

Report of SMHI's marine monitoring cruise with R/V Svea



Photo: Helena Björnberg, SMHI

Survey period:	2023-07-11 - 2023-07-17
Principals:	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 expedition, which is part of the Swedish national marine monitoring programme, the Skagerrak, the Kattegat, the Sound and the Baltic Proper were visited.

Sea surface temperatures were found to be within normal range at all visited areas, with values between 15 - 18°C. Likewise, surface salinity was observed to be within normal range at all sampling points, with the exception of the south Baltic Proper, where sea surface salinity was slightly above normal.

Dissolved inorganic nitrogen and phosphorus displayed low concentrations, which is normal for the season. The silicate levels in all sampled areas were within normal range for the season.

The oxygen conditions in the Baltic Proper continues to be critical. At the majority of stations, anoxic conditions occurred from a depth of 80 meters. At these sampling points, hydrogen sulphide could also be measured. The levels of nutrients in the bottom waters of the Baltic also reflected the oxygen deficiency, with values above normal, and levels that increased as the oxygen had been depleted in the water column.

In the Arkona basin, the oxygen situation was somewhat better, with bottom water values between 2,33 – 3,33 ml/l.

Surface accumulations of cyanobacteria could be observed to some extent. Wind before the cruise had temporarily mixed down the accumulations from the surface. Despite this, microscopy that was carried out throughout the cruise could identify a few different species of cyanobacteria that are currently blooming in the Baltic. More information about the algal situation can be found in the AlgAware-report for July (<https://www.smhi.se/publikationer/publikationer/algrapporter>).

The next regular monitoring cruise carried out by SMHI on board R/V Svea is planned between 10th – 16th of August, starting and finishing in Lysekil.

RESULTS

The cruise was carried out onboard R/V Svea. SMHI embarked in Kalmar July 11th, and the cruise terminated in Lysekil July 17th.

The weather was dominated by warm temperatures, clear skies and calm seas with weak winds in the Baltic. Upon entering the West Sea, the winds had picked up and speeds varied between 10 – 11 m/s, with occasional showers.

Air temperature varied between 15 - 22°C.

Additional water samples were collected at several stations to measure algal toxins and to sequence eDNA. Three guest scientist from the ANIME-project joined the cruise to sample from the Ferrybox and IFCB.

The station Östergarnsholm was visited to exchange a pCO₂-sensor, on assignment of the University of Uppsala.

Phytoplankton samples were analysed on board continuously throughout the cruise by the phytoplankton expert Marie Johansen. The results are presented in the AlgAware-report for July:

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

Daily algae monitoring via satellite is performed by SMHI during the summer and is available at <http://www.smhi.se/vadret/hav-och-kust/algsituationen>.

The MVP (Moving vessel profiler) was not used during the cruise as the new transponder had not yet been fixed to the instrument.

The Ferrybox (continuous measurements at 4 metres depth) and both ADCP:s were running throughout the whole cruise.

This report is based on data that has undergone an initial quality control. When additional quality review has been performed, certain values may change. Data from the expedition is published as soon as possible on the Data host, SMHI's website. This usually takes place within one to two weeks after the cruise has ended. Some analyses are made after the cruise and are published later.

SHARKweb: <http://www.smhi.se/klimatdata/oceanografi/havsmiljoda>

The Skagerrak

Surface water temperatures varied between 15 – 17,5°C, which is within normal range for the season. The sea surface salinity varied between 25 – 32 psu, with the lowest values observed by the coast and in the south. Somewhat higher salinity than normal was measured at the more coastal stations Å15, Å14 and Å13, than at the more remote stations of the Å-transect.

At Å17 and Å16, a pycnocline had formed around 25 meters. At the remaining stations, the water column was more visibly mixed, with a less obvious pycnocline.

All nutrients in the surface layer displayed low levels. Concentrations of dissolved inorganic nitrogen (DIN) varied between 0,17 µmol/l at Å17, having the least influence from the coast, to levels between 0,27 – 0,32 µmol/l at the stations in closer proximity to the coastal area. Further down in the water column, the levels were found to be within normal range.

Concentrations of dissolved inorganic phosphorus, phosphate, varied between 0,04 – 0,07 µmol/l, which is within normal range for the season. Deeper down, the concentrations increased, with levels above normal at Å13 and Släggö, but with no deviation outside of normal range at remaining sampling points.

Likewise, the silicate levels in the surface layer were low, and varied between 0,4 – 0,7 µmol/l. The highest value was found at Släggö with 1,03 µmol/l. Further down in the water column, the levels increased but stayed within normal.

Chlorophyll fluorescence measurements with CTD showed an eminent peak at around 25 meters of depth at Å17, with a high concentration of oxygen above in the water mass. At Å16, a peak was observed deeper in the water column, at around 30 – 40 meters. Å15 displayed two separate peaks at 15 and 45 meters. At the more coastal stations, higher levels of fluorescence could be noted at 15 – 25 meters. In the south of the Skagerrak, at station P2, plankton activity appeared lower and no obvious peak could be detected.

The lowest levels of oxygen in the bottom waters were found at Släggö, at 4,8 ml/l. In the offshore areas, the levels in the bottom waters varied between 5,4 – 6,0 ml/l, which is within normal range.

The Kattgat and the Sound

The surface temperatures varied between 7 – 18,5°C, which is normal for the season. The sea surface salinity in the northern Kattegat varied between 22 – 27 psu, which is above normal range. At Anholt E, salinity values of 19,8 psu was observed, which is normal. In the Sounds, the surface salinity was measured at 12,6 psu.

The pycnocline varied in the depth between the sampling points. At Fladen, furthest north, a weak pycnocline could be seen at 30 – 40 meters of depth. At the remaining stations, the pycnocline was located around 15 – 25 meters of depth. In the deep waters, normal values of salinity and temperatures were noted.

Dissolved inorganic nitrogen was higher than normal at Fladen and Anholt E, with 0,49 µmol/l and 0,38 µmol/l. At the remaining stations, the values were within normal range, between 0,25 – 0,27 µmol/l. Levels of phosphate varied between 0,07 – 0,19 µmol/l, which is normal for the season.

Concentrations of silicate varied between 0,7 – 2,33 $\mu\text{mol/l}$ in the Kattegat, and the Sound displayed a level of 7,8 $\mu\text{mol/l}$, which is normal for the season.

At all sampling points it could be seen that the levels of nutrients further down in the water column were lower than normal, below the pycnocline.

In the Kattegat, chlorophyllic fluorescence peaks were noted at 20 – 25 meters. In the Sounds, the fluorescence was seen to increase towards the bottom, accompanied by an increased salinity. The plankton sampling showed a high number of the specie *Guinardia flaccida*, indicating an inflow from the more saline West Sea. More information about the algal situation can be found in the AlgAware-report for July (<https://www.smhi.se/publikationer/publikationer/algrapporter>.).

Oxygen levels were within normal range in the bottom waters: varying between 4,8 – 5,2 ml/l in the Kattegat and 4,6 ml/l in the Sound.

The Baltic Proper

The surface temperature was within normal range at all sampling points in the Baltic, varying between 15 – 18°C. An apparent thermocline had formed at all stations around 20 -30 meters. Below the thermocline, temperatures between 5-9°C dominated, with the exception of BY1 where warmer than normal bottom water at 15°C was present below the thermocline.

In the Western Gotland Basin, the surface salinity was within normal range, with values somewhat above normal at BY39 Ölands Södra Udde, varying between 6,33 – 7,14 psu. In the Eastern Gotland Basin, the surface salinity was found to be within normal range, varying between 6,69 – 7,22 psu, with the exception of the BY29/LL19 where it was slightly below normal at 5,96 psu. At station BCS III-10 in the central Baltic Proper, the surface salinity was above normal range, at 7,42 psu. Additionally, surface salinity was observed to be above normal range in the Bornholm Basin, between 7,61 – 7,7 psu. A halocline had formed at all sampling points around 50 – 70 meters of depth.

The concentrations of dissolved inorganic nitrogen (DIN) in the surface layer were within normal range, and had decreased slightly since the cruise in June. All stations displayed levels below detection limit, <0,10 $\mu\text{mol/l}$, with the exception of BY39 and BY32, displaying levels of 0,33 $\mu\text{mol/l}$ and 0,22 $\mu\text{mol/l}$. In the Western and Eastern Gotland Basin, levels of DIN in the deep water was found to be above normal, where BY31 was observed with levels considerably above normal in below 75 meters. In the Baltic Proper the increase of DIN in the deep water coincided at the depth where hypoxia occurred.

The levels of phosphate in the surface waters were within normal range at all stations and varied between 0,14 $\mu\text{mol/l}$. In the Eastern Gotland Basin, higher levels of phosphate were noted at a depth of 60 – 80 meters. The remaining deep water of the Baltic displayed phosphate levels within normal range.

Concentrations of silicate in the sea surface were within normal range at all sampling points, with concentrations varying between 7,3 – 11,87 $\mu\text{mol/l}$. Similar to phosphate and DIN, higher values than normal could be detected in the deep water of the Eastern Gotland Basin and coincided with the oxycline, below which anoxia occurred.

In the Baltic Proper, the oxygen situation continues to be critical. Acute oxygen deficiency, oxygen levels below 2 ml/l, could be seen below 70 – 80 meters at all sampling points. Hydrogen sulphide

was measured at all sampling points in the Western and Eastern Gotland Basin with exception of the shallow station BY39.

At these stations, levels above normal of nutrients could also be detected in the deep water.

In the Bornholm Basin, anoxia occurred from 80 meters, although low levels of hydrogen sulphide could be measured.

In the Arkona basin, the situation was found to be somewhat better, but levels of oxygen were measured at the limit of hypoxic conditions in the bottom waters, at levels between 2,33 – 3,33 ml/l.

In the Bay of Hanö, anoxia occurred from 70 meters. No hydrogen sulphide was detected at these stations.

At all stations, peaks of chlorophyllic fluorescence could be detected to some extent, at a depth between 5 – 18 meters. A higher level of oxygen could also be observed higher up in the water column, above the fluorescence peak. Due to recent wind, surface accumulations of cyanobacteria had been mixed down in the water column. At limited occasions with calmer water, small surface accumulations could be observed. More information about the algal situation can be found in the AlgAware-report for July (<https://www.smhi.se/publikationer/publikationer/algrapporter>.).

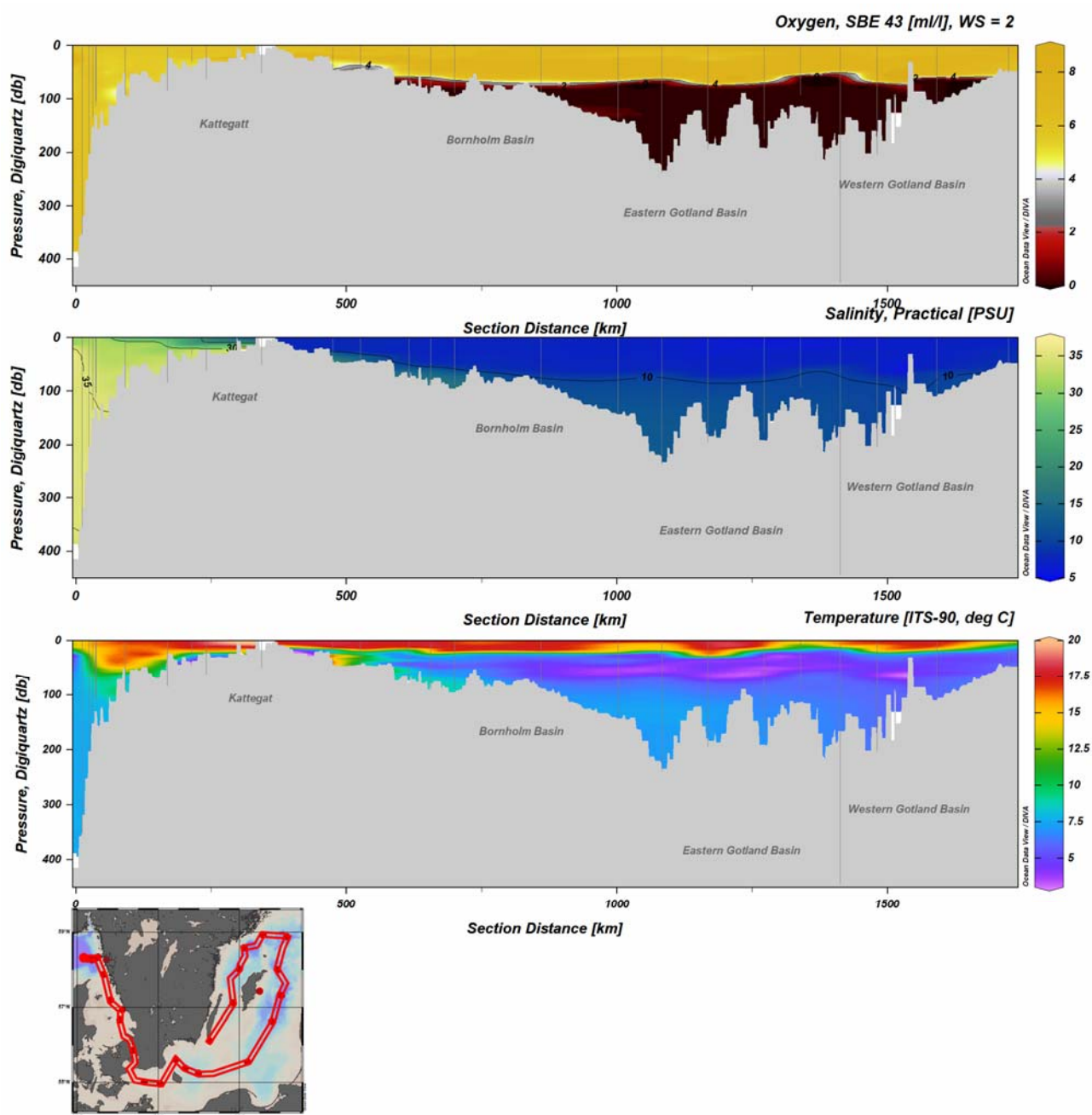


Figure 1. Transect showing CTD and MVP measurements of dissolved oxygen, salinity and temperature from Kattegat, the Sound through the Eastern Gotland Basin to the Western Gotland Basin.

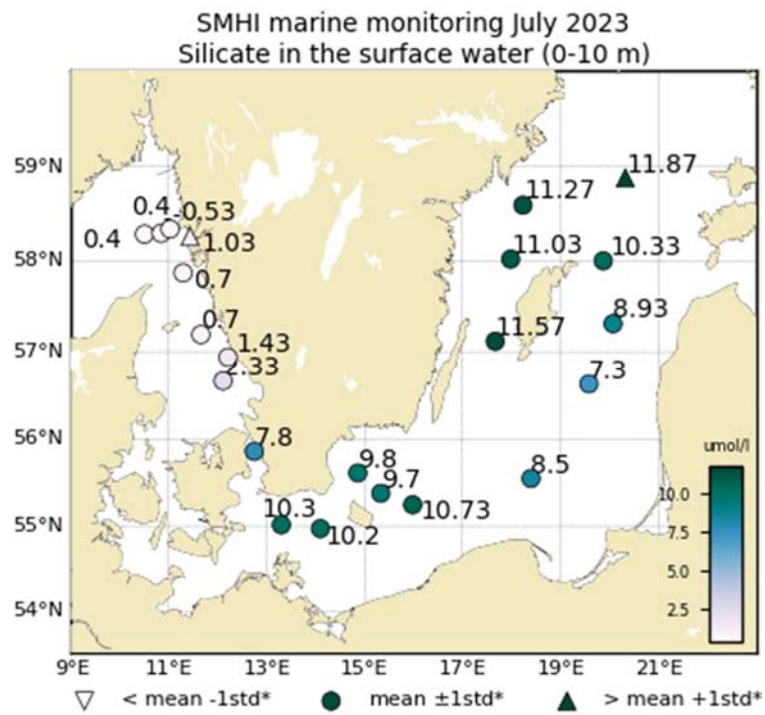


Figure 4. Concentration of silicate in the surface water (0-10m).

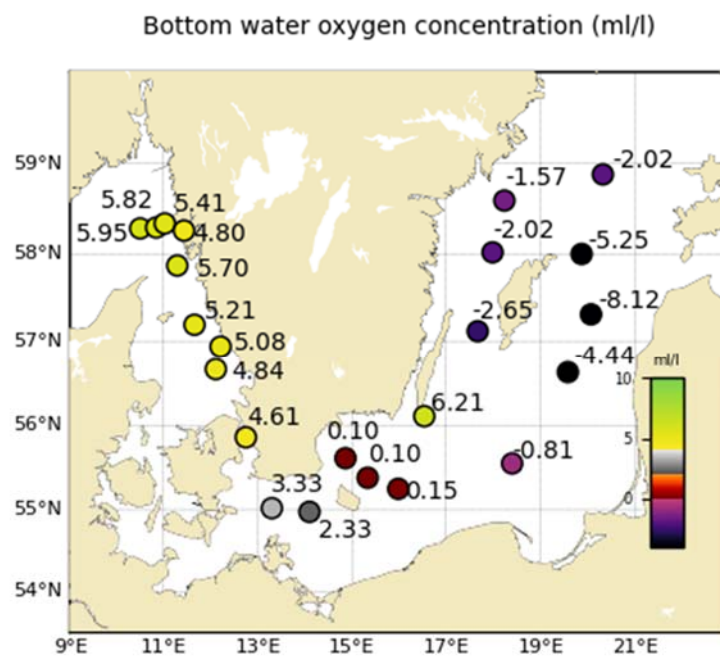


Figure 5. Oxygen concentration in the bottom water.

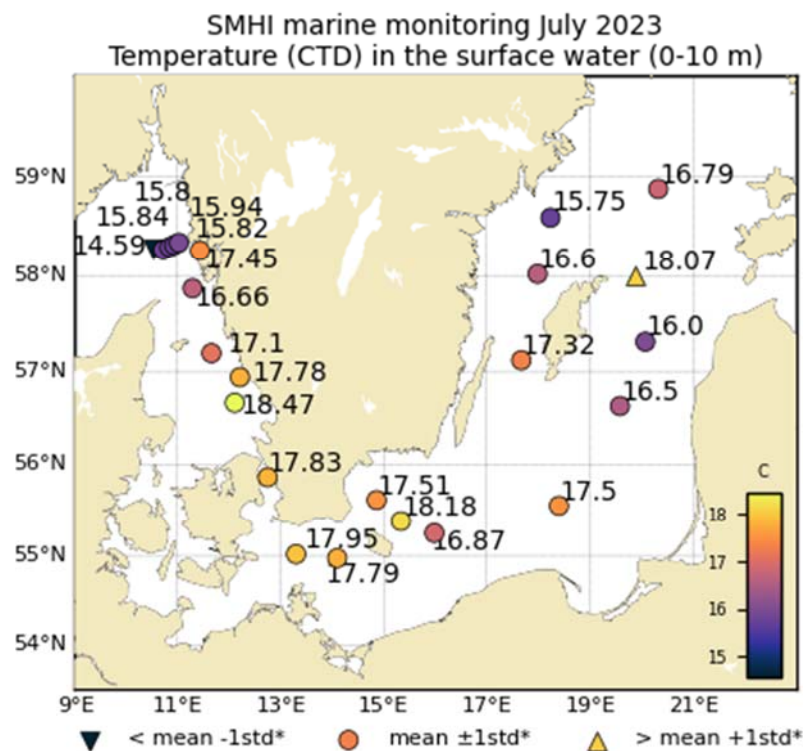


Figure 6. Temperature in the surface water (0-10m).

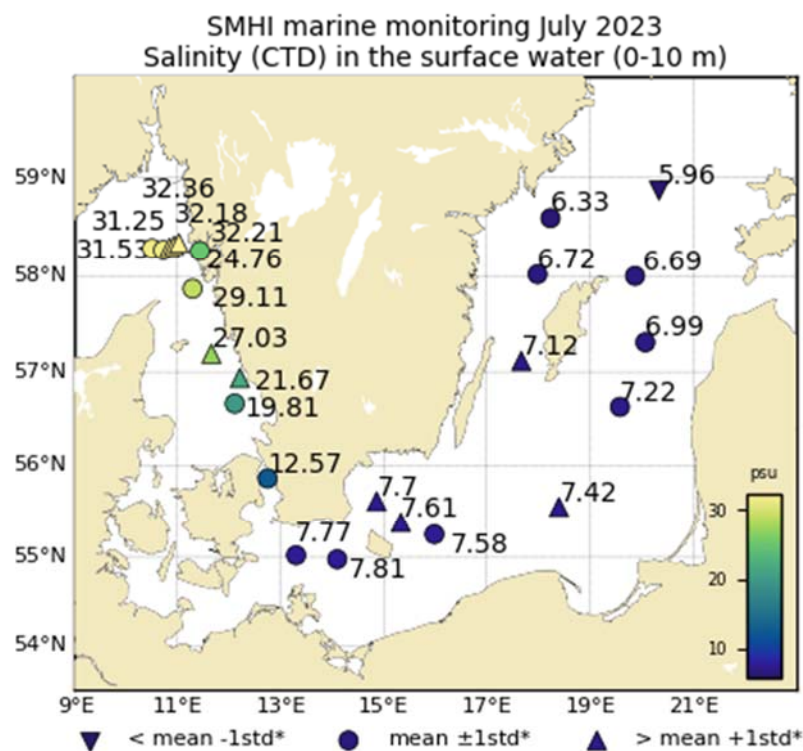


Figure 7. Salinity in the surface water (0-10m).

DELTAGARE

Namn	Roll	Från
Sara Johansson	Chief scientist	SMHI
Helena Björnberg	Marine chemist	SMHI
Örjan Bäck	Oceanographer	SMHI
Johan Håkansson	Chemist	SMHI
Sari Sopilä	Chemist	SMHI
Marie Johansen	Marine biologist	SMHI
Anders Andreasson	Guest scientist	KTH
Karin Garefelt	Guest scientist	KTH
Henrik Lundbäck	Guest scientist	KTH
Stefan Bertilsson	Guest scientist	SLU
Xavi Florenza Garcia	Guest scientist	SLU

APPENDICES

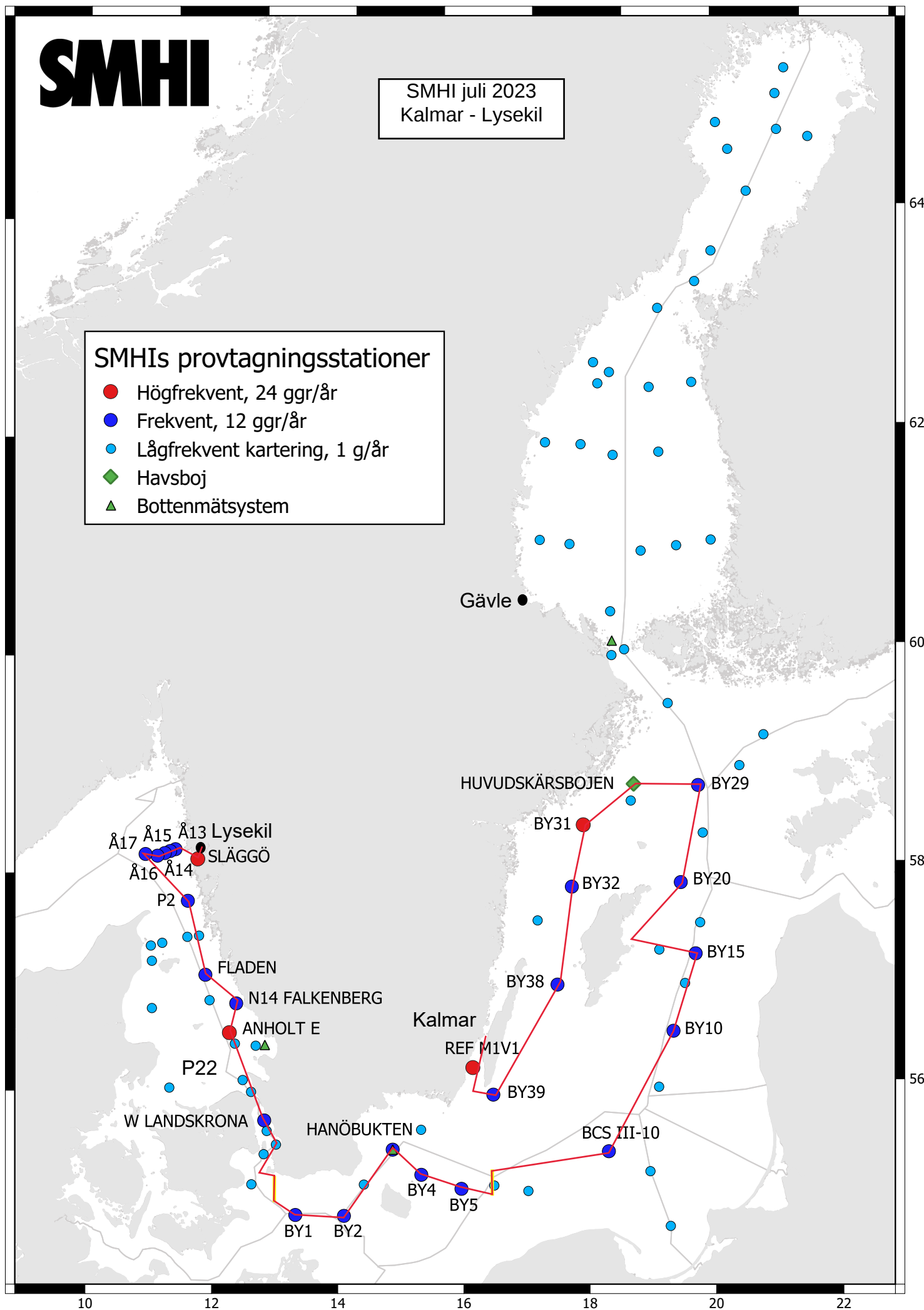
- Track chart
- Table over stations, sampled parameters and number of sampling depths
- Vertical profiles for regular monitoring stations
- Monthly average surface water plots for regular monitoring stations

SMHI

Havs
och Vatten
myndigheten

SMHIs provtagningsstationer

- Högfrekvent, 24 ggr/år
- Frekvent, 12 ggr/år
- Lågfrekvent kartering, 1 g/år
- ◆ Havsboj
- ▲ Bottenmätsystem



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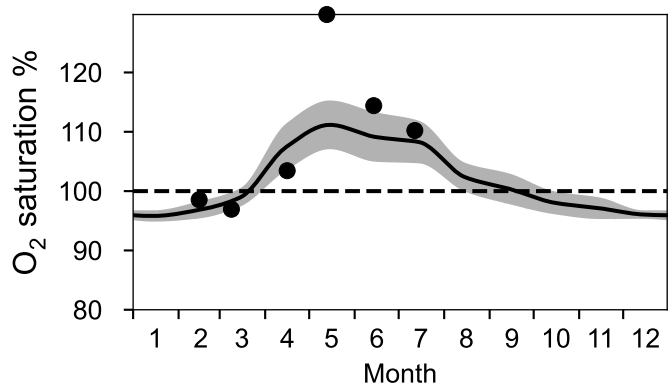
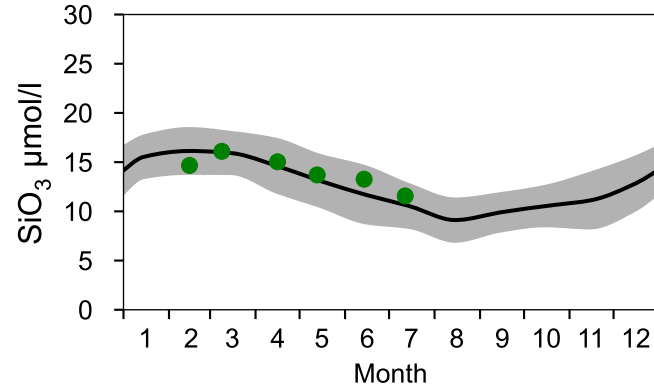
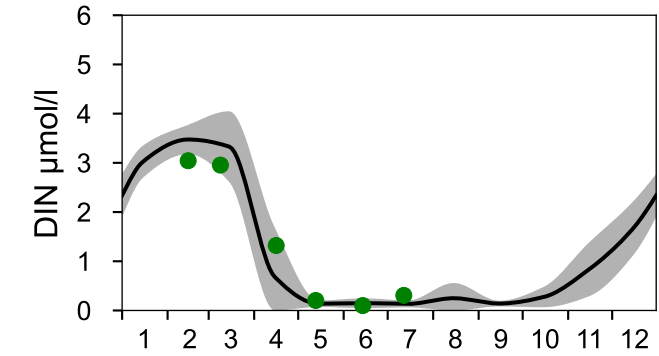
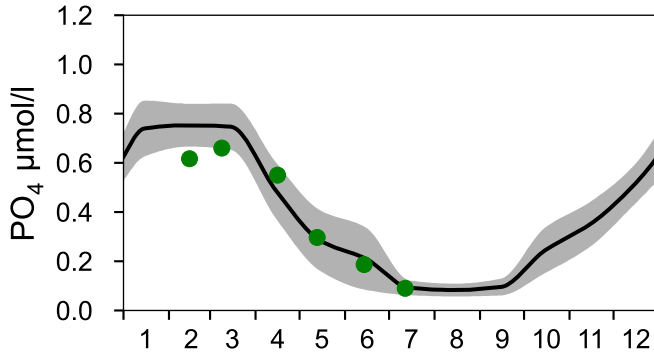
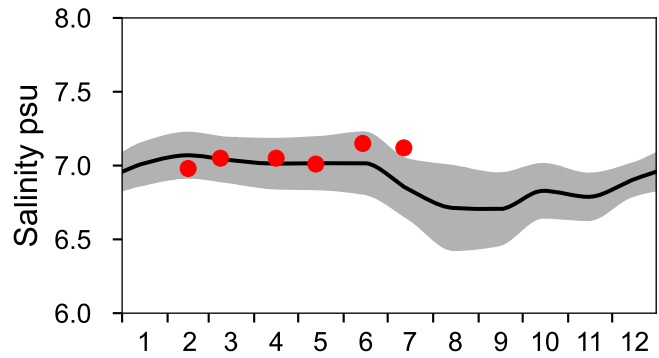
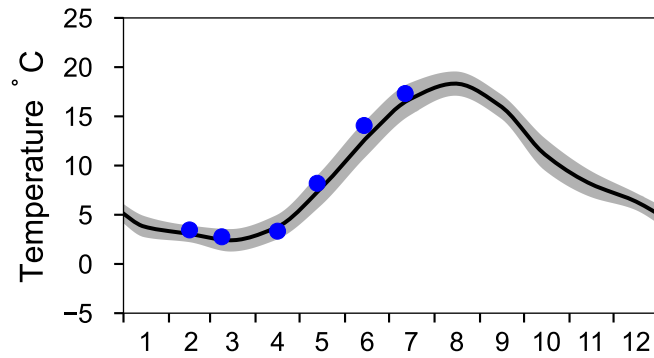
STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

Annual Cycles

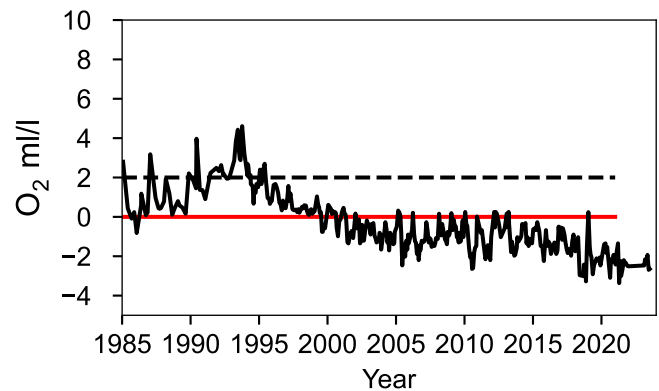
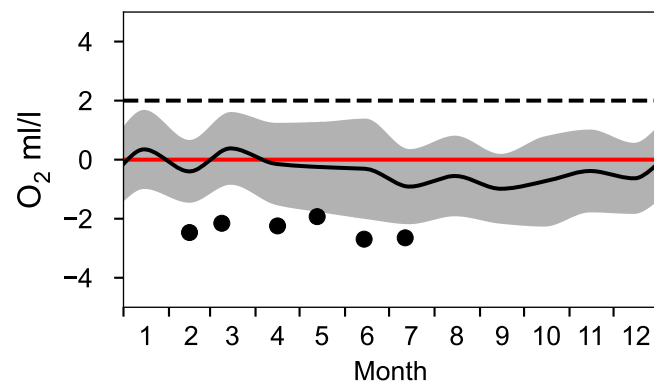
— Mean 2006-2020

■ St.Dev.

