ELISABETH MANN BORGESE – Berichte

***Baltic Sea Long-term Observation Programme***

Cruise No. EMB230

29. January – 09. February 2020,
Rostock-Marienehe to Rostock-Marienehe (Germany)
HELCOM /long-term obs


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2022

**Table of Contents**

# 1 Cruise Summary

## 1.1 Summary in English

This campaign of measurements is the first one in a series of five annual cruises to study the spatial and temporal variations of the Baltic Sea ecosystem by numerous hydrographic, hydrochemical and hydrobiological parameters. It is conducted in the frame of the COMBINE Programme of the Helsinki Commission (HELCOM) as well as measurements ouside the German territorial waters for the IOW's long term data programme, performed since 1969. In key areas moorings and autonomous platforms are used to gain higher temporal resolution of data, which are maintained by these cruises. The data acquired are used for the regular national and international assessments of the state of the Baltic Sea, and provide the scientific basis for measures to be taken for the protection of the ecosystem Baltic Sea.

During this expedition 89 stations (113 CTD casts) were measured from the western to the central Baltic Sea. Water sampling in discrete depths were done for measuring numourus paremters of nutrients and pollutants, as well as extraction of zooplankton samples. Transects of 300 l surface water were filtered for analysing organic pollutants at nine subareas. In addition, in situ pumps filtered water in two discrete depths at the Gotland Deep. Sediment sampling of the uppermost 3-5 cm were done at the Gotland Deep and 6 stations in the German EEZ for analysis of organic contaminants. In addition, three scanfish profiles were measured in the eastern Gotland Basin and Arkona Basin. The basical equipment (winch and bottom sensors) of the profiling moring at the Gotland Deep, called GODESS, was recovered at February 3rd and brought back to Warnemünde for maintanance. The rope of the profiling sensor unit was broken and the unit was driftet away, but luckily found at the Estonian coast close too Keibu /Gulf of Finland at January 8th. A new permanent mooring of physical oceanographic sensors was deployed for the first time in southwestern part of the Gotland Deep as well at February 3rd.

The cruise was performed mainly in windy weather conditions, 9 out of 12 days with more than 4 Bft (one day waiting on weather in bay near to Östergarn at the eastern coastline of Gotland – February 2nd). The last day (February 10th) had to be cancelled because of severe gale warning in western Baltic Sea and the expedition ended at February 9th, shortly before the gale arrived. Nearly all of the planned work programme were realised, but the scanfish profile in the western Gotland Basin could not be done because of bad weather /lack of time.

## 1.2 Zusammenfassung

Die Messkampagne ist eine von fünf jährlichen Expeditionen zur Erfassung der räumlich-zeitlichen Variabilität des Ökosystems Ostsee mit einer Vielzahl hydrographischer, chemischer und biologischer Parameter. Die Arbeiten sind eingebettet in das COMBINE Programme der Helsinki Kommission (HELCOM) zur Überwachung der Meeresumwelt sowie Messungen außerhalb der deutschen Territorialgewässer für das IOW Langzeitdatenprogramm, das seit 1969 fortlaufend vom Institut durchgeführt wird. An Schlüsselstationen werden Verankerungen und autonome Messplattformen eingesetzt und mit Hilfe dieser Expeditionen gewartet, um die zeitliche Datenauflösung zu verbessern. Die gewonnenen Daten werden für regelmäßige nationale und internationale Bewertungen des Umweltzustandes der Ostsee verwendet und bilden die wissenschaftliche Basis für zu ergreifende Maßnahmen zum Schutz der Meeresumwelt.

Im Gebiet der westlichen bis zentralen Ostsee wurden an 89 Stationen 113 CTD Einsätze gefahren zur Erkundung der aktuellen hydrographischen Situation. Wasserproben wurden für die Messung einer Vielzahl an Nährstoff- und Schadstoffparametern entnommen, sowie Zooplanktonproben

daraus extrahiert. Netze wurden für die Beprobung von Zoo- und Phytoplankton gefahren. In neun Seegebieten wurden 300 Liter Oberflächenwasser für die Analyse organischer Schadstoffe entnommen und zusätzlich im Gotland Tief in zwei Wassertiefen in situ Pumpen zu diesem Zweck eingesetzt. Die Sedimente der Meeresbodenoberfläche (die oberen 3-5 cm) wurden am Gotland Tief und 6 Stationen in deutschen Hoheitsgewässern für die Analyse von organischen Schadstoffen beprobt. Zusätzlich wurden drei Scanfish-Profile im östlichen Gotland Becken und Arkona Becken gemessen. Am 3. Februar wurden die an Ort und Stelle verbliebenen Hauptteile der GODESS Verankerung (Winde und Bodensensoren) im Gotland Tief geborgen und zur Wartung nach Warnemünde gebracht. Die profilierende Sensoreinheit war zuvor abgerissen und wurde bis an die estnische Küste im Golf von Finnland verdriftet. Am 8. Januar wurde die Sensoreinheit in der Nähe von Keibu gefunden und das IOW für einen Rücktransport informiert. Eine neue Dauerverankerung mit physikalisch-ozeanographischer Sensorik wurde im südwestlichen Teil des Gotland Tiefs ebenfalls am 3. Februar ausgelegt.

Die Expedition war hauptsächlich von windigen bis starkwindigen Witterungsverhältnissen geprägt (9 von 12 Schiffstagen mit mehr als 4 Bft). Am 2. Februar mussten die Arbeiten eingestellt und in einer schützenden Bucht nahe Östergarn an der Ostküste der Insel Gotland abgewettert werden. Der letzte geplante Schiffstag (10.2.) wurde aufgrund von einer schweren Orkanvorhersage für die westliche Ostsee nicht genutzt und die Expedition endete vorzeitig am 9. Februar, kurz bevor der Orkan das Gebiet erreichte. Ein Großteil der geplanten Arbeiten konnten durchgeführt werden, jedoch fiel das beantragte Scanfish Transekt im westlichen Gotland Becken der schlechten Witterung /Zeitmangel zum Opfer.

## 2 Participants

### 2.1 Principal Investigators

| Name | | Institution |
|---|---|---|
| Naumann, Michael, Dr. | (Physical Oceanography) | IOW |
| Mohrholz, Volker, Dr. | (Physical Oceanography) | IOW |
| Kuss, Joachim, Dr. | (Marine Chemistry – nutrients) | IOW |
| Kanwischer, Marion, Dr. | (Marine Chemistry – contaminants) | IOW |
| Kremp, Anke, Dr. | (Marine Biology – phytoplankton) | IOW |
| Dutz, Jörg, Dr. | (Marine Biology – zooplankton) | IOW |

## 2.2 Scientific Party

| Name | Discipline | Institution |
|---|---|---|
| Naumann, Michael, Dr. | Physical Oceanography/chief scientist | IOW |
| Kolbe, Martin | Physical Oceanography | IOW |
| Donath, Jan | Physical Oceanography | IOW |
| Kaiser, Jan | Physical Oceanography | IOW |
| Sadkowiak, Birgit | Marine Chemistry | IOW |
| Hand, Ines | Marine Chemistry | IOW |
| Jeschek, Jenny | Marine Chemistry | IOW |
| Exner, Carolin | Marine Chemistry | IOW |
| Pötzsch, Michael | Biological Oceanography | IOW |

## 2.3 Participating Institutions

IOW Leibniz Institute for Baltic Sea Research Warnemünde, Germany

# 3 Research Program

## 3.1 Description of the Work Area

The area under investigation of the cruise EMB230 covered the western and central Baltic from the Kiel Bight to the northern Gotland Basin. An overview of the locations of CTD stations, mooring positions, and the cruise track is given in Figure 3.1. A station list is given in Table 7.1. The majority of stations is located along the thalweg transect of the Baltic Sea, describing the hydrographic, hydrochemical and biological conditions in all basins on the pathway of saltwater inflows from the North Atlantic (Fig. 5.2; 5.4). These inflows are the solely source for ventilation of the deep basins (MATTHÄUS et al. 2008). The possible western pathway of saline water from the Bornholm Basin to the western Gotland Basin was not sampled, since there were no indications of a spreading of saline waters through this trench. In the center of the eastern Gotland Basin an east-west transect of an undulating Scanfish CTD was measured (Fig. 3.1 – orange line, Tab. 7.6 – SF1, SF2), in order to gather information about the cross basin distribution of hydrographic parameters in the main basin of the Baltic proper. The counterpart in the western Gotland Basin had to be cancelled due to lack of time. These perpendicular transects of high-resolution measurements contributes to the understanding of small-scale processes on the basin wide dynamics. A third Scanfish CTD transect was measured from Bornholm Gat to Darss Sill on the tour back, to get a detailed hydrographic information of the Arkona Basin during this wind phase (Tab. 7.6 – SF3). Yellow transects mark surface water pumps and filtering system for organic pollutants (Fig. 3.1).

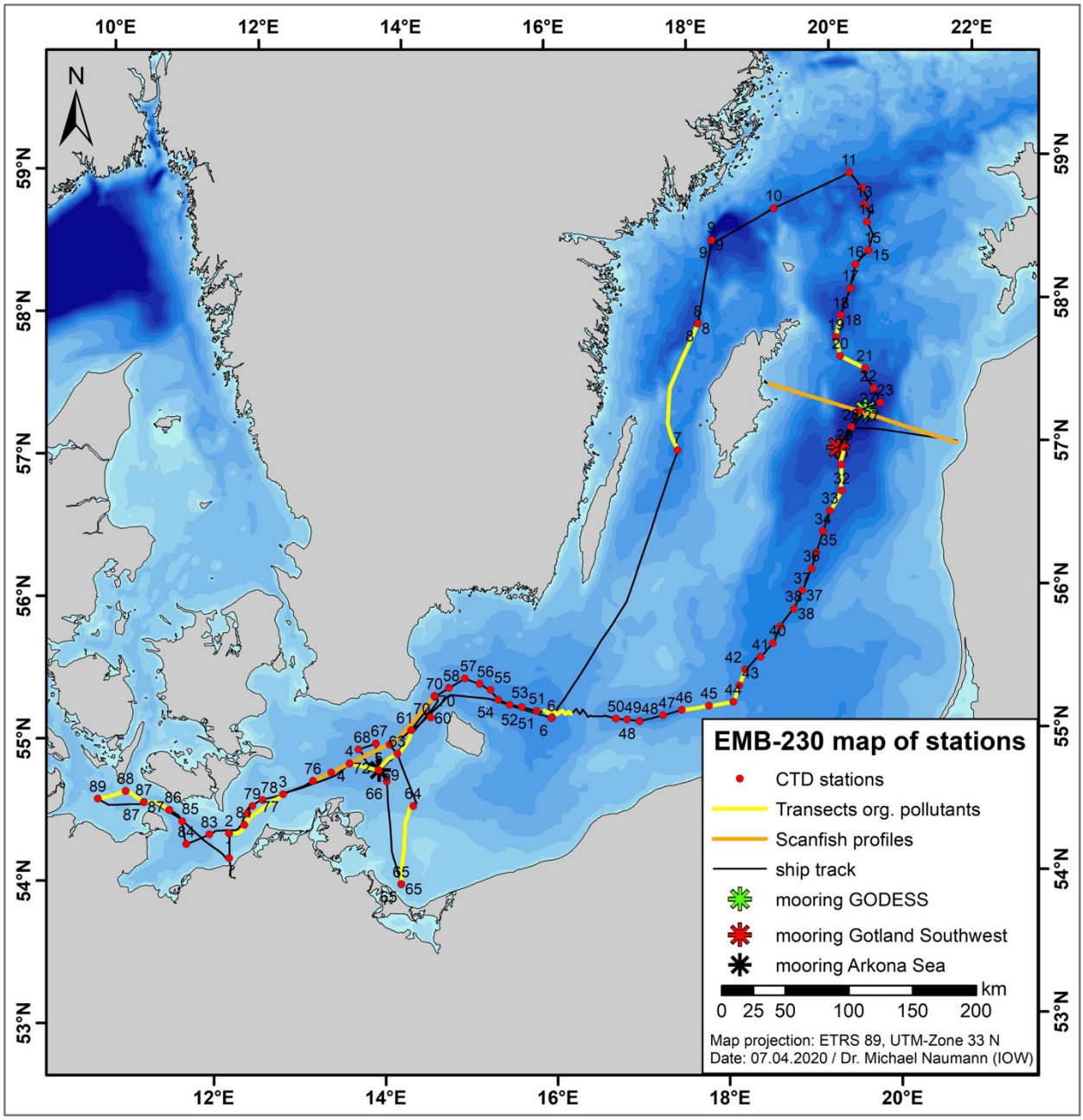



**Fig. 3.1** Track chart of R/V Elisabeth Mann Borgese of cruise EMB230 (bathymetry from Seifert et al. 2008). CTD stations are marked by red points (label number corresponds to table 7.2) and yellow track sections show transects of surface water sampling for organic pollutants, scanfish profiles are marked in orange.

## 3.2 Aims of the Cruise

The performed meteorological, hydrographic, hydrochemical and hydrobiological sampling and measurements lead to an assessment of the actual winter situation of the Baltic Sea ecosystem from Kiel Bight to the northern Gotland Basin in the central part. EMB230 ist the first cruise in the year 2020 of five annually expeditions.

In the frame of the COMBINE Programme of the Helsinki Commission (HELCOM), national monitoring demands are conducted as contract work for the Federal Maritime and Hydrographic Agency (BSH) in German territorial waters and the Exclusive Economic Zone as well as bordering sea areas of Denmark and Sweden in the western Baltic Sea. Due to scientific interests, analysing variations and trends of the Baltic ecosystem as a whole, the IOW extends the investigated sites by its long-term observation programme. Stations in Danish, Swedish, Polish, and Latvian

territorial waters and their respective Exclusive Economic Zones are continuously sampled within this programme since the year 1969. The acquired data are used for regular national and international assessments of the state of the Baltic Sea (e.g. HELCOM 2018, NAUMANN et al. 2019), are analysed in numerous publications and provide the scientific basis for measures to be taken for the protection of the ecosystem Baltic Sea.
The recent scientific interest is the interplay of latest very warm summers in a role and the so far very warm wintertime 2019/20.

Additional program:
A new long-term mooring was deployed at the southwestern part of the Gotland Deep to measure hydrographic parameters in the deep-water layer (temperature, salinity, dissolved oxygen and currents) for more details of basin-wide circulation processes. The mooring protocol is attached as appendix (responsible scientist: Dr. V. Mohrholz).

Recovery of the mooring GODESS – Gotland Deep Environmental Sampling Station was done at February 3rd and brought back to Warnemünde. The rope of the profiling sensor unit was broken and the unit was driftet away, but luckily found at the Estonian coast close too Keibu /Gulf of Finland at January 8th. Only the basical equipment (winch and bottom sensors) had to be recovered. (responsible scientist: Dr. R. Prien)

Maintenance of MARNET station Arkona Basin was done by mounting a new windpower generator on top of the platform and the accu was exchanged in the electronic container. Power supply problems caused a shutdown of the live data transmission to our servers on land since December 2019. A storm damaged both wind generators and in wintertime the solar cells deliver not enough power to keep the stations alive due to limited sunlight hours. All sensor packages are equipped by autonomous data storage, that no data loss was created. Live data for operational tasks of BSH was missing during the last weeks (responsible engineer: R. Mars).

## 3.3 Agenda of the Cruise

*The standard measurements*

The work on the stations usually started with a CTD cast and programmed sampling during the down cast on standard depth levels for chemical and biological parameters. Manual releases in near-bottom waters and close to the sea surface completed the sampling. At key stations for example the Bornholm Deep, Gotland Deep and so on multiple CTD casts followed on demand to meet the additional water sample requirements. A detailed list of all CTD measurements are given in table 7.2. At these key stations, water sampling was carried out for dissolved oxygen, basic dissolved inorganic nutrients, total nutrient concentrations, as well as net sampling for phytoplankton and zooplankton species were carried out. Moreover, determinations of chlorophyll and the depth of visibility by means of a Secci disk were also done. For the detailed list of sampling see table 7.3.

