

Cruise Report

March, R/V Svea Swedish National Marine Monitoring Programme



Survey period:	2020-05-07 - 2020-05-15
Survey area:	Skagerrak, Kattegat, the Sound and the Baltic Proper
Principal:	Swedish Meteorological and Hydrological Institute (SMHI) & Swedish Agency for Marine and Water Management (SwAM)
Cooperation partners:	Swedish University of Agricultural Sciences (SLU) & Swedish Maritime Administration (SMA)

SUMMARY

During the cruise, which is part of the Swedish pelagial monitoring programme, the Skagerrak, the Kattegat, the Sound and the Baltic Proper were visited.

The surface water temperature varied between 6-10 °C, which is normal for the season. At most stations in the Baltic Proper, the temperature in the entire depth profile was above normal. The cooling that normally occurs during winter was 2019/2020 very weak. The surface water had now started to warm up. The salinity in the Baltic Proper was above normal at all stations visited, both in the surface and in the deep water.

Dissolved inorganic nitrogen in the surface water was basically consumed in all sea areas, which is normal after the spring bloom. Phosphate levels, just as in March and April, were higher than normal in the Bornholm Basin, the southeastern Baltic Proper and in parts of the Eastern Gotland Basin. Phosphate levels were now also higher than normal in the Gulf of Hanö and in parts of Arkona. The silicate levels were above normal at most stations visited in the Kattegat and the Baltic Proper.

The oxygen situation in the Baltic Sea continues to be serious. Completely oxygen-free conditions, when toxic hydrogen sulphide is formed, were found in the Western, Northern and Eastern Gotland basins from 80-90 meters deep. Acute oxygen deficiency (<2 ml/l) was found from 70-80 meters depth throughout the area and even shallower from about 60 meters depth in the Hanö Bight. In Hanö Bight, Bornholm Basin and in the southeastern Baltic Proper, oxygen levels in the bottom water have continued to decline. In March they were above 2 ml / l, which is the limit for acute oxygen deficiency, in April between 1.4-1.7 ml/l and during this expedition in May 0.4-1.0 ml / l. In the Skagerrak and Kattegat, the oxygen situation was good.

The inflow that occurred in November/December 2019 had now reached the southeastern Baltic Proper. Oxygen levels of about 1.0-1.5 ml/l could be found close to the bottom at BCSIII-10 and at intermediate depth, 80-125 meters, at BY10.

SMHI's next expedition is scheduled for 1-7 June with R/V Svea.

Front: R/V Svea in Lysekil harbour after completed cruise.

RESULTS

The cruise was performed onboard R/V Svea and started in Västervik on the 7th of May and ended in the same port on the 15th of May. The winds were weak to moderate and from varying wind directions throughout the expedition. The air temperature varied between 5 and 13°C.

SMHI's offshore sea buoy at Huvudskär was deployed. This sea buoy measures a number of parameters in real time. Data is presented here:

<https://www.smhi.se/en/weather/sweden-weather/sea-observations>

A measuring instrument for ocean currents (ADCP) was placed in the vicinity of Östergarnsholm east of Gotland, on behalf of Uppsala University.

During the cruise, extra sampling of phytoplankton for DNA barcoding was carried out within a project for the development of the monitoring program and eDNA (environmental DNA) for researchers at the University of Turku. Samples were also taken from water and plankton samples for measuring selenium for EAWAG in Switzerland (Swiss Federal Institute of Aquatic Science and Technology).

Additional sampling was also performed at the national stations BY31, BY29 and at BY39.

In addition to the regular sampling program, Svea's instruments were also used to measure profiles during cruising, a so-called, Moving Vessel Profiles (MVP). The instrument was operated between regular sampling stations and the results show that the measurements can be a good complement to the regular monitoring program. The transects measured were: Å17 - Anholt E, BCSIII-10 - BY5, BY15 - BY10, BY39 - BY38, Fladen to Gothenburg, Östergarnsholm - BY15. Svea's ferrybox was also operational during the cruise.

During SMHI's expedition, phytoplankton samples are collected for later analysis at SMHI's laboratory. The results are presented in the AlgAware algal report shortly after the expedition is completed. <https://www.smhi.se/en/publications/algal-situation-reports-2-1056>

This report is based on data that has undergone an initial quality control. After further quality controls, certain values or quality flags may have changed. Data from this cruise is published as soon as possible on the data host's website, normally this is done within a week after the cruise is completed. Some analyzes are done after the cruise and will be published later.

Data and cruise reports can be downloaded here:

<https://www.smhi.se/en/theme/marine-environment-2-885>

The Skagerrak

The surface water temperature was normal for the season and varied around 9°C at all stations. Further down in the water column, the temperature was also normal or slightly above normal. The salinity in the surface water was higher than normal at the coastal stations, Å13, Släggö and P2. The other stations showed normal salinity. The salinity ranged between 28-31 psu. The stratification was well developed and the thermocline and the halocline coincided at a depth of 10-25 meters.

The nutrients in the surface water were generally consumed after the spring bloom, which is normal for the season. Normal levels were noted at all stations except phosphate levels at Släggö and silicate in the offshore areas at Å17 and Å15 which showed higher levels than normal. The phosphate concentration ranged from 0.04-0.07 $\mu\text{mol/l}$ offshore and was 0.13 $\mu\text{mol/l}$ at the coast. The content of dissolved inorganic nitrogen was normal for the season at all stations and ranged between 0.1–0.6 $\mu\text{mol/l}$ offshore, and 1.7 $\mu\text{mol/l}$ at Släggö at the coast. The silicate content varied between 0.4–1.5 $\mu\text{mol/l}$, lowest at P2 in the south and highest offshore at Å17. In the deep water, the concentrations of nutrients were lower than normal at Å17 in central Skagerrak, but above normal closer to the coast at Å13.

Plankton activity, measured by CTD fluorescence, was found at all stations and coincided in depth with stratification in salinity and temperature. Fluorescence peaks were noted at most stations at about 25 meters depth. At P2, the fluorescence peak was found deeper, at just over 40 meters deep. The Secchi disk depth was 6 meters at the stations where it was measured in the Skagerrak.

The oxygen situation was good at all stations in the Skagerrak, with values normal for the season.

The Kattegat and the Sound

The surface water temperature was normal for the season and varied between 9-10°C. The salinity in the surface water varied between 19 and 25 psu, lowest in the Sound and highest in the northern Kattegat. The salinity was higher than normal in the northern parts of the Kattegat as well as in the Sound. Thermocline and halocline coincided and were found at a depth of 10-20 meters. In the deep water, below the surface layer, the salinity was slightly lower than normal, the temperature was generally normal or slightly above normal.

All nutrients were basically consumed by the spring bloom. Phosphate levels in the surface water varied between 0.06-0.08 $\mu\text{mol/l}$. In the Sound the concentration was slightly higher, 0.24 $\mu\text{mol/l}$, where the surface water is strongly influenced by outflowing water from the southern Baltic Sea where nutrient levels are higher. The content of dissolved inorganic nitrogen was also low; 0.10 - 0.13 $\mu\text{mol/l}$, also here the nitrogen content was higher in the Sound, 0.9 $\mu\text{mol/l}$. The silicate concentrations were unchanged from the previous measurements performed in April, the concentrations ranged from 2.7 $\mu\text{mol/l}$ in the northern Kattegat to 8.5 $\mu\text{mol/l}$ in the Sound. The nutrient levels in the deep water were normal for the season, except in the Sound where the levels were generally above normal.

At all the stations visited, the oxygen content in the bottom water was good. In Kattegat the bottom water oxygen concentration ranged from 5.9 to 6.1 ml/l and in the Sound it was 4.3 ml/l.

Fluorescence measurements from the CTD indicated plankton activity from the surface down to a depth of 15-20 meters. Minor fluorescence peaks were noted at all stations coinciding with thermocline and halocline. The Secchi disk depth varied between 6-10 meters in the area.

The Baltic Proper

The surface water temperature was now normal throughout the entire Baltic Proper and varied between 6-9°C, coldest in the north and warmest in the southwest. However, at most stations the temperature in the entire depth profile below the surface water was above normal. The cooling that normally occurs during winter was 2019/2020 very weak. Normally, a cold layer of "winter water" is found this time of the year at about 30-70 meters depth. Due to the warm winter, this layer is very poorly developed and the temperature throughout the deep water is well above normal. The salinity in the surface water was above normal at all stations visited, and varied between 6.2 and 8.4 psu. Also in the deep water, the salinity was generally higher than normal. The halocline was found at about 70-80 meters depth in the Northern, Eastern and Western Gotland Basins, in the Bornholm Basin and Hanö Bight slightly shallower from 50-60 meters depth and in Arkona at about 40 meters depth. The thermocline coincided with the halocline that delimits the surface layer from the deep water, but a secondary thermocline was also found in the surface water at some stations at 10-20 meters depth, where the heating of the surface water had progressed further.

Similar to the observations in March and April, the levels of phosphate in the surface water were higher than normal in the Bornholm Basin, the southeastern Baltic Proper and in parts of the Eastern Gotland Basin. The levels were now higher than normal also in the Hanö Bight and in parts of the Arkona basin. The levels varied between 0.2–0.5 µmol/l. Dissolved inorganic nitrogen was below the detection limit (<0.10 µmol/l) in the surface water, which is normally the case this year after the spring bloom has consumed all available nitrogen. In the deep water, the concentrations of dissolved inorganic nitrogen were higher than normal in the Western Gotland Basin. The silicate content in the surface water was above normal throughout the entire Baltic Proper, except in the Western Gotland Basin and at BY29 in the northern Gotland Basin where the concentrations were lower than normal, 5.6 µmol/l. The levels varied between 9.2-19 µmol/l. In the water column, the silicate content was generally elevated throughout the surface layer down to the halocline.

The oxygen situation in the Baltic Proper continues to be serious. Absolutely oxygen-free conditions or anoxia, when toxic hydrogen sulphide is formed, were found in the Western, Northern and Eastern Gotland basins from 80-90 meters depths. Acute oxygen deficiency or hypoxia (<2 ml/l) was found from 70-80 meters deep throughout the area and even shallower from about 60 meters deep in the Hanö Bight. In Hanö Bight, the Bornholm Basin and in the southeastern Baltic Sea, oxygen levels in the bottom water have continued to decline. In March they were above 2 ml/l, which is the limit for acute oxygen deficiency, in April between 1.4-1.7 ml/l and now in May 0.4-1.0 ml/l.

The inflow to the Baltic Sea that occurred in November/December 2019 had now reached the southeastern Baltic Proper. It could be clearly seen at the station BCSIII-10 where the oxygen content increased at the bottom to about 1.5 ml/l. At BY10, the inflow could be seen at intermediate depths of 80-125 meters where the oxygen content increased to just over 1 ml/l. This inflow had not yet reached BY15.

Plankton activity, estimated from the chlorophyll fluorescence on the CTD probe, occurred throughout the investigated area, with some fluorescence maxima in the surface layer down to 20-25 meters depth. Plankton activity was slightly higher in the Eastern Gotland Basin and in the southeastern South Baltic compared to the North, and the Western Gotland Basin. The Secchi disk depth varied between 6-10 meters. The Secchi disk depth was deepest south of Öland and most shallow in the Arkona Basin.

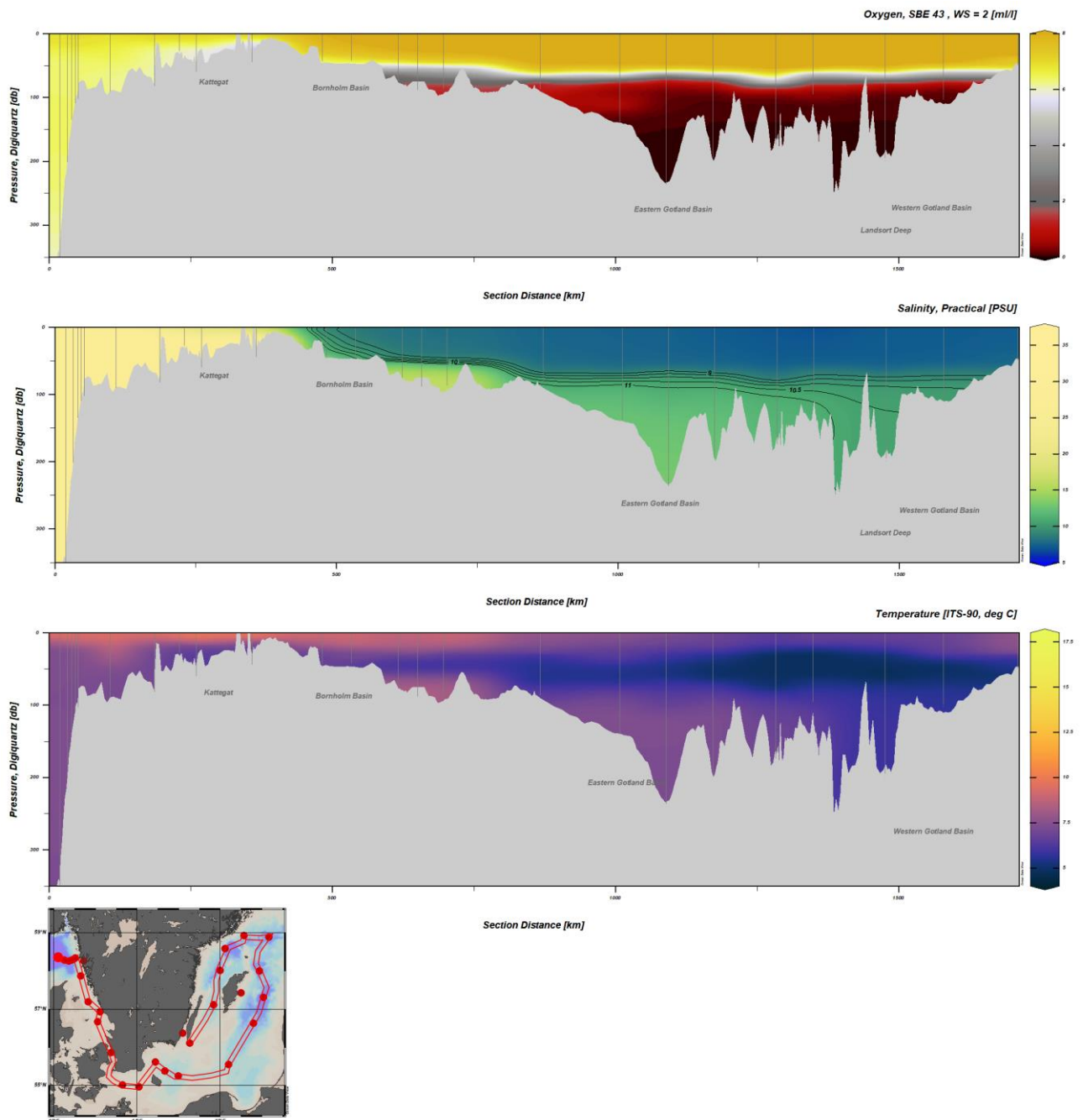


Figure 1. Transect showing dissolved oxygen, salinity and temperature from the Skagerrak, Kattegat, the Sound, through the Baltic Proper, to the Western Gotland Basin.

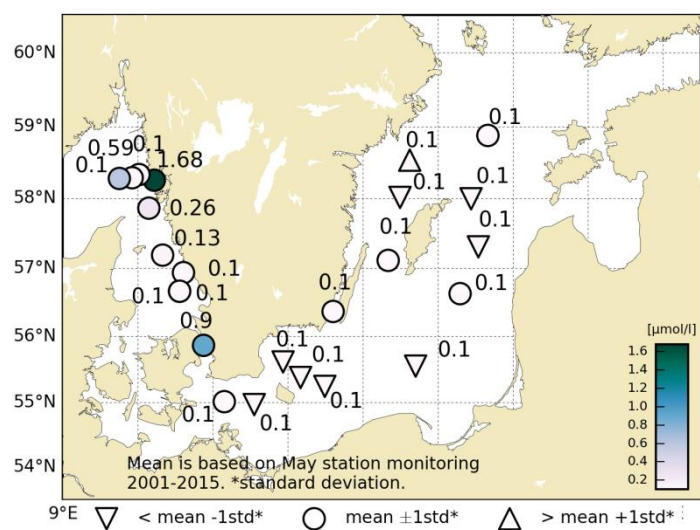


Figure 2: Concentration of dissolved inorganic nitrogen in the surface water (0-10m).

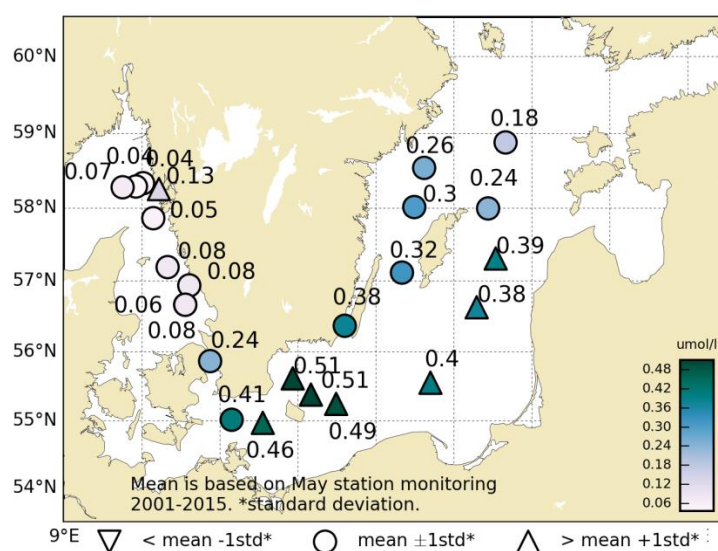


Figure 3: Concentration of phosphate in the surface water (0-10m).

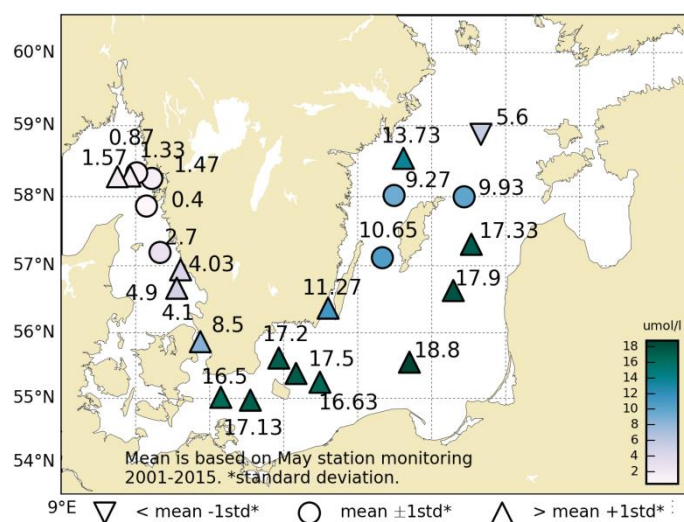


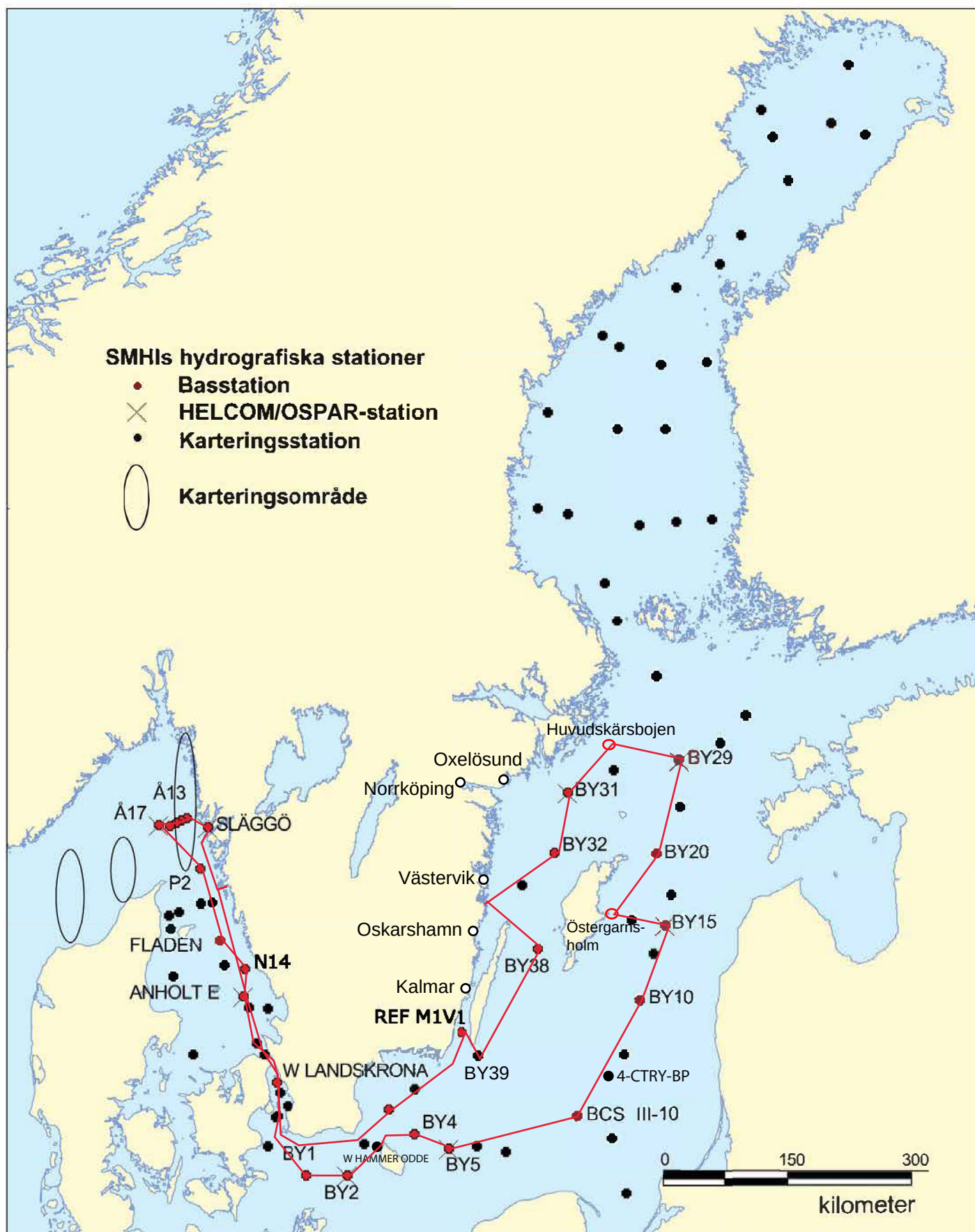
Figure 4: Concentration of silicate in the surface water (0-10m).

PARTICIPANTS

Name		Leg	From
Sara Johansson	Chief Scientist	Västervik – Västervik	SMHI
Kristin Andreasson		Västervik – Göteborg	SMHI
Johan Håkansson		Västervik – Västervik	SMHI
Sari Sipilä		Göteborg – Västervik	SMHI
Johan Kronsell	Extra technician	Västervik – Helsingborg	SMHI
Ann-Turi Skjevik		Västervik – Västervik	SMHI
Ola Kalén		Västervik – Västervik	SMHI
Erik Udehn	Extra technician	Västervik - Helsingborg	SMHI
Maria Nordström	Extra technician	Västervik - Helsingborg	SMHI

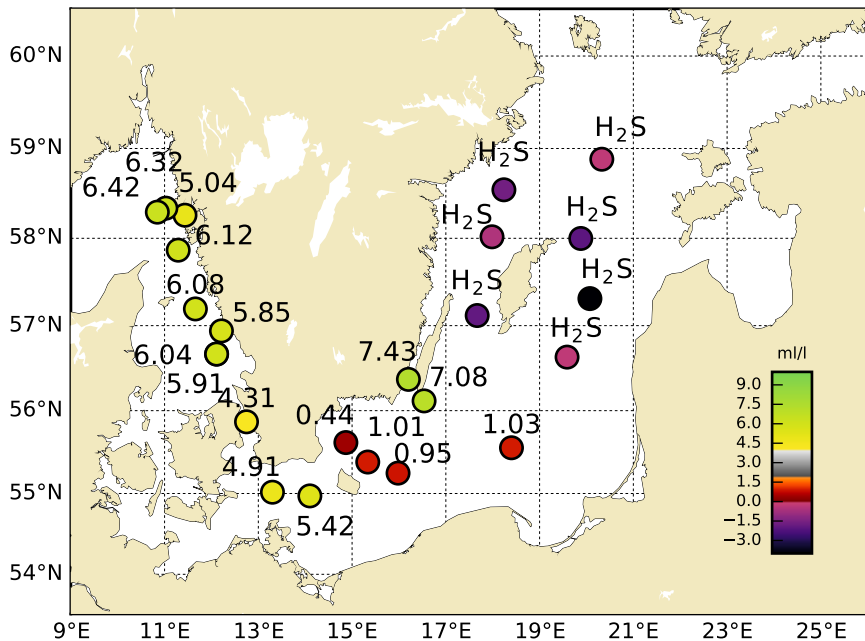
APPENDICES

- Track chart
- Table over stations, sampled parameters and number of sampling depths
- Map showing bottom oxygen concentrations and surface salinity, temperature and nutrient concentrations
- Vertical profiles for regular monitoring stations
- Monthly average surface water plots for regular monitoring stations



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STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

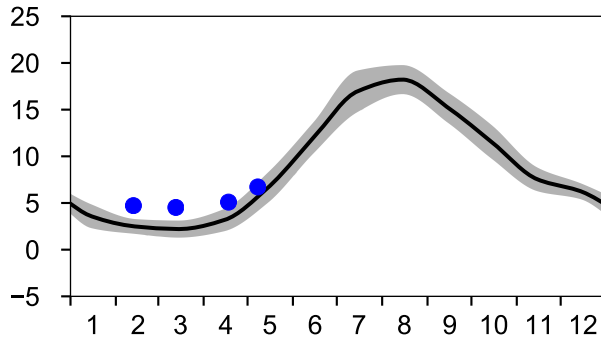
Annual Cycles

— Mean 2001-2015

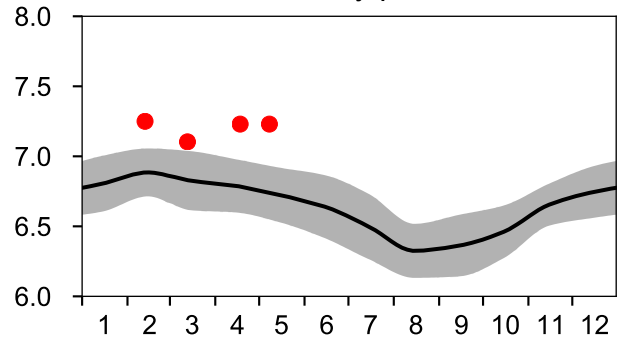
■ St.Dev.

● 2020

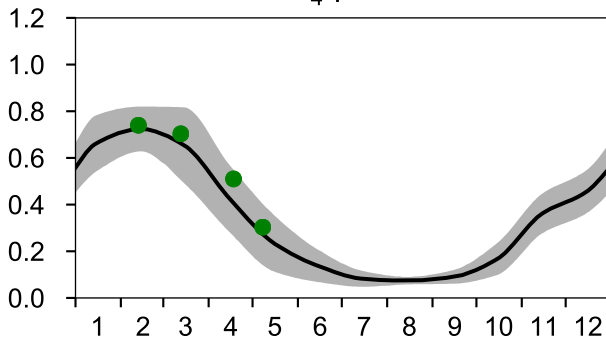
Temperature °C



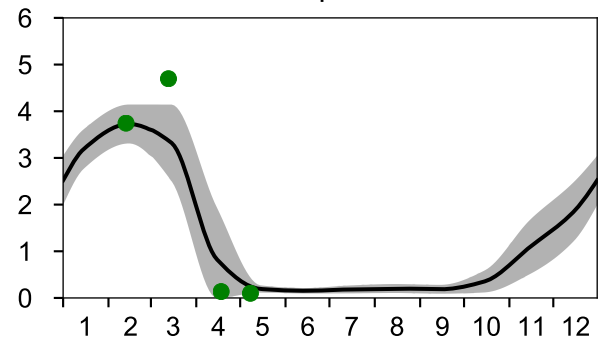
Salinity psu



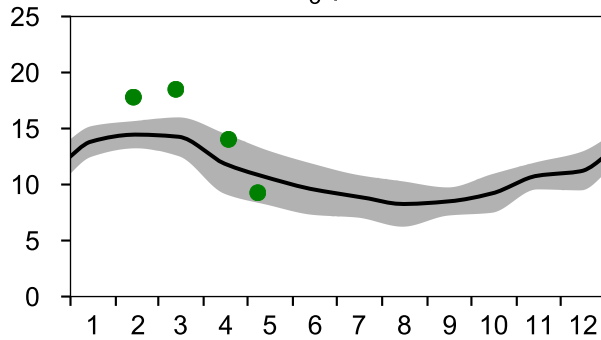
PO₄ µmol/l



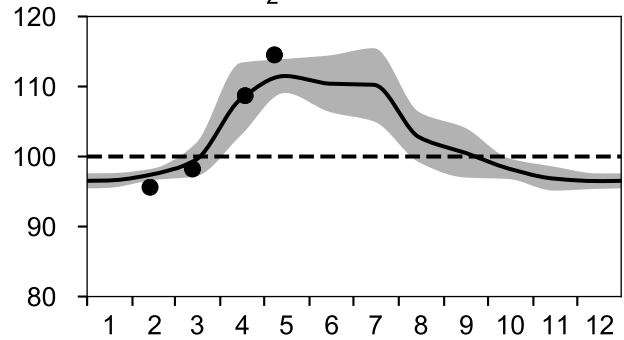
DIN µmol/l



SiO₃ µmol/l

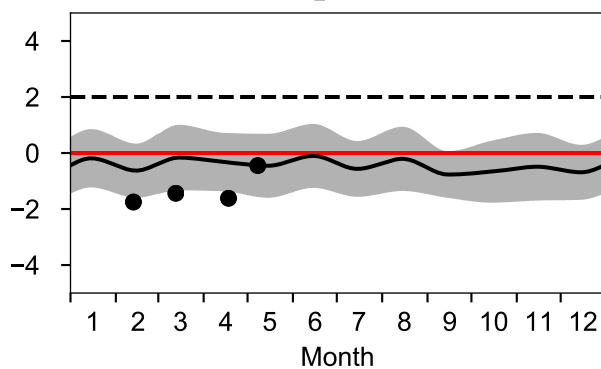


O₂ saturation %

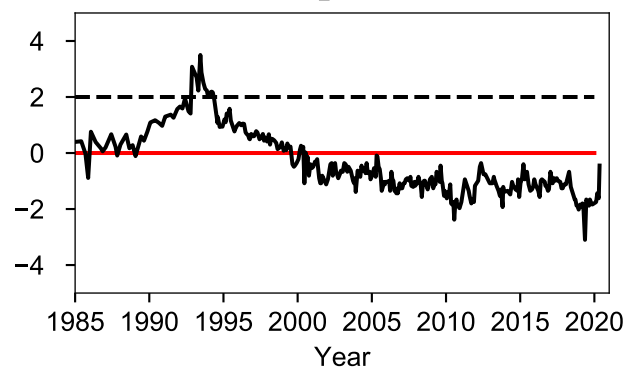


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O₂ ml/l



O₂ ml/l

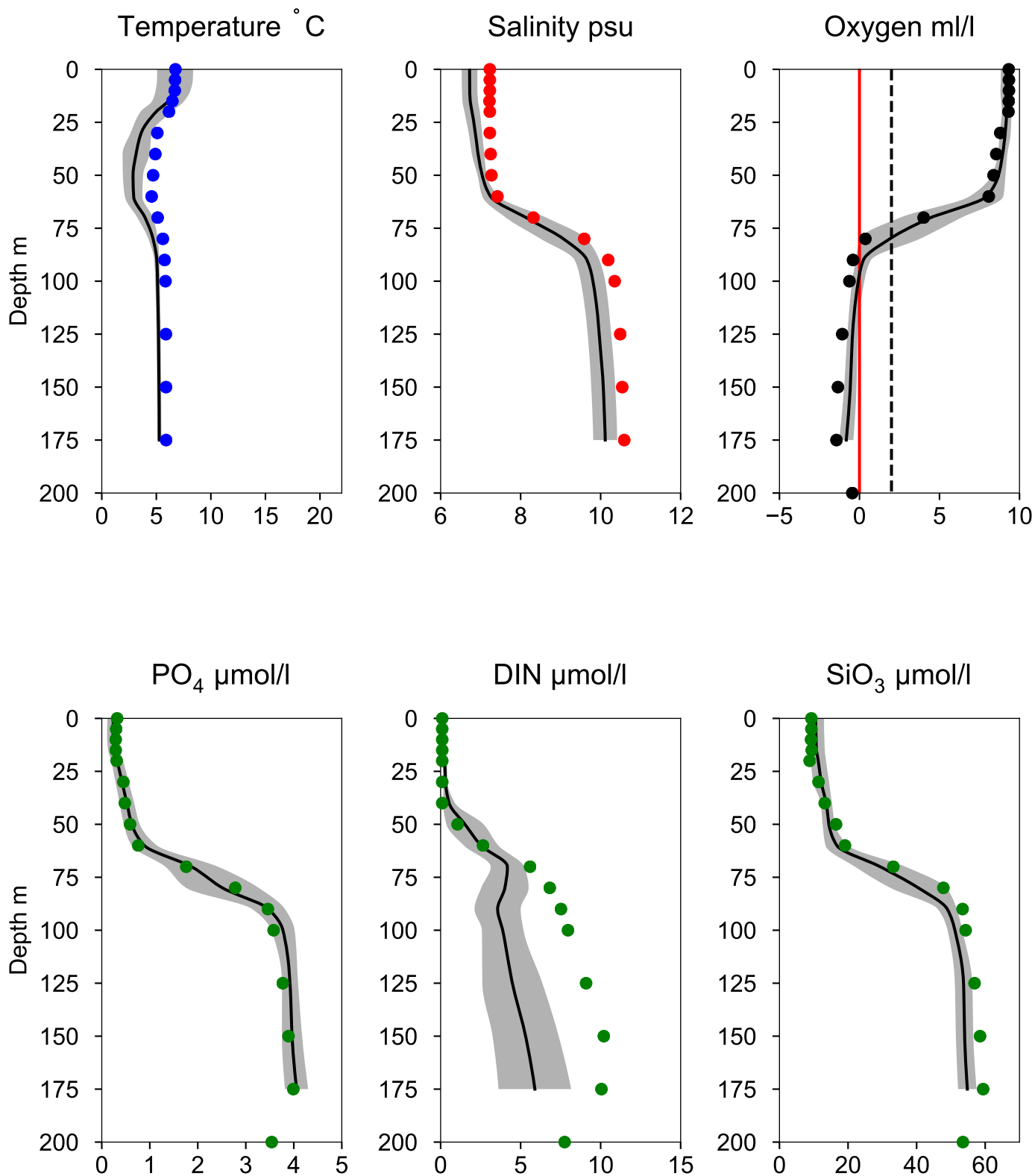


Vertical profiles BY32 NORRKÖPINGSDJ May

— Mean 2001-2015

■ St.Dev.

