

Leibniz Institute for Baltic Sea Research Warnemünde

Cruise Report

r/v "Alkor"


Cruise- No. 06AK / 11 / 02


23 March – 01 April, 2011

Western and Central Baltic Sea

This report is based on preliminary data

Leibniz-Institut für Ostseeforschung Warnemünde
an der Universität Rostock
Seestraße 15
D-18119 Rostock- Warnemünde
GERMANY

 +49-381-5197-0

 +49-381-5197 440

1. **Cruise No.:** 06AK / 11 / 02
2. **Dates of the cruise:** from 23 March 2011 to 01 April 2011
3. **Particulars of the research vessel:**
Name: Alkor
Nationality: Germany
Operating Authority: IFM GEOMAR
4. **Geographical area in which ship has operated:**
western and central Baltic Sea
5. **Dates and names of ports of call**
6. **Purpose of the cruise**
Monitoring cruise in the framework of HELCOM programme
7. **Crew:**
Name of master: O. Secchi
Number of crew: 10
8. **Research staff:**
Chief scientist: Dr. R. Feistel
Scientists: Dr. M. Nausch
Engineers: S. Weinreben
Technicians: J. Donath, S. Trinkler, M. Karli, I. Schaub, S. Busch,
G. Plüschke, U. Hehl
9. **Co-operating institutions:**
10. **Scientific equipment**
CTDO bathysonde, plankton net, Secchi disk

11. General remarks and preliminary results

The cruise of r/v Alkor from 23 March till 01 April 2011 was carried out under mostly moderate wind (BF2-7) conditions. An exception was a front of the low "Bernhard" that passed on the evening of 27 March when wind speeds of 20 m/s occurred and harsh sea state (2.5 m waves) prevented scientific work for 12 hours. Sample filtering and related station work requested for external scientific projects, in particular at TF0271 and TF0284, caused an additional delay of approximately 24h of the regular program. Surface water temperatures varied between 2.3 °C in the Kiel Bight and 0.4°C south of Gotland. Air-temperature readings of the ship's weather station were not reliable. A mooring and a sediment trap were recovered and deployed as planned. Additionally, due to good weather conditions, a moored ADCP lost in 2007 could successfully be searched and recovered.

Two preconditions were expected to influence the observation results, (i) lasting unusually cold winter temperatures in December 2010 and February 2011 in the Baltic Sea region, including extended ice cover, and (ii) the very minor inflow activity from the North Sea during all of 2010. In fact, during the cruise no indication for recent inflow activities could be found. One of the recovered moorings indicated that a minor cold inflow had reached the Eastern Gotland Basin on 24./25.11.2010 at depths between 170 and 200 m. Despite the lack of larger inflows in 2010, the stations of the southern Baltic were free of H₂S. The southernmost station of the cruise with H₂S in the near-bottom layer is TF0263, similar to 2010. Somewhat unexpectedly, anoxic conditions in the central Baltic have not worsened essentially since last March. In the western Baltic, the silicate concentration is much higher this March than last year, see Tables 1 and 2, below. From the Bornholm to the Gotland Deep, surface salinities have slightly decreased, but increased from the Farö to the Karlsö Deep. No systematic trends are visible in near-bottom salinities and temperatures of the central basins over the year passed.

In this report, oxygen values marked with an asterisk refer to raw sensor data that may be corrected by post-processing after the cruise.*

On 24 March 2011 in the **Arkona Basin**, TF0113, the temperature profile shows minima of 0.54 °C at 32 m depth. The salty bottom layer > 12 psu extends from 41 m depth downward with a temperature maximum of 1.3 °C and an oxygen minimum of 7.7 ml/l.

In the **Bornholm Basin**, TF0213, the surface layer is very well mixed down to about 52 m. Oxygen decreases gradually across the halocline to a first minimum of 0.5* ml/l at 69 m and decreases again down to 0.3* ml/l below 78 m, with an intermediate maximum of 1.4* ml/l at about 72 m. Towards the bottom (85 m), salinity reaches a maximum of 15.3 psu. Downward from the halocline, temperature increases almost continuously to 7.5 °C at about 70 m, and drops to 7.2 °C near the bottom below an intermediate minimum of 7.0 °C at 72.5 m.

