

**Leibniz Institute for
Baltic Sea Research
Warnemünde
(Germany)**

C r u i s e R e p o r t

r/v "Poseidon"

Cruise No. P 475

This report based on preliminary data and results

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1. **Cruise No.:** P 475
2. **Dates of the cruise:** from 27. 9. to 12. 10. 2014
3. **Particulars of the research vessel:**
 - Name: "Poseidon"
 - Nationality: Germany
 - Operating Authority: GEOMAR Kiel
4. **Geographical area in which ship has operated:**
Western Baltic Sea; Gdansk Basin, Bornholm Basin; Arkona Basin; Mecklenburg Bay
5. **Dates and names of ports of call:**
 - 26. 09. 2014 Rostock (load of the ship)
 - 07. 10. 2014 Rostock (exchange of staff and gear)
 - 12. 10. 2014 Rostock (unload of the ship)
6. **Purpose of the cruise:**
Investigation of transport, deposition and exchange of matter at the sediment-water boundary in German waters (Project SECOS). Reconstruction of Holocene history of the western Baltic Sea (Gdansk-Basin and Bornholm Basin). Acoustic mapping of the sea floor at selected areas in German waters. Documentation and sampling of "stone reef habitats" by research scuba divers (German waters only).
7. **Crew:**
 - Name of master: Matthias Günther
 - Number of crew: 15
8. **Research staff:**
 - Chief scientist: Dr. Thomas Leipe (IOW)
 - Scientists: 6 (Moros, Wölfel, Gogina, Morys, Bunke, Lipka)
 - Engineers: 3 (Nickel, Plewe, Stohr)
 - Technicians: 4 (Hehl, Bender, Frahm, Jeschek)
9. **Co-operating institutions:**
 - University of Rostock (Germany)
 - University of Szczecin (Poland)
 - Polish Geological Institute Gdansk (Poland)
 - Geological Survey of Denmark, Copenhagen (Denmark)
10. **Scientific equipment:**
Side-Scan-Sonar, Sediment-Echosounder, CTD, Benthic Chamber, Van Veen Grab Sampler, Multi-Corer, Gravity Corer, Frahm-Corer, Video Camera, Water Sampler, Dredge, Nutrient Analyser, Scuba Diver.
11. **General remarks and preliminary results:**
The major part of the cruise was used for investigation of near surface sediments at selected key-sites (type-localities for sand, mud and stone reefs) in German territorial waters and in the German exclusive economic zone (EEZ) of the Baltic Sea. In the frame of the German research project "SECOS" this was already the third cruise with focus on "functioning" of sedimentary deposits in relation to matter cycles (nutrients, gasses,

pollutants) and sediment dynamics (transport, deposition). Special attention was paid on occurrence and activity of benthic macro fauna (bio-turbation). Sediment types, benthic colonization and bio-geochemical matter cycles are strongly dependent on environmental parameters as bathymetry, salinity, temperature, and oxygen. From west to east, the investigation area of the German Baltic Sea is characterized by general decreasing salinity and the morphology (coastal zone, shelf, sills, and basins) causes for hydrodynamic driven transport sorting and deposition of the sediments. The basins (Mecklenburg Bay and Arkona Basin) are partly characterized by oceanographic clines. In the eastern part of the area (Pomeranian Bay), the large river Oder supply suspended matter, nutrients and contaminants to the open Baltic waters.

During the cruise, at each of the 6 SECOS-stations extensive work was done to obtain samples and measurements for characterizing these key sites on small scales. So called "Benthic Chambers" were deployed at 5 of the SECOS-stations for several days to measure "in situ" continuously hydro-chemical parameters and to collect water samples at a time series. Around the chambers or the key-sites, large numbers of surface sediment samples were taken by Multi-Corer and Grab sampler to investigate the "patchiness" or variability of benthic organisms as well as of sediment- and bio-geochemical parameters. Pore-water profiles obtained at short sediment cores are used for analysing water chemistry, nutrients and trace metals. CTD casts were run for online registration of temperature, salinity, oxygen, turbidity, chlorophyll etc. in the water column. Sea water samples were collected by bottles at selected depths for nutrient analyses. A large amount of pore-water and sea-water samples were directly measured on board for nutrient analyses with a "Seal Quattro" instrument.

The 6 SECOS key-stations investigated at this cruise are the numbers: P475-11 (Oderboje); P475-17 (Arkonamast); P475-24 (Darss Sill); P475-52 (Stoltera); P475-53 (Lübeck Bay); P475-57 (Mecklenburg Bay) in the station list (see table below).

