

Leibniz Institute for Baltic Sea Research Warnemünde

Monitoring cruise

FS „Elisabeth Mann Borgese“

Cruise- No. EMB-095

2nd – 14th February 2015

Western and Central Baltic Sea

This report is based on preliminary data

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1. Basic information

Ship: FS Elisabeth Mann Borgese
Nationality: Germany
Operating Authority: Baltic Sea Research Institute Warnemünde (IOW)
Cruise: EMB-095
Date: 02.02.-14.02.2015
Master: Volker Ziegner
Number of crew: 11
Chief scientist: Dr. Michael Naumann
Number of research staff: 12

Geographical area in which ship has operated:

western and central Baltic Sea

Purpose of the cruise

Monitoring cruise in the framework of HELCOM programme, additional measurement programmes to follow the Major Baltic Inflow of December 2014

Research staff:

	Name	On board	Institution	Responsibility
1	Michael Naumann	02.02.-14.02.2015	IOW	CTD, VMADCP, chief scientist
2	Johann Ruickoldt	02.02.-14.02.2015	IOW	CTD, CTD-maintenance
3	Jan Donath	02.02.-14.02.2015	IOW	CTD, QM CTD-measurements
4	Birgit Sadkowiak	02.02.-14.02.2015	IOW	Nutrients, QM laboratory analysis
5	Andrea Tschakste	02.02.-14.02.2015	IOW	Organic contaminants
6	Marion Abraham	02.02.-14.02.2015	IOW	Organic contaminants
7	Susanne Schöne	02.02.-14.02.2015	IOW	Dissolved oxygen
8	Nicolas Raab	02.02.-14.02.2015	IOW	Dissolved oxygen
9	Jan Werner	02.02.-14.02.2015	IOW	Trace gas
10	Michael Pöttsch	02.02.-14.02.2015	IOW	Biological sampling, Frahmplot
11	Stephanie Mothes	02.02.-14.02.2015	University of Rostock	Microbiological sampling
12	Uwe Hehl	02.02.-14.02.2015	IOW	Mooring, Frahmplot

Scientific equipment:

CTD + Rosette water sampler, glass bowl sampling and in situ pump for sampling of organic pollutants (PAH), Phytoplankton net (Apstein), Zooplankton net (WP2), Secchi disk, nutrient analyser, oxygen analyser, Frahmplot sediment corer, Equilibrator/sensor system for CH₄, CO₂ and N₂O measurements in surface waters

2. General remarks and preliminary result:

The first monitoring cruise of the year 2015 in a series of five expeditions performed annually by the Leibniz Institute for Baltic Sea Research Warnemünde was carried out with FS “Elisabeth Mann Borgese“ between February 2nd and 14th 2015. The cruise is part of the German contribution to the HELCOM COMBINE program and contributes to IOW’s long term data series in the central Baltic Sea. The data acquired are used for regular national and international assessments of the state of the Baltic Sea, are analysed in numerous publications, and provide the scientific basis for measures to be taken for the protection of the ecosystem Baltic Sea.

Additionally, the measurements were focused to investigate the propagation of the Major Baltic Inflow from December 2014 and its impact on environmental conditions in the deep basins of the central Baltic.

The area under investigation covered the Baltic Sea between Kiel Bight and the northern Gotland Sea (Fig. 1). Marine meteorological, hydrographic, hydrochemical and hydrobiological investigations were performed according to the COMBINE program of HELCOM. The majority of stations is located along a SW-NE transect, describing the state in the succession of basins from the western to the central Baltic as main information (Fig. 5). Additional stations from the Bornholm to the Western Gotland Basin were done to investigate a possible western pathway of the saline water intrusion (Fig. 6). The highstand of the inflowing salt water in the Bornholm Basin up to -55 m gave indications that the Middle Bank can be passed for a direct ventilation of the Western Gotland Basin. In the Eastern Gotland Basin additional stations were sampled to get an area-wide overview of the physical, chemical and biological state of suboxic to anoxic conditions before the inflow arrives. The mooring “Gotland central” equipped with sediment traps and hydrographic sensors was recovered and again deployed on 10th February. Four planned sampling stations of the long term observations in the Northern Central Basin and northern part of the Western Gotland Basin were deleted. We got not a permission to sample the Landsort Deep as a key station of this area. The other 3 stations were deleted because of time- and route effectiveness after the bad weather period from 7th to 9th February.

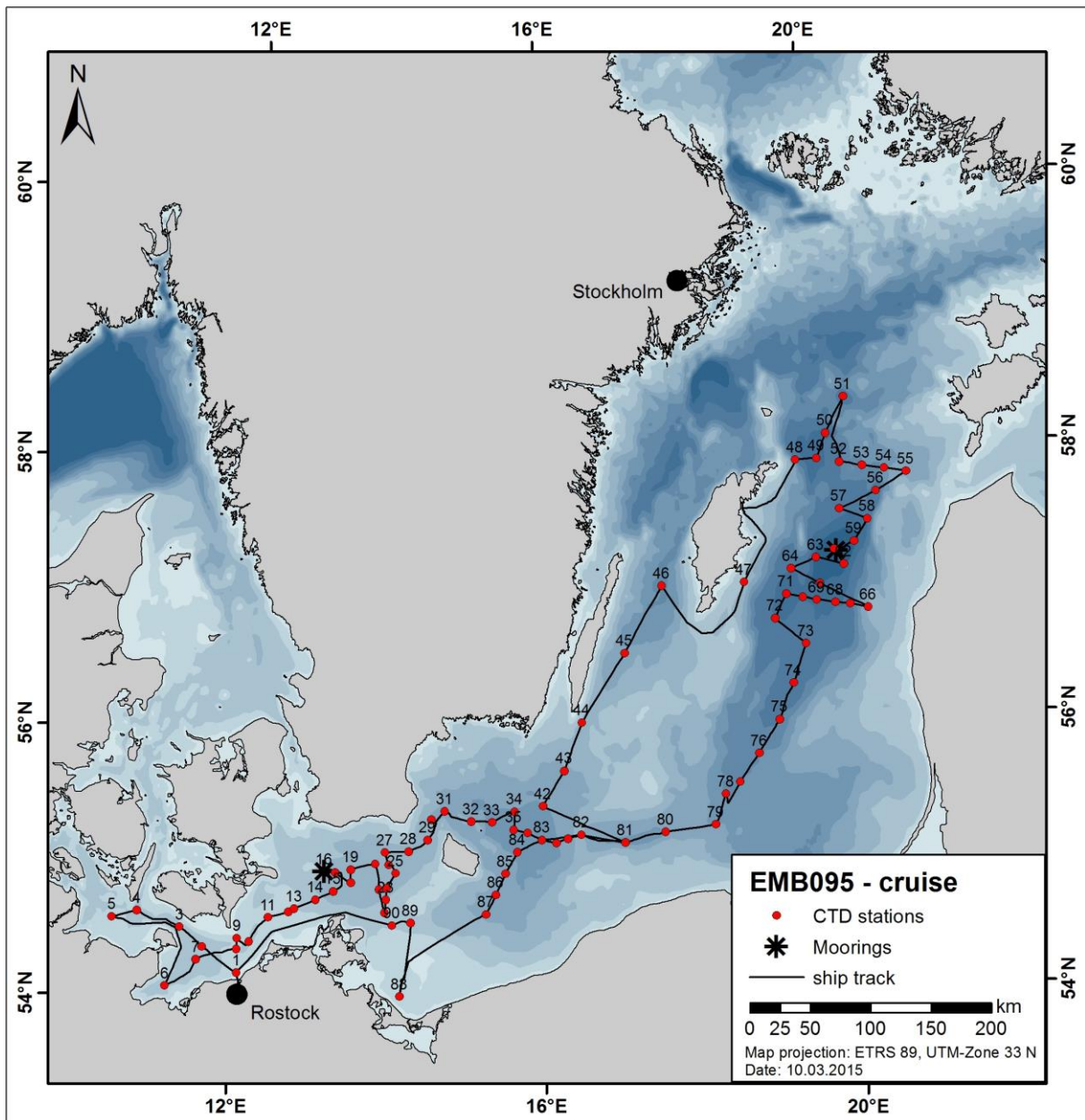


Figure 1: Map of stations and ship track of cruise EMB-095 from 2nd to 14th February. Red dots indicate the position of CTD stations with labels of the station number (Tab. 3).

