Leibniz Institute for Baltic Sea Research Warnemünde

C r u i s e R e p o r t

r/v "E. M. Borgese"

Cruise- No. EMB199

This report is based on preliminary data

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1. **Cruise No.:** EMB 199

2. **Dates of the cruise:** from 05.11.2018 to 15.11.2018

3. **Particulars of the research vessel:**

Name: E.M. Borgese
Nationality: Germany
Operating Authority: Leibniz Institute of Baltic Sea Research Warnemünde (IOW)

4. **Geographical area in which ship has operated:**

Baltic Sea from Kiel Bight to Gotland Sea

5. **Dates and names of ports of call**

Sassnitz 08.11. – 09.11. 2018

6. **Purpose of the cruise**

Monitoring in the frame of the HELCOM COMBINE Programm, Long term data programm of IOW

7. **Crew:**

Name of master: Uwe Scholz
Number of crew: 11

8. **Research staff:**

Chief scientist:
Dr. Martin Schmidt, IOW
Scientific Crew:

Donath	Jan
Hand	Ines
Pötzsch	Michael
Schöne	Susanne
Ruickoldt	Johann
Henschel	Tiffany
Schubert	Stefanie
Kreuzer	Lars
Hehl	Uwe

Observer:

9. **Co-operating institutions:**

All institutions dealing with HELCOM monitoring programmes, University of Rostock

10. **Scientific equipment**

CTD SBE 911+ with doubled sensors, SBE oxygen sensor and WETLABS ECO FLNTU Fluorometer/turbidity sensor
PAR/SPAR – sensor, SBE-35 thermometer
Rosette with water samplers
In-situ camera
Plankton nets, WP2 net, filtration set
Van Veen grab, dredge

Autoanalyser *Evolution (Allicance Instruments)*,
Photometer *Shimadsu UV 1240 mini*, Titrino *716 DMS (Metrum)*
Ships weather station and data distribution system (WERUM),Thermosalinograph

11. General remarks and preliminary result

Narrative of the cruise and measurements

The cruise started Nov. 05th 2018 in Rostock-Marienehe. As part of the HELCOM COMBINE programm and the long term observation programm of IOW it studies hydrographic, chemical and biological changes in the Baltic Sea. During the first leg of the cruise, hydrographic, biological and chemical measurements were carried out in the Western Baltic Sea between Kiel Bight and Bornholms Gatt and in the Odra Bight as well. The program includes phytoplankton, zooplankton and macrozoobenthos sampling at selected stations. The second leg leads to the South-Eastern and Central Baltic Sea. Here station work comprises hydrographic measurements and biochemical water samling.

During the first leg, the wheather was calm permitting easy field work, especially macrozoobenthos sampling. All planned stations could be worked. After a crew exchange in the morning of Nov. 09th, "E. M. Borgese" was heading through the Bornholm Sea to the Eastern Gotland Sea. Although the wind often exceeded 5 Bf, hydrographic measurements and sampling were possible. Unfortunately, the high sea state and the wind did not allow the scheduled maintenance of two long term moorings in the Gotland Sea. The ship time was used for a more detailed hydrographic sampling through the Bornholm Basin to study the consequences of unusual warm inflow events during summer 2018. To observe the overflow from the Bornholm Basin into the Gotland Basin a section through the Stolpe trench was worked repeatedly.

The cruise ended Nov. 15th in Rostock-Marienehe.

Instrumentation and quality control

Work at each station started with a CTD-cast (SBE 911+ with sensors for temperature and conductivity, pressure, SBE oxygen sensor and WETLABS Fluoro/turbiditymeter) including water sampling for oxygen and nutrient measurements. Underwater light conditions are determined with a PAR sensor, combined with a similar sensor on deck. The quality of the hydrographic measurements is controlled by the double sensor equipment of the CTD. As a measure of the overall stability of the CTD, the frequency of the central CTD quartz-generator is controlled. Additionally, the temperature sensors are compared regularly with a highly stable SBE-35 thermometer, for the control of salinity measurements water samples are taken to be measured later in the laboratory with an AUTOSAL 8400. The electrochemical Clark-cell based oxygen sensors are controlled and corrected against oxygen samples taken on every station within a well mixed layer. Due to problems with the Winkler titration, the quality of the oxygen data from this cruise is reduced and possible errors in the oxygen sensor data of +/- 4% of the measured concentration could not be corrected. The zero point of the oxygen sensor was controlled prior and after the cruise and revealed as stable. In addition, the anoxic deep water in the Gotland Basin was used to verify the sensor stability at low oxygen concentrations.

At selected stations phytoplankton samples are taken, Secci-depth is determined and 3 l water is filtered. The filters are frozen in liquid nitrogen for processing in the lab. Additionally, zooplankton samples were taken with a WP2 net within the euphotic zone, and above and below the halocline.

To detect long term variability of the microbial community, at stations TF0271 and TF0284 DNA samples are taken.

At some stations, TF0018, TF0012, TF0010, TF0360, TF0030, TF0109, TF0152, TF0160, benthic samples are taken with a van Veen grab (three holes per station) and with a dredge. The grab taken samples are sieved and samples are stored for further analysis in the laboratory. Sampling was scheduled for daylight. Following the HELCOM guidelines, species decomposition and abundance are analyzed three month after the cruise.

Oxygen concentration in water samples is determined with a 716 DMS Titrino III, for H_2S determination the photometric Ethylen blue method is used. Nutrients (nitrate, nitrite, phosphate and silicate) are determined with an Autoanalyser *Evolution (Allicance Instruments)*, for ammonium the photometric method is used. Quality is ensured by accreditation of the methods. For quality control during the cruise, standard samples are processed together with the water samples.

At stations TF0113, TF0212, TF0213, TF0271 and TF0286, samples are taken to determine concentration of methane, nitrous oxide and carbon dioxide. These measurements are part of the IOW long term observation programme and contribute to the investigation of zooplanktion metabolic activity and of stöchiometry and kinetics of mineralisation processes in the different basins of the Baltic Sea.

Underway measurements are carried out with ships thermosalinograph and ships weather station. Data are stored in the DSHIP system. The new self-cleaning dual channel thermosalinograph is tested successfully. Thermolaninograph salinity was verified by comparison with CTD based salinity in 3.5 m water depth.

Preliminary results

Meteorological conditions

The cruise took place after the warmest summer in Germany from the start of permanent meteorological registration. The week before the cruise was characterised by strong westerly winds exciting large sea level oscillations, cooling but little precipitation. Then the extended high pressure area *Zouhir* over Russia, (see Fig. 1), established a long lasting northward flow of warm air and retained the frontal systems of the low pressure area *Yaprak* over the Atlantic. Skies were fully overcast in the morning and visibility was low due to fog, but around noon sun and air temperature reminded more in late summer than in early November, (see Fig. 2-4). This changed Nov. 10th, when growing low pressure influence went along with strong to gale force wind, permanently overcast skies, little rain and low visibility range. Solar radiation became negligible and the air temperature fell below the sea surface temperature. Hence, the surface layer was significantly cooled during the second leg and some erosion of the seasonal thermocline was observed. Generally. Air temperature and atmosphere temperature are very similar, sensible and thermal radiative heat fluxes are small.

