

Report from the SMHI monitoring cruise with R/V Aranda



Survey period: 2016-06-13 - 2016-06-20
Survey area: Skagerrak, Kattegat, the Sound and the Baltic Proper
Principal: Swedish Meteorological and Hydrological Institute, SMHI, and the Swedish Agency for Marine and Water Management, SWAM.

SUMMARY

The June expedition in the Swedish regular marine monitoring programme covered the Skagerrak, the Kattegat, the Sound and the Baltic Proper. This report is based on data that only have undergone a first quality control, when data is published at the data host some values might have changed after further quality controls have been performed.

All nutrient concentrations in the surface water were very low in the Skagerrak and the Kattegat. Stratifications was found at around 10 meters and nutrient concentrations increased below 20-30 meters. The inorganic nitrogen was depleted down to 30-40 meters but phosphate was still present in the southwest. The silicate levels were still above normal in the entire Baltic Proper.

Acute hypoxia was measured from around 70 meters in the entire Baltic Proper. Hydrogen sulphide was only present close to the bottom, 175-195 meters, at the Fårö Deep and from 80 meters in the Western Gotland Basin. The entire water column at the Gotland Deep was still oxygenated.

Next regular cruise is scheduled to start 18th of July.

RESULTS

The expedition was conducted aboard the Finnish research Vessel Aranda. It started in Helsinki the 13th of June and ended in Åbo/Turku at the 20th, where Aranda was having a service at the shipyard.

The winds were weak and mainly from south until the last days of the expedition, when a low pressure system passed and the wind speed increased to 10-15 m/s, predominantly westerly.

During the expedition some extra zooplankton samples were taken at the stations BY15, BY5, BY2, Anholt E and Släggö on behalf of Umeå University. During the last day of the cruise the wave buoy at Huvudskär was visited and a smaller service was performed, figure 1.

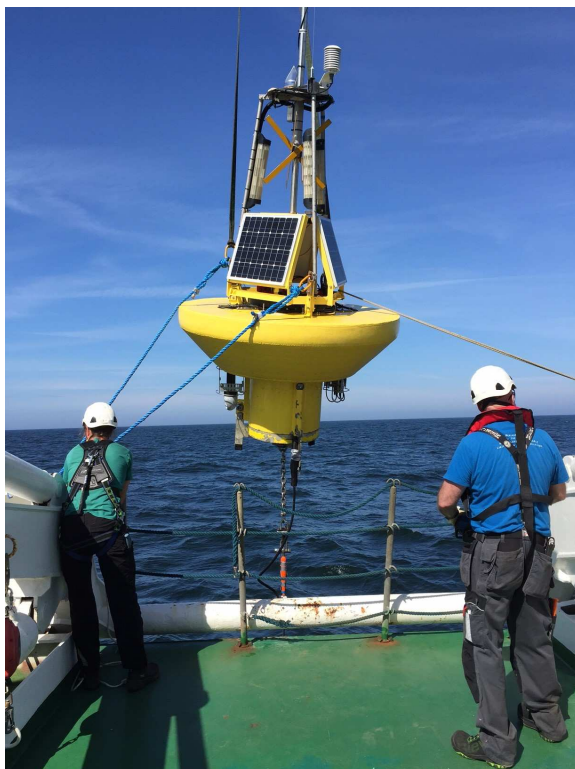


Figure 1. Service of the wave buoy at Huvudskär.

Unfortunately the concentrations of ammonia, NH_4 , could not be analyzed before Lysekil during his cruise due to instrumental problems. In the Lysekil a new instrument was delivered and ammonia could be analyzed at Å17 and onwards, see separate station list. Figures showing dissolved inorganic nitrogen, DIN, only contain nitrate+nitrite for all stations before Å17. In case of anoxic conditions, hydrogen sulfide present, DIN has been removed from the figures since DIN is almost only ammonia in anoxic waters.

During the sampling of LL19 there was a short circuit in the cable and the connection to the CTD/bottle carousel was lost. The cable could be reterminated and was ready to use again just before BY10, hence the stations LL17, BY20 and BY15 are missing data from the CTD.

On this cruise phytoplankton was analyzed on board by Malin Mohlin, the results are published in the Algaware report for June;
http://www.smhi.se/oceanografi/oce_info_data/reports/alg/algst16_6.pdf, below follows a summary.

The species diversity was large in the Skagerrak among the dinoflagellates, but it was the diatom *Proboscia alata* that dominated the phytoplankton community.

Diatoms were very common in the Kattegat, and similar to the Skagerrak it was *Proboscia alata* that was most abundant with an exception at Anholt E, where also *Dactyliosolen fragilissimus* and *Guinardia flaccida* were very common.

There were no visible surface accumulations of cyanobacteria during this cruise. However, filamentous cyanobacteria were visible by eye in the water at all stations in the Baltic Proper. When analyzing the samples from the surface, and down to 10 meters depth, it was mainly large amounts *Aphanizomenon flos-aquae*. The toxic species *Nodularia spumigena* was present in all samples but not dominating in abundance. Surface accumulations could arise if the weather keeps being stable with low winds and high water temperature.

SMHI analyzes satellite images to detect surface accumulations of cyanobacteria every day during the summer, available at <http://www.smhi.se/vadret/hav-och-kust/algsituationen>.

The Skagerrak

The temperature in the surface water was normal or just above normal for the season; it varied from 15 °C offshore to 17 °C closer to the coast. The surface salinity in outermost parts was normal and somewhat lower than normal closest to the coast, varying from 20-30 psu. The stratification both in temperature and salinity coincided at around 10 meters

All nutrient concentrations were very low in the surface layer in the entire area, which is normal for the summer season. Phosphate concentrations varied between 0.02-0.05 µmol/l, nitrate and nitrite concentrations was below the limit of quantification, LOQ, (<0,10 µmol/l and <0.02 µmol/l respectively). Concentrations of silicate were around 0.1 µmol/l except at P2, where levels of 0.7 µmol/l were measured. At all stations a peak in fluorescence was observed at 20-30 meters, at Å13 there was a major peak at 25 meter. At 10-20 meters the water was oversaturated with oxygen which indicates higher biological activity, nutrient concentrations increased first at a depth of 30 meters and below. The bottom water was well oxygenated, even at Släggö in the mouth of Gullmarsfjorden.

The Kattegat and the Sound

The temperature in the surface water was normal for the season and varied between 16 and 17.5 °C. The salinity in the surface layer was also normal for the season except for in the Sound where it was higher than normal at around 10-15 meters. Lowest measured value in the surface was 9 psu and the highest, at 28 psu, came from 10 meters at Fladen. The temperature and salinity stratification in the area could be found between 5 to 15 meters.

All nutrient levels in the upper layer were very low which is normal for the summer. Phosphate concentrations varied between 0.04-0.30 µmol/l, nitrate and nitrite var below of around the limit of quantification, LOQ, (<0,10 µmol/l and <0.02 µmol/l respectively) and silicate varied between 0.4 and 0.9 µmol/l. Highest nutrient concentrations was found in the Sound. Nutrient levels above LOQ were present at 15-20 meters and below. Oxygen conditions in the bottom water were good and the lowest concentration measured was 4.5 ml/l in the Sound. A fluorescence peak at 10-25 meter could be seen at all stations, highest in the Sound at W Landskrona between 10 and 15 meters.

Egentliga Östersjön

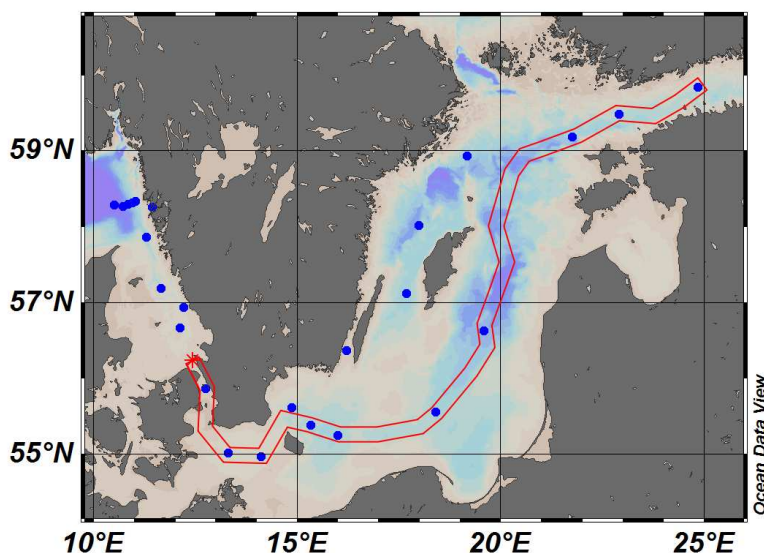
The temperature in the surface water was normal and measured between 14-15 °C, warmest in the south western parts of the Baltic Proper. Surface salinity was normal or just above and varied between 7 and 8 psu.

The halocline in the Baltic Proper varied between 50 and 80 meters, except for in the Arkona basin where it was found a bit shallower, at around 35-40 meters. A well-developed summer thermocline could be found at 15-20 meters.

Concentrations of nitrite in the surface were around 0.03-0.04 $\mu\text{mol/l}$ and nitrate levels were below the limit of quantification at 0.10 $\mu\text{mol/l}$, except for BY5 where nitrate concentration was just over 0.35 $\mu\text{mol/l}$. Not until depths of 50 meters or below the concentrations of nitrate and nitrite started to increase. Phosphate concentrations in the surface were in the Western Gotland Basin slightly under normal and in the Arkona Basin somewhat higher than normal, in the remaining parts of the Baltic Proper they were at normal levels for the season. The concentrations in the central parts of the Baltic Proper were around 0.10 $\mu\text{mol/l}$ and in the Arkona and Bornholm Basin around 0.30 $\mu\text{mol/l}$. Concentrations of silicate were higher than normal and varied between 9-14 $\mu\text{mol/l}$.

In the Western Gotland Basin there was a quick transition from the oxic and the anoxic layer at 80 meters, at BY38 acute hypoxia (dissolved $\text{O}_2 < 2\text{ml/l}$) was found at around 70 meters and hydrogen sulphide from 80 meters and below. In the northern part of the Eastern Gotland Basin, BY20, oxygen concentrations varied with just above 2.0 ml/l at 80 meters, but hydrogen sulphide did not appear until close to the bottom at 175-195 meters. At BY15 Gotland Deep the whole water column was still oxygenated, however the concentrations were low and acute hypoxia was found already at 70 meters. Acute hypoxia was also observed in the Hanö Bay from about 60 meters and in the Bornholm Basin from 70 meters, which is a deterioration from the last measurements in May.

Measurements of fluorescence and samples of phytoplankton showed biological activity in the surface layer in the entire Baltic Proper, and some fluorescence peaks were observed around 10 meters. No obvious surface accumulations were observed but there were plenty of cyanobacteria present in the upper layer that could surface and accumulate if calm and warm weather continues.



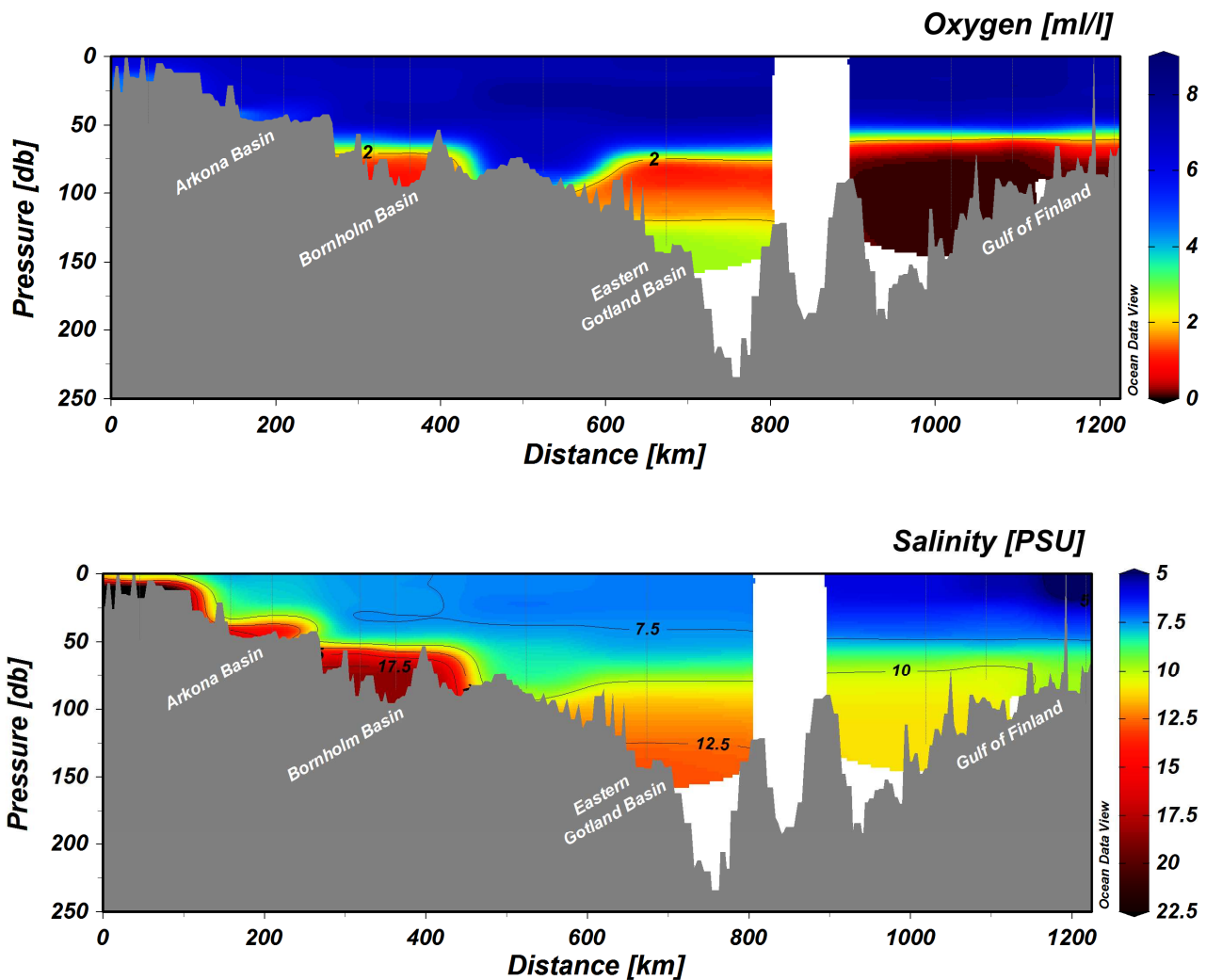


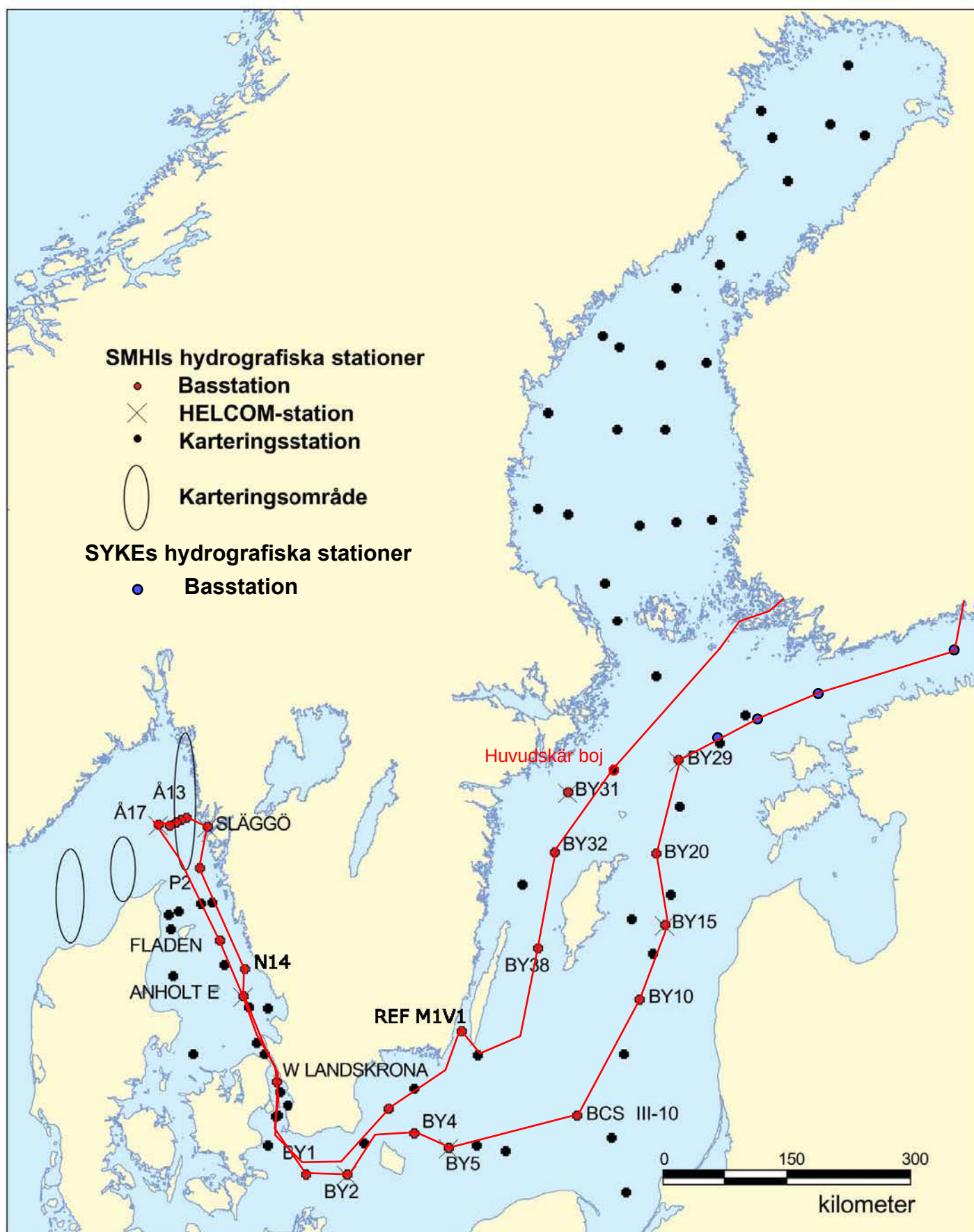
Figure 2. Transect showing oxygen and salinity through the Baltic Proper, from the Sound to the Gulf of Finland.

PARTICIPANTS

Name	Institute
Örjan Bäck	SMHI
Sara Johansson	SMHI
Daniel Bergman Sjöstrand	SMHI
Sari Sipilä	SMHI
Johanna Linders	SMHI
Malin Mohlin	SMHI

APPENDICES

- Track chart
- Table over stations, analyzed parameters and number of sampling depths
- Map showing bottom oxygen concentrations
- Vertical profiles for normal monitoring stations
- Monthly average surface water plots for normal monitoring stations

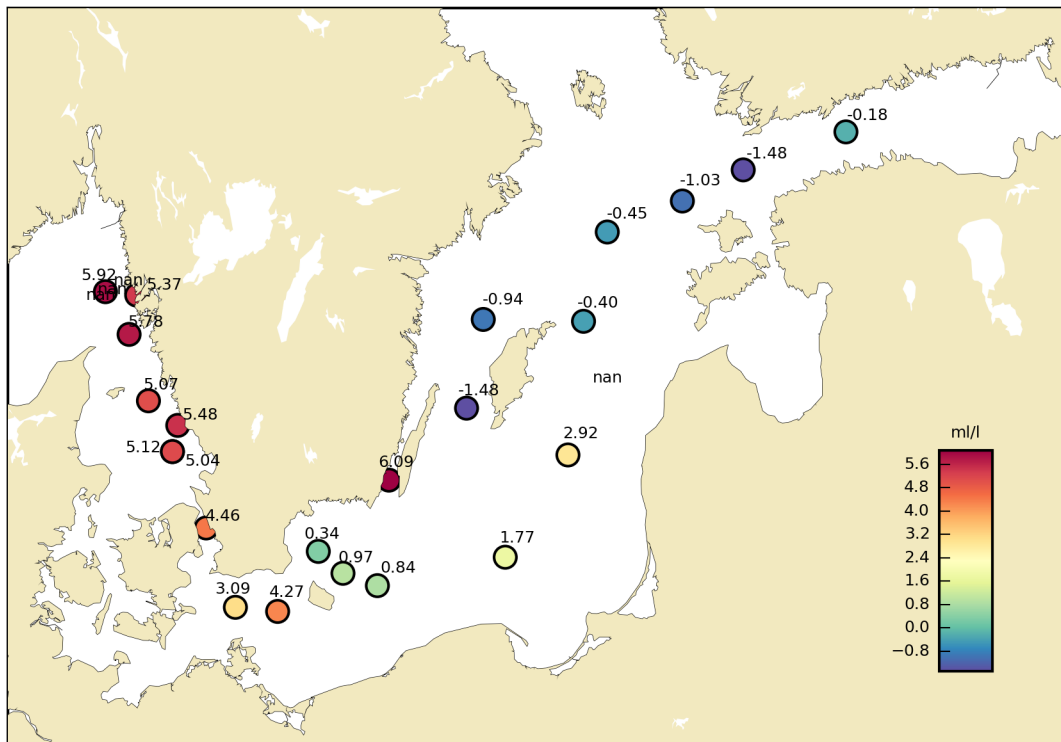


Ship: AR
Year: 2016

[illegible]

Bottom water oxygen concentration (ml/l)

Country: Finland
Ship : Aranda
Date : 20160613-20160620
Series : 0326-0354



STATION BY20 FÅRÖDJ SURFACE WATER (0-10m)

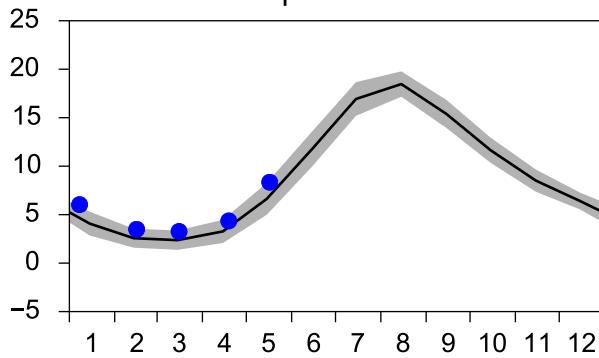
Annual Cycles

— Mean 2001-2015

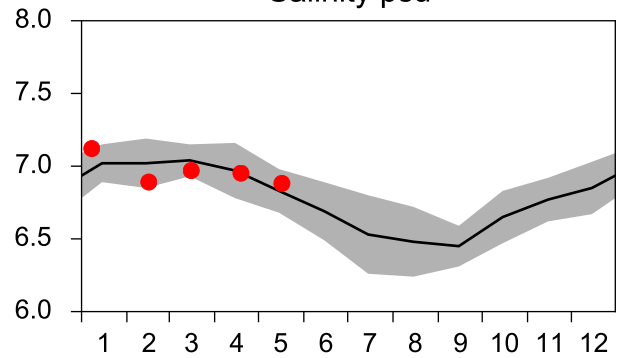
■ St.Dev.

● 2016

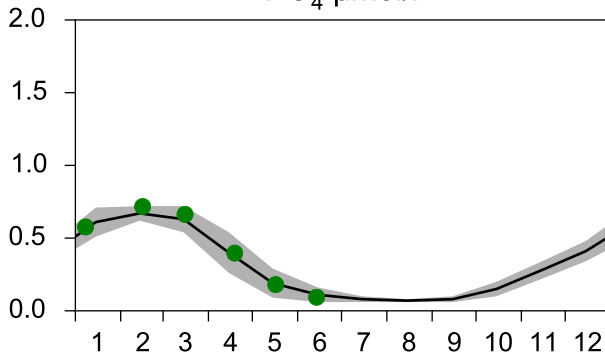
Temperature °C



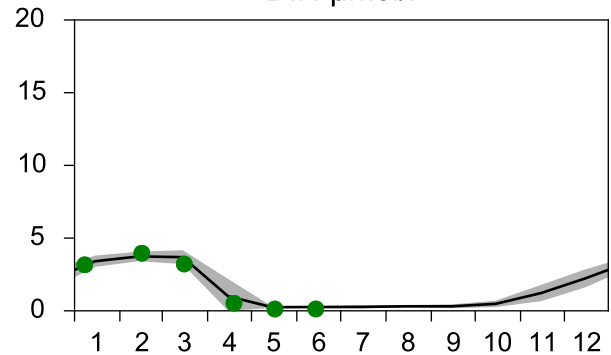
Salinity psu



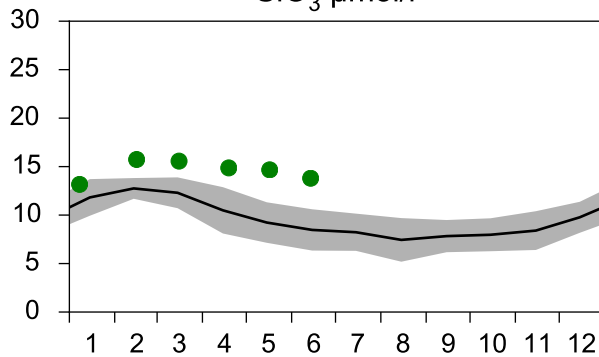
PO₄ µmol/l



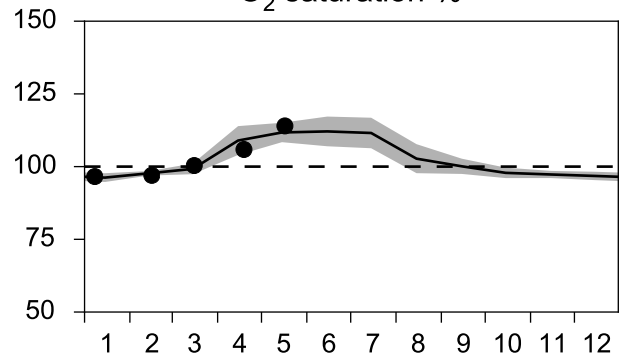
DIN µmol/l



SiO₃ µmol/l

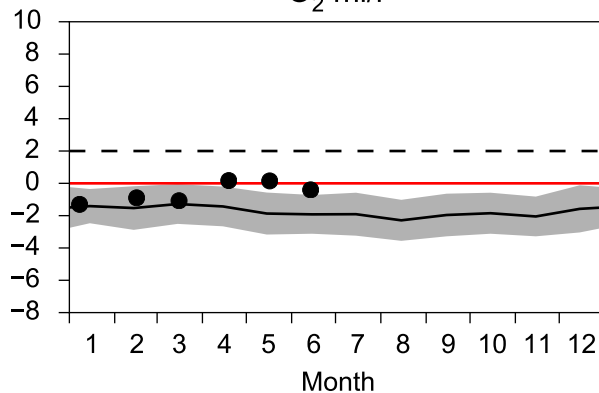


O₂ saturation %

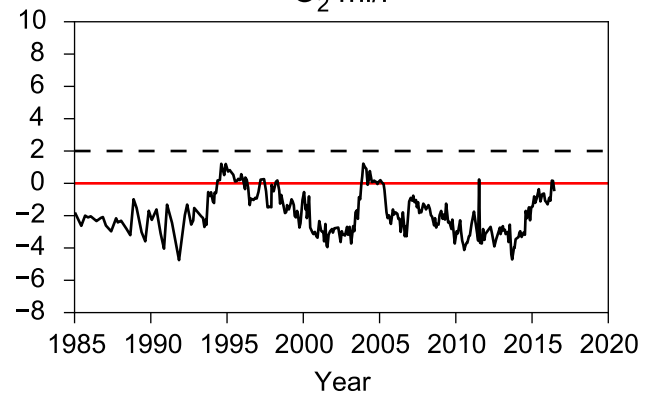


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O₂ ml/l

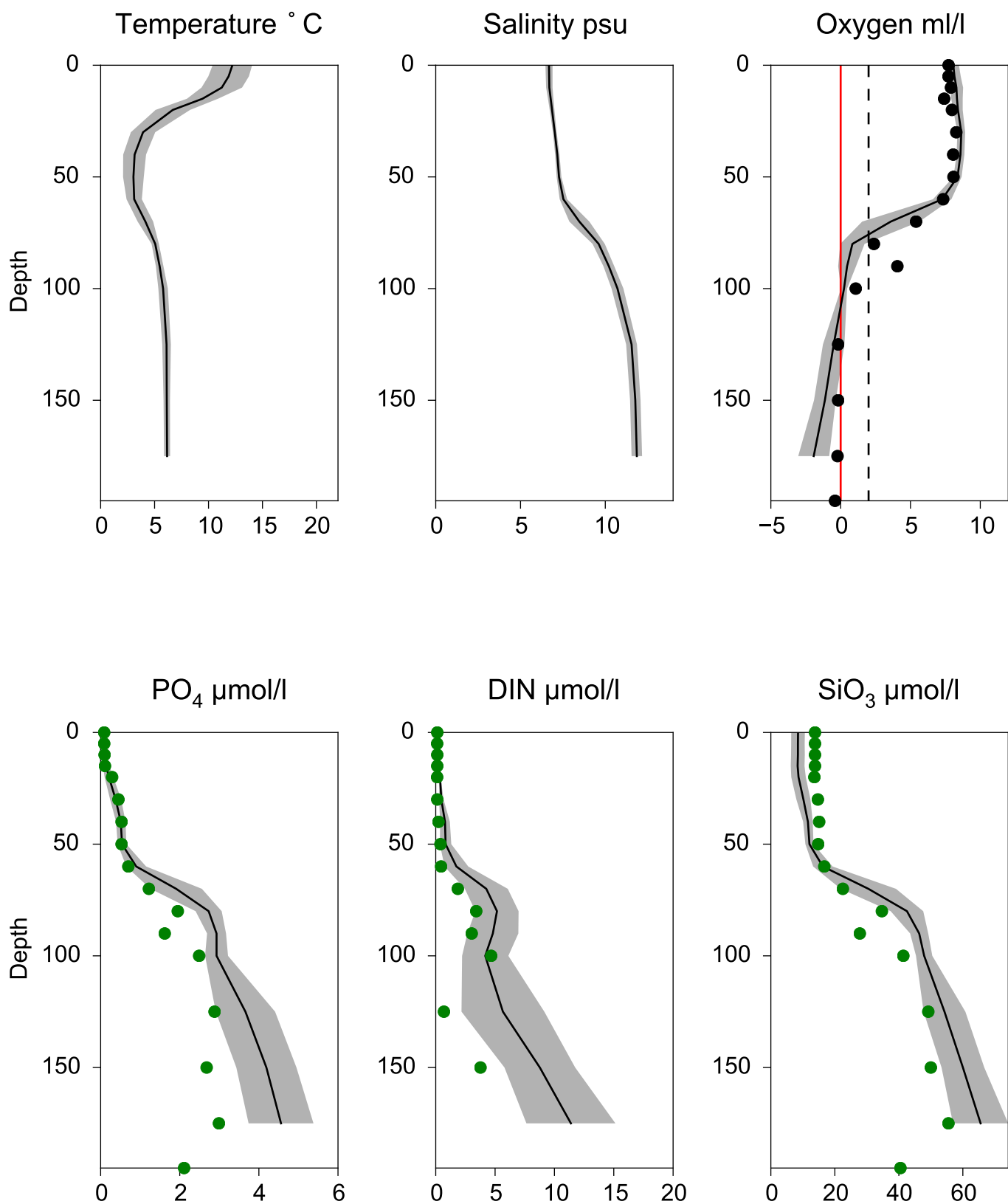


O₂ ml/l



Vertical profiles BY20 FÅRÖDJ June

— Mean 2001-2015 ■ St.Dev. ● 2016-06-14



STATION BY15 GOTLANDSDJ SURFACE WATER (0-10m)

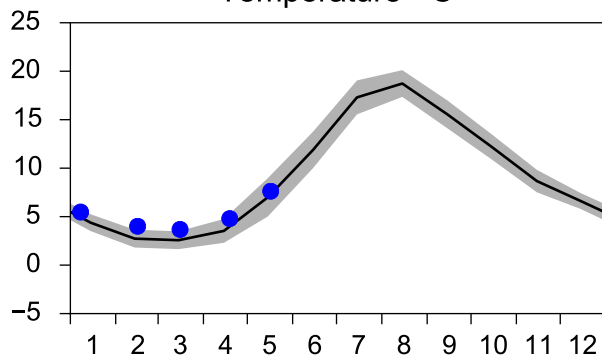
Annual Cycles

— Mean 2001-2015

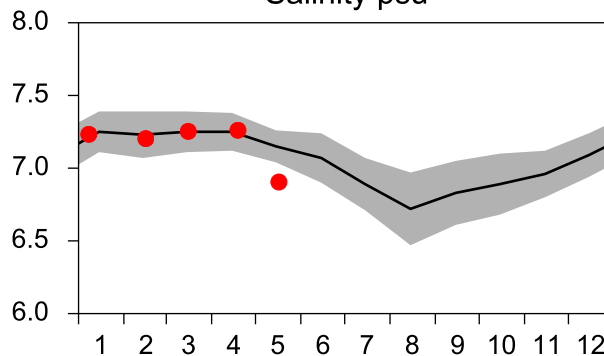
■ St.Dev.