- The **weather situation** during the cruise was often changing between sunny and calm phases up to bad stormy weather periods. It was influenced by the low pressure cells “Othmar” and “Patrick” moving from the north Atlantic Ocean to northern Europe and an extensive strong Highpressure “Gabriela” of up to 1040 hPa over Ireland moving to central Europe. Air pressure ranged between 990 and 1031 hPa. The Wind speed changed often and ranged between 1 and 9 Bft. Wind directions changed between all directions but nearly 2/3 of the cruise western directions are dominating. Two days of gale with gusts up to 11 Bft from northern direction hampered the work and we had to stay in the harbour of Slite at the northeast coast of Gotland from 7th to 9th February. Air temperature ranged between -1.8 °C (3rd Feb.) in the Mecklenburg Bight up to 7.1 °C (10th Feb.) in the Eastern Gotland Basin.

The following hydrographical and hydrochemical characteristics have been observed during the cruise (cf. Tables 1 and 2, Figures 4 to 8):

- **Surface temperatures** varied slightly between 4.1 °C (Stolpe Channel) and 3.03 °C (Kiel Bight). In all investigated areas of the Baltic Sea, temperatures are well above the long-term mean after a record year of sea surface temperatures in the Baltic Sea (SIEGEL et al. 2015) and so far extreme mild winter 2014/2015 with a cold sum of 15.4 K d at the weather station Warnemünde. The water column is mixed completely down to the halocline (see fig. 5).
- **Deep water layer temperatures** (bottom near depths) increases and decreases slightly in the central Baltic Proper during the last year due to smaller salt water intrusions in spring to summer 2014. Actually the Bornholm Deep is affected by warm bottom water due to the recent inflow of December 2014. At all key stations the temperatures are still higher as the long-term mean. Figure 7 shows the penetration of first inflowing water at the eastern part of the Eastern Gotland Basin with temperatures more than 8 °C, which could be classified as former uplifted bottom water of the Bornholm Basin. In Figure 5 this situation can be seen longitudinal cross section of the basins and pathway of the salt water intrusion.

	Feb 2013	Febr. 2014	Aug. 2014	Febr. 2015	Mean 1971/90
Bornholm D.	5.82 °C	8.65 °C	5.92 °C	7.15 °C	6.1 °C
Gotland Deep	6.41 °C	6.36 °C	6.02 °C	6.71 °C	5.6 °C
Farö Deep	5.98 °C	5.76 °C	5.87 °C	6.17 °C	5.2 °C
Landsort D.	5.58 °C	5.34 °C	5.19 °C	not sampled	4.8 °C
Karlsö Deep	5.29 °C	5.08 °C	5.00 °C	5.03 °C	4.2 °C

- The recent major Baltic inflow from December 2014 is the third largest that have occurred since 1880 and has an estimated inflow volume and salt transport of 198 km³ and 4 Gt (MOHRHOLZ et al. 2015). This event exceeds the former events of 2003 and 1993 and will influence the deep basins around Gotland. After ten years of stagnation this succession of intrusions is documented by a slightly increasing **salinity in the bottom layer** in the central Baltic Proper:

	Nov. 2013	Nov. 2014	Feb. 2015
Gotland Deep	12.07	12.23	12.31
Farö Deep	11.43	11.60	11.81
Landsort Deep	10.43	10.45	not sampled
Karlsö Deep	10.10	9.75	9.78

- Thus, the **oxygen situation in the deep water** of central basins (>100 m water depth) documents this recent inflow activity of 2014 very well. Hydrogen sulphide concentrations (expressed as negative oxygen equivalents) in the near-bottom layer were high in November 2013 as maximum stage of the stagnation period and

decreased drastically in the Eastern Gotland Basin (Gotland Deep, Farö Deep). Northern parts and the Western Gotland Basin are not effected by this intrusions so far, but the high volume of the December event will most probably turn the entire Baltic deepwater conditions from anoxic to oxic, with widespread consequences for marine life and biogeochemical cycles. Figure 5 and 6 visualize the propagation of the inflowing highly saline water from the Bornholm Basin via the Stolpe Sill to the southwestern part of the Eastern Gotland Basin. The thesis of a direct overflow from the Bornholm Basin via the Middle Bank into the Western Gotland Basin cannot be approved, because of more or less constant Hydrogen sulphide values in the Karlsö Deep since November 2013.

	Nov. 2013	Nov. 2014	Feb. 2015
Gotland Deep	-8.75 ml/l	-1.71 ml/l	-0.92 ml/l
Farö Deep	-7.74 ml/l	-2.41 ml/l	-1.07 ml/l
Landsort Deep	-1.32 ml/l	-0.95 ml/l	not sampled
Karlsö Deep	-1.20 ml/l	-1.25 ml/l	-0.86 ml/l

- The **nutrient situation** in the surface layer is typical for the winter season, except in the Lübeck Bight. In this western Baltic area the phosphate and nitrate values are lowered, because the biological production like the diatom bloom has started (table 1).
- In the deep waters of the **central basins** (>100 m water depth), the hydrographic situation is mirrored. The ventilation of the Eastern Gotland Basin since summer 2014 caused decreasing phosphate, ammonium and silicate concentrations (table 2). The values are halved or even more decreased since November 2013. Also silicate concentrations have decreased from 126.8 $\mu\text{mol/l}$ to 54.7 $\mu\text{mol/l}$ since that stage at the Gotland Deep.
- Samples for **phyto- and zooplankton** were collected for later analysis in the laboratory.
- **Additional program:**
 One complete depth profile of station TF271 for al longterm data collection of CT, AT, and pH (photospectrometric)(responsible scientist: Dr. B. Schneider)
 Equilibrator/sensor system for continuous measurement of CH₄, CO₂, and N₂O in surface waters using off-axis integrated cavity output spectroscopy (responsible scientist: Prof. G. Rehder, Jan Werner).
 Water samples for CH₄ and N₂O measurements in different water depths at 12 stations along the cruise track. Part of a Phd work on studies about greenhouse gas conversion in marine systems with distinct oxygen dynamics (responsible scientist: Prof. G. Rehder, Jan Werner).
 Filtration of water samples from different water depths at selected stations for analysis of bacterial DNA, RNA and cell numbers (flow cytometry and fluorescence

in situ hybridization) to investigate the impact of the inflow on bacterial communities (Responsible scientists: Prof. K. Jürgens, B. Bergen).

At station TF213 (Bornholm Basin) are additional phyto- and microzooplankton samples taken by WP2 and Apstein nets as well as water samples (responsible scientist: Dr. J. Dutz).

In the Gotland Deep (station TF271) are water samples from the oxic and anoxic water layer taken for a long-term study of redox-sensitive trace-elements such as iron and manganese. The main aim of the study is to assess the impact of the inflow from December 2014 on the concentrations of the dissolved species Fe(II) and Mn(II) (responsible scientist: Dr. D. Meyer).

In the Bornholm and Eastern Gotland Basin are 4 samples (TF213, TF271, TF272, TF285) of sea bed sediments taken to analyse the resettlement of foraminifera due to the impact of the Major Baltic Inflow of December 2014 (responsible scientist: Dr. M. Moros).

At the Gotland Deep (station TF271) a Frahmplot sediment core of the surface sediments up to 1m depth is taken to analyse the concentrations of organic pollutants. For the same task are done watersampling by an in situ pumpsystem in the deep water layer of the Bornholm Deep and Gotland Deep (stations TF213, TF271) (responsible scientist: Prof. D. Schulz-Bull).

For the BONUS project BLUEPRINT are water sampling done at the stations TF12, TF01, ABBOJE, TF245, TF271 and OBBOJE for RNA isolation. The 2 l samples are fixed by a fixative based on phenol-ethanol to keep microbiological contents in situ and stored at -80 °C (responsible scientist: Dr. C. Bennke, PD M. Labrenz).

