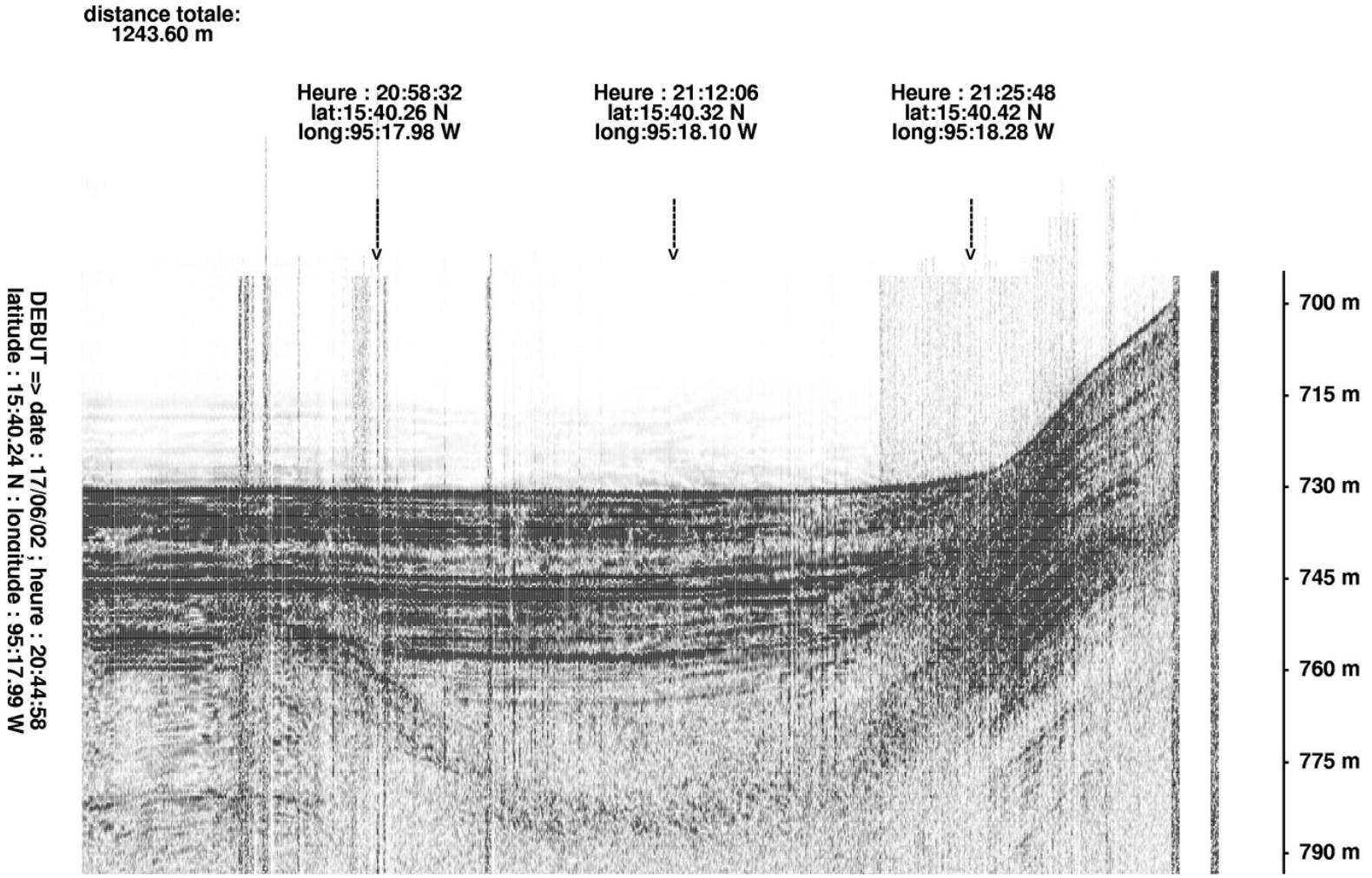


IMAGES VIII, 2002
MONA

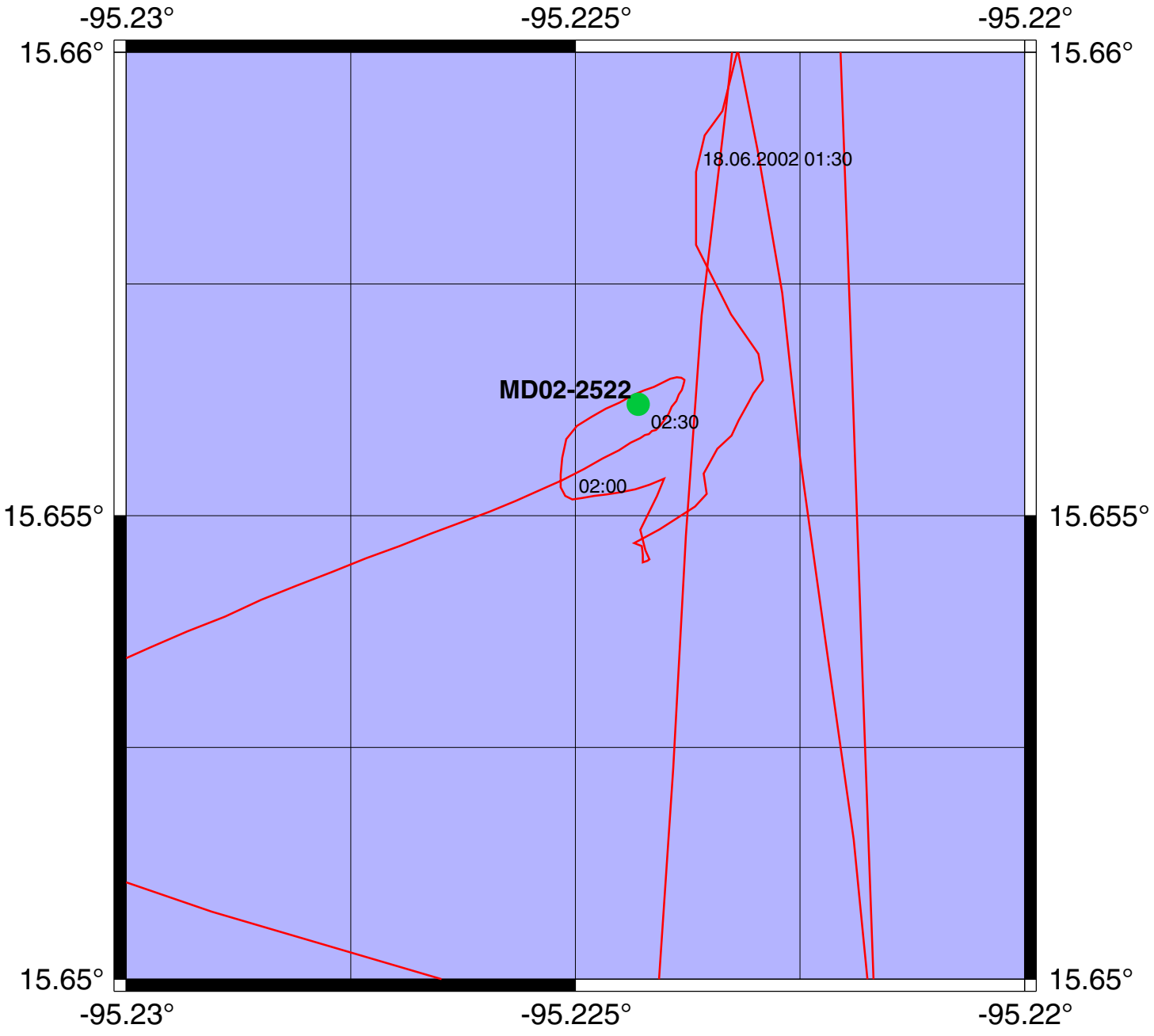
3.5 kHz Seismic Replay

Station 25
Core MD02-2520
MD02-2521C2

Station 25 , Departure



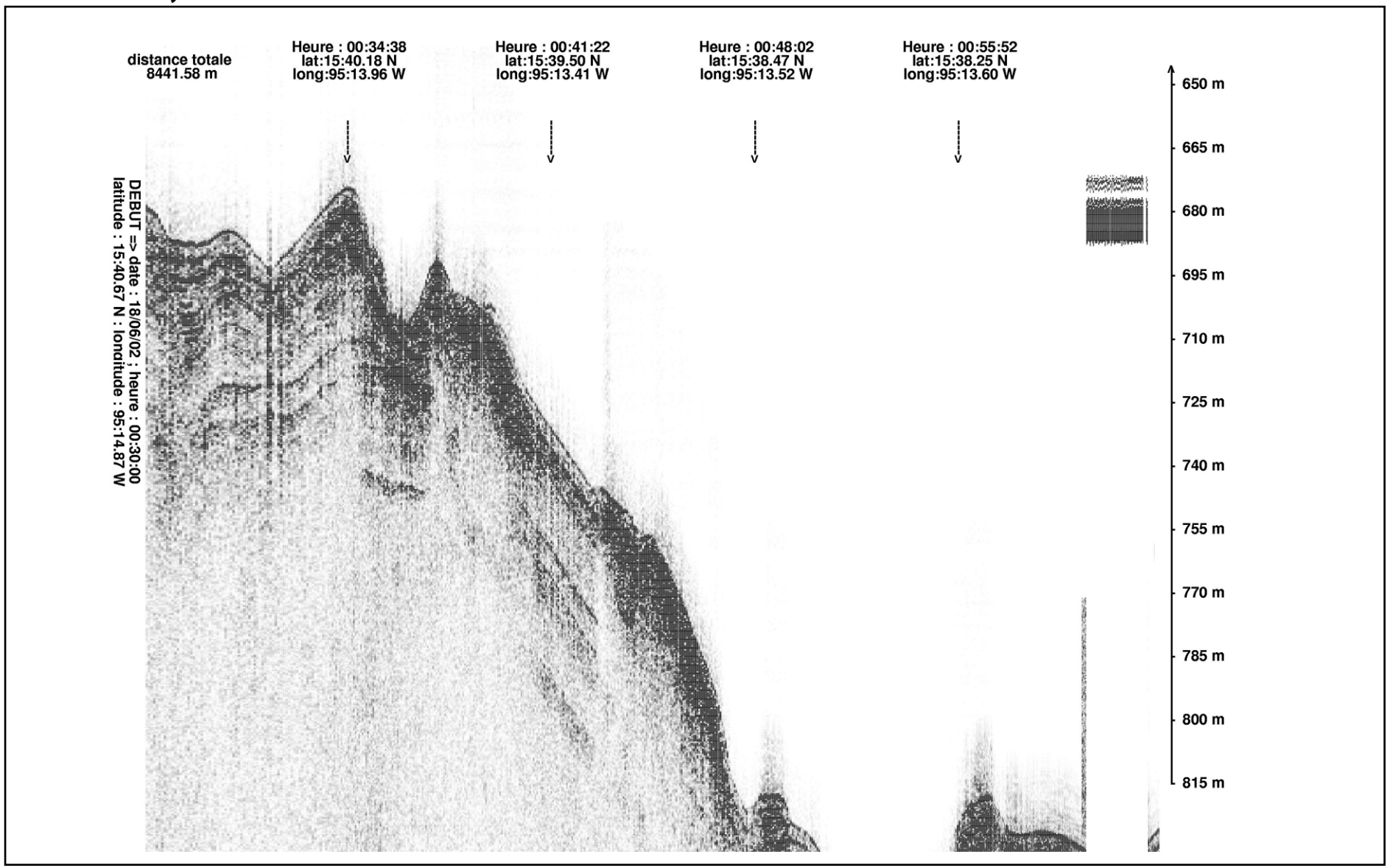
IMAGES VIII/MD126, Mona
Station 26 Tehuantepec 2



GMT 2002 Sep 26 12:14:04

3.5 kHz Seismic Replay

Station 26, Arrival to Station

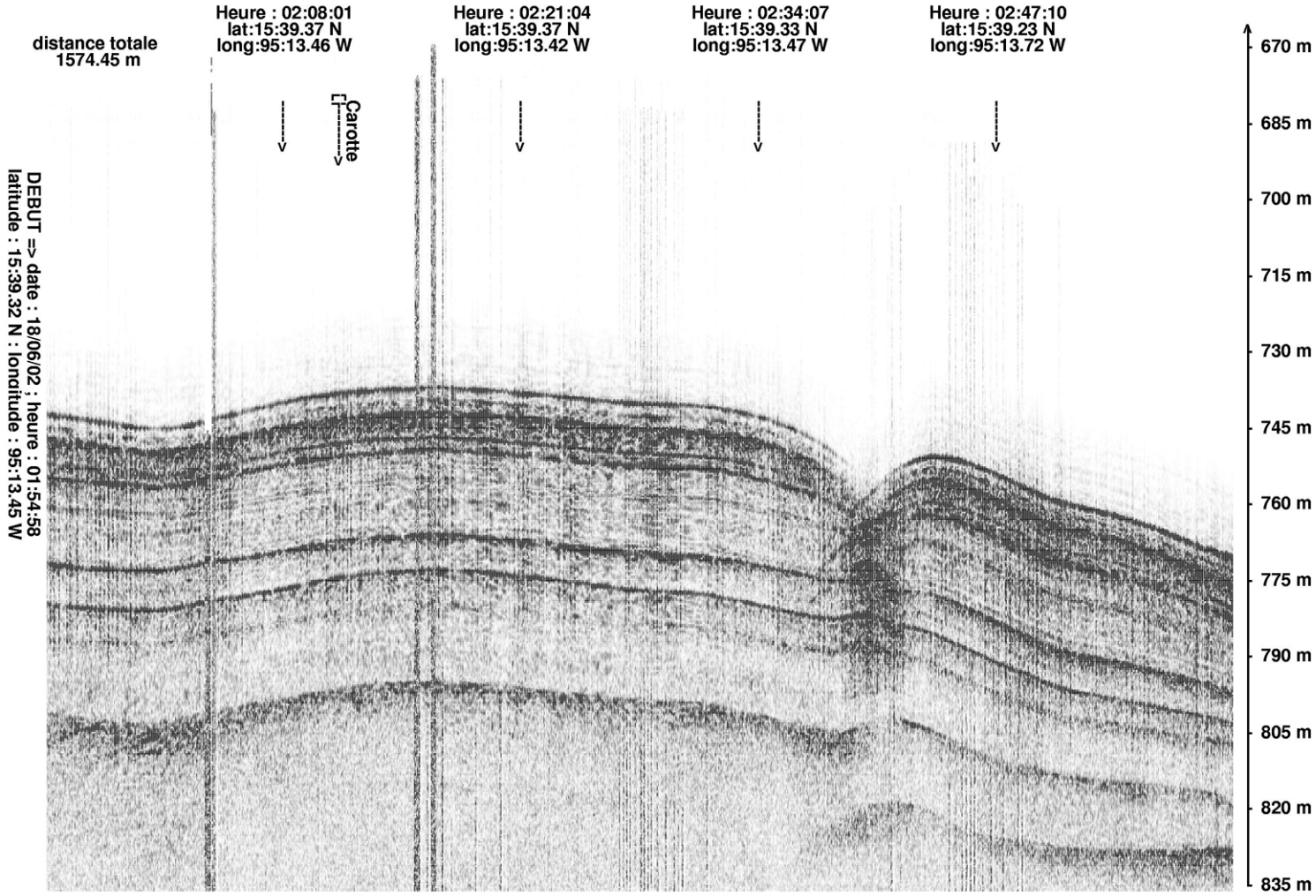


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 26
Core MD02-2522

Station 26,Coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **18.06.2002**

N° de station : **26 Tehuantepec 2**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2522

(MD - année - milles - centaines)

CAROTTE (longueur) :

36.74 m

POSITION :

Latitude : **15° 39.37 N**

Longitude : **095° 13.46 W**

CAROTTIER (type) (1) : **CALYPSO II**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **40.62** **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) : **Cylindre**

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **689.50** **m**

Ligne filée : **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **01:50**

Début manœuvre : **01:50**

Déclenchement : **02:11**

Fin de manœuvre : **02:57**

Durée de manœuvre : **01:07**

Départ station : **02:57**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents : **1 section extruded at 2532 cm : about 120 cm**

end of the core : 3674 cm

0	150	300	450	600	750	900	1050
I	II	III	IV	V	VI	VII	

1050	1200	1350	1500	1650	1800	1950	2100
VIII	IX	X	XI	XII	XIII	XIV	
					56 ⊠ 87		

2100	2250	2400	2532	2650	2800	2950	3100
XV	XVI	XVII	XVIII	XIX	XX	XXI	
56 ⊠ 68		40 ⊠ 57 ⊠					

3100	3250	3400	3550	3674
XXII	XXIII	XXIV	XXV	
			124	

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2522

(Station 26, Tehuantepec 2 ; Latitude : 15° 39. 37N ; Longitude : 95° 13. 46W ; 690m water depth) has recovered a total of 36.74m of sediment. The interval between 17.20m (Section XII) and 25.00m (Section XVII) has been locally disturbed by coring and contains some empty intervals, up to 0.40m long. During opening operations on the deck, 1.45m of sediment was extruded from the top of Section XVIII.

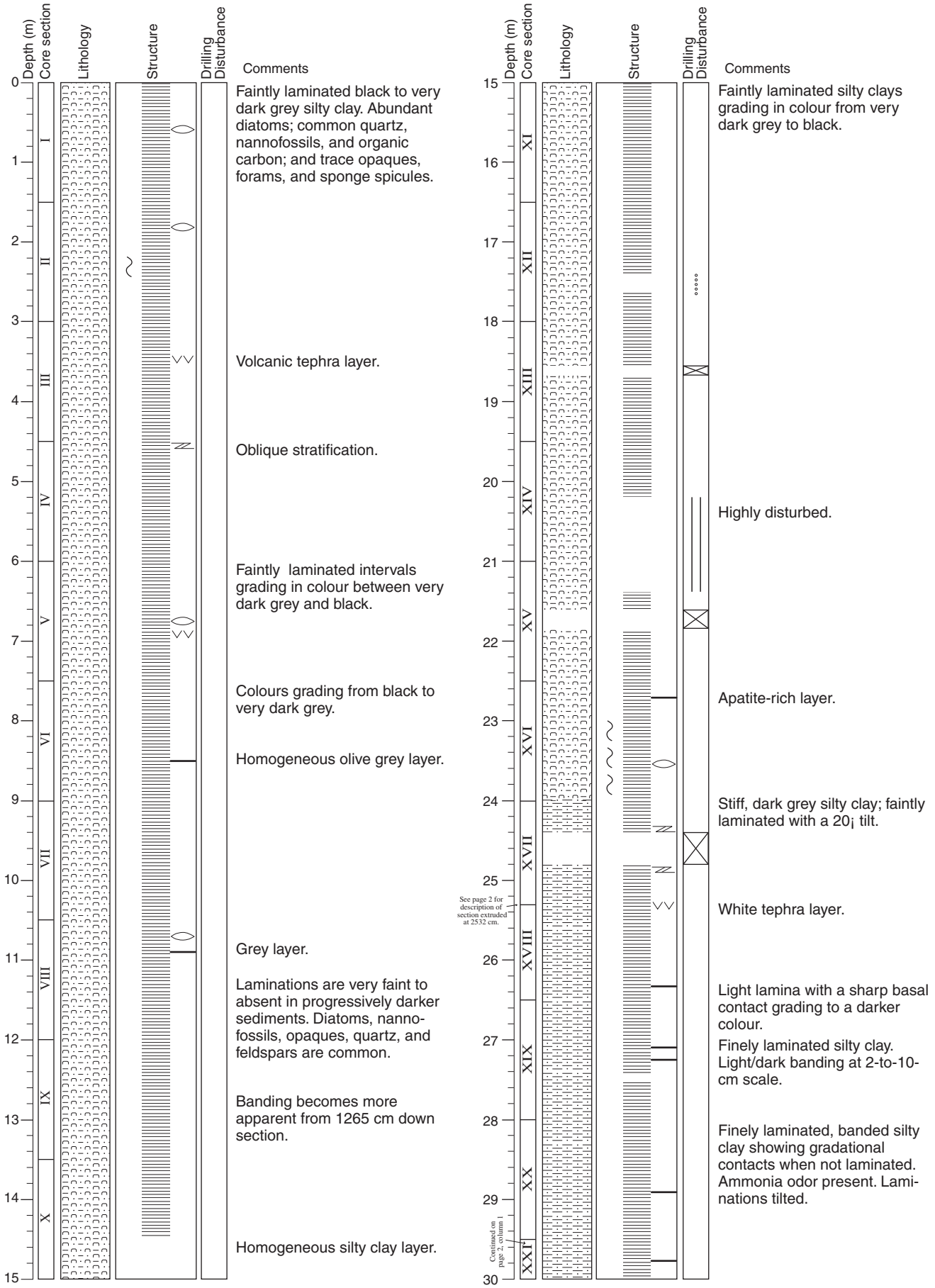
The dominant sediment consists of silty clay. Its color ranges from olive grey and dark olive grey to very dark grey and black.

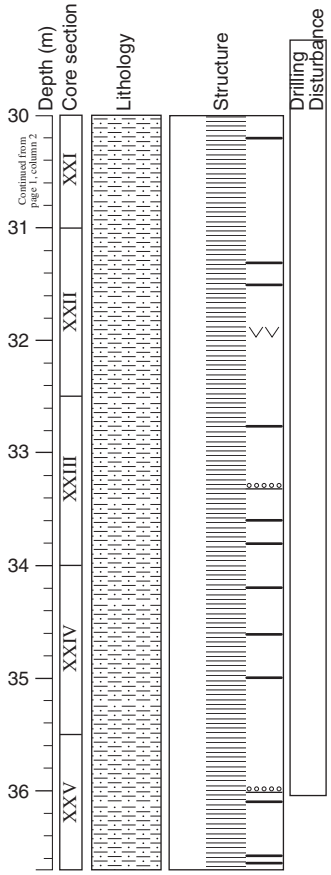
The sediment is continuously laminated throughout the core, with the exception of a few massive intervals generally associated to some core disturbance. Some intervals show an oblique stratification, at 4.60m (Section IV), and from 24.20m to 25.00m (Section XVII). A thicker banding is sometimes superposed to the laminations. Isolated layers of very light or dark colors are present below 22.70m (Section XVI). Turbidite intervals are recorded at 33.30m (Section XXIII) and 36.00m (Section XXV).

Minor lithology includes :
- White to grey tephra layers, throughout the core.

MONA

Core: MD02-2522





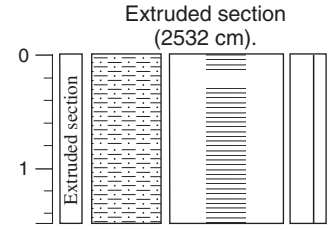
Comments

Faintly laminated and indurated olive to grey silty clay. Some changes in colour with depth. Homogeneous layers are darker in colour and less than 1-cm thick.

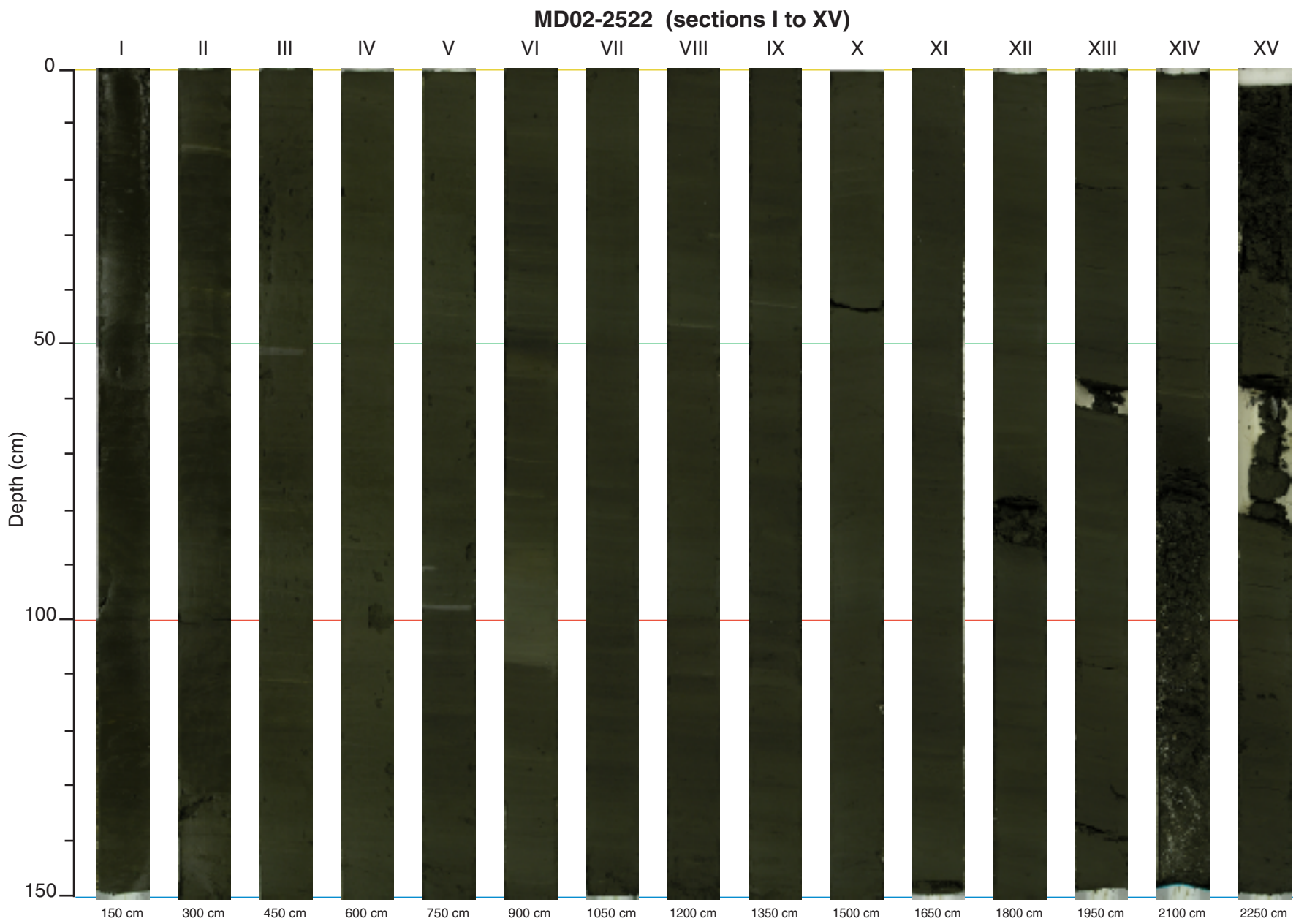
3272 to 3327 cm: 3-mm-thick olive grey laminae with sharp contacts.
3327 cm: 3-mm-thick grey, sandy turbidite; no sharp contacts.
3360 cm: 'remarkable', 1-cm-thick grey layer that thickens in one direction.

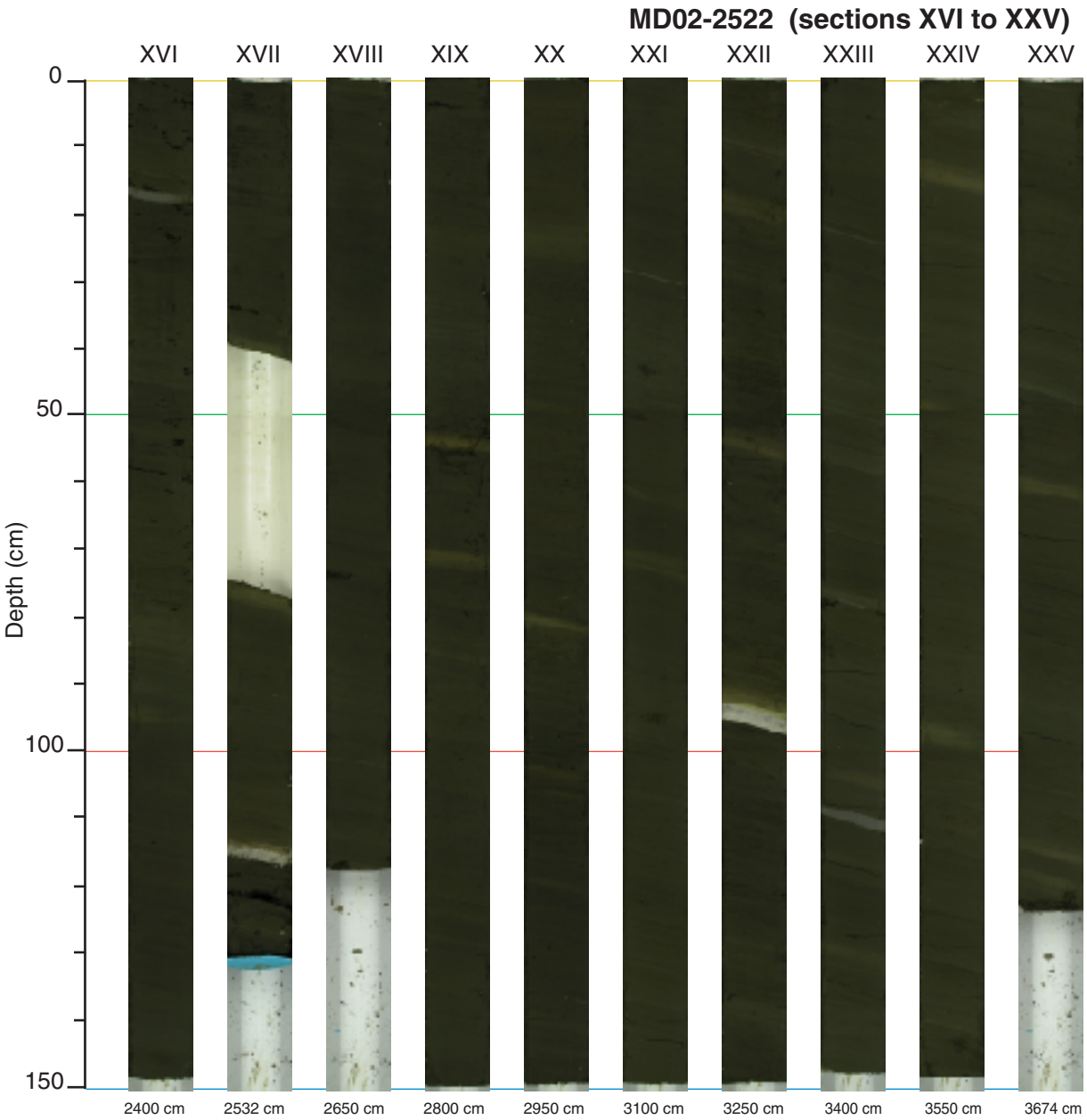
Alternating banding between darker and lighter colours and laminated and homogeneous intervals.

End of core, 3674 cm.



Eight-piece extrusion that appears to alternate between faintly laminated and homogeneous.

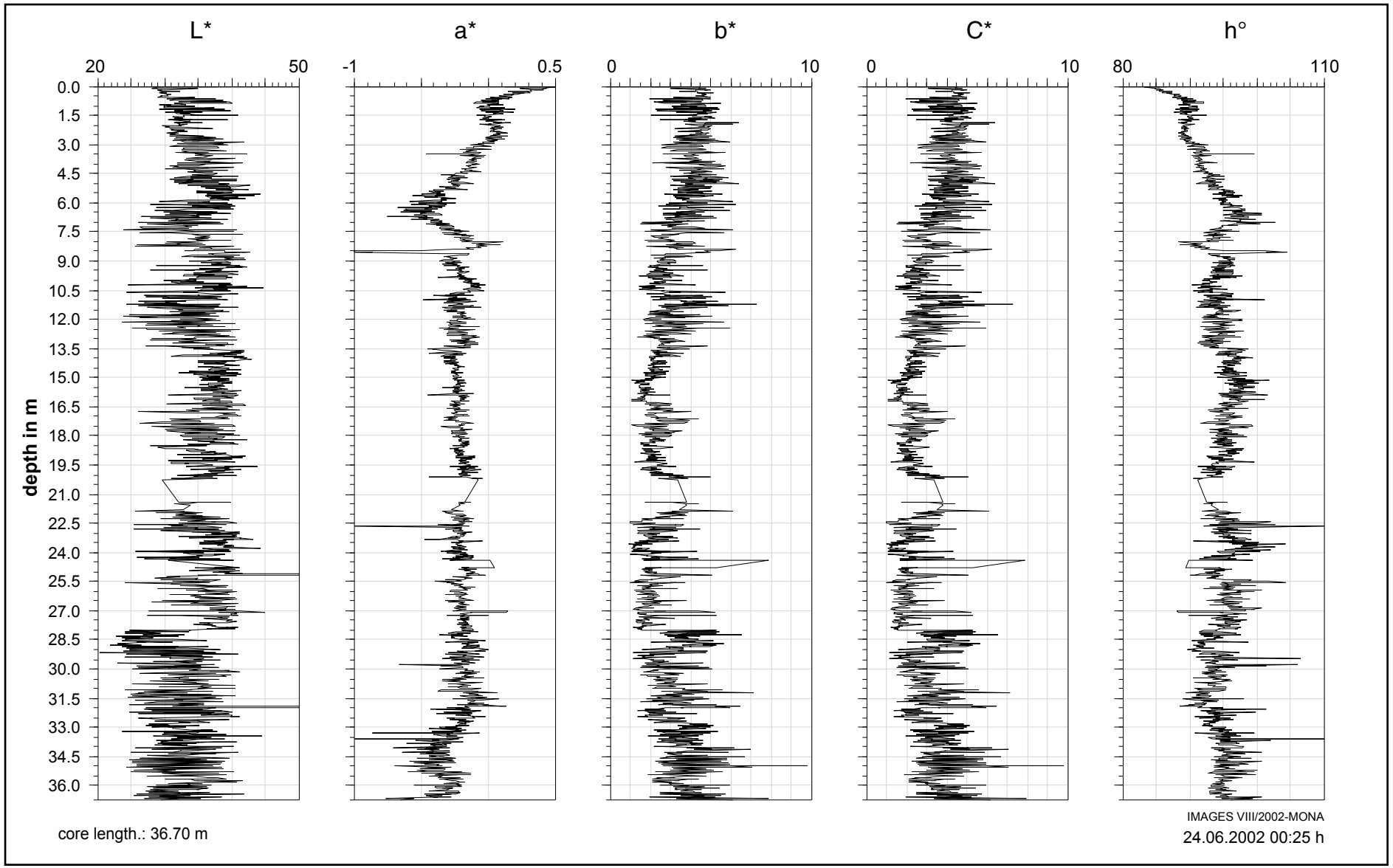

MD02-2522 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2522 (sections XVI to XXV)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
0
50
100
150
Depth (cm)
2400 cm
2532 cm
2650 cm
2800 cm
2950 cm
3100 cm
3250 cm
3400 cm
3550 cm
3674 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

