

# **Baltic Sea Research Institute Warnemünde**

## **Cruise Report**


R/V "GAUSS"


Cruise- No. 11 / 05 / 01 (Gauss 433)

10 February - 20 February 2005

This report is based on preliminary data

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**1. Cruise No.:** 11 / 05 / 01 (GAUSS 433)

**2. Dates of the cruise:** from 10/02/2005 to 20/02/2005

**3. Particulars of the research vessel:**

Name: r/v 'GAUSS'

Nationality: Germany

Operating Authority: Bundesamt für Seeschifffahrt und Hydrographie (BSH),  
Hamburg

**4. Geographical area in which ship has operated:**

Baltic Sea between Kiel Bight and northern Gotland Sea

**5. Dates and names of ports of call**

**6. Purpose of the cruise**

Monitoring cruise in the frame of the HELCOM COMBINE program

**7. Crew:**

Name of master: J. Schütt

Number of crew: 21

**8. Research staff:**

Chief scientist: Klaus Nagel

Participants :	Kerstin Bohn	Ursula Hennings
	Susanne Busch	Johann Ruickoldt
	Jan Donath	Birgit Sadkowiak
	Ines Hand	Heike Simon
	Uwe Hehl	Erika Trost

**9. Co-operating institutions:**

All institutions dealing with the COMBINE program of HELCOM

**10. Scientific equipment :** CTD , water samplers, plankton net, sediment samplers

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## 11. General remarks and preliminary result

The area under investigation covered the Baltic Sea between Kiel Bight and the northern Gotland Basin as shown in the attached maps. Marine meteorological, hydrographic, chemical and biological investigations were performed at 78 stations according to the COMBINE program of HELCOM. The measurements were supplemented by continuous registration of standard meteorological parameters as well as surface water temperature and salinity

For selected stations, which are characteristic for different regions of the Baltic Sea, preliminary data of hydrographic and hydrochemical parameters in the surface and the near-bottom layer are compiled in the attached tables. These results are also compared with mean values calculated from the measurements performed during the February cruises of the years 1971 to 1990.

The weather during the cruise was dominated by great differences in air pressure. At the beginning of the cruise, air pressure decreased by 56 hPa down to 960 hPa within 36 hours. During the next 3 days, air pressure increased again up to 1025 hPa. Wind speeds varied between 10 m/s and 20 m/s during the low pressure period and 5 m/s and 15 m/s during the rest of the cruise. Westerly and north westerly winds dominated at the beginning, changing to north east to north after four days. Westerly winds prevailed at the end of the cruise. Air temperatures varied between 2°C and 5°C during the low pressure period at the beginning and decreased to -2°C to about 0°C in the following days. Surface water temperatures were relatively constant between 2°C and 4°C in the whole area under investigation. Only in the Pomeranian Bight surface water temperatures between 0.4°C close to the mouth of river Swina and 2°C were observed. Apart from the Pomeranian Bight, surface temperatures in nearly all areas are slightly higher compared to those measured in February 2004 and are close to the top of the range calculated from long term observations.

Salinity in the surface layer was within the range expected from long term means in all areas except some stations in the the western Baltic Sea. Due to calm weather in the days before the cruise, surface salinity at these stations was slightly lower than expected and than that found in February 2004. As a result of the major saltwater inflow at the beginning of 2003, salinity in the near bottom layer of all areas under investigation was higher than the upper level of the range calculated from long term observations. Except the shallow areas of the western Baltic Sea and the Pomeranian Bight, halocline and thermocline were found in the same depth, in the Arkona Basin around 40 m and between 60 m and 80 m in the eastern and western Gotland Basin.

The western Baltic Sea, the Pomeranian Bight and the Arkona Basin were well oxygenated down to the sea floor with oxygen concentrations varying between 6.5 ml/l

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and 9 ml/l. Oxygen concentration in the Bornholm Basin dropped below 2 ml/l at depths below approximately 70 m. Traces of hydrogen sulphide could be detected only in the in the bottom layer of the deepest station on the first sampling. However, 5 days later traces of oxygen were found at the same position. In the western and eastern Gotland Basin oxygen concentrations below 2 ml/l were found at depths exceeding 60 m to 80 m. Hydrogen sulphide was measured below 225 m in the Eastern Gotland Basin and below 100 m in the western Gotland Basin.

