

Report from the SMHI monitoring cruise onboard R/V Aranda



Survey period: 2019-05-09 – 2019-05-16
Principal: Swedish Meteorological and Hydrological Institute (SMHI),
Swedish Agency for Marine and Water Management (SwAM)
Cooperation partners: Finnish Environment Institute (SYKE)

SUMMARY

The cruise in May, which is part of the Swedish national marine monitoring program, covered the Skagerrak, the Kattegat, the Sound, the Baltic Proper and the Gulf of Finland.

The sea surface temperature and salinity was normal in all sea areas, except the surface salinity that was above normal in parts of the Skagerrak, in the Eastern Gotland Basin and in the Hanö Bight. The deep water in parts of the Baltic Proper showed temperature and salinity above or high above normal values.

The spring bloom had consumed the majority of the nutrients in the surface water but elevated amounts of silicate were still present in the Skagerrak, the Kattegat and in large parts of the Baltic Proper. Some plankton activity occurred in both the Skagerrak and the Kattegat as distinct fluorescence maxima, but in the Baltic Proper the plankton activity was more evenly distributed in the surface layer down to 20 meters depth.

In the Western Gotland Basin unusual high concentrations of hydrogen sulphide, which is formed during oxygen free conditions, was found in the deep water. Oxygen free conditions, with hydrogen sulphide present, were also found in the Eastern Gotland Basin from 130 meters depth and in the Western and Northern Gotland Basins and in the Gulf of Finland from depth exceeding 80-90 meters. In the whole Baltic Proper and the Gulf of Finland oxygen deficiency (oxygen < 2ml/l) was found from 65 - 75 meters depth

The analyzed plankton samples are presented in the separate algae report [AlgAware](#).

Next regular cruise is scheduled to 10th – 17th of June.

RESULTS

The expedition was performed aboard the Finnish research vessel Aranda and started in Helsinki on 9th of May and ended in Helsinki on the 16th of May. The winds were initially strong from the north-east but then subsided to weak or moderate winds, mainly from the north. The air temperature varied between 7–10 °C and it was mostly clear weather.

During the expedition additional sampling was performed for analysis of DNA-barcoding for the project “*DNA-metabarcoding of marine phytoplankton*” supported by the Swedish Agency for Marine and Water Management (SwAM). The project covers all national marine monitoring stations in the open sea where plankton sampling is done.

At some stations, water samples and plankton samples were taken to measure selenium at EAWAG in Switzerland (Swiss Federal Institute of Aquatic Science and Technology), we also took some extra samples of plankton for Åbo Akademi who measures DNA.

In total 30 stations were visited and an overview of the stations and which parameters were measured are summarized in the Appendix. In the Northern Baltic Proper and in the Gulf of Finland four stations were visited on behalf of the Finnish Environment Institute (SYKE). This sampling effort is a part of the cooperation between SMHI and SYKE. At the Huvudskär ocean buoy a reference CTD cast was taken. The station, Släggö, could not be visited by Aranda due to that the Swedish defence does not grant Aranda permission because it is a Finnish Government vessel. The sampling at Släggö was instead performed by SMHI separately with a leased small vessel from Kristineberg's Marina Research Station. Data from this sampling, which was performed the same week as Aranda's expedition, is included in this report.

Analysis of plankton samples is presented in the separate plankton report AlgAware which is published on SMHI's website shortly after the expedition.

<https://www.smhi.se/publikationer/publikationer/algrapporter>

This report is based on data that have passed a first quality control. When data are published at the national oceanographic data centre some values might have changed after further quality controls have been performed. Data from this cruise will be published as soon as possible on the data centre's webpage, normally within a week after the cruise.

Data can be downloaded here: <http://www.smhi.se/klimatdata/oceanografi/havsmiljodata> (only available in Swedish)

Skagerrak

The temperature and salinity in the surface water were normal in the Skagerrak, the temperature was just above 9 °C and the salinity varied from 27 to 29 psu in the central Skagerrak. In the southern part, at P2, and closest to the coast, at Släggö, the salinity was higher than normal, 31 psu and 28 psu respectively. A weakly developed halocline was observed between 5 and 15 meters. The surface layer temperature (0–10 m) had begun to increase somewhat but a clear and sharp thermocline was not noted.

The spring bloom had consumed most of the nutrients in the surface layer and there were low concentrations of dissolved inorganic nitrogen (DIN) and phosphate which is normal for this time of

year. However, the content of silicate in the outermost Skagerrak was above normal, 2.1 $\mu\text{mol/l}$, and at Släggö the silicate content was lower than normal, 0.6 $\mu\text{mol/l}$. The concentration of DIN and phosphate was around the detection limit (0.3 $\mu\text{mol/l}$ and 0.5 $\mu\text{mol/l}$, respectively). The silicate content varied between 0.9 to 1.2 $\mu\text{mol/l}$. Below the halocline, generally somewhat lower levels than normal of nutrients were observed, except for the station closest to the coast, at Å13, where the levels were normal or just above normal. The same conditions were noted in April.

Oxygen concentrations were normal except at Å17 (300 meters) where, as in April, the oxygen concentration was lower than normal.

In the open Skagerrak, the fluorescence in the surface layer was low but slightly deeper, just below the halocline, between 15 and 25 meters, fluorescence peaks were noted. At Släggö high plankton activity was noted in the surface and a fluorescence peak was seen at 10 meters depth. The Secchi disk depth was 9 meters in the central parts of the Skagerrak and 7 meters closer to the coast.

Kattegat and the Sound

In the Kattegat, the surface water temperature varied around 9-10 °C, which is normal for the season. The salinity in the surface layer varied between 18 and 22 psu, and in the Sound 14 psu was recorded. The halocline in the Kattegat was found between 5–20 meters depth and below the salinity was about 33 psu and the temperature varied around 5-7 °C, which is warmer than normal. In the Sound there was a strong halocline at 10-15 meters depth.

The nutrients, DIN and phosphate, in the surface water were for the season normal with low concentrations. Phosphate varied between 0.06-0.15 $\mu\text{mol/l}$ and DIN 0.3 $\mu\text{mol/l}$. The concentration of silicate was higher than normal in the Kattegat and varied between 2.7–5.0 $\mu\text{mol/l}$. Below the surface layer, in both the Kattegat and the Sound, the concentrations of all nutrients were normal or just below normal for the season.

The oxygen conditions in the bottom water were good and as the lowest recorded concentration was 5.0 ml/l at W Landskrona. At all stations in the Kattegat, fluorescence peaks were noted at about 10-20 meters deep. At Fladen, the fluorescence peak was found between 15-20 meters depth. The Secchi disk depth varied between 6-7 meters.

Baltic Proper and the Gulf of Finland

The temperature increase of the surface layer continued in May and the temperature varied with normal values between ~9°C in the Arkona Basin to 4.5°C in the central Gulf of Finland. The thermocline was found at about 20 meters depth and below, down to the halocline, colder "winter water" was found. The temperature in the deep water, below the halocline, was higher or much higher than normal at all visited stations.

The salinity of the surface layer varied between 5.4–8.1 psu, highest in the Arkona Basin and lowest in the central Gulf of Finland. In the Arkona Basin and in the Eastern Gotland Basin, the salinity was higher than normal, while it was lower than normal in the Hanö Bight and in the Northern Gotland Basin. In the Arkona Basin, the halocline began around 35 meters and in the Bornholm Basin and in the Hanö Bight from 50 to 55 meters. In the other areas, the halocline was found at a depth of about 60-70 meters. In the deep water, the salinity, just like the temperature, was above or much above what is normally measured. This is probably due to the recent inflows in 2018 to the

Baltic Sea that have been warm and with high salinity, possibly as a result of last year's warm summer.

DIN was consumed down to 30-50 meters in most of the Baltic Proper, which is normal for the season. The concentration of DIN in the surface water was below the detection limit of 0.3 $\mu\text{mol/l}$. The concentration of phosphate was generally normal for the season except in the central parts of the Eastern Gotland Basin where the concentrations were slightly higher than normal. Phosphate levels varied between 0.2-0.4 $\mu\text{mol/l}$ with the lowest levels in the Arkona Basin and the Eastern Gotland Basin. The concentration of silicate in the surface water varied between 8.0 $\mu\text{mol/l}$ in the Arkona Basin to 16.3 $\mu\text{mol/l}$ in the Northern Gotland Basin. In the Eastern, Northern, Western Gotland Basins, the Hanö Bight and at the coast, the levels of silicate were above or much above normal. Below the halocline, in the deep water, higher nutrient levels were noted than normal in the Western Gotland Basin, the Bornholm Basin and in the Hanö Bight. In the Eastern and Northern Gotland Basins, there was a layer with lower DIN concentrations around 80–100 meters where there were also low concentrations of oxygen. Higher fluorescence was also measured at these depths. This is probably due to bacterial activity in this layer.

In the Bornholm Basin and the Hanö Bight, oxygen-free conditions were noted, or oxygen levels very close to zero from 70-80 meters depth, and acute oxygen deficiency (<2ml/l) already from about 60 meters depth. In the other basins acute oxygen deficiency was found from depths exceeding ~ 70 meters depth. Hydrogen sulphide was measured in the Eastern, Western, Northern Gotland basins and in the Gulf of Finland. In the Eastern Gotland Basin, it was completely oxygen-free (when hydrogen sulphide was formed) from 130 meters at the Gotland depth (BY15) and from 90 meters in the Fårö deep (BY20) and in the Northern Gotland Basin. In the Western and Northern Gotland Basins, it was completely oxygen-free from 80 - 90 meters and the levels of hydrogen sulphide in the deep water were much higher than normal. In the central and outer parts of the Gulf of Finland, acute oxygen deficiency was noted from a depth of 60 meters and completely oxygen-free conditions from about 70 meters deep.

From the surface down to about 20 meters deep, high fluorescence was noted throughout the investigated area, indicating a continued spring bloom. The Secchi disk depth varied between 8 and 11 meters, deepest in the Eastern Gotland Basin.

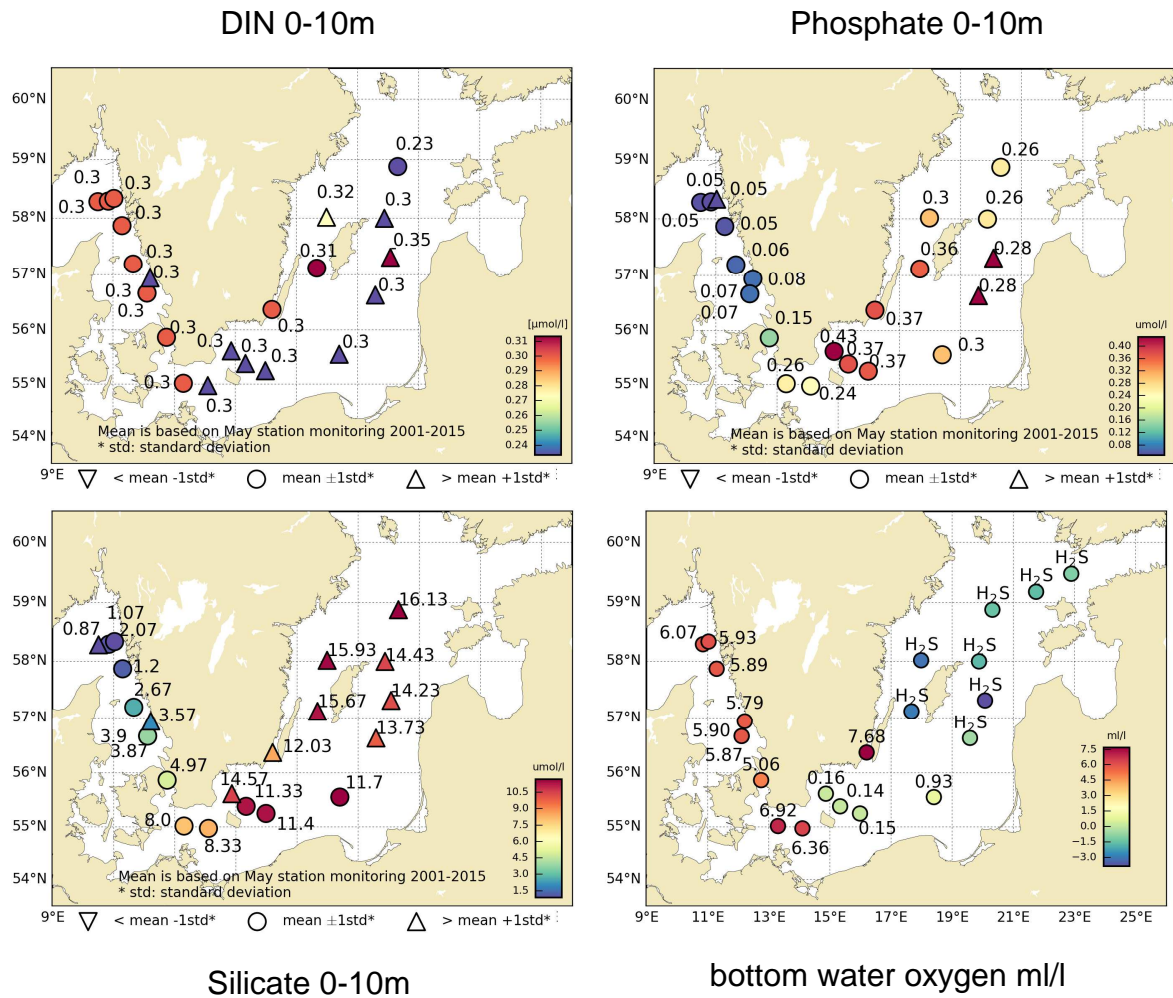


Figure 1. The concentration of DIN, phosphate and silicate in the surface layer 0–10 meter. The oxygen condition in the bottom water, H₂S means hydrogen sulphide.

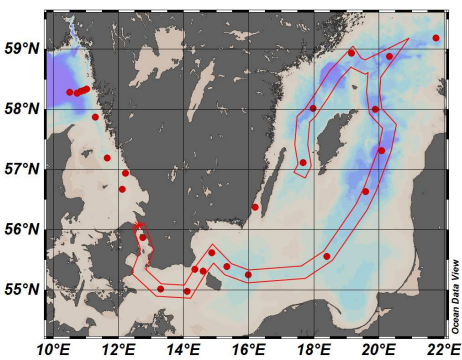
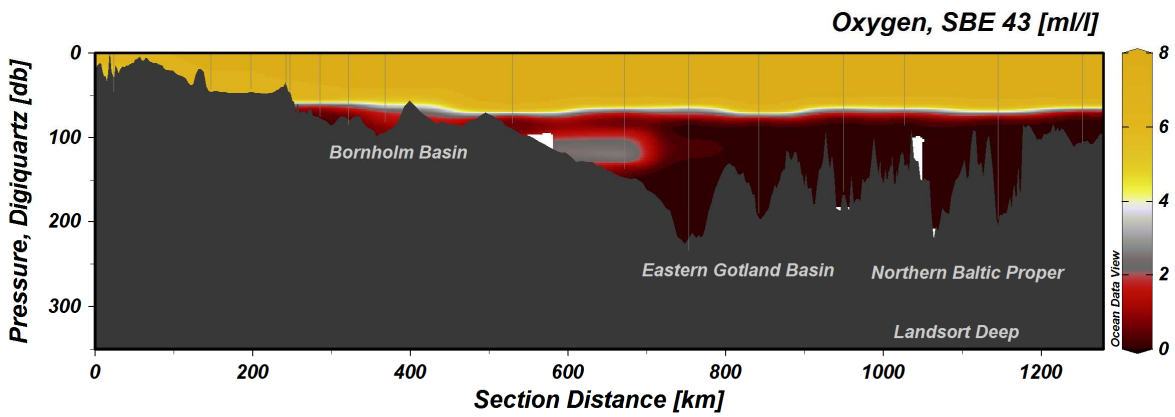
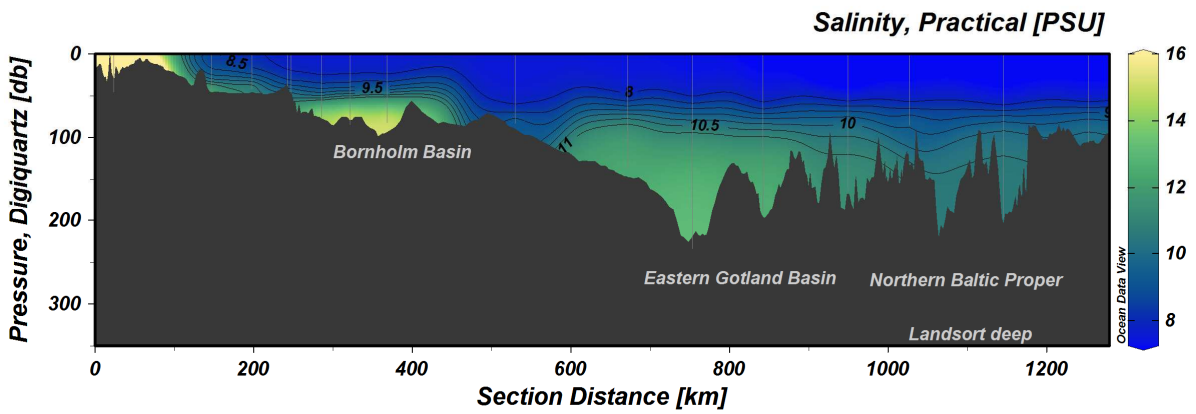
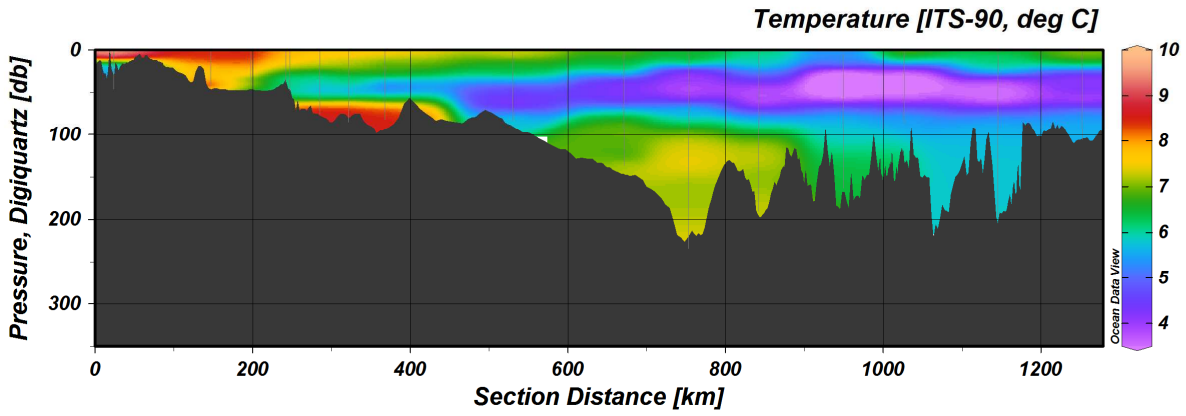


Figure 2. Transect showing temperature, salinity and dissolved oxygen from the Sound, through the Baltic Proper, to the Western Gotland Basin.

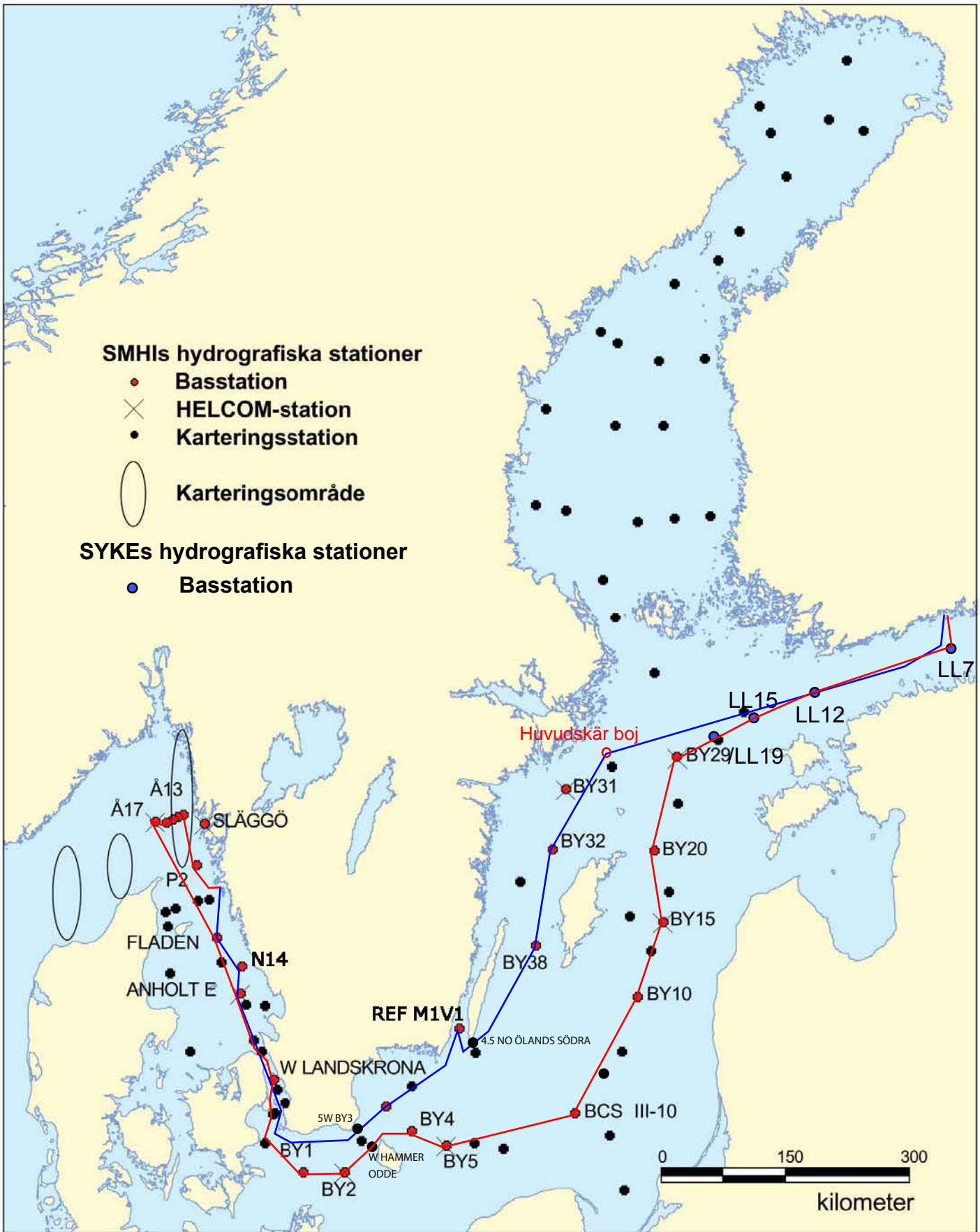
Participants

Name	Leg	Responsibility	Institute
Sari Sipilä		Chief scientist	SMHI
Johan Håkansson			SMHI
Ola Kalén		Quality manager	SMHI
Madeleine Nilsson	Helsinki - Gothenburg		SMHI
Lars Anderson	Gothenburg - Helsinki		SMHI
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Anna-Kerstin Thell	Gothenburg - Helsinki		SMHI

Appendix

- Track chart
- Table of stations, sampled parameters and number of sampling depths
- Vertical profiles for regular monitoring stations
- Monthly average surface water plots for regular monitoring stations

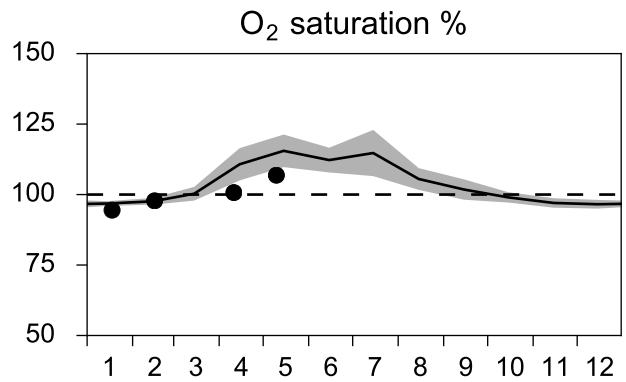
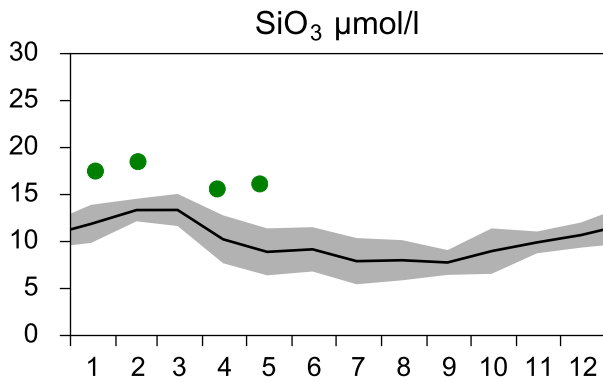
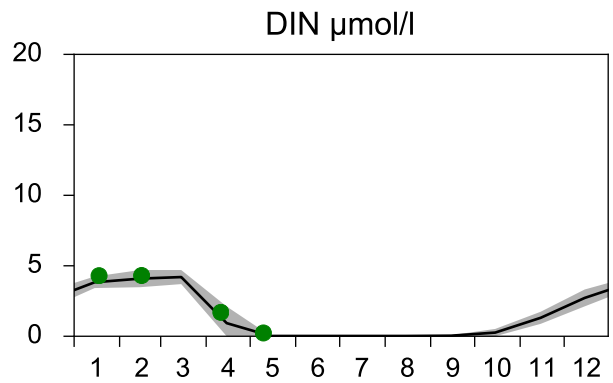
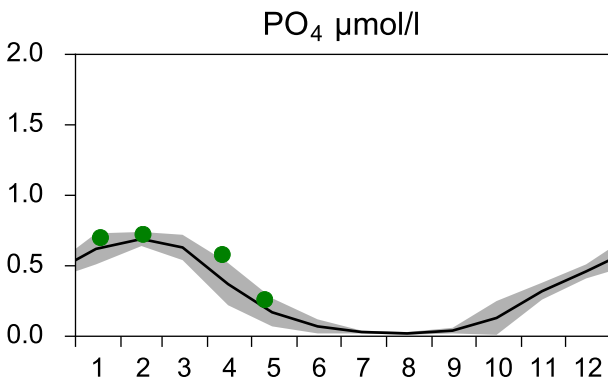
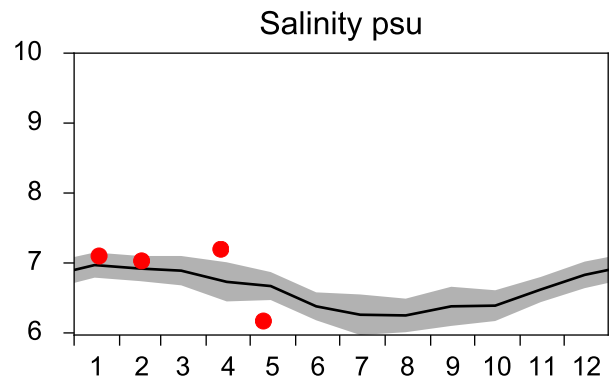
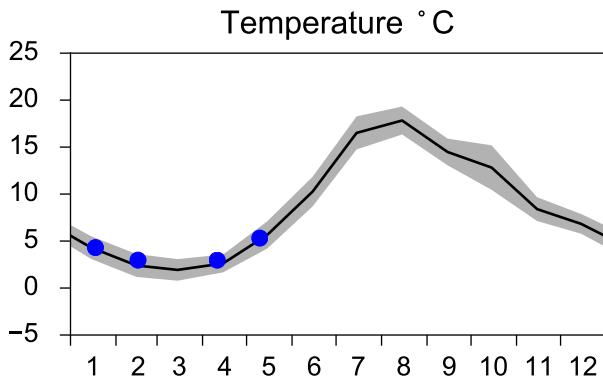
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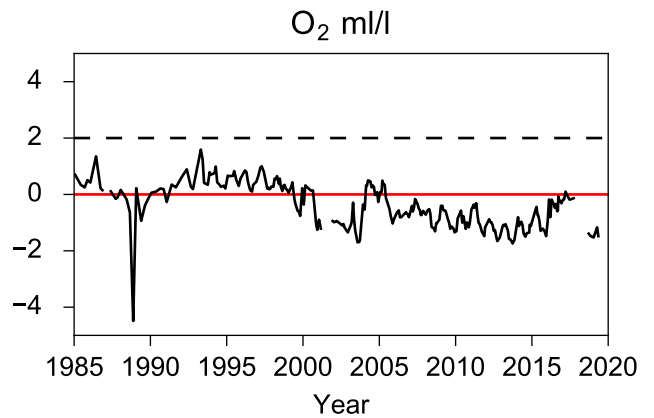
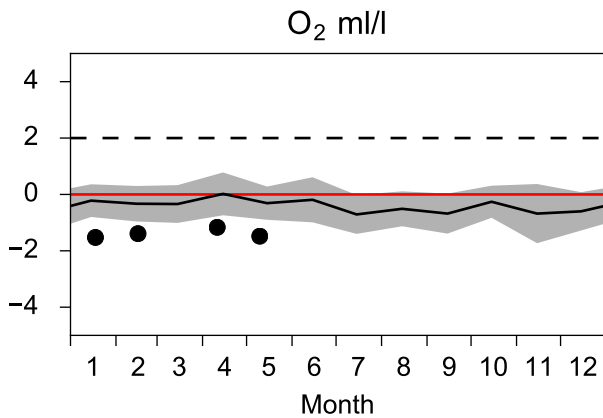
STATION BY29 / LL19 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

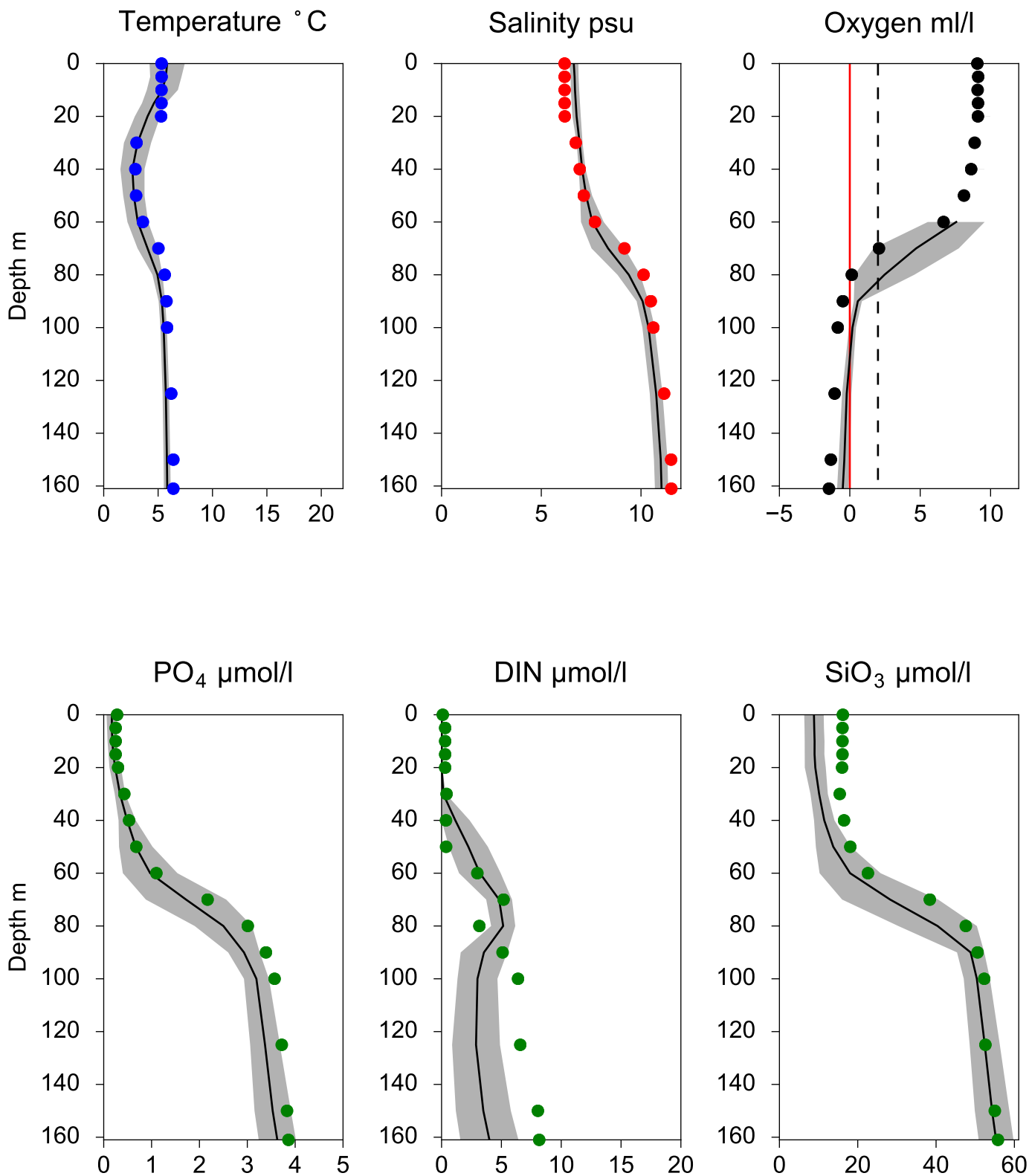


OXYGEN IN BOTTOM WATER (depth >= 150 m)