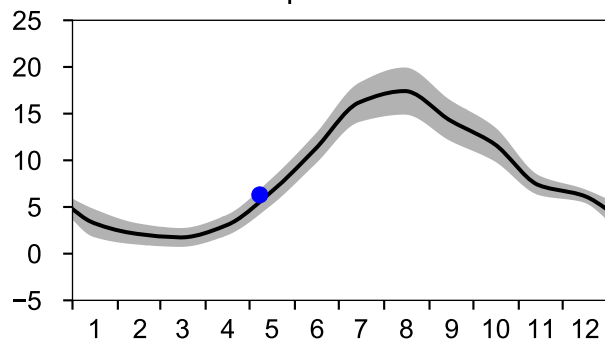
● 2020-05-08



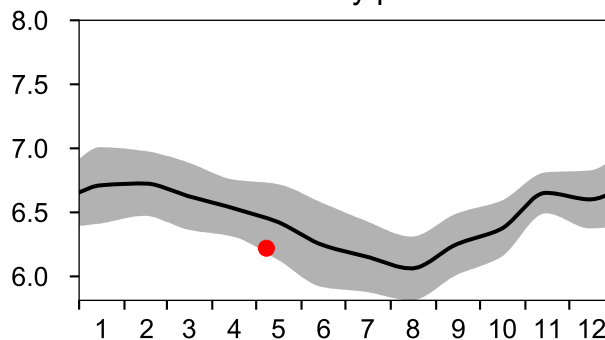
STATION BY31 LANDSORTSDJ SURFACE WATER (0-10 m)

Annual Cycles

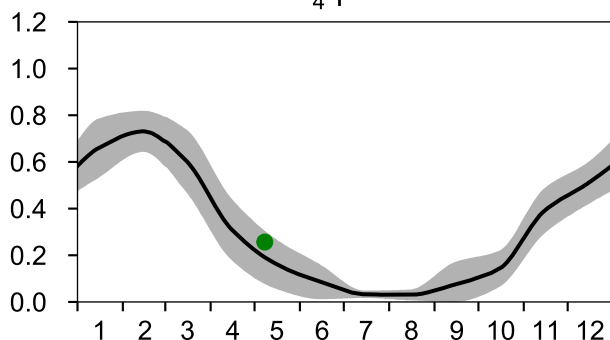
— Mean 2001-2015
Temperature °C



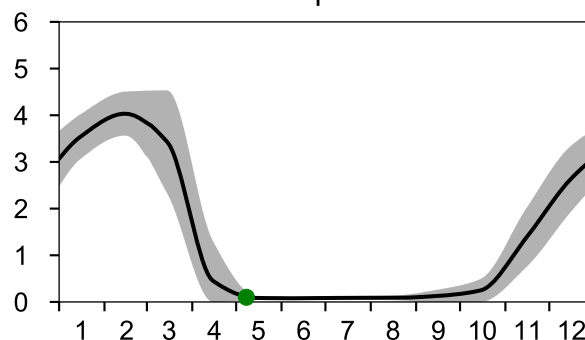
St.Dev. • 2020
Salinity psu



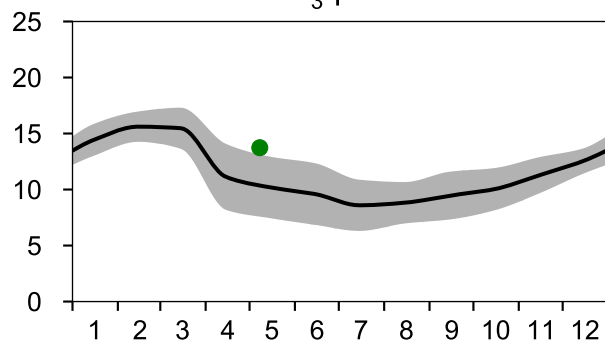
PO₄ µmol/l



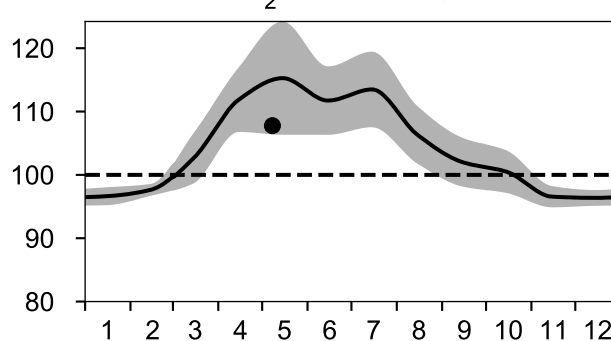
DIN µmol/l



SiO₃ µmol/l

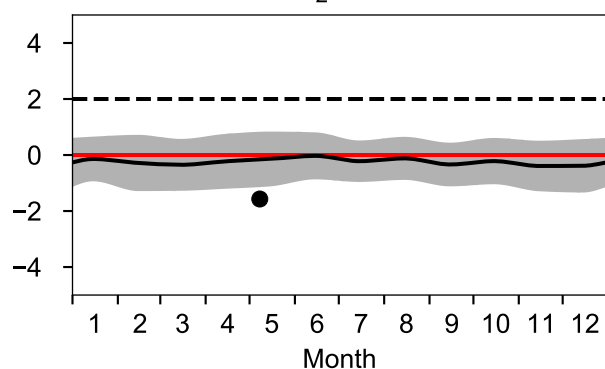


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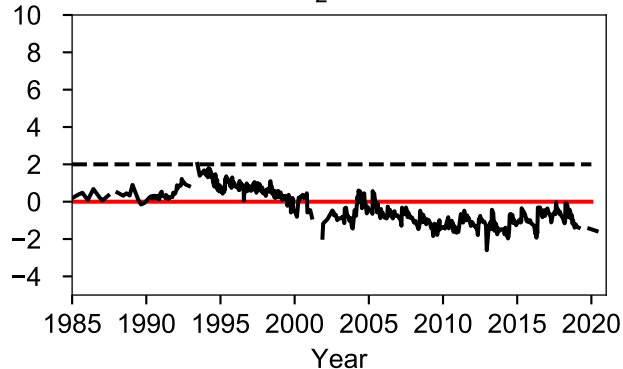


OXYGEN IN BOTTOM WATER (depth >= 419 m)

O₂ ml/l

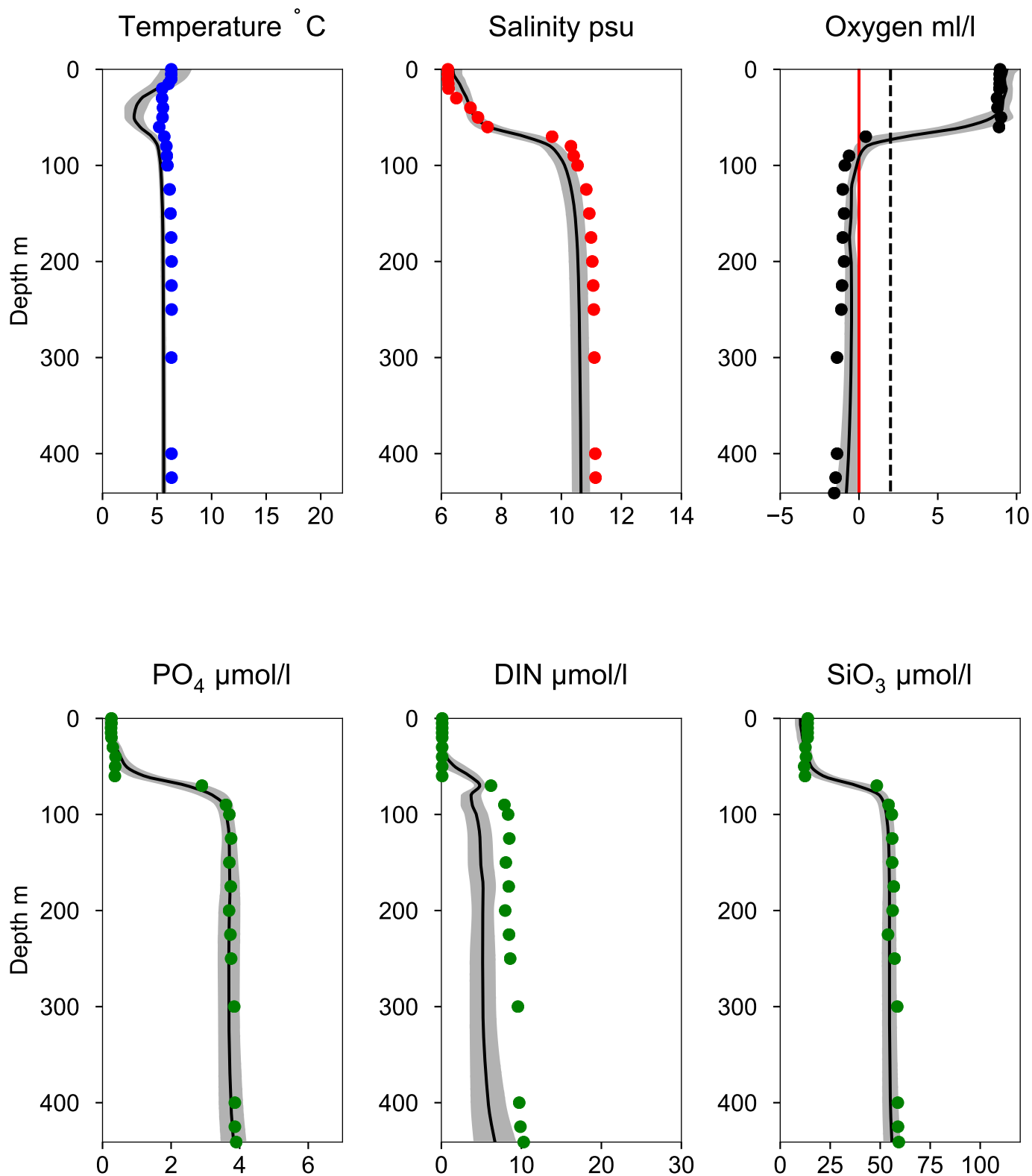


O₂ ml/l



Vertical profiles BY31 LANDSORTSDJ May

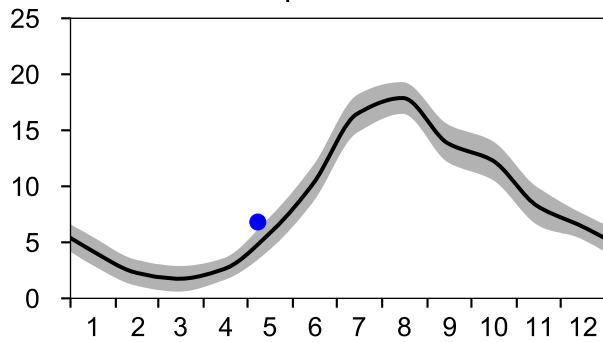
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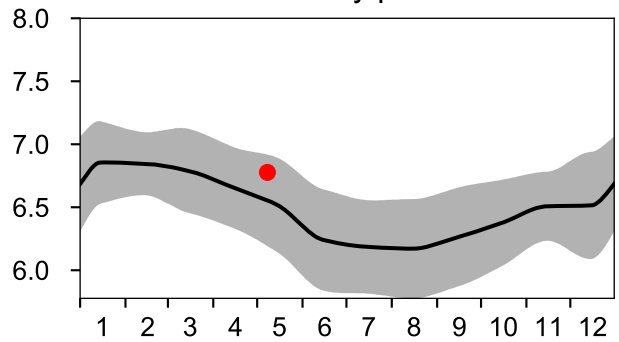
STATION HUVUDSKÄR SURFACE WATER (0-10 m)

Annual Cycles

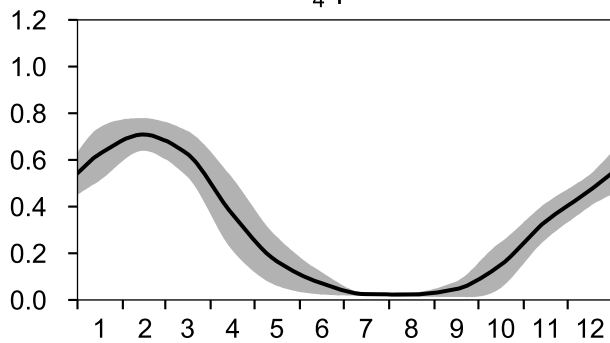
— Mean 2001-2015
Temperature °C



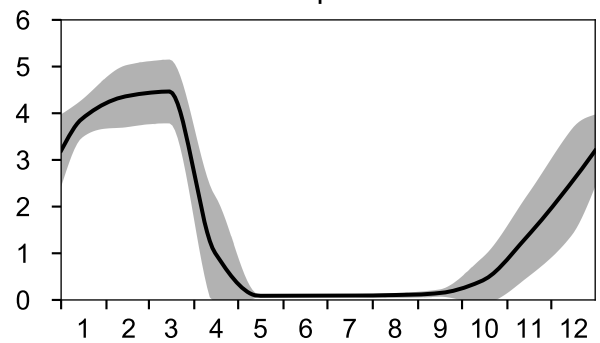
■ St.Dev. ● 2020
Salinity psu



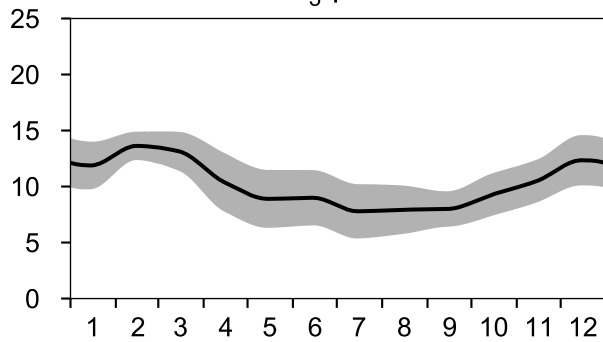
PO₄ µmol/l



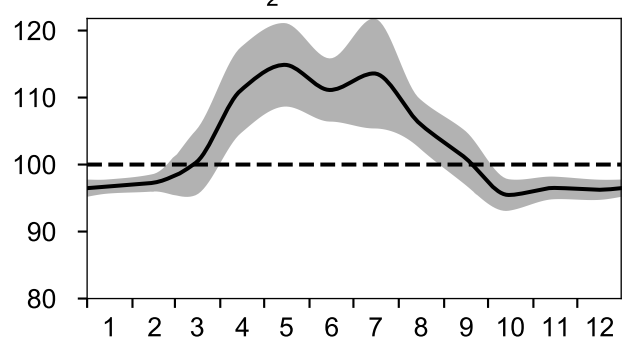
DIN µmol/l



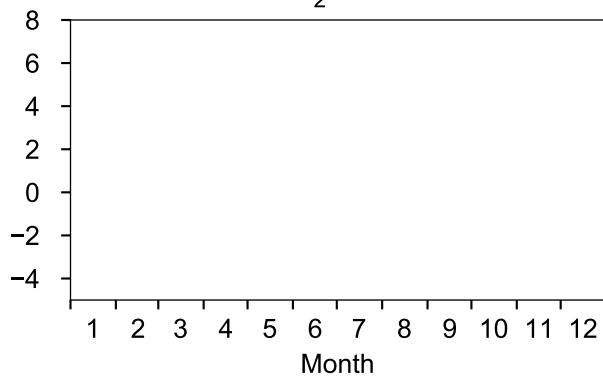
SiO₃ µmol/l



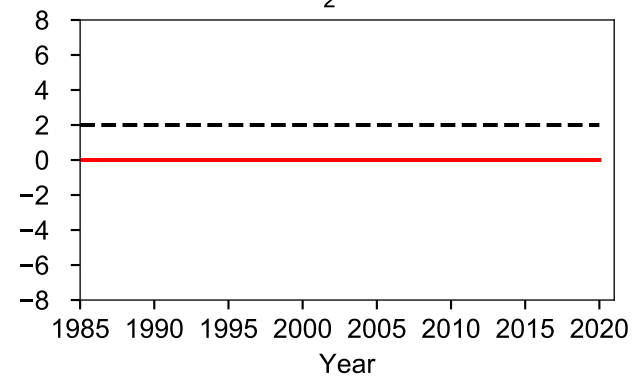
O₂ saturation %



O₂ ml/l



O₂ ml/l

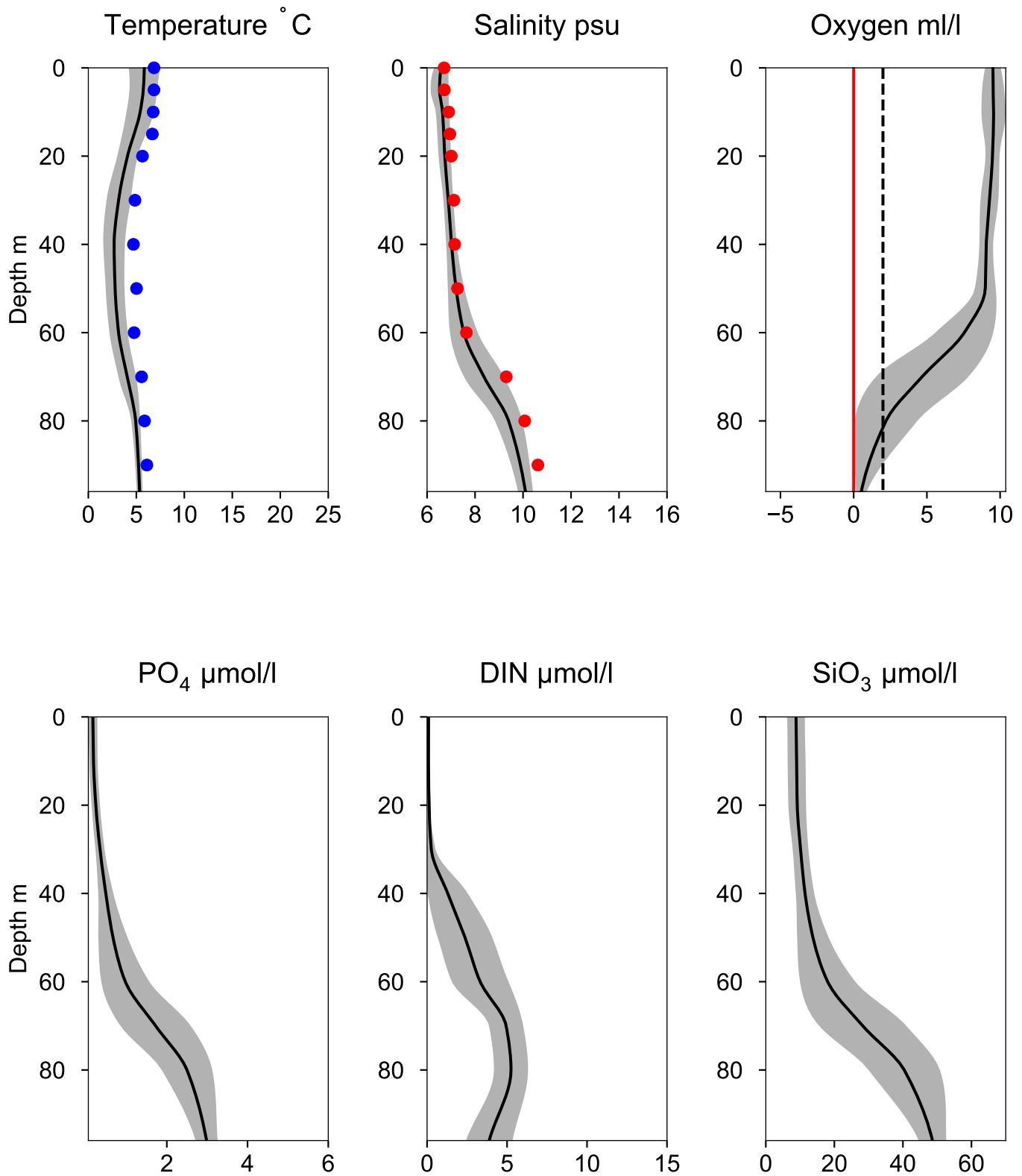


Vertical profiles HUVUDSKÄR May

— Mean 2001-2015

■ St.Dev.

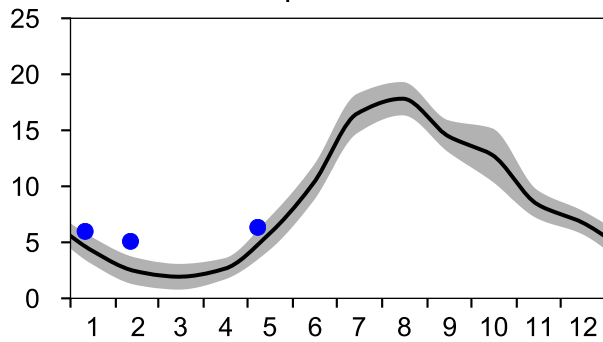
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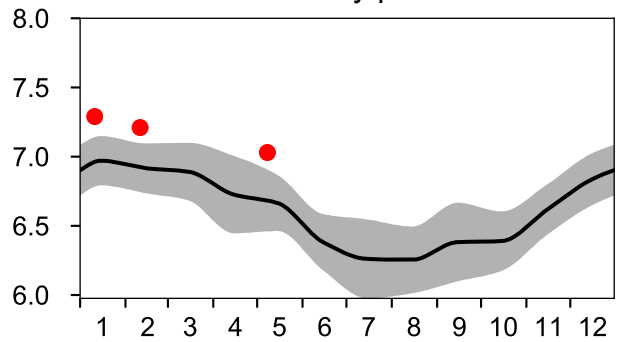
STATION BY29 / LL19 SURFACE WATER (0-10 m)

Annual Cycles

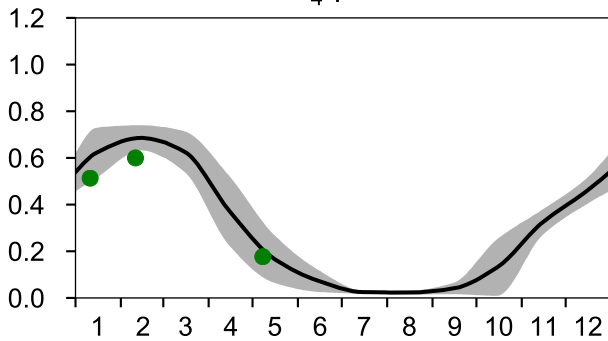
— Mean 2001-2015
Temperature °C



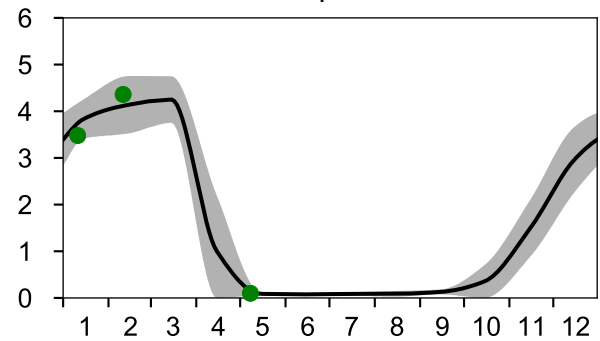
St.Dev. ● 2020
Salinity psu



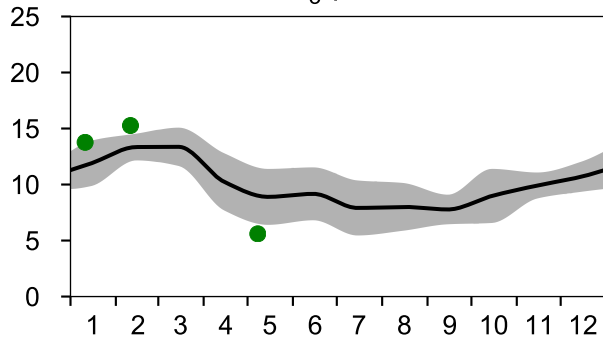
PO₄ µmol/l



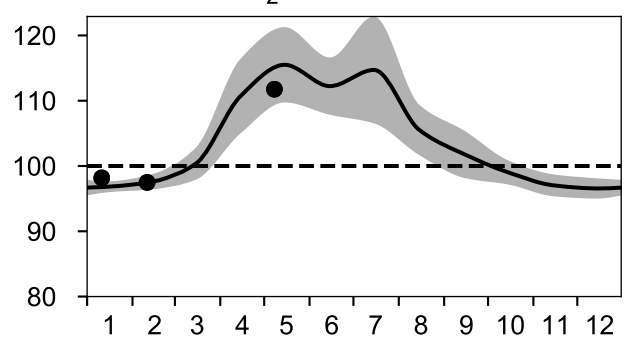
DIN µmol/l



SiO₃ µmol/l

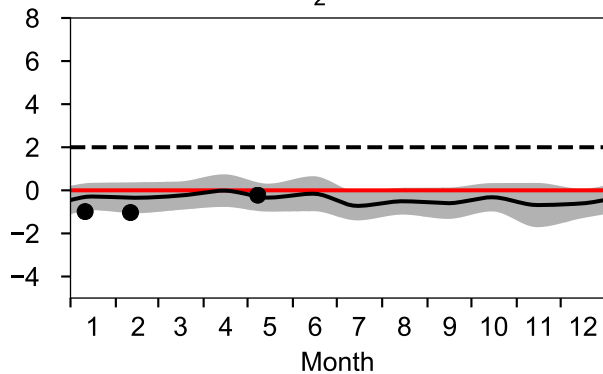


O₂ saturation %

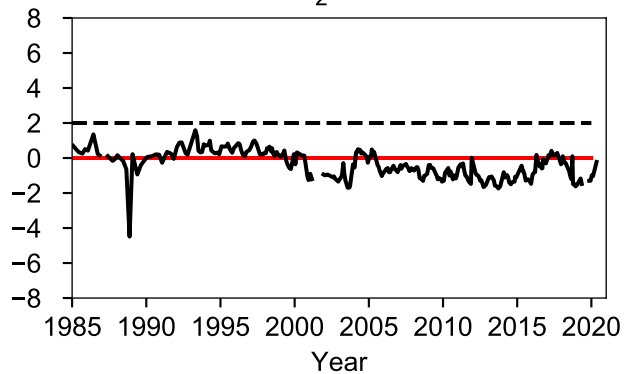


OXYGEN IN BOTTOM WATER (depth >= 150 m)

O₂ ml/l

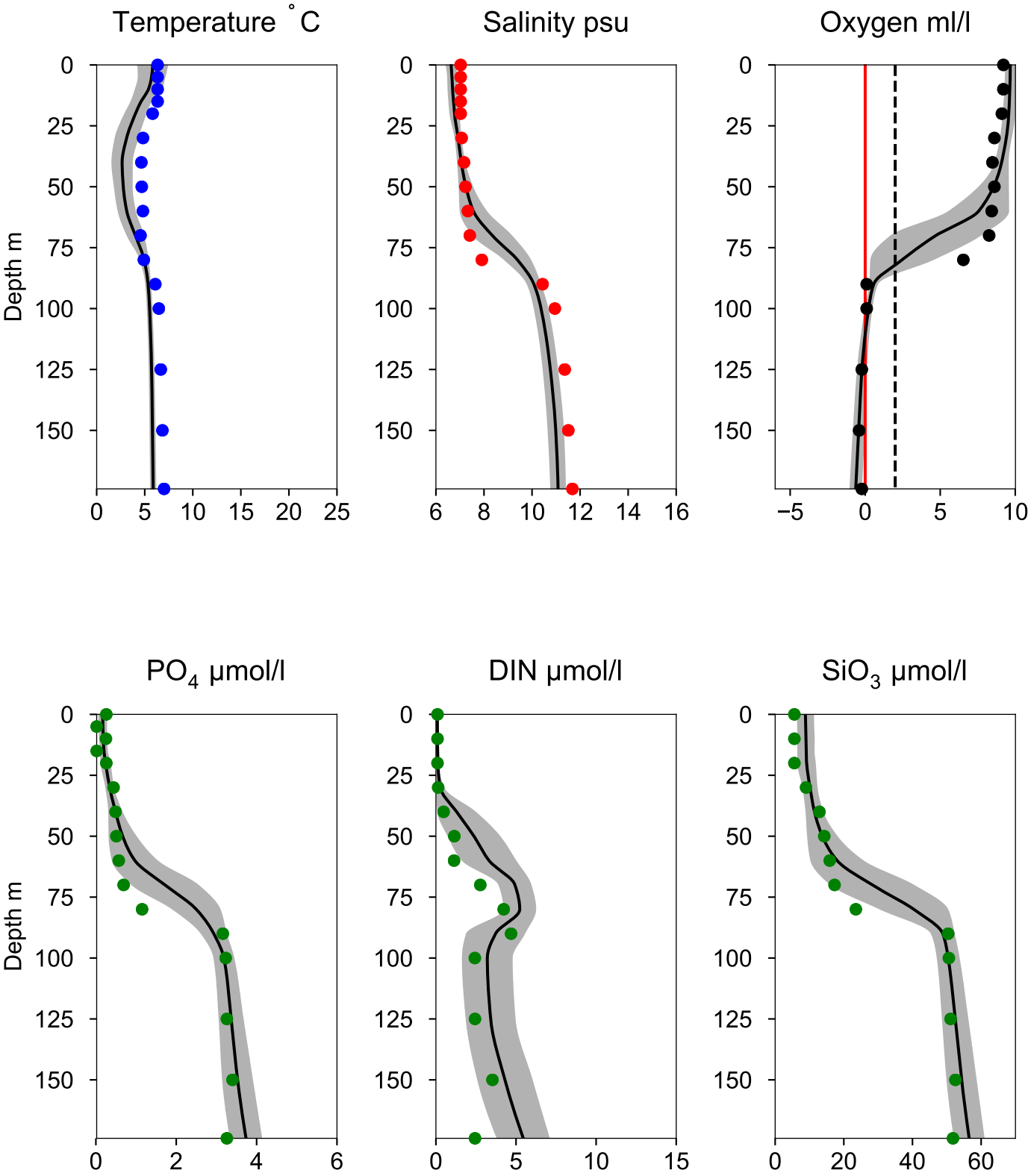


O₂ ml/l



Vertical profiles BY29 / LL19
May

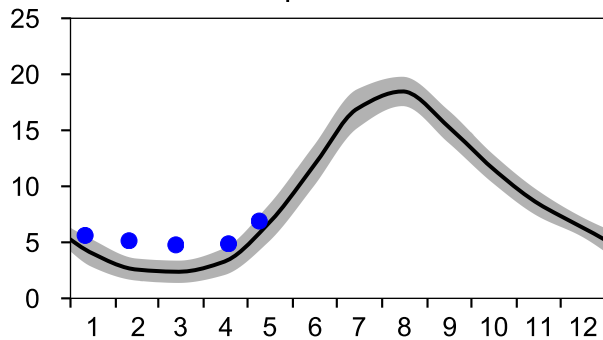
— Mean 2001-2015 St.Dev. • 2020-05-08



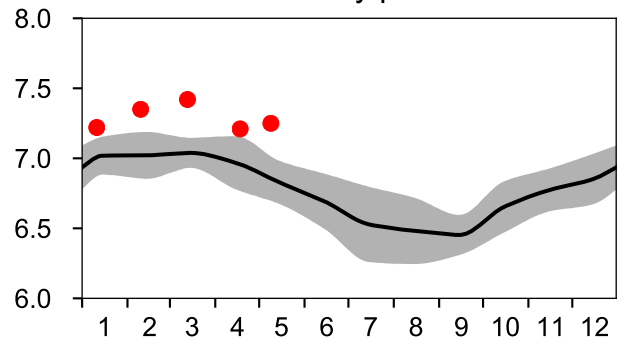
STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

Annual Cycles

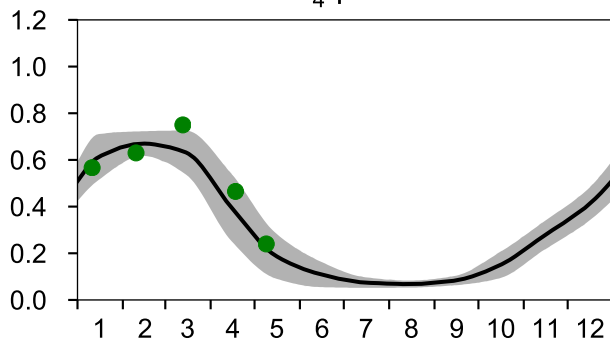
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Temperature °C



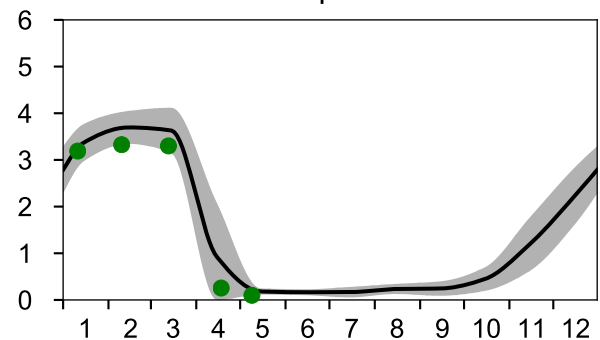
St.Dev. ● 2020
Salinity psu



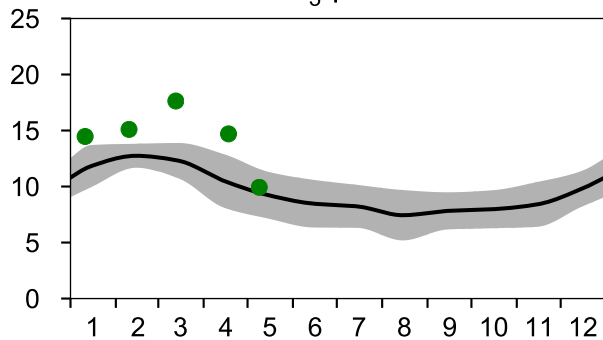
PO₄ µmol/l



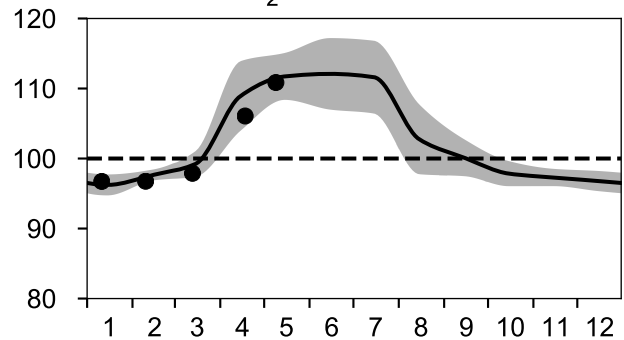
DIN µmol/l



SiO₃ µmol/l

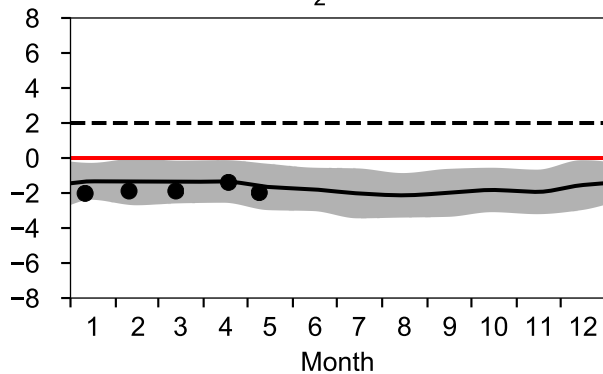


O₂ saturation %

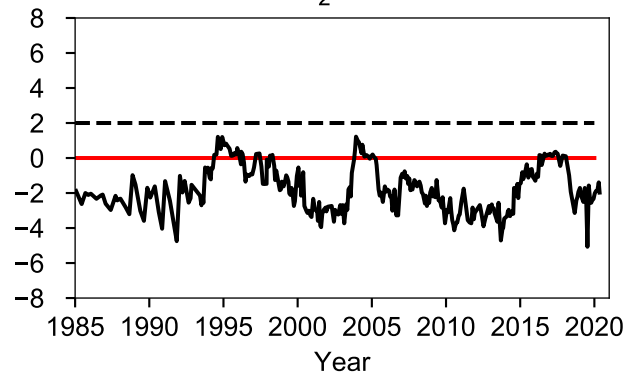


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O₂ ml/l



O₂ ml/l

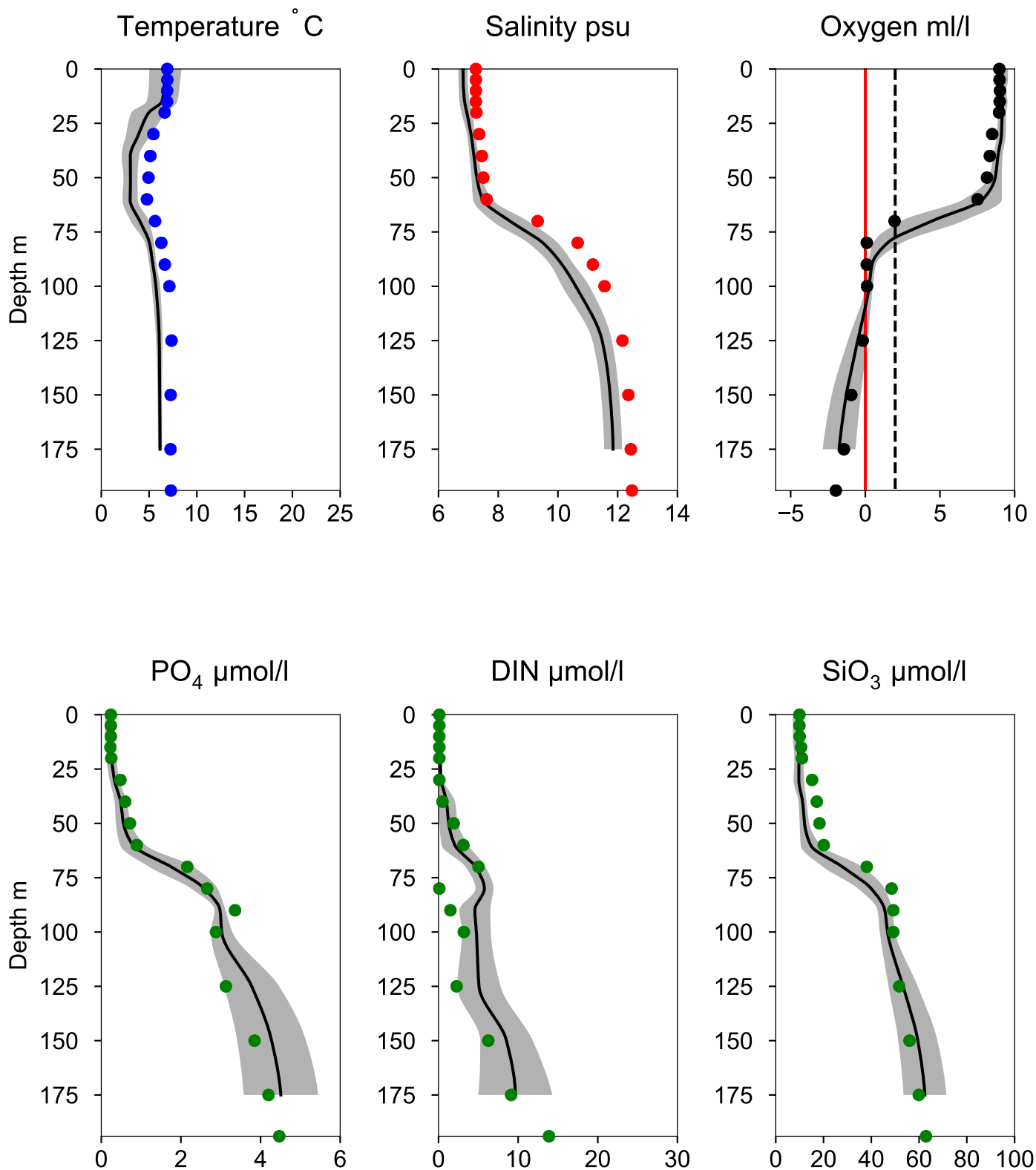


Vertical profiles BY20 FÅRÖDJ May

— Mean 2001-2015

■ St.Dev.