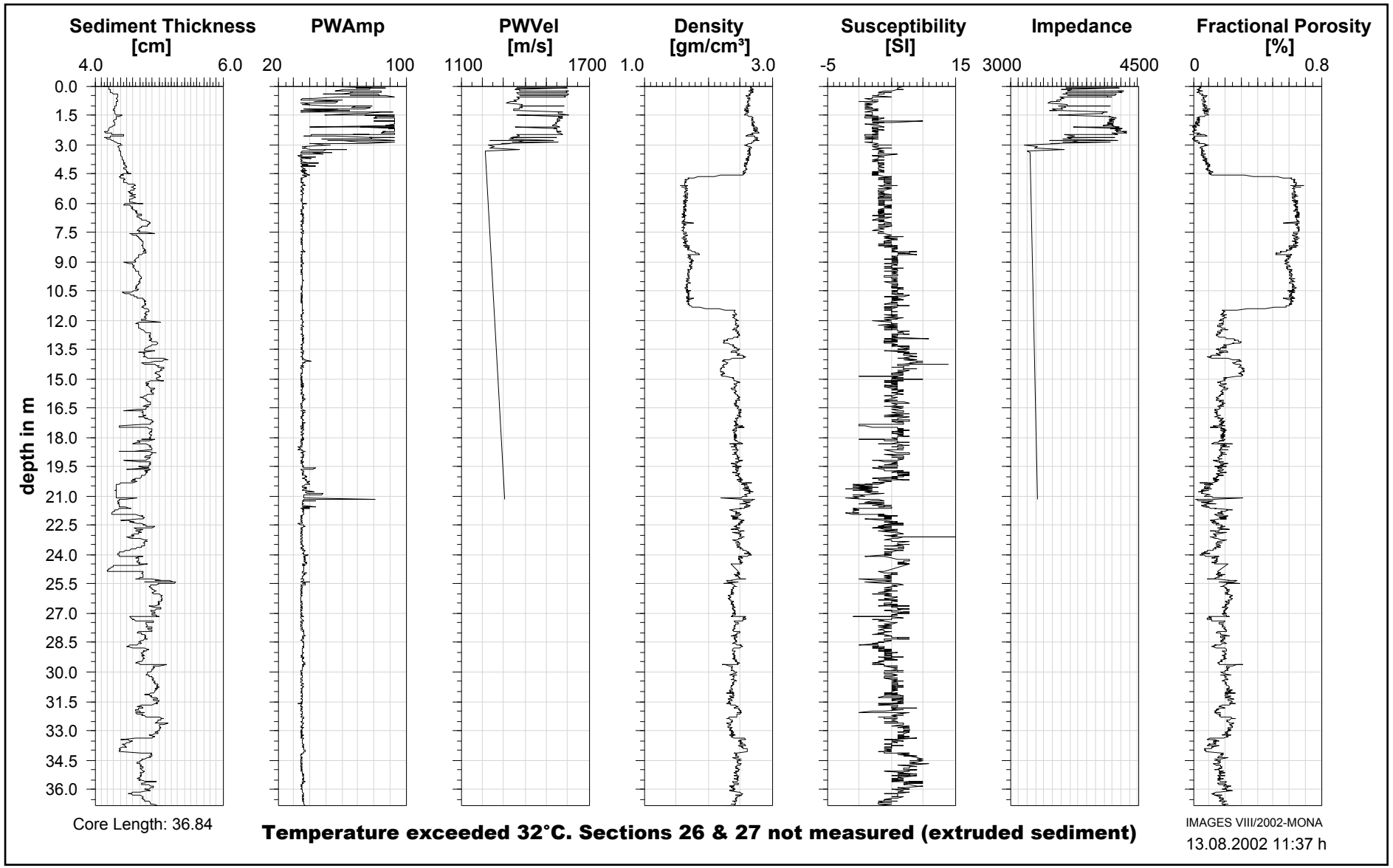
Station 26
Core MD02-2522



IMAGES VIII, 2002
MONA

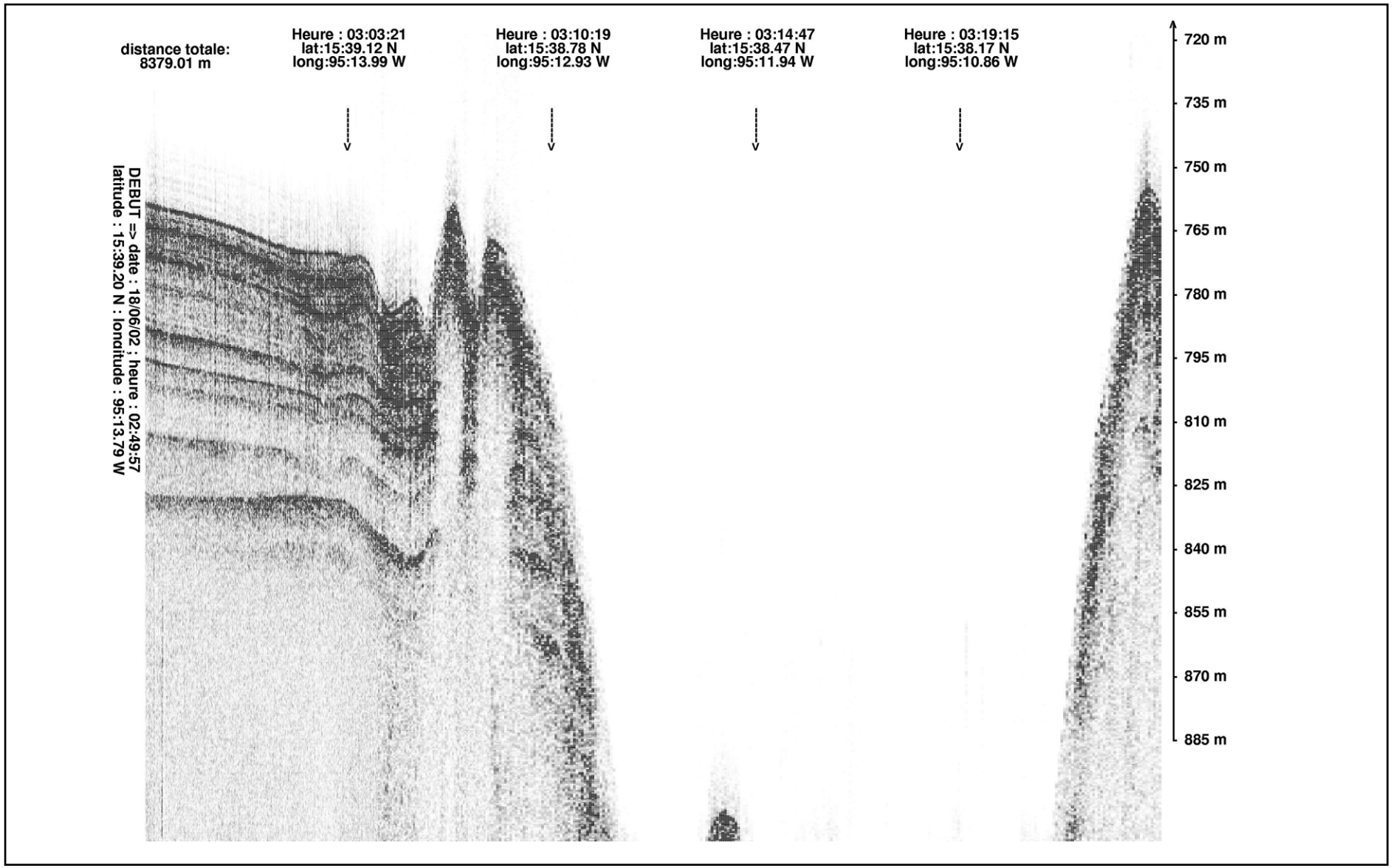
Multi Sensor Core Logger

Station 26
Core MD02-2522

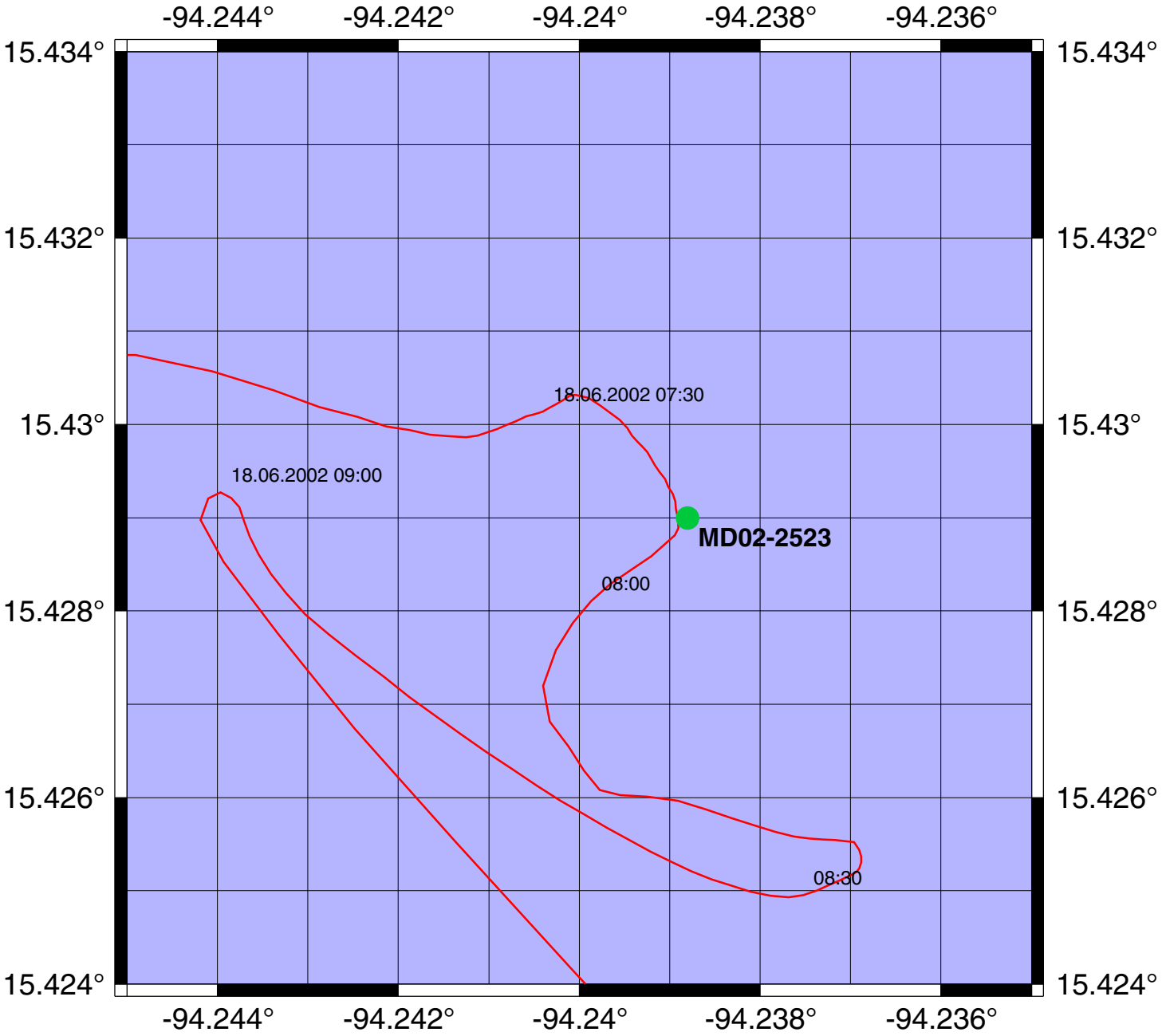


3.5 kHz Seismic Replay

Station 26 , Depature from Station



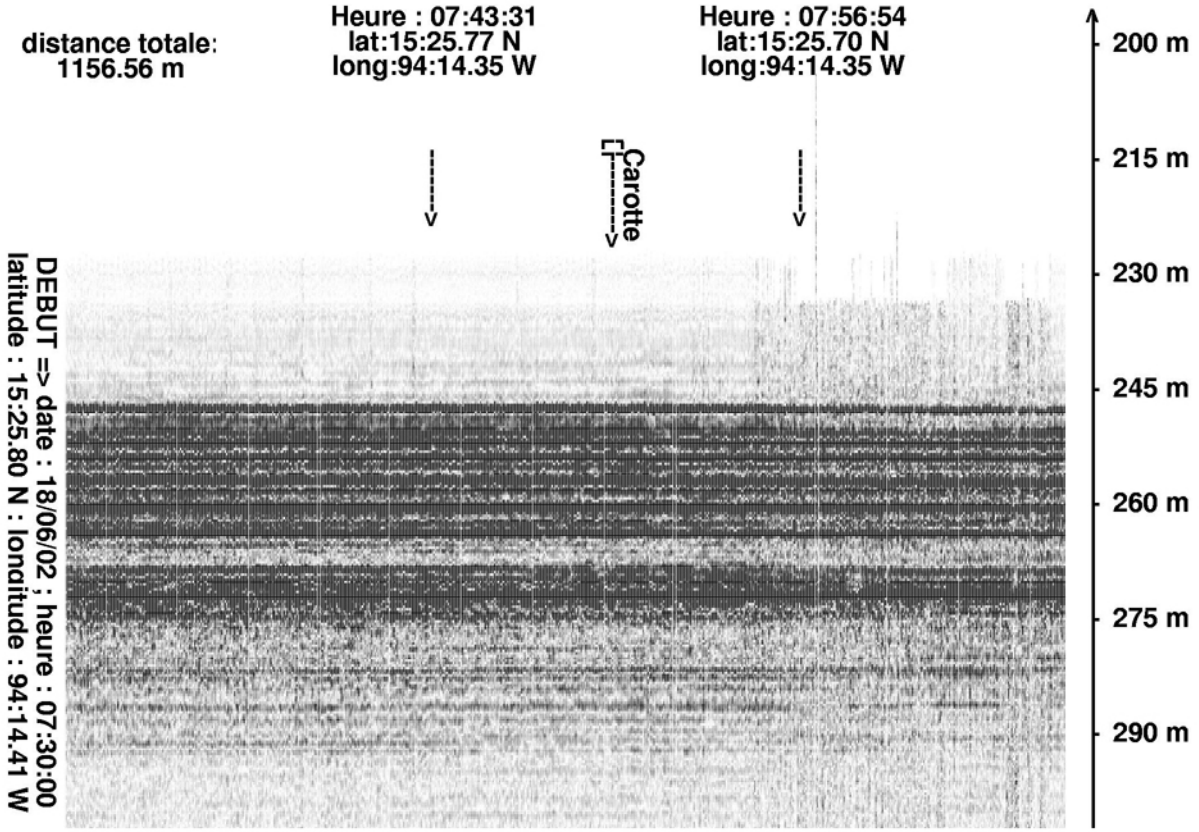
IMAGES VIII/MD126, Mona
Station 27 Tehuantepec 3



GMT 2002 Sep 26 12:15:15

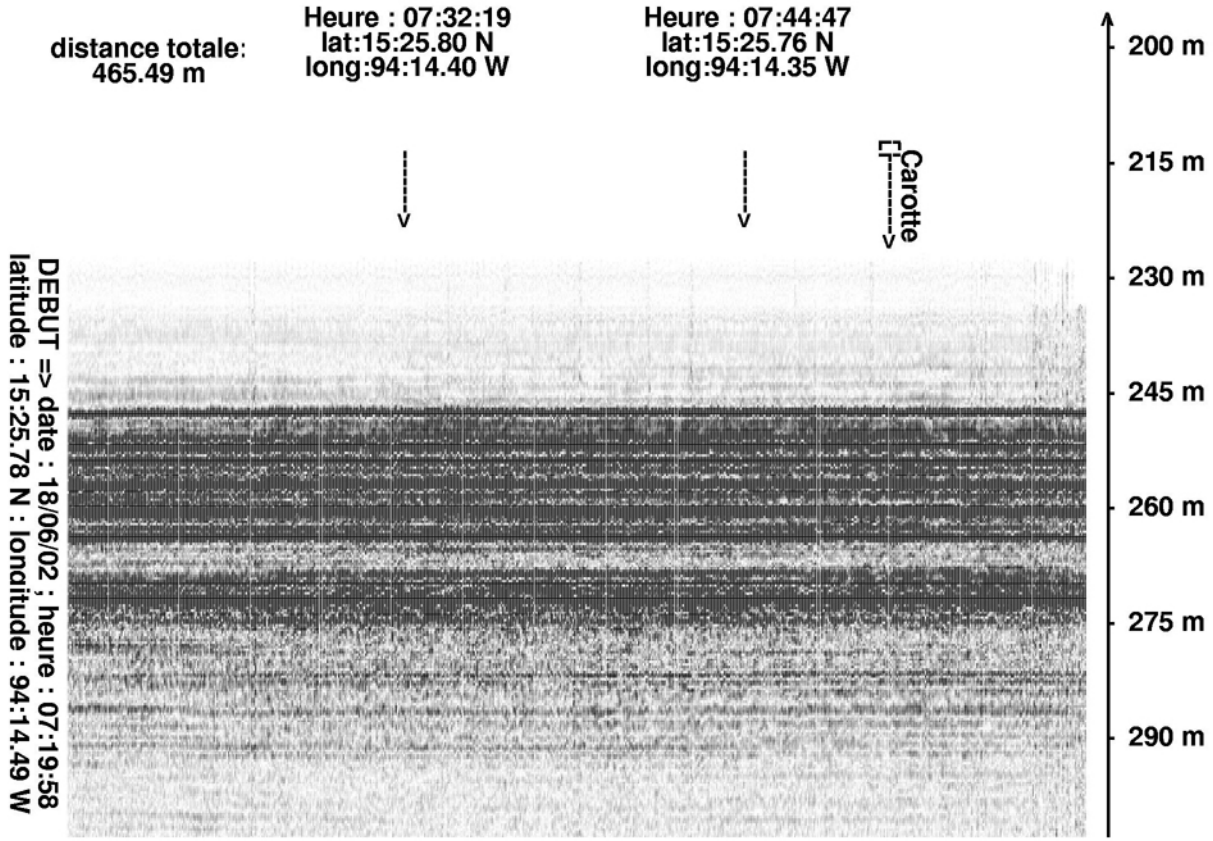
3.5 kHz Seismic Replay

MD02-2523 Coring Operation



3.5 kHz Seismic Replay

MD02-2523 Coring Operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **18.06.2002**

N° de station : **27 Tehuantepec 3**

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2523

(MD - année - milles - centaines)

CAROTTE (longueur) :

24.74 m

POSITION :

Latitude : **015° 25.74 N**

Longitude : **094° 14.33 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **202** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **07:30**

Début manœuvre : **07:45**

Déclenchement : **07:50**

Fin de manœuvre : **09:00**

Durée de manœuvre : **01:15**

Départ station : **09:00**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2523

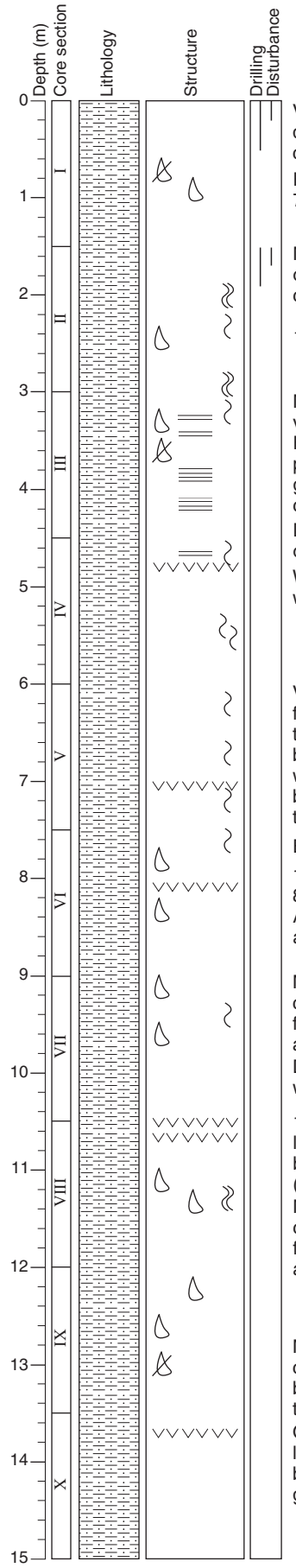
(Station 27, Tehuantepec 3 ; Latitude : 15° 25. 74N ; Longitude : 94° 14. 33W ; 202m water depth) has recovered a total of 18.20m of sediment. The upper part of the sediment has been disturbed, down to 2.00m (Section II).

The dominant sediment consists of silty clay, enriched in bituminous components in the lower part of the core below 15.00m (Section XI). The colors range from olive grey and dark olive grey to very dark grey and black. The sediment is mostly bioturbated, with some shell fragments, throughout the core. However, a short interval of lighter and darker bands, up to 8cm thick, is observed from 3.20m (Section III) to 4.70m (Section IV).

Minor lithologies include :
- Light grey to grey, and olive to dark olive ash layers, from 4.80m (Section IV) to 13.74m (Section X).
- Nannofossil-foraminifer ooze, very dark grey, in Section V.

MONA

Core: MD02-2523



Comments

Very homogeneous, very soft dark grey to very dark grey silty clay. Soupy at the top.

Forams and shell fragments at 70 and 80 cm.

Massive, maybe 'sandy' dark olive grey to olive grey silty clay.

1-cm shell at 241 cm.

Massive, dark olive grey to very dark grey silty clay. Forams and nannofossils present. Dark bands with both gradual and sharp (8-cm thick) contacts.

Dark olive grey to black silty ooze with nannofossils.

Whitish to light grey ash layer with bioturbated top at 480 cm.

Very dark grey nannofossil-foram ooze with some terrigenous grains. Light grey, banded 3-cm-thick ash layer with a sharp contact at the base and a gradual contact at the top.

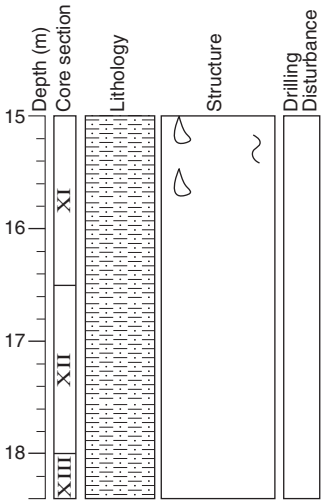
Bioturbation common.

1-cm bivalve shells from 785 to 825 cm.
Ash layer with bioturbated top and whitish bottom.

Mottled, dark olive grey silty clay with nannofossils and forams, terrigenous grains, and ash particles.
Dark olive grey silty clay mixed with olive grey ash.

1050 to 1070 cm: grey ash layer with a graded top and a base with angular grains (turbidite?).
Mottled, dark olive grey silty clay with nannofossils and forams, terrigenous grains, and ash particles.

Mottled, dark grey to black silty clay with nannofossils, forams, bituminous diatoms, and terrigenous grains.
Olive to dark olive grey ash layer with a coarse-grained base and a top with mixed grading at 1374 cm.

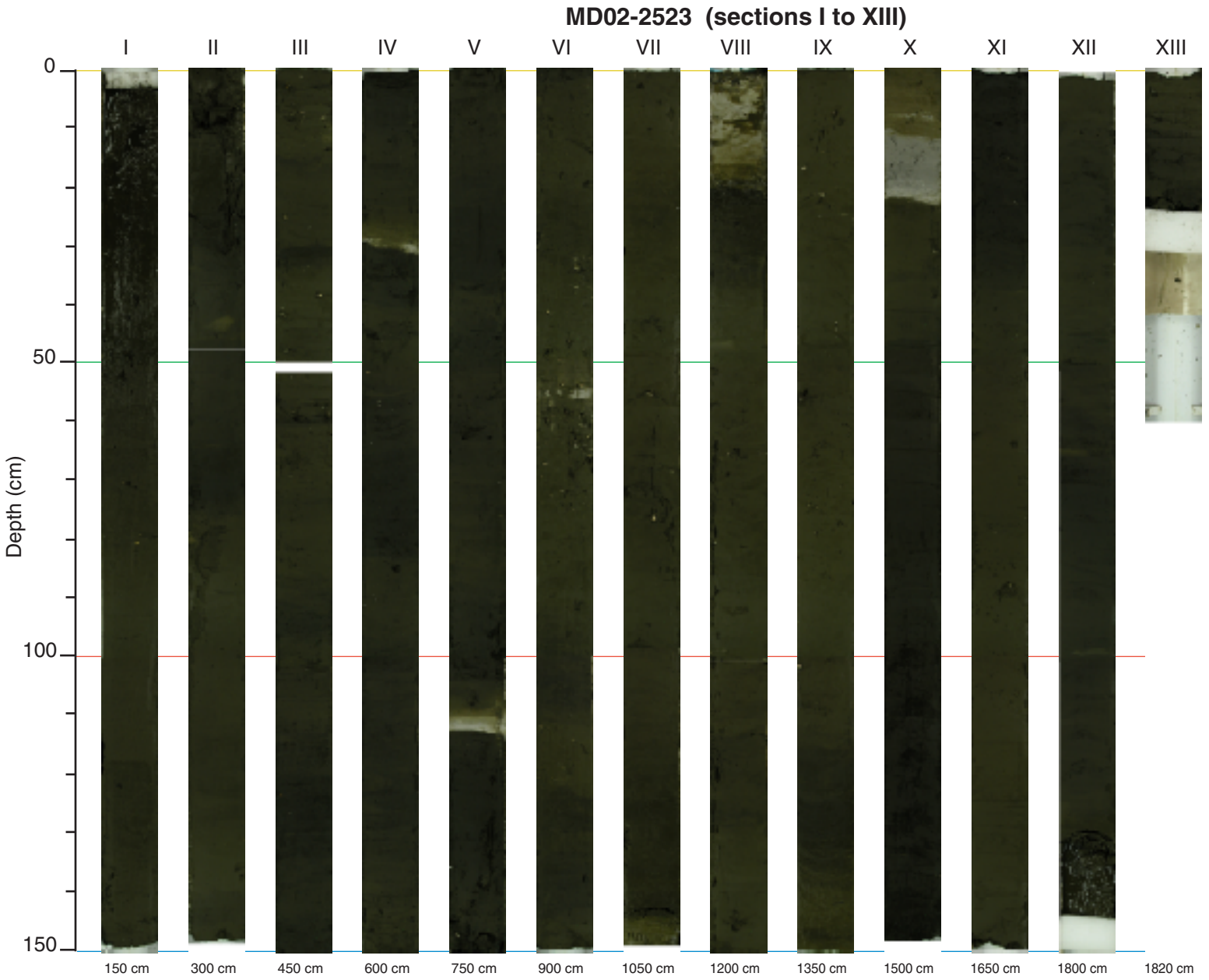


Comments

Homogeneous to mottled black to dark olive grey bituminous silty clay; bioturbated and organic rich. Diatoms present.

Mottled, very dark grey silty clay with diatoms, forams, and nannofossils.

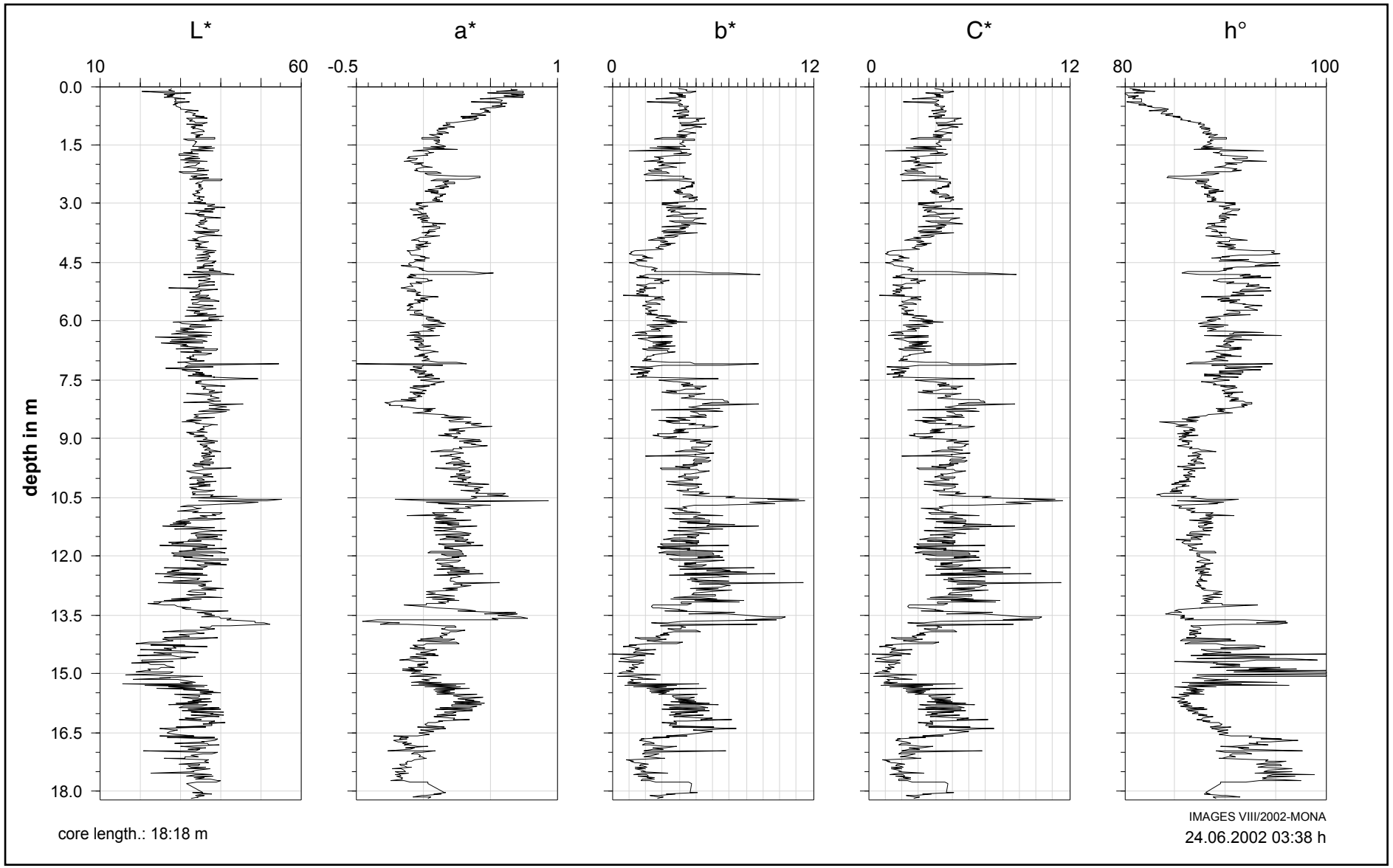
Very dark grey silty clay with diatoms. Possibly bituminous.
End of core, 1820 cm.


MD02-2523 (sections I to XIII)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1820 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

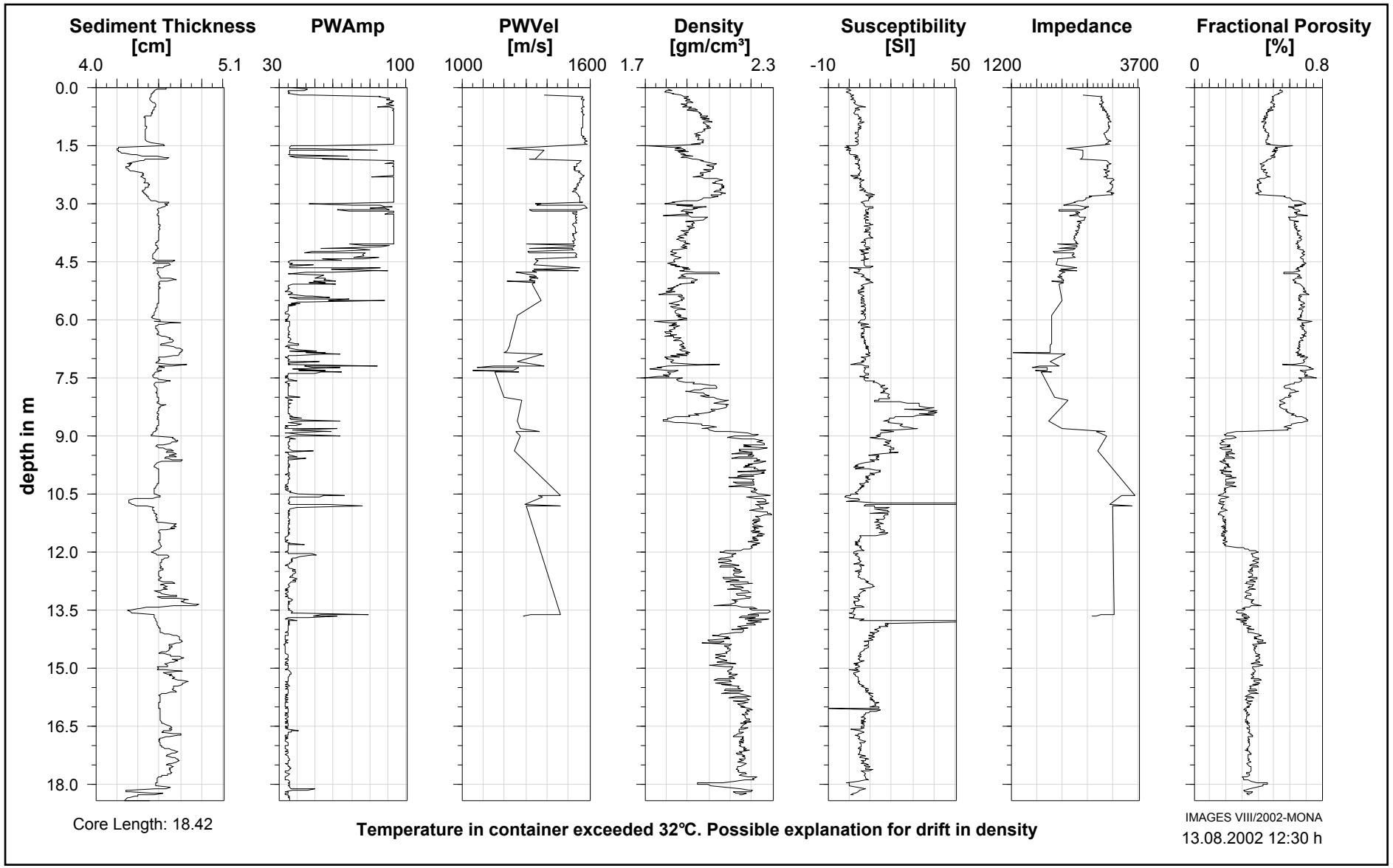
Station 27
Core MD02-2523



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 27
Core MD02-2523



4.6 Central American Margin

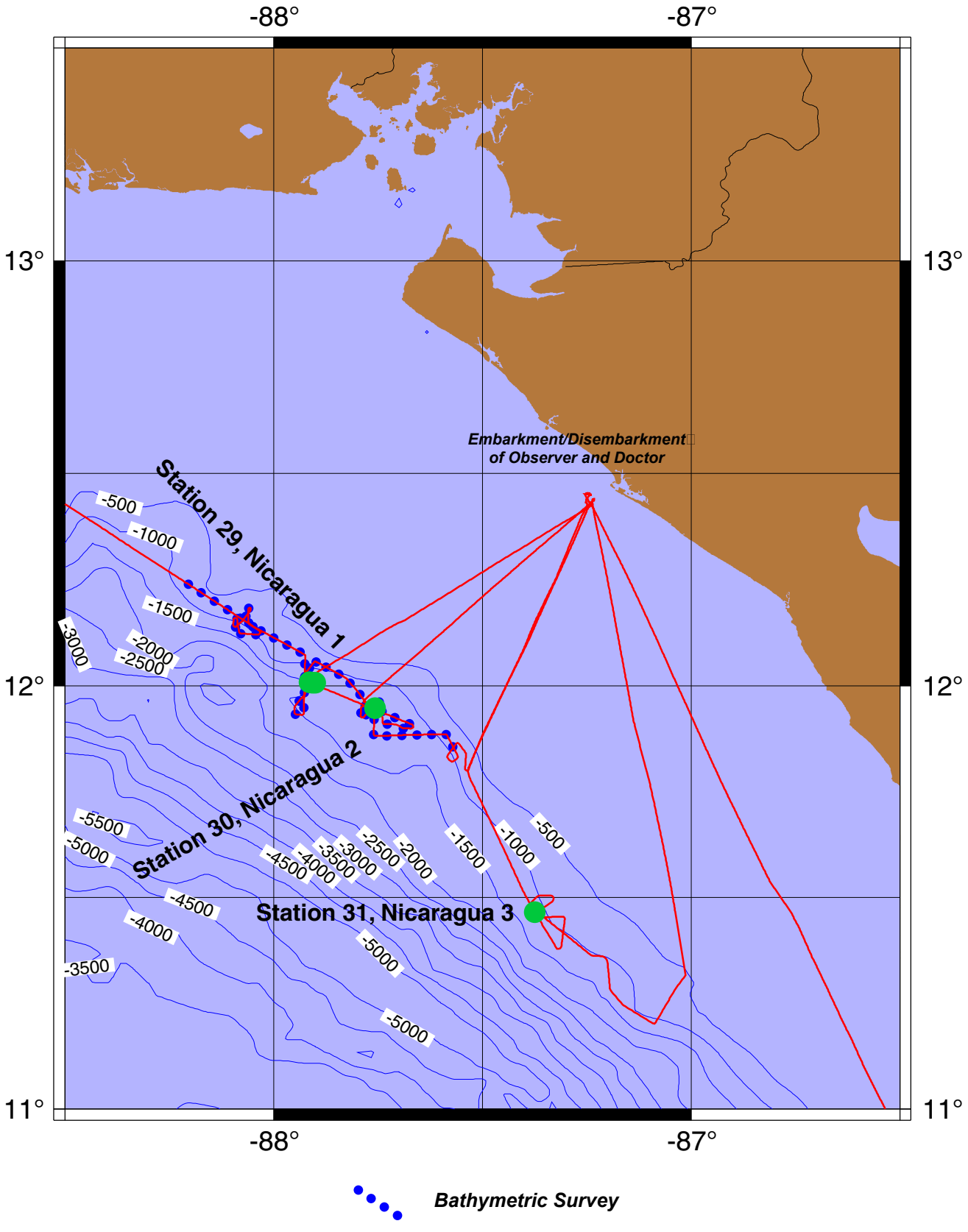
The Nicaragua margin is the southern most upwelling cell in the North American Margin. It corresponds also to the oceanic response to strong seasonal winds crossing the continent. Equivalent setting to Tehuantepec is excepted to be found here and the scientific objectives are also close. The difference is that here we did not have any information from previous cruises. We did an extensive survey of the Nicaragua margin. We found that deep canyons continuously cut the slope. Only three areas appeared suitable for coring (figure Bathymetry). The operations were stopped twice by urgent returns to Nicaragua for severe medical reasons. In the first of these three areas we took three cores. The first one (MD02-2524) appeared to be excellent, but the barrel was short. We tried to retrieve a longer core. but a technical problem appeared preventing us to do longer (MD02-2526). That explains why we took 2 cores of the same length at the same site. The third one was a CASQ (Calypso square MD02-2525C²). These three cores show laminations. These laminations are tilted between 1 and 3m, implying some sort of sliding, which is not surprising, knowing that the site is on a slope close to a canyon.

The two other sites on the Nicaragua margin went perfectly well.