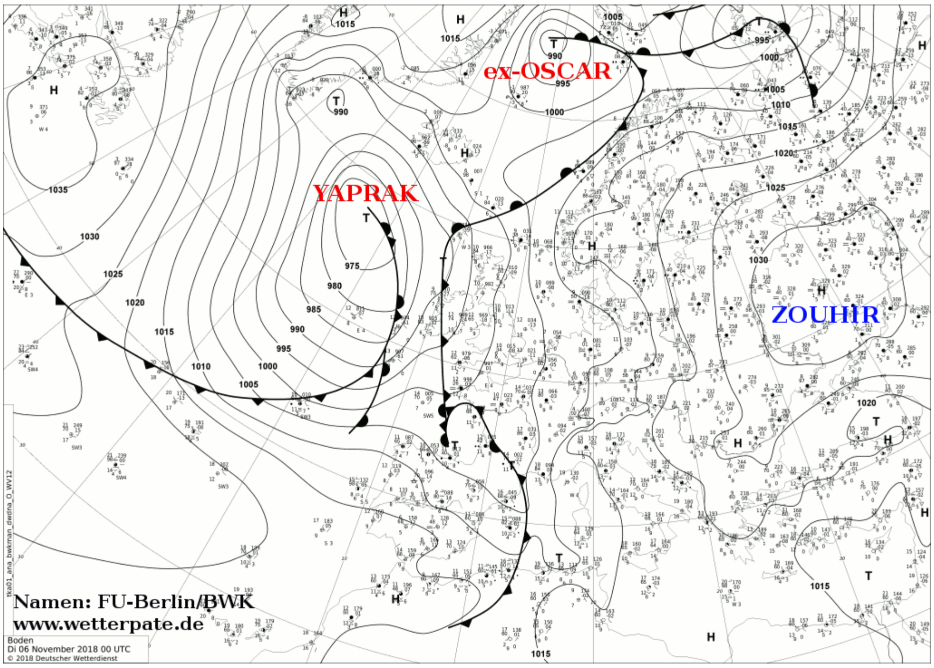


Fig. 1 Typical air pressure distribution during the first part of the cruise. (*The permission of the FU-Berlin to use the map in this report is kindly acknowledged.)*

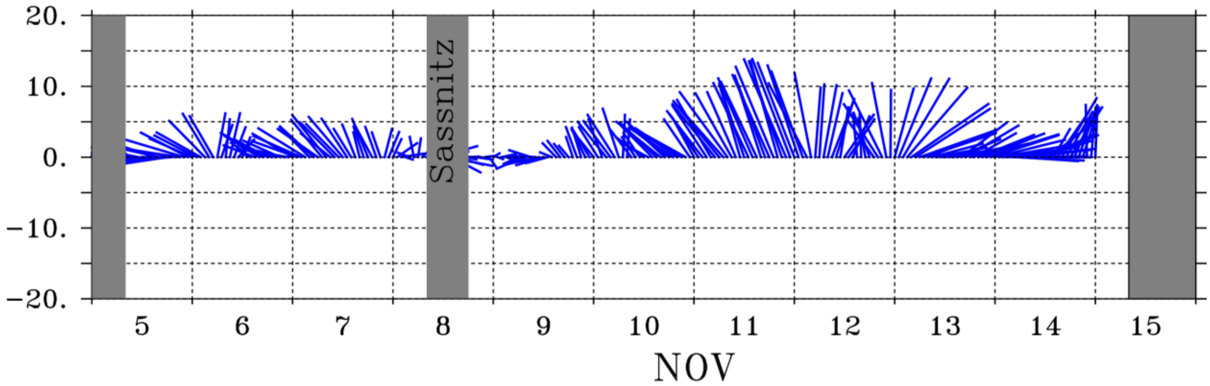


Fig. 2 Wind conditions during the cruise measured by ships weather station. South-easterly winds dominated until Nov. 11th turning to south-west later.

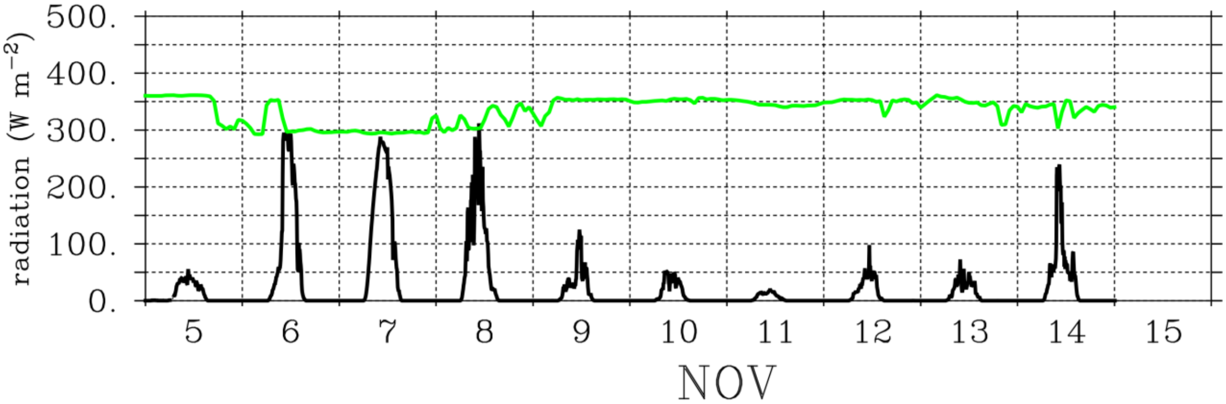


Fig. 3 Downwelling short wave (black) and downwelling long wave radiation (green) measured by ships weather station.

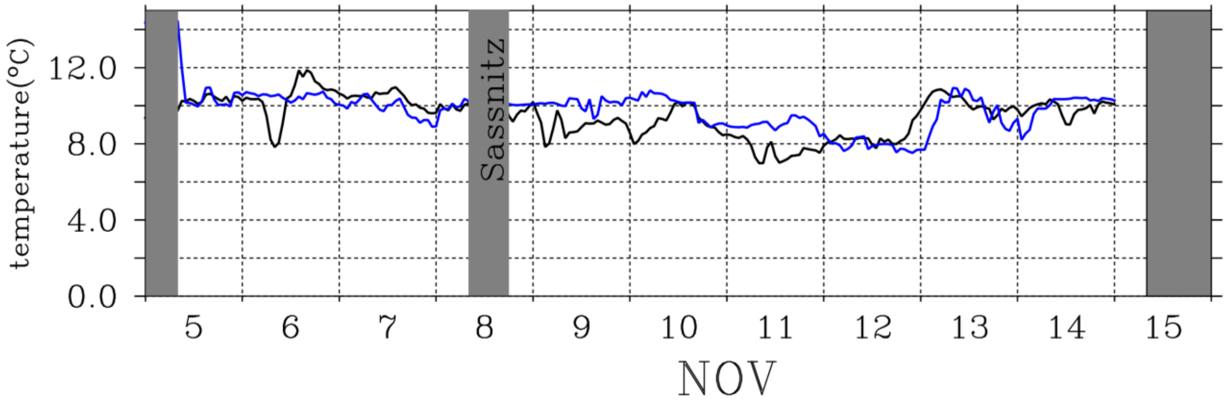


Fig. 4 Air temperature (black) and sea surface temperature [°C] measured by the thermosalinograph.

Underway measurements of surface hydrographic conditions

Fig. 5 gives an overview over the variability of the sea surface temperature and salinity observed during the cruise.

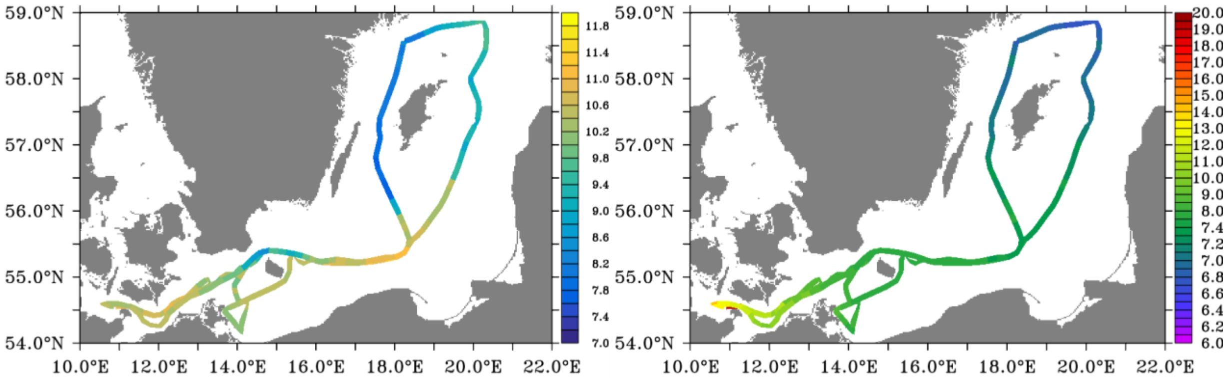


Fig. 5 Surface temperature [°C] (left) and surface practical salinity (right) measured with ships thermosalinograph.

