

## **Leibniz Institute for Baltic Sea Research Warnemünde**

r/v „Professor Albrecht Penck“

Monitoring cruise

Cruise- No. 07 / PE / 09 / 12

5<sup>th</sup> – 13<sup>th</sup> May 2009

Kiel Bight to northern Gotland Sea

this report is based on preliminary data

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Monitoring cruise  
Cruise No. 07/PE/09/12  
r/v „Professor Albrecht Penck“

Warnemünde 18<sup>th</sup> May 2009

The third monitoring cruise of the Leibniz Institute for Baltic Sea Research Warnemünde in 2009 was carried out with r/v „Professor Albrecht Penck“ between May 5<sup>th</sup> and May 13<sup>th</sup> 2009. The cruise is part of the German contribution to the HELCOM COMBINE program and contributes to IOW's long term data series in the central Baltic Sea.

Scientific staff participating:

Günther Nausch (scientist in charge)	05.05. – 13.05.2009
Jan Donath	05.05. – 13.05.2009
Benedikt Niesterok	05.05. – 13.05.2009
Sigrid Sagert	05.05. – 13.05.2009
Juliane Unger	05.05. – 13.05.2009
Klaus-Peter Wlost	05.05. – 13.05.2009

The area under investigation covered the Baltic Sea between Kiel Bight and the northern Gotland Sea. Marine meteorological, hydrographic, hydrochemical and hydrobiological investigations were performed according to the COMBINE program of HELCOM. The station map is attached to this report.

At the beginning of the cruise (5<sup>th</sup> – 6<sup>th</sup> May), deep “Zora” caused wind from western to northwestern direction of Bft 7 with wind speed up to 20 m/s. During the following days air pressure increased up to 1021 hPa. Wind was blowing with Bft 4 -5, mainly from southwestern to northwestern direction. These good working conditions were only interrupted by the passage of a front system with Bft 7 in the morning of May 9<sup>th</sup> leading to the interruption of the research program for several hours.

The following hydrographic and hydrochemical characteristics have been observed during the cruise (cf. Tables 1 and 2 and Figs. 3 and 4):

- Surface temperatures varied between 10.11°C (Lübeck Bight) and 5.16°C (Farö Deep) and are well above the long term mean for the period 1971-1990 (in brackets). The reason can be seen in the extremely mild winter and unusually warm and sunny April.

Lübeck Bight	10.11°C (4.71°C)
Arkona Basin	7.32°C (4.30°C)
Bornholm Deep	7.02°C (6.12°C)
Gotland Deep	6.52°C (5.62°C)
Farö Deep	5.16°C (5.20°C)
Landsort Deep	6.14°C (4.76°C)
Karlsö Deep	7.46°C (6.76°C)

- The major Baltic inflow from January 2003 was the last strong inflow event into the Baltic Sea. In the Bornholm and Gdansk Basin baroclinic inflow events influenced the deep water conditions in the following years. Thus, the deep water of the Bornholm Basin was free of hydrogen sulphide during the present cruise. However, the effects of the baroclinic inflows could influence the deep basins around Gotland only marginally, if any. Thus, the stagnation period continues there documented by decreasing salinity in the bottom layer. In the Farö Deep salinity remained stable whereas in the western Gotland Basin also a slow decrease could be observed.

	May 2006	May 2007	May 2008	May 2009
Gotland Deep	12.64 psu	12.89 psu	12.68 psu	12.54 psu
Farö Deep	12.11 psu	12.13 psu	12.13 psu	12.13 psu
Landsort Deep	11.01 psu	11.04 psu	10.91 psu	10.84 psu
Karlsö Deep	10.13 psu	10.13 psu	9.98 psu	10.00 psu

- The oxygen situation in the deep water documented this stagnation period. Hydrogen sulphide concentrations (expressed as negative oxygen equivalents) in the near-bottom layer increased in the eastern Gotland Basin.

