

# Cruise Report

## Major Baltic Inflow of November 2015

FRV "SOLEA"

Cruise no. 714

7<sup>th</sup> – 18<sup>th</sup> January 2016

Western to central Baltic Sea

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**Verteiler:**

BLE, Hamburg  
Schiffsführung FFS „SOLEA“  
BMELV, Ref. 622  
TI, Präsidialbüro (M. Welling)  
TI, Verwaltung Hamburg  
TI-FOE  
TI-OF  
TI-SF  
TI, FIZ Fischerei  
TI, PR  
TI, Einsatzplanung Forschungsschiffe  
BFEL Hamburg, FB Fischqualität  
IFM-GEOMAR, Kiel  
Institut für Fischerei der Landesforschungsanstalt  
LA für Landwirtschaft, Lebensmittels. u. Fischerei  
BSH, Hamburg

Deutscher Fischerei-Verband e. V., Hamburg  
Leibniz Institut für Ostseeforschung  
Doggerbank GmbH  
Mecklenburger Hochseefischerei Sassnitz  
Kutter- und Küstenfisch Sassnitz  
Landesverband der Kutter- und Küstenfischer  
Sassnitzer Seefischer  
Deutsche Fischfang Union Cuxhaven  
Fahrtteilnehmer

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joanna.ciagadlak@minrol.gov.pl  
bhmw@mw.mil.pl  
lena@mir.gdynia.pl

## 1. Basic information

<b>Research ship:</b>	FRV „SOLEA“
<b>Cruise:</b>	SB714
<b>Nationality:</b>	Germany
<b>Dates of the cruise:</b>	07. – 18.01.2016
<b>Master:</b>	V. Koops
<b>Chief scientist</b>	Dr. Uwe Böttcher (part I: 07.-13. January) Dr. Andrés Velasco (part II: 13.-18. January)
<b>Operating Authority:</b>	Thünen Institute of Baltic Sea Fisheries (TI-OF) Baltic Sea Research Institute Warnemünde (IOW)

**Geographical area in which ship has operated:** western and central Baltic Sea

## 2. Purpose of the cruise:

This cruise was carried out to fill data gaps in the highly dynamic inflow phase of winter 2015 - 2016 as an additional cruise contributes to a series of five monitoring expeditions performed annually by the Leibniz Institute for Baltic Sea Research Warnemünde in the central Baltic Sea.

The task was to follow the propagation of the new Major Baltic Inflow of moderate intensity (1,4 Gt salt transport). From November 14<sup>th</sup> – 22<sup>th</sup>, huge amounts of North Sea waters rich in oxygen entered the Baltic Sea again. It was a series of 12 storm fronts passing the Baltic Sea region since the beginning of November, which had triggered this event. According to first calculations a water volume of 76 km<sup>3</sup> with a salt content of 17-22 g/kg passed the narrow and shallow Western Baltic Sea during the main inflow period. Currently, this water mass can be traced in a water depth of 30-45 m in the Arkona Basin and below the halocline in the Bornholm Basin (50-70 m). After the very strong inflow of December 2014 the salinity values at the bottom of the Bornholm Basin are still high. The water masses of this anew event slide on top of this salinity layer of the former event of 2014 and can pass the Slupsk Sill very quickly entering the central Baltic Sea. We want to find out the transport velocity and in which water depth the water masses will be stratified to have an expectation of the potential spreading up to the northern and western Gotland Basin, ventilating this so far anoxic areas.

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.

## 3. Scientific staff participating:

	Name	On board	Institution	Responsibility
1	Dr. Uwe Böttcher	07.01.- 13.01.2016	TI-OF	chief scientist; CTD
2	Dr. Andres Velasco	13.01.- 18.01.2016	TI-OF	chief scientist; CTD
3	Dr. Volker Mohrholz	08.01.- 13.01.2016	IOW	CTD, MSS, ADCP
4	Dr. Michael Naumann	13.01.- 18.01.2016	IOW	CTD, MSS, ADCP
5	Sebastian Beier	07.01.- 18.01.2016	IOW	Dissolved oxygene
6	Lea Wietrzynski	07.01.- 18.01.2016	TI-OF	Dissolved oxygene
7	Christian Schmidt	07.01.- 18.01.2016	TI-OF	CTD, MSS, ADCP
8	Dr. Daniel Stepputtis	07.01.- 07.01.2016	TI-OF	technological testing

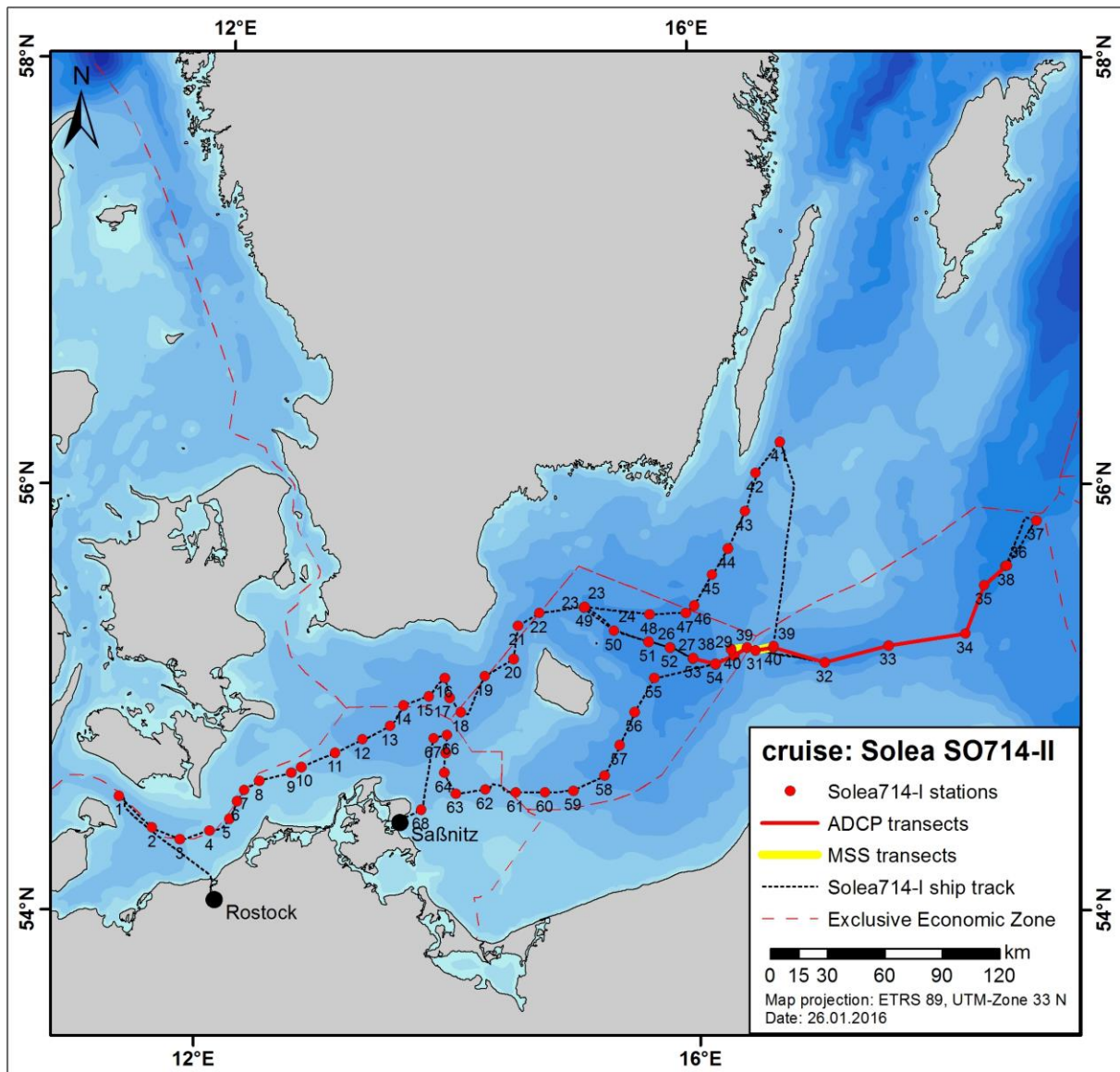
## 4. Scientific equipment:

CTD+ Rosette Water sampler, oxygen analyser, microstructure profiler (MSS), acoustic Doppler current profilers (ADCP)

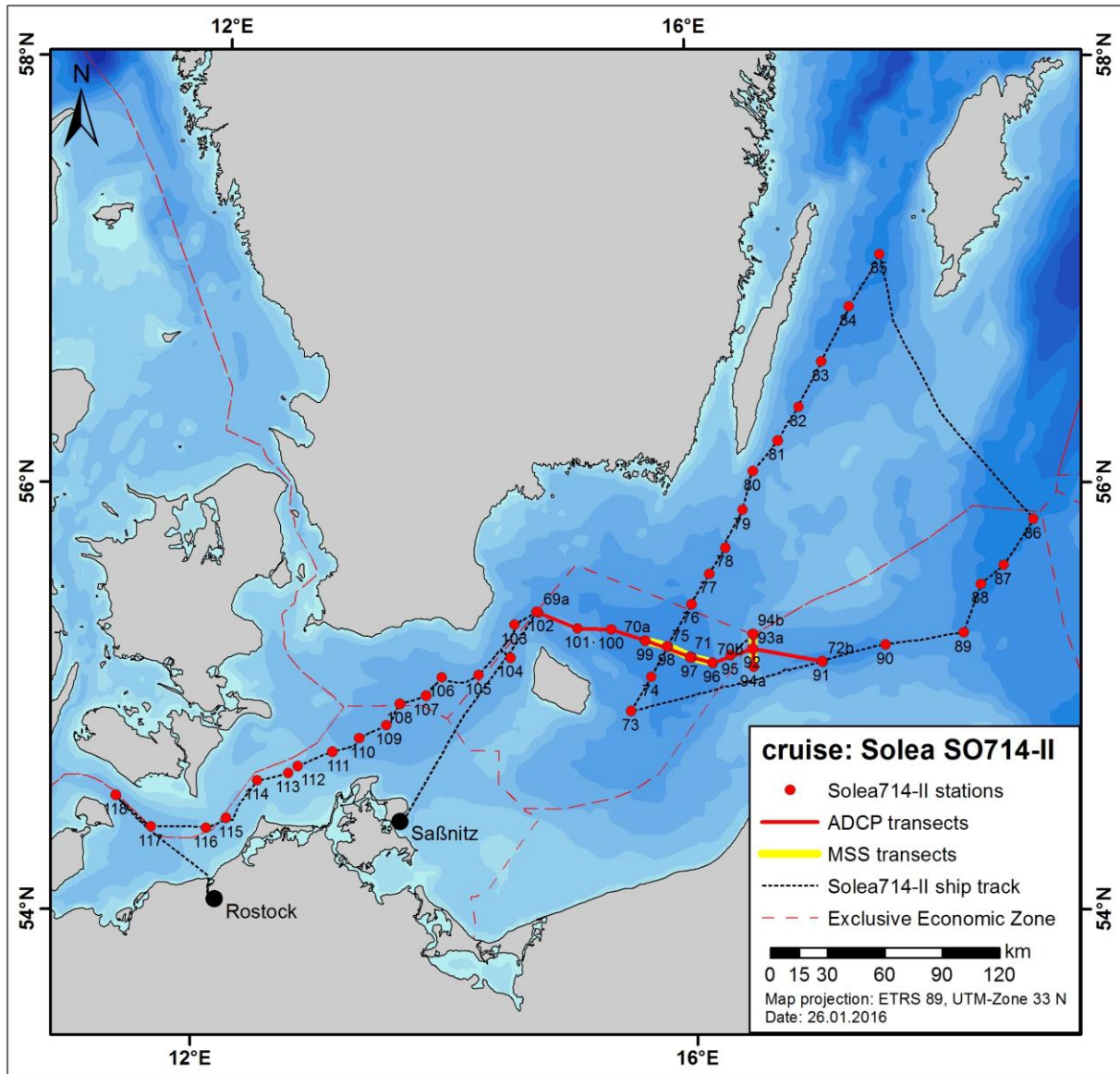
## 5. Narrative and preliminary result (Dr. Michael Naumann)

After loading and preparation of scientific equipment, FRV "Solea" left Rostock-Marienehe port at noon of January 07<sup>th</sup>. The first day was used to test the microstructure profiler (MSS) and the towed ADCP (mounted on Nackthai) on the roadstead in front of Warnemünde. On the next day the investigations started in the Fehmarnbelt. The **area under investigation** covered the Baltic Sea from the Mecklenburg Bight to southern parts of the western and eastern Gotland Basin (Fig. 1, 2). On January 13<sup>th</sup> the ship entered Saßnitz port for a few hours to exchange a part of the scientific crew. On January 18<sup>th</sup> investigations were concluded near Fehmarn and the ship steamed back to Rostock-Marienehe port where the cruise ended in the evening of the same day.

Marine meteorological and hydrographic investigations were performed according to the COMBINE program of HELCOM. The majority of stations is located along a W-E transect, describing the state in the succession of basins in the southern Baltic Sea as main information (Fig. 4, 5). Additional stations on a N-S transect from the central Bornholm Basin to the western Gotland Basin were done to investigate the propagation and stratification of the saline water intrusion more detailed (Fig. 6).



**Figure 1:** Map of stations and ship track of cruise Solea714-I from 8<sup>th</sup> to 13<sup>th</sup> January. Red dots indicate the position of CTD stations with labels of the station number (Tab. 3).



**Figure 2:** Map of stations and ship track of cruise Solea714-II from 13<sup>th</sup> to 18<sup>th</sup> January. Red dots indicate the position of CTD stations with labels of the station number (Tab. 4).

The **weather situation** during the cruise was often changing between calm phases and temporarily periods of strong wind forces. During the first part it was influenced by the low pressure cells "Britta" and "Carolina" moving from the north Atlantic Ocean to western and northern Europe and an extensive highpressure "Alf" of up to 1020 hPa over Scandinavia and eastern Europe. The second part was dominated by high pressure "Benno" moving from the Gulf of Biscay to southern Europe and the low pressure cells "Daniella", "Emma" and "Gudrun" crossing northern Europe. Air pressure ranged between 989 and 1023 hPa. The Wind speed changed between 0.1 to 19.3 m/s (1-8 Bft), but stays two-thirds of the cruise below 10 m/s (1-5 Bft). Wind directions changed between all directions. Air temperature ranged from -4.4 °C (16<sup>th</sup> Jan.) at the Western Gotland Basin up to 4.8 °C (12<sup>th</sup> Jan.) at the central Bornholm Basin.

