



Baltic Sea Research Institute Warnemünde

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

r/v "Professor Albrecht Penck"

Cruise- No. 07PE / 07 / 18

Monitoring Cruise
26 July – 5 August 2007
Kiel Bight to northern Gotland Sea

This report is based on preliminary data

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1. **Cruise No.:** 07PE / 07 / 18
2. **Dates of the cruise:** from 26 July to 05 August 2007
3. **Particulars of the research vessel:**
Name: "Professor Albrecht Penck"
Nationality: Germany
Operating Authority: Baltic Sea Research Institute (IOW)
4. **Geographical area in which ship has operated:**
Kiel Bight to Northern Gotland Sea
5. **Dates and names of ports of call**
02 August 2007, Visby (Sweden)
6. **Purpose of the cruise**
Baltic monitoring in the frame of the COMBINE Programme of HELCOM
7. **Crew:**
Name of master: Gunnar Kasch
Number of crew: 10
8. **Research staff:**
Chief scientist: Dr. N. Wasmund

Participants: Donath, Jan
Wlost, Peter
Dr. Deutsch, Barbara
Liskow, Iris
Trinkler, Sven
Sokoll, Sarah
Ismail, Hassan E.
9. **Co-operating institutions:**
All institutions dealing with HELCOM monitoring programmes.

10. **Scientific equipment**
CTD, water samplers, plankton nets

11. **General remarks and preliminary results**

The area under investigation extended from Kiel Bight to the Northern Gotland Sea (station map see Figs. 1 and 2). In addition to the normal monitoring track, a transect along Darss Sill was carried out to study the water exchange through this "bottle-neck" of the Baltic Sea. On the way back, selected HELCOM stations in the Bornholm Sea, Arkona Sea and Mecklenburg Bight were sampled a second time. The meteorological, hydrographical, chemical and biological investigations were performed according to the Manual of the COMBINE Programme of HELCOM.

Deep air pressure prevailed during the first 6 days of the cruise, decreasing from 1012 hPa on 26.7.07 to 998 hPa on 30.7.07 with westerly winds of up to 15 m/s, cloudy sky and sometimes rain. Air pressure increased from 998 hPa on 31.7.07 to 1023 hPa to 4.8.07 while the wind calmed down to 2-6 m/s on 4.8.07.

Air temperature was in a range of 14-20 °C. Surface water temperature ranged from 14-18 °C in the northern Baltic Proper and 17-21 °C in Mecklenburg Bight and was mostly below the long-term August means of the period 1971-1990 (in brackets):

Mecklenburg Bight (stat. TF0012)	17.5 °C (17.7 °C)
Arkona Sea (stat. TF0113)	15.5 °C (17.0 °C)
Bornholm Sea (stat. TF0213)	15.8 °C (17.6 °C)
Eastern Gotland Sea (stat. TF0271)	14.6 °C (17.3 °C)
Farö Deep (stat. TF0286)	16.6 °C (17.7 °C)
Landsort Deep (stat. TF0284)	15.2 °C (18.2 °C)
Karlsö Deep (stat. TF0245)	17.2 °C (16.9 °C)

The temperature of the bottom water was, however, much higher than the long-term July mean, especially in the Bornholm Sea. This tendency becomes most obvious in comparison with the July 2003, when unusually low bottom layer temperatures in some Baltic basins were caused by the strong salt water inflow from January 2003:

	July 2007	July 2005	July 2003	Mean 1971-1990
Bornholm Deep	8.80°C	6.97°C	3.71 °C	6.12 °C
Gotland Deep	6.82°C	5.97°C	4.63 °C	5.62 °C
Farö Deep	6.06°C	6.03°C	6.00 °C	5.20 °C
Landsort Deep	5.73°C	5.82°C	5.88 °C	4.76 °C
Karlsö Deep	5.14°C	5.34°C	4.90 °C	4.18 °C

The upper mixed water layer in the western Baltic Sea reached down to 5-9 m. The salinity increased below this depth in different steps, with a strong increase below 18 m. The salinity reached 27 PSU at the bottom of the deepest regions of Kiel Bight but only 15 PSU in the deep water of the Arkona Sea. The water column was homogeneous down to 18 m in the Arkona Sea. Below that depth, temperature decreased by almost 10 °C within a few metres but increased quickly in deeper water again up to 12-15 °C (stat. TF0069, TF0114, TF0105, TF0103, TF0109, TF0112, TF0145). Also in the Bornholm Sea, a strong thermocline with a sudden temperature decrease of about 10 °C occurred at 18-20 m depth (stat. TF0200, TF0212; not such steep thermocline at stat. TF0213, TF0221). The salinity starts to increase already within this thermocline and reaches almost 17 PSU in the bottom water of the basin while oxygen concentrations decreased to zero at about 90 m depth.

