



Cruise Report

R/V "ALKOR"

Cruise- No. AL-407a

06 February - 14 February 2013

This report is based on preliminary data !

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1. Cruise No. : AL-407a
2. Dates of the cruise : from 06/02/2013 to 14/02/2013
3. Particulars of the research vessel :
 - Name : r/v 'ALKOR'
 - Nationality : Germany
 - Operating Authority : GEOMAR Helmholtz - Zentrum für Ozeanforschung
Kiel , 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 : - / -
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 :

06/02 - 14/02/2012	Jan Donath	Lars Kreuzer
	Ines Hand	Michael Pötzsch
	Uwe Hehl	Johann Ruickoldt
	Tom Ibenthal	Andrea Tschakste
	Jenny Jeschek	
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 AL407a 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 maps attached. Marine meteorological, hydrographic, chemical and biological investigations were performed at 63 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 flat air pressure gradients and widely spaced isobars across northern and central Europe. Air pressure increased slowly and constantly from 993 hPa at the beginning of the cruise to almost 1025 hPa at the end. Wind was between very low and moderate and wind speeds exceeding 10 m/s for short periods of time were an exception. Almost during the whole cruise it was misty with many snow showers or showers of gentle rain. Air temperature was nearly constant and varied between -3°C and +1°C. The weather situation found during this cruise was quite unusual for this time of the year in this region.

Water temperature in the surface of the entire area under investigation varied between 1.7°C and 2.8°C, which is in the range expected from long term observations. Only at one station in the Pomeranian Bight water temperature slightly below +1°C were measured.

Salinity in the surface layer was within the range expected from long term measurements in the southern and central regions of the Baltic Sea and varied between 6.5 - 8 g/kg. Only in the Western Baltic 13 - 16 g/kg were measured. A halocline was observed between 35 m and 45 m in the Arkona Basin and between 50 m and 70 m in the Bornholm Basin and in the Eastern Gotland Basin.

Salinities found in the bottom layer in the Western Baltic were between 15 g/kg and approximately 20 g/kg and are in the range expected from long term observations. Salinity measured in the bottom layer of the Arkona Basin (20.85 g/kg) was one of the highest found during February cruises since 1995 (only the value of 21.75 g/kg found in 2008 was higher). At the bottom of the Bornholm Basin salinities were found to be in the expected range (or slightly below the expected range), indicating that no significant amounts of high saline water recently flowed from the Arkona Basin into the Bornholm Basin.

Salinities found in the southern and central areas of the Baltic Sea are in the range expected from long term observations and varied between 10 g/kg and 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 close to 70 m with oxygen concentrations of 1 ml/l to 2 ml/l and more than 3 ml/l close to the bottom, indicating some inflow of saline and oxygen rich water during the months before.

Anoxic conditions had been observed in the central eastern and western Gotland Basin at depths below 100 m. In the bottom layer of the eastern Gotland Basin concentrations close to 5 mg/l H₂S were found, which is more than expected from long term observations, but significantly less than the value measured last year at the same time (7.5 mg/l H₂S).

Nitrate concentrations in the surface layer were normal for this time of the year and varied 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. 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.

In the bottom layer concentrations of nitrate and phosphate are controlled by the presence of oxygen or hydrogen sulphide and were found in the normal range. Due to the ongoing stagnation phosphate concentrations at the bottom of the Eastern Gotland Basin were higher than that expected from long term datasets and correlate with relatively high amounts of H₂S.