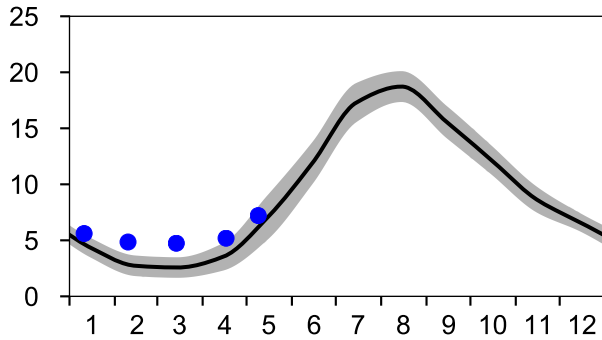
● 2020-05-09



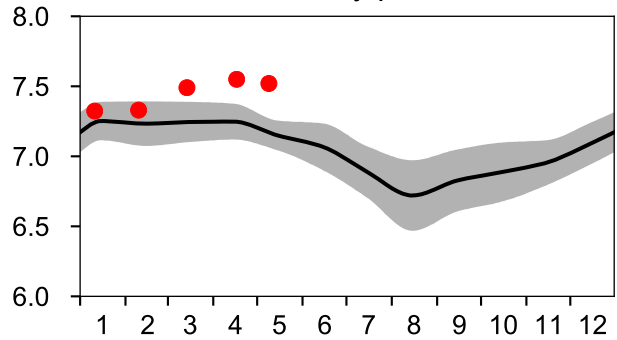
STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

Annual Cycles

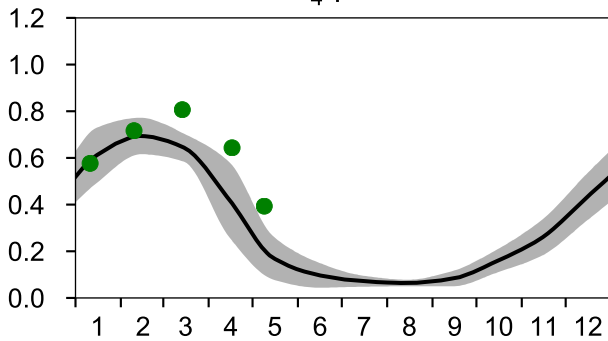
— Mean 2001-2015
Temperature °C



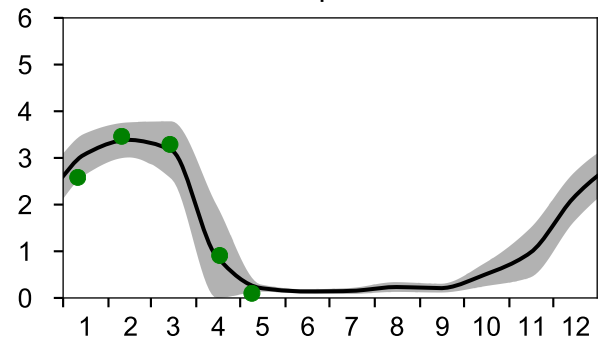
— St.Dev. • 2020
Salinity psu



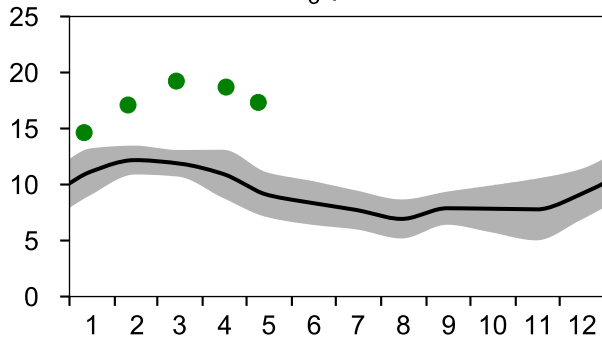
PO₄ µmol/l



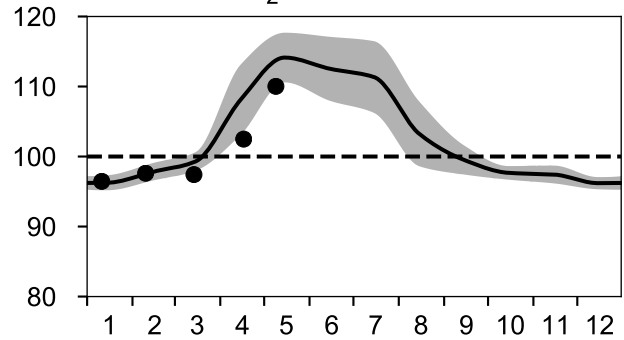
DIN µmol/l



SiO₃ µmol/l

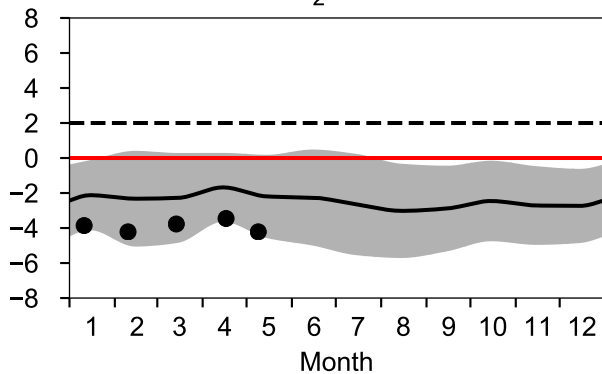


O₂ saturation %

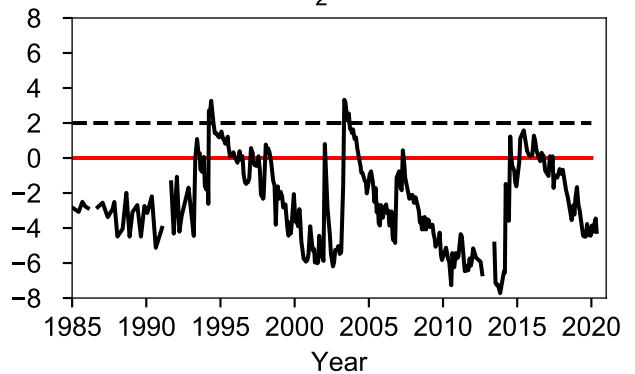


OXYGEN IN BOTTOM WATER (depth >= 225 m)

O₂ ml/l

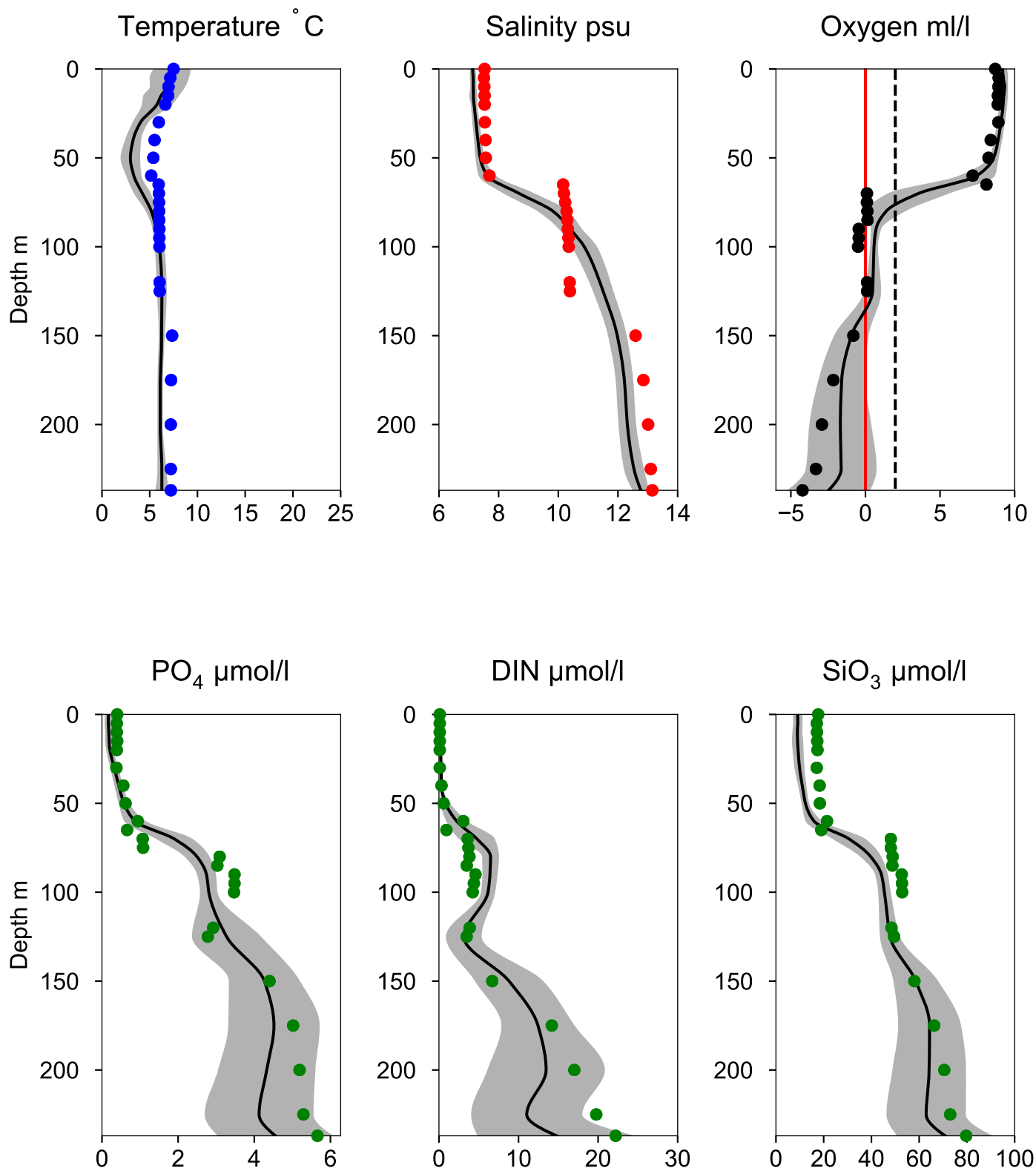


O₂ ml/l



Vertical profiles BY15 GOTLANDSDJ May

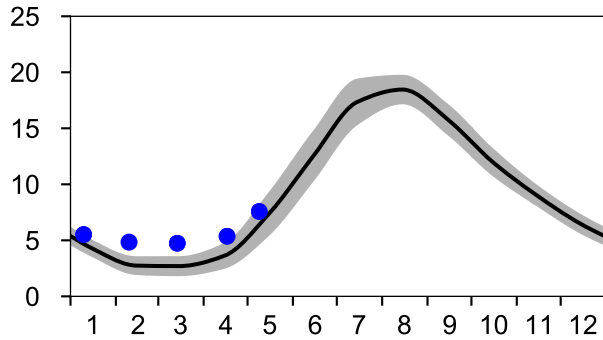
— Mean 2001-2015 St.Dev. • 2020-05-09



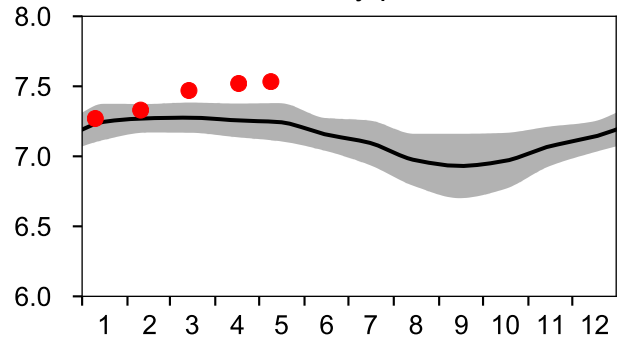
STATION BY10 SURFACE WATER (0-10 m)

Annual Cycles

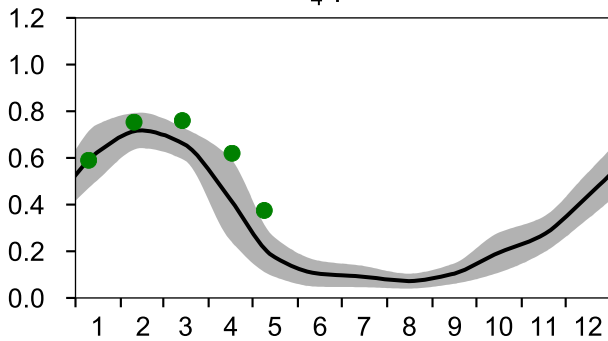
— Mean 2001-2015
Temperature °C



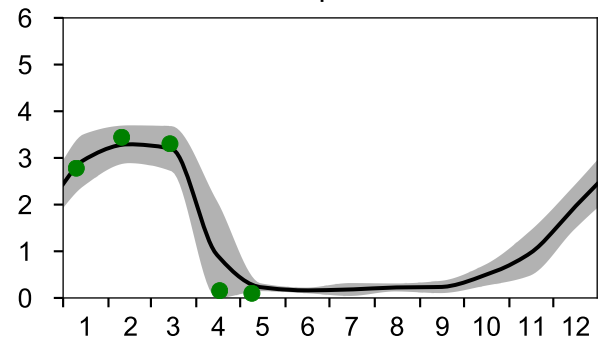
— St.Dev. • 2020
Salinity psu



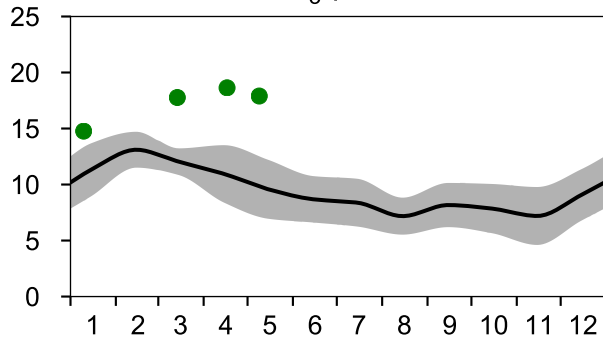
PO₄ µmol/l



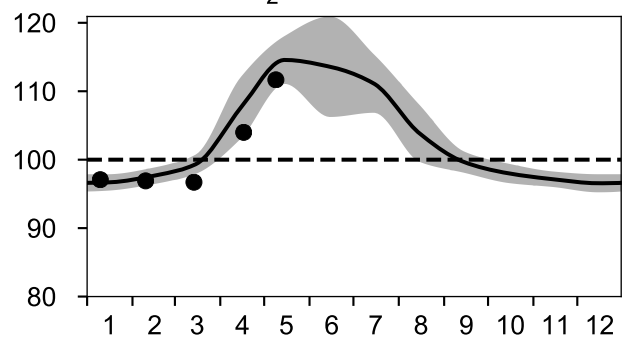
DIN µmol/l



SiO₃ µmol/l

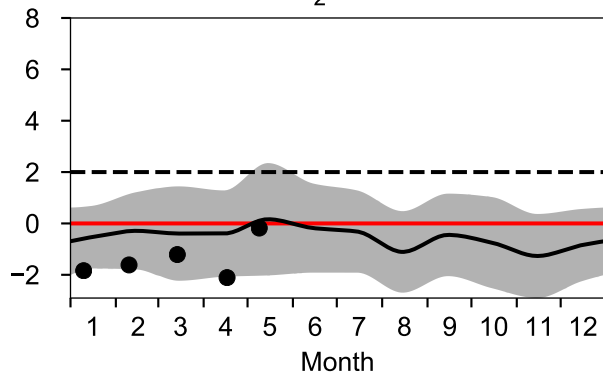


O₂ saturation %

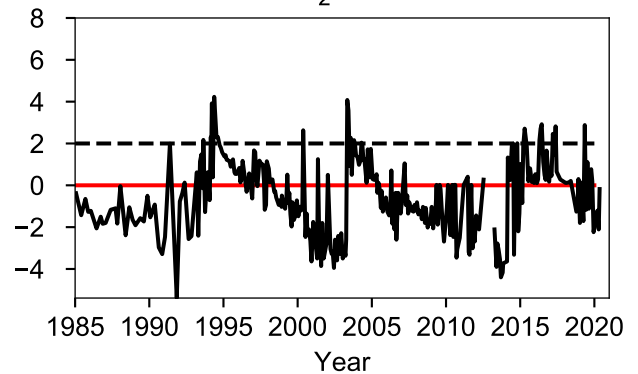


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l

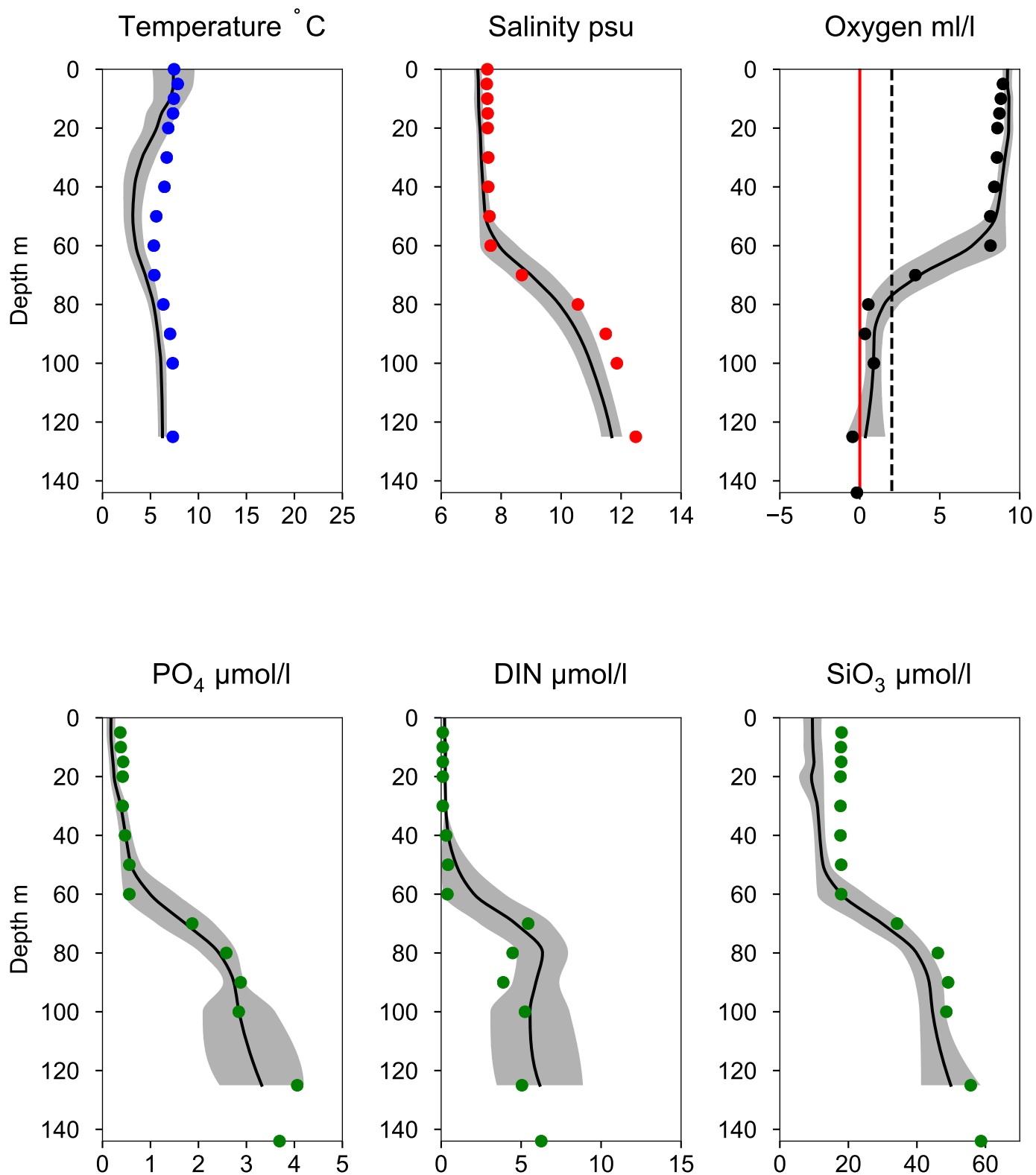


O₂ ml/l



Vertical profiles BY10 May

— Mean 2001-2015 St.Dev. • 2020-05-09



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

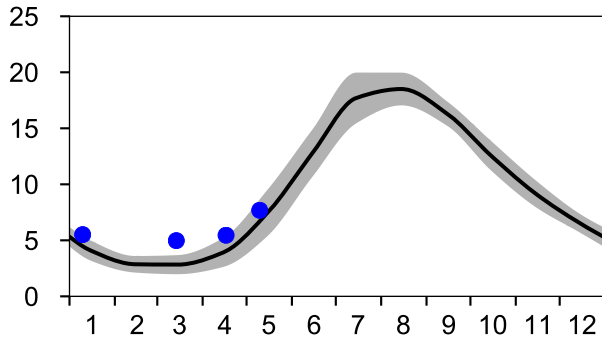
Annual Cycles

— Mean 2001-2015

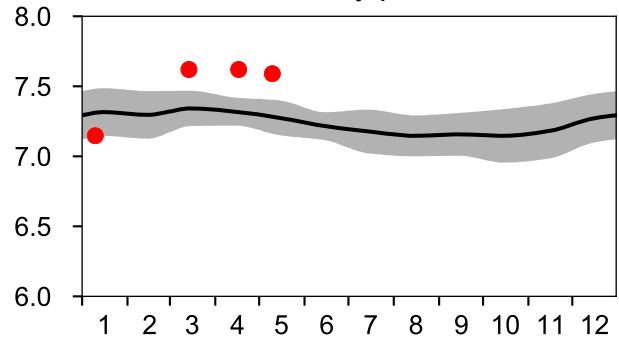
■ St.Dev.

● 2020

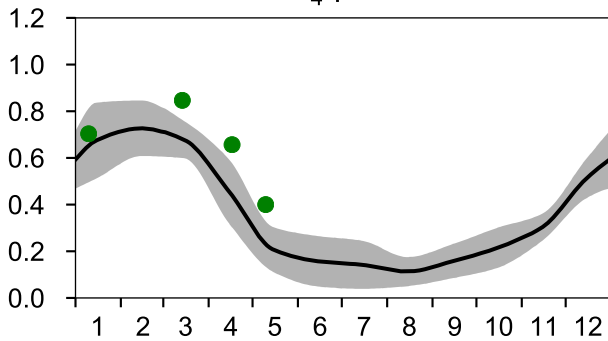
Temperature °C



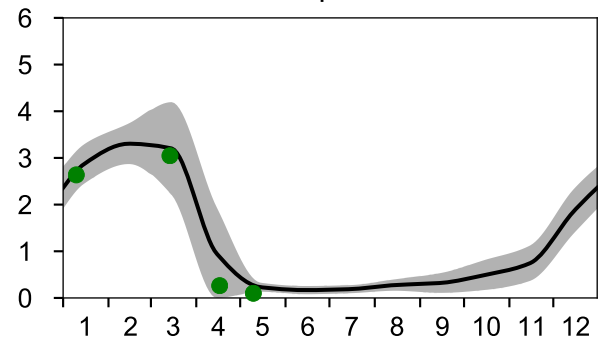
Salinity psu



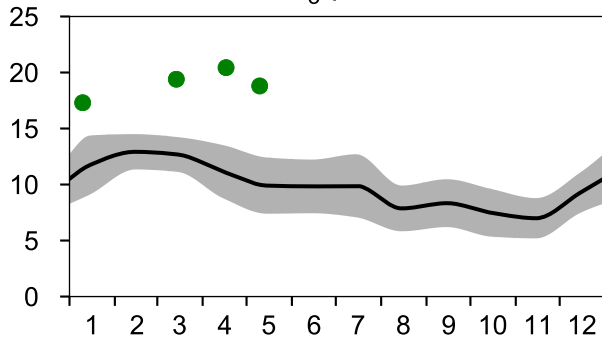
PO₄ μmol/l



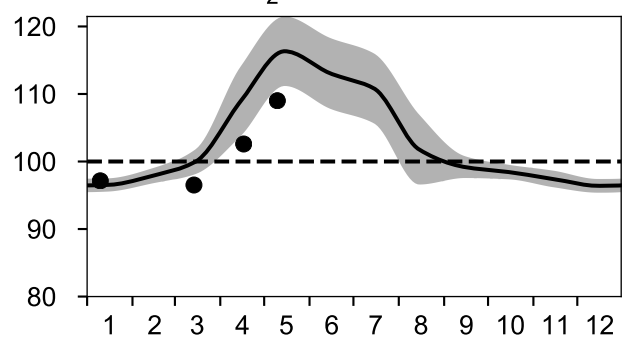
DIN μmol/l



SiO₃ μmol/l

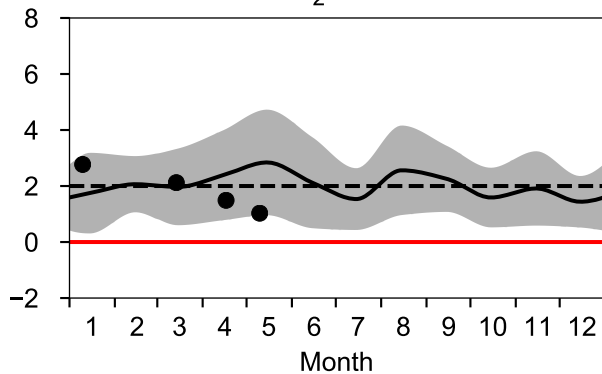


O₂ saturation %

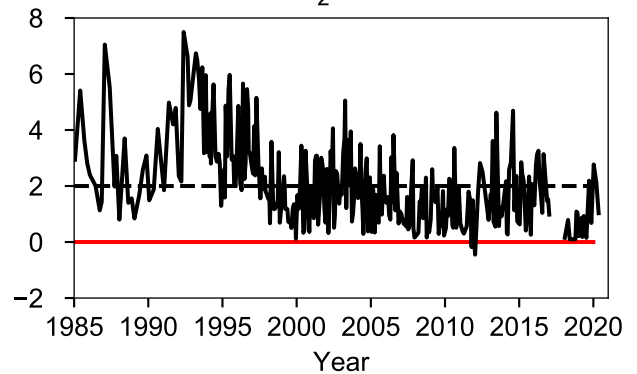


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l



O₂ ml/l

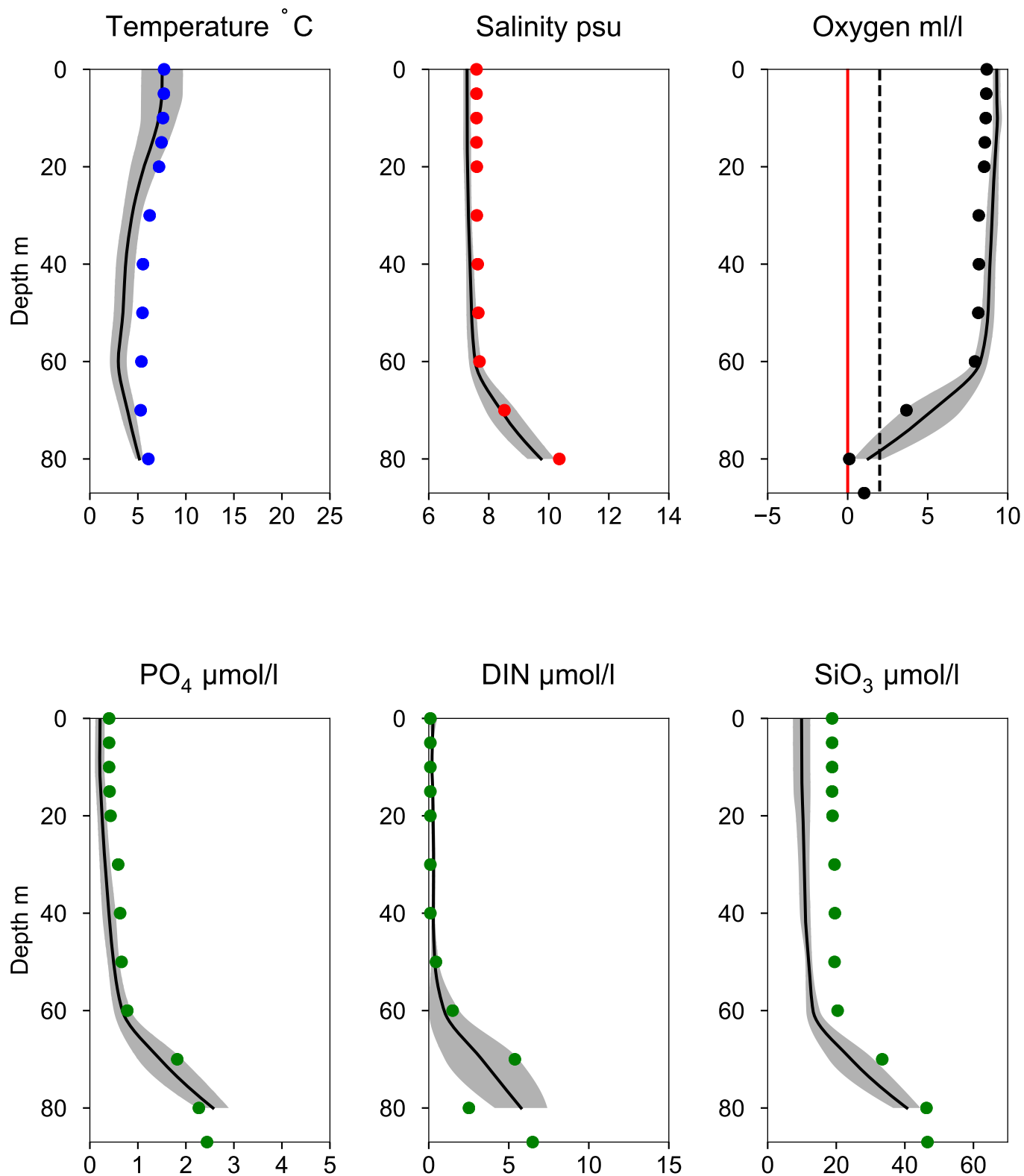


Vertical profiles BCS III-10 May

— Mean 2001-2015

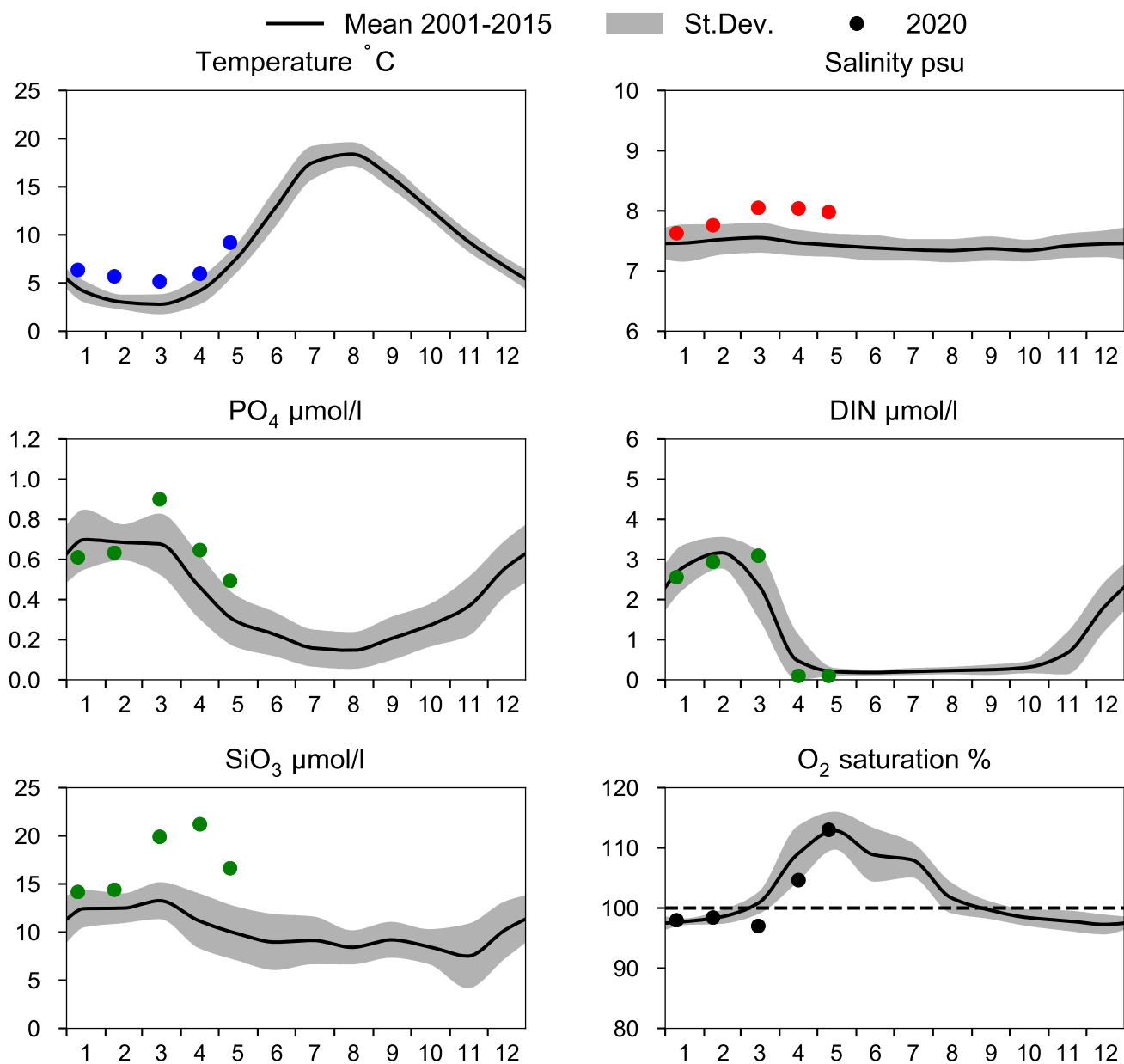
■ St.Dev.

