Cruise Report

R/V "ALKOR"

Cruise- No. AL-385B (06AK1202)

02 February - 14 February 2012

This report is based on preliminary data !

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1. Cruise No.: AL-385B (06AK1202)

2. Dates of the cruise: from 02/02/2012 to 14/02/2012

3. Particulars of the research vessel:

Name:	r/v 'ALKOR'
Nationality:	Germany
Operating Authority:	Leibniz Institute of Marine Sciences at Kiel University (IFM - GEOMAR) , 24148 Kiel

4. Geographical area in which ship has operated:

Baltic Sea between Kiel Bight and central Gotland Sea

5. Dates and names of ports of call

04/02/2012	Saßnitz
08/02 – 09/02/2012	Visby

6. Purpose of the cruise

Joint cruise for Monitoring in the frame of the COMBINE program of HELCOM and long term observation program of IOW

7. Crew:

Name of master:	J.P. Lass
Number of crew:	10

8. Research staff:

Chief scientist: Klaus Nagel

Participants :

02/02 - 14/02/2012	Jan Donath	Peter Wlost
	Ines Hand	Uwe Hehl
	Gunnar Jakobs	Michael Pötzsch
	Jenny Jeschek	
02/02 – 09/02/2012	Sven Trinkler	
02/02 – 04/02/2011	Andrea Tschakste	

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 cruise AL385 was a joint cruise between the German contribution to the COMBINE program of HELCOM and the long term data series of IOW. The area under investigation covered the Baltic Sea between Kiel Bight and the central Gotland Basin as shown in the attached maps. Marine meteorological, hydrographic, chemical and biological investigations were performed at 76 stations. 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 2000 to 2010.

The weather during the cruise was dominated by a high - pressure system with air pressure between 1030 hPa and 1045 hPa. Low or moderate easterly or northerly winds prevailed during the first 10 days of the cruise, which is quite unusual for this time of the year. Apart from the last two days of the cruise, air temperature was always below 0°C, starting from -10°C at the beginning of the cruise.
Water temperature in the surface of the entire area under investigation varied between 1.5°C and 3.5°C, which is in the range expected from long term observations. Only in coastal areas, where ice was drifting from the coast into the sea, some lower water temperatures were found.

Salinity in the surface layer was within the values expected from long term measurements in all regions of the Baltic Sea and varied between 7 - 8 g/kg. Only in Kiel and Mecklenburg Bight 10 - 15 g/kg were measured. A halocline was observed between 35 m and 45 m in the Arkona Basin, between 50 m and 70 m in the Bornholm Basin and in the Eastern Gotland Basin. Salinities found in the bottom layer in the central areas of the Baltic Sea are in the range expected from long term observations and varied around 12 g/kg.

The western Baltic Sea and the Arkona basin were well oxygenated down to the sea floor with oxygen concentrations between 7 ml/l to 9 ml/l.

Oxygen concentration in the Bornholm Basin showed a minimum between 50 m to 70 m with oxygen concentrations of 1 ml/l to more than 3 ml/l, indicating an inflow of saline and oxygen rich water during the weeks before. Up to 4 ml/l of oxygen were found at the bottom in this region.

Anoxic conditions had been observed in the central eastern and western Gotland Basin at depths below 90 m to 100 m. In the bottom layer of the eastern Gotland Basin concentrations of up to 7.5 mg/l H_2S were found, which is significantly more than the value measured last year at the same time (5.1 mg/l H_2S).

Nitrate concentrations in the surface layer were normal for this time of the year and vary between 3 µmol/l and almost 5 µmol/l, which is within the range expected from long term observations. Only in the western part of the Western Baltic Sea and in the Pomeranian Bight some higher concentrations were measured.
Except for the stations in the Bornholm Basin, phosphate concentrations in the surface layer were found between 0.6 µmol/l and 0.8 µmol/l and are in good agreement with the values expected from IOW's long term data series. However, in the surface layer of the stations between Bornholmsgat and Slupsk Sill phosphate concentrations of more than 1 µmol/l were measured.
In the bottom layer concentrations of nitrate and phosphate are controlled by the presence of oxygen or hydrogen sulphide and were found in the expected range. Due to the ongoing stagnation phosphate concentrations at the bottom of the Eastern Gotland Basin were higher than that measured one year ago (>7 µmol/l) and correlate with relatively high amounts of H_2S (>7 mg/l H_2S).

During the cruise samples for the determination of HCH, CKW/PAK (9 stations) and Phyto- and Zooplankton (12 stations), carbonate system parameters (4 stations) and trace metals (1 station) were taken for later analysis in the laboratory.