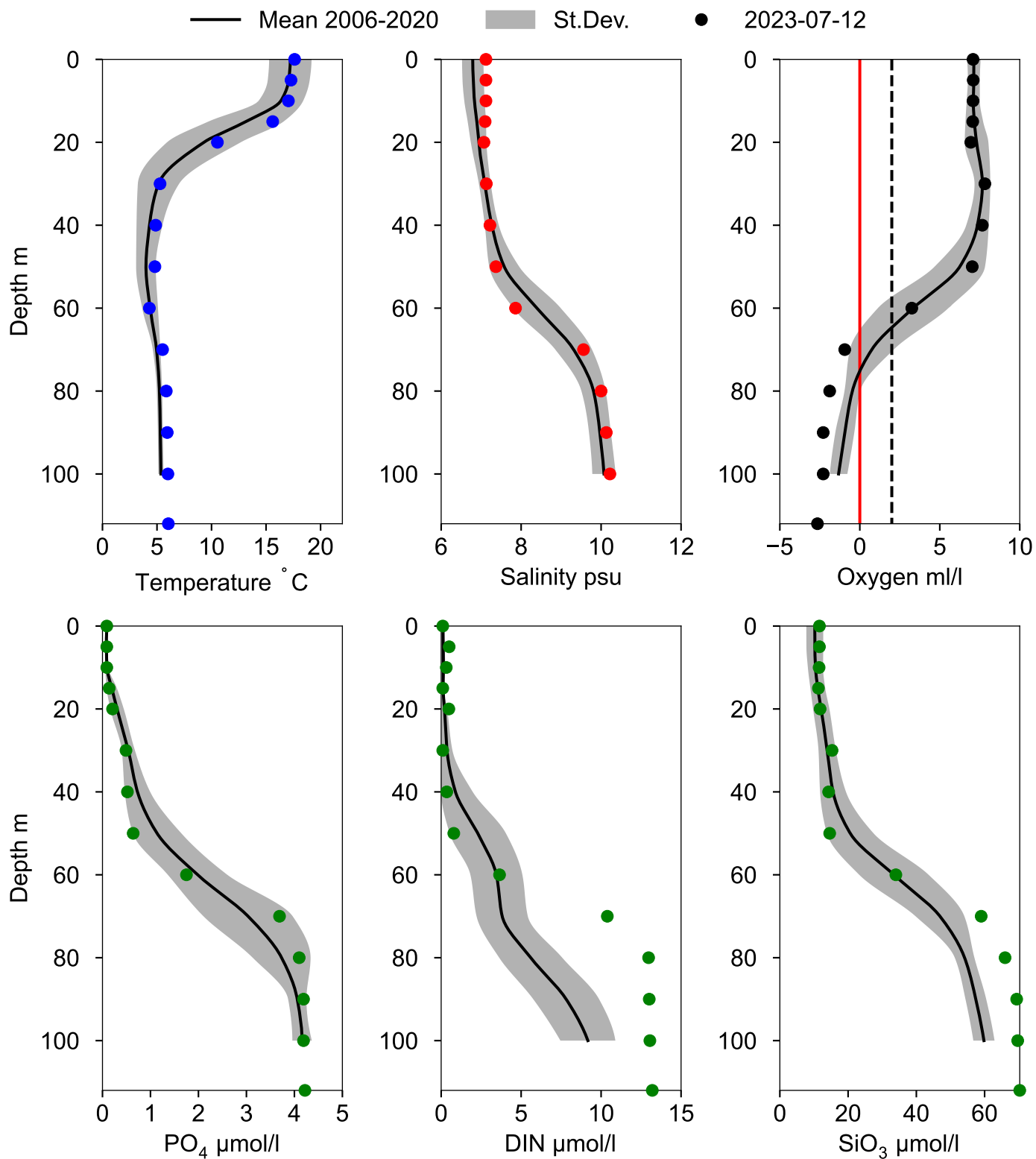
● 2023



OXYGEN IN BOTTOM WATER (depth >= 100 m)



Vertical profiles BY38 KARLSÖDJ July



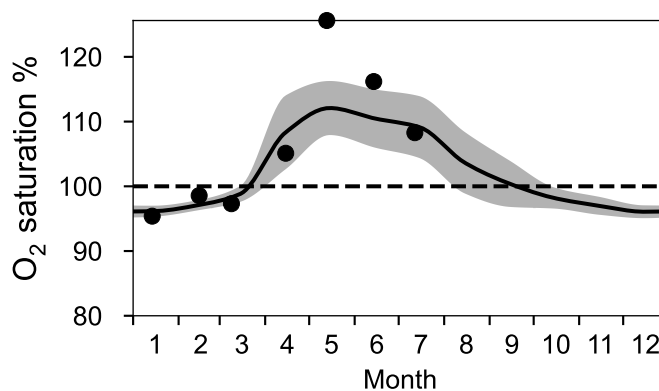
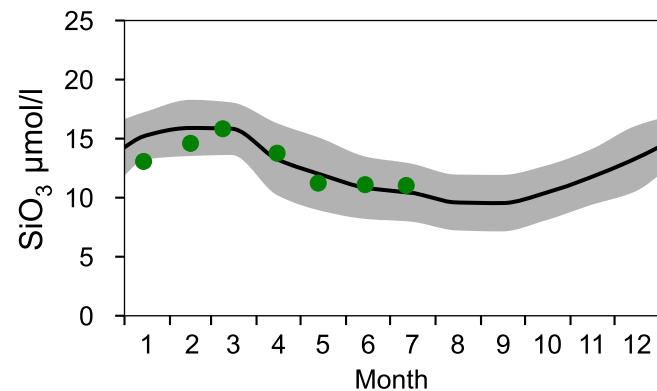
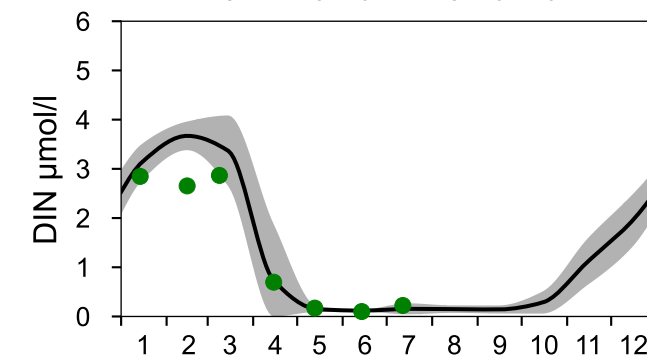
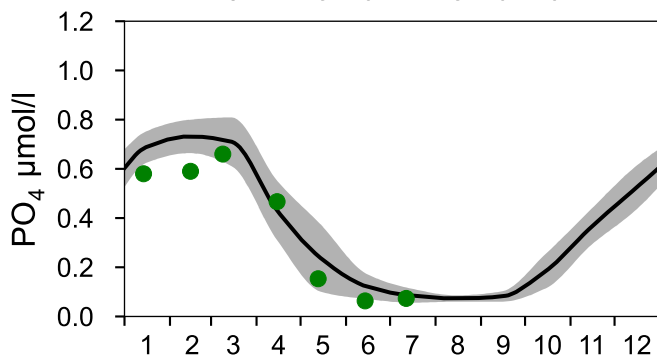
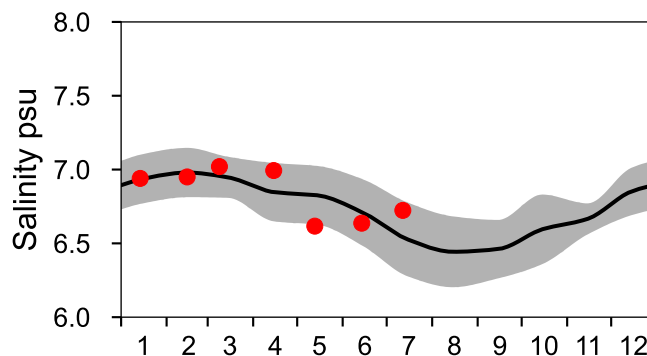
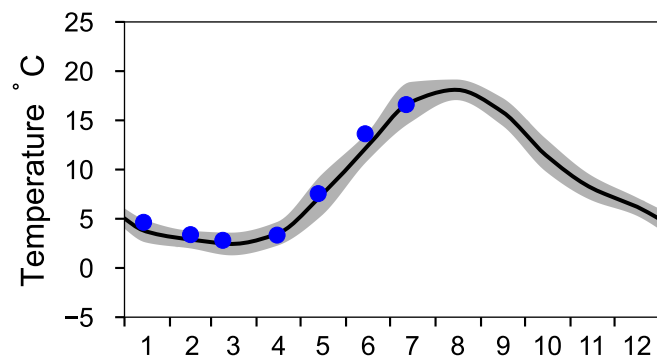
STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

Annual Cycles

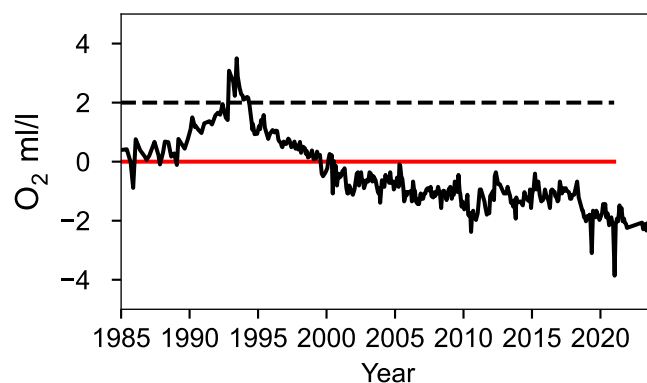
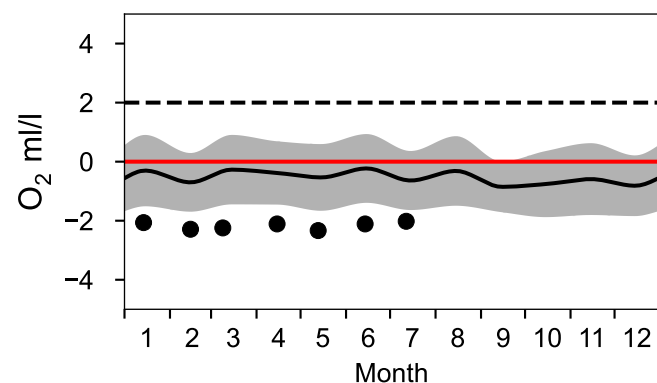
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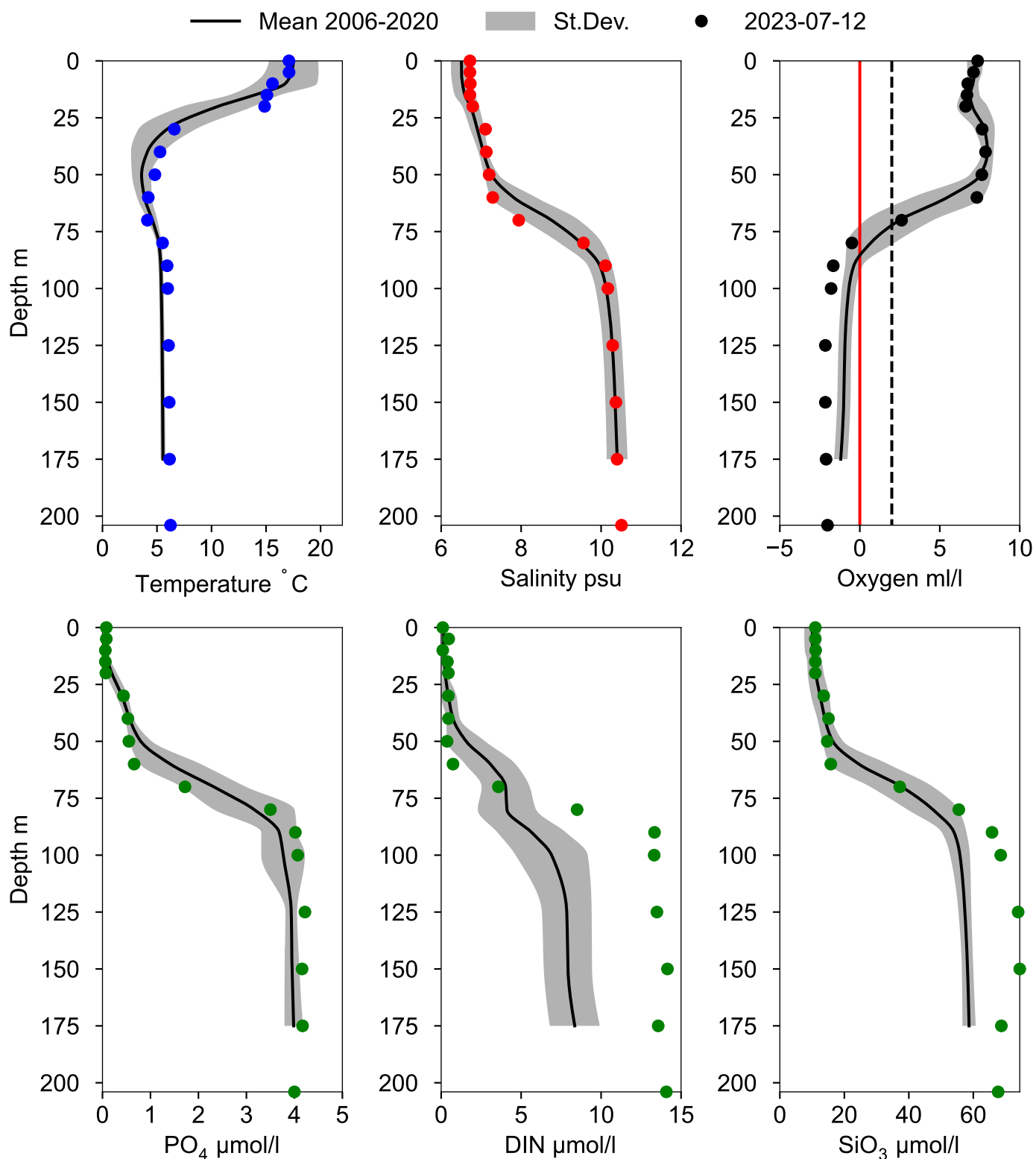
● 2023



OXYGEN IN BOTTOM WATER (depth >= 175 m)



Vertical profiles BY32 NORRKÖPINGSDJ July



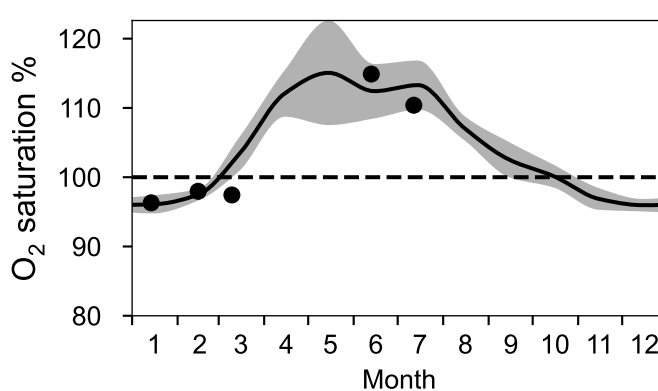
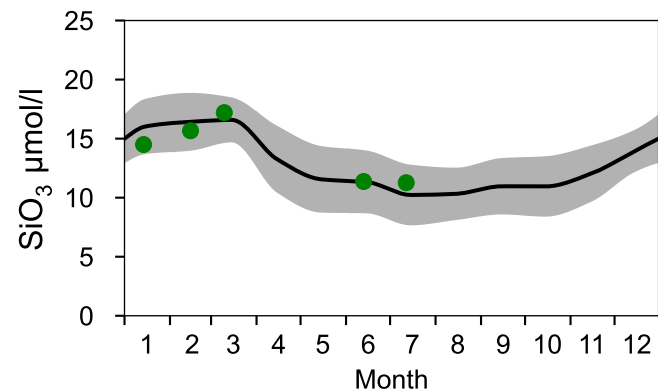
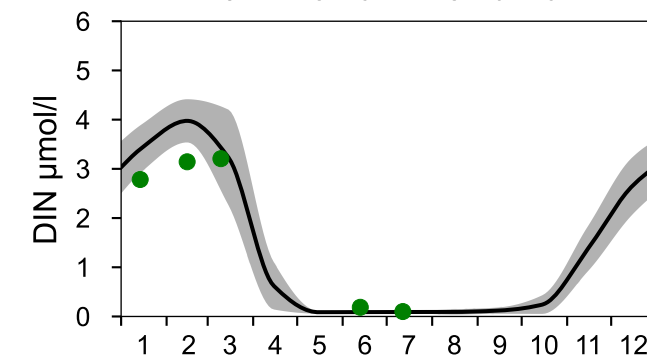
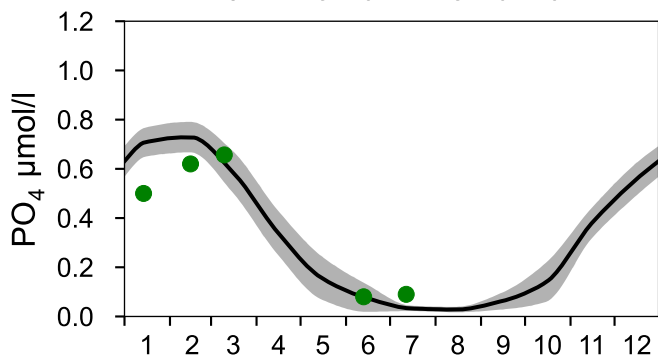
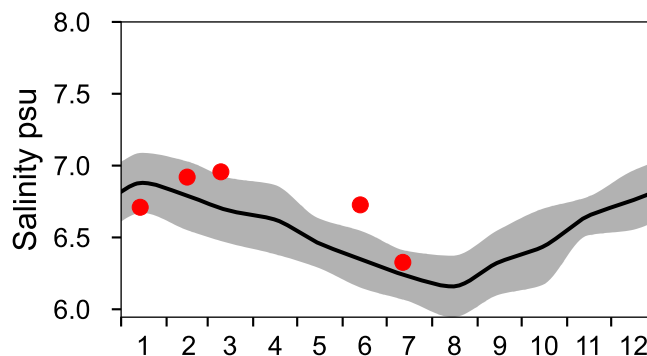
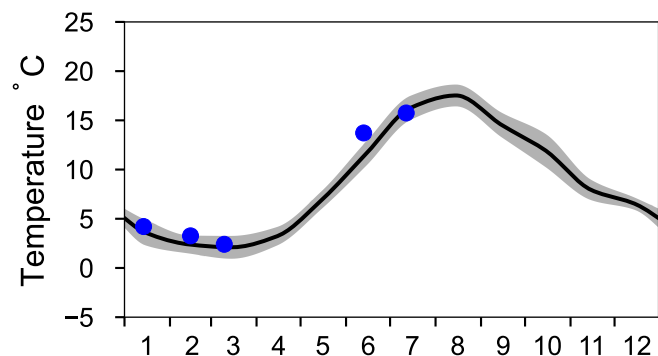
STATION BY31 LANDSORTSDJ SURFACE WATER (0-10 m)

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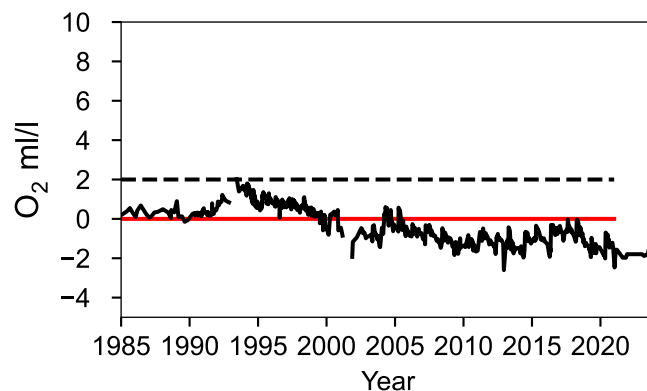
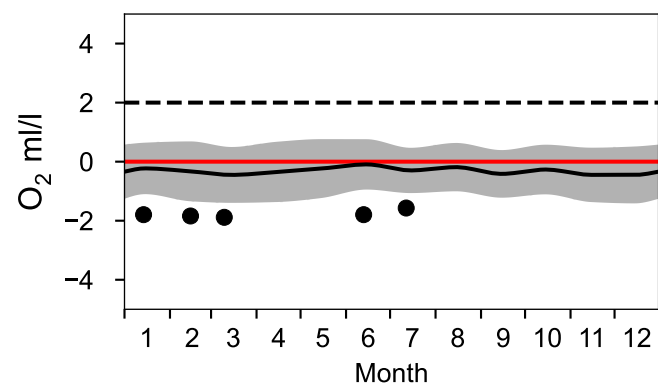
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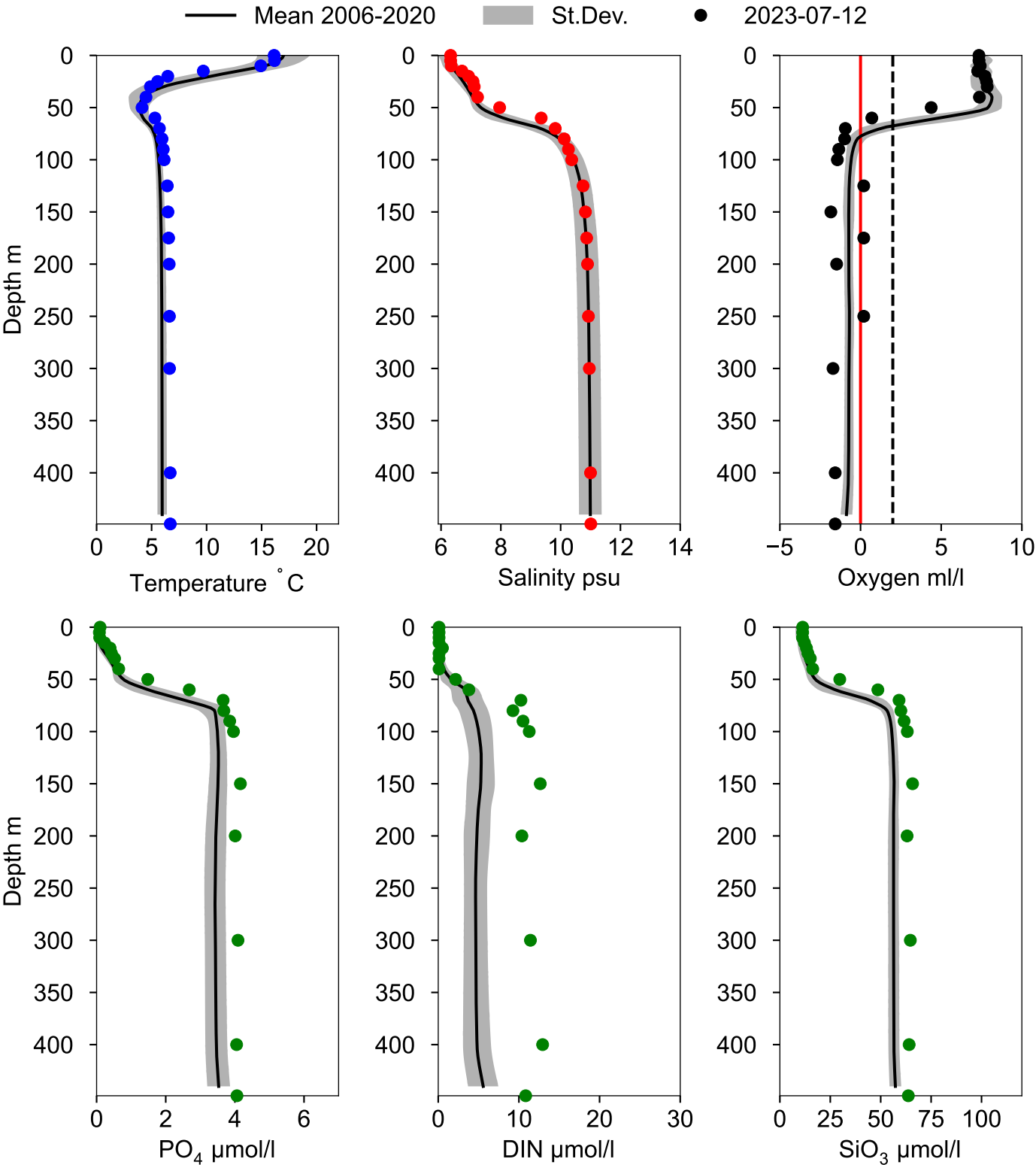
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OXYGEN IN BOTTOM WATER (depth >= 419 m)



Vertical profiles BY31 LANDSORTSDJ July



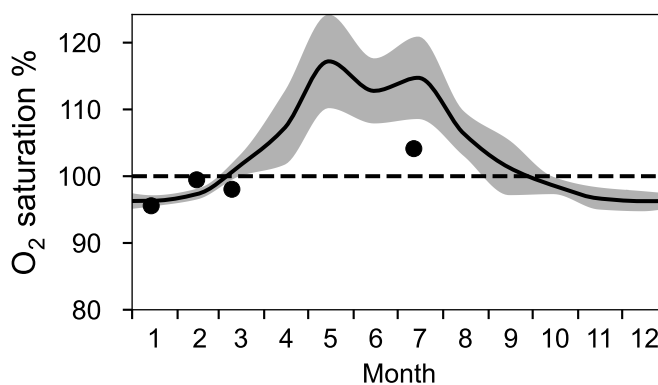
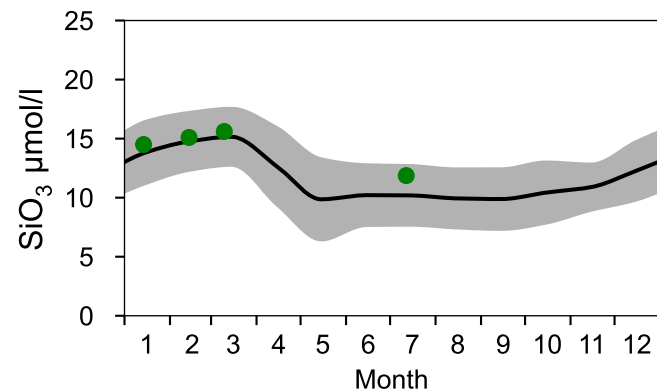
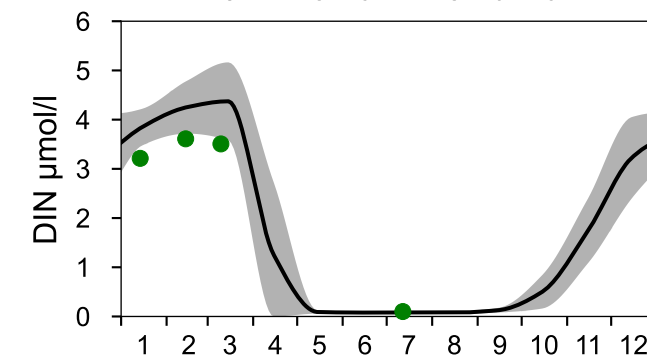
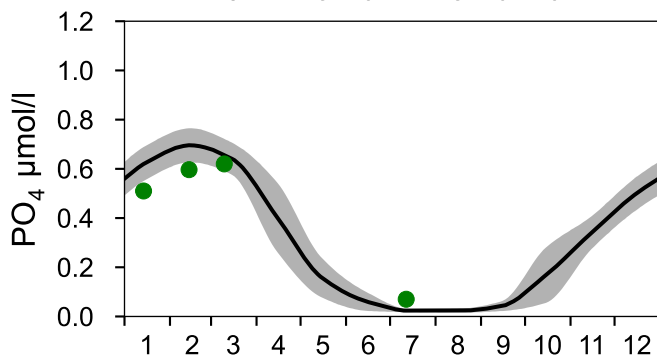
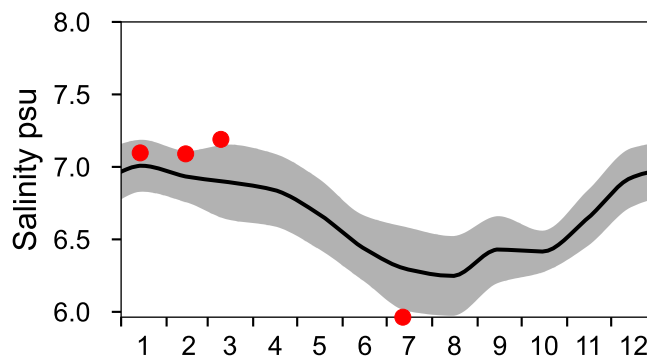
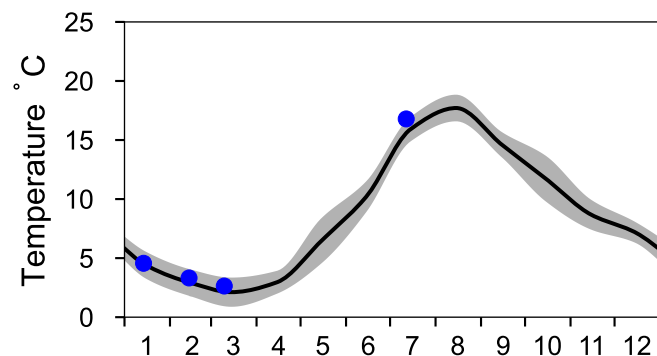
STATION BY29 / LL19 SURFACE WATER (0-10 m)

Annual Cycles

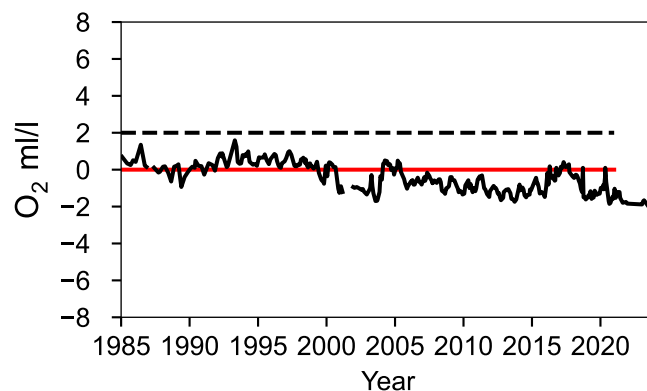
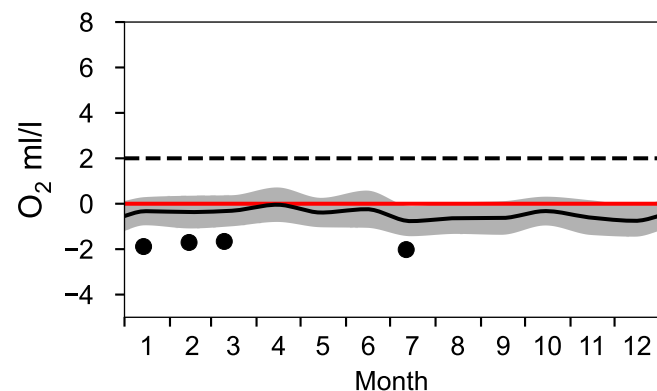
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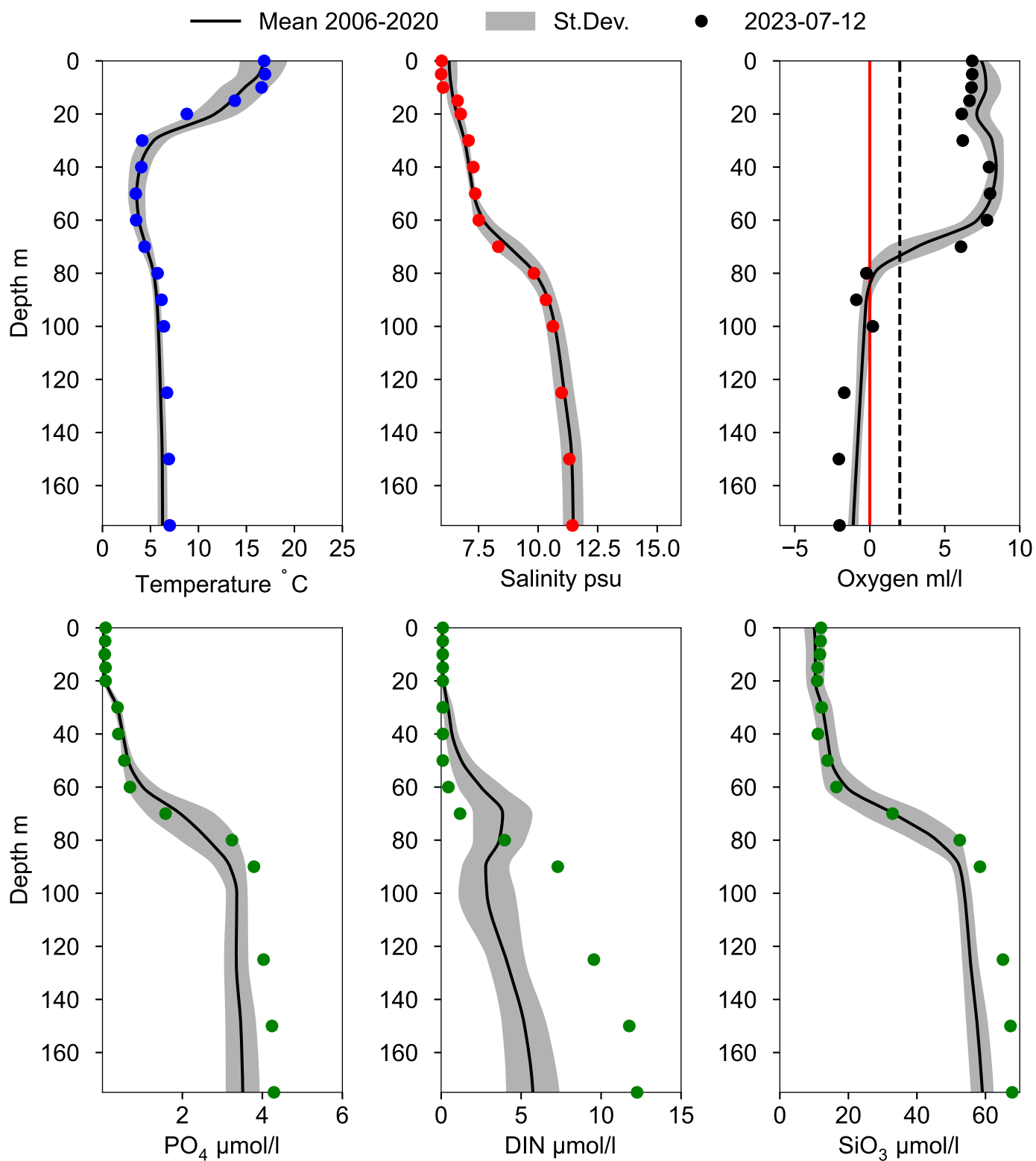
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OXYGEN IN BOTTOM WATER (depth >= 150 m)