● 2020-05-10

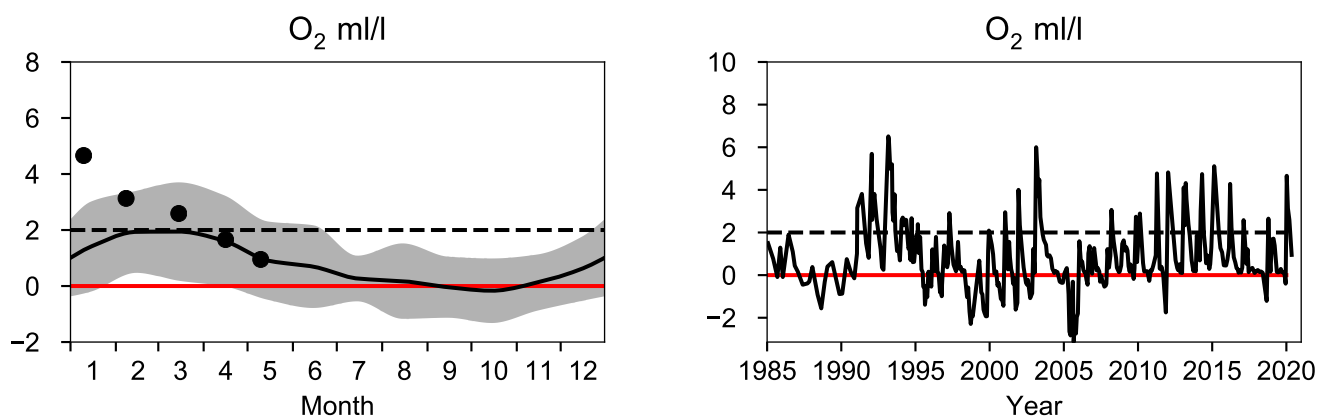


STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

Annual Cycles

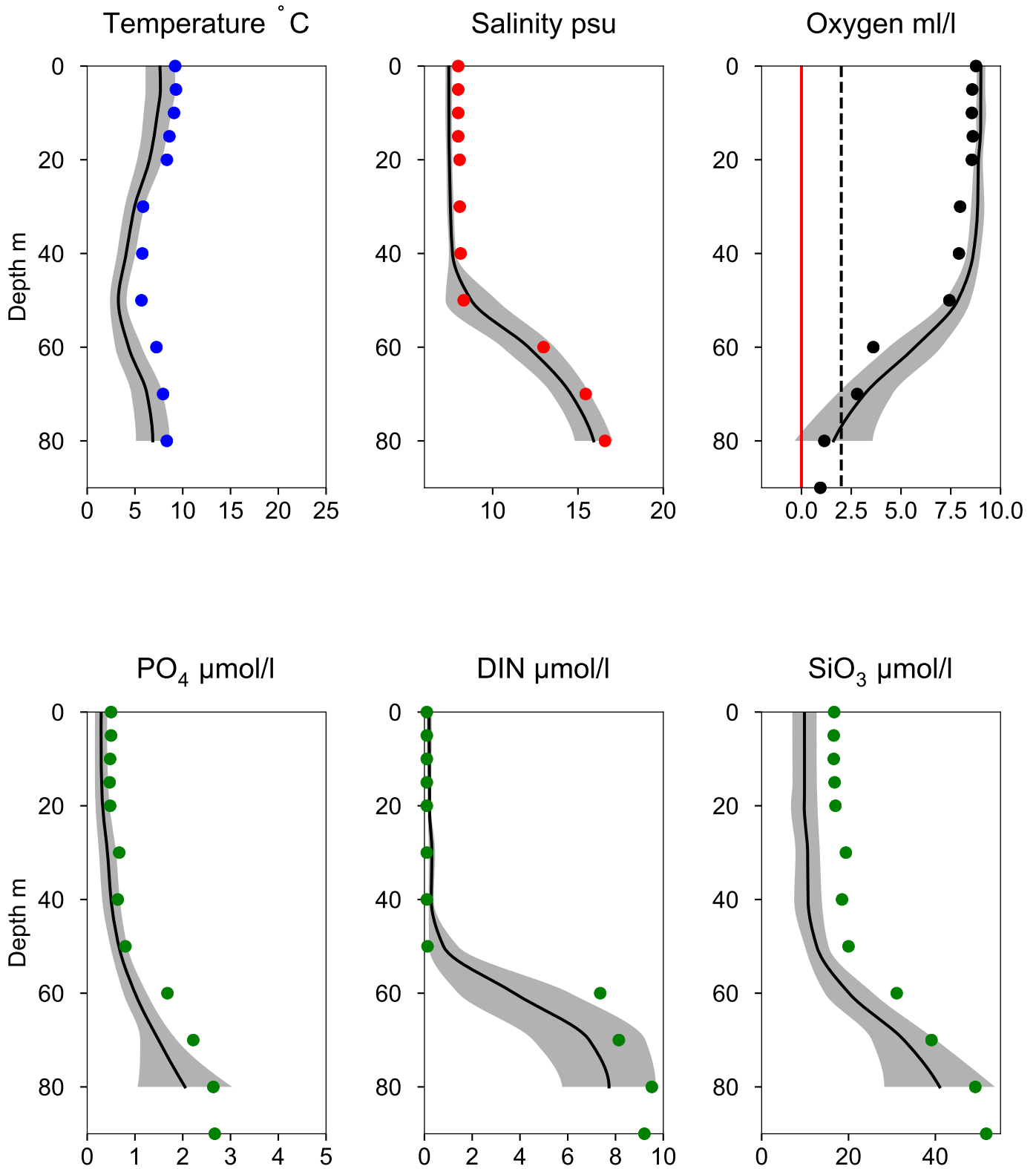


OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles BY5 BORNHOLMSDJ May

— Mean 2001-2015 St.Dev. • 2020-05-10



STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

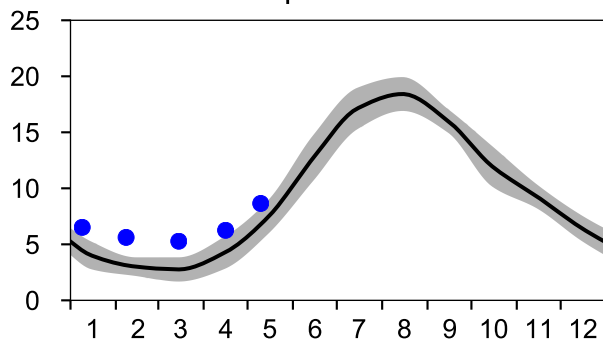
Annual Cycles

— Mean 2001-2015

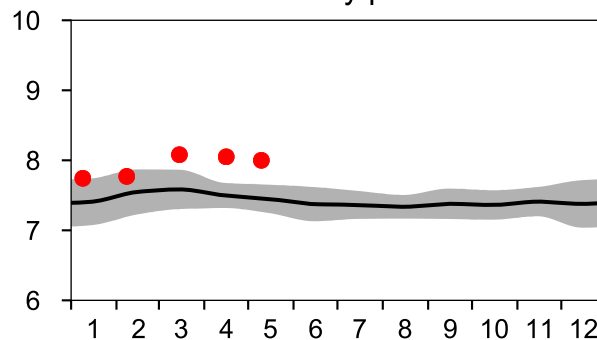
■ St.Dev.

● 2020

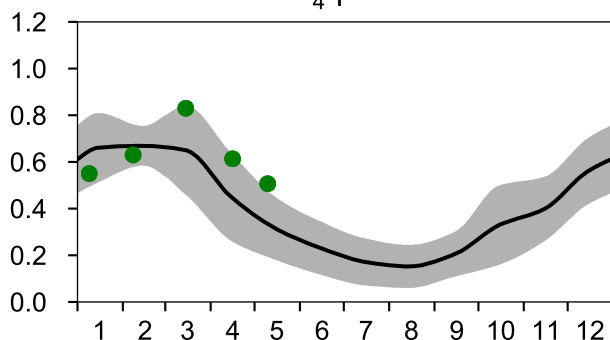
Temperature °C



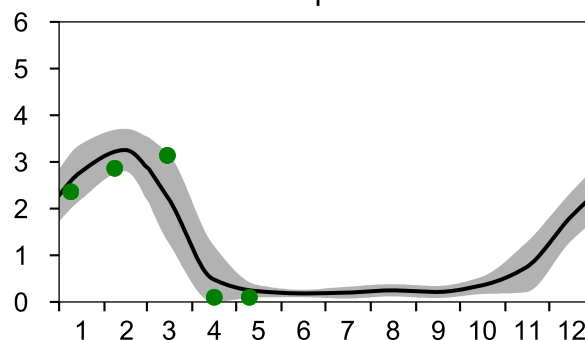
Salinity psu



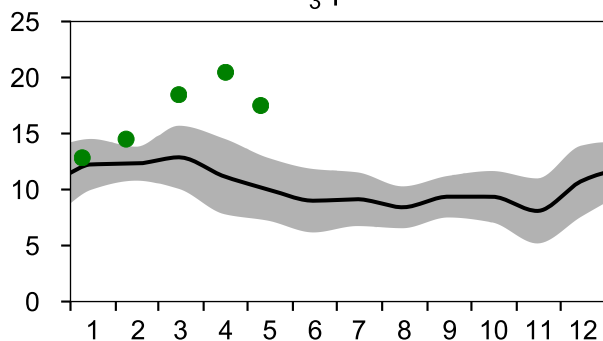
PO₄ µmol/l



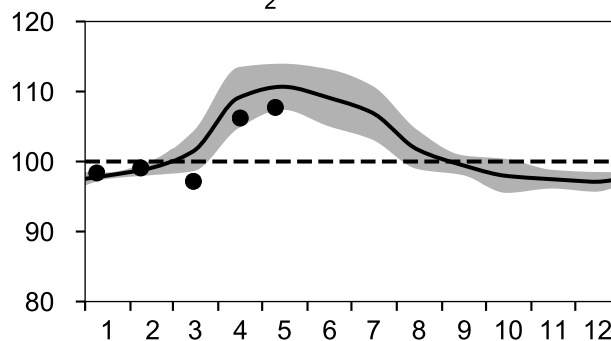
DIN µmol/l



SiO₃ µmol/l

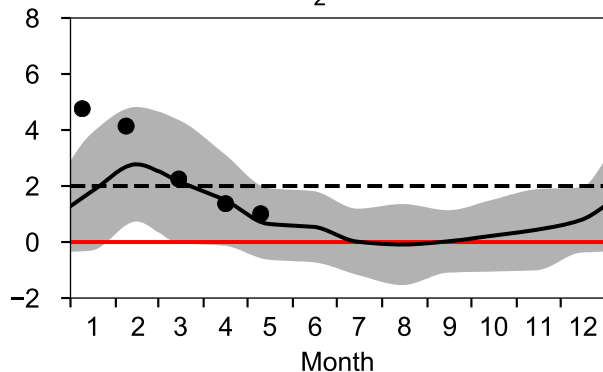


O₂ saturation %

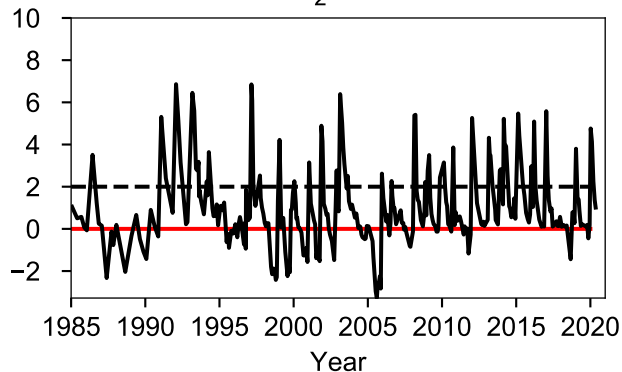


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l



O₂ ml/l

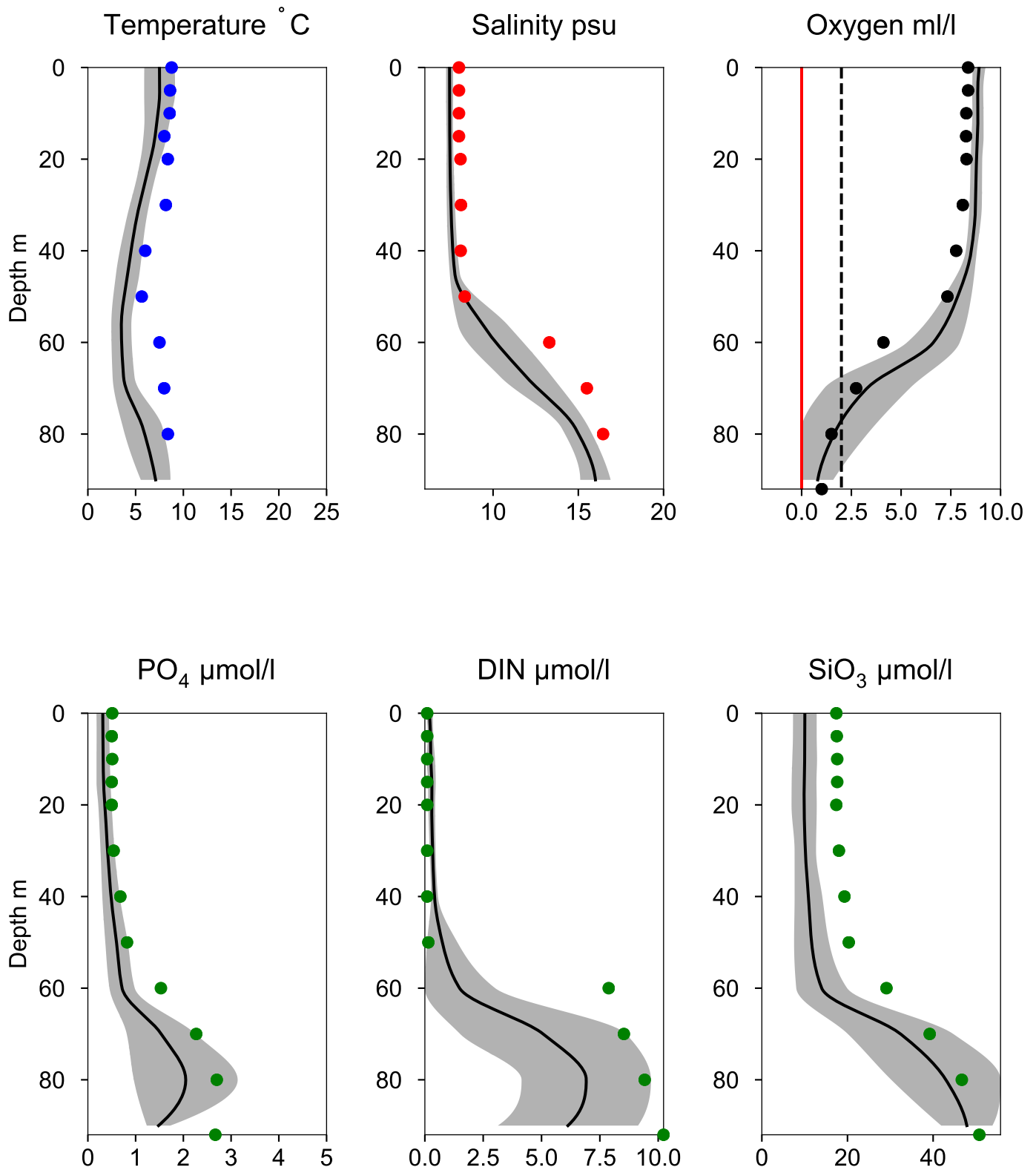


Vertical profiles BY4 CHRISTIANSÖ May

— Mean 2001-2015

■ St.Dev.

● 2020-05-10



STATION BY2 ARKONA SURFACE WATER (0-10 m)

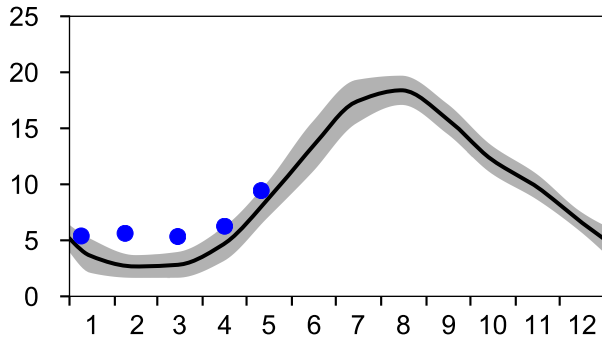
Annual Cycles

— Mean 2001-2015

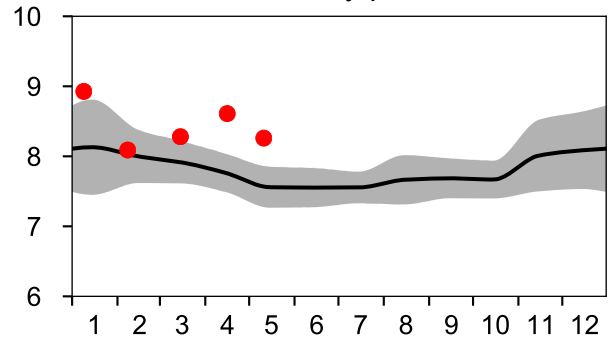
■ St.Dev.

● 2020

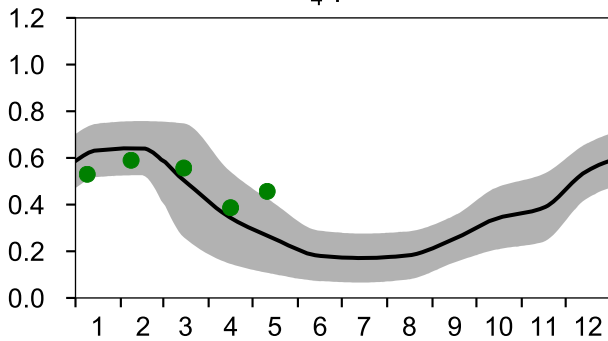
Temperature °C



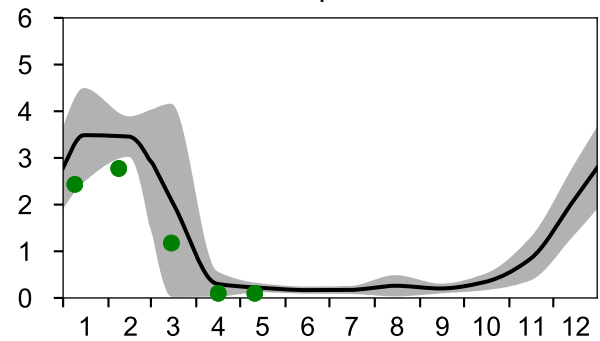
Salinity psu



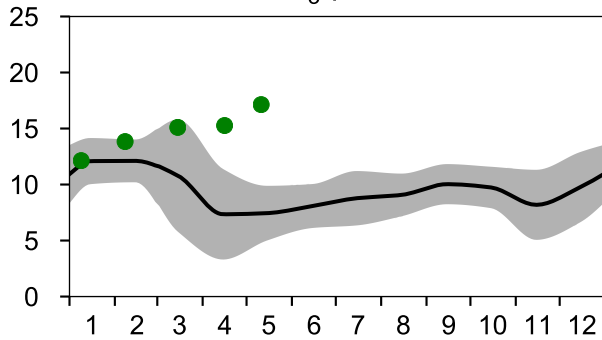
PO₄ µmol/l



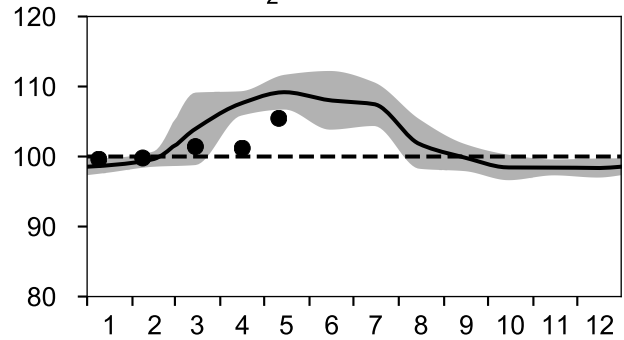
DIN µmol/l



SiO₃ µmol/l

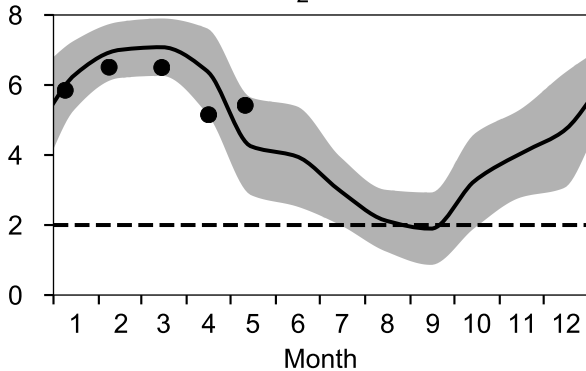


O₂ saturation %

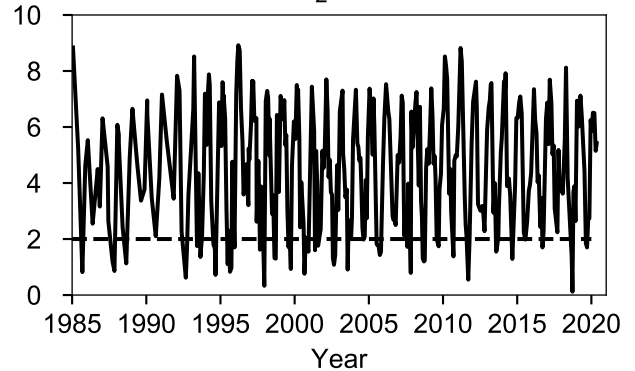


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l



O₂ ml/l

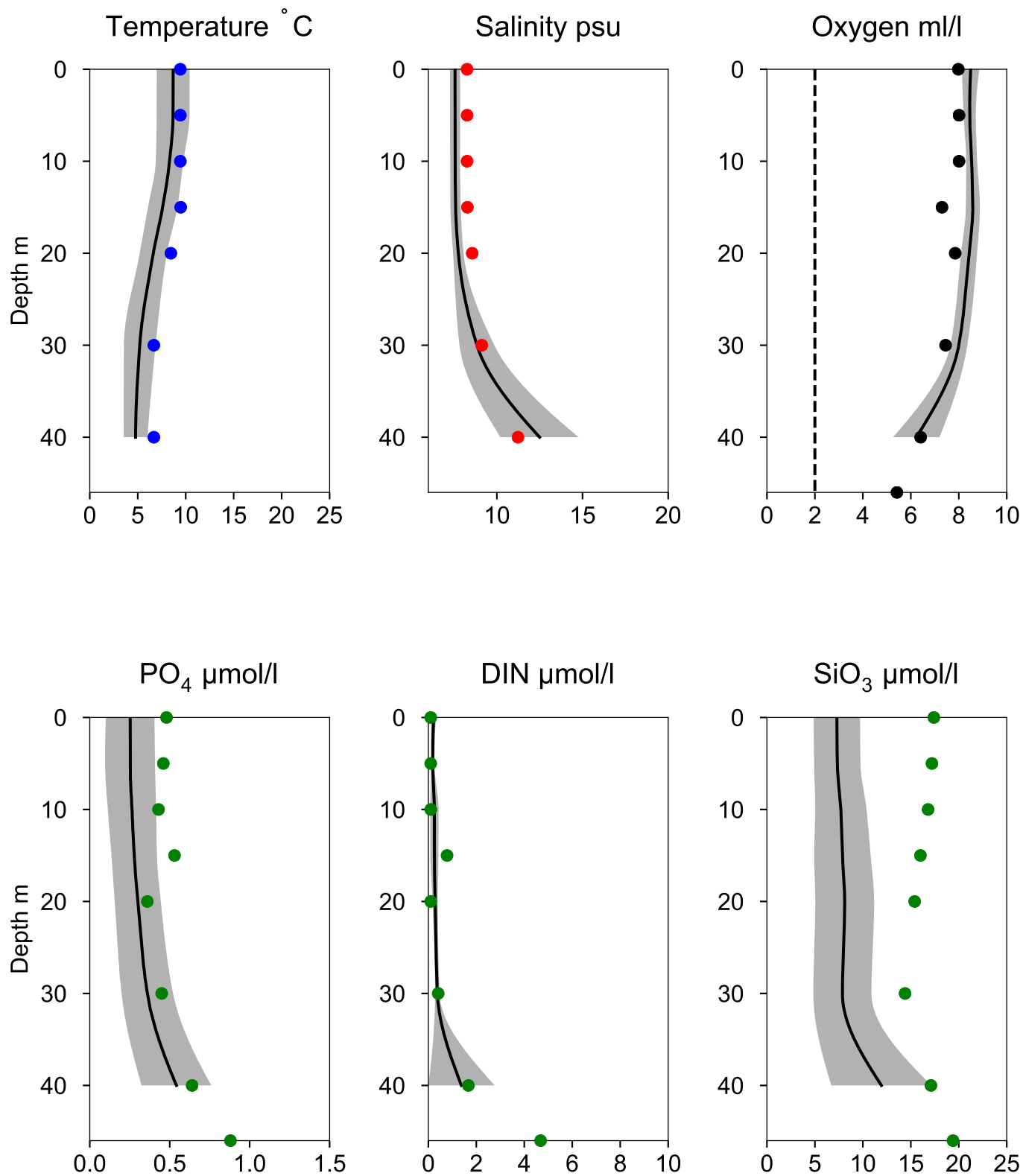


Vertical profiles BY2 ARKONA May

— Mean 2001-2015

■ St.Dev.

● 2020-05-11



STATION BY1 SURFACE WATER (0-10 m)

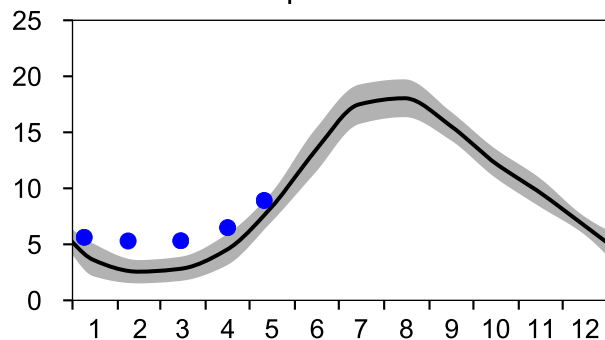
Annual Cycles

— Mean 2001-2015

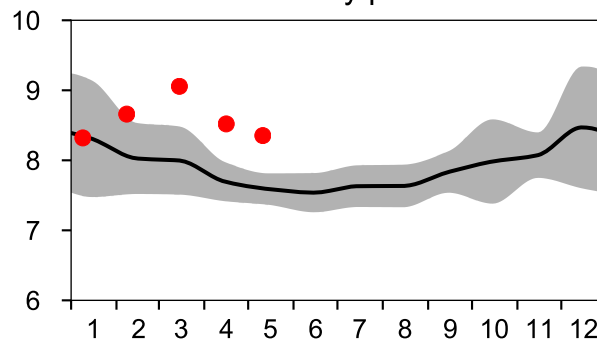
■ St.Dev.

● 2020

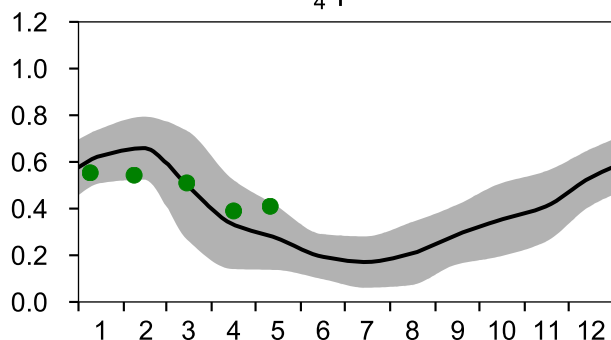
Temperature °C



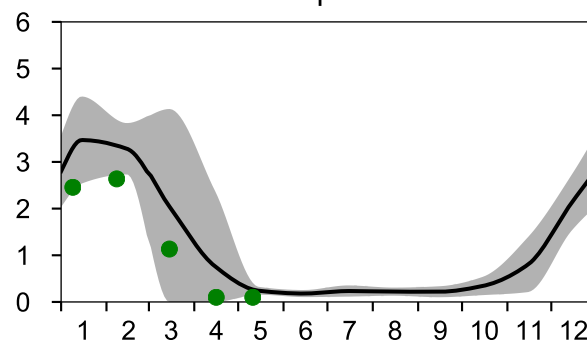
Salinity psu



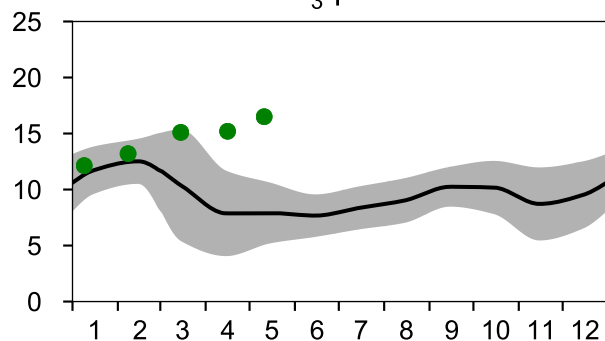
PO₄ µmol/l



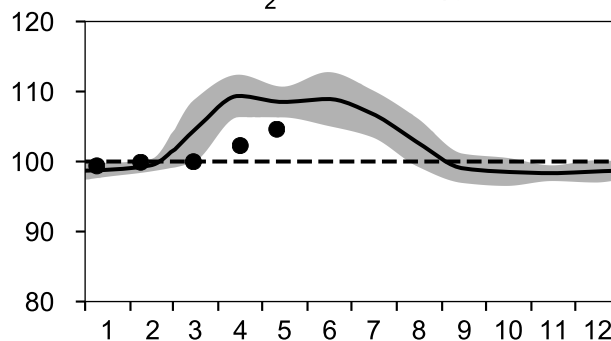
DIN µmol/l



SiO₃ µmol/l

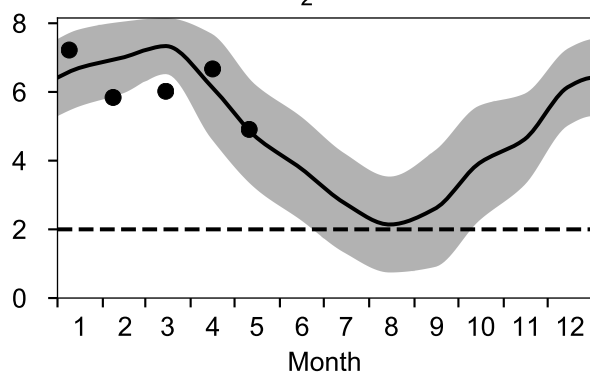


O₂ saturation %

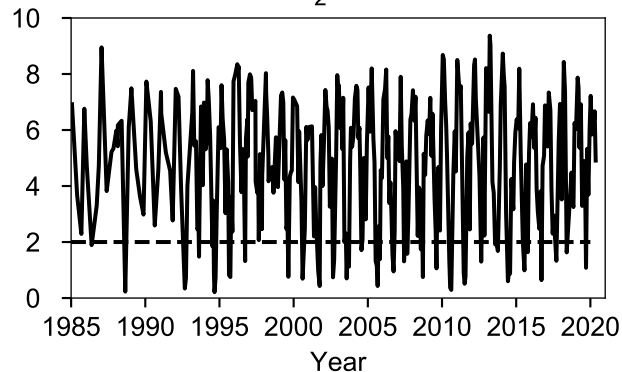


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

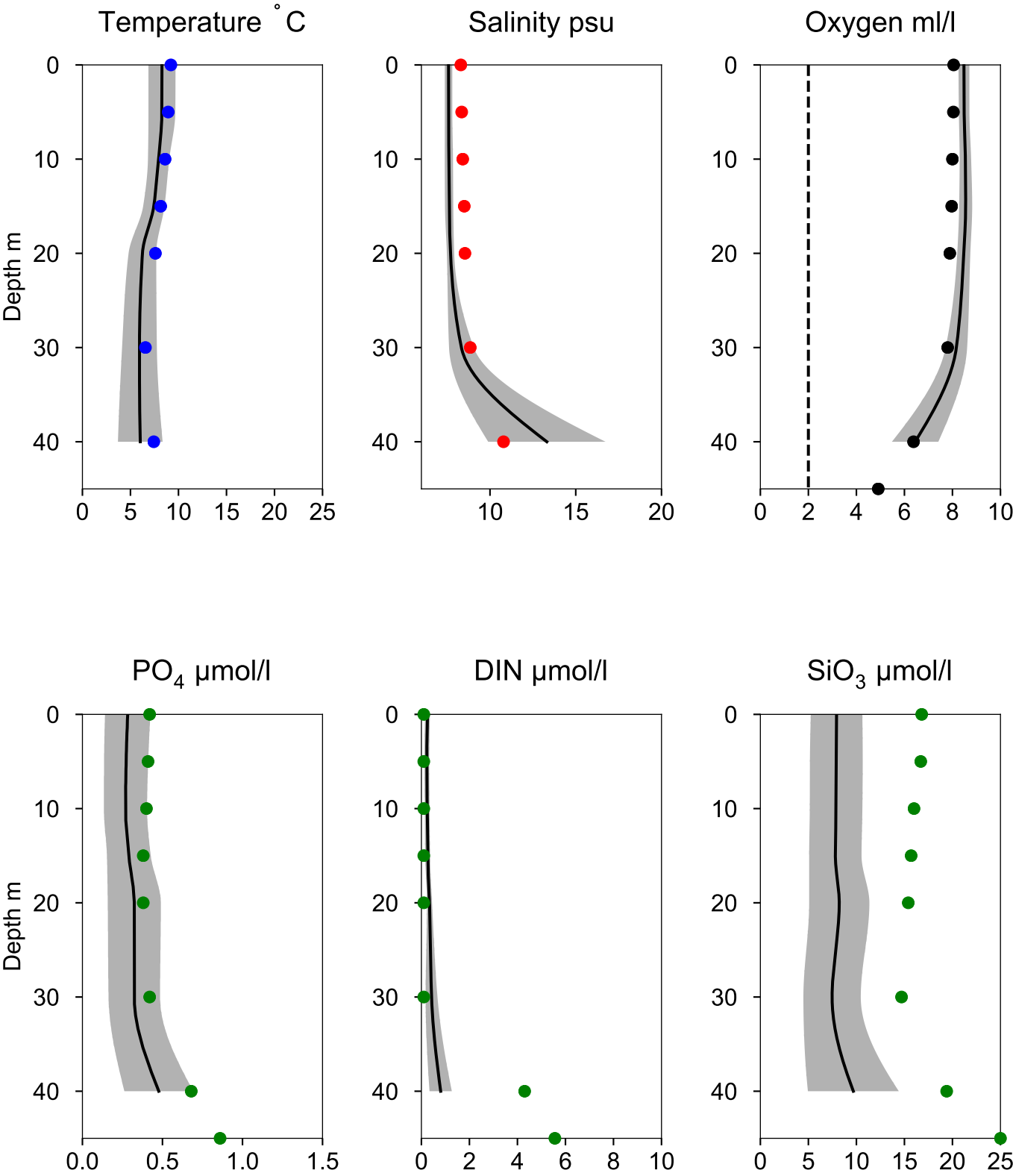


O₂ ml/l



Vertical profiles BY1
May

— Mean 2001-2015 St.Dev. • 2020-05-11



STATION W LANDSKRONA SURFACE WATER (0-10 m)

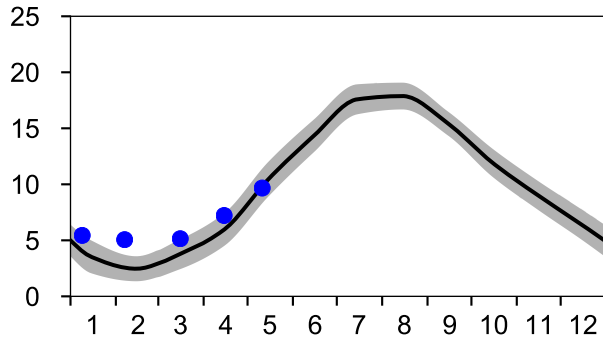
Annual Cycles

— Mean 2001-2015

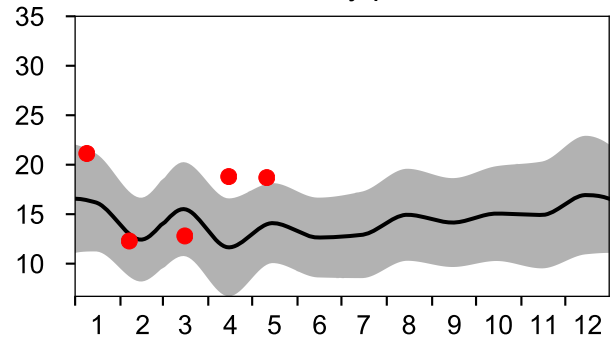
■ St.Dev.

