Institut für Meereskunde
an der Universität Kiel

CRUISE REPORT[1)]

P0231/3

R.V. Poseidon **Cruise No.:** ~~P231-3~~

Dates of Cruise: 3.08.97 - 17.08.97

General subject of research: physical, chemical and biological oceanography
(physical, biological or geological oceanography)

Port Calls: Lissabon / Ponta Delgada

IfM-Department / CAU Institute: Marine Planktology & Marine Chemistry

Chief Scientist: Joanna Waniek

Number of Scientists: 10

Project: JGOFS

Cruise Report

This Cruise Summery Report consists of 13 pages and covers:

1) Scientific crew, list and institute affiliation

2) Research programme (short project summary, scientific goals etc.)

3) Report of cruise with technical details (port calls, cruise track, weather, special events)

4) Scientific report and first results

5) Scientific equipment, instruments, moorings etc.

6) Appendix of charts with cruise tracks, list of stations, diagrams etc.

7) Additional remarks

1) To be delivered 3 months after cruise to Provost of IfM in 3 copies for Institute files and Foreign Office.

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Adresse
Institut für Meereskunde
an der Universität Kiel
Düsternbrooker Weg 20
D-24105 Kiel

Telefon
☎Vermittlung
(0431) 597-0

Telex
17431793
ifmkiel ttx d

Telefax
(0431) 565876

Telegramm
Meereskunde Kiel

Teletex
(2627-) 431793
= IfMKiel

Telemail
IFM.KIEL

1. Scientific participants Poseidon P231-3

Waniek, Joanna	Chief scientist, oceanography	IfMK
Lundgreen, Ulrich, Dr.	organic marine chemistry	IfMK
Schiebel, Ralf, Dr.	foraminifers	GPT
Griffiths, Colin	moorings, oceanography	PML
Fehner, Uwe	planktology	IfMK
Reineke, Cornelia	TA, nutrients	IfMK
Will, Stefan	TA, moorings	IfMK
Petersen, Johannes	TA, moorings	IfMK
Prang, Angela	TA, in-situ pumps	IfMK
Petrick, Gert	TA, in-situ pumps	IfMK

1.1 Participating Institutions

IfMK
Institut für Meereskunde an der Universität Kiel, Düsternbrooker Weg 20, D-24 105 Kiel

GPT
Geologisch-Paläontologisches Institut der Universität Tübingen, Sigwartstr. 10, D-72076 Tübingen

PML
Plymouth Marine Laboratory, Citadel Hill, Plymouth, PL1 2PB, United Kingdom

2. Research Objectives

2.1. Research program

The objectives of the Poseidon cruise P231-3 were to continue research activities in the framework of the German JGOFS project with its main project „Long-term studies on the variability of particle flux in the North Atlantic". The aim of the study is to determine and understand the process controlling the short-term, seasonal and interanually varying fluxes of carbon and associated (trace) biogenic elements and compounds in different climatic regions of the North Atlantic.

Part of the JGOFS activities at IfM Kiel is to investigate the chemical composition of sinking and suspended particles in the North Atlantic. Aim of this investigations is to gain a better understanding of the processes of particle formation and remineralisation in the water column. Long-term measurements on sinking particles by means of "Kiel Sediment Traps" (KST) are accomplished by ship-related measurements on suspended particulate matter (SPM) using the "Kiel In Situ Pumps" (KISP). The KISP additionally provides large volume water sampling for dissolved organic constituents by means of XAD resin cartridges (Petrick et al., 1996). SPM is sampled with polycarbonate membrane filters, poresize 0.47µm, for trace element analysis, but for the determination of trace organic substances glassfiber (GF/F) filters are used. Organic measurements include the determination of total POC, amino acids, PCB and alkenones.

Aim of these investigations is to evaluate, from a chemical point of view, the changes with depth that occur with marine particles. Specific questions are:

- How fast does remineralisation follow changes of biological and chemical variables within the water column?

- In what way is the chemical composition related to particle size, time, space and physical-biological events?
- What are the compositional differences between SPM and sinking particles?
- What are the relationships between organic compounds and trace elements?
- How is the vertical concentration profile for dissolved anthropogenic tracers (e.g. PCB) linked to the composition of SPM?
- How fast are different components of the organic carbon pool remineralised?
- What insights into the processes of particle formation and destruction can be obtained by comparison of the chemical composition of the dissolved phase, SPM and sinking particles?

References:

Petrick, G., Schulz-Bull, D.E., Martens, V., Scholz , K. and Duinker, J.C., 1996. in-situ filtration/extraction system for the recovery of trace organics in solution and on particles tested in deep ocean water. Mar. Chem., 54: 97-105.

2.2 Working program

The working program for the leg 3 was:
1). The Kiel JGOFS long-term mooring L1 (Kiel 276-17) with sediment trap and current meters, which were deployed by RV Meteor in summer 1996 were recovered and re-deployed.
2). Recovering of additional three moorings for the PML Group of Robin Pingree.
3) Application of in-situ pumps for vertical profiles of SPM for the analysis of particulate trace elements, natural radionuclides and dissolved and particulate trace organics.
4). Sampling by multiple opening-closing net and water samplers from the productive and export zone down to 2500 m water depth.
5). Measurements of vertical profiles of physical variables (pressure, conductivity, temperature) with CTD-oxygen-fluorescence system at mooring position and several positions in the region of the Azores Frontal Zone.