Vertical profiles BY29 / LL19 July



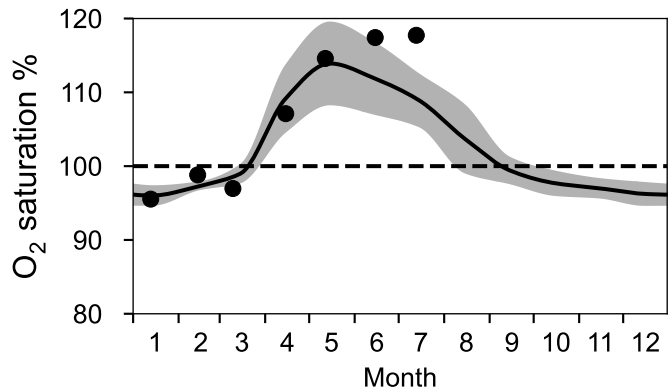
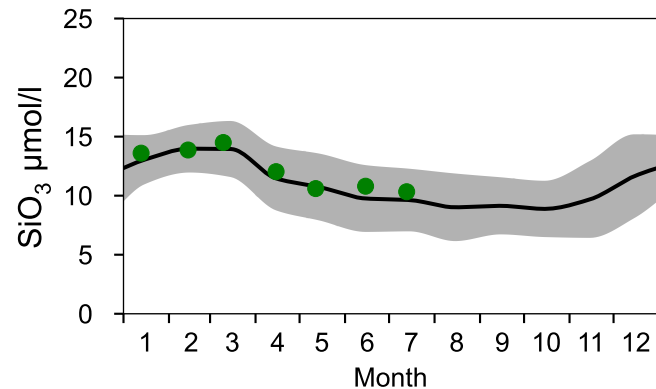
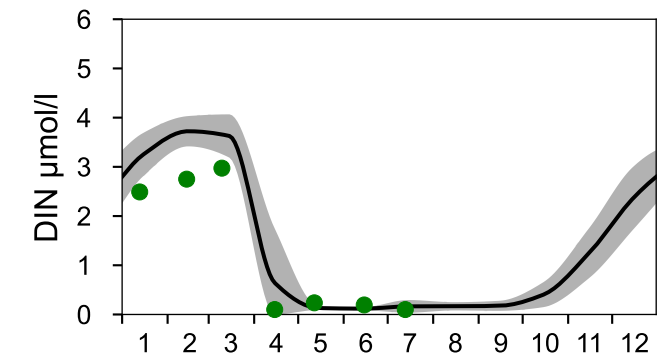
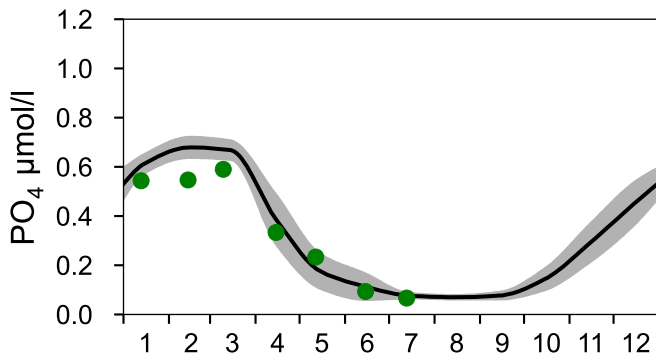
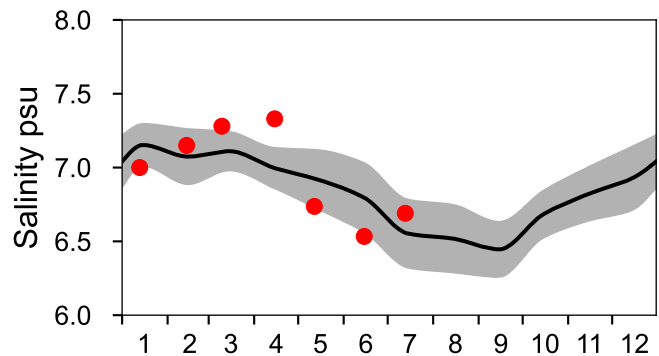
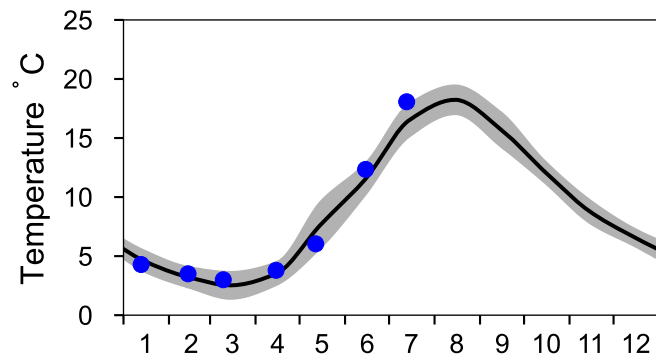
STATION BY20 FÄRÖDJ SURFACE WATER (0-10 m)

Annual Cycles

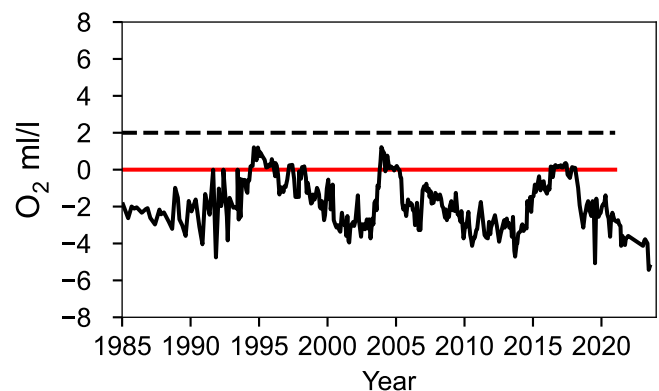
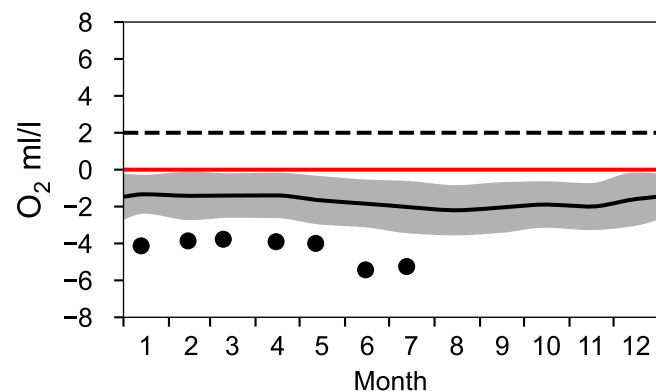
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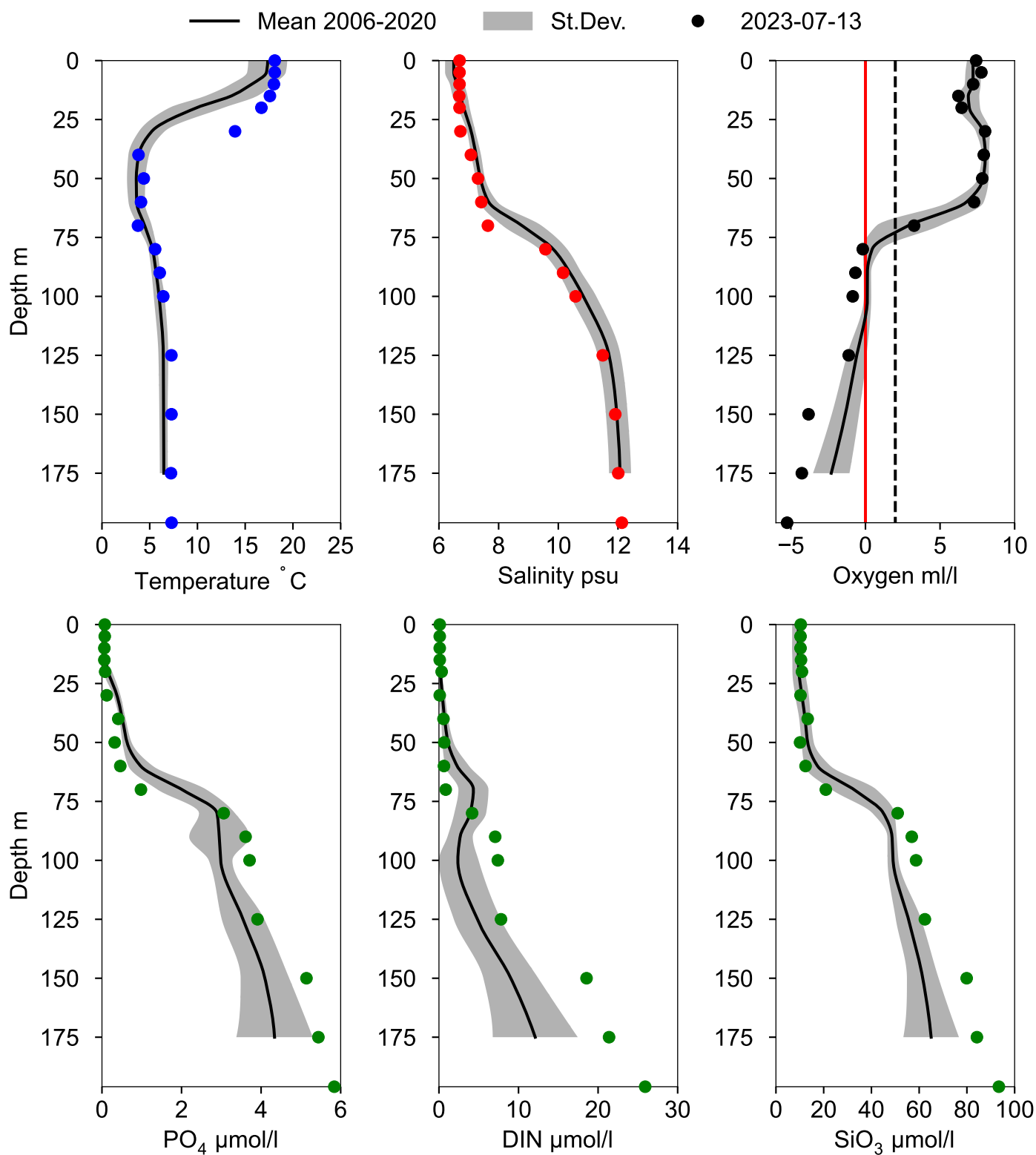
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OXYGEN IN BOTTOM WATER (depth >= 175 m)



Vertical profiles BY20 FÅRÖDJ July



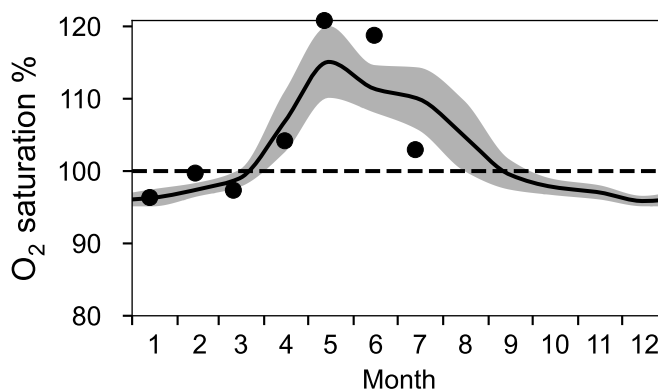
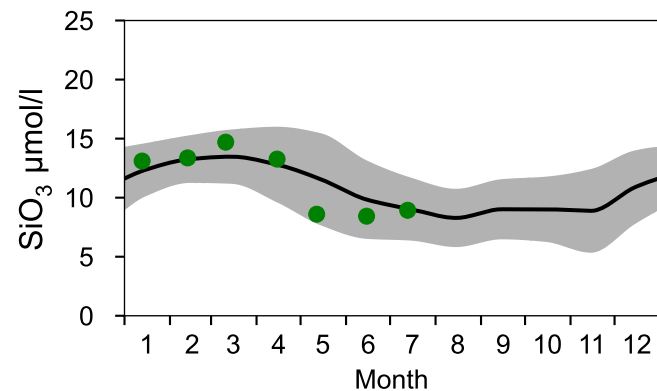
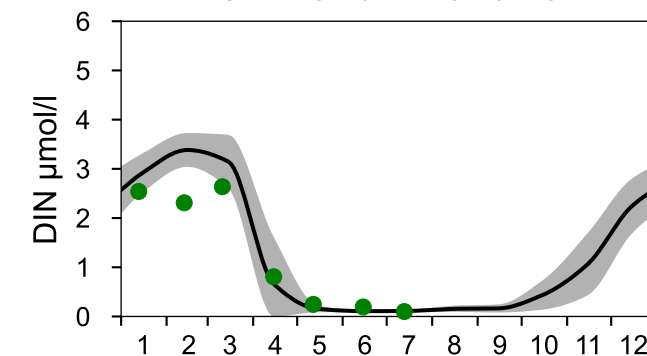
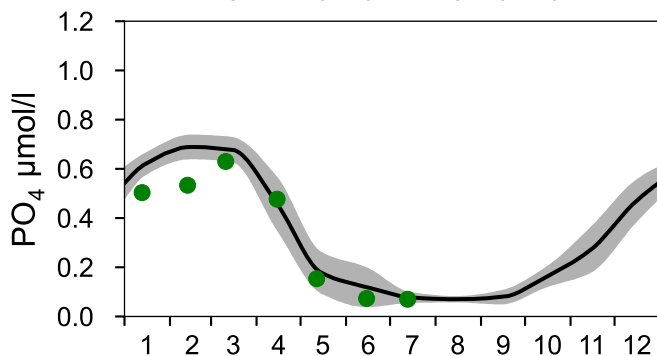
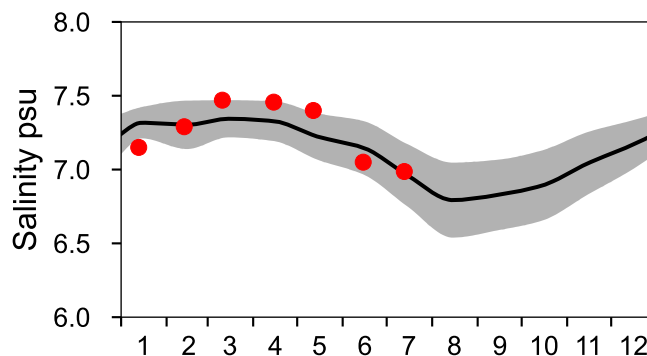
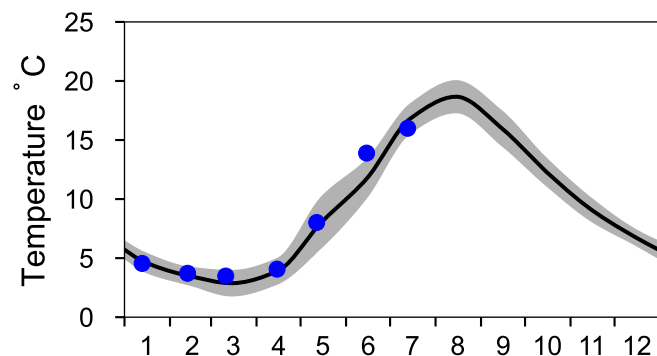
STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

Annual Cycles

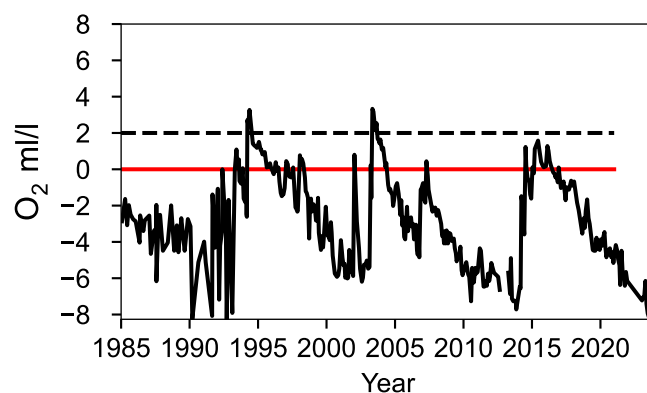
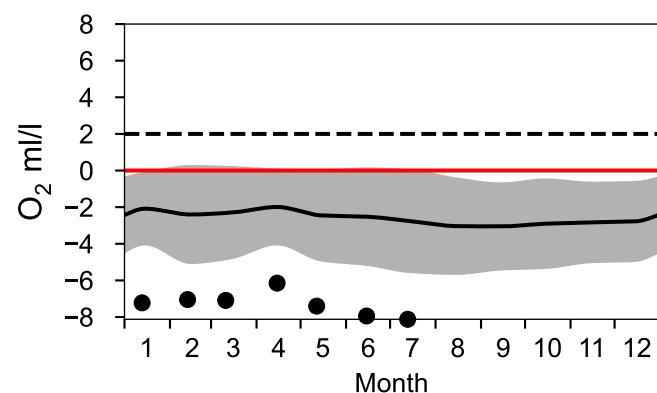
— Mean 2006-2020

■ St.Dev.

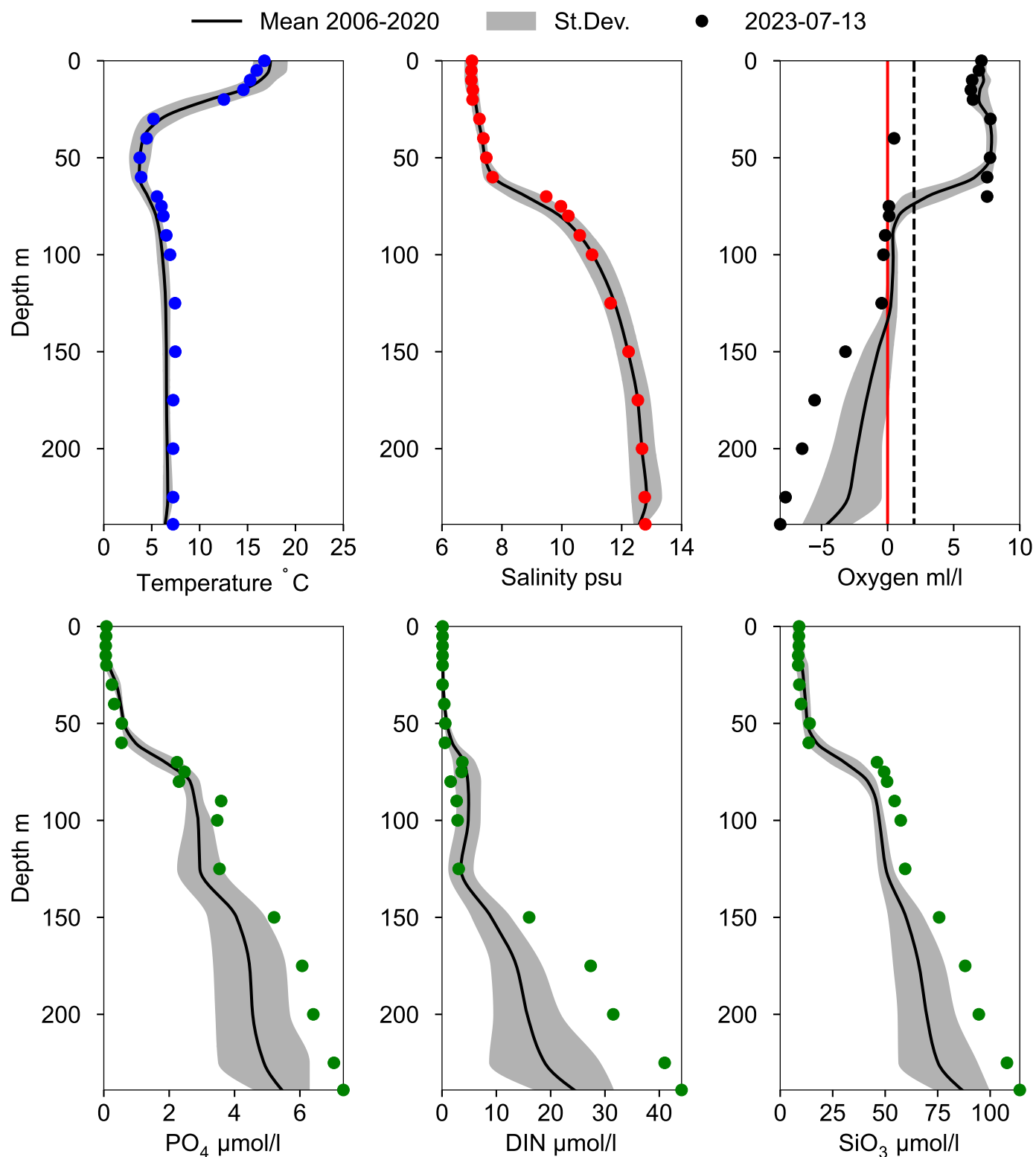
● 2023



OXYGEN IN BOTTOM WATER (depth >= 225 m)



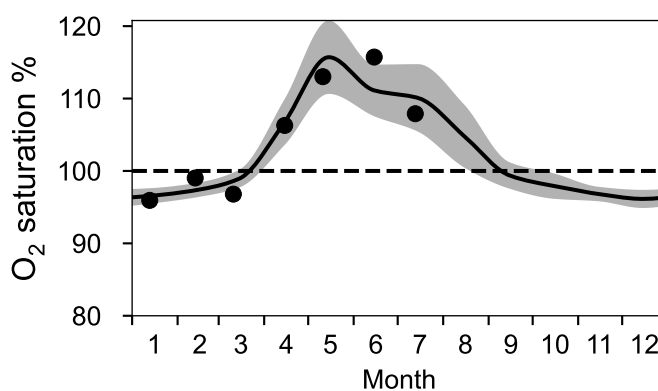
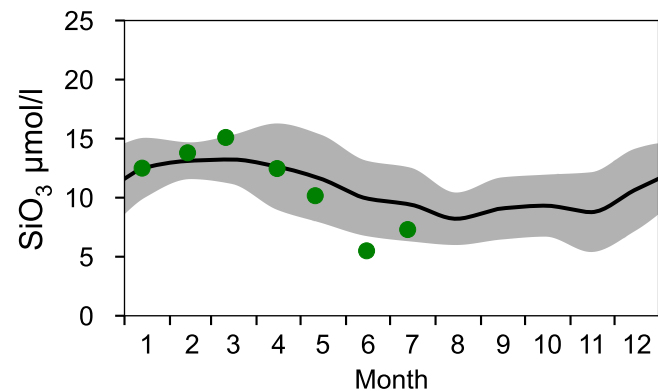
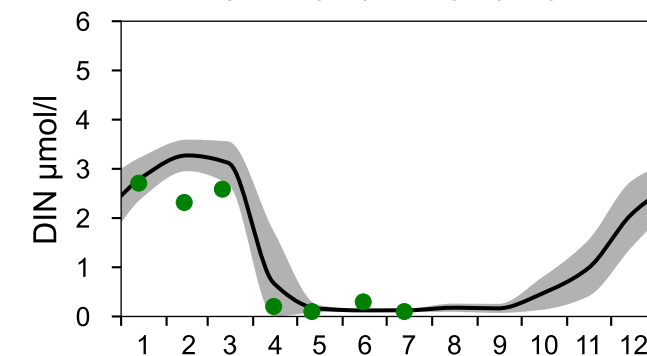
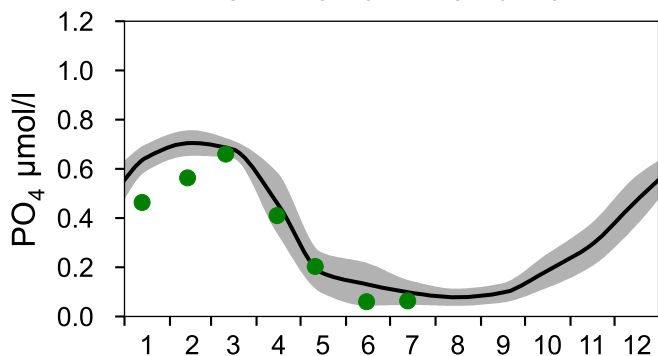
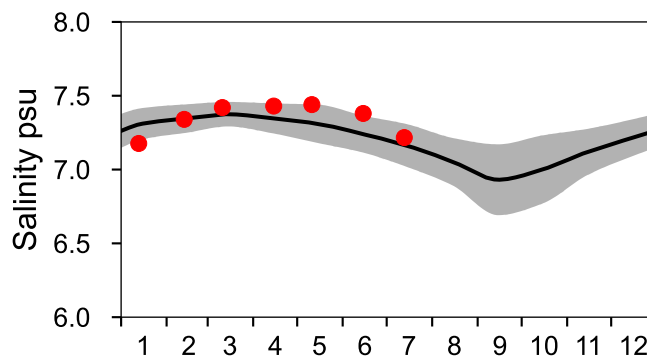
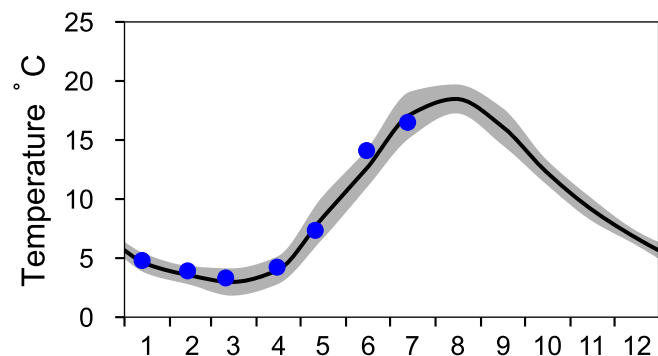
Vertical profiles BY15 GOTLANDSDJ July



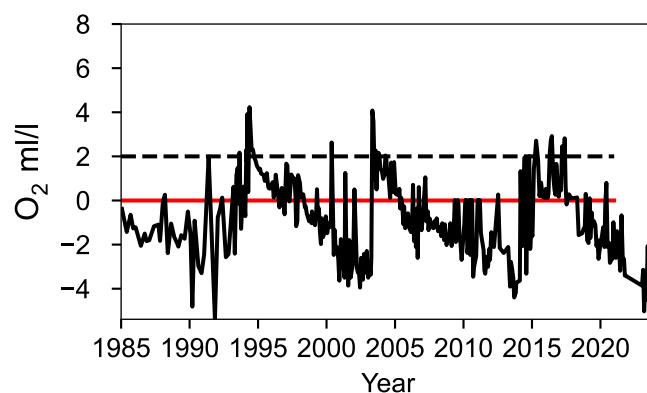
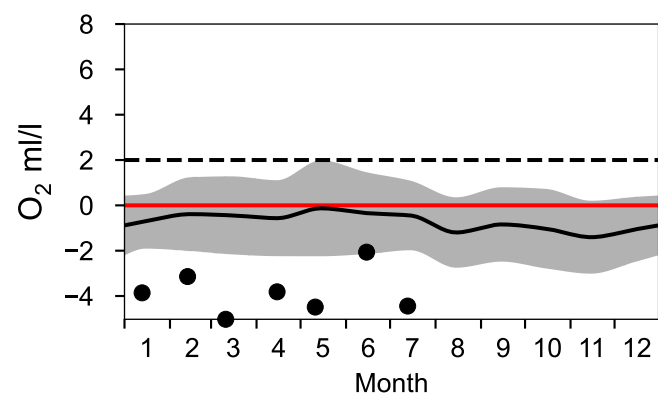
STATION BY10 SURFACE WATER (0-10 m)

Annual Cycles

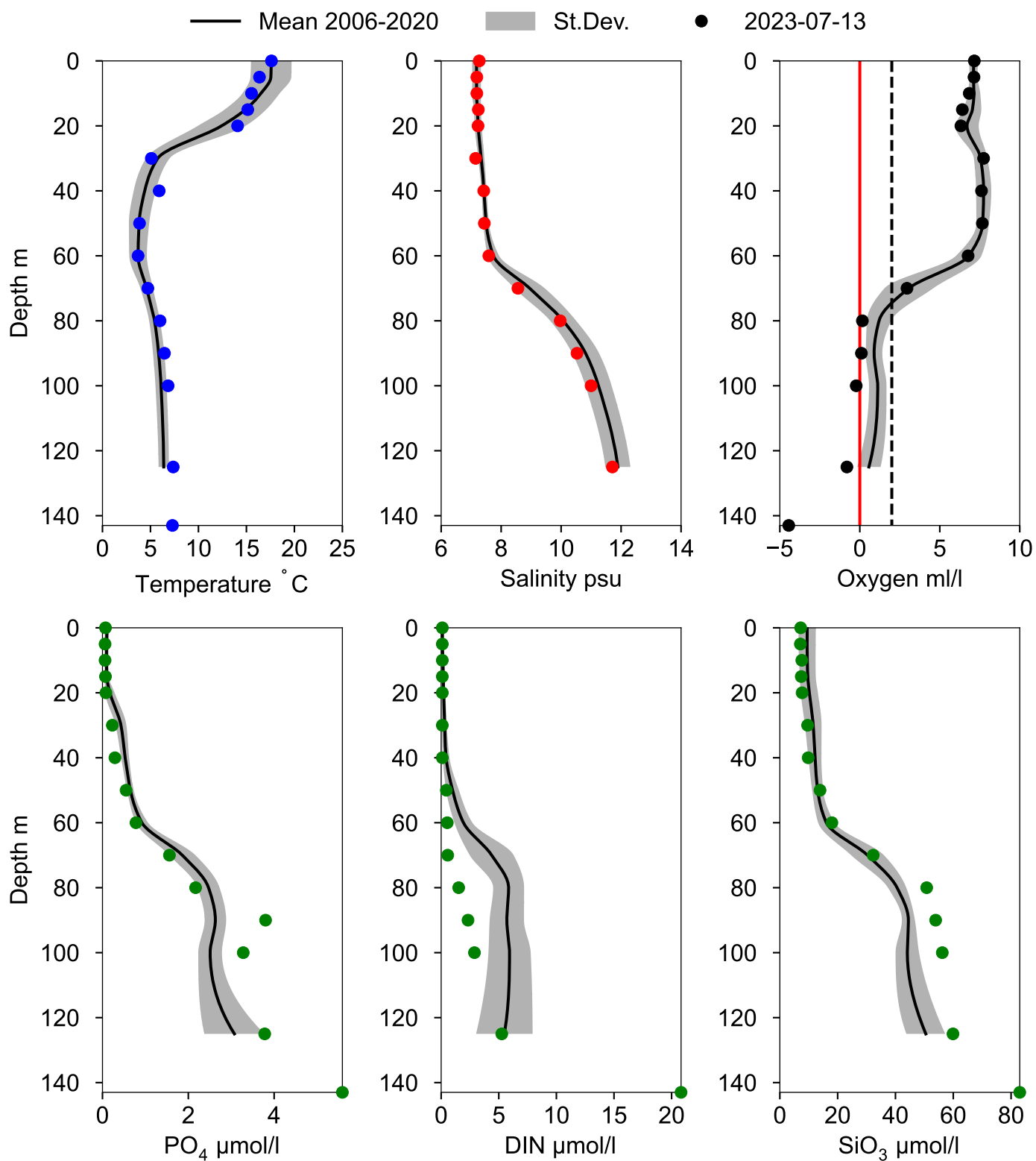
— Mean 2006-2020 St.Dev. • 2023



OXYGEN IN BOTTOM WATER (depth >= 125 m)



Vertical profiles BY10 July



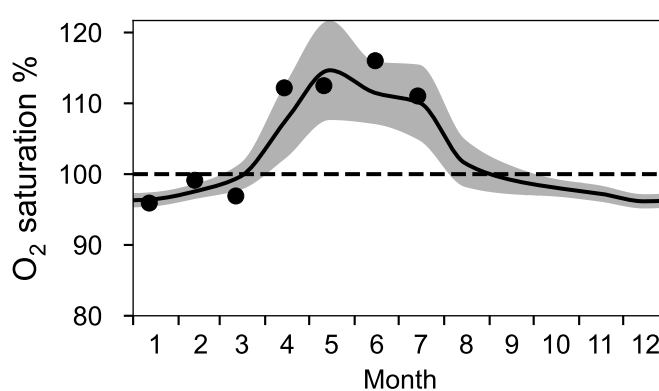
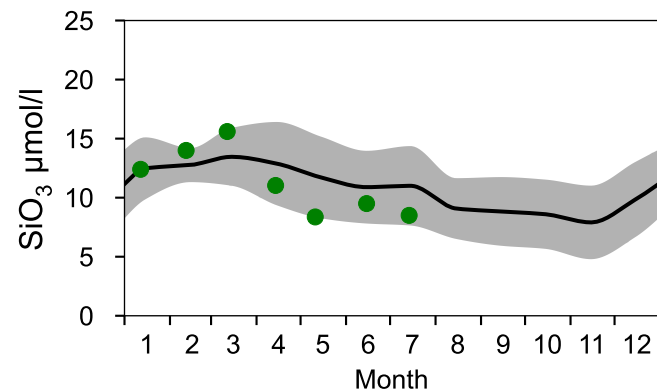
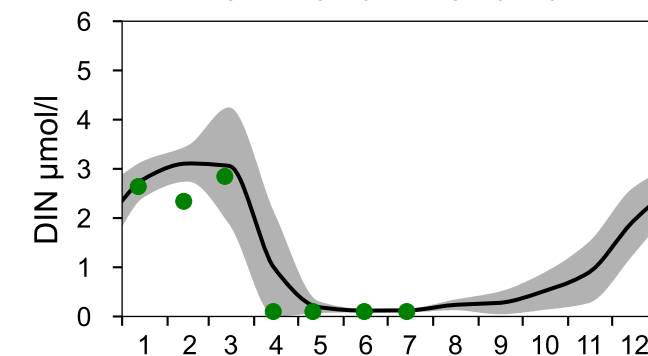
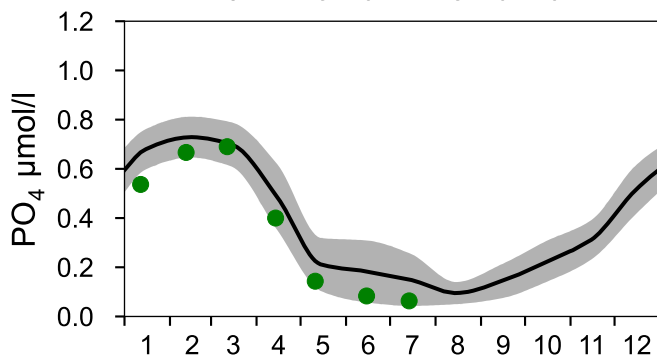
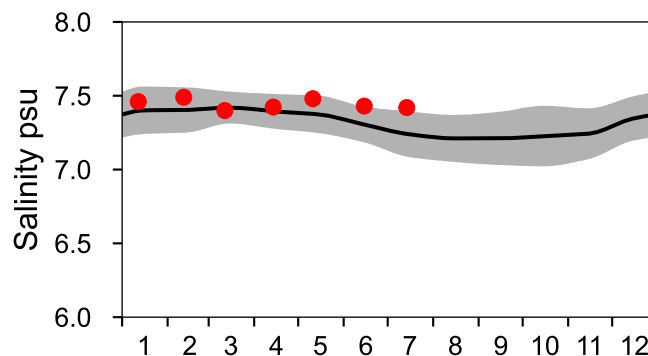
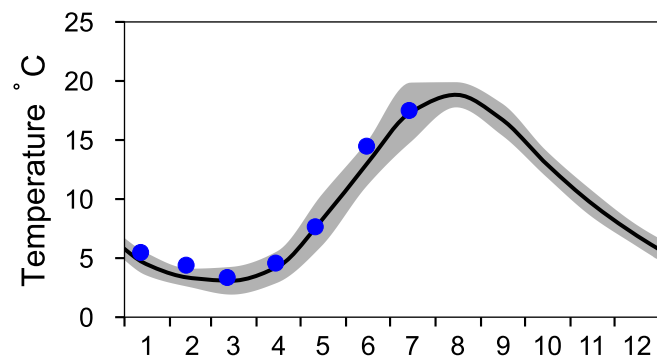
STATION BCS III-10 SURFACE WATER (0-10 m)

Annual Cycles

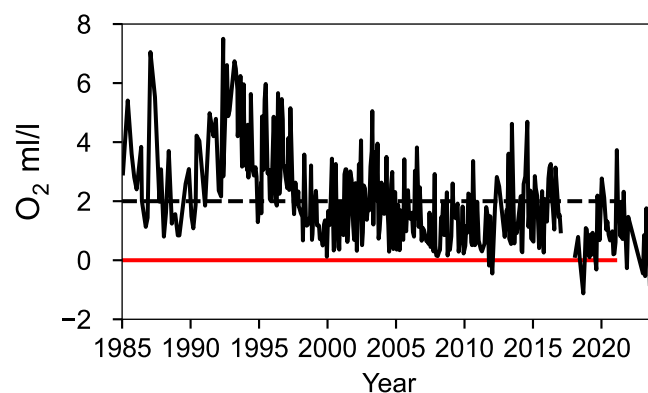
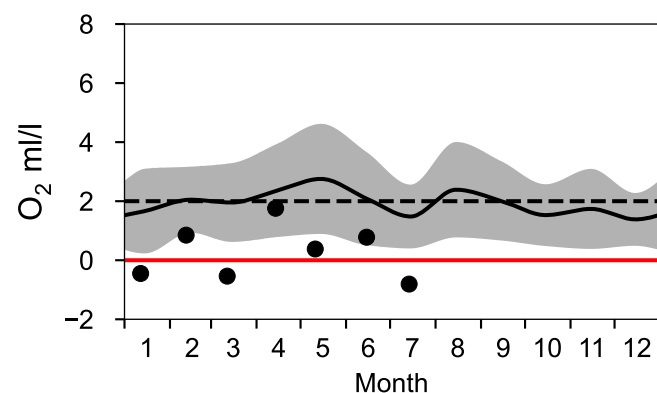
— Mean 2006-2020

■ St.Dev.