The situation is similar in the southern Gotland Basin, but oxygen was not depleted there. However, it was depleted at the deep stations of the central Gotland Basin (stations TF0263, TF0272, TF0271, TF0270) below 120 m depth, in the Farö Deep (TF0286), the northern Baltic Proper (TF0285, TF0282, TF0283), and the Landsort Deep (stat. TF0284) below 80-90 m depth and in the Karlsö Deep (stat. TF0245) below 70 m depth (cf. Fig. 3c; "negative oxygen" due to H₂S see Fig. 4).

Relatively high Phosphate concentrations occurred in the Mecklenburg Bight and the southern Baltic Proper, which should enable the development of nitrogen-fixing cyanobacteria.

Net samples of phytoplankton revealed the typical diatom summer bloom in Kiel Bight, dominated by *Proboscia alata* and accompanied by *Dactyliosolen fragilissimus*, *Nitzschia* cf. *longissima* and *Chaetoceros* spp. as well as dinoflagellates (mainly *Prorocentrum micans*, few *Ceratium tripos*). In Mecklenburg Bight, *Prorocentrum minimum* was most abundant, followed by *Chaetoceros impressus* and some solitary *Chaetoceros* (in valve view). The importance of *Chaetoceros* spp. increased towards the Arkona Sea and Bornholm Sea, but that of *Prorocentrum minimum* decreased. Cyanobacteria (*Nodularia spumigena*, *Aphanizomenon* sp., *Anabaena* spp.) dominated in the Gotland Sea but they did not form blooms. It seemed that *Anabaena* was relatively more present than in previous years.

Medusae (many *Aurelia aurita*, some *Mnemiopsis leidyi*) were most conspicuous in Kiel Bight (stat. TF0360 on 26.7.07) and in Mecklenburg Bight (stat. TF0046 on 4.8.07).

Attachments

- Tables 1& 2: Preliminary results for selected parameters in the surface layer and the near bottom layer (unvalidated results)
- Figs. 1-2: Station grid
- Fig. 3 Transsect from the Kiel Bight to the northern Gotland Basin for temperature, salinity and oxygen (unvalidated data)
- Fig. 4: Oxygen /hydrogen sulphide concentrations in the bottom near layer for selected stations

Dr. Norbert Wasmund
Scientist in charge

Table 1: Surface layer (0 - 10m)

Area	Station	Temperature	Salinity	PO ₄ ³⁻	NO ₂₃ ^{-*}
Date	Name/ No. **	°C	PSU	μmol/dm ³	μmol/dm ³
Kiel Bight 26.7.07	TF0360/ 002	18.47	14.78	0.09	0.16
Meckl. Bight 27.7.07	TF0012/ 007	17.46	11.05	0.30	0.05
Lübeck Bight 27.7.07	TF0022/ 006	18.53	13.67	0.11	0.43
Arkona Basin 28.7.07	TF0113/ 020	15.55	7.47	0.19	0.04
Bornholm Deep 3.8.07	TF0213/ 057	15.88	7.58	0.22	0.1
Stolpe Channel 30.7.07	TF0222/ 039	15.74	7.48	0.21	0.18
SE Gotland Basin 30.7.07	TF0259/ 041	15.45	7.37	0.14	0.18
Gotland Deep 31.7.07	TF0271/ 048	14.63	6.96	0.03	0.19
Fårö Deep 31.7.07	TF0286/ 050	16.64	6.59	0	0.05
Landsort Deep 1.8.07	TF0284/ 054	15.16	6.02	0.03	0.02
Karlsö Deep 2.8.07	TF0245/ 056	17.17	6.50	0	0.01

* $\Sigma \text{NO}_2^- + \text{NO}_3^-$; NO₂ was present only in traces in most areas under investigation

