

Report from SMHI's marine monitoring cruise with R/V Svea – December 2024



Photo: Lena Viktorsson, SMHI

Survey period: 2024-12-05 to 2024-12-16

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

Cooperation partners: Swedish University of Agricultural Sciences (SLU),
Swedish Maritime Agency (SMA), Umeå University

SUMMARY

During the expedition, which is part of the Swedish pelagic monitoring program, the Skagerrak, the Kattegat, the Sound, the Baltic Proper and the Gulf of Bothnia were visited.

During the expedition, which is part of Sweden's pelagic monitoring program, the Skagerrak, Kattegat, Öresund, Baltic Proper, and the Gulf of Bothnia were visited. In the Gulf of Bothnia, SMHI and the Umeå Marine Research Center (UMF) jointly conducted a mapping of, among other things, nutrients.

Surface water cooling continued in December and was within the normal range at most stations in all marine areas. Surface water temperatures ranged between 6-7 °C in the Skagerrak, 7-8 °C in the Baltic Proper, and 3-5 °C in the Gulf of Bothnia.

Nutrient concentrations increased in both the Kattegat and the Baltic Proper compared to November. At some stations, phosphate and silicate concentrations exceeded normal levels, while dissolved inorganic nitrogen concentrations were below normal. However, at most stations, concentrations were within normal ranges.

In the Gulf of Bothnia, a north-south gradient in nutrient concentrations was observed. Silicate and dissolved inorganic nitrogen decreased towards the south, while phosphate concentrations increased. Additionally, there was an east-west gradient, where the concentration of dissolved inorganic nitrogen was notably lower at stations in the eastern parts. Phosphate concentrations were above normal in the Bothnian Sea but not in the Bothnian Bay. Dissolved inorganic nitrogen concentrations were mostly within the normal range.

Oxygen concentrations in bottom waters were normal in the Kattegat (5.0-5.6 ml/l) and Öresund (4.1 ml/l). In the Arkona Basin, bottom water oxygen levels were favorable, with concentrations around 5 ml/l. In the Bornholm Basin, acute oxygen deficiency (<2 ml/l) persisted, while Hanö Bay experienced an inflow of new water that increased oxygen concentrations to just above 2 ml/l in bottom waters. Increased oxygen concentrations were also observed around 60-70 meters in the Bornholm Basin. At station BY39, oxygen concentrations were 2.0 ml/l, indicating acute oxygen deficiency at a depth of only 50 meters. In the rest of the Baltic Proper, oxygen conditions remained unchanged since November. In the Eastern Gotland Basin, hydrogen sulfide was detected from 90 meters and acute oxygen deficiency from 75 meters. In the Western Gotland Basin, hydrogen sulfide was detected from 60-80 meters, with acute oxygen deficiency from 55-65 meters.

The next expedition with R/V Svea is scheduled to start on 9 January in Gothenburg, during which nutrient mapping in the Kattegat will also be conducted.

EXPEDITION OVERVIEW

The expedition was conducted with the research vessel R/V Svea, starting in Kalmar on December 5 and ending in Gothenburg on December 16. Weather conditions varied throughout the week. During the initial part of the expedition in the Gulf of Bothnia, the weather was mostly calm, with clear skies on some days. In the latter half, weather conditions deteriorated, with strong winds and high seas on the west coast during the final day, limiting sampling to a single station in the Skagerrak.

Profiles of salinity, temperature, oxygen, and fluorescence in the water column were measured using a CTD mounted on a rosette equipped with 24 water samplers. Sampling and analysis were conducted jointly by SMHI and UMF in the Gulf of Bothnia. All nutrients from the Gulf of Bothnia were analyzed by UMF, while other parameters presented here were analyzed by SMHI. In the Baltic Proper and Skagerrak/Kattegat, SMHI performed all sampling and analyses.

In the Gulf of Bothnia, in addition to the mapping stations, monthly sampling stations of the Umeå Marine Research Center (UMF) were visited, including GAVIK-1, B7, and C3. Station C3 replaced the mapping stations US2/Ulvödjupet and US3/C6. Four mapping stations are also part of UMF's monthly sampling program (SR3/C24, MS4/C14, F9/A13, and F3/A5). One mapping station in the eastern part of the Bothnian Sea (US7) was omitted due to time constraints. A total of 16 stations in the Bothnian Sea and 8 stations in the Bothnian Bay were visited, including two stations in the Northern Quark.

In the Baltic Proper and Skagerrak/Kattegat, a total of 21 stations were visited, two of which belong to mapping stations (Almagrundet and the threshold at the Åland Sea).

Reference measurements were conducted at Flinten 7 on the northbound journey through Öresund. The Auto Heave Compensation (AHC) system for the winch used in CTD measurements was tested.

Svea's ferrybox was operational throughout the expedition but without the pCO₂ instrument, which was under maintenance. A daily reference sample was taken from the ferrybox for chlorophyll analysis. The Moving Vessel Profiler (MVP) was used for transects during the journey but could not be deployed in the Gulf of Bothnia due to the risk of ice formation on the cable at low temperatures.

At five stations in the Baltic Proper (BY39, BY32, BCS III-10, Hanöbukten, and BY1), water samples were collected at 3 meters depth for eDNA analysis as part of the SAMBA II project at the Swedish Museum of Natural History.

The report is based on data subjected to an initial quality check and compared with monthly averages for the period 1991-2020. Further quality control may lead to adjustments in some values. Values presented in the report have been rounded to the nearest tenth and may differ from published data. Data will be made publicly available on the data host's website, usually within a week after the expedition's conclusion. Some analyses conducted post-expedition will be published later.

For more information on our data hosting and to download data, visit:

<https://www.smhi.se/data/oceanografi/datavardskap-oceanografi-och-marinbiologi>

For details on the algae situation, refer to the Algaware report:

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

The Skagerrak

A storm over the Skagerrak on the final day of the expedition limited sampling to a single station, P2, located off Marstrand just north of Gothenburg. Here, surface water temperature and salinity were normal (7.4 °C and 29.4 psu, respectively). The water column was well-mixed down to 15 meters, where a halocline separated surface water from the saltier and warmer deep water. Below the halocline, salinity increased to 35 psu and temperature to slightly above 9 °C, slightly higher than normal.

Nutrient concentrations in surface water had increased since November. Phosphate (0.64 µmol/l) and dissolved inorganic nitrogen (4.28 µmol/l) levels were within normal ranges, while silicate levels (9.23 µmol/l) were above normal for the season. Oxygen concentration in bottom water was 5.7 ml/l, which is normal and slightly higher than in November.

Fluorescence measurements showed a peak just below the halocline around 25 meters, with no significant surface chlorophyll peaks observed.

The Kattegat and the Sound

In the Kattegat and the Sound, surface water temperature had decreased since November and was normal at all stations, around 6 °C. Salinity in surface water was also normal, ranging from 10 psu in Öresund (1 m depth) to 25 psu (0-10 m average) at the northernmost station, Fladen. In the Sound, the water column was strongly stratified, with a halocline at 4 meters depth. Surface salinity was 10 psu, increasing to 31 psu in bottom waters. In the Kattegat, the halocline was slightly deeper (around 10 meters), coinciding with a thermocline. Deep water temperature was slightly above normal at approximately 10 °C.

Dissolved inorganic nutrient concentrations in surface water had increased, except for silicate at Fladen. At Fladen, a marked increase in both silicate and phosphate occurred in November, resulting in a smaller increase between November and December compared to other stations like Anholt E and N14 Falkenberg. At the latter two stations, significant increases in all nutrients were observed, with phosphate and silicate concentrations exceeding normal levels (phosphate ~0.6 µmol/l, silicate ~11 µmol/l). At all Kattegat stations, dissolved inorganic nutrient levels were approaching winter maxima typically reached in January.

Oxygen levels in Kattegat bottom waters had increased slightly since November and were now within normal ranges (5.0-5.6 ml/l). In Öresund, bottom water oxygen concentration was 4.1 ml/l, which is on the threshold for oxygen deficiency.

Chlorophyll fluorescence was highest between 0 and 10 meters, with the highest values recorded at station N14 Falkenberg.

The Baltic Proper

Surface water temperatures were normal at all stations, ranging from approximately 4 °C at the station Tröskeln Ålands hav (a winter mapping station) to 6.5-7.5 °C in other parts of the region. Salinity in surface waters ranged from 6.0-8.3 psu and was normal at most stations, except in the Western Gotland Basin, where it was above normal, continuing a

pattern observed in November. In the Arkona Basin, a thermocline and halocline were present around 25-30 meters. Below these layers, water was warmer and saltier. At the western Arkona station (BY1), the water column was well-mixed down to almost 40 meters, with salinity reaching 18 psu compared to 12 psu at the eastern station (BY2).

In the Bornholm Basin and Hanö Bay, the water column was well-mixed down to 45 meters, where a thermocline and a halocline coincided. Below these layers, inflow of warmer, saltier water was observed, particularly at 60 meters in Hanö Bay, 65 meters at station BY4, and 70 meters at station BY5. Below these depths, salinity was around 16 psu, and temperature was 10-11 °C. In the Eastern and Western Gotland Basins, haloclines and thermoclines were observed around 40-50 meters, except at the stations BY15 and BY20 in the central Eastern Gotland Basin, where the mixed layer extended to 60 meters.

Phosphate and dissolved inorganic nitrogen concentrations increased at all stations and were approaching winter maxima typically reached in January-February. Surface phosphate concentrations ranged from 0.4-0.9 µmol/l and exceeded normal levels at some stations, notably BY31, BY39, and Almagrundet, where levels were 0.7-0.9 µmol/l. Dissolved inorganic nitrogen concentrations ranged from 1.3-3.4 µmol/l, lowest in the Arkona Basin and highest at the northernmost stations.

Oxygen conditions in the Arkona Basin were favorable, with bottom water oxygen concentrations around 5 ml/l. In the Bornholm Basin, acute oxygen deficiency (< 2 ml/l) persisted, while Hanö Bay experienced an inflow of new water that increased oxygen concentrations to just above 2 ml/l in bottom waters. In the Bornholm Basin, the inflow settled at depths of 65-70 meters, where an increase in oxygen concentrations compared to November was also observed. During the autumn, several very small inflows have occurred through the Öresund, and what we observe in Hanö Bay and Bornholm is likely a combined effect of these. At station BCS III-10, the bottom water oxygen concentration was 0.5 ml/l, which is normal. In the rest of the Eastern Gotland Basin, hydrogen sulfide was detected from 90 meters, with acute oxygen deficiency from 75 meters. In the Eastern Gotland Basin, hydrogen sulfide was detected from 90 meters, with acute oxygen deficiency from 75 meters. In the Western Gotland Basin, hydrogen sulfide was detected from 60-80 meters, with acute oxygen deficiency from 55-65 meters. At station BY39, oxygen concentrations were 2.0 ml/l, indicating acute oxygen deficiency at a depth of 50 meters.

Gulf of Bothnia

Surface water temperatures were within normal ranges for each station compared to the basin's averages. In the Bothnian Sea, surface temperatures ranged from 3-5 °C, coldest near the coasts. In the Bothnian Bay, surface temperatures dropped further to 3.0-4.3 °C. Salinity in surface waters ranged from 5.0-5.5 psu in the Bothnian Sea and 2.8-3.3 psu in the Bothnian Bay. Surface salinity was above normal in the eastern parts of the Bothnian Sea but otherwise normal.

In the Bothnian Sea, the water column was well-mixed down to 50-60 meters at most stations. Oxygen concentrations decreased below the halocline to about 5 ml/l. In the northwestern parts, a halocline was present around 10 meters depth, below which salinity increased gradually toward the bottom. At the deepest station in the Bothnian Sea (station C3), a water mass was observed below 165 meters with a salinity approximately 0.2 psu higher than the overlying bottom water and an oxygen concentration nearly 1 ml/l higher (just under 6 ml/l compared to slightly above 5 ml/l at depths of 100-150 meters).

In the Bothnian Bay, differences in salinity and temperature between surface and bottom layers were smaller, with salinity reaching a maximum of 3.7 psu near the bottom. A weak halocline coincided with a thermocline from about 20 meters near the coasts to 40 meters farther out in the basin.

No oxygen deficiency was observed at any station in the Gulf of Bothnia. The lowest oxygen concentrations were measured at stations MS6 and MS4/C14 in the central Bothnian Sea, around 4.7 ml/l, which was below normal. Relatively low oxygen concentrations (4.5 ml/l) were also measured at the coastal station GAVIK-1.

Nutrient mapping in the Gulf of Bothnia showed silicate concentrations above normal at most stations, ranging from 21-23 $\mu\text{mol/l}$ in the eastern Bothnian Sea to 24-28 $\mu\text{mol/l}$ in the western parts. The highest silicate concentration (37.6 $\mu\text{mol/l}$) was recorded at the coastal station GAVIK-1. In the Bothnian Bay, silicate concentrations ranged from 37-41 $\mu\text{mol/l}$, with two stations in the eastern parts showing normal levels. Dissolved inorganic nitrogen concentrations in the Bothnian Sea were within normal ranges at most stations but exceeded normal levels at a few. Phosphate concentrations in the Bothnian Bay were within normal ranges (0.06-0.08 $\mu\text{mol/l}$). In the Bothnian Sea, phosphate concentrations exceeded normal levels at all stations, ranging from 0.33-0.54 $\mu\text{mol/l}$, with a north-south gradient showing increasing concentrations toward the south.

Fluorescence measurements indicated low plankton activity at all stations.

Figures

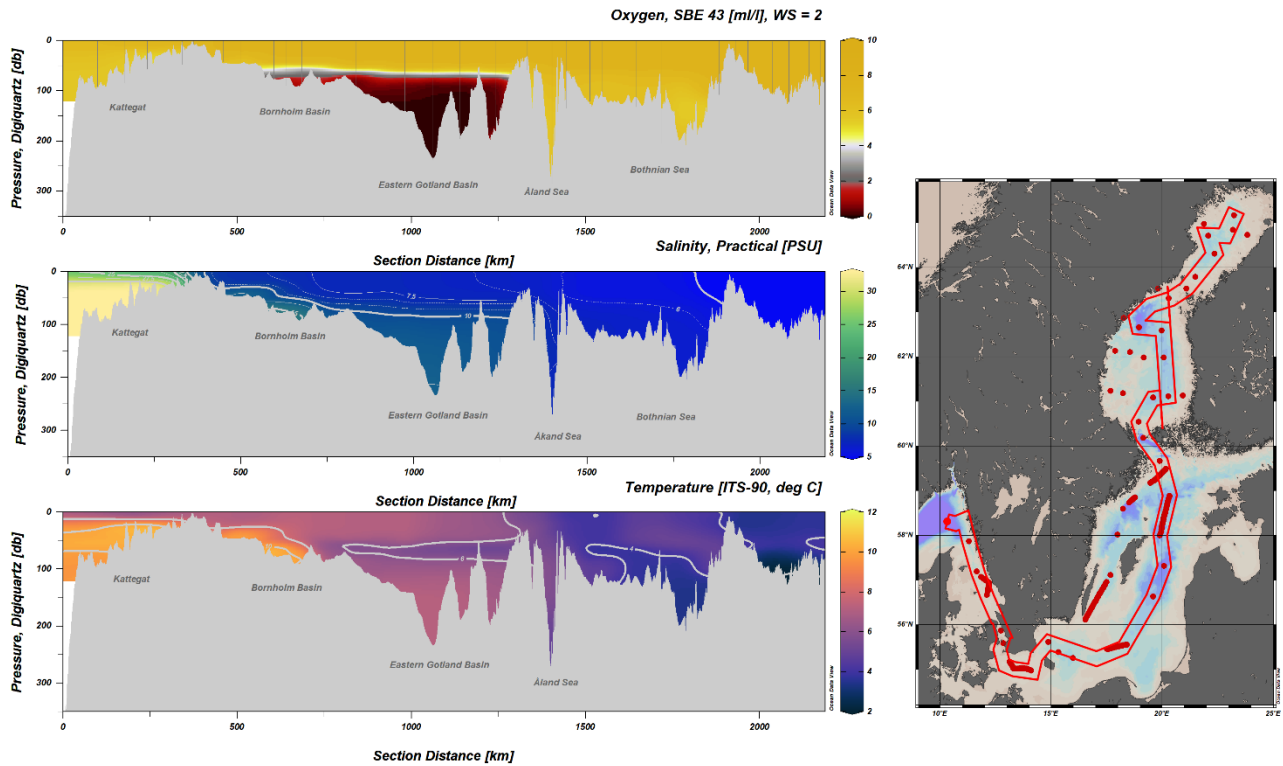


Figure 1. Section showing oxygen concentration, salinity, and temperature from CTD measurements, from the Skagerrak through the Kattegat and into the Baltic Proper and Gulf of Bothnia (to the right).

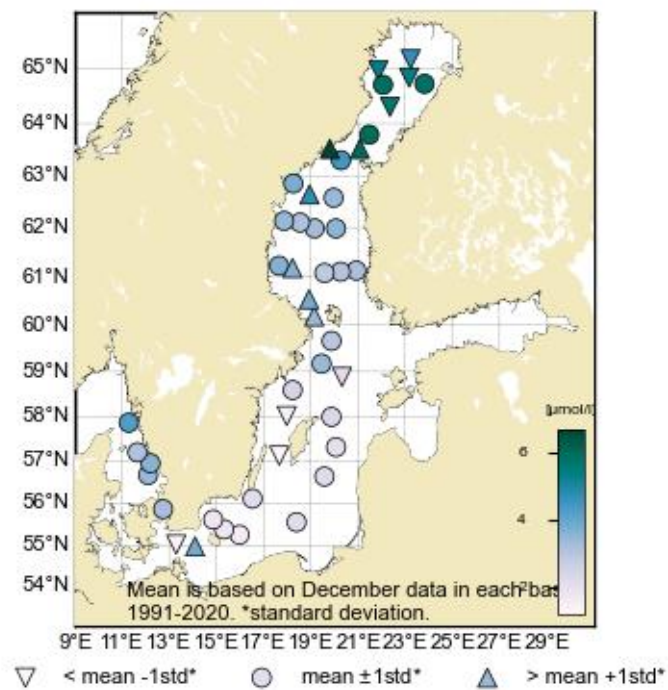


Figure 2. The concentration ($\mu\text{mol/l}$) of inorganic nitrogen (DIN) in the surface water (0 – 10 m). The mean value is based on data for the month at each station during the years 1991 – 2020.

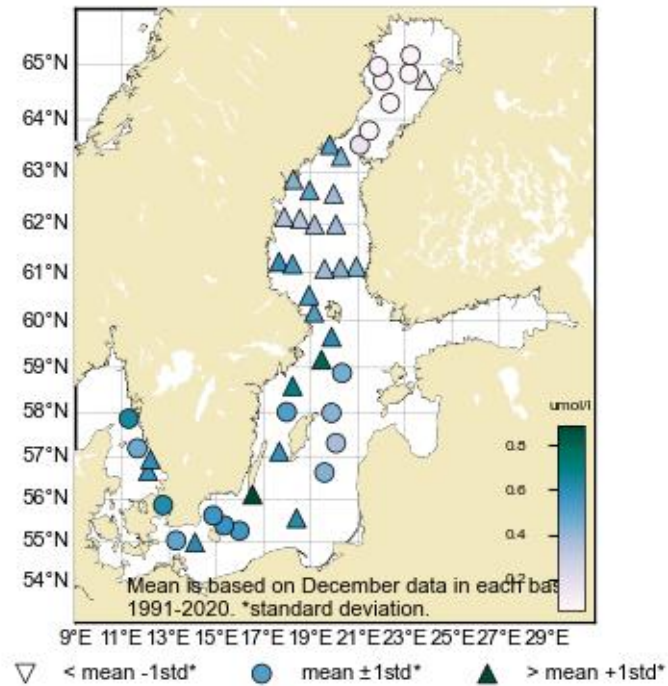


Figure 3. The concentration ($\mu\text{mol/l}$) of phosphate in the surface water (0 – 10 m). The mean value is based on data for the month at each station during the years 1991 – 2020.

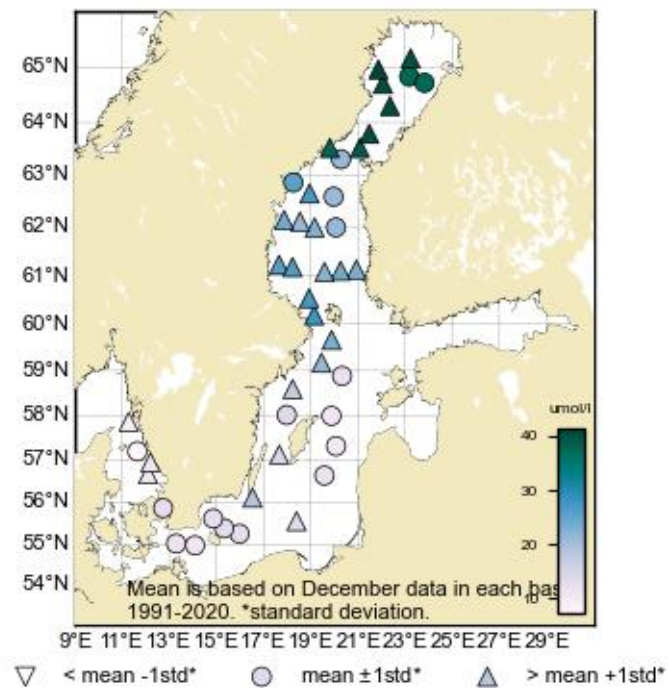


Figure 4. The concentration ($\mu\text{mol/l}$) of silicate in the surface water (0 – 10 m). The mean value is based on data for the month at each station during the years 1991 – 2020.

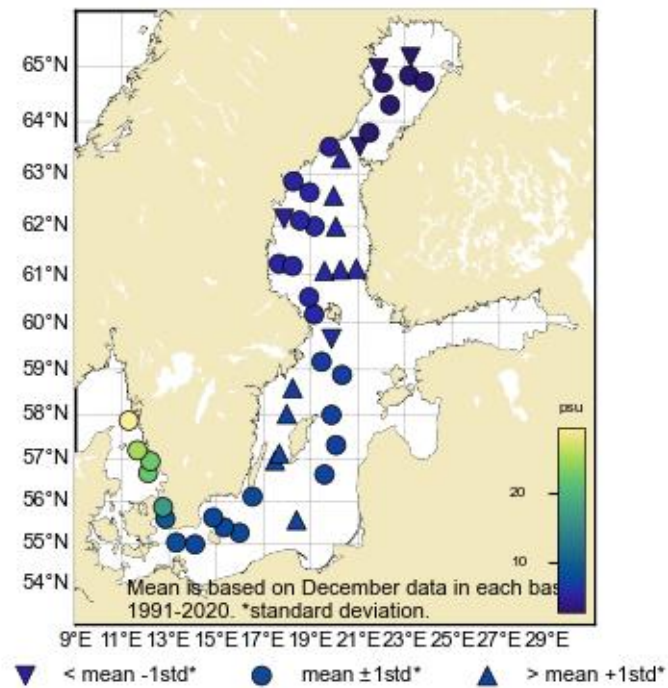


Figure 7. The salinity in the surface water (0 – 10 m). The mean value is based on data for the month at each station during the years 1991 – 2020.

PARTICIPANTS

Name	Role	From	Leg
Lena Viktorsson	Expeditionsledare, Vattenprovtagning	SMHI	Kalmar-Gävle-Gävle
Martin Hansson	Vattenprovtagning,	SMHI	Kalmar-Gävle-Gävle
Ann-Turi Skjevik	CTD- och plattformarbete	SMHI	Kalmar-Gävle-Gävle
Örjan Bäck	CTD- och plattformarbete	SMHI	Kalmar-Gävle-Gävle
Sara Johansson	Närsaltsanalyser, kvalitetsansvarig	SMHI	Kalmar-Gävle
Martina Jeuthe	Kemiska och biologiska analyser	UMF	Gävle-Gävle
Marléne Johansson	Biologiska analyser	UMF	Gävle-Gävle
Åsa Hallberg	Kemiska analyser	UMF	Gävle-Gävle
Anna-Kerstin Thell	Expeditionsledare, Vattenprovtagning	SMHI	Gävle-Göteborg
Helena Björnberg	CTD- och plattformarbete	SMHI	Gävle-Göteborg
Ola Kalén	CTD- och plattformarbete	SMHI	Gävle-Göteborg
Johanna Linders	Vattenprovtagning	SMHI	Gävle-Göteborg
Monica Lindner	Närsaltsanalyser, kvalitetsansvarig	SMHI	Gävle-Göteborg

APPENDICES

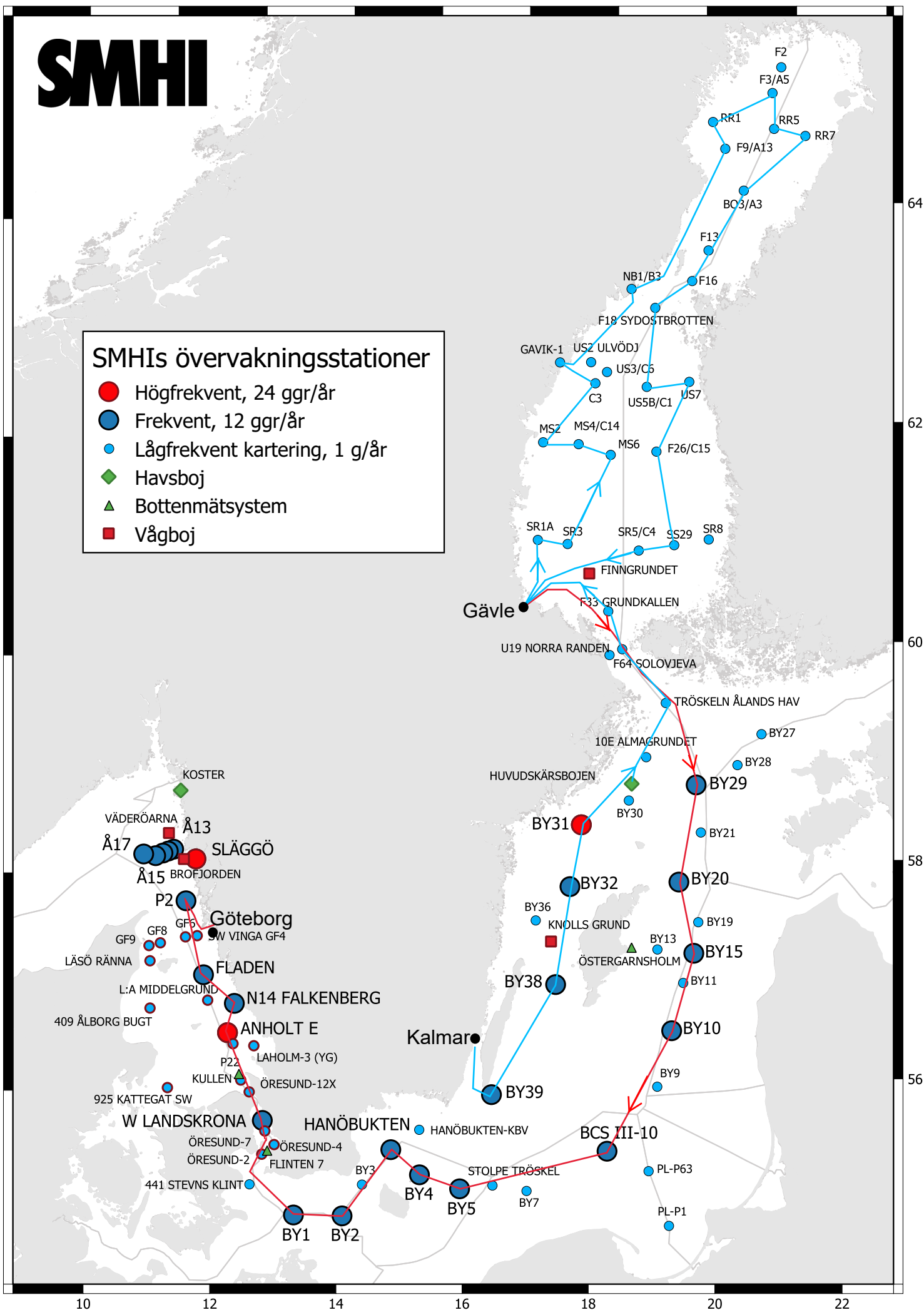
- Track chart
- Table with stations, analysed parameters and number of sampling depths
- Monthly average plots for surface water
- Vertical profiles



Havs
och Vatten
myndigheten

SMHIs övervakningsstationer

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



Time: 09:48

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	WCW elac aove tueo hdsb	CZPP hohp loy apt o p	No de	No btl	T e m m l p t t	T e m m l p t t	S a a c h o o y y	P h o o s s o r r r	D h o o z z o o r r	H h o o z z o o r r	P h o o z z o o r r	N n n n n n n n	N n n n n n n n	A a a a a a a a	S s s s s s s s	H h h h h h h h	C c c c c c c c			
1039	26	BPSE49	BAS...	BY39 ÖLANDS S UDDE	5606.97	01632.17	20241205	0817	50	11.0	12 1.0	3.9	1025	1730	xxx-	8 8	x x x x x x x - x x x x x x x x x - x -	- x - x - - x - - - - - - - - - - -															
1040	26	BPWX00	EXT...	AHC-TEST	5657.43	01729.49	20241205	1510			17 5.0	4.2	1022	9999	----		- x - x - - x - - - - - - - - - - -																
1041	26	BPWX45	BAS...	BY38 KARLSÖDJ	5707.06	01740.20	20241205	1743	114		18 6.0	4.6	1019	9999	x---	14 14	x x x x - x x x x x x x x x x x - x x x -																
1042	26	BPWX38	BAS...	BY32 NORRKÖPINGS DJ	5800.97	01759.11	20241206	0001	205		16 9.1	4.4	1016	9999	x---	17 17	- x - x - x x x x x x x x x x x - x - x -																
1043	26	BPNX37	BAS...	BY31 LANDSORTSDJ	5835.66	01814.06	20241206	0425	459		15 11.0	4.6	1013	9990	xxx-	20 20	- x - x x x x x x x x x x x x x x x x - -																
1044	26	BPNX00	EXT...	10E ALMAGRUNDET	5910.26	01927.53	20241206	1105	133		16 14.0	4.9	1016	2840	x---	14 4	x x x x - x x - x x x x x x x - x - - -																
1045	26	GBAX02	BAS...	F64 SOLOVJEVA	6011.00	01908.97	20241206	1933	290		16 7.5	3.9	1018	9999	----	20 20	- x - x - x x - x x x x x x x - x - - -																
1046	26	GBSX03	BAS...	F33 GRUNDKALLEN	6032.44	01855.86	20241206	2238	136		17 7.7	3.2	1017	9999	----	15 15	x x x x - x x - x x x x x x x - x - - -																
1047	26	GBSX00	BAS...	SR1A/C11	6113.95	01739.65	20241207	1145	64	3.0	17 8.0	2.3	1016	2820	----	10	x x x x - x x - x x x x - x x - - - -																
1048	26	GBSX00	BAS...	SR3/C24	6111.09	01813.88	20241207	1353	70		15 5.6	2.3	1016	2820	----	10 10	x x x x x x x - x x x x x x x x x x x -																
1049	26	GBSX17	BAS...	MS6	6159.01	01909.87	20241207	1953	68		16 3.0	2.4	1019	9999	----	10 10	x x x x - x x - x x x x x x x - x - x -																
1050	26	GBSX15	BAS...	MS4 / C14	6205.99	01832.90	20241207	2221	88		16 4.2	2.6	1020	9999	----	11 11	x x x x x x x - x x x x x x x x x x x -																
1051	26	GBSX00	BAS...	MS2/C13	6207.94	01752.46	20241208	0050	76		31 2.0	1.4	1021	9999	----	10	- x - x - x x - x x x x - x x - x - x -																
1052	26	GBSX31	BAS...	C3	6239.19	01857.13	20241208	0532	201		23 5.0	2.0	1024	9990	----	17 17	- x - x x x x - x x x x x x x x x x - -																
1053	26	GBSF51	BAS...	GAVIK-1	6251.81	01815.83	20241208	0842	84	7.0	27 4.0	0.0	1025	1620	----	6 6	x x x x x x x - x x x x x x x x x x - -																
1054	26	GBSX59	BAS...	B7	6331.51	01948.53	20241208	1542	24																								

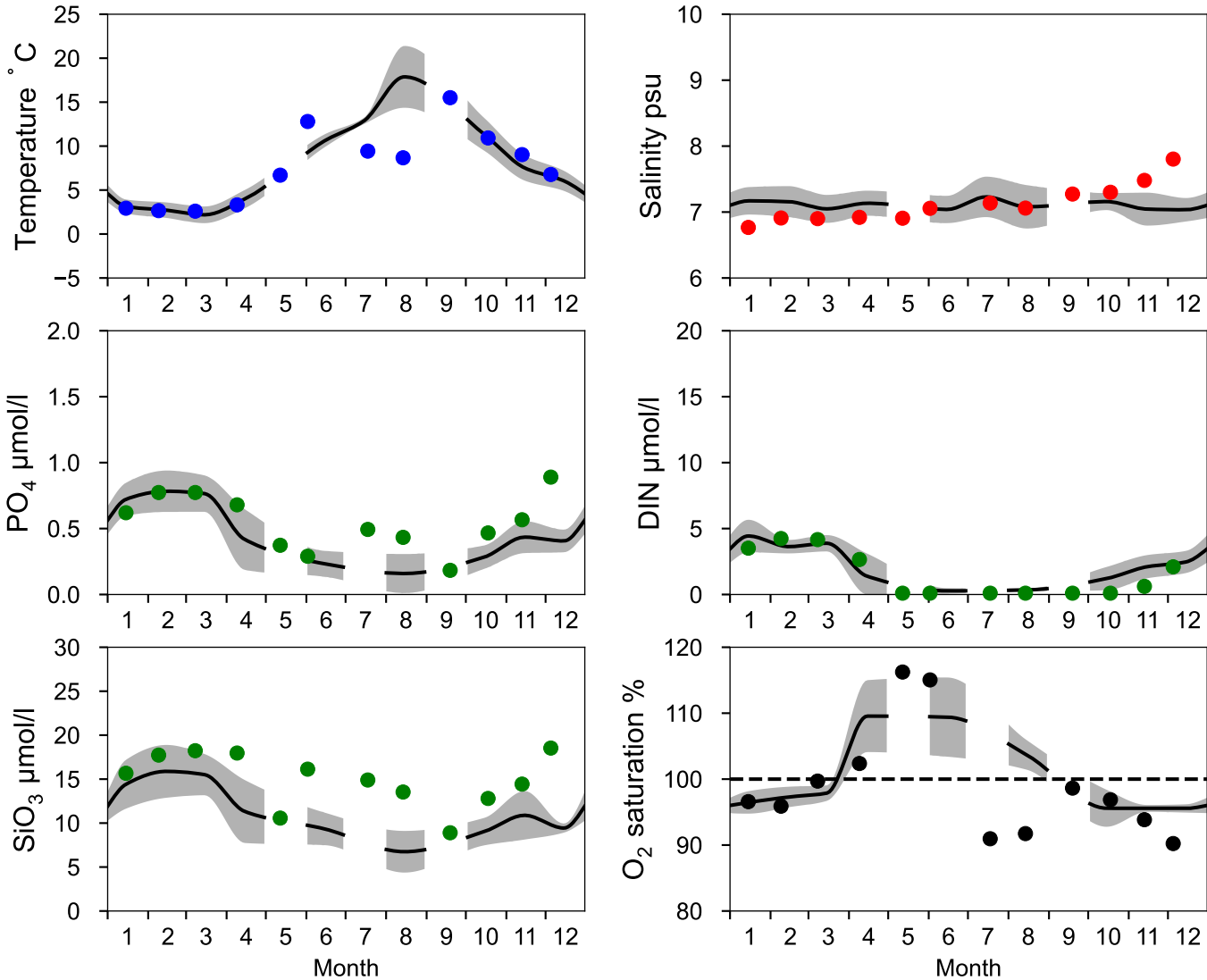
Ship: 77SE
Year: 2024

[illegible]

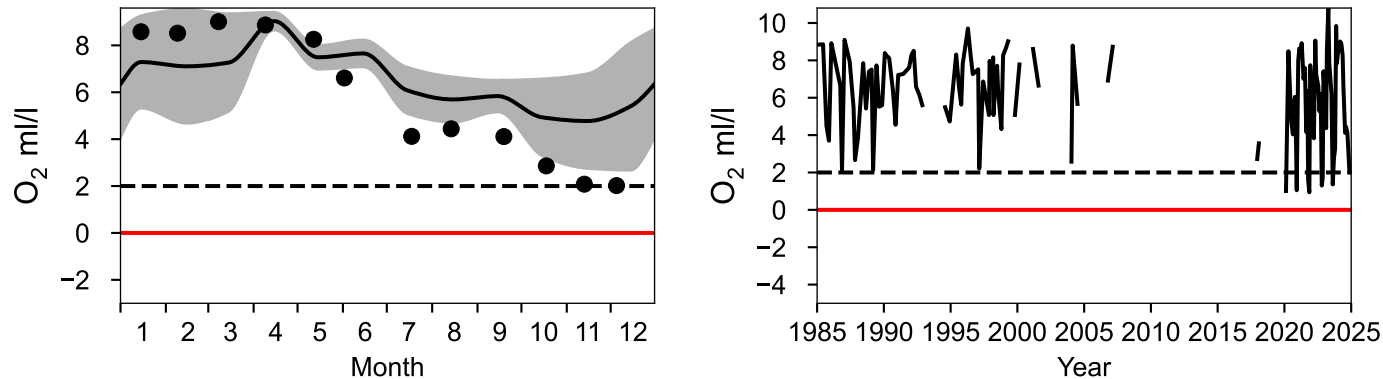
STATION BY39 ÖLANDS S UDDE SURFACE WATER (0-10 m)

Annual Cycles

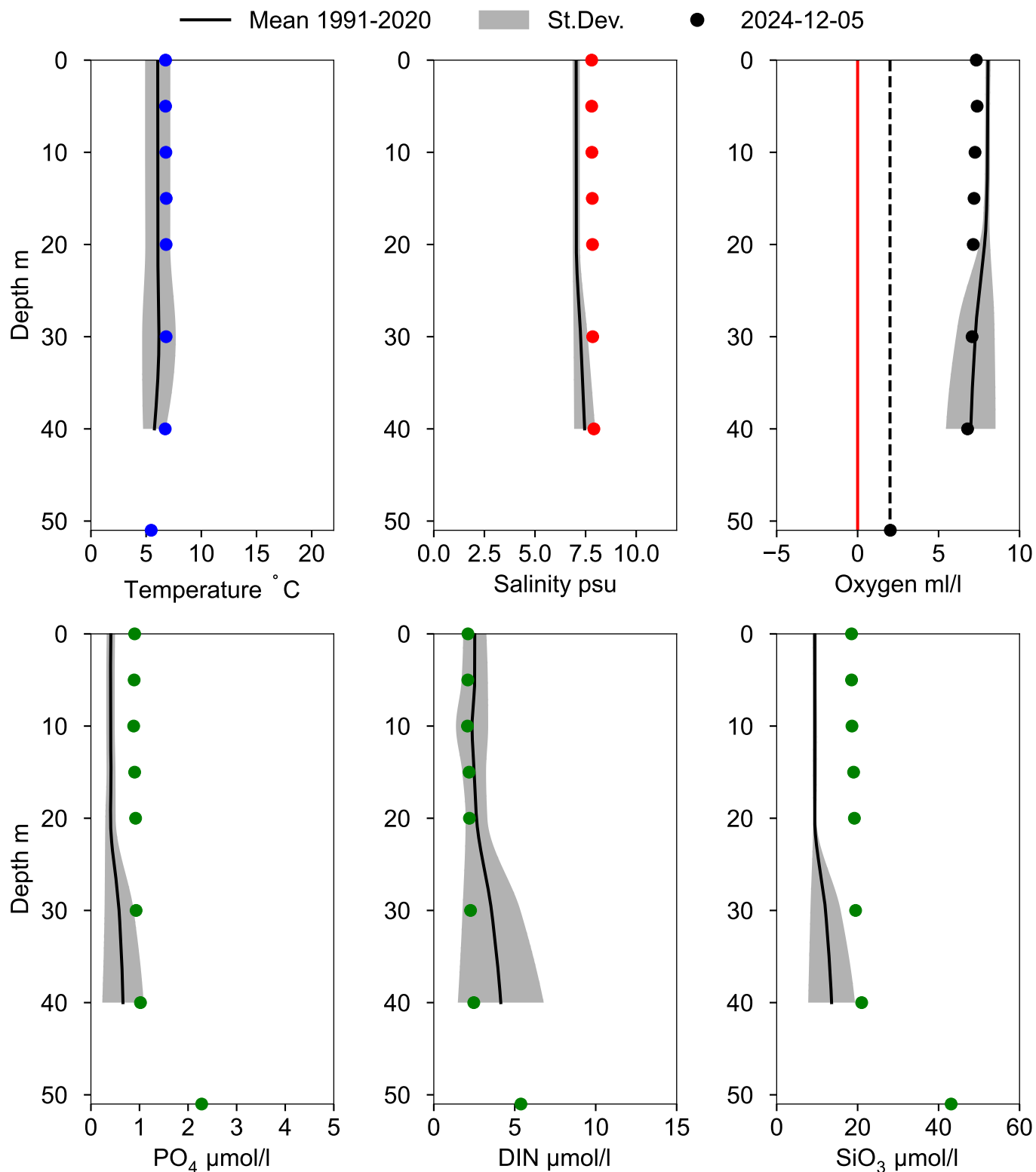
— Mean 1991-2020 St.Dev. ● 2024



OXYGEN IN BOTTOM WATER (depth >= 40 m)



Vertical profiles BY39 ÖLANDS S UDDE December



STATION AHC-TEST SURFACE WATER (0-10 m)

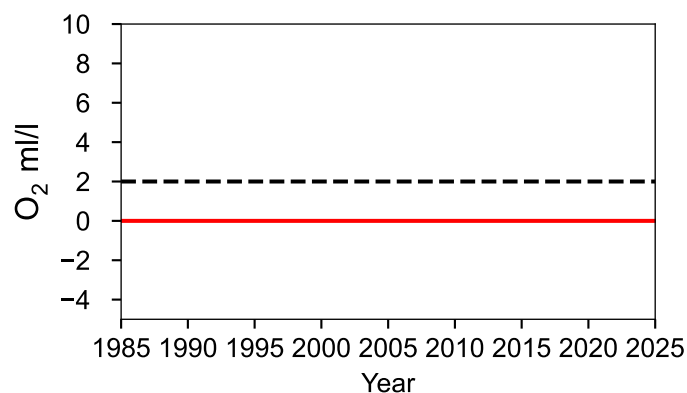
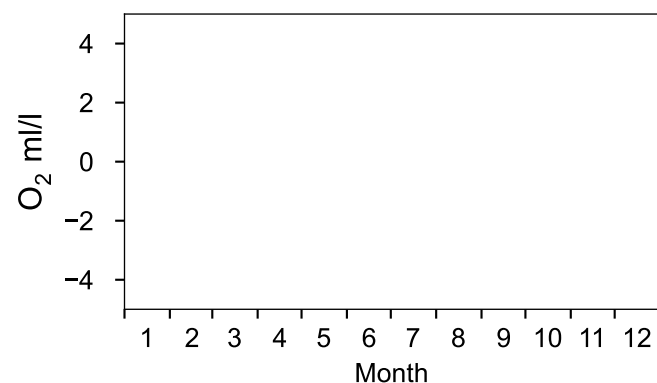
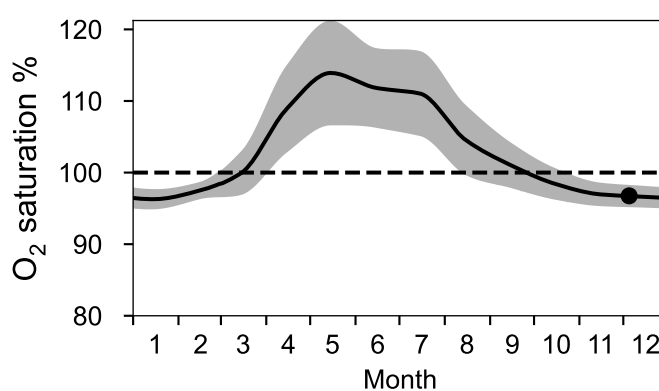
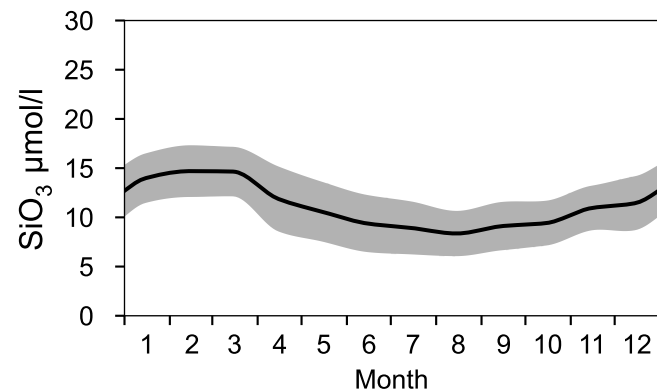
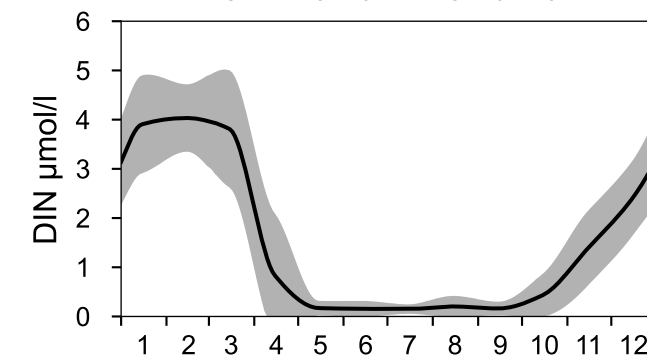
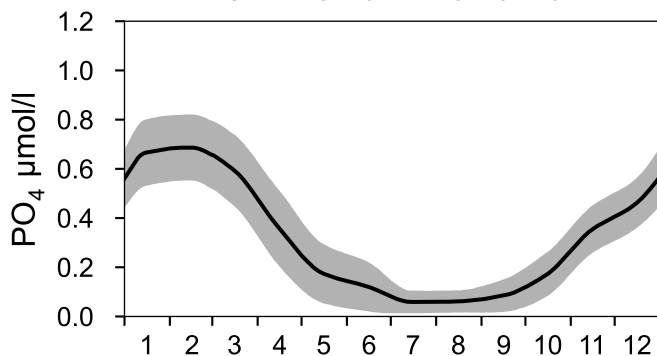
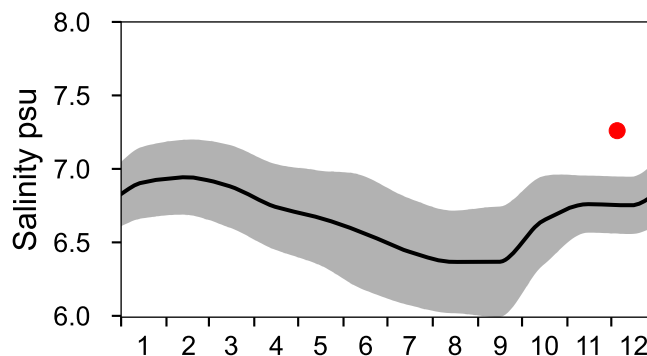
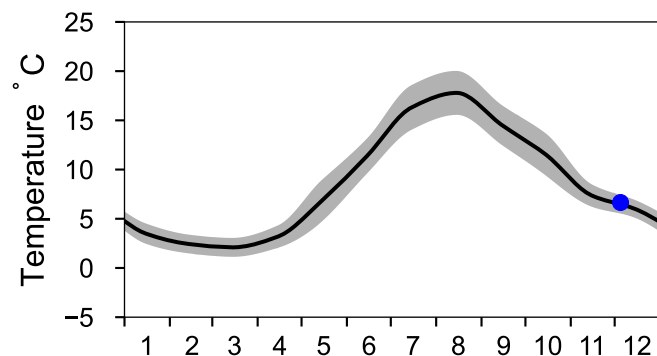
Annual Cycles

Statistics based on data from: Västra Gotlandshavet

— Mean 1991-2020

■ St.Dev.

● 2024



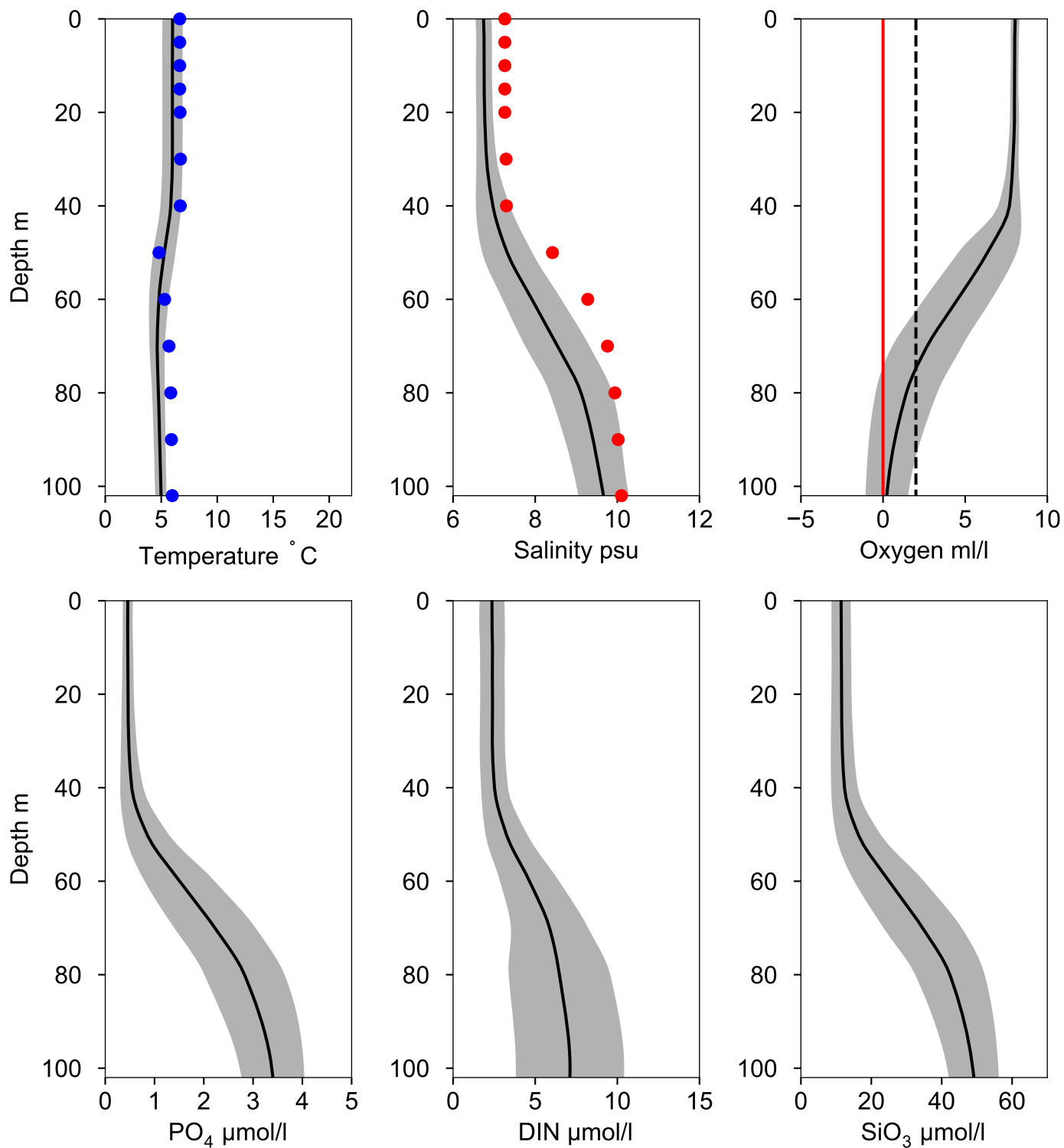
Vertical profiles AHC-TEST December

Statistics based on data from: Västra Gotlandshavet

— Mean 1991-2020

■ St.Dev.

● 2024-12-05



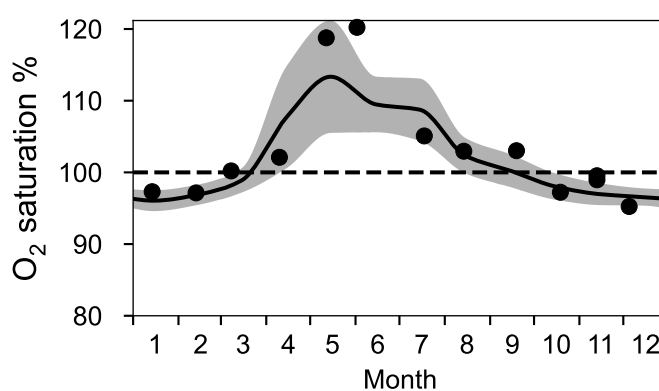
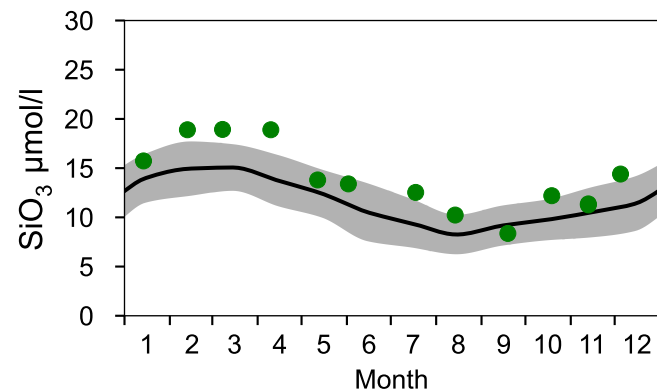
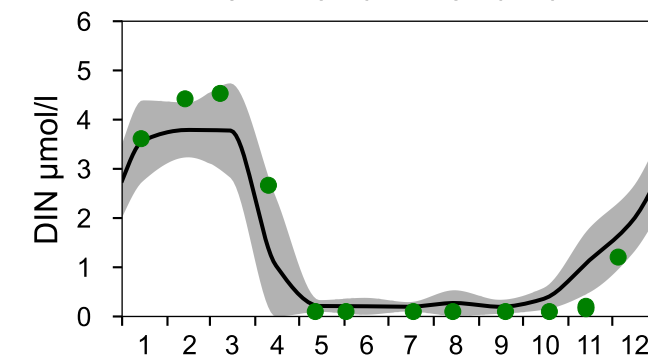
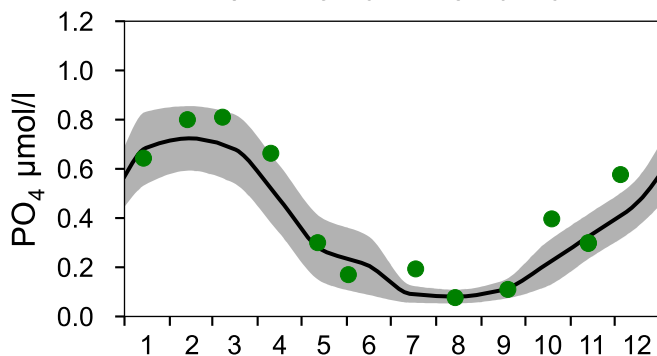
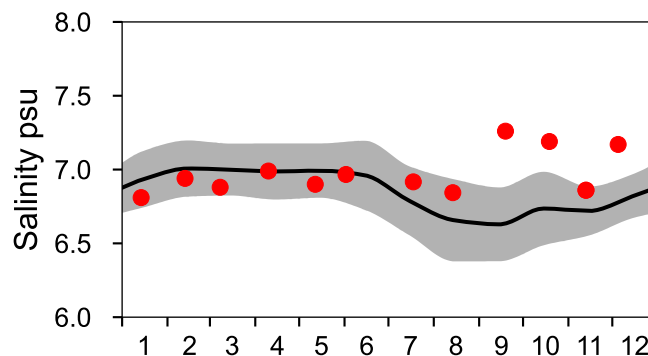
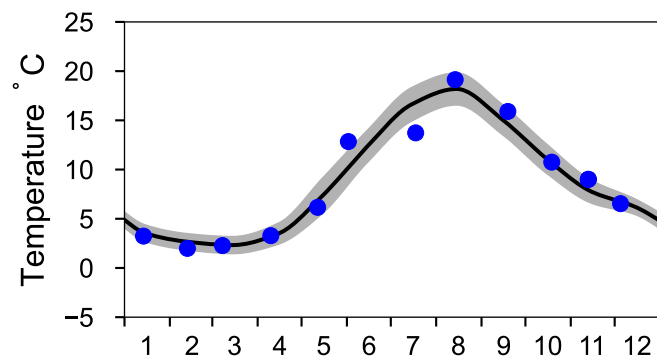
STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

Annual Cycles

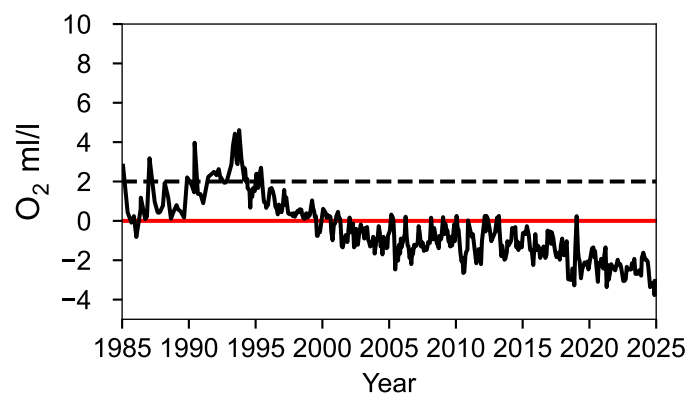
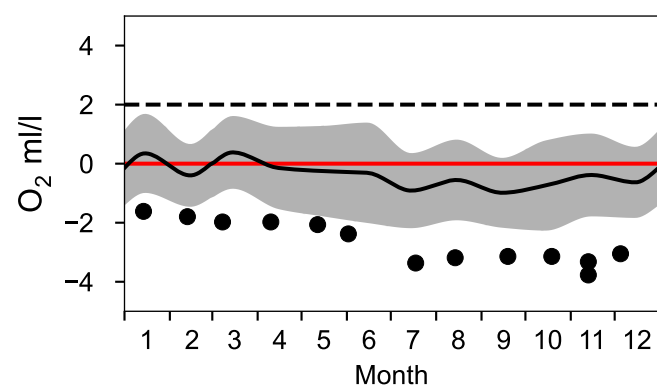
— Mean 1991-2020

■ St.Dev.

