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2023-12-21
Dnr: 2023/1432/2.10.10

Report from SMHI's joint monitoring cruise with UMF on board R/V Svea

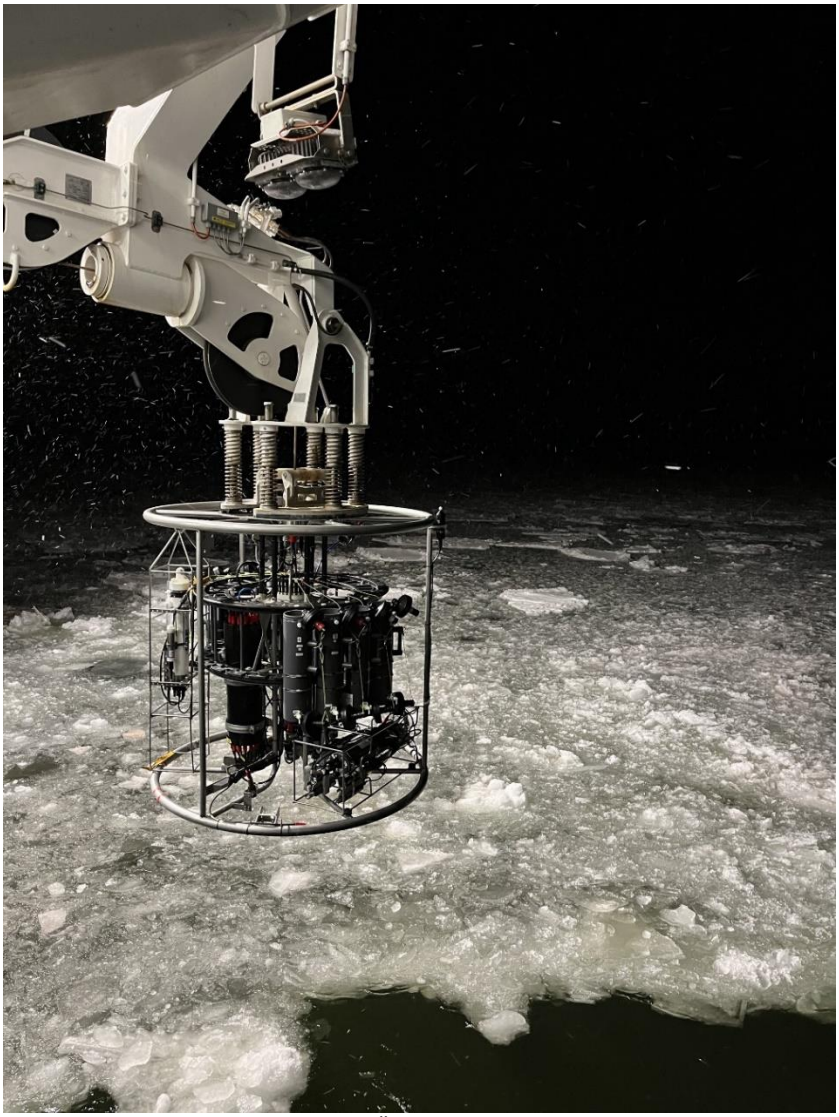

Photo: Sampling in Örefjärden, Madeleine Nilsson, SMHI

Survey period: 2023-12-05 till 2023-12-16

Principal: Swedish Meteorological and Hydrological Institute (SMHI),
Umeå Marine Sciences Centre (UMF),
Swedish Agency for Marine and Water Management (SwAM)

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

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SUMMARY

During the expedition, as part of the Swedish pelagic monitoring program, the Skagerrak, the Kattegat, the Sound, the Baltic Proper, and the Bothnian Bay were visited. In the Bothnian Bay, SMHI and Umeå Marine Research Centre (UMF) conducted joint mapping, including nutrients.

The surface water temperature had continued to decline in December and was lower than normal in many areas.

Normally, the concentrations of dissolved inorganic nutrients increase during winter, but in December, the concentrations of both phosphate and dissolved inorganic nitrogen had decreased at several stations in Skagerrak. However, in Kattegat, the concentrations of inorganic nutrients had increased since November, which is normal. In the Baltic Proper, the concentration of nutrients in the surface layer had increased since November. The levels were within the normal range for the season, except in the Northern Baltic Proper where the levels were above normal.

The levels of dissolved inorganic nitrogen in the surface waters of the Åland Sea were at normal levels. In the Bothnian Sea, the levels were slightly higher than normal in the north-west and at some stations in the south-east. The levels increased with depth, and at these stations, levels above normal were also noted in the bottom water. In the central Bothnian Sea, the levels were higher than normal and around the normal range.

Phosphate levels in surface waters were higher than normal at all stations except coastal stations along the Swedish coast. Phosphate levels increased with depth, and the levels were well above normal in deep waters at some stations. Silicate levels were above normal at the majority of stations in the Bothnian Sea. Here too, the levels increased with depth, and at many stations, levels above normal were noted in deep waters.

In the Bothnian Bay, the concentration of dissolved inorganic nitrogen was around normal. In deep waters, nitrogen levels increased and showed both lower and higher levels than normal. Phosphate levels in surface waters were very low, which is normal for the season, except in the southern Bothnian Bay where levels were higher than normal. Levels increased with depth, and higher-than-normal levels were found in deep waters. Silicate levels in surface waters are naturally high due to the large runoff into the Bothnian Bay. Levels above normal were noted, and in the deep waters, the levels increased further, also exceeding normal levels.

The oxygen situation was good at all stations in Skagerrak and Kattegat; no oxygen deficiency was noted. In the Sound, oxygen deficiency was measured near the bottom.

In the main basins of the Baltic Proper, oxygen-free conditions occurred from 60 to 80 meters, which coincided with measured levels of hydrogen sulphide. Similar conditions could be observed in the Bornholm Basin and in the Hanö Bay. The oxygen situation in the bottom waters of the Arkona Basin were good.

The oxygen levels in the bottom water of the Bothnian Sea varied around 5,5 ml/l in the deeper areas and slightly higher in the bottom water of the shallower regions. Oxygen deficiency was observed in Gaviksfjärden. No oxygen deficiency was noted in the Bothnian Bay or Northern Quark, which is normal.

SMHI’s next regular expedition with R/V Svea is scheduled for January 11th to 17th, starting in Gothenburg and terminating in Lysekil.

RESULT

The expedition was carried out on board the R/V Svea, starting in Kalmar on December 5th and concluding in Lysekil on December 16th. In the Bothnian Bay, a joint sampling expedition was conducted with colleagues from Umeå Marine Research Centre (UMF) as part of the streamlining and coordination of the Swedish Meteorological and Hydrological Institute (SMHI) and UMF's contributions to the national marine environmental monitoring program.

In a joint effort, the annual winter mapping of nutrients in the Bothnian Bay was conducted. SMHI's personnel performed CTD (Conductivity, Temperature, Depth), water, and net sampling, as well as some analyses, while UMF's personnel carried out all analyses of nutrients and biological parameters. New for this year was the sampling of Örefjärden and the national station NB1/B3. In the Bothnian Sea, two stations, US2 and SR1A, were cancelled to adhere to the schedule. UMF's personnel and equipment were picked up and dropped off in Gävle after the sampling. SMHI also changed personnel after the Bothnian Bay was visited.

During the second part of the expedition, from Gävle to Lysekil, the Baltic Proper, the Kattegatt and the Skagerrak were visited. Due to several SMHI personnel falling ill towards the end of the cruise, one station (N14) was cancelled, along with sampling and analysed depths restricted in the Skagerrak.

In the Bothnian Bay, an instrument was placed at Falkens Grund to measure ice thickness, ice movements and currents in the area.

At three stations on the West coast, additional water sampling for phytoplankton samples was conducted for Stockholm University.

Svea's instrument for measuring profiles underway, MVP, was operating during day time at all stations. In the Bothnian Sea and the Bothnian Bay, measurements were interrupted as the instruments are sensitive to frost. Measurements resumed in the Baltic Proper when there was no longer a risk of ice formation. Unfortunately, the instrument itself was lost during a transect in the Kattegat. Since the instrument has a transponder, it will be recovered in early 2024.

The Ferrybox system ran continously during the full cruise. Tests of the automatic sampling system were conducted throughout the expedition. Samples were regularly taken for the analysis of nutrients, total nitrogen and phosphorus, and chlorophyll.

This report is based on data that has undergone initial quality control and is compared to monthly means from the period 1991 - 2020. When additional quality control has been performed, certain values may change. Values in the report have been rounded and can differ a bit from values published in the data base. Data from this cruise are published as soon as possible on the data host's website, this usually takes place within a week after the cruise has ended. Some analyses are made after the cruise and are published later.

Data can be downloaded here:
https://www.smhi.se/en/services/open-data/national-archive-for-oceanographic-data/download-data-1.153150

Skagerrak

The temperature in the surface water had significantly decreased since November and was now around 2–7 °C down to about 20 m. At the coastal station Släggö, the surface water temperature was lower, about 2 degrees. The surface water temperature was below normal for the month, except at station Å17, which also showed the highest surface water temperature at 6.8 degrees. At all stations except Å15, there was a relatively well-mixed surface layer down to about 20 m. At Å15, salinity and temperature increased continuously from the surface down to about 20 m. At around 40 m, there was slightly warmer water left from the summer, and below 50 m, the temperature dropped again to about 8 degrees. The surface salinity indicated that Å15 was situated between the fresher Baltic Sea water along the coast and the saltier water from the North Sea found at Å17. The surface water salinity was below normal at the other stations.

Normally, the concentration of dissolved inorganic nutrients increases during winter, but in December, the concentrations of both phosphate and dissolved inorganic nitrogen had decreased at all stations except Å15 and Å17. At the westernmost station Å17, the levels were above normal, while they were well below normal at the most coastal station Släggö.

The oxygen situation was good at all stations in the Skagerrak, with normal values for the season, with concentrations between 5.4–5.6 ml/l.

Chlorophyll fluorescence is a measure of plankton activity measured with a sensor mounted on the CTD[1]. No strong chlorophyll fluorescence peaks were recorded, but some activity was noted at all stations in the mixed surface layer down to the depth of the thermocline.

Kattegatt and the Sound

Similar to the Skagerrak, the surface water temperature had significantly decreased since November and was now around 3–5 °C, with the warmest temperatures found in the Sound. At the two stations sampled in the Kattegatt, the surface water temperature was below normal. In the Sound, the water was well-mixed down to 5 m, and in this layer, the salinity was 8 psu, and the temperature was 4 degrees, which was lower than normal. Below the pycnocline at 10 m, both temperature and salinity increased, and here the salinity was above normal, about 34 psu. In the Kattegatt, stratification occurred between 5–10 m, also with temperatures below normal in the well-mixed surface layer. Just like in November, there was a layer of warmer water beneath the surface layer, at 11 degrees, around 25 m.

The concentration of inorganic nutrients had increased since November, which is normal. The concentrations of phosphate and dissolved inorganic nitrogen (DIN) were normal, while the concentration of silicate was above normal at the Anholt station and in the Sound. In the Sound, all nutrients were above normal below 5 m.

Oxygen levels in the bottom water of the Kattegat were normal for the season. In the Kattegatt, all values were above 4 ml/l (the limit for oxygen deficiency), and in the Sound, they were just below, at 3.7 ml/l.

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[1] The CTD is a profiling measuring instrument and stands for Conductivity, Temperature, Depth. SMHI's CTD is also equipped with sensors that measure oxygen and fluorescence, among other parameters.

Similar to the Skagerrak, some plankton activity was noted in the upper layer down to the thermocline from the chlorophyll fluorescence sensor.

The Baltic Proper

The temperature in the surface layer had decreased since November and varied between 5–6 degrees. At two stations, it was below normal (BY4 and BY31), while at the remaining stations, it was within the normal range. The salinity in the surface layer ranged from 6.4–8.1 psu, from the Arkona Basin to the Northern Baltic Proper. At all stations, there was a well-mixed surface layer with cold water, but the depth of the thermocline varied significantly. It was only 10 m deep at stations BY31 (Landsort Deep) and BCS-III 10, but it extended to 50 m at stations BY15 and BY10 in the Eastern Gotland Basin. Beneath the well-mixed surface layer, there were layers with higher temperatures down to about 50 m depth. The halocline was situated between 60-70 m depth.

In the Northern Baltic Proper and Eastern Baltic Proper, the water was well-mixed down to approximately 50 meters. Below that, there was an intermediate layer of older, colder water extending down to about 70 meters, with the exception of BY20 where an intermediate water layer was also found at 50 meters, but it was somewhat warmer than normal. In the Bornholm Basin, there was a well-mixed water column down to 50 meters, beneath which there was a warmer water layer at around 9 degrees extending down to the bottom. This phenomenon could also be observed in the eastern Arkona Basin at BY2 Arkona at around 40 meters.

The concentration of nutrients had increased in the surface layer since November. The levels were within the normal range for the season, except in the Northern Baltic Proper where the concentrations were higher than normal. The concentrations ranged between 1.6 – 4.6 µmol/l. A similar trend was observed for the concentration of phosphate, where levels had increased since November, and the Northern Baltic Proper had concentrations higher than normal for the season. Phosphate concentrations varied between 0.5 – 0.7 µmol/l. The concentration of silicate had also increased since November, with the Arkona Basin and Bornholm Basin standing out with levels above normal in the surface layer, while concentrations at other stations were within the normal range for the season. Silicate levels ranged between 11.5 – 18.3 µmol/l. At the station Tröskeln Ålands Hav, higher than normal concentrations were noted for all sampled nutrients.

In the Bornholm Basin and the Baltic Proper, the concentration of all nutrients was higher than normal below the halocline towards the bottom. The increase in the nutrient levels was observed from approximately 60 to 70 meter throughout the area. This coincided with the depletion of oxygen in the water column, i.e. when the oxygen concentration is zero and toxic hydrogen sulphide is formed. From the Bornholm Basin to the Northern Baltic Proper, oxygen-free conditions prevailed in the bottom waters. Hydrogen sulphide was also measured in these areas.
Oxygen-free conditions were noted in the Eastern Gotland Basin at depths exceeding 70 meters, and from 70 to 80 meters in the Western Gotland Basin. In the Northern Baltic Proper, oxygen-free conditions prevailed from around 60 meters.
In the Arkona Basin, the oxygen situation in the bottom water was good, with concentrations ranging between 5,8 – 7,3 ml/l.

Fluorescence measurements from the CTD indicated plankton activity in the surface layer above the thermocline at all stations, while very low values were measured beneath the thermocline. No significant peaks in chlorophyll fluorescence were observed.

More information about the algal situation can be found in the Algalware-report for December: https://www.smhi.se/publikationer/publikationer/algrapporter (Only available in Swedish).

The Bothnian Sea and the Åland Sea

In the western part of the Bothnian Sea, the surface water temperature was lower than normal for the season, ranging between 0.2 – 2.6 degrees. In other areas, the temperature was slightly lower to normal for the season, between 2.9 – 3.6 degrees. Generally, no distinct temperature stratification was observed at the visited stations.

The salinity in the surface water was mostly normal for the season, but lower levels were noted along the Swedish coast, while higher levels than normal were observed near the Finnish coast in the southeastern parts. Surface salinity varied between 4.6 and 5.6 psu. Similar to the temperature, no clear salinity stratification was observed, with slightly increasing salinities towards the bottom, where salinities ranged between 6 - 7 psu in the bottom water.

Concentrations of dissolved inorganic nitrogen in the surface water in the Åland Sea were around 2.9 – 3.0 µmol/l, which is normal. In the Bothnian Sea, concentrations were slightly higher than normal in the northwestern parts and at some stations in the southeastern part, ranging between 2.9 – 5.8 µmol/l. Concentrations increased with depth, and higher-than-normal levels were also noted in the bottom water at these stations. In the central Bothnian Sea, concentrations were higher than normal and around normal.

Phosphate concentrations in the surface water were higher than normal at all stations, except for nearshore stations along the Swedish coast. Concentrations varied between 0.3 - 0.5 µmol/l throughout the area. Phosphate concentrations increased with depth, and in the deep water, concentrations were much higher than normal at some stations. Silicate concentrations were above normal at the majority of stations in the Bothnian Sea. Surface concentrations varied between 18.8 – 39.4 µmol/l. Similar to nitrogen, silicate concentrations increased with depth, and at many stations, concentrations above normal were noted in the deep water.

Oxygen concentrations in the bottom water varied around 5.5 ml/l in the deeper areas of the Bothnian Sea and slightly higher in the bottom water in shallower areas, ranging from 7-9 ml/l. In Gaviksfjärden, oxygen deficiency was noted with 3.7 ml/l, indicating that oxygen deficiency (<4 ml/l) was measured in the bottom water.

Plankton activity, assessed from chlorophyll fluorescence measured with the CTD probe, was low throughout the surveyed area. No visibility depth was measured due to darkness or rough seas, and turbidity measured with the CTD's turbidity meter indicated high particle concentrations in the deeper parts of the Bothnian Sea. This could also be observed in real-time video footage from the camera mounted on the CTD rosette.

The Bothnian Bay and Northern Quark

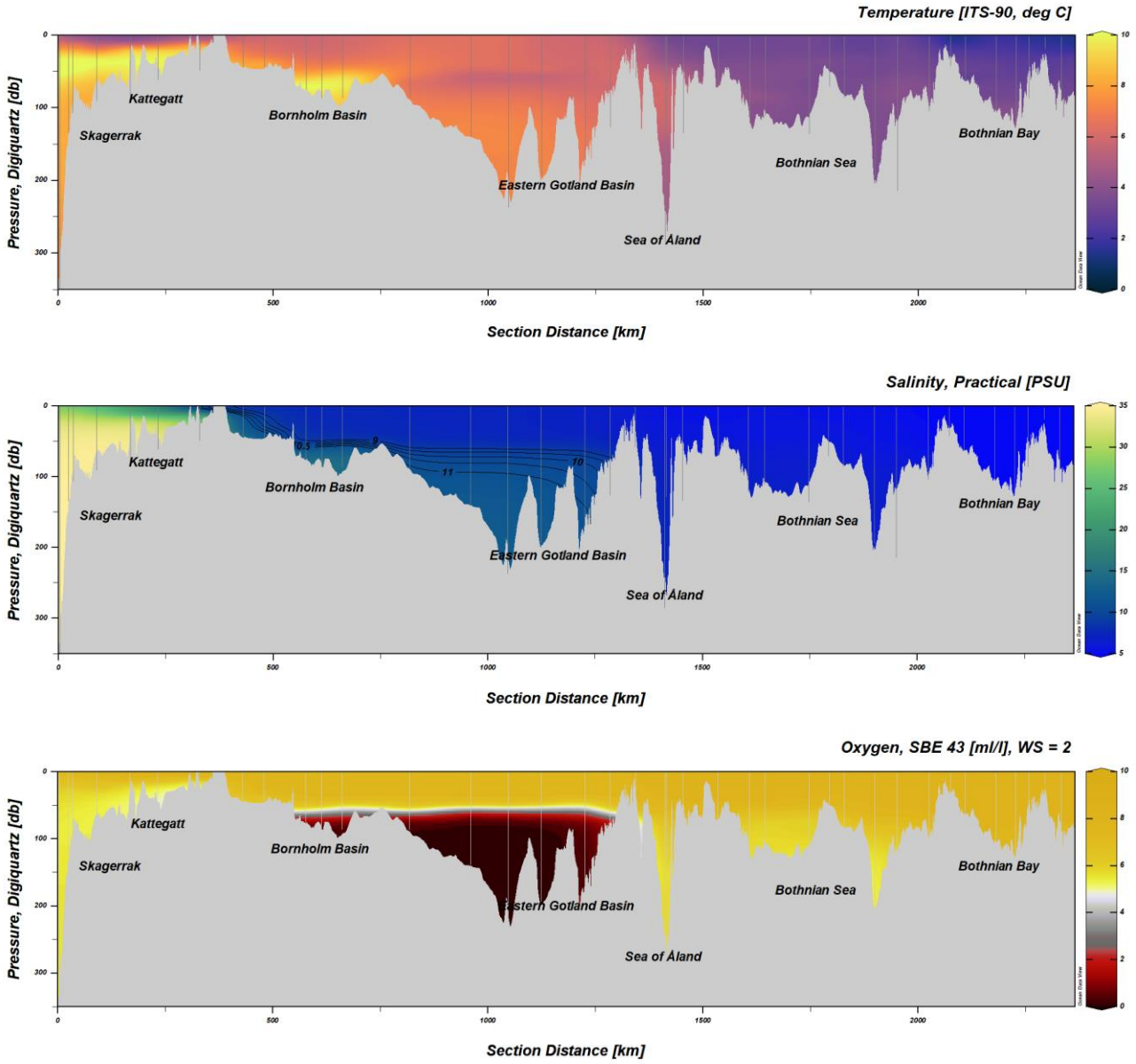
The stratification in the Bothnian Bay and Northern Quark is weaker than in the Bay of Bothnia, but a weak temperature stratification was found at around a depth between 20-50 meters. Generally, a well-mixed water mass was observed during the expedition in the Bothnian Bay.

The surface water temperature ranged from lower than normal to normal for the season, between -0.7 to 3.3 degrees Celsius, with the coastal station F16 standing out with a surface water temperature below 0 degrees. The surface salinity was normal, varying between 2.9 to 5.6 practical salinity units (psu). The salinity in the deep water was within the normal range.

The concentration of dissolved inorganic nitrogen was around normal levels, ranging between 4.1 to 6.0 µmol/l. In deep water, nitrogen concentration increased and exhibited some variation, with both normal levels and concentrations lower or higher than normal. Phosphate levels in surface water were very low, which is typical for the season, except for the southern Bothnian Bay where the levels were higher than normal. Phosphate concentrations increased with depth, and in the deep waters, higher levels than normal were observed. The silicate content in surface water is naturally high due to significant runoff into the Bothnian Bay. Levels above normal were noted, varying around 40 µmol/l. In deep water, concentrations further increased, and again, the levels were higher than normal.

No oxygen deficiency was observed in the Bothnian Bay or Northern Quark, which is normal. Oxygen levels in the bottom water were above 7 ml/l at all stations.

The plankton activity, assessed from chlorophyll fluorescence measured with a CTD probe, was low throughout the surveyed area. No visibility depth was measured due to darkness or high waves, preventing reliable measurements. Turbidity measured with the CTD's turbidity meter indicated lower particle concentrations in the deeper parts of the Bothnian Bay compared to the Bothnian Sea.