A mooring was recovered at the FINO-2 platform closely located to the BALTIC 2 offshore windpark installation site at the Kriegers Flak for the IOW/BSH FINO-2 project (responsible scientists: E. Stohr, S. Krüger).

Attachments:

Tables 1 and 2: Preliminary results of selected parameters in the surface layer and the near bottom water layer - (unvalidated results)

Figures 2 and 3: detailed Track charts

Figure 4: Oxygen/hydrogen sulphide in the bottom near layer for selected stations

Figure 5-8: Cross sections showing the hydrographic parameters temperature, salinity and oxygen in the water column of different key areas

Table 3: List of stations

Attachment 11: Protocol of mooring deployment „Gotland – central”, 10th February 2015

Warnemünde 14th March 2015

Dr. Michael Naumann
(scientist in charge)

Table 1: Surface water layer (about 1 m depth)

Area Date	Station Name /No.*	Temp. °C	Sal. psu	O ₂ ml/l	PO ₄ µM	NO ₃ µM	SiO ₄ µM
Kiel Bight 02.02.2015	TFO360/05	3.03	20.76	7.98	0.65	7.53	13.8
Meckl.Bight 03.02.2015	TFO012/07	3.06	12.62	8.28	0.61	5.51	13.2
Lübeck Bight 03.02.2015	TFO022/06	3.07	19.04	8.07	0.12	0.01	3.8
Darss Sill 03.02.2015	TFO030/13	3.19	9.40	8.51	0.59	4.15	12.8
Arkona Basin 04.02.2015	TFO113/17	3.46	9.34	8.39	0.57	3.69	12.3
Bornholm Deep 05.02.2015	TFO213/36	4.04	7.60	8.38	0.60	3.48	12.9
Stolpe Channel 06.02.2015	TFO222/40	4.10	7.59	8.29	0.64	3.27	13.0
SE Gotland Basin 12.02.2015	TFO259/76	3.71	7.26	8.51	0.86	3.35	17.1
Gotland Deep 10.02.2015	TFO271/59	3.79	7.05	8.52	0.62	3.15	15.9
Farö Deep 09.02.2015	TFO286/48	3.94	7.01	8.43	0.61	3.43	15.7
Landsort Deep no sampling	TFO284						
Karlsö Deep 06.02.2015	TFO245/45	3.68	7.01	8.42	0.80	3.27	18.5

* see attached map

Table 2: Deep water layer (bottom near layer depths)

Area Date	Station Name /No.*	Temp. °C	Sal. psu	O ₂ ml/l	PO ₄ µM	NO ₃ µM	SiO ₄ µM
Kiel Bight 02.02.2015	TFO360/05	4.12	24.22	7.41	0.70	9.08	14.6
Meckl.Bight 03.02.2015	TFO012/07	4.09	21.35	7.58	0.75	8.96	15.5
Lübeck Bight 03.02.2015	TFO022/06	4.86	22.57	7.47	0.71	9.13	14.8
Darss Sill 03.02.2015	TFO030/13	5.07	15.81	7.0	0.77	8.43	16.8
Arkona Basin 04.02.2015	TFO113/17	5.63	22.84	5.99	0.93	8.27	17.9
Bornholm Deep 05.02.2015	TFO213/36	7.15	19.81	5.38	1.05	7.71	22.4
Stolpe Channel 06.02.2015	TFO222/40	7.69	16.65	4.08	1.44	7.96	34.1
SE Gotland Basin 12.02.2015	TFO259/76	6.1	12.07	0.47	2.58	4.98	49.5
Gotland Deep 10.02.2015	TFO271/59	6.71	12.31	-0.92	2.78	0	54.7
Farö Deep 09.02.2015	TFO286/48	6.17	11.81	-1.07	3.22	0	63.5
Landsort Deep no sampling	TFO284						
Karlsö Deep 06.02.2015	TFO245/45	5.03	9.78	-0.86	3.70	0	61.4

* see attached map

** hydrogen sulphide was converted into negative oxygen equivalent

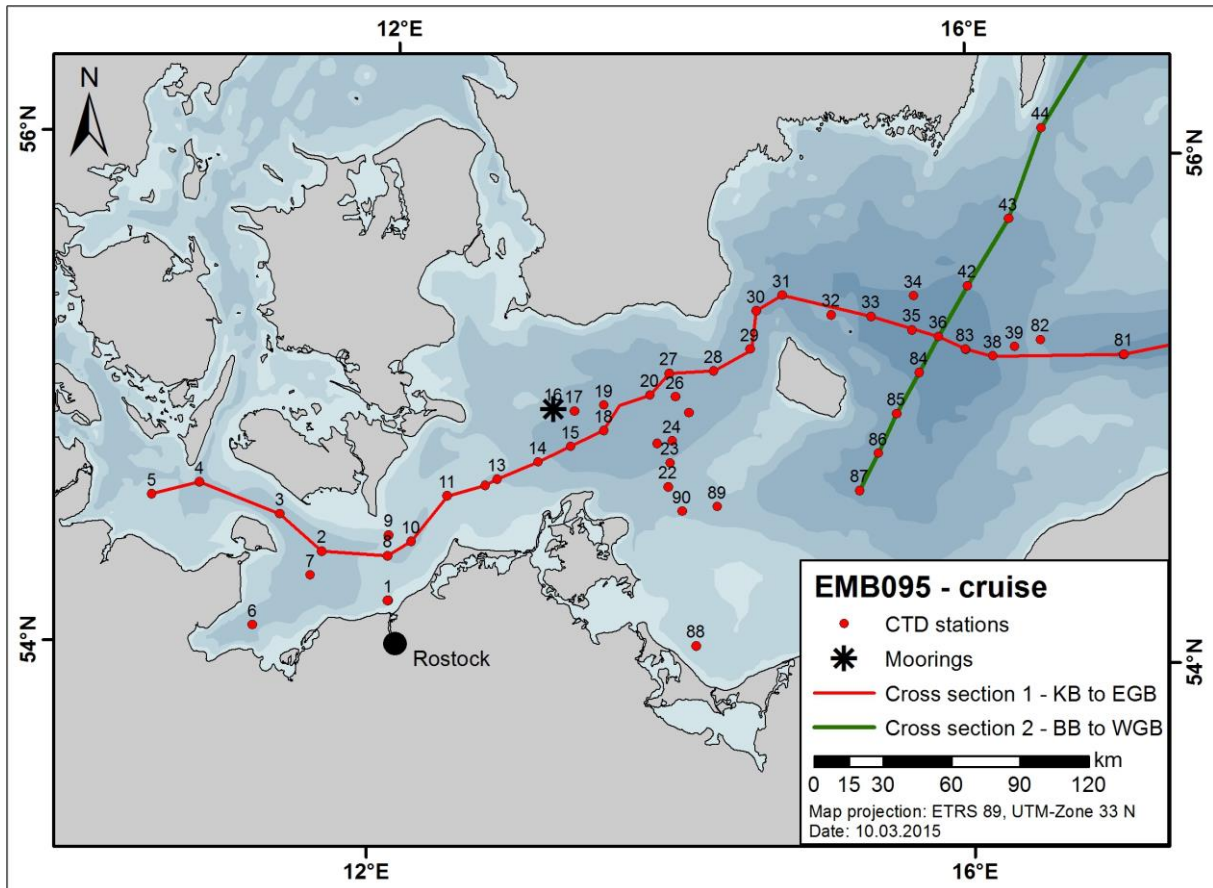


Fig. 2: Stations (labeled with station number -> Tab. 3) and shown cross sections in the western Baltic Sea

