

Report from the SMHI monitoring cruise with R/V Aranda



Survey period:

2019-07-13 - 2019-07-19

Principal:

Swedish Meteorological and Hydrological Institute (SMHI),
Swedish Agency for Marine and Water Management (SwAM).

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SUMMARY

During the expedition, which is part of the Swedish national marine monitoring program, Skagerrak, Kattegat, Öresund, the Baltic Proper, was visited.

The weather was sunny and mostly calm. Several surface accumulations of cyanobacteria were observed in the Baltic Sea. During the expedition, live samples of phytoplankton were analysed, the results of these analyses are published here,

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

The surface temperature was normal for the season and varied between 15-18 ° C. A thermocline existed at all stations, but the depth varied between 5-20 m. The nutrient concentrations were low, which is normal in the summer. In the Baltic Proper, dissolved inorganic nitrogen was depleted down to the halocline of between 40-60 m depth. However, phosphate remained in the surface water, although at low levels, the phosphate concentration started increasing again at about 20 m depth. In the Skagerrak and the Kattegat, the concentrations of both dissolved inorganic nitrogen and phosphate were very low from the surface down to 15-20 m.

The deep water in the Eastern Gotland Basin was oxygenated from 80 m to about 130 m, just as in June. In the central part of the basin, oxygen concentration reached almost 2 ml/l in the deep water while the oxygen concentration in the northern and southern parts was lower. Hydrogen sulphide was measured from 140 m at the Gotland depth and 70 m in the Western Gotland Basin and it was then oxygen-free all the way down to the bottom. In the Bornholm Basin, oxygen deficiency (<2 ml/l) was observed from 70 m to the bottom and at one of the stations, hydrogen sulphide was measured at the bottom.

The next regular expedition is scheduled for 17th – 23rd August.

RESULTS

The July expedition was conducted aboard the Finnish research vessel Aranda, it started in Nynäshamn on the 13th of July and ended in Åbo on the 19th of July.

During the expedition, phytoplankton samples were analysed on board by the phytoplankton expert Marie Johansen, the results are presented in the Algaware report for July; <https://www.smhi.se/publikationer/publikationer/algrapporter>, below is a summary:

The diatom *Proboscia alata* was found in high concentrations in the hose samples (0-10m) taken at all stations in the Skagerrak and the Kattegat area. Distinct fluorescence maxima were noted at 25-30 meters at most stations. These maxima were all dominated by different species from the dinoflagellate genus *Ceratium*. No heavy surface accumulations were seen along the eastern part of the Baltic. Small aggregates visible as grains in the water column were found at all stations. These grains contained all three groups of cyanobacteria in various ratios. In the western part of the Baltic, from the Hanö Bight and the south of Öland, numerous grains and streaks of accumulations were visible in large areas. In the central parts of the Baltic between Öland and Gotland large patches of surface accumulations were present. The lack of wind and waves had enabled the filaments to float up to the surface and accumulate in patches or large streaks.

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>.

During the expedition, in addition to regular sampling, sampling was also performed to determine DNA within the project "DNA barcoding of marine phytoplankton" financed by the Swedish Agency for Marine and Water Management (SwAM) which includes all national monitoring stations where plankton is tested. At five stations, water and plankton samples were also taken for selenium measurements at EAWAG in Switzerland (Swiss Federal Institute of Aquatic Science and Technology).

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

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

The Skagerrak

The temperature at the surface was between 17-18°C, normal for the season. At most stations, a thermocline was found between 5-10 m. The temperature in the deep water was about 8°C. At the outermost station Å17 there was slightly colder water between 25-35 m deep. At station P2, the salinity was 22 in the surface, which is lower than normal and probably due to influence of the fresher water from the Baltic stream.

Since primary production is in ongoing during the summer, the inorganic nutrients were largely depleted down to 20 m depth, both nitrate and phosphate were at or near the reporting limit (0.10 µmol/l and 0.02 µmol/l, respectively). Below 20 m depth, the levels of nutrients increased again and

were at normal levels except at station Å15, where the concentrations of ammonium were unusually high at depths of 50-75 m.

The Kattegat and the Sound

The temperature at the surface varied between 16-18°C, coldest at station Fladen where it was lower than normal. There was a pycnocline at about 5 m depth at station Fladen; about 7 m at station Anholt and at station W Landskrona in the Sound and about 10 m at the more coastal station N14 Falkenberg. Below the pycnocline, the temperature dropped to about 7°C in the deep water. At the Fladen, the temperature in the deep water was slightly higher, about 8°C, which is more reminiscent of the deep water in the western parts of the Skagerrak. At station Fladen where water from the Skagerrak can sometimes come in with the Jutland current, the salinity of the surface water was slightly higher than normal, 24 against normally about 20. In the rest of the Kattegat, the salinity was normal, around 20. At station Fladen the water was also colder than in June from the surface down to 30 m.

The levels of nutrients were normal in the surface at all stations, dissolved inorganic nitrogen was depleted from the surface down to 15 m and began to increase again at 20 m while the phosphate levels began to increase already at 15 m. At station N14 Falkenberg, the dissolved inorganic nitrogen was depleted in almost the entire water column, the levels were below the reporting limit down to 25 m and it was only in the measurement 1 meter above the bottom that low levels could be measured.

The oxygen levels were normal and no signs of oxygen deficiency were found at any of the stations.

The Baltic Proper

The levels of inorganic nutrients were very low in the surface. Dissolved inorganic nitrogen was below the reporting limit (0.10 µmol/l) down to the halocline throughout the area (50-60 m depth in the Eastern and Western Gotland Basins, 40 m depth in the Bornholm Basin and 20 m in the Arkona Basin). Phosphate, on the other hand, was measurable, but very low (0.05-0.10 µmol/l) and began to increase again already at 10-15 m depth in the Southern Baltic Proper and at 20 m in the Eastern Gotland Basin. Silicate was slightly above normal in the surface water in the Eastern Gotland Basin.

There were peaks in nitrate and/or nitrite at the transition from oxic to anoxic water at all stations, which usually is associated to bacterial nitrogen processes (eg. denitrification). At BY15 there was also a reduction in phosphate between 80-125 m where there water was oxic. At BY4 in the Bornholm Basin low levels of hydrogen sulphide were measured at the bottom and there the levels of phosphate and silicate were higher than normal.

At the coastal station RefM1V1, nitrogen was depleted throughout the water column while there was relatively much phosphate left, about 0.5 µmol/l, which is normal at this station for July.

The Eastern Gotland Basin

The surface water temperature ranged between 14.5-16.5 °C, coldest at the northernmost stations BY20 and BY15. This was slightly lower than normal for the month at these two stations. The salinity in the surface water was normal and varied between 7.0-7.5. The halocline was around 65 m, slightly deeper at the southern station BCS III-10. Two thermoclines were found at all stations around 10 m and 20 m respectively. Cold winter water remained below the deeper thermocline (20 m). Below the halocline the temperature increased to just above the 15-year mean. The salinity was also above average in the deep water. The fact that the salt content and the temperature were above

normal in the deep water is because the latest inflows here have brought warmer and saltier water with them than during the 15-year period that we compare to.

At all stations, parts of the deep water were oxygenated, just as in June. At BY20, hydrogen sulphide (completely oxygen-free) was measured already at 80 m and low oxygen concentrations (<1 ml/l) were measured with an oxygen sensor (Seabird electrode) at 105-120 m, but was not captured in sampling at discrete depths with water samplers. At the other stations, the oxygen below the halocline (60 m) decreased to become near zero around 80 m. The oxygen then increased again below 80 m and was at its highest in the deep water (barely 2 ml/l) at 130 m and then disappeared completely at 140 m where hydrogen sulphide was measured.

Western Gotland Basin

The surface water temperature varied between 15.5-17.3 °C, coldest at station BY38, which was normal for the area. The salinity of the surface water was normal, about 6.5. The halocline was at around 55 m and the thermocline at around 15 m depth. Just as in the Eastern Gotland Basin, cold winter water remained between thermocline and halocline.

Hydrogen sulphide was measured from 70 m and 80 m depth to the bottom at station BY38 and station BY32, respectively.

At the coastal station RefM1V1, the water was well mixed with a salinity of about 7. The temperature in the surface water down to about 15 m was 16.5 °C where there was a thermocline below which the water was about 14°C.

Southern Baltic Proper

The temperature in the surface water was about 17°C at the two stations in the Arkona Basin, while it differed between the stations in the Bornholm Basin where it was 16°C at station BY4 and 18°C at station BY5. At the station W Hammer Odde, between the two basins, the temperature in the surface water was 17°C. The temperature in the Hanö Bight was about 16°C, just like at station BY4, the colder surface water here is due to the upwelling of deep water in the Hanö Bight and it is probably also this that caused the cold surface water at station BY4.

In the Bornholm Basin, there was a thermocline at 20 m and 30 m depth respectively at stations BY4 and BY5. At station BY5 there was an additional thermocline at 10 m depth. At the station BY1, the surface water was well mixed from the surface down to 10 m unlike station BY2 where the thermocline was not as sharp. In the deep water, the temperature varied with depth due to previous inflows, the varying temperature being visible at station BY2 where a temperature peak from a previous inflow was visible at 50 m in the profile.

In the Arkona Basin, the temperature and salinity were higher than normal from 20 m to the bottom and the water was well oxygenated all the way to the bottom with the lowest oxygen content around 5 ml/l. In the Bornholm Basin, the oxygen levels were lower with oxygen deficiency (<2 ml/l) from 70 m and at station BY4, low levels of hydrogen sulphide (6 μ mol/l) were measured closest to the bottom.

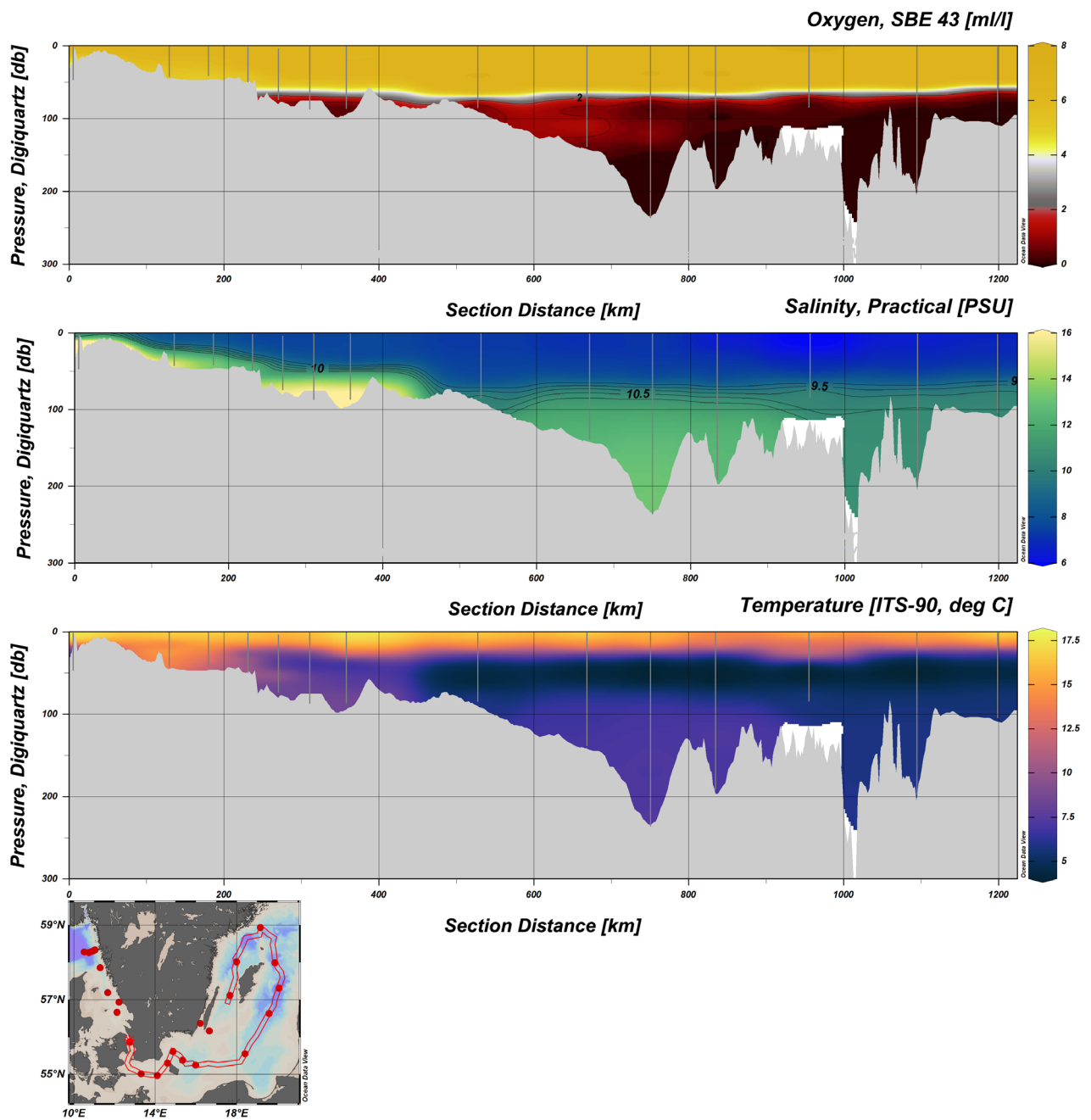
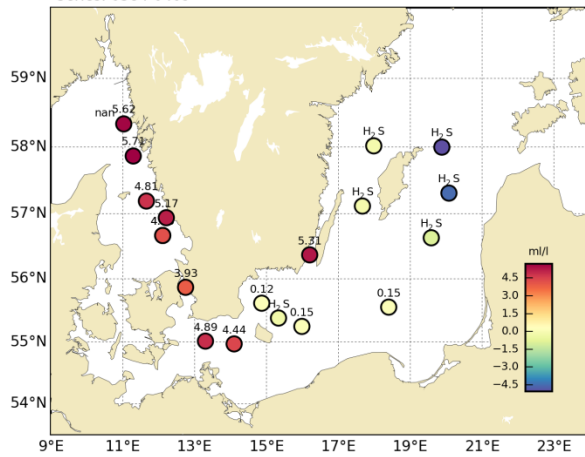


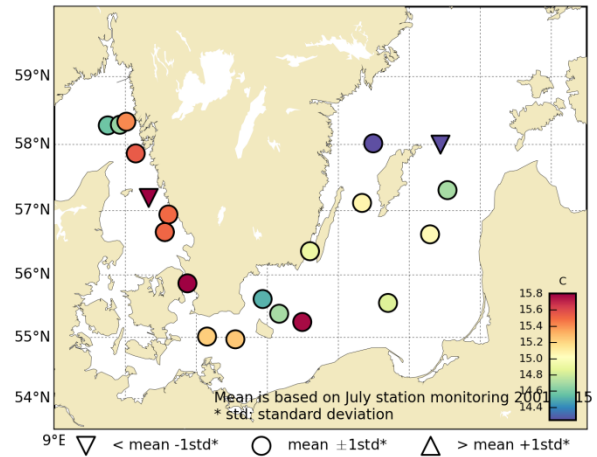
Figure 1. Transect showing dissolved oxygen, salinity and temperature from the Sound, through the Baltic Proper, to the Western Gotland Basin.

Bottom water oxygen concentration (ml/l)

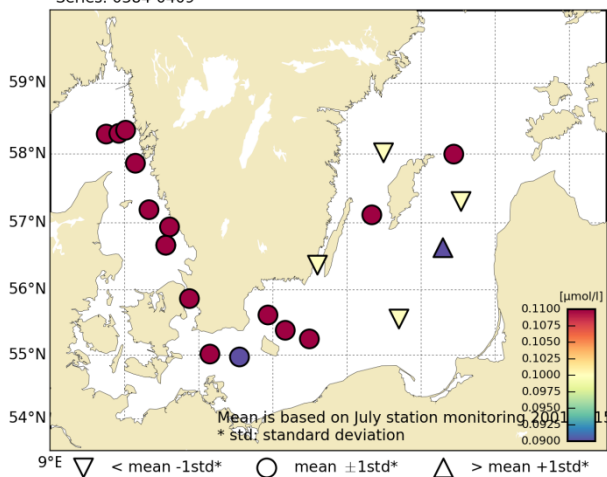
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Date: 20190714-20190719
Series: 0384-0409

**Surface (0-10 m) Temperature**

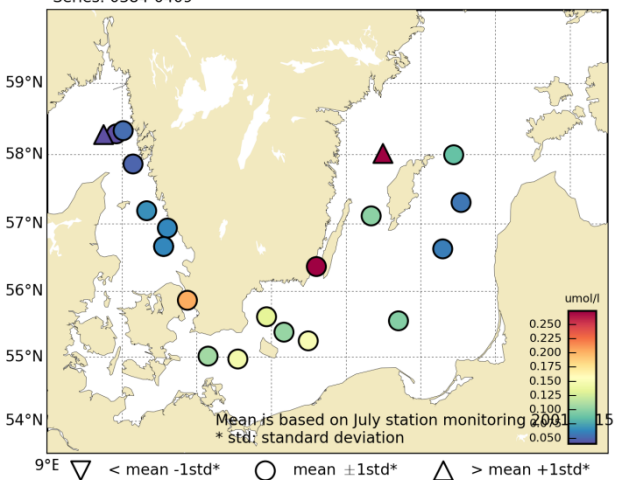
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Series: 0384-0409

**Surface (0-10 m) Dissolved inorganic nitrogen concen**

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Date: 20190714-20190719
Series: 0384-0409

**Surface (0-10 m) Phosphate concentration**

Ship: Aranda
Date: 20190714-20190719
Series: 0384-0409

**Surface (0-10 m) Silicate concentration**

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Series: 0384-0409

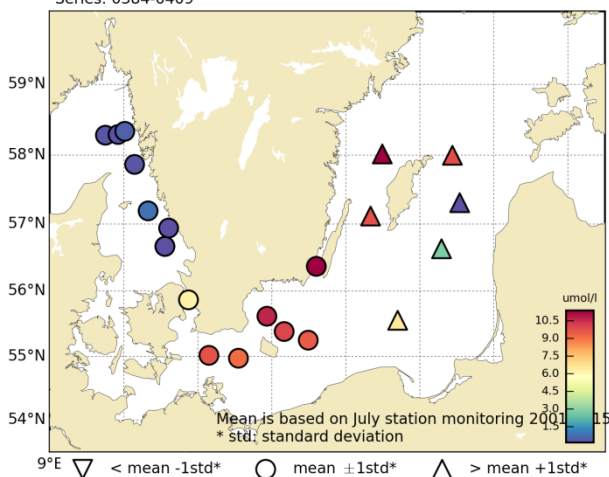


Figure 2. Maps showing bottom value for oxygen concentration and surface values (mean value 0-10 m) for temperature, dissolved inorganic nitrogen, phosphate and silicate.

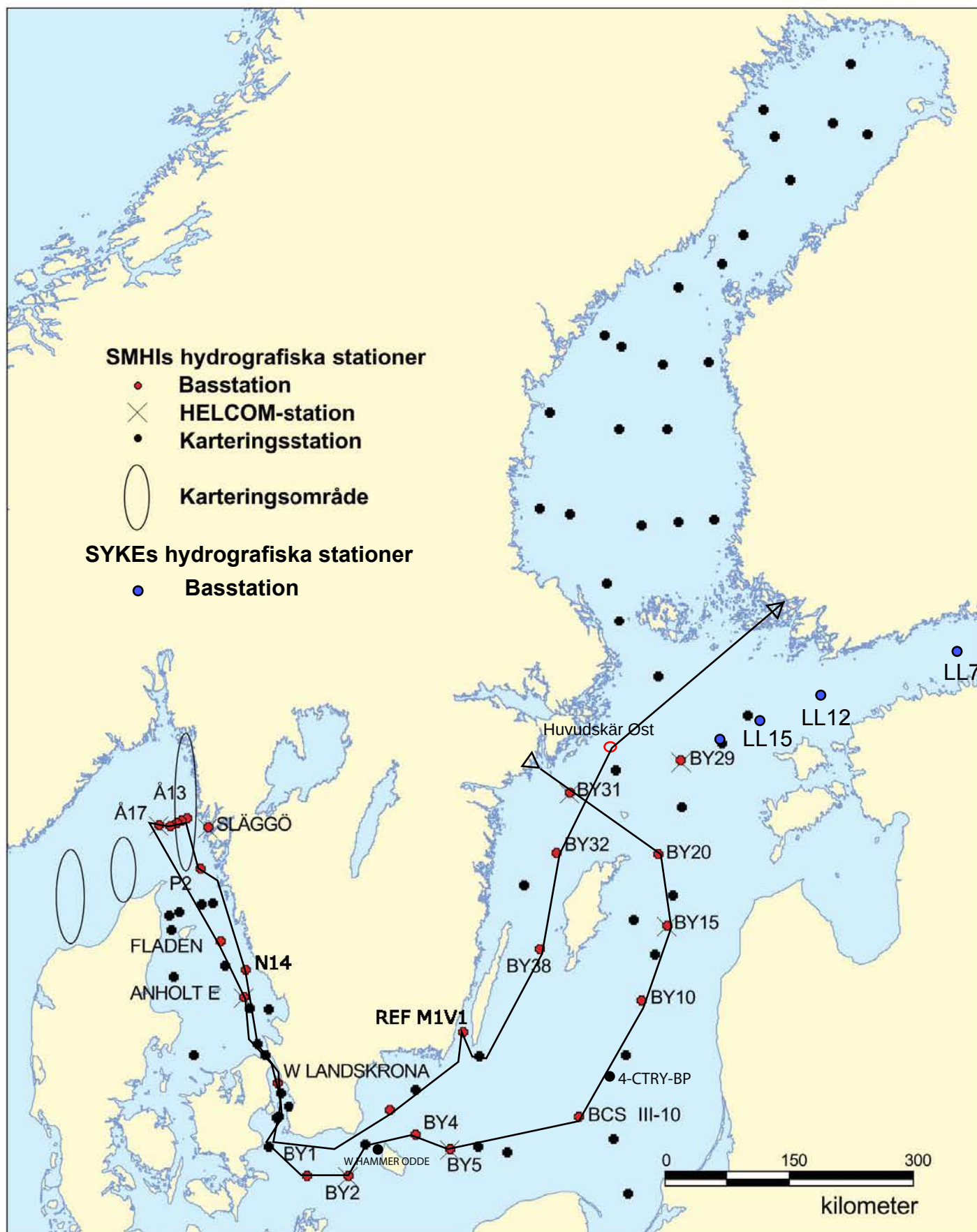
PARTICIPANTS

Name		From
Lena Viktorsson	Chief scientist	SMHI
Sari Sipilä		SMHI
Sara Johansson	Quality manager	SMHI
Ann-Turi Skjevik		SMHI
Lars Andersson		SMHI
Marie Johansen	Plankton expert	SMHI

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

TRACKCHART
 Country: Sweden
 Ship: R/V Aranda
 Date: 20190216-20190226
 Series:



Date: 2019-07-19
Time: 15:12

Ship: AR
Year: 2019

Ser no	Cru no	Stat code	Proj	Stat name	Lat	Lon	Start date yyyymmdd	Start time hhmm	Bottom depth m	Secchi depth m	Wind dir vel	Air temp C	Air pres hPa	WCWI elac aove	CZPHP hohop loys apte hdsb o p	No de	No btl	T e	T e	S a	S a	P h	D o	D o	H 2	P h	P t	N t	N t	N t	N t	A n	A n	A s	H c	C c	
																		m m	m l	l l	x x	s o	r r	r r	r o	k o	m m	m m	p p	t t	y y	s t	i a	z n	t y	3 u	n n
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STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

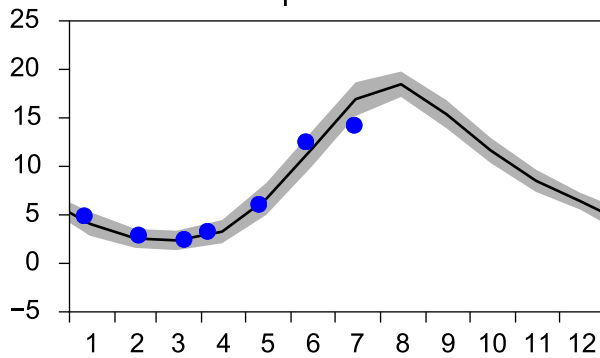
Annual Cycles

— Mean 2001-2015

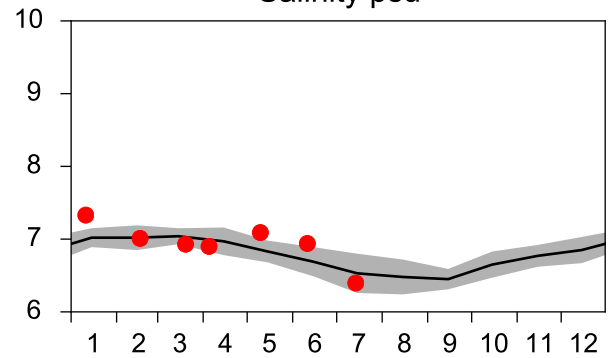
■ St.Dev.