*Organic pollutants*

Organic pollutants were sampled at transects of surface water (Tab. 7.4, Fig. 3.1 – yellow transects), by in situ pumps in deepwater layer and seafloor sediments of the upper 3-5 cm at six stations (Tab. 7.5). The nine transects are characterizing all main regions of the cruise. At key station Gotland Deep (TF0271) two depths at 80 m and 220 m were sampled by in situ pump systems and filtered water of about 300 liters in 5 hours deployment time. Surface sediments were

sampled at five positions of long-term data series in the western Baltic (BSH programme) and as well at the Gotland Deep (Responsible scientist: Dr. Marion Kanwischer).

*Long-term observation of the microbiological habitat of the redoxcline*

Insights into the changes of the microbial food web of the redoxcline is obtained by well resolved sampling of the range of the redoxcline at Gotland Deep (TF0271) and Landsort Deep (TF0284) stations on each monitoring cruise. Therefore, in the redoxcline as well as 6 depths above and below, respectively, in depth intervals of 2 m, samples were taken by CTD/water sampling bottles and prepared for microbiological analysis (FISH and DNA) and determination of pigments (Responsible scientist: Prof. Klaus Jürgens).

*Long-term investigations of $CH_4$, $N_2O$ and the marine carbonate system*

Sampling for simultaneous $CH_4$ and $N_2O$ observation is carried out on 4 stations (TF0113, TF0213, TF0271, TF0286) in the frame of the accompanying project for long term data collection. All samples were taken in septum-sealed 250 mL water bottles and fixed with 200 µL or in case of hydrogen sulphide presence with 500 µL saturated $HgCl_2$-solution to prevent microbiological activity and stored dark. On the same stations and depths also CT, AT, and pH were sampled for their long-term observation. These samples were fixed by the same method and were also stored dark (Responsible scientist: Prof. Gregor Rehder).

*Equipment*

Data acquisition was carried out using the following devices and measuring platforms.

At stations and transects:

- CTD SBE 911+ with rosette water sampler
- Scanfish MKIII
- Oceanographic moorings (Gotland southwest, GODESS)
- Surface water pumps and filtering system for organic pollutants
- In situ pumps and filtering system for organic pollutants in discrete depths
- Phytoplankton nets (Apstein)
- Zooplankton net (WP2)
- Secci desk
- Multicorer

Continuous measurements:

- Underway measurements of surface water properties

- Ship weather station

This ship based data set consists of one minute averages of: time (UTC), latitude and longitude, ships heading, depth, air pressure, air temperature, humidity, global radiation, infrared radiation, surface conductivity, surface salinity, surface water temperature, surface chlorophyll-a fluorescence, surface turbidity, wind direction, wind speed.

## 4 Narrative of the Cruise

This paragraph is aimed to give an impression of the work on board during the campaign. It is a day by day report that includes the weather conditions and sea state. All times are given in UTC.

*Tuesday, 28th January 2020:* Loading and transport of equipment started at 07:00. Depacking was finished around 11:30 and all devices and laboratories were prepared at 15:30.

*Day 1, Wednesday, 29th January 2020:* Embarking of the scientific crew was done between 06:00 to 06.30 followed by safety instructions. Departure of the peer Rostock-Marienehe and start of the cruise was in time at 07:00. At 09:00 started the station work at TF005 two nautical miles northerly of Warnemünde. The weather situation in the Mecklenburg Bay was 5-6 °C air temperature, cloudy and strong westerly wind around 6 Bft, gusts up to 7 Bft. Due to windy weather and sea state close to our working limits of the vessel in the western Baltic, we decided not to sample routinely the numerus stations in this region (Kiel Bight, Mecklenburg Bight, Arkona Basin) like we do it normally. We went eastwards with a limited number of sampling. We started with key stations we normally measure twice at our tour back to the harbor. The plan is to start the chain of stations along the thalweg transect from the north (Landsort Deep, western Gotland Basin).
10:30 we measured station TF0041 in the Kadet Trench with CTD and chemical sampling. A surface water sampling profile for organic contaminants (transect T2) was started from there up to Darss Sill – MARNET autonomous station (TF001). 13:40 we reached the Darss Sill station and one CTD cast with chemical sampling was done for data validation of the MARNET autonomous station. At 17:10 we measured key station Arkona Deep (TF0113) with two CTD casts and chemical as well as biological water sampling. Net sampling with a WP2 net was done and transect T3 for organic contaminants started from this position.
MARNET station AB Boje was reached in the darkness at 19:30. A CTD cast was done for validation issues of the sensor packages in eight depth levels of this station. In addition, a foto documentation of MARNET station platform above the water was done under spotlight from the bridge. Both wind turbines were damaged and without rotor blades during the last storms. Afterwards we drove northeastwards through the Bornholms Gat.

*Day 2, Thursday, 30th January 2020:* At 04:40 we reached key station Bornholm Deep (TF0213) and sampling was done up to 07:45 (2 CTD casts, chemical & biological sampling, WP2 net). The weather situation in the Bornholm Basin was: air temperature 5.3 °C, cloudy, rainy, strong winds around 6 Bft and 2.5 m swell. Sampling was pretty close to the working limit. Our tour was continued in northern direction, next stops were planned at the western Gotland Basin. During the afternoon hours wind and swell decreased slowly. In the evening we reached key station Karlsö Deep (TF0245) in the southern part of the western Gotland Basin. Sampling of one CTD cast and chemical water samples was done from 19:20 to 20:00. Transect T9 for organic contaminants was afterwards started from this position.

*Day 3, Friday, 31st January 2020:* Station TF0240 in the centre of the western Gotland Basin was sampled from 1:30 to 02:00 1in the night (end of transect T9, 1 CTD cast with chemical sampling). The weather situation in the western Gotland Basin was calm, 4.5 °C air temperature, 990.7 hPa

air pressure, cloudy, moderate winds of 4 Bft and swell around 1 m. During the morning hours up to lunch we sampled the key station Landsort Deep (TF0284) of 440 m water depth. Five CTD casts were done to get all needed chemical and biological water samples. From 16:15 to 16:45 station TF0283 at the border from western to northern Gotland Basin was measured by a CTD cast. Continuous station work was done from 19:50 onwards to midnight at stations TF0288, TF0282 and TF0289. The "thalweg transect" has started. We found nice working conditions in the northern Gotland Basin. The wind blew moderate to calm of up to 4 Bft with a sea state of around 1 m swell.

*Day 4, Saturday, 1st February 2020:* In the time frame 00:30 to 05:45 the stations TF0279, TF0285, TF0278 and TF0277 in the northern Gotland Basin were measured by CTD. Additional sampling for detection of hydrogen sulphide were done in the deep water layer.
The key station Farö Deep was reached at 07:00 and measured by two CTD casts for detailed chemical sampling. From this location another transect for filtration of organic contaminants has started in southern direction (T8). The weather conditions in this region were cloudy, slight rainy, later sometimes sunny, air pressure of 987 hPa, air temperature of 6.7 °C and moderate winds around 5 Bft with a sea state of 1 m swell. In the time span 09:30 to 13:00 the stations TF0290, TF0287 and TF0270 at the northern part eastern Gotland Basin
were measured by CTD casts. At Station TF0270 the filtration of transect T8 was finished. During the afternoon the wind increased to 6-7 Bft and swell up to 1.5 m. A trial of the scanfish system as preparation was done on the transit track between stations TF0270 to TF0276 from 13:00 up to 14:10. Then stations TF0276 and Gotland NE were measured by CTD up to 16:30. At 17:50 we arrived at key station Gotland Deep (TF0271) and up to 22:30 five CTD casts were done for sampling of numerous chemical and biological parameters (cf. Tab. 7.3). Two net samples for phytoplankton were done as well. The weather situation at the Gotland Deep was challenging, close to the working limit. It was cloudy, 985 hPA of air pressure, 6 °C air temperature and strong winds of 7 Bft with 2 m swell.
Increasing westerly winds and sea state was forecasted, so station work was quitted and course was set to the eastcoast of Gotland to stay in the cover. At 22:45 we left the Gotland Deep and started scanfish measurements (SF1) on our track to Gotland as western part of the planned transect perpendicular to the "thalweg" transect.

*Day 5, Sunday, 2nd February 2020:* A transect length of 39 NM was measured up to 06:45 and after 41 NM the anchor position was reached in bay close to Östergarn, located some nautical miles in the south of Slite harbour at 07:30. The weather was sunny, 984 hPa air pressure, 3 °C air pressure and 7-8 Bft in the shadow of Gotlands coastline. Samples were measured in the laboratories and equipment prepared for the next days.

*Day 6, Monday, 3rd February 2020:* Up to 5 we stayed anchored "waiting on weather". At 09:15 we arrived again at the Gotland Deep. The weather situation calmed down to 4 Bft with swell of 1-1.5 m, cloudy to sunny sky, 999 hPa air pressure and 3.7 °C air temperature. A next CTD cast was done for decision of two discrete depth levels for in situ pump measurements of organic contaminants in the deep water layer, which is intended for the upcoming night hours. Daytime was used for mooring work. From 10:00 to 11:30 the bottom part with winch system and bottom sensors of mooring GODESS was recovered. The profiling unit of physical and chemical parameters was lost. Luckily it was found in Estonia some weeks ago and is send back to Warnemünde. Afterwards we deployed a new permanent mooring of physical parameters named Gotland Southwest in 18 NM distance at the southwestern rim of the deeper part of the eastern Gotland Basin between 13:00 to 13:45. At 15:30 we arrived for a third time at the Gotland Deep (TF0271) and a multicorer sampling for organic contaminants in surface sediments was done,

followed by 5 hours in situ pump filtering in 220 m and 80 m depth. At the end a CTD cast for sensor calibration was done. The station was left at 23:50.

*Day 7, Tuesday, 4th February 2020:* At midnight scanfish measurements restarted to complete the W-E scanfish transect to the eastern part of the basin. After 43 NM with 5 kn speed of the vessel we finished the transect at 07:30 close to the Latvian coast. After 45 NM transit to station TF0275, located in centre of the basin, the "thalweg" transect of CTD measurements was continued in southwestern direction. The weather in the eastern Gotland Basin was sunny to cloudy, air pressure of 1003 hPa, air temperature of 2.5 °C and moderate to strong winds 5-6 Bft with swell of 1-1.5 m. From 11:50 onwards to 22:30 the stations TF0275, TF0272, TF0273, TF0274, TF0260, TF0261, TF0263 and TF0262 were measured by CTD casts (cf. Tab. 7.2). Chemical water sampling for nutrients was done at station TF0260. Hydrogen sulphide was sampled in the deep water layer at TF0275, TF0272, TF0273, TF0274, TF0260 and TF0262. A surface water transect for organic contaminants (T7) was filtered between TF0272 and TF0260.

*Day 8, Wednesday, 5th February 2020:* Seven stations in the southern part of the eastern Gotland Basin were measured by CTD casts between 01:00 and 08:40 (TF0265, TF0253, TF0258, TF0255, TF0259, TF0257, TF0256). At key station TF0259 chemical and biological water sampling was done and a surface water transect for organic contaminants (T6) was filtered between TF0259 and TF0267. The weather situation was appropriate with sunny to cloudy sky, an air temperature of 3 °C and moderate to strong wind 5-6 Bft with 2m swell. From 09:45 to 16:30 six stations in the Slupsk Channel were measured by CTD under increasing wind and sea state (TF0268, TF0267, TF0266, TF0222, TF0229, TF0228). At key station Slupsk Channel (TF0222) water sampling for chemical parameters was done. Station work was stopped at 16:30 and we had to skip the next stations. The wind had increased to 8-9 Bft with 2.5 m significant wave height, max wave heights up to 4 m. The transit speed was 3 kn and we had to tack multiple times to find a more "smooth" angle to cross the waves (cf. Fig. 3.1 – ship track). From 21:46 to 02:25 surface water transect for organic contaminants (T5 – Bornholm Basin) was filtered at these tacking course.

*Day 9, Thursday, 6th February 2020:* Due to bad weather the following stations had to be skipped (TF0227, TF0226, TF0225, TF0221, TF0213, TF0214). At 03:15 station work restarted at station TF0212 in the central Bornholm Basin. Up to 11:15 stations TF0211, TF0209, TF0200, TF0208, TF0207, TF0206 were measured by CTD casts. Chemical sampling for nutrient parameters was done at station TF0200. The stations in the Bornholm Gat followed from 12:00 to 15:00 (TF0140, TF0142, TF0144) with chemical sampling at TF0140 and TF0142. We reached the entrance to the Arkona Basin (station TF0145) at 16:00. The weather was sunny to cloudy, air pressure of 1023 hPa, air temperature of 6.4 °C and moderate to strong winds (5-6 Bft). The sea state was 1-1.5 m swell. Stations TF0145, TF0103, TF0109 were measured up to 19:00 by CTD casts. At key station TF0109 water sampling for chemical and biological parameters was done. We headed southwards to the Oder Bank. At 21:40 we measured station TF0152 by CTD and a next transect for filtering organic contaminants in surface waters started there (T4).

*Day 10, Friday, 7th February 2020:* The autonomous MARNET station "OB Boje" was reached at 01:15 and the transect of was finished. The station work was done up to 02:00 conducting one CTD cast with chemical and biological sampling. Afterwards followed transit back to Arkona Basin. Between 05:45 to 06:00 station TF0112 at the southern rim of the basin was measured by CTD. At 06:45 we reached MARNET station "AB Boje" and emergency maintenance of the power system was planned, but we had to postpone this work due to dense fog. The transport of colleagues via dinghy to the station was not possible, due to navigation issues of dinghies in foggy conditions. Other weather parameters at that time were air pressure of 1030 hPa, air temperature of 3.2 °C, light breeze of 0-1 Bft and slight swell of 0.25 m. At 08:10 we measured station TF0104 and later

TF0105, both with chemical and biological sampling, and headed back to the MARNET station. In the time frame 11.30 to 16:00 the maintenance of the autonomous station was done by mounting a new windpower generator and charging changing the accu. We left northeastwards to the entrance of the Bornholm Gat and started an additional scanfish track (SF3 Bornholm Gat – Arkona Basin) at 22:00.

*Day 11, Saturday, 8th February 2020:* The scanfish profile ended at position TF0115 at 09:45. On the route we stopped two times and interrupted the measurements for CTD casts at stations TF0113, TF0114 for chemical and biological sampling. Mid of the day we visited the Darss Sill and measured stations TF0001, TF0002, the last one with chemical water sampling.
From 13:30 to 18:00 we moved on southwestwards and measured stations at the Kadet Trench (TF0033, TF0083, TF0046, TF0041). Key station TF0046 was as well sampled for chemical and biological parameters. The weather at the Mecklenburg Bight was sunny, air pressure of 1017 hPa, air temperature of 6.3 °C, wind between 4-5 Bft and swell of 0.5 - 1 m.
In the time frame 18:20 to 22:00 stations TF0017, TF0012 (+ chemical & biological sampling) and TF0013 were measured by CTD casts. At 22:35 we measured station TF0010 in the Fehmarn Belt by CTD and took samples for nutrient parameters. From this position transect T1 for filtering of organic contaminants started at 23:15.

*Day 12, Sunday, 9th February 2020:* A next station in the Fehmarn Belt (TF0014) was measured by CTD between 00:20 to 00:45. The last stations of the cruise were located in the Kiel Bight (TF0361, TF0360) and visited in the time frame 01:30 to 03:30. At key station TF0360 only biological samples were taken and the transect of filtering surface waters ended there. Chemical sampling was quitted and laboratory equipment had to be reinstalled and packed early because of the fourthcoming gale. At the transit tour back to port of Rostock we already had 8 Bft abaft, continuously increasing. Gale warning up to 12 Bft was given by the weather service (winter gale “Sabine”). At 10:15 we savely arrived at port Rostock-Marienehe and the cruise ended one day earlier than scheduled. In total, 89 CTD stations, 3 scanfish transects, 8 transects for organic contaminants, 6 sediment samples, 1 sediment core and MARNET maintenance was done.