● 2016

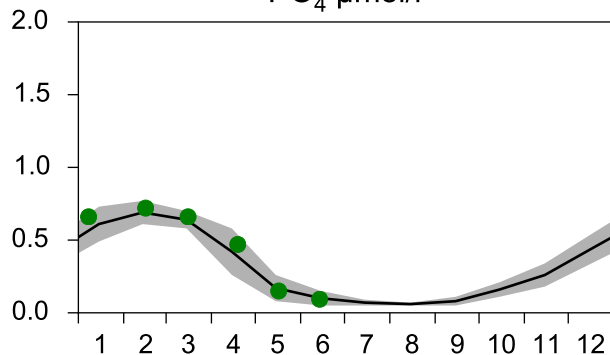
Temperature °C



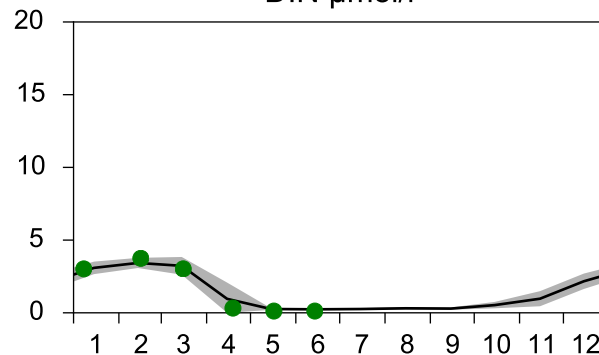
Salinity psu



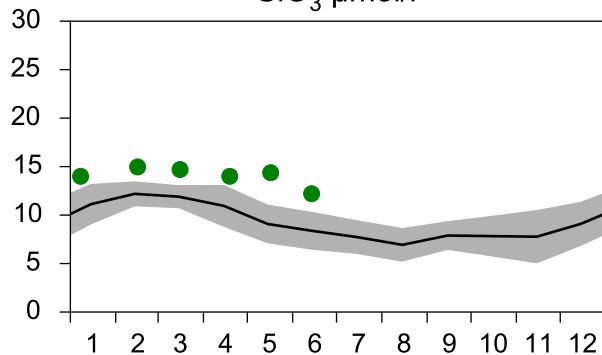
PO₄ µmol/l



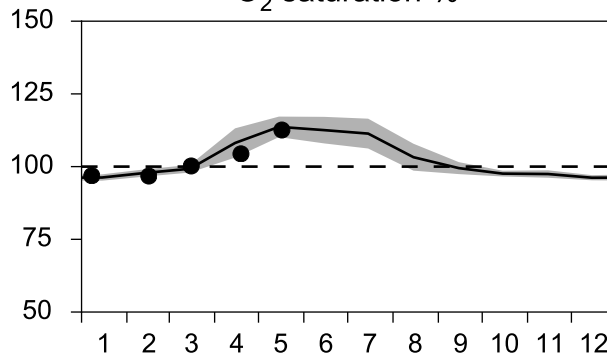
DIN µmol/l



SiO₃ µmol/l

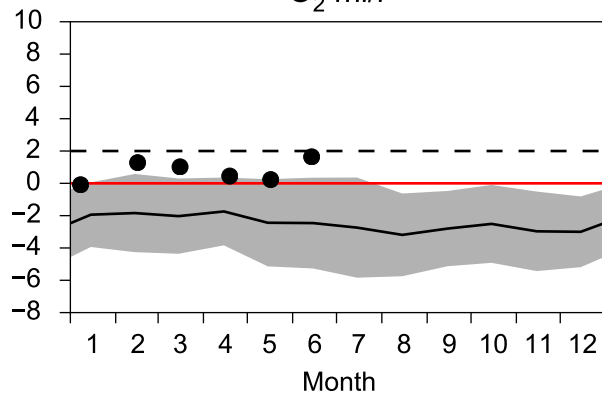


O₂ saturation %

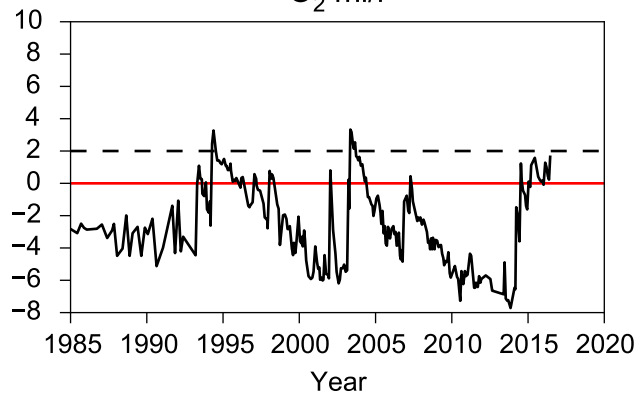


OXYGEN IN BOTTOM WATER (depth >= 225 m)

O₂ ml/l

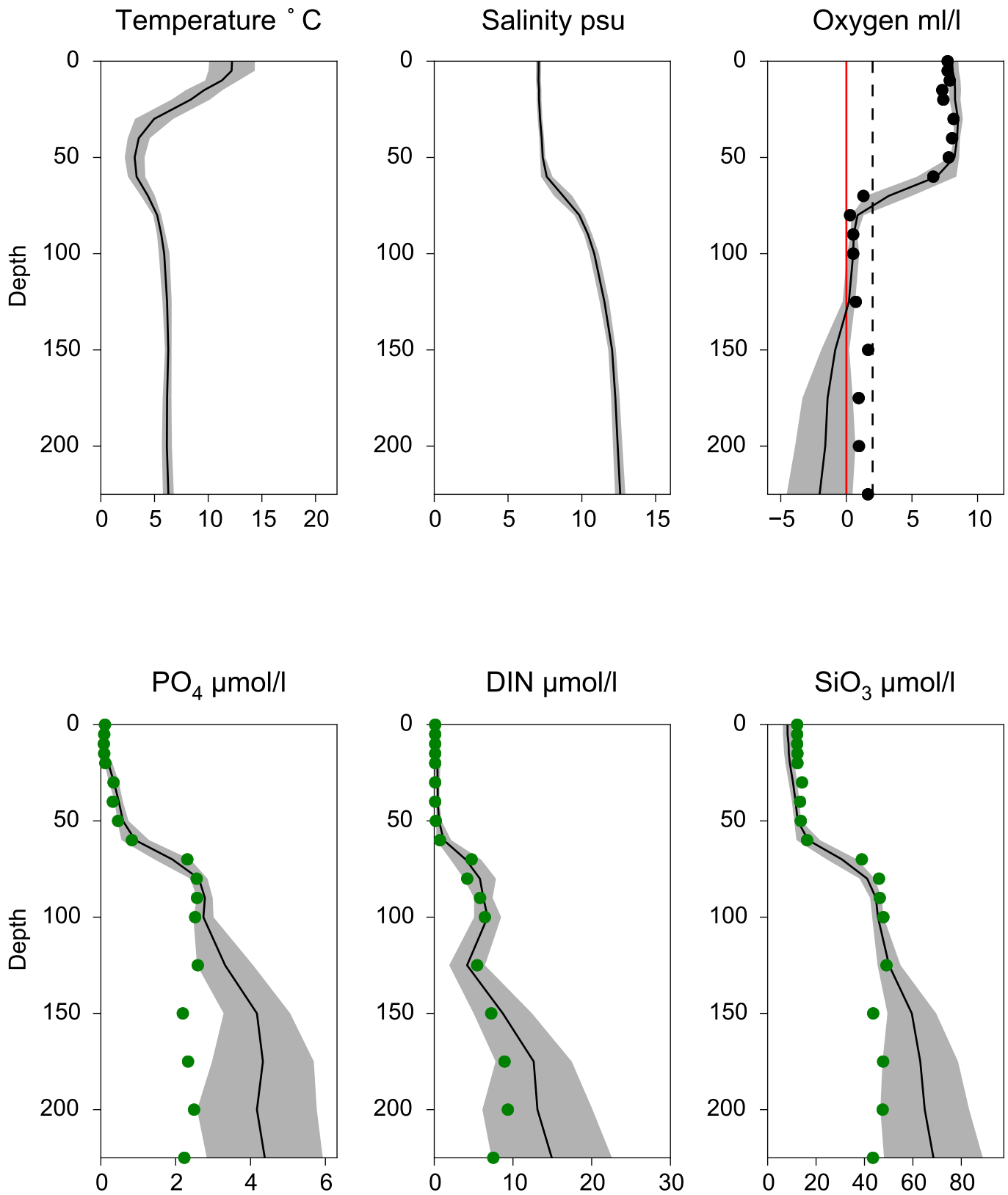


O₂ ml/l



Vertical profiles BY15 GOTLANDSDJ June

— Mean 2001-2015 St.Dev. • 2016-06-14



STATION BY10 SURFACE WATER (0-10m)

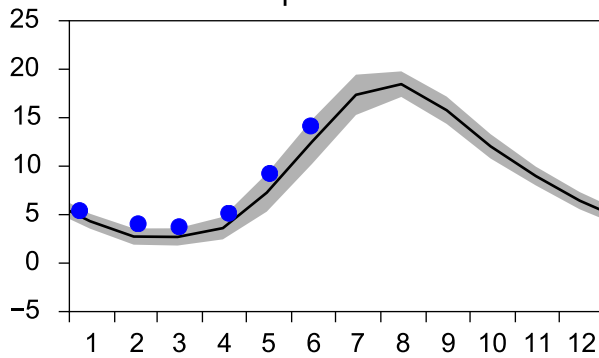
Annual Cycles

— Mean 2001-2015

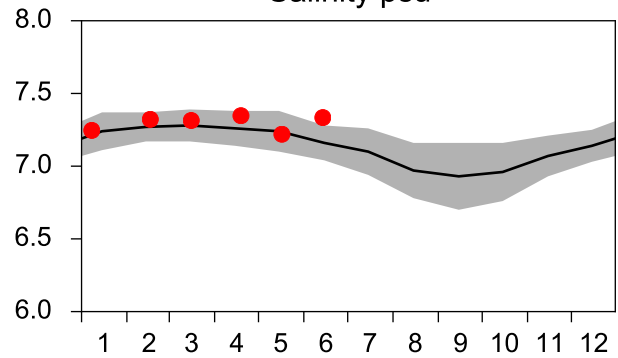
■ St.Dev.

● 2016

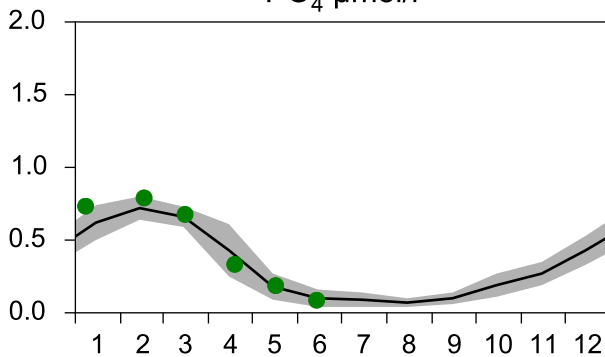
Temperature °C



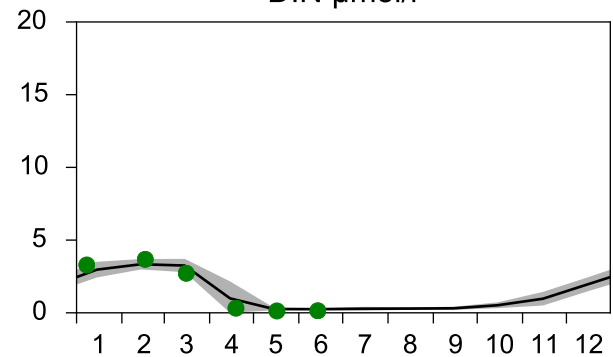
Salinity psu



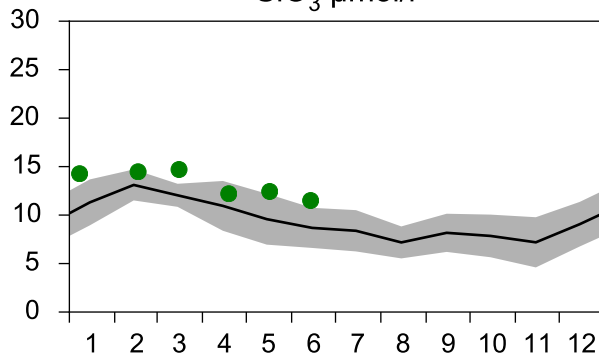
PO₄ µmol/l



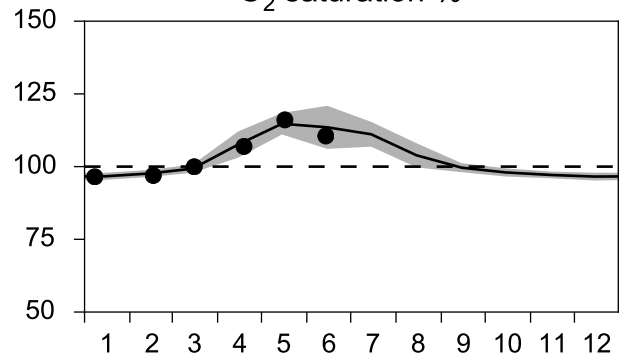
DIN µmol/l



SiO₃ µmol/l

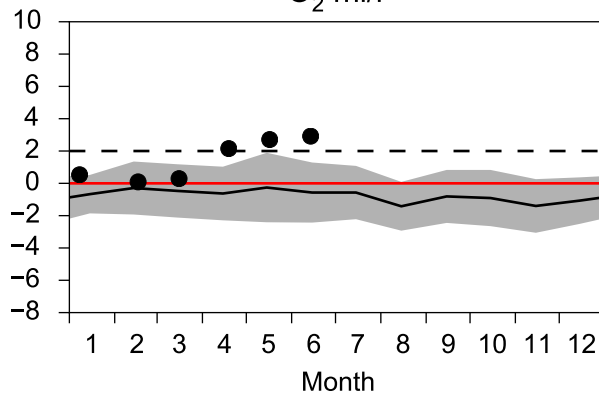


O₂ saturation %

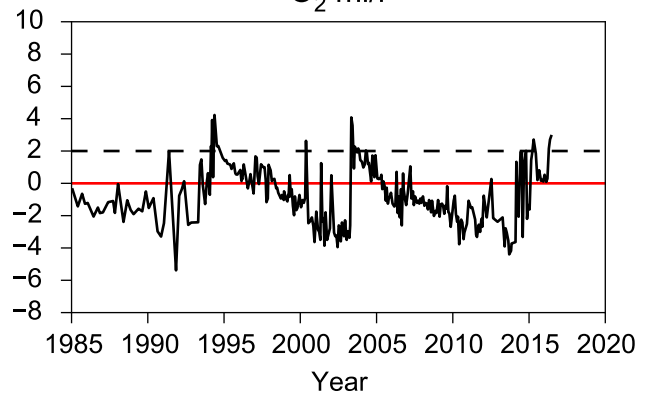


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l

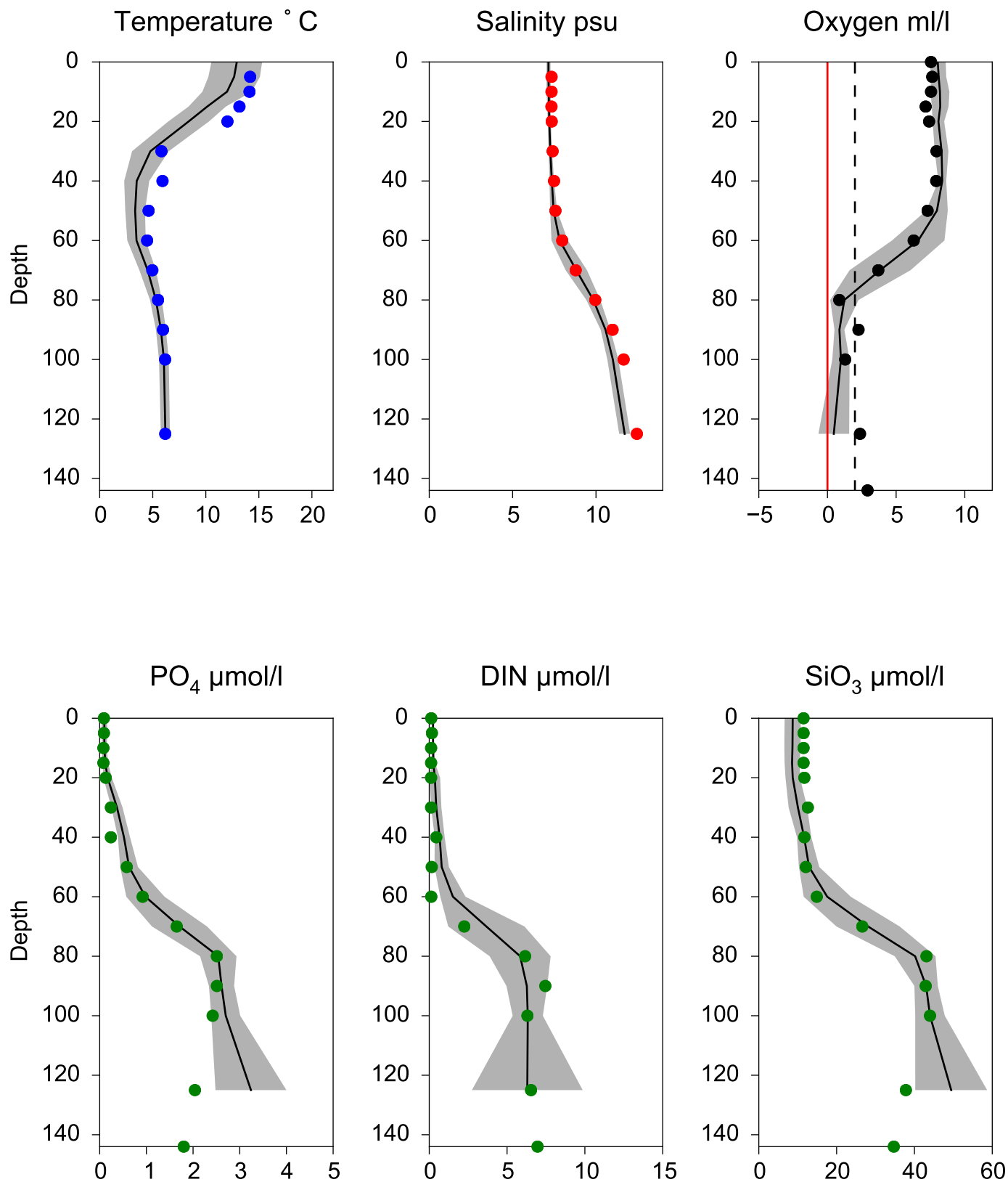


O₂ ml/l



Vertical profiles BY10 June

— Mean 2001-2015 St.Dev. • 2016-06-14



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

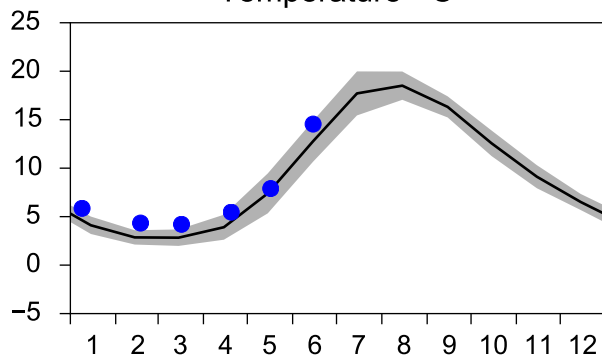
Annual Cycles

— Mean 2001-2015

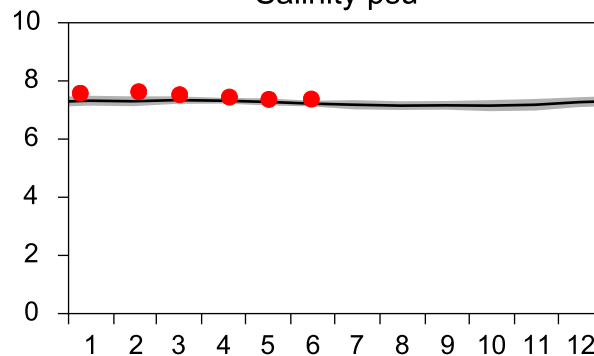
■ St.Dev.

● 2016

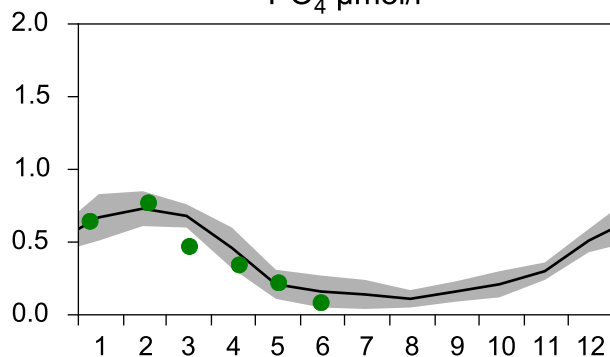
Temperature °C



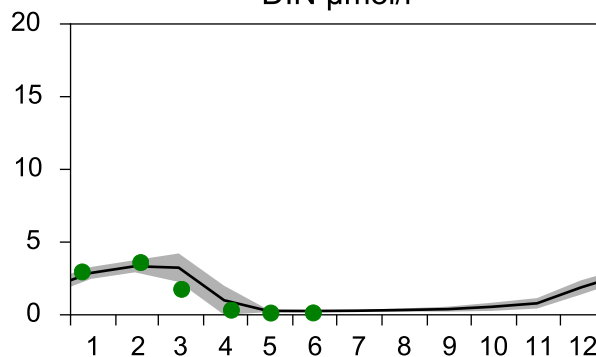
Salinity psu



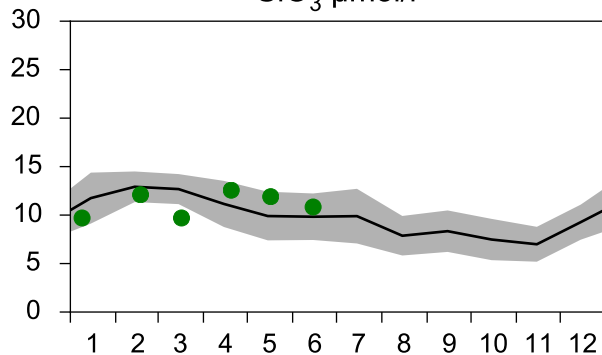
PO₄ µmol/l



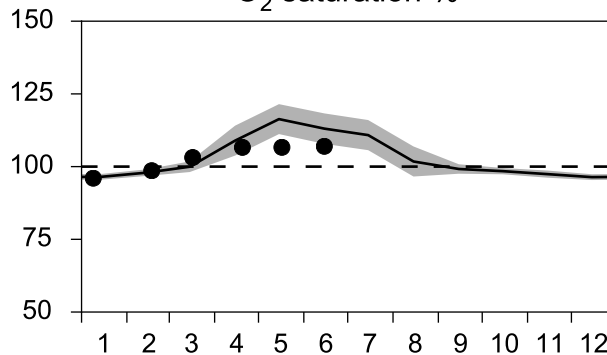
DIN µmol/l



SiO₃ µmol/l

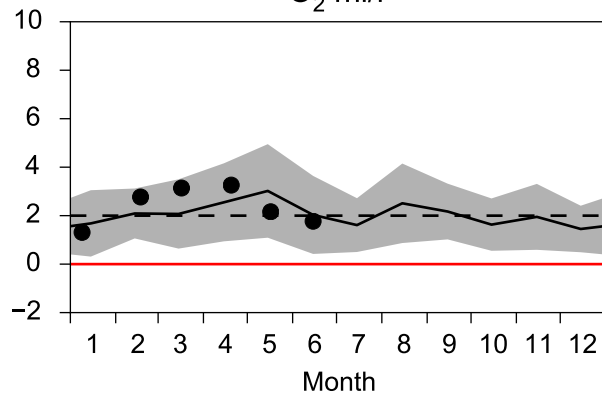


O₂ saturation %

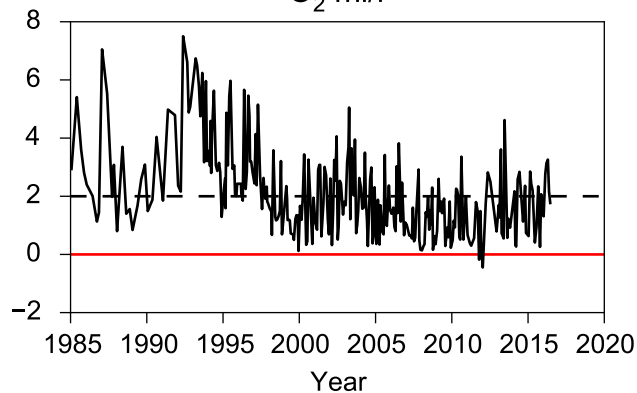


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

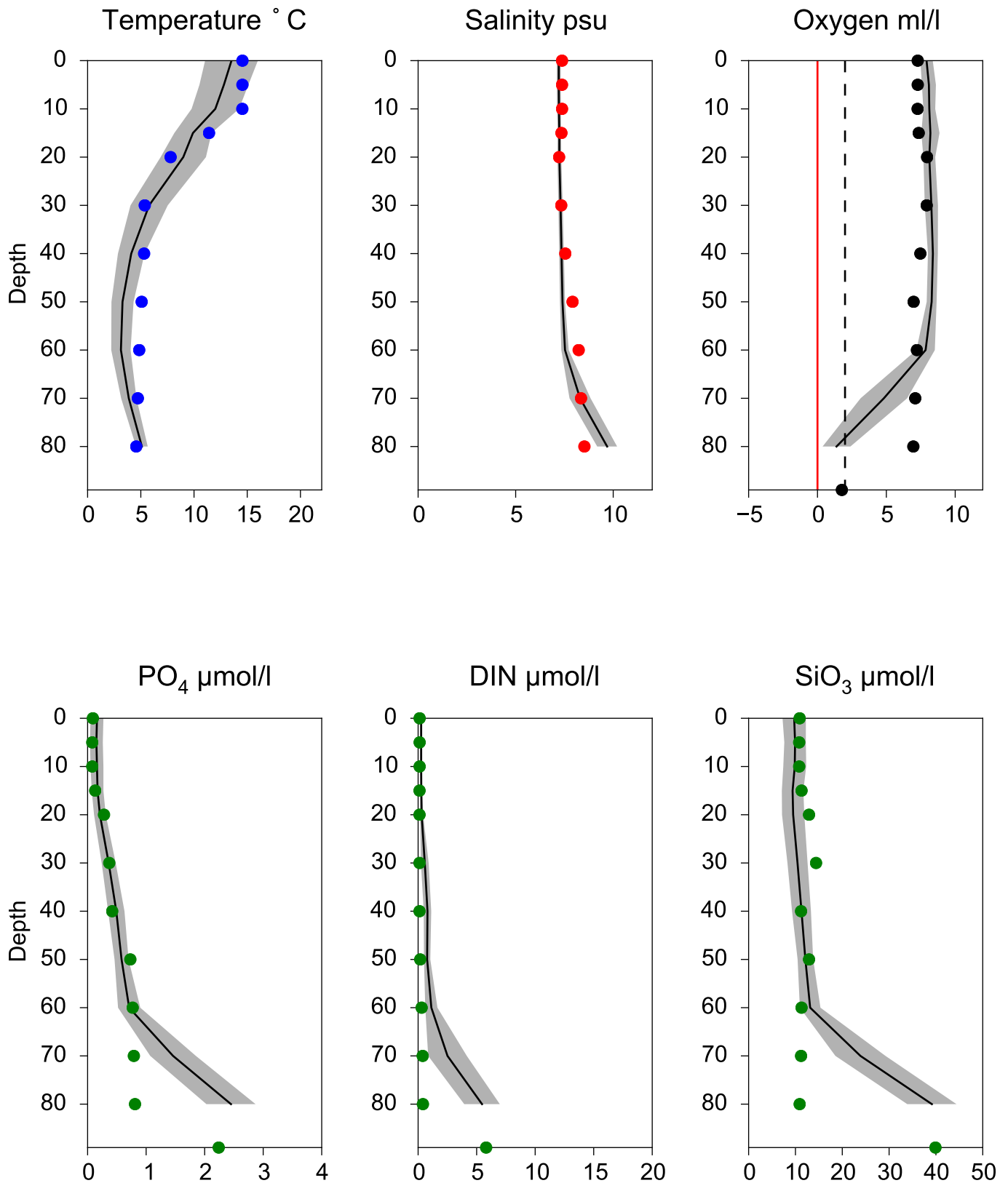


O₂ ml/l



Vertical profiles BCS III-10 June

— Mean 2001-2015 ■ St.Dev. ● 2016-06-15



STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10m)

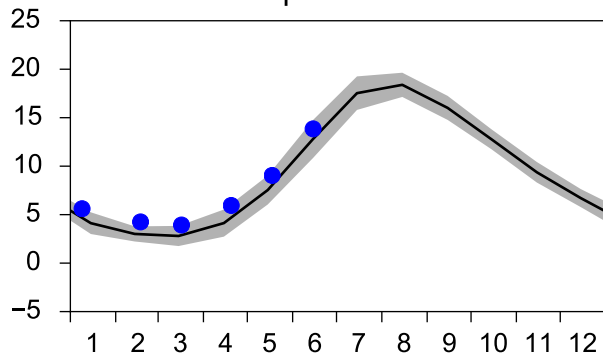
Annual Cycles

— Mean 2001-2015

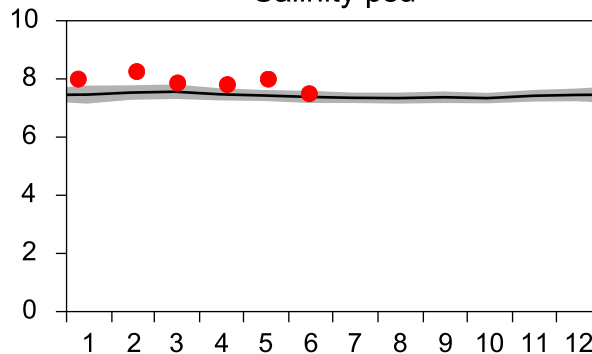
■ St.Dev.

