INSTITUT FÜR OSTSEEFORSCHUNG WARNEMÜNDE
an der Universität Rostock BALTIC SEA RESEARCH INSTITUTE

Baltic Sea Research Institute Warnemünde

Cruise Report

R/V "ALKOR"

Cruise- No. 06AK / 07 / 01 (AL293)

05 February - 15 February 2007

This report is based on preliminary data

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an der Universität Rostock
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1. Cruise No.: 06AK/ 07 / 01 (AL293))

2. Dates of the cruise: from 06/02/2007 to 15/02/2007

3. Particulars of the research vessel:

Name: r/v 'ALKOR'
Nationality: Germany
Operating Authority: Leibniz Institute of Marine Sciences at Kiel University (IFM - GEOMAR) , Kiel

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 COMBINE program of HELCOM

7. Crew:

Name of master: J. P. Lass
Number of crew: 11

8. Research staff:

Chief scientist: Klaus Nagel

Participants :	Rainer Bahlo	Uwe Hehl
	Kerstin Bohn	Ursula Hennings
	Bärbel Buuk	Johann Ruickoldt
	Jan Donath	Erika Trost
	Ines Hand	Anna-Maria Welz

9. Co-operating institutions:

All institutions dealing with the COMBINE program of HELCOM

10. Scientific equipment : CTD
water samplers
plankton net

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 64 stations according to the COMBINE program of HELCOM. The measurements were supplemented by continuos 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. Air temperature, air pressure, wind velocity as well as temperature and salinity in the surface layer are recorded continuously during the cruise and are shown in the attached figure.

The weather during the cruise was rather calm and warm for this time of the year. Air pressure varied between 995 hPa and 1020 hPa. In the Western Baltic and the Arkona Basin air temperatures fluctuate between 2°C and 1°C slowly decreasing down to almost -4°C in the western and eastern Gotland Basin. Easterly winds prevailed during the whole cruise with dominating wind speeds below 10 m/s. Only a few short periods with wind speeds between 10 m/s and 15 m/s have been observed. Highest wind velocities of more than 15 m/s were were measured for a few hours on 09/02/07. Surface water temperatures were relatively constant between 3°C and 5°C in the area under investigation, only in the eastern Gotland Basin temperature dropped down to 2°C. Compared to the temperatures measured at the same time of the last year, temperatures during this cruise were higher at all stations (except Landsort Deep) and are also higher than expected from long term observations.

Except station TF0360 salinity in the surface layer was within the range expected from long term measurements in all regions of the Baltic Sea and varied around 12 in the western and 7 – 8 in all other areas. A halocline and thermocline was observed 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 22 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 higher than the mean calculated from long term measurements, reaching values up to 9°C at the bottom of the Bornholm basin and Stolpe Channel.

The western Baltic Sea and the Arkona basin were well oxygenated down to the sea floor with oxygen concentrations varying around 8 ml/l. Due to the relatively high water temperature oxygen concentrations are slightly below the values expected from long term observations. Oxygen concentration in the Bornholm Basin dropped below 2 ml/l at depths below 70 m to 80 m, but no H_2S was found in this area. In the Eastern Gotland and western Gotland basin hydrogen sulphide was measured below 90 – 100 m in concentrations reaching up to 2.4 mg/l in the eastern and up to 1.2 mg/l in the western Gotland basin.

Nitrate concentrations in the surface layer were normal for this time of the year and vary between 2.4 µmol/l and almost 4.5 µmol/l, which is within the range expected from long term observations for most stations. Only at stations TF0360 and TF0012 nitrate concentrations of more than 9 µmol/l and 7 µmol/l, respectively, are found due to the inflow of high saline and nitrate rich water. Phosphate concentrations in the surface layer were close to those found at the same time one year ago and are 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.