*Day 13, Monday, 10th February 2020:* In the time frame 07:00 to 11:00 deinstallation, unloading of scientific equipment and disembarking of scientific crew was done. End of cruise EMB230 at 11:00.

## 5 Preliminary Results

The results presented in the following section are preliminary and not comprehensive. CTD data is quality checked and validated. The aim of this section is to give a first impression on the collected data set. An advanced data analysis will be integrated follow after all validated data sets are available.

### 5.1 Surface Temperatures

Surface temperatures showed generally very warm values above 5 °C in all regions and varied only slightly along the cruise track between 4.9 °C (Karlsö Deep, western Gotland Basin) and 5.59 °C at the Bornholm Deep (cf. Tab. 5.1). The ferry box system measured up to 6.1 °C (February 6th) in the Arkona Basin on the tour back home. February 2020 sea surface temperatures were even warmer than the year before, which showed as well temperatures above average. A comparison of the cruise data compared to longterm measurements are given at key stations in Figure 5.5. At all stations new temperature records are observed in the surface water layer. These warm water temperatures are the result of very warm winter weather with continuous positive terrestrial

temperature anomalies since October 2019. For example, station Warnemünde showed air temperature anomalies of +1.3 K in October, +1.1 K in November, +3.0 K in December, +4.2 K in January 2020 and 4.2 K in February 2020 (data DWD). It results in a cold sum of 0 Kd for wintertime 2019/20, indicating a new warmth record in the long- term data since 1948. The water column is mixed down to the halocline (cf. Fig. 5.2) showing homogenous temperatures between 4-5 °C.

## 5.2 Deep Water Layer Temperatures

(bottom near depths) showed at all key stations from the western to the central Baltic Sea increased values at the upper edge of the long-term data series like in 2019. The temperatures at the key stations Bornholm Deep (-0.5 K) and Gotland Deep (-0.4 K) slightly decreased, but increased at Farö Deep (+0.3 K), Landsort Deep (+0.3 K) compared to previous year. The warming began in the central Baltic Proper since 2014, the start of an intensive inflow period of several events up to beginning of 2017. In between short stagnation phases and a cold winter inflow of January-February 2016 lead to slightly decrease in the Bornholm Basin and eastern Gotland Basin during 2017-2018. Beside this barotropic driven inflow events, a next warming phase has started due to several baroclinic inflow events of warm summer water in late 2018. A consequence of nearly windless, long-lasting high-pressure periods across Northern Europe. These warm saline water bodies are on their pathway to the central Baltic Sea and had actually arrived at the Gotland Deep in winter 2018-2019. Since that time some smaller water volumes have passed the sill between eastern Gotland Basin and Faro Deep (-120 m sill depth) and influenced more distant basins in the Baltic Proper.

**Table 5.1** Deep water layer temperatures at key station of recent years (bottom near depths)

| Location | Feb '13 | Feb '14 | Feb '15 | Feb '16 | Feb '17 | Feb '18 | Feb '19 | Feb '20 |
|---|---|---|---|---|---|---|---|---|
| Bornholm D. | 5.82 °C | 8.65 °C | 7.15 °C | 8.39 °C | 6.96 °C | 6.85 °C | 8.96 °C | 8.43 °C |
| Gotland Deep | 6.41 °C | 6.36 °C | 6.71 °C | 7.86 °C | 7.19 °C | 6.91 °C | 7.65 °C | 7.26 °C |
| Farö Deep | 5.98 °C | 5.76 °C | 6.17 °C | not sampled | 6.73 °C | 6.80 °C | 6.81 °C | 7.18 °C |
| Landsort D. | 5.58 °C | 5.34 °C | not sampled | 5.84 °C | 5.98 °C | 6.24 °C | 6.19 °C | 6.43 °C |
| Karlsö Deep | 5.29 °C | 5.08 °C | 5.03 °C | 5.22 °C | 5.53 °C | 5.58 °C | 5.62 °C | 5.83 °C |

Figure 5.3 (left part) shows a temperature-salinity plot of all gathered data. The slightly warming of bottom water temperatures and slight salinity increase at these key areas F and G is visible.

## 5.3 Salinity in the Bottom Layer

The major Baltic inflow from December 2014 and the following barotropic inflow events up to 2017 increased the salinity in the bottom layer in the central Baltic Proper rapidly to a maximum of 13.84 at the Gotland Deep in February 2016. Afterwards the values slowly decrease in the eastern Gotland Basin and Bornholm Basin with a short slight increase in 2019 caused by the baroclinic events of summer 2018. Since that short interruption in the last year the bottom layer salinity decreased further to February 2020 in the area from the Bornholm Basin to Farö Deep. The salinity at Landsort Deep stayed more or less constant during the last three years 2018-2020 at 11.3 g/kg. The Karlsö Deep in the south of the western Gotland Basin showed a slight increase of 0.3 g/kg compared to stagnant value of 10.3 g/kg of the previous three years.

**Table 5.2** Deep water layer Salinity at key station of recent years (bottom near depths)

| Location | Feb '13 | Feb '14 | Feb '15 | Feb '16 | Feb '17 | Feb '18 | Feb '19 | Feb '20 |
|---|---|---|---|---|---|---|---|---|
| Bornholm D. | 15.62 | 15.99 | 19.81 | 19.19 | 17.93 | 17.14 | 17.79 | 17.16 |
| Gotland Deep | 12.07 | 12.23 | 12.31 | 13.84 | 13.50 | 13.3 | 13.37 | 13.20 |
| Farö Deep | 11.43 | 11.60 | 11.81 | not sampled | 12.68 | 12.79 | 12.62 | 12.52 |
| Landsort D. | 10.43 | 10.45 | not sampled | 11.03 | 11.18 | 11.38 | 11.30 | 11.30 |
| Karlsö Deep | 10.10 | 9.75 | 9.78 | 9.97 | 10.34 | 10.32 | 10.33 | 10.62 |

## 5.4 Oxygen Situation in the Deep Water

Thus, the oxygen situation in the deep water of central basins (>100 m water depth) documents recently a stagnation period, which has started after the phase of several ventilations due to the inflow events 2014-2017. This inflow activity is mirrored in measurements of former years. 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 2004-2013 and decreased in the eastern Gotland Basin and Farö Deep completely and oxic periods occurred in these areas during 2015-2017. Since that time a shift back to euxinic conditions occurred and hydrogen sulphide concentrations increased again in the eastern Gotland Basin to Farö Deep. Recently, high concentrations of -6.55 ml/l was found at the Gotland Deep. At the Landsort Deep and Karlsö Deep in the western Gotland Basin hydrogen sulphide varied only slightly during 2013-2018, but increased during the last two years up to -2.78 ml/l at the Karlsö Deep. These more distant basins show no major changes induced by the last saltwater intrusions. The oxygen situation at the bottom of the Bornholm Basin is much more dynamic, showing short term changes even by weak inflows. Actually, dissolved oxygen concentrations of 3.75 ml/l occurred in February 2020. In addition, figure 5.2 visualize the situation along the “Talweg”. In the western basins up to the Slupsk Sill oxic deep water conditions were detected. The Slupsk Channel was slightly hypoxic (1.98 ml/l) and euxinic conditions occurred in more distant areas of the Baltic Proper (c.f. table 5.5). An areal overview of measured bottom near values at key stations is shown in figure 5.1. The comparison to longterm measurements at these key stations is shown in figure 5.5. At all of these stations the oxygen parameter is on a low level, except at the Bornholm Deep.

**Table 5.3** Deep water layer concentrations of dissolved oxygen and hydrogen sulphide (negative oxygen equivalent) at key station of recent years (bottom near depths)

| Location | Feb '13 | Feb '14 | Feb '15 | Feb '16 | Feb '17 | Feb '18 | Feb '19 | Feb '20 |
|---|---|---|---|---|---|---|---|---|
| Bornholm D. | 3.4 ml/l | 0.84 ml/l | 5.38 ml/l | 1.47 ml/l | 2.24 ml/l | 0.05 ml/l | 1.87 ml/l | 3.75 ml/l |
| Gotland Deep | -8.75 ml/l | -1.71 ml/l | -0.92 ml/l | 1.7 ml/l | -1.09 ml/l | -0.87 ml/l | -3.02 ml/l | -6.55 ml/l |
| Farö Deep | -7.74 ml/l | -2.41 ml/l | -1.07 ml/l | not sampled | 0.20 ml/l | -0.71 ml/l | -2.49 ml/l | -3.06 ml/l |
| Landsort D. | -1,32 ml/l | -0.95 ml/l | not sampled | -1.28 ml/l | -0.89 ml/l | -1.13 ml/l | -1.82 ml/l | -2.15 ml/l |
| Karlsö Deep | -1,20 ml/l | -1.25 ml/l | -0.86 ml/l | -0.90 ml/l | -1.12 ml/l | -1,64 ml/l | -2.25 ml/l | -2.78 ml/l |

## 5.5 Nutrient Situation

The nutrient situation in the surface layer is typical for the winter season. In all key areas phosphate and nitrate values are on a higher winter level, because the biological production like the diatom bloom has not been started (table 5.4). 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 and rising nitrate concentrations during the inflow years. The values were halved or even more decreased since November 2013. Also silicate concentrations have decreased from 126.8 µmol/l to 43.7 µmol/l in February 2016. During the last years the situation at the bottom water of the Gotland

Deep has changed back into stagnation. Nitrate concentration are reduced and bound in the sediment, phosphate is released. Phosphate values were more or less stable during the last two years at the station Gotland Deep, 4.97 µmol/l (Feb. 2017), 4.32 µmol/l (Feb. 2018), 4.55 µmol/l (Feb. 2019) and 5.18 µmol/l February 2020. Silicate shows the same stable concentrations from 64 µmol/l (Feb. 2017), 65.4 µmol/l (Feb. 2018), 64 µmol/l (Feb. 2019) and 64.5 µmol/l in February 2020 (c.f. table 5.5). After a nitrate release at the Farö Deep in February 2017 (7.46 µmol/l) induced by oxic water, it is bound again in the sediment and phosphate increased to 4.10 µmol/l.

## 5.6 Biological Sampling

Samples for phyto- and zooplankton were collected for later analysis in the laboratory.

Tables and figures:

**Table 5.4** Surface water layer (about 3 m depth) - hydrographic and hydrochemical properties

| Area /Date | Station Name /No.* | Temp. °C | Sal. psu | $O_2$ (sensor) ml/l | $O_2$ (titration) ml/l | PO4 µM | NO3 µM | SiO4 µM |
|---|---|---|---|---|---|---|---|---|
| Kiel Bight /2020-02-09 | TF0360/89 | 5,54 | 21,73 | 6,93 | 7,65 | 0,23 | 0,54 | 2,30 |
| Meckl.Bight /2020-02-08 | TF0012/84 | 5,03 | 15,65 | 7,18 | 8,04 | 0,59 | 3,81 | 13,80 |
| Darss Sill /2020-01-29 | TF0001/03 | 5,42 | 8,66 | 7,53 | 8,22 | 0,30 | 2,58 | 15,10 |
| Arkona Basin /2020-01-29 | TF0113/04 | 5,35 | 8,20 | 7,34 | 8,21 | 0,32 | 2,53 | 15,80 |
| Bornholm Deep /2020-01-30 | TF0213/06 | 5,59 | 7,47 | 7,32 | 8,19 | 0,38 | 2,92 | 17,50 |
| Slupsk Channel /2020-02-05 | TF0222/48 | 5,51 | 7,49 | 7,30 | 8,20 | 0,58 | 3,20 | 16,30 |
| SE Gotland Basin /2020-02-05 | TF0259/42 | 4,99 | 7,22 | 7,36 | 8,28 | 0,66 | 3,15 | 18,40 |
| Gotland Deep /2020-02-01 | TF0271/24 | 5,04 | 7,34 | 7,32 | 8,22 | 0,62 | 3,35 | 16,70 |
| Farö Deep /2020-02-01 | TF0286/18 | 5,44 | 7,39 | 7,29 | 8,16 | 0,52 | 3,96 | 14,60 |
| Landsort Deep /2020-01-31 | TF0284/09 | 5,18 | 7,23 | 7,36 | 8,16 | 0,59 | 3,83 | 16,50 |
| Karlsö Deep /2020-01-30 | TF0245/07 | 4,90 | 7,10 | 8,48 | 8,23 | 0,43 | 3,76 | 18,10 |

**Table 5.5** Deep water layer (bottom near depths) - hydrographic and hydrochemical properties

| Area /Date | Station Name /No.* | Temp. °C | Sal. psu | $O_2$ (sensor) ml/l | $O_2$ (titration) ml/l | PO4 µM | NO3 µM | SiO4 µM |
|---|---|---|---|---|---|---|---|---|
| Kiel Bight /2020-02-09 | TF0360/89 | 5,53 | 21,40 | 6,91 | 7,77 | 0,26 | 1,50 | 3,30 |
| Meckl.Bight /2020-02-08 | TF0012/84 | 5,24 | 18,67 | 6,68 | 7,49 | 0,66 | 4,04 | 13,90 |
| Darss Sill /2020-01-29 | TF0001/03 | 5,42 | 14,37 | 7,23 | 7,69 | 0,46 | 4,11 | 15,70 |
| Arkona Basin /2020-01-29 | TF0113/04 | 6,13 | 19,14 | 5,85 | 6,62 | 0,48 | 6,53 | 17,00 |
| Bornholm Deep /2020-01-30 | TF0213/06 | 8,43 | 17,16 | 3,35 | 3,75 | 1,99 | 8,01 | 36,60 |
| Slupsk Channel /2020-02-05 | TF0222/48 | 9,56 | 13,77 | 1,76 | 1,98 | 2,17 | 7,23 | 44,10 |
| SE Gotland Basin /2020-02-05 | TF0259/42 | 7,05 | 11,66 | 0,04 | -0,15 | 2,82 | 0,00 | 51,60 |
| Gotland Deep /2020-02-01 | TF0271/24 | 7,26 | 13,20 | 0,03 | -6,55 | 5,18 | 0,00 | 64,50 |
| Farö Deep /2020-02-01 | TF0286/18 | 7,18 | 12,52 | 0,03 | -3,06 | 4,10 | 0,00 | 63,50 |
| Landsort Deep /2020-01-31 | TF0284/09 | 6,43 | 11,30 | -0,04 | -2,15 | 3,55 | 0,00 | 60,90 |
| Karlsö Deep /2020-01-30 | TF0245/07 | 5,83 | 10,62 | 0,02 | -2,78 | 3,65 | 0,00 | 59,80 |

