Cruise Report

R/V MARIA S. MERIAN

Cruise MSM 01/02

March 27 to April 6, 2006

Task :

Geoscientific Investigation of Quarternary Sediments the Mecklenburgian Bight, Great Belt, Southern Kattegat, Kriegers Flag, Arkona Basin, and Hanö Bay (Bornholm Basin)

Authors:

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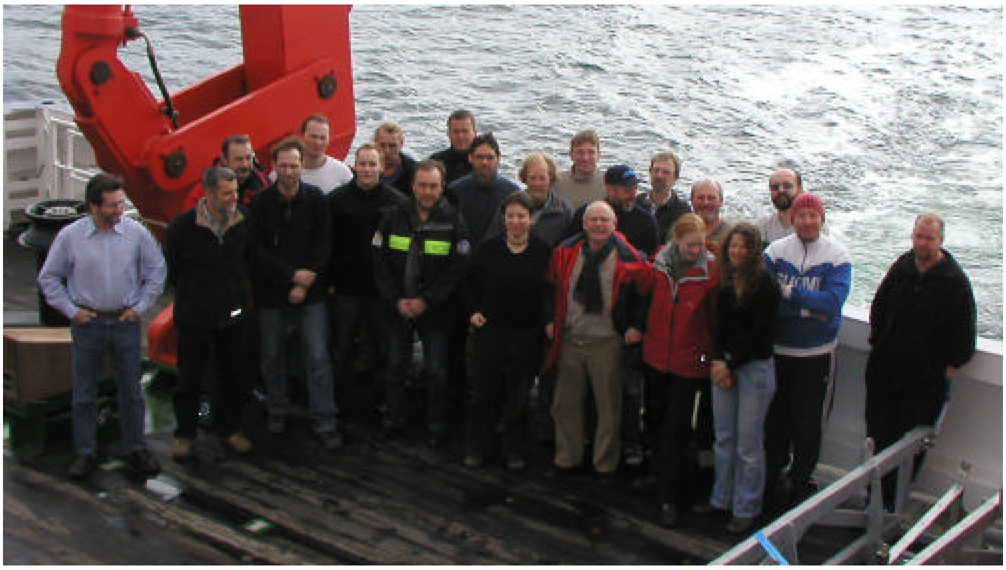
Editor: J. Harff



Warnemünde, April 2006

Content

Enclosures

1 Scientific task (Harff)

In 2004 a group of scientists from Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Russia, and Sweden had submitted a pre-proposal for a Baltic IODP "Paleo-environmental evolution of the Baltic Sea Basin through the last glacial cycle". The general aim of the project is to use the high resolution sedimentary record of the Baltic Sea in order to reconstruct the climatic response of Northern Europe to the forcing of the Northern Atlantic atmospheric and oceanic circulation system during the last c. 130 000 years. It is anticipated to close the gaps in knowledge by the mission specific IODP drill campaign. Information from seismic surveys and onshore drill results imply that the Baltic Sea will not only host complete sedimentary sequences in high resolution for the Late Pleistocene and Holocene but also for the entire last glacial cycle. Eemian sequences are expected particularly in the Kattegat area. The southern Baltic Sea which is regarded having been ice free before the LGM is prospective for complete records of the early and middle Weichselian, whereas the Northern Baltic Sea hosts late Pleistocene to Holocene sediments with high resolution. During the expedition four sites in the Kattegat and the western Baltic Sea had to be investigated in terms of the sea floor features using a multibeam echosounder and the uppermost sediments which have to be sampled with gravity and vibro-corers.
Furthermore it was anticipated to investigate the surface sediments of the Mecklenburgian Bight, Great Belt, southern Kattegat, Arkona Basin and northern Bornholm Basin in terms of their sedimentological and dynamic features.
In the frame of the DFG project SINCOS (www.sincos.org) the coastal and basin sediments are investigated with respect to changes in the paleoecosystem caused by the transgression of marine water into the former lacustrine Baltic basin (Littorina transgression). Here the history and the tracks of the saline water inflow during the early Holocene play the most important role. Sampling of sediment cores in Kattegat, Arkona Basin and Mecklenburgian Bight shall contribute to the elaboration of solutions of open questions for the project SINCOS.
Datable sediment cores from 20 to 45 m b.s.l. are of special interest. At these water depths all sills are found important for the Littorina transgression. On the other side there are practically no information about the first marine water inflow into the Baltic Basin. The data available by now lead to assumptions about the transgression between 7000 and 8000 cal. y BP. Swedish data of marine sediments from an area close to the Blekinge coast older then 9000 cal. y. BP contradict to these information. It is aimed to contribute to answer these open questions by sampling sediments in key areas to be dated in the frame of forthcoming research.
Another question to be answered is the change of the inflow intensity of North Sea water into the Baltic Sea. First investigations in the Skagerrak, Kattegat and the Mecklenburgian Bight imply remarkable variation in the supply of water rich in salt and oxygen to the western Baltic. In order to reconstruct these variations in a high resolution it is planned to sample sediment cores along a transect from the Kattegat to the northwestern Bornholm Basin. The reconstruction will be carried out based on a multi-proxy concept including sedimentological, mineralogical, bio- and chronostratigraphical methods.

2 List of participants (Krauß)

No.	Name	First Name	Timespan	Position	Institute	Country
1	Harff	Jan	27.03.06-06.04.06	Chief scientist Geology	IOW	Germany
2	Endler	Rudolf	27.03.06-06.04.06	Scientist Geology	IOW	Germany
3	Wagner	Bernd	27.03.06-06.04.06	Scientist Geology	IOW	Germany
4	Moros	Matthias	27.03.06-06.04.06	Scientist Geology	IOW	Germany
5	Leipe	Thomas	27.03.06-06.04.06	Scientist Geology	IOW	Germany
6	Schmidt	Steffi	27.03.06-06.04.06	Scientist Geology	IOW	Germany
7	Bening	Herbert	27.03.06-06.04.06	Technician	IOW	Germany
8	Nickel	Gerald	27.03.06-06.04.06	Technician	IOW	Germany
9	Frahm	Andreas	27.03.06-06.04.06	Technician	IOW	Germany
10	Andrén	Thomas	09.02.-16.02.06	Scientist Geology	Stockholm University	Sweden
11	Bennike	Ole	27.03.06-06.04.06	Scientist Geology	Geological Survey of Denmark and Greenland (GEUS)	Denmark
12	Bitinas	Albertas	27.03.06-06.04.06	Scientist Geology	Lithuanian Geological Survey (LGT)	Lithuania
13	Seckus	Jonas	27.03.06-06.04.06	Scientist Geology	LGT	Lithuania
14	Eroshenko	Denis	27.03.06-06.04.06	Scientist Geology	Shirshov Institute of Oceanology Kaliningrad (ABIORAS)	Russia
15	Kotilainen	Aarnoo	27.03.06-06.04.06	Scientist Geology	Geological Survey of Finland	Finland
16	Lie	Oyvind	27.03.06-01.04.06	Scientist Geology	Bjerknes Centre for Climate Research	Norway

17	Lampe	Reinhard	01.04.06-06.04.06	Scientist Geology	University Greifswald	Germany
18	Krauß	Nikolas	27.03.06-06.04.06	Student	University Greifswald	Germany
19	Lemke	Georg	27.03.06-06.04.06	Student	University Rostock	Germany
20	Nowak	Aleksandra	27.03.06-06.04.06	Student	University Stettin	Poland
21	Lis	Paulina	27.03.06-06.04.06	Student	University Stettin	Poland
22	Hafkemeyer	Jörg	27.03.06-01.04.06	Journalist		Germany
23	Lehsten	Christian	27.03.06-01.04.06	Journalist		Germany

3 Cruise protocol (Harff)

Date	UTC	Action	Device/ Scientist	Station/ profile
27.03.06	08:00	Departure Warnemünde port		
	08:15-10:00	Technical check (ship's engine)		
		Transit to work area Mecklenburgian Bight		
	11:40-21:15	Sediment sampling	MUC / Dr. Endler, Dr. Leipe, A. Nowak, G. Bening, A. Frahm	317750, 317760, 317770, 317780, 317790, 317800, 317810, 317820, 317830, 317840, 317850, 317860, 317870, 317880, 317890, 317900, 317910, 317920, 317930, 317940, 317960
		Transit Mecklenburgian Bight		
	21:45-24:00	Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile1

28.03.06	00:00- 05:00	Sedimentacoustical profiling	SES-2000 deep / G. Nickel, G. Lemke	SES_ Profile1
		Transit		
	06:00	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, P. Lis, G. Bening	317970
	09:30	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	317980
	12:25	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	317990
	14.40- 21:15	Sediment sampling	MUC, / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318000, 318020, 318030, 318040, 318050, 318060, 318070, 318080
		Transit to Great Belt		
	23:00 24:00	Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile2
29.03.06	00:00- 07:00	Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile2
	07:50	Sediment sampling	MUC, Gravity Corer, Vibrocorer / Dr. Moros, Dr. Endler, Dr. Leipe, P. Lis, G. Bening	318090
	11:15	Sediment sampling	MUC, Gravity Corer / Dr. Moros, Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318100
	14:30- 15;30	Sediment sampling	MUC, Gravity Corer / Dr. Moros, Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, A. Frahm	318110
		Transit to Anholt Loch		
		Scientific Seminar J. Harff: Introduction to the Baltic IODP.- Ø. Lie: The NAO and its role for the north European climate.-		
30.03.06		Transit to Anholt Loch		
		Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile3
	06:15	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318150

	11:00	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318160
	14:15	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, P. Lis, G. Bening	318170
		Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile4
	17:20	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, P. Lis, G. Bening	318180
	18:30	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318140
		Transit to Copenhagen		
31.03.06		Transit to Copenhagen		
	12:00-13:00	Reception aboard of R/V MSM		
01.04.06	07:00	Departure Copenhagen port		
		Transit to Kriegers Flag		
		Scientific seminar O. Bennike : Pre-Holocene sediments from the Kriegers Flag		
	11:55	Sediment sampling	Van Veen grab, Vibrocorer / Dr. Bennike, G. Bening	318190
	13:15	Sediment sampling	Van Veen grab, Vibrocorer / Dr. Bennike, A. Frahm	318200
	16:45	Sediment sampling	MUC / Dr. Leipe, A. Nowak, G. Bening	318210
		Transit to Northern Arkona Basin		
		Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile5
02.04.06	00:00-05:45	Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile5, Profile5a
	06 :30	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318220
	08 :50	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318230
	12 :00	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318240

	13 :30	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318460
		Transit to Hanö Bay		
		Scientifi seminar T. Andren: The Baltic Basin during the last glacial cycle.- A. Nowak, P. Lis: Who we are and where we go – Dapartment of Paleo-Oceanography, University Szczecin.-		
	22:00-24:00	Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile6
03.04.06	00:00-05:30	Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Lemke	SES_ Profile6
	06:20	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318250
	08:15	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318260
	10:15	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318280
	14:30	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318270
		Scientific seminar A. Bitinas: Dynamics, morphogenesis and deglaciation of the Scandinavian ice sheet: on the way of a new paradigm.- J. Seckus: Late glacial – Holocene history in Curonian Lagoon (Lithuanian sector).-		
		Transit to station 328290		
	21:50	Sediment sampling	MUC / Dr. Leipe, A. Nowak,	318290
		Transit to western Arkona Basin		
04.04.06		Transit to western Arkona Basin		
	04:00-05:30	Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Lemke	SES_ Profile7
	08:10	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318300
	08:35	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318310

	10:50	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318320
	13:00	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318330
	16:20	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318340
	20:00-24:00	Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile7
05.04.06	00:00-05:30	Sedimentacoustical profiling	SES-2000 deep / Dr. Endler, G. Nickel	SES_ Profile7
	06:05	Sediment sampling	MUC, Gravity Corer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318350
	08:30	Sediment sampling	MUC, Gravity Corer, Vibrocorer / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318360
	10:00-12:00	Sedimentacoustical profiling	Parasound / Dr. Endler, G. Nickel	SES_ Profile8
	12:15-12:30	Sediment sampling	MUC / Dr. Endler, Dr. Moros, Dr. Leipe, A. Nowak, G. Bening	318450
	12:30-24:00	Sedimentacoustical profiling	Parasound / Dr. Endler, G. Nickel	SES_ Profile8
	17:00-19:00	Scientific Seminar General discussion: Summary of the cruise.-	All scientists	
06.04.06	00:00-01:00	Sedimentacoustical profiling	Parasound / Dr. Endler, G. Nickel	SES_ Profile8
	01:00-04:00	Transit to Pilot Station Rostock		
	04:45	Warnemünde, ship yard, end of the expedition		

4 Methods and Devices

4.1 Sediment Echosounding (Endler)

High resolution sub-bottom profiling was performed using the parametric sediment echosounder SES2000deep from INNOMAR Technology GmbH (www.innomar.com).
Parametric echosounders work both as low-frequency sediment echosounders and as high-frequency narrow beam echsounders (to measure water depth). They make use of the so called “parametric” effect which produces additional (secondary) frequency components through non-linear interaction of two signals with high, slightly different (primary) frequencies at high sound pressures. The new, low (secondary) frequency components propagate within the narrow cone of the high (primary) frequencies. Therefore, the footprint size is comparably small and both lateral and vertical resolution are significantly improved. The directivity pattern of the low frequency components shows no significant side lobes and remains nearly constant for different secondary frequencies. The insonified volume is the same and comparable results are obtained for different secondary frequencies. Parametric systems have a high system bandwidth and can therefore transmit short pulses without ringing (e.g. 1 period of 7 kHz). This makes parametric systems particularly useful for high resolution surveys in shallow and deep water areas. Furthermore, short pulses, narrow beams and the absence of side lobes result in less volume and bottom surface reverberation compared to linear systems. This improves the signal to noise ratio and therefore the usable depth range (penetration depth).
The portable parametric SES2000deep sediment echosounder is designed for operation in shelf and deep sea areas. It consists of a main device and a transducer array. The transducer was mounted in the moonpool of the ship. The main device (two electronic boxes, see fig. 1) contains transmitters, receivers and modules for analogue and real time signal processing. Analogue to digital converters (ADC) are used for digitizing the receiver signals with 16-bit resolution at sampling rates up to 100 kHz depending on the signal bandwidth. All data are stored digitally on hard disk including navigational data. A motion reference unit was used to correct for ship's movement. The main parameters of the SES2000deep sediment echsounder are listed in table 1.

Fig. 1: The portable parametric sediment echosounder SES2000deep, recording and transmitting units (blue boxes).

Water depth range	5 … full ocean depth
Vertical resolution	< 15 cm
Penetration depth	up to 150 m
Accuracy of the depth measurement	0.15 m + 0.04% of water depth
Primary transmitter frequency	35 kHz
Secondary transmitter frequency	2, 3.5, 5, 6 , 7 kHz
Transmitter pulse length	0.25 … 3.7 ms
Repetition rate	Up to 30 s^{-1}
Beam width	+/- 1.5° @ 2 …7 kHz
Beam steering range	+/- 16 °
Transducer dimensions	82 * 75 cm
Electrical power	>80 kW
Source level	>244 dB/µPa re 1m

Table 1: Main Parameters of the Parametric sediment-echosounder SES2000deep (from http://www.innomar.com/produ_2000deep.html)

4.2 Sediment Sampling (Moros)

For sedimentological sampling Multi-Corer, Van-Veen Grab sampler, Gravity-Corer (6, 12, 18 m) and a 6 m-Vibro-Corer were used during the cruise.
The new Multi-Corer of the Baltic Sea Research Institute shown in Fig. 2 was used in order to obtain up to 45 cm long cores of surface sediments with a preserved fluffy surface layer and including the bottom water. Van-Veen Grab sampler was used in areas with hard surface sediments (sand).

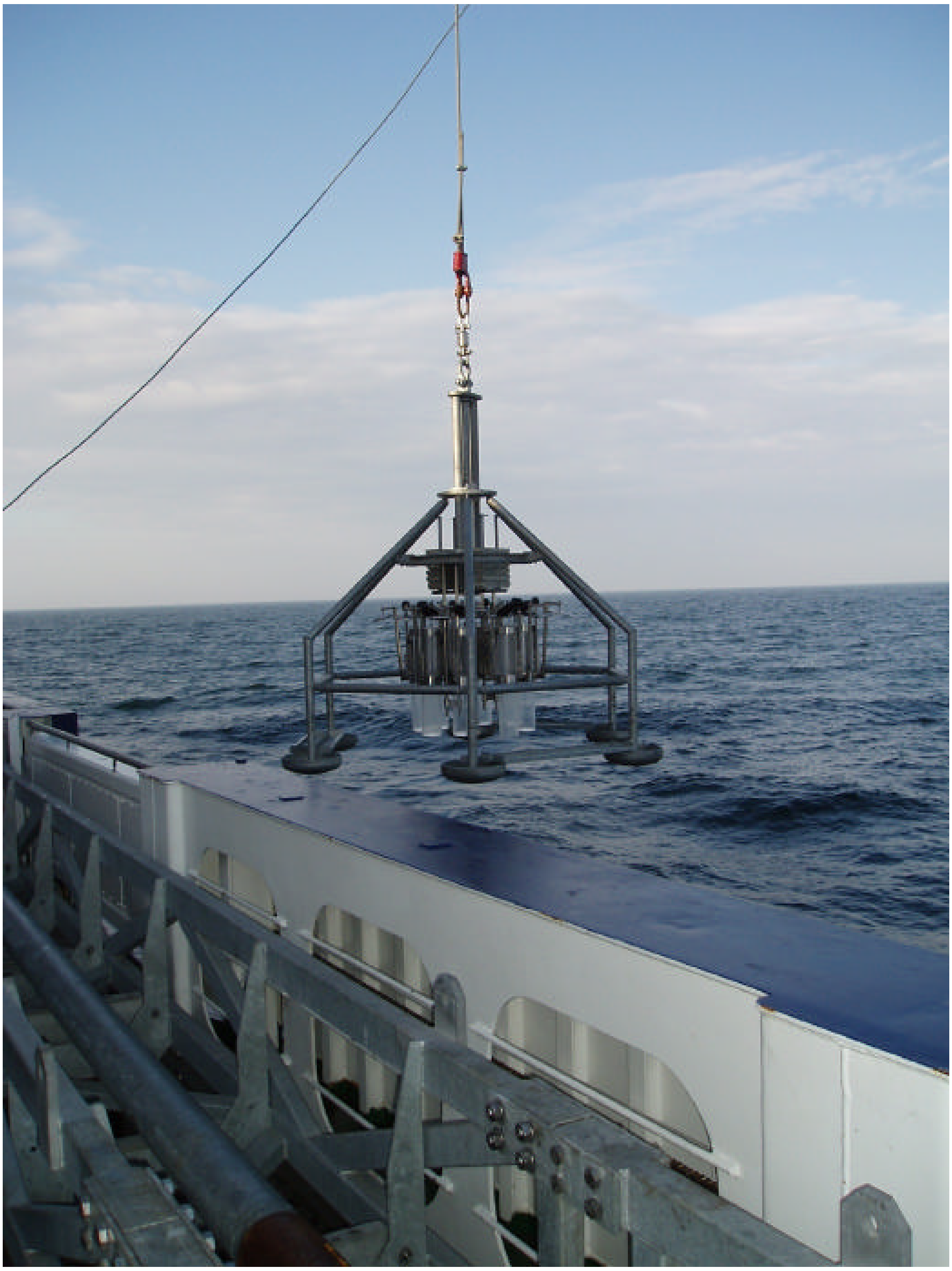


Fig. 2: New Multi-corer of the Baltic Sea Research Institute.

To gain long sediment cores a Gravity-Corer and a Vibro-Corer were used for soft and sandy sediments, respectively.
The Gravity-Corer (Fig. 3) consists of a steel tube with 6 m, 12 m or 18 m length and top section with discs of lead-weights, each 60 kg. The RV “Maria S. Merian” offers a rack for the handling of Gravity-Corers with steel tubes of up to 24 m length. The 6 m steel tube (in a few cases 12 m) was used with foil to gain cores, which were opened on board for description. Gravity-Corer steel tubes loaded with plastic liners (diameter 125 mm) were used to obtain cores which will be studied in the labs of the participating institutes. The plastic liners were cut into sections of 1 m on bord.

Fig. 3: Gravity-corer with 18 m long steel tube was used in Arkona Basin.

The 6-m Vibro-Corer (Fig.4) was used for sandy sediments. Vibro-Corer tube was loaded (i) with foil in order to obtain sediment cores for sedimentological descriptions on bord and (ii) with plastic liners, which were cut into 1 m sections and will be analyzed in the labs.

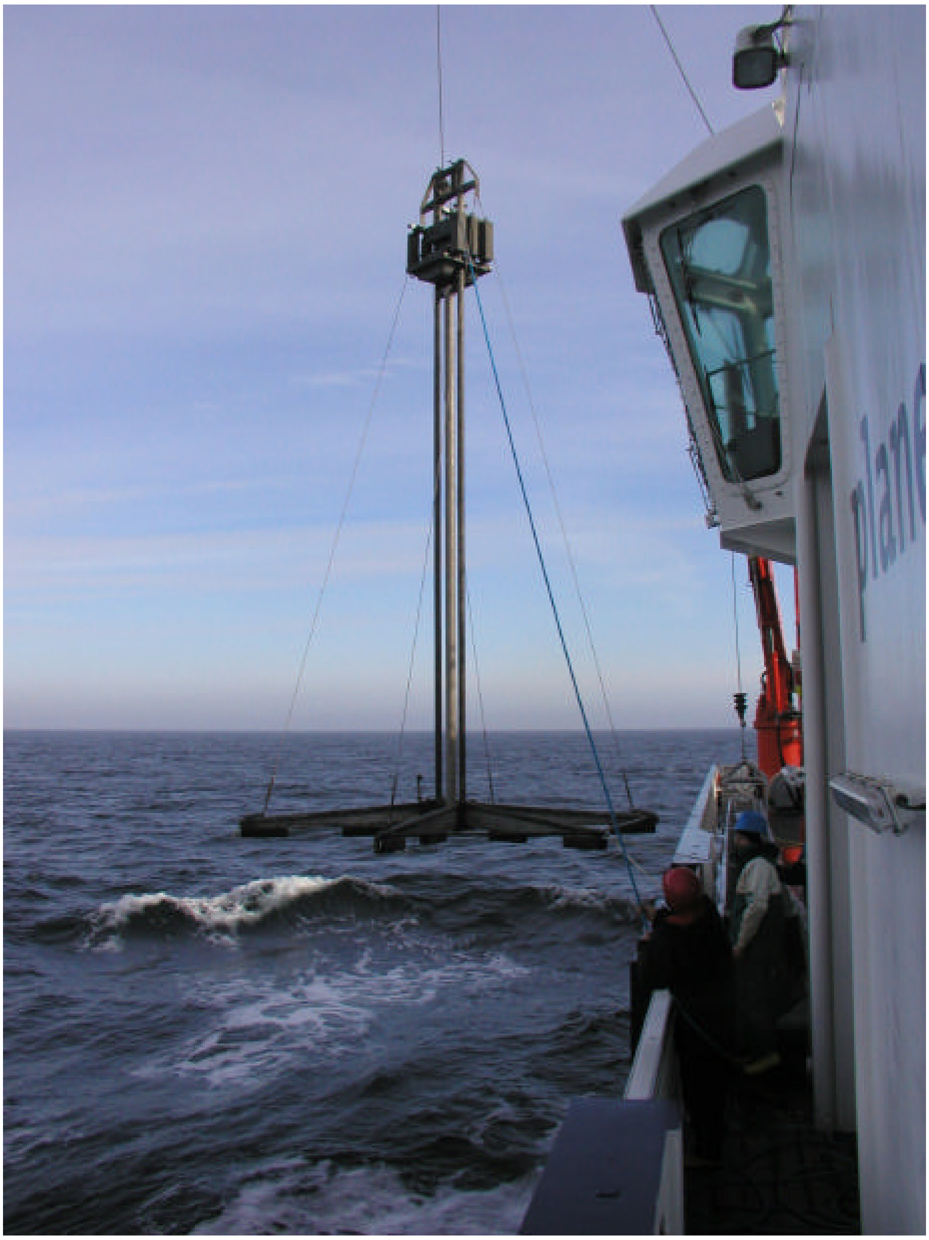


Fig. 4: Vibro-corer was used for harder and sandier sediments.

4.2 Lithological core description (B. Wagner, S. Schmidt, D. Eroshenko)

The lithological core description and the photographic documentation were carried out on cores recovered with the gravity or vibro corer, both equipped with a plastic foil of 10 cm in diameter. On deck, the foil containing a sediment sequence of up to 12 m length was removed from the corer and horizontally transported to the laboratory. There, the foil and the sediment sequence were lengthwise cut with a knife from the outer side of the core to its central part. By little assistence the core then fall apart into two halves (Fig. 5). The surface of the side, which was cut by a knife, was cleaned in order to remove sediment particles that were lengthwise displaced by the cutting. The opposite side, i.e. the broken side, was left untreated in order to better recognize macrofossils and micro-structures.

Fig. 5: Core opening in the laboratory.

After opening core documentation commenced with one overview photography from each core and close-ups on selected cores or core segments. The subsequent descriptive core documentation was based on the grain-size composition, structure, consolidation, and fossil content of the sediments (Fig. 6). Macrofossils were determined, if possible, to the species level. Sediment color was determined by using the Munsell Soil Color Chart, however, some aberrations were probably created by the artificial light of the laboratory. An overview of the lithological core description for each core is given in the enclosures.

Fig. 6: First discussion of sediment characteristics of a core after its opening. Note the smooth outer side of core that is cut by a knife, and the rough inner side, which is broken apart.

4.4 Benthosbiological investigation (Lis/Nowak)

Sediment samples were collected to study meiobenthos (=meiofauna), i.e., benthic invertebrates not exceeding 1 mm in size. From each multicorer deployment (Fig.7), 4-5 tubes were designated for subsampling of meiobenthos.
The overlying water was aspired off onto a 0.032 mm sieve. The sieve residue was washed off with filtered seawater into a jar and enough formalin was added to bring the final concentration to 10%. The jar was labeled (station number + n/w where n is the tube number).

Subsequently, the sediment in each tube was pushed up with an extruded so that the sediment surface was flush with the tube rim, and a 28 mm inner diameter plastic syringe (with cut-off tip) was inserted into the centre of the sediment surface to the depth of about 10 cm (marked on the syringe). The syringe was retrieved and the syringe content was sub-divided, using the syringe piston, into 1-cm subsamples (Fig. 8). Each subsample was placed in a separate plastic jar to which formalin and filtered seawater (1:10) was added for preservation. The jars were labeled with symbols involving station number, tube number, and sediment layer. The list of samples collected is appended.

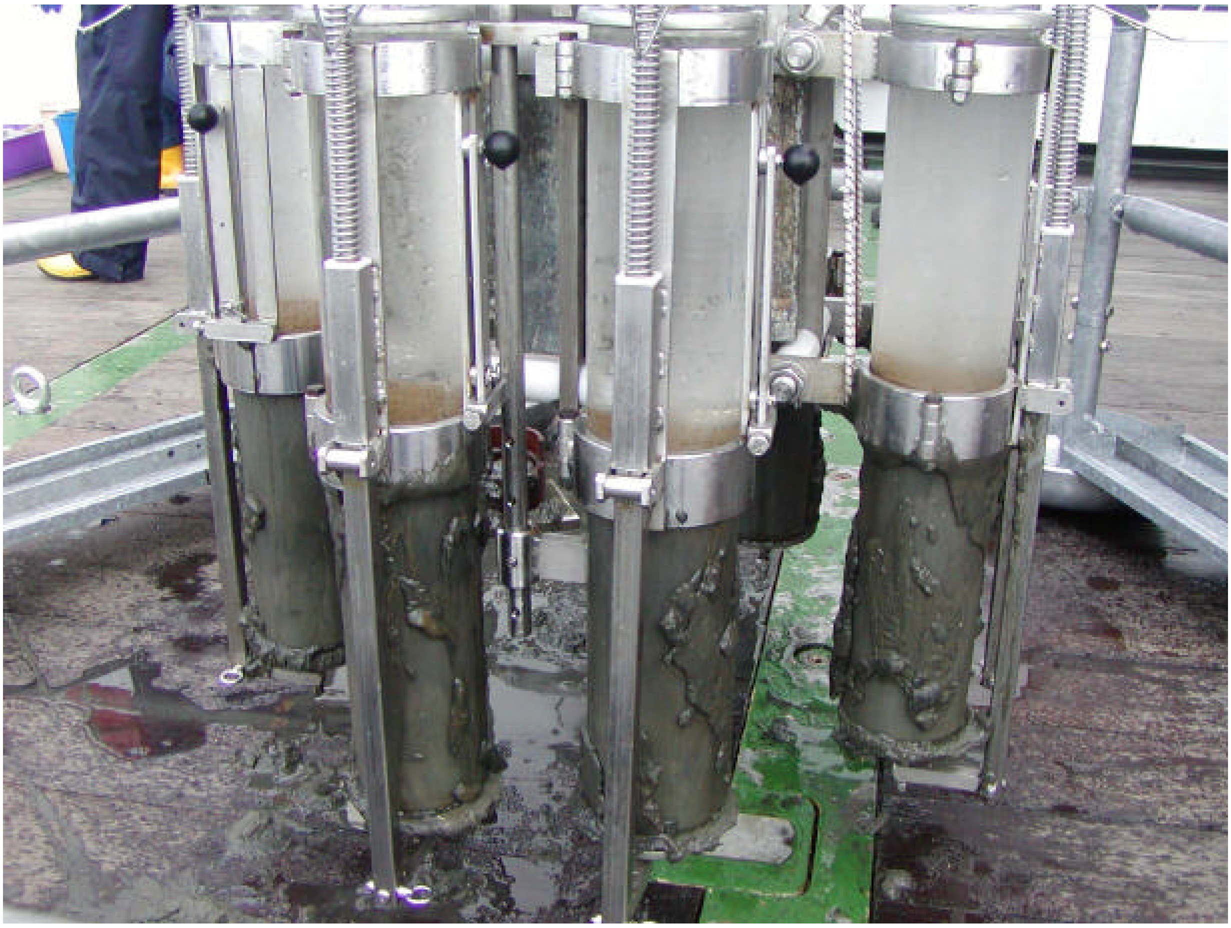


Fig. 7: Multicorer samples after retrieval

At each station, data concerning station coordinates, meteorological conditions, and water temperature were recorded.
A total of 10 stations were sampled for the meiobenthos (10 multicorer deployments); altogether, 417 sub-samples were obtained. They will be further processed at the laboratory of the Department of Palaeoceanology, University of Szczecin, Poland; meiobenthic organisms will be isolated from the sediment, examined under the stereo- and compound microscope, identified, and enumerated.

