

Leibniz Institute for Baltic Sea Research Warnemünde

Cruise Report

r/v "Elisabeth Mann Borgese"


Cruise- No. EMB 040


12 – 22 March, 2013

Western and Central Baltic Sea

This report is based on preliminary data

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1. **Cruise No.:** EMB 040
2. **Dates of the cruise:** from 12 March 2013 to 22 March 2013
3. **Particulars of the research vessel:**
Name: Elisabeth Mann Borgese
Nationality: Germany
Operating Authority: IOW Warnemünde
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: U. Scholz
Number of crew: 11
8. **Research staff:**
Chief scientist: Dr. R. Feistel
Scientists: Dr. S. Feistel
Engineers: I. Schuffenhauer
Technicians: J. Donath, S. Beier, Bi. Sadkowiak, A. Tschakste,
E. Heym, C. Gehlert, M. Pöttsch
9. **Co-operating institutions:**
10. **Scientific equipment**
CTDO bathysonde, towed CTD, plankton net, Secchi disk

11. General remarks and preliminary results

The cruise of r/v "Borgese" from 12 till 22 March 2013 was carried out under calm (less BF 5) wind conditions in the first half and under stronger (BF 6-8), cold and persistent winds from NE in the second half. The latter, in combination with rapid freezing-over of water splashes and growing ice cover on ship and wind-exposed equipment, prevented a planned Scanfish track from the northern tip of Gotland to the Bornholm-gat. The transition between the wind conditions happened on 18 March when the Vb-low "Birk" moved from the Adriatic to the Baltic Sea. At the Darss Sill a mooring could be successfully recovered despite difficult wave conditions.

Surface water temperatures varied between 0.9 °C in the Mecklenburg Bight and 2.0 °C south of Gotland. Air-temperature readings were generally below the freezing point, between -0.2 °C near Bornholm and -4.0 °C near Gotland.

Two preconditions were expected to influence the observation results, (i) the continuing cold winter conditions with formation of new ice, caused by lasting easterly winds and permanent strong outflow of surface water from the Baltic Sea, and (ii) the recent Major Baltic Inflow event of November/December 2011 and weaker ones after December 2012.

In the western Baltic, surface nutrient conditions were exceptionally high for the time of the year, indicating that the spring bloom there has not or yet incompletely begun, or alternatively, that surface waters with new plankton were mostly flushed to the Kattegat and were replaced by nutrient-rich water from the east.

On the way from the Bornholm Deep to the Gotland Deep, a weak oxygen signal was observed in the near-bottom layer as far downstream as TF0263. All over the cruise except Landsort Deep, no hydrogen sulfide could be detected at depths less than 120 m, regardless of bathymetric station depth.

The deep basins except Karlsö Deep showed lower temperature and lower salinity than last year in the near-bottom layer. The observed combined changes in T and S resulted in reduced density. This observation may be explained by lateral inflow of denser bottom water from adjacent basins (likely in delayed response to inflow events), followed by vertical mixing. To illustrate these effects, the density changes computed from TEOS-10 Reference Salinity for selected stations of Table 2 at the depths given therein are:

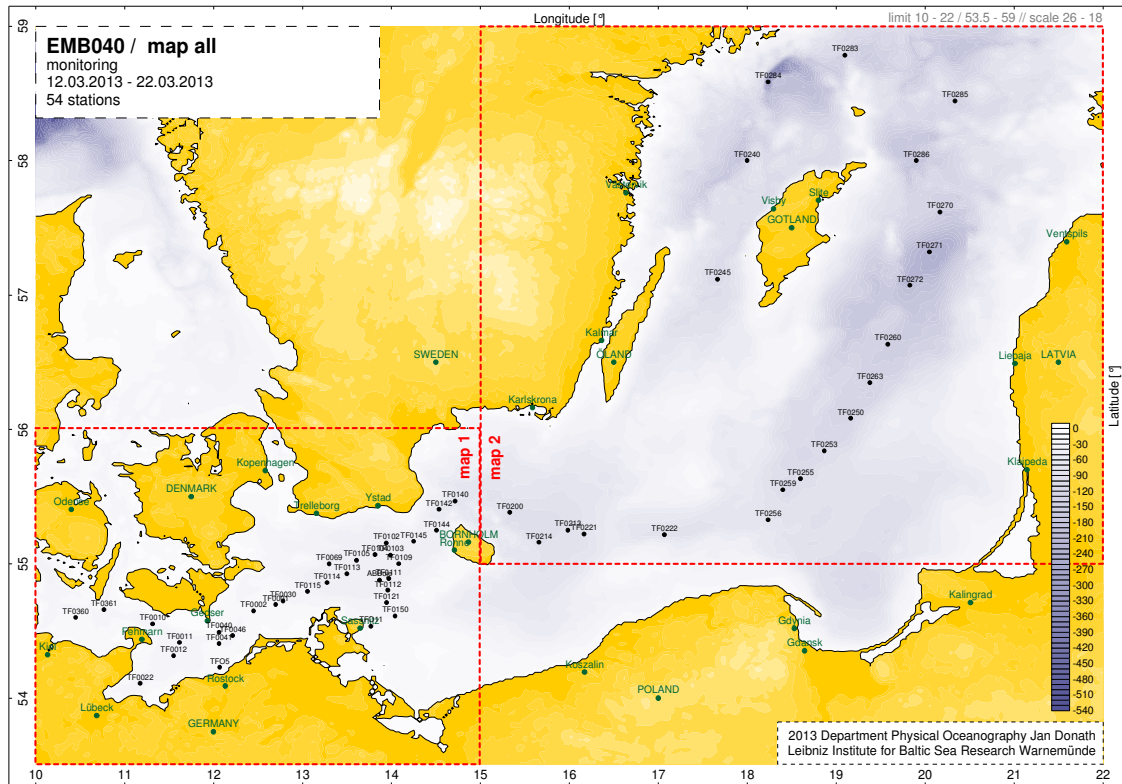
Station: 2012 -> 2013
TF0259: 1008.10 -> 1007.87 kg/m³
TF0271: 1010.47 -> 1010.35 kg/m³
TF0286: 1009.83 -> 1009.64 kg/m³
TF0284: 1010.19 -> 1010.09 kg/m³
TF0245: 1008.00 -> 1008.02 kg/m³