● 2023



OXYGEN IN BOTTOM WATER (depth >= 80 m)

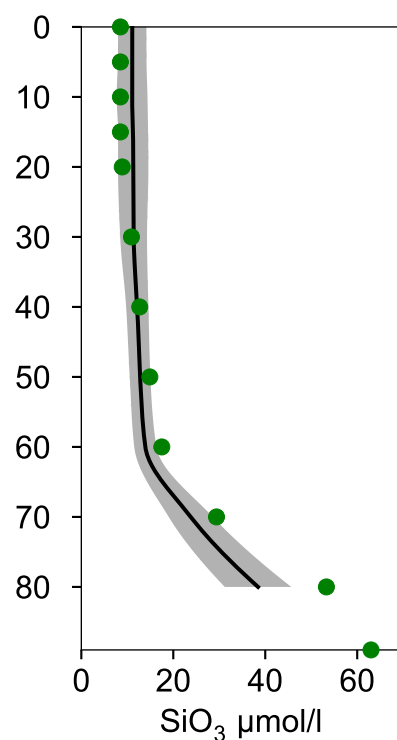
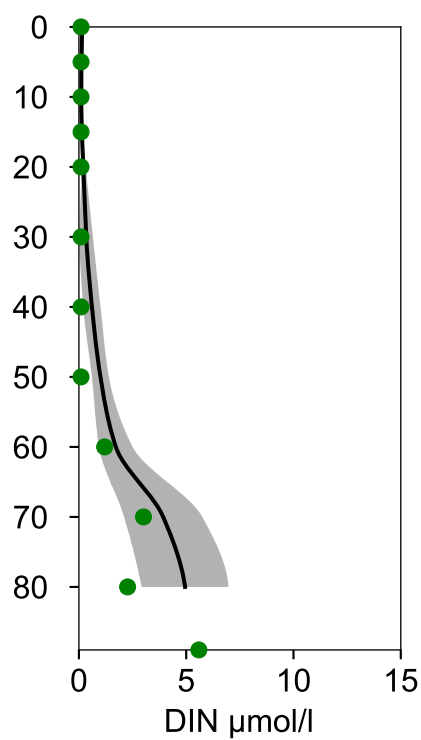
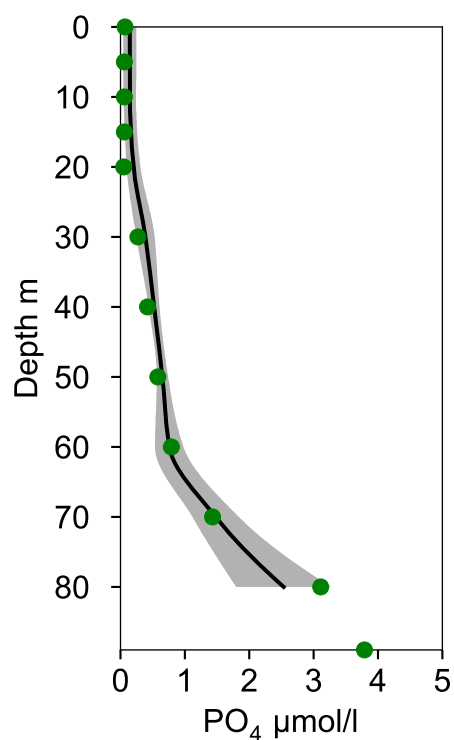
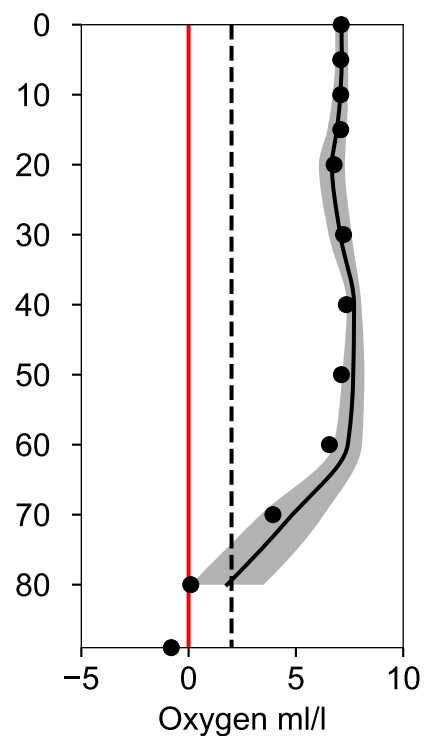
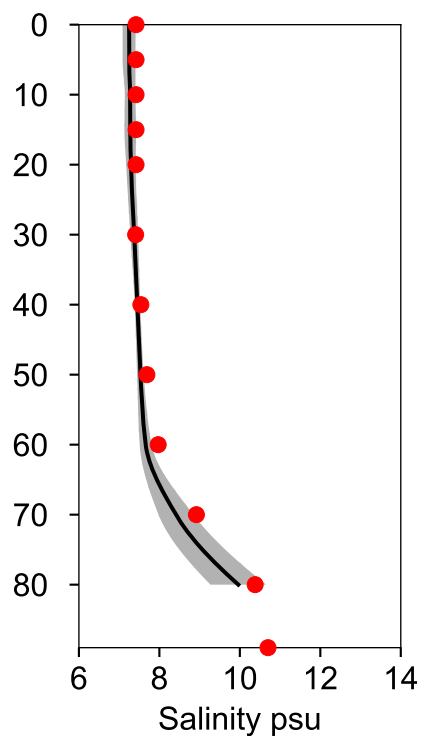
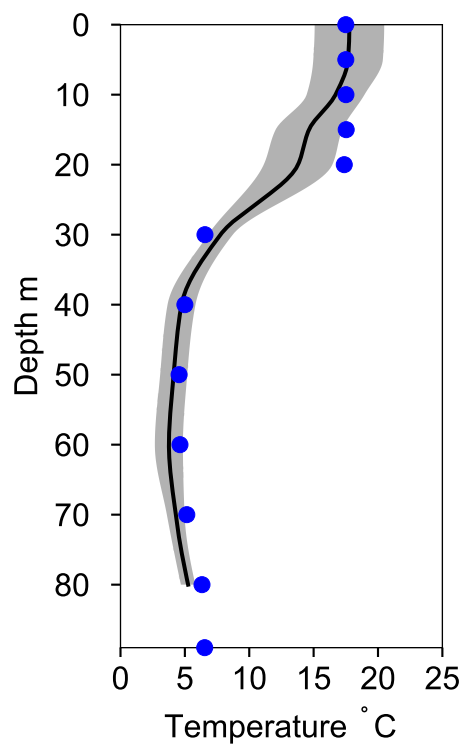


Vertical profiles BCS III-10 July

— Mean 2006-2020

■ St.Dev.

● 2023-07-14



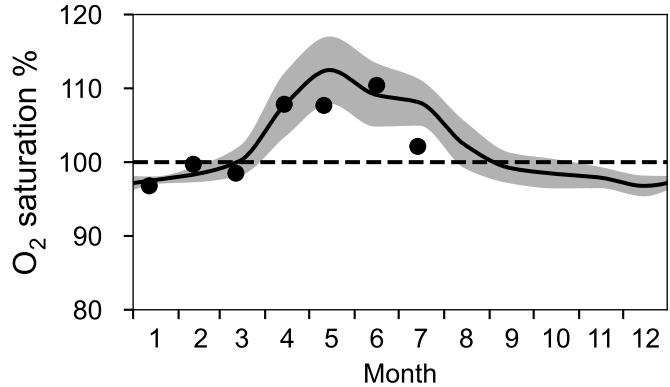
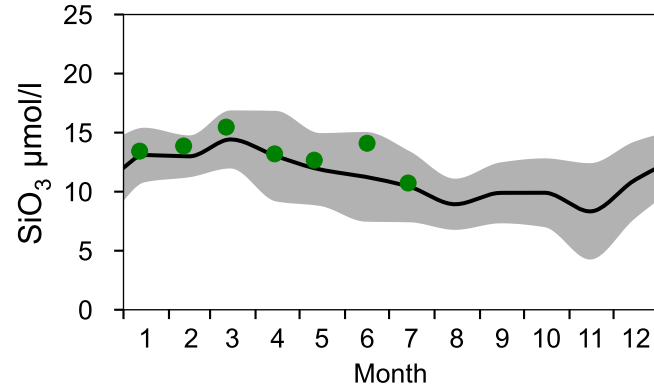
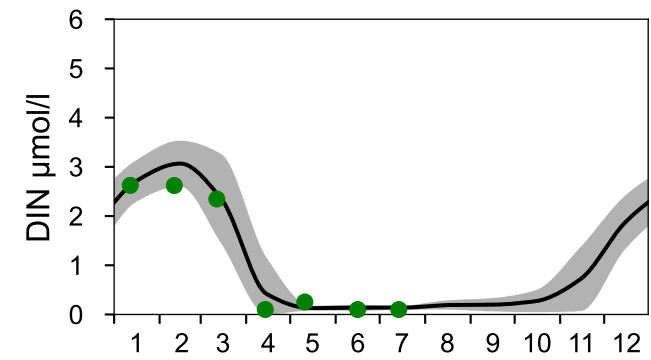
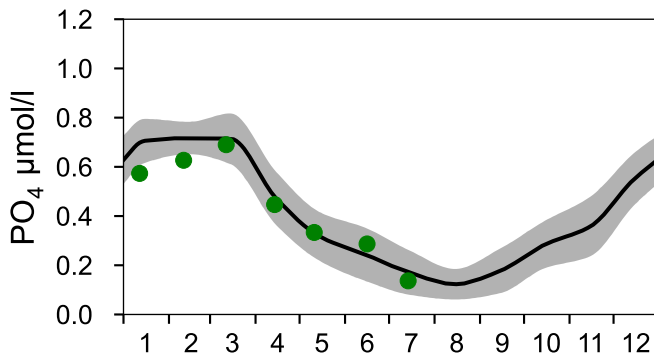
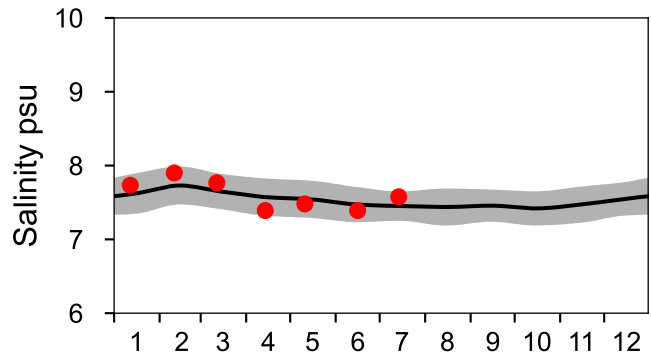
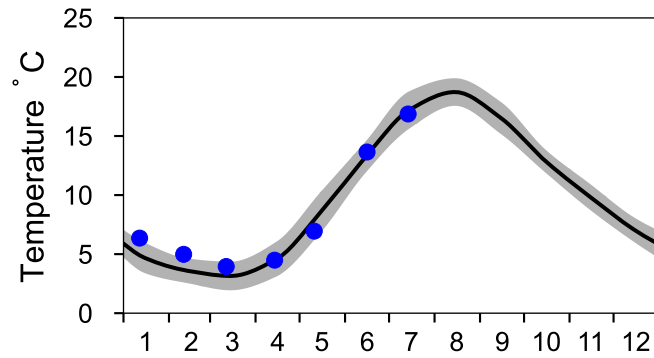
STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

Annual Cycles

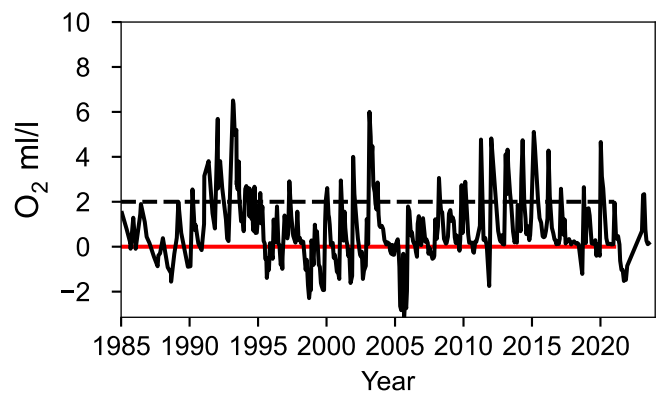
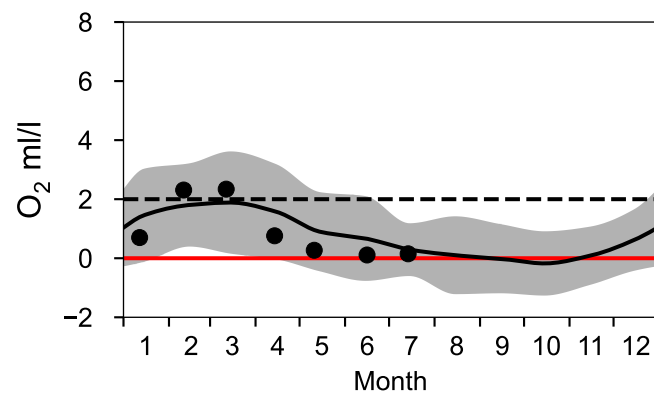
— Mean 2006-2020

■ St.Dev.

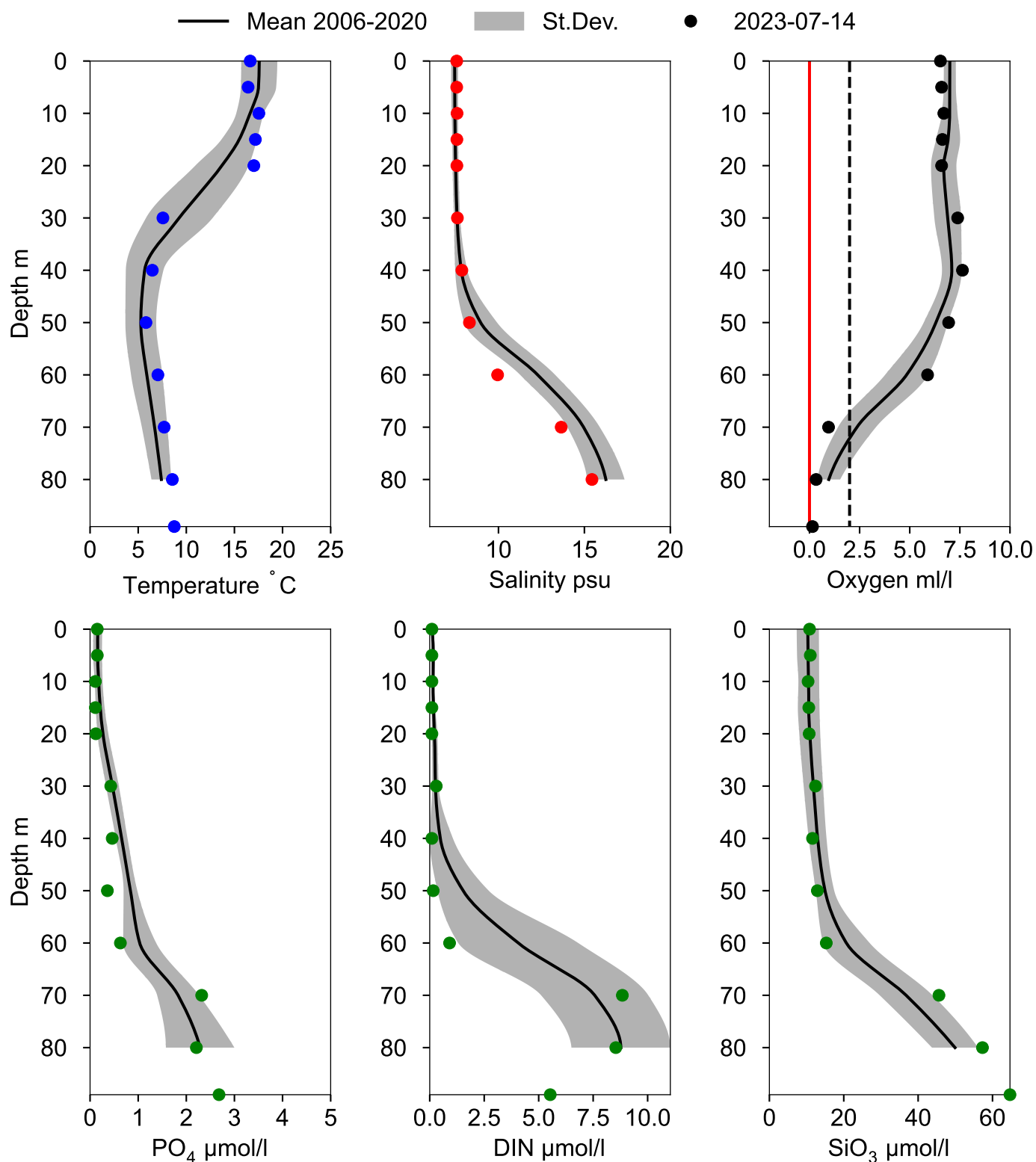
● 2023



OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles BY5 BORNHOLMSDJ July



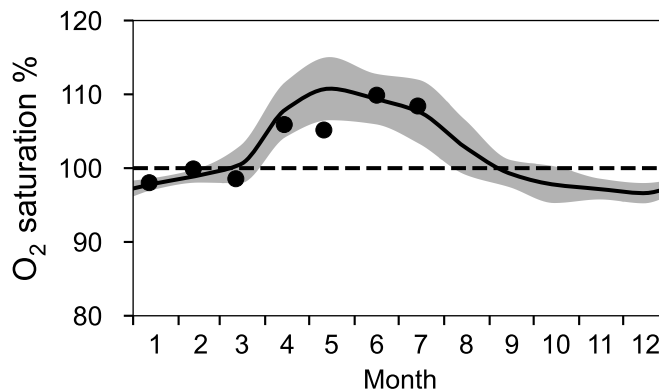
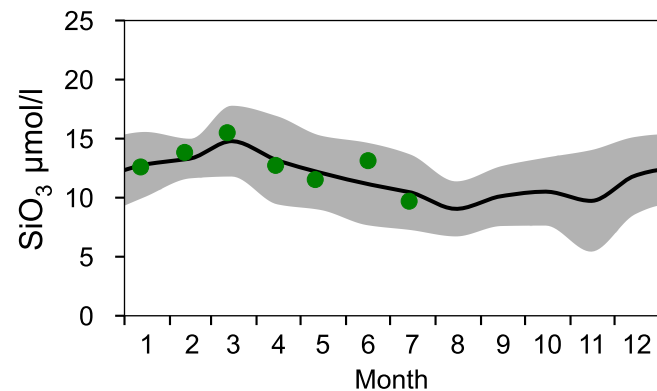
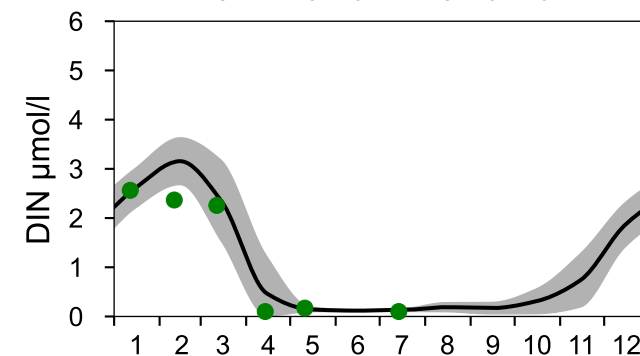
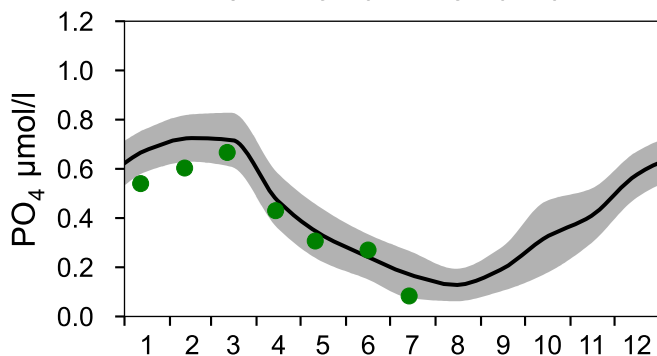
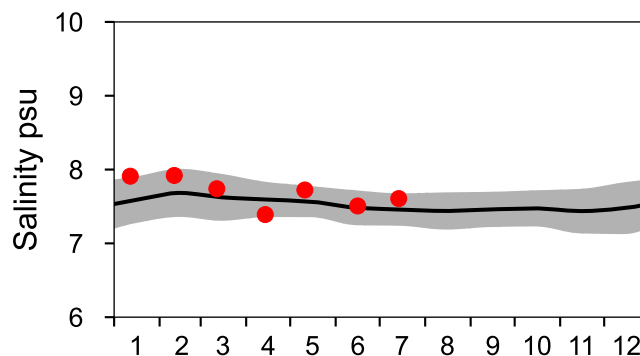
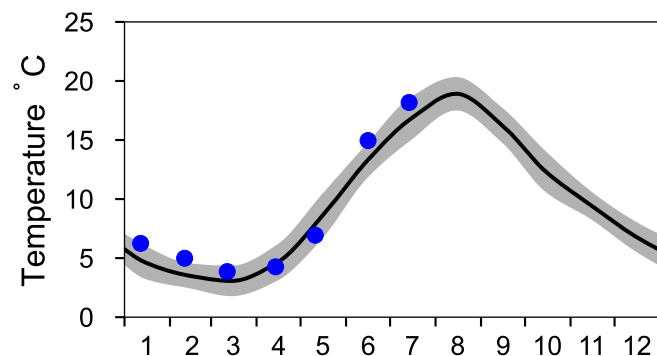
STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

Annual Cycles

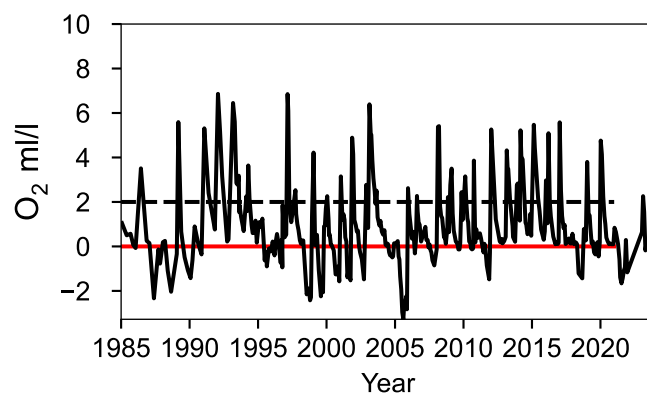
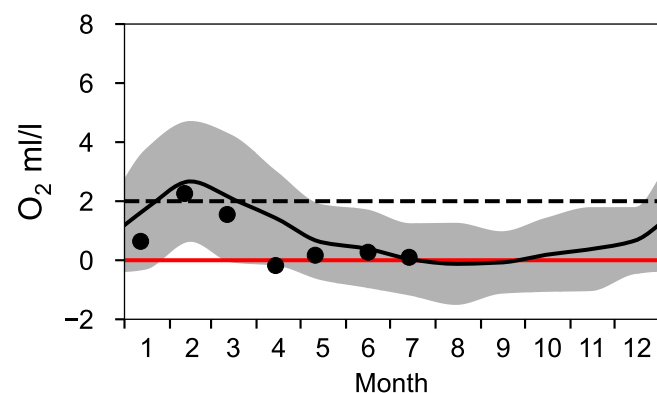
— Mean 2006-2020

■ St.Dev.

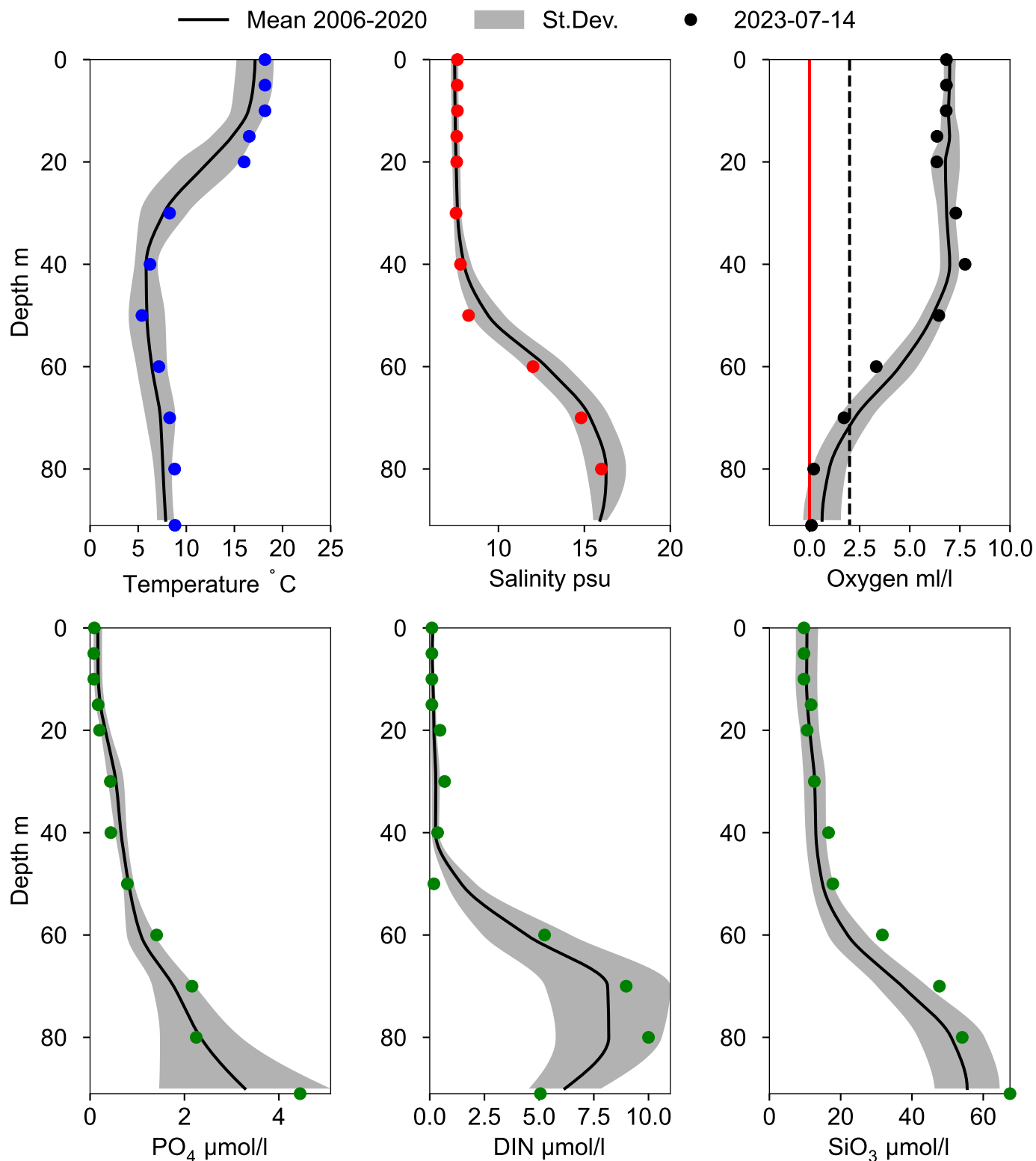
● 2023



OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles BY4 CHRISTIANSÖ July



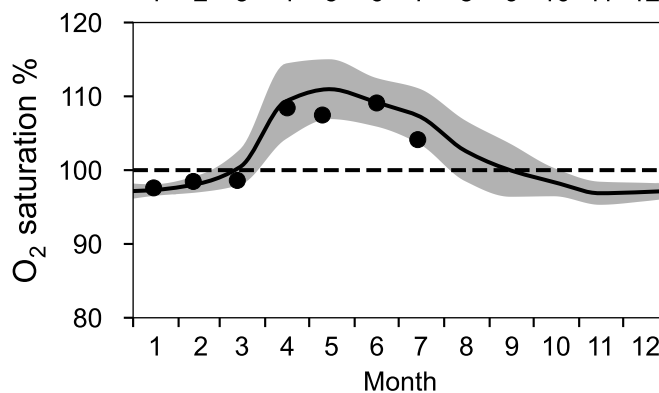
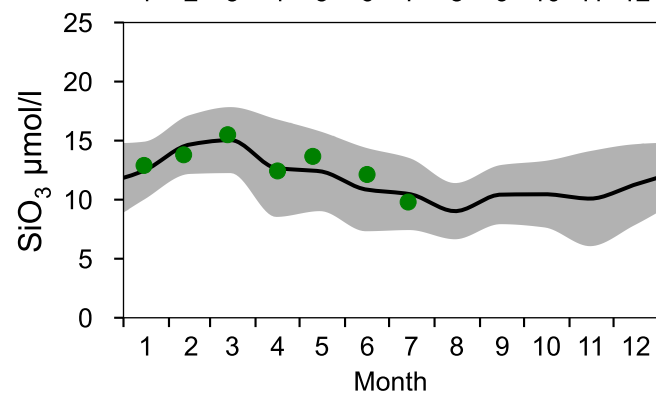
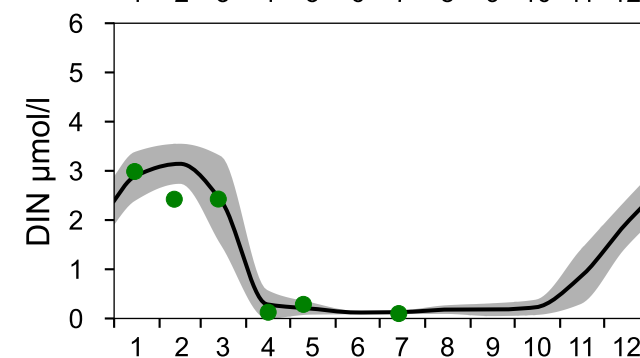
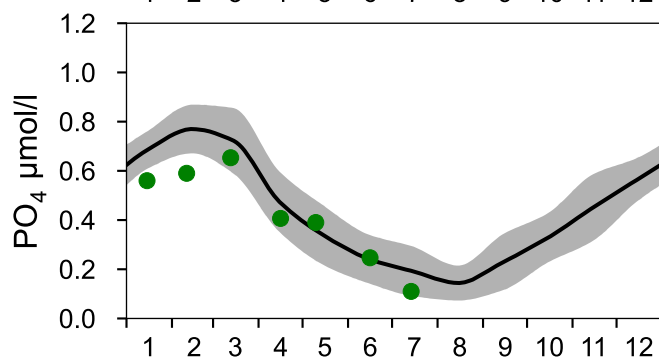
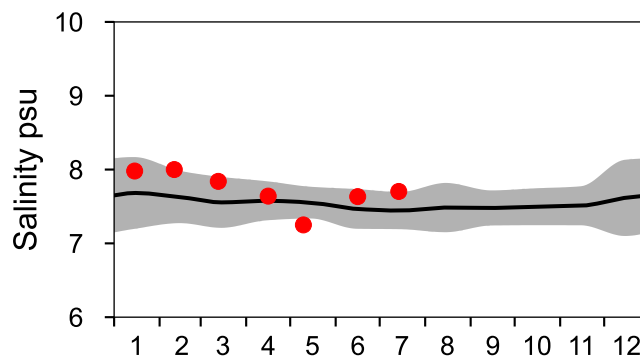
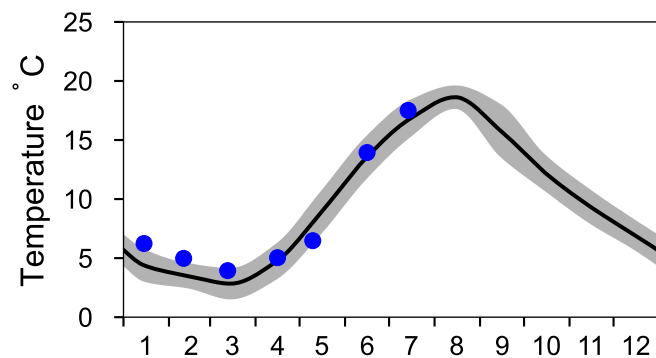
STATION HANÖBUKTEN SURFACE WATER (0-10 m)

Annual Cycles

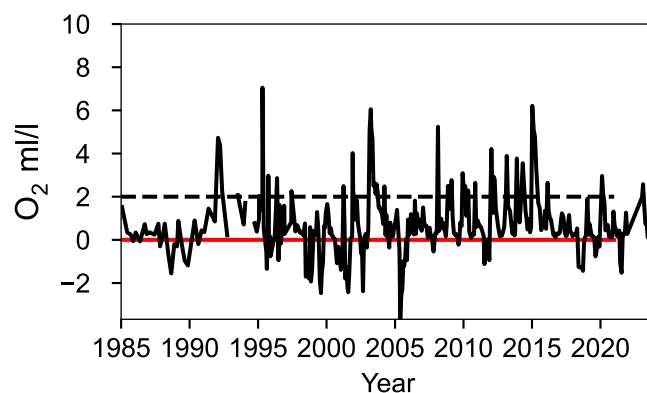
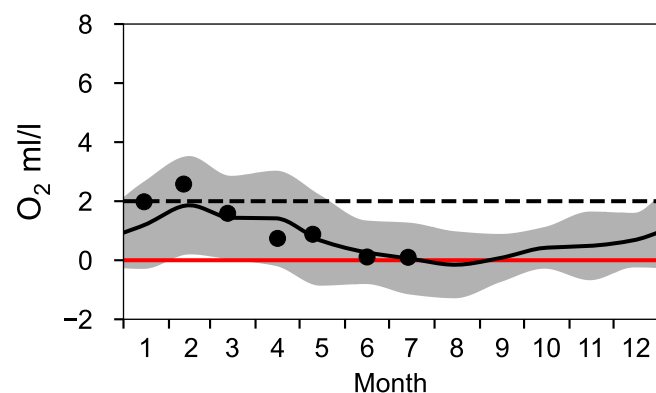
— Mean 2006-2020

■ St.Dev.