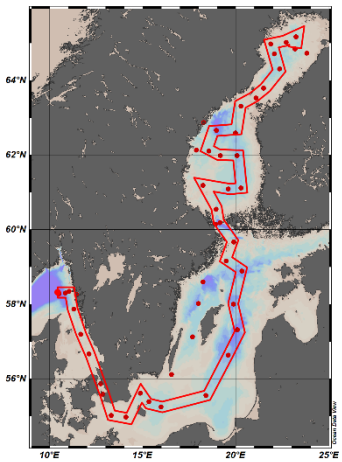
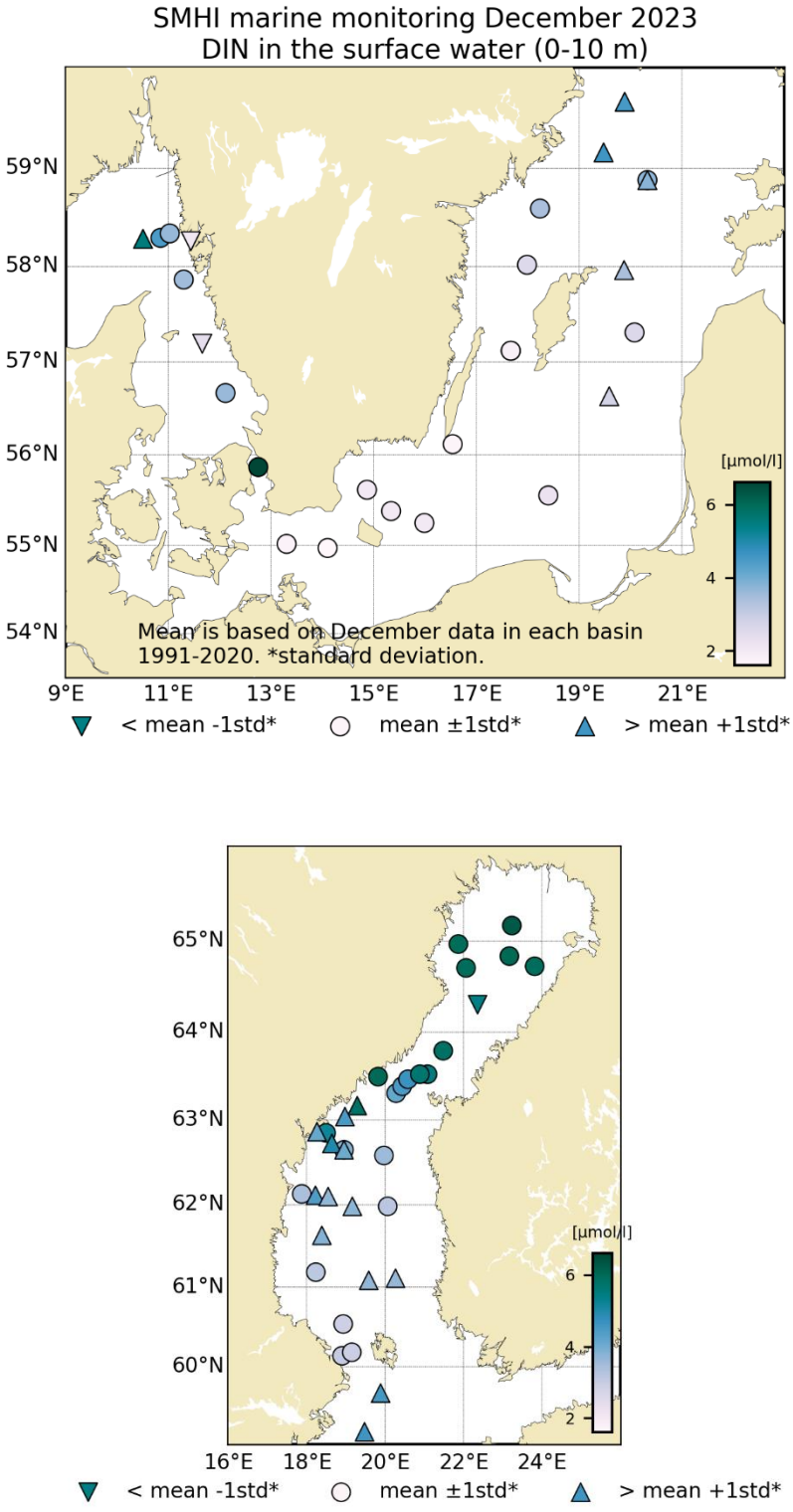
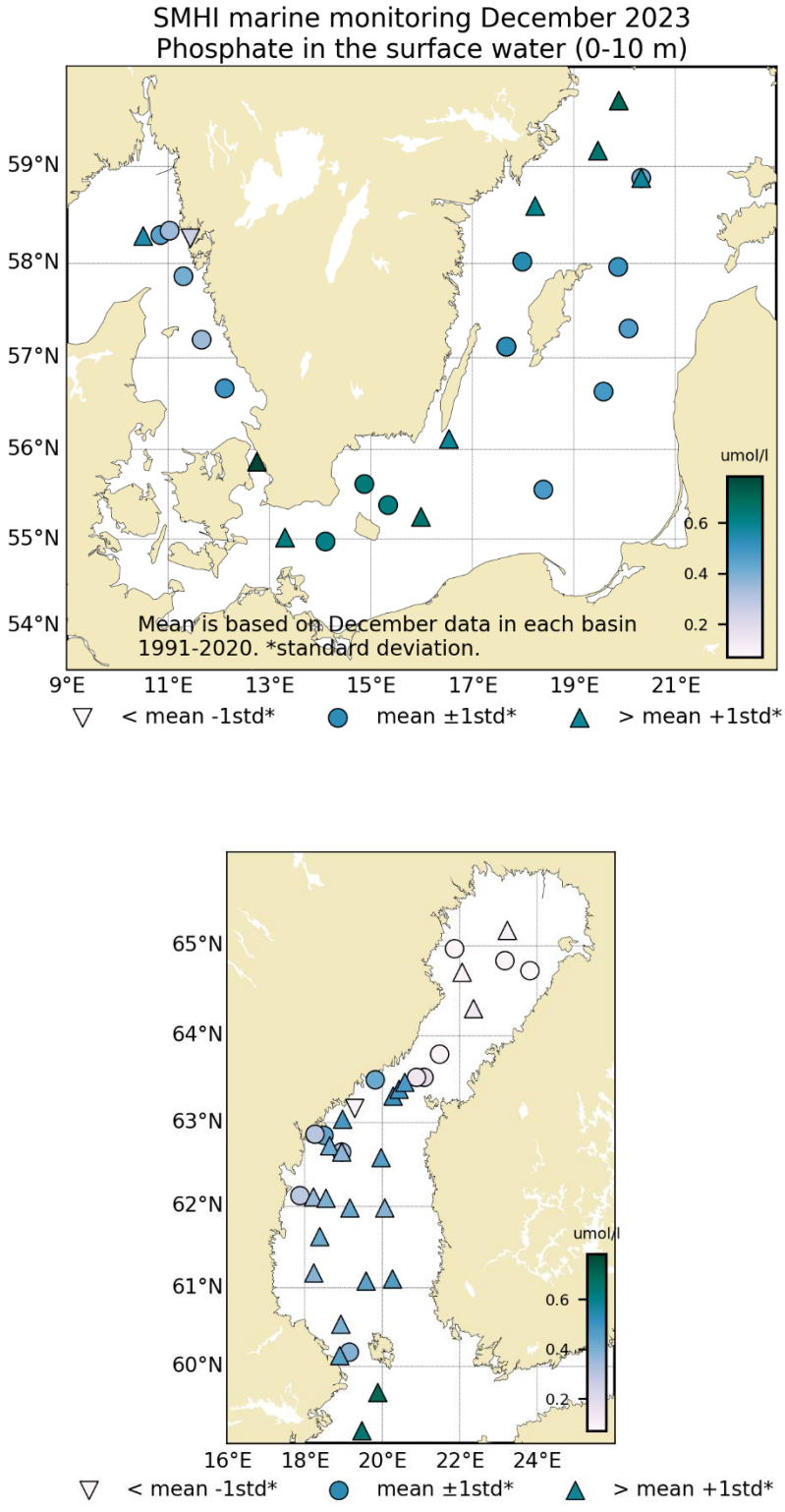


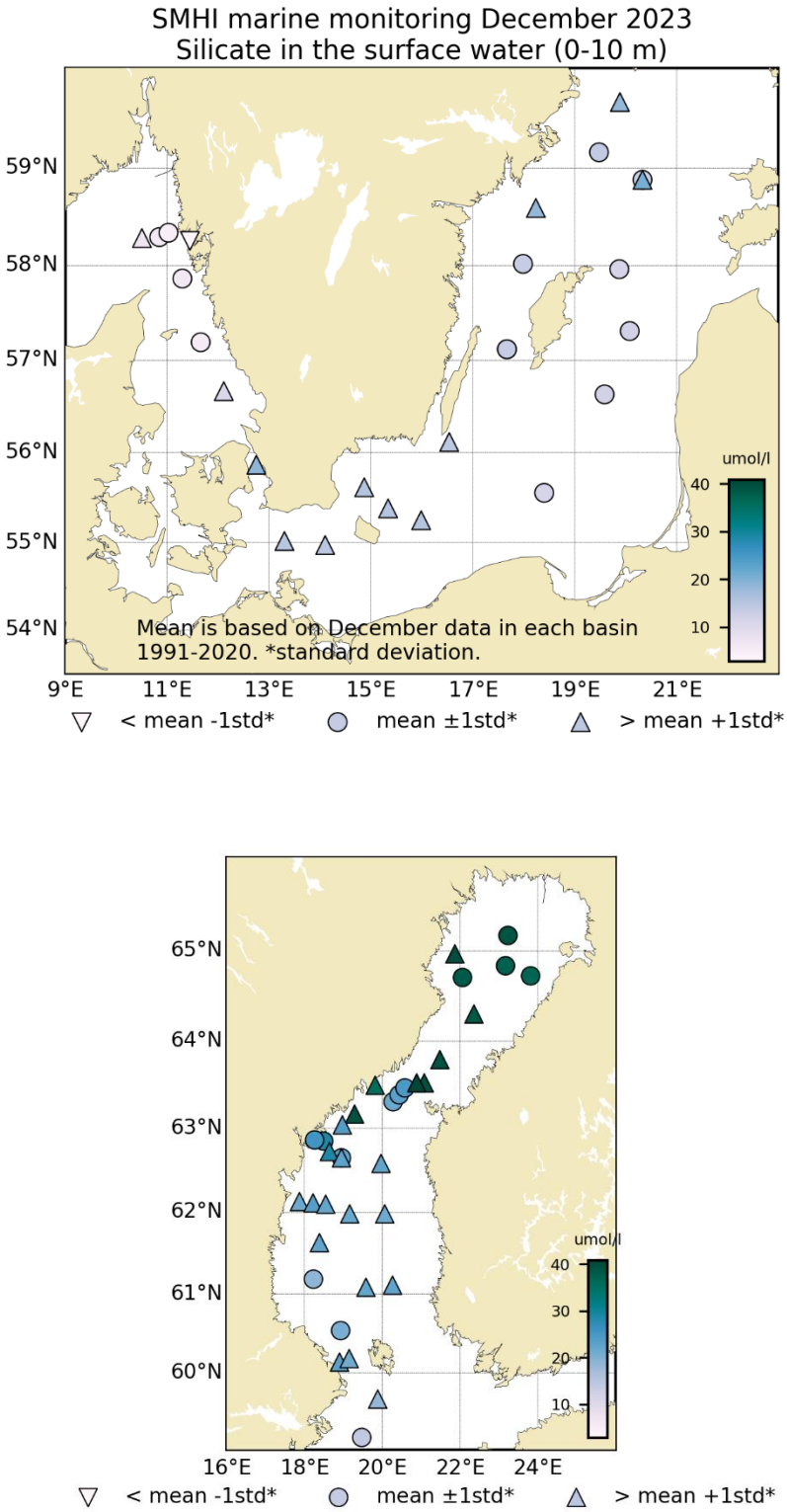
Figure 1. Transect showing oxygen concentration, salinity and temperature measured with CTD, stretching from Skagerrak, Kattegat, the Sound, the Baltic Proper, through the Eastern Gotland Basin and up to the Bothnian Bay.



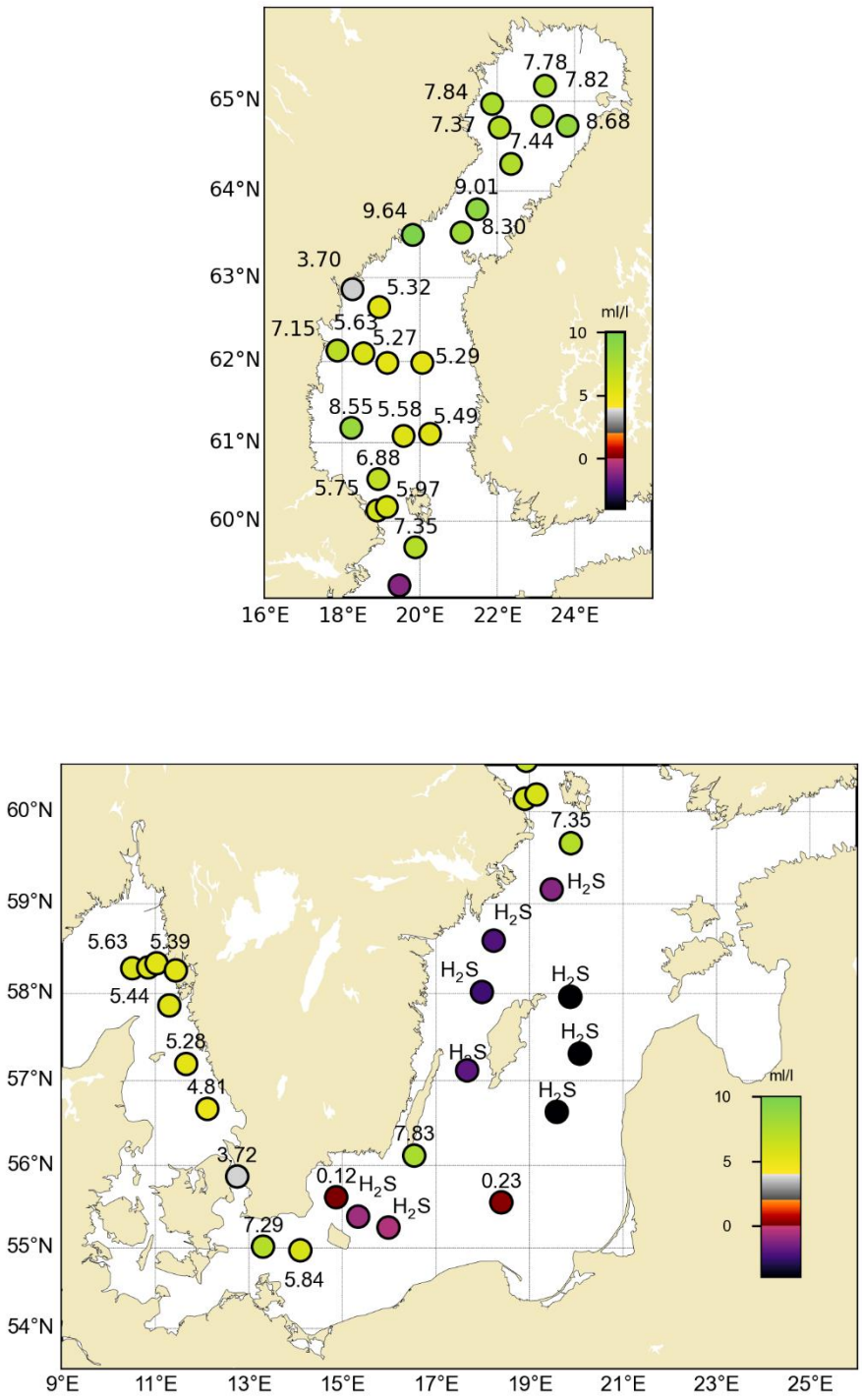
Figur 2. Koncentrationen (µmol/l) av oorganiskt kväve i ytvattnet (0-10m).



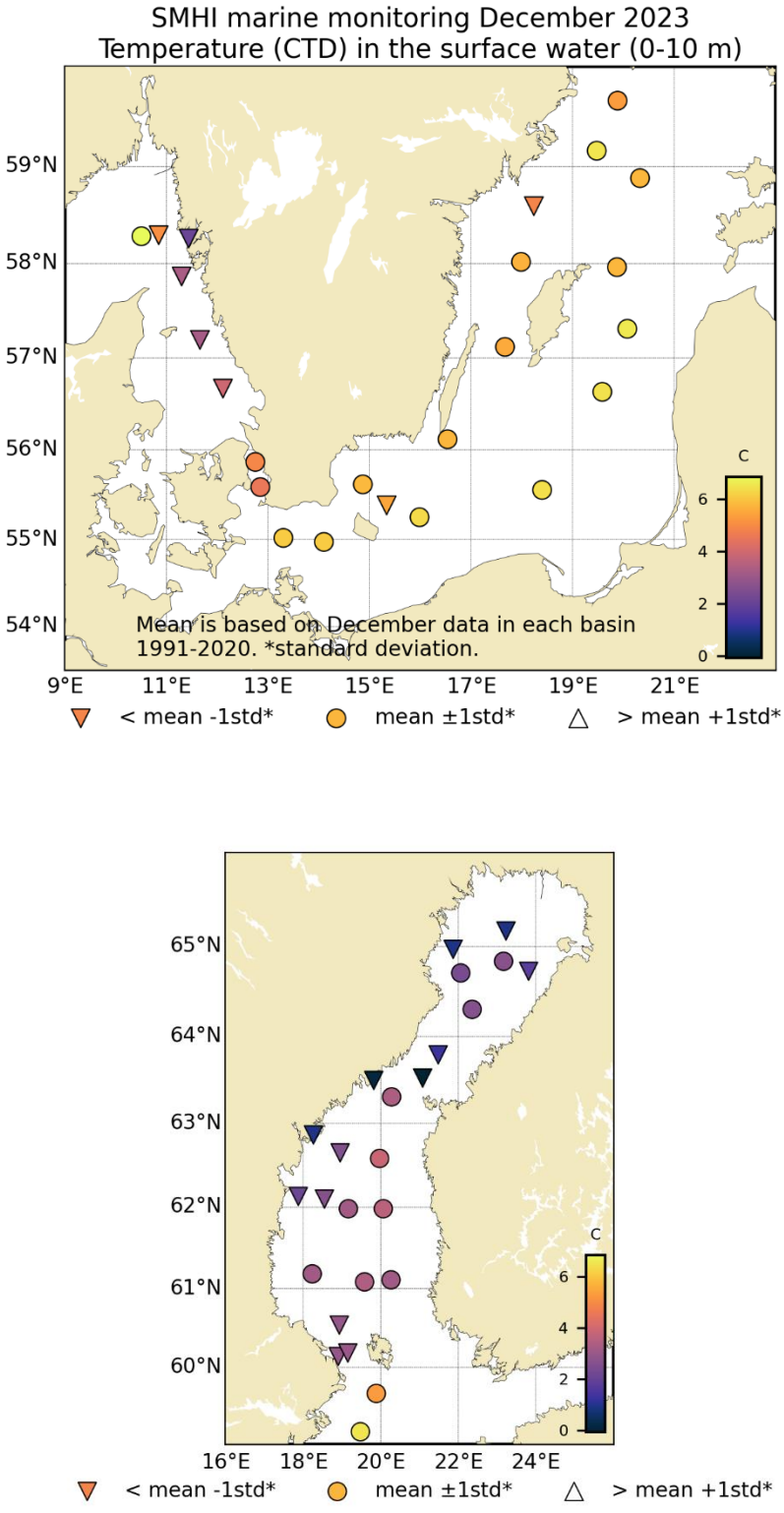
Figur 3. Koncentrationen (µmol/l) av fosfat i ytvattnet (0-10m).



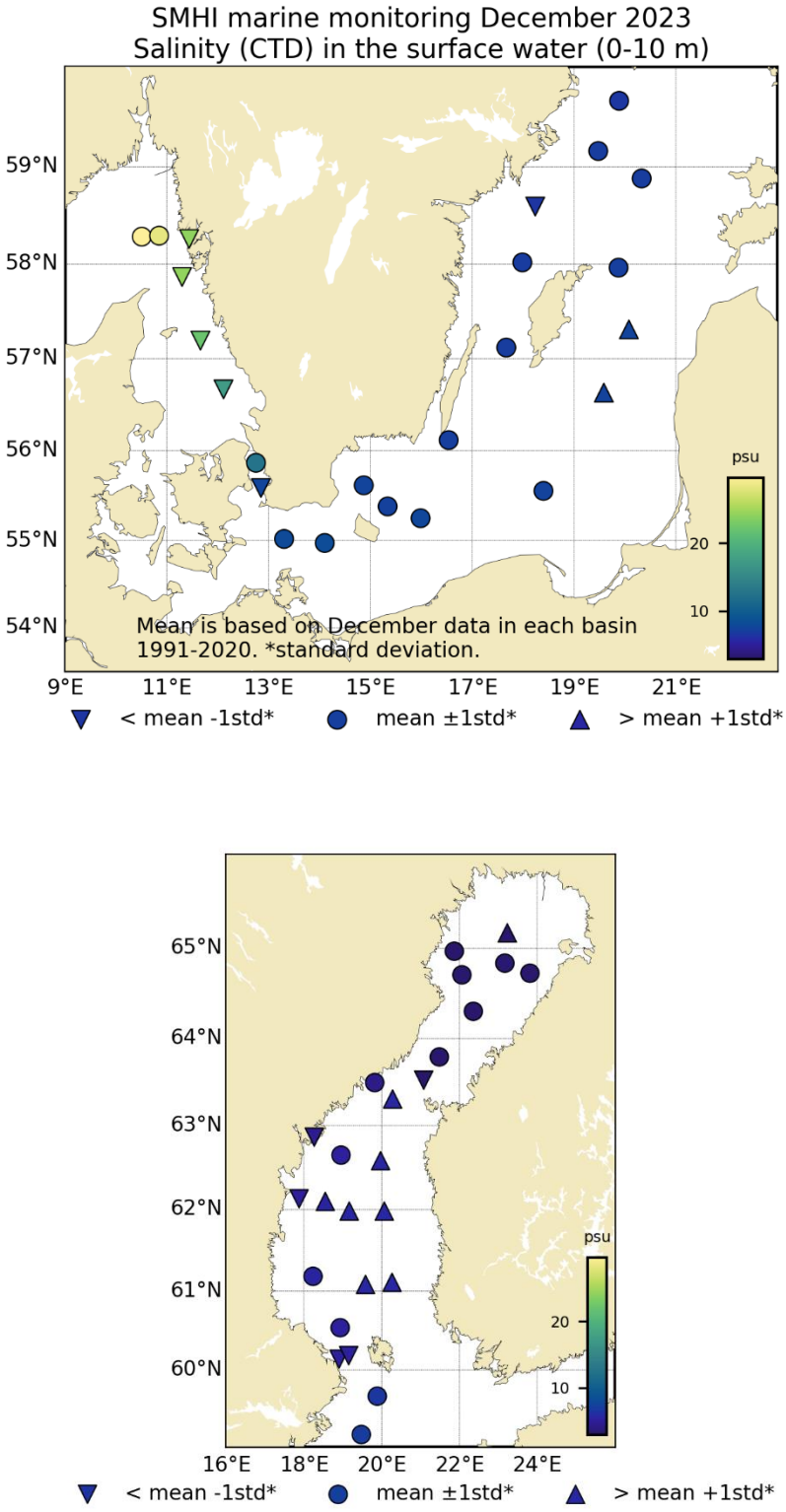
Figur 4. Koncentrationen (µmol/l) av silikat i ytvattnet (0-10m).



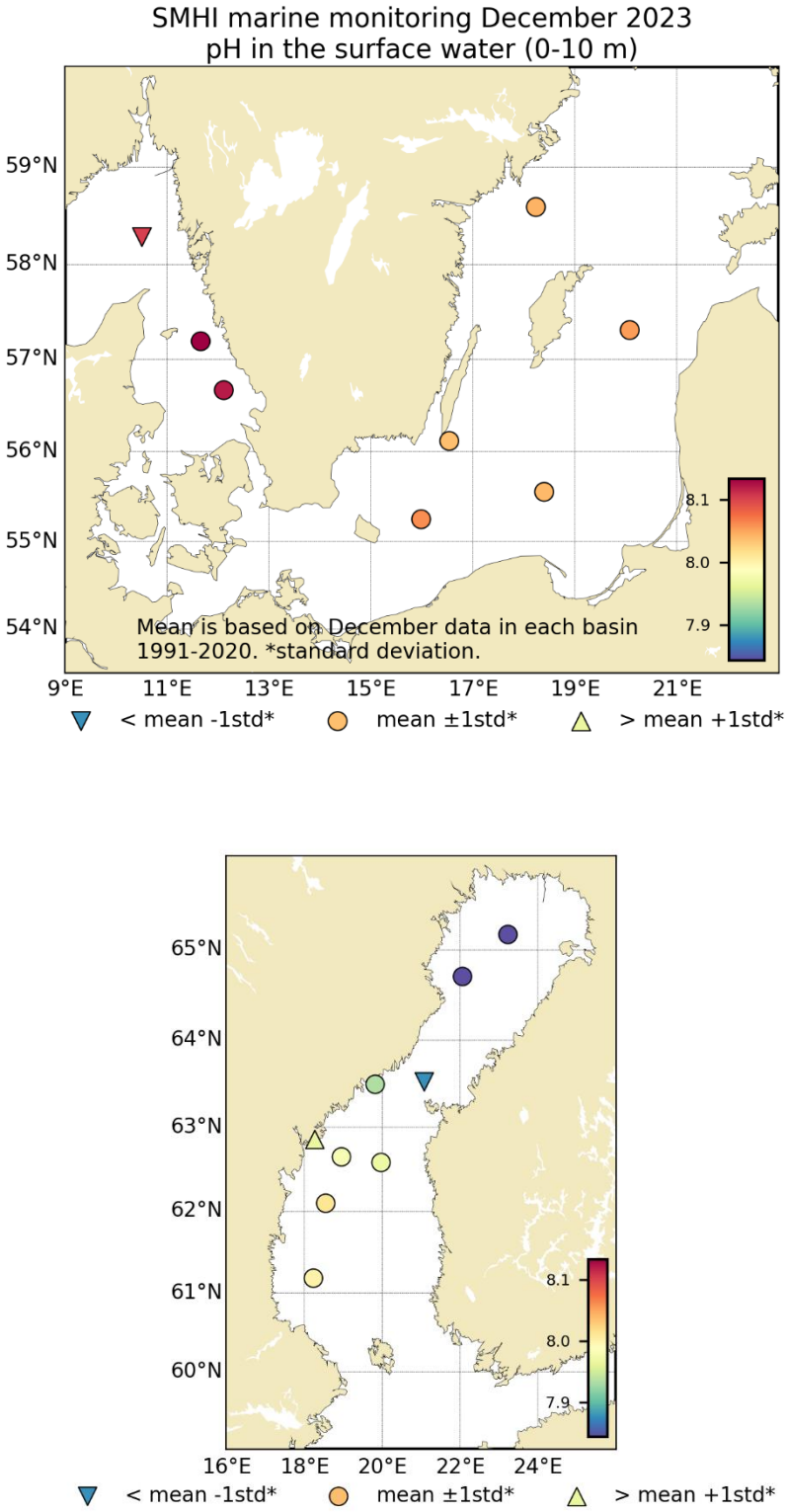
Figur 5. Syrekoncentrationen (ml/l) i bottenvattnet.