Fig. 8: Slicing a syringe subsample in the ship’s deck laboratory

5 First results

5.1 Preparation of a Baltic IODP

5.1.1 Anholt Loch (Bennike)

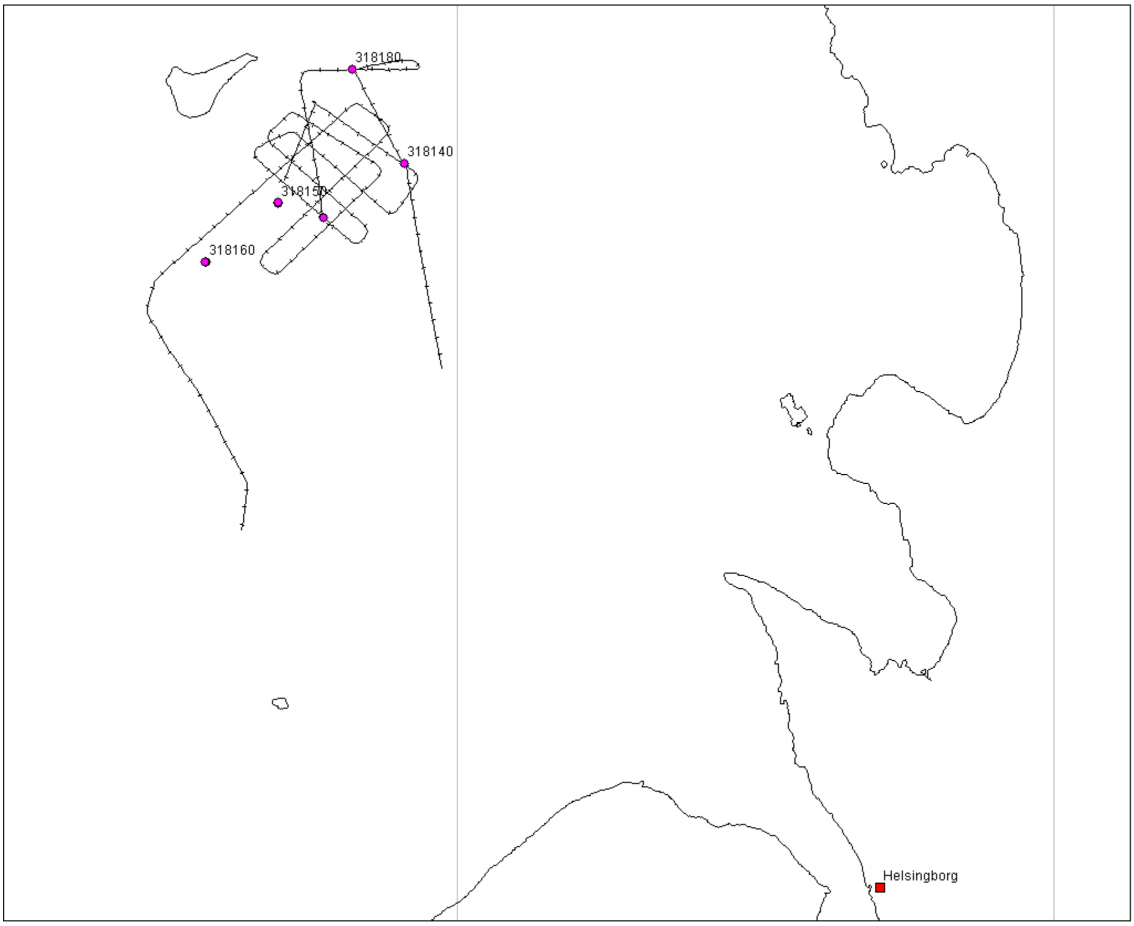


Fig. 9: Track plot and stations, Anholt Loch

Southern Kattegat holds thick Quaternary sequences. On the island of Anholt, a boring penetrated 104 m of till, sand and clay of Saalian (?), Eemian and Weichselian age.

The topography of the pre-Quaternary surface in the region around Anholt has been surveyed by reflection seismic methods suing a multi-channel system and small air guns (Lykke-Andersen et al. 1993). On the basis of a rather coarse grid of seismic lines, an erosional valley could be mapped to the south-east of Anholt. The valley is c. 25 km long and c. 2 km wide, and north-west to south-east orientated. The distance from the sea bottom to the valley bottom is 200 to 300 m. The valley is probably formed by sub-glacial melt-water erosion during repeated glaciations in the early and middle Quaternary.

Based on the stratigraphy in the Anholt boring, it was suggested that the valley is infilled by a sequence of pre-Eemian, Eemian, Weichselian and Holocene deposits (Lykke-Andersen et al. 1993). Based on later boomer profiles and shallow cores, the younger parts of the in-fill was referred to the Late-glacial (Jensen et al. 2002). However, the boomer profiles do not provide information about the older parts of the in-fill.

The area was inundated by the Fennoscandian ice sheet during the Last Glacial Maximum, but according to published seismic profiles, this did not lead to disturbances of the sequence in the Anholt region. Because the valley acted as a sediment trap, it may contain an unusual complete sequence of sediments from the last interglacial-glacial cycle. Such sequences are rare in north-western Europe. A record from a core from the valley fill could be compared with the Greenland ice core records. One aim of such a comparison would be to see if the marked and abrupt climate changes seen in Greenland can also be identified in the eastern North Atlantic region. This is essential for a better understanding of the causes for climatic changes, and for comparison with modelling results.

5.1.2 Kriegers Flag (Bennike)

During regional mapping in the early 1990s the Geological Survey of Sweden discovered a pre-Holocene marine occurrence to the north-east of Kriegers Flak (Fig. 10) in the eastern Arkona Basin. This is a unique find because it is the only pre-Holocene marine deposit known from the entire Baltic Sea, and hence it has major palaeogeographical implications. The occurrence was described by Klingberg (1998), however the chronology is uncertain, and all that can be said is that it is older than 40,000 years, based on a non-finite radiocarbon date. Klingberg suggested that the deposit may be of late Saalian, early Eemian or early Weichselian age. However, it could also be older and younger. In this context it should be noted that a relative high sea-level stand dated to around 60,000 years BP was recently reported for the White Sea region. It may be speculated if marine waters could enter the Baltic Basin via the Karelian during this period.

The occurrence consists of over-consolidated clay, which is underlain and overlain by till. Part of the marine clay contains low diversity foraminifer faunas that are dominated by *Elphidium excavatum* and *E. albiumbilicatum*. These faunas point to brackish water conditions, which is confirmed by extremely low $d^{18}O$ values between –11.2 and –11.9‰. Normal marine waters have values close to zero, and the only way to explain the low values are admixture of melt water from the Scandinavian ice sheet. Five samples were analysed for pollen, but the interpretation of the pollen spectra are hampered by the presence of reworked pollen grains.

In order to better constrain the dating of the deposit, we collected new samples. We plan to try to date the occurrence by optically stimulated luminescence dating and amino acid analyses. We also plan to carry out additional work on the palaeoecology using diatoms and other biological and non-biological proxies.

5.1.3 Northern Arkona Basin (Andren)

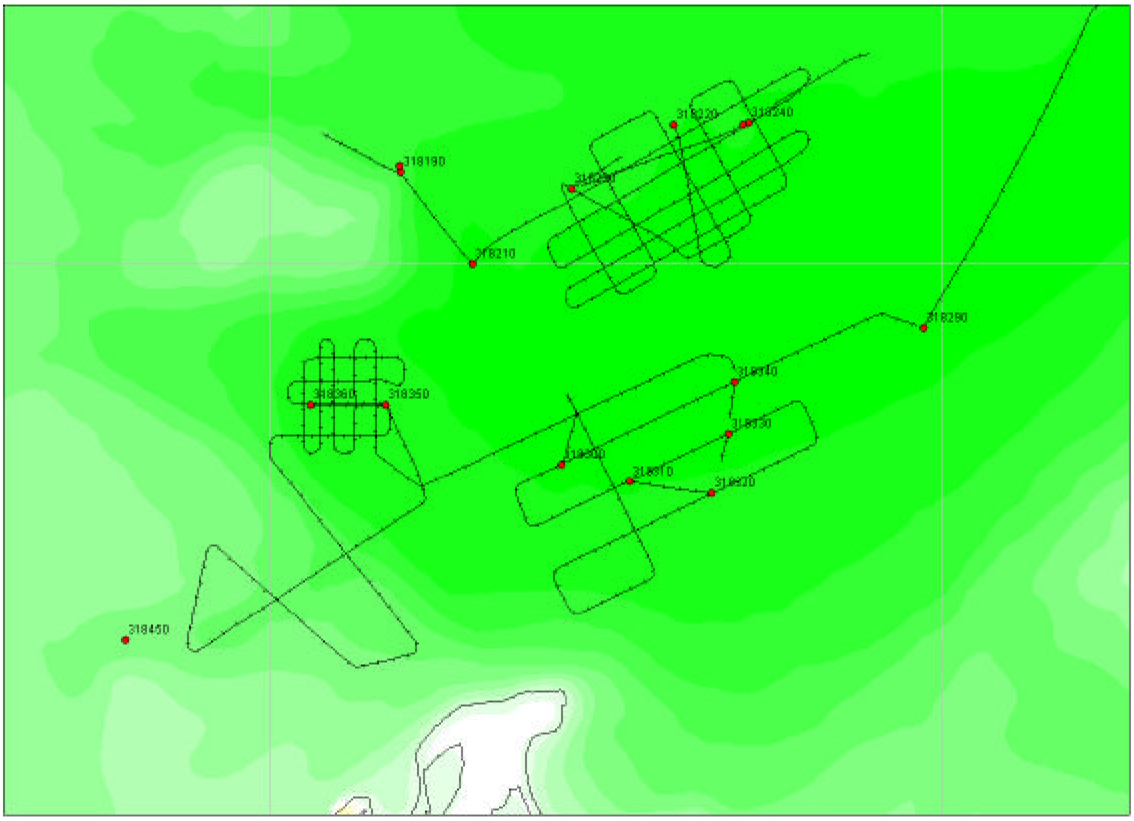


Fig.10: Track plot and stations, Arkona Basin

The seismic profiling performed during the R/V Heincke cruise indicated an erosional valley in a more or less E-W direction which is good for the protection from ice erosion as the main directions of ice flow has been from north and northeast with only a last weak ice advance from almost due east in this area.

The lake that is presumed to have existed in the southern Baltic Basin prior to the last Weichselian ice advance over the area, starting at c. 40 000 BP, is supposed to have its level at c. 60 m below the present sea level. This is approximately the waterdepth at the site and it could be expected the sediments in the valleys constitutes of shallow lake, beach and terrestrial sediments.

The first, preliminary interpretation of the material does not indicate that this site is optimal for meeting the objectives outlined in the IODP proposal, to recover the most complete sediment sequence spanning from the Eemian to the last Weichselian ice advance. The site was, however, included in the present coring cruise.

Three gravity cores were taken from this site along an E-W transect. The water depth at all three coring stations was close to 46 m the length of the cores varied between 116 and 545 cm. Below follows general lithological description of the cores. For a detailed description look at the enclosures.

Core 318220-2
Water depth: 45.81 m
Recovery: 545 cm
***Lithology*:**

0-405 cm	Silty gyttja, olive grey, bivalve shells occur in this unit. This unit is probably of Littorina age.
405-545 cm	Clay, olive grey to dark grey, homogenous, silt layers and slumping structures occurs. The unit was deposited in the Ancylus Lake or very early Littorina Sea.

Core 318230-2
Water depth: 45.45 m
Recovery: 220 cm
Lithology:

0-30 cm	Silt, grey black, homogenous, probably of recent to sub recent age.
30-86 cm	Silty gyttja, olive grey, homogenous, shell fragments occur. This unit could have been deposited in the Littorina Sea but it could also be of younger age.
86-100 cm	Clay, medium grey, homogenous. Probably deposited in the Ancylus Lake.
100-220 cm	Clay and sand, varved?, This may a varved clay with thick proximal varves or a clayey till deposited in the Baltic Ice Lake.

Core 318240-2
Water depth: 46.21 m
Recovery: 116 cm
Lithology:

0-10 cm	Silt, grayish black.
10-27 cm	Fine sand, olive gray, color indicates some organic content.
27-116 cm	Clay/fine sand, dark yellowish brown – pale brown, this unit is probably the lowermost part of the varved clay sequence or the uppermost part of the clayey till. It’s most likely of Baltic Ice Lake age.

5.1.4 Hanö Bay (Bornholm Basin) (Andren)

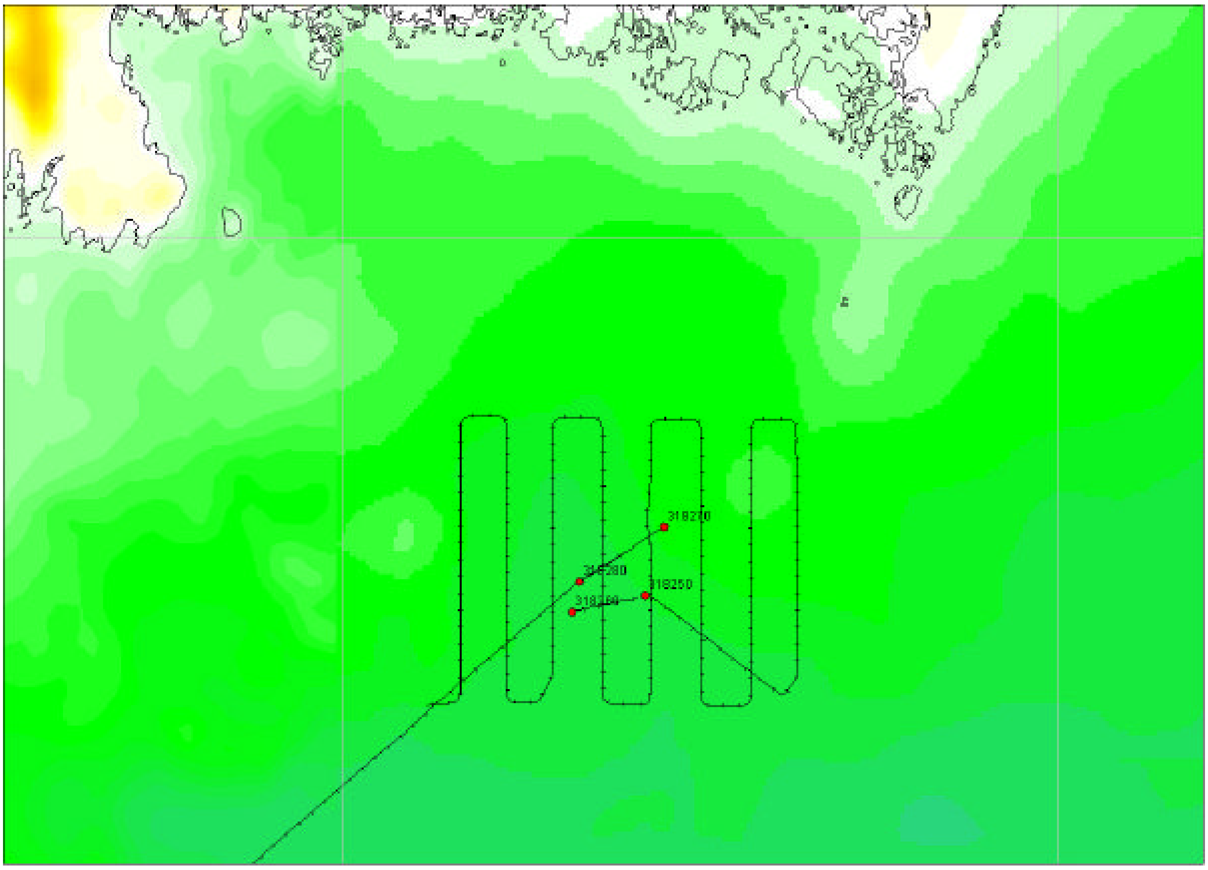


Fig. 11: Track plot and stations, Hanö Bay

Based on information from an old core and the radiocarbon age of its lowermost part, 25930±250 uncorrected radiocarbon years, this site was included in the R/V Heincke seismic cruise even if it was not a part of the original IODP pre-proposal 672-pre.
A first short profile indicates the possible occurrence of a thick, relatively transparent with some internal reflectors, sequence of sediments below a relatively thin till cover of Late Weichselian age. The lower unit must then be of Eemian, early or mid Weichselian age. The whole area is covered by c. 10 m of Holocene mud and clay. These data indicates that this site may be the most promising drill site investigated during the present cruise.
During the present cruise four stations were cored by a gravity corer. Two stations was also cored by a vibro-corer and at these stations are vibro-cores the ones with the best penetration and hence the most complete. The descriptions below of the sediment sequences from these two sites are for this reason based on the vibro-cores.

Core 318250-2
Water depth: 63.26 m
Recovery: 500 cm
Lithology:

0-410 cm	Silty gyttja, olive grey, some laminations and shells occur.
410-500 cm	Silt, grayish dark, some laminations occur. Both this units are probably of Littoria or post-Littorina age.

Core 318260-2
Water depth: 63.26 m
Recovery: 573 cm
Lithology:

0-30 cm	Silty gyttja, olive grayish black/dark grey, some laminations occur. This unit is of recent or sub-recent age.
30-120 cm	Clay, pale yellowish brown, homogenous. The unit may have been deposited in the Baltic Ice Lake or the early Yoldia Sea.
120-310 cm	Clay, brownish grey, varved, sulphid layers occur between 190 and 310 cm. The unit is most probably of Baltic Ice Lake age.
310-573 cm	Clay, grayish, stones and some weak layering occur, This might be the lowermost part of the varved clay or the uppermost part of the clayey till.

Core 318270-3 (vibro-core)
Water depth: 47.72 cm
Recovery: 550 cm
Lithology:

0-58 cm	Silty gyttja, light olive grey, some layering occurs. This unit is probably of recent or sub-recent age.
58-150 cm	Clay, pale yellowish brown, homogenous.
150-340 cm	Silt, pale yellowish brown, homogenous, drop stones occur. Possibly the lowermost part of the varved clay deposited in the Baltic Ice Lake.
340-550 cm	Sand and gravel, pale yellowish brown. Most probably glaciofluvial material of Late Weichselian age.

Core 318280-5 (vibro-core)
Water depth: 62.72 m
Recovery: 522 cm
Lithology:

0-45 cm	Silt, olive grey (uppermost 10 cm grayish black), homogenous. Recent or sub-recent age.
45-210 cm	Clay, brownish grey, uppermost part homogenous from 52 cm and down-core varved. Unit deposited in the Baltic Ice Lake.
210-280 cm	Silt and sand, brownish grey/olive grey, drop-stones occur. The diamict appearance of the unit may indicate a till genesis.
280-345 cm	Silty gyttja, olive grey. This is most probably the same unit that was dated to close to 30 000 uncorrected radiocarbon years.
345-522 cm	Silt and sand, grayish black. The unit is well sorted and thick bands of organic (peat?) material (color: dusky brown) occur frequently in the lower part of the sequence.

5.2 Paläogeography of the western Baltic Sea

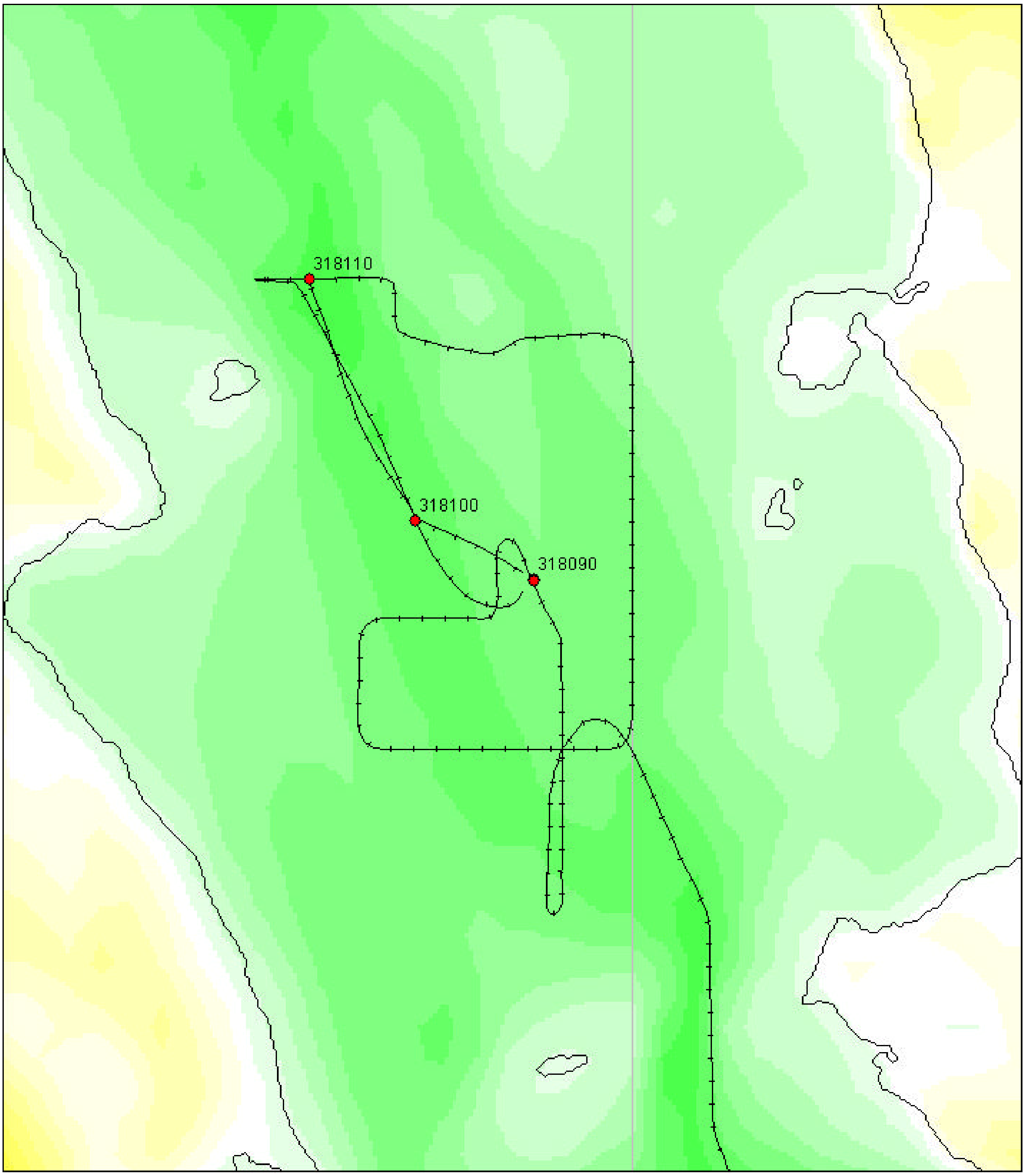


Fig. 12: Track plot and Stations, Great Belt

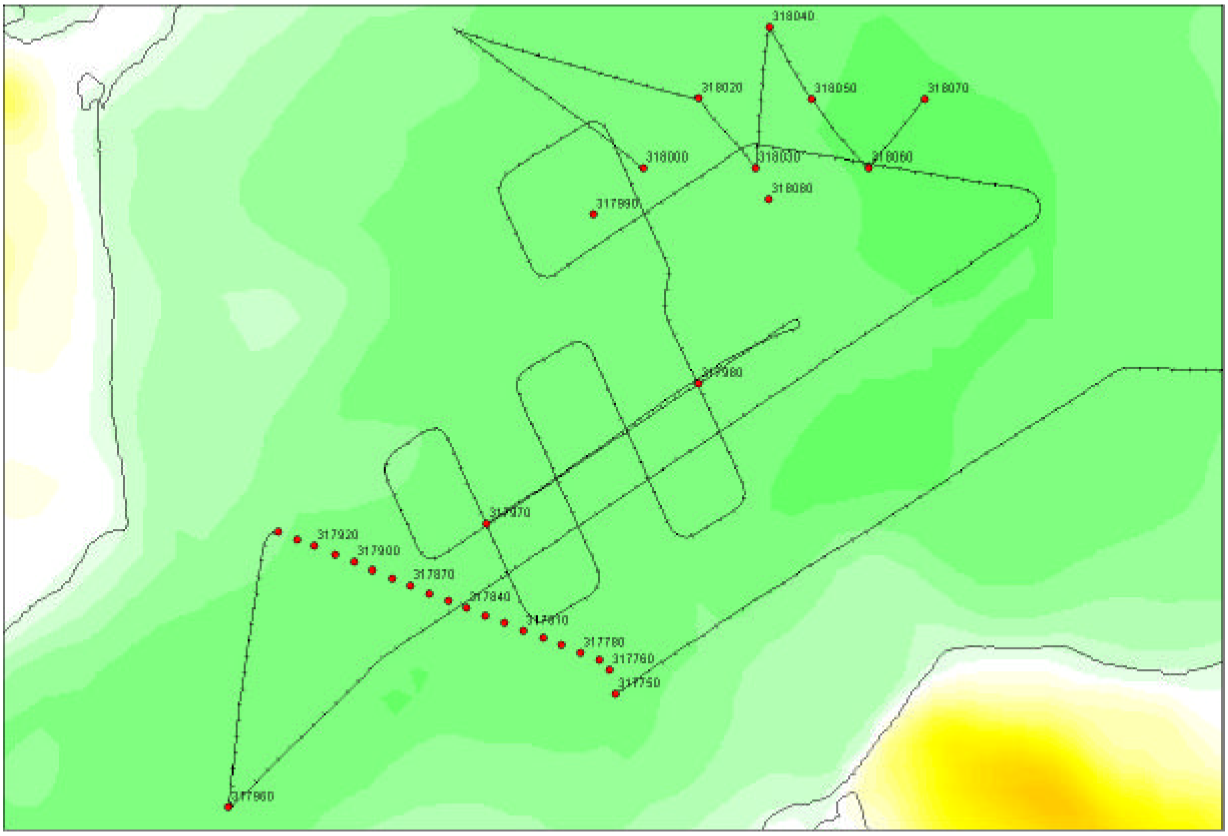


Fig. 13: Track plot and Stations, Mecklenburgian Bight

Transect from Southern Kattegat (Fig. 9) **- Great Belt** (Fig. 12) **- Mecklenburgian Bight** (Fig. 13) **to Arkona Basin** (Fig. 10)

One objective of the R/V “Maria S. Merian” cruise was to obtain cores for a national project that deals with the high-resolution reconstruction of Holocene changes in the inflow of North Sea waters into the western Baltic Basins since the Litorina transgression about 8500 years ago. The strength of the inflow of saline, oxygen-rich North Sea waters into the Baltic determines the ventilation and hence conditions for benthic life in the whole Baltic Sea.
Coring sites on a transect from southern Kattegat to Arkona Basin which follows the pathway of the North Sea water inflow were selected on the basis of seismoacoustic profiles obtained during the cruise and earlier published data (Lemke 1998, Bennicke et al. 2004, Moros et al. 2002). It was aimed to core sites with highest accumulation of Litorina Sea stage sediments in the respective areas. However, there were two aspects that needed to be taken into account before selecting the core sites: (i) earlier studies (Lemke 1998, Moros et al. 2002) have shown that not the actually water depth but the depth position of the uppermost tills surface determines the thickness of the sediment succession of focus and (ii) previous investigations (Moros, unpublished data) have demonstrated that the inflow of North Sea waters into the western Baltic Sea has been increased strongly during the late Holocene. Due to this higher bottom water current speed during the late Holocene sediments were eroded in specific areas and channel like structures formed. Within these structures the surface sediments bear relative high contents of sandy material (up to 85 wt.%), particularly in wide areas of southern Kattegat and Great Belt. The material eroded

during the late Holocene is most likely deposited in areas of low bottom water speed, particularly in large parts of the Mecklenburgian Bight and the Arkona Basin. However, during the cruise we were able to find sites also in southern Kattegat and Great Belt that might have been influenced by only weak bottom water currents also during the late Holocene. Those sites are expected to yield a high-resolution record of North Sea water inflow changes from the early to the late phase of the Litorina Sea stage.

Thus, the coring strategy was to take cores from areas where we observe today (during the late Holocene): (i) low bottom water current speed in order to obtain high-resolution records of the inflow changes and (ii) high bottom water current speed in order to date the start and to obtain physical evidence for the observed inflow change/increase that occurred during the late Holocene.

In the southern Kattegat area core 318180 (water depth: 43 m) was taken at a site recently influenced by strong bottom water currents whereas core 318170 (water depth: 36 m, > 5.2 m Litorina Stage sediments) was taken in an area of low bottom water flow speed. The latter will probably yield a high-resolution record of North Sea water inflow changes also for the late Holocene. Three sites were cored in the Great Belt. Cores 318100 (32 m water depth, > 5.5 m Litorina Sea stage sediments) and 318110 (36 m water depth, c. 5 m Litorina Sea stage sediments) seem to be well suited for high-resolution studies. Great Belt core 318090 (22 m water depth) taken in an area of higher bottom water intensity may yield a record of physical evidence for bottom water intensity changes during the later phase of the Litorina Sea stage.