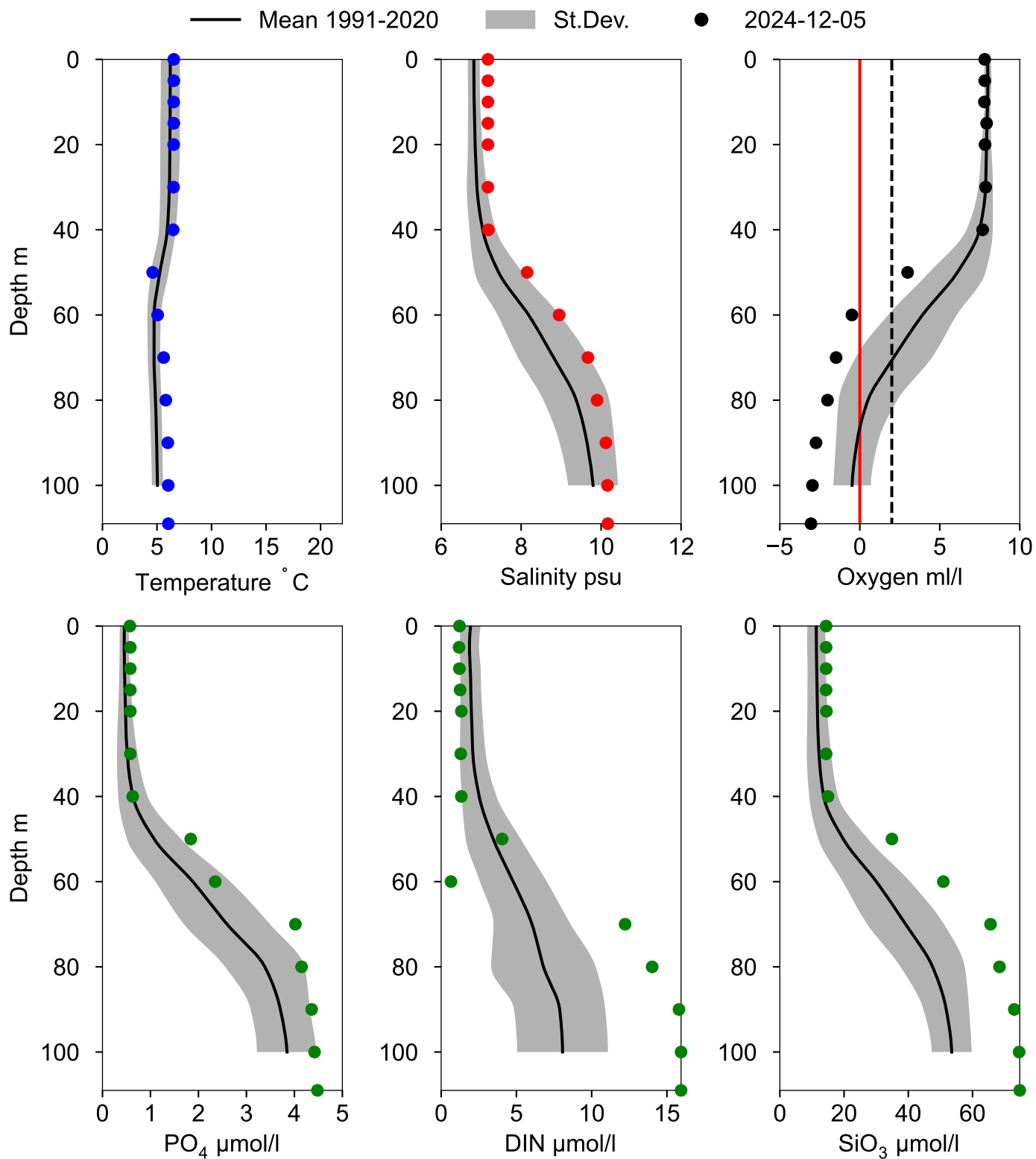
● 2024



OXYGEN IN BOTTOM WATER (depth >= 100 m)



Vertical profiles BY38 KARLSÖDJ December



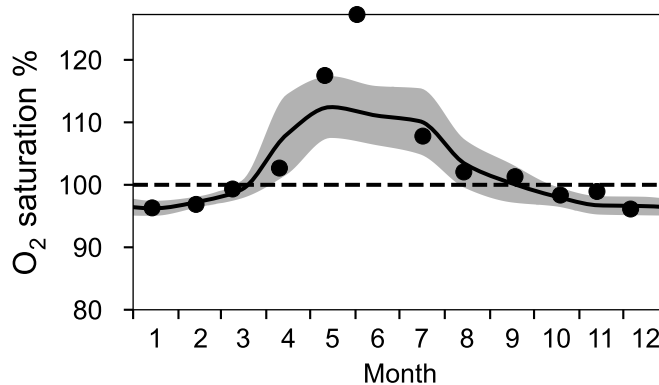
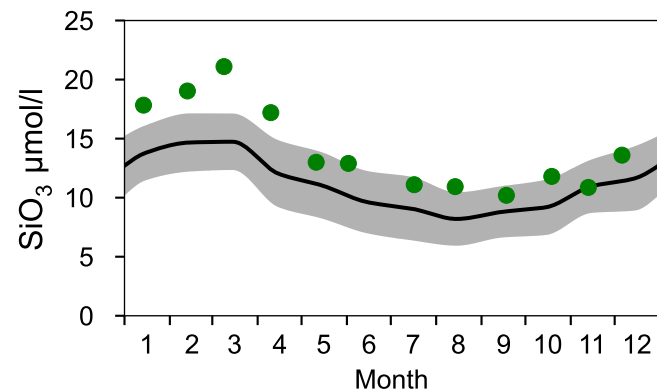
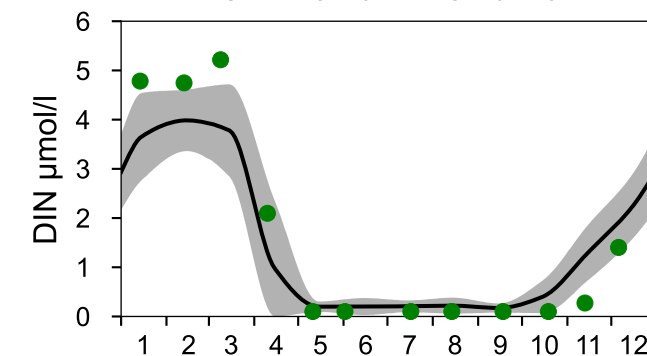
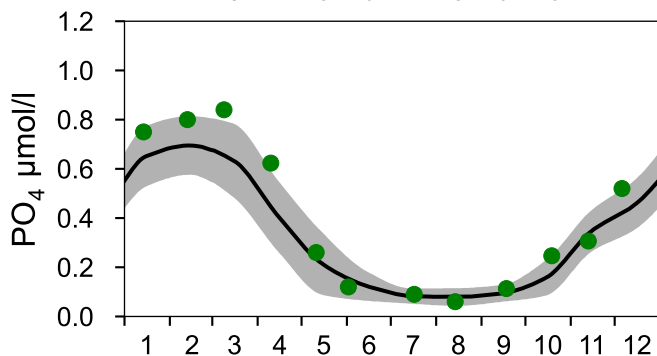
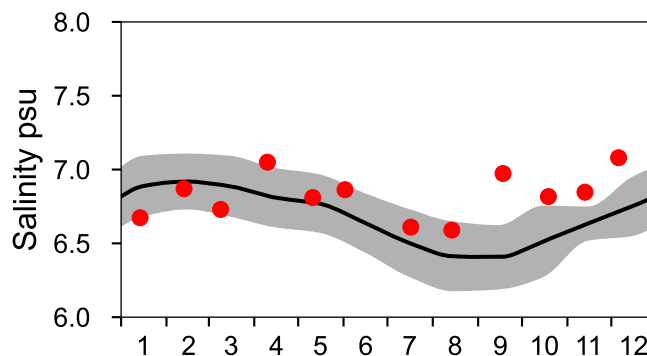
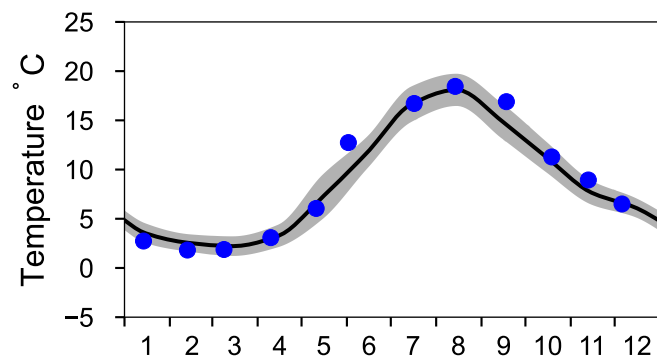
STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

Annual Cycles

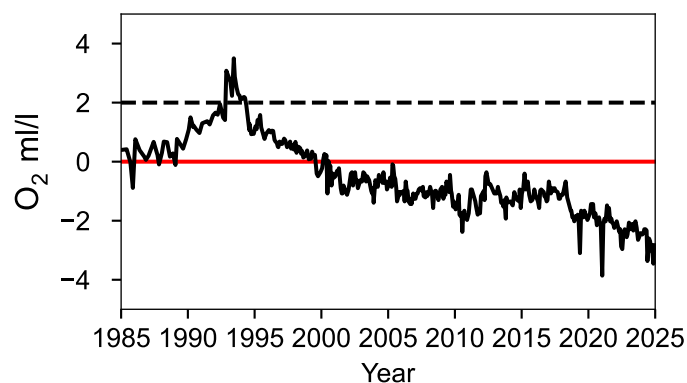
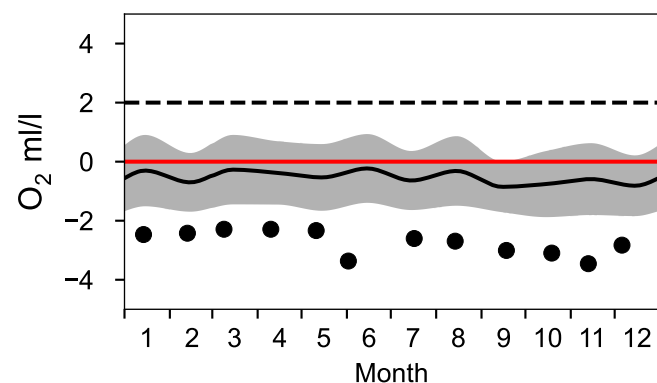
— Mean 1991-2020

■ St.Dev.

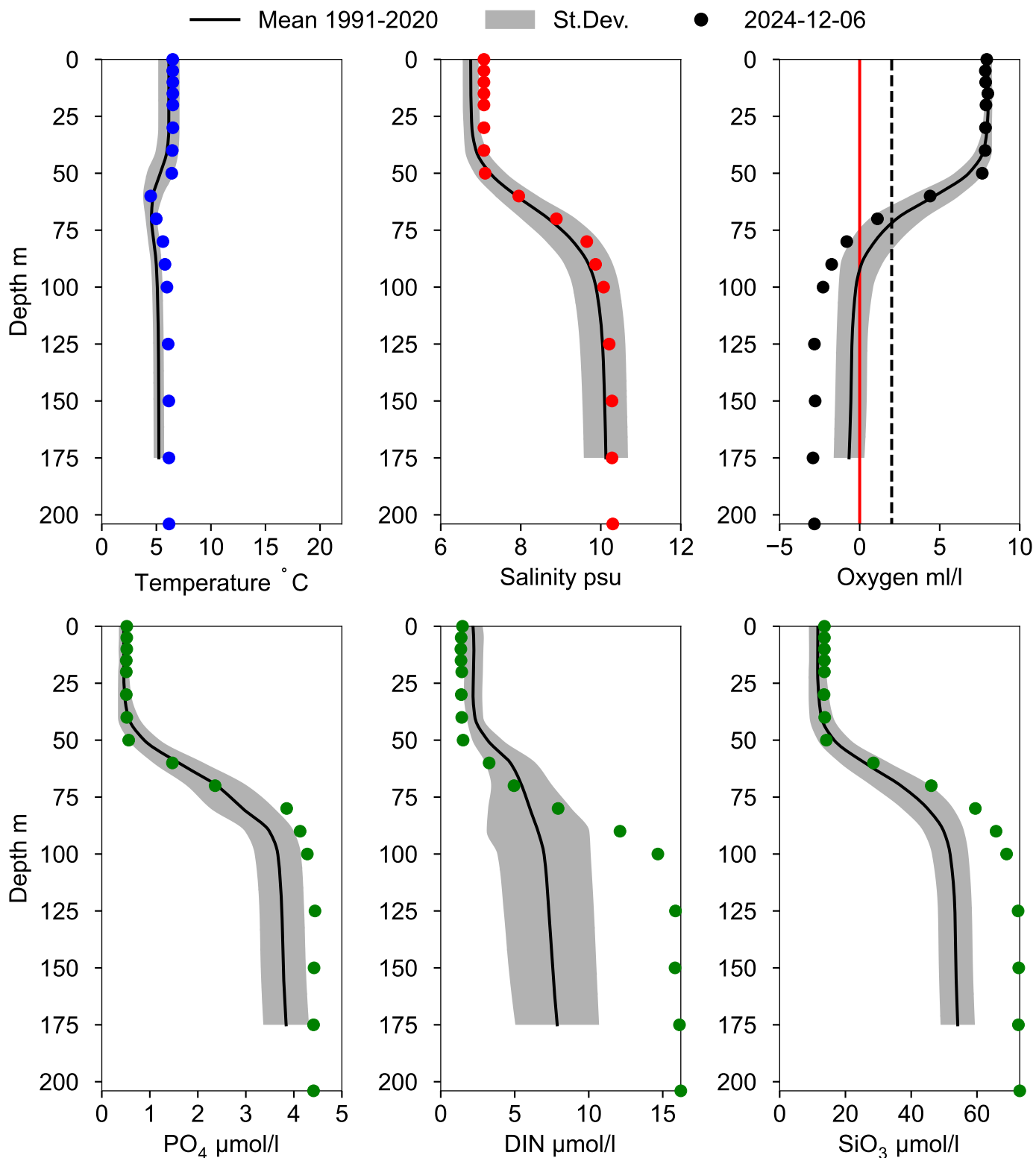
● 2024



OXYGEN IN BOTTOM WATER (depth >= 175 m)



Vertical profiles BY32 NORRKÖPINGSDJ December



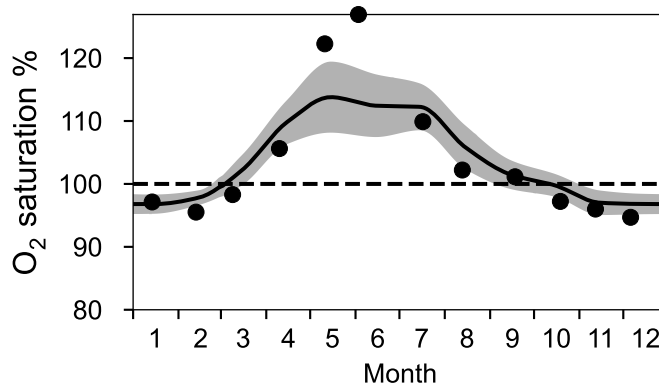
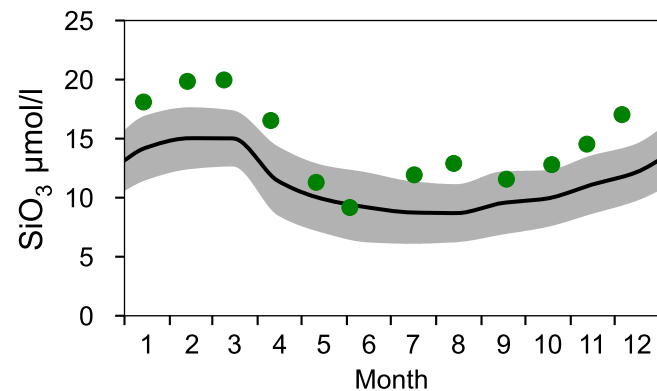
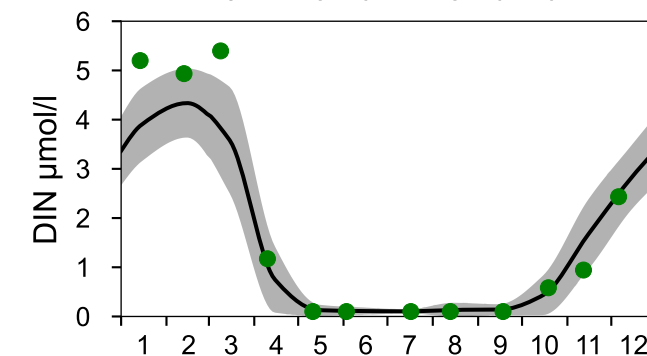
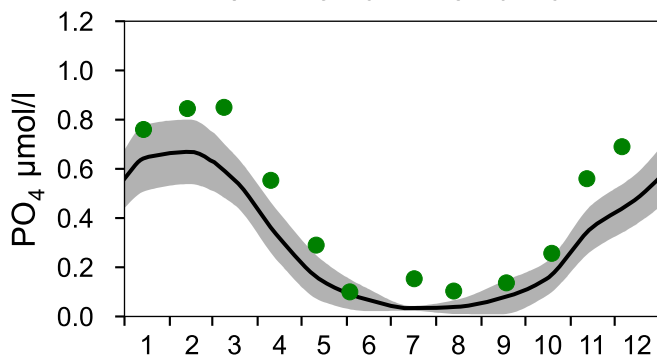
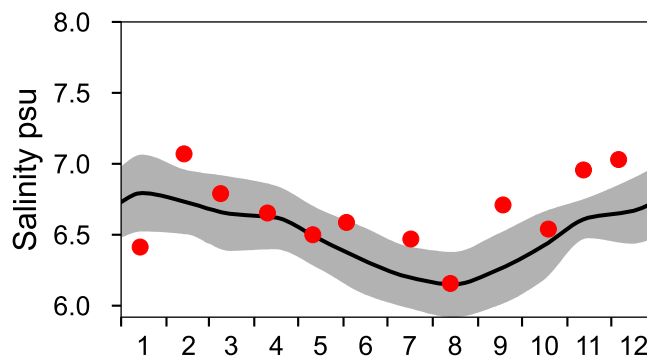
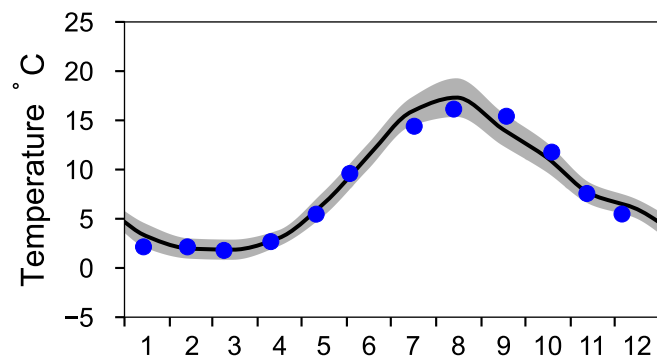
STATION BY31 LANDSORTSDJ SURFACE WATER (0-10 m)

Annual Cycles

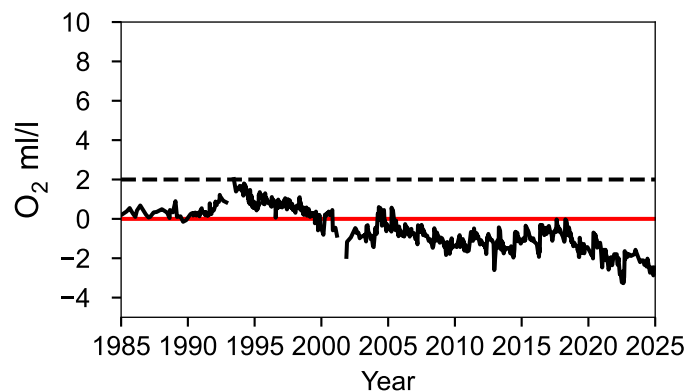
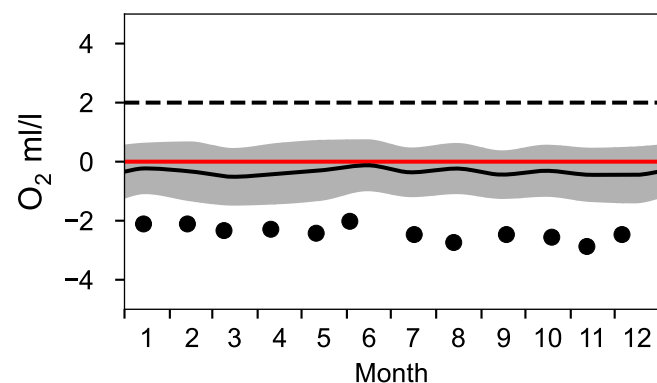
— Mean 1991-2020

■ St.Dev.

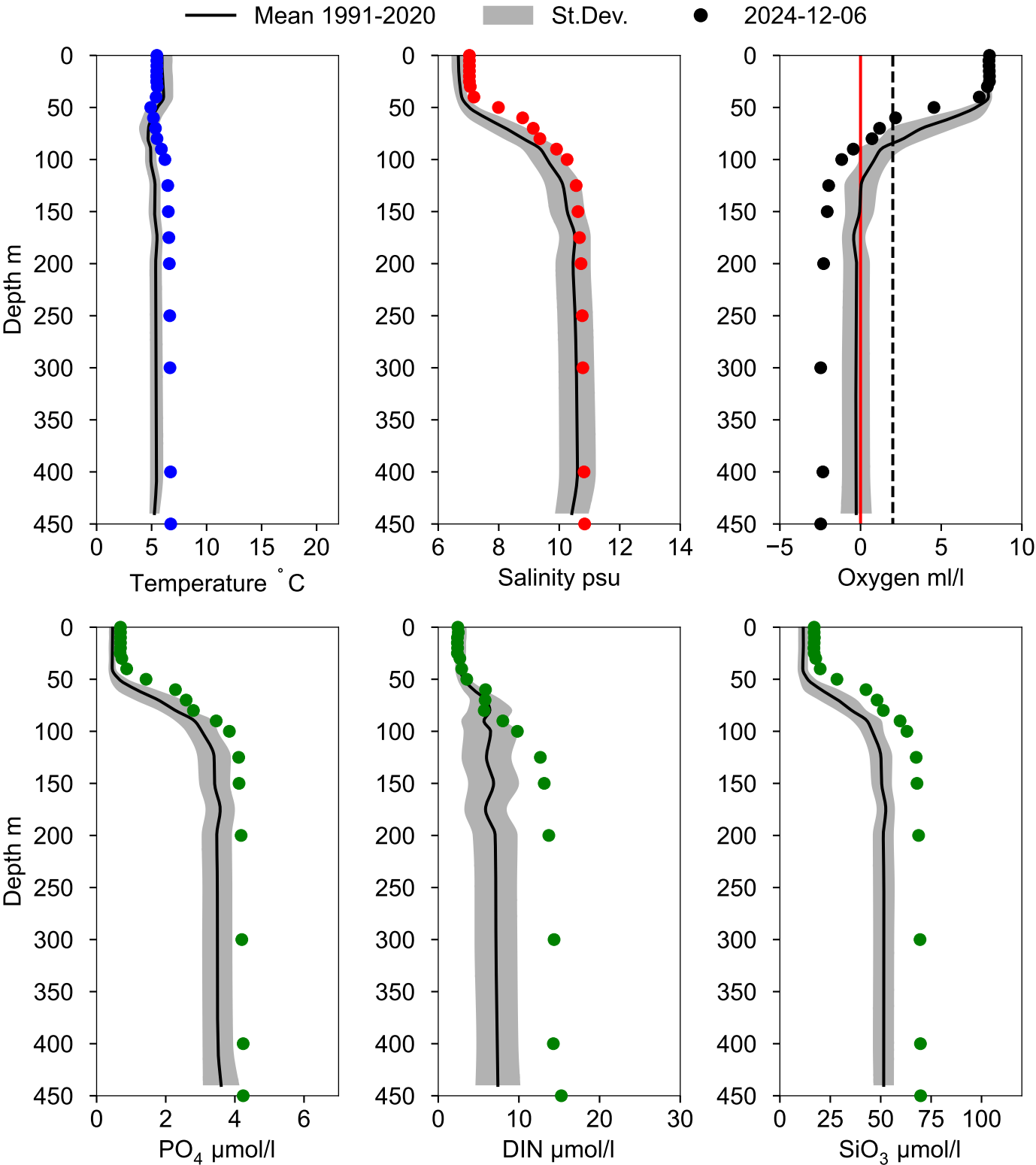
● 2024



OXYGEN IN BOTTOM WATER (depth >= 419 m)



Vertical profiles BY31 LANDSORTSDJ
December



STATION 10E ALMAGRUNDET SURFACE WATER (0-10 m)

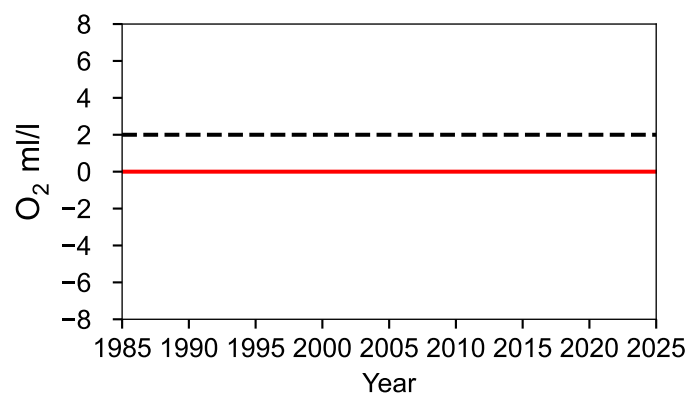
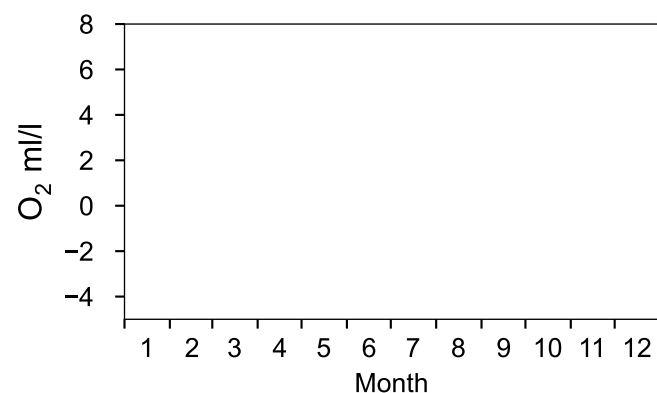
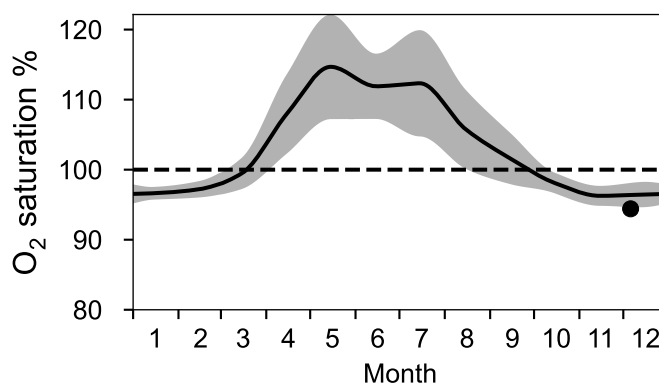
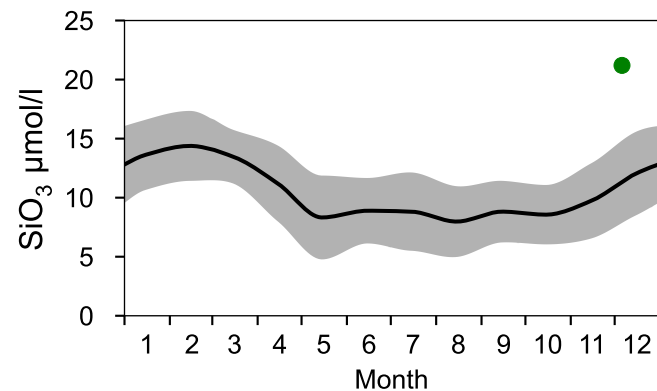
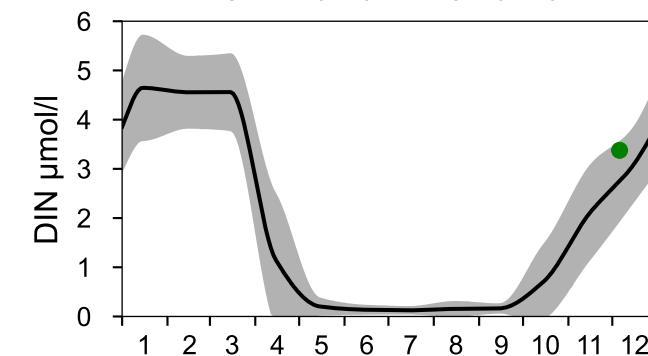
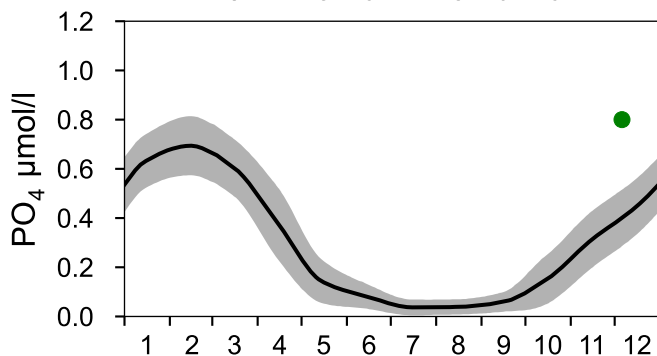
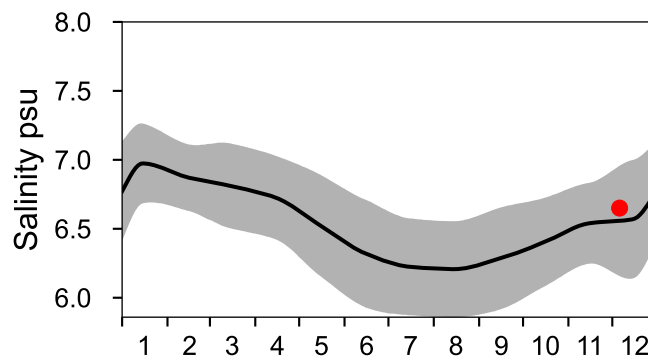
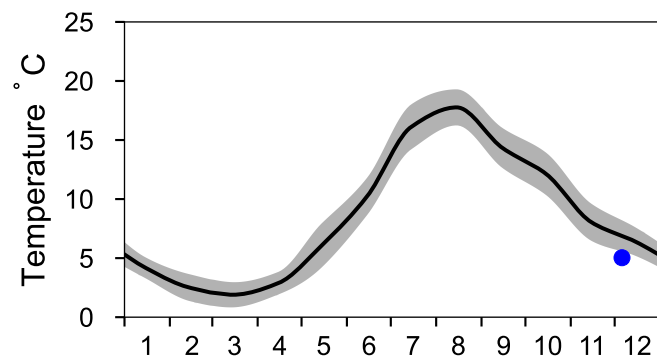
Annual Cycles

Statistics based on data from: Norra Egentliga Östersjön

— Mean 1991-2020

■ St.Dev.

● 2024



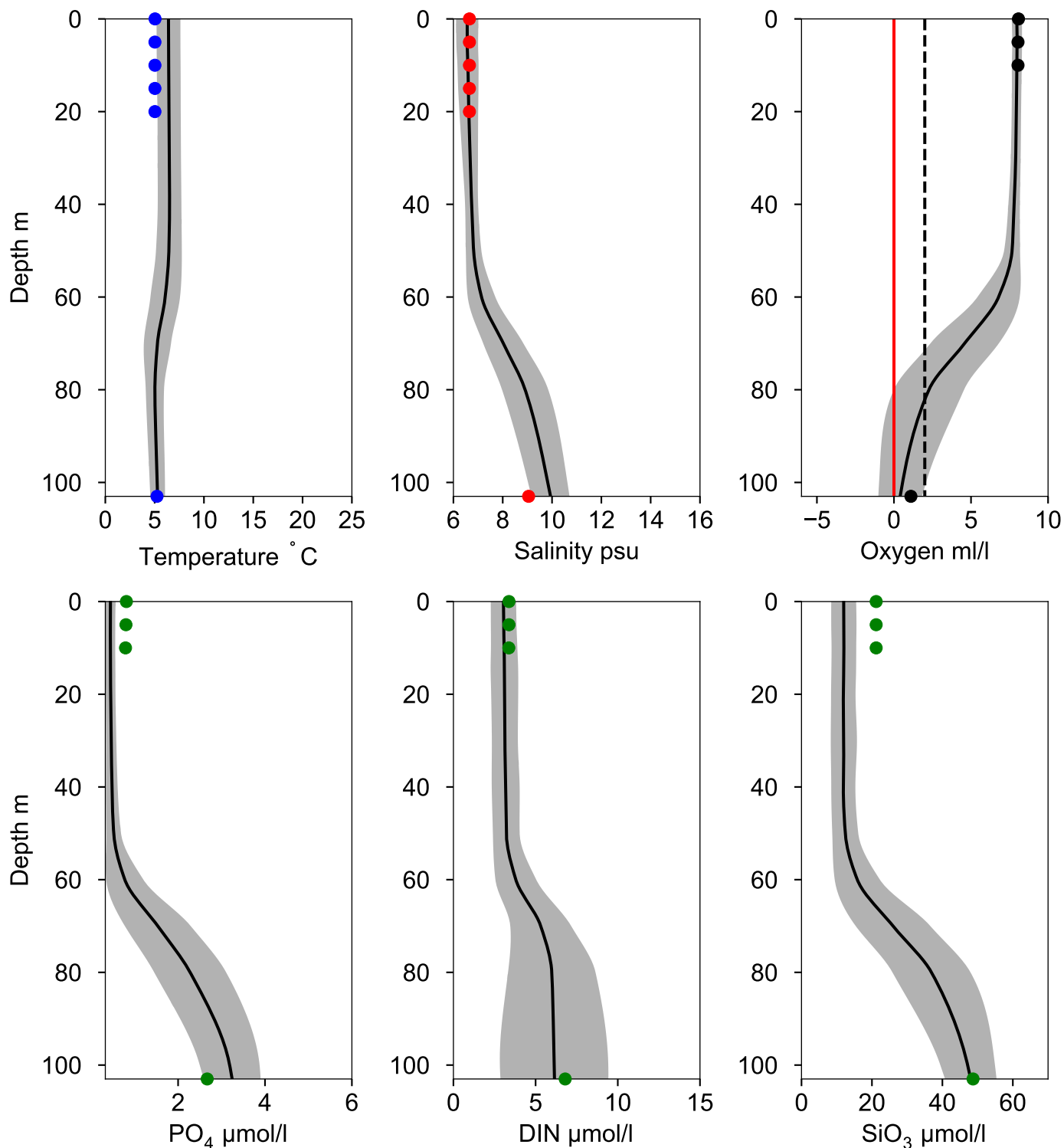
Vertical profiles 10E ALMAGRUNDET December

Statistics based on data from: Norra Egentliga Östersjön

— Mean 1991-2020

■ St.Dev.

● 2024-12-06

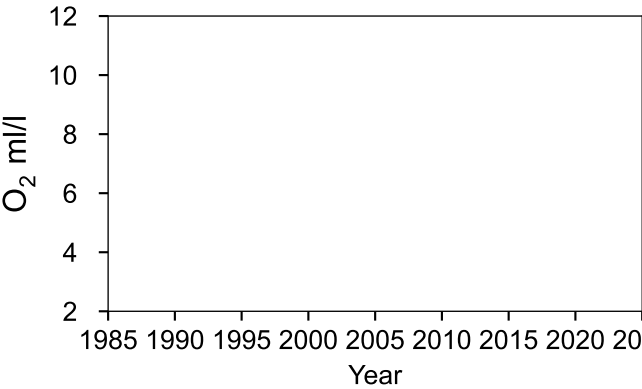
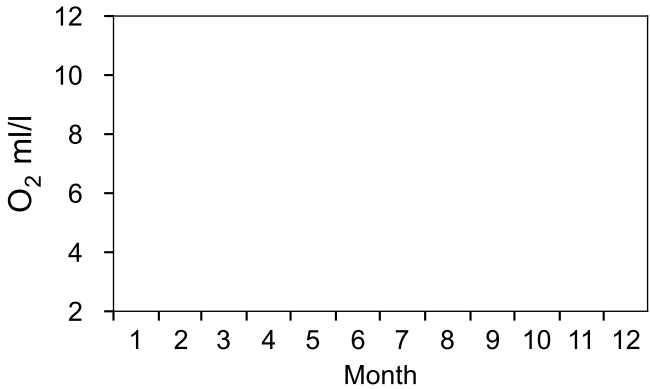
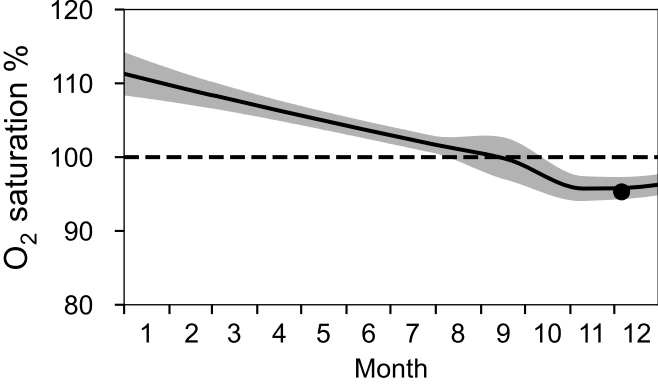
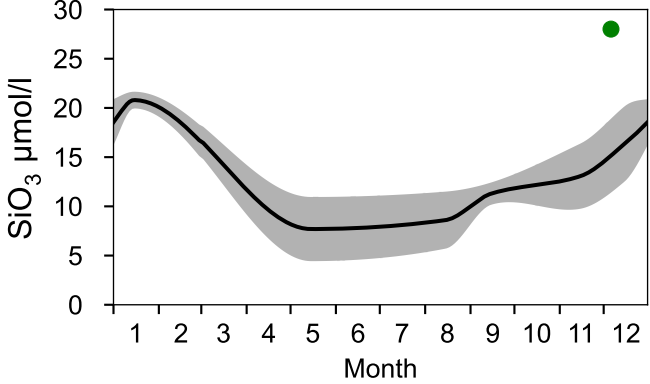
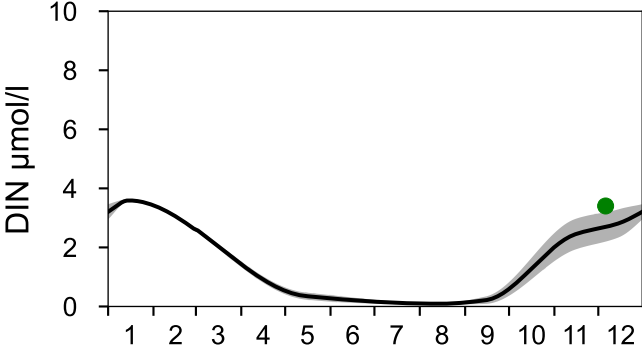
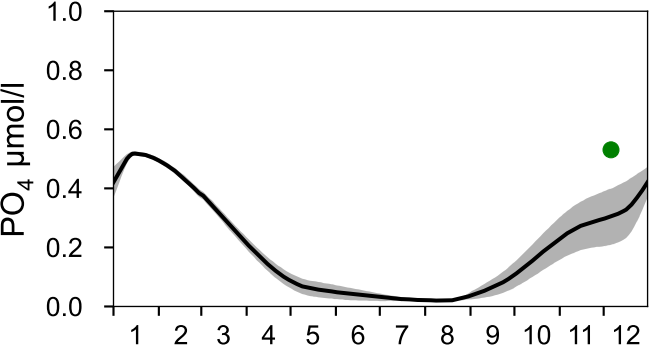
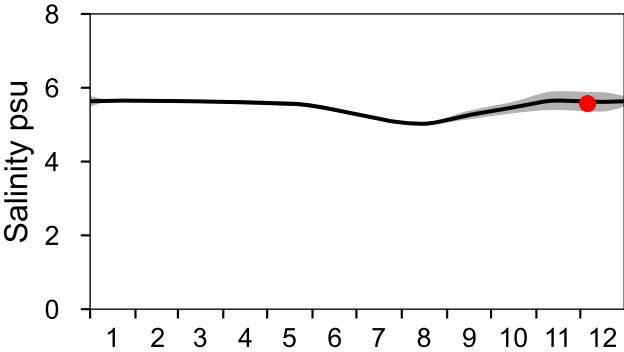
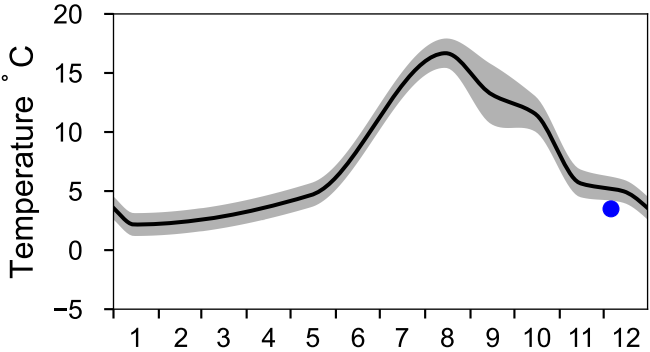


STATION F64 SOLOVJEVA SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Ålands hav

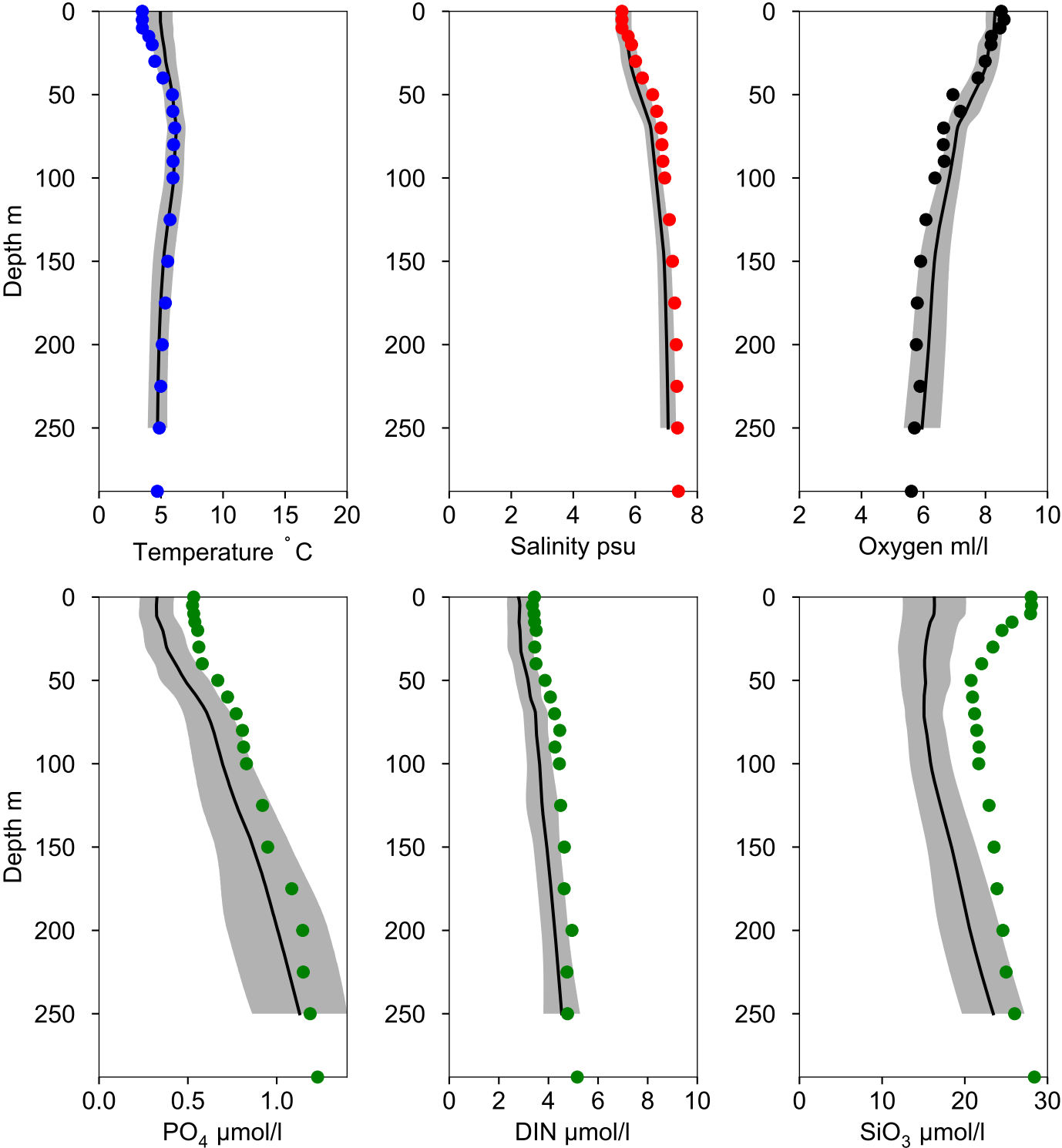
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles F64 SOLOVJEVA December

Statistics based on data from: Ålands hav

— Mean 1991-2020 St.Dev. ● 2024-12-06

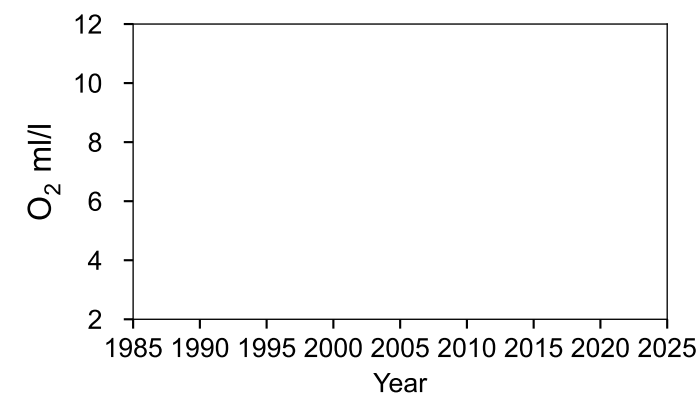
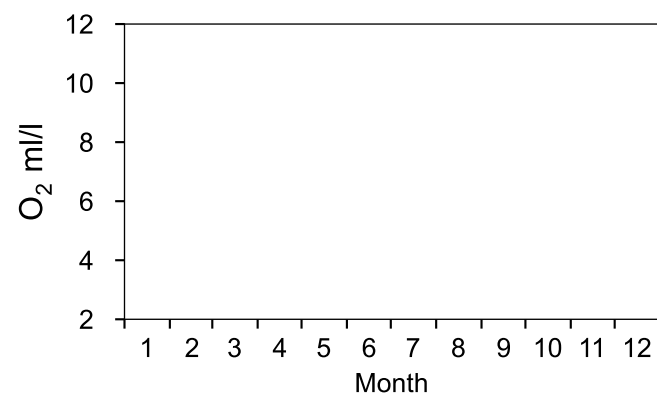
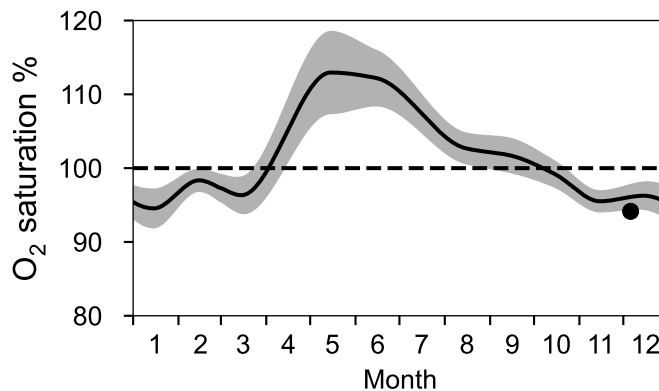
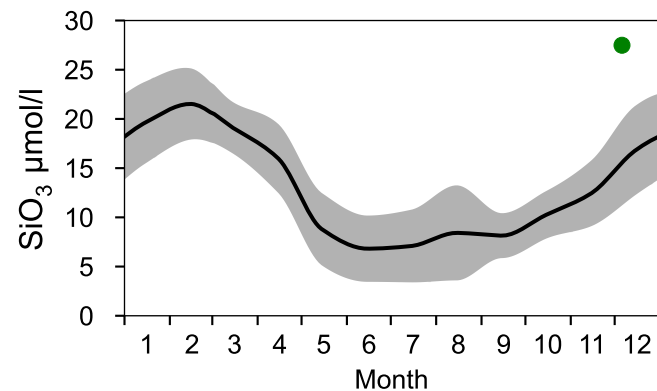
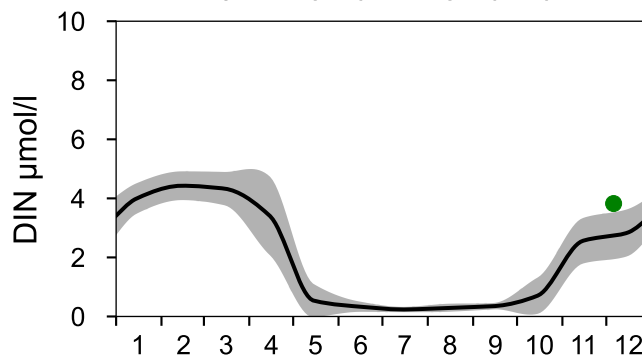
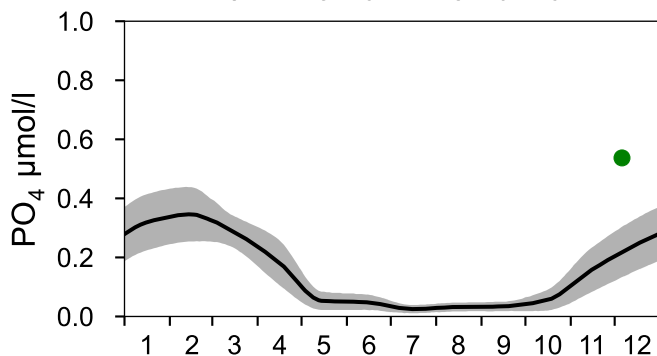
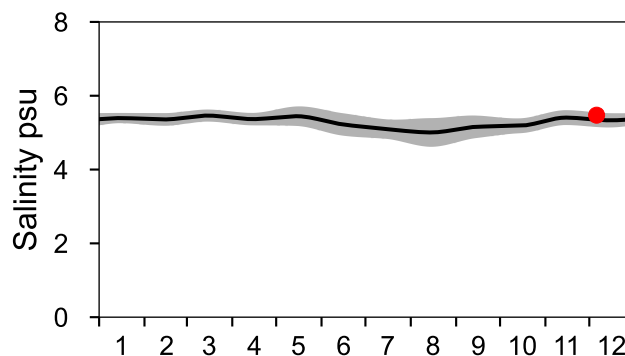
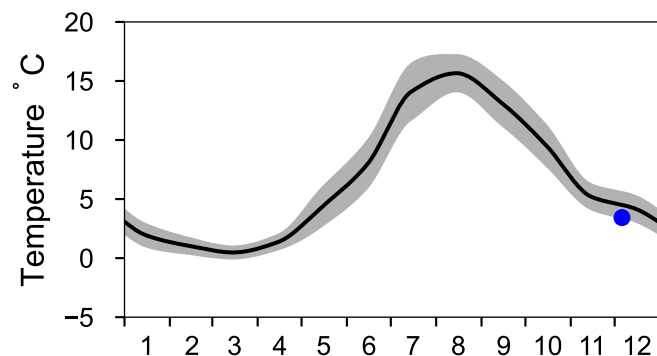


STATION F33 GRUNDKALLEN SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

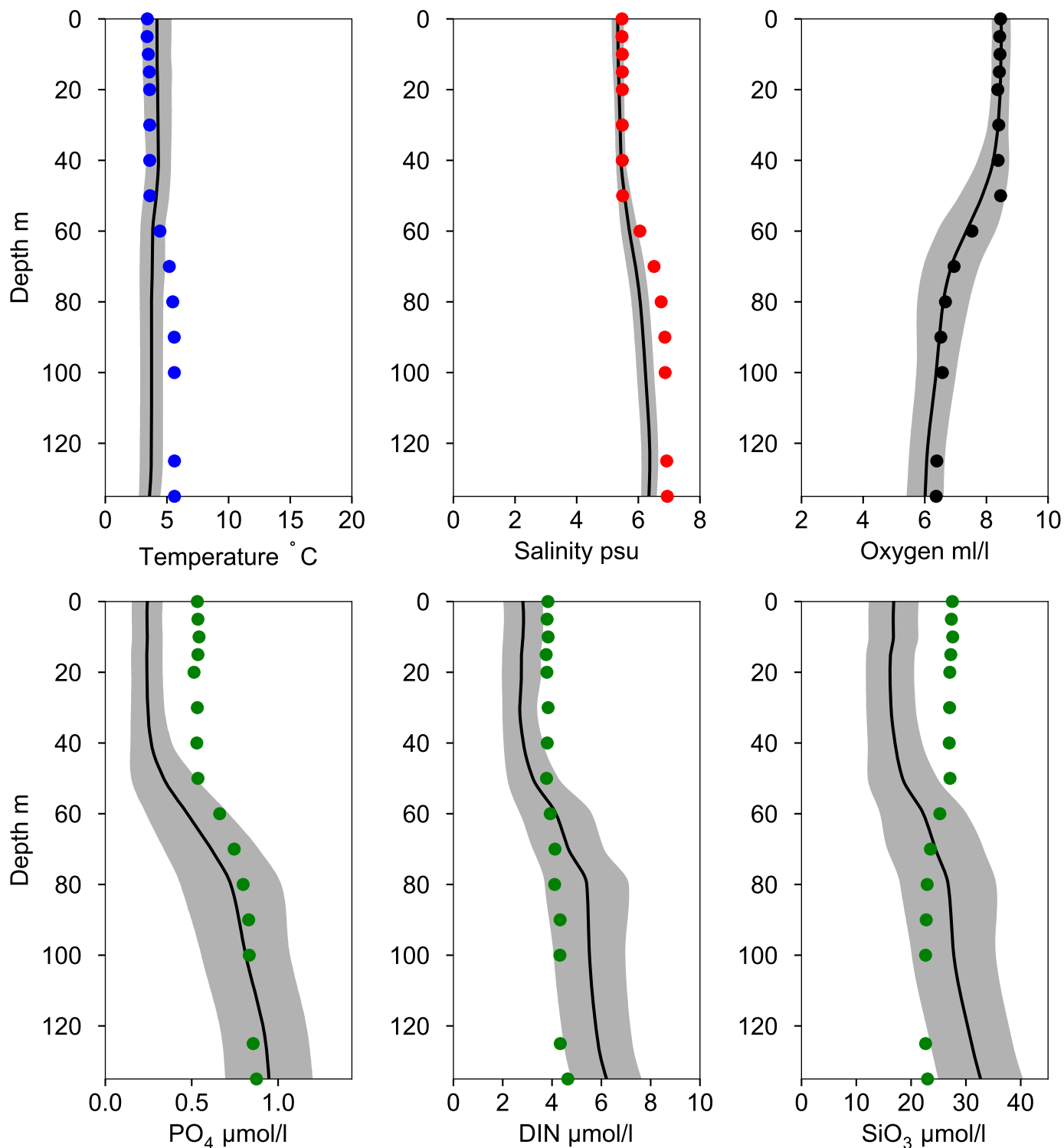
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles F33 GRUNDKALLEN December

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024-12-06

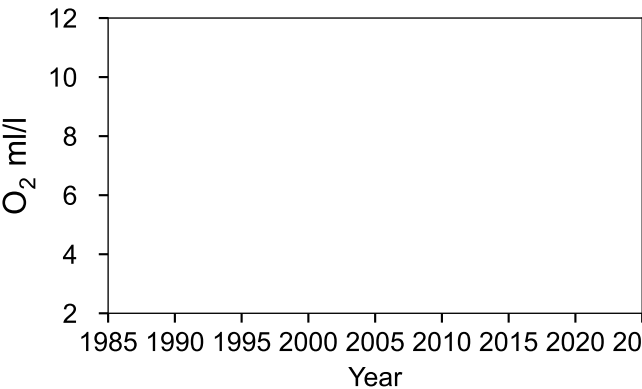
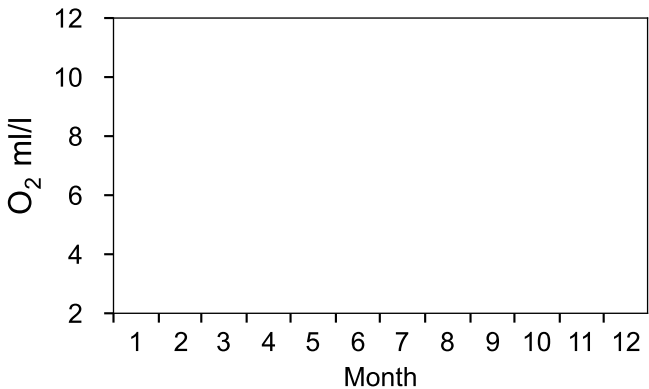
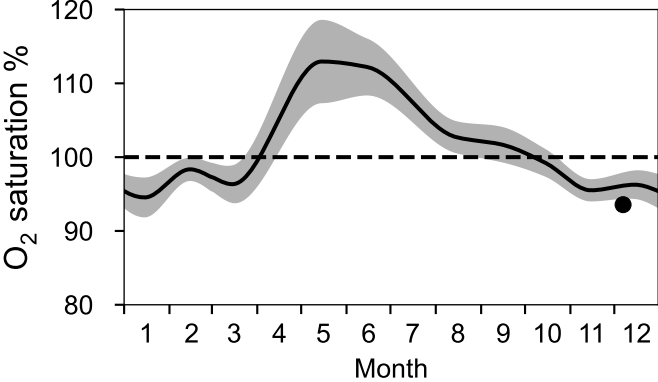
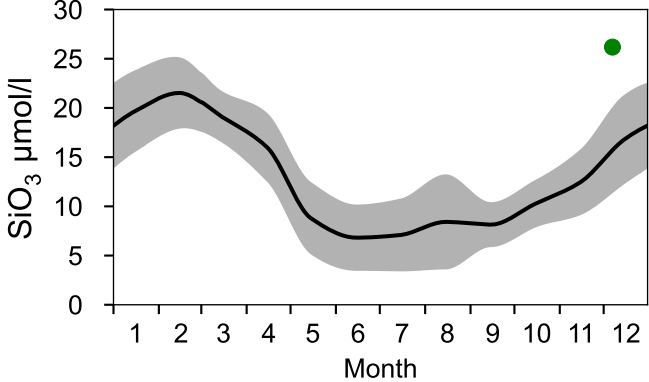
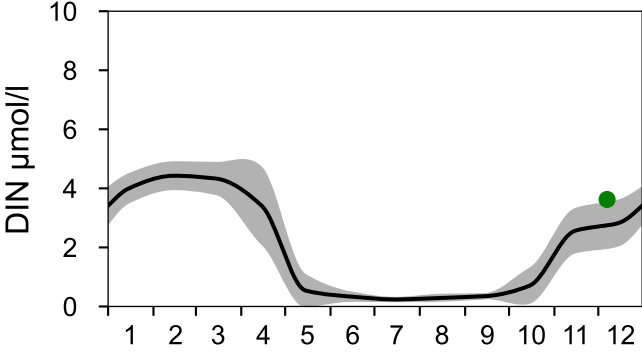
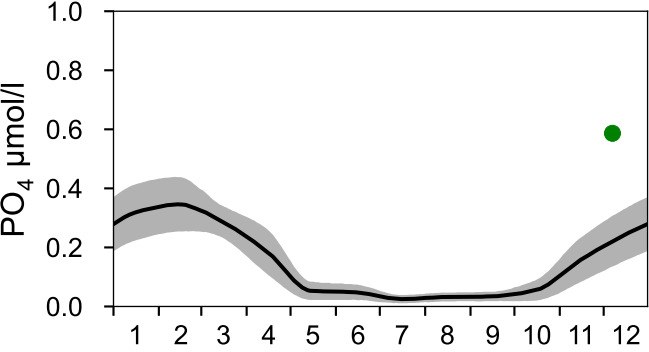
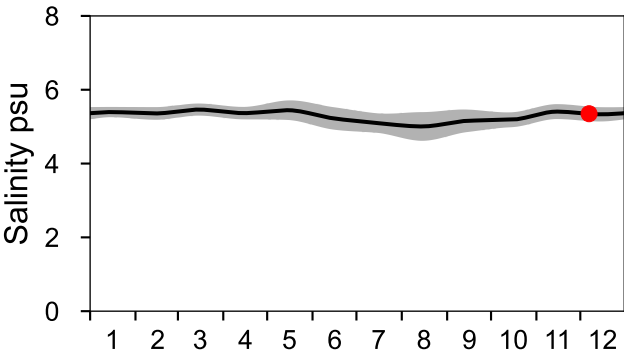
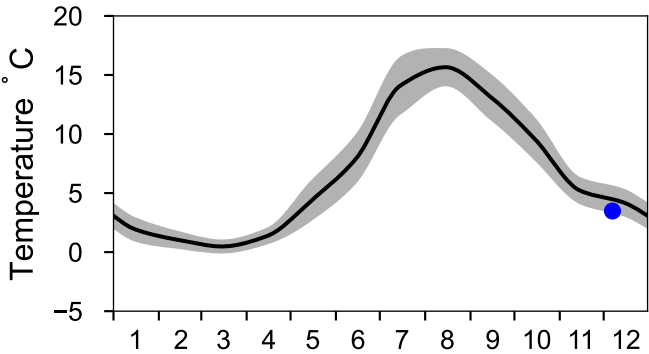


STATION SR1A/C11 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

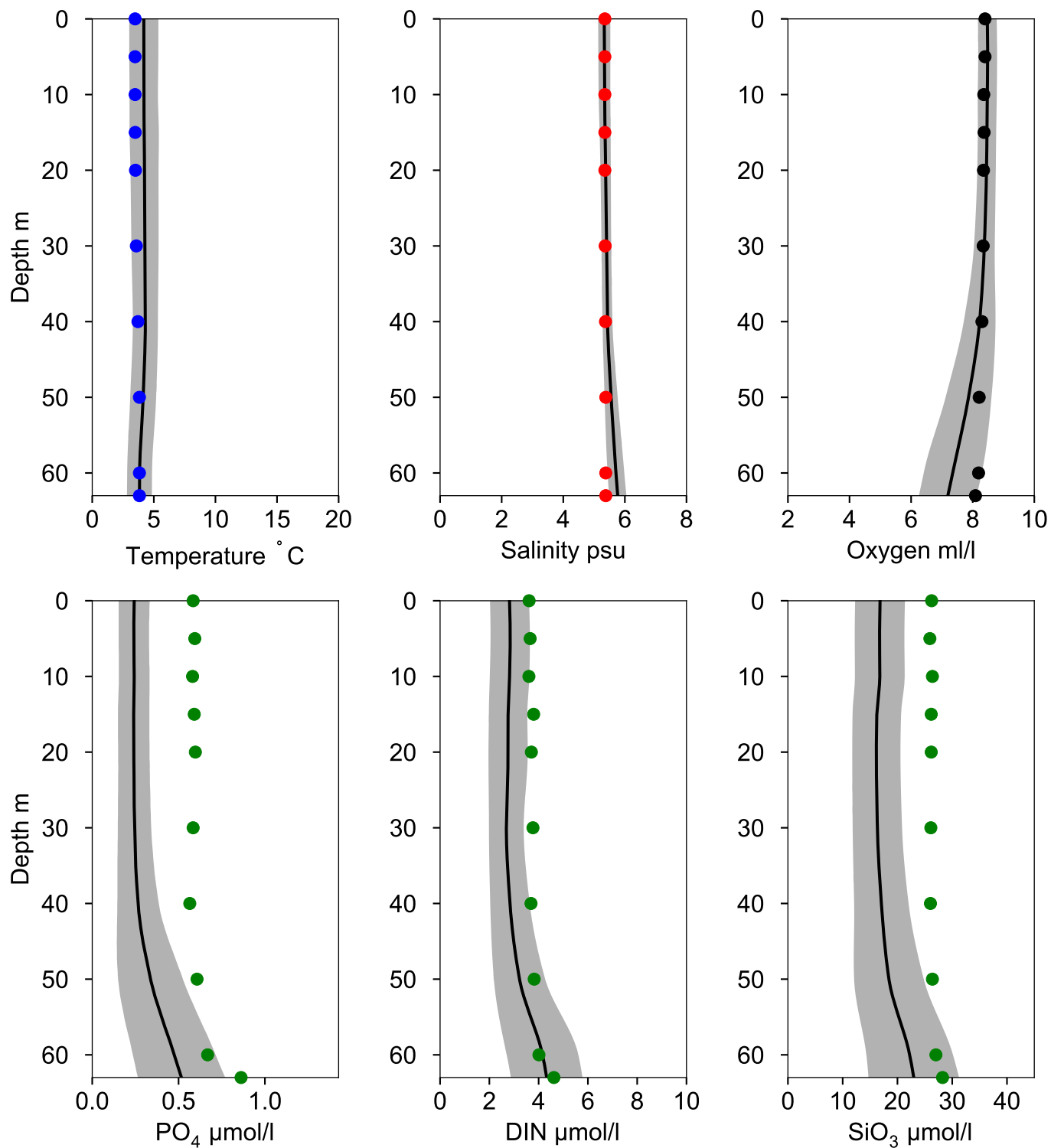
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles SR1A/C11 December