● 2019

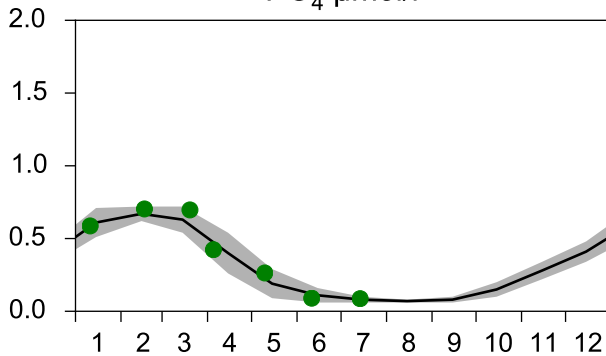
Temperature °C



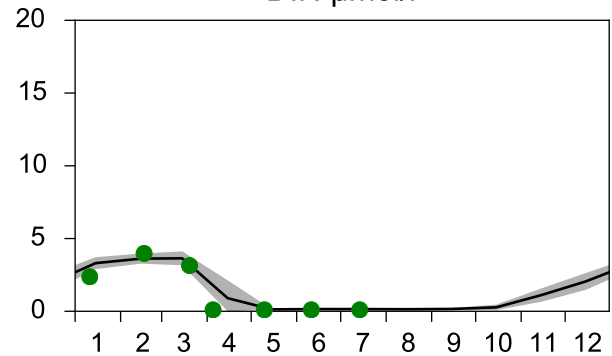
Salinity psu



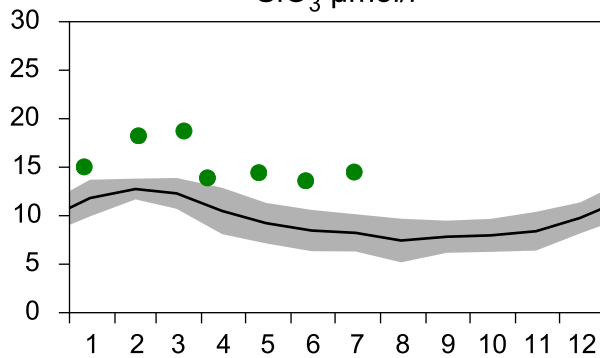
PO₄ µmol/l



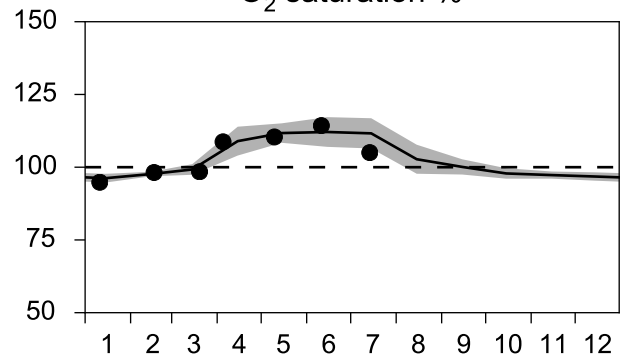
DIN µmol/l



SiO₃ µmol/l

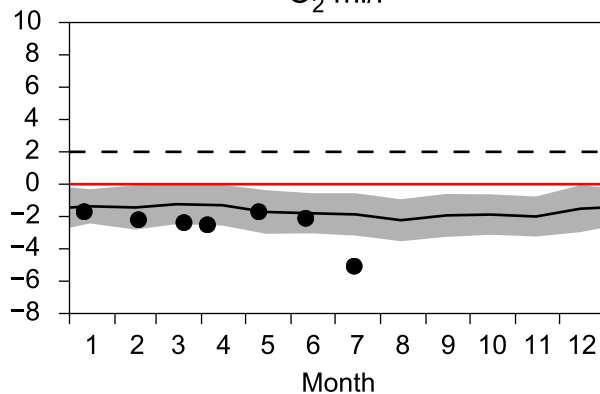


O₂ saturation %

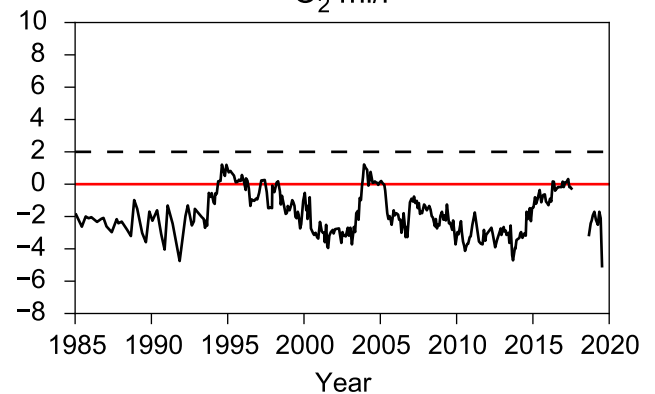


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O₂ ml/l

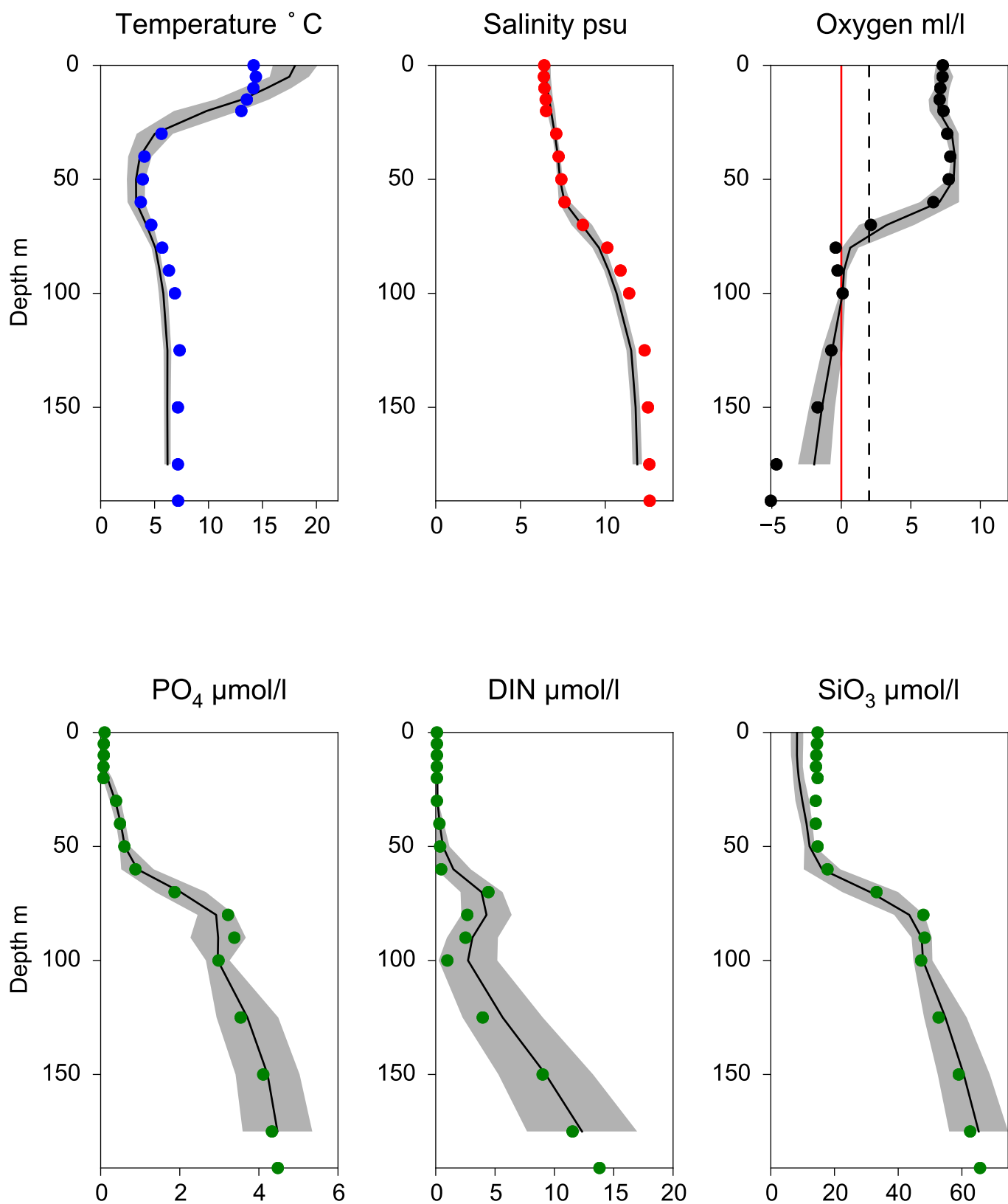


O₂ ml/l



Vertical profiles BY20 FÅRÖDJ July

— Mean 2001-2015 ■ St.Dev. ● 2019-07-14



STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

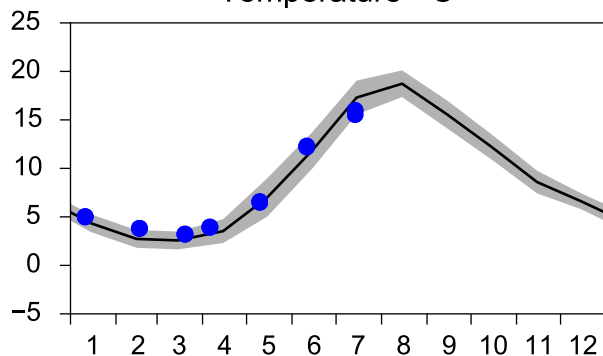
Annual Cycles

— Mean 2001-2015

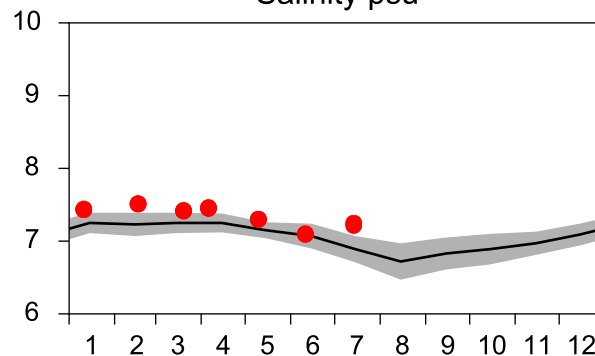
■ St.Dev.

● 2019

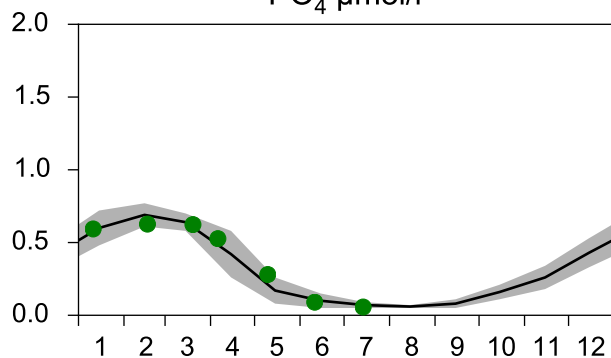
Temperature °C



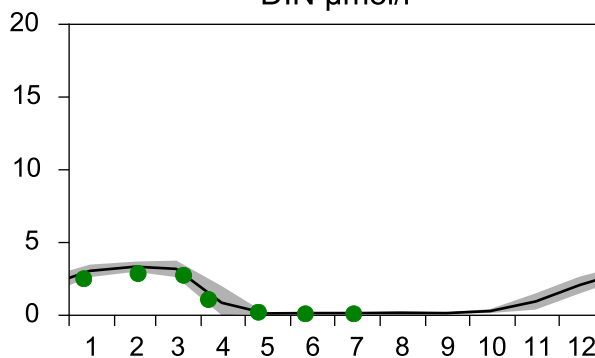
Salinity psu



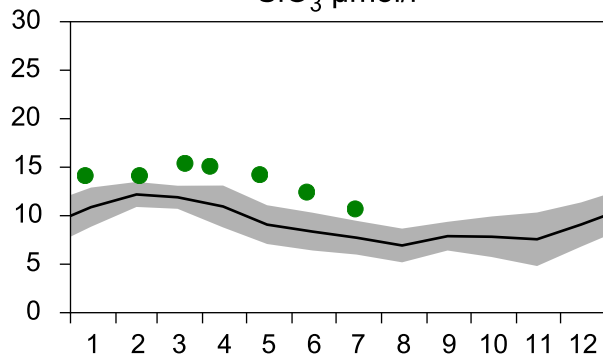
PO₄ µmol/l



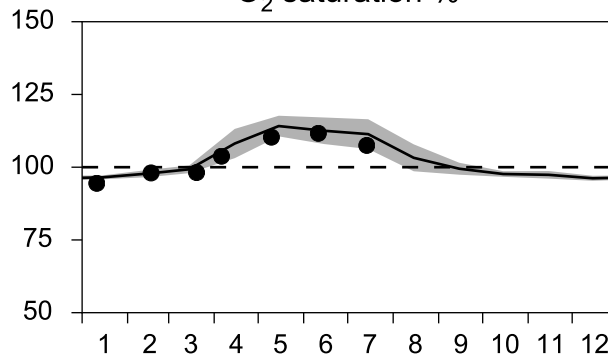
DIN µmol/l



SiO₃ µmol/l

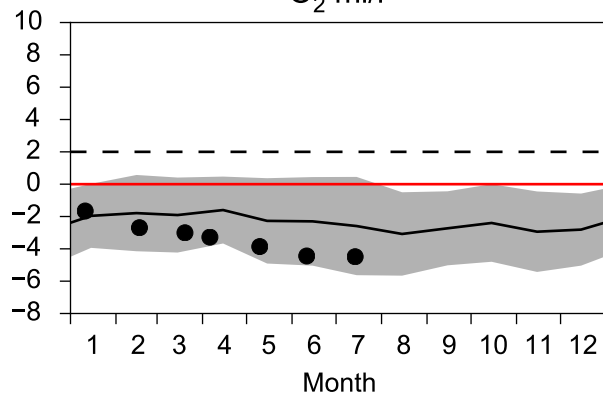


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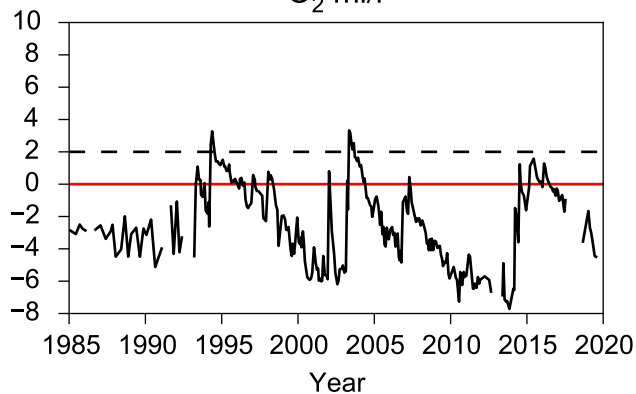


OXYGEN IN BOTTOM WATER (depth >= 225 m)

O₂ ml/l

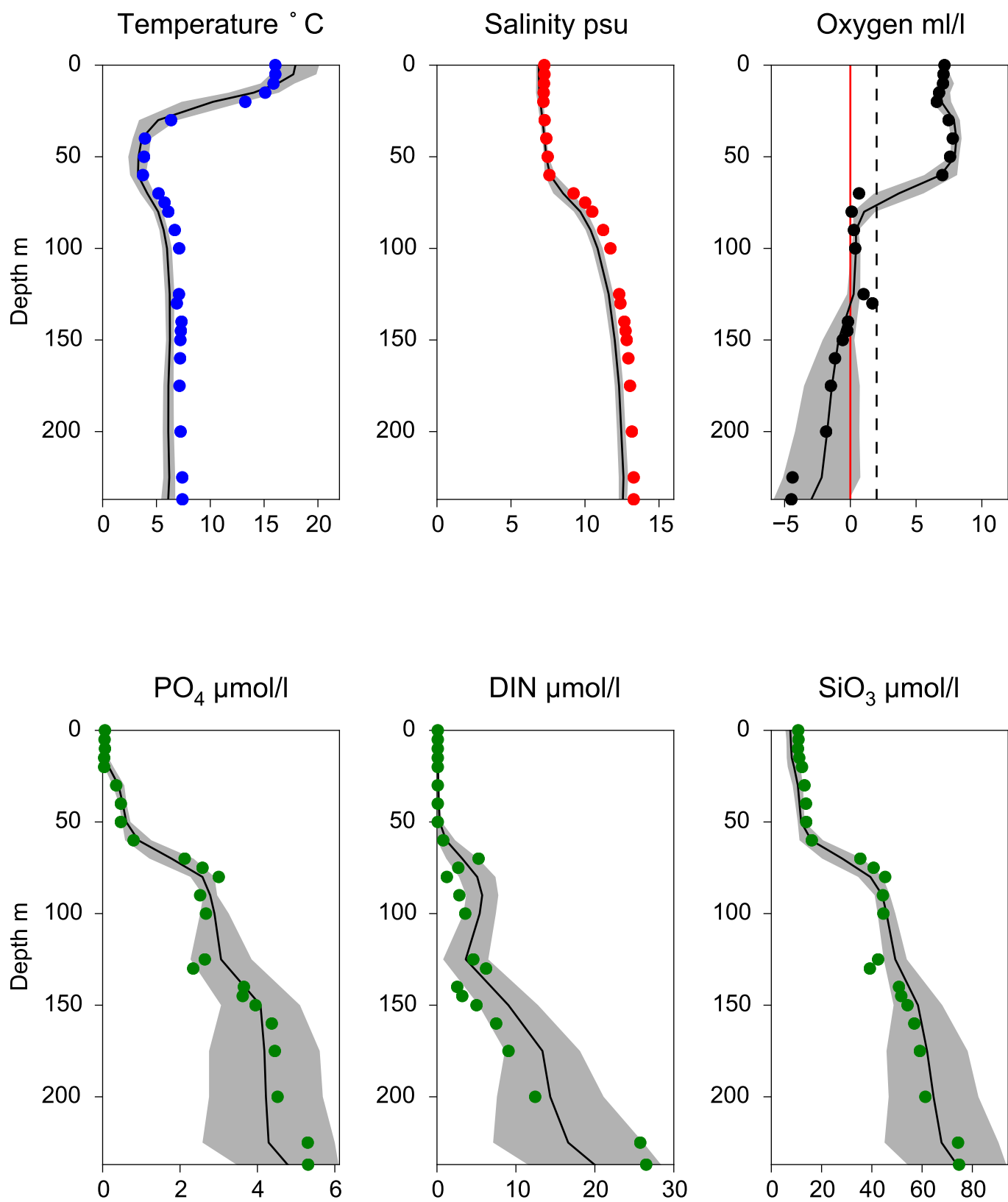


O₂ ml/l



Vertical profiles BY15 GOTLANDSDJ July

— Mean 2001-2015 ■ St.Dev. ● 2019-07-14



STATION BY10 SURFACE WATER (0-10 m)

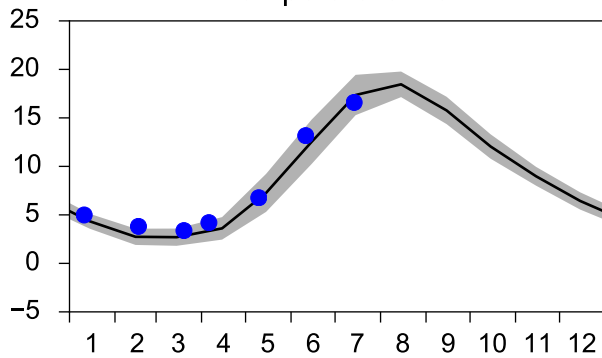
Annual Cycles

— Mean 2001-2015

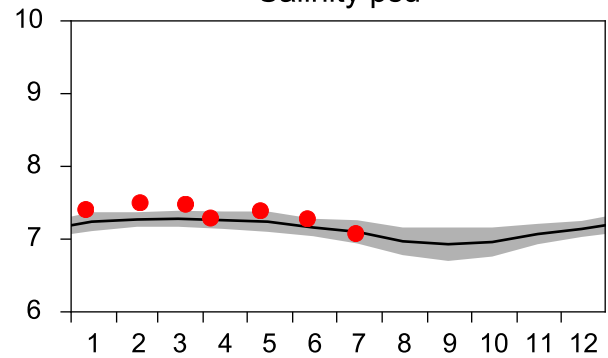
■ St.Dev.

● 2019

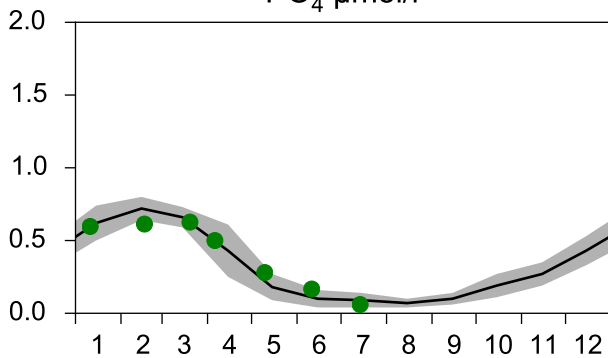
Temperature °C



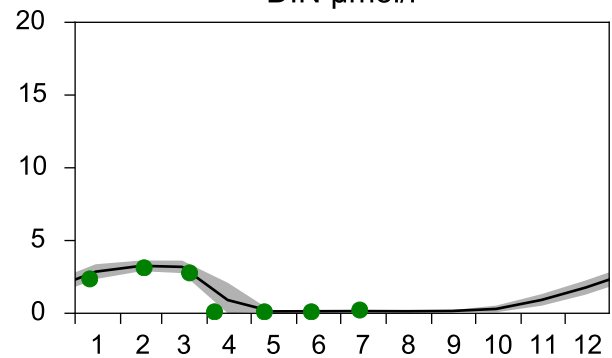
Salinity psu



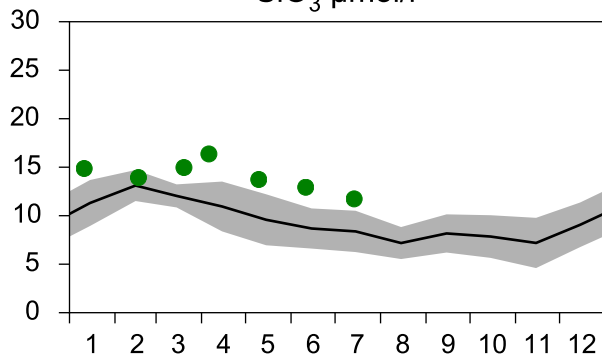
PO₄ µmol/l



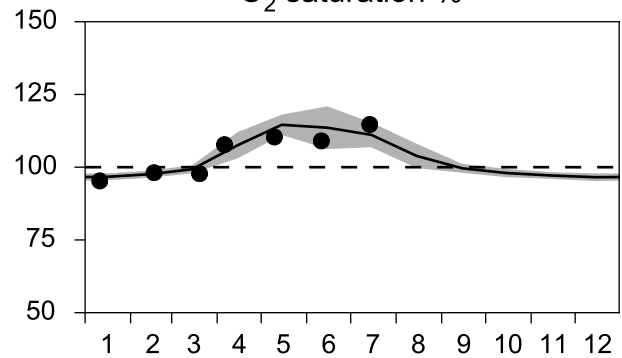
DIN µmol/l



SiO₃ µmol/l

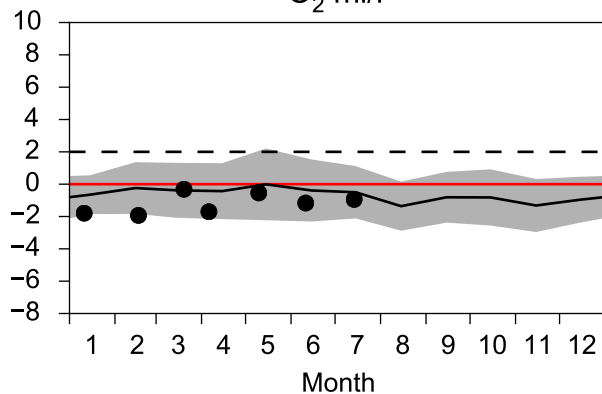


O₂ saturation %

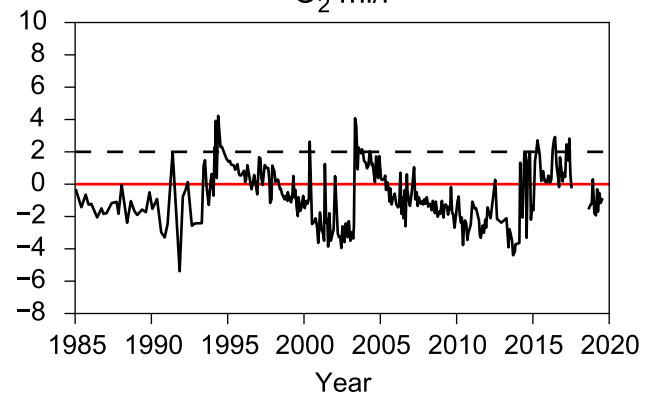


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l

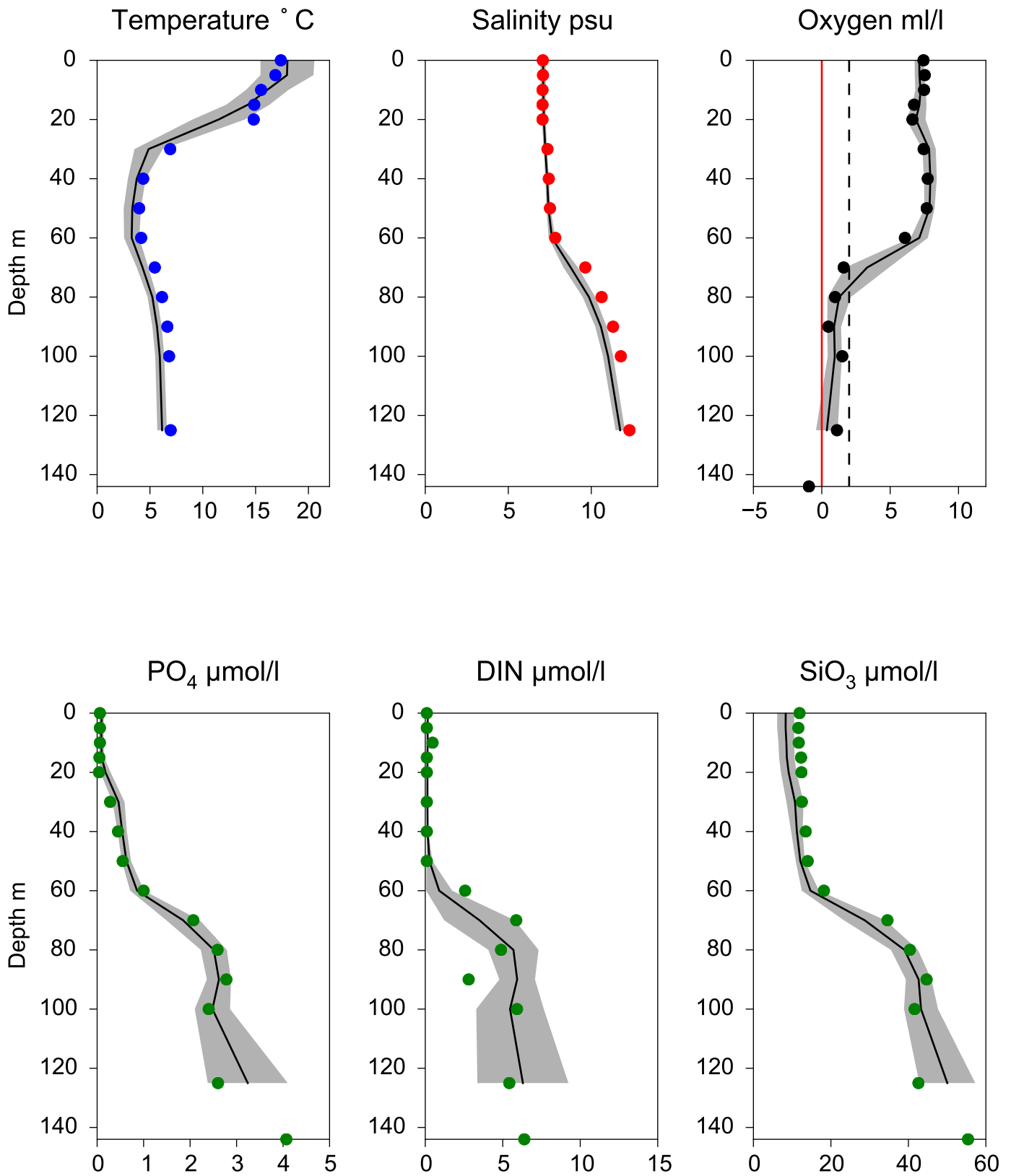


O₂ ml/l



Vertical profiles BY10 July

— Mean 2001-2015 St.Dev. • 2019-07-14



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

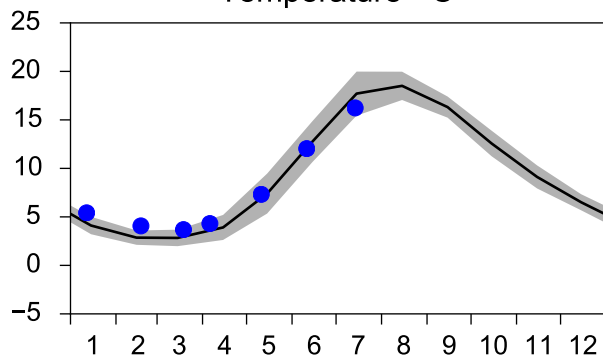
Annual Cycles

— Mean 2001-2015

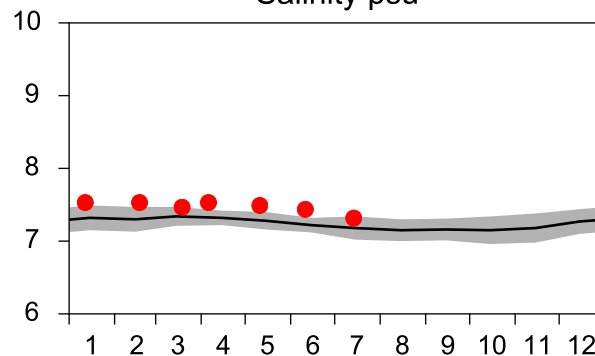
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● 2019

