

Report from the SMHI monitoring cruise with R/V Aranda



Survey period:

2019-08-16 - 2019-08-23

Principal:

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

Cooperation partners:

Finnish Environment Institute (SYKE)

SUMMARY

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

The surface temperature was normal for the season and varied between 17-19 °C. Windy weather had mixed the warmer surface water in Skagerrak down to 60 meters and the thermocline was partly broken or deeper. The thermocline was observed at 15-20 meters in the rest of the area.

The nutrient concentrations were low, as is normal in the summer. The dissolved inorganic nitrogen was depleted down to the halocline both at the West coast and in the Baltic Proper while phosphate remained in the surface water, although at low levels.

Acute hypoxia ($< 2\text{ml/l}$) was noted from 70 meters in the Baltic Proper. In the Bornholm Basin and in the southern part of the Eastern Gotland Basin low concentrations of hydrogen sulphide was measured near the bottom. The deepest part of the Eastern Gotland Basin, BY15, was oxygen depleted from 150 meters and high concentrations of hydrogen sulphide was observed. At station BY20, north of BY15, hydrogen sulphide was noted at 80 meters and below it was low concentrations of oxygen (0.3 ml/l) down to 125 meters where again hydrogen sulphide was present. In the Western Gotland Basin hydrogen sulphide was noted from 80 meters.

The next regular expedition is scheduled for 12th – 19th September.

Image front: Tornados passing when the expedition reached the west coast, station P2. Photo: Sari Sipilä.

RESULTS

The August expedition was conducted aboard the Finnish research vessel Aranda, it started in Helsinki on the 16th of August and ended in the same harbour on the 23rd of August.

The wind velocity during the cruise varied between 6-9 m/s apart from at the west coast where the wind increased to 10-12 m/s, the current was also very strong at Fladen in Kattegat. After the Å-section in Skagerrak the wind decreased to 7-9 m/s. The wind came from SSW in the beginning of the cruise but then turned to SSE at the Gotland Basin, at the Bornholm Basin the wind turned again to SSW. The air temperature varied between 17-18 °C which was about the same temperature as the sea surface.

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. Extra water and plankton samples were also taken for selenium measurements at EAWAG in Switzerland (Swiss Federal Institute of Aquatic Science and Technology).

Molecular geochemists from Umeå University also participated in the expedition studying the mercury cycle in the ocean. Argo floats were retrieved and deployed for FMI (Finnish Meteorological Institute) and the expedition ended with a visual check of SMHI's ocean buoy at Huvudskär.

The results of the plankton analyses are eventually presented in the Algaware report for August; <https://www.smhi.se/publikationer/publikationer/algrapporter>.

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

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> (currently only available in Swedish).

The Skagerrak

The temperature at the surface was between 16.8-17.4°C, which is normal for the season. The surface salinity was also normal and varied between 29.6 and 31.7, highest in the southern part. Windy weather had mixed the warmer surface water down to 60 meters and the thermocline, which at the last cruise was at 5-10 meters, was partly broken or deeper. The mixing had also affected the salinity stratification and the halocline, especially near the coast, was weaker than normal (the salinity gradient was smaller).

The concentration of nutrients in the surface layer down to 20 meters was very low as a consequence of the summer primary production. The dissolved inorganic nitrogen was at the detection limit 0.1 µmol/l, phosphate at 0.05 µmol/l and silicate varied between 0.6-3.3 µmol/l. The higher silicate concentration was observed in the southern part of Skagerrak, at station P2, levels

were above normal. Below 20 m depth, the levels of nutrients increased again but at the coast the levels in the deep water were below normal.

Chlorophyll fluorescence peaks were noted mainly at station P2 in the surface and at station Å17 at 30 meters.

The oxygen condition in the Skagerrak deep water was good. At all stations, a lower oxygen concentration, compared with the last cruise in July was noted, but this is normal for the season and depends on the degradation of the summer primary production.

The Kattegat and the Sound

The temperature in the surface varied between 16.7-18.4 °C, coldest at station W Landskrona in the Sound. At the station Fladen the temperature was 17.3 °C which is lower than normal. The salinity in the surface varied between 18.3 at Anholt E to 25.3 at Fladen. The surface salinity was above normal in the northern Kattegat and in the Sound. Both the thermocline and the halocline was observed about 15 meters in the Kattegat and little shallower in the Sound.

The surface levels of nutrients were normal at all stations in Kattegat. The concentration of dissolved inorganic nitrogen was depleted (below detection limit 0.01 µmol/l) from the surface down to 15 meters but there was still small amounts of phosphate (0.06-0.09 µmol/l) left in the surface layer. The concentration of silicate varied between 0.8 -1.13 µmol/l. In the Sound, the nutrients were low only down to 5 meters, dissolved inorganic nitrogen and phosphate was as in Kattegat very low in the surface while the concentration of silicate was higher, 6.6 µmol/l.

Chlorophyll fluorescence peaks were noted at the pycnocline and the highest peak was seen at the coastal station N14 Falkenberg.

The oxygen levels were normal and there were no signs of deficiency. At all stations, a lower oxygen concentration, compared with last cruise in July, was noted but this is normal for the season and depends on degradation of the summer primary production.

The Baltic Proper

The surface temperature was normal and varied between 17-19.5 °C, coldest at the coastal station RefM1V1 and warmest in the Bornholm Basin. The surface salinity was above normal in the southern parts and varied from 7.9 in the Arkona Basin to 6.3 in the northern part of the Eastern Gotland Basin. The thermocline was about 20 meters at all stations apart from near the coast at RefM1V1 and BY38 where it was about 10 meters. The position of the halocline varied from 65 meters in the Eastern Gotland Basin to 50 meters in the Western Gotland Basin, 30 meters in the Arkona Basin and 10 meters nearest the coast at RefM1V1. A layer with colder water was observed between the thermocline and the halocline, which is a remainder from the winter cooling. The temperature increased again below the halocline. The salinity and temperature of the deep water in both the Eastern- and Western Gotland Basin was above normal, due to recent inflows that have brought warmer and saltier water when compared with the latest 15-year period.

The concentration of dissolved inorganic nitrogen and phosphorus was very low in the surface layer, which is normal for the season. Dissolved inorganic nitrogen was below the detection limit (0.01 µmol/l) down to the halocline at all stations. However, phosphate was still available at small amounts (0.07 µmol/l). Close to the coast, at station RefM1V1, the concentration of phosphate was as usual higher, 0.25 µmol/l. Phosphate was not consumed as deep as the inorganic nitrogen, below

30-40 meters the concentration of phosphate increased again. The surface concentration of silicate varied between 7.4-17.5 $\mu\text{mol/l}$ and was above normal in the Eastern- and Western Gotland Basin. In the deep water, the concentration of phosphate and silicate was above normal in the Bornholm Basin and in the Western Gotland Basin the inorganic nitrogen (present as ammonia) and silicate was above normal levels.

The Arkona Basin was oxygenated but it was still a large difference between the oxygen concentration in the bottom water at BY1 (4.9 ml/l) and at BY2 (1.85 ml/l). In the rest of the investigated area, acute hypoxia ($< 2\text{ml/l}$) was noted from 70 meters. In the Bornholm Basin and in the southern part of the Eastern Gotland Basin low concentrations of hydrogen sulphide was measured near the bottom. The deepest part of the Eastern Gotland Basin, BY15, was oxygen depleted from 150 meters and high concentrations of hydrogen sulphide was observed (100 $\mu\text{mol/l}$). At station BY20, north of BY15, hydrogen sulphide was noted at 80 meters and below there were low concentrations of oxygen (0.3 ml/l) down to 125 meters where again hydrogen sulphide was present. In the Western Gotland Basin hydrogen sulphide was noted from 80 meters.

Chlorophyll fluorescence peaks were noted at the surface.

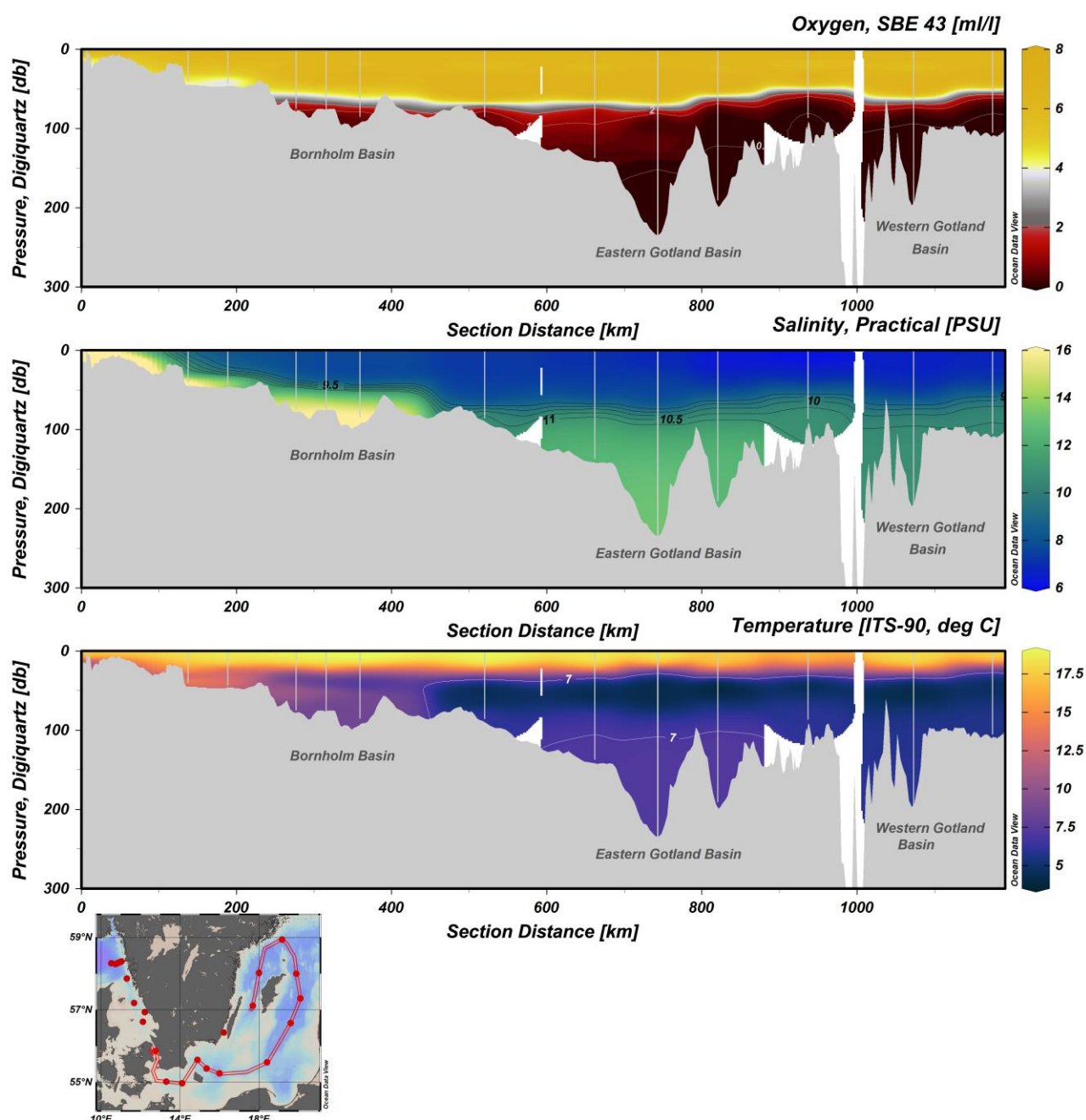


Figure 1. Transect showing dissolved oxygen, salinity and temperature from the Sound, through the Baltic Proper and to the Western Gotland Basin.

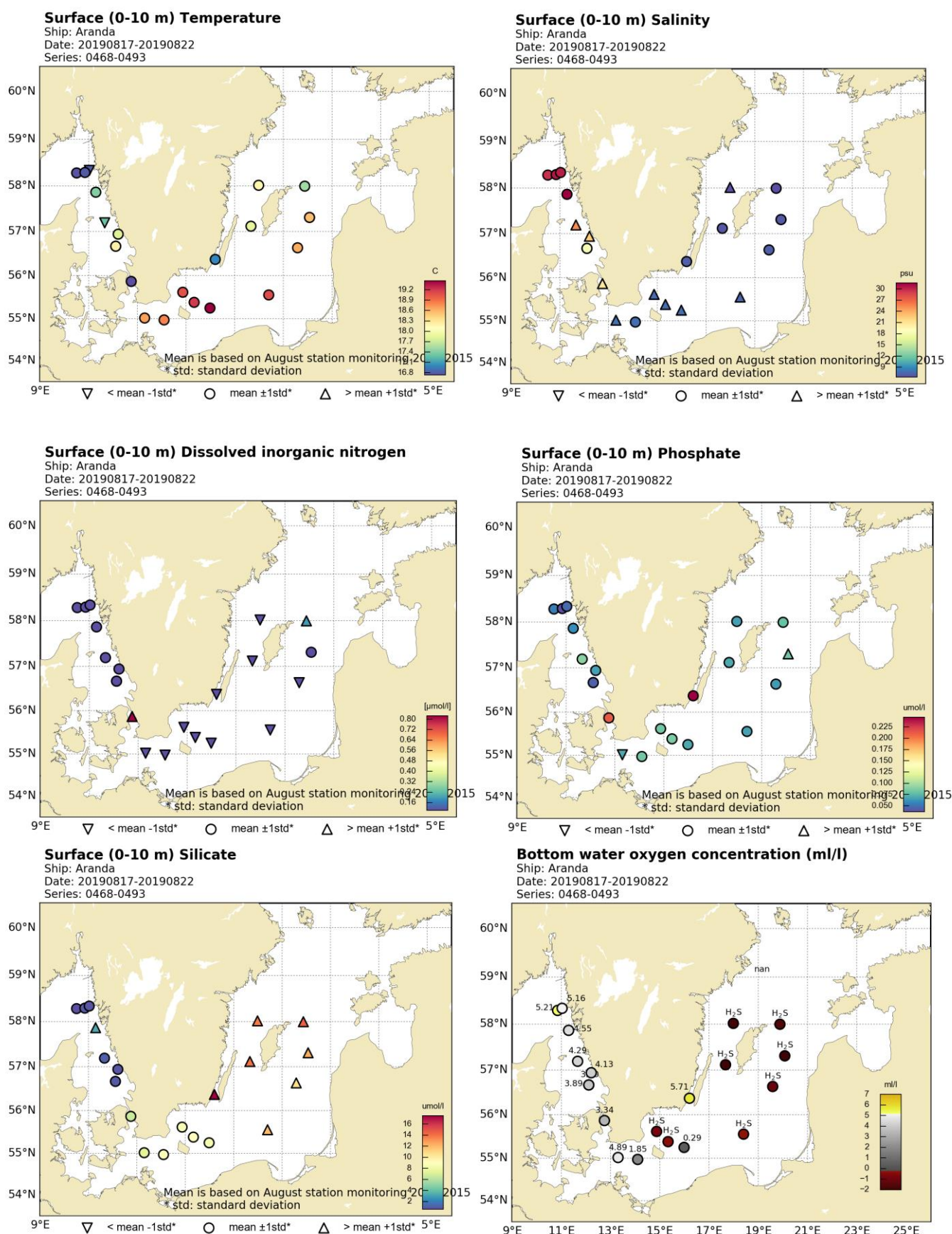


Figure 2. Surface values (mean 0-10 m) of temperature, salinity, dissolved inorganic nitrogen, phosphate and silicate and bottom values for oxygen concentration.

PARTICIPANTS

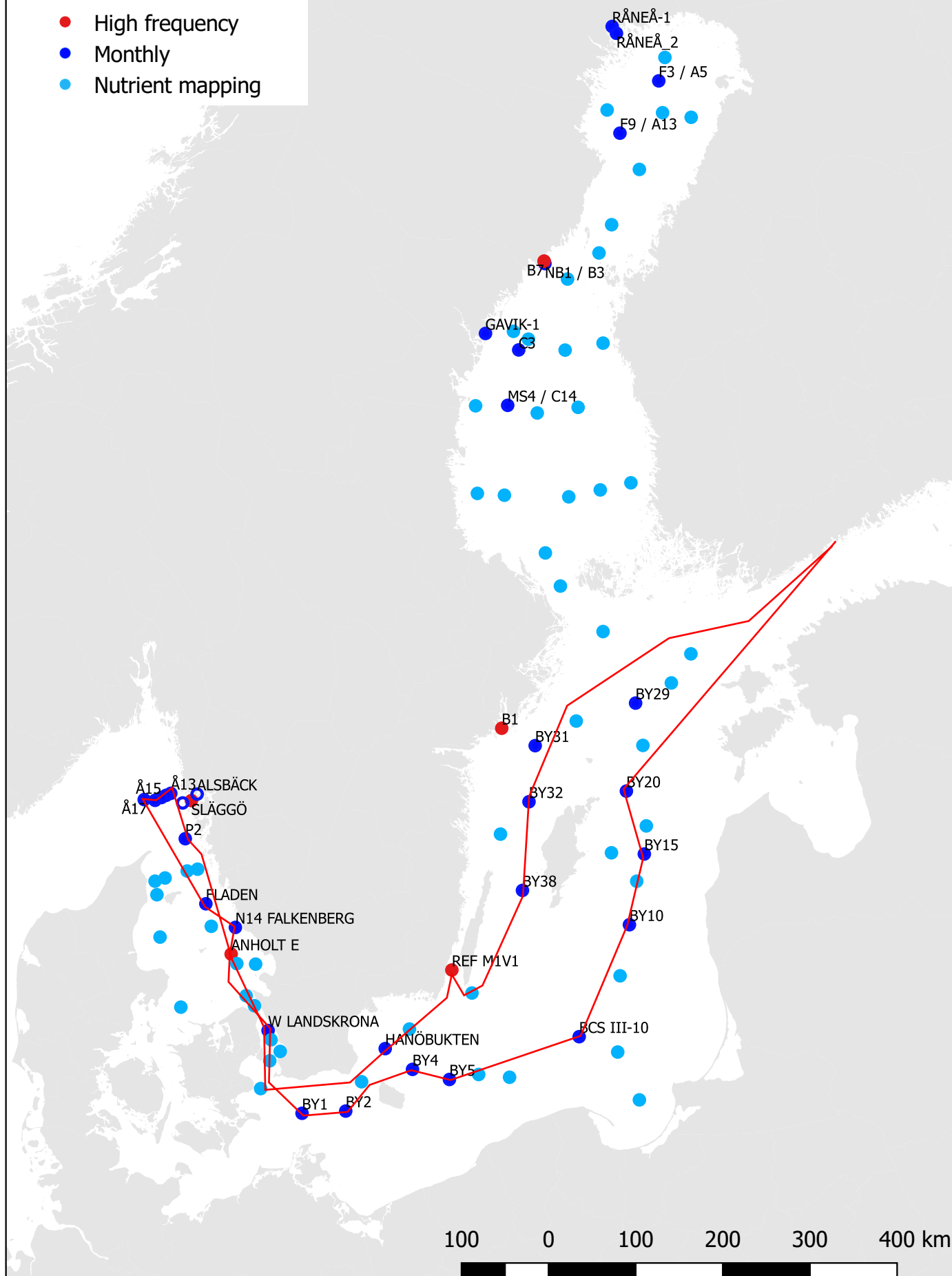
Name	Leg	Roll	From
Sari Sipilä		Chief scientist	SMHI
Lars Andersson			SMHI
Jenny Lycken		Quality manager	SMHI
Ola Kalén			SMHI
Madeleine Nilsson			SMHI
Anders Hulthén	Helsinki-Landskrona		SMHI
Erik Björn			Umeå university
Erik Capo			Umeå university
Caiyan Feng			Umeå university

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

Monitoring stations

- High frequency
- Monthly
- Nutrient mapping



Time: 07:30

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	Air vel	Air temp C	Air pres hPa	WCWI elac aove hdsb	CZPP hohp loy apt o	No de	No btl	T e m m	T a l l	S a h o o	P h o o	D h o o	H o o	P h o o	N h o o	N h o o	N h o o	N h o o	A h o o	S h o o	H h o o	C h o o	C h o o		
0468	14	BPEX26	BAS...	BY20 FÅRÖDJ	5759.89	01952.73	20190817	0800	195	5	21	8	17.5	1008	1430	x---	17		x	x	-	x	-	x	x	x	x	-	x	x	x	x	-	x	-	-
0470	14	BPEX21	BAS...	BY15 GOTLANDSDJ	5718.72	02004.57	20190817	1535	237	4	17	8	18.4	1007	2730	xxxx	24		x	x	-	x	x	x	x	x	-	x	x	x	x	-	x	-	-	
0471	14	BPEX21	BAS...	BY15 GOTLANDSDJ	5718.72	02004.59	20190817	1705	235		16	8	18.3	1007	2730	----	19		-	x	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	
0472	14	BPEX13	BAS...	BY10	5638.02	01935.08	20190818	0100	144		14	9	19.4	1006	9990	x---	16		x	x	x	x	-	x	x	x	-	x	x	x	-	x	-	x	x	
0473	14	BPSE11	BAS...	BCS III-10	5533.31	01824.00	20190818	0825	91	8	16	6	19.7	1003	2730	x---	12		x	x	x	x	-	x	x	x	-	x	x	x	-	x	-	-	-	
0474	14	BPSB07	BAS...	BY5 BORNHOLMSDJ	5515.00	01559.05	20190818	1550	91	6	17	6	19.2	1002	5820	xxxx	12		x	x	x	x	x	x	x	-	x	x	x	-	x	-	-	-		
0475	14	BPSB06	BAS...	BY4 CHRISTIANSÖ	5522.98	01520.04	20190818	1950	93		21	9	18.7	1000	9990	x---	12		x	x	x	x	-	x	x	x	-	x	x	x	-	x	-	x	x	
0476	14	BPSA03	BAS...	BY2 ARKONA	5458.27	01405.93	20190819	0135	47		27	6	17.4	1004	9990	xxx-	8		x	x	x	x	-	x	x	-	x	-	x	x	x	-	x	-	-	
0477	14	BPSA02	BAS...	BY1	5500.95	01318.05	20190819	0500	46	5	23	7	17.4	1007	2730	x---	8		x	x	x	x	-	x	x	-	x	-	x	x	x	-	x	-	-	
0478	14	SOCX39	BAS...	W LANDSKRONA	5552.01	01244.89	20190819	1200	52	8	23	9	18.8	1007	2720	x---	9		x	x	x	x	-	x	x	-	x	-	x	x	x	-	x	-	-	
0479	14	KAEX29	BAS...	ANHOLT E	5640.11	01206.68	20190819	1720	63	7	21	11	18.1	1008	1340	xxxx	10		x	x	x	x	x	-	x	-	x	x	x	-	x	-	x	-	-	
0480	14	KANX25	BAS...	FLADEN	5711.54	01139.52	20190819	2200	84		22	12	17.3	1010	9990	x---	12		x	x	x	x	-	x	x	-	x	-	x	x	x	-	x	-	-	
0481	14	SKEX18	BAS...	Å17	5817.05	01030.25	20190820	0530	349	7	23	12	16.3	1007	1140	xxx-	15		x	x	-	x	x	x	-	x	-	x	x	x	-	x	-	-	-	
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0483	14	SKEX16	BAS...	Å15	5817.66	01050.72	20190820	0820	136		21	11	15.7	1010	1640	x---	12		x	x	x	-	x	x	-	x	-	x	x	x	-	x	-	-	-	
0484	14	SKEX15	BAS...	Å14	5818.93	01056.54	20190820	0930	111		21																									

STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

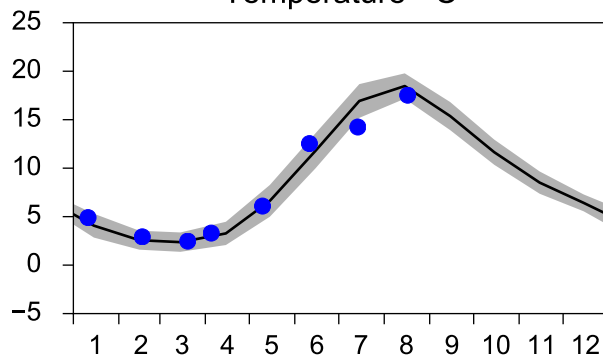
Annual Cycles

— Mean 2001-2015

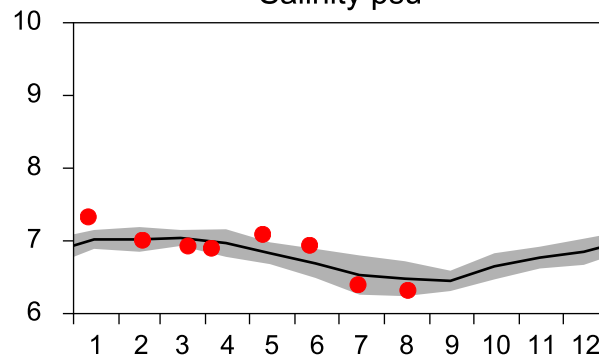
■ St.Dev.

