

# **Baltic Sea Research Institute Warnemünde**

## **Cruise Report**

R/V "GAUSS"

Cruise- No. 11 / 06 / 01 ( Gauss 453 )

26 January - 04 February 2006

This report is based on preliminary data

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**1. Cruise No.:** 11 / 06 / 01 (GAUSS 453)

**2. Dates of the cruise:** from 26/01/2006 to 04/02/2006

**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**

28/01/2006 Saßnitz

**6. Purpose of the cruise**

Monitoring cruise in the frame of the COMBINE program of HELCOM

**7. Crew:**

Name of master: Langner

Number of crew: 20

**8. Research staff:**

Chief scientist: Klaus Nagel

Participants :	Kerstin Bohn	Johann Ruickoldt
	Barbara Deutsch	Birgit Sadkowiak (26 – 29/01/06)
	Jan Donath	Emilie Strady
	Ines Hand	Ina Topp
	Ursula Hennings	Erika Trost

**9. Co-operating institutions:**

All institutions dealing with the COMBINE program of HELCOM

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

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## 11. General remarks and preliminary results

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 62 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 rather calm for this time of the year and dominated by a stable high pressure system with air pressure variations between 1030 hPa and 1010 hPa. Air temperatures were between 0°C and -2°C in the Western Baltic and 3°C to almost 5°C in the eastern and central areas of the Baltic Sea. Prevailing wind direction during the whole cruise was between west and north with wind speeds mostly between 5 m/s and 10 m/s. Only a few short periods with wind speeds between 10 m/s and 15 m/s have been observed. Surface water temperatures were relatively constant between 3°C and 4°C in the area under investigation. Only in the shallow western parts temperatures down to 1°C were found in the surface water layer. Compared to those temperatures measured at the same time of the last year, temperatures during this cruise were slightly lower but within the range expected from long term observations.

Salinity in the surface layer was within the range expected from long term measurements in all regions of the Baltic Sea and varied between 10 in the western and 7 – 8 in all other areas. Due to the calm weather situation a halocline and thermocline was observed at almost all stations at depths varying around 10 m in the western Baltic Sea, between 40 m and 50 m in the Arkona Basin, 50 m – 60 m in the Bornholm Basin and 70 m and 80 m in the Eastern and Western Gotland Basins. Salinity in the bottom layer was found between 16 and 20 in the Western Baltic, the Arkona Basin and the Bornholm Basin, while salinities between 10 and 13 were measured in the Eastern and Western Gotland Basins. These values were slightly above those expected from long term observations. Due to the saltwater inflows in the years before temperature in this saline bottom water layer was

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higher than the mean calculated from long term measurements, reaching values up to 9°C at the bottom of the Bornholm basin.

The western Baltic Sea and the Arkona basin were well oxygenated down to the sea floor with oxygen concentrations varying between 6.5 ml/l and 9 ml/l. Oxygen concentration in the Bornholm Basin dropped below 2 ml/l at depths below 70 m to 80 m, but no H<sub>2</sub>S was found in this area. Below 125 m in the Eastern Gotland basin and below 100 m in the Eastern Gotland Basin hydrogen sulphide was measured in concentrations varying between 0.5 mg/l and 2.4 mg/l.

Nitrate concentrations in the surface layer were normal for this time of the year and vary between 2.2 µmol/l and almost 4 µmol/l, which is slightly below the range expected from long term observations for most stations. Apart from some stations in the western Baltic Sea and the Arkona Basin, phosphate concentrations in the surface layer were significantly lower than those found at the same time one year ago and are now again in good agreement with the values expected from long term observations. In the bottom layer concentrations of nitrate and phosphate are controlled by the presence of oxygen or hydrogen sulphide and lie in the expected range.