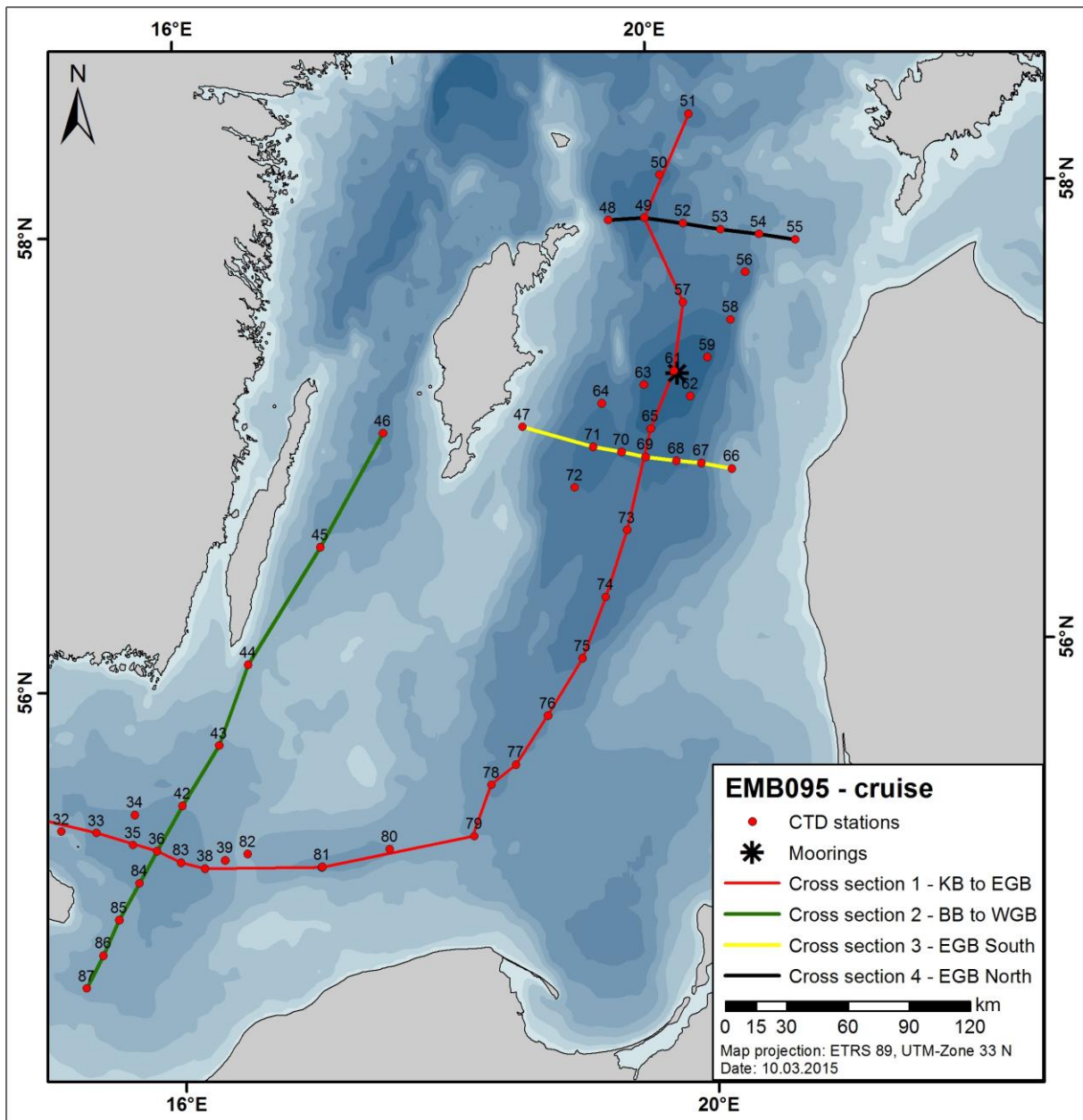


Fig. 3: Stations (labeled with station number -> Tab. 3) and shown cross sections in the central Baltic Sea