● 2016

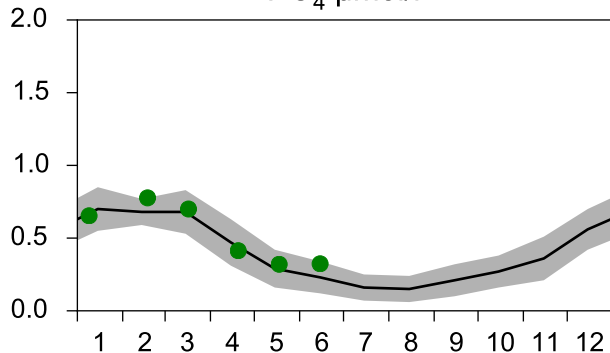
Temperature °C



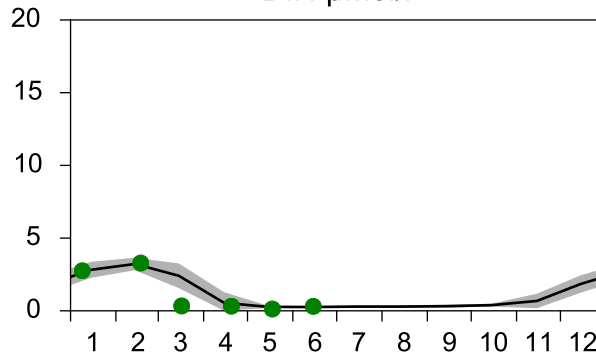
Salinity psu



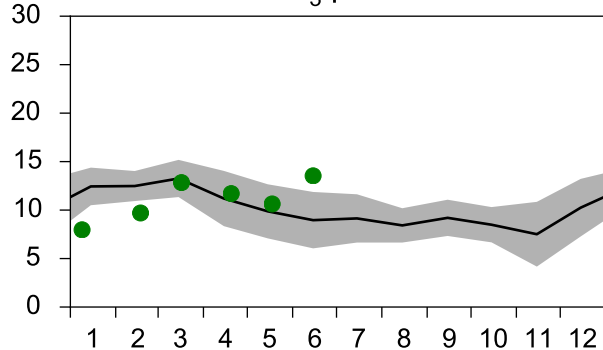
PO₄ µmol/l



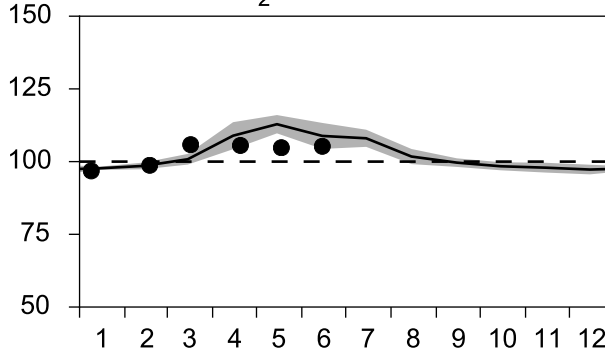
DIN µmol/l



SiO₃ µmol/l

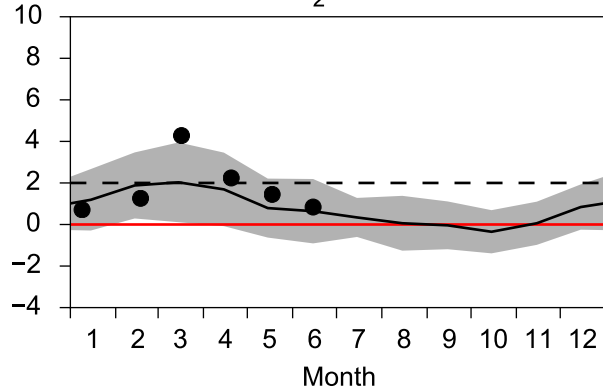


O₂ saturation %

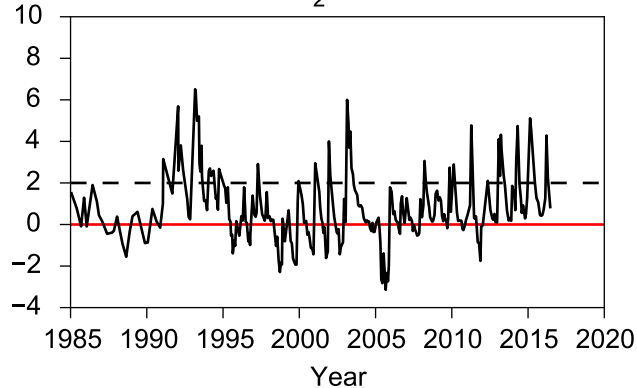


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

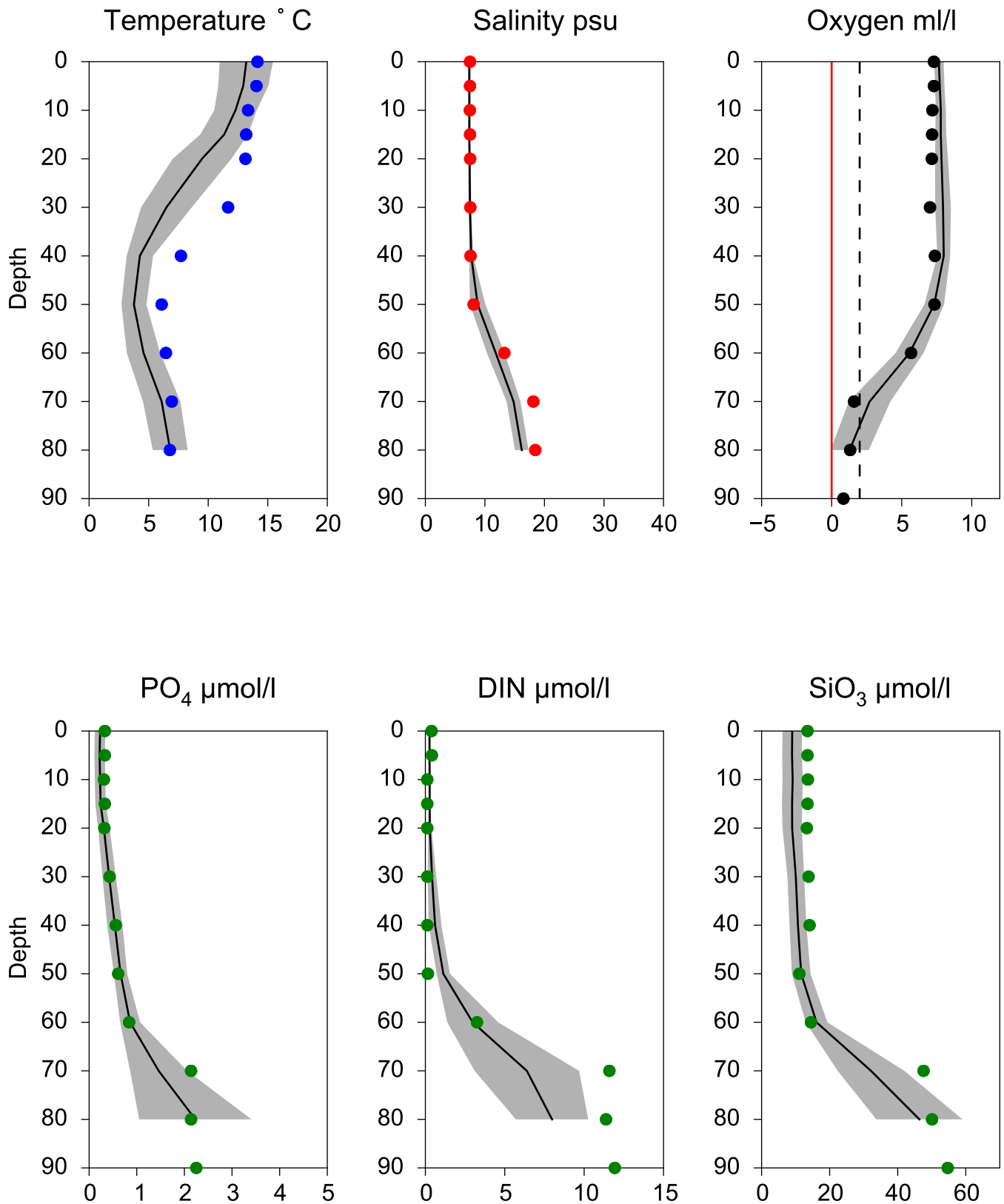


O₂ ml/l



Vertical profiles BY5 BORNHOLMSDJ June

— Mean 2001-2015 St.Dev. • 2016-06-15



STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10m)

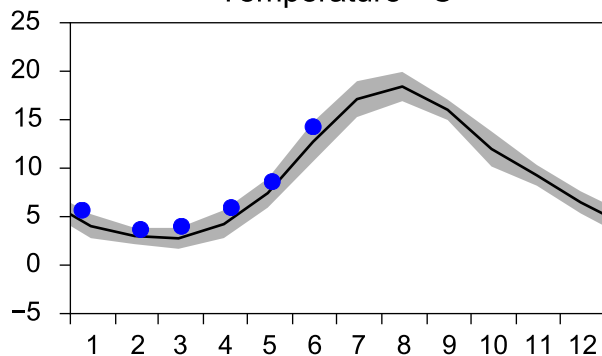
Annual Cycles

— Mean 2001-2015

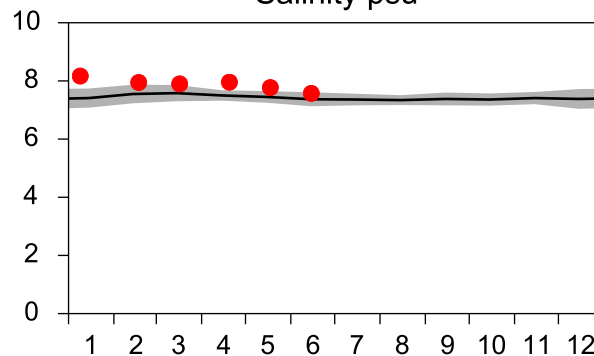
■ St.Dev.

● 2016

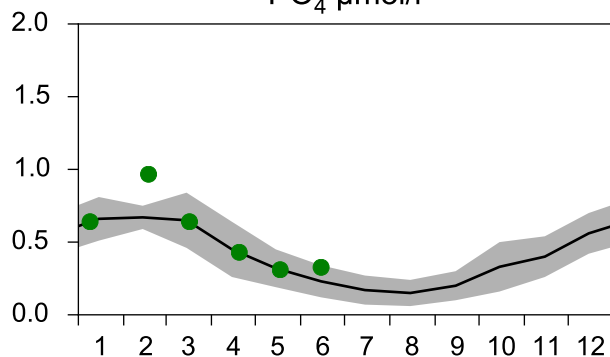
Temperature °C



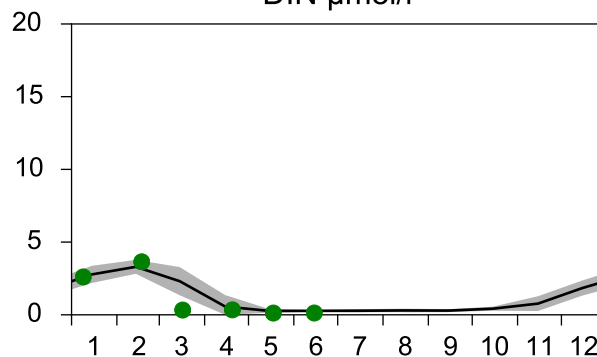
Salinity psu



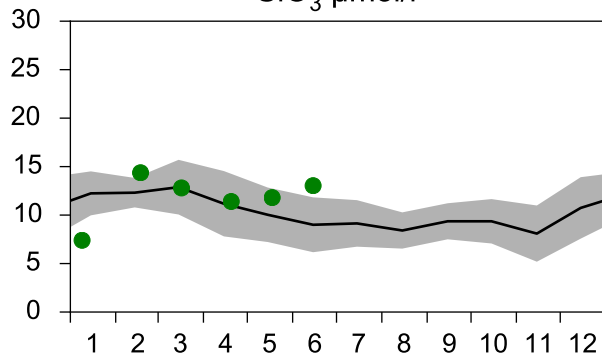
PO₄ µmol/l



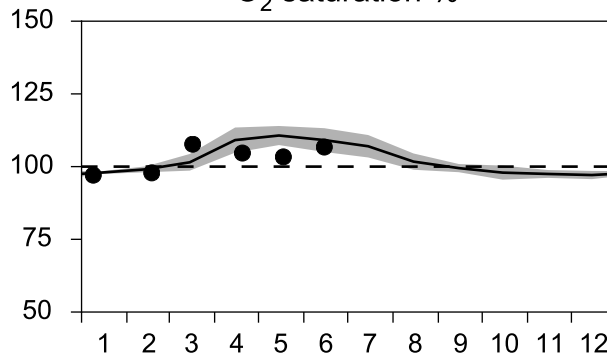
DIN µmol/l



SiO₃ µmol/l

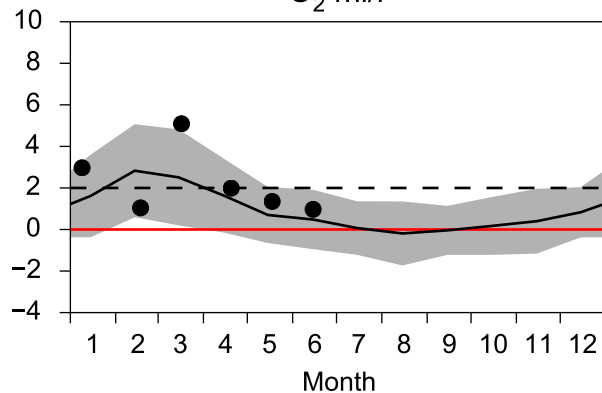


O₂ saturation %

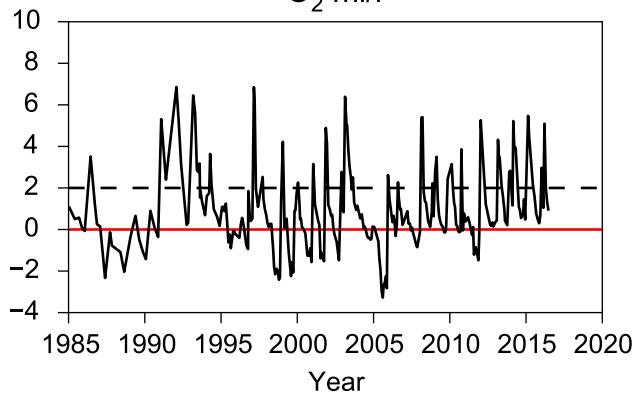


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

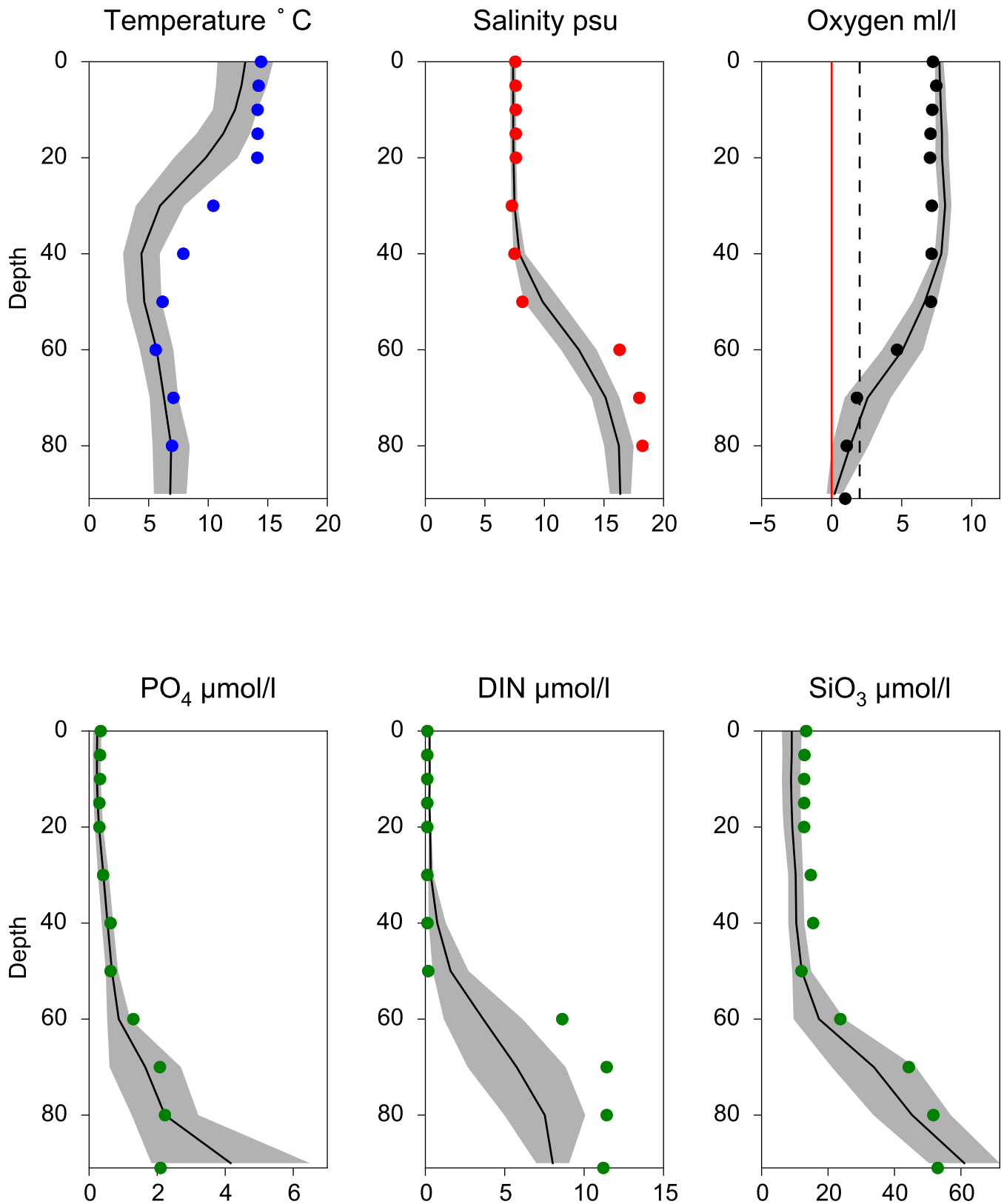


O₂ ml/l



Vertical profiles BY4 CHRISTIANSÖ June

— Mean 2001-2015 St.Dev. • 2016-06-15



STATION BY2 ARKONA SURFACE WATER (0-10m)

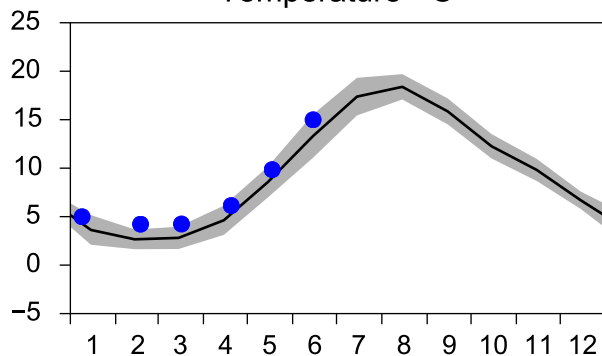
Annual Cycles

— Mean 2001-2015

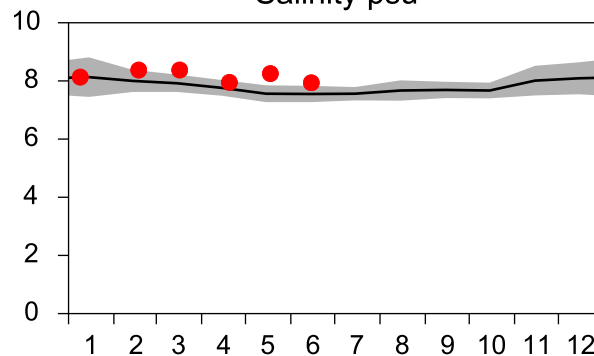
■ St.Dev.

● 2016

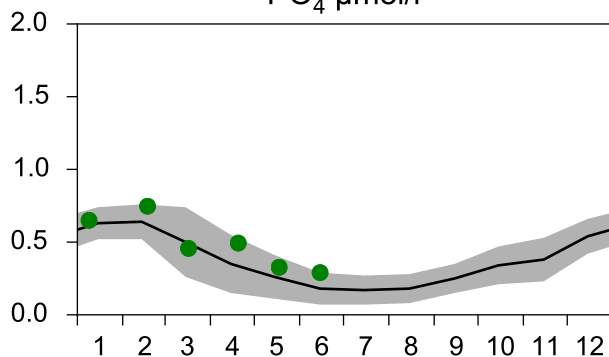
Temperature °C



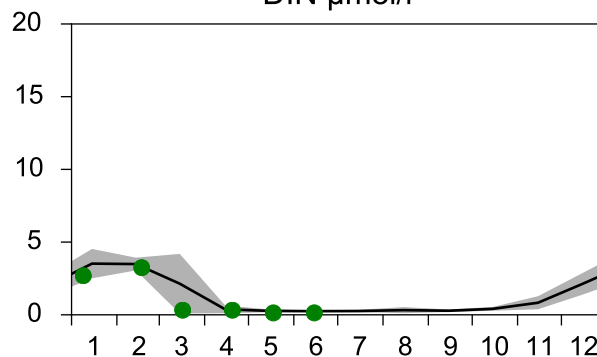
Salinity psu



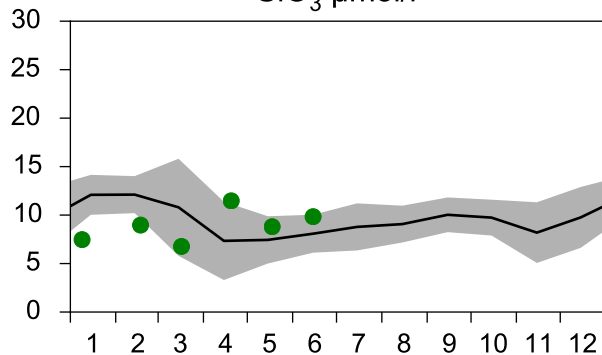
PO₄ µmol/l



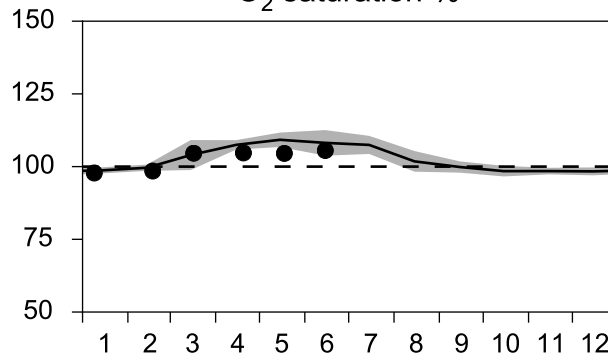
DIN µmol/l



SiO₃ µmol/l

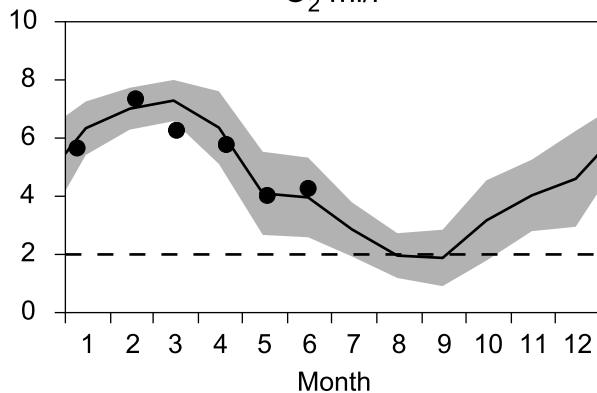


O₂ saturation %

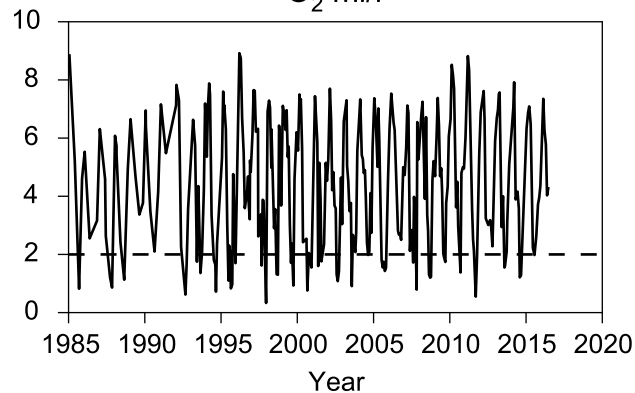


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

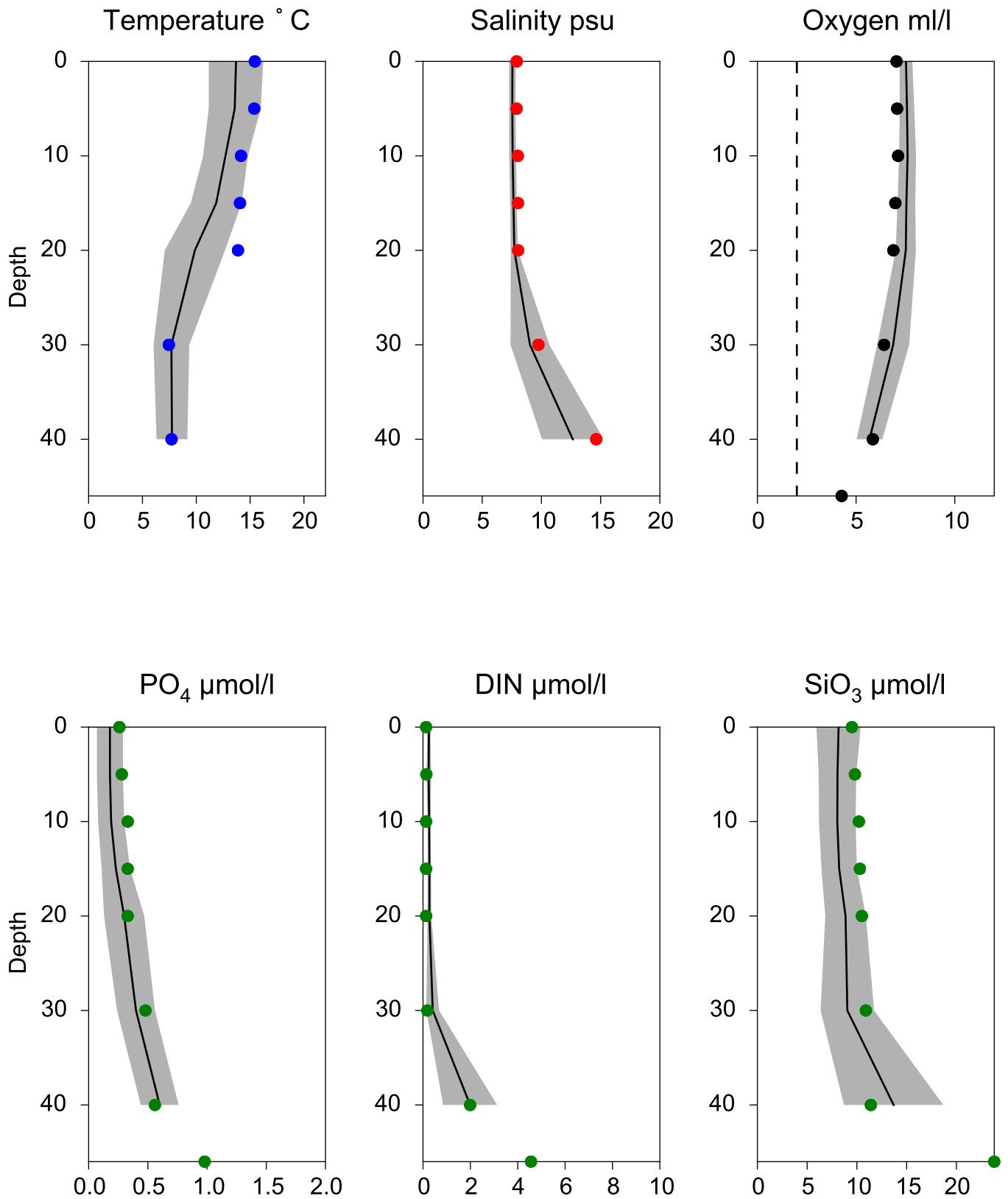


O₂ ml/l



Vertical profiles BY2 ARKONA June

— Mean 2001-2015 St.Dev. • 2016-06-15



STATION BY1 SURFACE WATER (0-10m)

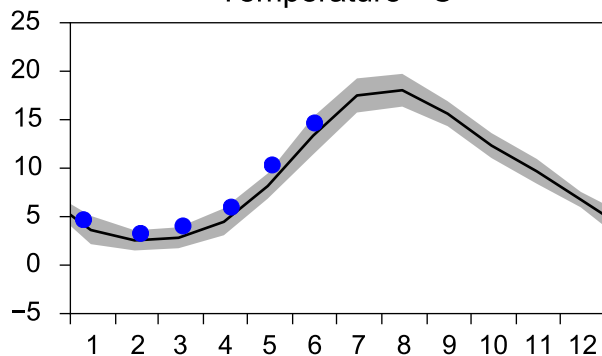
Annual Cycles

— Mean 2001-2015

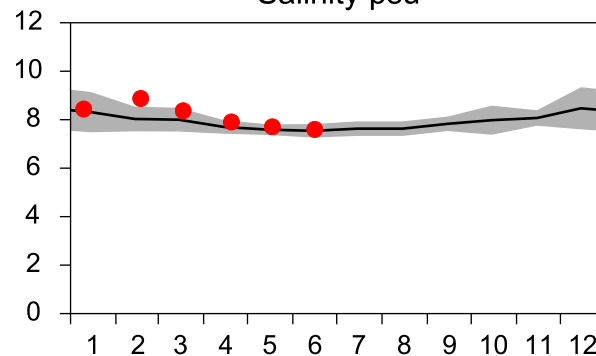
■ St.Dev.