Vertical profiles BY29 / LL19 May

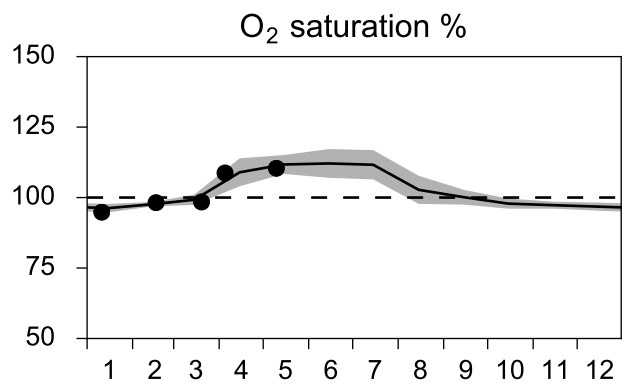
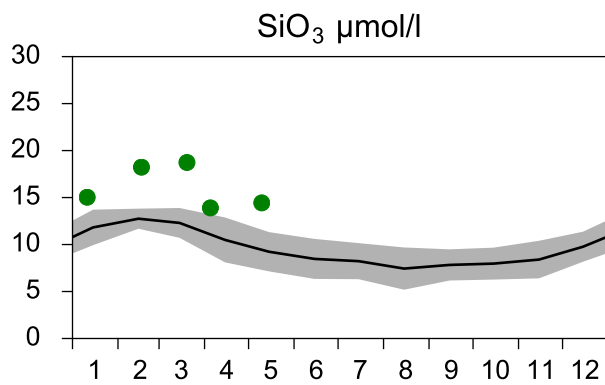
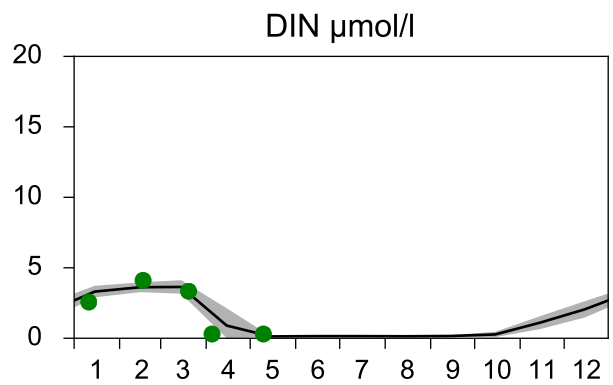
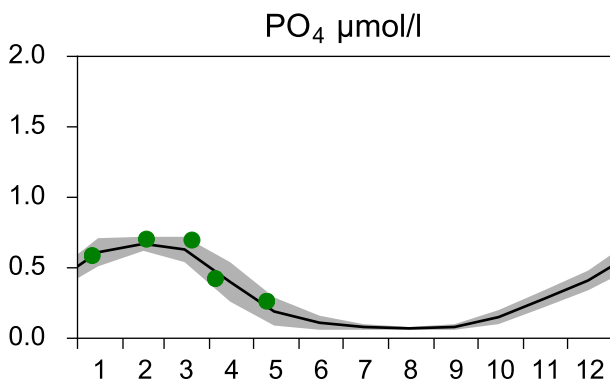
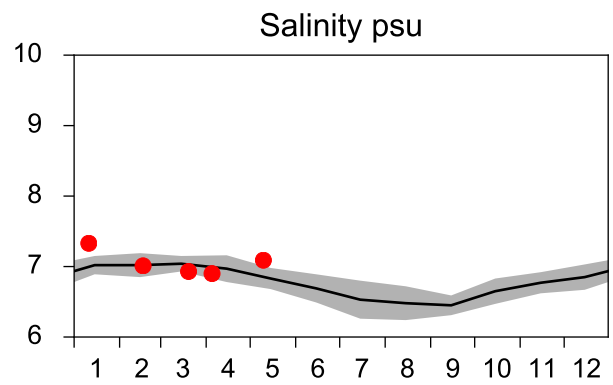
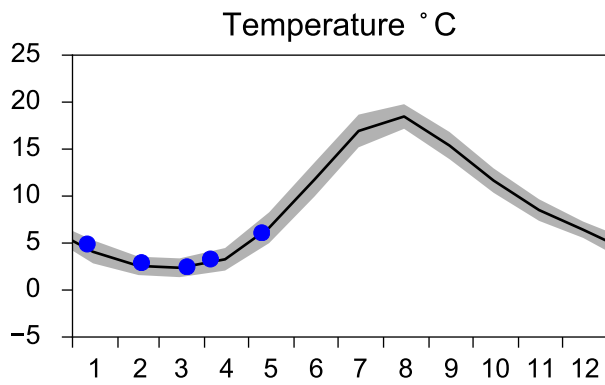
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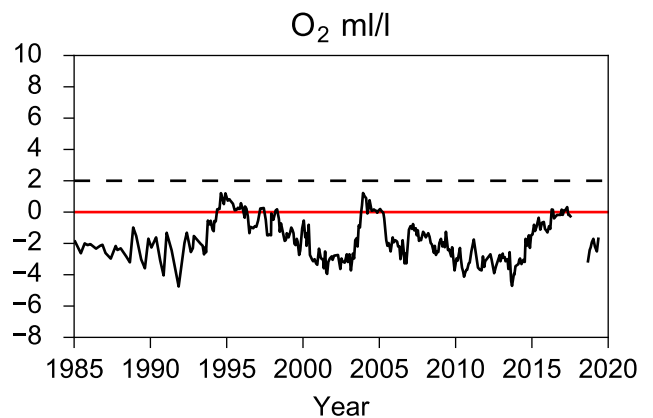
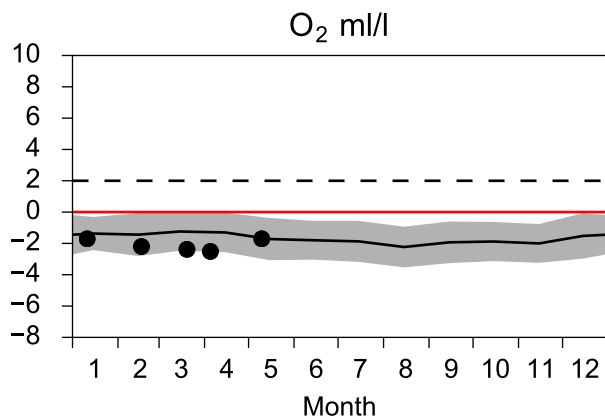
STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019

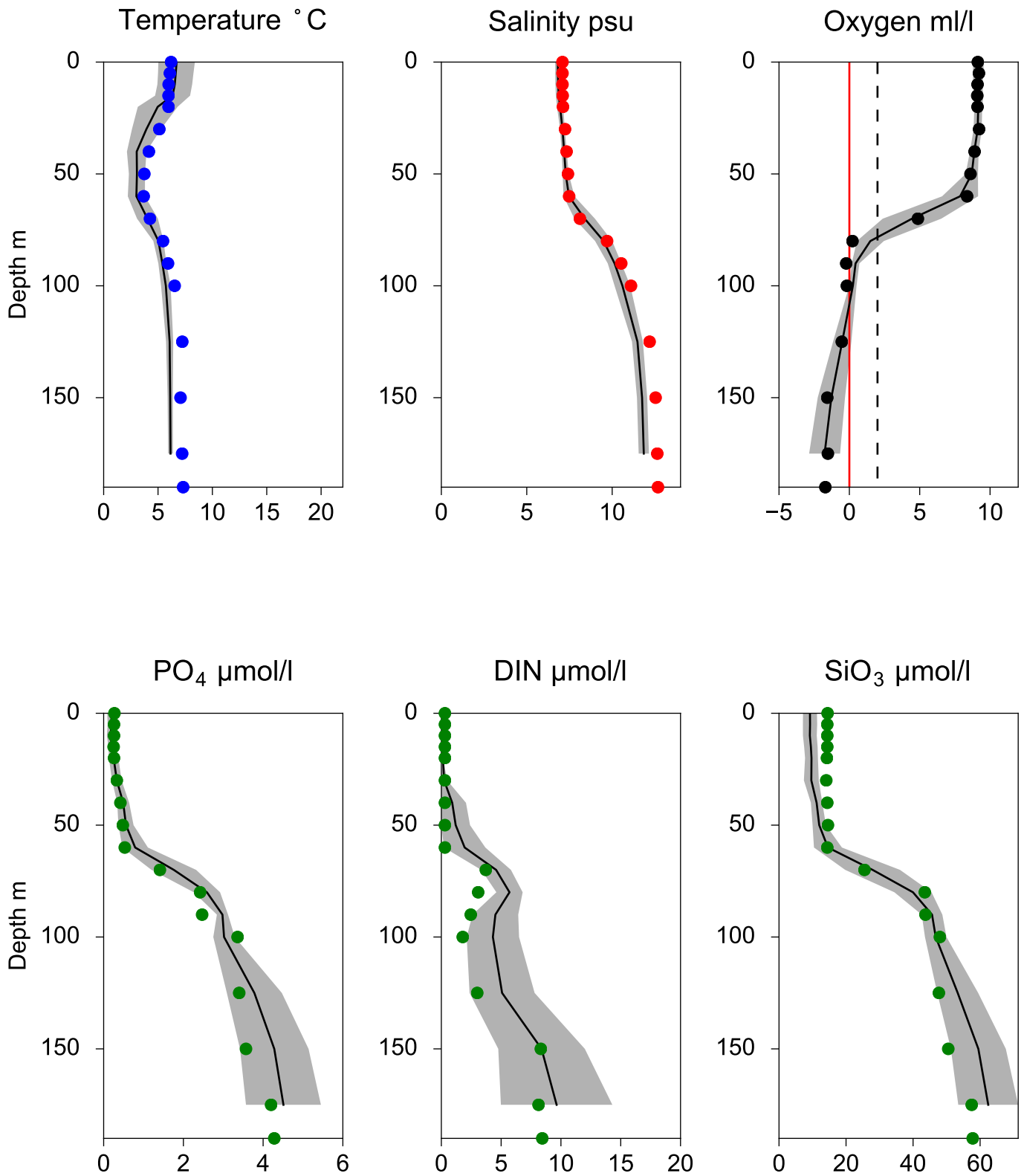


OXYGEN IN BOTTOM WATER (depth >= 175 m)



Vertical profiles BY20 FÅRÖDJ May

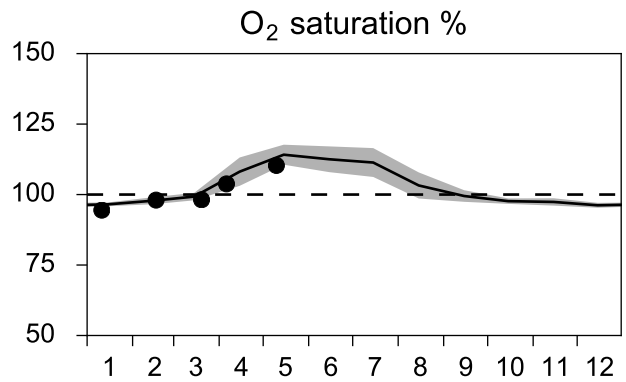
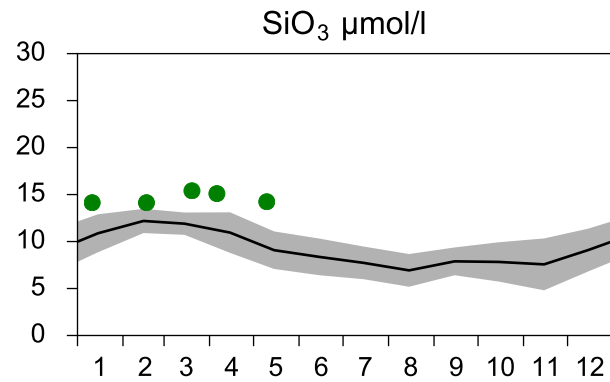
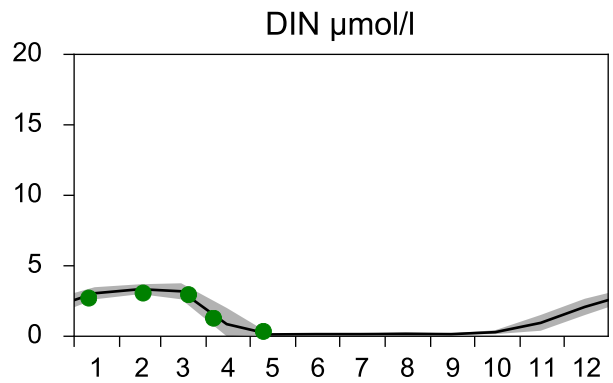
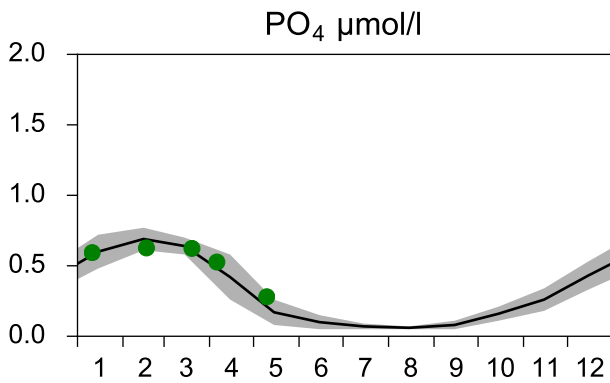
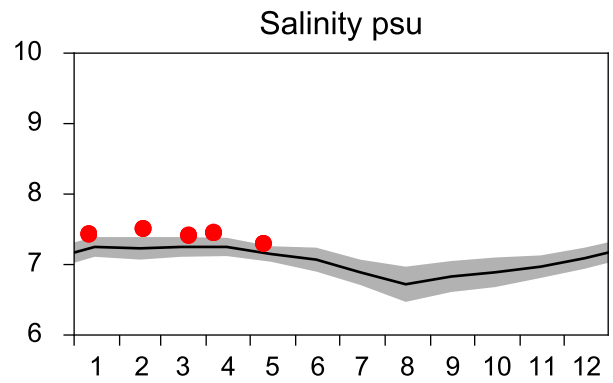
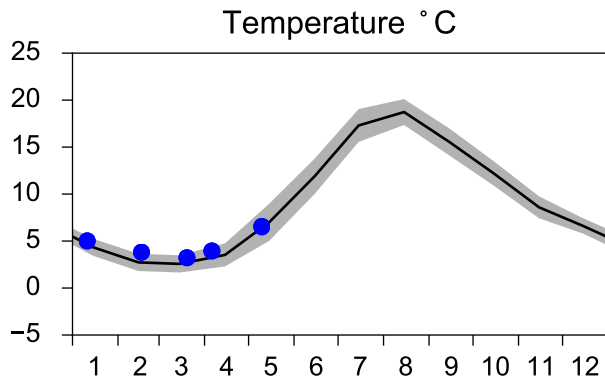
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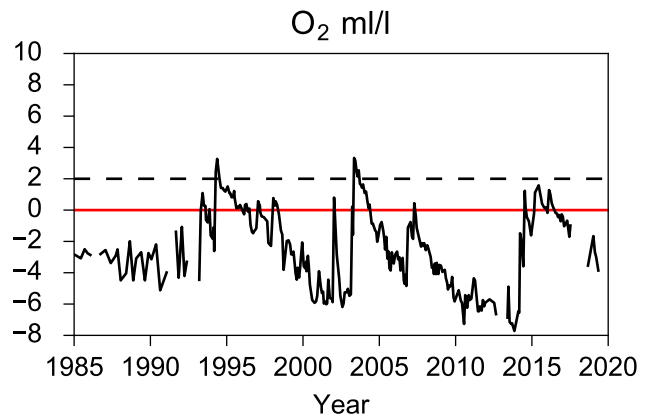
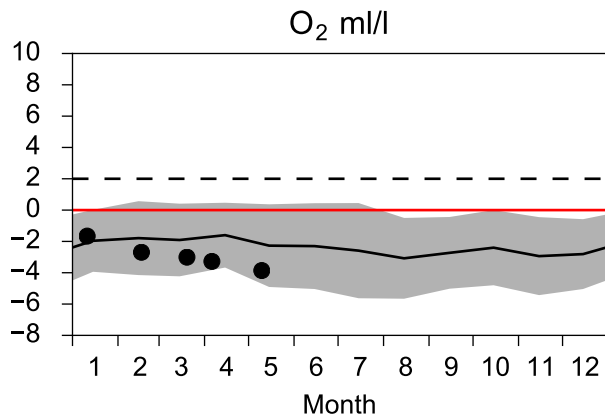
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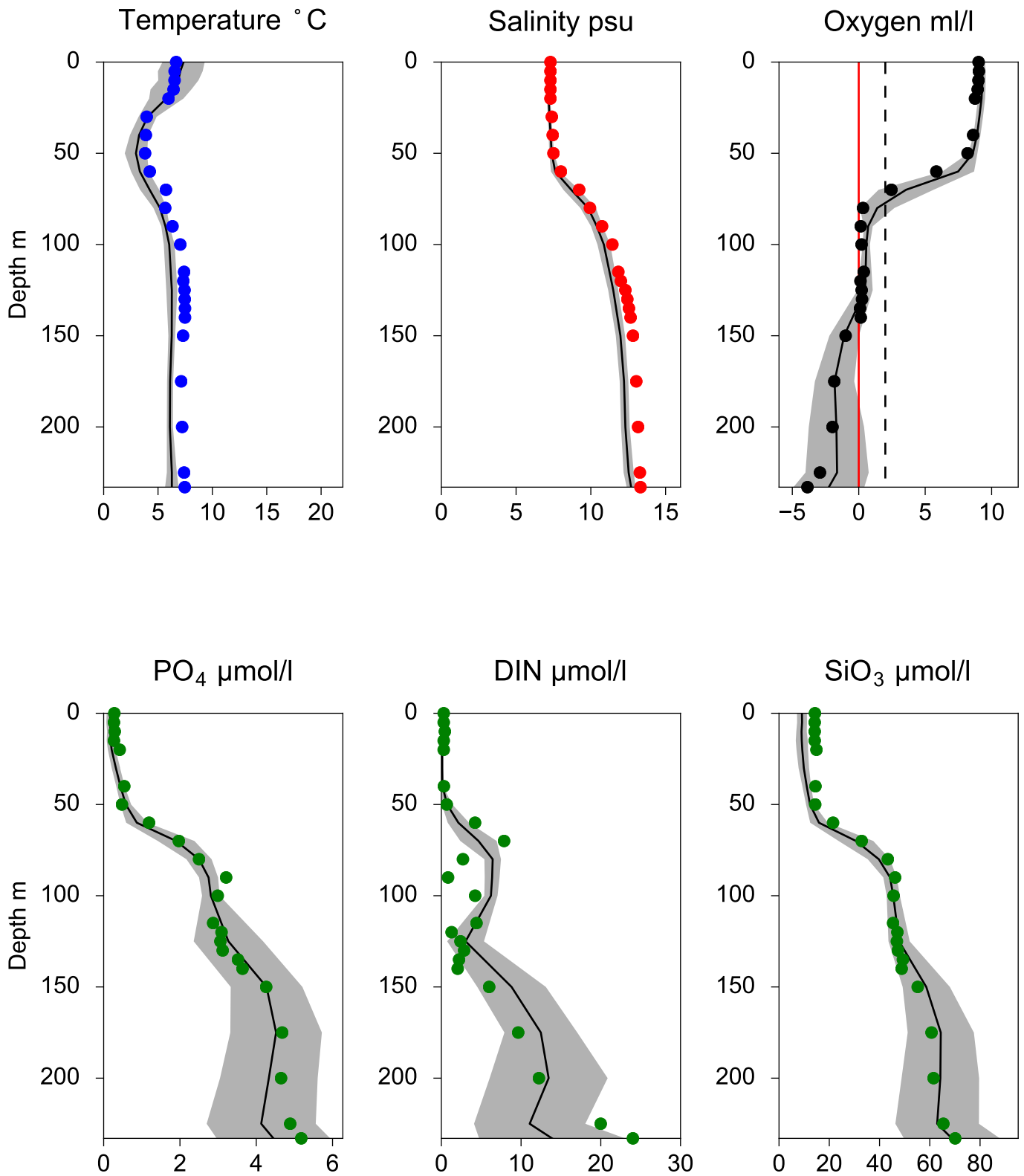


OXYGEN IN BOTTOM WATER (depth >= 225 m)



Vertical profiles BY15 GOTLANDSDJ May

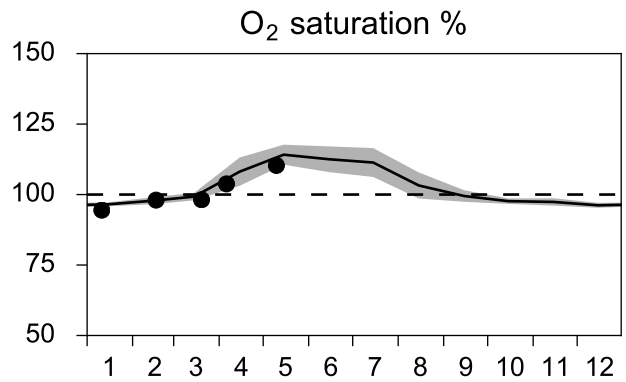
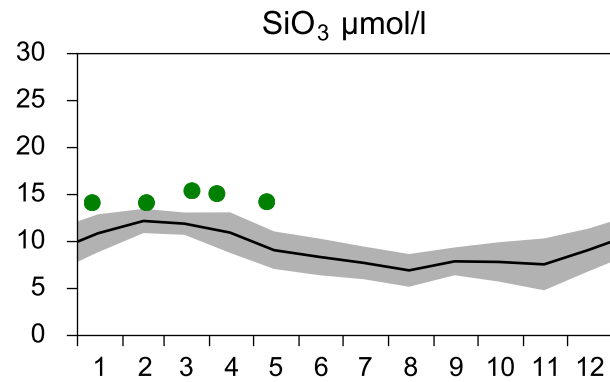
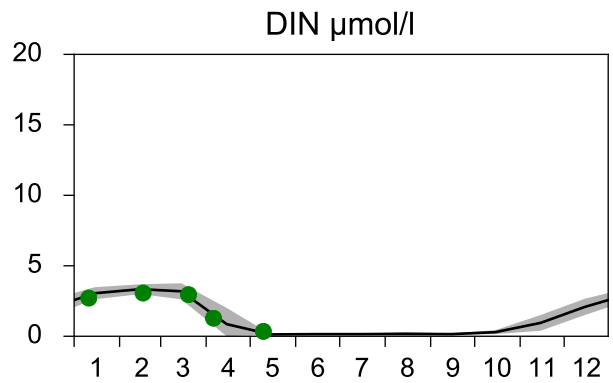
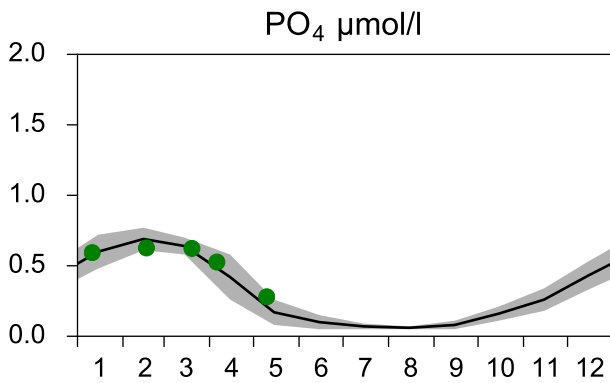
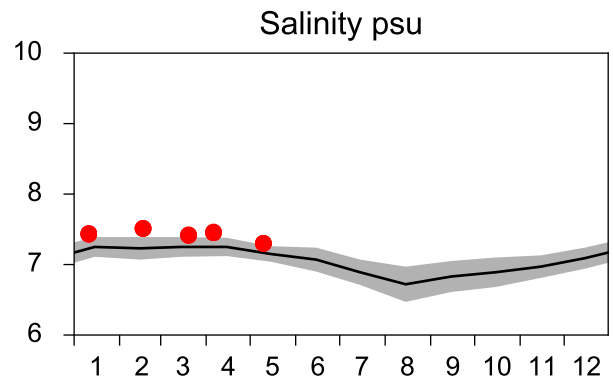
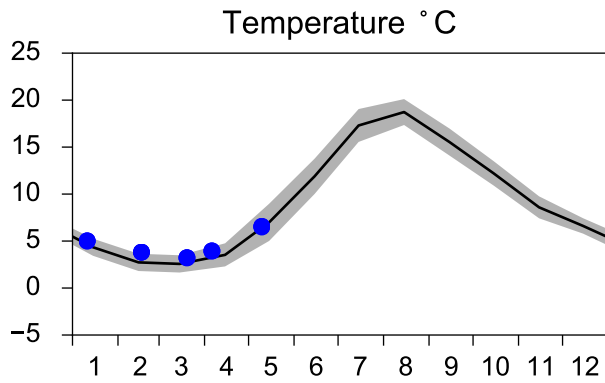
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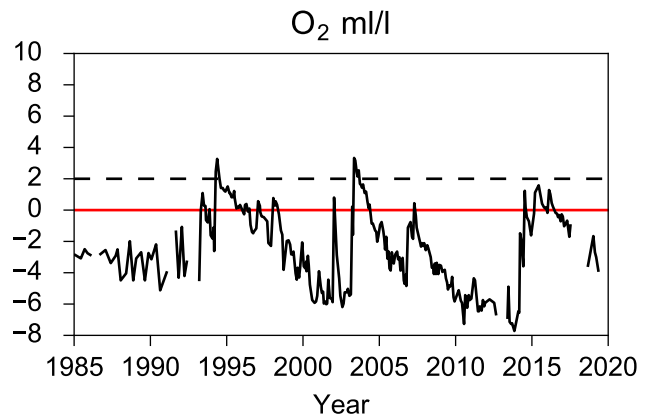
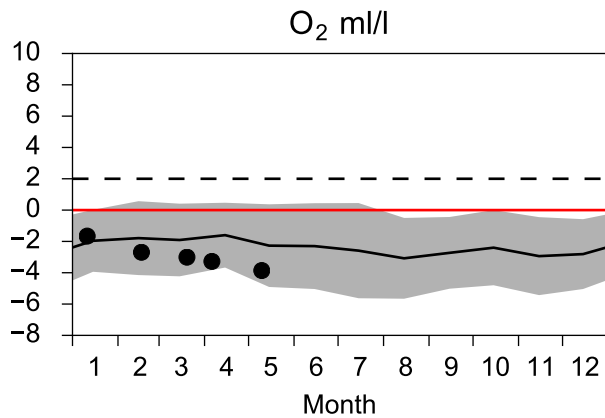
STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

Annual Cycles

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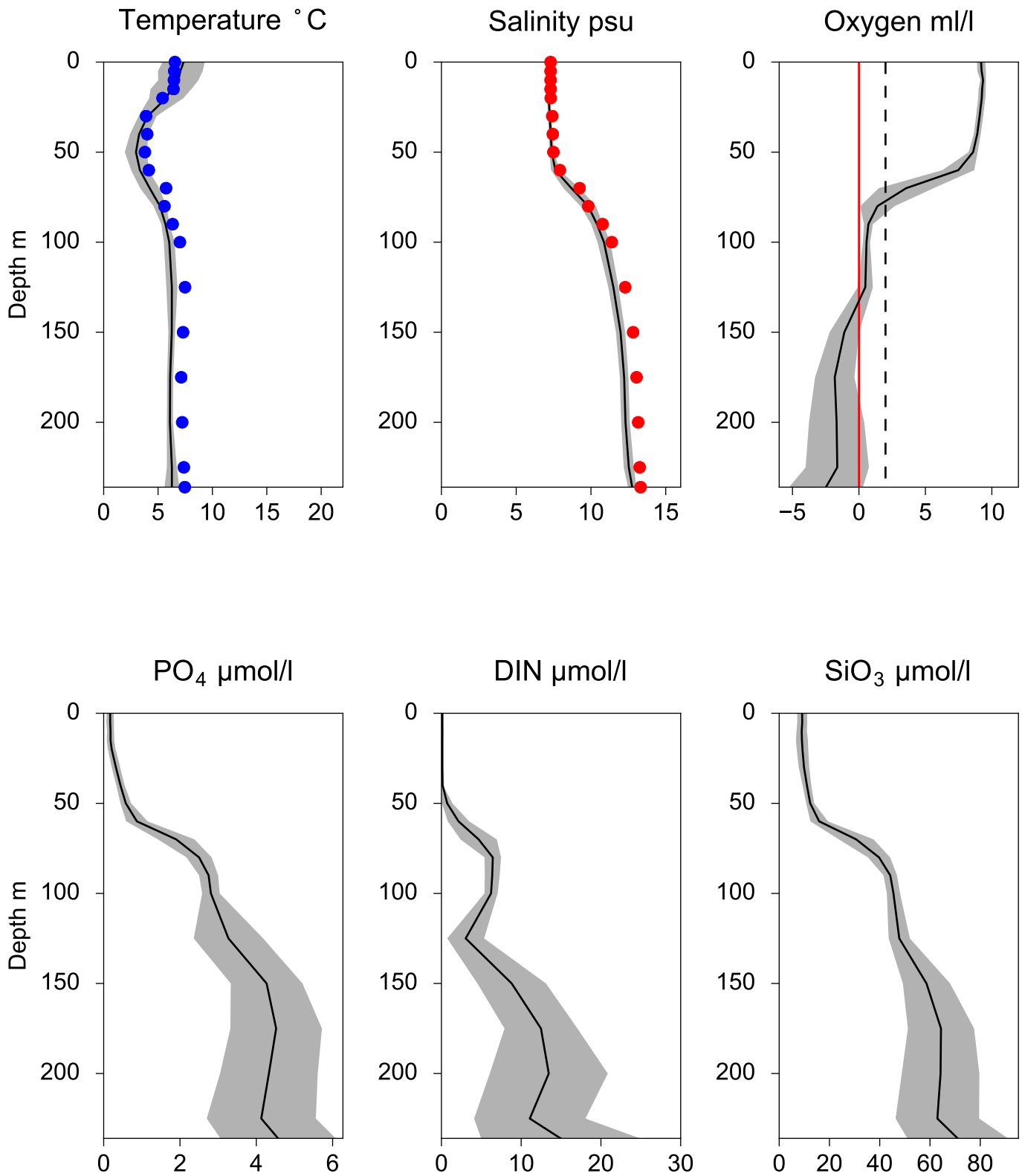


OXYGEN IN BOTTOM WATER (depth >= 225 m)



Vertical profiles BY15 GOTLANDSDJ May

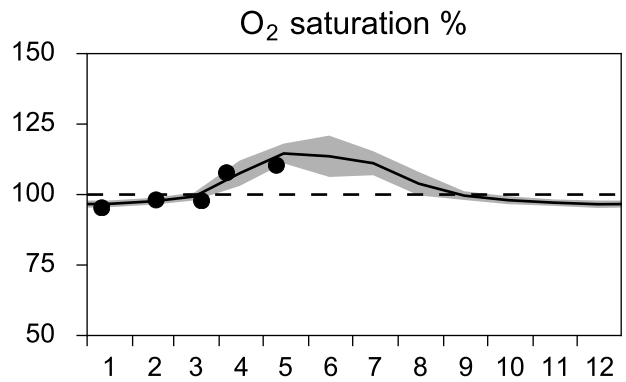
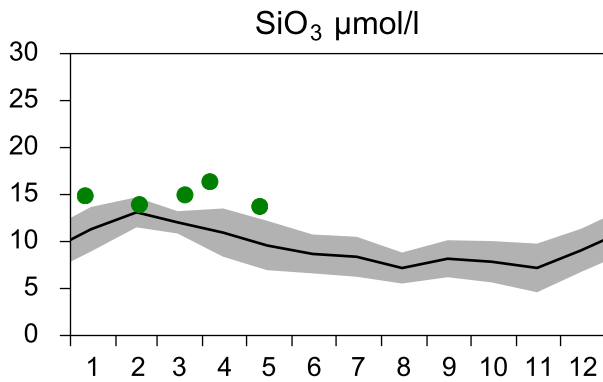
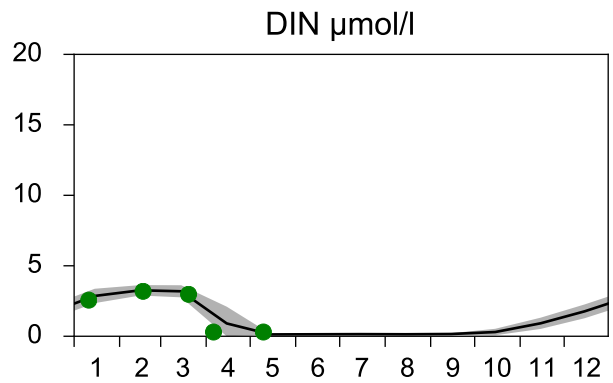
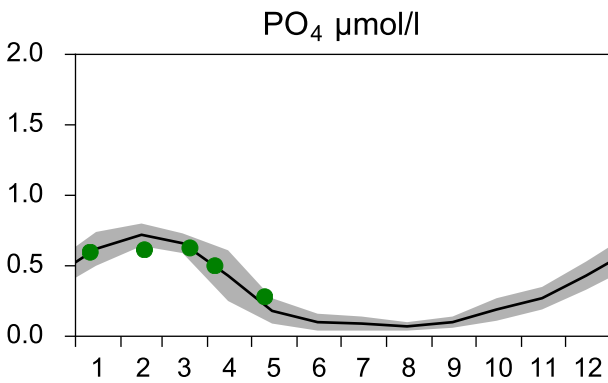
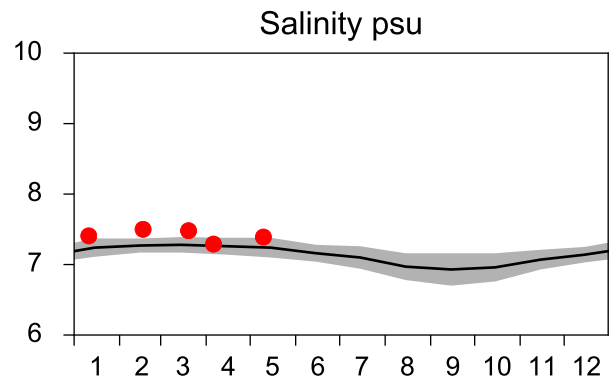
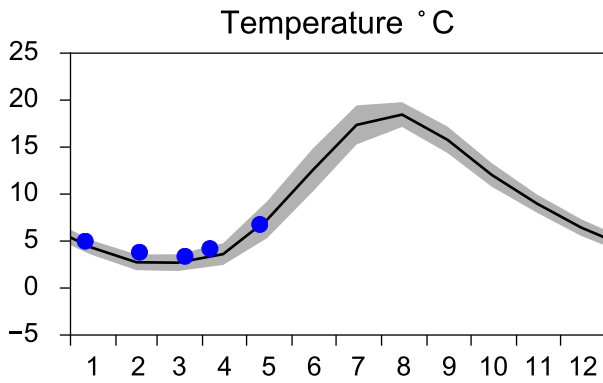
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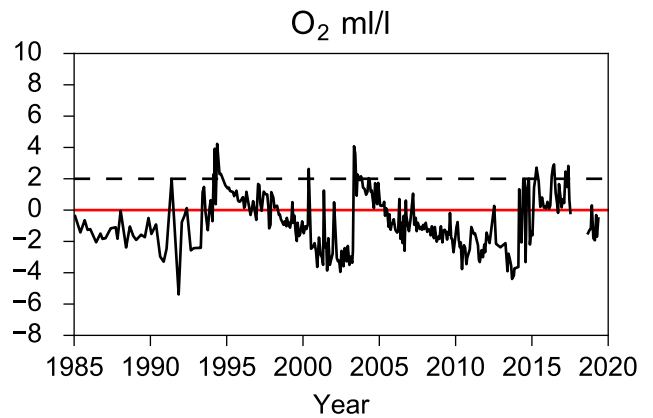
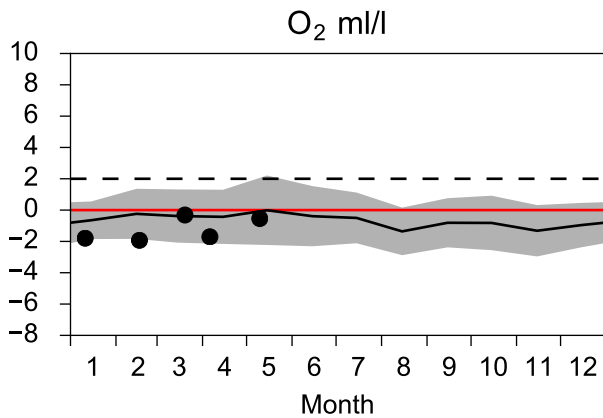
STATION BY10 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019