Figur 6. Temperaturen i ytvattnet (0-10m).



Figur 7. Salthalten i ytvattnet (0-10m).



Figur 8. pH i ytvattnet (0-10m).

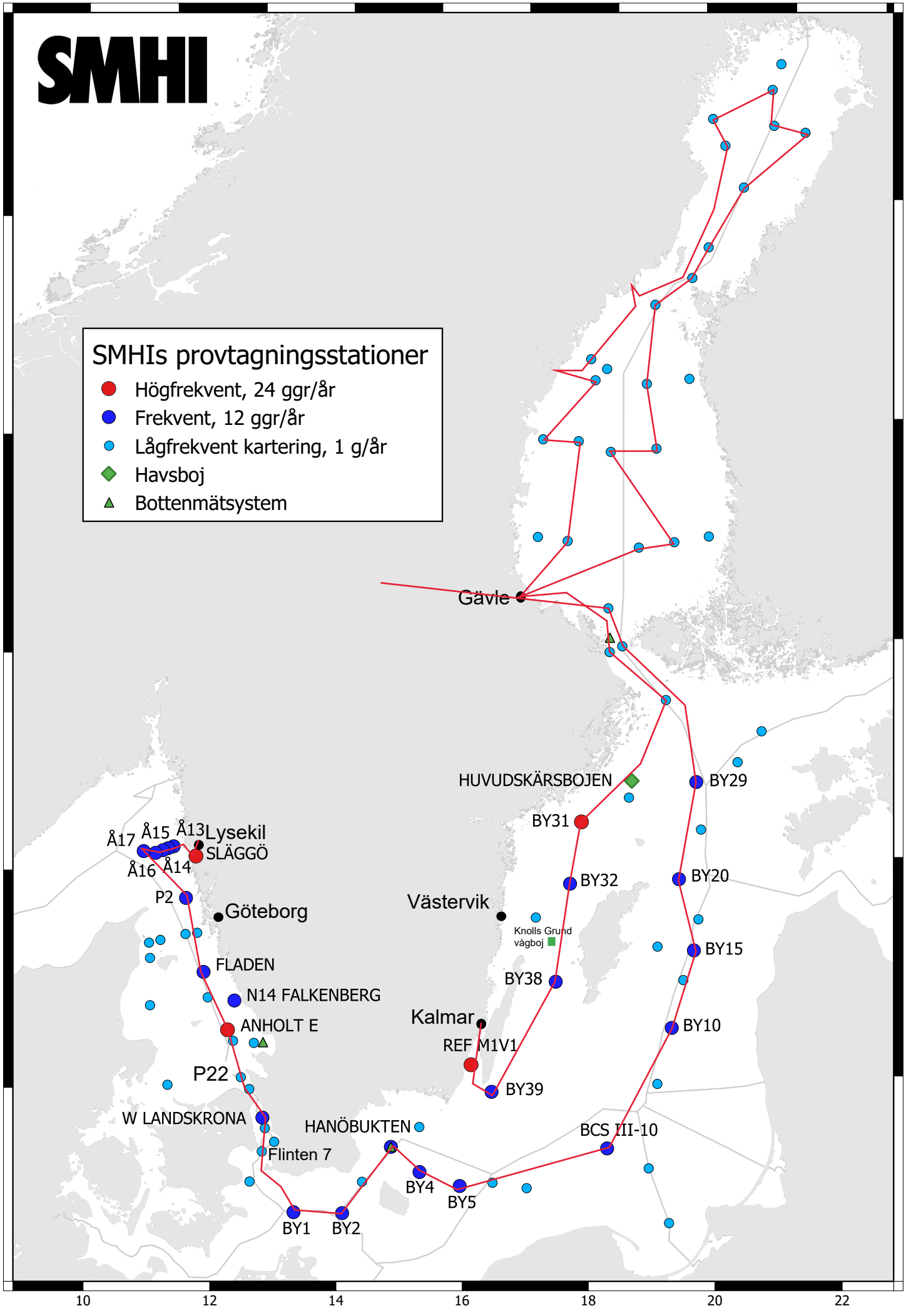
DELTAGARE

Name	Role	From
Martin Hansson	Cruise leader, leg one, Oceanographer	SMHI
Örjan Bäck	Oceanographer	SMHI
Madeleine Nilsson	Marine chemist	SMHI
Helena Björnberg	Marine chemist	SMHI
Monica Linder	Chemist	SMHI
Daniel Bergman Sjöstrand	Marine technician	SMHI
Joakim Ahlgren	Chemist	UMF
Martina Jeuthe	Chemist	UMF
Siv Huseby	Marin biologist	UMF
Lena Viktorsson	Cruise leader leg two, Oceanographer	SMHI
Sari Sipilä	Chemist	SMHI
Ann-Turi Skjevik	Marin biologist	SMHI
Johanna Linders	Oceanographer	SMHI
Johan Håkansson	Chemist	SMHI

APPENDICES

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

SMHI
Havs och Vatten myndigheten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SMHIs provtagningsstationer
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Frekvent, 12 ggr/år
Lågfrekvent kartering, 1 g/år
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Bottenmätsystem
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Ship: SE
Year: 2023

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	Wind vel	Air temp C	Air pres hPa	WCWI	CZPP	No de	No btl	Temp_btl	Temp_ctd	Salt_btl	Salt_ctd	Ph	Doxy_btl	Doxy_ctd	H2S	Phos	Ptot	Ntri	Ntra	Ntrz	Amon	Ntot	Alky	Sio3-si	Humus	Comnt_visit	Comnt_samp
5078	21	BPWX00	EXT...	FERRYBOX	5707.10	01740.06	20231205	0650	50						----	----	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0984	21	BPSE49	BAS...	BY39 ÖLANDS S UDDE	5606.98	01632.14	20231205	0713	50		9	6.9	2.45	1019	1620	-x--	8		x	x	-	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	-	-
5076	21	BPWX00	EXT...	FERRYBOX	5627.17	01654.97	20231205	1125	50						----	----	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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0990	21	BPST08	BAS...	U19 NORRA RANDEN	6008.34	01854.14	20231206	1932	131		30	4.5	-5.1	1027	9999	----	15		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
5083	21	GBSX00	EXT...	FERRYBOX	6052.71	01831.63	20231207	1203	50						----	----	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
0991	21	GBSX07	BAS...	SR5 / C4	6105.03	01934.99	20231207	1515	124		12	10.5	-0.2	1029	9999	----	14		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0992	21	GBSX06	BAS...	SS29	6106.58	02015.93	20231207	1815	114		14	10	-1.3	1029	9999	----	14		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0993	21	GBSX22	BAS...	F26 / C15	6159.01	02003.99	20231207	2340	138		99	8.8	-1.4	1028	9999	----	15		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0994	21	GBSX17	BAS...	MS6	6159.00	01909.88	20231208	0301	73		14	12.9	-0.3	1027	9990	----	10		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0995	21	GBSX26	BAS...	US5B / C1	6235.19	01958.24	20231208	0750	218		15	13.2	-1.3	1029	2840	----	17		-	x	-	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	x	-

Date: 2024-01-23
Time: 15:05

Ship: SE
Year: 2023

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	Wind vel	Air temp C	Air pres hPa	WCWI elac aove tueo hdsb	CZPP hohp loy apt o p	No de	No btl	Temp_btl	Temp_ctd	Salt_btl	Salt_ctd	Ph	Doxy_btl	Doxy_ctd	H2s	Phos	Ptot	Ntri	Ntra	Ntrz	Amon	Ntot	Alky	Sio3-si	Humus	Comnt_visit	Comnt_samp
5084	21	GBSX00	EXT...	FERRYBOX	6312.68	02014.24	20231208	1214	50						----	----	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
5086	21	LAND	EXT...	FERRYBOX F18	5318.53	02016.87	20231208	1244	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
0996	21	GBSX30	BAS...	F18 SYDOSTBROTTEN	6318.52	02016.85	20231208	1300	107		15	11.1	-3.5	1029	2840	----	14		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
5087	21	GBSX00	EXT...	FERRYBOX F18N	6323.29	02026.17	20231208	1437	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
5088	21	GBQX00	EXT...	FERRYBOX 3	6328.09	02035.02	20231208	1500	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
0997	21	GBQX31	BAS...	F16	6331.52	02104.87	20231208	1626	44		15	9.7	-5.4	1030	9999	----	8		-	x	-	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	x	-
5089	21	GBQX00	EXT...	FERRYBOX 4	6331.54	02053.18	20231208	1635	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
5101	21	BPNX00	EXT...	FERRYBOX 6	5852.88	02019.68	20231208	1730	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	-	-
0998	21	GBBX32	BAS...	F13	6347.47	02128.99	20231208	1853	64		14	10.1	-5.4	1030	9999	----	10		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0999	21	GBBX33	BAS...	BO3 / A3	6418.31	02221.54	20231208	2310	106		16	12	-7	1031	9999	----	14		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
1000	21	GBBX35	BAS...	RR7	6443.61	02348.99	20231209	0415	39				-7.9	1030	9999	----	7		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
1001	21	GBBX37	BAS...	RR5	6450.24	02310.22	20231209	0702	68		16	8	-6.9	1029	9999	----	10		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
1002	21	GBBX45	BAS...	F3 / A5	6510.00	02314.02	20231209	0934	92		14	8.2	-7.2	1028	7830	----	12		-	x	-	x	x	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
5085	21	GBBX00	EXT...	FERRYBOX	6501.32	02244.09	20231209	1148	50						----	----	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
1003	21	GBBX00	EXT...	FALKENS GRUND	6500.80	02242.47	20231209	1202	21		15	7.3	-5.44	1026	7830	----	6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1004	21	GBBX40	BAS...	RR1	6458.06	02152.12	20231209	1500	88		16	6.5	-4.3	1024	9999	----	12		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
1005	21	GBBX43	BAS...	F9 / A13	6442.54	02203.88	20231209	1725	125		15	6	-4.9	1024	9999	----	14		x	x	-	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	x	-
5092	21	GBSX00	EXT...	FERRYBOX 10	6250.99	01829.75	20231210	0000	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
1006	21	GBSX58	EXT...	NB1 / B3	6329.87	01949.20	20231210	0456	26		20	5.4	-6.6	1019	9996	----	6		-	x	-	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	x	-
5090	21	GBSX00	EXT...	FERRYBOX 8	6309.93	01917.42	20231210	0900	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
5091	21	GBSX00	EXT...	FERRYBOX 9	6302.36	01858.51	20231210	1000	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
1007	21	GBSF51	BAS...	GAVIK-1	6251.85	01815.79	20231210	1230	81		9	4.3	-3.7	1017	2811	----	11		x	x	-	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	x	-

Date: 2024-01-23
Time: 15:05

Ship: SE
Year: 2023

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	Wind vel	Air temp C	Air pres hPa	WCWI (Weath Cloud Waves Iceob)	CZPP (Chlo Zoop Phytop Pp)	No de	No btl	Temp_btl	Temp_ctd	Salt_btl	Salt_ctd	Ph	Doxy_btl	Doxy_ctd	H2s	Phos	Ptot	Ntri	Ntra	Ntrz	Amon	Ntot	Alky	Sio3-si	Humus	Comnt_visit	Comnt_samp
5093	21	GBSX00	EXT...	FERRYBOX 12	6243.61	01838.60	20231210	1444	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
1008	21	GBSX31	BAS...	C3	6239.16	01857.16	20231210	1550	198		8	2.9	-2.6	1017	9999	----	9		-	x	-	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	x	-
5094	21	GBSX00	EXT...	FERRYBOX 13	6239.16	01857.16	20231210	1601	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
1009	21	GBSX13	BAS...	MS2	6207.89	01752.39	20231210	2050	75		12	3.9	-0.3	1014	9990	----	10		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	x
5095	21	GBSX00	EXT...	FERRYBOX 14	6206.93	01813.37	20231210	2225	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
1010	21	GBSX15	BAS...	MS4 / C14	6205.98	01832.85	20231210	2325	88		14	6.9	-1.3	1014	9999	----	12		-	x	-	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	x	-
5096	21	GBSX00	EXT...	FERRYBOX 15	6137.99	01823.22	20231211	0017	50						----	----	1		-	-	-	-	-	-	-	-	x	-	x	x	x	x	-	-	x	-	x	-
1011	21	GBSX09	BAS...	SR3	6111.04	01813.93	20231211	0653	75		10	9.8	-0.1	1011	9990	----	10		-	x	-	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	x	-
1012	21	GBSX03	BAS...	F33 GRUNDKALLEN	6032.41	01855.86	20231211	1923	137		6	10	-0.8	1010	9990	----	15		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
1013	21	GBAX02	BAS...	F64 SOLOVJEVA	6011.01	01909.02	20231211	2330	290		6	9	-0.8	1011	9990	----	20		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
5097	21	BPNX00	EXT...	FERRYBOX	5852.88	02019.68	20231212	0838	50						----	----	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1014	21	BPNX35	BAS...	BY29 / LL19	5852.88	02019.69	20231212	0900	173		3	11	0.7	1008	2840	----	16		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
1015	21	BPEX26	BAS...	BY20 FÅRÖDJ	5757.73	01952.42	20231212	1600	198		8	10	1.3	1007	9990	----	17		-	x	-	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	-	-
1016	21	BPEX21	BAS...	BY15 GOTLANDSDJ	5718.7	02004.67	20231212	2130	242		33	7	2.2	1007	9990	-x--	19		-	x	-	x	x	x	x	x	x	-	x	x	x	x	-	-	x	-	-	-
1017	21	BPEX13	BAS...	BY10	5638.02	01935.09	20231213	0253	143		33	8	2.5	1008	9990	----	15		x	x	-	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	-	-
5098	21	BPSE00	EXT...	FERRYBOX	5556.32	01849.25	20231213	0816	50						----	----	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
1018	21	BPSE11	BAS...	BCS III-10	5533.31	01823.93	20231213	1120	90	13	35	8	3.5	1009	2730	---x	12		x	x	-	x	x	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
1019	21	BPSB07	BAS...	BY5 BORNHOLMSDJ	5515.00	01559.05	20231213	2025	90		6	12	3.8	1011	9990	-x--	12		x	x	-	x	x	x	x	x	x	-	x	x	x	x	-	-	x	-	x	-
1020	21	BPSB06	BAS...	BY4 CHRISTIANSÖ	5522.93	01520.16	20231214	0030	90		4	12	2.2	1013	9990	----	12		x	x	-	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	-	-
1021	21	BPSH05	BAS...	HANÖBUKTEN	5537.03	01452.04	20231214	0330	79		13	11	1.4	1015	9990	----	11		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
1022	21	BPSA03	BAS...	BY2 ARKONA	5458.27	01406.00	20231214	0900	46	10	3	7	3.2	1018	2830	-x--	8		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
5099	21	BPSA00	EXT...	FERRYBOX	5458.27	01406.00	20231214	0937	50						----	----	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Date: 2024-01-23
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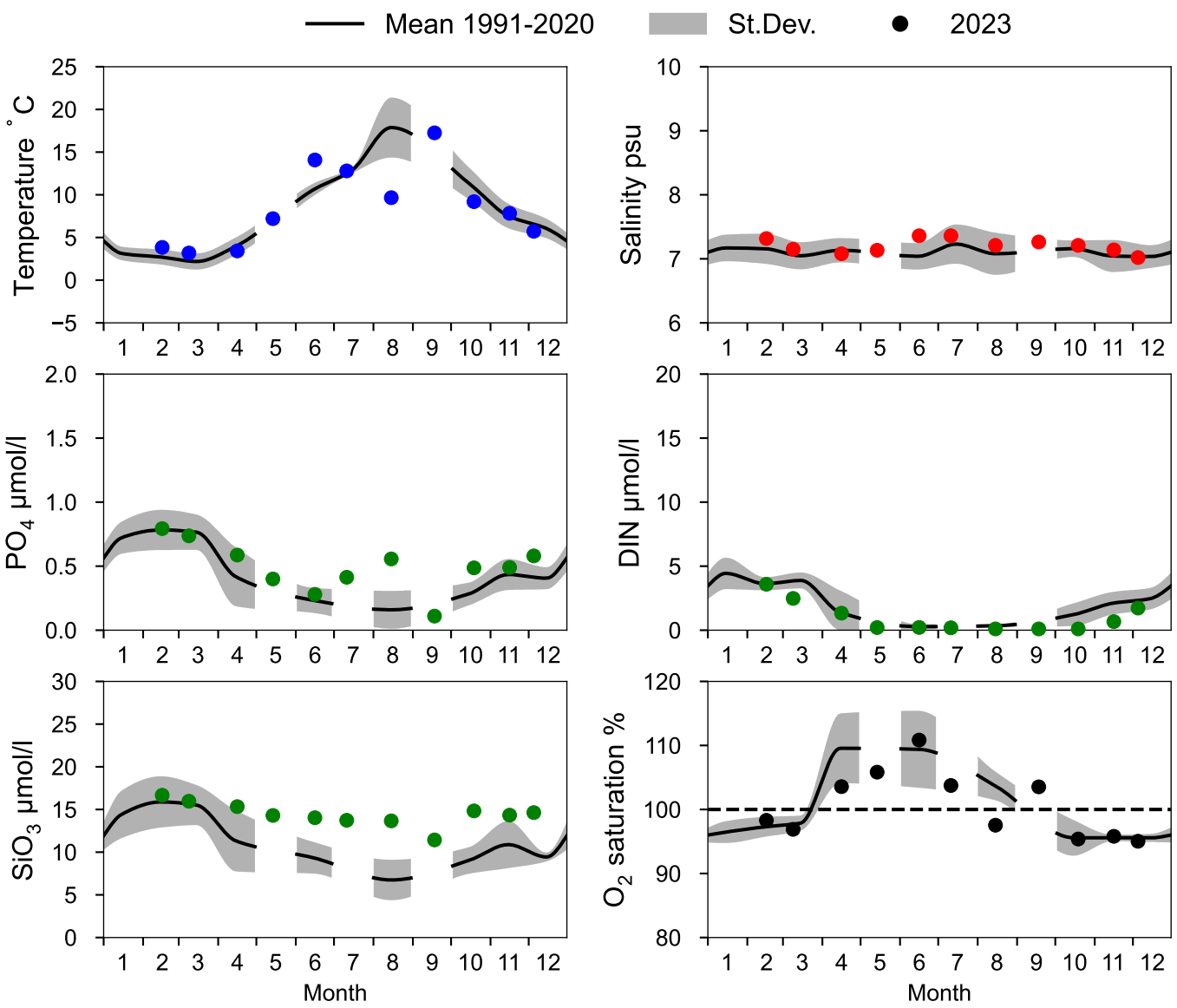
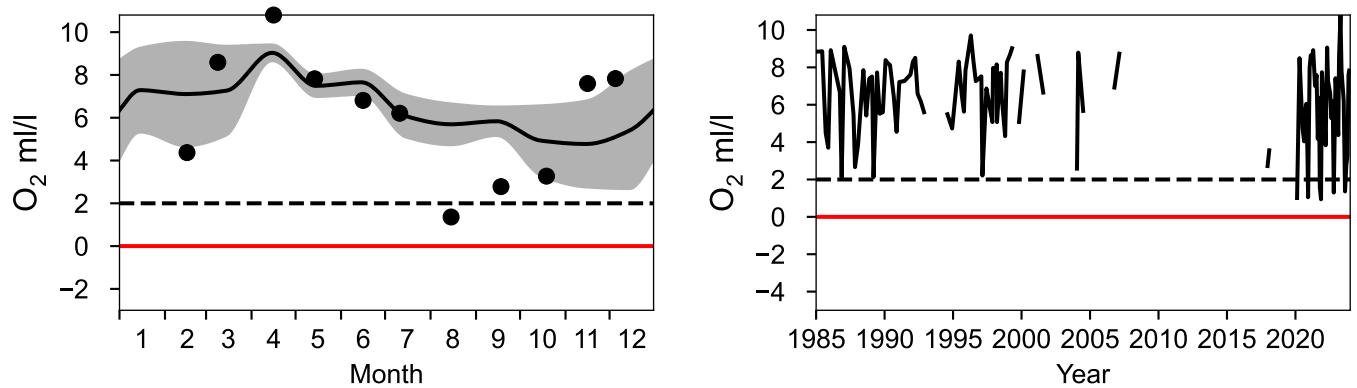
Ser no	Cru no	Stat code	Proj	Stat name	Lat	Lon	Start date yyyymmdd	Start time hhmm	Bottom depth m	Secchi depth m	Wind dir	Wind vel	Air temp C	Air pres hPa	WCWI elac aove tueo hdsb	CZPP hohp loy apt o p	No de	No btl	T e m p _ b t l	T e m p _ c t d	S a l t _ b t l	S a l t _ c t d	P h o s p h a t e _ b t l	D o x y _ b t l	D o x y _ c t d	H 2 s	P h o s p h a t e	P h o s p h a t e	N i t r a t e	N i t r a t e	N i t r o g e n	A m m o n i u m	A l k a l i n i t y	S i l i c a t e	H u m i c _ s u b s t	C o m m e n t s _ v i s i t	C o m m e n t s _ s a m p t
1023	21	BPSA02	BAS...	BY1	5501.00	01318.10	20231214	1312	45	11	4	4	2	1020	2830	----	8		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
1024	21	SOSX00	EXT...	FLINTEN7	5535.23	01250.82	20231214	1900	10		23	5	2	1023	9990	----	3		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
1025	21	SOCX39	BAS...	W LANDSKRONA	5551.98	01244.94	20231214	2140	52		26	6	1.9	1023	9990	----	9		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
1026	21	KAEX29	BAS...	ANHOLT E	5640.12	01206.67	20231215	0318	62		19	7	2.5	1024	9990	-x--	10		x	x	-	x	x	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
1027	21	KANX25	BAS...	FLADEN	5711.57	01139.48	20231215	0810	85		25	8	3.6	1023	4930	---x	13		x	x	-	x	x	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
5100	21	KANX00	EXT...	FERRYBOX	5729.50	01129.71	20231215	1040	50						----	----	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1028	21	SKEX23	BAS...	P2	5751.85	01117.85	20231215	1330	92	8	25	11	5.4	1023	2730	----	10		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
1029	21	SKEX18	BAS...	Å17	5817.06	01030.30	20231215	1930	354		25	12	7.4	1023	9990	----	15		-	x	-	x	x	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
1030	21	SKEX16	BAS...	Å15	5817.66	01050.71	20231215	2130	137		26	12	6.8	1024	9990	----	12		-	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
1031	21	SKEX14	BAS...	Å13	5820.39	01101.52	20231215	2240	108		27	8	5.6	1025	9990	----	10		-	-	-	-	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-
1032	21	FIBG27	BAS...	SLÄGGÖ	5815.59	01126.14	20231216	0045	74		25	10	5.1	1024	9990	-x--	9		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-

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

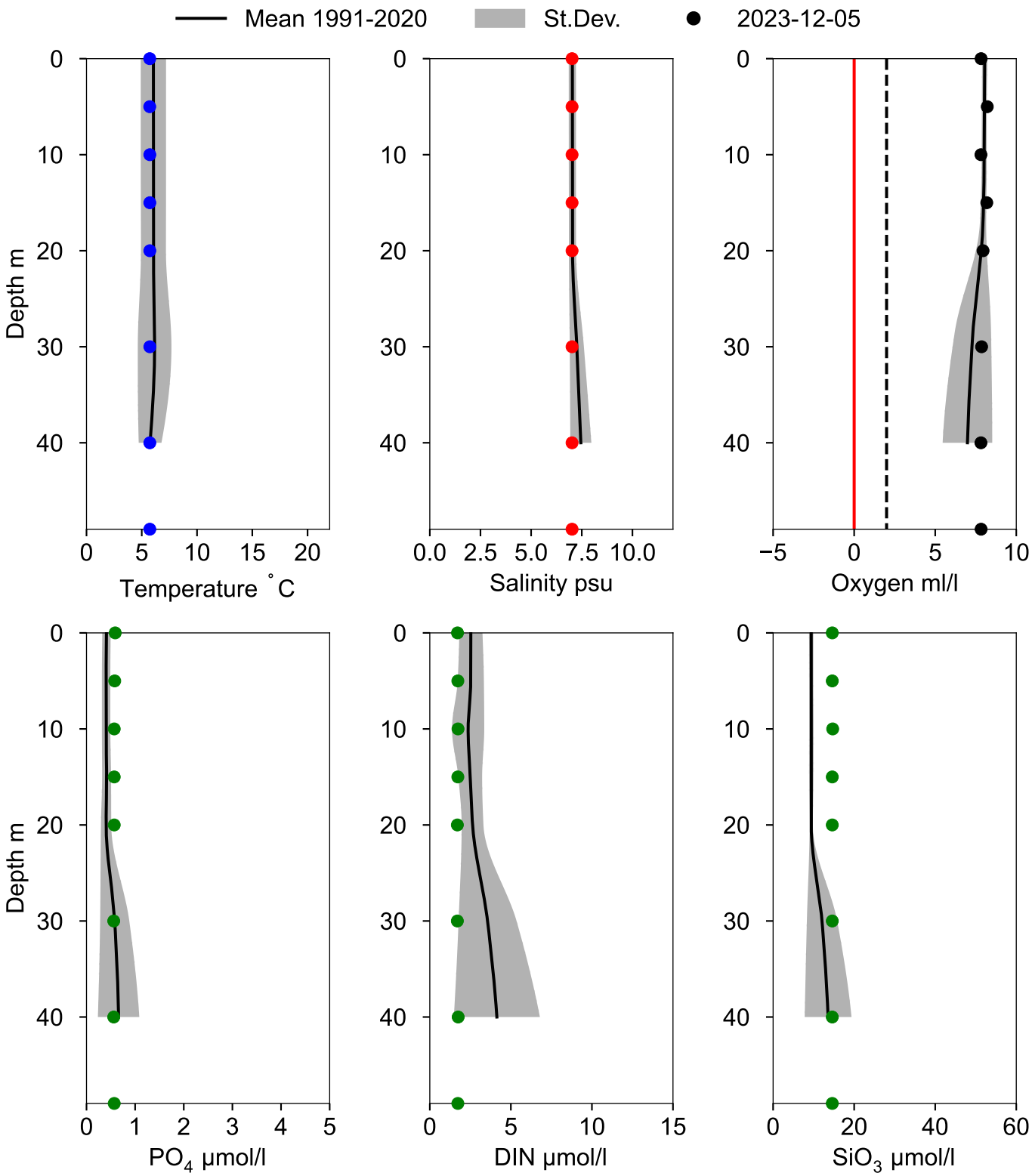
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