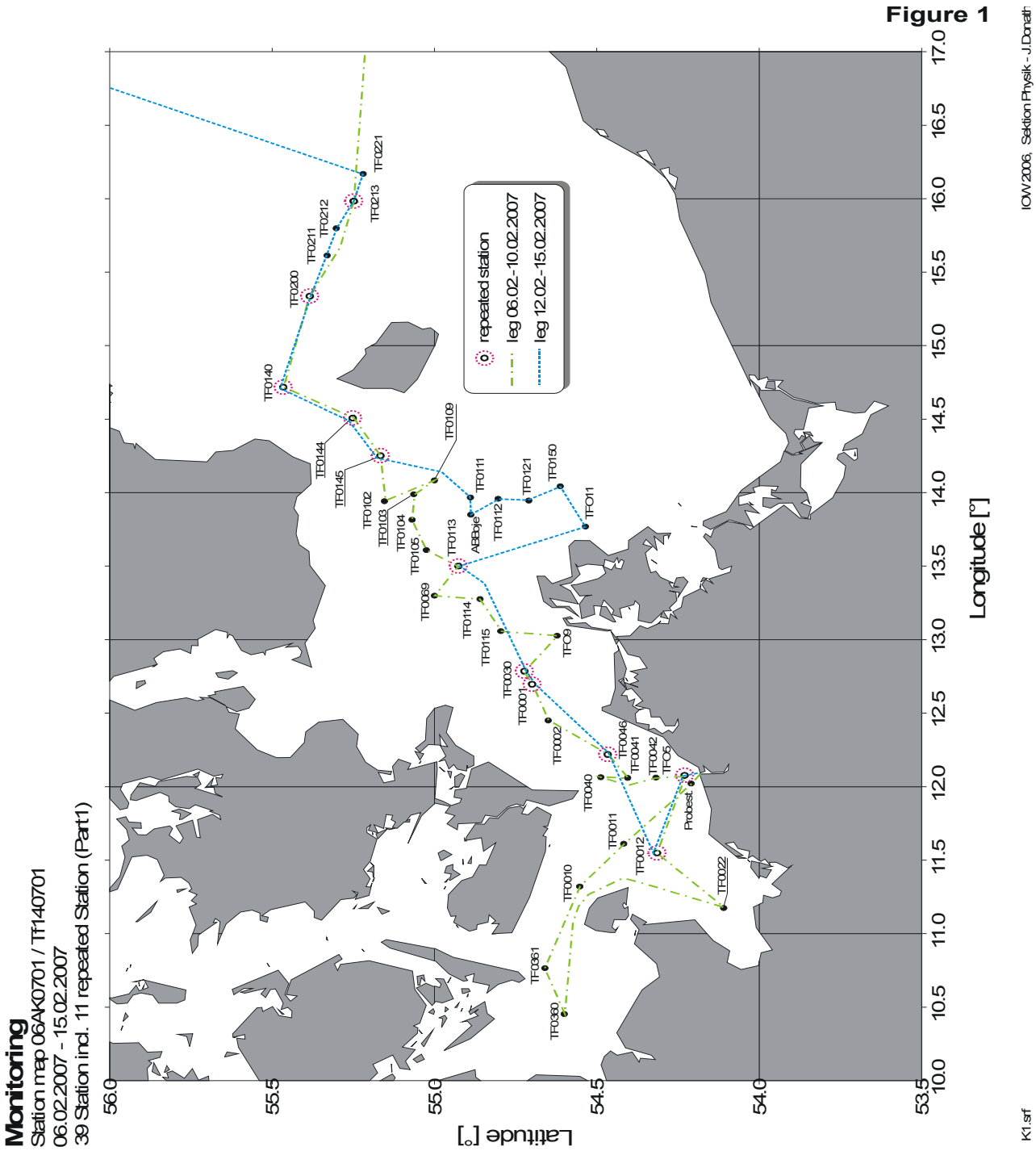
During this cruise samples for determination of biological parameters, trace elements and organic contaminants were taken for later analysis in the laboratory.

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)
- figure showing continuously measured meteorological and hydrological parameters
- 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_2 equivalents)