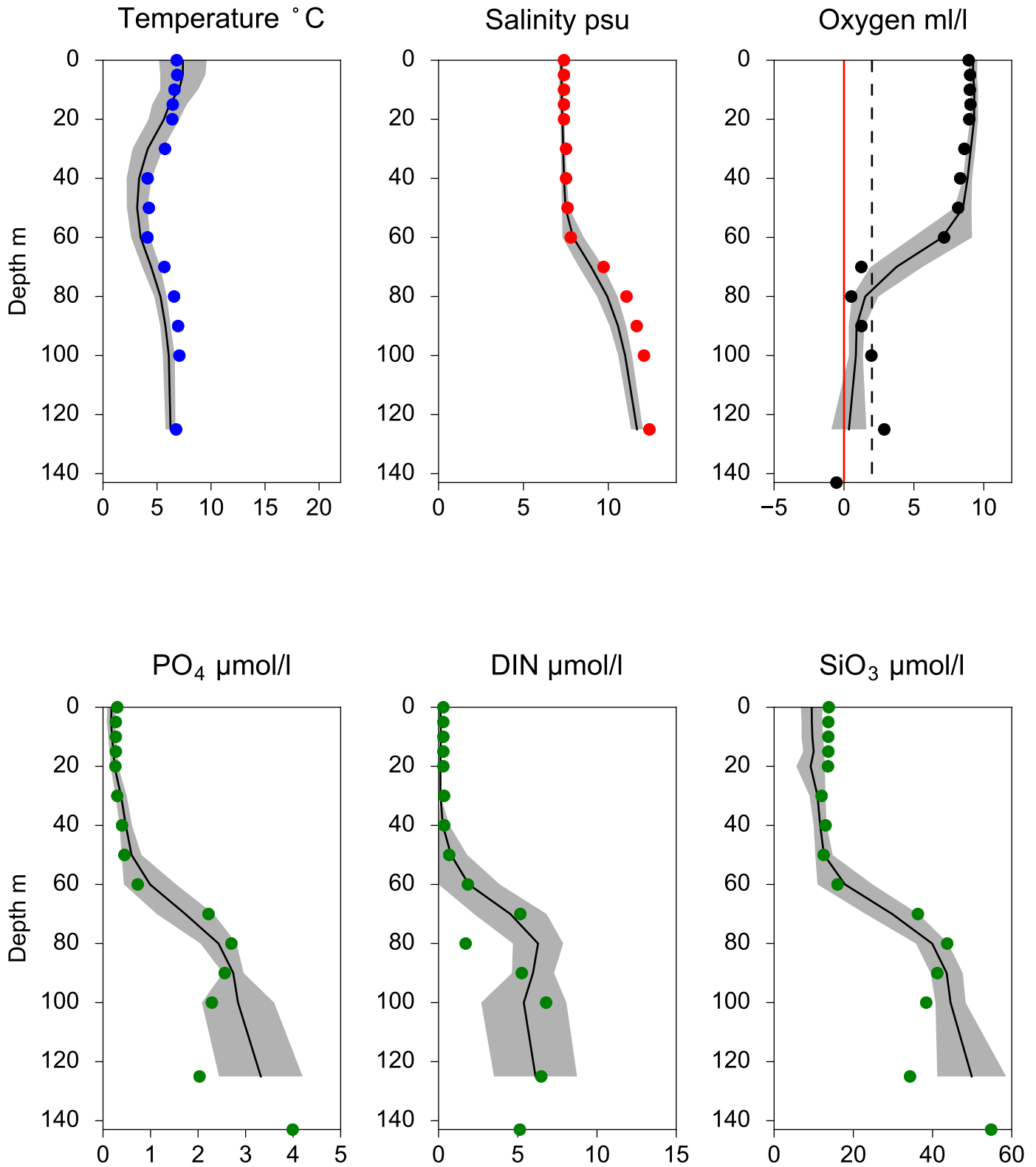


OXYGEN IN BOTTOM WATER (depth >= 125 m)



Vertical profiles BY10 May

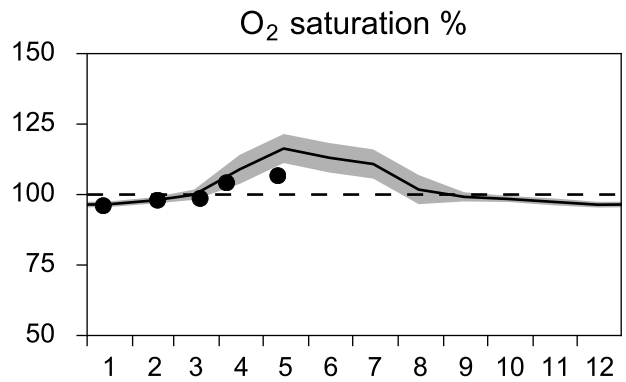
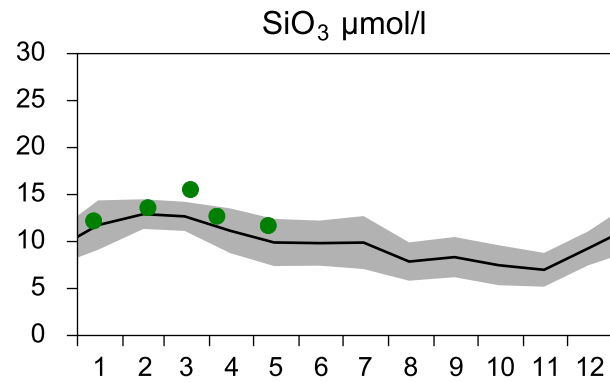
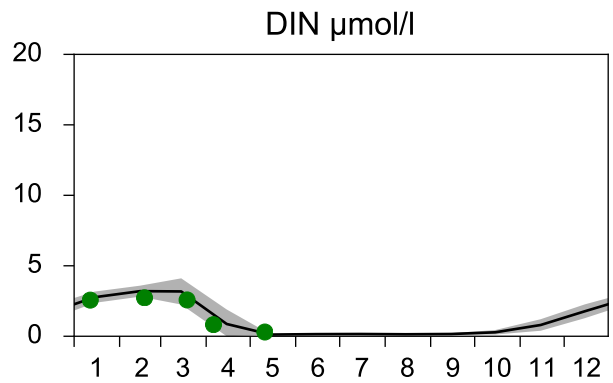
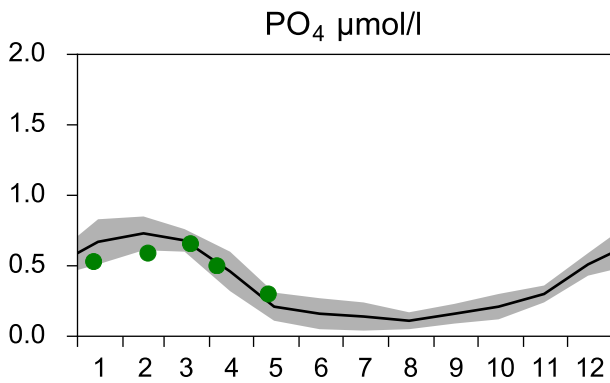
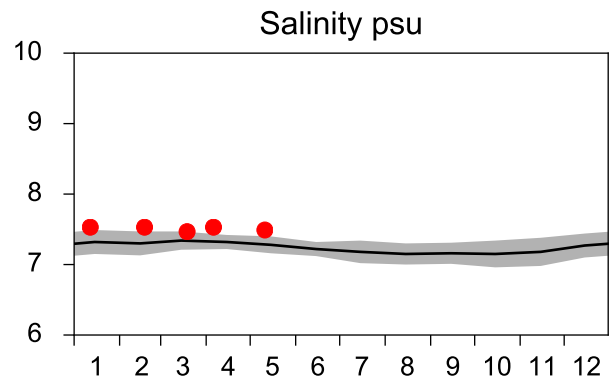
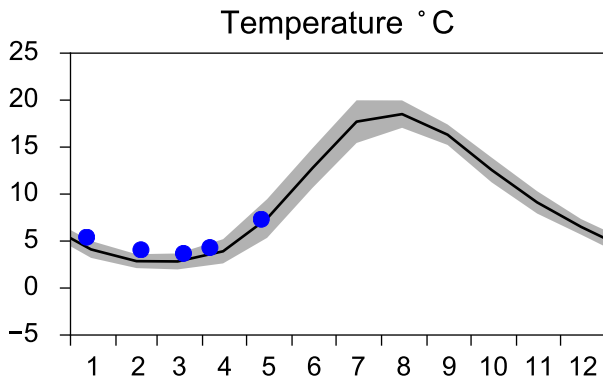
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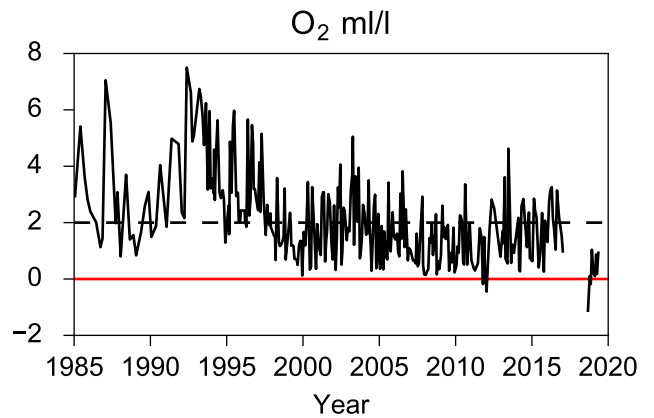
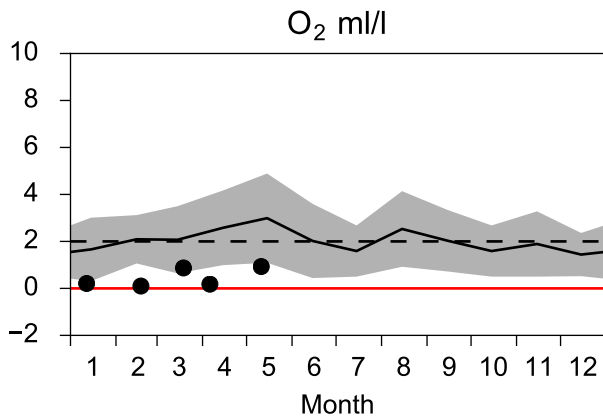
STATION BCS III-10 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

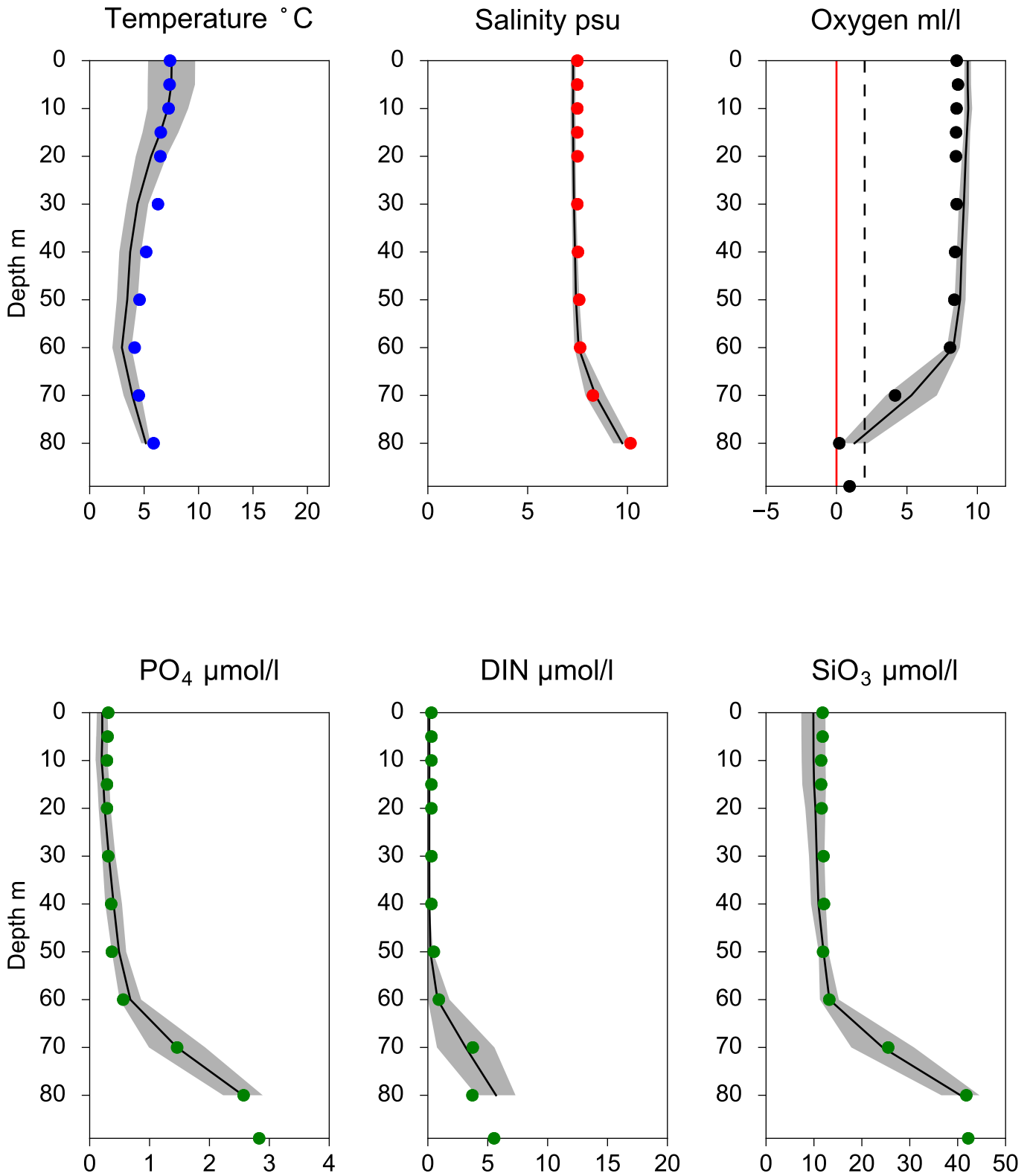


OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles BCS III-10 May

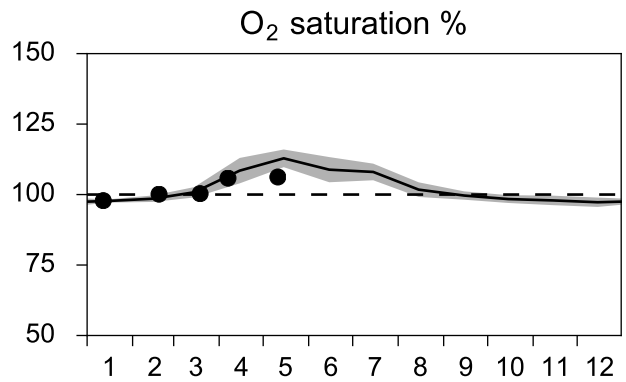
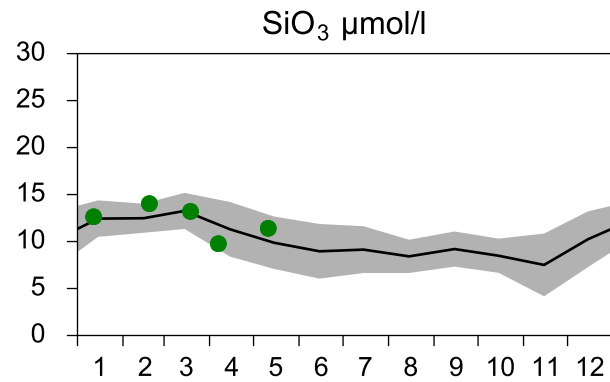
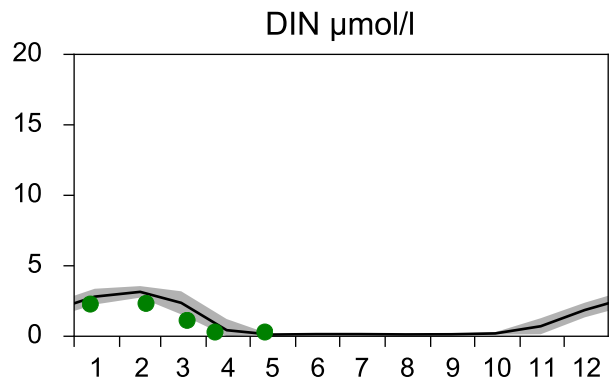
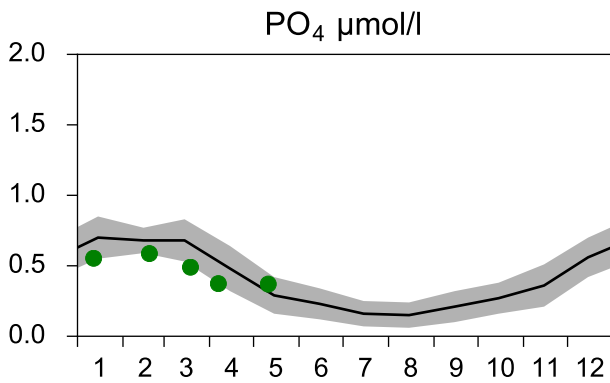
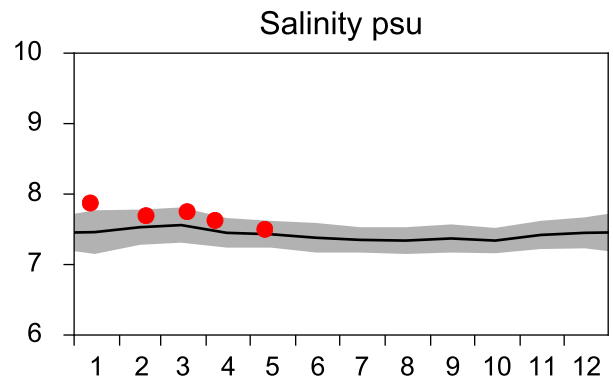
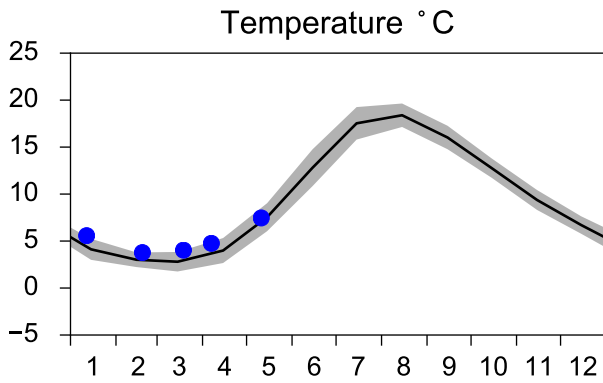
— Mean 2001-2015 ■ St.Dev. ● 2019-05-11



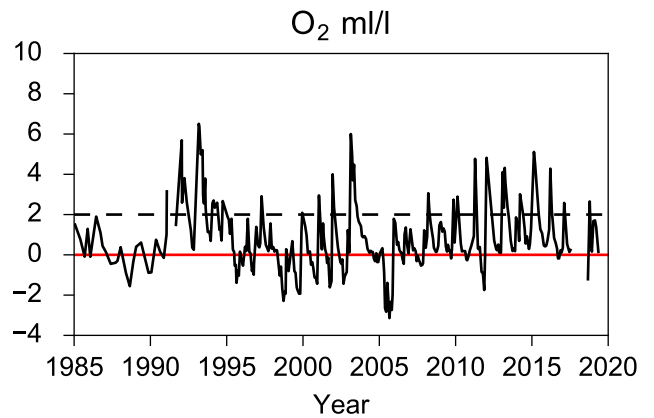
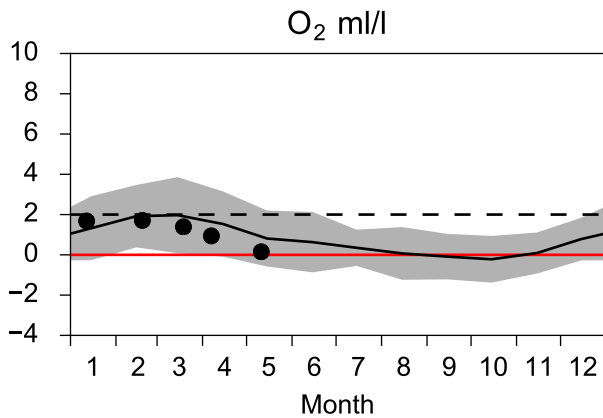
STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019

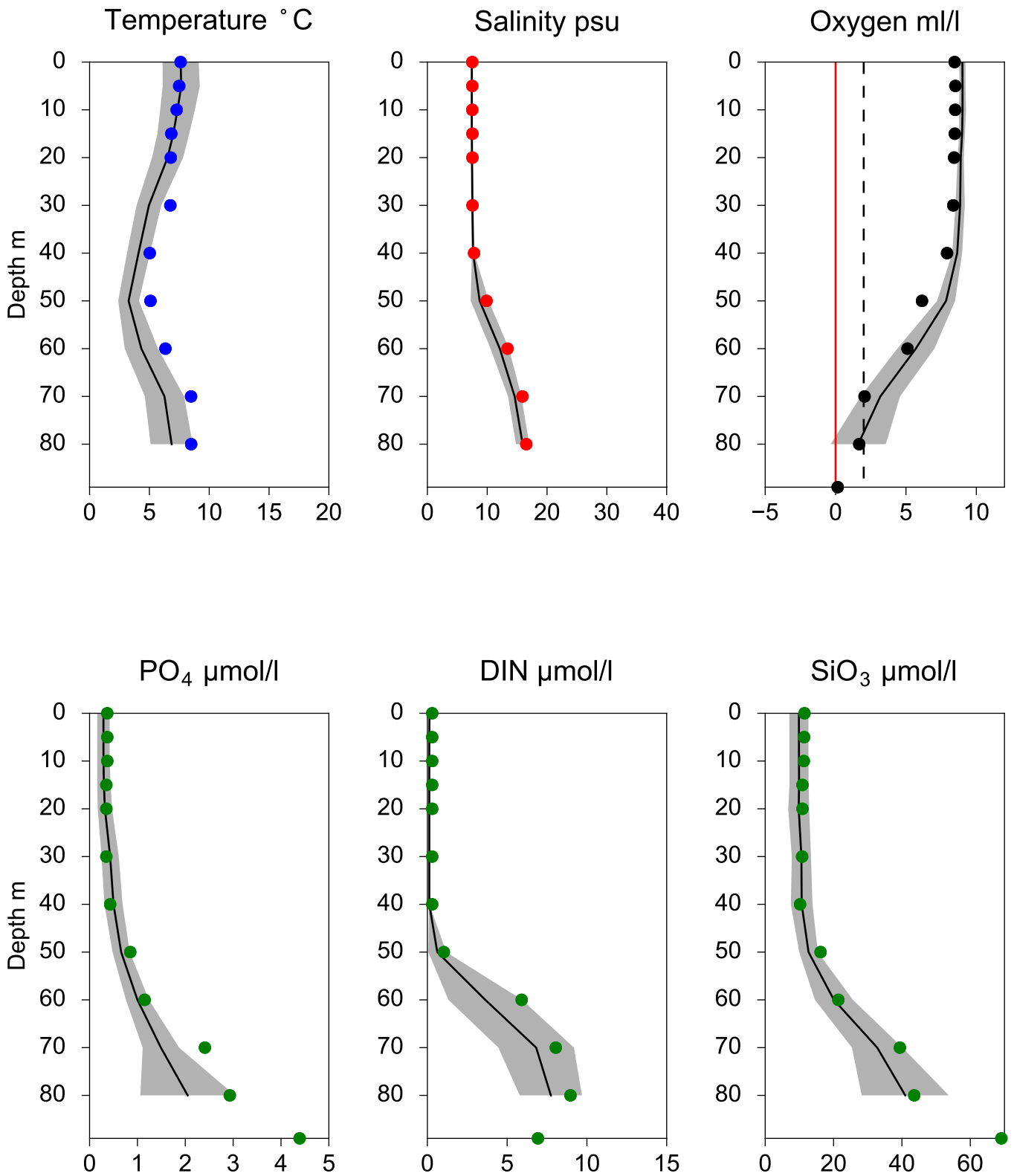


OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles BY5 BORNHOLMSDJ May

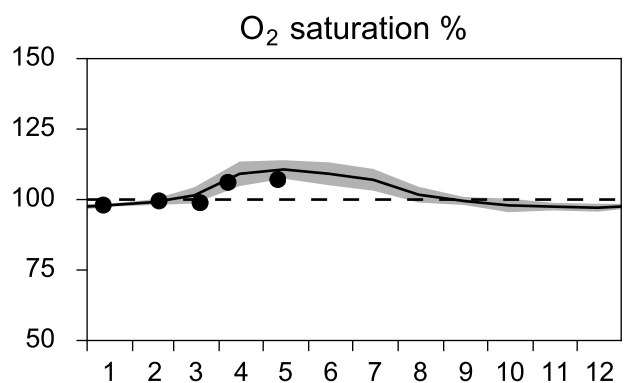
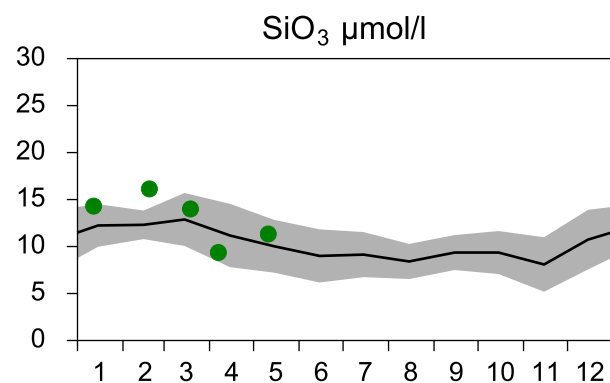
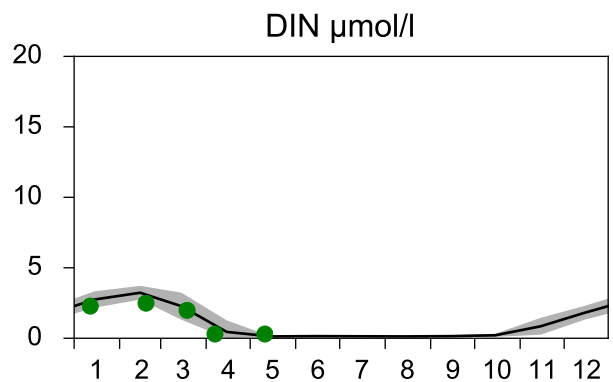
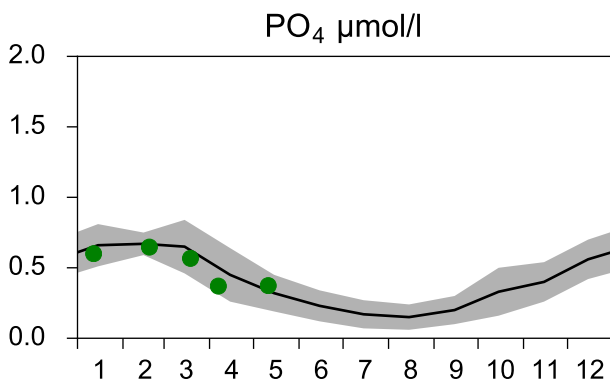
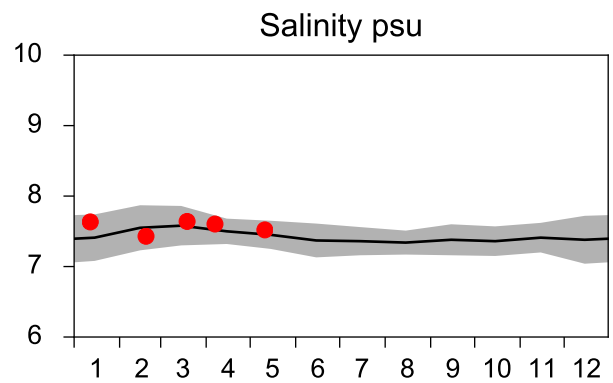
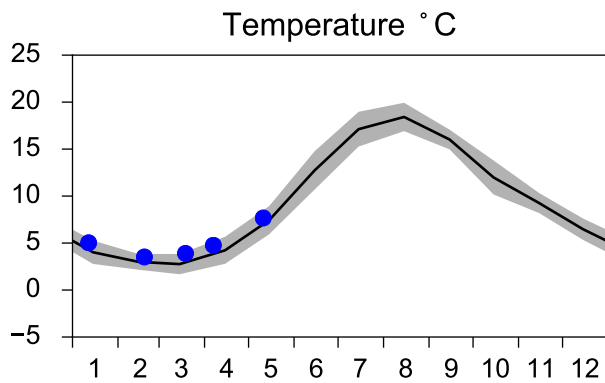
— Mean 2001-2015 ■ St.Dev. ● 2019-05-11



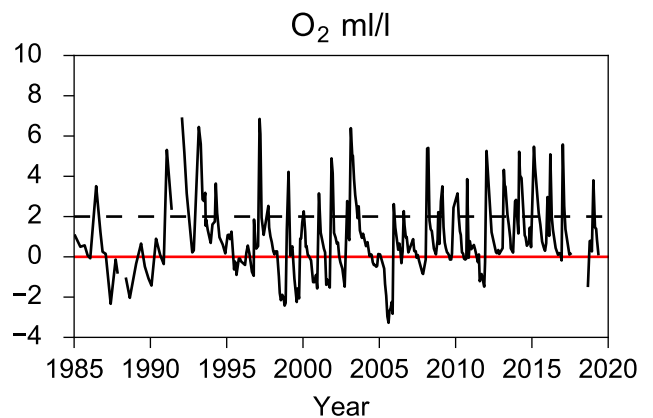
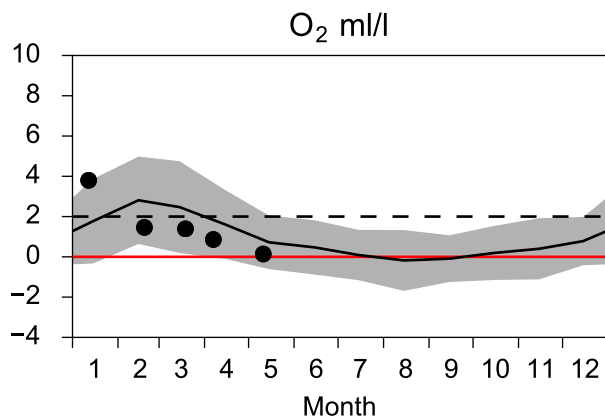
STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