● 2020

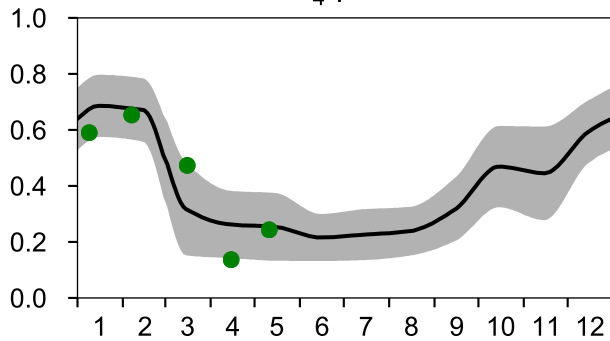
Temperature °C



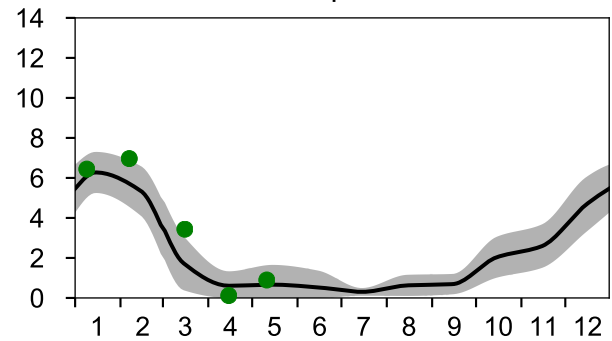
Salinity psu



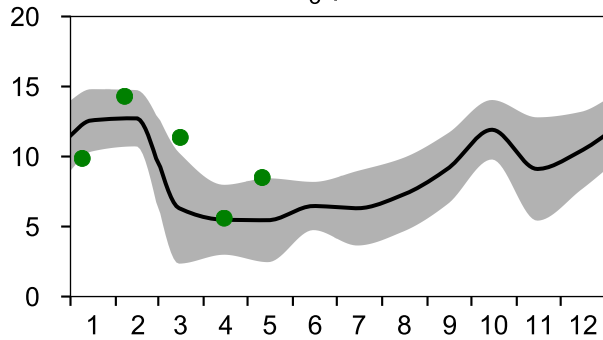
PO₄ µmol/l



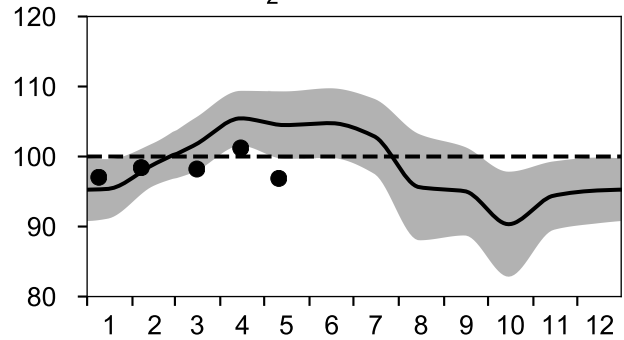
DIN µmol/l



SiO₃ µmol/l

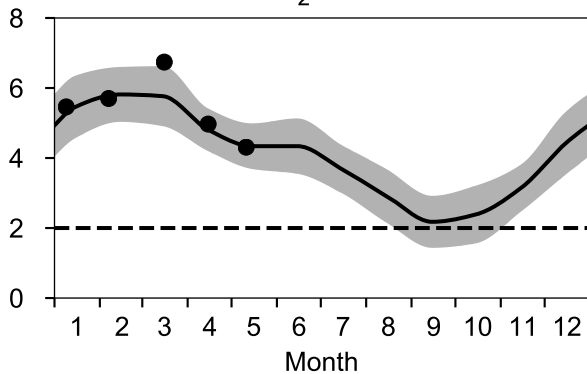


O₂ saturation %

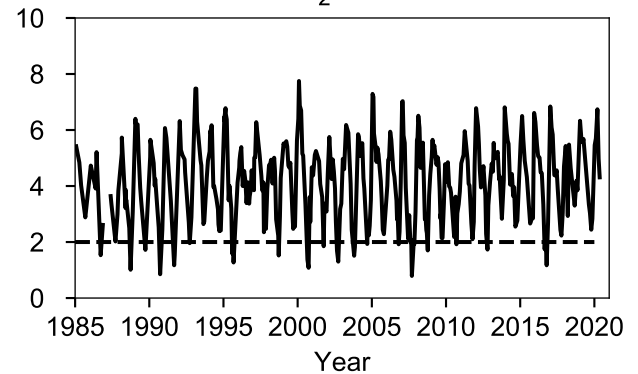


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

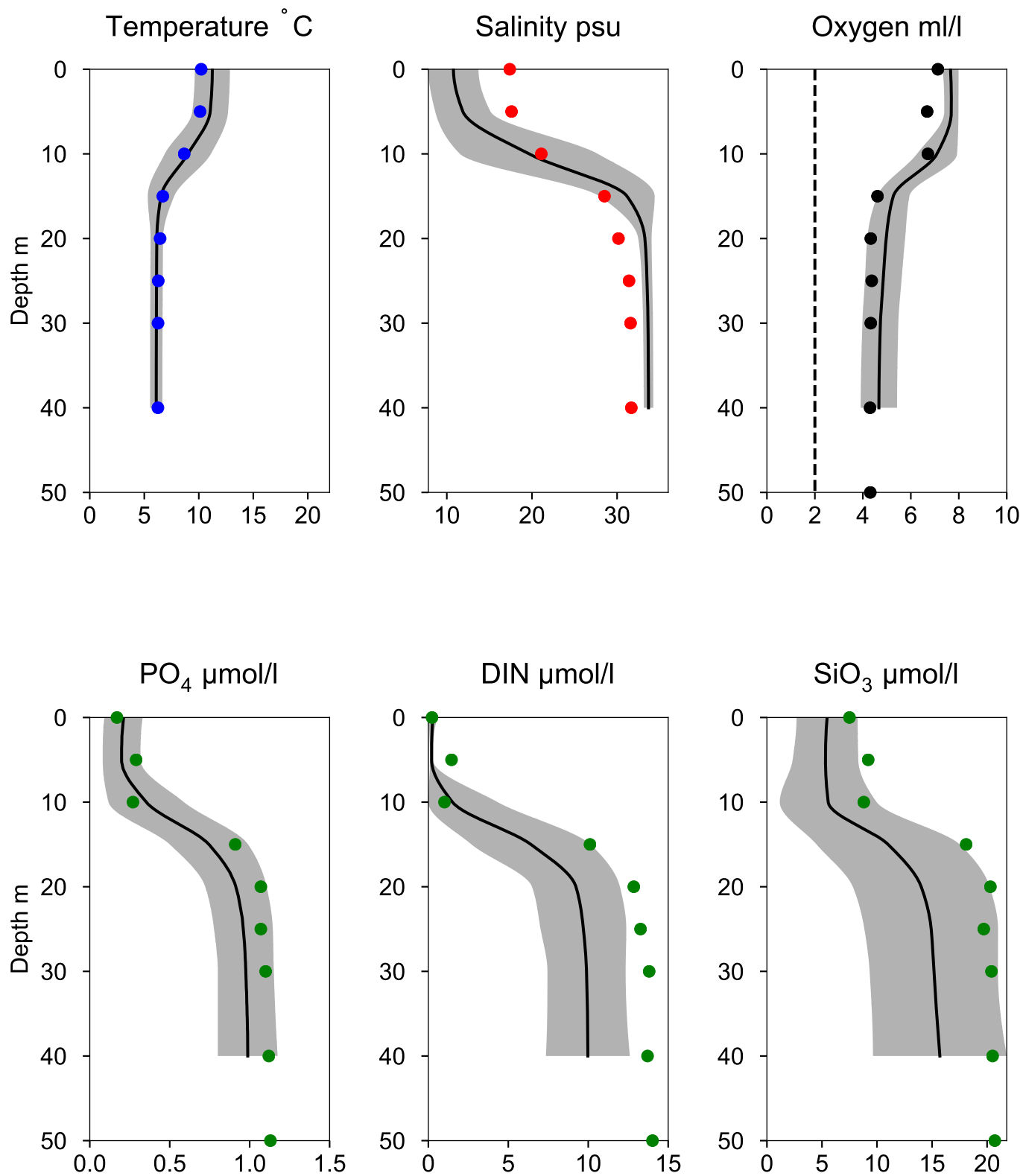


O₂ ml/l



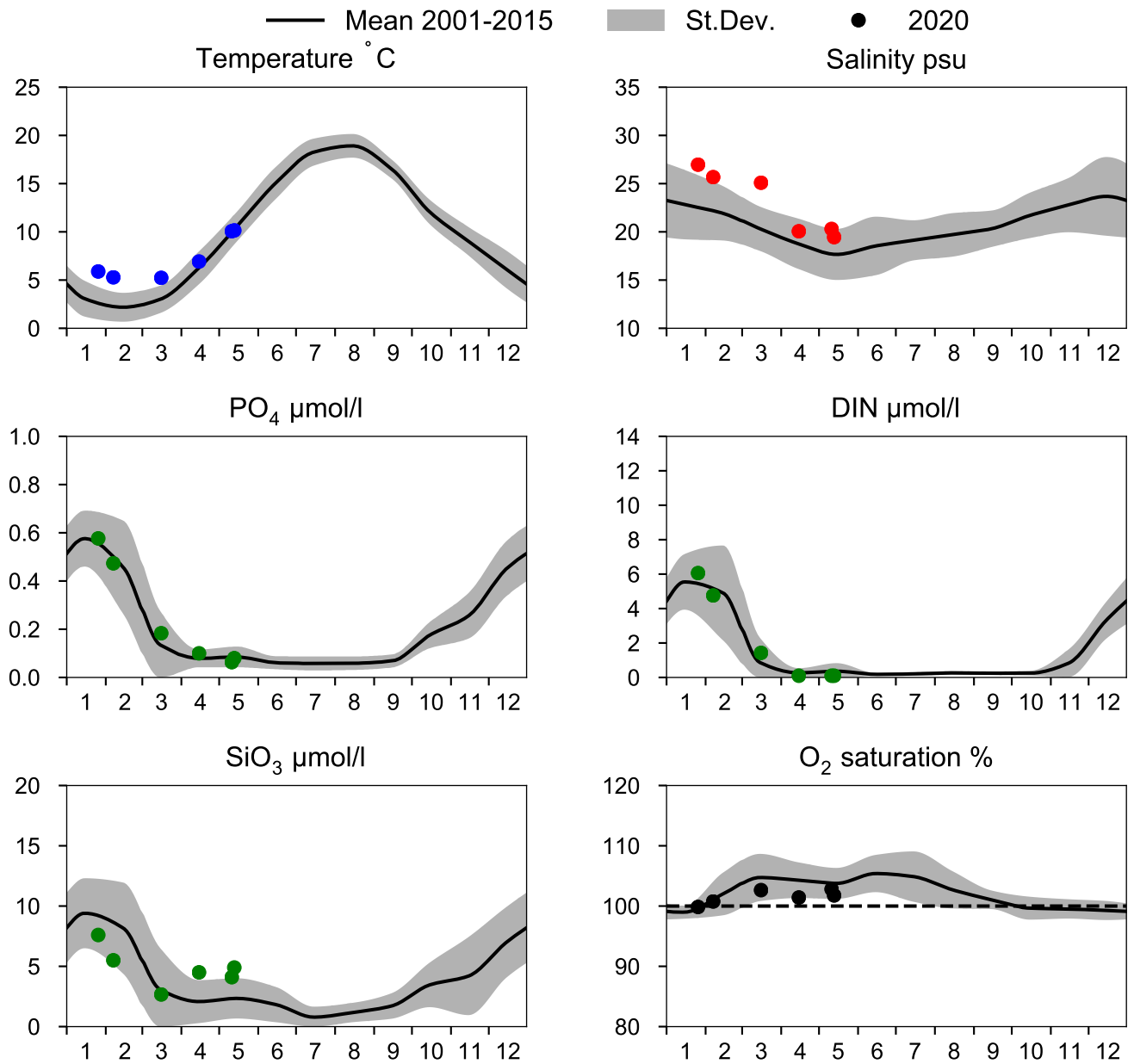
Vertical profiles W LANDSKRONA May

— Mean 2001-2015 St.Dev. • 2020-05-11

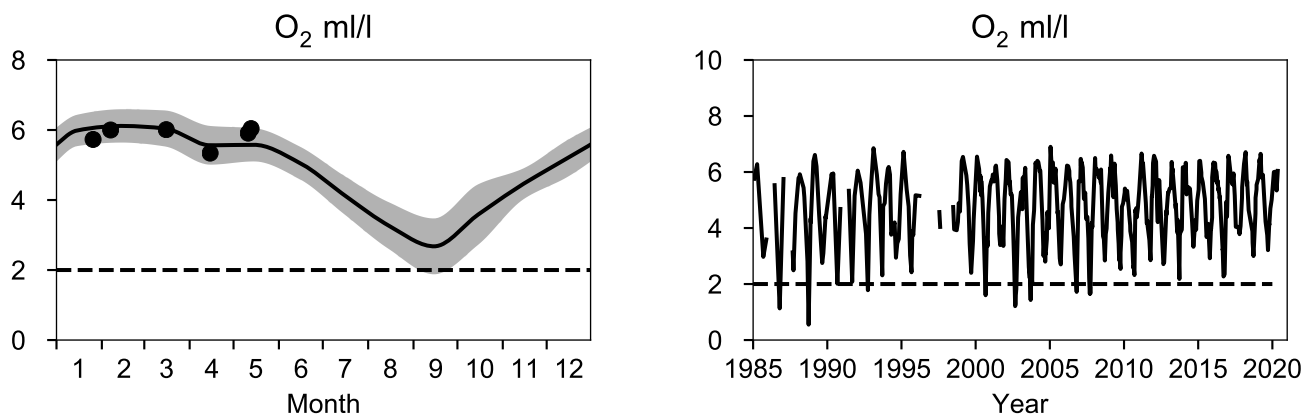


STATION ANHOLT E SURFACE WATER (0-10 m)

Annual Cycles

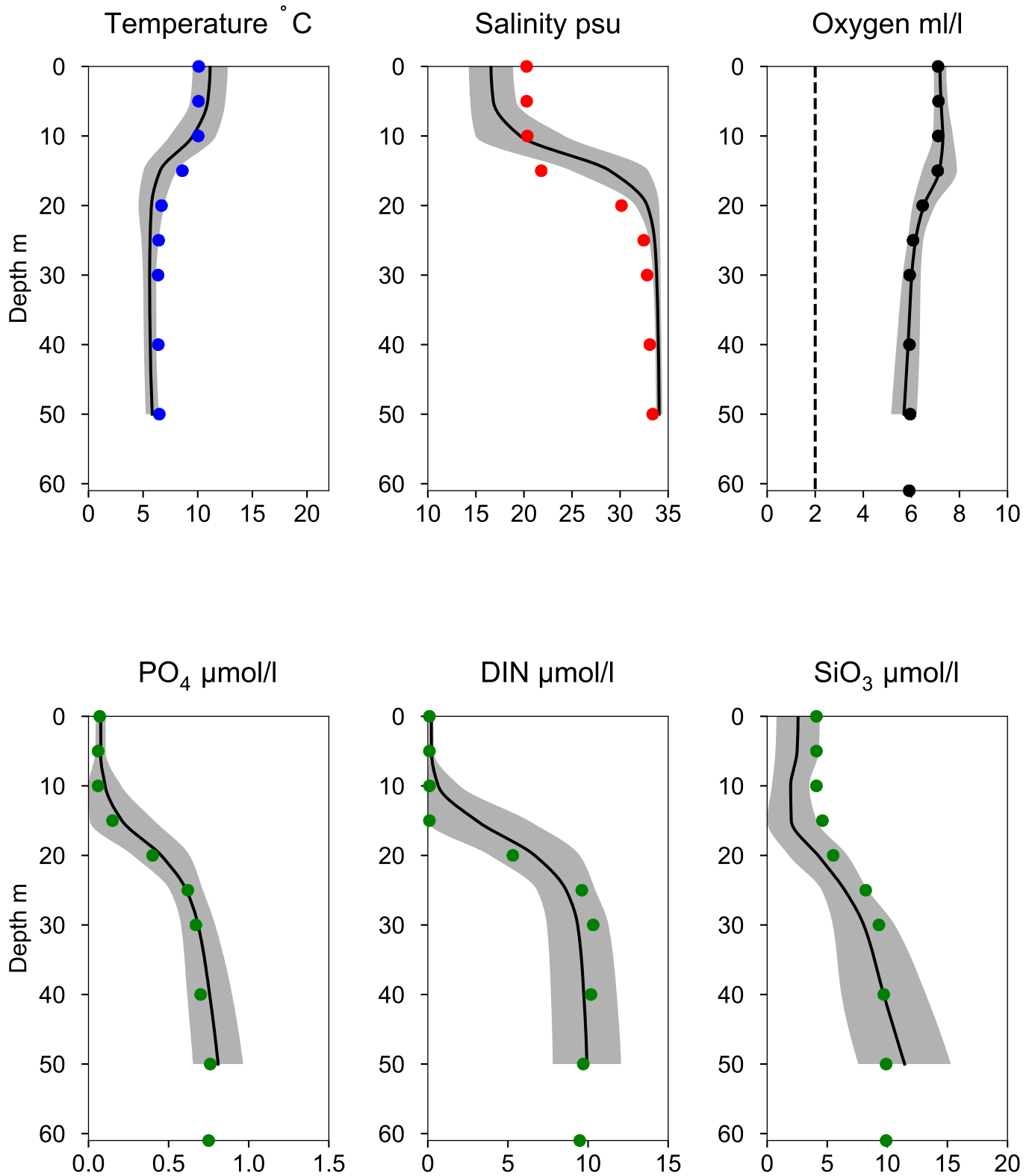


OXYGEN IN BOTTOM WATER (depth >= 52 m)



Vertical profiles ANHOLT E May

— Mean 2001-2015 St.Dev. • 2020-05-11



STATION N14 FALKENBERG SURFACE WATER (0-10 m)

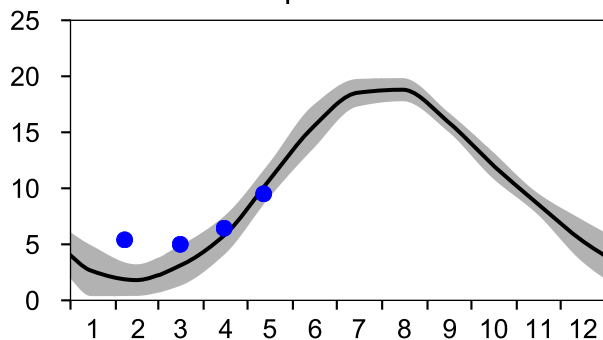
Annual Cycles

— Mean 2001-2015

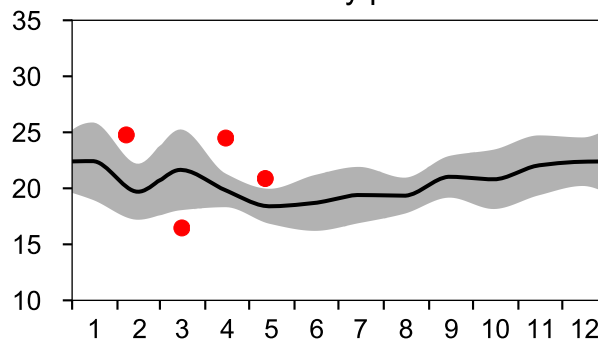
■ St.Dev.

● 2020

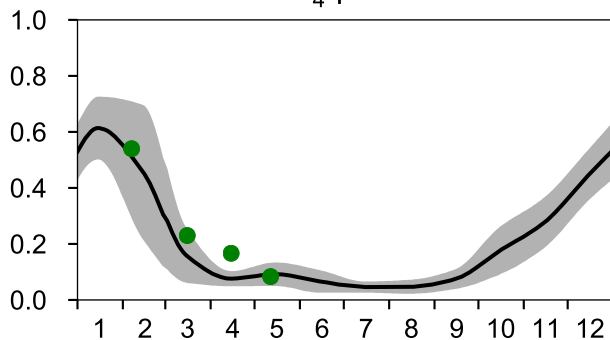
Temperature °C



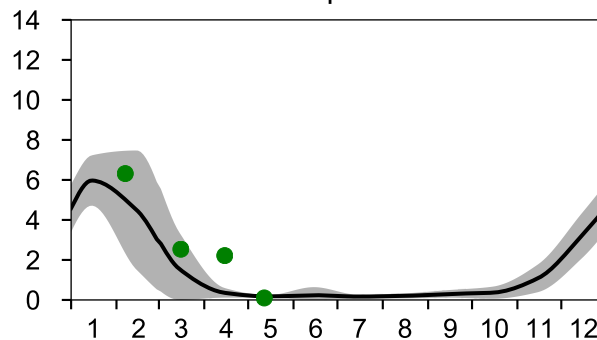
Salinity psu



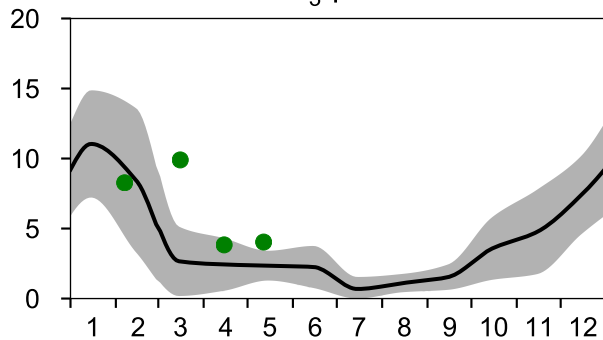
PO₄ µmol/l



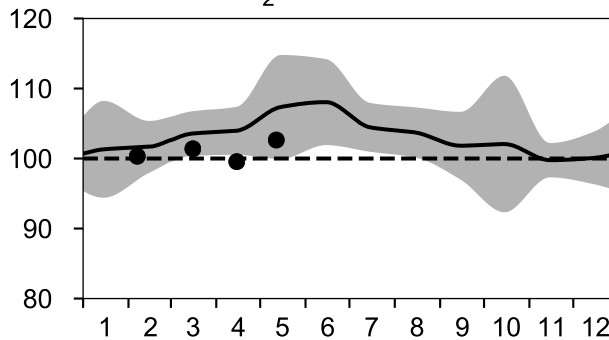
DIN µmol/l



SiO₃ µmol/l

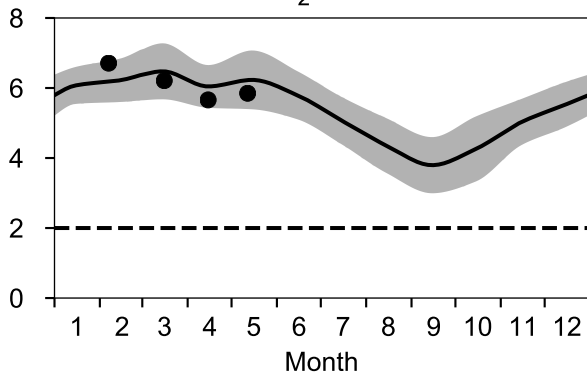


O₂ saturation %

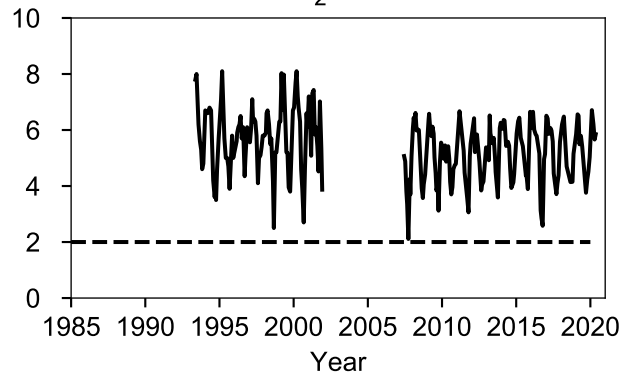


OXYGEN IN BOTTOM WATER (depth >= 20 m)

O₂ ml/l



O₂ ml/l

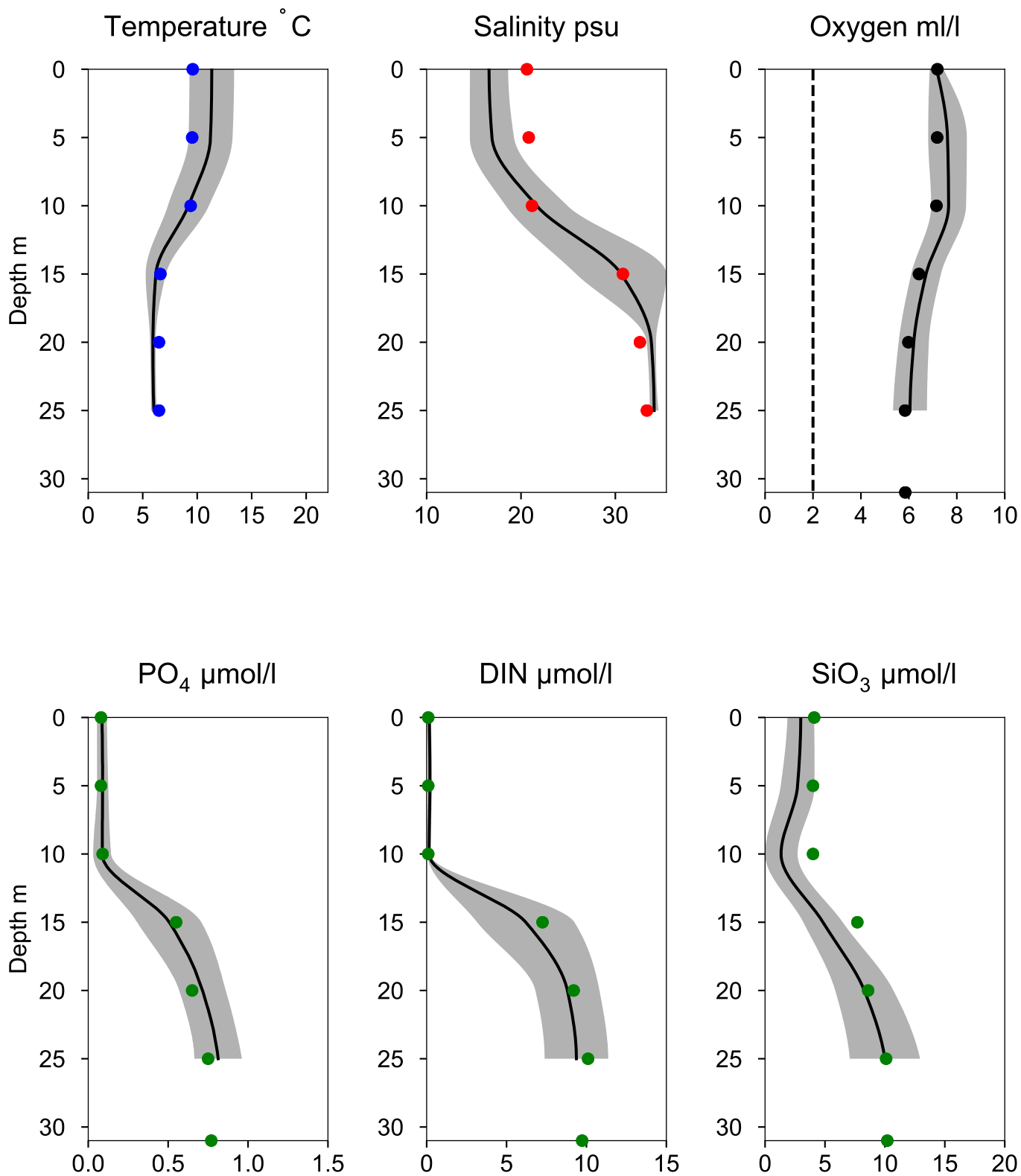


Vertical profiles N14 FALKENBERG May

— Mean 2001-2015

■ St.Dev.

● 2020-05-12



STATION FLADEN SURFACE WATER (0-10 m)

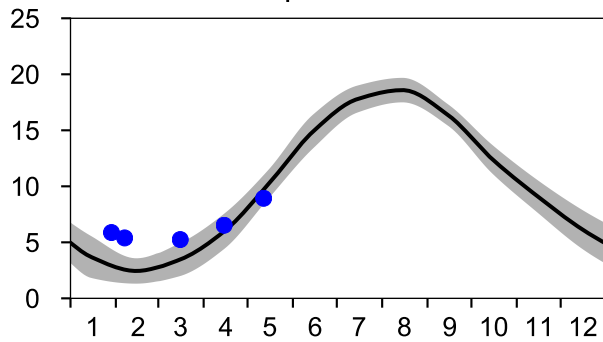
Annual Cycles

— Mean 2001-2015

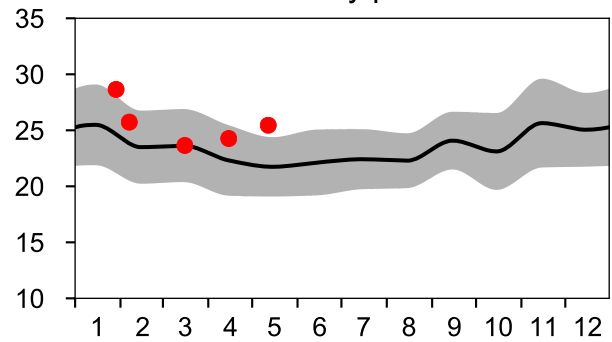
■ St.Dev.

● 2020

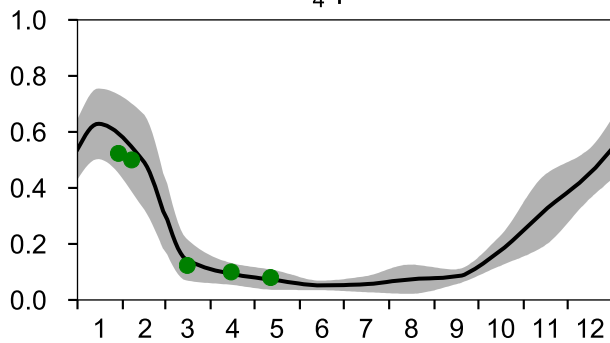
Temperature °C



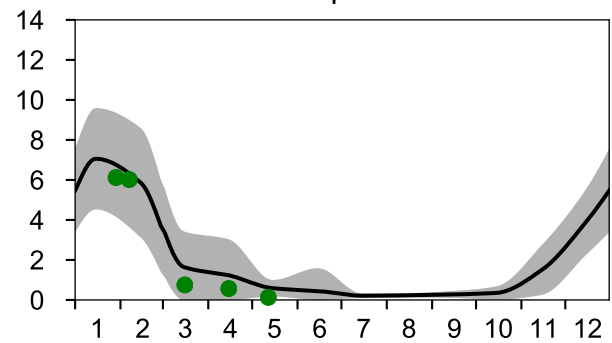
Salinity psu



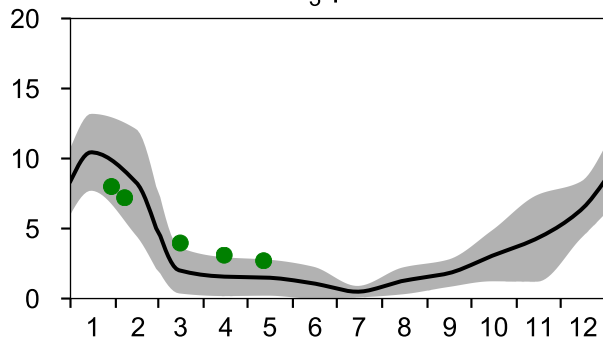
PO₄ µmol/l



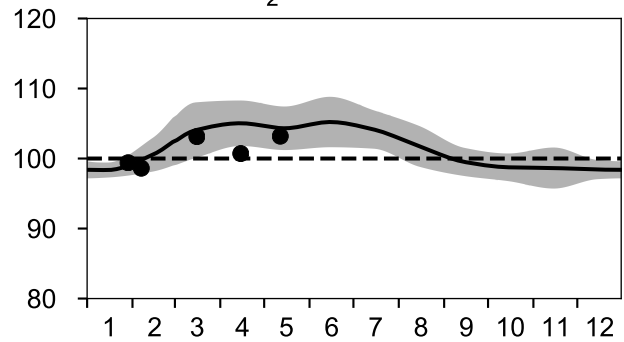
DIN µmol/l



SiO₃ µmol/l

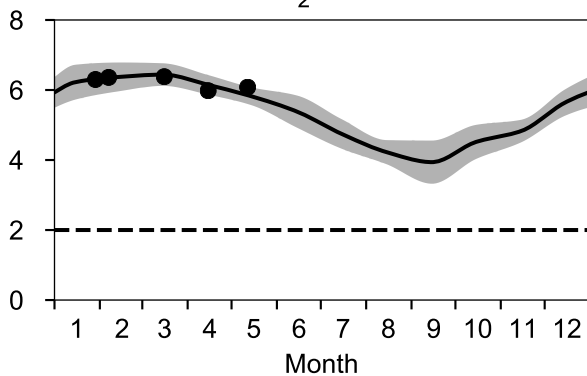


O₂ saturation %

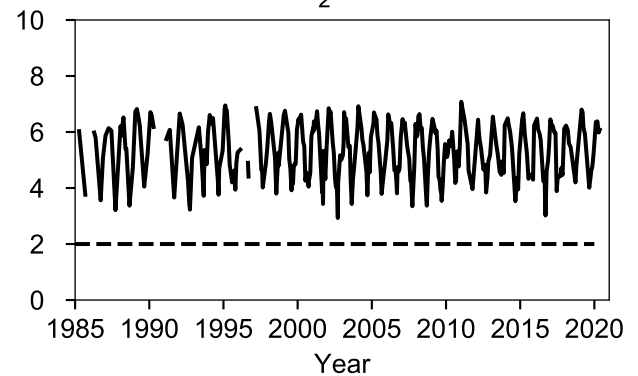


OXYGEN IN BOTTOM WATER (depth >= 74 m)

O₂ ml/l



O₂ ml/l

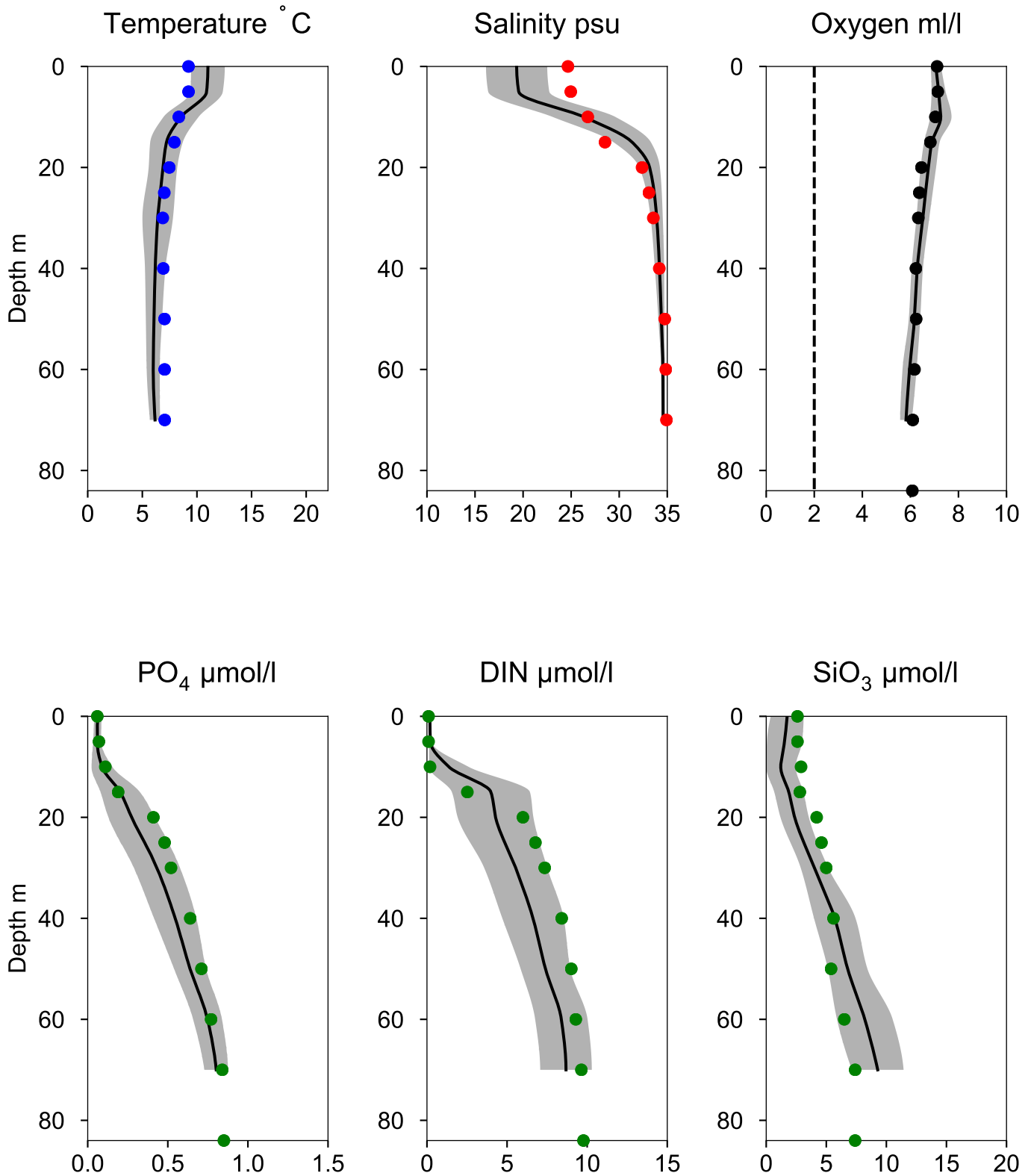


Vertical profiles FLADEN May

— Mean 2001-2015

■ St.Dev.

● 2020-05-12



STATION P2 SURFACE WATER (0-10 m)

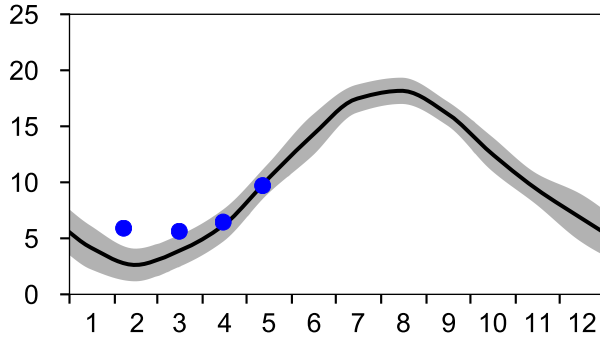
Annual Cycles

— Mean 2001-2015

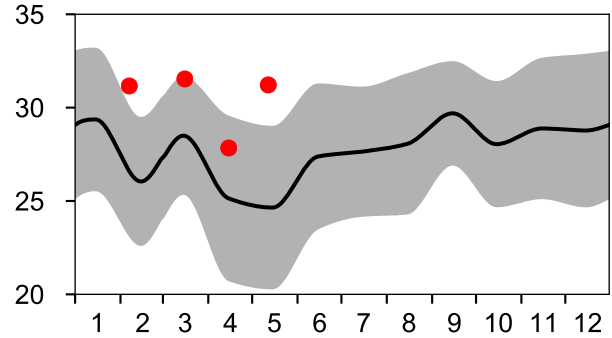
■ St.Dev.