3. Report of cruise with technical details

After leaving Lisboa on August 3rd 1997 fine weather preavailed allowing maximal speed for Poseidon. The scientific work started with a XBT section at 35° 40.0' N, 16° 07.2' W, with XBT drops every 4 hours. Poseidon reached the first main station at 32° 59.9' N, 22° 00.4' W in the early morning of August 6th 1997: The JGOFS mooring L1 (Kiel 276-17) with four sediment traps, two inclinometers and six current meters was recovered without any technical problems. On 07.08.1997 at 08:00 UTC we started with the re-deployment of the mooring L1 (Kiel 276-18), without sediment traps. During the recovering and re-deployment of the mooring the weather conditions were good, with good visibility, low winds (3-4 Bft) and small waves (<2 m). From the position of the JGOFS mooring L1 Poseidon was heading to the moorings PML 156, 157 and 155. Only the mooring PML 157 was recovered succesfull (for details see below, Chapter 4).

At all four main stations, where moorings had to be recovered and re-deployed for longterm studies of the seasonality of particle sedimentation and circulation patterns, several other devices were deployed regurlarly: One or more CTD-rosette casts were taken for studies of hydrographical parameters and nutrients. For investigations of trace element cycling in-situ pumps were used at different depths to collect suspended organic and anorganic particles. Additional multi-closing net casts were taken for characterisation of the community of foraminifers, micro- and macrozooplankton in the water column down to 2500 m water depth. The connections between the main stations were occupied by monitoring of the vertical temperature distribution in the water column down to 1830 m; the spatial scale of the XBT drops was 2 or 1 hour. During the 3rd leg of the cruise 66 XBT were droped, 9 CTD casts were taken, 4 KISP and 4 MSN profiles were made.

RV Poseidon reached Ponta Delgada in the morning of August 15th 1997 where the leg P231-3 ended. The maps with general cruise track, locations of the stations and the xbt survey are shown in appendix (Figure 1-3).

4. Scientific report and first results

4.1 Mooring report

Recovering and re-deployment of the JGOFS mooring L1 / Kiel 276-17 (water depth 5239 m) 33° 00.0' N, 22° 00.0' W

At the position of the JGOFS mooring L1 (Kiel 276-17) immediate contact was made with the release unit at the start of the recovery at 08:00 UTC on 06.08.1997. The surface float was spotted at 08:08 UTC. The whole mooring with four sediment traps, two inclinometers and six current meters was recovered at 10:33 UTC.

On 07.08.1997 at 08:00 UTC we started with the re-deployment of the mooring L1 (Kiel 276-18). The mooring was deployed (12:40 UTC) without sediment traps. During recovery and re-deployment of the mooring the weather conditions were good, with good visibility, low winds (3-4 Bft) and small waves (<2 m).

Mooring PML 157 at Great Meteor Tablemount (water depth 303 m) 30° 00.05' N, 28° 27.83' W

An acoustic search was conducted in the vicinity of the mooring from 0735Z until 1100Z. At no time acoustic contact was made with either release. A lookout was kept at all the times when the release frequencies were transmitted. A fishing float was spotted 1.5 cables from the mooring position. All acoustic activity was monitored on a NAGRAFAX for one release and on the WATERFALL display for the other.

Mooring PML 156 (water depth 3910 m) 32° 31.00' N, 34° 23.96' W

Immediate contact was made with the MORS release at the start of the recovery at 0807Z. No range was received from the deck unit although return signals were clearly audible. The pinger was switched on and it was clear that the mooring was vertical, this was monitored on the NAGRAFAX. A lifering was spotted by the bridge some distance away, this was retrieved. We then returned to the mooring position.The IOS release was switched on and monitored on the WATERFALL display, the release was then switched into release mode and released. The shackle from the pickup line to the S/S sphere was worn other than that the mooring was recovered in good condition by 1050Z. On deck all functions of the MORS release appeared to be working except the pyro command.

Mooring PML 155 (water depth 3910 m) 32° 31.18' N, 35° 29.10' W

Immediate contact was made with the single MORS release, the pinger was switched on. The mooring was clearly vertical. Numerous attempts were made to release the mooring but without success. It was then decided to switch off the pinger and return the release into the closed position and switch it off to conserve the batteries in the hope that a dragging operation could be attempted at a later date. The decision to do this was based on past experience with this batch of MORS release from DISCOVERY 219. With this batch of releases the electronics have worked fine, the fault is a mechanical one. Over time the sacrificial anode has deposited onto the hook pivot assembly thus jamming the hook.

4.2 Distribution and Composition of Phytoplankton

For analysing the qualitative composition of the phytoplankton a Apstein-net (55 µm) was used. Sampling took place down to a depth of ca. 10 m below the chlorophyll-a-maximum. After running the net a part of the sample was studied under the microscope on board and the rest was fixed with formol for further studies in the laboratory. During POS 231-2 net runs were performed at each CTD-station on the transect along 20°W. During POS 213-3 sampling took place only at station L1.

For analysing the quantitative composition and the vertical distribution of the phytoplankton, water samples were taken and fixed with formol for Utermöhl-microscopy at each CTD-station during POS 231-2 und POS 231-3. At each station 6 samples were taken from the surface water down to a depth of about 120m (~ whole euphotic zone).