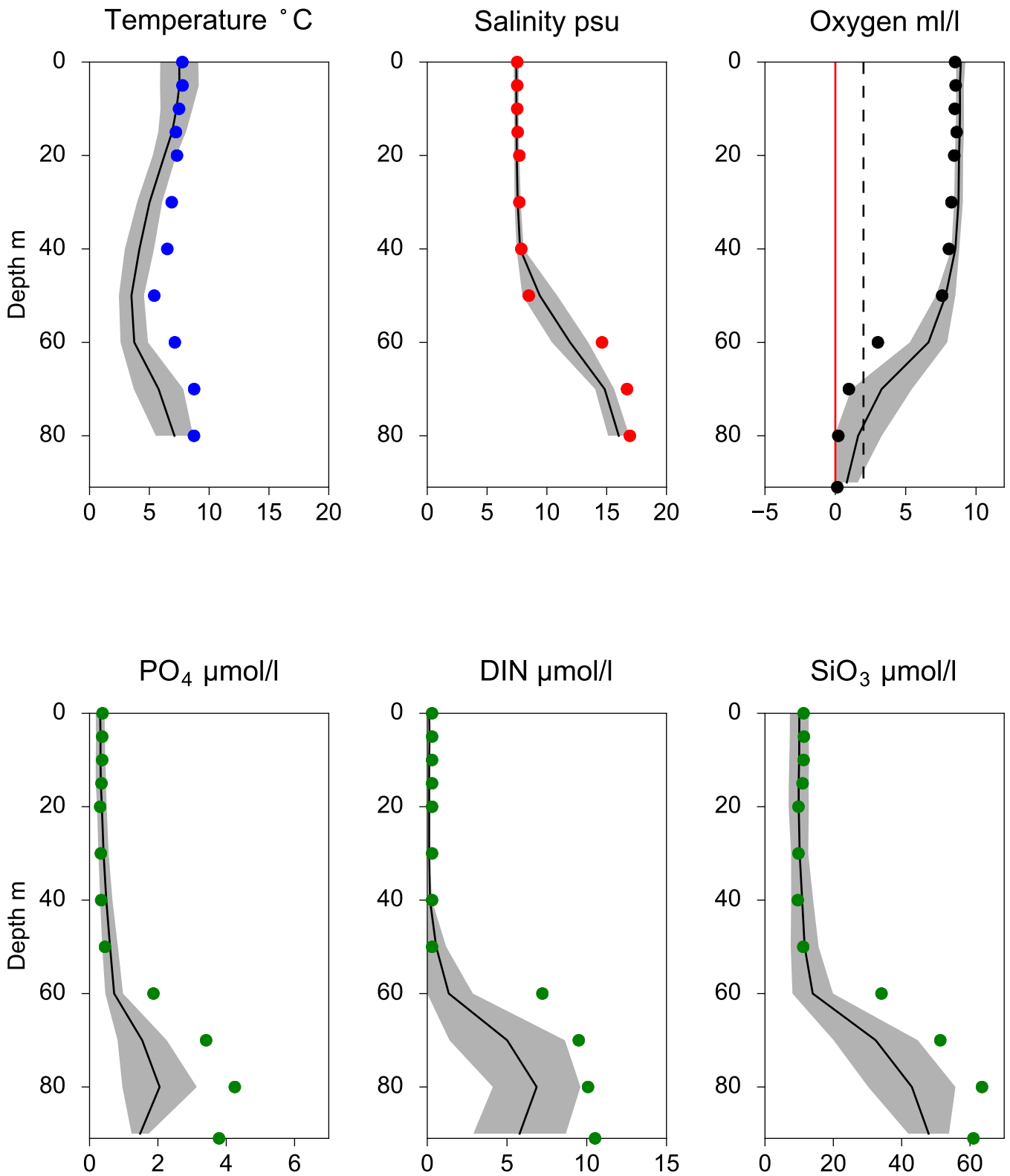


OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles BY4 CHRISTIANSÖ May

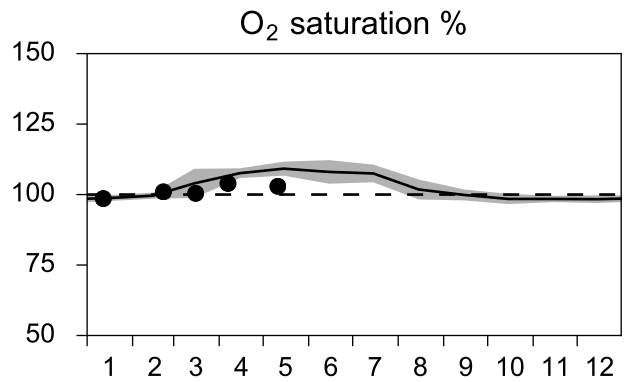
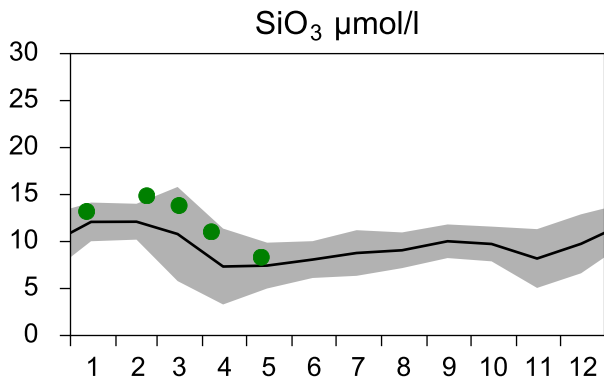
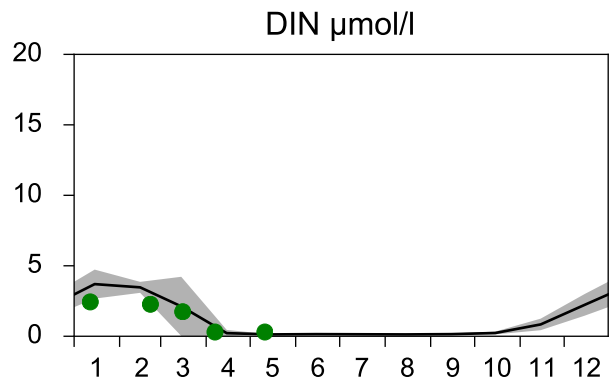
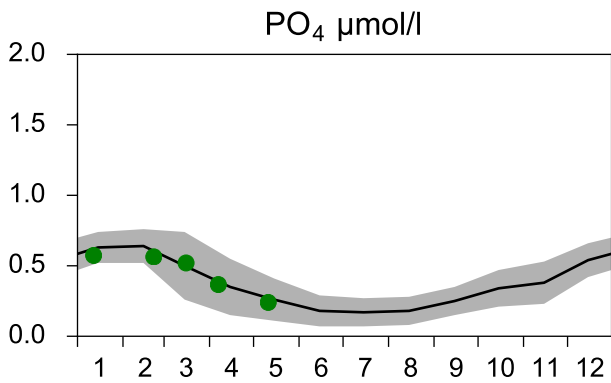
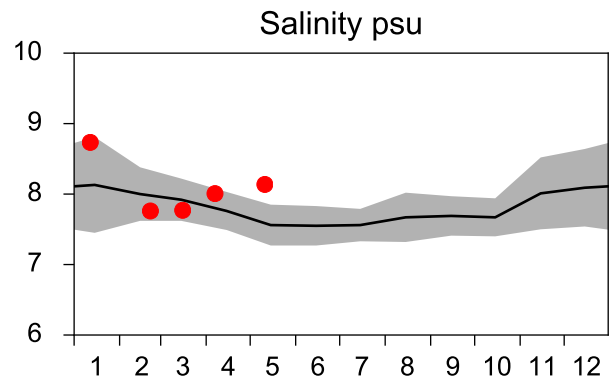
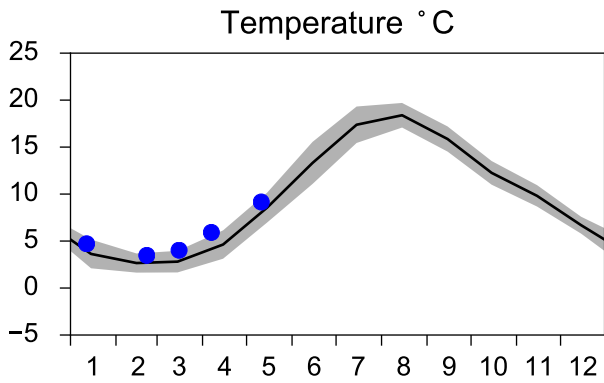
— Mean 2001-2015 St.Dev. ● 2019-05-11



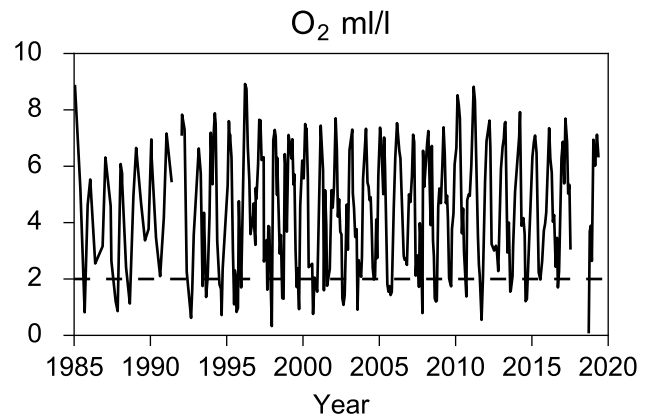
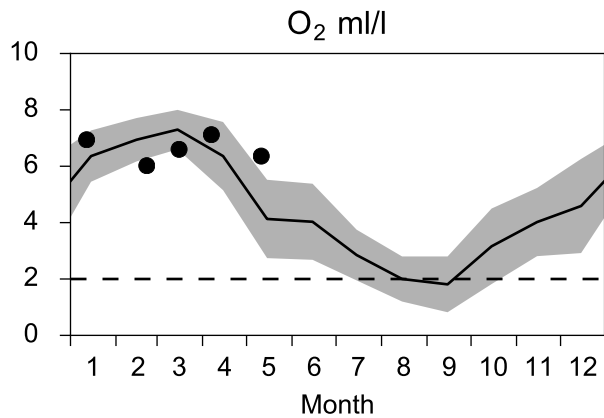
STATION BY2 ARKONA SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

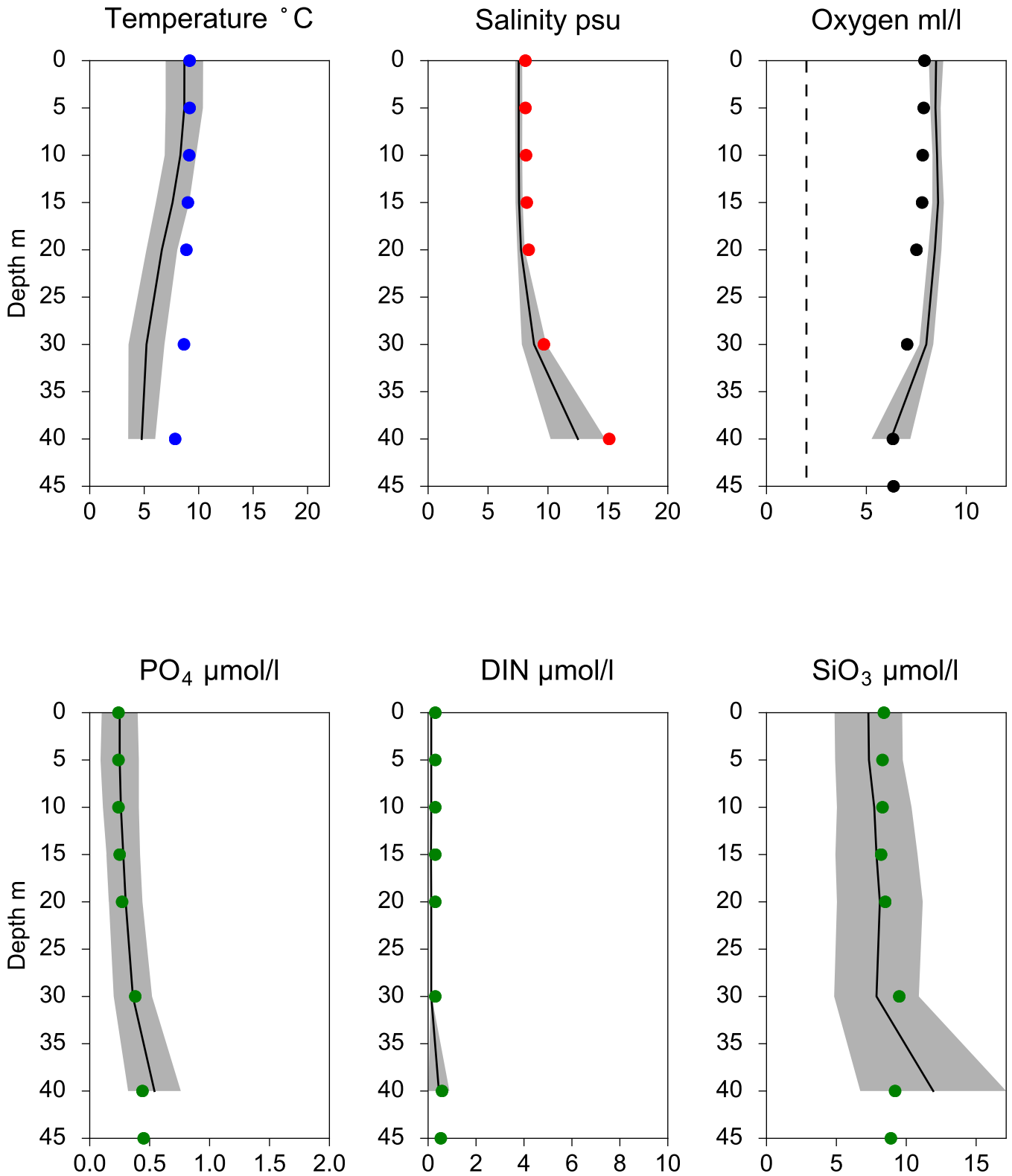


OXYGEN IN BOTTOM WATER (depth >= 40 m)



Vertical profiles BY2 ARKONA May

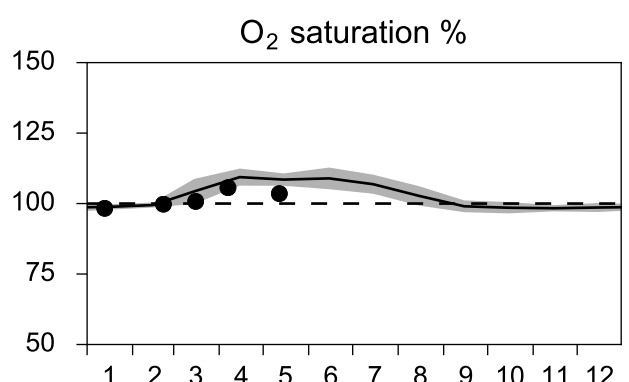
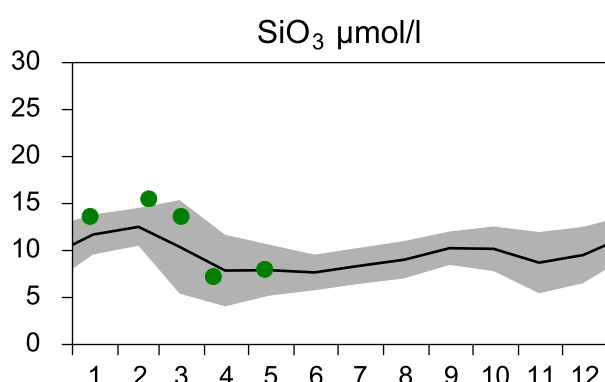
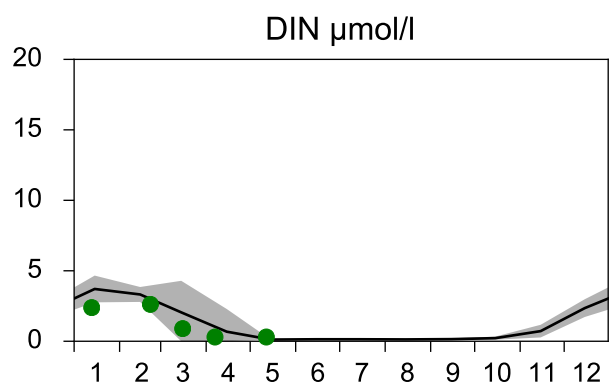
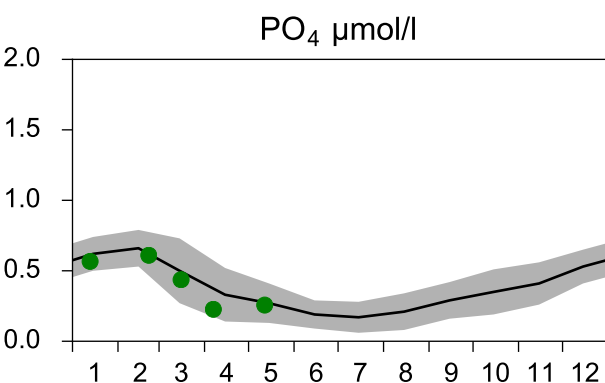
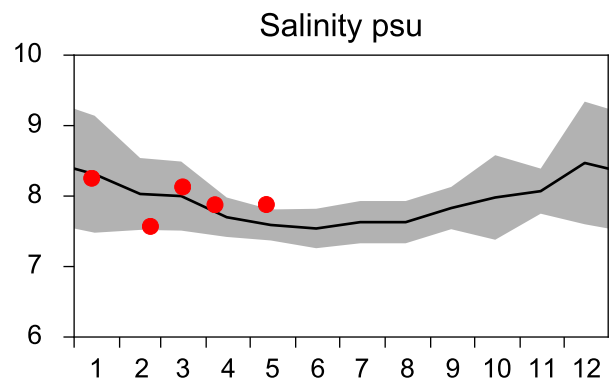
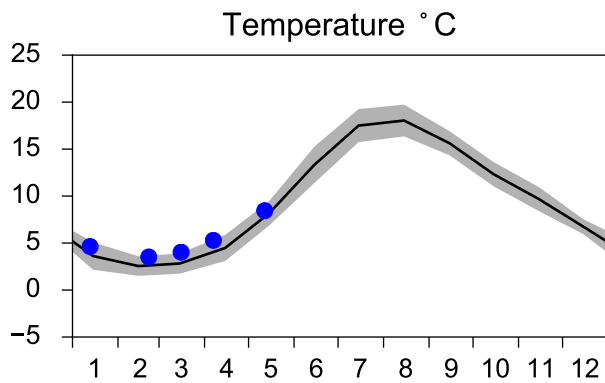
— Mean 2001-2015 ■ St.Dev. ● 2019-05-11



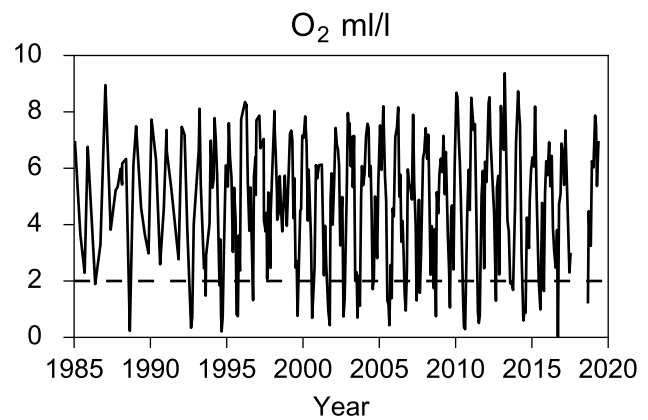
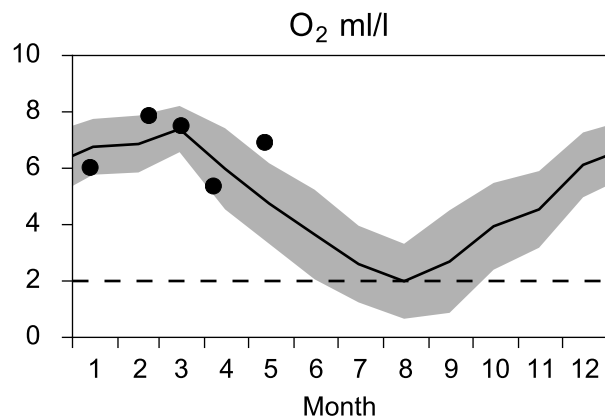
STATION BY1 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

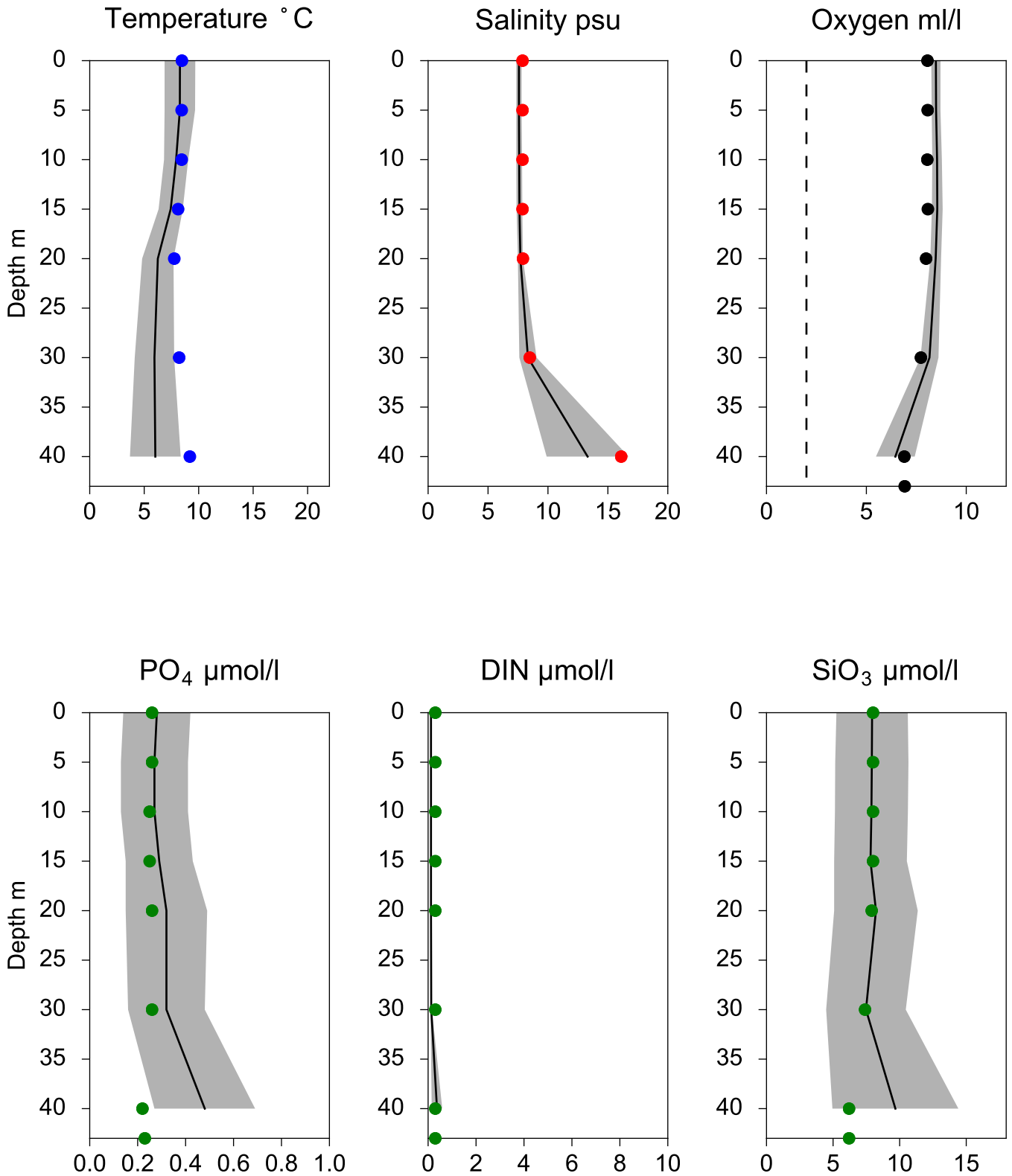


OXYGEN IN BOTTOM WATER (depth >= 40 m)



Vertical profiles BY1 May

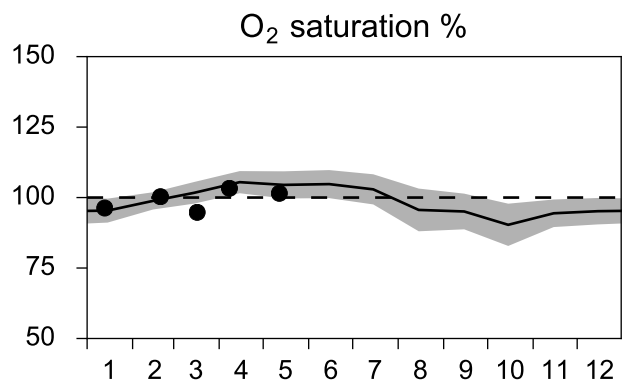
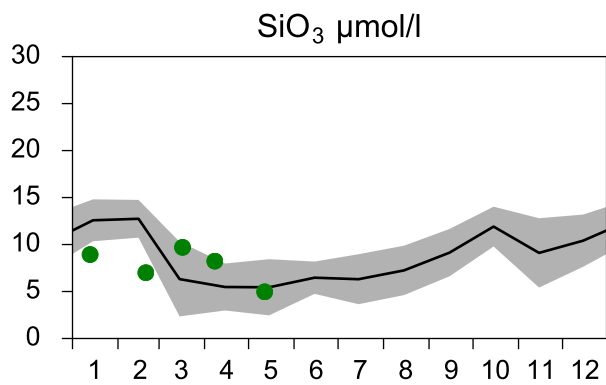
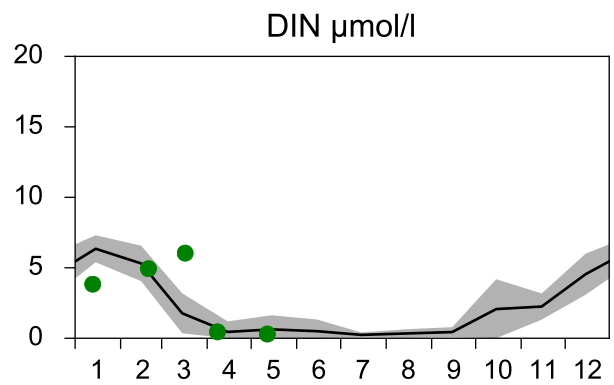
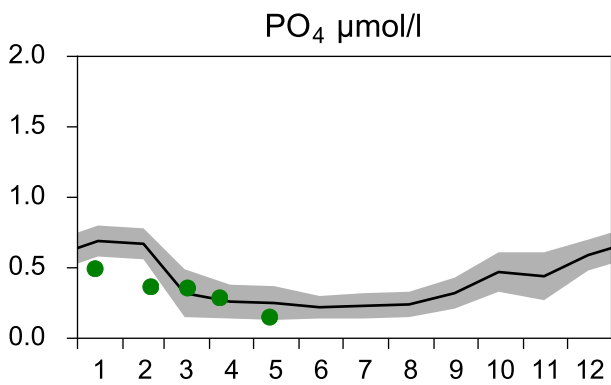
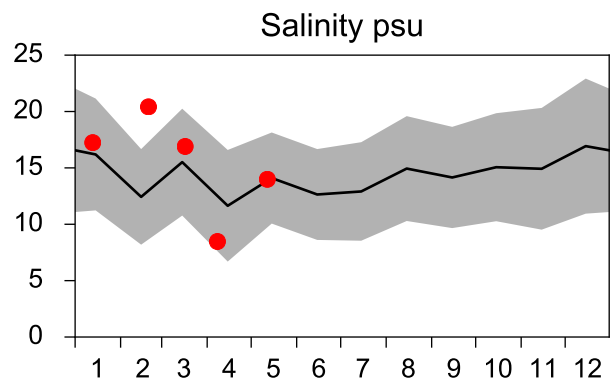
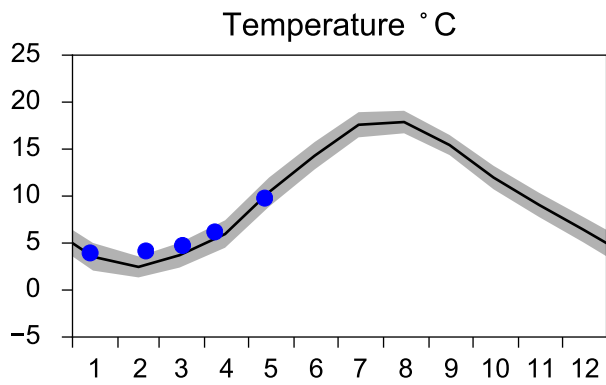
— Mean 2001-2015 ■ St.Dev. ● 2019-05-12



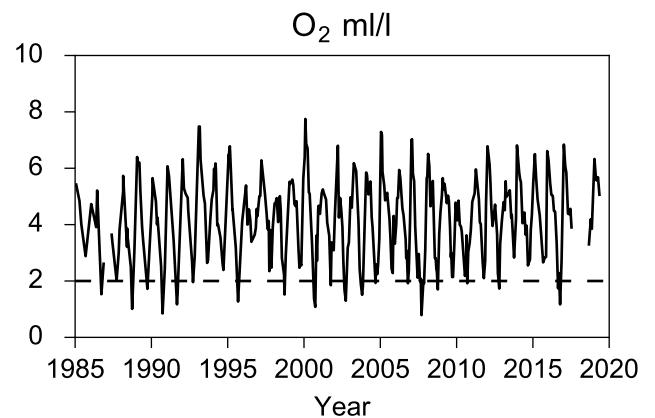
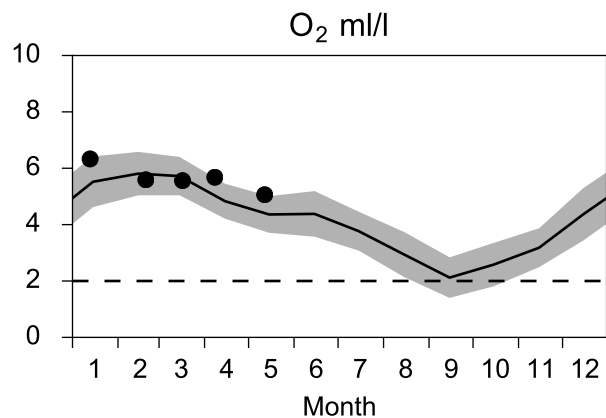
STATION W LANDSKRONA SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

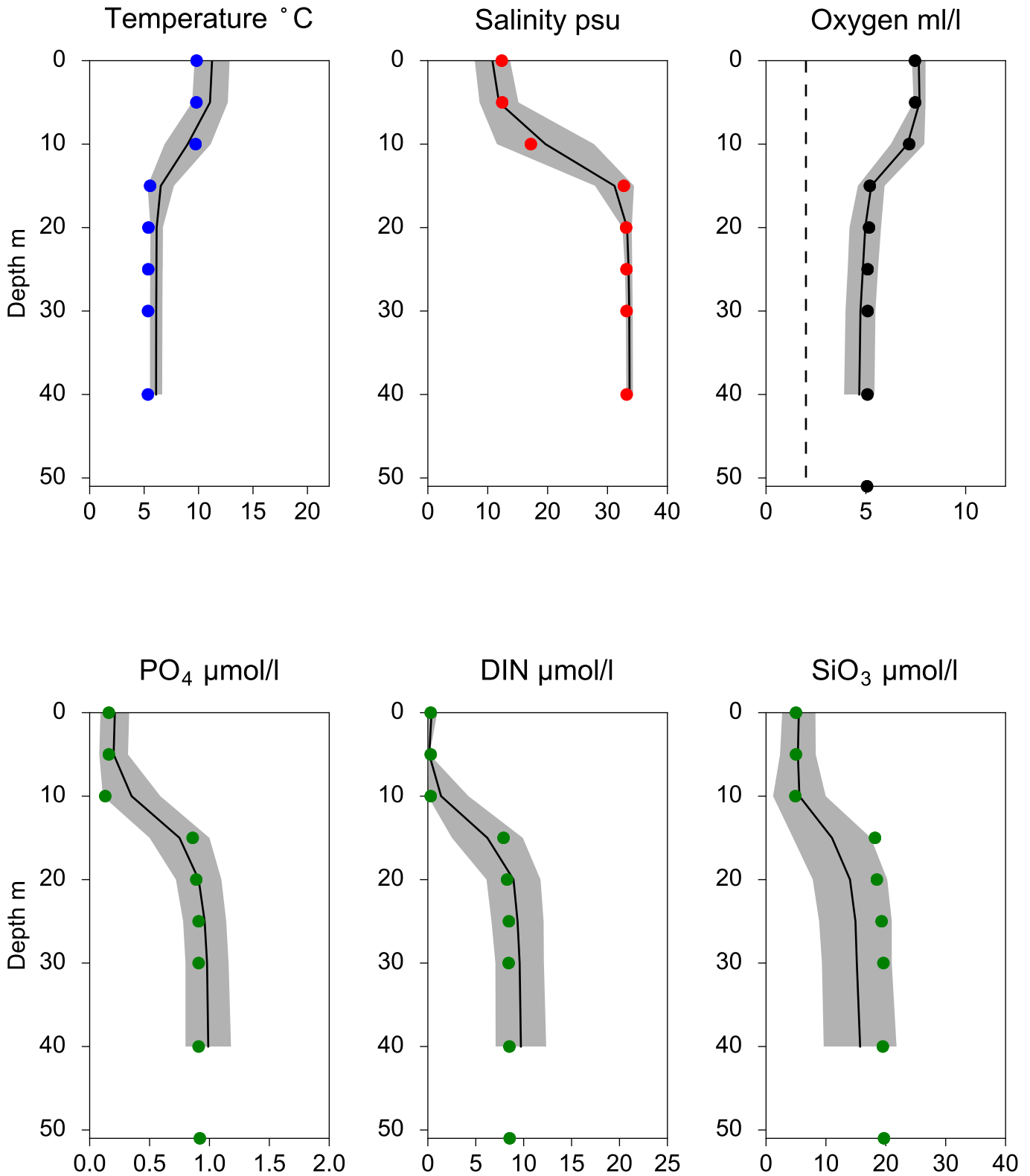


OXYGEN IN BOTTOM WATER (depth >= 40 m)