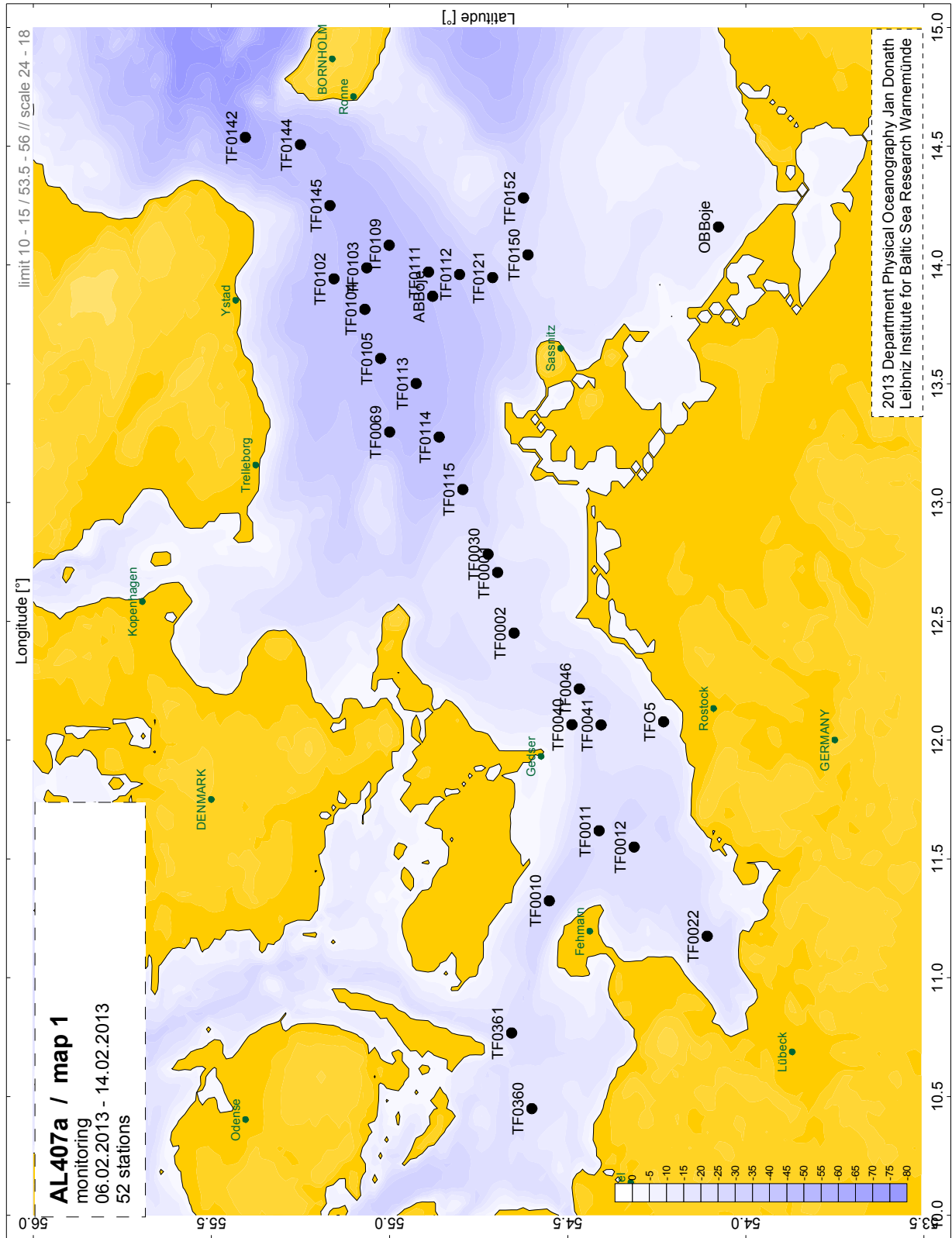
During the cruise samples for the determination of HCH, CKW/PAK (9 stations) and Phyto- and Zooplankton (12 stations), carbonate system parameters (1 station) and samples for methane analysis (12 stations) were taken for later analysis in the laboratory.