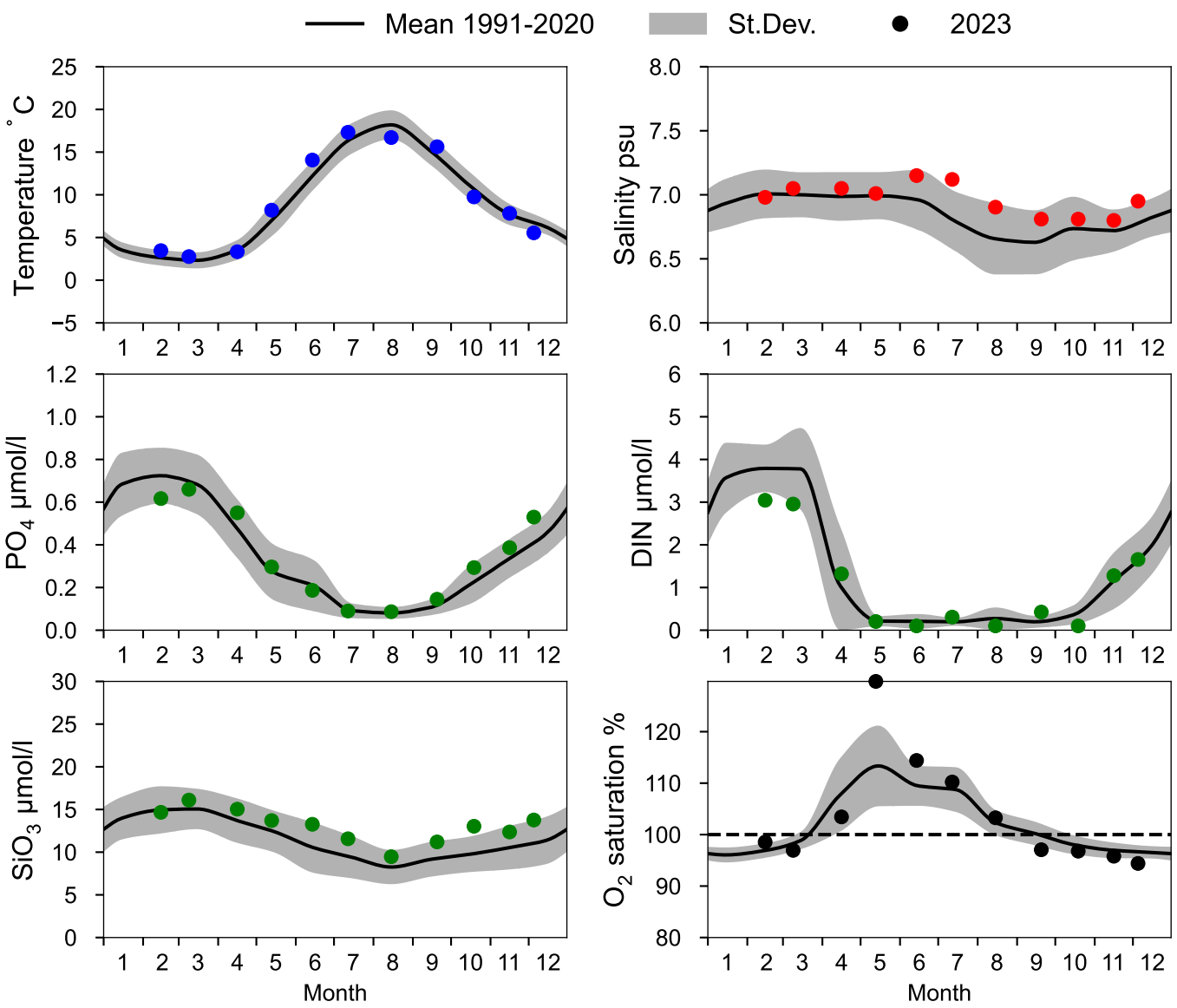


Vertical profiles BY39 ÖLANDS S UDDE
December

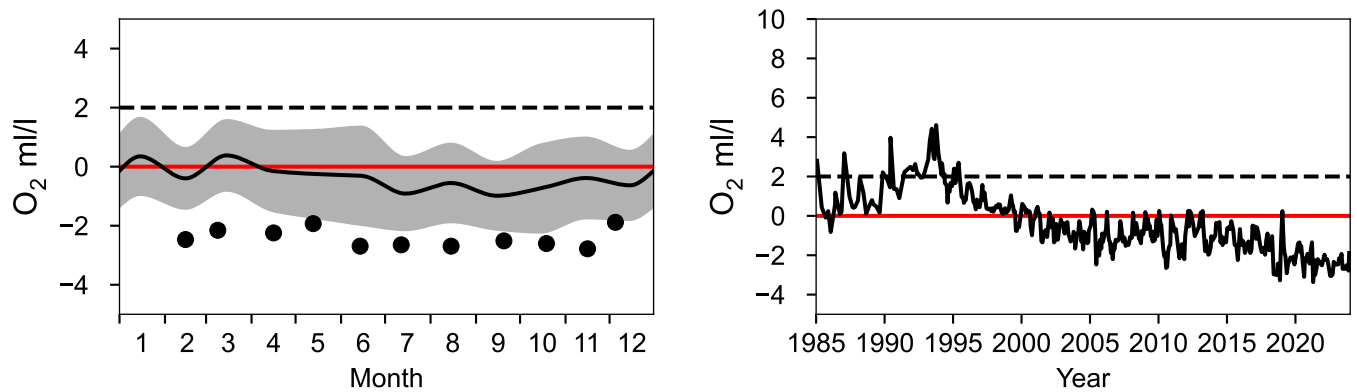


STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

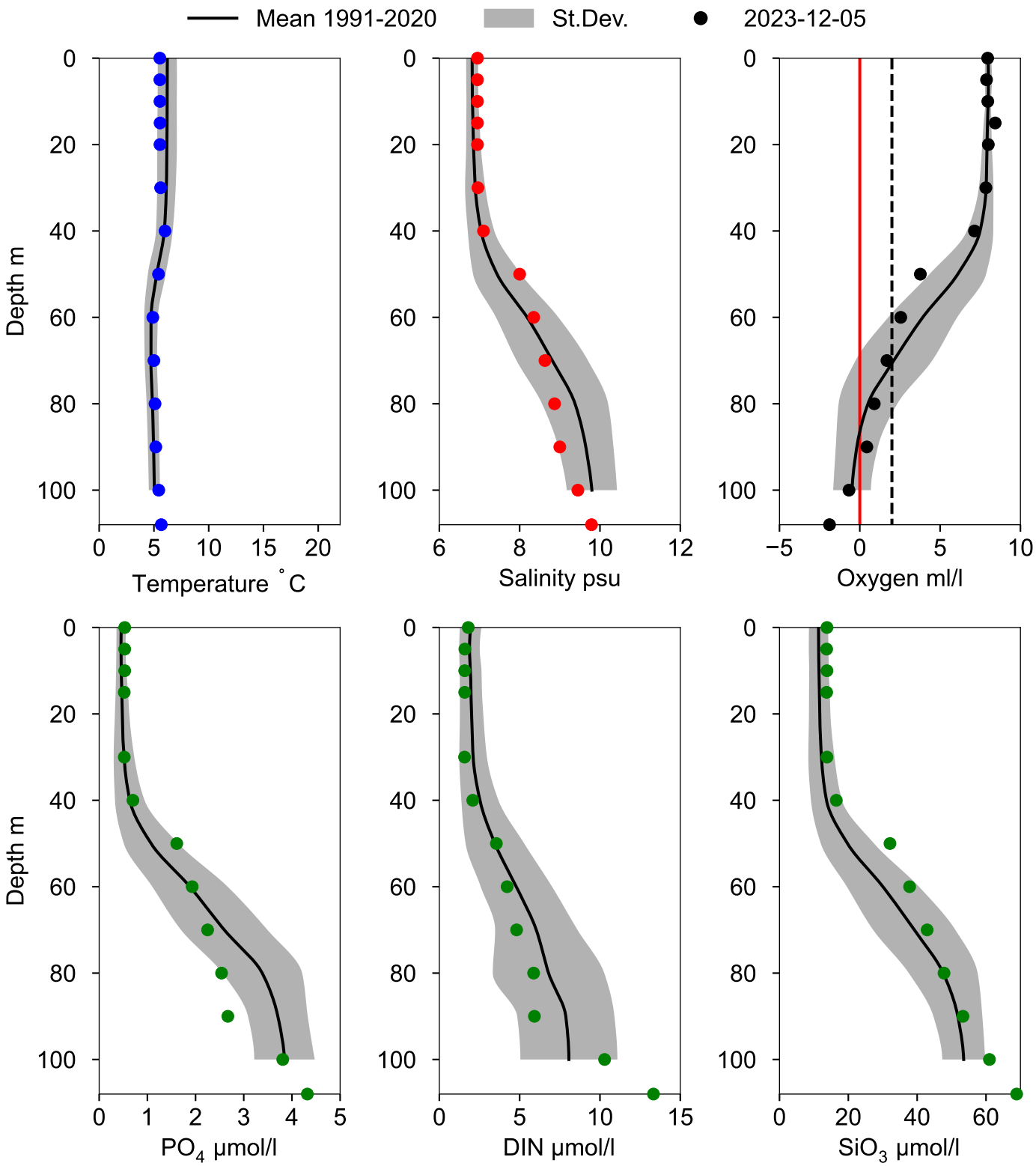
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 100 m)

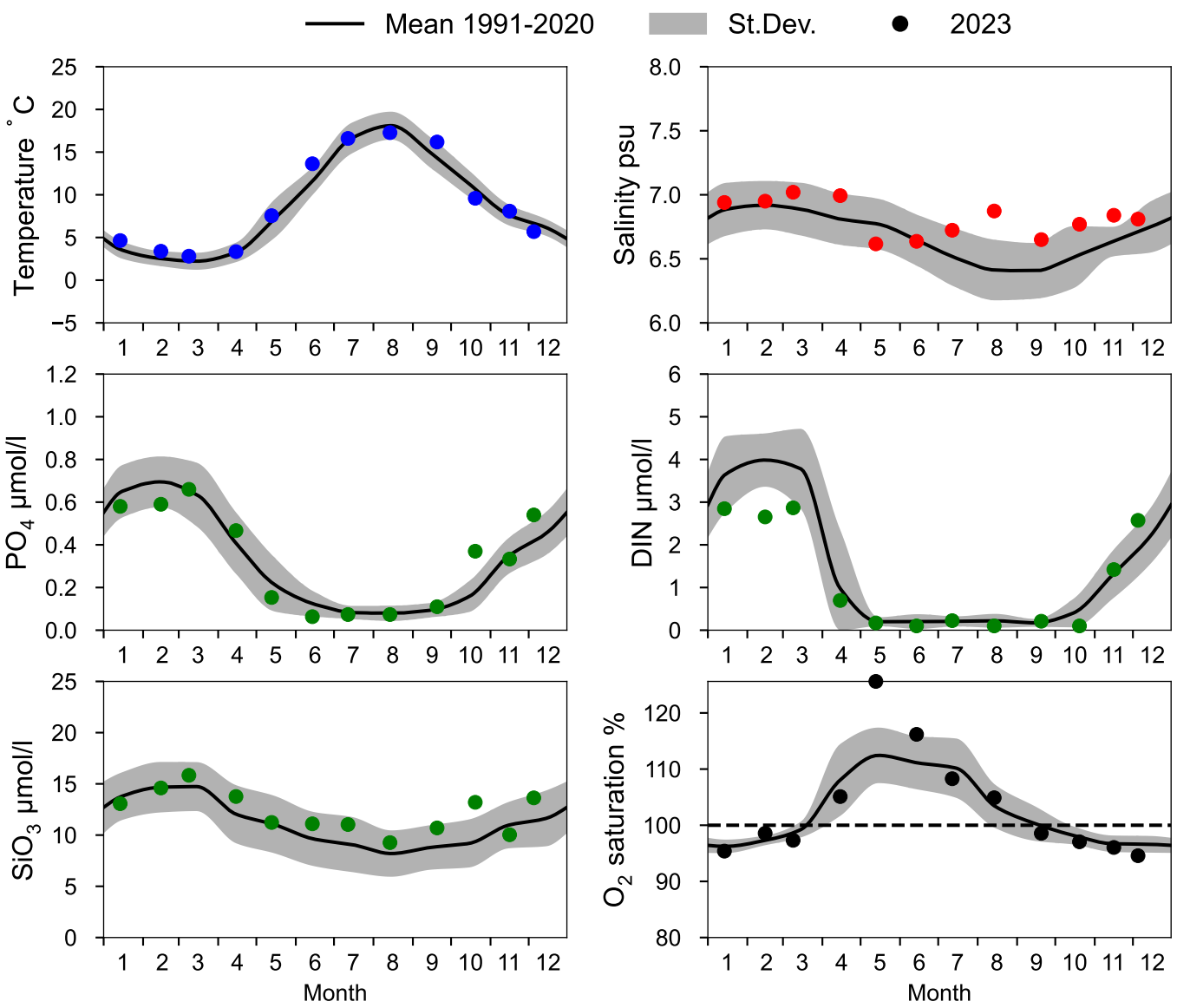


Vertical profiles BY38 KARLSÖDJ
December

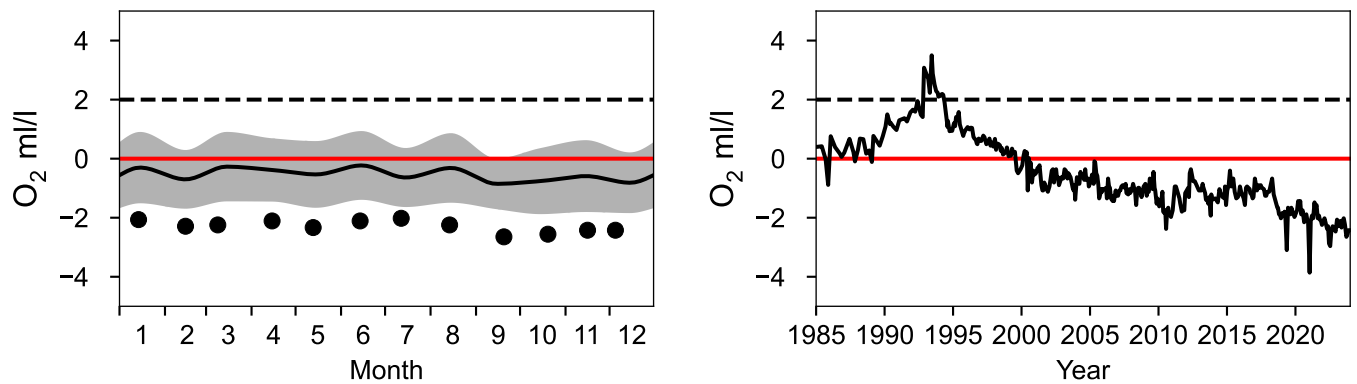


STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

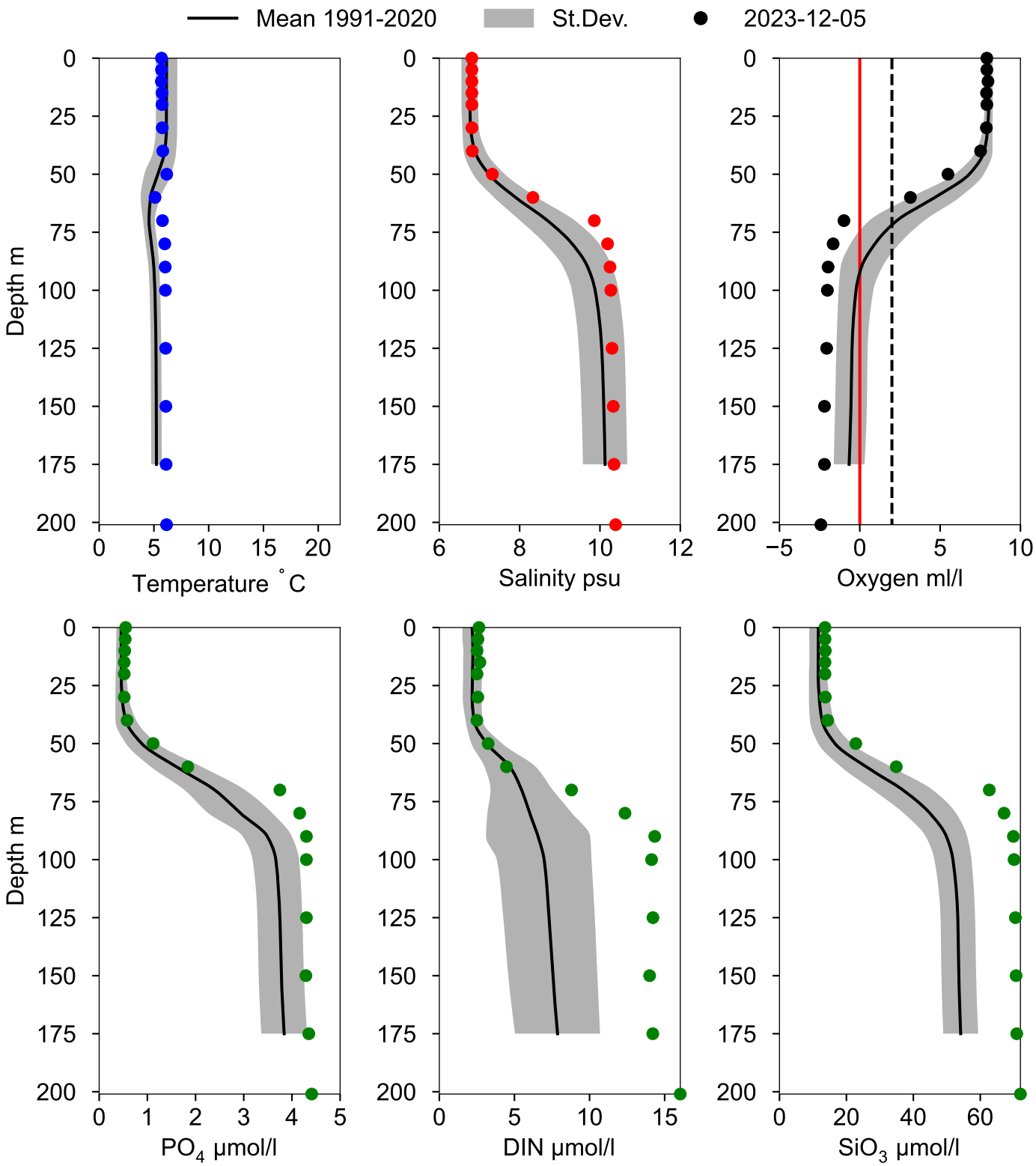
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)

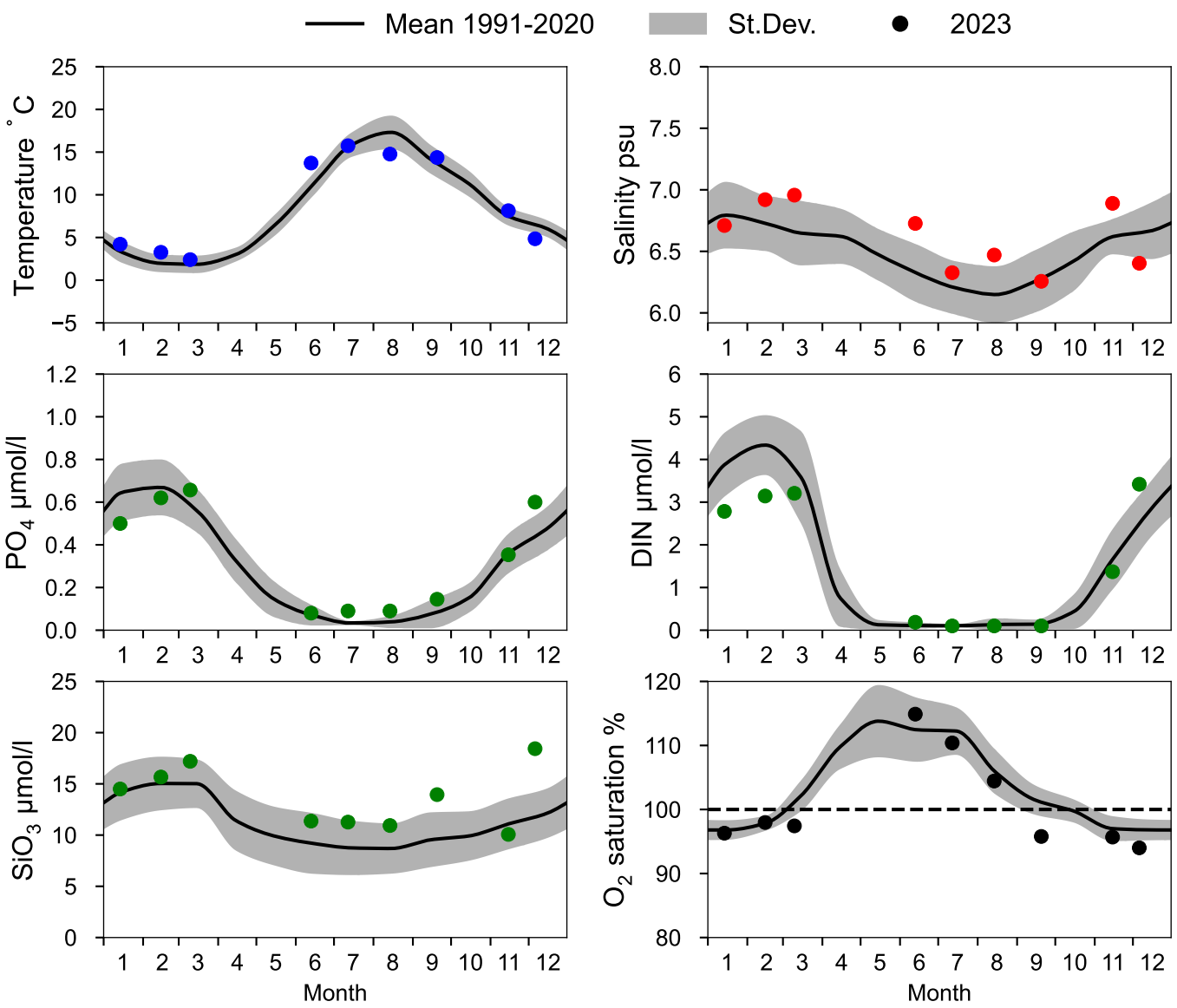


Vertical profiles BY32 NORRKÖPINGSDJ
December

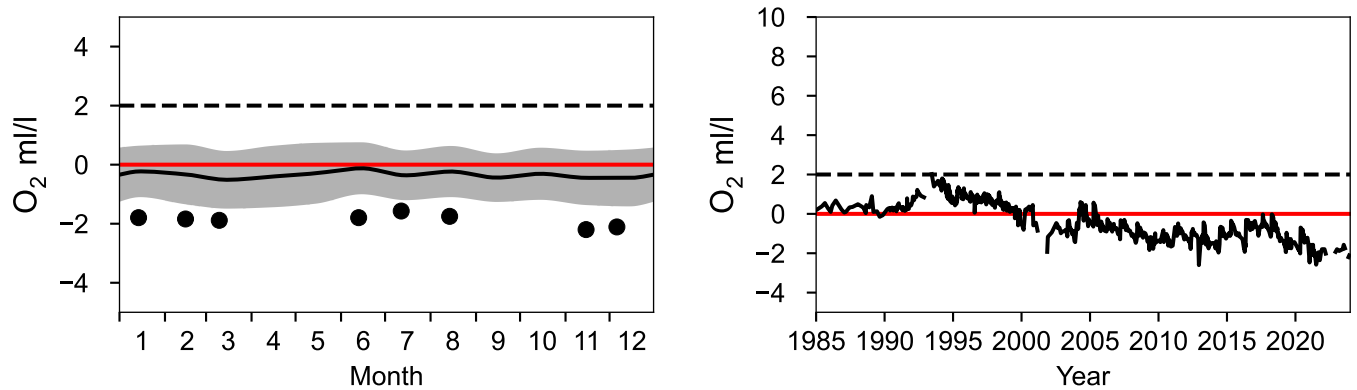


STATION BY31 LANDSORTSDJ SURFACE WATER (0-10 m)