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024-12-07

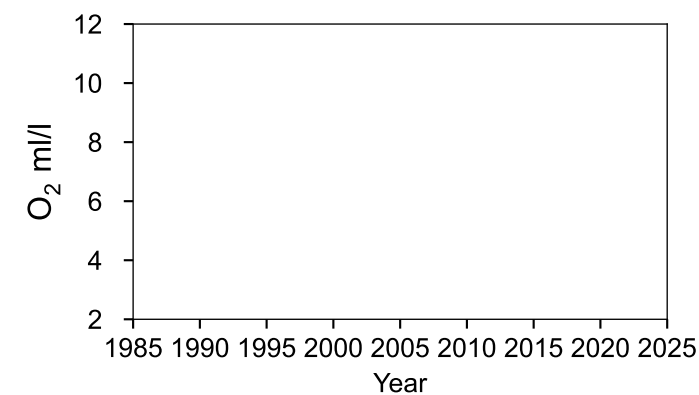
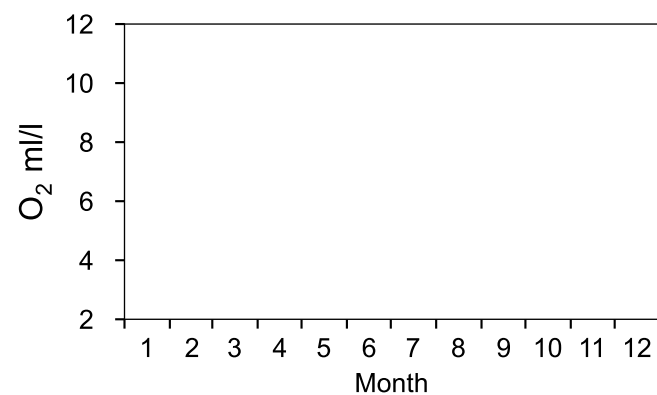
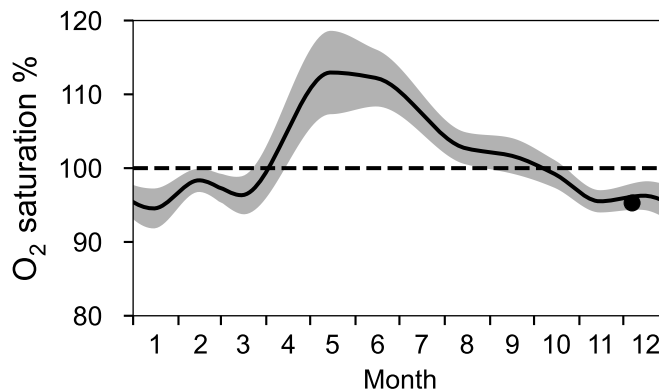
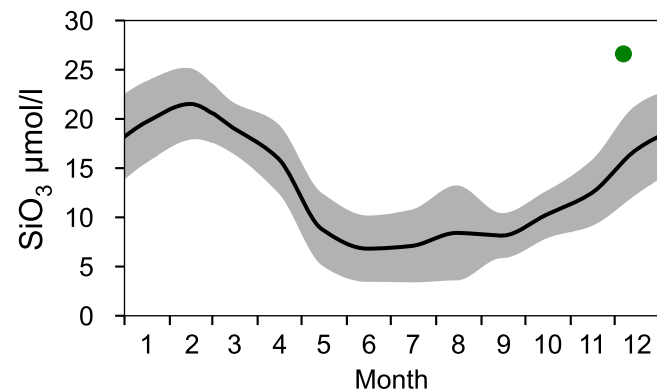
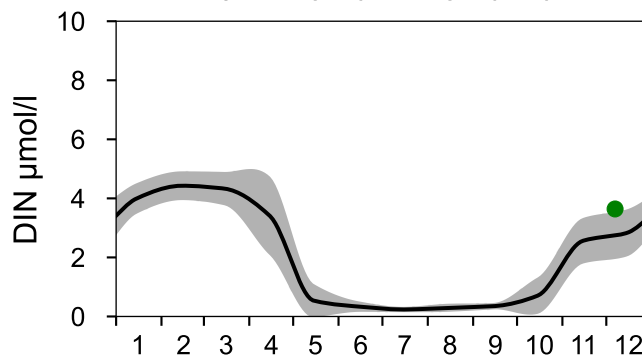
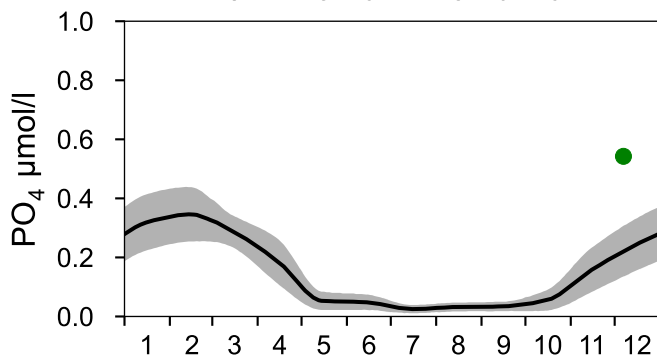
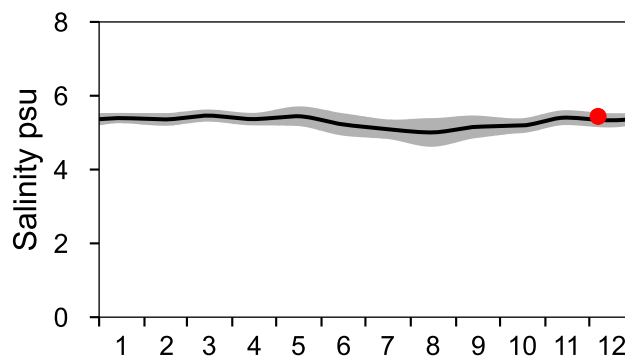
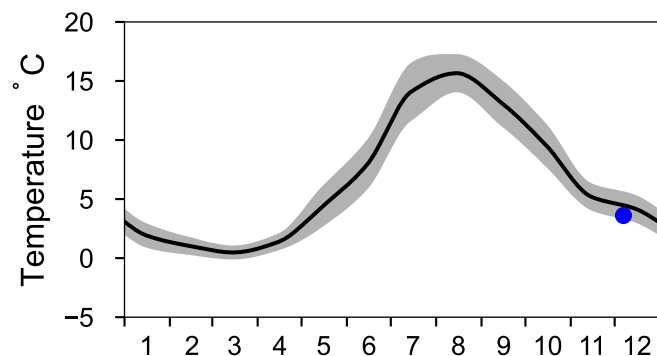


STATION SR3/C24 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

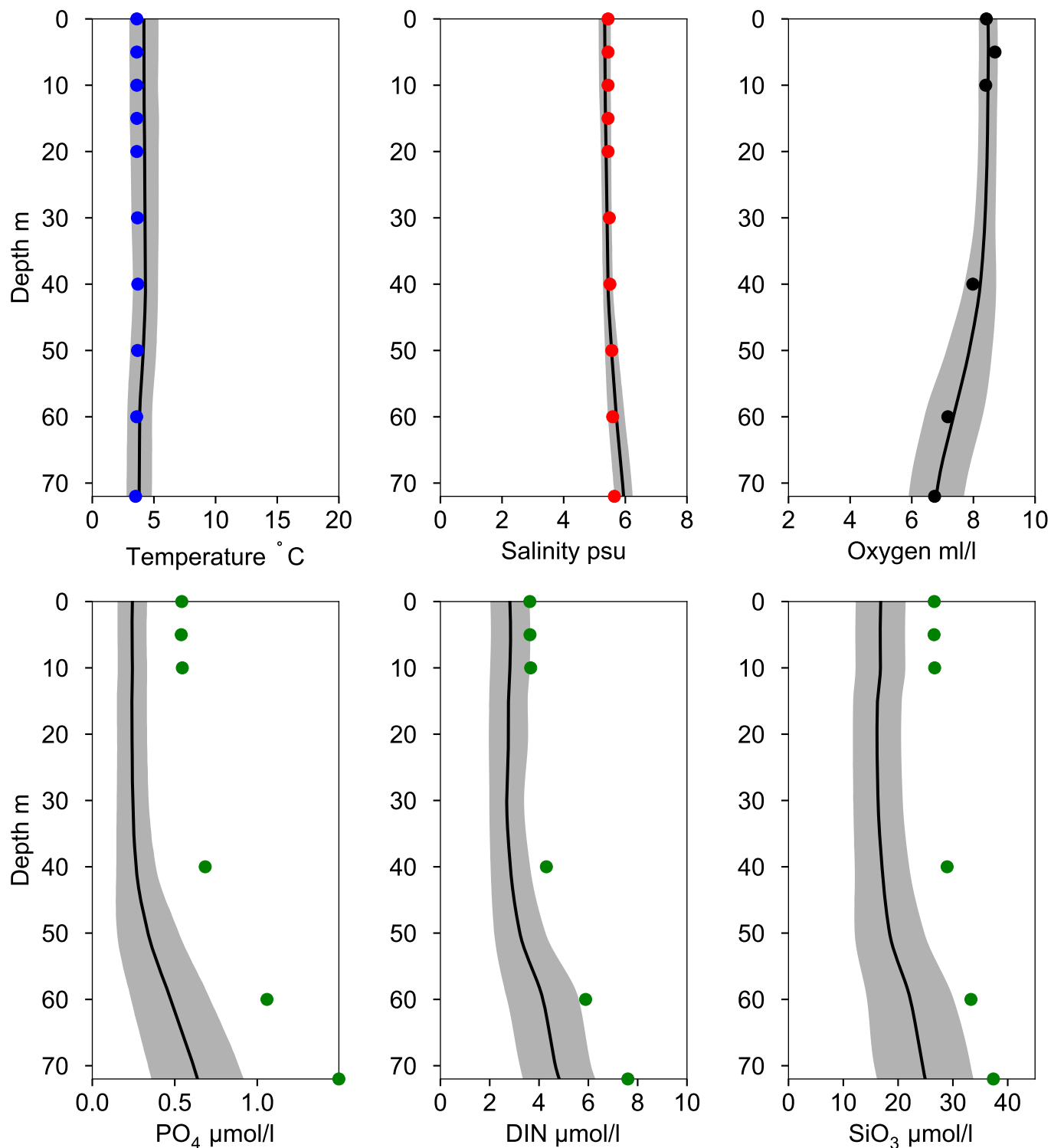
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles SR3/C24 December

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024-12-07

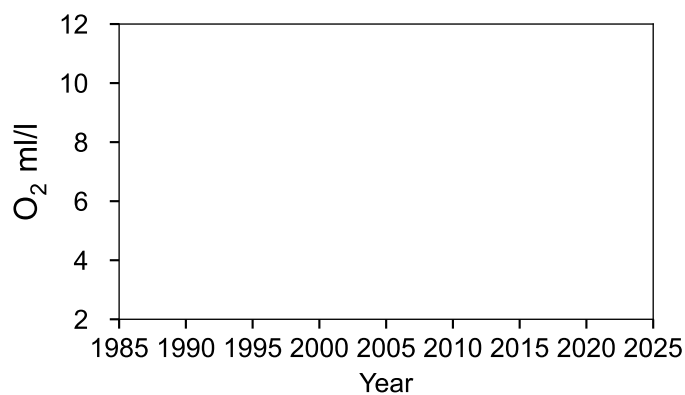
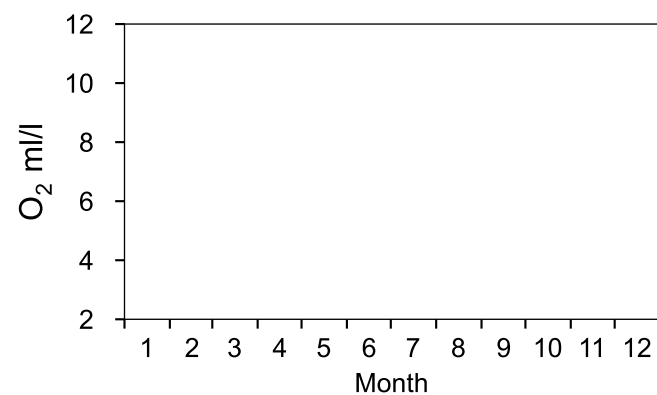
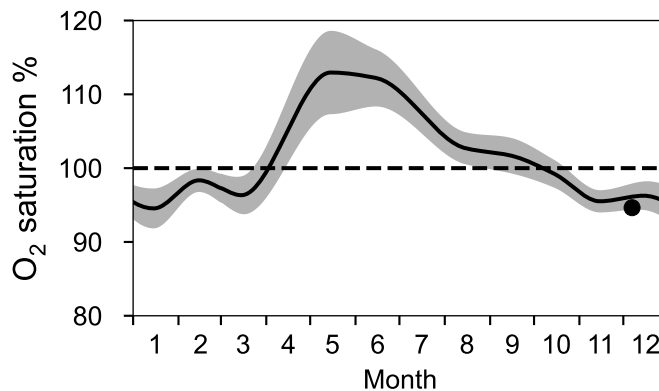
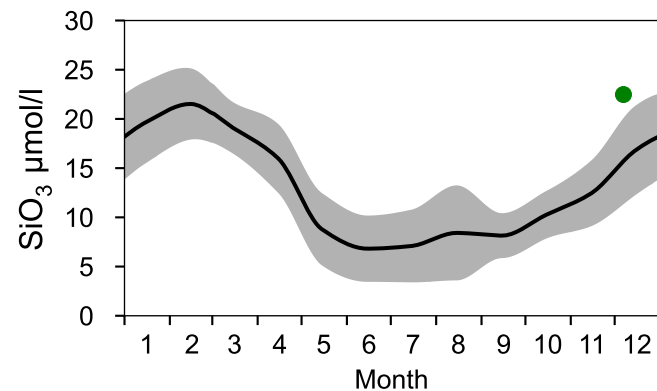
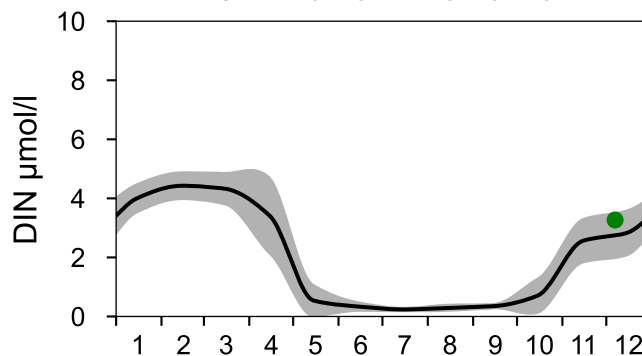
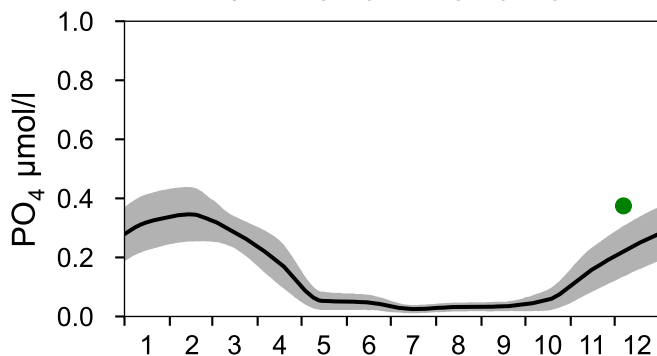
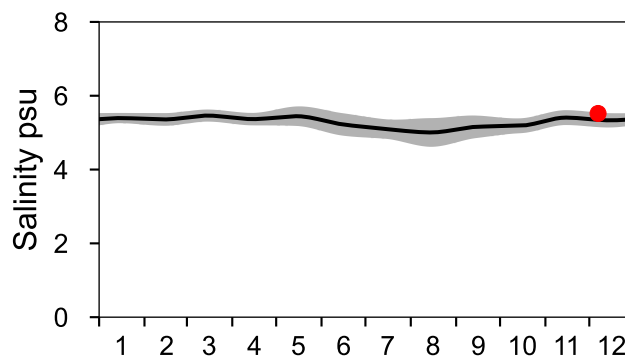
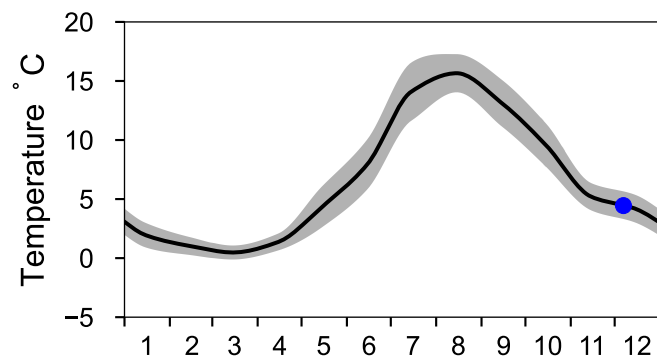


STATION MS6 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

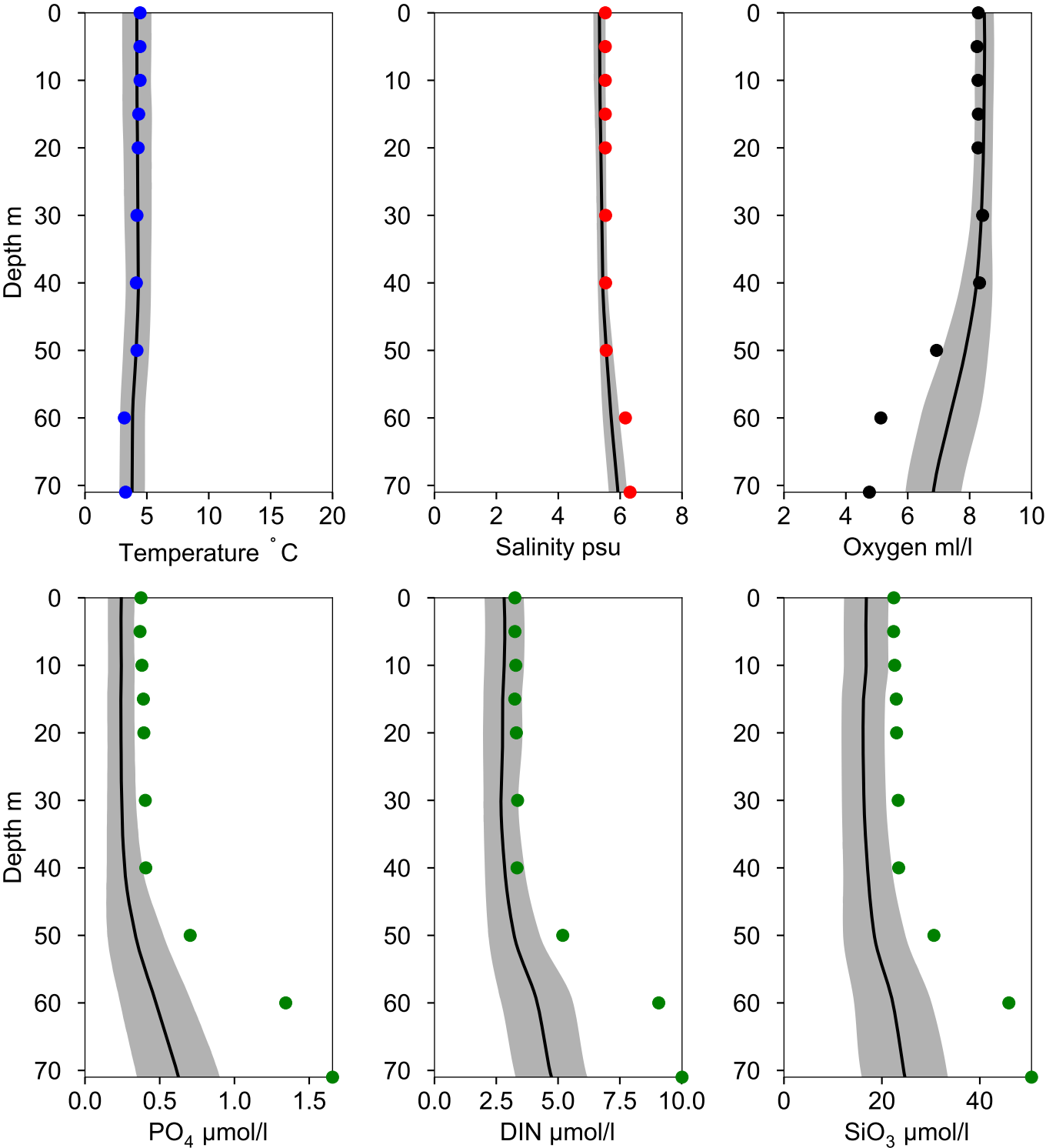
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles MS6 December

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024-12-07



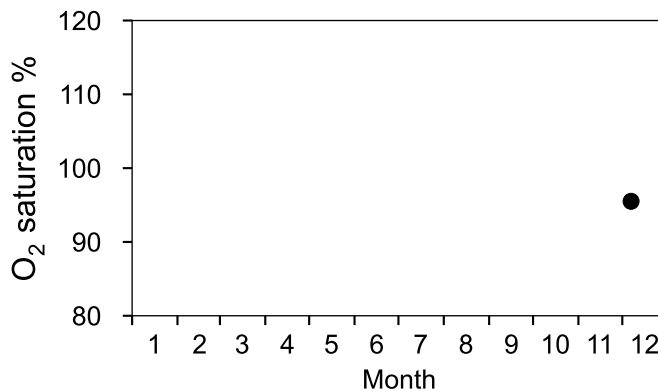
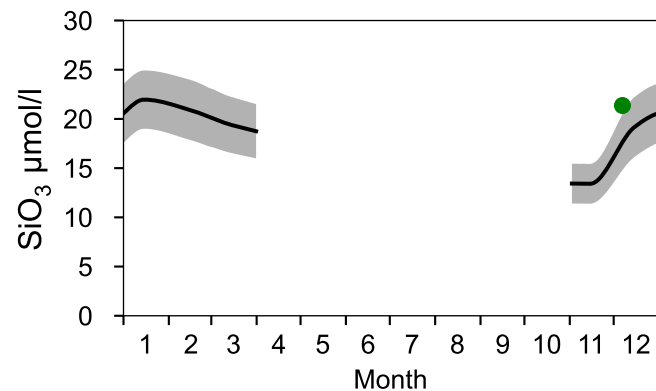
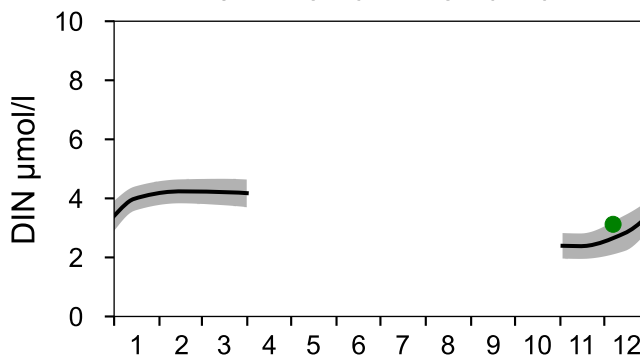
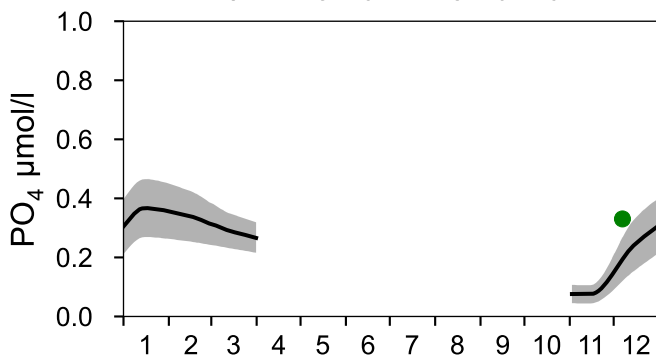
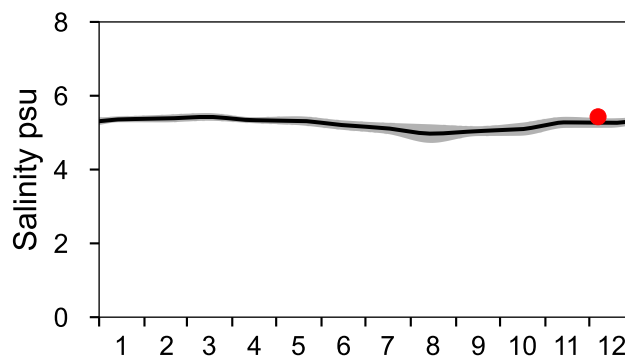
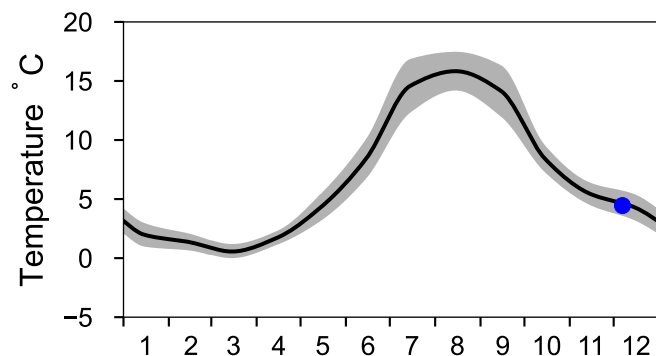
STATION MS4 / C14 SURFACE WATER (0-10 m)

Annual Cycles

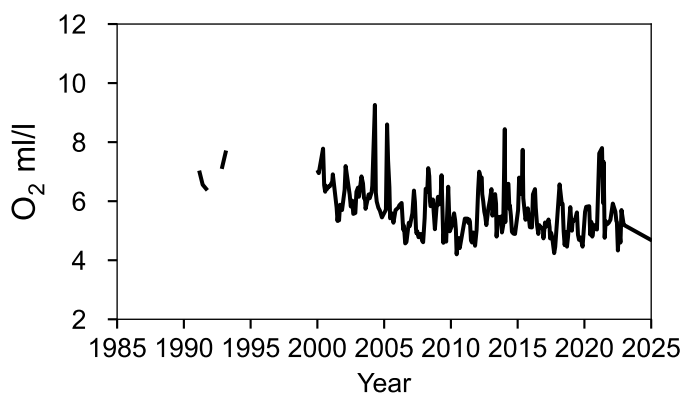
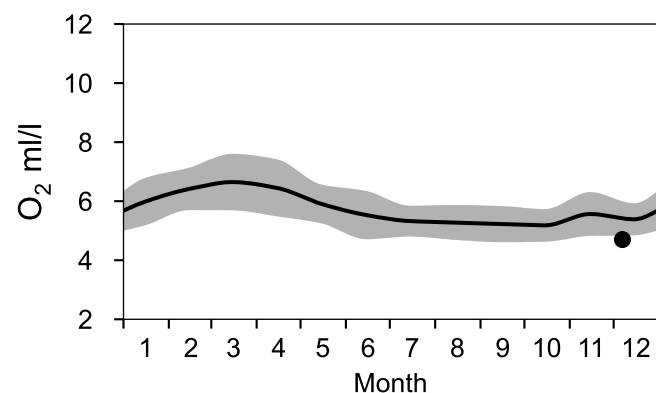
— Mean 1991-2020

■ St.Dev.

● 2024

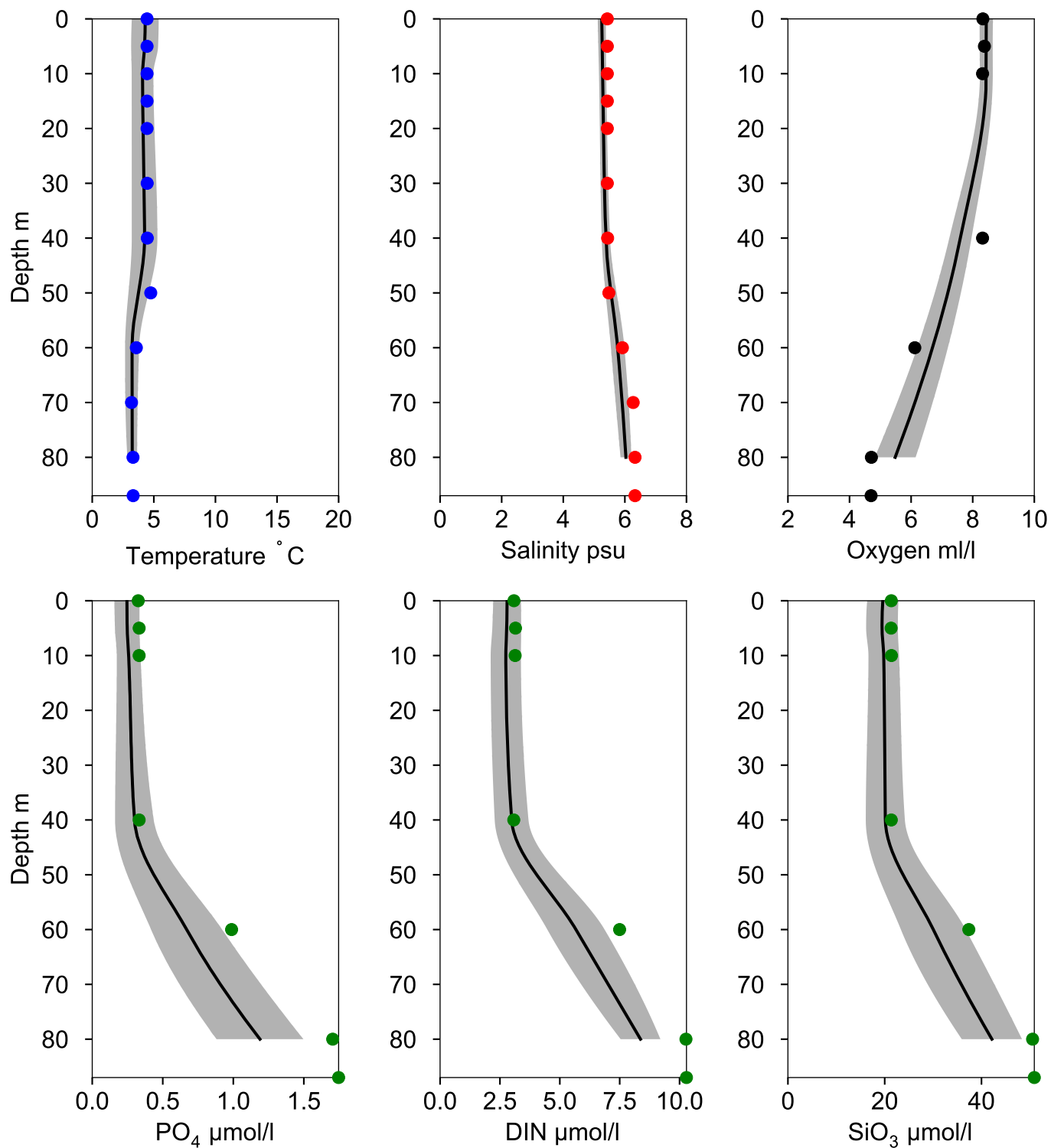


OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles MS4 / C14 December

— Mean 1991-2020 St.Dev. ● 2024-12-07

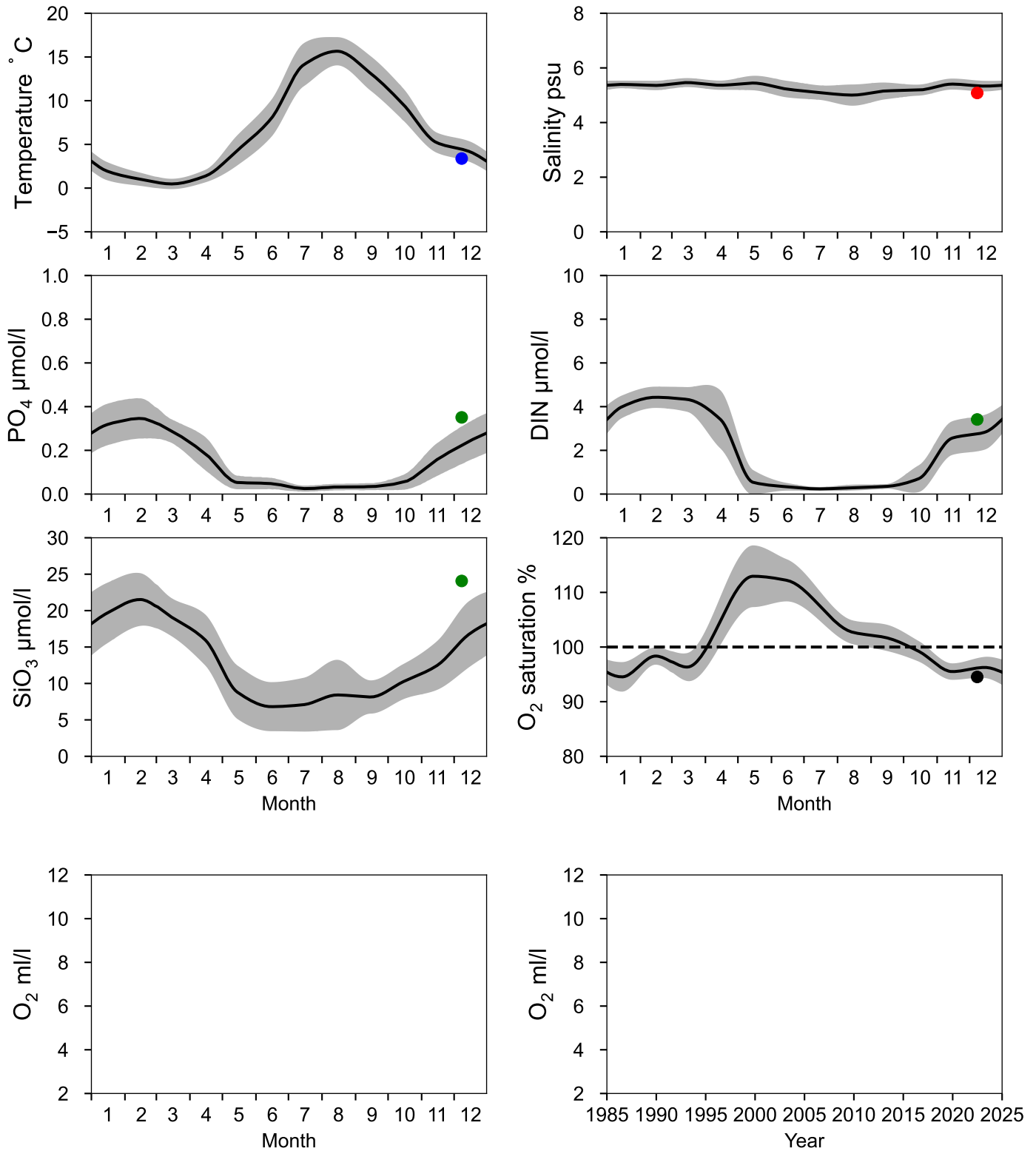


STATION MS2/C13 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

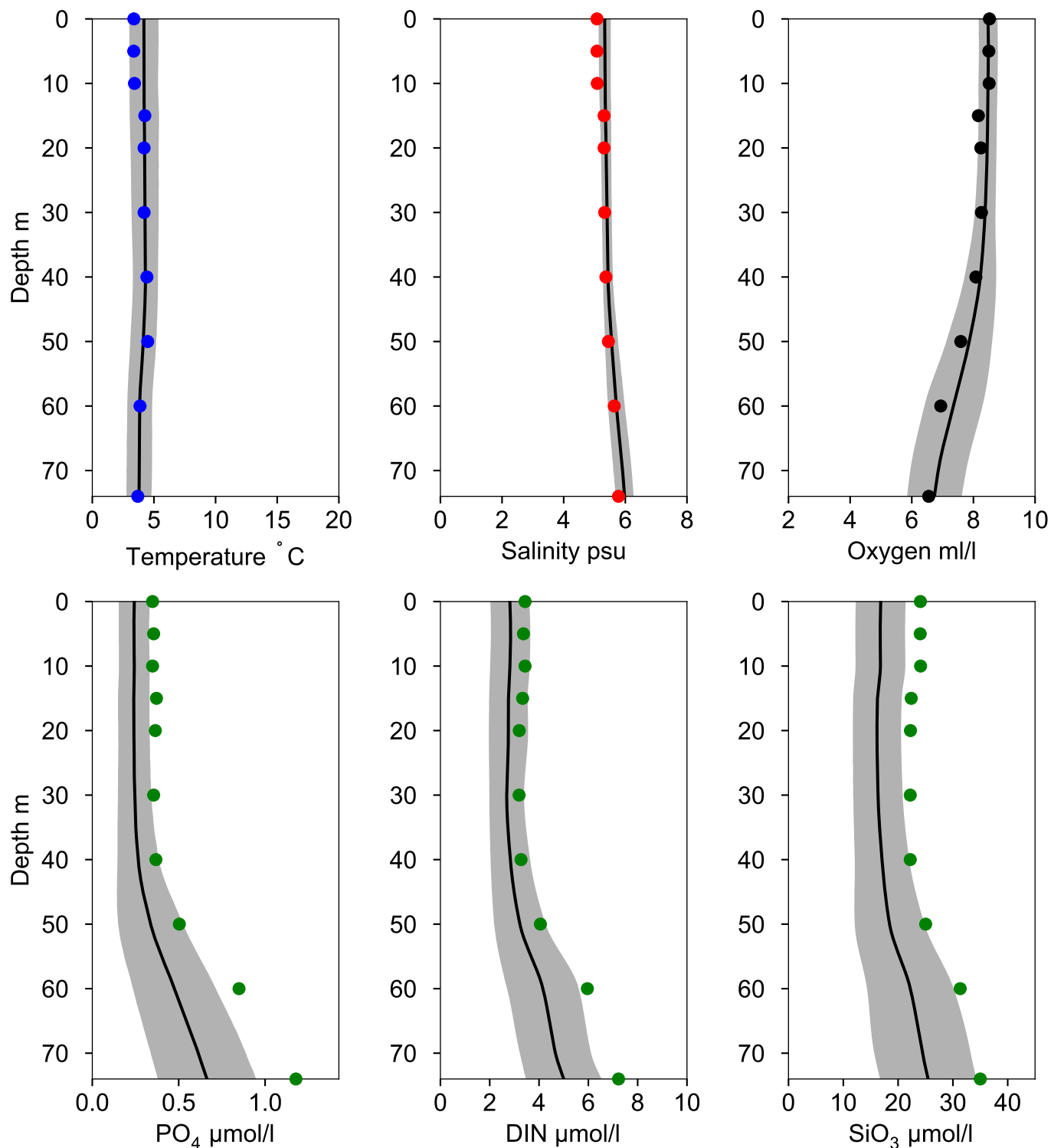
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles MS2/C13 December

Statistics based on data from: Bottenhavet

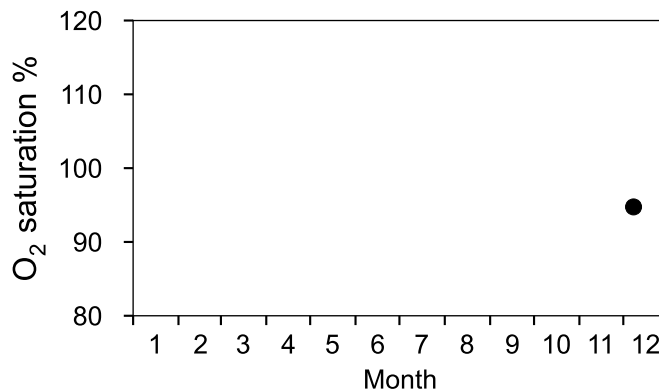
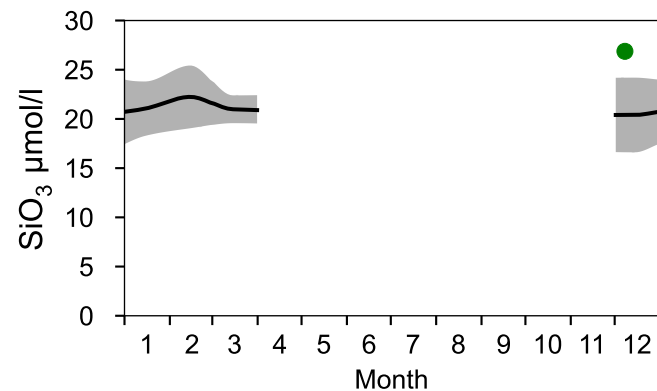
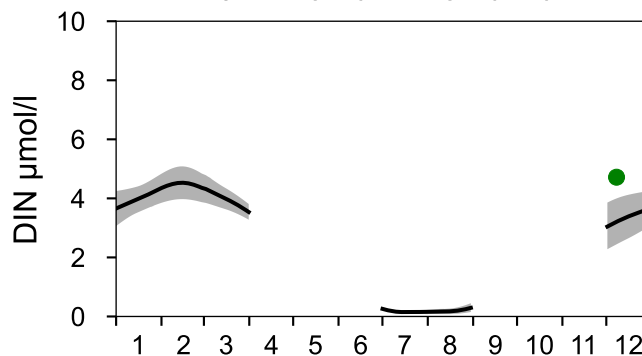
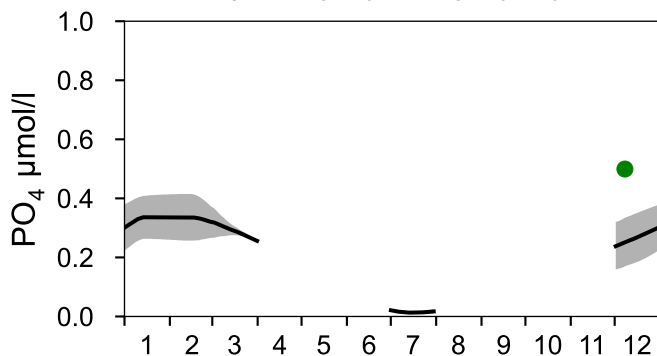
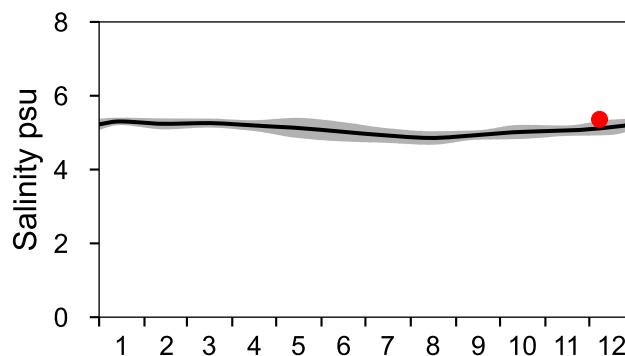
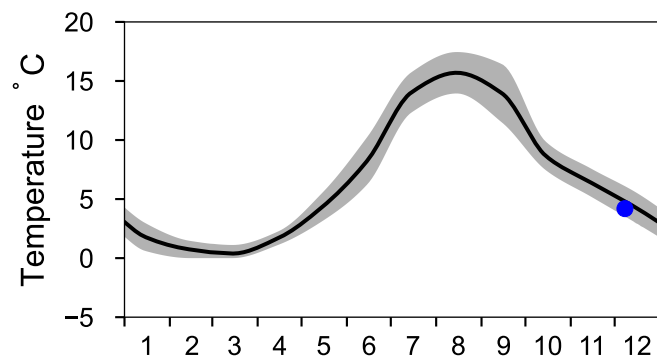
— Mean 1991-2020 St.Dev. ● 2024-12-08



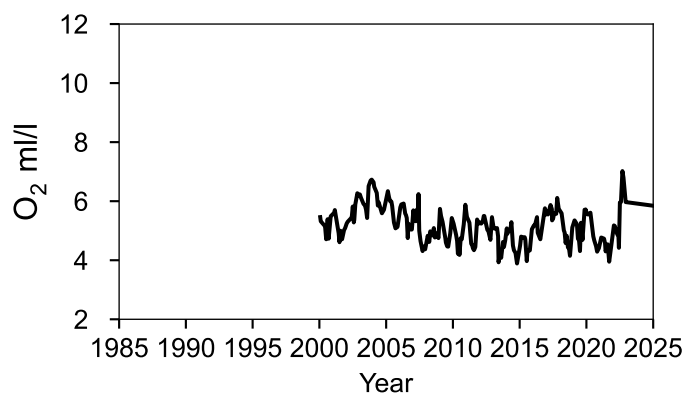
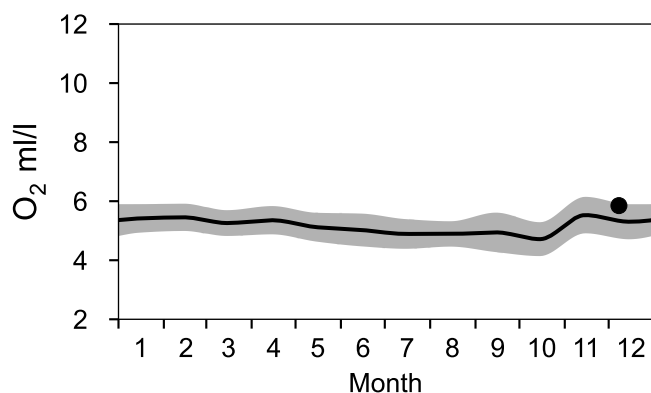
STATION C3 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 1991-2020 St.Dev. ● 2024



OXYGEN IN BOTTOM WATER (depth >= 184 m)

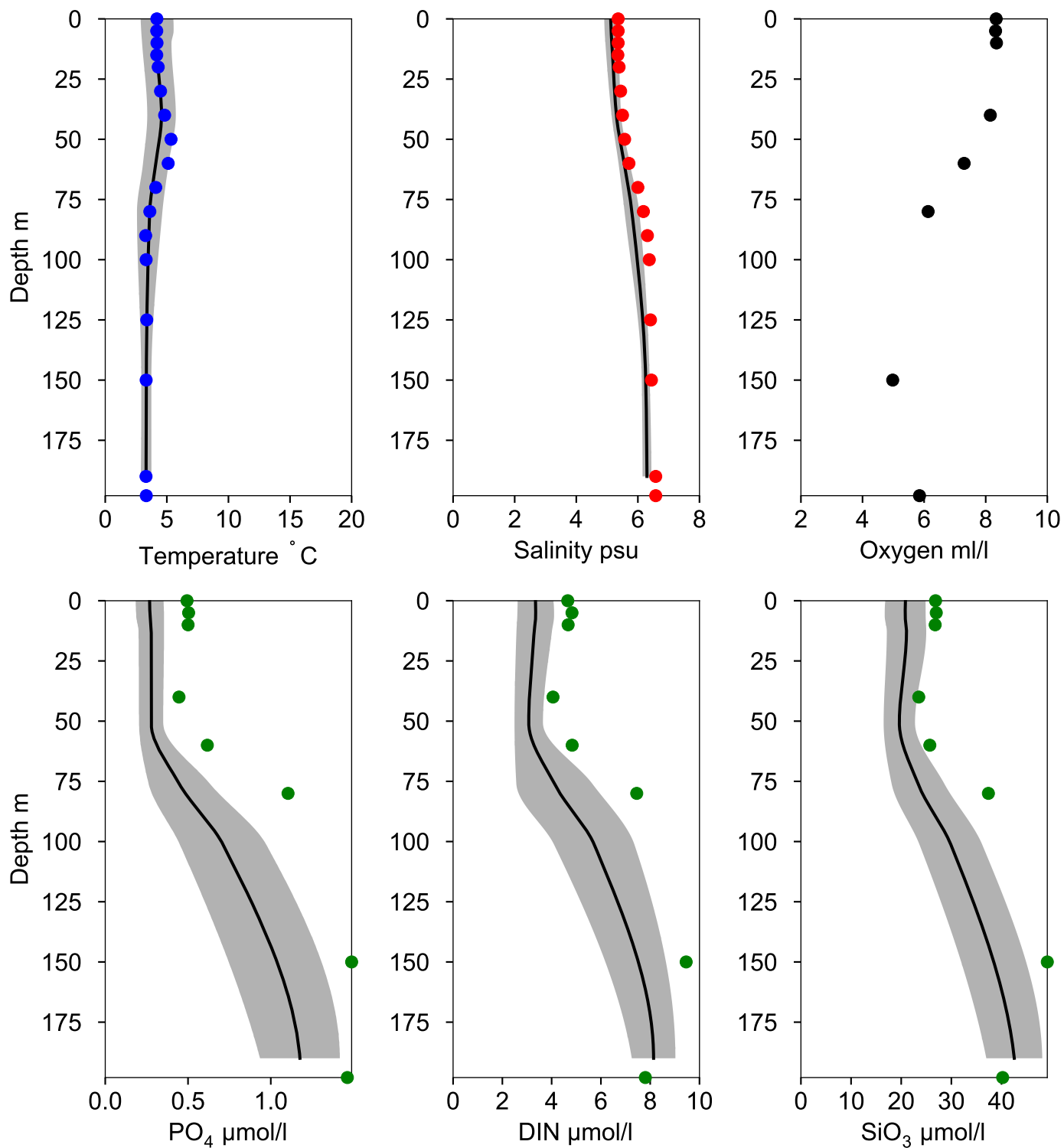


Vertical profiles C3 December

— Mean 1991-2020

■ St.Dev.

● 2024-12-08



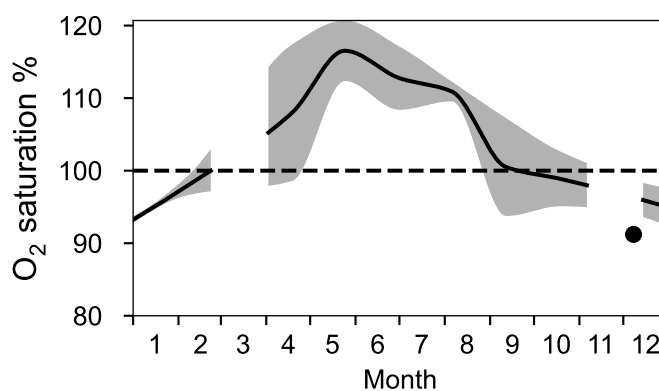
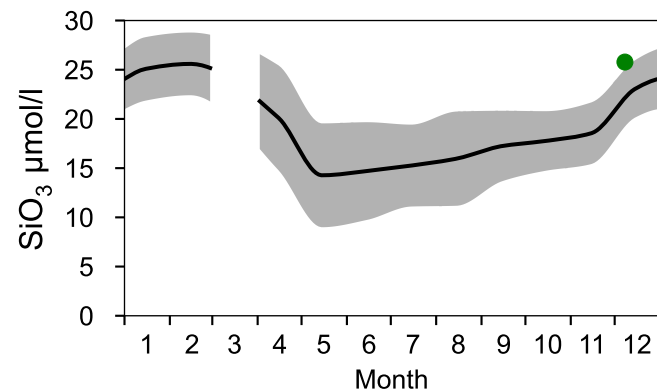
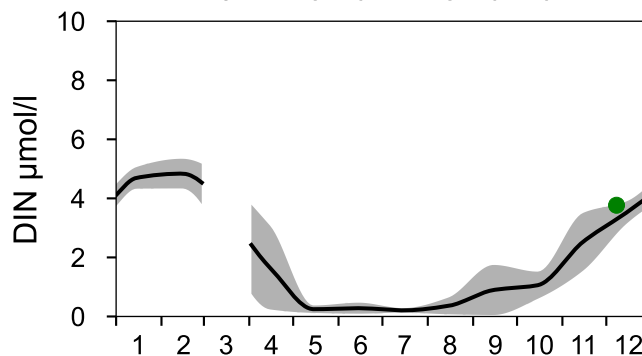
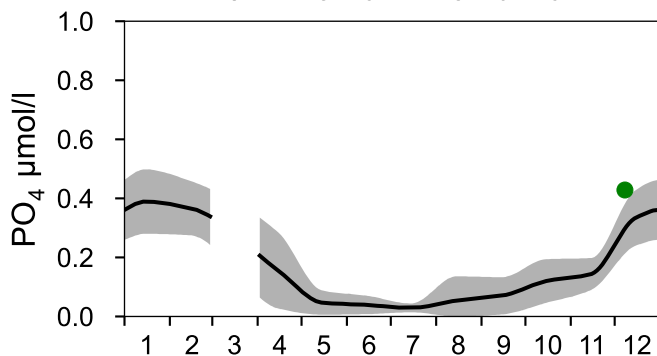
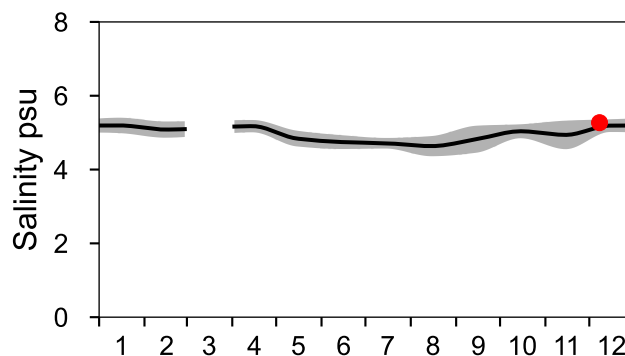
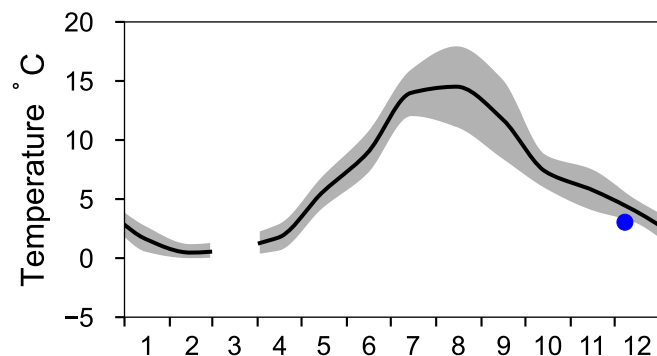
STATION GAVIK-1 SURFACE WATER (0-10 m)

Annual Cycles

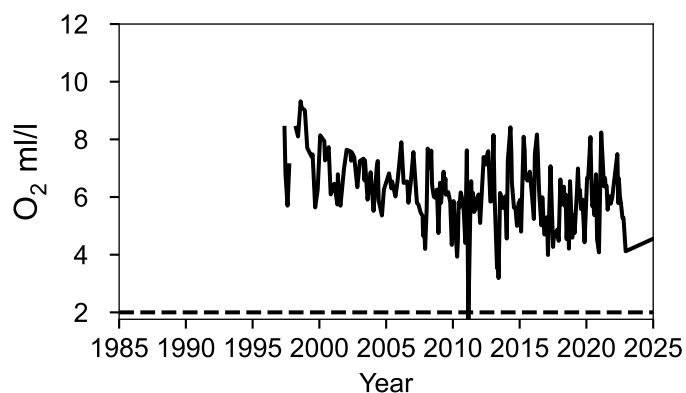
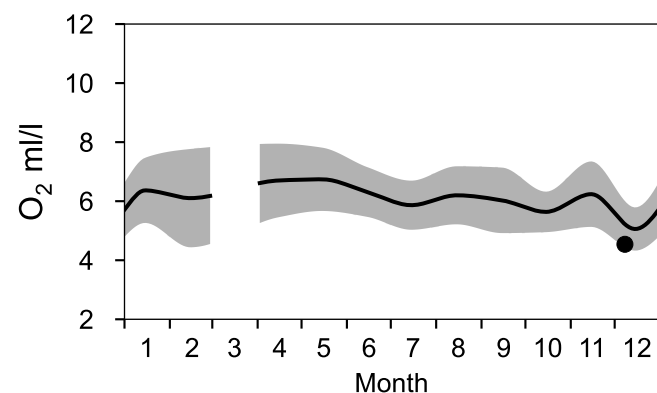
— Mean 1991-2020

■ St.Dev.

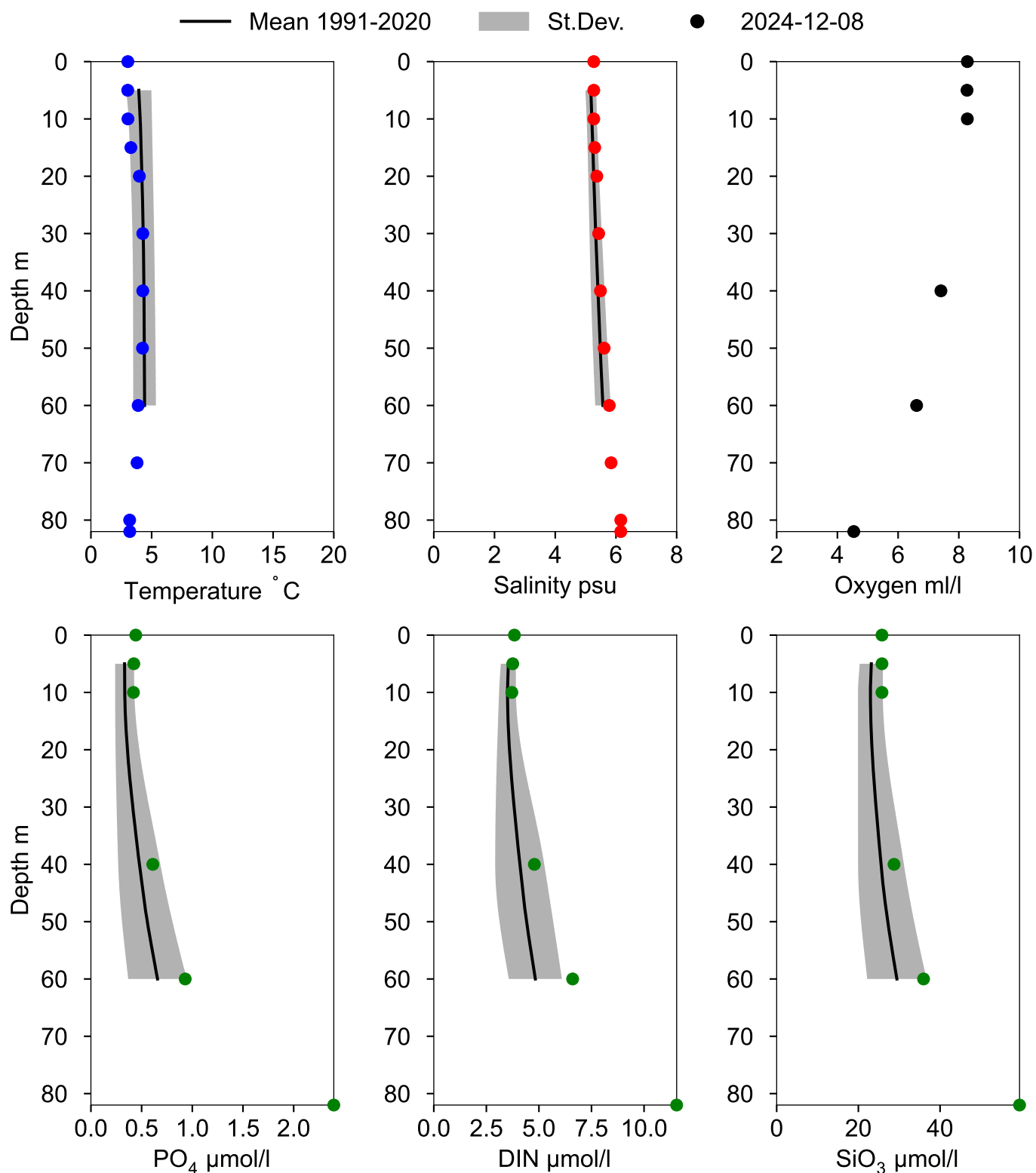
● 2024



OXYGEN IN BOTTOM WATER (depth >= 75 m)



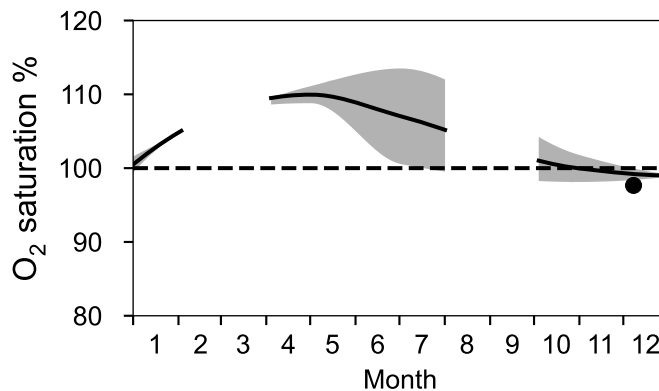
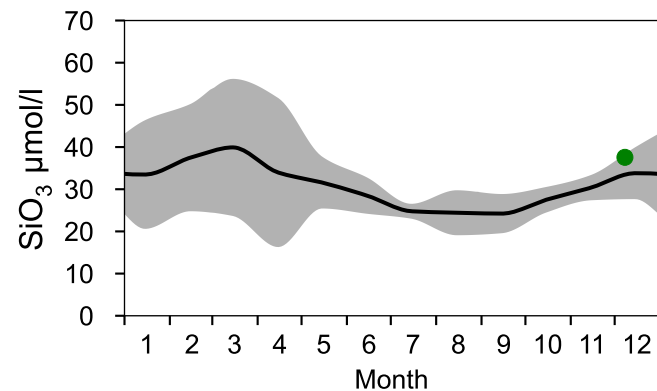
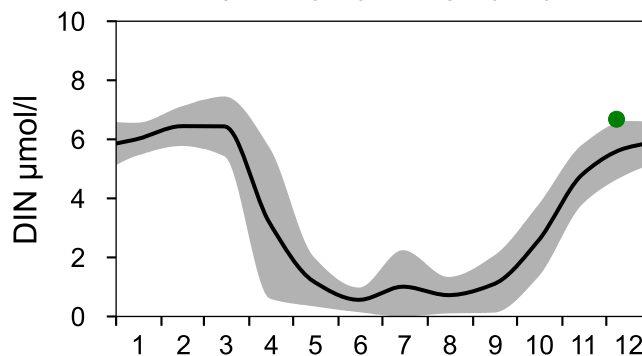
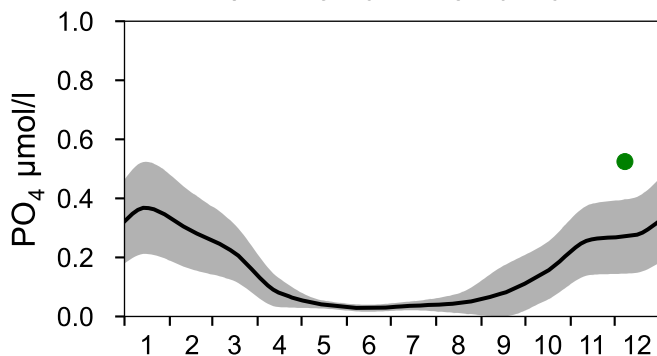
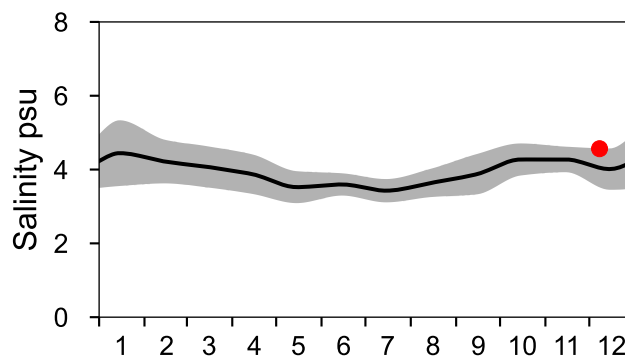
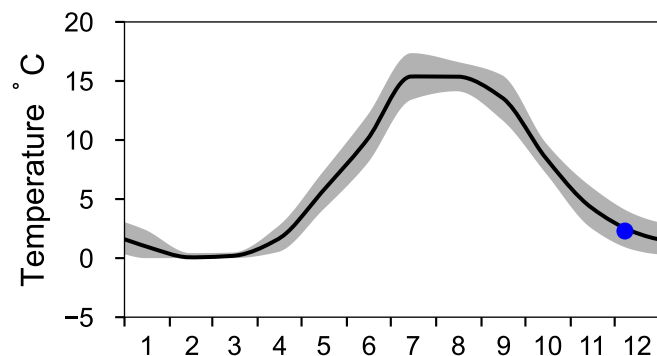
Vertical profiles GAVIK-1 December



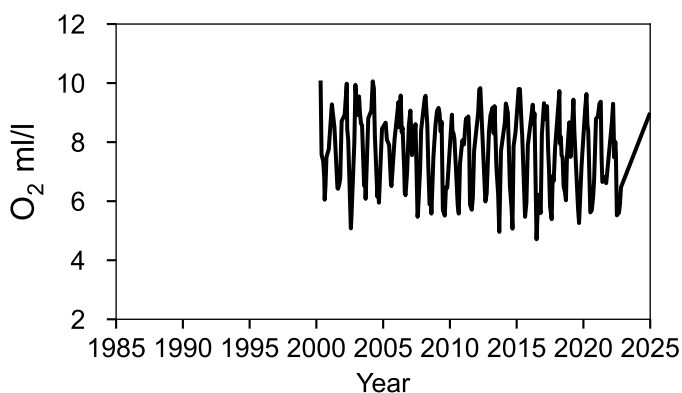
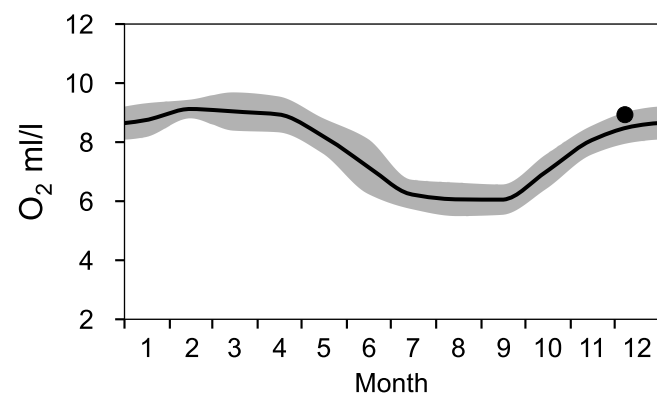
STATION B7 SURFACE WATER (0-10 m)