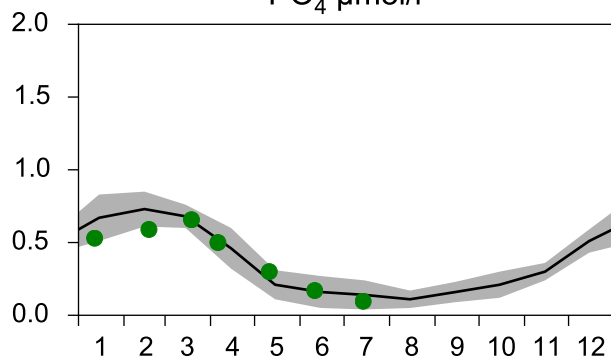
Temperature °C



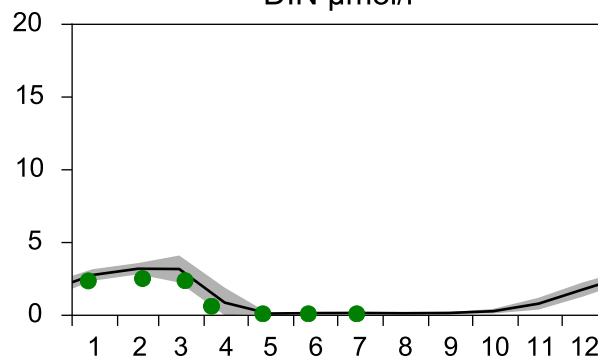
Salinity psu



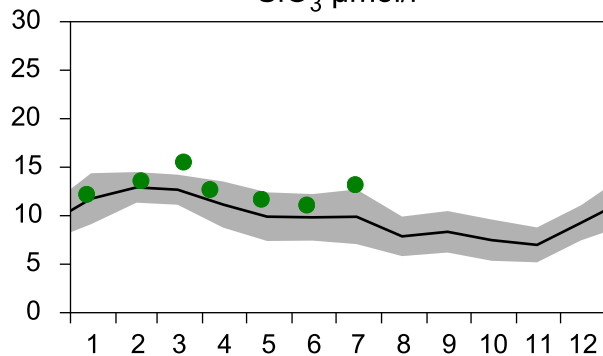
PO₄ µmol/l



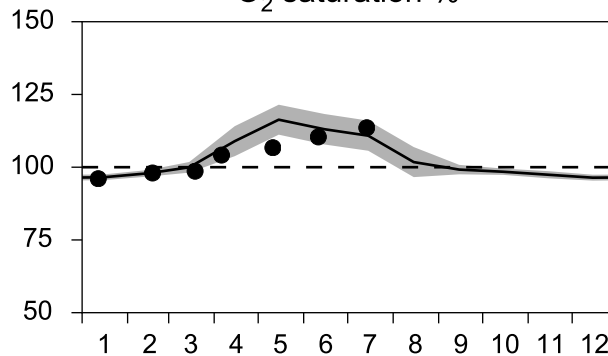
DIN µmol/l



SiO₃ µmol/l

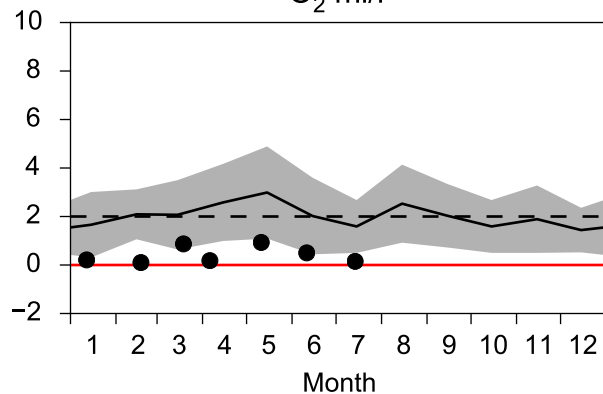


O₂ saturation %

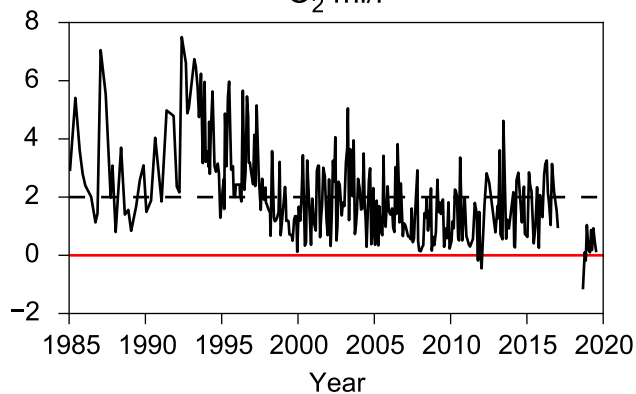


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

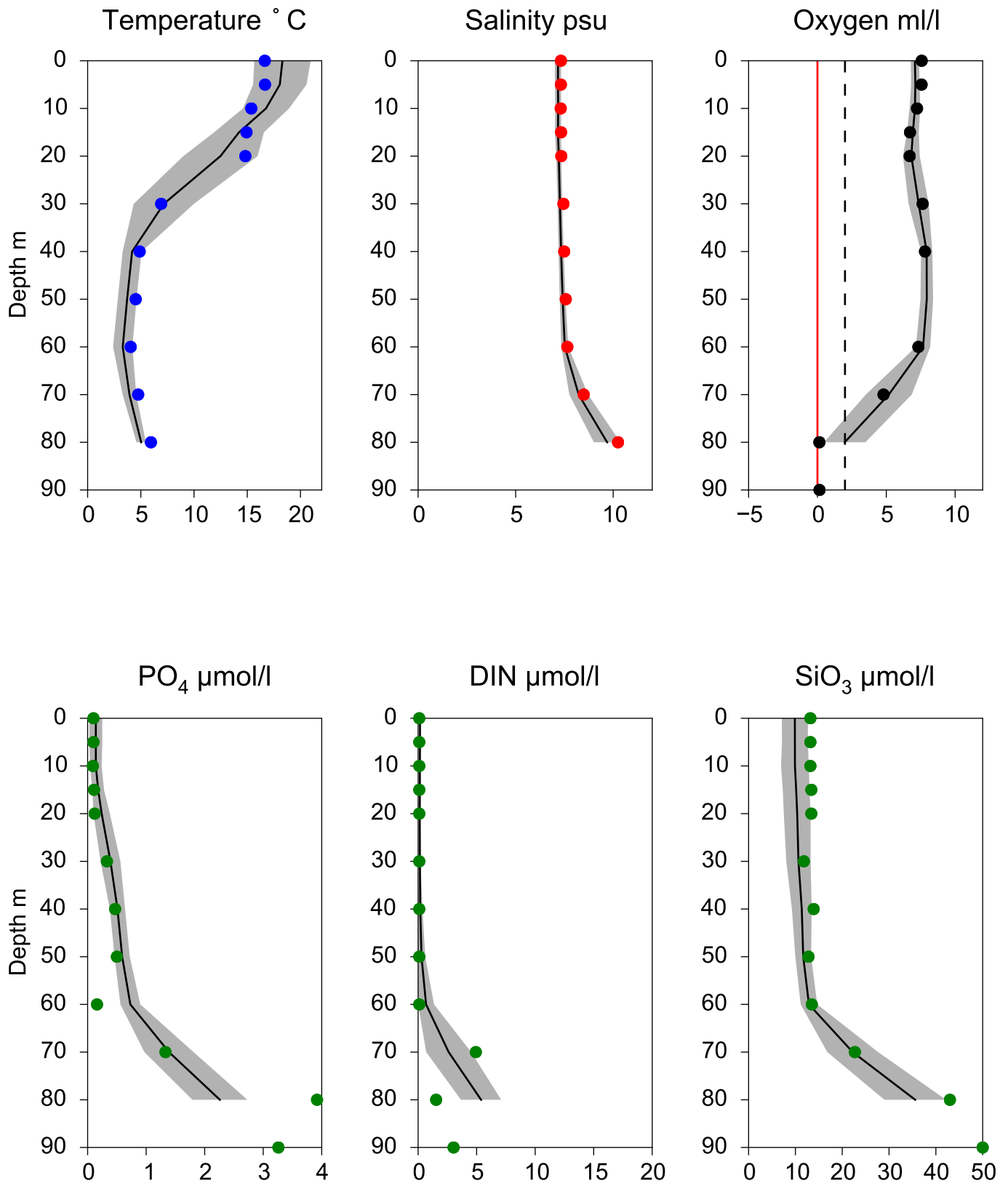


O₂ ml/l



Vertical profiles BCS III-10 July

— Mean 2001-2015 ■ St.Dev. ● 2019-07-14



STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

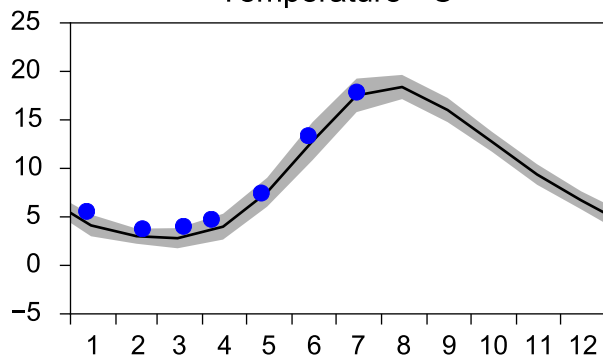
Annual Cycles

— Mean 2001-2015

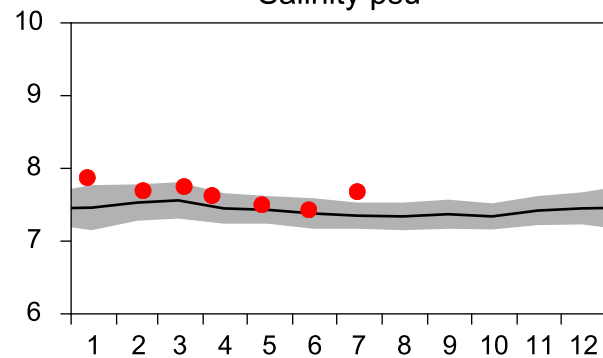
■ St.Dev.

● 2019

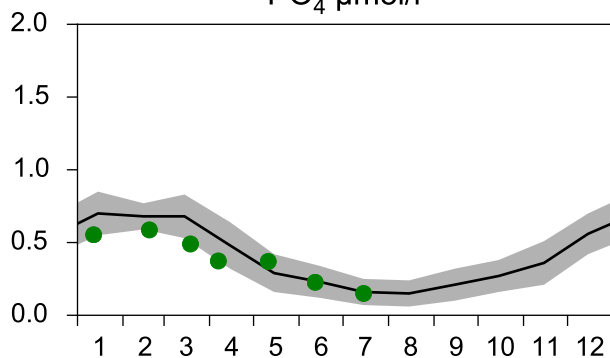
Temperature °C



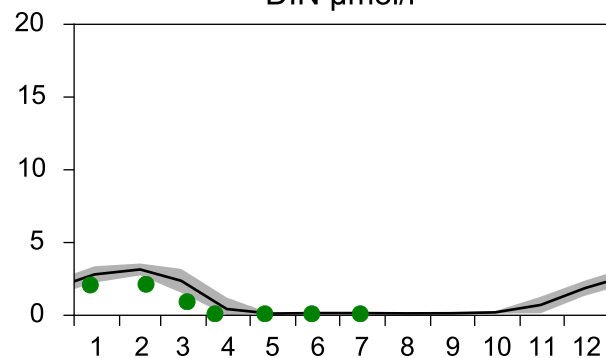
Salinity psu



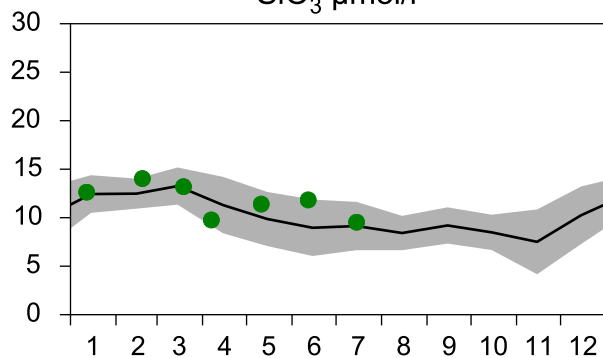
PO₄ µmol/l



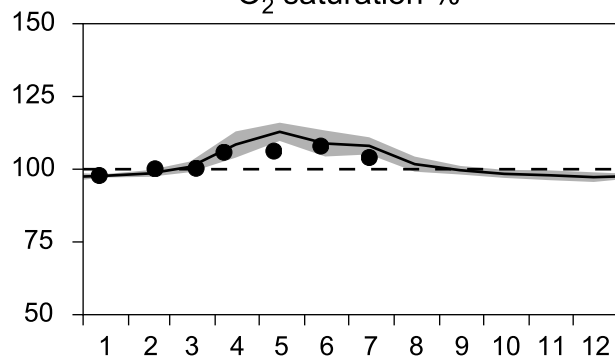
DIN µmol/l



SiO₃ µmol/l

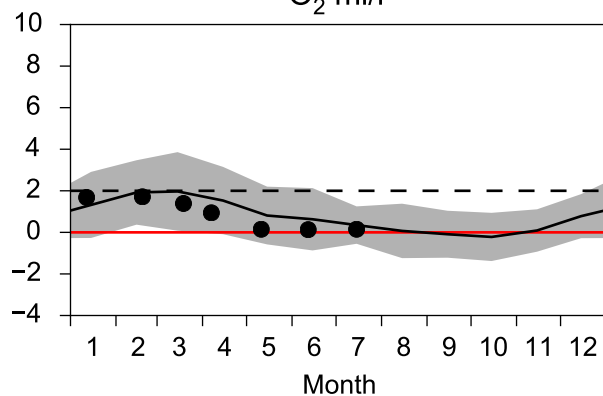


O₂ saturation %

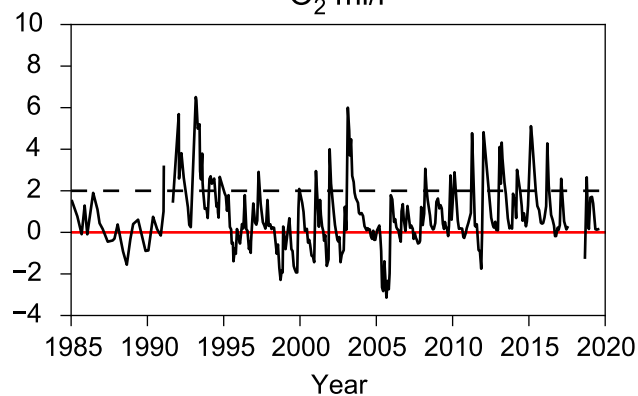


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

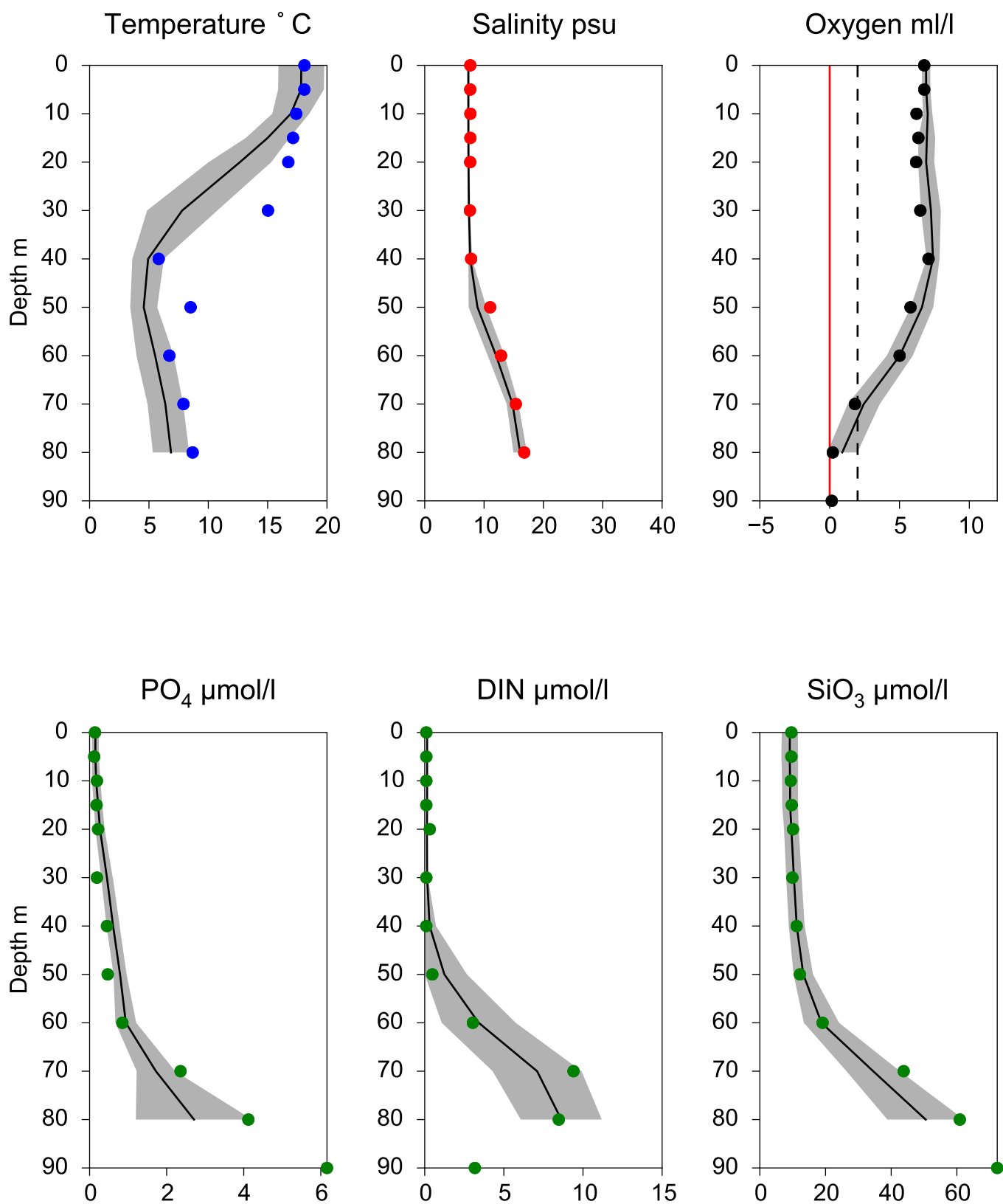


O₂ ml/l



Vertical profiles BY5 BORNHOLMSDJ July

— Mean 2001-2015 St.Dev. • 2019-07-15



STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

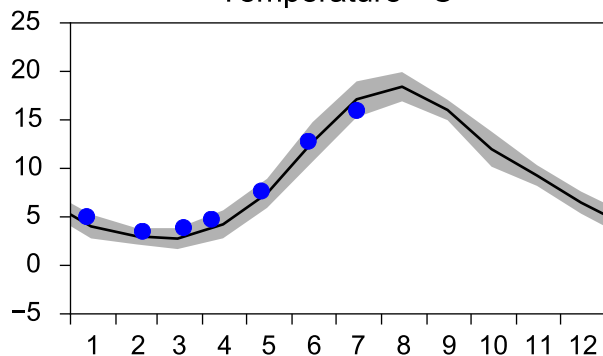
Annual Cycles

— Mean 2001-2015

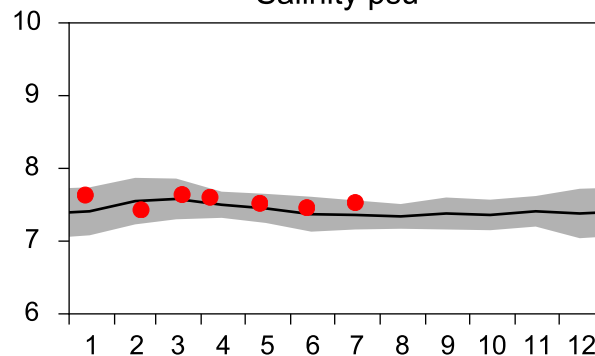
■ St.Dev.

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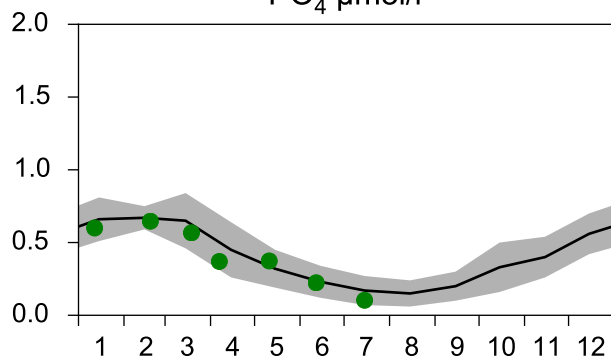
Temperature °C



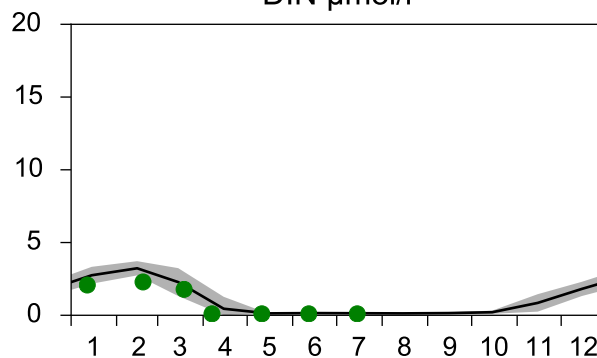
Salinity psu



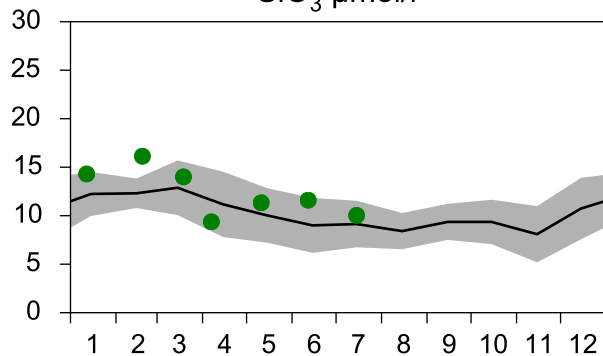
PO₄ µmol/l



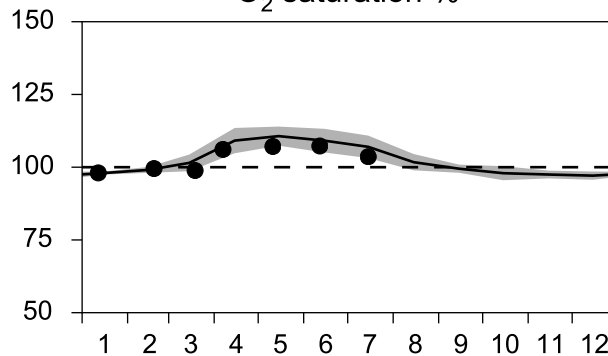
DIN µmol/l



SiO₃ µmol/l

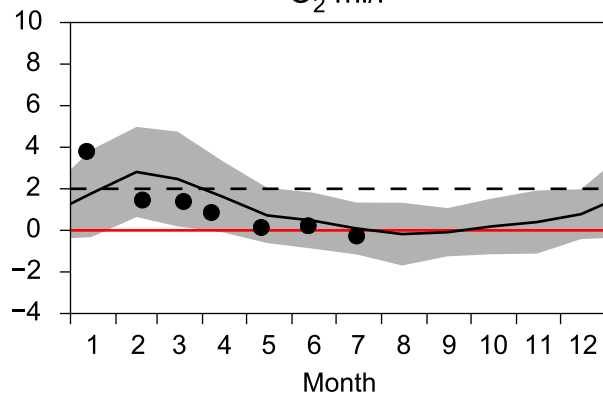


O₂ saturation %

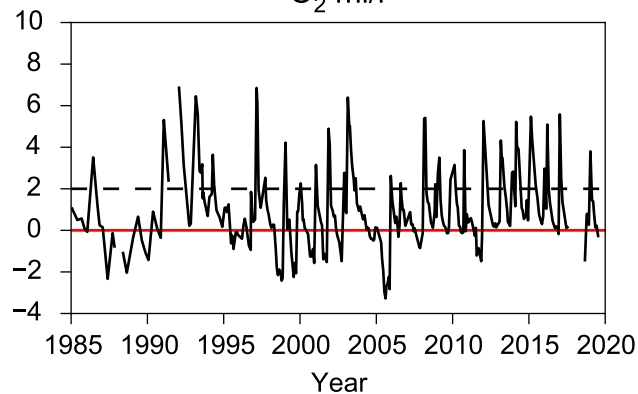


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

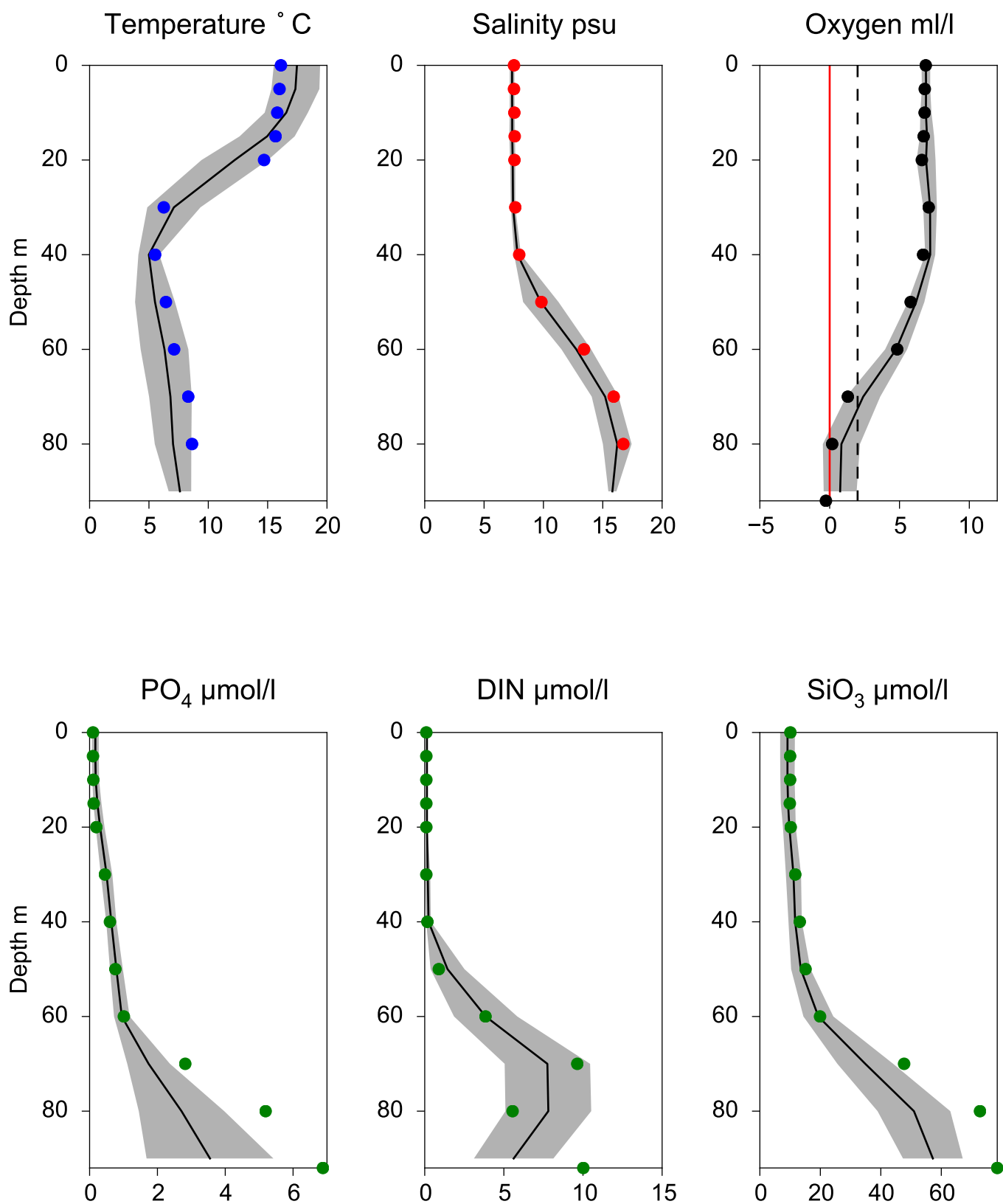


O₂ ml/l



Vertical profiles BY4 CHRISTIANSÖ July

— Mean 2001-2015 St.Dev. • 2019-07-15



STATION BY2 ARKONA SURFACE WATER (0-10 m)

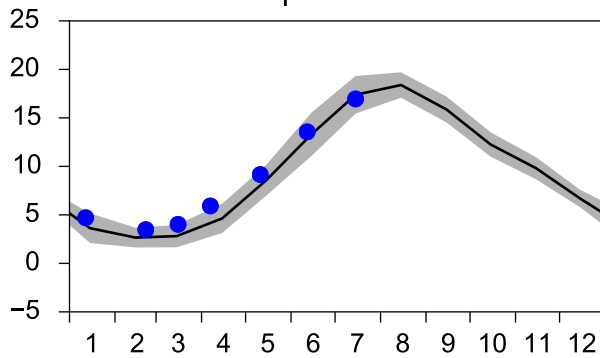
Annual Cycles

— Mean 2001-2015

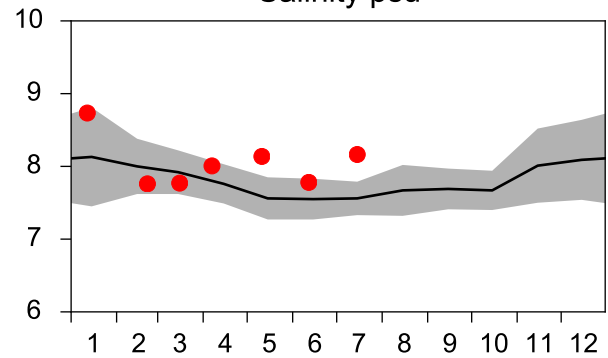
■ St.Dev.