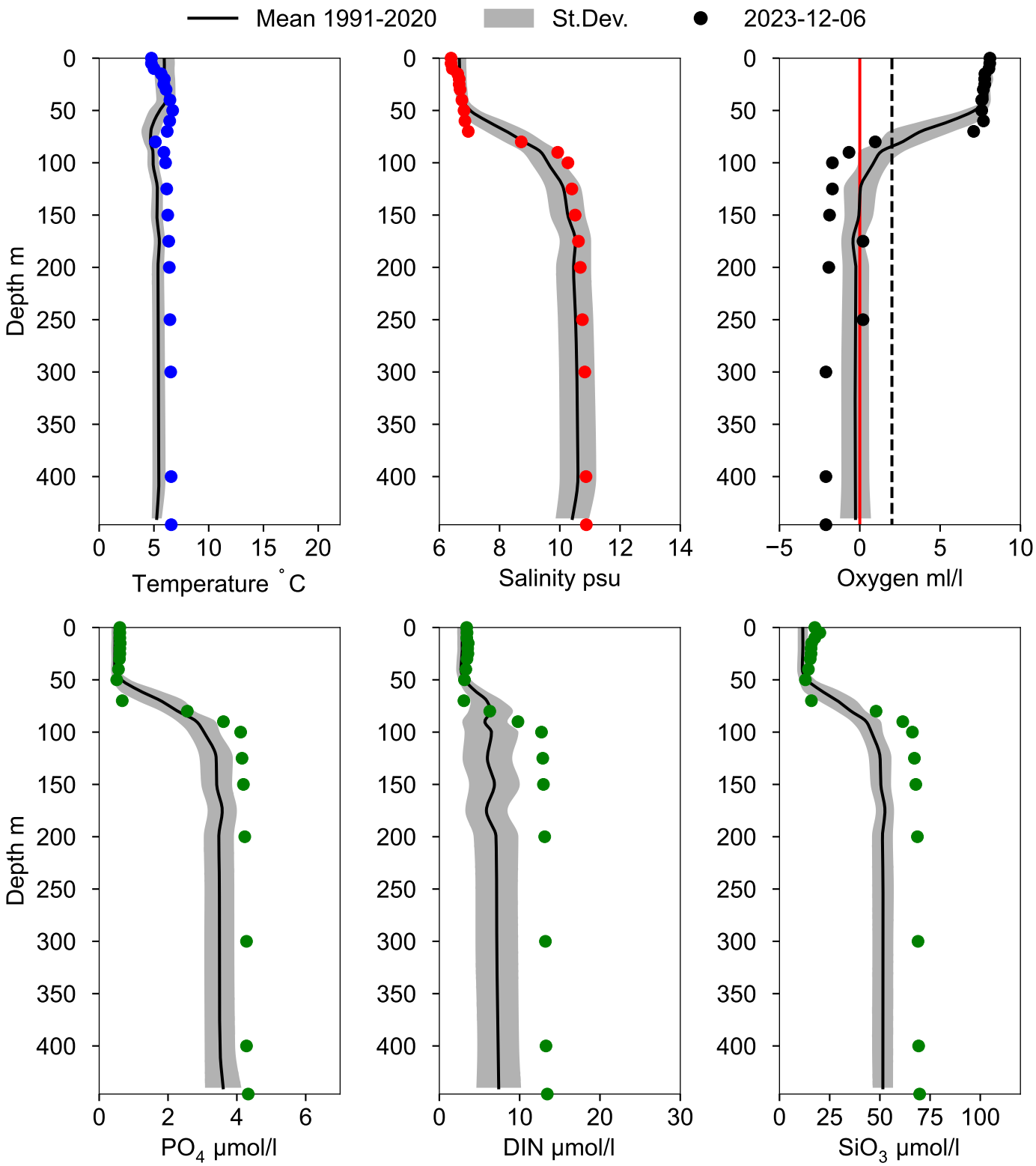
Annual Cycles



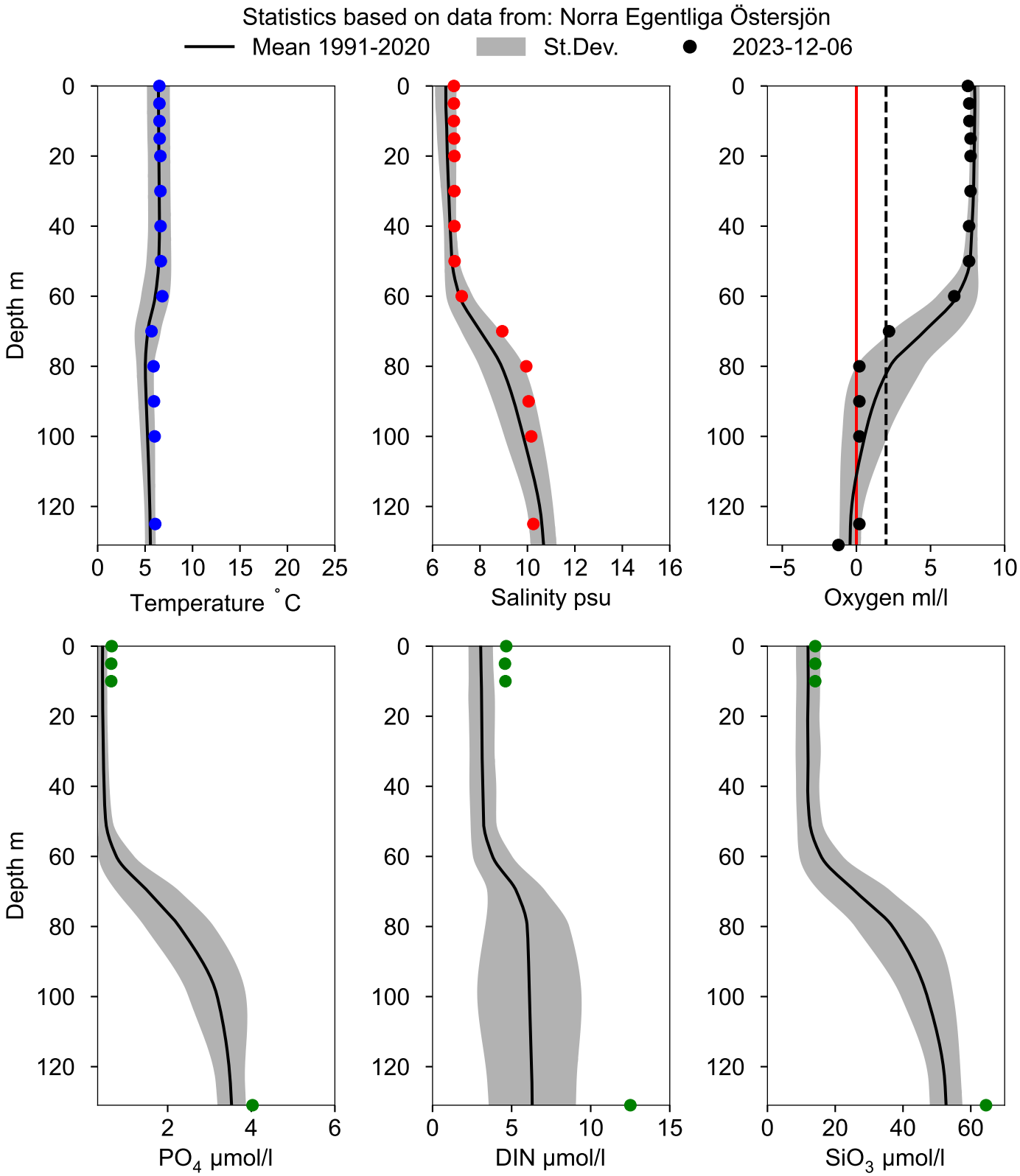
OXYGEN IN BOTTOM WATER (depth >= 419 m)



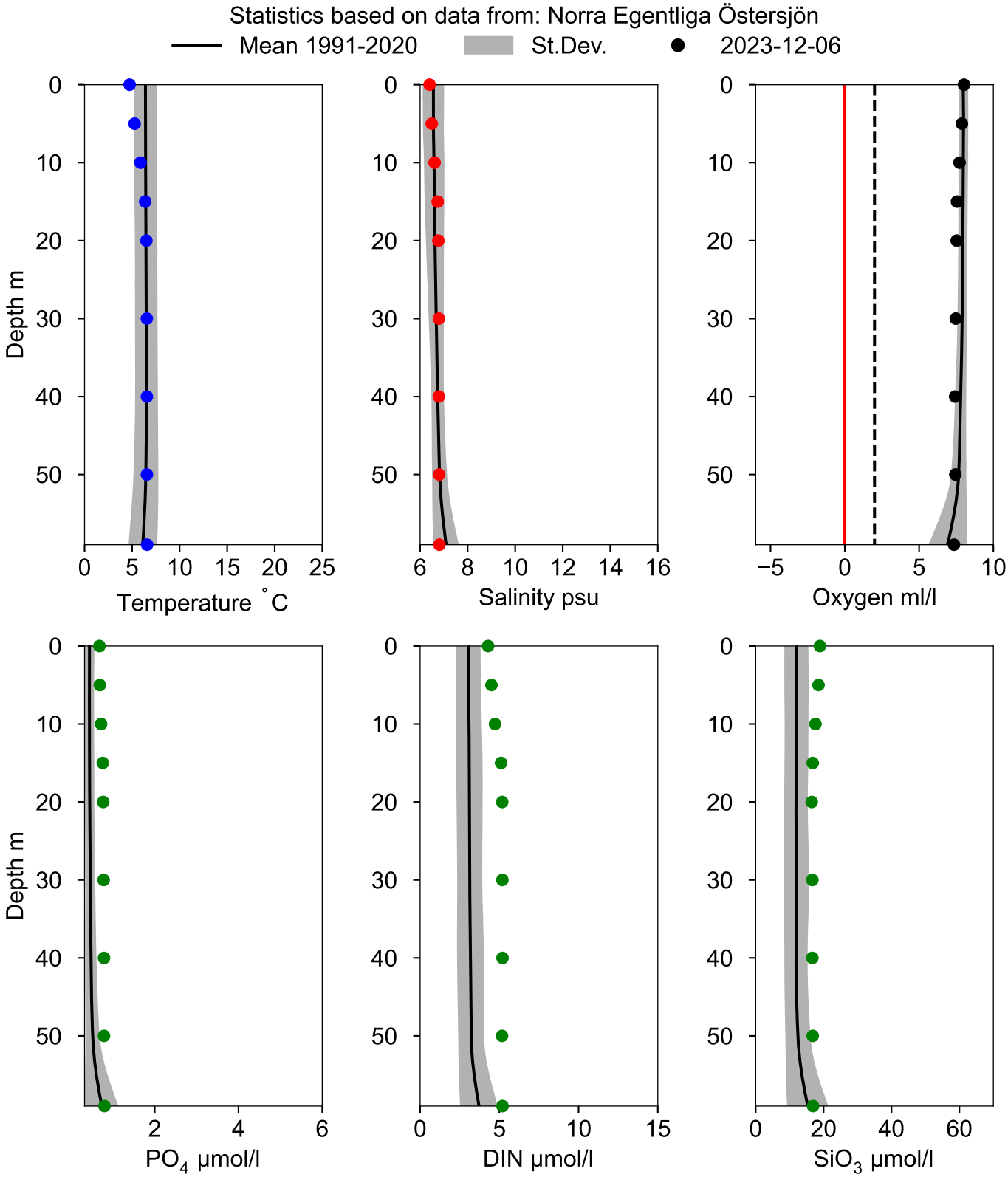
Vertical profiles BY31 LANDSORTSDJ
December



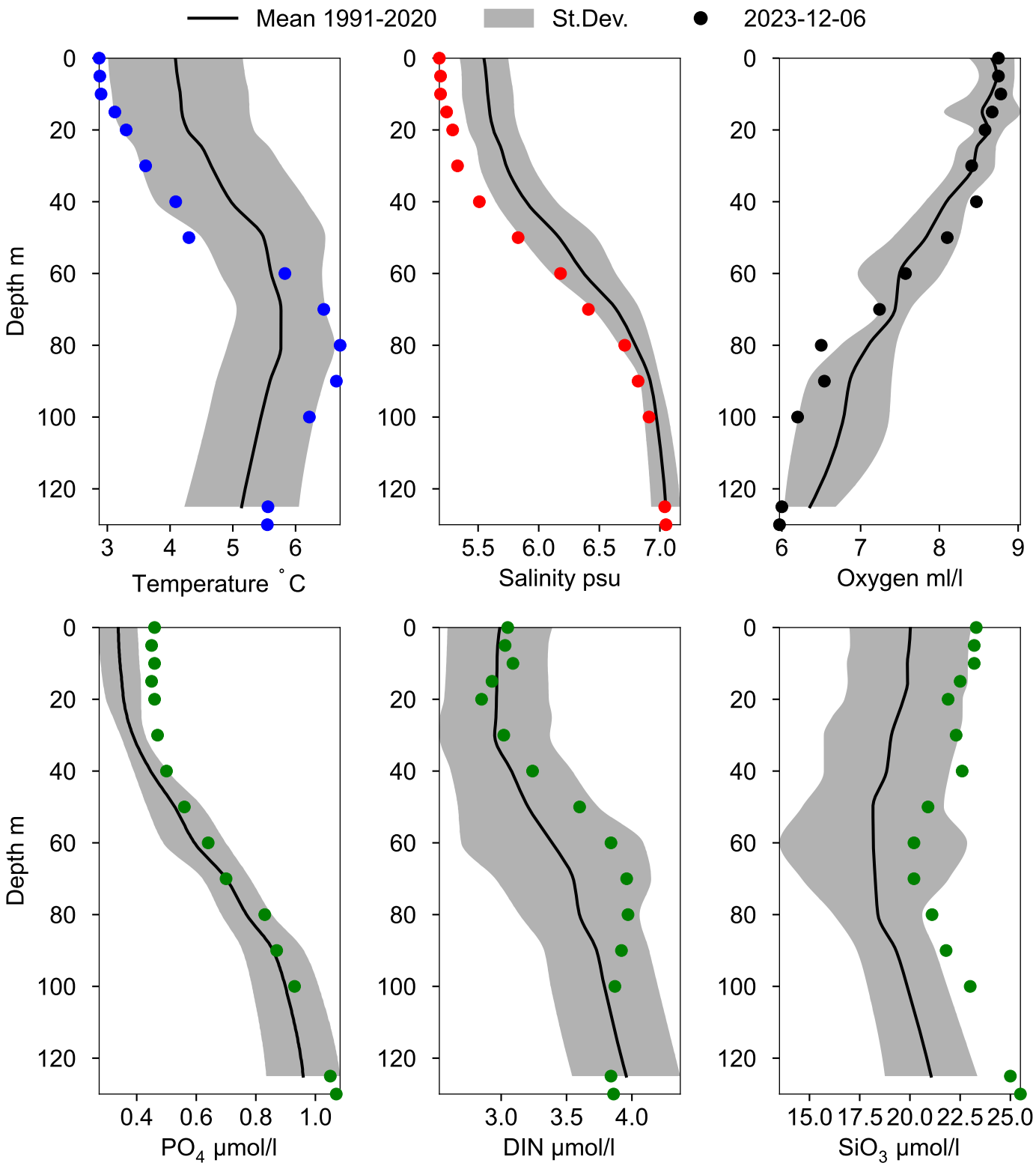
Vertical profiles 10E ALMAGRUNDET
December



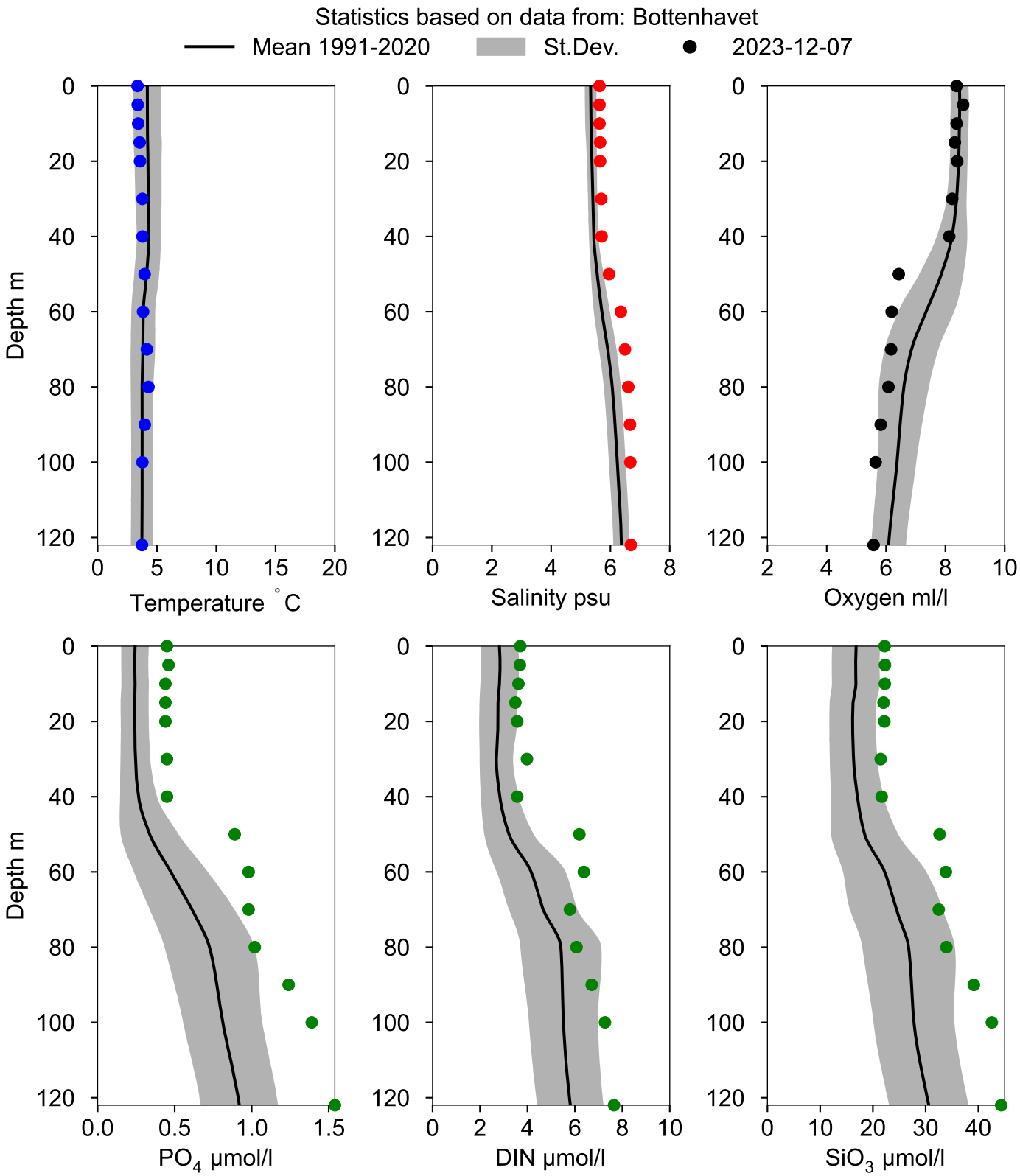
Vertical profiles TRÖSKELN ÅLANDS HAV
December



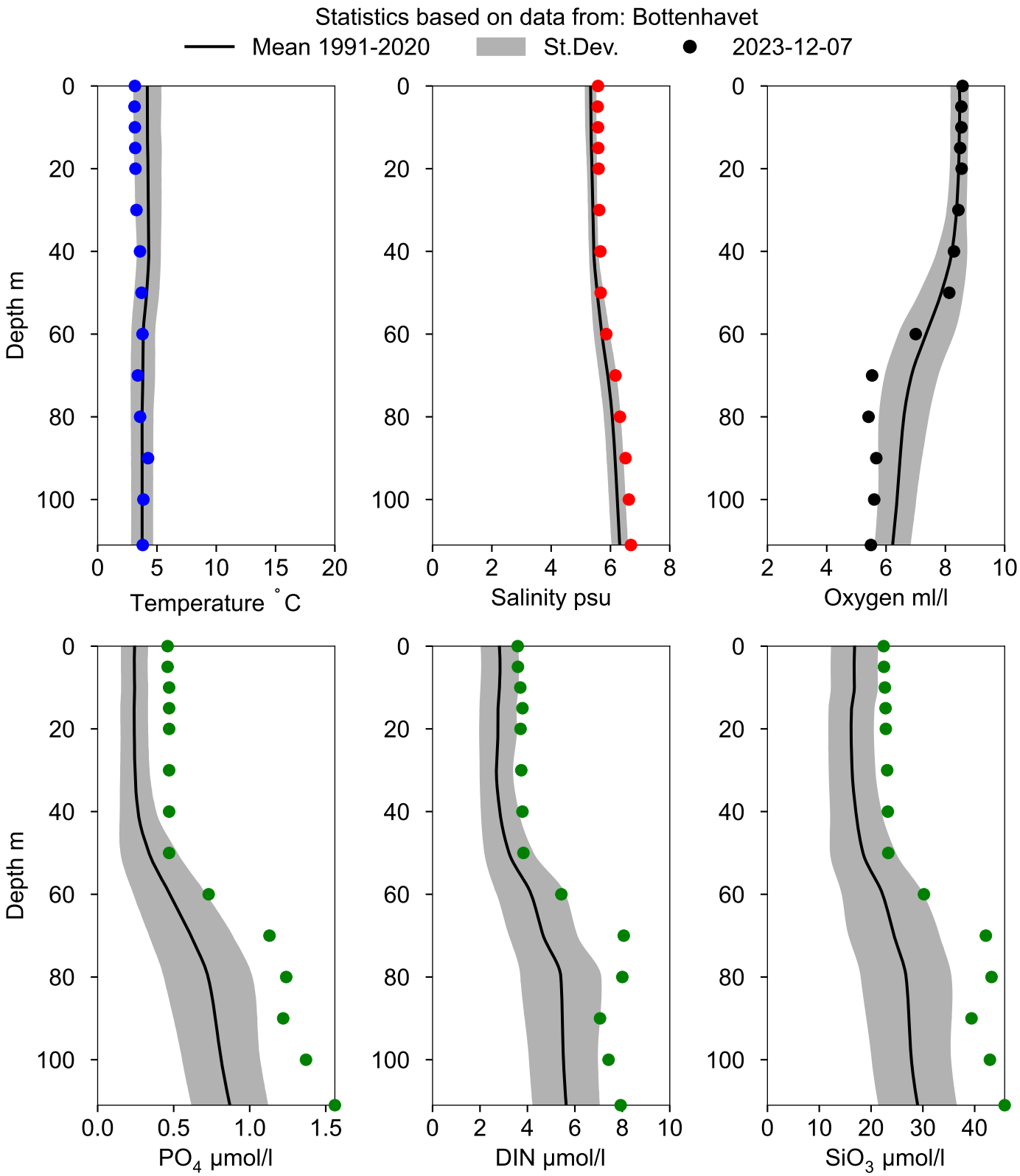
Vertical profiles U19 NORRA RANDEN
December