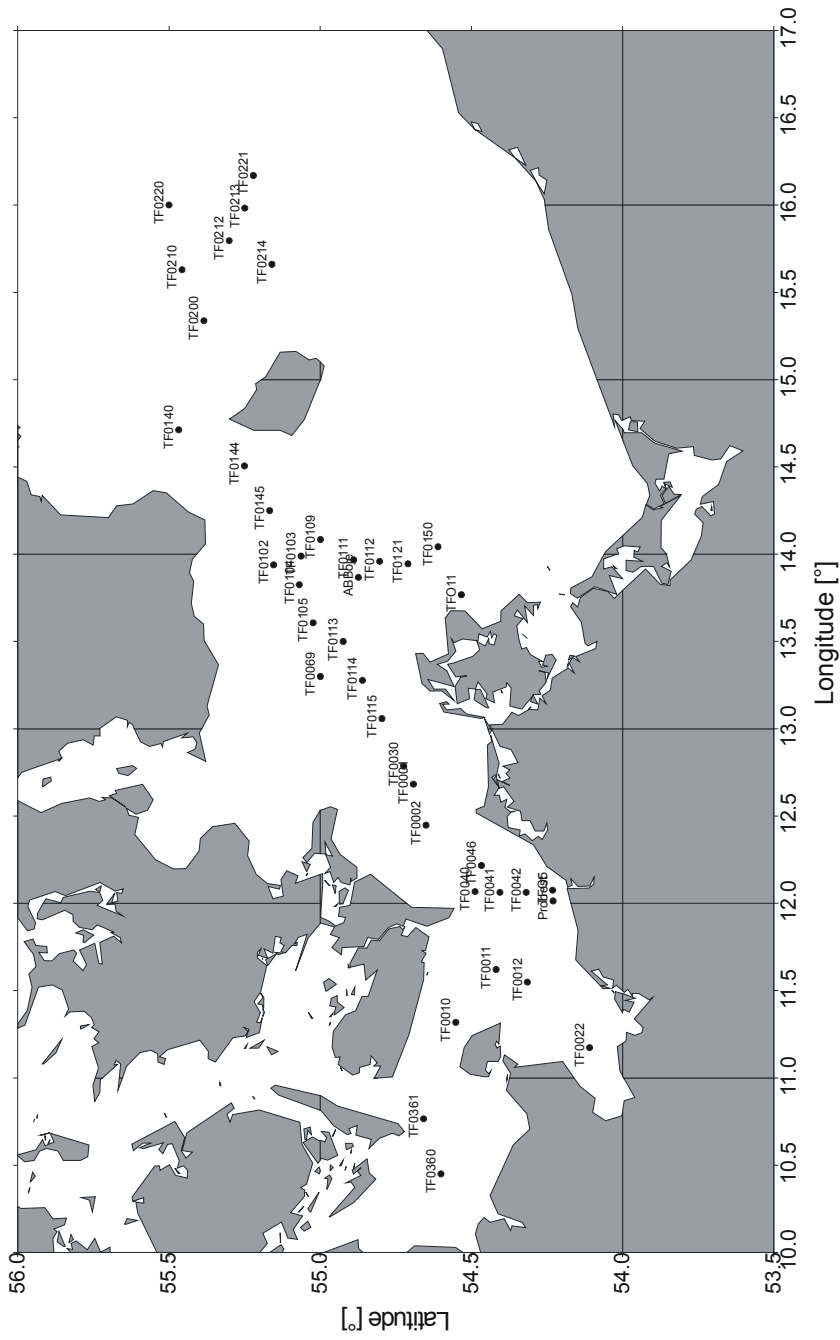
During this cruise samples for determination of biological parameters, trace elements and organic contaminants were taken for later analysis in the laboratory.

Klaus Nagel  
Scientist in charge

Attachments :

- station charts
- tables of preliminary results for 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, salinity and oxygen concentration between Kiel Bight and northern Gotland Sea
- map showing oxygen concentrations in near the bottom water layer ( hydrogen sulphide concentration is given as negative O<sub>2</sub> equivalents )