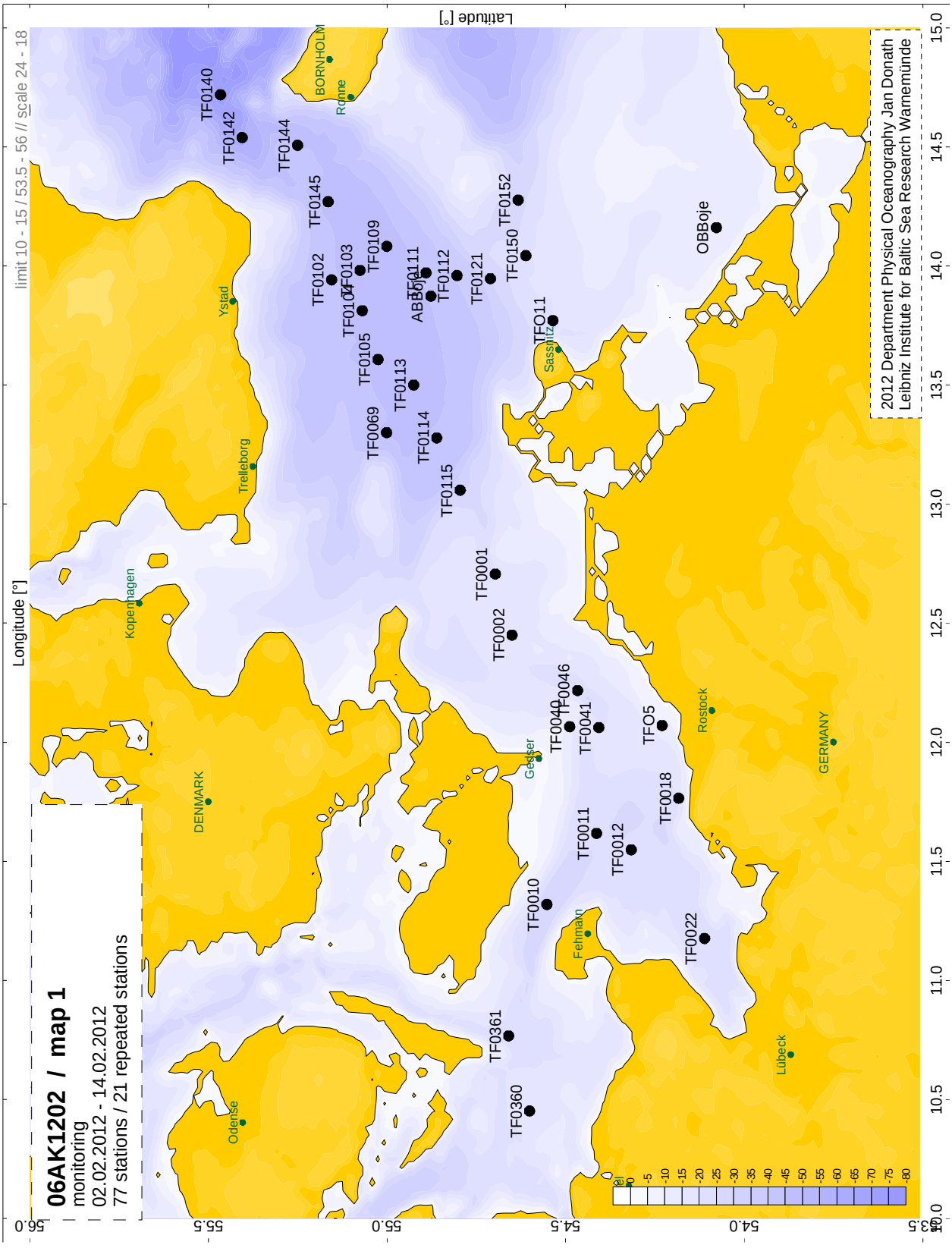
Methane concentrations were measured at 8 stations. At 2 stations experiments analysing the methane metabolism were started and will be finished later in the laboratory.
At both stations also samples from the sediment surface were taken for the analysis of biomarkers.

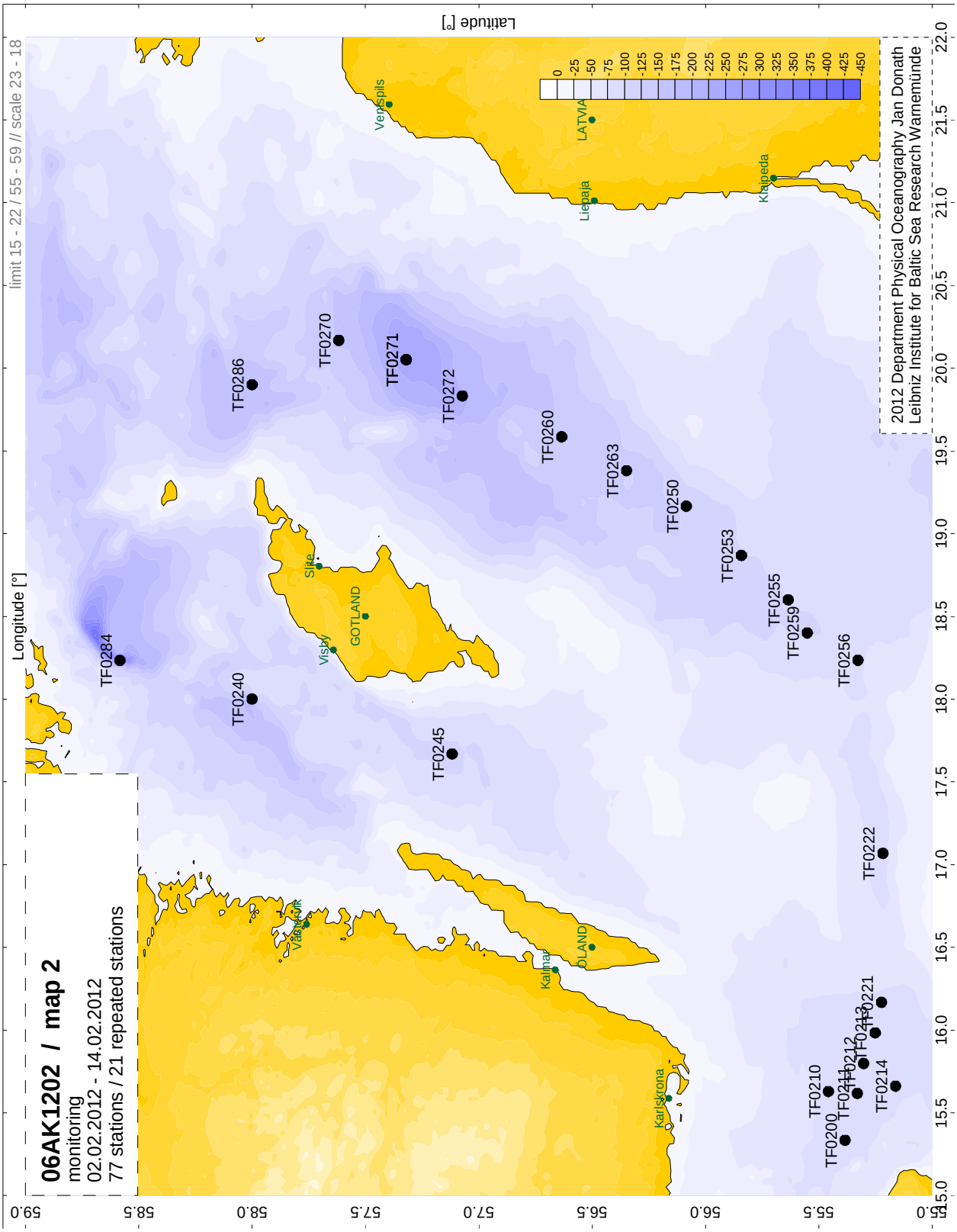
On 07/02/2012 a sediment trap has been recovered and re-layered again at position 57° 18,84' N , 020° 07.30' E.