Annual Cycles

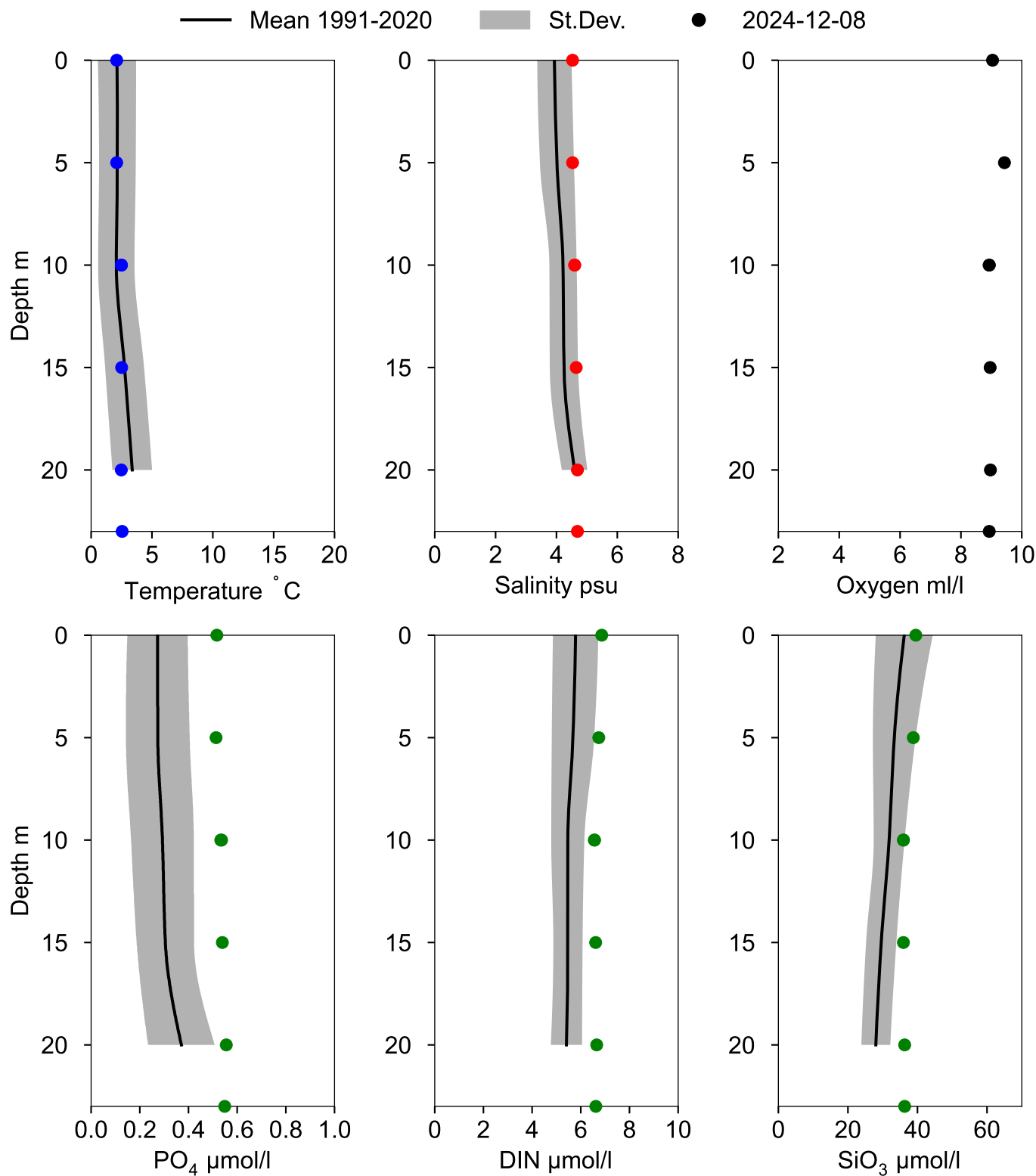
— Mean 1991-2020 St.Dev. ● 2024



OXYGEN IN BOTTOM WATER (depth >= 20 m)



Vertical profiles B7
December

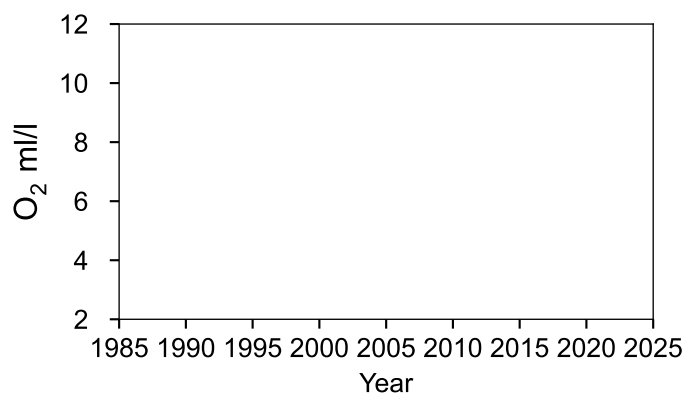
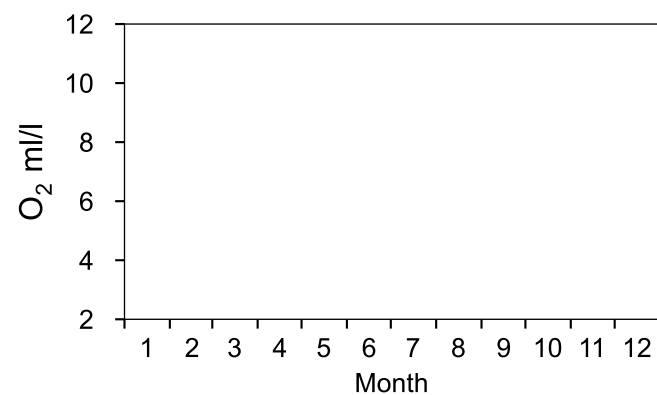
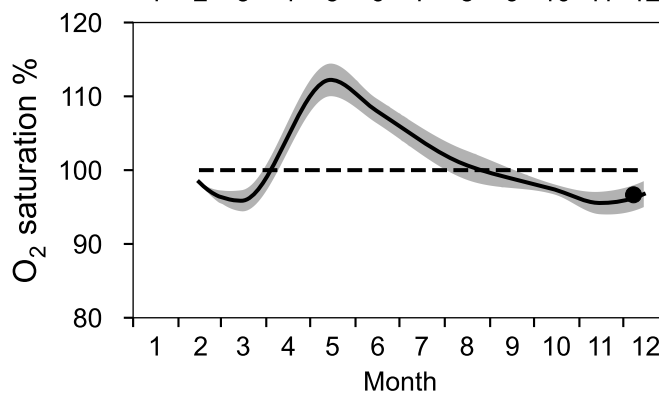
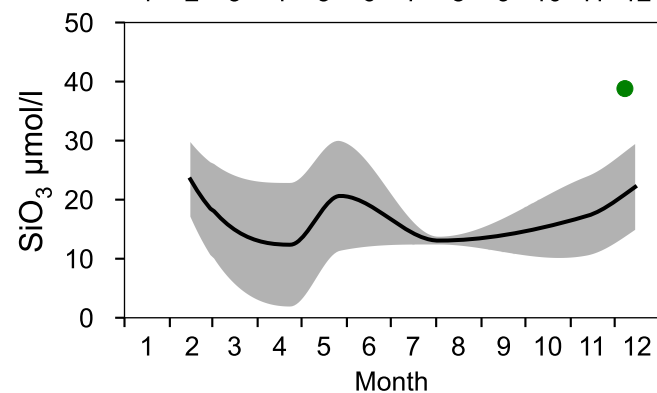
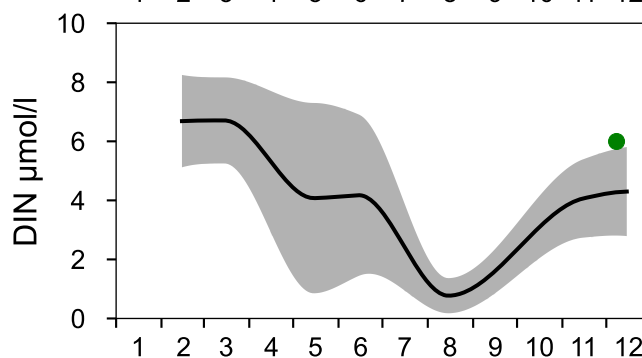
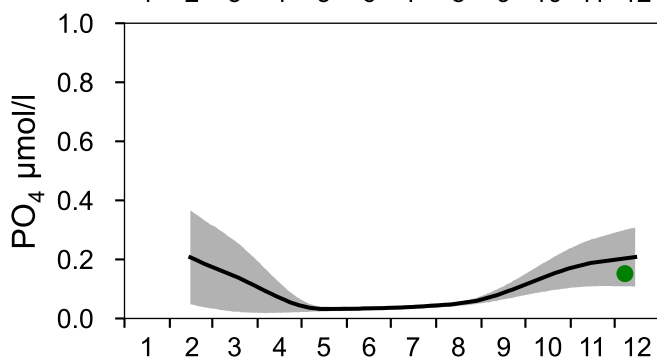
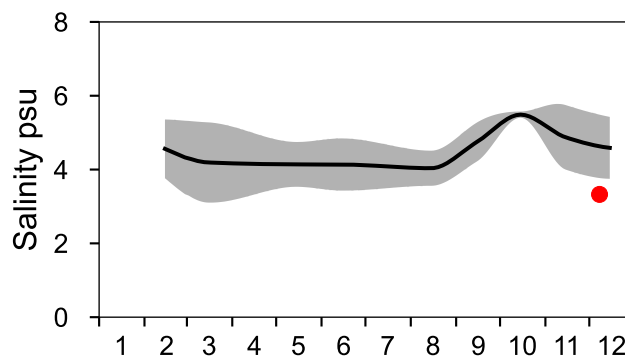
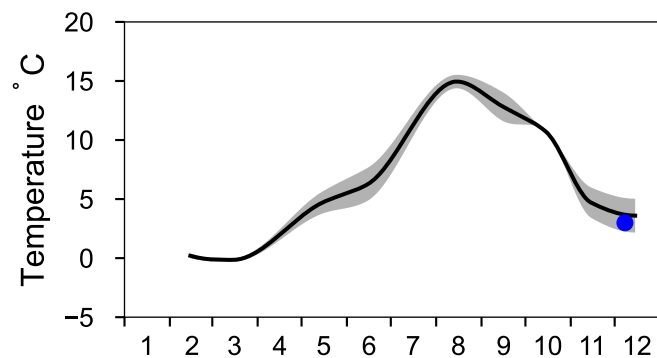


STATION F16 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Norra Kvarken

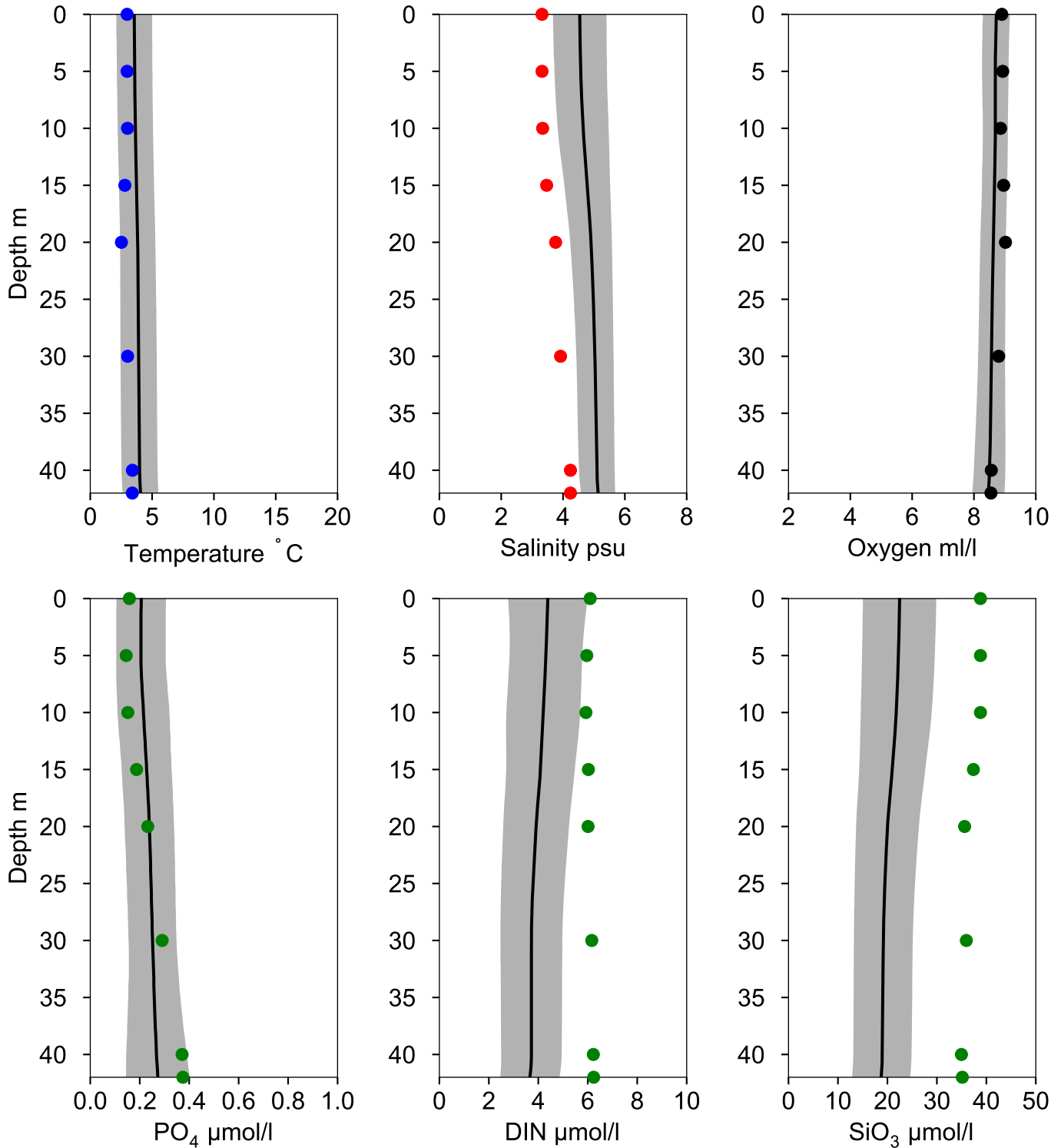
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles F16 December

Statistics based on data from: Norra Kvarken

— Mean 1991-2020 St.Dev. ● 2024-12-08

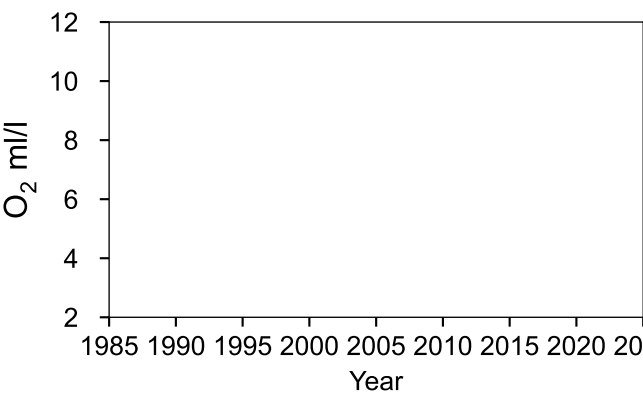
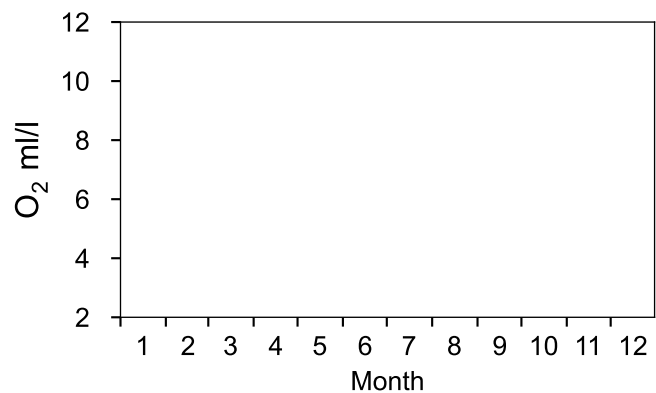
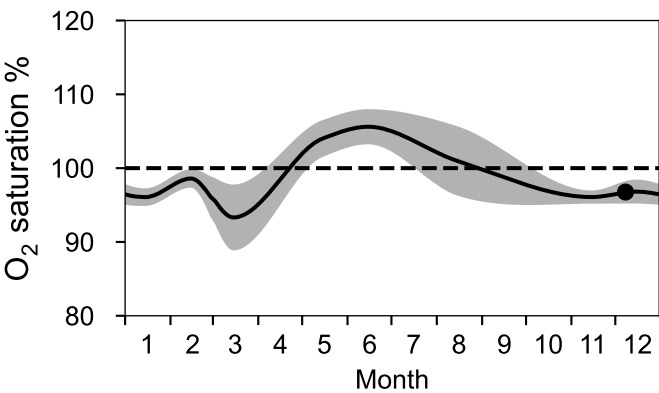
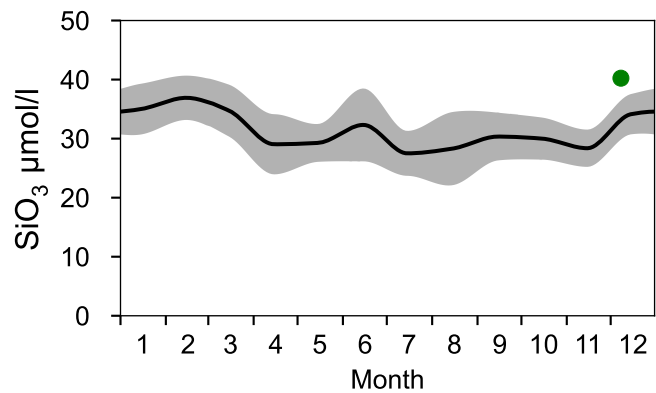
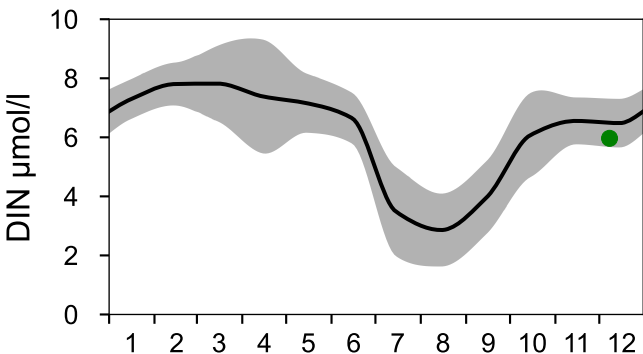
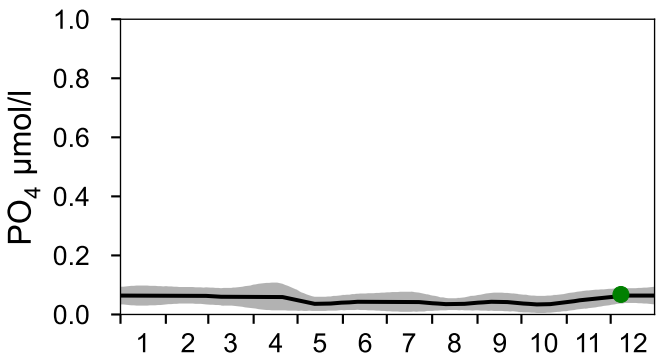
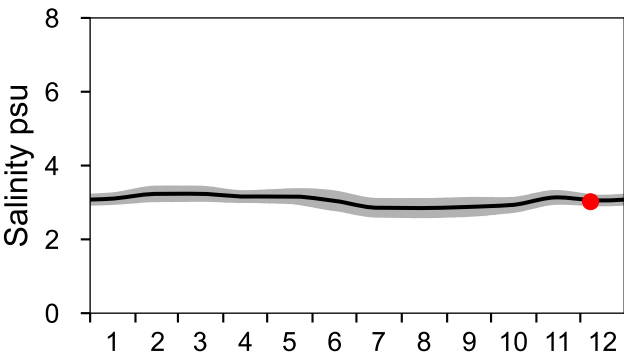
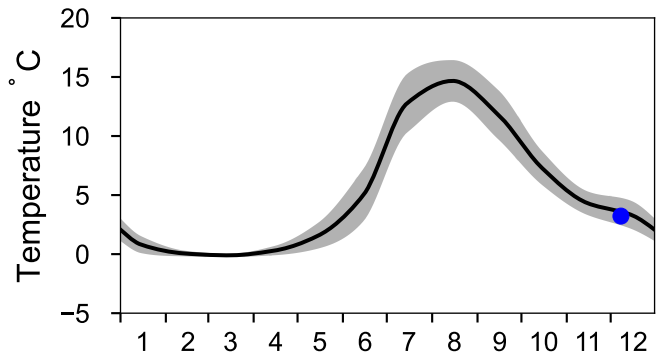


STATION F13/A19 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenviken

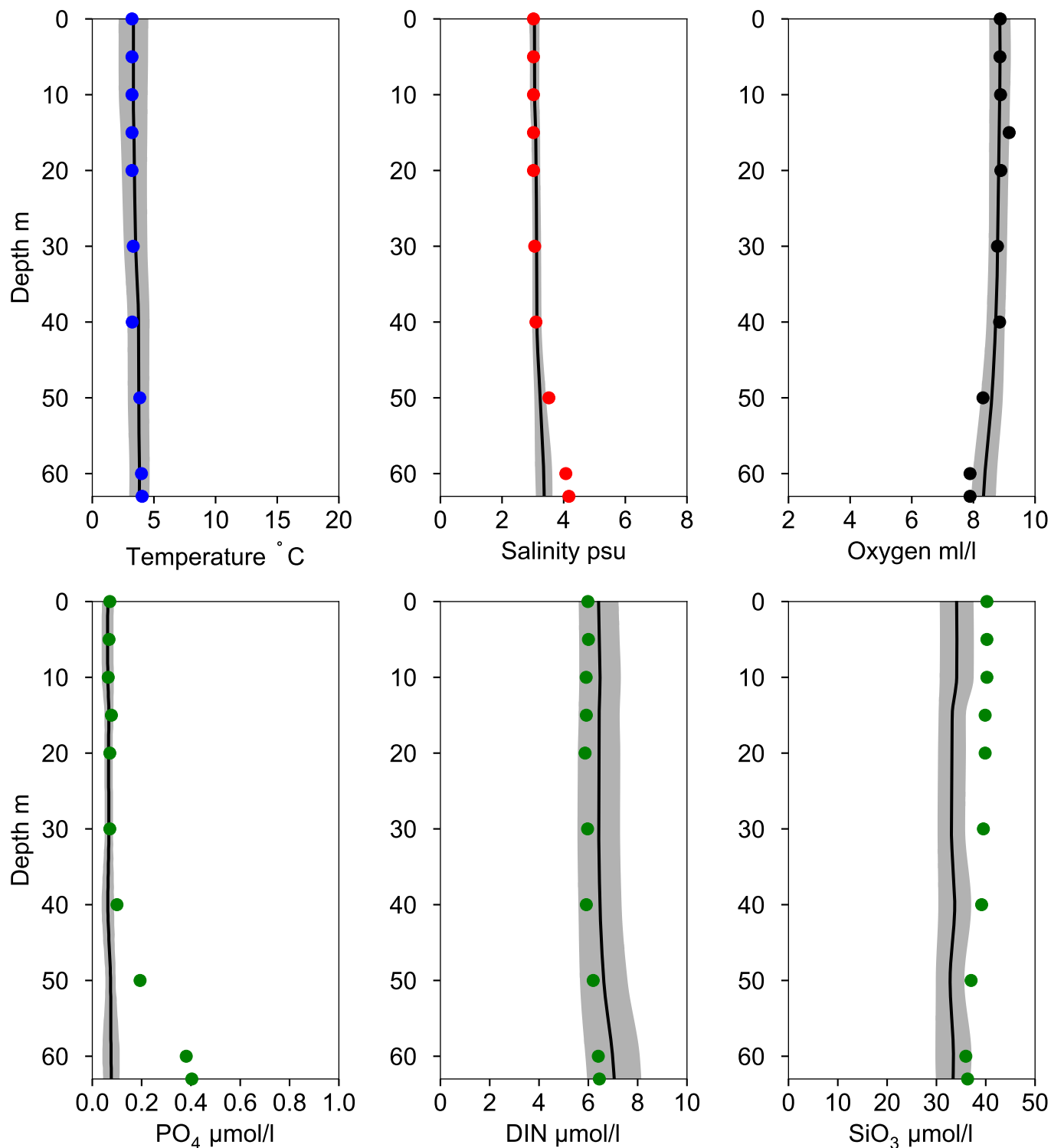
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles F13/A19 December

Statistics based on data from: Bottenviken

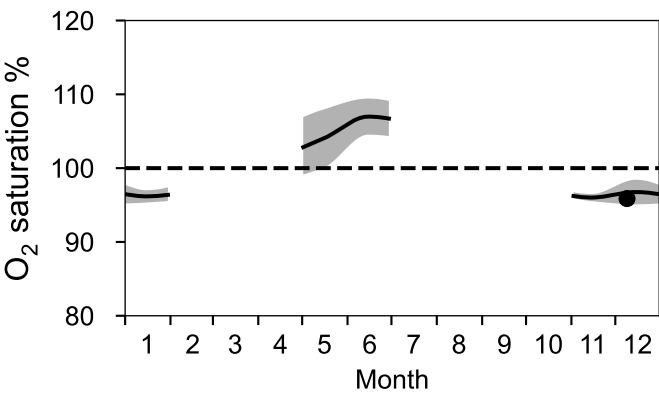
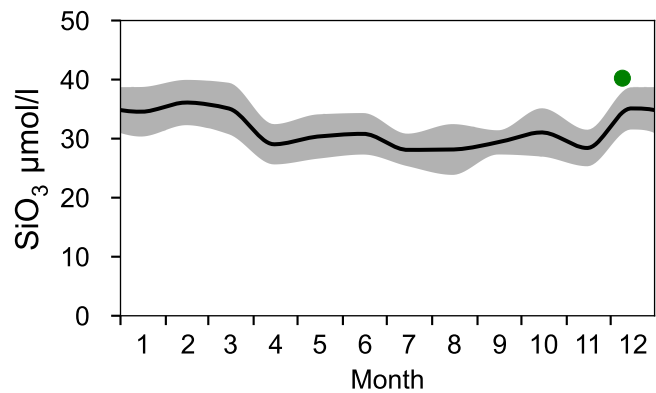
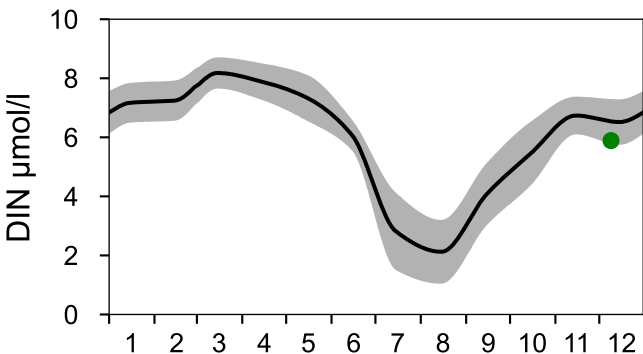
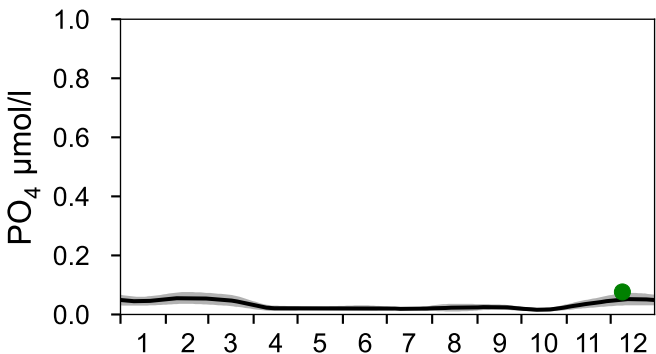
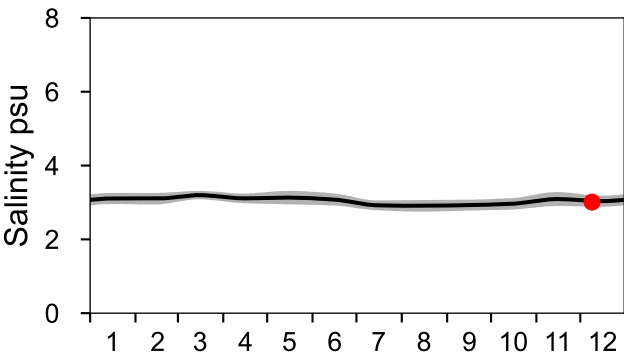
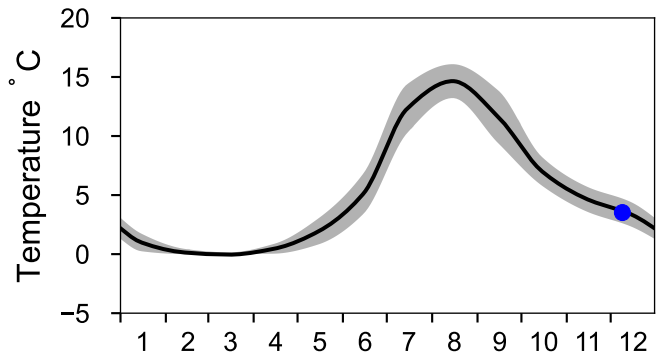
— Mean 1991-2020 St.Dev. ● 2024-12-08



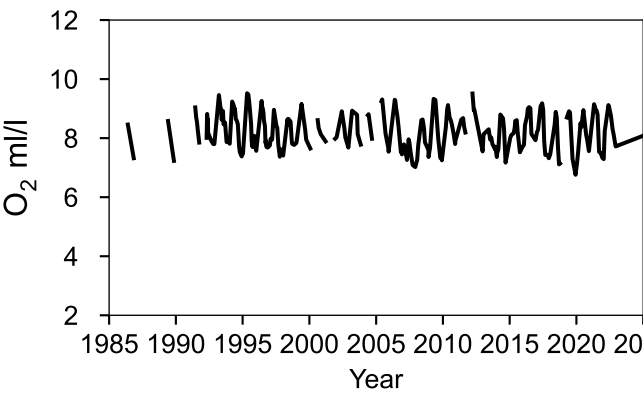
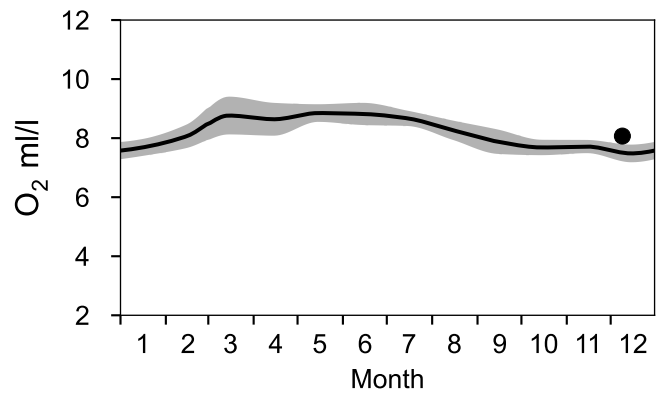
STATION F9 / A13 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 1991-2020 St.Dev. ● 2024

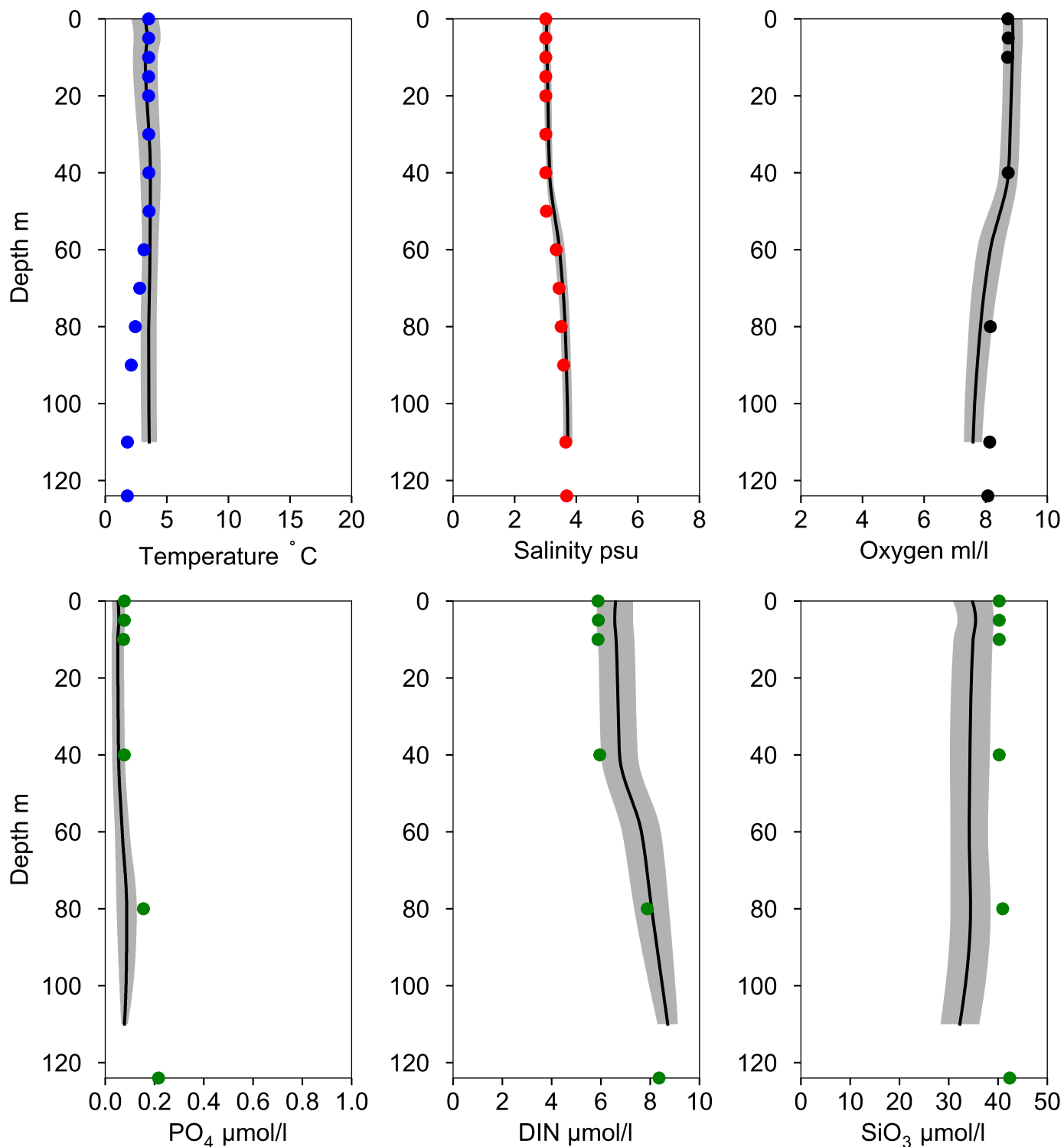


OXYGEN IN BOTTOM WATER (depth >= 120 m)



Vertical profiles F9 / A13 December

— Mean 1991-2020 St.Dev. ● 2024-12-09

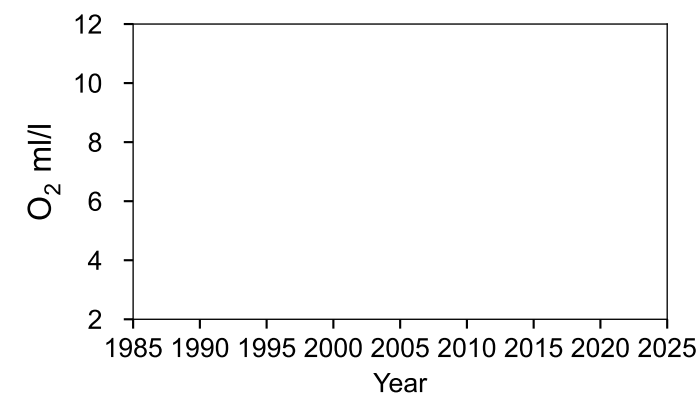
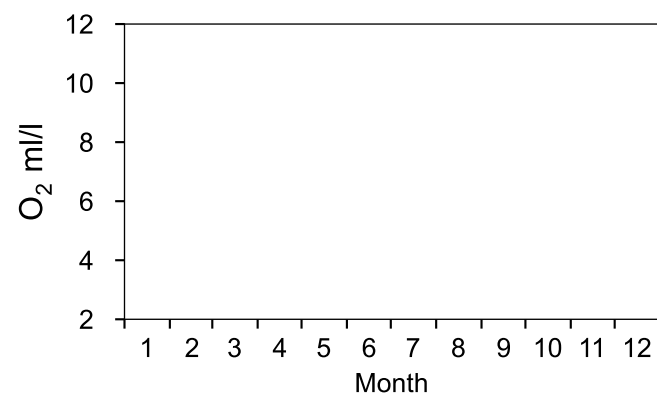
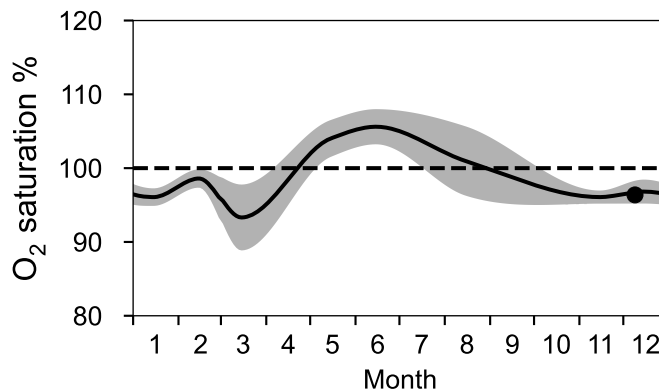
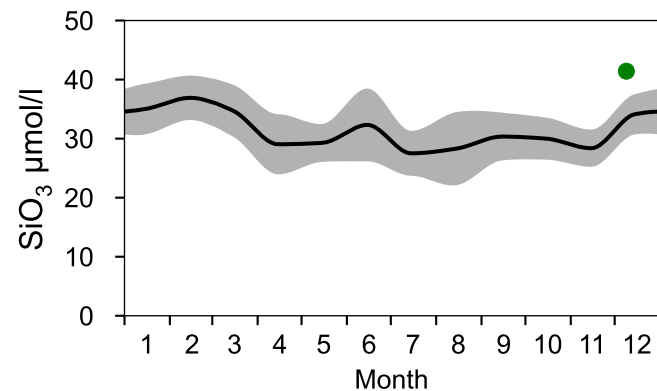
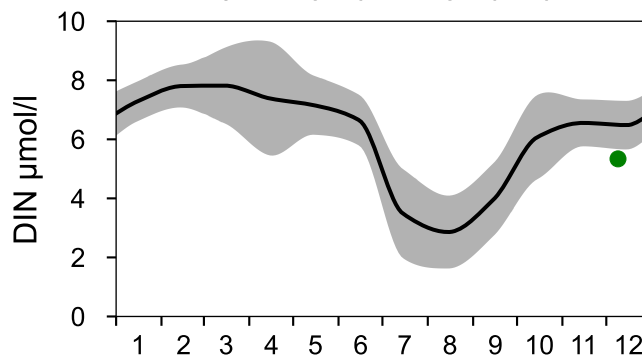
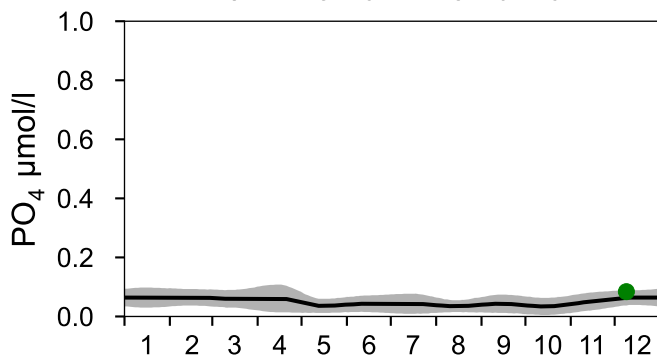
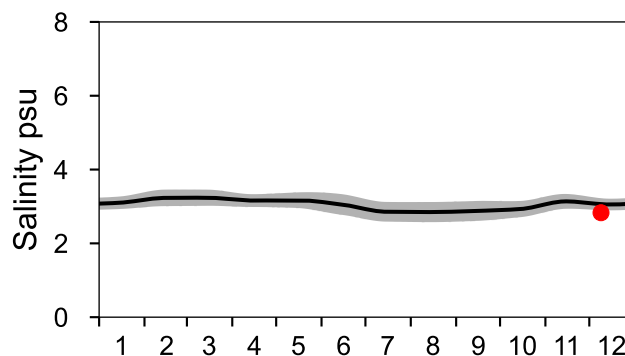
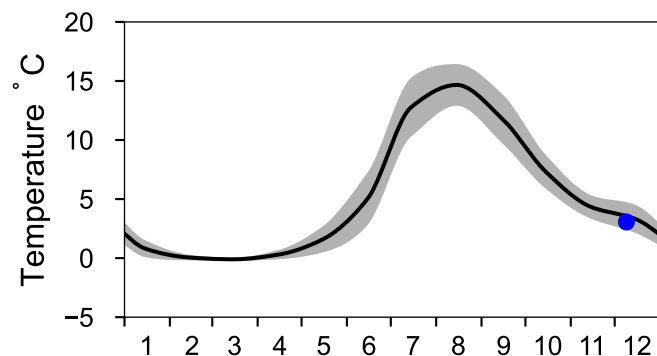


STATION RR1/A8 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenviken

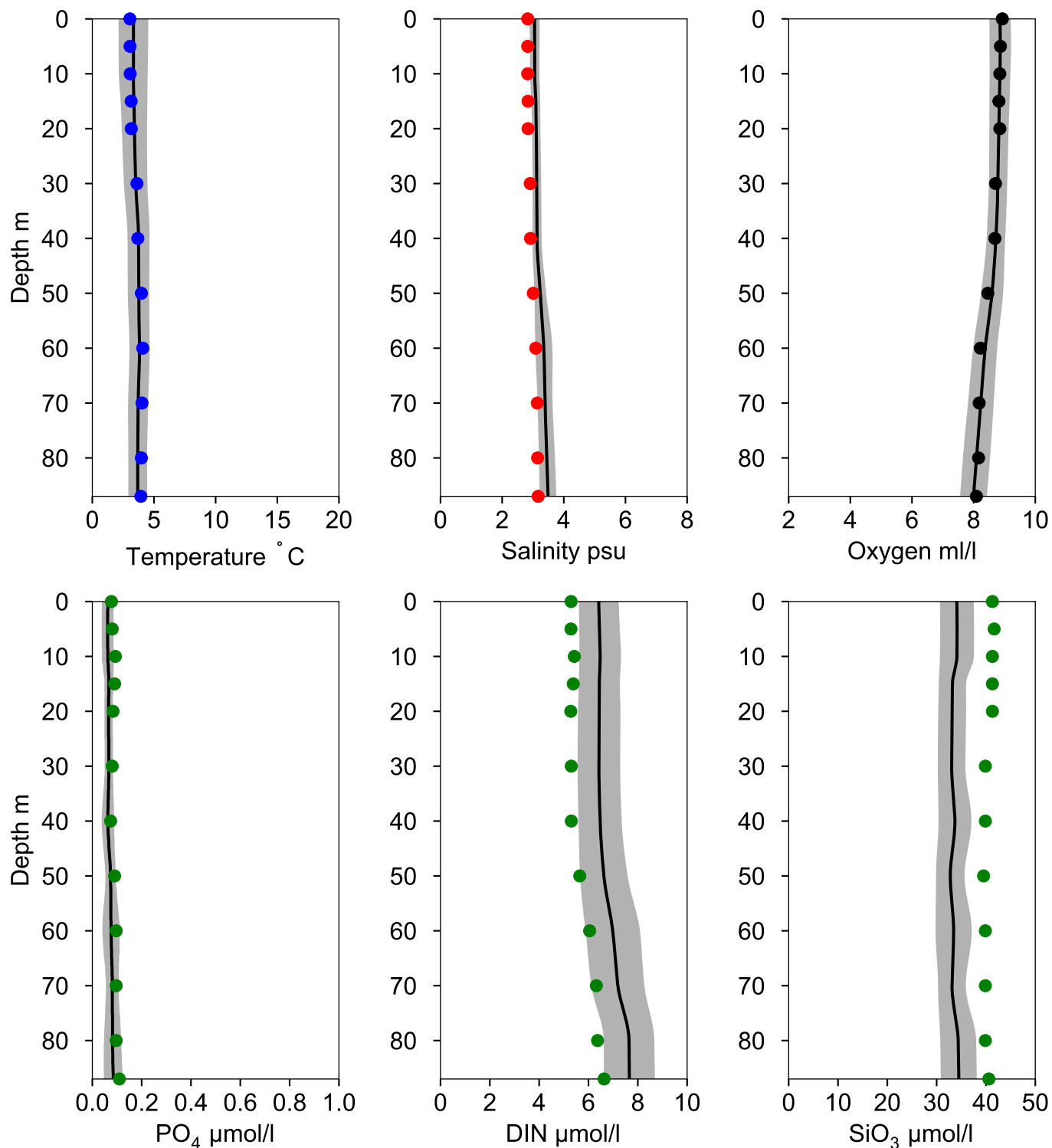
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles RR1/A8 December

Statistics based on data from: Bottenviken

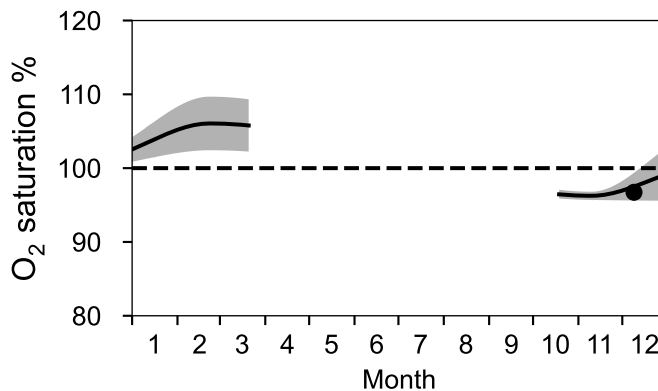
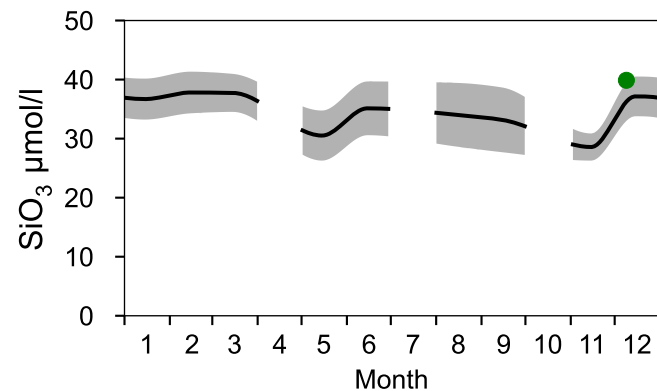
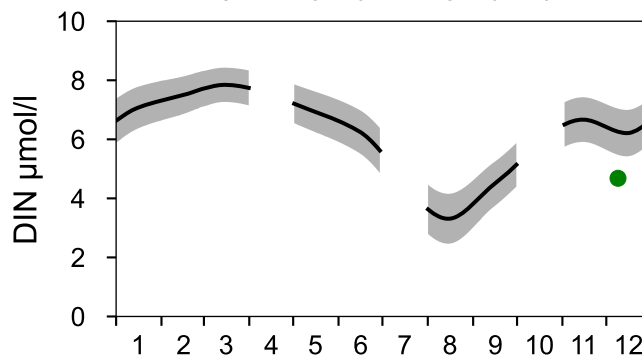
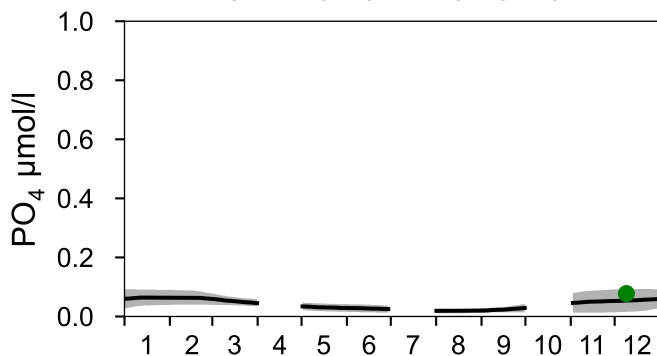
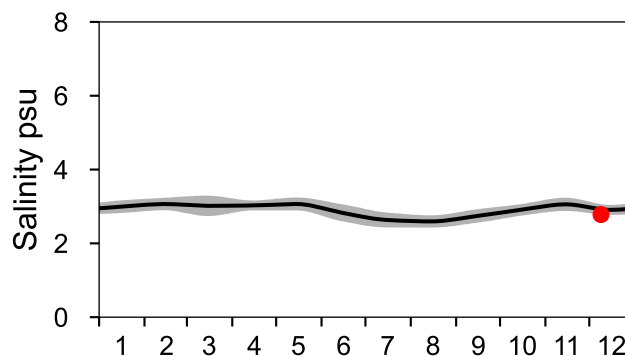
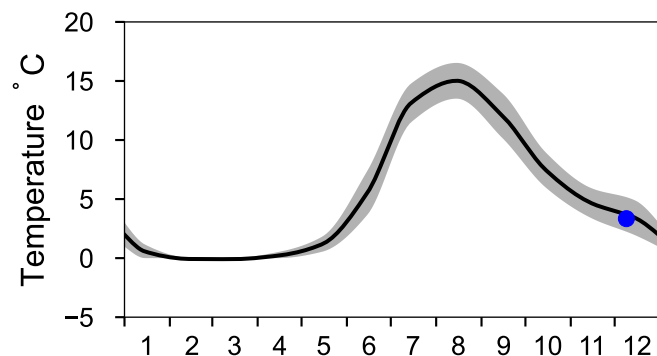
— Mean 1991-2020 St.Dev. ● 2024-12-09



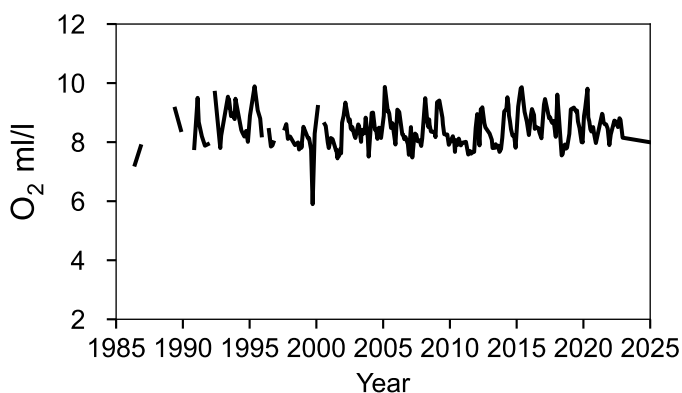
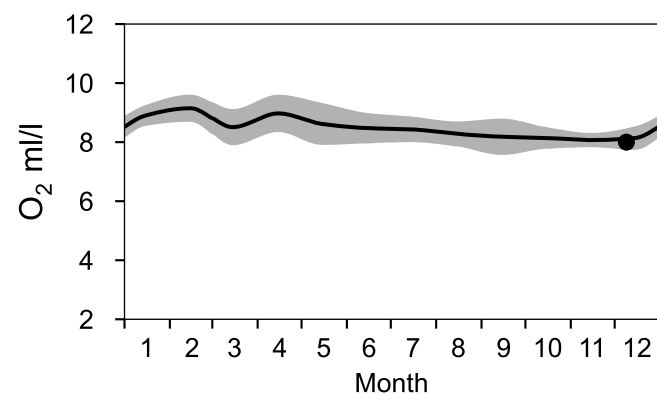
STATION F3 / A5 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 1991-2020 St.Dev. ● 2024

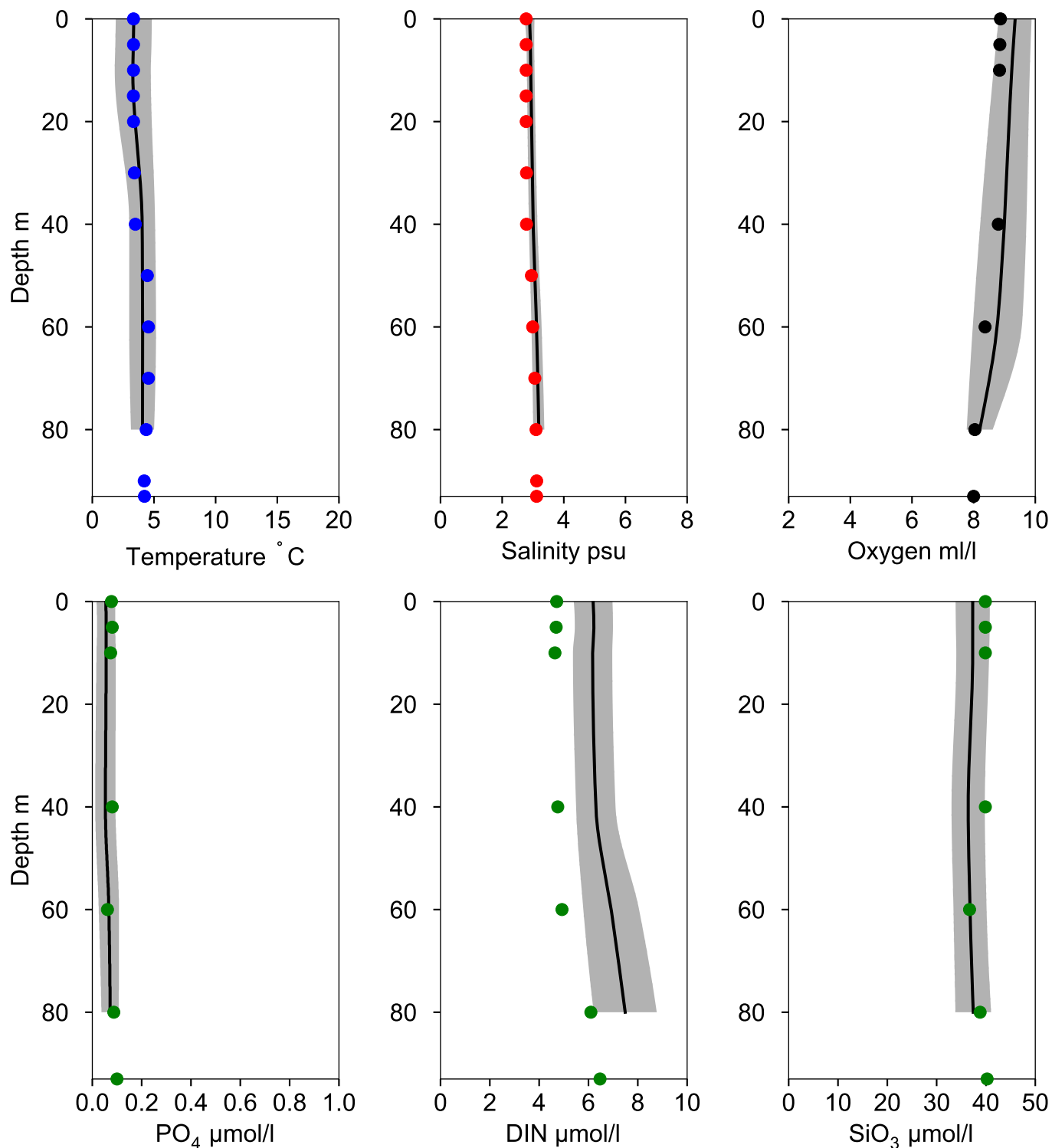


OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles F3 / A5 December

— Mean 1991-2020 St.Dev. ● 2024-12-09

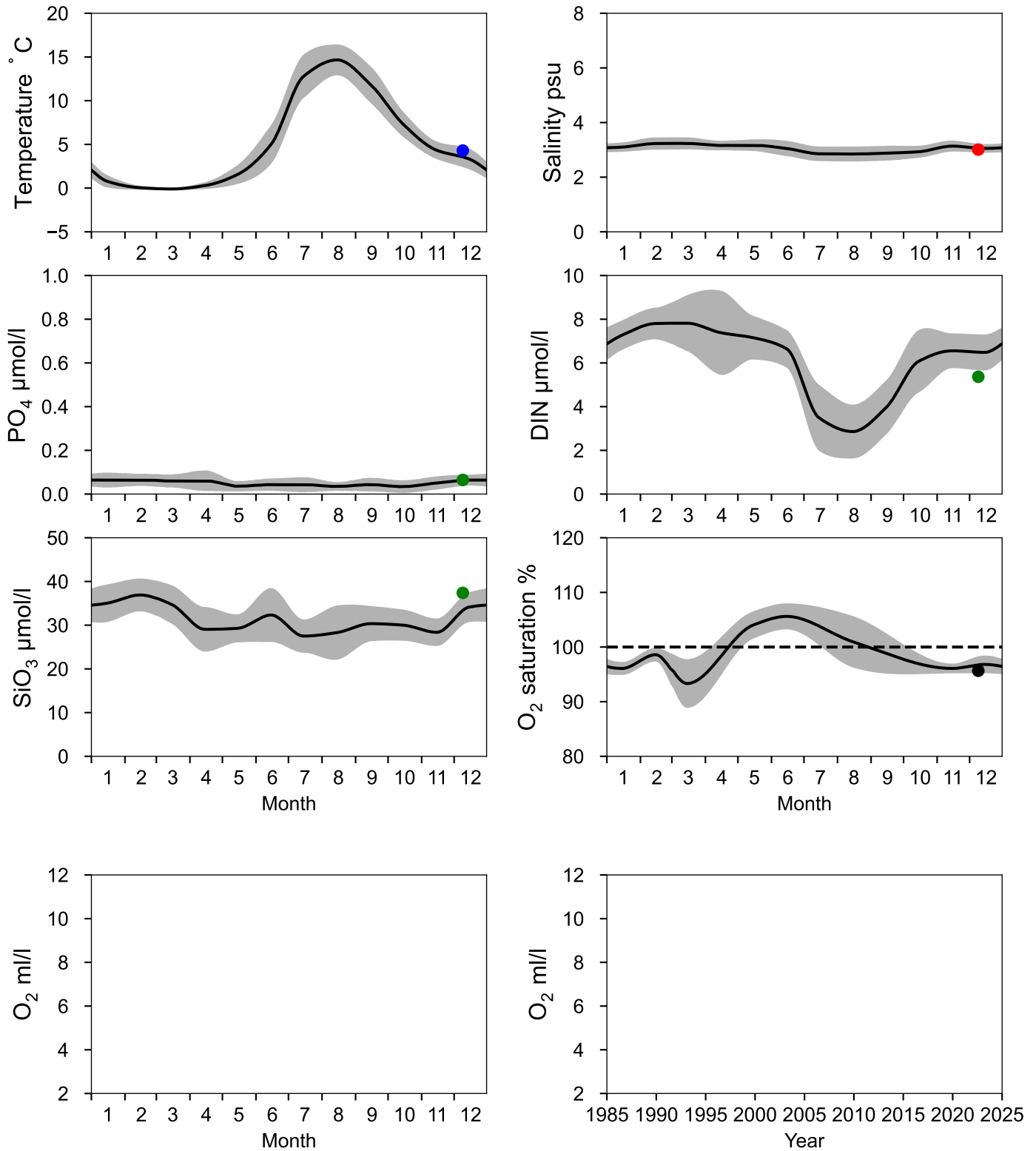


STATION RR5 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenviken

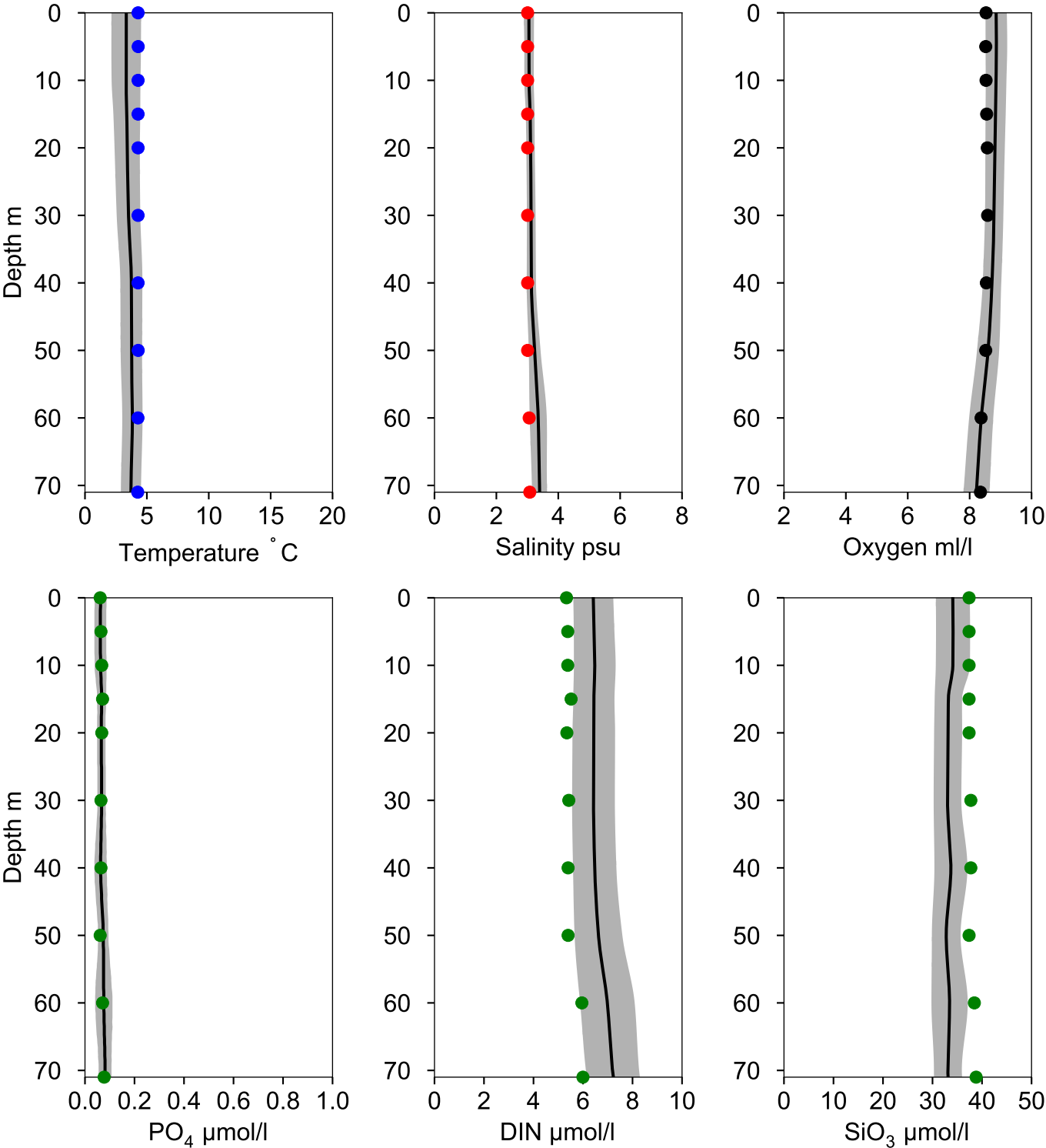
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles RR5 December