Vertical profiles W LANDSKRONA May

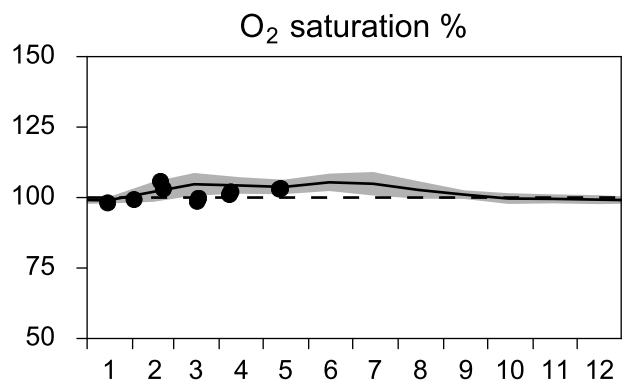
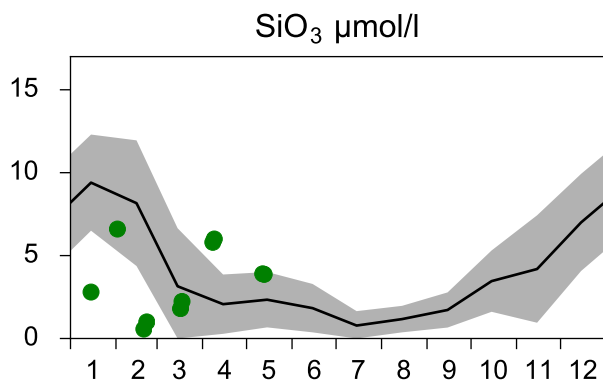
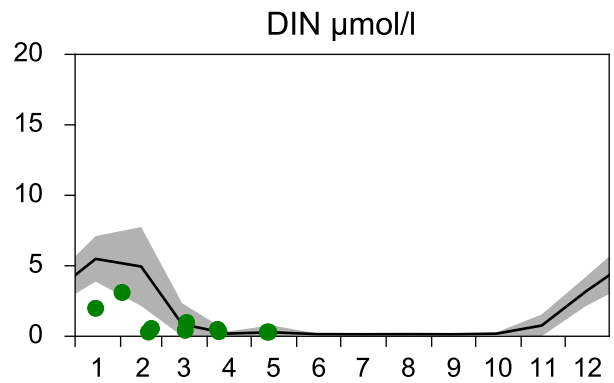
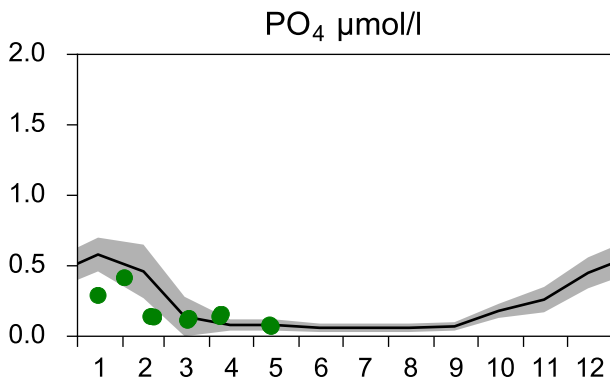
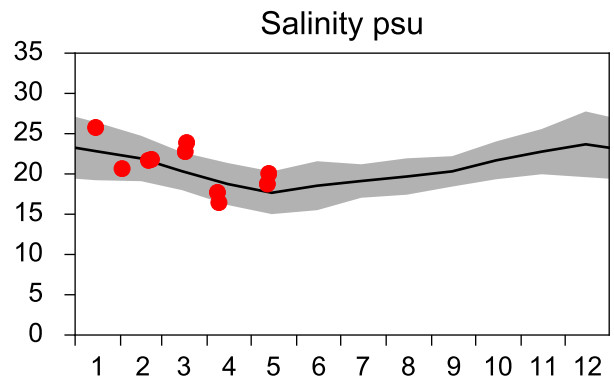
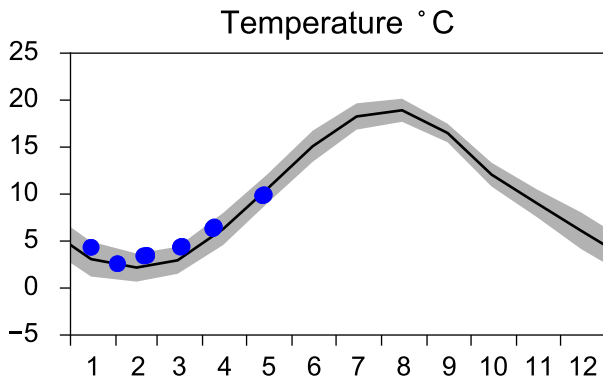
— Mean 2001-2015 ■ St.Dev. ● 2019-05-12



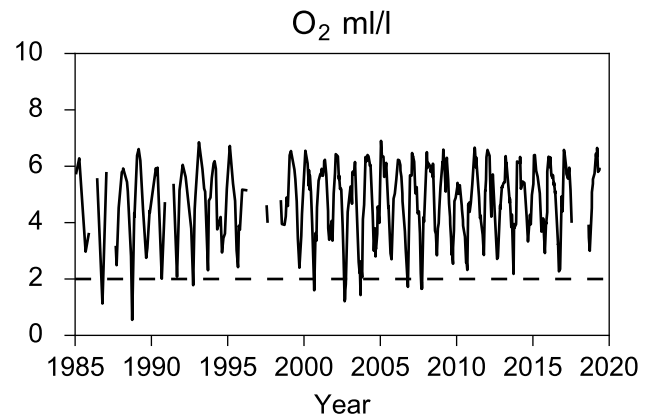
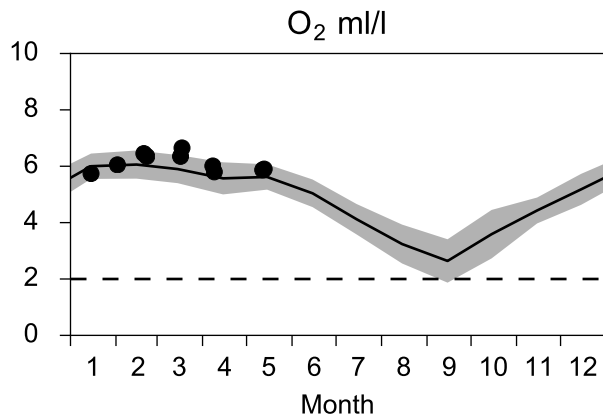
STATION ANHOLT E SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019

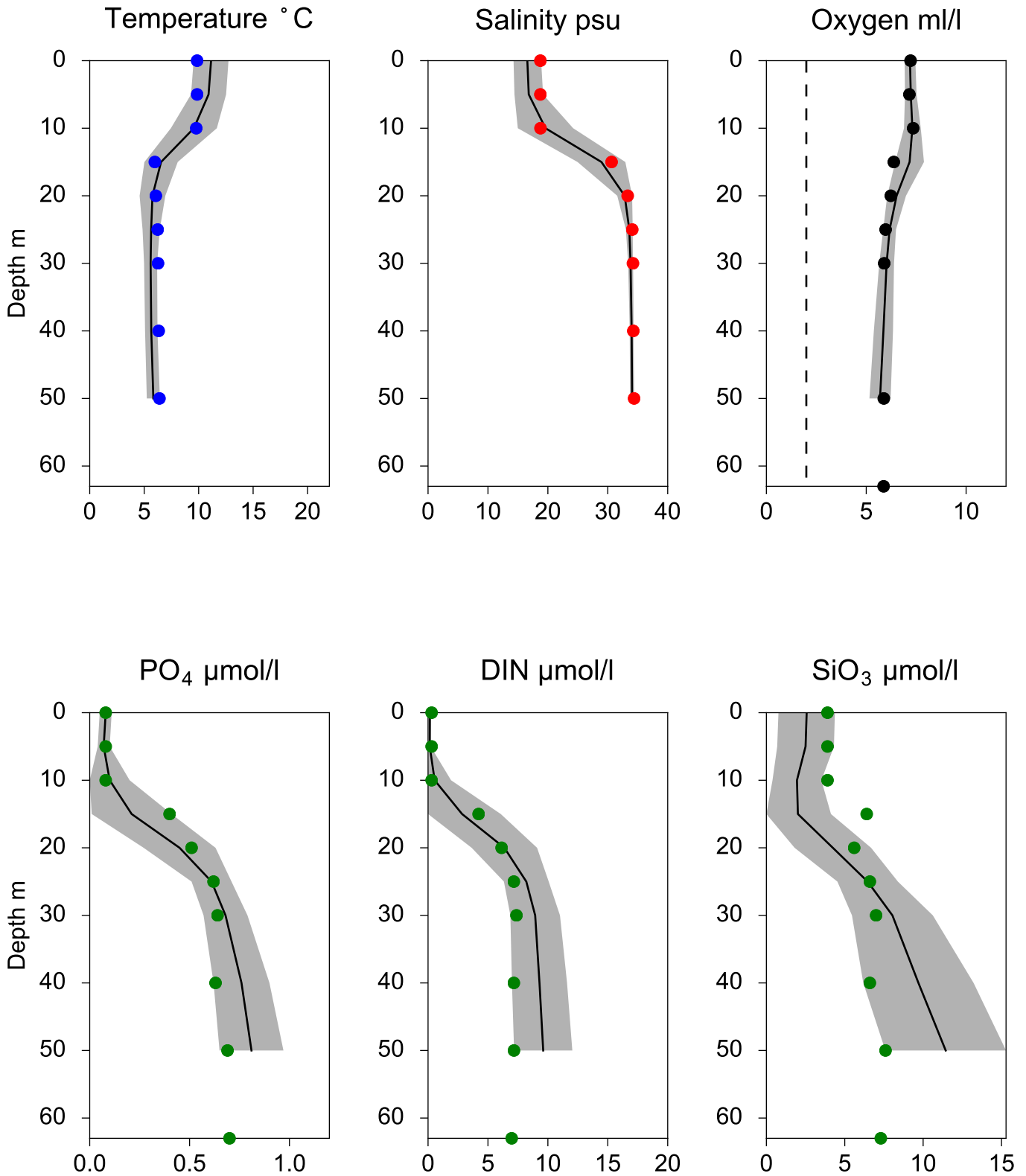


OXYGEN IN BOTTOM WATER (depth >= 52 m)



Vertical profiles ANHOLT E May

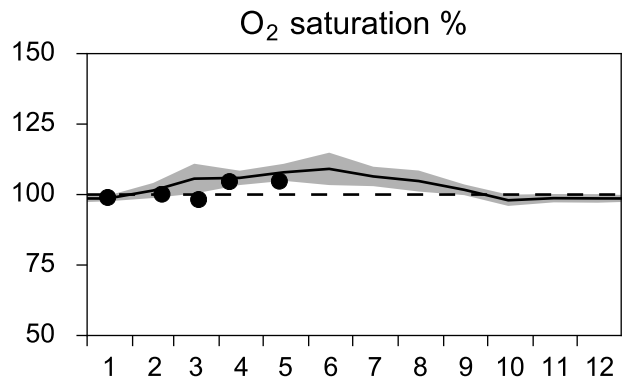
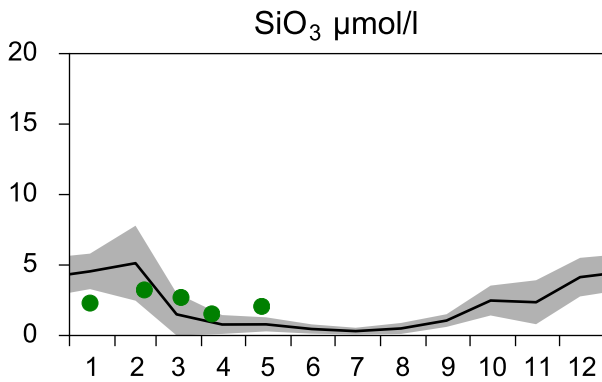
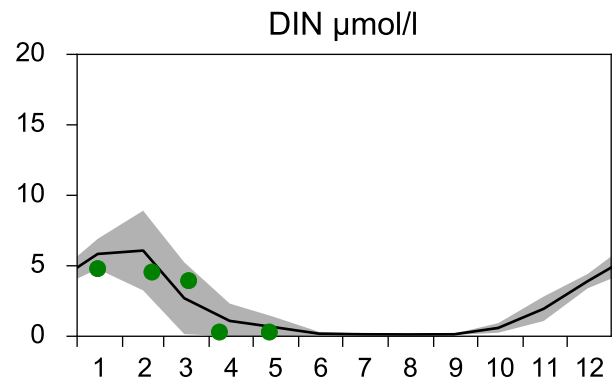
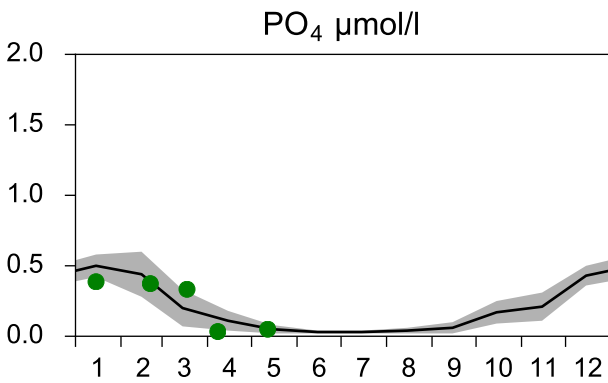
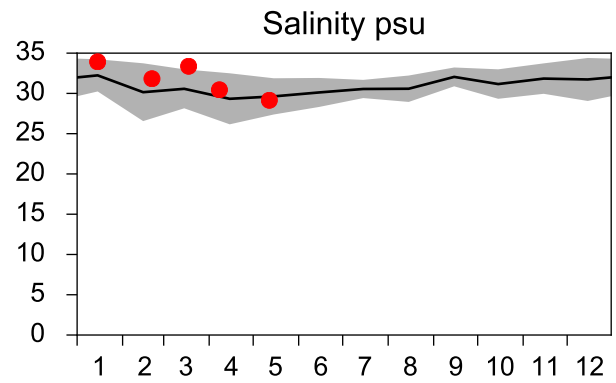
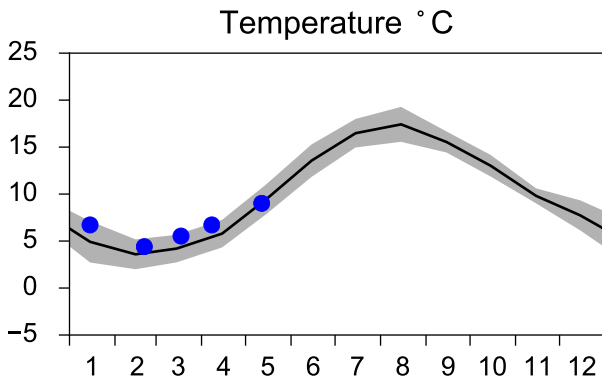
— Mean 2001-2015 ■ St.Dev. ● 2019-05-12



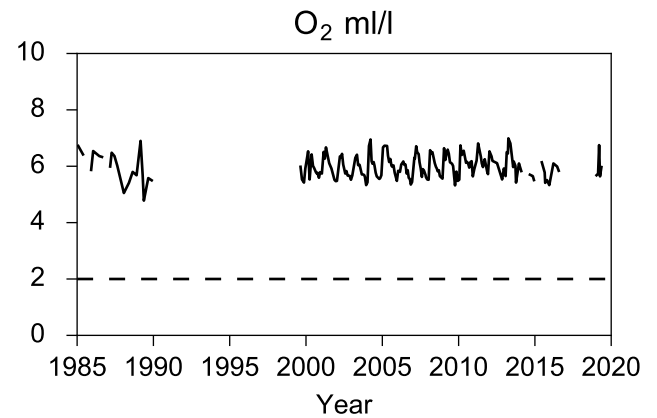
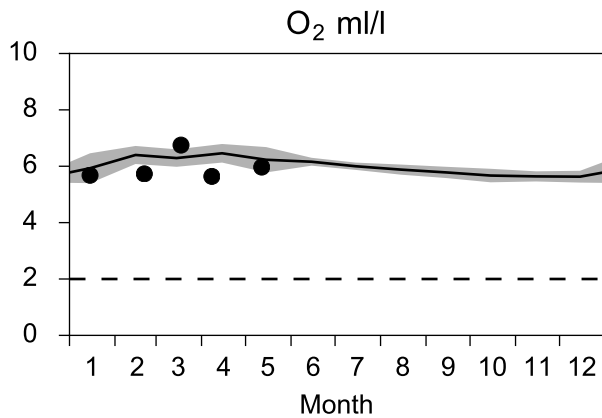
STATION Å17 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019

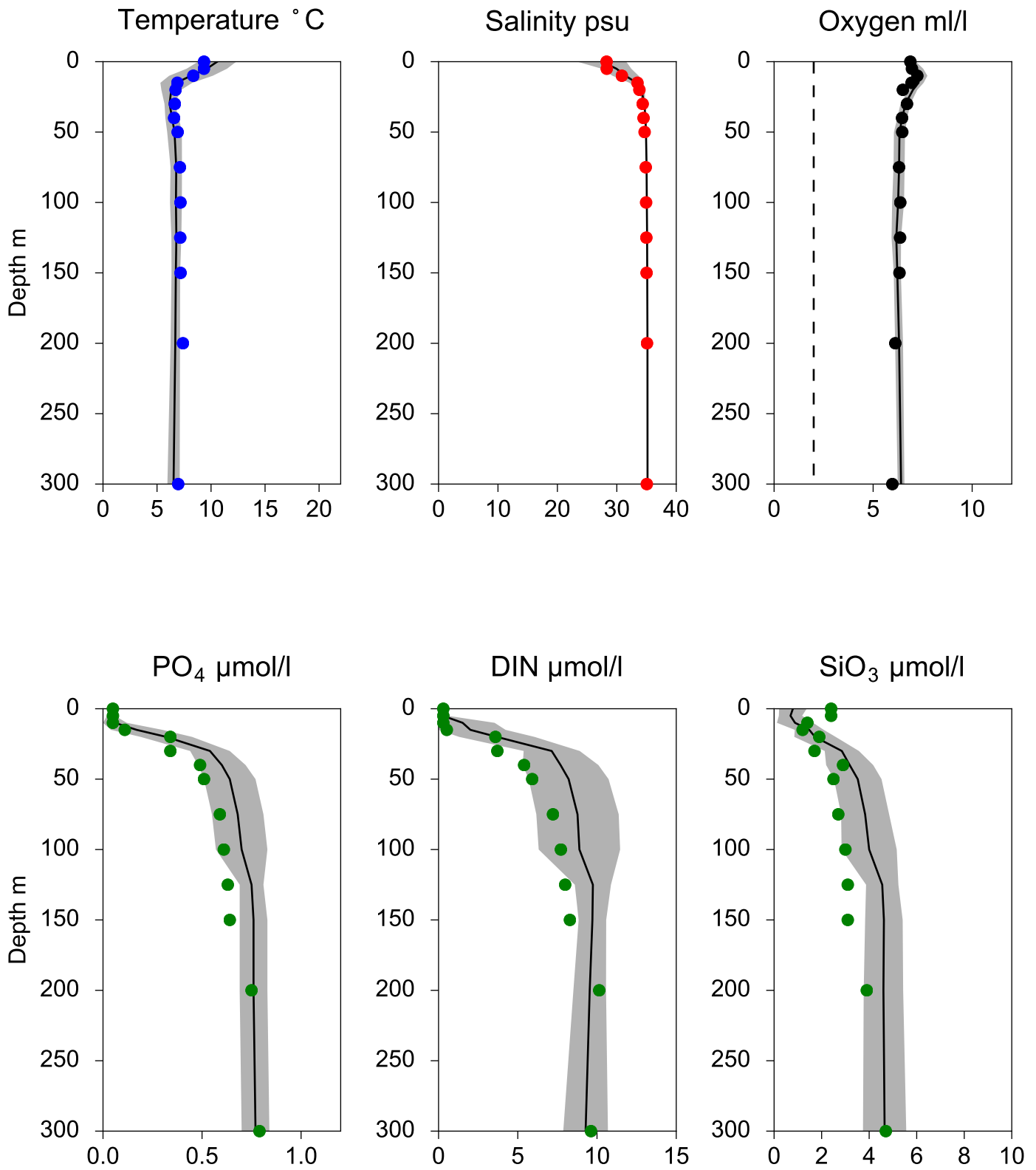


OXYGEN IN BOTTOM WATER (depth >= 300 m)



Vertical profiles Å17 May

— Mean 2001-2015 ■ St.Dev. ● 2019-05-12



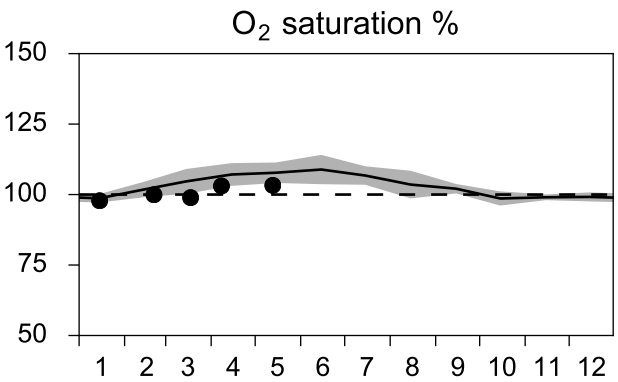
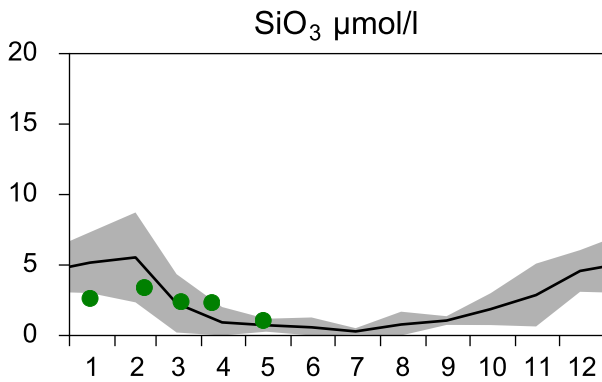
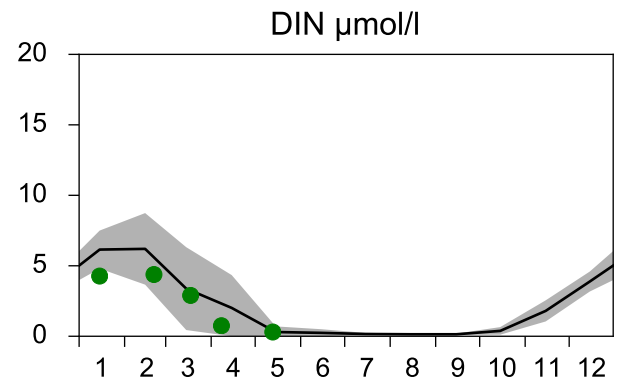
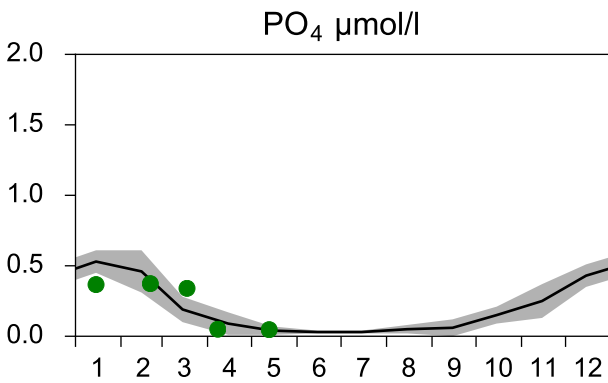
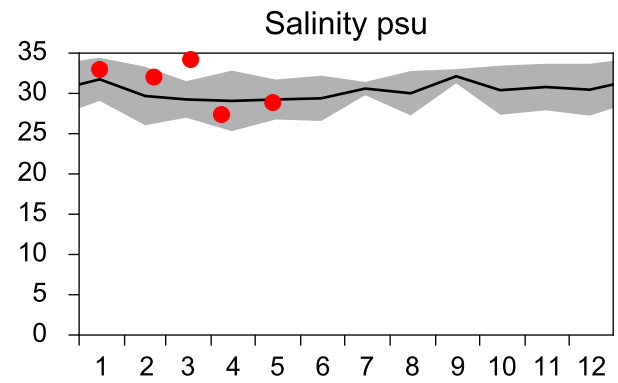
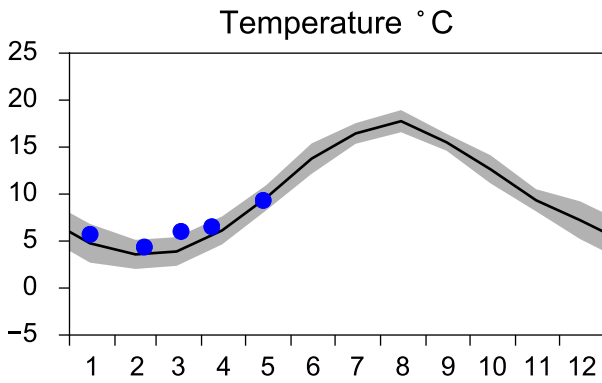
STATION Å15 SURFACE WATER (0-10 m)

Annual Cycles

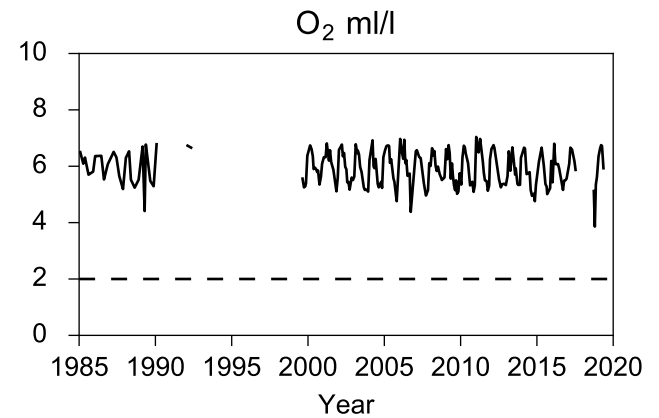
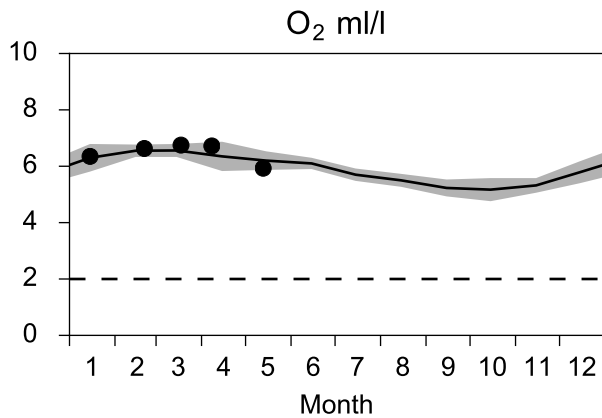
— Mean 2001-2015

■ St.Dev.

● 2019

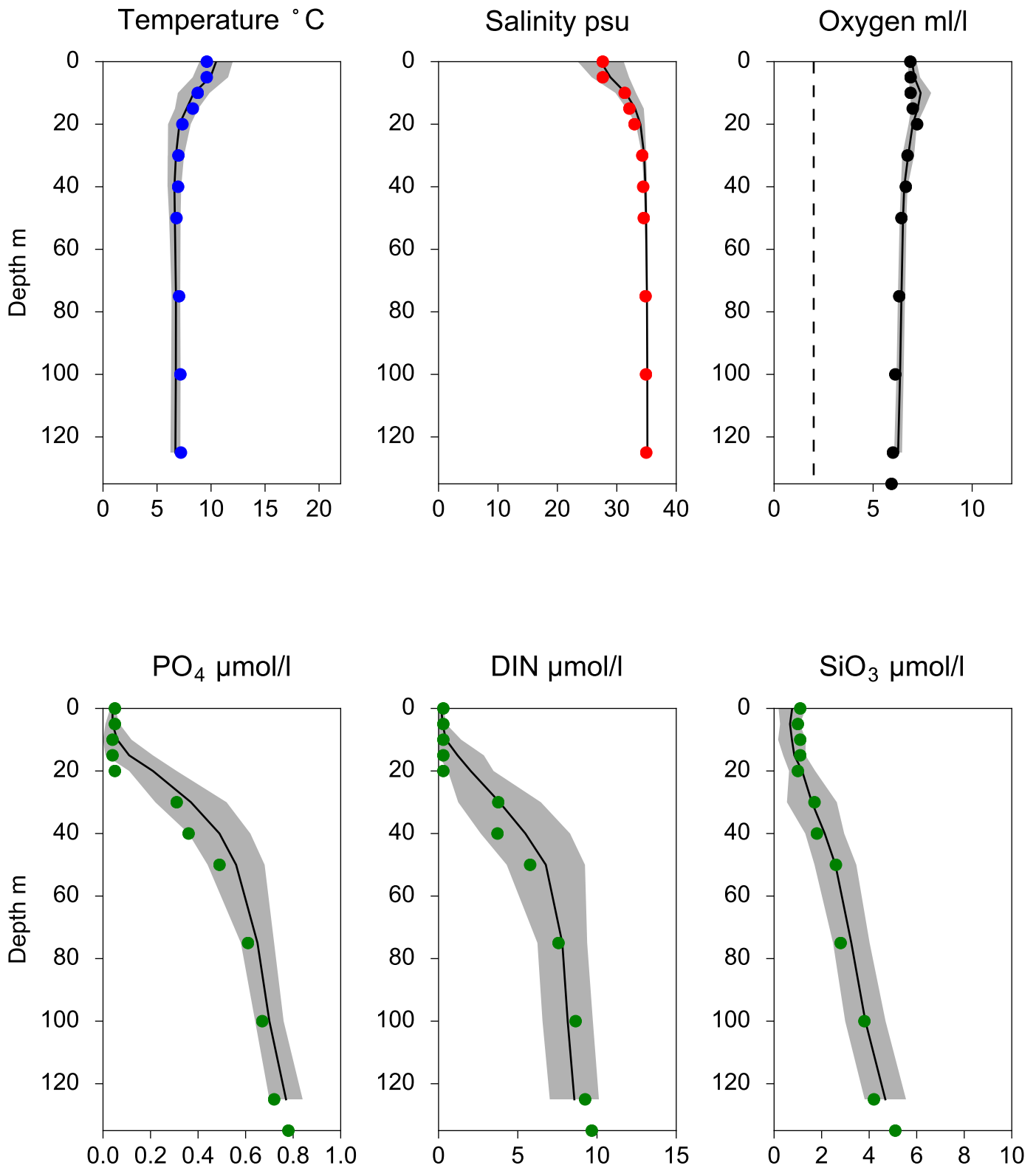


OXYGEN IN BOTTOM WATER (depth >= 125 m)



Vertical profiles A15 May

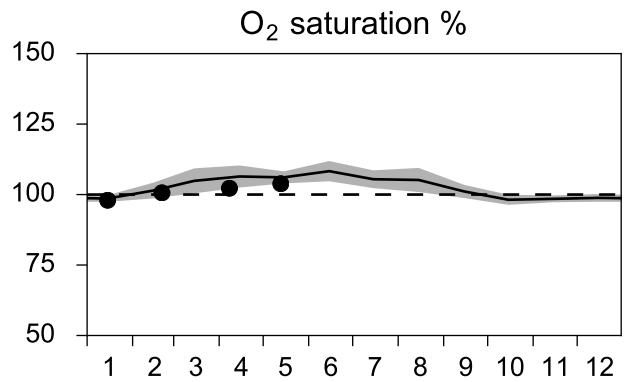
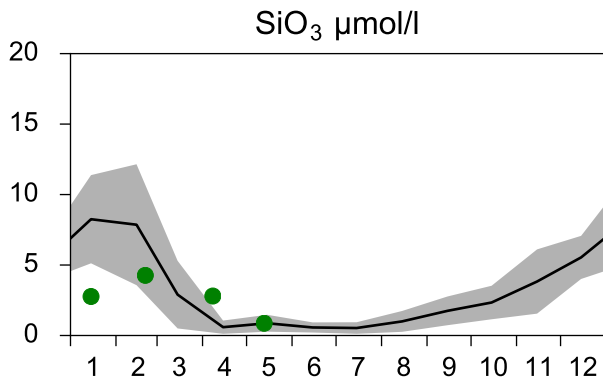
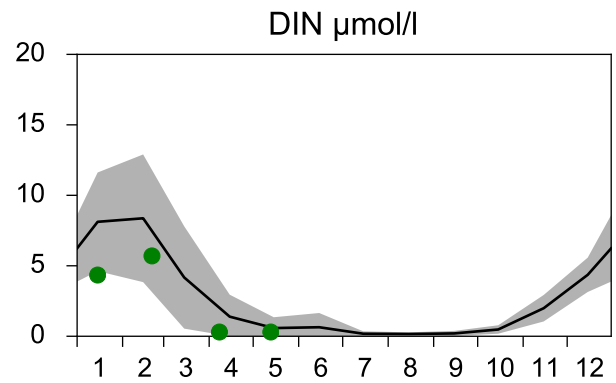
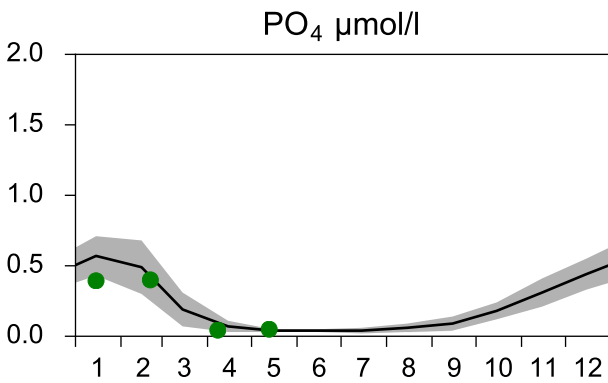
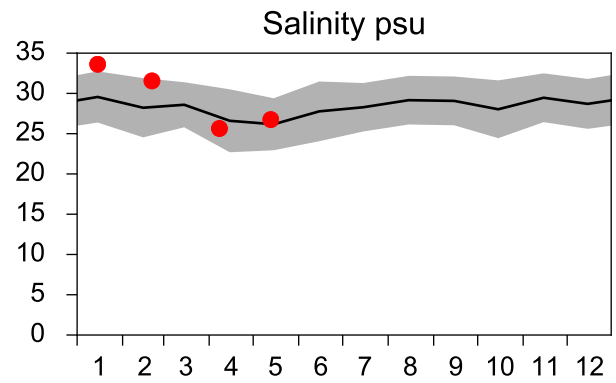
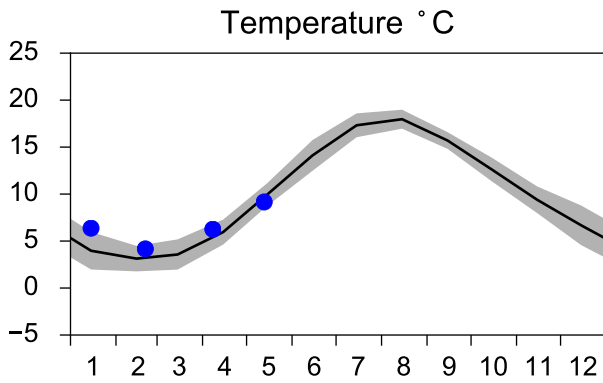
— Mean 2001-2015 ■ St.Dev. ● 2019-05-13



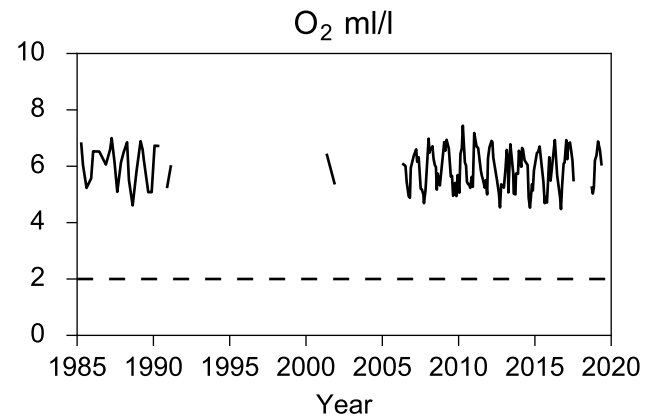
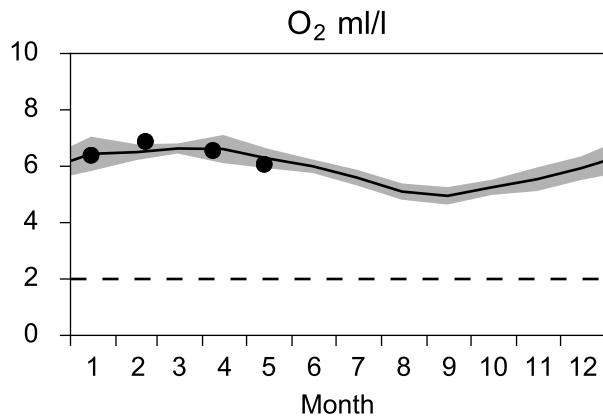
STATION Å13 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