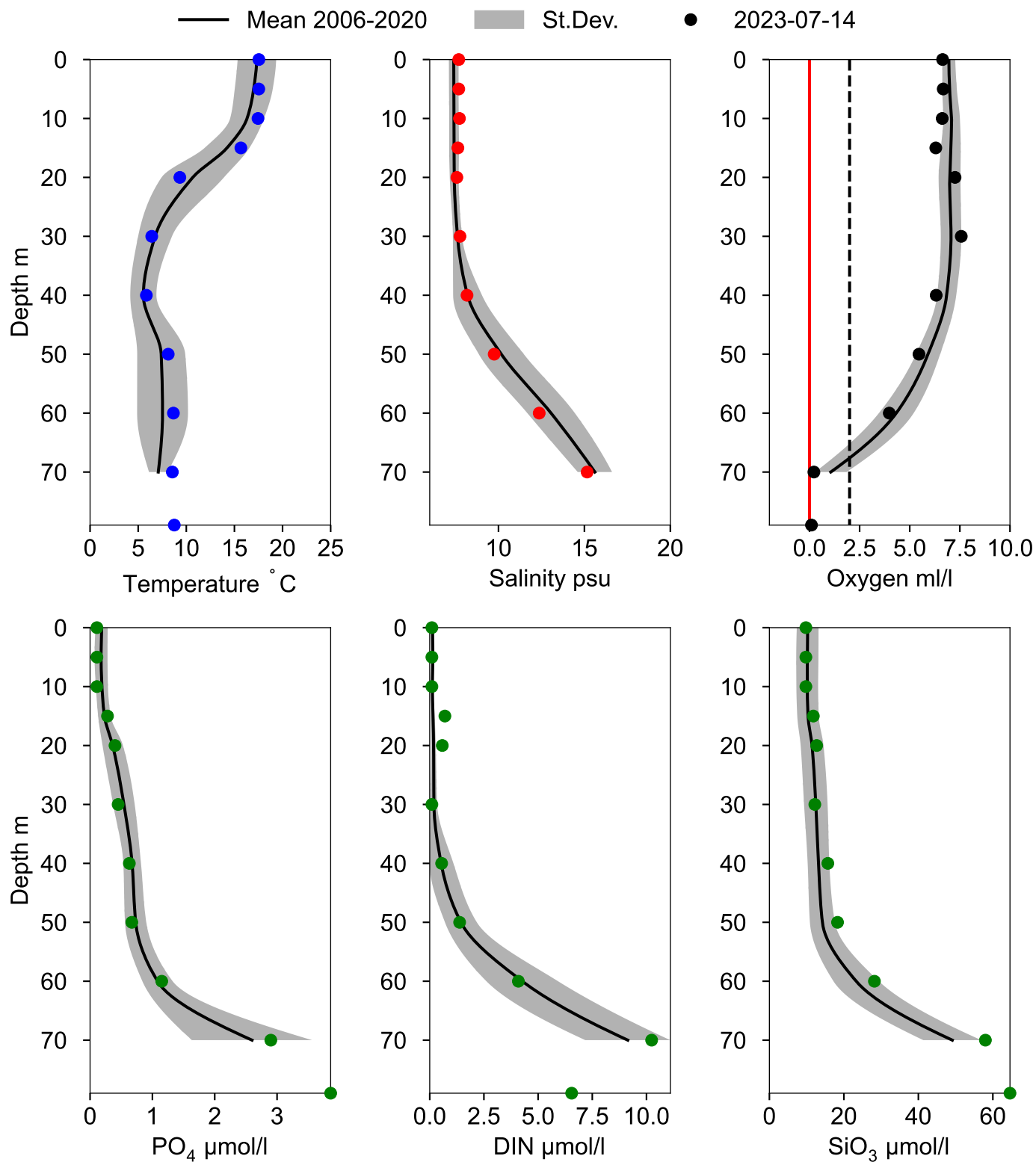
● 2023



OXYGEN IN BOTTOM WATER (depth >= 70 m)



Vertical profiles HANÖBUKTEN July



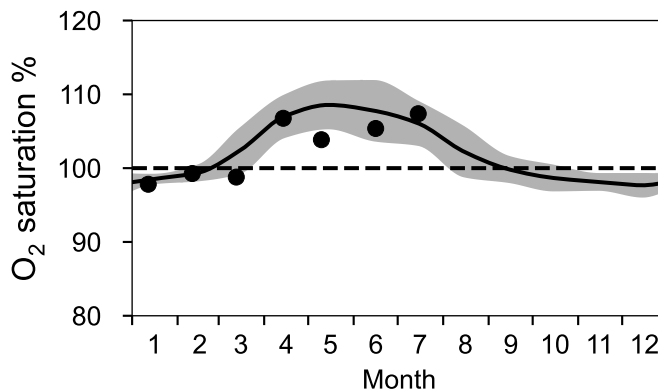
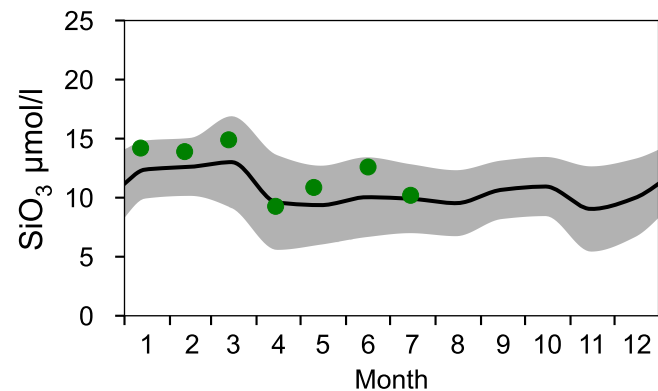
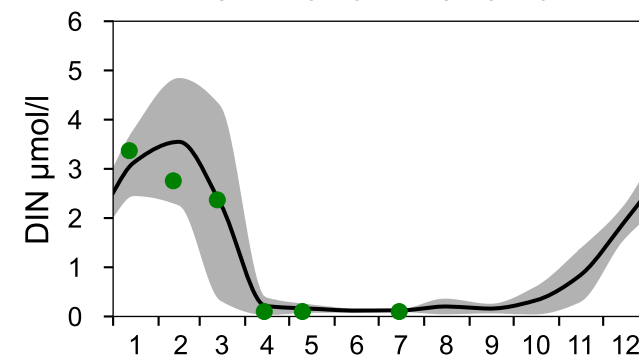
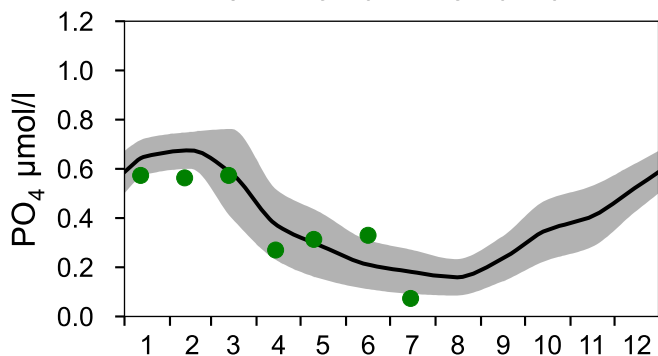
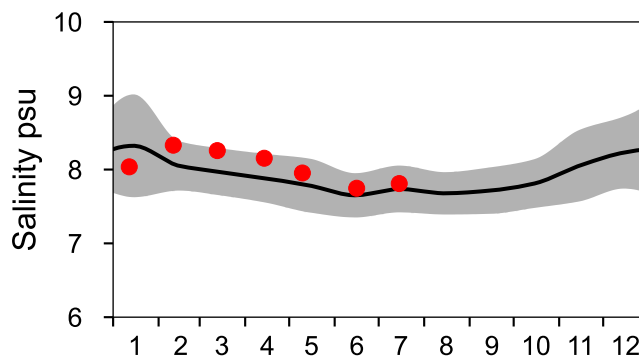
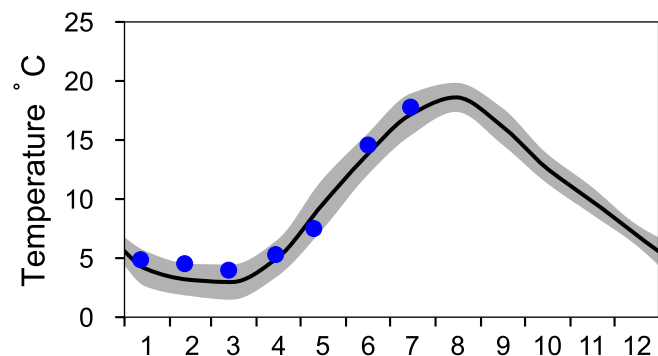
STATION BY2 ARKONA SURFACE WATER (0-10 m)

Annual Cycles

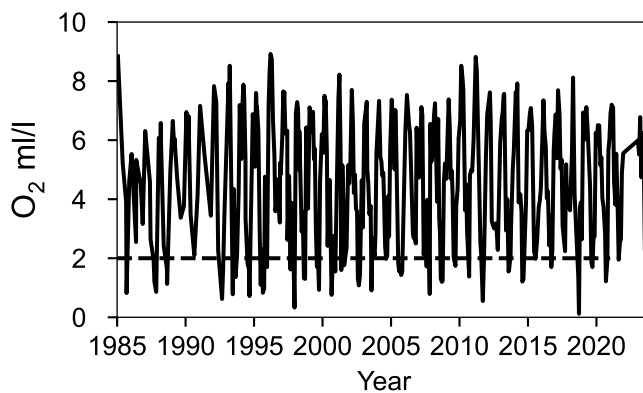
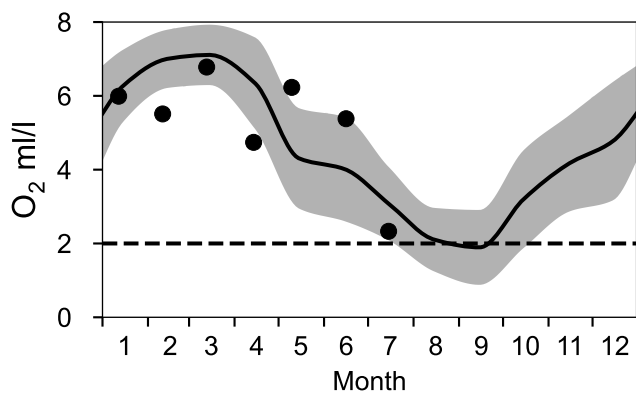
— Mean 2006-2020

■ St.Dev.

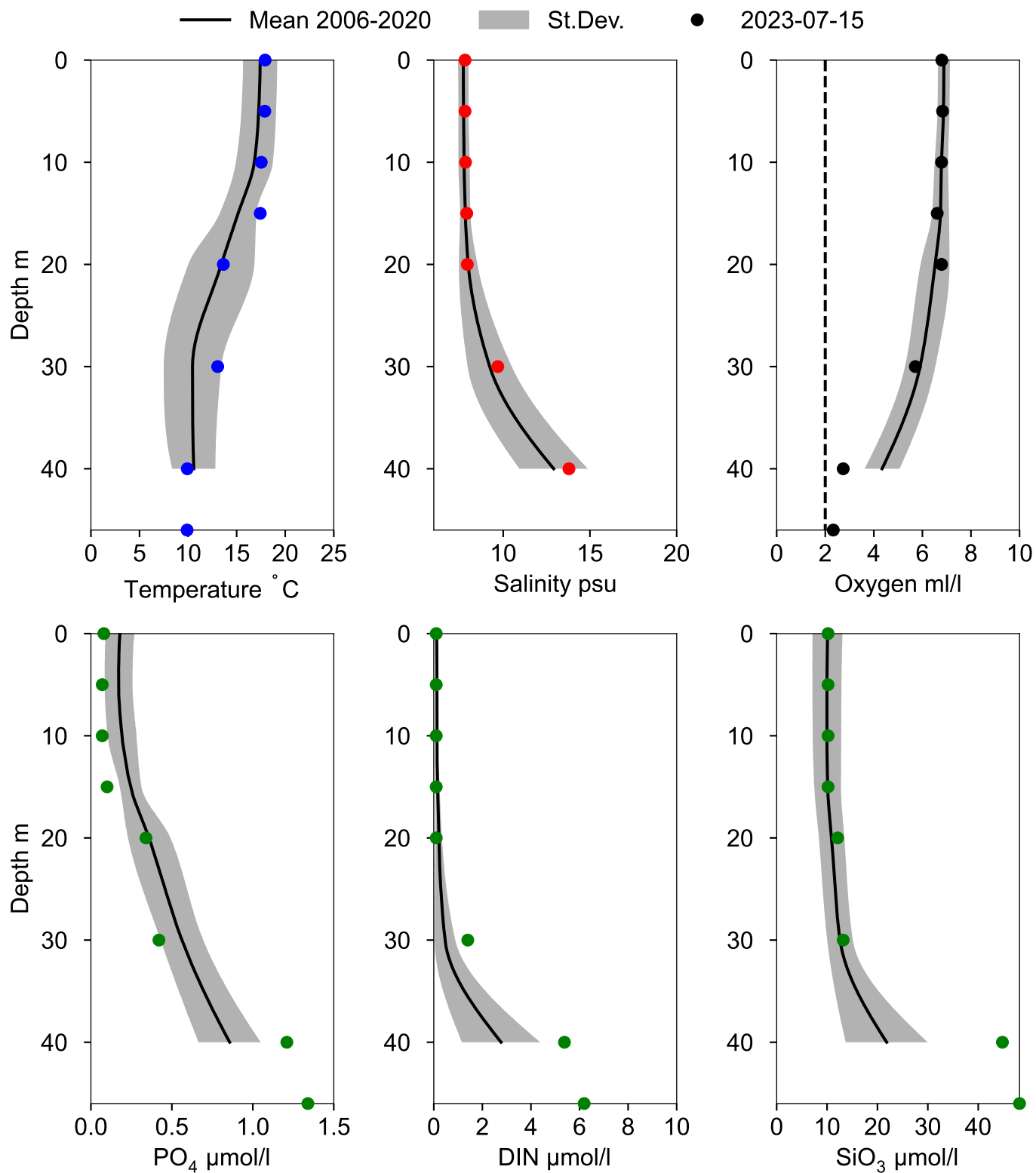
● 2023



OXYGEN IN BOTTOM WATER (depth >= 40 m)



Vertical profiles BY2 ARKONA July



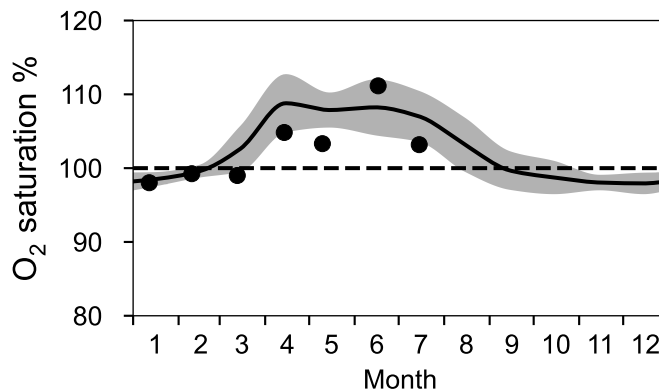
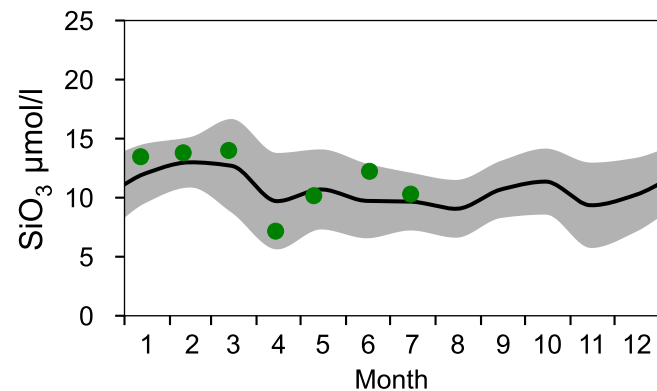
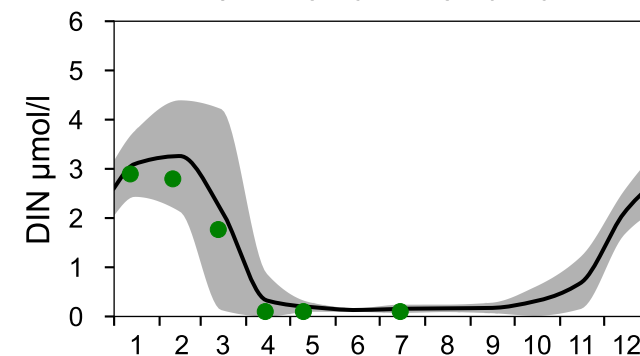
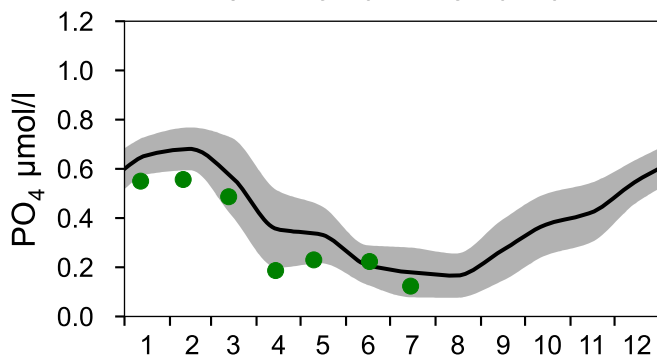
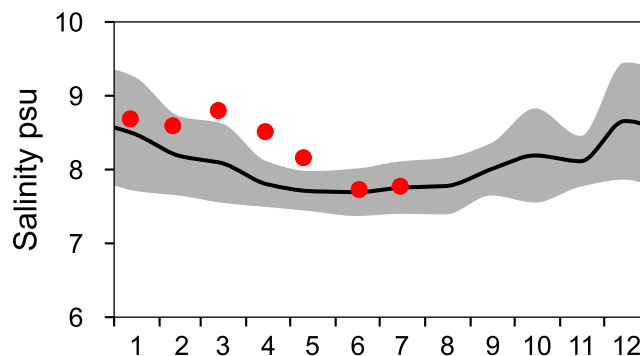
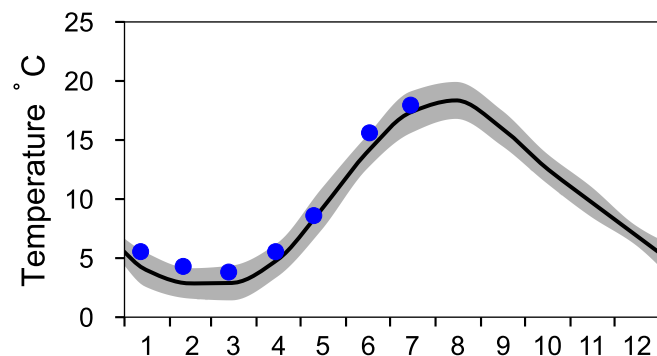
STATION BY1 SURFACE WATER (0-10 m)

Annual Cycles

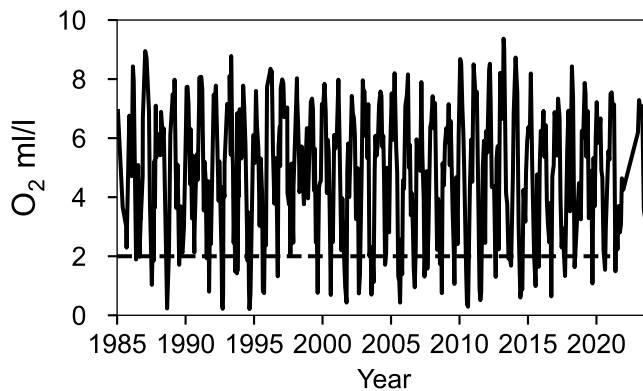
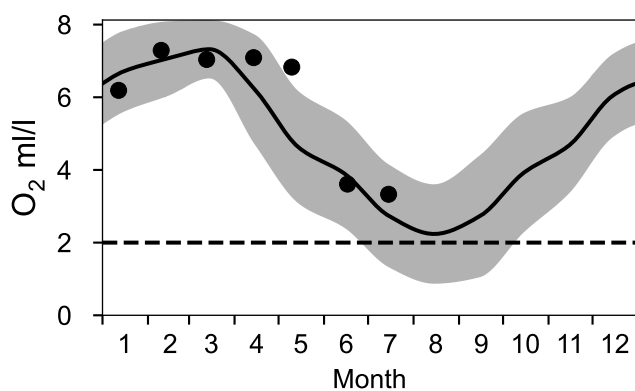
— Mean 2006-2020

■ St.Dev.

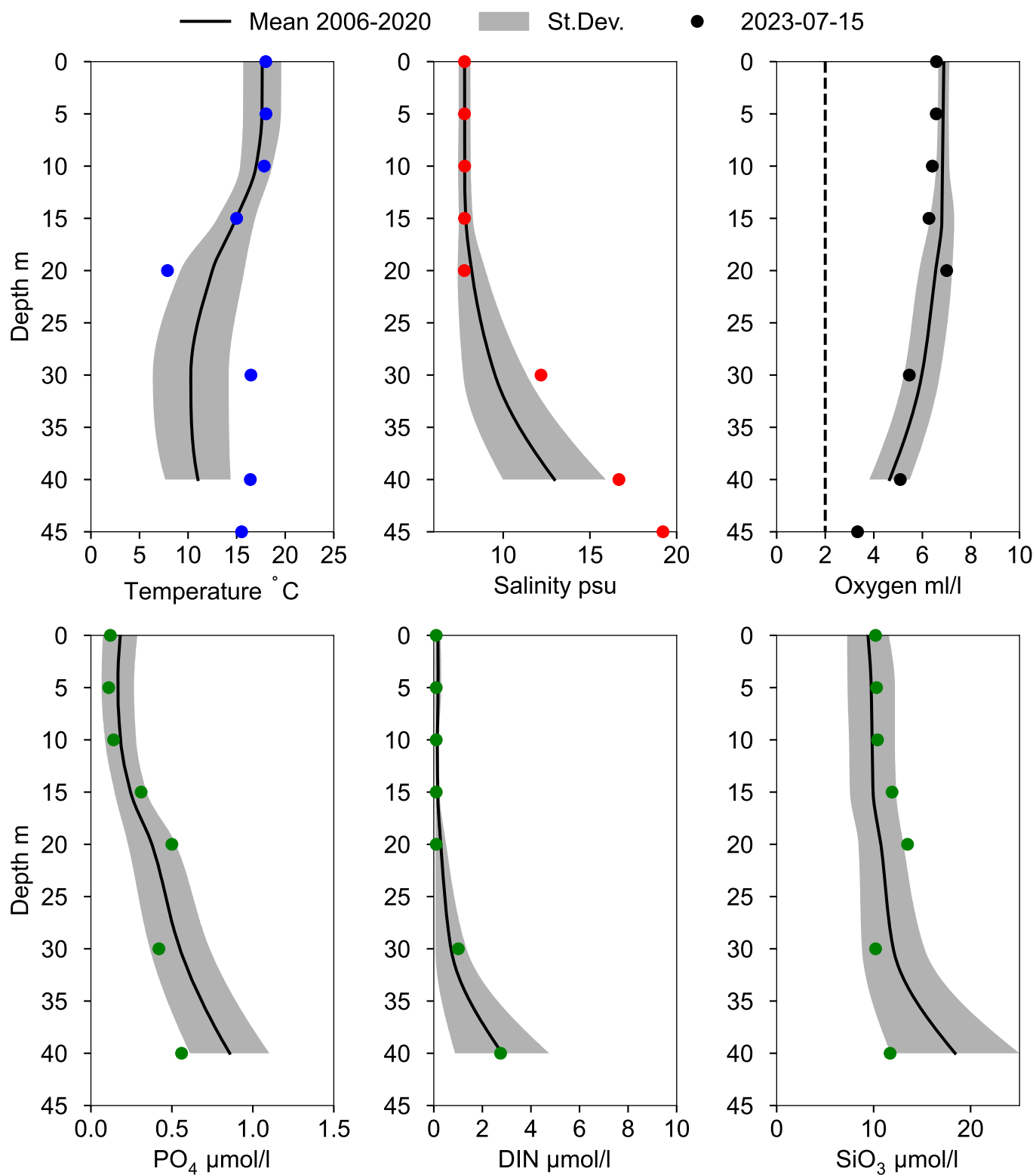
● 2023



OXYGEN IN BOTTOM WATER (depth >= 39 m)



Vertical profiles BY1 July



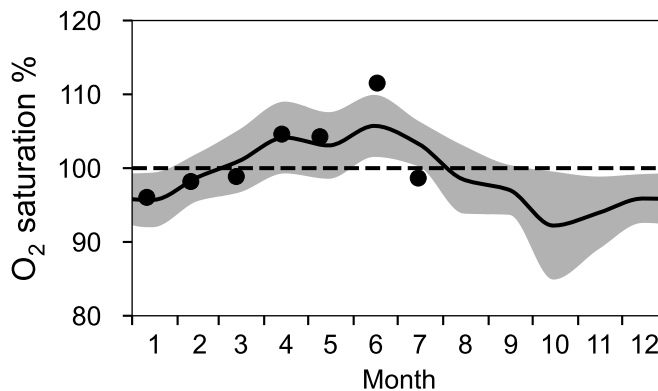
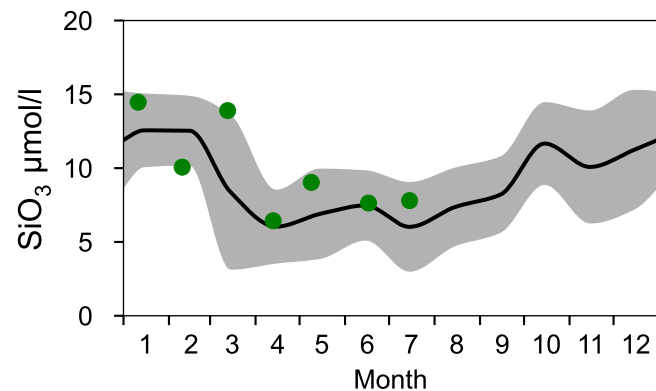
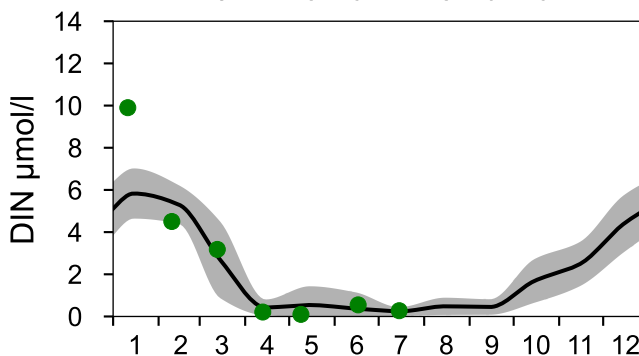
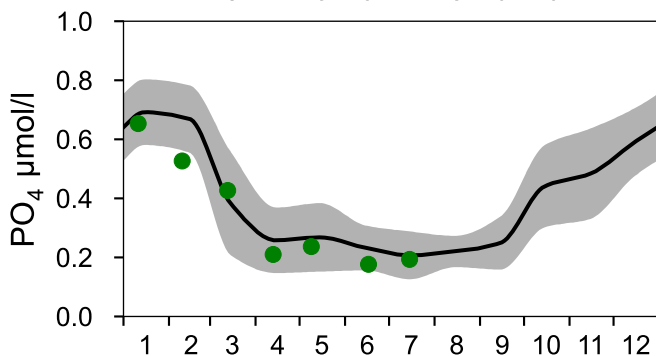
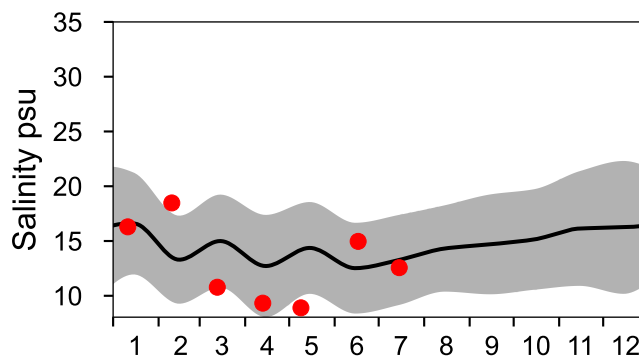
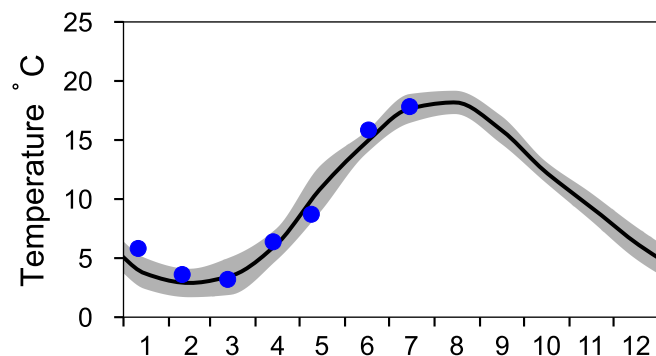
STATION W LANDSKRONA SURFACE WATER (0-10 m)

Annual Cycles

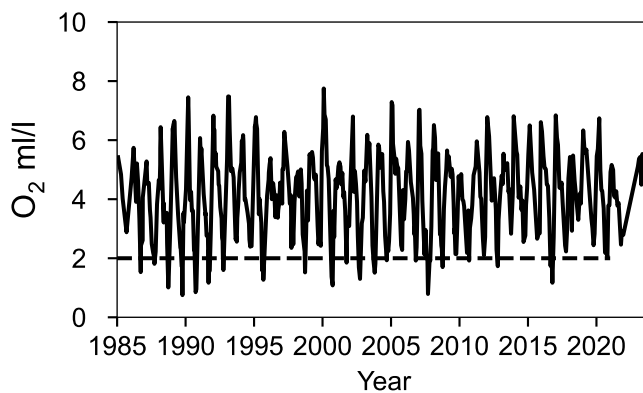
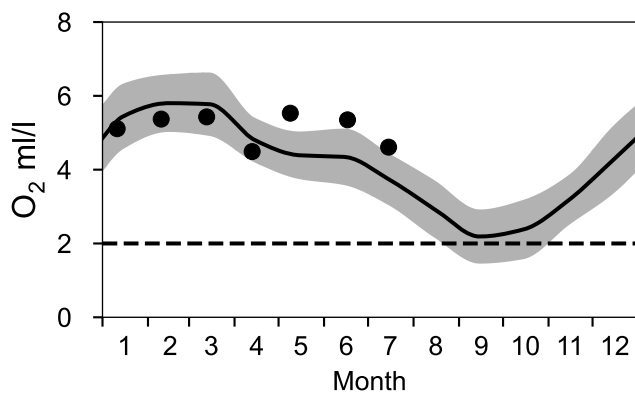
— Mean 2006-2020

■ St.Dev.