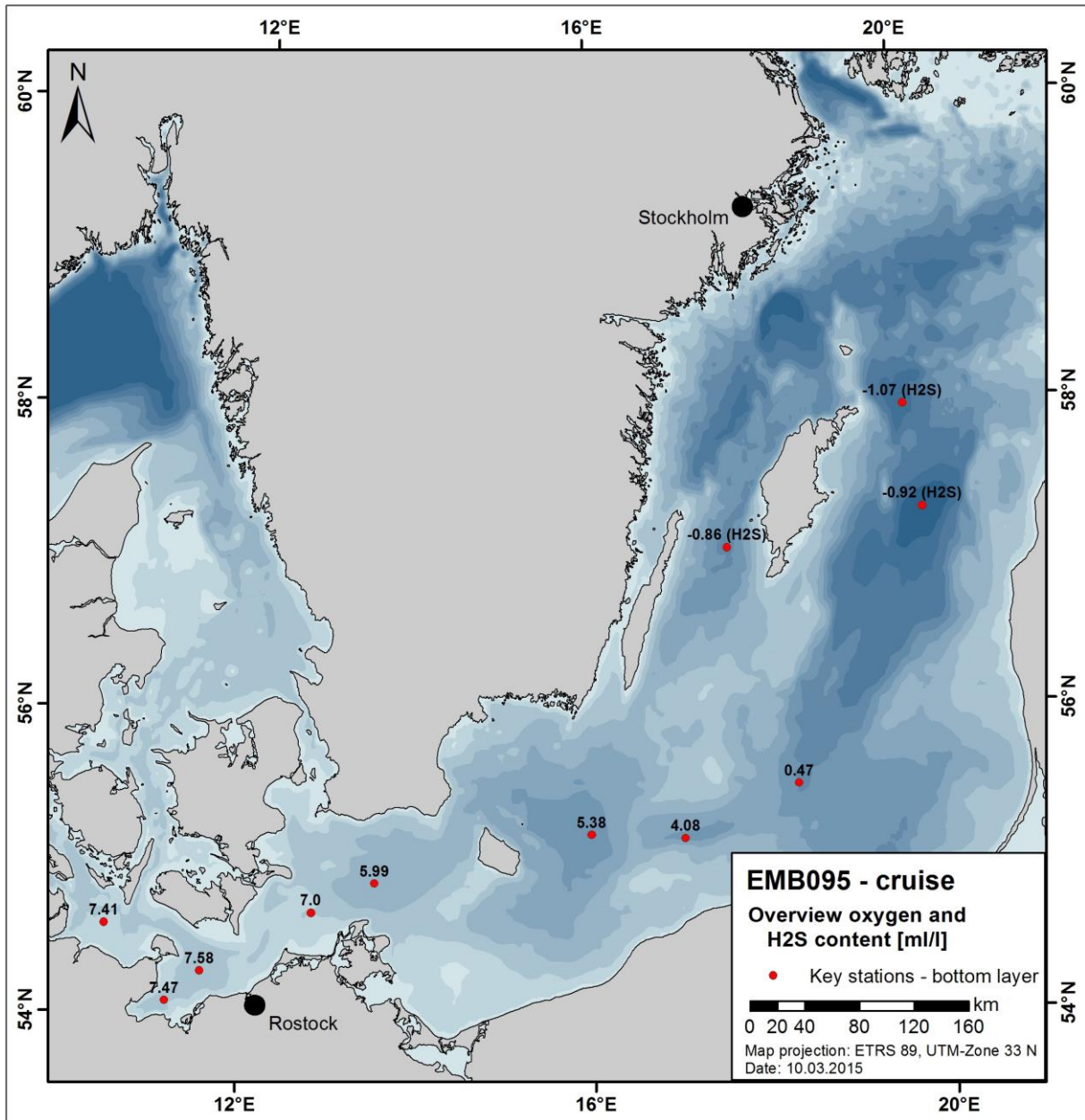


Fig. 4: Oxygen/hydrogen sulphide in the bottom near layer for selected stations

Cross section 1 - Kiel Bight to Eastern Gotland Basin

02.02.2015 11:01 - 12.02.2015 23:01 UTC

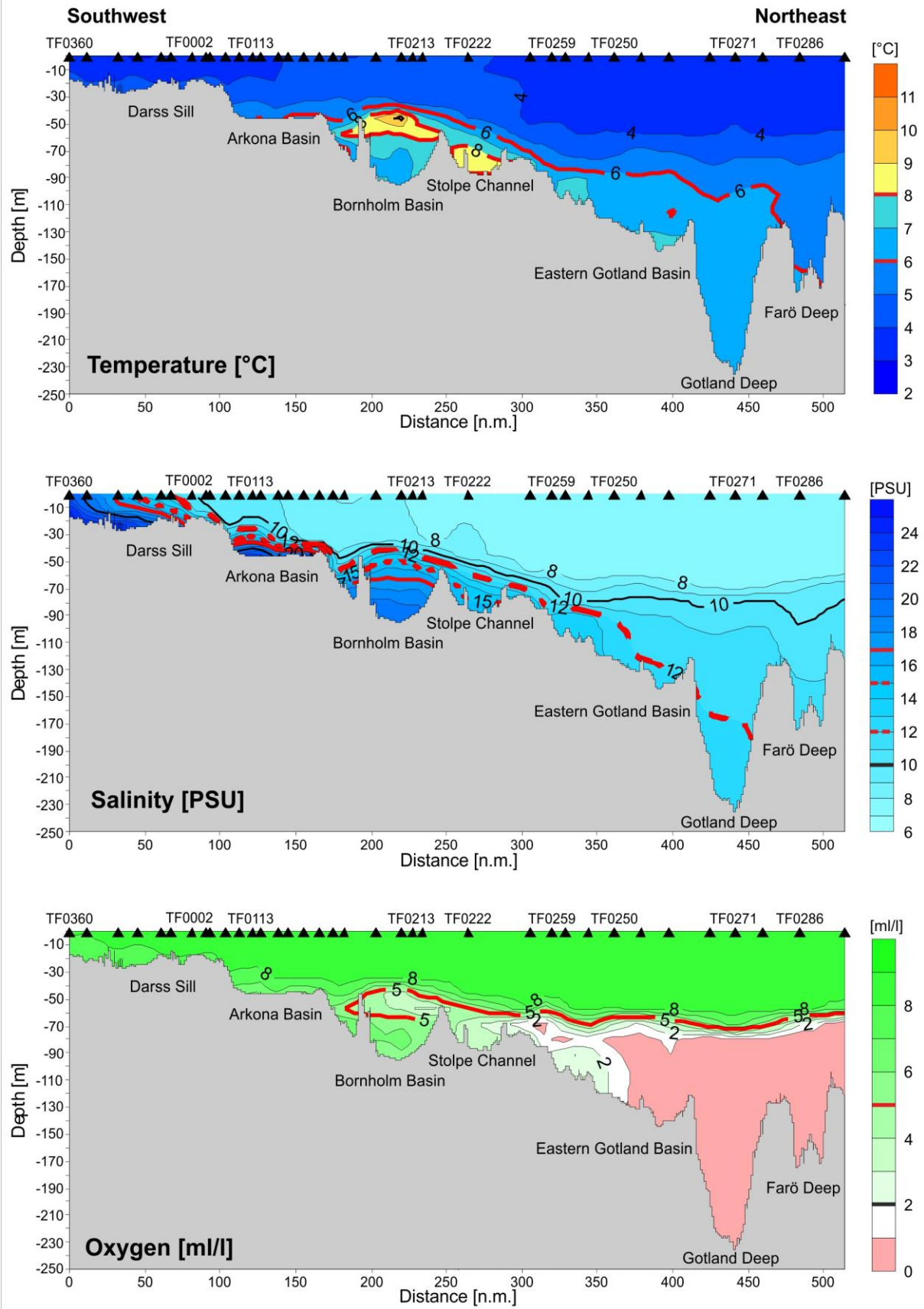


Fig. 5: Cross section 1 from Kiel Bight to the northern part of the Eastern Gotland Basin

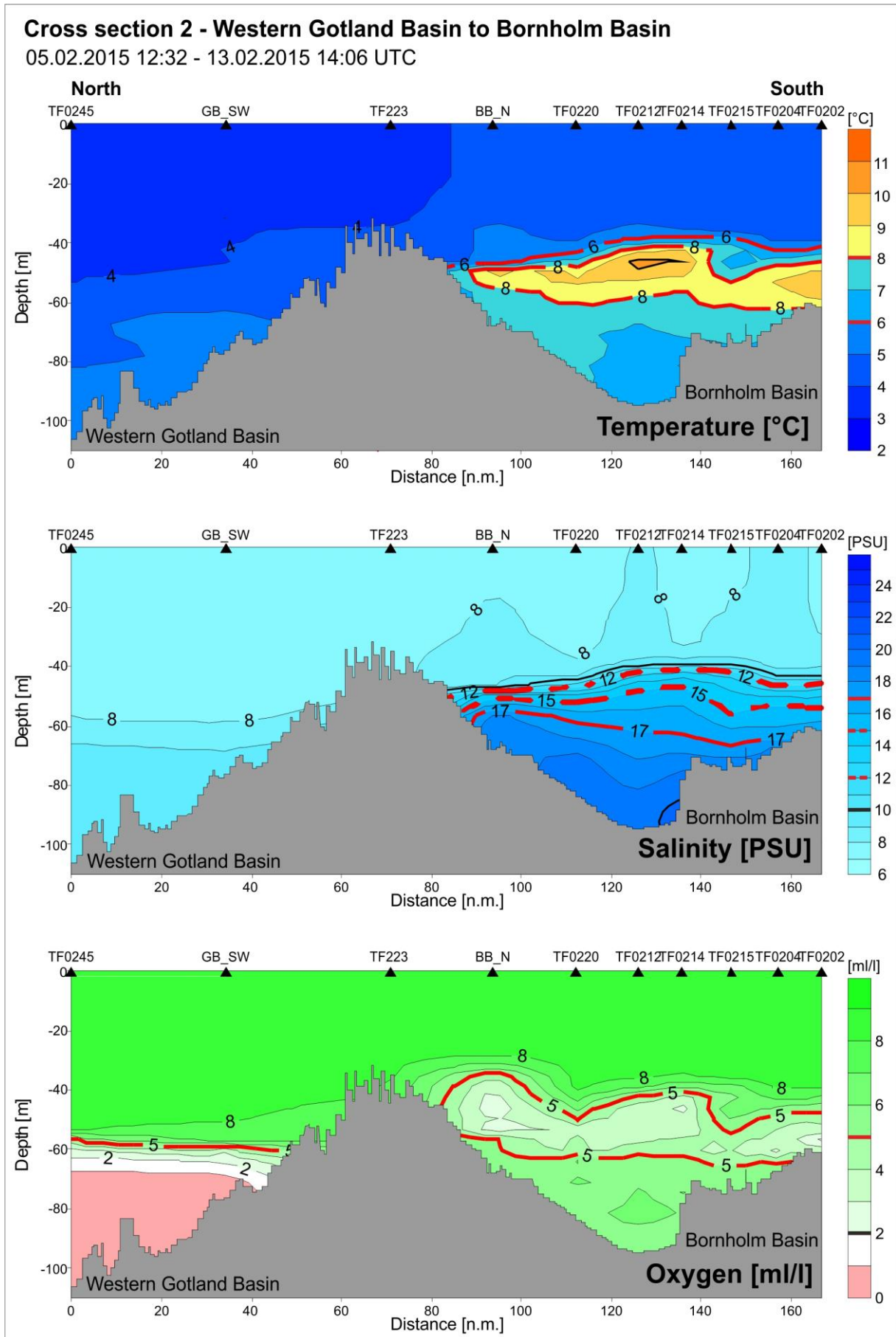


Fig. 6: Cross section 2 from the southern Bornholm Basin to the Western Gotland Basin