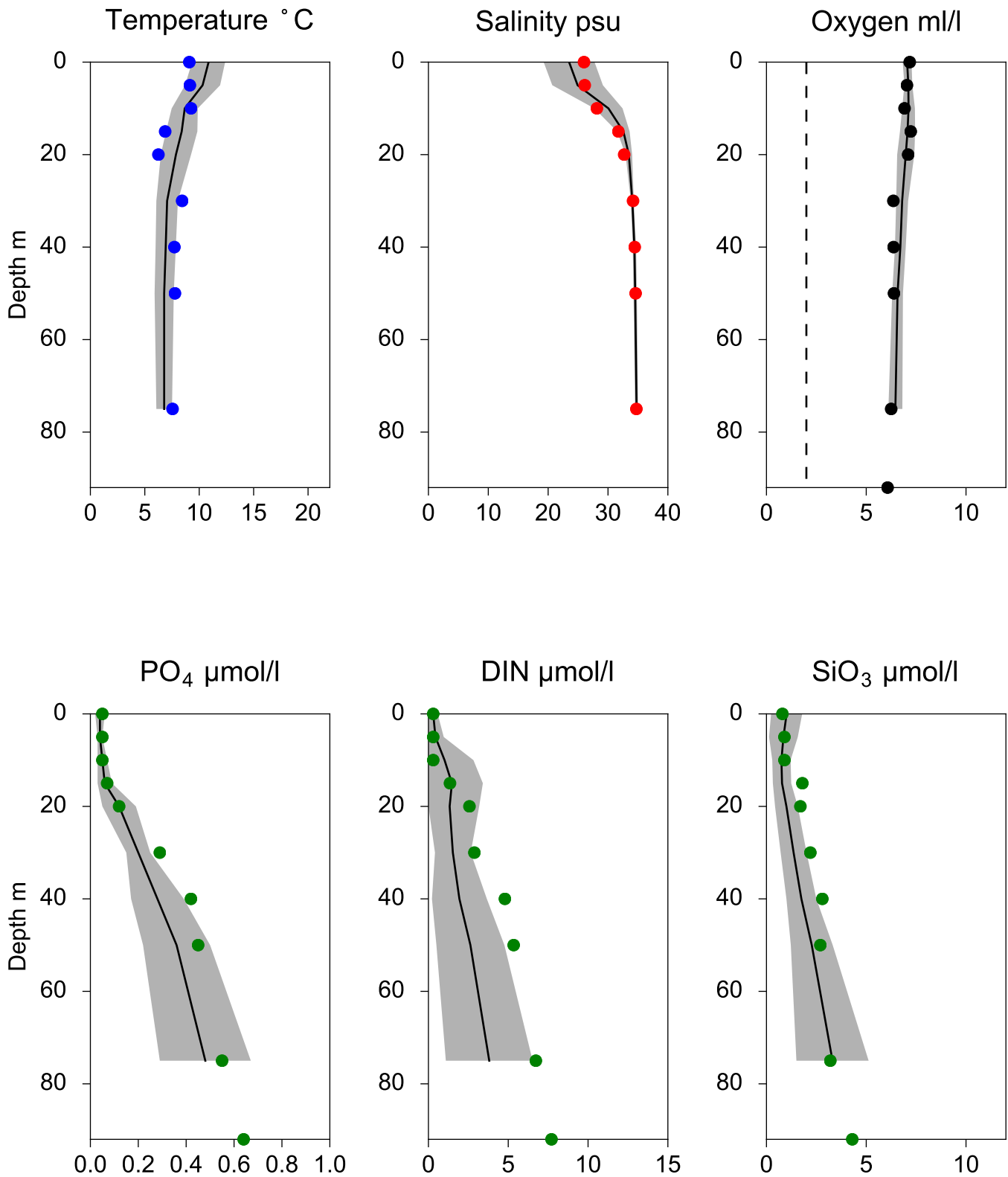


OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles Å13 May

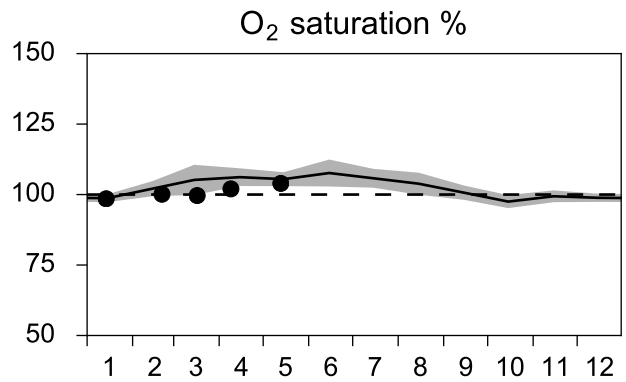
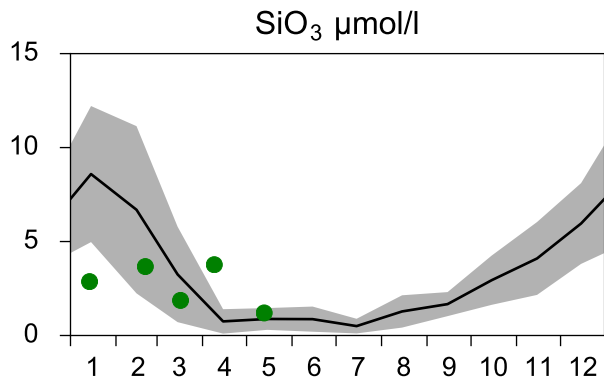
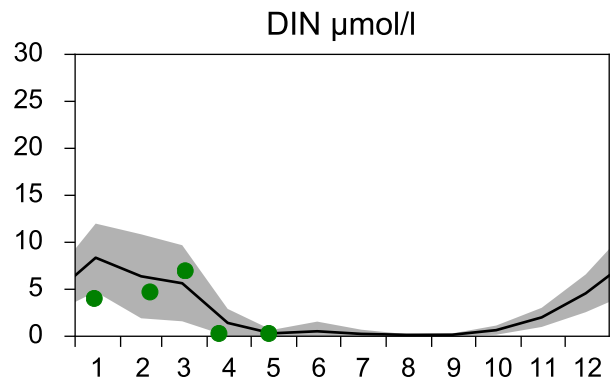
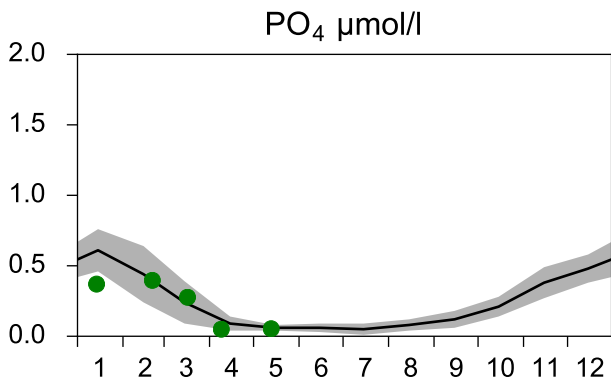
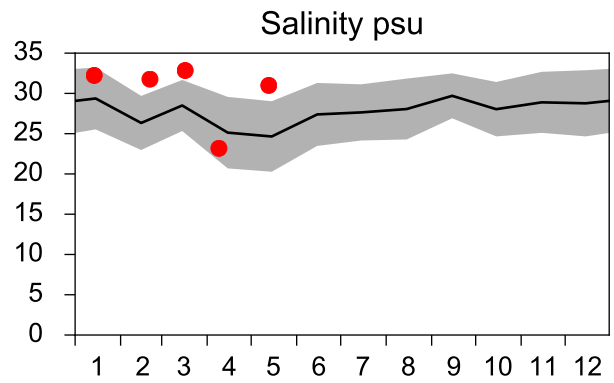
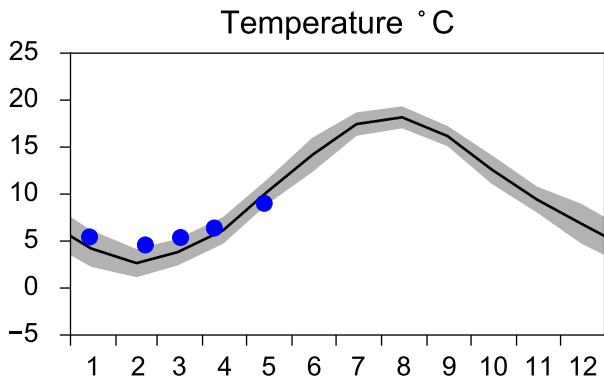
— Mean 2001-2015 ■ St.Dev. ● 2019-05-13



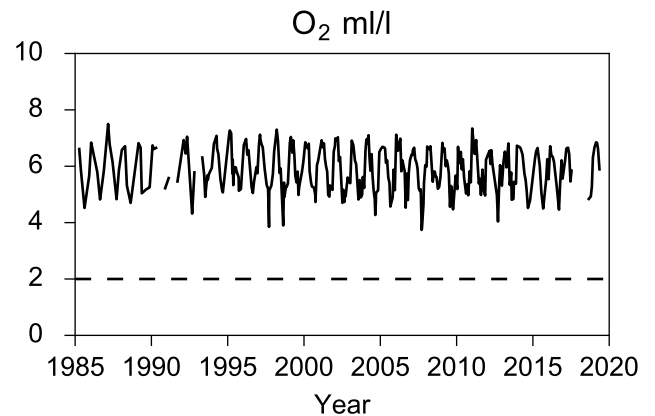
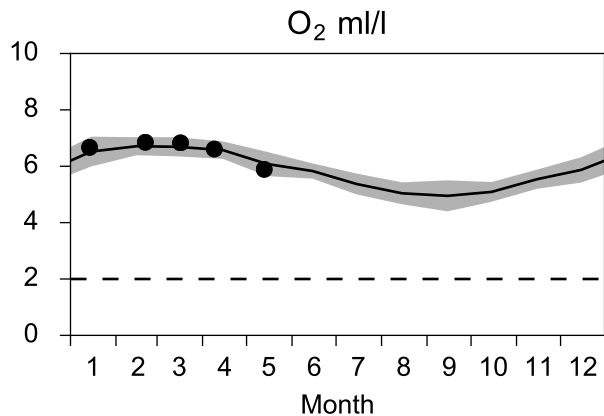
STATION P2 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019

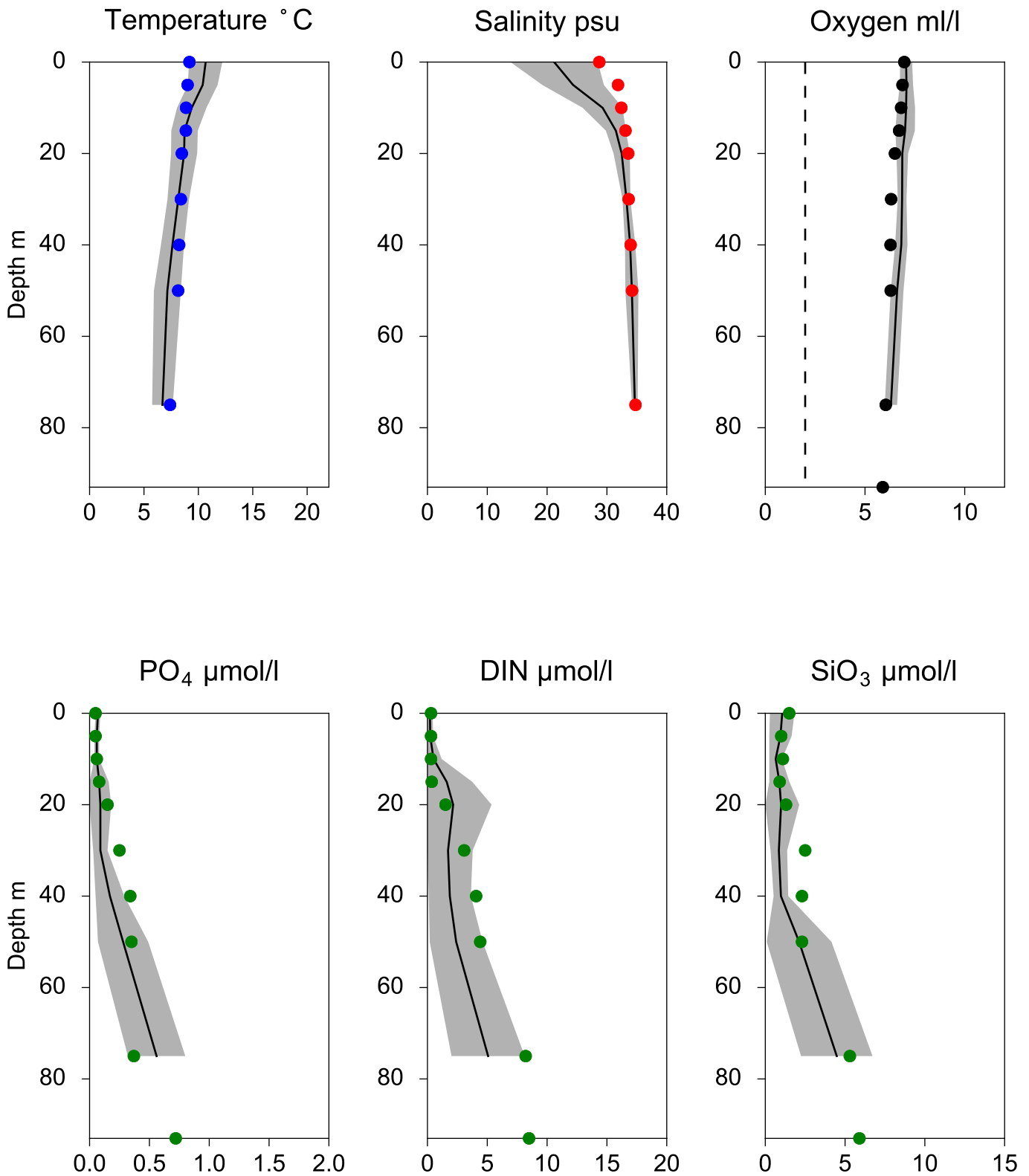


OXYGEN IN BOTTOM WATER (depth >= 75 m)



Vertical profiles P2 May

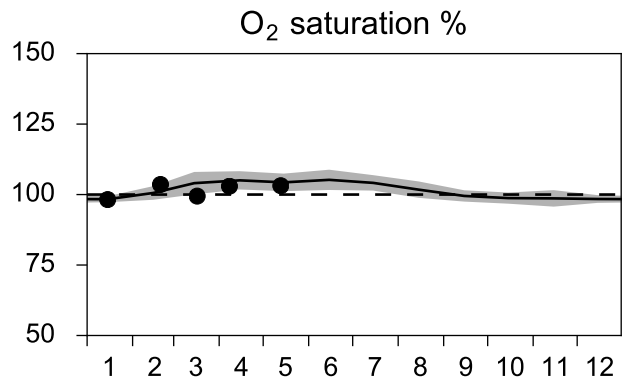
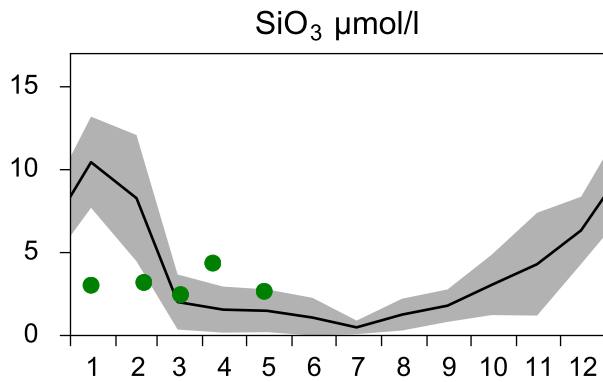
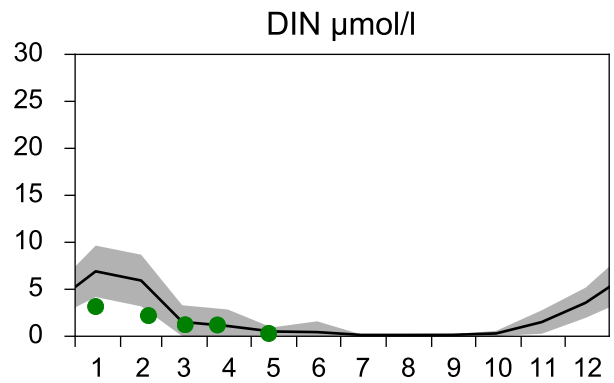
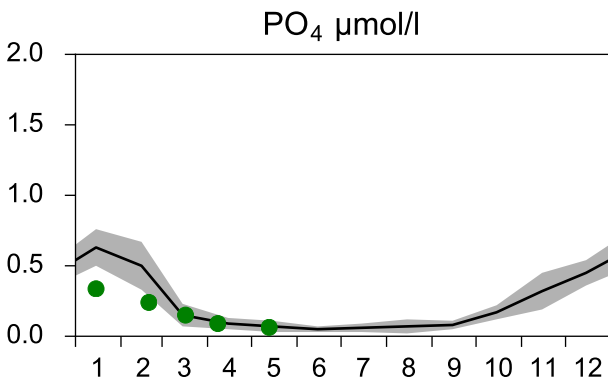
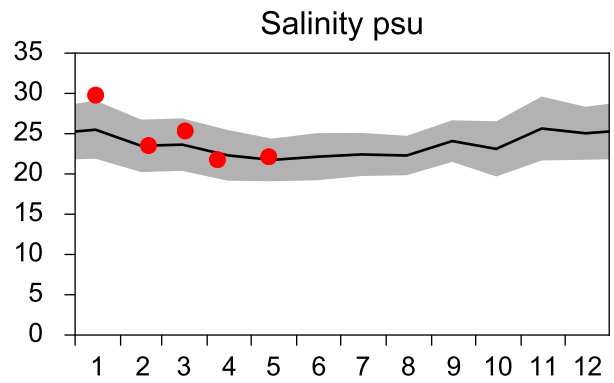
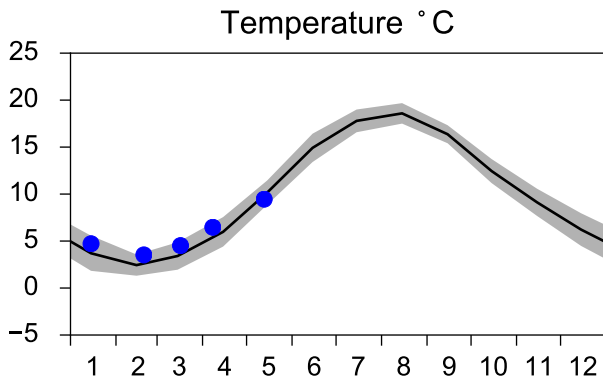
— Mean 2001-2015 ■ St.Dev. ● 2019-05-13



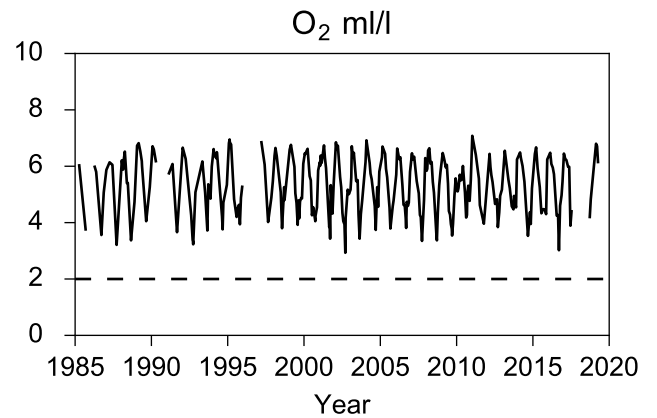
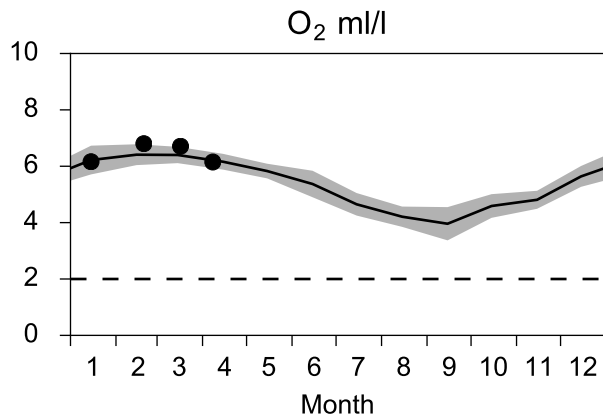
STATION FLADEN SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

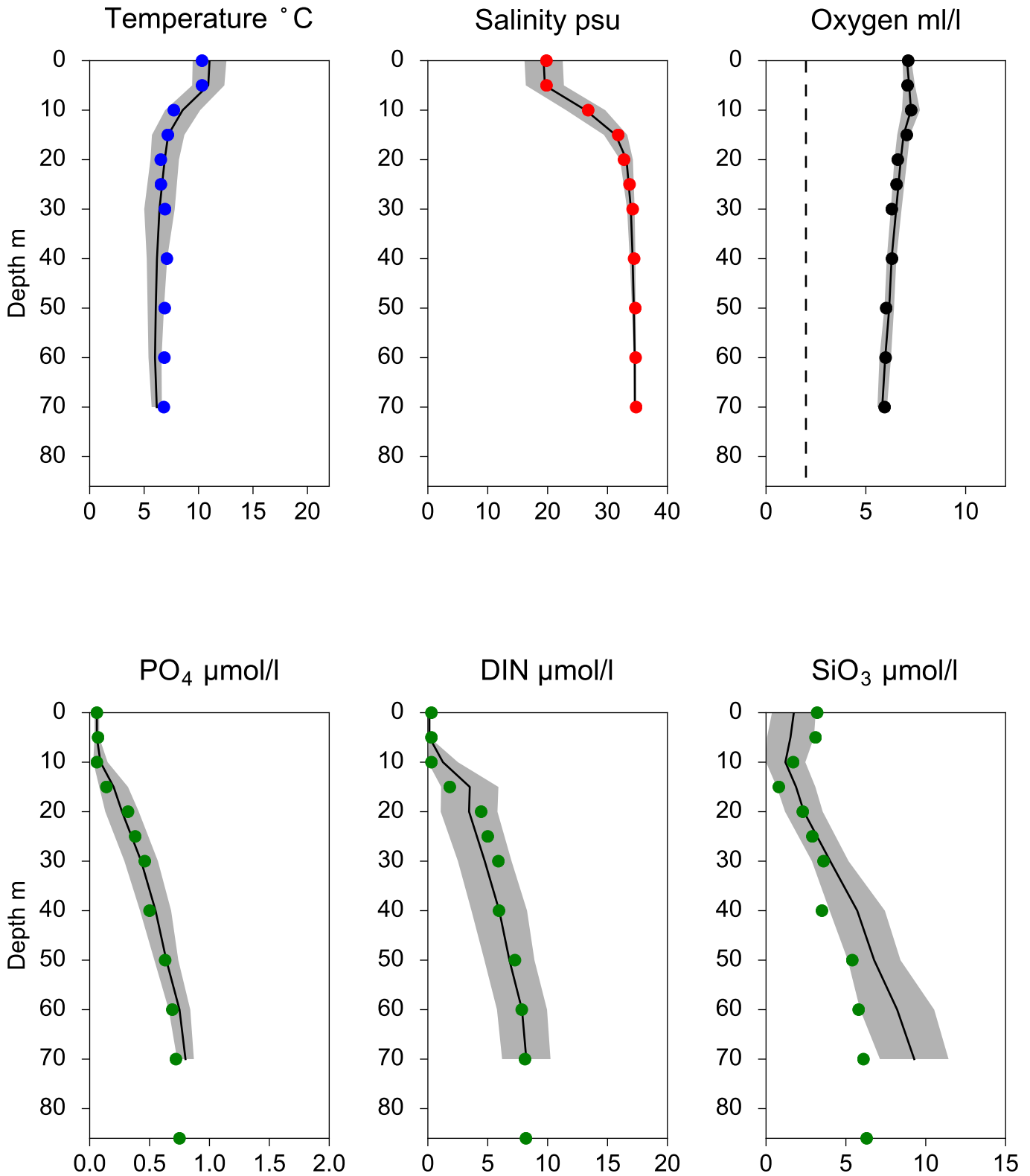


OXYGEN IN BOTTOM WATER (depth >= 74 m)



Vertical profiles FLADEN May

— Mean 2001-2015 ■ St.Dev. ● 2019-05-13



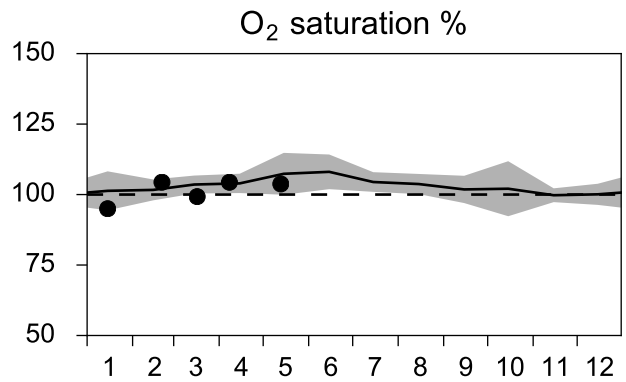
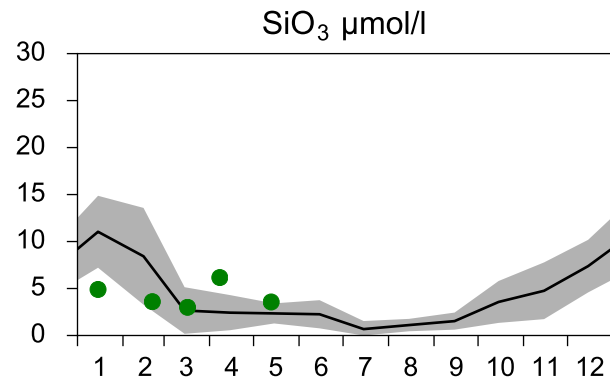
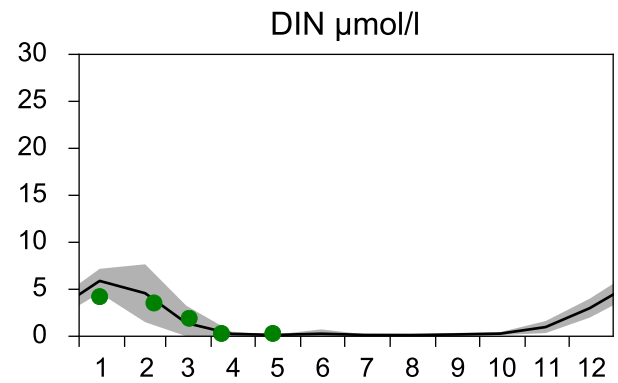
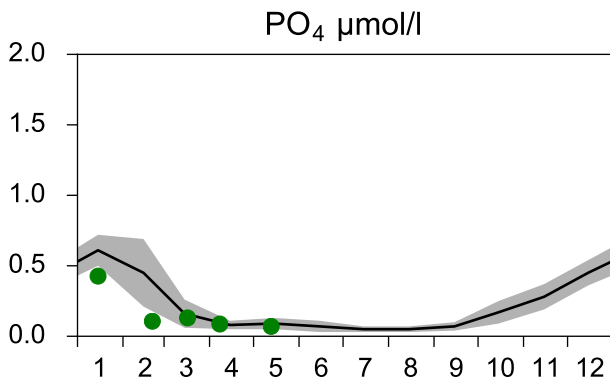
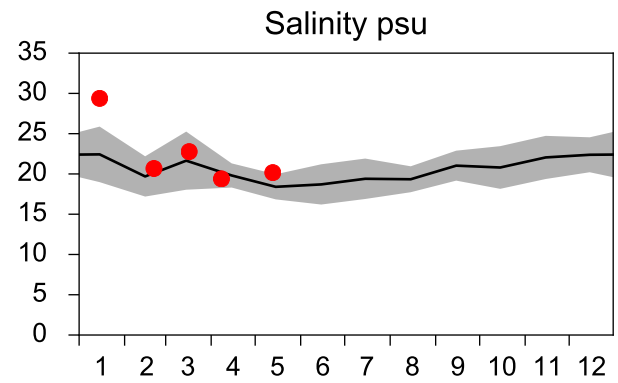
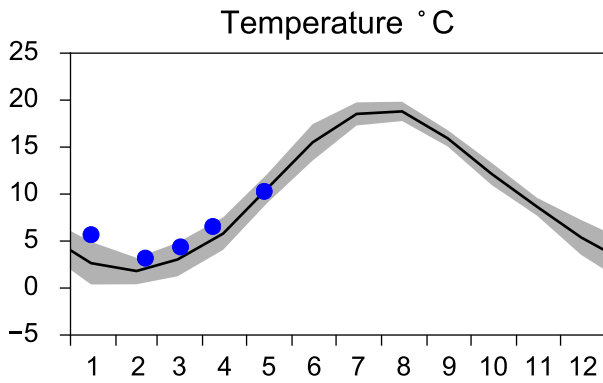
STATION N14 FALKENBERG SURFACE WATER (0-10 m)

Annual Cycles

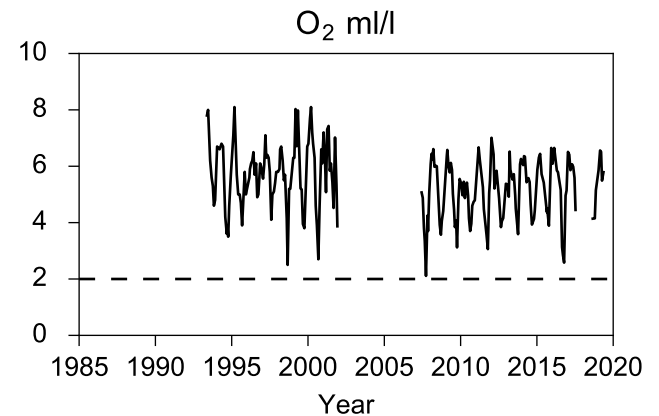
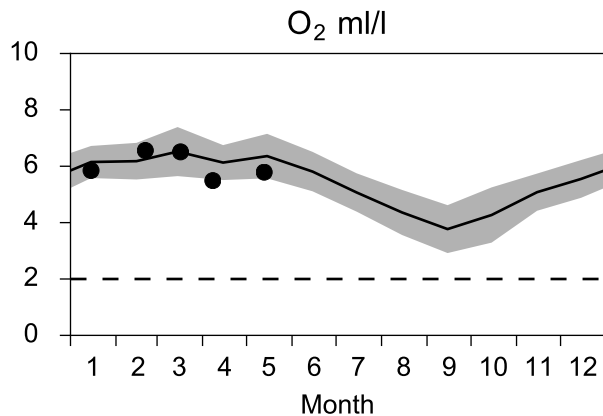
— Mean 2001-2015

■ St.Dev.