	May 2006	May 2007	May 2008	May 2009
Gotland Deep	- 3.61 ml/l	- 0.14 ml/l	- 4.25 ml/l	- 5.33 ml/l
Farö Deep	- 2.33 ml/l	- 1.37 ml/l	- 2.47 ml/l	- 1.27 ml/l
Landsort Deep	- 0.50 ml/l	- 0.71 ml/l	- 1.81 ml/l	- 1.34 ml/l
Karlsö Deep	- 0.86 ml/l	- 1.09 ml/l	- 1.57 ml/l	- 0.71 ml/l

- Also the vertical extension of the hydrogen sulphide is remarkable. At stations 271 (Gotland Deep) and 286 (Farö Deep) hydrogen sulphide was found between around 130 m and the bottom. At station 284 (Landsort Deep) the layer between 100 m and the bottom (437 m) was anoxic.
- As a result of the major Baltic inflow 2003, bottom water temperature had decreased in the Baltic deep water. Meanwhile, several baroclinic inflow events have increased the temperature again exceeding the long-term mean again. Whereas in the western Gotland Basin no clear changes could be observed within the last years, the above mentioned inflow events had warmed up especially the deep water of the Bornholm Basin (Fig. 3). As already seen for salinity and oxygen/hydrogen sulphide the eastern Gotland Basin is only marginally affected, if any.

	May 2006	May 2007	May 2008	May 2009	Mean 1971/90
Bornholm D.	7.10 °C	9.25 °C	7.15 °C	8.66 °C	6.12 °C
Gotland Deep	5.94 °C	6.88 °C	6.45 °C	6.31 °C	5.62 °C
Farö Deep	6.09 °C	6.01 °C	6.16 °C	6.74 °C	5.20 °C
Landsort D.	5.73 °C	5.68 °C	5.61 °C	5.71 °C	4.76 °C
Karlsö Deep	5.13 °C	5.14 °C	5.18 °C	5.32 °C	4.18 °C

## Attachments

Tables 1 and 2: Preliminary results of selected parameters in the surface layer and the near bottom layer (unvalidated results)

Figs. 1-2: Track charts

Fig. 3: Transect from the Kiel Bight to the northern Gotland Basin for temperature, salinity and oxygen (unvalidated data)

Fig. 4: Oxygen/hydrogen sulphide in the bottom near layer for selected stations

Günther Nausch

Scientist in charge

Table 1: Surface water layer (about 1 m depth)

Area Date	Stat. Name/No.*	Temp. °C	Sal. psu	O <sub>2</sub> ml/l
Kiel Bight 06.05.2009	360/0010	9.92	13.36	7.46
Meckl.Bight 05.05.2009	012/0005	9.93	9.68	7.71
Lübeck Bight 05.05.2009	022/0006	10.11	11.05	7.56
Arkona Basin 07.05.2009	113/0017	7.32	7.75	8.27
Bornholm Deep 08.05.2009	213/0035	7.02	7.58	8.85
Stolpe Channel 08.05.2009	222/0038	7.59	7.41	9.04
SE Gotland Basin 09.05.2009	259/0040	6.56	7.37	9.22
Gotland Deep 10.05.2009	271/0047	6.52	7.25	9.17
Farö Deep 10.05.2009	286/0049	6.16	7.11	9.31
Landsort Deep 11.05.2009	284/0051	6.14	6.18	9.00
Karlsö Deep 11.05.2009	245/0053	7.45	7.00	8.81