Besides of the work at the SECOS-key stations a few other activities were performed during the cruise. At the so called "Falster-Rügen-Plate", a shallow water sandy area between the two islands, at 36 stations surface sediment samples were collected for later geochemical analyses of fine sediment fraction (also part of the SECOS-Project). Further on, scuba divers were used for documentation and sampling of macro-fauna and flora of selected hard grounds (stone fields) at 4 stations and for supporting the work with the Benthic Chambers (1 station). Acoustic side-scan sonar profiles were run across different areas of the German EEZ for sea floor mapping. This part of the work is embedded in international HELCOM activities to investigate and map "marine habitats". In total 41 km² of sea floor were covered by side-scan sonar during this cruise (see figure in the appendix).

A small part of the cruise was used to work in foreign waters of the Baltic Sea and to obtain long sediment cores from selected sites in the Gdansk Basin, Poland (1 station; P475-12) and in the Bornholm Basin, Denmark (2 stations; P475-15; P475-16). Prior the cruise notifications were submitted and permissions arrived from the named countries. At each of the three stations the same programme was carrying out: CTD-profiles for hydrography, Multi-Corer and Frahm-Corer for obtaining surface sediments (short cores) and Gravity Corer for long sediment cores (12 meter). The cores were cut, packed and stored for later analyses in our home lab. Multi-proxy analyses will be performed during the next time to investigate environmental and climate change during Littorina Time (Holocene, ca. 8000 Years B.P.). The data will be compared and correlated to results of our previous work in Arkona-Basin and Gotland Basin.

Appendix:

Explanation of abbreviations, list of stations, maps, and CTD-profiles.

Legend for the stations list:

abbreviation	description		
Grab	VanVeen Grab Sampler		
MUC	Multi-Corer (surface sediment)		
GC	Gravity Corer (12 meter)		
FC	Frahm-Corer (80 cm)		
BC	Benthic Chamber (nutrient cycle)		
V	Video Camera (under water)		
W	Water Sampler (single)		
TS	Temperature, Salinity (single)		
CTD	CTD-Rosette (full equiped)		
Dredge	Dredge for benthic macrofauna		
FRP	Falster-Rügen-Plate		