In Mecklenburgian Bight and Arkona Basin we looked mainly for sites with high accumulation of Litorina Sea stage sediments. In Mecklenburgian Bight with sites 317970, 317980 and 317990 we found suitable core locations for high resolution studies. The water depth at all sites is about 23 m. It is expected that we obtained up to 7 m of Litorina Sea stage sediments there. In the Arkona Basin (cores 318300-318340) we obtained cores for high-resolution studies (up to 10 m Litorina Sea stage sediments) on North Sea water inflow changes during the Holocene.

A grid of MUCs (318000, 318020, 318030, 318040, 318050, 318060, 318070, 318080) was taken where the North Sea waters enter the Mecklenburgian Bight.

Vibro core 318360 and gravity core 318350 were taken in the frame of a small national project which was created in commemoration of our friend and colleague Wolfram Lemke who died unexpectedly last year. One of his main scientific topic was to find the pathway of the Ancylus Lake drainage, a dramatic water level drop that occurred during the Baltic Sea´s history. This aspect is under ongoing debate. New studies have demonstrated that this event might be assigned to a characteristic sand layer which is found in the Arkona Basin, well pronounced in the Arkona Basin´s western part. Cores 318360 and 318350 contain this layer and it will be studied in great detail. The macrofossil content, dating etc. will be performed.

5.3 Benthosbiology (Nowak)

5.3.1 Meiobenthos

Data concerning meiobenthos in the sediment will be known after the sediment samples have been processed in the laboratory and the meiofauna is examined under the microscope.

5.3.2 Other biological observations

Some cores collected with vibro-, gravity- and multicorer showed the presence of macrobenthic organisms (visible with naked eye). They included ophiuroids (particularly in cores collected in the Great Belt and Kattegat), polychaetes (1 individual, preserved in a meiobenthos sample), two echinoids, gastropods and bivalves. Live bivalves were found to be present in the upper sediment layers of cores collected with the multicorer, particularly in the Kattegat. They were dominated by *Arctica islandica* (Fig. 14). Mollusc shells were very abundant in the sediment, particularly in the Kattegat, Great Belt, and Mecklenburg Bight. Some specimens were picked out from the sediment and brought to the laboratory for further identification.

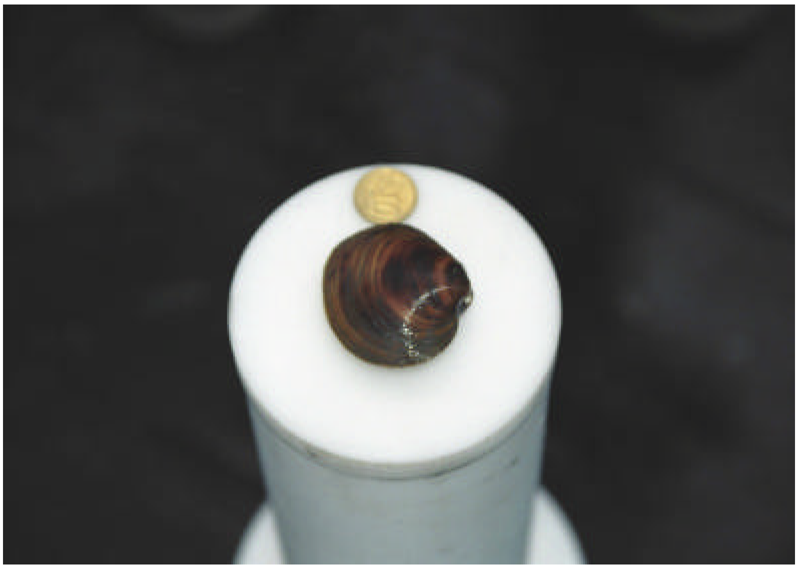


Fig. 14: A live specimen of *Arctica islandica*

5.3 Geochemical Monitoring (Leipe)

In the frame of the National Environmental Monitoring Programme in German territorial waters of the Baltic Sea (BLMP) five stations have to be sampled and analyzed every year. The programme runs since 1998 and the analytical programme involves such parameters as: Grain-size, organic carbon, nutrient elements, selected major and trace elements including heavy metals (Pb, Zn, Cu, Cr, Ni, Co, Cd, Hg) and As.
The samples were obtained by a multi-corer device and the uppermost 2 cm of the sediment surface are selected for further analyses. After freeze drying the fine fraction (<20µm) will be separated and analyzed. The aim of this programme is to investigate the environmental pollution of sediments in selected areas and to assess the spatial and temporal variability (or trends) of the contaminants.

During the R.V. "Merian" cruise, the following five stations were sampled:

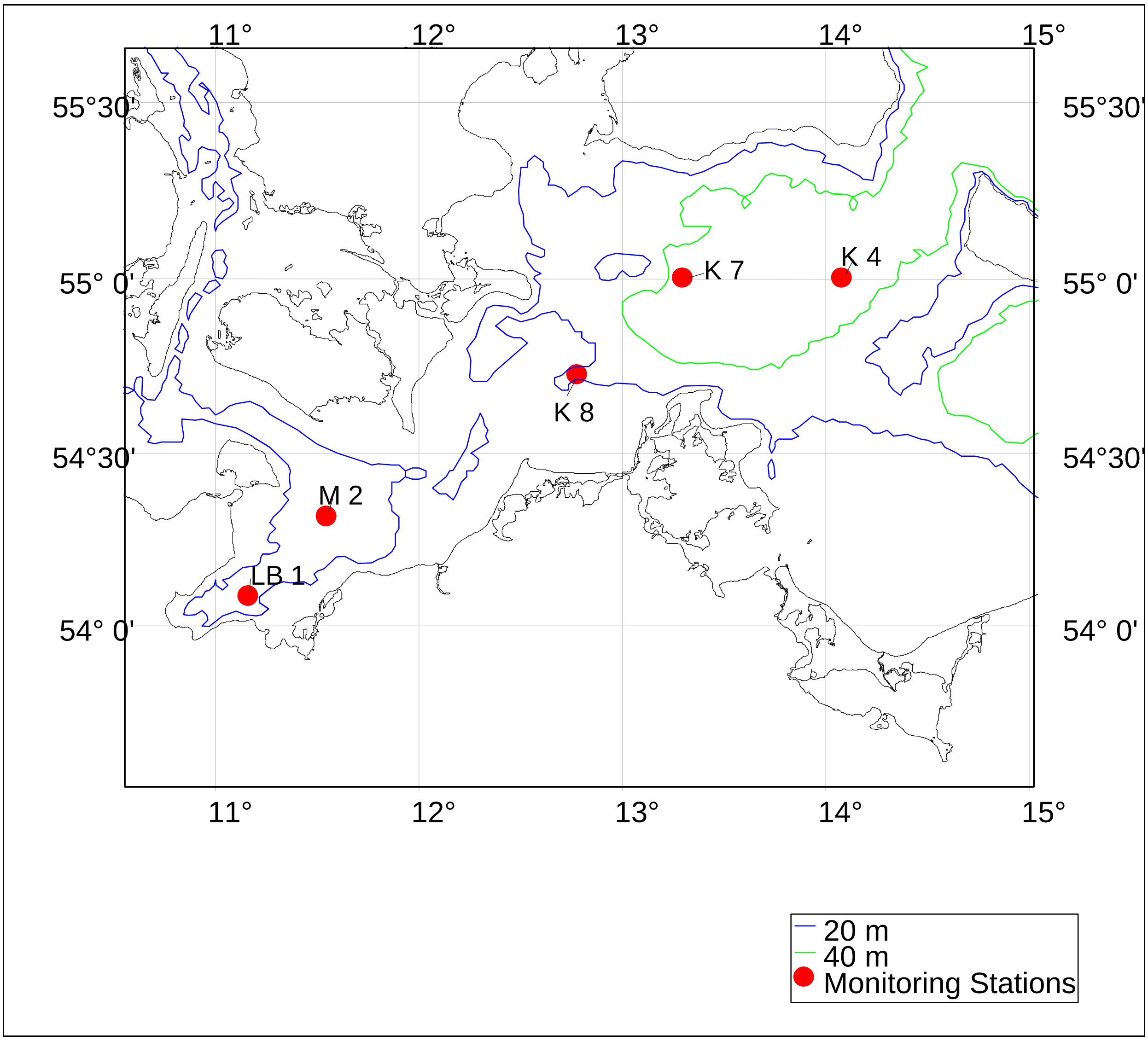


Fig. 15: BLMP - monitoring stations in the Baltic Sea

Fig. 16 gives an example of time trends of heavy metals in sediments of two selected stations, in the western (left side, K7) and eastern (right side, K4) Arkona Basin, for the years 1998 to 2005:

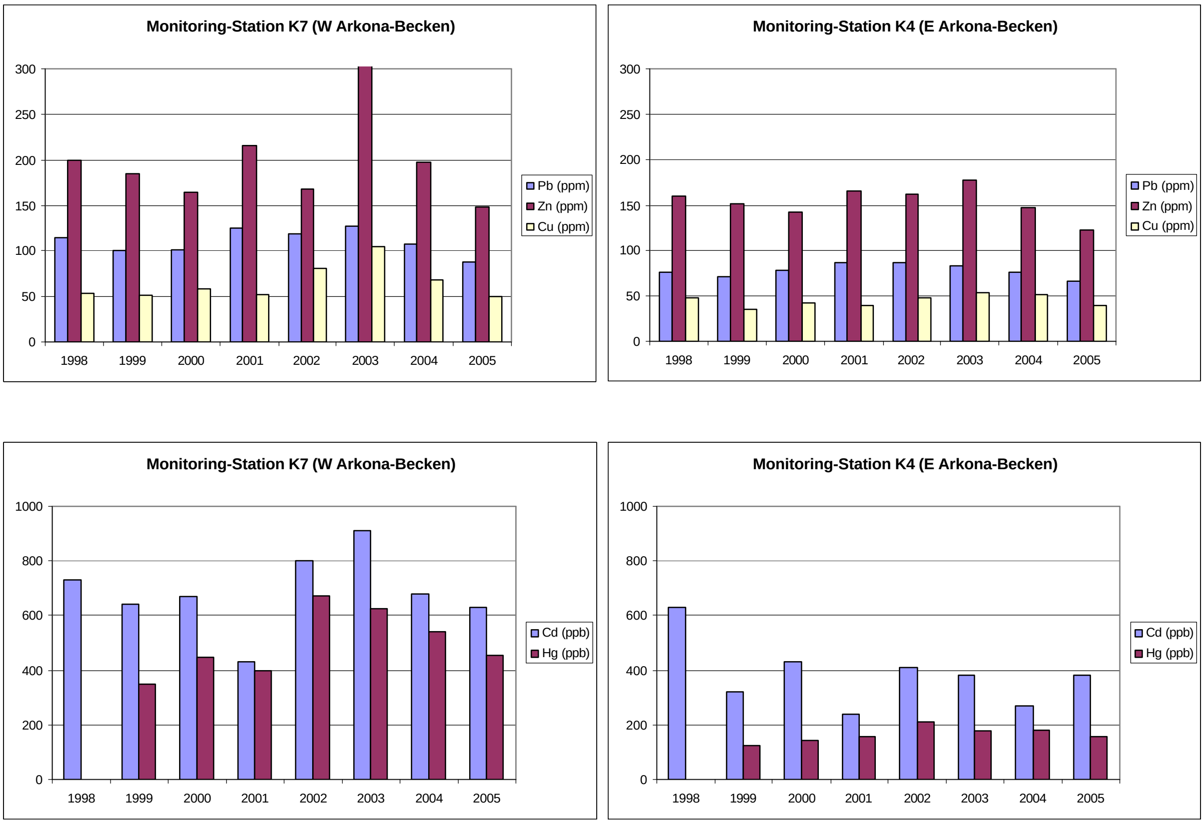


Fig. 16: Time trends of heavy metals in sediments, stations K7 and K4

6 Summary (Harff)

A presite survey for a Baltic IODP served as the core task of the expedition MSM 01/02. In 2004 a group of scientists from Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Russia, and Sweden had submitted a pre-proposal for a Baltic IODP "Paleo-environmental evolution of the Baltic Sea Basin through the last glacial cycle". The general aims of the project is to use the high resolution sedimentary record of the Baltic Sea in order to reconstruct the climatic response of Northern Europe to the forcing of the Northern Atlantic atmospheric and oceanic circulation system during the last c. 130 000 years. It is anticipated to close the gaps in knowledge by the mission specific IODP drill campaign. Information from seismic surveys and onshore drill results imply that the Baltic Sea will not only host complete sedimentary sequences in high resolution for the Late Pleistocene and Holocene but also for the entire last glacial cycle. During the cruise MSM 01/02 a scientific crew of 21 scientists and technicians coming from Denmark, Finland, Germany, Lithuania, Norway, Poland, Russia and Sweden investigated four areas:

Kattegat: “Anholt Loch”, Southern Baltic: Kriegers Flag, Northern Arkona Basin and Hanö Bay (Bornholm Basin). These areas having been ice free before the LGM are regarded prospective for complete records from the Eemian interglacial through the early and middle Weichselian to the Holocene. The sites have been investigated by a 912 nm seismoacoustic survey (echosounder SES2000 DEEP) and sampled by mulitcorer, gravitiy corer and vibrocorer (18 sites). It was anticipated to receive sediment cores representing the lithostratigraphic units “Interglacial” (Eemian), “Glacial”, “Late Glacial” (Weichselian) and “Holocene”. For each of the stratigraphic target units cores have been taken in 1 m plastic liners and transported to the IOW laboratories. Here, sedimentological and sedimentphysical (MSCL) parameters will be measured. These data will be used as basic information for the construction of a stratigraphic composite of the expected sediment sequence to be penetrated by the IODP campaign. These data has to be included into the full proposal for the Baltic IODP to be submitted by October 2006.

Furthermore, it was anticipated to investigate the Holocene sediment sequence of the Mecklenburgian Bight, Great Belt, southern Kattegat, Arkona Basin in terms of their sedimentological and dynamic features. In the frame of the DFG project SINCOS (www.sincos.org) the coastal and basin sediments are investigated with respect to changes in the paleo-ecosystem caused by the transgression of marine water into the former lacustrine Baltic basin (Littorina ransgression). Here the history and the tracks of the saline water inflow during the early Holocene play the most important role.

14 sites have been sampled by gravity corer for the measurements of paleooceanographic proxies in the laboratories of the IOW and its partners.

As a surprising preliminary result it is noted that in an isolated sub-basin within the Great Belt a sediment core has been taken that shows a texture clearly stratified by grain size and organic carbon. Such a laminated facies mirroring quite water environment has not been expected in the Great Belt. Obviously, the sediment sequence deposited in a semi-enclosed isolated sub-basin displays the history of the hydrographic interrelation between the Baltic and the North Sea in a high temporal resolution. For the detailed investigation of this sediment core a specific program will be elaborated.

The sediment cores taken in the Kattegat, Arkona Basin and Mecklenburgian Bight shall contribute to the solutions of open questions of the history of the Littorina transgression in the western Baltic Sea (project SINCOS). Data available by now lead to assumptions about the transgression between 7000 and 8000 cal. y BP. Swedish data of marine sediments from an area close to the Blekinge coast older then 9000 cal. y BP contradict to these information. The investigation of the gravity cores taken from the Arkona Basin will contribute to answer these open questions based on a multi-proxy concept including sedimentological, mineralogical, bio- and chronostratigraphical methods.

The scientific tasks of the expedition have been fulfilled completely. In addition, it has to be stated that the R/V “Maria S. Merian” is extraordinary suitable for sediment sampling. Cranes, core frame and the wide work deck allow the sampling of up to 24 m length and its further treatment and subsampling. The automatic positioning system as an appropriate ship technology to keep the position precisely during sampling.

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Enclosures

1 Cruise track plot (Endler)

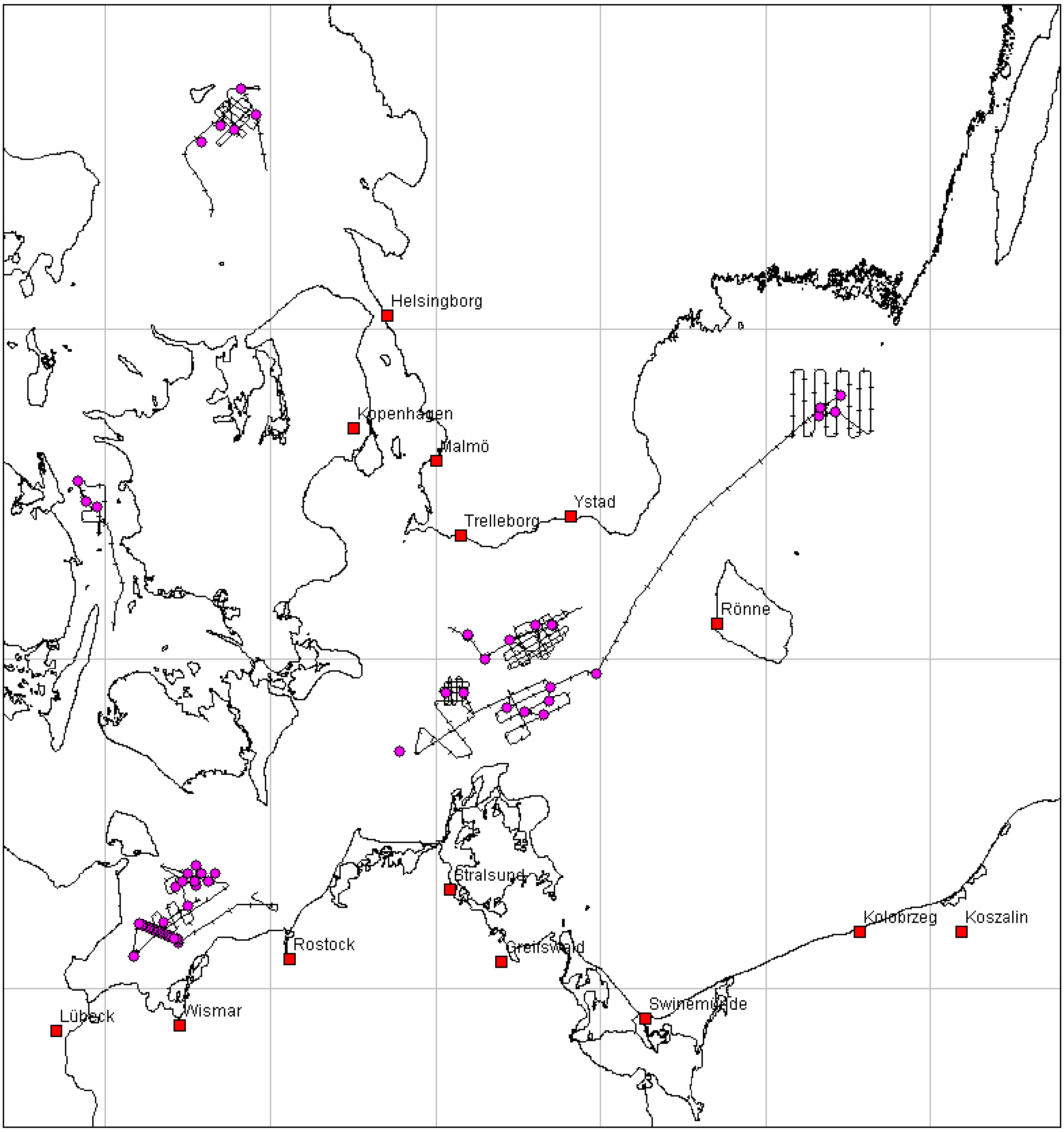


Fig.17: Cruise track plot

2 Station/Profile List

2.1 Station List

SW-Mecklenburgian Bight

IOW-Station	Longitude	Latitude
317750	54°08.4041	11°26.4683
317760	54°08.8977	11°26.2329
317770	54°09.0969	11°25.7824
317780	54°09.2610	11°24.9792
317790	54°09.4226	11°24.1812
317800	54°09.5771	11°23.3801
317810	54°09.7478	11°22.5609
317820	54°09.9106	11°21.7530
317830	54°10.0703	11°20.9463
317840	54°10.2314	11°20.1469
317850	54°10.3882	11°19.3520
317860	54°10.5508	11°18.5393
317870	54°10.7075	11°17.7448
317880	54°10.8691	11°16.9550
317890	54°11.0320	11°16.1492
317900	54°11.1914	11°15.3474
317910	54°11.3530	11°14.5442
317920	54°11.5168	11°13.7464
317930	54°11.6758	11°12.9247
317940	54°11.8423	11°12.1120
317960	54°06.0000	11°10.0000

Central Mecklenburgian Bight

IOW-Station	Longitude	Latitude
317970	54°12.00	11°21.00
317980	54°15.00	11°30.00
317990	54°18.60	11°25.56
318000	54°19.56	11°27.67
318020	54°21.036	11°30.00
318030	54°19.56	11°32.47
318040	54°22.536	11°33.042
318050	54°21.036	11°34.872
318060	54°19.56	11°37.272
318070	54°21.036	11°39.672
318080	54°18.900	11°33.000

Great Belt

IOW-Station	Longitude	Latitude
318090	55°27.6018	10°56.8157
318100	55°28.5734	10°53.0532
318110	55°32.423	10°49.68

Southern Kattegat / Anholt Loch

IOW-Station	Longitude	Latitude
318150	56°36.892	11°41.958
318160	56°33.909	11°34.681
318170	56°36.1495	11°46.5248
318180	56°43.5787	11°49.4462
318140	56°38.862	11°54.627

Kriegers Flag

IOW-Station	Longitude	Latitude
318190	55°04.08	13°11.63
318200	55°04.38	13°11.62
318210	55°00.00	13°18.00

Northern Arkona Basin

IOW-Station	Longitude	Latitude
318220	55°06.179	13°36.007
318230	55°03.357	13°26.962
318240	55°06.2576	13°42.7453
318460	55°06.180	13°42.325

Hanö Bay

IOW-Station	Longitude	Latitude
318250	55°44.983	15°25.459
318260	55°44.280	15°19.287
318280	55°45.570	15°19.981
318270	55°47.873	15°27.051

Transit

IOW-Station	Longitude	Latitude
318290	54°57.2	13°58.4

Central Arkona Basin

IOW-Station	Longitude	Latitude
318300	54°51.0792	13°25.9415
318310	54°50.3335	13°32.0159
318320	54°49.7797	13°39.3535
318330	54°52.4601	13°40.9131
318340	54°54.7617	13°41.4239

Western Arkona Basin

IOW-Station	Longitude	Latitude
318350	54°54.72	13°10.271
318360	54°53.72	13°03.671

IOW-Station	Longitude	Latitude
318450	54°43.40	12°47.00

2.2 Profile List

SES-Profile 1

Nr	Longitude	Latitude
1.1	54°09,215	11°16,693
1.2	54°18,954	11°45,909
1.3	54°20,088	11°32,178
1.4	54°17,100	11°23,262
1.5	54°19,290	11°21,292
1.6	54°20,700	11°25,860
1.7	54°17,135	11°29,058
1.8	54°16,908	11°28,251
1.9	54°12,492	11°32,250
1.10	54°11,586	11°29,166
1.11	54°16,000	11°25,168
1.12	54°15,102	11°22,062
1.13	54°10,687	11°26,064
1.14	54°09,792	11°22,998
1.15	54°14,208	11°19,002
1.16	54°13,304	11°16,418
1.17	54°11,106	11°18,420
1.18	54°16,140	11°33,480

SES-Profile 2

Nr	Longitude	Latitude
2.1	55°21,6	10°57,732
2.2	55°27,00	10°57,732
2.3	55°27,00	10°51,24
2.4	55°24,9	10°51,24
2.5	55°24,9	11°00,00
2.6	55°31,548	11°00,00
2.7	55°31,548	10°52,38
2.8	55°32,424	10°52,38
2.9	55°32,424	10°46,56

SES-Profile 3

Nr	Longitude	Latitude
3.1	56°33,045	11°29,608
3.2	56°41,966	11°49,800
3.3	56°40,623	11°53,588
3.4	56°33,909	11°39,727
3.5	56°33,237	11°41,789
3.6	56°38,537	11°52,772
3.7	56°41,511	11°43,374
3.8	56°40,192	11°40,544
3.9	56°35,443	11°51,380
3.10	56°34,724	11°49,797
3.11	56°39,472	11°38,961
3.12	56°40,538	11°43,436
3.13	56°36,204	11°53,448
3.14	56°38,22	11°56,370
3.15	56°41,972	11°45,480

SES-Profile 4

Nr	Longitude	Latitude
4.1	56°43,59	11°45,122
4.2	56°43,59	11°54,612

SES-Profile 5

Nr	Longitude	Latitude
5.1	55°02,075	13°24,061
5.2	55°08,138	13°45,329
5.3	55°07,231	13°46,173
5.4	55°00,982	13°24,558
5.5	54°59,665	13°25,650
5.6	55°05,914	13°47,018
5.7	55°04,995	13°47,763
5.8	54°58,771	13°26,147
5.9	54°57,876	13°26,743
5.10	55°03,541	13°46,470
5.11	55°08,238	13°41,205
5.12	55°07,244	13°37,230
5.13	55°01,852	13°43,240
5.14	55°00,336	13°37,724
5.15	55°05,728	13°31,714
5.16	55°03,790	13°25,403
5.17	54°58,522	13°31,265

SES-Profile 5a

Nr	Longitude	Latitude
5a.1	54°59,467	13°34,793
5a.2	55°05,355	13°28,335
5a.3	55°06,871	13°34,149
5a.4	55°00,759	13°40,904

SES-Profile 6

Nr	Longitude	Latitude
6.1	55°40,518	15°10,022
6.2	55°52,533	15°10,016
6.3	55°52,500	15°13,835
6.4	55°40,485	15°13,840
6.5	55°40,461	15°17,761
6.6	55°52,475	15°17,756
6.7	55°52,442	15°21,893
6.8	55°40,428	15°21,899
6.9	55°40,372	15°25,860
6.10	55°52,386	15°25,854
6.11	55°52,317	15°30,174
6.12	55°40,303	15°30,180
6.13	55°40,375	15°34,313
6.14	55°52,390	15°34,308
6.15	55°52,357	15°38,107
6.16	55°40,342	15°38,113

SES-Profile 7

Nr	Longitude	Latitude
7.1	54°57,831	13°54,448
7.2	54°50,076	13°21,632
7.3	54°48,215	13°23,182
7.4	54°54,016	13°47,375
7.5	54°52,093	13°49,049
7.6	54°46,292	13°24,856
7.7	54°44,338	13°27,151
7.8	54°46,137	13°34,533
7.9	54°53,488	13°27,340