4.3 CTD profiles

During the 3rd leg of the cruise hydrographic measurements (CTD casts) were carried out in the vicinity of the mooring positions for monitoring of the hydrographical conditions in the research area. The water column was probed by a FSI CTD with an additional fluorometer and oxygen sensor and a 12 bottle water sampler with 12l Niskin bottles. From the Niskin bottles water samples were taken for the calibration of the fluorescence measurements and for determination of nutrients, chlorophyll a and various biological parameters (PSI, CN, HPLC, TEP, Utermöhl) from distinct water depth. The positions of the CTD casts are shown in Figure 2 in appendix.

4.4 XBT survey

An XBT survey was conducted during the trip. A total of 66 Sippican T5's (1830m) were deployed at regular intervals. The ship speed was held at 6 knots during all XBT deployments. The system performed very well indeed. The positions of the XBT's are shown in Figure 3 in appendix.

4.5 Chemical investigations

On POSEIDON cruise 231 different types of samples were taken. At long-term stations L1 to L3 (JGOFS) and NB (SFB313) sediment traps were recovered with different success, covering the whole range from complete failure of the sample cup rotating unit to a 100% recovery yield. Five moorings with 13 sediment traps in total had been laid out in 1996, four moorings containing 11 sediment traps were recovered; the mooring at station NB was lost. All sediment trap samples will be processed in the home laboratory. Until then, they are stored at 4°C in the dark. All traps will be analysed for

JGOFS core parameters (biogenic opal, carbonate, POC, PON and total massflux). In addition, the 500 m traps will be examined microscopically and the deeper traps will be chemically anzalysed for amino acids, alkenones, polychlorinated biphenyls (PCB) and trace elements.

Suspended particulate matter was sampled using the KISP. Altogether, 48 KISP filters were obtained for the analysis of SPM-load, amino acids, PCB, POC/PON and trace elements. For the determination of amino acids, the filters were subsampled on board ship and immediately hydrolysed with 6N HCl at 150°C for 70 min. The remaining filters were freeze dried and stored; they will be further processed at the home laboratory.

Water samples were taken for the analysis of PCB using the KISP extraction cartridges at the three stations L2, A1 and L1. A total of 18 samples was retained. They were stored at room temperature and will be solvent-extracted at the home laboratory. For the determination of dissolved amino acids small volumes (500 µl) of water taken from CTD-rosette casts were filtered and immediately hydrolysed on board ship. 40 samples in total were taken from the same depths the KISP were used.

4.6 Zooplankton

Zooplankton and phytoplankton was sampled by a multinet-water sampler device between the ocean surface and 2500 m water depth. Three sites, at 33° N, 22° W, at 32.5° N, 34.5° W and at 35° N, 31°W, are suspected to be south of the Azores Frontal Zone (AFZ), the fourth site at 36° N, 29° W, to be north of the AFZ. Analysis of the hydrographical data (CTD, XBT) will reveal the special hydrographic situation at positions sampled. Faunal composition and particulate carbonate flux of planktic foraminifers and pteropods (multinet samples, 100 µm), and coccoliths (water samples, 4 liters filtered, 0.45 µm) will be investigated. By comparison of northern and southern samples the impact of the AFZ on distribution and flux of the calcareous plankton will be shown. Sampling was carried out as part of CANIGO (MAST III) and data are to be integrated into the an interannual data set on the spatial and temporal development and flux of the calcareous plankton.

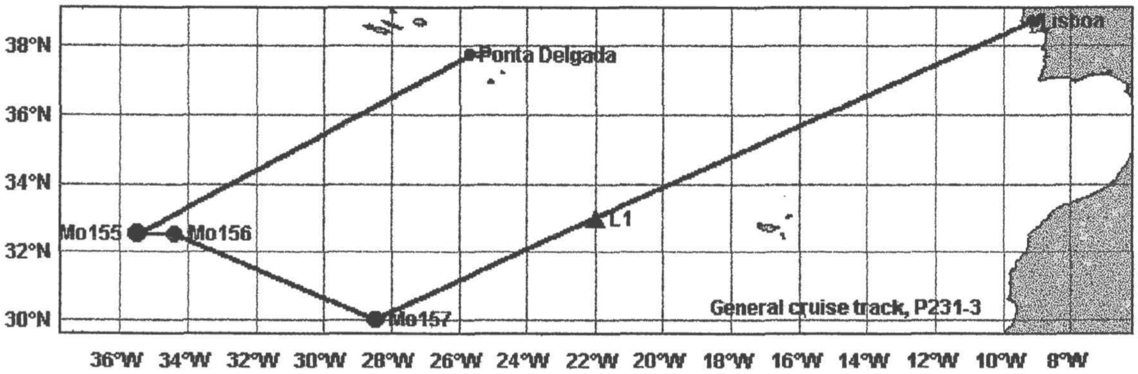
5. Scientific equipment / instruments used during P231-3

CTD	Conductivity-Temperature-Depth Multisampler
XBT	Expandable Bathythermograph
ADCP	Acoustic Doppler Current Profiler
KISP	Kiel In-Situ Pumps
KST	Kiel Sediment Trap
AN	Apstein Net
SC	Secchi Disc
MO	Mooring
MSN	Multi Closing Net
CM	Current Meter