● 2020

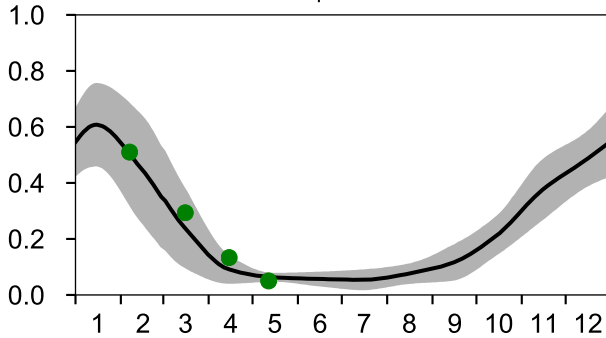
Temperature °C



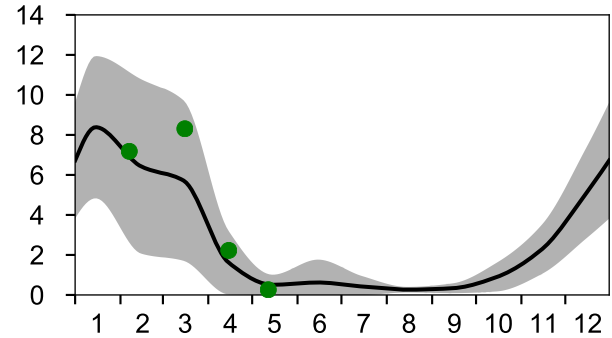
Salinity psu



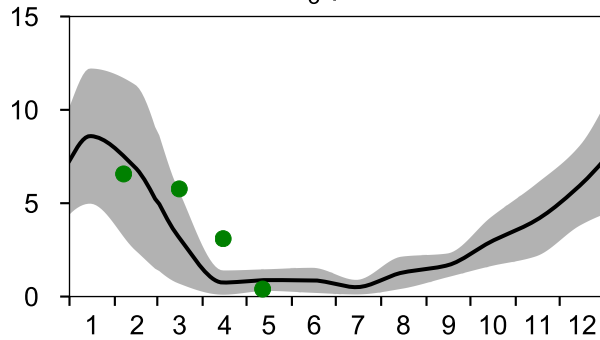
PO₄ µmol/l



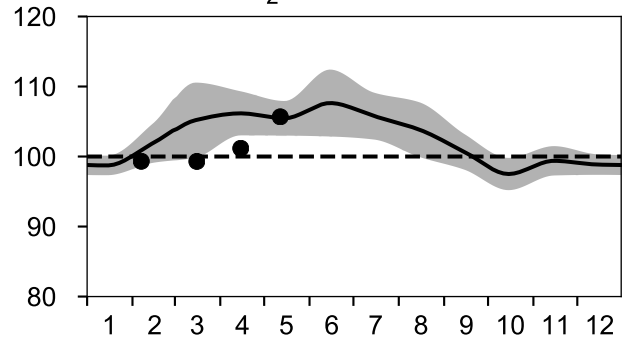
DIN µmol/l



SiO₃ µmol/l

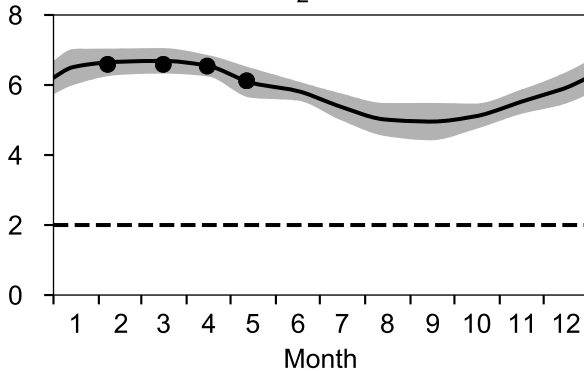


O₂ saturation %

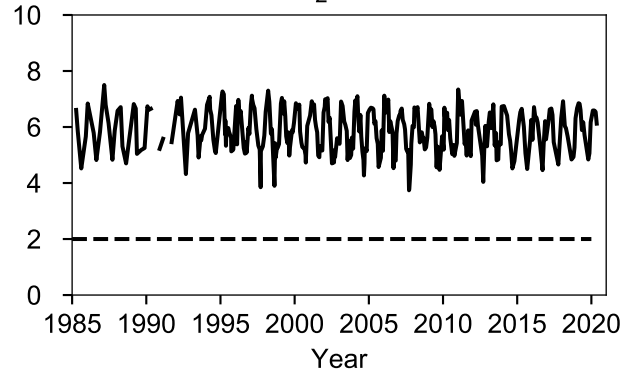


OXYGEN IN BOTTOM WATER (depth >= 75 m)

O₂ ml/l



O₂ ml/l

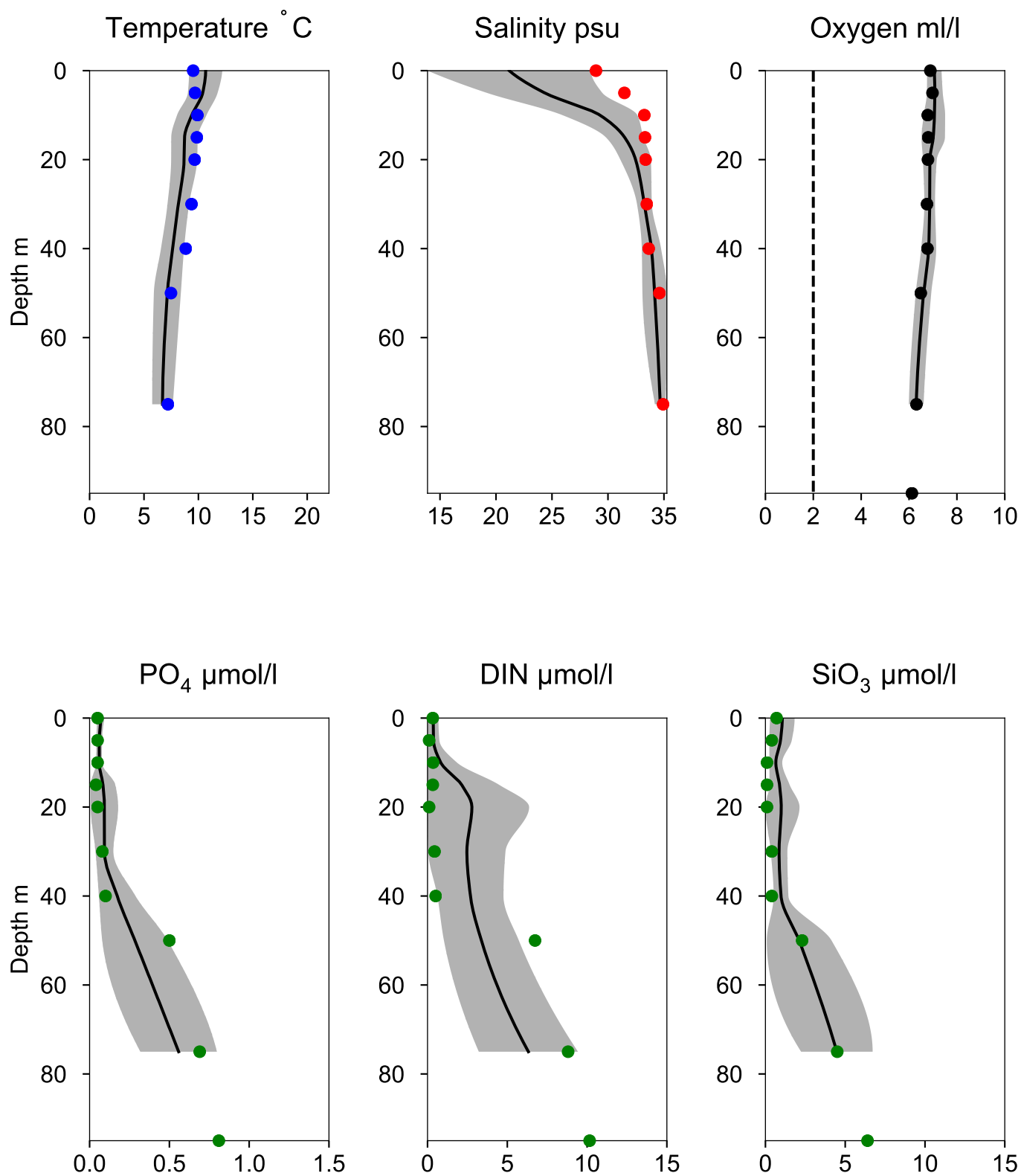


Vertical profiles P2 May

— Mean 2001-2015

■ St.Dev.

● 2020-05-12



STATION SLÄGGÖ SURFACE WATER (0-10 m)

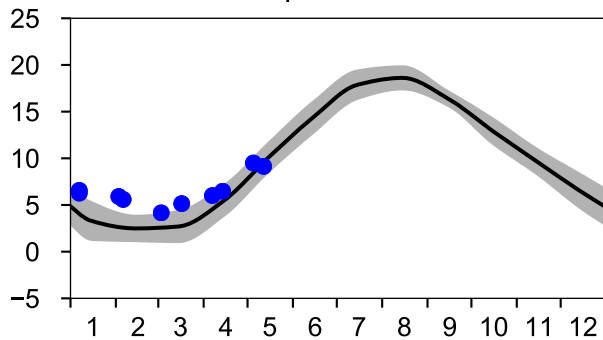
Annual Cycles

— Mean 2001-2015

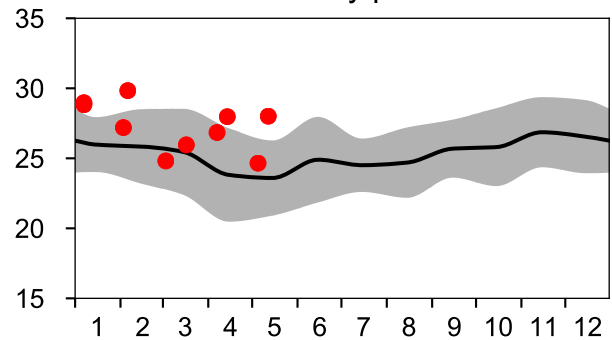
■ St.Dev.

● 2020

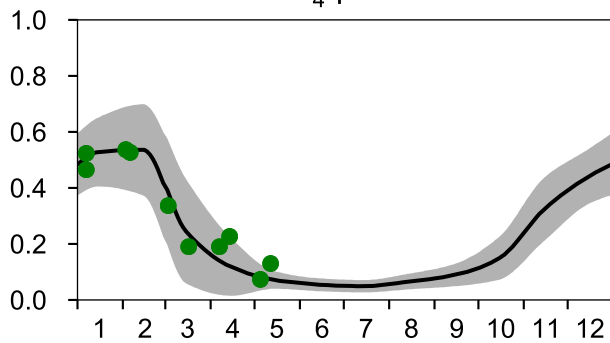
Temperature °C



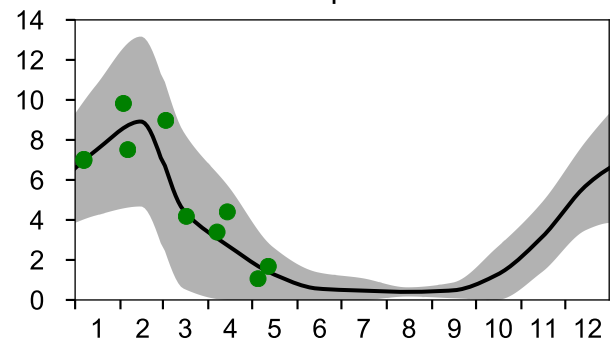
Salinity psu



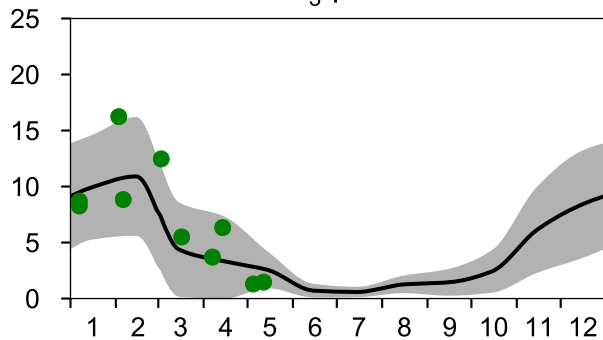
PO₄ µmol/l



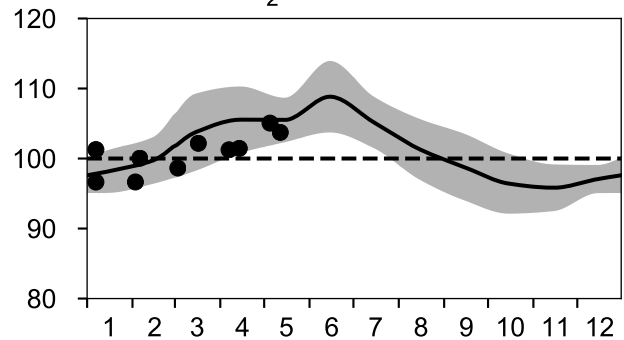
DIN µmol/l



SiO₃ µmol/l

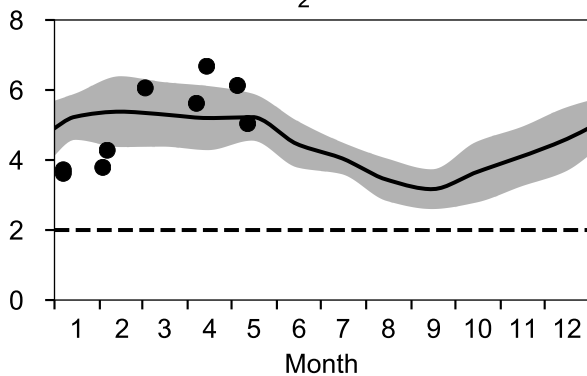


O₂ saturation %

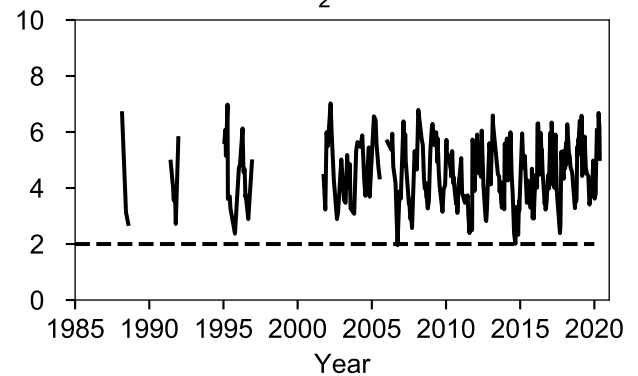


OXYGEN IN BOTTOM WATER (depth >= 64 m)

O₂ ml/l



O₂ ml/l

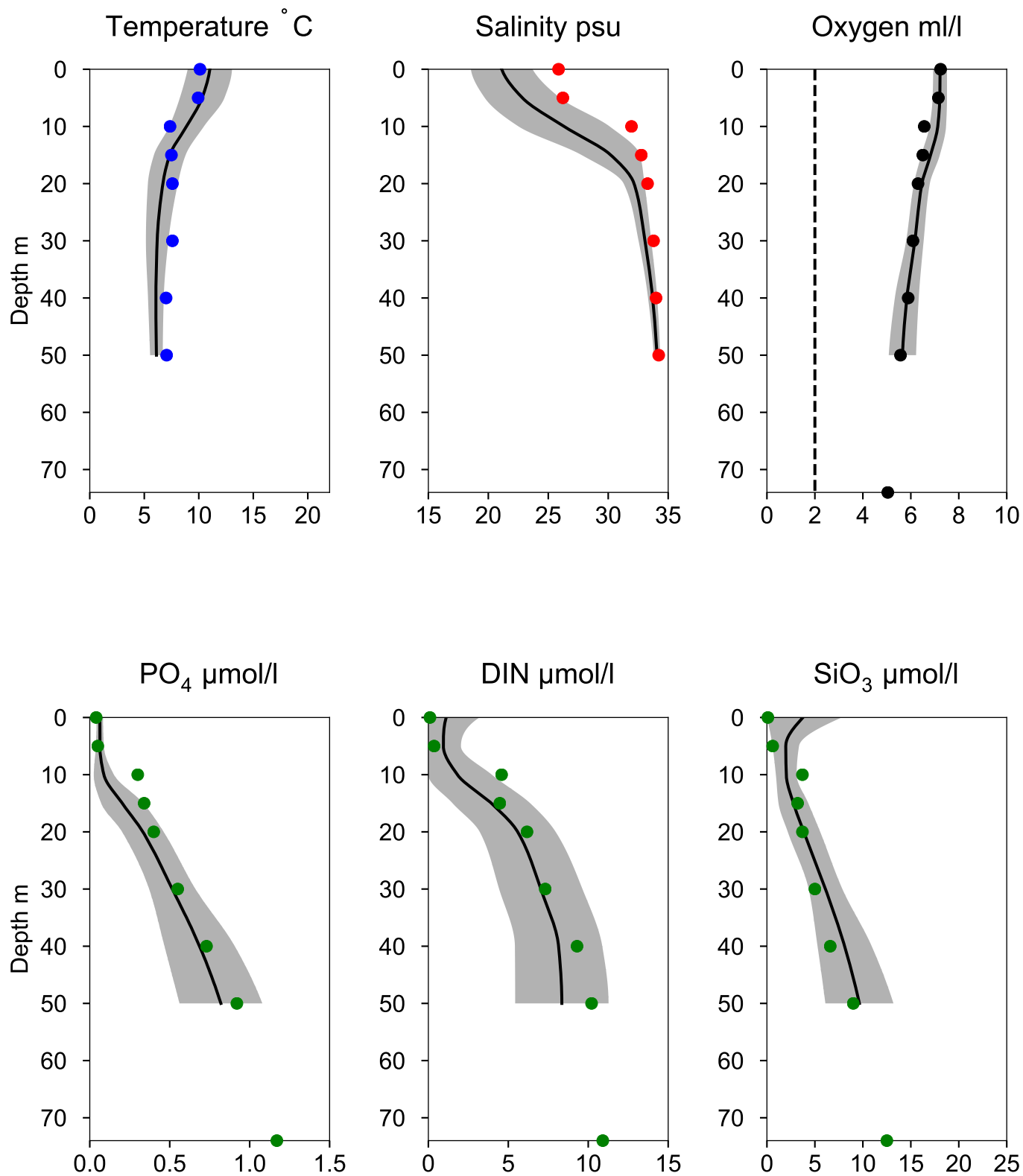


Vertical profiles SLÄGGÖ May

— Mean 2001-2015

■ St.Dev.

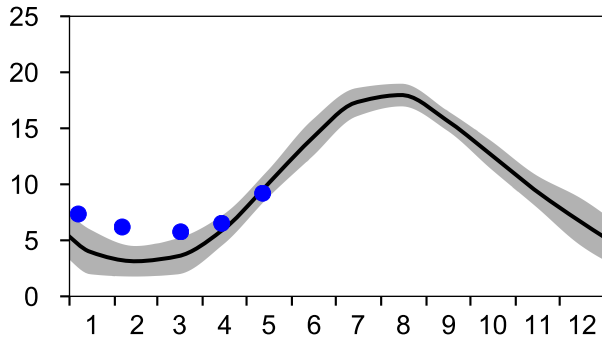
● 2020-05-12



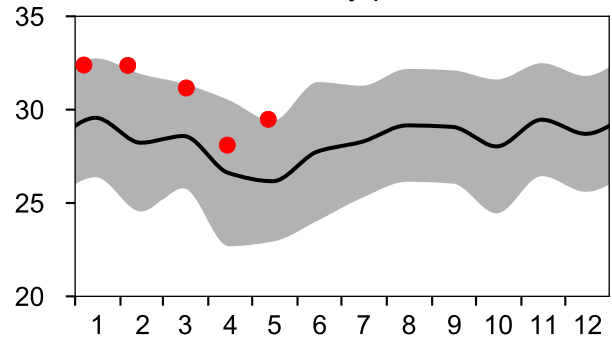
STATION Å13 SURFACE WATER (0-10 m)

Annual Cycles

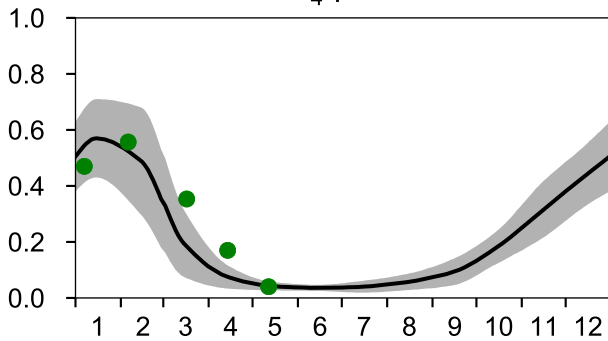
— Mean 2001-2015
Temperature °C



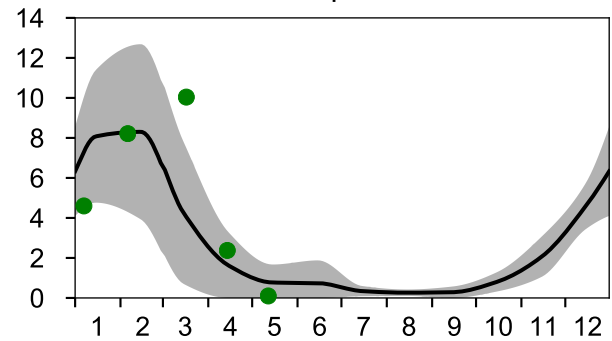
— St.Dev. • 2020
Salinity psu



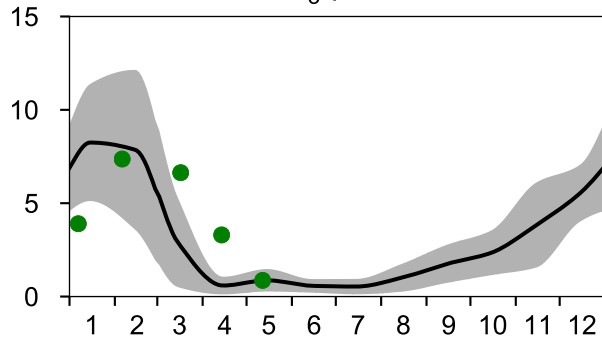
PO₄ µmol/l



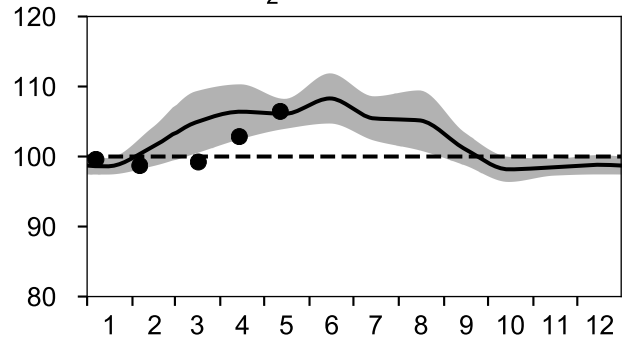
DIN µmol/l



SiO₃ µmol/l

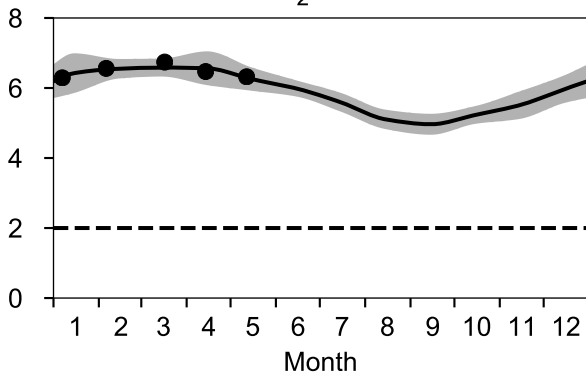


O₂ saturation %

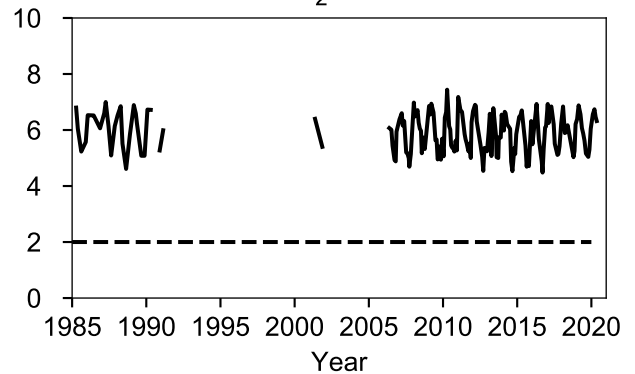


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

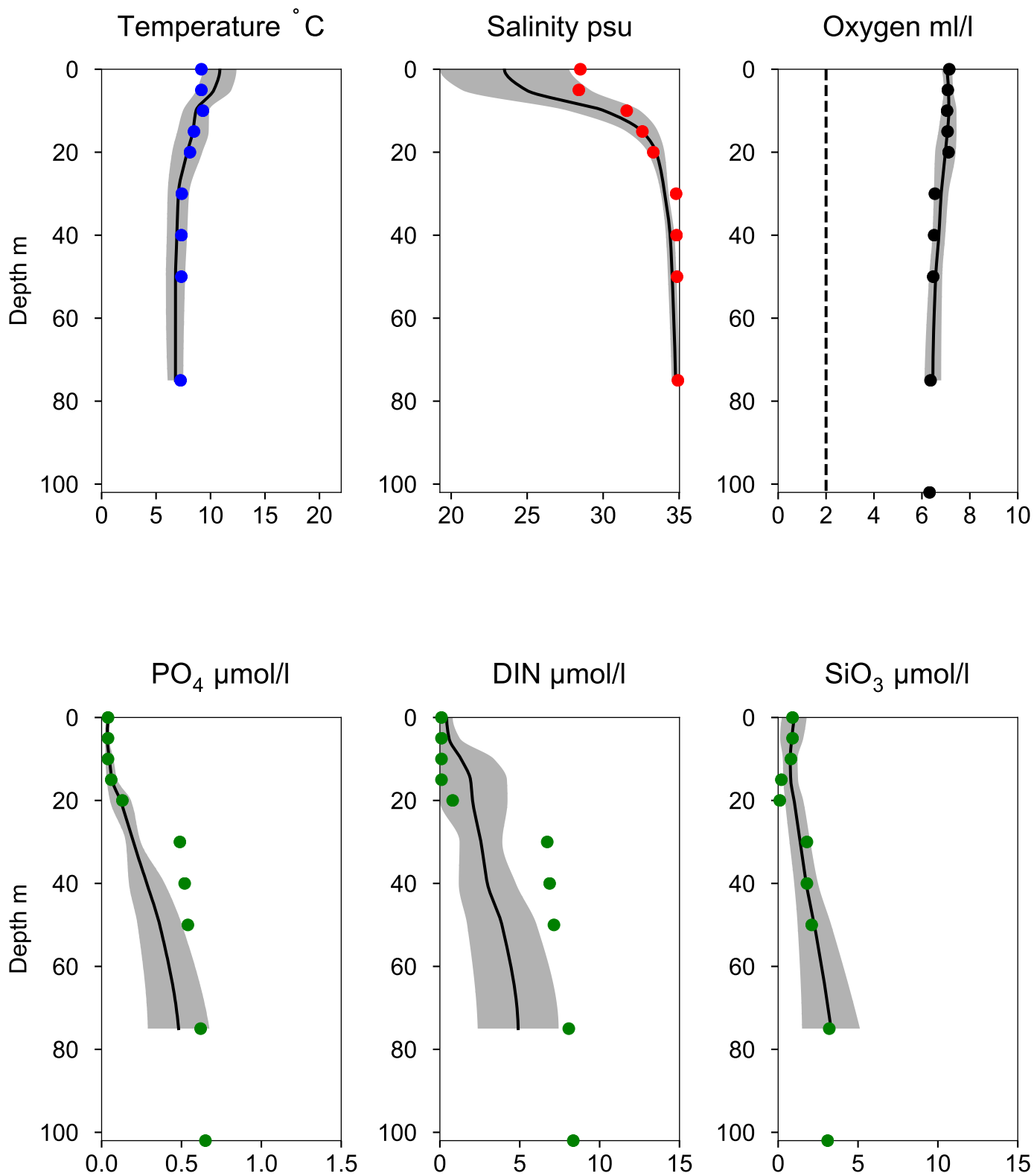


O₂ ml/l



Vertical profiles Å13 May

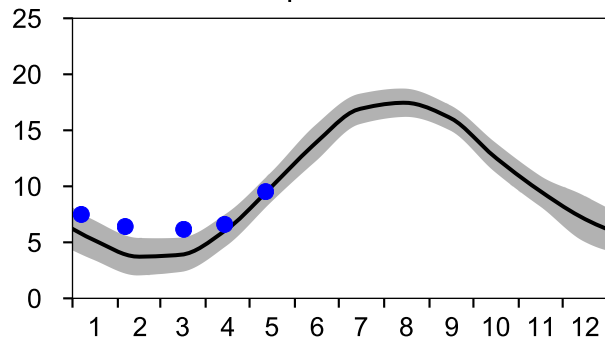
— Mean 2001-2015 St.Dev. • 2020-05-12



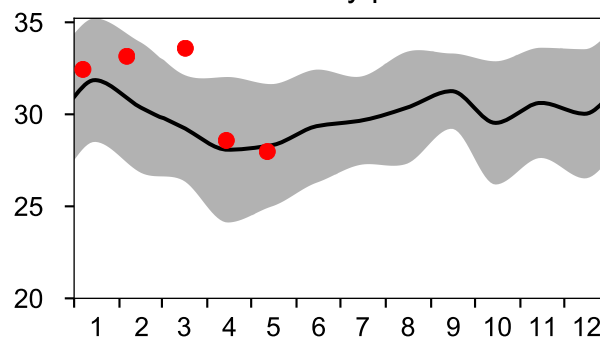
STATION Å14 SURFACE WATER (0-10 m)

Annual Cycles

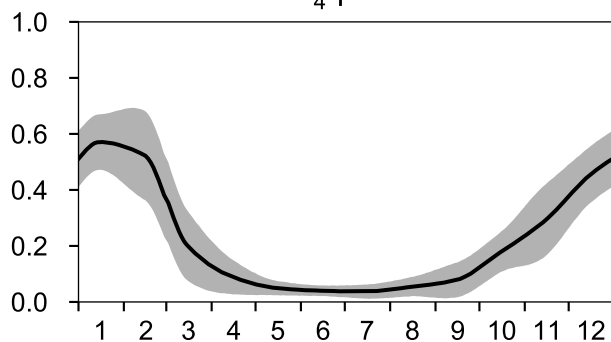
— Mean 2001-2015
Temperature °C



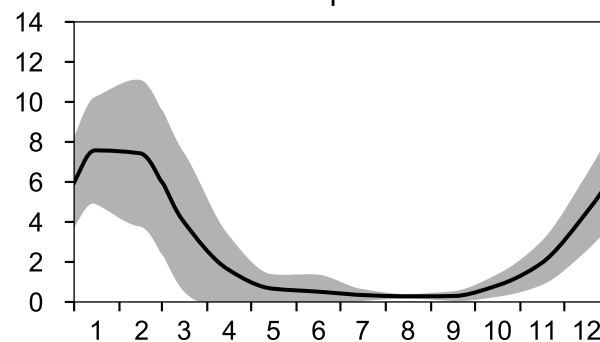
St.Dev. • 2020
Salinity psu



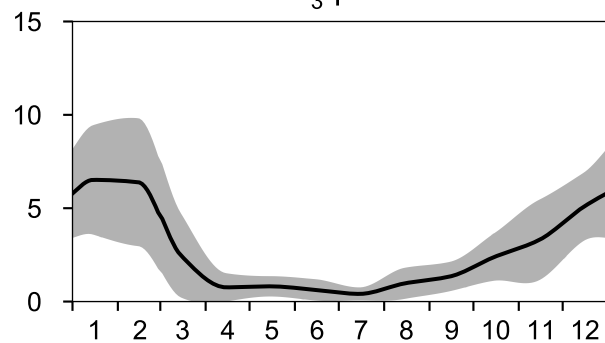
PO₄ µmol/l



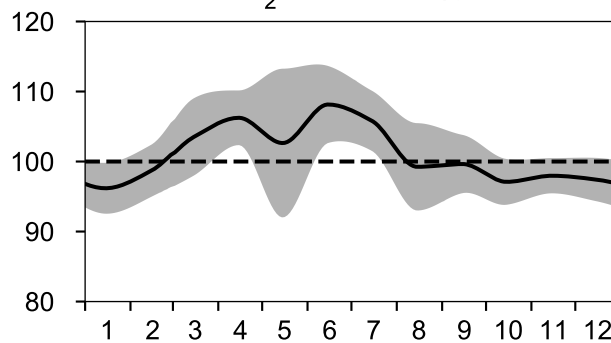
DIN µmol/l



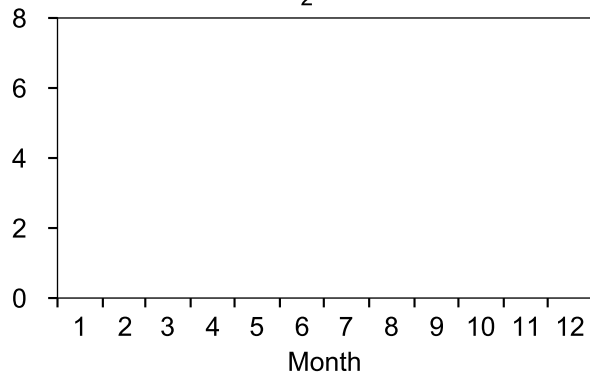
SiO₃ µmol/l



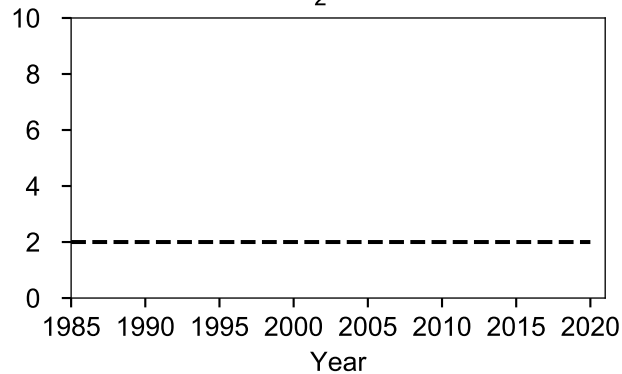
O₂ saturation %



O₂ ml/l

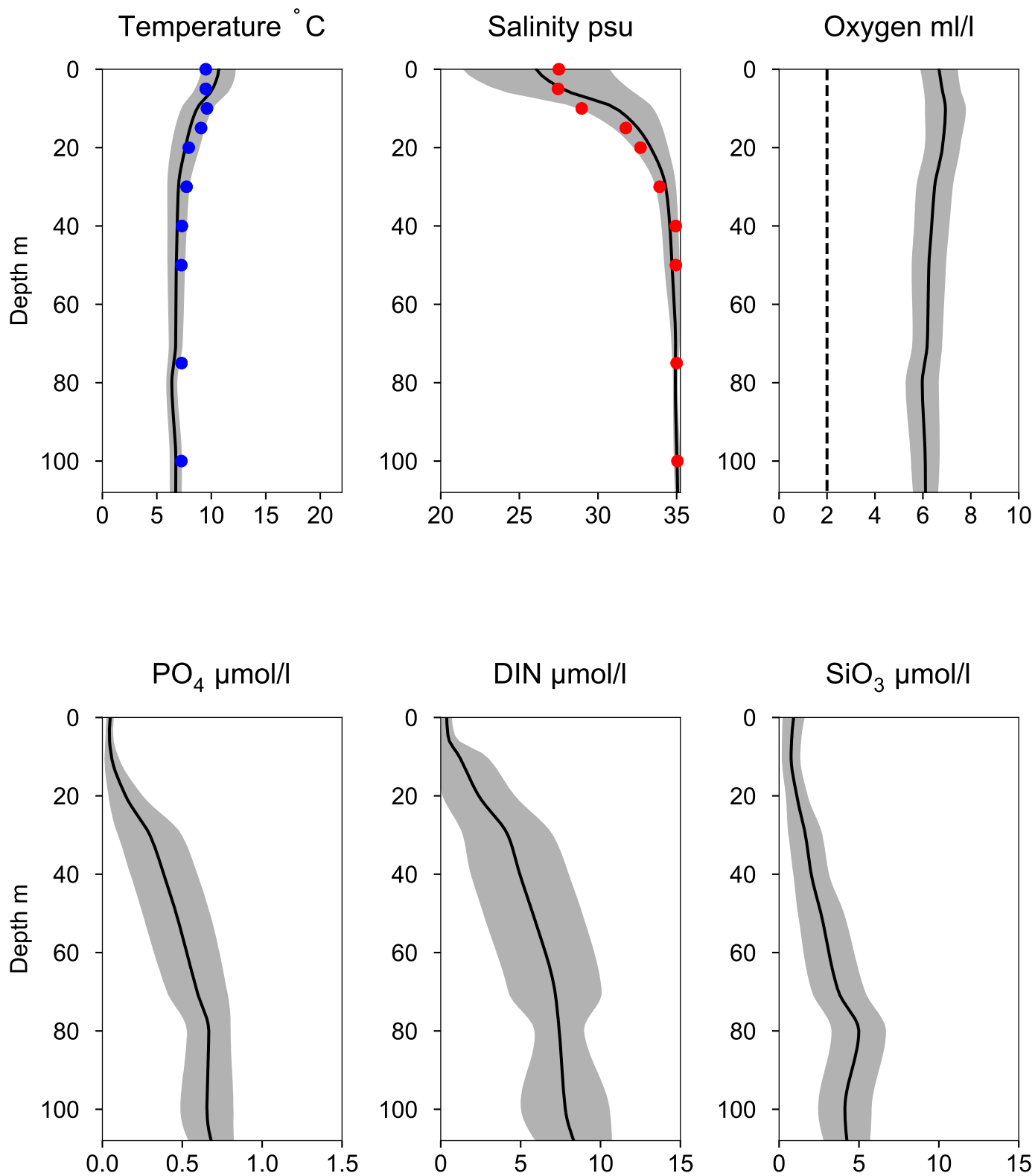


O₂ ml/l



Vertical profiles Å14 May

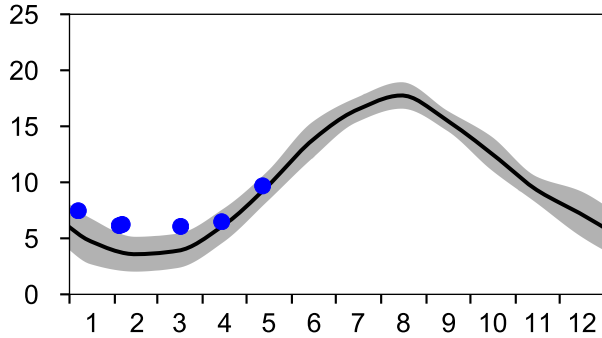
— Mean 2001-2015 St.Dev. • 2020-05-12



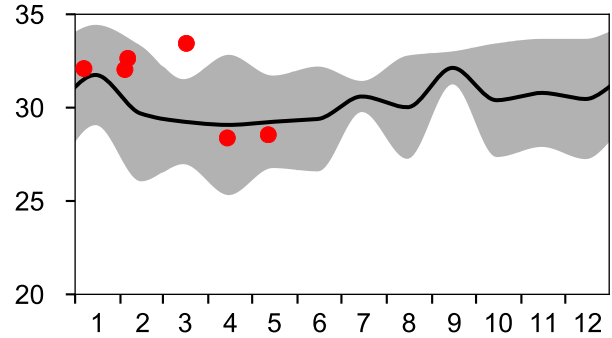
STATION Å15 SURFACE WATER (0-10 m)