Poseidon-cruise 475 (27.09. - 12.10. 2014) station list							
Date	UTC (start)	Station	Alias / Area	North [GPS]	East [GPS]	W D [m]	Gear
27.09.2014	08:22	P475_1	FRP	54°12.00	12°05.08	12	Grab
27.09.2014	09:02	P475_2	FRP	54°15.02	12°04.96	13	Grab
27.09.2014	10:03	P475_3	FRP	54°18.02	12°03.42	18	Grab, V, W, TS
27.09.2014	11:30	P475_4	FRP	54°21.12	12°05.90	21	Grab
27.09.2014	12:09	P475_5	FRP	54°24.01	12°05.03	22	Grab
27.09.2014	13:00	P475_6	FRP	54°26.79	12°10.00	25	Grab
27.09.2014	13:40	P475_7	FRP	54°24.01	12°10.03	22	Grab
27.09.2014	14:18	P475_8	FRP	54°21.01	12°10.03	20	Grab
27.09.2014	14:51	P475_9	FRP	54°18.00	12°10.01	14	Grab
27.09.2014	15:11	P475_10	FRP	54°16.91	12°09.97	10	Grab
28.09.2014	06:25	P475_11	Oderboje	54°04.54	14°09.66	15	BC, CTD, MUC, Grab, Dredge
29.09.2014	07:40	P475_12	Gdansk Basin	54°49.37	19°11.12	106	CTD, MUC, GC, FC
30.09.2014	08:59	P475_13	Oderboje	54°04.55	14°09.62	15	BC recovery, V, MUC
30.09.2014	13:04	P475_14	Oderbank	54°26.46	14°03.38	16	CTD, V, MUC, Grab
01.10.2014	04:38	P475_15	Bornholm Bas	55°15.65	15°27.12	94	CTD, MUC, FC, GC
01.10.2014	10:01	P475_16	Bornholm Bas	55°22.63	15°21.80	93	CTD, MUC, FC, GC
02.10.2014	04:40	P475_17	Arkonamast	54°53.01	13°51.35	49	BC, CTD, MUC, Grab, Dredge, V
03.10.2014	06:07	P475_18	AB3	54°56.84	13°18.21	47	MUC
03.10.2014	08:03	P475_19	AB1	54°47.46	13°15.14	43	MUC
03.10.2014	11:38	P475_20	new station	54°50.10	13°32.02	46	MUC
03.10.2014	12:40	P475_21	new station	54°51.85	13°32.05	47	MUC
03.10.2014	13:54	P475_22	AB2	54°55.27	13°44.24	47	MUC
03.10.2014	14:54	P475_23	Arkonamast	54°53.01	13°51.38	50	BC recovery
04.10.2014	07:05	P475_24	Darss Sill	54°42.05	12°41.74	22	BC, CTD, MUC, Grab, V, Dredge
04.10.2014	13:10	P475_25	FRP	54°42.01	12°45.00	22	Grab
04.10.2014	13:48	P475_26	FRP	54°42.01	12°40.02	21	Grab
04.10.2014	14:23	P475_27	FRP	54°42.03	12°34.99	18	Grab
04.10.2014	15:11	P475_28	FRP	54°42.00	12°29.98	18	Grab, V
05.10.2014	04:51	P475_29	FRP	54°39.01	12°24.99	18	Grab, V, W, TS, Dredge
05.10.2014	06:54	P475_30	FRP	54°38.971	12°30.000	19	Grab
05.10.2014	07:29	P475_31	FRP	54°38.950	12°35.000	19	Grab
05.10.2014	08:01	P475_32	FRP	54°38.973	12°39.991	20	Grab
05.10.2014	08:38	P475_33	FRP	54°38.999	12°45.013	17	Grab
05.10.2014	09:11	P475_34	FRP	54°40.472	12°48.936	14	Grab
05.10.2014	09:33	P475_35	FRP	54°38.991	12°49.986	13	Grab
05.10.2014	10:14	P475_36	FRP	54°38.973	12°54.999	17	Grab
05.10.2014	10:49	P475_37	FRP	54°38.957	12°59.976	18	Grab
05.10.2014	11:24	P475_38	FRP	54°38.989	13°04.965	17	Grab
05.10.2014	12:00	P475_39	FRP	54°35.974	12°59.958	13	Grab
05.10.2014	12:35	P475_40	FRP	54°36.013	12°54.977	12	Grab
05.10.2014	13:09	P475_41	FRP	54°35.908	12°49.884	12	Grab
05.10.2014	13:37	P475_42	FRP	54°35.976	12°45.041	17	Grab
05.10.2014	14:16	P475_43	FRP	54°36.002	12°39.980	18	Grab
05.10.2014	15:03	P475_44	FRP	54°35.989	12°34.984	18	Grab
06.10.2014	06:20	P475_45	Darss Sill	54°42.106	12°41.674	22	BC recovery
06.10.2014	07:31	P475_46	FRP	54°44.98	12°44.98	20	Grab
06.10.2014	08:16	P475_47	FRP	54°44.97	12°50.00	21	Grab
06.10.2014	09:11	P475_48	FRP	54°47.992	12°54.967	23	Grab
06.10.2014	09:53	P475_49	FRP	54°44.952	12°54.968	24	Grab
06.10.2014	10:26	P475_50	FRP	54°41.965	12°55.017	23	Grab
06.10.2014	11:03	P475_51	FRP	54°41.99	12°49.97	18	Grab
08.10.2014	07:30	P475_52	Stoltera	54°15.493	11°56.538	18	MUC, Grab, V, TS, W, Dredge
08.10.2014	14:35	P475_53	Lübeck Bay	54°08.200	11°08.000	23	BC, CTD, MUC, Grab, V, Dredge
10.10.2014	07:02	P475_54	Lübeck Bay	54°06.049	11°09.963	24	MUC
10.10.2014	07:37	P475_55	Lübeck Bay	54°06.012	11°06.619	24	MUC
10.10.2014	10:56	P475_56	Meckl. Bay (D)	54°18.979	11°33.149	25	MUC
10.10.2014	13:43	P475_57	Meckl. Bay	54°13.516	11°35.690	25	BC, CTD, MUC, Grab, V, Dredge
11.10.2014	16:00	P475_57	Meckl. Bay	54°13.516	11°35.690	25	BC recovery
09.10.2014	10:00	KH 01	T 2	54°02.140	11°07.103	15	Diver
09.10.2014	12:30	KH 02	T 5	54°01.851	10°55.902	12	Diver
09.10.2014	14:30	KH 03	T 10	54°06.906	11°02.350	8	Diver
11.10.2014	09:30	KH 04	T 6	54°08.986	11°30.183	21	Diver
11.10.2014	15:00	KH 05	T BC	54°13.516	11°35.690	25	Diver