** Station name see maps (Fig. 1 and 2)

Table 2: Bottom-near water layer

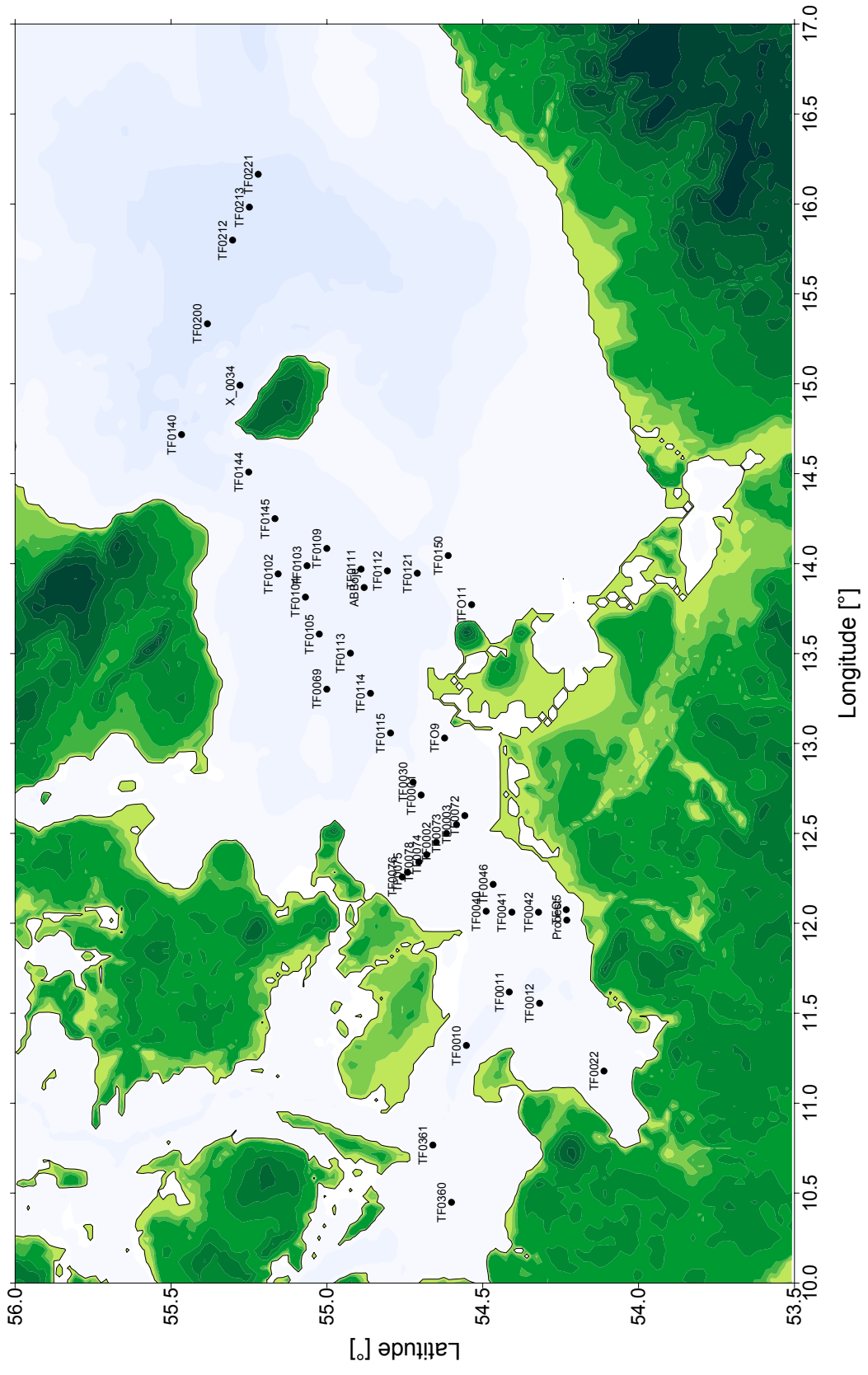
Area	Station	Sampl. Depth	Temp.	Salinity	O ₂	PO ₄ ³⁻	NO ₂₃ ^{-*}
Date	Name/ No. **	m	°C	PSU	cm ³ /dm ³	μmol/dm ³	μmol/dm ³
Kiel Bight 26.7.07	TF0360/ 002	15	18.53	21.10	2.92	0.51	0.49
Meckl. Bight 27.7.07	TF0012/ 007	21	13.36	18.30	2.29	0.98	3.24
Lübeck Bight 27.7.07	TF0022/ 006	19	12.45	18.51	0.95	1.33	6.21
Arkona Basin 28.7.07	TF0113/ 020	44	11.10	15.40	2.47	1.35	7.31
Bornholm Deep 3.8.07	TF0213/ 057	87	8.83	16.35	-0.22	4.75	0.55
Stolpe Channel 30.7.07	TF0222/ 039	90	7.03	13.58	1.52	2.01	11.09
SE Gotland Basin 30.7.07	TF0259/ 041	86	5.62	10.77	0.27	2.94	7.11
Gotland Deep 31.7.07	TF0271/ 048	232	6.82	12.89	- 3.95	3.85	0
Fårö Deep 31.7.07	TF0286/ 050	189	6.06	12.15	- 2.84	4.10	0
Landsort Deep 1.8.07	TF0284/ 054	434	5.73	11.23	- 1.08	3.40	0
Karlsö Deep 2.8.07	TF0245/ 056	106	5.14	10.41	- 2.74	3.60	0