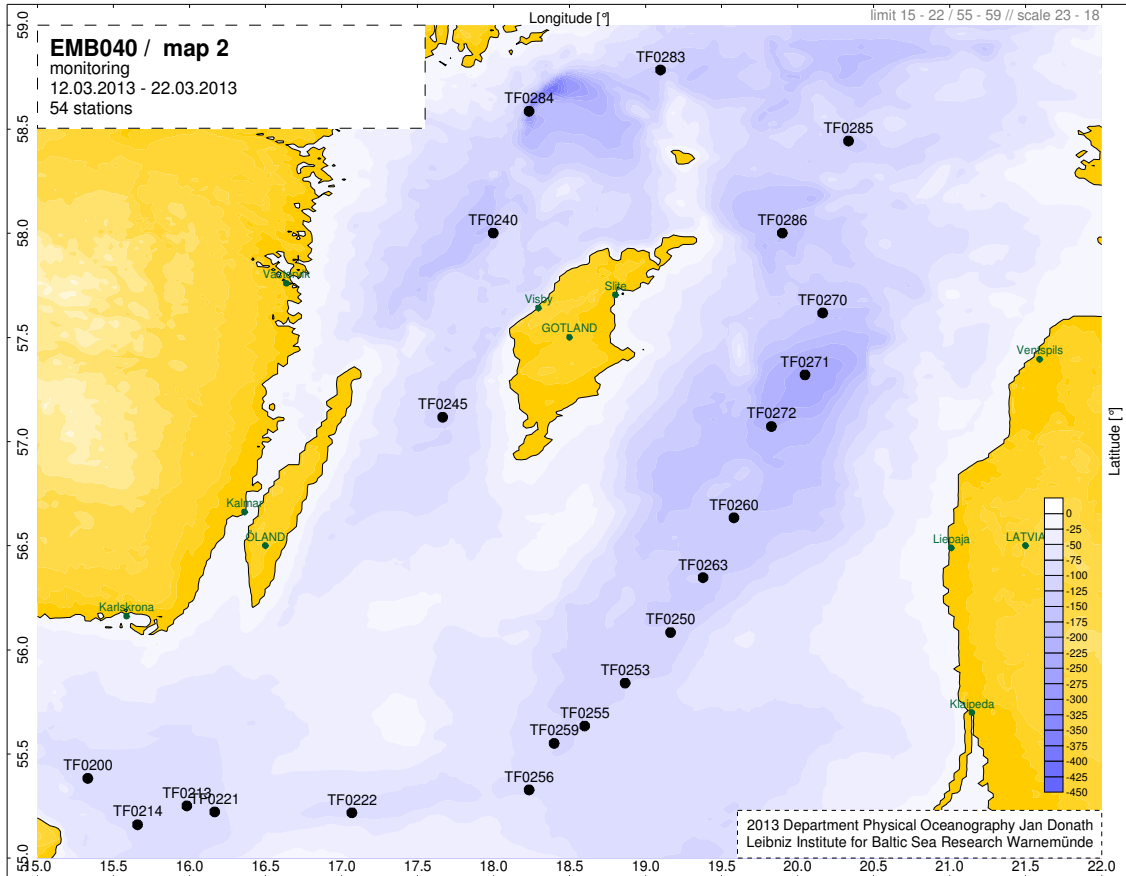
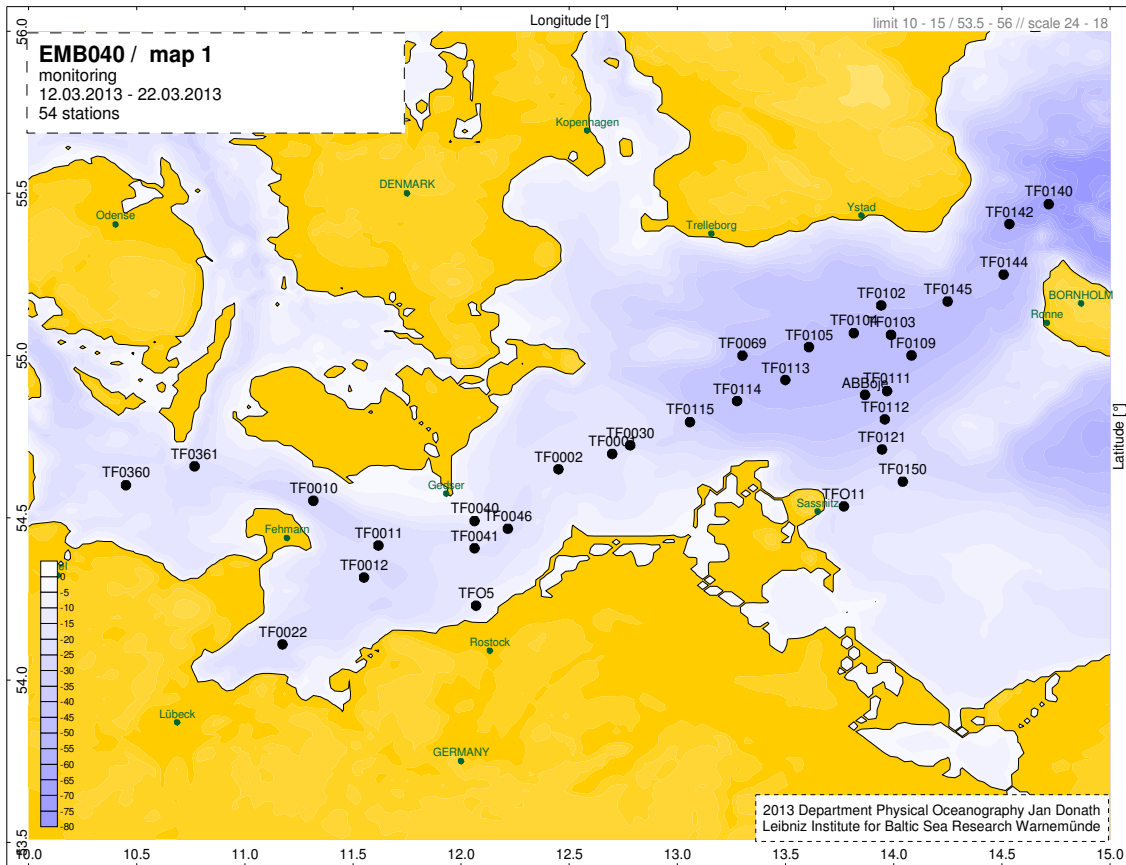
In this report, oxygen values marked with an asterisk refer to raw sensor data.*