* hydrogen sulphide was converted into negative oxygen equivalents

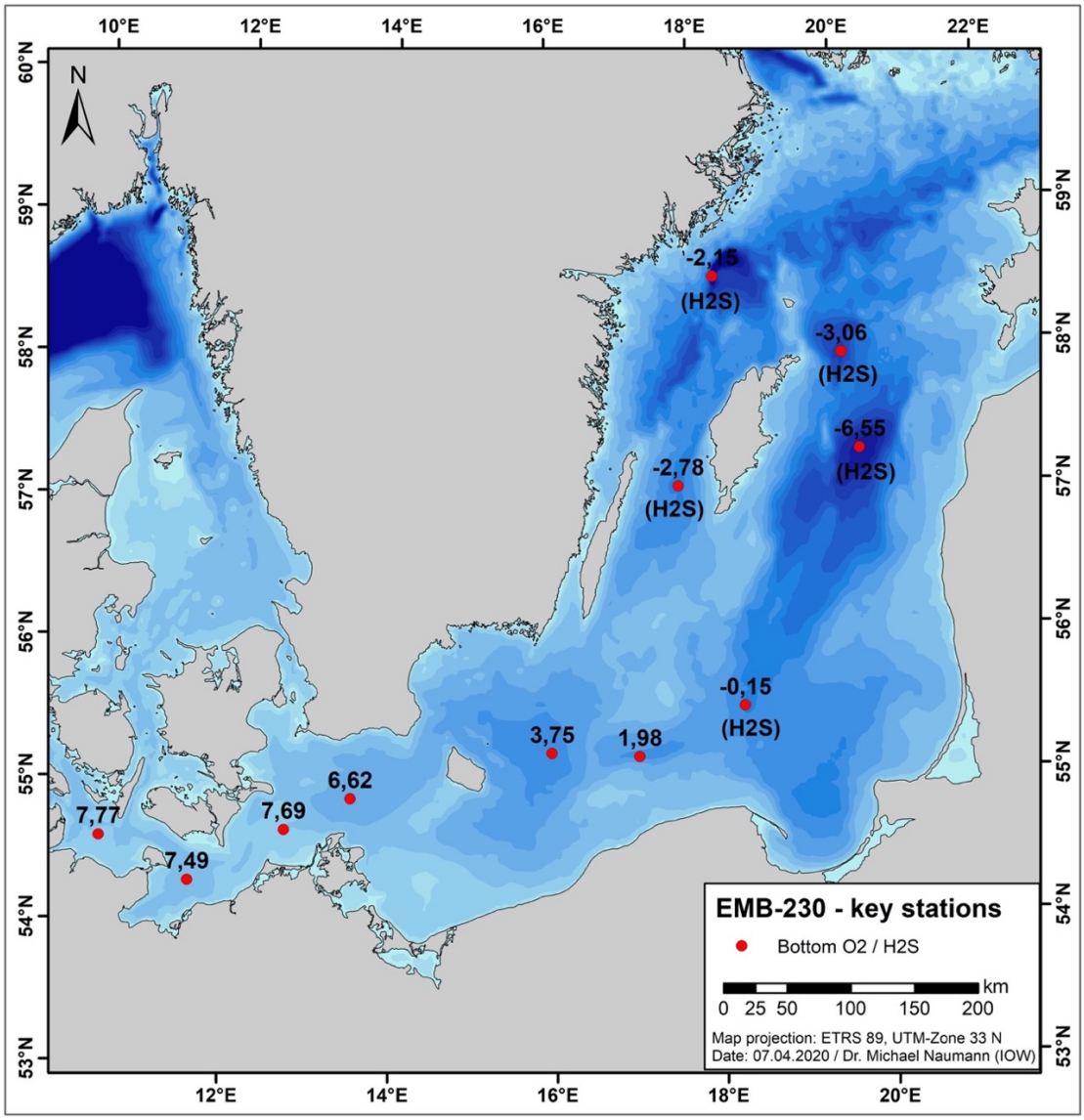



**Fig. 5.1** Oxygen/hydrogen sulphide conditions in the bottom near layer for selected key stations (hydrogen sulphide was converted into negative oxygen equivalents).

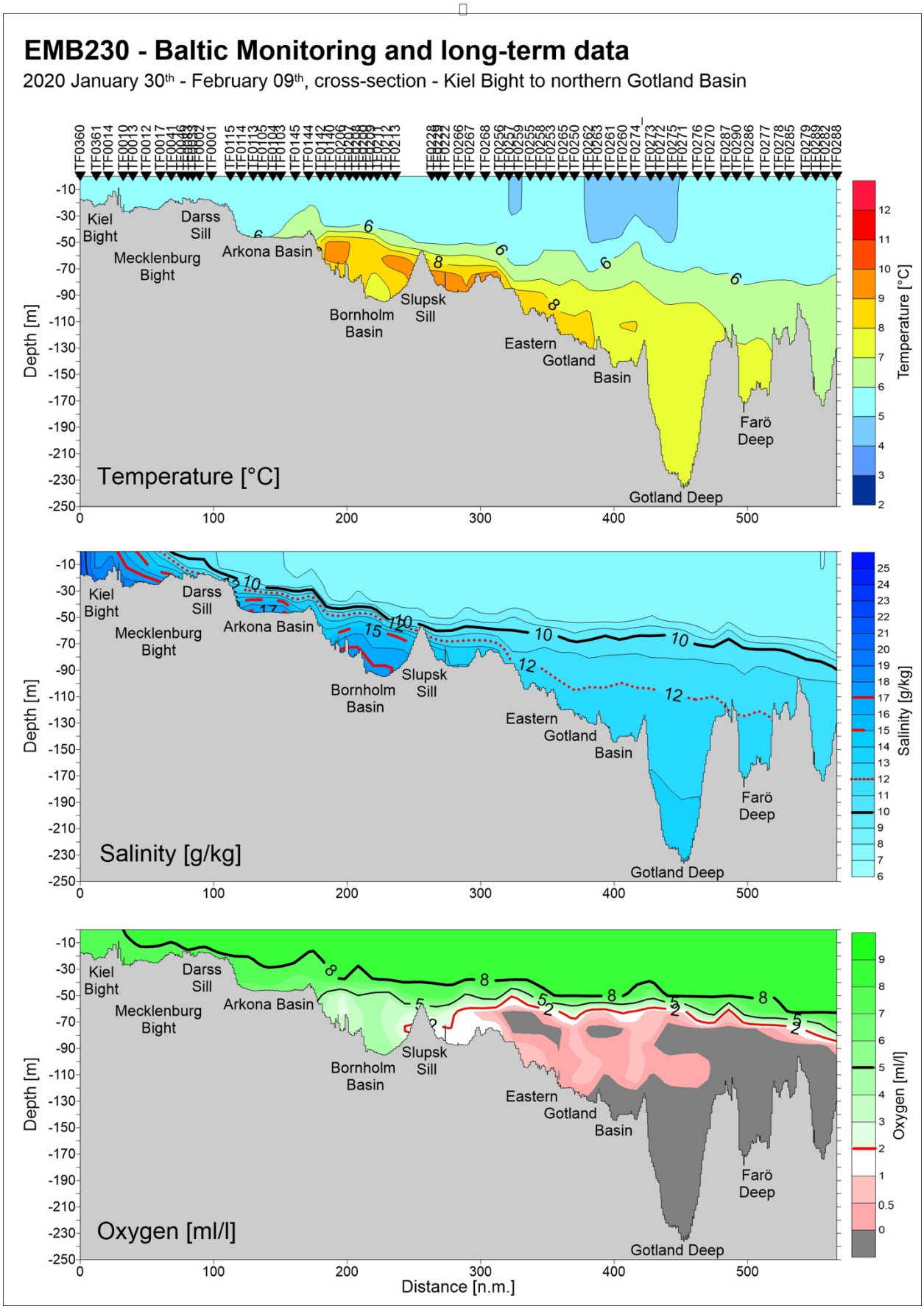



**Fig. 5.2** Cross section from Kiel Bight to eastern Gotland Basin showing the hydrographic parameters temperature, salinity and oxygen on the "Talweg" of Major Baltic Inflows (for location see map Fig. 5.4).

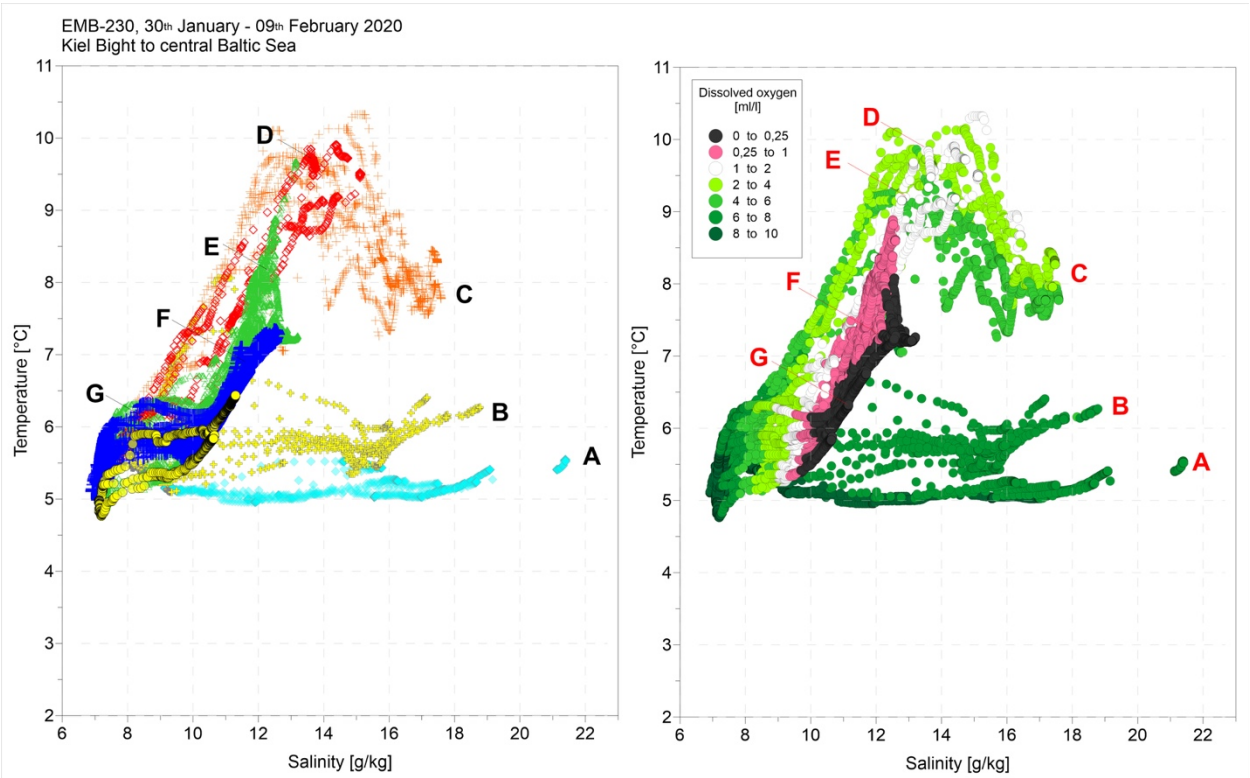



**Fig. 5.3** Temperature-Salinity diagram (left) of all stations, A – Kiel Bight – Mecklenburg Bight (yellow); B – Arkona Basin (yellow); C – Bornholm Basin (orange); D – Slupsk Channel (red); E – Eastern Gotland Basin (green); F – Northern Central Basin (blue); G – Western Gotland Basin (black). Diagram on right side shows all temperature – salinity values and dissolved oxygen classified in color.

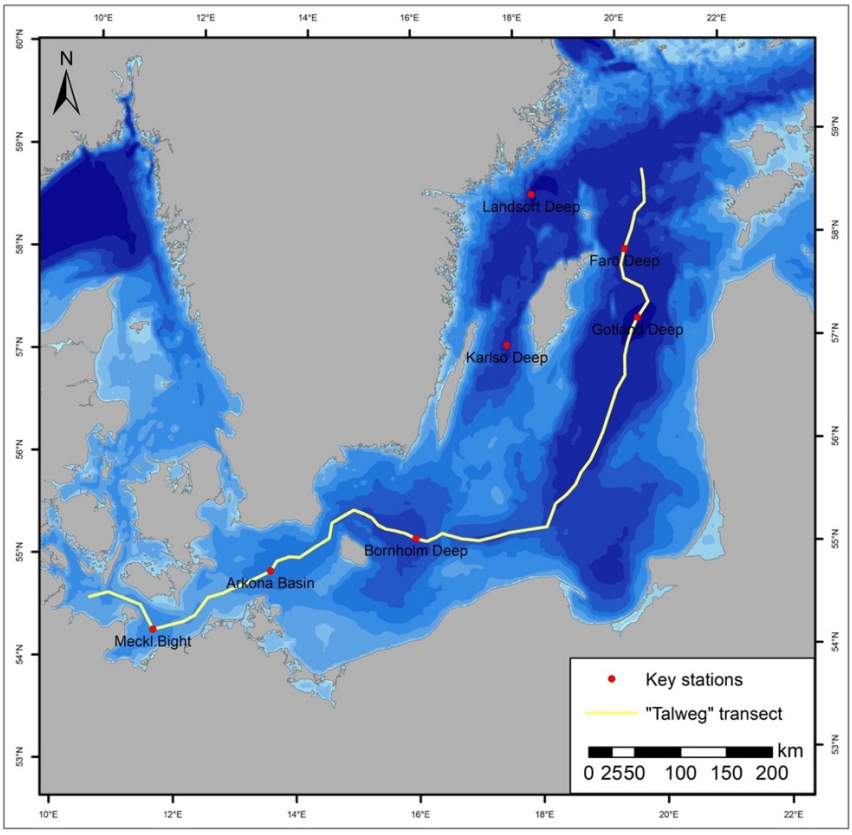
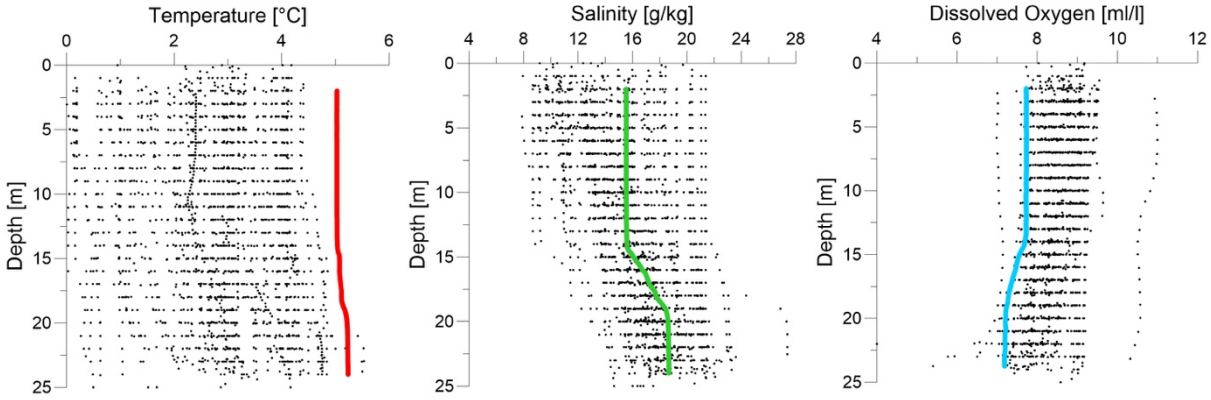


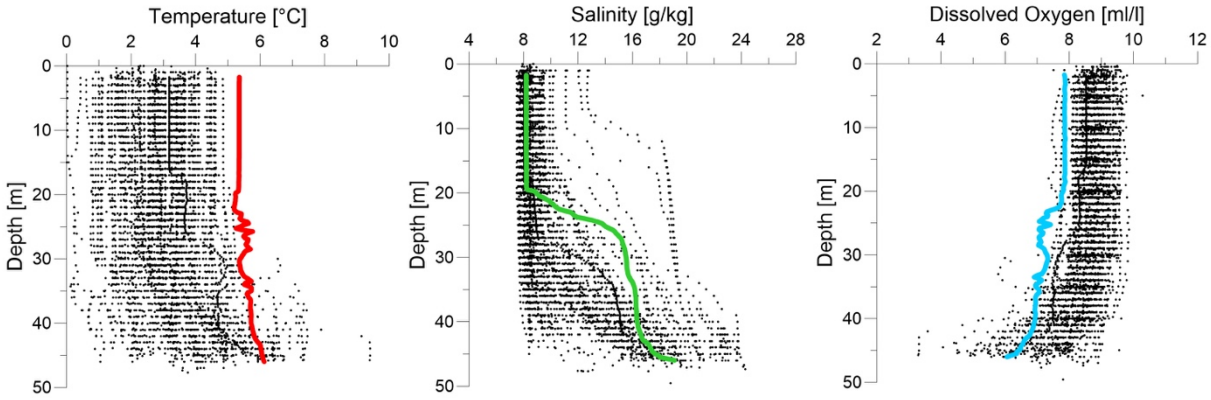

**Fig. 5.4** Location of selected key stations (tables in sections 5.2 – 5.4, table 5.4, 5.5, figure 5.5) and the "Talweg"-transect crossing all deep basins on the pathway of saltwater inflows (figure 5.2).