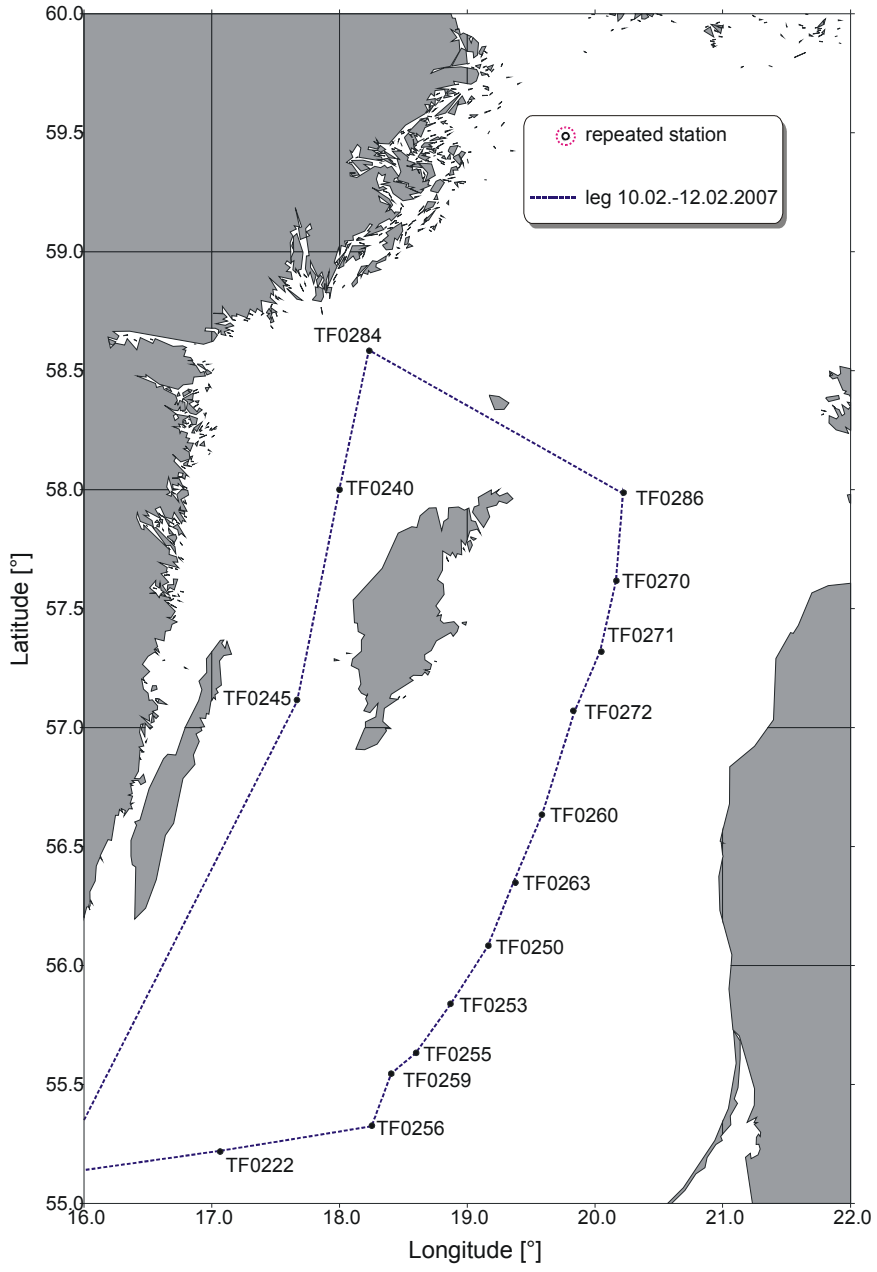
Figure 1


Monitoring
Station map 06AK0701 / TF140701
06.02.2007 - 15.02.2007
39 Station incl. 11 repeated Station (Part1)
repeated station
leg 06.02.-10.02.2007
leg 12.02.-15.02.2007
Latitude [°]
Longitude [°]
IOW 2006, Sektion Physik - J.Donath
K1.srf

Monitoring

Station map 06AK0701 / Tf140701
06.02.2007 - 15.02.2007
15 Station (Part2)