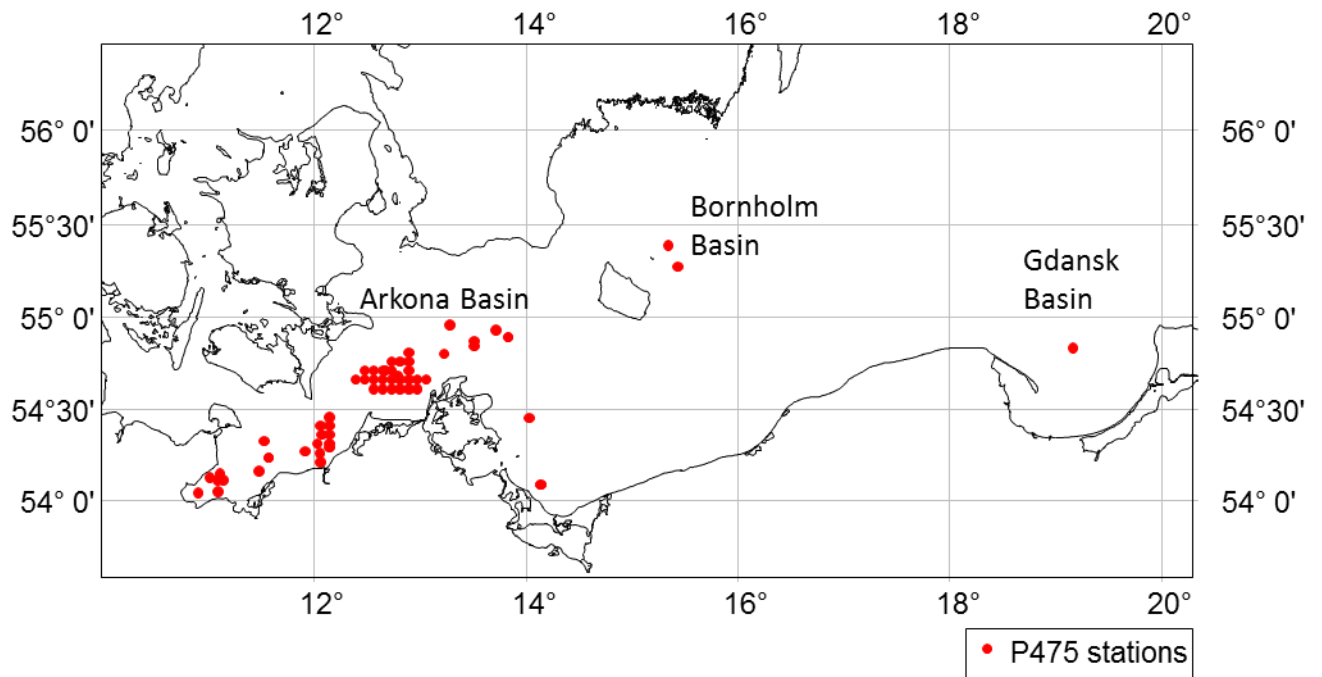


Figure 1: Map of all P475 stations, overview.