Salinity in the entrance of Kiel Bight was about 20 in the beginning of the cruise, but an outflow situation developed later. When station TF0360 was worked again in the end of the cruise, surface salinity was below 15. The minimum practical surface salinity value of about 6.9 is met in the Baltic Proper north of Gotland, which is still an elevation of 0.5 compared with the conditions prior the last major inflow event.

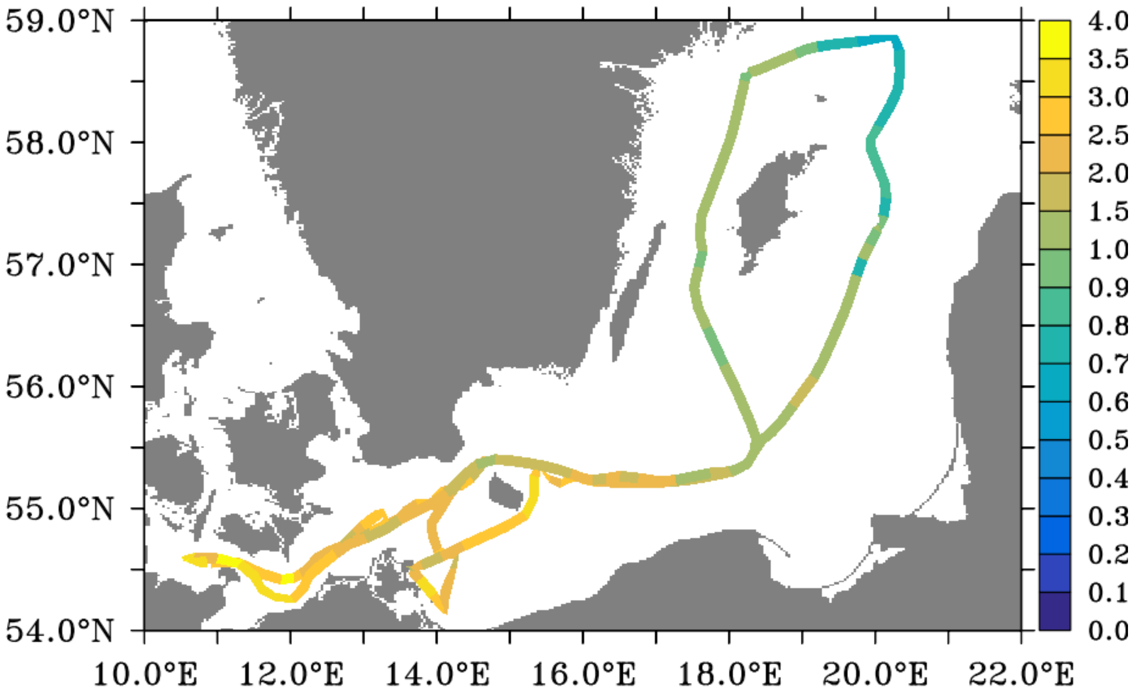


Fig. 6 Surface fluorescence in chlorophyll-a units, [mg dm^{-3}].

Fluorescence as a measure for chlorophyll-a concentration shows elevated values in the Western Baltic Sea but is generally low in the Gotland Basin. This is consistent with the findings for light availability and surface nutrient concentration, which did not reach the typical winter levels yet, see Tab. 1. Throughout the Baltic, part of the dissolved inorganic nitrogen is found as ammonium indicating some recent mineralisation still taking place in the surface layer.

Hydrographic conditions

The hydrographic conditions met **west of Darß Sill** are typical for the season. The bottom water is the warmest water body but with the highest salinity. Surface salinity varies from about 20 in the Kiel Bight to 10 at Darß Sill, see Fig. 15. In the beginning of the cruise, surface temperature is uniformly about 10°C, water is cooling there to about 9°C during the cruise. Bottom salinity is about 19 in the Kiel Bight and falls to 18 towards Darß sill. The bottom water is well oxygenated.

East of Darß Sill surface salinity is about 7.5 – 8, bottom salinity hardly exceeds 21 in the **Arkona Basin**. There, oxygen concentration is only slightly depleted above the sea floor. A thick layer of relatively warm (>10°C) water mass stretches from the Arkona Basin into the Bornholm Basin and continues even through the **Słupsk trench**. In the **Bornholm Basin** and the Słupsk trench, the winter water is displaced upwards. Fig. 7 shows the development of hydrographic conditions comparing the 2018 conditions with conditions from a pre-inflow year (2013) and the previous year (2017). The bottom salinity is significantly elevated compared with pre-inflow values, the oxygen concentration is about zero again. There is a temperature minimum at about 40m depth corresponding to a winter water layer, but its location appears as elevated upwards and the core temperature of about 8°C is much higher than usual winter water temperature. The whole water body below the winter water is about 4 degrees warmer than in the pre-inflow year 2013.

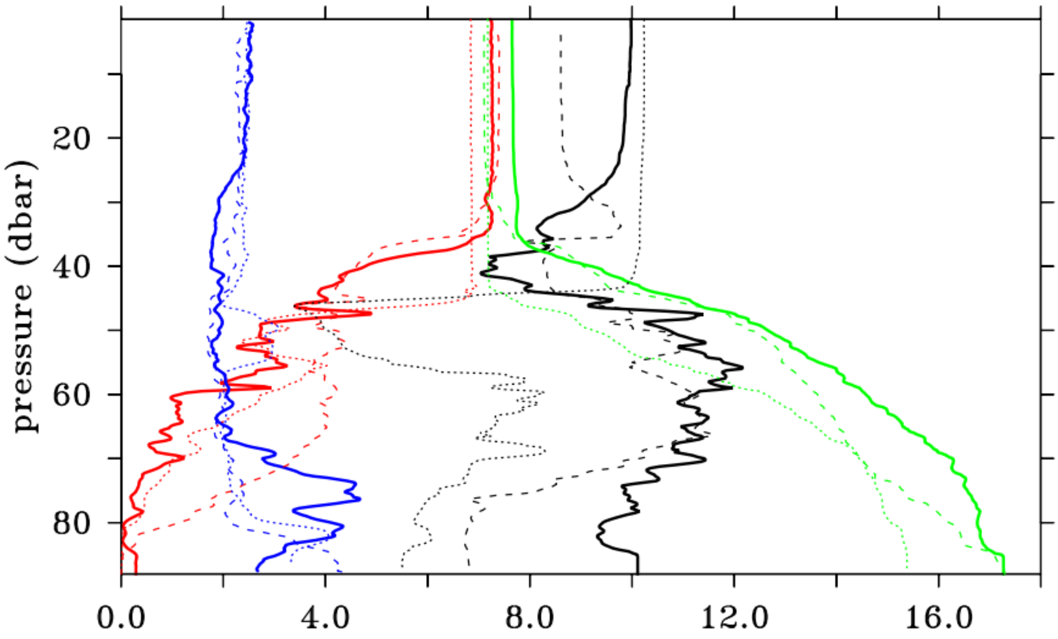


Fig. 7 Vertical profiles of temperature ([°C], black), salinity (green), oxygen concentration ([cm³/dm³] red) and turbidity (blue) for Nov. 2018 (thick line), Nov. 2017 (dashed line) and for the pre-inflow situation Nov. 2013 (dotted line) on station TF0213 in the Bornholm Basin.