Figure 2



K2.srf

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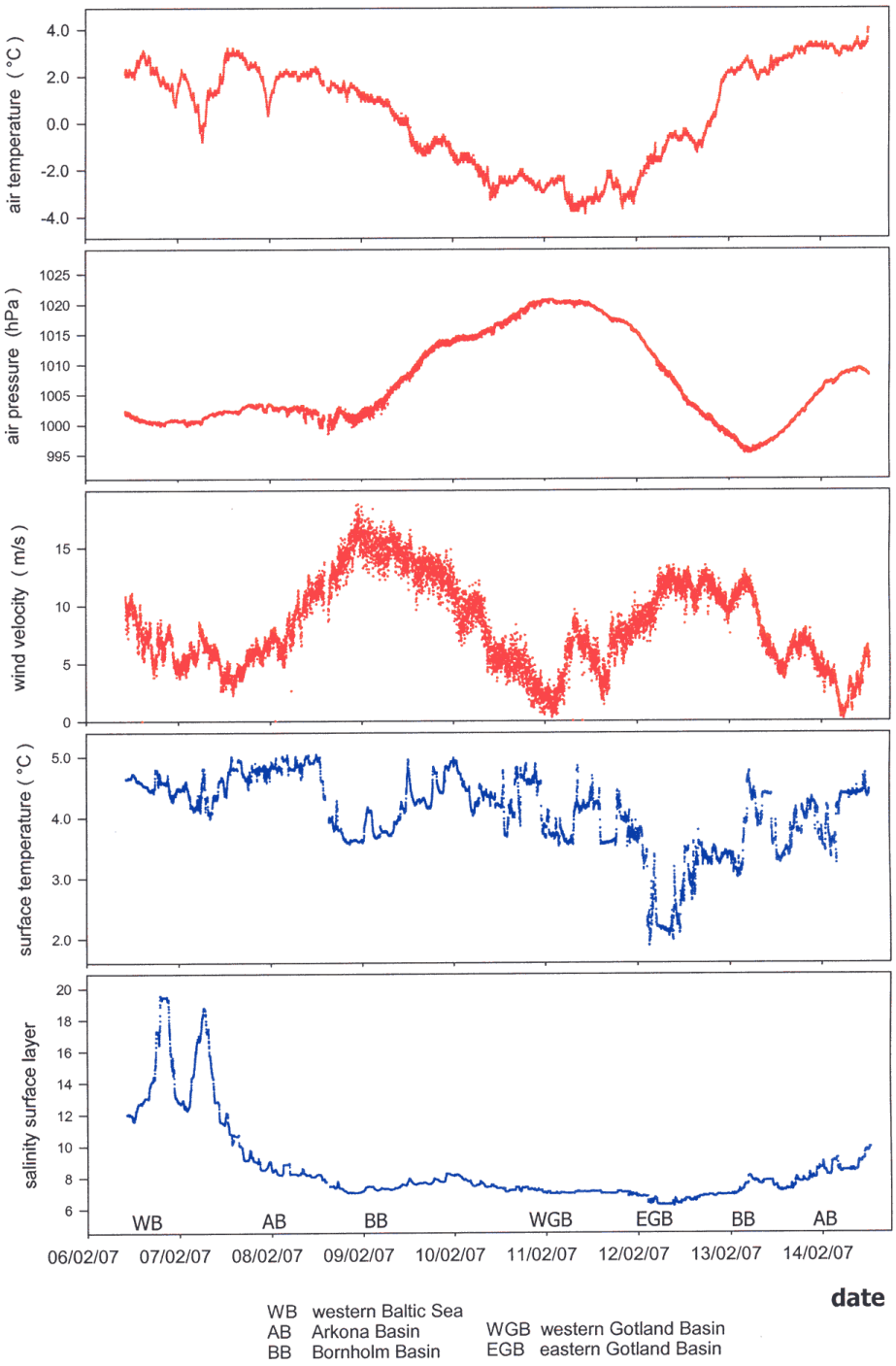
Continuos measurements of meteorological and hydrological paramters
during the cruise 06AK/07/01 (AL293)



WB western Baltic Sea
AB Arkona Basin
BB Bornholm Basin
WGB western Gotland Basin
EGB eastern Gotland Basin

K.Nagel \ ddx_TF0702 \ 14/02/2007

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

Station **Date**	**Stat.Name** **Stat.No. **)**	**Temp.** **°C**	**Salinity**	**NO_3** *) **µmol/l**	**PO_4** **µmol/l**	**SiO_4** **µmol/l**	**O_2** **ml/l**
Kiel Bight 06/02/2007	TF0360 5	4.66	19.73	9.43	0.70	16.5	7,65
Mecklenburg Bight 07/02/2007	TF0012 7	4.37	13.07	7.04	0.58	14.3	8.63
Arkona Basin 08/02/2007	TF0113 20	4.88	8.46	4.32	0.80	13.4	8.18#
Bornholm Deep 09/02/2007	TF0213 30	4.33	7.87	3.30	0.77	14.3	8.14
Stolpe Channel 10/02/2007	TF0222 31	4.50	7.99	3.41	0.76	12.8	8.09
SE Gotland Basin 10/02/2007	TF0259 33	4.25	7.54	2.47	0.75	13.3	7.95
Gotland Deep 11/02/2007	TF0271 40	3.61	7.22	3.13	0.54	12.1	8.17
Fårö Deep 11/02/2007	TF0286 42	3.71	7.11	3.56	0.58	12.8	8.19
Landsort Deep 12/02/2007	TF0284 43	2.19	6.51	4.51	0.68	19.6	8.66
Karlsö Deep 12/02/2007	TF0245 45	3.33	7.12	3.80	0.74	15.3	8.32

*) NO_3 is given as sum of NO_3^- and NO_2^- (in most samples NO_2^- was present only in traces)
**) see attached maps