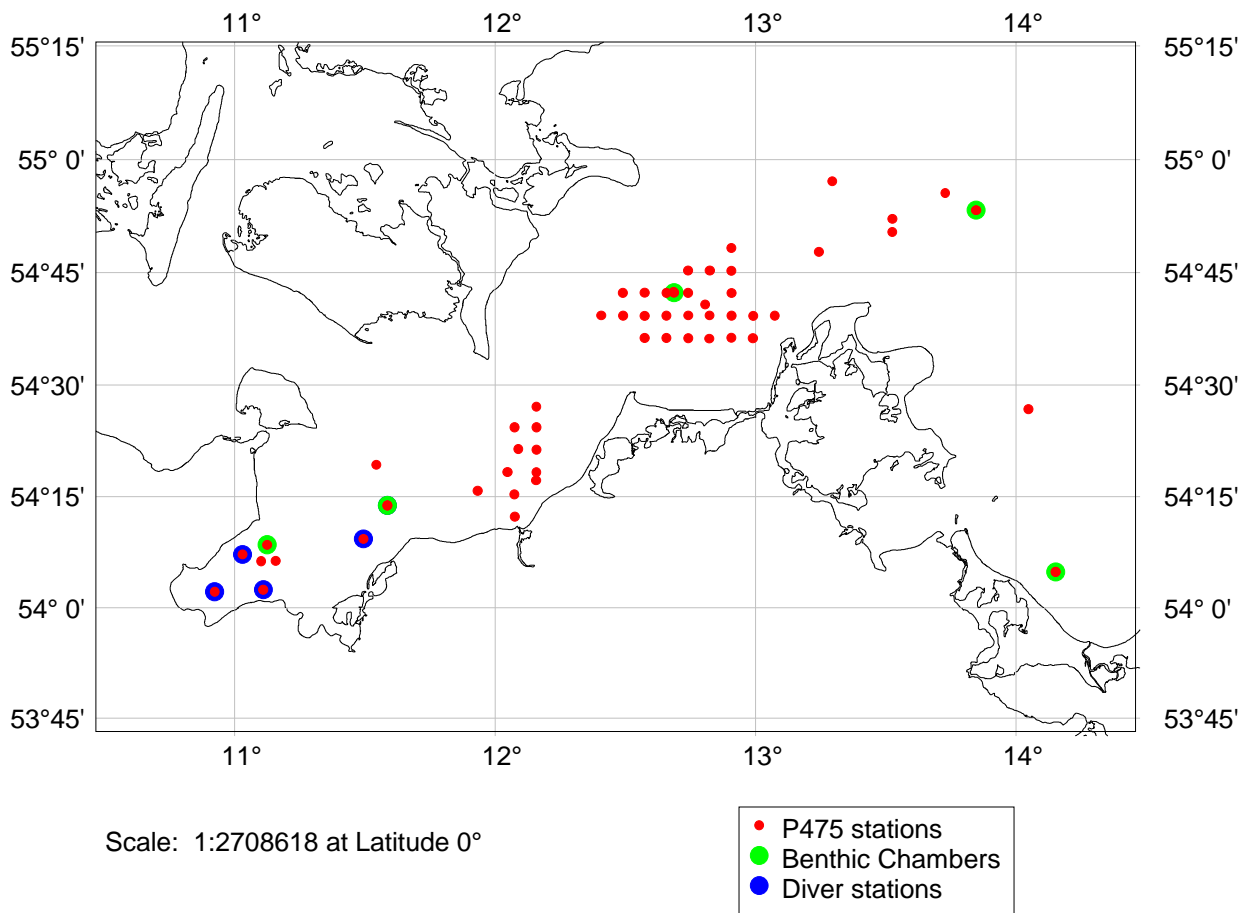


Figure 2: Map of P475 stations, detail, German waters.