● 2019

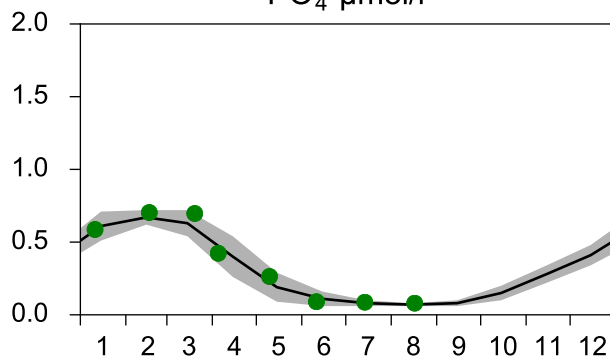
Temperature °C



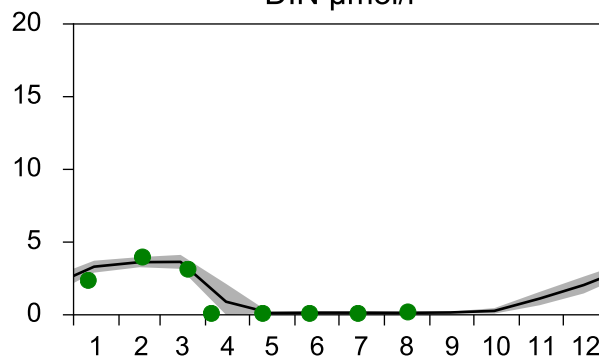
Salinity psu



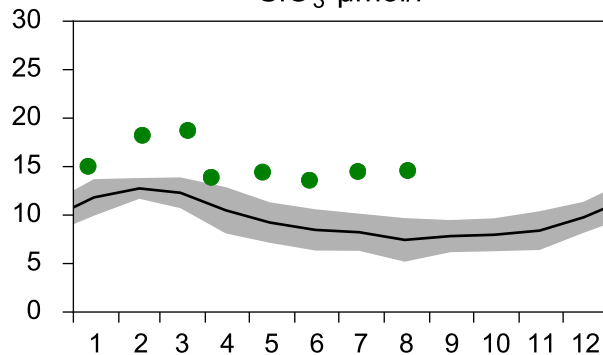
PO₄ µmol/l



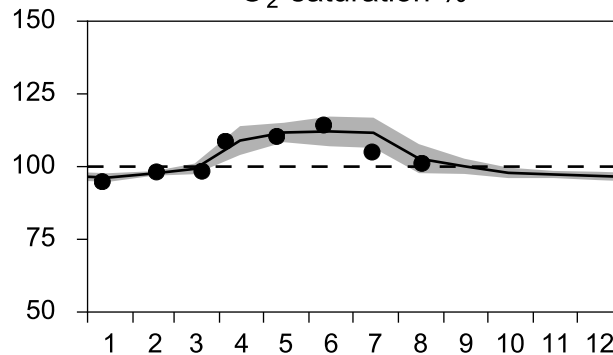
DIN µmol/l



SiO₃ µmol/l

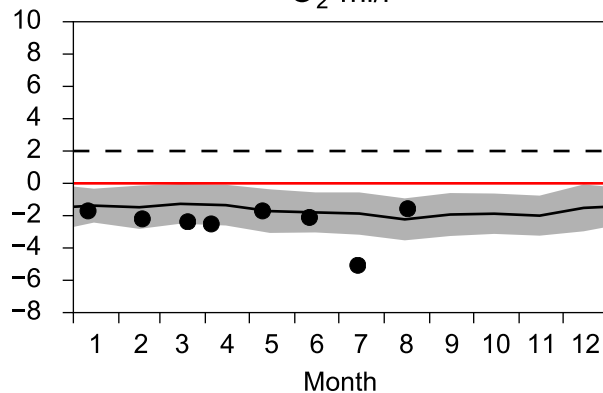


O₂ saturation %

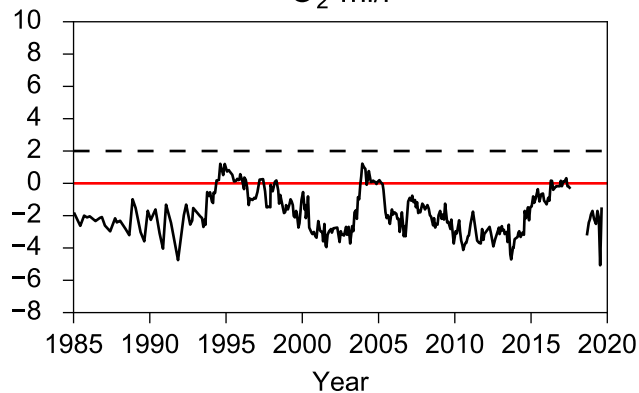


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O₂ ml/l

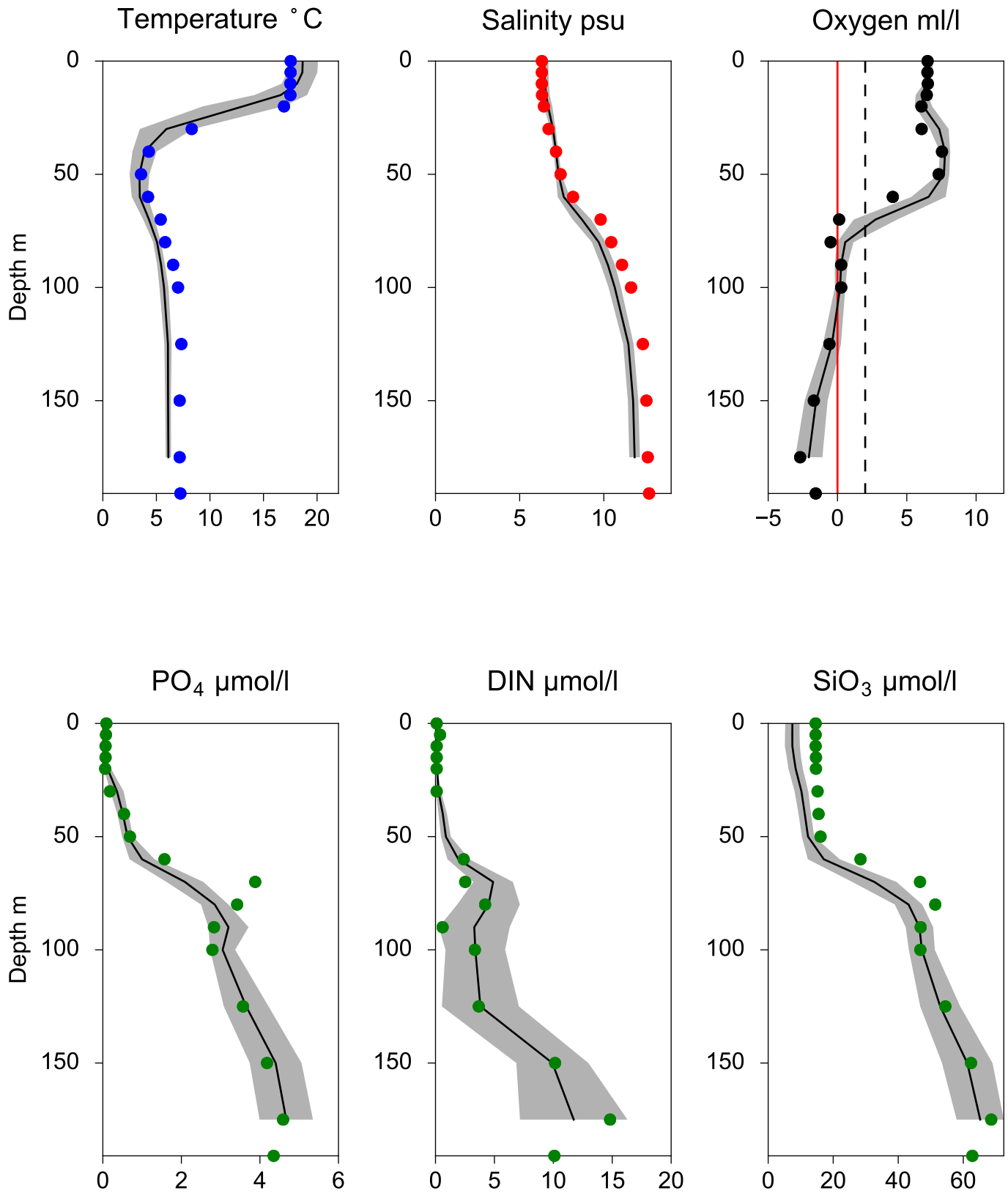


O₂ ml/l



Vertical profiles BY20 FÅRÖDJ August

— Mean 2001-2015 St.Dev. • 2019-08-17



STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

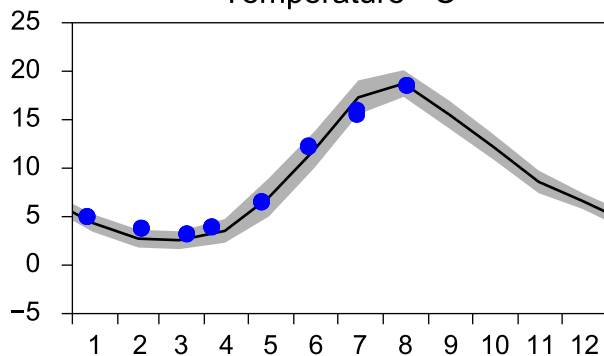
Annual Cycles

— Mean 2001-2015

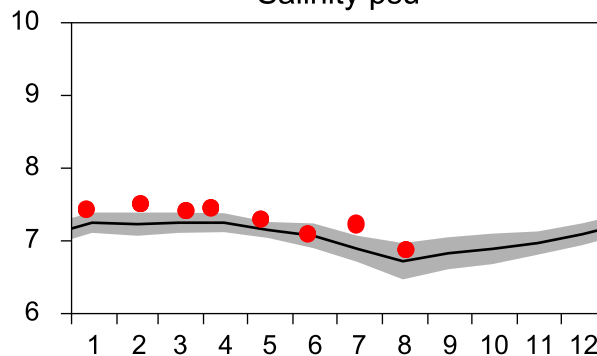
■ St.Dev.

● 2019

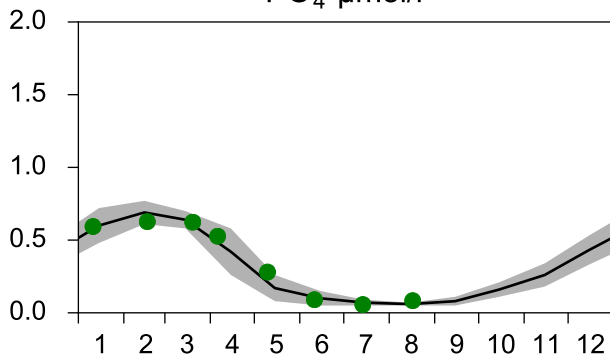
Temperature °C



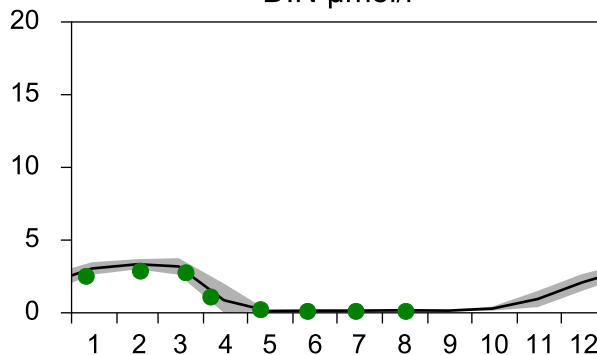
Salinity psu



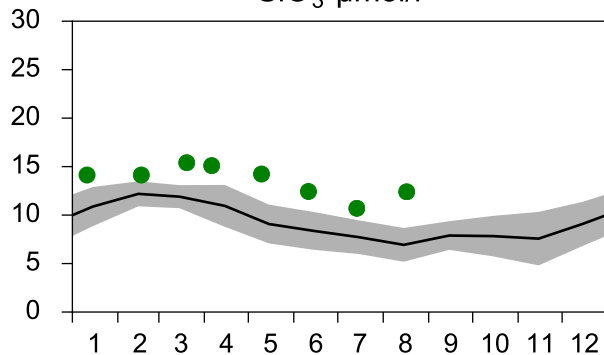
PO₄ µmol/l



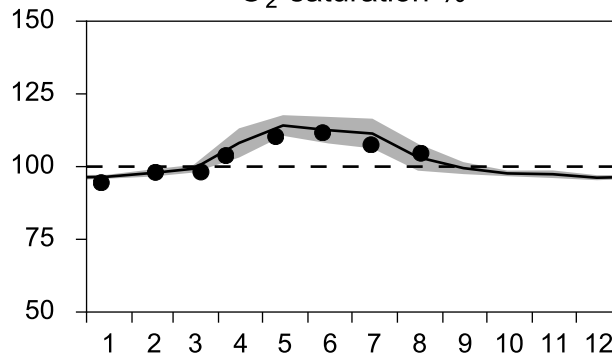
DIN µmol/l



SiO₃ µmol/l

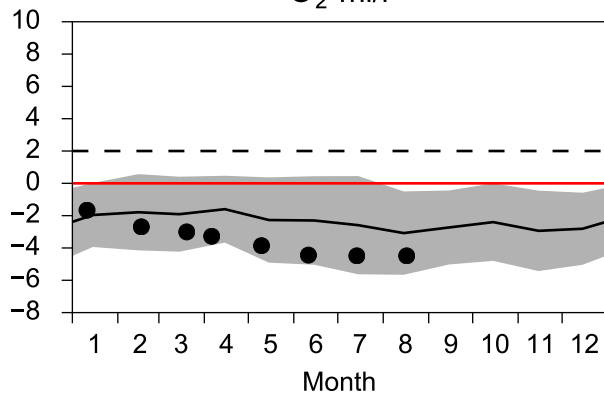


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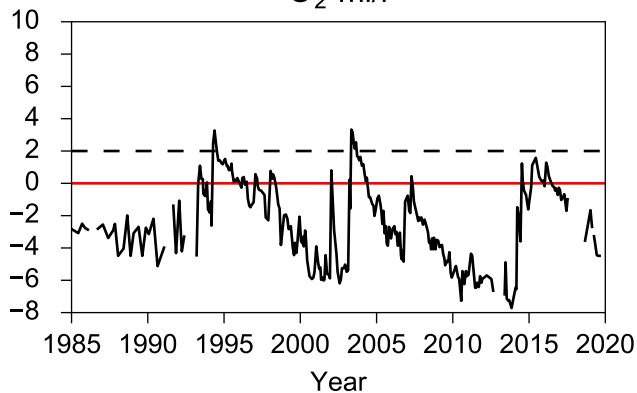


OXYGEN IN BOTTOM WATER (depth >= 225 m)

O₂ ml/l

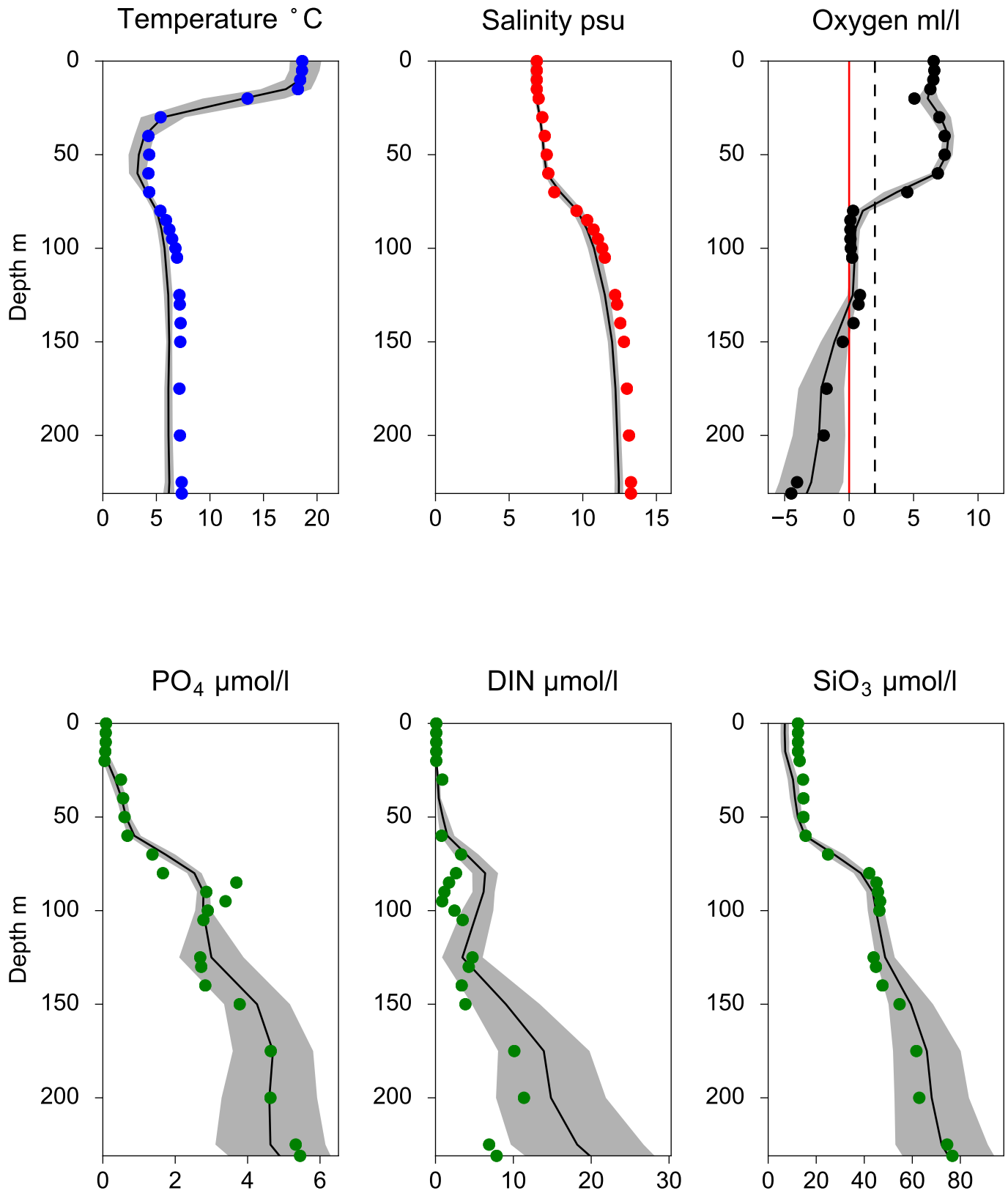


O₂ ml/l



Vertical profiles BY15 GOTLANDSDJ August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-17



STATION BY10 SURFACE WATER (0-10 m)

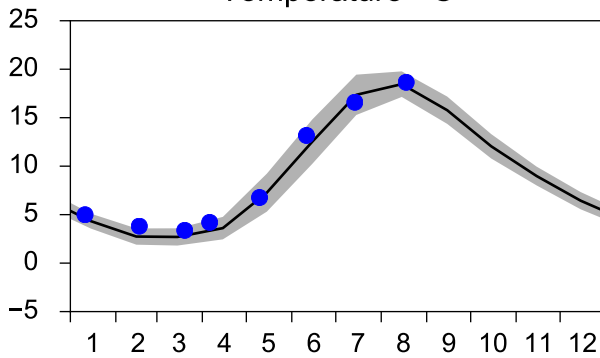
Annual Cycles

— Mean 2001-2015

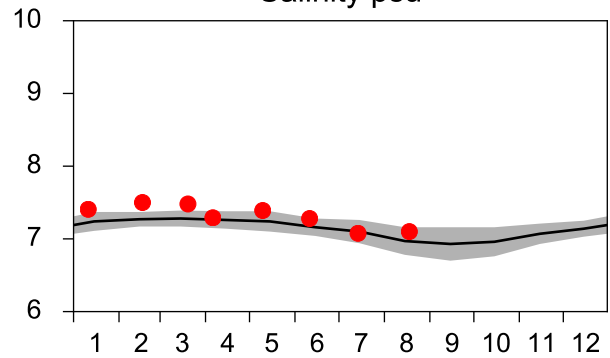
■ St.Dev.

● 2019

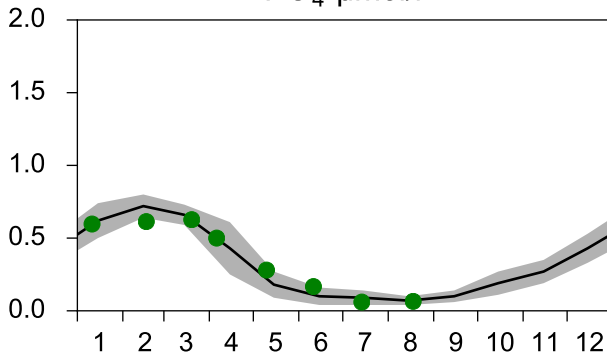
Temperature °C



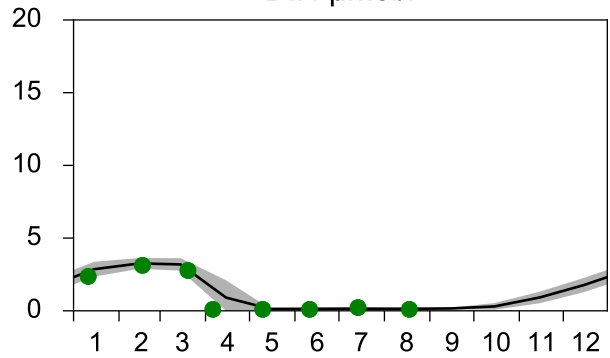
Salinity psu



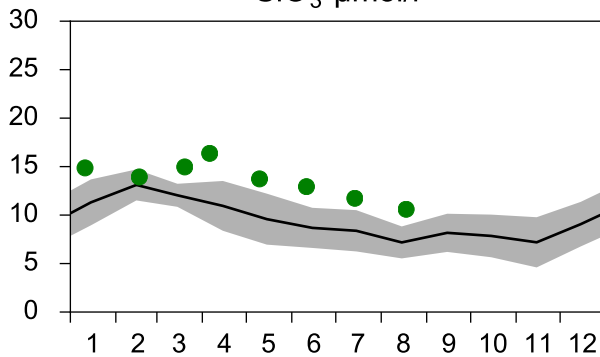
PO₄ µmol/l



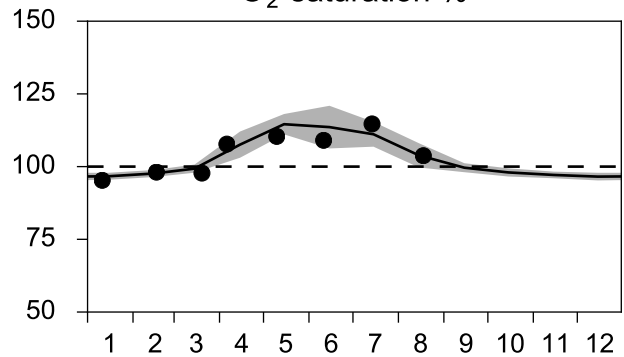
DIN µmol/l



SiO₃ µmol/l

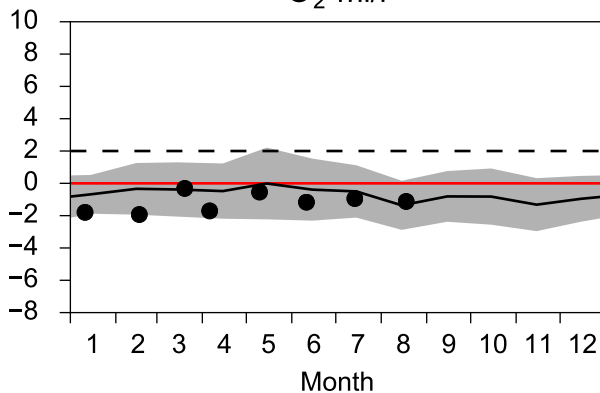


O₂ saturation %

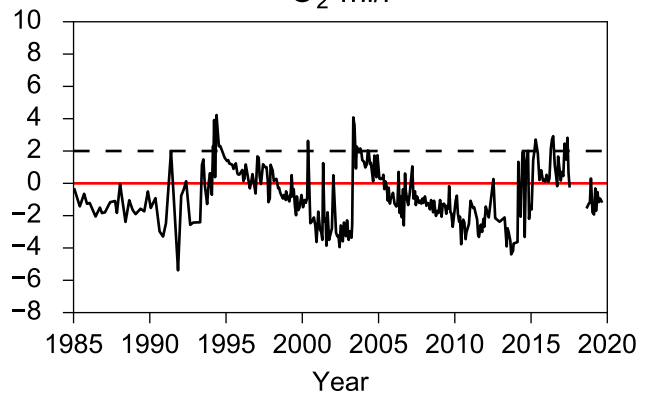


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l

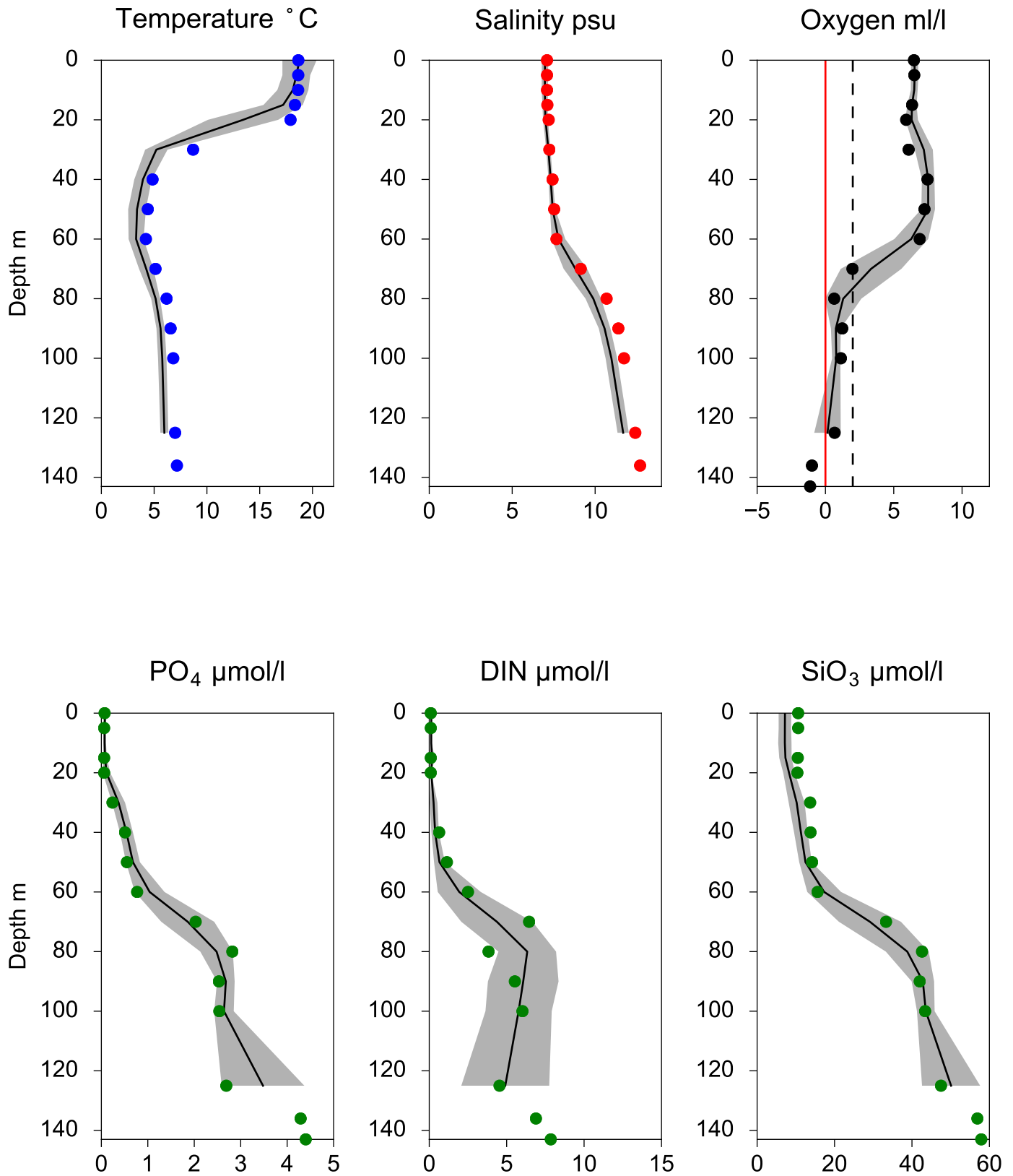


O₂ ml/l



Vertical profiles BY10 August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-18



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

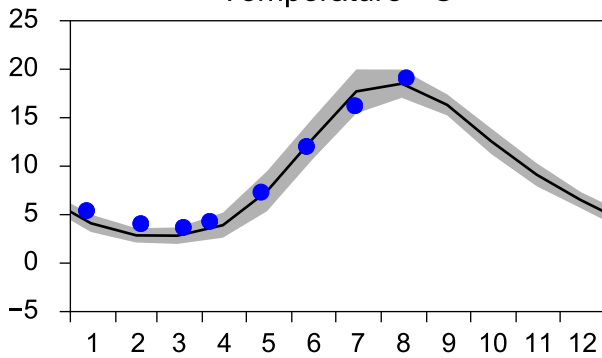
Annual Cycles

— Mean 2001-2015

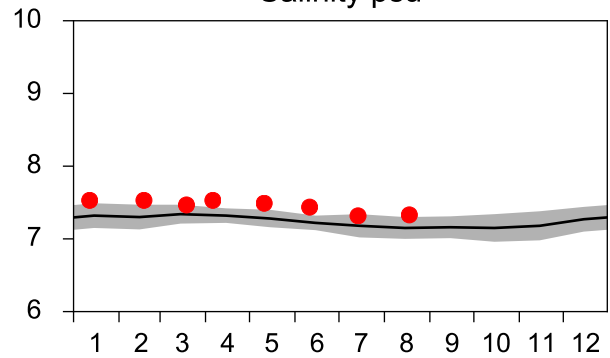
■ St.Dev.