Statistics based on data from: Bottenviken

— Mean 1991-2020 St.Dev. ● 2024-12-09

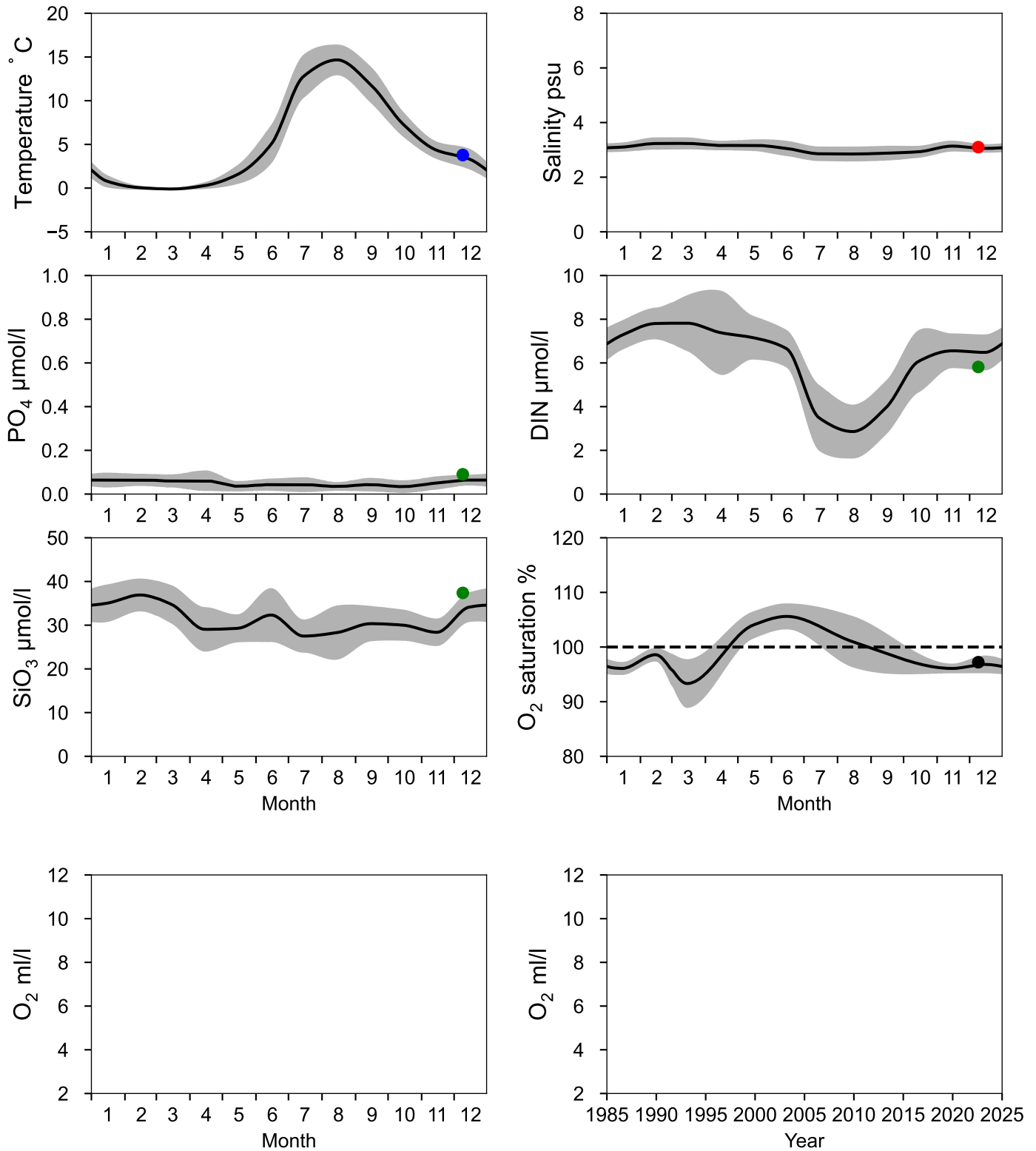


STATION RR7 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenviken

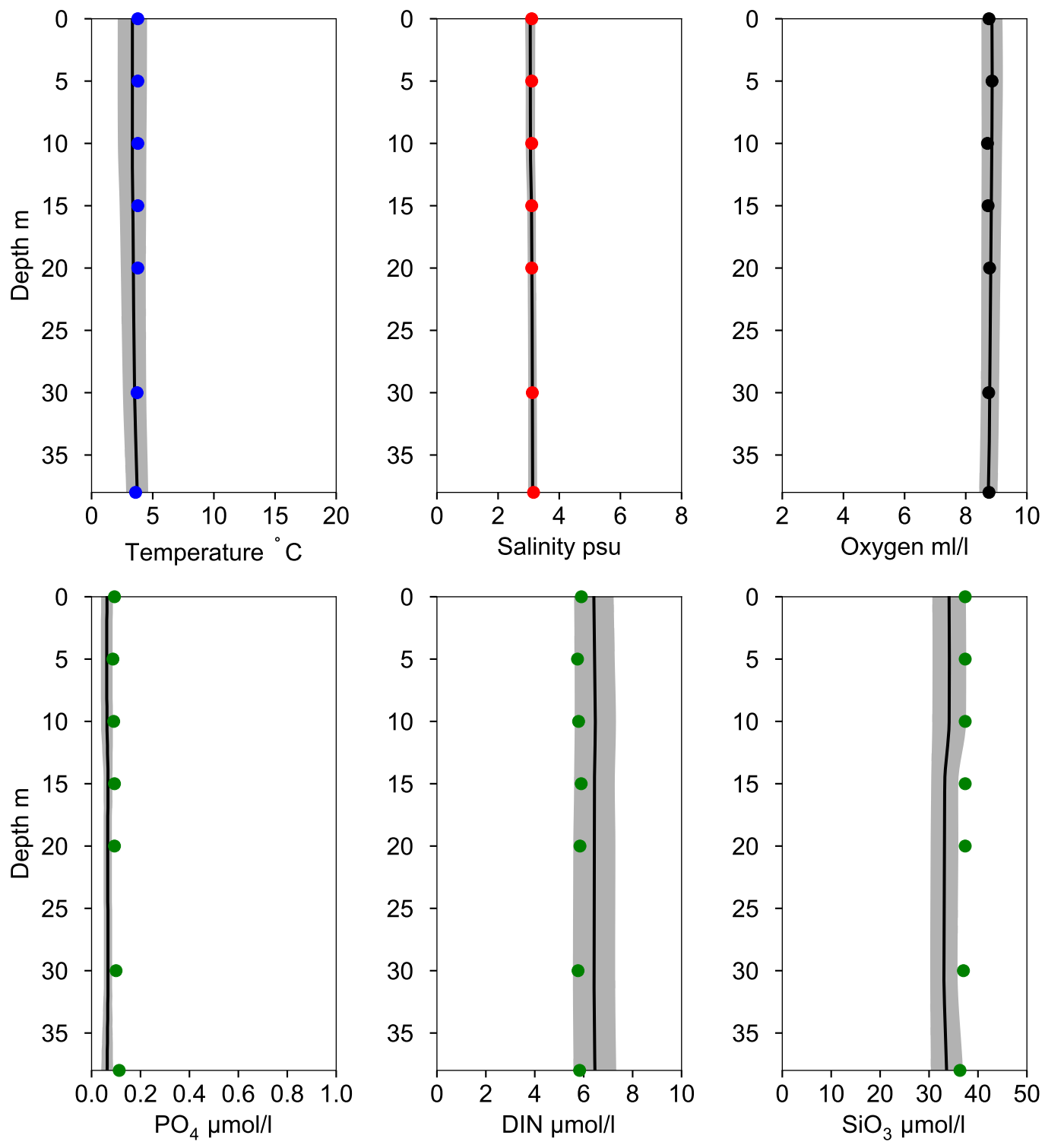
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles RR7 December

Statistics based on data from: Bottenviken

— Mean 1991-2020 St.Dev. ● 2024-12-09

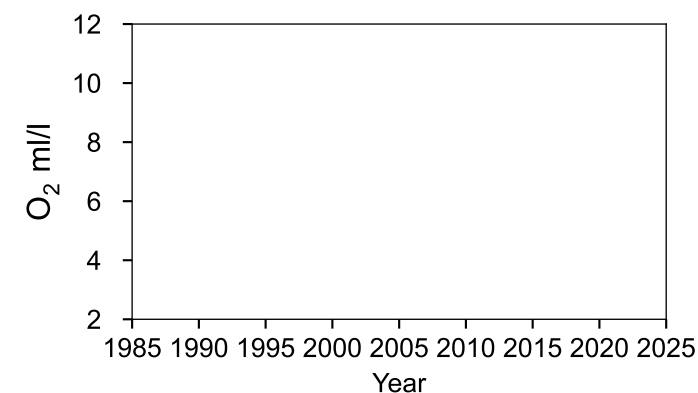
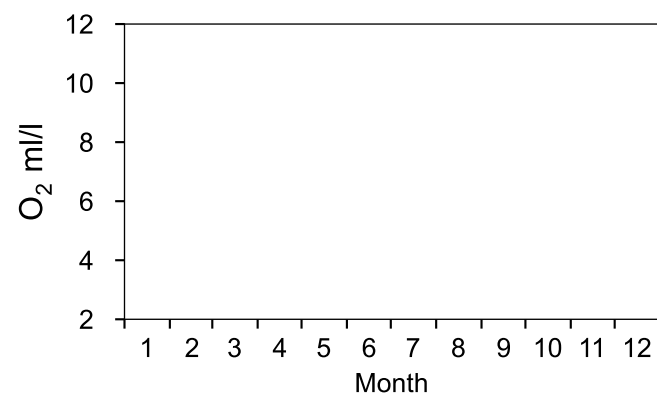
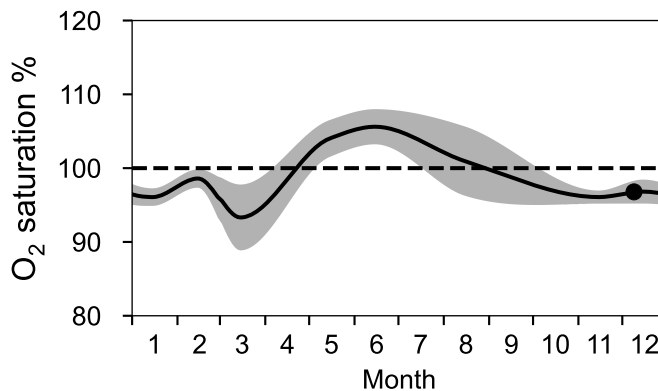
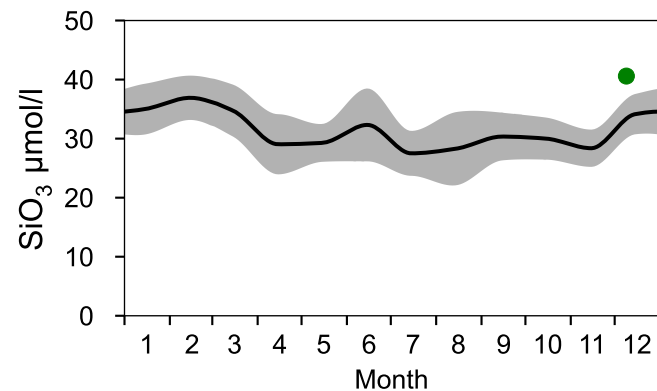
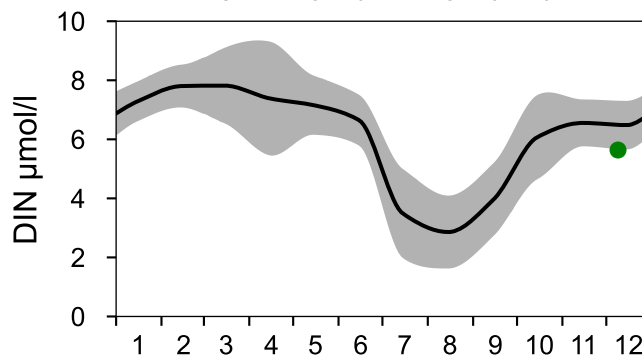
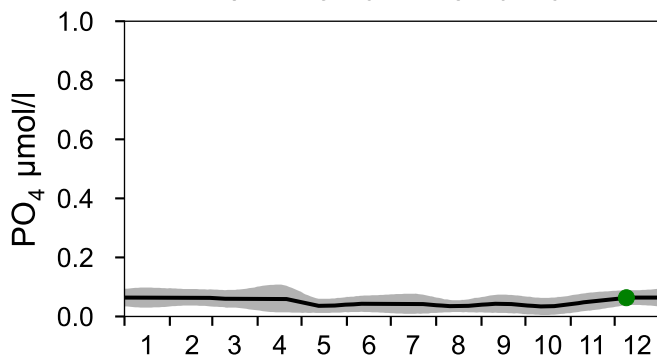
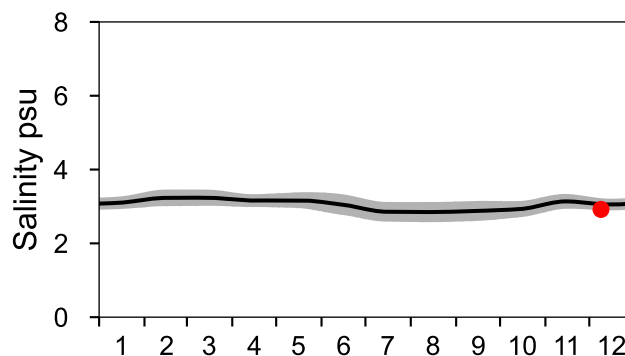
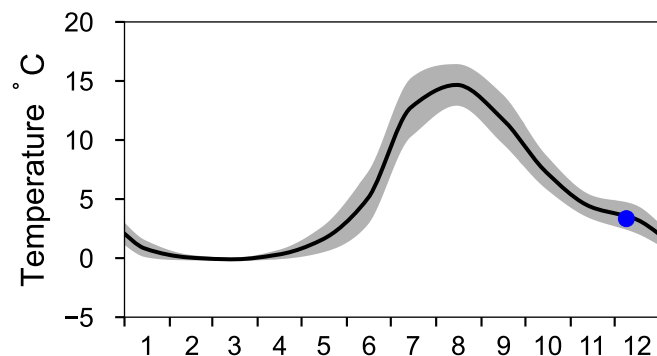


STATION BO3 / A3 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenviken

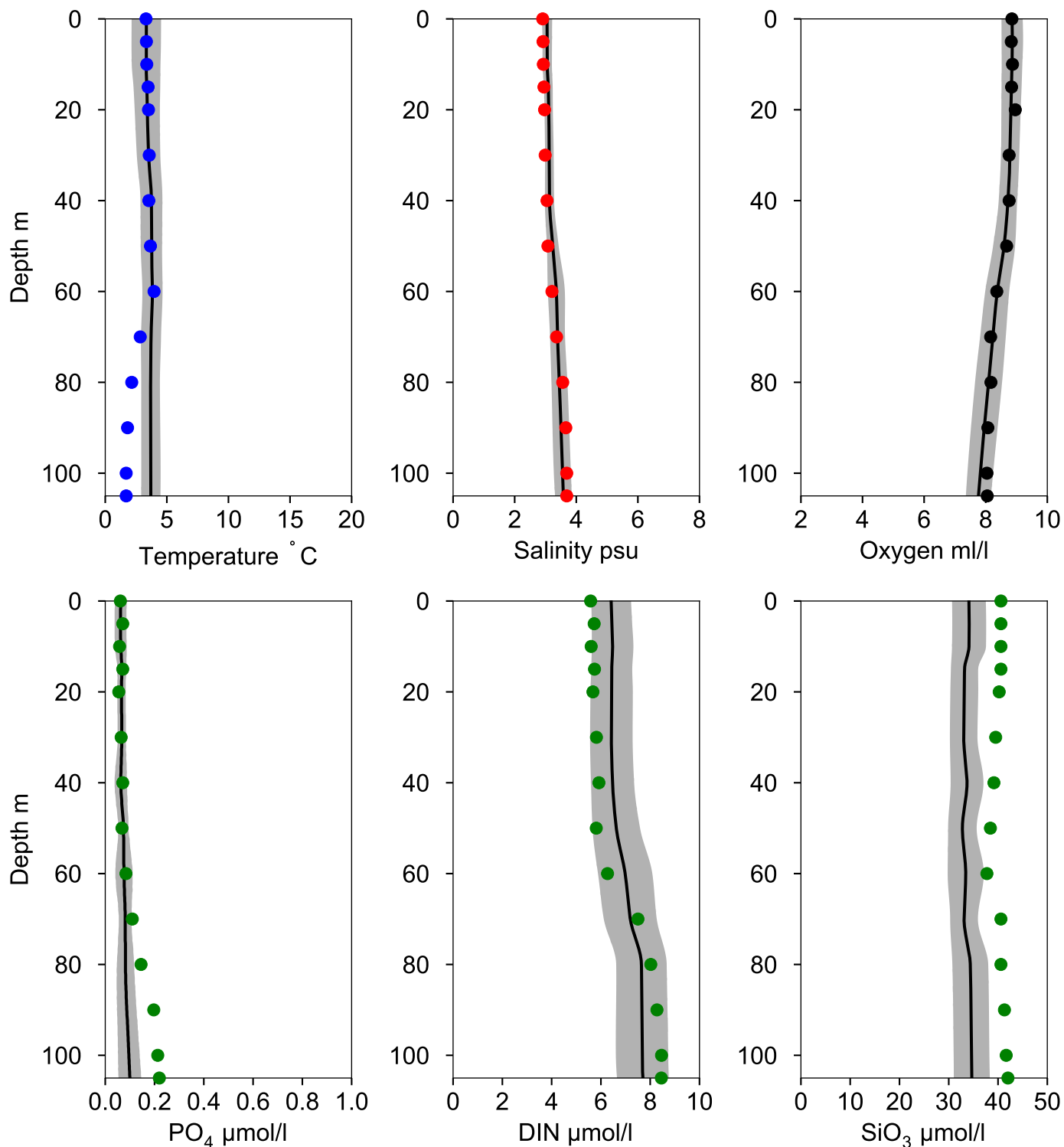
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles BO3 / A3 December

Statistics based on data from: Bottenviken

— Mean 1991-2020 St.Dev. ● 2024-12-09

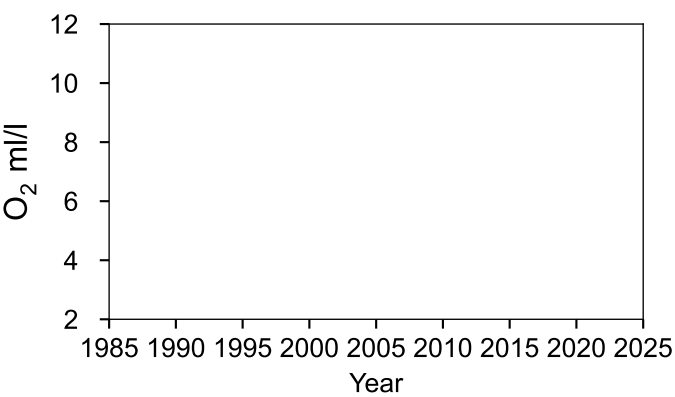
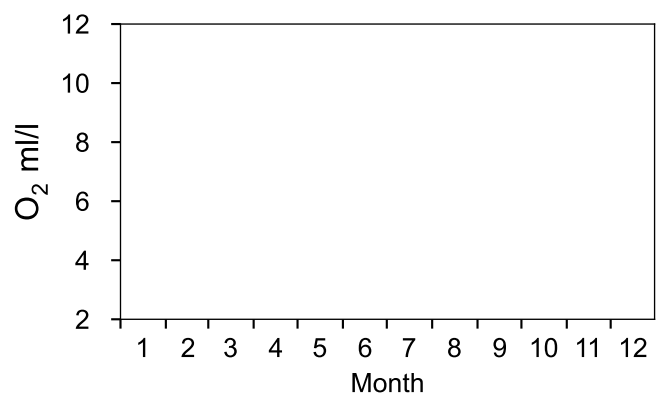
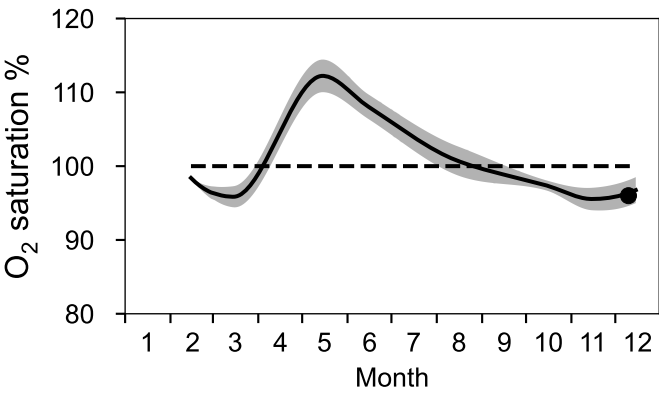
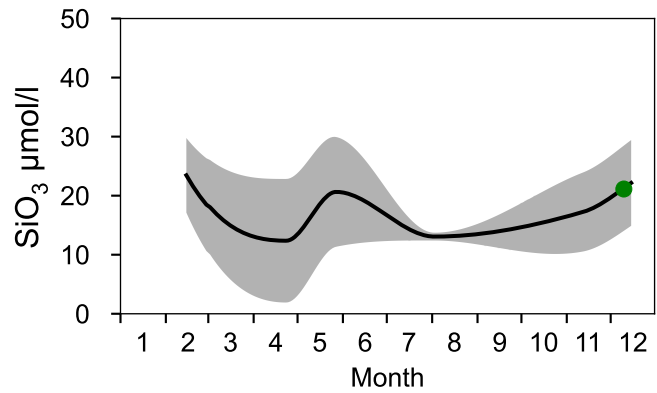
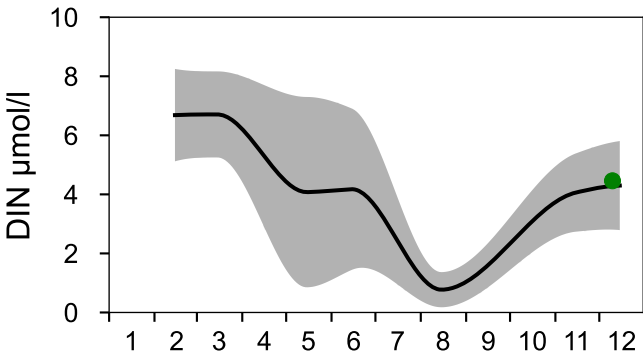
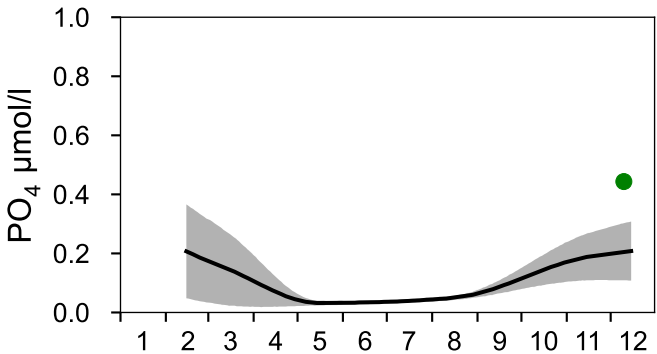
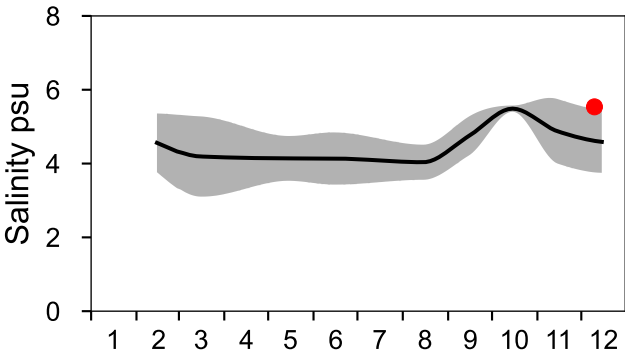
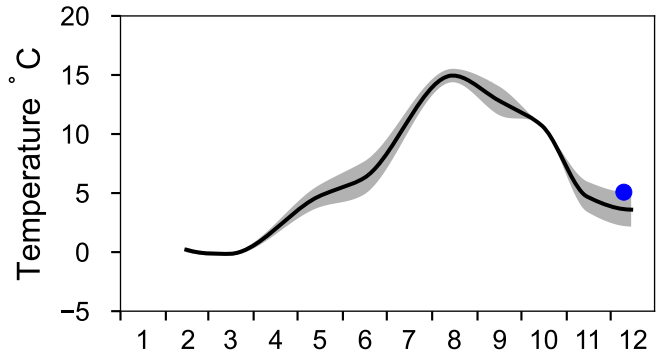


STATION F18 SYDOSTBROTEN SURFACE WATER (0-10 m)

Annual Cycles

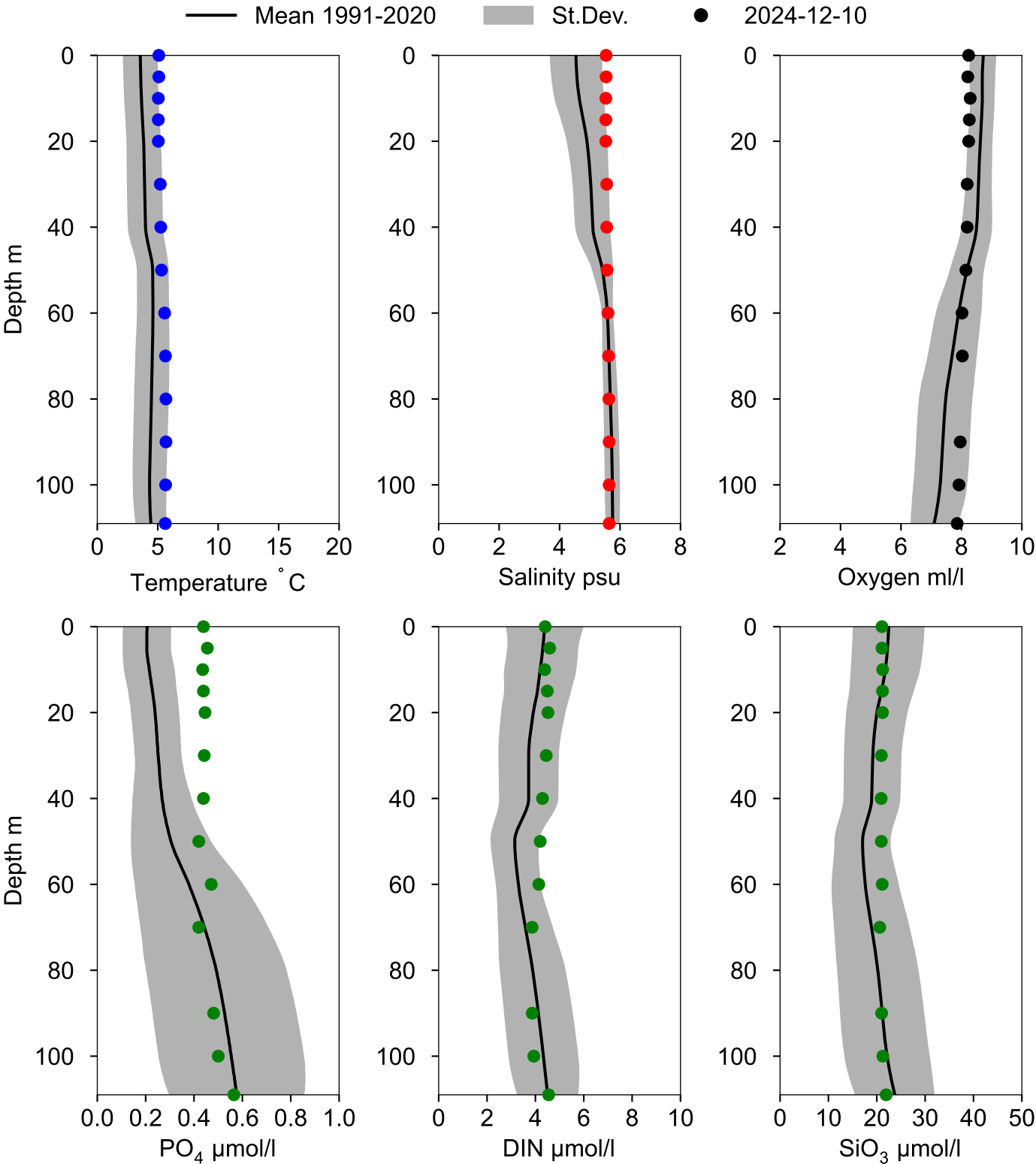
Statistics based on data from: Norra Kvarken

— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles F18 SYDOSTBROTEN December

Statistics based on data from: Norra Kvarken

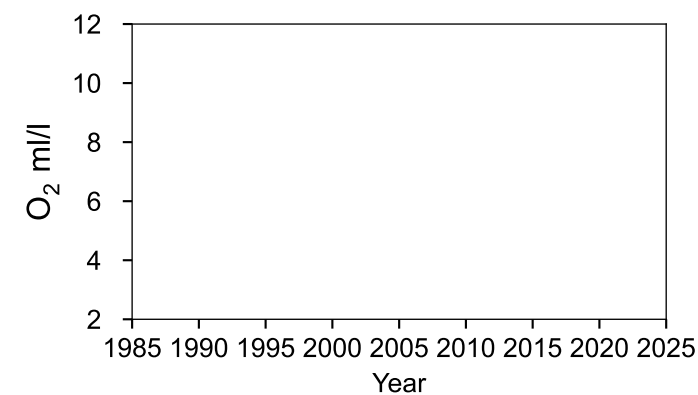
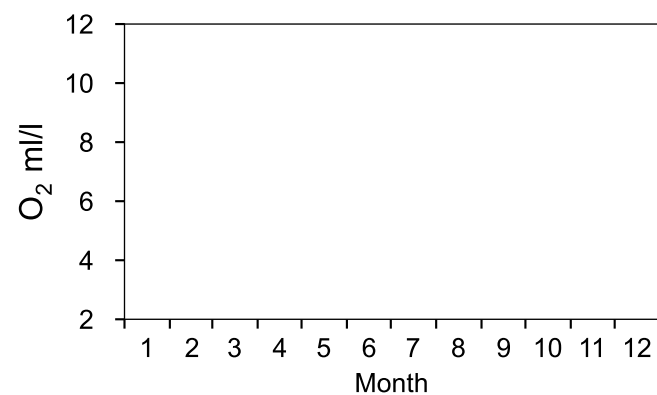
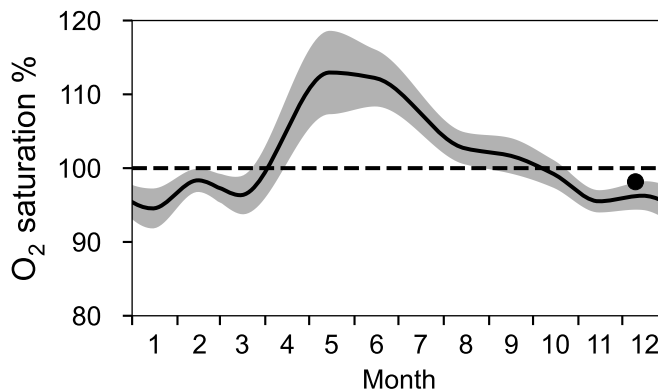
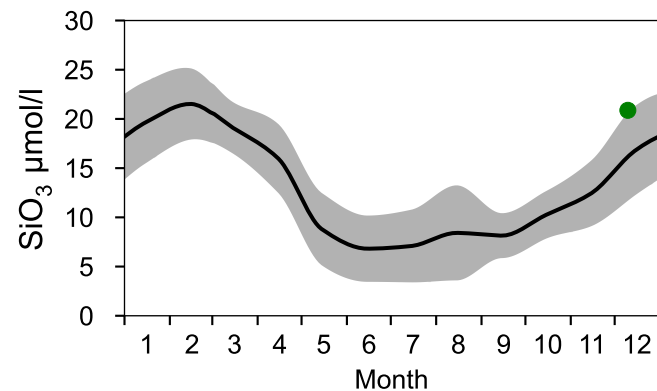
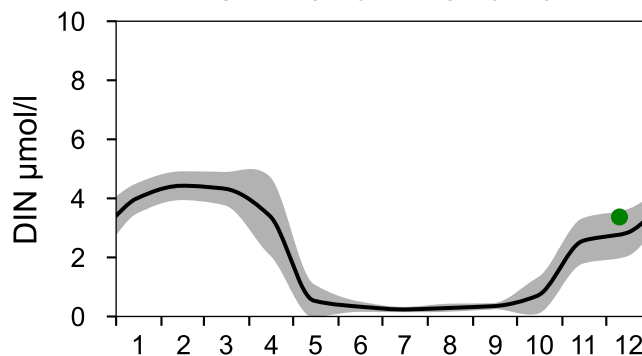
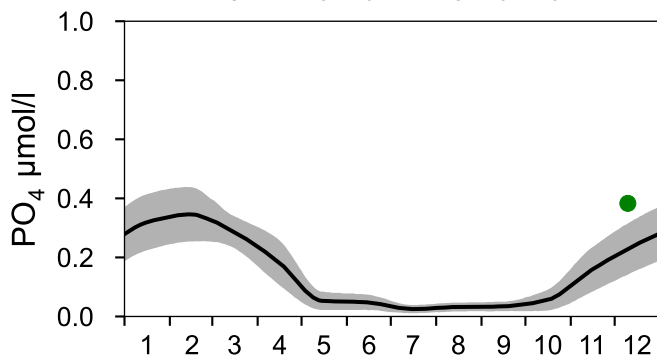
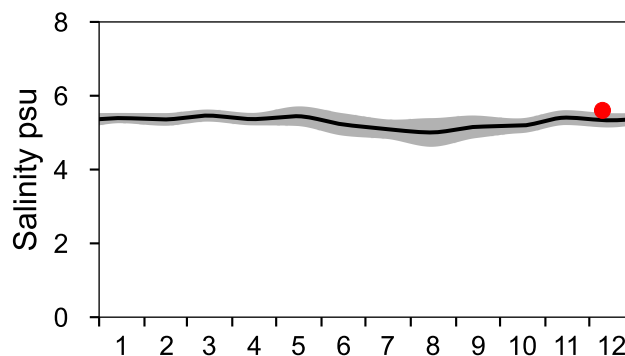
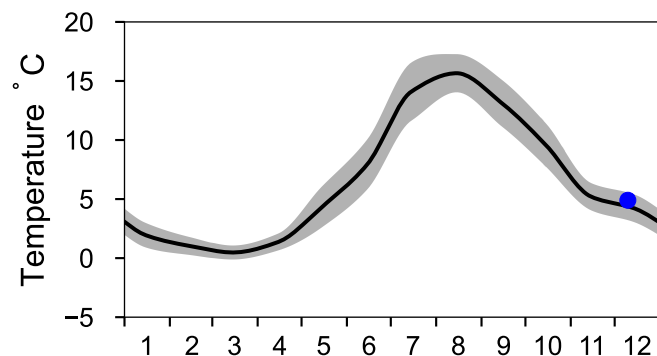


STATION US5B / C1 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024

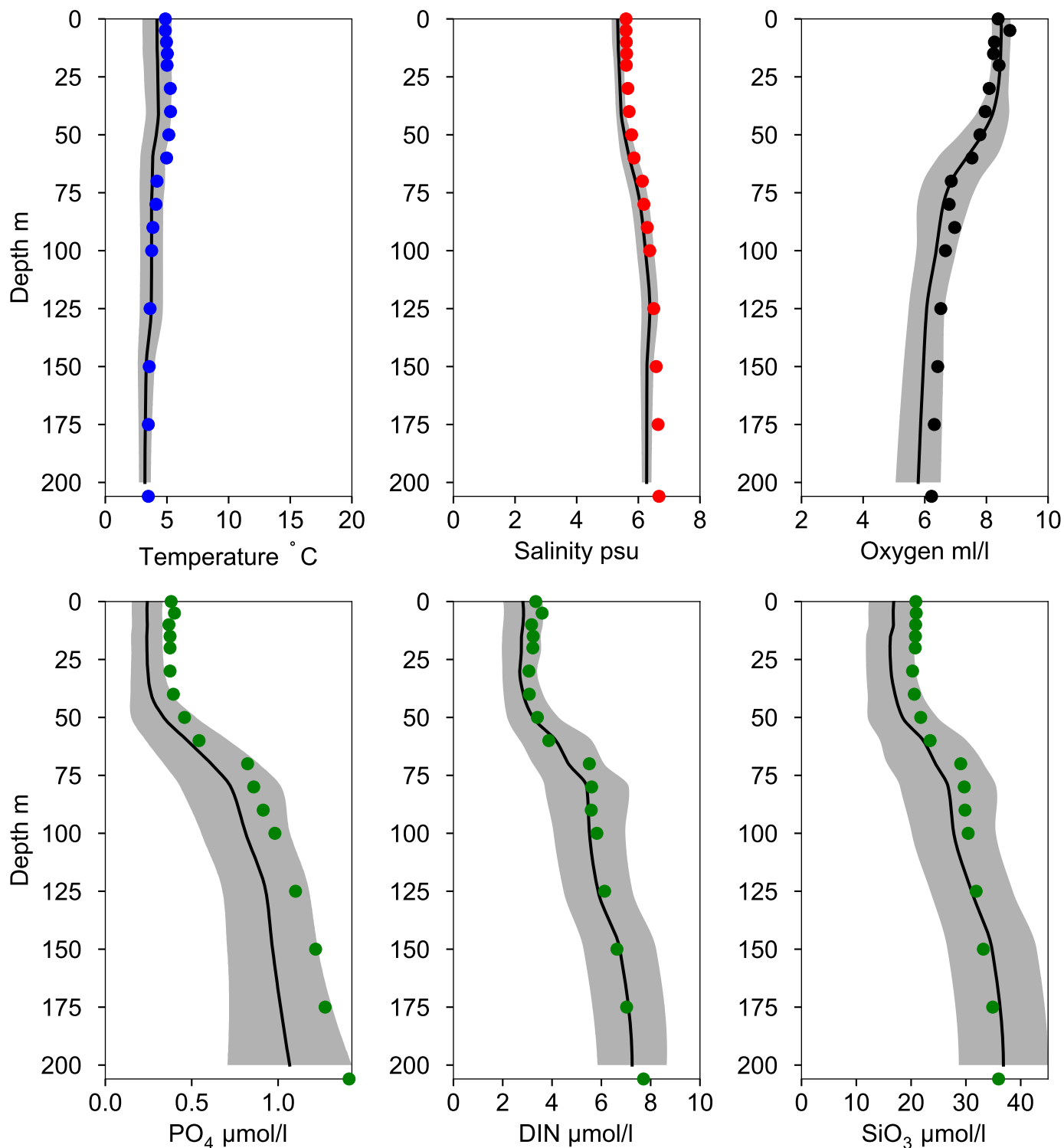


Vertical profiles US5B / C1

December

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024-12-10

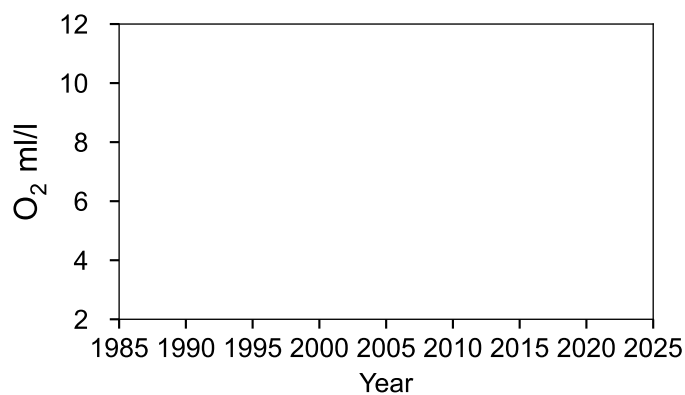
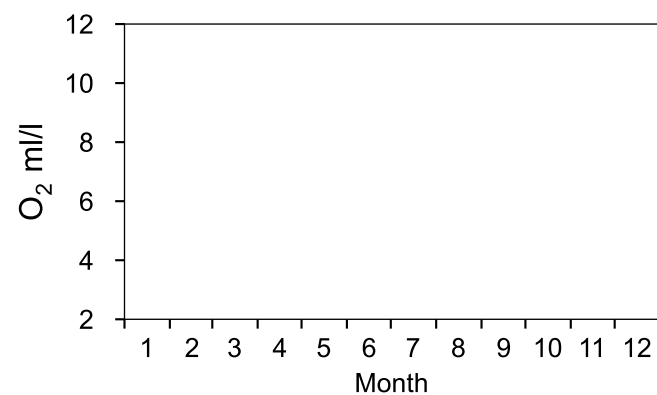
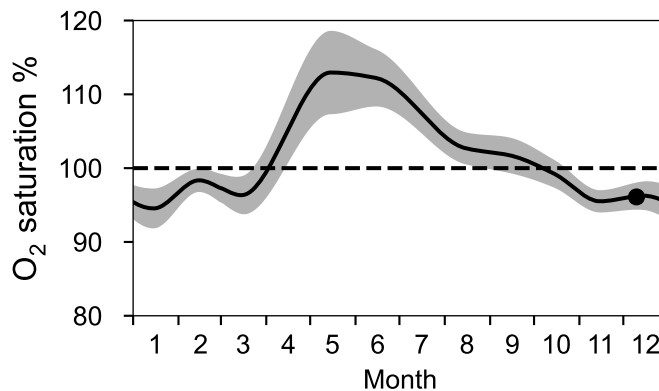
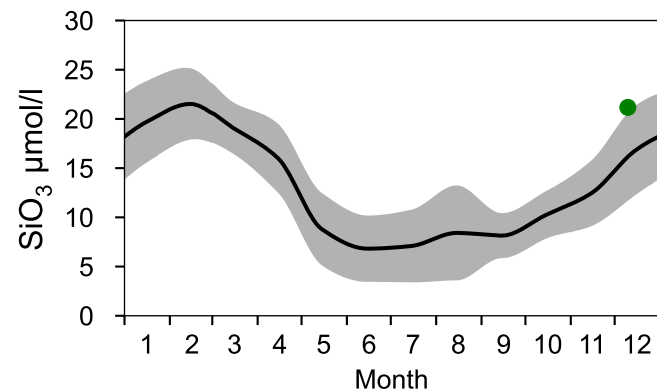
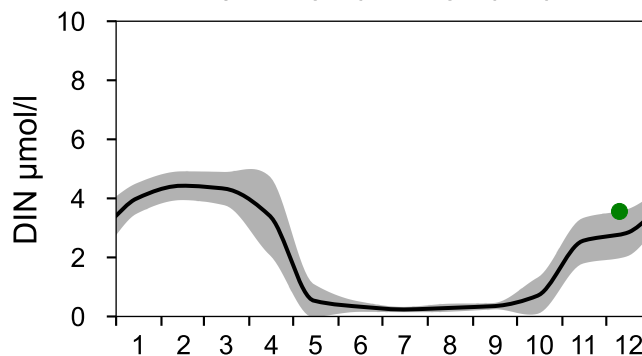
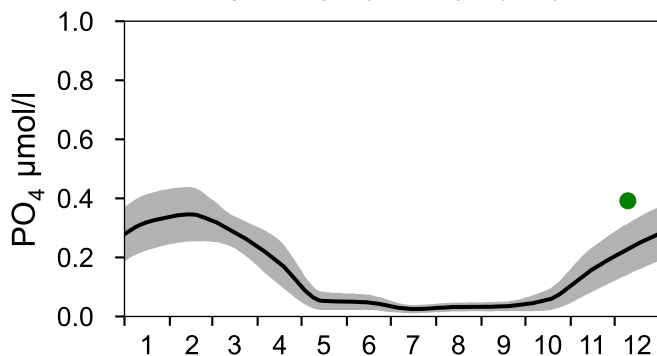
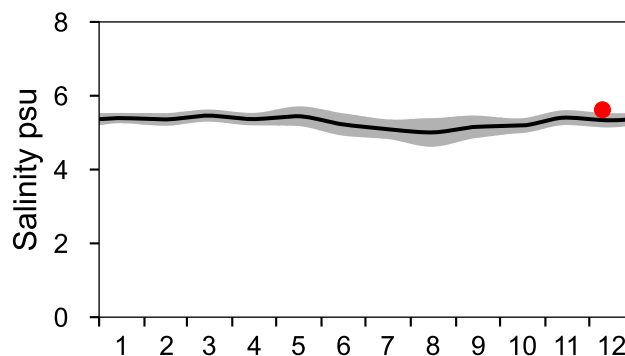
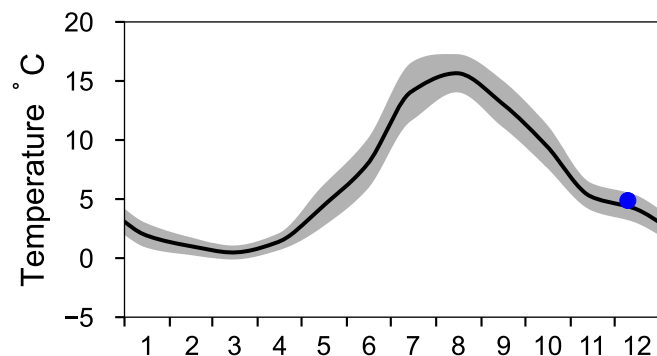


STATION F26 / C15 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

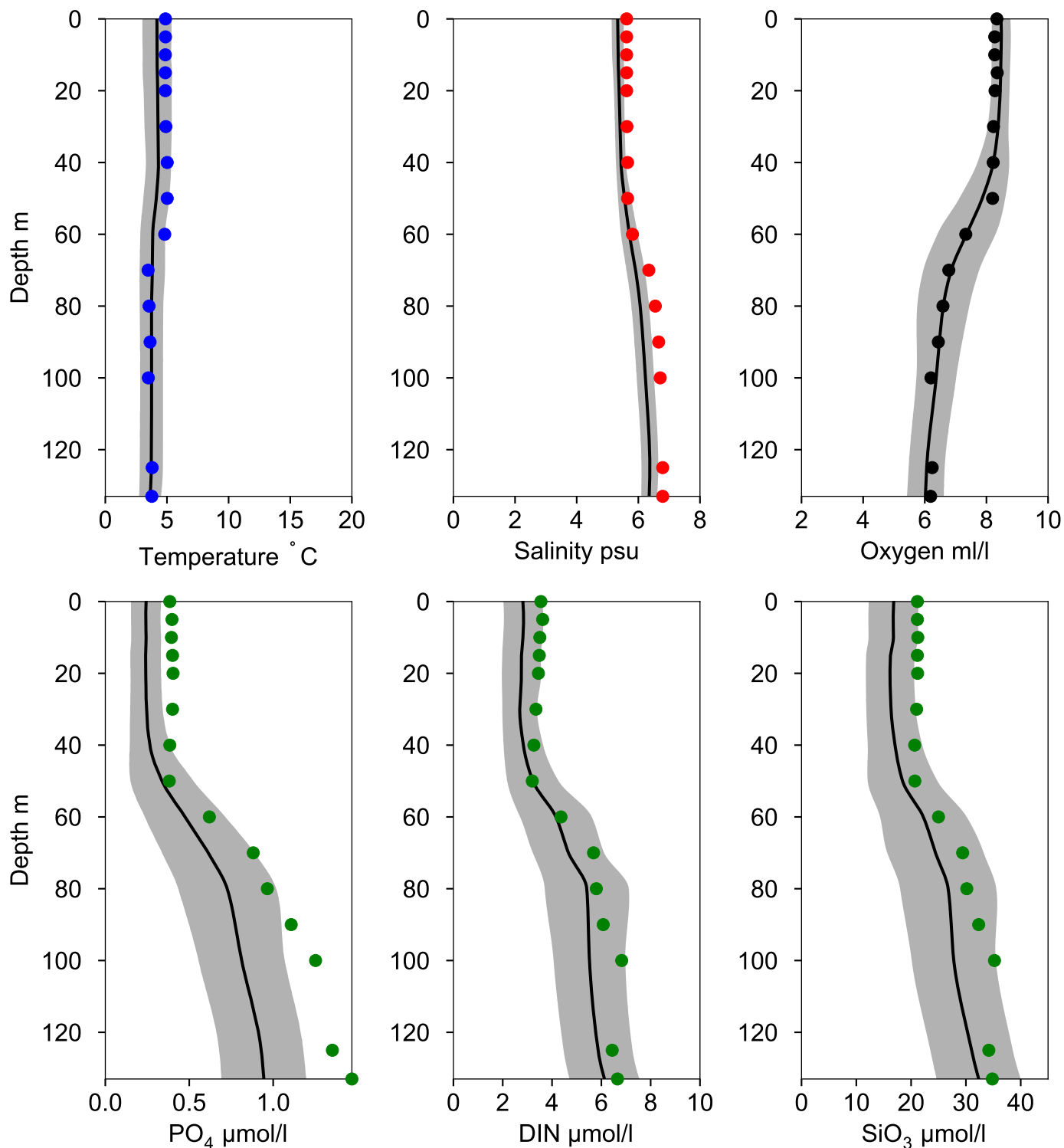
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles F26 / C15 December

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024-12-10

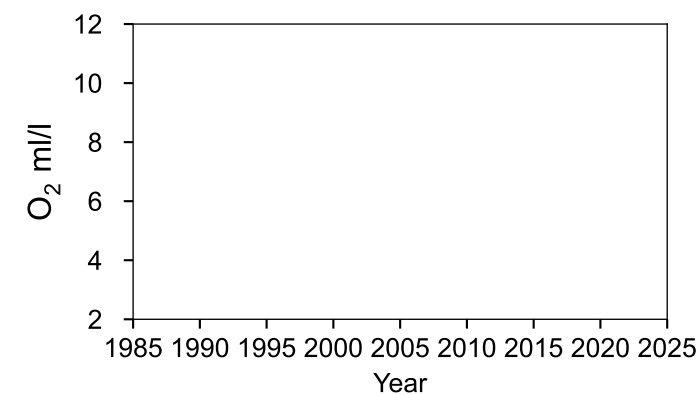
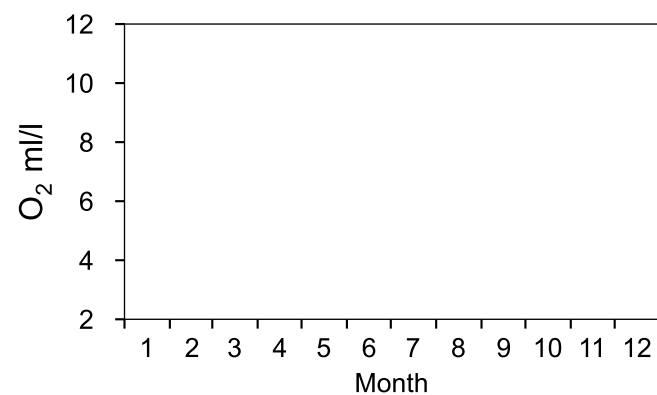
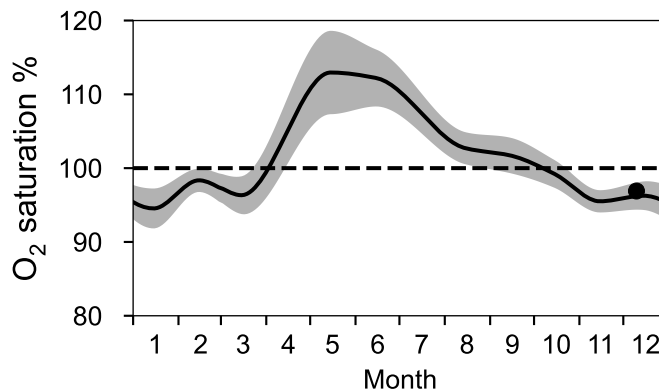
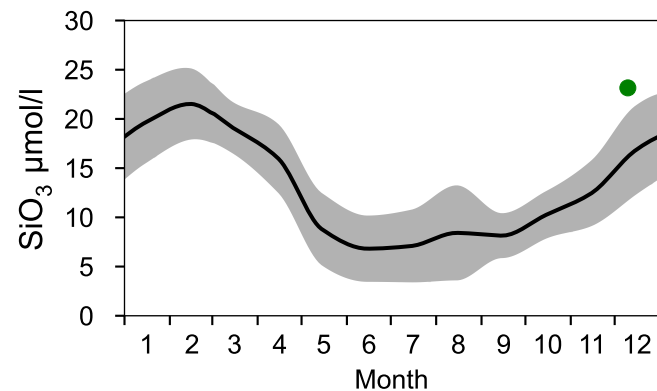
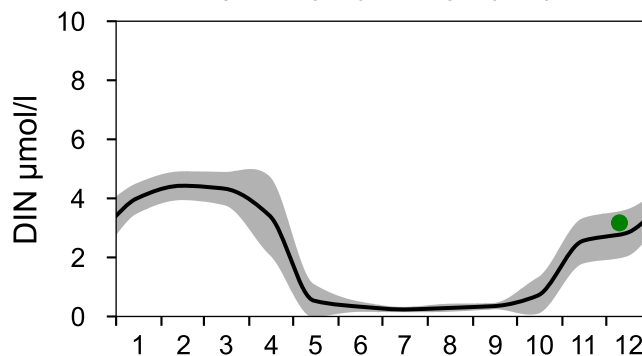
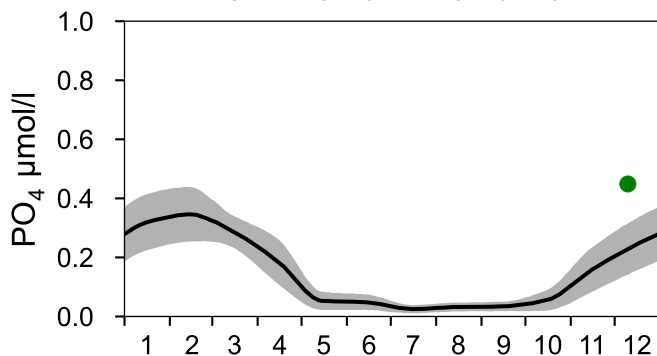
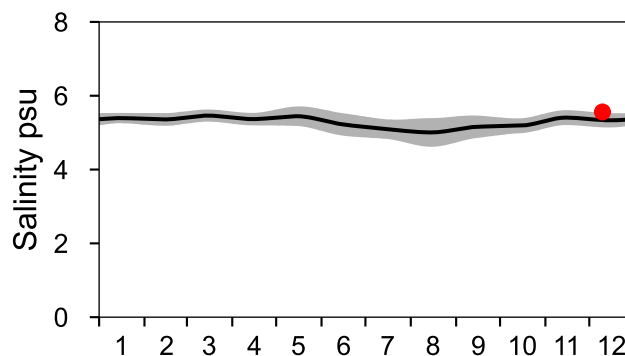
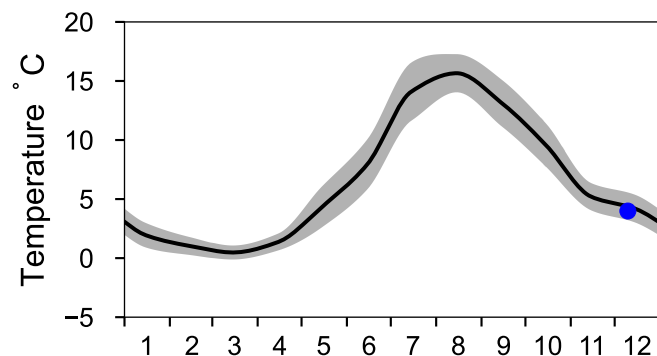


STATION SR8 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

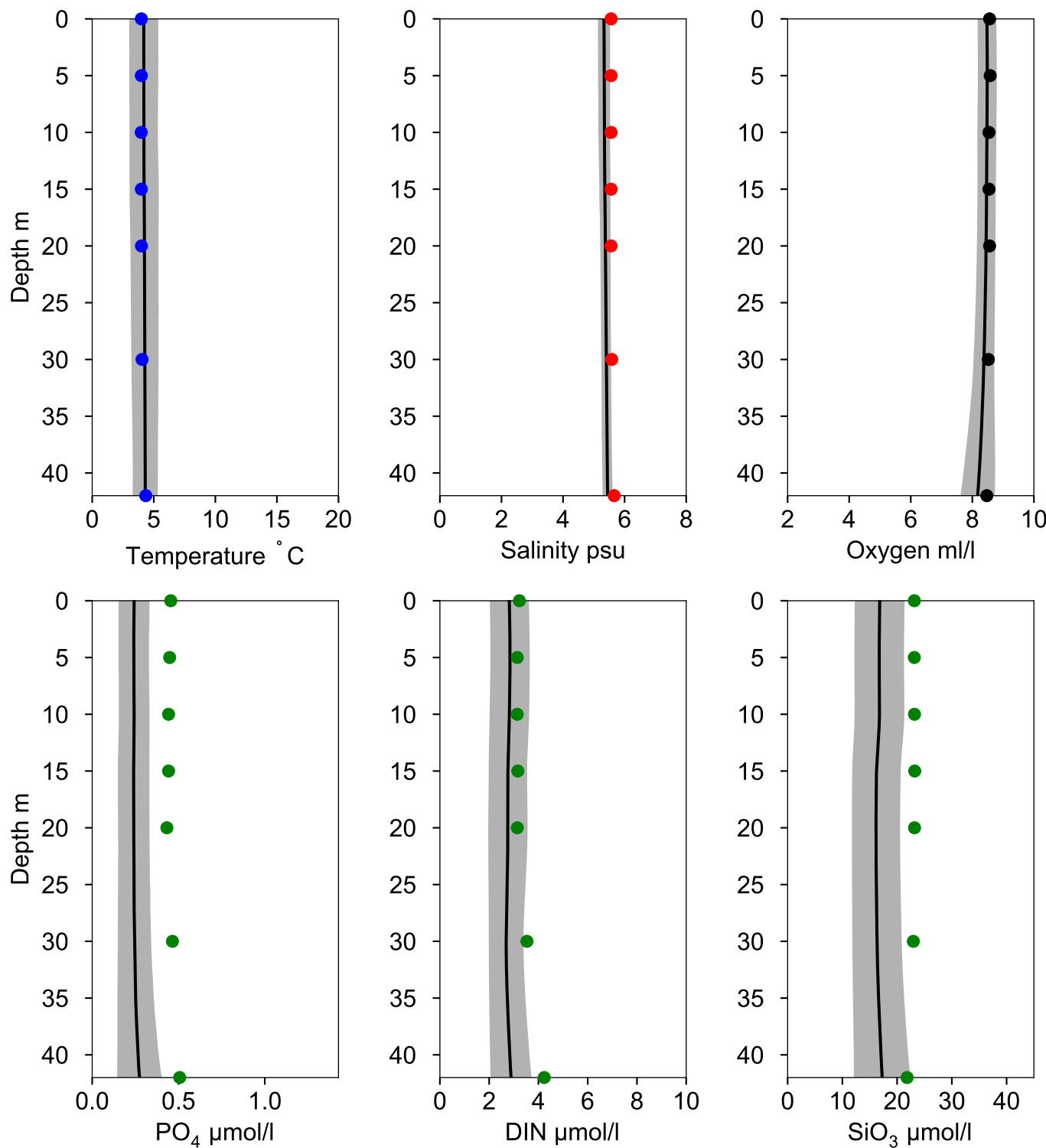
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles SR8 December