**Station TF0012 - Mecklenburg Bight**



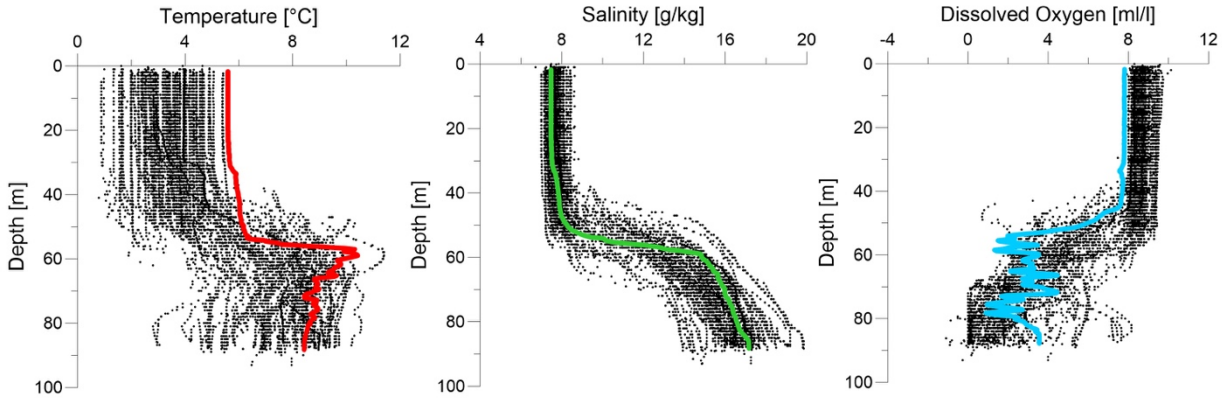

comparison February 2020 to long-term winter measurements since 1971

**Station TF0113 - Arkona Basin**

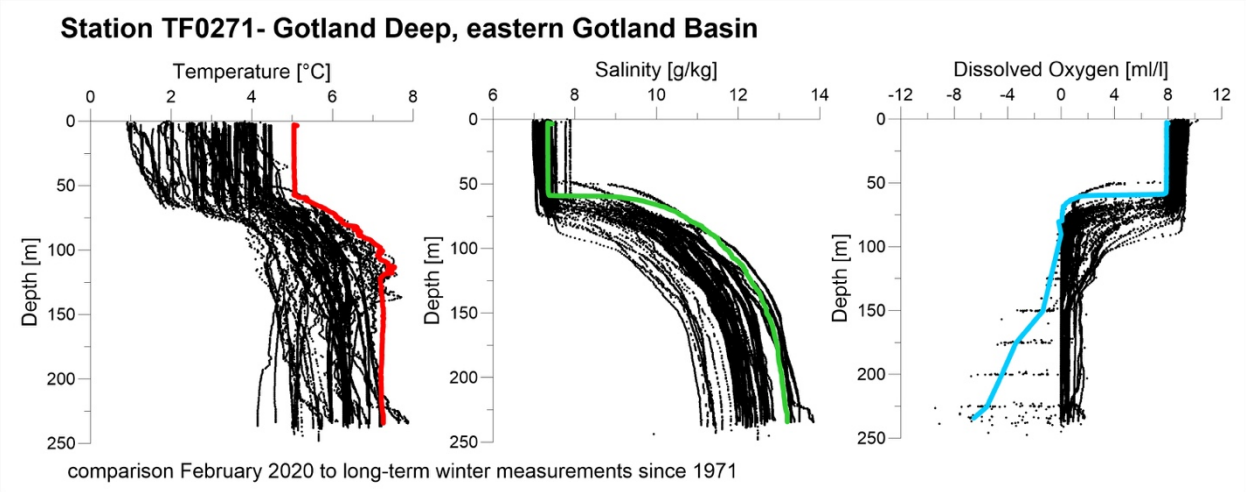


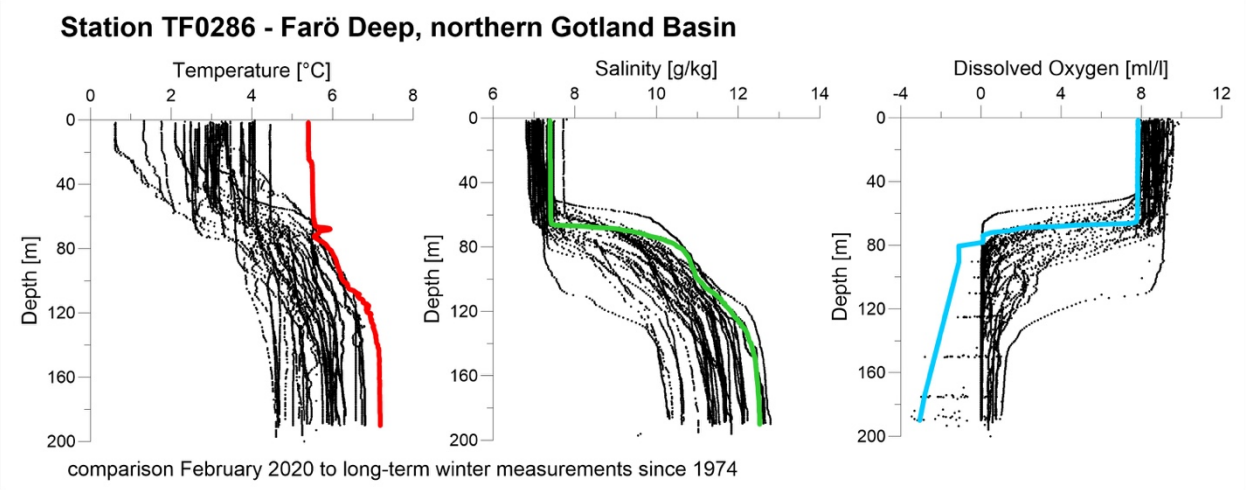

comparison February 2020 to long-term winter measurements since 1953

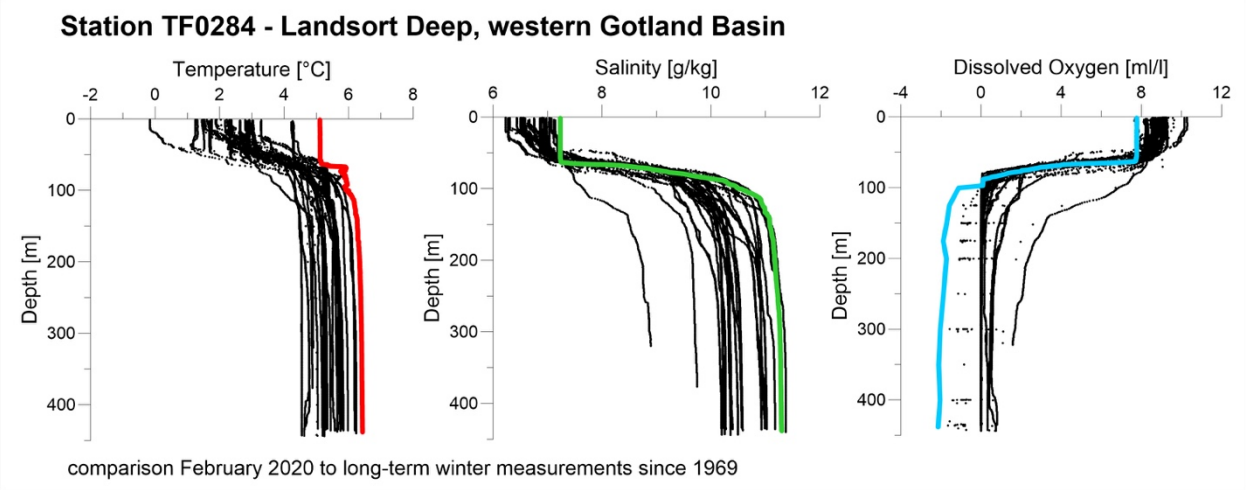
**Station TF0213 - Bornholm Basin**




comparison February 2020 to long-term winter measurements since 1971


Station TF0271- Gotland Deep, eastern Gotland Basin
Temperature [°C]
Salinity [g/kg]
Dissolved Oxygen [ml/l]
Depth [m]
comparison February 2020 to long-term winter measurements since 1971


Station TF0286 - Farö Deep, northern Gotland Basin
Temperature [°C]
Salinity [g/kg]
Dissolved Oxygen [ml/l]
Depth [m]
comparison February 2020 to long-term winter measurements since 1974


Station TF0284 - Landsort Deep, western Gotland Basin
Temperature [°C]
Salinity [g/kg]
Dissolved Oxygen [ml/l]
Depth [m]
comparison February 2020 to long-term winter measurements since 1969

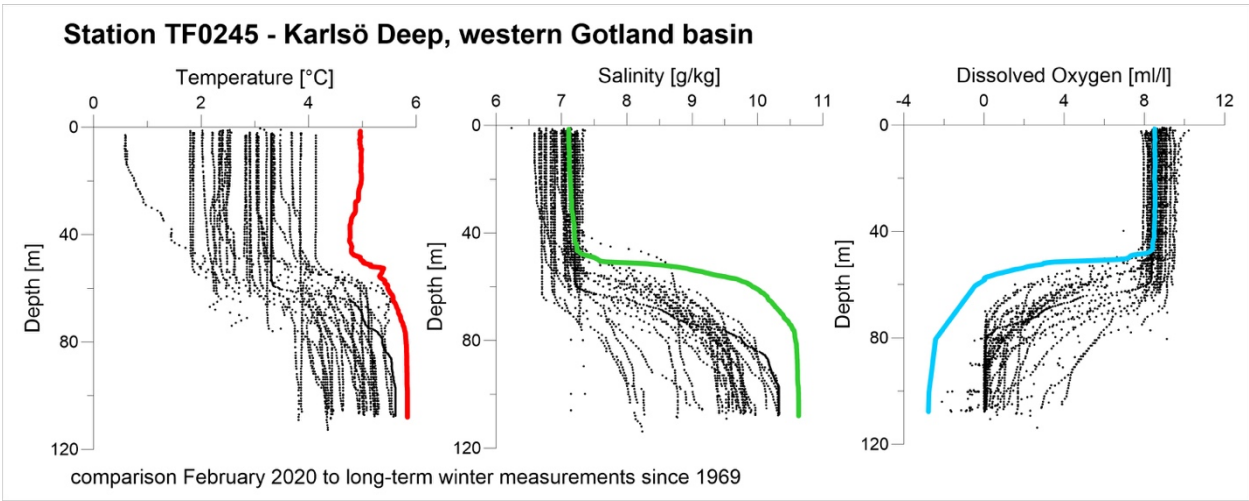



**Fig. 5.5** Comparison of cruise data (February 2020) to longterm measurements of temperature, salinity, oxygen and hydrogen sulphide at key stations (locations cf. figure 5.4).

# 6 Ship's Meteorological Station

The weather situation during the cruise was generally strong windy under influence of the large low pressure cells crossing northern Europe. A mean windspeed of 18.1 kn (max. 41.9 kn, 9 Bft) was measured during the cruise and most of the time the ship moved against the swell. One day staying anchored waiting on weather on February 2th (low pressure "Naima"), 10 hours of cruising with 2 kn speed against storm of low pressure "Quendresa" (February 5th) and cancellation of the last day of the cruise (low pressure "Sabine") hampered the work.

Air pressure varied from 982 hPa (February 2nd) to 1030 hPa (February 7th). Some notes of the daily weather situation are given in section 4. The air temperature showed a minimum of 0.4 °C (February 4th) in the eastern Gotland Basin to a maximum of 8.3 °C (January 30th) in the Bornholm Basin. A mean temperature of 4.6 °C was measured during the cruise.