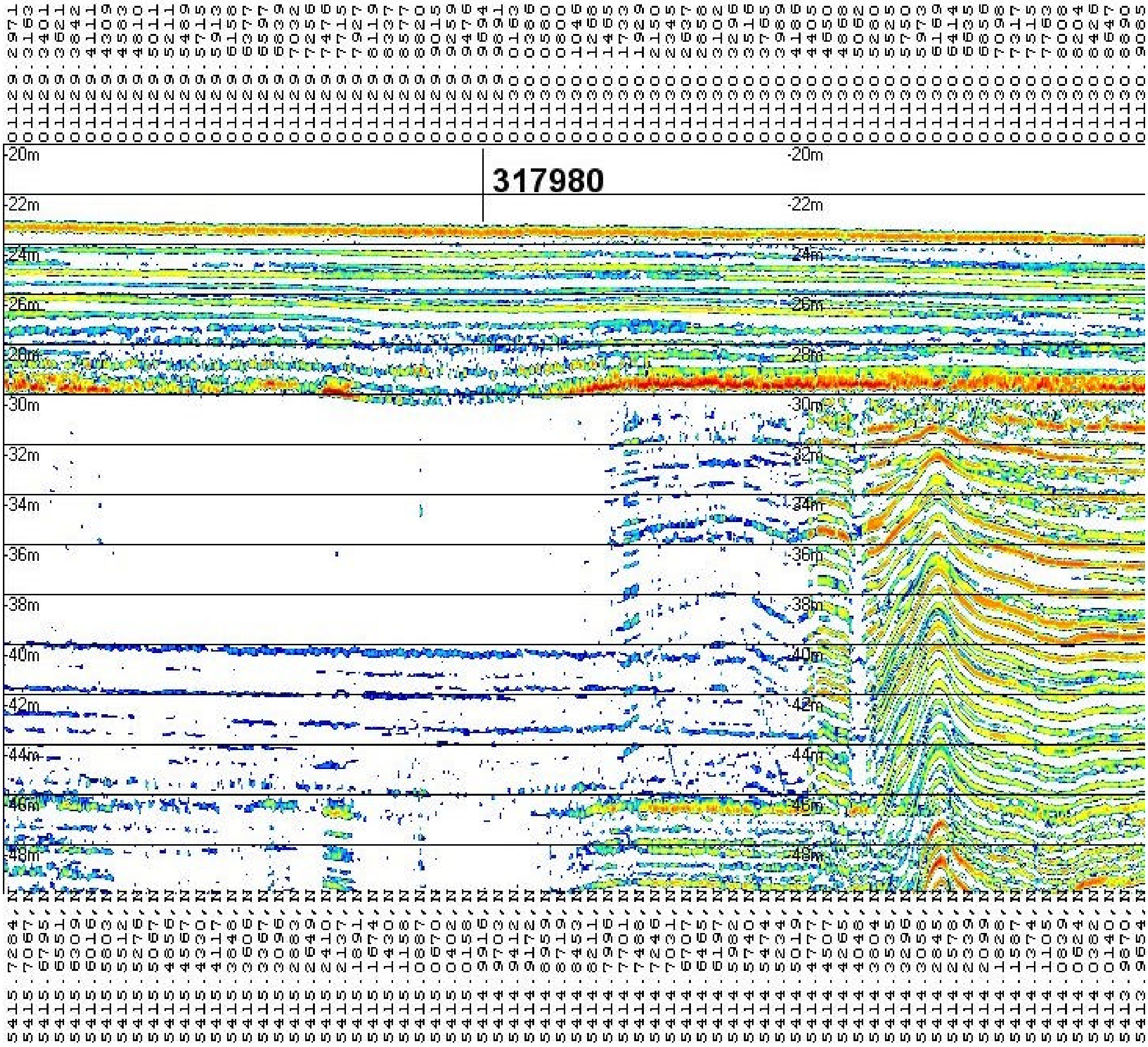
SES-Profile 8

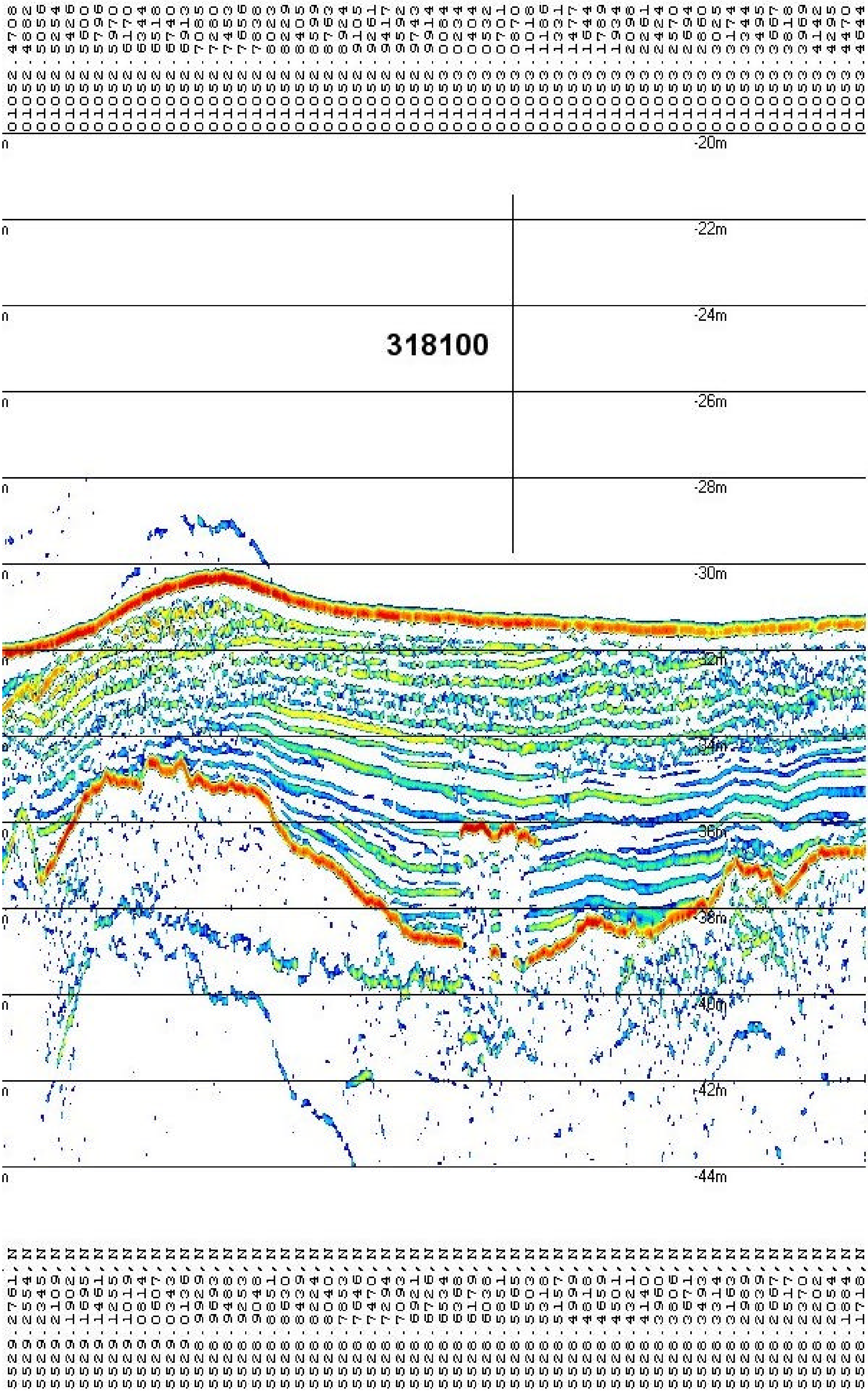
Nr	Longitude	Latitude
8.1	54°55,927	13°38,576
8.2	54°50,072	13°13,383
8.3	54°51,600	13°09,360
8.4	54°56,700	13°09,360
8.5	54°56,700	13°07,560
8.6	54°51,600	13°07,560
8.7	54°51,600	13°05,700
8.8	54°56,700	13°05,700
8.9	54°56,700	13°04,500
8.10	54°51,600	13°04,500
8.11	54°51,600	13°02,940
8.12	54°55,800	13°02,940
8.13	54°55,800	13°10,680
8.14	54°54,780	13°10,680
8.15	54°54,780	13°01,560
8.16	54°53,700	13°01,560
8.17	54°53,700	13°10,680
8.18	54°52,380	13°10,680
8.19	54°52,380	13°00,000

SES-Profile 9

Nr	Longitude	Latitude
9.1	54°51,946	13°06,539
9.2	54°45,045	12°44,892
9.3	54°43,400	12°47,000
9.4	54°36,415	12°55,916
9.5	54°40,071	13°12,849
9.6	55°00,000	13°13,086
9.7	55°00,000	13°18,238
9.8	54°40,917	13°17,936
9.9	54°41,285	13°22,048
9.10	55°00,000	13°22,344

3 Profiles/SES-Pictures

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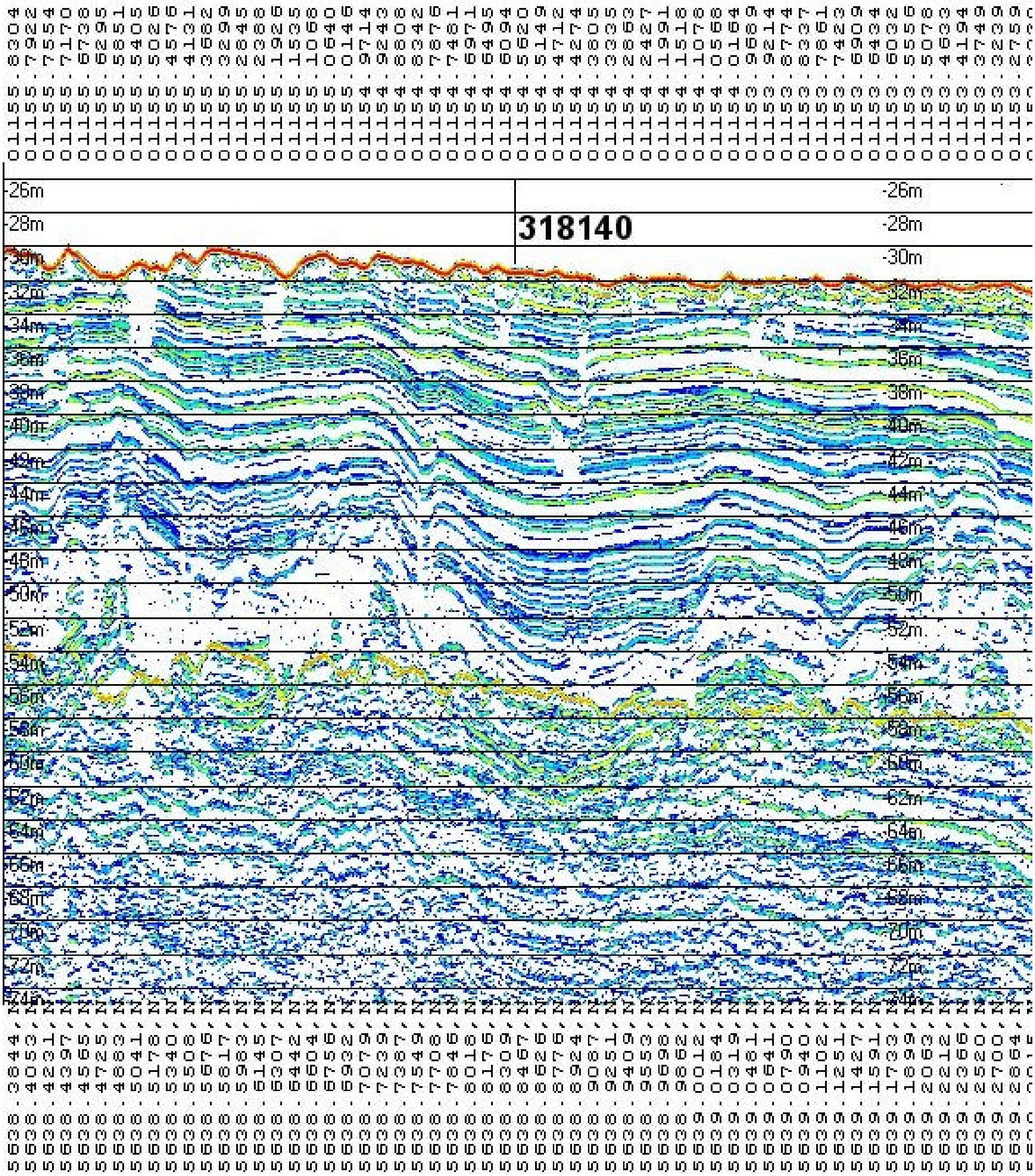
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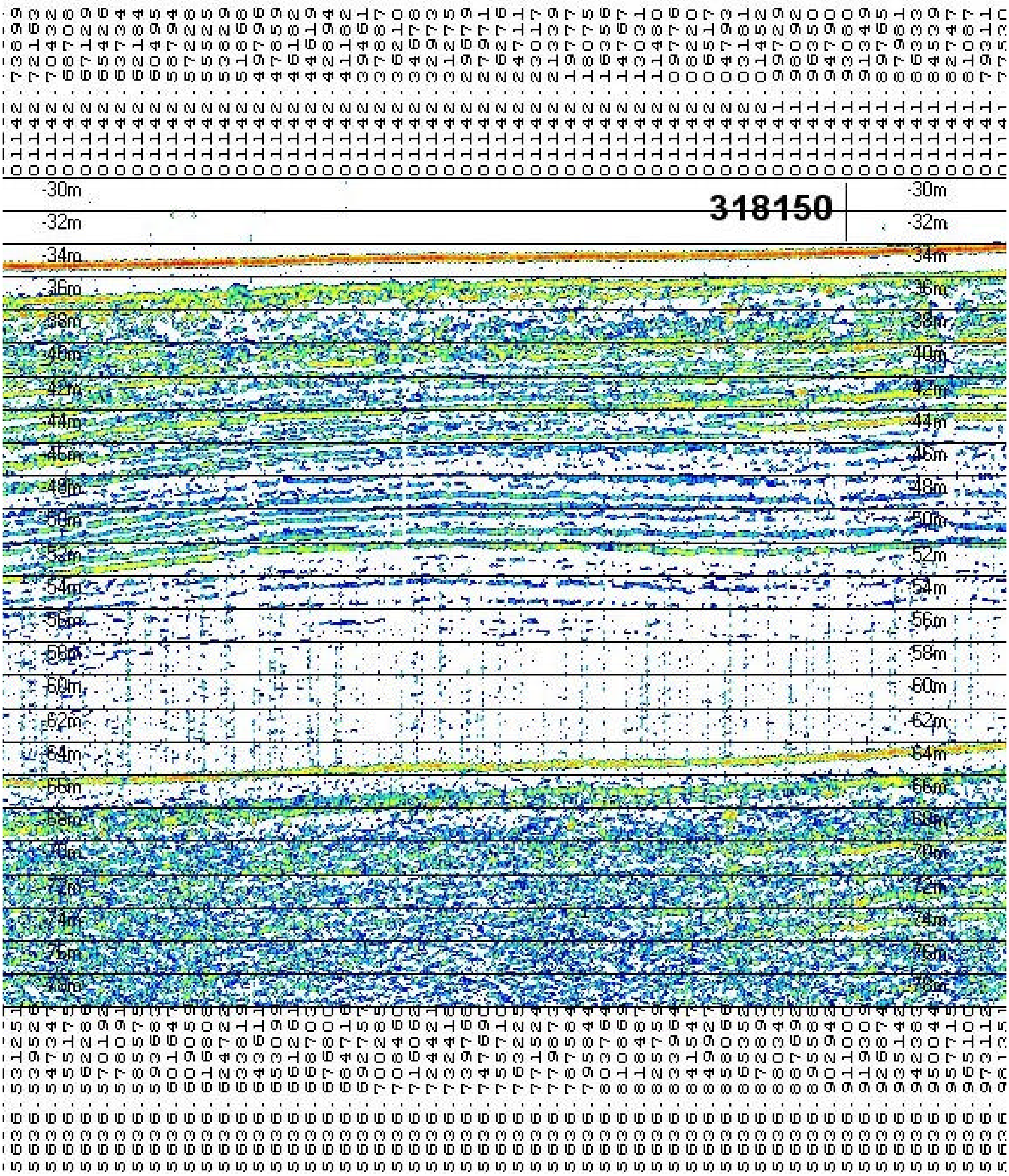
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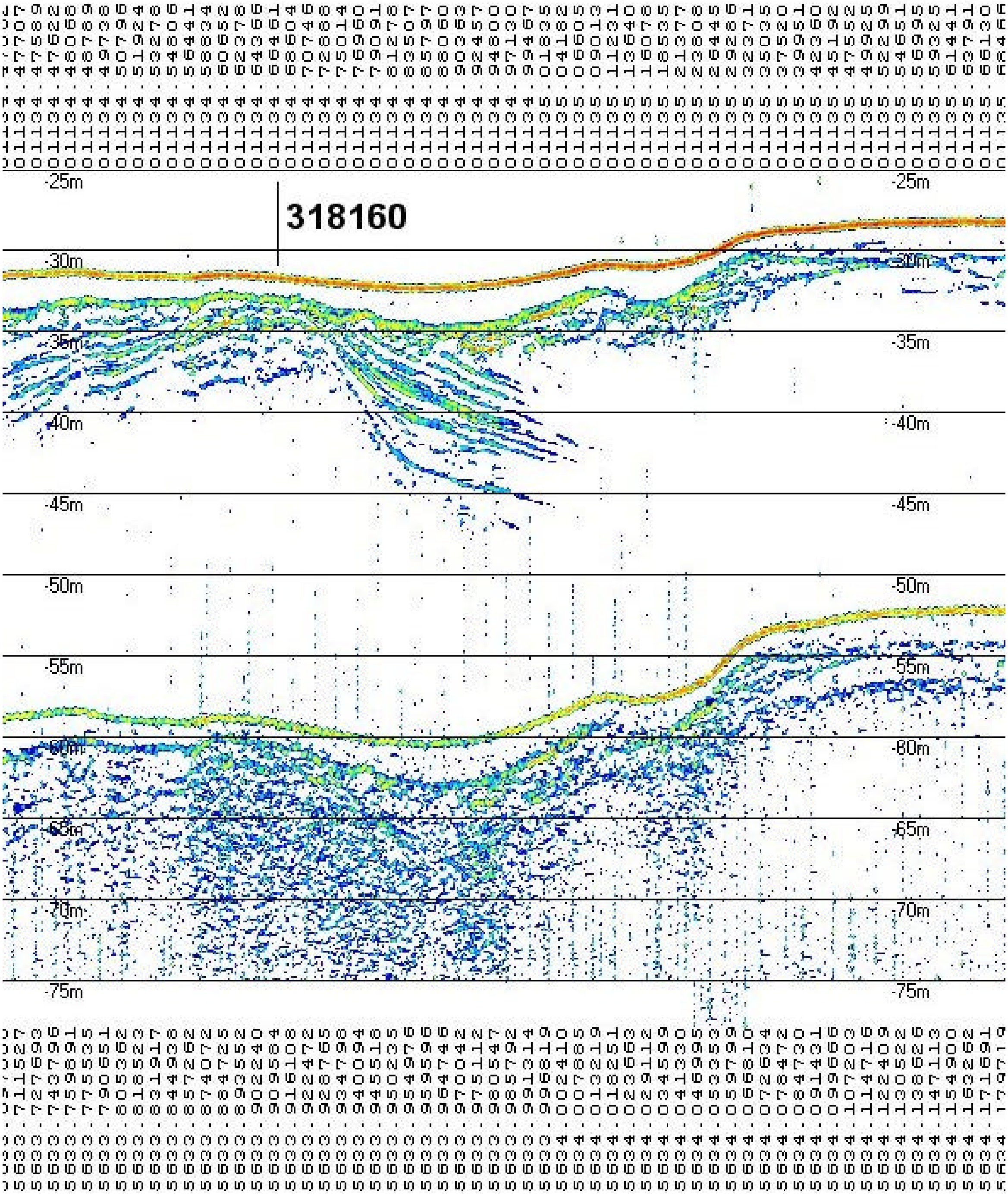
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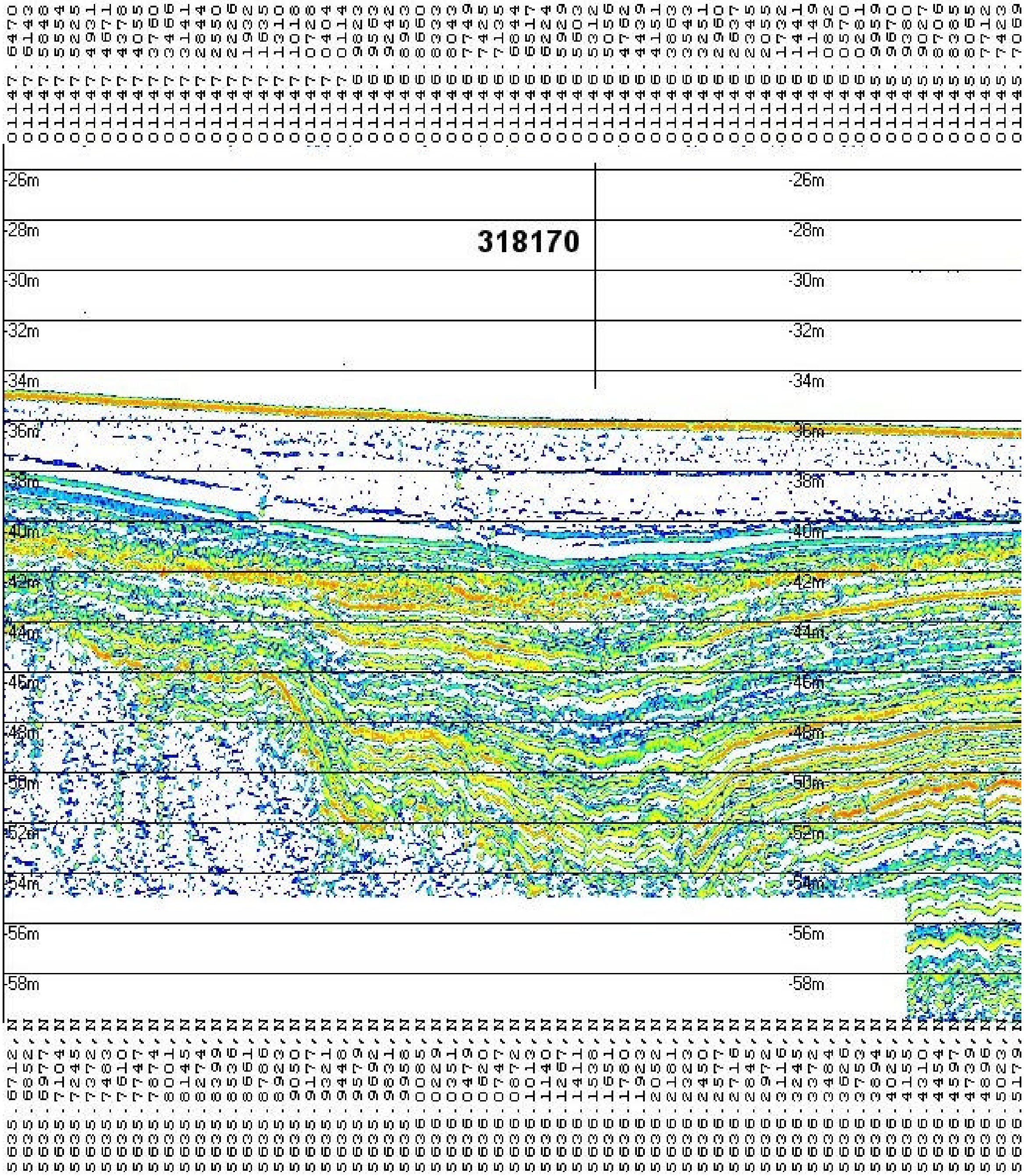
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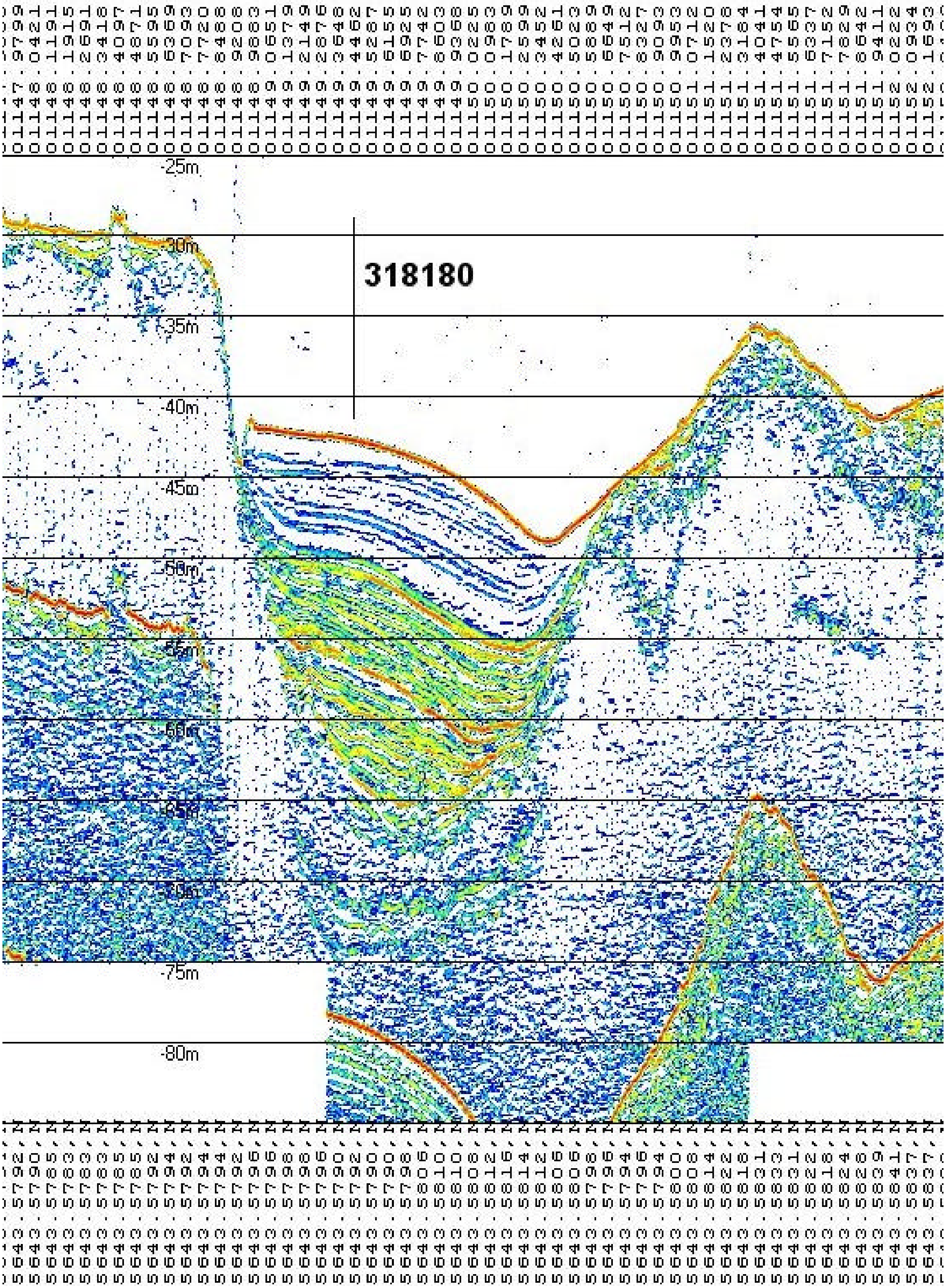
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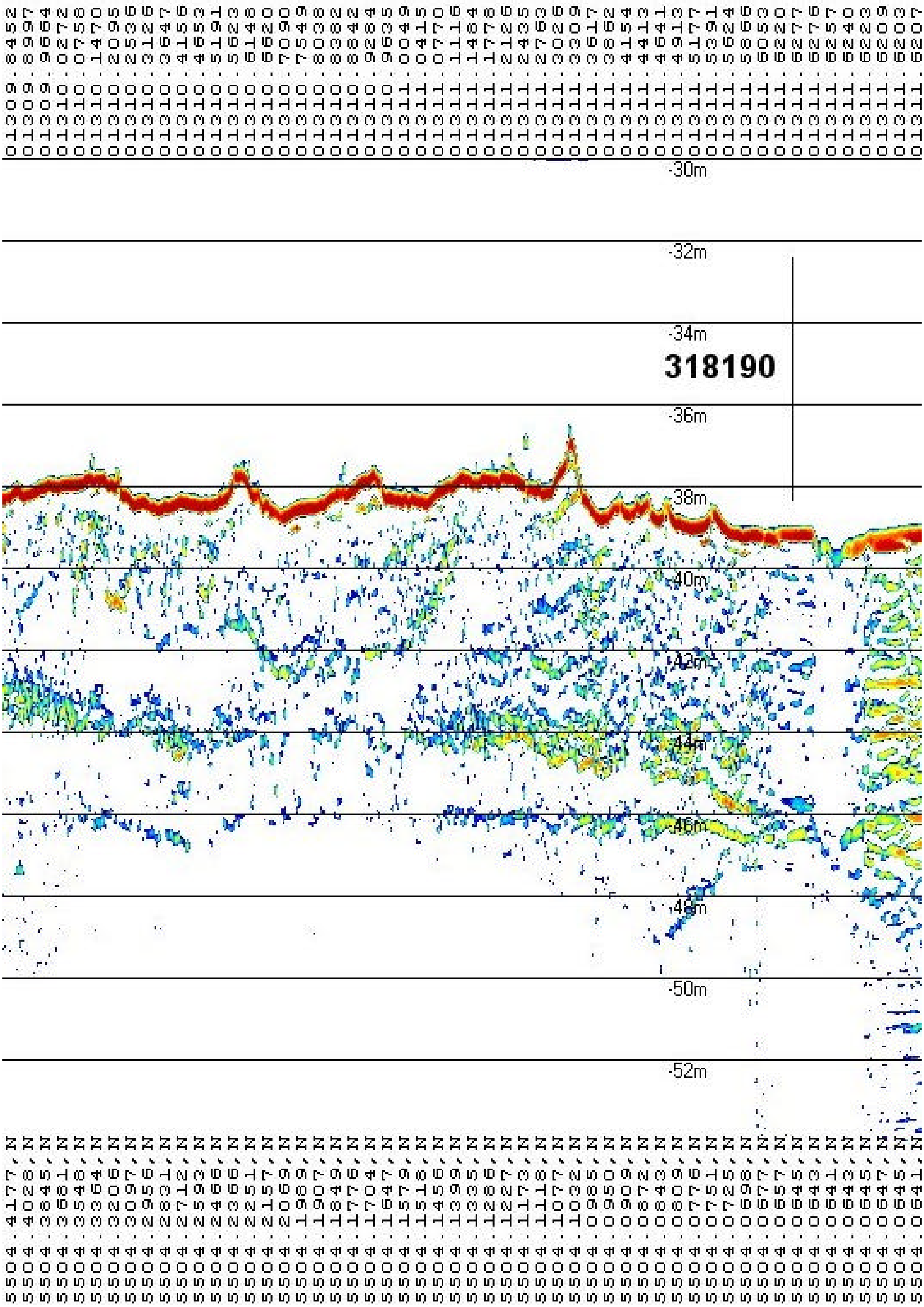
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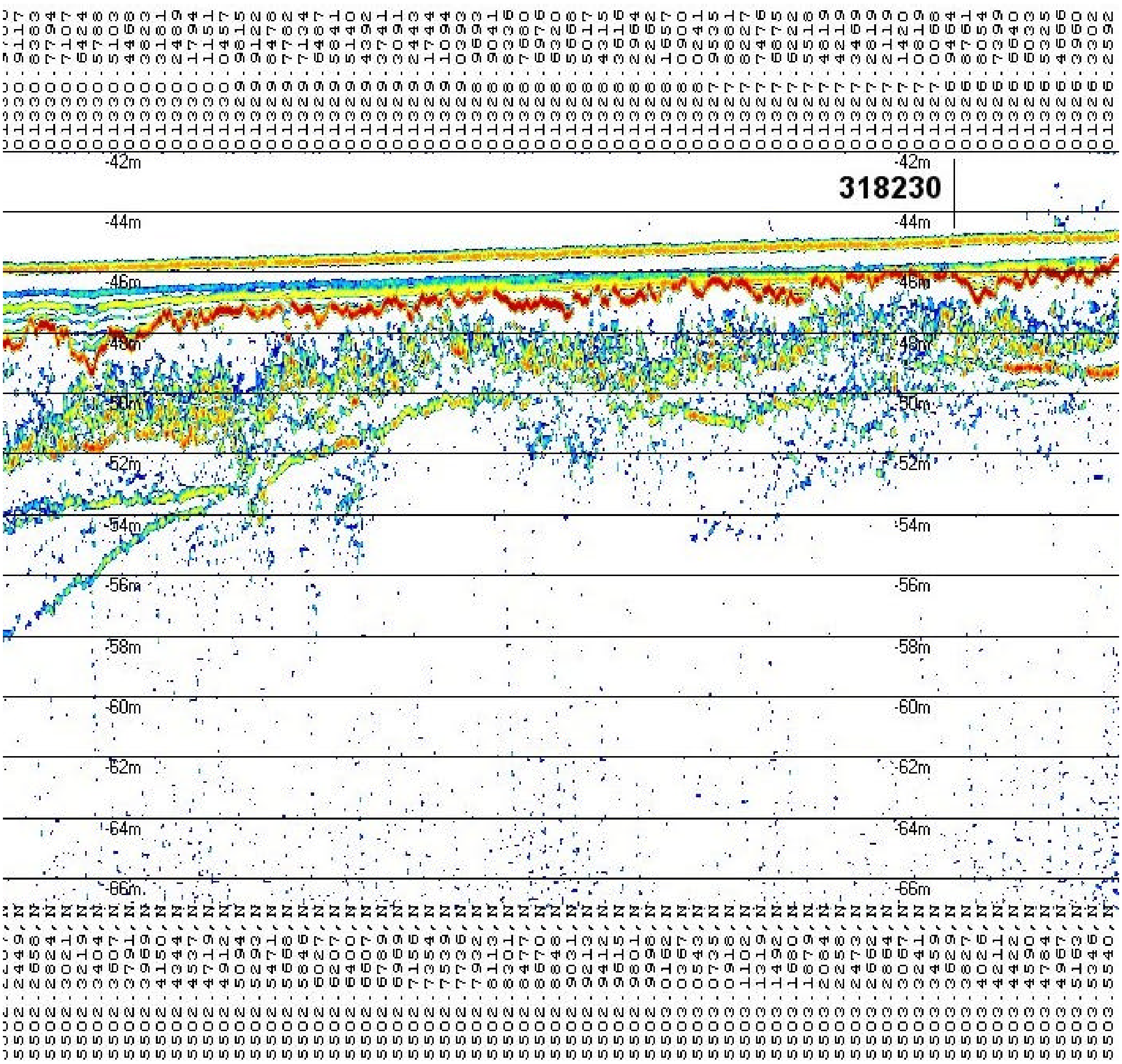