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
- transects of T, S and O₂ east of the Bornholm Basin
- near-bottom O₂/H₂S chart





**Table 1: Preliminary data of 2013 from the surface layer (2 m) of selected regions.
Oxygen values from titration. In brackets, related data of March 2012.**

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 12.03.2013	TF0360 5	1.20 (5.37)	13.08 (14.40)	8.85 (8.94)	5.49 (0.17)	0.67 (0.03)	20.00 (1.10)
Mecklenburg Bight 13.03.2013	TF0012 7	0.91 (5.55)	9.86 (11.72)	9.03 (9.20)	4.49 (0.15)	0.68 (0.13)	17.80 (3.10)
Lübeck Bight 13.03.2013	TF0022 6	1.26 (5.57)	10.95 (12.81)	8.92 (9.74)	6.11 (0.15)	0.61 (0.04)	19.50 (0.80)
Darss Sill 13.03.2013	TF0030 13	1.02 (3.63)	7.72 (8.15)	9.45 (9.12*)	4.92	0.61	17.80
Arkona Basin 13.03.2013	TF0113 17	1.25 (3.46)	7.59 (7.80)	9.30 (8.82*)	3.05	0.61	15.80
Bornholm Deep 14.03.2013	TF0213 29	1.87 (3.15)	7.20 (7.67)	9.21 (8.75*)	3.18	0.70	15.80
Stolpe Channel 15.03.2013	TF0222 31	1.78 (3.21)	7.23 (7.56)	9.17 (9.06)	3.03 (2.41)	0.66 (0.82)	14.60 (17.2)
SE Gotland Basin 15.03.2013	TF0259 33	1.95 (3.18)	7.20 (7.41)	8.97 (8.96)	3.24 (3.03)	0.58 (0.67)	12.50 (14.00)
Gotland Deep 16.03.2013	TF0271 40	1.52 (3.04)	7.17 (7.34)	7.92 (8.91)	3.93 (3.18)	0.55 (0.66)	12.70 (13.50)
Farö Deep 17.03.2013	TF0286 42	1.43 (2.75)	7.11 (6.92)	9.18 (9.10)	3.70 (4.79)	0.57 (0.63)	13.10 (14.20)
Landsort Deep 18.03.2013	TF0284 45	1.05 (3.11)	6.55 (6.96)	9.55 (9.09)	4.11 (3.44)	0.51 (0.59)	16.40 (15.20)
Karlsö Deep 18.03.2013	TF0245 47	1.85 (3.05)	6.78 (7.24)	8.94 (9.05)	3.66 (3.02)	0.59 (0.65)	13.60 (14.70)

Table 2: Preliminary data of 2013 from the near-bottom layer of selected regions.