**Monitoring**  
station map TF110507  
26.01. - 04.02.2006  
40 stations on part 1

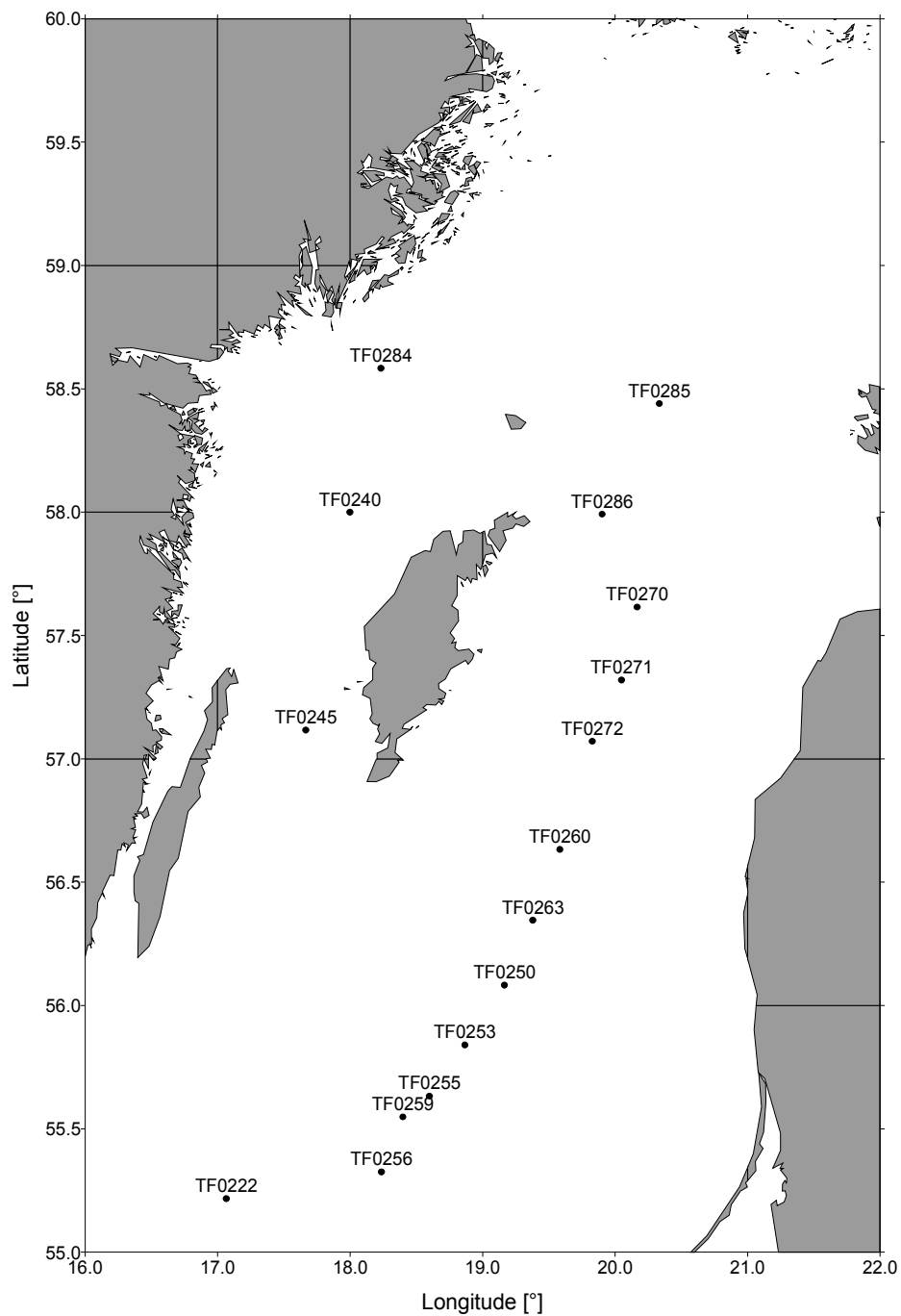


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### Monitoring

station map TF110507  
26.01. - 04.02.2006  
16 stations on part 2



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

<b>Station Date</b>	<b>Stat.Name Stat.No. **)</b>	<b>Temp. °C</b>	<b>Salinity PSU</b>	<b>NO<sub>3</sub> *) µmol/l</b>	<b>PO<sub>4</sub> µmol/l</b>	<b>SiO<sub>4</sub> µmol/l</b>	<b>O<sub>2</sub> ml/l</b>
Kiel Bight 27/01/06	TF0360 5	0.90	11.78	3.45	0.76	15.7	8.96
Mecklenburg Bight 27/01/06	TF0012 6	0.65	10.91	3.88	0.82	17.6	8.99
Arkona Basin 28/01/06	TF0113 19	1.31	8.04	3.72	0.79	18.6	9.12
Bornholm Deep 29/01/06	TF0213 39	2.57	7.58	2.26	0.71	14.3	8.76
Stolpe Channel 30/01/06	TF0222 41	2.53	7.53	2.78	0.70	13.2	8.63
SE Gotland Basin 30/01/06	TF0259 43	2.93	7.40	2.55	0.65	11.4	8.59
Gotland Deep 31/01/06	TF0271 50	3.02	7.26	2.87	0.44	10.2	8.35
Fårö Deep 01/02/06	TF0286 52	3.28	7.04	3.67	0.53	12.7	8.53
Landsort Deep 02/02/06	TF0284 54	2.63	6.88	3.20	0.59	14.4	8.72
Karlsö Deep 02/02/06	TF0245 56	2.39	6.92	2.95	0.60	14.0	9.07