● 2016

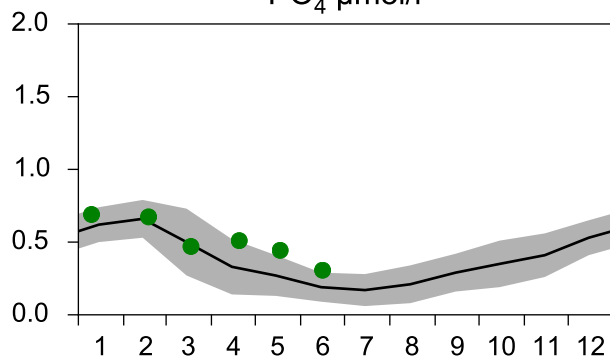
Temperature °C



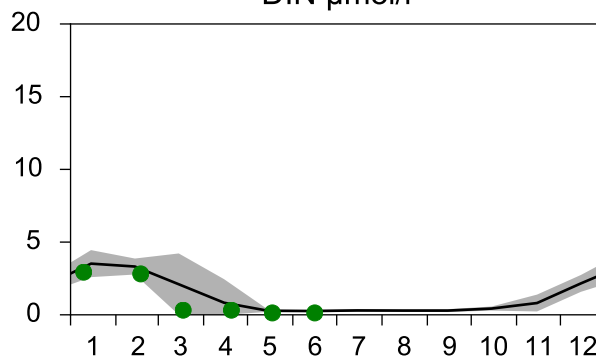
Salinity psu



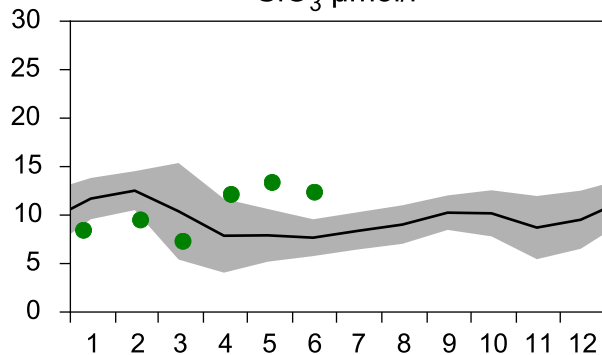
PO₄ µmol/l



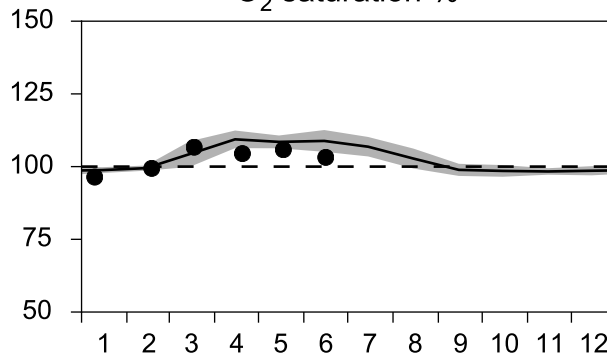
DIN µmol/l



SiO₃ µmol/l

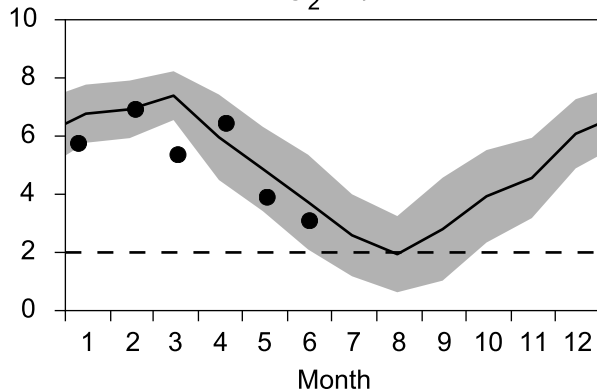


O₂ saturation %

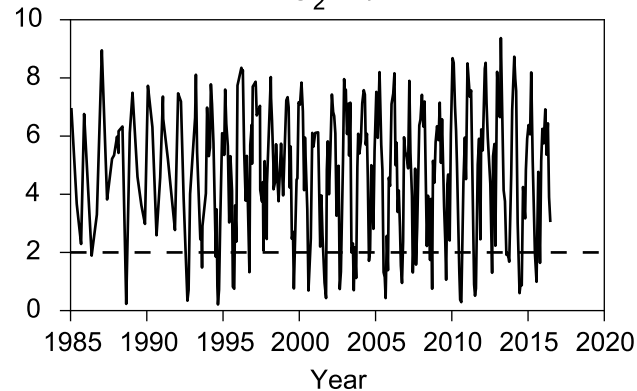


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

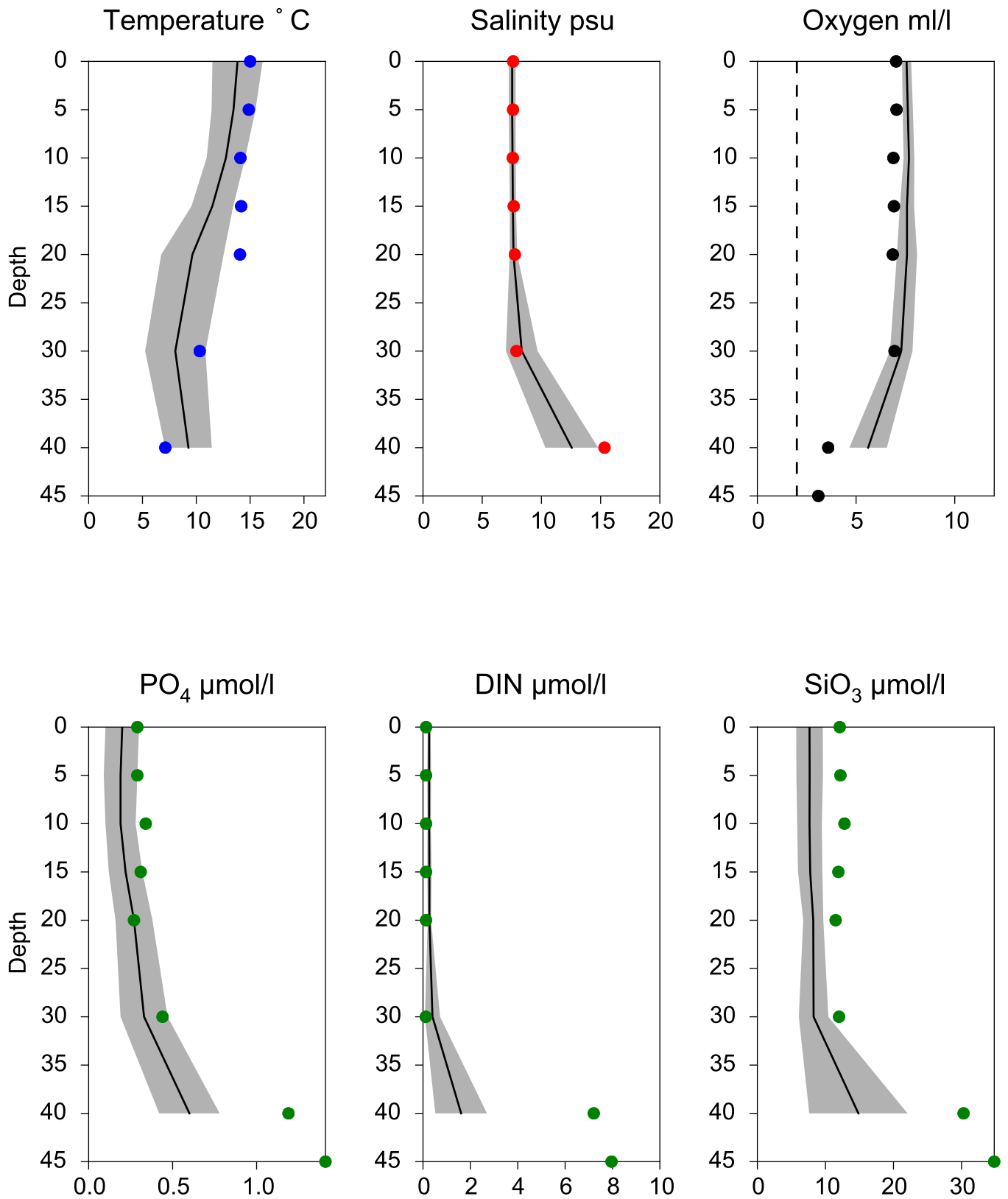


O₂ ml/l



Vertical profiles BY1 June

— Mean 2001-2015 St.Dev. • 2016-06-16



STATION W LANDSKRONA SURFACE WATER (0-10m)

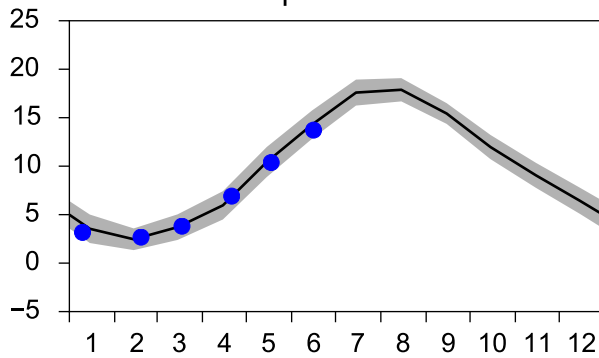
Annual Cycles

— Mean 2001-2015

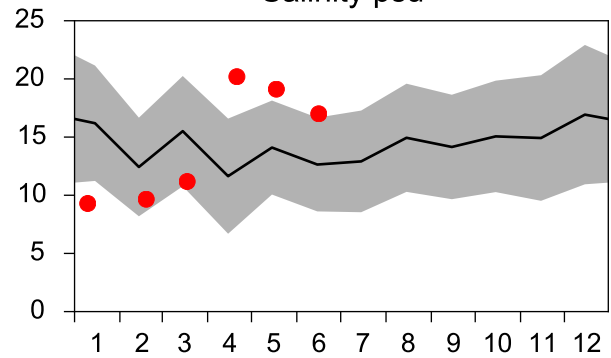
■ St.Dev.

● 2016

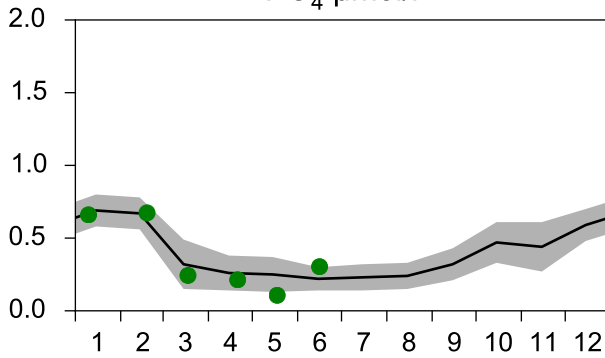
Temperature °C



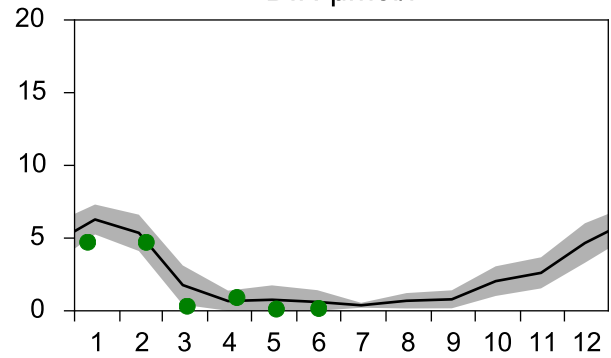
Salinity psu



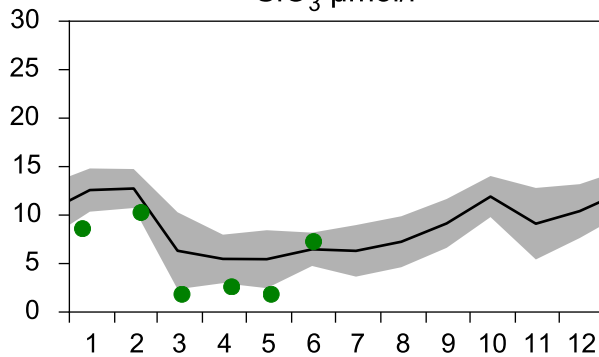
PO₄ µmol/l



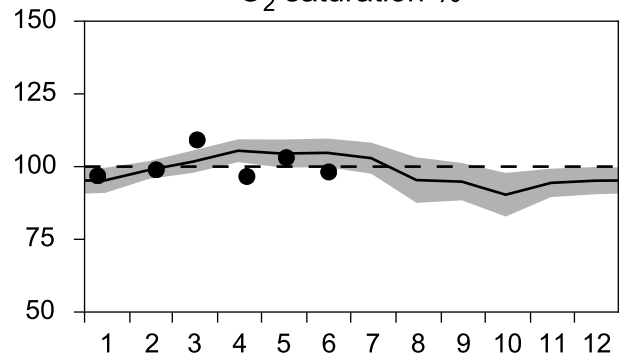
DIN µmol/l



SiO₃ µmol/l

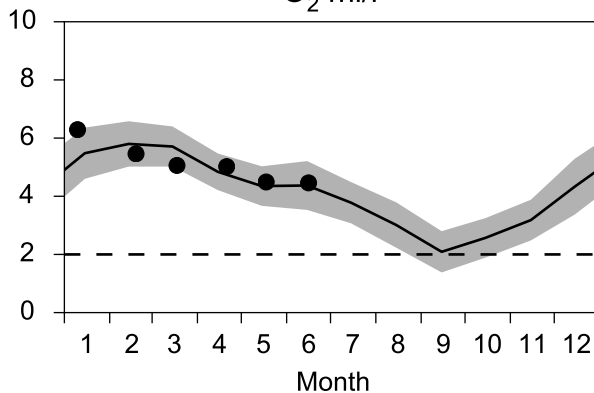


O₂ saturation %

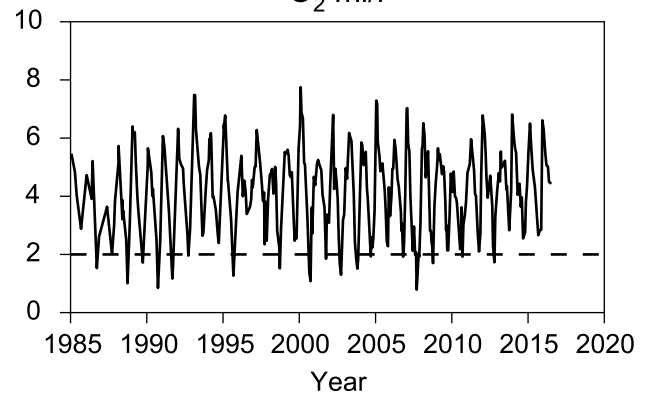


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

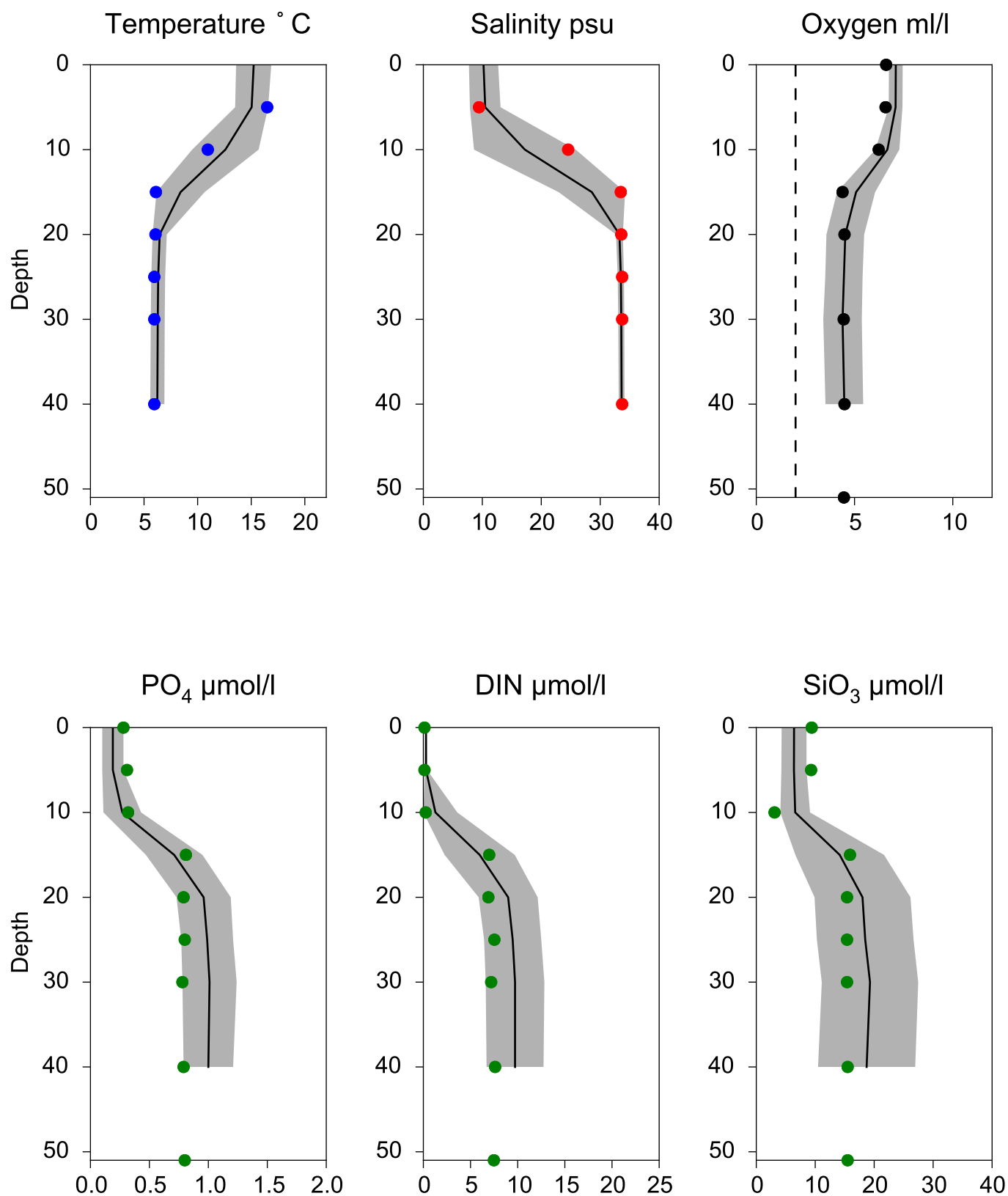


O₂ ml/l



Vertical profiles W LANDSKRONA June

— Mean 2001-2015 St.Dev. • 2016-06-16



STATION ANHOLT E SURFACE WATER (0-10m)

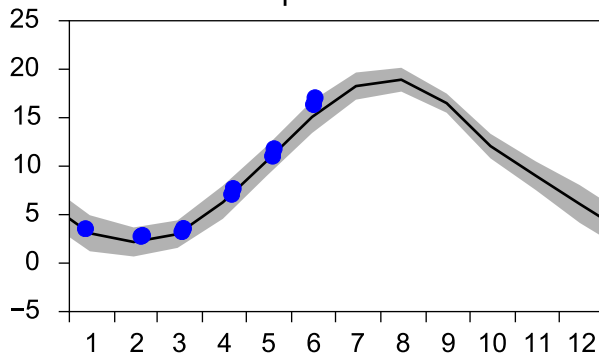
Annual Cycles

— Mean 2001-2015

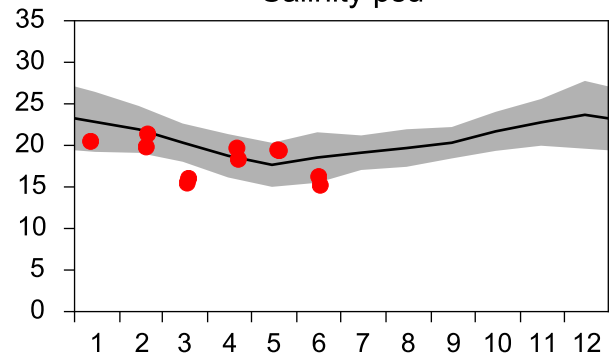
■ St.Dev.

● 2016

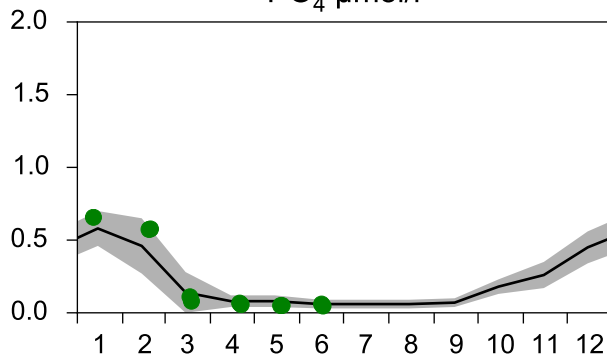
Temperature °C



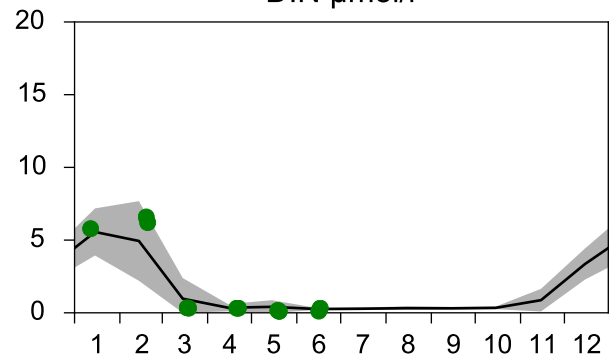
Salinity psu



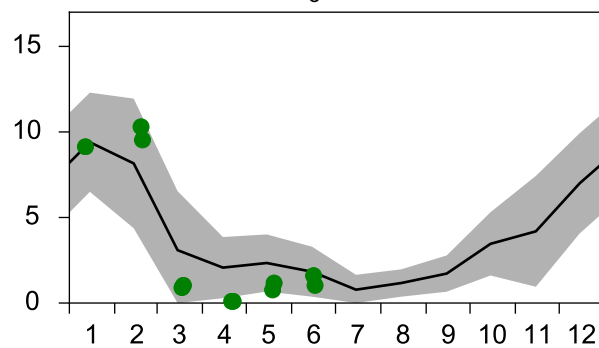
PO₄ µmol/l



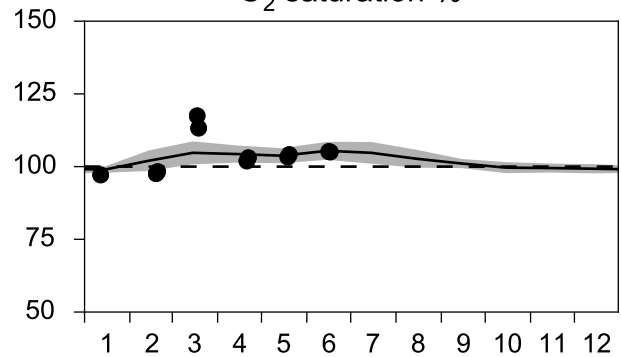
DIN µmol/l



SiO₃ µmol/l

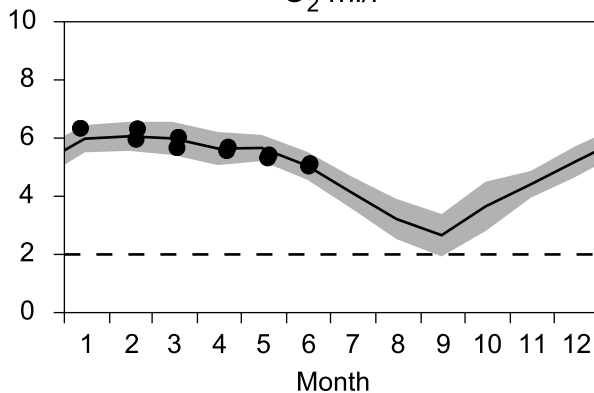


O₂ saturation %

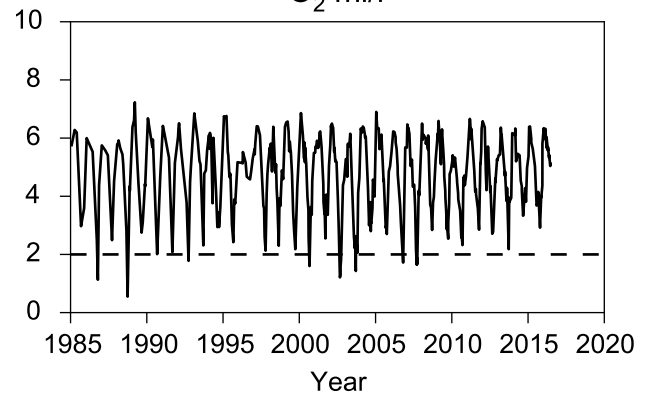


OXYGEN IN BOTTOM WATER (depth >= 45 m)

O₂ ml/l

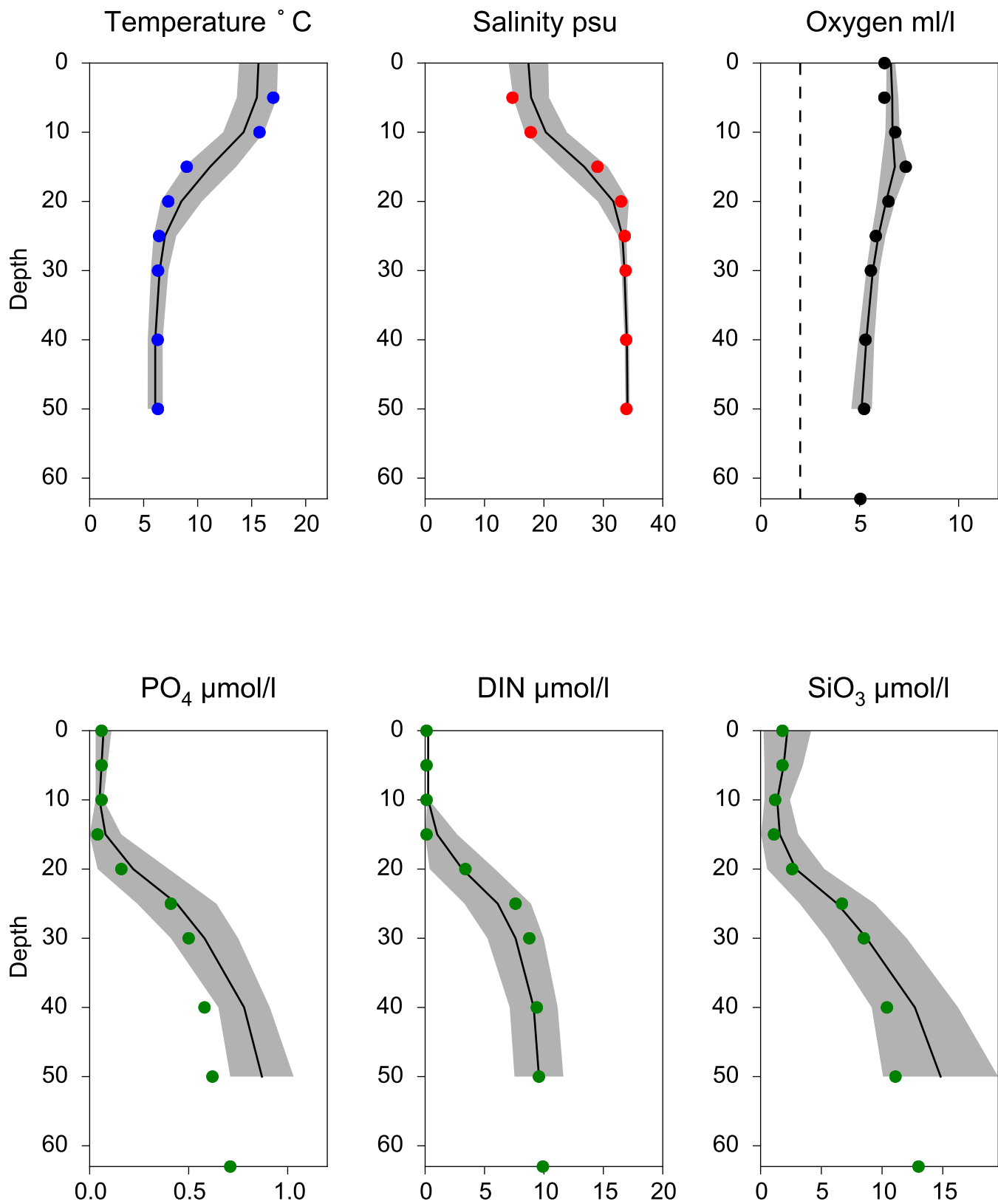


O₂ ml/l



Vertical profiles ANHOLT E June

— Mean 2001-2015 St.Dev. • 2016-06-16



STATION FLADEN SURFACE WATER (0-10m)

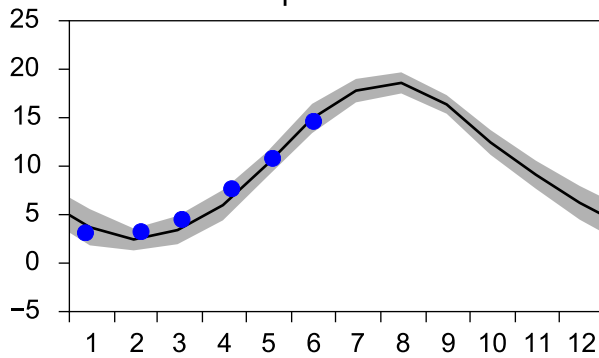
Annual Cycles

— Mean 2001-2015

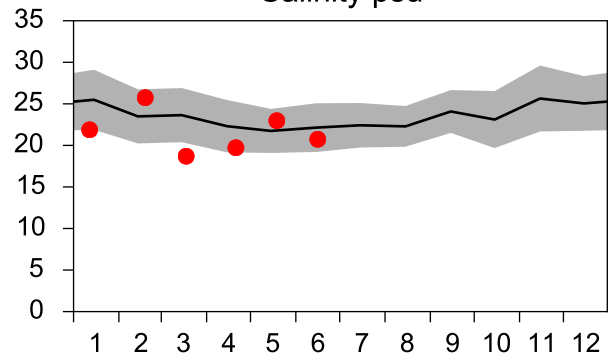
■ St.Dev.