Klaus Nagel
Scientist in charge

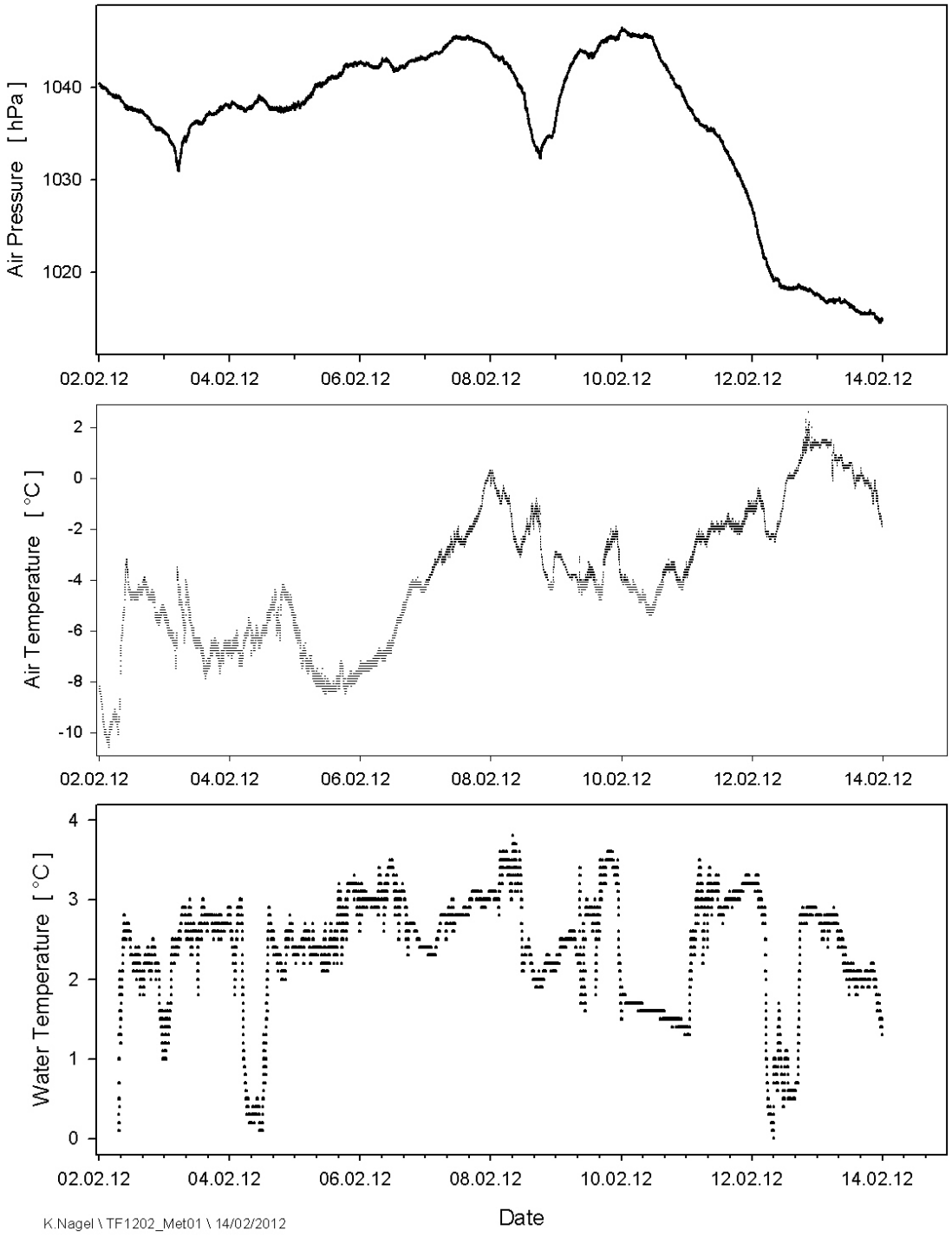
Attachments :