# 7 Station List EMB230

## 7.1 Overall Station List

| Station No. | Station ID | Date | Gear | Time [UTC] | Latitude [decimal] °N | Longitude [decimal] °E | Water Depth [m] | Remarks /Recovery |
|---|---|---|---|---|---|---|---|---|
| 1 | TFO5 | 2020-01-29 | CTD, Secchi disk | 9:01 | 54,2311 | 12,0748 | 13,4 | 1 cast, chemical sampling |
| 2 | TF0041 | 2020-01-29 | CTD | 10:30 | 54,4061 | 12,0628 | 20,2 | 1 cast, chemical sampling |
| 3 | TF0001 | 2020-01-29 | CTD | 13:38 | 54,6962 | 12,6987 | 22,0 | 1 cast, chemical sampling |
| 4 | TF0113 | 2020-01-29 | CTD, plankton net | 17:10 | 54,9252 | 13,5009 | 47,4 | 2 casts, chemical, biological sampling |
| 5 | ABBOJE | 2020-01-29 | CTD | 19:49 | 54,8802 | 13,8603 | 45,6 | 1 cast, chemical sampling |
| 6 | TF0213 | 2020-01-30 | CTD, plankton net, Secchi disk | 4:37 | 55,2502 | 15,9853 | 89,7 | 2 casts, chemical, biological sampling |
| 7 | TF0245 | 2020-01-30 | CTD | 19:23 | 57,1154 | 17,6672 | 110,7 | 1 cast, chemical sampling |
| 8 | TF0240 | 2020-01-31 | CTD | 0:51 | 58,0000 | 17,9994 | 166,4 | 3 casts, chemical sampling, CTD calibration |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9 | TF0284 | 2020-01-31 | CTD, Secchi disk | 6:41 | 58,5834 | 18,2330 | 438,9 | 5 casts, chemical, biological sampling |
| 10 | TF0283 | 2020-01-31 | CTD | 16:17 | 58,7833 | 19,0993 | 126,6 | 1 cast, chemical sampling |
| 11 | TF0288 | 2020-01-31 | CTD | 19:56 | 58,9981 | 20,1578 | 141,2 | 1 cast, chemical sampling |
| 12 | TF0282 | 2020-01-31 | CTD | 21:22 | 58,8831 | 20,3170 | 170,1 | 1 cast, chemical sampling |
| 13 | TF0289 | 2020-01-31 | CTD | 22:56 | 58,7661 | 20,3302 | 190,7 | 1 cast, chemical sampling |
| 14 | TF0279 | 2020-02-01 | CTD | 0:30 | 58,6415 | 20,3454 | 163,3 | 1 cast, chemical sampling |
| 15 | TF0285 | 2020-02-01 | CTD | 2:11 | 58,4419 | 20,3347 | 123,1 | 3 casts, chemical sampling, CTD calibration |
| 16 | TF0278 | 2020-02-01 | CTD | 3:58 | 58,3502 | 20,1474 | 120,4 | 1 cast, no water sampling |
| 17 | TF0277 | 2020-02-01 | CTD | 5:24 | 58,1842 | 20,0518 | 161,0 | 1 cast, no water sampling |
| 18 | TF0286 | 2020-02-01 | CTD, Secchi disk | 7:03 | 58,0007 | 19,9002 | 192,9 | 2 casts, chemical sampling |
| 19 | TF0290 | 2020-02-01 | CTD | 9:38 | 57,8505 | 19,8175 | 169,1 | 1 cast, chemical sampling |
| 20 | TF0287 | 2020-02-01 | CTD | 11:03 | 57,7154 | 19,8534 | 130,3 | 1 cast, chemical sampling |
| 21 | TF0270 | 2020-02-01 | CTD, start scanfish test | 12:42 | 57,6168 | 20,1667 | 143,2 | 1 cast, chemical sampling |
| 22 | TF0276 | 2020-02-01 | CTD, end scanfish test | 15:04 | 57,4704 | 20,2606 | 206,5 | 1 cast, chemical sampling |
| 23 | Gotland_NE | 2020-02-01 | CTD | 16:14 | 57,3672 | 20,3341 | 217,0 | 1 cast, chemical sampling |
| 24 | TF0271 | 2020-02-01 | CTD, Secchi disk, plankton net, start scanfish transect | 18:02 | 57,3203 | 20,0509 | 236,9 | 7 casts, chemical, biological sampling, CTD calibration, start SF1 |
| 25 | no | 2020-02-02 | End of scanfish transect | 21:50 | 57,5521 | 18,9035 | 28,0 | end SF1 |
| X 25-2 | no | 2020-02-02 | no | 7:30 | 57,5630 | 18,8508 | 12,0 | anchored, waiting on weather |
| 26 | TF0271 | 2020-02-03 | CTD | 9:19 | 57,3190 | 20,0506 | 237,9 | 1 cast, no water sampling |
| X 26-2 | TF0271 | 2020-02-03 | Mooring work | 10:00 | 57,3066 | 20,0812 | 241,0 | "GODESS" recovery |
| X 26-3 | Gotland_SE | 2020-02-03 | Mooring work | 13:00 | 57,0754 | 19,7520 | 189,0 | "Gotland Southwest" deployment |
| 27 | TF0271 | 2020-02-03 | Multicorer, in situ pumps, CTD, start scanfish transect | 15:30 | 57,3201 | 20,0481 | 237,0 | 1 sample surface sediments, 220 m and 80 m filtering of organic coantaminants, 2 casts of CTD calibration, start SF2 |
| X 27-2 | no | 2020-02-02 | End of scanfish transect | 7:30 | 57,0448 | 21,2821 | 19,4 | end SF2 |
| 28 | TF0275 | 2020-02-04 | CTD | 11:56 | 57,2102 | 19,9299 | 227,2 | 1 cast, chemical sampling |
| 29 | TF0272 | 2020-02-04 | CTD | 13:27 | 57,0716 | 19,8295 | 206,5 | 1 cast, chemical sampling |
| 31 | TF0273 | 2020-02-04 | CTD | 14:53 | 56,9517 | 19,7698 | 181,6 | 1 cast, chemical sampling |
| 32 | TF0274 | 2020-02-04 | CTD | 16:28 | 56,7675 | 19,7511 | 153,3 | 1 cast, chemical sampling |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 33 | TF0260 | 2020-02-04 | CTD | 17:57 | 56,6332 | 19,5828 | 144,2 | 1 cast, chemical sampling |
| 34 | TF0261 | 2020-02-04 | CTD | 19:20 | 56,4915 | 19,4795 | 142,5 | 1 cast, chemical sampling |
| 35 | TF0263 | 2020-02-04 | CTD | 20:47 | 56,3462 | 19,3774 | 138,0 | 1 cast, chemical sampling |
| 36 | TF0262 | 2020-02-04 | CTD | 22:05 | 56,2344 | 19,3004 | 131,4 | 1 cast, chemical sampling |
| 37 | TF0250 | 2020-02-04 | CTD | 23:43 | 56,0835 | 19,1661 | 129,0 | 2 cast, chemical sampling, CTD calibration |
| 38 | TF0265 | 2020-02-05 | CTD | 0:58 | 55,9584 | 19,0468 | 115,7 | 2 cast, chemical sampling, CTD calibration |
| 39 | TF0253 | 2020-02-05 | CTD | 2:24 | 55,8398 | 18,8655 | 105,8 | 1 cast, chemical sampling |
| 40 | TF0258 | 2020-02-05 | CTD | 3:30 | 55,7264 | 18,7652 | 91,7 | 1 cast, chemical sampling |
| 41 | TF0255 | 2020-02-05 | CTD | 4:41 | 55,6332 | 18,5999 | 95,0 | 1 cast, chemical sampling |
| 42 | TF0259 | 2020-02-05 | CTD, plankton net | 6:01 | 55,5494 | 18,4000 | 90,7 | 1 cast, chemical, biological sampling |
| 43 | TF0257 | 2020-02-05 | CTD | 7:06 | 55,4402 | 18,3195 | 90,4 | 1 cast, chemical sampling |
| 44 | TF0256 | 2020-02-05 | CTD | 8:23 | 55,3260 | 18,2357 | 77,7 | 1 cast, chemical sampling |
| 45 | TF0268 | 2020-02-05 | CTD | 9:50 | 55,3068 | 17,9315 | 76,0 | 1 cast, chemical sampling |
| 46 | TF0267 | 2020-02-05 | CTD | 11:27 | 55,2859 | 17,5933 | 84,0 | 1 cast, chemical sampling |
| 47 | TF0266 | 2020-02-05 | CTD | 12:44 | 55,2519 | 17,3601 | 88,8 | 1 cast, chemical sampling |
| 48 | TF0222 | 2020-02-05 | CTD | 14:04 | 55,2161 | 17,0680 | 90,9 | 2 casts, chemical sampling |
| 48 | TF0222 | 2020-02-05 | CTD | 14:16 | 55,2160 | 17,0668 | 91,8 | 1 cast, chemical sampling |
| 49 | TF0229 | 2020-02-05 | CTD | 15:15 | 55,2285 | 16,9145 | 85,8 | 1 cast, chemical sampling |
| 50 | TF0228 | 2020-02-05 | CTD | 16:09 | 55,2373 | 16,7750 | 77,9 | 1 cast, chemical sampling |
| 51 | TF0212 | 2020-02-06 | CTD | 3:02 | 55,3023 | 15,7999 | 95,8 | 3 casts, chemical sampling, CTD calibration |
| 52 | TF0211 | 2020-02-06 | CTD | 5:04 | 55,3300 | 15,6154 | 95,4 | 1 cast, chemical sampling |
| 53 | TF0209 | 2020-02-06 | CTD | 6:21 | 55,3470 | 15,4661 | 93,7 | 1 cast, chemical sampling |
| 54 | TF0200 | 2020-02-06 | CTD | 7:54 | 55,3840 | 15,3267 | 92,9 | 1 cast, chemical sampling |
| 55 | TF0208 | 2020-02-06 | CTD | 8:49 | 55,4522 | 15,2292 | 94,6 | 1 cast, chemical sampling |
| 56 | TF0207 | 2020-02-06 | CTD | 9:44 | 55,4960 | 15,0946 | 87,0 | 1 cast, chemical sampling |
| 57 | TF0206 | 2020-02-06 | CTD | 10:54 | 55,5345 | 14,9124 | 77,0 | 1 cast, chemical sampling |
| 58 | TF0140 | 2020-02-06 | CTD | 12:04 | 55,4663 | 14,7155 | 70,2 | 1 cast, chemical sampling |
| 59 | TF0142 | 2020-02-06 | CTD | 13:09 | 55,4043 | 14,5371 | 61,0 | 1 cast, chemical sampling |
| 60 | TF0144 | 2020-02-06 | CTD | 14:45 | 55,2587 | 14,4896 | 44,4 | 1 cast, chemical sampling |
| 61 | TF0145 | 2020-02-06 | CTD | 16:12 | 55,1668 | 14,2503 | 47,2 | 1 cast, chemical sampling |
| 62 | TF0103 | 2020-02-06 | CTD | 17:38 | 55,0633 | 13,9890 | 47,4 | 1 cast, chemical sampling |

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|---|---|---|---|---|---|---|---|---|
| 63 | TF0109 | 2020-02-06 | CTD, Secchi disk, plankton net, multicorer | 18:30 | 54,9998 | 14,0837 | 48,6 | 1 cast, chemical, biological sampling, 1 sample surface sediments |
| 64 | TF0152 | 2020-02-06 | CTD | 21:44 | 54,6332 | 14,2857 | 31,9 | 1 cast, chemical sampling |
| 65 | OBBoje | 2020-02-07 | CTD, multicorer | 1:15 | 54,0795 | 14,1510 | 16,5 | 3 casts, chemical, 1 sample surface sediments, CTD calibration |
| 66 | TF0112 | 2020-02-07 | CTD | 5:51 | 54,8037 | 13,9594 | 40,8 | 1 cast, chemical sampling |
| 67 | TF0104 | 2020-02-07 | CTD | 8:16 | 55,0693 | 13,8195 | 46,7 | 1 cast, chemical sampling |
| 68 | TF0105 | 2020-02-07 | CTD | 9:17 | 55,0247 | 13,6046 | 46,6 | 1 cast, chemical sampling |
| 69 | ABBoje | 2020-02-07 | CTD, dinghy | 15:08 | 54,8828 | 13,8554 | 46,1 | 1 cast, chemical sampling, maintenance MARNET station |
| 70 | TF0142 | 2020-02-07 | CTD, start scanfish transect | 19:23 | 55,4070 | 14,5368 | 60,1 | 3 casts, chemical sampling, CTD calibration, Start SF3 - part 1 |
| 71 | TF0113 | 2020-02-08 | interruption of scanfish transect | 4:35 | 54,9255 | 13,5002 | 47,4 | SF3 - part 1 end |
| 72 | TF0113 | 2020-02-08 | CTD, plankton net, multicorer, restart scanfish transect | 4:44 | 54,9255 | 13,5002 | 47,4 | 1 cast, chemical, biological sampling, 1 sample surface sediments, Start SF3 - part 2 |
| 73 | TF0114 | 2020-02-08 | interruption of scanfish transect | 7:45 | 54,8589 | 13,2779 | 45,3 | SF3 - part 2 end |
| 74 | TF0114 | 2020-02-08 | CTD, restart scanfish transect | 7:52 | 54,8589 | 13,2779 | 45,3 | 1 cast, chemical sampling, Start SF3 - part 3 |
| 75 | TF0115 | 2020-02-08 | end of scanfish transect | 9:50 | 54,7957 | 13,0587 | 30,5 | SF3 - part 3 end |
| 76 | TF0115 | 2020-02-08 | CTD | 9:59 | 54,7957 | 13,0587 | 30,5 | 1 cast, chemical sampling |
| 77 | TF0001 | 2020-02-08 | CTD | 11:39 | 54,6955 | 12,6977 | 21,8 | 1 cast, chemical sampling |
| 78 | TF0002 | 2020-02-08 | CTD | 12:44 | 54,6501 | 12,4500 | 18,2 | 1 cast, chemical sampling |
| 79 | TF0033 | 2020-02-08 | CTD | 13:30 | 54,6044 | 12,3315 | 20,7 | 1 cast, no water sampling |
| 80 | TF0083 | 2020-02-08 | CTD | 14:12 | 54,5511 | 12,2738 | 26,1 | 1 cast, chemical sampling |
| 81 | TF0046 | 2020-02-08 | CTD, Secchi disk, plankton net | 15:08 | 54,4699 | 12,2408 | 29,0 | 1 cast, chemical, biological sampling |
| 82 | TF0041 | 2020-02-08 | CTD | 17:13 | 54,4070 | 12,0592 | 19,5 | 1 cast, chemical sampling |
| 83 | TF0017 | 2020-02-08 | CTD | 18:21 | 54,3920 | 11,8221 | 22,8 | 1 cast, chemical sampling |
| 84 | TF0012 | 2020-02-08 | CTD, plankton net, multicorer | 19:38 | 54,3162 | 11,5510 | 25,0 | 1 cast, chemical, biological sampling, 1 sample surface sediments |
| 85 | TF0013 | 2020-02-08 | CTD | 21:47 | 54,4761 | 11,4862 | 26,8 | 1 cast, chemical sampling |

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|---|---|---|---|---|---|---|---|---|
| 86 | TF0010 | 2020-02-08 | CTD, multicorer | 22:41 | 54,5514 | 11,3235 | 28,4 | 1 cast, chemical sampling, 1 sample surface sediments |
| 87 | TF0014 | 2020-02-09 | CTD | 0:22 | 54,5958 | 11,0104 | 27,9 | 3 casts, chemical sampling, CTD calibration |
| 88 | TF0361 | 2020-02-09 | CTD | 1:37 | 54,6666 | 10,7836 | 23,4 | 1 cast, no water sampling |
| 89 | TF0360 | 2020-02-09 | CTD, Secchi disk, plankton net | 3:03 | 54,6006 | 10,4507 | 18,3 | 1 cast, biological sampling |

## 7.2 Station List – CTD Measurements, 89 Stations, 113 Casts

| Date | Latitude [decimal] °N | Longitude [decimal] °E | Station | No. | Cast | Begin [UTC] | End [UTC] | Water Depth [m] | Max Depth [m] | Dataset [file name] |
|---|---|---|---|---|---|---|---|---|---|---|
| 2020-01-29 | 54,2311 | 12,0748 | TFO5 | 1 | 1 | 9:01 | 9:07 | 13,42 | 12,3 | V0001F01.hex |
| 2020-01-29 | 54,4061 | 12,0628 | TF0041 | 2 | 1 | 10:30 | 10:35 | 20,19 | 18,6 | V0002F01.hex |
| 2020-01-29 | 54,6962 | 12,6987 | TF0001 | 3 | 1 | 13:38 | 13:42 | 22,02 | 20,5 | V0003F01.hex |
| 2020-01-29 | 54,9252 | 13,5009 | TF0113 | 4 | 1 | 17:10 | 17:18 | 47,38 | 45,9 | V0004F01.hex |
| 2020-01-29 | 54,9251 | 13,5000 | TF0113 | 4 | 2 | 18:04 | 18:11 | 47,03 | 45,9 | V0004F02.hex |
| 2020-01-29 | 54,8802 | 13,8603 | ABBOJE | 5 | 1 | 19:49 | 19:54 | 45,59 | 44,3 | V0005F01.hex |
| 2020-01-30 | 55,2502 | 15,9853 | TF0213 | 6 | 1 | 4:37 | 4:46 | 89,66 | 87,6 | V0006F01.hex |
| 2020-01-30 | 55,2506 | 15,9829 | TF0213 | 6 | 2 | 5:26 | 5:37 | 89,78 | 87,6 | V0006F02.hex |
| 2020-01-30 | 57,1154 | 17,6672 | TF0245 | 7 | 1 | 19:23 | 19:35 | 110,65 | 107 | V0007F01.hex |
| 2020-01-31 | 58,0000 | 17,9994 | TF0240 | 8 | 2 | 0:51 | 0:53 | 166,4 | 0,1 | V0008K02.hex |
| 2020-01-31 | 58,0003 | 18,0010 | TF0240 | 8 | 3 | 1:03 | 1:06 | 164,09 | 11,6 | V0008K03.hex |
| 2020-01-31 | 58,0004 | 18,0010 | TF0240 | 8 | 1 | 1:29 | 1:43 | 164,09 | 161,5 | V0008F01.hex |
| 2020-01-31 | 58,5834 | 18,2330 | TF0284 | 9 | 1 | 6:41 | 7:21 | 438,87 | 434,2 | V0009F01.hex |
| 2020-01-31 | 58,5840 | 18,2314 | TF0284 | 9 | 2 | 8:05 | 8:20 | 443,51 | 134,7 | V0009F02.hex |
| 2020-01-31 | 58,5837 | 18,2335 | TF0284 | 9 | 3 | 8:55 | 9:00 | 440,8 | 42,1 | V0009F03.hex |
| 2020-01-31 | 58,5833 | 18,2336 | TF0284 | 9 | 4 | 11:46 | 12:10 | 440,8 | 432,9 | V0009F04.hex |
| 2020-01-31 | 58,5835 | 18,2345 | TF0284 | 9 | 5 | 12:31 | 12:38 | 440,8 | 114,4 | V0009F05.hex |
| 2020-01-31 | 58,7833 | 19,0993 | TF0283 | 10 | 1 | 16:17 | 16:28 | 126,59 | 120,9 | V0010F01.hex |
| 2020-01-31 | 58,9981 | 20,1578 | TF0288 | 11 | 1 | 19:56 | 20:11 | 141,23 | 140,5 | V0011F01.hex |
| 2020-01-31 | 58,8831 | 20,3170 | TF0282 | 12 | 1 | 21:22 | 21:40 | 170,1 | 158,9 | V0012F01.hex |
| 2020-01-31 | 58,7661 | 20,3302 | TF0289 | 13 | 1 | 22:56 | 23:13 | 190,68 | 188 | V0013F01.hex |
| 2020-02-01 | 58,6415 | 20,3454 | TF0279 | 14 | 1 | 0:30 | 0:41 | 163,25 | 158,8 | V0014F01.hex |
| 2020-02-01 | 58,4419 | 20,3347 | TF0285 | 15 | 2 | 2:11 | 2:12 | 123,14 | 0 | V0015K02.hex |
| 2020-02-01 | 58,4415 | 20,3339 | TF0285 | 15 | 3 | 2:23 | 2:25 | 122,37 | 9,9 | V0015K03.hex |
| 2020-02-01 | 58,4413 | 20,3341 | TF0285 | 15 | 1 | 2:45 | 2:54 | 121,99 | 119 | V0015F01.hex |
| 2020-02-01 | 58,3502 | 20,1474 | TF0278 | 16 | 1 | 3:58 | 4:06 | 120,41 | 117,5 | V0016F01.hex |
| 2020-02-01 | 58,1842 | 20,0518 | TF0277 | 17 | 1 | 5:24 | 5:39 | 160,99 | 157 | V0017F01.hex |
| 2020-02-01 | 58,0007 | 19,9002 | TF0286 | 18 | 1 | 7:03 | 7:21 | 192,94 | 188,6 | V0018F01.hex |
| 2020-02-01 | 58,0006 | 19,9000 | TF0286 | 18 | 2 | 8:05 | 8:11 | 193,07 | 33,3 | V0018F02.hex |
| 2020-02-01 | 57,8505 | 19,8175 | TF0290 | 19 | 1 | 9:38 | 9:55 | 169,06 | 163,9 | V0019F01.hex |