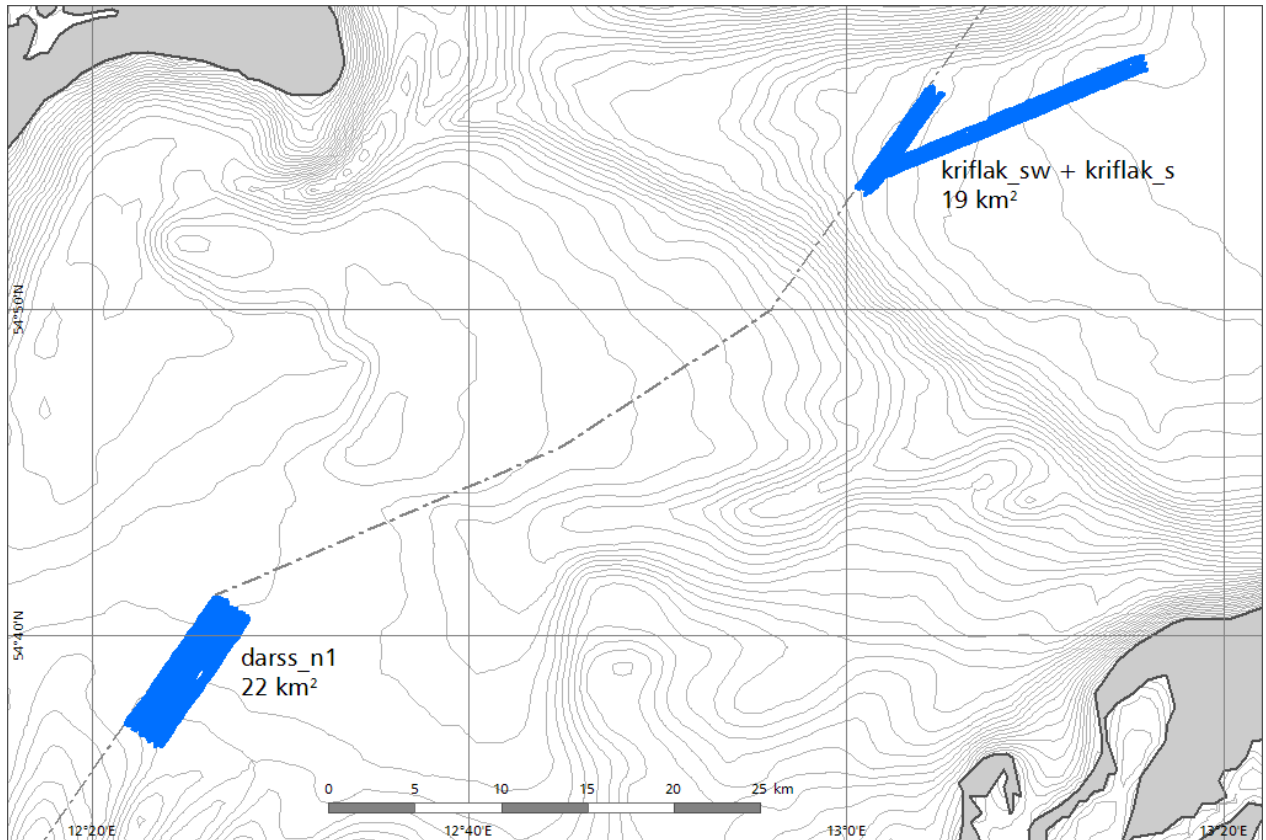


Figure 3: Map of the Darss Sill – Arkona Basin area (western Baltic Sea) with coverage of sea floor mapping by side-scan-sonar profiles (blue areas) during P475 cruise.