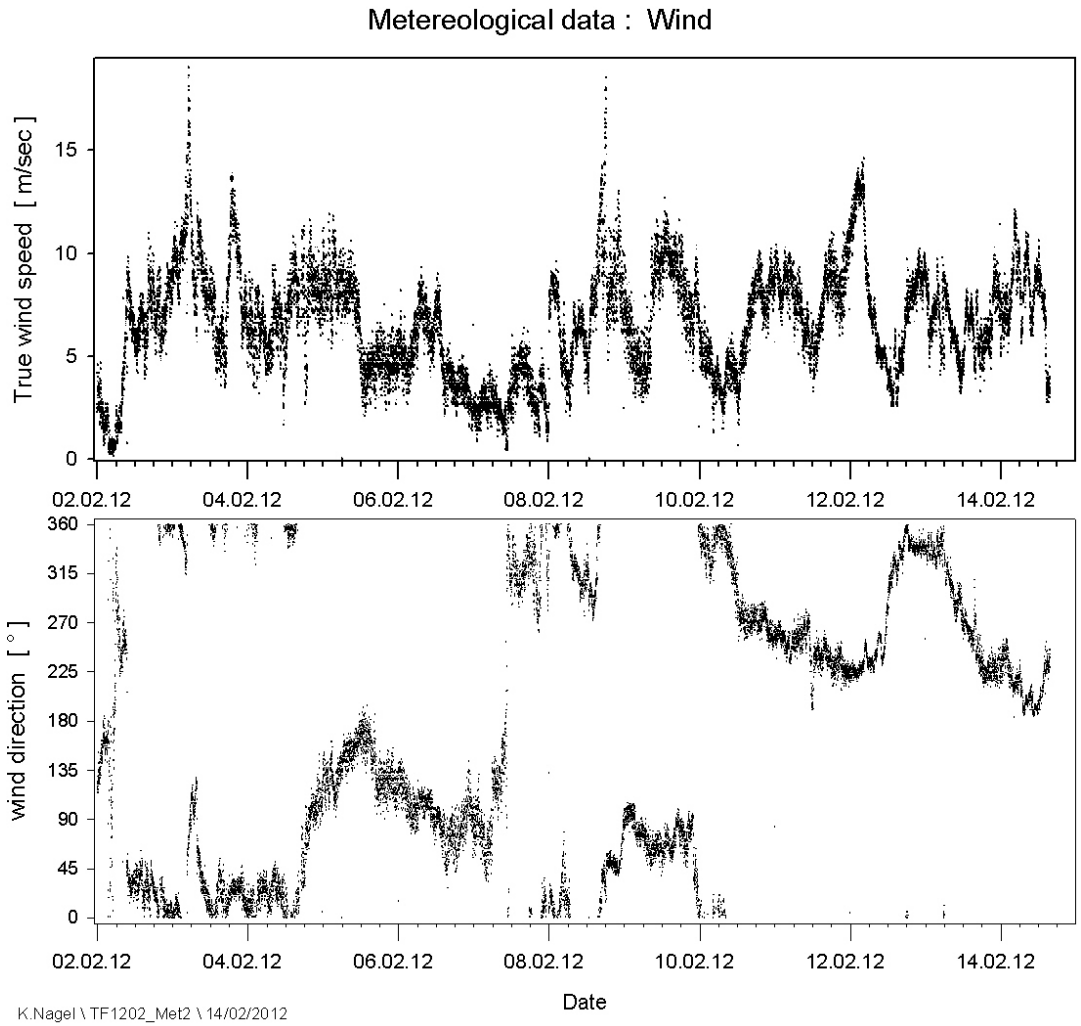
- station charts
- figures showing meteorological data at the ships position during the cruise
- tables of preliminary results for selected stations (surface layer and near bottom layer)
- comparison of actual data with mean values calculated from the measurements during the February cruises of the years 2000 – 2010 (surface layer and near bottom layer)
- transect of temperature, salinity and oxygen concentration between Kiel Bight and Gotland Sea
- map showing oxygen concentrations in near the bottom water layer
  (hydrogen sulphide concentration is given as negative O_2 equivalents)


06AK1202 / map 1
monitoring
02.02.2012 - 14.02.2012
77 stations / 21 repeated stations
limit 10 - 15 / 53.5 - 56 // scale 24 - 18
2012 Department Physical Oceanography Jan Donath
Leibniz Institute for Baltic Sea Research Warnemünde
Longitude [°]
Latitude [°]
DENMARK
GERMANY
Kopenhagen
Odense
Ystad
Trelleborg
Sassnitz
Rostock
Lübeck
Fehmarn
Gedser
BORNHOLM
Ronne
OBBoje
TF0140
TF0142
TF0144
TF0145
TF0102
TF0103
TF0109
TF0104
TF0105
TF0113
TF0069
TF0114
TF0115
TF0111
TF0112
TF0121
TF0150
TF0152
TF011
TF0001
TF0002
TF0046
TF0040
TF0041
TF5
TF0018
TF0011
TF0012
TF0010
TF0022
TF0361
TF0360