Nitrate concentrations in the surface layer were normal for this time of the year and vary between 2.5 µmol/l and 4.5 µmol/l, which is within the range expected from long term observations or slightly below this range for all stations. Apart from some stations in the western Baltic Sea and the Arkona Basin, phosphate concentrations in the surface layer of the Baltic Proper were significantly higher than expected from long term observations. At numerous stations the phosphate concentrations measured in February 2004 were approximately 50% above the long term mean. In the bottom layer concentrations of nitrate and phosphate were controlled by the oxic conditions and were within the expected range.

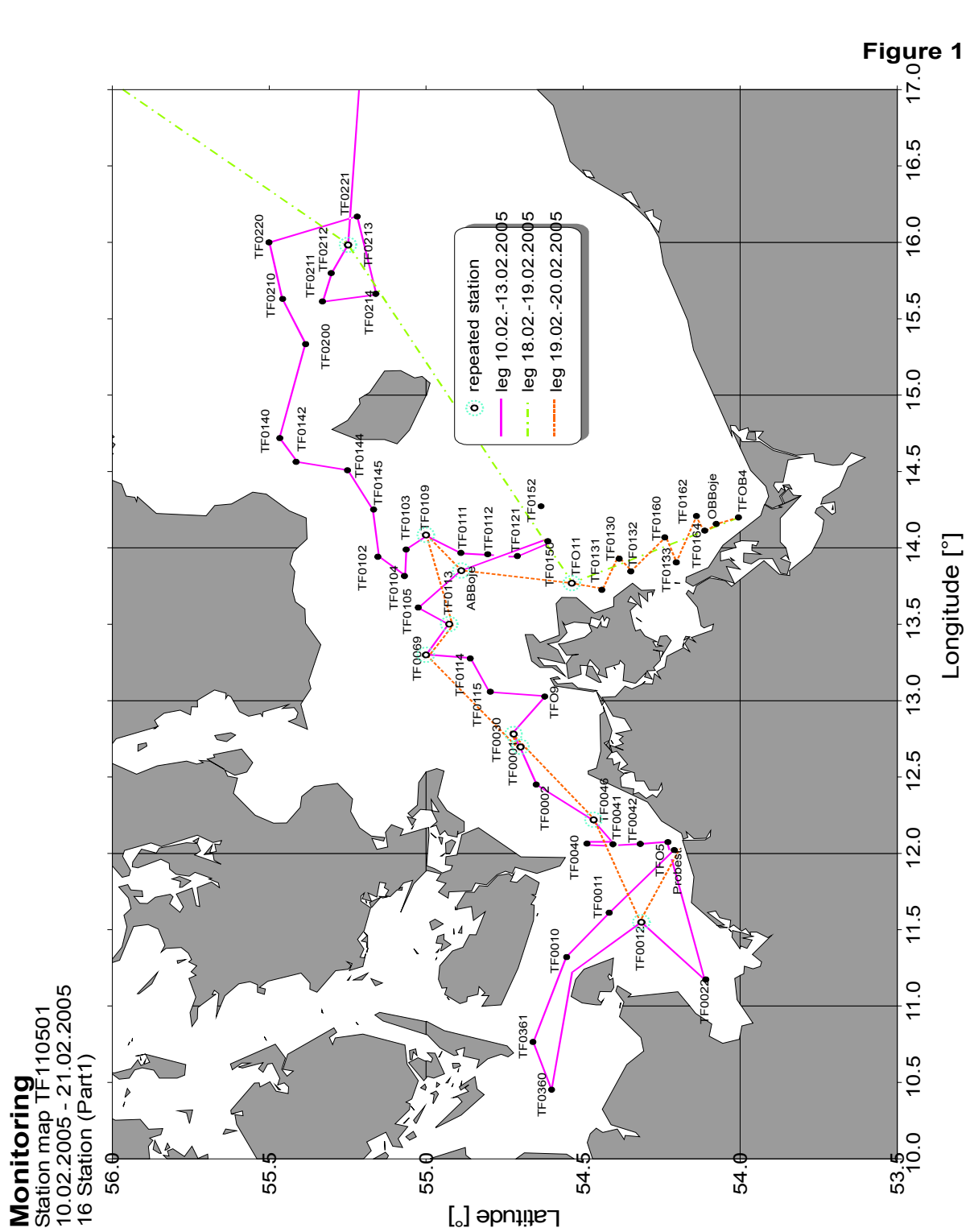
During this cruise samples for determination of biological parameters, trace elements and organic contaminants were taken for later analysis in the laboratory.