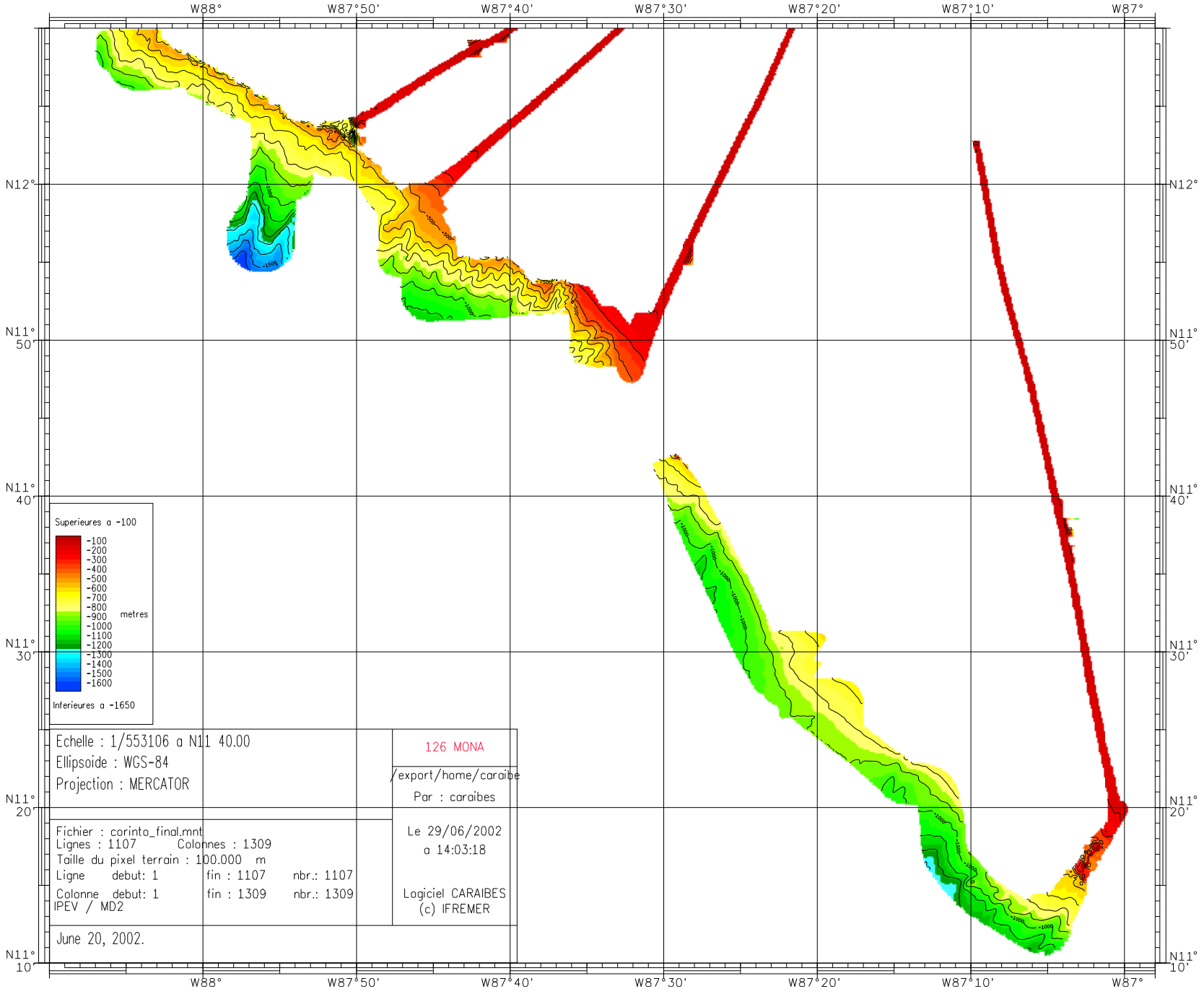
We took cores on Cocos and Coïba ridges. These location are lower productive area and at a much deeper depth. The idea was to get a more oligotrophic record and to retrieve core spanning several climatic cycles. The preliminary data on the two cores taken (MD02-2529 and -2530) indicate that the cores have sedimentation rates higher that expected, and that we may have record only 2 cycles.

On Panama gulf we had to do a long survey (6 hours) to find a good position for coring. The sismic data were not suggesting good enough sediment to try directly a long Calypso core. Therefore we took a CASQ. The sediment retrieved in the CASQ appeared excellent for studying with precision the Holocene. .Unfortunately, we did not have enough time to do CALYPSO coring, before reaching Panama.

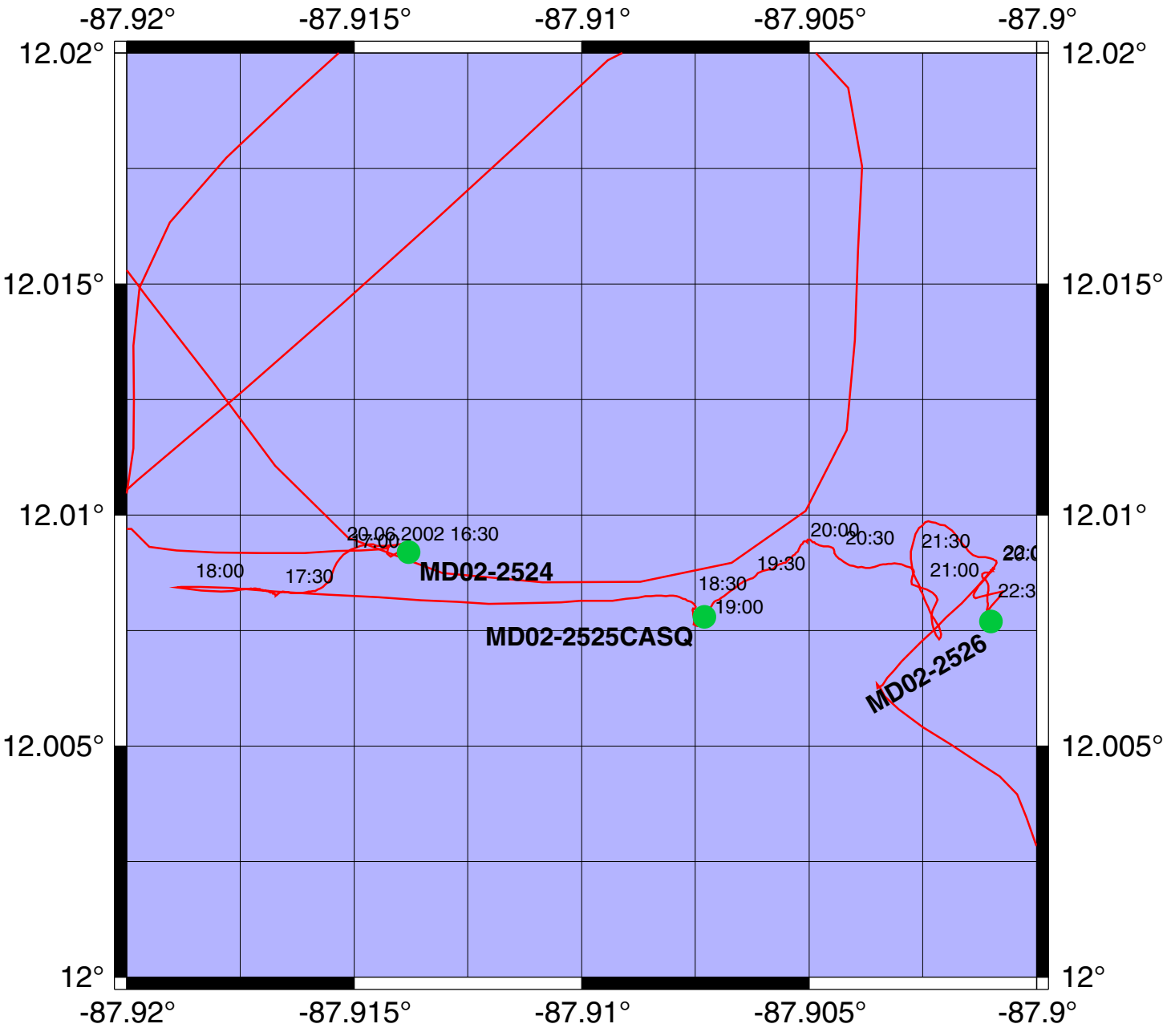
IMAGES VIII/MD126, Mona
Nicaragua 1 - 3



GMT 2002 Sep 26 12:17:48


W88°
W87°50'
W87°40'
W87°30'
W87°20'
W87°10'
W87°
N12°
N11° 50'
N11° 40'
N11° 30'
N11° 20'
N11° 10'
Superieures a -100
-100
-200
-300
-400
-500
-600
-700
-800
-900
-1000
-1100
-1200
-1300
-1400
-1500
-1600
metres
Inferieures a -1650
Echelle : 1/553106 a N11 40.00
Ellipsoide : WGS-84
Projection : MERCATOR
126 MONA
/export/home/caraibe
Par : caraibes
Le 29/06/2002
a 14:03:18
Logiciel CARAIBES
(c) IFREMER
Fichier : corinto_final.mnt
Lignes : 1107 Colonnes : 1309
Taille du pixel terrain : 100.000 m
Ligne debut: 1 fin : 1107 nbr.: 1107
Colonne debut: 1 fin : 1309 nbr.: 1309
IPEV / MD2
June 20, 2002.

IMAGES VIII/MD126, Mona
Station 29 Nicaragua 1



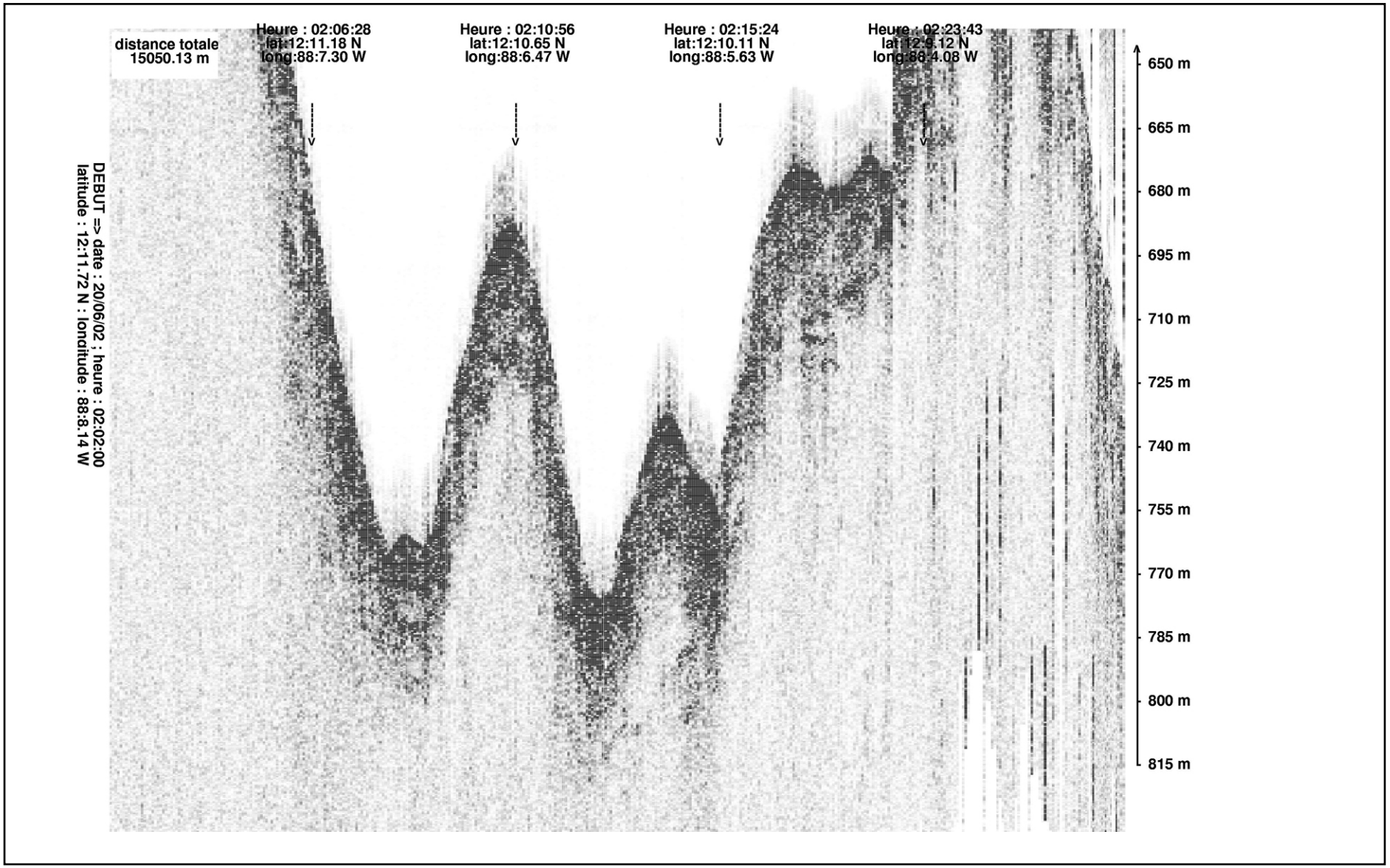
GMT 2002 Sep 26 12:25:23

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 29
MD02-2524,
MD02-2525C^{2},
MD02-2526.

Station 29,Survey A

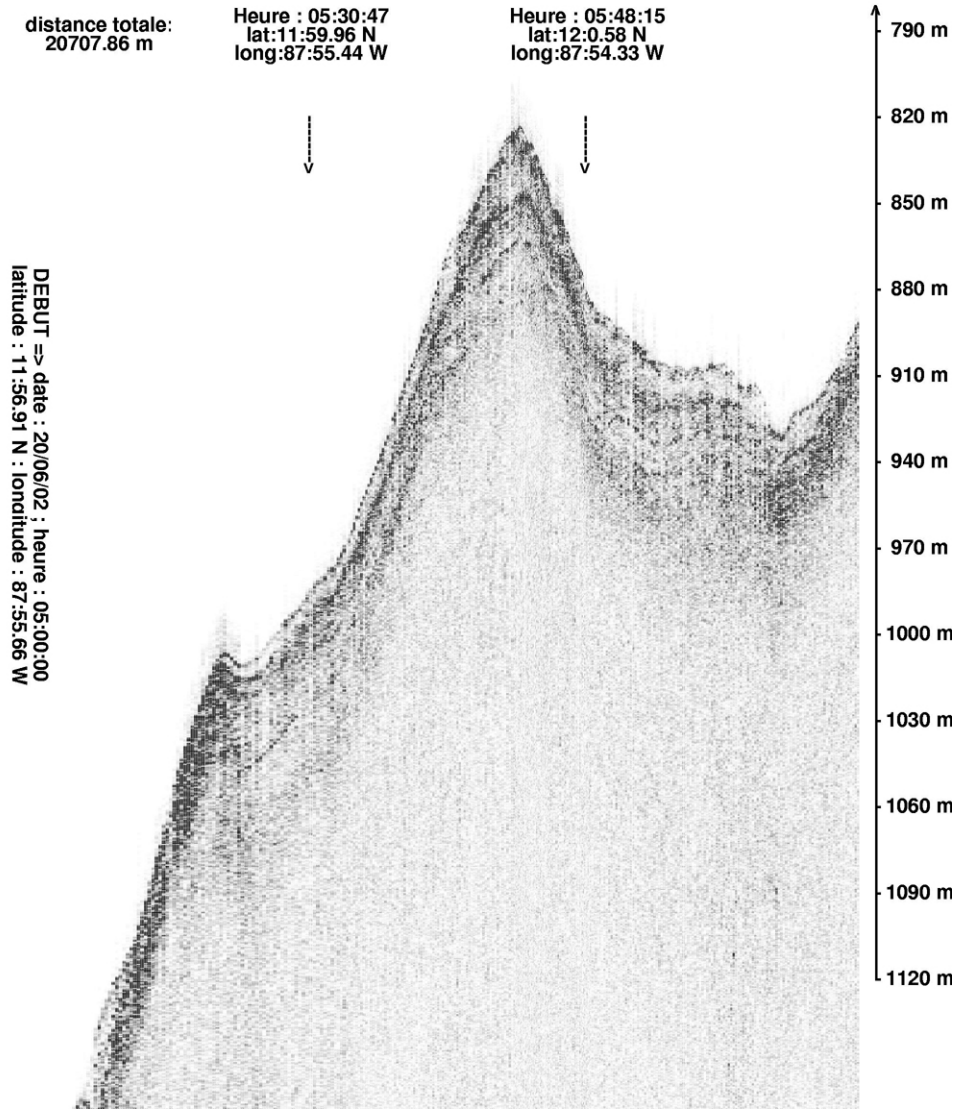


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 29
MD02-2524,
MD02-2525C^{2},
MD02-2526.

Station 29,Survey B

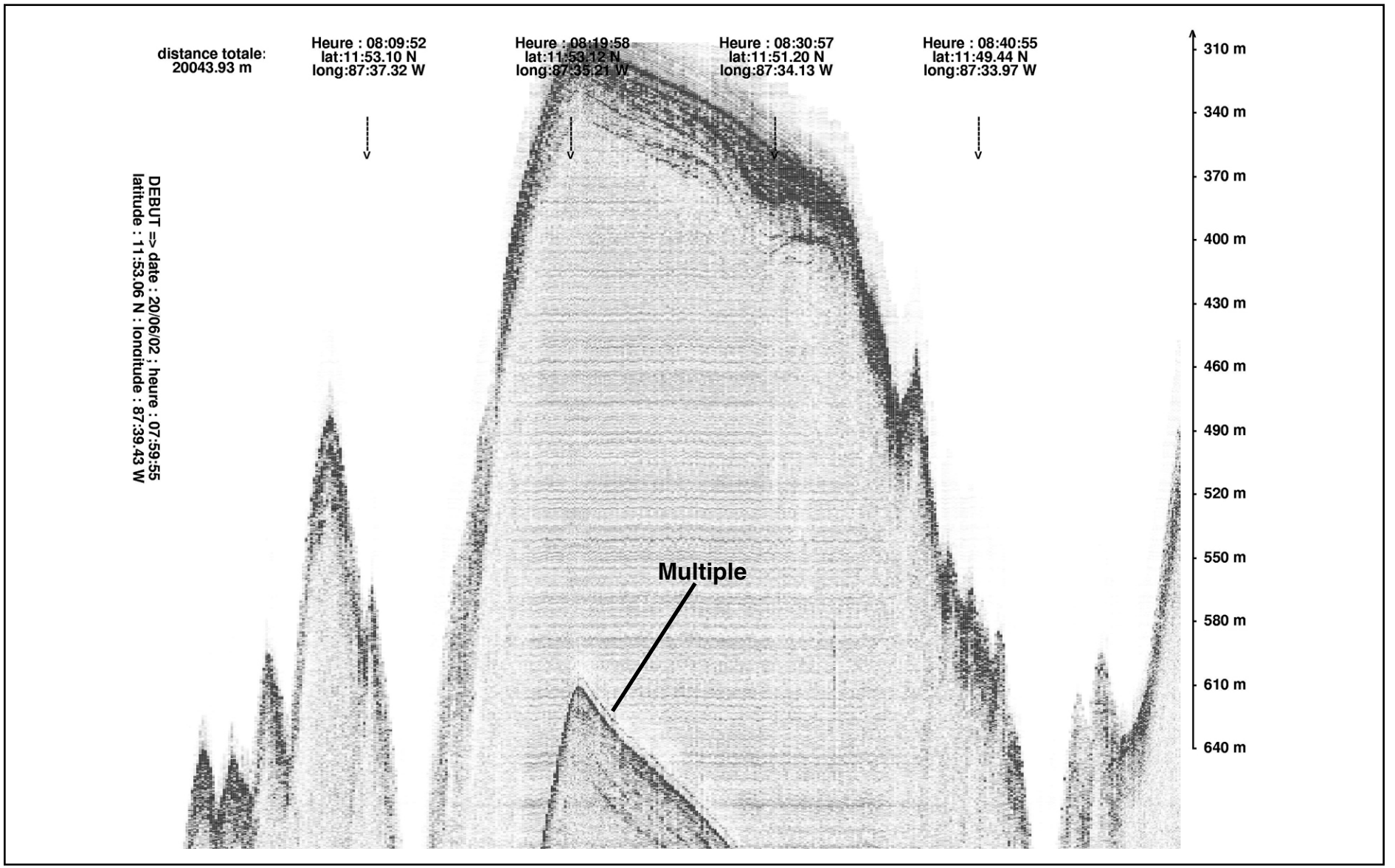


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 29
MD02-2524,
MD02-2525C^{2},
MD02-2526.

Station 29,Survey C

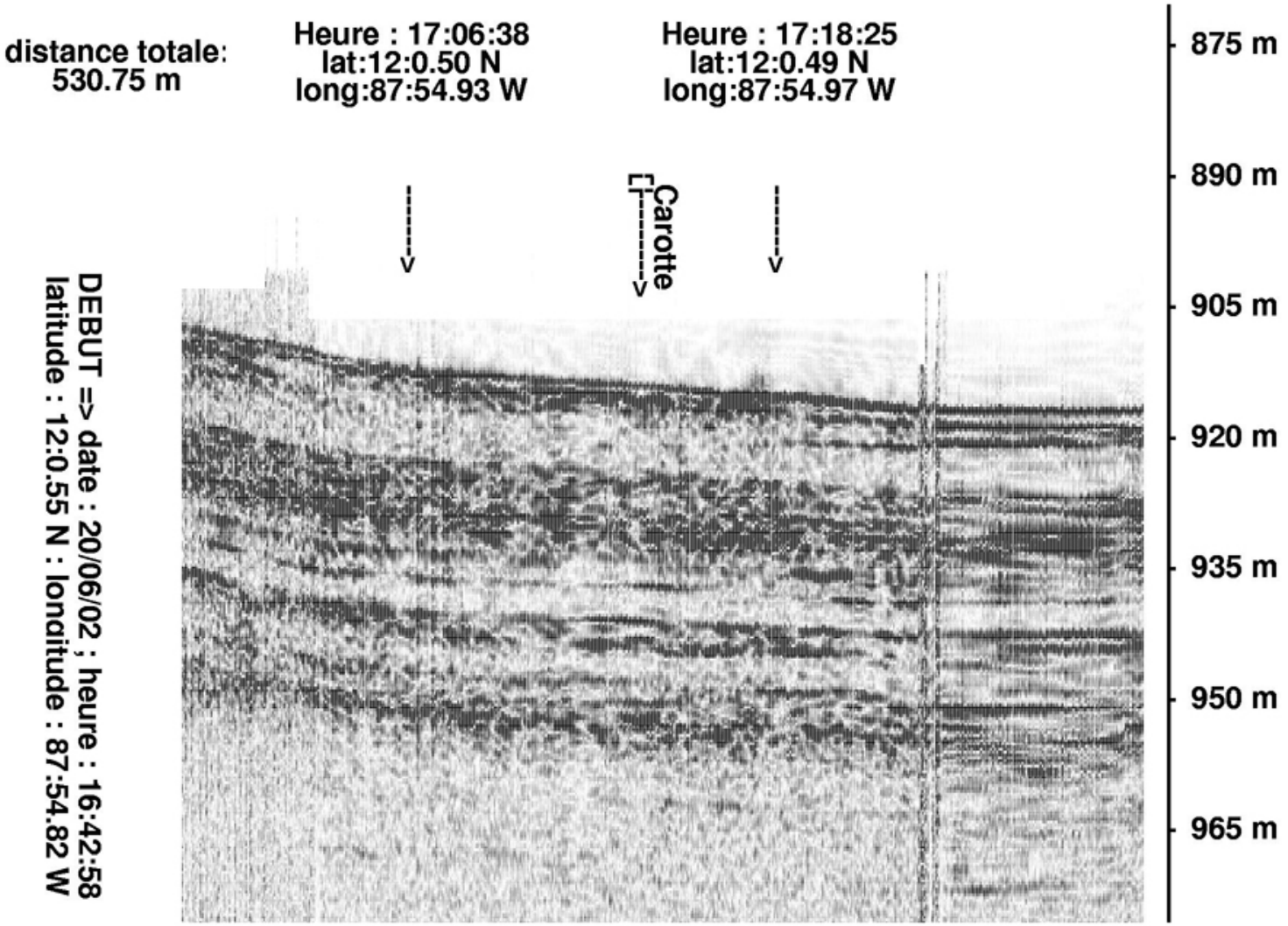


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 29
Core MD02-2524

MD02-2524,Coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **20.06.2002**

N° de station : **29**
Nicaragua 1

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2524

(MD - année - milles - centaines)

CAROTTE (longueur) :

30.26 m

POSITION :

Latitude : **012° 00.49 N**

Longitude : **087° 54.95 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **896** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **01:48**

Début manœuvre : **16:40**

Déclenchement : **17:14**

Fin de manœuvre : **17:30**

Durée de manœuvre : **00:50**

Départ station : **Resté en station pour carottage suivant**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2524

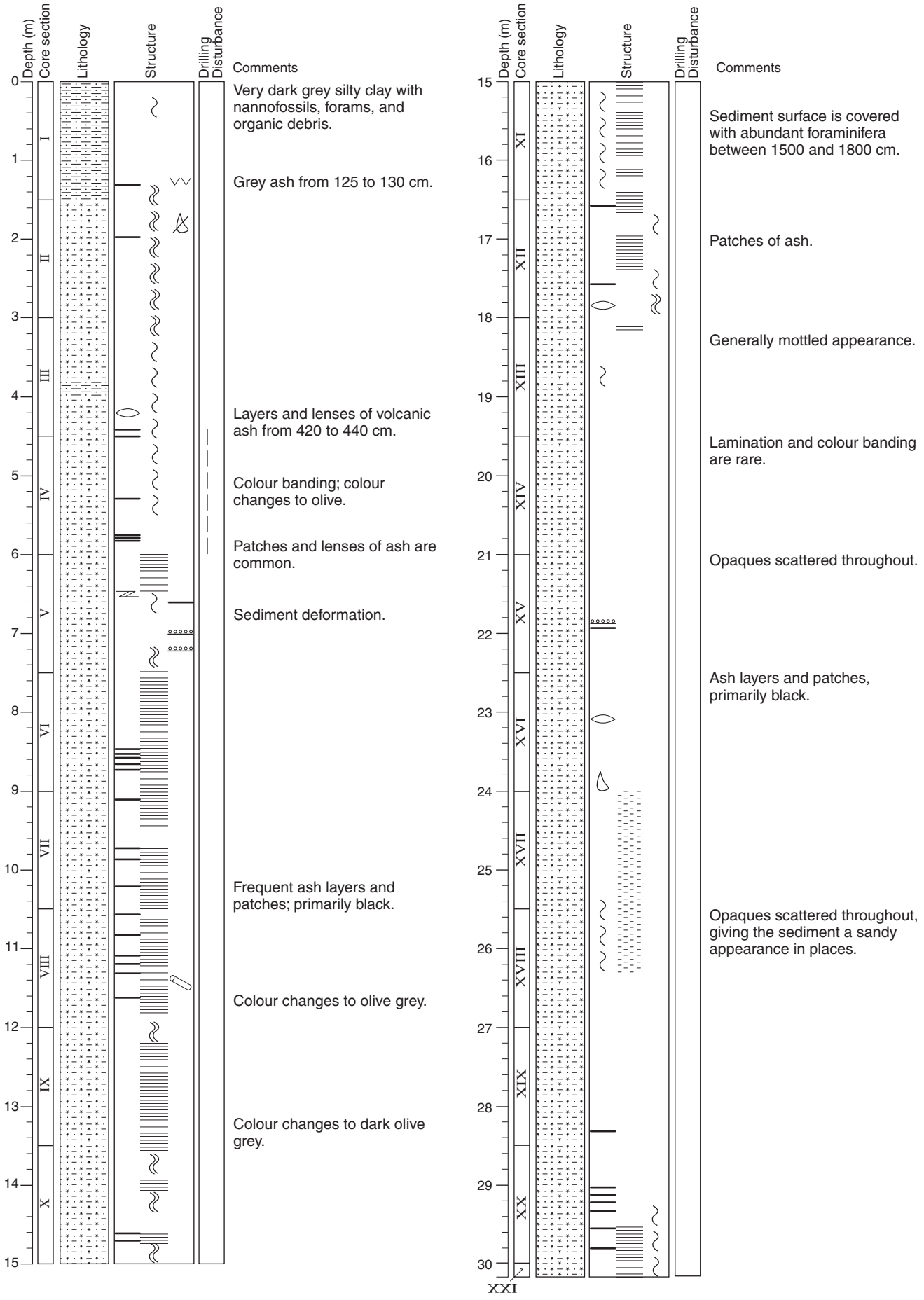
(Station 29, Nicaragua 1 ; Latitude : 12° 00. 55N ; Longitude : 87° 54. 83W ; 863m water depth) has recovered a total of 30.26m of sediment. The sediment has only been very slightly disturbed by coring, from 4.50m to 6.00m (Section IV).

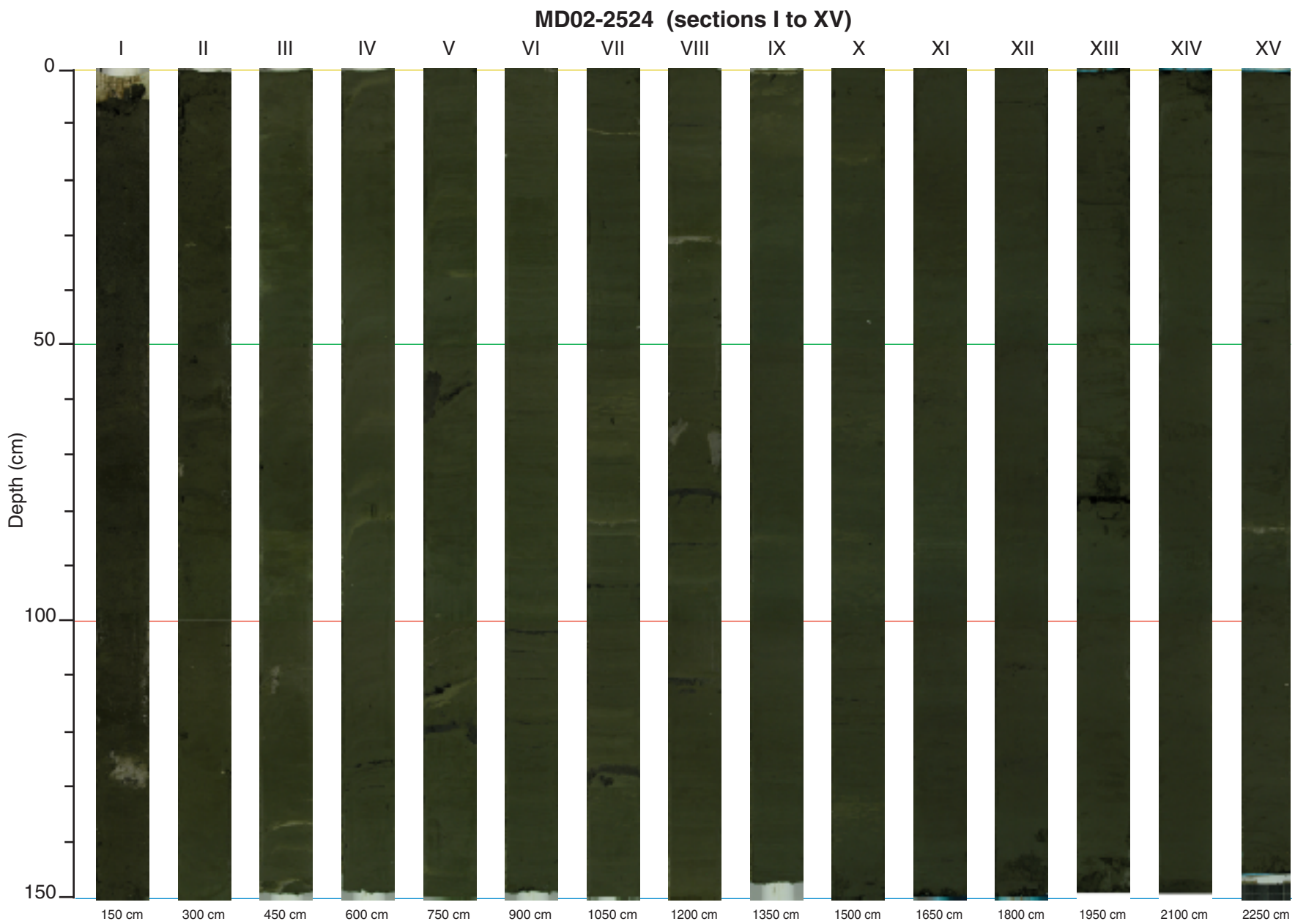
The dominant sediment mostly consists of silty clay, olive and olive grey to dark olive grey and very dark grey in color. The upper part of the core, down to 6.00m (Section IV) is mostly bioturbated. From 6.00m (Section V) to 17.50m (Section XII) the sediment is mostly laminated, with oblique lamination in Section V. The lamination is interrupted by a few bioturbated intervals. Sandy layers with graded bedding occur in Section V. The lower part of the core below 17.50m (Section XII) is mostly massive, with some faintly laminated intervals and minor bioturbation.

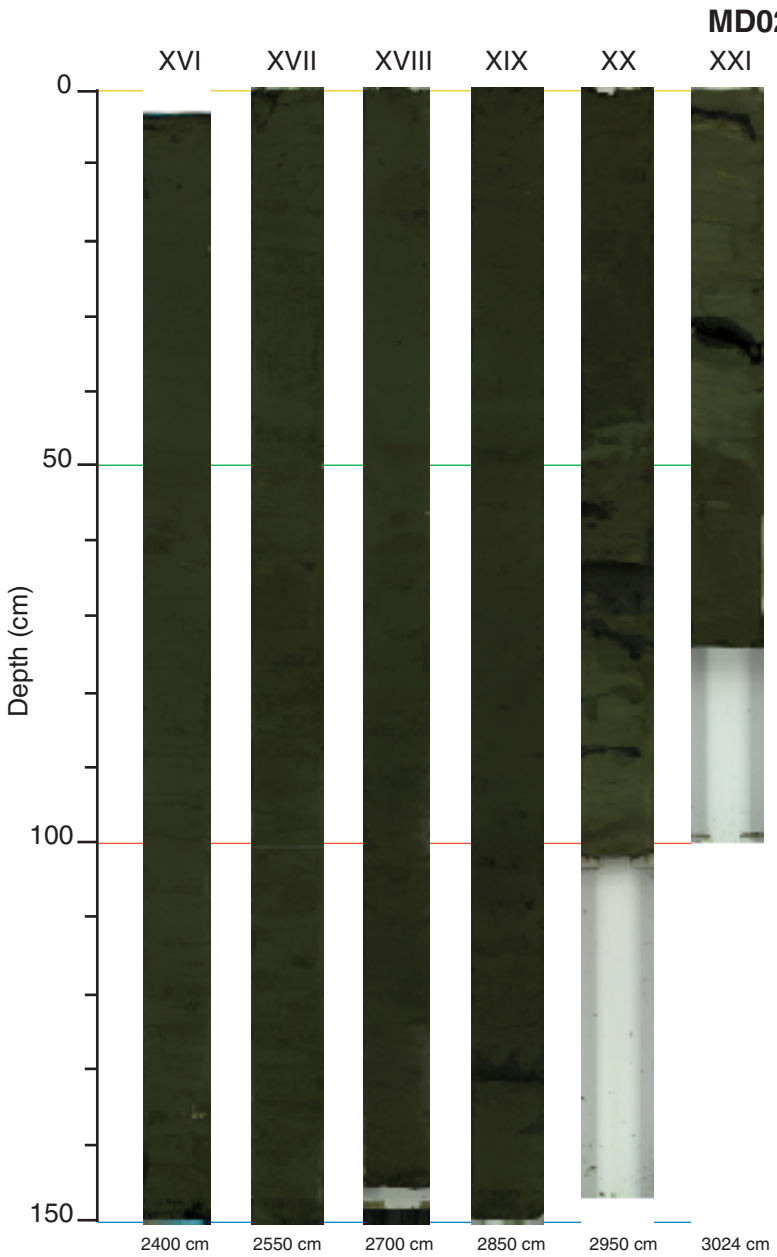
Minor lithology includes :
- Layers and lenses of volcanic ash, grey to black, throughout the core.