● 2016

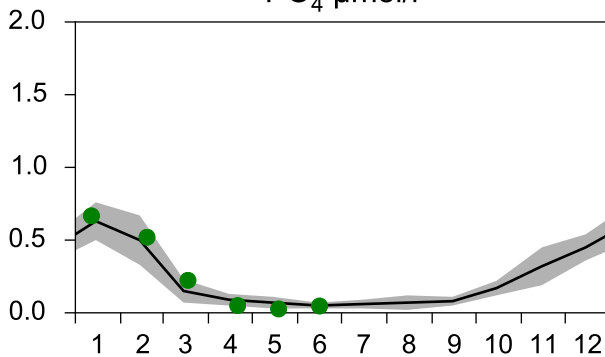
Temperature °C



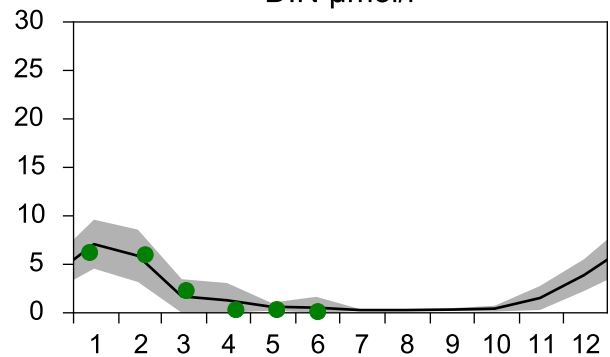
Salinity psu



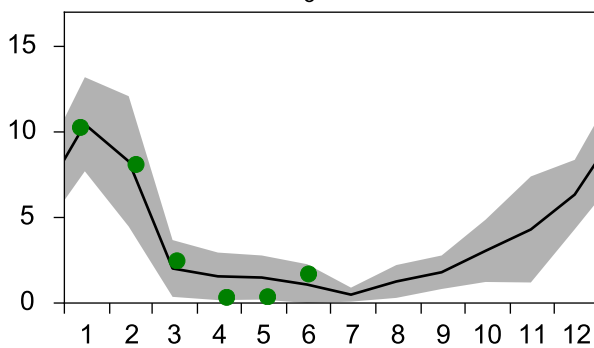
PO₄ µmol/l



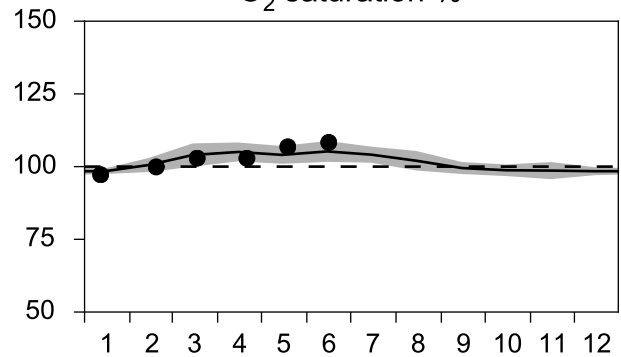
DIN µmol/l



SiO₃ µmol/l

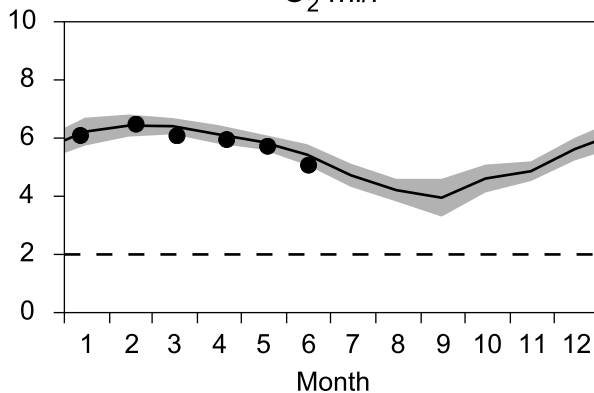


O₂ saturation %

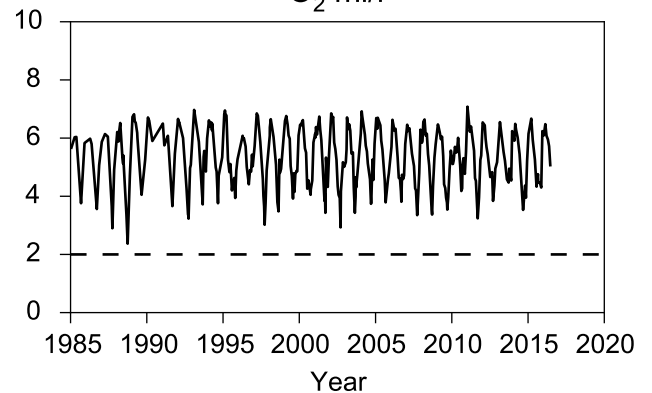


OXYGEN IN BOTTOM WATER (depth >= 65 m)

O₂ ml/l

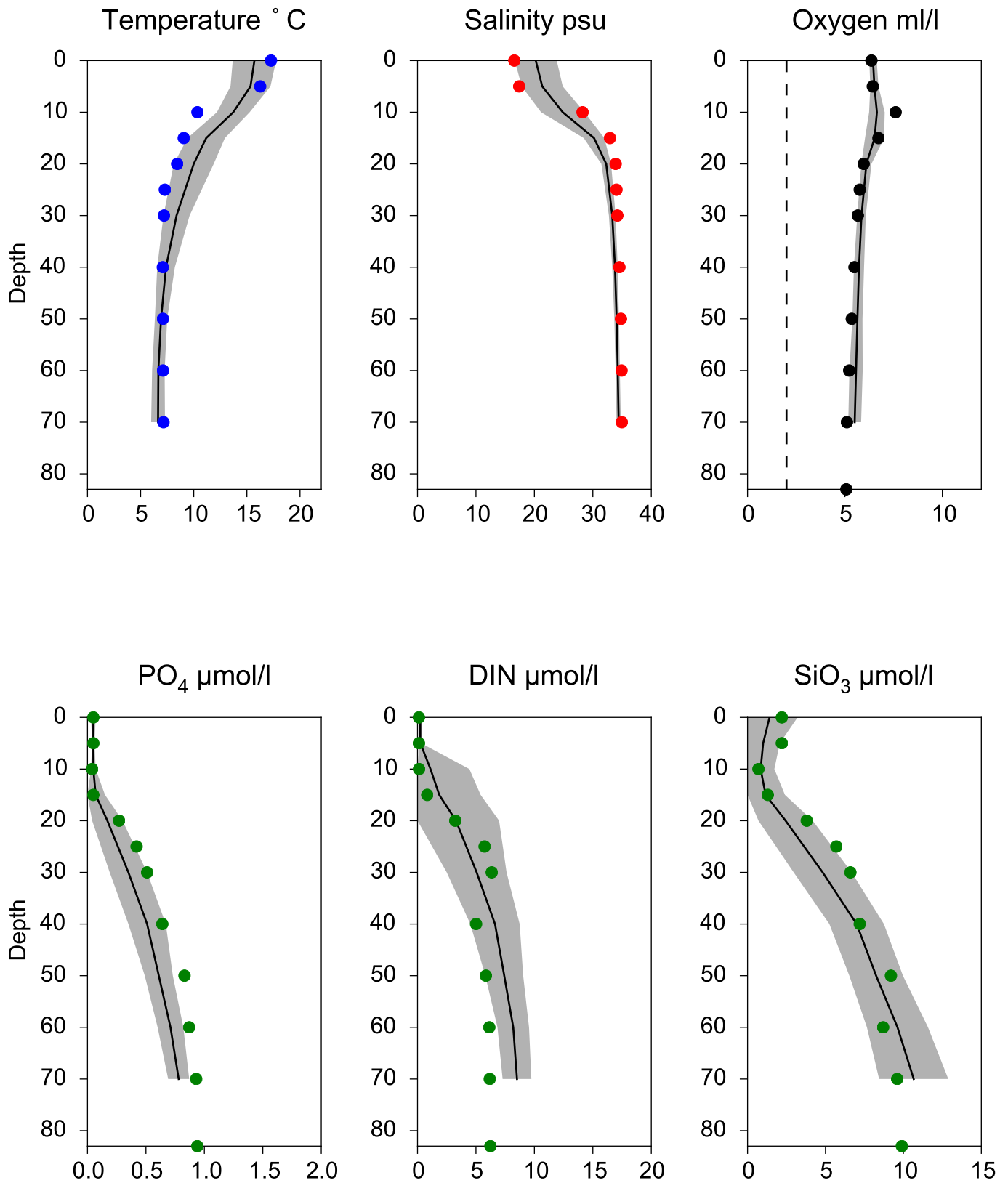


O₂ ml/l



Vertical profiles FLADEN June

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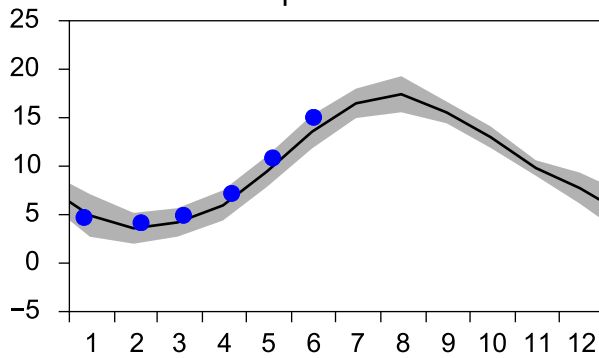


STATION Å17 SURFACE WATER (0-10m)

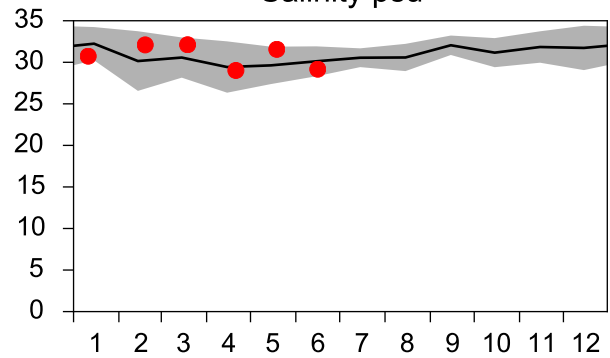
Annual Cycles

— Mean 2001-2015 St.Dev. • 2016

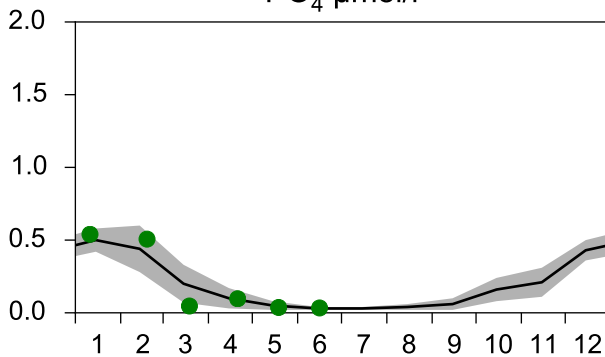
Temperature °C



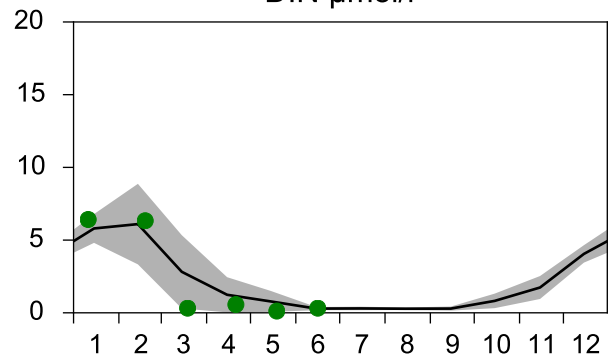
Salinity psu



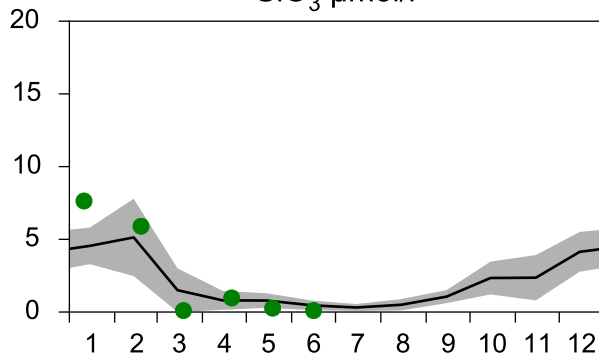
PO₄ µmol/l



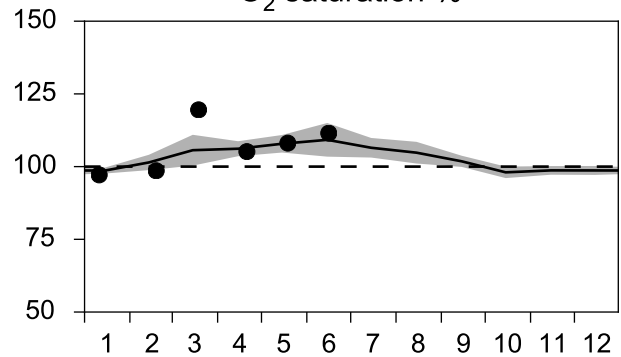
DIN µmol/l



SiO₃ µmol/l

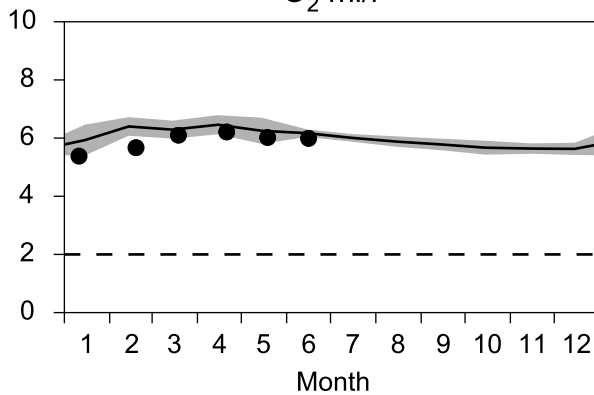


O₂ saturation %

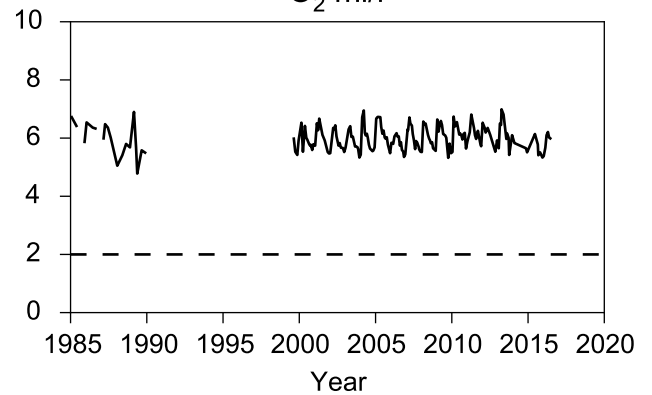


OXYGEN IN BOTTOM WATER (depth >= 300 m)

O₂ ml/l

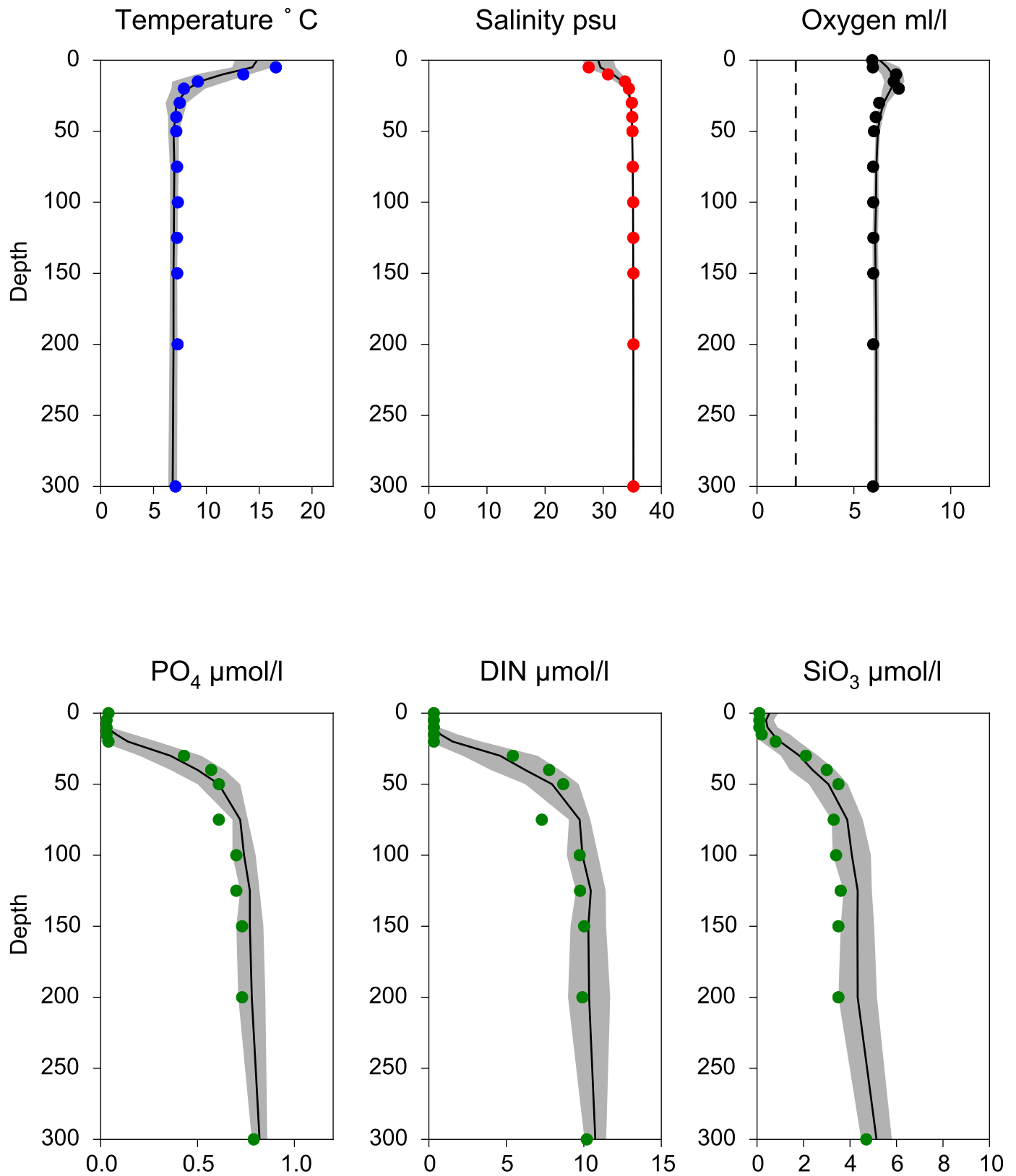


O₂ ml/l



Vertical profiles Å17 June

— Mean 2001-2015 ■ St.Dev. ● 2016-06-16

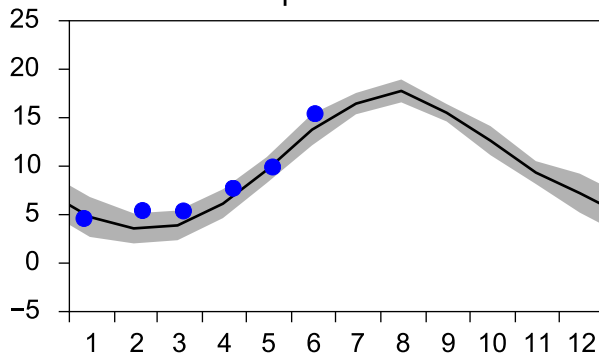


STATION Å15 SURFACE WATER (0-10m)

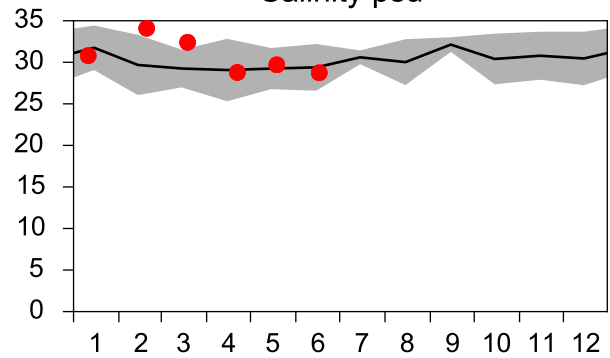
Annual Cycles

— Mean 2001-2015 St.Dev. • 2016

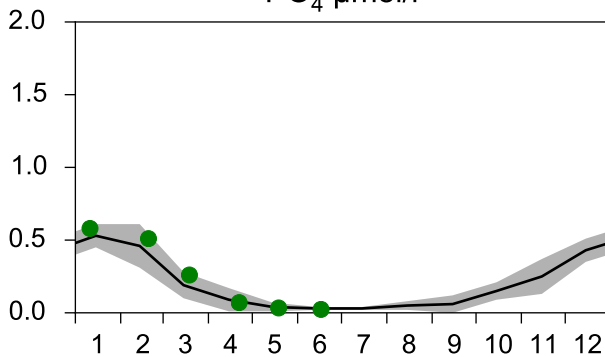
Temperature °C



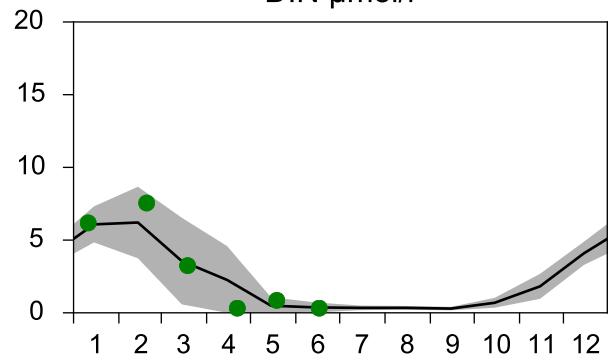
Salinity psu



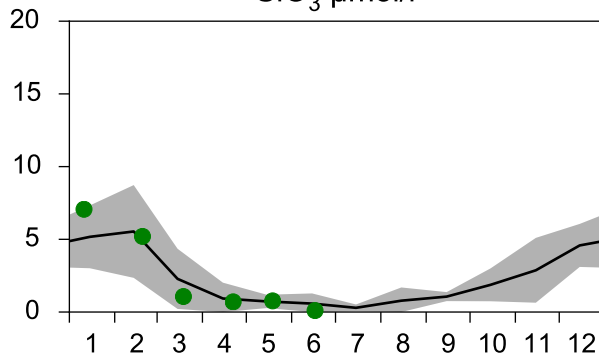
PO₄ µmol/l



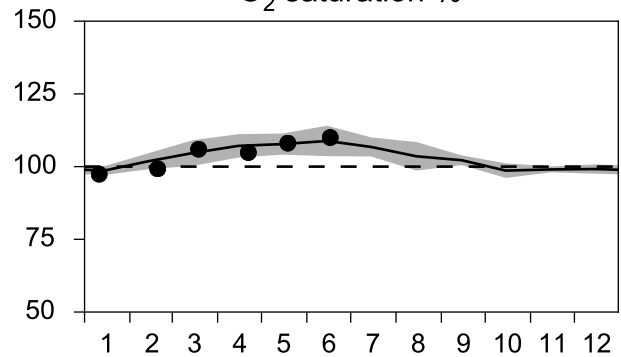
DIN µmol/l



SiO₃ µmol/l

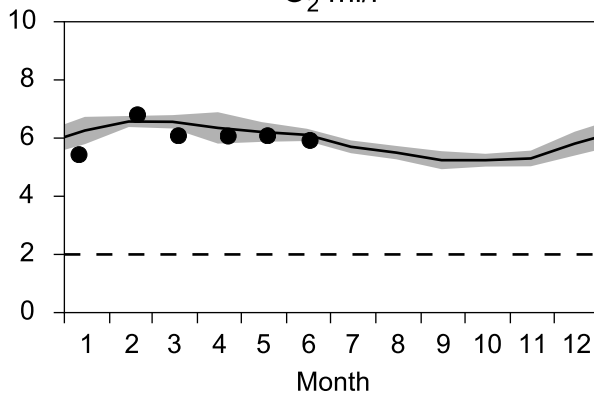


O₂ saturation %

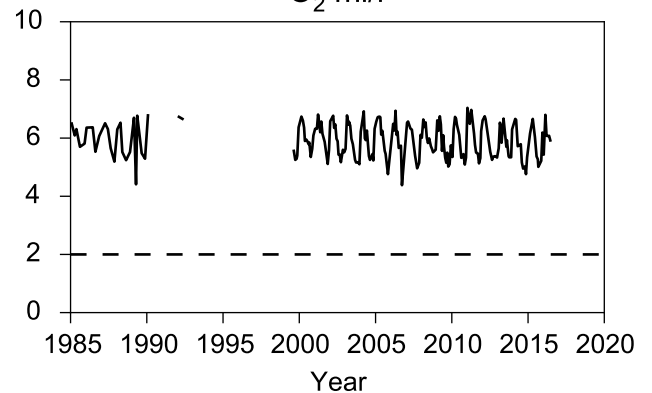


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l

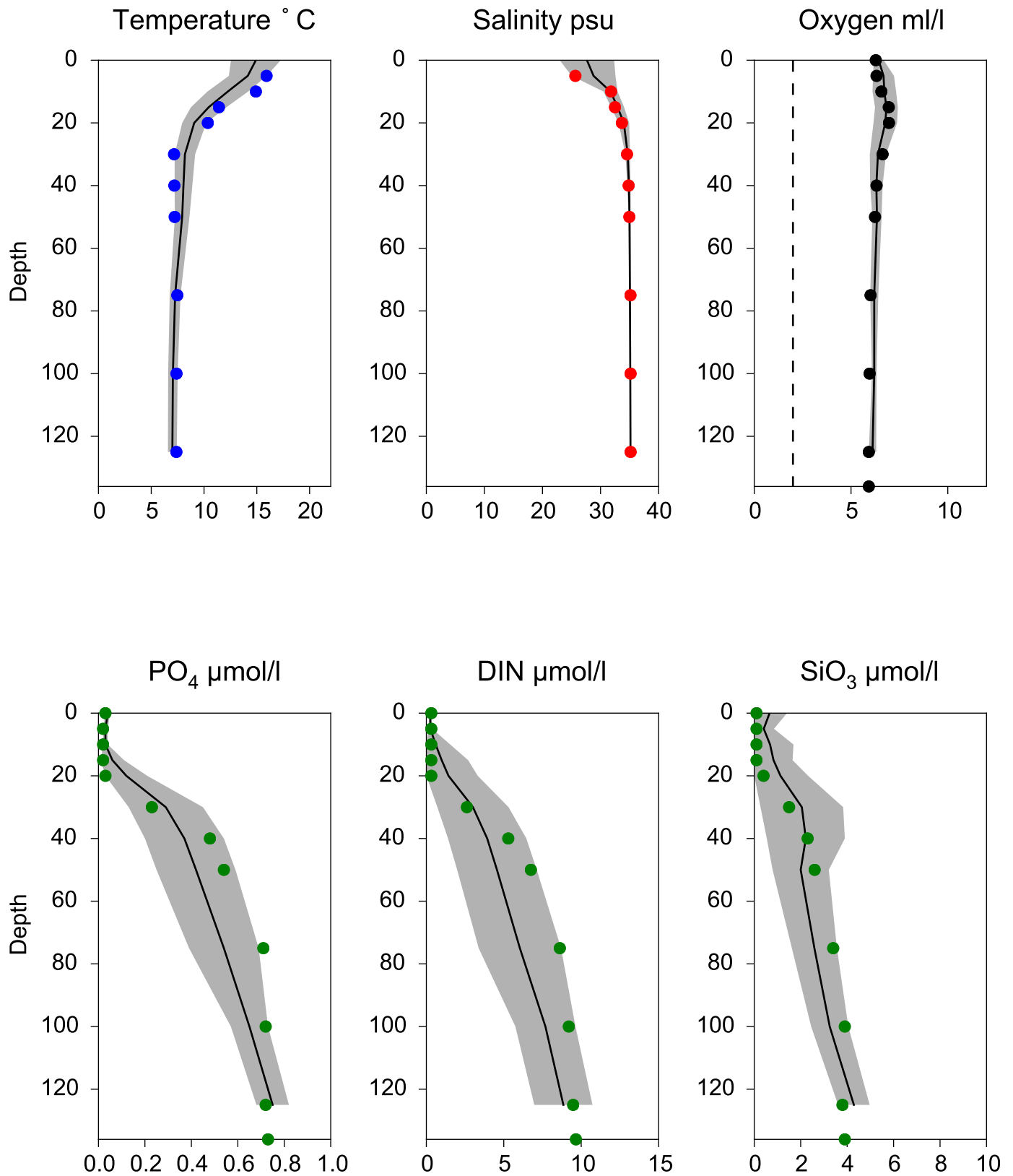


O₂ ml/l



Vertical profiles Å15 June

— Mean 2001-2015 ■ St.Dev. ● 2016-06-17



STATION Å13 SURFACE WATER (0-10m)

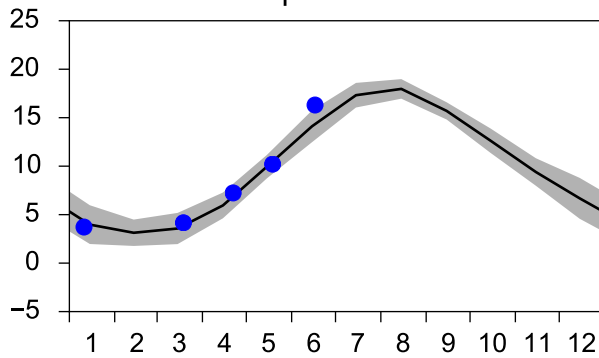
Annual Cycles

— Mean 2001-2015

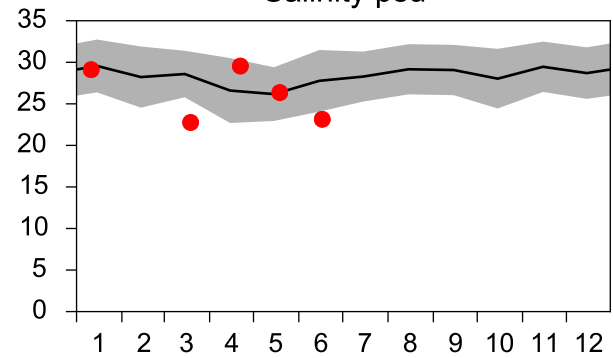
■ St.Dev.