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

- **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 and the Major Baltic Inflow from December 2014. The situation in the western and southern Baltic Sea is more dynamic. To the beginning of the cruise the Arkona Basin was filled by warm water of the inflow pulse of 4<sup>th</sup> to 6<sup>th</sup> December (around 8 °C) and to the end this volume were mainly transported into the Bornholm Basin (c.f. Fig. 4, 5). The deep water of the Bornholm Basin was affected by two processes. Since December 2015 the former bottom water of the inflow of December 2014 (below 70 m water depth, 7-8 °C) got mixed with the new inflow pulses from November and December 2015 showing increasing temperatures over 8 °C. This mixing process is nearly finished to the end of the cruise (Fig. 5). On top the new water of the November MBI and small inflow pulse of December is stratified up to the halocline in 50 m water depth and moving eastwards passing the Slupsk Sill. The bottom of the Slupsk Channel was already filled by new warm inflow water up to 9 °C to the beginning of the cruise (Fig. 4). During the cruise the front was propagating into the southwestern part of the Eastern Gotland Basin. In Figure 4 and 5 this situation can be seen in a longitudinal cross section from west to east crossing the basins in the main pathway of salt water intrusions.
- The recent Major Baltic Inflow from November 2015 is classified of moderate intensity with a salt transport of 1.4 Gt (cf. press release of the Leibniz-Institute for Baltic Sea Research from November 25<sup>th</sup>). This event pushed the third time within 1.5 years highly saline water into the Baltic Sea. After ten years of stagnation (2004-2014) this succession of intrusions is documented by an abrupt increasing **salinity in the bottom layer** in the central Baltic Proper and increased stratification between surface and deep water layer. Actually the Arkona Basin is filled by highly saline water of up to 19 g/kg and the Bornholm Basin by 21 g/kg. In the Slupsk Channel the salinity is rising since mid-November, showing the recent inflow activity.
- 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 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 and are completely oxydised since April 2014 (Naumann et al. submitted). Northern parts and the Western Gotland Basin are not affected by this intrusion so far (Fig. 6). In the Bornholm Basin the new inflow water propagates below the halocline on top of the highly saline bottom water of earlier events in 2014 (cf. Fig. 4, 5). A similar effect is to expect in the Eastern Gotland Basin, which leads to the assumption that the new inflow water of autumn/winter 2015 can ventilate farther north areas like the Farö Deep, Northern Central Basin and the Western Gotland Basin.

### **Attachments:**

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

Figures 3 and 6: Cross sections of the main hydrographic parameters (unvalidated results)

Figure 7: Temperature-salinity-oxygen diagram of measured CTD stations from Darss Sill, Arkona Basin, Bornholm Basin and Slupsk Channel (Solea714-II, 2016 January 15<sup>th</sup> – 18<sup>th</sup>).

Table 3 and 4: List of stations

**Table 1: Surface water layer (about 5 m depth)**

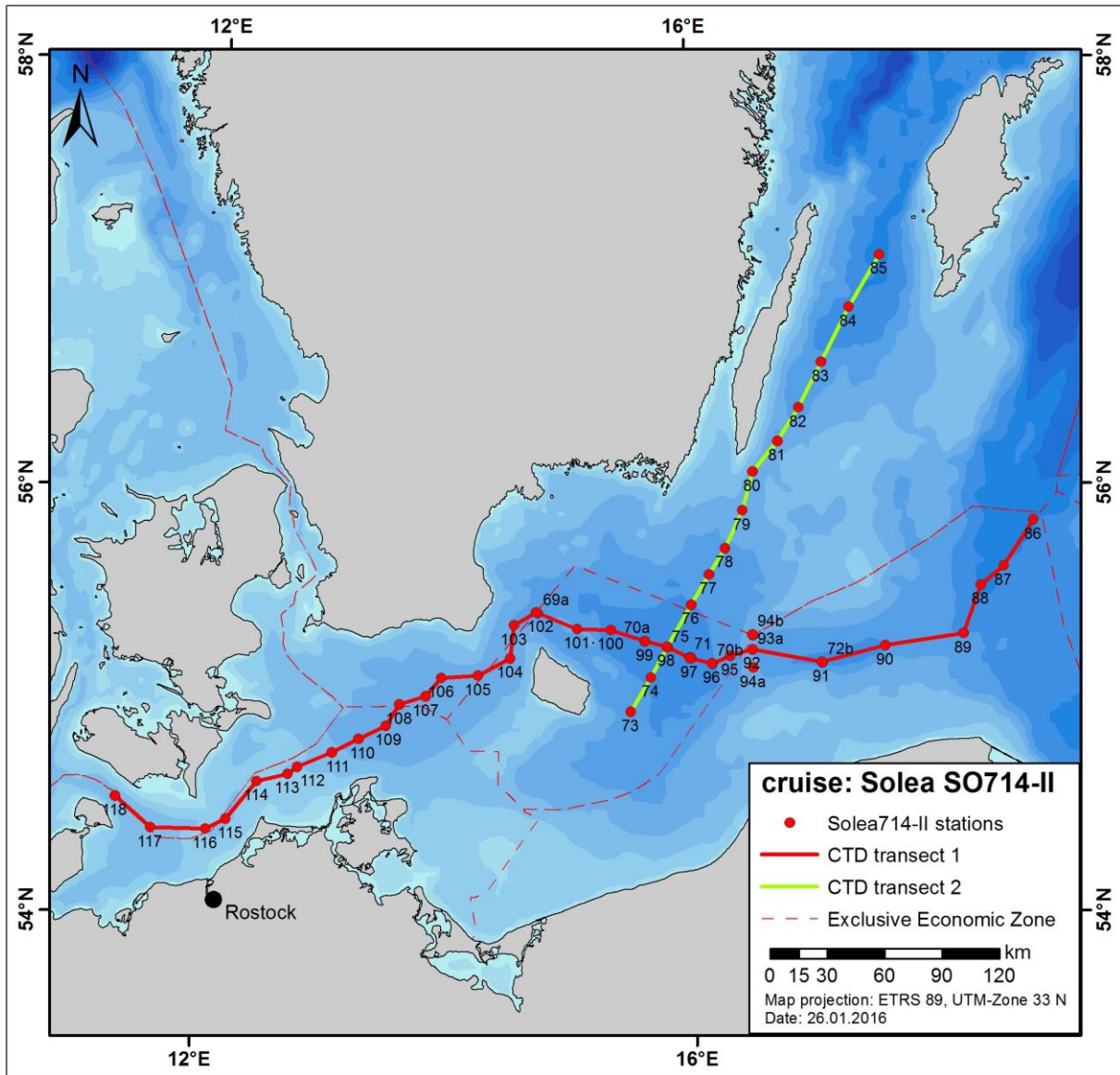
<b>Area Date</b>	<b>Station Name /No.*</b>	<b>Temp. oC</b>	<b>Sal. psu</b>	<b>O2 ml/l</b>
Meckl.Bight 18.01.2016	TFO011/117	2.99	9.89	8.31
Darss Sill 18.01.2016	TFO030/112	3.71	9.06	7.96
Arkona Basin 17.01.2016	TFO113/109	4.25	8.73	8.12
Bornholm Deep 17.01.2016	TFO213/97	4.73	8.25	7.36
Stolpe Channel 16.01.2016	TFO222/91	5.16	8.22	6.68
SE Gotland Basin 16.01.2016	TFO259/88	5.69	8.28	7.5
Karlsö Deep 16.01.2016	TFO245/85	2.66	7.42	7.53