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024-12-10

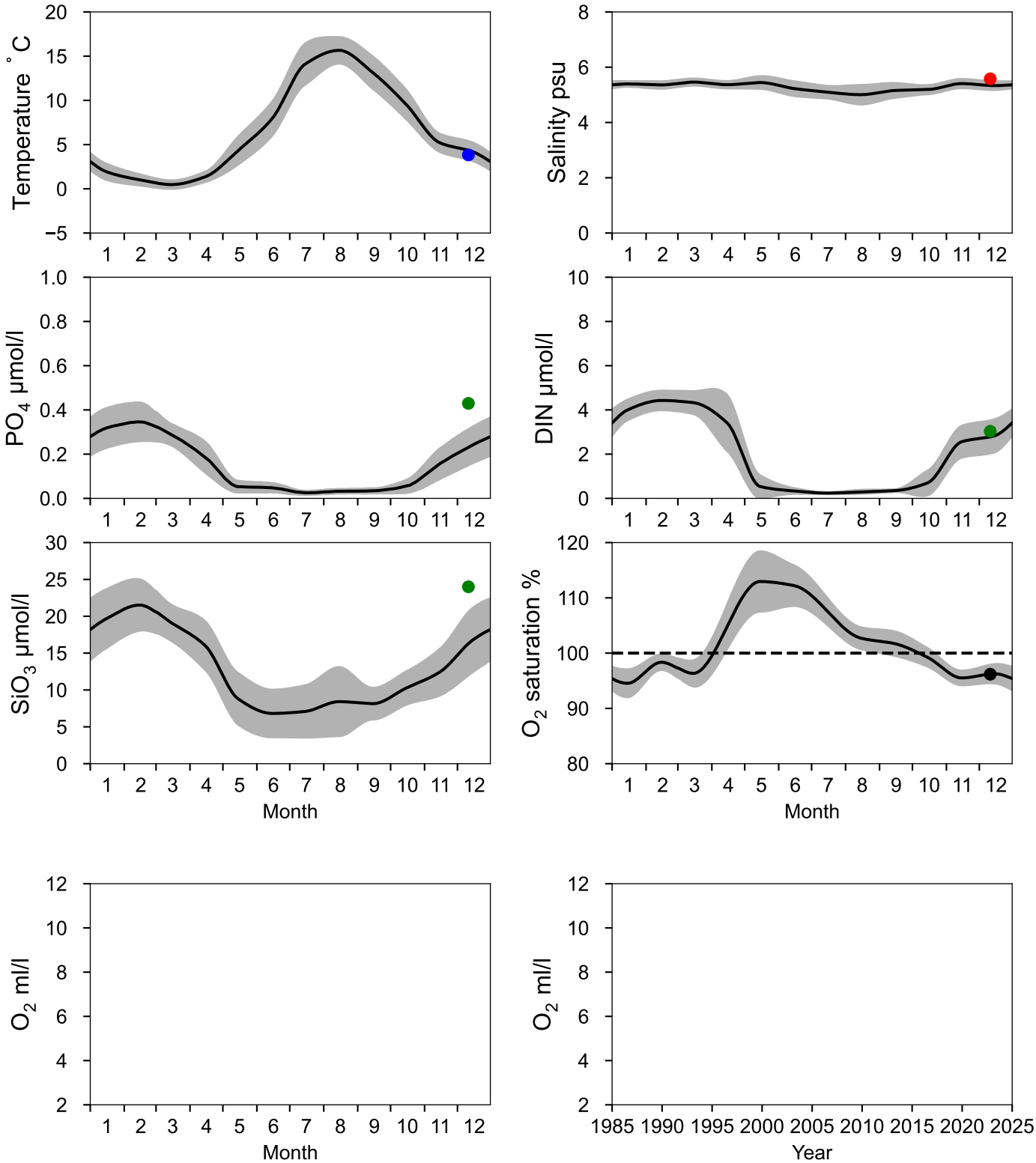


STATION SS29 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

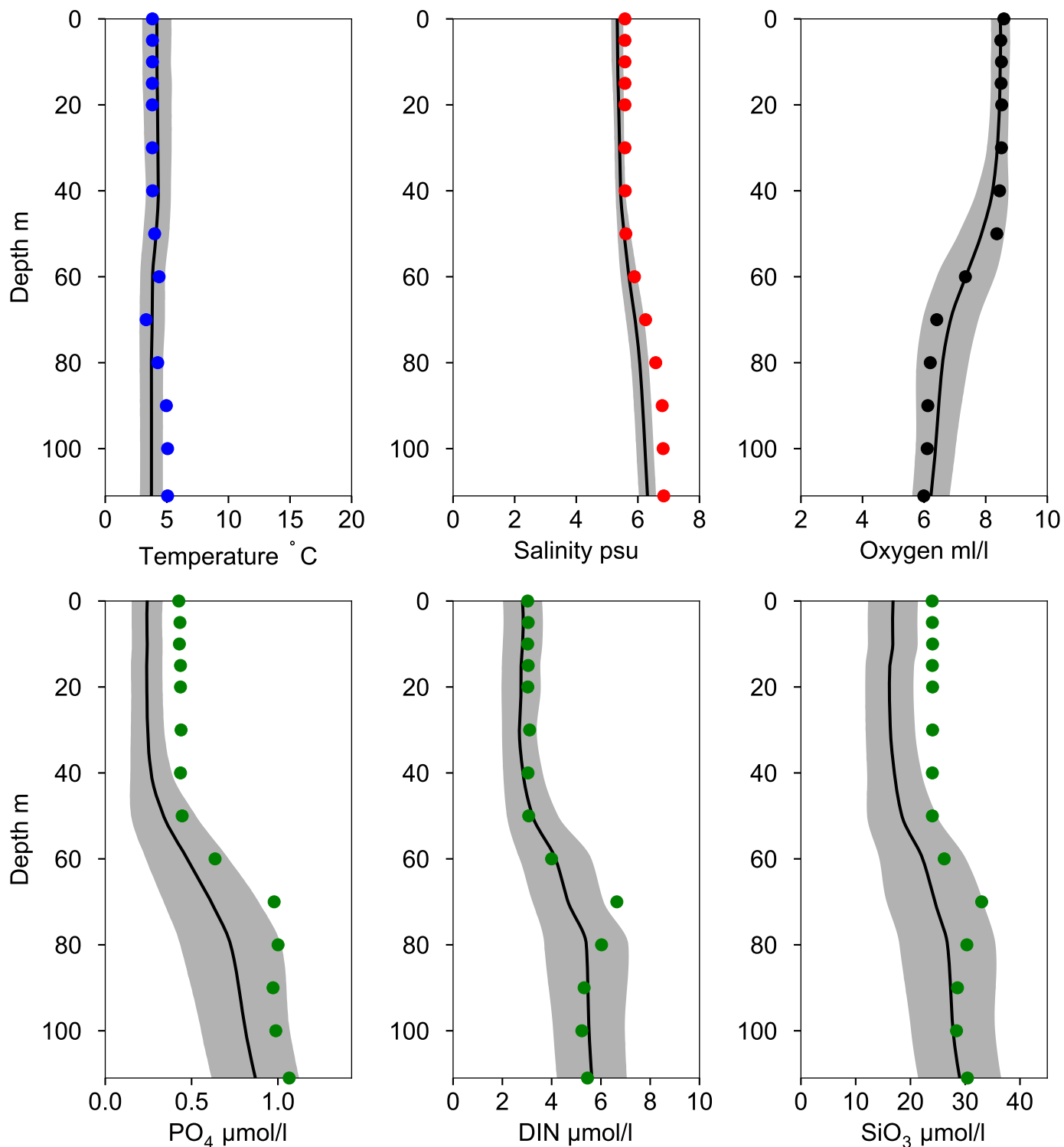
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles SS29 December

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024-12-11

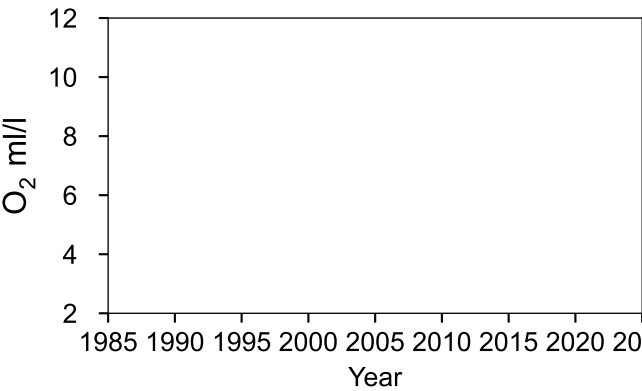
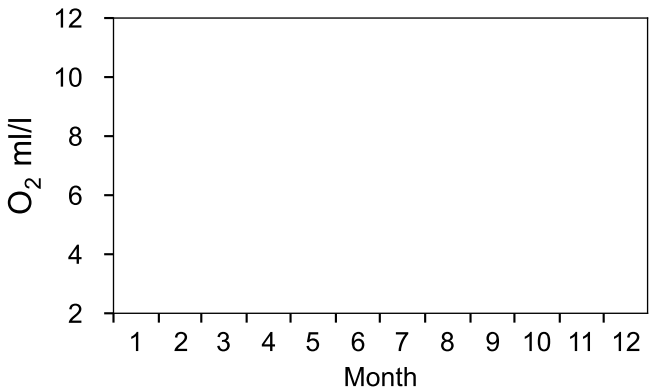
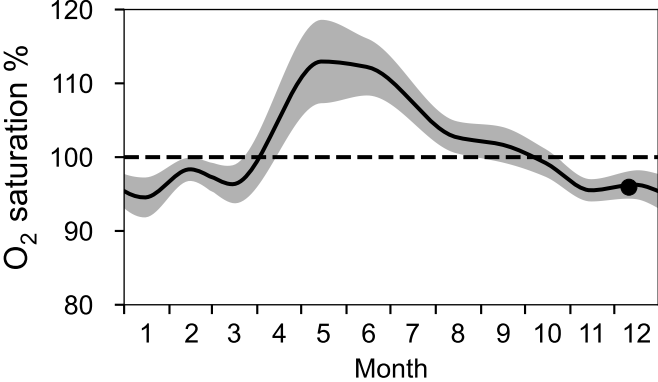
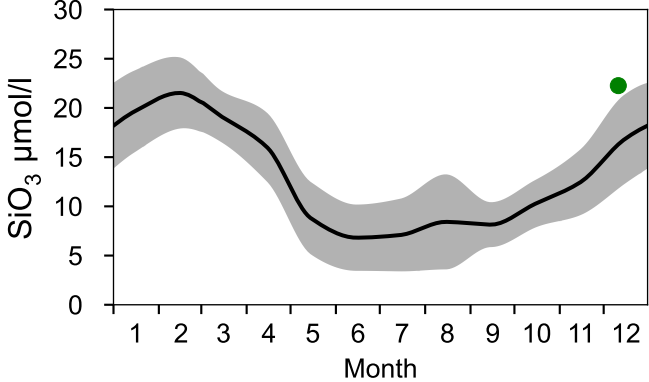
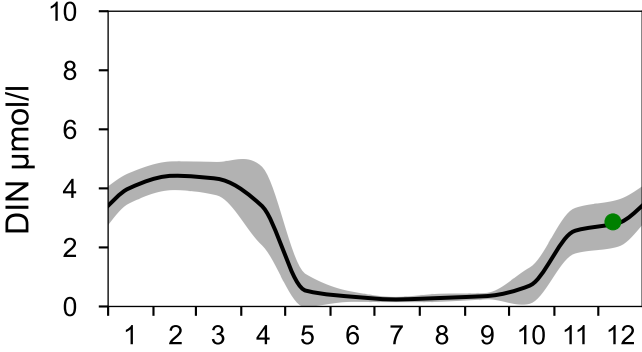
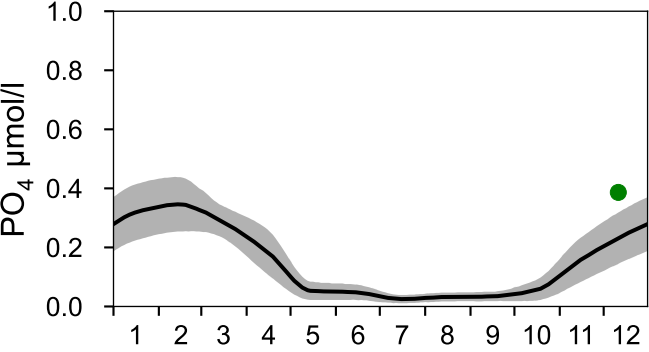
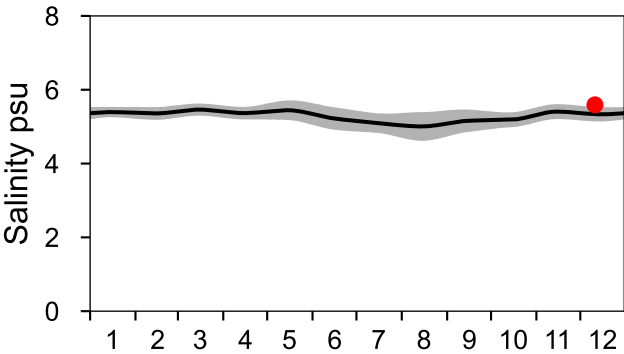
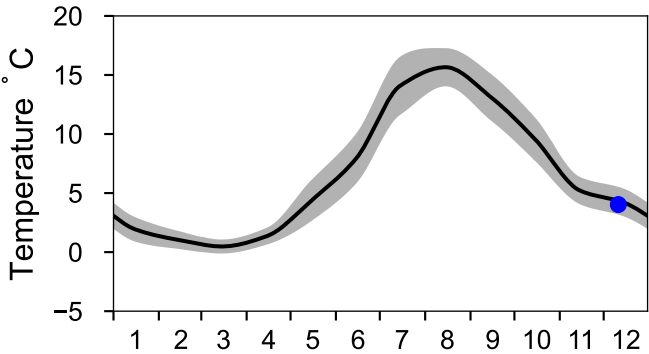


STATION SR5/LL4 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Bottenhavet

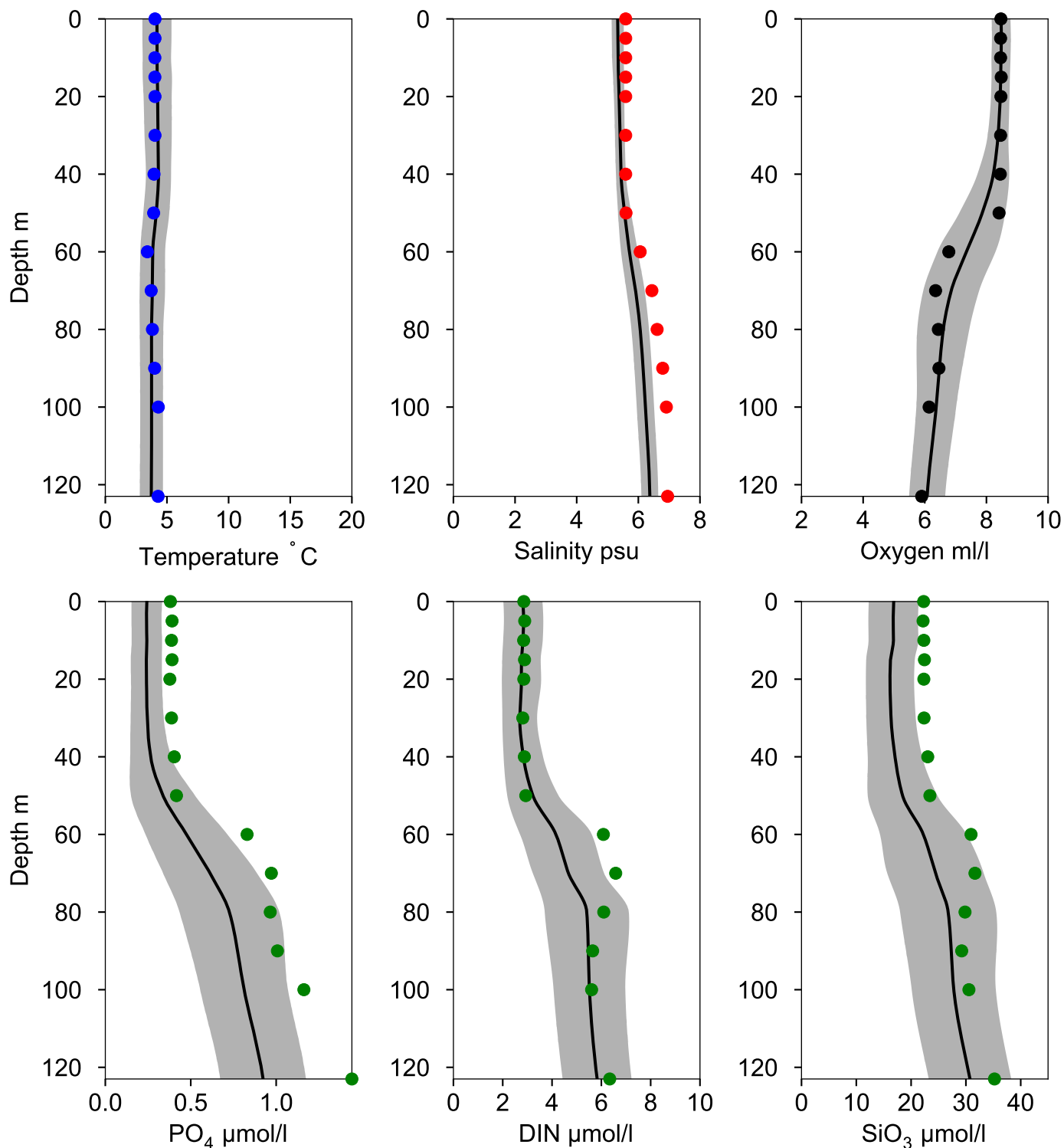
— Mean 1991-2020 St.Dev. ● 2024



Vertical profiles SR5/LL4 December

Statistics based on data from: Bottenhavet

— Mean 1991-2020 St.Dev. ● 2024-12-11

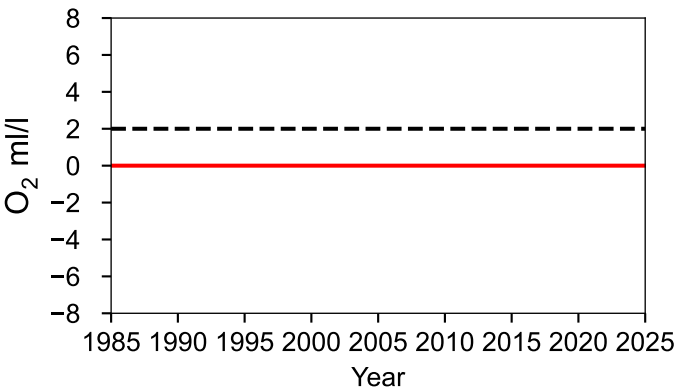
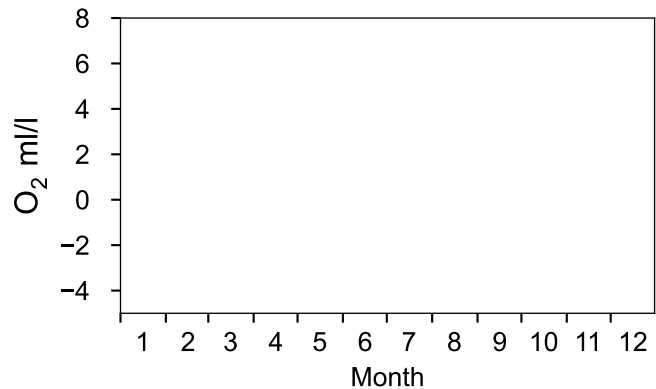
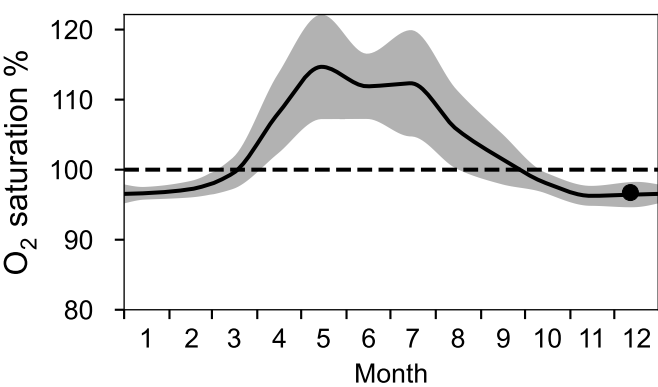
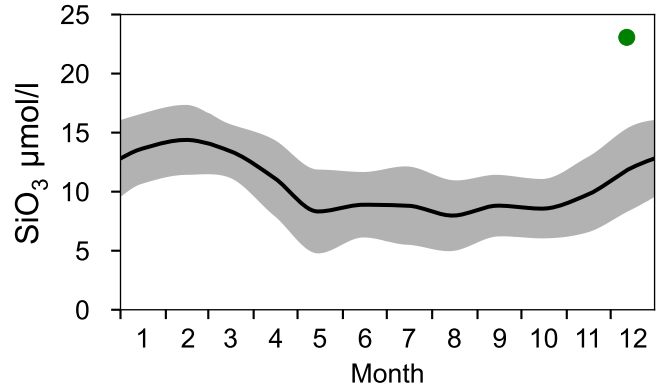
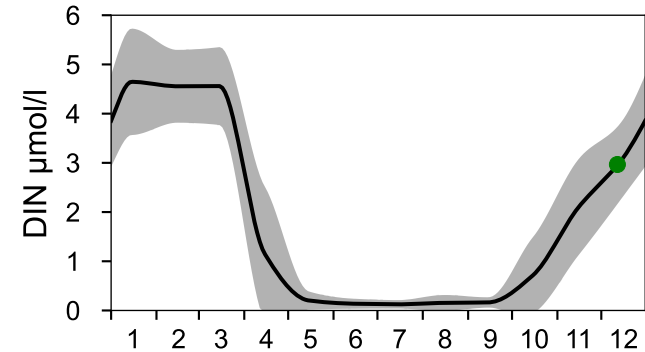
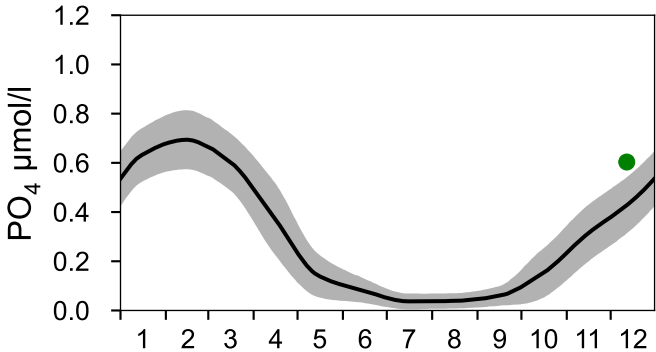
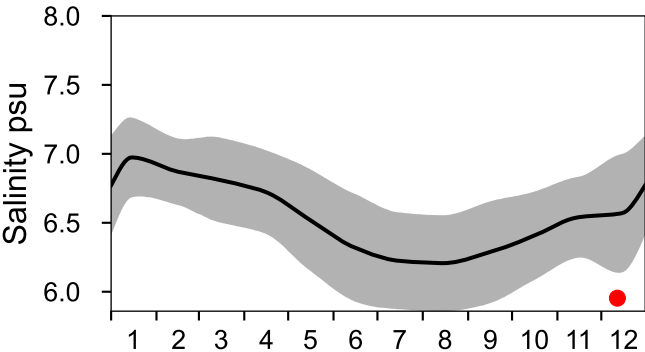
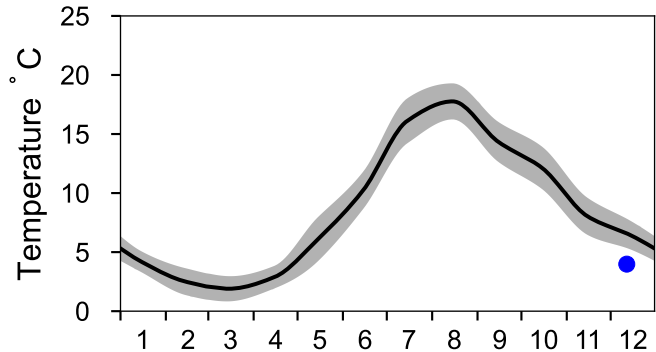


STATION TRÖSKELN ÅLANDS HAV SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Norra Egentliga Östersjön

— Mean 1991-2020 St.Dev. ● 2024



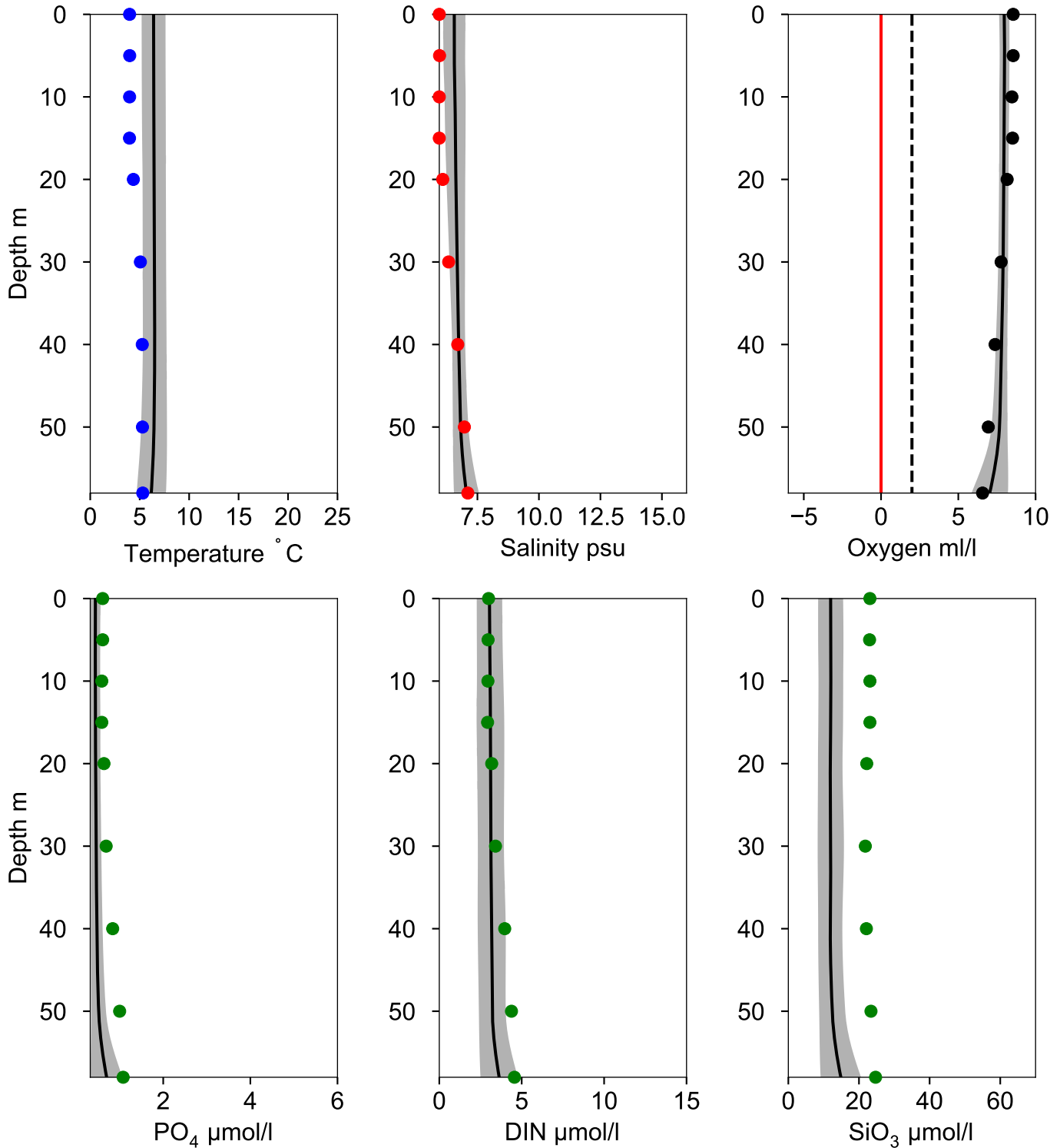
Vertical profiles TRÖSKELN ÅLANDS HAV December

Statistics based on data from: Norra Egentliga Östersjön

— Mean 1991-2020

■ St.Dev.

● 2024-12-12



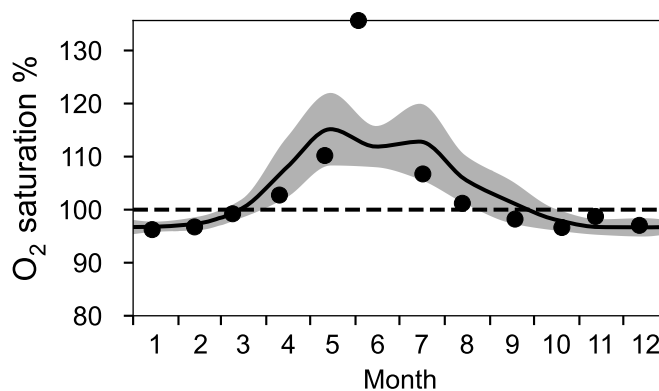
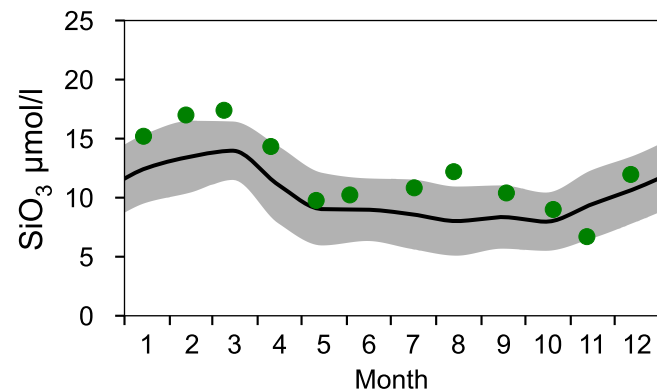
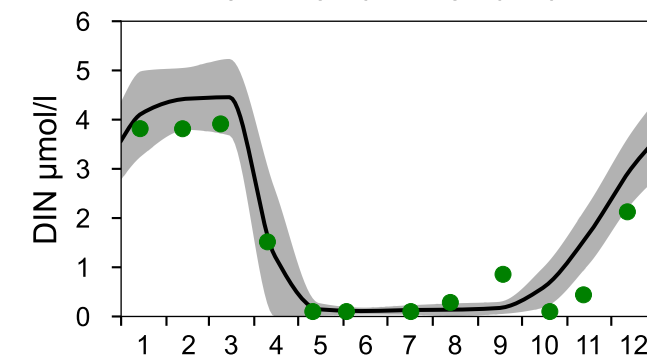
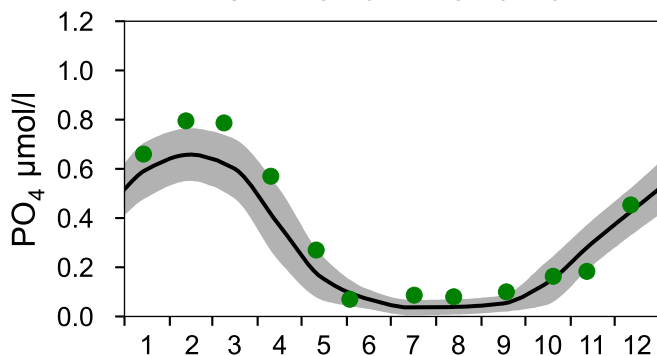
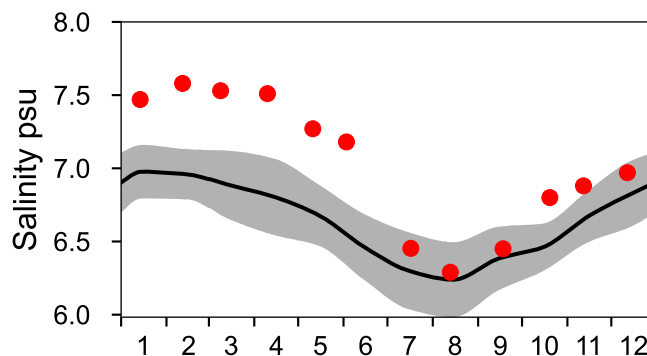
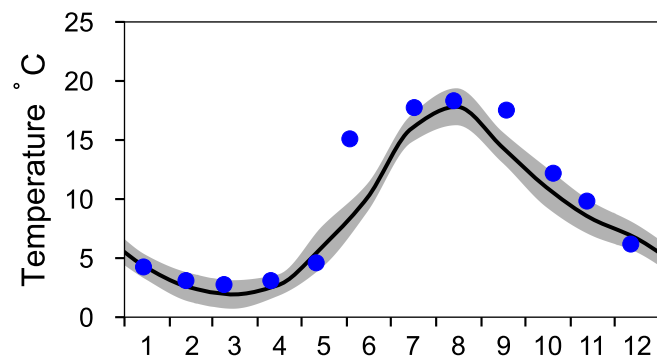
STATION BY29 / LL19 SURFACE WATER (0-10 m)

Annual Cycles

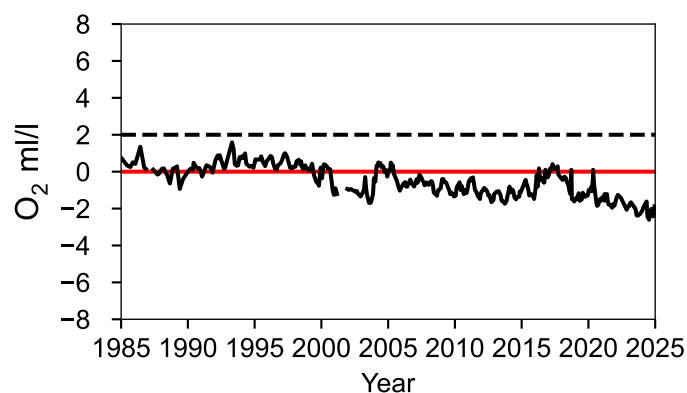
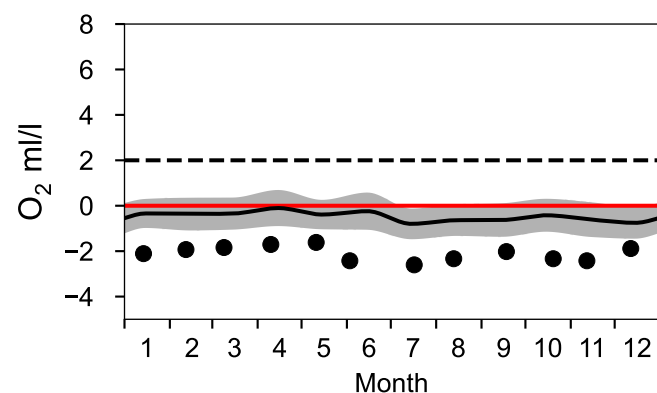
— Mean 1991-2020

■ St.Dev.

● 2024

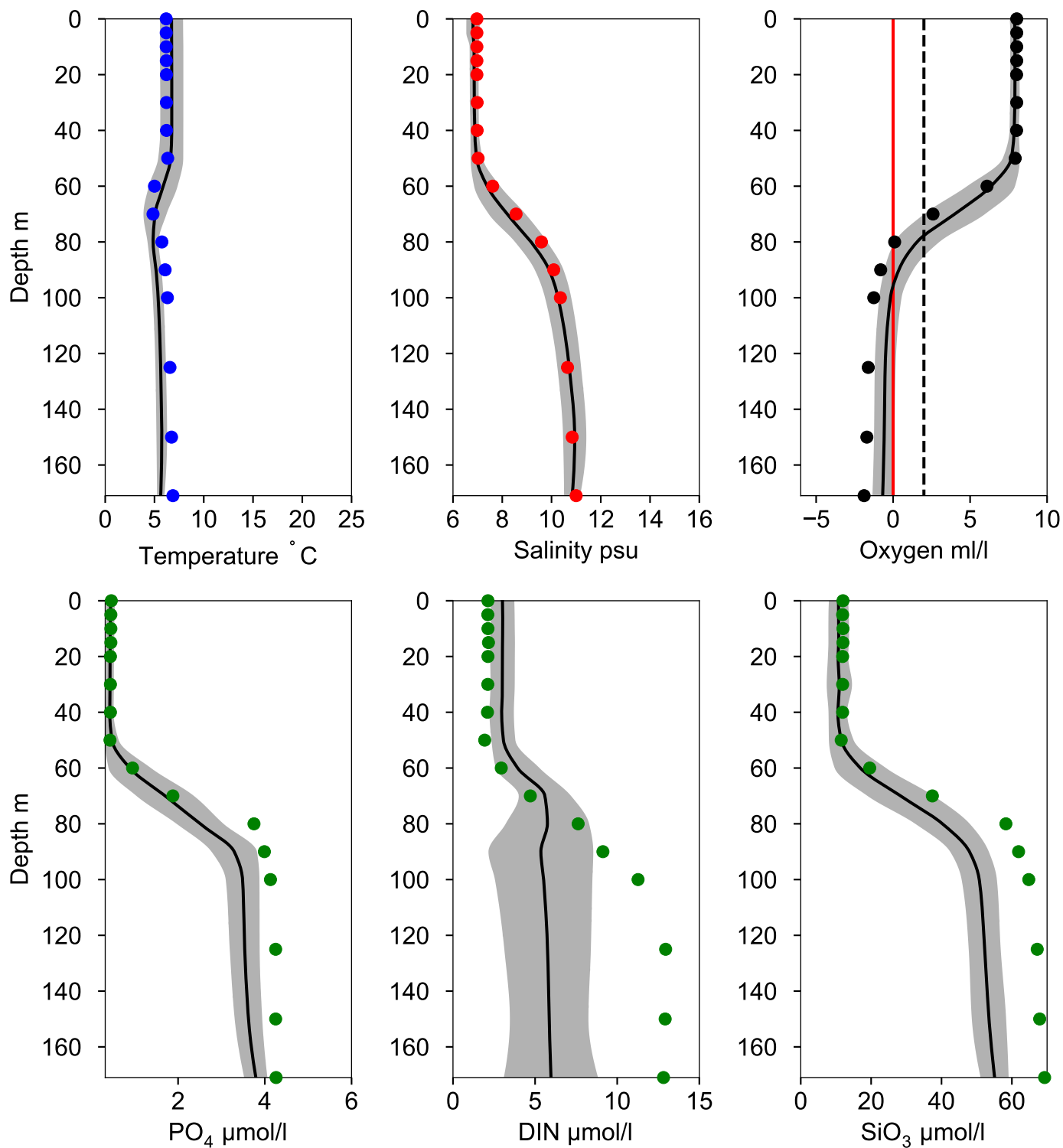


OXYGEN IN BOTTOM WATER (depth >= 150 m)



Vertical profiles BY29 / LL19 December

— Mean 1991-2020 St.Dev. ● 2024-12-12



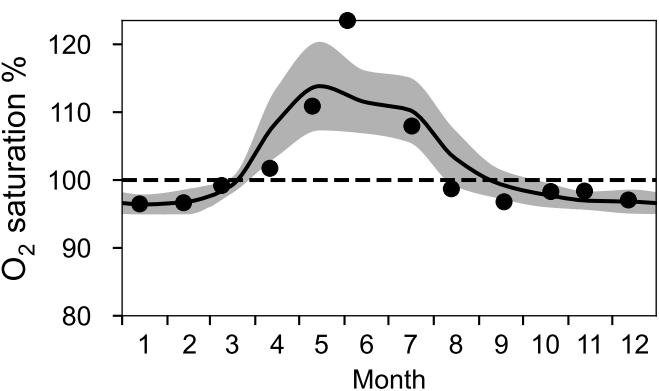
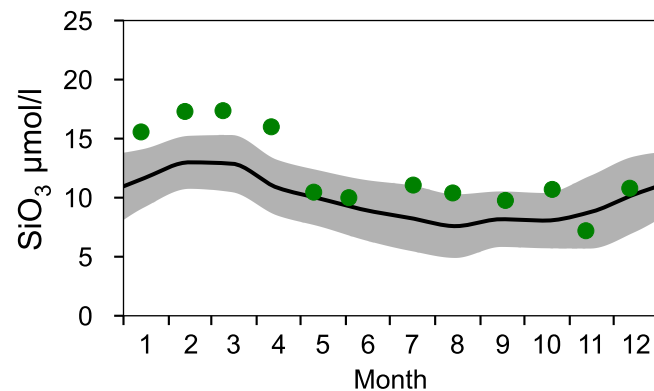
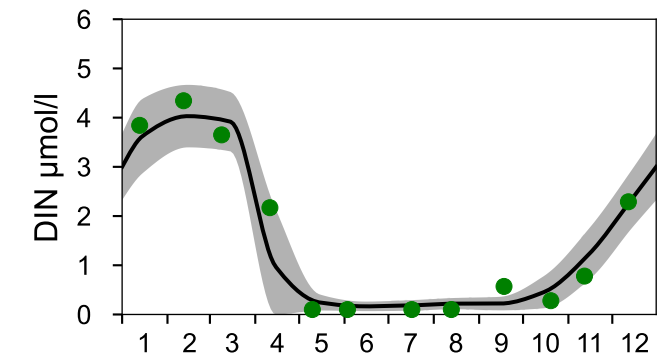
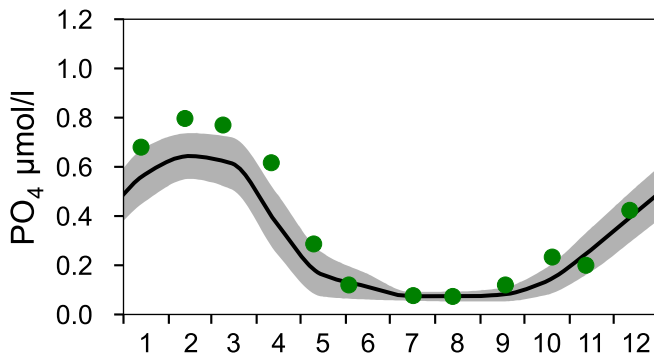
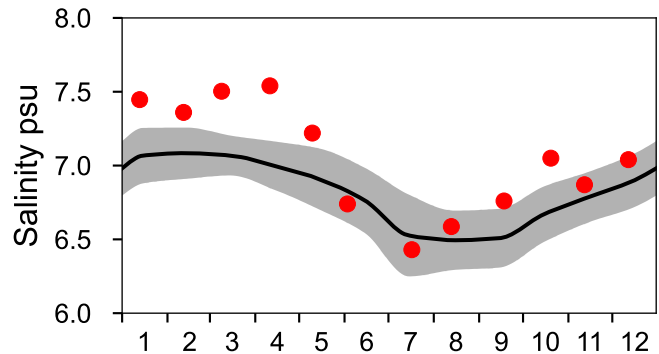
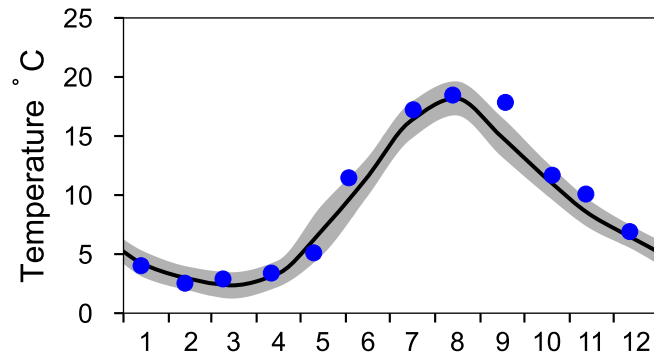
STATION BY20 FÄRÖDJ SURFACE WATER (0-10 m)

Annual Cycles

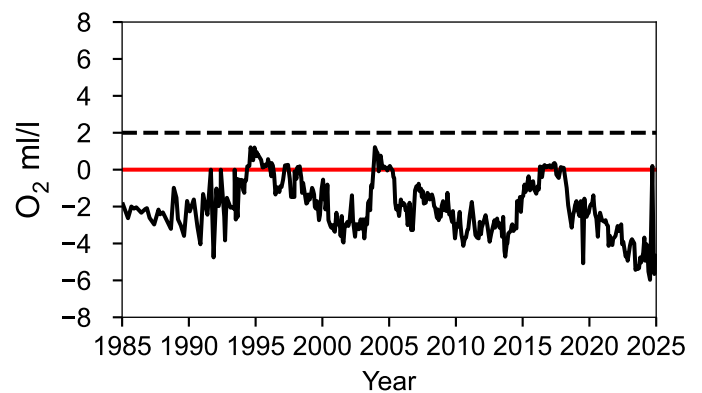
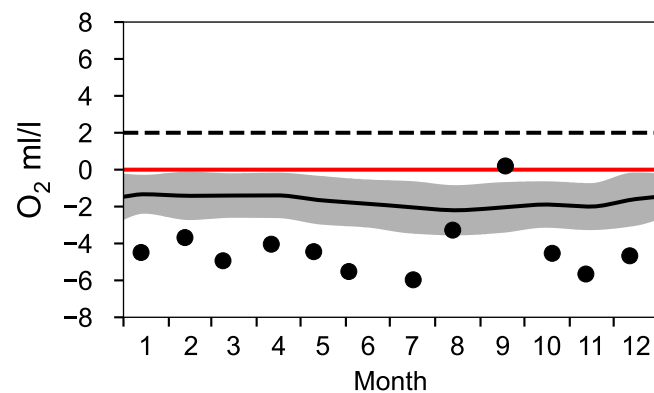
— Mean 1991-2020

■ St.Dev.

● 2024

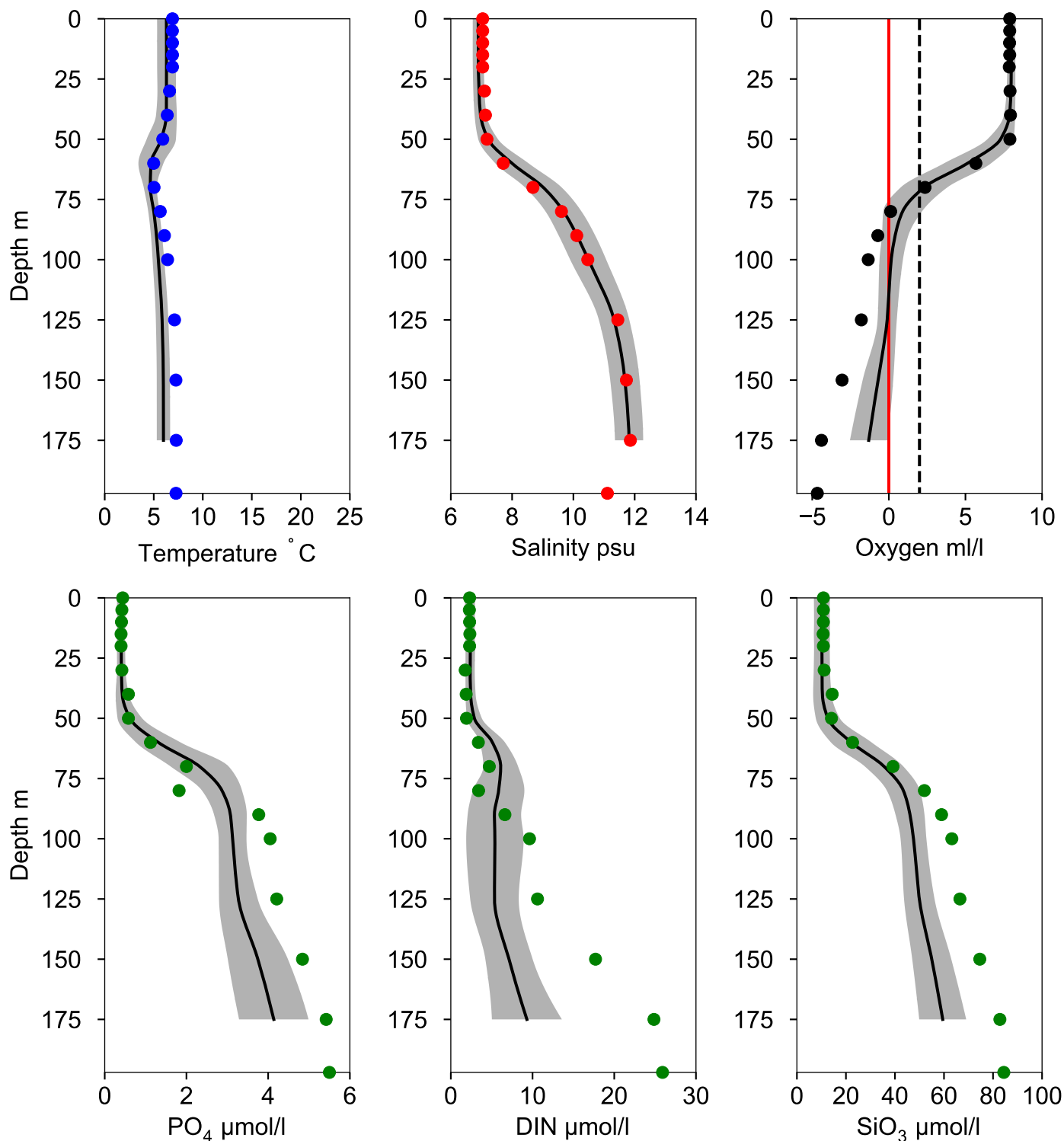


OXYGEN IN BOTTOM WATER (depth >= 175 m)



Vertical profiles BY20 FÅRÖDJ December

— Mean 1991-2020 St.Dev. ● 2024-12-12



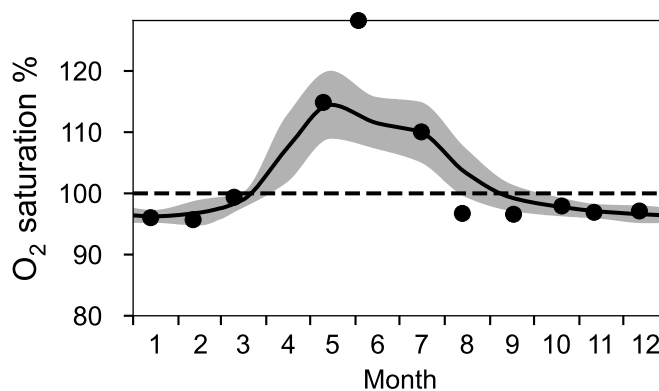
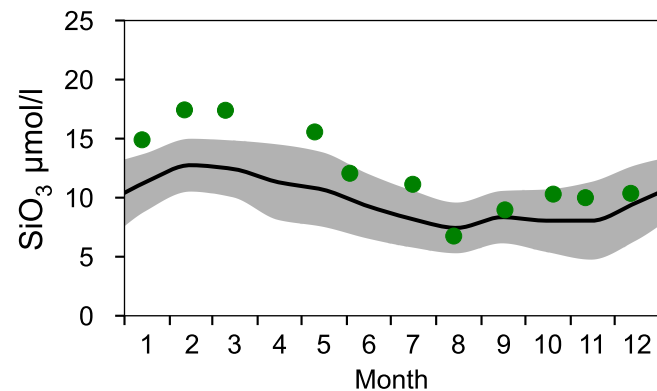
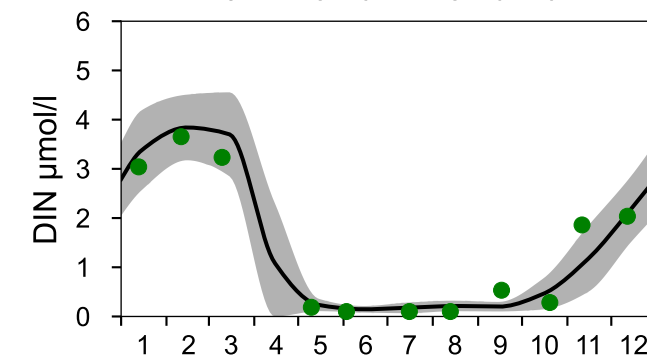
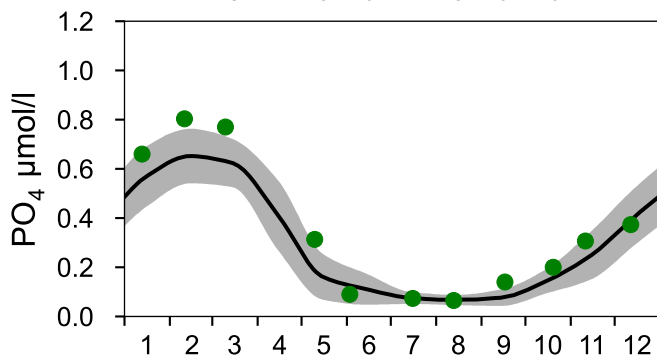
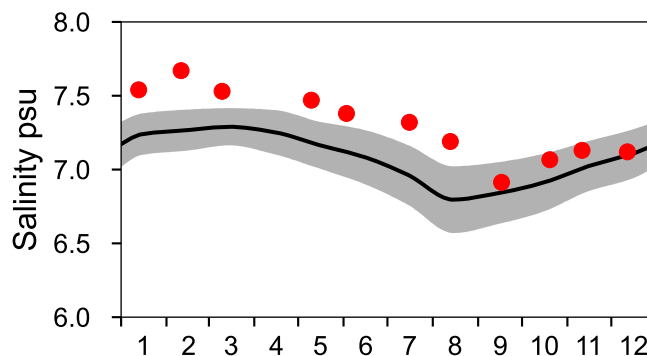
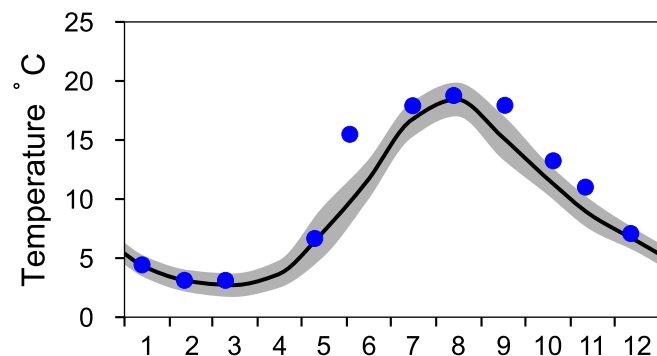
STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

Annual Cycles

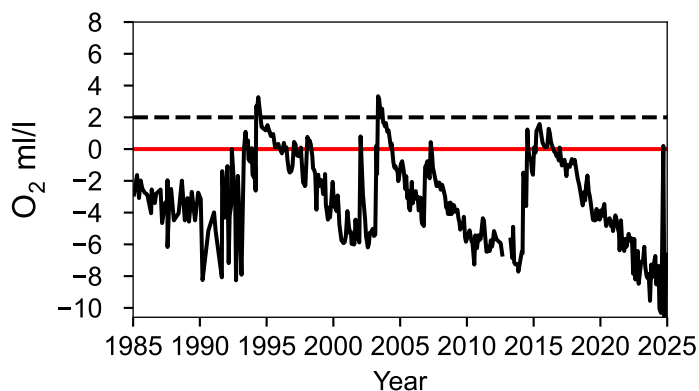
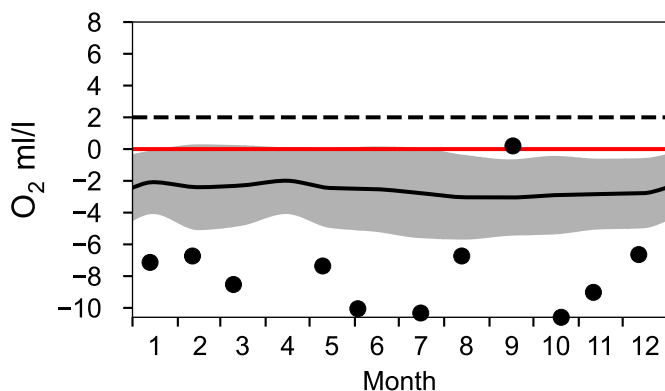
— Mean 1991-2020

■ St.Dev.

● 2024

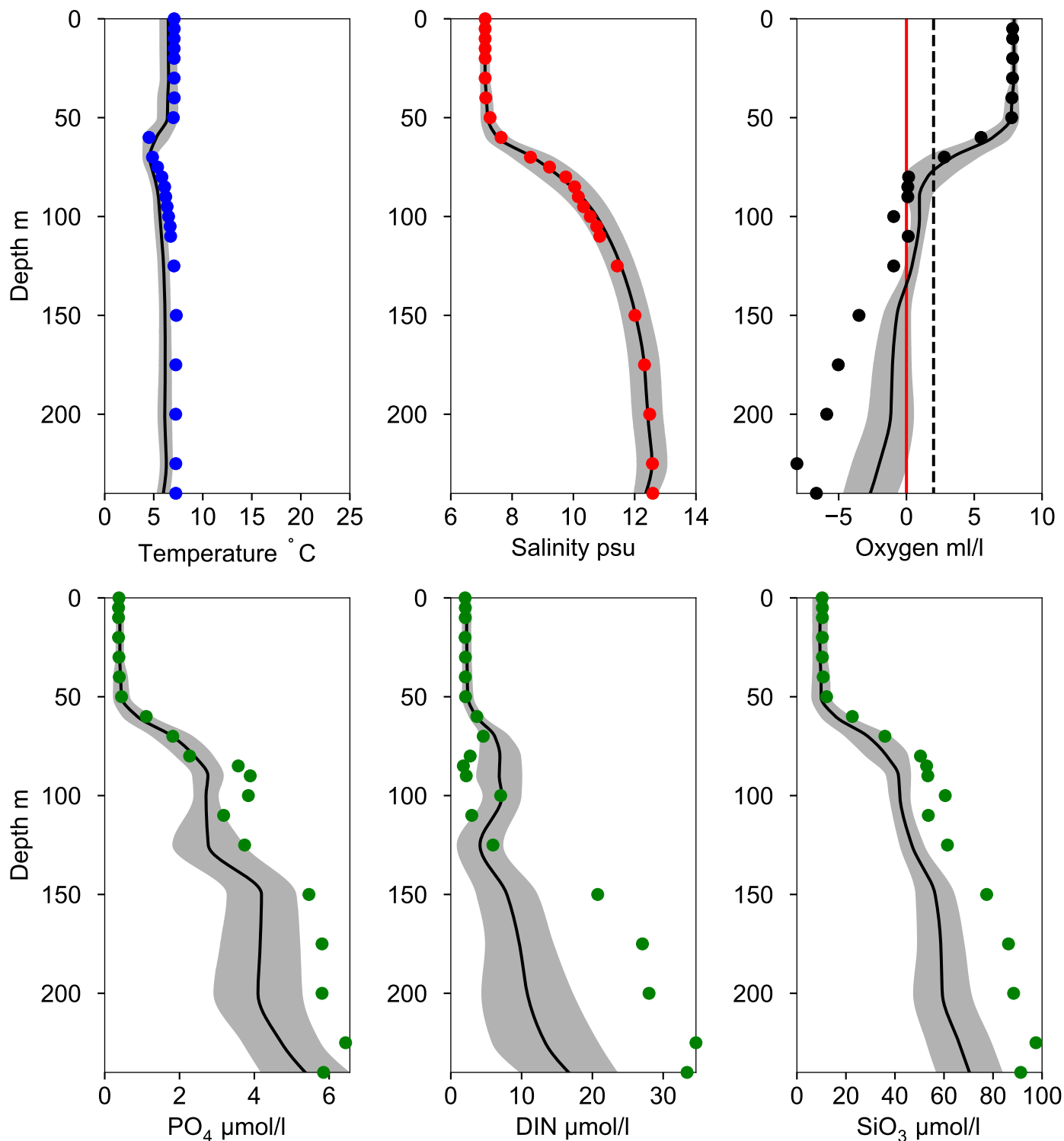


OXYGEN IN BOTTOM WATER (depth >= 225 m)



Vertical profiles BY15 GOTLANDSDJ December

— Mean 1991-2020 St.Dev. • 2024-12-12



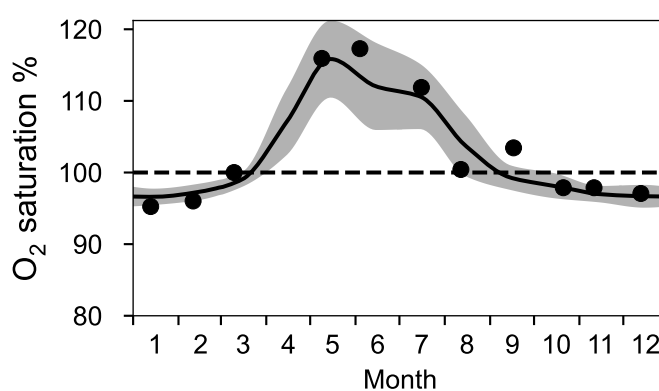
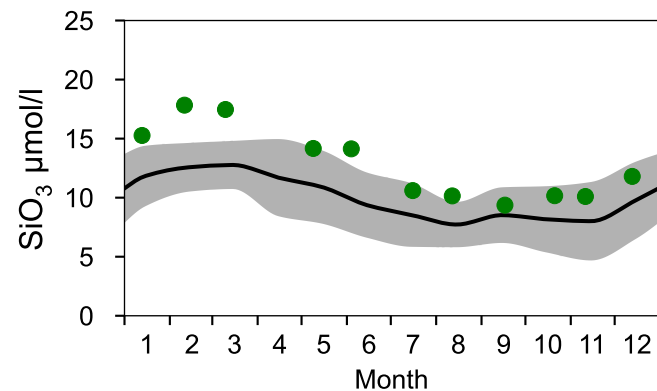
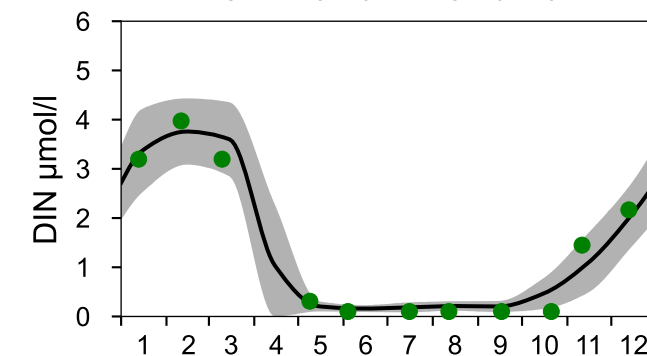
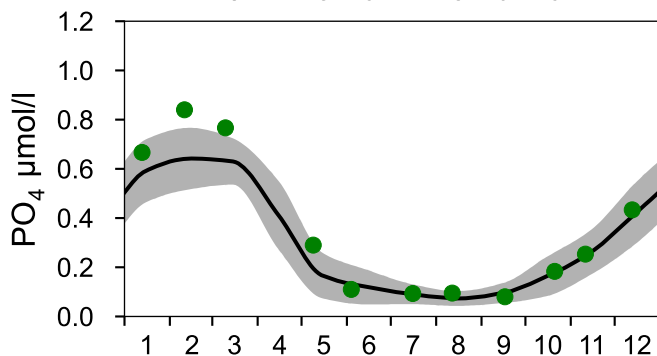
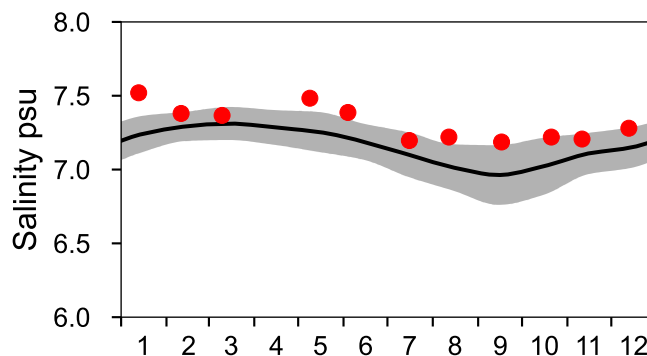
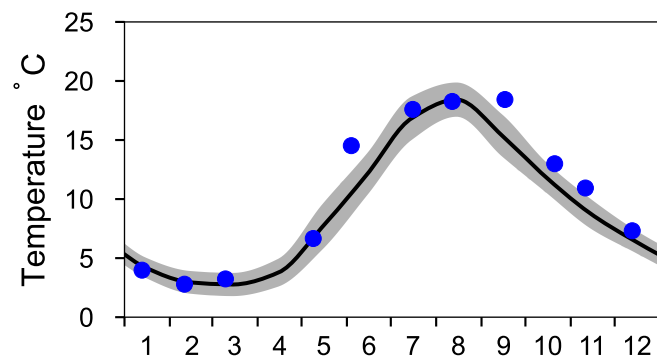
STATION BY10 SURFACE WATER (0-10 m)

Annual Cycles

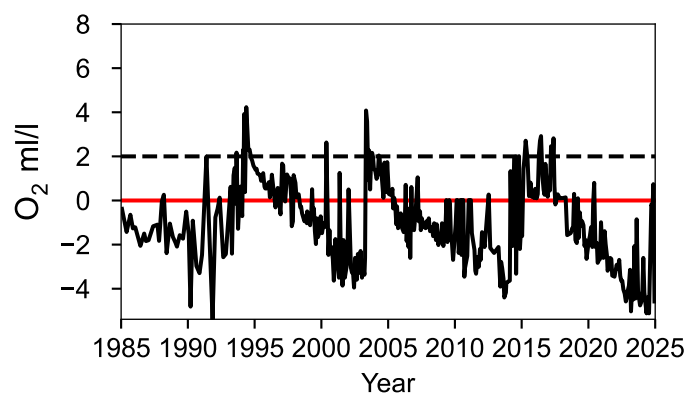
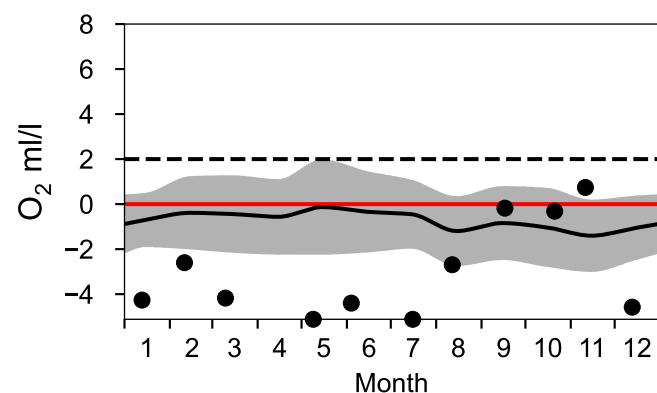
— Mean 1991-2020

■ St.Dev.