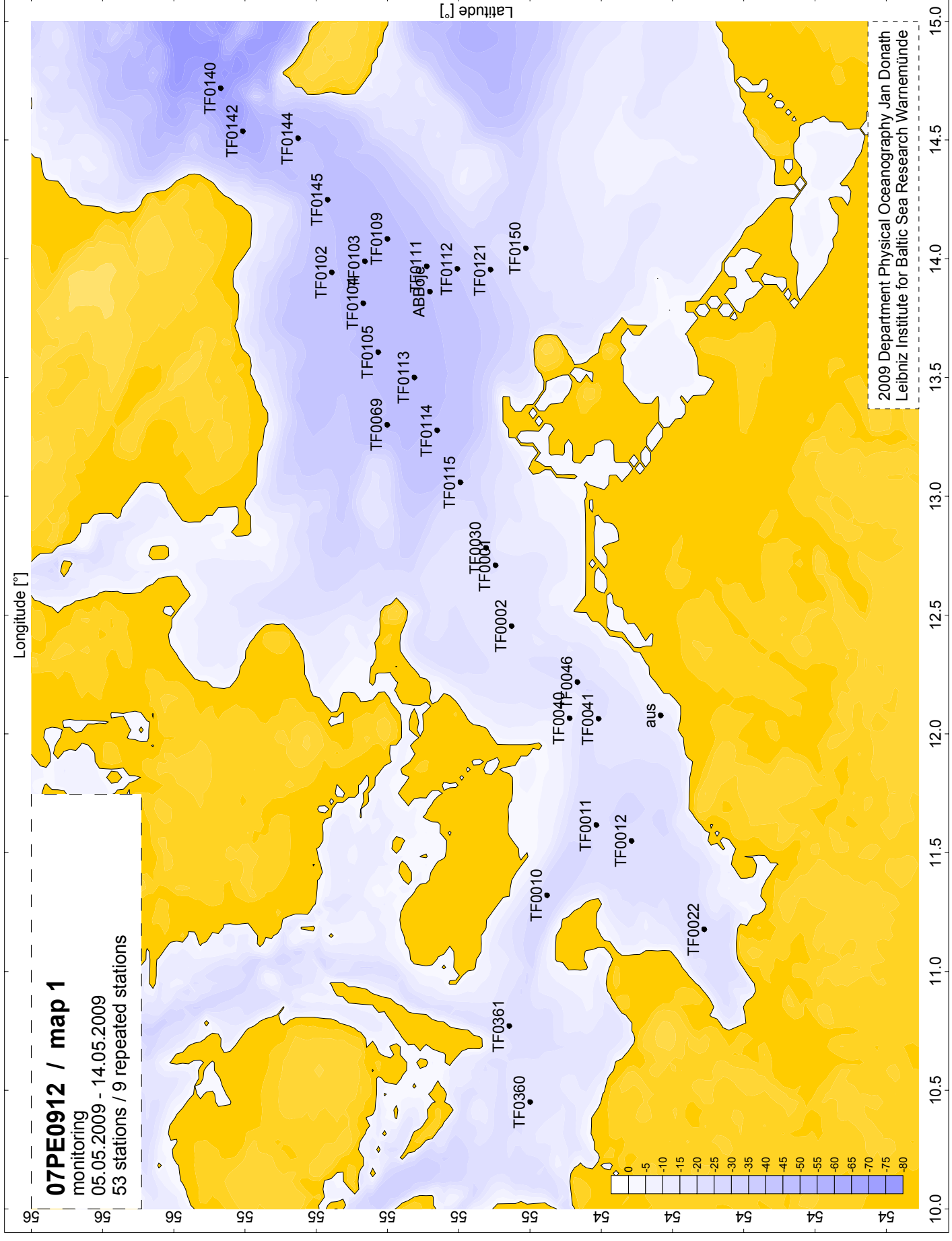
\* see attached map

Table 2: Near bottom layer

Area Date	Stat. Name/No.*	Depth m	Temp. °C	Sal. psu	O <sub>2</sub> ml/l
Kiel Bight 06.05.2009	360/0010	17	7.90	18.51	6.91
Meckl.Bight 05.05.2009	012/0005	23	5.59	26.81	4.27
Lübeck Bight 05.05.2009	022/0006	22	4.89	21.07	3.84
Arkona Basin 07.05.2009	113/0017	46	5.32	13.89	5.71
Bornholm Deep 08.05.2009	213/0035	87	8.66	15.87	0.31
Stolpe Channel 08.05.2009	222/0038	89	7.82	13.29	2.11
SE Gotland Basin 09.05.2009	259/0040	87	6.33	11.08	0.99
Gotland Deep 10.05.2009	271/0047	233	6.31	12.54	-5.33**
Farö Deep 10.05.2009	286/0049	189	6.74	12.13	-1.27**
Landsort Deep 11.05.2009	284/0051	437	5.71	10.84	-1.34**
Karlsö Deep 11.05.2009	245/0053	107	5.32	10.00	-0.71**