● 2019

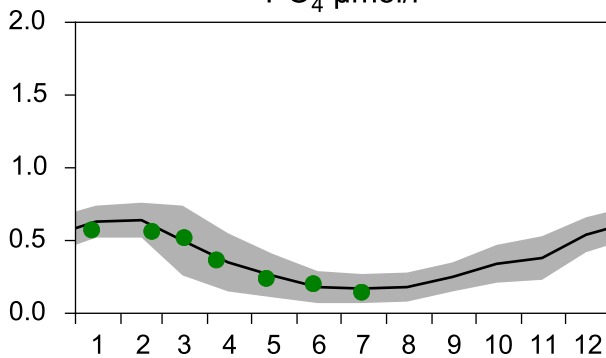
Temperature °C



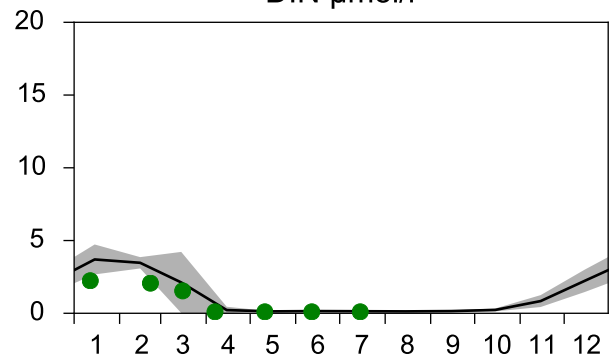
Salinity psu



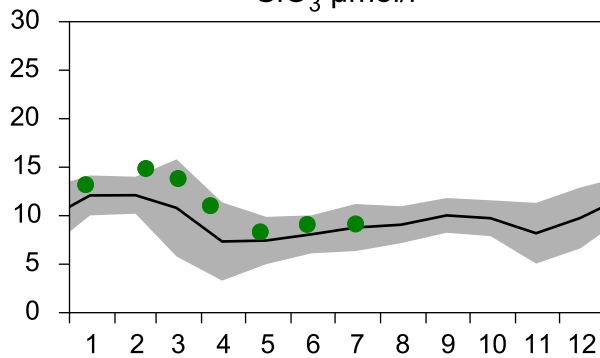
PO₄ µmol/l



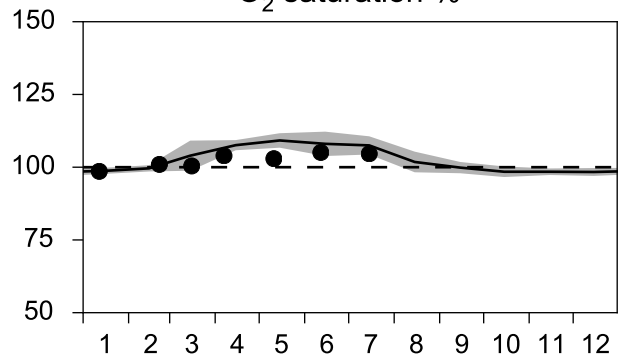
DIN µmol/l



SiO₃ µmol/l

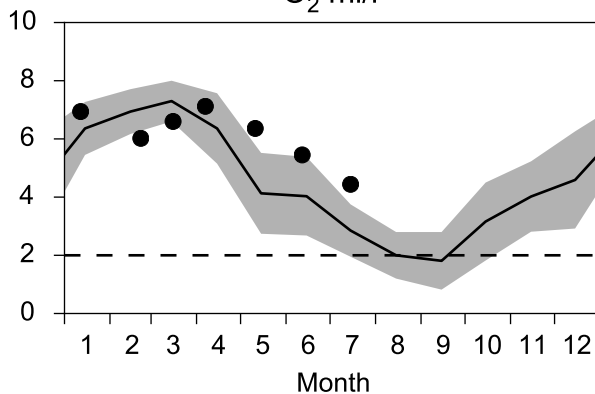


O₂ saturation %

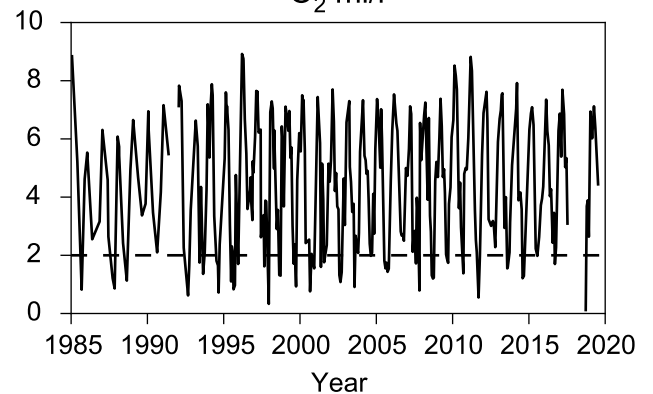


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

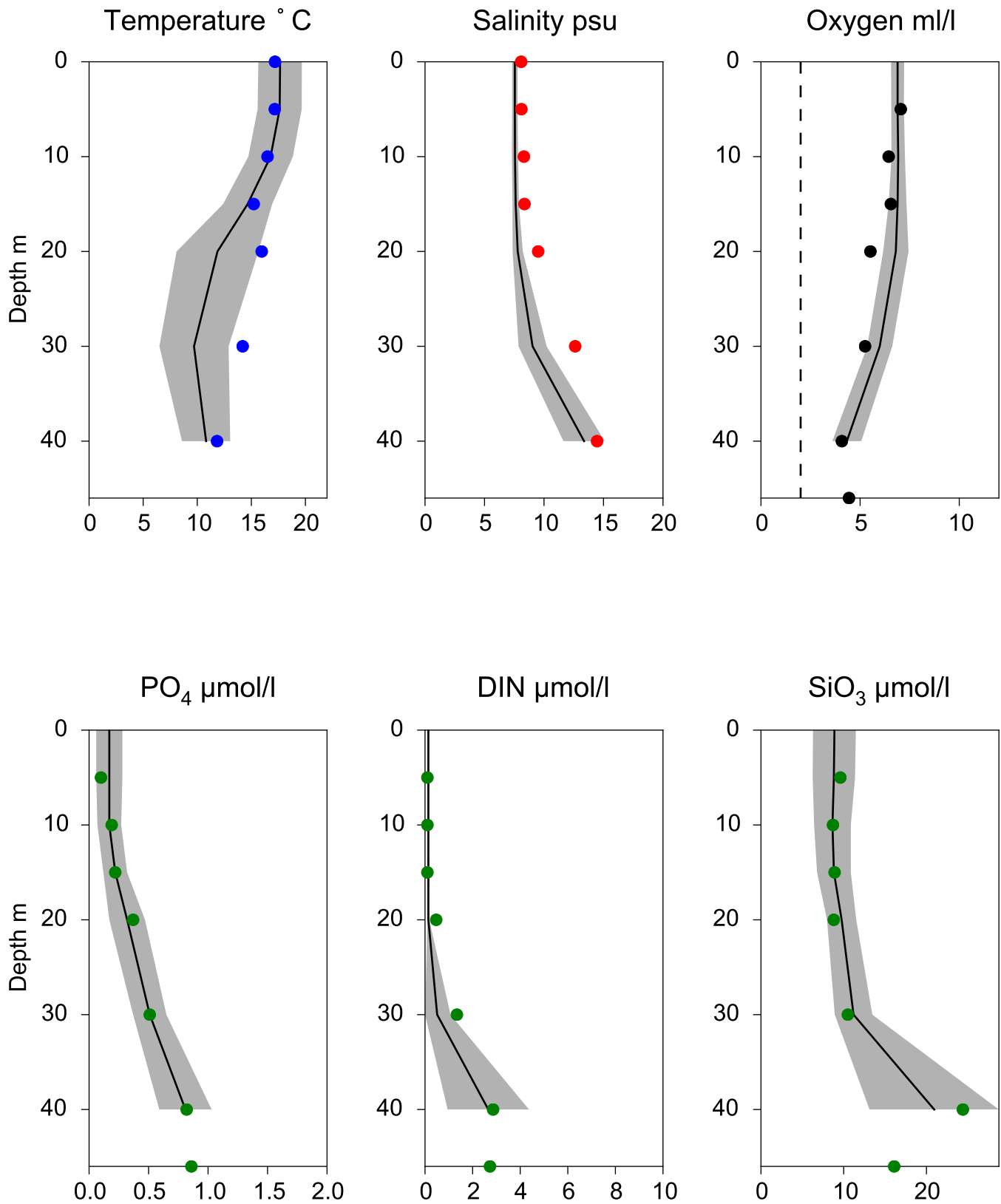


O₂ ml/l



Vertical profiles BY2 ARKONA July

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STATION BY1 SURFACE WATER (0-10 m)

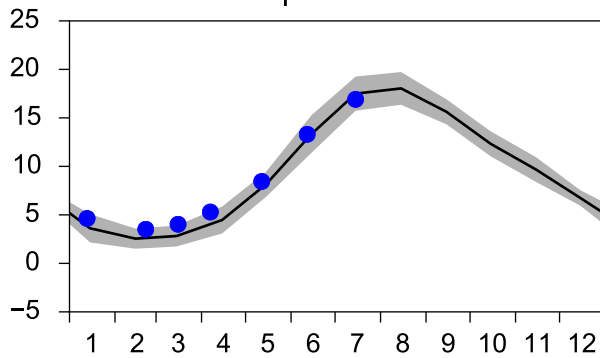
Annual Cycles

— Mean 2001-2015

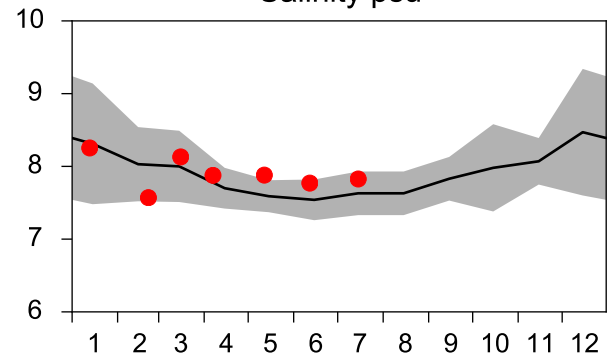
■ St.Dev.

● 2019

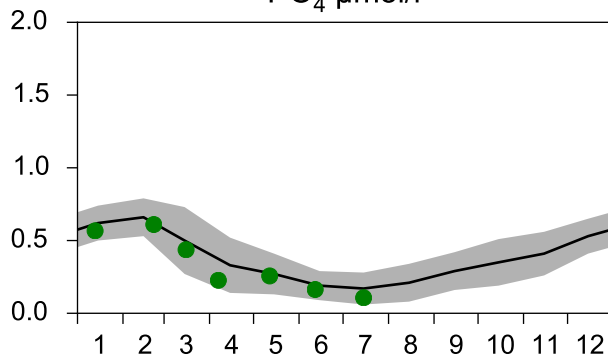
Temperature °C



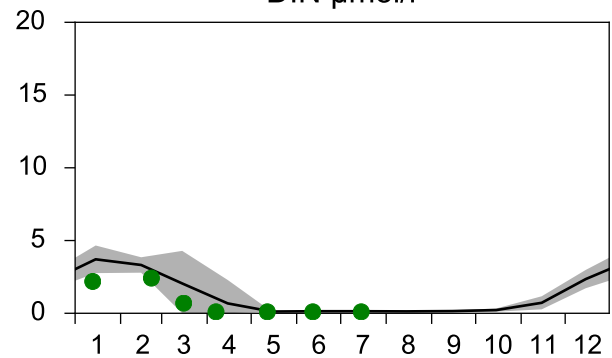
Salinity psu



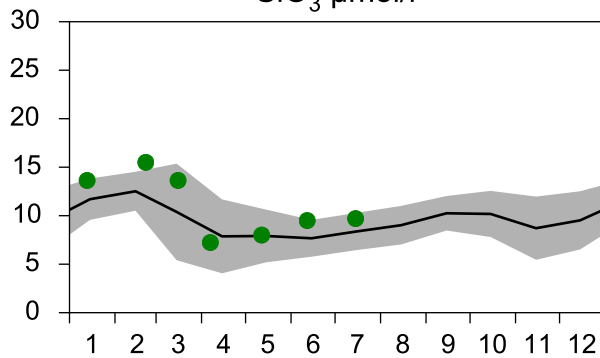
PO₄ µmol/l



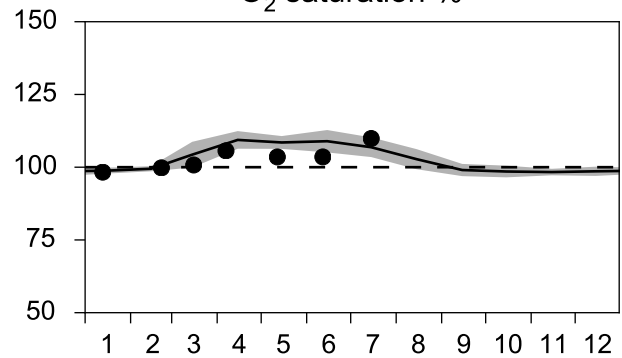
DIN µmol/l



SiO₃ µmol/l

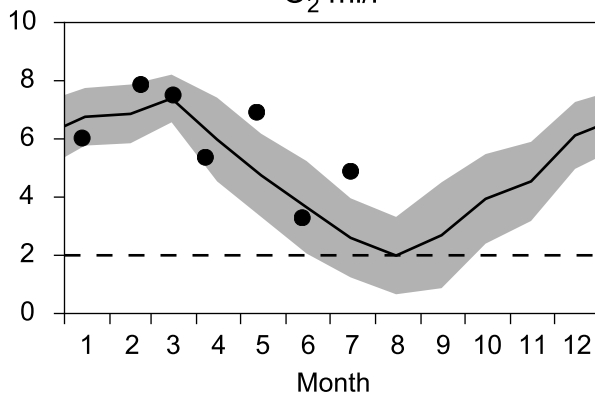


O₂ saturation %

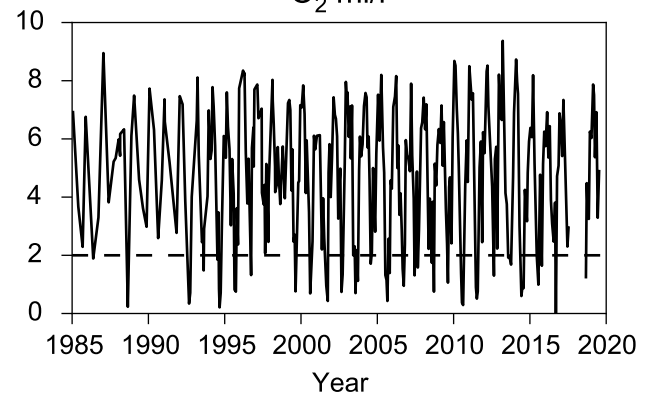


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

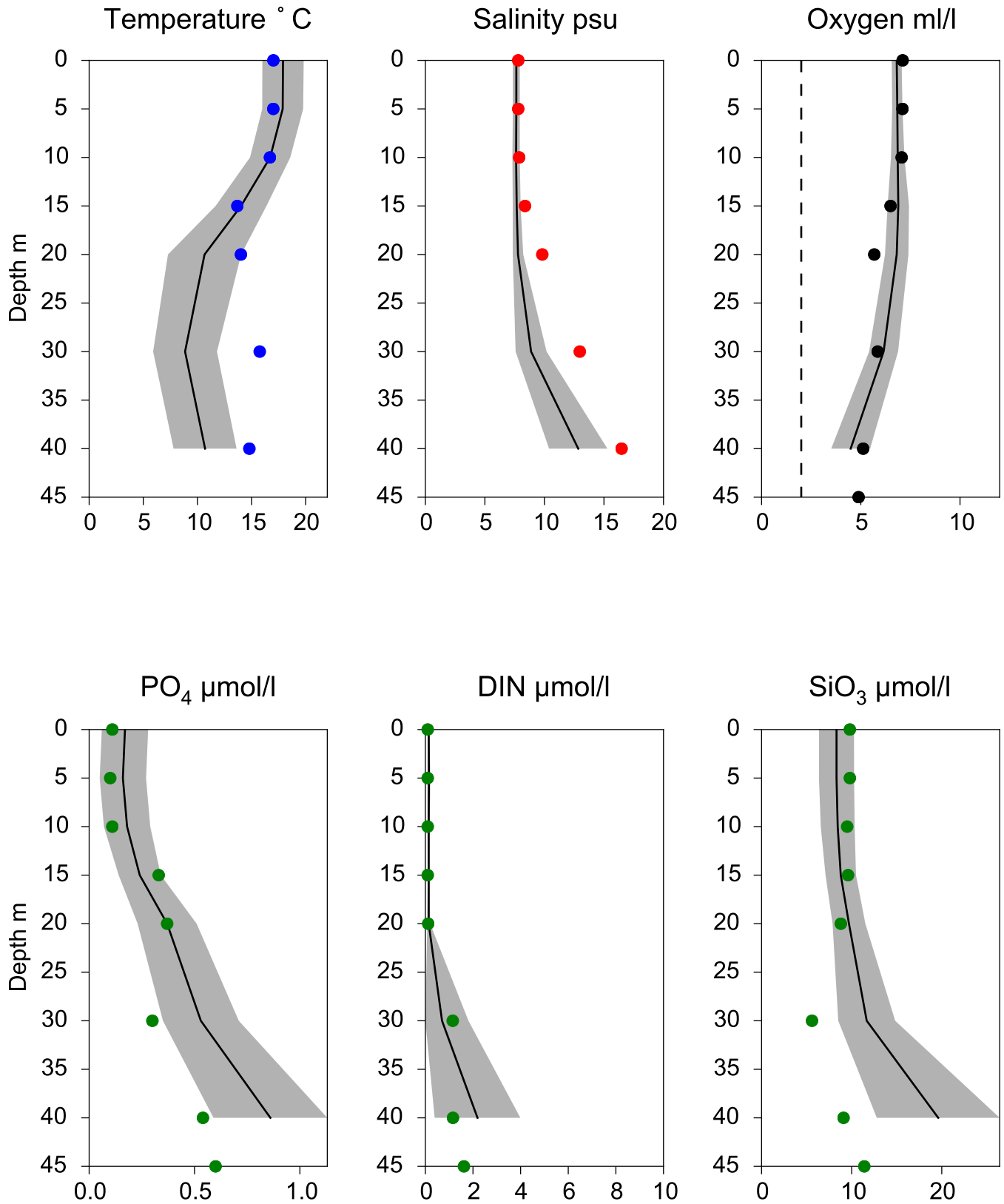


O₂ ml/l



Vertical profiles BY1 July

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STATION W LANDSKRONA SURFACE WATER (0-10 m)

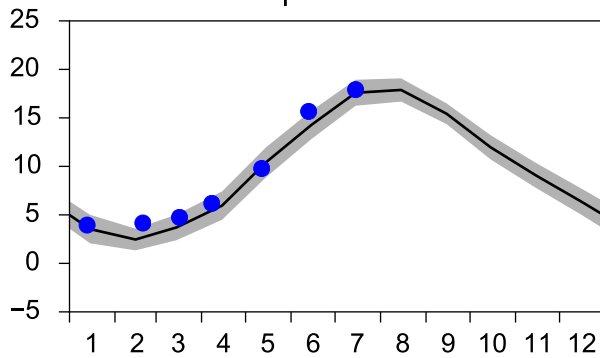
Annual Cycles

— Mean 2001-2015

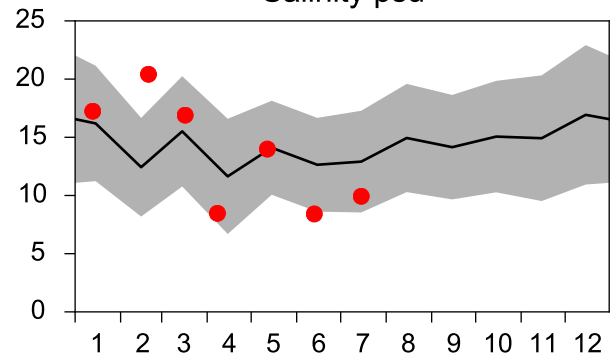
■ St.Dev.

● 2019

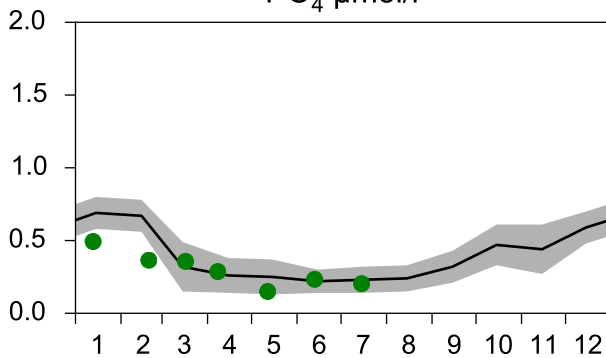
Temperature °C



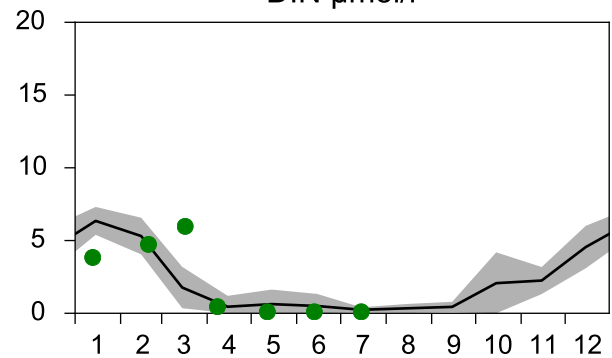
Salinity psu



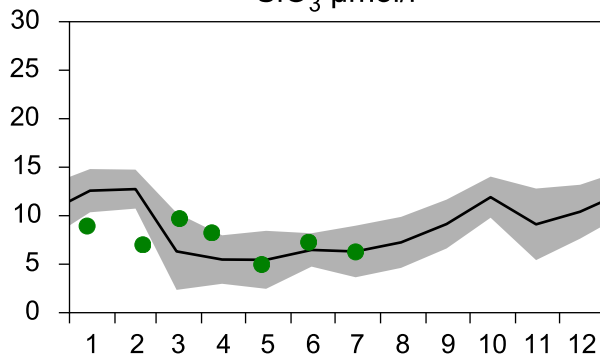
PO₄ µmol/l



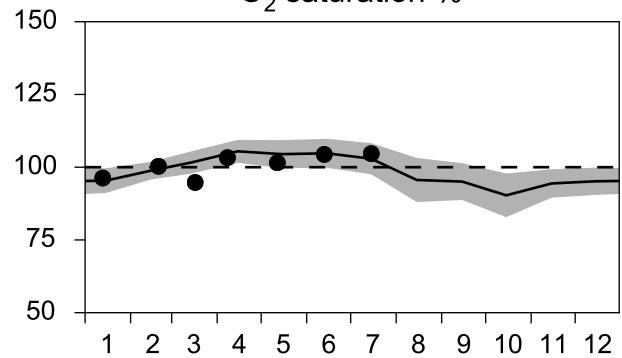
DIN µmol/l



SiO₃ µmol/l

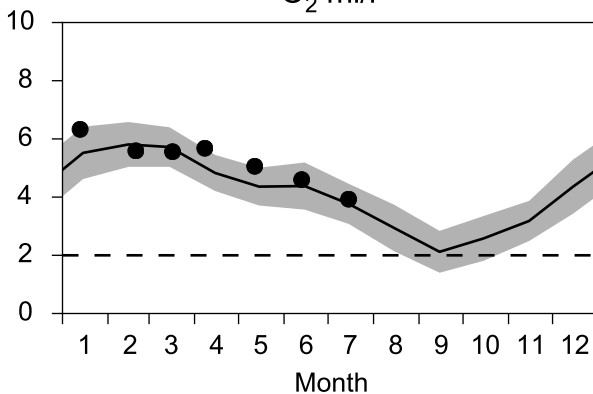


O₂ saturation %

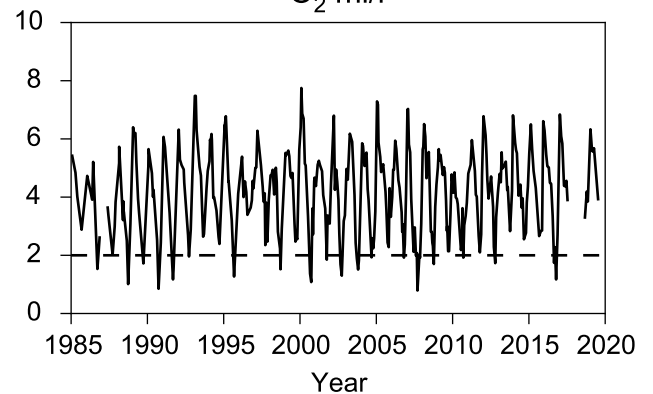


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

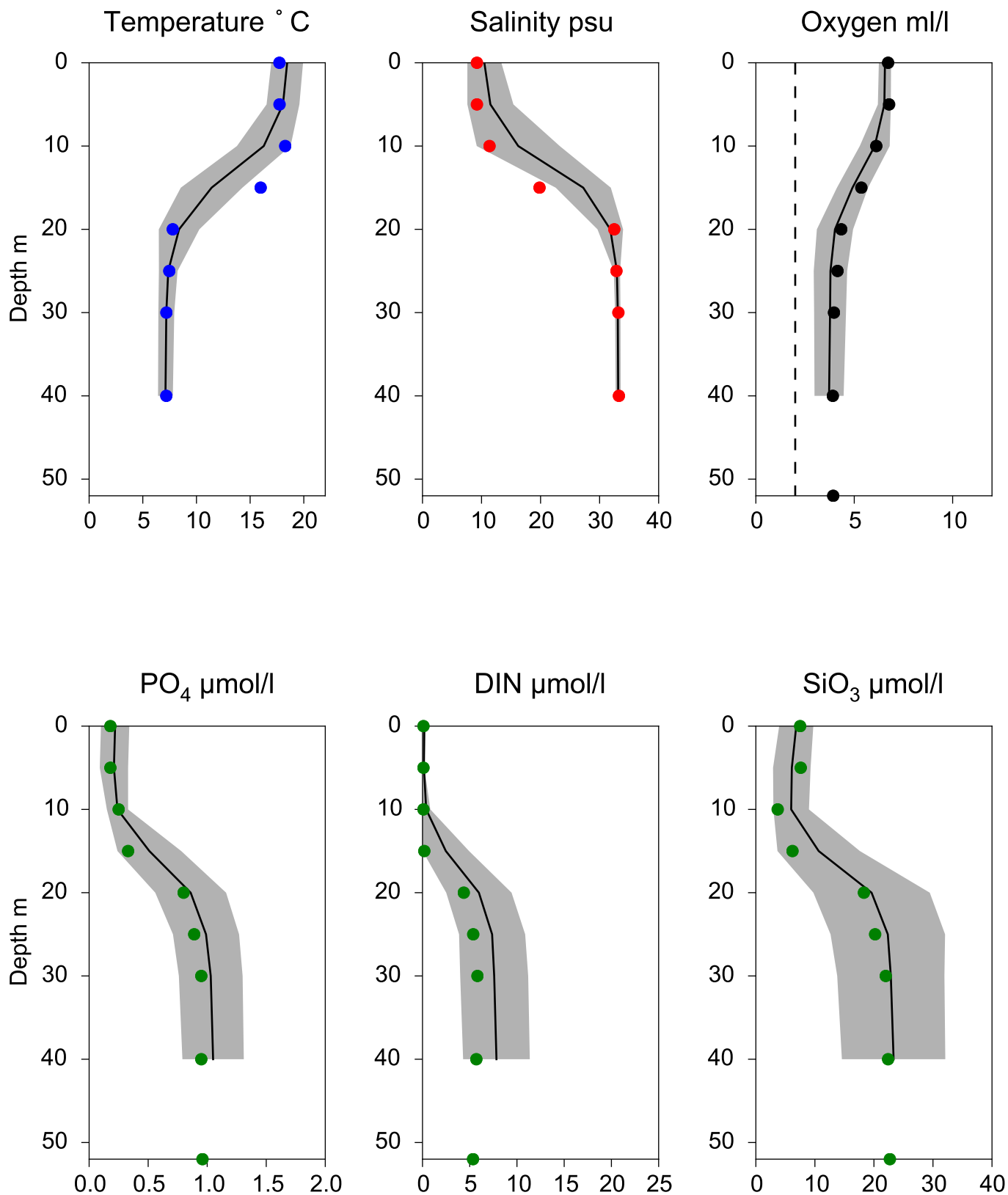


O₂ ml/l



Vertical profiles W LANDSKRONA July

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STATION ANHOLT E SURFACE WATER (0-10 m)

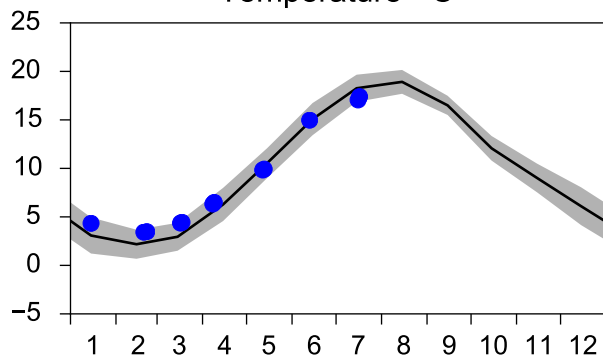
Annual Cycles

— Mean 2001-2015

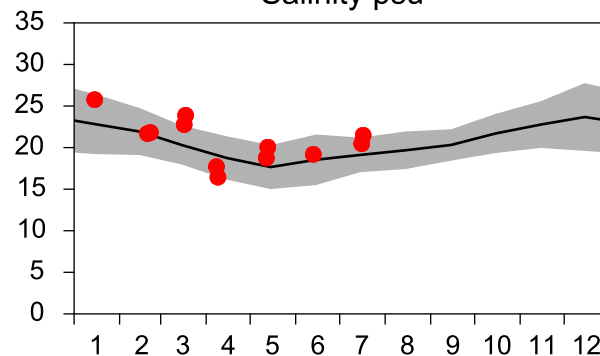
■ St.Dev.