Latitude [°]
Longitude [°]
limit 15 - 22 / 55 - 59 // scale 23 - 18
06AK1202 / map 2
monitoring
02.02.2012 - 14.02.2012
77 stations / 21 repeated stations
2012 Department Physical Oceanography Jan Donath
Leibniz Institute for Baltic Sea Research Warnemünde
0 -25 -50 -75 -100 -125 -150 -175 -200 -225 -250 -275 -300 -325 -350 -375 -400 -425 -450
LATVIA
Ventspils
Liepaja
Klaipeda
GOTLAND
Visby
Slite
ÖLAND
Kalmar
Karlskrona
TF0284
TF0286
TF0270
TF0271
TF0272
TF0260
TF0263
TF0250
TF0253
TF0255
TF0259
TF0256
TF0240
TF0245
TF0222
TF0210
TF0200
TF0211
TF0212
TF0213
TF0221
TF0214

Metereological data : air pressure , temperatures




Metereological data : Wind
True wind speed [m/sec]
0
5
10
15
02.02.12
04.02.12
06.02.12
08.02.12
10.02.12
12.02.12
14.02.12
wind direction [°]
0
45
90
135
180
225
270
315
360
Date
K.Nagel \ TF1202_Met2 \ 14/02/2012

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 02/02/2012	TF0360 5	2.11	15.25	6.25	0.71	22.1	8.43
Mecklenburg Bight 02/02/2012	TF0012 6	2.27	9.66	4.24	0.72	17.0	8.68
Arkona Basin 03/02/2012	TF0113 18	2.87	8.25	3.43	0.73	14.5	8.10
Bornholm Deep 05/02/2012	TF0213 40	2.42	7.82	3.08	1.07	20.3	8,66
Stolpe Channel 05/02/2012	TF0222 42	2.48	7.90	3.33	1.15	21.2	8.65
SE Gotland Basin 05/02/2012	TF0259 44	3.21	7.33	2.80	0.70	13.4	8.46
Gotland Deep 06/02/2012	TF0271 51	2.74	7.28	3.11	0.63	12.3	8.58
Fårö Deep 11/02/2012	TF0286 55	3.04	7.22	3.39	0.56	11.4	8.76
Landsort Deep 10/02/2012	TF0284 54	1.70	6.72	4.72	0.63	18.2	9.29
Karlsö Deep 09/02/2012	TF0245 52	2.94	7.28	4.08	0.81	15.5	8.47