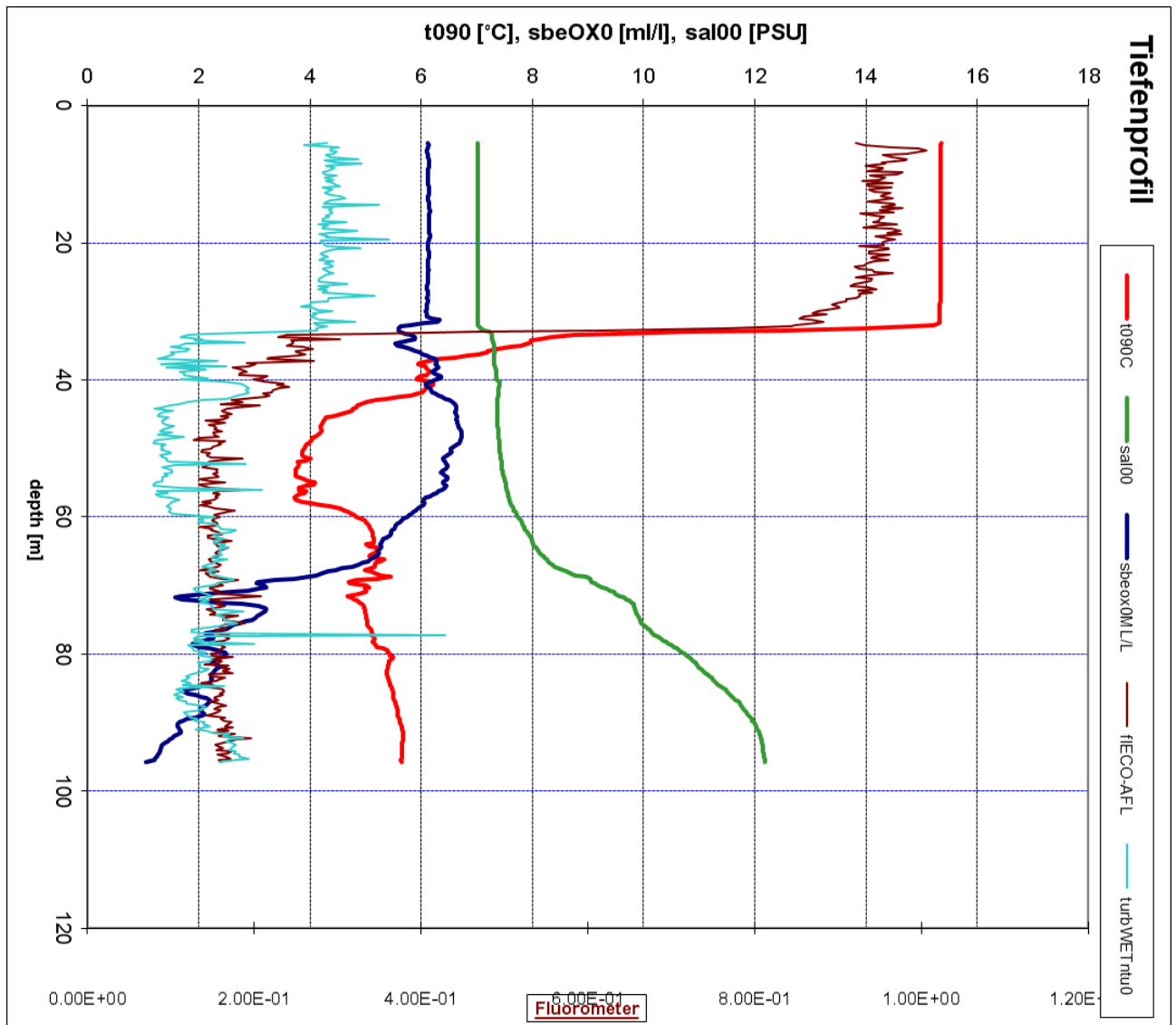


Figure 4: CTD-hydrographic profile from Gdansk-Basin station P475-12.

Legend: temperature (red), salinity (green), oxygen (dark blue), fluorescence chlorophyll (brown), turbidity (light blue).

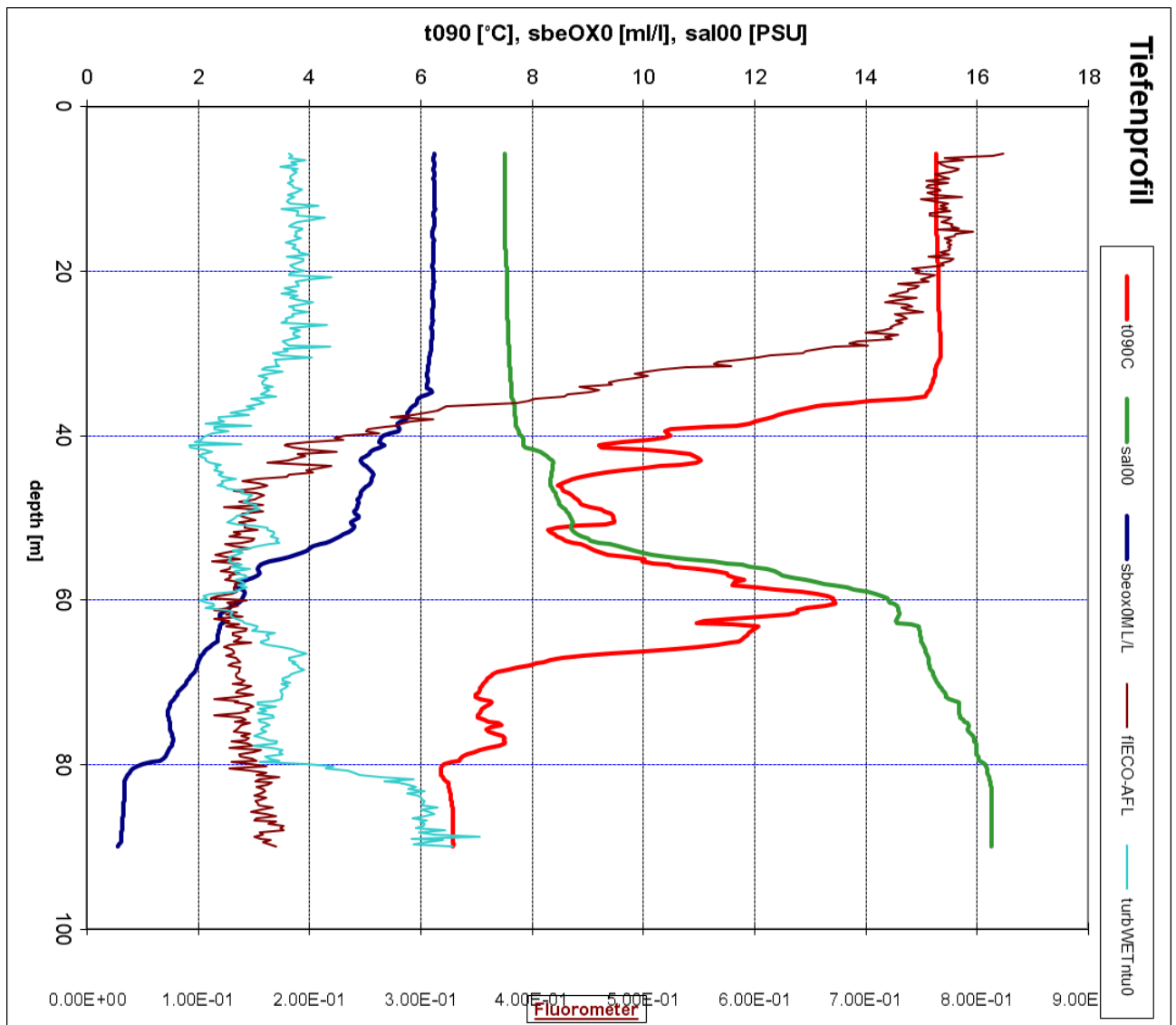


Figure 5: CTD-hydrographic profile from Bornholm Basin station P475-15.