East of Słupsk Trench the profiles below the uniform surface layer are characterised by a fast dropping oxygen concentration below 60 m depth. Occasionally, the water is anoxic and a slight sulphidic smell was observed during sampling. The warm and saline water body continues from Słupsk trench into the Gotland Basin, see Fig. 14.

In the **Central Gotland Basin,** the hydrographic conditions are still determined by the major Baltic inflow event about three years ago that caused a strong enhancement of salinity and temperature in the deeper layers and partial ventilation of the deep Gotland Basin waters. The thermocline is constantly at about 50 m depth. Compared with previous years the winter water temperature is back to pre-inflow conditions, see Fig. 8. The temperature in the deeper water still exceeds 6°C everywhere. We see a recovery of anoxic conditions in the bottom water. At 75m water depth, the oxygen concentration is well below 1 cm³/dm³, the water is sulphidic below 80m depth. A pronounced turbidity maximum localised in the redoxcline at 80m depth, but also a second one at 120m depth can be seen as indicator of active mixing bringing sulphidic and oxic water in contact. At 80m depth even nitrate was found in coexistence with hydrogen sulphide.
Hence, the typical anoxic conditions in the Eastern Gotland Basin are restoring rapidly after the inflow event. The extension of the sulphidic layer up to 80m depth is remarkable. Fig.s 9 - 11 demonstrate the re-establishing of stagnant, high nutrient and anoxic conditions in the bottom water. Compared with the previous year, salinity in the bottom water at station TF0271 is only slightly diminished, all nutrient concentrations are increasing again, the inorganic nitrogen pool consists solely of

ammonium.

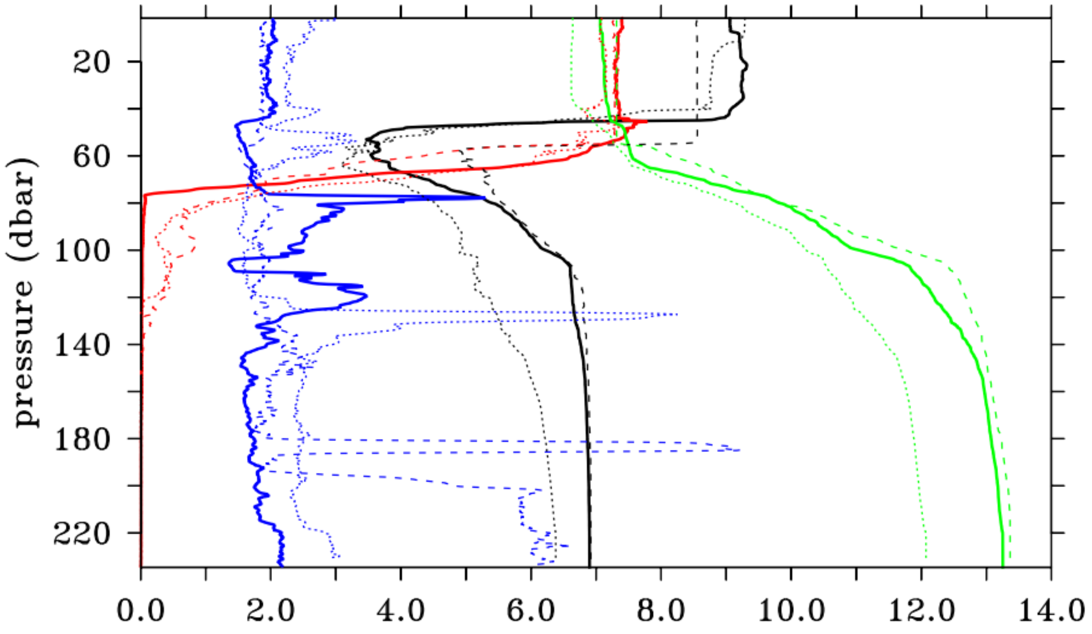


Fig. 8 Vertical profiles of temperature ([°C]black), salinity (green), oxygen concentration ([cm³/dm³], red) and turbidity (blue) for Nov. 2018 (thick line), Nov. 2017 (dashed line) and for the pre-inflow situation Nov. 2013 (dotted line) on station TF0271 in the Gotland Basin.

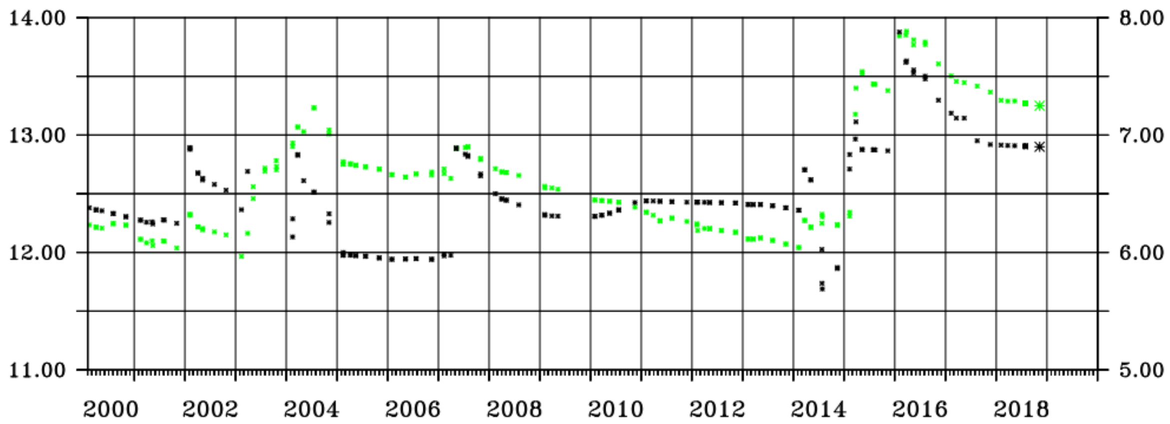


Fig. 9 Time series of the bottom practical salinity (green, left scale) and in situ temperature ([°C] black, right scale) at the central station TF0271 in the Gotland Basin. The recent result is marked with a star.

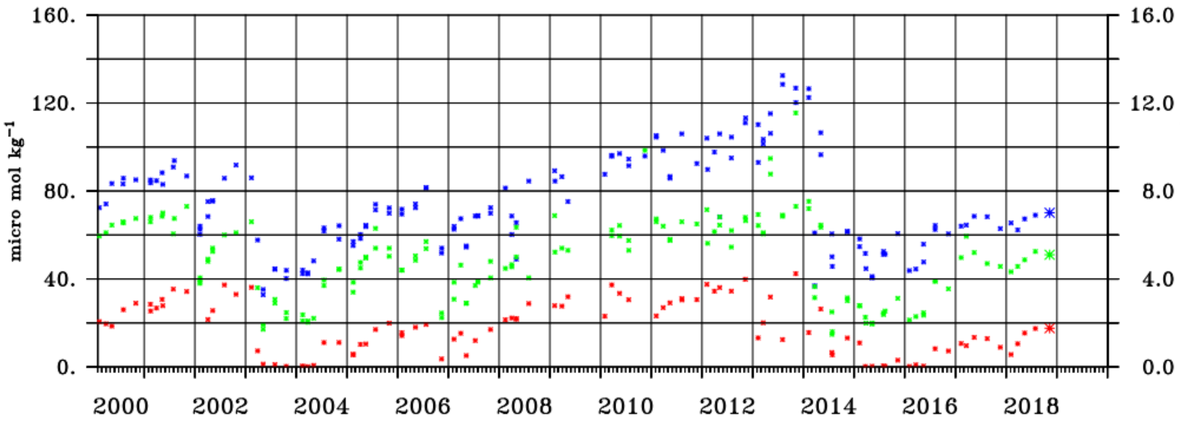


Fig. 10 Time series of nutrient concentrations at the bottom of the central station TF0271 in the Gotland Basin. All concentrations in µmol/kg, phosphate: green, right scale; ammonium: red, left scale; silicate: blue, left scale. The recent results are marked with a star.