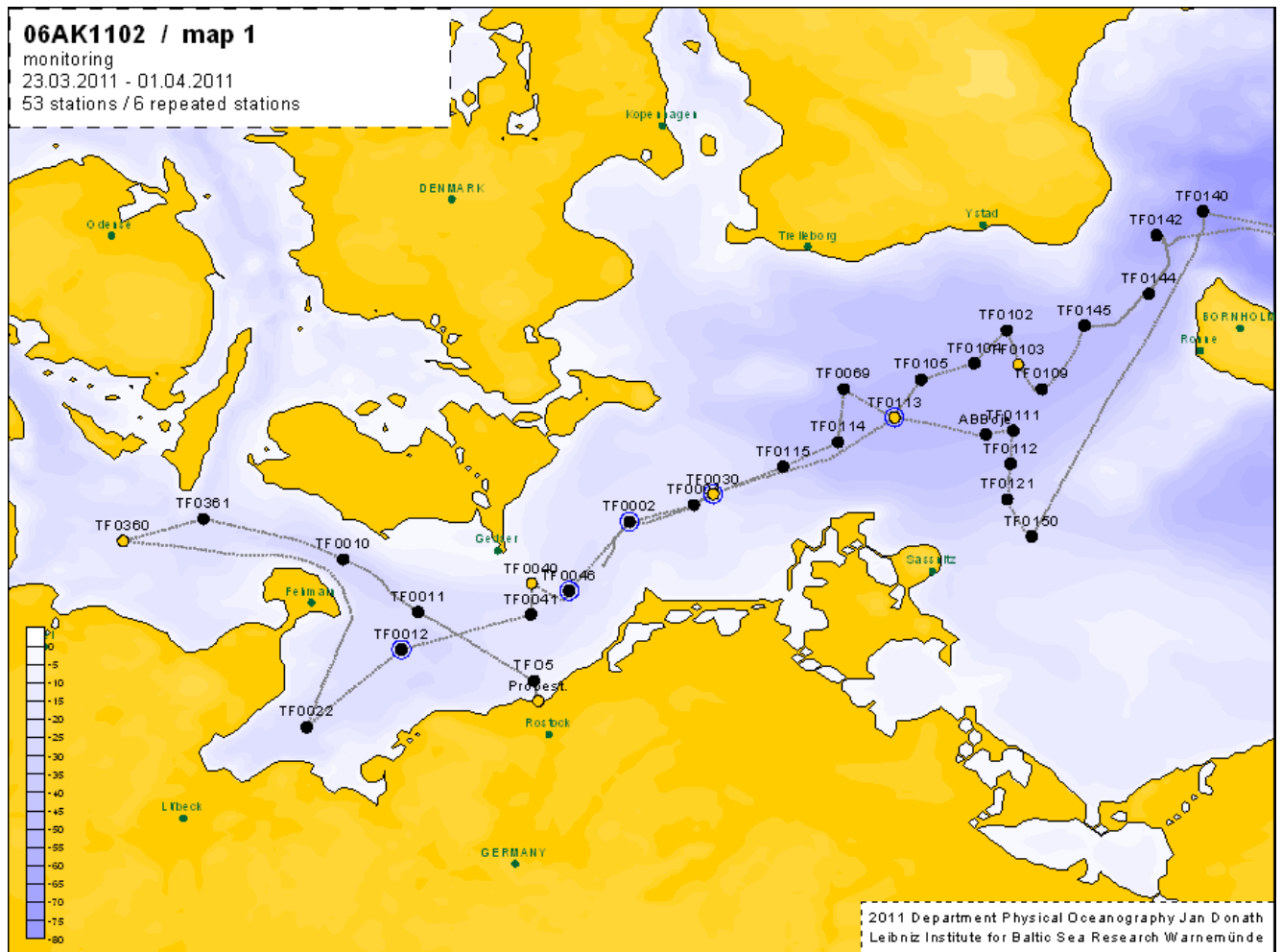
In the **Stolpe Channel**, TF0222, the temperature almost constant at 1.5 °C from the surface to 50 m, and increases further down to 6.3 °C at 90 m. The maximum salinity above the floor is 12.9 psu. Oxygen decreases continuously from 8.9* ml/l at the surface to 2.5* ml/l near the bottom.