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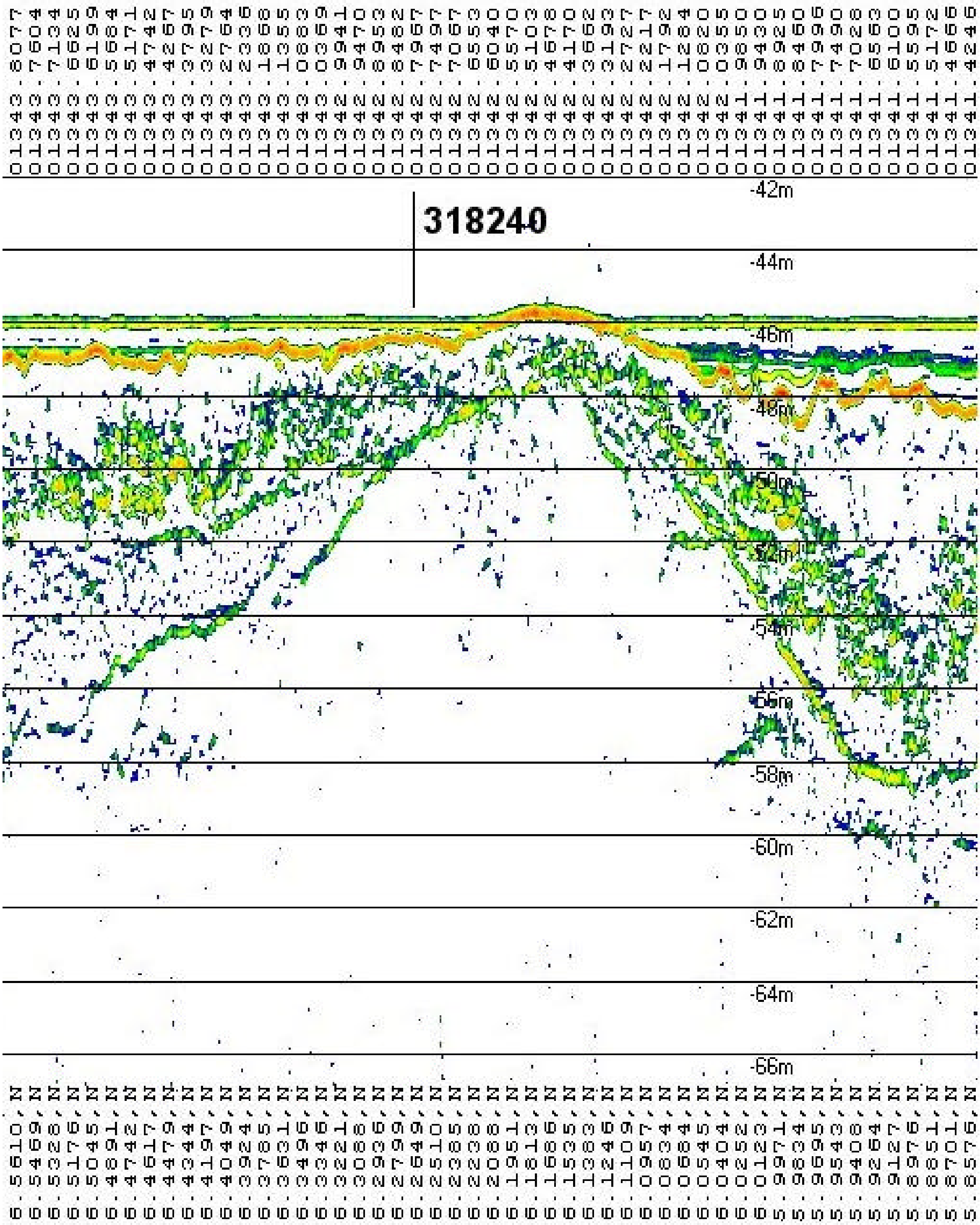
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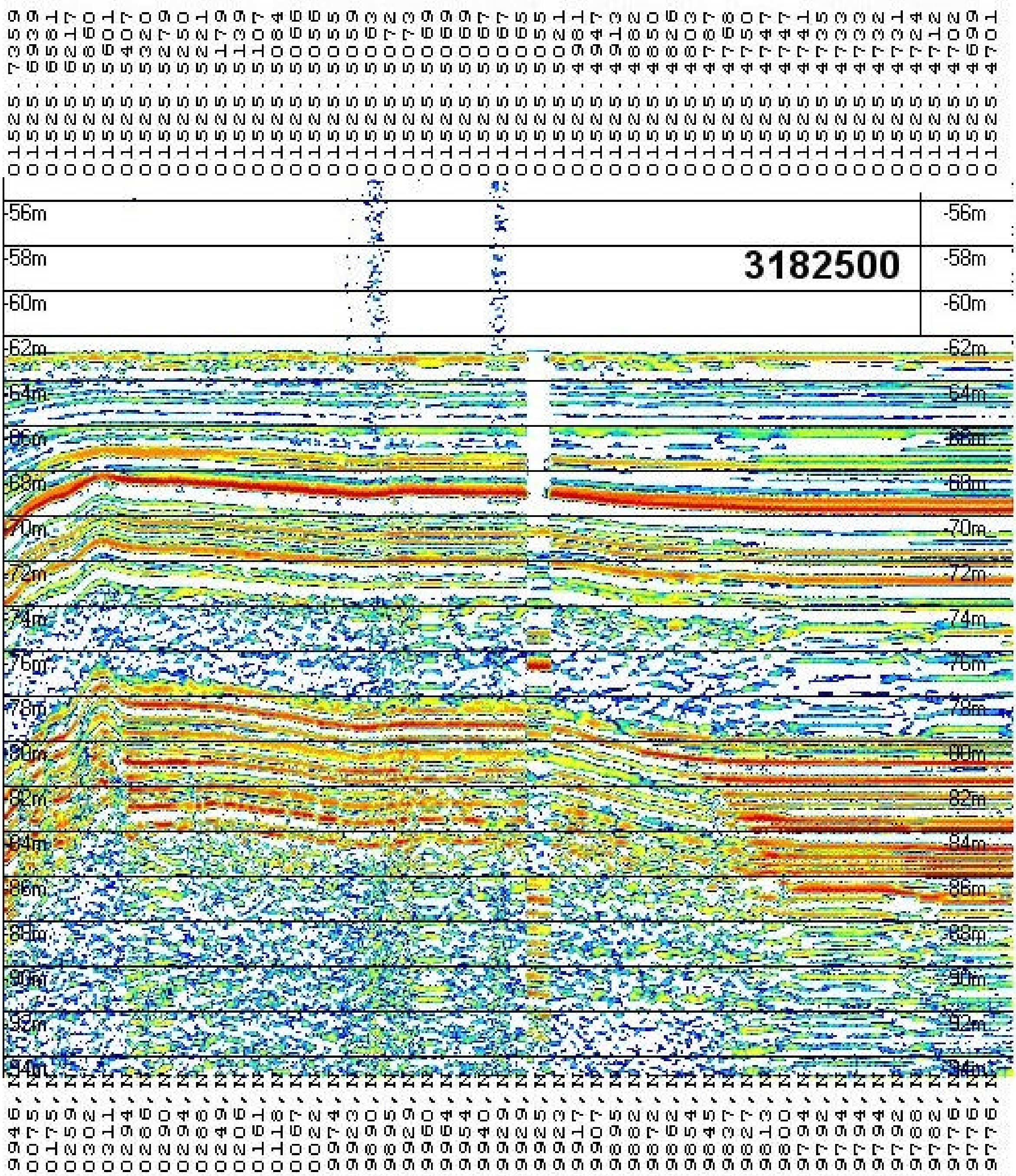
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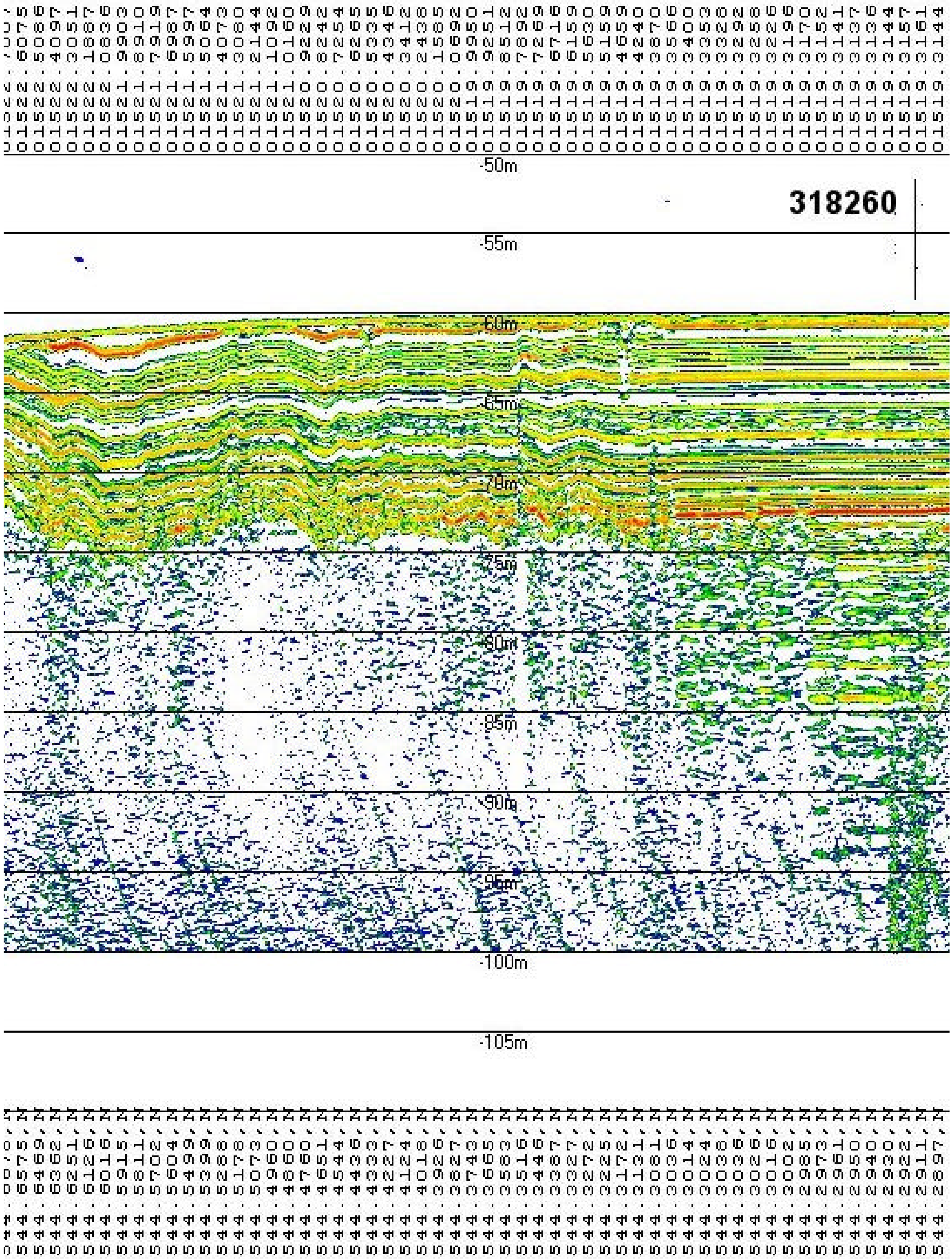
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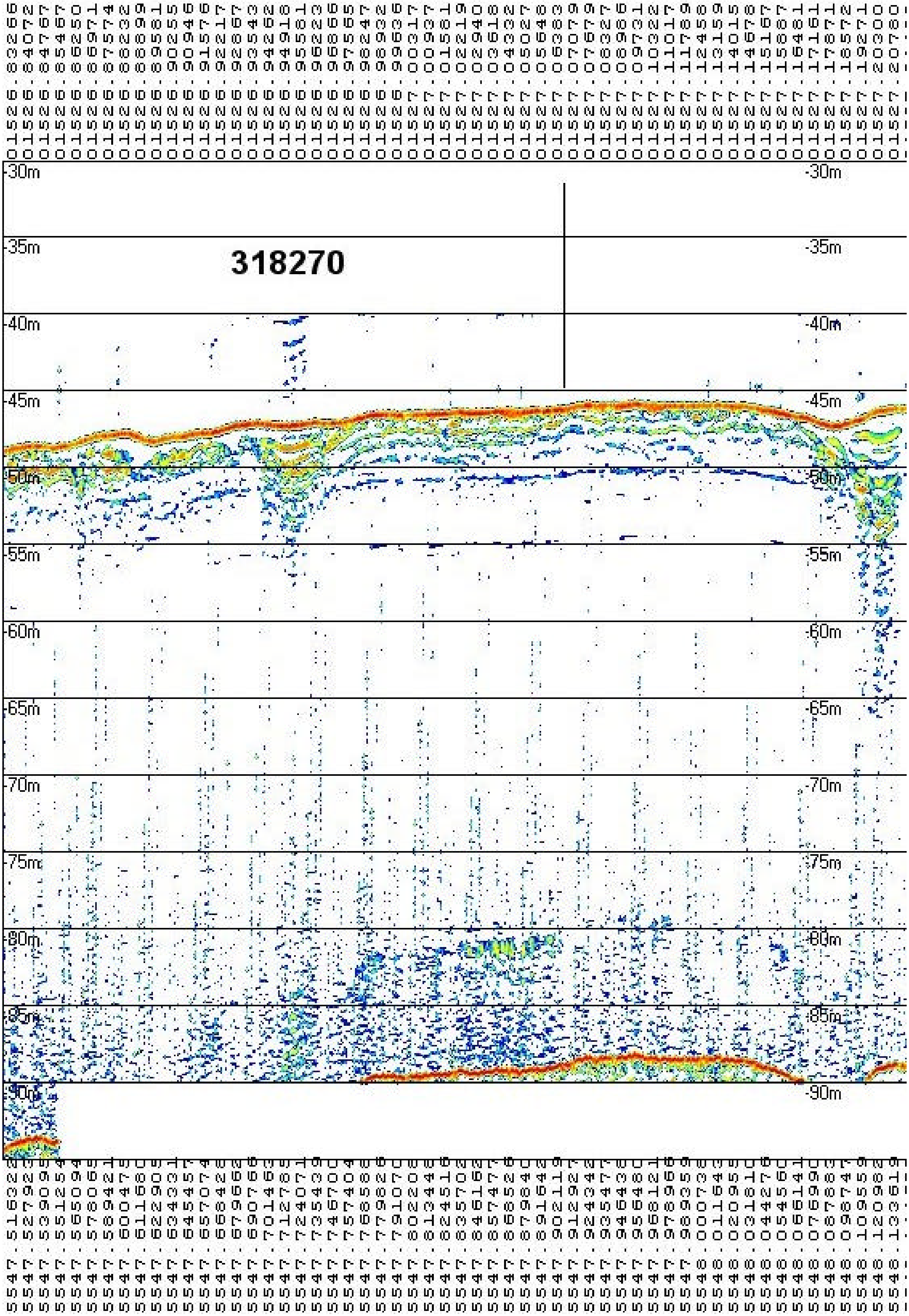
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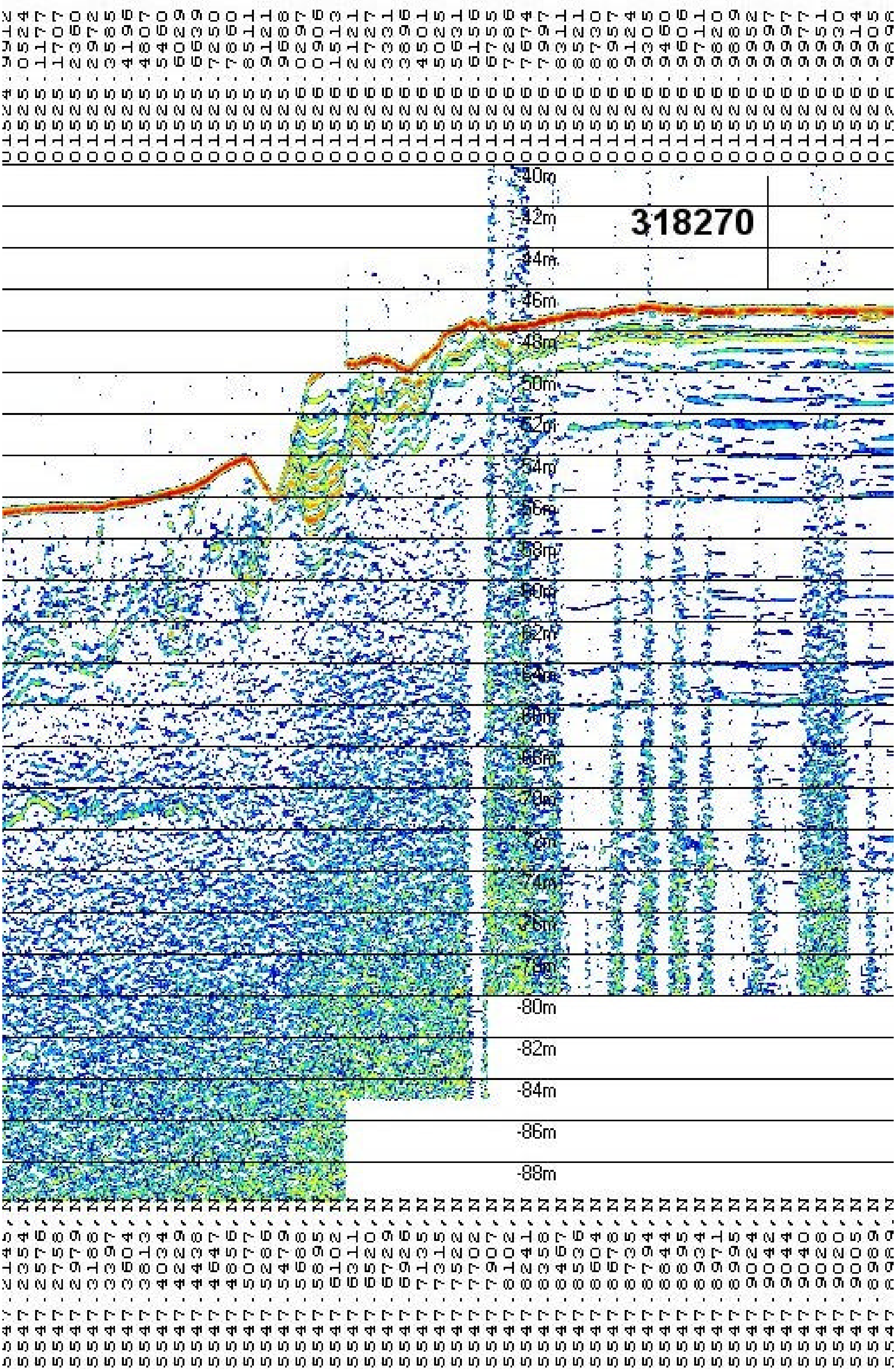
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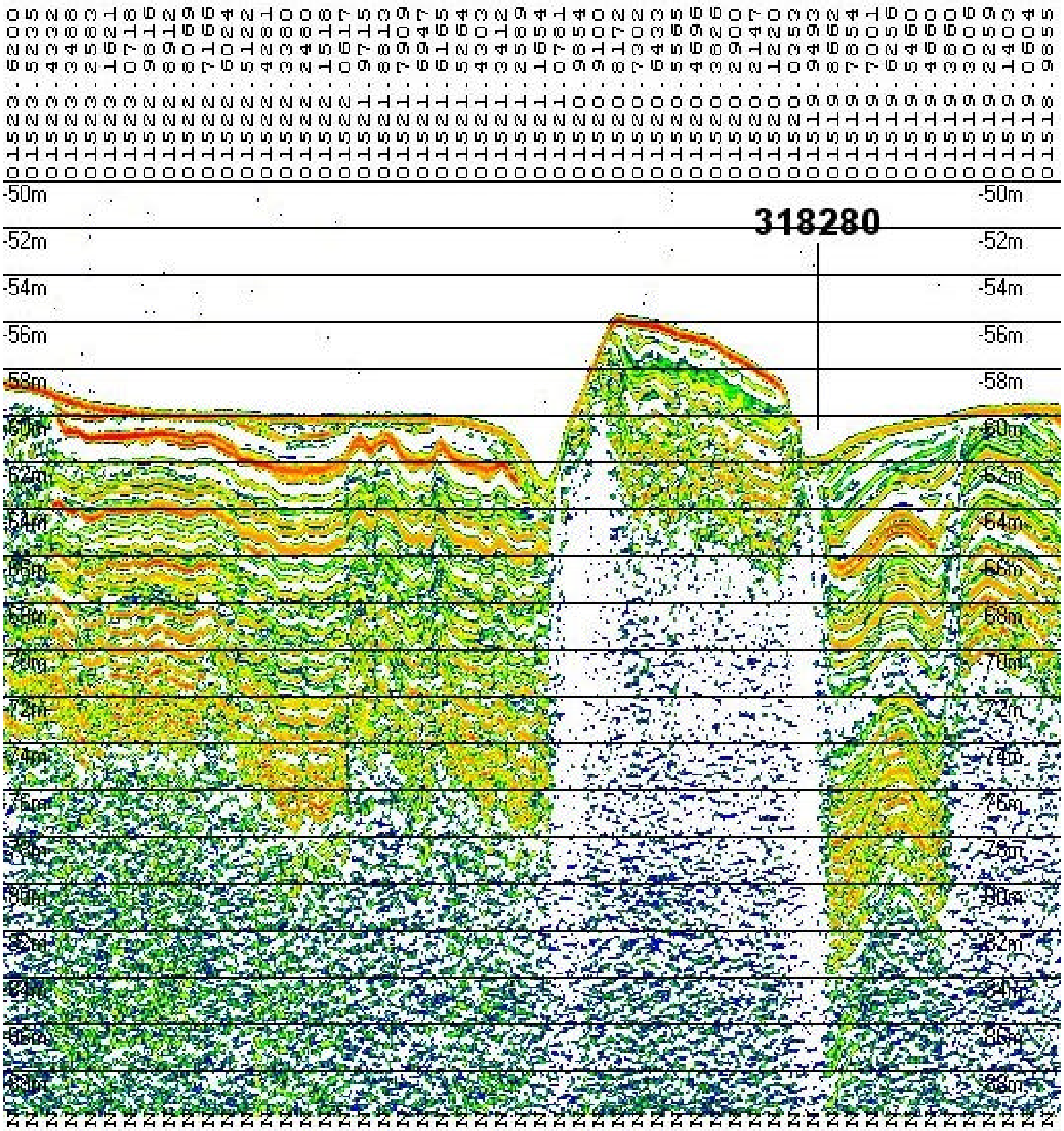
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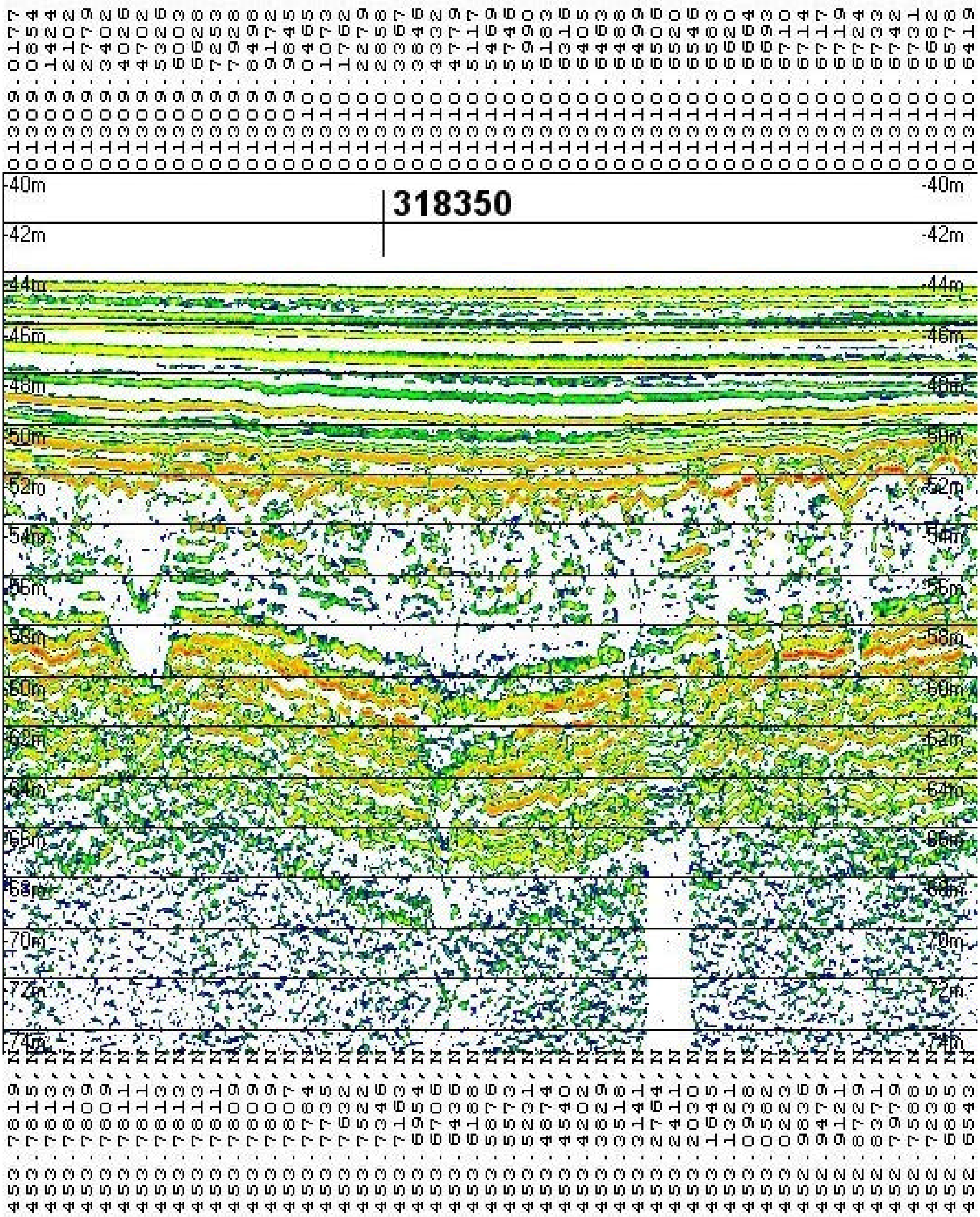
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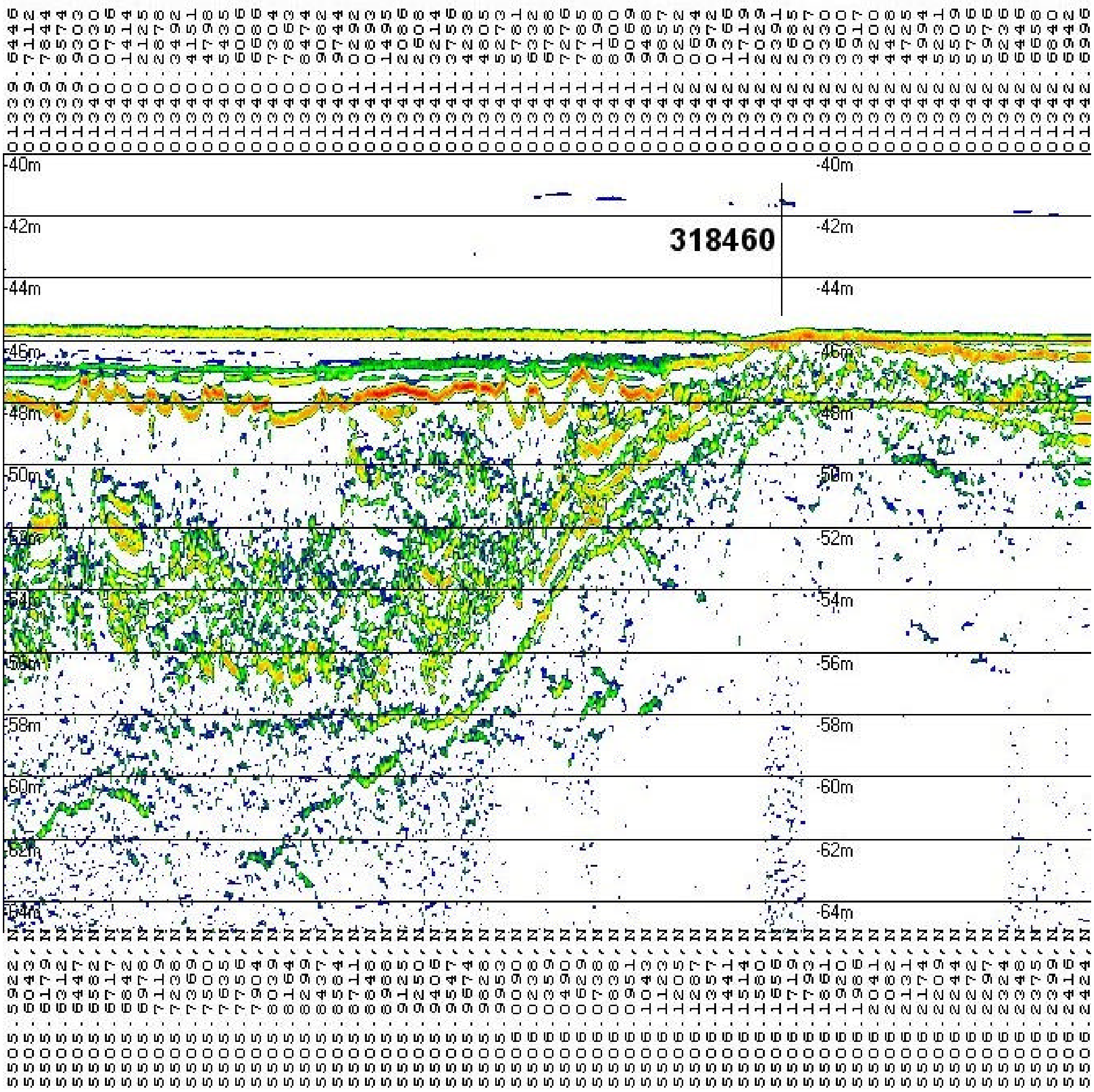
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4 Core Lists (Krauß)