*) 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

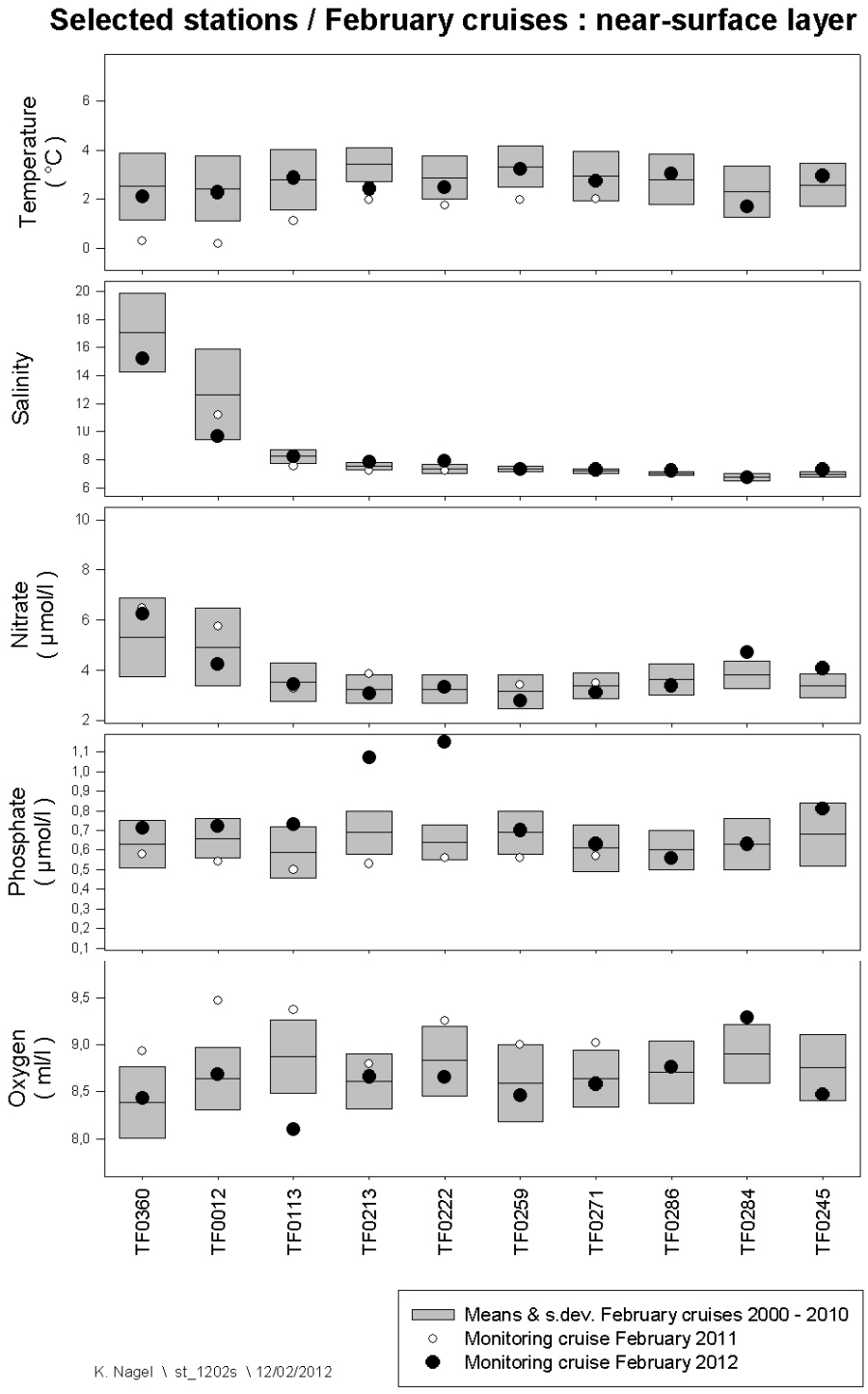
– **near bottom layer** -

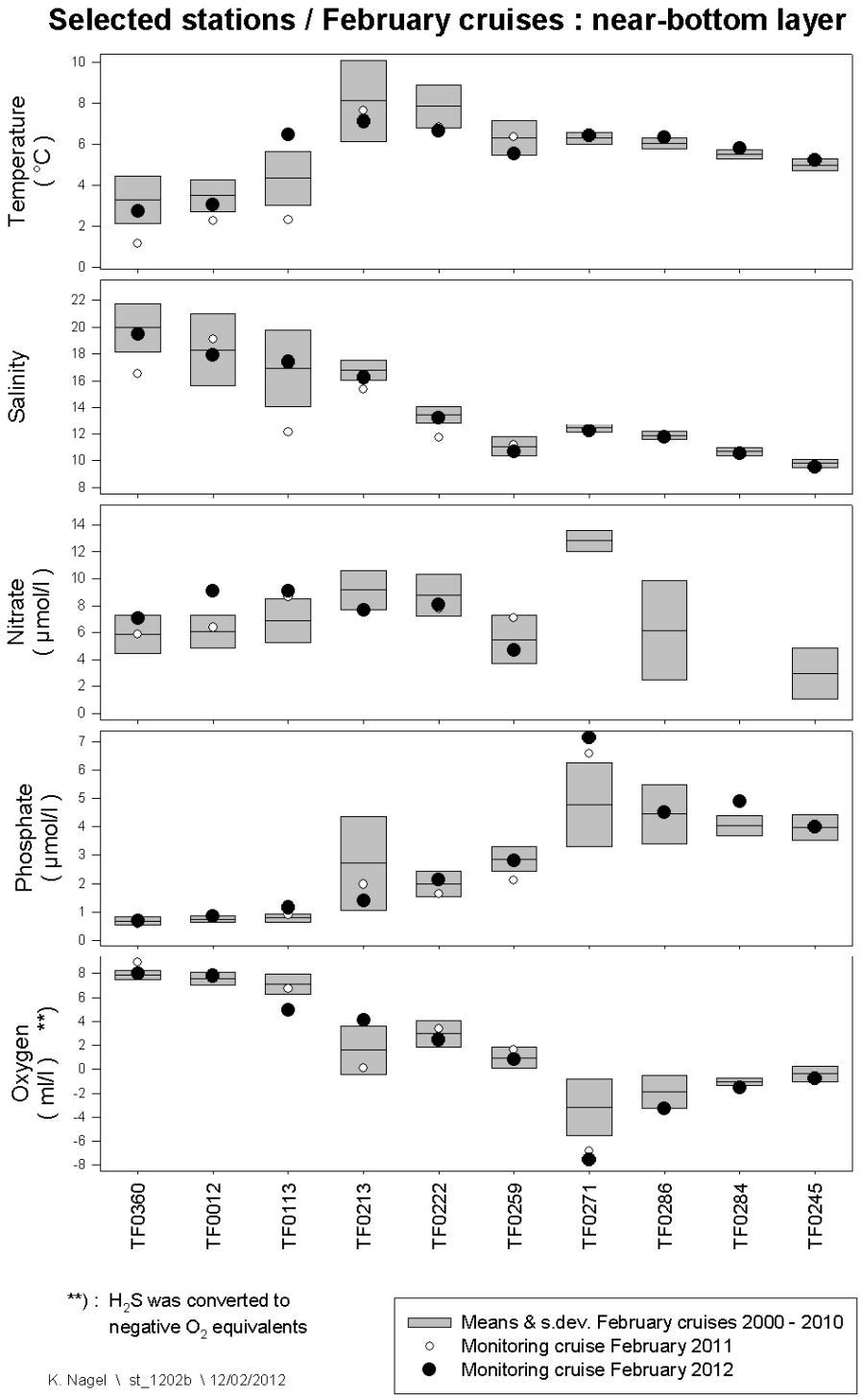
Station **Date**	**Stat.Name** **Stat.No. **)**	**Depth** **m**	**Temp.** **°C**	**Salinity** **PSU**	**NO_3 *)** **µmol/l**	**PO_4** **µmol/l**	**SiO_4** **µmol/l**	**O_2** **ml/l**
Kiel Bight 02/02/2012	TF0360 5	14	2.74	19.44	7.06	0.69	26.2	7.99
Mecklenburg Bight 02/02/2012	TF0012 6	24	3.04	17.88	9.05	0.84	28.2	7.79
Arkona Basin 03/02/2012	TF0113 18	45	6.46	17.4	9.11	1.15	33.6	4.93
Bornholm Deep 05/02/2012	TF0213 40	85	7.11	16.24	7.67	1.38	33.0	4.13
Stolpe Channel 05/02/2012	TF0222 42	86	6.63	13.23	8.06	2.13	42.4	2,46
SE Gotland Basin 05/02/2012	TF0259 44	84	5.51	10.63	4.68	2.80	49.1	0.84
Gotland Deep 06/02/2012	TF0271 51	229	6.43	12.23		7.15	104	-7.57
Fårö Deep 11/02/2012	TF0286 55	182	6.33	11.72		4.50	73.9	-3.32
Landsort Deep 10/02/2012	TF0284 54	427	5.79	10.52		4.90	60.0	-1.56
Karlsö Deep 09/02/2012	TF0245 52	102	5.22	9.51		4.00	59.5	-0.81