\*) 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 -**

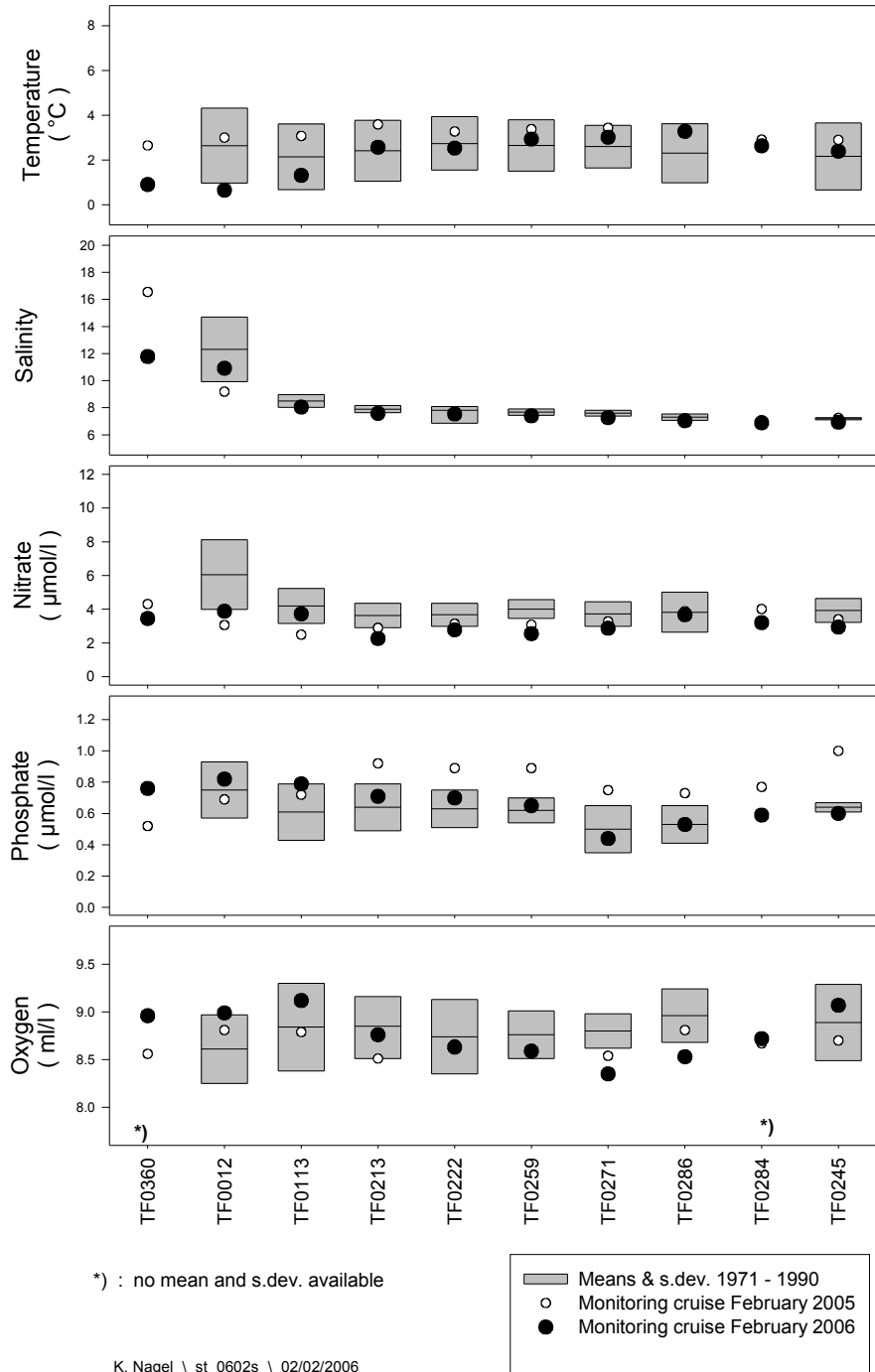
Station Date	Stat.Name Stat.No. **)	Depth m	Temp. °C	Salinity PSU	NO <sub>3</sub> *) µmol/l	PO <sub>4</sub> µmol/l	SiO <sub>4</sub> µmol/l	O <sub>2</sub> ml/l
Kiel Bight 27/01/06	TF0360 5	16	3.05	20.04	3.80	0.80	16.5	7.60
Mecklenburg Bight 27/01/06	TF0012 6	22	2.60	18.04	3.77	0.95	18.0	7.73
Arkona Basin 28/01/06	TF0113 19	45	5.47	18.14	5.61	0.98	20.3	6.16
Bornholm Deep 29/01/06	TF0213 39	86	9.01	17.12	10.95	2.85	52.6	0.87
Stolpe Channel 30/01/06	TF0222 41	87	8.40	13.79	8.04	2.47	45.4	2.17
SE Gotland Basin 30/01/06	TF0259 43	87	6.45	11.45	4.95	2.58	44.6	1.07
Gotland Deep 31/01/06	TF0271 50	232	6.01	12.66		4.40	69.5	-3.11 ( H <sub>2</sub> S )
Fårö Deep 01/02/06	TF0286 52	187	6.00	12.11		3.97	64.0	-2.12 ( H <sub>2</sub> S )
Landsort Deep 02/02/06	TF0284 54	435	5.75	11.02		3.50	54.9	-0.80 ( H <sub>2</sub> S )
Karlsö Deep 02/02/06	TF0245 56	106	5.16	10.13		3.85	57.6	-0.66 ( H <sub>2</sub> S )

\*) 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)

