



Short Report POSEIDON Cruise 476-77

Biogeochemistry interactions in the anoxic/suboxic eastern Gotland Basin

Kiel - Kiel
17. – 24. Oct. 2014

Cruise lead
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I. Objectives

The combined cruises Poseidon 476-77 are follow up cruises of ALKOR 422 which was carried out in Latvian waters in 2013 in the same working area. Our general investigations focus on redox-dependent nutrient, nitrogen and trace metal cycles in the benthic boundary layer of the suboxic to anoxic eastern Gotland Basin. We aim to study release rates and inventories of phosphate and iron under varying degrees of bottom water oxygenation and to quantify source/sink mechanisms of the benthic boundary layer for nitrogen species and trace metals under changing oxygen conditions to assess potential feedbacks on upper mixed layer processes. While Alkor 422 was carried out in summer we wanted to study the changing of oxygen conditions in fall and winter. The natural gradient of bacterial mats (*Beggiatoa* ssp.), which are indicators of the suboxic zone were investigated during the expedition by studying various stations from anoxic to anoxic water (autumn situation). Two instruments were employed for our investigation the towed video/still-camera system OFOS (Ocan Floor Observation System) and a TV-controlled CTD/Rosette water sampler. Two small bottom observatories (Satellite Lander, Fig. 1) were deployed at 96m and 123m for nine months to monitor changes in: CTD, turbidity, chlorophyll, oxygen and currents during the winter and spring situation. The observatories will be retrieved in July 2015 with R/V Poseidon.

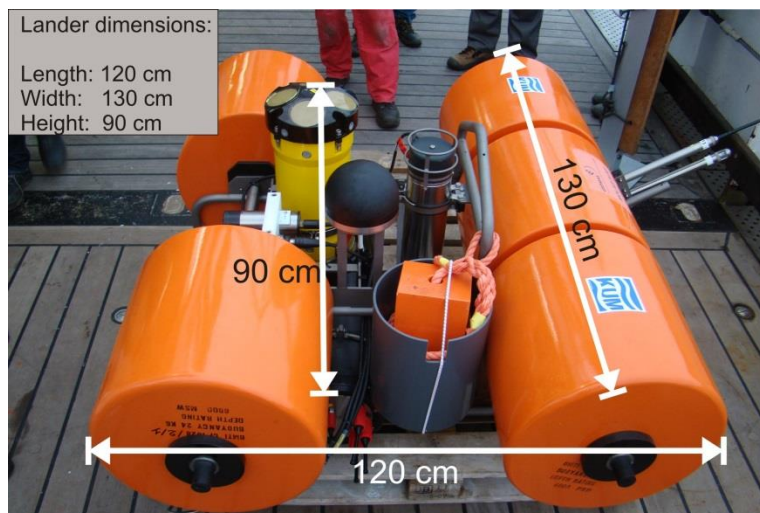


Fig. 1: Satellite Lander housing a 300 kHz ADCP and a storage CTD with additional turbidity and chlorophyll sensor. Oxygen is measured by optodes.

II. Area of investigation

Investigations were carried out both in the Latvian EEZ. The limits of the working areas were:

S to N, 56°50'N to Latvia/Estonia EEZ line;

W to E, EEZ line Latvia/Sweden to 12nm beyond the Latvian coast.

Main working activities were focused to a depth transects (Fig. 2), which was already investigated during previous cruises e. g. ALKOR cruises 355,346 and 422 (2009, 2010, 2013). The wider area was surveyed by TV-guided CTD/Rosette water sampler casts and Ocean Floor Observation System deployments to monitor the distribution of the oxycline and the occurrence of bacterial mats around rim of the eastern Gotland Basin.