● 2019

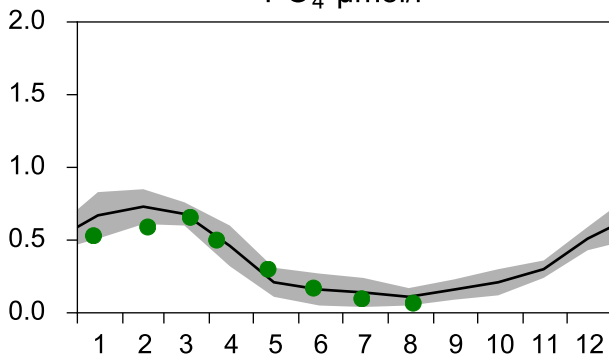
Temperature °C



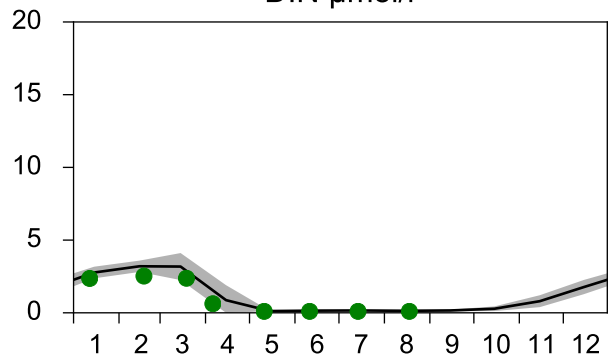
Salinity psu



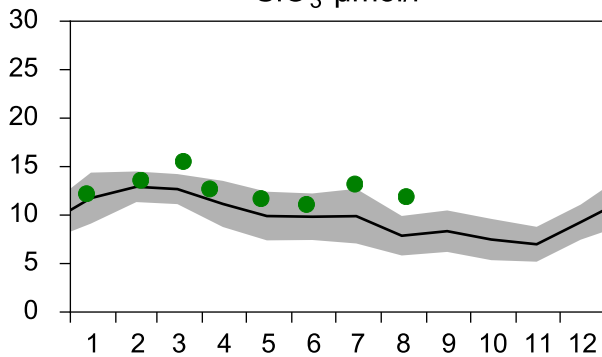
PO₄ µmol/l



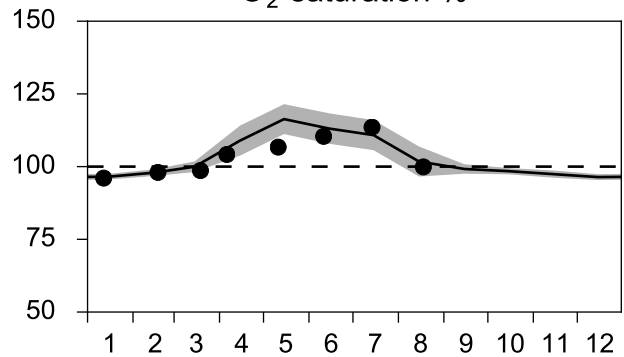
DIN µmol/l



SiO₃ µmol/l

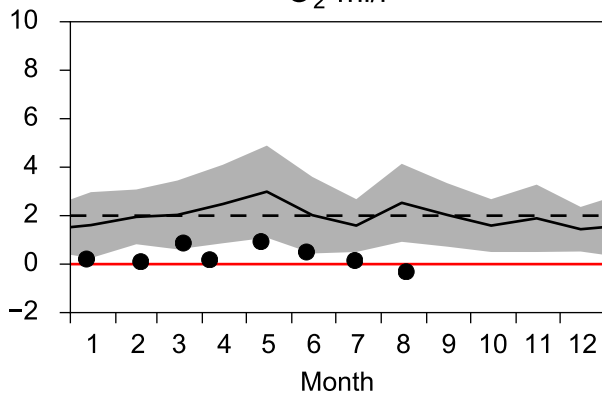


O₂ saturation %

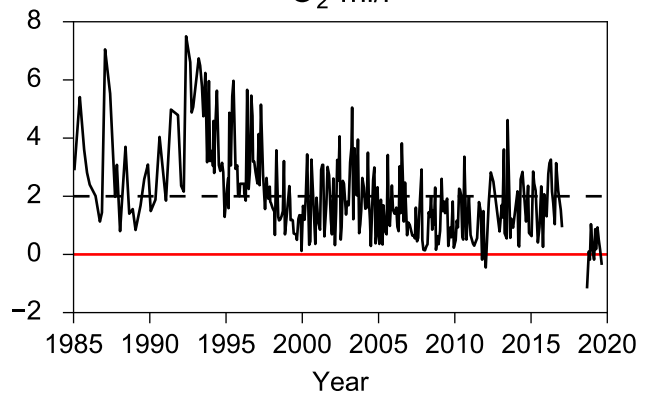


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

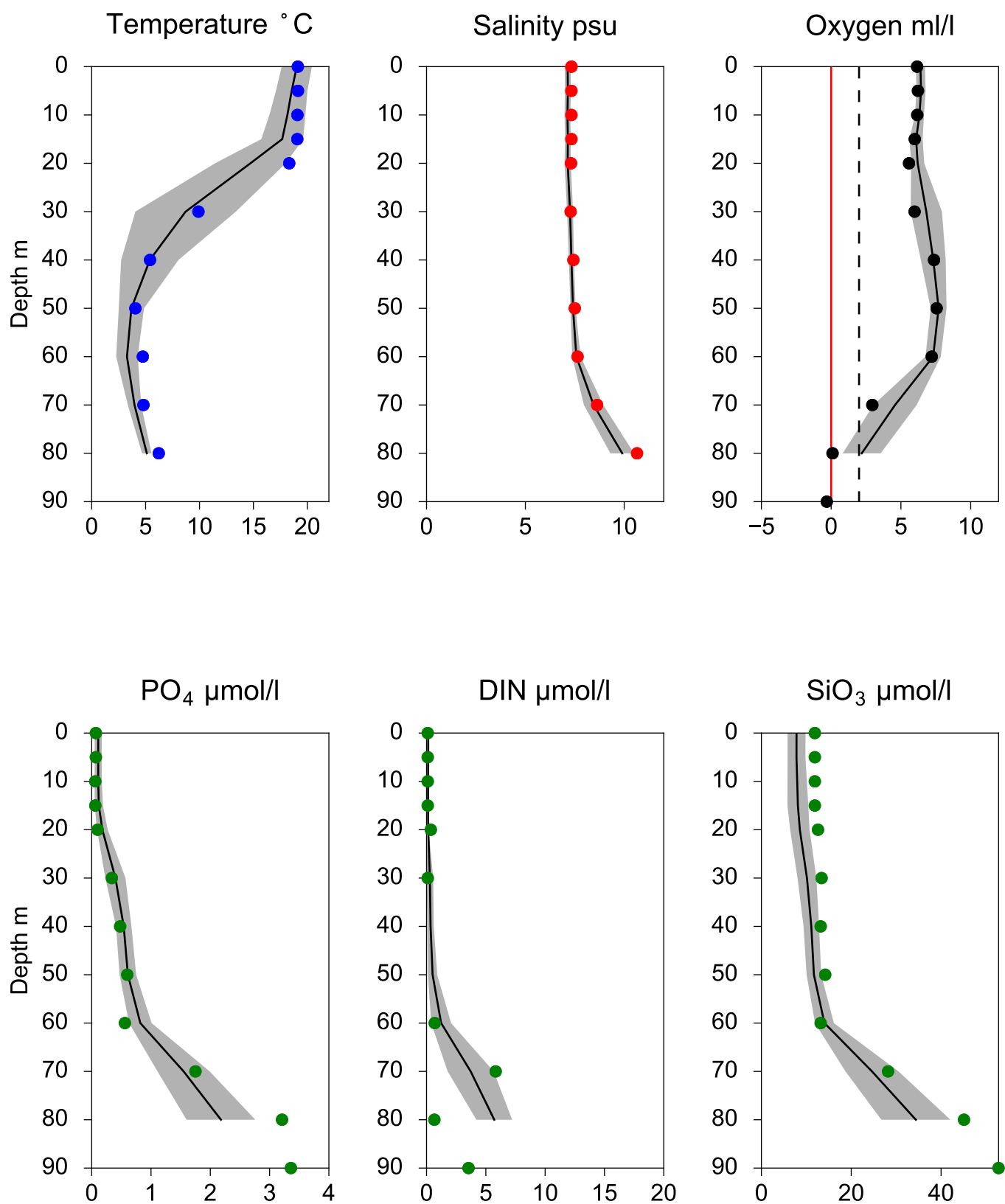


O₂ ml/l



Vertical profiles BCS III-10 August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-18



STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

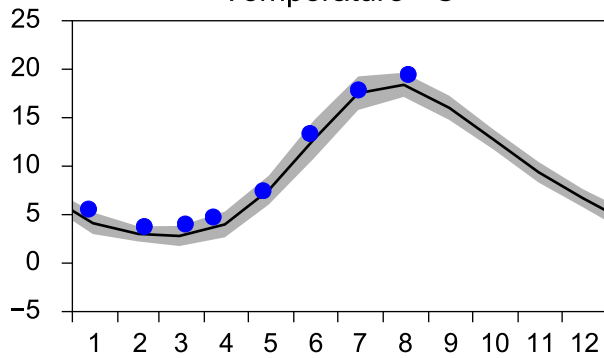
Annual Cycles

— Mean 2001-2015

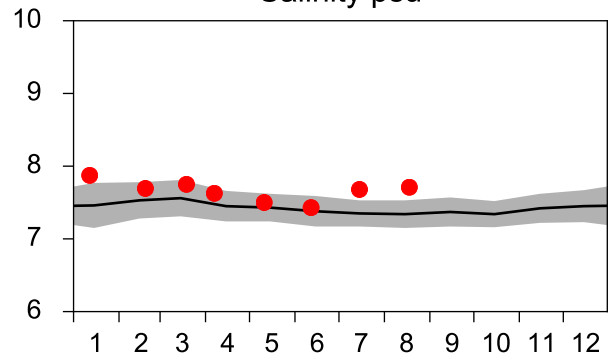
■ St.Dev.

● 2019

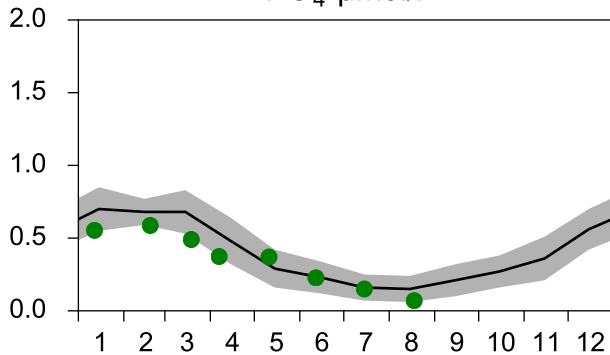
Temperature °C



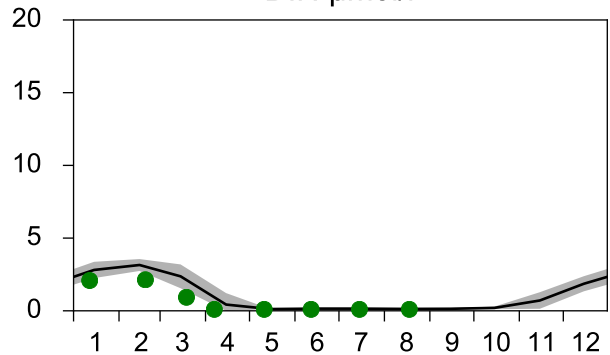
Salinity psu



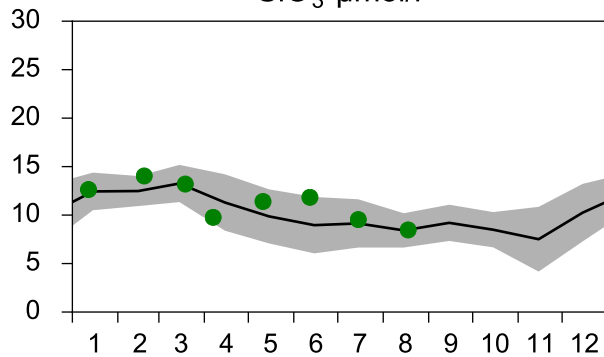
PO₄ µmol/l



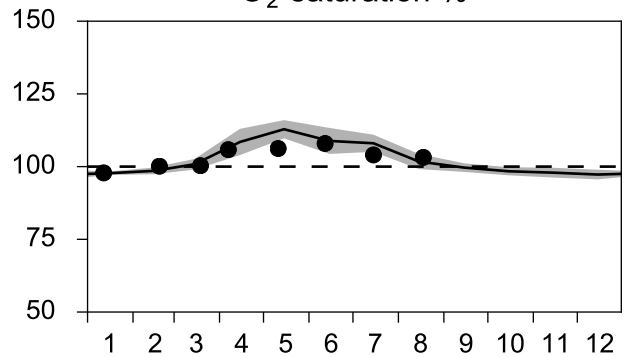
DIN µmol/l



SiO₃ µmol/l

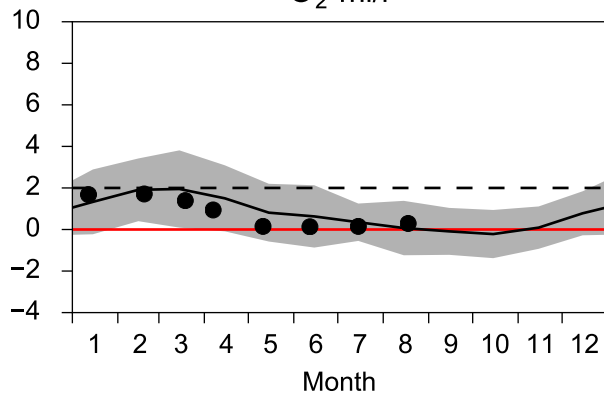


O₂ saturation %

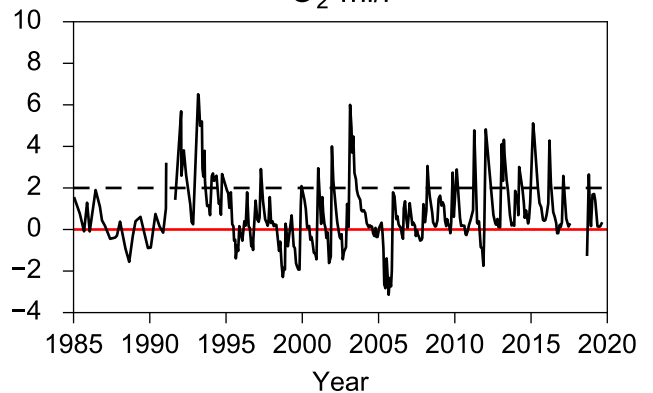


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

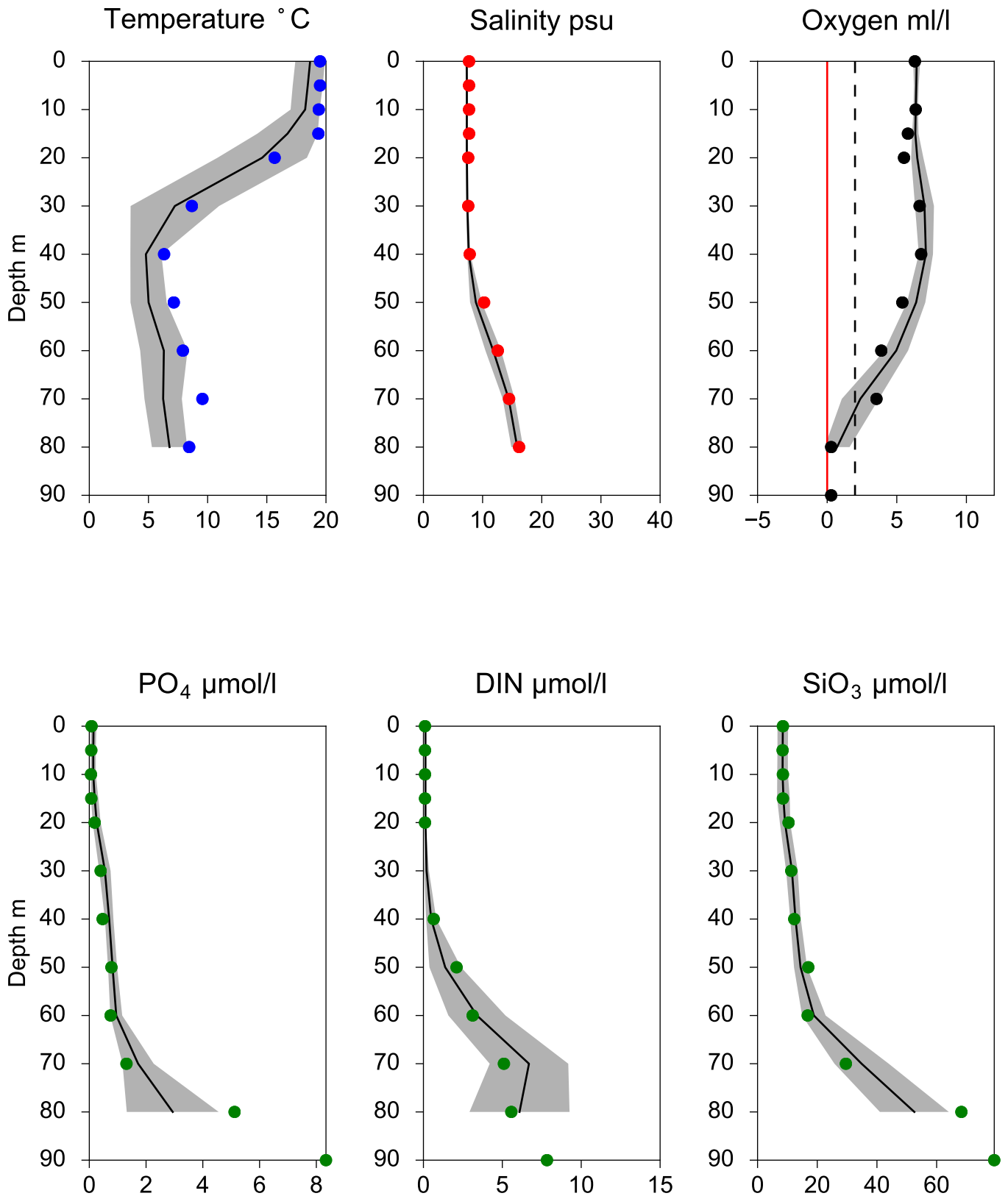


O₂ ml/l



Vertical profiles BY5 BORNHOLMSDJ August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-18



STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

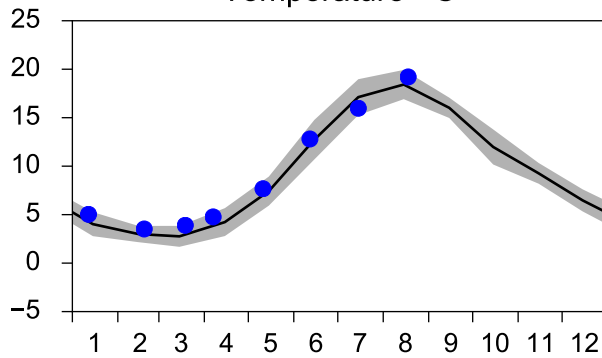
Annual Cycles

— Mean 2001-2015

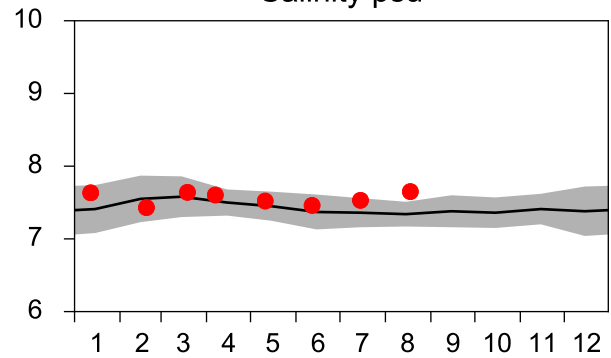
■ St.Dev.

● 2019

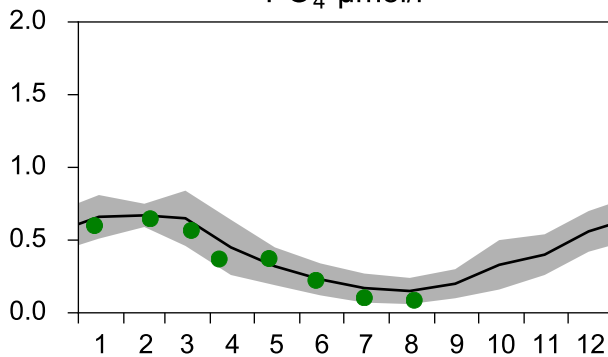
Temperature °C



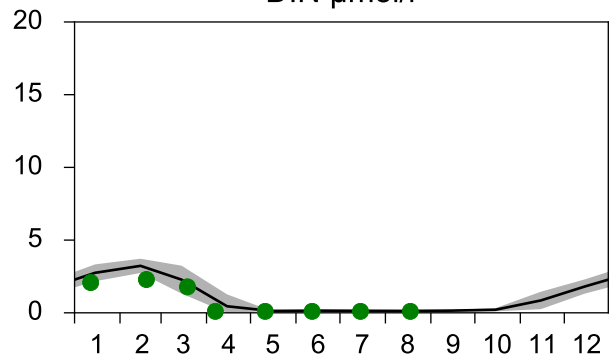
Salinity psu



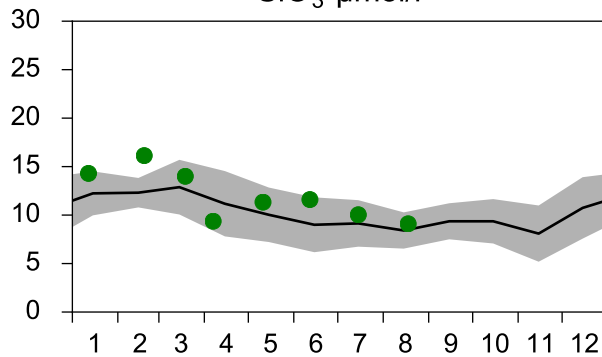
PO₄ µmol/l



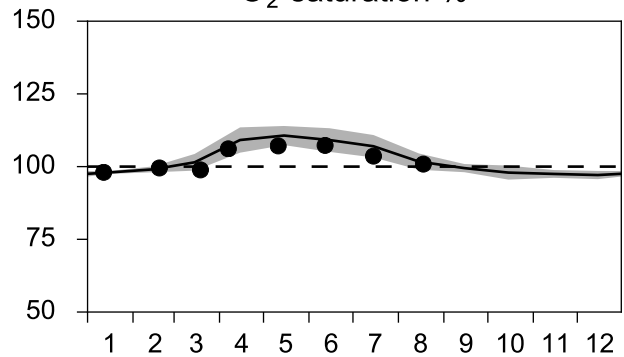
DIN µmol/l



SiO₃ µmol/l

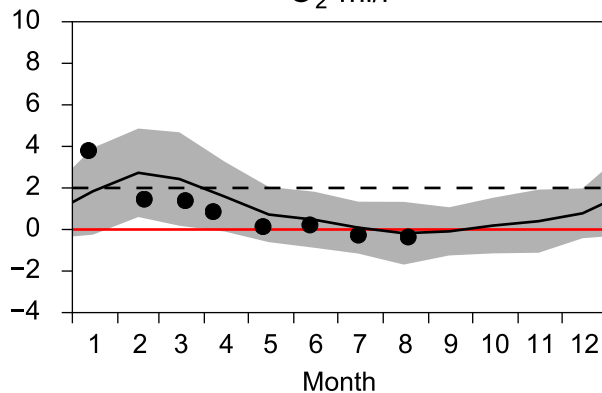


O₂ saturation %

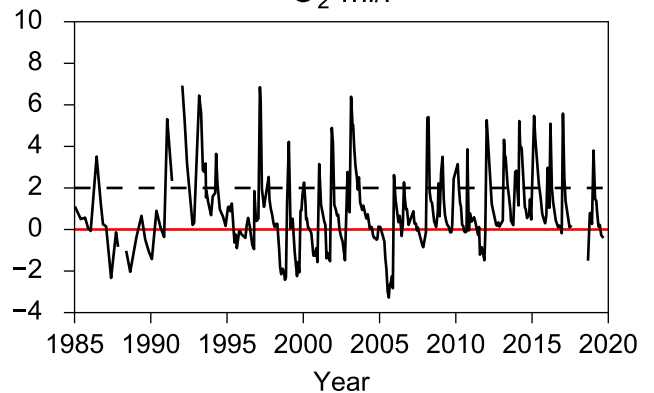


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

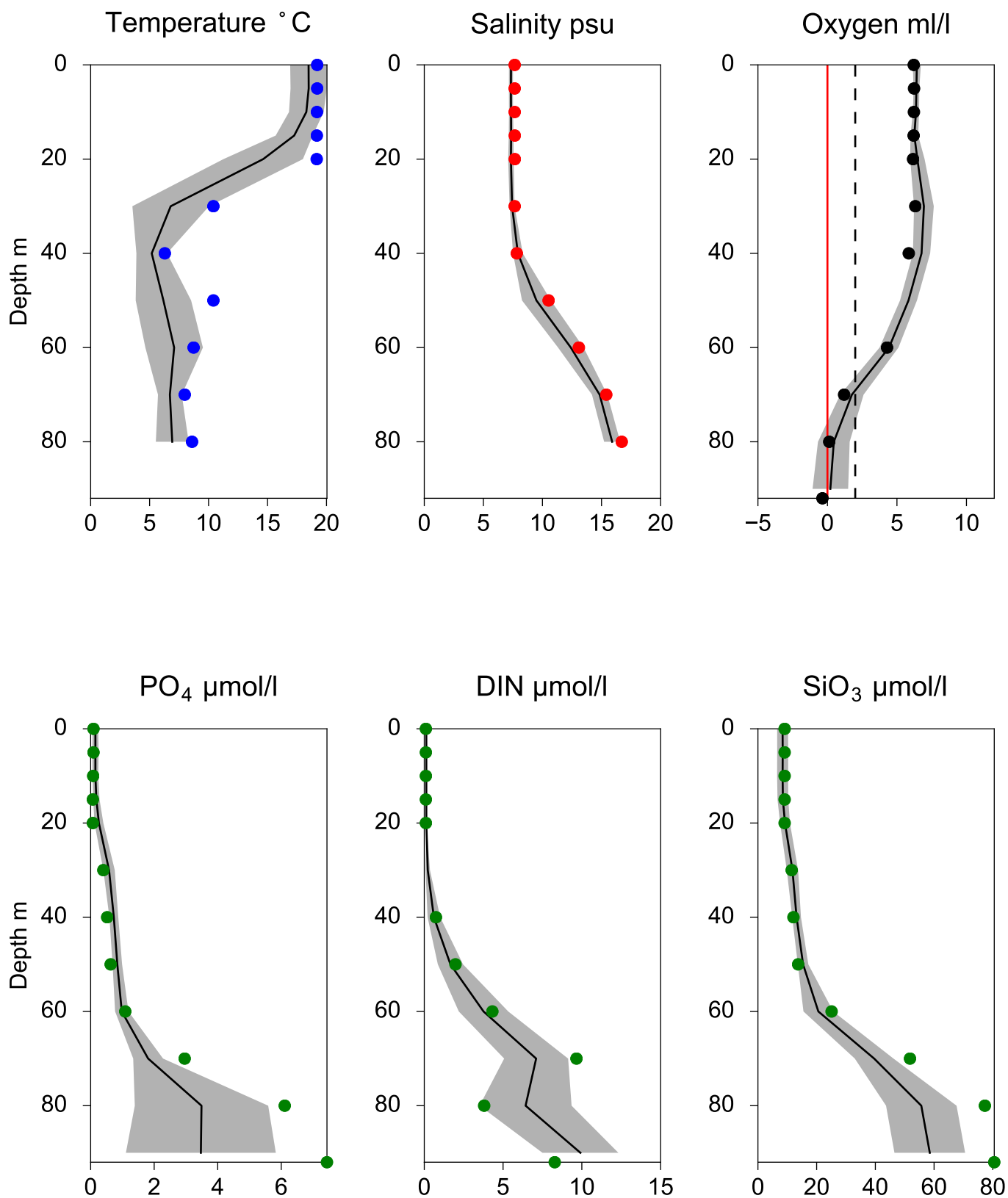


O₂ ml/l



Vertical profiles BY4 CHRISTIANSÖ August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-18



STATION BY2 ARKONA SURFACE WATER (0-10 m)

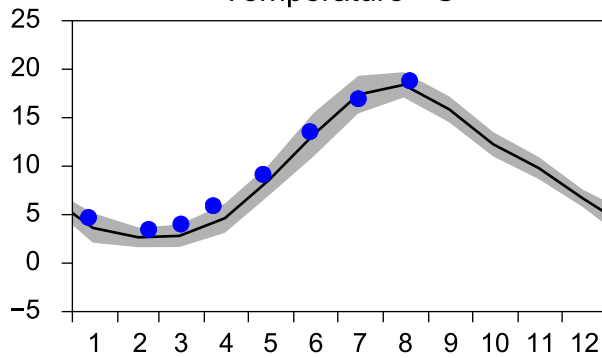
Annual Cycles

— Mean 2001-2015

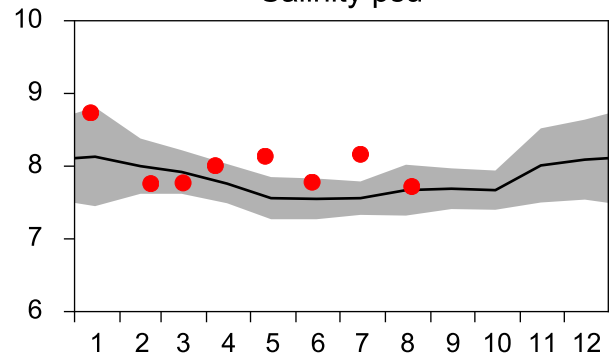
■ St.Dev.