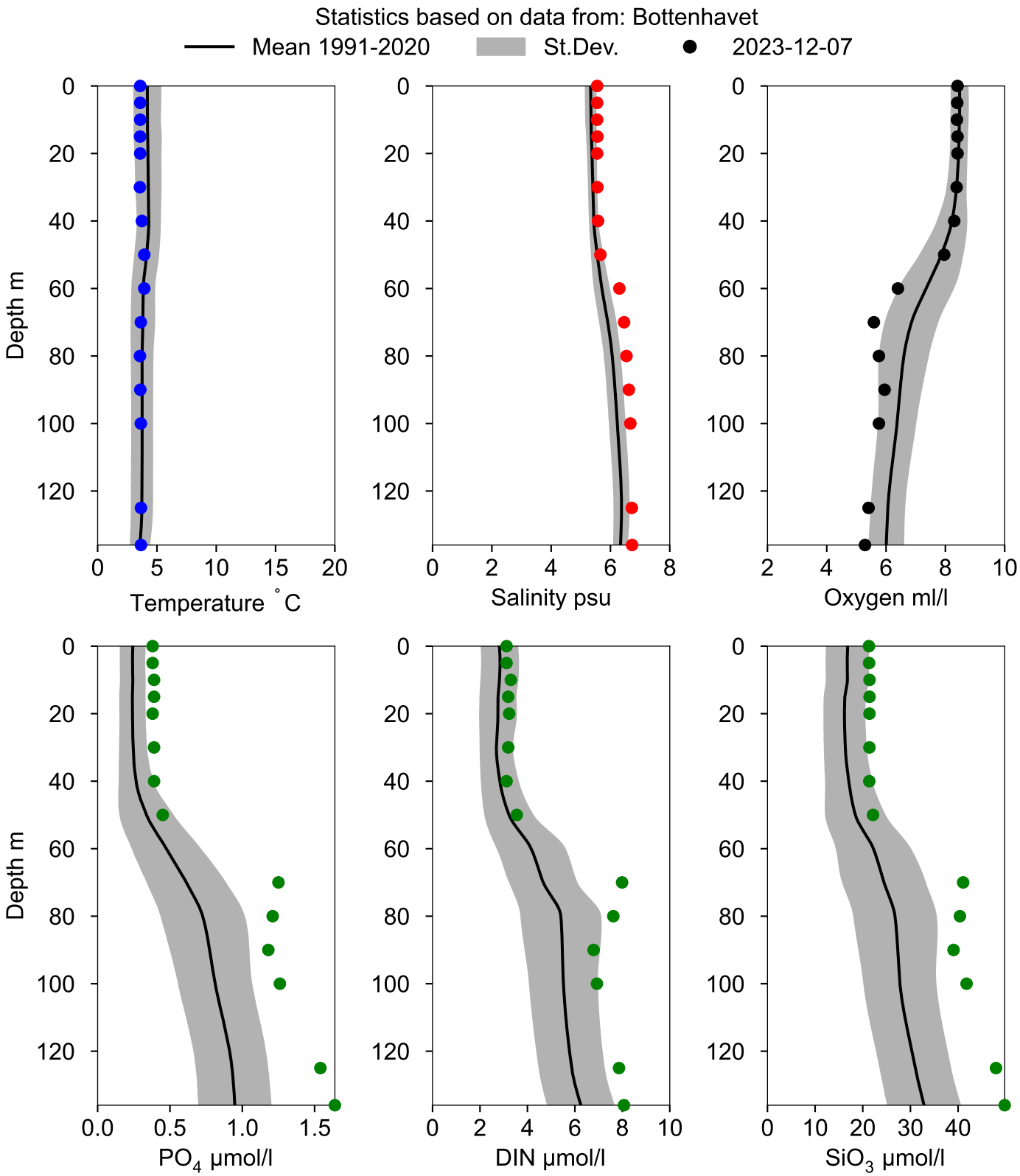
Vertical profiles SR5/LL4
December



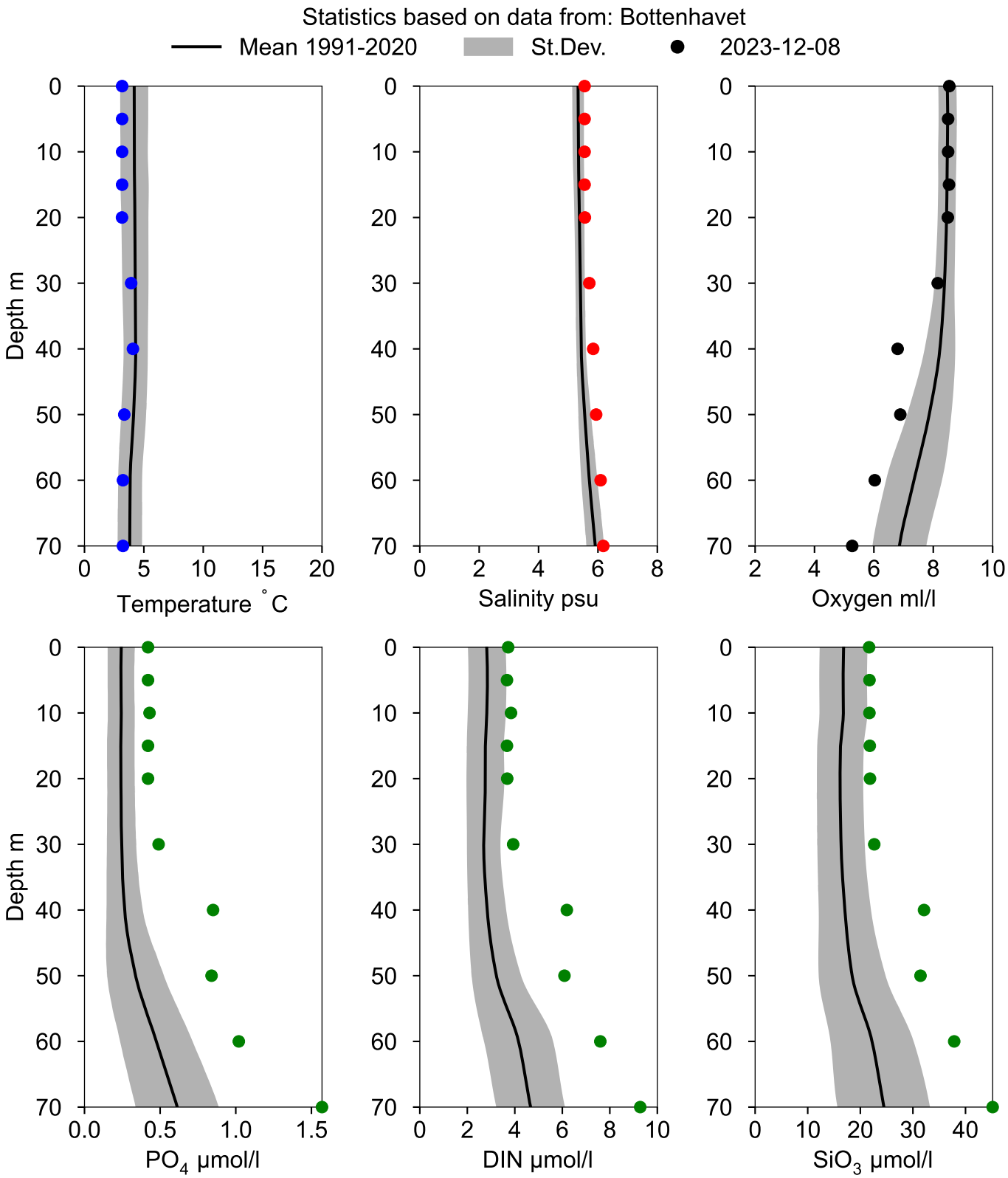
Vertical profiles SS29
December



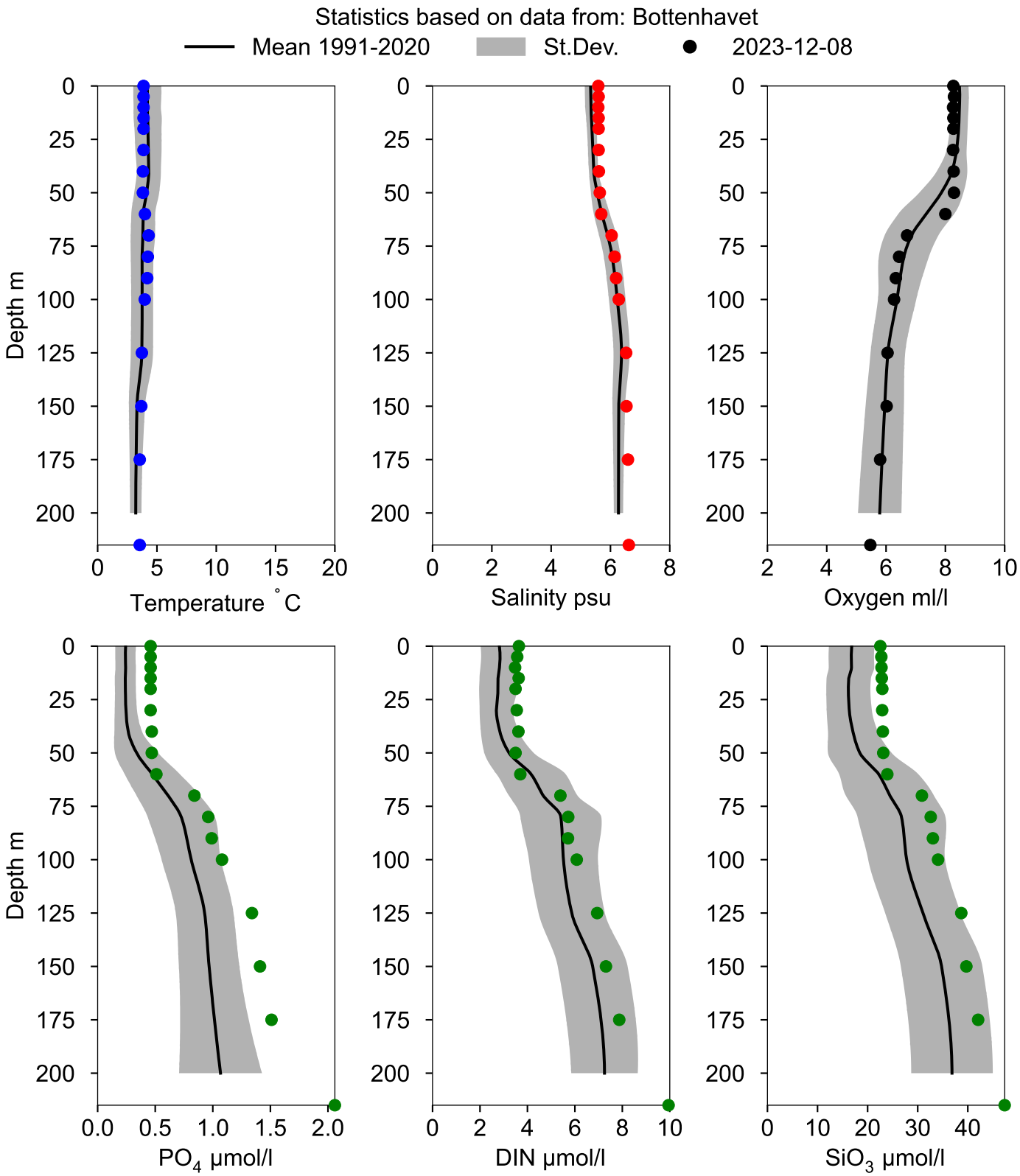
Vertical profiles F26 / C15
December



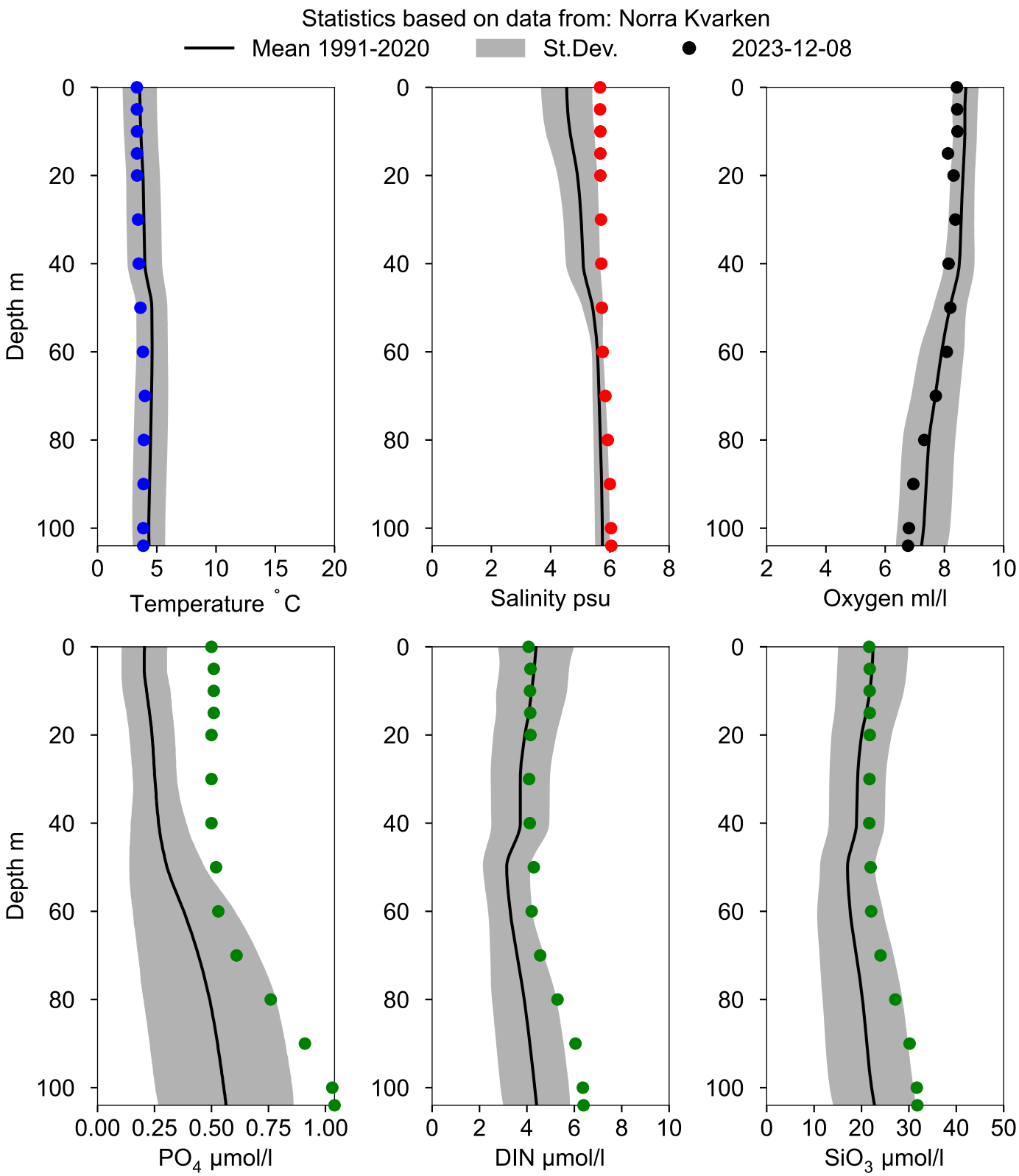
Vertical profiles MS6
December



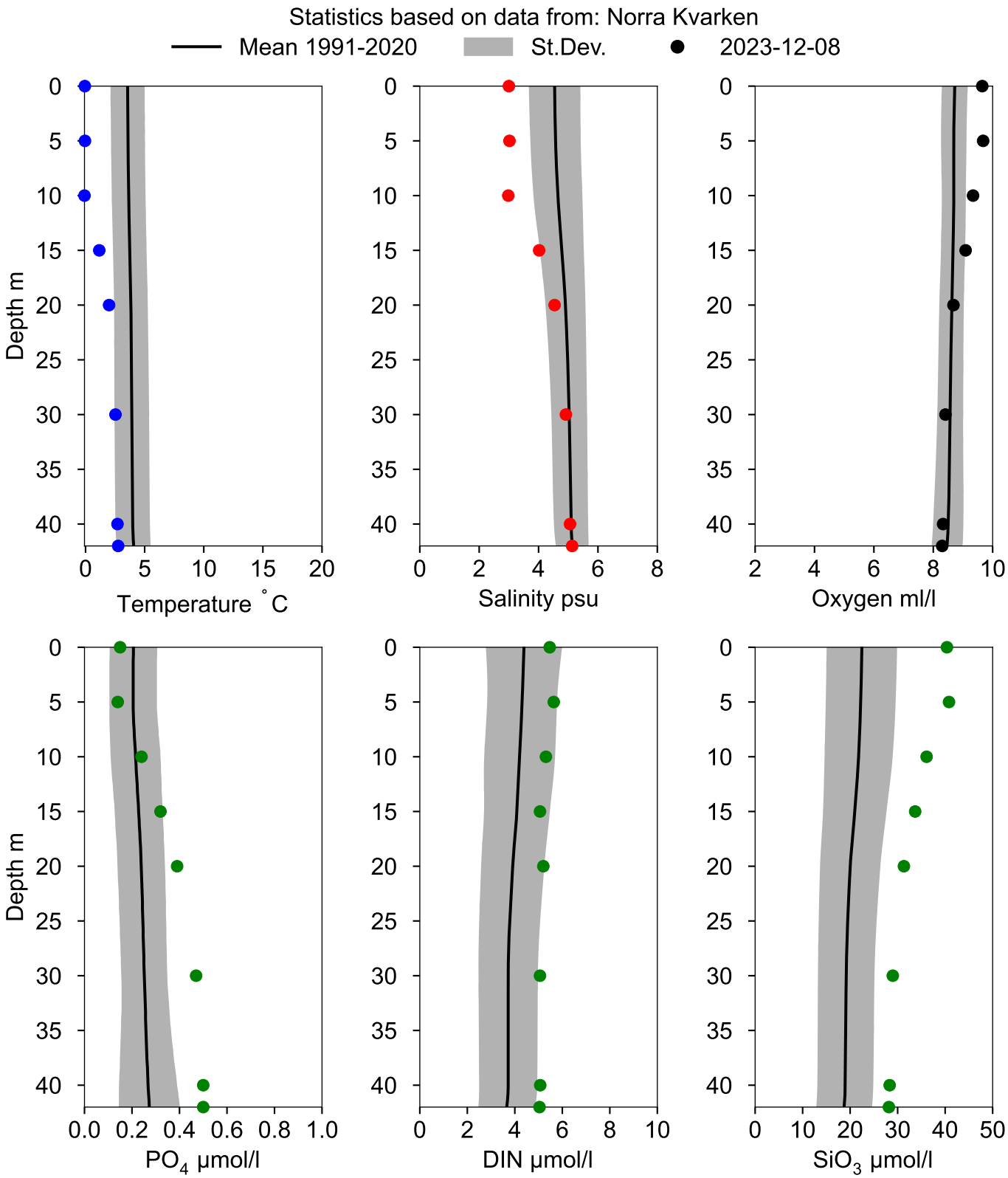
Vertical profiles US5B / C1
December



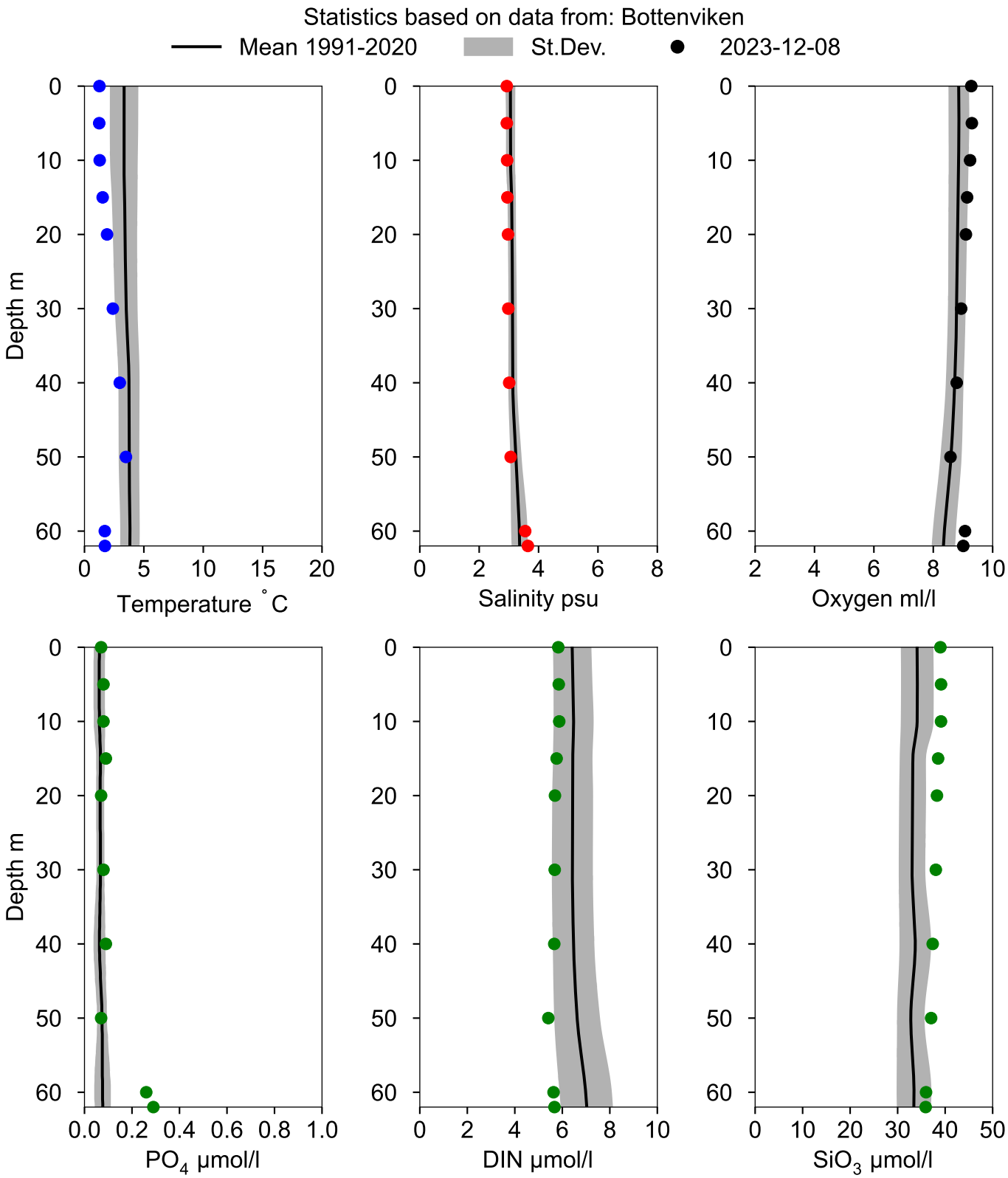
Vertical profiles F18 SYDOSTBROTTEN
December