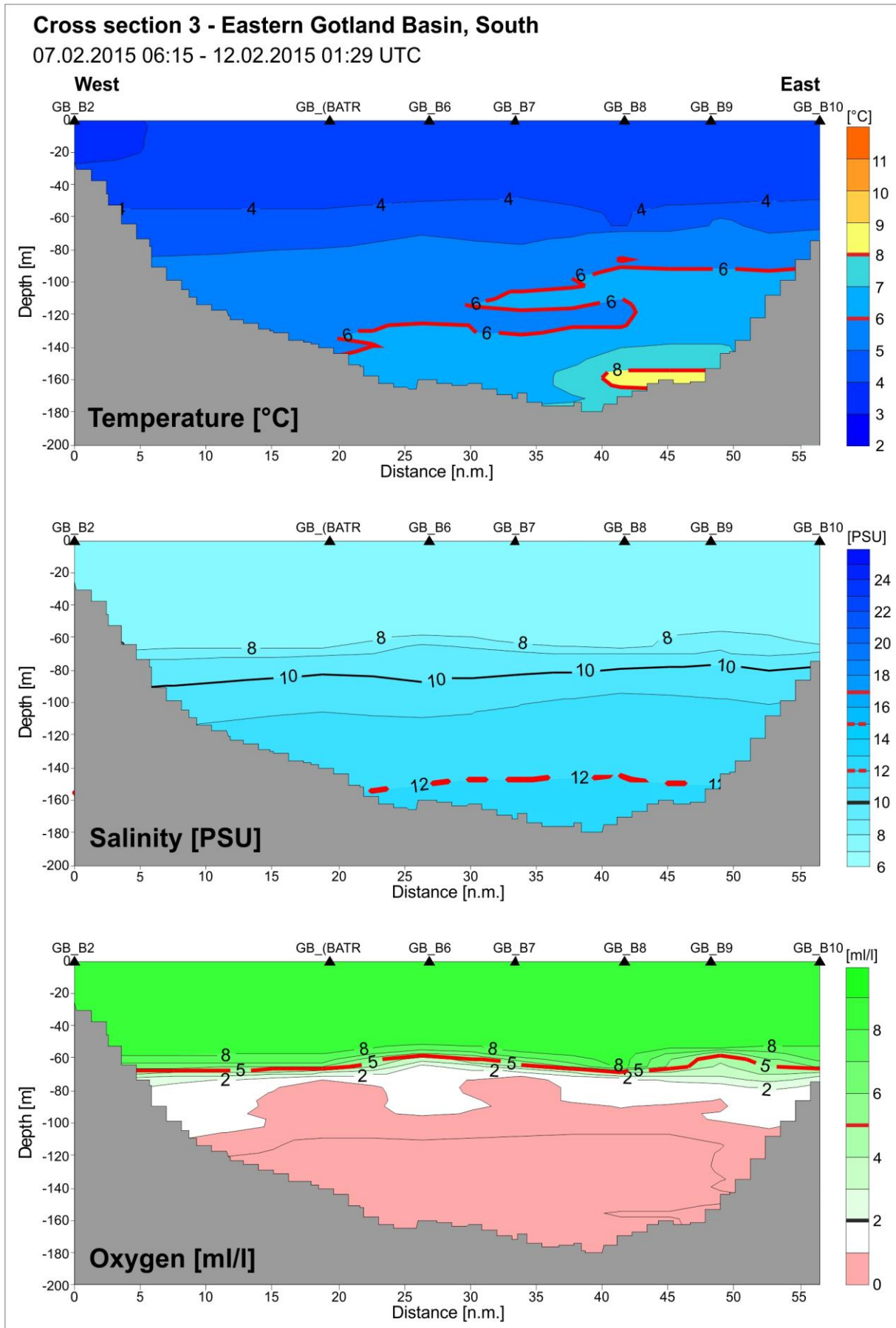


Fig. 7: Cross section 3 from west to east in the southern part of the Eastern Gotland Basin

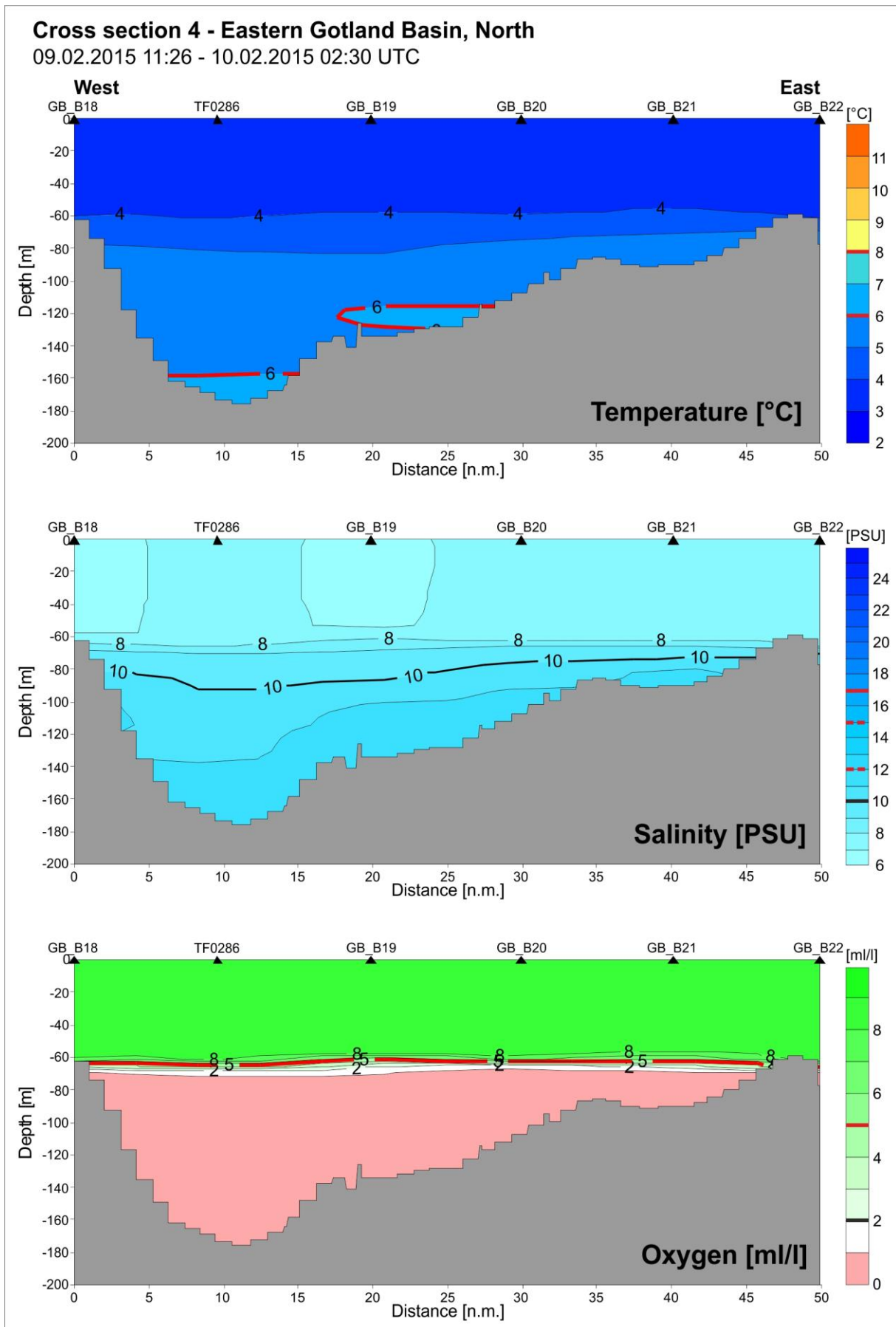


Fig. 8: Cross section 4 from west to east in the northern part of the Eastern Gotland Basin

Tab. 3: List of stations, mooring recovery and deployments carried out during the cruise EMB-095.