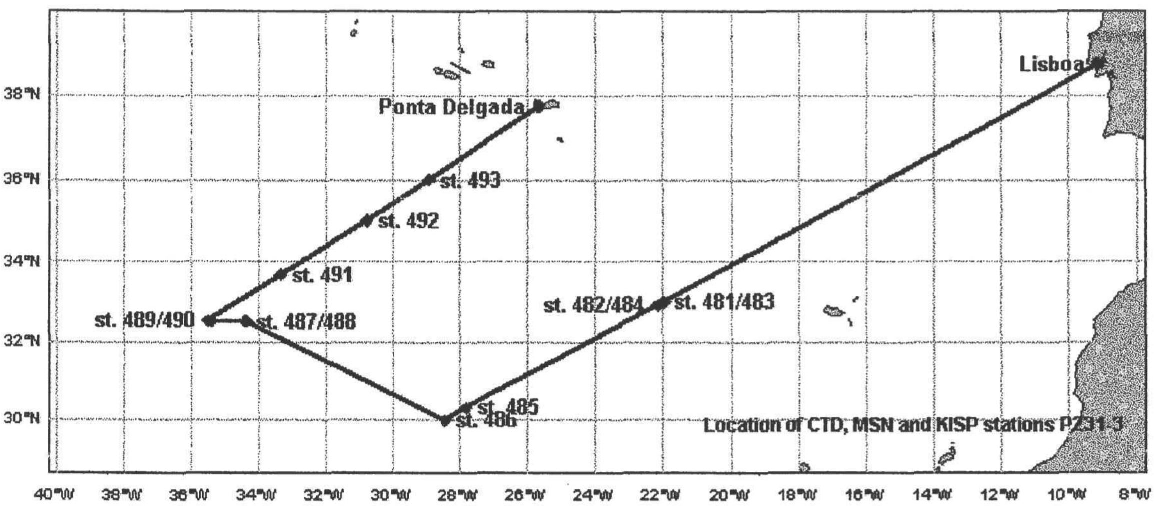
6. Appendix of charts with cruise tracks, list of stations, diagrams

6.1. Charts of the cruise

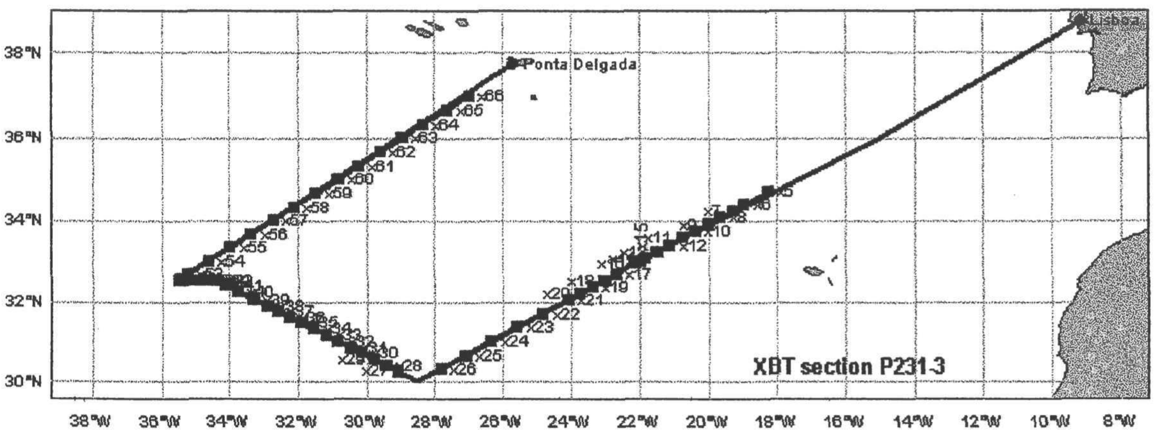
6.1.1 General cruise track with the JGOFS and PML mooring positions