\* see Figure 2 / Table 4

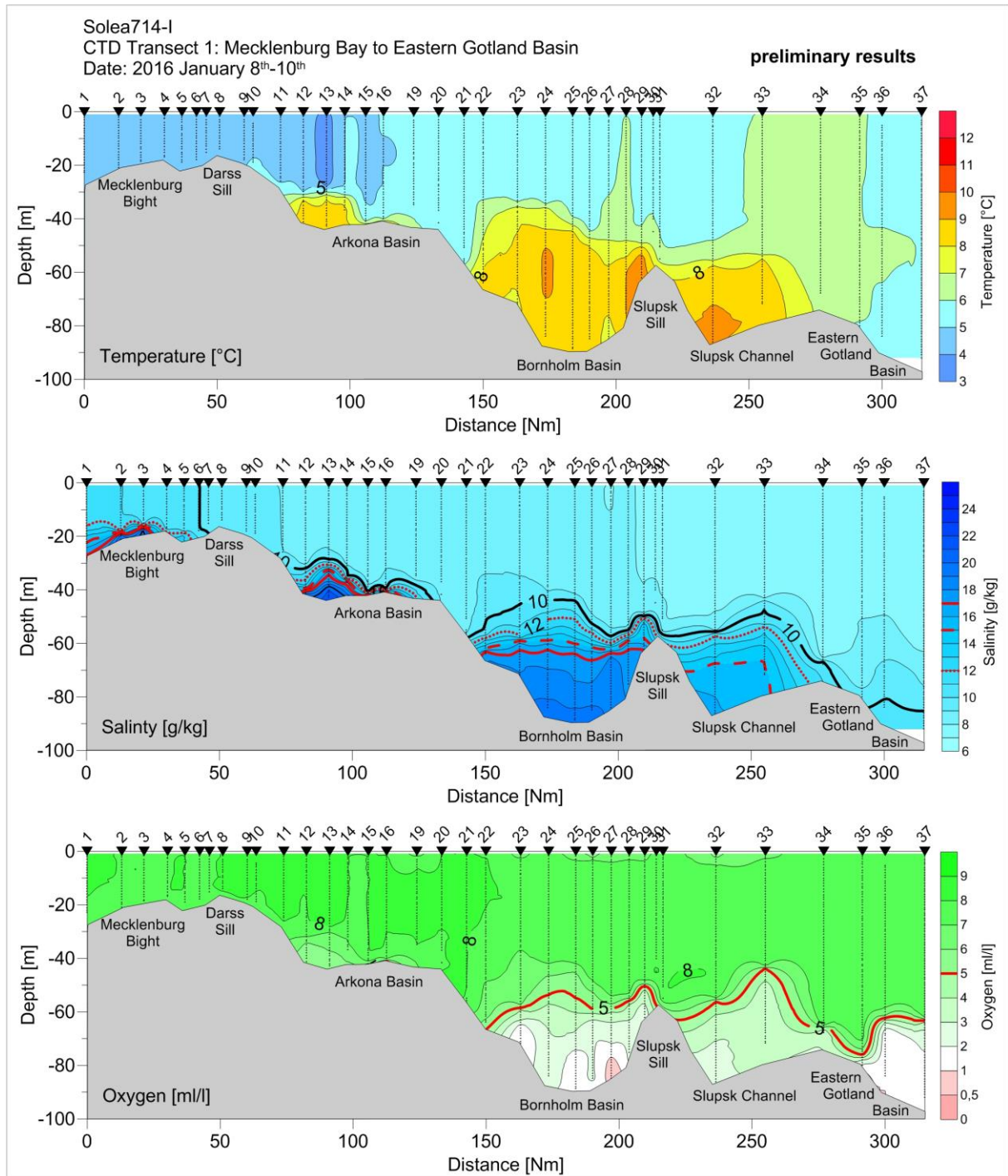
**Table 2: Deep water layer (bottom near layer depths)**

<b>Area Date</b>	<b>Station Name /No.*</b>	<b>Temp. oC</b>	<b>Sal. psu</b>	<b>O2 ml/l</b>
Meckl.Bight 18.01.2016	TFO011/117	3.98	21.86	7.24
Darss Sill 18.01.2016	TFO030/112	4.75	15.12	7.08
Arkona Basin 17.01.2016	TFO113/109	8.26	19.13	5.85
Bornholm Deep 17.01.2016	TFO213/97	8.47	20.84	2.02
Stolpe Channel 16.01.2016	TFO222/91	8.54	18.51	2.17
SE Gotland Basin 16.01.2016	TFO259/88	7.03	12.21	3.56
Karlsö Deep 16.01.2016	TFO245/85	5.22	10.64	0.07

\* see Figure 2 / Table 4

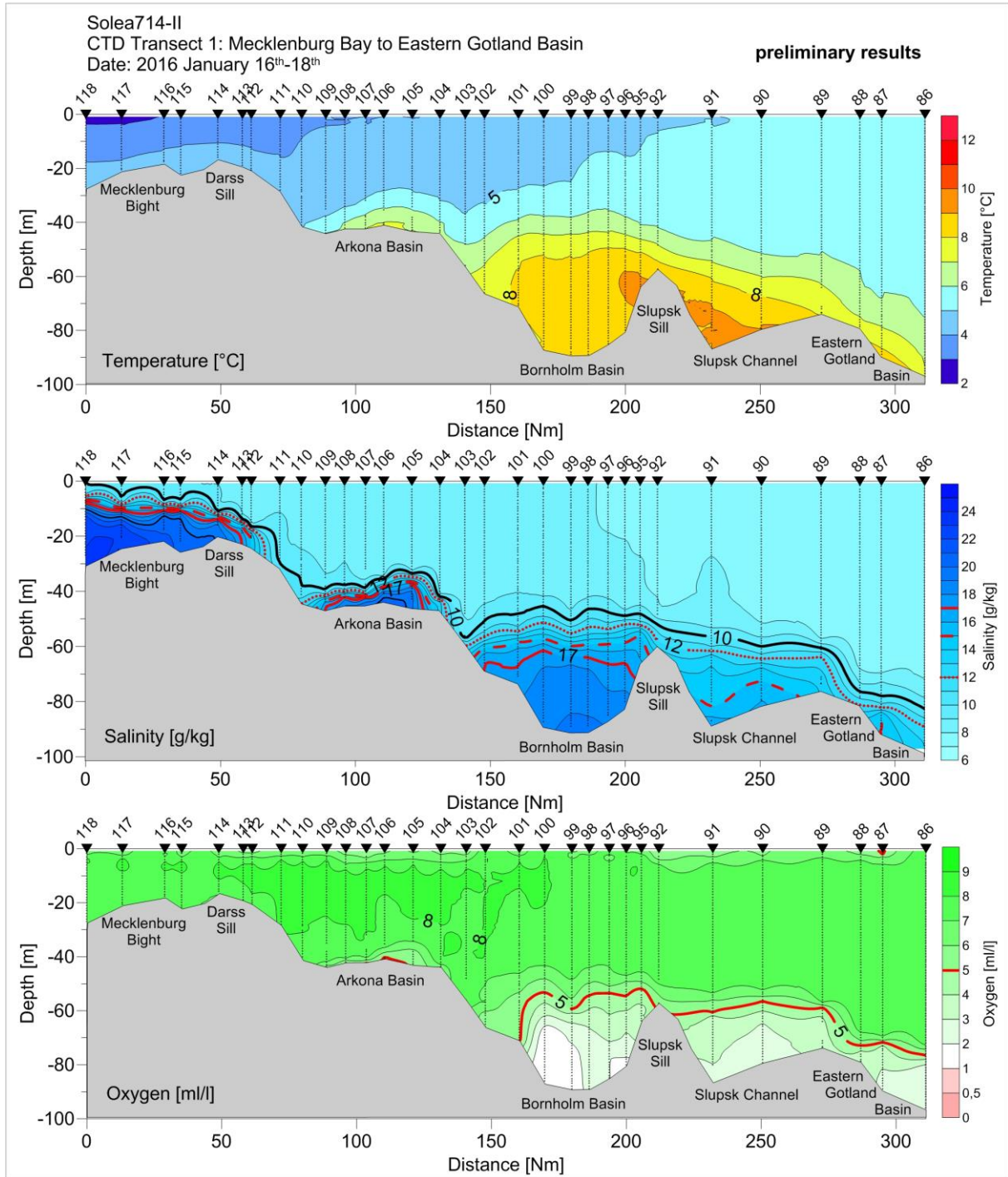


**Figure 3:** Stations (labeled with station number -> Tab. 4) and shown cross sections in the western to central Baltic Sea.