Annual Cycles

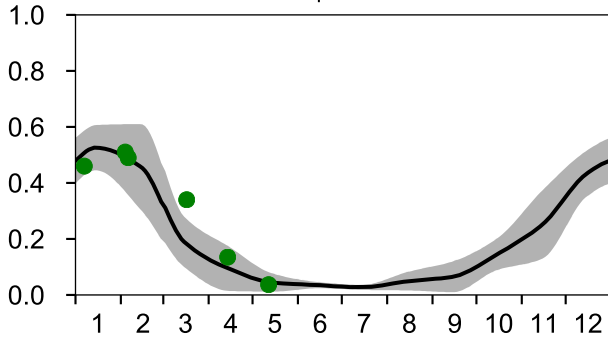
— Mean 2001-2015
Temperature °C



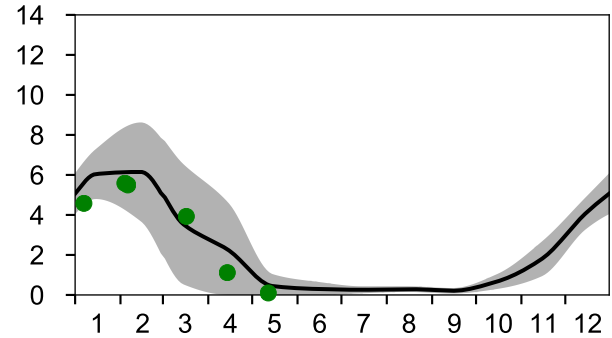
St.Dev. • 2020
Salinity psu



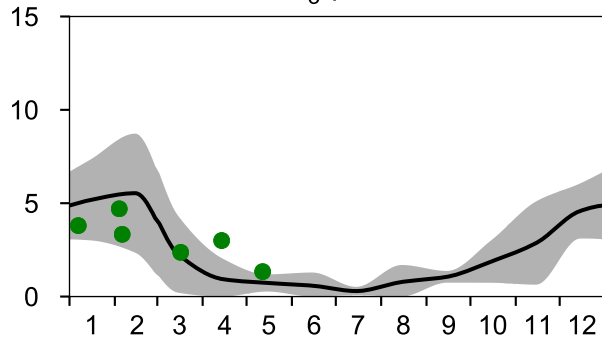
PO₄ µmol/l



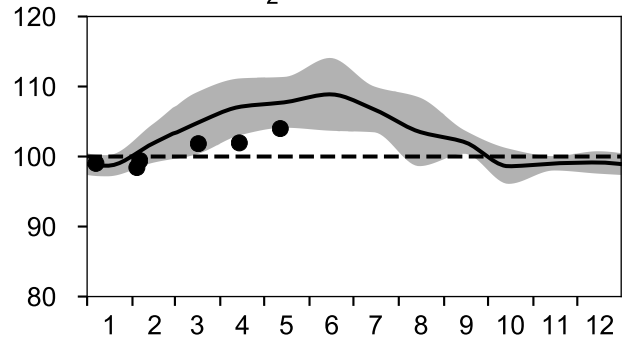
DIN µmol/l



SiO₃ µmol/l

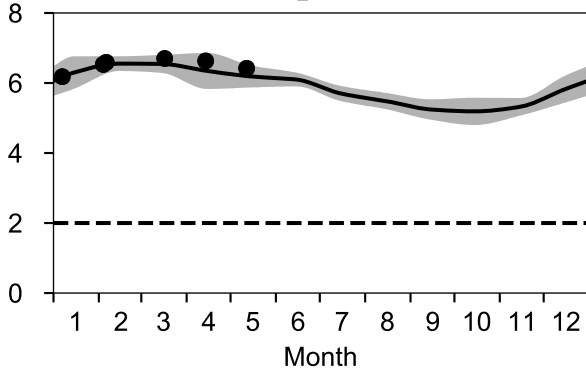


O₂ saturation %

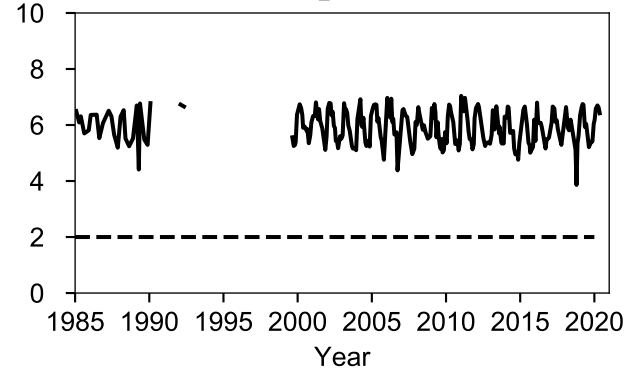


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l



O₂ ml/l

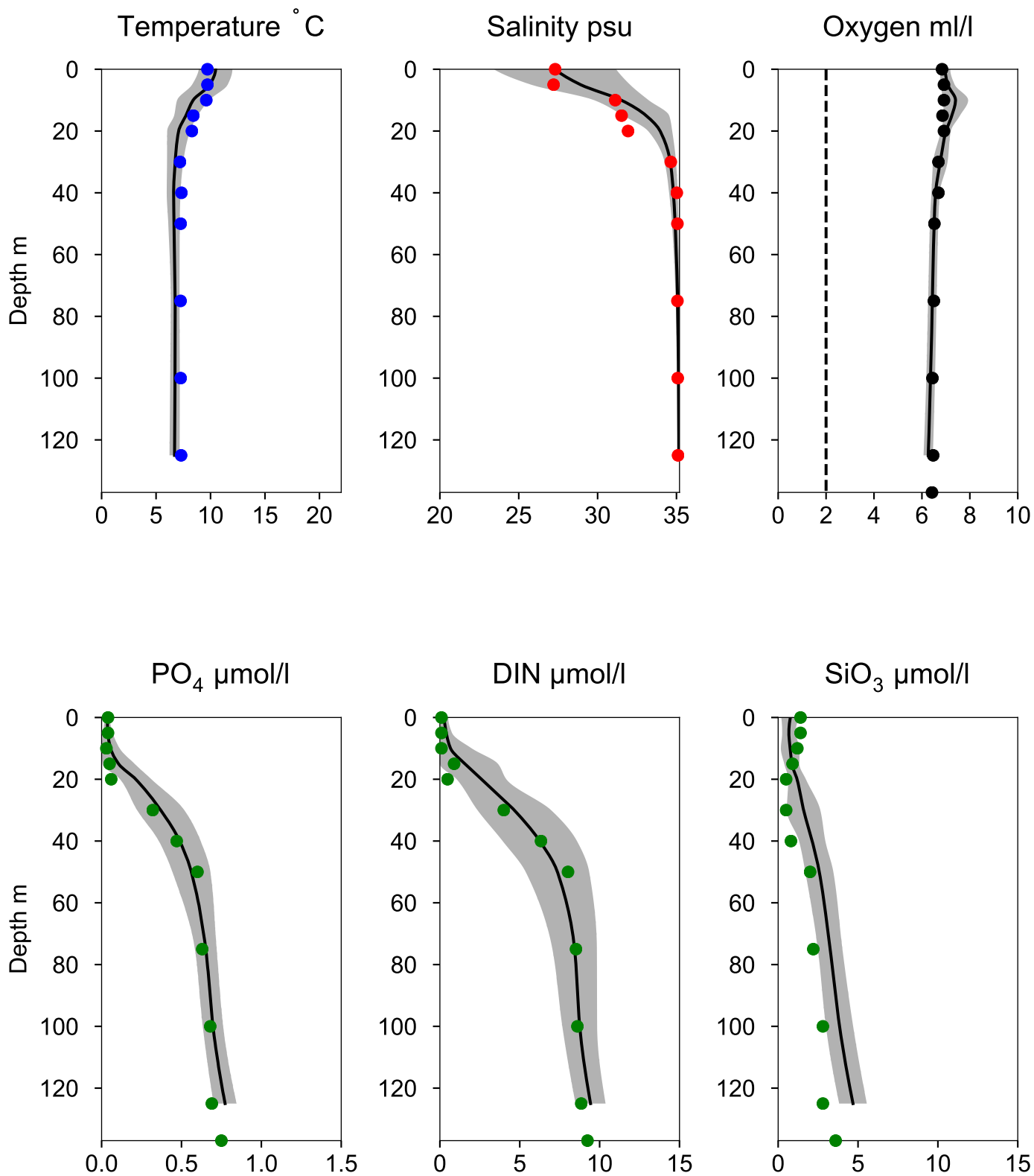


Vertical profiles Å15 May

— Mean 2001-2015

■ St.Dev.

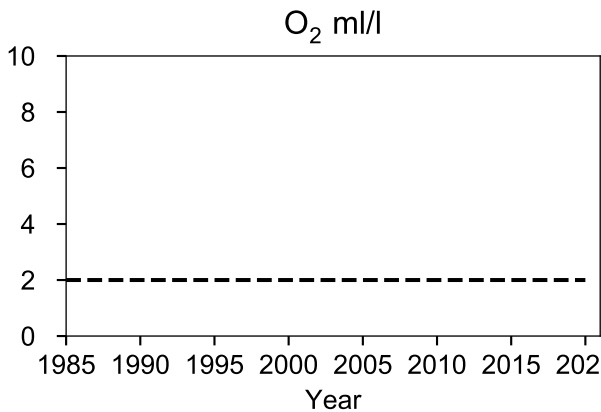
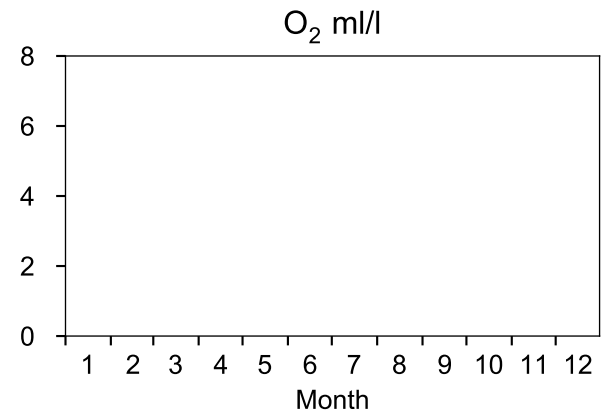
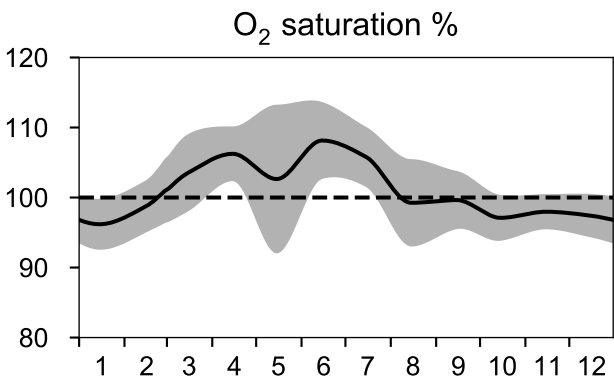
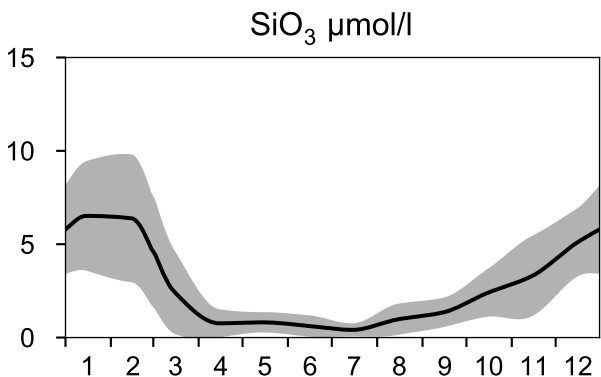
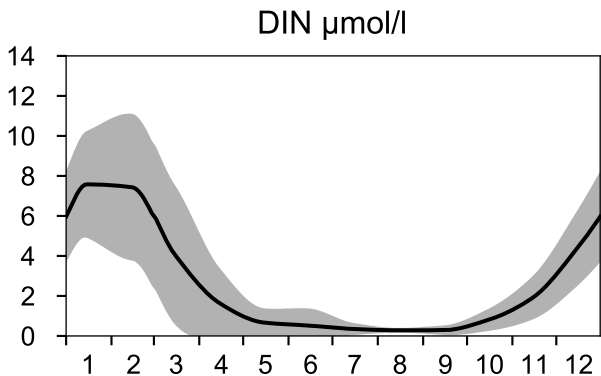
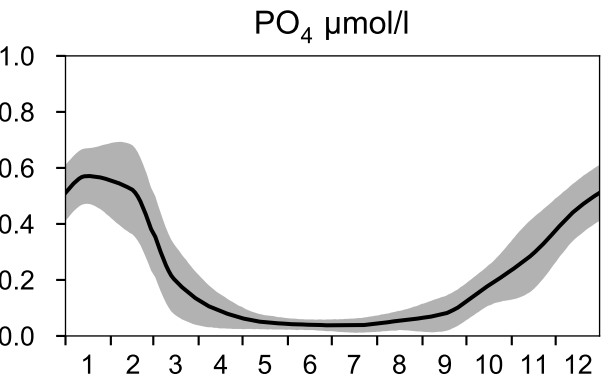
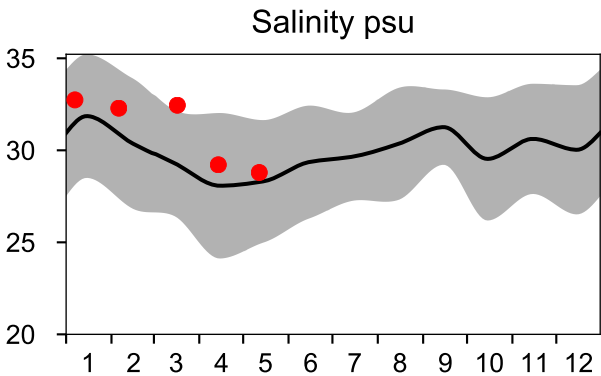
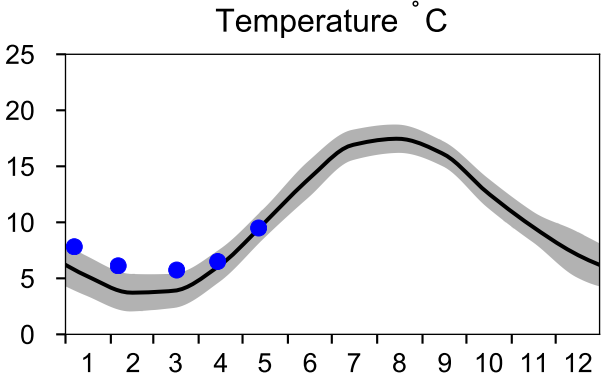
● 2020-05-12



STATION Å16 SURFACE WATER (0-10 m)

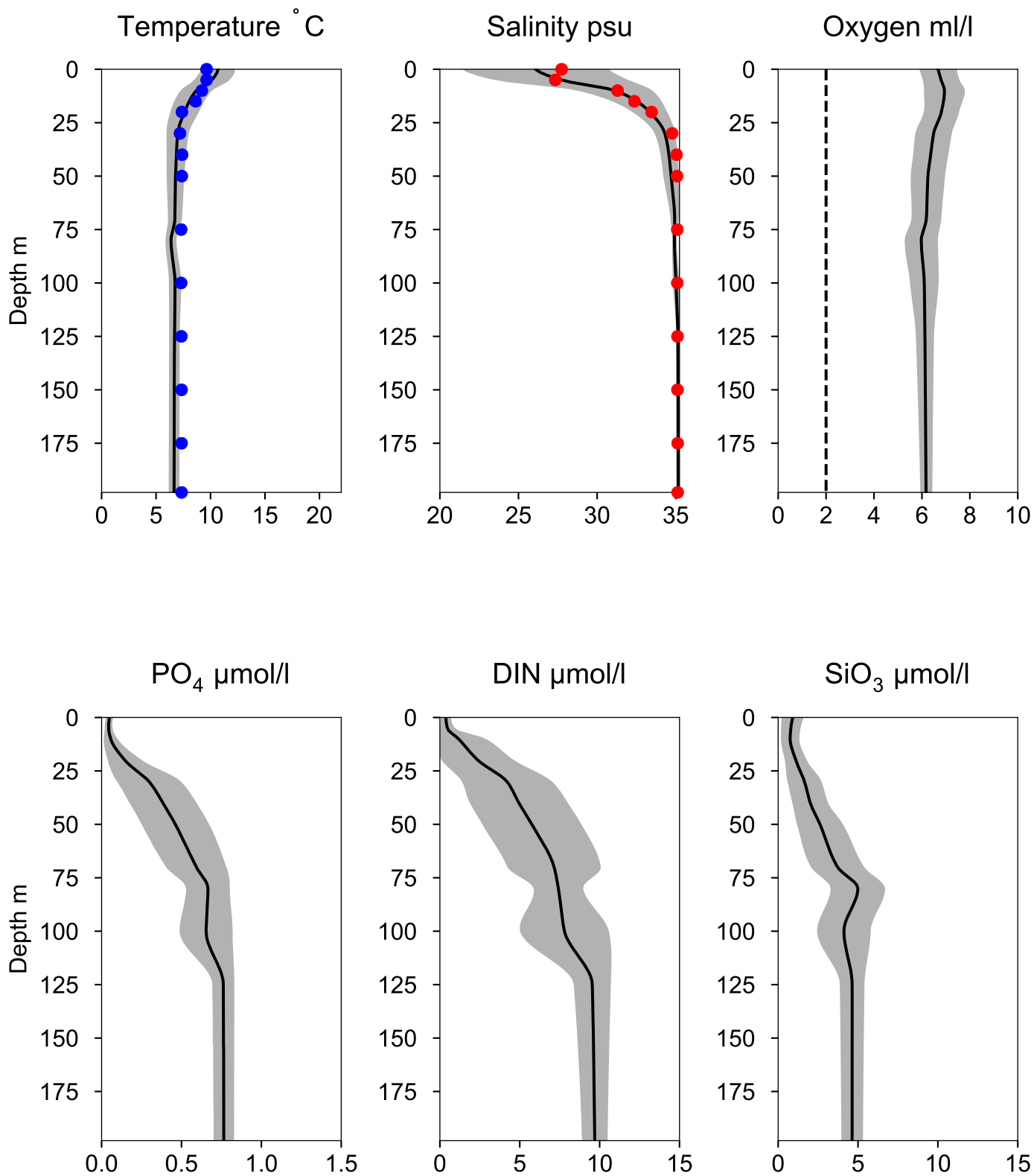
Annual Cycles

— Mean 2001-2015 St.Dev. • 2020



Vertical profiles Å16 May

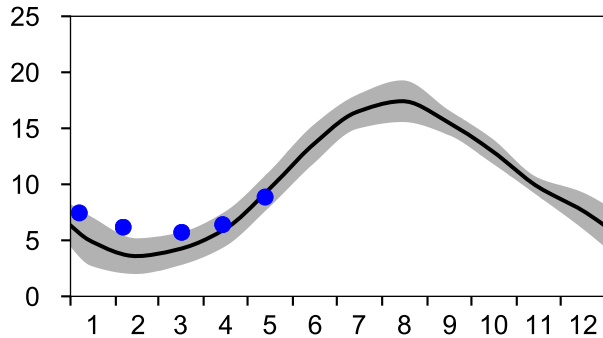
— Mean 2001-2015 St.Dev. • 2020-05-12



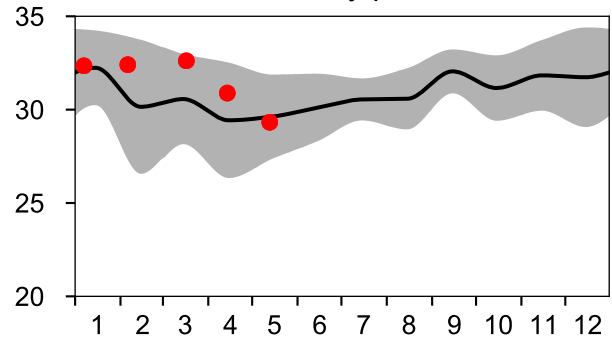
STATION Å17 SURFACE WATER (0-10 m)

Annual Cycles

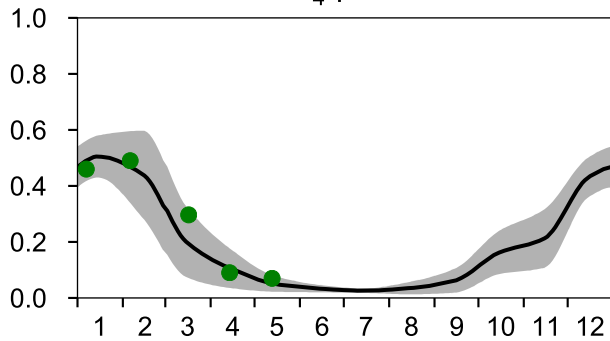
— Mean 2001-2015
Temperature °C



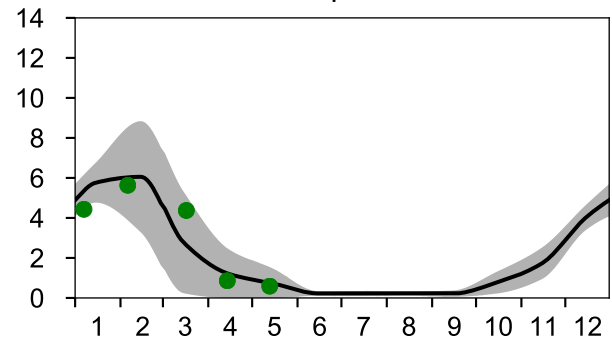
■ St.Dev. ● 2020
Salinity psu



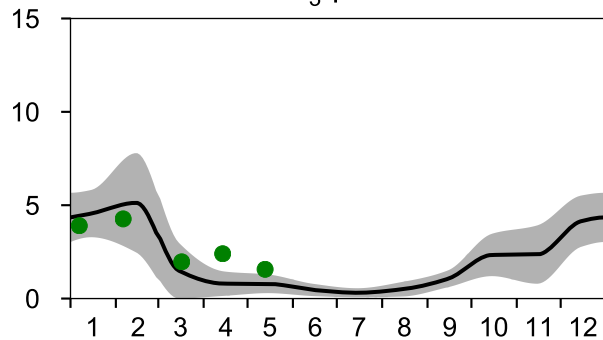
PO₄ µmol/l



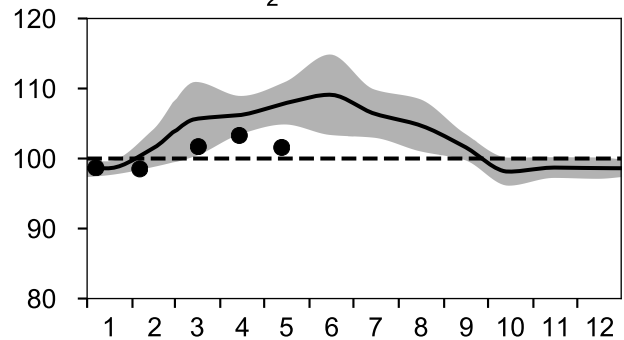
DIN µmol/l



SiO₃ µmol/l

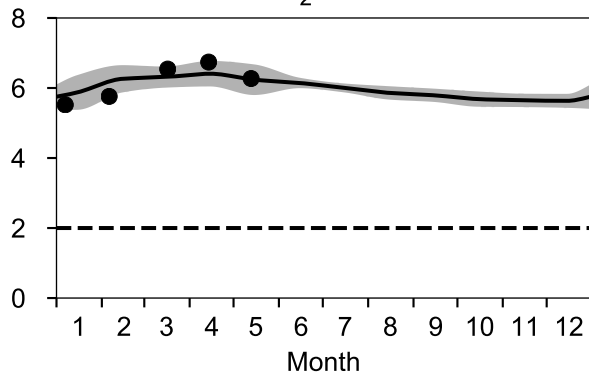


O₂ saturation %

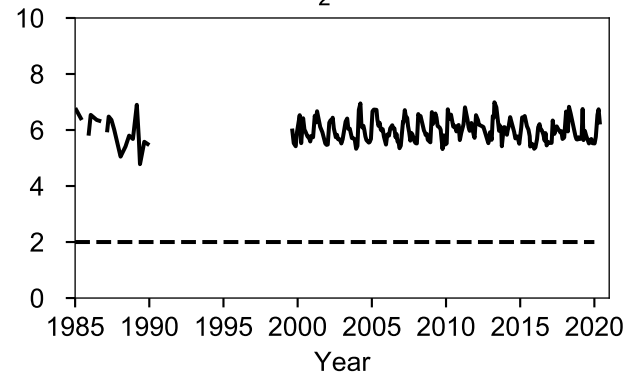


OXYGEN IN BOTTOM WATER (depth >= 300 m)

O₂ ml/l

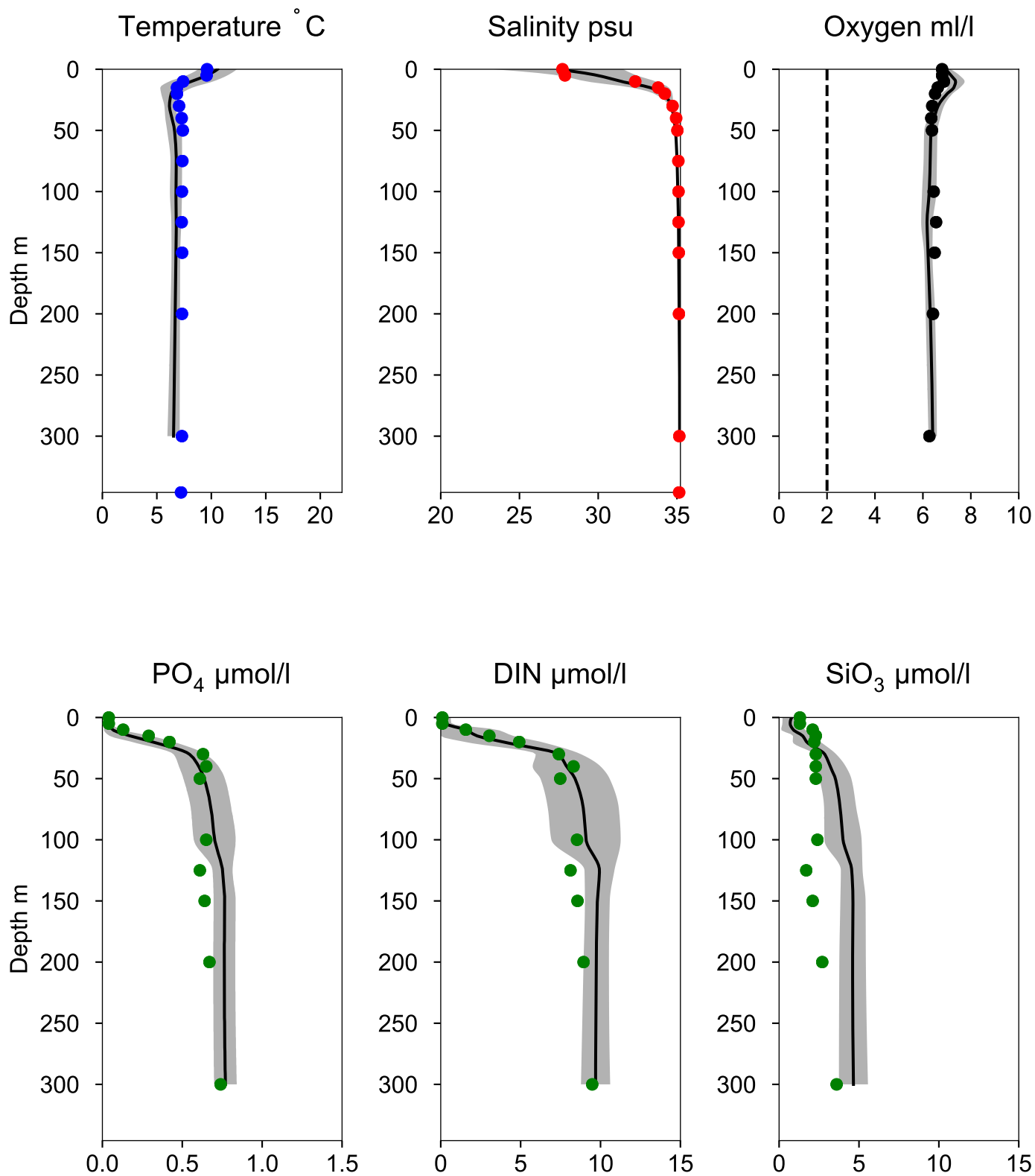


O₂ ml/l



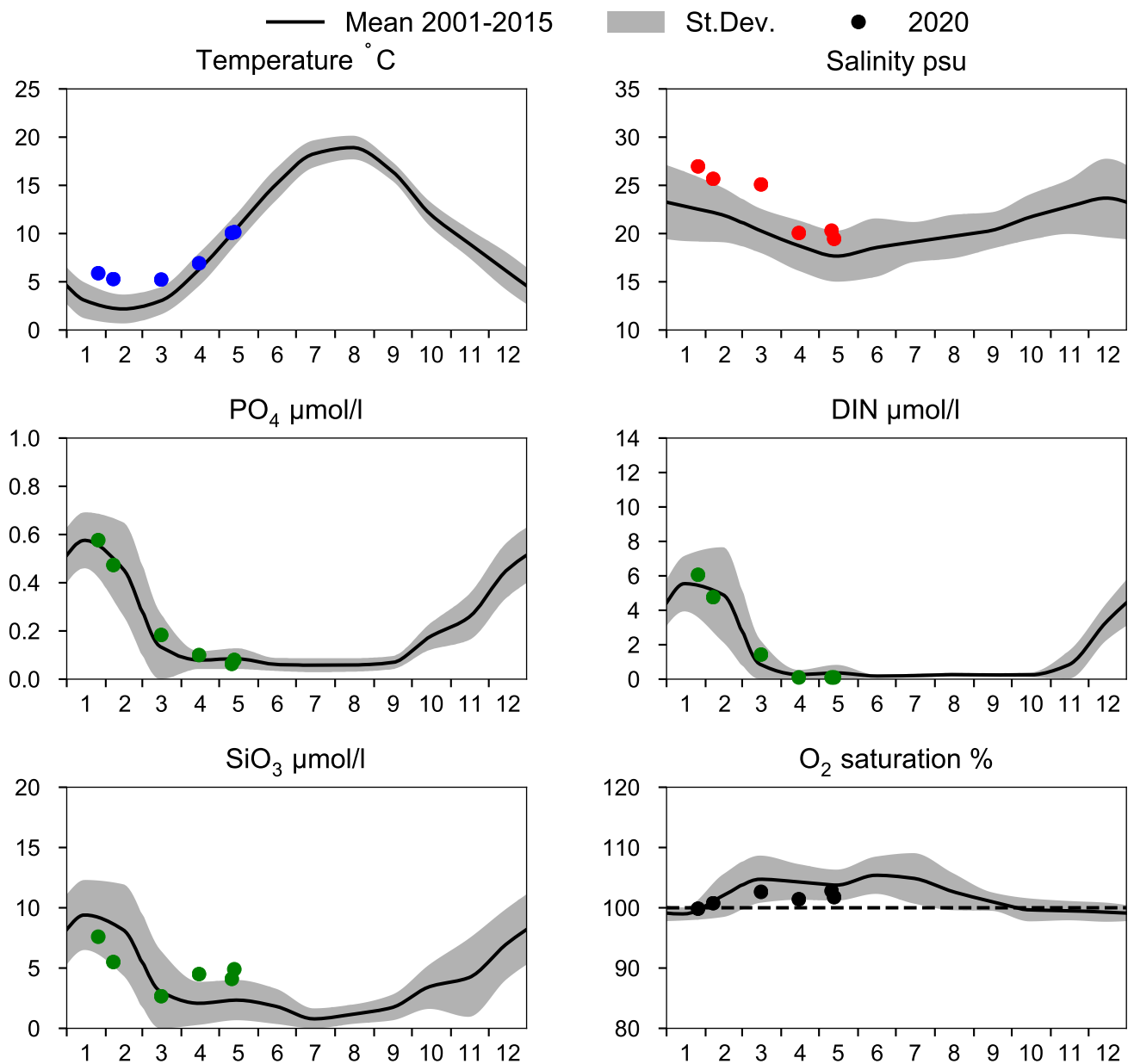
Vertical profiles Å17 May

— Mean 2001-2015 St.Dev. • 2020-05-13

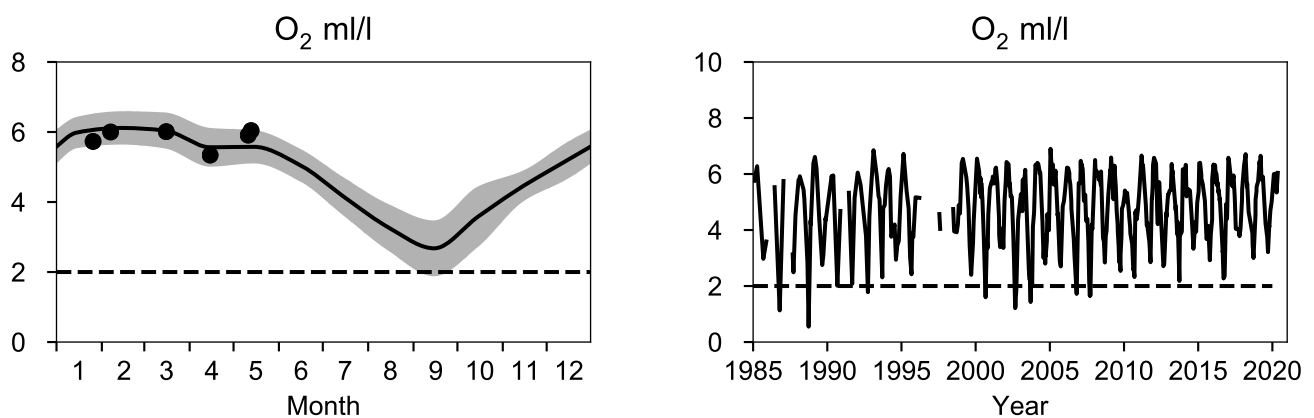


STATION ANHOLT E SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 52 m)

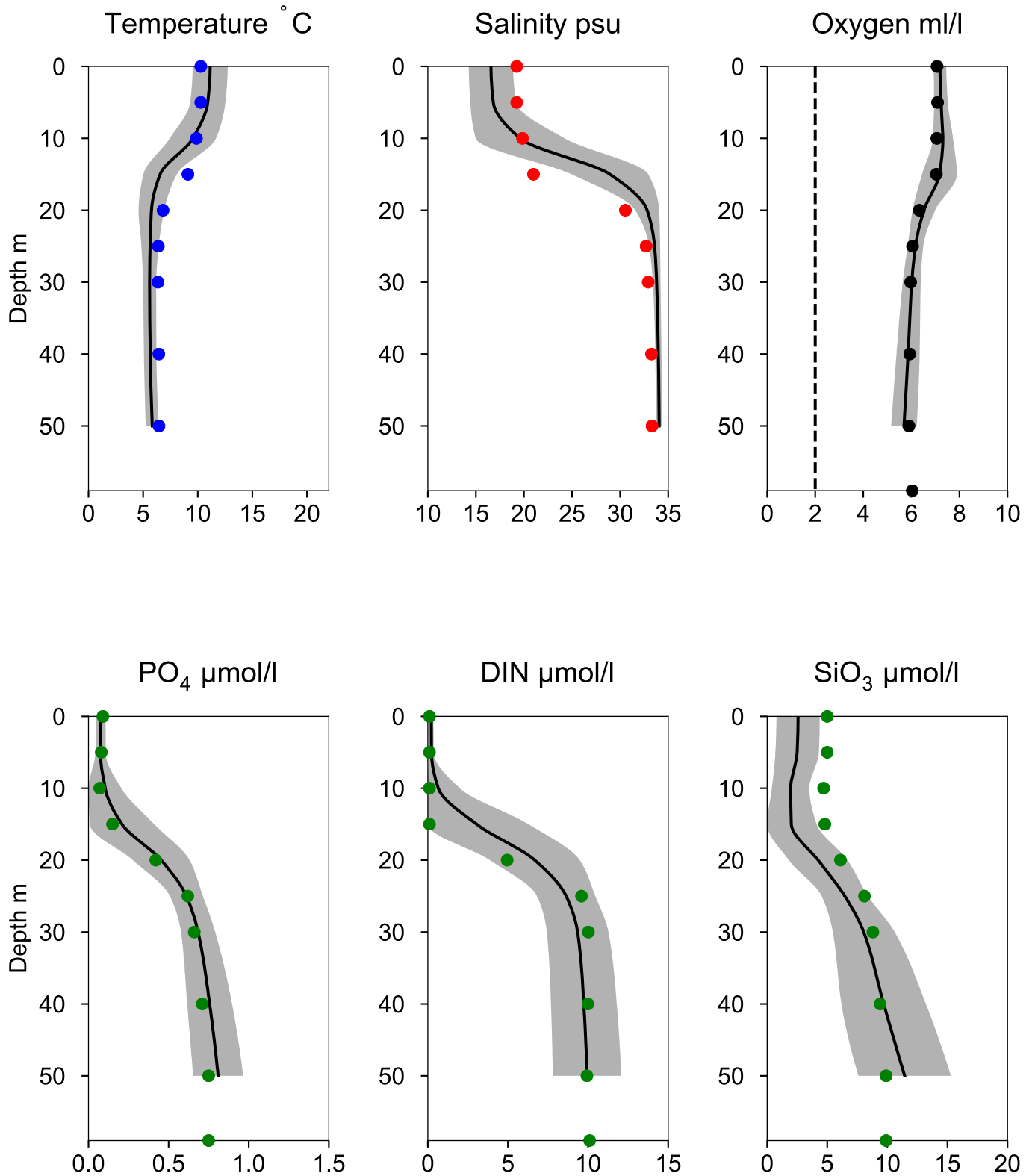


Vertical profiles ANHOLT E May

— Mean 2001-2015

■ St.Dev.