● 2019

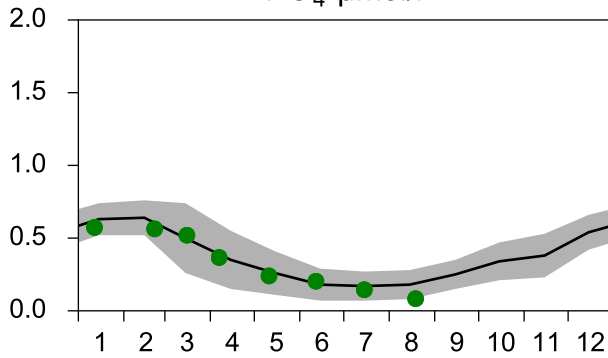
Temperature °C



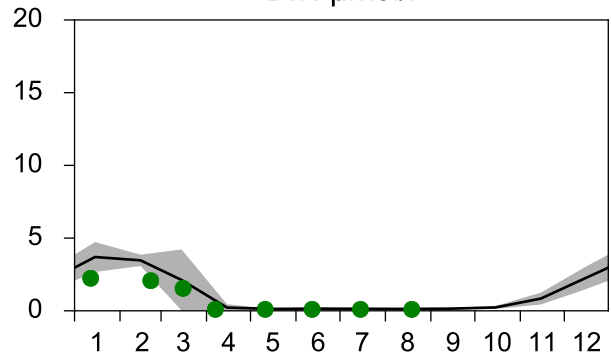
Salinity psu



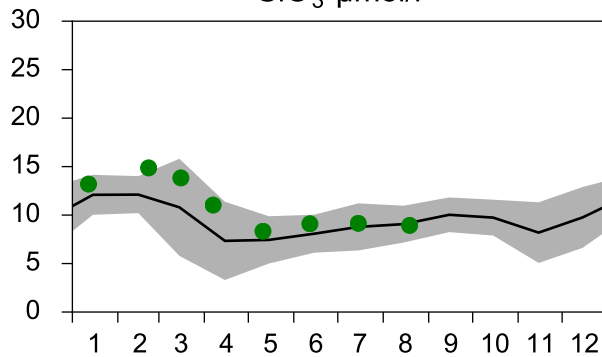
PO₄ µmol/l



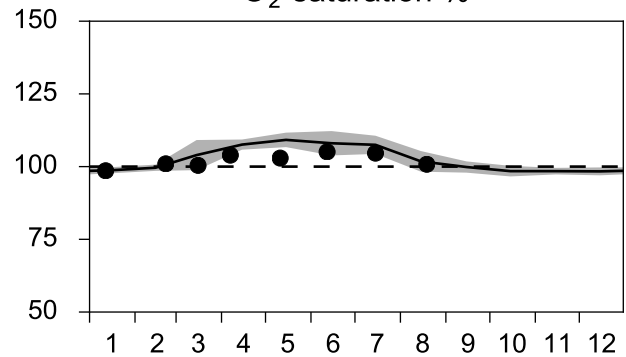
DIN µmol/l



SiO₃ µmol/l

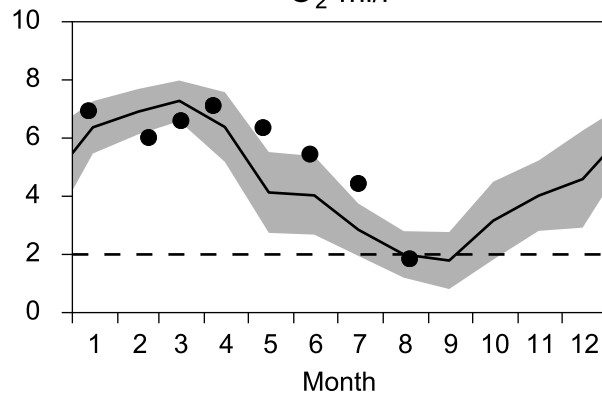


O₂ saturation %

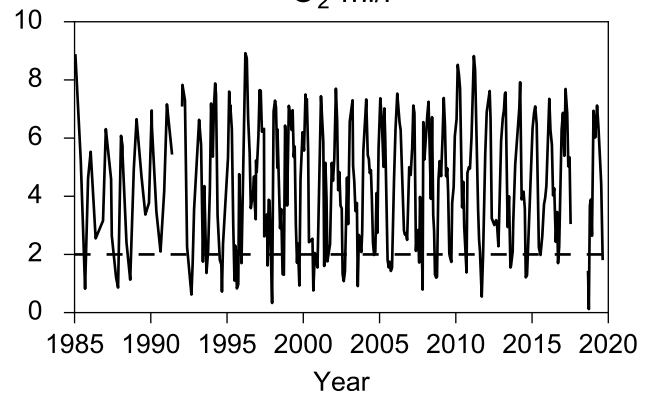


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

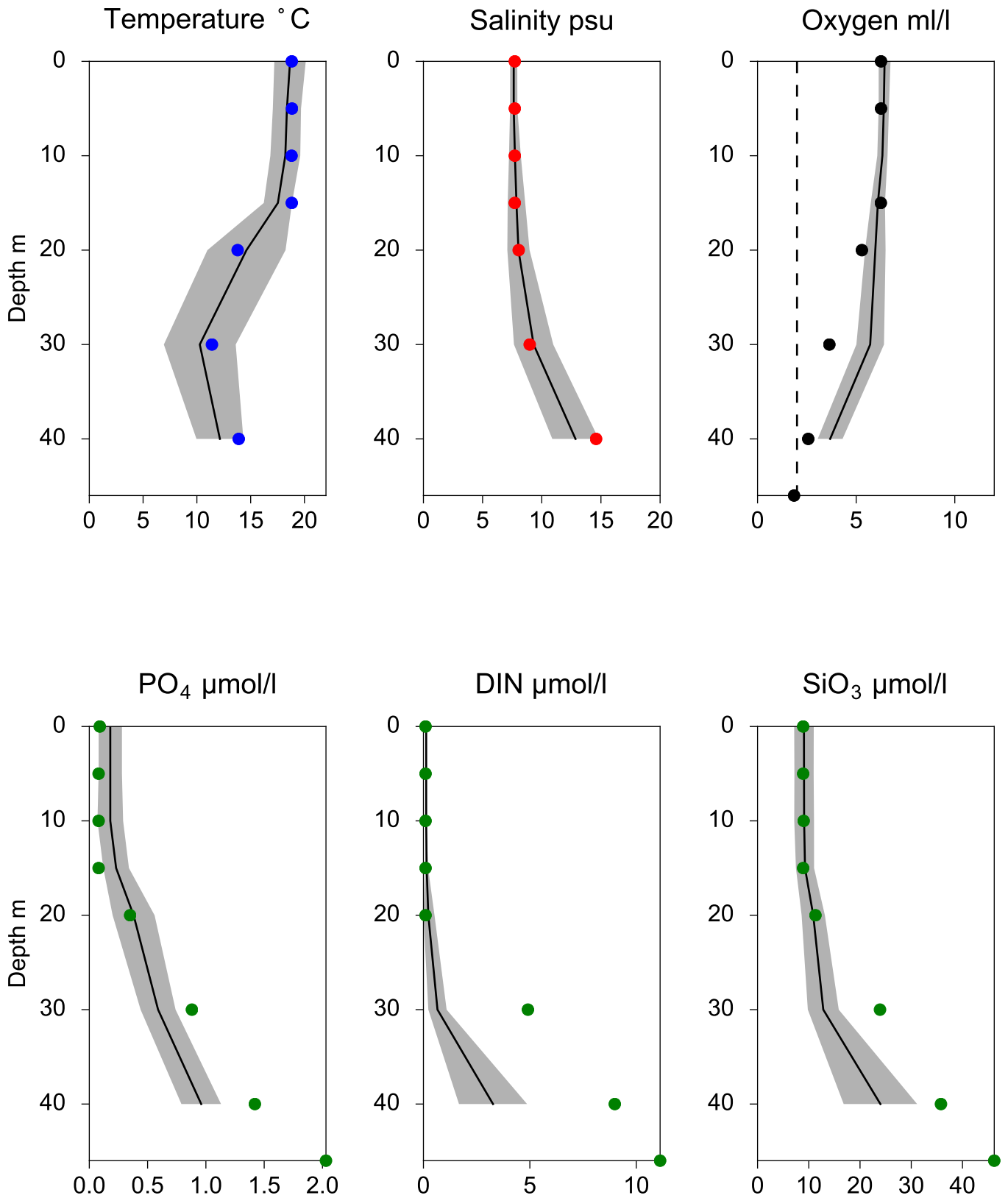


O₂ ml/l



Vertical profiles BY2 ARKONA August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-19



STATION BY1 SURFACE WATER (0-10 m)

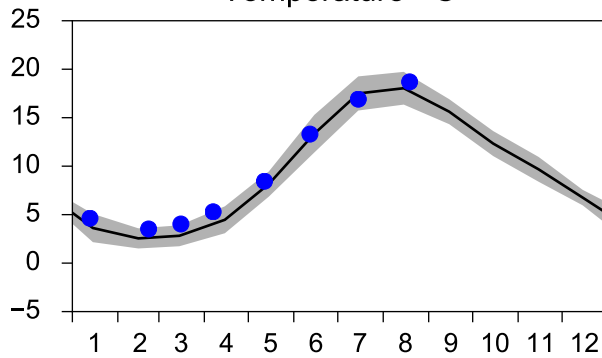
Annual Cycles

— Mean 2001-2015

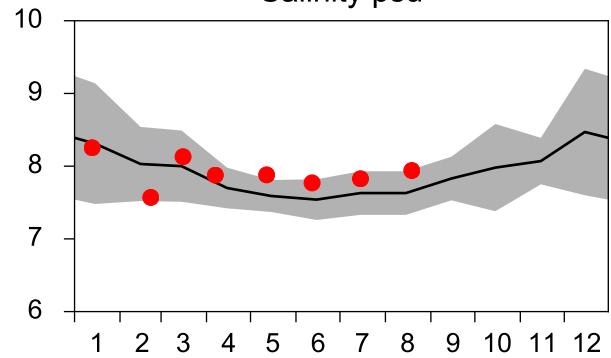
■ St.Dev.

● 2019

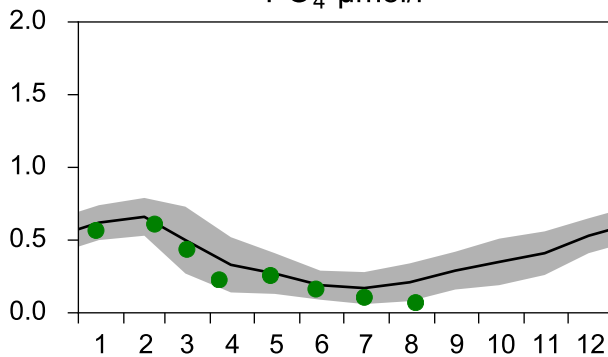
Temperature °C



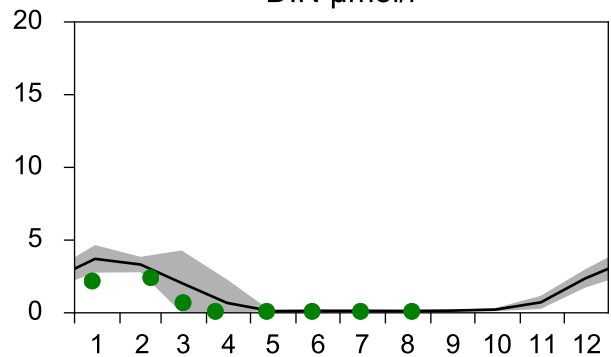
Salinity psu



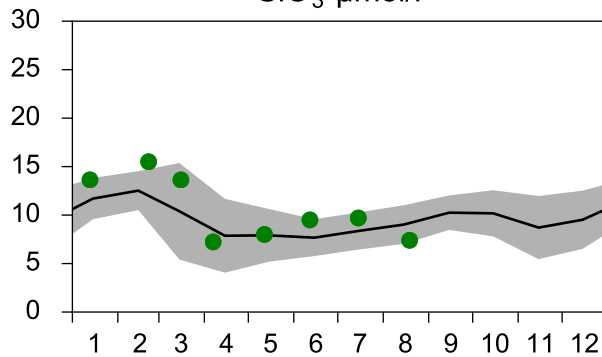
PO₄ µmol/l



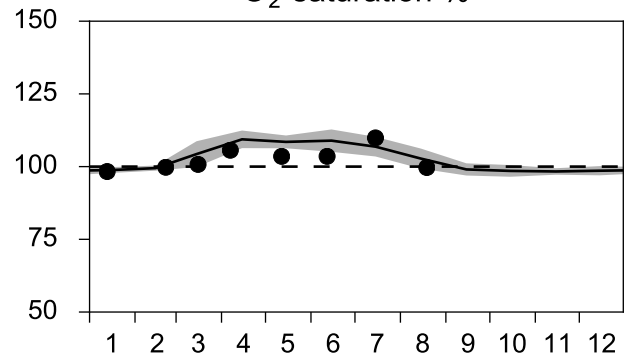
DIN µmol/l



SiO₃ µmol/l

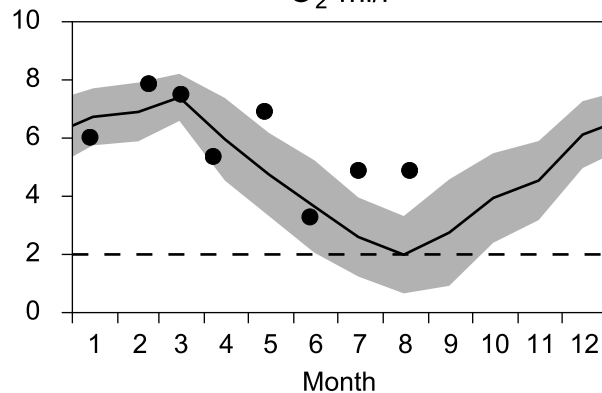


O₂ saturation %

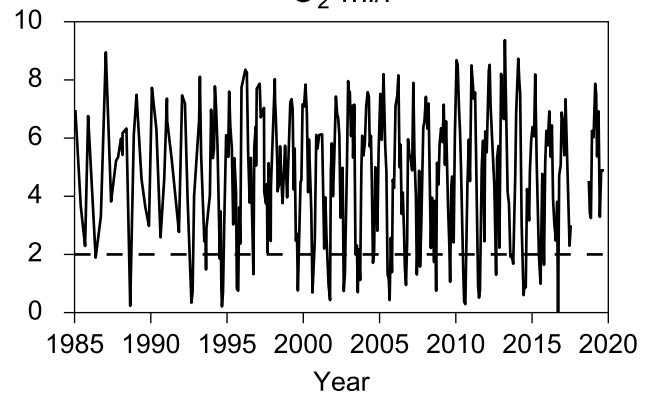


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

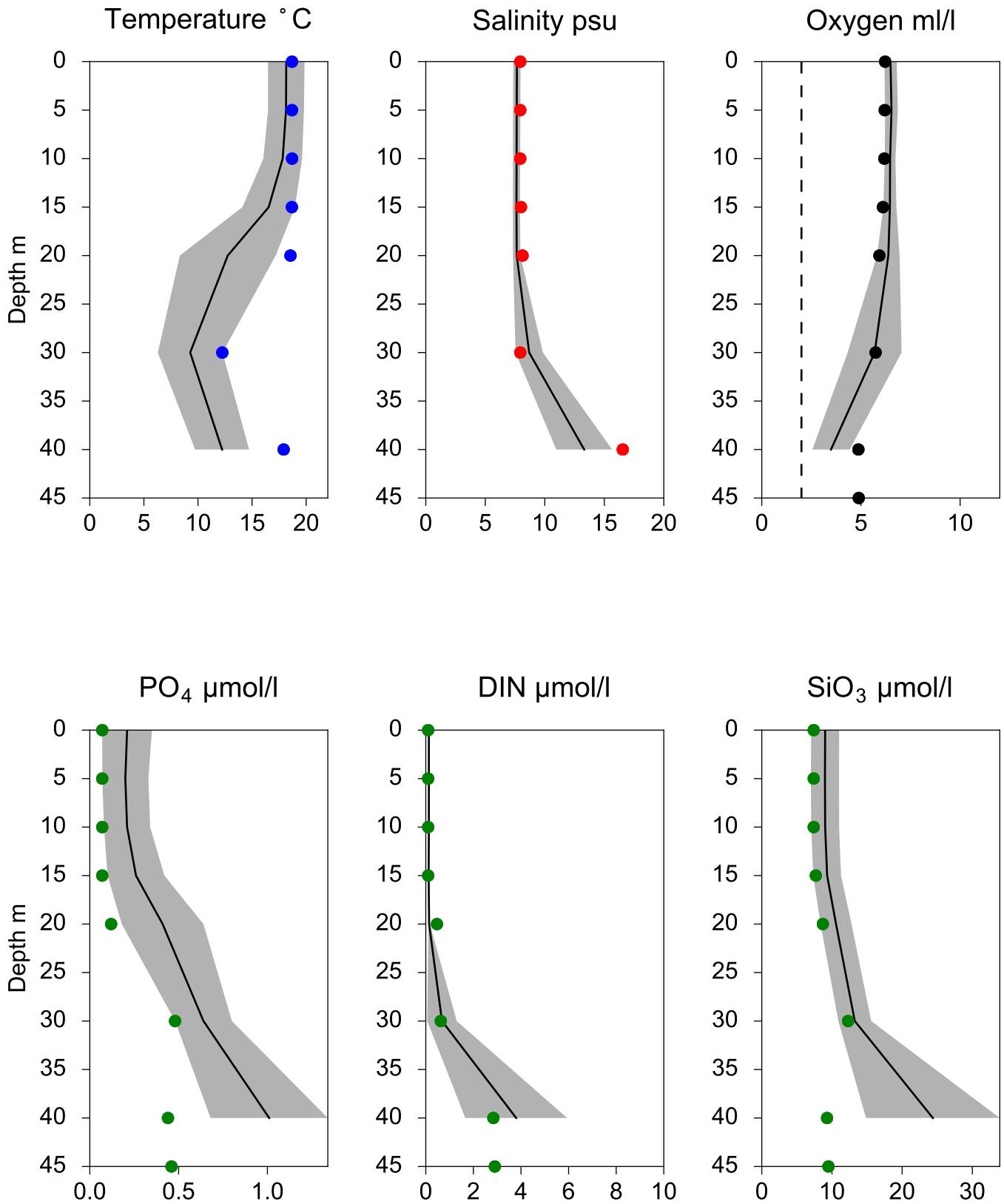


O₂ ml/l



Vertical profiles BY1 August

— Mean 2001-2015 St.Dev. • 2019-08-19



STATION W LANDSKRONA SURFACE WATER (0-10 m)

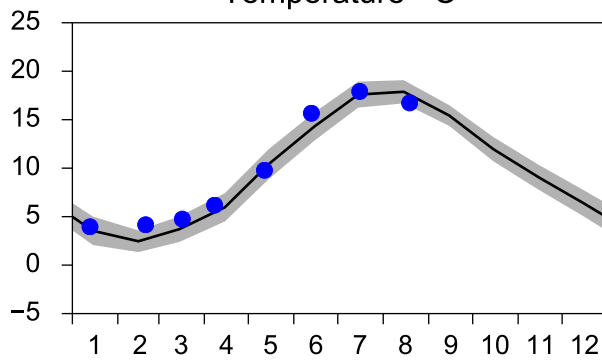
Annual Cycles

— Mean 2001-2015

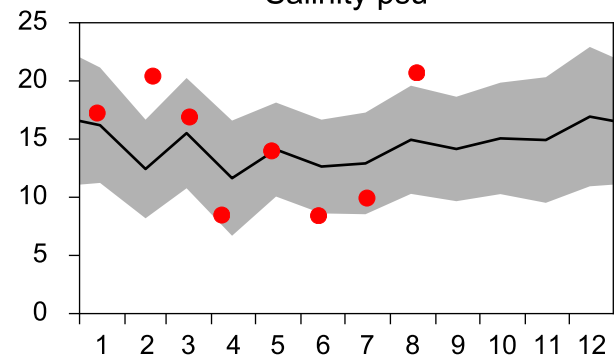
■ St.Dev.

● 2019

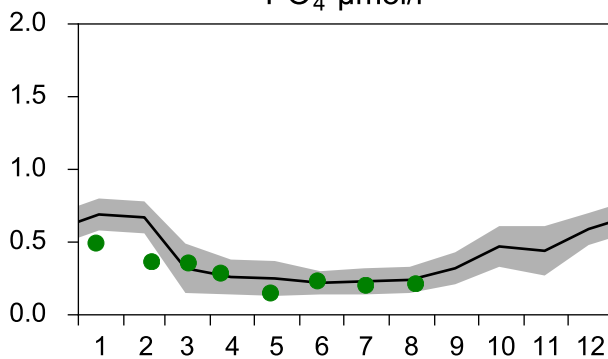
Temperature °C



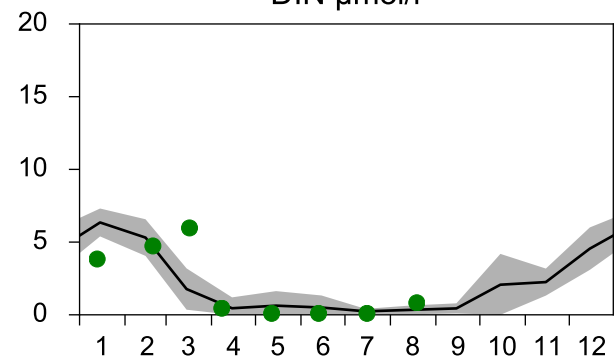
Salinity psu



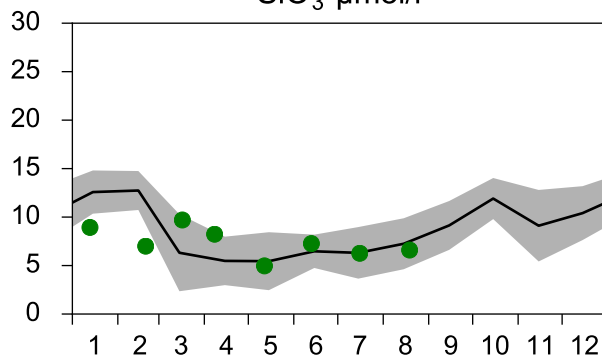
PO₄ µmol/l



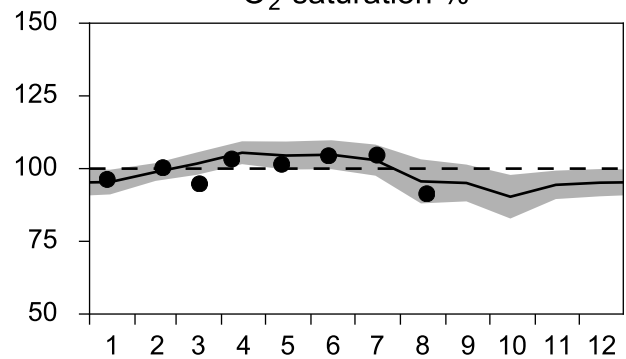
DIN µmol/l



SiO₃ µmol/l

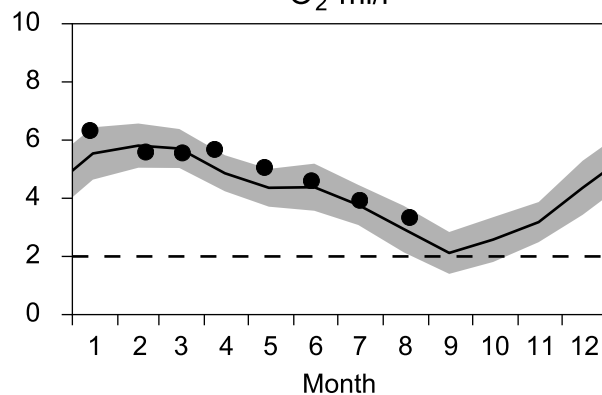


O₂ saturation %

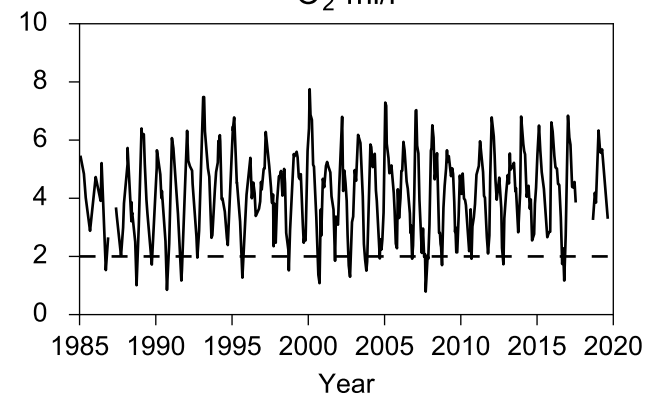


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

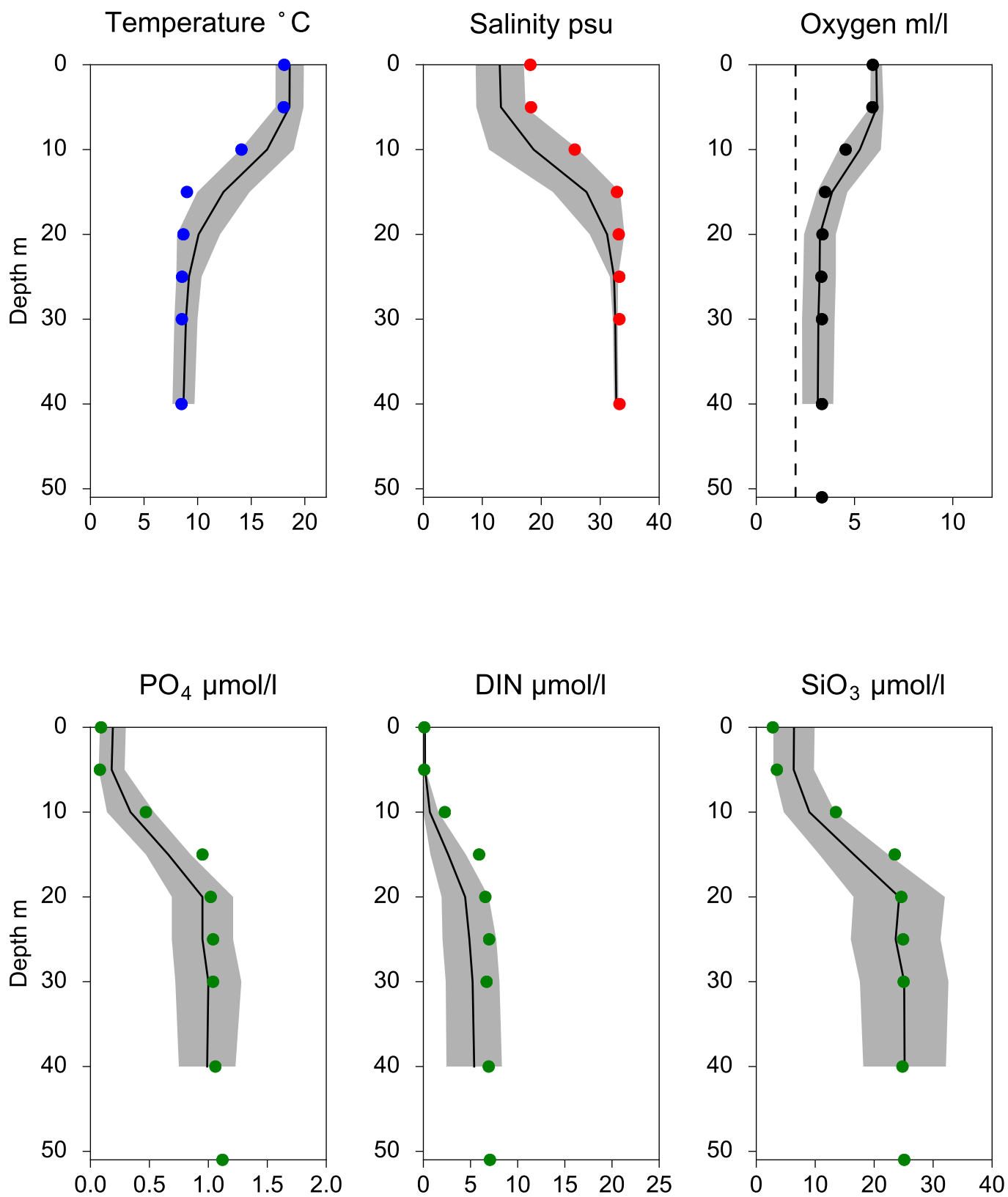


O₂ ml/l



Vertical profiles W LANDSKRONA August

— Mean 2001-2015 St.Dev. • 2019-08-19



STATION ANHOLT E SURFACE WATER (0-10 m)

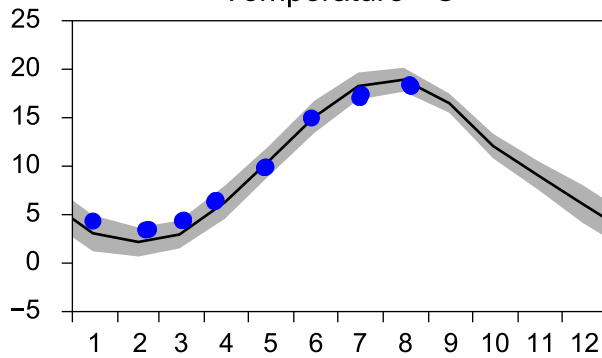
Annual Cycles

— Mean 2001-2015

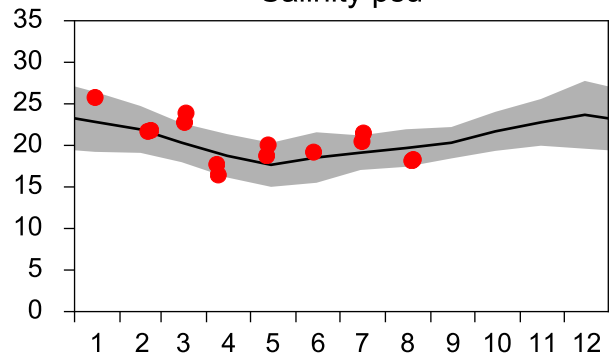
■ St.Dev.