● 2016

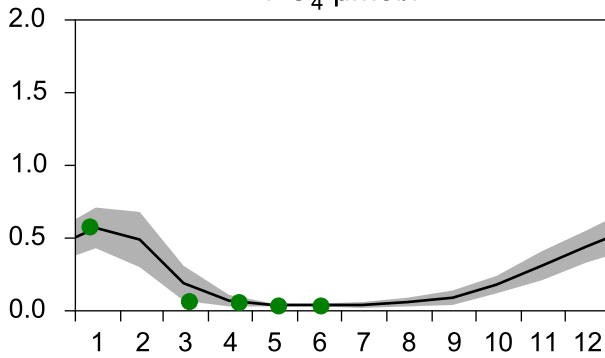
Temperature °C



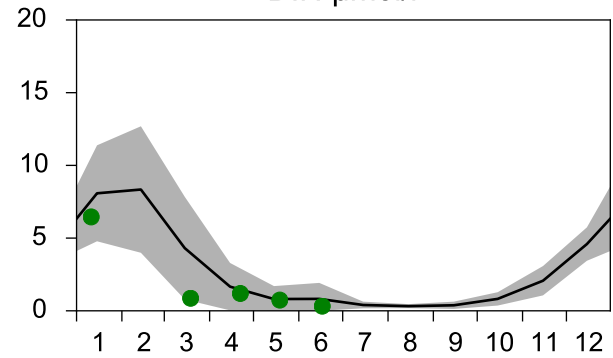
Salinity psu



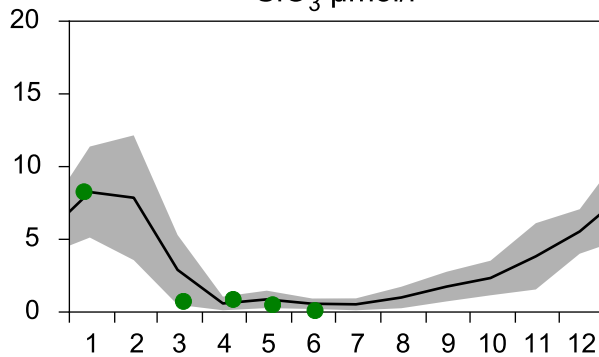
PO₄ µmol/l



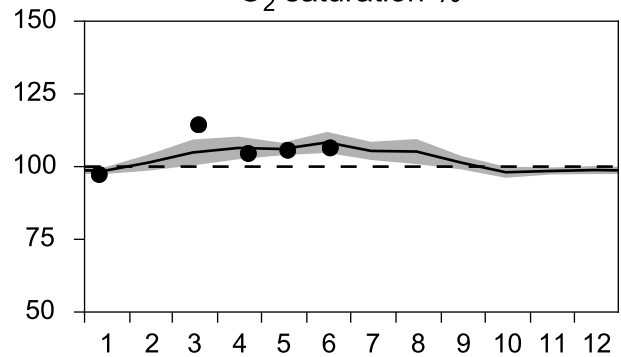
DIN µmol/l



SiO₃ µmol/l

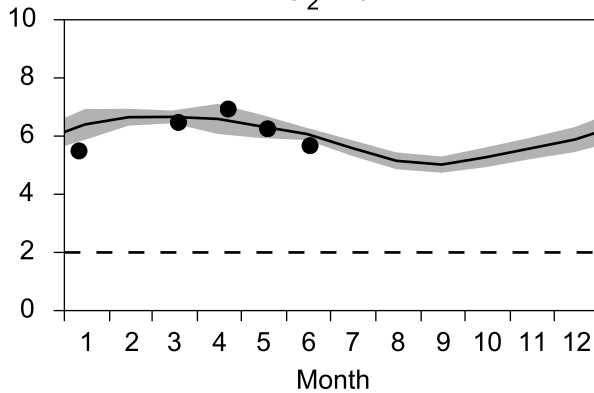


O₂ saturation %

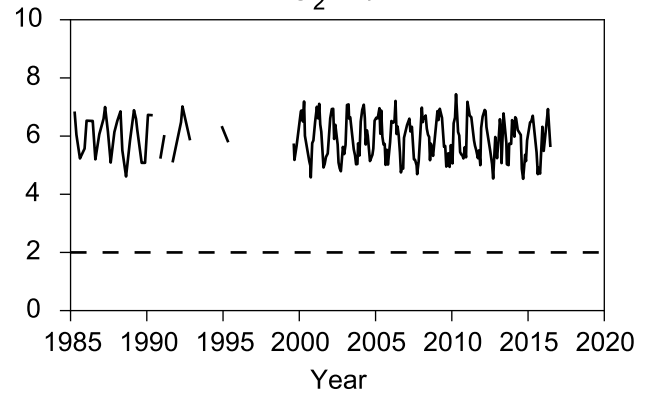


OXYGEN IN BOTTOM WATER (depth >= 75 m)

O₂ ml/l

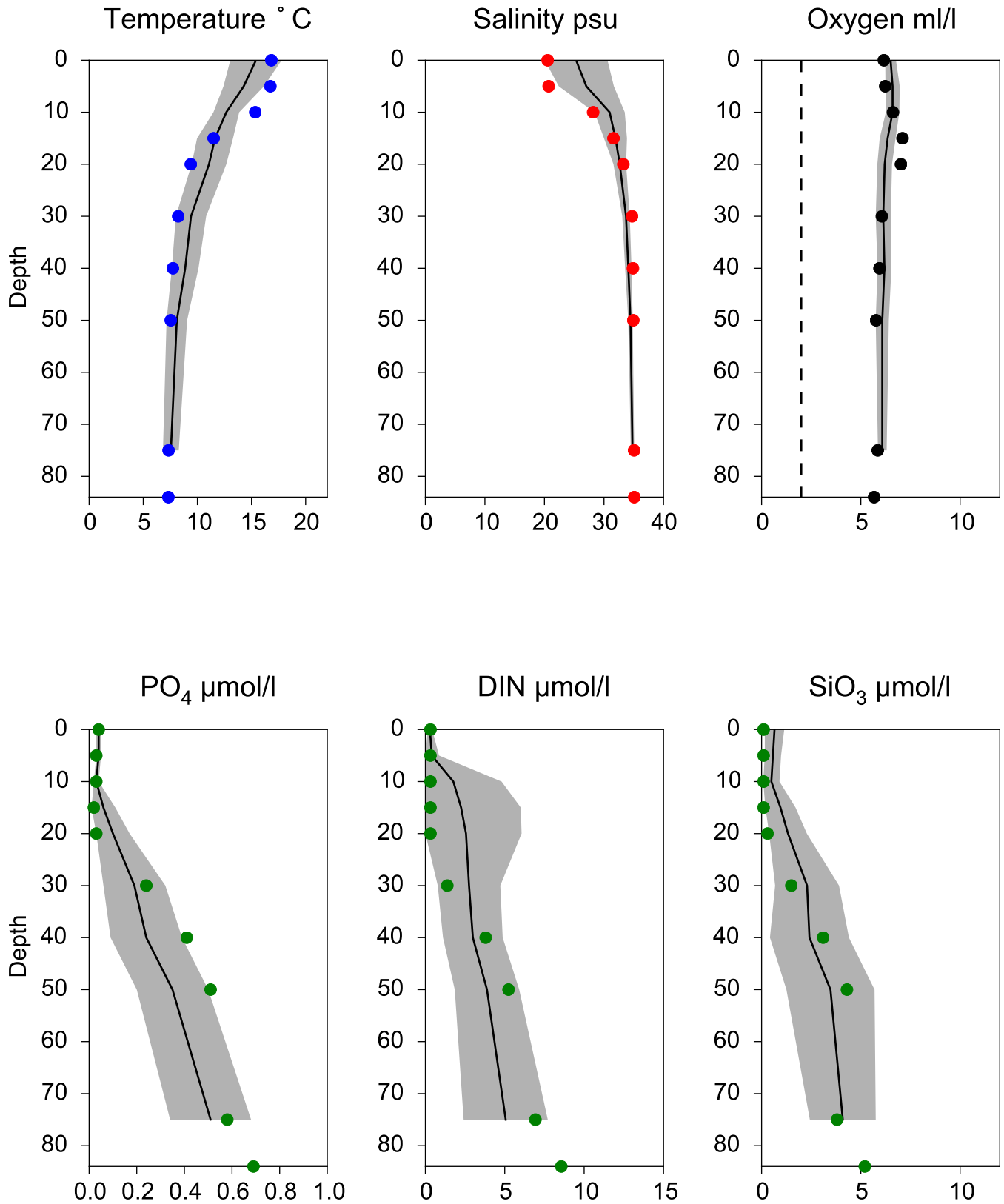


O₂ ml/l



Vertical profiles Å13 June

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STATION SLÄGGÖ SURFACE WATER (0-10m)

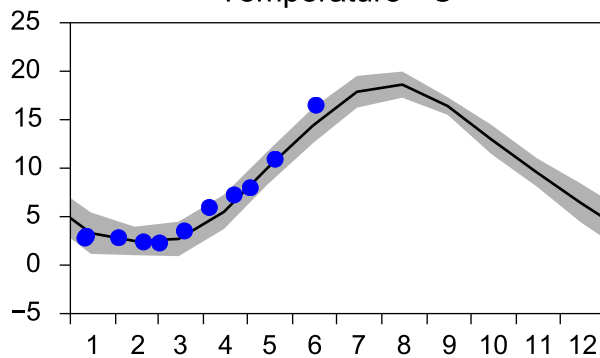
Annual Cycles

— Mean 2001-2015

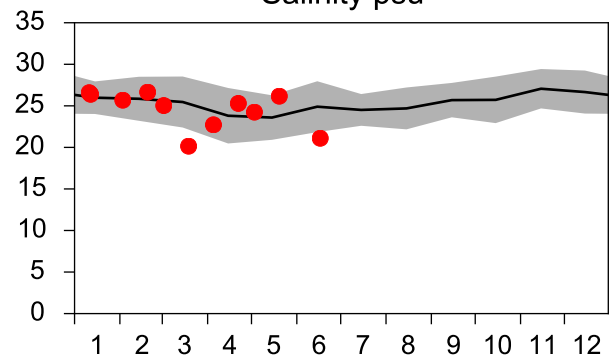
■ St.Dev.

● 2016

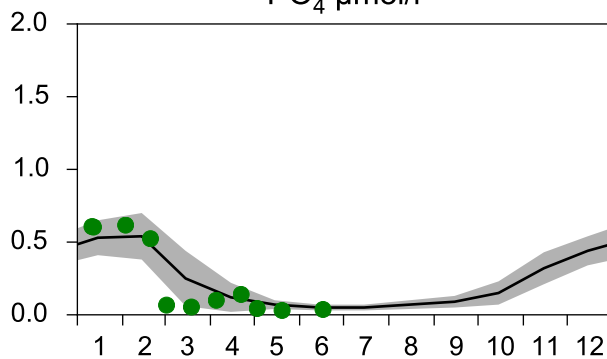
Temperature °C



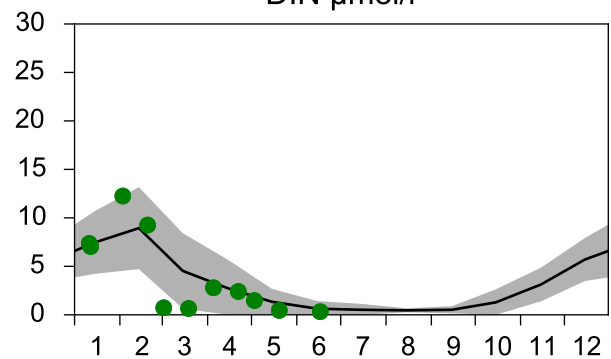
Salinity psu



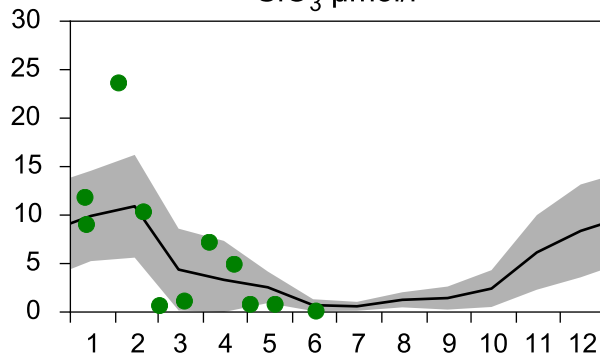
PO₄ µmol/l



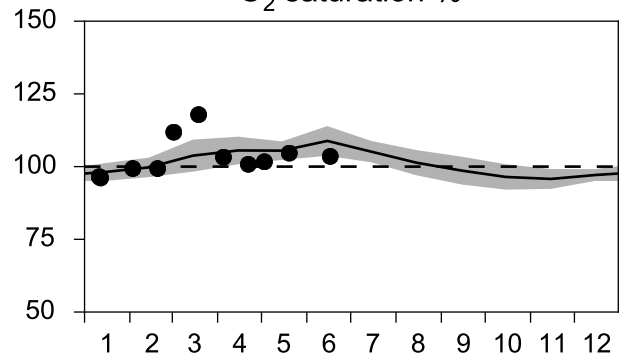
DIN µmol/l



SiO₃ µmol/l

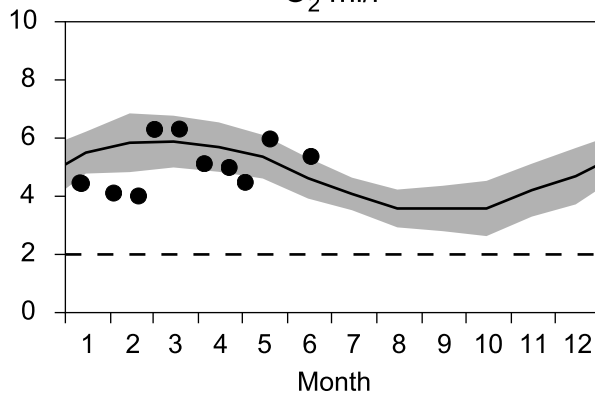


O₂ saturation %

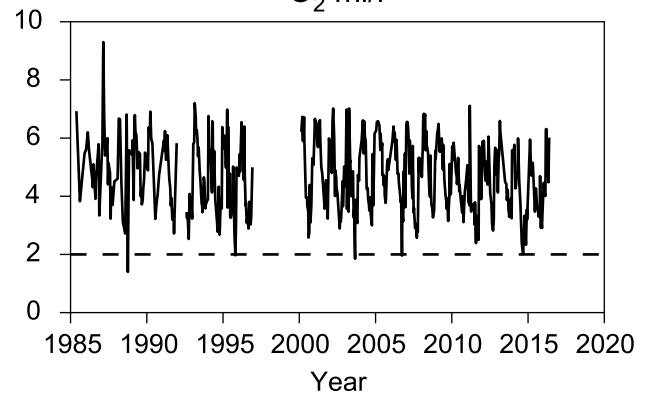


OXYGEN IN BOTTOM WATER (depth >= 50 m)

O₂ ml/l

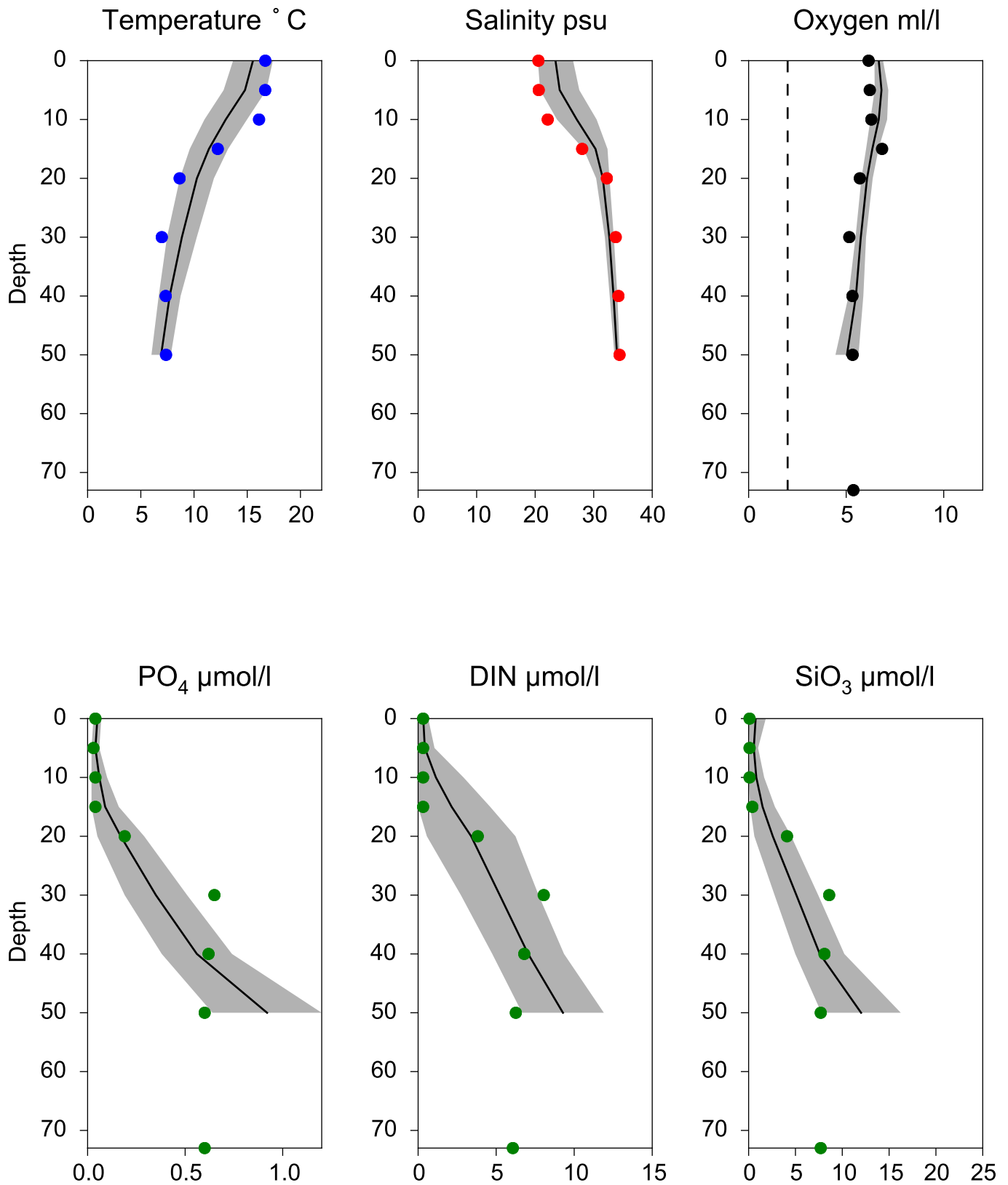


O₂ ml/l



Vertical profiles SLÄGGÖ June

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STATION P2 SURFACE WATER (0-10m)

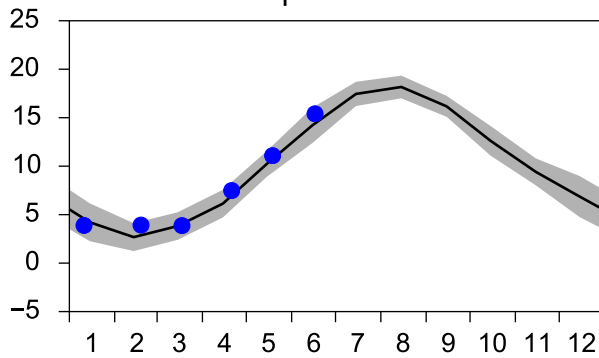
Annual Cycles

— Mean 2001-2015

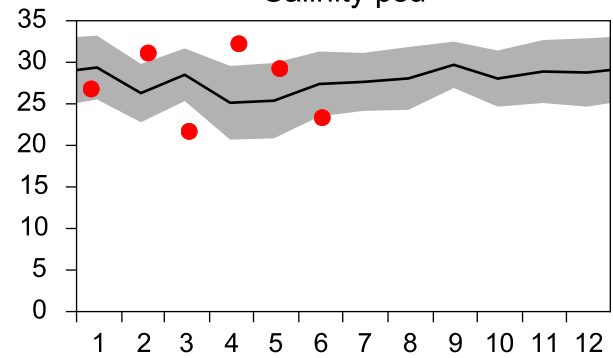
■ St.Dev.

● 2016

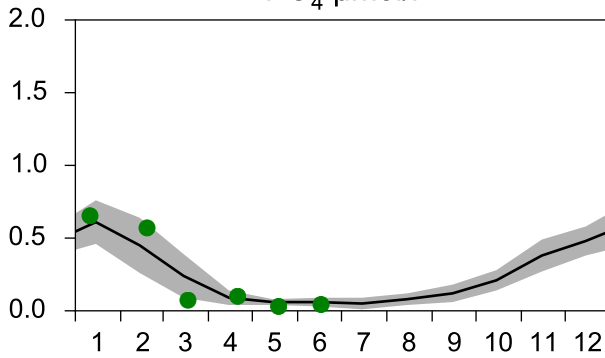
Temperature °C



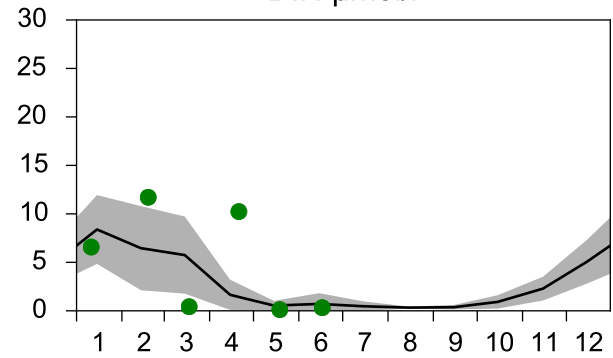
Salinity psu



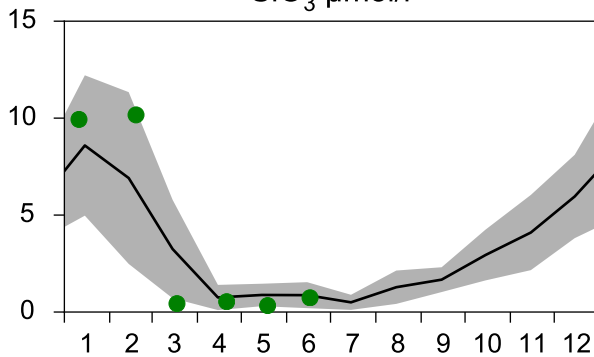
PO₄ µmol/l



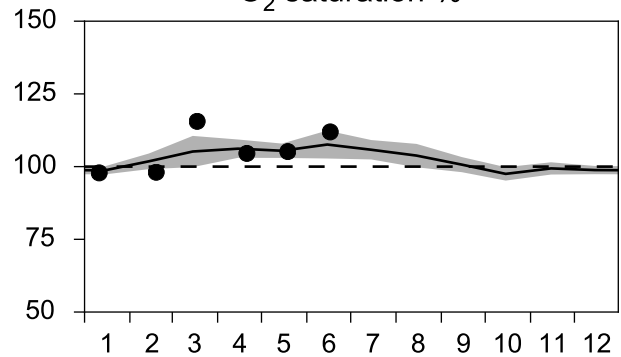
DIN µmol/l



SiO₃ µmol/l

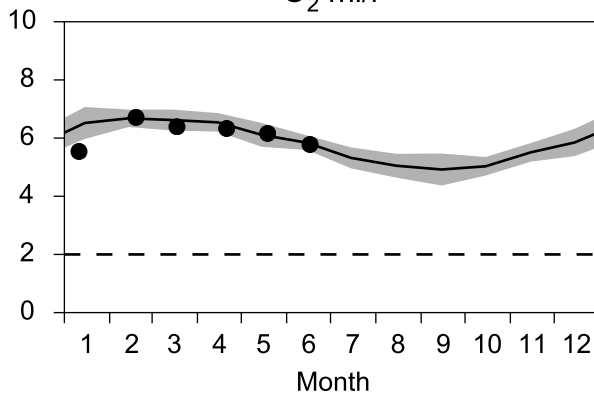


O₂ saturation %

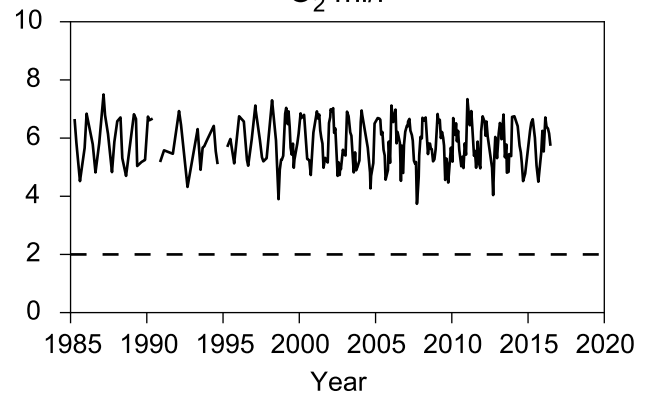


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

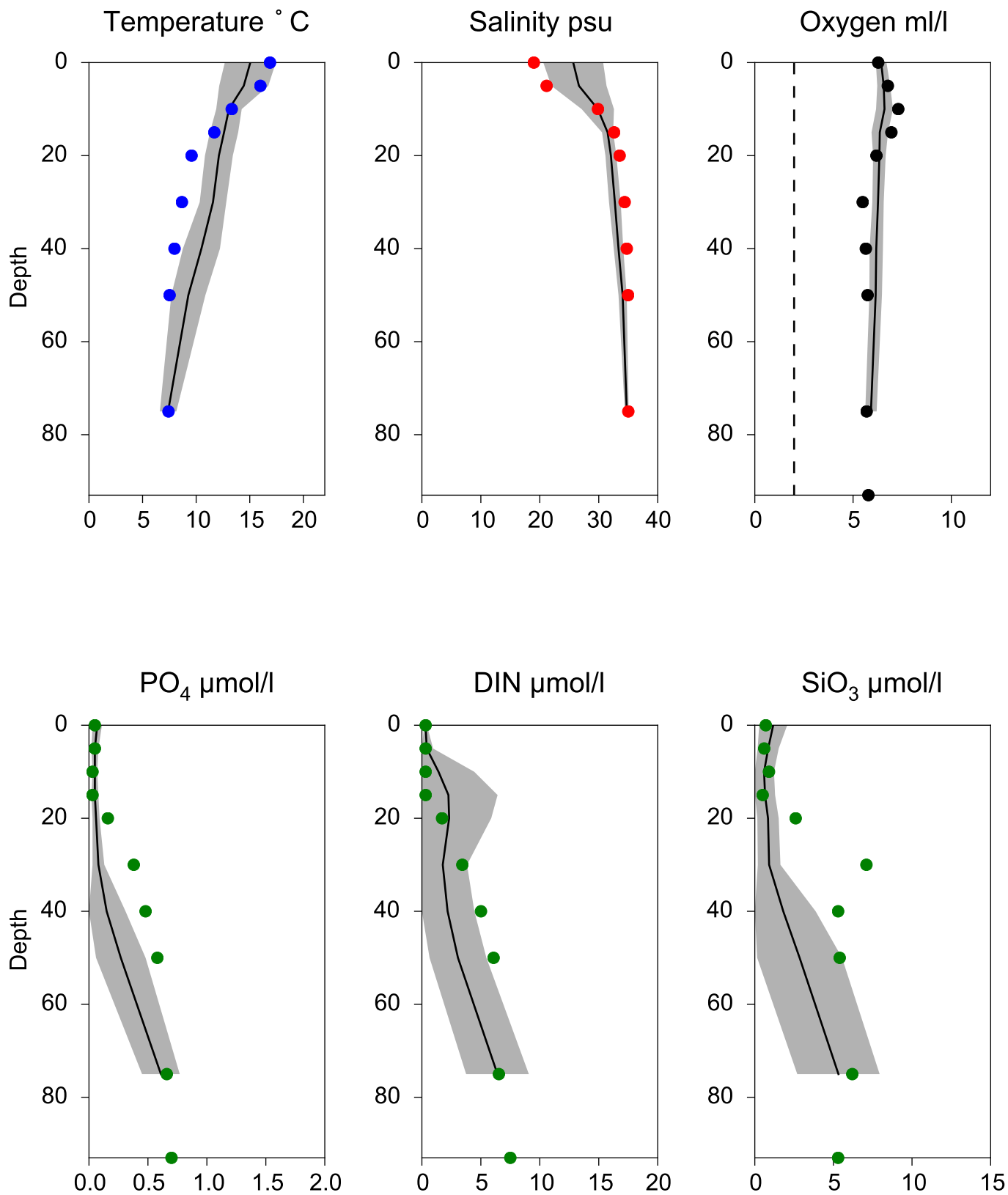


O₂ ml/l



Vertical profiles P2 June

— Mean 2001-2015 St.Dev. • 2016-06-17



STATION N14 FALKENBERG SURFACE WATER (0-10m)