On 15/02/2005 a sediment trap was recovered and laid out again at a position very close to station TF0271.

Klaus Nagel  
Scientist in charge

Attachments :

- track charts
- tables of preliminary results of selected stations (surface layer and near bottom layer)
- comparison of actual data with mean values calculated from the measurements during the February cruises of the years 1971 – 1990 (surface layer and near bottom layer)
- transects of temperature and salinity between Kiel Bight and northern Gotland Sea
- map showing oxygen concentrations in near the bottom water layer

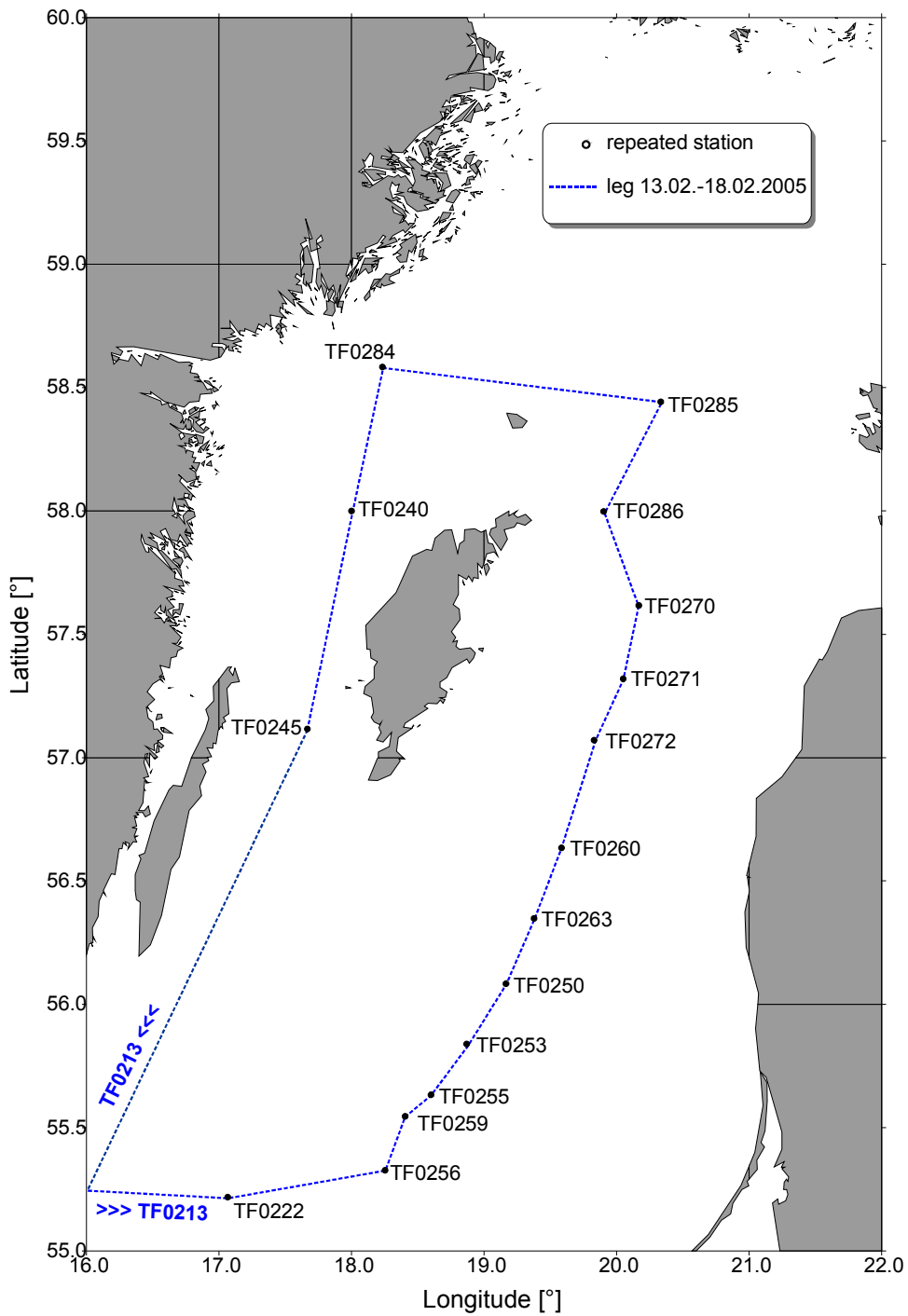


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**Monitoring**  
Station map TF110501  
10.02.2005 - 21.02.2005  
16 Station (Part2)

**Figure 2**



Preliminary results of hydrographic and hydrochemical parameters at selected stations -  
**surface layer -**

Station Date	Stat.Name Stat.No. **)	Temp. °C	Salinity PSU	NO <sub>3</sub> *) µmol/l	PO <sub>4</sub> µmol/l	SiO <sub>4</sub> µmol/l	O <sub>2</sub> ml/l
Kiel Bight 10/02/05	TF0360 5	2.65	16.55	4.31	0.52	11.6	8.56
Mecklenburg Bight 10/02/05	TF0012 6	3.00	9.19	3.06	0.69	14.8	8.81
Arkona Basin 12/02/05	TF0113 20	3.07	8.19	2.49	0.72	14.1	8.79
Pomeranian Bight 19/02/05	TFOB4 61	0.36	5.91	54.55	1.22	77.0	9.71
Bornholm Deep 13/02/05	TF0213 42	3.59	7.79	2.90	0.92	16.0	8.51
Stolpe Channel 13/02/05	TF0222 43	3.27	7.67	3.14	0.89	16.1	8.66
SE Gotland Basin 14/02/05	TF0259 45	3.38	7.45	3.08	0.89	16.1	8.59