● 2019

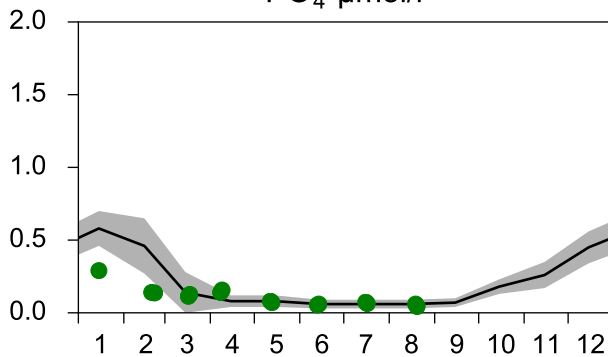
Temperature °C



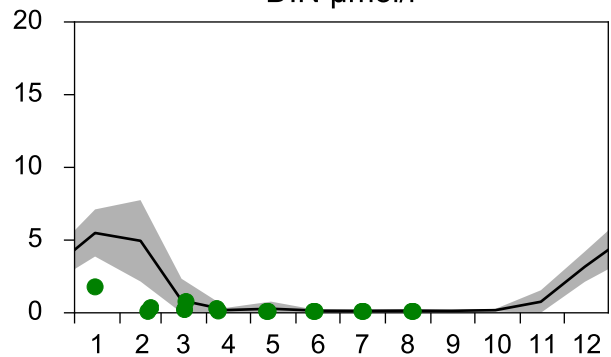
Salinity psu



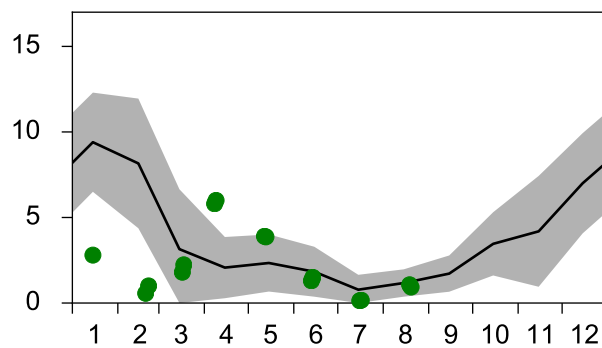
PO₄ µmol/l



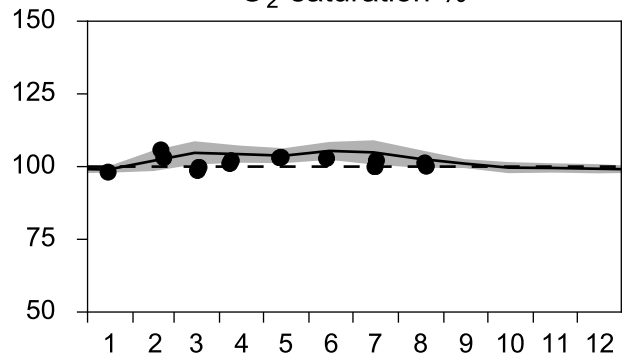
DIN µmol/l



SiO₃ µmol/l

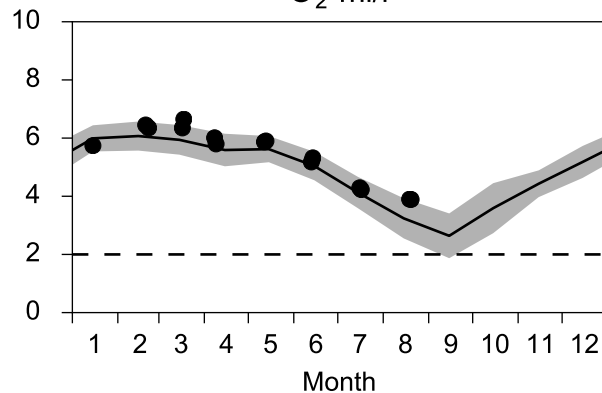


O₂ saturation %

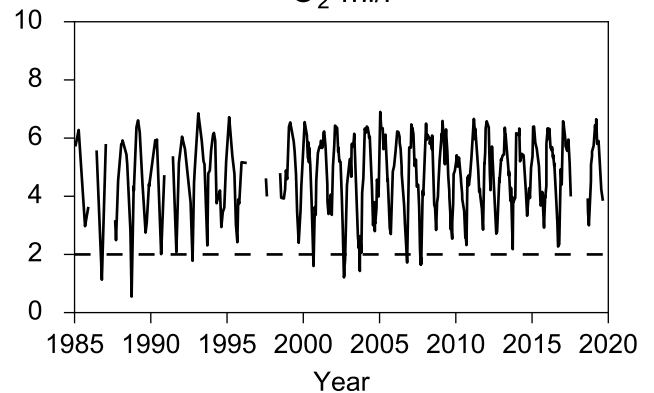


OXYGEN IN BOTTOM WATER (depth >= 52 m)

O₂ ml/l

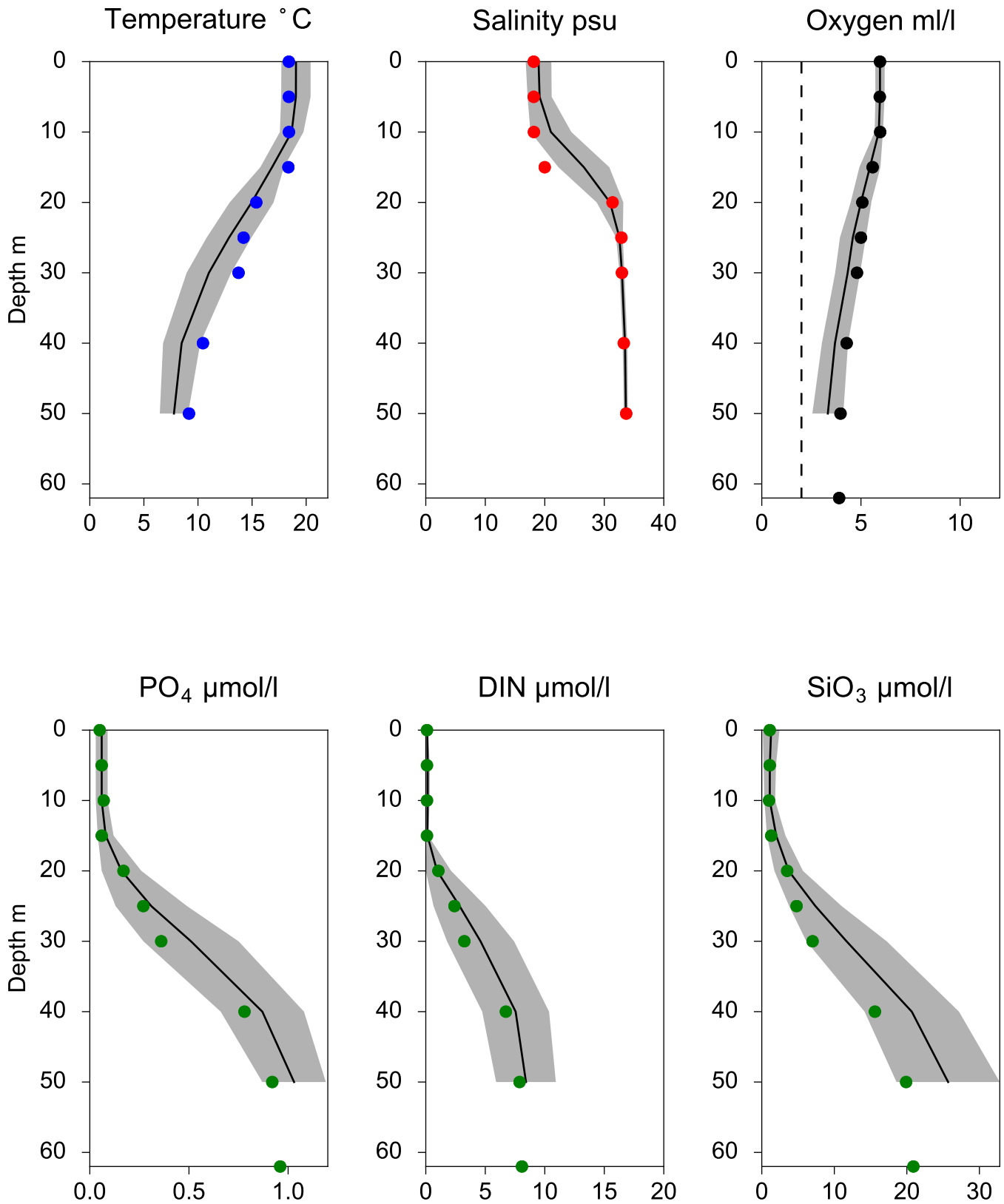


O₂ ml/l



Vertical profiles ANHOLT E August

— Mean 2001-2015 St.Dev. • 2019-08-19



STATION FLADEN SURFACE WATER (0-10 m)

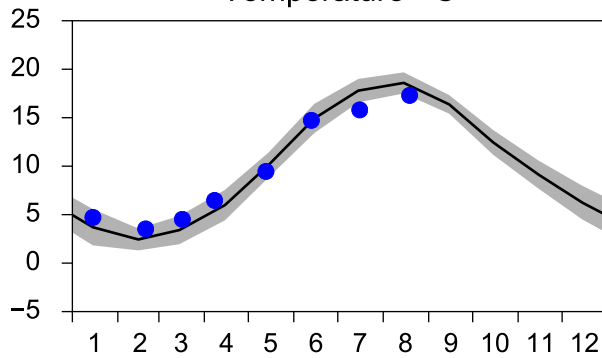
Annual Cycles

— Mean 2001-2015

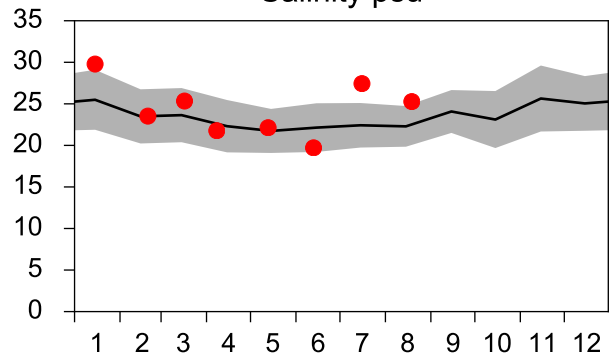
■ St.Dev.

● 2019

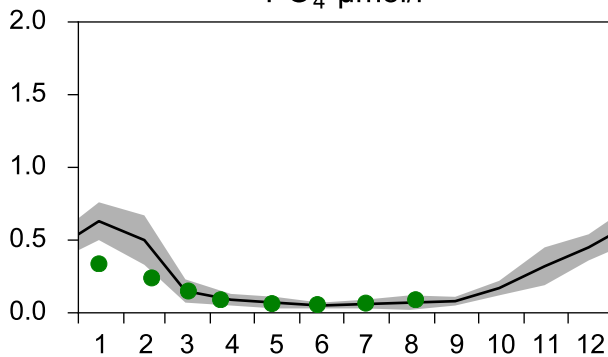
Temperature °C



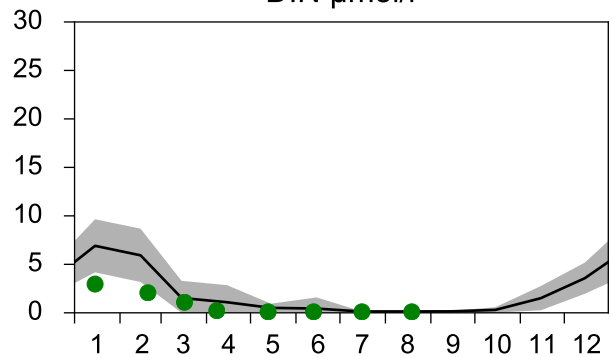
Salinity psu



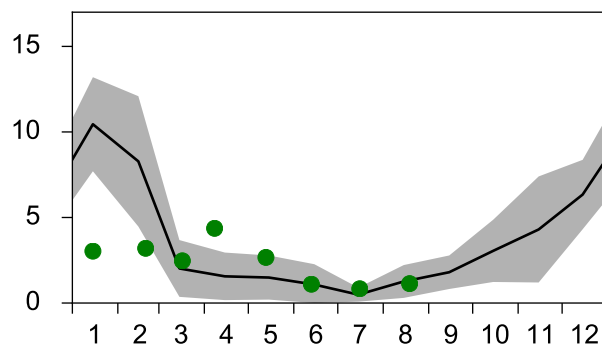
PO₄ µmol/l



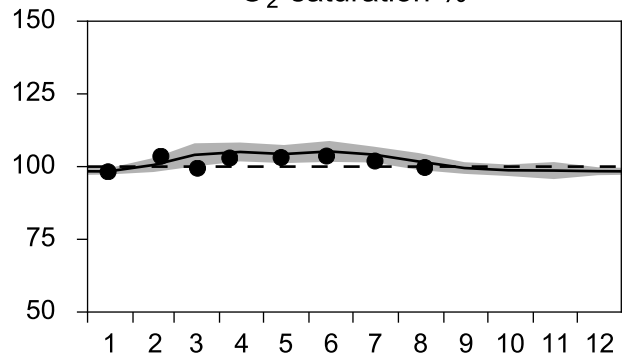
DIN µmol/l



SiO₃ µmol/l

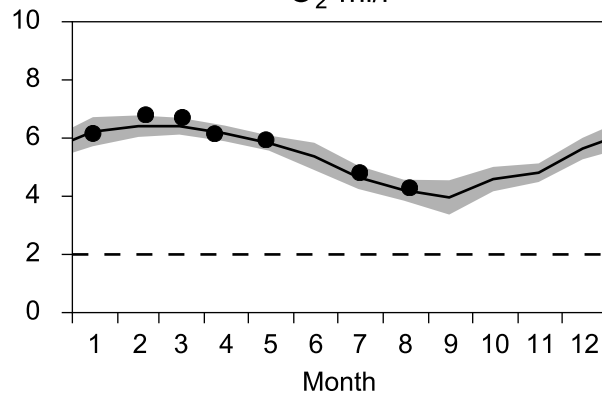


O₂ saturation %

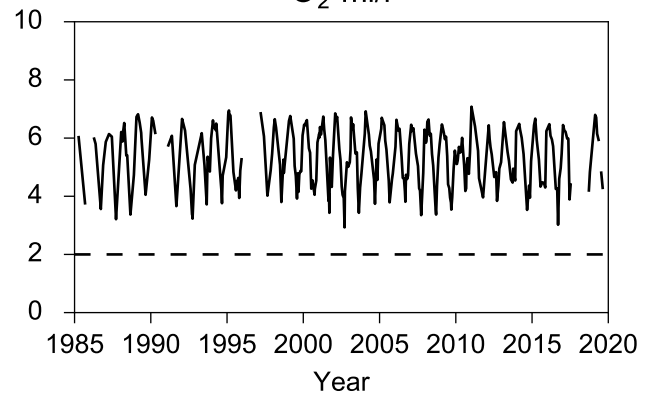


OXYGEN IN BOTTOM WATER (depth >= 74 m)

O₂ ml/l

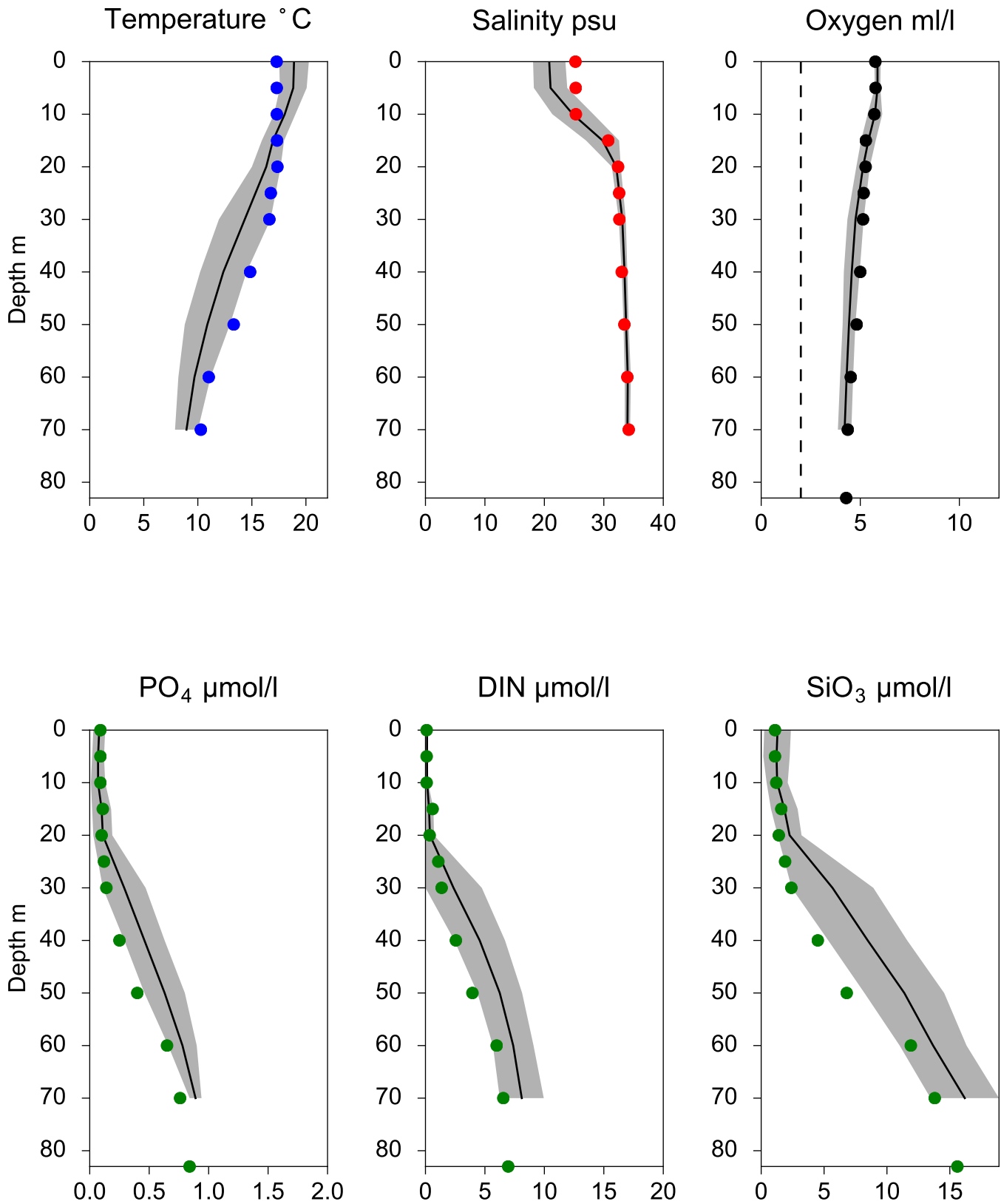


O₂ ml/l



Vertical profiles FLADEN August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-19



STATION Å17 SURFACE WATER (0-10 m)

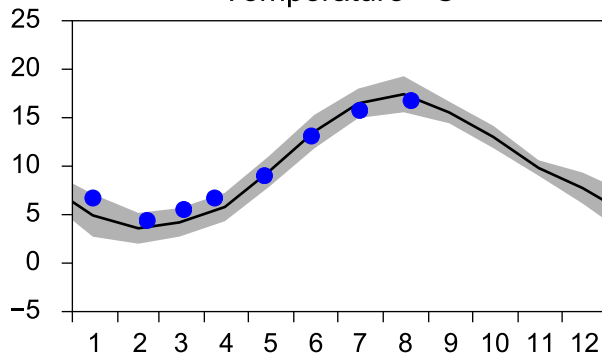
Annual Cycles

— Mean 2001-2015

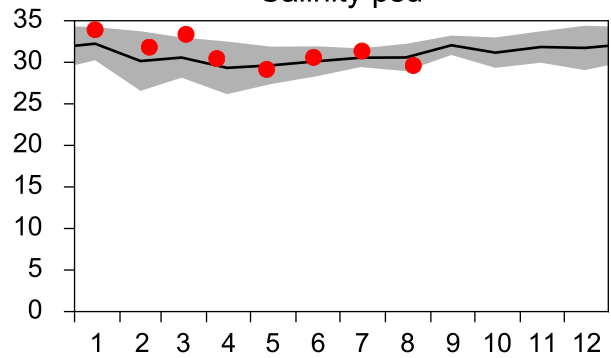
■ St.Dev.

● 2019

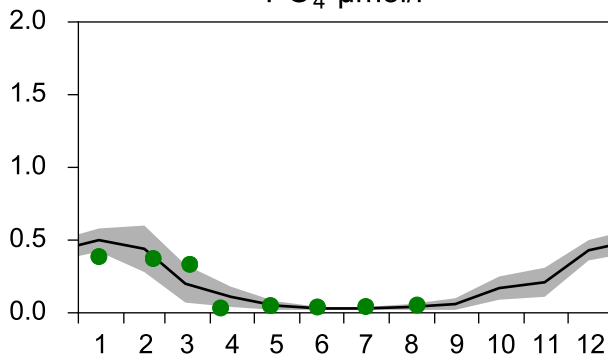
Temperature °C



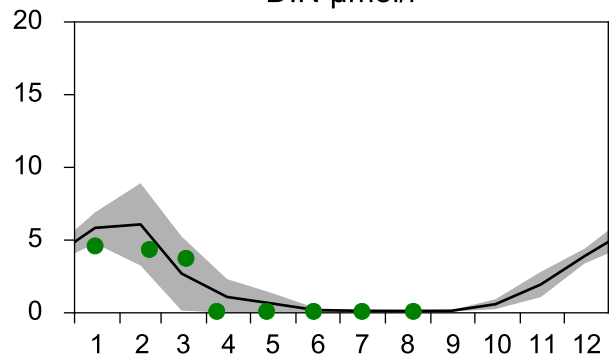
Salinity psu



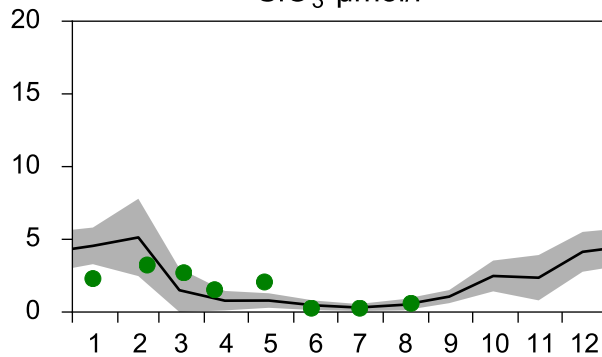
PO₄ µmol/l



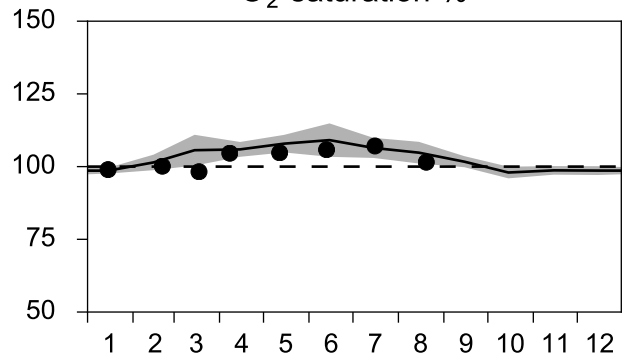
DIN µmol/l



SiO₃ µmol/l

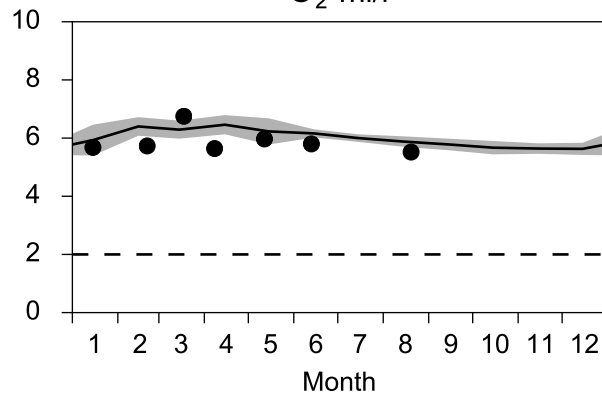


O₂ saturation %

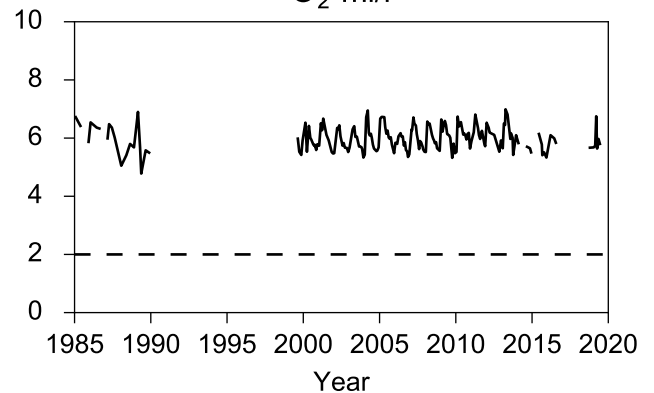


OXYGEN IN BOTTOM WATER (depth >= 300 m)

O₂ ml/l

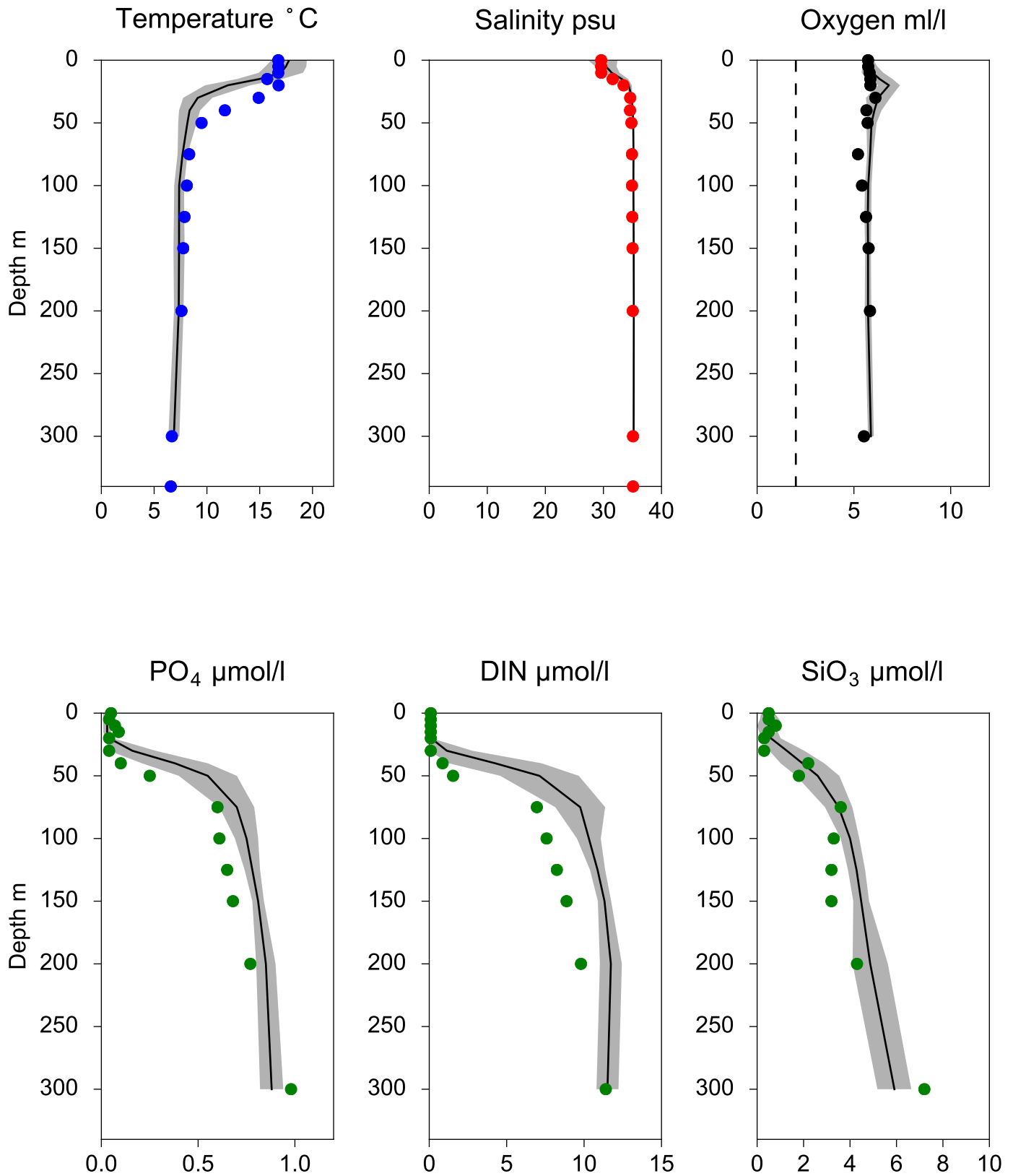


O₂ ml/l



Vertical profiles Å17 August

— Mean 2001-2015 St.Dev. • 2019-08-20



STATION Å15 SURFACE WATER (0-10 m)

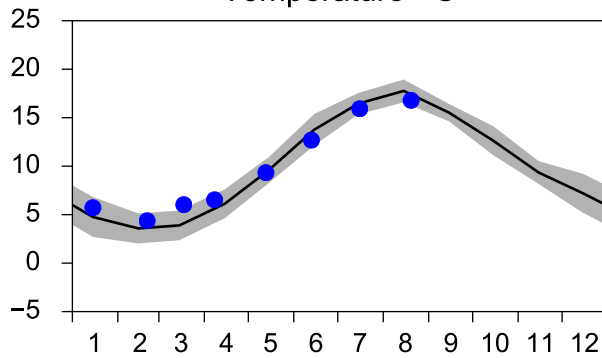
Annual Cycles

— Mean 2001-2015

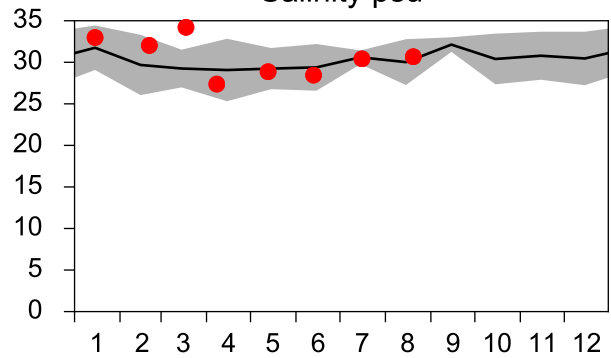
■ St.Dev.