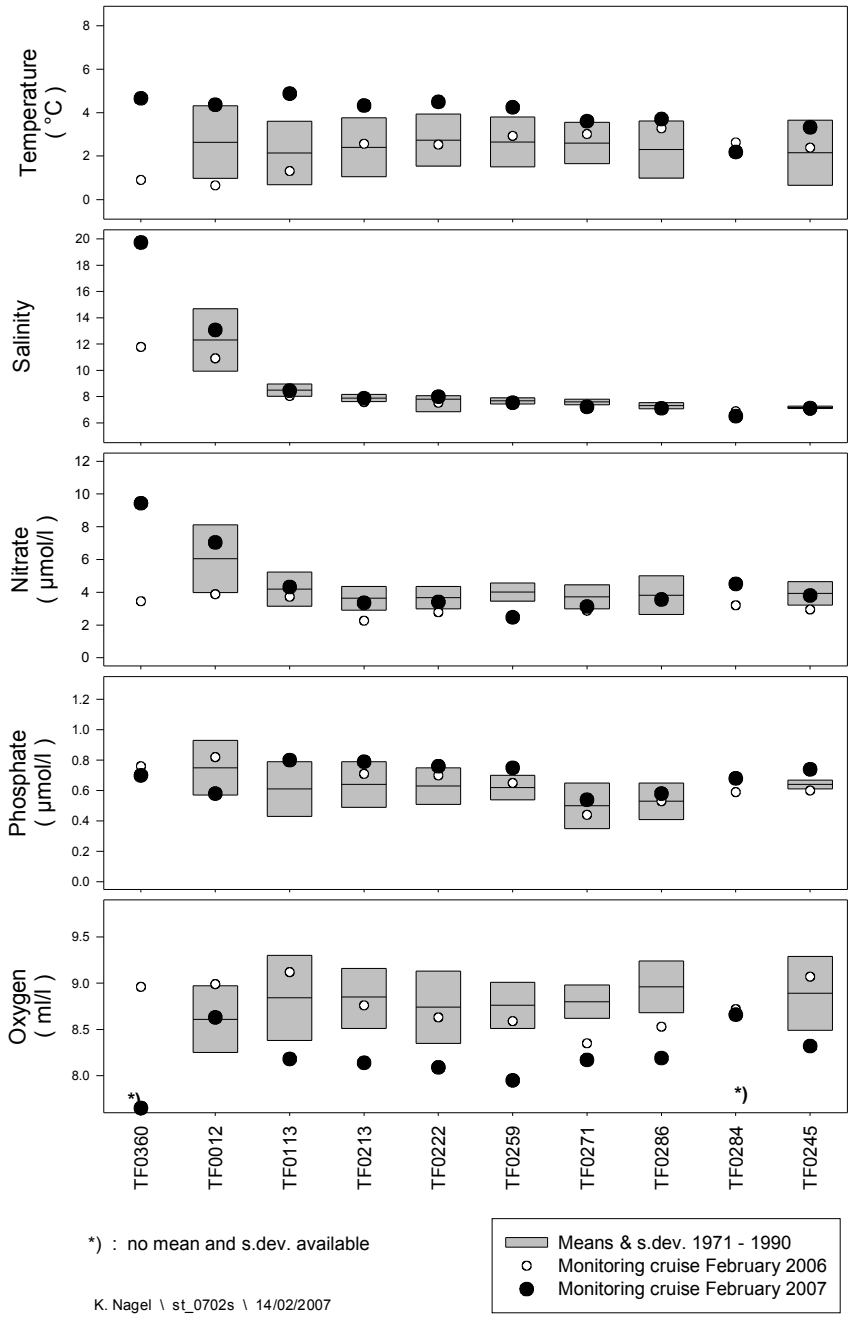
Preliminary results of hydrographic and hydrochemical parameters at selected stations – **near bottom layer** -