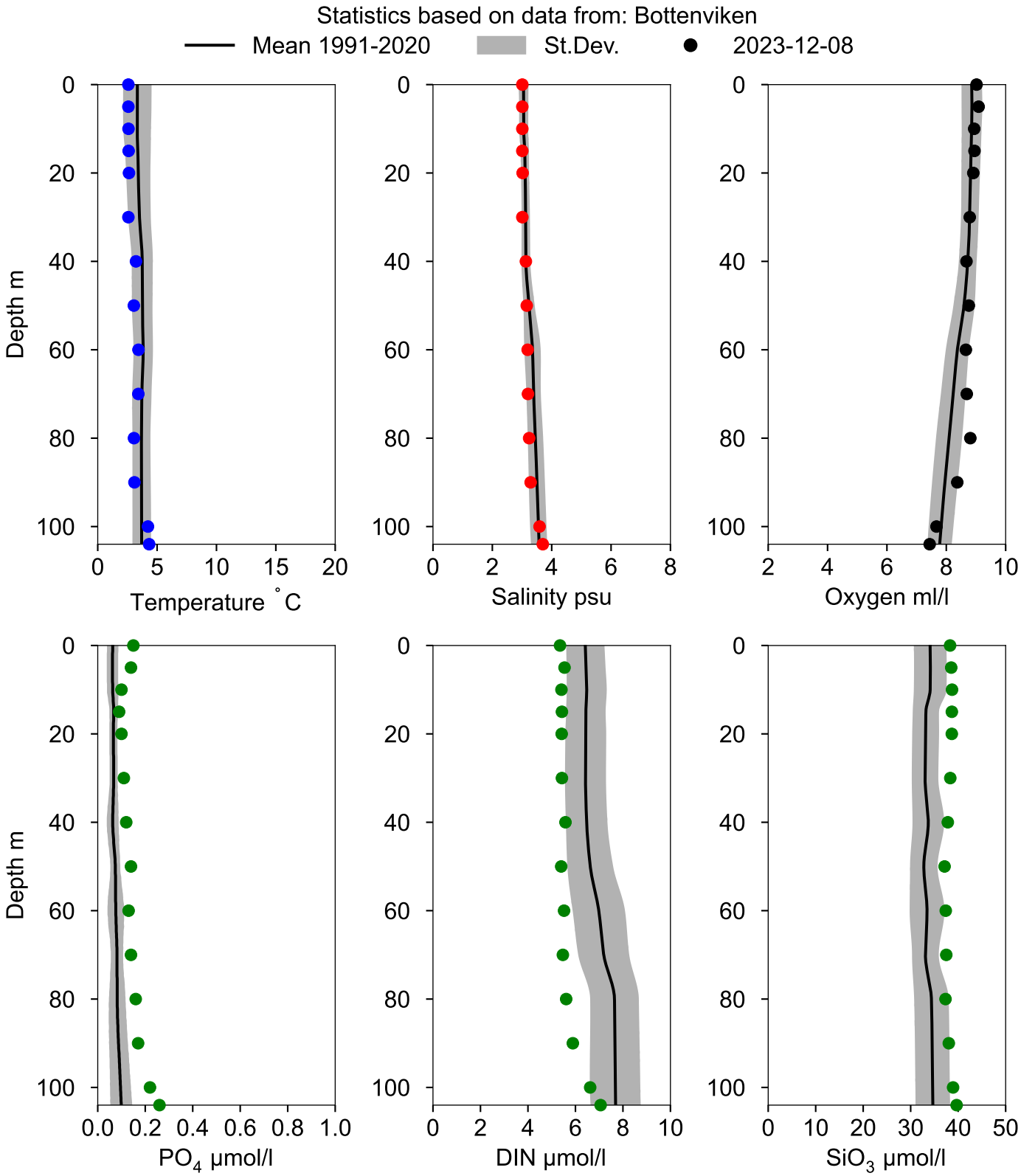
Vertical profiles F16
December



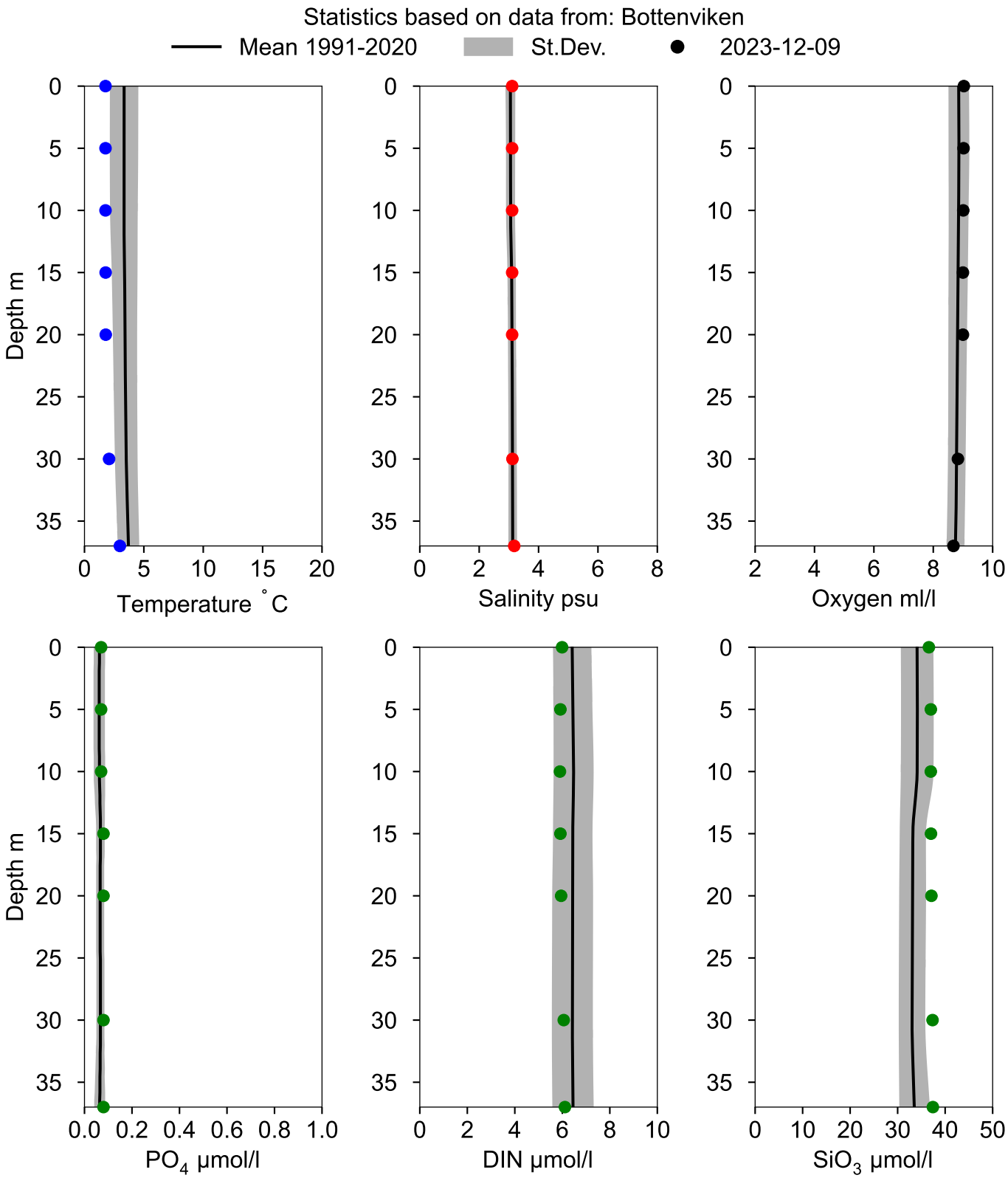
Vertical profiles F13/A19
December



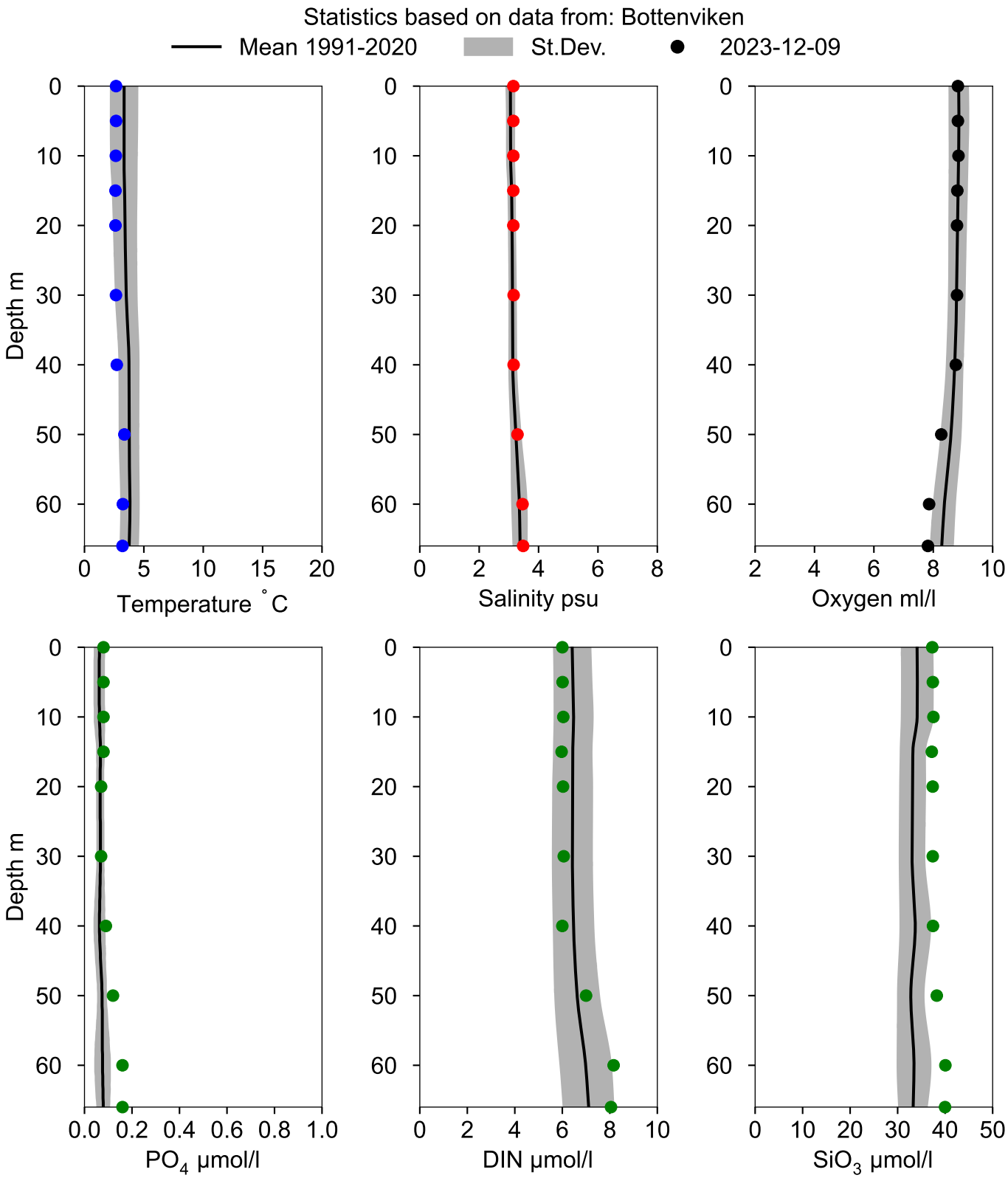
Vertical profiles BO3 / A3
December



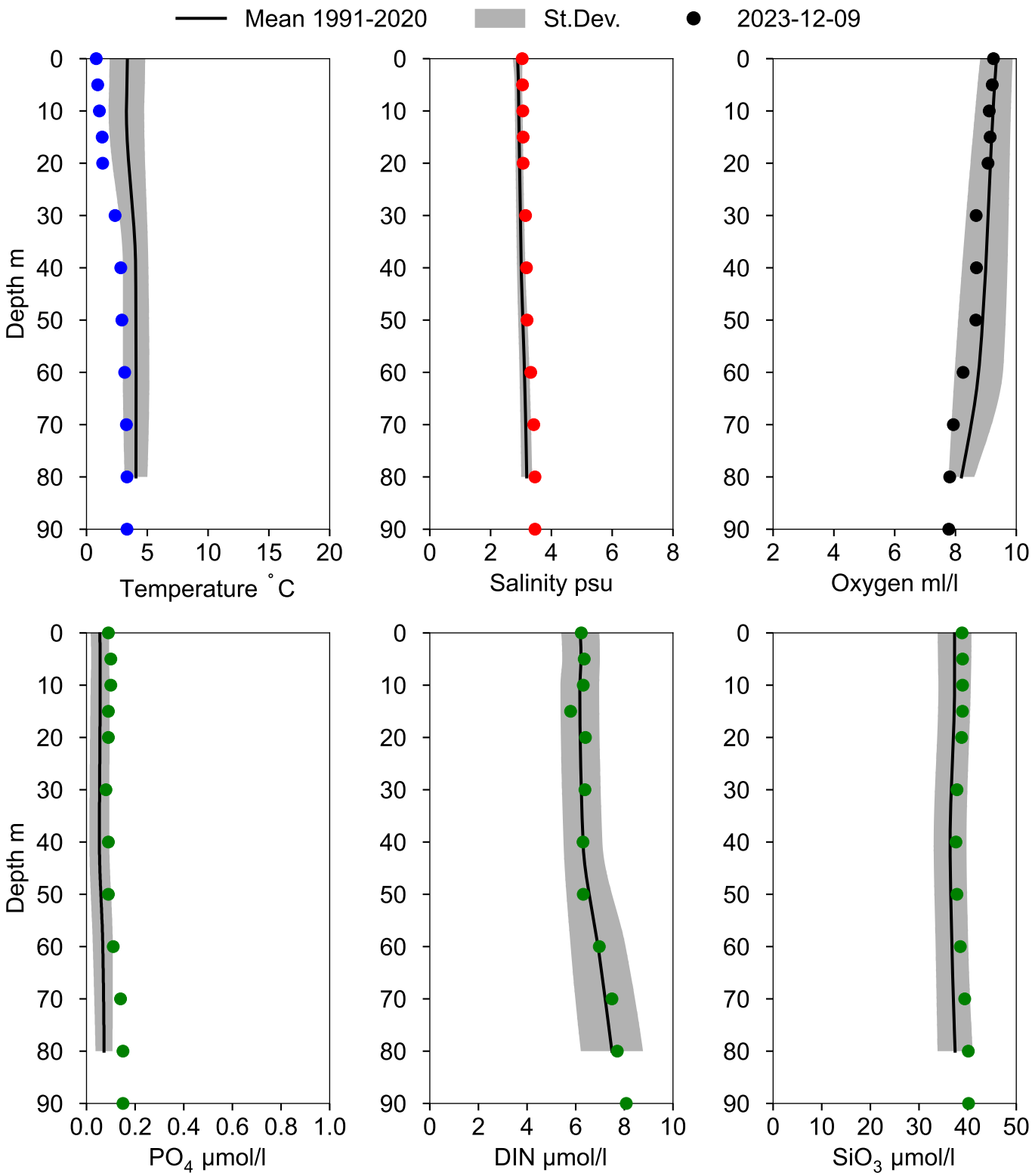
Vertical profiles RR7
December



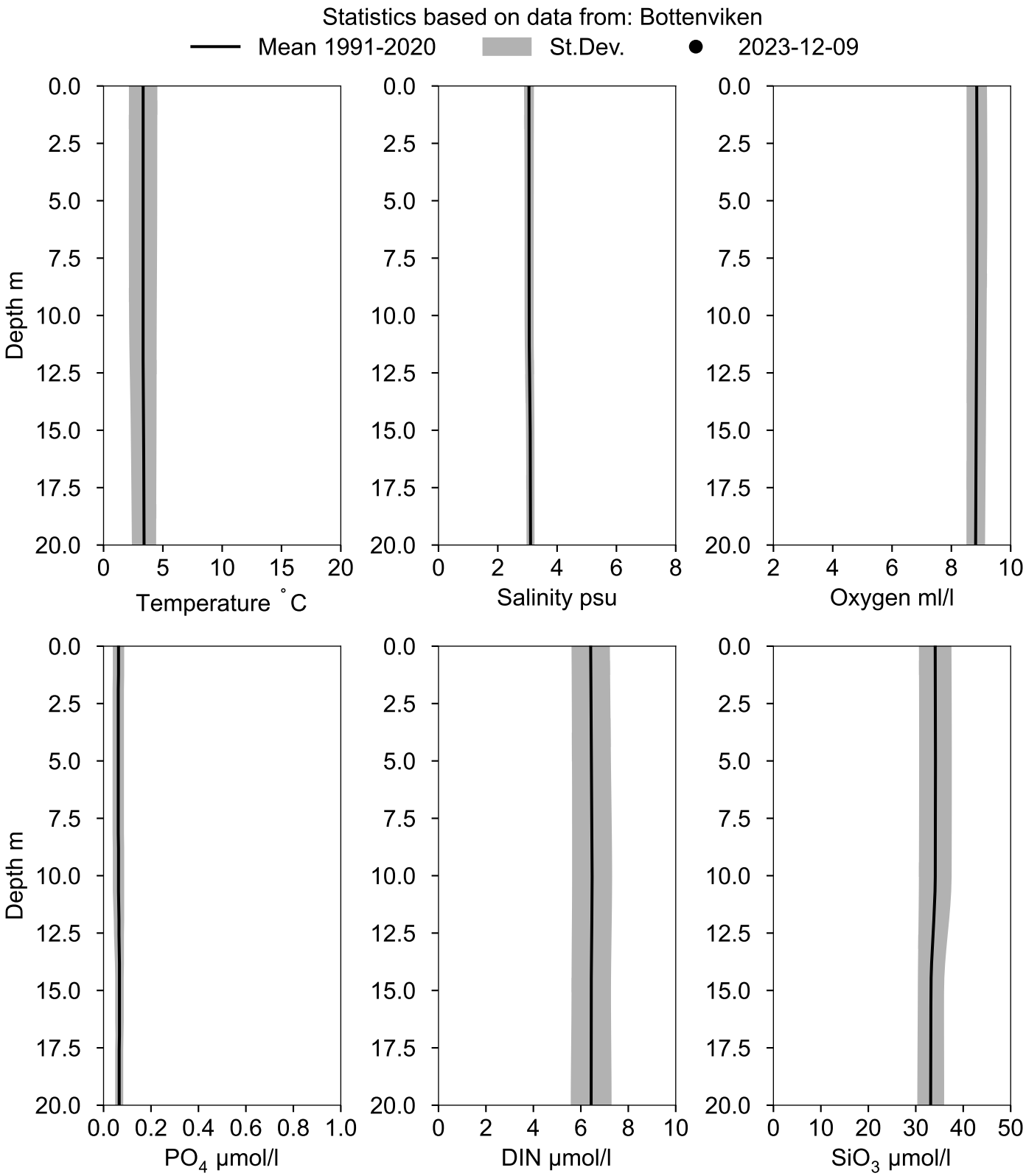
Vertical profiles RR5
December



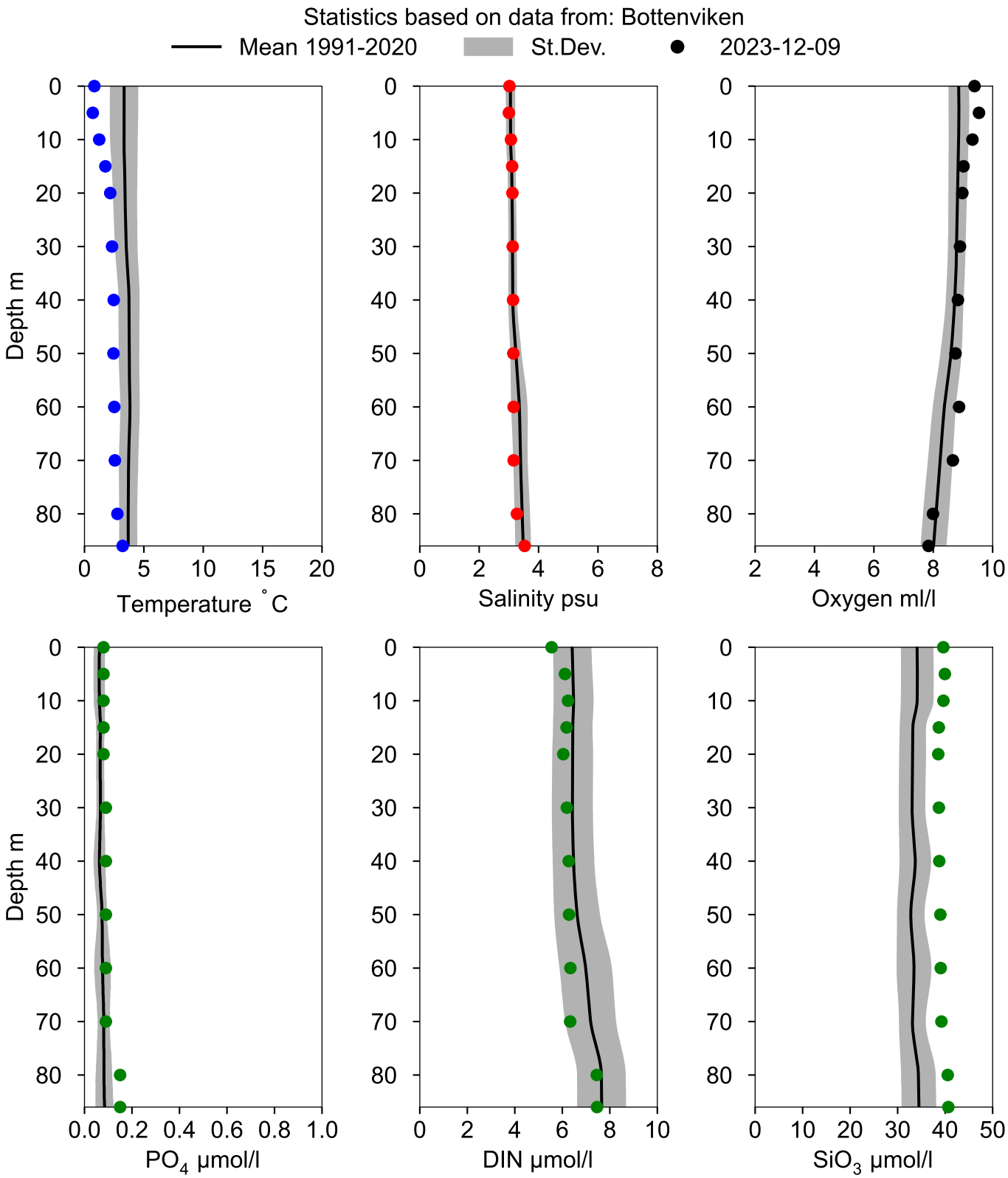
Vertical profiles F3 / A5
December



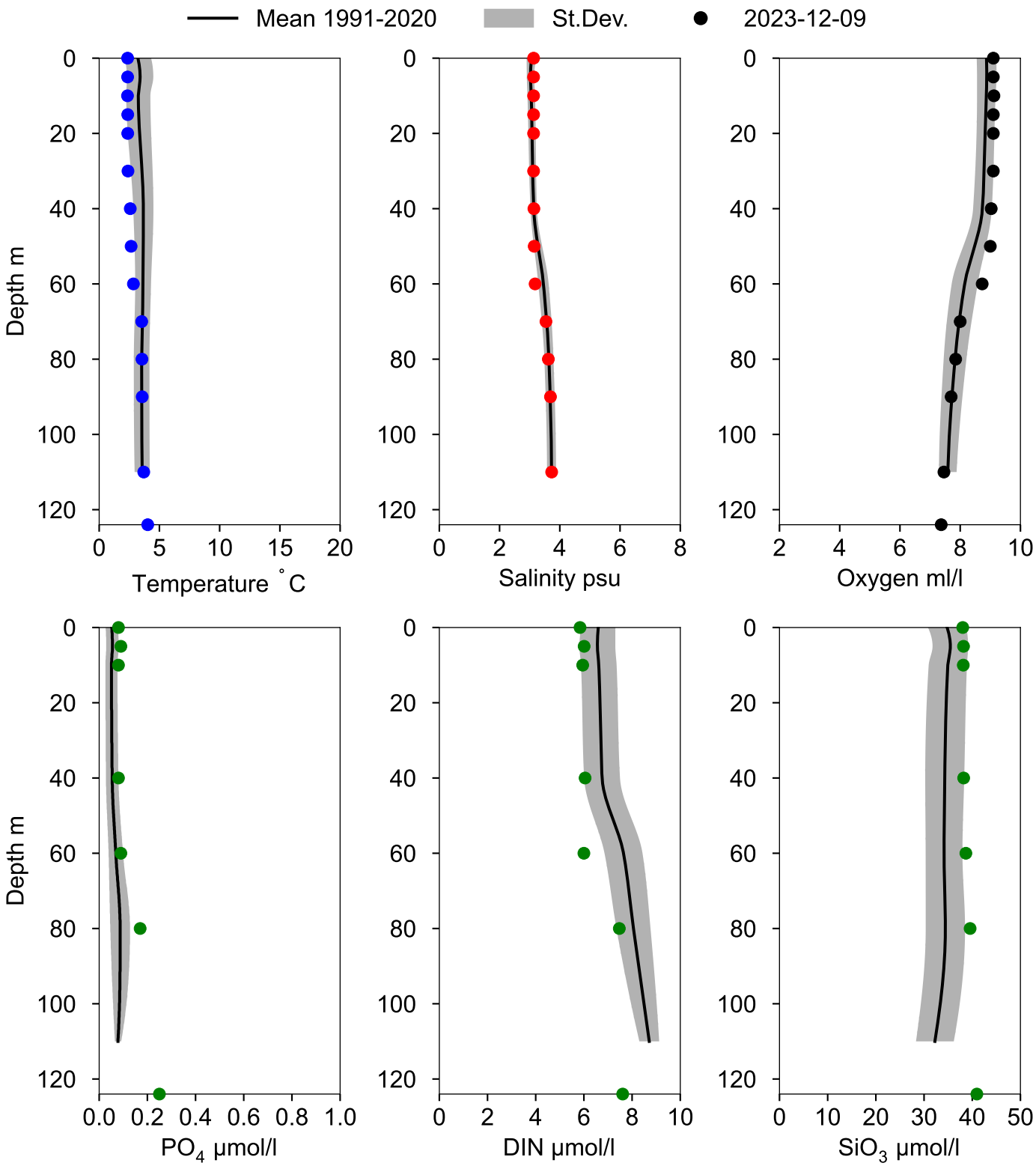
Vertical profiles FALKENS GRUND
December