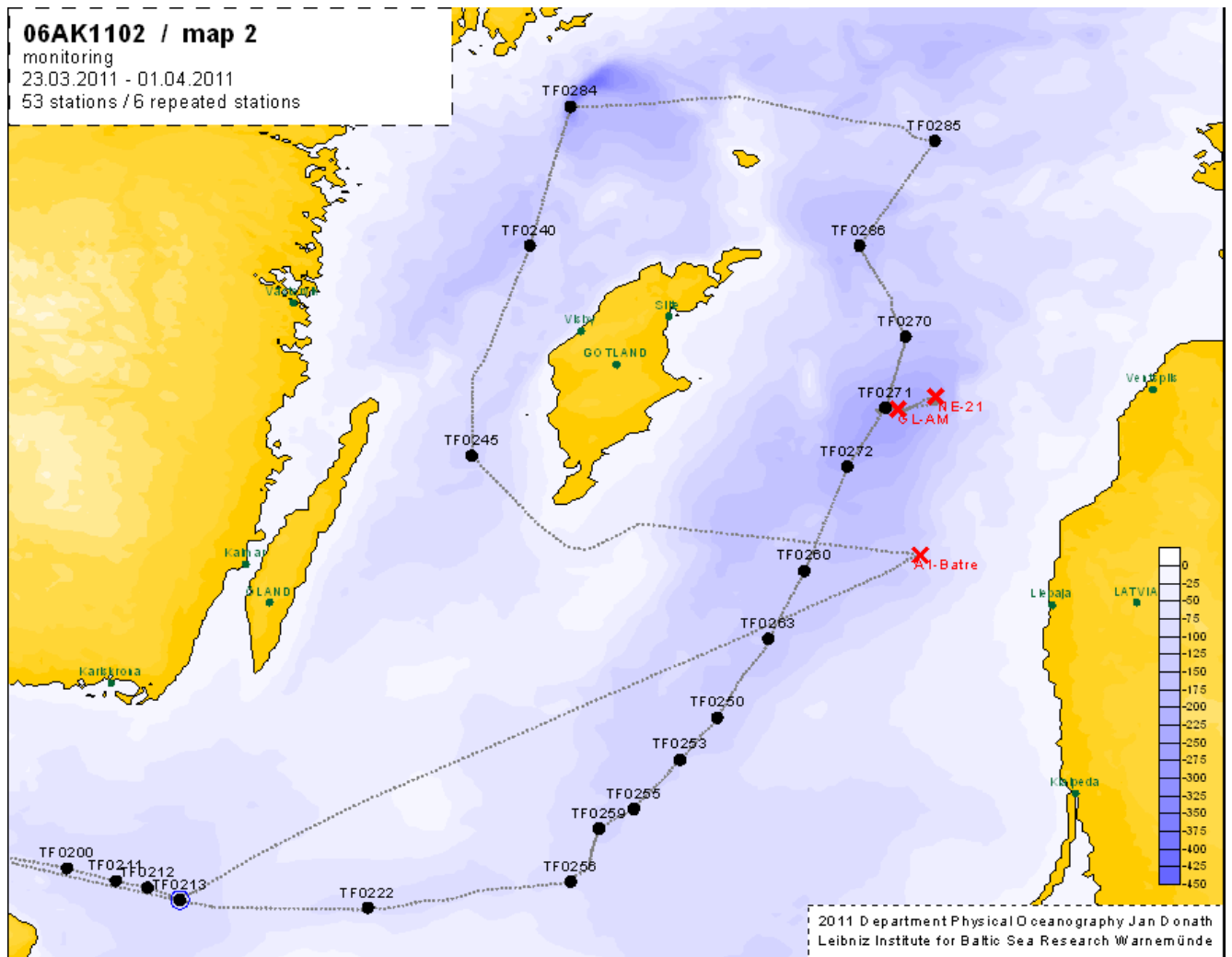
In the **South-Eastern Gotland Basin**, at TF0263 hydrogen sulfide up to -0.73 ml/l oxygen equivalent is found near the bottom, also below 150 m up to -1.58 ml/l at TF0260, and up to -4.68 below 150 m at TF0272.

In the **Eastern Gotland Basin** at TF0271, H₂S is detected from 150 m downward with a maximum of -6.99 ml/l. At the **Farö Deep** at TF0286, H₂S is detected from 125 m downward with a maximum of -2.82 ml/l, at the **Landsort Deep**, TF0284, from 100 m downward up to -0.85 ml/l, and at the **Karlsö Deep**, TF0245, from 90 m downward up to -1.20 ml/l.

Rainer Feistel, scientist in charge

- Attachments:**
- station charts
 - tables of preliminary results (surface layer and near-bottom layer)
 - transects of T, S and O₂ from Kiel Bight to Eastern Gotland Basin
 - near-bottom O₂/H₂S chart
 - preliminary map showing areas of near-bottom H₂S and O₂ deficiency





**Table 1: Preliminary data of 2011 from the surface layer (2 m) of selected regions.
Oxygen values from titration. In brackets, related data of March 2010.**