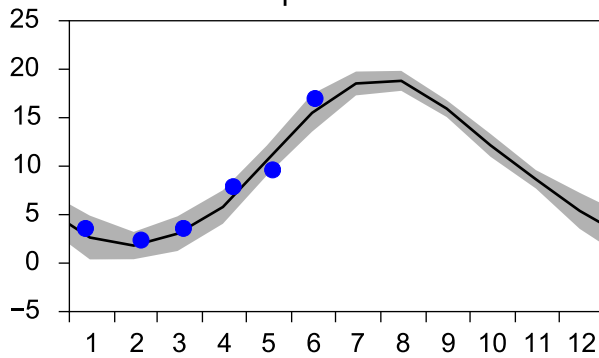
Annual Cycles

— Mean 2001-2015

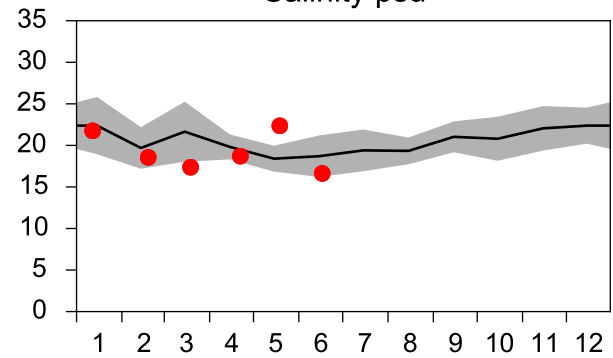
■ St.Dev.

● 2016

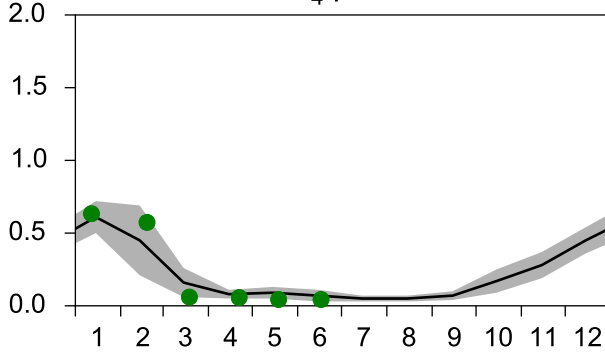
Temperature °C



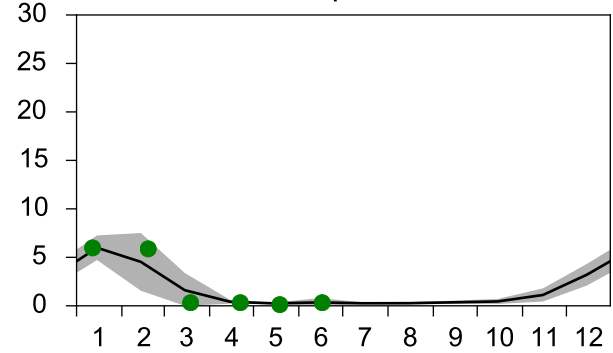
Salinity psu



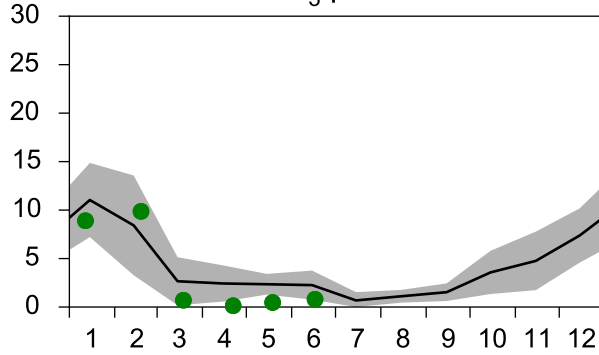
PO₄ µmol/l



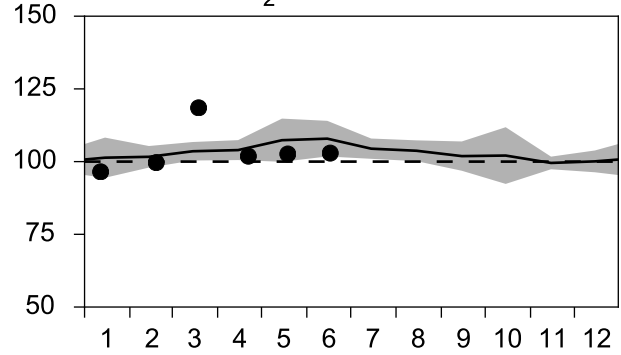
DIN µmol/l



SiO₃ µmol/l

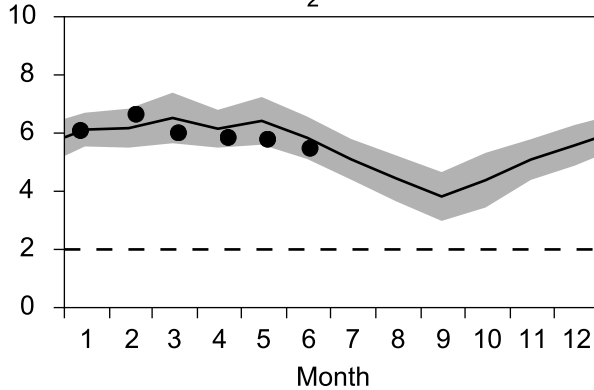


O₂ saturation %

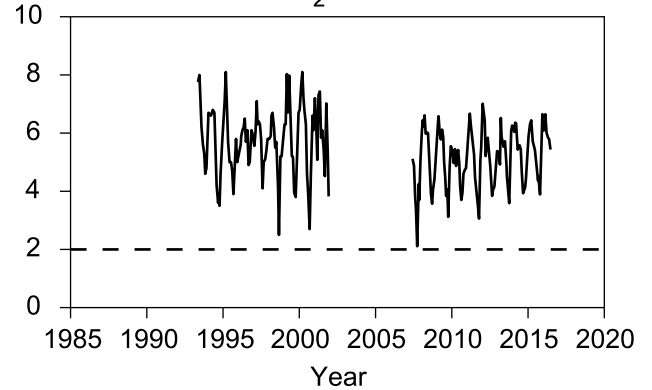


OXYGEN IN BOTTOM WATER (depth >= 25 m)

O₂ ml/l

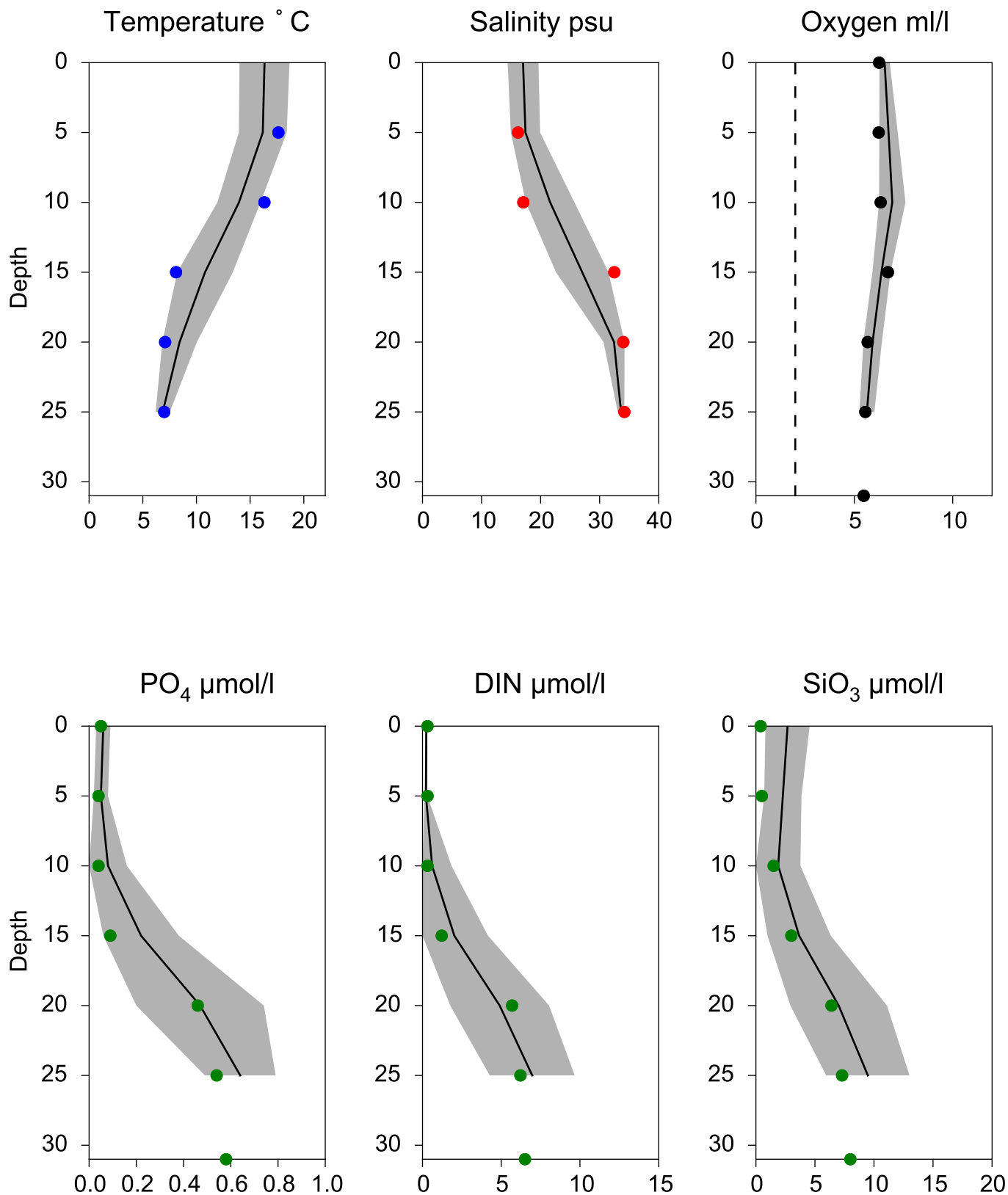


O₂ ml/l



Vertical profiles N14 FALKENBERG June

— Mean 2001-2015 St.Dev. • 2016-06-17



STATION ANHOLT E SURFACE WATER (0-10m)

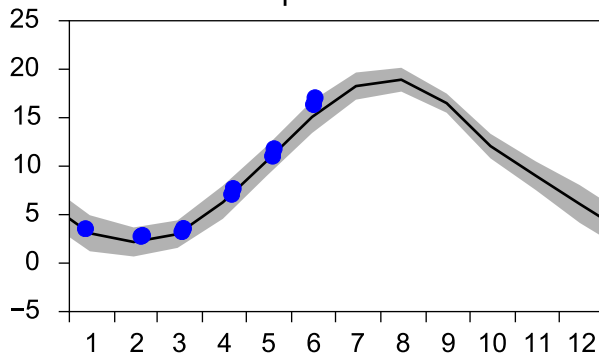
Annual Cycles

— Mean 2001-2015

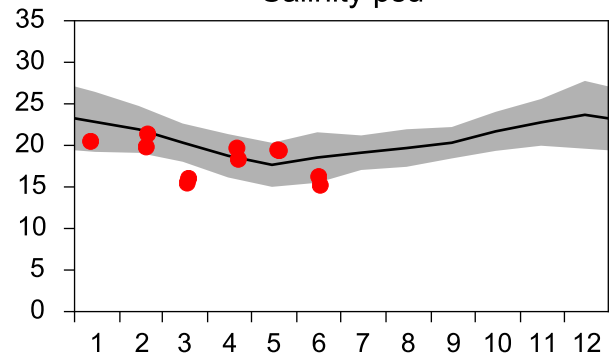
■ St.Dev.

● 2016

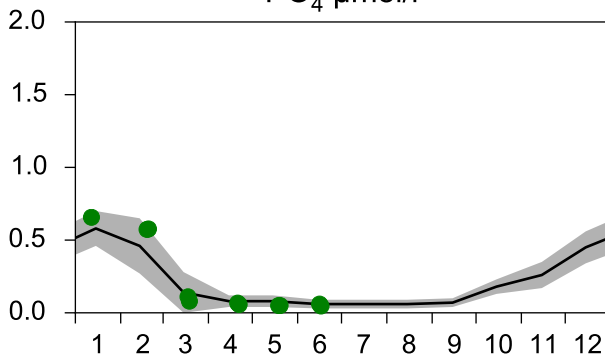
Temperature °C



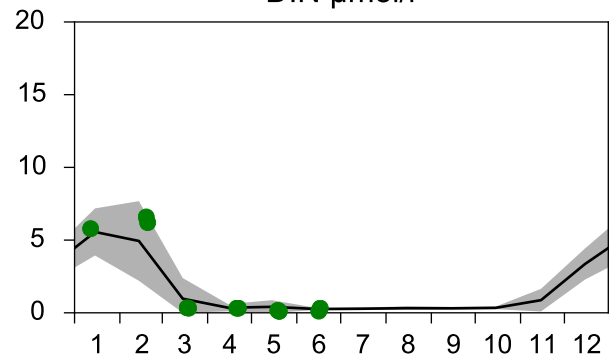
Salinity psu



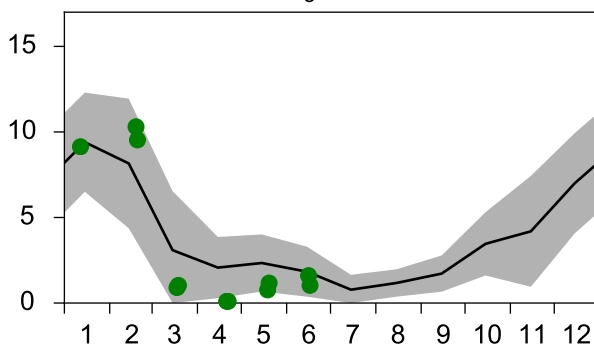
PO₄ µmol/l



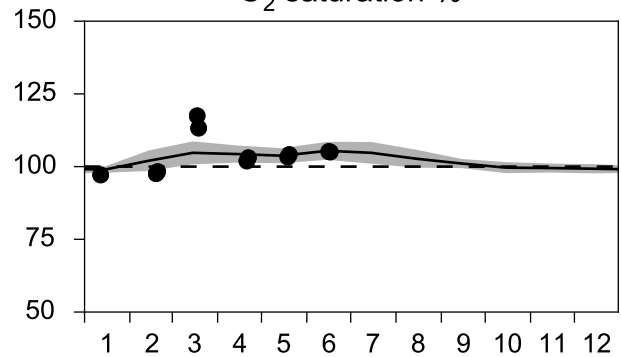
DIN µmol/l



SiO₃ µmol/l

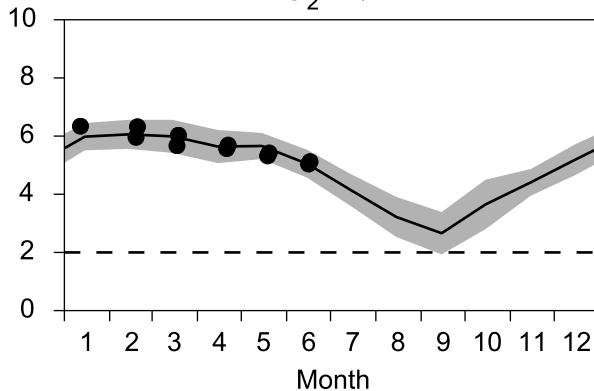


O₂ saturation %

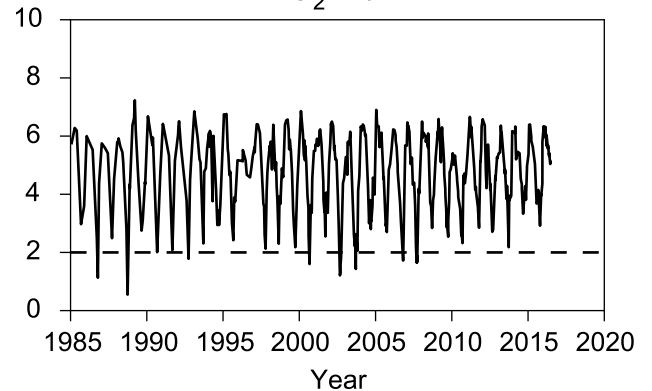


OXYGEN IN BOTTOM WATER (depth >= 45 m)

O₂ ml/l



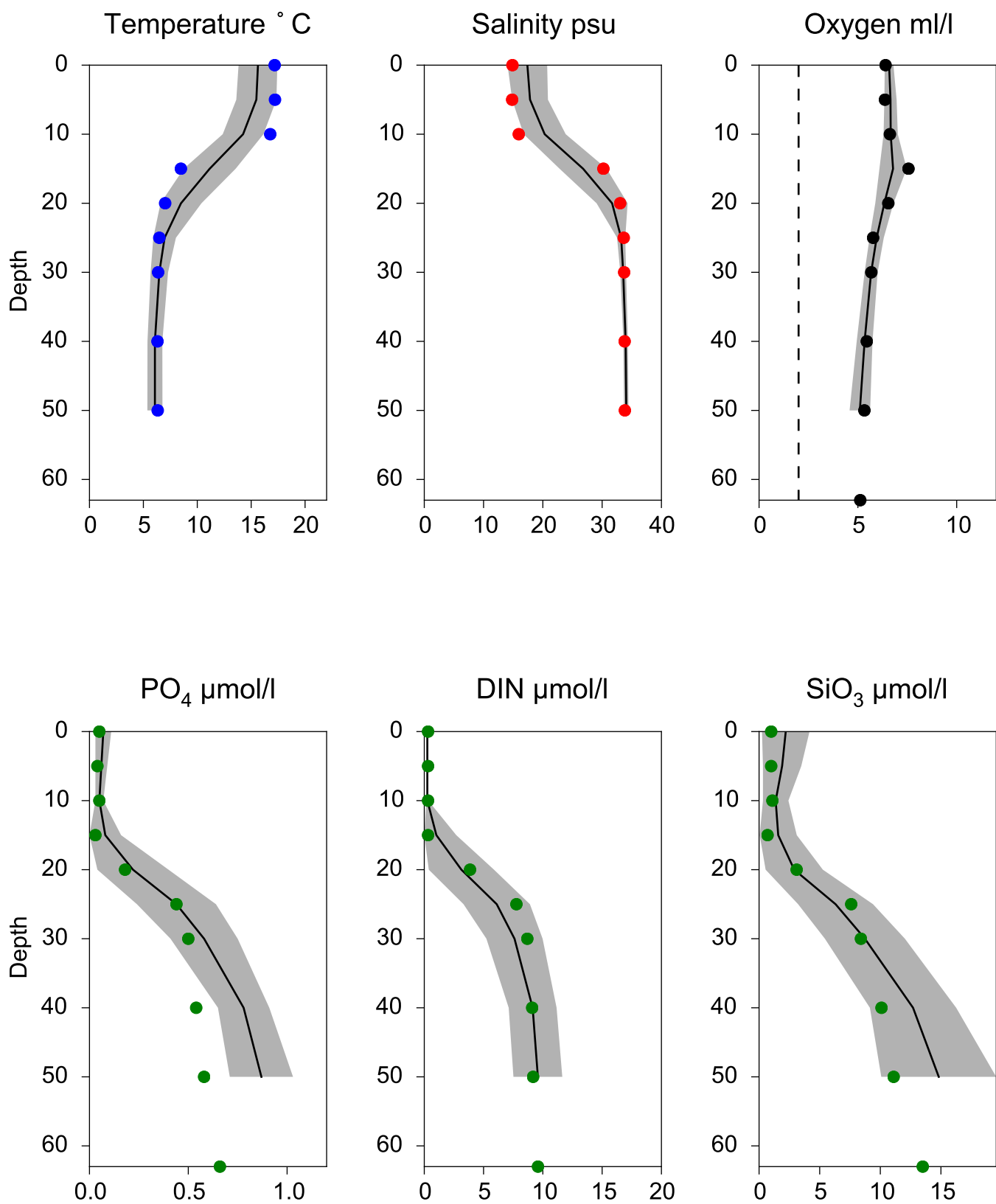
O₂ ml/l



Vertical profiles ANHOLT E

June

— Mean 2001-2015 St.Dev. • 2016-06-17



STATION HANÖBUKTEN SURFACE WATER (0-10m)

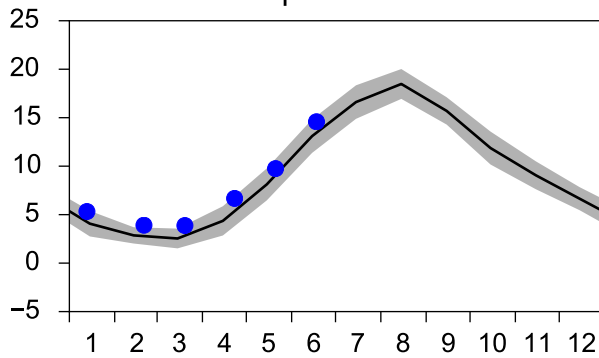
Annual Cycles

— Mean 2001-2015

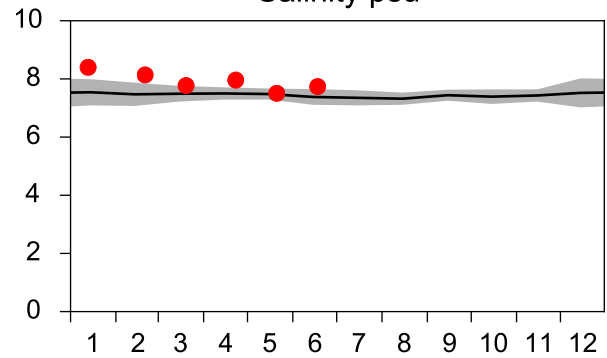
■ St.Dev.

● 2016

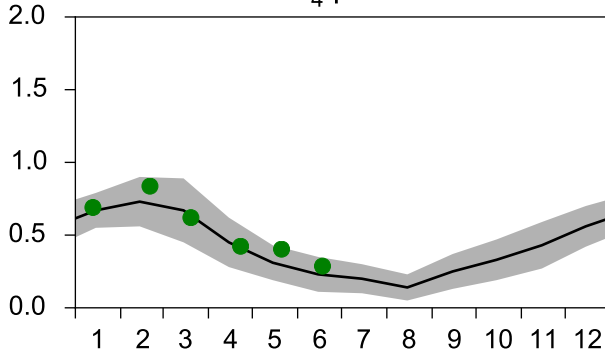
Temperature °C



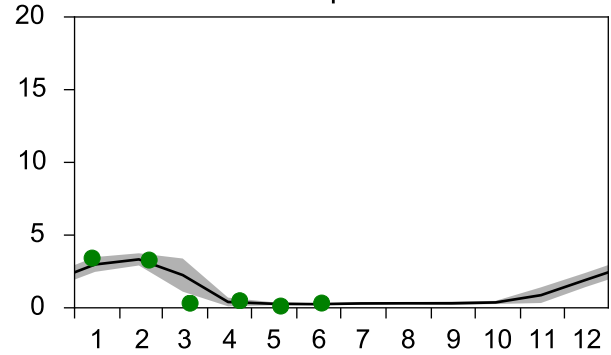
Salinity psu



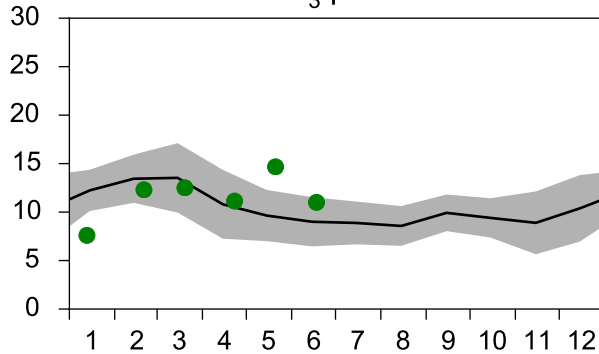
PO₄ µmol/l



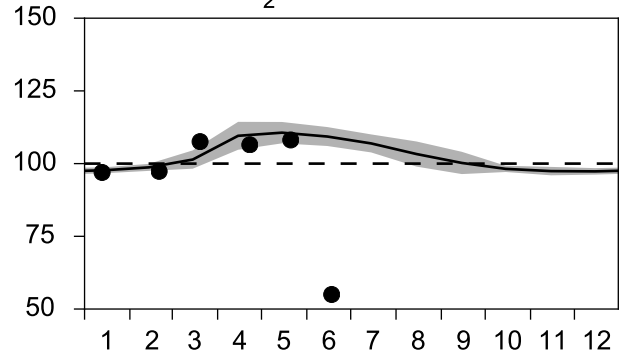
DIN µmol/l



SiO₃ µmol/l

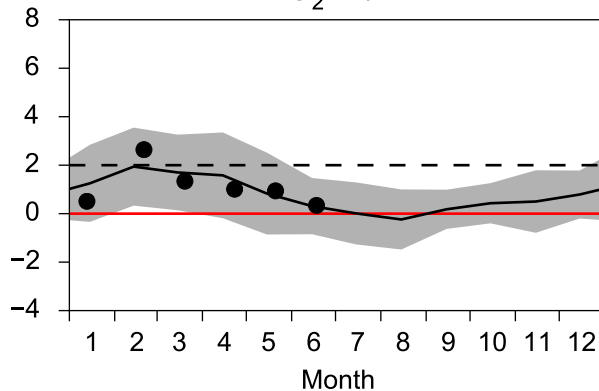


O₂ saturation %

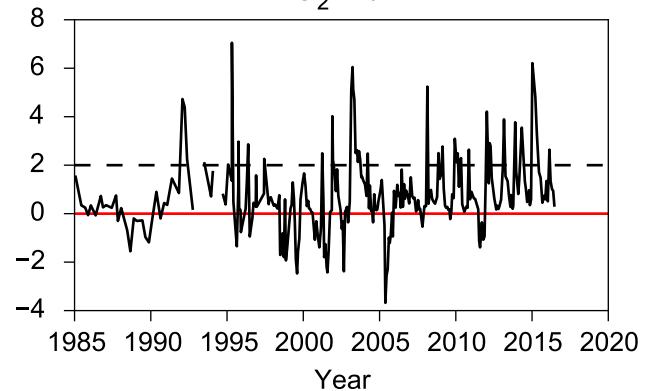


OXYGEN IN BOTTOM WATER (depth >= 70 m)