Core List

Projekt: DYNAS-FWG   Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **11:39:30**	**IOW- Station ID** **317750**	
Lat. 54°8.4041 **Long.** 11°26.4683	**Water depth start** 15.00	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	11:43:55	54°8.405 11°26.487	15.00	MUC	0.6	0.32/0.32	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	RV MSM	Area MB	Year 2006	Month March	Day 27	Start (UTC) 12.20:26	IOW- Station ID 317760	
Lat. 54°8.8977 **Long.** 11°26.2329	**Water depth start** 22.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	12:23:16	54°8.899 11°26.242	22.50	MUC	0.6	0.33/0.33	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **12:51:28**	**IOW- Station ID** **317770**	
Lat. 54°9.0969 **Long.** 11°25.7824	**Water depth start** 22.60	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	12:55:24	54°9.107 11°25.802	22.60	MUC	0.6	0.0		Empty Cores
-2	12:59:09	54°9.107 11°25.802	22.60	MUC	0.6	0.35/0.35	Moros	1 core for FWG
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG   Cruise: MSM 01/02

RV- Stat. Code	**RV MSM**	**Area MB**	**Year 2006**	**Month March**	**Day 27**	**Start (UTC) 13:23:08**	**IOW- Station ID 317780**	
Lat. 54°9.2610 **Long.** 11°24.9792	**Water depth start** 23.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	13:28:06	54°9.266 11°24.999	23.50	MUC	0.6	0.35/0.35	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **13:49:44**	**IOW- Station ID** **317790**	
Lat. 54°9.4226 **Long.** 11°24.1812	**Water depth start** 24.00	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	13:52:07	54°9.434 11°24.198	24.00	MUC	0.6	0.39/0.39	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG   Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **14:13:10**	**IOW- Station ID** **317800**	
Lat. 54°9.5771 **Long.** 11°23.3801	**Water depth start** 24.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	14:16:06	54°9.579 11°23.400	24.50	MUC	0.6	0.40/0.40	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV MSM**	**Area MB**	**Year 2006**	**Month March**	**Day 27**	**Start (UTC) 14:23:22**	**IOW- Station ID 317810**	
Lat. 54°9.7478 **Long.** 11°22.5609	**Water depth start** 24.80	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	14:34:22	54°9.746 11°22.571	24.50	MUC	0.6	0.35/0.35	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **14:50:51**	**IOW- Station ID** **317820**	
Lat. 54°9.9106 **Long.** 11°21.7530	**Water depth start** 24.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	14:53:18	54°9.910 11°21.773	24.50	MUC	0.6	0.38/0.38	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **15:10:36**	**IOW- Station ID** **317830**	
Lat. 54°10.0703 **Long.** 11°20.9463	**Water depth start** 24.50	**Station description** No. Of Cores: 2 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	15:14:12	54°10.068 11°20.960	24.50	MUC	0.6	0.36/0.36	Moros Lis/Nowak	1 core for FWG 1 core
-2								
-3								
-4								
-5								
-6								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **15:33:19**	**IOW- Station ID** **317840**	
Lat. 54°10.2314 **Long.** 11°20.1469	**Water depth start** 24.20	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	15:35:07	54°10.225 11°20.160	24.20	MUC	0.6	0.35/0.35	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **15:56:56**	**IOW- Station ID** **317850**	
Lat. 54°10.3882 **Long.** 11°19.3520	**Water depth start** 24.00	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	15:59:31	54°10.384 11°19.365	24.00	MUC	0.6	0.38/0.38	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **16:20:11**	**IOW- Station ID** **317860**	
Lat. 54°10.5508 **Long.** 11°18.5393	**Water depth start** 23.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	16:22:02	54°10.542 11°18.567	23.50	MUC	0.6	0.43/0.43	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	RV MSM	Area MB	Year 2006	Month March	Day 27	Start (UTC) 16:45:02	IOW- Station ID 317870	
Lat. 54°10.7075 **Long.** 11°17.7448	**Water depth start** 23.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	16:48:20	54°10.703 11°17.759	23.50	MUC	0.6	0.0		No sample
-2	16:59:40	54°10.703 11°17.758	23.50	MUC	0.6	0.3/0.3	Moros	1 core for FWG
-3								
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **17:18:54**	**IOW- Station ID** **317880**	
Lat. 54°10.8691 **Long.**11°16.955 0	**Water depth start** 18.26	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	17:20:04	54°10.863 11°16.974	16:43	MUC	0.6	0.35/0.35	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **17:42:50**	**IOW- Station ID** **317890**	
Lat.54°11.0320 **Long.**11°16.1492	**Water depth start** 22.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	17:45:15	54°11.025 11°16.170	22.50	MUC	0.6	0.34/0.34	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	RV MSM	Area MB	Year 2006	Month March	Day 27	Start (UTC) 18:13:50	IOW- Station ID 317900	
Lat.54°11.1914 **Long.**11°15.3474	**Water depth start** 22.00	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	18:16:38	54°11.185 11°15.362	22.00	MUC	0.6	0.0		No sample
-2	18:27:45	54°11.189 11°15.368	22.00	MUC	0.6	0.35/0.35	Moros	1 core for FWG
-3								
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **18:46:22**	**IOW- Station ID** **317910**	
Lat.54°11.3530 **Long.**11°14.5442	**Water depth start** 21.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	18:50:50	54°11.343 11°14.578	21.50	MUC	0.6	0.32/0.32	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	RV MSM	Area MB	Year 2006	Month March	Day 27	Start (UTC) 19:09:00	IOW- Station ID 317920	
Lat.54°11.5168 **Long.**11°13.746 4	**Water depth start** 21.50	**Station description** No. Of Cores: 2 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	19:11:05	54°11.540 11°13.675	21.30	MUC	0.6	0.38/0.38	Moros Lis/Nowak	1 core for FWG 1 core sliced for Szczecin
-2								
-3								
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG   Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **19:42:13**	**IOW- Station ID** **317930**	
Lat.54°11.6758 **Long.**11°12.9247	**Water depth start** 21.45	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	19:26:12	54°11.678 11°12. 931	21.15	MUC	0.6	0.37/0.37	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **20:05:33**	**IOW- Station ID** **317940**
Lat.54°11.8423 **Long.**11°12.112 0	**Water depth start** 21.03	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:					

Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	20:08:42	54°11.839 11°12.127	21.03	MUC	0.6	0.39/0.39	Moros	1 core for FWG
-2								
-3								
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG　　　　Cruise: MSM 01/02

RV- Stat. Code	**RV MSM**	**Area MB**	**Year 2006**	**Month March**	**Day 27**	**Start (UTC) 20:57:20**	**IOW- Station ID 317960**	
Lat.54°06.0000 **Long.**11°10.000	**Water depth start** 24:15	**Station description** No. Of Cores: 2 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	20:59:47	54°06.001 11°10.020	24:02	MUC	0.6	0.39/0.39	Moros Leipe	1 core for FWG 1 core for surface sample
-2								
-3								
-4								
-5								
-6								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **28**	**Start (UTC)** **06:01:58**	**IOW- Station ID** **317970**	
Lat. 54°12.00 **Long.** 11°21.00	**Water depth start** 22.50	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	06:23:15	54°12.011 11°21.009	22.50	MUC	0.6	0.34/0.34	Moros Lis/Nowak	1 core sliced 1 core sliced for Szczecin
-2	06:57:44	54°12.011 11°21.009	22.50	SL	6.00	6.00/ -		Core did slide out of the SL on deck
-3	07:31:49	54°12.011 11°21.009	22.50	SL	6.00	6.00/1.18	Moros	Short gain description
-4	08:08:07	54°12.011 11°21.010	22.50	SL	12.00	12.00/7.58	Moros	
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **28**	**Start (UTC)** **09:30:51**	**IOW- Station ID** **317980**	
Lat. 54°15.00 **Long.** 11°30.00	**Water depth start** 24.07	**Station description** No. Of Cores: 3 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	09:33:27	54°15.003 11°30.012	24.04	MUC	0.6	0.35/0.35	Moros	1 core sliced
-2	10:29:20	54°15.002 11°30.011	24.06	SL	6.0	6.0/5.84	Moros	Description
-3	11:15:11	54°14,996 11°30.008	24.04	SL	12.0	12.0/9.66	Moros	Storage
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **28**	**Start (UTC)** **12:24:30**	**IOW- Station ID** **317990**	
Lat. 54°18.60 **Long.** 11°25.56	**Water depth start** 16.54?	**Station description** No. Of Cores: 3 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	12:27:43	54°18.596 11°25.570	23.05?	MUC	0.6	0.34/0.34	Moros	1 core sliced
-2	12:25:21	54°18.598 11°25.572	16.52?	SL	6.0	6.0/5.70	Moros	Description
-3	13:19:40	54°18.596 11°25.571	16.86?	SL	12.0	12.0/8.65	Moros	Storage
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **27**	**Start (UTC)** **14:37:50**	**IOW- Station ID** **318000**	
Lat.54°19.56 **Long.**11°27.67	**Water depth start** 23.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	14:41:40	54°19.569 11°27.693	23.50	MUC	0.6	0.33/0.33	Moros	1 core sliced
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **28**	**Start (UTC)** **16:14:00**	**IOW- Station ID** **318020**	
Lat. 54°21.036 **Long.** 11°30.00	**Water depth start** 24.50	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	16:17:56	54°21.048 11°30.009	24.50	MUC	0.6	0.29/0.29	Moros	1 core sliced
-2								
-3								
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **28**	**Start (UTC)** **16:53:48**	**IOW- Station ID** **318030**	
Lat. 54°19.56 **Long.** 11°32.47	**Water depth start** 25.05	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	16:56:20	54°19.571 11°32.480	25.17	MUC	0.6	0.32/0.32	Moros	1 core sliced
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **28**	**Start (UTC)** **17:45:24**	**IOW- Station ID** **318040**	
Lat. 54°22.536 **Long.** 11°33.042	**Water depth start** 25.25	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	17:48:31	54°22.548 11°33.057	25.25	MUC	0.6	0.27/0.27	Moros	1 core sliced
-2								
-3								
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	RV MSM	Area MB	Year 2006	Month March	Day 28	Start (UTC) 18:33:40	IOW- Station ID 318050	
Lat. 54°21.036 **Long.** 11°34.872	**Water depth start** 25:52	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	18:44:56	54°21.043 11°34.884	27.59	MUC	0.6	0.28/0.28	Moros	1 core sliced
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **28**	**Start (UTC)** **19:24:39**	**IOW- Station ID** **318060**	
Lat. 54°19.56 **Long.** 11°37.272	**Water depth start** 25.85	**Station description** No. Of Cores: 2 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	19:27:42	54°19.570 11°37.267	25.83	MUC	0.6	0.32/0.32	Moros Lis/Nowak	1 core sliced 1 core sliced
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **28**	**Start (UTC)** **20:06:16**	**IOW- Station ID** **318070**	
Lat. 54°21.036 **Long.** 11°39.672	**Water depth start** 25.87	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	20:08:52	54°21.039 11°39.677	25.91	MUC	0.6	0.36/0.36	Moros	1 core sliced
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **MB**	**Year** **2006**	**Month** **March**	**Day** **28**	**Start (UTC)** **20:59:43**	**IOW- Station ID** **318080**	
Lat. 54°18.900 **Long.** 11°33.000	**Water depth start** 27.27	**Station description** No. Of Cores: 2 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	21:02:14	54°18.901 11°33.018	25.35	MUC	0.6	0.36/0.36	Moros Leipe	1 core sliced 1 core for surface sample
-2								
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Great Belt**	**Year** **2006**	**Month** **March**	**Day** **29**	**Start (UTC)** **07:50:14**	**IOW- Station ID** **318090**	
Lat. 55°27.6018 **Long.** 10°56.8157	**Water depth start** 21.75	**Station description** No. Of Cores: 3 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	07:54:54	55°27.613 10°56.825	21.77	MUC	0.6	0.28/0.28	Moros	1 core sliced
-2	09:09:51	55°27.611 10°56.826	21.78	VKG	6.0	0/0		Problems with the support-cable
-4	09:43:44	55°27.610 10°56.827	21.79	GC	6.0	6.0/5.52	Moros	Description
-3	10:12:43	55°27.609 10°56.825	21.78	GC	6.0	6.0/4.21	Moros	Storage (core No.318090-3**!!**)
-5								
-6								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	RV MSM	Area Great Belt	Year 2006	Month March	Day 29	Start (UTC) 11:12:54	IOW- Station ID 318100	
Lat. 55°28.5734 **Long.** 10°53.0532	**Water depth start** 31.55	**Station description** No. Of Cores: 10 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	11:17:38	55°28.579 10°53.060	31.55	MUC	0.6	0.26/0.26	Lis/Nowak Moros Endler	5 for Szczecin, 1 core sliced 1 core
-2	12:02:08	55°28.579 10°53.064	31.52	GC	6.0	6.0/5.47	Moros	Description
-3	12:33.06	55°28.572 10°53.064	31.52	GC	6.0	6.0/5.13	Moros	Storage
-4	13:30:35	55°28.569 10°53.071	31.36	GC	12.0	10.50/6.80	Moros	Storage
-5								
-6								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	RV MSM	Area Great Belt	Year 2006	Month March	Day 29	Start (UTC) 14:29:27	IOW- Station ID 318110	
Lat. 55°32.423 **Long.** 10°49.68	**Water depth start** 31.50	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	14:30:35	55°32.421 10°49.705	31.57	MUC	0.6	0.32/0.32	Moros Endler	1 core sliced 1 core
-2	14:43:12	55°32.421 10°49.703	31.40	GC	6.0	6.00/5.47	Moros	Description
-3	15:11:06	55°32.420 10°49.698	31.38	GC	12.0	5.70/5.20	Moros	Storage
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Anholt Loch**	**Year** **2006**	**Month** **March**	**Day** **30**	**Start (UTC)** **06:14:19**	**IOW- Station ID** **318150**	
Lat. 56°36.892 **Long.** 11°41.958	**Water depth start** 35.42	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	06:22:54	56°36.898 11°41.974	35.26	MUC	0.6	30.0/30.0	Moros Endler	1 core sliced 1 core
-2	06:47:50	56°36.897 11°41.971	35.57	GC	6.0	3.0/2.34	Bennike	Description
-3	07:31:34	56°36.895 11°41.973	35.20	VKG	6.0			Problems with electricity
-4	09:39:54	56°36.906 11°41.966	35.00	VKG	6.0	3.05/3.05	Bennike	Description
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Anholt Loch**	**Year** **2006**	**Month** **March**	**Day** **30**	**Start (UTC)** **10:58:26**	**IOW- Station ID** **318160**	
Lat. 56°33.909 **Long.** 11°34.681	**Water depth start** 32.29	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	11:02:26	56°33.913 11°34.709	32.43	MUC	0.6	0.27/0.27	Moros Endler	1 core sliced 1 core
-2	11:19:19	56°33.916 11°34.680	32.45	GC	6.0	6.0/0.78	Bennike	Description
-3	12:19:01	56°33.916 11°34.673	32.28	VKG	6.0	0.91/0.91		Problems with electricity
-4	12:43:42	56°33.916 11°34.673	32.21	GC	6.0	2.50/0.84	Bennike	Storage
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Anholt Loch**	**Year** **2006**	**Month** **March**	**Day** **30**	**Start (UTC)** **14:13:44**	**IOW- Station ID** **318170**	
Lat. 56°36.892 **Long.** 11°46.5248	**Water depth start** 36.19	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	14:16:39	56°36.161 11°46.520	36.18	MUC	0.6	0.31/0.31	Moros Endler	1 core 1 core
-2	14:29:10	56°36.161 11°46.520	36.20	GC	6.0	6.0/6.0	Bennike	Description
-3	14:57:40	56°36.158 11°46.522	36.21	GC	12.0	6.10/5.40	Bennike	Storage
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV MSM**	**Area Anholt Loch**	**Year 2006**	**Month March**	**Day 30**	**Start (UTC) 17:17:48**	**IOW- Station ID 318180**	
Lat.56°43.5787 **Long.**11°49.4462	**Water depth start** 43.14	**Station description** No. Of Cores: 8 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	17:19:17	56.43.587 11°49.418	43.00	MUC	0.6	0.22/0.22	Lis/Nowak Moros Endler	5 cores 1 core 1 core
-2	17:32:35	56.43.585 11°49.418	43.01	GC	12.0	6.30/5.70	Bennike	Storage
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Anholt Loch**	**Year** **2006**	**Month** **March**	**Day** **30**	**Start (UTC)** **18:28:25**	**IOW- Station ID** **318140**	
Lat.56°38.862 **Long.**11°54.627	**Water depth start** 31.34	**Station description** No. Of Cores: 3 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	18:30:48	56°38.878 11°54.641	31.32	MUC	0.6	0.23/0.23		2 for IOW
-2	18:40:23	56°38.878 11°54.641	31.35	GC	6.0	1.0/0.94	Bennike	Storage
-3								
-4								
-5								
-6								
-7								

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Kriegers Flak**	**Year** **2006**	**Month** **April**	**Day** **1**	**Start (UTC)** **11:55:50**	**IOW- Station ID** **318190**	
Lat. 55°04.08 **Long.** 13°11.63	**Water depth start** 39.69	**Station description** No. Of Cores: 3 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	12:00:53	55°04.092 13°11.634	39.68	Van Veen Grabber				No gain
-2	12:10:23	55°04.092 13°11.635	39.71	Van Veen Grabber			Bennike	Description
-3	12:39:54	55°04.092 13°11.635	39.61	VKG	6.0	3.17/3.17	Bennike	Description and storage
-4	15:41:24	55°04.093 13°11.631	39.63	VKG	6.0	2.5/2.22	Bennike	Storage
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Kriegers Flak**	**Year** **2006**	**Month** **April**	**Day** **1**	**Start (UTC)** **13:15:10**	**IOW- Station ID** **318200**	
Lat. 55°04.38 **Long.** 13°11.62	**Water depth start** 40.42	**Station description** No. Of Cores: 3 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	13:17:37	55°04.392 13°11.617	40.43	Van Veen Grab			Bennike	Description
-2	13:40:24	55°04.392 13°11.616	40.42	VKG	6.0	1.30/0.48	Bennike	Description
-3	14:34:34	55°04.392 13°11.616	40.45	VKG	6.0	3.0/2.17	Bennike	Description
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Kriegers Flak**	**Year** **2006**	**Month** **April**	**Day** **1**	**Start (UTC)** **16:46:53**	**IOW- Station ID** **318210**	
Lat.55°00.00 **Long.**13°18.00	**Water depth start** 47.40	**Station description** No. Of Cores: Positioning System: GPS Geoid: WGS84 Stationsname: K7						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	16:53:08	55°00.012 13°18.000	47.45	MUC	0.6	0.41/0.41	Lis/Nowak Moros Endler	5 cores 1 core 1 core
-2								
-3								
-4								
-5								
-6								
-7								

C o r e   L i s t

Projekt: DYNAS-FWG　　　　Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Northern Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **2**	**Start (UTC)** **06:31:04**	**IOW- Station ID** **318220**	
Lat. 55°06.179 **Long.** 13°36.007	**Water depth start** 45.96	**Station description** No. Of Cores: 9 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	06:38:44	55°06.179 13°36.021	45.89	MUC	0.6	0.41/0.41	Endler Moros Lis/Nowak	1 core 1 core 5 cores
-2	07:00:49	55°06.180 13°36.023	45.81	GC	6.0	6.00/5.45	Andren	Description
-3	07:45:31	55°06.181 13°36.023	45.80	GC	12.00	12.00/7.10	Andren	Storage
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Northern Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **2**	**Start (UTC)** **08:52:27**	**IOW- Station ID** **318230**	
Lat. 55°03.357 **Long.** 13°26.962	**Water depth start** 45.34	**Station description** No. Of Cores: 3 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	08:54:34	55°03.358 13°26.978	45.35	MUC	0.6	0.39/0.39	Endler	1 core
-2	09:18:55	55°03.360 13°26.977	45.45	GC	0.6	2.70/2.20	Andren	Description
-3	10:33:32	55°03.359 13°26.978	45.41	VKG	6.0	5.43/5.43	Andren	Storage
-4								
-5								
-6								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Northern Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **2**	**Start (UTC)** **11:58:07**	**IOW- Station ID** **318240**	
Lat. 55°06.2576 **Long.** 13°42.7453	**Water depth start** 46.26	**Station description** No. Of Cores: 3 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	12:03:09	55°06.261 13°42.760	46.40	MUC	0.6	0.41/0.41	Endler	1 core
-2	12:17:41	55°06.260 13°42.761	46.21	GC	6.0	6.0/1.16	Andren	Description
-3	12:47:53	55°06.262 13°42.761	46.19	VKG	6.0	6.0/6.0	Andren	Storage
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG   Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Northern Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **2**	**Start (UTC)** **13:31:24**	**IOW- Station ID** **318460**	
Lat. 55°06.180 **Long.** 13°42.325	**Water depth start** 45.92	**Station description** No. Of Cores: 2 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	13:36:49	55°06.184 13°42.340	45.94	VVG			Andren	Description
-2	14:14:56	55°06.188 13°42.338	45.98	VKG	6.0	4.45/4.45	Andren	Storage
-3								
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	RV MSM	Area Hanö Bay	Year 2006	Month April	Day 3	Start (UTC) 06:18:54	IOW- Station ID 318250	
Lat.55°44.983 **Long.**15°25.459	**Water depth start** 68.71	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	6:24:11	55°44.978 15°25.474	70.64	MUC	0.6	0.34/0.34	Moros Endler	1 core 1 core
-2	6:42:51	55°44.978 15°25.474	63.26	GC	6.0	6.0/5.0	Andren	Description
-3	7:20:21	55°44.980 15°25.474	71.12	GC	12.0	12.0/	Andren	Storage
-4								
-5								
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Hanö Bay**	**Year** **2006**	**Month** **April**	**Day** **3**	**Start (UTC)** **08:14:28**	**IOW- Station ID** **318260**	
Lat.55°44.280 **Long.** 15°19.287	**Water depth start** 60.68	**Station description** No. Of Cores: 9 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	08:16:11	55°44.280 15°26.962	60.74	MUC	0.6	0.31/0.31	Lis/Nowak	5 cores 2 cores for IOW
-2	08:32:35	55°44.278 15°19.304	60.63	GC	6.0	6.0/5.73	Andren	Description
-3	09:15:10	55°44.276 15°19.302	60.62	GC	12.0	12.0/9.0	Andren	Storage
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Hanö Bay**	**Year** **2006**	**Month** **April**	**Day** **3**	**Start (UTC)** **10:12:56**	**IOW- Station ID** **318280**	
Lat. 55°45.570 **Long.** 15°19.981	**Water depth start** 62,78	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	10:28:03	55°45.575 15°19.995	62.72	MUC	0.6	0.38/0.38	Endler	1 core
-2	10:54:25	55°45.575 15°19.995	62.90	GC	6.0	6.0/6.0		Failure
-3	11:25:49	55°45.576 15°19.993	62.83	GC	6.0	6.0/5.5	Andren	Description
-4	12:04:55	55°45.576 15°19.993	63.02	VKG	6.0	6.0/5.2	Andren	Storage
-5	13:28:	55°45.569 15°19.999	62.72	VKG	6.0	6.0/5.22	Andren	Description
-6								
-7								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Hanö Bay**	**Year** **2006**	**Month** **April**	**Day** **3**	**Start (UTC)** **14:31:34**	**IOW- Station ID** **318270**	
Lat. 55°47.873 **Long.** 15°27.051	**Water depth start** 47.70	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	14:34:23	55°47.873 15°27.051	47.67	MUC	0.6	0.22/0.22		2 for IOW
-2	14:44:49	55°47.879 15°27.065	47.64	GC	6.0	4.5/2.65	Andren	Description
-3	15:49:35	55°47.876 15°27.066	47.72	VKG	6.0	6.0/5.5	Andren	Description
-4	15:24:06	55°47.876 15°27.066	47.77	VKG	6.0			Failure
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	RV MSM	Area Central Arkona Basin	Year 2006		Month April	Day 3		Start (UTC) 21:50:32	IOW- Station ID 318290
Lat. 55°57.20 **Long.** 13°58.40	**Water depth start** 48.06	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:							
Core	**Time (UTC)**	**Real Position Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**	
-1	21:53:42	54°57.193 13°58.411	49.68	MUC	0.6	0.48/0.48	Leipe	1 core	
-2									
-3									
-4									
-5									
-6									
-7									

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Central Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **4**	**Start (UTC)** **06:08:11**	**IOW- Station ID** **318300**	
Lat. 54°51.0792 **Long.** 13°25.9415	**Water depth start** 46.55	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	06:12:48	54°51.074 13°25.957	46.57	MUC	0.6	0.38/0.38	Moros Endler	1 core sliced 1 core
-2	06:33:45	54°51.076 13°25.956	46.64	GC	6.0	6.0/4.56	Moros	Description
-3	07:40:09	54°51.074 13°25.955	46.11	GC	18.0	18.0/5.30	Moros	Storage
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Central Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **4**	**Start (UTC)** **08:34:54**	**IOW- Station ID** **318310**	
Lat. 54°50.3335 **Long.** 13°32.0159	**Water depth start** 45.80	**Station description** No. Of Cores: 10 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	08:40:27	54°50.337 13°32.030	45.80	MUC	0.6	0.37/0.37	Moros Endler Lis/Nowak	1 core sliced 1 core 6 cores
-2	08:59:09	54°50.337 13°32.030	45.79	GC	6.0	6.0/5.43	Moros	Description
-3	09:28:43	54°50.335 13°32.030	45.94	GC	12.0	12.0/7.52	Moros	Storage
-4								
-5								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Central Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **4**	**Start (UTC)** **10:52:21**	**IOW- Station ID** **318320**
Lat. 54°49.7797 **Long.** 13°39.3535	**Water depth start** 45.27	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:					

Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	10:55:11	54°49.786 13°39.365	45.37	MUC	0.6	0.37/0.37	Moros Endler	1 core sliced 1 core
-2	11:19:34	54°49.786 13°39.365	45.27	GC	12.0	12.0/11.24	Moros	Storage
-3	12:11:24	54°49.782 13°39.370	45.23	GC	6.0	4.50/3.75	Moros	Storage
-4								
-5								
-6								

Core List

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Central Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **4**	**Start (UTC)** **13:03:14**	**IOW- Station ID** **318330**	
Lat. 54°52.4601 **Long.** 13°40.9131	**Water depth start** 46.70	**Station description** No. Of Cores: 5 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	13:08:43	54°52.460 13°40.929	46.49	MUC	0.6	0.44/0.44		2 for IOW
-2	13:43:57	54°52.460 13°40.929	46.51	GC	12.0	12.0/12.5	Moros	Description
-3	14:38:48	54°52.457 13°40.927	46.56	GC	12.0	12.0/11.45	Moros	Storage
-4	15:05:34	54°52.457 13°40.927	46.56	GC	6.0	6.0/4.95	Moros	Storage
-5								
-6								
-7								

C o r e   L i s t

Projekt: DYNAS-FWG   Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Central Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **4**	**Start (UTC)** **16:17:41**	**IOW- Station ID** **318340**
Lat. 54°54.7617 **Long.** 13°41.4239	**Water depth start** 45.81	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:					

Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	16:20:36	54°54.7617 13°41.4239	45.89	MUC	0.6	0.43		2 for IOW
-2	17:05:41	54°54.765 13°41.444	47.27	GC	6.0	6.0/6.26	Moros	Description
-3	17:28:47	54°54.765 13°41.444	47.23	GC	12.0	12.0/11.4	Moros	Storage
-4								
-5								
-6								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Southwestern Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **5**	**Start (UTC)** **06:04:59**	**IOW- Station ID** **318350**	
Lat.54°53.72 **Long.**13°10.271	**Water depth start** 44.29	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	06:20:48	54°53.717 13°10.284	44.35	MUC	0.6	0.36/0.36		2 for IOW
-2	06:44:16	54°53.717 13°10.284	44.31	GC	6.0	6.0/6.10	Moros	Description
-3	07:18:25	54°53.715 13°10.281	44.37	GC	12.0	12.0/5.88	Moros	Storage
-4								
-5								
-6								
-7								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Southwestern Arcona basin**	**Year** **2006**	**Month** **April**	**Day** **5**	**Start (UTC)** **08:28:15**	**IOW- Station ID** **318360**	
Lat.54°53.72 **Long.**13°03.671	**Water depth start** 43.88	**Station description** No. Of Cores: 4 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	08:33:01	54°53.712 13°03.680	43.88	MUC	0.6	0.32/0.32		2 for IOW
-2	08:54:15	54°53.712 13°03.680	43.63	GC	6.0	6.0/1.55	Moros	Description
-3	09:26:54	54°53.712 13°03.674	43.90	VKG	6.0	6.0/5.63	Moros	Storage
-4								
-5								
-6								

C o r e L i s t

Projekt: DYNAS-FWG Cruise: MSM 01/02

RV- Stat. Code	**RV** **MSM**	**Area** **Western Arkona Basin**	**Year** **2006**	**Month** **April**	**Day** **5**	**Start (UTC)** **12:14:43**	**IOW- Station ID** **318450**	
Lat. 54°43.40 **Long.** 12°47.00	**Water depth start** 22.84	**Station description** No. Of Cores: 1 Positioning System: GPS Geoid: WGS84 Stationsname:						
Core	**Time (UTC)**	**Real Position** **Lat. Long.**	**Depth (m)**	**Gear**	**Corerlength (m)**	**Penetration / Gain (m)**	**Scientist/ Institute**	**Comment**
-1	12:17:34	54°43.291 12.47.000	23.07	VVG			Leipe	
-2								
-3								
-4								
-5								
-6								
-7								

5 Sample List (Schmidt/Nowak)

Thomas Andren University Stockholm:

Core 318280-5: 348–353, 365–370, 375–380, 390–395, 405–410, 420–425,430–435, 440–445, 450–455, 460–465, 470–475, 480–485, 490–495 cm

Ole Bennike Geo-Survey Denmark:

Core 318280-5: 375–380, 385–390, 410–415, 465–470, 475–480 cm

Core 318330-2: 640–650, 680–690, 700–720, 725–735, 770–780, 750–760, 800–810, 840–850, 880–890, 910–920, 940–950, 1000–1020, 1035–1045, 1080–1090, 1130–1140, 1185–1195 cm

Rudolf Endler IOW:

Core 318280-5: 467 – 522 cm

Core 318350-2: 490 – 500 cm

VVG 318190-2: 1 sample

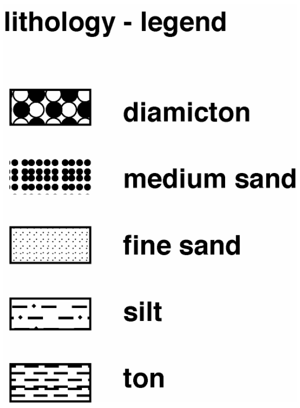
IOW:

Core 318300-2: 280 cm (fish)

IOW station number	Szczecin station number	Coordinates	Date	Time UTC	
317830	A 1	54°10.680'N 11°20.960'E	27.03.2006	15:16	
Depth [m]		Air pressure [hpa]		Humidity [%]	
24.71		1000.20		88	
Air temperature [°C]			Water temperature [°C]		
12.10			2.20		
Overlying water samples	1/w	2/w	3/w	4/w	5/w
Sediment subsample number					Depth in sediment [cm]
1/1	2/1	3/1	4/1	5/1	0-1
1/2	2/2	3/2	4/2	5/2	1-2
1/3	2/3	3/3	4/3	5/3	2-3
1/4	2/4	3/4	4/4	5/4	3-4
1/5	2/5	3/5	4/5	5/5	4-5
1/6	2/6	3/6	4/6	5/6	5-6
1/7	2/7	3/7	4/7	5/7	6-7
1/8	2/8	3/8	4/8	5/8	7-8
1/9	2/9	3/9			8-9
1/10	2/10	3/10			9-10
	2/11				10-11

IOW station number	Szczecin station number	Coordinates	Date	Time UTC	
317920	B 2	54°11.515'N 11°13.772'E	27.03.2006	19:12	
Depth [m]		Air pressure [hpa]		Humidity [%]	
21.48		1000.20		94	
Air temperature [°C]			Water temperature [°C]		
7.70			2.60		
Overlying water samples	1/w	2/w	3/w	4/w	
Sediment subsample number					Depth in sediment [cm]
1/1	2/1	3/1	4/1		0-1
1/2	2/2	3/2	4/2		1-2
1/3	2/3	3/3	4/3		2-3
1/4	2/4	3/4	4/4		3-4
1/5	2/5	3/5	4/5		4-5
1/6	2/6	3/6	4/6		5-6
1/7	2/7	3/7	4/7		6-7
1/8	2/8	3/8	4/8		7-8
1/9	2/9	3/9	4/9		8-9
	2/10	3/10			9-10

6 Lithological core descriptions (Schmidt)



VKG - vibrocorer
GC - gravity corer
VVG - van veen grab

HCl+++ - high carbonate content
HCl++ - medium carbonate content
HCl+ - low carbonate content

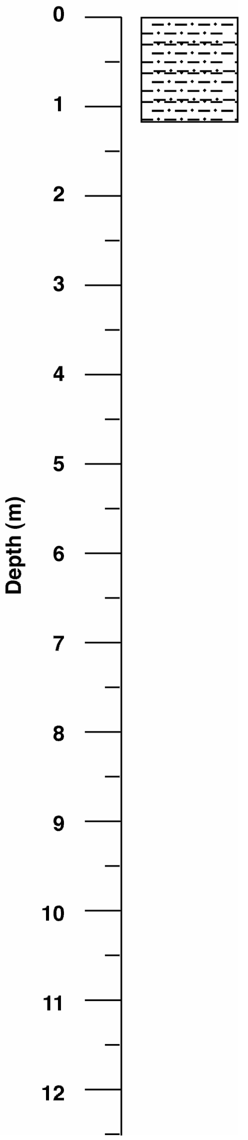
H_2S+++ - strong sulphur smell
H_2S++ - medium sulphur smell
H_2S+ - low sulphur smell

CH_4 +++ - high methan content
CH_4 ++ - medium methan content
CH_4 + - low methan content

Mecklenburgian Bight

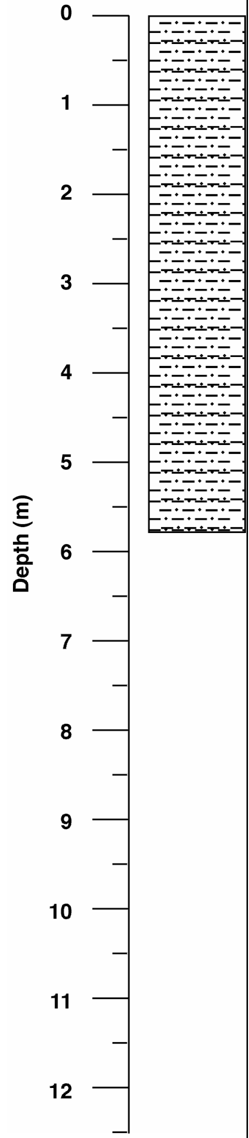
317970-3 GC FS MARIA S. MERIAN 01/2 March 28, 2006

54°12.011 Water Depth: 22.95 m
11°21.009

lithology	colour	description
	olive gray (5Y3/2)	0 – 118 cm: silt, H_2S++, soft, shell layers: 5, 22, 115 cm; bioturbation: 40 – 60 cm, scattered foraminifera, scattered mussels, slight lamination: 30 – 120 cm

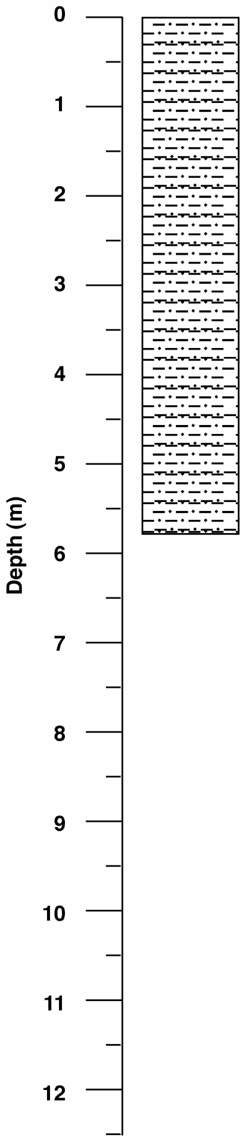
317980-2 GC FS MARIA S. MERIAN 01/2 March 28, 2006

54°15.002 Water Depth: 24.06 m
11°30.011

lithology	colour	description
	light olive green (5Y5/2) light olive green (5Y5/2)	0 – 40 cm: silt, H_2S++, organic rich, H_2O rich 40 – 580 cm: silt, homogeneous, H_2S+, HCl+, scattered foraminifera, bioturbation between 200 and 400 cm, shell layers: 48, 102, 200, 500, 550 cm

317990-2 GC FS MARIA S. MERIAN 01/2 March 28, 2006

54°18.598 Water Depth: 16.52 m
11°25.572

<table>
<tr><th>lithology</th><th>colour</th><th>description</th></tr>
<tr>
<td>
</td>
<td>dark olive gray (5Y3/2)

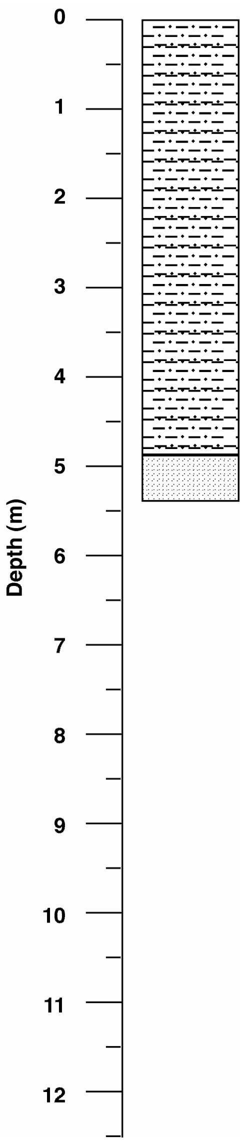
olive gray (5Y5/2)</td>
<td>0 – 20 cm: silt, H_2S++, HCl+, H_2O rich, organic rich

20 – 570 cm: silt, H_2S+, HCl+, scattered foraminifera, mussels and few snails, bioturbation, thin shell layer: 565 cm</td>
</tr>
</table>

Great Belt

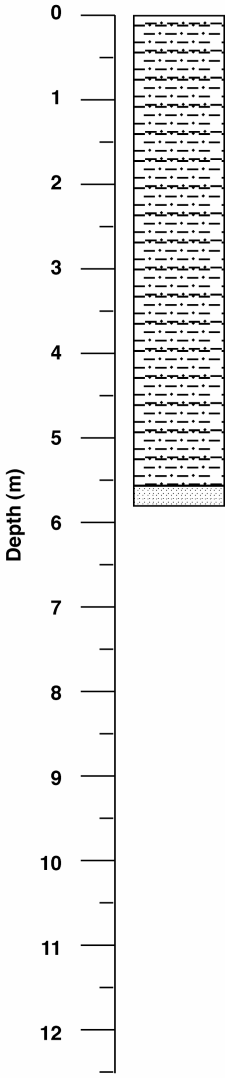
318110-2 GC FS MARIA S. MERIAN 01/2 March 29, 2006

55°32.421 Water Depth: 31.40 m
10°49.703

lithology	colour	description
	olive gray (5Y3/2)	0 – 25 cm: silt, H_2S+++, organic rich
	light olive gray (5Y5/2)	25 – 485 cm: homogeneous silt, H_2S+, HCl+, shell layers: 47 – 55 (snail, mussels), 380, 400 cm; *Arctica*: 215, 350, 360 cm; quartz: 110 cm; wood: 330, 315, 425 cm
	light olive gray (5Y5/2)	485 – 547 cm: fine sand, HCl++, shell layer: 511 – 535 cm

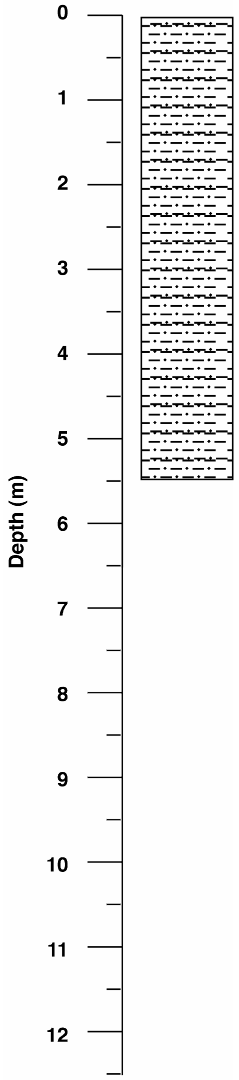
318090-4 GC FS MARIA S. MERIAN 01/2 March 29, 2006

55°27.610 Water Depth: 21.79 m
10°56.827

lithology	colour	description
	olive gray (5Y3/2)	0 – 3 cm: silt, H_2O-rich, H_2S+++
	light olive gray (5Y5/2)	3 – 10 cm: silt, H_2S++, scattered mussels, some black spots, nodular,
	light olive gray (5Y5/2)	10 – 175 cm: silt, H_2S+, nodular, shell layers: 40, 120 cm
	light olive gray (5Y5/2)	175 – 312 cm: silt, H_2S+, HCl++, shell layer: 290 – 299 cm; 269 cm (*Macoma baltica*)
	light olive gray (5Y5/2)	312 – 500 cm: homogenous silt, H_2S+, HCl+, snails: 330 – 345 cm, wood: 430 cm
	light olive gray (5Y5/2)	500 – 552 cm: silt, H_2S+
	light olive gray (5Y5/2)	552 – 575 cm: fine sand, H_2S+, light sulphidic lamination, shell layer: 540 cm

318100-3 GC FS MARIA S. MERIAN 01/2 March 29, 2006

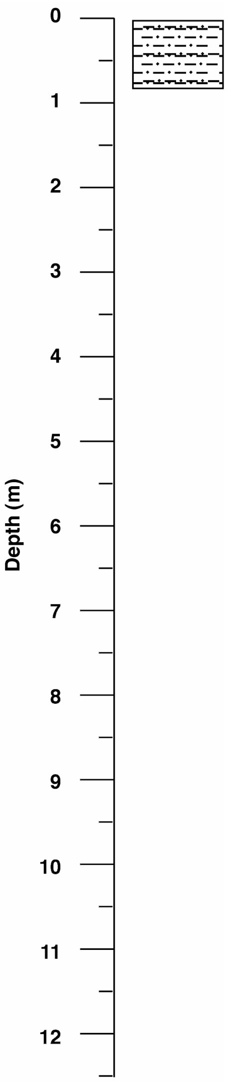
55°28.569 Water Depth: 31.52 m
10°53.071

lithology	colour	description
	olive gray (5Y3/2)	0 – 36 cm: silt, H_2S++, 0 – 5 cm: H_2O rich 36 – 270 cm: silt, H_2S+, HCl+, shell layer: 154 cm, slight lamination, wood (80 cm) 270 – 363 cm: silt, H_2S++, HCl+, lamination
	olive gray (5Y3/2)	363 – 547 cm: silt, H_2S+, HCl+, lamination layers (~1 – 2 cm), sharp upper boundary, mussels (477 cm)
	olive gray/black (lamination)	
	olive gray/black (lamination)	

Anholt Loch

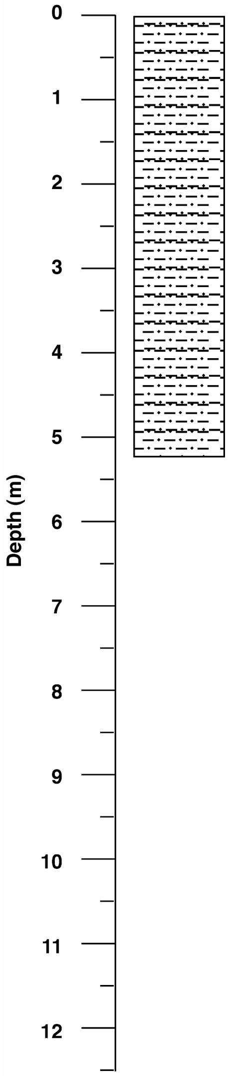
318160-2 GC FS MARIA S. MERIAN 01/2 March 30, 2006

56°33.916 Water Depth: 32.45 m
11°34.680

lithology	colour	description
	olive gray (5Y3/2)	0 – 78 cm: homogenous silt, HCl+, mussels (50 cm)

318170-2 GC FS MARIA S. MERIAN 01/2 March 30, 2006

56°36.161 Water Depth: 36.20 m
11°46.520

lithology	colour	description
	olive gray (5Y3/2) light olive gray (5Y5/2) light olive gray (5Y5/2)	0 – 30 cm: silt, HCl+, H_2S++ 30 – 240 cm: homogenous silt, HCl+, scattered mussels, 240 – 520 cm: homogenous silt, HCl+, scattered mussels, high density

Kriegers Flak

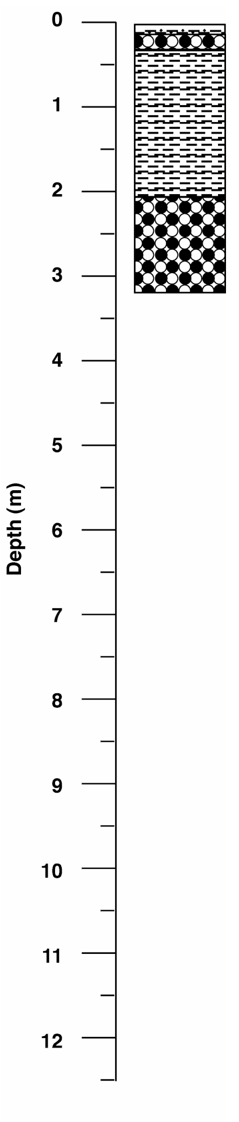
318190-2 VVG FS MARIA S. MERIAN 01/2 April 01, 2006

55°04.092 Water Depth: 39.71 m
13°11.635

mud, grayish black, H_2S smell, H_2O rich, dropstone (~∅15 cm), mussels, dropstones, HCl-

318190-3 VKG FS MARIA S. MERIAN 01/2 April 01, 2006

55°04.092 Water Depth: 39.61 m
13°11.635



lithology	colour	description
	olive gray (5Y3/2)	0 – 10 cm: silt, H_2O-rich, H_2S++, HCl-, scattered mussels
	pale brown (5 YR 5/2)	10 – 34 cm: diamicton, clay matrix, HCl++, high density, dropstones (~∅1–3 cm), stiff consistency (-> till?)
	light olive gray (5Y5/2)	34 – 205 cm: clay, HCl++, high density, H_2O-poor, black spots
	grayish brown (5YR3/2)	205 – 315 cm: diamicton, clay matrix, HCl+++, dropstones (~1 cm), quartz, high density, red spots, sulphidic layers, stiff consistency (-> till?)

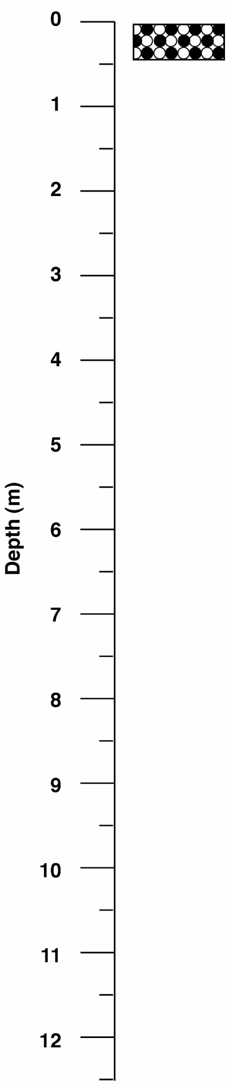
318200-1 VVG FS MARIA S. MERIAN 01/2 April 01, 2006

55°04.392 Water Depth: 40.43 m
13°11.617

fine sand, brown (surface), olive gray, H_2O rich, dropstone (15 cm), mussels, dropstones (~1–2 cm, bad rounded), quartz, seagrass, HCl-, black spots

318200-2 VKG FS MARIA S. MERIAN 01/2 April 01, 2006

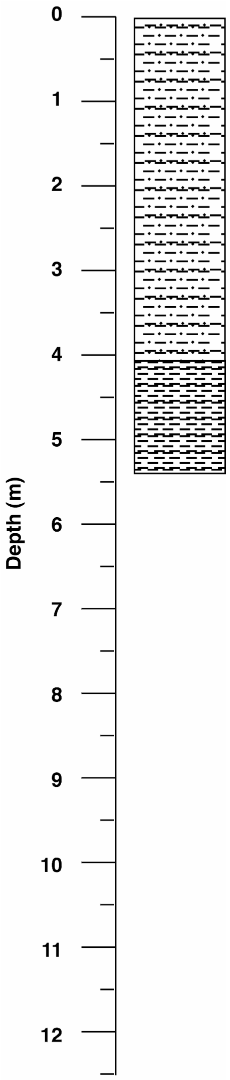
55°04.392 Water Depth: 40.42 m
13°11.616

lithology	colour	description
	light olive gray (5Y5/2)	0 – 48 cm: diamicton, fine sand matrix, HCl+, 0 – 3 cm: poorly rounded dropstones (~1–5 cm), mussels, high density layer: 12 – 15 cm (HCl+++)

Northern Arkona Basin

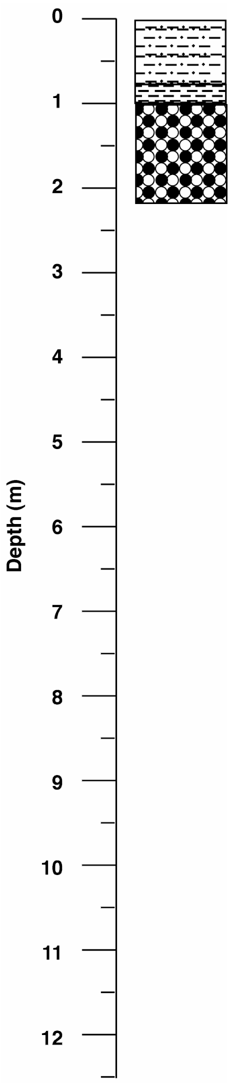
318220-2 GC FS MARIA S. MERIAN 01/2 April 02, 2006

55°06.180 Water Depth: 45.81 m
13°36.023

lithology	colour	description
	olive gray (5Y3/2)	0 – 8 cm: silt, H_2O-rich, H_2S+++ 8 – 340 cm: homogenous silt, H_2S+, high density, scattered mussels, foraminifera, quartz, shell layer: 340 cm (*Mytilus*)
	olive gray/gray (lamination)	340 – 400 cm: silt, H_2S+, less sharp lamination, high density, gas break
	olive gray (5Y3/2)	400 – 405 cm: silt, H_2S++
	olive gray (5Y3/2)	405 – 490 cm: clay, H_2S+
	gray dark	490 – 545 cm: clay, small white silt layer (~0,2 cm), 505 cm: slumping structure (~5 cm)

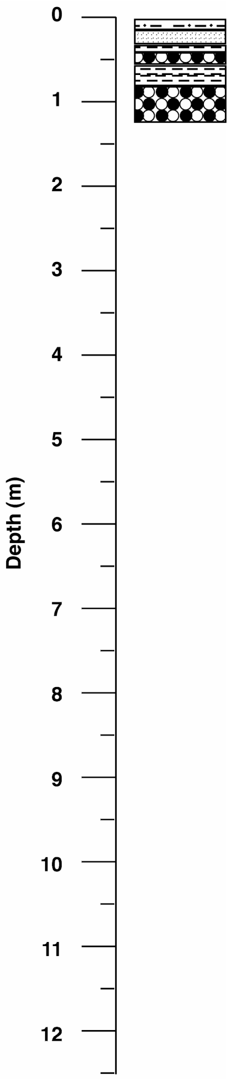
318230-2 GC FS MARIA S. MERIAN 01/2 April 02, 2006

55°03.360 Water Depth: 45.45 m
13°26.977

lithology	colour	description
	gray black	0 – 30 cm: silt, H_2O-rich, H_2S++
	olive gray 5 Y 4/1	30 – 86 cm: homogenous silt, scattered mussels
	medium gray	86 – 100 cm: clay, HCl++, sand layer (86 – 87 cm)
	Pale brown (5 YR 5/2)/ gray (lamination)	100 – 220 cm: diamicton, HCl++, lamination 45° tilted 160 – 220 cm: lamination change 45° tilted, 190 – 200 cm: medium sandy gray layer, stiff consistency (-> till?)

318240-2 GC FS MARIA S. MERIAN 01/2 April 02, 2006

55°06.260 Water Depth: 46.21 m
13°42.761

lithology	colour	description
	grayish black	0 – 10 cm: silt, H_2O-rich, H_2S++
	olive gray (5 Y 4/1)	10 – 27 cm: fine sand, high density
	dark yellowish brown (10 YR 4/2)	27 – 38 cm: clay, HCl+
	dark yellowish brown (10 YR 4/2)	38 – 55 cm: diamicton, finesand matrix, dropstones
	dark yellowish brown (10 YR 4/2)	55 – 80 cm: clay, HCl++
	pale brown (5 YR 5/2)	80 – 116 cm: diamicton, pebbles, dropstones,

318460-1 VVG FS MARIA S. MERIAN 01/2 April 02, 2006

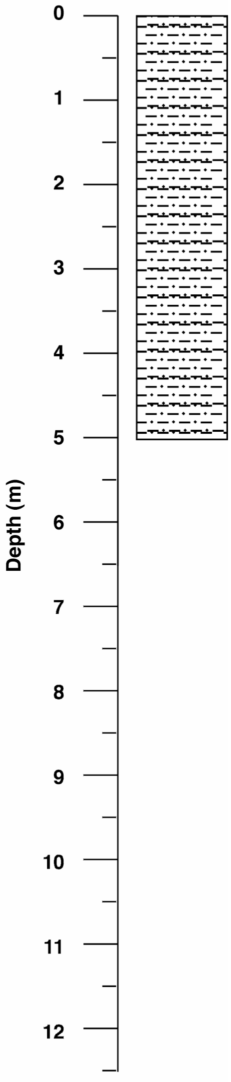
55°06.184 Water Depth: 45.94 m
13°42.340

sandy surface, clay, olive gray, 5 Y 4 M, mussels, dropstones

Hanö Bay

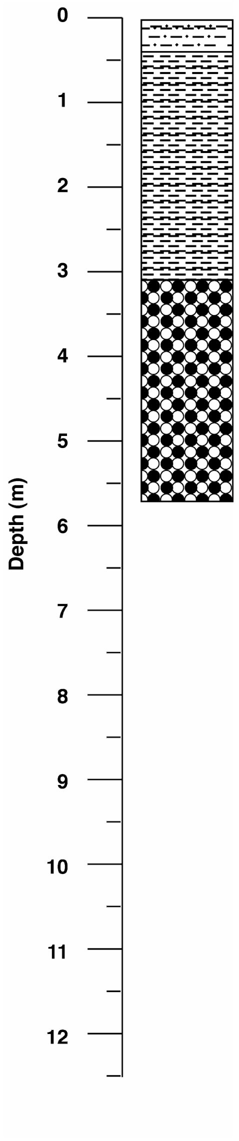
318250-2 GC FS MARIA S. MERIAN 01/2 April 03, 2006

55°44.978 Water Depth: 63.26 m
15°25.474

lithology	colour	description
	olive gray (5 Y 3/2)	0 – 45 cm: silt, H_2S+, H_2O rich
	olive gray (5 Y 3/2)	45 – 440 cm: silt, high density, slight lamination, black spots, 400 – 410 cm strong lamination, shell layer: 150 – 260 cm
	olive gray / black (lamination)	410 – 500 cm: silt, slight lamination
	grayish dark	

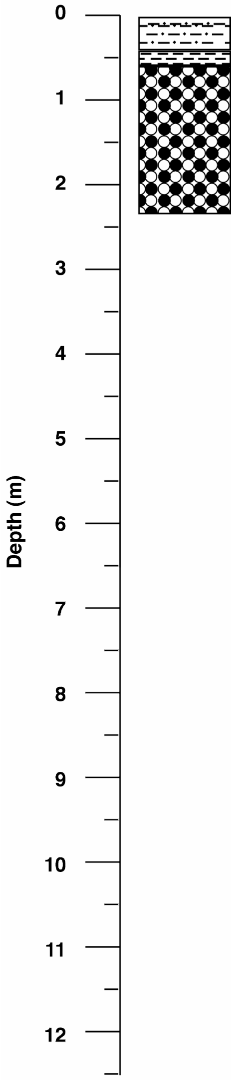
318260-2 GC FS MARIA S. MERIAN 01/2 April 03, 2006

55°44.278
13°19.304 Water Depth: 63.26 m

lithology	colour	description
	olive grayish black/ dark gray (lamination)	0 – 30 cm: silt, H_2S++, H_2O rich, slight lamination
	pale yellowish brown (10YR6/2)	30 – 120 cm: clay, homogenous, HCl+, very high density
	brownish gray (5YR4/1)	120 – 190 cm: clay, HCl+, slight lamination
	brownish gray (5YR4/1)	190 – 310 cm: clay, HCl+, lamination, sulphidic layers, hematite and carbonate inclusions
	grayish	310 – 573 cm: diamicton, HCl+, poorly rounded pebbles (~3 cm layers)
	brownish gray (5YR4/1)	330 – 573 cm: slight lamination (silt–finesand)