● 2019

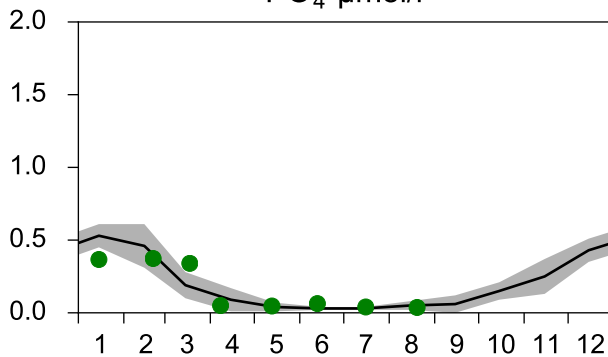
Temperature °C



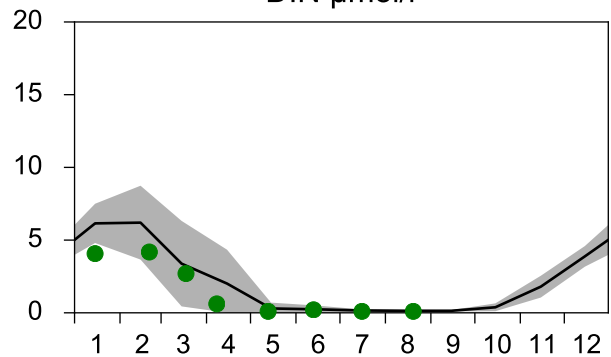
Salinity psu



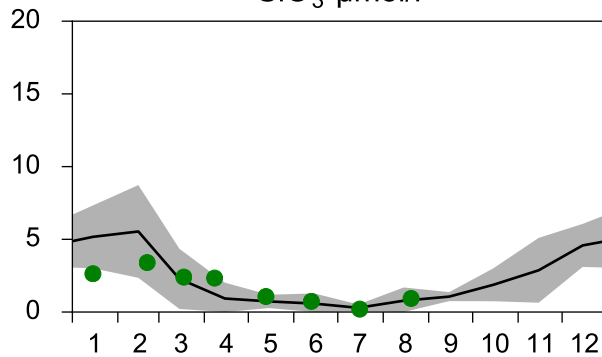
PO₄ µmol/l



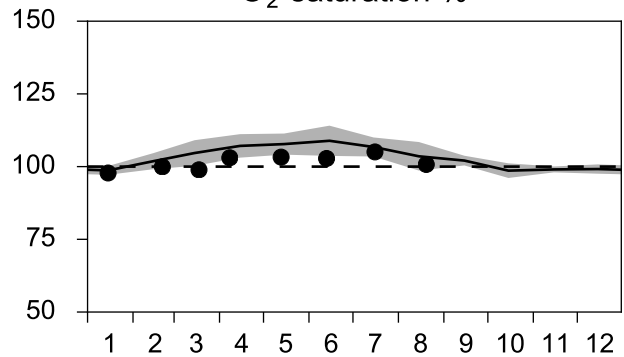
DIN µmol/l



SiO₃ µmol/l

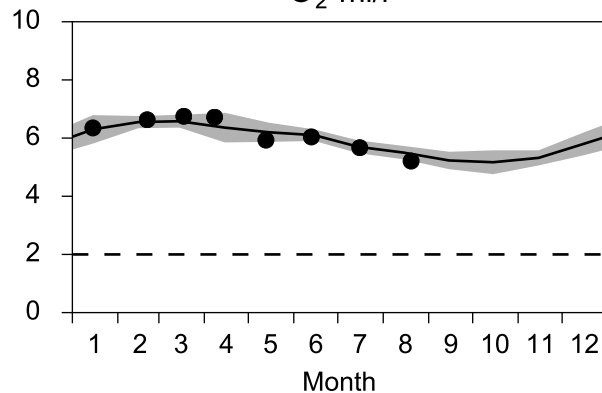


O₂ saturation %

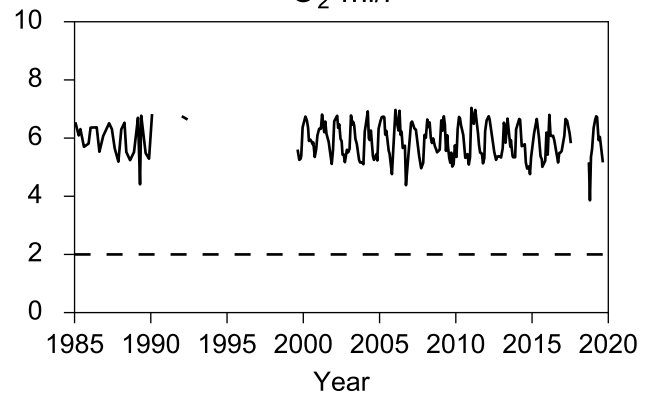


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l

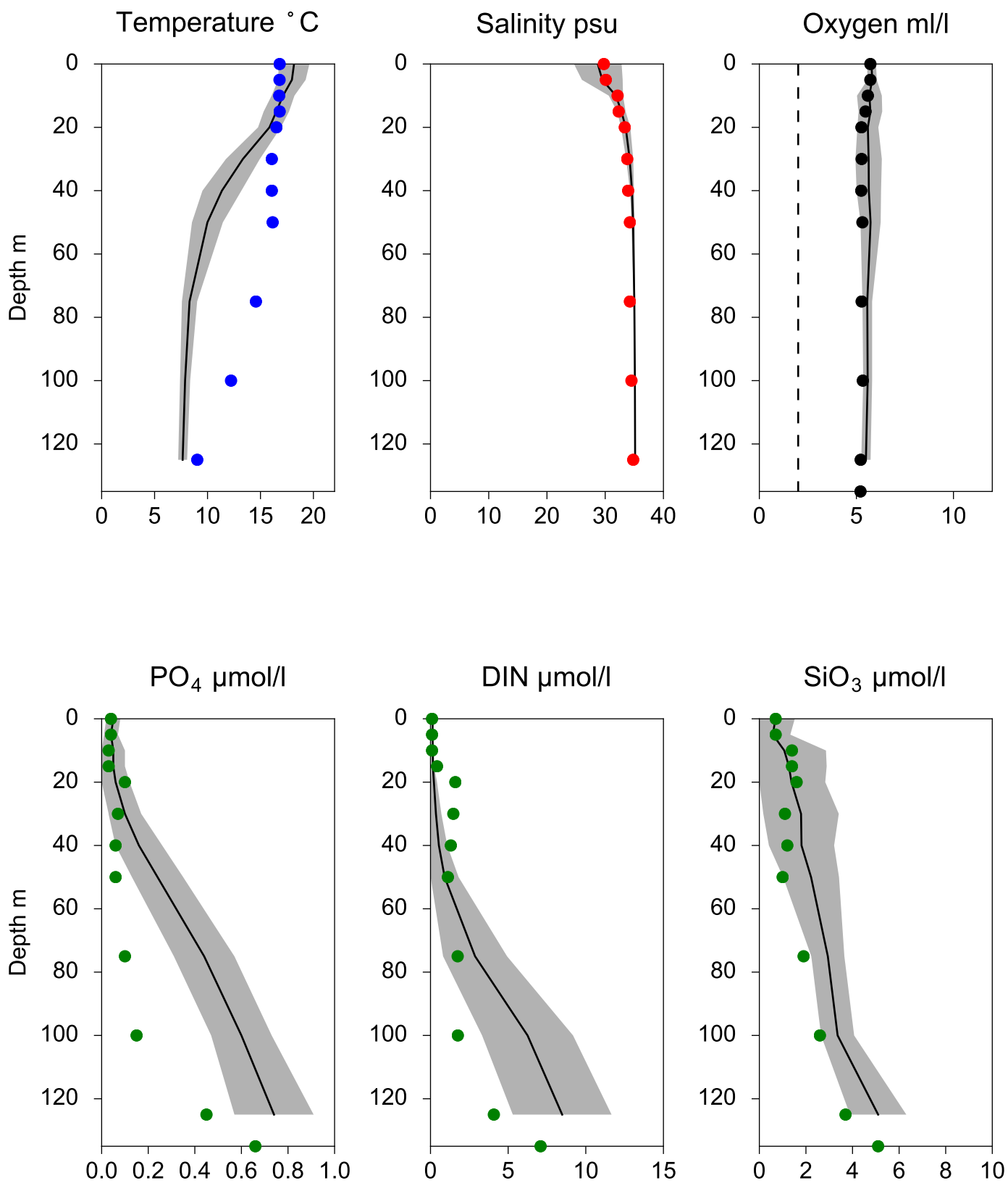


O₂ ml/l



Vertical profiles Å15 August

— Mean 2001-2015 St.Dev. • 2019-08-20



STATION Å13 SURFACE WATER (0-10 m)

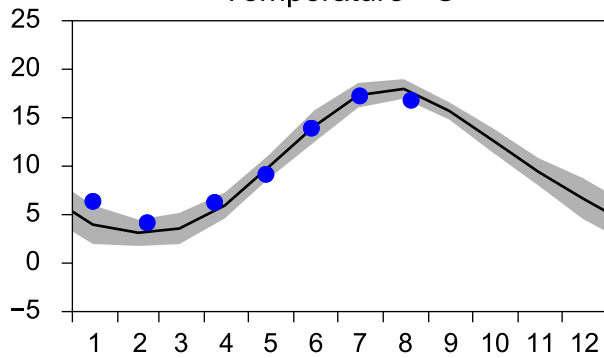
Annual Cycles

— Mean 2001-2015

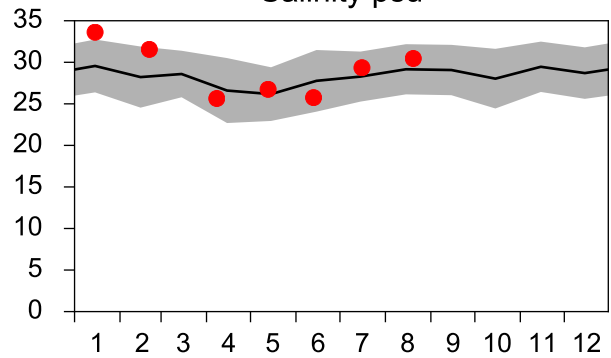
■ St.Dev.

● 2019

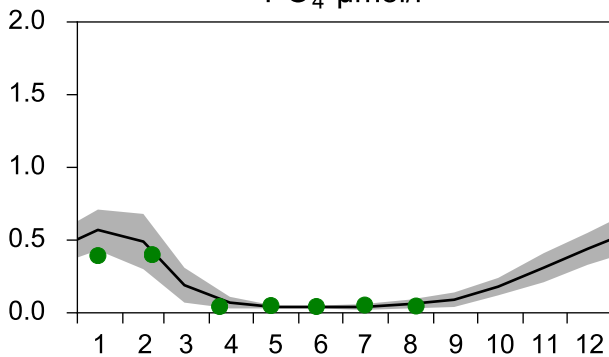
Temperature °C



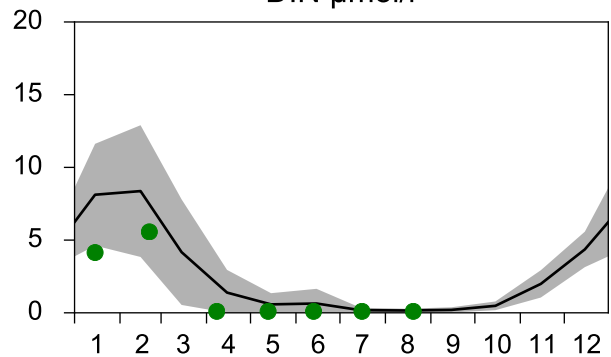
Salinity psu



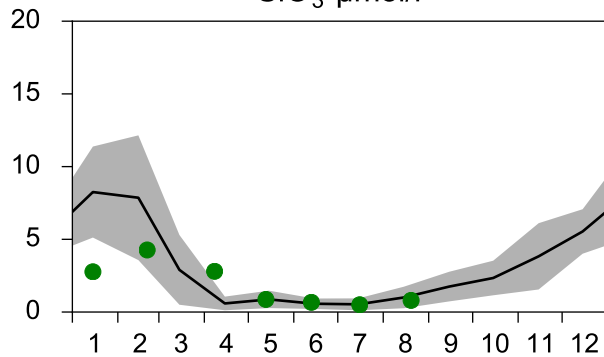
PO₄ µmol/l



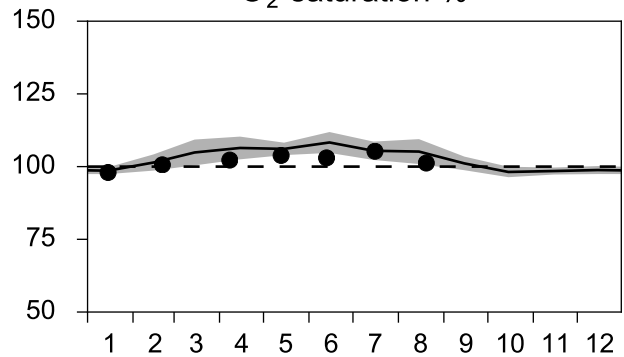
DIN µmol/l



SiO₃ µmol/l

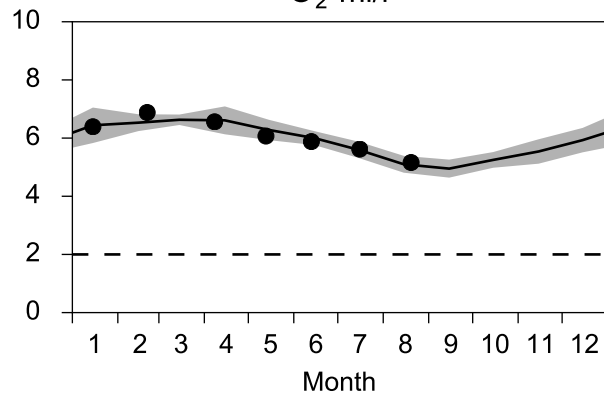


O₂ saturation %

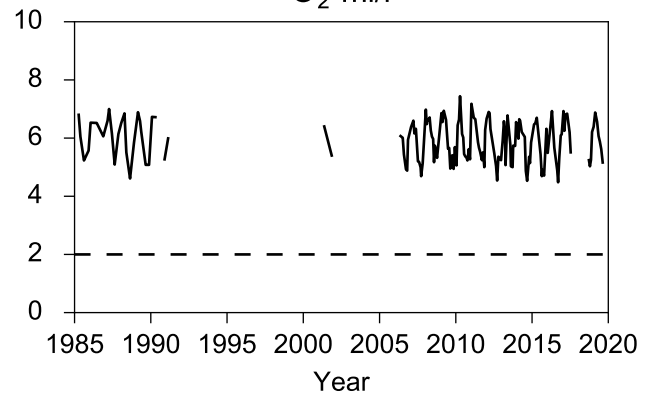


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

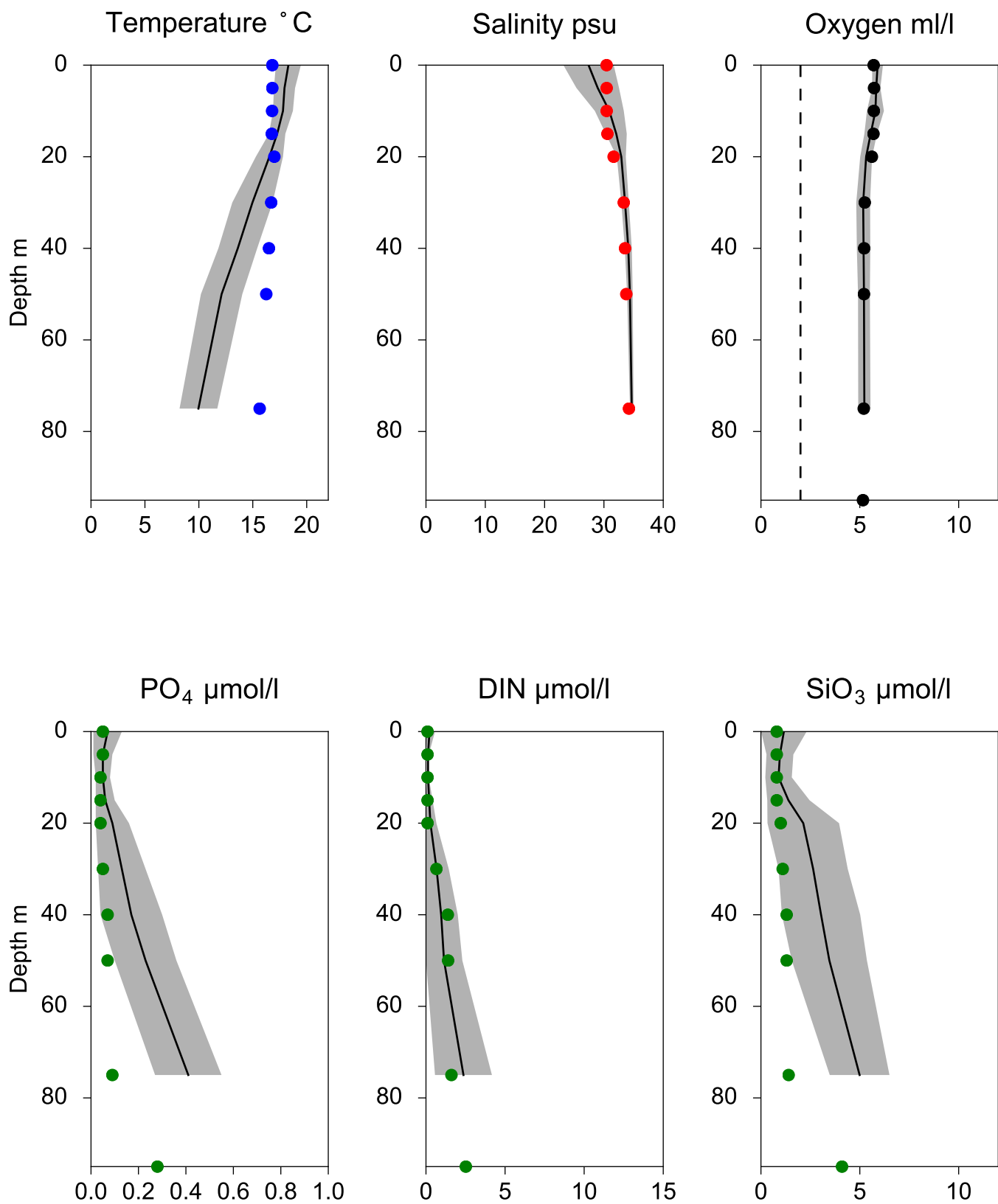


O₂ ml/l



Vertical profiles Å13 August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-20



STATION P2 SURFACE WATER (0-10 m)

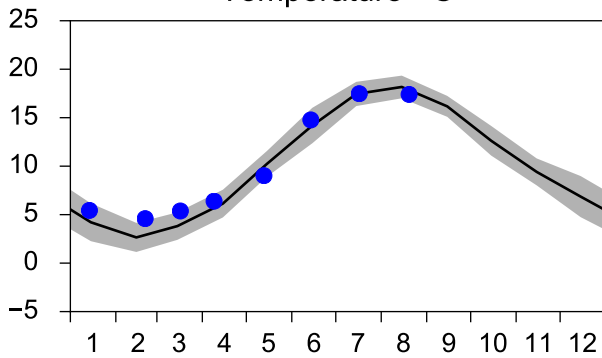
Annual Cycles

— Mean 2001-2015

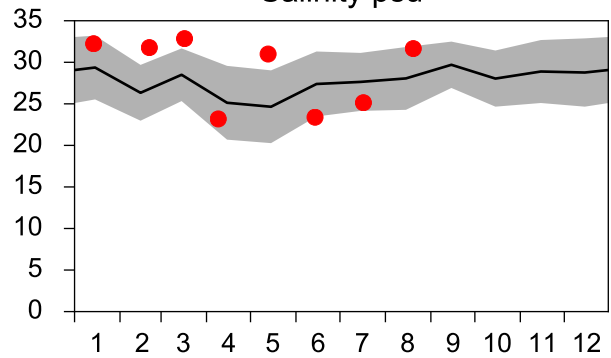
■ St.Dev.

● 2019

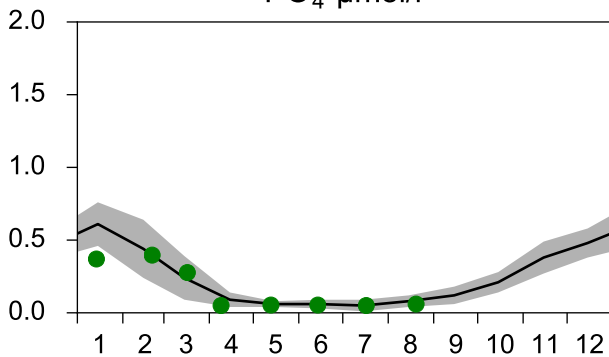
Temperature °C



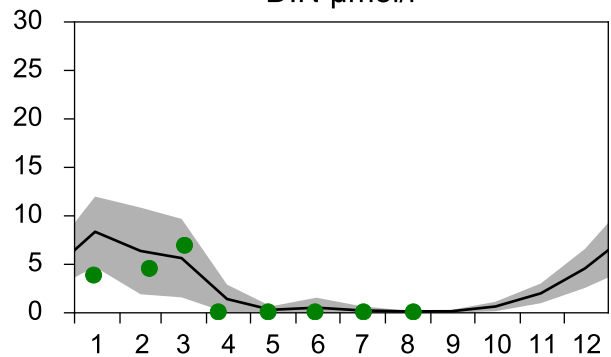
Salinity psu



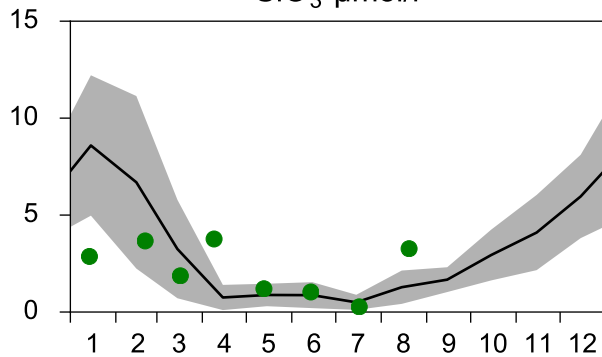
PO₄ μmol/l



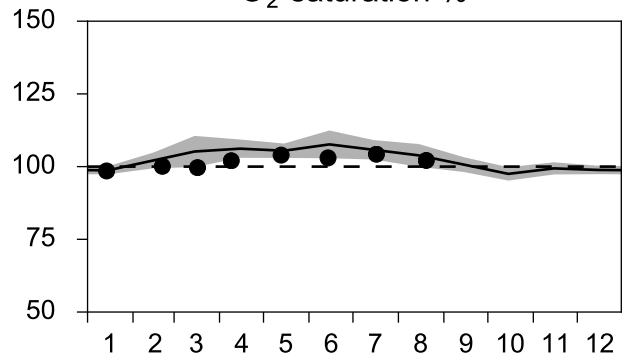
DIN μmol/l



SiO₃ μmol/l

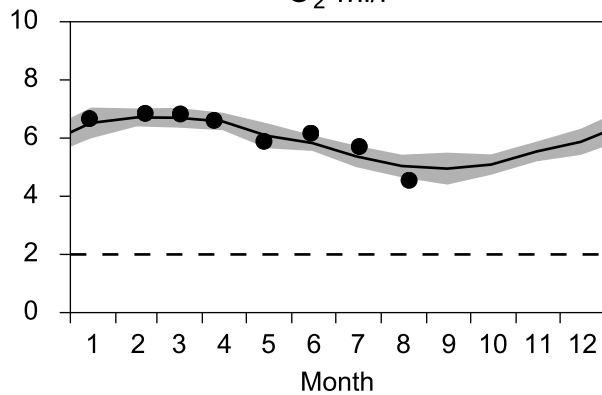


O₂ saturation %

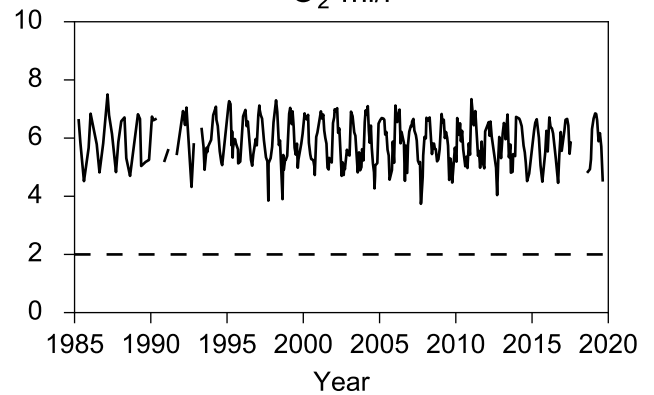


OXYGEN IN BOTTOM WATER (depth >= 75 m)