Gotland Deep 15/02/05	TF0271 52	3.44	7.39	3.28	0.75	15.0	8.54
Fårö Deep 16/02/05	TF0286 514	3.37	7.21	3.88	0.73	13.5	8.81
Landsort Deep 17/02/05	TF0284 56	2.91	7.07	4.01	0.77	15.3	8.67
Karlsö Deep 17/02/05	TF0245 58	2.90	7.24	3.40	1.00	19.0	8.7

\*) NO<sub>3</sub> is given as sum of NO<sub>3</sub><sup>-</sup> and NO<sub>2</sub><sup>-</sup> (in most samples NO<sub>2</sub><sup>-</sup> was present only in traces)

\*\*) see attached maps

Preliminary results of hydrographic and hydrochemical parameters at selected stations  
– near bottom layer -

Station Date	Stat.Name Stat.No. **)	Depth m	Temp. °C	Salinity PSU	NO <sub>3</sub> *) µmol/l	PO <sub>4</sub> µmol/l	SiO <sub>4</sub> µmol/l	O <sub>2</sub> ml/l
Kiel Bight 10/02/05	TF0360 5	15	3.08	20.31	5.36	0.54	10.7	8.12
Mecklenburg Bight 11/02/05	TF0012 6	23	4.01	19.43	5.90	0.71	15.3	6.50
Arkona Basin 12/02/05	TF0113 20	44	5.44	17.98	7.66	0.76	16.6	7.00
Pomeranian Bight 19/02/05	TFOB4 61	9	1.05	7.98	13.24	0.80	28.4	9.23
Bornholm Deep 13/02/05	TF0213 42	87	6.55	16.66		5.3	65.8	0 ***)
Stolpe Channel 13/02/05	TF0222 43	87	8.02	13.45	7.71	1.71	38.8	2.28
SE Gotland Basin 14/02/05	TF0259 45	87	6.32	11.68	6.82	2.75	44.5	0.97
Gotland Deep 15/02/05	TF0271 52	232	5.98	12.76		3.40	55.2	-0.6 ( H <sub>2</sub> S )
Fårö Deep 16/02/05	TF0286 54	187	6.00	12.23	3.33	2.84	48.7	0.16
Landsort Deep 16/02/05	TF0284 56	435	5.67	11.01		3.75	52.1	-0.88 ( H <sub>2</sub> S )
Karlsö Deep 17/02/05	TF0245 58	106	5.02	9.81	0.35	3.45	54.0	< 0.1