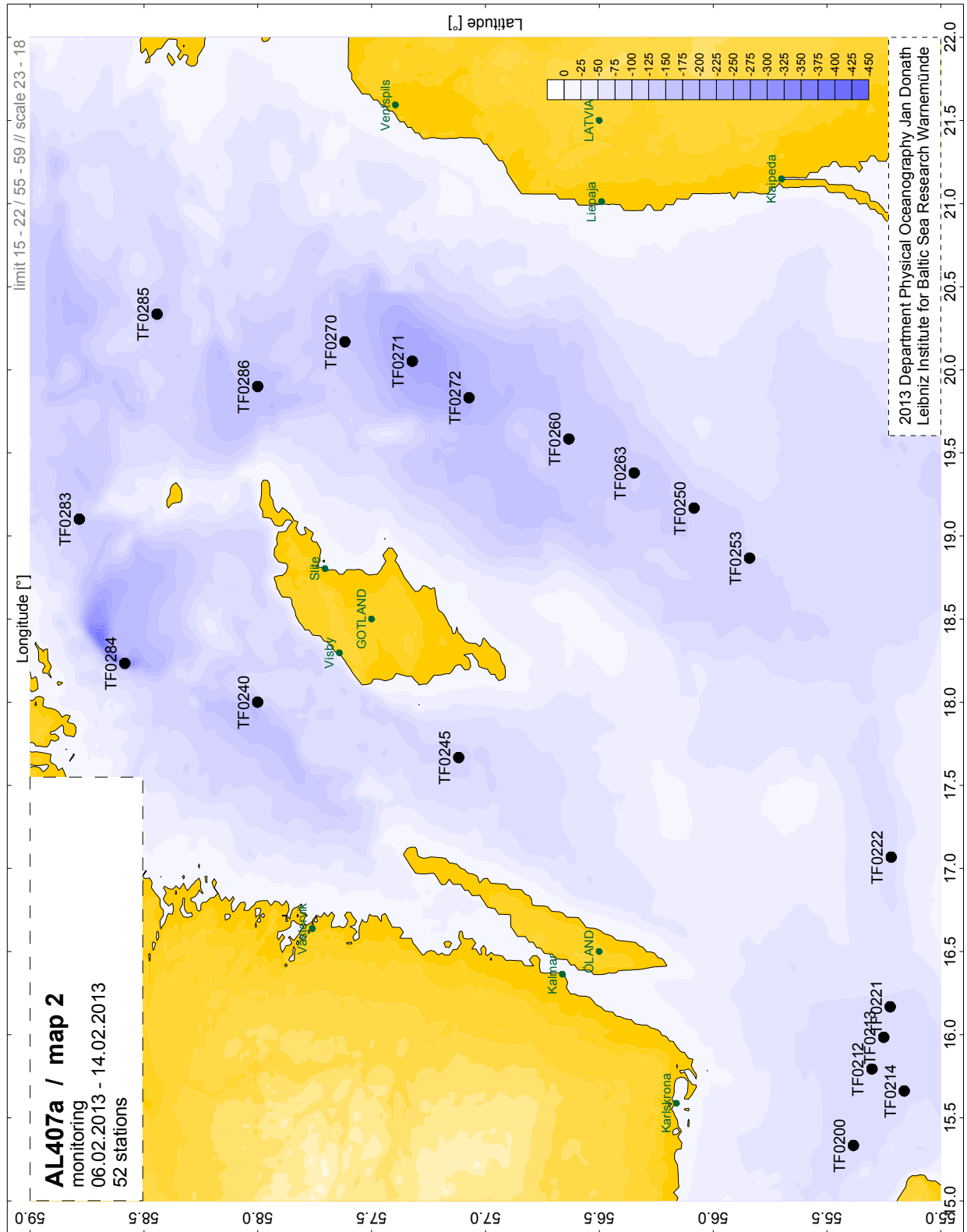
On 10/02/2012 a sediment trap has been recovered and re-layered again at position 57° 18,36' N , 020° 04.75' E.

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 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 O₂ equivalents)





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 06/02/2013	TF0360 5	1.91	15.24	4.9	0.72	22	8.48
Mecklenburg Bight 07/02/2013	TF0012 7	2.13	13.39	6.7	0.85	26	8.36
Arkona Basin 07/02/2013	TF0113 17	1.83	7.75	3.4	0.63	16	8.91
Bornholm Deep 09/02/2013	TF0213 37	2.70	7.34	3.1	0.71	15	8.63
Stolpe Channel 09/02/2013	TF0222 39	2.49	7.09	3.2	0.60	14	8.69
SE Gotland Basin - / -	TF0259 - / -						
Gotland Deep 10/02/2013	TF0271 45	2.51	7.04	3.1	0.52	11	8.56
Fårö Deep 11/02/2013	TF0286 47	2.69	7.10	3.0	0.51	11	8.57
Landsort Deep 12/02/2013	TF0284 50	1.84	6.55	4.4	0.55	15	8.57
Karlsö Deep 12/02/2013	TF0245 52	2.47	6.77	3.8	0.63	13	8.48

*) NO₃ is given as sum of NO₃⁻ and NO₂⁻ (in most samples NO₂⁻ was present only in traces)

**) see attached maps

Preliminary results of hydrographic and hydrochemical parameters at selected stations