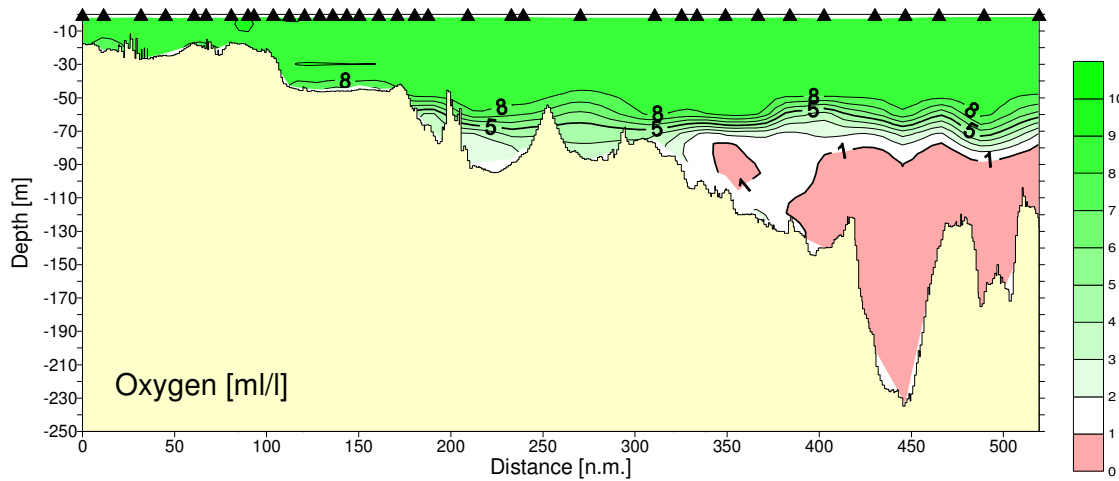
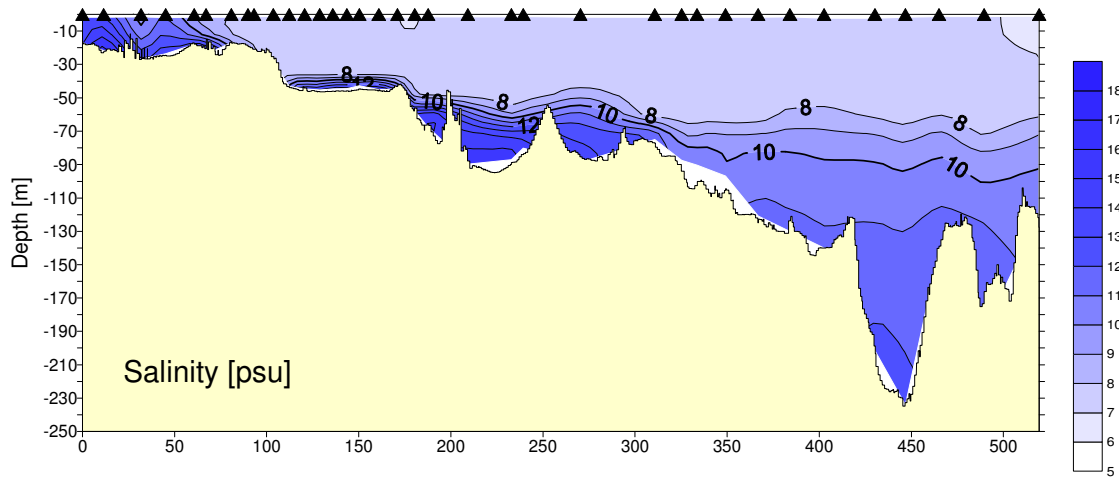
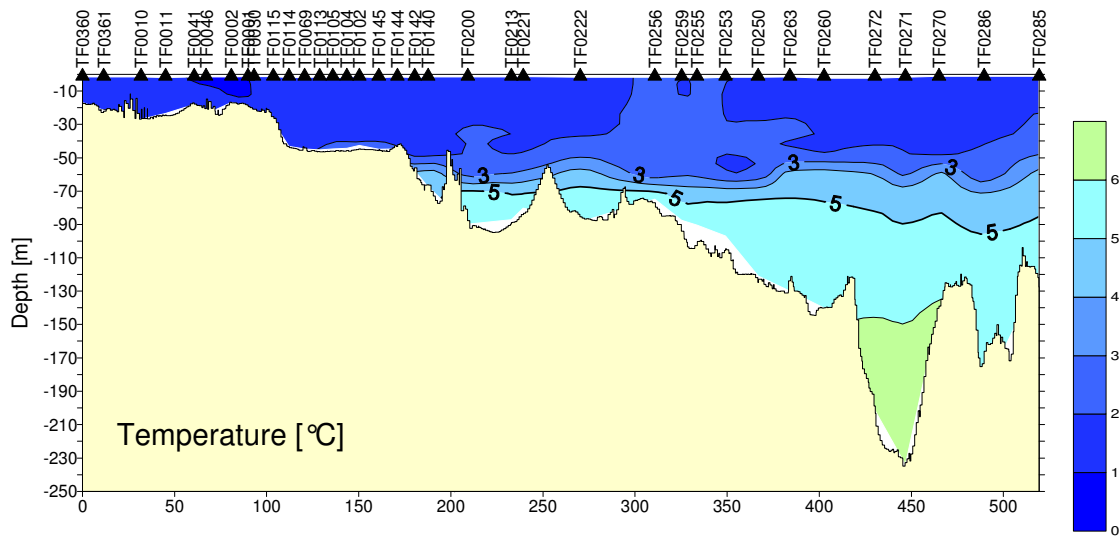
Oxygen values from titration. Negative oxygen values are equivalents of H₂S.