6.1.2. Location of CTD, KISP and MSN profiles



6.1.3 Map of the XBT drops

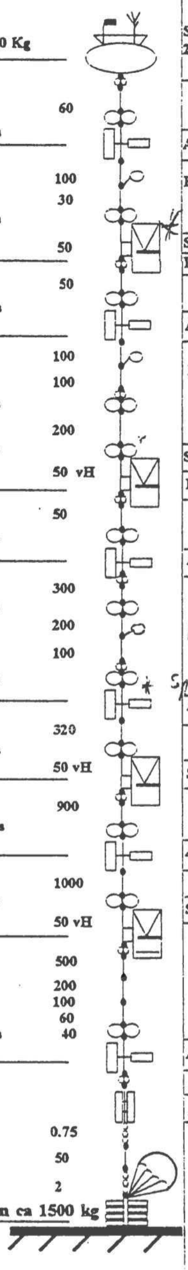


6.2 List of stations

Station No.	Profile No.	Date (1997)	Time (UTC)	Latitude (N)	Longitude (W)	Depth m	Devises
481	1	04.08	20:00	35° 40.0	16° 07.2	1830	XBT
	2	05.08	00:00	35° 20.3	16° 51.0	1830	XBT
	3	05.08	04:00	35° 00.4	17° 34.9	1830	XBT
	4	05.08	08:00	34° 41.0	18° 18.7	1830	XBT
	5	05.08	12:00	34° 22.5	18° 59.5	1830	XBT
	6	05.08	13:59	34° 13.4	19° 20.0	1830	XBT
	7	05.08	15:58	34° 03.7	19° 40.8	1830	XBT
	8	05.08	18:00	33° 54.0	20° 02.4	1830	XBT
	9	05.08	20:00	33° 43.9	20° 34.3	1830	XBT
	10	05.08	22:00	33° 33.8	20° 46.4	1830	XBT
	11	06.08	00:00	33° 23.5	21° 08.9	1830	XBT
	12	06.08	01:59	33° 13.2	21° 30.5	1830	XBT
	13	06.08	04:00	33° 02.8	21° 51.3	1830	XBT
	14	06.08	05:32	32° 59.3	21° 58.3	1830	XBT
	1	06.08	05:58	32° 59.7	21° 58.1	500	CTD
	1	06.08	06:44	32° 59.6	21° 58.0	Chla max	AN
482		06.08	08:05	32° 59.9	22° 00.4	—	recovering of MO 276/17
	1	06.08	11:40	32° 59.9	22° 00.0	100, 700, 2500	MSN
	1	06.08	15:55	32° 59.8	21° 58.0	2500	KISP
	2	07.08	00:44	33° 01.0	21° 57.8	500	CTD
	3	07.08	01:57	33° 01.0	21° 57.3	3990	CTD
483		07.08	08:12	32° 59.5	21° 59.9	5222	deployment of Mo 276/18
484	2	07.08	14:09	32° 55.3	22° 09.7	2500	KISP
	15	07.08	21:46	32° 57.8	22° 09.1	1830	XBT
	16	08.08	01:01	32° 40.7	22° 42.4	1830	XBT
	17	08.08	03:00	32° 31.0	23° 03.0	1830	XBT
	18	08.08	04:59	32° 21.2	23° 24.3	1830	XBT
	19	08.08	07:00	32° 11.3	23° 46.0	1830	XBT
	20	08.08	09:00	32° 01.4	24° 07.6	1830	XBT
	21	08.08	13:00	31° 40.8	24° 51.7	1830	XBT
485	22	08.08	17:00	31° 20.4	25° 36.7	1830	XBT
	23	08.08	21:00	30° 59.1	26° 21.6	1830	XBT
	24	09.08	01:00	30° 37.9	27° 05.7	1830	XBT
	25	09.08	05:00	30° 18.1	27° 50.1	1830	XBT
486		09.08	08:37	29° 59.6	28° 28.0	303	recovering of MO 157, no response
	4	09.08	12:03	29° 59.8	28° 28.1	301	CTD
	2	09.08	12:28	29° 59.8	28° 28.0	Chla max	AN
	3	09.08	12:45	29° 59.8	28° 28.1	110	KISP
487	26	09.08	23:00	30° 16.0	29° 05.2	1830	XBT
	27	10.08	01:05	30° 25.0	29° 26.2	1830	XBT
	28	10.08	03:03	30° 34.0	29° 47.2	1830	XBT
	29	10.08	05:04	30° 42.9	30° 09.0	1830	XBT
	30	10.08	07:05	30° 52.3	30° 30.2	1830	XBT
	31	10.08	09:04	31° 01.2	30° 51.6	1830	XBT

487	32	10.08	11:00	31° 10.1	31° 12.0	1830	XBT
	33	10.08	13:00	31° 18.9	31° 33.4	1830	XBT
	34	10.08	15:03	31° 28.5	31° 54.8	1830	XBT
	35	10.08	17:03	31° 37.7	32° 37.7	1830	XBT
	36	10.08	19:03	31° 45.7	32° 36.7	1830	XBT
	37	10.08	21:04	31° 53.1	32° 54.2	1830	XBT
	38	10.08	23:00	32° 04.0	33° 19.6	1830	XBT
	39	11.08	01:05	32° 15.7	33° 47.8	1830	XBT
	40	11.08	03:00	32° 24.5	34° 09.3	1830	XBT
	41	11.08	04:24	32° 30.2	34° 22.3	1830	XBT
	5	11.08	04:31	32° 30.3	34° 22.1	3800	CTD
488		11.08	08:06	32° 30.8	34° 23.6	3846	recovering of MO 156
	6	11.08	11:41	32° 31.0	34° 24.0	500	CTD
	2	11.08	12:30	32° 31.0	34° 24.0	100, 700, 2500	MSN
	4	11.08	16:43	32° 30.8	34° 23.6	200	KISP
489	42	12.08	01:17	32° 31.8	34° 22.4	1830	XBT
	43	12.08	02:00	32° 31.1	34° 30.6	1830	XBT
	44	12.08	03:01	32° 30.9	34° 42.4	1830	XBT
	45	12.08	04:01	32° 30.9	34° 53.5	1830	XBT
	46	12.08	05:01	32° 31.1	35° 05.0	1830	XBT
	47	12.08	06:00	32° 31.1	35° 15.8	1830	XBT
	48	12.08	07:00	32° 31.0	35° 24.2	1830	XBT
	49	12.08	07:30	32° 31.1	35° 28.0	1830	XBT
490		12.08	08:03	32° 31.3	35° 28.7	3858	recovering of MO 155, no response
	7	12.08	10:58	32° 32.3	35° 27.3	3636	CTD
491	50	12.08	13:30	32° 33.1	35° 25.6	1830	XBT
	51	12.08	13:39	32° 33.8	35° 24.5	1830	XBT
	52	12.08	14:44	32° 40.0	35° 12.9	1830	XBT
	53	12.08	18:03	33° 00.0	34° 35.6	1830	XBT
	54	12.08	21:24	33° 20.0	33° 58.5	1830	XBT
	55	13.08	01:07	33° 40.1	33° 21.3	1830	XBT
	56	13.08	04:45	33° 59.9	32° 43.8	1830	XBT
	57	13.08	08:23	34° 19.8	32° 06.4	1830	XBT
	58	13.08	12:00	34° 40.0	31° 28.7	1830	XBT
	59	13.08	15:58	34° 59.9	30° 49.0	1830	XBT
492	8	13.08	16:08	35° 00.4	30° 48.4	120	CTD
	3	13.08	16:45	35° 00.8	30° 48.6	100	MSN
	60	13.08	20:20	35° 20.0	30° 12.1	1830	XBT
	61	14.08	00:02	35° 40.0	29° 33.8	1830	XBT
	62	14.08	03:42	35° 59.9	28° 56.0	1830	XBT
	63	14.08	03:47	36° 00.0	28° 56.0	1830	XBT
493	9	14.08	03:55	36° 00.2	28° 56.0	3000	CTD
	4	14.08	06:42	36° 00.0	28° 56.0	100, 700, 2500	MSN
	64	14.08	13:30	36° 19.8	28° 17.0	1830	XBT
	65	14.08	18:22	36° 40.0	27° 35.8	1830	XBT
	66	14.08	23:58	37° 00.0	26° 57.4	1830	XBT