\* see attached map

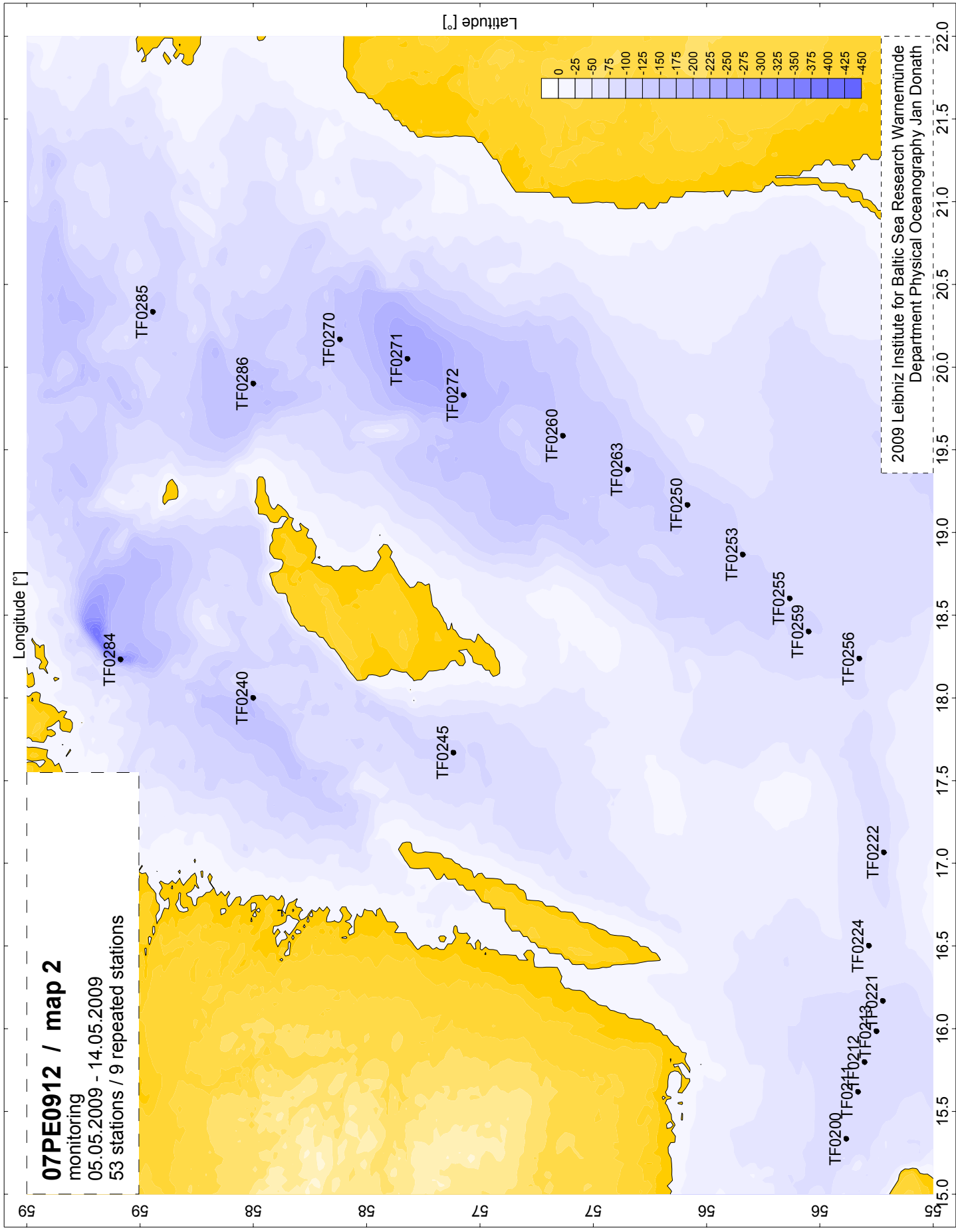
\*\* hydrogen sulphide was converted into negative oxygen equivalents