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|---|---|---|---|---|---|---|---|---|---|---|
| 2020-02-01 | 57,7154 | 19,8534 | TF0287 | 20 | 1 | 11:03 | 11:14 | 130,31 | 126,8 | V0020F01.hex |
| 2020-02-01 | 57,6168 | 20,1667 | TF0270 | 21 | 1 | 12:42 | 12:53 | 143,24 | 139,5 | V0021F01.hex |
| 2020-02-01 | 57,4704 | 20,2606 | TF0276 | 22 | 1 | 15:04 | 15:16 | 206,45 | 200,5 | V0022F01.hex |
| 2020-02-01 | 57,3672 | 20,3341 | Gotland_NE | 23 | 1 | 16:14 | 16:29 | 216,95 | 212,5 | V0023F01.hex |
| 2020-02-01 | 57,3203 | 20,0509 | TF0271 | 24 | 1 | 18:02 | 18:22 | 236,94 | 232,4 | V0024F01.hex |
| 2020-02-01 | 57,3203 | 20,0501 | TF0271 | 24 | 2 | 18:57 | 19:10 | 238,02 | 120 | V0024F02.hex |
| 2020-02-01 | 57,3204 | 20,0507 | TF0271 | 24 | 3 | 19:50 | 19:59 | 237,15 | 28,1 | V0024F03.hex |
| 2020-02-01 | 57,3204 | 20,0514 | TF0271 | 24 | 4 | 20:29 | 20:34 | 238,02 | 31,3 | V0024F04.hex |
| 2020-02-01 | 57,3203 | 20,0508 | TF0271 | 24 | 5 | 21:10 | 21:13 | 237,15 | 0 | V0024K05.hex |
| 2020-02-01 | 57,3205 | 20,0508 | TF0271 | 24 | 6 | 21:23 | 21:26 | 237,15 | 10 | V0024K06.hex |
| 2020-02-01 | 57,3201 | 20,0515 | TF0271 | 24 | 7 | 21:50 | 22:13 | 237,54 | 232,5 | V0024F07.hex |
| 2020-02-03 | 57,3190 | 20,0506 | TF0271 | 26 | 1 | 9:19 | 9:43 | 237,92 | 232,9 | V0026F01.hex |
| 2020-02-03 | 57,3201 | 20,0481 | TF0271 | 27 | 1 | 22:38 | 22:43 | 237,04 | 11,5 | V0027K01.hex |
| 2020-02-03 | 57,3197 | 20,0488 | TF0271 | 27 | 2 | 22:46 | 22:48 | 237,52 | 0,2 | V0027K02.hex |
| 2020-02-04 | 57,2102 | 19,9299 | TF0275 | 28 | 1 | 11:56 | 12:15 | 227,19 | 222,4 | V0028F01.hex |
| 2020-02-04 | 57,0716 | 19,8295 | TF0272 | 29 | 1 | 13:27 | 13:45 | 206,46 | 202 | V0029F01.hex |
| 2020-02-04 | 56,9517 | 19,7698 | TF0273 | 31 | 1 | 14:53 | 15:04 | 181,59 | 177,8 | V0031F01.hex |
| 2020-02-04 | 56,7675 | 19,7511 | TF0274_ | 32 | 1 | 16:28 | 16:37 | 153,34 | 149,4 | V0032F01.hex |
| 2020-02-04 | 56,6332 | 19,5828 | TF0260 | 33 | 1 | 17:57 | 18:12 | 144,23 | 140 | V0033F01.hex |
| 2020-02-04 | 56,4915 | 19,4795 | TF0261 | 34 | 1 | 19:20 | 19:35 | 142,51 | 138,7 | V0034F01.hex |
| 2020-02-04 | 56,3462 | 19,3774 | TF0263 | 35 | 1 | 20:47 | 21:01 | 138 | 129,8 | V0035F01.hex |
| 2020-02-04 | 56,2344 | 19,3004 | TF0262 | 36 | 1 | 22:05 | 22:22 | 131,4 | 127,9 | V0036F01.hex |
| 2020-02-04 | 56,0835 | 19,1661 | TF0250 | 37 | 1 | 23:43 | 23:46 | 129 | 11,6 | V0037K01.hex |
| 2020-02-04 | 56,0834 | 19,1660 | TF0250 | 37 | 2 | 23:48 | 23:55 | 128,7 | 121,1 | V0037F02.hex |
| 2020-02-05 | 55,9584 | 19,0468 | TF0265 | 38 | 1 | 0:58 | 1:00 | 115,7 | 0,2 | V0038K01.hex |
| 2020-02-05 | 55,9586 | 19,0469 | TF0265 | 38 | 2 | 1:01 | 1:13 | 115,5 | 108,3 | V0038F02.hex |
| 2020-02-05 | 55,8398 | 18,8655 | TF0253 | 39 | 1 | 2:24 | 2:31 | 105,8 | 98,9 | V0039F01.hex |
| 2020-02-05 | 55,7264 | 18,7652 | TF0258 | 40 | 1 | 3:30 | 3:36 | 91,65 | 88,5 | V0040F01.hex |
| 2020-02-05 | 55,6332 | 18,5999 | TF0255 | 41 | 1 | 4:41 | 4:47 | 94,99 | 92,8 | V0041F01.hex |
| 2020-02-05 | 55,5494 | 18,4000 | TF0259 | 42 | 1 | 6:01 | 6:12 | 90,66 | 87,6 | V0042F01.hex |
| 2020-02-05 | 55,4402 | 18,3195 | TF0257 | 43 | 1 | 7:06 | 7:17 | 90,4 | 85 | V0043F01.hex |
| 2020-02-05 | 55,3260 | 18,2357 | TF0256 | 44 | 1 | 8:23 | 8:38 | 77,68 | 75,1 | V0044F01.hex |
| 2020-02-05 | 55,3068 | 17,9315 | TF0268 | 45 | 1 | 9:50 | 10:03 | 75,95 | 73,5 | V0045F01.hex |
| 2020-02-05 | 55,2859 | 17,5933 | TF0267 | 46 | 1 | 11:27 | 11:33 | 84 | 81,8 | V0046F01.hex |
| 2020-02-05 | 55,2519 | 17,3601 | TF0266 | 47 | 1 | 12:44 | 12:50 | 88,79 | 87 | V0047F01.hex |
| 2020-02-05 | 55,2161 | 17,0680 | TF0222 | 48 | 1 | 14:04 | 14:15 | 90,91 | 59,3 | V0048F01.hex |
| 2020-02-05 | 55,2160 | 17,0668 | TF0222 | 48 | 1 | 14:16 | 14:23 | 91,78 | 89,2 | V0048F01.hex |
| 2020-02-05 | 55,2285 | 16,9145 | TF0229 | 49 | 1 | 15:15 | 15:21 | 85,79 | 83,7 | V0049F01.hex |
| 2020-02-05 | 55,2373 | 16,7750 | TF0228 | 50 | 1 | 16:09 | 16:18 | 77,91 | 75,4 | V0050F01.hex |
| 2020-02-06 | 55,3023 | 15,7999 | TF0212 | 51 | 2 | 3:02 | 3:04 | 95,8 | 0,4 | V0051K02.hex |
| 2020-02-06 | 55,3024 | 15,7993 | TF0212 | 51 | 3 | 3:10 | 3:16 | 94,93 | 11,9 | V0051K03.hex |
| 2020-02-06 | 55,3022 | 15,7990 | TF0212 | 51 | 1 | 3:18 | 3:24 | 95,22 | 93 | V0051F01.hex |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2020-02-06 | 55,3300 | 15,6154 | TF0211 | 52 | 1 | 5:04 | 5:21 | 95,35 | 93,4 | V0052F01.hex |
| 2020-02-06 | 55,3470 | 15,4661 | TF0209 | 53 | 1 | 6:21 | 6:30 | 93,72 | 91,9 | V0053F01.hex |
| 2020-02-06 | 55,3840 | 15,3267 | TF0200 | 54 | 1 | 7:54 | 8:03 | 92,85 | 89,7 | V0054F01.hex |
| 2020-02-06 | 55,4522 | 15,2292 | TF0208 | 55 | 1 | 8:49 | 9:12 | 94,6 | 92,7 | V0055F01.hex |
| 2020-02-06 | 55,4960 | 15,0946 | TF0207 | 56 | 1 | 9:44 | 9:54 | 87,04 | 84,2 | V0056F01.hex |
| 2020-02-06 | 55,5345 | 14,9124 | TF0206 | 57 | 1 | 10:54 | 10:59 | 77,02 | 74,7 | V0057F01.hex |
| 2020-02-06 | 55,4663 | 14,7155 | TF0140 | 58 | 1 | 12:04 | 12:10 | 70,24 | 68 | V0058F01.hex |
| 2020-02-06 | 55,4043 | 14,5371 | TF0142 | 59 | 1 | 13:09 | 13:15 | 60,95 | 59,1 | V0059F01.hex |
| 2020-02-06 | 55,2587 | 14,4896 | TF0144 | 60 | 1 | 14:45 | 14:49 | 44,37 | 43,2 | V0060F01.hex |
| 2020-02-06 | 55,1668 | 14,2503 | TF0145 | 61 | 1 | 16:12 | 16:18 | 47,22 | 45,7 | V0061F01.hex |
| 2020-02-06 | 55,0633 | 13,9890 | TF0103 | 62 | 1 | 17:38 | 17:44 | 47,4 | 45,9 | V0062F01.hex |
| 2020-02-06 | 54,9998 | 14,0837 | TF0109 | 63 | 1 | 18:30 | 18:36 | 48,55 | 47,1 | V0063F01.hex |
| 2020-02-06 | 54,6332 | 14,2857 | TF0152 | 64 | 1 | 21:44 | 21:50 | 31,9 | 30,7 | V0064F01.hex |
| 2020-02-07 | 54,0795 | 14,1510 | OBBoje | 65 | 2 | 1:15 | 1:19 | 16,5 | 9,7 | V0065K02.hex |
| 2020-02-07 | 54,0796 | 14,1511 | OBBoje | 65 | 1 | 1:21 | 1:24 | 16,3 | 14,9 | V0065F01.hex |
| 2020-02-07 | 54,0794 | 14,1510 | OBBoje | 65 | 3 | 1:25 | 1:27 | 15,74 | 0,4 | V0065K03.hex |
| 2020-02-07 | 54,8037 | 13,9594 | TF0112 | 66 | 1 | 5:51 | 5:58 | 40,78 | 39,9 | V0066F01.hex |
| 2020-02-07 | 55,0693 | 13,8195 | TF0104 | 67 | 1 | 8:16 | 8:22 | 46,65 | 45,4 | V0067F01.hex |
| 2020-02-07 | 55,0247 | 13,6046 | TF0105 | 68 | 1 | 9:17 | 9:23 | 46,58 | 45,5 | V0068F01.hex |
| 2020-02-07 | 54,8828 | 13,8554 | ABBoje | 69 | 1 | 15:08 | 15:12 | 46,13 | 44,8 | V0069F01.hex |
| 2020-02-07 | 55,4070 | 14,5368 | TF0142 | 70 | 2 | 19:23 | 19:25 | 60,1 | 11,6 | V0070K02.hex |
| 2020-02-07 | 55,4076 | 14,5353 | TF0142 | 70 | 1 | 19:27 | 19:32 | 59,9 | 58,2 | V0070F01.hex |
| 2020-02-07 | 55,4088 | 14,5339 | TF0142 | 70 | 3 | 19:34 | 19:36 | 59,77 | 0,4 | V0070K03.hex |
| 2020-02-08 | 54,9255 | 13,5002 | TF0113 | 72 | 1 | 4:44 | 4:50 | 47,44 | 46,1 | V0072F01.hex |
| 2020-02-08 | 54,8589 | 13,2779 | TF0114 | 74 | 1 | 7:52 | 7:59 | 45,29 | 43,8 | V0074F01.hex |
| 2020-02-08 | 54,7957 | 13,0587 | TF0115 | 76 | 1 | 9:59 | 10:04 | 30,53 | 29,3 | V0076F01.hex |
| 2020-02-08 | 54,6955 | 12,6977 | TF0001 | 77 | 1 | 11:39 | 11:41 | 21,75 | 20,5 | V0077F01.hex |
| 2020-02-08 | 54,6501 | 12,4500 | TF0002 | 78 | 1 | 12:44 | 12:47 | 18,19 | 17,6 | V0078F01.hex |
| 2020-02-08 | 54,6044 | 12,3315 | TF0033 | 79 | 1 | 13:30 | 13:33 | 20,71 | 19,7 | V0079F01.hex |
| 2020-02-08 | 54,5511 | 12,2738 | TF0083 | 80 | 1 | 14:12 | 14:18 | 26,11 | 25,2 | V0080F01.hex |
| 2020-02-08 | 54,4699 | 12,2408 | TF0046 | 81 | 1 | 15:08 | 15:17 | 29,01 | 27,9 | V0081F01.hex |
| 2020-02-08 | 54,4070 | 12,0592 | TF0041 | 82 | 1 | 17:13 | 17:16 | 19,5 | 18,7 | V0082F01.hex |
| 2020-02-08 | 54,3920 | 11,8221 | TF0017 | 83 | 1 | 18:21 | 18:25 | 22,78 | 21,8 | V0083F01.hex |
| 2020-02-08 | 54,3162 | 11,5510 | TF0012 | 84 | 1 | 19:38 | 19:42 | 24,99 | 24,1 | V0084F01.hex |
| 2020-02-08 | 54,4761 | 11,4862 | TF0013 | 85 | 1 | 21:47 | 21:54 | 26,79 | 26 | V0085F01.hex |
| 2020-02-08 | 54,5514 | 11,3235 | TF0010 | 86 | 1 | 22:41 | 22:45 | 28,39 | 27,6 | V0086F01.hex |
| 2020-02-09 | 54,5958 | 11,0104 | TF0014 | 87 | 2 | 0:22 | 0:24 | 27,91 | 11,6 | V0087K02.hex |
| 2020-02-09 | 54,5955 | 11,0107 | TF0014 | 87 | 1 | 0:26 | 0:28 | 27,72 | 26,5 | V0087F01.hex |
| 2020-02-09 | 54,5954 | 11,0109 | TF0014 | 87 | 3 | 0:29 | 0:31 | 27,79 | 0,2 | V0087K03.hex |
| 2020-02-09 | 54,6666 | 10,7836 | TF0361 | 88 | 1 | 1:37 | 1:39 | 23,44 | 22,6 | V0088F01.hex |
| 2020-02-09 | 54,6006 | 10,4507 | TF0360 | 89 | 1 | 3:03 | 3:07 | 18,29 | 17,5 | V0089F01.hex |