● 2019

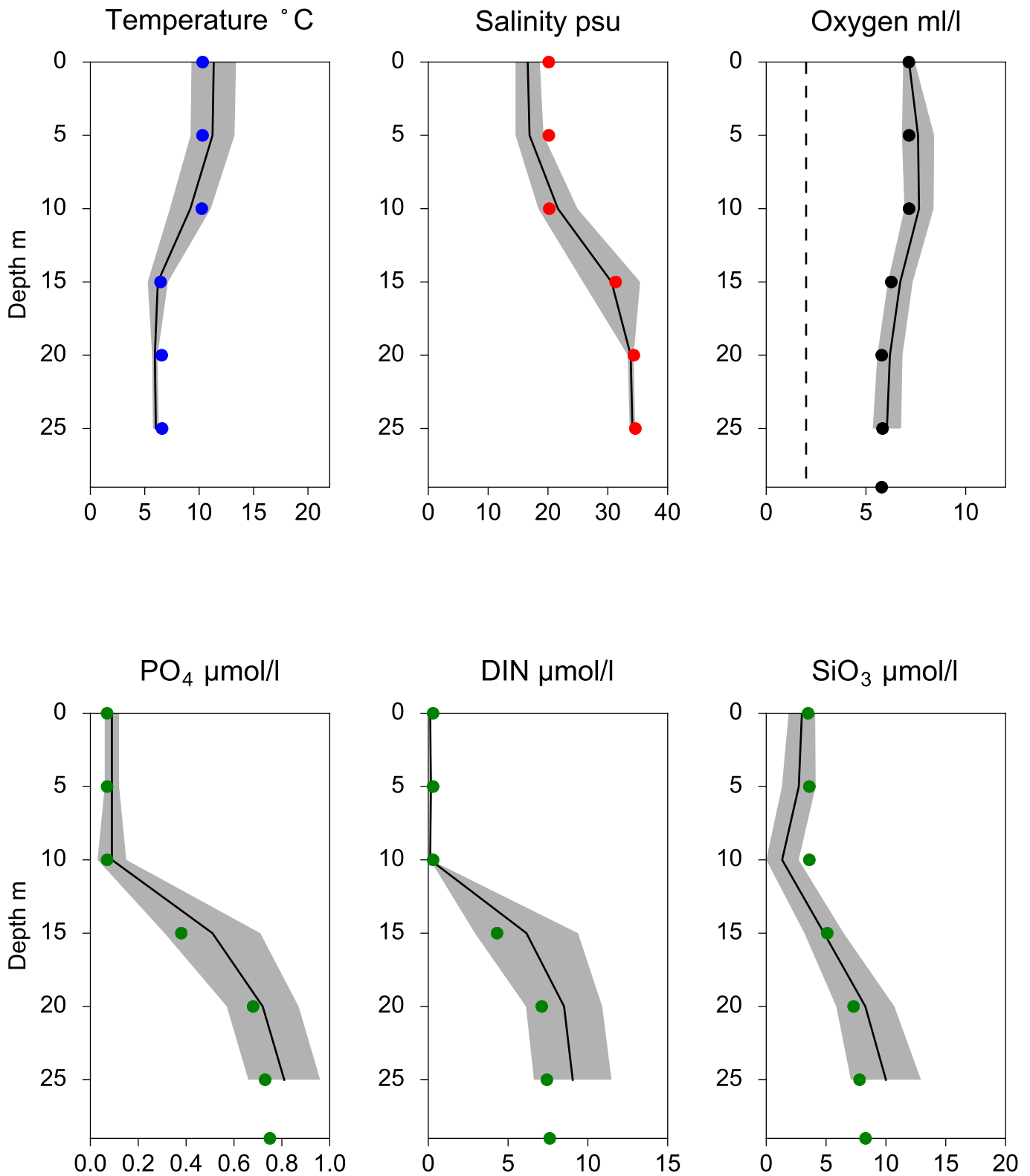


OXYGEN IN BOTTOM WATER (depth >= 25 m)



Vertical profiles N14 FALKENBERG May

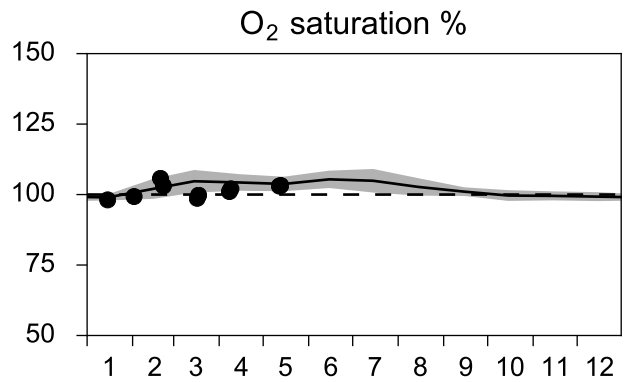
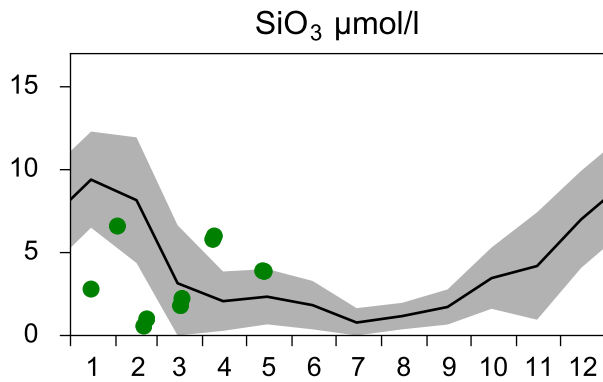
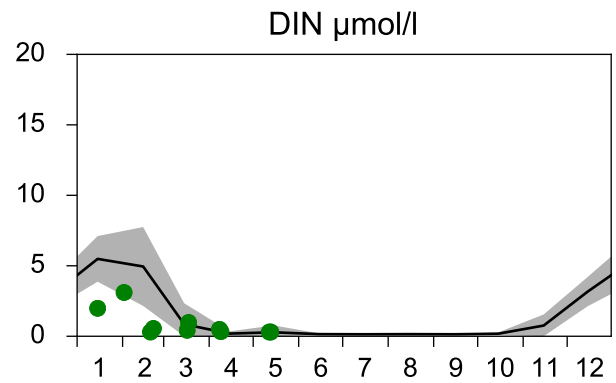
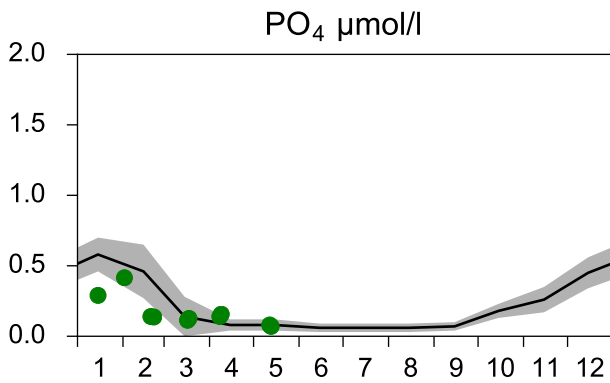
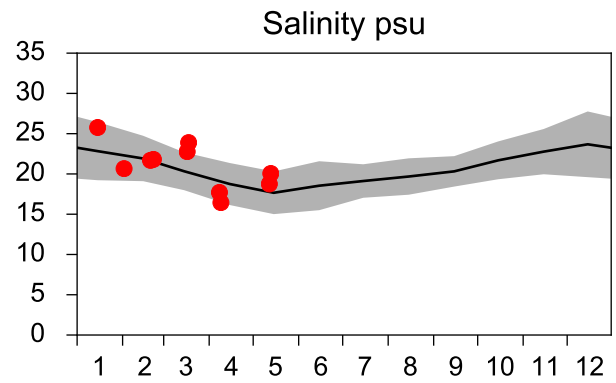
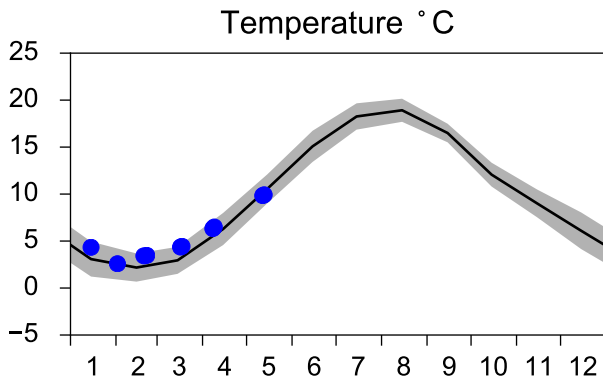
— Mean 2001-2015 ■ St.Dev. ● 2019-05-13



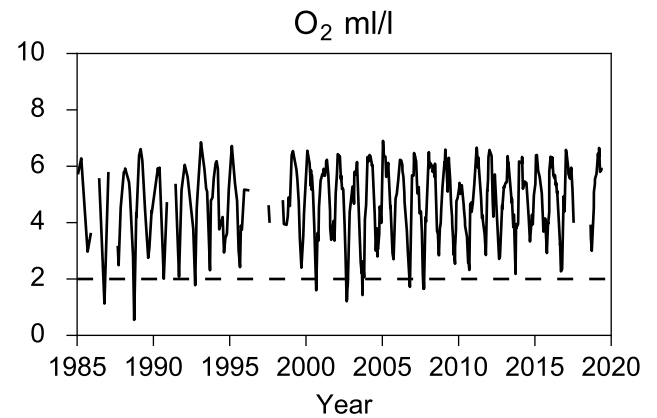
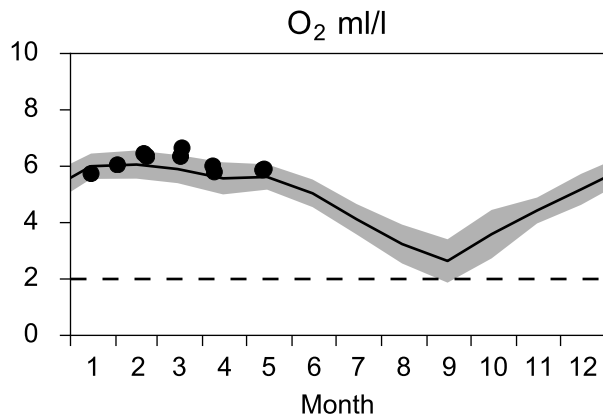
STATION ANHOLT E SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019

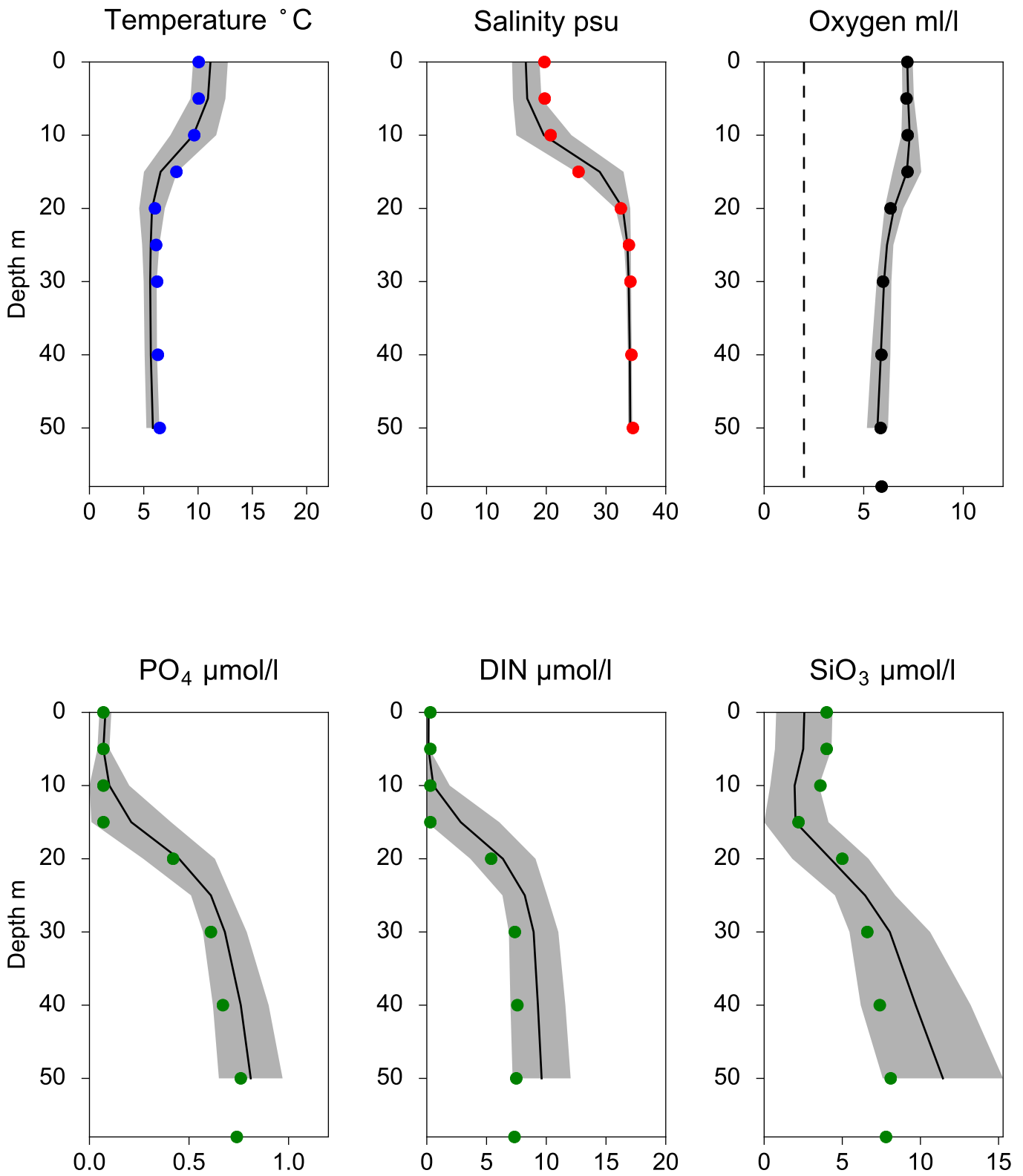


OXYGEN IN BOTTOM WATER (depth >= 52 m)



Vertical profiles ANHOLT E May

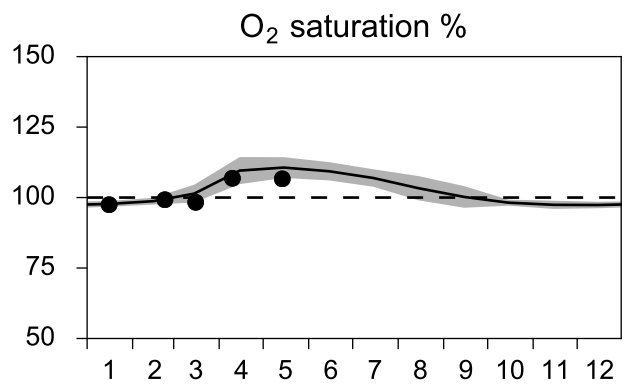
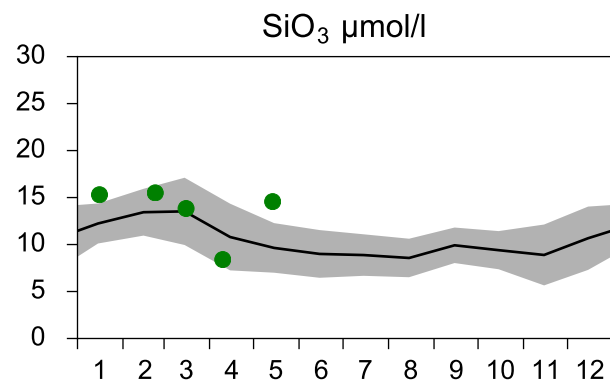
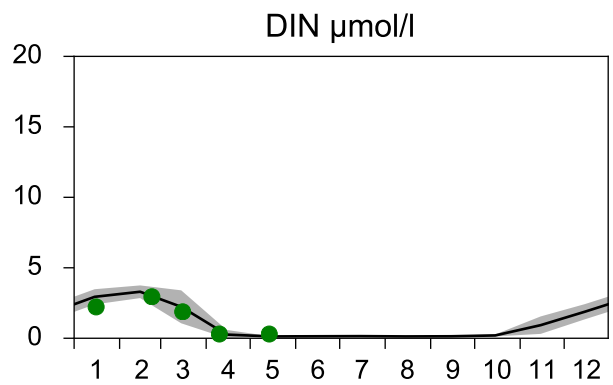
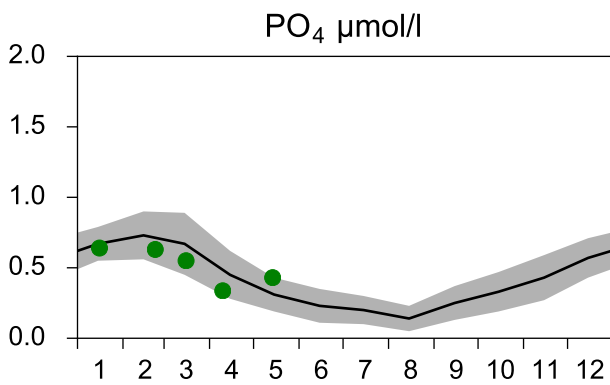
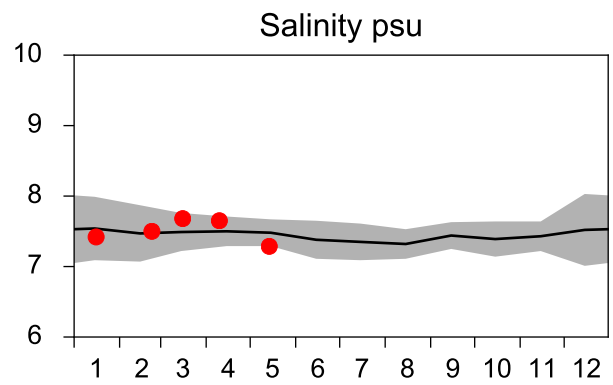
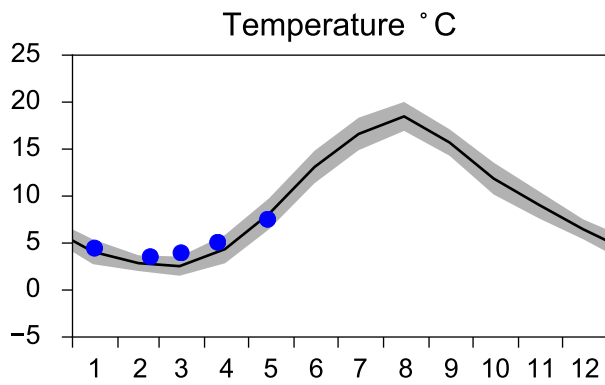
— Mean 2001-2015 ■ St.Dev. ● 2019-05-13



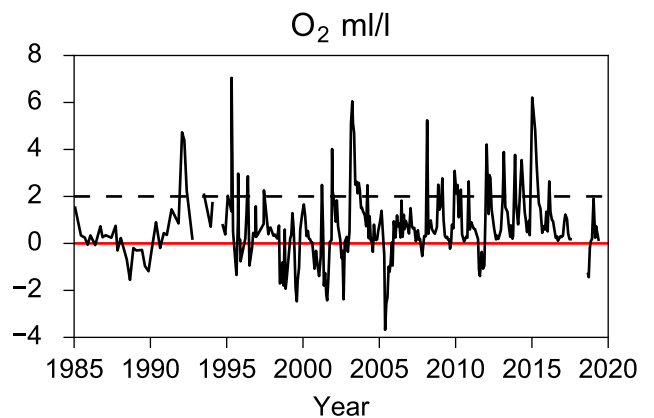
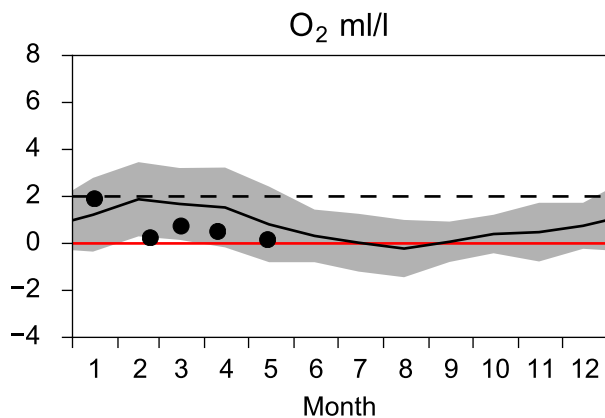
STATION HANÖBUKTEN SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

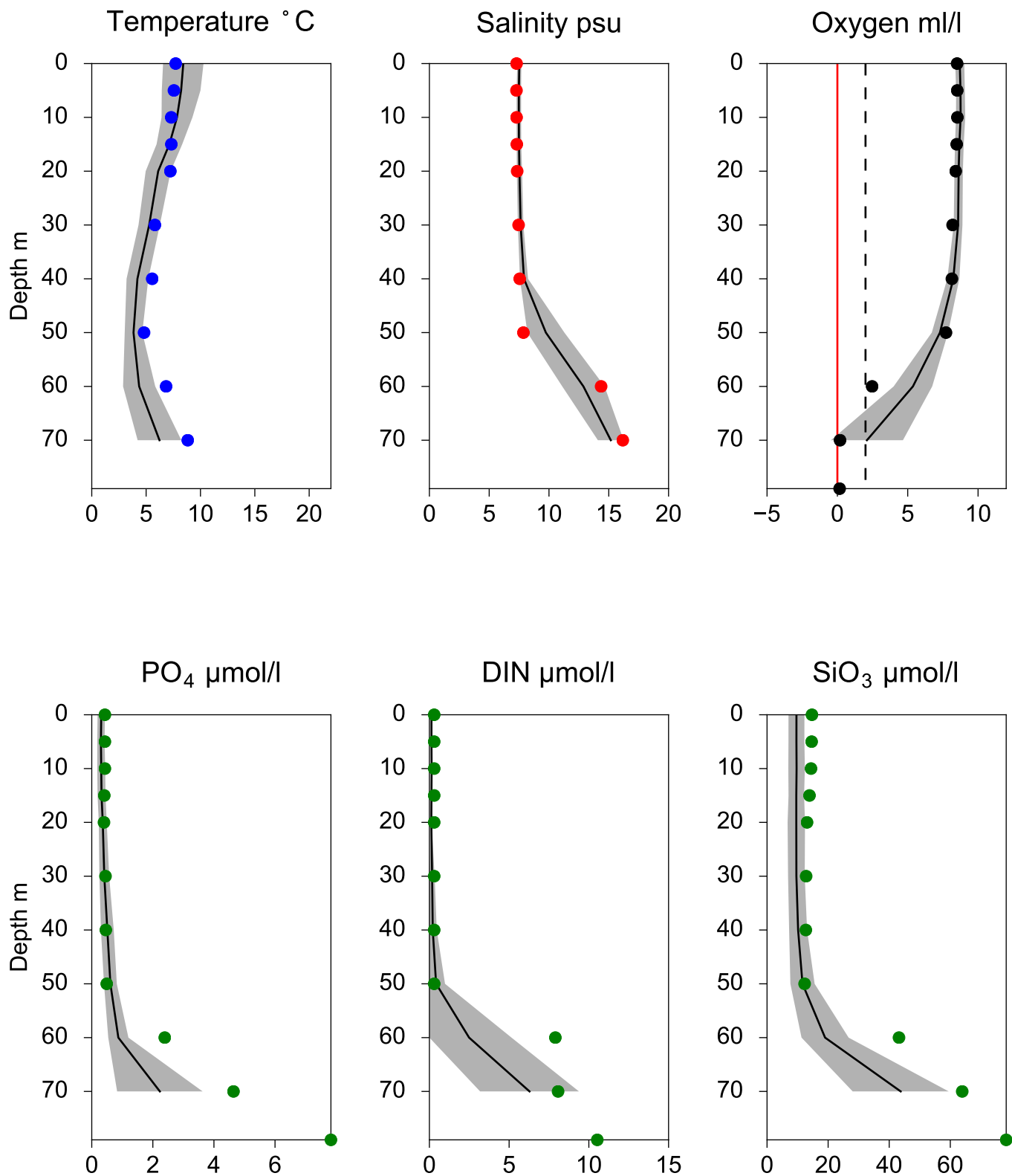


OXYGEN IN BOTTOM WATER (depth >= 70 m)



Vertical profiles HANÖBUKTEN May

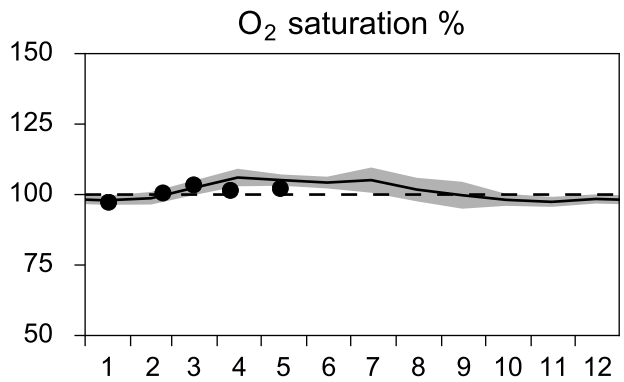
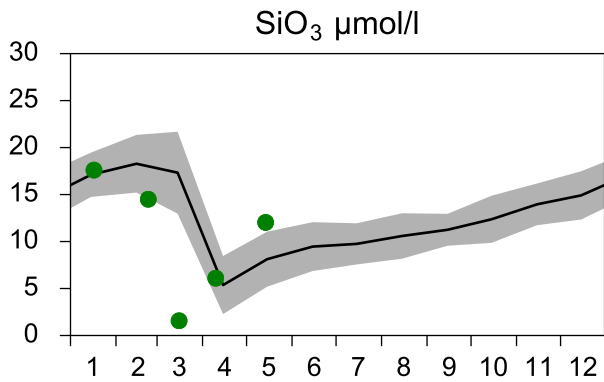
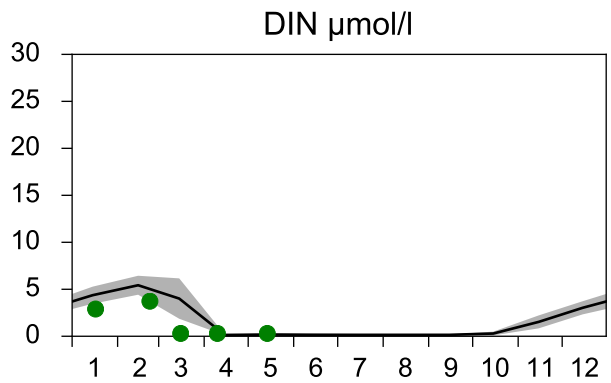
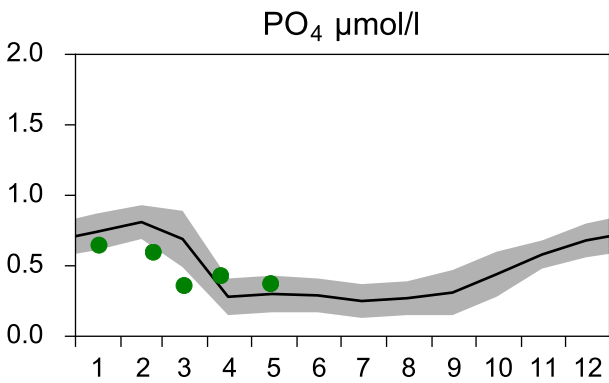
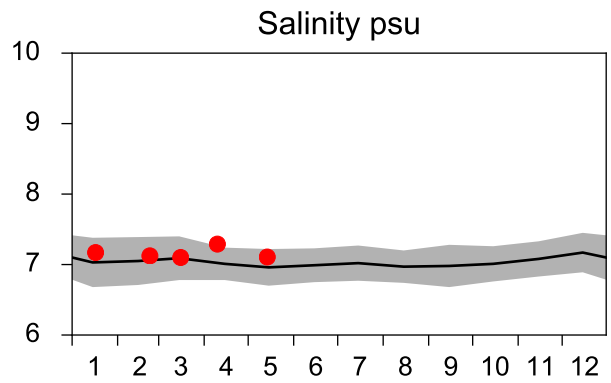
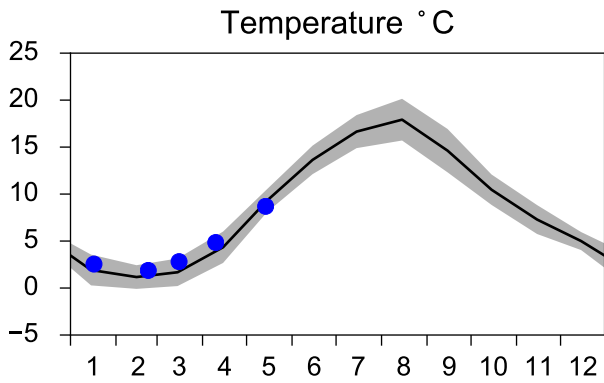
— Mean 2001-2015 St.Dev. ● 2019-05-14



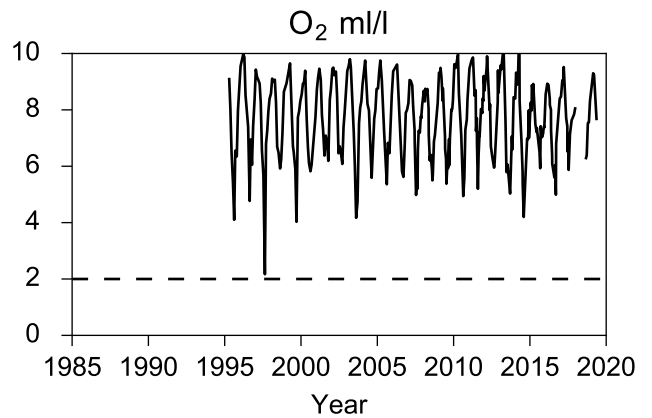
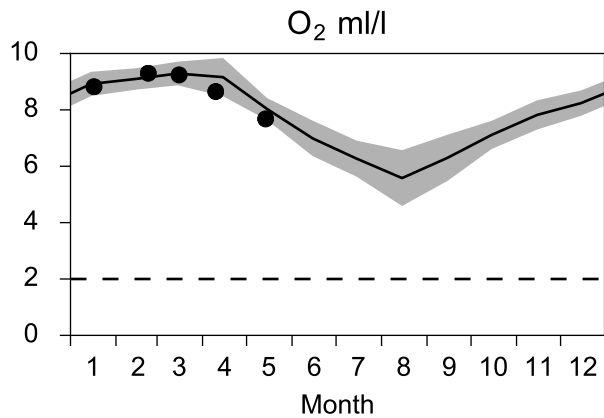
STATION REF M1V1 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019

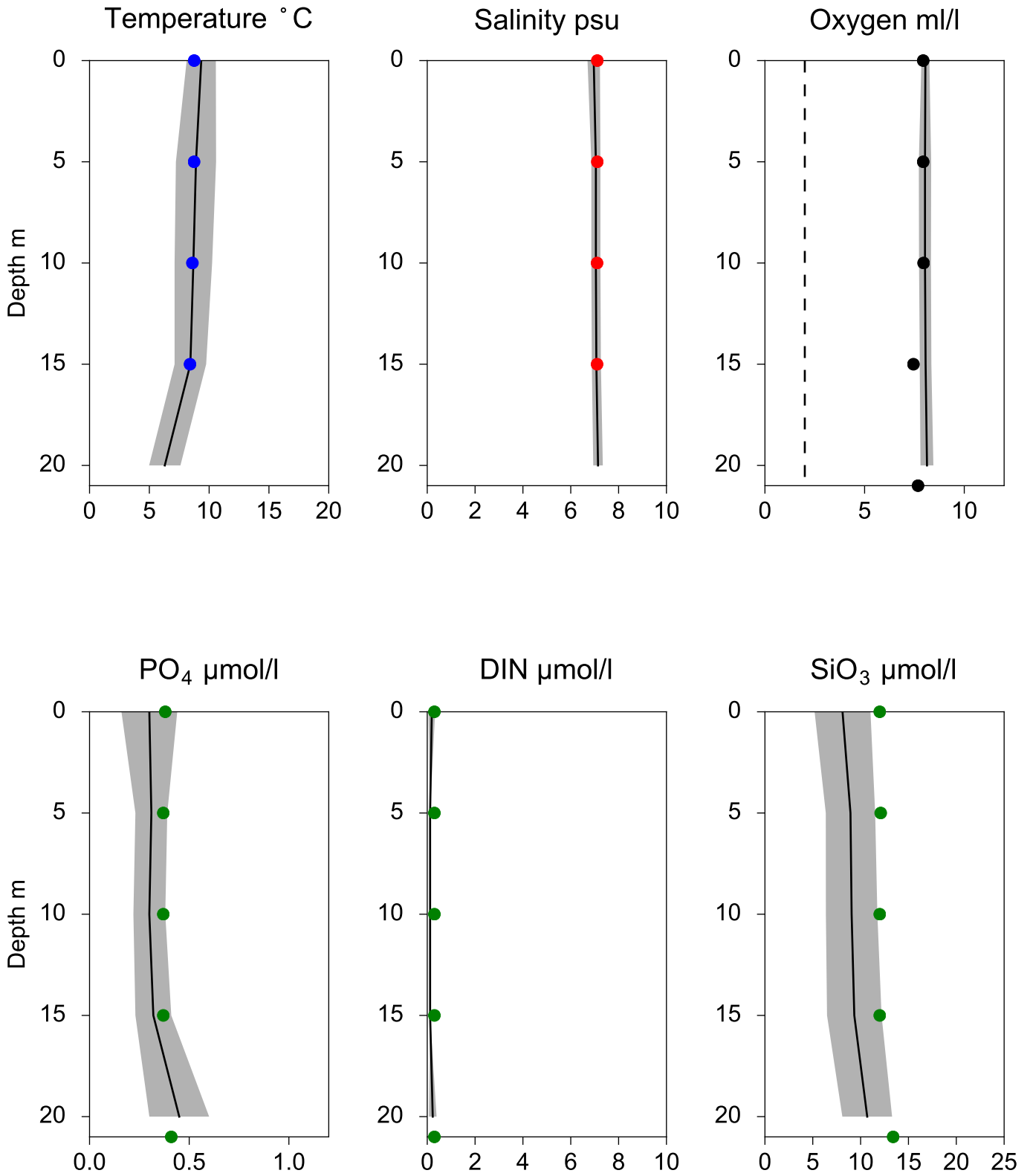


OXOGEN IN BOTTOM WATER (depth >= 17 m)



Vertical profiles REF M1V1 May

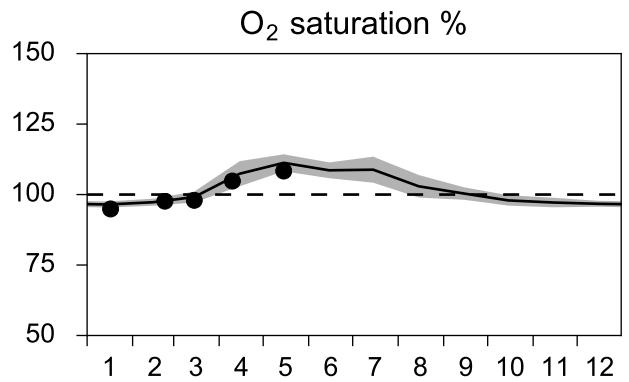
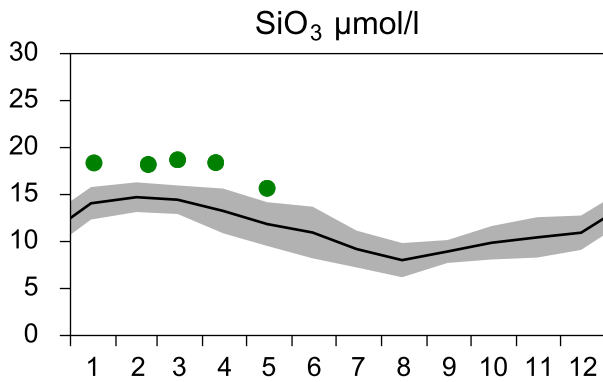
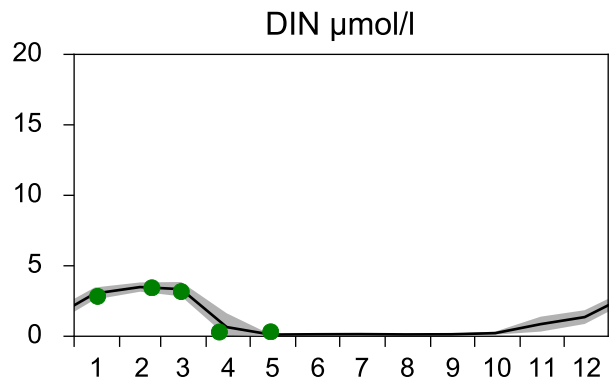
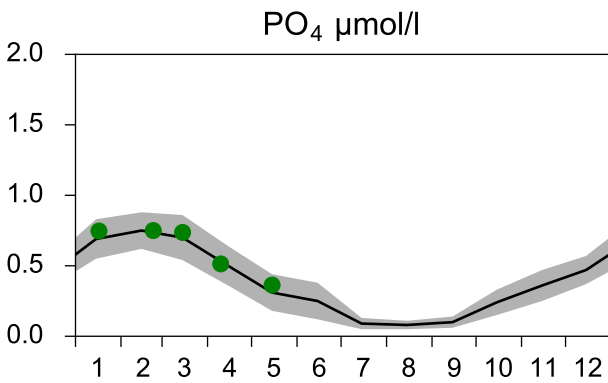
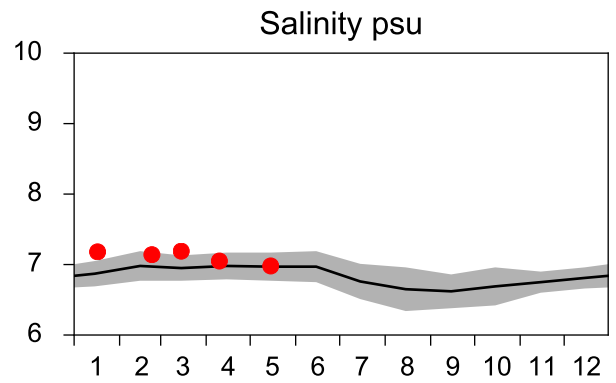
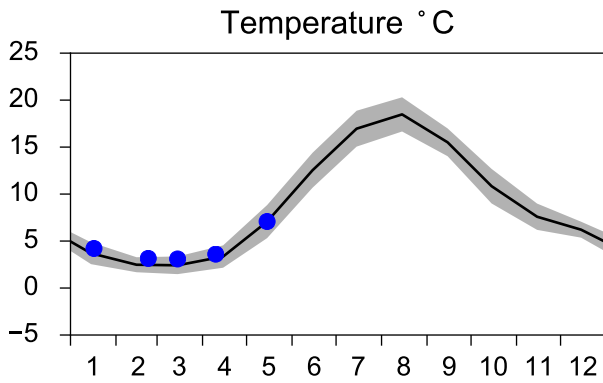
— Mean 2001-2015 ■ St.Dev. ● 2019-05-14