**07PE0912 / map 1**

monitoring  
 05.05.2009 - 14.05.2009  
 53 stations / 9 repeated stations

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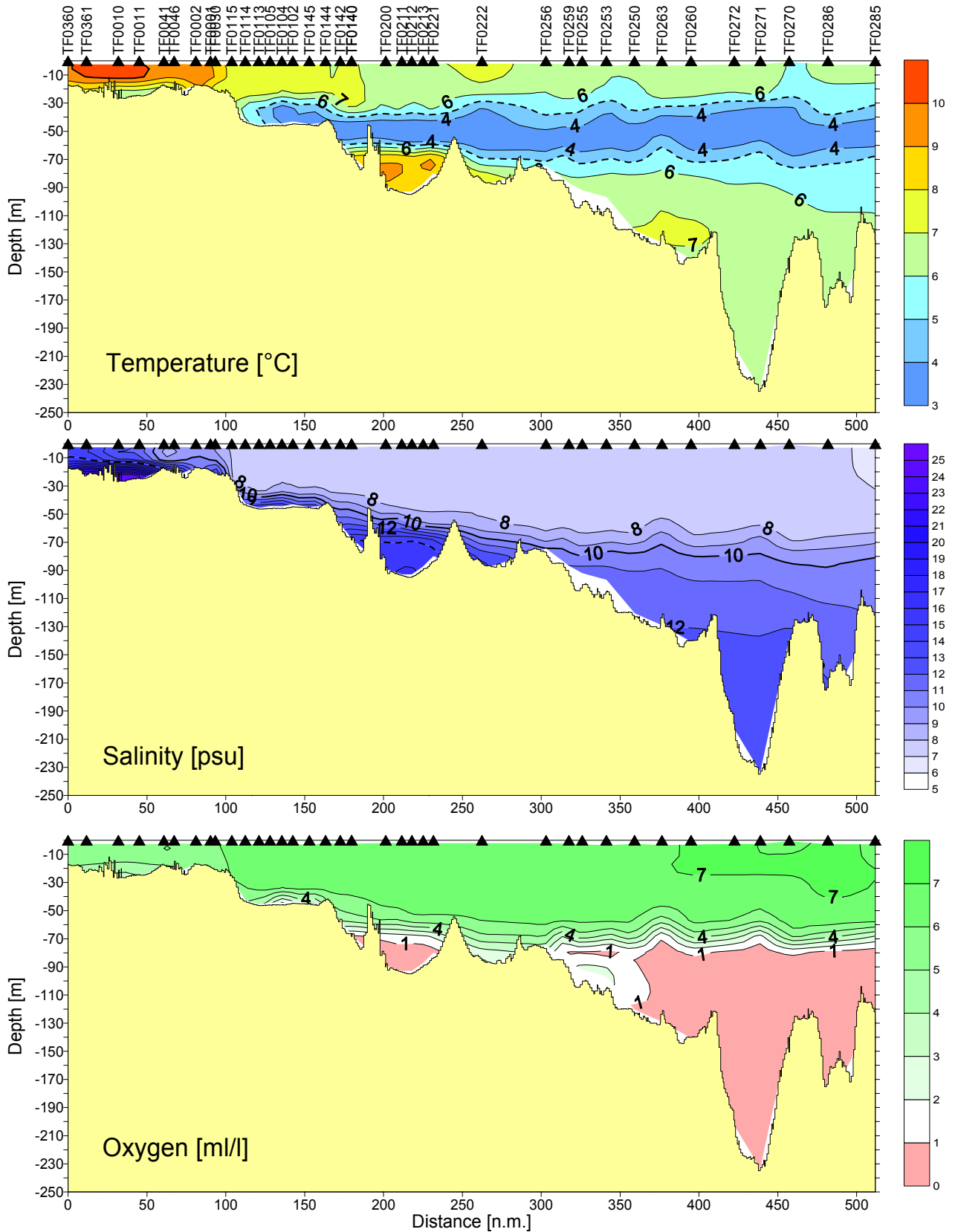
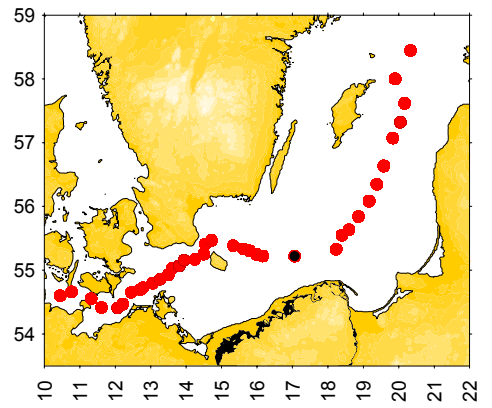