Station **Date**	**Stat.Name** **Stat.No. **)**	**Depth** **m**	**Temp.** **°C**	**Salinity** **PSU**	**NO_3 *)** **µmol/l**	**PO_4** **µmol/l**	**SiO_4** **µmol/l**	**O_2** **ml/l**
Kiel Bight 06/02/2007	TF0360 5	16.9	5.08	21.30	9.36	0.88	18.2	7.37
Mecklenburg Bight 07/02/2007	TF0012 7	23.5	4.73	19.06	10.80	0.68	18.7	7.33
Arkona Basin 08/02/2007	TF0113 20	45.7	7.36	17.87	10.08	0.99	21.7	5.79
Bornholm Deep 09/02/2007	TF0213 30	85.9	9.37	16.26	8.85	1.94	45.0	1.20
Stolpe Channel 10/02/2007	TF0222 31	89.3	9.34	14.29	9.18	1.61	35.4	2.30
SE Gotland Basin 10/02/2007	TF0259 33	87.6	5.86	11.13	5.93	2.71	45.5	0.84
Gotland Deep 11/02/2007	TF0271 40	234.2	5.99	12.66		3.08	62.6	-1.70 (H_2S)
Fårö Deep 11/02/2007	TF0286 42	189.8	5.99	12.05		3.86	59.5	-1.22 (H_2S)
Landsort Deep 12/02/2007	TF0284 43	434.8	5.75	10.94		3.61	55.6	-1.18 (H_2S)
Karlsö Deep 12/02/2007	TF0245 45	107.2	5.22	10.29		4.26	58.7	-1.66 (H_2S)

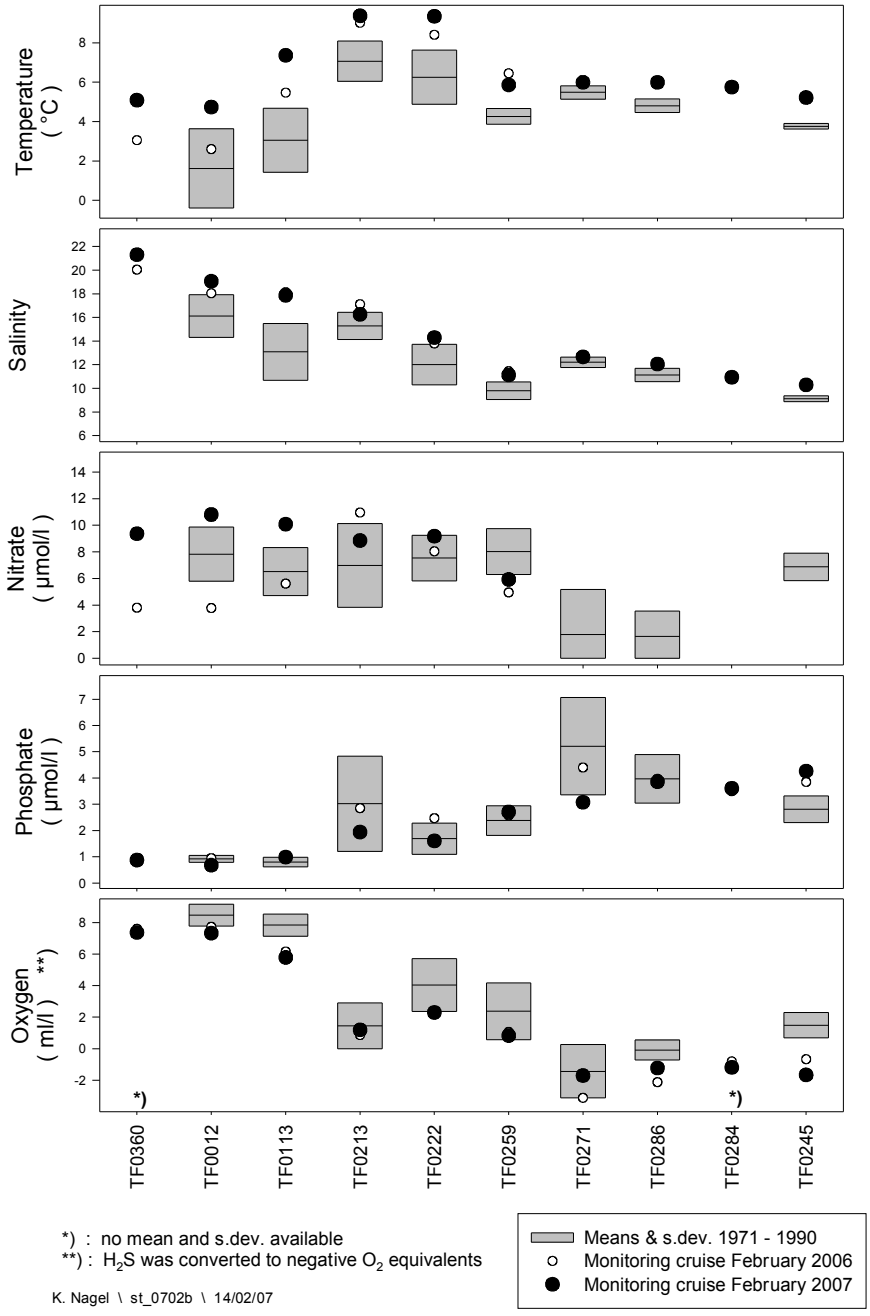
*) NO_3 is given as sum of NO_3^- and NO_2^- (in most samples NO_2^- was present only in traces)