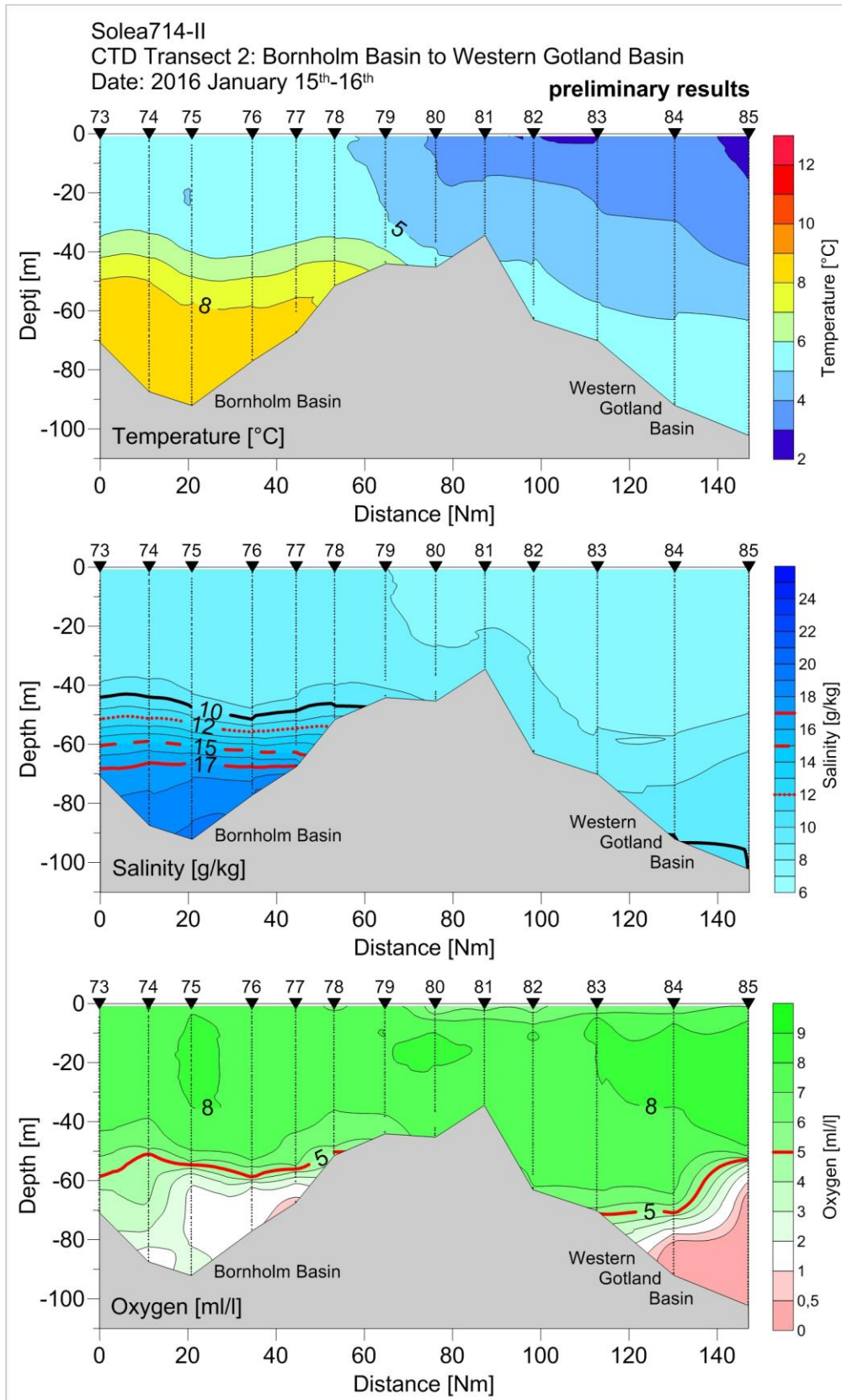


**Figure 4:** Cross section 1 from Mecklenburg Bight to the southern entrance of the Eastern Gotland Basin (January 8<sup>th</sup> – 10<sup>th</sup>, Solea714-I).

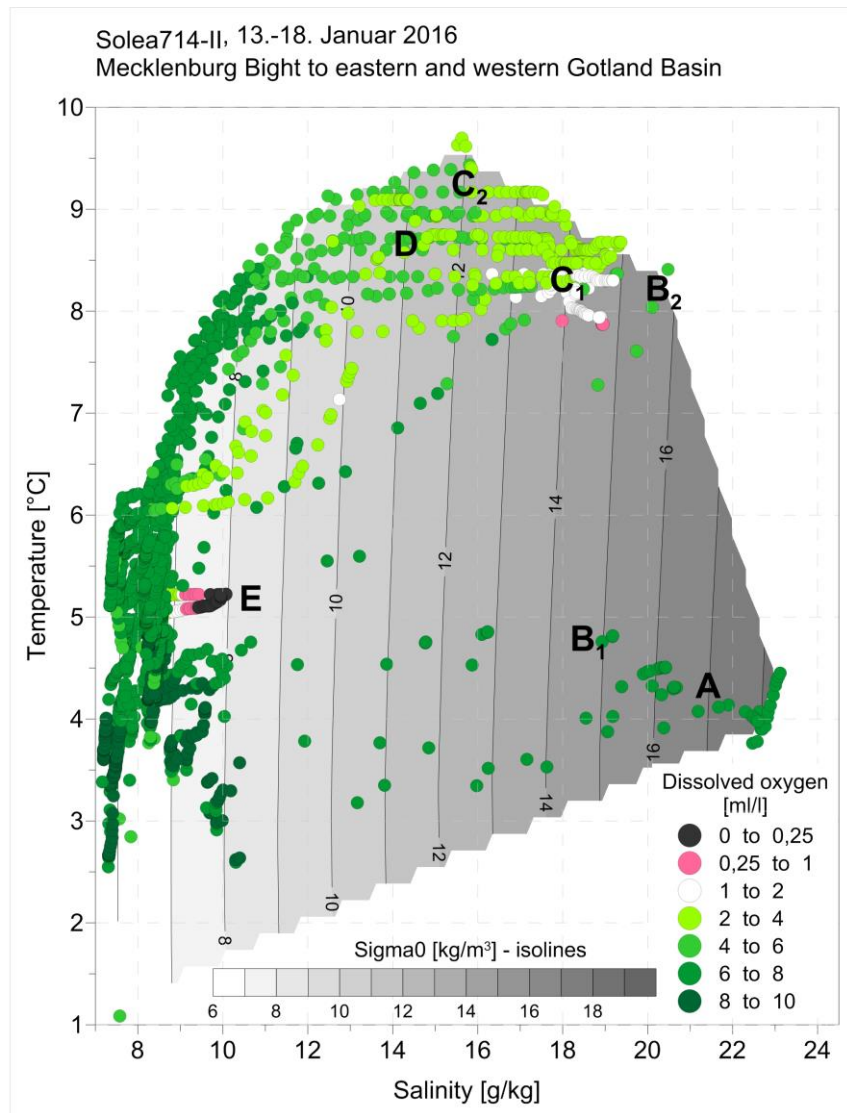




**Figure 5:** Cross section 1 from Mecklenburg Bight to the southern entrance of the Eastern Gotland Basin (January 16<sup>th</sup> – 18<sup>th</sup>, Solea714-II).



**Figure 6:** Cross section 2 – central Bornholm Basin to Western Gotland Basin (January 15<sup>th</sup> – 16<sup>th</sup>, Solea714-II).



**Figure 7:** Temperature-salinity-oxygen diagram of measured CTD stations from Darss Sill, Arkona Basin, Bornholm Basin and Slupsk Channel (Solea714-II, 2016 January 15<sup>th</sup> – 18<sup>th</sup>).