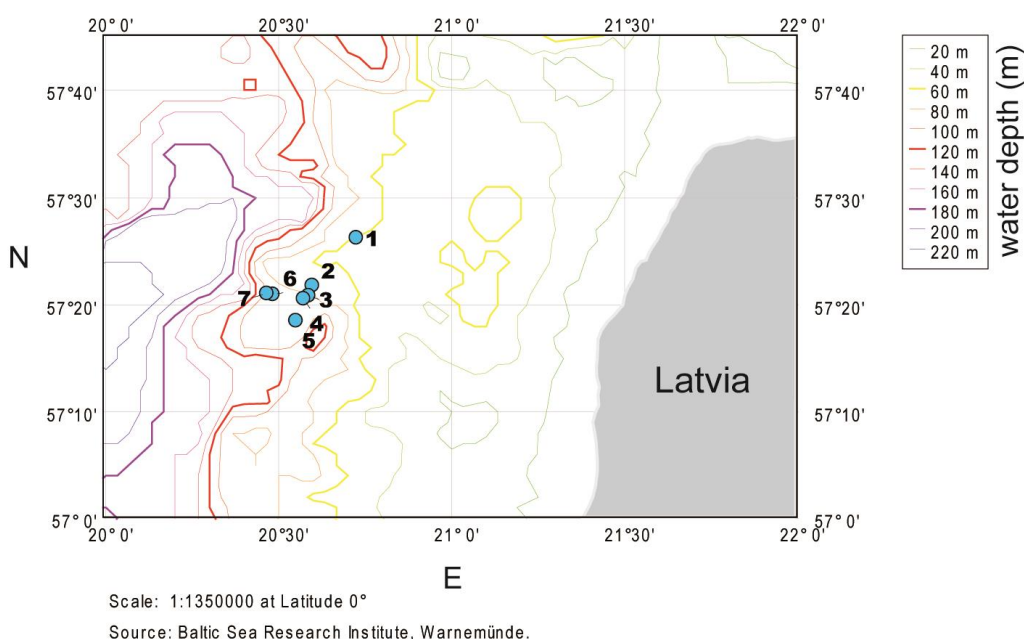


Fig. 2: Depth transect in the Latvian EEZ over station 1-7 (1: 65m oxic, intrusions of deeper anoxic water possible; 2: 80m oxycline; 3-5: 80-125m lower boundary of the oxycline, highly variable bottom water O₂-conditions; 6: 150m anoxic deep water; 7: 170m sulfidic deep water).

III. Participants

Name		Task	Institution	
1.	Pfannkuche	Olaf	Cruise lead POS 476	GEOMAR
2.	Sommer	Stefan	Cruise lead POS 477	GEOMAR
3.	Fabrizius	Eduard	Video-Technology	GEOMAR
4.	Türk	Mathias	Electronics	GEOMAR

GEOMAR: GEOMAR Helmholtz-Zentrum für Meeresforschung, Wischhofstr. 1-3, 24148 Kiel, Germany.

IV. Narrative of the cruise

Friday, 17-10-14: Due to technical problems our departure from Kiel had to be cancelled on Friday.

Saturday, 18-10-14: we left Kiel harbor at 08:00h and started our transit to our research area in the Latvian EEZ of the eastern Gotland Basin.

Sunday, 19-10-14: We continued our transit through the Baltic proper towards our research area.

Monday, 20-10-14: We arrived at our first working station at 57°20,79'N/20°35,34'E at 08:00h. Station work started with a CTD/Ro cast by 94m. Afterwards we deployed the first satellite lander SLM 2 by 96m (Stat. 1098-99). We changed position to 125m where we performed another CTD/Ro cast and deployed the second lander SLM 3 (Stat. 1100-01). The rest of the day was spent with 4 CTD/Ro casts and 3 OFOS transects in the vicinity of the lander deployment site by 97-123m (Stat. 1102-07).

Tuesday, 21-10-14: Station work started with two CTD/Ro casts in the deepest part of the Gotland Basin by ca. 240m (Stat. 1108-09). Afterward we moved to the rim of the basin for an OFOS transect by 143m and a CTD/Ro cast at the end of the transect line (Stat. 1110-11). In the afternoon we moved further north for two more OFOS transects in combination with a CTD/Ro cast in the depth range 83m – 98m (Stat. 1112-17).

Wednesday, 22-10-14: During the night we steamed to the southern part of our applied research area where we drove two more OFOS transects in combination with a CTD/Ro cast by 95 - 114m (Stat. 1118-21). At 13:30 we finished station work in the Latvian EEZ and started our home journey.