Location / Date	Station / Number	Temp. °C	Salinity psu	O ₂ ml/l	NO ₂₊₃ µmol/l	PO ₄ µmol/l	SiO ₄ µmol/l
Kiel Bight 23.03.2011	TF0360 6	2.74 (0.80)	12.46 (16.40)	9.54 (9.58)	0.02 (0.16)	0.10 (0.05)	6.60 (0.10)
Mecklenburg Bight 24.03.2011	TF0012 8	2.30 (1.15)	12.11 (14.86)	9.44 (10.17)	0.07 (0.12)	0.07 (0.05)	5.80 (0.90)
Lübeck Bight 23.03.2011	TF0022 7	2.06 (1.05)	12.08 (13.75)	9.87 (10.9)	0.12 (0.04)	0.05 (0.01)	4.90 (0.70)
Darss Sill 24.03.2011	TF0030 14	1.55 (1.18)	8.35 (7.34)	10.54 (9.62)	0.41 (1.79)	0.13 (0.48)	8.20 (14.20)
Arkona Basin 24.03.2011	TF0113 18	1.14 (1.30)	7.51 (7.35)	10.28 (9.60)	2.59 (1.49)	0.32 (0.49)	11.90 (14.90)
Bornholm Deep 15.03.2011	TF0213 27	1.43 (1.63)	7.27 (7.42)	9.20 (9.08)	3.39 (2.84)	0.62 (0.65)	13.40 (14.80)
Stolpe Channel 25.03.2011	TF0222 29	1.48 (1.62)	7.30 (7.40)	9.53 (9.11)	5.55 (2.97)	0.65 (0.61)	15.20 (13.80)
SE Gotland Basin 26.03.2011	TF0259 31	1.30 (1.24)	7.25 (7.28)	9.58 (9.08)	4.06 (3.86)	0.63 (0.55)	13.90 (11.40)
Gotland Deep 26.03.2011	TF0271 38	0.78 (1.52)	7.32 (7.51)	8.99 (9.03)	3.70 (3.82)	0.60 (0.64)	11.50 (12.90)
Farö Deep 28.03.2011	TF0286 40	0.66 (0.34)	7.24 (6.95)	9.24 (9.37)	3.91 (4.60)	0.60 (0.54)	11.80 (14.00)
Landsort Deep 29.03.2011	TF0284 42	0.69 (0.13)	6.92 (6.42)	9.30 (9.45)	2.84 (4.47)	0.57 (0.56)	16.30 (17.00)
Karlsö Deep 29.03.2011	TF0245 44	0.71 (0.64)	6.94 (6.67)	9.64 (9.44)	3.39 (3.43)	0.60 (0.56)	9.64 (16.00)

**Table 2: Preliminary data of 2011 from the near-bottom layer of selected regions.
Oxygen values from titration. In brackets, related data of March 2010.**

Location / Date	Station / Number	Depth dbar	Temp. °C	Salinity psu	O ₂ ml/l	NO ₂₊₃ µmol/l	PO ₄ µmol/l	SiO ₄ µmol/l
Kiel Bight 23.03.2011	TF0360 6	15	1.33 (0.56)	17.80 (16.58)	8.48 (9.47)	0.73 (0.28)	0.10 (0.04)	12.10 (0.60)
Mecklenburg Bight 24.03.2011	TF0012 8	20	1.02 (1.17)	15.43 (18.34)	8.15 (8.96)	5.49 (0.16)	0.42 (0.05)	16.80 (0.90)
Lübeck Bight 23.03.2011	TF0022 7	20	1.31 (1.60)	18.29 (19.15)	7.74 (6.81)	3.70 (7.41)	0.41 (0.87)	15.80 (21.80)
Darss Sill 24.03.2011	TF0030 14	20	1.19 (0.78)	13.89 (15.74)	9.48 (8.91)	1.43 (1.99)	0.17 (0.24)	11.60 (3.40)
Arkona Basin 24.03.2011	TF0113 18	40	0.85 (1.29)	11.83 (16.59)	9.15 (7.80)	6.46 (4.49)	0.53 (0.60)	17.70 (11.40)
Bornholm Deep 15.03.2011	TF0213 27	80	7.26 (9.68)	15.34 (15.80)	0.28 (1.68)	6.36 (7.19)	2.31 (1.85)	60.00 (42.20)
Stolpe Channel 25.03.2011	TF0222 29	80	5.67 (6.77)	11.86 (12.34)	4.95 (4.23)	7.87 (8.18)	1.52 (1.47)	34.80 (32.20)
SE Gotland Basin 26.03.2011	TF0259 31	80	5.60 (5.83)	10.26 (10.04)	0.46 (0.56)	5.68 (5.88)	2.80 (2.72)	47.60 (45.20)
Gotland Deep 26.03.2011	TF0271 38	200	6.43 (6.36)	12.18 (12.37)	-4.34 (-4.93)	0.36 (0.28)	5.40 (5.52)	79.10 (83.90)
Farö Deep 28.03.2011	TF0286 40	150	6.46 (6.64)	11.80 (11.76)	-1.77 (-2.12)	0.61 (0.15)	4.35 (4.10)	63.80 (52.90)
Landsort Deep 29.03.2011	TF0284 42	400	6.00 (6.10)	10.62 (10.79)	-0.72 (-0.53)	0.23 (0.12)	3.70 (3.62)	56.30 (56.30)
Karlsö Deep 29.03.2011	TF0245 44	100	5.48 (5.40)	10.02 (9.99)	-1.10 (-0.58)	0.14 (0.08)	3.95 (3.75)	57.50 (57.90)

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Kiel Bight - Gotland Sea
23.03.2011 11:41 - 31.03.2011 06:23 UTC