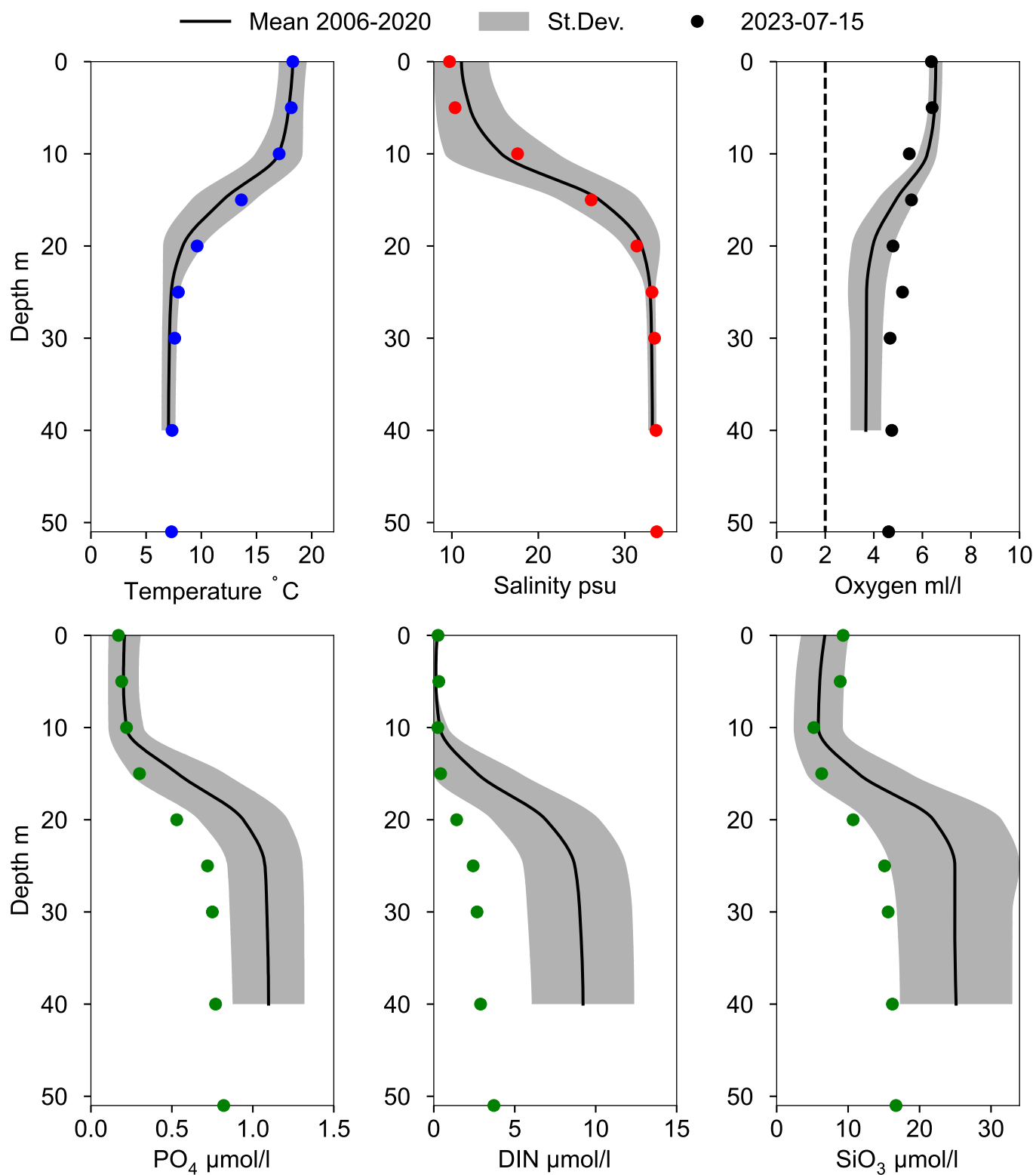
● 2023



OXYGEN IN BOTTOM WATER (depth >= 40 m)



Vertical profiles W LANDSKRONA July



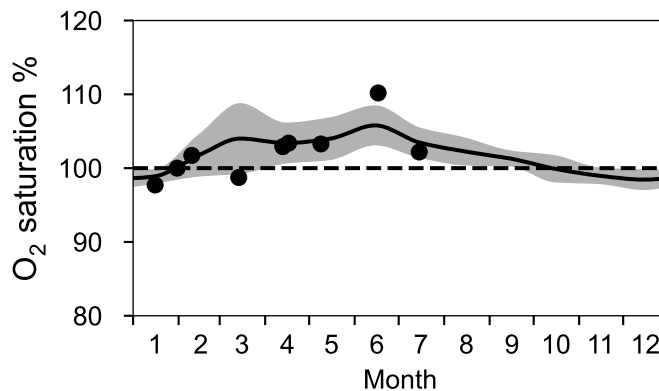
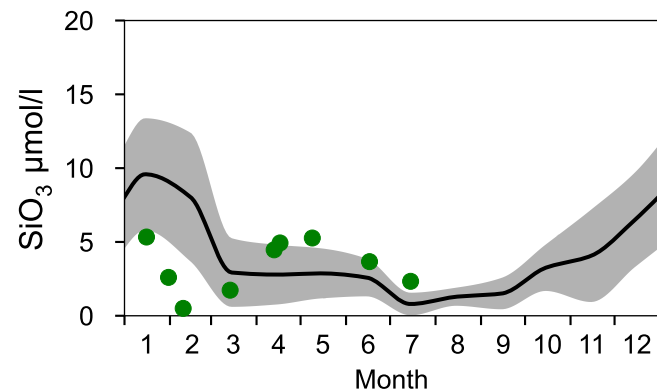
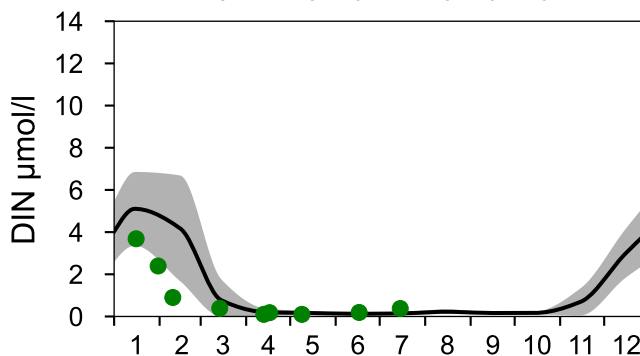
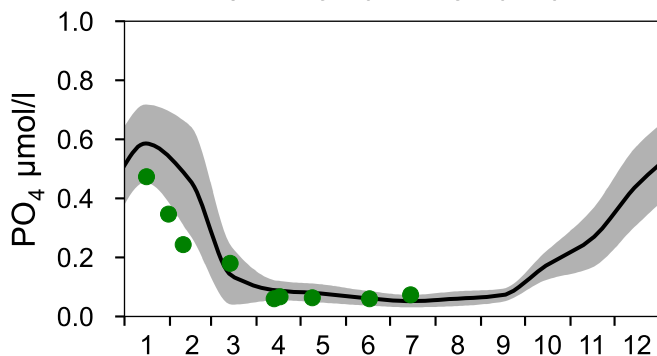
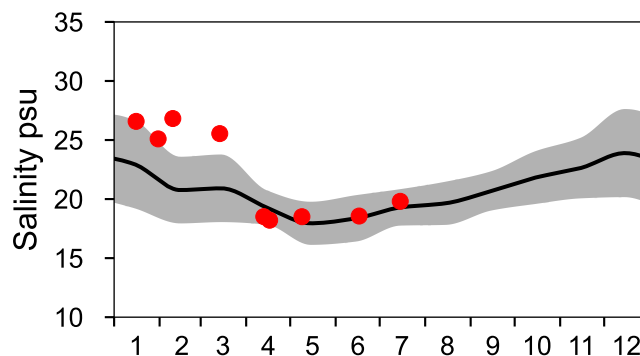
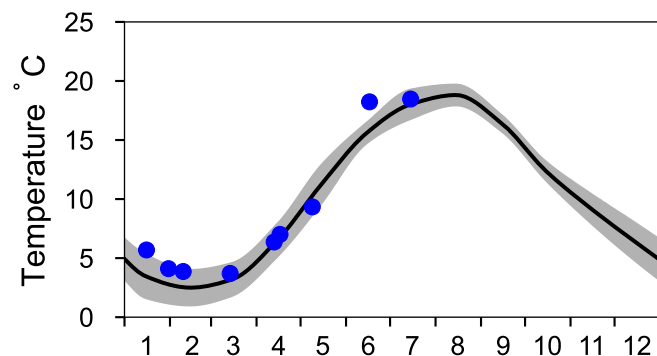
STATION ANHOLT E SURFACE WATER (0-10 m)

Annual Cycles

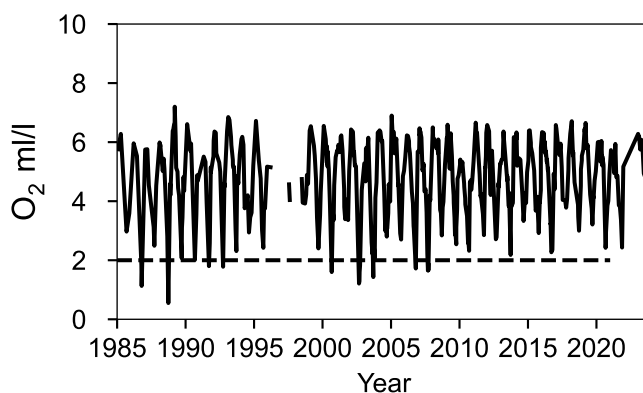
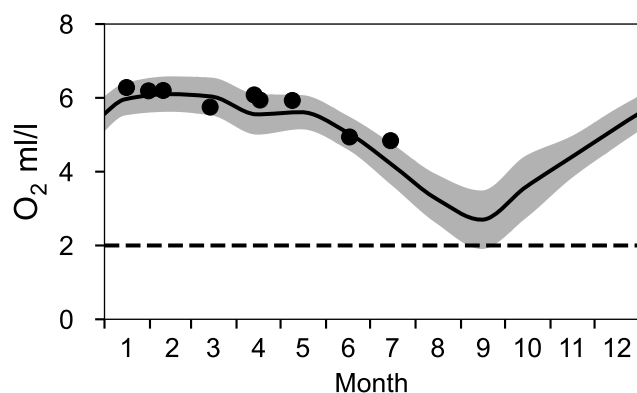
— Mean 2006-2020

■ St.Dev.

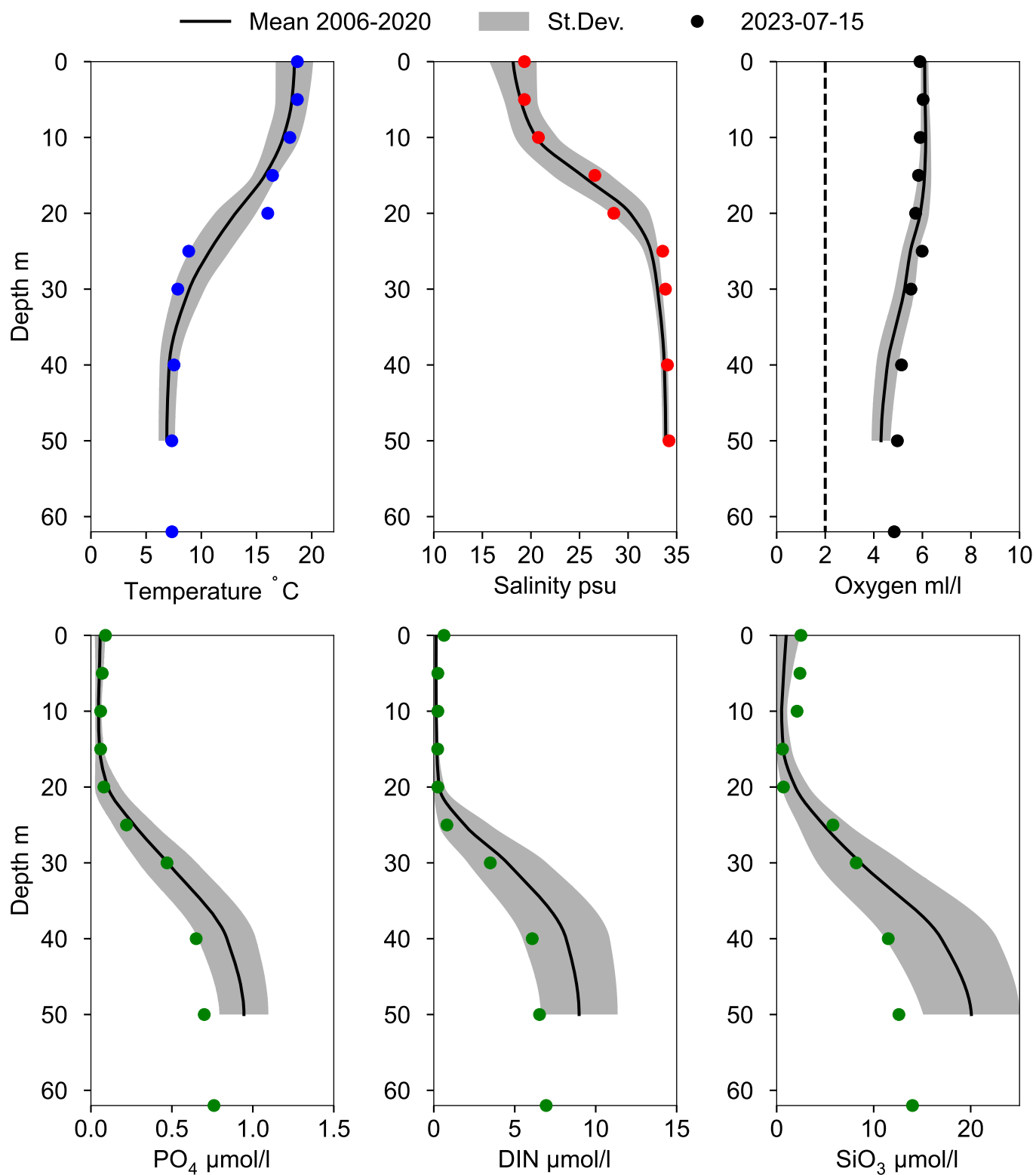
● 2023



OXYGEN IN BOTTOM WATER (depth >= 52 m)



Vertical profiles ANHOLT E July



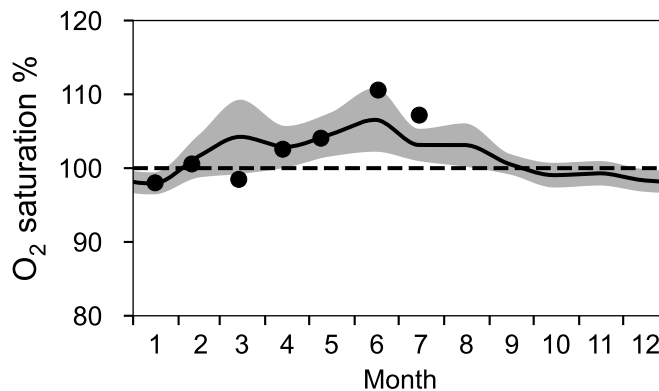
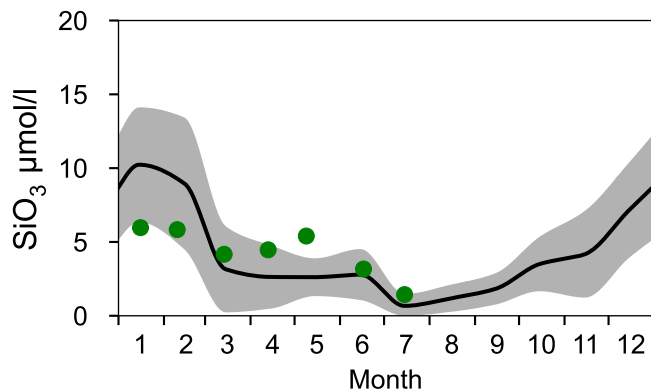
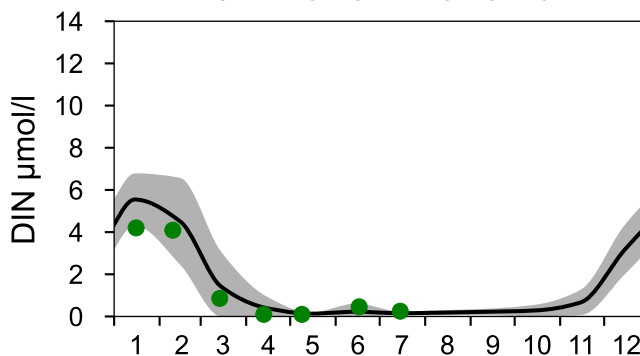
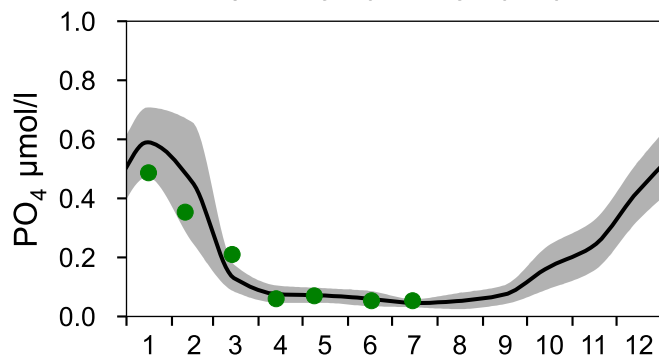
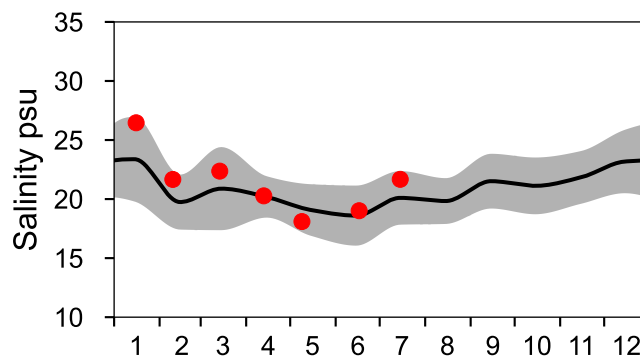
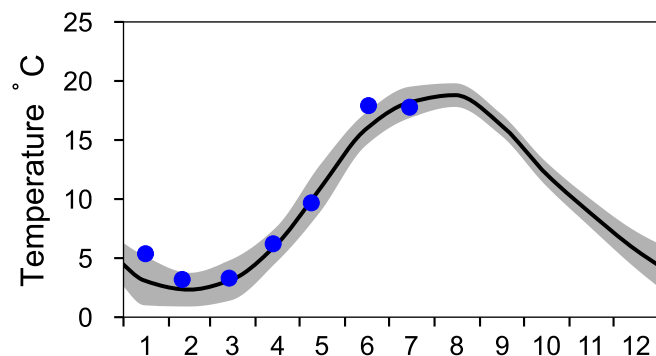
STATION N14 FALKENBERG SURFACE WATER (0-10 m)

Annual Cycles

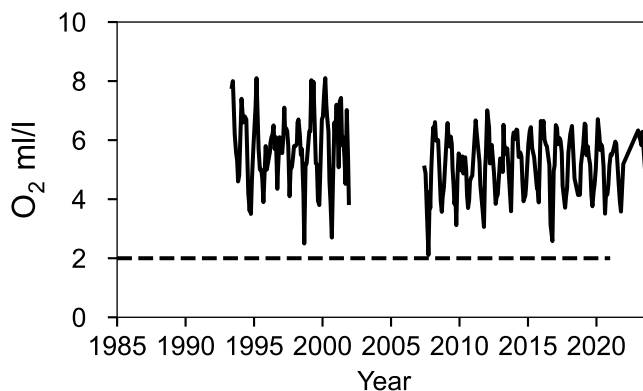
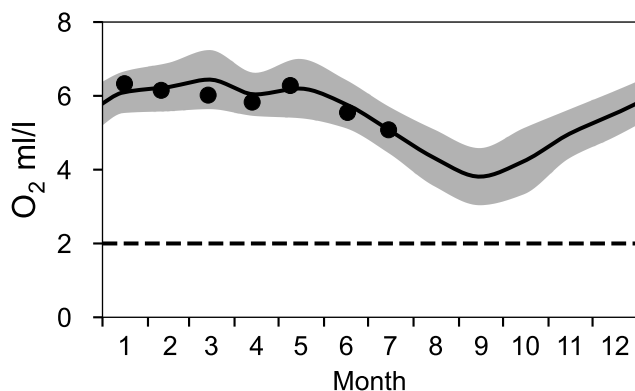
— Mean 2006-2020

■ St.Dev.

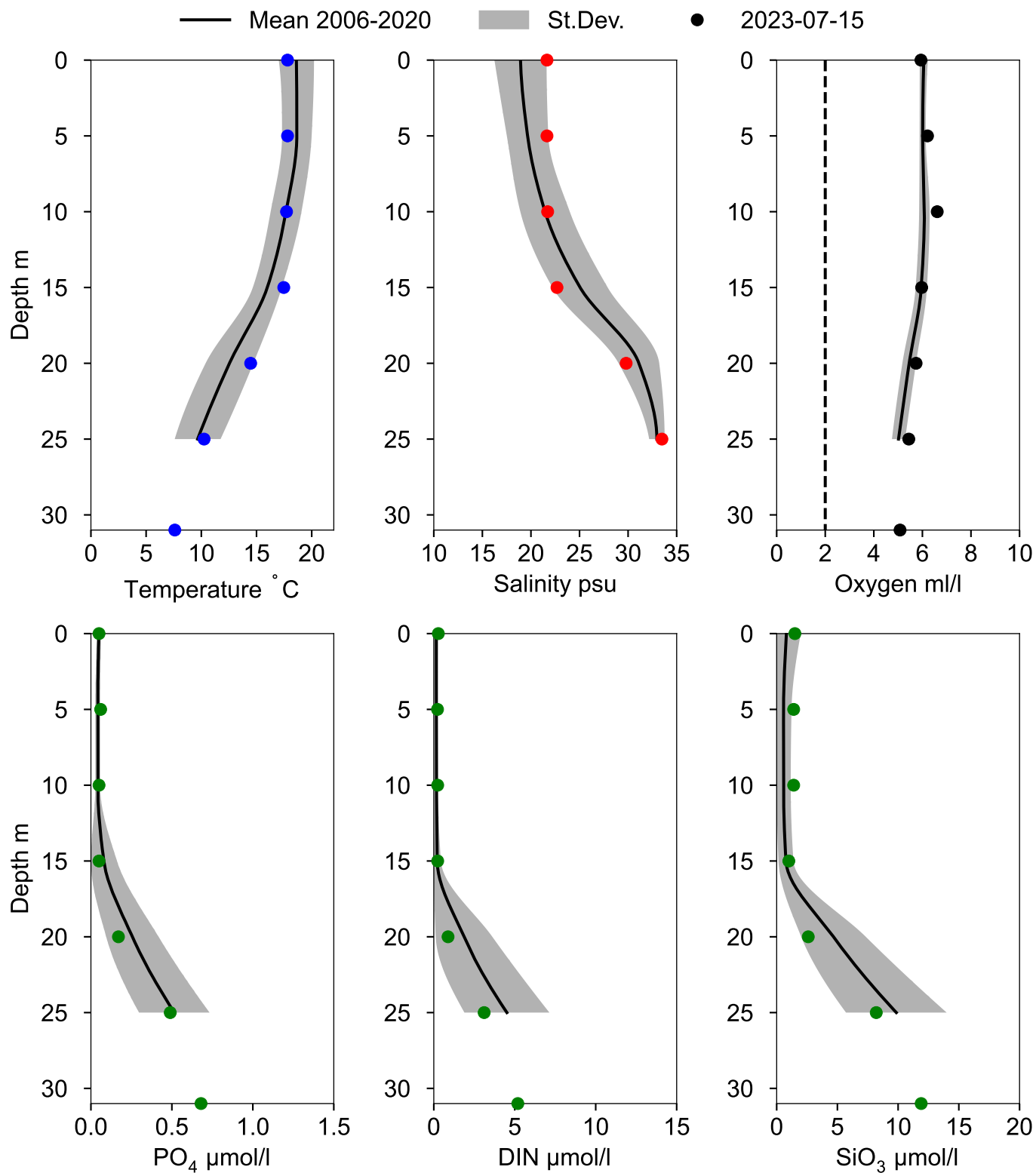
● 2023



OXYGEN IN BOTTOM WATER (depth >= 25 m)



Vertical profiles N14 FALKENBERG July



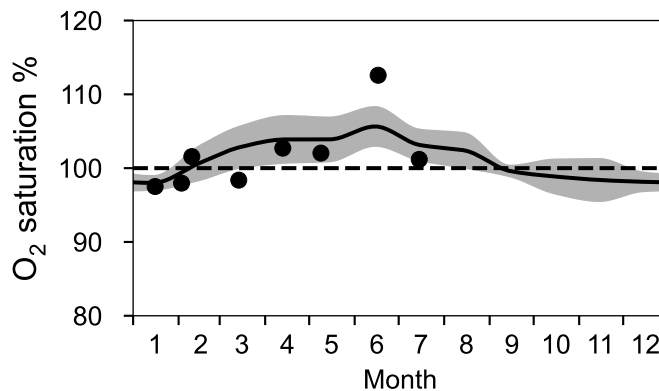
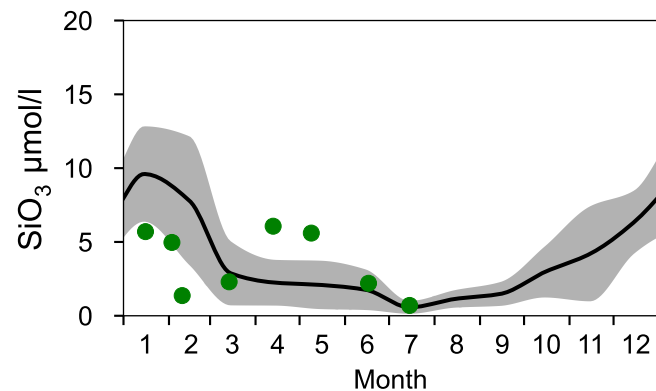
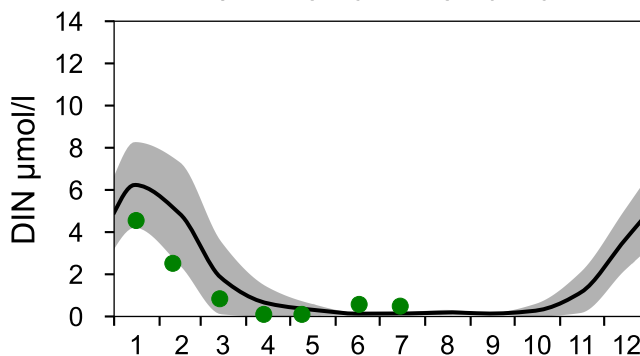
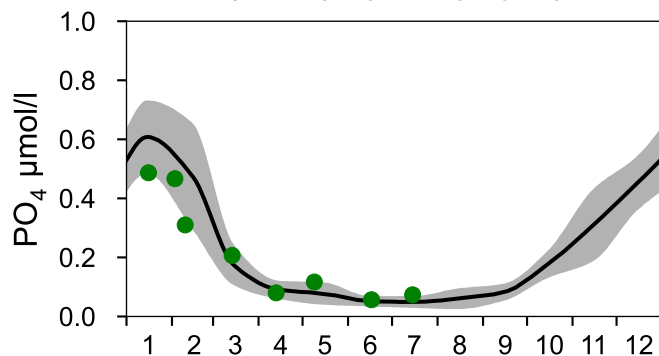
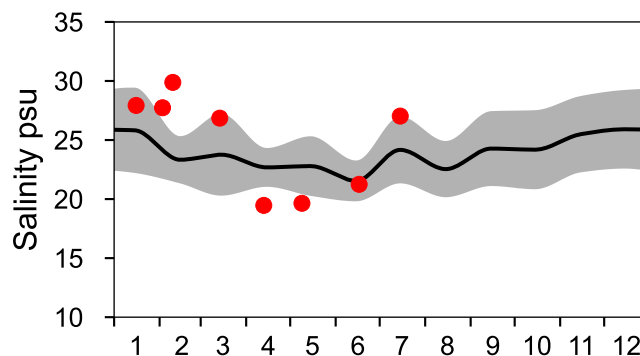
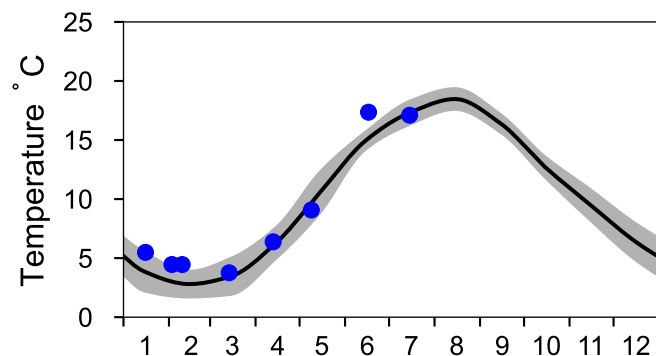
STATION FLADEN SURFACE WATER (0-10 m)

Annual Cycles

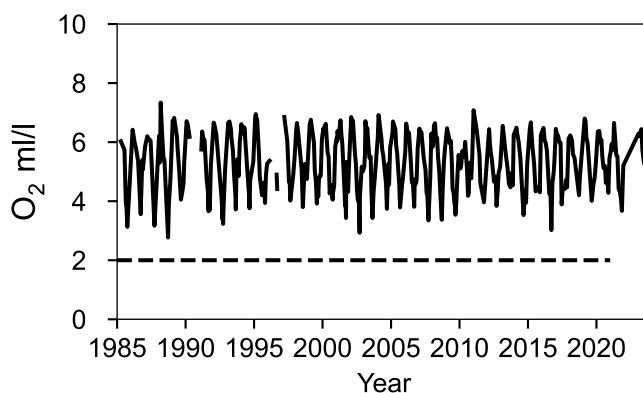
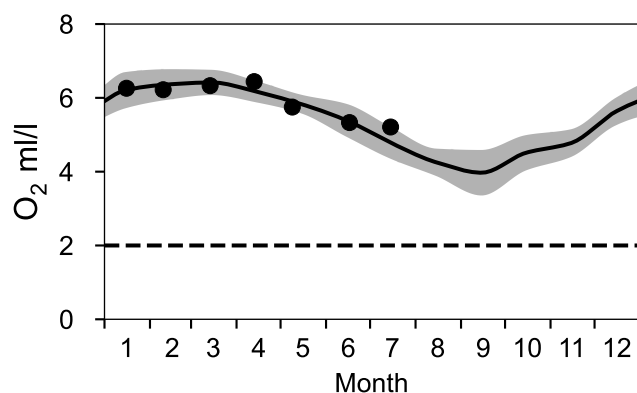
— Mean 2006-2020

■ St.Dev.