O₂ ml/l

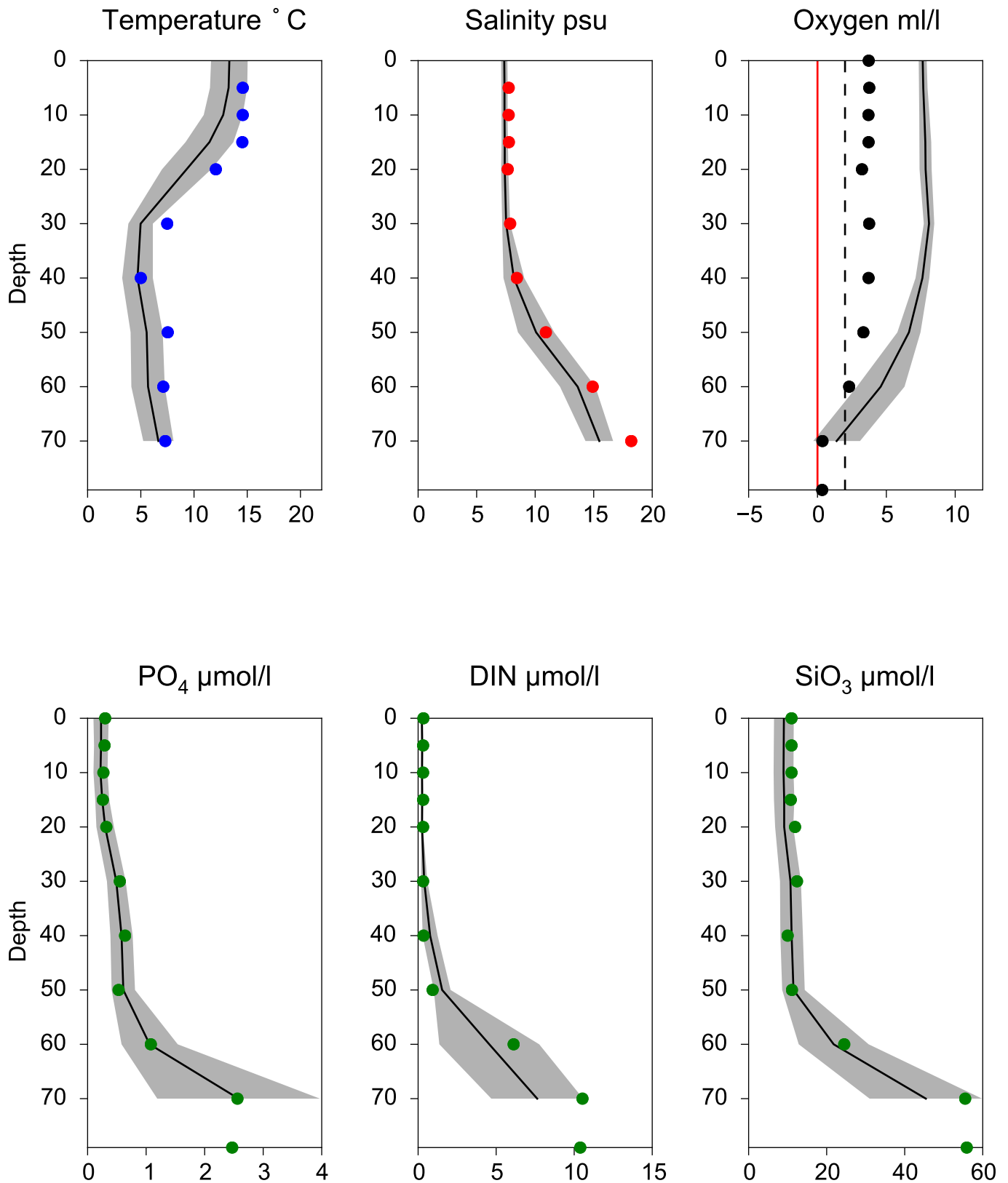


O₂ ml/l



Vertical profiles HANÖBUKTEN June

— Mean 2001-2015 St.Dev. • 2016-06-18



STATION REF M1V1 SURFACE WATER (0-10m)

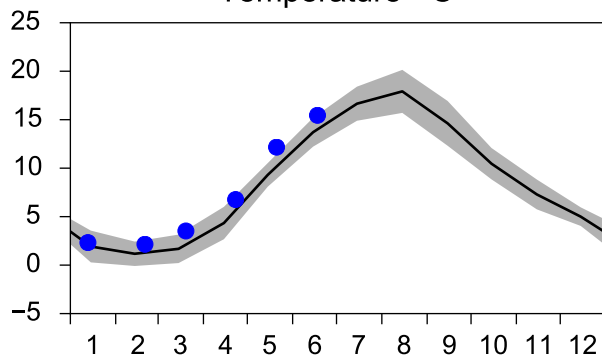
Annual Cycles

— Mean 2001-2015

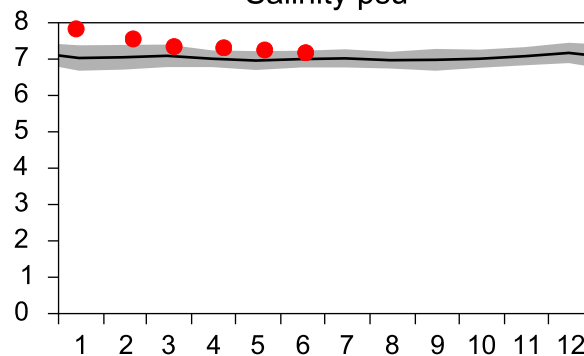
■ St.Dev.

● 2016

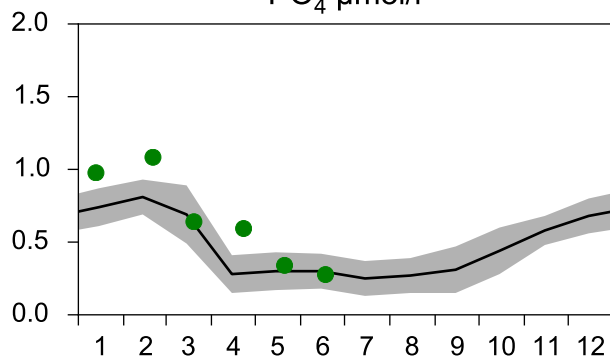
Temperature °C



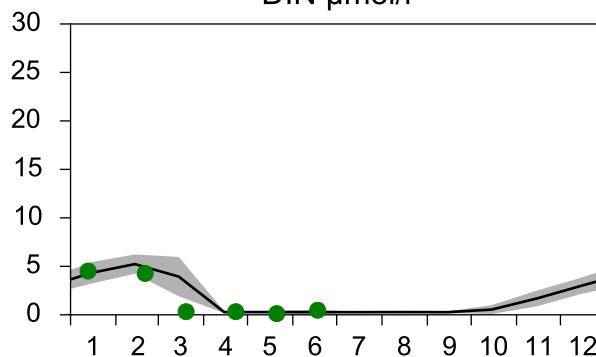
Salinity psu



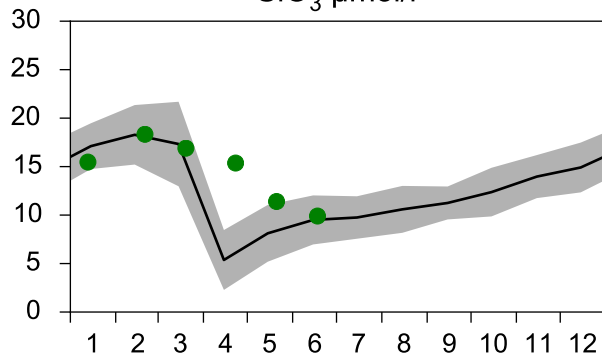
PO₄ µmol/l



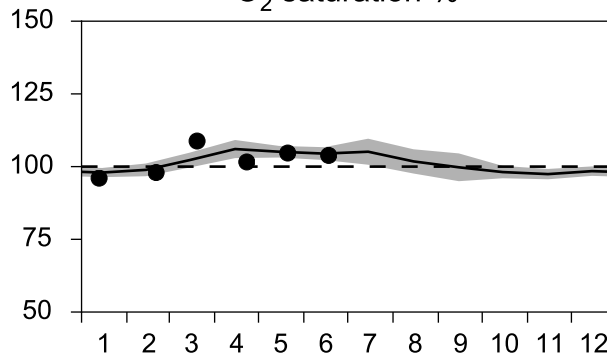
DIN µmol/l



SiO₃ µmol/l

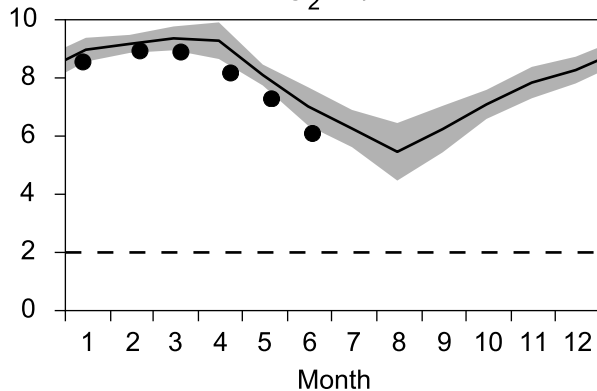


O₂ saturation %

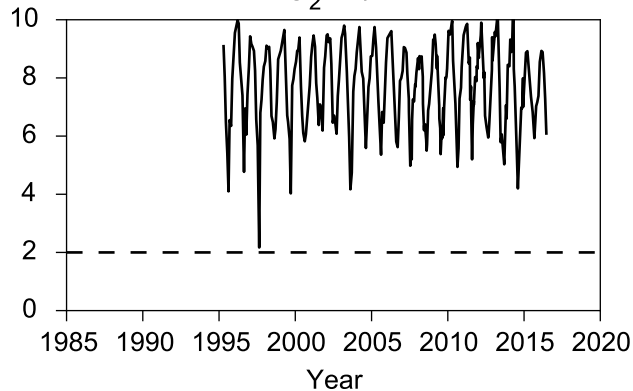


OXYGEN IN BOTTOM WATER (depth >= 17 m)

O₂ ml/l

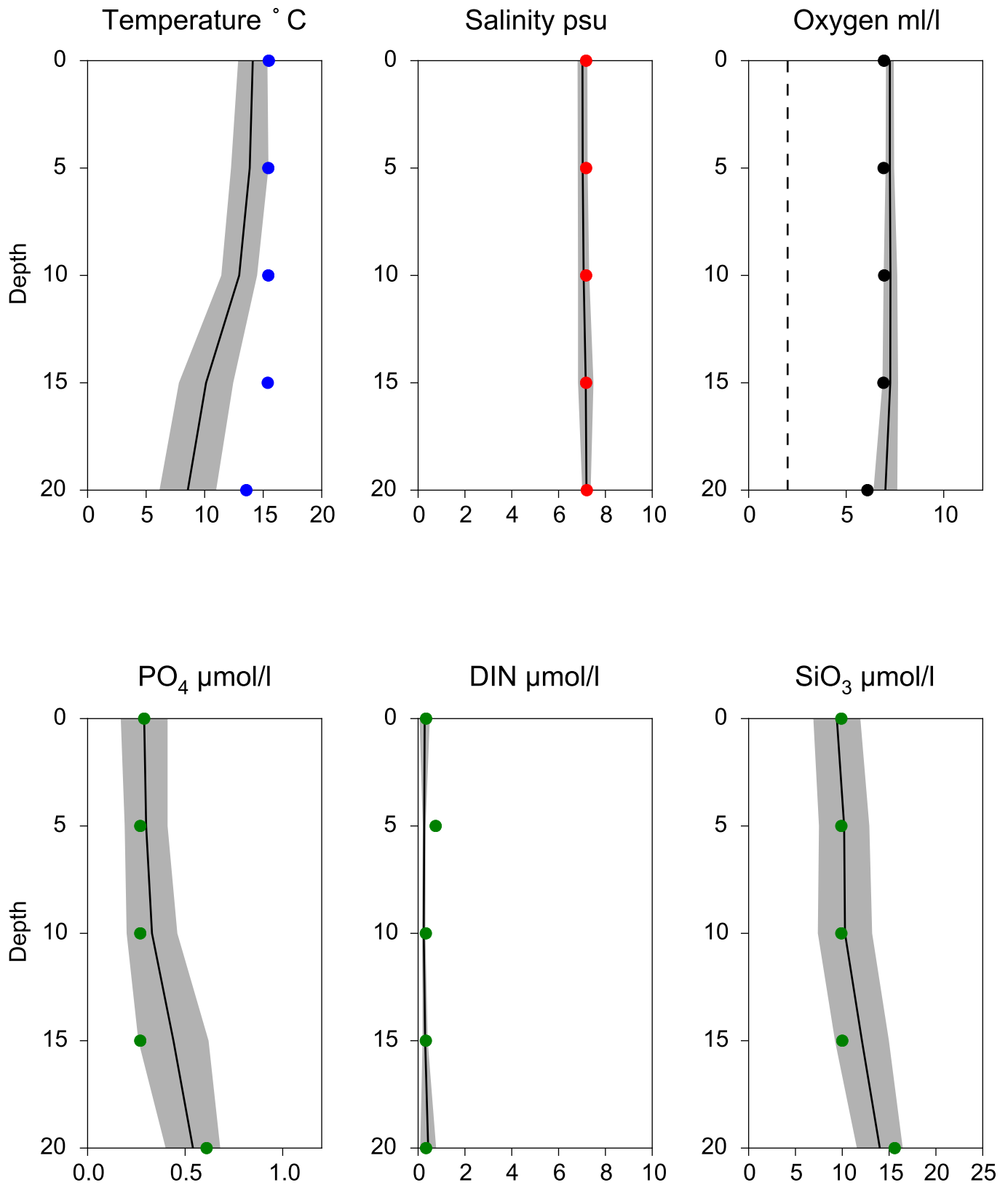


O₂ ml/l



Vertical profiles REF M1V1 June

— Mean 2001-2015 St.Dev. • 2016-06-18



STATION BY38 KARLSÖDJ SURFACE WATER (0-10m)

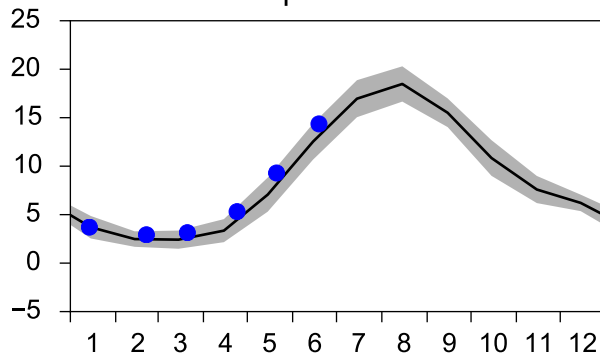
Annual Cycles

— Mean 2001-2015

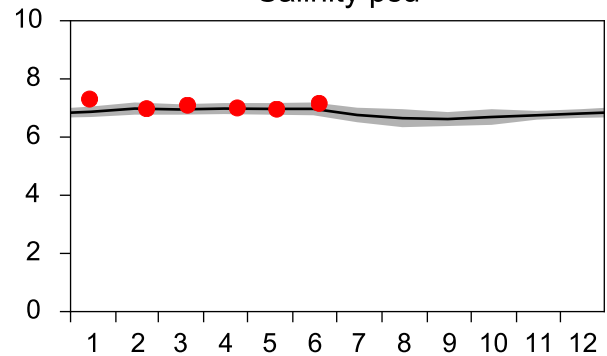
■ St.Dev.

● 2016

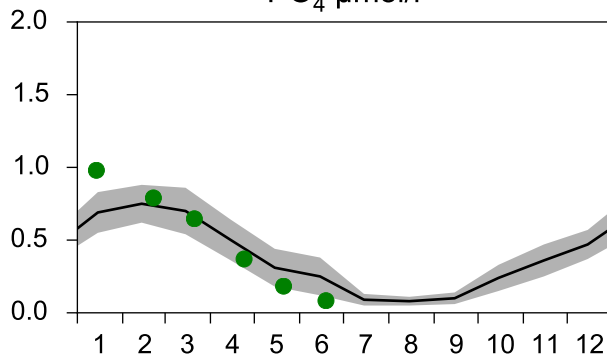
Temperature °C



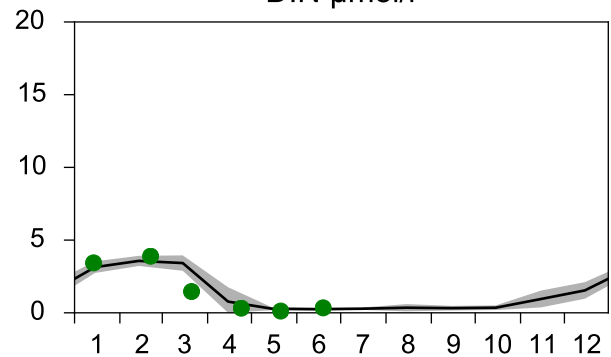
Salinity psu



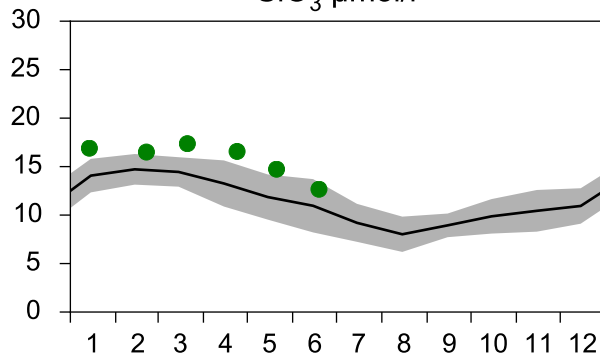
PO₄ µmol/l



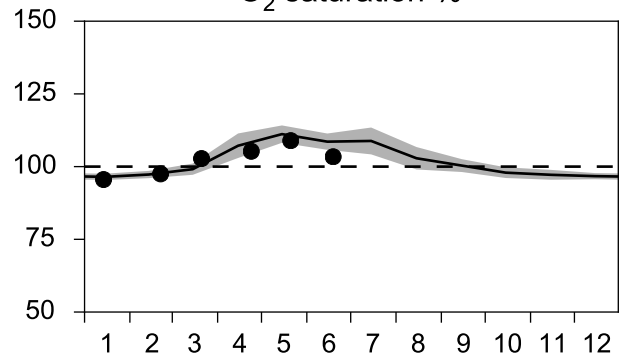
DIN µmol/l



SiO₃ µmol/l

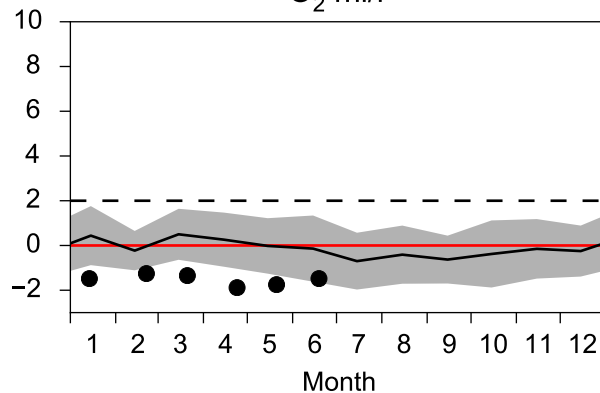


O₂ saturation %

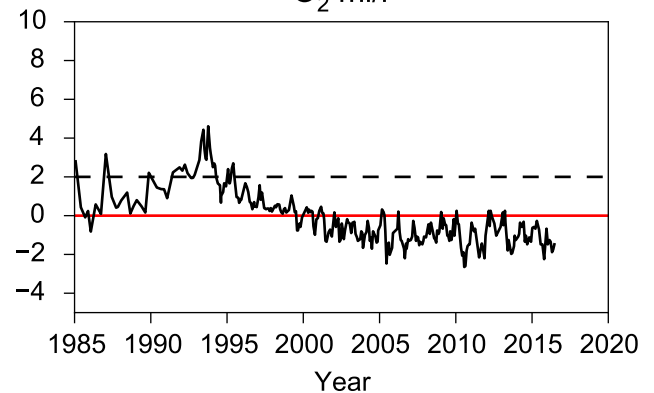


OXYGEN IN BOTTOM WATER (depth >= 100 m)

O₂ ml/l

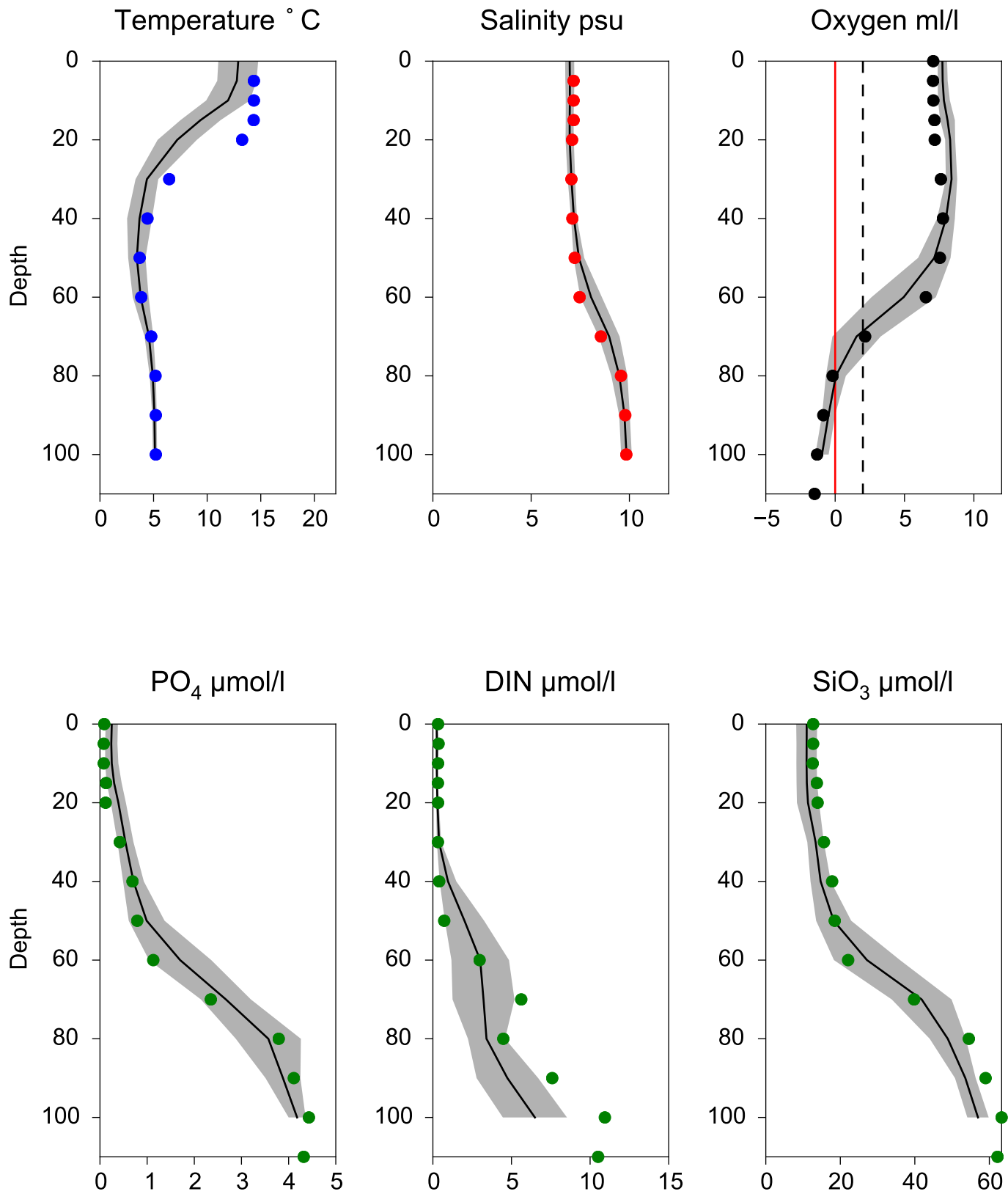


O₂ ml/l



Vertical profiles BY38 KARLSÖDJ June

— Mean 2001-2015 St.Dev. • 2016-06-19



STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10m)

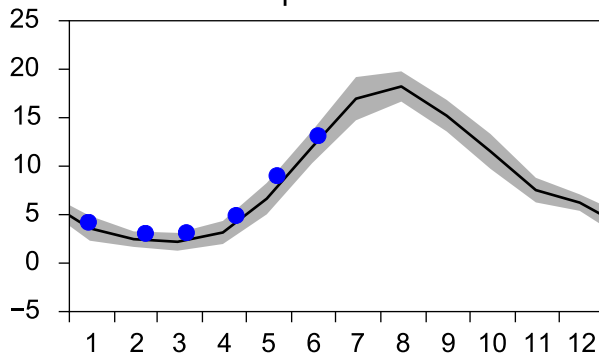
Annual Cycles

— Mean 2001-2015

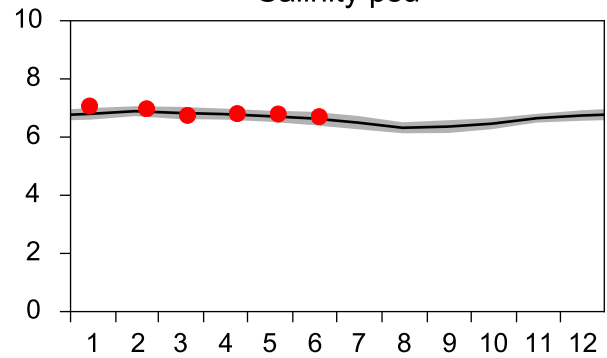
■ St.Dev.

● 2016

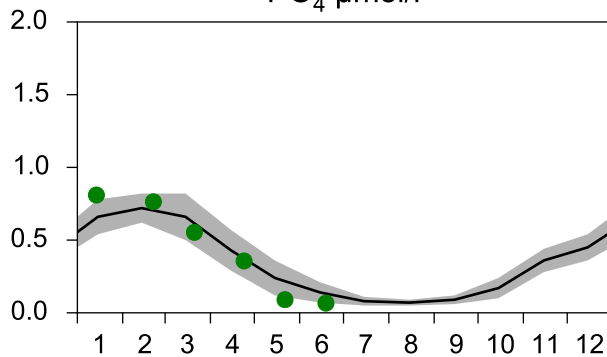
Temperature °C



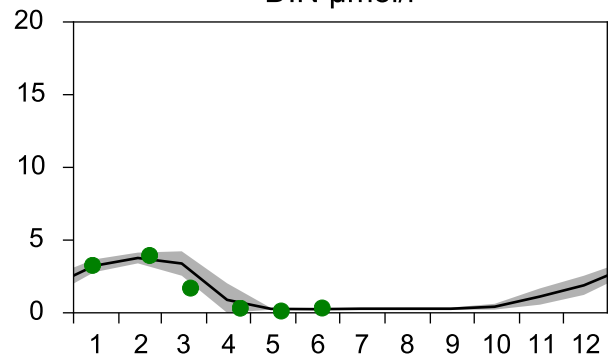
Salinity psu



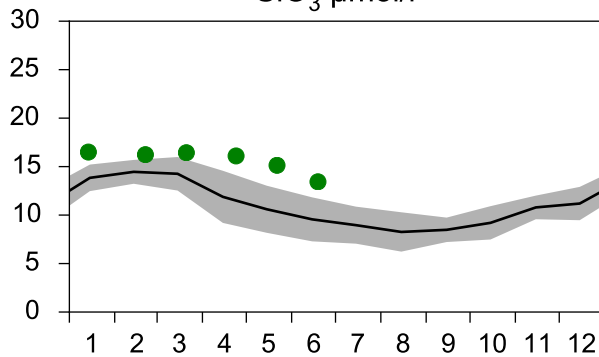
PO₄ µmol/l



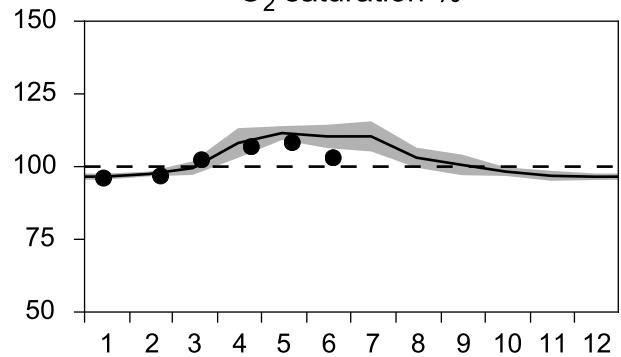
DIN µmol/l



SiO₃ µmol/l

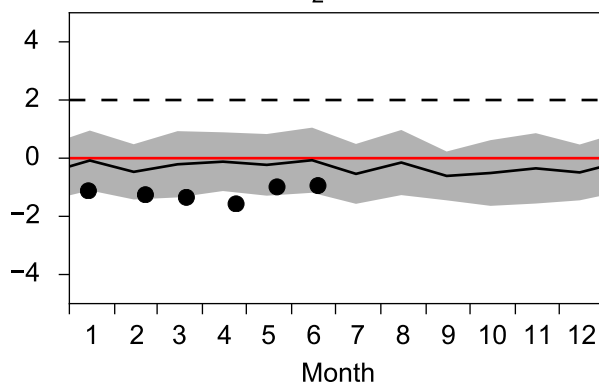


O₂ saturation %

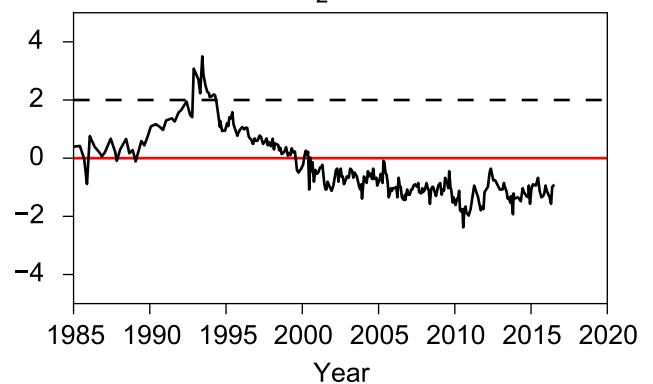


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O₂ ml/l



O₂ ml/l



Vertical profiles BY32 NORRKÖPINGSDJ June

— Mean 2001-2015 St.Dev. • 2016-06-19