6.3. Moorings diagrams



Einsatz-tiefe in m	Bodenab-stand in m	Reck in %	Ist-Länge in m	Gerätetyp und Nr.:	Rotor los	Gerät ins Wasser	Gerät aus dem Wasser	Rotor fest
							6/3/97 UTC.	
ca 210	ca 5025		Auftrieb 420 Kg	Sender-Fr.: 27.036 MHz		07:29	07:16	
			Niroseil 60 8 x Benthos					
ca 270	ca 4965			A-VT #11348 ✓		07:34	07:20.	O.K.
			Niroseil 100 Niroseil 30 5 x Benthos	Blubb	Trap.	07:40	0740	*
			Niroseil 50	Sn-Falle #56 ✓	ausgelöst	07:41	0742	Only 1
ca 450	ca 4785			Inklino.#1111 ✓				Sample *
			Niroseil 50 5 x Benthos			07:44	0736	
ca 500	ca 4735			A-VT #11442 ✓		07:44	0736	O.K.
			Niroseil 100 Niroseil 100 2 x Benthos	Blubb		08:15 08:20	0740 0743	
			Kevlar 200 3 x Benthos		Trap.	08:28	0748	
			Kevlar 50 vH	Sn-Falle #57 ✓	Schwapptisch	08:29		
ca 950	ca 4285			Inklino.#1112 ✓			0752.	
			Kevlar 50 2 x Benthos			08:34	0755	
ca 1000	ca 4235			A-VT #9833 ✓		08:34	0755	O.K.
			Kevlar 300 3 x Benthos Kevlar 200 Kevlar 100 2 x Benthos	Blubb		08:49 09:01	0802 0807	
				Spindle bent. ✓		09:03	0811	(Trap under Ship)
ca 1600	ca 3635			A-VT #9821 ✓		09:03	0811	OK.
		320 m +10.5% =ca. 354 m	Perlon 320 5 x Benthos			09:18	0821	
ca 2004	ca 3231		Kevlar 50 vH	Sn-Falle #58 ✓	Trap O.K.	09:21	0826.	
		900 m +11.5% =ca. 1003 m	Perlon 900 3 x Benthos			09:57	0845	
ca 3000	ca 2235			A-VT #9345 ✓		09:57	0845	OK
		1000 m +11.6% =ca. 1116 m	Perlon 1000 5 x Benthos			10:41	0907	
ca 4155	ca 1080		Kevlar 50 vH	Sn-Falle #59 ✓	Trap not O.K	10:42	0910	
		930 m +11.6% =ca. 1060 m	Perlon 500 Perlon 200 100 Perlon 60 6 x Benthos 40			11:01	0927	
ca 5185	ca 50			A-VT #9312 ✓		11:19	0932	O.K.
				Ausl. 1 #642		11:20	"	
				Ausl. 2 #54		11:20	"	
			Kette 0.75 Perlon 50 Kette 2				All inboard 0933.	
ca 5235	0		Ankerstein ca 1500 kg			11:24		

as blown over remov..

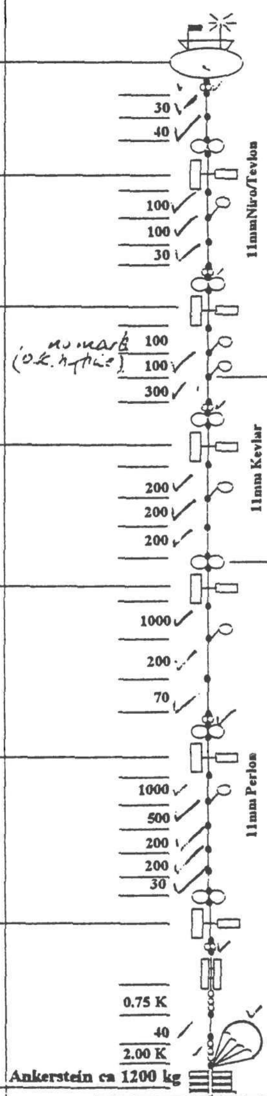
● Schäkel-Ring-Schäkel ∞ Wirbel

Entwurf: D.Carlsen **Gezeichnet:** J.Petersen

Schiff/Expedition Meteor 36/2	Schiff/Expedition	Verankerungs Nr.: 276-17
Auslegedatum 28.02.96	Aufnahmedatum	Institut für Meereskunde Kiel Physik
Protokollführer-in Wanlek	Protokollführer-in	Seegebiet: Nord-Ost-Atlantik
Lottiefe 5231m	von Tiefe	Position: (Decca,GPS,etc)
auf Tiefe 5244m	Zeitmeridian UTC	33°00,25 N 21°59,61 W

All instruments in good condition
no fouling.