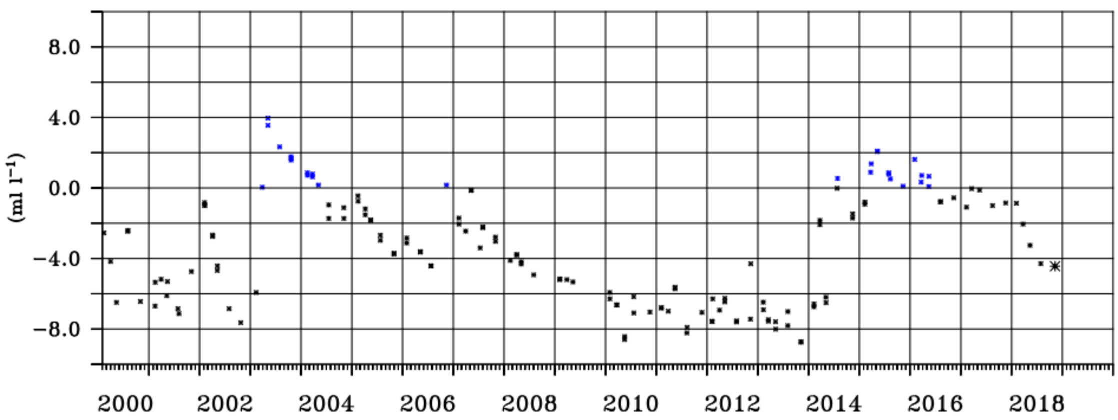


Fig. 11 Time series of oxygen and sulphide concentrations in ml/l at the bottom of the central station TF0271 in the Gotland Basin. Oxygen: blue, oxygen equivalent of hydrogen sulphide: black. The recent result is marked with a star.

Also the other sampled deep basins, Fårö Deep, Landsort Deep and Karlsö Deep are anoxic and sulphidic. In all deep basins, oxygen is generally absent below 80m depth, see also Fig. 16.

Macrozoobenthos

As a preliminary result, species decomposition and abundance of macrozoobenthos compares with the findings of the previous year. At station TF0012 a large amount of *Arctica islandica* with a size between 10 – 55 mm was found. The grab samples had a sulphidic smell. The dredge sample at station TF0030 was dominated by *Mytilus edulis* of all sizes. Station TF0360 exhibits the larges variety of species from different mussels, crustacea, sea stars and brittle stars.

Fig. 12 Dredge macrozoobenthos samples samples at stations TF0030 (left) and TF0360 (right).

Appendix: Further maps and tables and plots

Tables 1 - 2: Preliminary results for selected parameters in the surface layer and the near bottom layer

Table 1: Surface layer (0 - 10m)

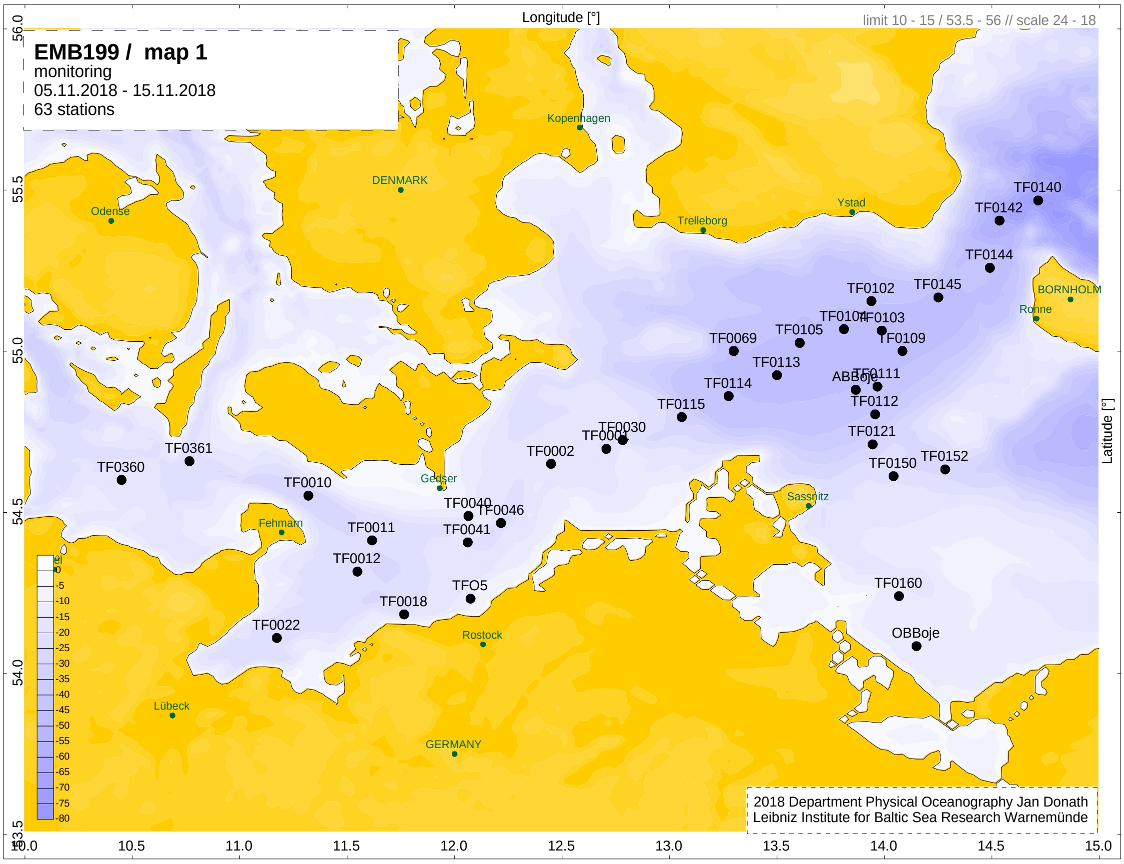
Area	Station	Tempera-ture	Salinity	PO_4^{3-}	NO_2^{3-} * DIN	SiO_4
Date	Name/ No. **	°C	PSU	µmol/dm³	µmol/dm³	µmol/dm³
Kiel Bight	TF0360/76 14.11.2018	10.3	13.45	0.41	0.13 0.41	12.0
Meckl. Bight	TF0012/03 05.11.2018	9.9	10.75	0.31	0.08 0.34	14.2
Lübeck Bight	TF0022/03 05.11.2018	10.9	18.74	0.71	0.17	16.7
Arkona Basin	TF0113/18 07.11.2018	9.7	8.19	0.43	0.55 0.95	15.8
Pom. Bight	TF0160/34 08.11.2018	10.0	7.59	Not measured		
Bornholm Deep	TF0213/39 09.11.2018	10.2	7.65	0.28	0.08 0.17	11.4
Stolpe Channel	TF0222/41 10.11.2018	10.3	7.44	0.18	0.06	7.8
SE Gotland Basin	TF0259/43 10.11.2018	10.6	7.33	0.13	0.16 0.36	10.6
Gotland Deep	TF0271/50 10.11.2018	9.1	7.06	0.25	0.28 0.82	12.3
Fårö Deep	TF0286/52 11.11.2018	8.8	6.97	0.38	0.46	12.8
Landsort Deep	TF0284/56 12.11.2018	7.6	6.53	0.39	0.66 1.05	14.0
Karlsö Deep	TF0245/58 12.11.2018	7.8	7.09	0.39	0.39	18.7

* Σ NO_2^- + NO_3; NO_2 was present only in traces in most areas under investigation