● 2020-05-13



STATION HANÖBUKTEN SURFACE WATER (0-10 m)

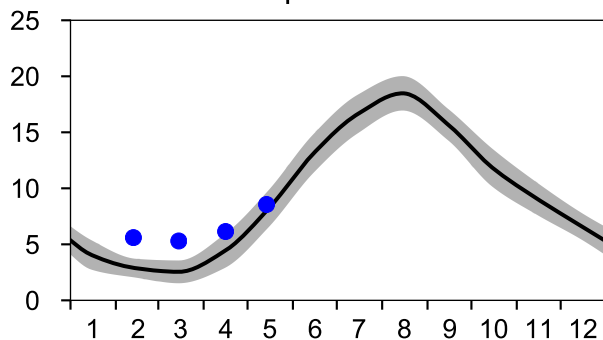
Annual Cycles

— Mean 2001-2015

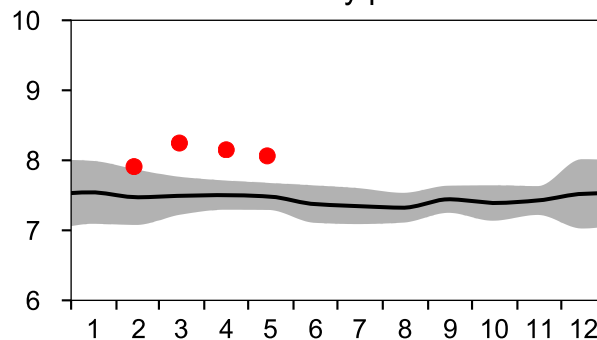
■ St.Dev.

● 2020

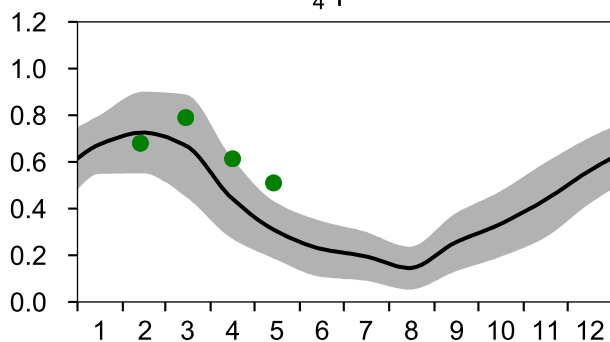
Temperature °C



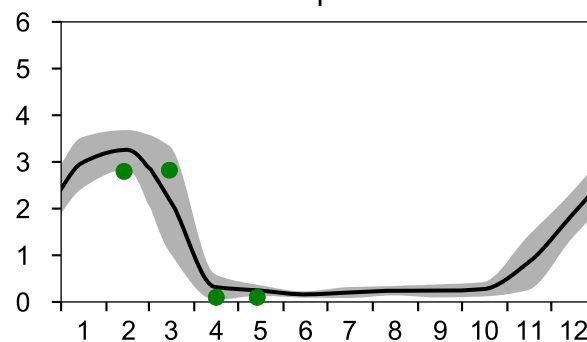
Salinity psu



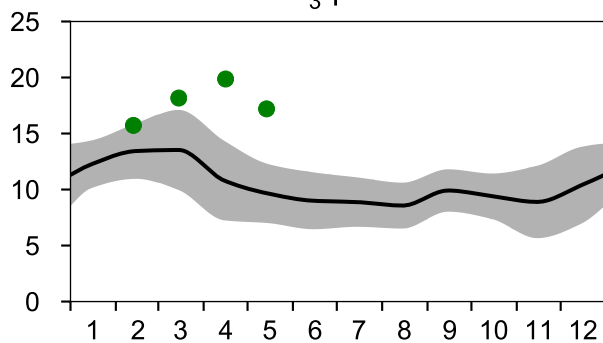
PO₄ µmol/l



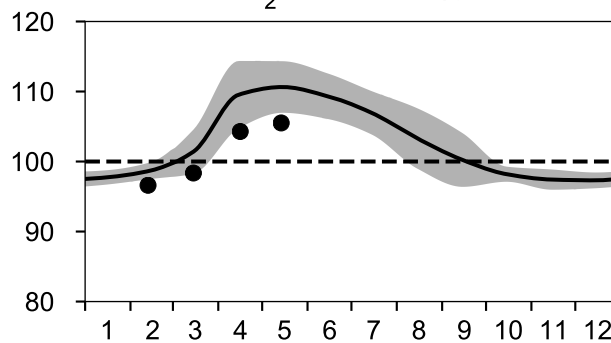
DIN µmol/l



SiO₃ µmol/l

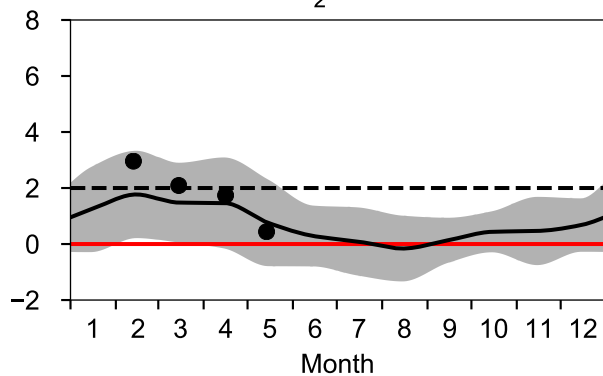


O₂ saturation %

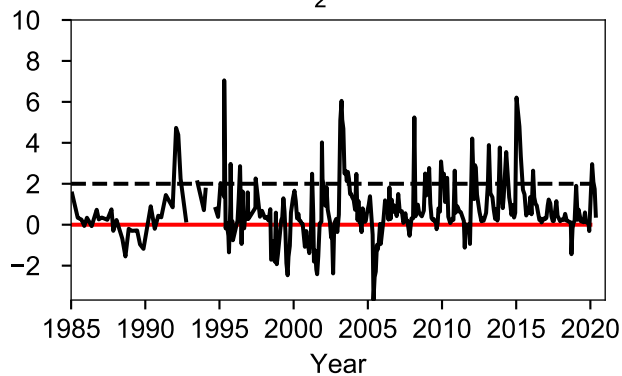


OXYGEN IN BOTTOM WATER (depth >= 70 m)

O₂ ml/l



O₂ ml/l

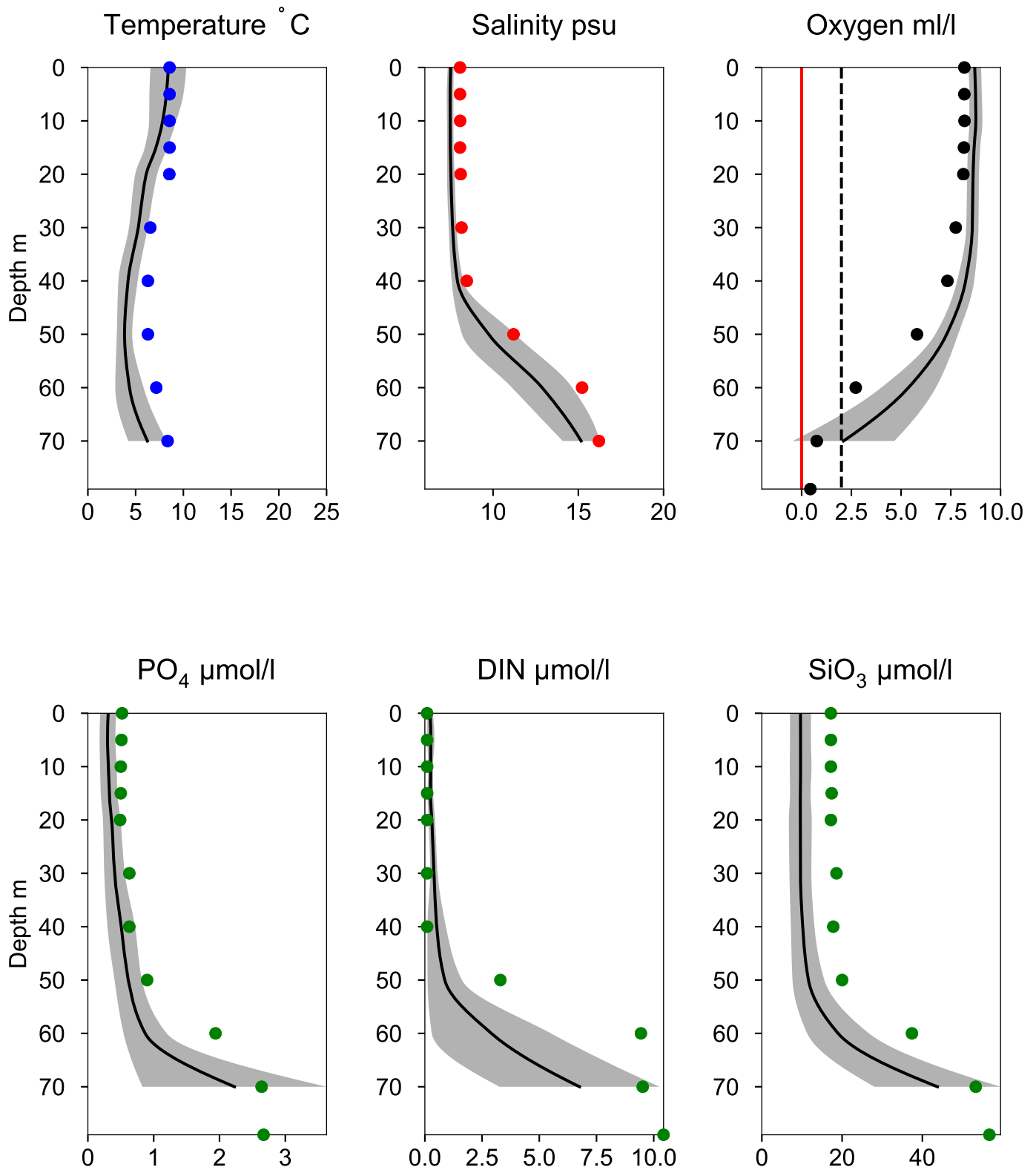


Vertical profiles HANÖBUKTEN May

— Mean 2001-2015

■ St.Dev.

● 2020-05-14



STATION REF M1V1 SURFACE WATER (0-10 m)

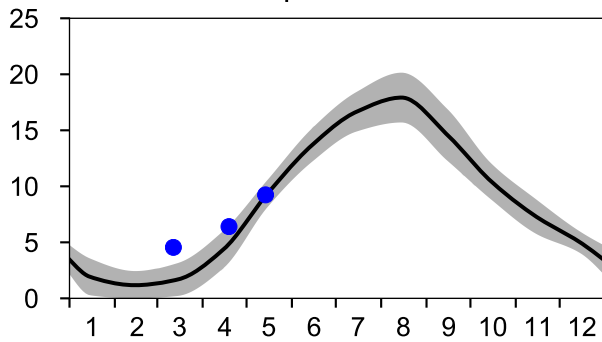
Annual Cycles

— Mean 2001-2015

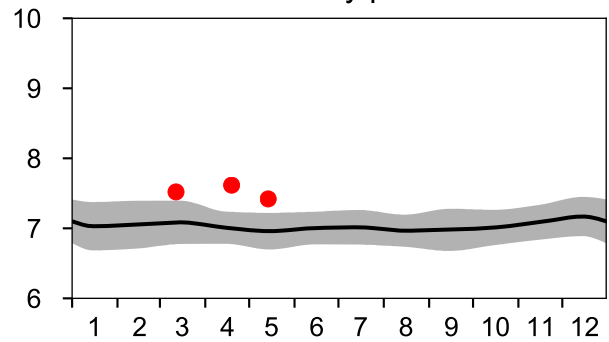
■ St.Dev.

● 2020

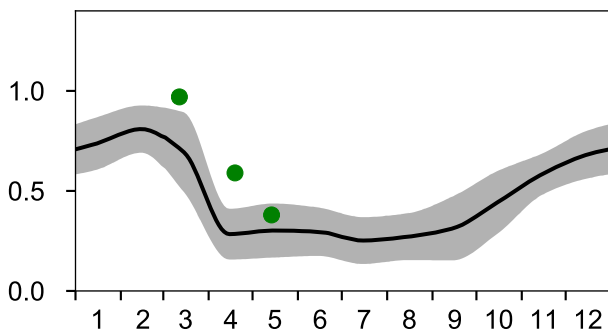
Temperature °C



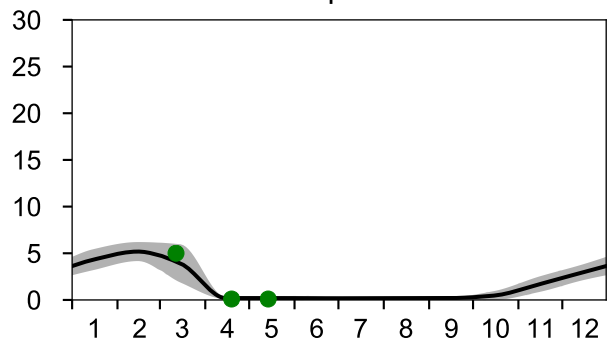
Salinity psu



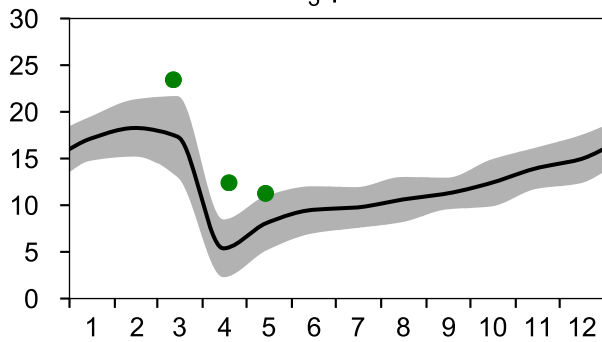
PO₄ µmol/l



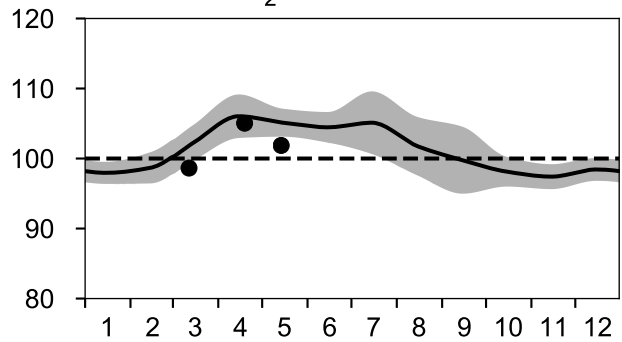
DIN µmol/l



SiO₃ µmol/l

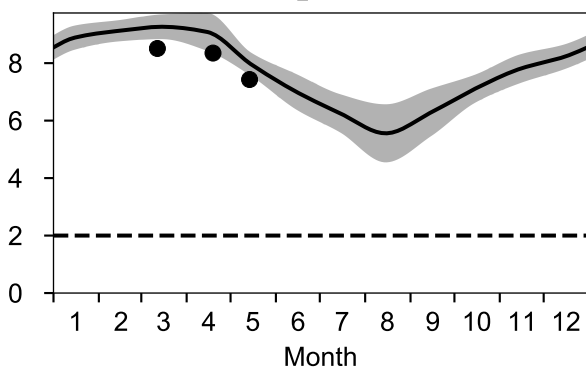


O₂ saturation %

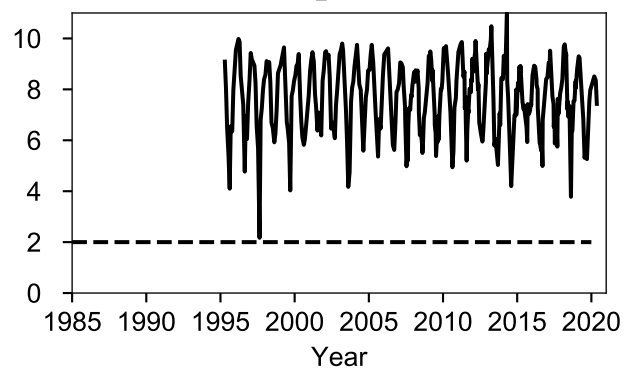


OXYGEN IN BOTTOM WATER (depth >= 15 m)

O₂ ml/l



O₂ ml/l

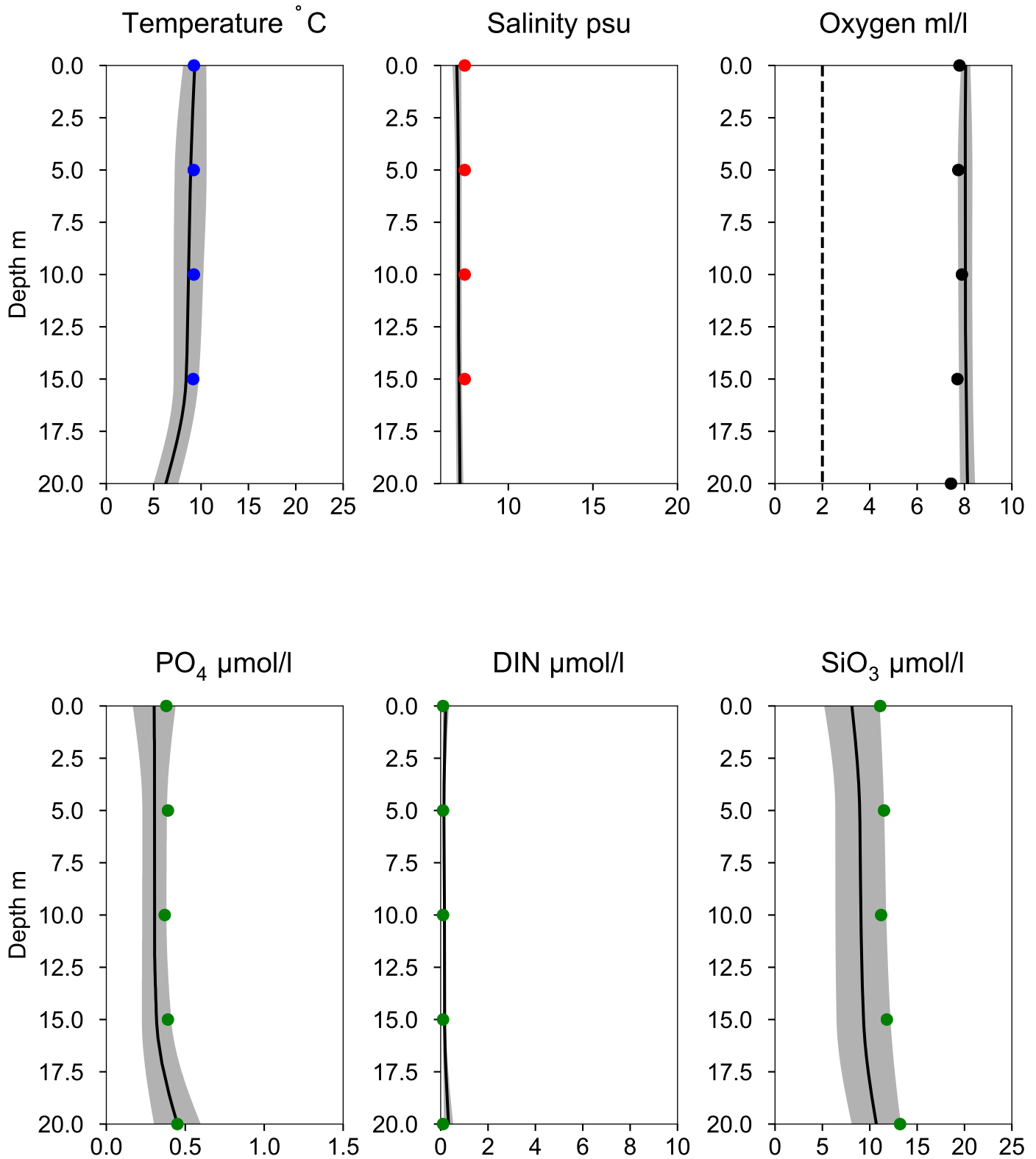


Vertical profiles REF M1V1 May

— Mean 2001-2015

■ St.Dev.

● 2020-05-14



STATION BY39 ÖLANDS S UDDE SURFACE WATER (0-10 m)

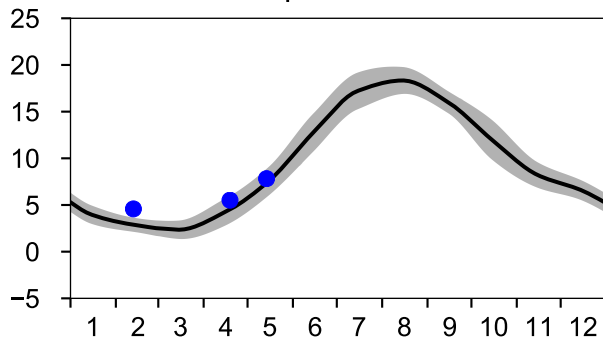
Annual Cycles

— Mean 2001-2015

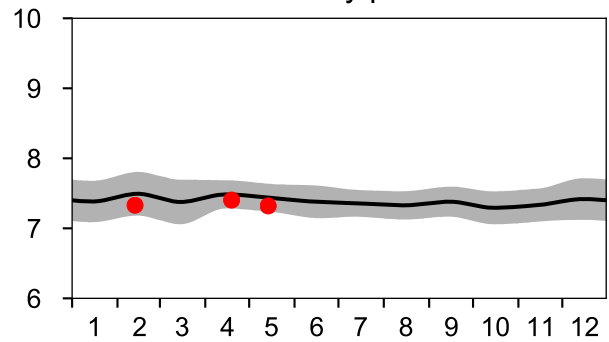
■ St.Dev.

● 2020

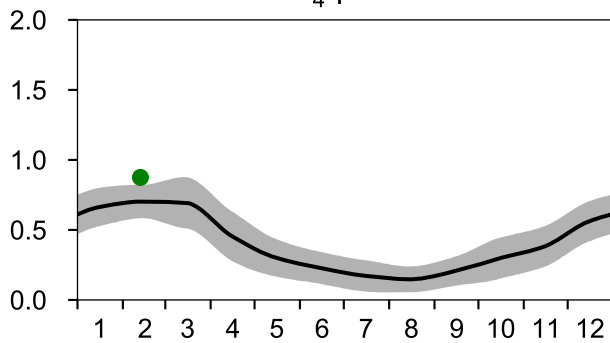
Temperature °C



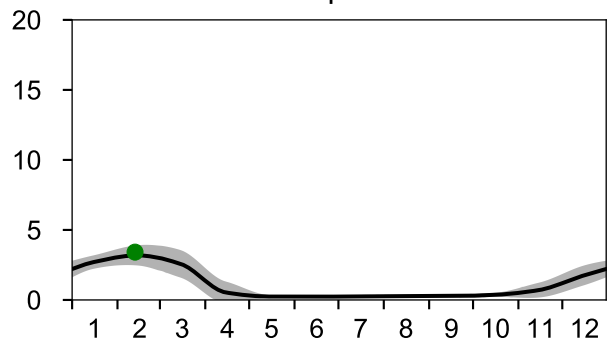
Salinity psu



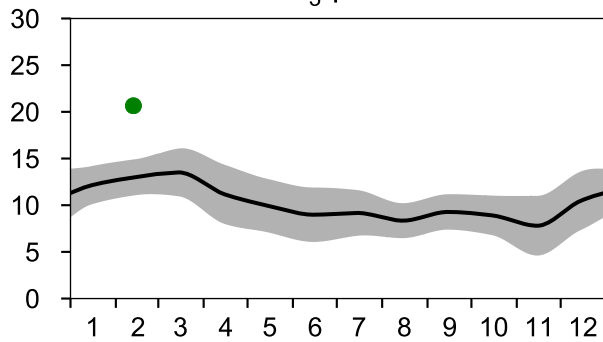
PO₄ µmol/l



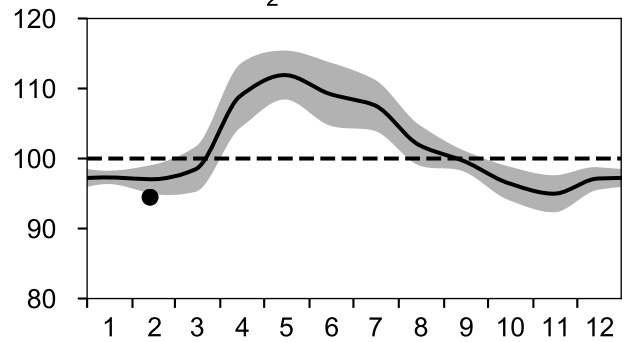
DIN µmol/l



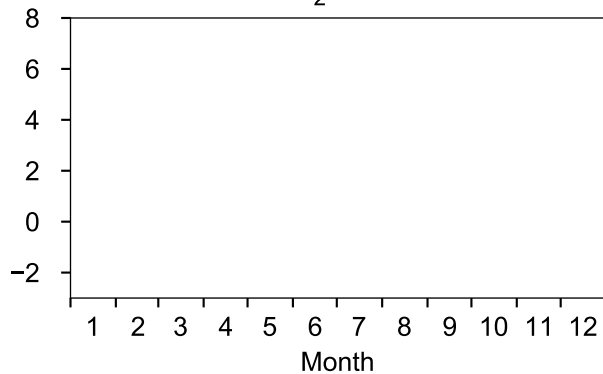
SiO₃ µmol/l



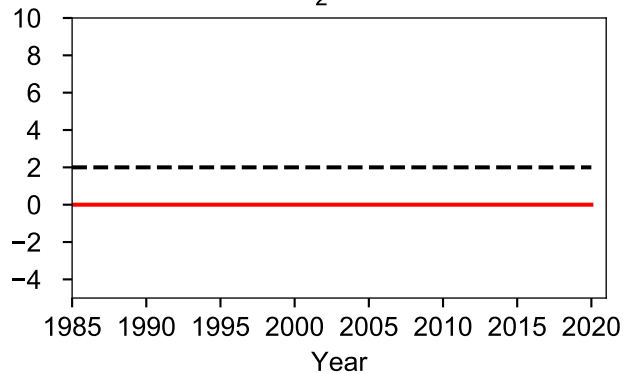
O₂ saturation %



O₂ ml/l

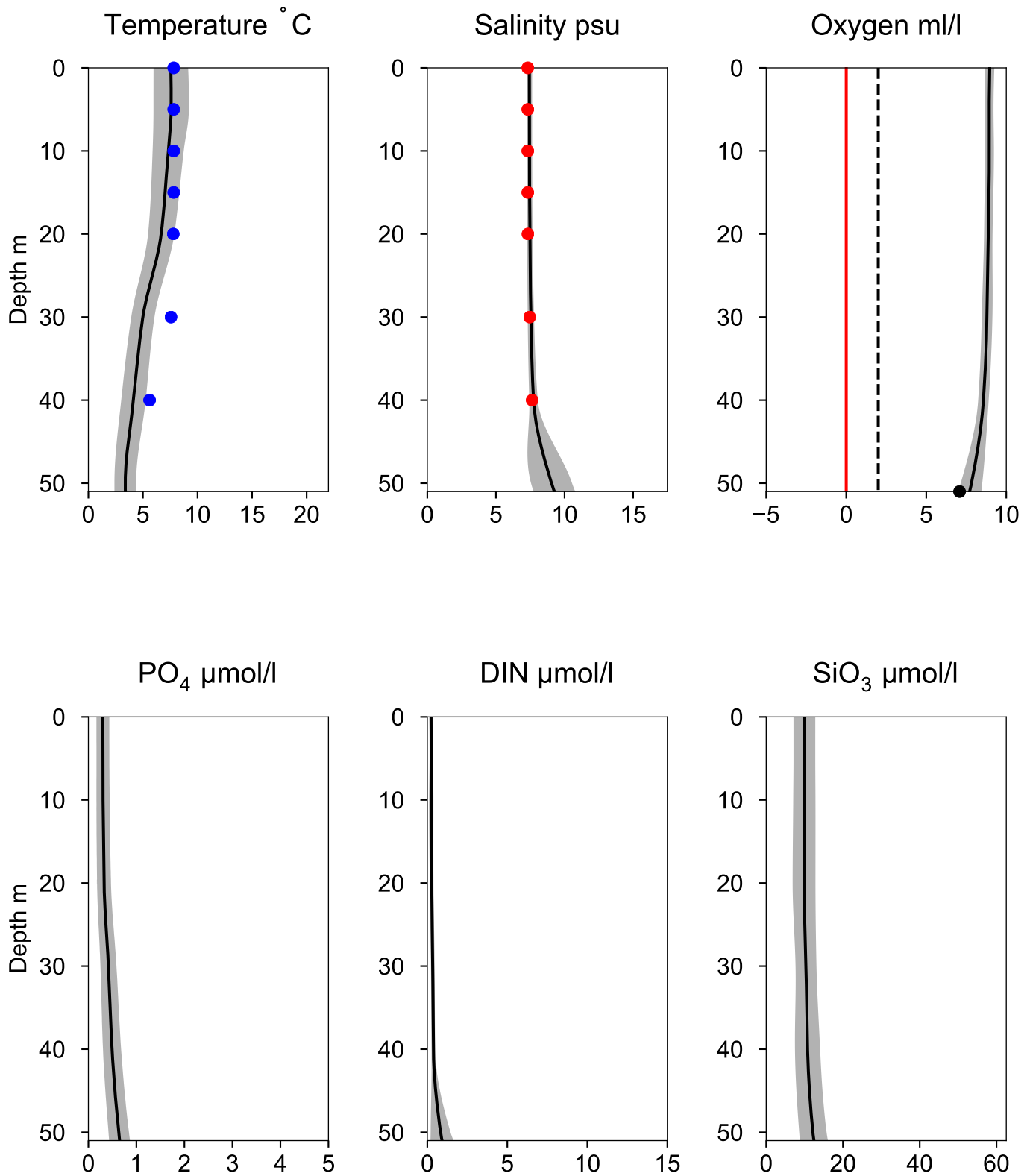


O₂ ml/l



Vertical profiles BY39 ÖLANDS S UDDE May

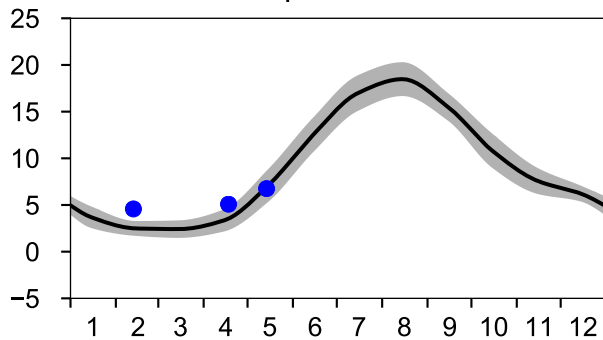
— Mean 2001-2015 St.Dev. • 2020-05-14



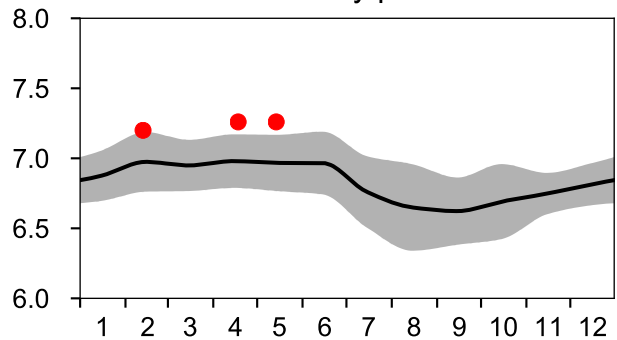
STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

Annual Cycles

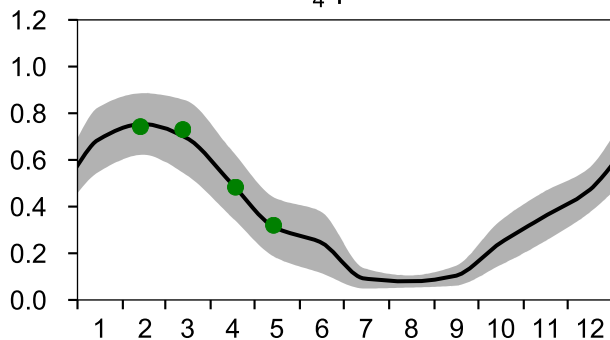
— Mean 2001-2015
Temperature °C



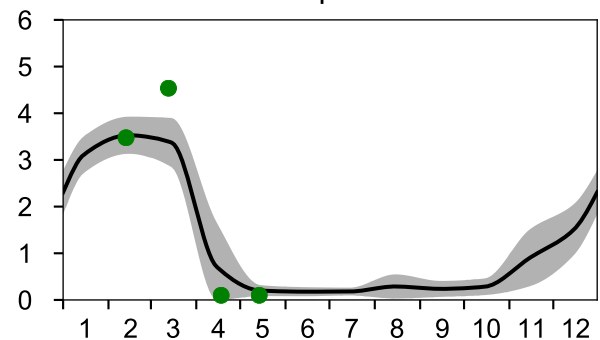
St.Dev. ● 2020
Salinity psu



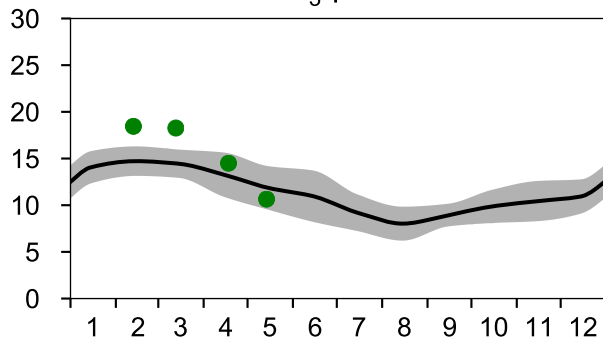
PO₄ µmol/l



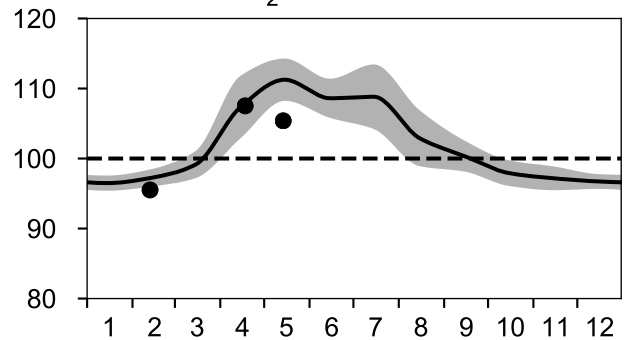
DIN µmol/l



SiO₃ µmol/l

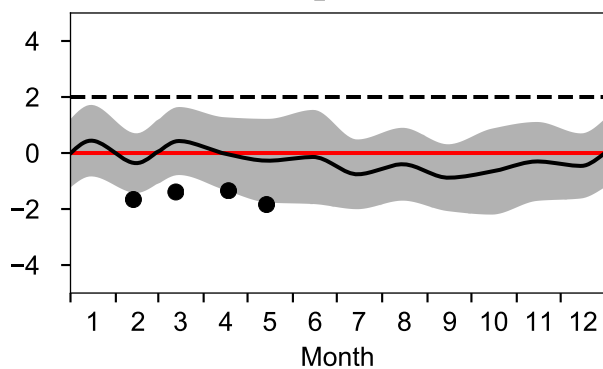


O₂ saturation %

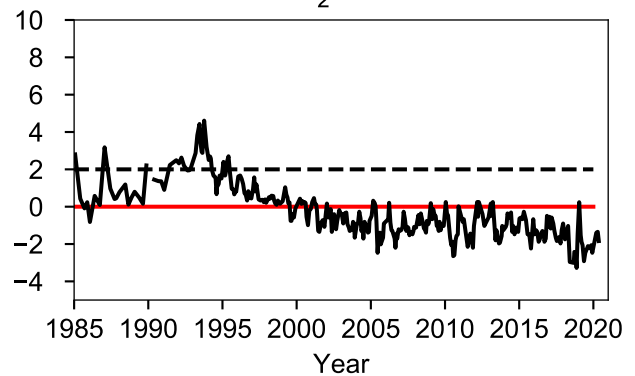


OXYGEN IN BOTTOM WATER (depth >= 100 m)

O₂ ml/l



O₂ ml/l



Vertical profiles BY38 KARLSÖDJ May

— Mean 2001-2015

■ St.Dev.

● 2020-05-14