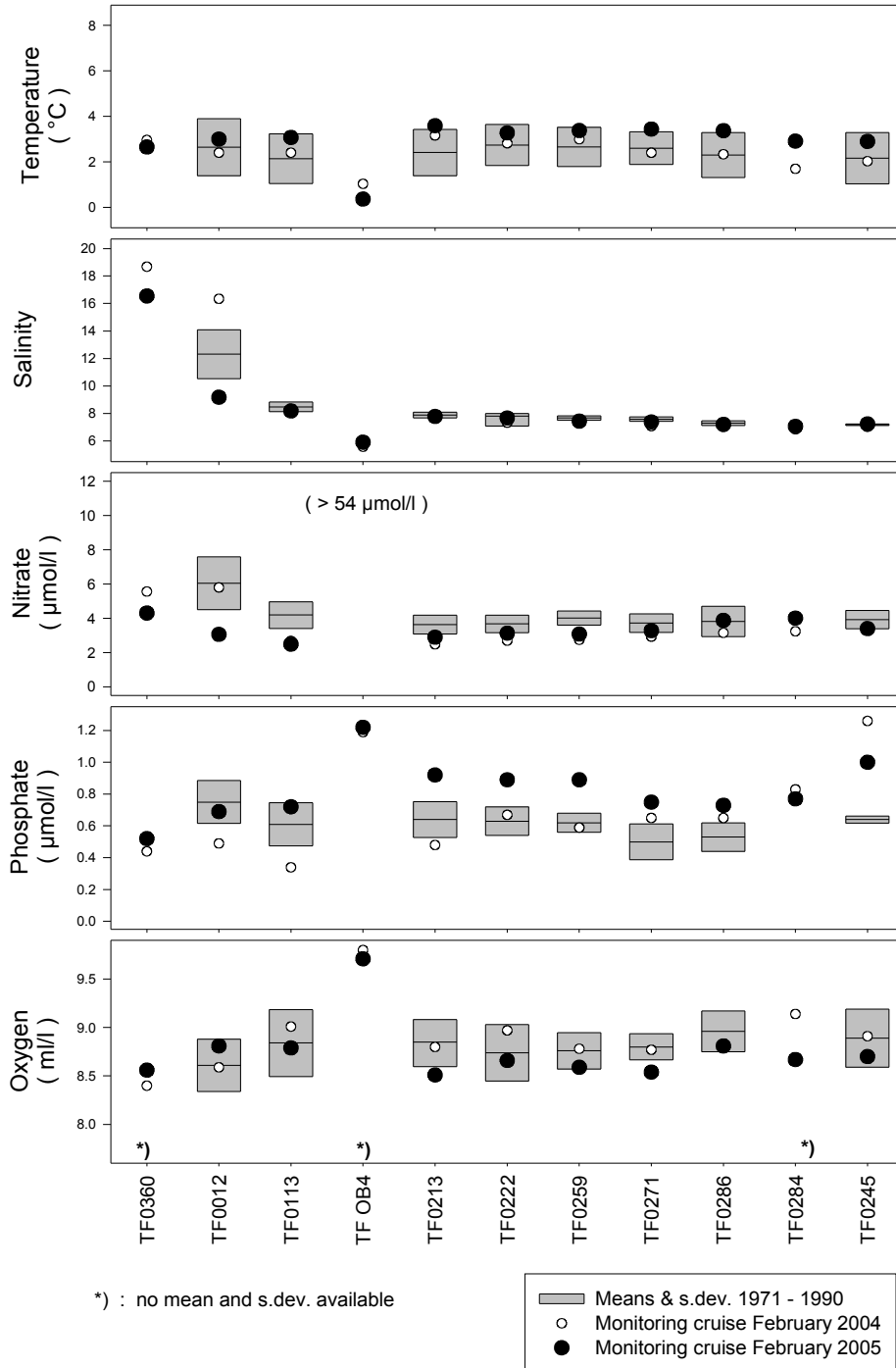
\*) NO<sub>3</sub> is given as sum of NO<sub>3</sub><sup>-</sup> and NO<sub>2</sub><sup>-</sup> (in most samples NO<sub>2</sub><sup>-</sup> was present only in traces)