MONA

Core: MD02-2524



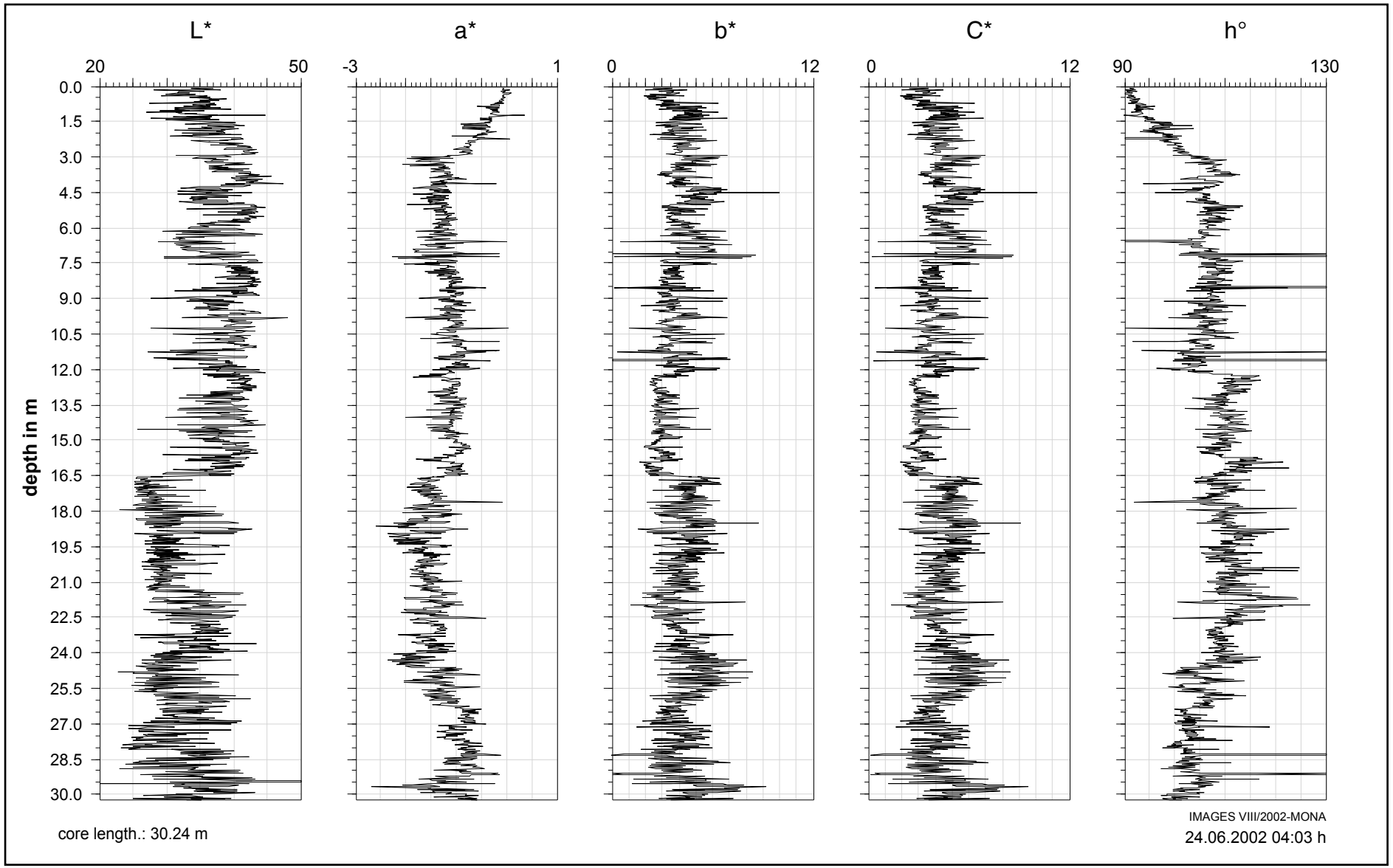

MD02-2524 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2524 (sections XVI to XXI)
XVI
XVII
XVIII
XIX
XX
XXI
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
2950 cm
3024 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

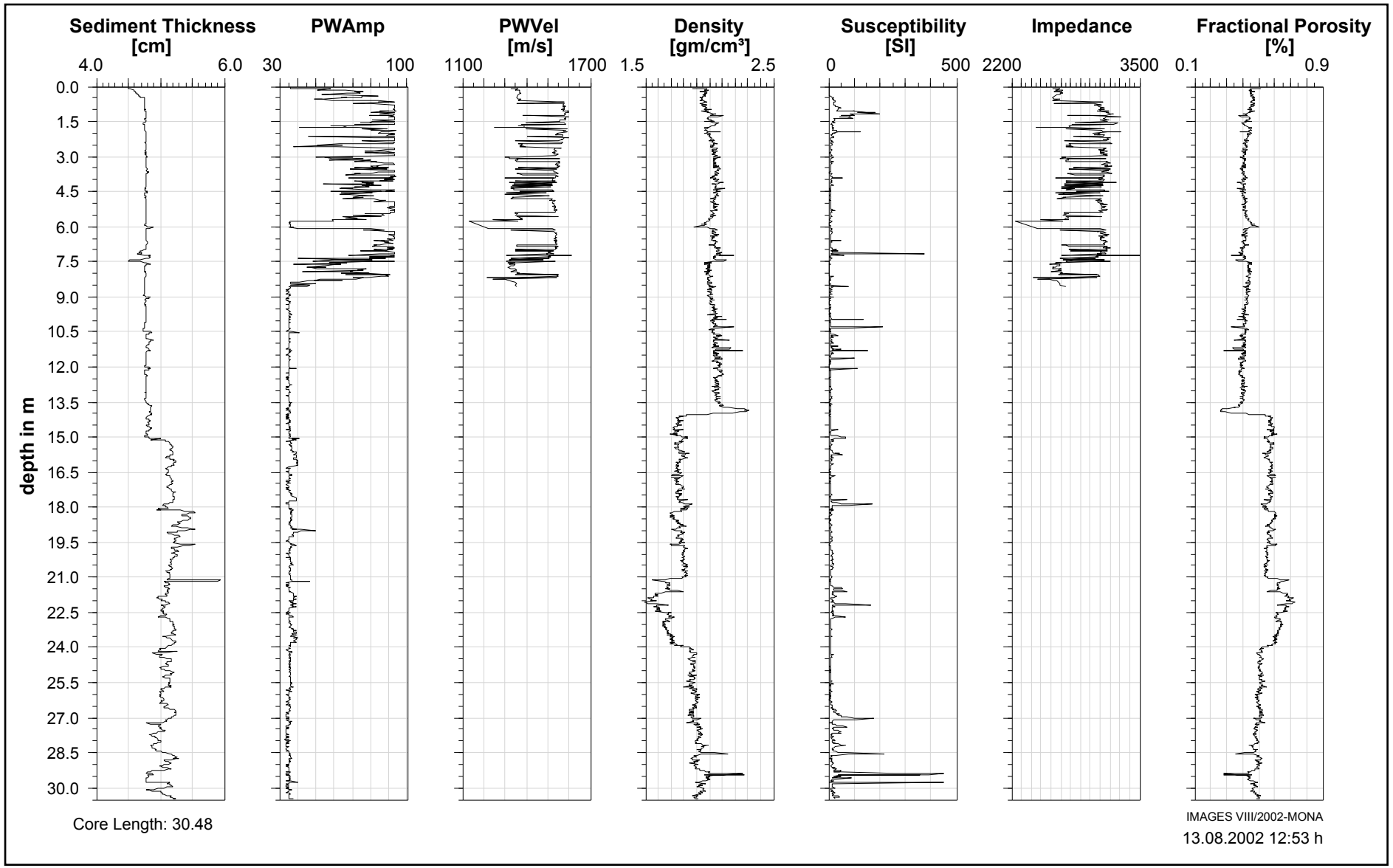
Station 29
Core MD02-2524



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 29
Core MD02-2524

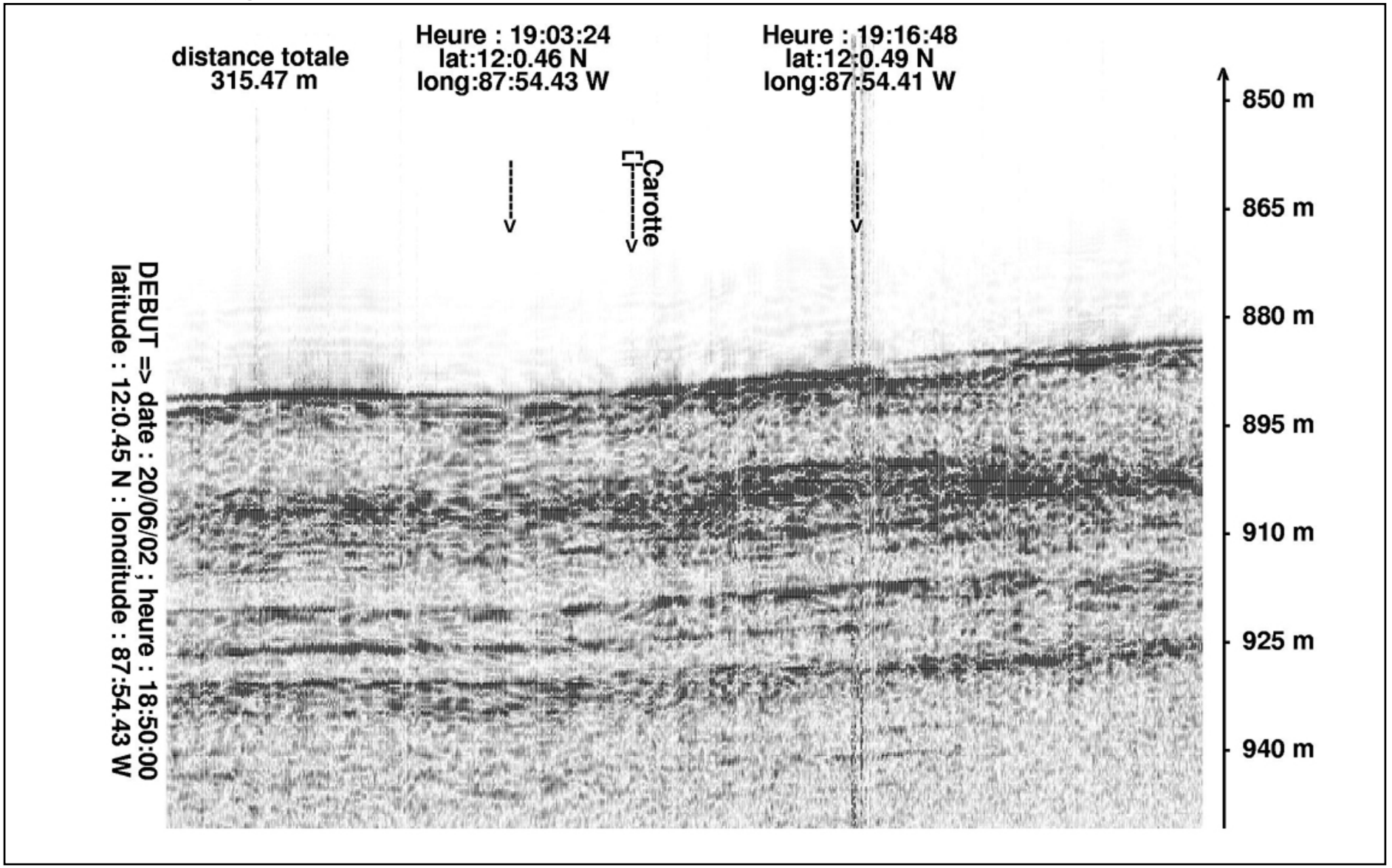


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 29
Core MD02-2525C^2

Station 29,Coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **20.06.2002**

N° de station : **29**
Nicaragua 1

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2525 C²

(MD - année - milles - centaines)

CAROTTE (longueur) :

? m

POSITION :

Latitude : **012° 00.47 N**

Longitude : **087° 54.44 W**

CAROTTIER (type) (1) : **CAROTTIER CARRE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **877** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **Déjà en station**

Début manœuvre : **18:56**

Déclenchement : **19:08**

Fin de manœuvre : **19:30**

Durée de manœuvre : **00:34**

Départ station : **Reste en station pour carottage suivant**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

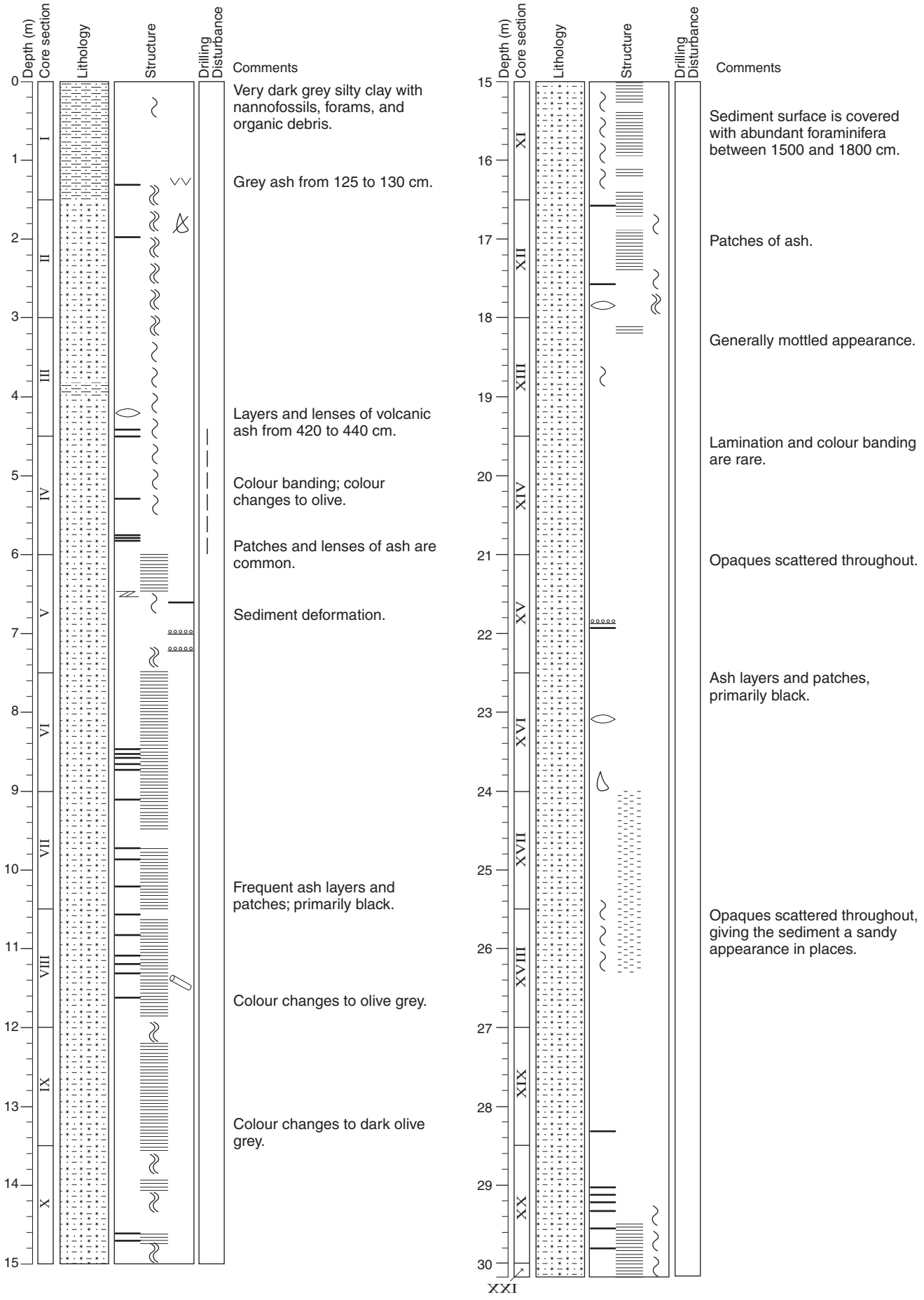
Description / incidents :

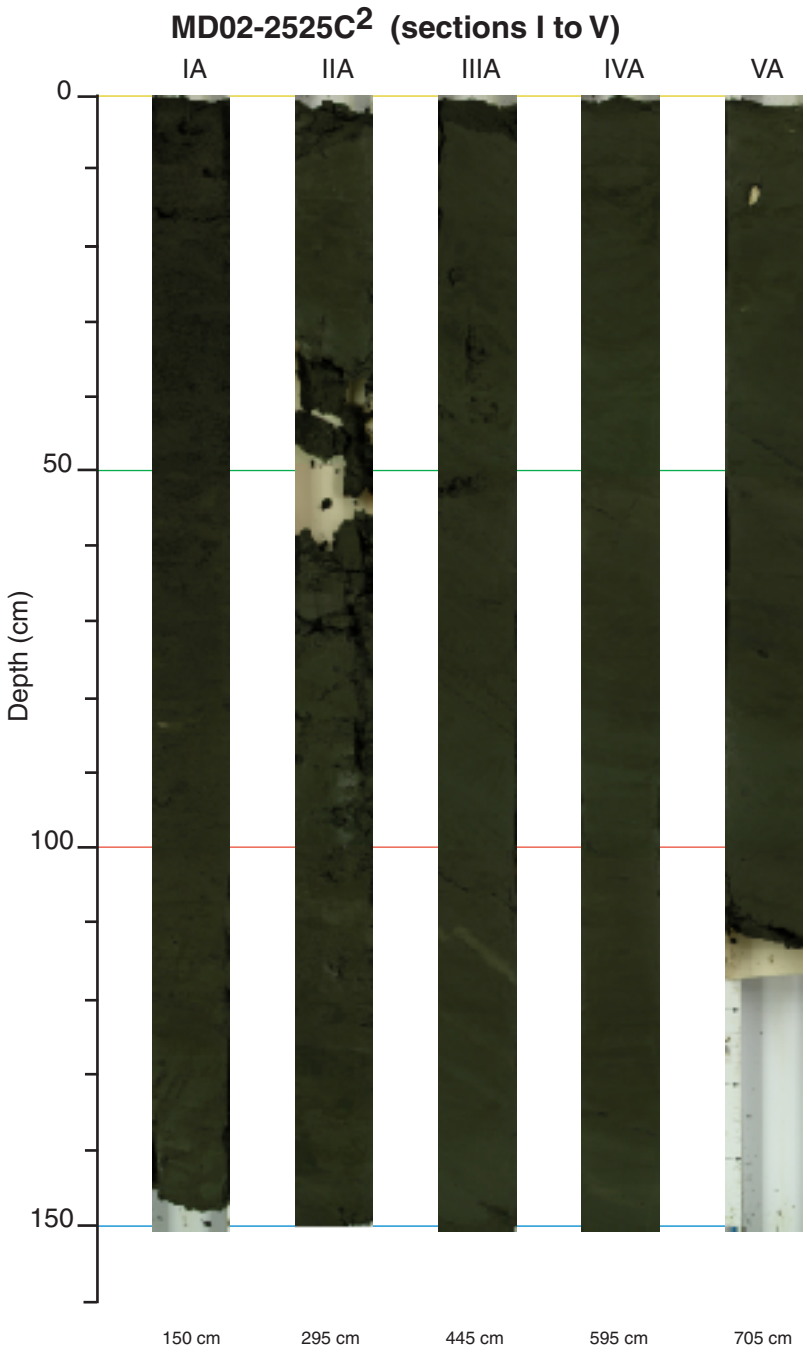
(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MONA

Core: MD02-2524

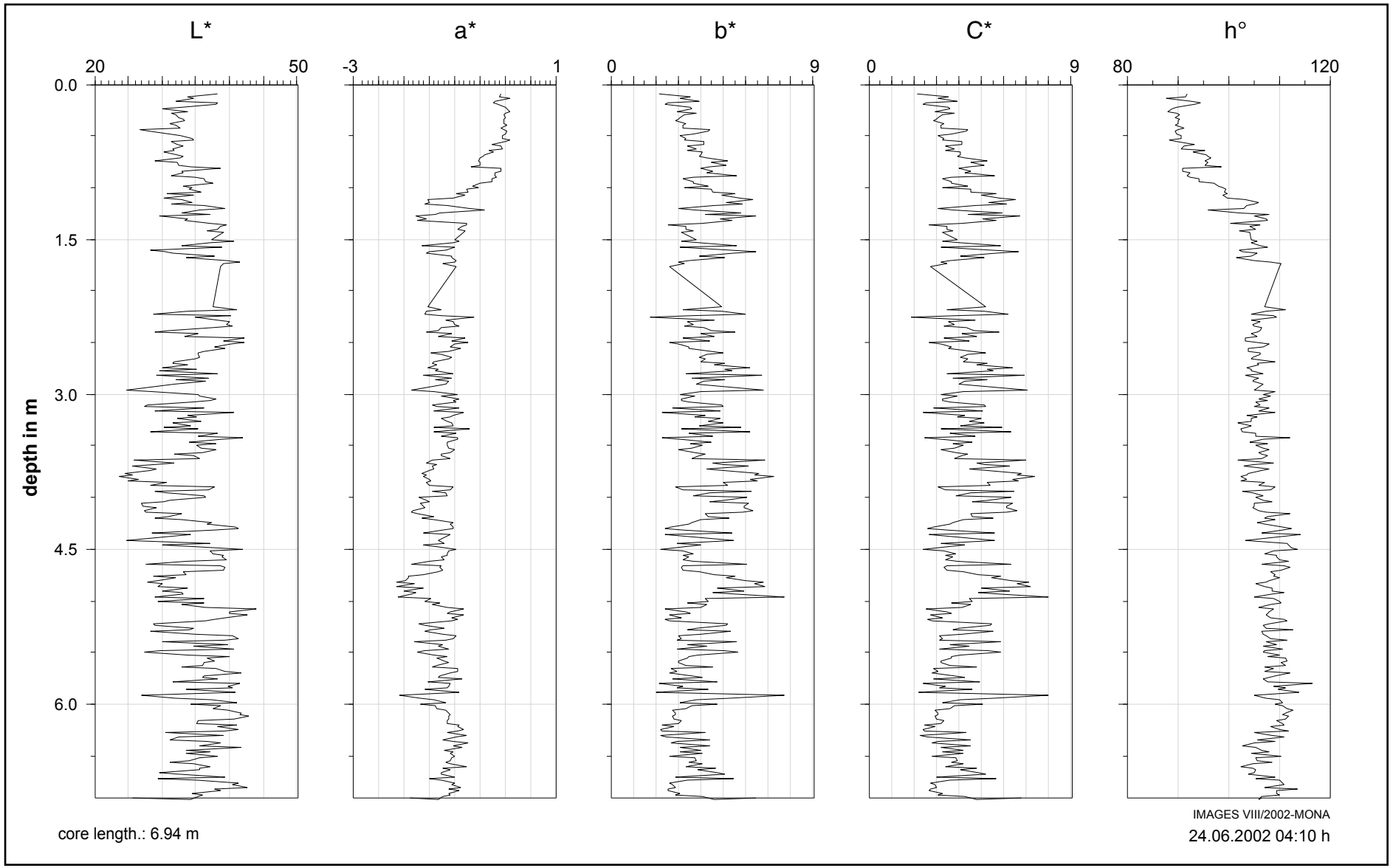



MD02-2525C2 (sections I to V)
IA
IIA
IIIA
IVA
VA
0
50
100
150
Depth (cm)
150 cm
295 cm
445 cm
595 cm
705 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

Station 29
Core MD02-2525C²

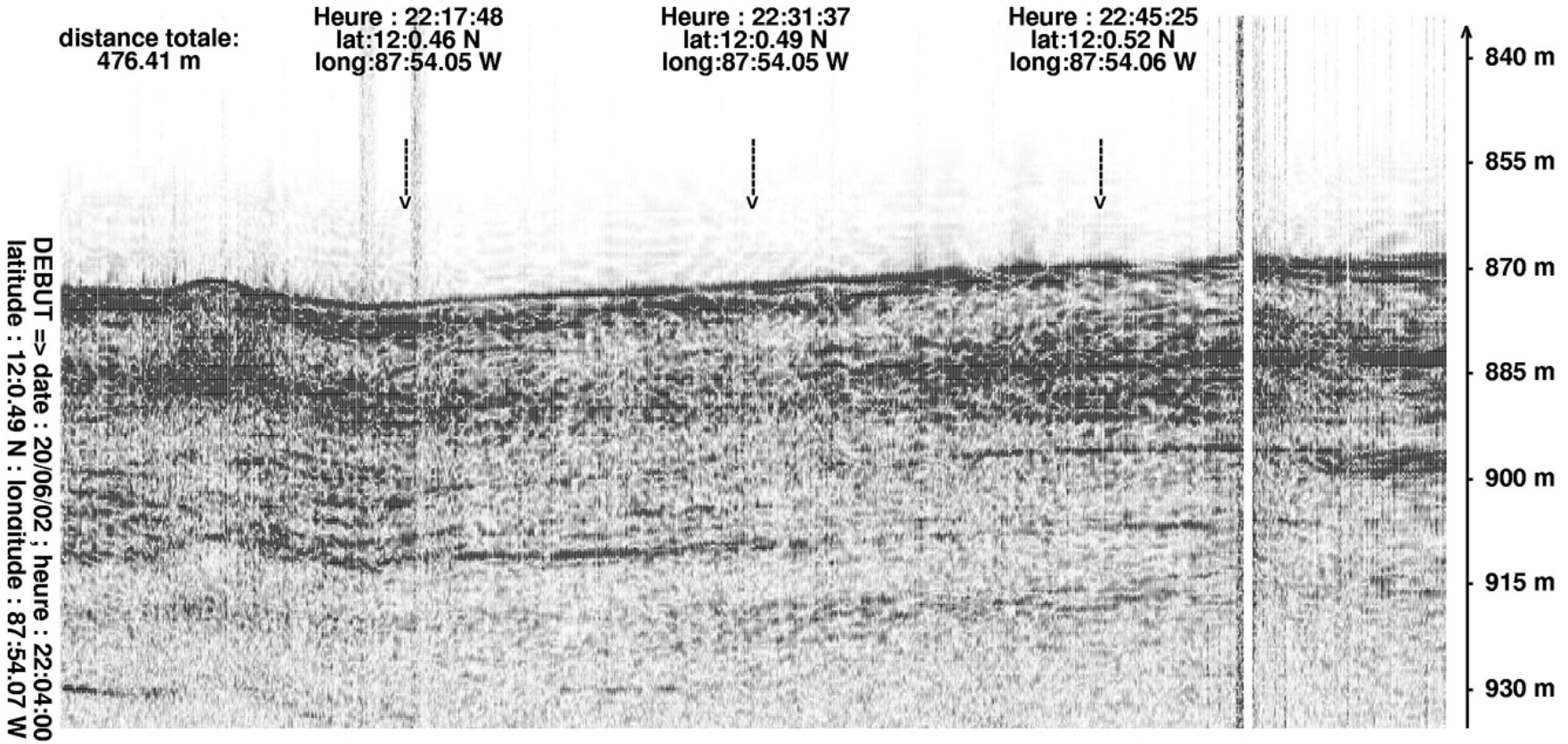


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 29
Core MD02-2526

MD02-2526,Coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **20.06.2002**

N° de station : **29**
Nicaragua 1

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2526

(MD - année - milles - centaines)

CAROTTE (longueur) :

30.15 m

POSITION :

Latitude : **012° 00.46 N**

Longitude : **087° 54.06 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **800** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **Déjà en station**

Début manœuvre : **21:57**

Déclenchement : **22:20**

Fin de manœuvre : **22:40**

Durée de manœuvre : **00:43**

Départ station : **22:40**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2526

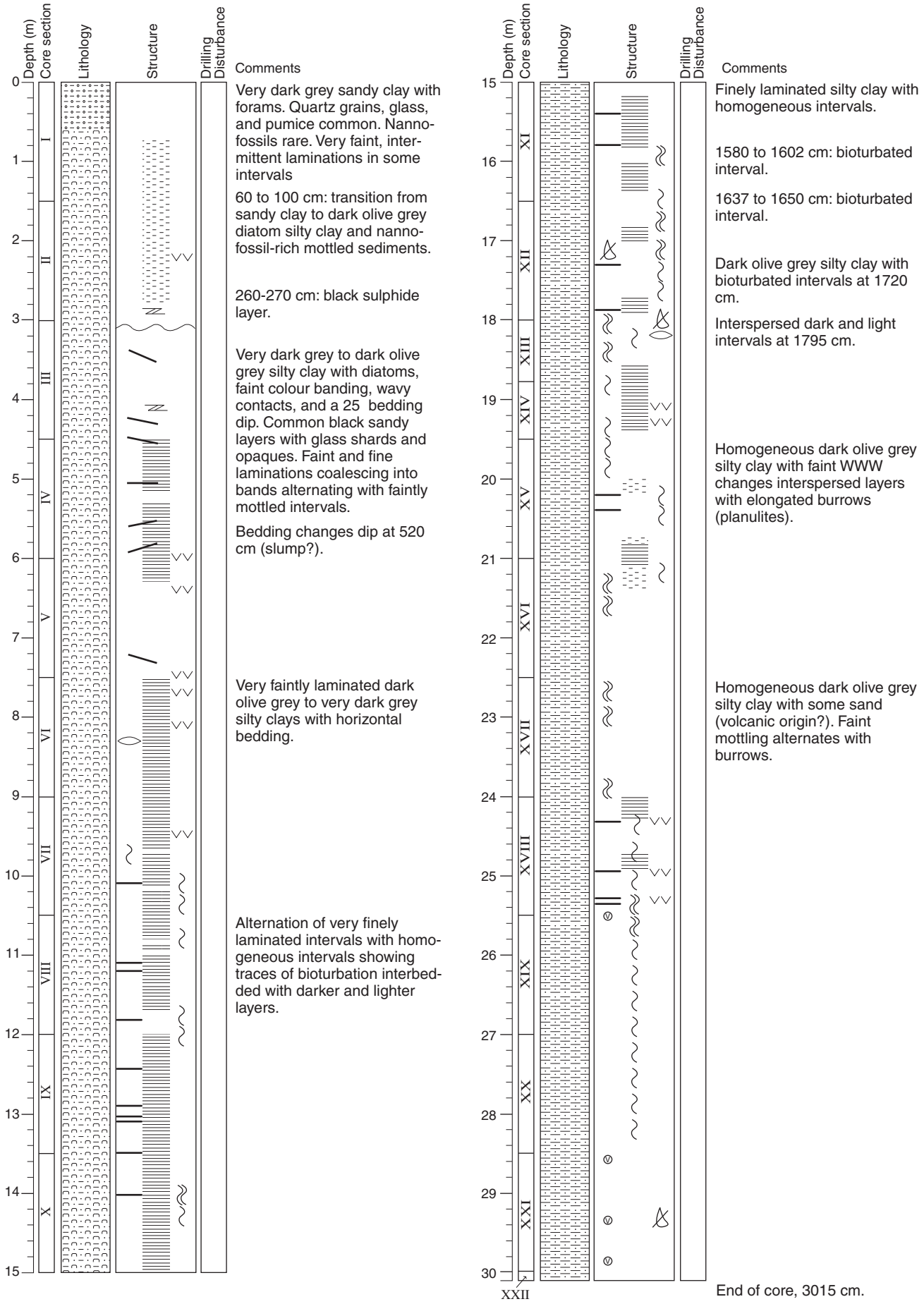
(Station 29, Nicaragua 1 ; Latitude : 12° 00. 46N ; Longitude : 87° 54. 06W ; 800m water depth) has recovered a total of 30.15m of sediment. The sediment has not been disturbed by coring.

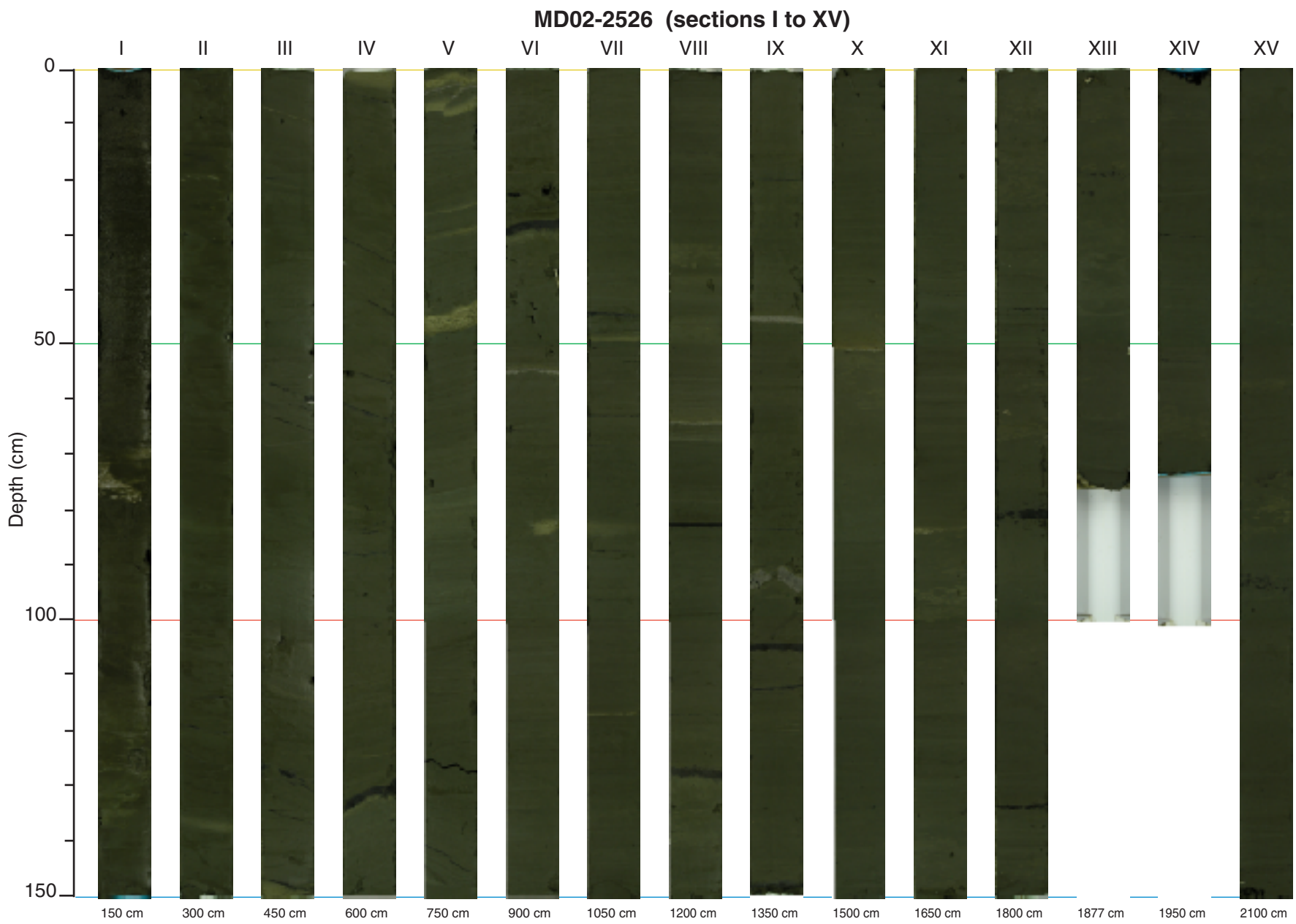
The dominant sediment consists of a diatom silty clay grading to silty clay below 7.50m (Section V). The colors range from dark olive grey to very dark grey. The sediment is mostly laminated in the upper part of the core, down to 16.50m (Section XI). Laminations are oblique with a 25° angle from 2.80m (Section II) to 7.50m (Section V), with a change in direction at 5.20m (Section IV). Finely laminated intervals sometimes alternate with faintly mottled intervals. The sediment is mostly bioturbated in the lower part of the core, below 16.50m (Section XII). However, a few faintly laminated intervals persist.

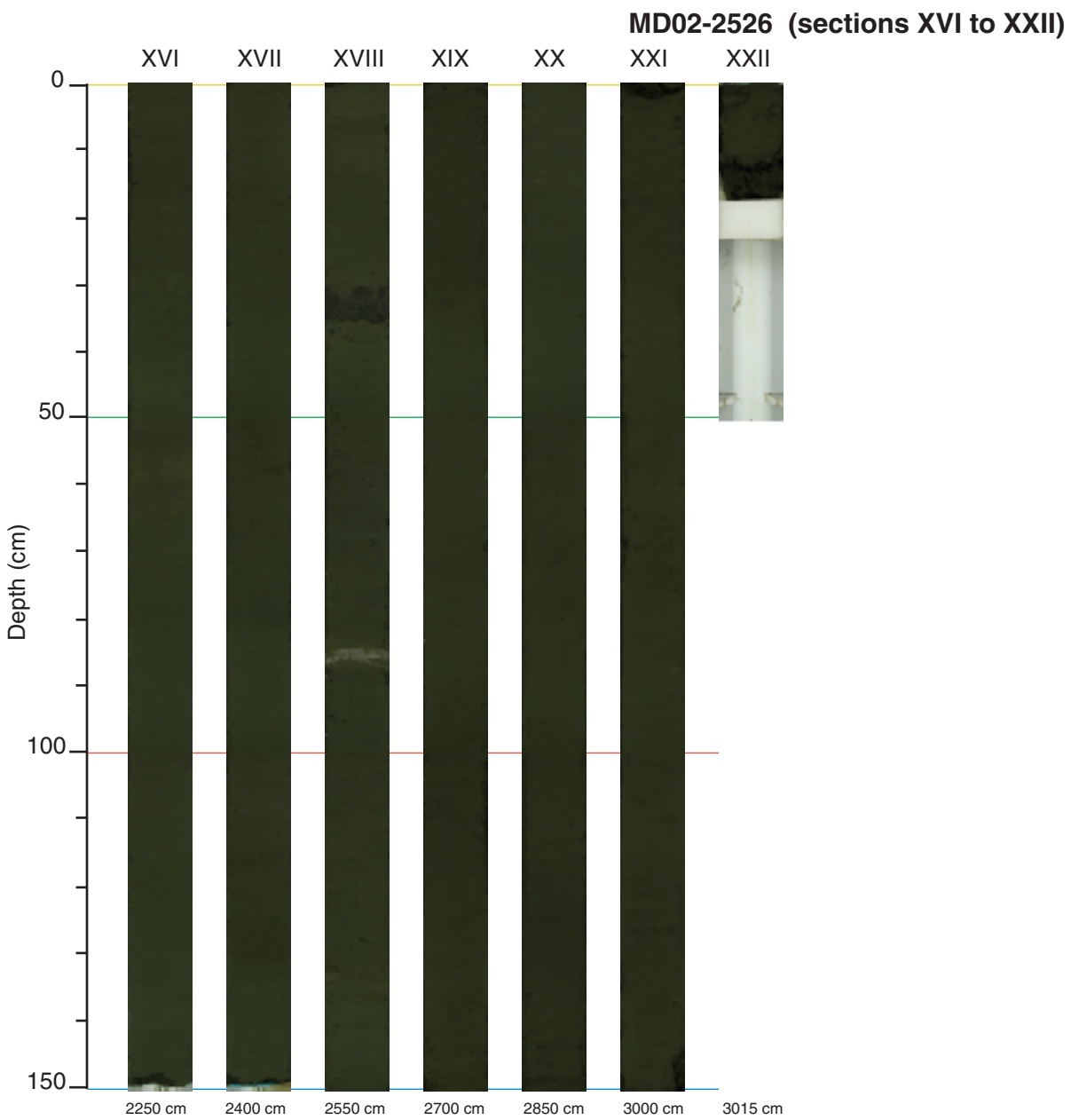
Minor lithologies include :
- Sandy clay, very dark grey and intermittently laminated, from top to 1.00m (Section I).
- Layers and lenses of volcanic glass and ash, throughout the core.