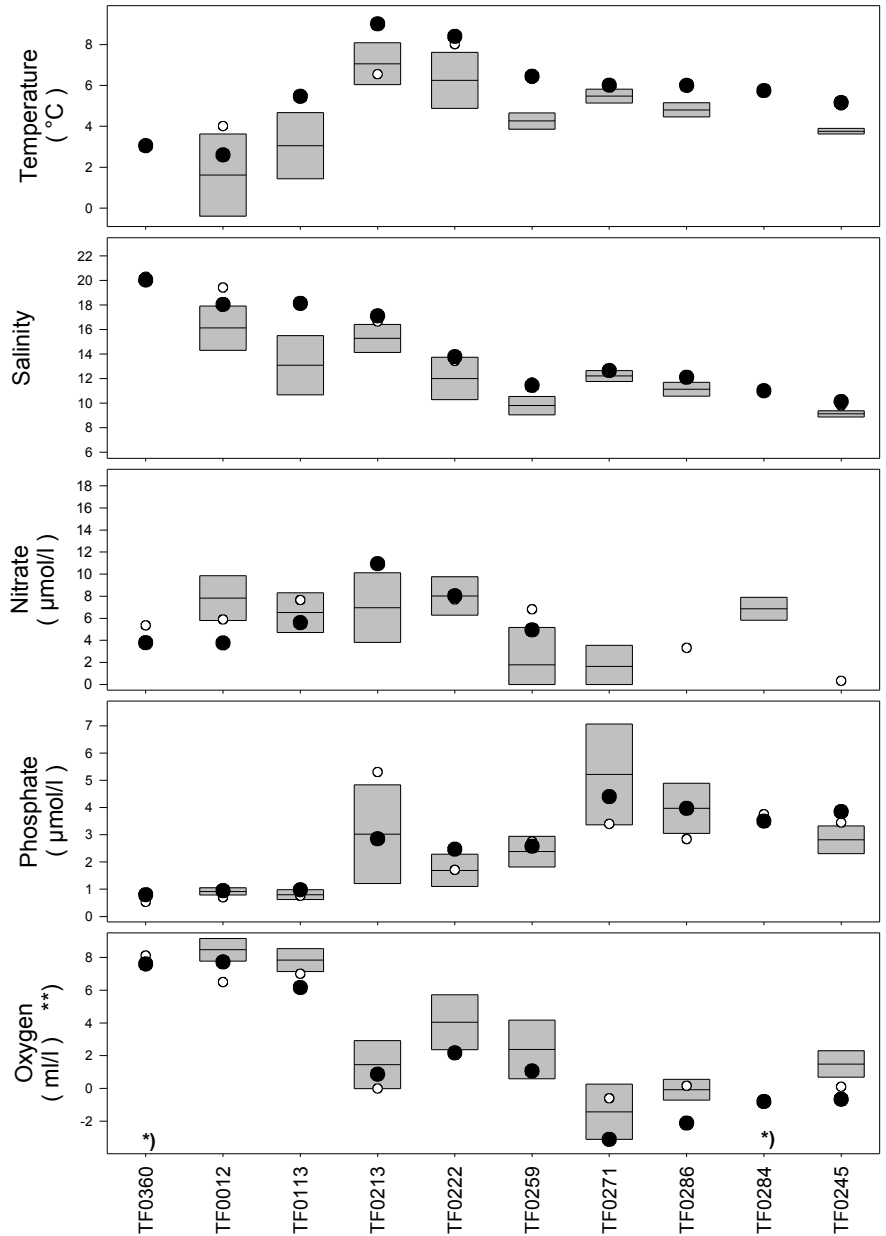
\*\*) see attached maps



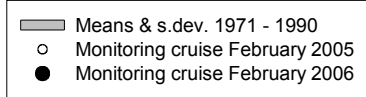
Monitoring stations / February cruises : near-surface layer