Classified water volumes:

- A – bottom water of the Mecklenburg Bight
- B<sub>1</sub> – new bottom water of the Darss Sill, Arkona Basin and Bornholm Gat
- B<sub>1</sub> – old bottom water of the Darss Sill, Arkona Basin and Bornholm Gat (small inflow pulse December 2015)
- C<sub>1</sub> – bottom water of the Bornholm Basin (MBI December 2014 and November 2015)
- C<sub>2</sub> – upper deep water of the Bornholm Basin (MBI November 2015, stratified below the halocline)
- D – new bottom water of the Slupsk Sill, Slupsk Channel and southwestern part of the eastern Gotland Basin (small inflow pulse October 2015 and MBI November 2015)
- E – anoxic bottom water of the western Gotland Basin

**Table 3:** List of stations carried out during the cruise SO714-I.

Stat. No.	Stat. Name	Latitude	Longitude	Lot-Depth [m]		Date	Time [UTC]	CTD cast(s)	Remarks
1	TF0010	54°33,114N	011°19,213E	29,1	Begin	08.01.2016	11:23	SB714001.hex	CTD 1 oxygen samples
				29,5	End	08.01.2016	11:36		
2	TF 0011	54°24,575N	011°35,938E	25,9	Begin	08.01.2016	12:55	SB714002.hex	CTD
				25,2	End	08.01.2016	13:06		
3	TF 0017	54°21,608N	011°49,498E	23,4	Begin	08.01.2016	13:55	SB714003.hex	CTD 1 oxygen samples
				23,6	End	08.01.2016	14:03		
4	TF 0041	54°24,419N	012°03,729E	20,8	Begin	08.01.2016	14:54	SB714004.hex	CTD
				19,1	End	08.01.2016	15:01		
5	TF 0046	54°27,958N	012°13,163E	26,4	Begin	08.01.2016	15:42	SB714005.hex	CTD 1 salinity samples
				26,5	End	08.01.2016	15:50		
6	TF0083	54°33,056N	012°16,541E	26,8	Begin	08.01.2016	16:26	SB714006.hex	CTD
				26,3	End	08.01.2016	16:31		
7	TF0033	54°36,322N	012°19,845E	21,6	Begin	08.01.2016	16:56	SB714007.hex	CTD
				20,9	End	08.01.2016	17:01		
8	TF 0002	54°39,005N	012°26,879E	18,5	Begin	08.01.2016	17:30	SB714008.hex	CTD
				18,7	End	08.01.2016	17:34		
9	TF 0001	54°41,616N	012°42,411E	21,5	Begin	08.01.2016	18:29	SB714009.hex	CTD
				22,4	End	08.01.2016	18:35		
10	TF 0030	54°43,377N	012°47,143E	23,5	Begin	08.01.2016	18:56	SB714010.hex	CTD
				23,7	End	08.01.2016	19:00		
11	TF 0115	54°47,675N	013°03,446E	31,2	Begin	08.01.2016	20:00	SB714011.hex	CTD 2 salinity samples 1 oxygen samples
				31,8	End	08.01.2016	20:08		
12	TF 0114	54°51,567N	013°16,666E	46,5	Begin	08.01.2016	21:01	SB714012.hex	CTD 2 oxygen samples
				46,1	End	08.01.2016	21:13		
13	TF 0113	54°55,518N	013°30,030E	48,7	Begin	08.01.2016	22:02	SB714013.hex	CTD 2 oxygen samples
				48,7	End	08.01.2016	22:13		
14	TF 0105	55°01,518N	013°36,386E	47,4	Begin	08.01.2016	22:56	SB714014.hex	CTD
				47,9	End	08.01.2016	23:02		
15	TF 0104	55°04,171N	013°48,859E	48,1	Begin	08.01.2016	23:48	SB714015.hex	CTD
				47,4	End	08.01.2016	23:58		
16	TF 0102	55°09,382N	013°56,502E	46,1	Begin	09.01.2016	00:40	SB714016.hex	1 oxygen samples
				46,2	End	09.01.2016	00:47		
17	TF 0103	55°03,798N	013°59,035E	48,2	Begin	09.01.2016	01:23	SB714017.hex	CTD
				48,6	End	09.01.2016	01:30		
18	TF 0109	54°59,850N	014°04,552E	49,6	Begin	09.01.2016	01:59	SB714018.hex	CTD
				49,1	End	09.01.2016	02:09		
19	TF 0145	55°10,028N	014°16,174E	48,8	Begin	09.01.2016	04:02	SB714019.hex	CTD
				48,8	End	09.01.2016	04:09		
20	TF 0144	55°15,036N	014°30,320E	46,8	Begin	09.01.2016	05:07	SB714020.hex	CTD
				46,4	End	09.01.2016	05:12		
21	TF 0142	55°24,321N	014°32,227E	62,3	Begin	09.01.2016	06:10	SB714021.hex	CTD
				64,2	End	09.01.2016	06:22		
22	TF 0140	55°27,956N	014°43,025E	71,4	Begin	09.01.2016	07:01	SB714022.hex	CTD
				71,4	End	09.01.2016	07:10		
23	ZS 0001	55°29,776N	015°05,574E	88,2	Begin	09.01.2016	08:28	SB714023.hex	CTD 2 salinity samples 4 oxygen samples
				87,5	End	09.01.2016	08:42		
23	ZS 0001	55°29,661N	015°04,949E	85,6	Begin	09.01.2016	08:59		CTD
				84,4	End	09.01.2016	09:14		
24	TF 0200	55°22,999N	015°19,977E	94,2	Begin	09.01.2016	10:19	SB714024.hex	CTD
				94,3	End	09.01.2016	10:35		
25	TF 0211	55°19,839N	015°36,925E	97,7	Begin	09.01.2016	11:41	SB714025.hex	CTD
				98,2	End	09.01.2016	11:51		
26	TF 0212	55°18,083N	015°47,838E	97,9	Begin	09.01.2016	12:33	SB714026.hex	CTD
				98,2	End	09.01.2016	12:45		