\*\*) see attached maps

\*\*\*) traces of H<sub>2</sub>S were detected on 13/02/05 and traces of O<sub>2</sub> were found on 18/02/05

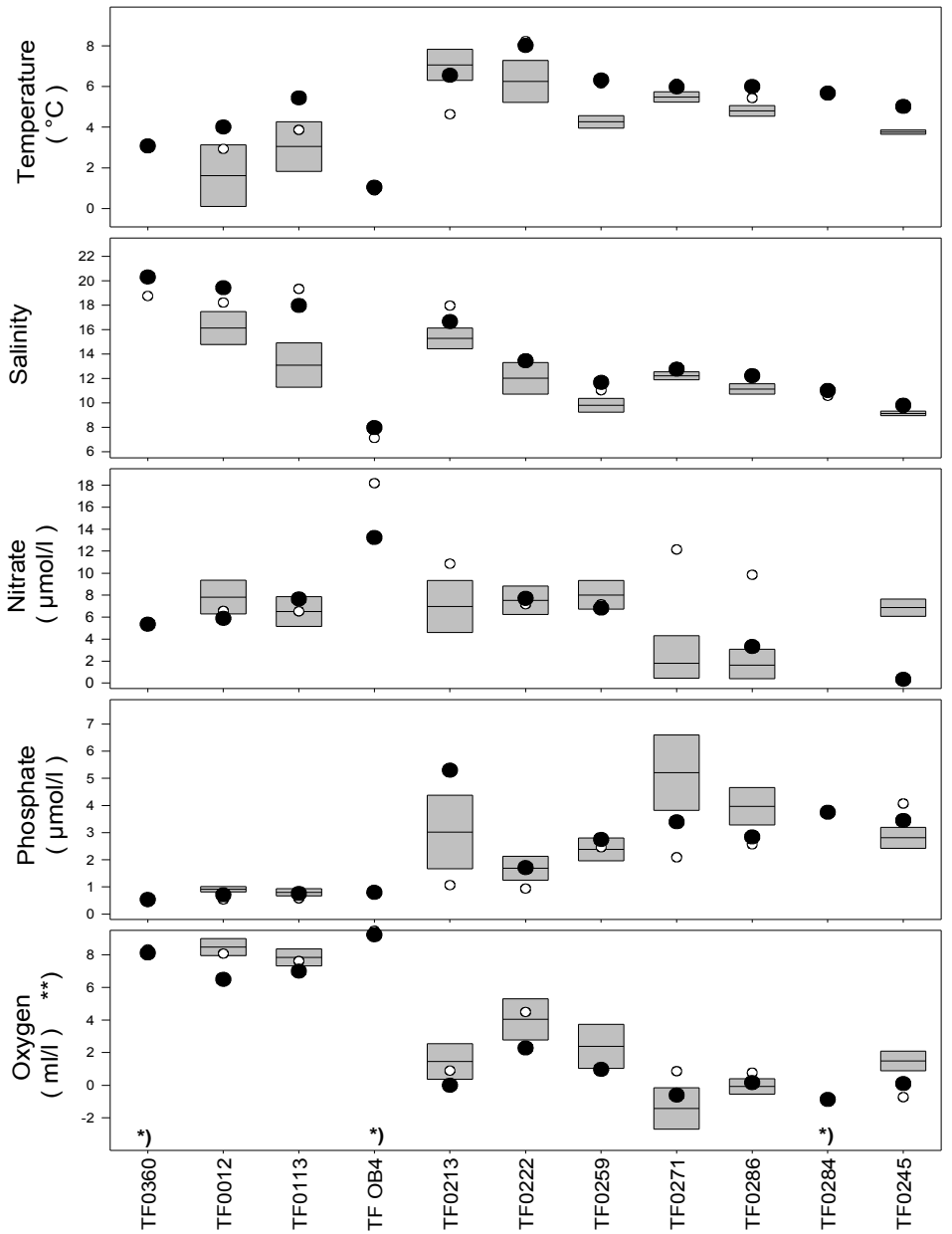


**Monitoring stations / February cruises : near-surface layer**



K. Nagel \ st\_0502s \ 20/02/2005

Monitoring stations / February cruises : near-bottom layer



\*) : no mean and s.dev. available  
\*\*) : H<sub>2</sub>S was converted to negative O<sub>2</sub> equivalents