O₂ ml/l

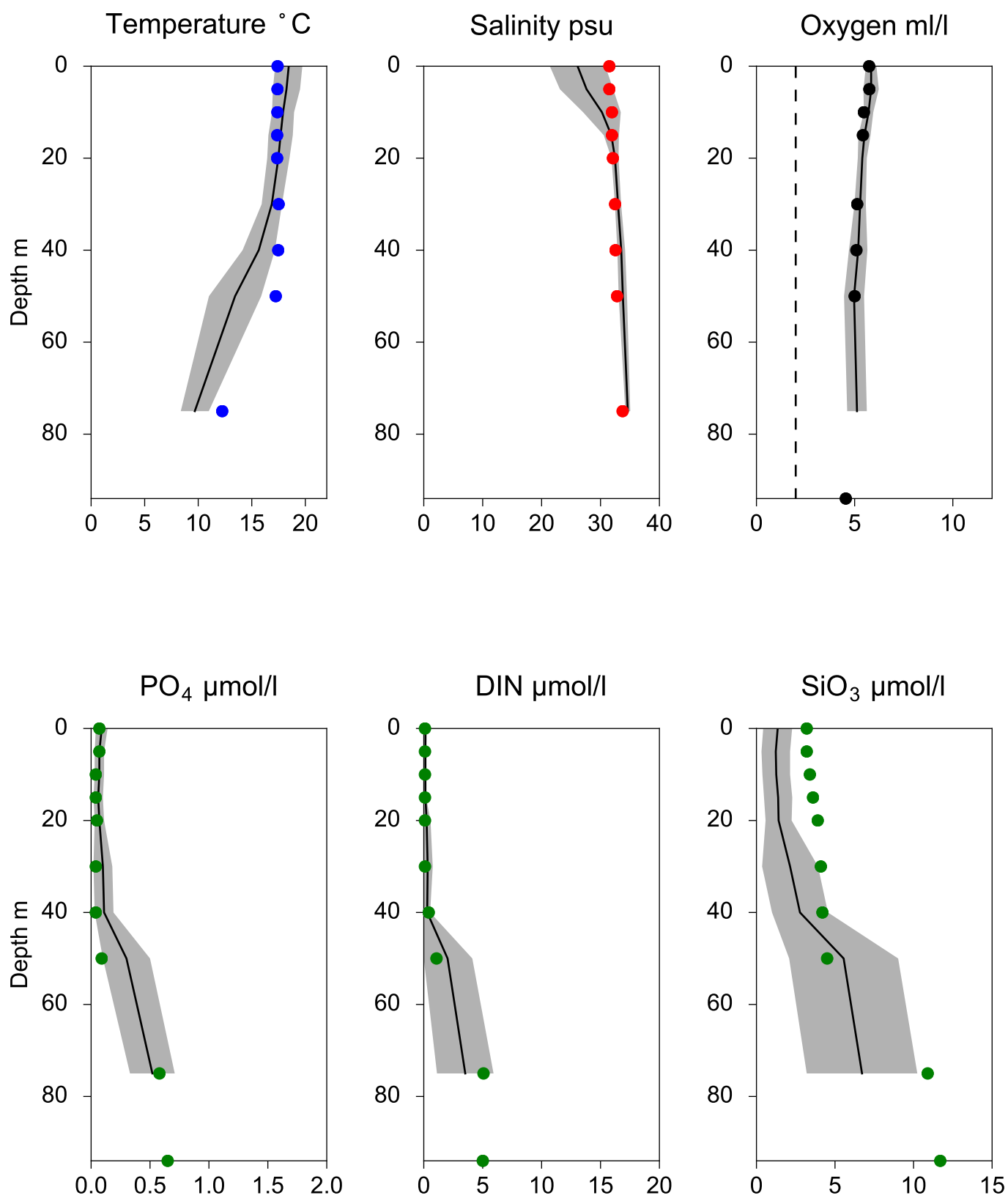


O₂ ml/l



Vertical profiles P2 August

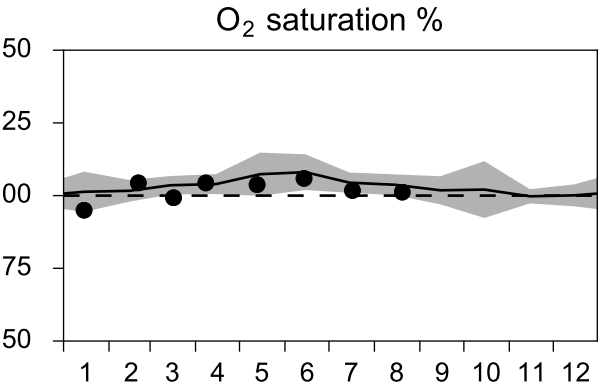
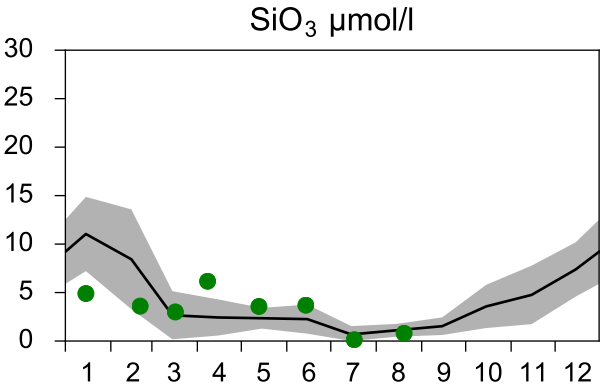
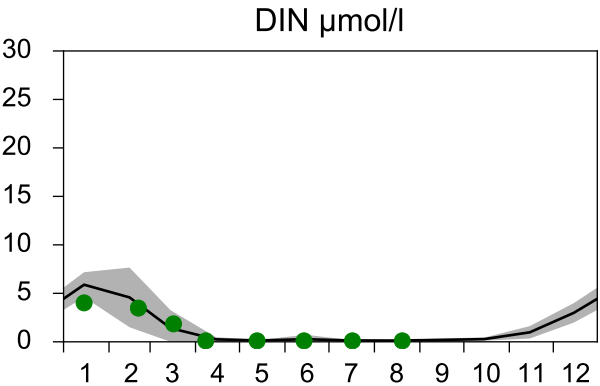
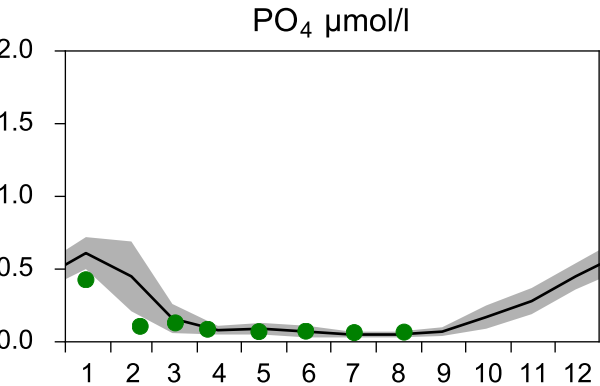
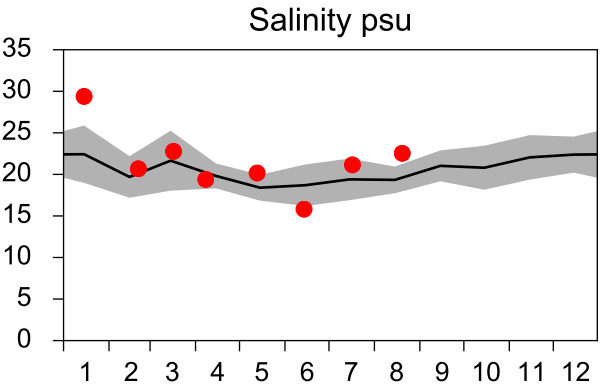
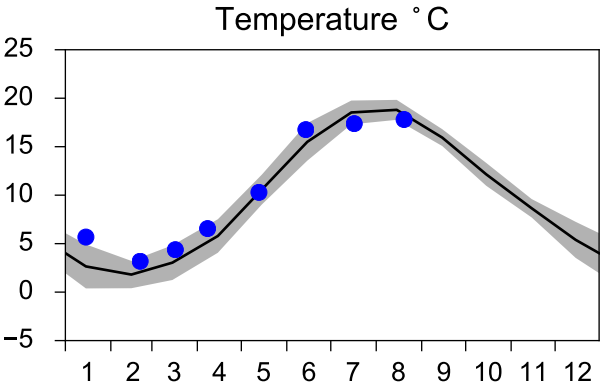
— Mean 2001-2015 St.Dev. • 2019-08-20



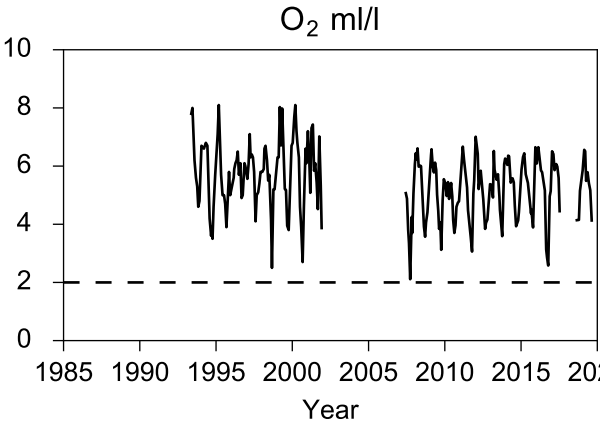
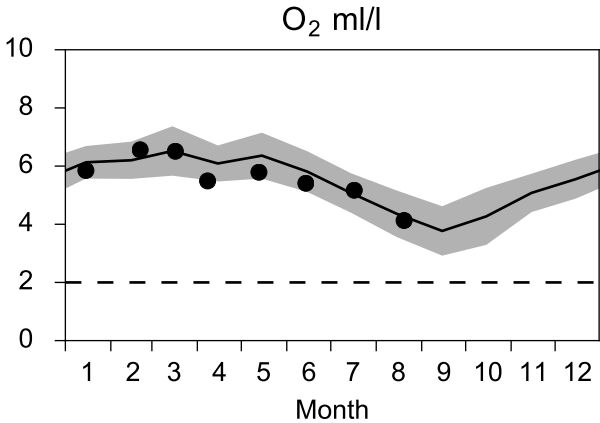
STATION N14 FALKENBERG SURFACE WATER (0-10 m)

Annual Cycles

— Mean 2001-2015 St.Dev. ● 2019

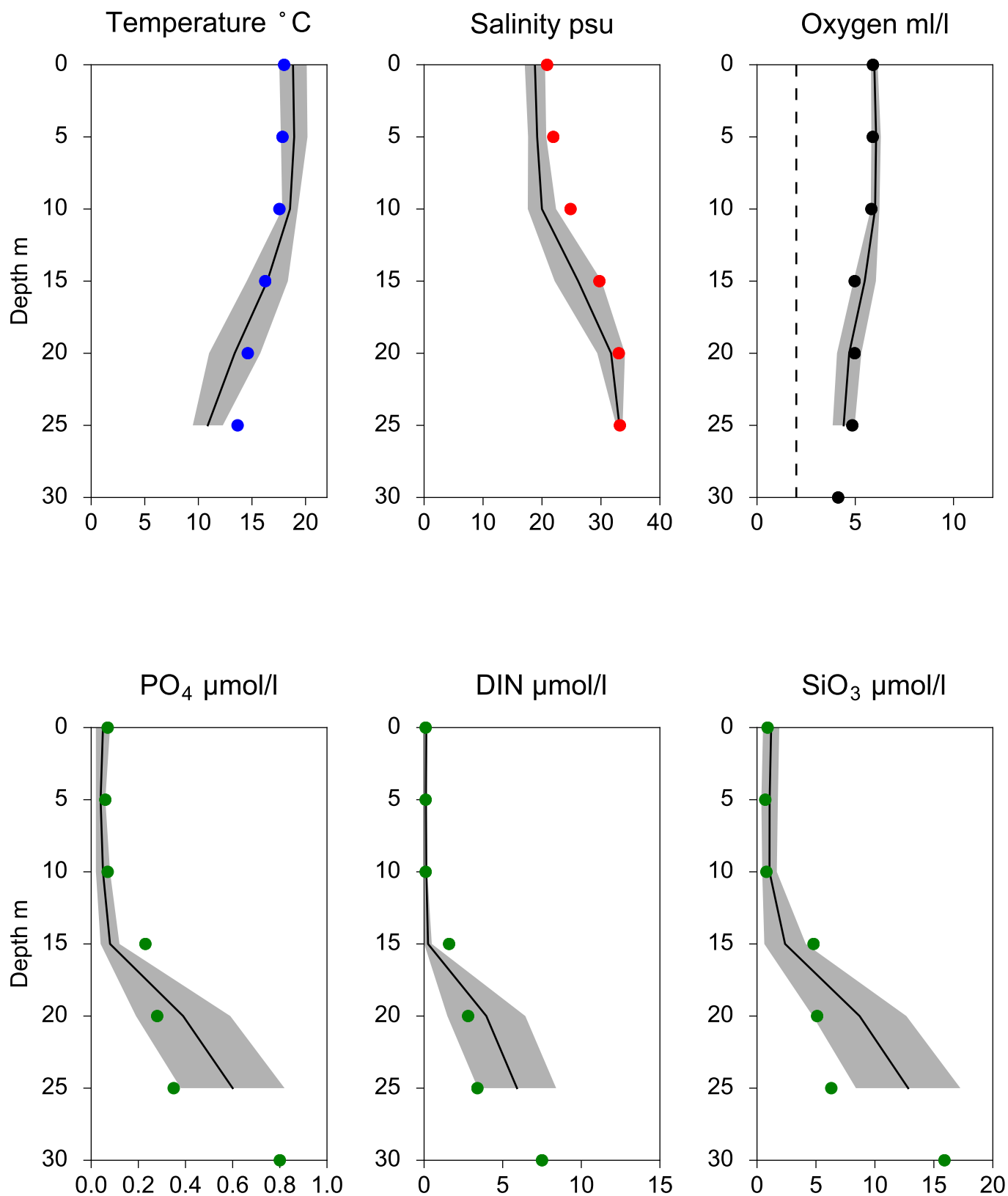


OXYGEN IN BOTTOM WATER (depth >= 25 m)



Vertical profiles N14 FALKENBERG August

— Mean 2001-2015 St.Dev. • 2019-08-20



STATION ANHOLT E SURFACE WATER (0-10 m)

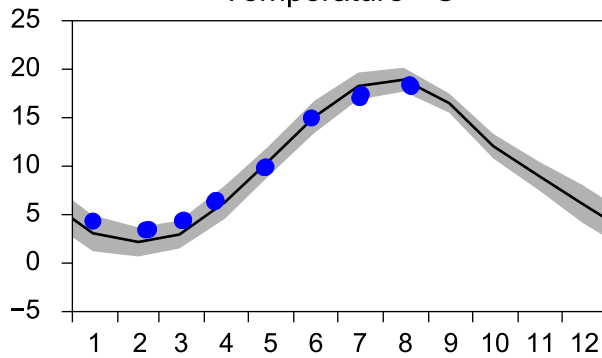
Annual Cycles

— Mean 2001-2015

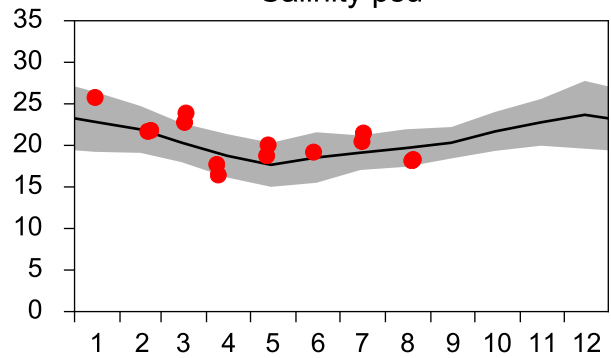
■ St.Dev.

● 2019

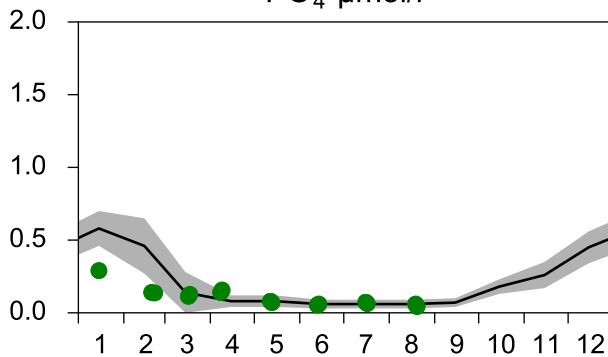
Temperature °C



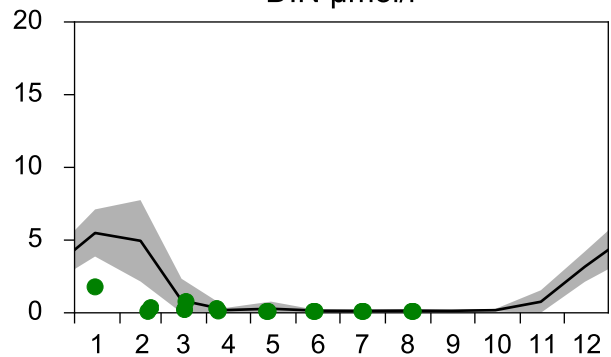
Salinity psu



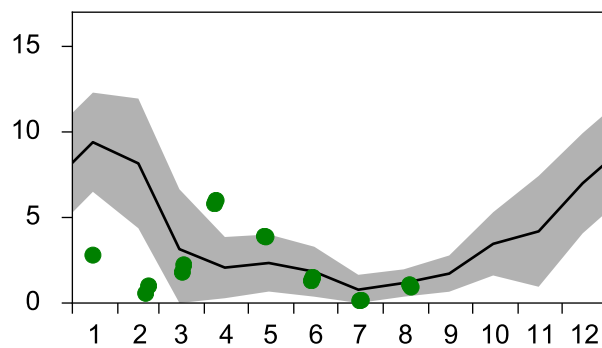
PO₄ µmol/l



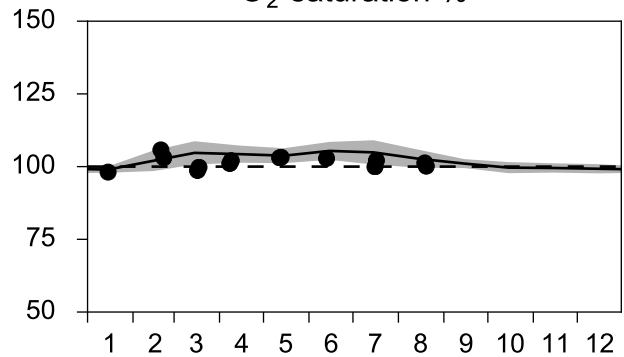
DIN µmol/l



SiO₃ µmol/l

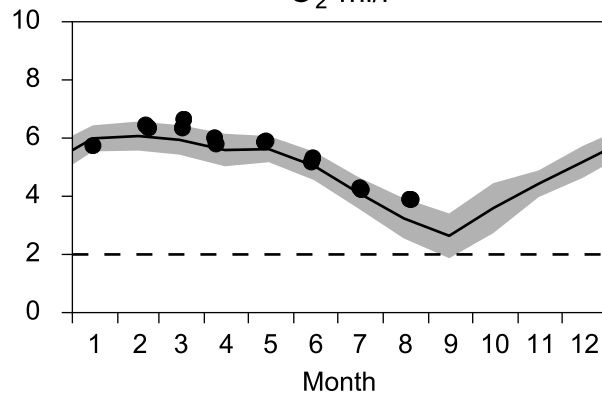


O₂ saturation %

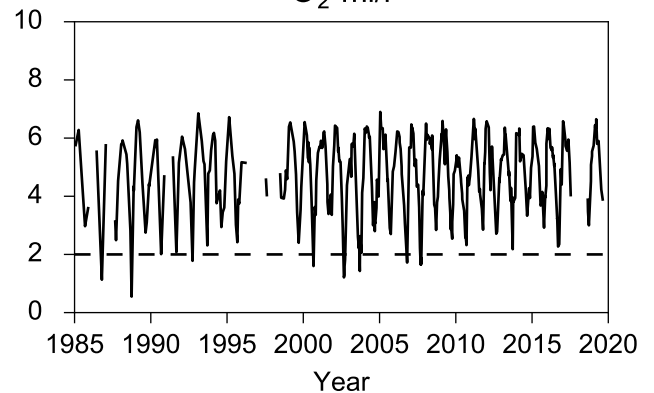


OXYGEN IN BOTTOM WATER (depth >= 52 m)

O₂ ml/l

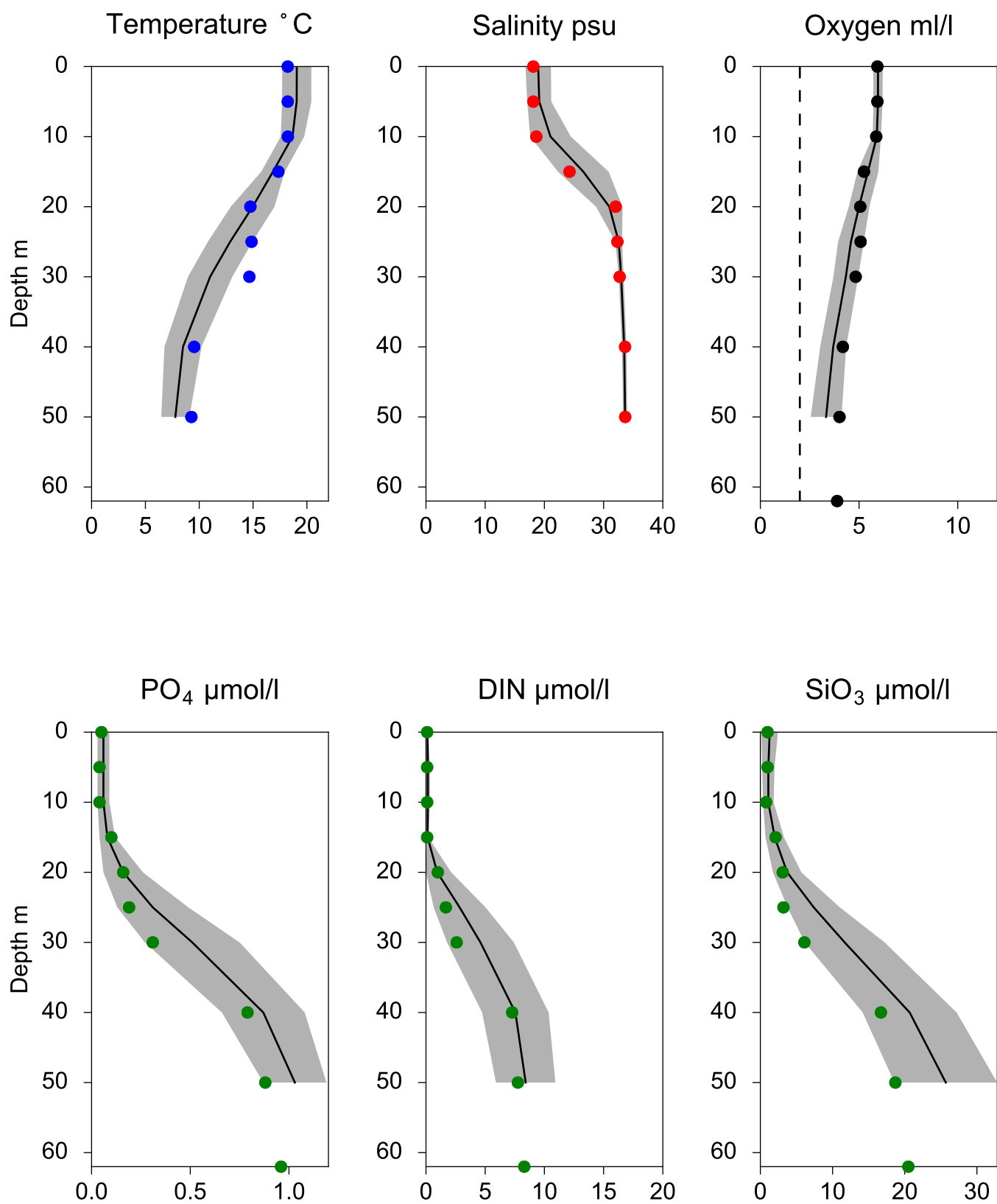


O₂ ml/l



Vertical profiles ANHOLT E August

— Mean 2001-2015 St.Dev. • 2019-08-20



STATION HANÖBUKTEN SURFACE WATER (0-10 m)

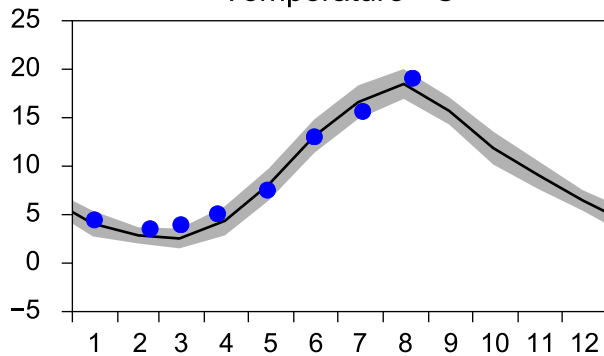
Annual Cycles

— Mean 2001-2015

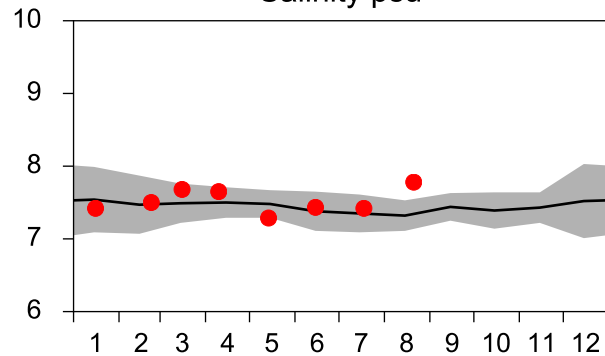
■ St.Dev.

● 2019

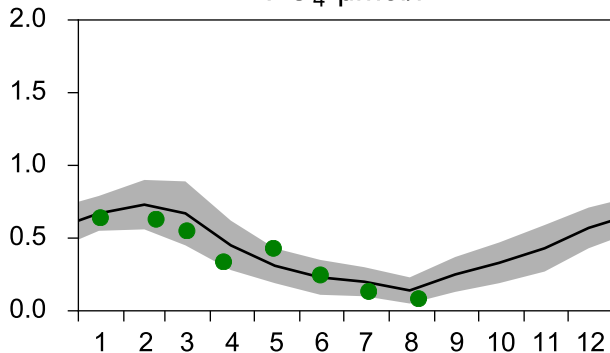
Temperature °C



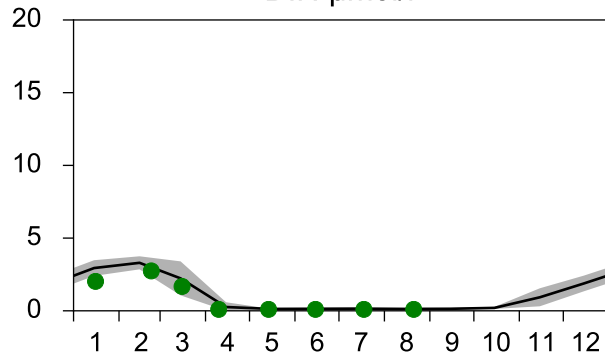
Salinity psu



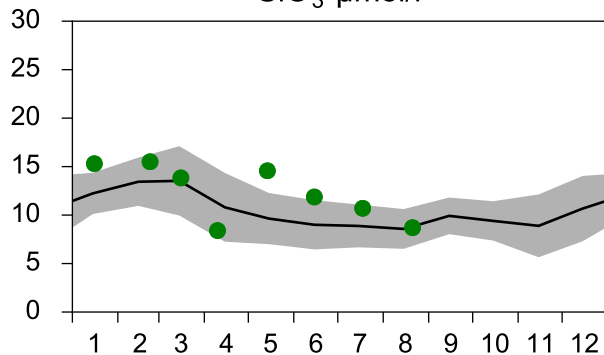
PO₄ µmol/l



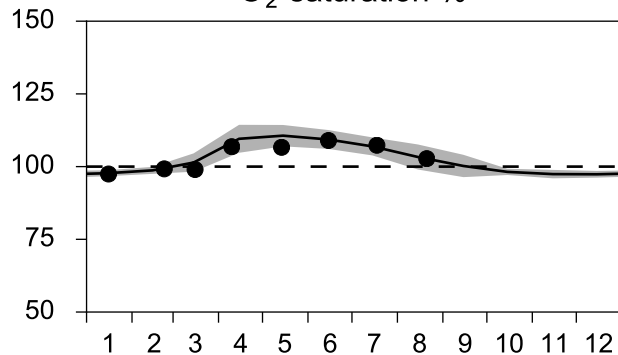
DIN µmol/l



SiO₃ µmol/l

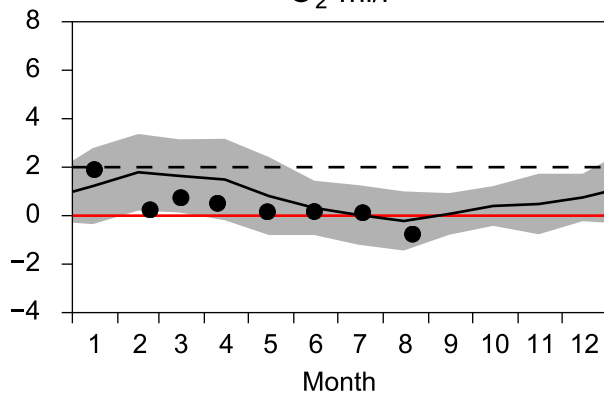


O₂ saturation %

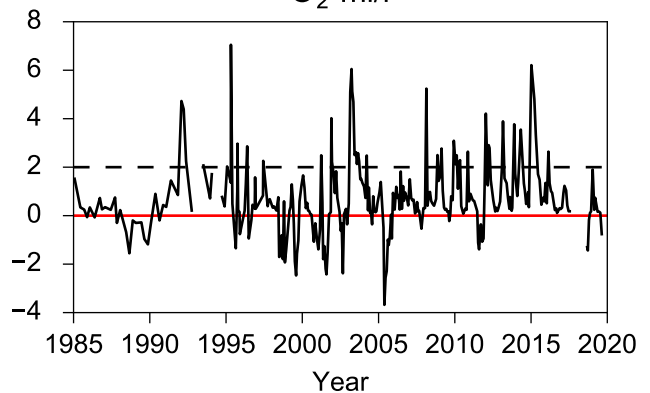


OXYGEN IN BOTTOM WATER (depth >= 70 m)

O₂ ml/l

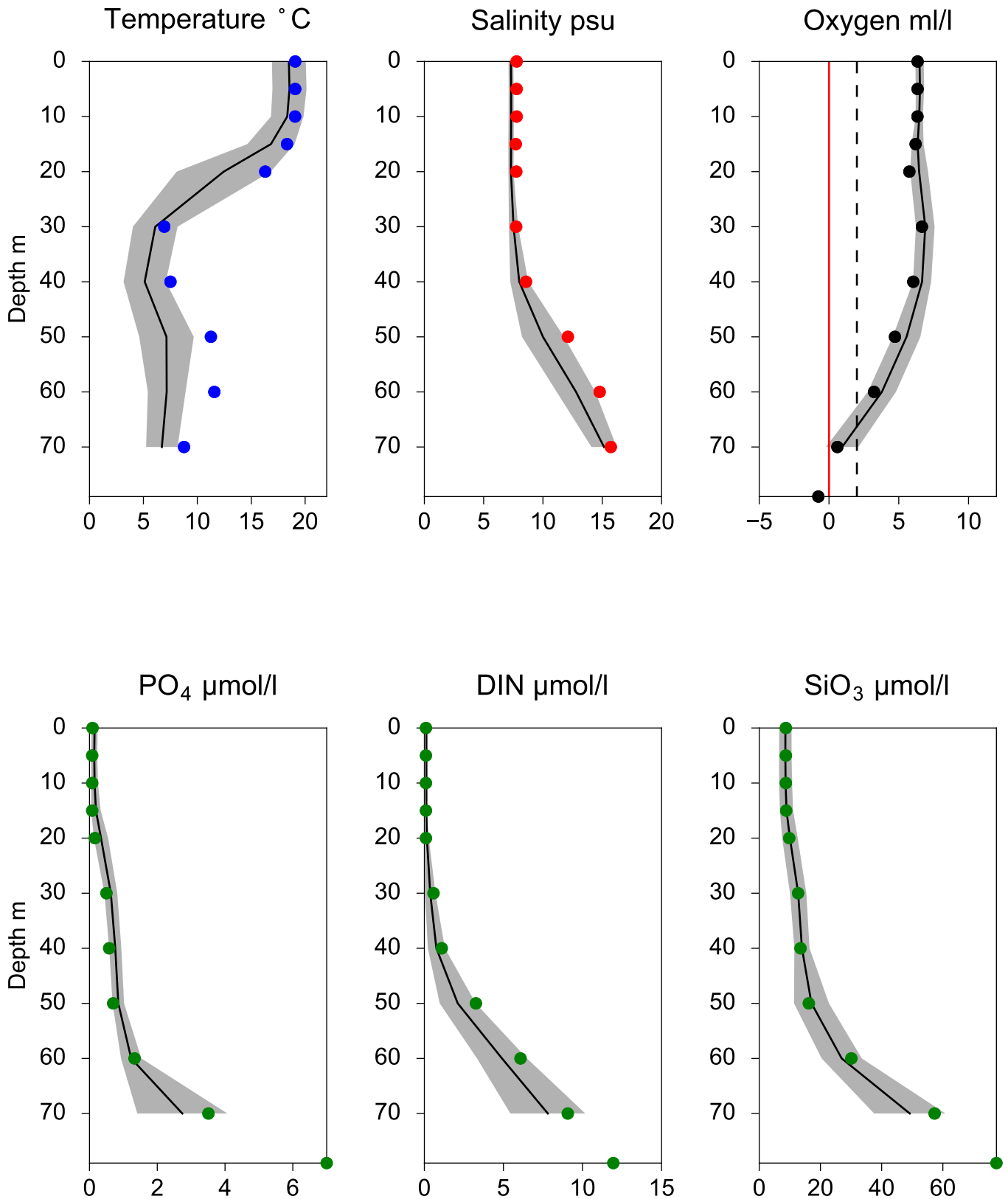


O₂ ml/l



Vertical profiles HANÖBUKTEN August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-21



STATION REF M1V1 SURFACE WATER (0-10 m)

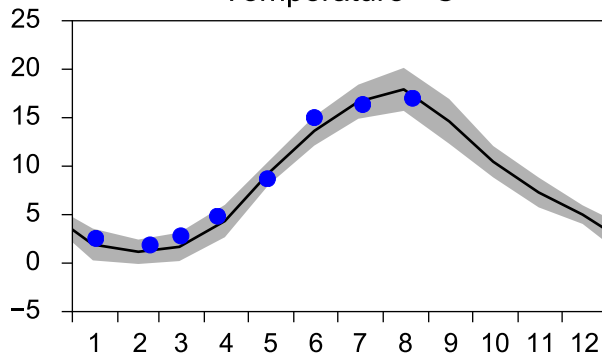
Annual Cycles

— Mean 2001-2015

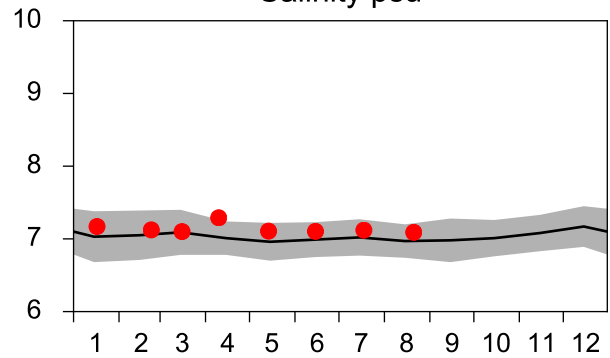
■ St.Dev.