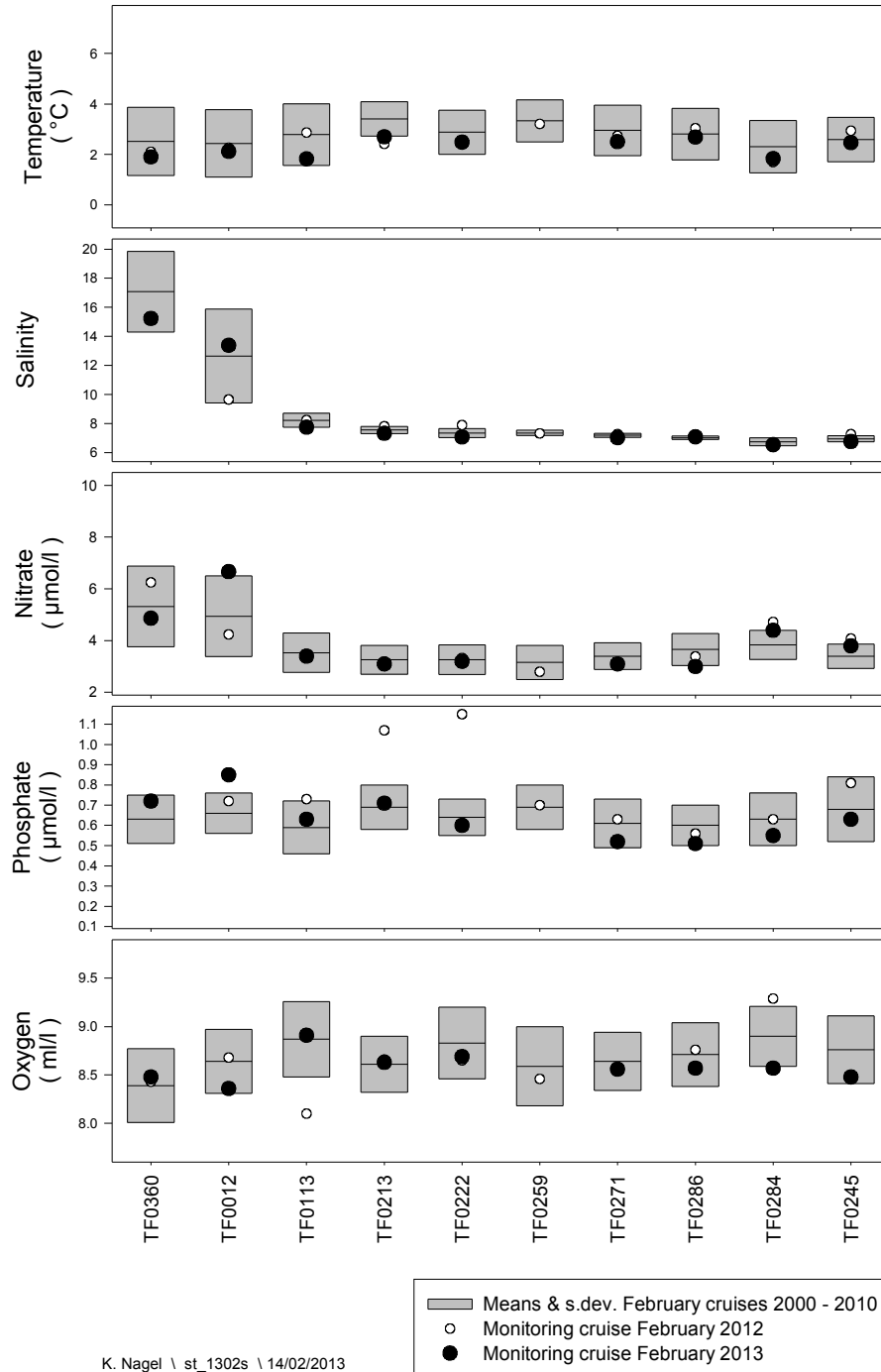
- near bottom layer -

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 06/02/2013	TF0360 5	17	2.90	19.63	6.3	0.78	24	7.87
Mecklenburg Bight 07/02/2013	TF0012 7	23	2.34	17.04	6.4	0.81	25	8.11
Arkona Basin 07/02/2013	TF0113 17	44	4.12	20.85	7.0	0.76	15	7.24
Bornholm Deep 09/02/2013	TF0213 37	85	5.82	15.62	6.1	1.52	40	3.40
Stolpe Channel 09/02/2013	TF0222 39	88	6.77	12.67	7.7	1.65	49	1.70
SE Gotland Basin - / -	TF0259 - / -							
Gotland Deep 10/02/2013	TF0271 45	232	6.41	12.12	-	6.95	110	-6.48
Fårö Deep 11/02/2013	TF0286 47	188	5.98	11.45	-	4.85	76	-2.86
Landsort Deep 12/02/2013	TF0284 50	432	5.58	10.40	-	3.90	59	-1.31
Karlsö Deep 12/02/2013	TF0245 52	106	5.29	9.80	-	3.55	58	-0.60