Stat. No.	Stat. Name	Latitude	Longitude	Lot-Depth [m]		Date	Time [UTC]	CTD cast(s)	Remarks
27	TF 0213	55°14,897N	015°58,897E	92,8	Begin	09.01.2016	13:31	SB714027.hex	CTD 2 salinity samples
				92,8	End	09.01.2016	13:46		
28	TF 0221	55°13,125N	016°10,025E	85,5	Begin	09.01.2016	14:27	SB714028.hex	CTD
				85,3	End	09.01.2016	14:38		
29	BB1	55°15,515N	016°19,157E	68,5	Begin	09.01.2016	15:41	SB714029.hex	CTD
				68,0	End	09.01.2016	15:51		
30	BB2	55°17,790N	016°25,795E	59,9	Begin	09.01.2016	16:29	SB714030.hex	CTD
				60,5	End	09.01.2016	16:36		
31	TF 0224	55°16,964N	016°30,025E	64,0	Begin	09.01.2016	16:53	SB714031.hex	CTD
				64,5	End	09.01.2016	16:59		
32	TF 0222	55°13,052N	017°03,991E	94,1	Begin	09.01.2016	18:52	SB714032.hex	CTD 2 salinity samples 2 oxygen samples
				94,5	End	09.01.2016	19:03		
33	SC_E	55°17,177N	017°35,761E	87,4	Begin	09.01.2016	20:47	SB714033.hex	CTD
				85,7	End	09.01.2016	20:54		
34	TF 0256	55°19,636N	018°14,079E	80,3	Begin	09.01.2016	22:53	SB714034.hex	CTD
				80,5	End	09.01.2016	23:03		
35	TF 0259	55°33,021N	018°24,309E	93,2	Begin	10.01.2016	00:23	SB714035.hex	CTD 2 salinity samples 2 oxygen samples
				93,1	End	10.01.2016	00:35		
36	TF 0255	55°38,117N	018°35,435E	99,7	Begin	10.01.2016	01:21	SB714036.hex	CTD
				100,1	End	10.01.2016	01:30		
37	TF 0253	55°50,443N	018°51,975E	104,4	Begin	10.01.2016	04:00	SB714037.hex	CTD 2 salinity samples 2 oxygen samples
				105,2	End	10.01.2016	04:13		
38		55°38,168N	018°36,126E	98,0	Begin	10.01.2016	05:43		ADCP
		55°14,952N	015°58,836E	93,1	End	11.01.2016	06:22		
39	TT0001 - - TT0002	55°17,427N	016°17,868E	71,5	Begin	11.01.2016	07:46		MSS
		55°17,575N	016°38,742E	73,8	End	11.01.2016	15:17		
40	TT0001 - - TT0002	55°17,315N	016°17,957E	70,7	Begin	11.01.2016	16:37		MSS
		55°18,066N	016°38,922E	74,1	End	11.01.2016	23:02		
41	wGB-5	56°15,529N	016°44,665E	52,5	Begin	12.01.2016	04:09	SB714041.hex	CTD 2 salinity samples 1 oxygen samples
				53,7	End	12.01.2016	04:17		
42	TF223	56°06,987N	016°31,843E	51,0	Begin	12.01.2016	05:18	SB714042.hex	CTD 2 salinity samples 2 oxygen samples
				51,1	End	12.01.2016	05:28		
43	BB_N3	55°56,226N	016°26,282E	48,5	Begin	12.01.2016	06:31	SB714043.hex	CTD
				48,1	End	12.01.2016	06:37		
44	BB_N	55°45,823N	016°17,276E	64,4	Begin	12.01.2016	07:45	SB714044.hex	CTD
				64,7	End	12.01.2016	07:51		
45	BB_N2	55°38,405N	016°09,045E	73,1	Begin	12.01.2016	08:40	SB714045.hex	CTD
				73,6	End	12.01.2016	08:48		
46	TF 0220	55°29,943N	016°00,045E	83,2	Begin	12.01.2016	09:45	SB714046.hex	CTD
				83,0	End	12.01.2016	09:55		
47	BB3	55°27,787N	015°55,554E	88,0	Begin	12.01.2016	10:16	SB714047.hex	CTD 2 salinity samples
				88,1	End	12.01.2016	10:29		
48	TF 0210	55°27,443N	015°37,694E	86,9	Begin	12.01.2016	11:24	SB714048.hex	CTD 2 oxygen samples
				86,6	End	12.01.2016	11:34		
49	ZS0001	55°29,755N	015°05,603E	88,2	Begin	12.01.2016	13:13	SB714049.hex	CTD 2 salinity samples 2 oxygen samples
				88,3	End	12.01.2016	13:24		
50	TF 0200	55°22,957N	015°19,954E	94,3	Begin	12.01.2016	14:24	SB714050.hex	CTD
				94,2	End	12.01.2016	14:35		
51	TF 0211	55°19,795N	015°36,961E	0,0	Begin	12.01.2016	15:31	SB714051.hex	CTD
				98,4	End	12.01.2016	15:39		
52	TF 0212	55°18,120N	015°47,720E	98,2	Begin	12.01.2016	16:16	SB714052.hex	CTD
				98,1	End	12.01.2016	16:25		

Stat. No.	Stat. Name	Latitude	Longitude	Lot-Depth [m]		Date	Time [UTC]	CTD cast(s)	Remarks
53	TF 0213	55°15,055N	015°59,146E	92,7	Begin	12.01.2016	17:09	SB714053.hex	CTD
				92,5	End	12.01.2016	17:16		
54	TF 0221	55°13,324N	016°09,964E	85,3	Begin	12.01.2016	17:54	SB714054.hex	CTD
				85,5	End	12.01.2016	18:02		
55	TF 0214	55°09,538N	015°39,583E	96,9	Begin	12.01.2016	19:41	SB714055.hex	CTD
				96,5	End	12.01.2016	19:51		
56	TF 0215	54°59,965N	015°30,002E	78,8	Begin	12.01.2016	20:54	SB714056.hex	CTD
				78,8	End	12.01.2016	21:02		
57	TF 0204	54°50,652N	015°22,616E	72,3	Begin	12.01.2016	22:03	SB714057.hex	CTD 2 salinity samples 2 oxygen samples
				72,3	End	12.01.2016	22:12		
58	TF 0202	54°42,012N	015°14,959E	66,8	Begin	12.01.2016	23:12	SB714058.hex	CTD
				66,8	End	12.01.2016	23:18		
59	TF 0203	54°37,826N	014°59,926E	54,3	Begin	13.01.2016	00:15	SB714059.hex	CTD
				54,5	End	13.01.2016	00:22		
60	TF 0154	54°37,358N	014°46,116E	48,9	Begin	13.01.2016	01:09	SB714060.hex	CTD
				48,8	End	13.01.2016	01:15		
61	TF 0153	54°37,323N	014°31,978E	33,7	Begin	13.01.2016	02:02	SB714061.hex	CTD
				34,0	End	13.01.2016	02:07		
62	TF 0152	54°38,008N	014°16,931E	32,2	Begin	13.01.2016	03:58	SB714062.hex	CTD
				32,2	End	13.01.2016	04:03		
63	TF 0150	54°36,774N	014°02,670E	22,1	Begin	13.01.2016	04:51	SB714063.hex	CTD
				22,1	End	13.01.2016	04:54		
64	TF 0121	54°42,626N	013°56,795E	31,4	Begin	13.01.2016	05:33	SB714064.hex	CTD2 salinity samples 2 oxygen samples
				31,9	End	13.01.2016	05:39		
65	TF 0112	54°48,333N	013°57,371E	42,2	Begin	13.01.2016	06:13	SB714065.hex	CTD
				42,0	End	13.01.2016	06:18		
66	TF 0111	54°53,286N	013°57,977E	46,7	Begin	13.01.2016	06:48	SB714066.hex	CTD
				47,0	End	13.01.2016	06:55		
67	ABBoje	54°52,270N	013°51,427E	47,2	Begin	13.01.2016	07:17	SB714067.hex	CTD
				47,6	End	13.01.2016	07:24		
68	TFO11	54°32,127N	013°45,998E	21,9	Begin	13.01.2016	09:15	SB714068.hex	CTD
				21,8	End	13.01.2016	09:20		