MONA

Core: MD02-2526



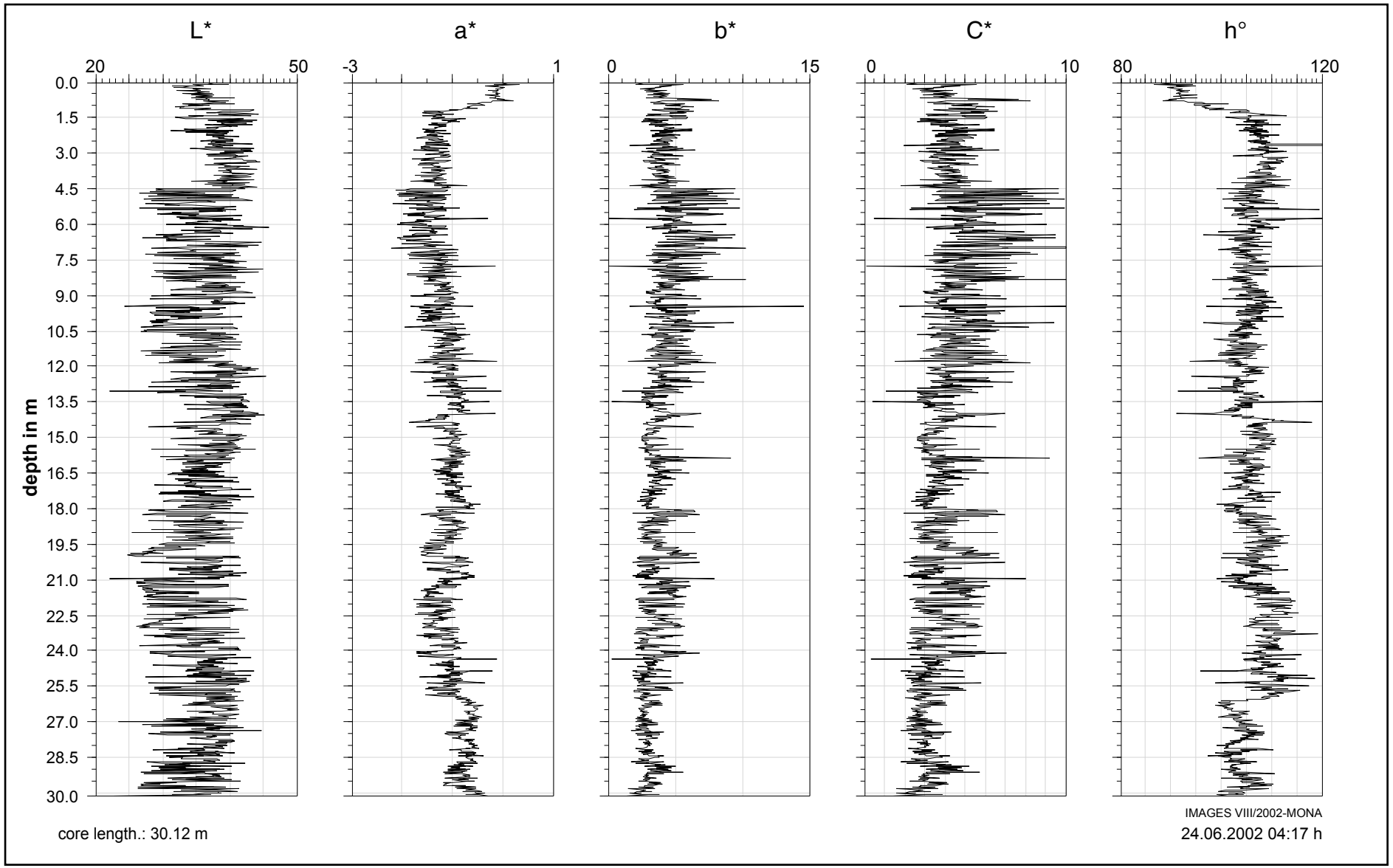

MD02-2526 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1877 cm
1950 cm
2100 cm


MD02-2526 (sections XVI to XXII)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
0
50
100
150
Depth (cm)
2250 cm
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3015 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

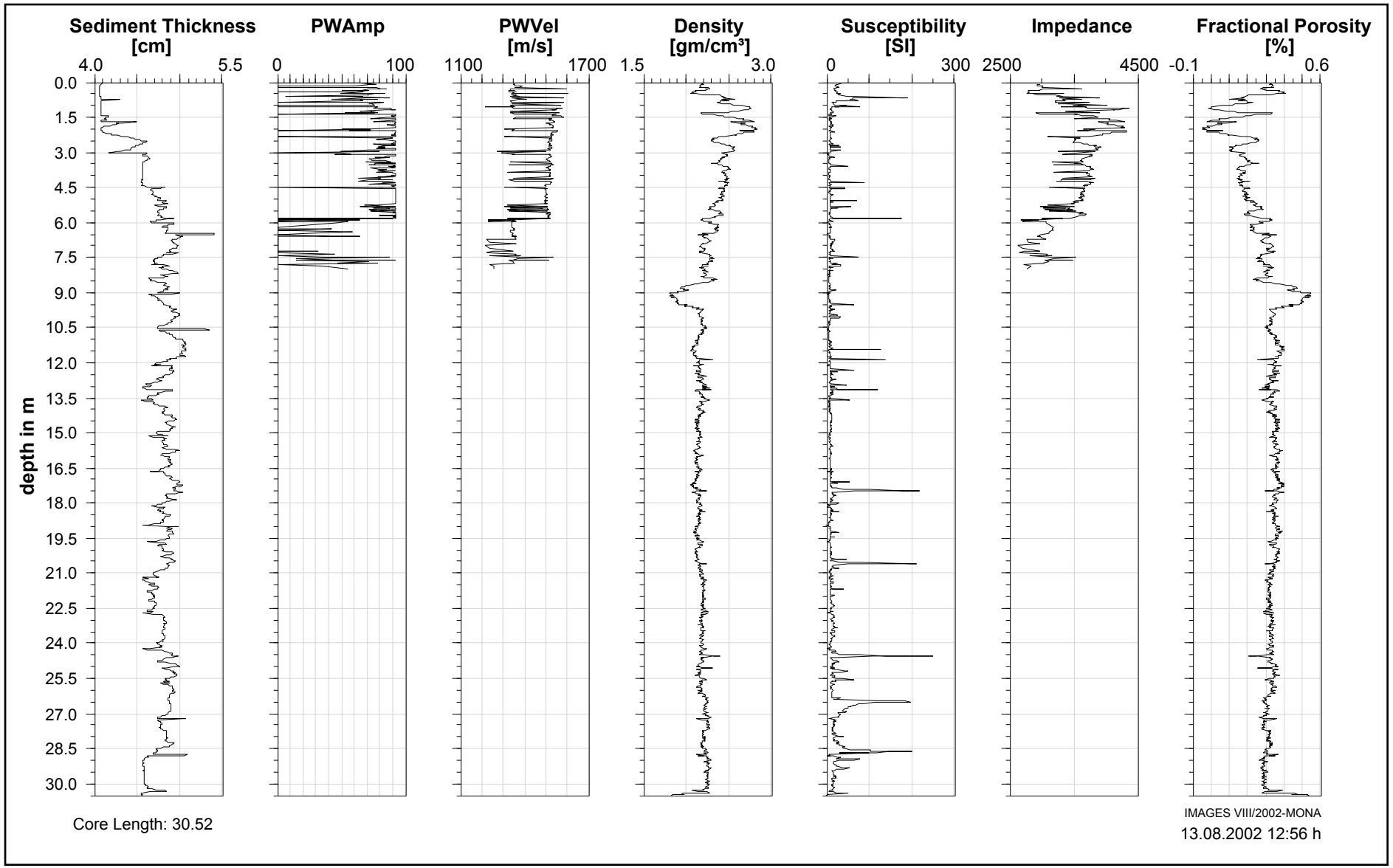
Station 29
Core MD02-2526



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 29
Core MD02-2526

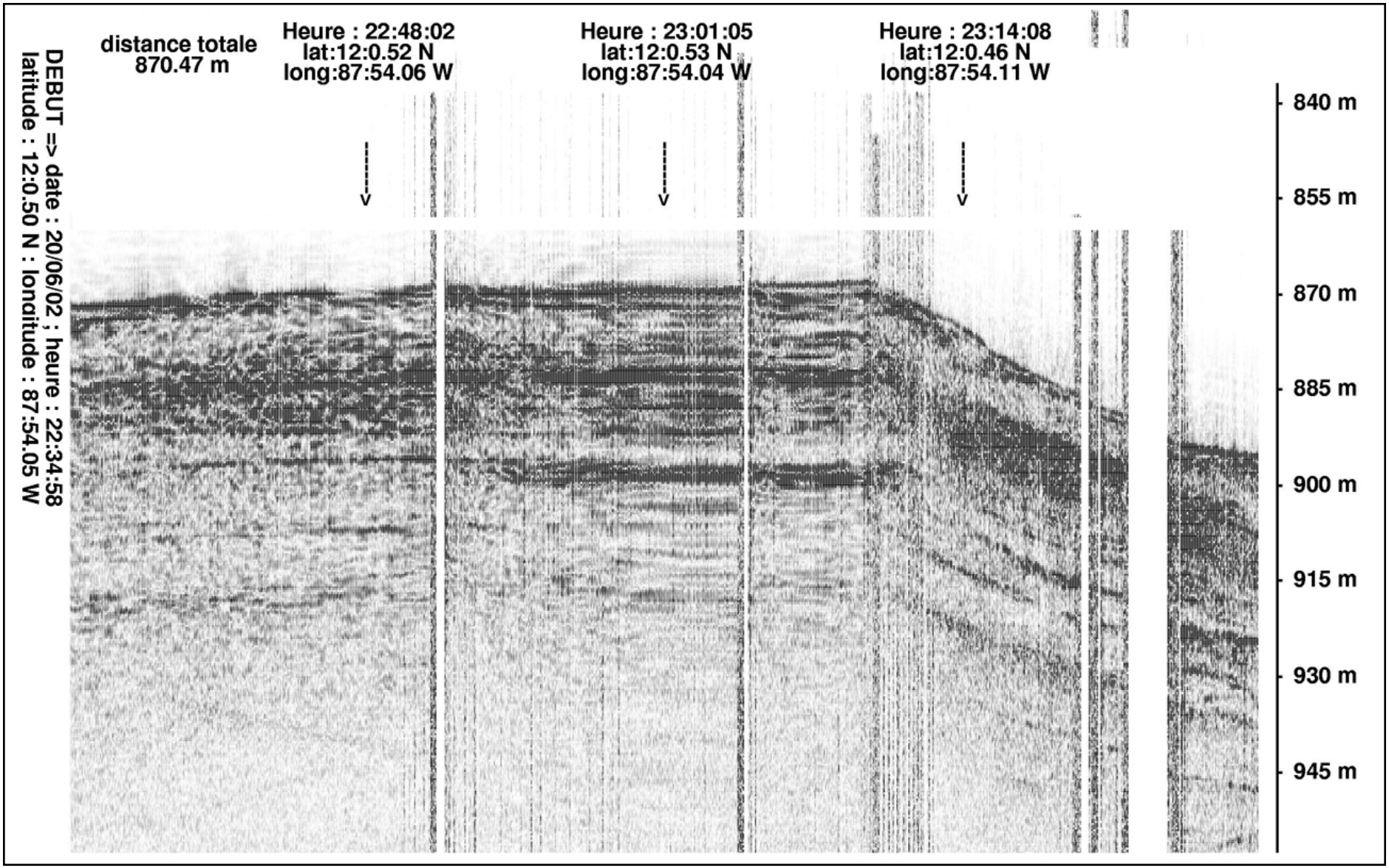


IMAGES VIII, 2002
MONA

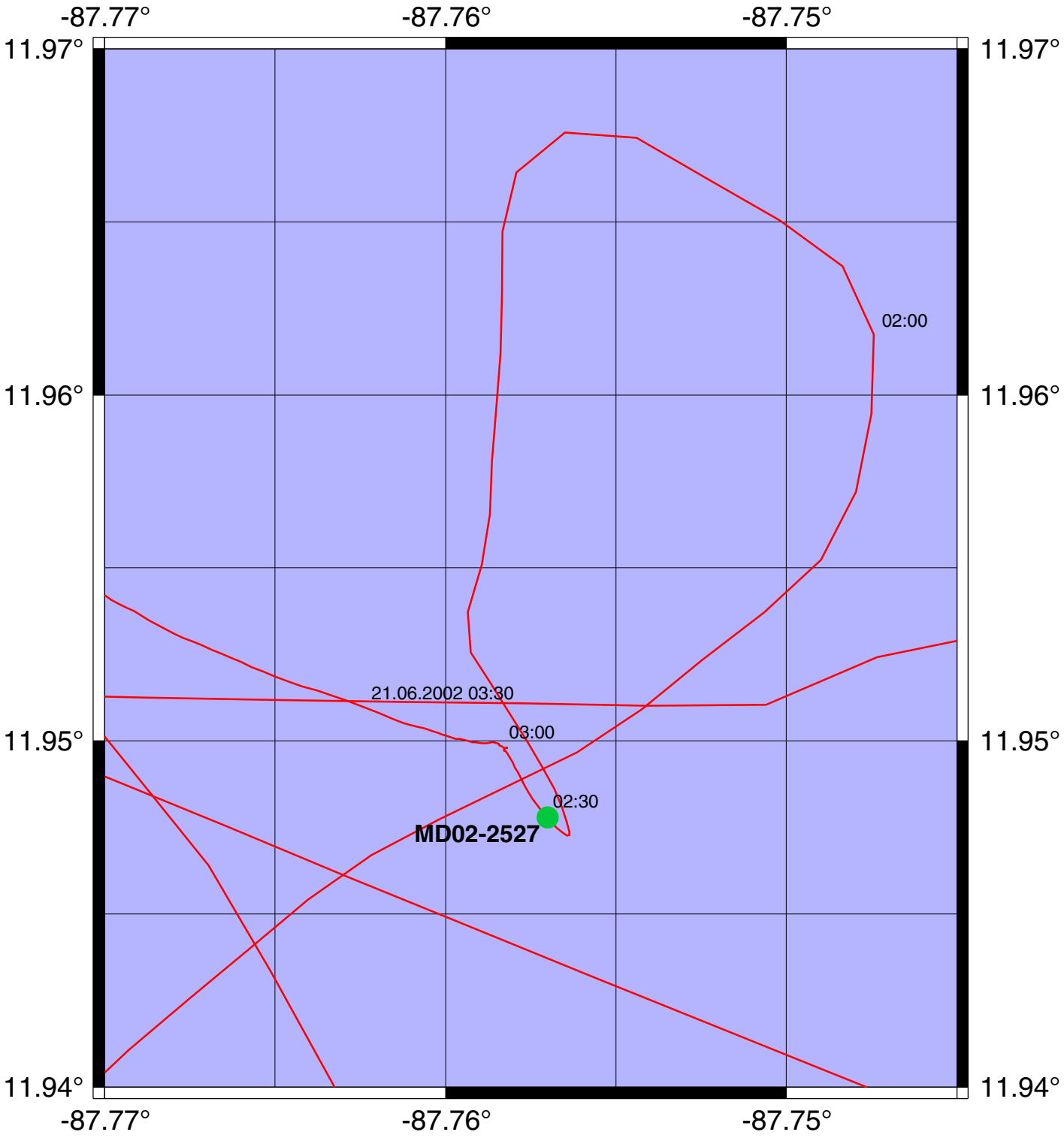
3.5 kHz Seismic Replay

Station 29
MD02-2524,
MD02-2525C^{2},
MD02-2526.

Station 29 ,Depature from Station



IMAGES VIII/MD126, Mona
Station 30 Nicaragua 2



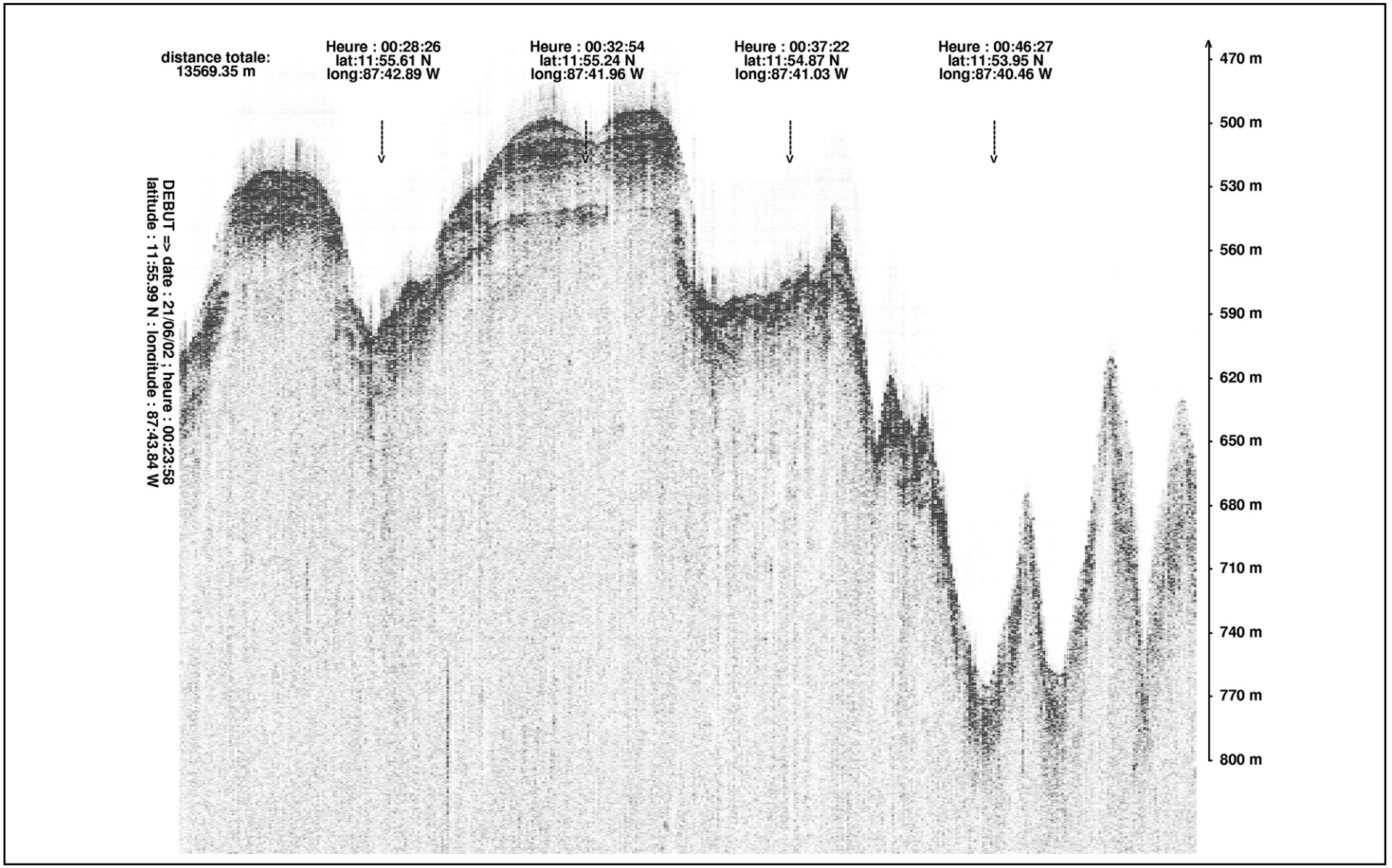
GMT 2002 Sep 26 12:27:25

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 30,
Core MD02-2527

Station 30,Arrival to Station

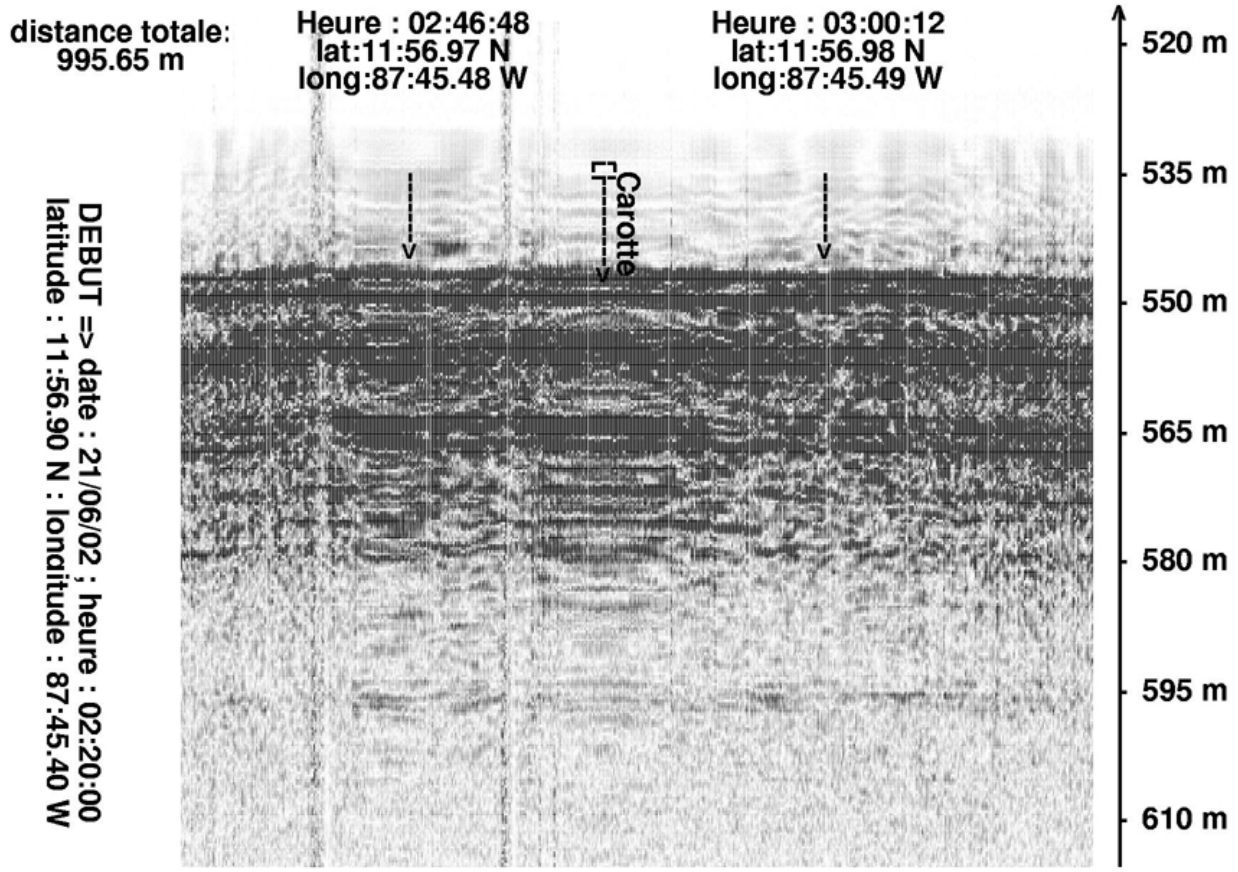


IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 30
Core MD02-2527

Station 30,Coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **21.06.2002**

N° de station : **30**
Nicaragua 2

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2527

(MD - année - milles - centaines)

CAROTTE (longueur) :

32.89 m

POSITION :

Latitude : **011° 56.98 N**

Longitude : **087° 45.69 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **500** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **00:15**

Début manœuvre : **02:29**

Déclenchement : **02:53**

Fin de manœuvre : **03:20**

Durée de manœuvre : **00:51**

Départ station : **03:20**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2527

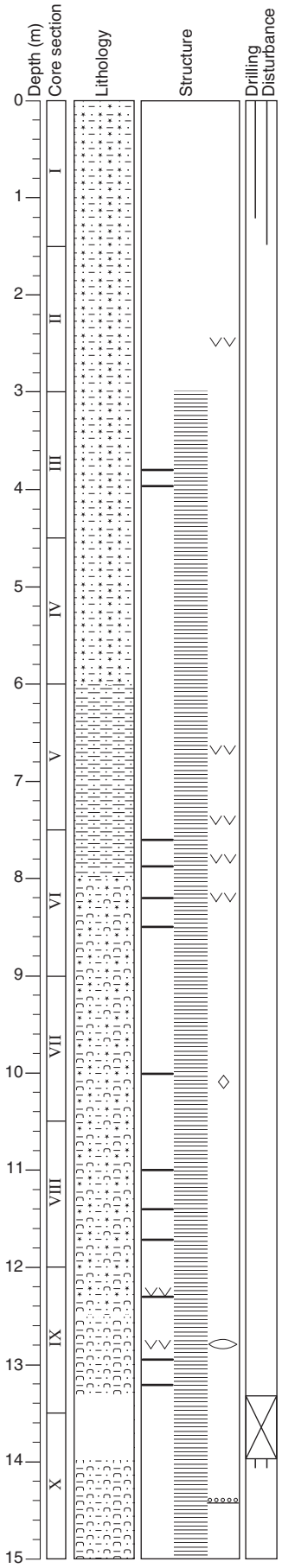
(Station 30, Nicaragua 2 ; Latitude : 11° 56. 87 N ; Longitude : 87° 54. 06W ; 535m water depth) has recovered a total of 32.90m of sediment. The sediment has been disturbed by coring from top to 1.50m (Section I) and empty intervals are recorded from 13.35m (Section IX) to 14.00m (Section X), and from 17.20m ti 17.35m (Section XII).

The dominant sediment consists of silty clay, that ranges in color from olive and olive grey to dark olive grey and very dark grey. The sediment is laminated throughout the core, with the exception of the upper 3.00m (down to Section II). Some oblique laminations and slump structures are observed in Section XVIII.

Minor lithology includes :
- Layers of volcanic glass and ash, scatterred throughout the core.

MONA

Core: MD02-2527



Comments

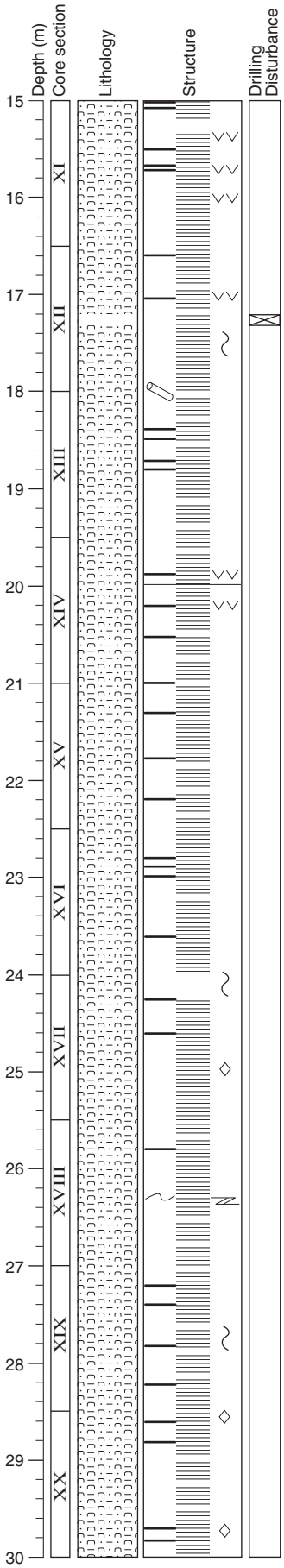
Homogeneous very dark grey silty clay with nannofossils.

Black sulphide-rich tephra.

Faintly laminated dark olive grey to very dark grey organic silty clay with common glass and diatoms.

Greener than olive grey, finely laminated silty clay with dark olive grey layers.

~1-mm thick or thinner black layers. Lighter layers contain abundant nannofossils. Overall common tephras.



Comments

Finely laminated olive grey silty clay with tephra layers and massive layers. Massive layers are lighter in colour (olive) with a sharp base and a graded top.

Thinly laminated clay lightening with depth from olive grey to light olive grey.

Finely laminated olive grey silty clay.

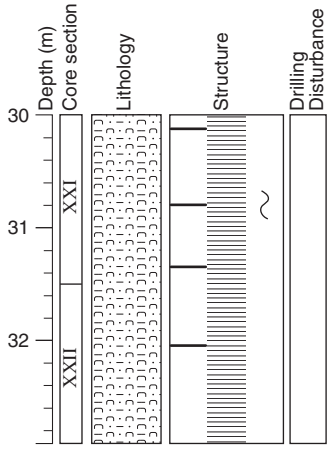
Mostly laminated olive grey silty clay with some massive thin beds and scarce tephra layers.

Slight cross stratification in some intervals.

Laminated olive grey silty clay changing to olive and then dark olive grey with depth. Possible siderite nodule.

Siderite nodule.

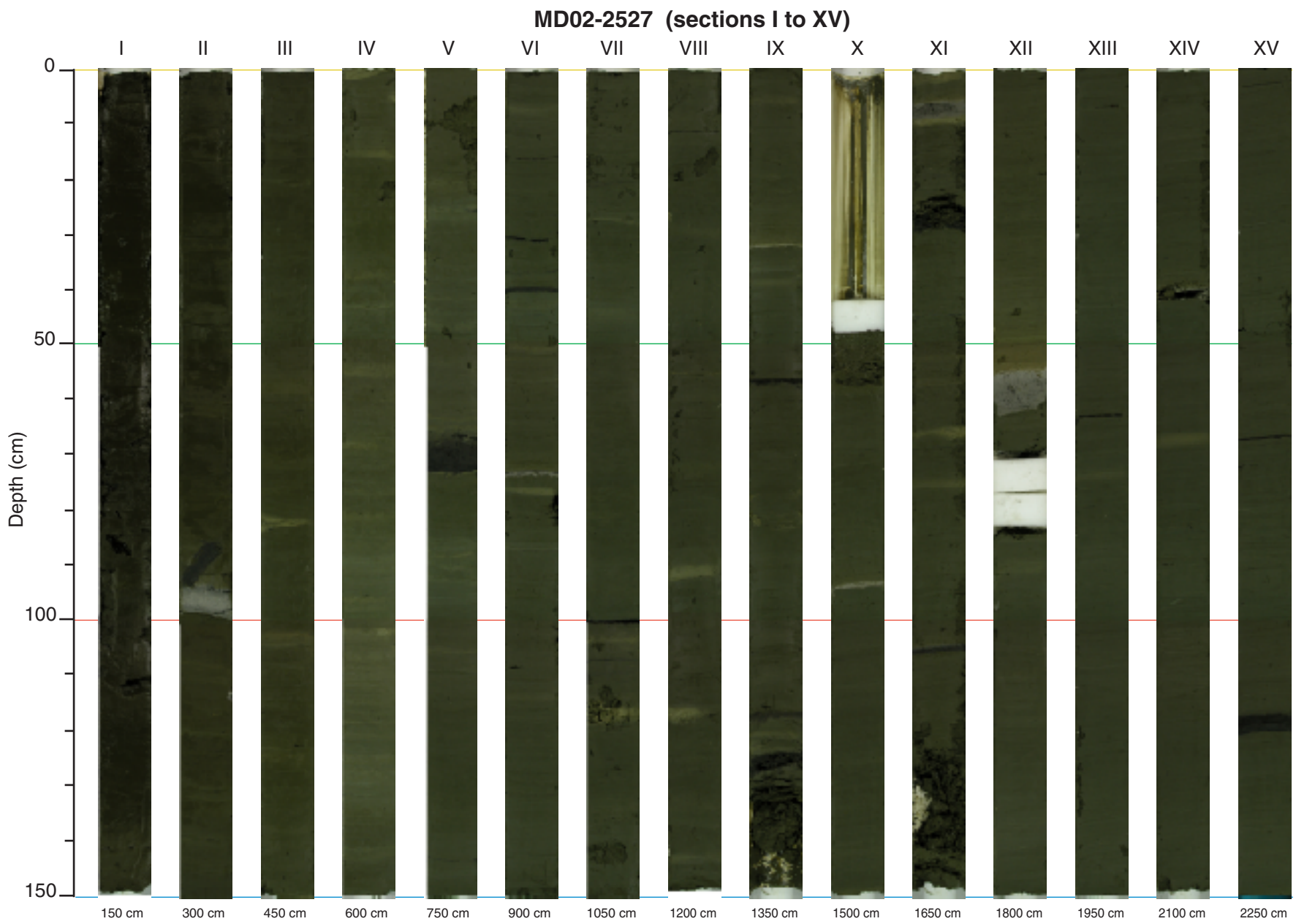
Siderite nodule.

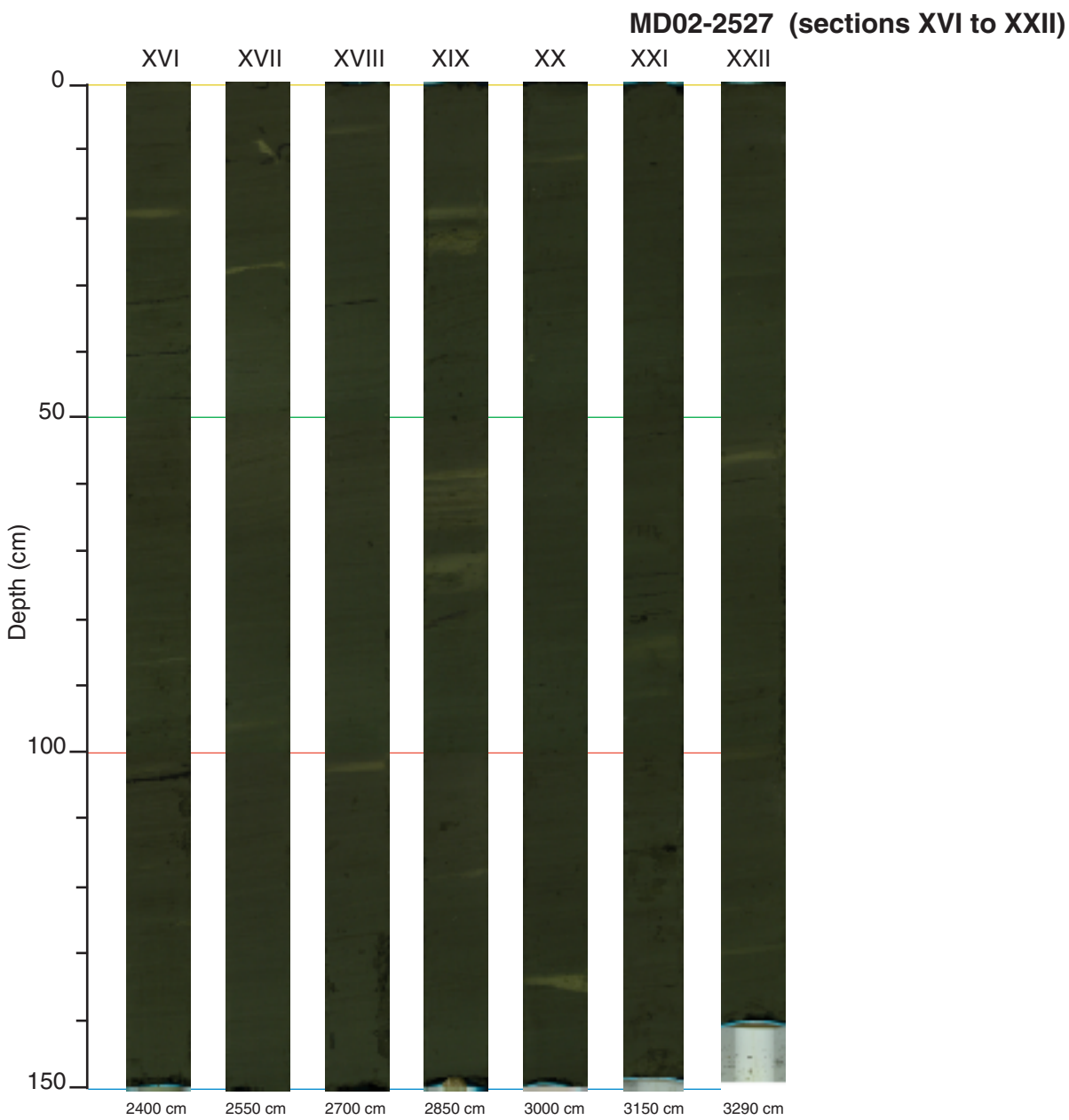


Comments

Very dark grey silty clay with abundant diatoms. Laminated throughout in bundles, massive in between. Pyrite-filled silico-flagellates.

End of core, 3290 cm.