In brackets, related data of March 2012.

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 12.03.2013	TF0360 5	15	1.21 (3.77)	14.35 (18.04)	8.73 (7.53)	5.45 (0.14)	0.66 (0.13)	20.60 (1.4)
Mecklenburg Bight 13.03.2013	TF0012 7	20	1.53 (2.60)	12.71 (15.88)	8.71 (7.68)	7.41 (4.15)	0.74 (0.52)	21.00 (14.1)
Lübeck Bight 13.03.2013	TF0022 6	20	1.26 (2.95)	12.47 (17.13)	8.82 (5.20)	8.70 (9.02)	0.70 (0.63)	21.80 (27.5)
Darss Sill 13.03.2013	TF0030 13	20	1.02 (2.91)	7.78 (10.34)	9.26 (8.50*)	3.87	0.64	15.20
Arkona Basin 13.03.2013	TF0113 17	40	1.32 (2.38)	7.76 (16.31)	9.27 (7.23*)	3.34	0.62	16.20
Bornholm Deep 14.03.2013	TF0213 29	80	5.50 (7.01)	15.05 (15.80)	2.37 (2.97*)	5.46	1.62	48.10
Stolpe Channel 15.03.2013	TF0222 31	80	5.37 (5.53)	13.26 (12.26)	3.42 (4.21)	6.57 (7.54)	1.48 (1.57)	39.80 (33.9)
SE Gotland Basin 15.03.2013	TF0259 33	80	4.29 (4.80)	9.43 (9.75)	- (3.06)	5.07 (5.36)	1.28 (1.99)	30.00 (36.5)
Gotland Deep 16.03.2013	TF0271 40	200	6.35 (6.42)	12.00 (12.15)	-5.45 (-5.45)	0 (0)	5.45 (5.67)	89.70 (88.3)
Farö Deep 17.03.2013	TF0286 42	150	5.87 (6.23)	11.35 (11.62)	-2.15 (-2.65)	0 (0)	4.40 (4.47)	68.40 (69.4)
Landsort Deep 18.03.2013	TF0284 45	400	5.55 (5.75)	10.38 (10.52)	-1.24 (-1.54)	0 (0)	3.70 (3.65)	59.70 (57.9)
Karlsö Deep 18.03.2013	TF0245 47	100	5.15 (5.03)	9.54 (9.51)	0.0 (0.0)	0.69 (0.24)	3.25 (3.20)	50.30 (54.6)

EMB040

Kiel Bight - Gotland Sea
 12.03.2013 15:37 - 17.03.2013 14:08 UTC



EMB040

200-263
14.03.2013 14:09 - 15.03.2013 14:29 UTC