**) see attached maps

Monitoring stations / February cruises : near-surface layer

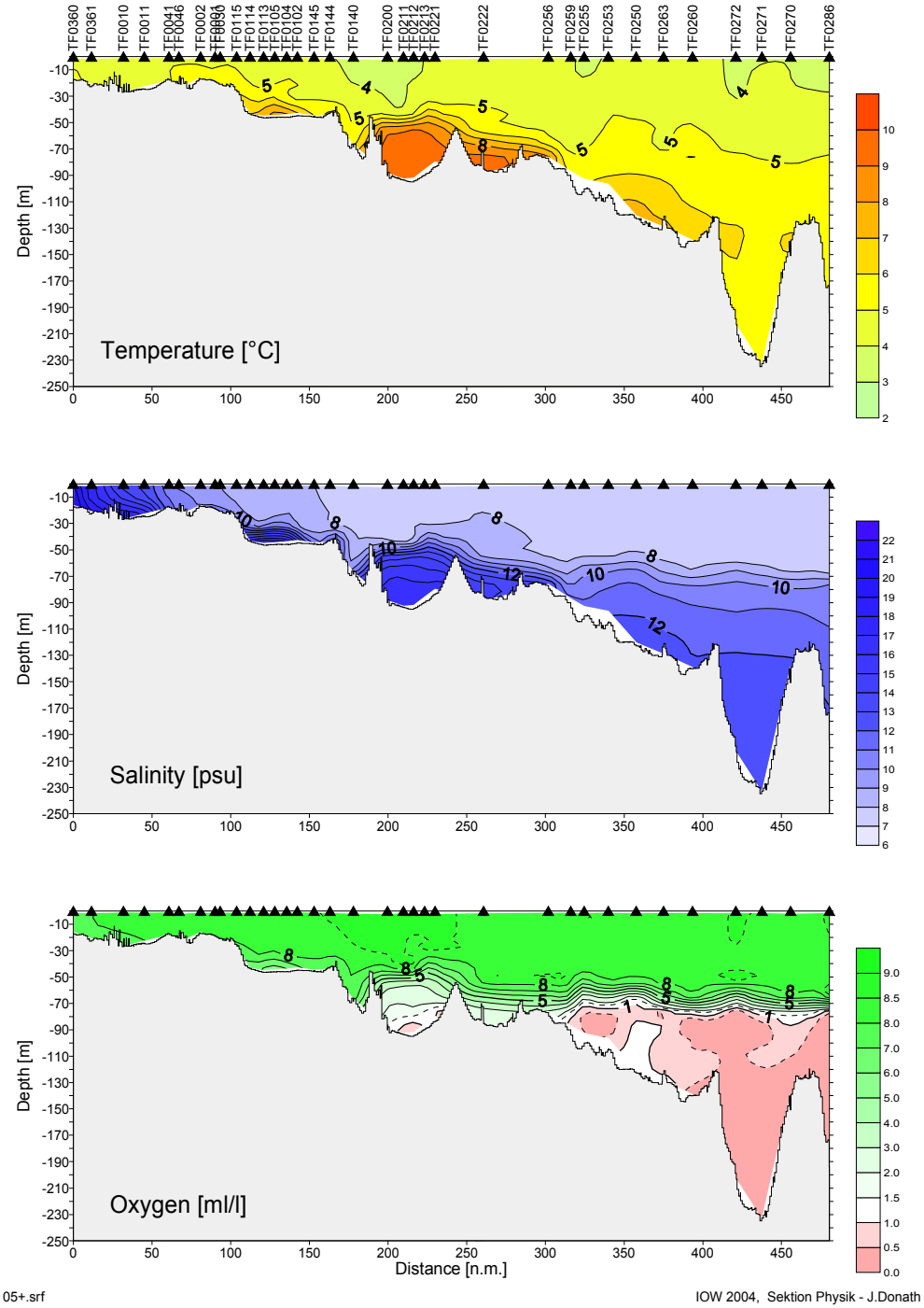


Monitoring stations / February cruises : near-bottom layer



Kiel Bight - Gotland Sea

Cruise 06AK0701 (TF140701)
06.02.2007 13:40 - 13.02.2007 12:46 UTC



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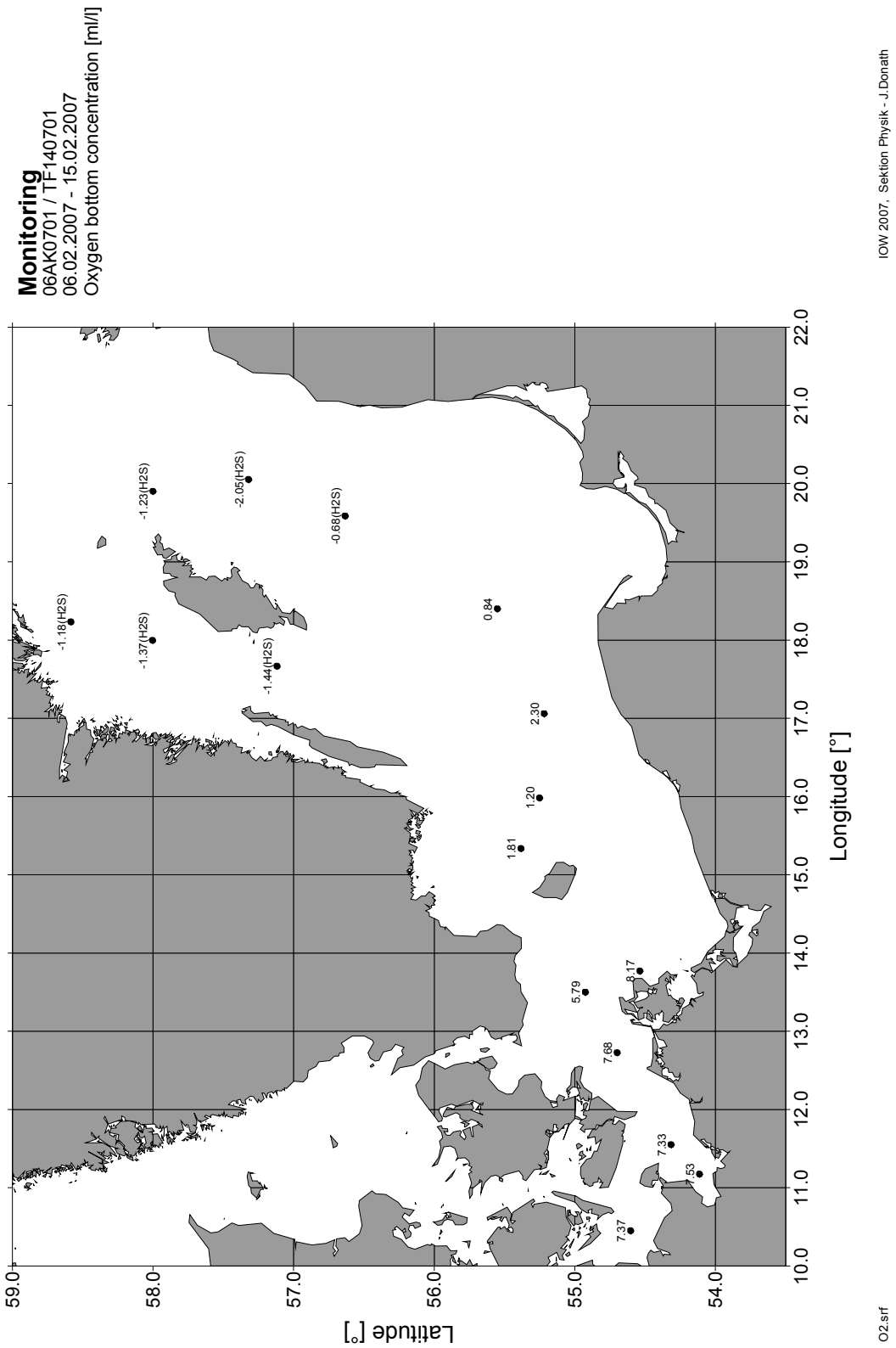
Monitoring
06AK0701 / TF140701
06.02.2007 - 15.02.2007
Oxygen bottom concentration [ml/l]
IOW 2007, Sektion Physik - J.Donath
-1.18(H2S)
-1.37(H2S)
-1.23(H2S)
-1.44(H2S)
-2.05(H2S)
-0.68(H2S)
0.84
2.30
1.20
1.81
8.17
5.79
7.68
7.33
.53
7.37
59.0
58.0
57.0
56.0
55.0
54.0
Latitude [°]
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0
21.0
22.0
Longitude [°]
O2.srf