Einsatztiefe in m	Bodenabstand in m	Reck in %	Ist-Länge in m	Gerätetyp und Nr.:	Rotor los	Gerät ins Wasser	Gerät aus dem Wasser	Rotor fest
				Auftrieb 420				
ca 200	ca 5035			Sender-Fr. Mhz.		7:13		
				5 Benthos ✓		7:18.		
ca 270	ca 4965			A-VTP 10501 ✓	O.K.	7:18		
				Blubb ✓		7:22.		
				5 Benthos ✓	O.K.	7:30		
ca 500	ca 4735			A-VT 10559	+3000	7:30		
				Blubb ✓		7:33		
				Blubb ✓		7:38.		
				4 Benthos ✓	O.K.	7:54		
ca 1000	ca 4235			A-VT 10578	+3000	7:54		
				Blubb ✓		8:03 8:12		
				3 Benthos ✓	O.K.	8:24		
ca 1600	ca 3635			A-VT 10577	+5000	8:24		
		1270m+10.3%R = ca. 1400 m		Blubb ✓		8:54 9:02		
				4 Benthos		9:05		
ca 3000	ca 2235			A-VT 11576	O.K.	9:05		
		1980 m+10.3%R = ca. 2180 m		Blubb		9:45 10:05 10:15 10:24		
				6 Benthos ✓		10:27		
ca 5185	ca 50			A-VT 10502 ✓	O.K.	10:27		
				Ausl. 1 ✓	B 730	10:27		
				Ausl. 2 ✓	M 37	10:27		
ca 5235	0		Ankerstein ca 1200 kg			10:34		