Stat. No.	Stat.Name	Latitude	Longitude	Depth [m]		Date	Time [UTC]	CTD cast(s)	Remarks
	Marienehe harbour					2.2.2015	6:55		Start of cruise
1	TF05	54°13,8761N	12°04,5378E	13,1	Begin End	2.2.2015 2.2.2015	8:10 8:35	0001F01	Secchi
2	TF0011	54°24,7968N	11°37,0272E	25,3	Begin End	2.2.2015 2.2.2015	10:45 11:06	0002F01	Secchi
3	TF0010	54°33,0876N	11°19,1956E	28,7	Begin End	2.2.2015 2.2.2015	12:35 13:10	0003F01	Glas bowl sampling
4	TF0361	54°39,5265N	10°46,0124E	23,3	Begin End	2.2.2015 2.2.2015	17:15 17:45	0004F01	
5	TF0360	54°36,0001N	10°27,0148E	18,6	Begin End	2.2.2015 2.2.2015	20:30 21:45	0005F01	Secchi; Glas bowl sampling; Bio net
6	TF0022	54°06,5658N	11°10,5246E	23,7	Begin End	3.2.2015 3.2.2015	2:45 2:55	0006F01	
7	TF0012	54°19,0066N	11°32,9342E	25,1	Begin End	3.2.2015 3.2.2015	5:25 6:30	0007F01 0007F02	Secchi; Glas bowl sampling; Bio net
8	TF0041	54°24,4128N	12°03,7093E	19,5	Begin End	3.2.2015 3.2.2015	8:15 8:45	0008F01	
9	TF0040	54°29,2979N	12°03,7633E	14,2	Begin End	3.2.2015 3.2.2015	9:32 9:40	0009F01	
10	TF0046	54°28,0166N	12°12,9702E	26,6	Begin End	3.2.2015 3.2.2015	10:45 11:40	0010F01 0010F02	Secchi; Glas bowl sampling; Bio net
11	TF0002	54°39,0305N	12°26,9327E	18,8	Begin End	3.2.2015 3.2.2015	13:10 13:20	0011F01	
12	TF0001	54°41,8071N	12°42,3317E	22,1	Begin End	3.2.2015 3.2.2015	14:25 14:40	0012F01	
13	TF0030	54°43,3672N	12°47,0270E	23,2	Begin End	3.2.2015 3.2.2015	15:15 16:05	0013F01 0013F02	Secchi; Glas bowl sampling; Bio net
14	TF0115	54°47,6771N	13°03,4566E	30,4	Begin End	3.2.2015 3.2.2015	17:15 17:35	0014F01	
15	TF0114	54°51,5504N	13°16,6517E	45,0	Begin End	3.2.2015 3.2.2015	18:30 18:50	0015F01	
16	FINO 2	55°00,330N	13°09,386E	20,0	Begin End	4.2.2015 4.2.2015	6:45 7:30		mooring recovery
17	TF0069	54°59,9681N	13°17,8873E	44,9	Begin End	4.2.2015 4.2.2015	8:20 8:45	0016F01	
18	TF0113	54°55,5296N	13°30,1122E	46,1	Begin End	4.2.2015 4.2.2015	9:45 10:45	0017F01 0017F02	Secchi; Glas bowl sampling; Bio net
19	TF0105	55°01,5096N	13°29,9665E	44,6	Begin End	4.2.2015 4.2.2015	11:45 12:00	0018F01	
20	TF0104	55°04,1260N	13°48,8466E	46,5	Begin End	4.2.2015 4.2.2015	13:15 13:30	0019F01	
21	ABBOJE	54°52,7519N	13°52,0286E	45,9	Begin End	4.2.2015 4.2.2015	14:40 14:55	0020F01	

Stat. No.	Stat.Name	Latitude	Longitude	Depth [m]		Date	Time [UTC]	CTD cast(s)	Remarks
22	TF0121	54°42,5604N	13°56,8125E	30,2	Begin End	4.2.2015 4.2.2015	15:55 16:10	0021F01	
23	TF0112	54°48,1677N	13°57,5774E	40,7	Begin End	4.2.2015 4.2.2015	17:00 17:20	0022F01	
24	TF0111	54°53,3913N	13°58,1234E	44,9	Begin End	4.2.2015 4.2.2015	18:00 18:20	0023F01	
25	TF0109	55°00,0031N	14°04,9517E	48,2	Begin End	4.2.2015 4.2.2015	19:10 20:25	0024F01 0024F02	Glas bowl sampling; Bio net
26	TF0103	55°03,8080N	13°59,2997E	47,5	Begin End	4.2.2015 4.2.2015	21:40 22:00	0025F01	
27	TF0102	55°09,3359N	13°56,4832E	45,2	Begin End	4.2.2015 4.2.2015	22:40 23:00	0026F01	
28	TF0145	55°09,9891N	14°14,9391E	46,8	Begin End	5.2.2015 5.2.2015	0:10 0:35	0027F01	
29	TF0144	55°15,1767N	14°29,7424E	44,5	Begin End	5.2.2015 5.2.2015	1:30 2:05	0028F01	
30	TF0142	55°24,2922N	14°32,2244E	60,3	Begin End	5.2.2015 5.2.2015	3:40 3:55	0029F01	
31	TF0140	55°28,0087N	14°42,9815E	69,4	Begin End	5.2.2015 5.2.2015	4:55 5:15	0030F01	
32	TF0205	55°23,4059N	15°03,4704E	75,4	Begin End	5.2.2015 5.2.2015	6:40 7:05	0031_01	
33	TF0200	55°23,0199N	15°19,9242E	91,3	Begin End	5.2.2015 5.2.2015	8:15 8:40	0032F01	
34	TF0210	55°27,7722N	15°37,7125E	83,9	Begin End	5.2.2015 5.2.2015	10:00 10:25	0033_01	
35	TF0211	55°19,7523N	15°36,8668E	95,4	Begin End	5.2.2015 5.2.2015	11:20 11:40	0034F01	
36	TF0212	55°18,1118N	15°47,8274E	95,4	Begin End	5.2.2015 5.2.2015	12:25 12:45	0035F01	
37	TF0213	55°14,9989N	15°58,9399E	90,0	Begin End	5.2.2015 6.2.2015	13:30 0:10	0036F01 0036F02 0036F03 0036K04 0036K05	Glas bowl sampling; Bio net; in situ pump; Frahmlot
38	TF0221	55°13,3505N	16°10,0324E	83,0	Begin End	6.2.2015 6.2.2015	1:00 1:20	0037F01	
39	BB1	55°15,4606N	16°19,2425E	66,4	Begin End	6.2.2015 6.2.2015	2:05 2:25	0038F01 0038F02	
40	TF0224	55°17,0018N	16°29,9229E	61,8	Begin End	6.2.2015 6.2.2015	3:00 3:30	0039F01	
41	TF0222	55°12,9621N	17°04,0113E	90,6	Begin End	6.2.2015 6.2.2015	5:30 6:35	0040F01	Glas bowl sampling
42	TF0220	55°29,9964N	15°59,9856E	80,8	Begin End	6.2.2015 6.2.2015	10:35 10:55	0041F01	
43	BB_N	55°45,7018N	16°17,4886E	63,3	Begin End	6.2.2015 6.2.2015	12:45 13:05	0042F01	