● 2019

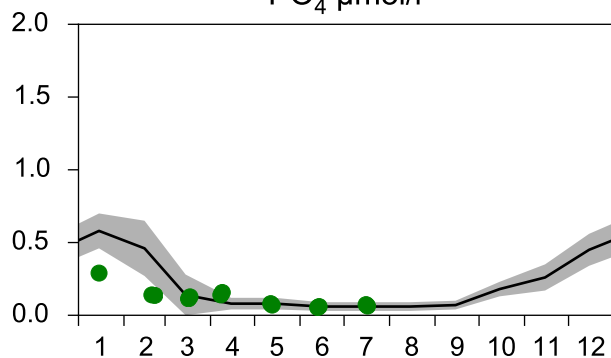
Temperature °C



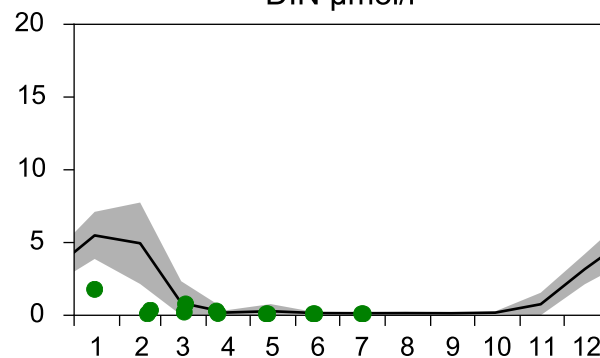
Salinity psu



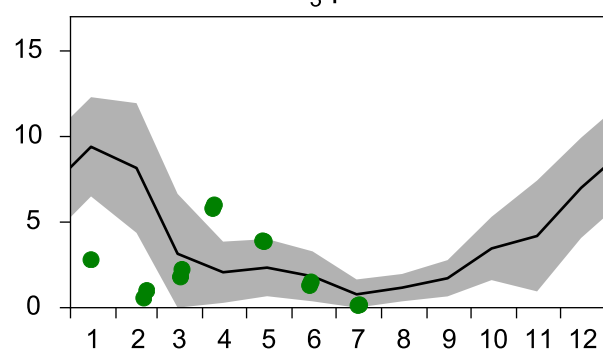
PO₄ µmol/l



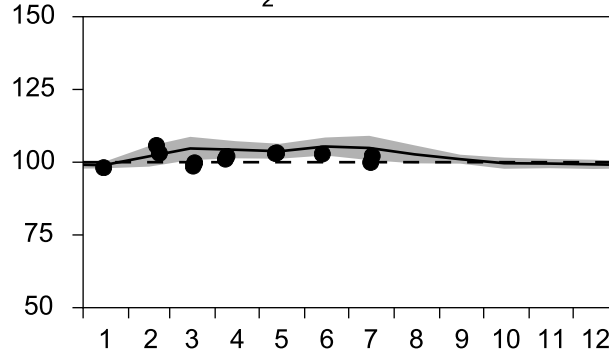
DIN µmol/l



SiO₃ µmol/l

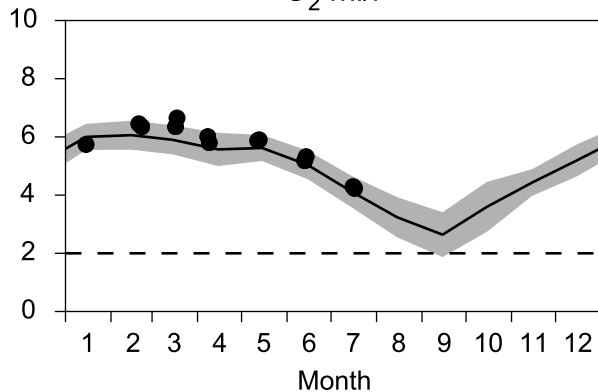


O₂ saturation %

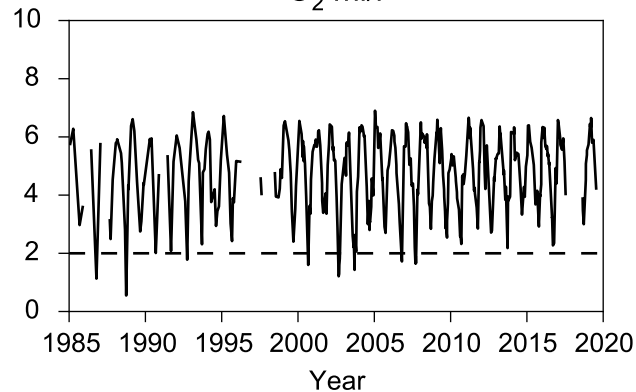


OXYGEN IN BOTTOM WATER (depth >= 52 m)

O₂ ml/l

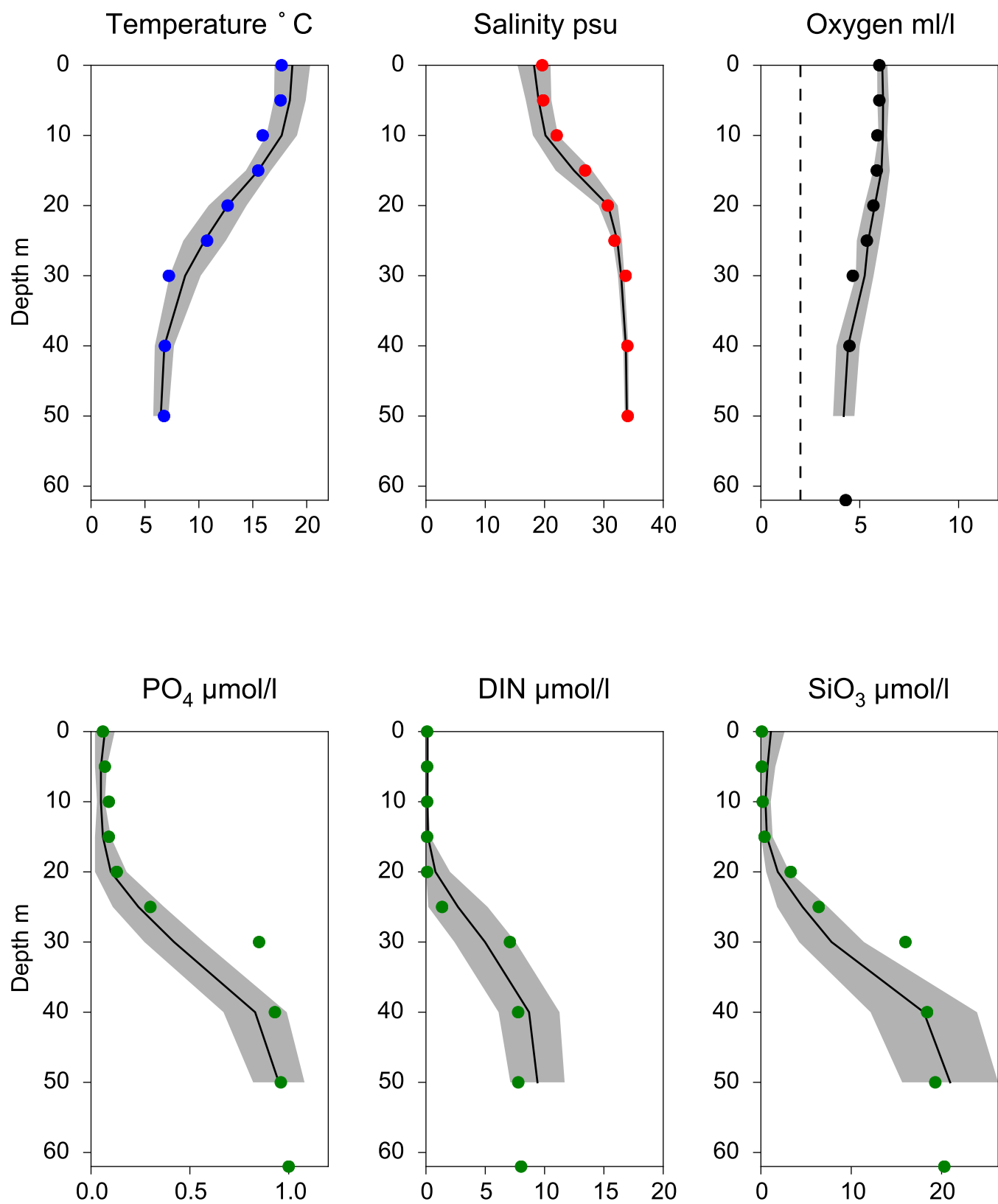


O₂ ml/l



Vertical profiles ANHOLT E July

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STATION FLADEN SURFACE WATER (0-10 m)

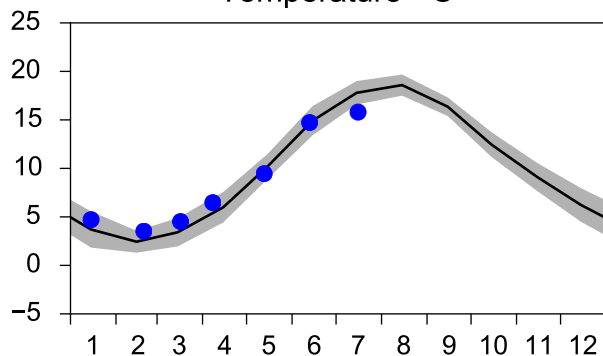
Annual Cycles

— Mean 2001-2015

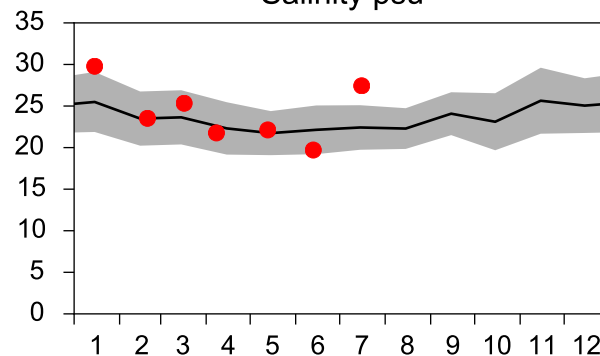
■ St.Dev.

● 2019

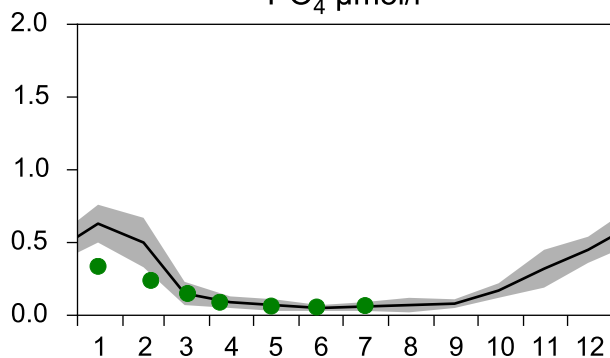
Temperature °C



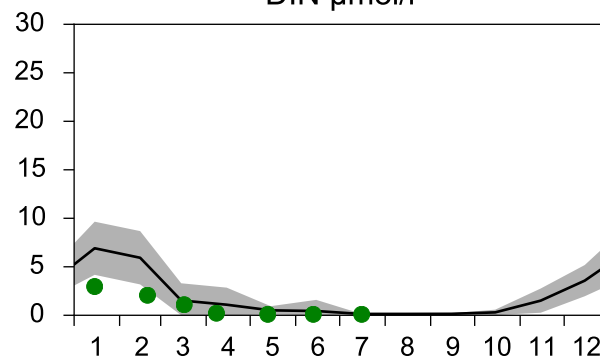
Salinity psu



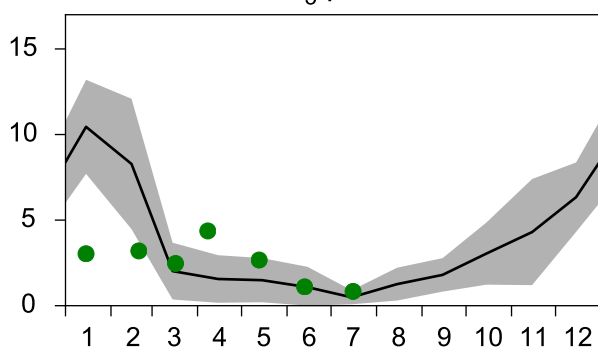
PO₄ µmol/l



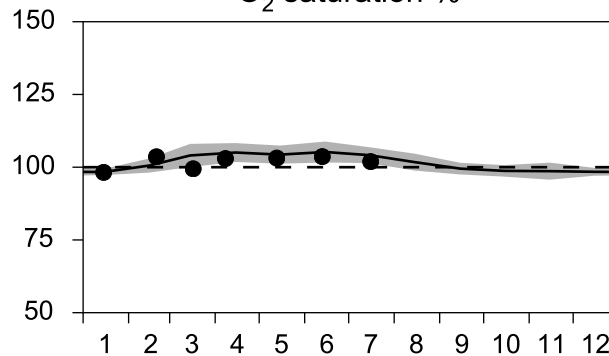
DIN µmol/l



SiO₃ µmol/l

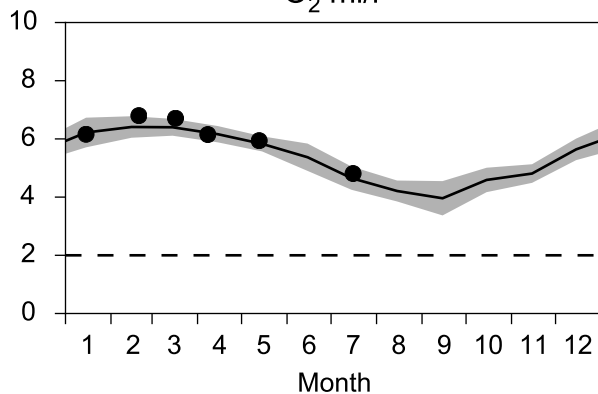


O₂ saturation %

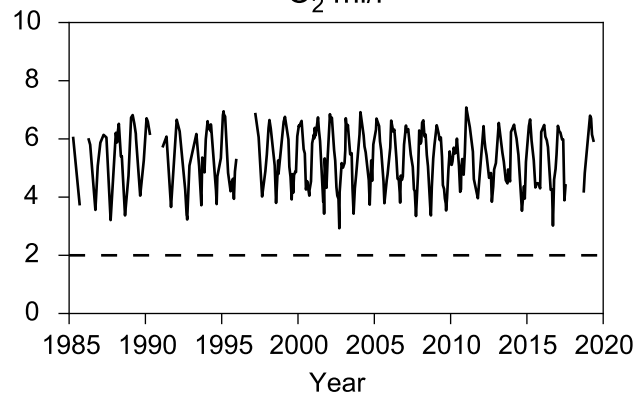


OXYGEN IN BOTTOM WATER (depth >= 74 m)

O₂ ml/l

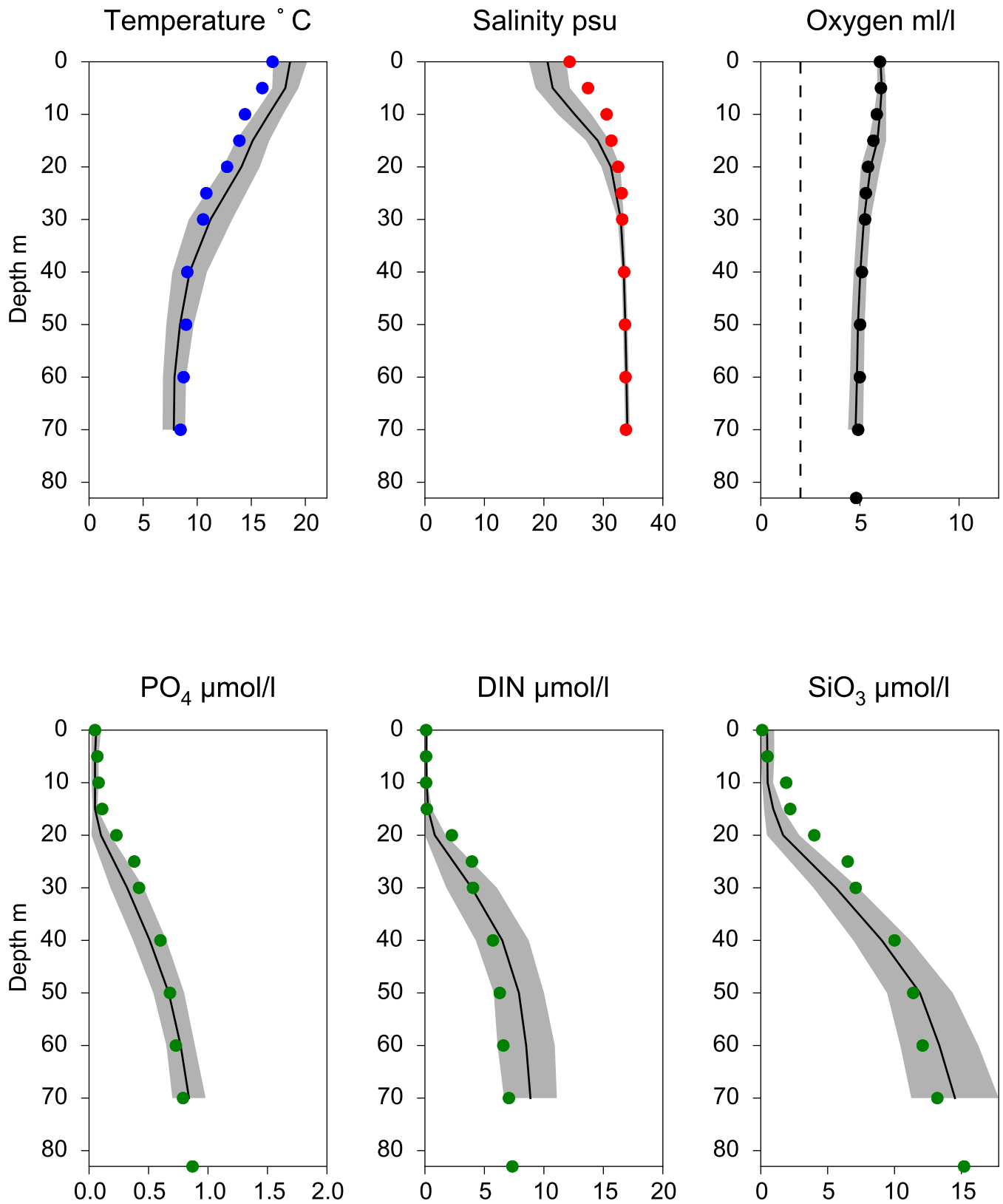


O₂ ml/l



Vertical profiles FLADEN July

— Mean 2001-2015 ■ St.Dev. ● 2019-07-16



STATION Å17 SURFACE WATER (0-10 m)

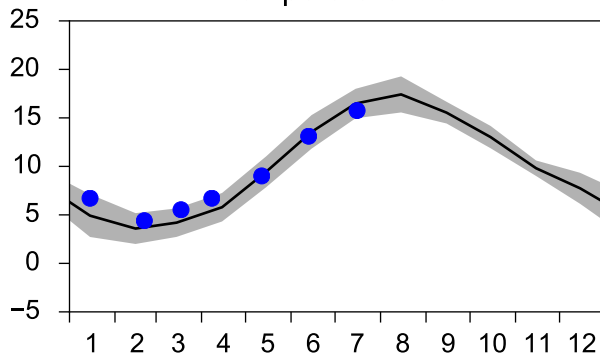
Annual Cycles

— Mean 2001-2015

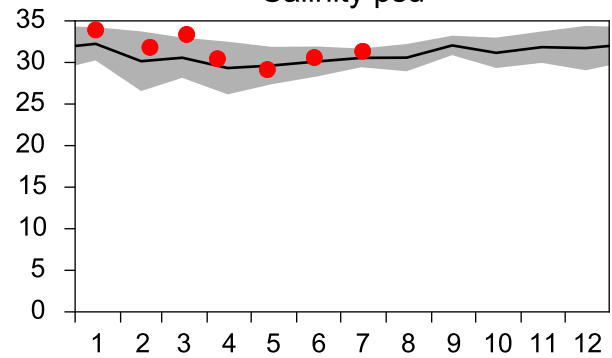
■ St.Dev.

● 2019

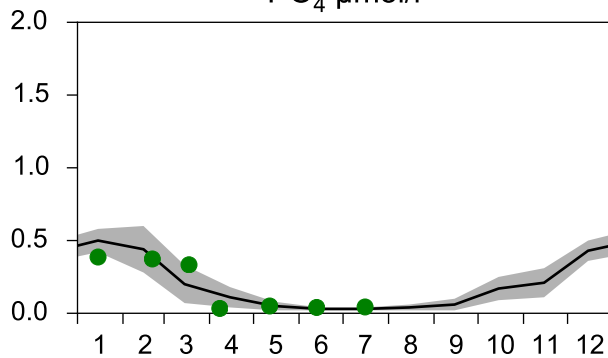
Temperature °C



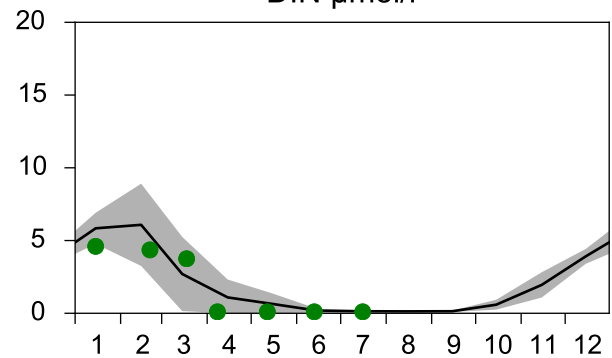
Salinity psu



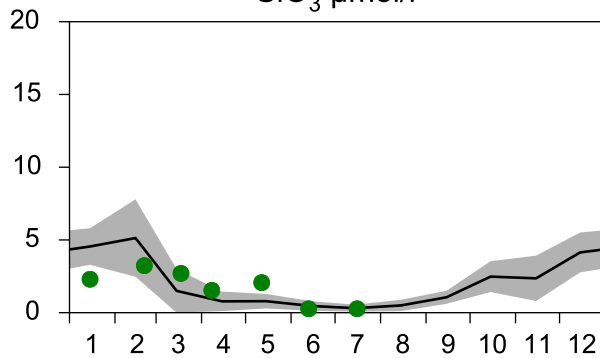
PO₄ µmol/l



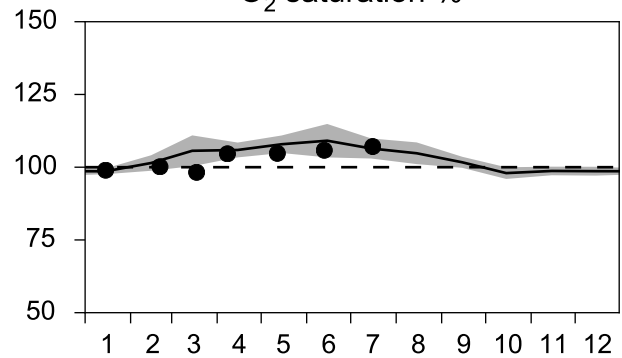
DIN µmol/l



SiO₃ µmol/l

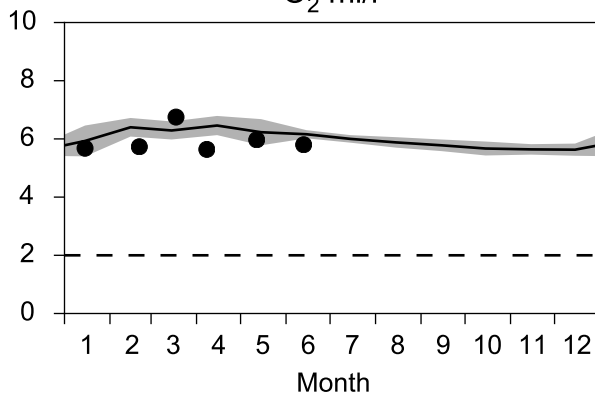


O₂ saturation %

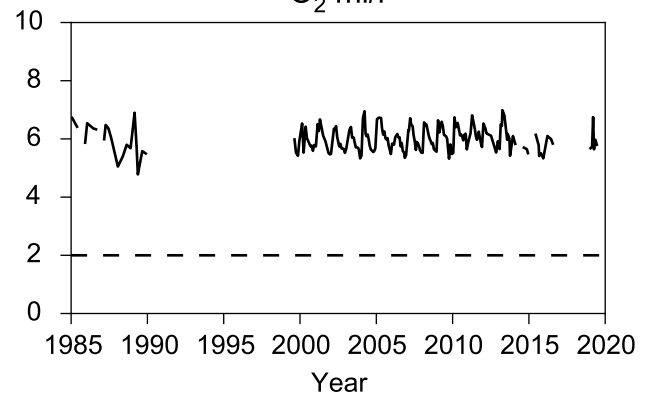


OXYGEN IN BOTTOM WATER (depth >= 300 m)

O₂ ml/l

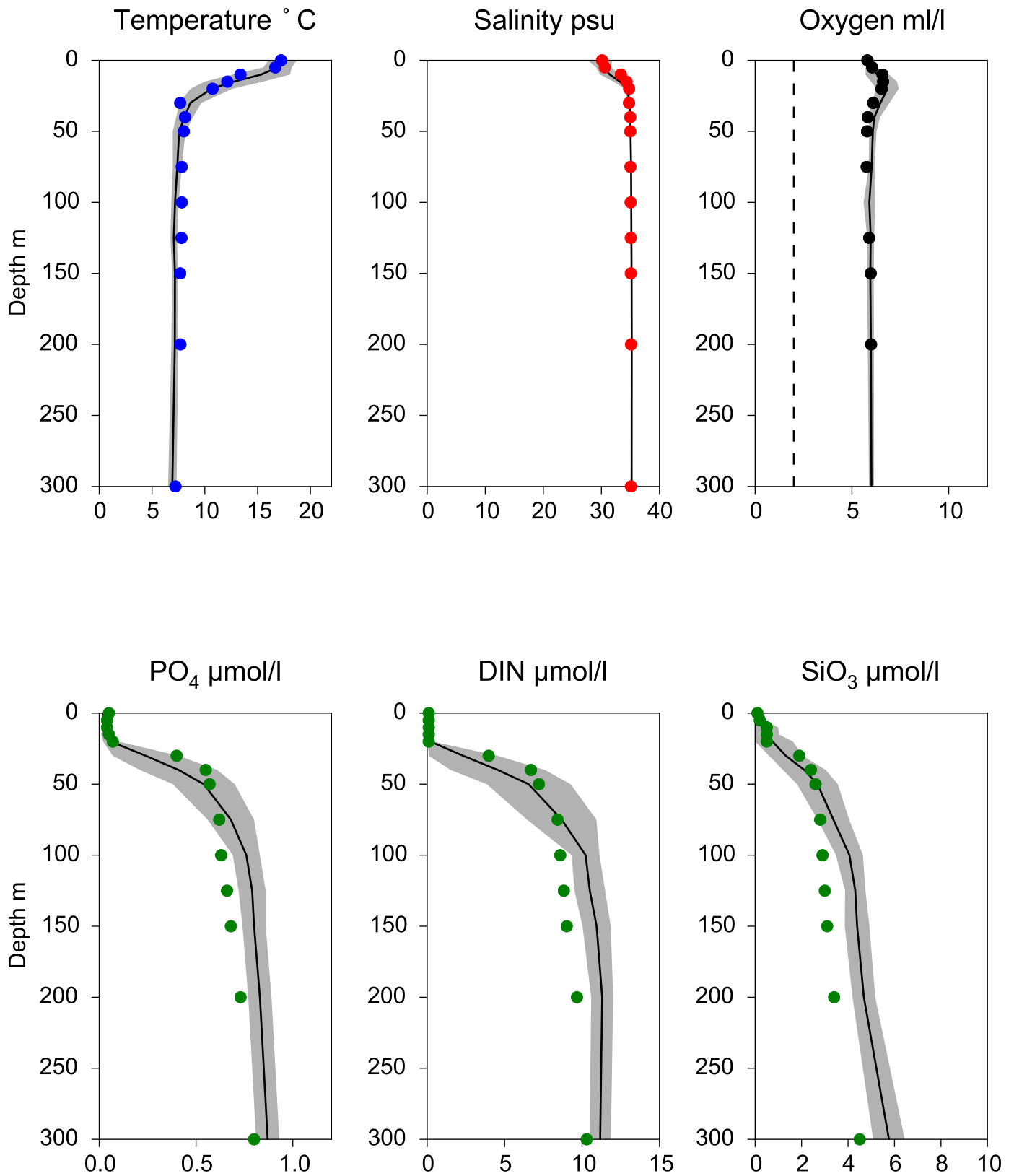


O₂ ml/l



Vertical profiles Å17 July

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STATION Å15 SURFACE WATER (0-10 m)

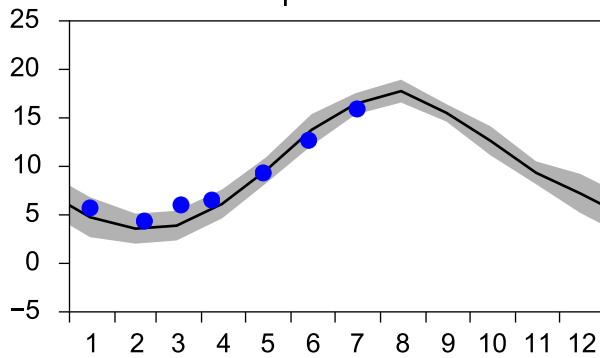
Annual Cycles

— Mean 2001-2015

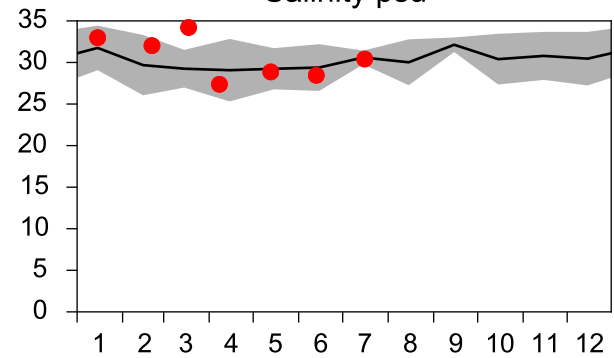
■ St.Dev.