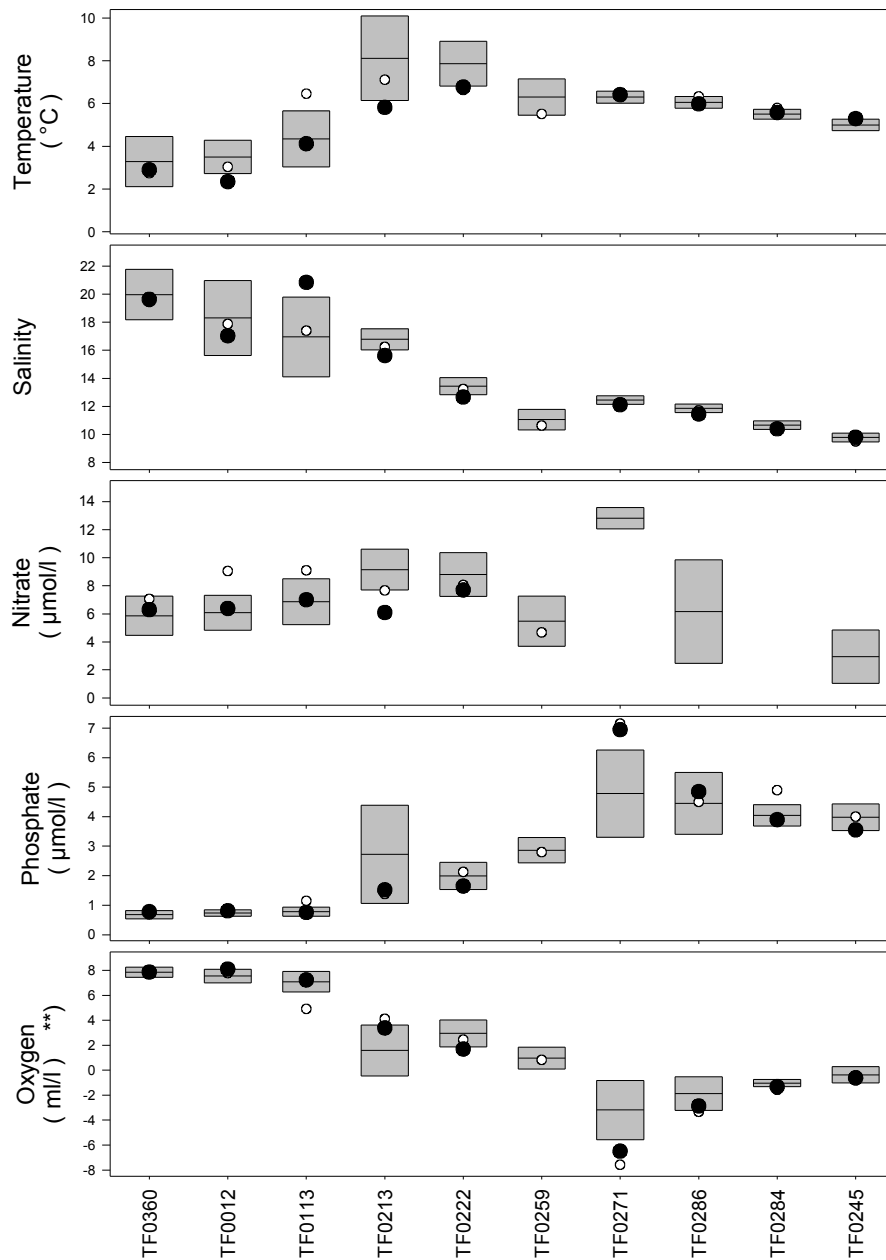
*) NO₃ is given as sum of NO₃⁻ and NO₂⁻ (in most samples NO₂⁻ was present only in traces)

**) see attached maps
H₂S was converted into negative O₂ equivalents

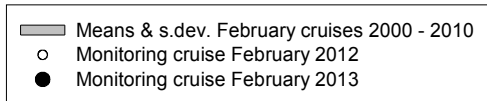
Selected stations / February cruises : near-surface layer



Selected stations / February cruises : near-bottom layer



**) : H₂S was converted to negative O₂ equivalents



K. Nagel \ st_1302b \ 14/02/2013

AL407a

Kiel Bight - Gotland Sea
06.02.2013 10:31 - 11.02.2013 18:28 UTC