Monitoring stations / February cruises : near-bottom layer



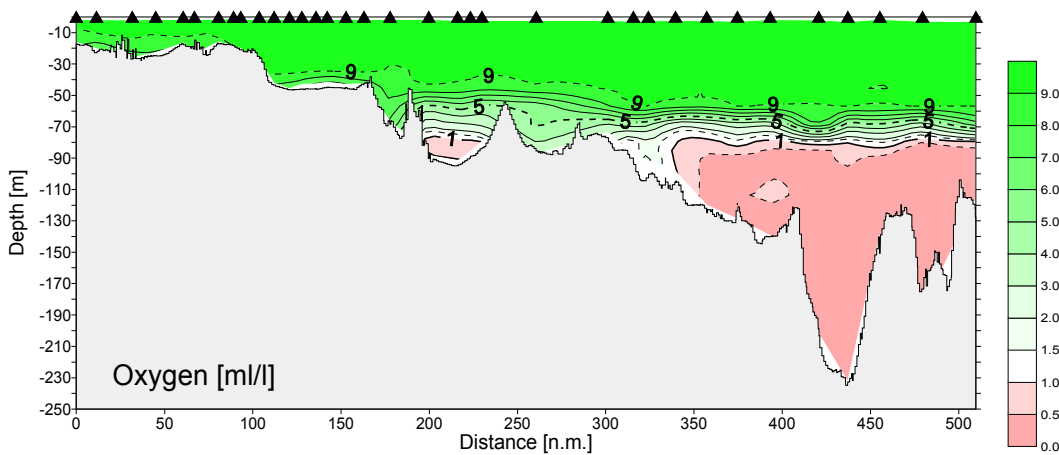
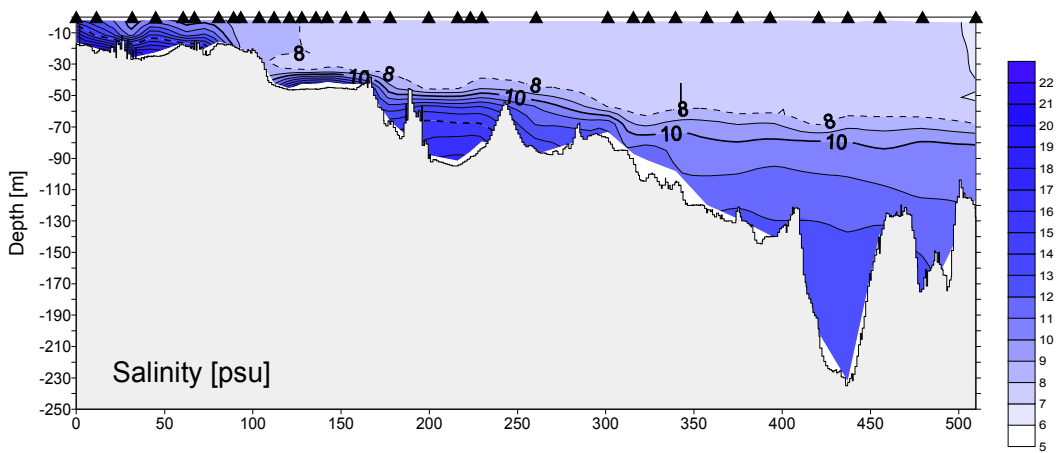
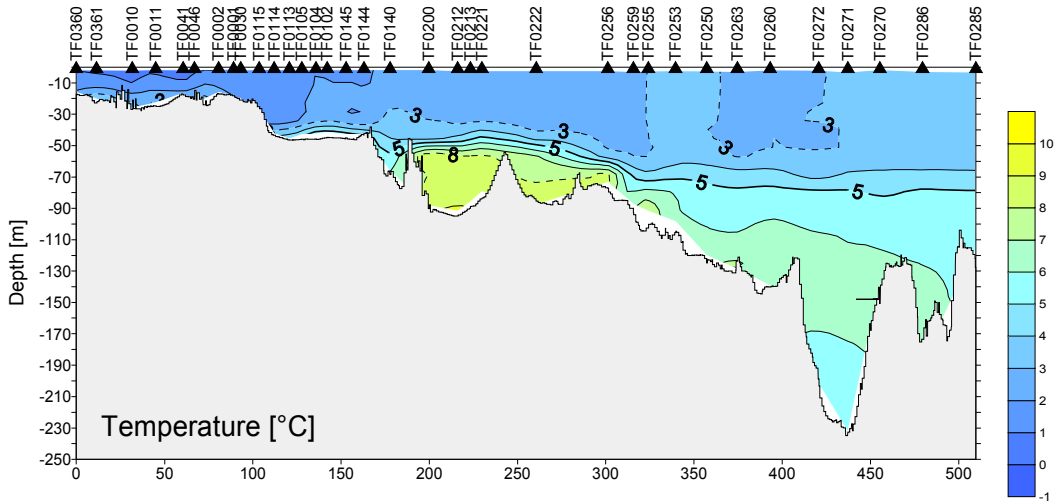
\*) : no mean and s.dev. available  
 \*\*) : H<sub>2</sub>S was converted to negative O<sub>2</sub> equivalents