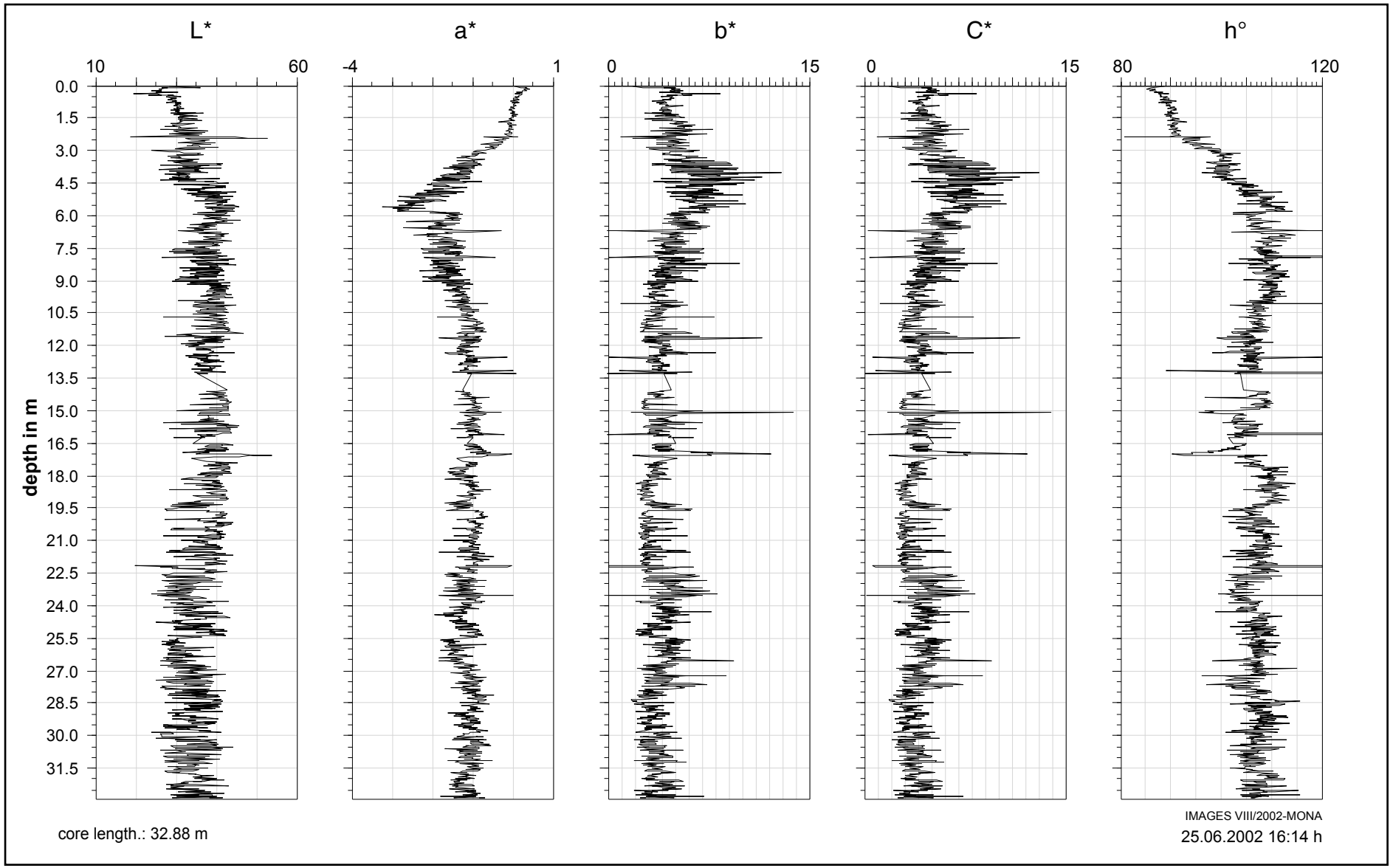

MD02-2527 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2527 (sections XVI to XXII)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3290 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

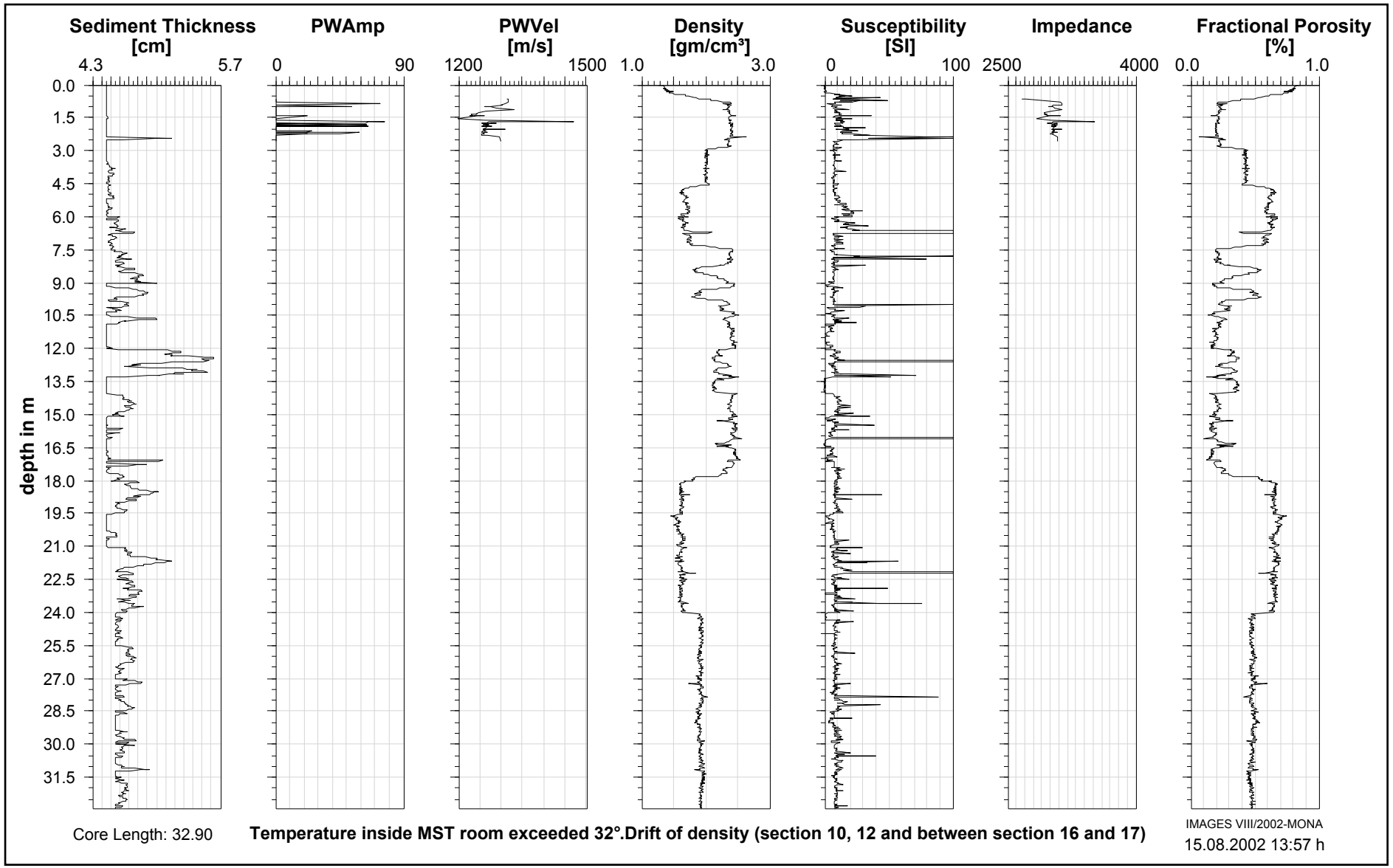
Station 30
Core MD02-2527



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 30
Core MD02-2527



Core Length: 32.90

Temperature inside MST room exceeded 32°.Drift of density (section 10, 12 and between section 16 and 17)

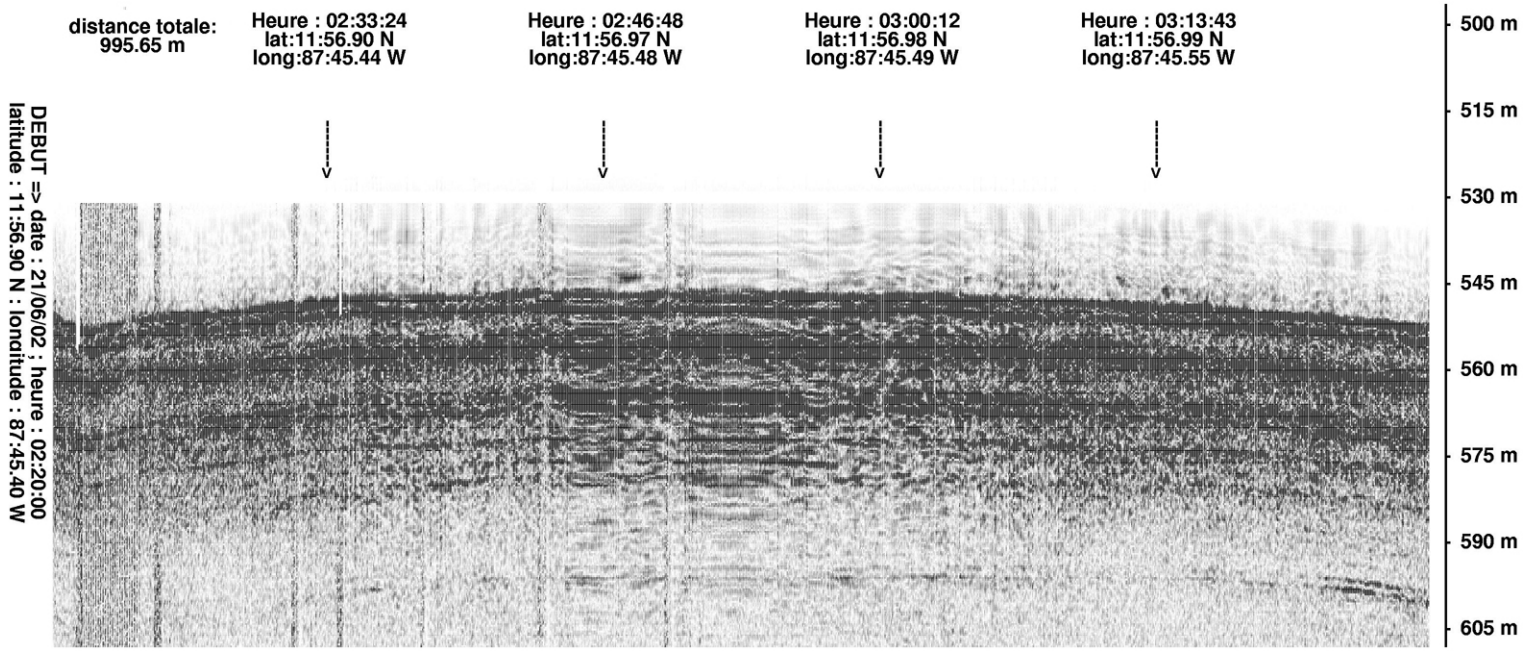
IMAGES VIII/2002-MONA
15.08.2002 13:57 h

IMAGES VIII, 2002
MONA

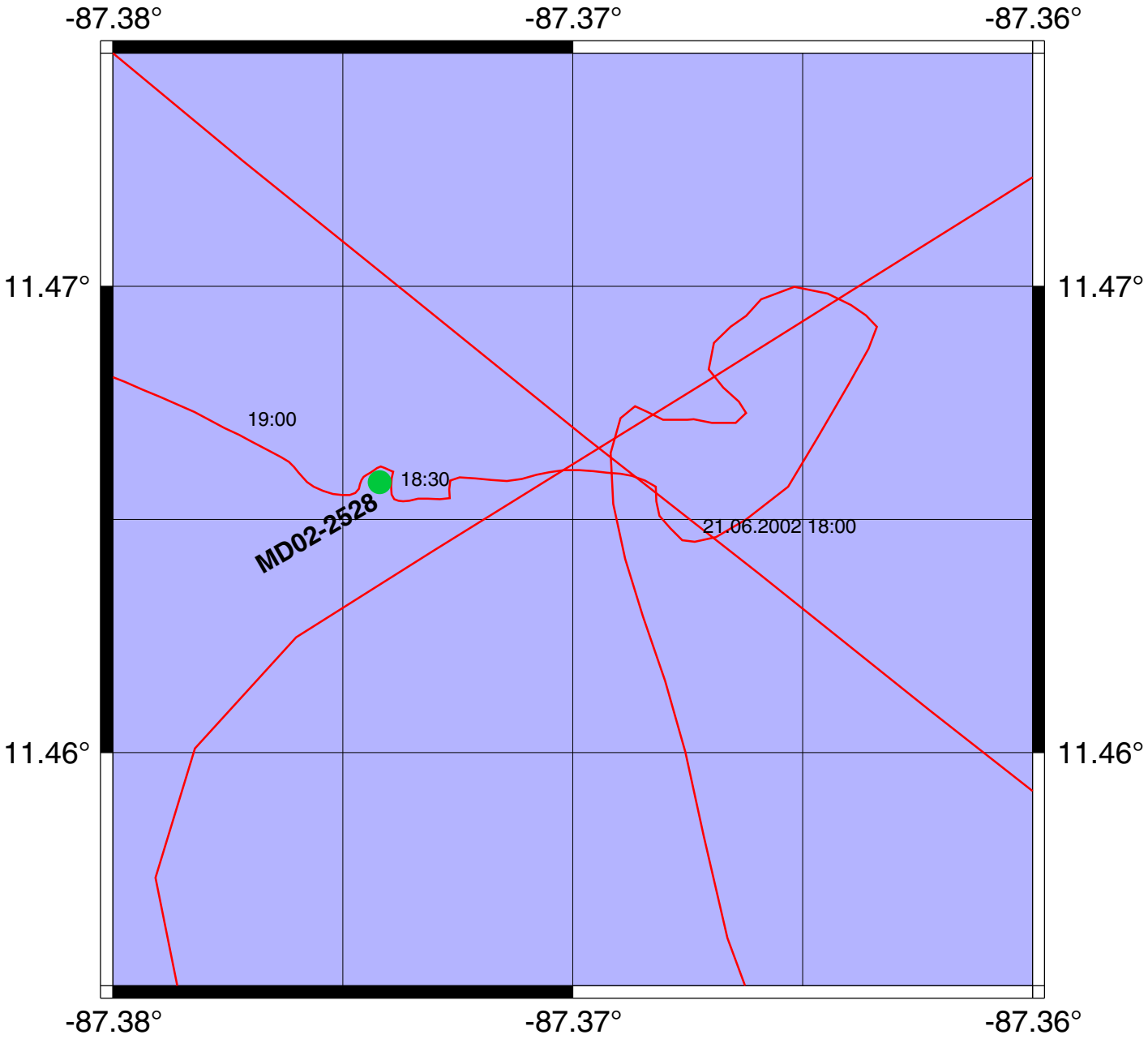
3.5 kHz Seismic Replay

Station 30,
Core MD02-2527

Station 30,Depature from Station



IMAGES VIII/MD126, Mona
Station 31 Nicaragua 3



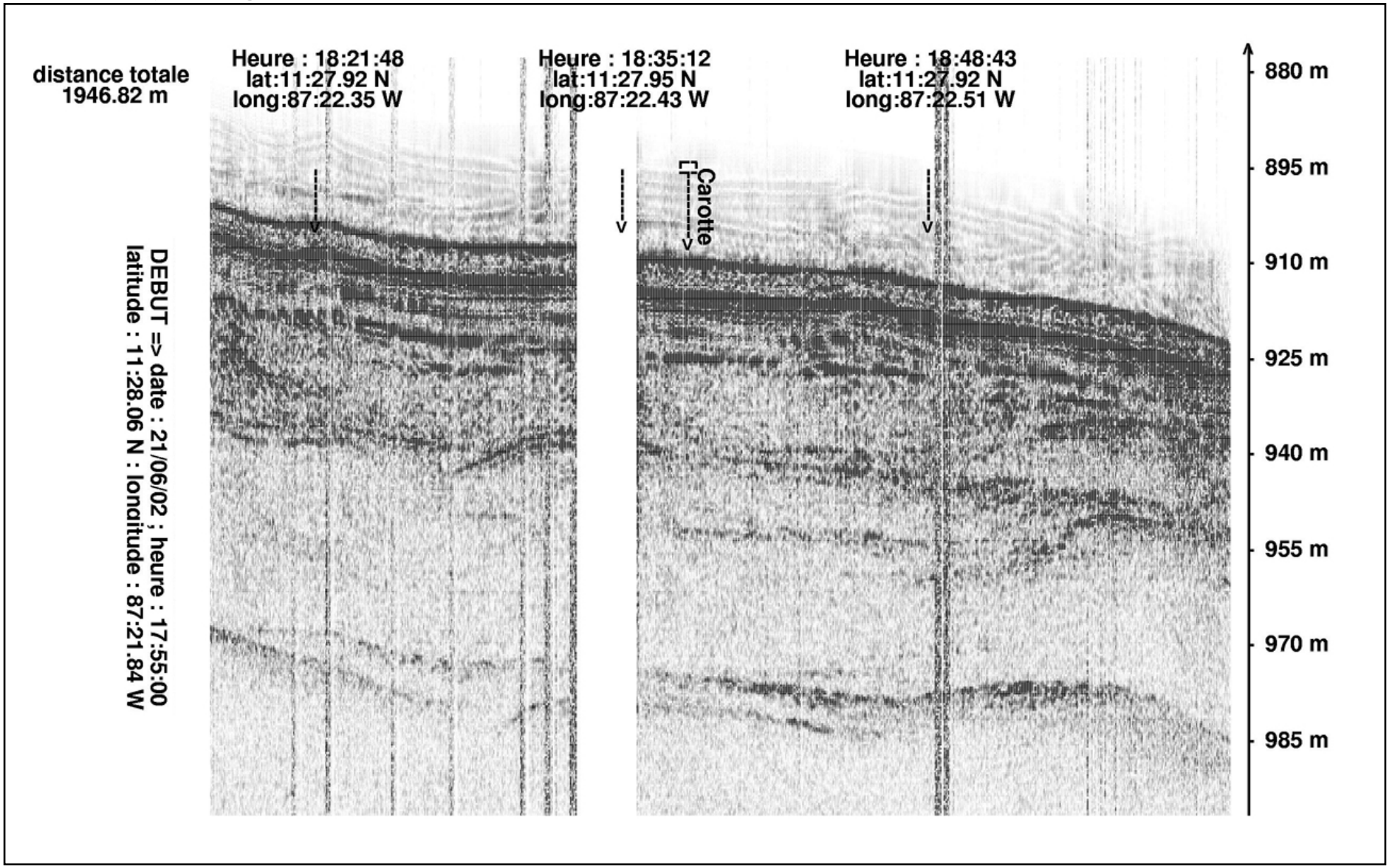
GMT 2002 Sep 26 12:28:32

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 31
Core MD02-2528

Station 31,Coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **21.06.2002**

N° de station : **31**
Nicaragua 3

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2528

(MD - année - milles - centaines)

CAROTTE (longueur) :

29.76 m

POSITION :

Latitude : **011° 27.95 N**

Longitude : **087° 22.45 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **849.50** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **18:00**

Début manœuvre : **18:20**

Déclenchement : **18:38**

Fin de manœuvre : **19:36**

Durée de manœuvre : **01:16**

Départ station : **19:36**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2528

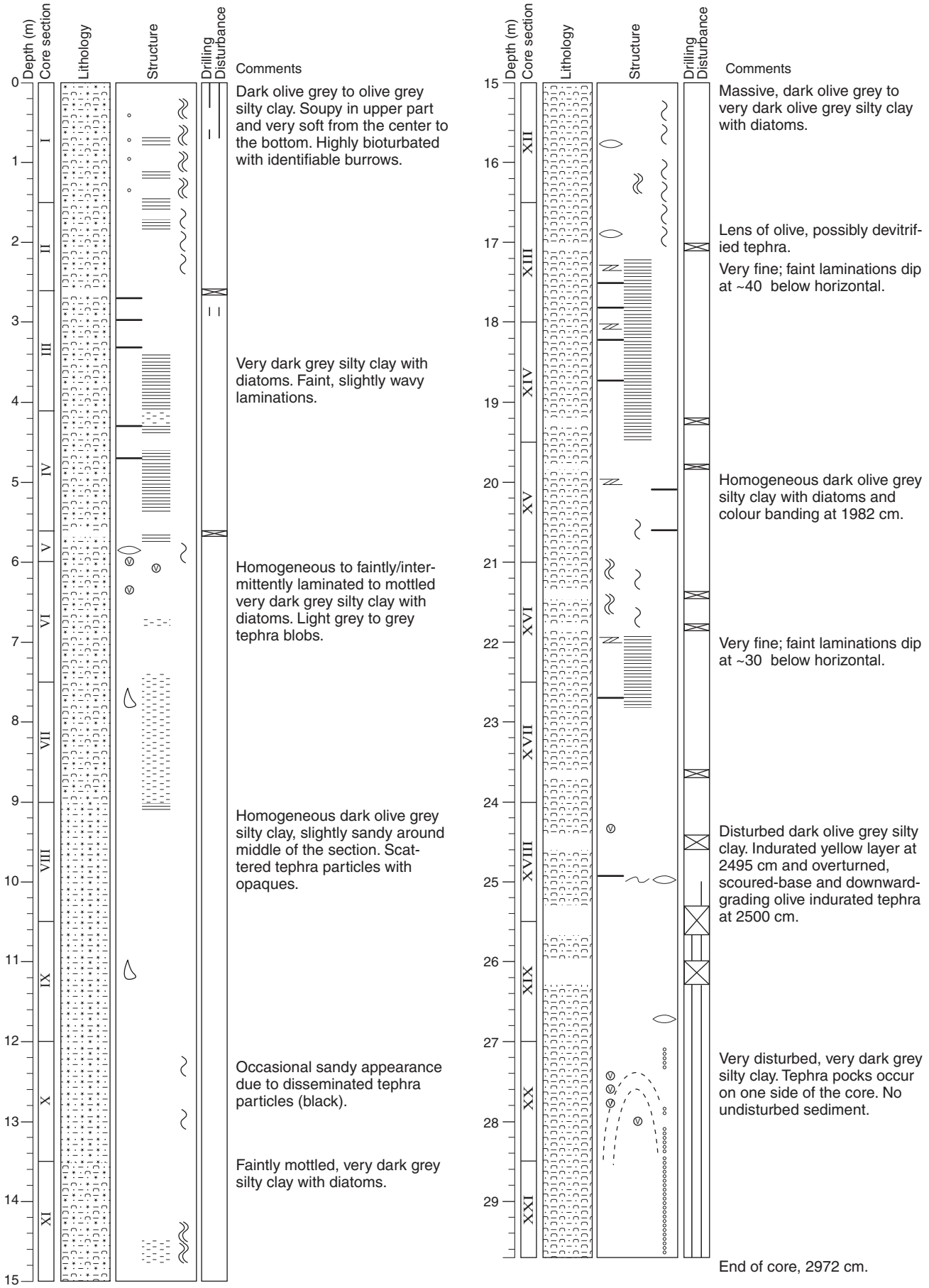
(Station 31 ; Latitude : 11° 27. 95N ; Longitude : 87° 22. 45W ; 850m water depth) has recovered a total of 29.60m of sediment. The sediment has been heavily disturbed by coring from top to 0.70m (Section I) and from 25.00m (Section XVIII) to the bottom of the core at 29.60m (Section XXI). Some empty intervals, 5cm to 20cm long, are also present.

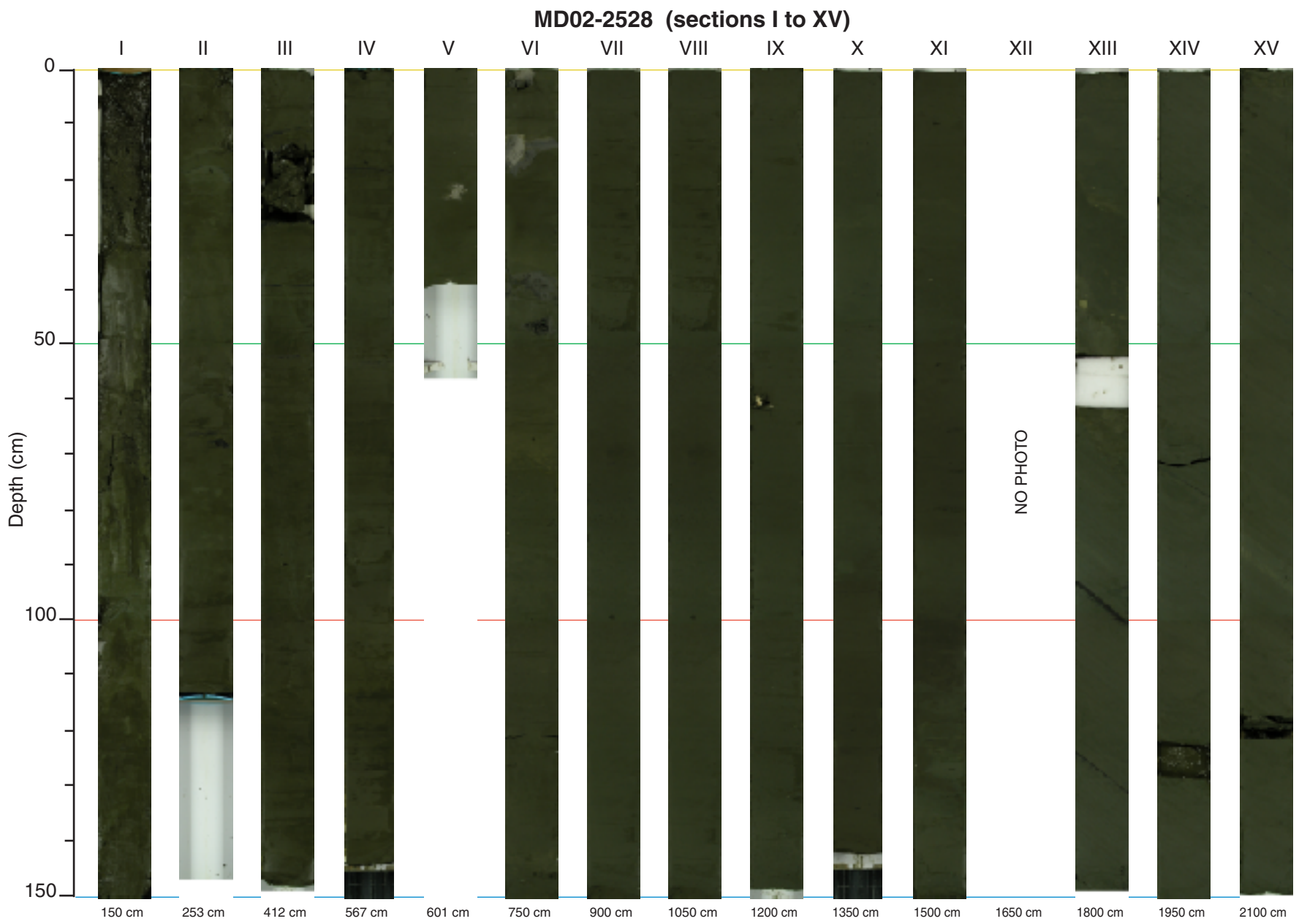
The dominant sediment consists of silty clay, olive grey and dark olive grey to very dark grey in color. The sediment is mostly massive with some bioturbated intervals, especially from top to 2.40m (Section II), from 14.20m (Section XI) to 17.00m (Section XIII), and from 20.40m (Section XV) to 21.80m (Section XVI). Some laminated intervals are also present, especially from 3.40m (Section III) to 5.40m (Section IV), from 17.20m (Section XIII) to 19.50m (Section XIV), and from 21.90m (Section XVI) to 22.80m (Section XVII). Laminations and other structures from 17.20m (Section XIII) to 22.80m (Section XVII) dip at a 30° to 40° angle.

Minor lithology includes :
- Layers and lenses of volcanic glass sometimes devitrified, light grey to grey and olive in color, throughout the core.

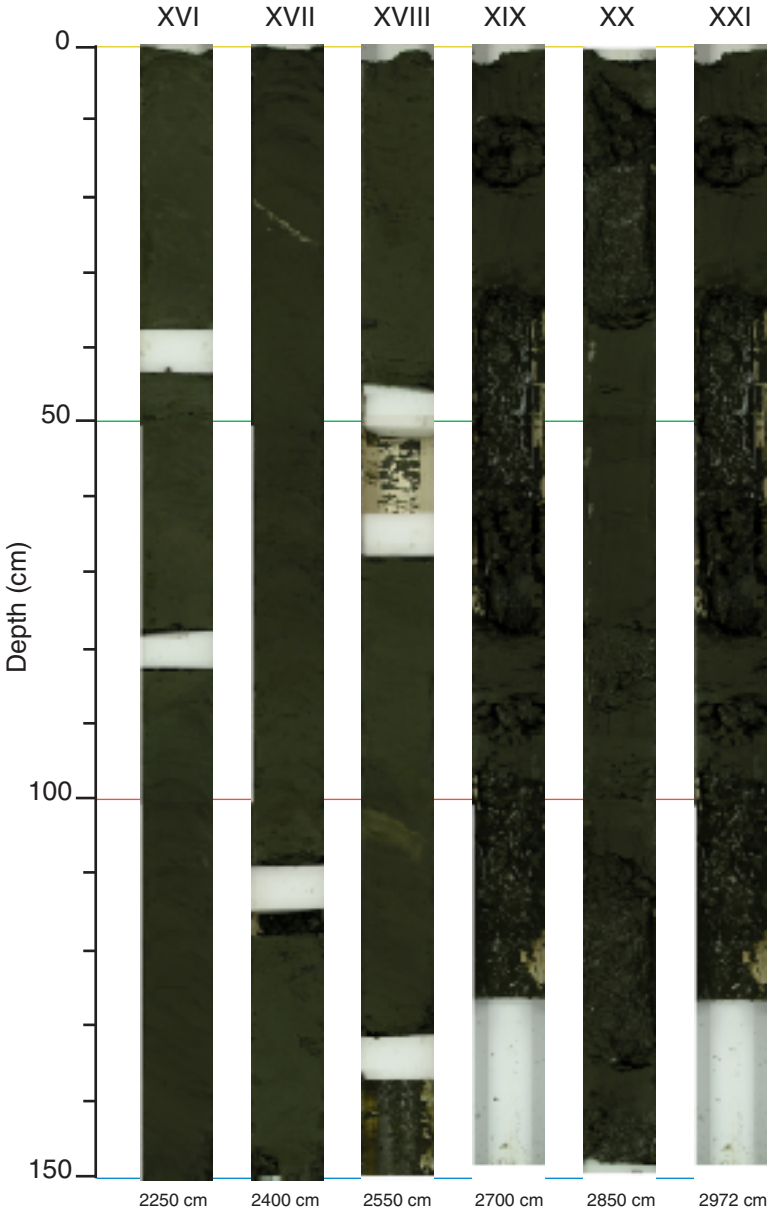
MONA

Core: MD02-2528




MD02-2528 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
NO PHOTO
150 cm
253 cm
412 cm
567 cm
601 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm

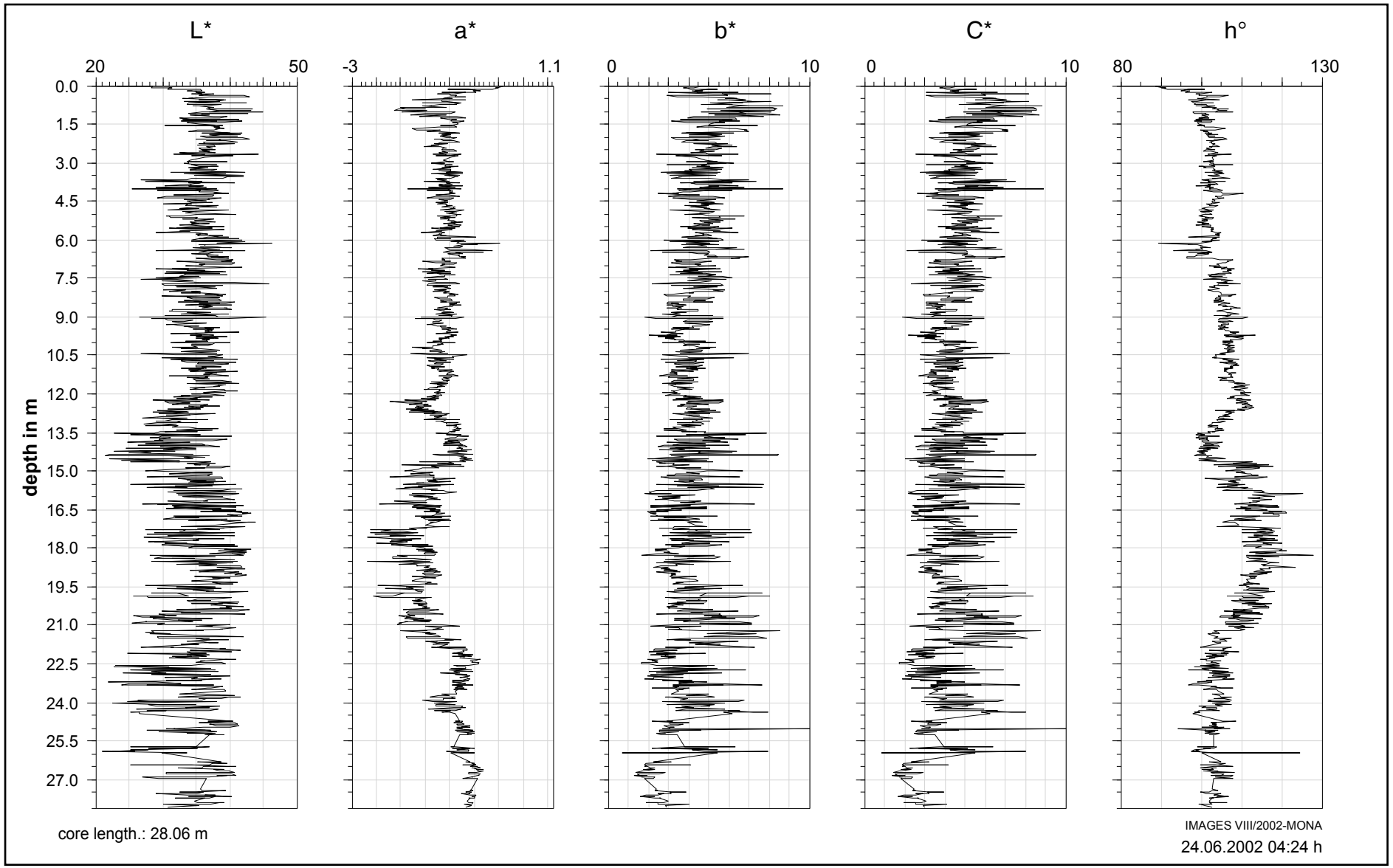
MD02-2528 (sections XVI to XXI)