● 2019

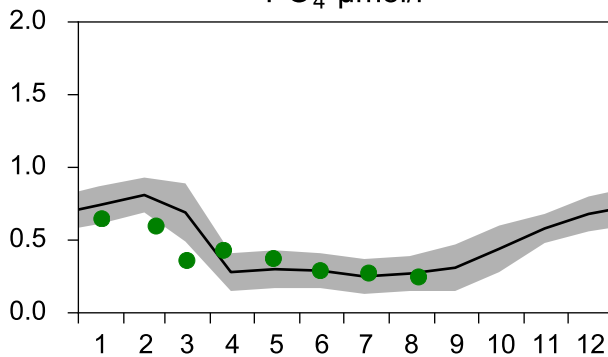
Temperature °C



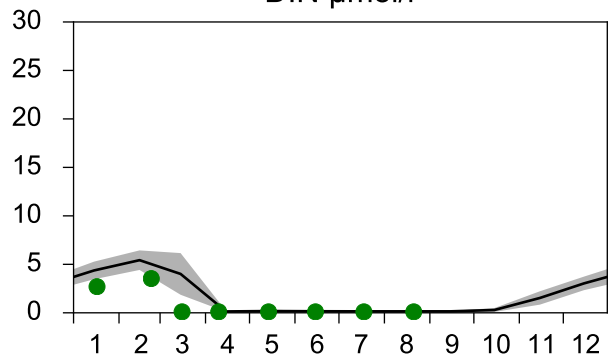
Salinity psu



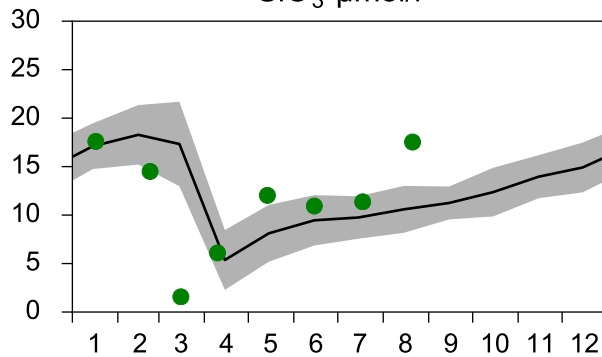
PO₄ µmol/l



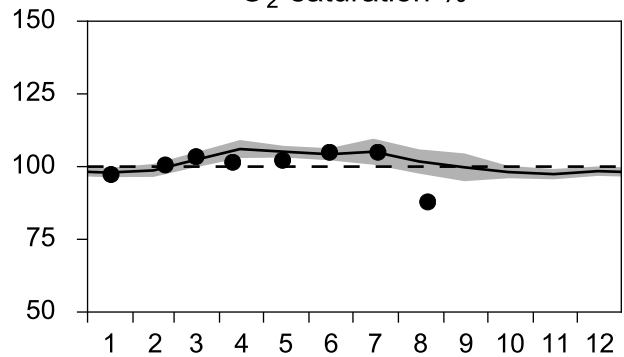
DIN µmol/l



SiO₃ µmol/l

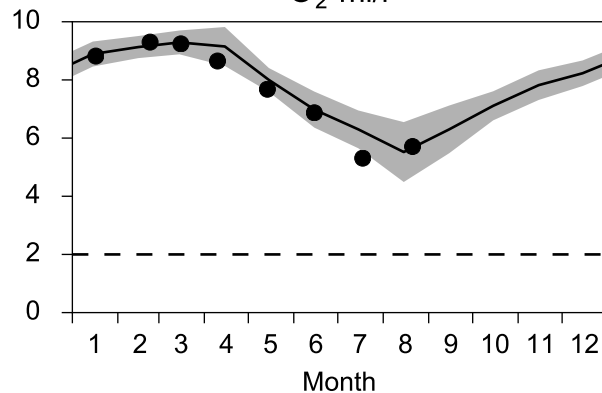


O₂ saturation %

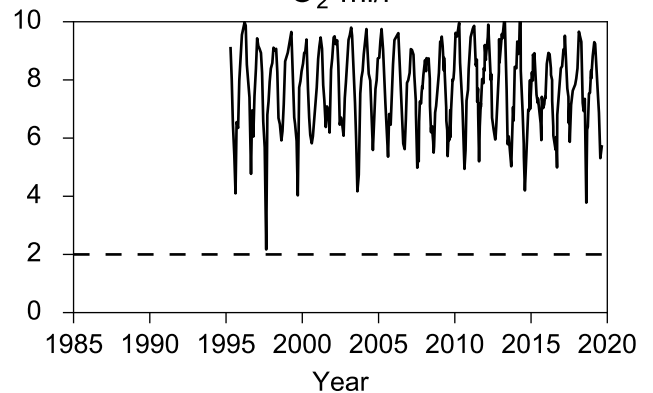


OXYGEN IN BOTTOM WATER (depth >= 17 m)

O₂ ml/l

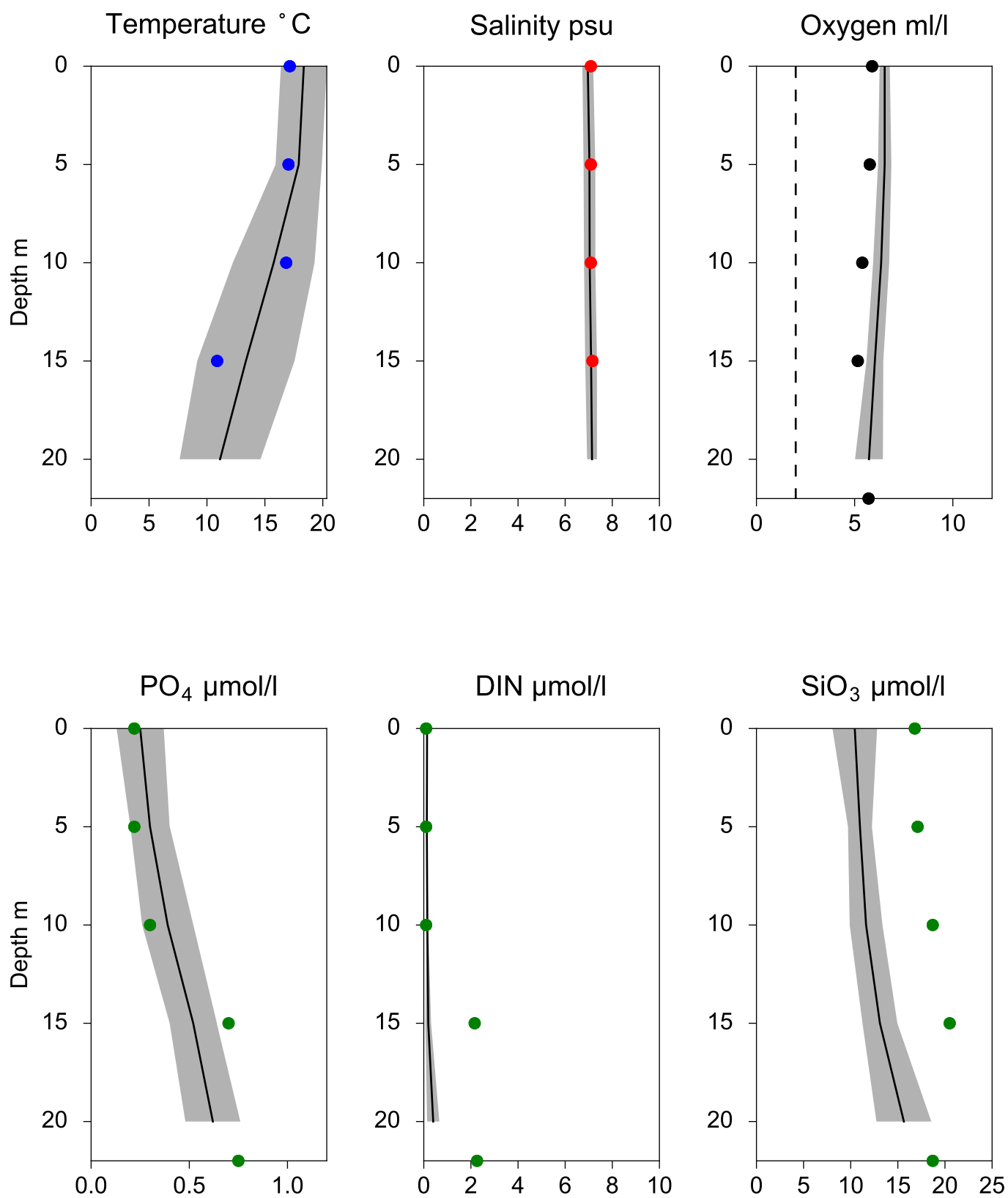


O₂ ml/l



Vertical profiles REF M1V1 August

— Mean 2001-2015 ■ St.Dev. ● 2019-08-21



STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

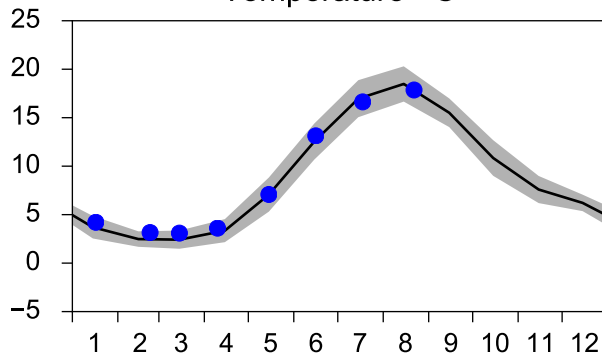
Annual Cycles

— Mean 2001-2015

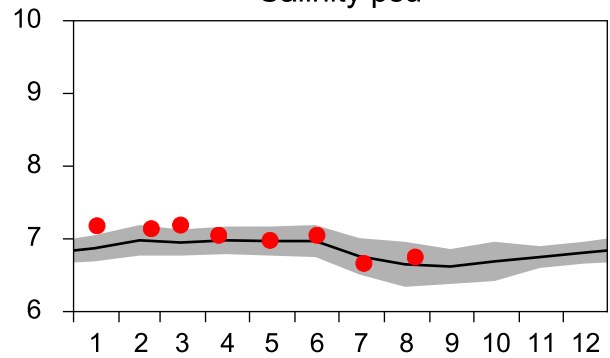
■ St.Dev.

● 2019

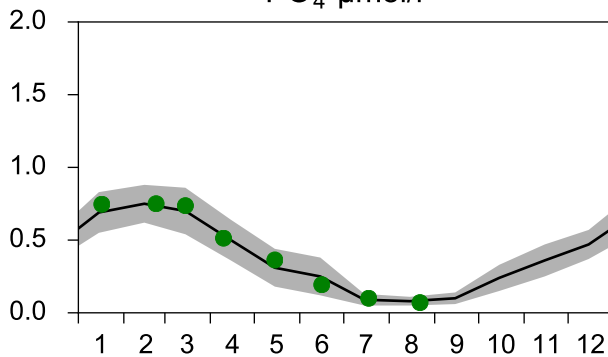
Temperature °C



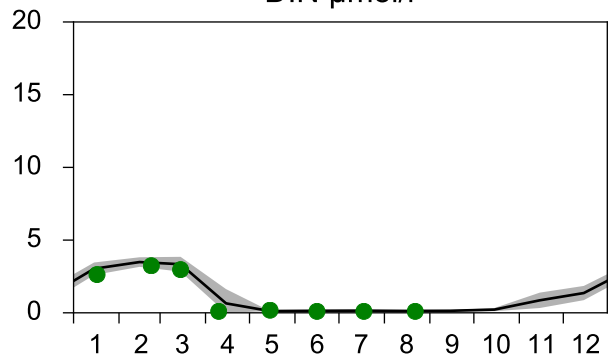
Salinity psu



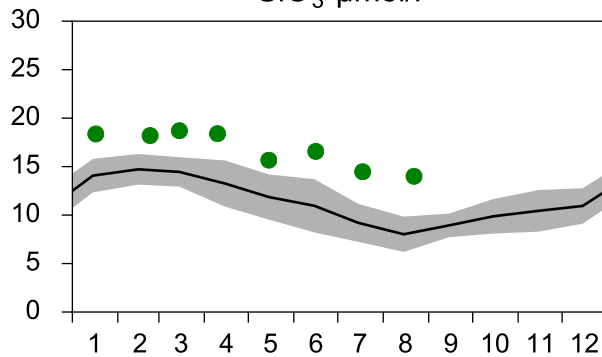
PO₄ µmol/l



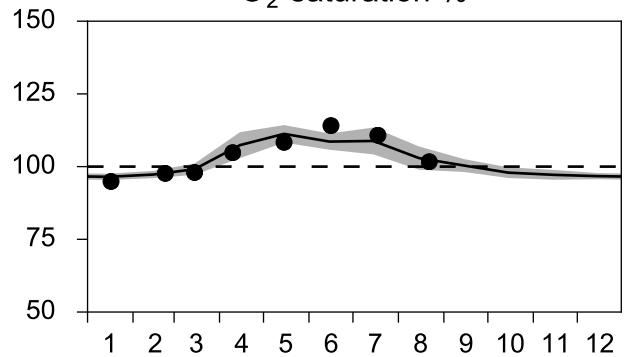
DIN µmol/l



SiO₃ µmol/l

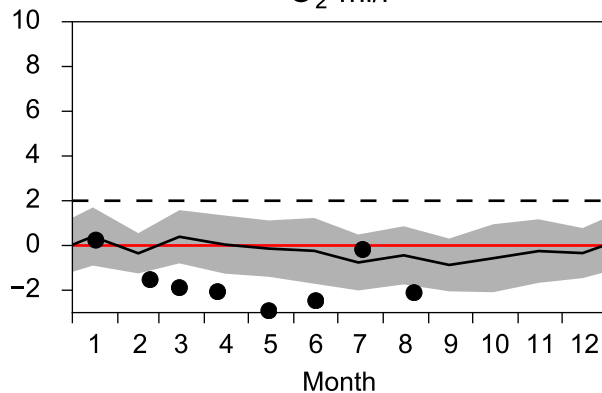


O₂ saturation %

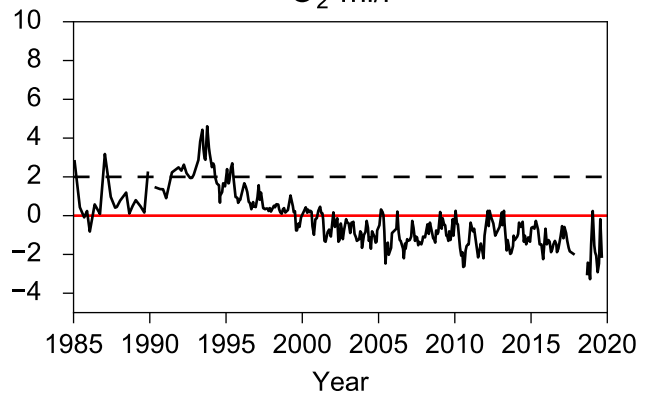


OXYGEN IN BOTTOM WATER (depth >= 100 m)

O₂ ml/l

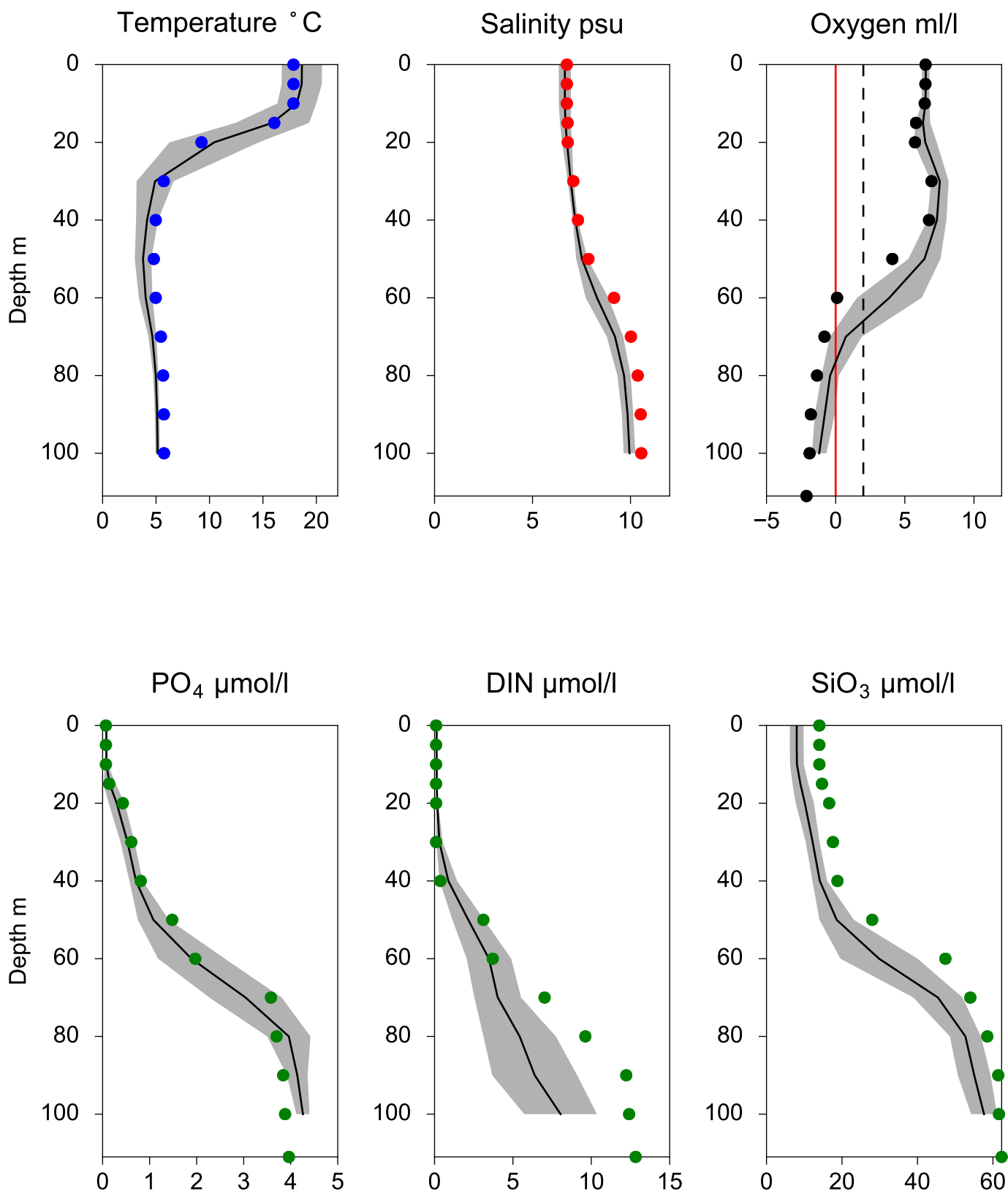


O₂ ml/l



Vertical profiles BY38 KARLSÖDJ August

— Mean 2001-2015 St.Dev. • 2019-08-22



STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

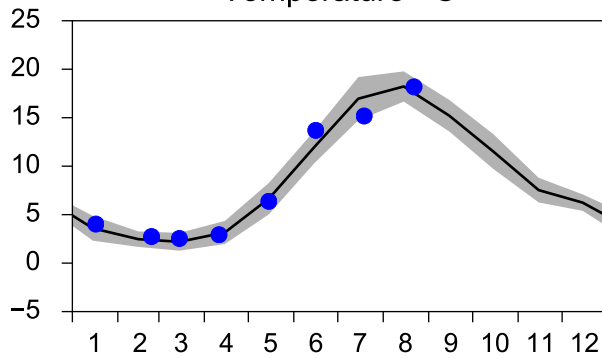
Annual Cycles

— Mean 2001-2015

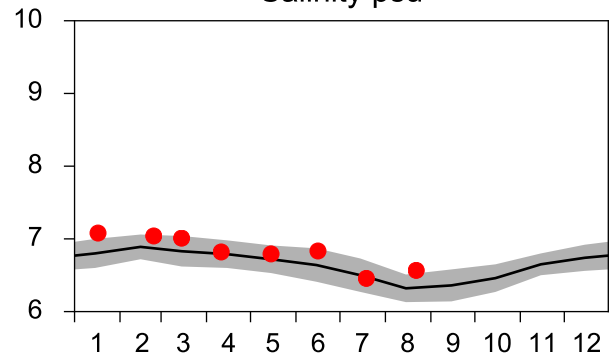
■ St.Dev.

● 2019

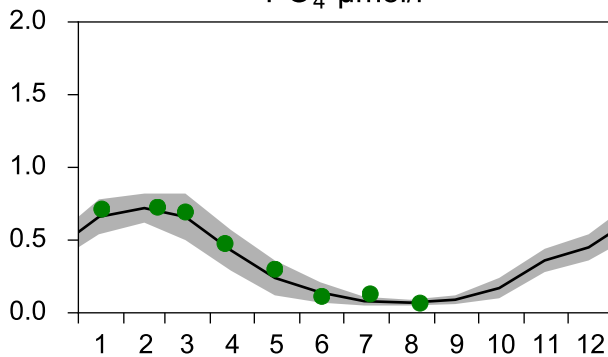
Temperature °C



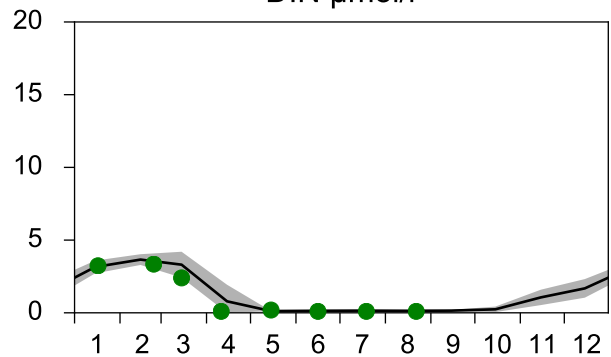
Salinity psu



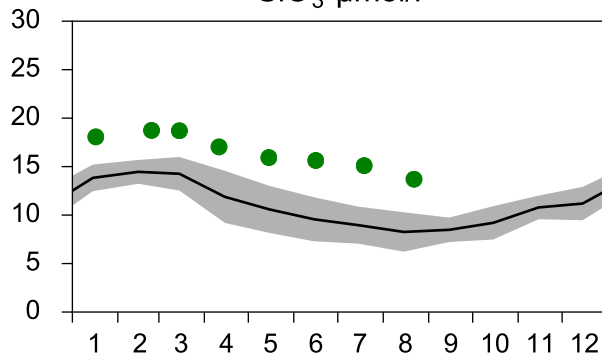
PO₄ µmol/l



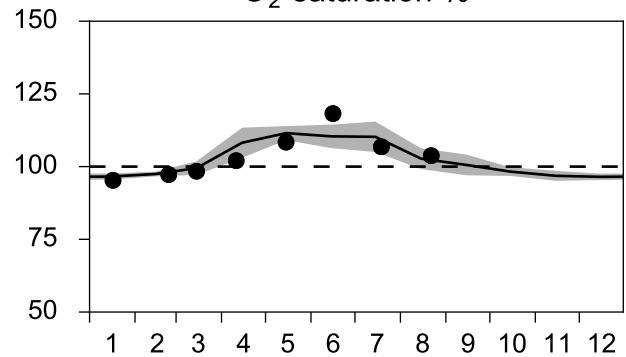
DIN µmol/l



SiO₃ µmol/l

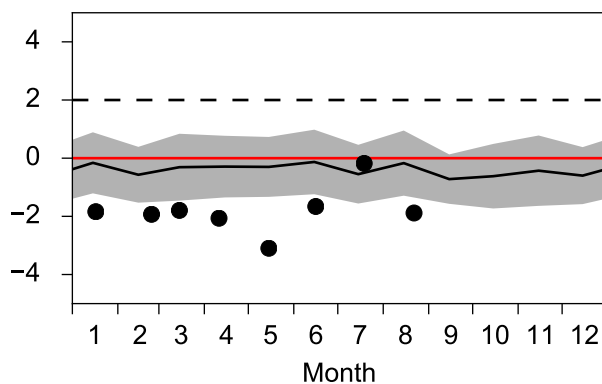


O₂ saturation %

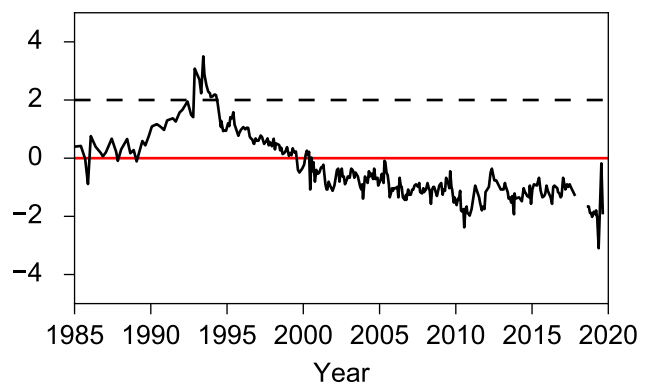


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O₂ ml/l



O₂ ml/l



Vertical profiles BY32 NORRKÖPINGSDJ August

— Mean 2001-2015 St.Dev. • 2019-08-22