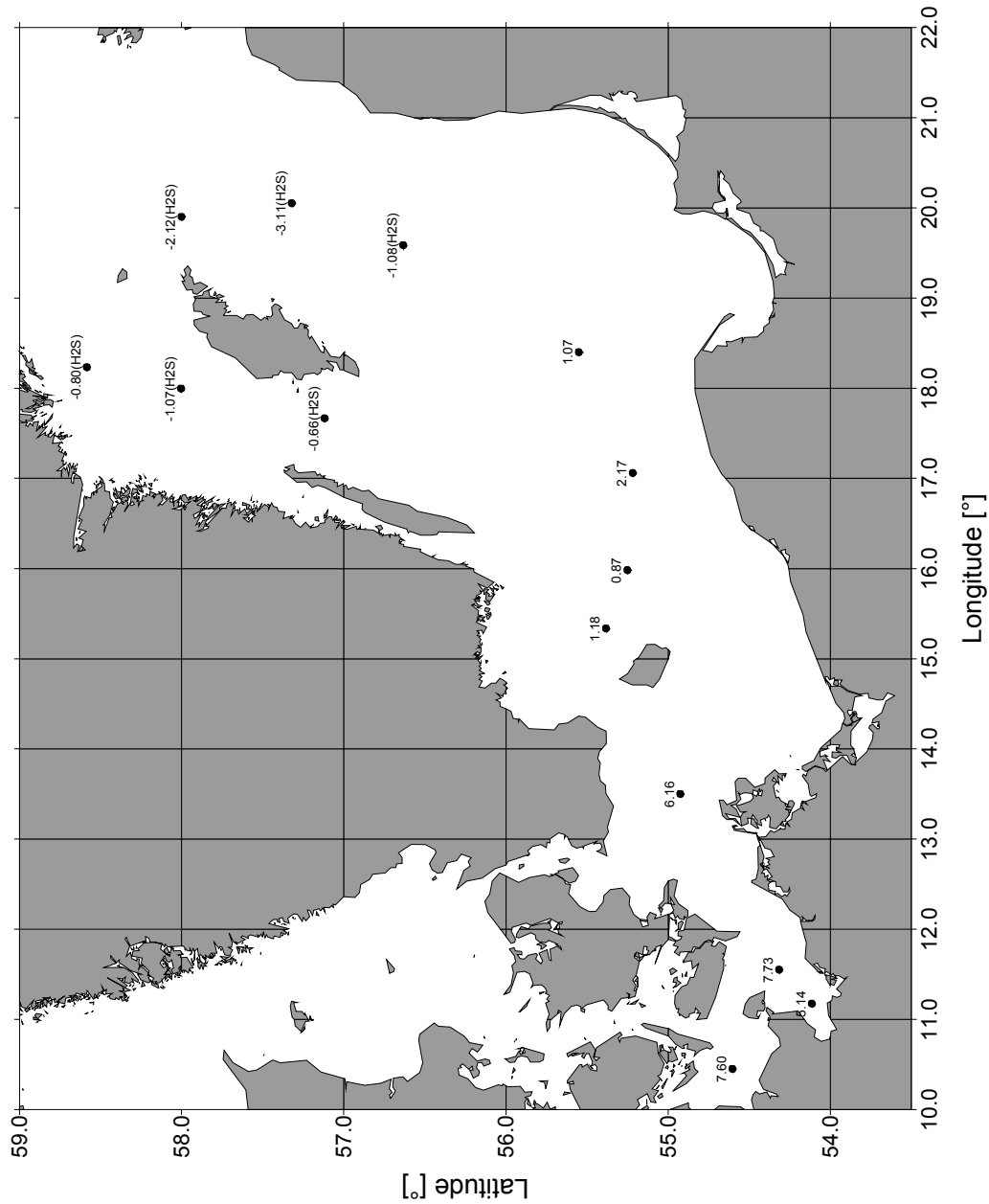
K. Nagel \ st\_0602b \ 02/02/06

**Kiel Bight - Gotland Sea**

TF110601  
26.01.2006 18:28 - 01.02.2006 19:10 UTC



**Monitoring**  
TF110601  
26.01.2006 - 04.02.2006  
Oxygen bottom concentration [ml/l]



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