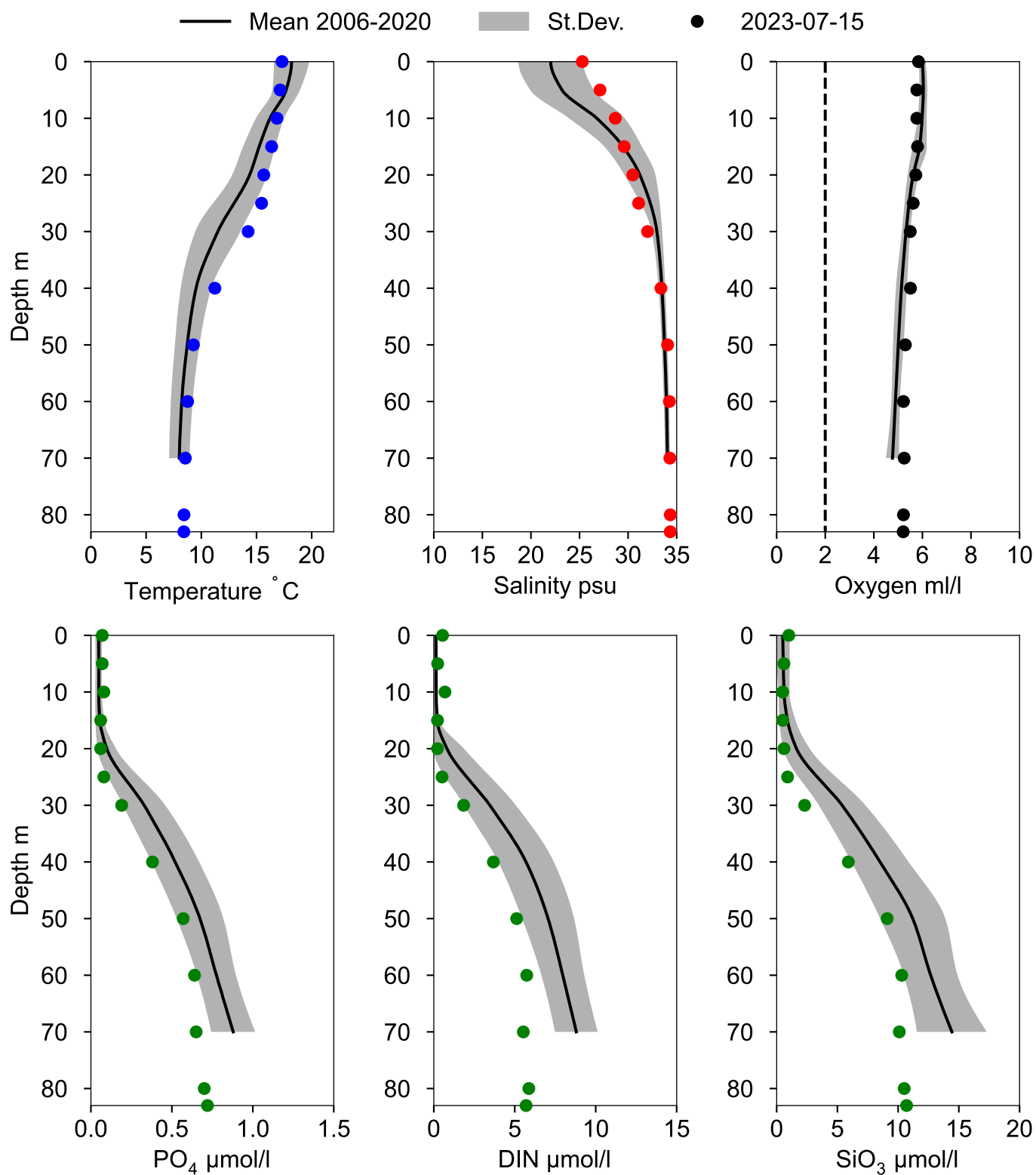
● 2023



OXYGEN IN BOTTOM WATER (depth >= 74 m)



Vertical profiles FLADEN July



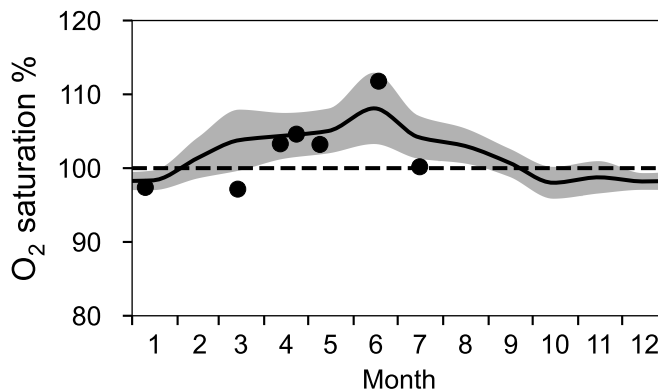
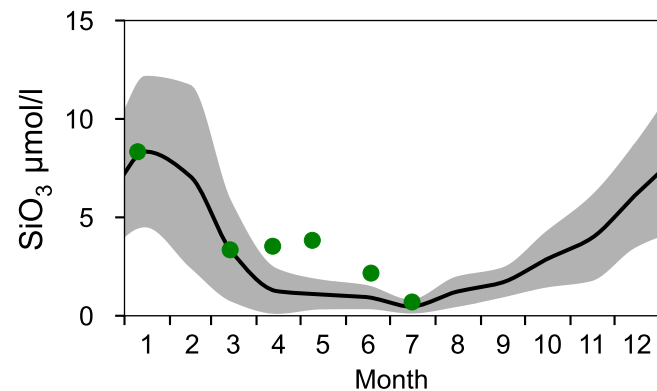
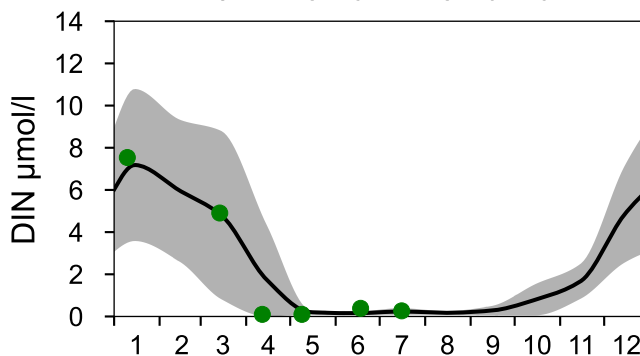
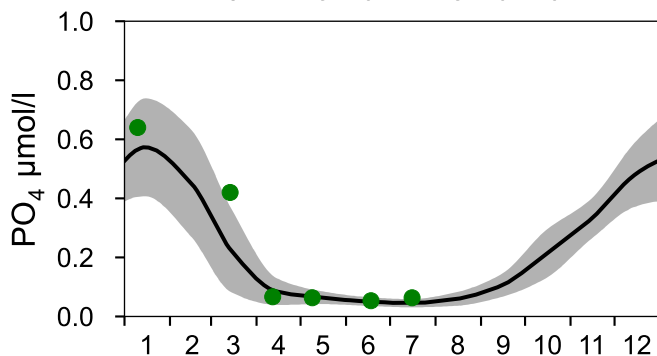
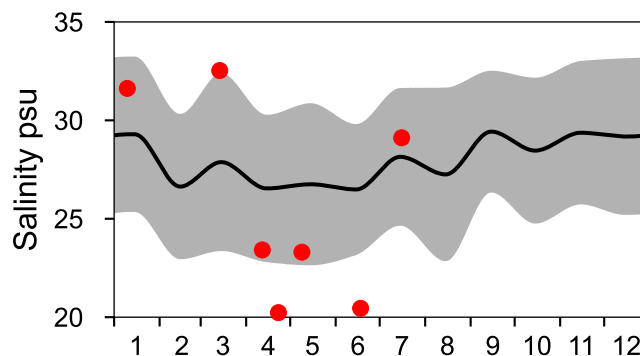
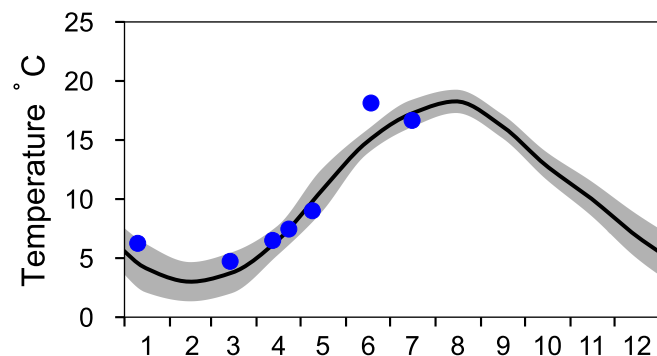
STATION P2 SURFACE WATER (0-10 m)

Annual Cycles

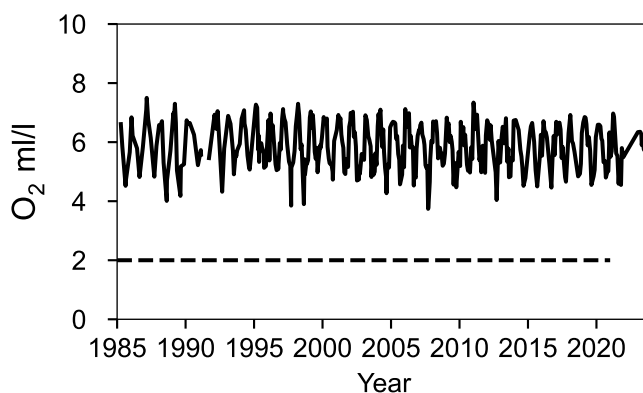
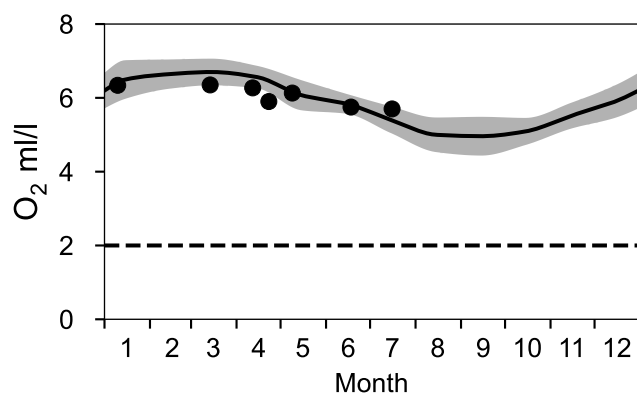
— Mean 2006-2020

■ St.Dev.

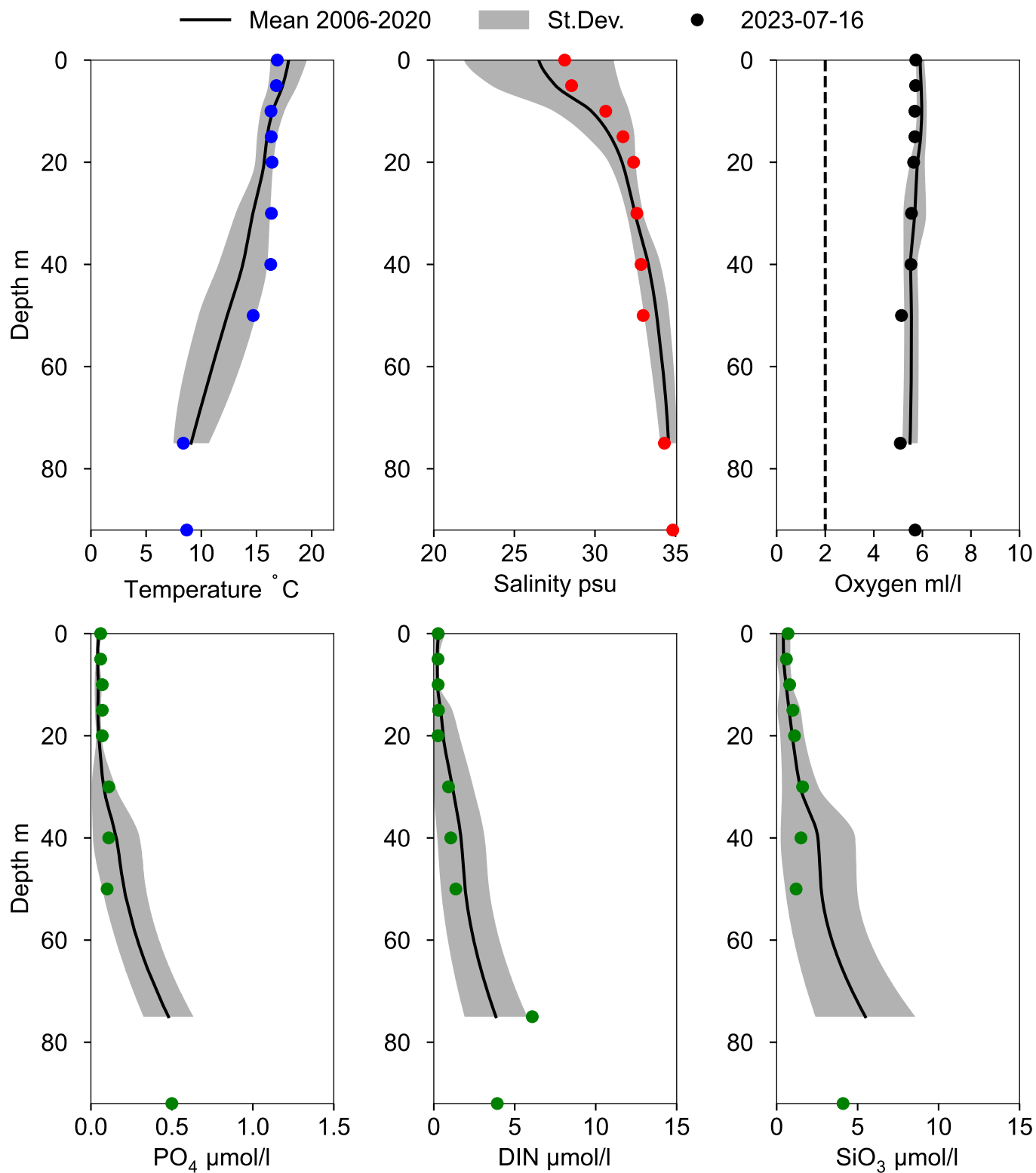
● 2023



OXYGEN IN BOTTOM WATER (depth >= 75 m)



Vertical profiles P2 July



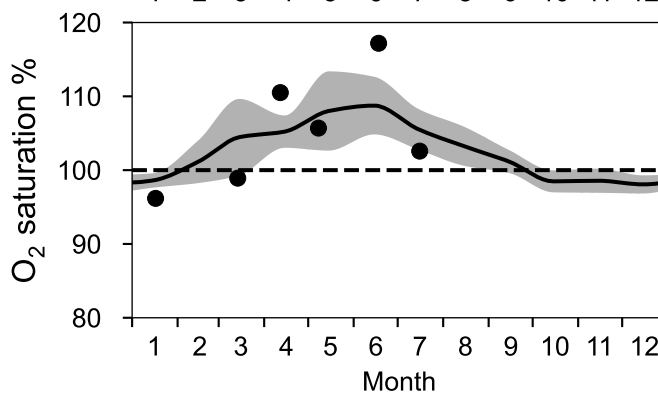
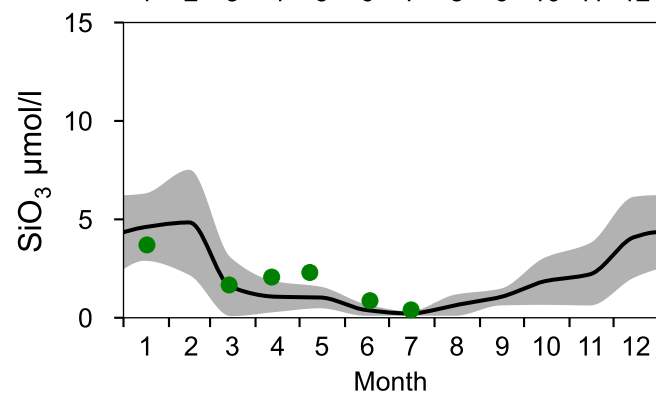
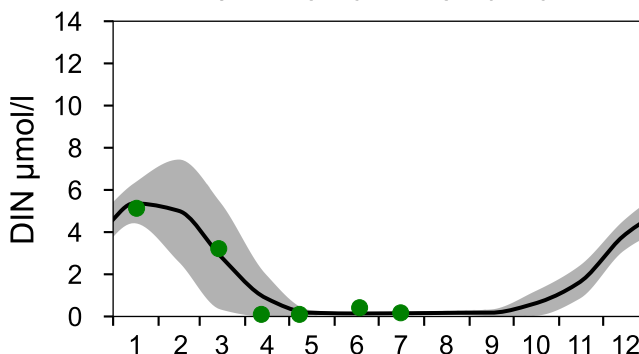
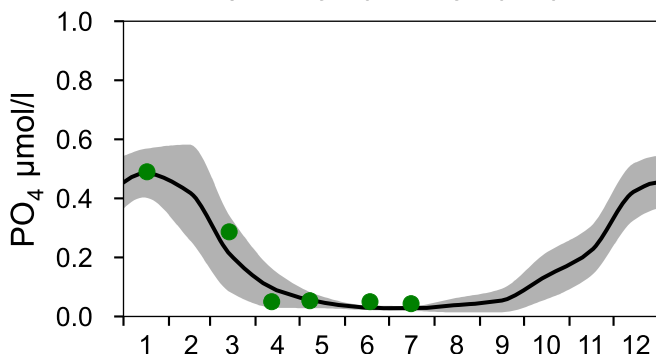
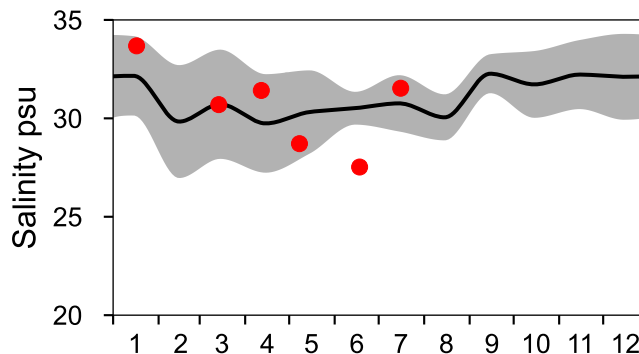
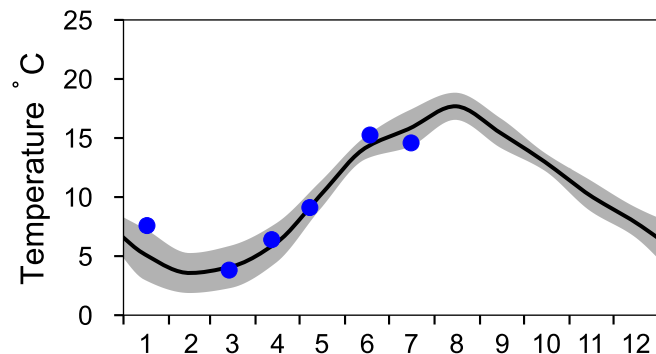
STATION Å17 SURFACE WATER (0-10 m)

Annual Cycles

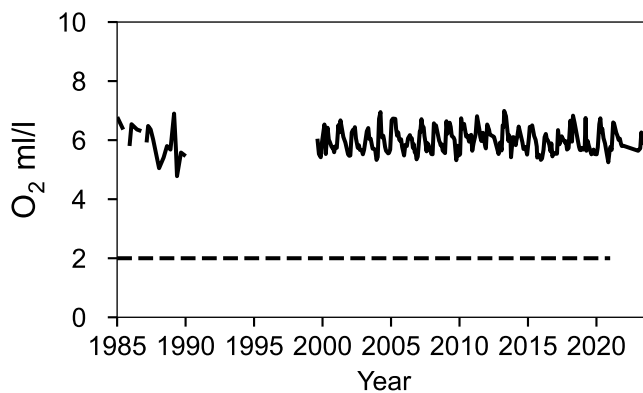
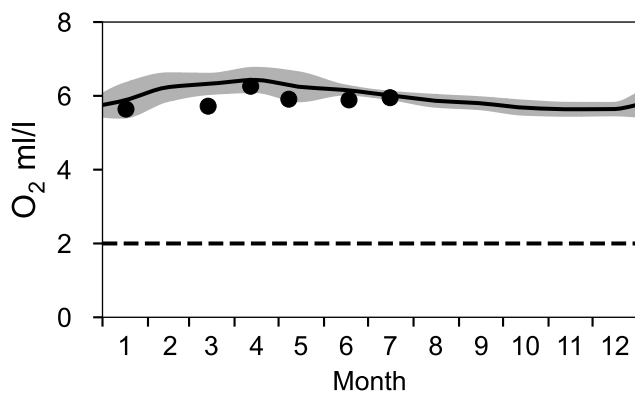
— Mean 2006-2020

■ St.Dev.

● 2023



OXYGEN IN BOTTOM WATER (depth >= 300 m)

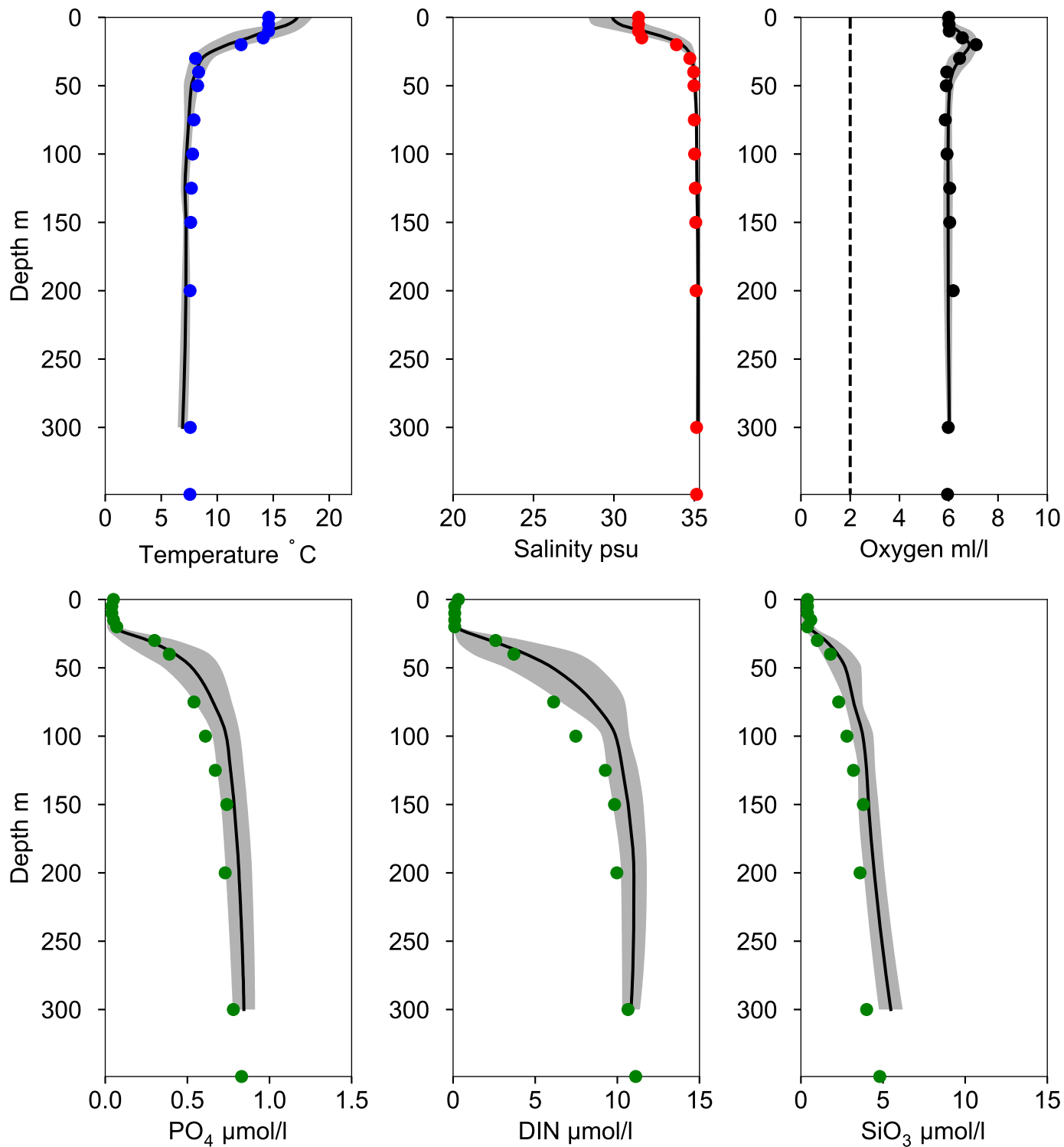


Vertical profiles Å17 July

— Mean 2006-2020

■ St.Dev.

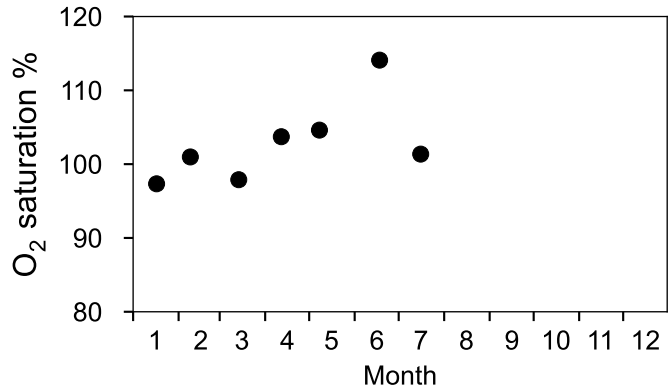
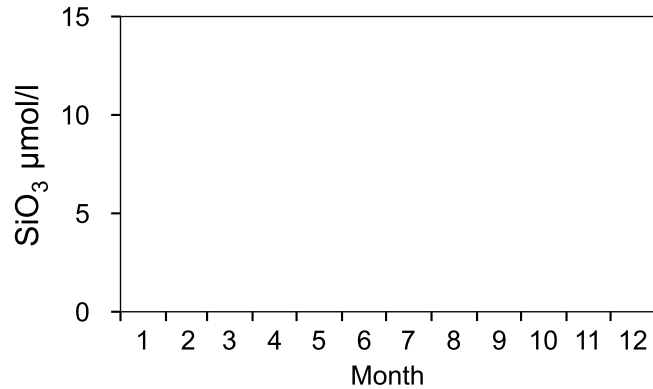
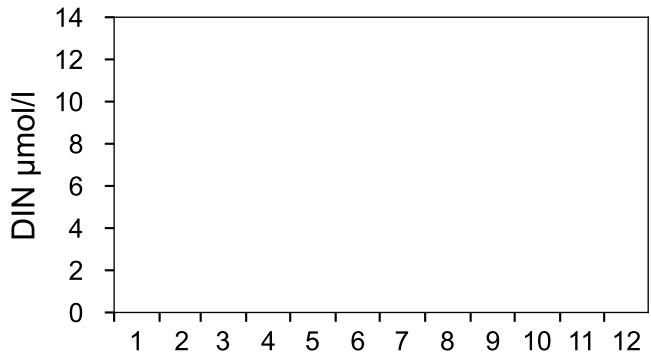
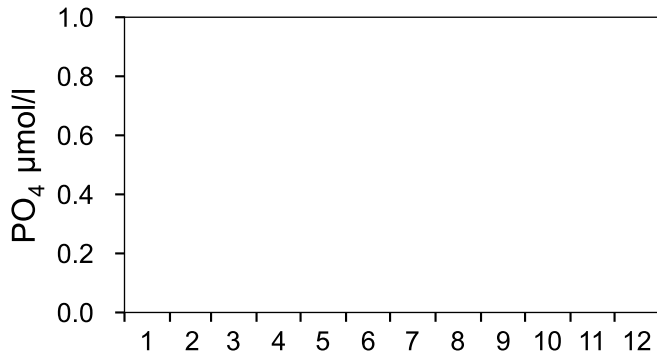
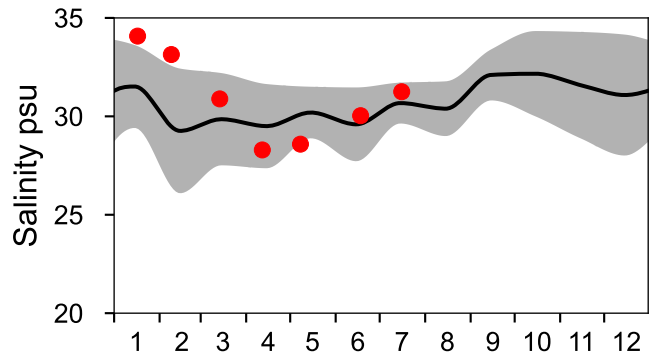
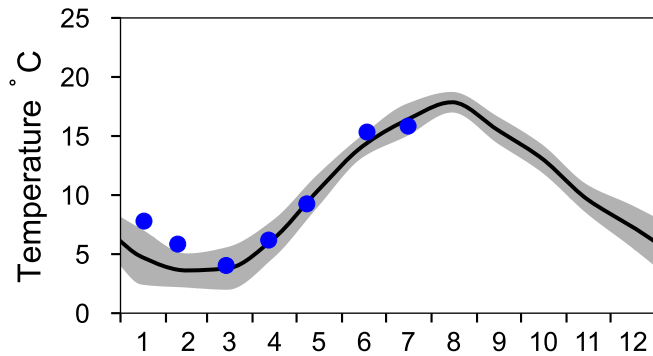
● 2023-07-16



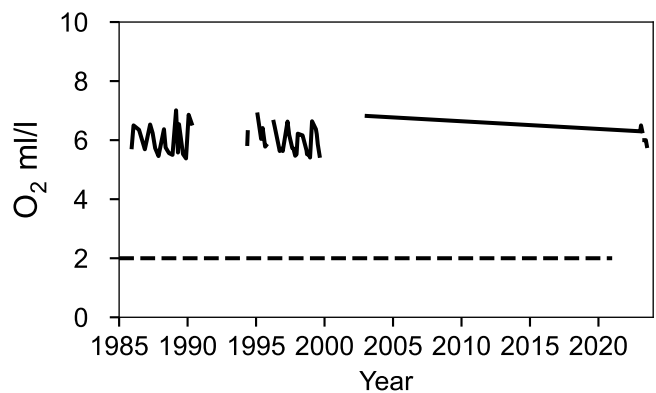
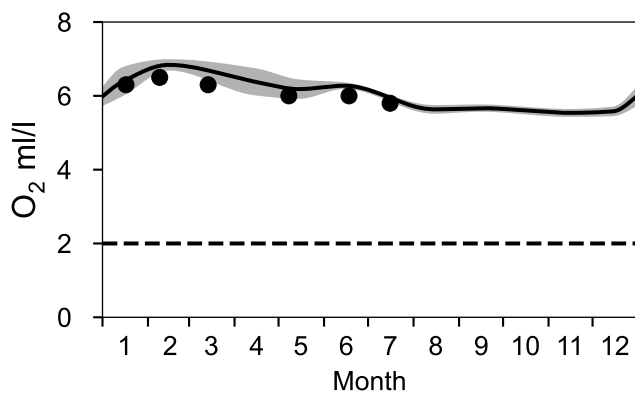
STATION Å16 SURFACE WATER (0-10 m)

Annual Cycles

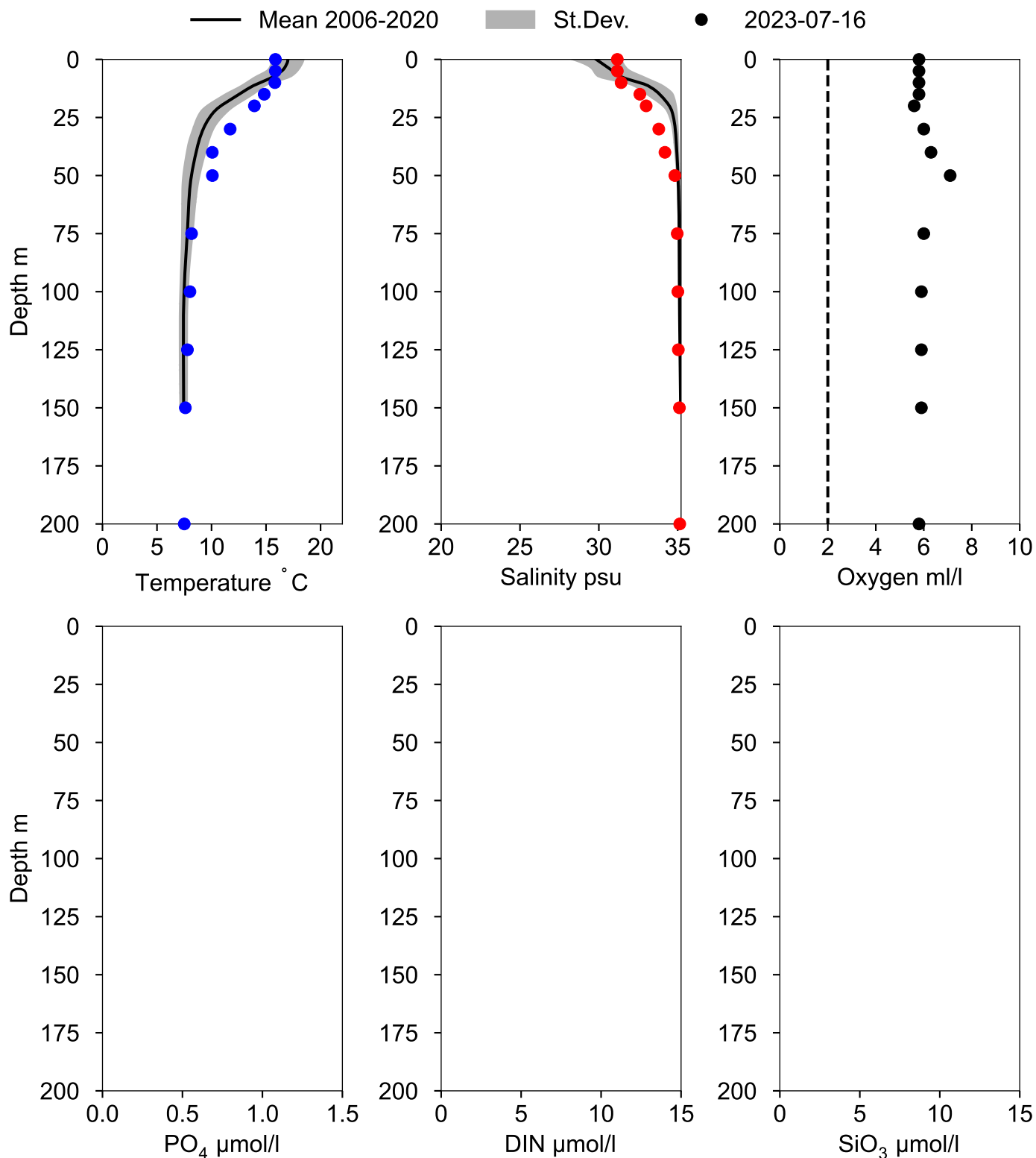
— Mean 2006-2020 St.Dev. • 2023



OXYGEN IN BOTTOM WATER (depth >= 193 m)



Vertical profiles A16 July



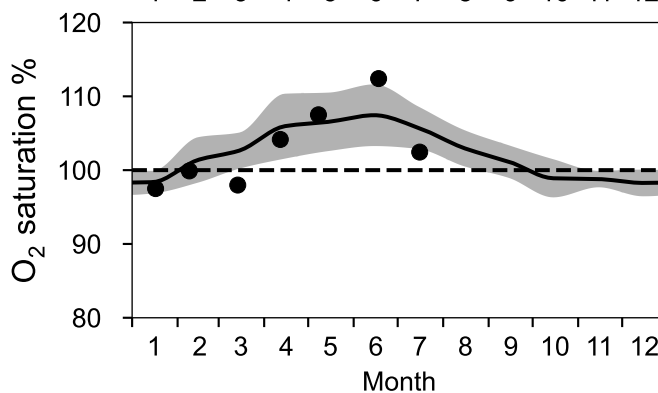
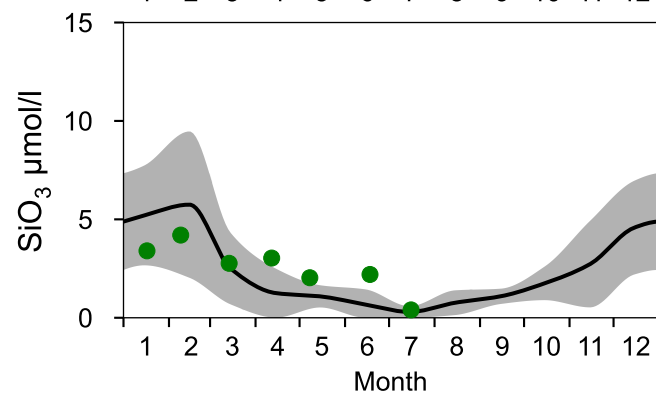
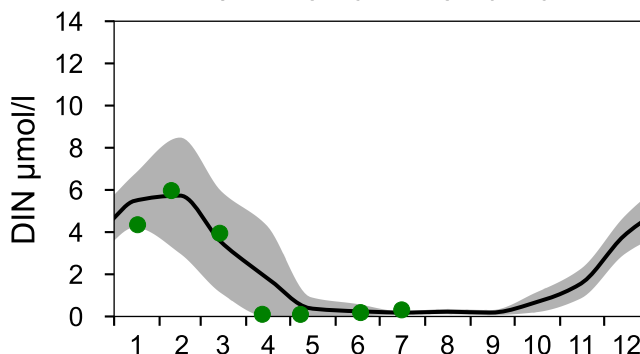
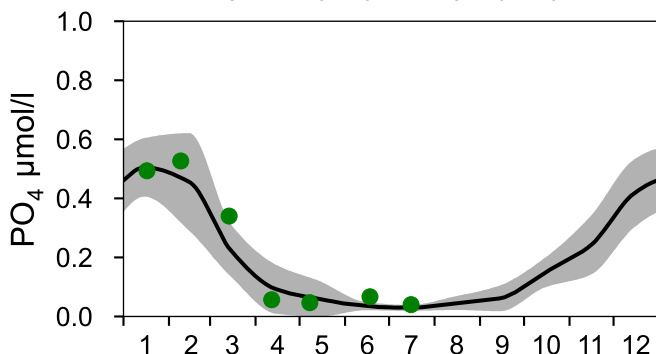
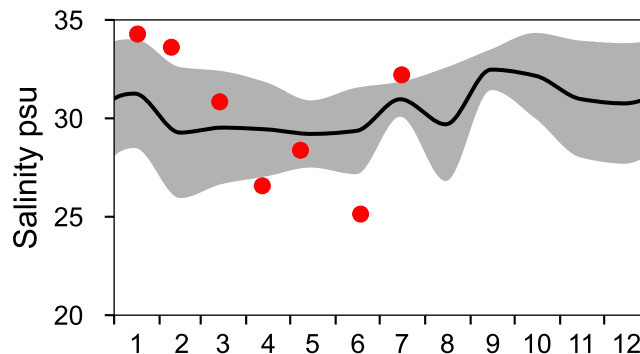
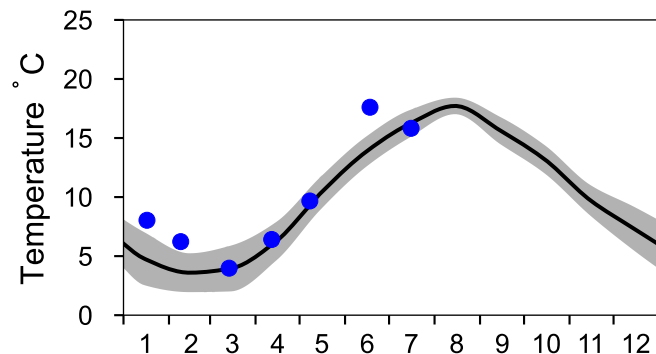
STATION Å15 SURFACE WATER (0-10 m)

Annual Cycles

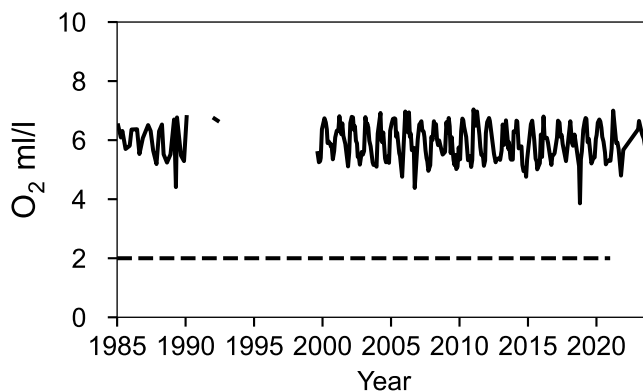
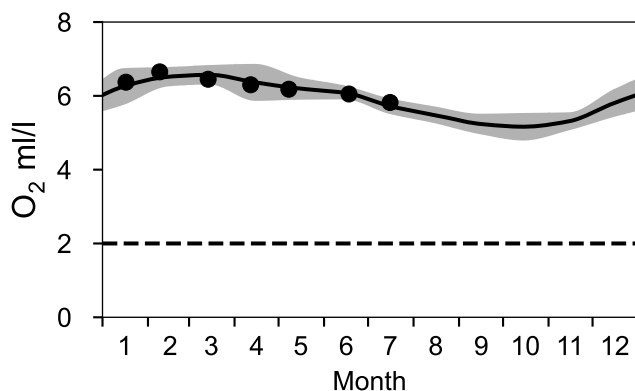
— Mean 2006-2020

■ St.Dev.