Legend: temperature (red), salinity (green), oxygen (dark blue), fluorescence chlorophyll (brown), turbidity (light blue).

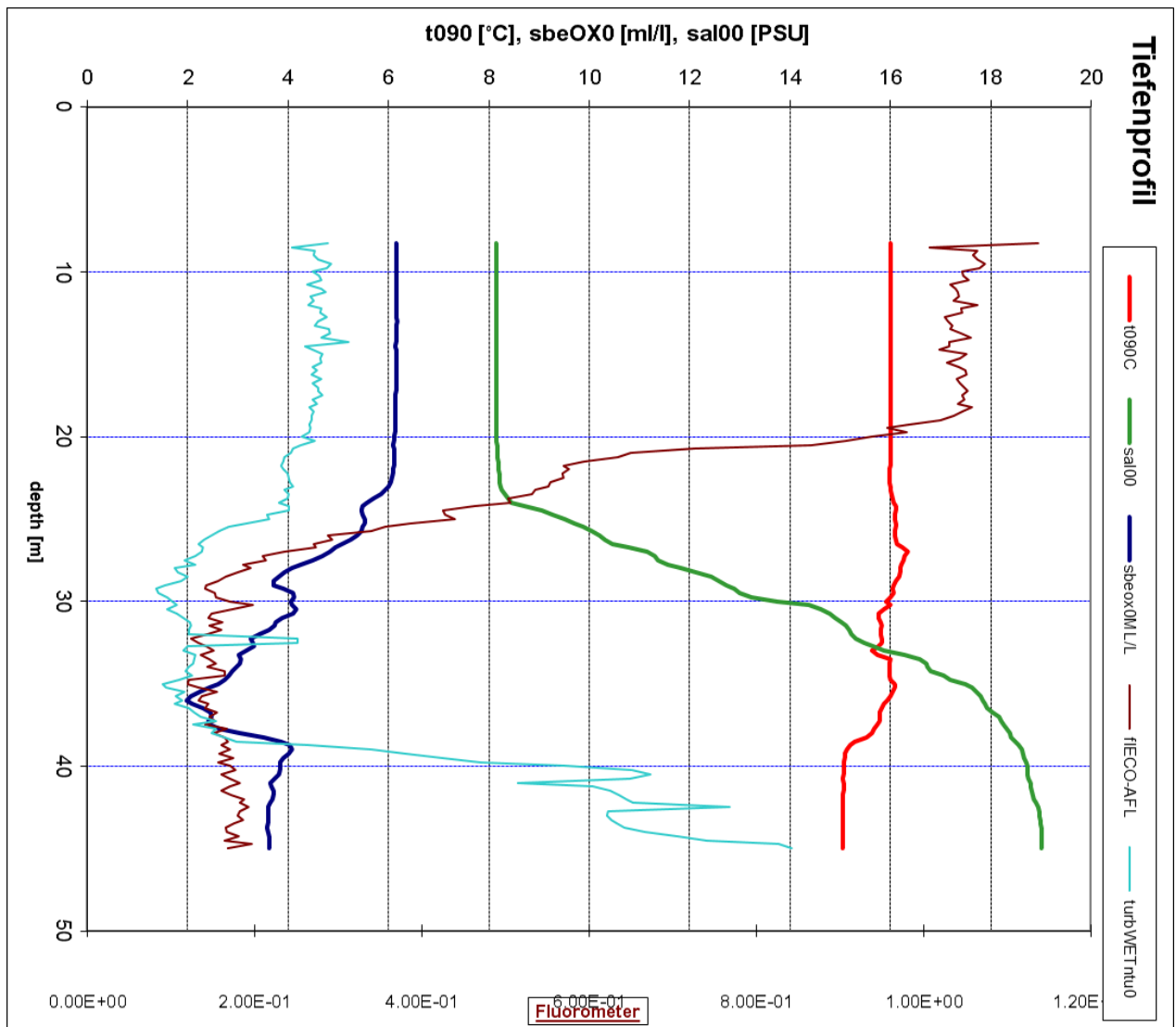


Figure 6: CTD-hydrographic profile from Arkona Basin station P475-17.

Legend: temperature (red), salinity (green), oxygen (dark blue), fluorescence chlorophyll (brown), turbidity (light blue).