Thursday, 23-10-14: We continued our transit through the Baltic proper towards Kiel.

Friday, 24-10-14: We arrived at the GEOMAR pier in Kiel at 11:00h thus finishing cruise Poseidon 476-77

V. List of sampling Stations and employed gear

Tab 1: List of employed gear with abbreviations

CTD/RO	CTD-Rosette water sampler
OFOS	Ocean Floor Observation System
SLM	Satellite Lander

Overleaf

Tab. 2: List of sampling station Poseidon Cruise 476-77

(**Coordinates 1:** CTD/RO, Lander position of deployment; OFOS- start of bottom view and start of OFOS transect/ **Coordinates 2:** OFOS- end of bottom view and end of OFOS transect).

Station	Gear	No.	Date	Time	Coordi	nates 1	Depth	Coordi	nates 2	Depth	Time
POS 476-77			2014	(UTC)	Lat. °N	Long. °E	(m)	Lat. °N	Long. °E	(m)	(UTC)
1098	CTD	1	20. Okt.	06:15	57°20.793' N	20°35.342' E	94				
1099	SLM 2	1	20. Okt.	07:32	57°20.739' N	20°35.319' E	96				
1100	CTD	2	20. Okt.	08:28	57°18.552' N	20°33.049' E	125				
1101	SLM !	1	20. Okt.	08:50	57°18.529' N	20°33.043' E	124				
1102	CTD	3	20. Okt.	10:11	57°18.538' N	20°33.029' E	123				
1103	OFOS	1	20. Okt.	11:27	57°18.533' N	20°33.016' E	123	57°18.55' N	20°32.14' E	116	12:19
1104	OFOS	2	20. Okt.	13:37	57°20.626' N	20°34.291' E	112	57°20.60' N	20°33.30' E	119	14:37
1105	CTD	4	20. Okt.	14:53	57°20.612' N	20°33.161' E	118				
1106	OFOS	3	20. Okt.	16:29	57°20.745' N	20°35.273' E	97	57°20.72	20°34.56' E	108	17:10
1107	CTD	5	20. Okt.	17:26	57°20.717' N	20°34.486' E	107				
1108	CTD	6	21. Okt.	06:04	57°21.111' N	20°8.263' E	241				
1109	CTD	7	21. Okt.	07:49	57°21.186' N	20°13.176' E	240				
1110	OFOS	4	21. Okt.	10:26	57°20.494' N	20°29.041' E	143	57°20.459' N	20°28.369' E	160	11:06
1111	CTD	8	21. Okt.	11:18	57°20.457' N	20°28.291' E	161				
1112	OFOS	5	21. Okt.	12:46	57°21.481' N	20°35.894' E	80	57°21.447' N	20°36.351' E	72	13:19
1113	CTD	9	21. Okt.	13:41	57°21.455' N	20°35.771' E	82				
1114	CTD	10	21. Okt.	15:00	57°28.57' N	20°35.93' E	98				
1115	OFOS	6	21. Okt.	16:13	57°28.579' N	20°36.029' E	96	57°28.57' N	20°36.52' E	85	16:45
1116	CTD	11	21. Okt.	17:10	57°29.236' N	20°36.715' E	83				
1117	OFOS	7	21. Okt.	17:30	57°29.259' E	20°36.751' E	82	57°29.23' N	20°37.17' E	74	18:00
1118	OFOS	8	22. Okt.	06:15	56°59.937' N	20°19.250' E	114	56°59.937' N	20°19.617' E	111	06:41
1119	CTD	12	22. Okt.	06:52	56°59.898' N	20°19.682' E	108				
1120	OFOS	9	22. Okt.	08:50	56°50.098' N	20°18.101' E	105	56°50.040' N	20°18.558' E	99	09:20
1121	CTD	13	22. Okt.	10:04	56°50.028' N	20°18.816' E	95				
1122	OFOS	10	22. Okt.	10:45	56°50.276' N	20°16.577' E	125	56°50.283' N	20°16.940' E	122	11:06
1123	CTD	14	22. Okt.	11:25	56°50.309' N	20°16.933' E	120				