*) 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

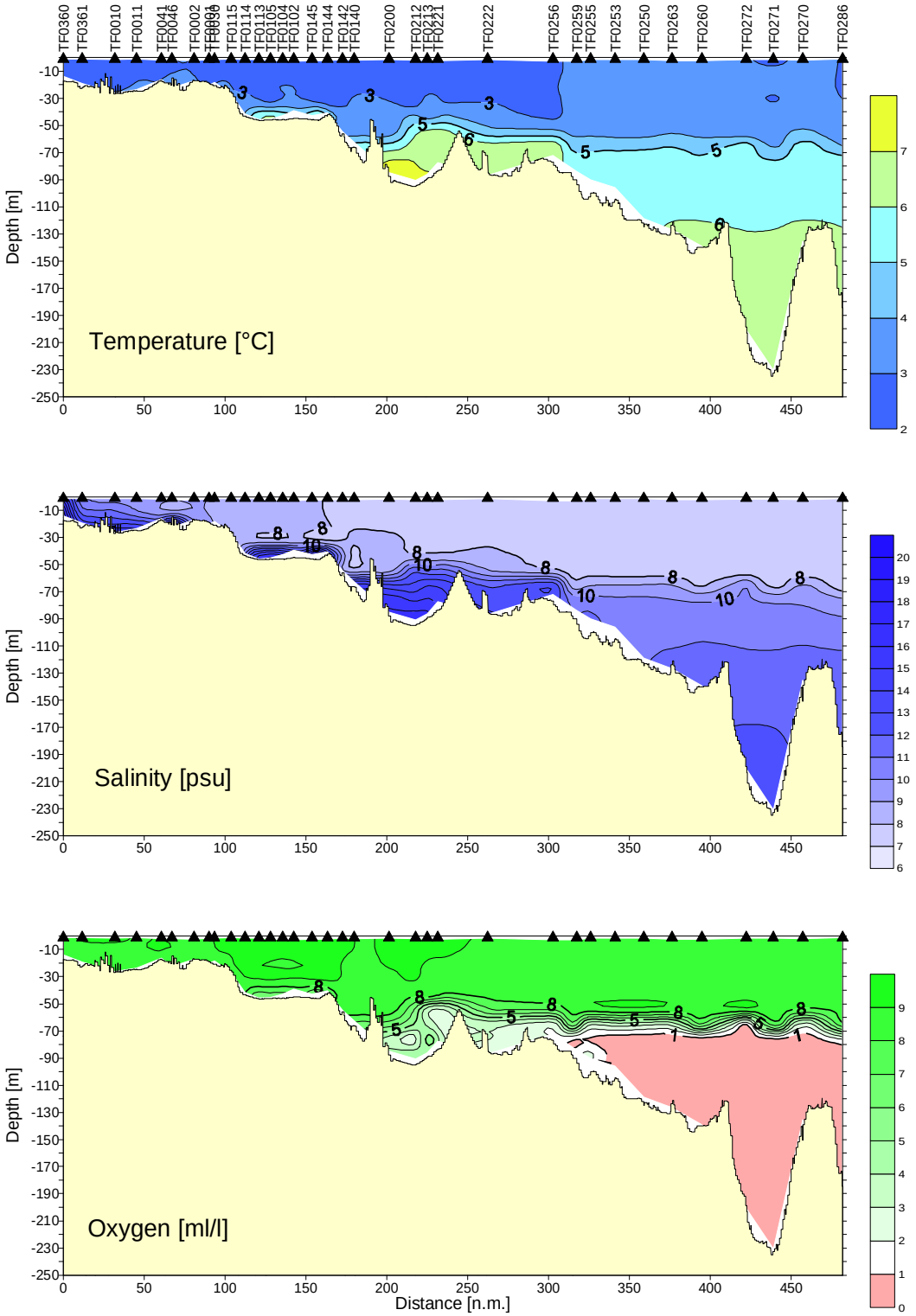
H_2S was converted into negative O2 equivalents


Selected stations / February cruises : near-surface layer
Temperature (°C)
Salinity
Nitrate (µmol/l)
Phosphate (µmol/l)
Oxygen (ml/l)
TF0360
TF0012
TF0113
TF0213
TF0222
TF0259
TF0271
TF0286
TF0284
TF0245
Means & s.dev. February cruises 2000 - 2010
Monitoring cruise February 2011
Monitoring cruise February 2012
K. Nagel \ st_1202s \ 12/02/2012