* $\Sigma \text{NO}_2^- + \text{NO}_3^-$; NO₂ was present only in traces in most areas under investigation

** Station name see maps (Fig. 1 and 2)

07PE0718 monitoring

stationmap
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46 stations 7 repeated stations

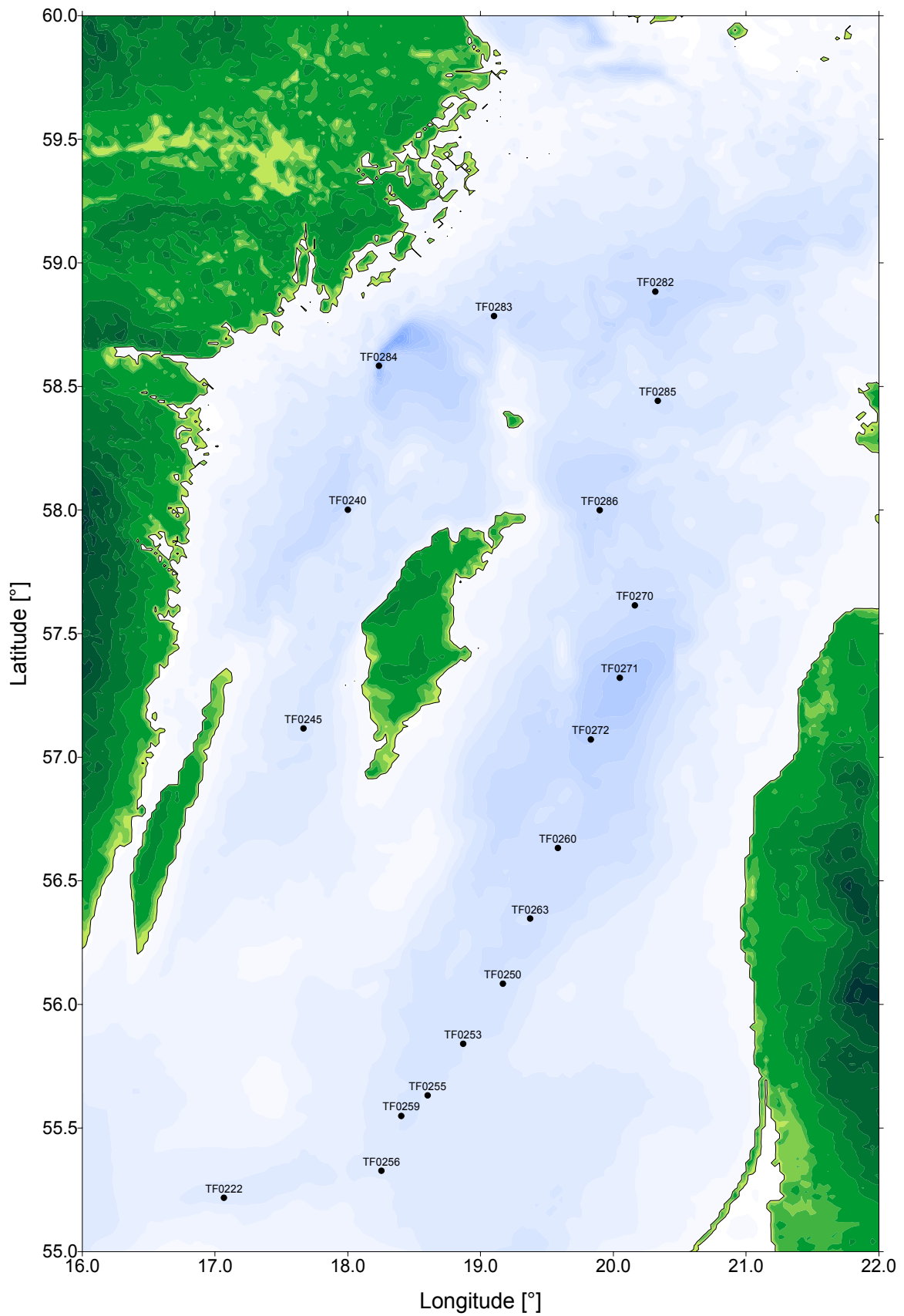


07PE0718 monitoring

stationmap

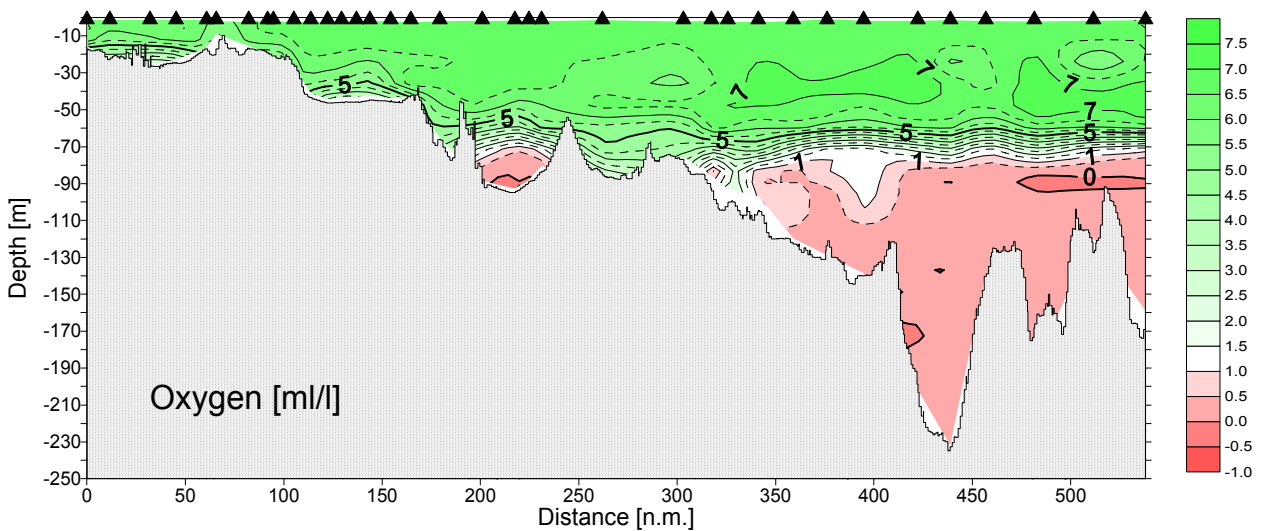
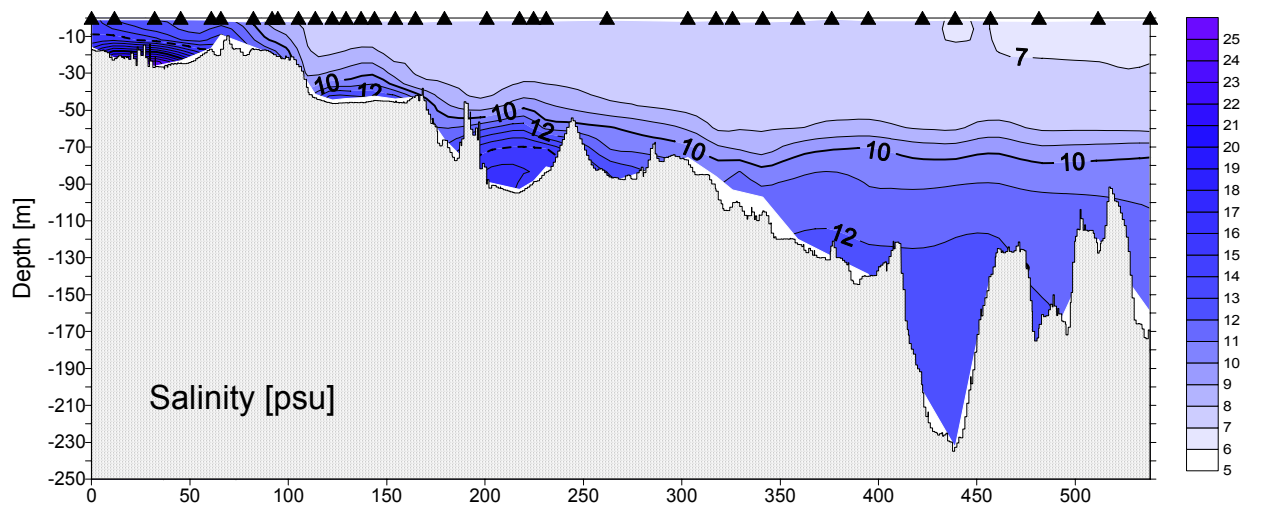
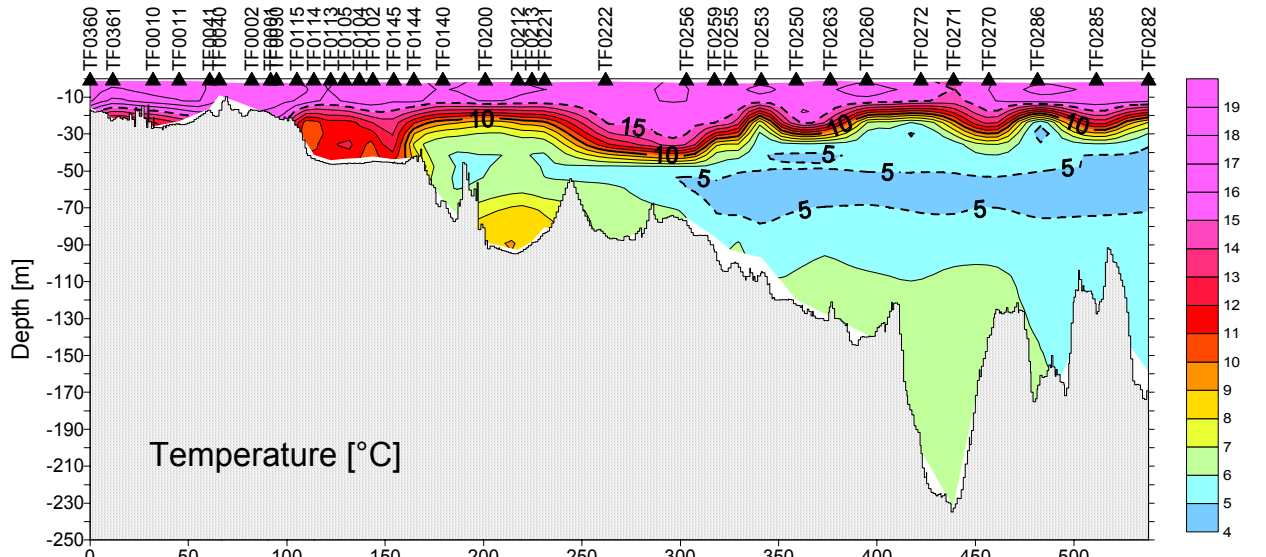
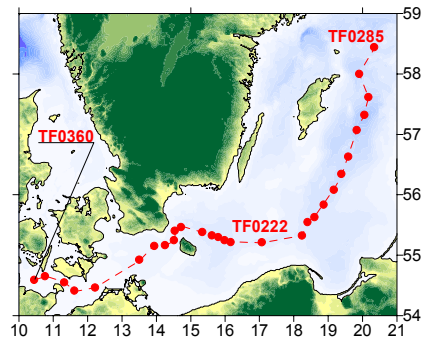
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18 Stationen



07PE0718 monitoring

Kiel Bight - Gotland Sea
26.07.2007 15:40 - 03.08.2007 21:16 UTC



Monitoring
07PE0718
26.07. - 05.08.2007

oxygen bottom
concentration [ml/l]