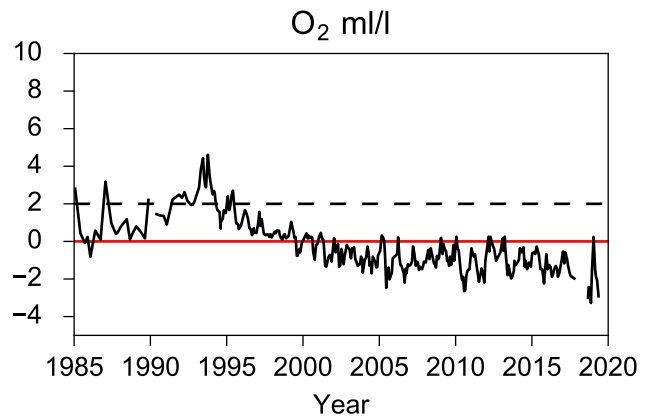
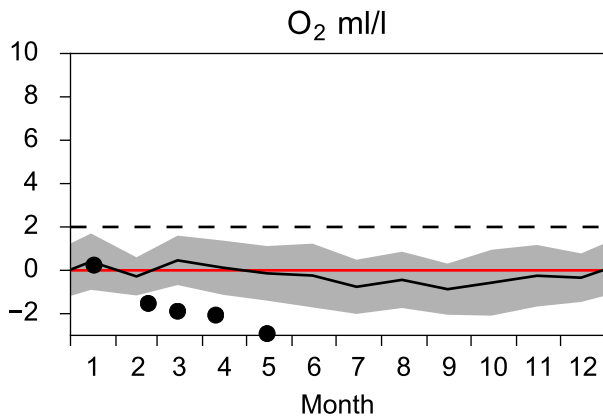
STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

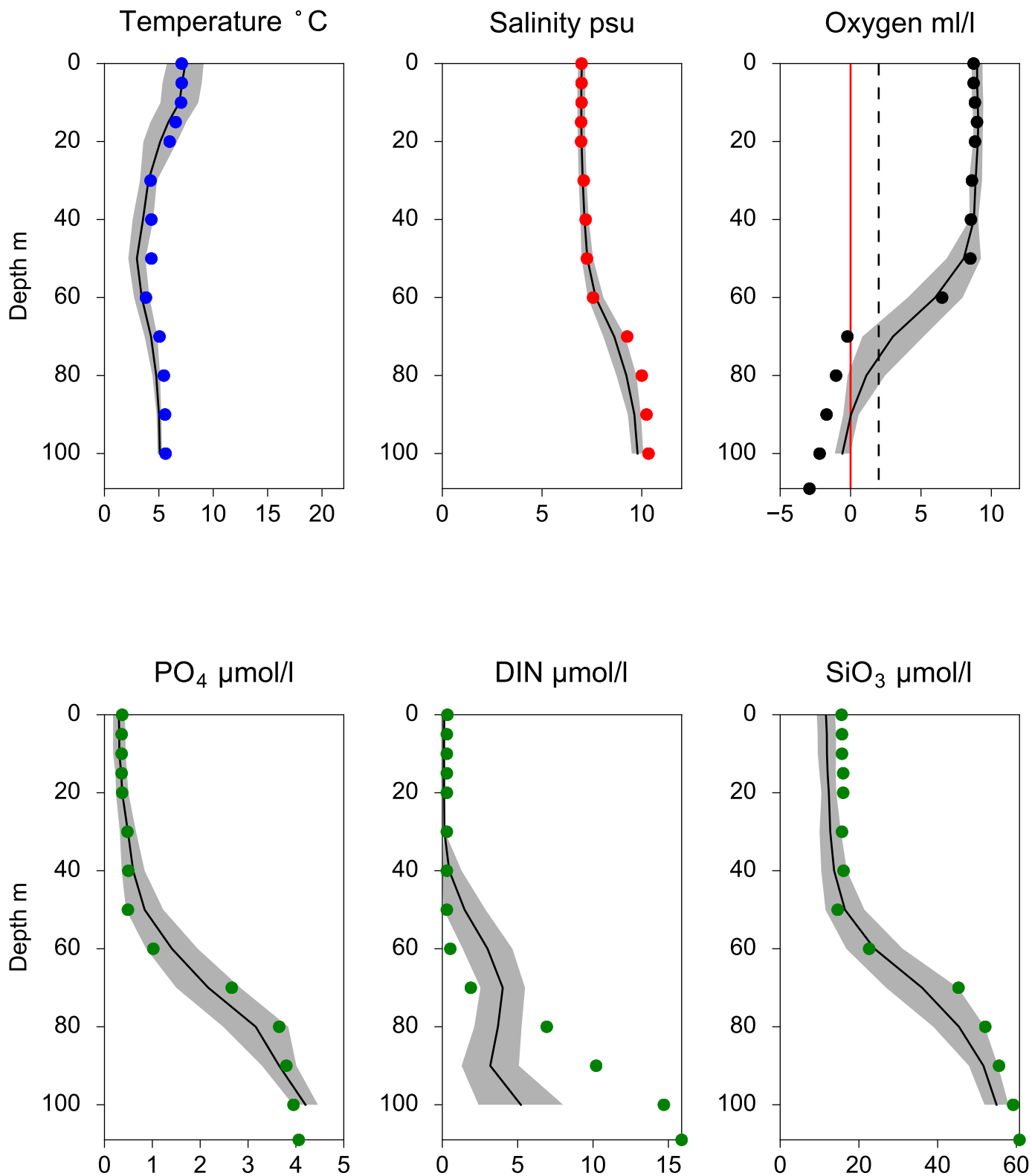


OXYGEN IN BOTTOM WATER (depth >= 100 m)



Vertical profiles BY38 KARLSÖDJ May

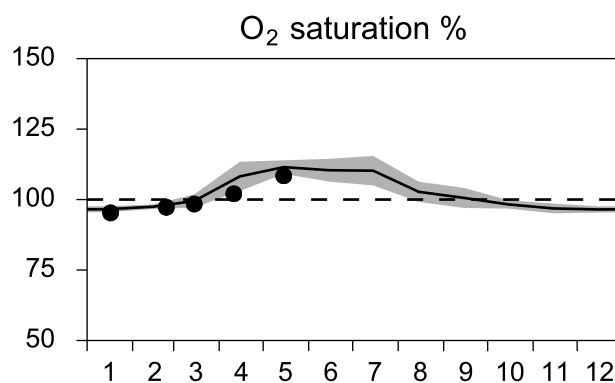
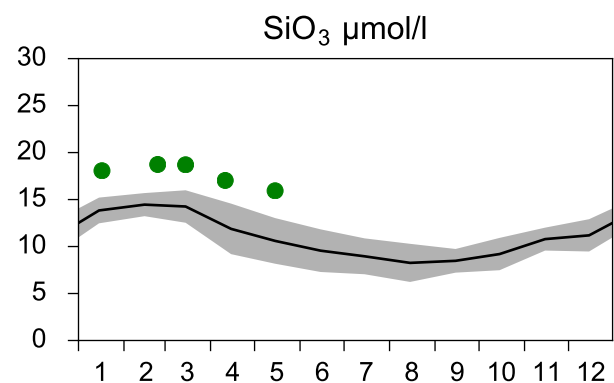
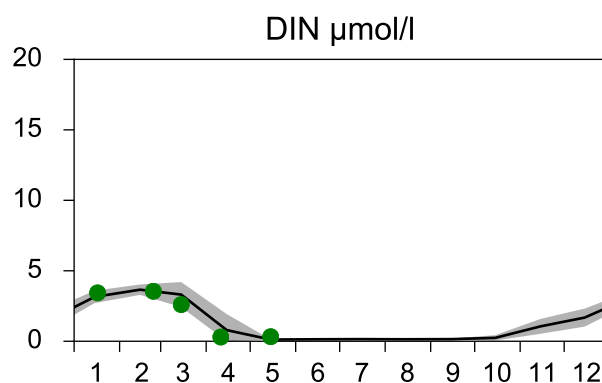
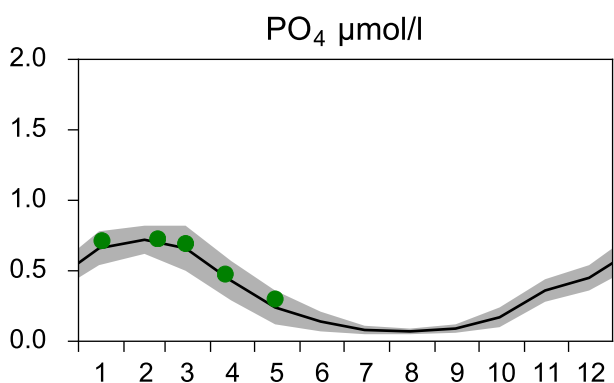
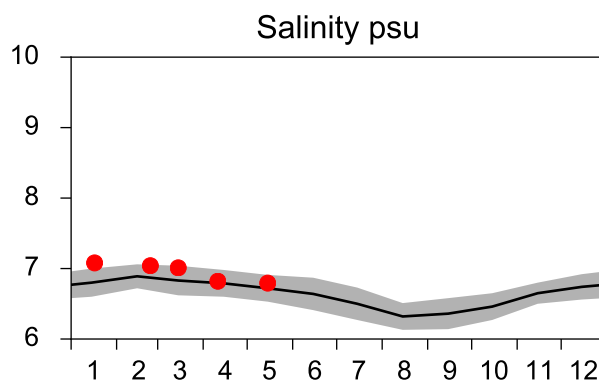
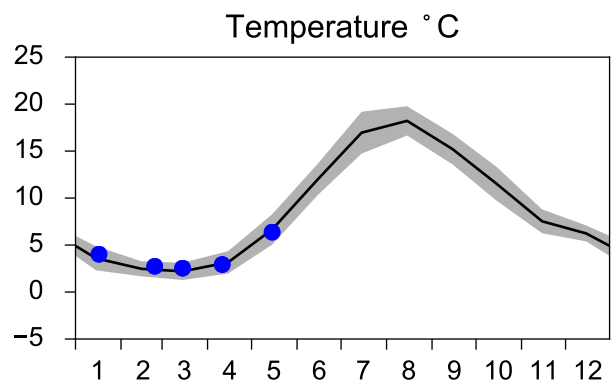
— Mean 2001-2015 ■ St.Dev. ● 2019-05-15



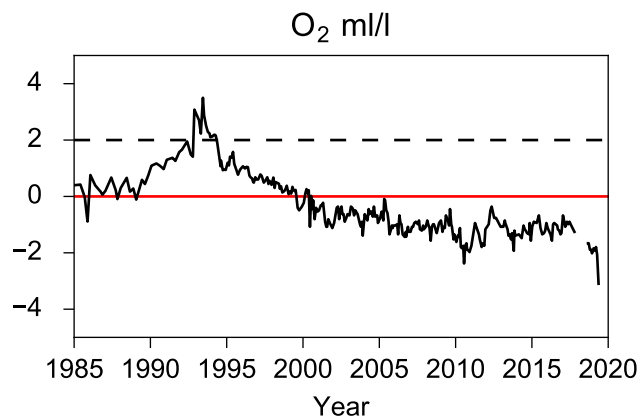
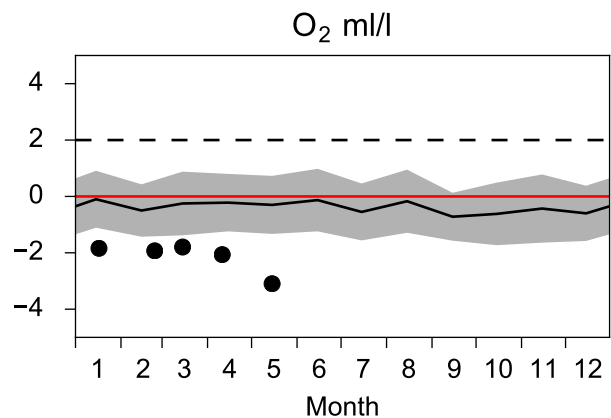
STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

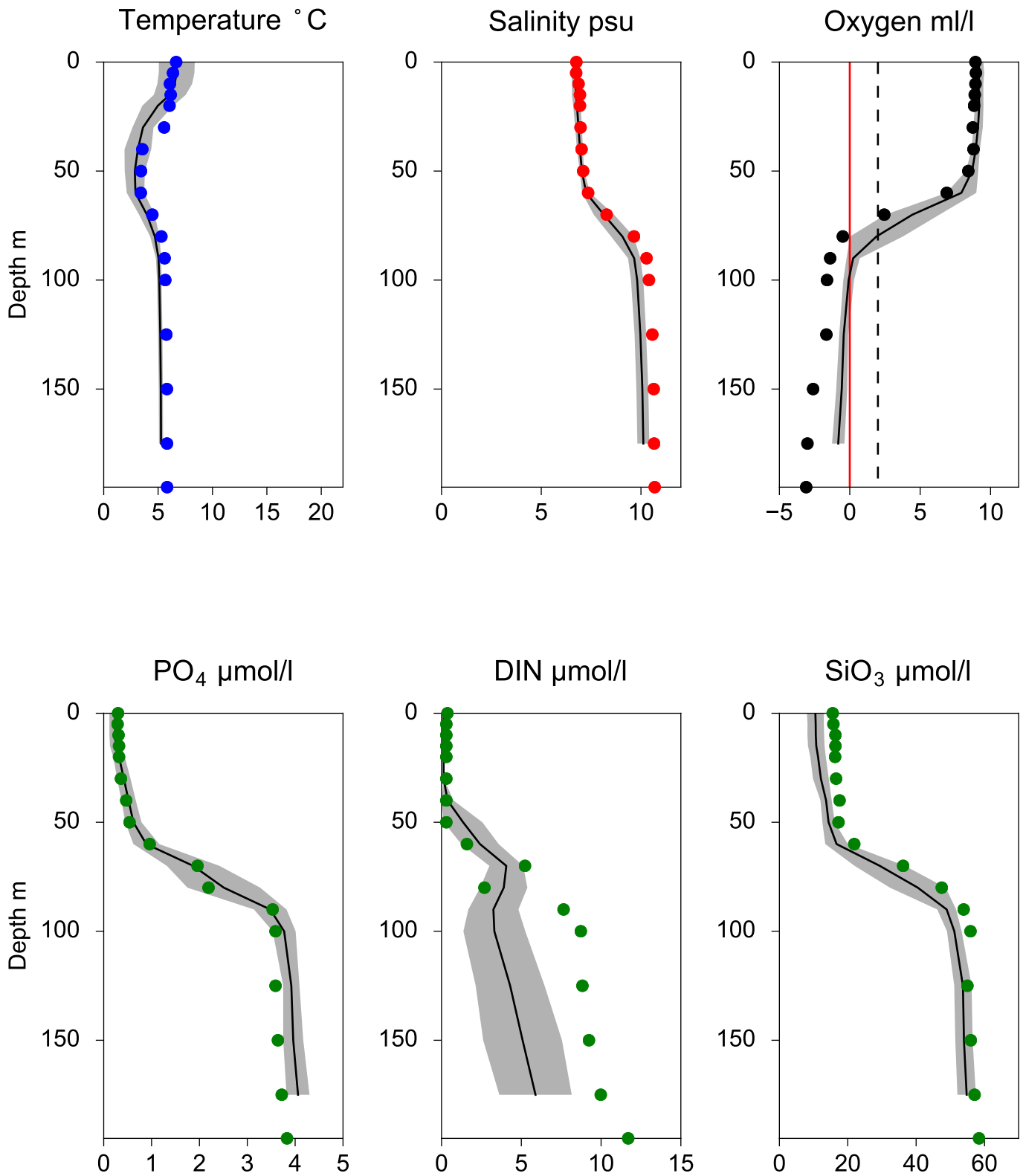


OXYGEN IN BOTTOM WATER (depth >= 175 m)



Vertical profiles BY32 NORRKÖPINGSDJ May

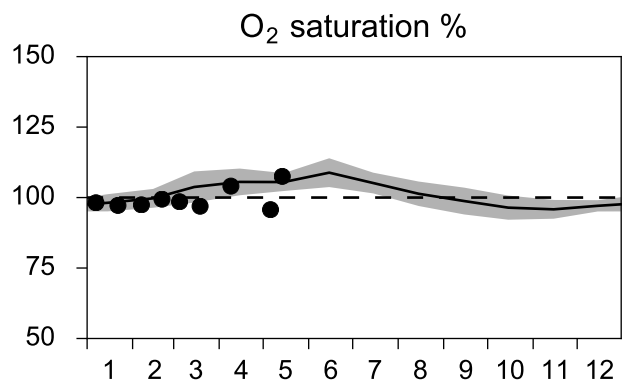
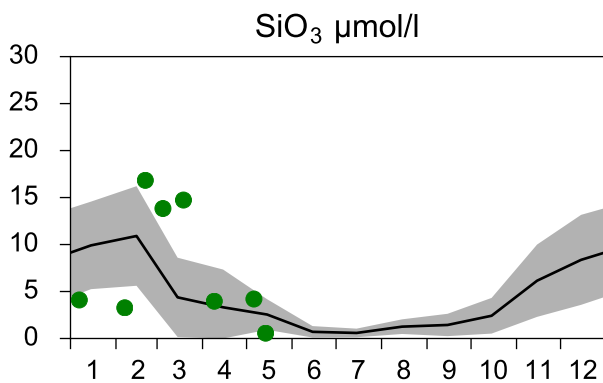
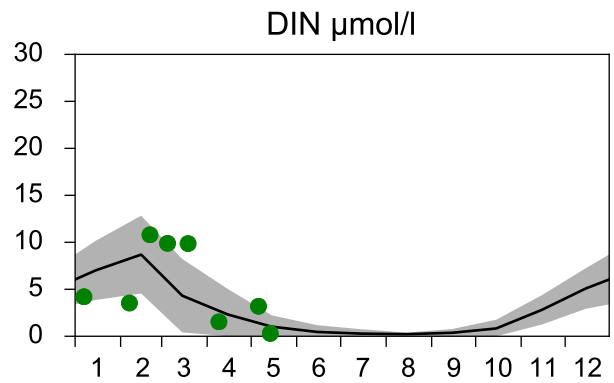
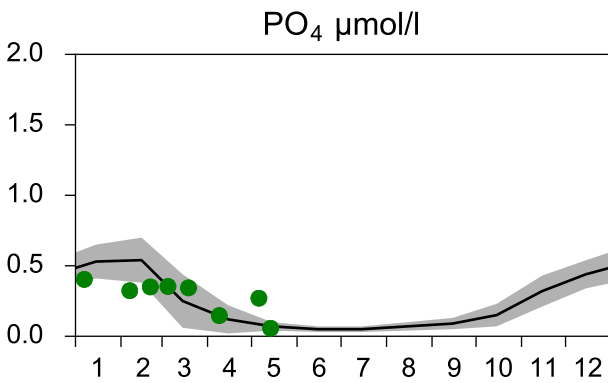
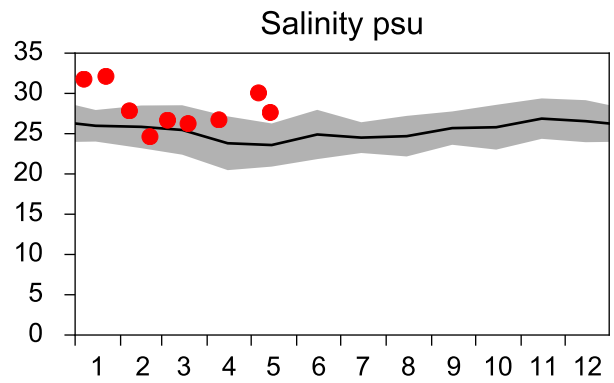
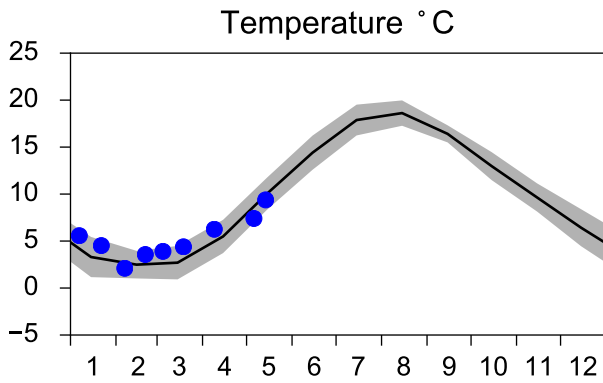
— Mean 2001-2015 ■ St.Dev. ● 2019-05-15



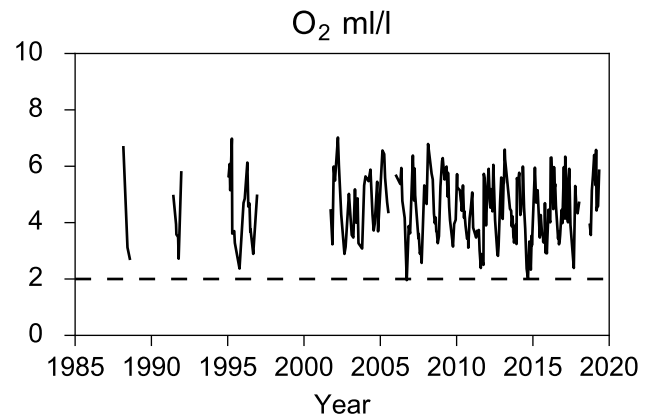
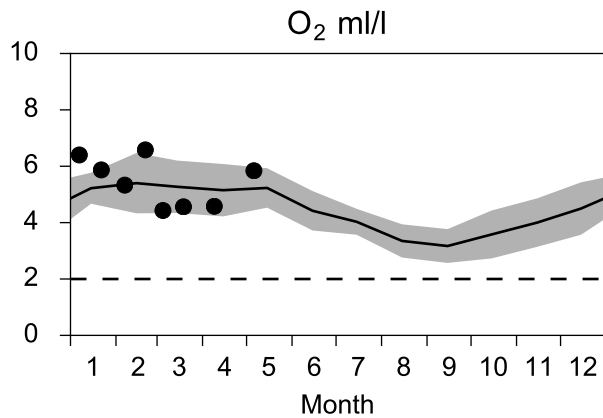
STATION SLÄGGÖ SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 ■ St.Dev. ● 2019

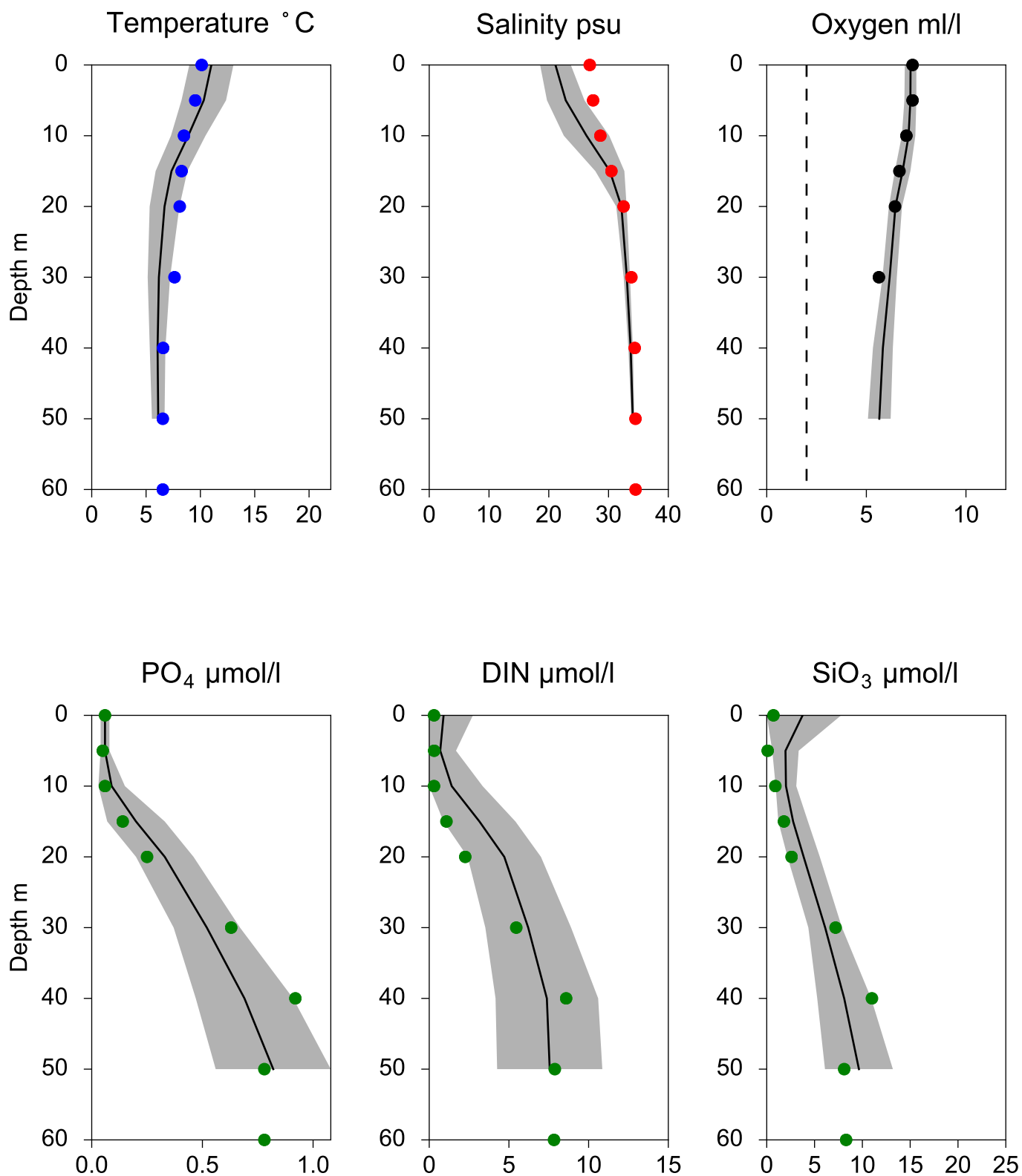


OXYGEN IN BOTTOM WATER (depth >= 64 m)



Vertical profiles SLÄGGÖ May

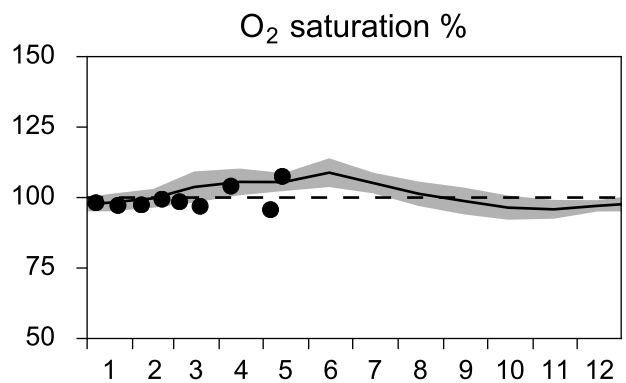
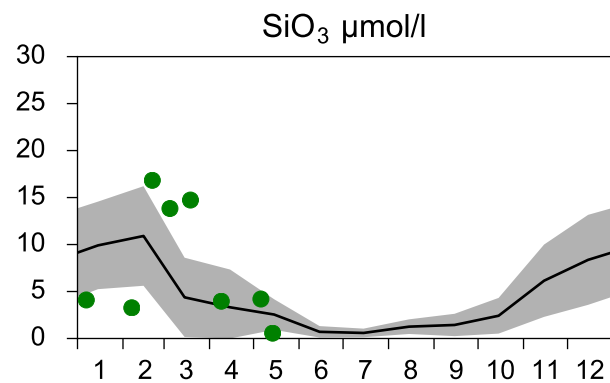
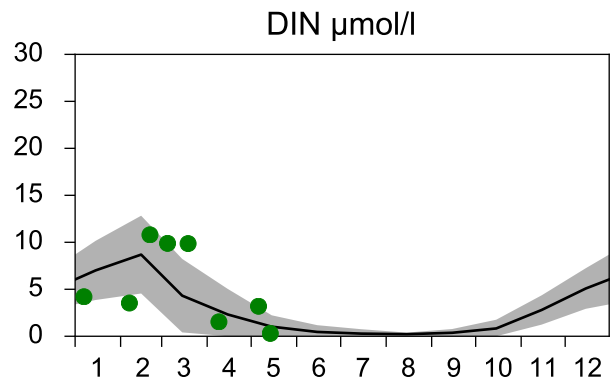
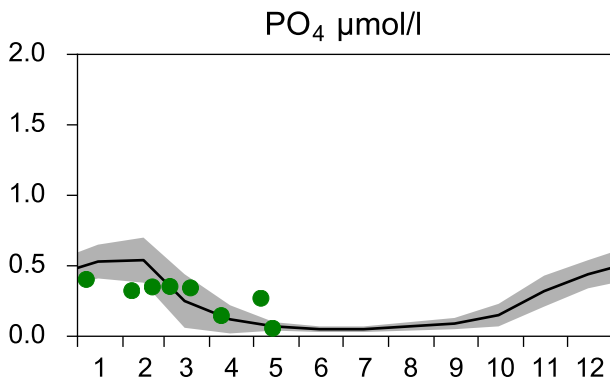
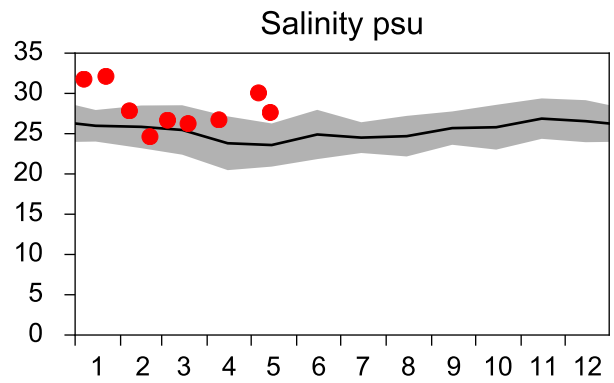
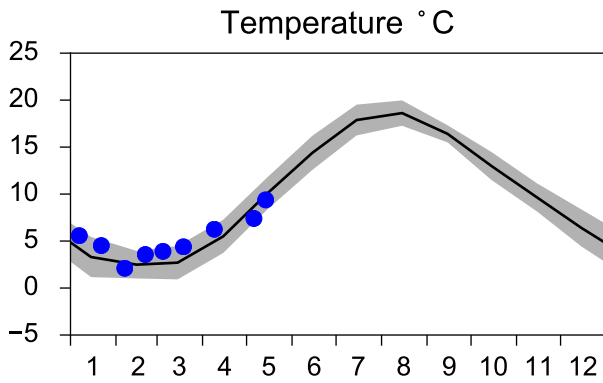
— Mean 2001-2015 ■ St.Dev. ● 2019-05-14



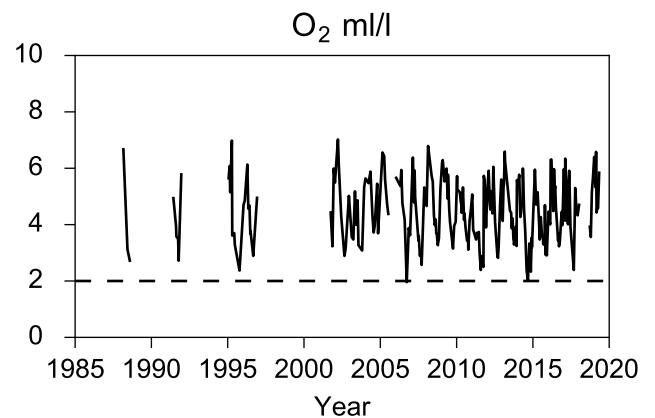
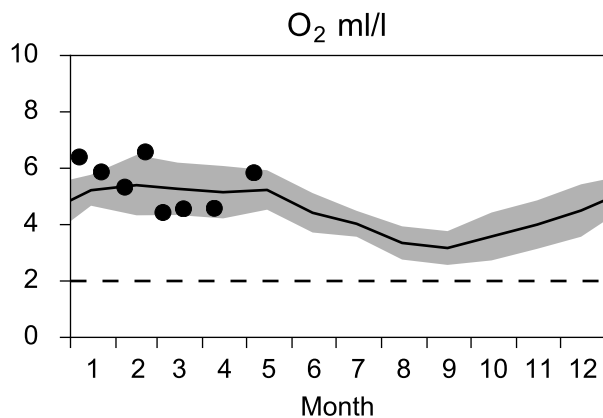
STATION SLÄGGÖ SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019



OXYGEN IN BOTTOM WATER (depth >= 64 m)



Vertical profiles SLÄGGÖ May

— Mean 2001-2015 ■ St.Dev. ● 2019-05-06