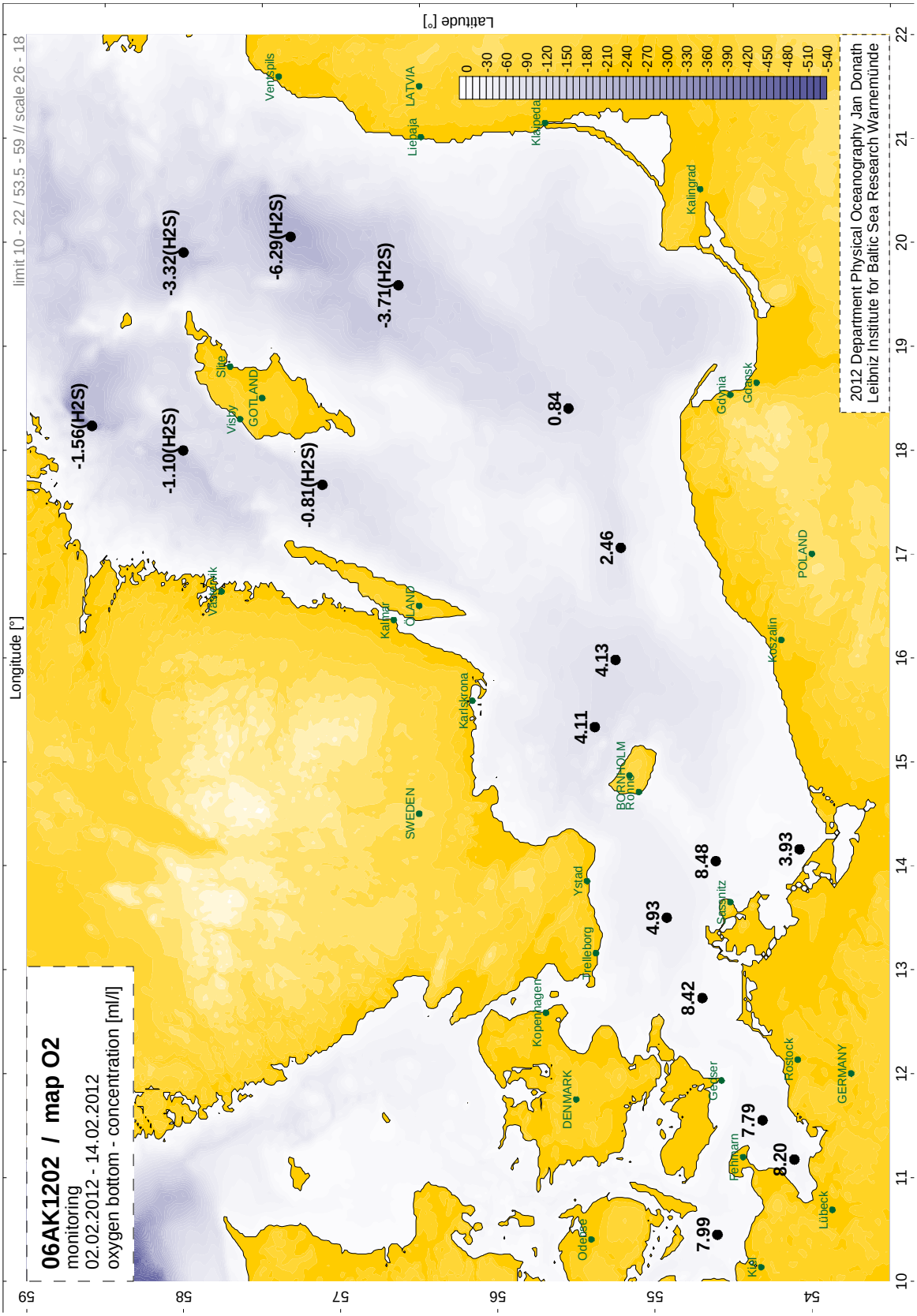

Selected stations / February cruises : near-bottom layer
Temperature (°C)
Salinity
Nitrate (µmol/l)
Phosphate (µmol/l)
Oxygen (ml/l) **)
TF0360
TF0012
TF0113
TF0213
TF0222
TF0259
TF0271
TF0286
TF0284
TF0245
**) : H2S was converted to negative O2 equivalents
K. Nagel \ st_1202b \ 12/02/2012
Means & s.dev. February cruises 2000 - 2010
Monitoring cruise February 2011
Monitoring cruise February 2012

06AK1202

Kiel Bight - Bornholm
02.02.2012 10:27 - 11.02.2012 10:01 UTC



05.srf


06AK1202 / map O2
monitoring
02.02.2012 - 14.02.2012
oxygen bottom - concentration [ml/l]
limit 10 - 22 / 53.5 - 59 // scale 26 - 18
Longitude [°]
Latitude [°]
2012 Department Physical Oceanography Jan Donath
Leibniz Institute for Baltic Sea Research Warnemünde
0 -30 -60 -90 -120 -150 -180 -210 -240 -270 -300 -330 -360 -390 -420 -450 -480 -510 -540
-1.56(H2S)
-1.10(H2S)
-3.32(H2S)
-0.81(H2S)
-6.29(H2S)
-3.71(H2S)
0.84
2.46
4.13
4.11
4.93
8.42
8.48
3.93
7.79
8.20
7.99
SWEDEN
DENMARK
GERMANY
POLAND
LATVIA
GOTLAND
ÖLAND
BORNHOLM
Ronne
Karlskrona
Ystad
Trelleborg
Kopenhagen
Gedser
Rostock
Sassnitz
Fehmarn
Lübeck
Kiel
Odense
Kalmar
Visby
Slite
Vaxholm
Ventspils
Liepaja
Klaipeda
Kaliningrad
Gdynia
Gdansk
Koszalin