● 2019

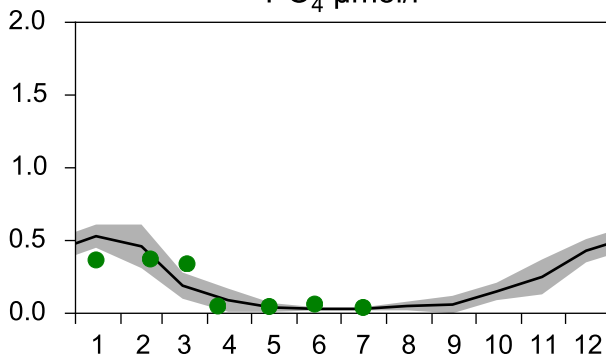
Temperature °C



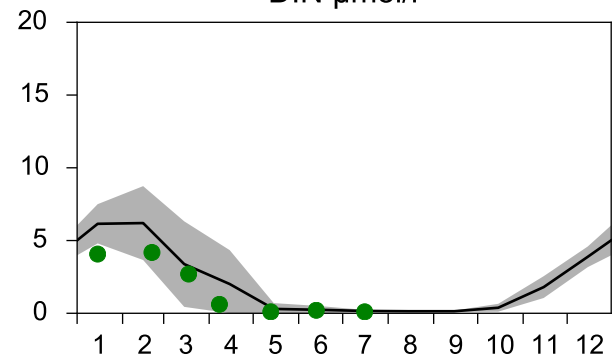
Salinity psu



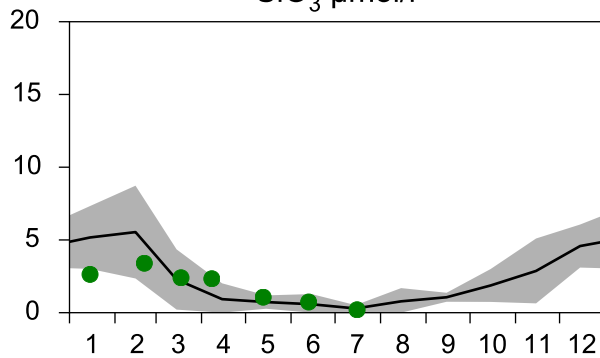
PO₄ µmol/l



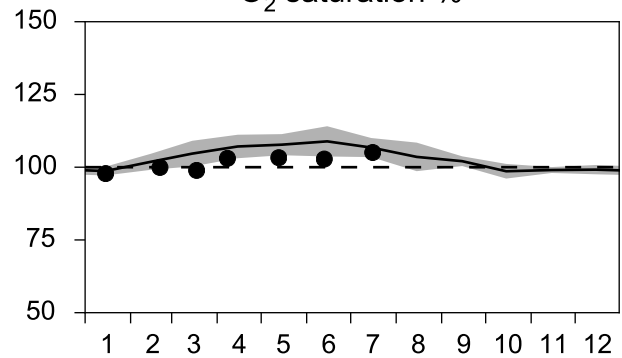
DIN µmol/l



SiO₃ µmol/l

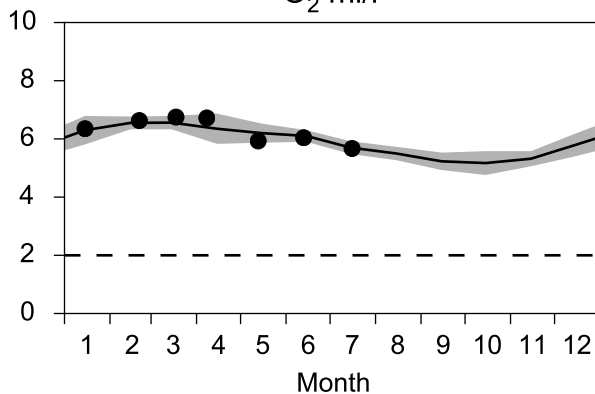


O₂ saturation %

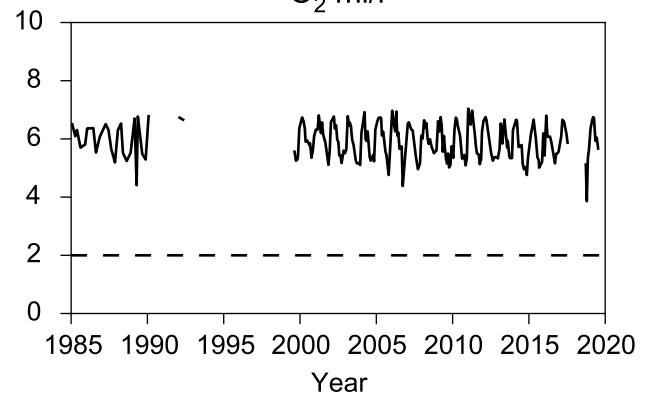


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l

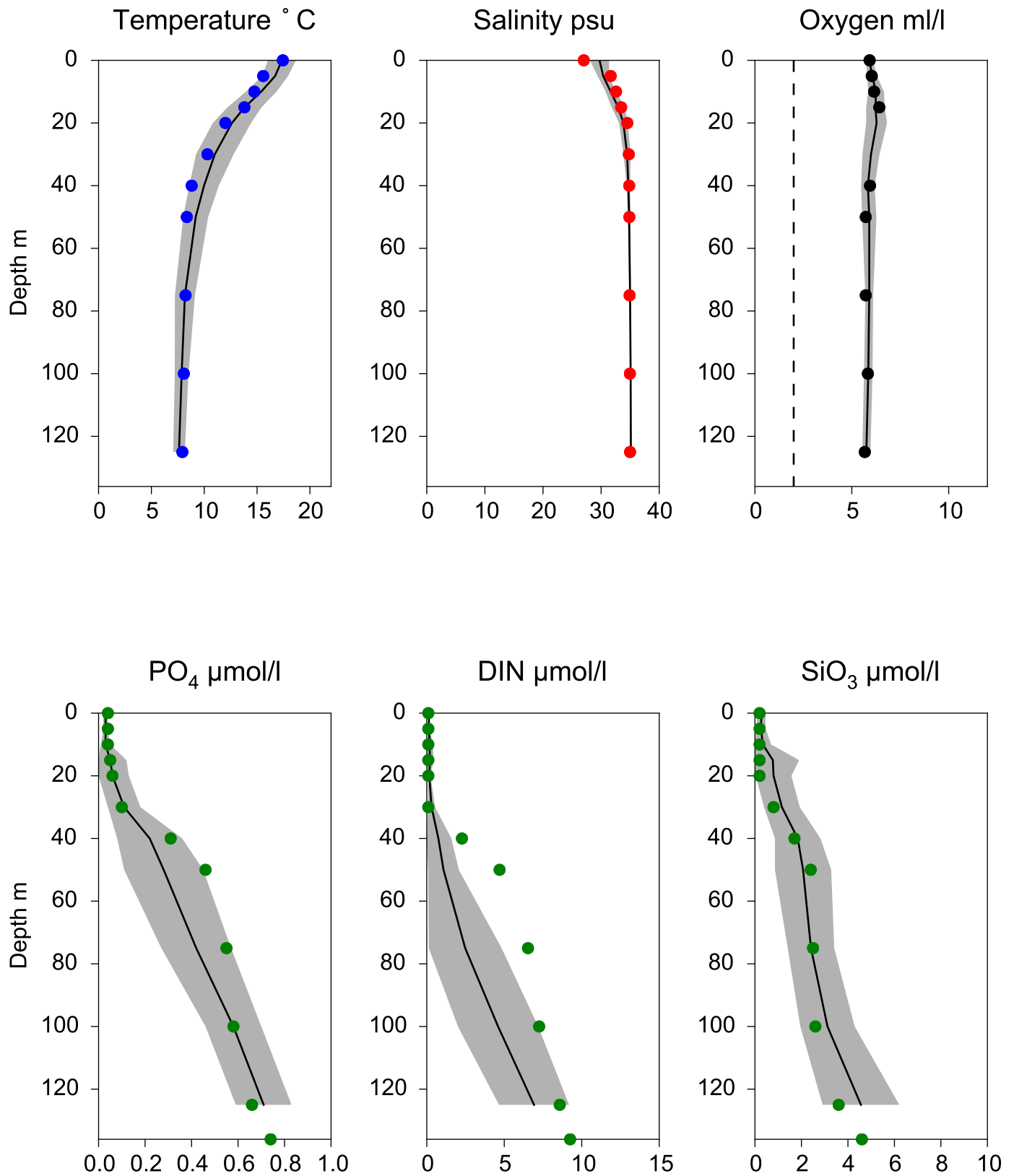


O₂ ml/l



Vertical profiles Å15 July

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STATION Å13 SURFACE WATER (0-10 m)

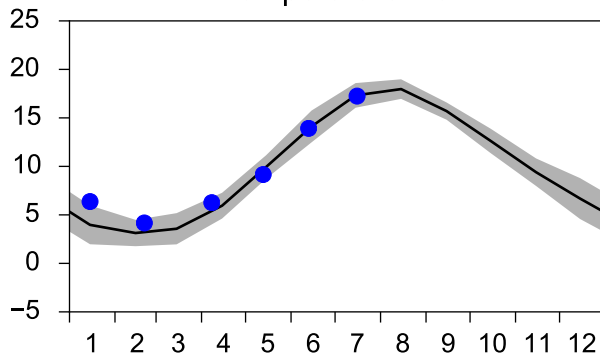
Annual Cycles

— Mean 2001-2015

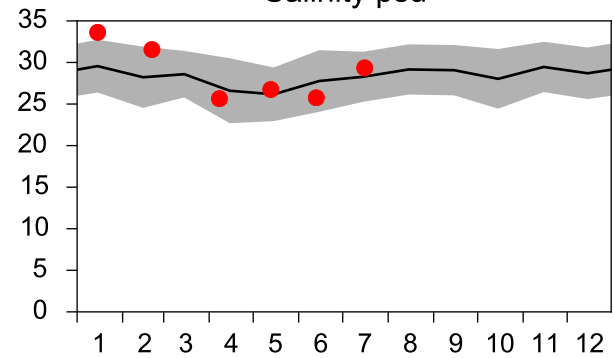
■ St.Dev.

● 2019

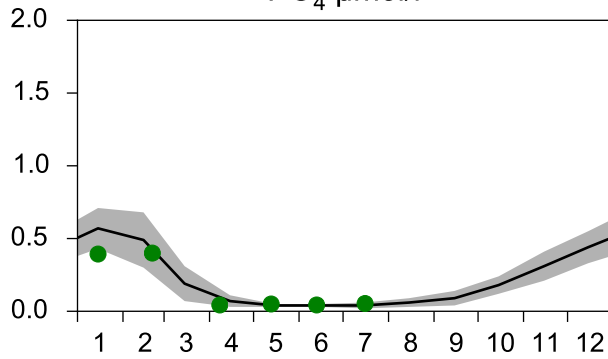
Temperature °C



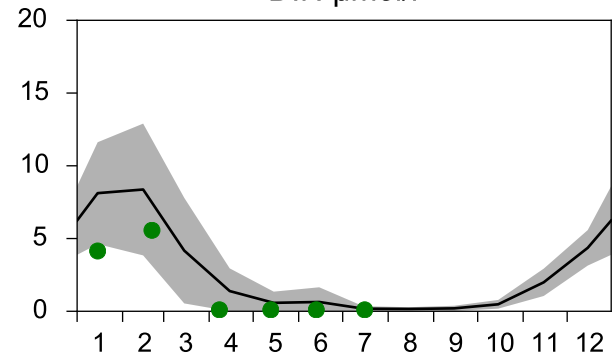
Salinity psu



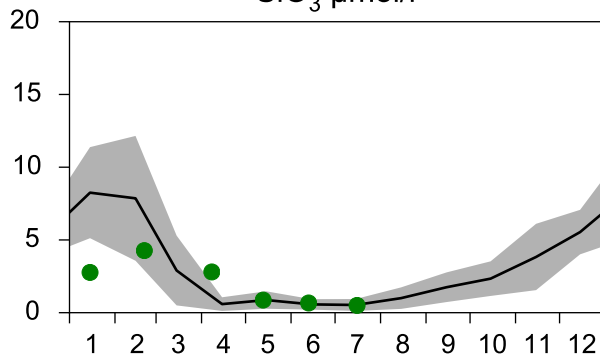
PO₄ µmol/l



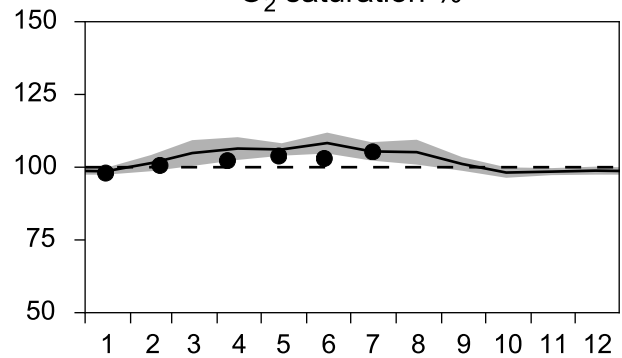
DIN µmol/l



SiO₃ µmol/l

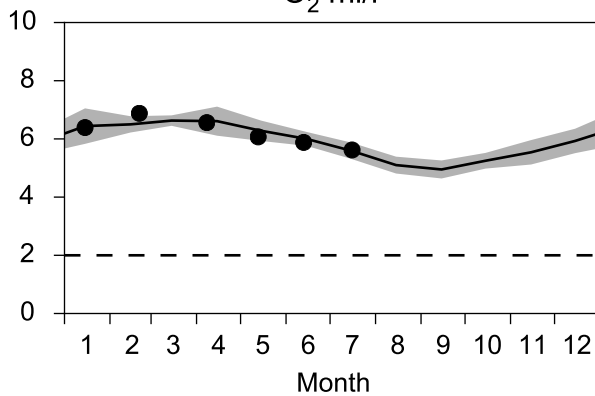


O₂ saturation %

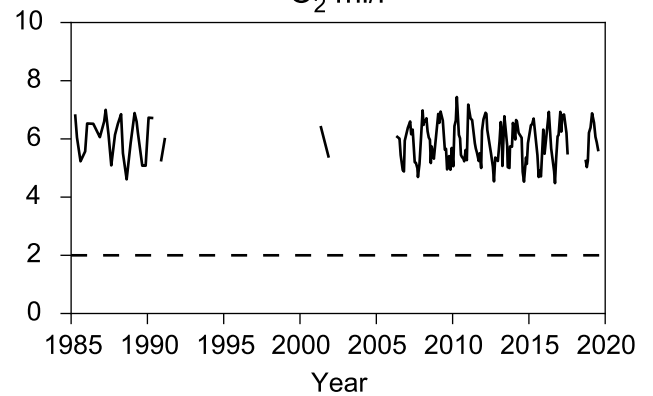


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

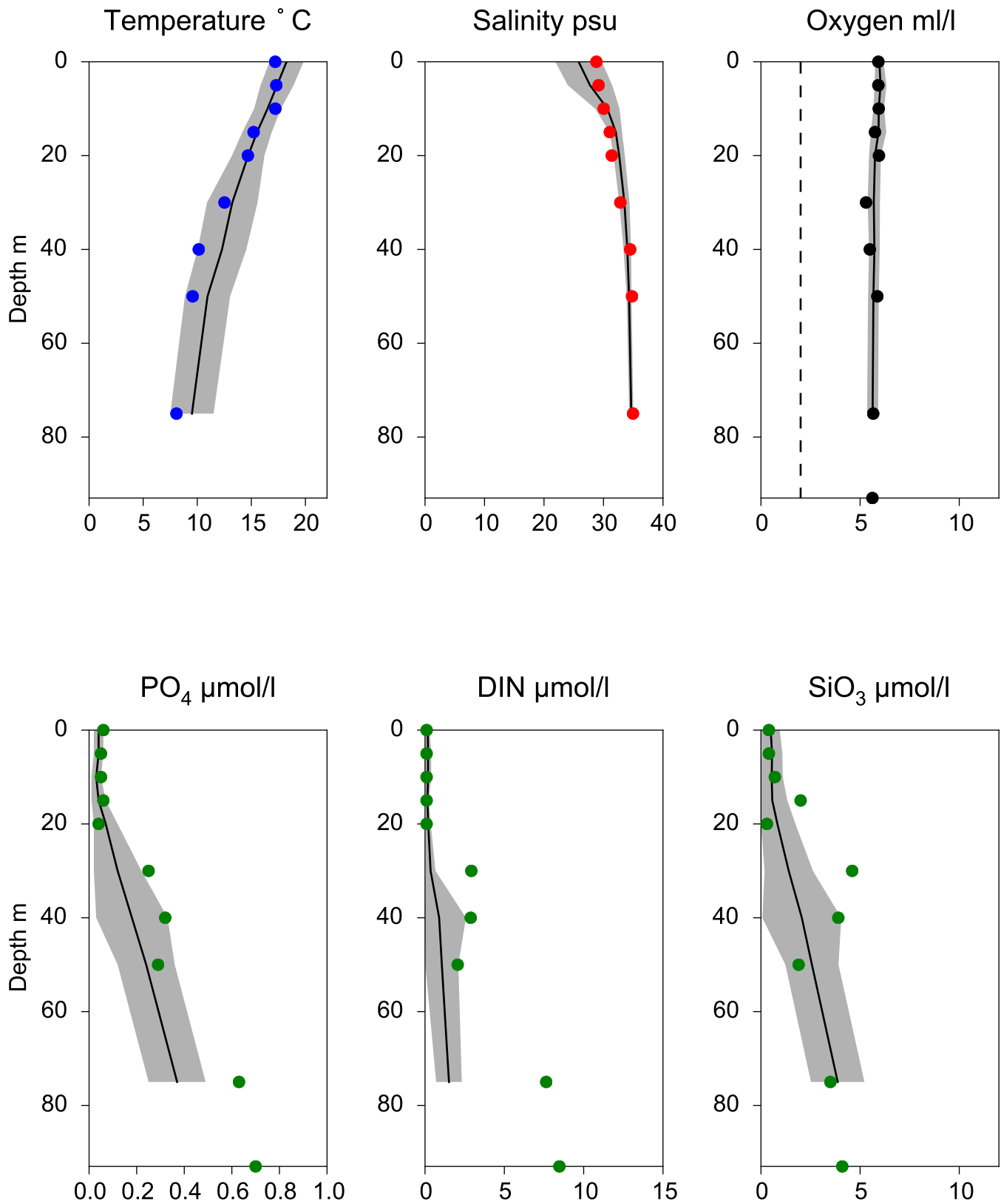


O₂ ml/l



Vertical profiles Å13 July

— Mean 2001-2015 ■ St.Dev. ● 2019-07-16



STATION P2 SURFACE WATER (0-10 m)

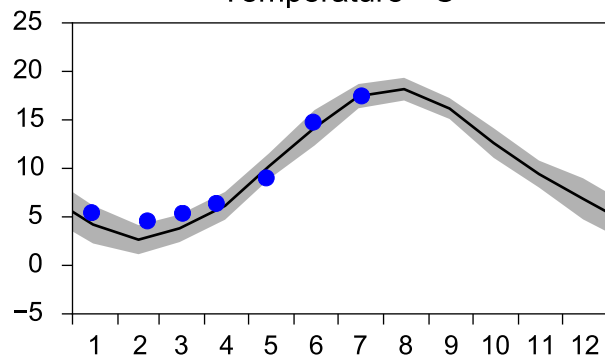
Annual Cycles

— Mean 2001-2015

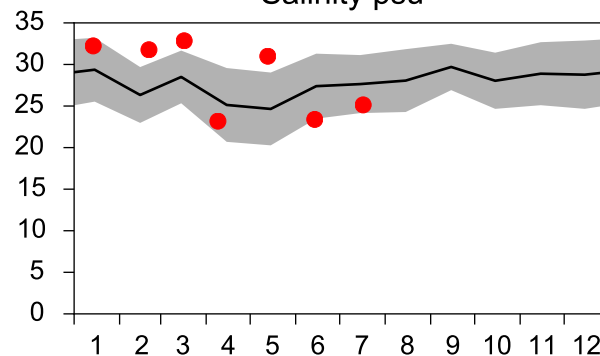
■ St.Dev.

● 2019

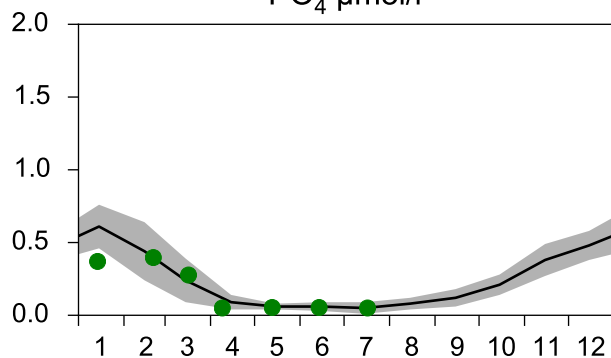
Temperature °C



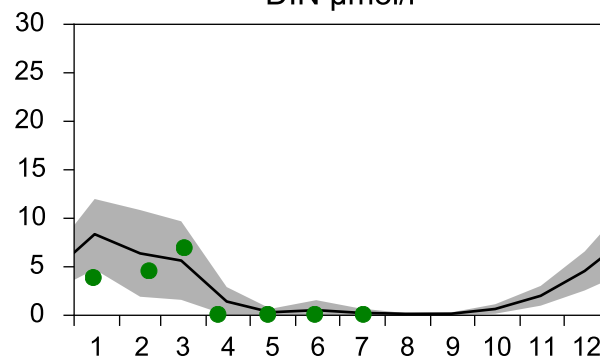
Salinity psu



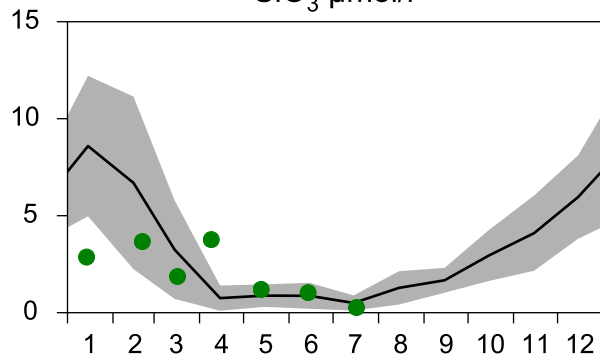
PO₄ µmol/l



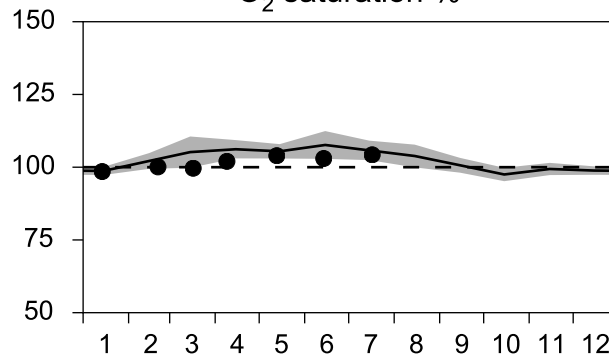
DIN µmol/l



SiO₃ µmol/l

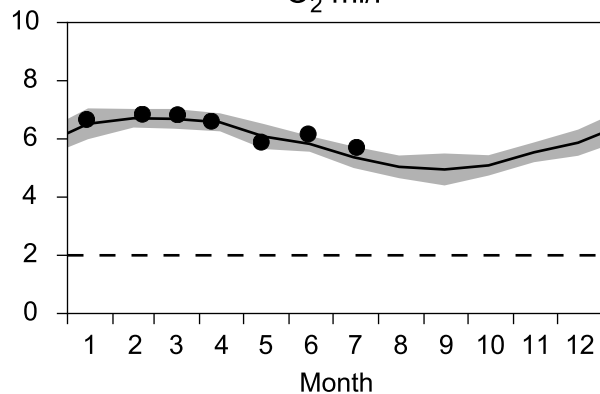


O₂ saturation %

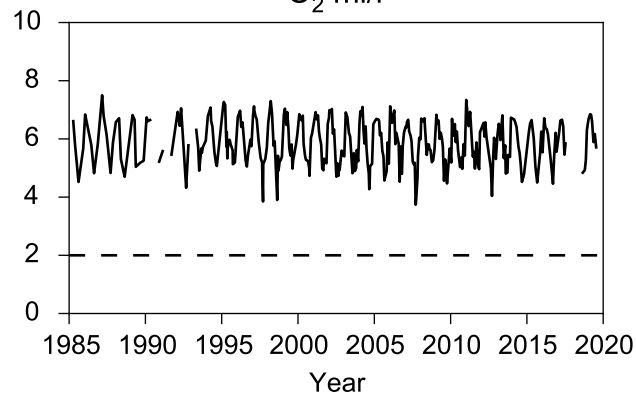


OXYGEN IN BOTTOM WATER (depth >= 75 m)

O₂ ml/l

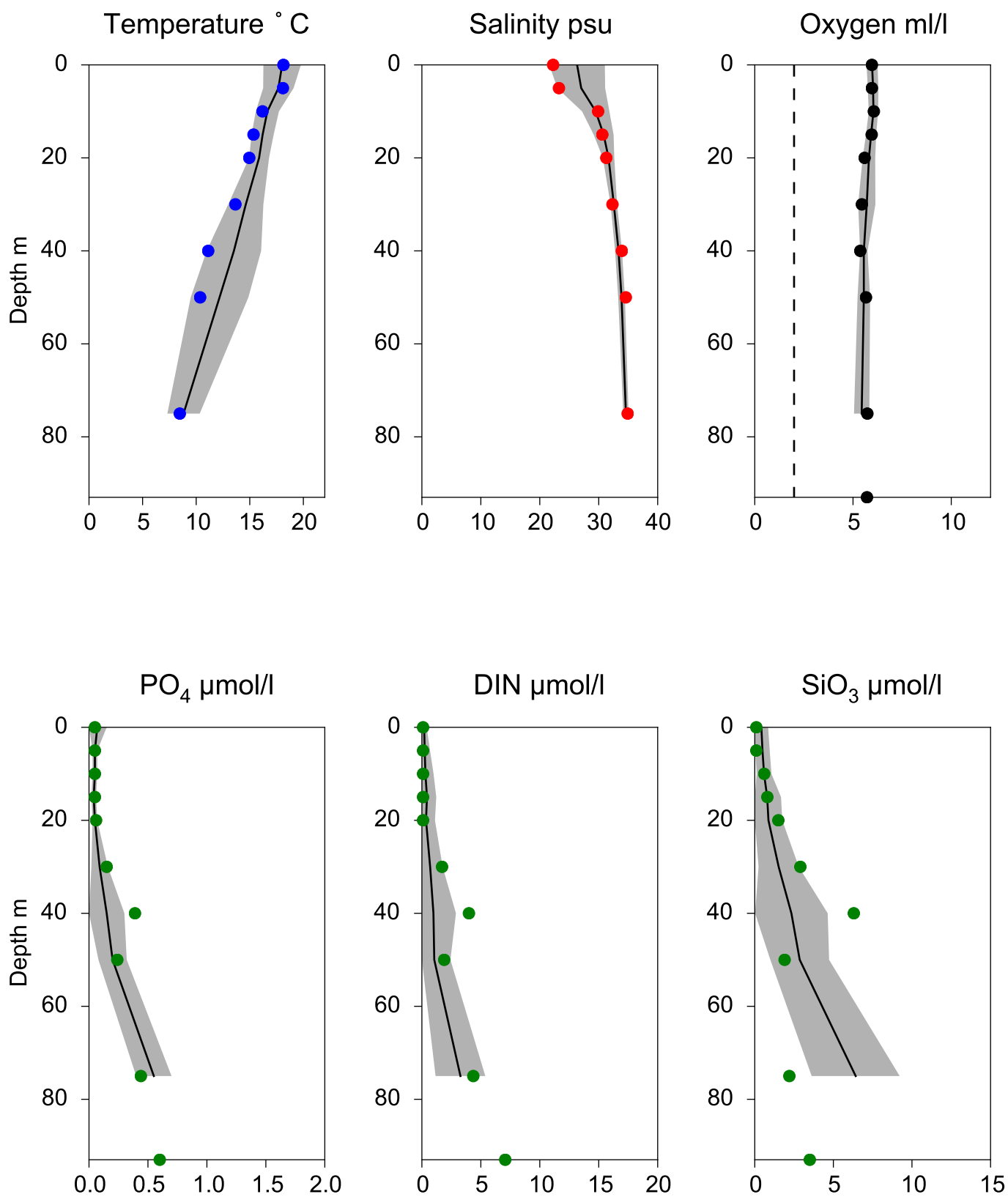


O₂ ml/l



Vertical profiles P2 July

— Mean 2001-2015 ■ St.Dev. ● 2019-07-17



STATION N14 FALKENBERG SURFACE WATER (0-10 m)

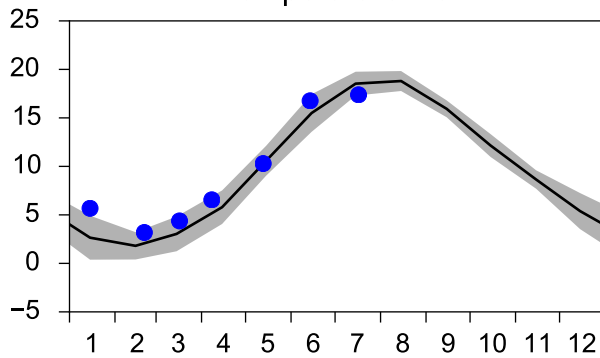
Annual Cycles

— Mean 2001-2015

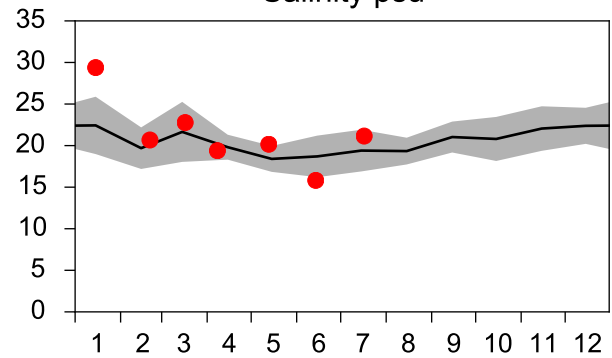
■ St.Dev.