IMAGES VIII, 2002
MONA

Colour Reflectivity

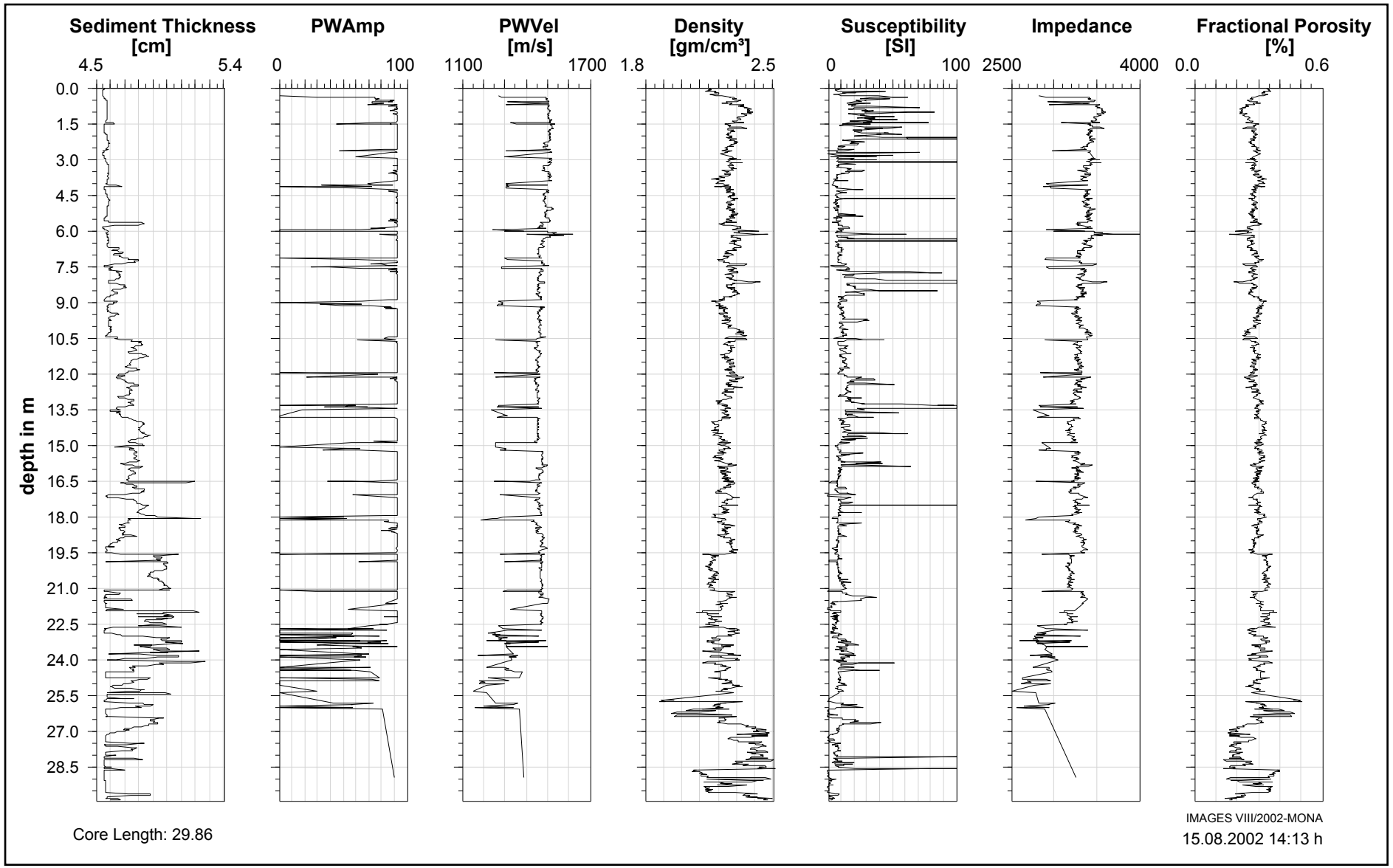
Station 31
Core MD02-2528



IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 31
Core MD02-2528

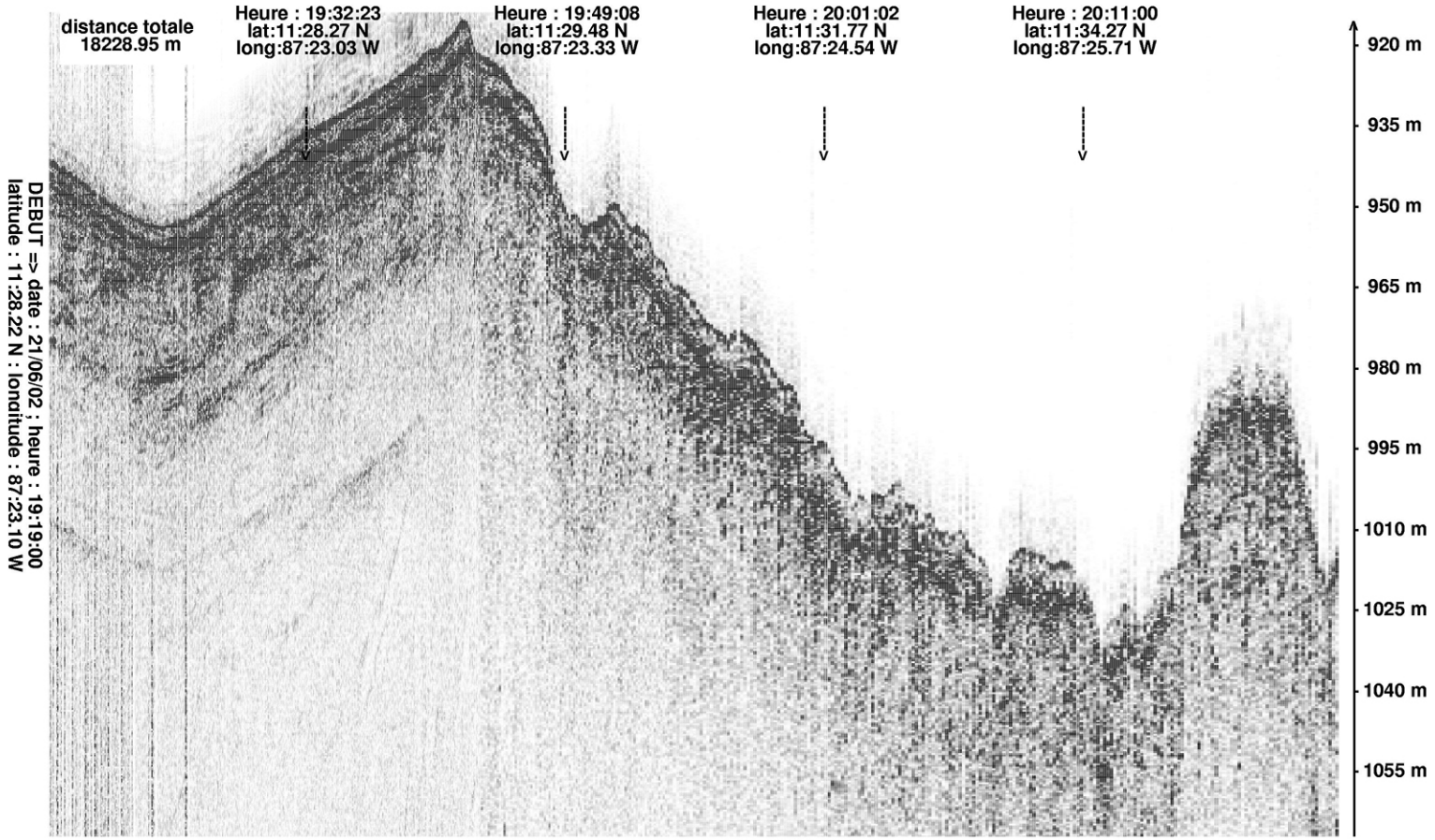


IMAGES VIII, 2002
MONA

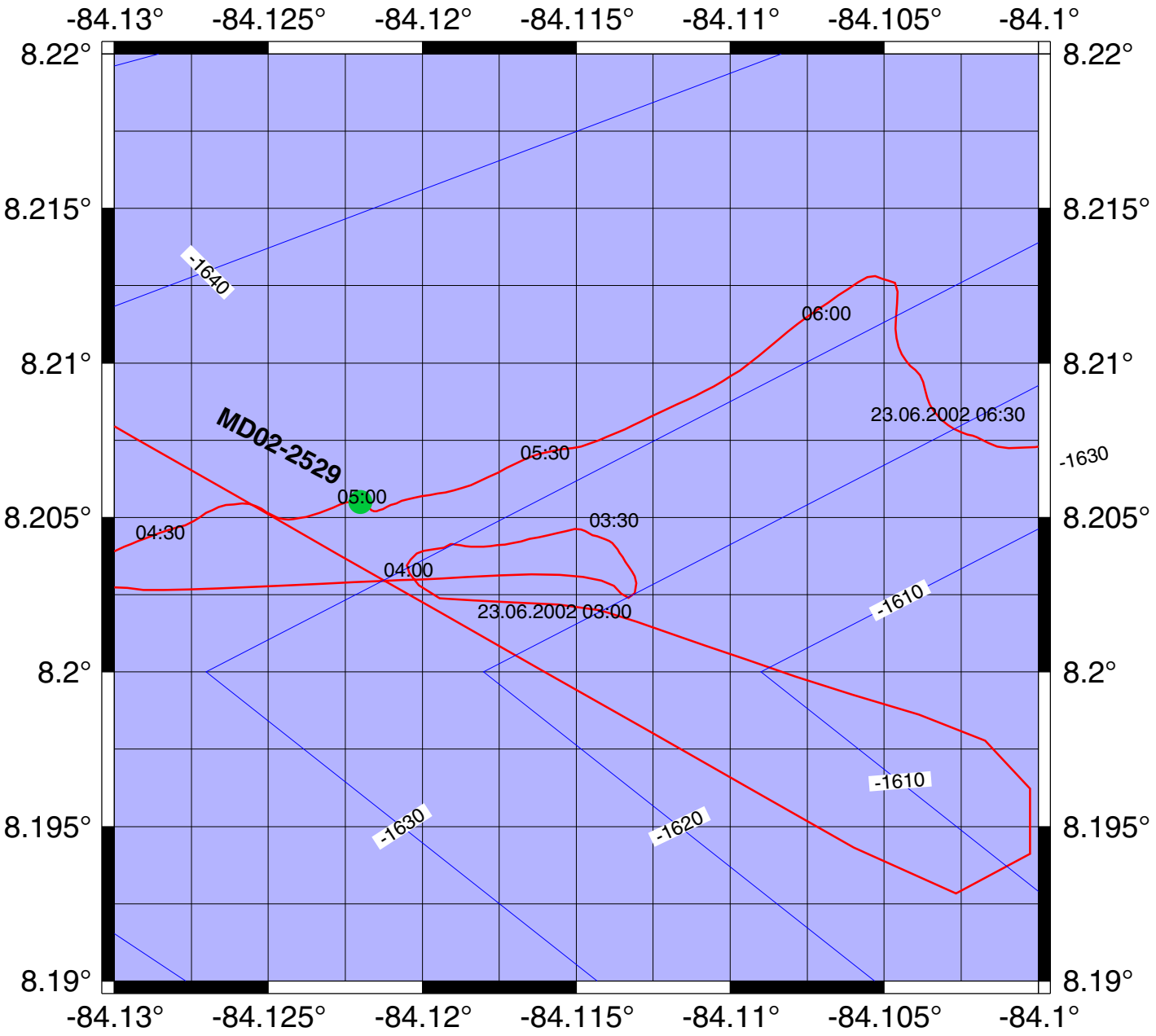
3.5 kHz Seismic Replay

Station 31,
Core MD02-2528

Station 31,Depature from Station



IMAGES VIII/MD126, Mona
Station 32, Cocos Ridge



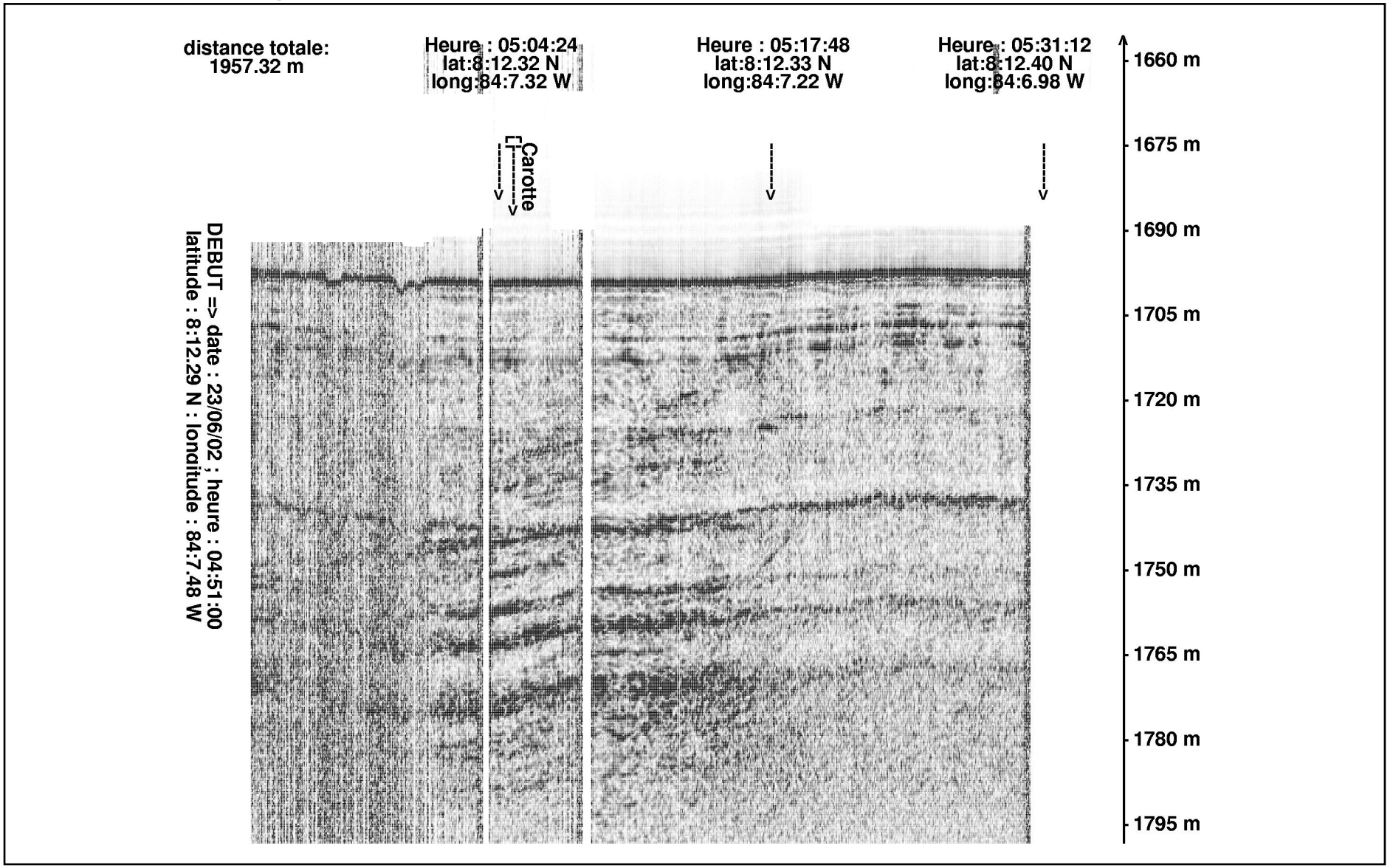
GMT 2002 Sep 26 12:30:46

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 32
Core MD02-2529

MD02-2529,Coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **23.06.2002**

N° de station : **32**
Cocos Ridge

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2529

(MD - année - milles - centaines)

CAROTTE (longueur) :

35.12 m

POSITION :

Latitude : **008° 12.33 N**

Longitude : **084° 07.32 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **1 619** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **03:09**

Début manœuvre : **04:37**

Déclenchement : **05:05**

Fin de manœuvre : **06:03**

Durée de manœuvre : **01:26**

Départ station : **06:03**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) : **OUI**

Filet à plancton :

Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2529

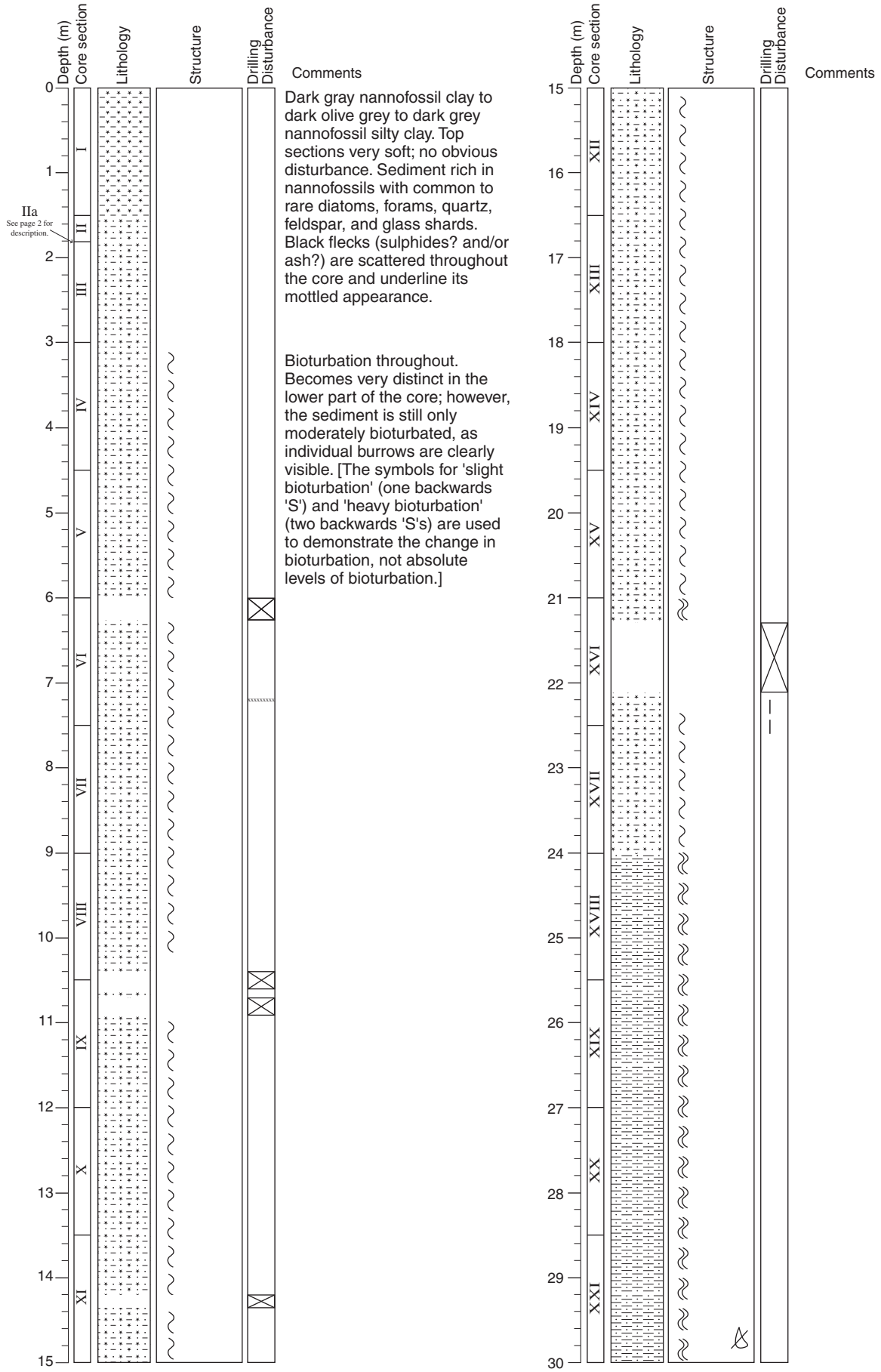
(Station 32 ; Latitude : 08° 12. 33N ; Longitude : 89° 07. 87W ; 1619m water depth) has recovered a total of 36.25m of sediment. The sediment has generally not been disturbed by coring, with the exception of empty intervals from 6.00m to 6.30m (Section VI), from 10.40m (Section VIII) to 11.00m (Section IX), from 14.20m to 14.40m (Section XI), and from 21.30m to 22.15m (Section XVI). About 1.20m of sediment was left in core barrel during opening operations on the deck, later discovered and numbered as Section IIA.

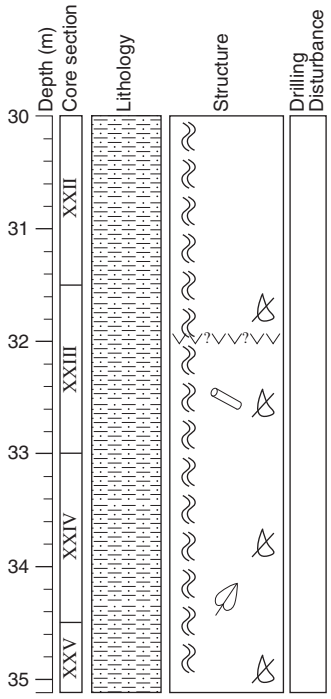
The dominant sediment consists of nannofossil clay to nannofossil silty clay, dark grey to dark olive grey in color. With the exception of the uppermost 3.00m (down to Section III), the sediment is extensively bioturbated, with an increase in the degree of bioturbation below 24.00m (Section XVIII). Shell, seed and wood fragments are present from 29.60m (Section XXI) to the bottom of the core.

Minor lithology includes :
- Ash layer and volcanic fragments in Section XXIII.

MONA

Core: MD02-2529





Comments

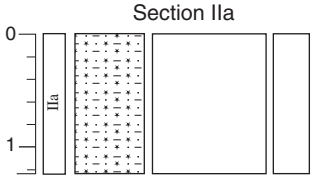
Appears increasingly sandy down section.

Pebble-sized volcanic fragments.

Radiolaria common.

5-cm-diameter plant seed.

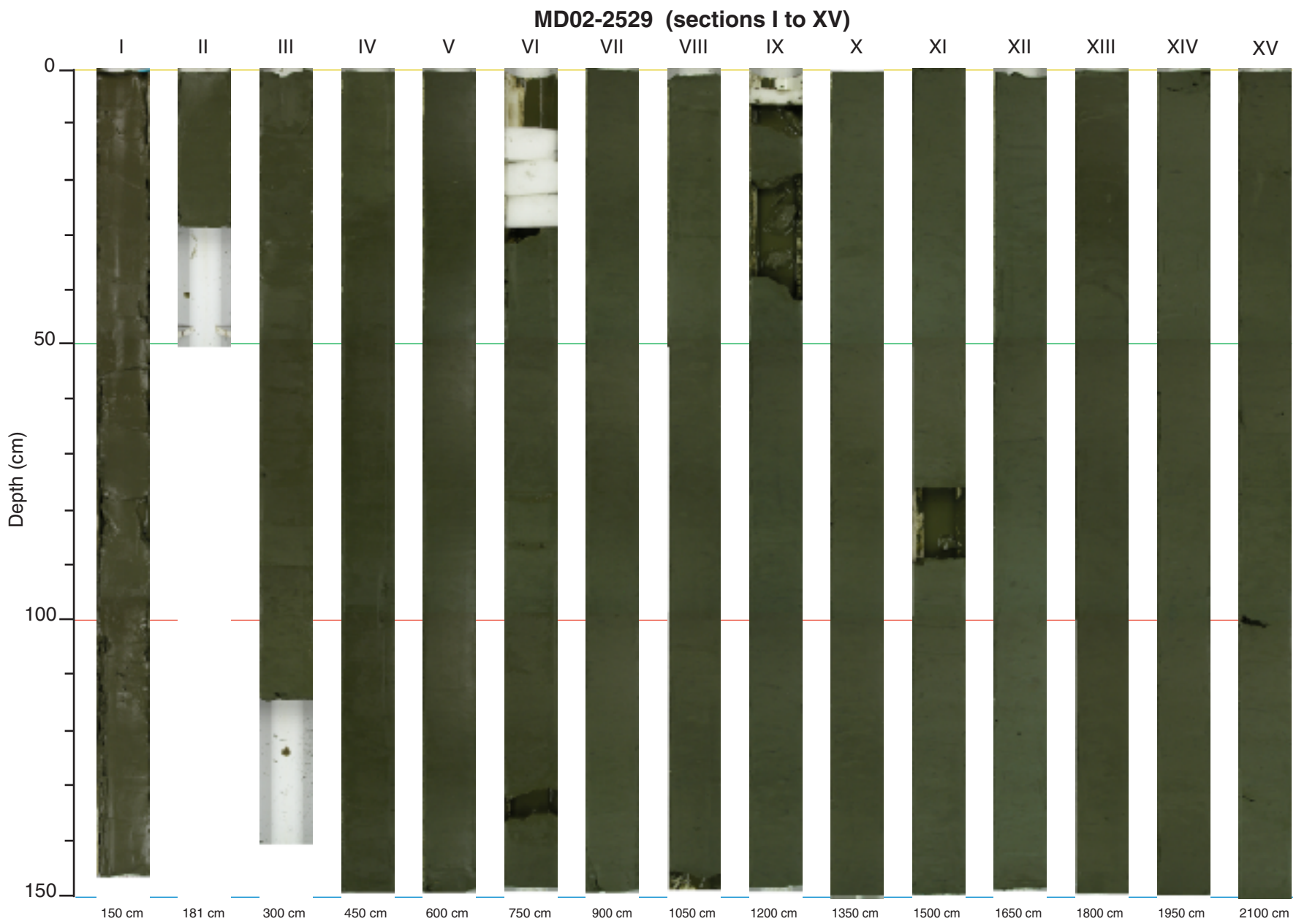
End of core, 3512 cm.

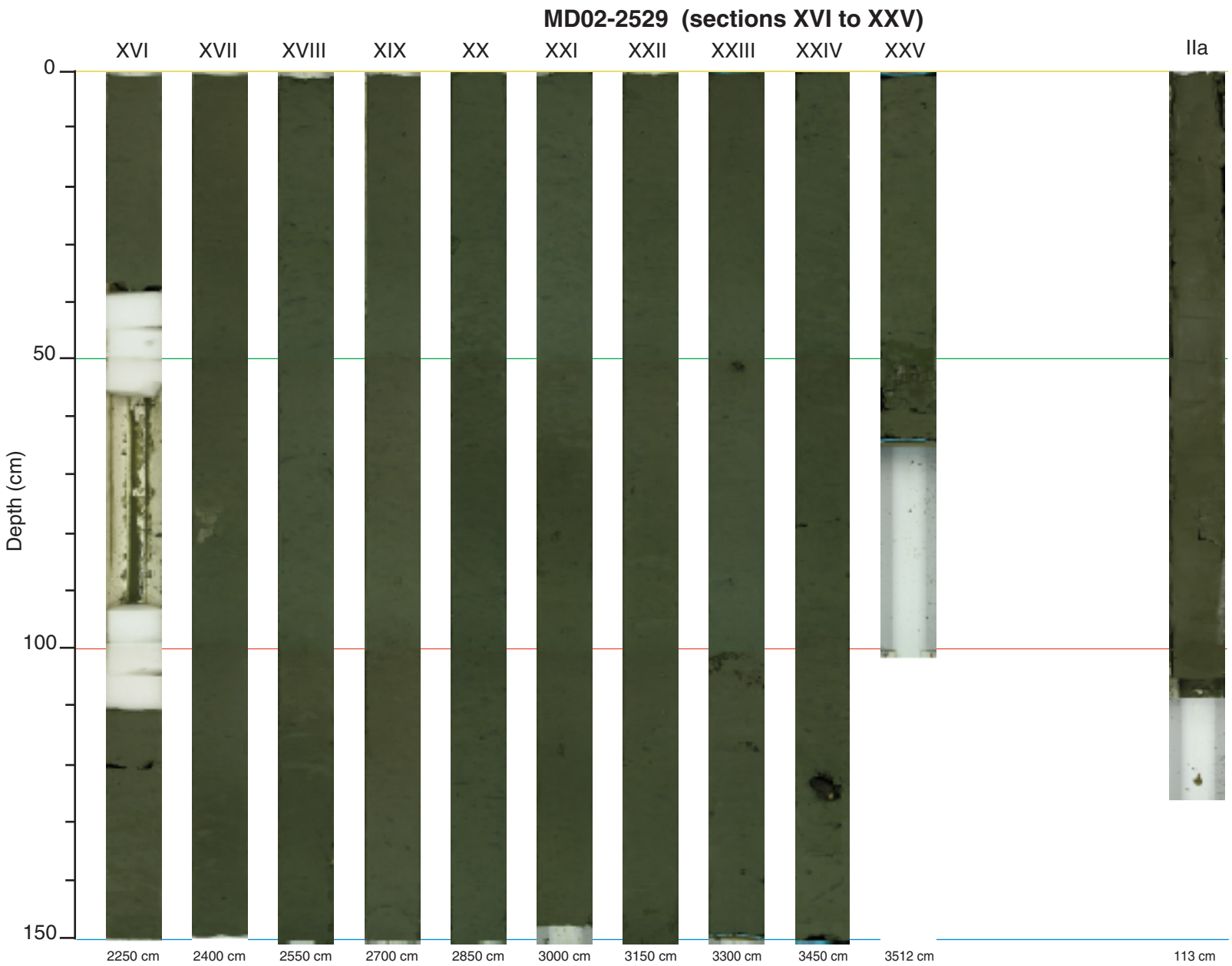


Section was left in core barrel and discovered after the entire remainder of the core had been numbered.

Length of section, 113 cm.

Total core length, 3625 cm.

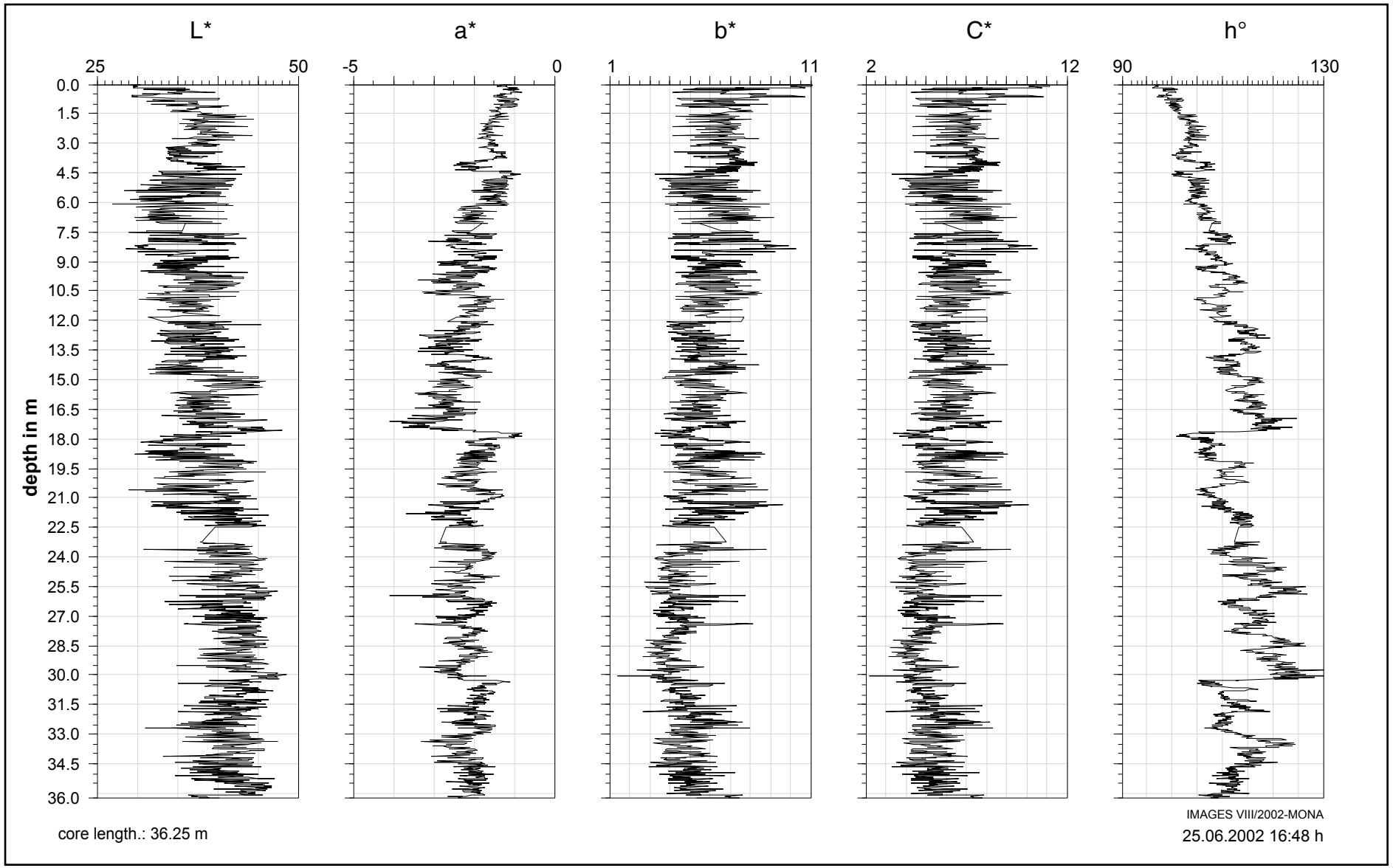

MD02-2529 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
181 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm


MD02-2529 (sections XVI to XXV)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
IIa
0
50
100
150
Depth (cm)
2250 cm
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3512 cm
113 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

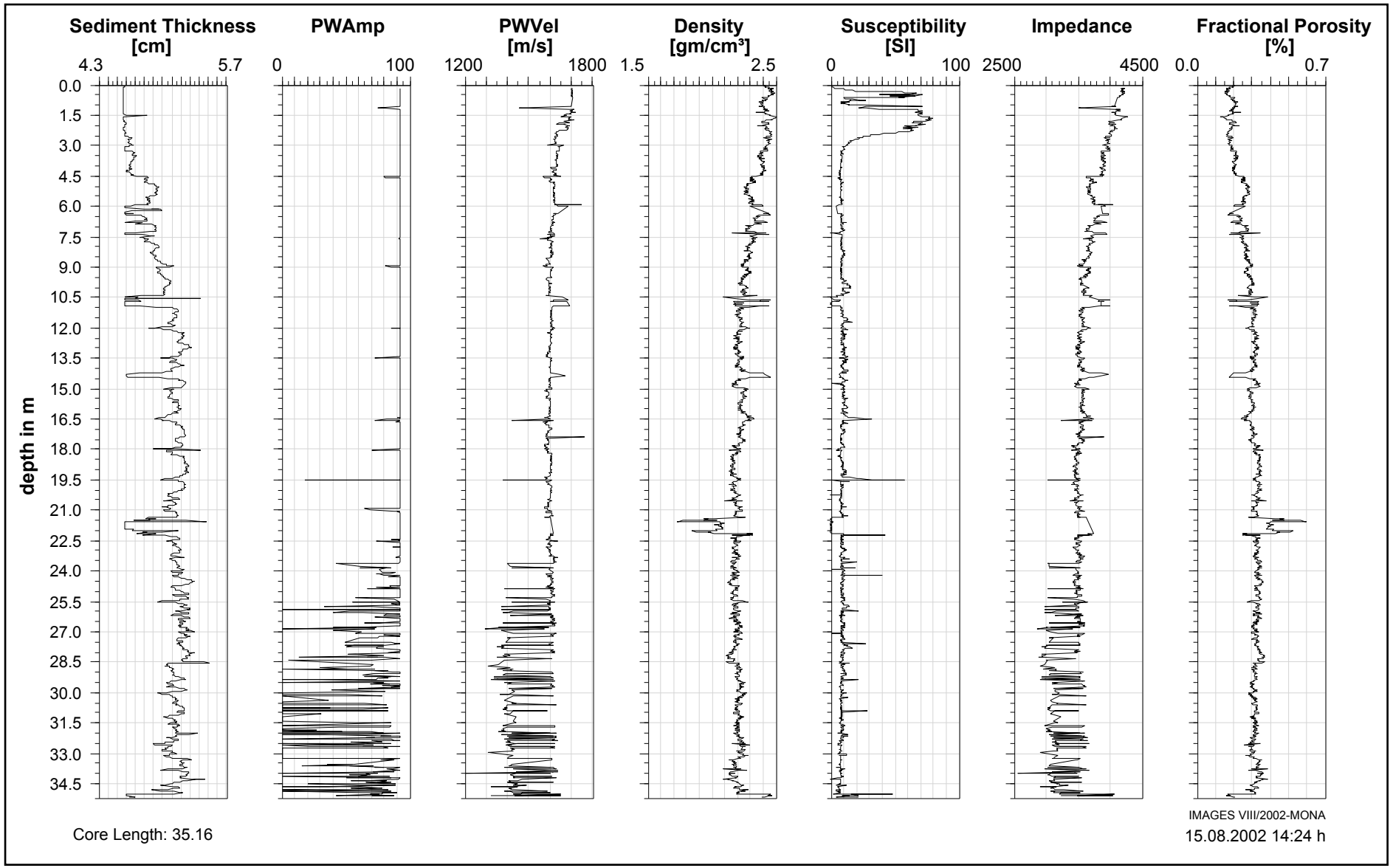
Station 32
Core MD02-2529



IMAGES VIII, 2002
MONA

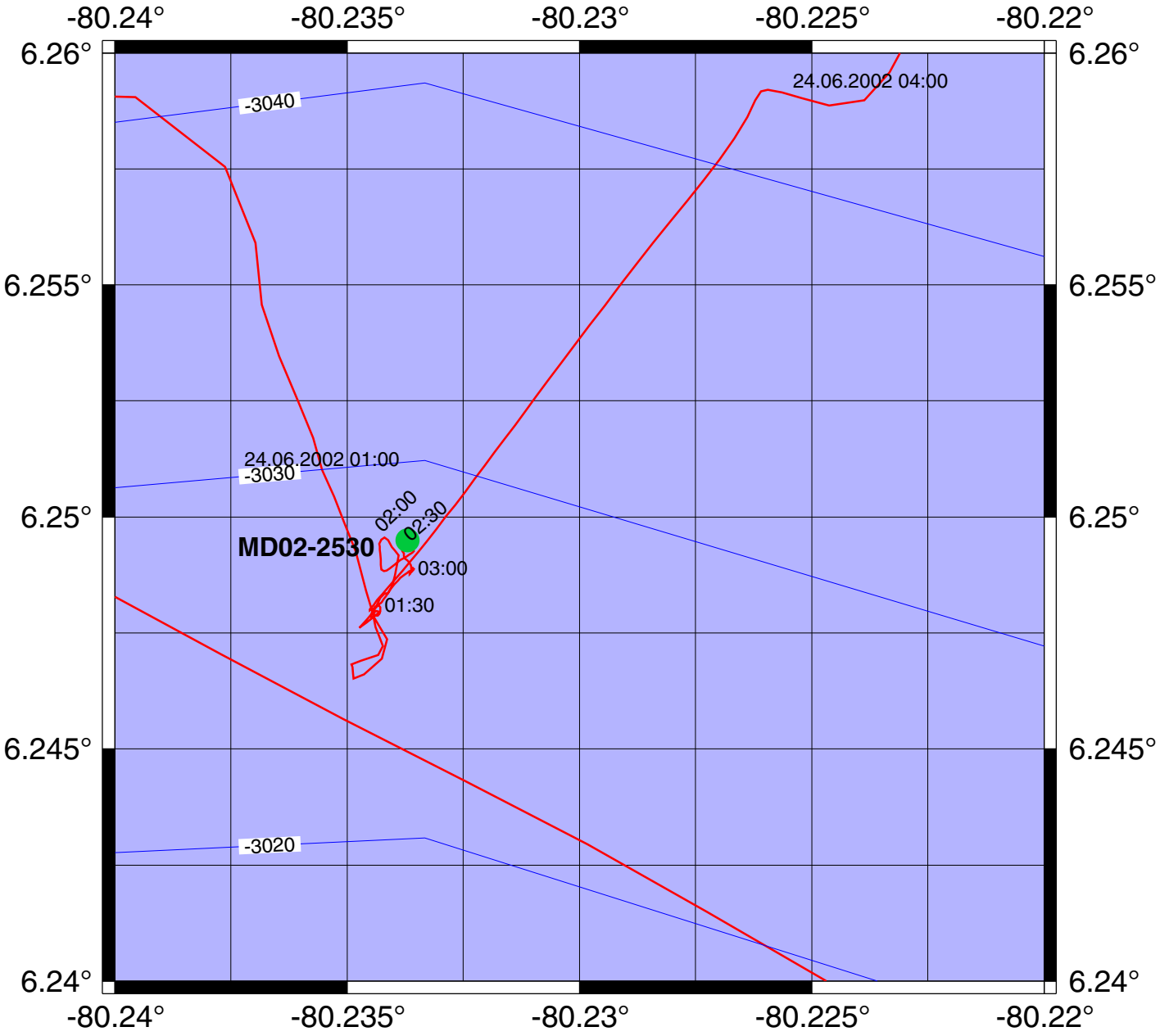
Multi Sensor Core Logger

Station 32
Core MD02-2529



Core Length: 35.16

IMAGES VIII/MD126, Mona
Station 33 Coiba Ridge



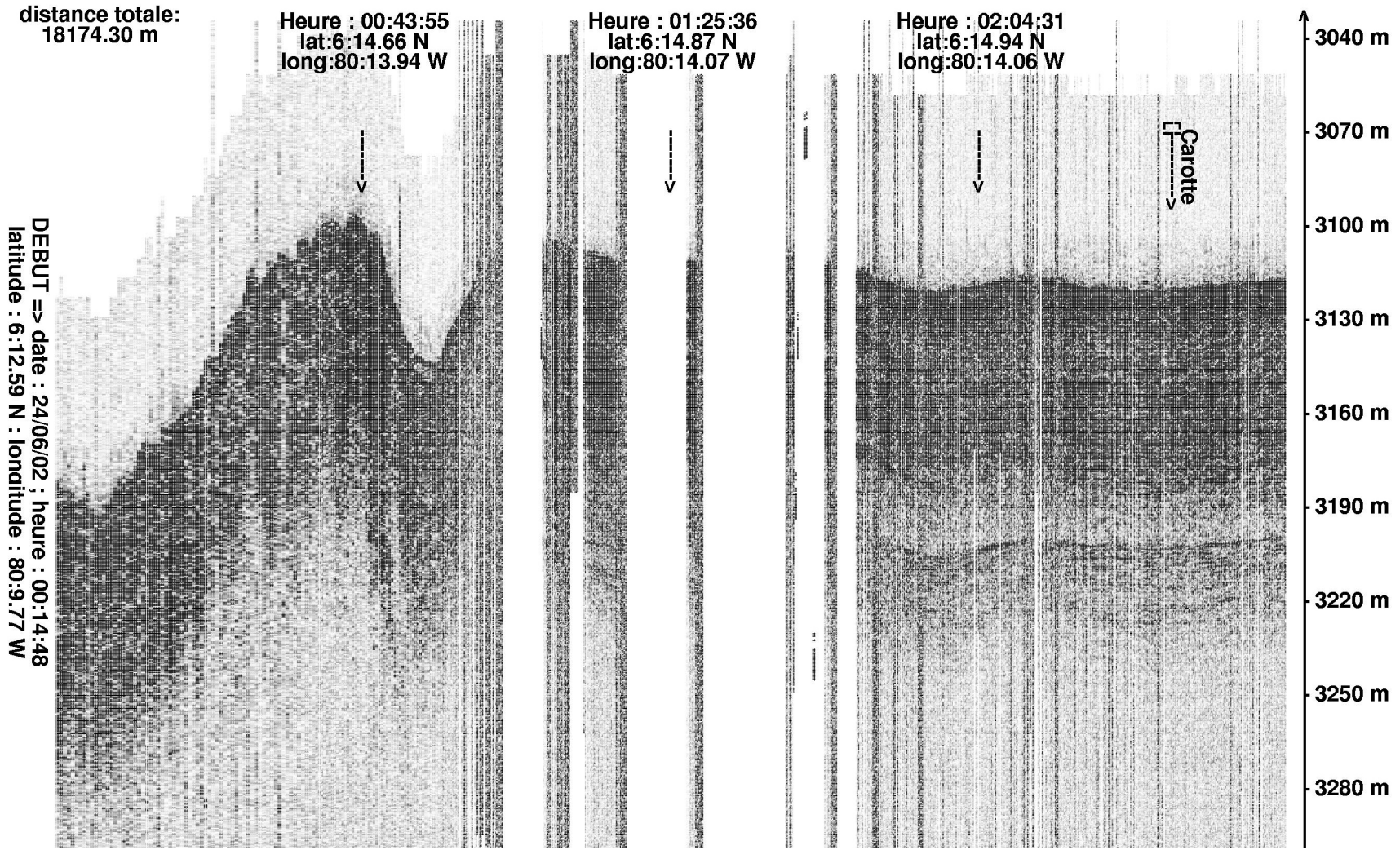
GMT 2002 Sep 26 12:32:45

IMAGES VIII, 2002
MONA

3.5 kHz Seismic Replay

Station 33
Core MD02-2530

MD02-2530,Coring operation



NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **24.06.2002**

N° de station : **33**
Coiba Ridge

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2530

(MD - année - milles - centaines)