Stat. No.	Stat.Name	Latitude	Longitude	Depth [m]		Date	Time [UTC]	CTD cast(s)	Remarks
44	TF223	56°06,9770N	16°32,0471E	49,6	Begin End	6.2.2015 6.2.2015	15:30 15:45	0043F01	
45	GB_SW	56°37,5066N	17°07,8402E	78,3	Begin End	6.2.2015 6.2.2015	19:20 19:40	0044_01	
46	TF0245	57°06,9677N	17°39,9581E	109,5	Begin End	6.2.2015 7.2.2015	23:10 0:05	0045F01 0045F02 0045K03	
47	GB_B2	57°06,8742N	18°47,7102E	34,1	Begin End	7.2.2015 7.2.2015	6:05 6:25	0046F01	
	Slite harbour (Gotland)	57°43,329N	18°48,430E		Begin End	7.2.2015 9.2.2015	13:10 7:35		waiting on weather; gale up to 62 kn/11 Bft
48	GB_B18	57°59,9657N	19°35,9432E	117,4	Begin End	9.2.2015 9.2.2015	11:15 12:10	0047F01 0047K02 0047K03	
49	TF0286	57°59,9726N	19°54,0450E	192,4	Begin End	9.2.2015 9.2.2015	13:15 14:30	0048F01 0048F02	Frahmplot
50	GB_B24	58°10,9631N	20°03,1206E	161,4	Begin End	9.2.2015 9.2.2015	15:45 16:20	0049F01	
51	TF0285	58°26,4880N	20°20,0842E	122,8	Begin End	9.2.2015 9.2.2015	18:05 18:55	0050F01 0050_02	
52	GB_B19	57°57,7725N	20°12,9986E	124,7	Begin End	9.2.2015 9.2.2015	22:00 22:40	0051F01	
53	GB_B20	57°55,3935N	20°31,3988E	98,8	Begin End	9.2.2015 10.2.2015	23:45 0:05	0052F01	
54	GB_B21	57°53,2999N	20°50,0493E	89,8	Begin End	10.2.2015 10.2.2015	1:05 1:20	0053F01	
55	GB_B22	57°51,0173N	21°07,9479E	77,4	Begin End	10.2.2015 10.2.2015	2:20 2:40	0054F01	
56	GB_B16	57°43,6605N	20°41,5347E	134,5	Begin End	10.2.2015 10.2.2015	4:20 4:40	0055F01	
57	TF0270	57°36,9810N	20°10,0229E	142,4	Begin End	10.2.2015 10.2.2015	6:30 7:55	0056F01 0056F02	
58	GB_B15	57°31,4634N	20°32,6495E	156,5	Begin End	10.2.2015 10.2.2015	9:15 9:50	0057F01	
59	Gotland_NE	57°22,0783N	20°19,8294E	219,1	Begin End	10.2.2015 10.2.2015	11:00 11:35	0058F01	
60	Gotland_ centre	57°18,372N	20°04,750E	249,0	Begin End	10.2.2015 10.2.2015	12:35 14:40		mooring recovery & deployment
61	TF0271	57°19,1150N	20°02,9511E	236,7	Begin End	10.2.2015 11.2.2015	15:15 7:40	0059F01 0059F02 0059F03 0059F04 0059F05 0059F06 0059F07 0059K08	Secchi, Glas bowl sampling; Bio net; in situ pump; Frahmplot

Stat. No.	Stat.Name	Latitude	Longitude	Depth [m]		Date	Time [UTC]	CTD cast(s)	Remarks
61	TF0271	57°19,1150N	20°02,9511E	236,7	End	11.2.2015	7:40	0059_09 0059F10	
62	GB_B14	57°12,1752N	20°10,1982E	231,8	Begin End	11.2.2015 11.2.2015	8:35 9:15	0060F01	
63	GB_B13	57°16,0135N	19°47,7546E	207,2	Begin End	11.2.2015 11.2.2015	10:35 11:10	0061F01	
64	GB_B12	57°11,8376N	19°26,7152E	163,1	Begin End	11.2.2015 11.2.2015	12:25 12:50	0062F01	
65	TF0272	57°04,3578N	19°49,7079E	205,2	Begin End	11.2.2015 11.2.2015	14:10 15:45	0063F01 0063F02	Frahmlot
66	GB_B10	56°52,2542N	20°27,4884E	61,8	Begin End	11.2.2015 11.2.2015	18:05 18:30	0064F01	
67	GB_B9	56°54,3323N	20°12,9962E	143,3	Begin End	11.2.2015 11.2.2015	19:20 19:55	0065F01	
68	GB_B8	56°55,3884N	20°01,1494E	164,0	Begin End	11.2.2015 11.2.2015	20:45 21:20	0066F01	
69	GB_B7	56°57,0161N	19°46,1976E	181,5	Begin End	11.2.2015 11.2.2015	22:25 23:05	0067F01	
70	GB_B6	56°58,7474N	19°34,7778E	165,8	Begin End	11.2.2015 12.2.2015	23:55 0:20	0068F01	
71	GB_BATRE	57°00,5512N	19°21,3644E	174,6	Begin End	12.2.2015 12.2.2015	1:20 1:45	0069F01	
72	GB_B1	56°50,1011N	19°11,2299E	162,8	Begin End	12.2.2015 12.2.2015	3:50 4:10	0070F01	
73	TF0260	56°37,9958N	19°35,0858E	143,8	Begin End	12.2.2015 12.2.2015	6:15 7:05	0071F01	
74	TF0263	56°20,8046N	19°22,7872E	133,6	Begin End	12.2.2015 12.2.2015	10:00 11:35	0072F01	Glas bowl sampling
75	TF0250	56°04,9920N	19°10,0683E	124,1	Begin End	12.2.2015 12.2.2015	13:50 14:10	0073F01	
76	TF0253	55°50,4301N	18°52,2233E	100,4	Begin End	12.2.2015 12.2.2015	16:15 16:35	0074F01	
77	TF0255	55°37,9940N	18°36,0817E	94,5	Begin End	12.2.2015 12.2.2015	18:10 18:35	0075F01	
78	TF0259	55°32,9447N	18°24,1355E	89,9	Begin End	12.2.2015 12.2.2015	20:05 21:30	0076F01 0076F02	Glas bowl sampling; Bio net
79	TF0256	55°19,6251N	18°15,0946E	78,8	Begin End	12.2.2015 12.2.2015	22:00 23:10	0077F01	
80	SC_E	55°17,1778N	17°35,6482E	83,5	Begin End	13.2.2015 13.2.2015	1:15 1:30	0078F01	
81	TF0222	55°13,0666N	17°04,1264E	91,3	Begin End	13.2.2015 13.2.2015	3:20 4:10	0079F01	Glas bowl sampling
82	TF0224	55°16,9897N	16°29,8744E	61,8	Begin End	13.2.2015 13.2.2015	6:10 6:25	0080F01	
83	TF0213	55°15,0185N	15°58,8914E	89,4	Begin End	13.2.2015 13.2.2015	8:10 8:35	0081F01	

Stat. No.	Stat.Name	Latitude	Longitude	Depth [m]		Date	Time [UTC]	CTD cast(s)	Remarks
84	TF0214	55°09,6388N	15°39,5768E	93,8	Begin End	13.2.2015 13.2.2015	9:45 11:05	0082F01	
85	TF0215	55°00,0076N	15°30,1446E	76,9	Begin End	13.2.2015 13.2.2015	11:20 11:35	0083F01	
86	TF0204	54°50,6490N	15°22,6685E	70,1	Begin End	13.2.2015 13.2.2015	12:40 13:00	0084F01	
87	TF0202	54°41,9522N	15°15,0216E	65,1	Begin End	13.2.2015 13.2.2015	14:00 14:15	0085F01	
88	OBBOJE	54°05,0786N	14°08,9670E	15,8	Begin End	13.2.2015 13.2.2015	19:30 20:20	0086F01 0086K02 0086K03	Glas bowl sampling
89	TF0152	54°37,9930N	14°16,9942E	31,2	Begin End	13.2.2015 13.2.2015	23:30 23:55	0087F01	Glas bowl sampling
90	TF0150	54°36,7585N	14°02,5732E	22,1	Begin End	14.2.2015 14.2.2015	0:50 1:05	0088F01	
91	TFO5	54°13,9047N	12°04,4725E	13,1	Begin End	14.2.2015 14.2.2015	8:05 8:25	0089F01	Bio net
	Marienehe harbour					14.2.2015	9:45		End of cruise

Briese Schifffahrts Gmb & Co. KG
Abtlg. Forschungsschifffahrt
FS "Elisabeth Mann Borgese"



VERANKERUNGSPROTOKOLL

Datum: 10.02..2015 **Beginn:** 14.10 **Ende:** 14.40 **UTC**

Gerät: Gotland - AT -2015 - 02 **Reise EMB** 95

Code Name: _____

Lottiefe: 249

Wetter: Wind: Bft. 3 260°
Strömung: 135° 0,5 kn

Absetzposition: **Breite:** 57°18,372'N (WGS 84, DGPS)
Gerät **Länge:** 020°04,750'E

Grundleine: **Breite:** keine
(Ende) **Länge:** _____

Richtung: _____ (vom Gerät)
Länge: _____

Oberfläche: _____

Bemerkungen: _____


Kapitän


Exp.-Leiter

Verteiler: Reederei
EMB
IOW
Fahrtitr.