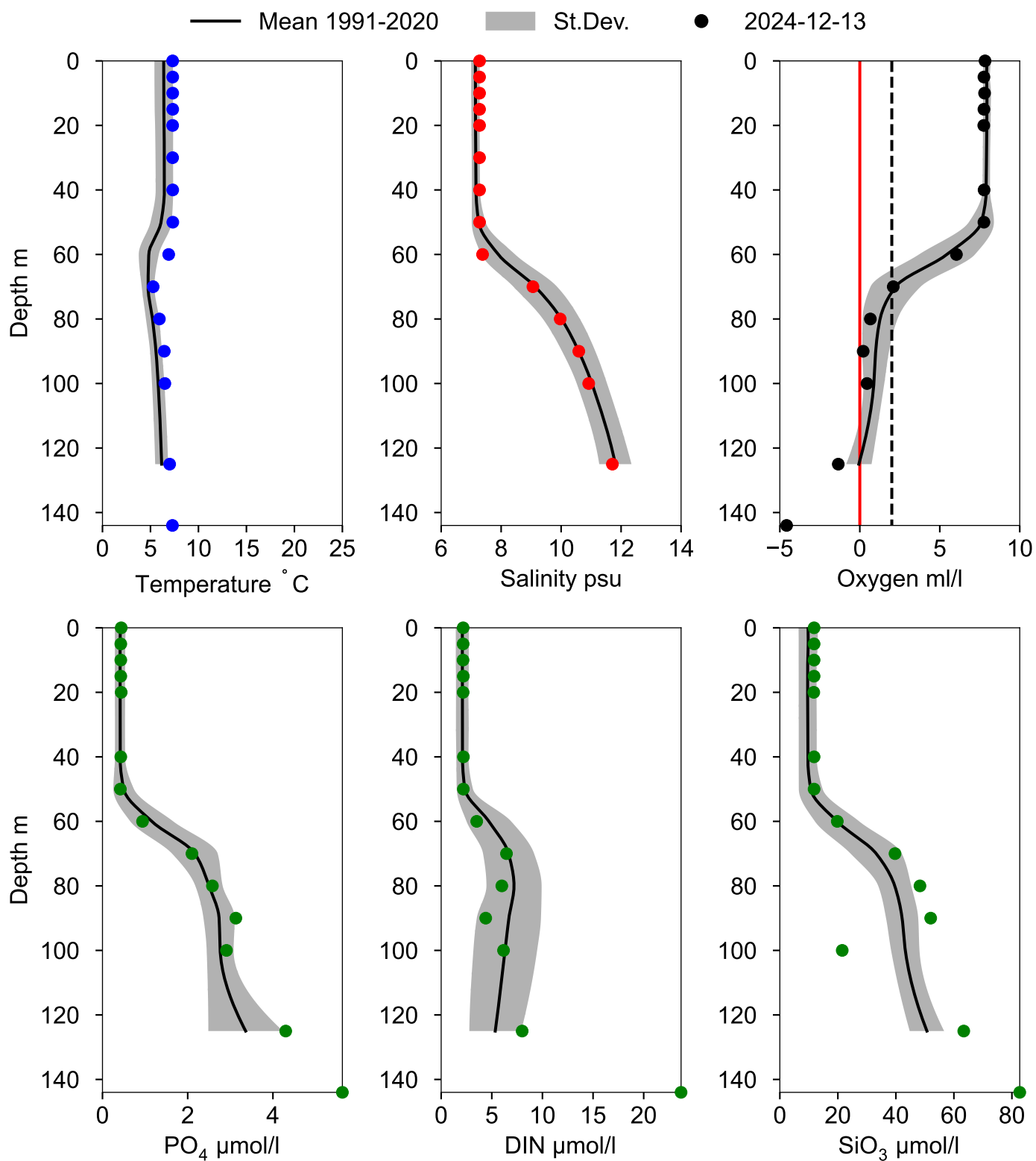
● 2024



OXYGEN IN BOTTOM WATER (depth >= 125 m)



Vertical profiles BY10 December



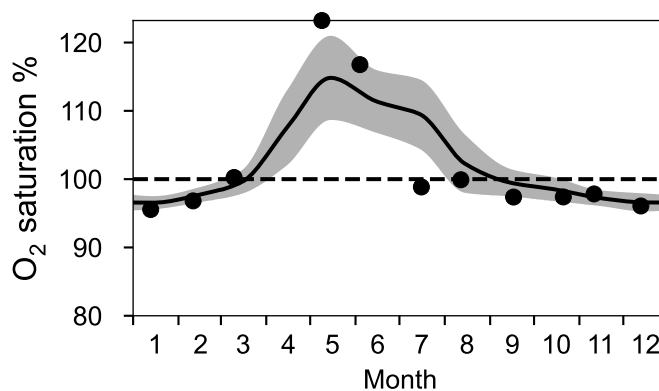
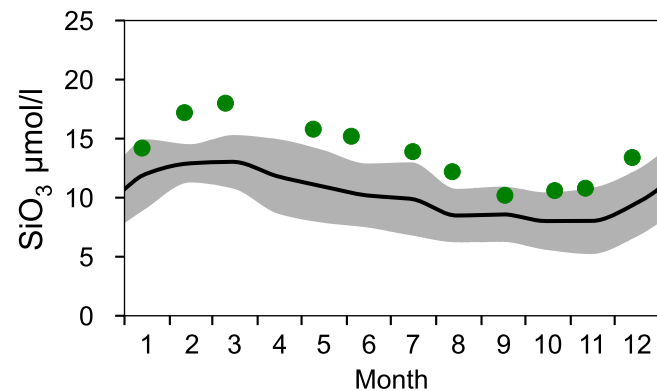
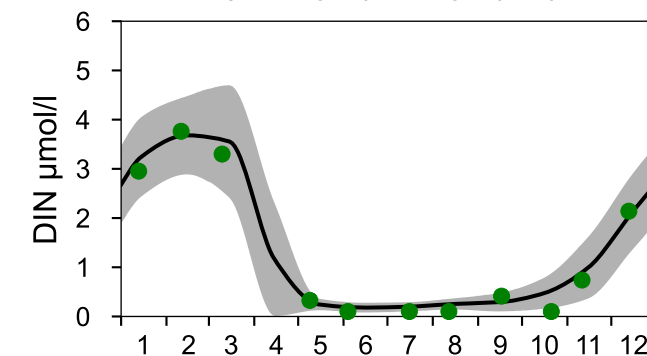
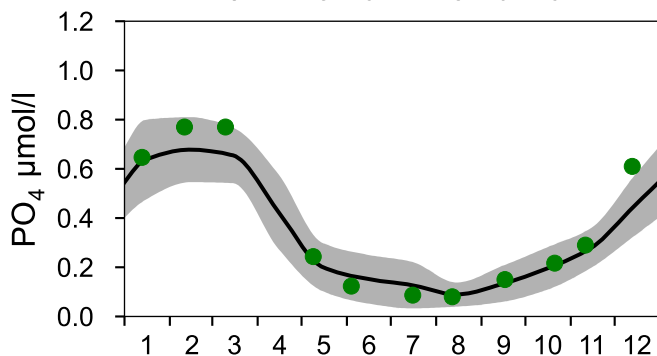
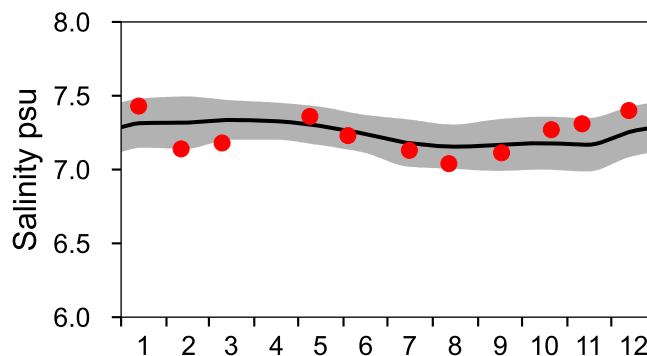
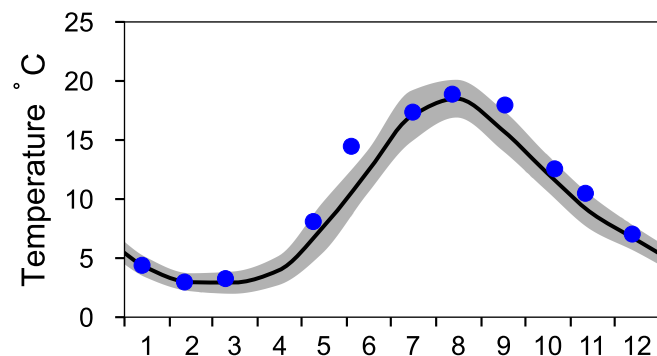
STATION BCS III-10 SURFACE WATER (0-10 m)

Annual Cycles

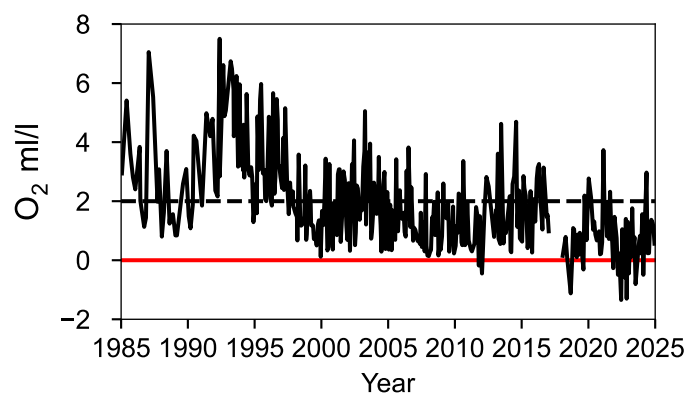
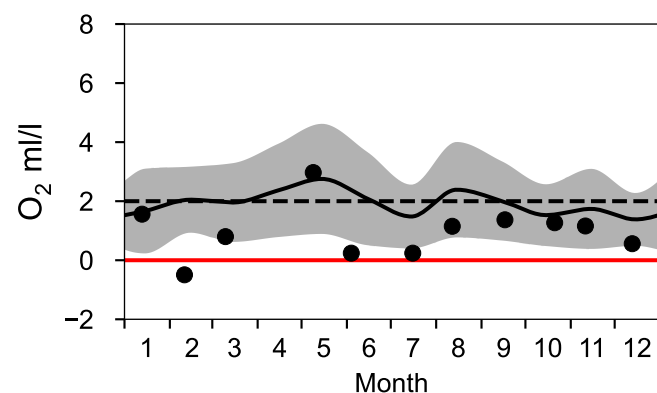
— Mean 1991-2020

■ St.Dev.

● 2024



OXYGEN IN BOTTOM WATER (depth >= 80 m)

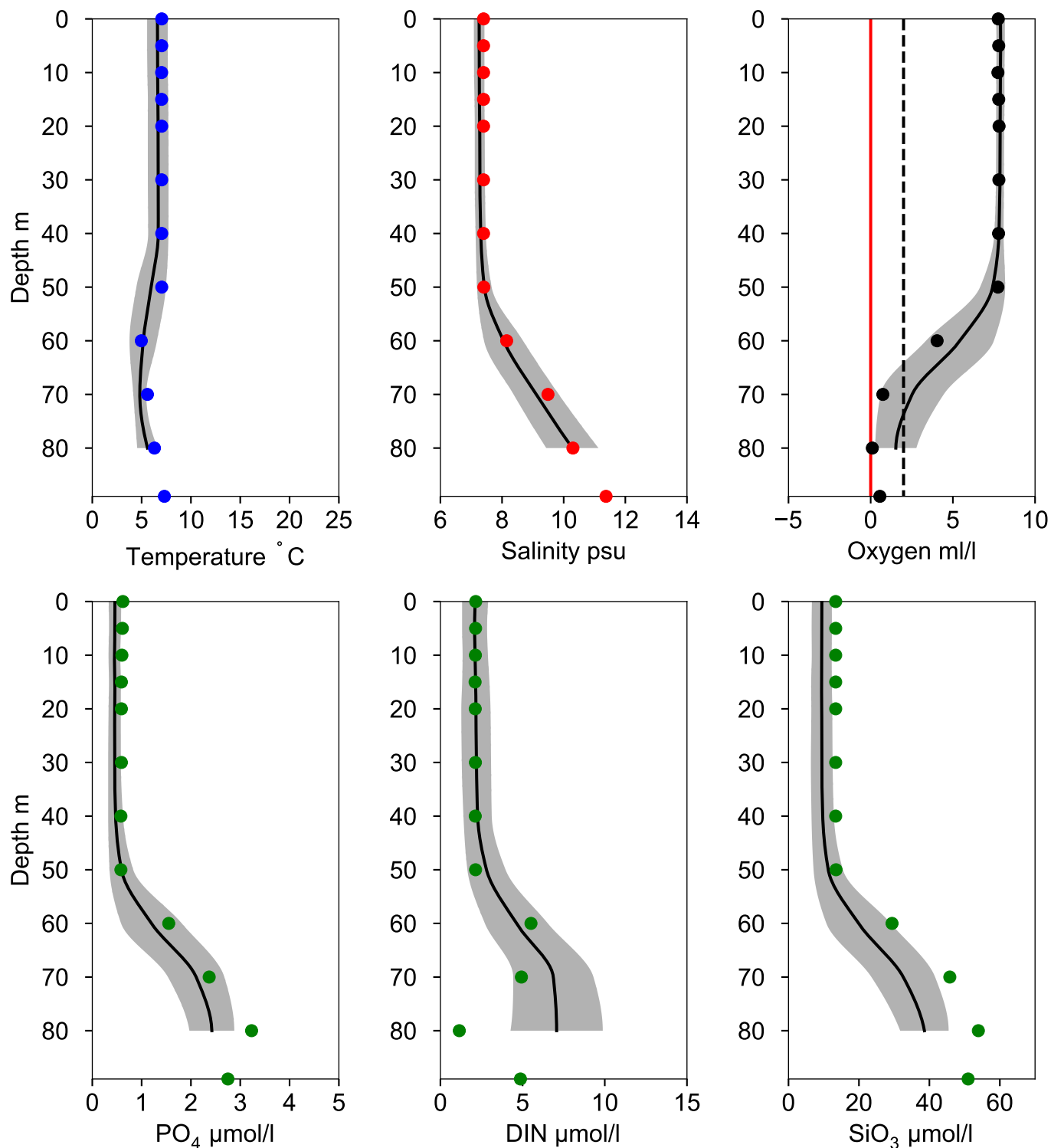


Vertical profiles BCS III-10 December

— Mean 1991-2020

■ St.Dev.

● 2024-12-13



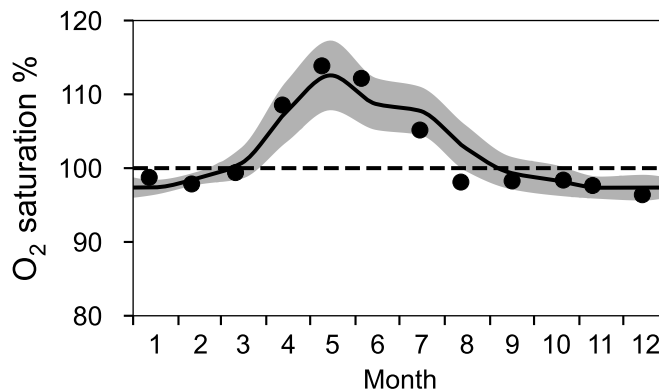
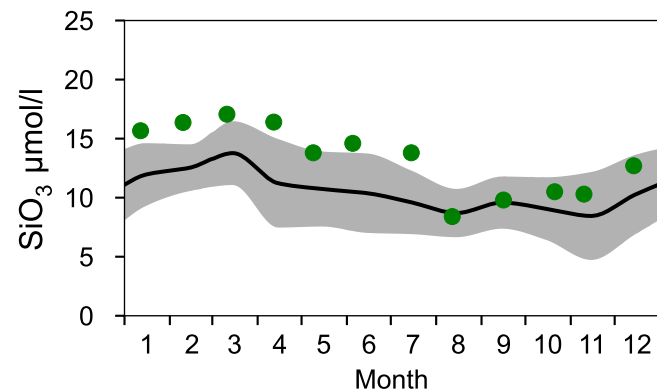
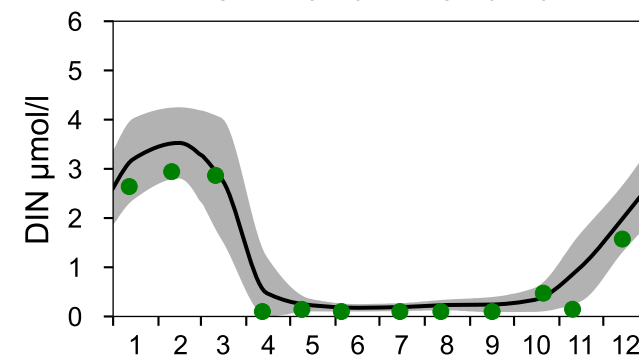
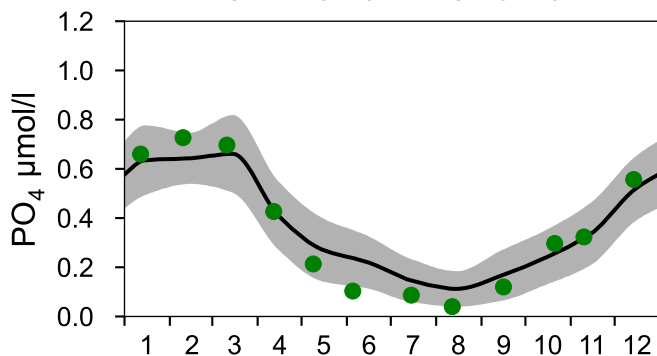
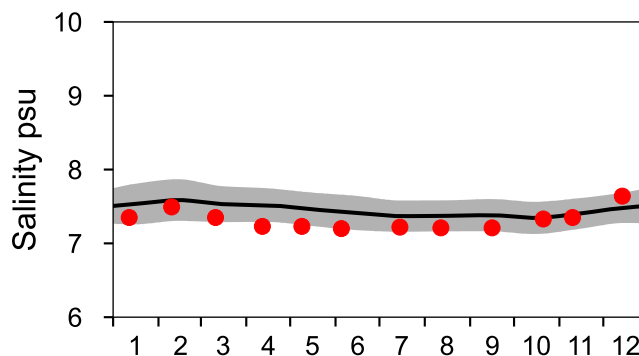
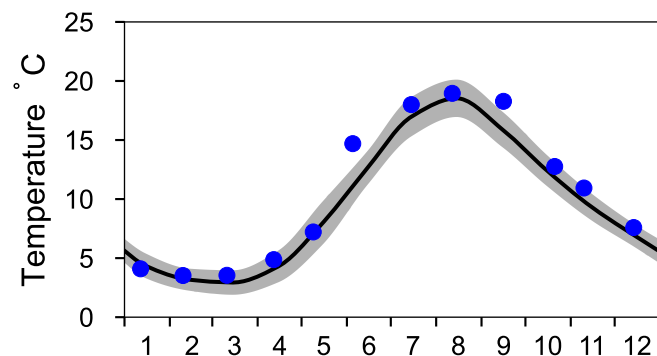
STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

Annual Cycles

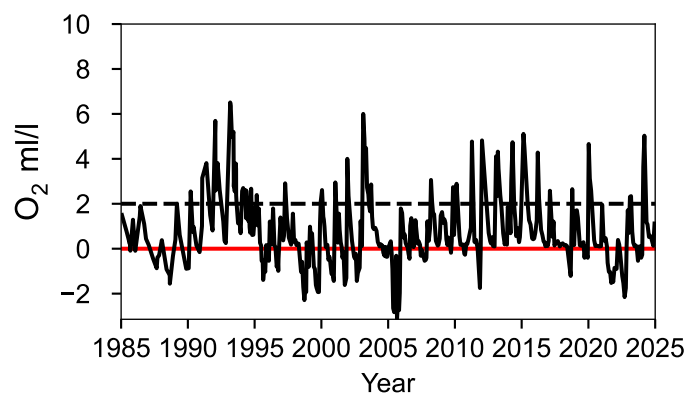
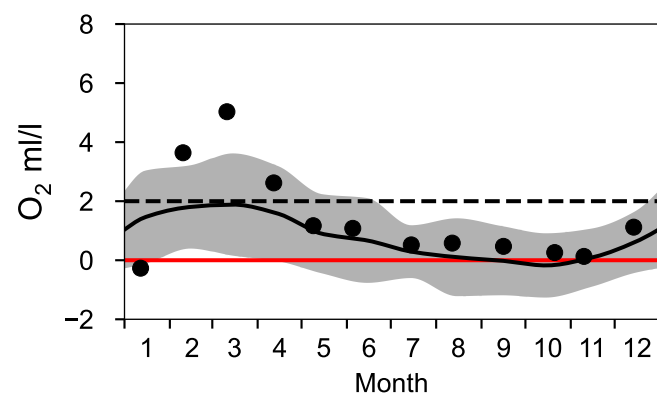
— Mean 1991-2020

■ St.Dev.

● 2024

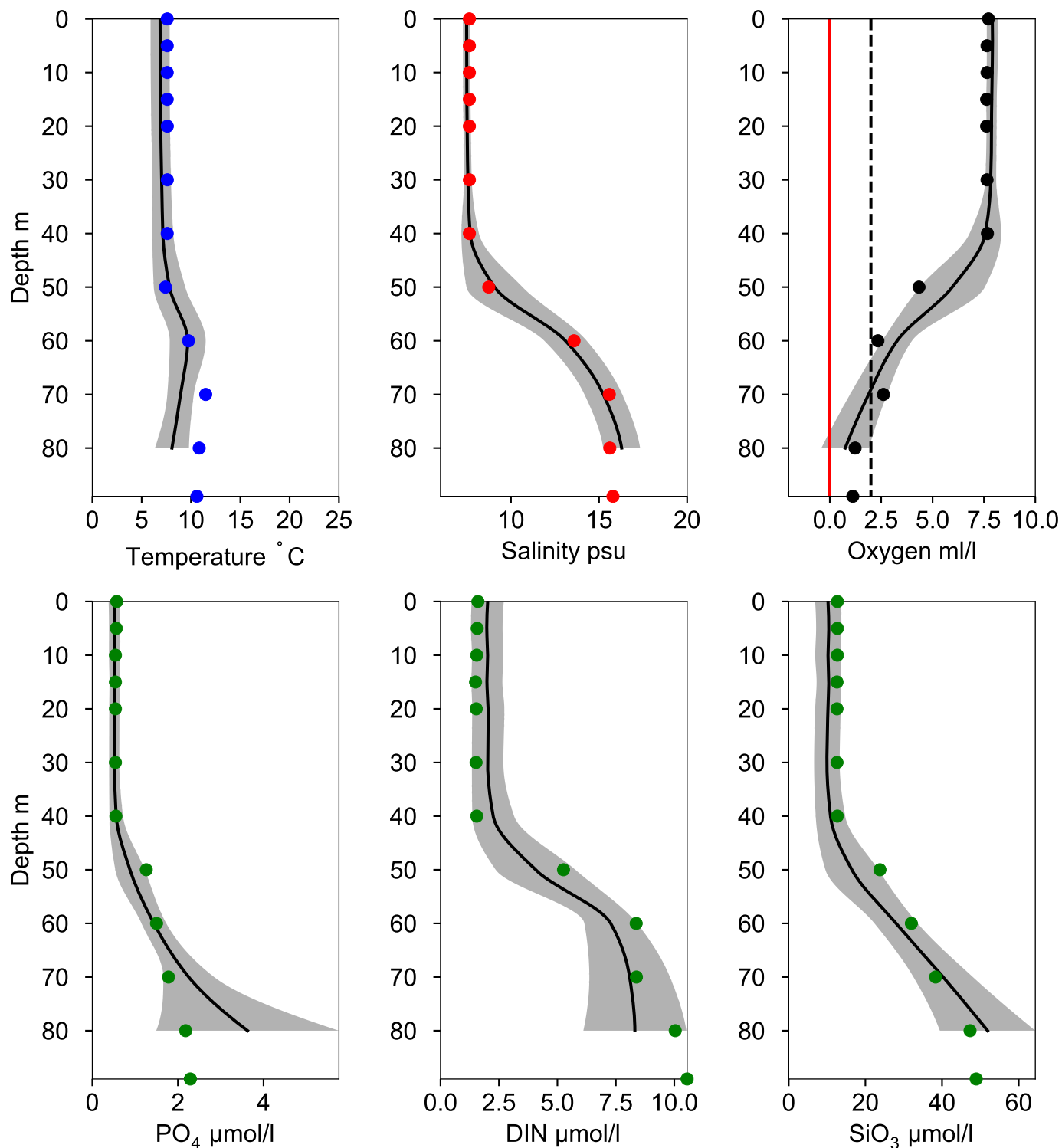


OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles BY5 BORNHOLMSDJ December

— Mean 1991-2020 St.Dev. ● 2024-12-14



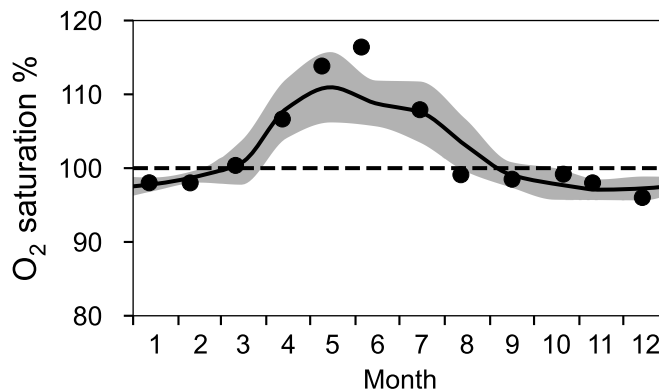
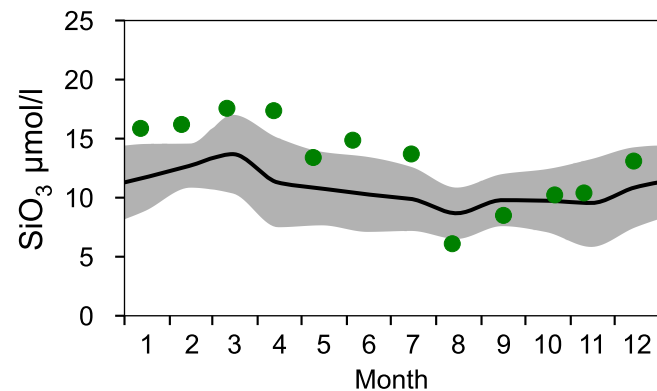
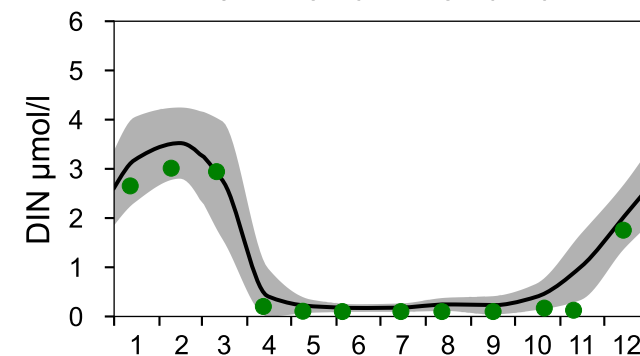
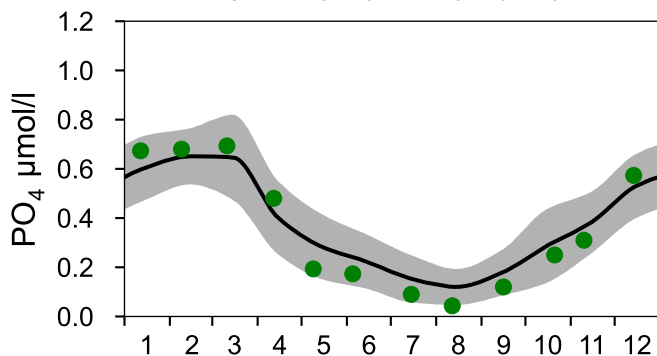
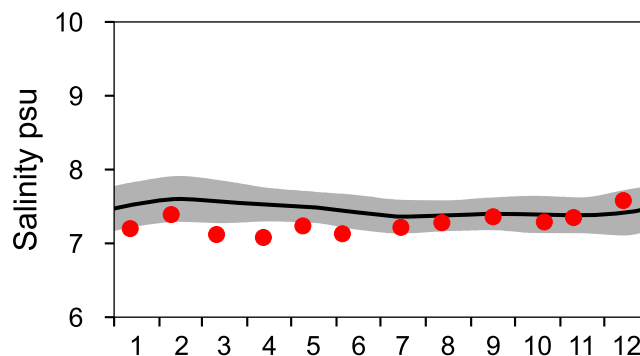
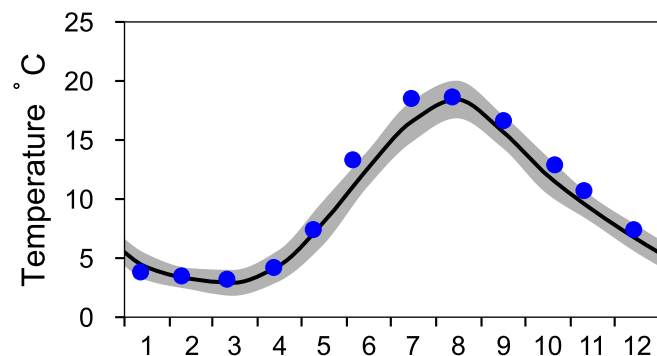
STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

Annual Cycles

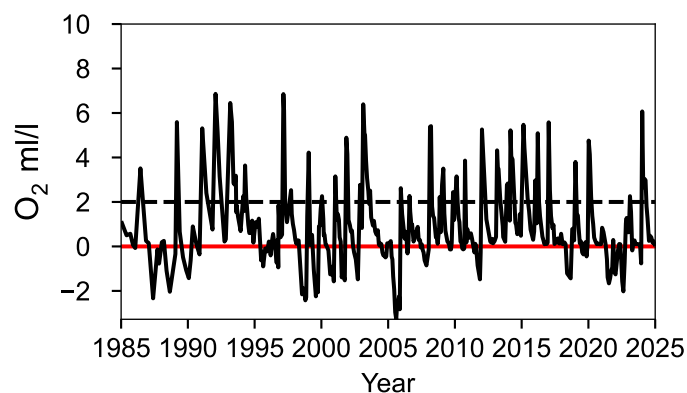
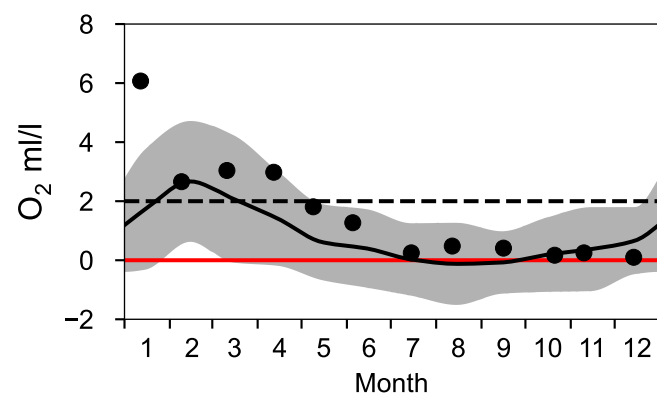
— Mean 1991-2020

■ St.Dev.

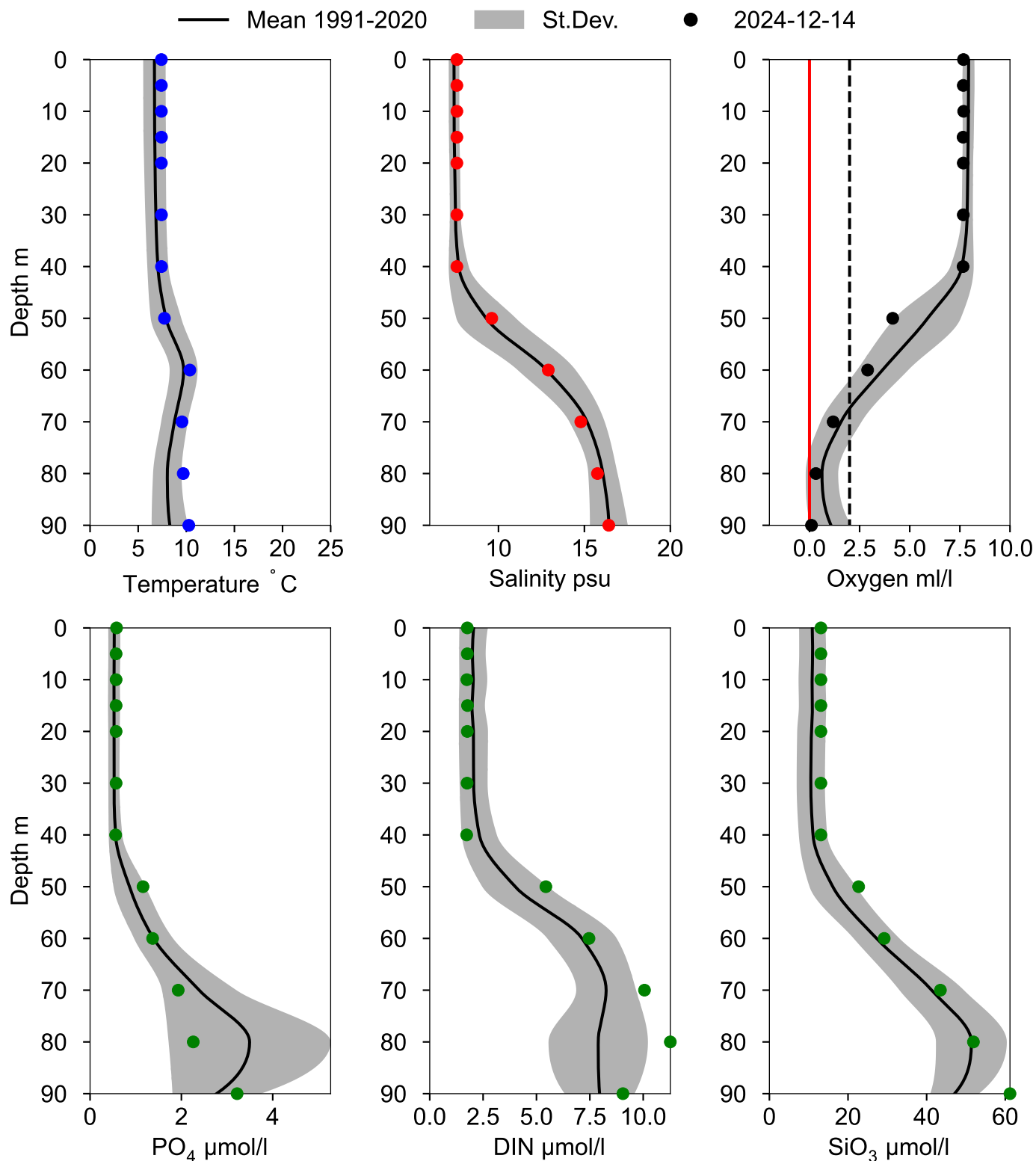
● 2024



OXYGEN IN BOTTOM WATER (depth >= 80 m)



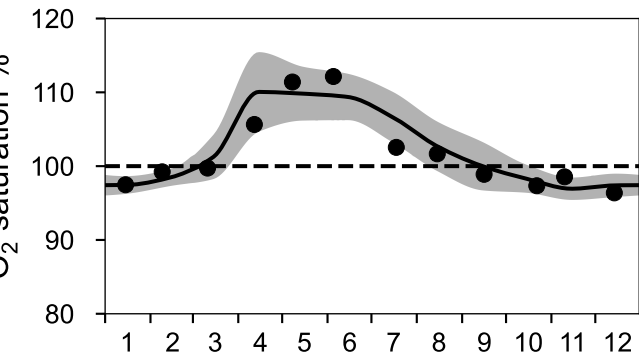
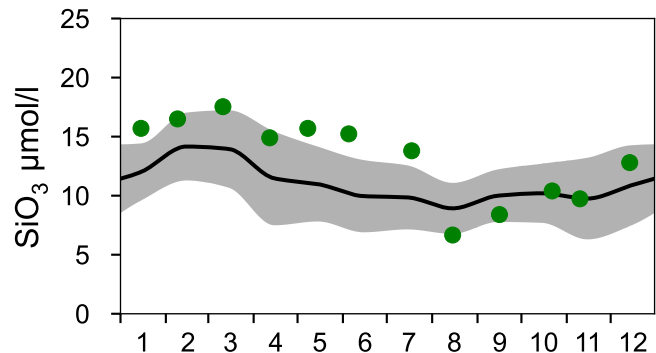
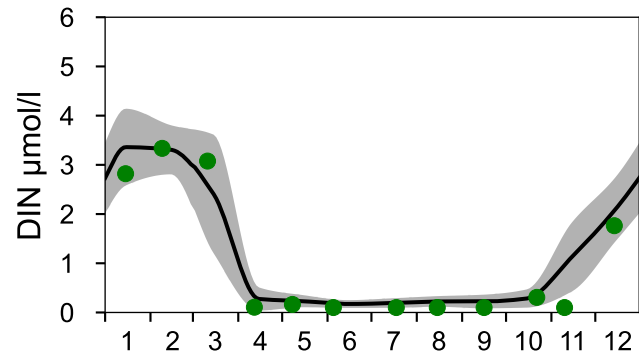
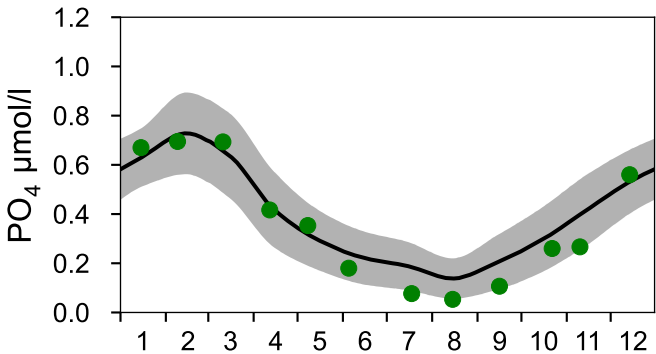
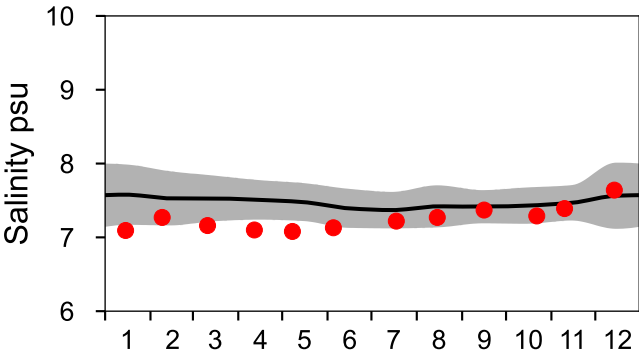
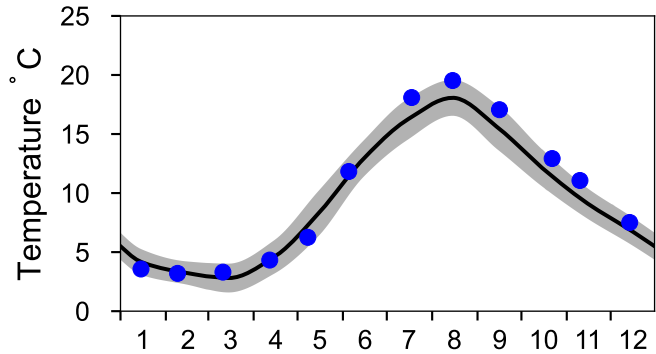
Vertical profiles BY4 CHRISTIANSÖ December



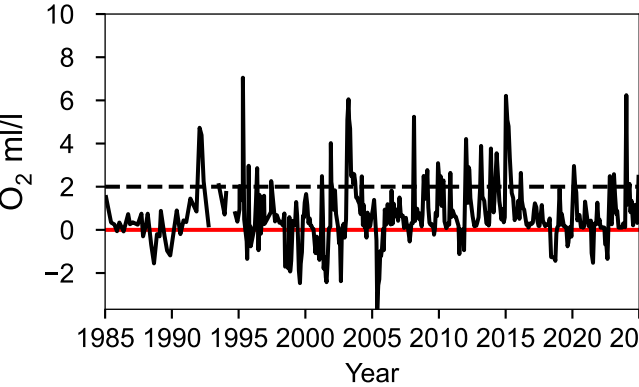
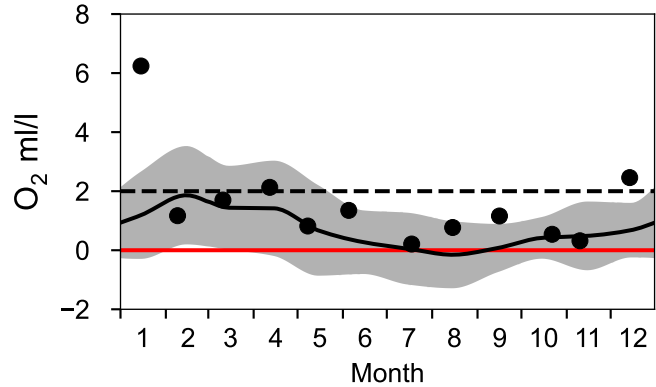
STATION HANÖBUKTEN SURFACE WATER (0-10 m)

Annual Cycles

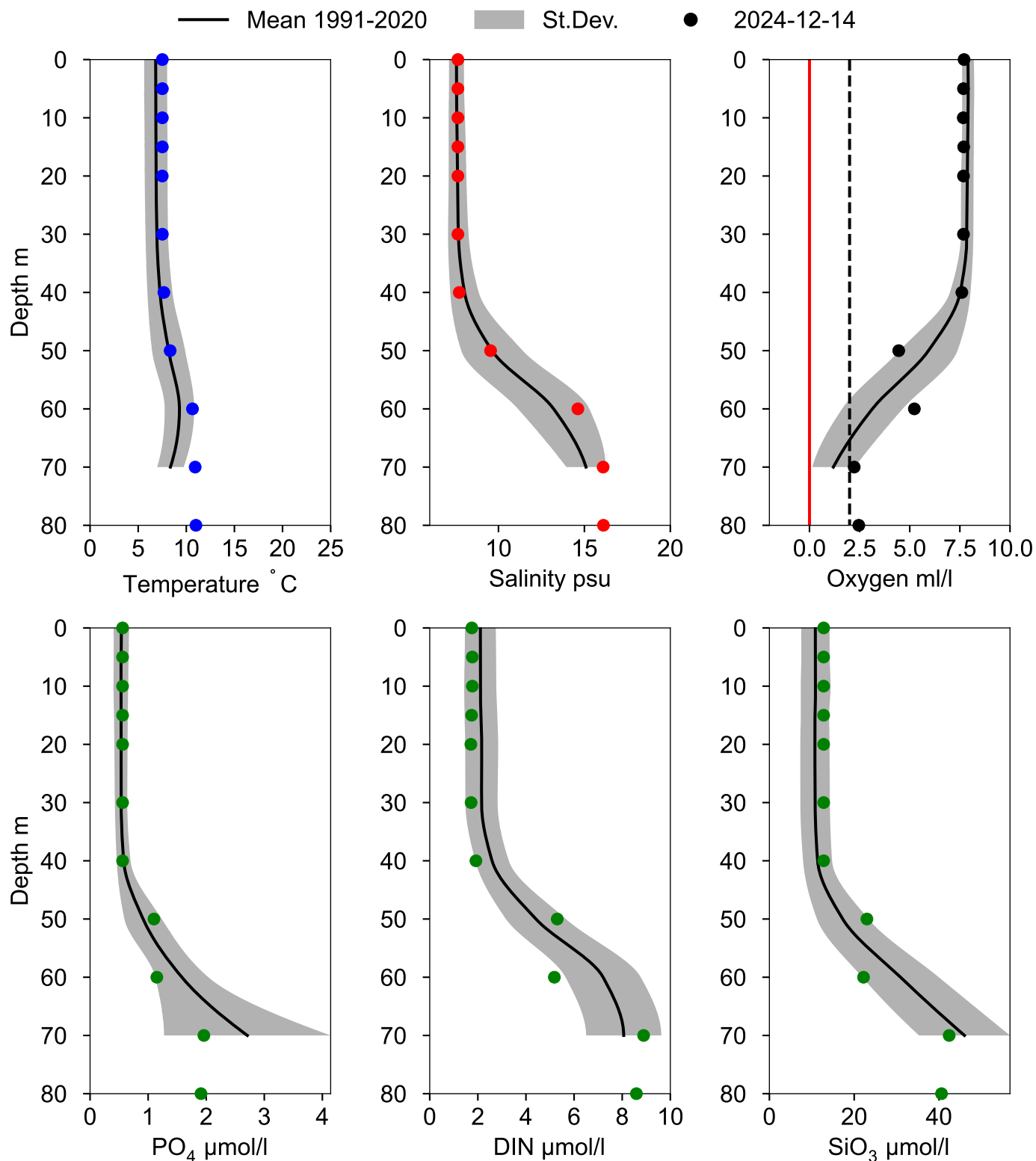
— Mean 1991-2020 St.Dev. ● 2024



OXYGEN IN BOTTOM WATER (depth >= 70 m)



Vertical profiles HANÖBUKTEN December



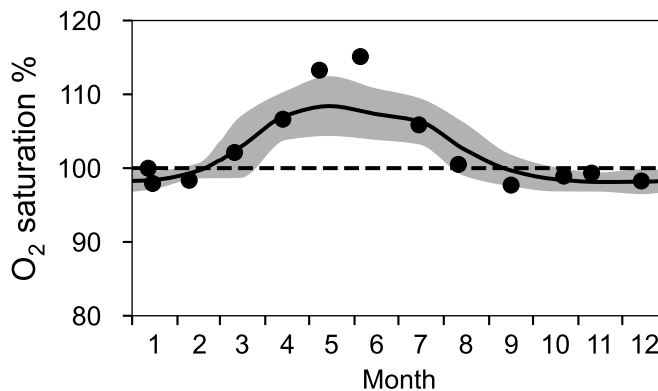
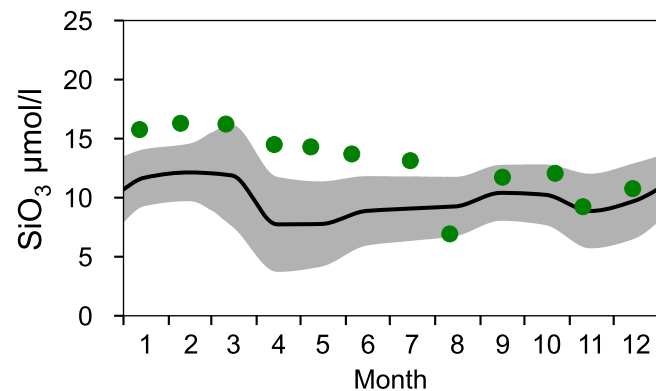
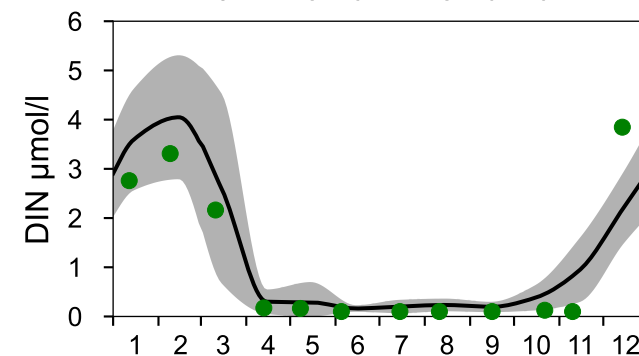
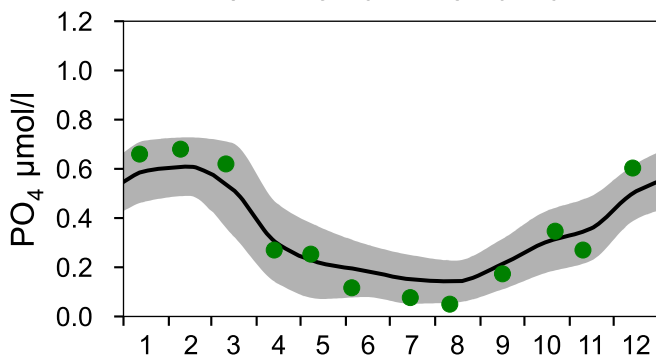
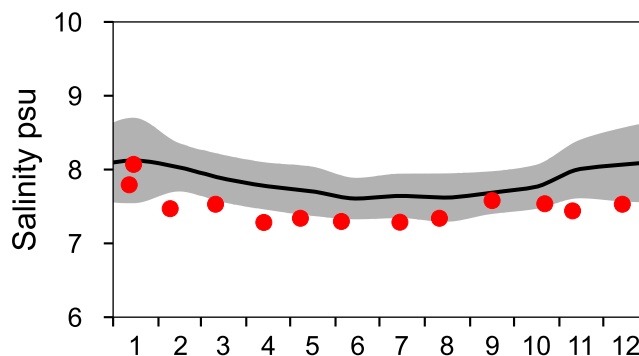
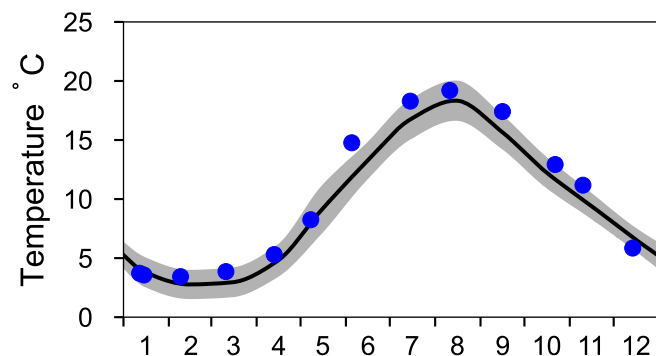
STATION BY2 ARKONA SURFACE WATER (0-10 m)

Annual Cycles

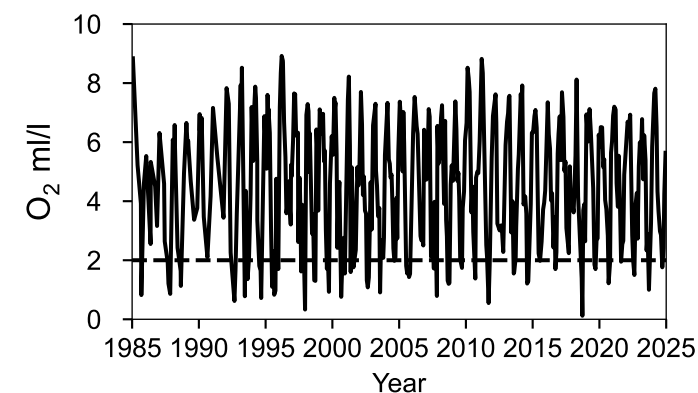
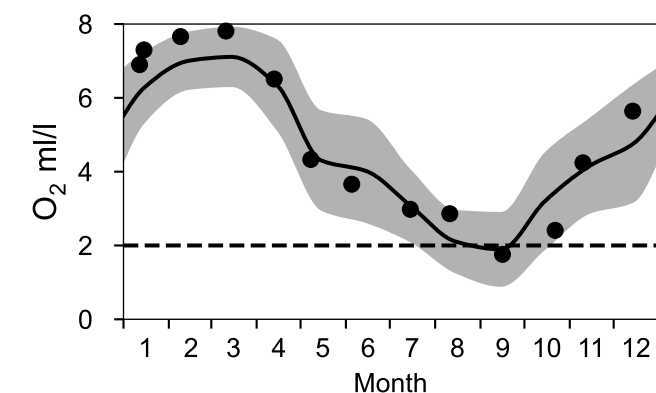
— Mean 1991-2020

■ St.Dev.

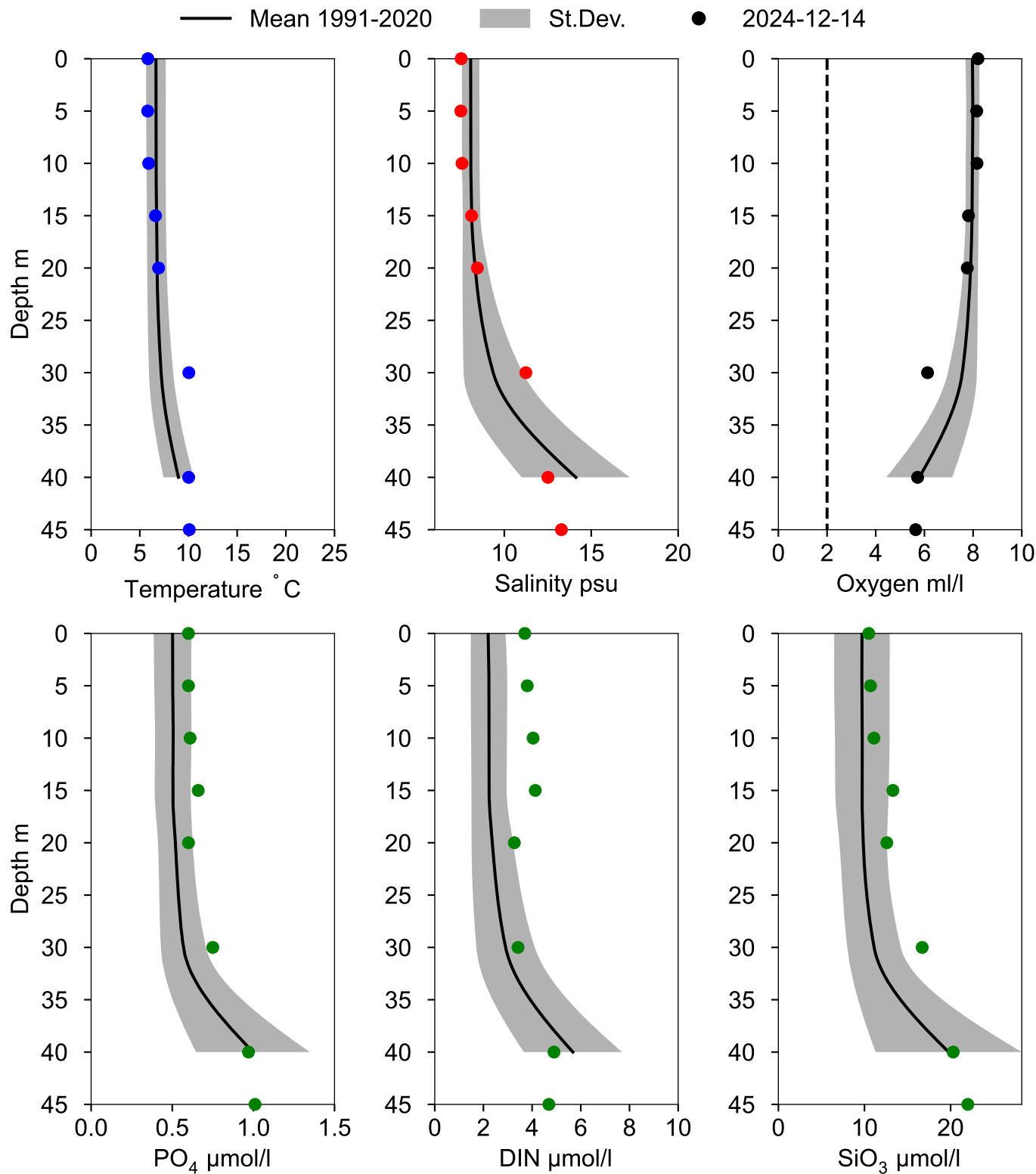
● 2024



OXYGEN IN BOTTOM WATER (depth >= 40 m)



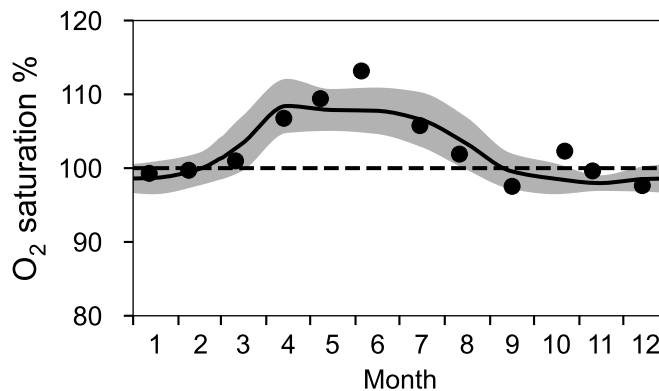
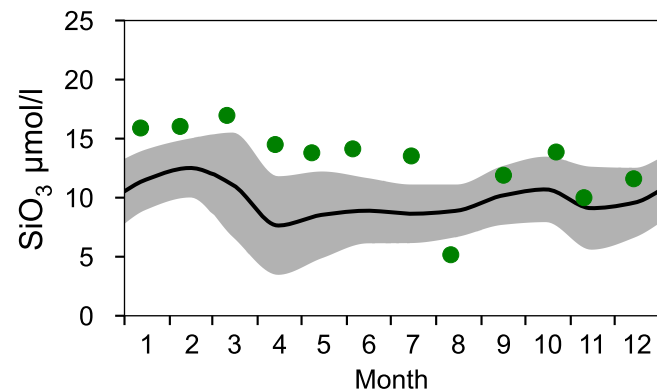
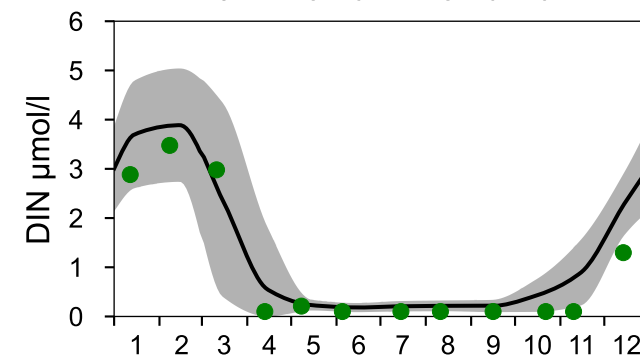
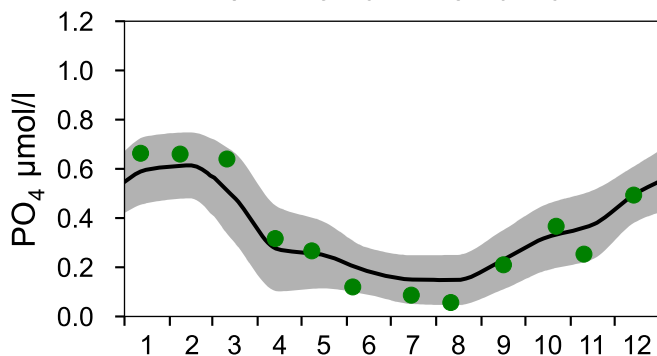
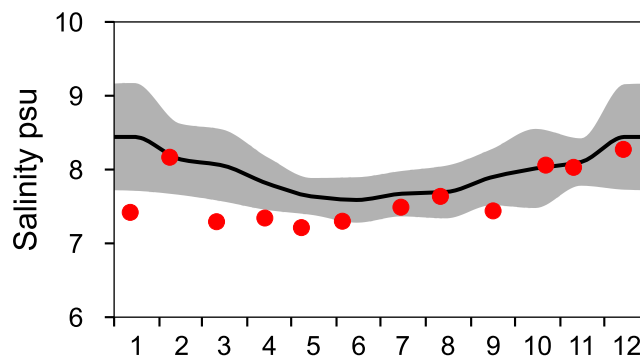
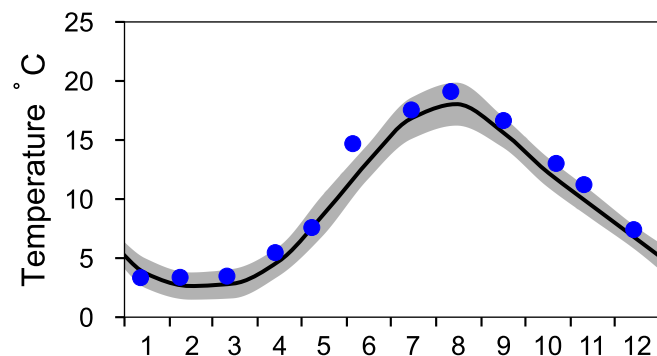
Vertical profiles BY2 ARKONA
December



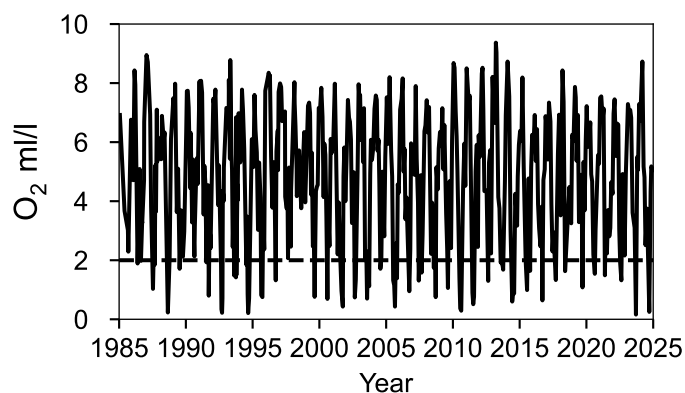
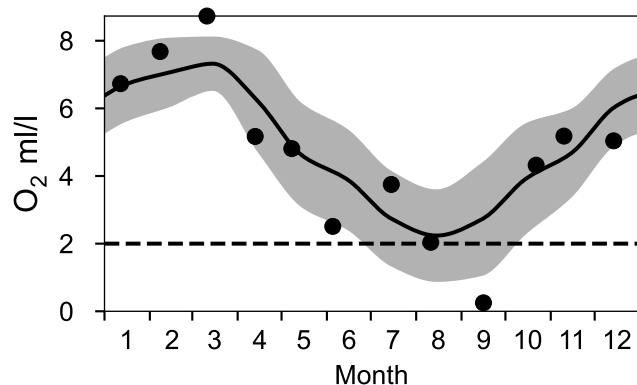
STATION BY1 SURFACE WATER (0-10 m)

Annual Cycles

— Mean 1991-2020 St.Dev. ● 2024



OXYGEN IN BOTTOM WATER (depth >= 39 m)

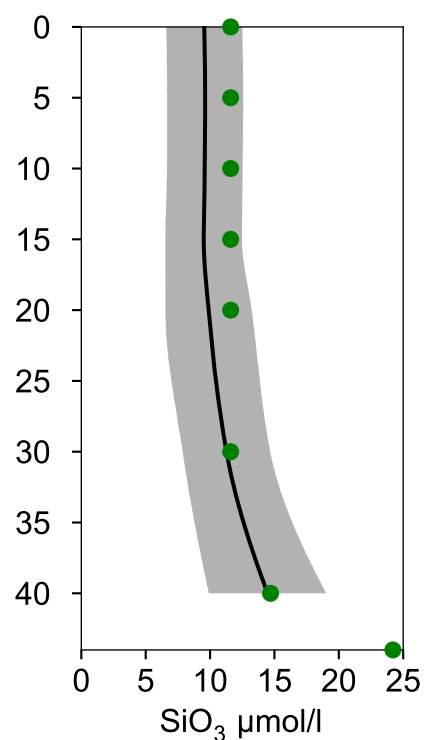
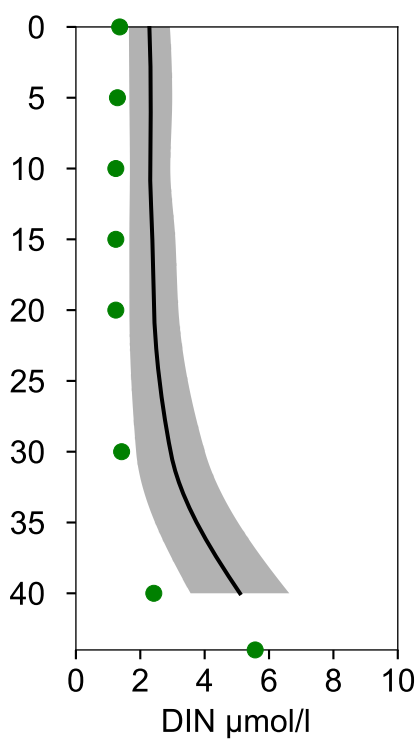
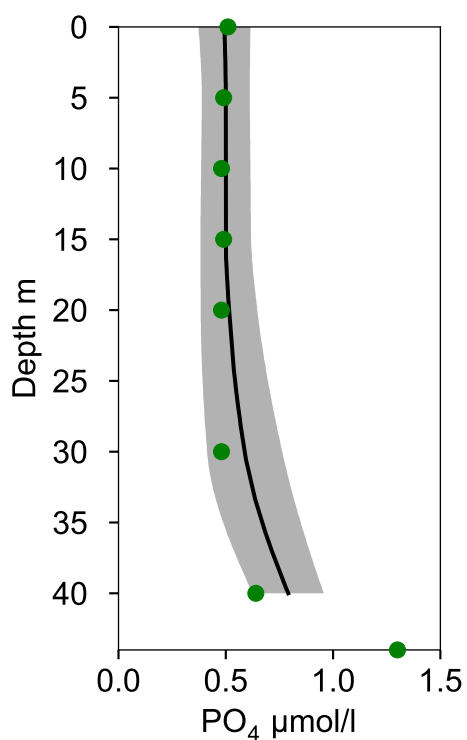
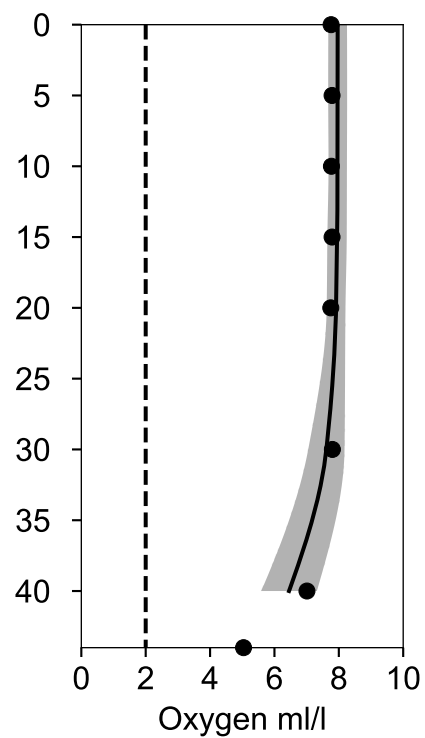
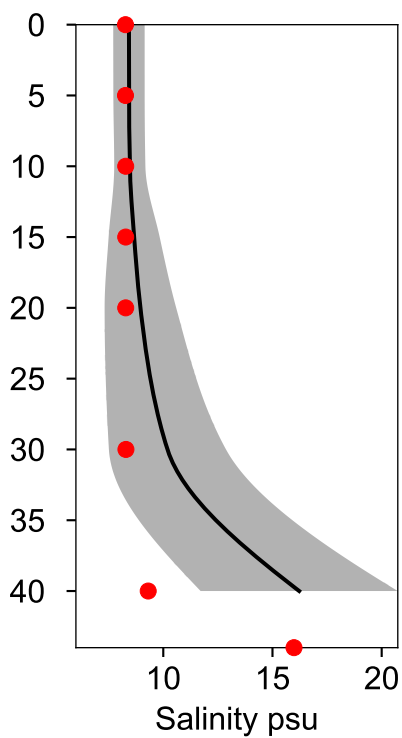
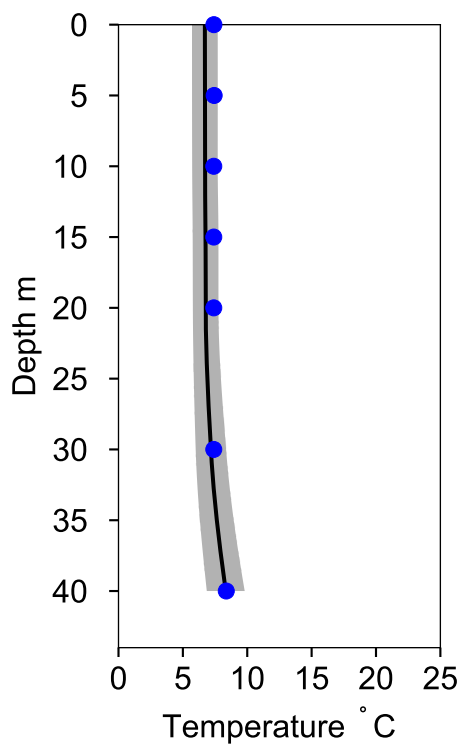


Vertical profiles BY1 December

— Mean 1991-2020

■ St.Dev.