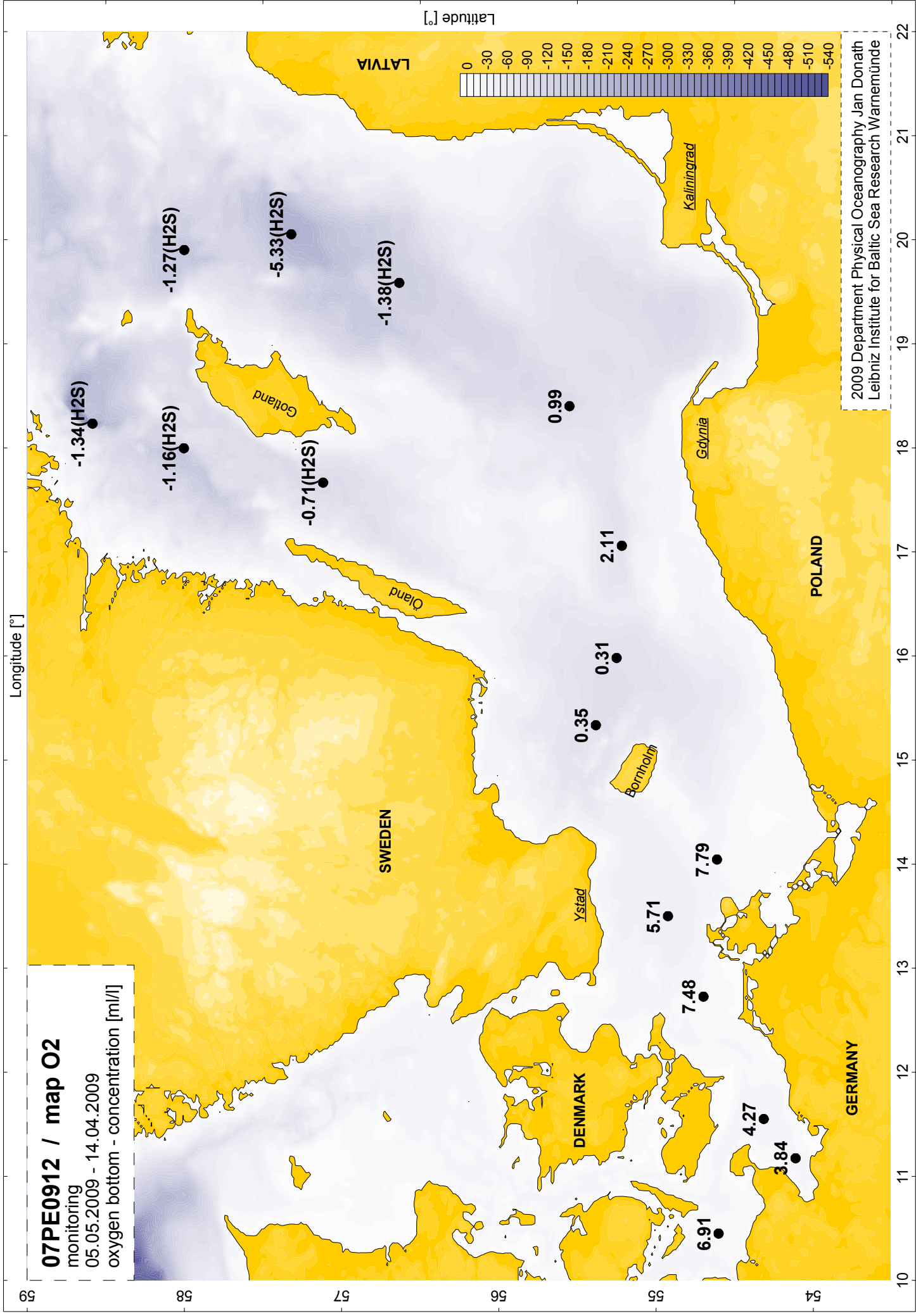
# 07PE0912 monitoring

Kiel Bight - Gotland Sea  
05.05.2009 08:54 - 10.05.2009 18:54 UTC

05.srf - data not validate

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