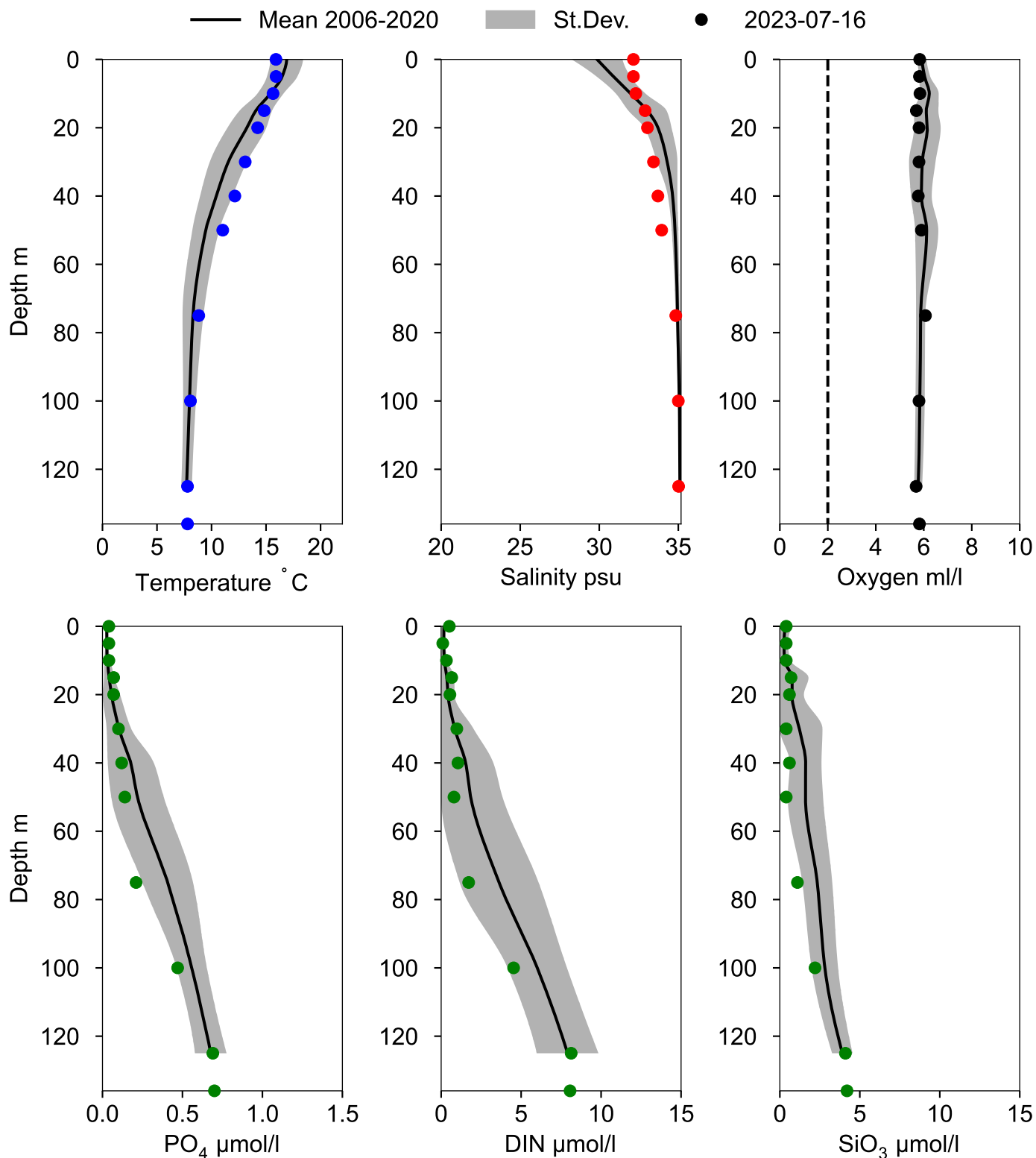
● 2023



OXYGEN IN BOTTOM WATER (depth >= 125 m)



Vertical profiles Å15 July



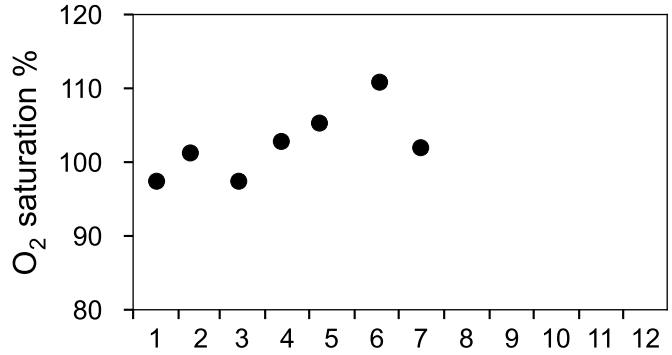
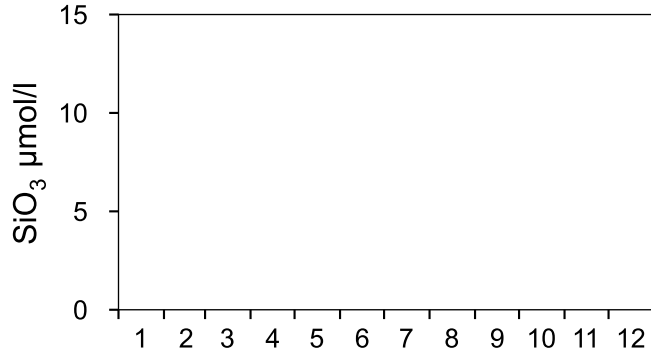
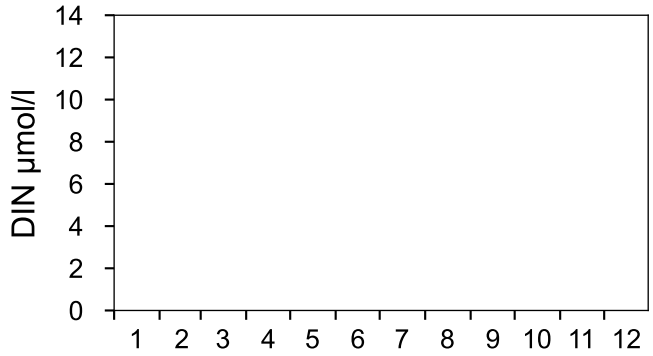
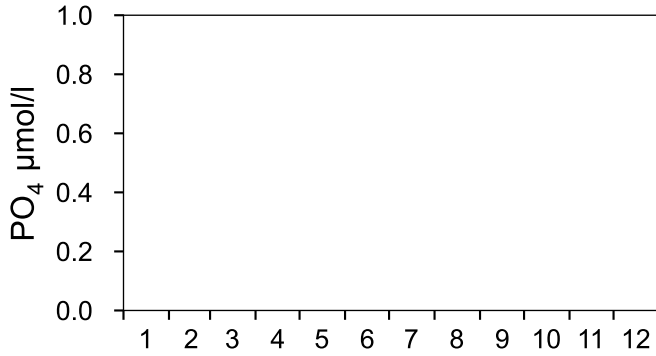
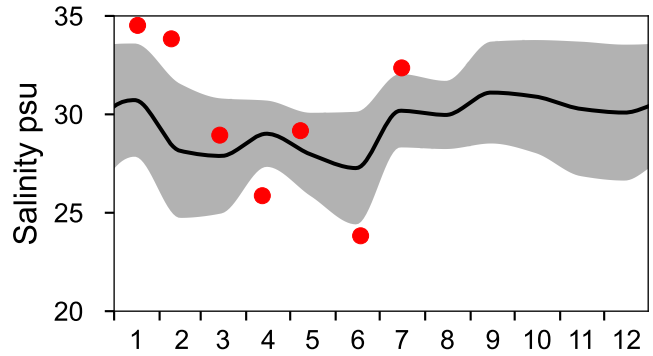
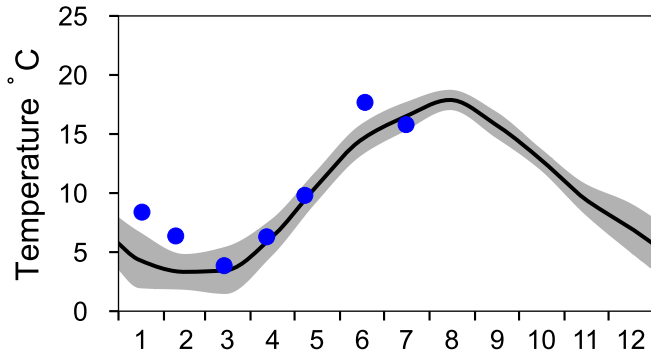
STATION Å14 SURFACE WATER (0-10 m)

Annual Cycles

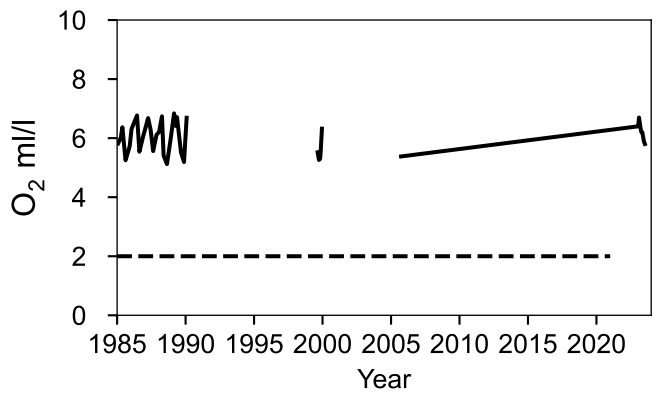
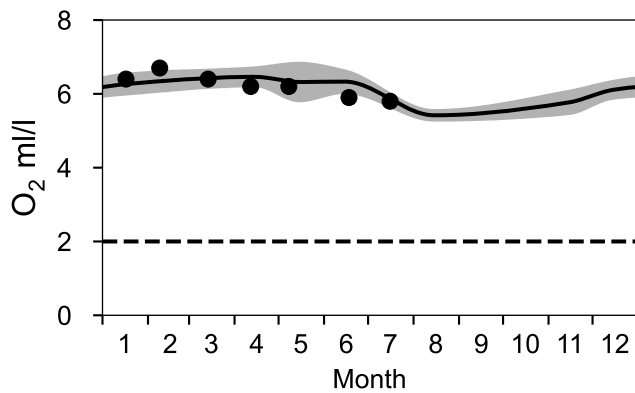
— Mean 2006-2020

■ St.Dev.

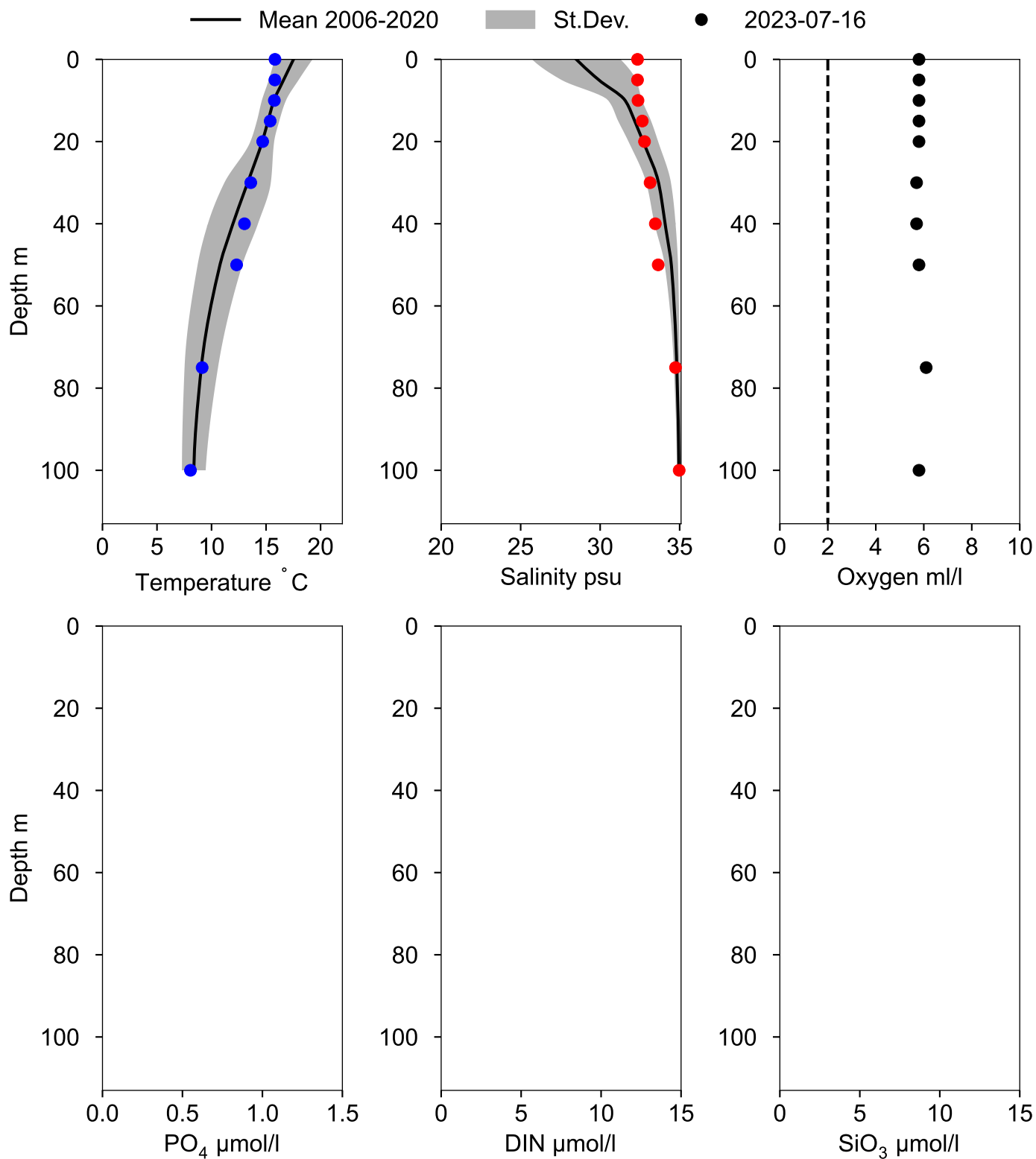
● 2023



OXYGEN IN BOTTOM WATER (depth >= 100 m)



Vertical profiles Å14 July



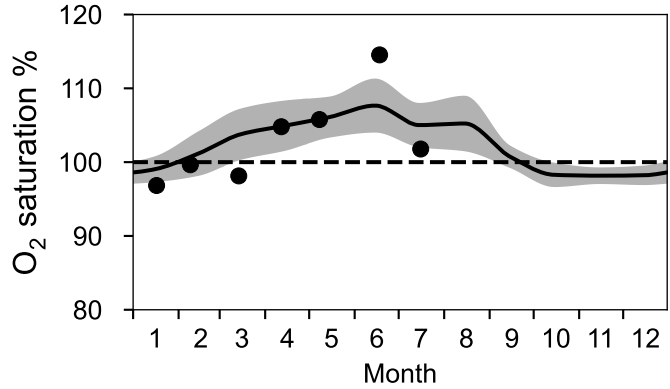
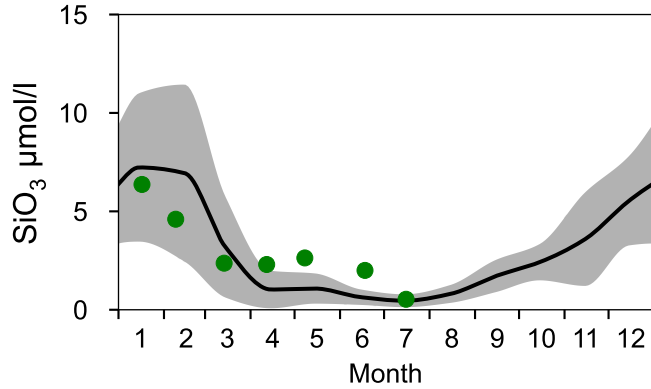
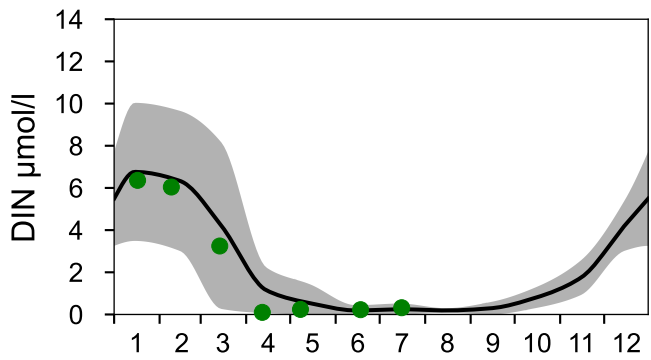
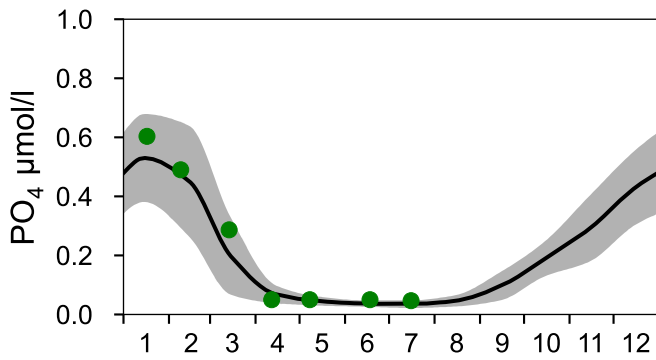
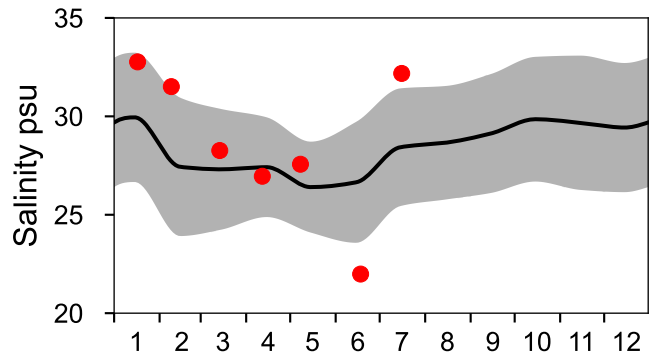
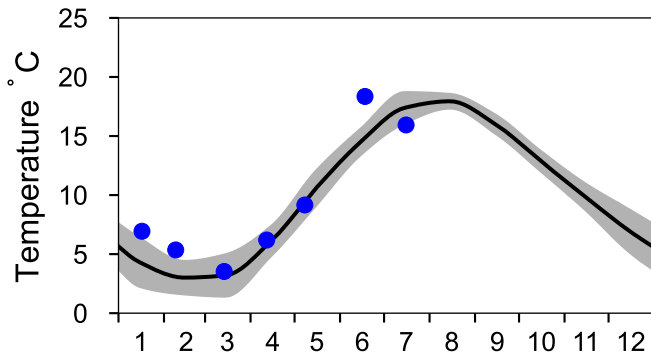
STATION Å13 SURFACE WATER (0-10 m)

Annual Cycles

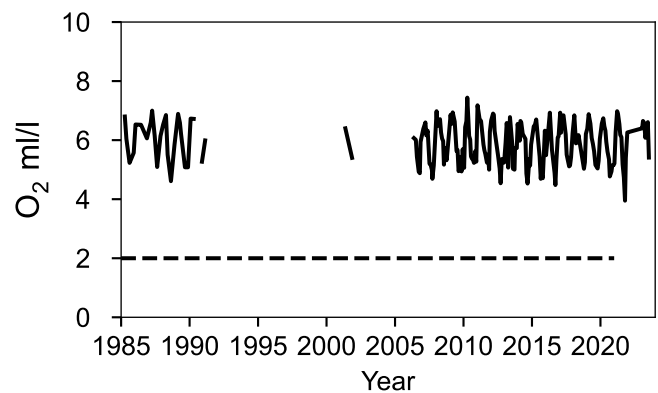
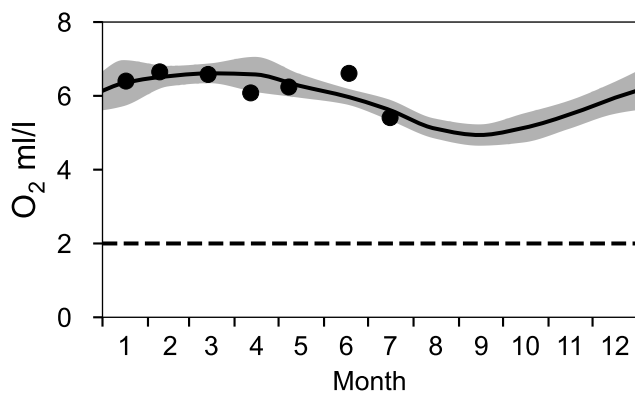
— Mean 2006-2020

■ St.Dev.

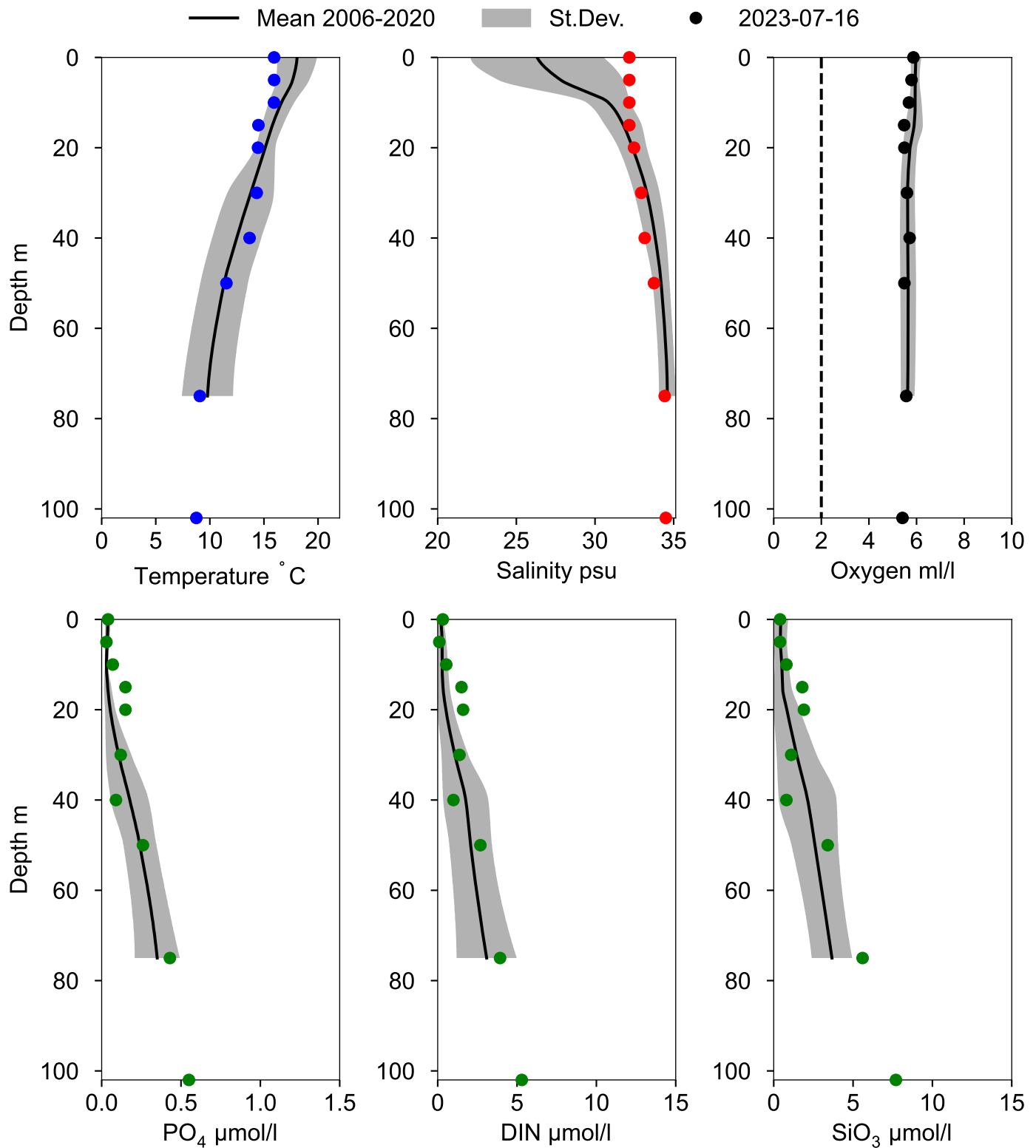
● 2023



OXYGEN IN BOTTOM WATER (depth >= 82 m)



Vertical profiles Å13 July



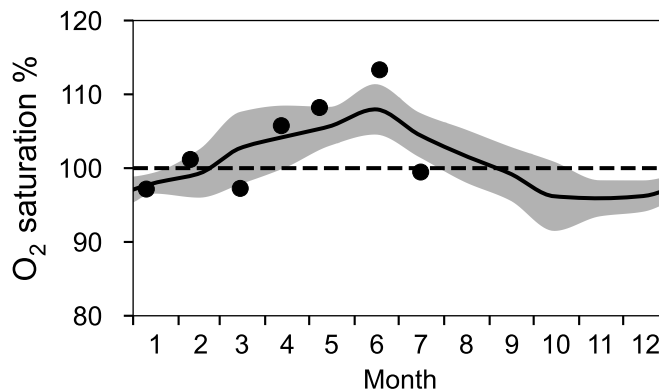
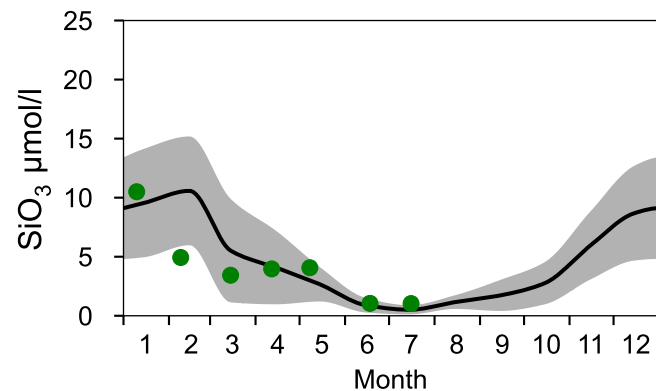
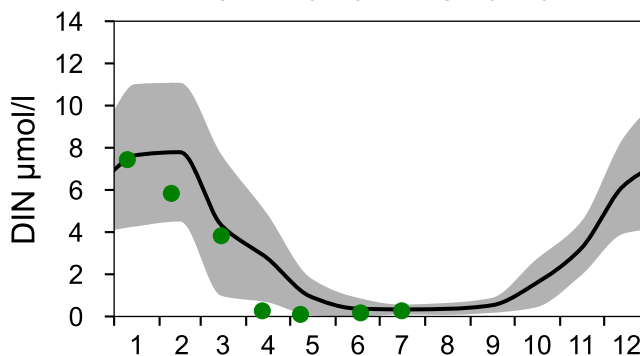
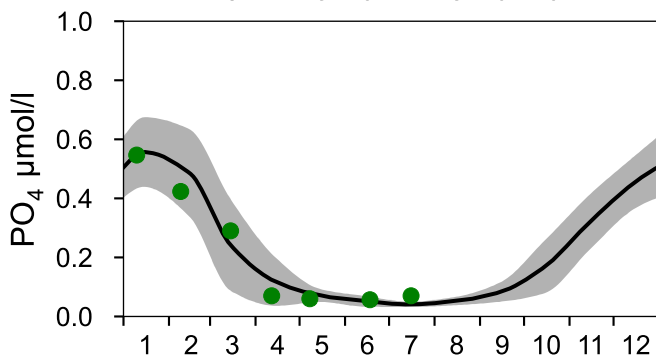
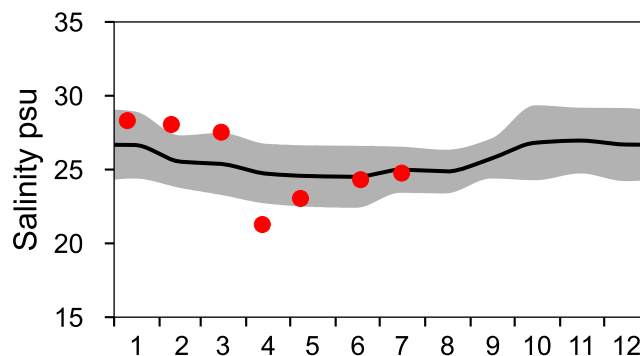
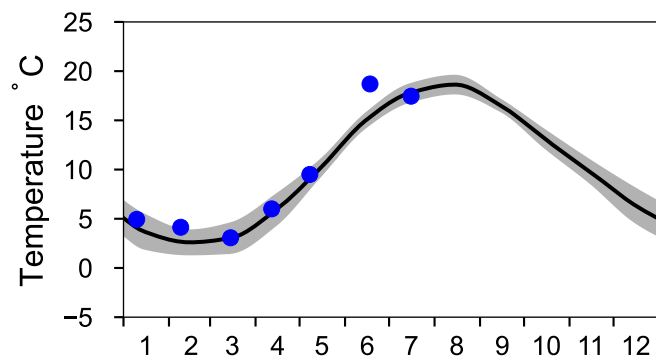
STATION SLÄGGÖ SURFACE WATER (0-10 m)

Annual Cycles

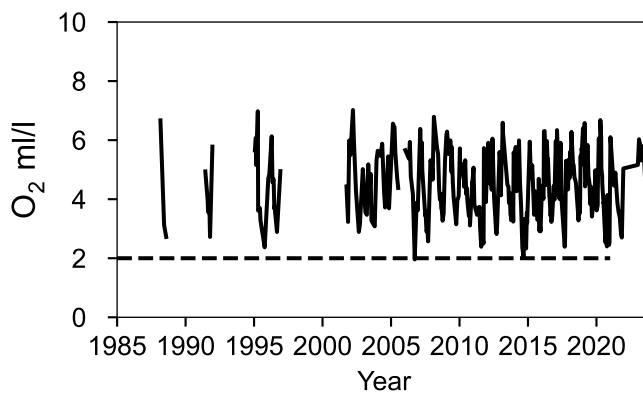
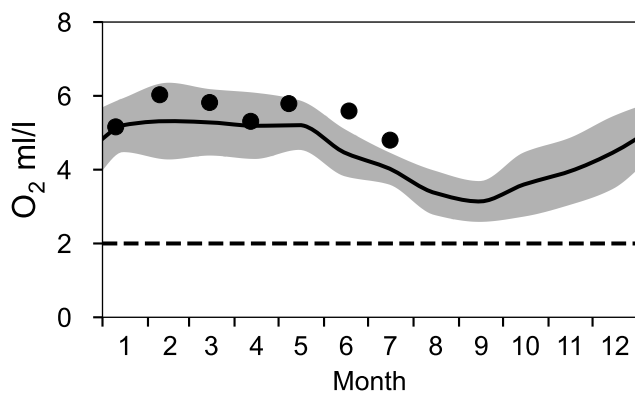
— Mean 2006-2020

■ St.Dev.

● 2023



OXYGEN IN BOTTOM WATER (depth >= 64 m)



Vertical profiles SLÄGGÖ July