Means & s.dev. 1971 - 1990  
 Monitoring cruise February 2004  
 Monitoring cruise February 2005

K. Nagel \ st\_0502b \ 20/02/05

**Kiel Bight - Gotland Sea**

TF110501  
 10.02.2005 10:06 - 16.02.2005 16:32 UTC

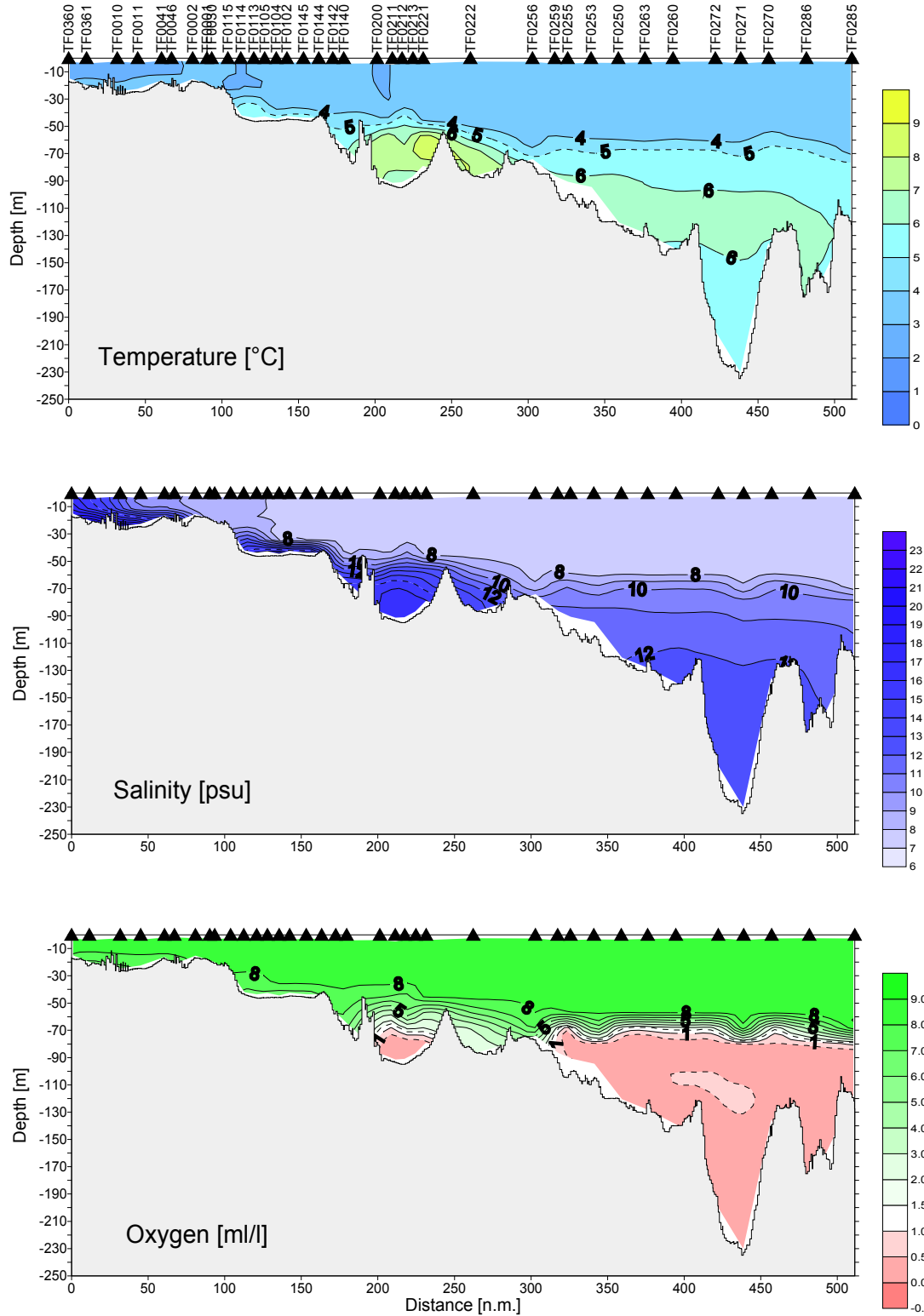
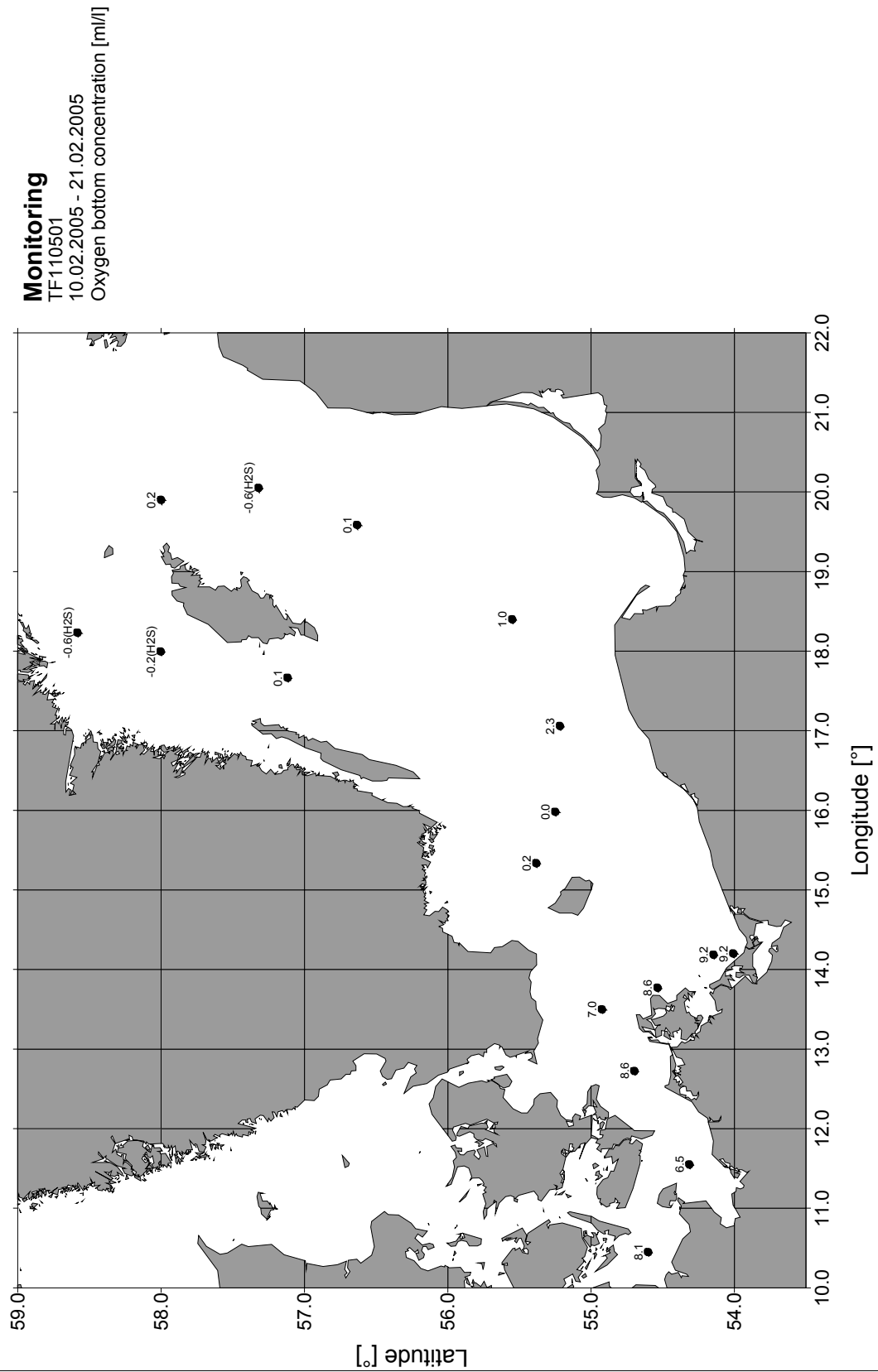


Figure 8



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