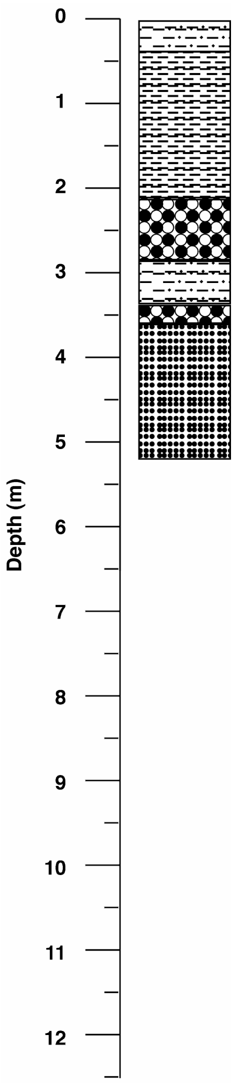
318280-3 GC FS MARIA S. MERIAN 01/2 April 03, 2006

55°45.276 Water Depth: 62.83 m
13°19.993

lithology	colour	description
	grayish black	0 – 10 cm: silt, H_2S++, H_2O rich
	olive gray (5Y3/2)	10 – 48 cm: silt, H_2S+
	dark greenish gray (5 GY4/1)	48 – 53 cm: clay, homogenous, HCl+, high density
	brownish gray (5YR4/1)	53 – 233 cm: diamicton, clay matrix, HCl++, thin organic layer (54 cm), dropstone layers (~1 – 2 cm thick) 200 – 233 cm: medium sand layer, dropstone (~∅10 cm)

318280-5 VKG FS MARIA S. MERIAN 01/2 April 03, 2006

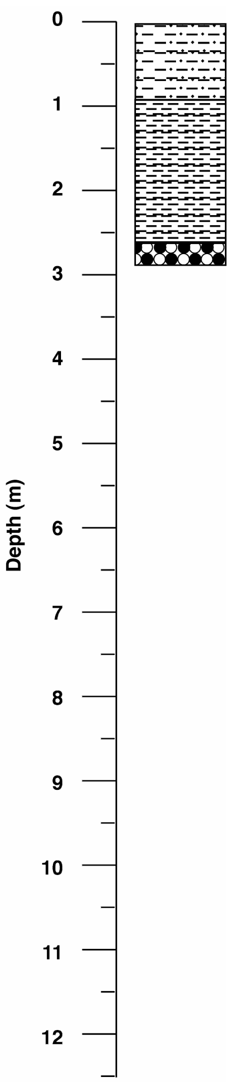
55°45.569 Water Depth: 62.72 m
15°19.999



lithology	colour	description
	grayish black	0 – 10 cm: silt, H_2O rich, H_2S++
	olive gray (5Y3/2)	10 – 45 cm: silt, H_2S+
	medium dark gray	45 – 52 cm: clay, HCl++
	brownish gray (5YR4/1)	52 – 210 cm: clay, HCl++, lamination
	brownish gray/ olive gray (lamination)	210 – 280 cm: diamicton, dropstones, lamination, high density, HCl++
	olive gray (5Y4/1)	280 – 345 cm: silt, soft, HCl+++
	grayish black	345 – 360 cm: diamicton, HCl++, dropstones
	dasky brown 5 (YR2/2)	360 – 522 cm: medium sand, silt layer: 430 cm, 460 – 467 cm (HCl++), 467 – 522 cm: slumping structure (HCl+)

318270-2 GC FS MARIA S. MERIAN 01/2 April 03, 2006

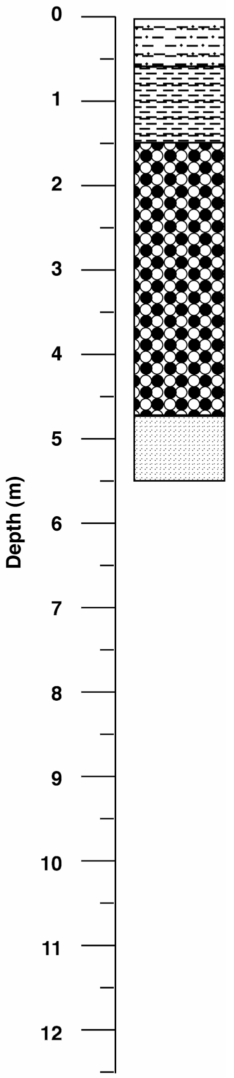
55°47.879 Water Depth: 47.64 m
15°27.065



lithology	colour	description
	light olive gray (5Y6/1)	0 – 90 cm: silt HCl++ / clay HCl+ varve (each ~7 cm)
	light olive gray (5Y6/1)	90 – 260 cm: clay, HCl+, high density
	brownish gray (5YR4/1)	260 – 290 cm: diamicton, low density, HCl+

318270-3 VKG FS MARIA S. MERIAN 01/2 April 03, 2006

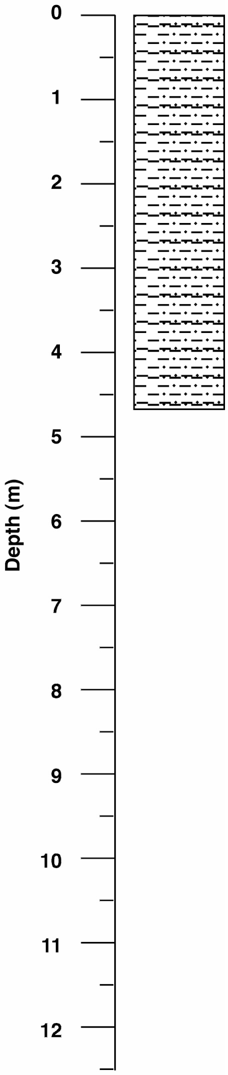
55°47.876 Water Depth: 47.72 m
15°27.066

lithology	colour	description
	light olive gray (5Y6/1)	0 – 22 cm: silt, HCl++ / clay HCl+ varve (each ~7 cm)
		22 – 30 cm: silt HCl++ / clay HCl+ varve (each ~7 cm), H2O rich
	pale yellowish brown (10YR6/2) * * *	30 – 58 cm: silt, nodular
		58 – 150 cm: clay, HCl+
		150 – 340 cm: diamicton, silt-matrix, HCl++, dropstones, H_2O rich
		340 – 440 cm: diamicton, fine sand matrix, high density, HCl+++
		440 – 470 cm: diamicton, HCl+++, gravel, very soft
	pale yellowish brown (10YR6/2)	470 – 550 cm: fine sand, HCl+++, slumping structures, black spots,

Central Arkona Basin

318300-2 GC FS MARIA S. MERIAN 01/2 April 04, 2006

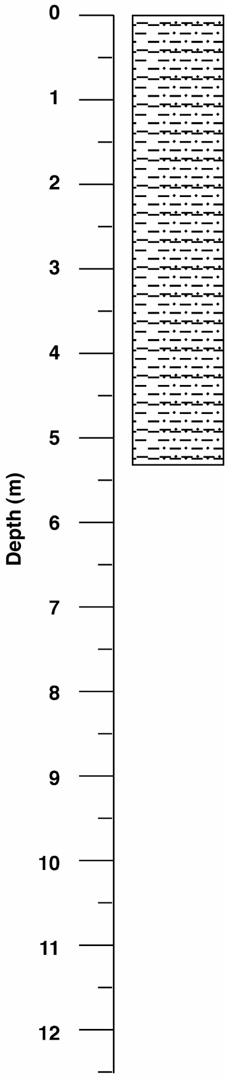
55°51.076 Water Depth: 46.14 m
15°25.956

lithology	colour	description
	black	0 – 30 cm: silt, H_2O rich, H_2S+
	grayish black	30 – 100 cm: silt, H_2S+
	olive black (5Y2/1)	100 – 150 cm: silt, scattered mussels, CH_4+
	olive gray (5Y4/1)	150 – 460 cm: silt, CH_4+, gas break, high density, slight lamination, scattered mussels, fish (280 cm)

318310-2 VKG FS MARIA S. MERIAN 01/2 April 04, 2006

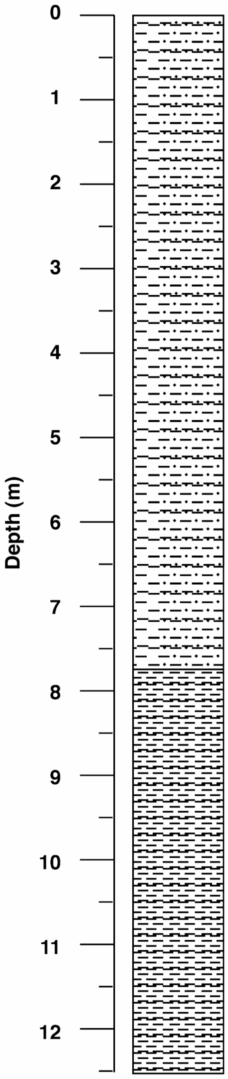
54°50.337
11°32.030

Water Depth: 25.79 m

lithology	colour	description
	black olive black (5Y2/1) olive gray (5 Y4/1)	0 – 30 cm: silt, H_2S++, H_2O rich, scattered some mussels (*Mytilus* etc.) 100 – 150 cm: silt, CH_4+ 150 – 543 cm: silt, gas break, high density, slight lamination, scattered mussels

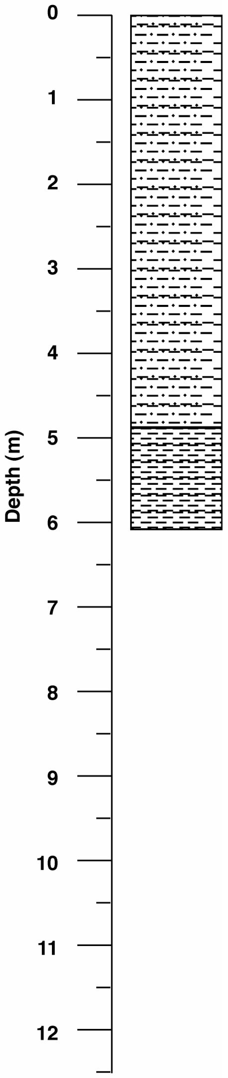
318330-2 GC FS MARIA S. MERIAN 01/2 April 04, 2006

54°52.460 Water Depth: 46.51 m
13°40.929

lithology	colour	description
	black	0 – 30 cm: silt, H_2O rich, H_2S++
	olive black (5Y2/1)	30 – 130 cm: silt, CH_4, 100 cm: mussel (*Macoma* etc.) layer, scattered mussels
	olive gray (5Y4/1)	130 – 650 cm: silt, homogenous, gas break (downwards to bottom), scattered mussels, shell layers: 460, 505 cm
	dark greenish gray (5GY4/1) brownish/black (lamination)	650 – 720 cm: silt, light sulphidic lamination, strong lamination: 663 cm (~1cm), gas break
	black	720 – 770 cm: silt, lamination (increasing downwards), gas break
	dark greenish gray (5GY4/1) brownish (lamination)	770 – 950 cm: clay, homogenous, gas break, vivianit, lamination: 800 – 850 cm, less sharp lamination: 850 – 950 cm
	dark greenish gray (5GY4/1) gray/black (lamination)	950 – 1250 cm: clay, HCl+++, less sharp lamination, CH_4, gas break, sulphidic lamination: 1100 – 1250 cm

318340-1 GC FS MARIA S. MERIAN 01/2 April 04, 2006

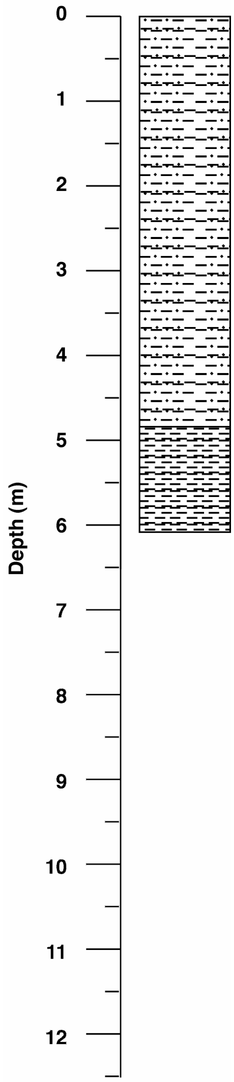
54°54.765 Water Depth: 47.27 m
13°41.444

lithology	colour	description
	dark black	0 – 10 cm: silt, H_2S++, H_2O rich
	grayish black	10 – 90 cm: silt, scattered mussels (*Macoma*)
	olive black (5Y2/1)	90 – 210 cm: silt, slight lamination, scattered mussels
	olive gray (5Y4/1)	210 – 480 cm: silt, gas break, shell layer: 370 cm
	medium dark gray	480 – 580 cm: clay, black spots, slight lamination, CH_4
	black	580 – 610 cm: clay, strong lamination

Southwestern Arkona Basin

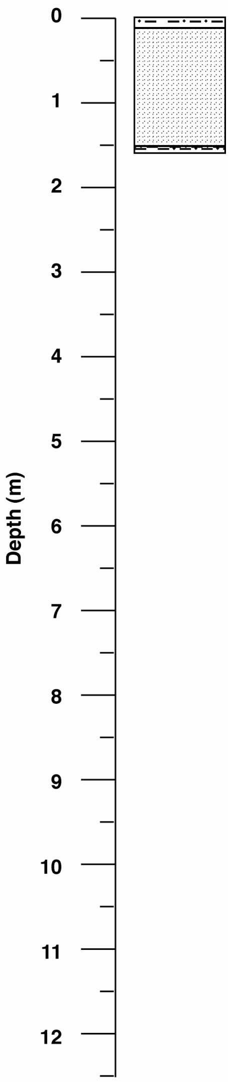
318350-2 GC FS MARIA S. MERIAN 01/2 April 05, 2006

54°53.717 Water Depth: 44.31 m
13°10.284

lithology	colour	description
	dark black	0 – 28 cm: silt, H_2O rich, H_2S++
	olive gray (5Y4/1)	28 – 70 cm: silt, low density, scattered mussels, H_2S+
	olive gray (5Y4/1)	70 – 480 cm: silt, H_2S+, high density, scattered mussels and foraminifera, foraminifera layer: 340 cm, fish: 270 cm
	medium dark gray/ dark black (lamination)	480 – 540 cm: clay, less sharp lamination: 480 – 505 cm, sulphidic lamination: 495 – 505 cm, black spots
	dark black	540 – 610 cm: clay, high density, lamination

318360-2 GC FS MARIA S. MERIAN 01/2 April 05, 2006

54°53.712 Water Depth: 43.63 m
13°03.680

lithology	colour	description
	dark black	0 – 14 cm: silt, H_2S++, H_2O rich
	olive gray (5Y3/2)	14 – 150 cm: fine sand, H_2S+, scattered illite,
	olive gray (5Y4/1)	150 – 157 cm: silt, H_2S+

7 Abstracts of seminars

HISTORY OF THE BALTIC SEA DURING THE LAST c. 130 000 YEARS

(Thomas Andrén)

Our present knowledge of the development during the last glacial cycle of Baltic Sea Basin (BSB) is based on results from short cores (up to 20m long); a frustrating situation since our seismic records show us that apparently undisturbed sediment sequences much thicker than available short cores exists. We have merely scraped the surface of the Baltic Sea's paleoenvironmental record!

In order to reconstruct the paleoenvironmental development from the Eemian interglacial until the retreat of the last Weichselian ice sheet we have to base the reconstruction on terrestrial records, that in most cases are fragmented. However, the Baltic development can be summarised as follows.

During the Eemian interglacial (OIS-5e) a sea existed in the BSB having a higher salinity and a higher sea level than the present Baltic Sea. The interglacial eventually came to an end and the first Early Weichselian glacial advance occurred in OIS-5d, probably not reaching further south than c. 60º N. During the subsequent interstadial (OIS-5c), known as Brørup in northern Europe, the ice sheet retreated to the Scandinavian mountains leaving the entire BSB free of ice. A second Early Weichselian glacial advance occurred in OIS-5b followed by a interstadial during OIS-5a. This interstadial, Odderade in northern Europe, is thought to correspond to the Tärendö interstadial in northern Sweden, and is thought to be colder than the Brørup (OIS-5c) interstadial. The Perapohjola interstadial in Finland might be subdivided into an interstadial dominated by *Pinus* and an interstadial dominated by *Betula* and may thus represent two different interstadials which can be correlated, tentatively, to Brørup and Odderade interstadials, respectively.

The development during OIS-4 and OIS-3 is not well known from the area around the BSB, but in northern Germany and Netherlands, however, several warmer interstadials are recognised and named after their type localities (e.g. Oerel, Glinde, Moershoofd, Hengelo and Denekamp). There is also an ample amount of evidences from the Danish coast of relatively long-lasting ice-free conditions in this part of the BSB on several occasions during the Middle and the beginning of Late Weichselian.

At c. 20 000 yr BP the Late Weichselian ice sheet grew to last glacial maximum (LGM) covering the entire BSB with a ice margin reaching the Main Stationary Line in Denmark and as far south as to the northern Germany and Poland.

After the LGM the ice sheet started to retreat and the southern part of the Baltic Sea Basin was deglaciated at c. 15 000 yr BP. The continuing northward ice recession is fairly well known including some intriguing still stands and even re-advances between 15 000 and 11 500 yr BP.

The Holocene development of the BSB is characterised by alternating freshwater and brackish phases as a result of the interaction between isostatic rebound and eustatic see level fluctuations.

Hight-resolution records from cores covering the last c. 2000 years indicates a very strong link between changes in the temperature in the northern hemisphere and the response of the Baltic Sea ecosystem. During periods of warmer climate the ecosystem responds with a high primary production recorded in the sediments as high values of organic carbon and laminated sequences as a result of permanent anoxia. Such a conditions was recorded during the Mideveal Warm Period (c. 800 to

1200 AD) and since the 1950´s. Correspondingly during peroids of cold climate, such as the Little Ice Age (c. 1400 to 1850 AD), a low content of organic carbon is recorded and the sediments are homogenous indicating low primary productivity and oxic bottom conditions in the Baltic Sea.

INTRODUCTION TO THE BALTIC IODP

(J. Harff)

In 2004 a group of scientists from Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Russia, and Sweden had submitted a pre-proposal for a Baltic IODP "Paleo-environmental evolution of the Baltic Sea Basin through the last glacial cycle". The general aims of the project is to use the high resolution sedimentary record of the Baltic Sea in order to reconstruct the climatic response of Northern Europe to the forcing of the Northern Atlantic atmospheric and oceanic circulation system during the last c. 130 000 years.It is anticipated to close the gaps in knowledge by the mission specific IODP drill campaign. Information from seismic surveys and onshore drill results imply that the Baltic Sea will not only host complete sedimentary sequences in high resolution for the Late Pleistocene and Holocene but also for the entire last glacial cycle. Early Weichselian sequences are expected particularly in the Kattegat area, the western Baltic Sea which is regarded having been ice free before the LGM is prospective for complete records of the early and middle Weichselian, whereas the Northern Baltic Sea hosts late Pleistocene to Holocene sediments with high resolution. During an expedition with the German R/V Heincke February 6 – 16, 2006 five sites in the Kattegat and the southern Baltic have been investigated in the frame of a presite survey. By airgun and sediment echosounder profiling four prospective sites have been selected: Kattegat: "Anholt Loch", Southern Baltic Sea: "Kriegers Flag", "Arkona Basin", and "Hanö Bay" (Bornholm Basin). Based on the results of the geophysical presite survey from March 27 to April 6, 2006 an expedition has been conducted for sediment sampling using the new German R/V "Maria S. Merian". A scientific crew of 21 scientists coming from 8 countries around the Baltic Sea have been investigated during this expedition the sites using a multibeam echosounder and the uppermost sediments which have been sampled with a gravity and vibro-corer. Aiming to describe those lithological units expected to be penetrated by the drilling campaign up to 12 m (gravity corer) and 6 m (vibro-corer) sediment cores have been taken. Glacial sediments have been sampled at Anholt Loch, the northern Arkona Basin and Kriegers Flag. At Hanö Bay nearshore sands of Weichselian age have been identified and sampled. Here also examples of late glacial (varved) clays have been found whereas muds representing the typical Holocene sediments is sampling at the erosional channel of Anholt Loch. The sediments have to be preliminarily described aboard. Other samples stored in 1m plastic-liners have to be taken to the laboratories of the Baltic Sea Research Institute where their physical properties will be measured by a Multi Sensor Core Logger (MSCL) and where they will be subsampled for dating and palaeontological, sedimentolgical and geochemical analysis. The results will be discussed together with the results from the geophysical presite survey in order to select the sites for a drilling campaign. The proposal will be submitted to the IODP panel by October 1, 2006.

DYNAMICS, MORPHOGENESIS AND DEGLACIATION OF THE LAST SCANDINAVIAN ICE SHEET: ON THE WAY OF THE NEW PARADIGM

(Albertas Bitinas)

The relatively harmonious system of presumptions, theories, hypothesis, models, etc. explaining the dynamics, morphogenesis and deglaciation of the Scandinavian Ice Sheet (SIS) during the Last Glaciation have been developed in the second half of the XX century in the peri-Baltic area, especially in its eastern flank – Baltic countries. We think that the mentioned system of standpoints could be named as paradigm – according to terminology and approaches of T. Kuhn (2003). Recent glaciodynamics-deglaciation paradigm of the SIS substantially explain many peculiarities of ice sheet dynamics, formation of number forms of glacial relief as well as deglaciation of territory. But there is a set of new factual data (as well as a few relatively old ones) that couldn't be explained by mentioned paradigm. For example, the cosmogenic dating (^{10}Be) of boulders of the eastern margin of SIS showed that glacier on the large territory from so called Middle Lithuanian Phase until the Gulf of Finland melted practically at the same time, i.e before 13,5-13 kyr. (Rinterknecht et al, 2006).

According to our opinion, the new factual data serves as sufficient background for formation of a new glaciodinamics-deglaciation paradigm of the SIS. It would be a few principal radical attitudes in the new paradigm in comparison with the old one:

- – the meltwater played exclusively significant role for the SIS dynamics and sub-glacial morphogenesis: a plenty of facts starting from structure of till until the formation of recourses of fresh underground water could be explained by this phenomenon;
- – the fluctuation of so called stadials-interstadials or phasials-interphasials were absent: the areal deglaciation of SIS significantly prevail against frontal one;
- – so called stadial or phazial marginal recessional ridges are as result of SIS surges: they are asynchronous along the SIS margin (maybe expect the Salpausselkä moraines only).

STUDIES OF THE DEPOSITS FROM THE WESTERN BALTIC SEA IN ATLANTIC GEOLOGICAL LABRATORY (ABIO RAS)

(Denis Eroshenko)

Atlantic geological laboratory (ABIO RAS) investigates Baltic Sea from 1963. The main aim of the works is the Atlantic Ocean and the seas and lagoons which depends to it including Mediterranean Sea and Black Sea. The main targets of the research programs are systemization of data on modern and quaternary deposits, geochemistry, geoecology and mineral resources in Atlantic Ocean.

In the whole period of investigations a huge amount of material about the relief and deposits of the bottom, including stratigraphical and geochemical data was collected. Investigations took part in more than 1000 stations, it was gotten tens of thousands of samples of the sea floor, and more than 2000 miles echosounding profiles.

Processing of works with the samples mainly is going in the labs of ABIO RAS in Kaliningrad usin following methodology:

1. Granular analysis;
2. Mineralogical analysis;
3. Spore and pollen analysis;
4. Atomic-absorption analysis;
5. Diffractometrical analysis.

Results of the works are published in scientific papers and monographs of co-workers of the lab: E. M. Emelyanov, A. I. Blazhchishin, B. I. Litvin, E. Trimonis, G. S. Kharin, N. I. Sviridov, V. A. Kravtsov. International projects with the specialists of the Baltic countries (Lithuania, Latvia, Estonia, Germany, Finland, Sweden) let us to create bathymetrical and geological maps of the Baltic Sea, where data of the lab were in special interest. ABIO RAS has data from more than 200 stations from the Western Baltic Sea and about 100 stations of it where long cores of sediments were taken with gravity- and vibrocorers.
The main three regions of western Baltic Sea are investigated – Mecklenburgian bight, Arcona and Bornholm Basin. Investigations let us separate the main lithostratigraphical complexes of the sediments, which has their own features:

1. Lower complex consists from grey morainic carbonate clays with huge amount of arena and chipping (Mecklenburgian bight) and massive diamecton (Arcona basin). Preliminary thickness of the horizon can reach 10 m.
2. Post-glacial deposits consists from varve clays (clays of the Baltic Ice Lake stage).
3. Deposits of the lacustrine Holocene (Yoldia Sea and Ancylus Lake stages) overlays with the sedimentational break on varved clays. Mainly this horizon consists of homogenic brown clays, as well as grey clays with the spots of hydrotroilith. Mainly are seeable two types of the sections: clays having interlayers of peat and gyttja, showing near coast – lagoon conditions of sedimentation and deposits of marine sedimentation where are absent interlayers of turf and gyttja (for example western part of Arcona basin).
4. Deposits of marine Holocene overlaying deposits of fresh water Holocene. Mainly that is olive gray silty-pelitic, pelitic homogenic mud with big amount of organic detritus (mainly shells).

These lithostratigraphical units show main properties of the development of the Baltic Sea. Descriptions of the cores, which were taken in research expedition with the R/V Maria S. Merian will correct the thickness of the marine Holocene in western Baltic Sea.

HOLOCENE CHANGES IN ATMOSPHERICAL CIRCULATION IN THE NORTH ATLANTIC REGION – EVIDENCES FOR MILLENIAL-SCALE VARIABILITY BETWEEN OCEAN AND ATMOSPHERE

(Øyvind Lie)

Whereas a number of records from the marine realm have demonstrated Holocene changes regarded to be related to overturning circulation in the North Atlantic region, independent information of atmospherical variability from the terrestrial realm have proven more elusive to capture in palaeo-records. This is a major concern, as several studies have suggested that atmospherical forcing may be an important factor to understand the reconstructed variations in ocean circulation through the Holocene.

A number of studies considering the instrumental period have shown (A) that the atmospheric variability associated with the North Atlantic Oscillation (NAO) and sea-level pressure (SLP) in the North Atlantic is amplified in alpine areas on the western side of the Scandinavian mountain range, and is manifested as variations in the total winter accumulation in these areas (Hurrell, 1995, Dai *et al.*, 1997, Rodwell *et al.*, 1999, Nordli *et al.*, 2003). Moreover, it is (B) demonstrated that the spatial distribution of winter precipitation can be seen as a direct response to NAO and SLP variations (Nordli *et al.*, 2003, Uvo, 2003).

A glacier may be regarded as a simple climatic system, responding to temperature during the ablation-season and winter-precipitation during the accumulation-season. By using an established approach to separate the two mass-balance terms of glaciers (Dahl and Nesje, 1996), four established Holocene glacier reconstructions are transferred into winter-accumulation signal, allowing the records to be viewed as palaeo-gauges of effective precipitation in three regions in southern Norway, thereby allowing the spatio-temporal variations in winter-precipitation to be reconstructed.

Whereas a number of studies have shown the effect of NAO-variability to strongly correlate with accumulation on Norwegian glaciers during the last 45 years (Pohjola and Rogers, 1997, Nesje et al., 2001, Six et al., 2001), also supported by general circulation models (Reichert et al., 2001), the non-stationarity of the NAO system (Barnston and Livezey, 1987, Ostermeier and Wallace, 2003, Cassou *et al.*, 2004) poses severe analytical problems of such ‘down-stream’ site specific reconstructions.

To evaluate the possible non-stationarity of atmospheric variations, we use a fixed spatial grid, creating stationary pressure-field indices in the analysis of atmospherical changes and likely pressure-field patterns are identified for the last 6000 years with a 200 yr resolution.

By comparing our results with information on North Atlantic Ocean circulation, we can demonstrate for the first time a consistent behavior between the ocean and independently reconstructed atmospherical circulation from the terrestrial realm, thereby presenting postpriori support to the apriori hypothesis that wind-fields are directly connected to variations in the ocean’s circulation during the last 6000 years.

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RESEARCH AT THE DEPARTMENTOF PALAEOOCEANOLOGY, UNIVERSITY OF SZCZECIN

(Aleksandra Nowak/Paulina Lis)

The research proceeds along two basic lines: one is the reconstruction of palaeoenvironmental changes using microfossils and proxies (diatoms, radiolarians; cladoceran remains); the other concerns the study of organisms of recent sedimentary environments, that is the macrobenthos and meiobenthos. The areas of study include lakes and peat bogs in Western Pomerania, River Odra, Szczecin Lagoon, and the Baltic Sea as well as water areas in other parts of the world: North Atlantic, Southern Ocean, and Clarion-Clipperton Fracture Zone in the equatorial Pacific. The presentation included photos taken at study sites and pictures of organisms being studied.

MODELLING OF THE COASTLINE CHANGES IN THE SOUTHEASTERN BALTIC SEA

(Jonas Seckus)

Work on Digital Elevation Model, geoseismic profile and relative sea level curves were presented.

Study of palaeogeomorphology, depositional-erosional history and sea level fluctuations of the Late-Glacial and Holocene Baltic basins shore formation performed on Klaipeda submarine slope were presented. The curve of relative sea level changes on the traverse Klaipeda–Dreverna is compared with the curve constructed by Kabailiene and Rimantiene (1996) and Kabailiene (1999) according to diatoms, archaeological and radiocarbon data and with curve constructed by Bitinas et al. (2004) according ^{14}C BP and OSL dating (conv.^{14}C BP). Author found direct correlation of the curves presented in this oral talk with curves of the eustatic changes in the North-West Europe and Atlantic-Caribbean region.

The palaeogeographical conditions and depositional–erosional activity of the fresh water basins during Alleröd-Boreal periods have been investigated using GIS database of the stratigraphical units. Palaeotopography of the till loam top, IL-BIL and $A_{1\text{-}2}$ Baltic Sea stages is reconstructed and exposed on 3D schemes.