** See maps

Table 2: Near bottom water layer

Area	Station	Depth	Temp.	Salinity	O_2	PO_4^{3-}	NO_2^{3-} * DIN	SiO_4
Date	Name/ No. **	M	°C	PSU	cm^3/dm^3	$\mu mol/dm^3$	$\mu mol/dm^3$	$\mu mol/dm^3$
Kiel Bight	TF0360/76 14.11.2018	17.5	11.33	22.24	4.62	0.73	0.2 1.17	14.3
Meckl. Bight	TF0012/03 05.11.2018	24.0	11.9	19.41	6.11	0.77	1.00 2.03	17.4
Lübeck Bight	TF0022/04 05.11.2018	22.7	12.8	20.91		0.9	0.73	19.9
Arkona Basin	TF0113/18 07.11.2018	46.0	11.62	20.16	4.89	0.82	3.25 4.30	19.2
Pom. Bight	TF0160/34 08.11.2018	14.0	10.82	9.71	Not measured			
Bornholm Deep	TF0213/39 09.11.2018	88.0	10.64	17.79	0.51	4.35	8.88 10.74	57.3
Stolpe Channel	TF0222/41 10.11.2018	89.5	11.61	15.41	1.83	2.57	7.98	41.4
SE Gotland Basin	TF0259/43 10.11.2018	88.0	9.34	14.29	2.49	3.06	7.76	47.7
Gotland Deep	TF0271/50 10.11.2018	234.5	6.90	13.25	-4.44	5.1	0.07 17.65	70.1
Fårö Deep	TF0286/52 11.11.2018	190.0	6.73	12.63	-5.04	4.75	0.42	66.3
Landsort Deep	TF0284/56 12.11.2018	438.0	6.25	11.41	-1.51	3.44	0.09 6.52	56.1
Karlsö Deep	TF0245/58 12.11.2018	107.5	5.74	10.57	-3.59	3.9	0.07 14.65	64.8



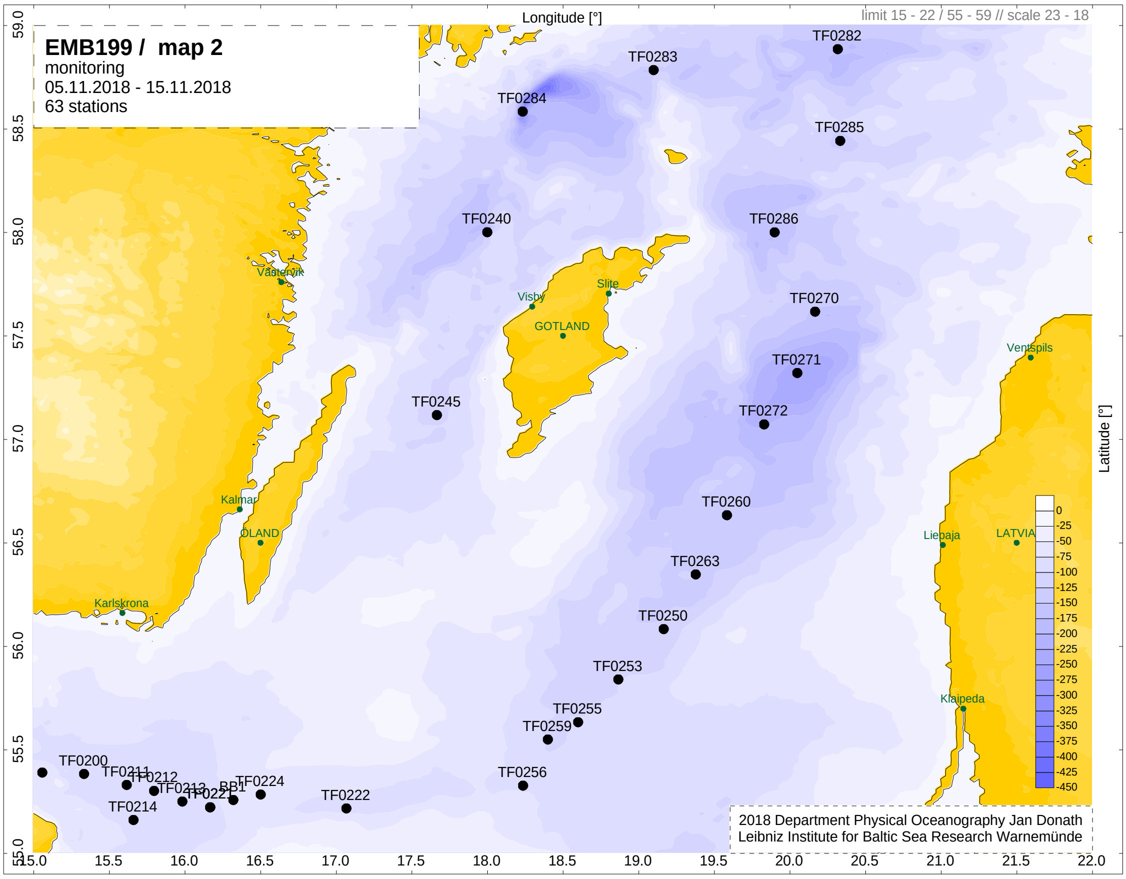


Fig. 13: Station maps

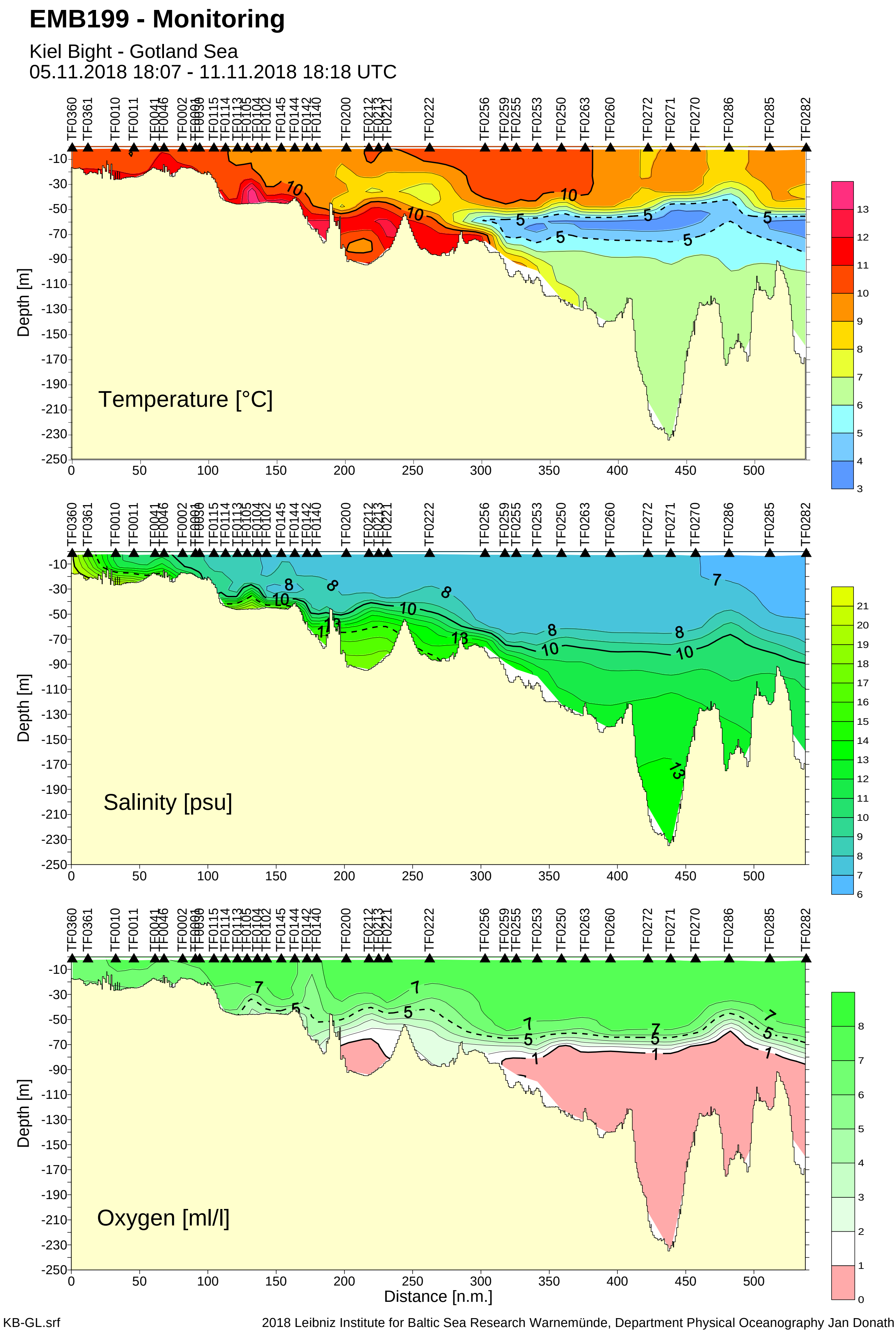


Fig. 14: Transect from the Kiel Bight to the Gotland Basin for temperature, salinity and oxygen