**Table 4:** List of stations carried out during the cruise SO714-II.

Stat. No.	Stat. Name	Latitude	Longitude	Lot-Depth [m]	Date	Time [UTC]	CTD cast(s)	Remarks
69	TF0211 -	55°19,790N	015°36,891E		Begin	14.01.2016	05:30	MSS profile TF211-TF220
	-TF0220	55°13,211N	016°10,109E		End	14.01.2016	18:00	Bornholm Basin
70	TF0211 -	55°19,790N	015°36,891E		Begin	14.01.2016	06:30	MSS profile TF211-TF221
	-TF0221	55°13,211N	016°10,109E		End	14.01.2016	19:00	Bornholm Basin
71	TF213	55°15,043N	15°58,912E	85,5	Begin	14.01.2016	19:38	SB714071.hex
					End	14.01.2016	20:00	1 CTD
72	TF213 -	55°14,982N	015°59,548E		Begin	14.12.2015	20:05	ADCP TF213- TF222
	-TF222	55°12,920N	017°04,324E		End	15.01.2016	06:27	Bornholm Basin - Slupsk Channel
73	TF215	55°00,0316N	15°29,7931E	71	Begin	15.01.2016	10:35	SB714073.hex
					End	15.01.2016	10:45	1 CTD
74	TF214	55°09,6014N	15°39,67E	90	Begin	15.01.2016	12:05	SB714074.hex
					End	15.01.2016	12:20	1 CTD 3 oxygen samples 2 salinity samples
75	TF212	55°18,0952N	15°47,8712E	91	Begin	15.01.2016	13:30	SB714075.hex
					End	15.01.2016	13:43	1 CTD
76	TF220	55°29,961N	15°59,935E	76	Begin	15.01.2016	15:13	SB714076.hex
					End	15.01.2016	15:20	1 CTD
77	BB_N2	55°38,388N	16°08,933E	68	Begin	15.01.2016	16:23	SB714077.hex
					End	15.01.2016	16:30	1 CTD
78	BB_N	55°45,714N	16°17,387E	58	Begin	15.01.2016	17:24	SB714078.hex
					End	15.01.2016	17:29	1 CTD
78	BB_N	55°45,714N	16°17,387E	58	Begin	15.01.2016	17:24	SB714078.hex
					End	15.01.2016	17:29	1 CTD
79	BB_N3	55°56,164N	16°26,330E	42	Begin	15.01.2016	18:41	SB714079.hex
					End	15.01.2016	18:45	1 CTD
80	TF223	56°07,056N	16°31,852E	47	Begin	15.01.2016	19:57	SB714080.hex
					End	15.01.2016	20:01	1 CTD
81	wGB-5	56°15,474N	16°44,767E	44	Begin	15.01.2016	21:15	SB714081.hex
					End	15.01.2016	21:19	1 CTD
82	wGB-4	56°24,809N	16°55,858E	62	Begin	15.01.2016	22:32	SB714082.hex
					End	15.01.2016	22:36	1 CTD
83	wGB-SW	56°37,376N	17°08,090E	78	Begin	16.01.2016	00:13	SB714083.hex
					End	15.01.2016	00:20	1 CTD
84	wGB-1	56°52,622N	17°23,2930E	90,5	Begin	16.01.2016	03:00	SB714084.hex
					End	15.01.2016	03:30	1 CTD
85	TF245	57°07,0578N	17°39,9142E	100	Begin	16.01.2016	05:05	SB714085.hex
					End	15.01.2016	05:22	1 CTD 3 oxygen samples 2 salinity samples
86	TF253	55°50,4648N	18°52,0385E	95,5	Begin	16.01.2016	13:25	SB714086.hex
					End	16.01.2016	13:37	1 CTD
87	TF255	55°38,016N	18°35,898E	90	Begin	16.01.2016	15:06	SB714087.hex
					End	16.01.2016	15:17	1 CTD, 2 oxygen samples 1 salinity samples
88	TF259	55°33,022N	18°24,015E	84	Begin	16.01.2016	16:07	SB714088.hex
					End	16.01.2016	16:14	1 CTD
89	TF256	55°19,603N	18°14,319E	73	Begin	16.01.2016	17:39	SB714089.hex
					End	16.01.2016	17:45	1 CTD
90	SC_E	55°17,190N	17°35,566E	79	Begin	16.01.2016	20:48	SB714090.hex
					End	16.01.2016	20:55	1 CTD
91	TF222	55°13,017N	17°04,029E	87	Begin	16.01.2016	21:37	SB714091.hex
					End	16.01.2016	21:44	1 CTD
92	TF224	55°17,093N	16°29,901E	58	Begin	16.01.2016	23:33	SB714092.hex
					End	16.01.2016	23:37	1 CTD

Stat. No.	Stat. Name	Latitude	Longitude	Lot-Depth [m]		Date	Time [UTC]	CTD cast(s)	Remarks
93	SS_N-SS_S	55°20,961N	16°30,260E	55-64	Begin	17.01.2016	00:02		ADCP SS_N-SS_S Slupsk Sill
		55°11,931N	016°30,170E		End	17.01.2016	02:10		
94	SS_S-SS_N	55°11,958N	016°30,229E	55-64	Begin	17.01.2016	02:10		MSS SS_S-SS-N Slupsk Sill
		55°21,182N	016°30,179E		End	17.01.2016	08:40		
95	BB1	55°15,4294N	16°19,0837E	62	Begin	17.01.2016	09:30	SB714095.hex	1 CTD
					End	17.01.2016	09:42		
96	TF221	55°13,3231N	16°09,9758E	80	Begin	17.01.2016	10:12	SB714096.hex	1 CTD
					End	17.01.2016	10:22		
97	TF213	55°14,9470N	15°58,9753E	85	Begin	17.01.2016	11:02	SB714097.hex	1 CTD 2 oxygen samples 1 salinity samples
					End	17.01.2016	11:13		
98	TF212	55°18,1685N	15°47,7255E	91	Begin	17.01.2016	11:57	SB714098.hex	1 CTD
					End	17.01.2016	12:10		
99	TF211	55°19,8091N	15°36,9586E	91	Begin	17.01.2016	12:50	SB714099.hex	1 CTD
					End	17.01.2016	13:02		
100	TF200	55°23,051N	15°20,026E	89	Begin	17.01.2016	14:06	SB714100.hex	1 CTD
					End	17.01.2016	14:13		
101	TF205	55°23,3178N	15°03,5444E	74	Begin	17.01.2016	15:14	SB714101.hex	1 CTD 3 oxygen samples 3 salinity samples
					End	17.01.2016	15:27		
102	TF140	55°27,9574N	14°43,0630E	65,5	Begin	17.01.2016	16:43	SB714102.hex	1 CTD
					End	17.01.2016	16:52		
103	TF142	55°24,269N	14°32,216E	56	Begin	17.01.2016	17:35	SB714103.hex	1 CTD
					End	17.01.2016	17:40		
104	TF144	55°15,0330N	14°30,3720E	42	Begin	17.01.2016	18:44	SB714104.hex	1 CTD
					End	17.01.2016	18:52		
105	TF145	55°10,047N	14°14,754E	43	Begin	17.01.2016	20:07	SB714105.hex	1 CTD
					End	17.01.2016	20:11		
106	TF102	55°09,277N	13°56,435E	41	Begin	17.01.2016	21:22	SB714106.hex	1 CTD
					End	17.01.2016	21:25		
107	TF104	55°04,042N	13°48,837E	42	Begin	17.01.2016	22:08	SB714107.hex	1 CTD
					End	17.01.2016	22:21		
108	TF105	55°01,572N	13°36,180E	43	Begin	17.01.2016	23:05	SB714108.hex	1 CTD
					End	17.01.2016	23:09		
109	TF113	54°55,505N	13°29,811E	43	Begin	17.01.2016	23:53	SB714109.hex	1 CTD
					End	17.01.2016	23:58		
110	TF114	54°51,675N	13°16,526E	42	Begin	18.01.2016	00:53	SB714110.hex	1 CTD
					End	18.01.2016	00:56		
111	TF115	54°47,6531N	13°03,6250E	28,2	Begin	18.01.2016	01:54	SB714111.hex	1 CTD
					End	18.01.2016	02:02		
112	TF30	54°43,3913N	12°47,1152E	20,3	Begin	18.01.2016	03:05	SB714112.hex	1 CTD
					End	18.01.2016	03:11		
113	TF01	54°41,2779N	12°42,5367E	18,9	Begin	18.01.2016	03:33	SB714113.hex	1 CTD
					End	18.01.2016	03:40		
114	TF02	54°38,9921N	12°27,5029	16	Begin	18.01.2016	04:35	SB714114.hex	1 CTD
					End	18.01.2016	04:42		
115	TF46	54°28,0265N	12°13,1438E	24	Begin	18.01.2016	06:09	SB714115.hex	1 CTD 3 oxygen samples 2 salinity samples
					End	18.01.2016	06:18		
116	TF41	54°25,0067N	12°03,6213E	18	Begin	18.01.2016	06:59	SB714116.hex	1 CTD
					End	18.01.2016	07:06		
117	TF11	54°24,7310N	11°36,9785E	20	Begin	18.01.2016	08:29	SB714117.hex	1 CTD
					End	18.01.2016	08:37		
118	TF10	54°33,0765N	11°19,1082E	27	Begin	18.01.2016	09:50	SB714118.hex	1 CTD
					End	18.01.2016	09:57		