## 7.3 Water Sampling – Parameters and Number of Samples

| No. | Station | O2 | H2S | PO4 | NO3 | NO2 | SIO4 | NH4 | P-Total | N-Total | POM + DOM | CH4 | CO2 | CKW / PAK | Glyphosat | Hormone | DNA-Filter | Fish-Filter | P+G, Betain | Phyto-Net | Chlorophyll | Phytoplankton | Zooplankton |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TFO5 | 1 | | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | | | | 1 | 1 | | | | | | | |
| 2 | TF0041 | 1 | | 3 | 3 | 3 | 3 | - | | - | - | | | 1 | | | | | | | | | |
| 3 | TF0001 | 3 | | 2 | 2 | 2 | 2 | - | | - | - | | | | | | | | | | | | |
| 4 | TF0113 | 7 | | 7 | 7 | 7 | 7 | 7 | 4 | 4 | 4 | 7 | 7 | 1 | | | | | | 2 | 6 | 2 | 1 |
| 5 | ABBOJE | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 6 | TF0213 | 10 | | 10 | 10 | 10 | 10 | 10 | 6 | 6 | 6 | 10 | 10 | | 1 | | | | | 1 | 6 | 11 | 7 |
| 7 | TF0245 | 4 | 4 | 8 | 8 | 8 | 8 | 8 | | - | - | | | 1 | | | | | | | | | |
| 8 | TF0240 | 14 | 5 | 10 | 10 | 10 | 10 | 10 | | - | - | | | | | | | | | | | | |
| 9 | TF0284 | 13 | 19 | 29 | 29 | 29 | 29 | 29 | 10 | 10 | 10 | | | | | | 52 | 26 | 52 | | | | |
| 10 | TF0283 | | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 11 | TF0288 | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 12 | TF0282 | 1 | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 13 | TF0289 | 1 | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 14 | TF0279 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 15 | TF0285 | 9 | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 16 | TF0278 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 17 | TF0277 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 18 | TF0286 | 8 | 8 | 16 | 16 | 16 | 16 | 16 | 6 | 6 | 6 | 16 | 16 | 1 | | | | | | | | | |
| 19 | TF0290 | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 20 | TF0287 | | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 21 | TF0270 | 1 | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 22 | TF0276 | 1 | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 23 | Gotland_NE | 1 | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 24 | TF0271 | 32 | 19 | 34 | 34 | 34 | 34 | 34 | 12 | 12 | 12 | 24 | 20 | 3 | | | 52 | 26 | 52 | 2 | 5 | 2 | |
| 25 | TF0271 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 26 | TF0271 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 27 | TF0271 | 9 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 28 | TF0271 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 29 | TF0275 | | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 30 | TF0272 | 1 | 3 | | - | - | - | - | | - | - | | | 1 | | | | | | | | | |
| 31 | TF0273 | 1 | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 32 | TF0274_ | 1 | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 33 | TF0260 | 7 | 2 | 9 | 9 | 9 | 9 | 9 | | - | - | | | | | | | | | | | | |
| 34 | TF0261 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 35 | TF0263 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 36 | TF0262 | 1 | 3 | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 37 | TF0250 | 9 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 38 | TF0265 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 39 | TF0253 | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 40 | TF0258 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 41 | TF0255 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 42 | TF0259 | 6 | 2 | 7 | 7 | 7 | 7 | 7 | | - | - | | | 1 | 1 | | | | | 1 | 6 | 3 | |
| 43 | TF0257 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 44 | TF0256 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 45 | TF0268 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 46 | TF0267 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | TF0266 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 48 | TF0222 | 2 | | 7 | 7 | 7 | 7 | 7 | | - | - | | | | | | | | | | | | |
| 49 | TF0229 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 50 | TF0228 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 51 | TF0212 | 9 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 52 | TF0211 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 53 | TF0209 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 54 | TF0200 | 2 | | 7 | 7 | 7 | 7 | - | | - | - | | | | | | | | | | | | |
| 55 | TF0208 | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 56 | TF0207 | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 57 | TF0206 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 58 | TF0140 | 2 | | 5 | 5 | 5 | 5 | - | | - | - | | | | | | | | | | | | |
| 59 | TF0142 | 2 | | 5 | 5 | 5 | 5 | - | | - | - | | | | | | | | | | | | |
| 60 | TF0144 | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 61 | TF0145 | 2 | | 5 | 5 | 5 | 5 | - | | - | - | | | | 1 | 2 | | | | | | | |
| 62 | TF0103 | 2 | | 5 | 5 | 5 | 5 | - | | - | - | | | | | | | | | | | | |
| 63 | TF0109 | 2 | | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | | | | | | | | | 1 | 5 | 2 | 2 |
| 64 | TF0152 | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 65 | OBBoje | 11 | | 2 | 2 | 2 | 2 | - | | - | - | | | | | 2 | | | | | | | |
| 66 | TF0112 | 2 | | 4 | 4 | 4 | 4 | - | | - | - | | | | | | | | | | | | |
| 67 | TF0104 | 2 | | 5 | 5 | 5 | 5 | - | | - | - | | | | | | | | | | | | |
| 68 | TF0105 | 2 | | 5 | 5 | 5 | 5 | - | | - | - | | | | | | | | | | | | |
| 69 | ABBoje | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 70 | TF0142 | 9 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 71 | TF0142 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 72 | TF0113 | 1 | | | - | - | - | - | | - | - | | | | | | | | | 1 | 6 | 2 | 2 |
| 73 | TF0113 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 74 | TF0114 | 2 | | 5 | 5 | 5 | 5 | - | | - | - | | | | | | | | | | | | |
| 75 | TF0114 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 76 | TF0115 | 4 | | 4 | 4 | 4 | 4 | - | | - | - | | | | | | | | | | | | |
| 77 | TF0001 | 2 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 78 | TF0002 | 3 | | 3 | 3 | 3 | 3 | - | | - | - | | | | | | | | | | | | |
| 79 | TF0033 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 80 | TF0083 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 81 | TF0046 | 1 | | 4 | 4 | 4 | 4 | - | | - | - | | | | 1 | 1 | | | | 2 | 5 | 2 | 2 |
| 82 | TF0041 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 83 | TF0017 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 84 | TF0012 | 2 | | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | | | | 1 | 1 | | | | 2 | 6 | 2 | 1 |
| 85 | TF0013 | 1 | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 86 | TF0010 | 1 | | 4 | 4 | 4 | 4 | - | | - | - | | | | | | | | | | | | |
| 87 | TF0014 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 88 | TF0361 | | | | - | - | - | - | | - | - | | | | | | | | | | | | |
| 89 | TF0360 | | | | - | - | - | - | | - | - | | | | | | | | | 2 | 6 | 3 | 1 |
| | **Samples** | **245** | **98** | **217** | **217** | **217** | **217** | **149** | **47** | **47** | **47** | **57** | **53** | **9** | **6** | **7** | **104** | **52** | **104** | **14** | **51** | **29** | **16** |
| | **Stations sampled** | **74** | **20** | **29** | **29** | **29** | **29** | **13** | **8** | **8** | **8** | **4** | **4** | **7** | **6** | **5** | **2** | **2** | **2** | **9** | **9** | **9** | **7** |

## 7.4 Profile List – Organic Pollutants

| Transect | Region | Date | Begin [UTC] | Latitude [decimal] | Longitude [decimal] | End [UTC] | Latitude [decimal] | Longitude [decimal] | Length [NM] |
|---|---|---|---|---|---|---|---|---|---|
| T1 | Kiel Bight - Fehmarn Belt | 08.02.20 | 23:15 | 54,5522 | 11,3216 | 1:30 | 54,6008 | 10,4516 | 33 |
| T2 | Mecklenburg Bight - Darss Sill | 29.01.20 | 10:30 | 54,4069 | 12,0637 | 13:40 | 54,6946 | 12,7017 | 29 |
| T3 | Arkona Sea | 29.01.20 | 18:15 | 54,9251 | 13,4999 | 22:20 | 55,1635 | 14,2517 | 36 |
| T4 | Pommeranian Bight | 06.02.20 | 22:00 | 54,6333 | 14,2832 | 1:10 | 54,0795 | 14,1510 | 35 |
| T5 | Bornholm Sea | 05.02.20 | 21:45 | 55,2850 | 16,2440 | 2:25 | 55,2940 | 15,8488 | 15 |
| T6 | central Baltic Sea | 05.02.20 | 06:15 | 55,5494 | 18,4000 | 11:25 | 55,2859 | 17,5933 | 37 |
| T7 | eastern Gotland Sea, South | 04.02.20 | 13:45 | 57,0716 | 19,8295 | 17:55 | 56,6332 | 19,5828 | 29 |
| T8 | eastern Gotland Sea, North | 01.02.20 | 08:15 | 58,0006 | 19,9000 | 12:40 | 57,6168 | 20,1667 | 29 |
| T9 | western Gotland Sea | 30.01.20 | 19:45 | 57,1154 | 17,6672 | 0:50 | 58,0000 | 17,9994 | 57 |

## 7.5 Station List – Sediment Sampling

| Date | Latitude [decimal] °N | Longitude [decimal] °E | Station | No. | UTC | Water Depth [m] | Sediment sampling |
|---|---|---|---|---|---|---|---|
| 2020-02-03 | 57.3203 | 20.0509 | TF0271 | 24 | 08:00 | 237.5 | Multicorer, 12 samples |
| 2020-02-06 | 54.9998 | 14.0837 | TF0109 | 63 | 18:45 | 48.5 | Multicorer, 1 sample |
| 2020-02-07 | 54.0795 | 14.1510 | OBBoje | 65 | 01:30 | 16.3 | Multicorer, 1 sample |
| 2020-02-08 | 54.9255 | 13.5002 | TF0113 | 72 | 04:55 | 47.4 | Multicorer, 1 sample |
| 2020-02-08 | 54.3162 | 11.5510 | TF0012 | 84 | 19:45 | 24.9 | Multicorer, 1 sample |
| 2020-02-08 | 54.5514 | 11.3235 | TF0010 | 86 | 22:50 | 28.4 | Multicorer, 1 sample |

## 7.6 List – Scanfish Profiles

| Profile | Region | Begin [UTC] | Latitude [decimal] °N | Longitude [decimal] °E | End [UTC] | Latitude [decimal] | Longitude [decimal] | Length [NM] |
|---|---|---|---|---|---|---|---|---|
| SF1 | Eastern Gotland Basin, TF0271 to Gotland | 2020-02-01; 22:56 | 57.3229 | 20.0390 | 2020-02-02; 06:45 | 57.5521 | 18.9035 | 39 |
| SF2 | Eastern Gotland Basin, TF0271 to Latvia | 2020-02-03; 23:15 | 57.3176 | 20.0609 | 2020-02-04; 07:30 | 57.0448 | 21.2821 | 43 |
| SF3 | Bornholm Gat to Arkona Basin | 2020-02-07; 19:43 | 55.4096 | 14.5370 | 2020-02-08; 09:45 | 54.7976 | 13.0643 | 64 |

## 7.7 List – Mooring Work

| Date | Latitude [decimal] °N | Longitude [decimal] °E | Begin [UTC] | End [UTC] | Water Depth [m] | Action |
|---|---|---|---|---|---|---|
| 2020-02-03 | 57,3066 | 20,0812 | 10:00 | 11:30 | 241 | Mooring GODESS, recovery |
| 2020-02-03 | 57.0754 | 19.7520 | 13:00 | 13:45 | 189 | Mooring Gotland Southwest, deployment |
| 2020-02-07 | 54.8828 | 13.8554 | 11:30 | 16:00 | 46 | MARNET station Arkona Basin, maintenance |

# 8 Data and Sample Storage and Availability

Data is intensively validated and will be freely available in the IOW DB by the online search and data download tool ODIN2 (https://odin2.io-warnemuende.de/#/). Afterwards the data will be imported into national and international databases (MUDAB, HELCOM, ICES).

**Table 8.1** Data availability and responsible scientists

| Data set | Responsible Scientist | Availability | Date |
|---|---|---|---|
| CTD data | Naumann, Michael, Dr. | IOW DB, MUDAB, HELCOM, ICES | May 2020 |
| Mooring data, Scanfish profiles | Mohrholz, Volker, Dr. | personal contact | March 2020 |
| Nutrient measurements | Kuss, Joachim, Dr. | IOW DB, MUDAB, HELCOM, ICES | May 2020 |
| Organic pollutants measurements | Kanwischer, Marion, Dr. | personal contact | August 2020 |
| Phytoplankton measurements | Kremp, Anke, Dr. | personal contact | November 2020 |
| Zooplankton measurements | Dutz, Jörg, Dr. | personal contact | November 2020 |

# 9 Acknowledgements

We thank the crew of RV Elisabeth Mann Borgese as well as our engineers and technicians for their support and a successful cruise. This longterm data programme is funded and conducted by the Leibniz-Institute for Baltic Sea Research Warnemünde.

# 10 References

HELCOM, 2018. State of the Baltic Sea - Second HELCOM holistic assessment 2011-2016. Baltic Sea Environment Proceedings 155. https://www.helcom.fi/Lists/Publications/BSEP155.pdf

Naumann, M., Gräwe, U., Mohrholz, V., Kuss, J., Kanwischer, M., Feistel, F., Hand, I., Waniek, J., Schulz-Bull, D., 2020. Hydrographic-hydrochemical assessment of the Baltic Sea 2019. – Meereswissenschaftliche Berichte (Marine Science Reports) 114, 91 pages. https://www.io-warnemuende.de/tl_files/forschung/meereswissenschaftliche-berichte/msr-2020-0114.pdf

Seifert, T., Tauber, F. & Kayser, B., 2008. http://www.io-warnemuende.de/topografie-der-ostsee.html, (Date of access: 08/03/2015)

# 11 Abbreviations

- defined in the text

# 12 Appendices

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

## VERANKERUNGSPROTOKOLL

| | | | | | | |
|---|---|---|---|---|---|---|
| **Datum:** | 03.02.2020 | **Beginn:** | 13:25 | **Ende:** | 13:40 | **UTC** |
| **Gerät:** | **Gotland SW** | | | **Reise EMB** | | **230** |
| **Code Name:** | **GOSW-01 Feb 2020** | | | | | |
| **Lottiefe:** | | | | | | |
| **Wetter:** | Wind: | 330° | | 6 m/s | | |
| | Strömung: | 180° | | 0,3 kn | | |
| **Absetzposition:** Gerät | **Breite:** | 57° 04,527´N | | (WGS 84, DGPS) | | |
| | **Länge:** | 019° 45,120´E | | | | |
| | **KrK:** | 330° | | | | |
| **Grundleine:** (Ende) | **Breite:** | nil | | | | |
| | **Länge:** | nil | | | | |
| | **KrK:** | nil | | | | |
| | Richtung: | nil | | (vom Gerät) | | |
| | Länge: | nil | | | | |
| **Oberfläche:** | keine | | | | | |

**Bemerkungen:** Releaser

Kapitän

Exp.-Leiter

Verteiler: Reederei
EMB
IOW
Fahrtltr.

**Fig. 12.1** Positioning of mooring “Gotland – southwest” (GoSW) at the Gotland Deep.