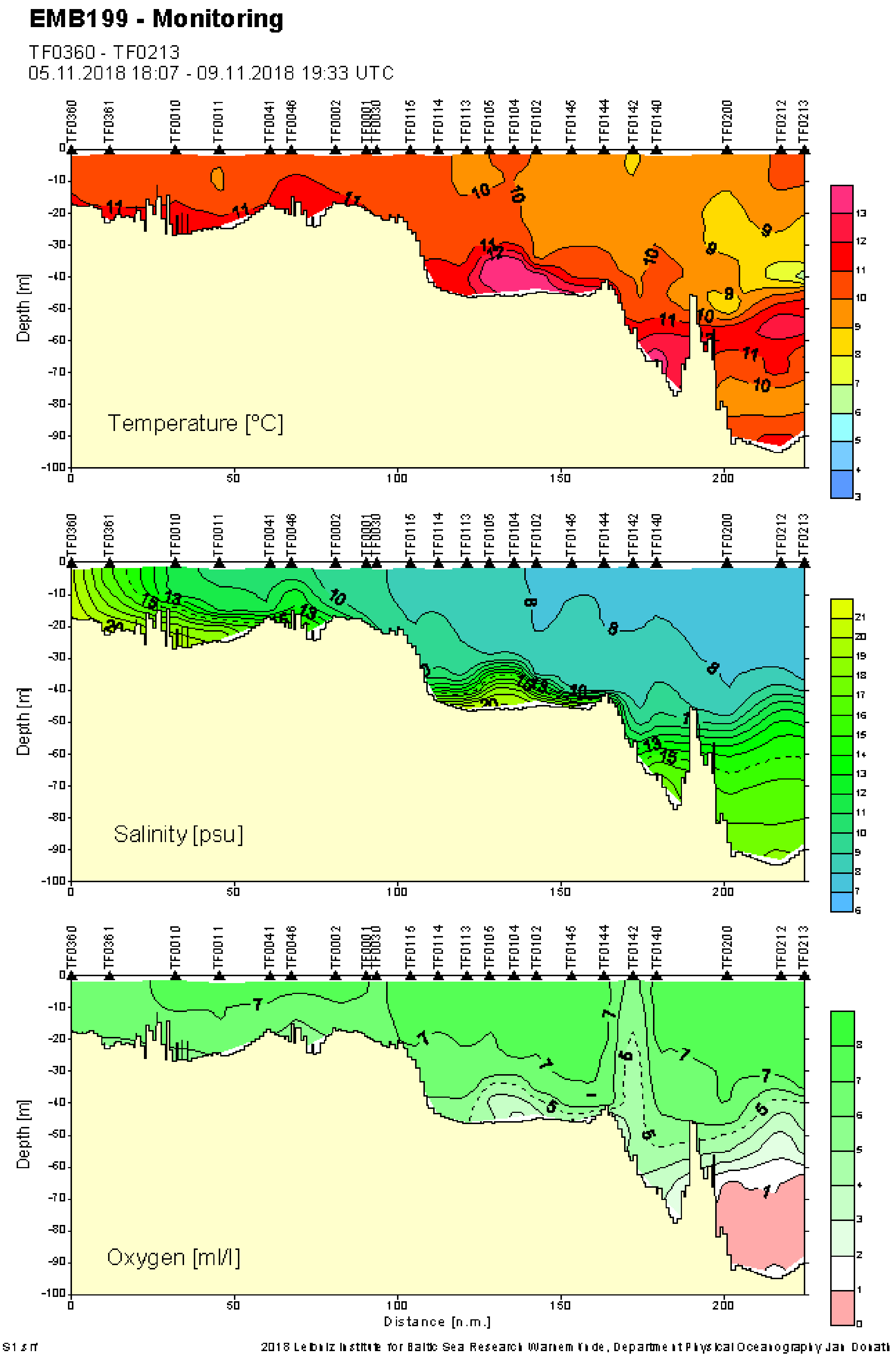


Fig. 15: Transect from the Kiel Bight to the Basin Basin for temperature, salinity and oxygen

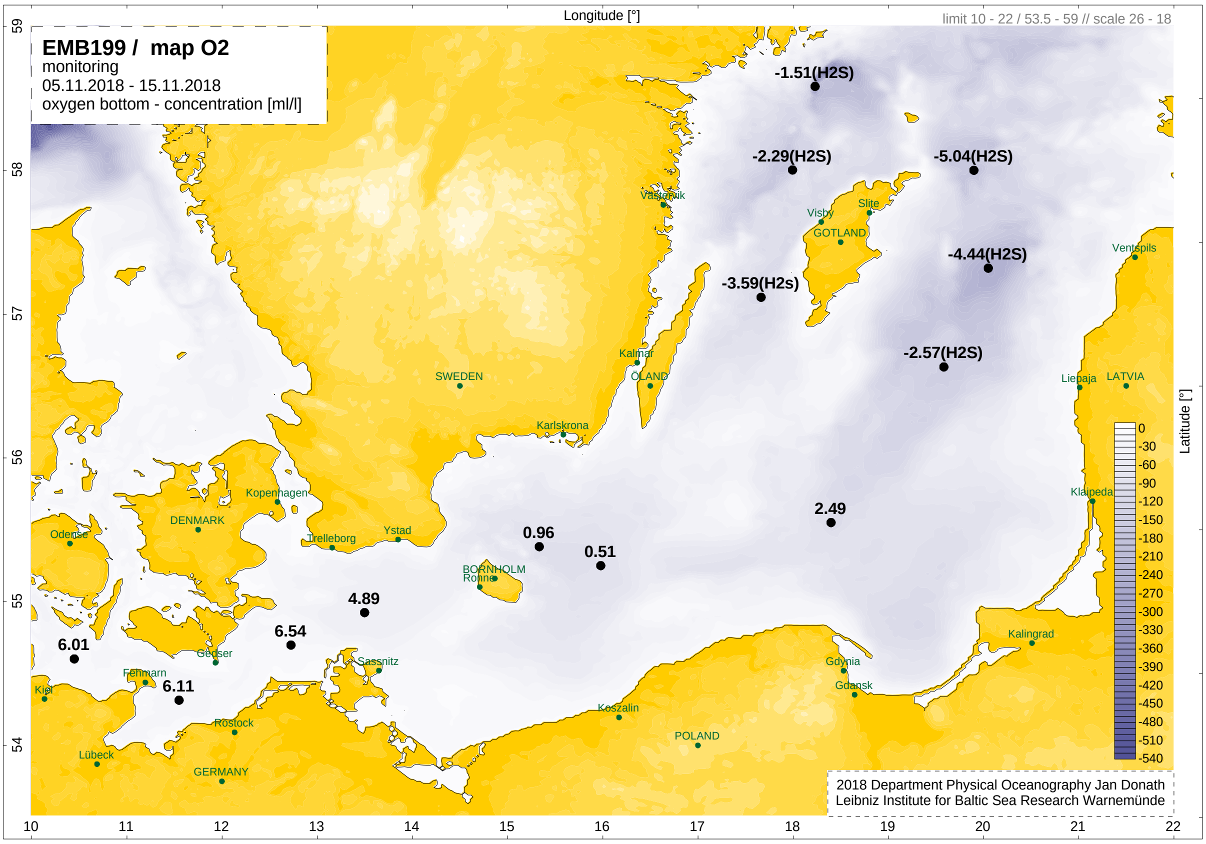


Fig. 16: Bottom oxygen concentration. Negative values are equivalent hydrogen sulphide concentrations.