● 2024-12-14



STATION FLINTEN7 SURFACE WATER (0-10 m)

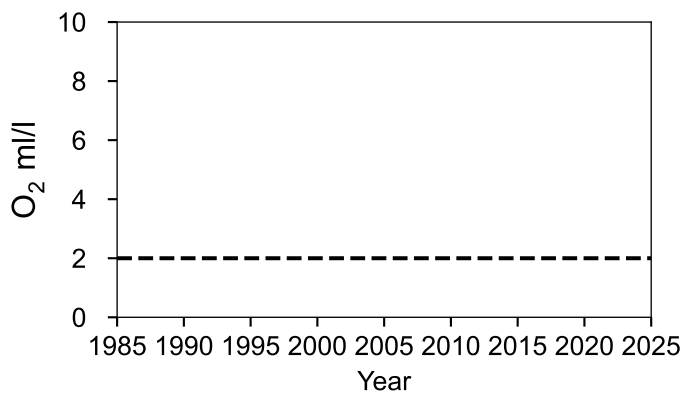
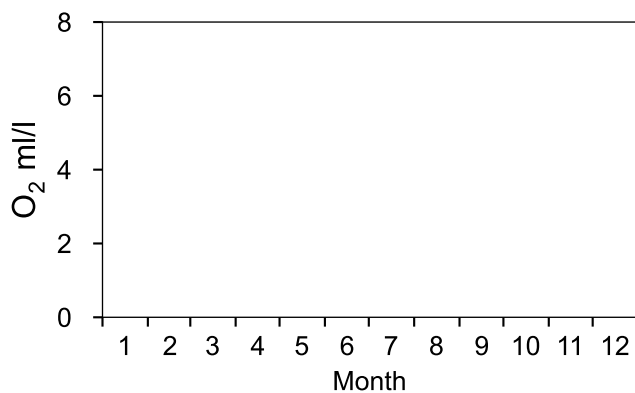
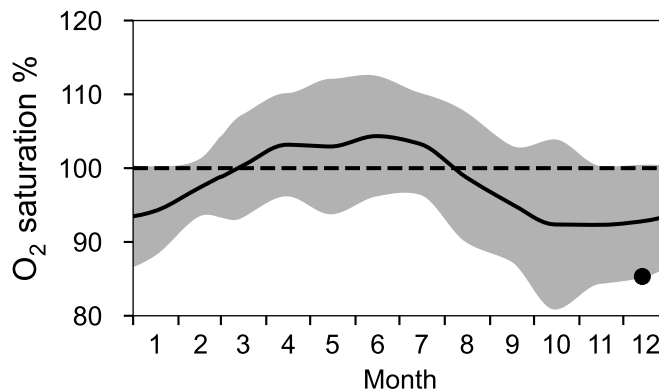
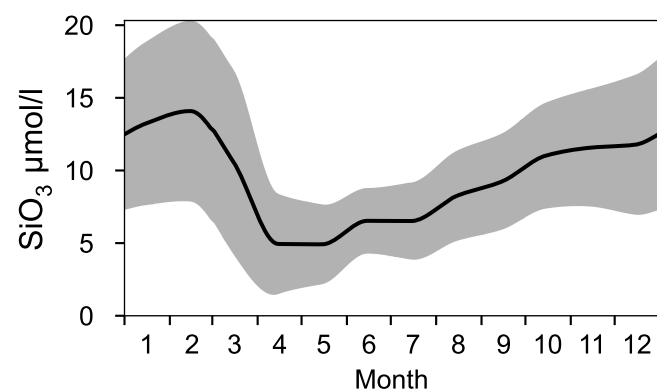
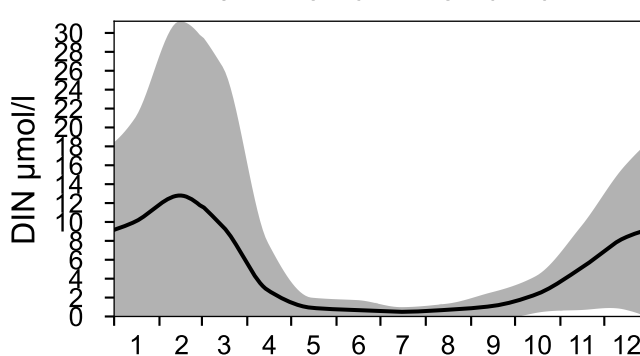
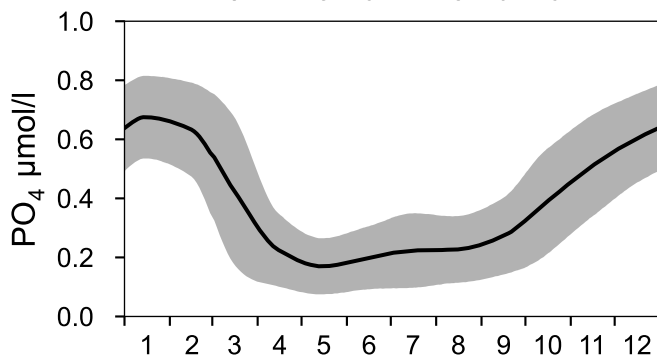
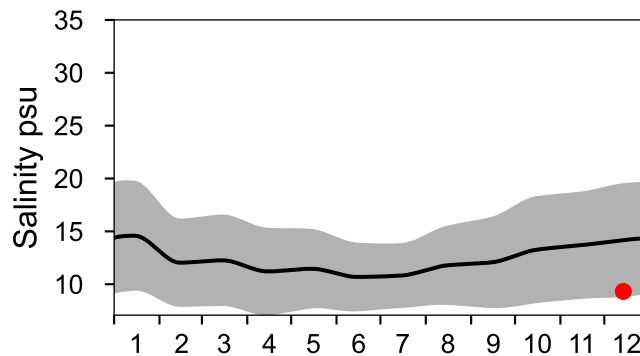
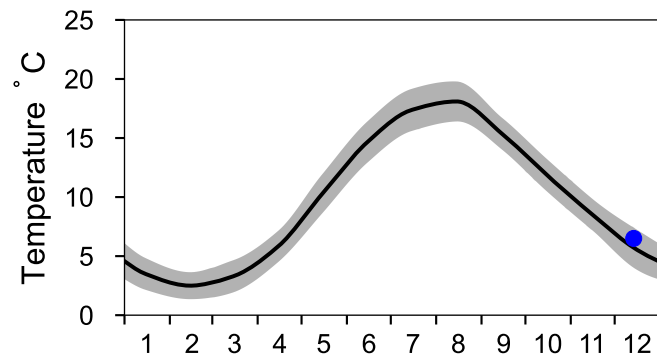
Annual Cycles

Statistics based on data from: Öresund

— Mean 1991-2020

■ St.Dev.

● 2024

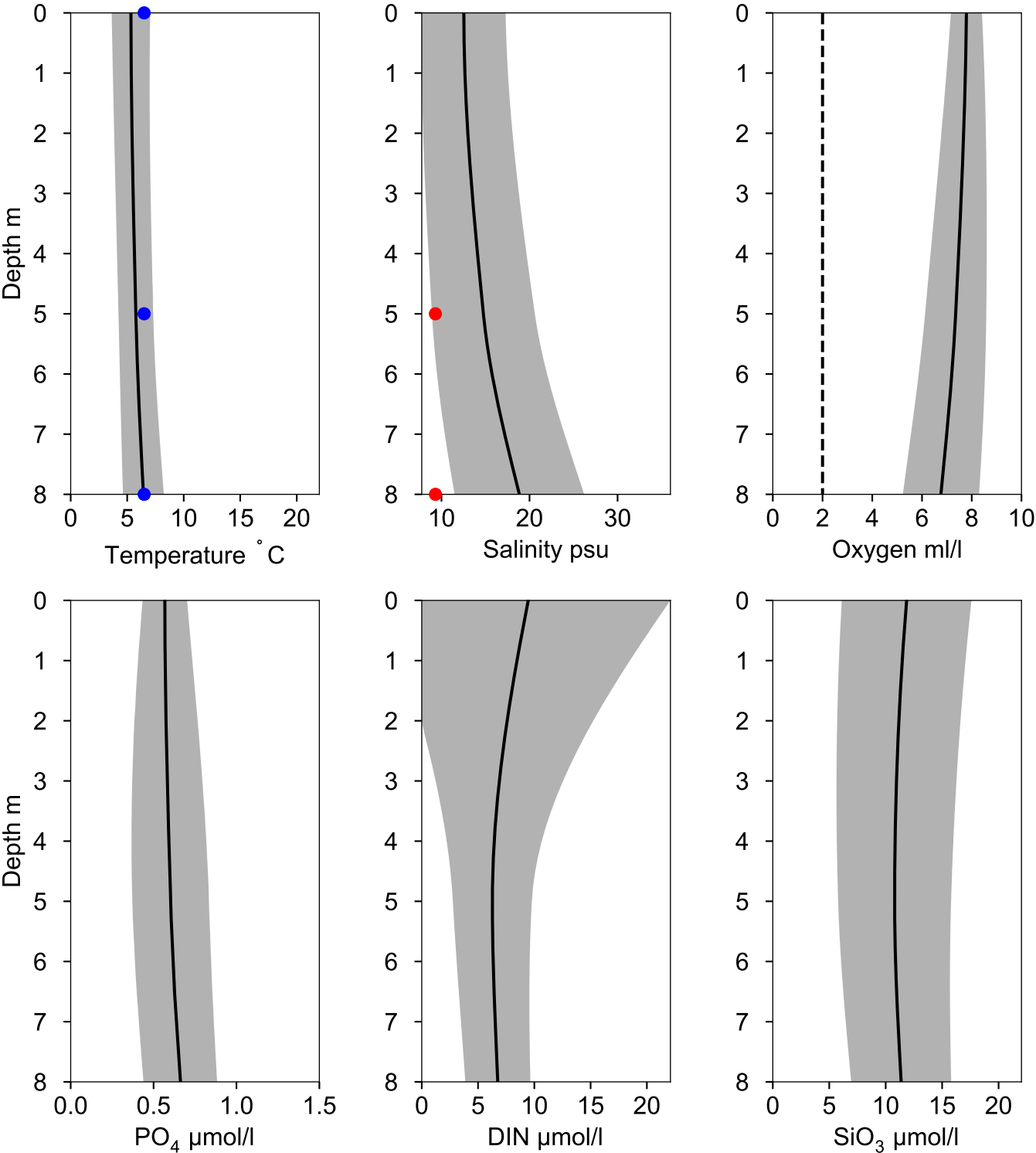


Vertical profiles FLINTEN7

December

Statistics based on data from: Öresund

— Mean 1991-2020 St.Dev. ● 2024-12-14



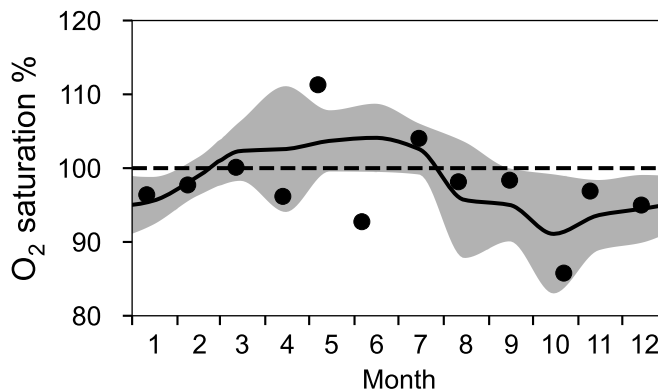
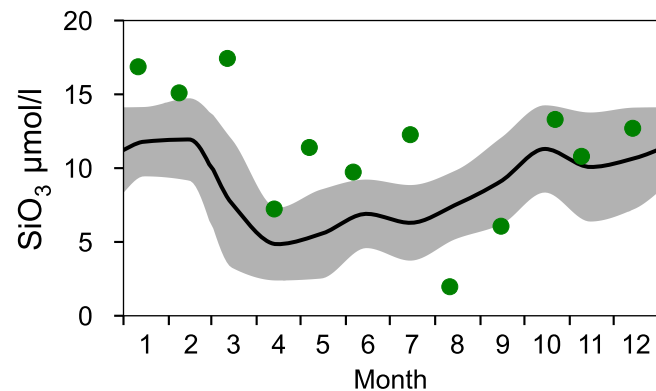
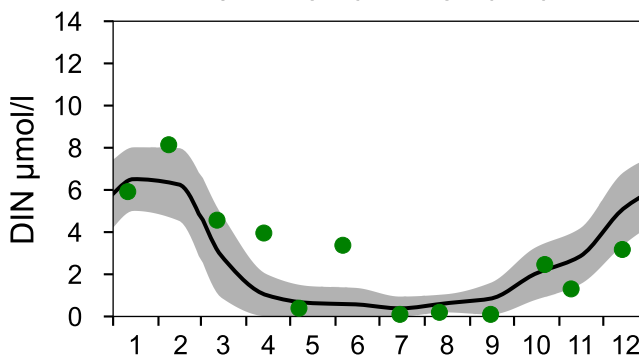
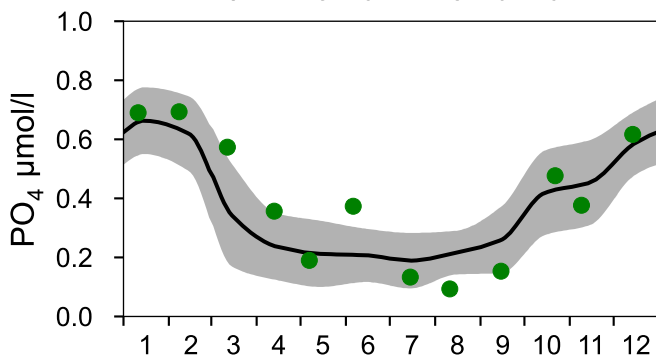
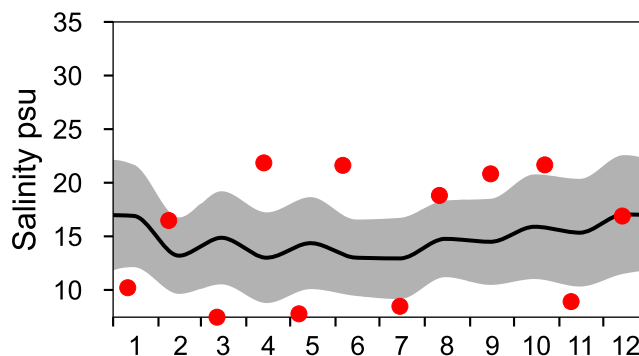
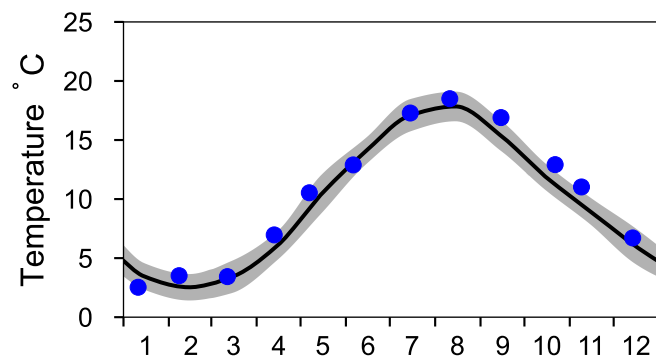
STATION W LANDSKRONA SURFACE WATER (0-10 m)

Annual Cycles

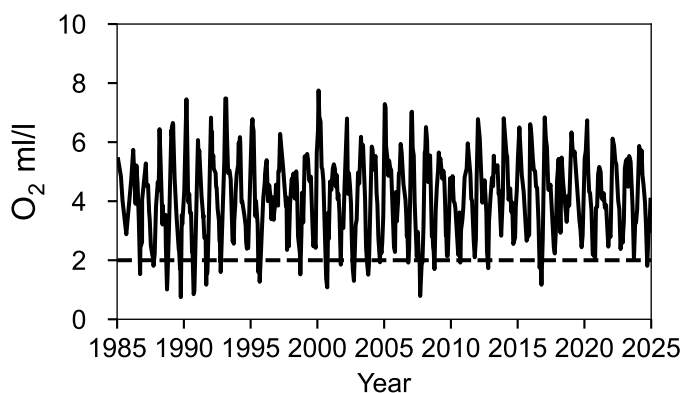
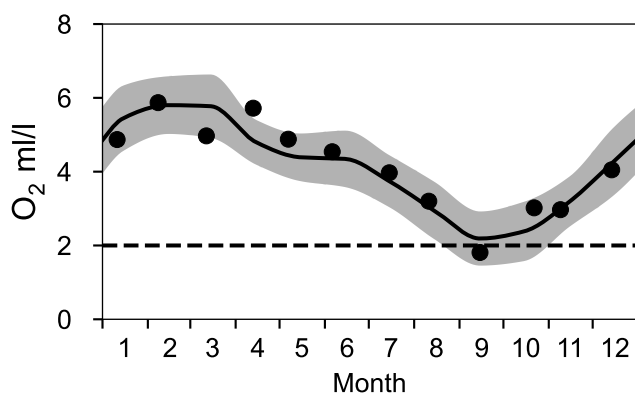
— Mean 1991-2020

■ St.Dev.

● 2024

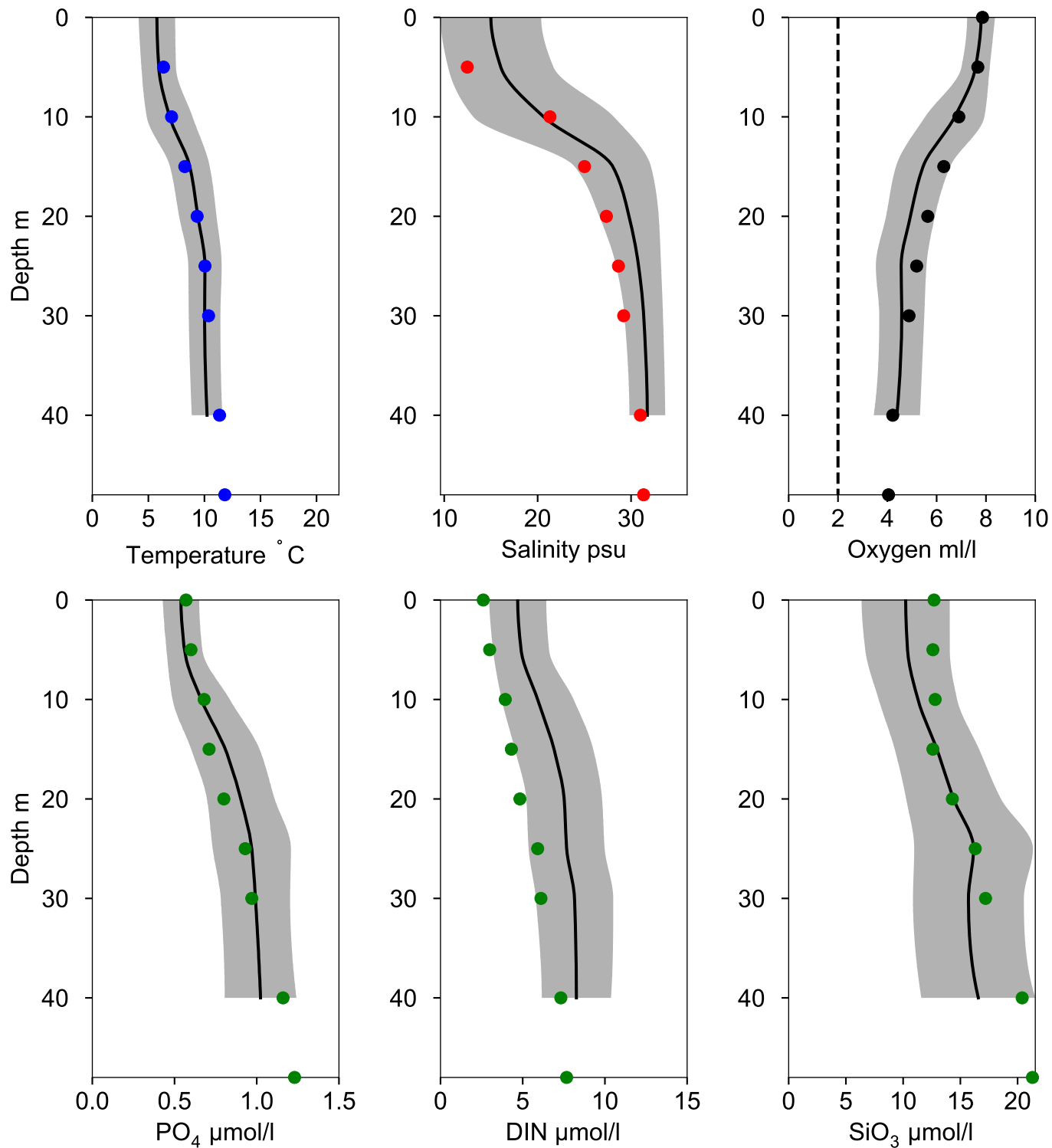


OXYGEN IN BOTTOM WATER (depth >= 40 m)



Vertical profiles W LANDSKRONA December

— Mean 1991-2020 St.Dev. ● 2024-12-14



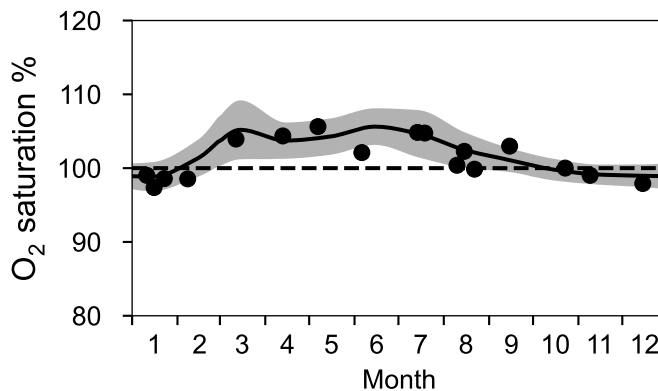
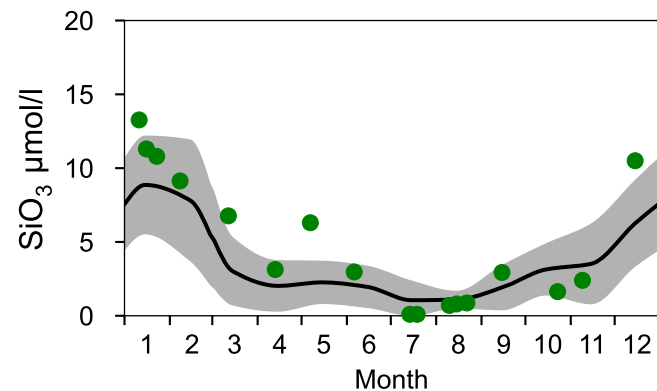
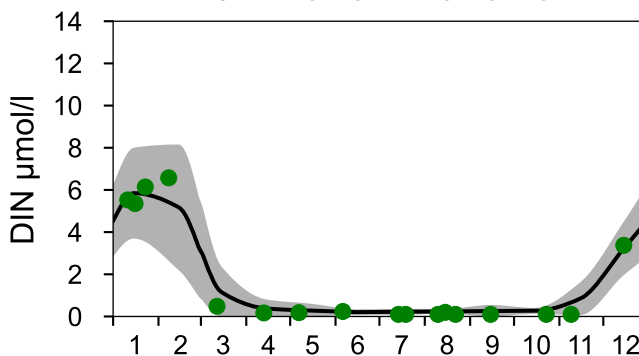
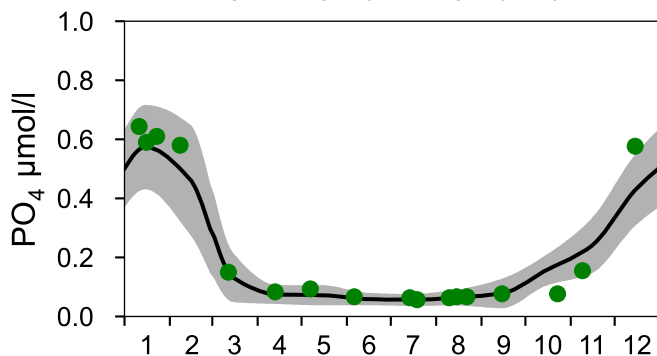
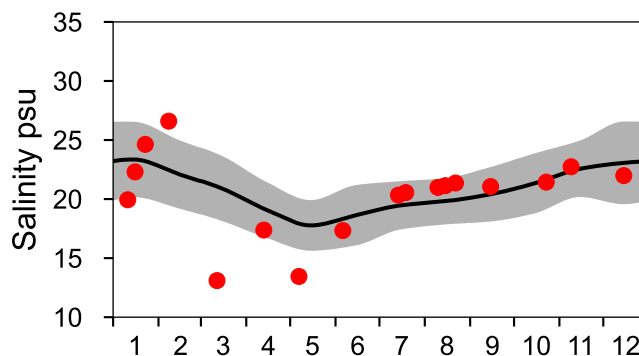
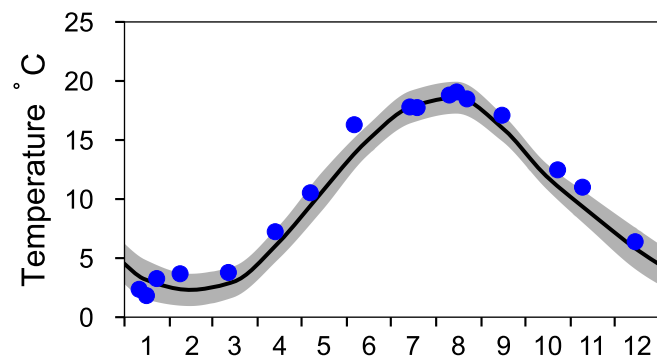
STATION ANHOLT E SURFACE WATER (0-10 m)

Annual Cycles

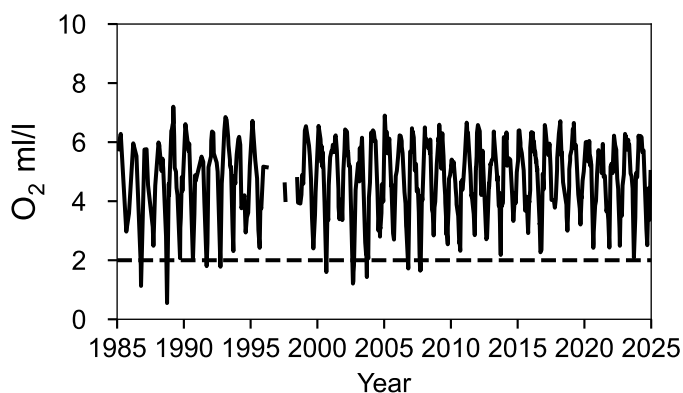
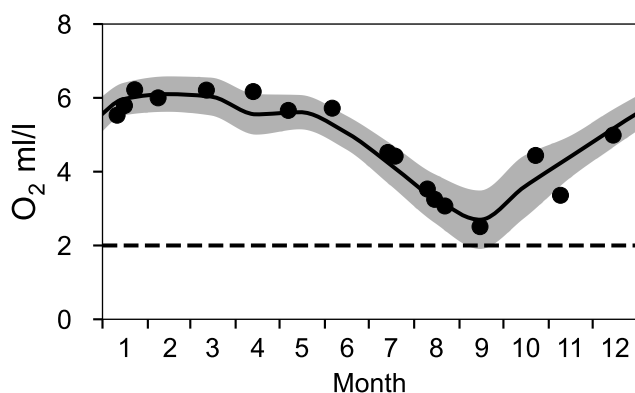
— Mean 1991-2020

■ St.Dev.

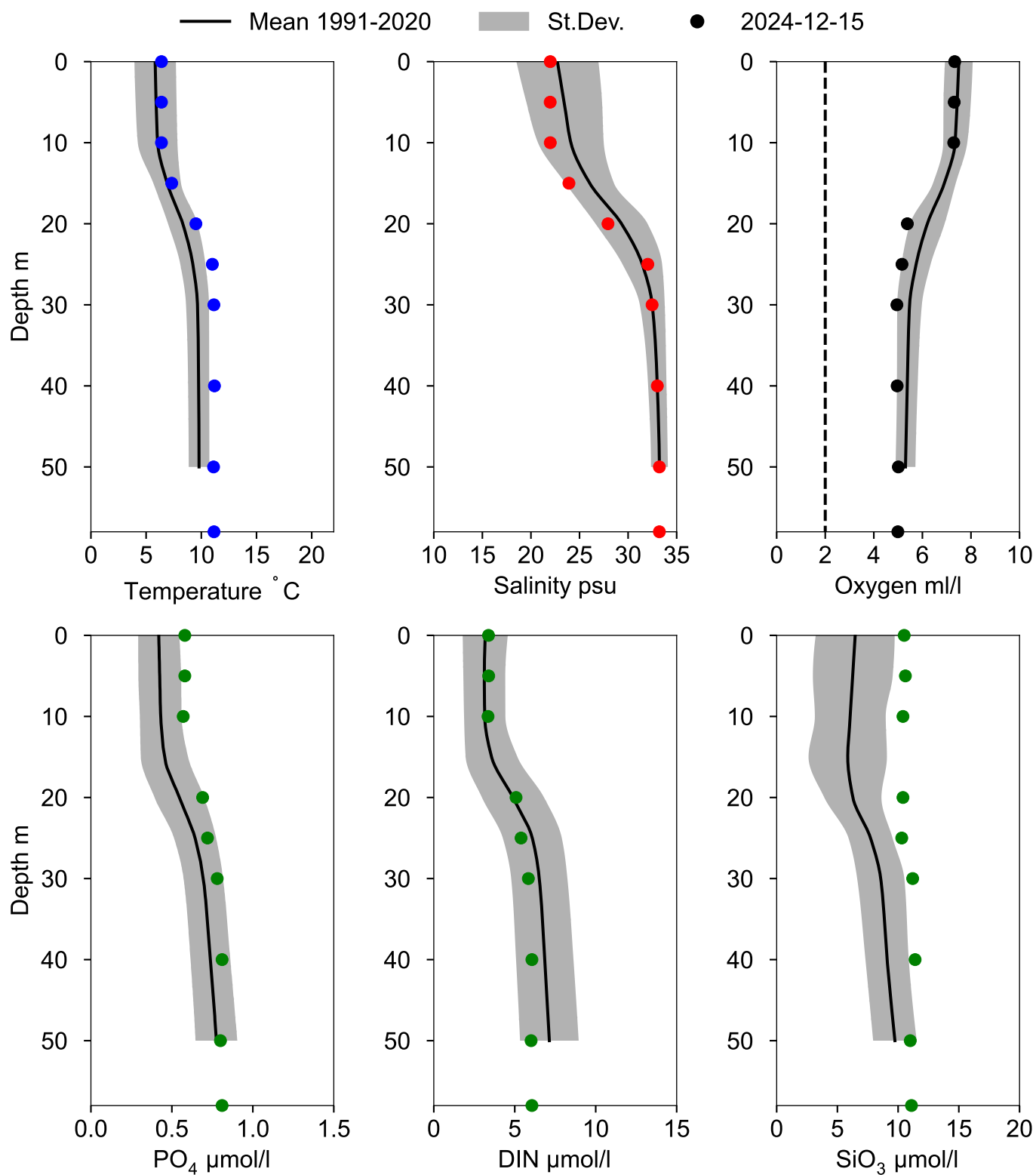
● 2024



OXYGEN IN BOTTOM WATER (depth >= 52 m)



Vertical profiles ANHOLT E December



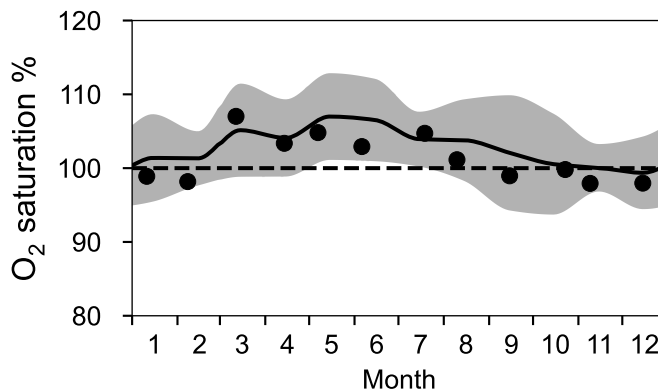
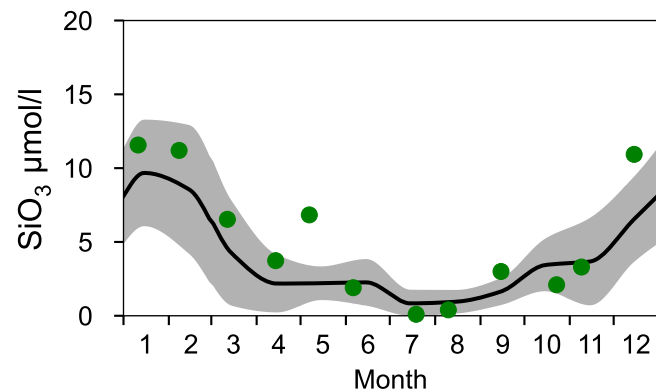
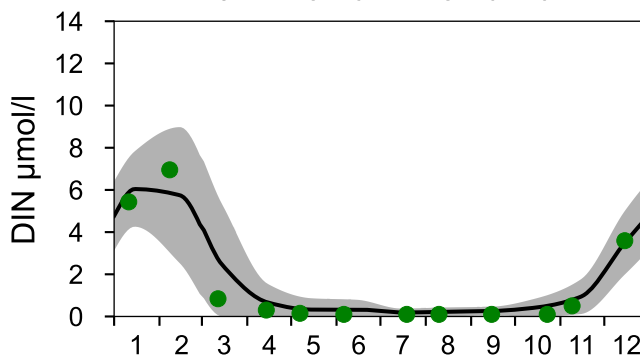
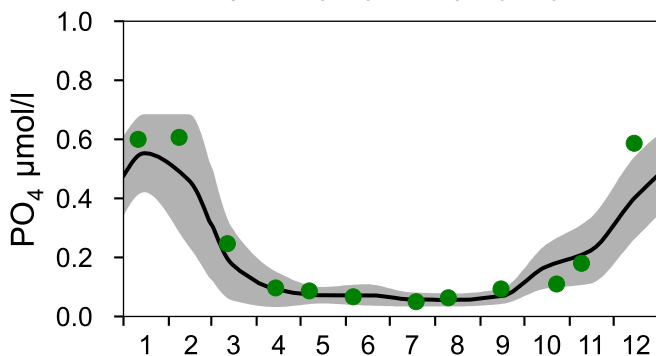
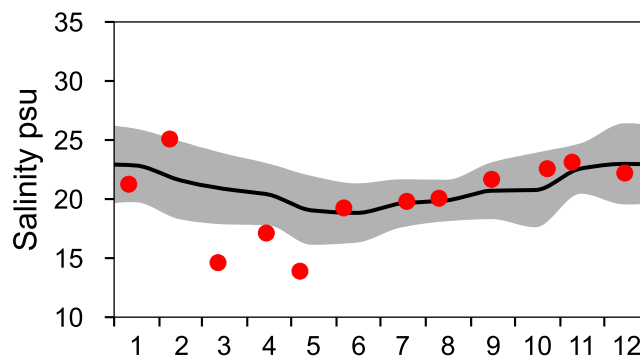
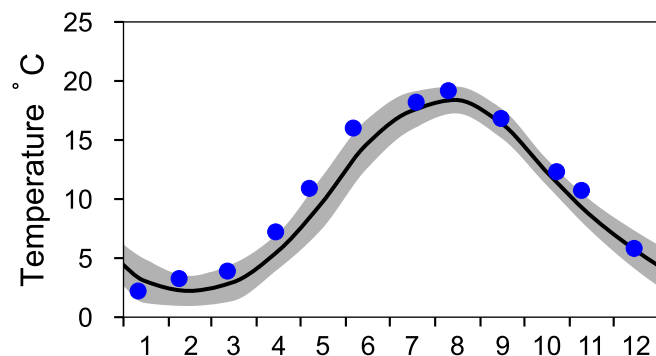
STATION N14 FALKENBERG SURFACE WATER (0-10 m)

Annual Cycles

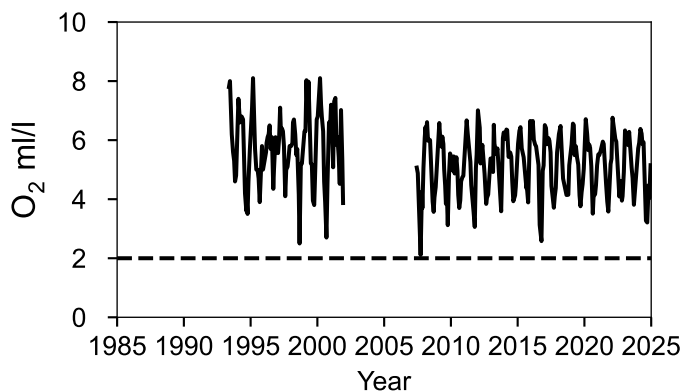
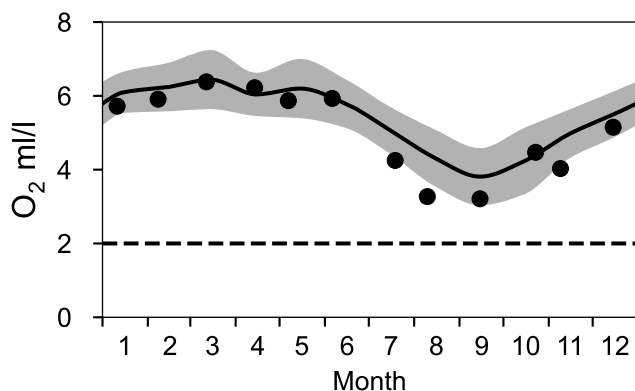
— Mean 1991-2020

■ St.Dev.

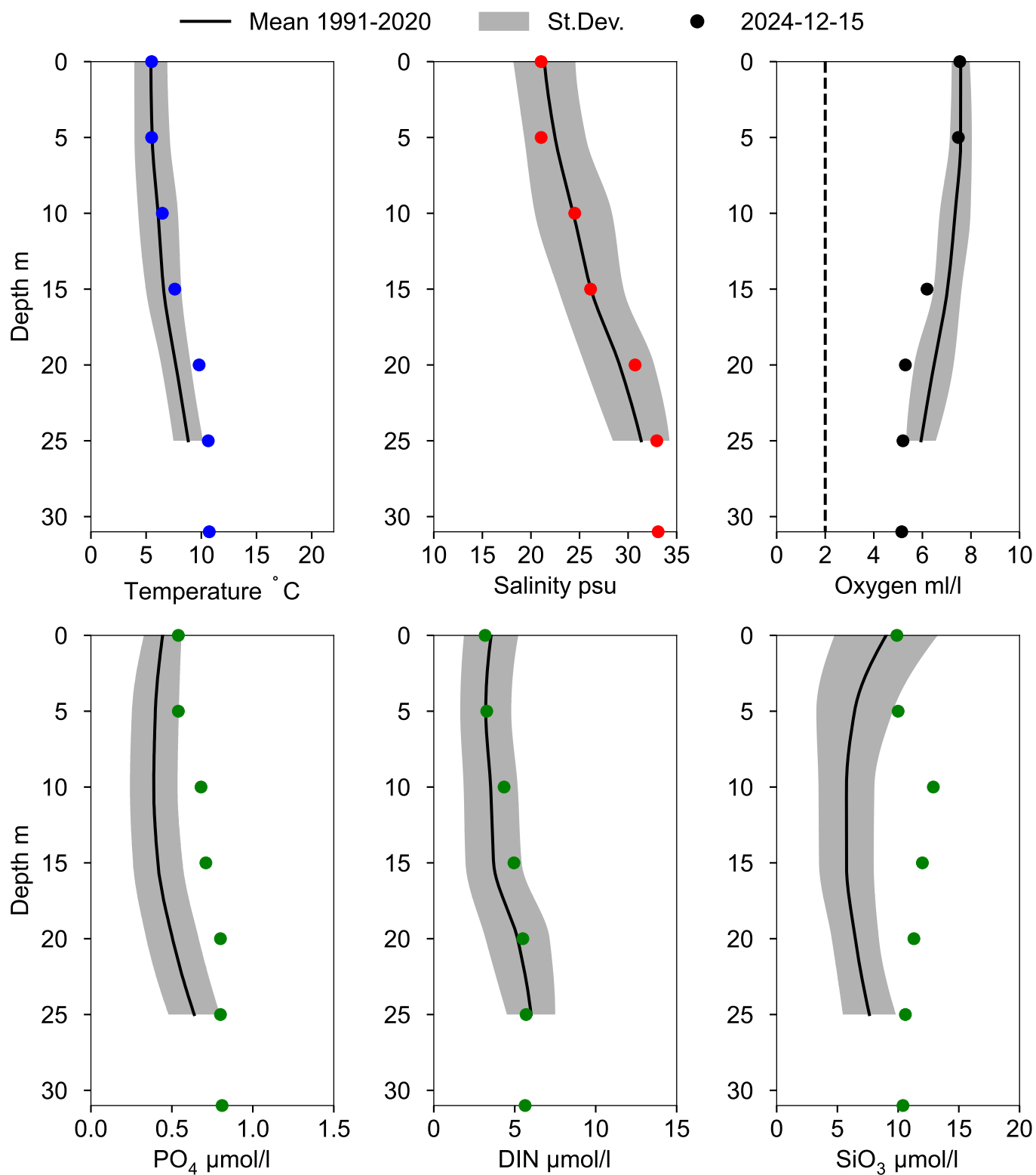
● 2024



OXYGEN IN BOTTOM WATER (depth >= 25 m)



Vertical profiles N14 FALKENBERG December



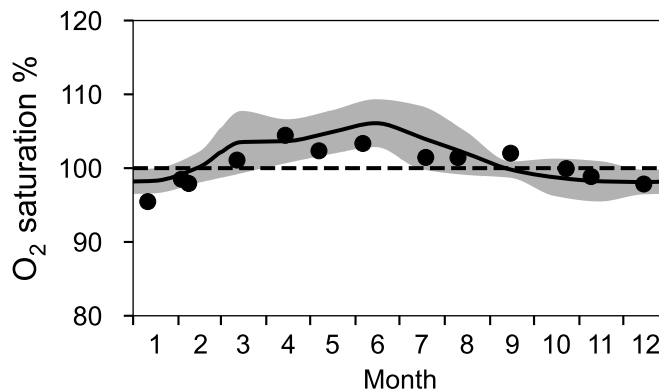
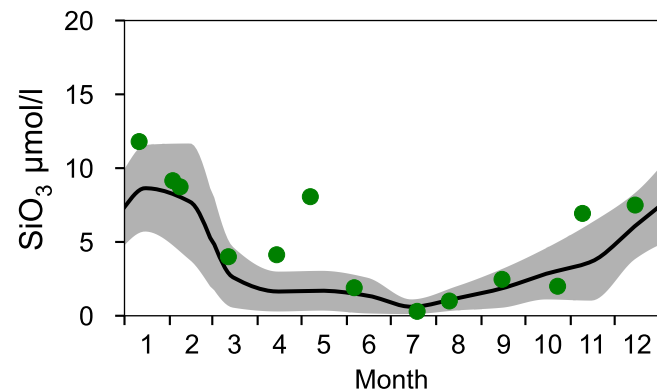
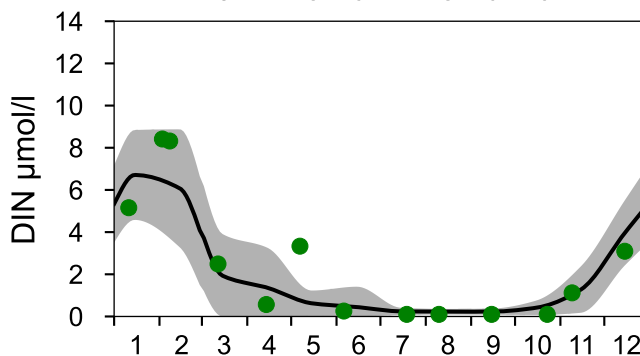
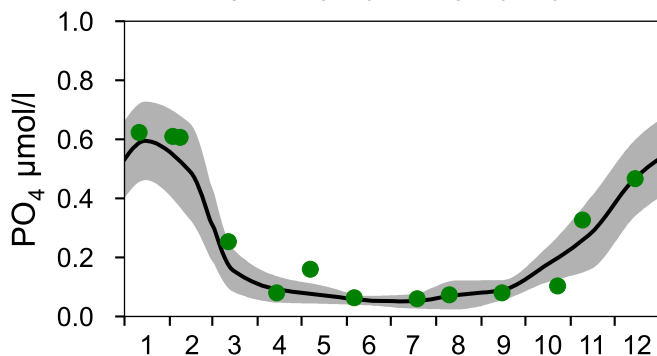
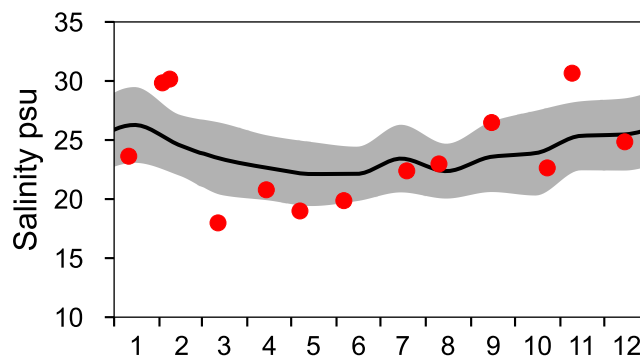
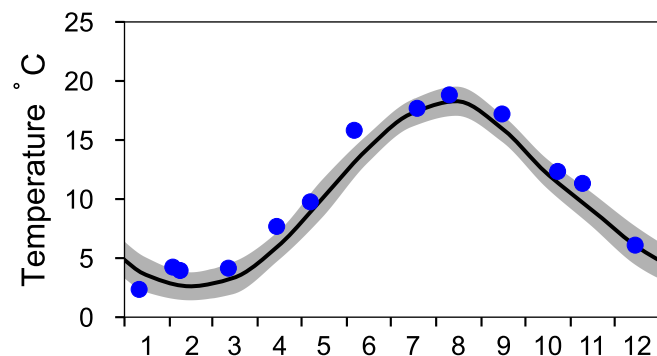
STATION FLADEN SURFACE WATER (0-10 m)

Annual Cycles

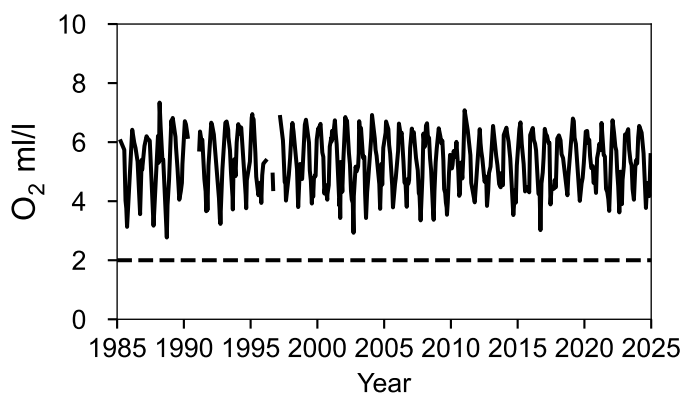
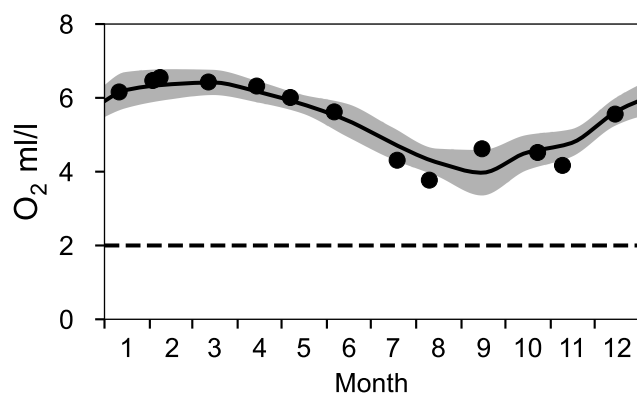
— Mean 1991-2020

■ St.Dev.

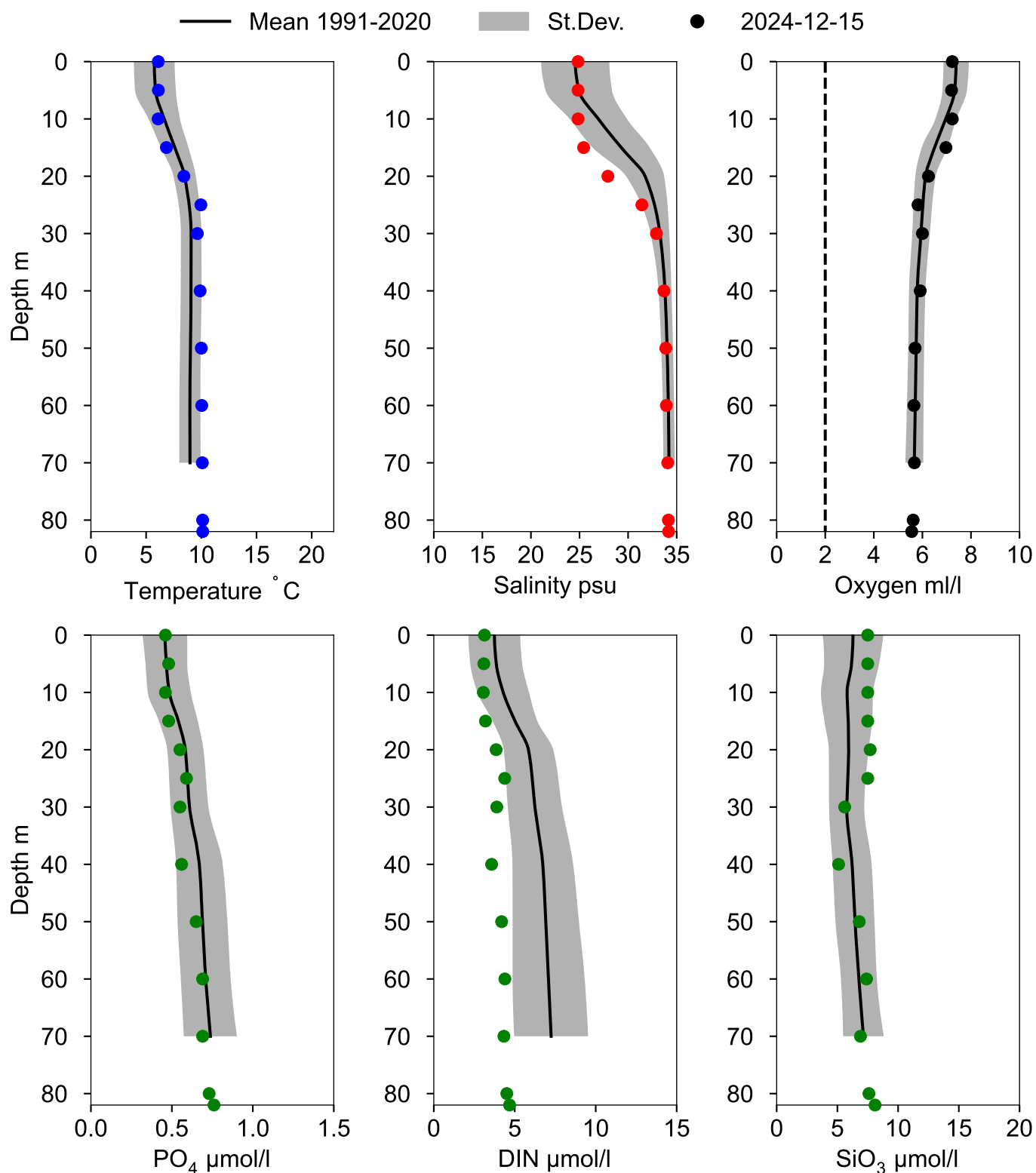
● 2024



OXYGEN IN BOTTOM WATER (depth >= 74 m)



Vertical profiles FLADEN December



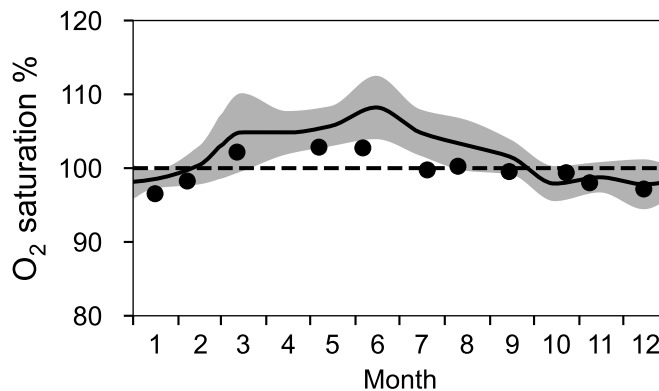
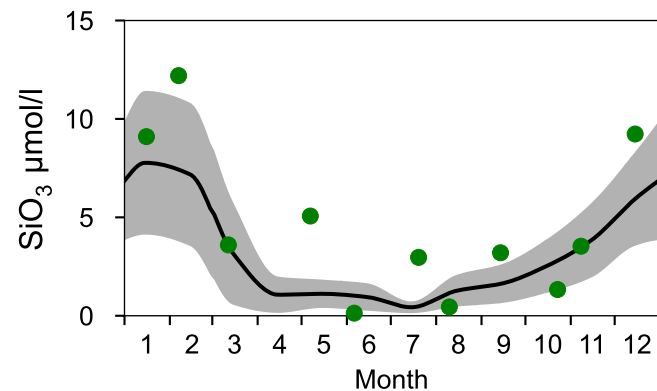
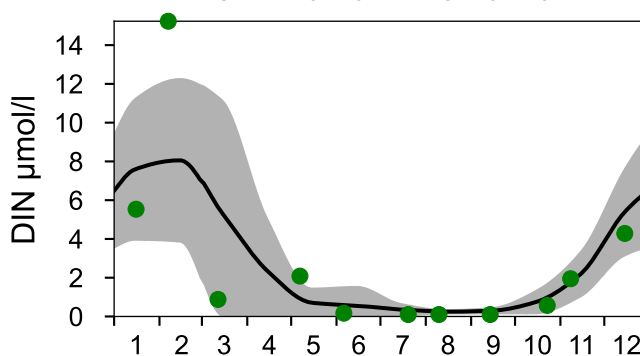
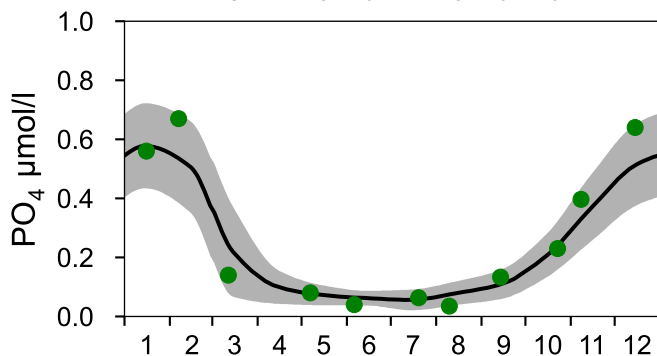
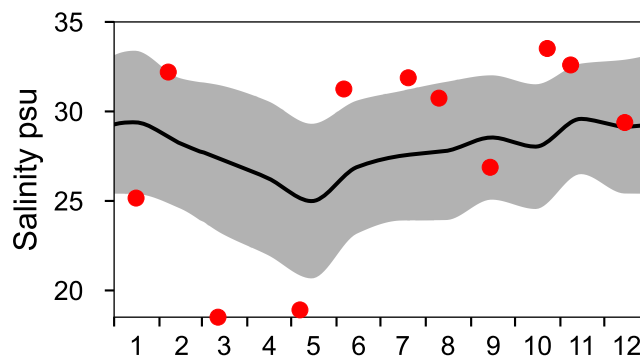
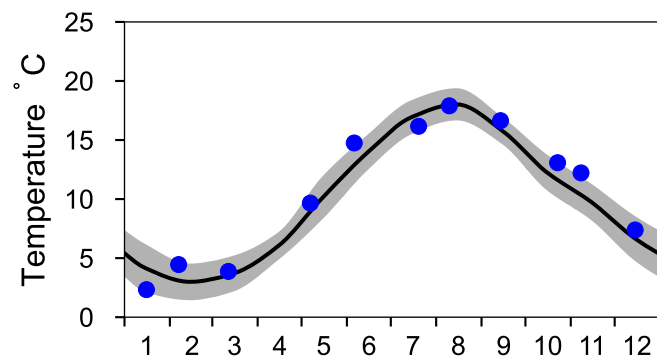
STATION P2 SURFACE WATER (0-10 m)

Annual Cycles

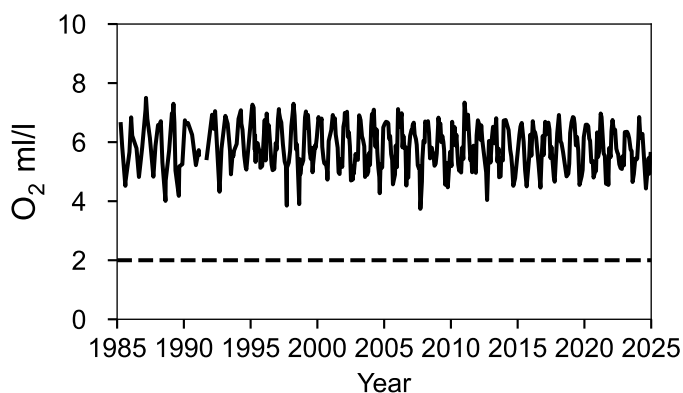
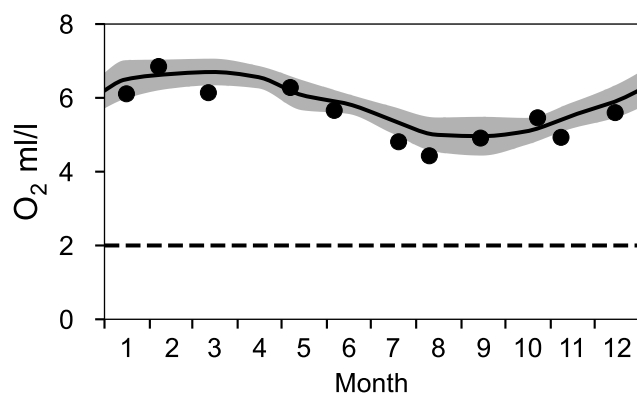
— Mean 1991-2020

■ St.Dev.

● 2024



OXYGEN IN BOTTOM WATER (depth >= 75 m)



Vertical profiles P2 December