● 2019

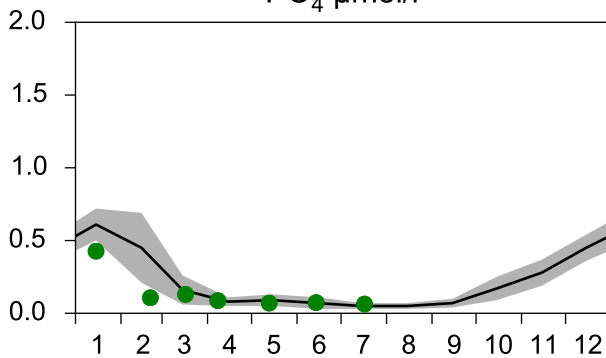
Temperature °C



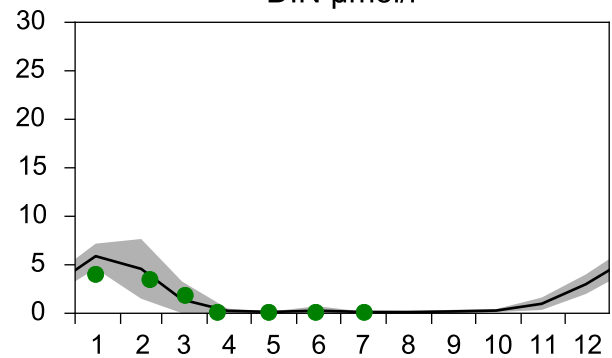
Salinity psu



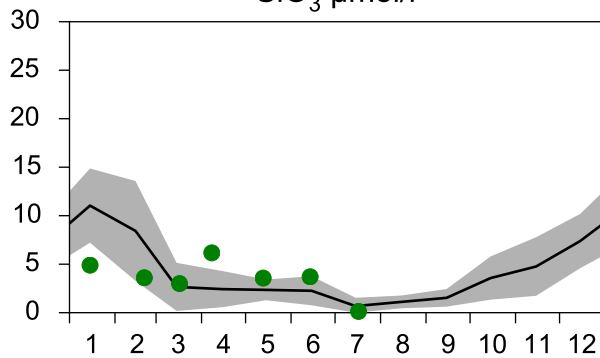
PO₄ µmol/l



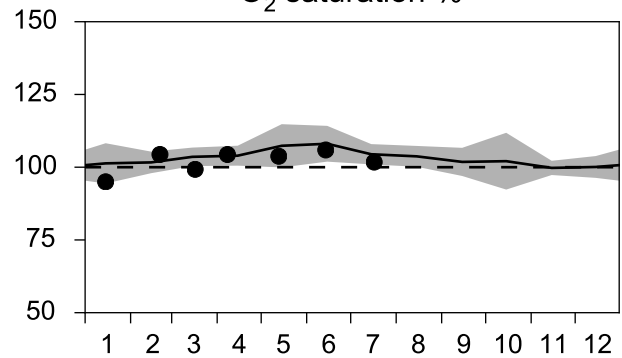
DIN µmol/l



SiO₃ µmol/l

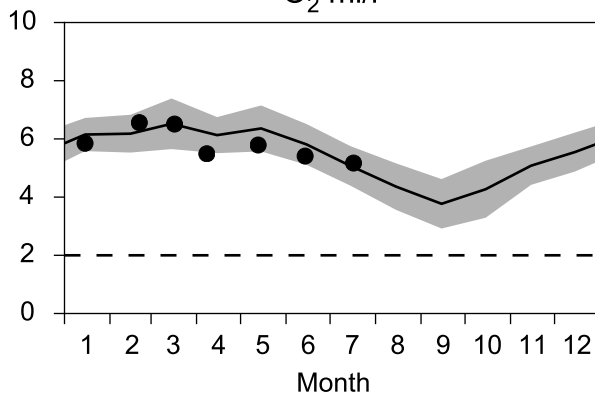


O₂ saturation %

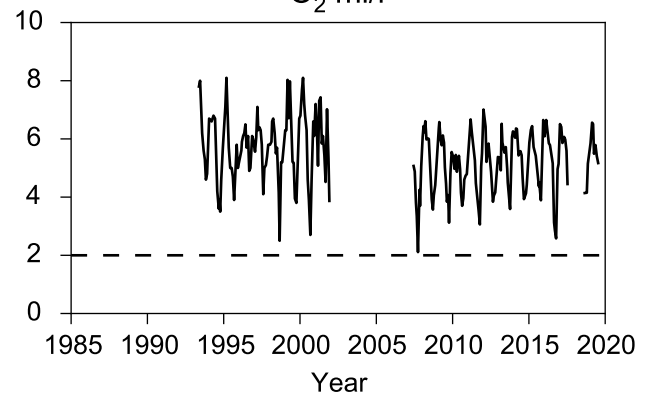


OXYGEN IN BOTTOM WATER (depth >= 25 m)

O₂ ml/l

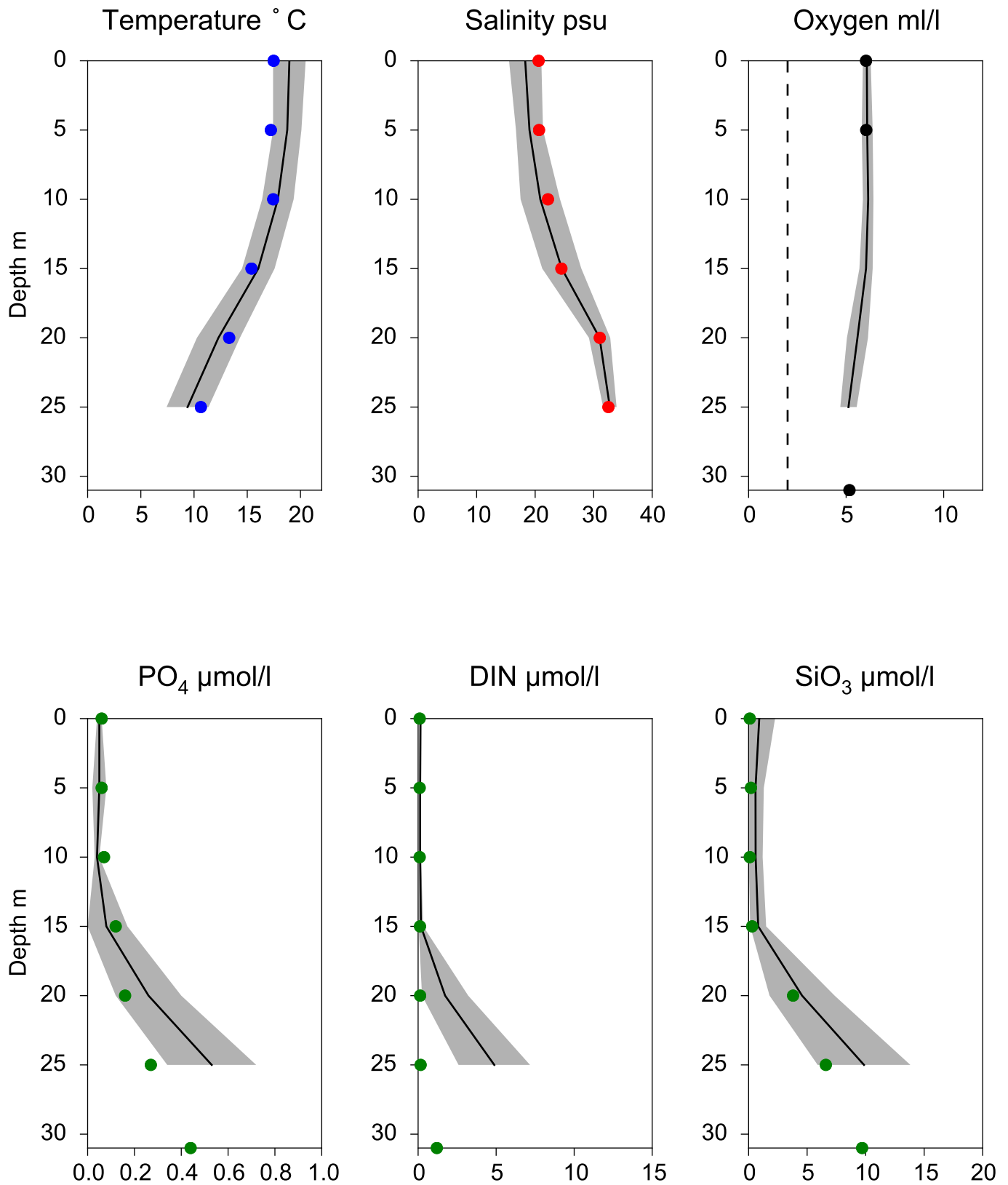


O₂ ml/l



Vertical profiles N14 FALKENBERG July

— Mean 2001-2015 St.Dev. • 2019-07-17



STATION ANHOLT E SURFACE WATER (0-10 m)

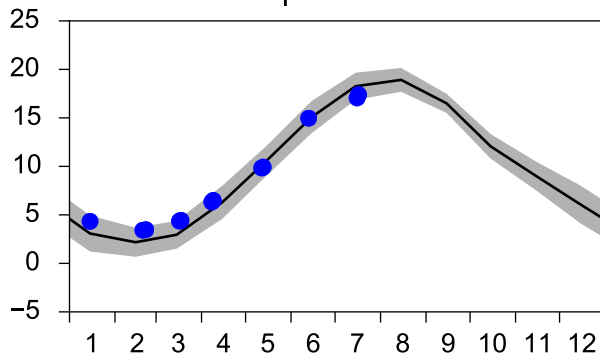
Annual Cycles

— Mean 2001-2015

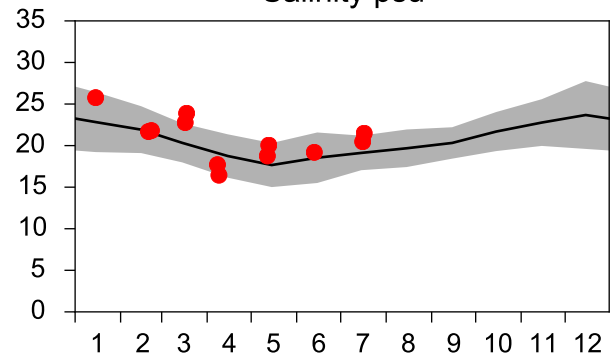
■ St.Dev.

● 2019

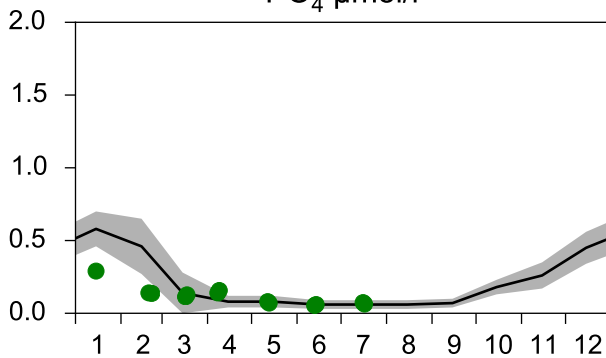
Temperature °C



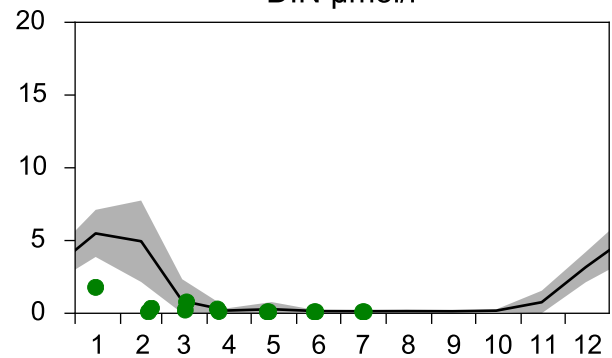
Salinity psu



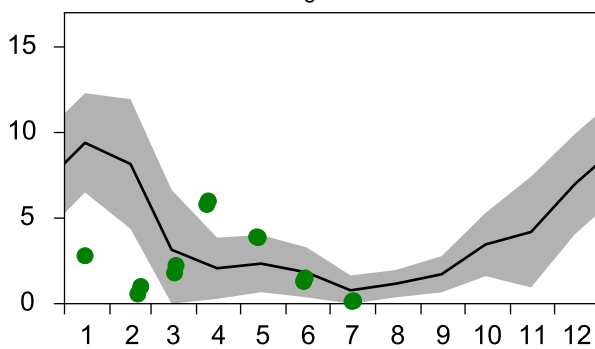
PO₄ µmol/l



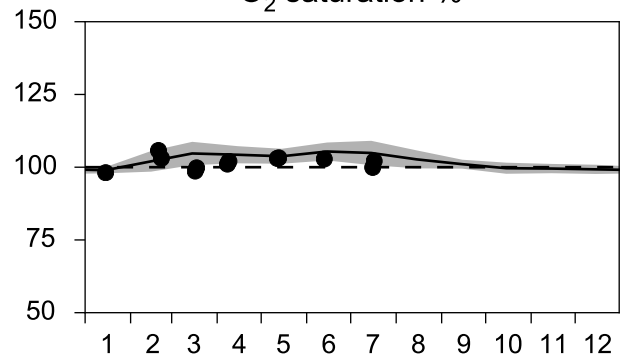
DIN µmol/l



SiO₃ µmol/l

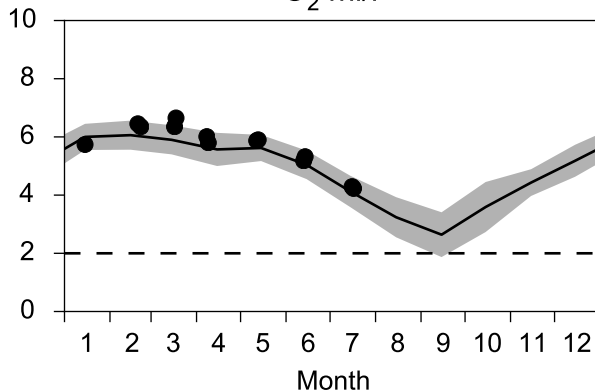


O₂ saturation %

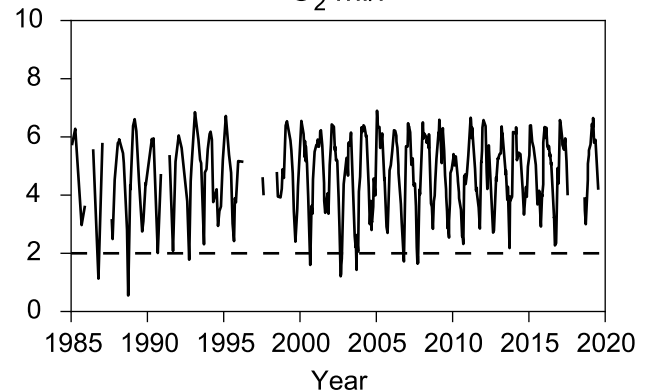


OXYGEN IN BOTTOM WATER (depth >= 52 m)

O₂ ml/l

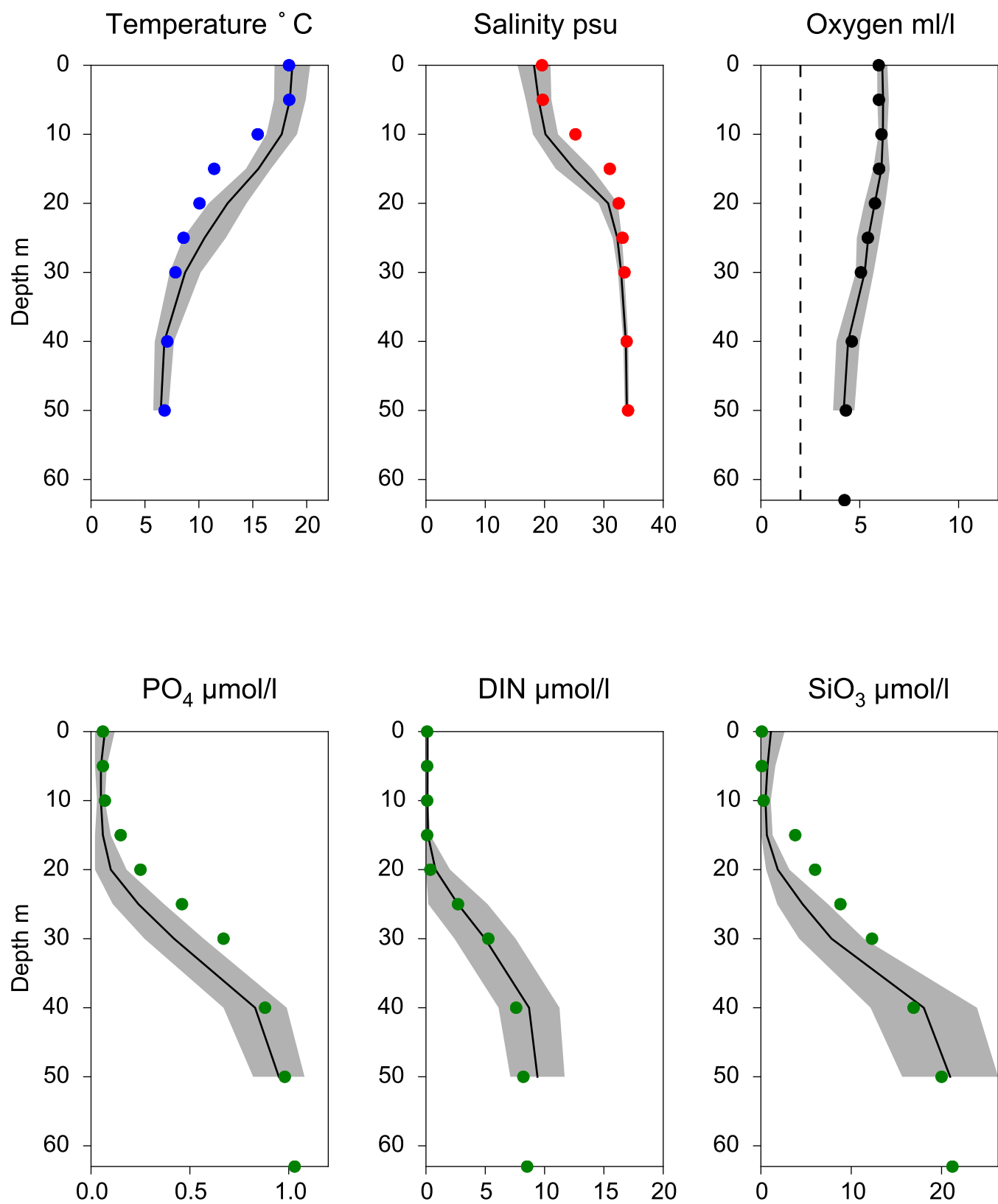


O₂ ml/l



Vertical profiles ANHOLT E July

— Mean 2001-2015 St.Dev. • 2019-07-17



STATION HANÖBUKTEN SURFACE WATER (0-10 m)

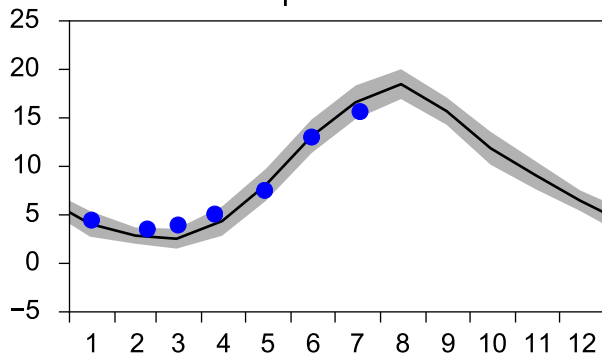
Annual Cycles

— Mean 2001-2015

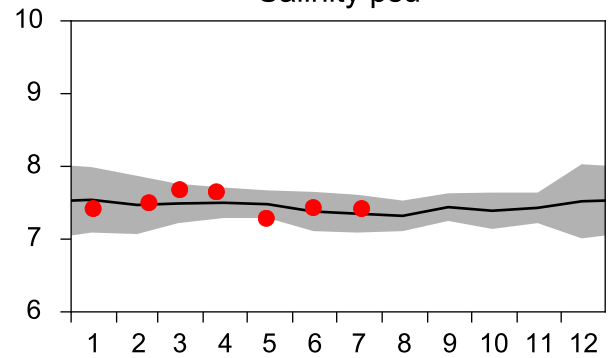
■ St.Dev.

● 2019

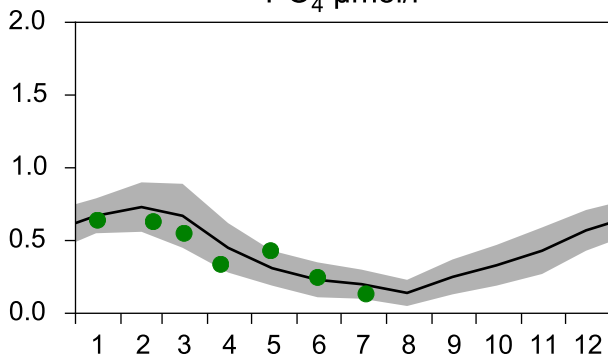
Temperature °C



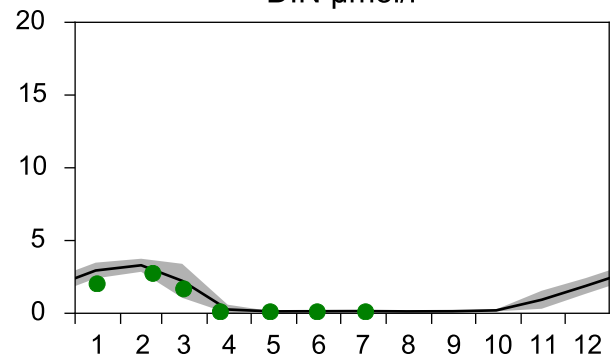
Salinity psu



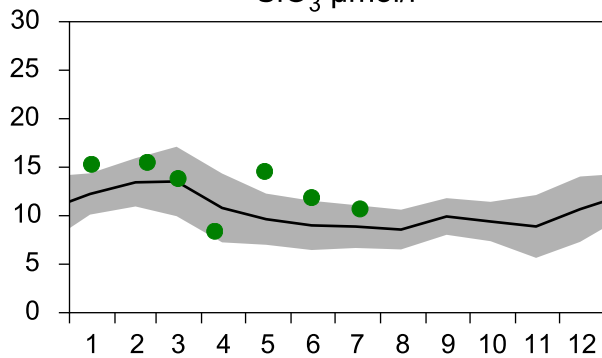
PO₄ µmol/l



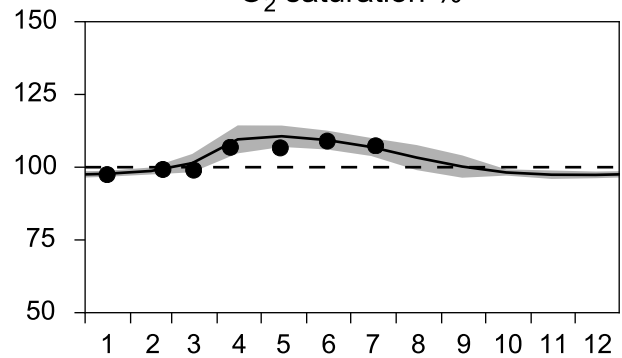
DIN µmol/l



SiO₃ µmol/l

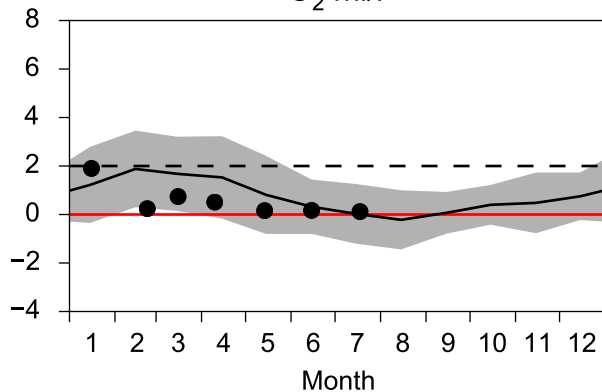


O₂ saturation %

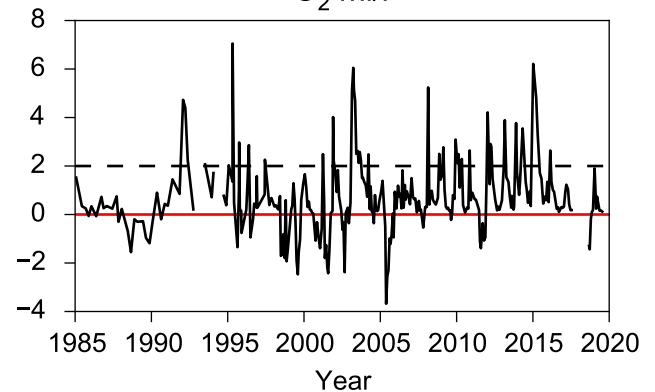


OXYGEN IN BOTTOM WATER (depth >= 70 m)

O₂ ml/l

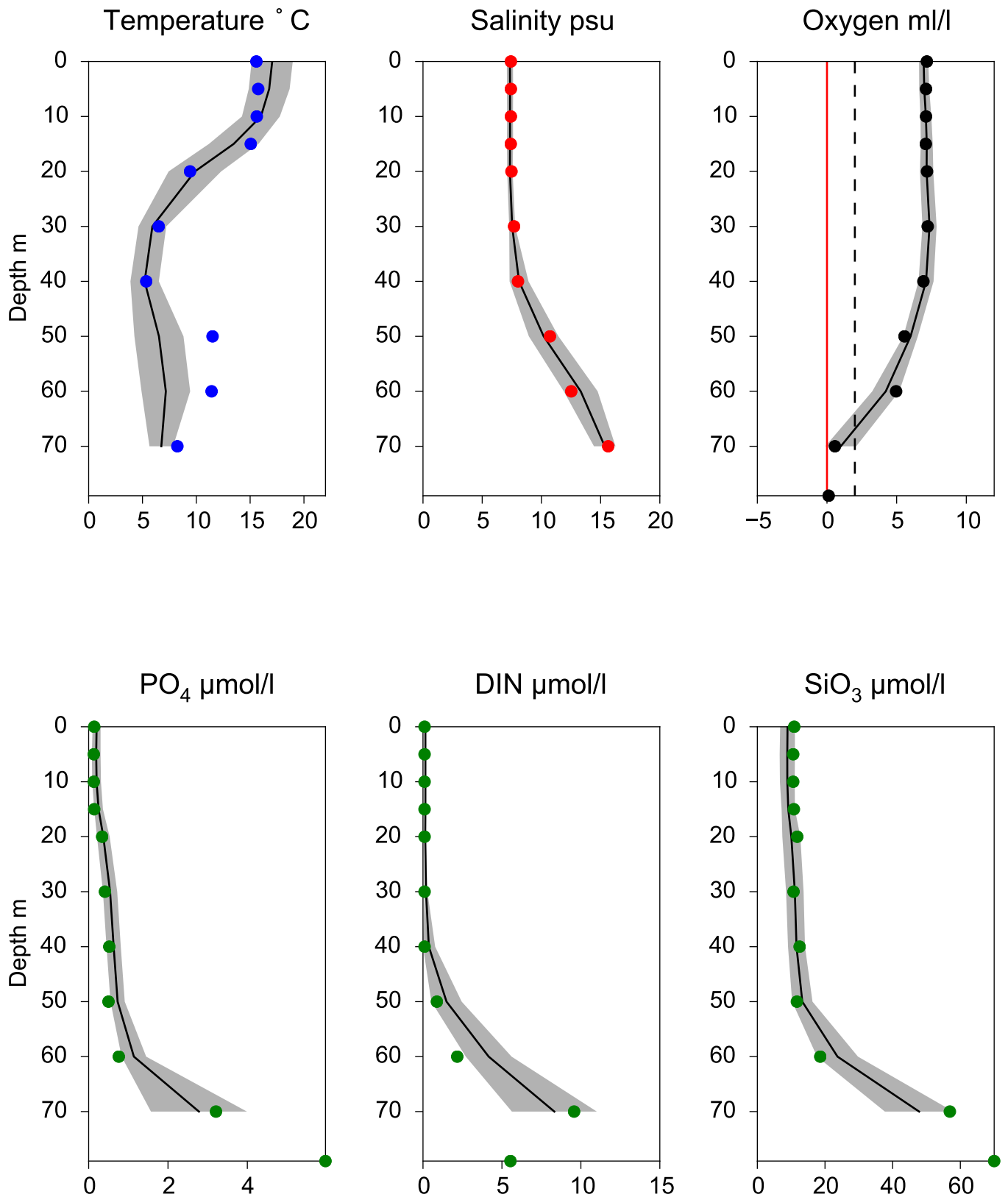


O₂ ml/l



Vertical profiles HANÖBUKTEN July

— Mean 2001-2015 St.Dev. • 2019-07-18



STATION REF M1V1 SURFACE WATER (0-10 m)

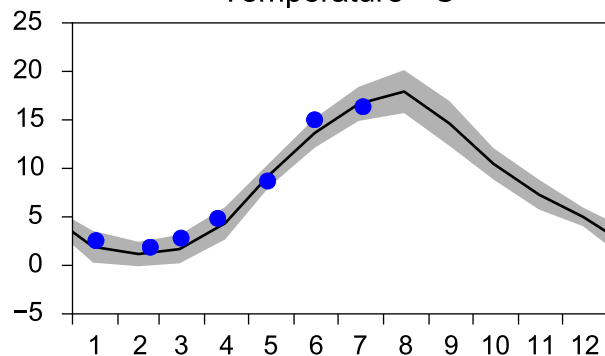
Annual Cycles

— Mean 2001-2015

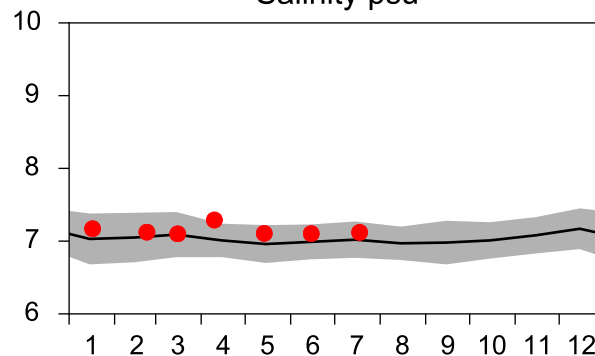
■ St.Dev.