Station list

TFO5	Nov 05 2018	54 13.9097N	12 04.4846E:	CTD, Nut
TF0018	Nov 05 2018	54 11.0009N	11 45.9503E:	CTD, Ben
TF0012	Nov 05 2018	54 18.9440N	11 32.9066E:	CTD, Nut, Phyt, Zoo, Ben
TF0022	Nov 05 2018	54 06.5881N	11 10.4108E:	CTD, Nut, Phyt
TF0011	Nov 05 2018	54 24.7654N	11 36.9911E:	CTD, Nut
TF0361	Nov 06 2018	54 39.5059N	10 46.0070E:	CTD, Nut
TF0360	Nov 06 2018	54 36.0080N	10 27.0412E:	CTD, Nut, Phyt, Zoo, Ben
TF0010	Nov 06 2018	54 33.0976N	11 19.2107E:	CTD, Nut, Ben
TF0041	Nov 06 2018	54 24.3971N	12 03.7025E:	CTD, Nut
TF0040	Nov 06 2018	54 29.3030N	12 03.8875E:	CTD
TF0046	Nov 06 2018	54 27.9821N	12 12.9910E:	CTD, Nut, Phyt, Zoo
TF0002	Nov 06 2018	54 38.9941N	12 26.9754E:	CTD
TF0001	Nov 06 2018	54 41.7999N	12 42.3939E:	CTD
TF0069	Nov 07 2018	55 00.0072N	13 17.9994E:	CTD, Nut
TF0114	Nov 07 2018	54 51.6163N	13 16.5529E:	CTD
TF0115	Nov 07 2018	54 47.7225N	13 03.4748E:	CTD
TF0030	Nov 07 2018	54 43.4142N	12 47.0117E:	CTD, Nut, Phyt, Zoo, Ben
TF0113	Nov 07 2018	54 55.5152N	13 30.0590E:	CTD, Nut, Phyt, Zoo
TF0105	Nov 07 2018	55 01.5183N	13 36.4171E:	CTD, Nut
TF0104	Nov 07 2018	55 04.0871N	13 48.7673E:	CTD, Nut
TF0109	Nov 07 2018	55 00.0147N	14 05.0606E:	CTD, Nut, Phyt, Zoo, Ben
TF0103	Nov 07 2018	55 03.8109N	13 59.2892E:	CTD, Nut
TF0102	Nov 07 2018	55 09.2998N	13 56.4177E:	CTD, Nut
TF0145	Nov 07 2018	55 09.9865N	14 15.0976E:	CTD, Nut
TF0144	Nov 07 2018	55 15.4999N	14 29.4926E:	CTD, Nut
TF0140	Nov 07 2018	55 28.0337N	14 42.9830E:	CTD, Nut
TF0142	Nov 07 2018	55 24.2939N	14 32.2051E:	CTD, Nut
TF0111	Nov 08 2018	54 53.3990N	13 58.0978E:	CTD, Nut
ABBoje	Nov 08 2018	54 52.7859N	13 52.0589E:	CTD, Nut
TF0112	Nov 08 2018	54 48.2305N	13 57.4436E:	CTD, Nut
TF0121	Nov 08 2018	54 42.6323N	13 56.7663E:	CTD, Nut
TF0150	Nov 08 2018	54 36.7091N	14 02.5840E:	CTD, Nut
TF0152	Nov 08 2018	54 37.9813N	14 17.0066E:	CTD, Ben
TF0160	Nov 08 2018	54 14.3893N	14 04.1113E:	CTD, Ben
OBBoje	Nov 08 2018	54 05.0734N	14 08.9978E:	CTD, Nut
TF0200	Nov 09 2018	55 22.9933N	15 19.9906E:	CTD, Nut
TF0214	Nov 09 2018	55 09.6289N	15 39.6248E:	CTD
TF0212	Nov 09 2018	55 18.0886N	15 47.7851E:	CTD
TF0213	Nov 09 2018	55 14.9980N	15 58.9931E:	CTD, Nut, Phyt, Zoo
TF0221	Nov 09 2018	55 13.3010N	16 10.0043E:	CTD
TF0222	Nov 10 2018	55 13.0093N	17 04.0895E:	CTD, Nut
TF0256	Nov 10 2018	55 19.5982N	18 14.1529E:	CTD
TF0259	Nov 10 2018	55 32.9921N	18 24.0092E:	CTD, Nut, Phyt
TF0255	Nov 10 2018	55 37.9918N	18 35.9963E:	CTD
TF0253	Nov 10 2018	55 50.3933N	18 51.9818E:	CTD
TF0250	Nov 10 2018	56 04.9969N	19 09.9752E:	CTD
TF0263	Nov 10 2018	56 20.8193N	19 22.6850E:	CTD
TF0260	Nov 10 2018	56 37.9922N	19 35.0626E:	CTD, Nut
TF0272	Nov 10 2018	57 04.3084N	19 49.8073E:	CTD
TF0271	Nov 10 2018	57 19.2148N	20 02.9909E:	CTD, Nut, Phyt, Zoo
TF0270	Nov 11 2018	57 37.0063N	20 10.0253E:	CTD
TF0286	Nov 11 2018	58 00.0003N	19 53.9657E:	CTD, Nut
TF0285	Nov 11 2018	58 26.5259N	20 19.9989E:	CTD
TF0282	Nov 11 2018	58 53.0810N	20 19.0076E:	CTD
TF0283	Nov 11 2018	58 47.0363N	19 05.9497E:	CTD
TF0284	Nov 12 2018	58 35.0016N	18 14.0230E:	CTD, Nut
TF0240	Nov 12 2018	58 00.0181N	17 59.9748E:	CTD, Nut, Zoo
TF0245	Nov 12 2018	57 07.0129N	17 39.9875E:	CTD, Nut
TF0259	Nov 13 2018	55 33.0252N	18 24.0255E:	CTD
TF0256	Nov 13 2018	55 19.6090N	18 14.1156E:	CTD
SC_E	Nov 13 2018	55 17.1498N	17 35.6486E:	CTD
TF0222	Nov 13 2018	55 13.0045N	17 04.0458E:	CTD
TF0224	Nov 13 2018	55 17.0227N	16 30.0590E:	CTD
BB1	Nov 13 2018	55 15.4471N	16 19.2440E:	CTD
TF0221	Nov 13 2018	55 13.3220N	16 10.0862E:	CTD, Zoo
TF0213	Nov 13 2018	55 14.9765N	15 59.0375E:	CTD, Nut, Phyt

TF0212	Nov 13 2018	55 18.0874N	15 47.8311E:	CTD
TF0211	Nov 13 2018	55 19.7965N	15 36.9250E:	CTD
TF0200	Nov 13 2018	55 22.9932N	15 20.0667E:	CTD
TF0205	Nov 13 2018	55 23.3875N	15 03.4297E:	CTD
TF0113	Nov 14 2018	54 55.5038N	13 30.0382E:	CTD, Phyt, Zoo
TF0030	Nov 14 2018	54 43.4046N	12 47.0467E:	CTD, Phyt, Zoo
TF0046	Nov 14 2018	54 27.9782N	12 13.0119E:	CTD, Phyt, Zoo
TFO5	Nov 14 2018	54 13.9127N	12 04.4939E:	CTD, Nut
TF0012	Nov 14 2018	54 18.8741N	11 33.0157E:	CTD, Nut
TF0360	Nov 14 2018	54 36.0064N	10 27.0396E:	CTD, Nut