CAROTTE (longueur) :

35.98 m

POSITION :

Latitude : **006° 14.97 N**

Longitude : **080° 14.02 W**

CAROTTIER (type) (1) : **CALYPSO**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **3 045** **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **01:17**

Début manœuvre : **01:35**

Déclenchement : **02:25**

Fin de manœuvre : **03:35**

Durée de manœuvre : **02:00**

Départ station : **03:35**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

Calypso Core MD 02-2530

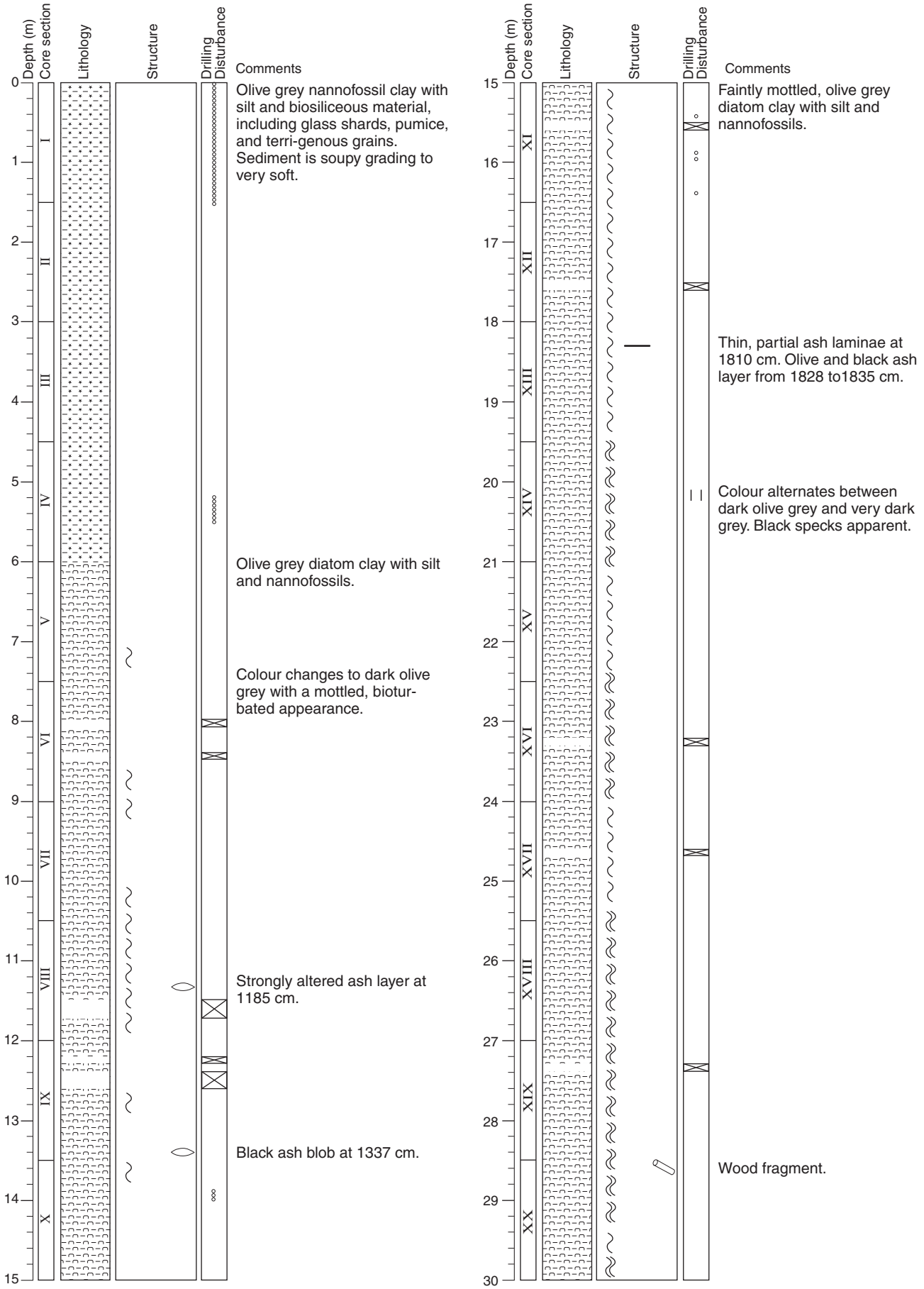
(Station 33 ; Latitude : 06° 14. 93N ; Longitude : 80° 14. 05W) ; 3045m water depth) has recovered a total of 35.99m of sediment. The sediment is soupy from top to 1.50m (Section I), and from 5.20m to 5.50m (Section IV). Empty intervals, 10cm to 30cm long, are present in Sections VI, VIII, IX, XI, XII, XVI, XVII, and XIX.

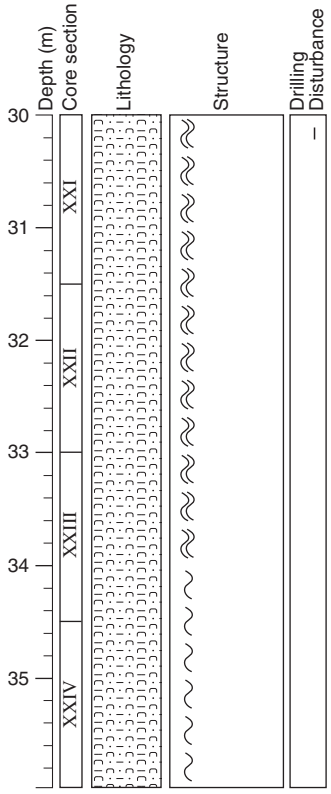
The dominant sediment consists of nannofossil clay, diatom clay, and diatom silty clay. The colors range from olive grey and dark olive grey to very dark grey. The sediment is mostly massive, with some slightly bioturbated intervals, from top to 15.00m (Section X). The lower part of the core, from 15.00m (Section XI) to the bottom, is continuously bioturbated.

Minor lithology includes :
- A few layers and lenses of volcanic ash, olive to black, from 11.00m (Section VIII) to 18.50m (Section XIII).

MONA

Core: MD02-2530



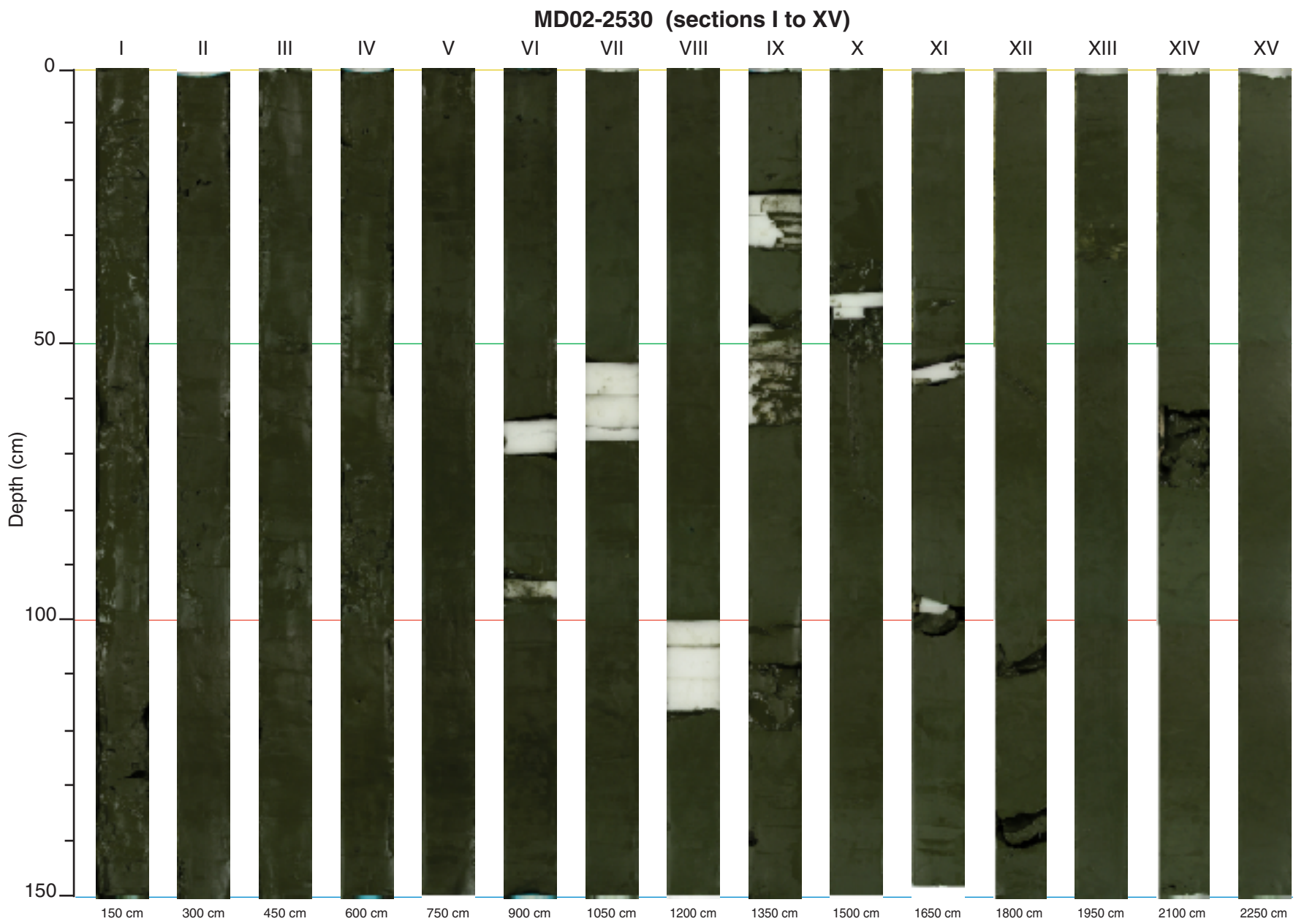


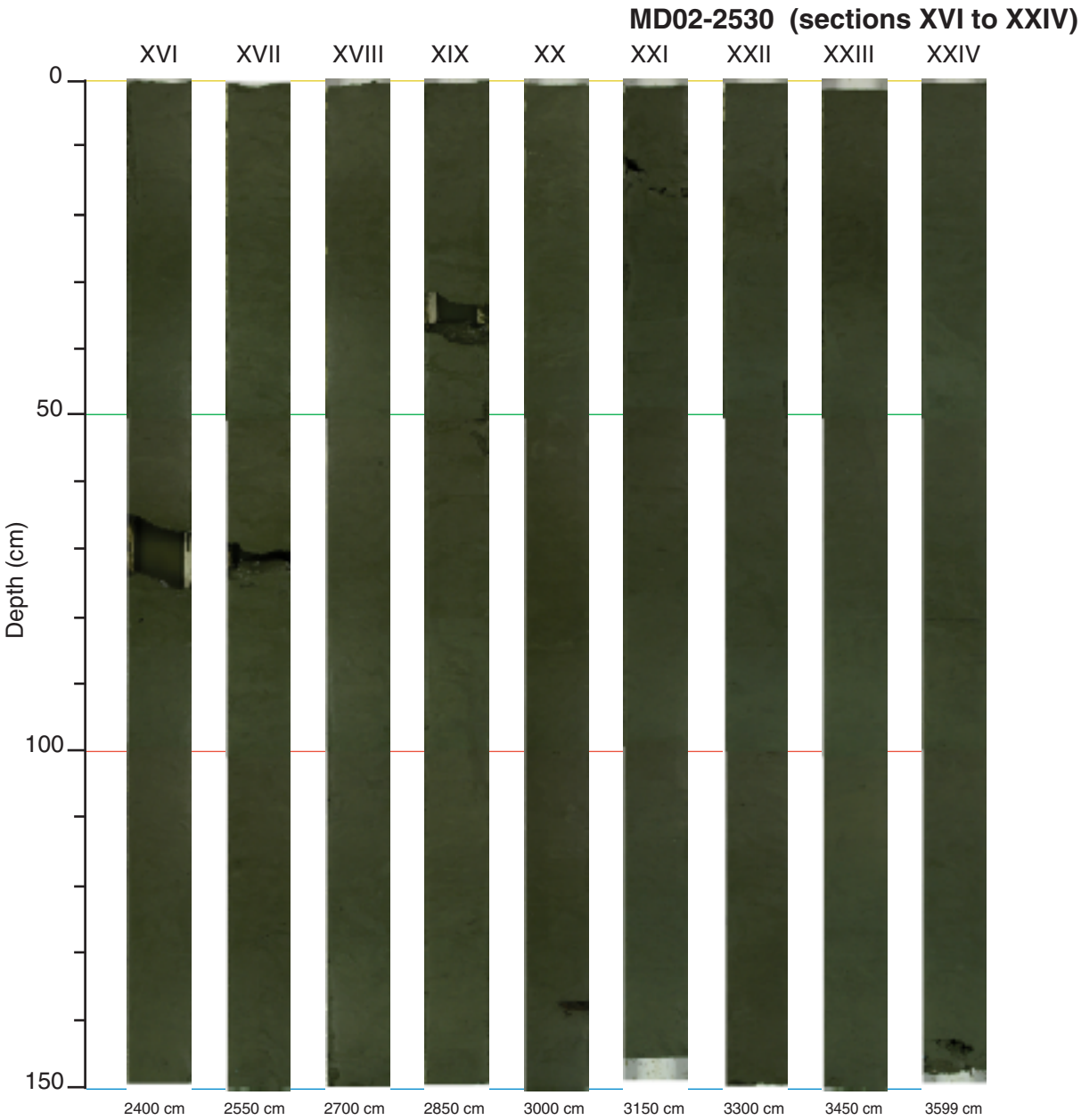
Comments

Very dark grey diatom silty clay with low to moderate bioturbation throughout. Some silt-filled burrows below 3070 cm.

Black specks present.

End of core, 3599 cm.

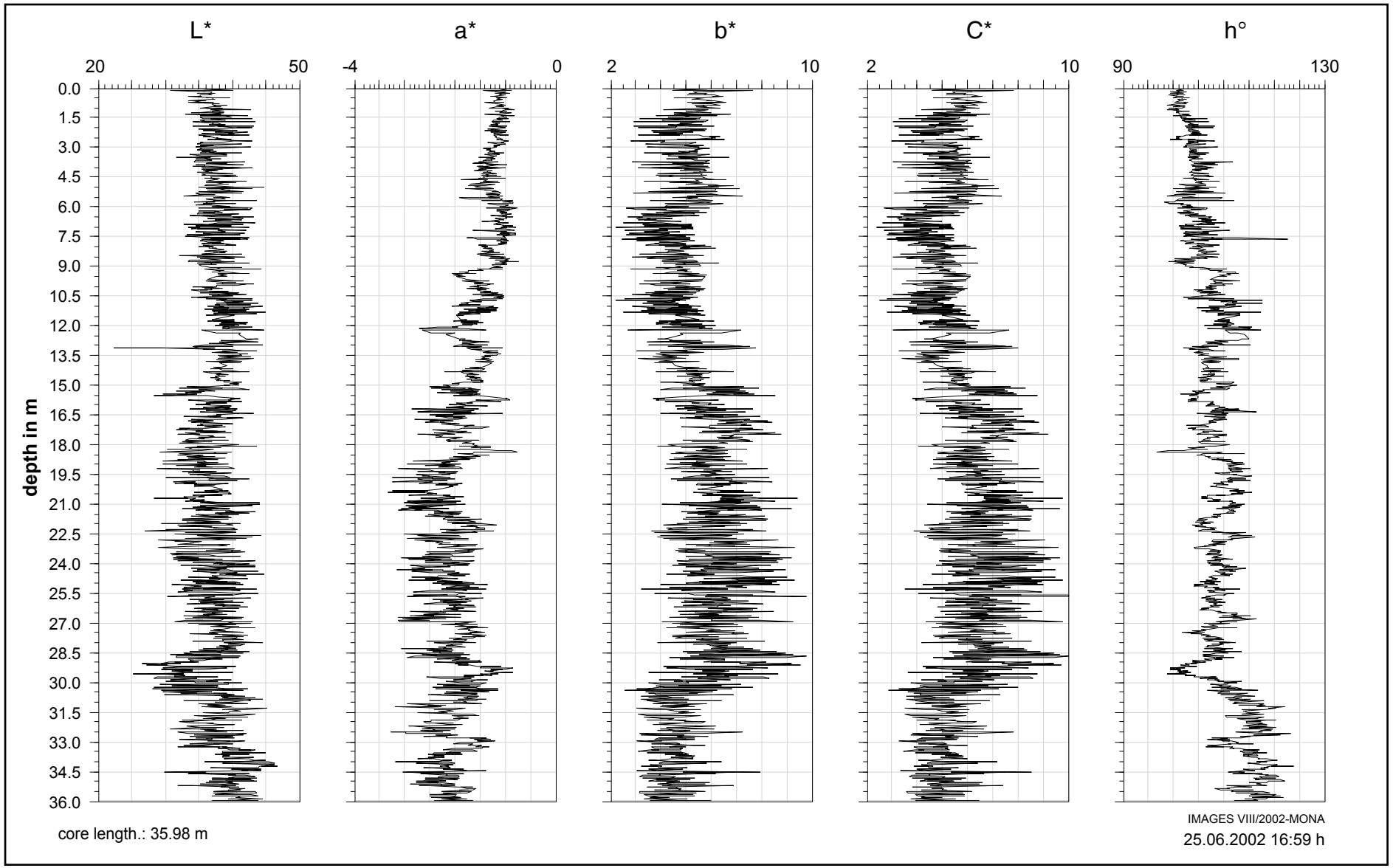

MD02-2530 (sections I to XV)
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
0
50
100
150
Depth (cm)
150 cm
300 cm
450 cm
600 cm
750 cm
900 cm
1050 cm
1200 cm
1350 cm
1500 cm
1650 cm
1800 cm
1950 cm
2100 cm
2250 cm


MD02-2530 (sections XVI to XXIV)
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
0
50
100
150
Depth (cm)
2400 cm
2550 cm
2700 cm
2850 cm
3000 cm
3150 cm
3300 cm
3450 cm
3599 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

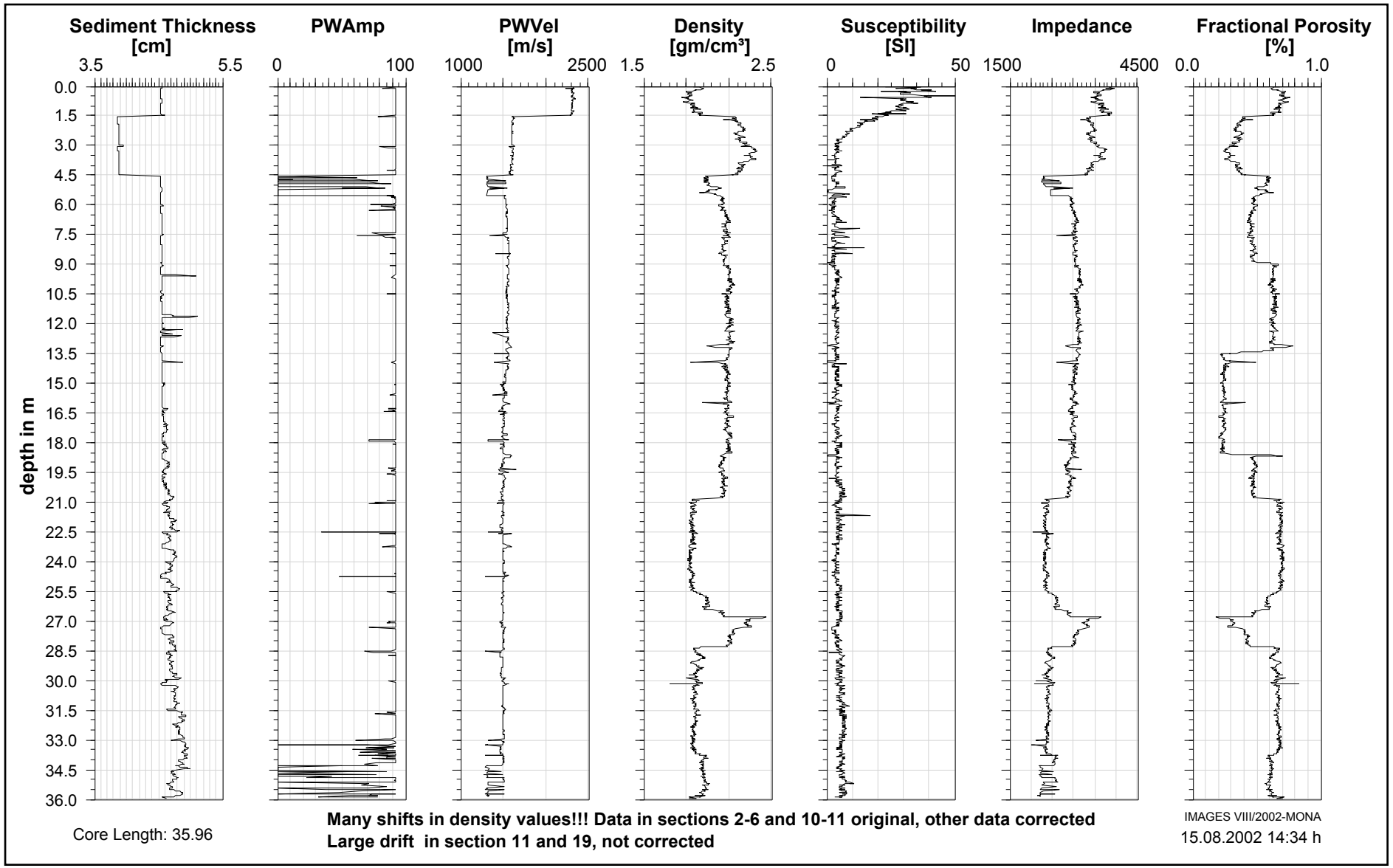
Station 33
Core MD02-2530



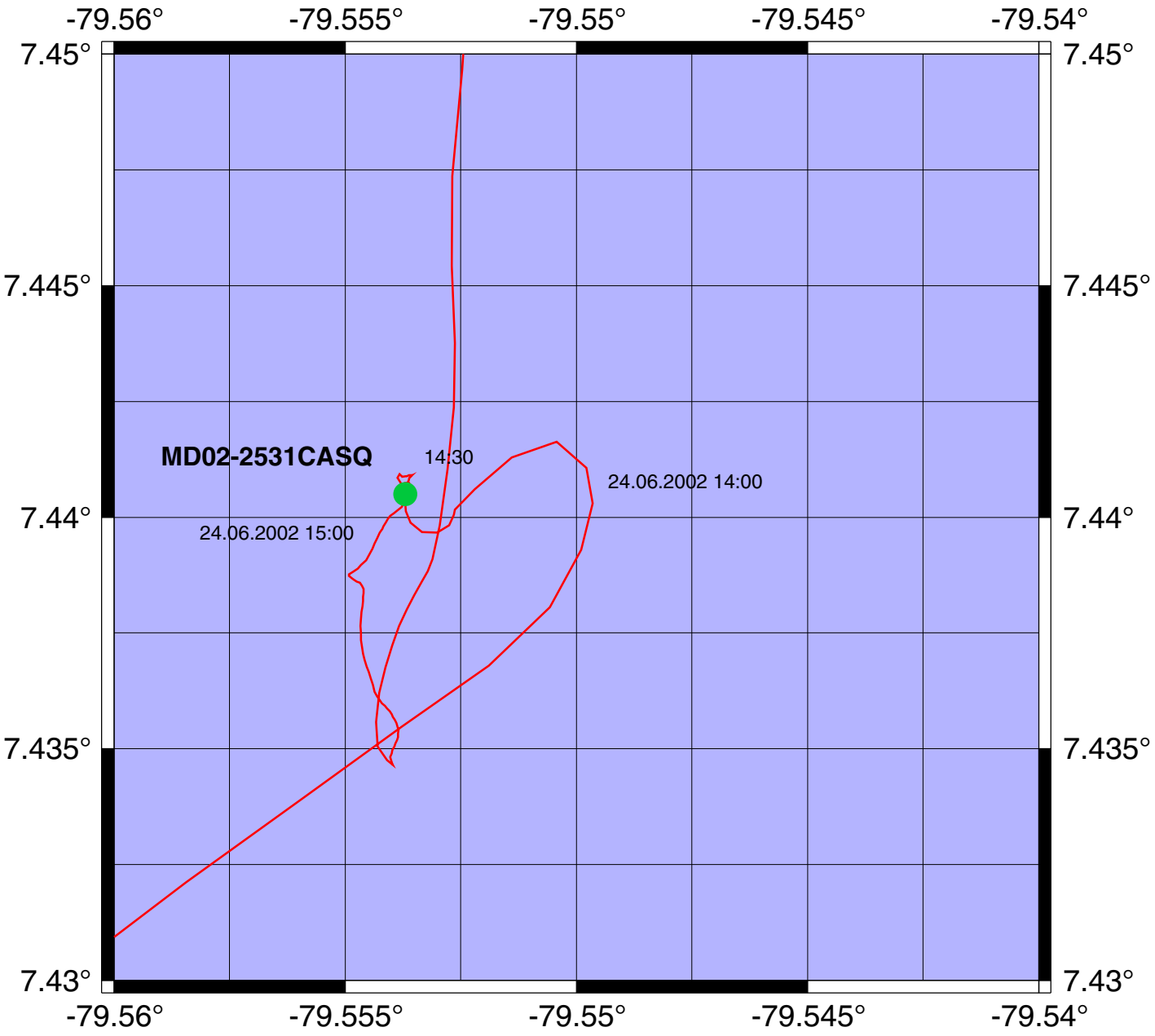
IMAGES VIII, 2002
MONA

Multi Sensor Core Logger

Station 33
Core MD02-2530



IMAGES VIII/MD126, Mona
Station 34, Panama Margin



GMT 2002 Sep 26 12:35:32

NOM DE LA CAMPAGNE

MD 126 MONA

IMAGES 8

Date : **24.06.2002**

N° de station : **34**
Panama Margin

Météo : (force) / Direction
Vent :
Mer :
Variation tension (maxi) :

CAROTTE (N°) :

MD 02-2531 C²

(MD - année - milles - centaines)

CAROTTE (longueur) :

5.30 m

POSITION :

Latitude : **07° 26.43 N**

Longitude : **79° 33.22 W**

CAROTTIER (type) (1) : **CAROTTIER CARRE**

Poids total (air) : **t**

Poids total (eau) : **t**

REGLAGES :

Tubes (longueur) : **m**

Câbles :
Chute libre : **m**

Boucle : **m**

LC poids : **m**

CONTREPOIDS :
Type (2) :

Longueur PVC : **m**

Pénétration : **m**

Longueur de carotte : **m**
+ Ogive (+ 0,15 m)

PARAMETRES MESURES :

Sonde corrigée : **m**

Ligne filée : **m**

Arrachement/total *(tonne)* : **t**

Arrachement/différentiel *(tonne)* : **t**

Pénétration/apparente *(m)* : **m**

Pénétration/tensiomètre *(m)* : **m**

HEURES (GMT)

En station : **14:13**

Début manœuvre : **14:26**

Déclenchement :

Fin de manœuvre :

Durée de manœuvre :

Départ station : **?**

INSTRUMENTATION
OPERATIONS ANNEXES

Pinger :

Flux de chaleur :

CTD (hydro) :

CTD (bouteilles) :

Filet à plancton :

Autres :

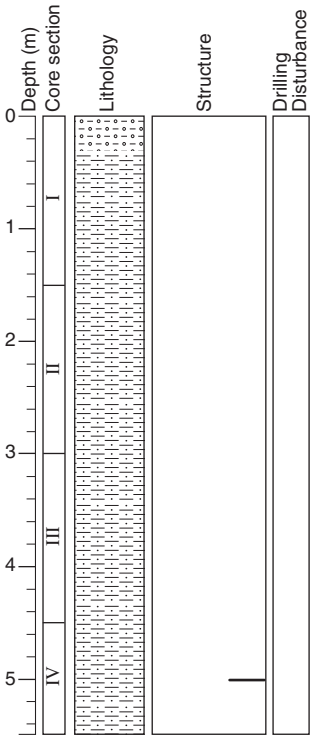
Description / incidents :

(1) CALYPSO - CALYPSO GRAVI/FLUX - BOX CORER 1/4m ou carré géant

(2) Cylindrique 100 kg / Plat / Préleveur

MONA

Core: MD02-2531 C^2



Comments

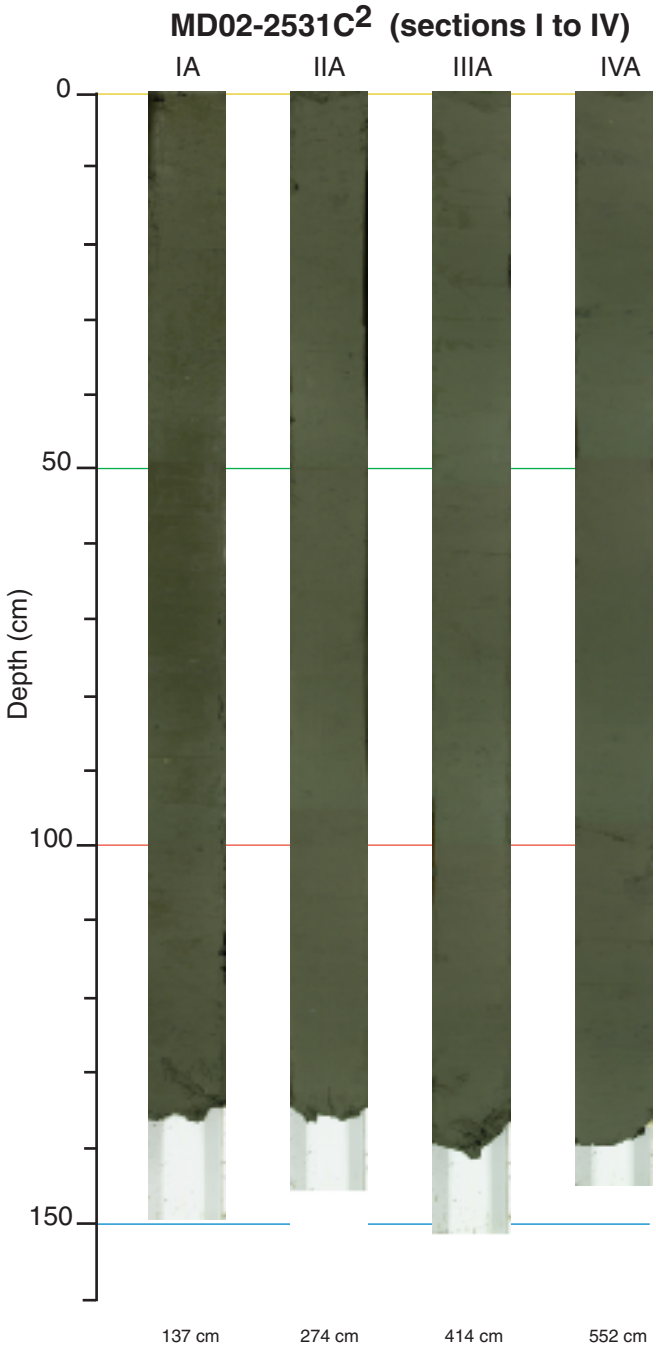
0 to 30 cm: dark olive grey sandy clay with terrigenous and volcanoclastic grains and minerals, benthic and planktonic foraminifera, nannofossils, biosiliceous material, and opaques).

From 30 cm to the bottom of the core: silty clay with quartz, feldspar, altered glass shards, common 'green' mineral, forams, opaques, biosiliceous material, and nannofossils.

Faintly mottled throughout.

500 cm: 2-mm-thick layer, rich in phosphatic fragments.

End of core, 554 cm.


MD02-2531C2 (sections I to IV)
IA
IIA
IIIA
IVA
0
50
100
150
Depth (cm)
137 cm
274 cm
414 cm
552 cm

IMAGES VIII, 2002
MONA

Colour Reflectivity

Station 34
Core MD02-2531C²