● 2019

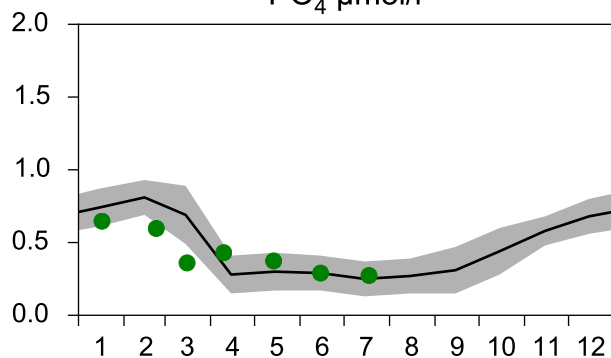
Temperature °C



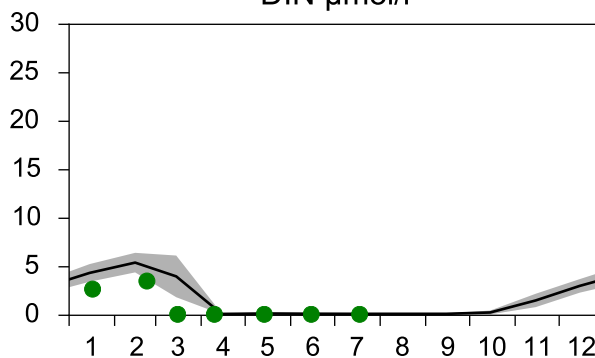
Salinity psu



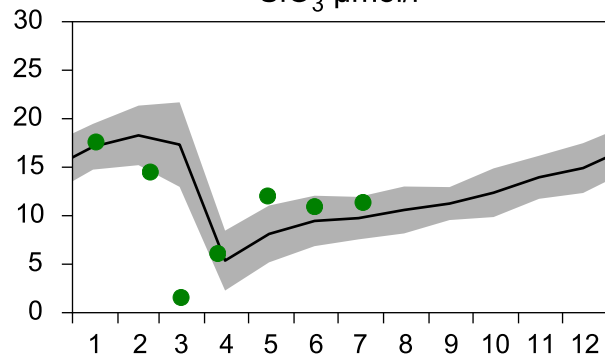
PO₄ µmol/l



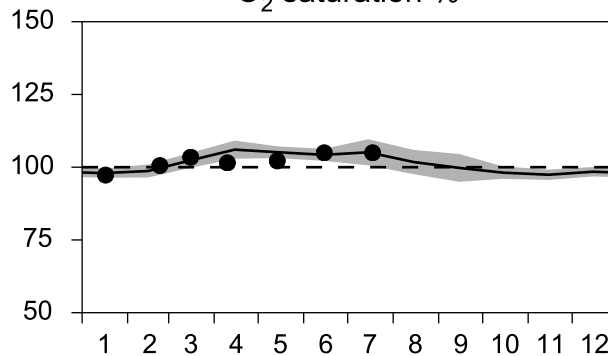
DIN µmol/l



SiO₃ µmol/l

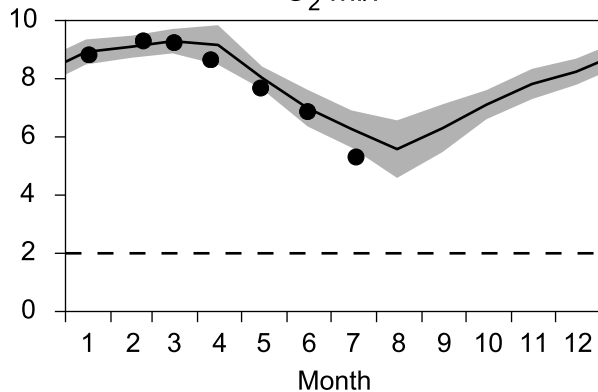


O₂ saturation %

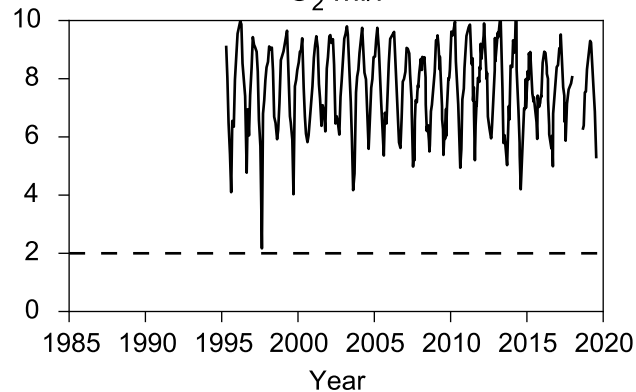


OXYGEN IN BOTTOM WATER (depth >= 17 m)

O₂ ml/l

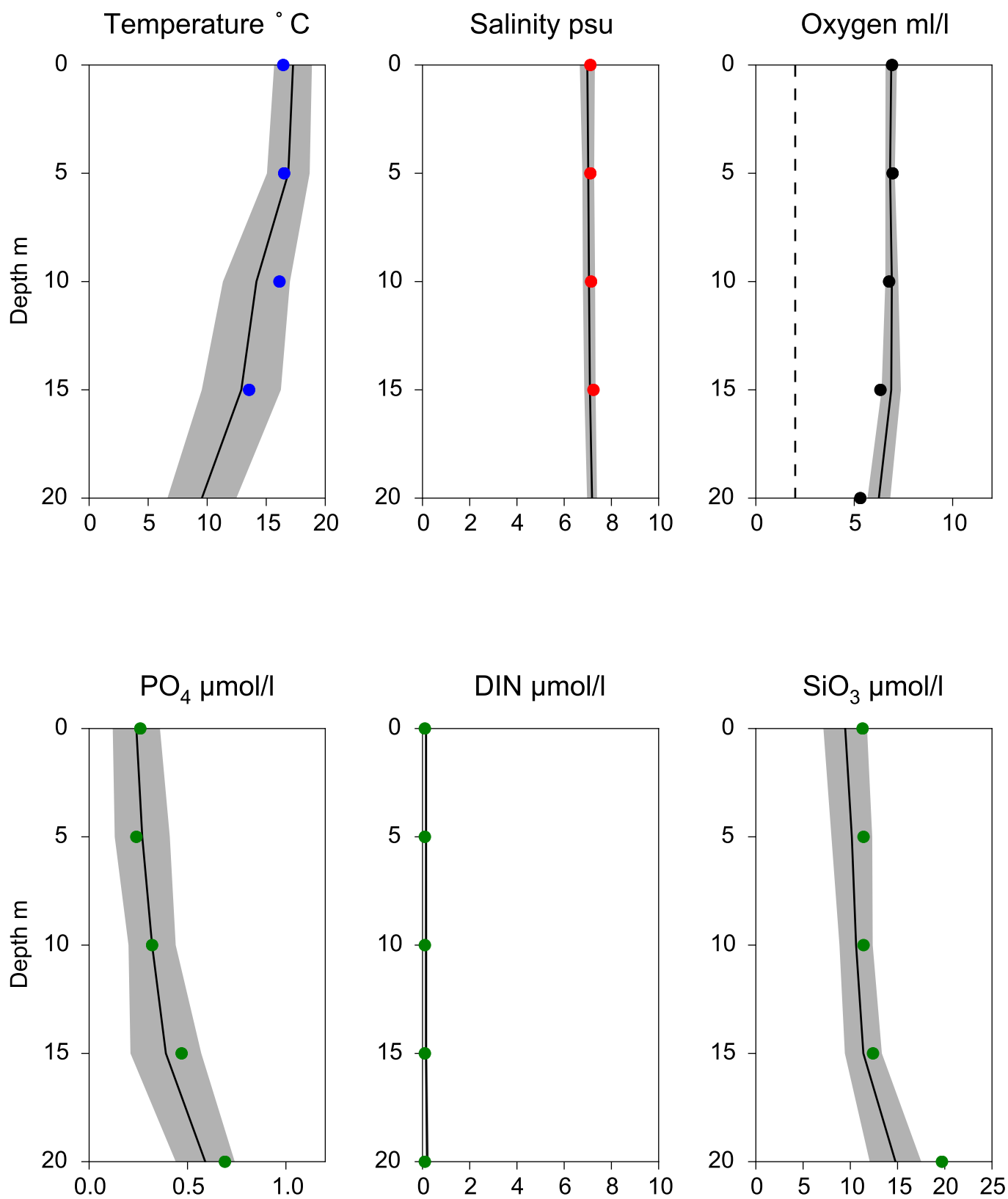


O₂ ml/l



Vertical profiles REF M1V1 July

— Mean 2001-2015 ■ St.Dev. ● 2019-07-18



STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

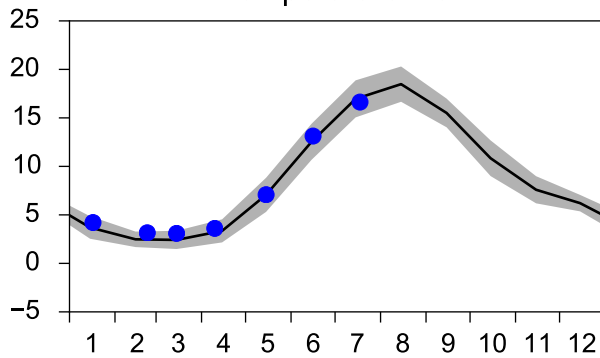
Annual Cycles

— Mean 2001-2015

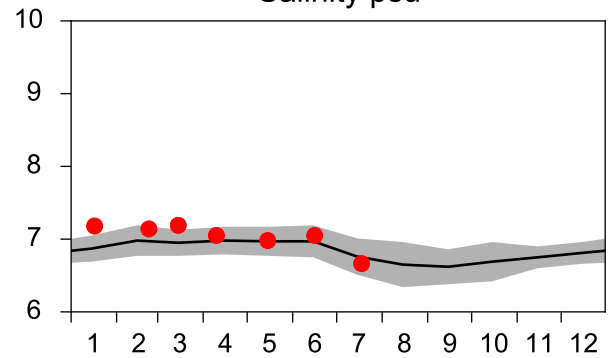
■ St.Dev.

● 2019

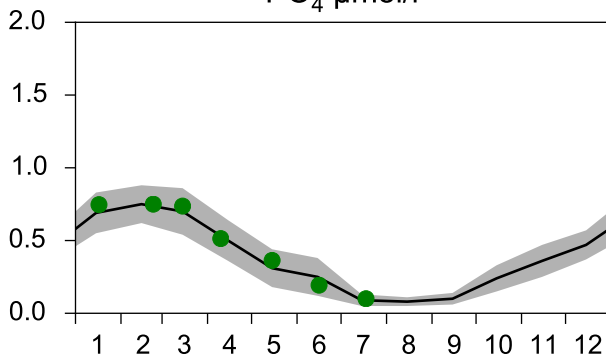
Temperature °C



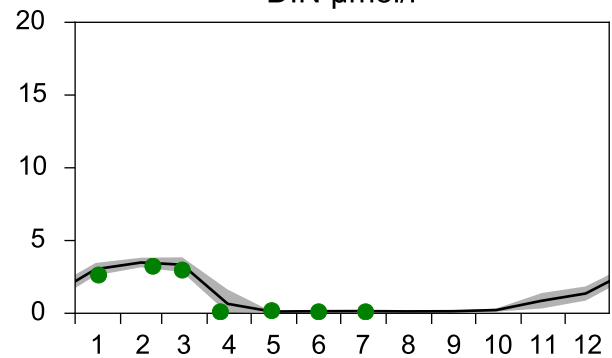
Salinity psu



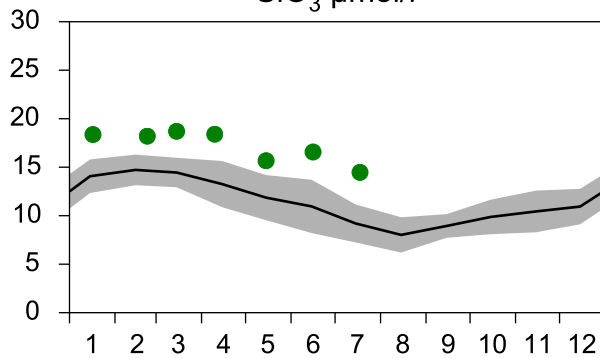
PO₄ µmol/l



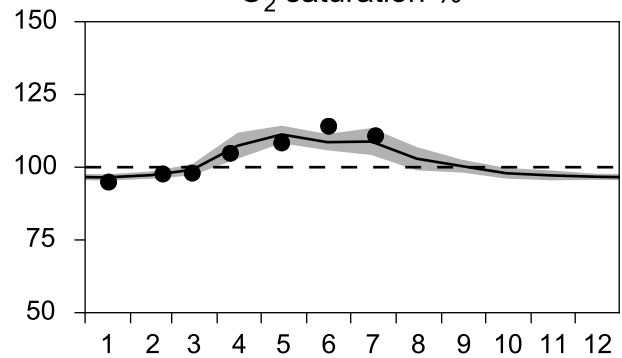
DIN µmol/l



SiO₃ µmol/l

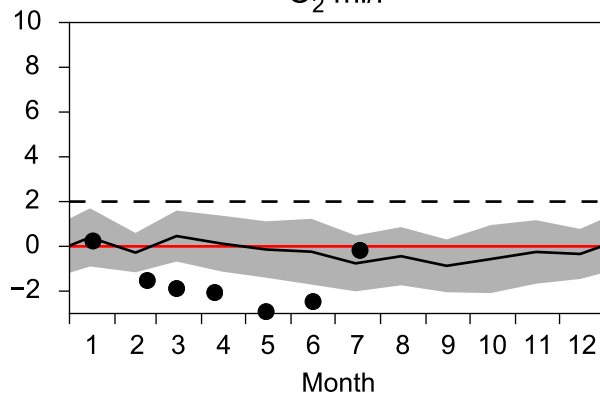


O₂ saturation %

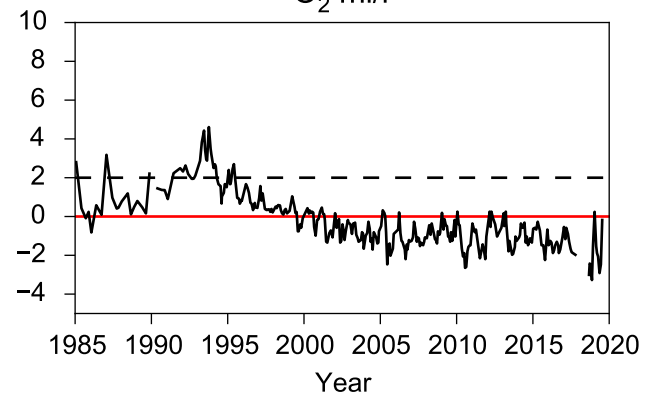


OXYGEN IN BOTTOM WATER (depth >= 100 m)

O₂ ml/l

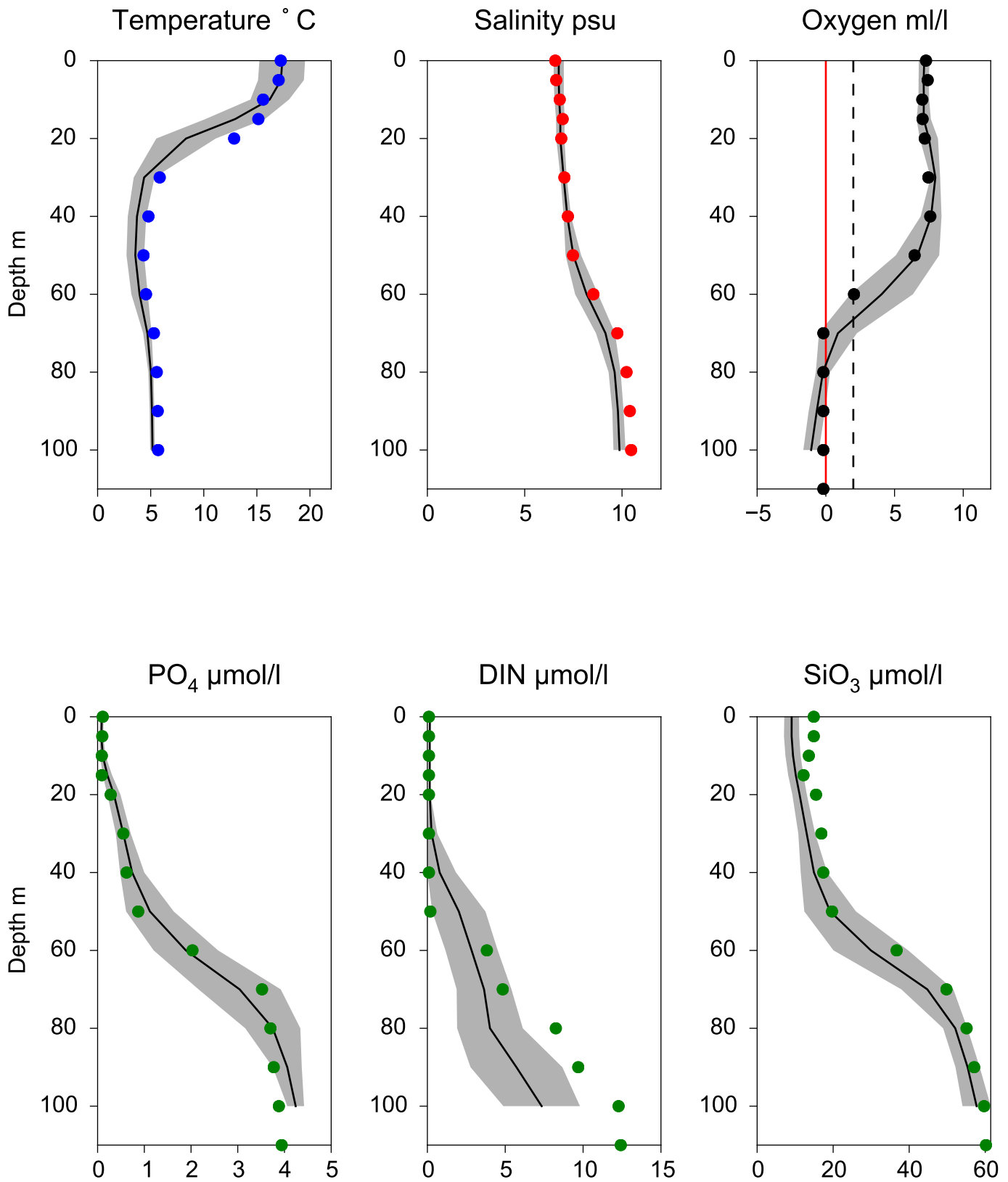


O₂ ml/l



Vertical profiles BY38 KARLSÖDJ July

— Mean 2001-2015 ■ St.Dev. ● 2019-07-18



STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

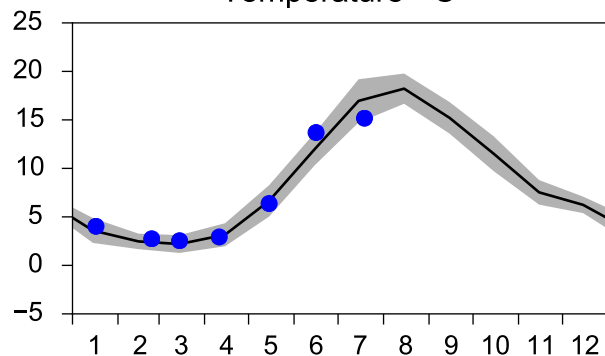
Annual Cycles

— Mean 2001-2015

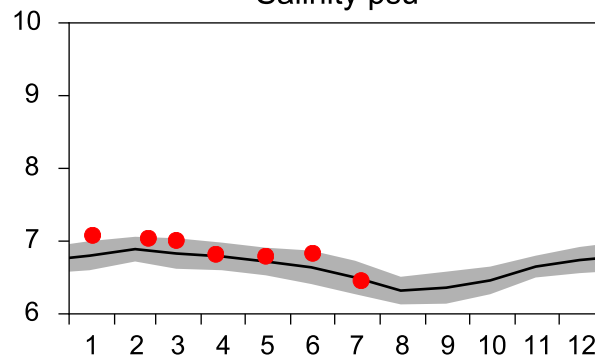
■ St.Dev.

● 2019

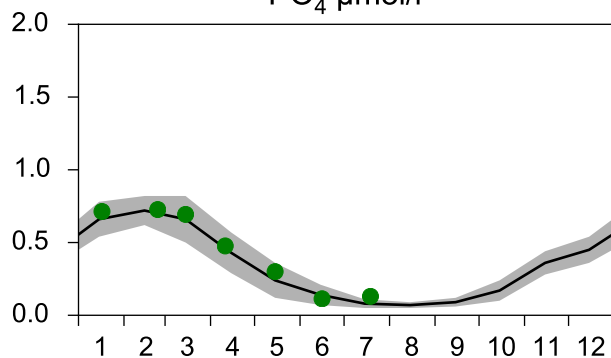
Temperature °C



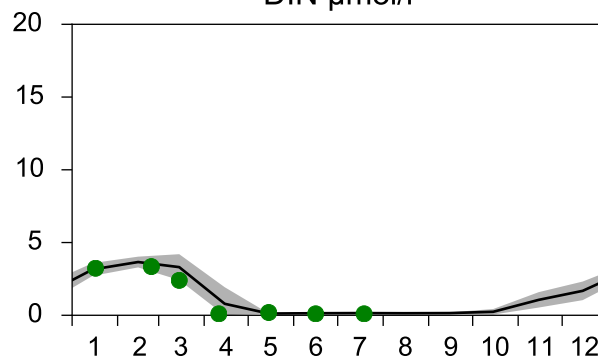
Salinity psu



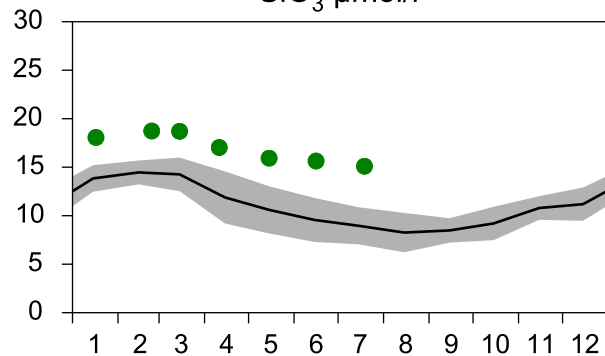
PO₄ µmol/l



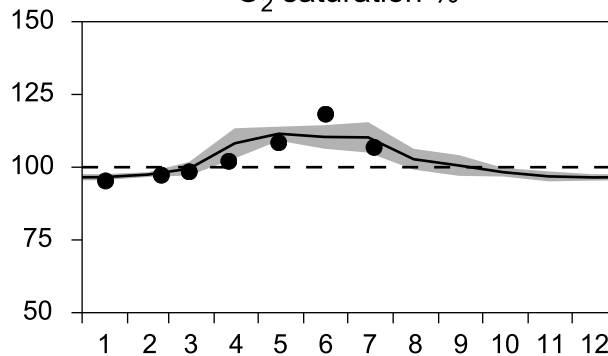
DIN µmol/l



SiO₃ µmol/l

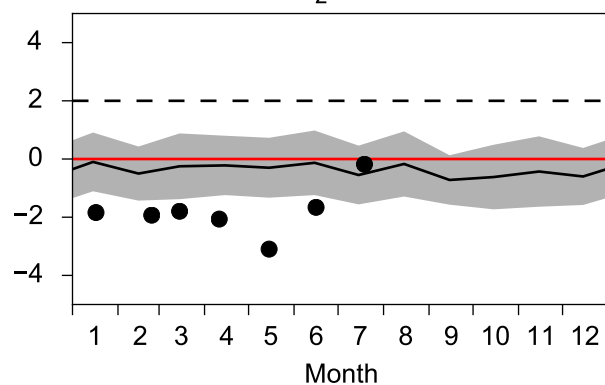


O₂ saturation %

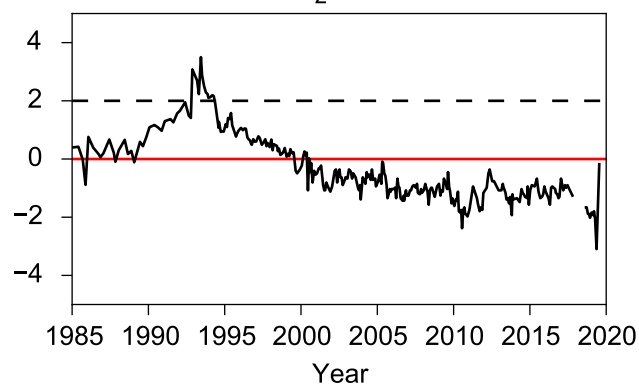


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O₂ ml/l



O₂ ml/l



Vertical profiles BY32 NORRKÖPINGS DJ July

— Mean 2001-2015 St.Dev. • 2019-07-19