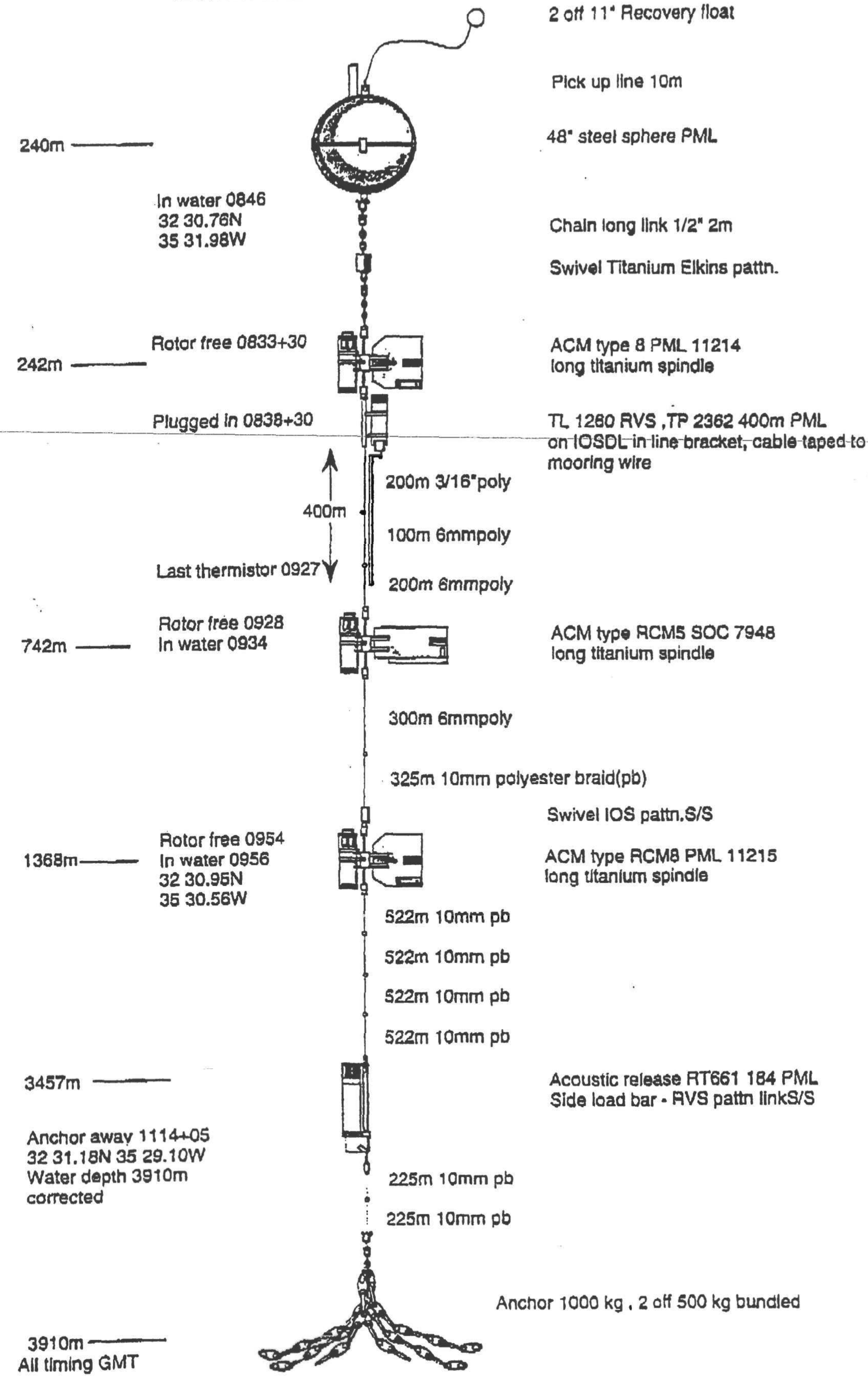
● Schäkel-Ring-Schäkel   ∞ Wirbel

Entwurf: D.Carlsen | Gezeichnet: D.Carlsen

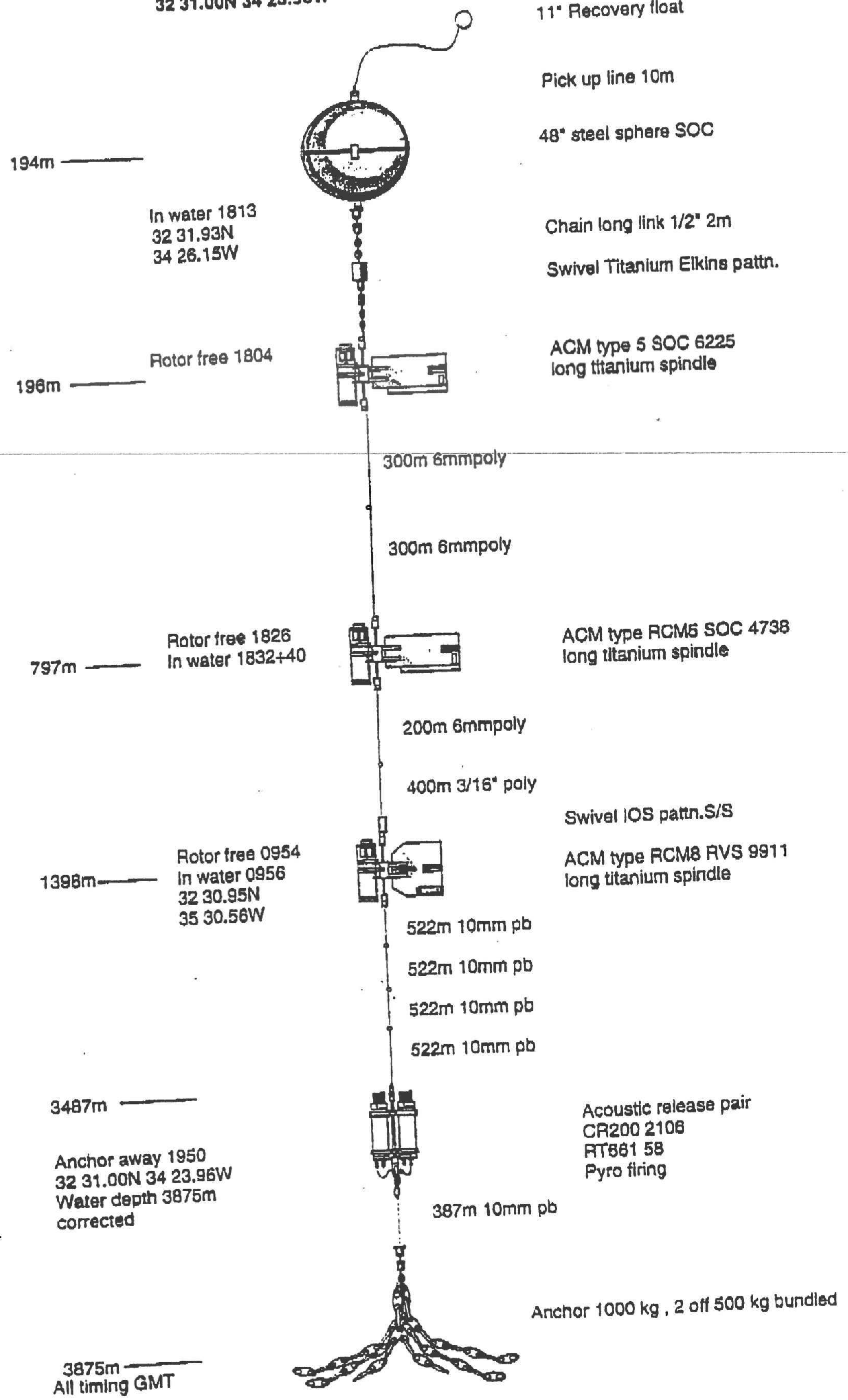
Schiff/Expedition F251-3	Schiff/Expedition	Verankerungs Nr.: 276 - 18
Auslegedatum 7/8/97	Aufnahmedatum	Institut für Meereskunde Kiel Physik
Protokollführer-in C.GRIFFITHS	Protokollführer-in	Seegebiet: Nord-Ost-Atlantik
Lottiefe 5222 m.	von Tiefe	Position: (Decca,GPS,etc)
auf Tiefe 1240*	Zeitmeridian	

MIC *surface buoy not sighted.
Abtauchen der Boje wurde nicht beobachtet, sie konnte nicht gefunden werden

Mooring 155 Deployed 28th October 1995 Day 301
32 31.18N 35 29.10W



Mooring 156 Deployed 28th October 1996 Day 301
32 31.00N 34 23.96W



Mooring 157 Deployed 16th October 1995 Day 289
Great Meteor Tablemount