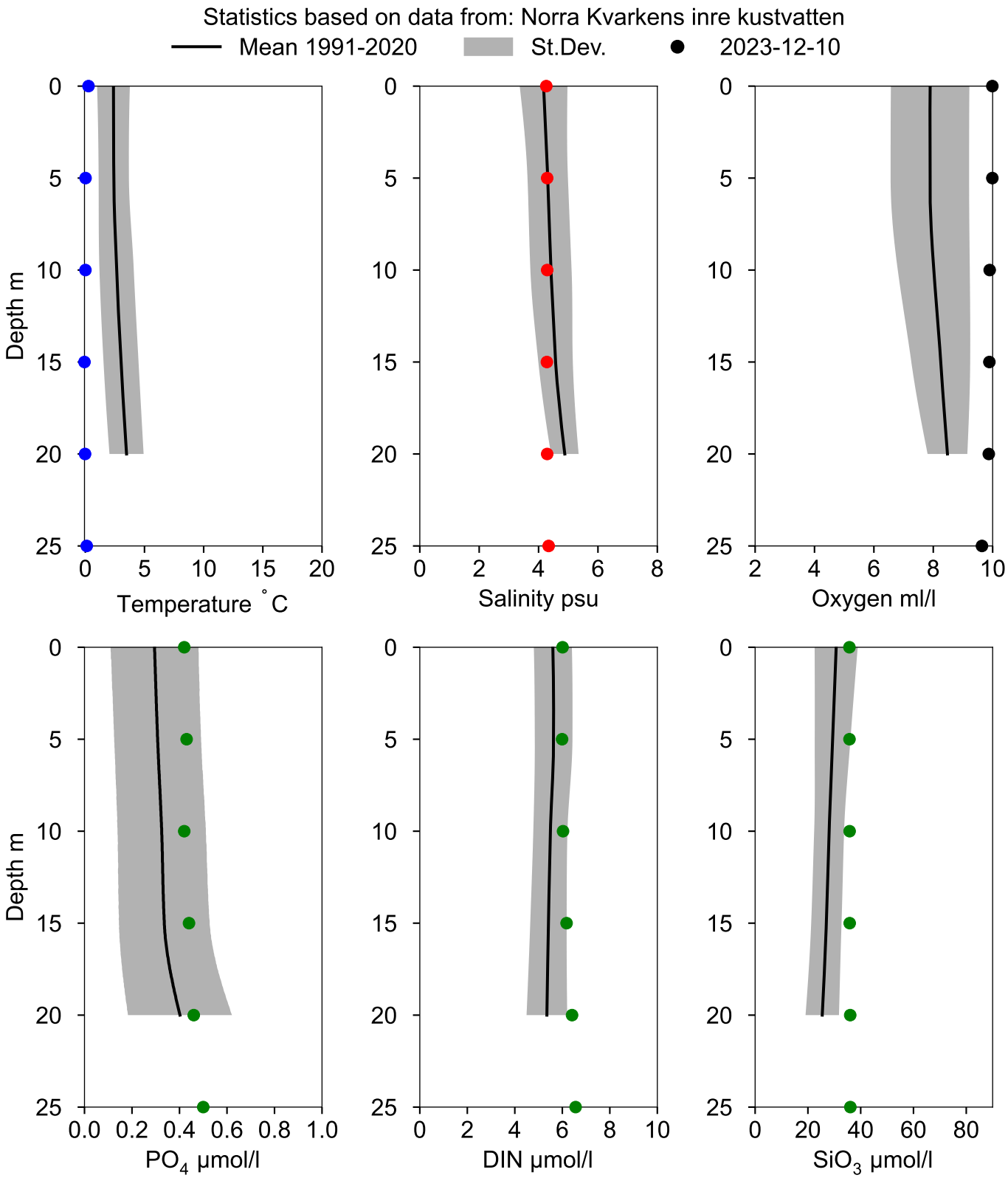
Vertical profiles RR1/A8
December



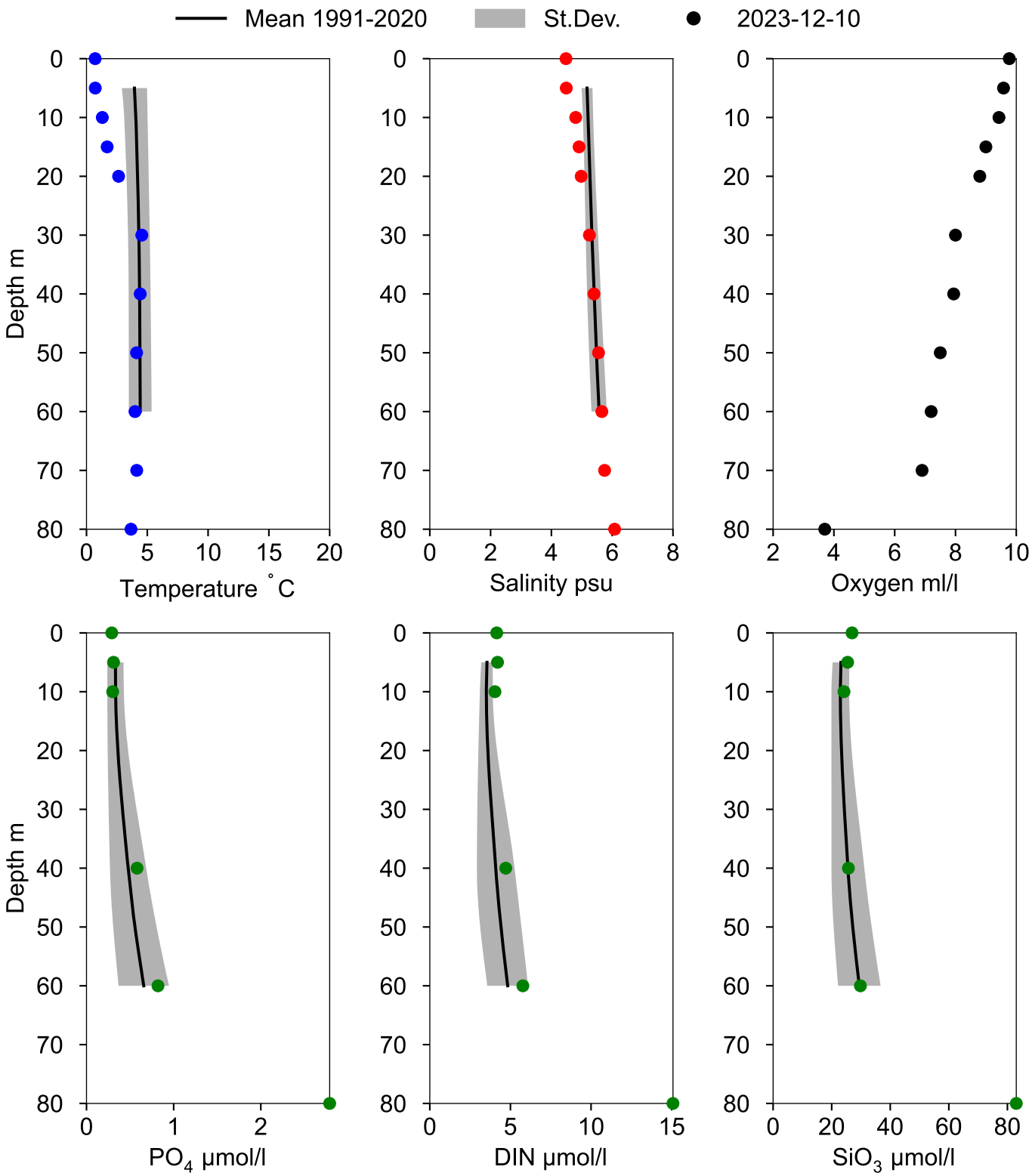
Vertical profiles F9 / A13
December



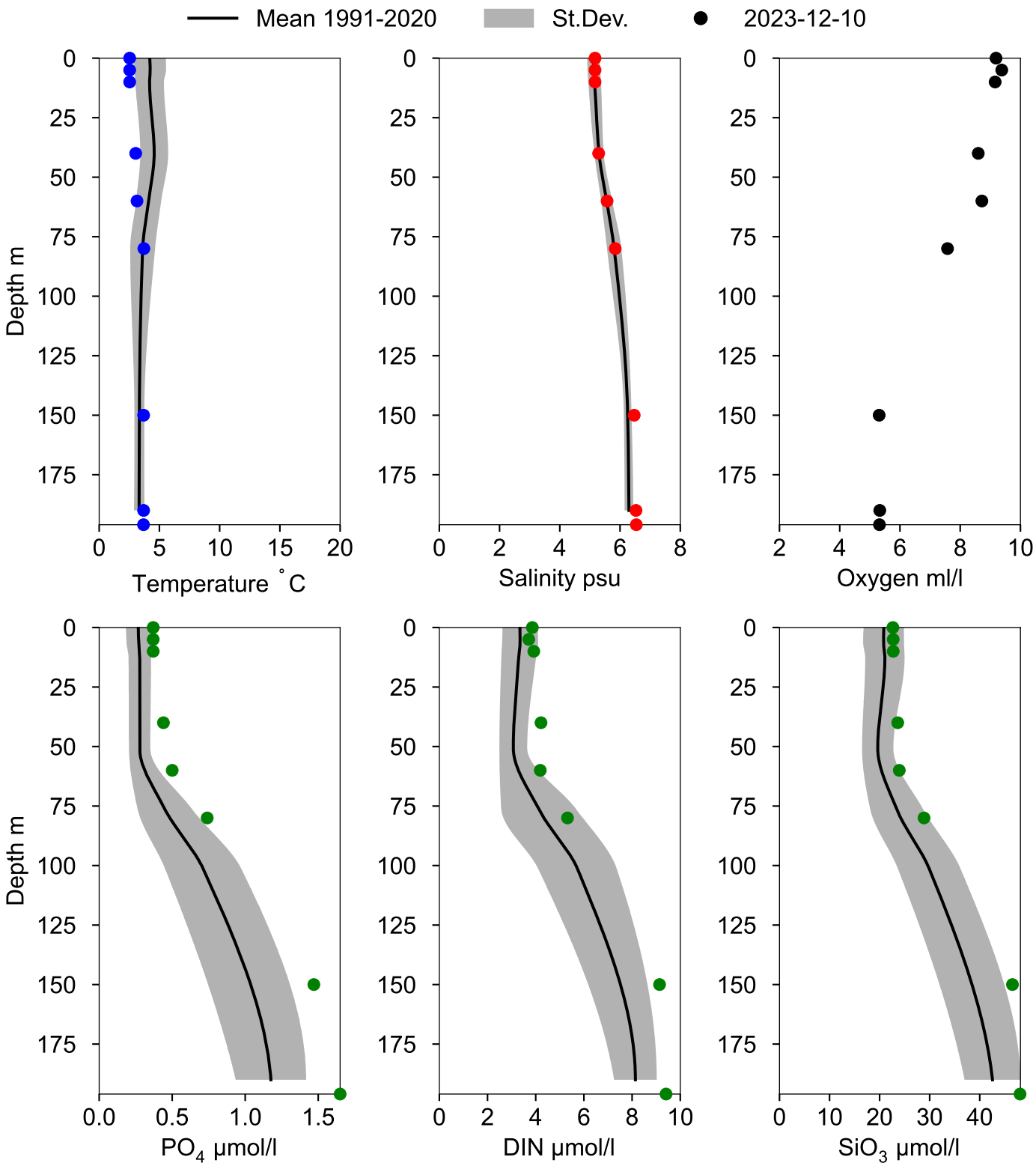
Vertical profiles NB1 / B3
December



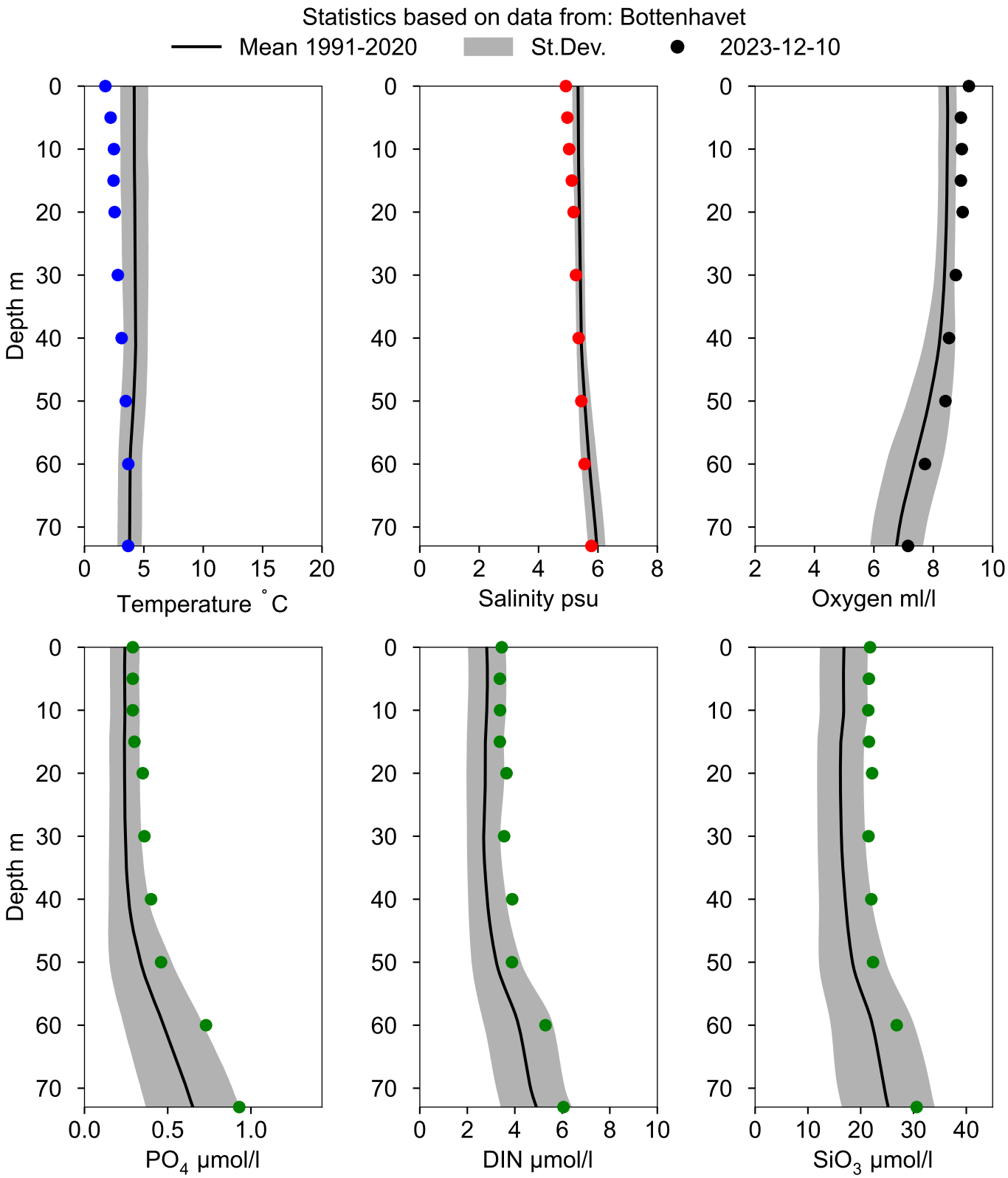
Vertical profiles GAVIK-1
December



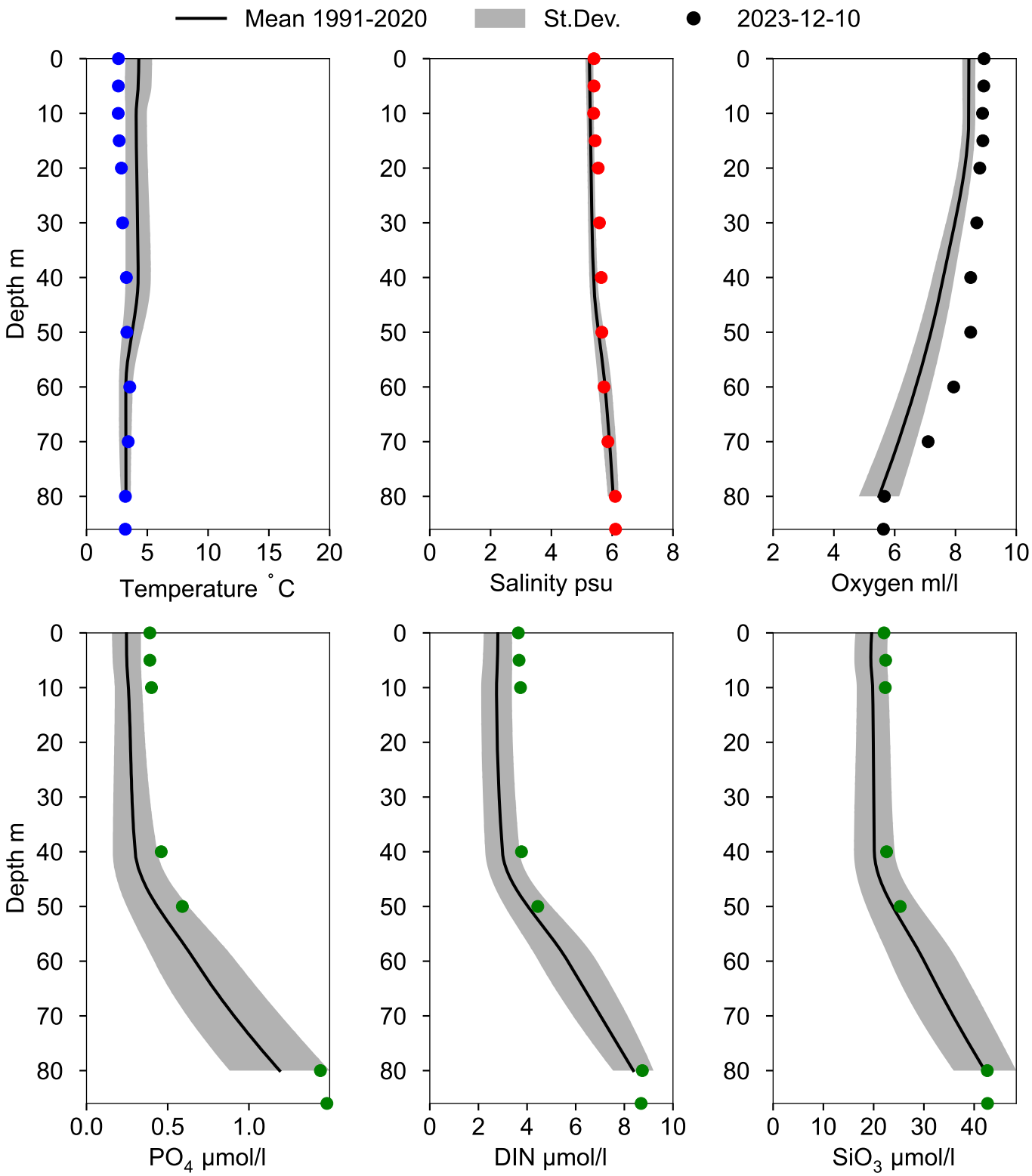
Vertical profiles C3
December



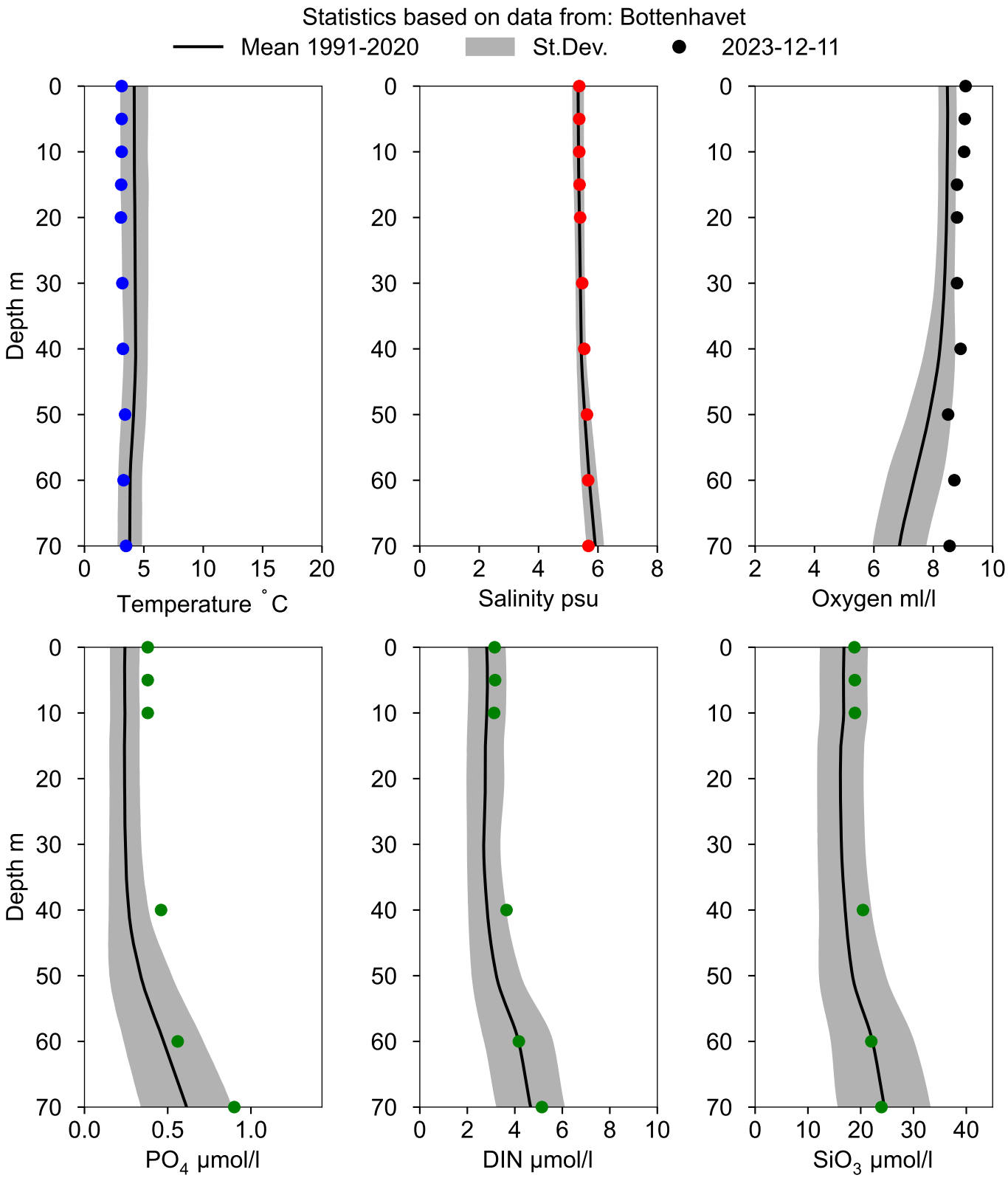
Vertical profiles MS2/C13
December



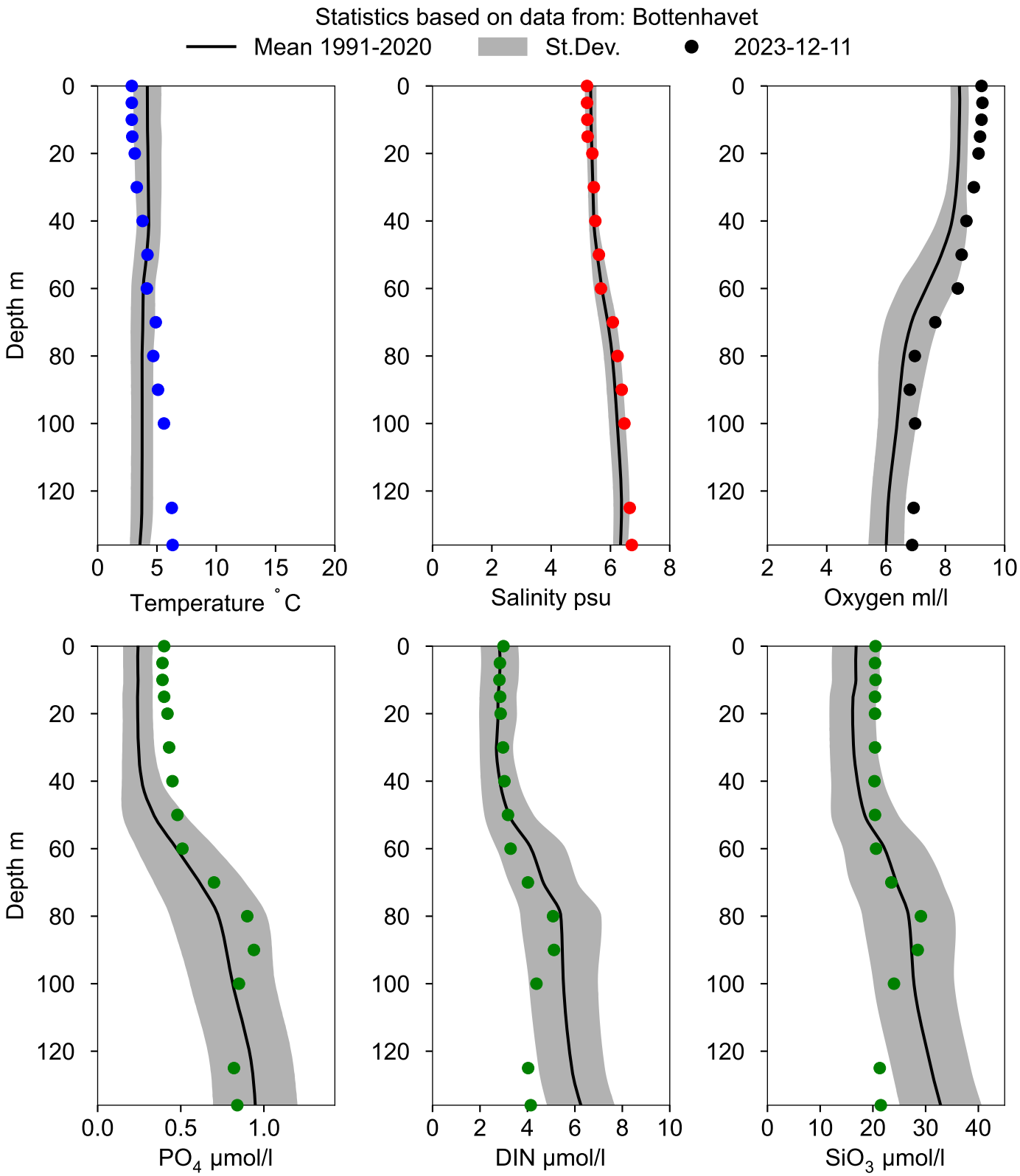
Vertical profiles MS4 / C14
December



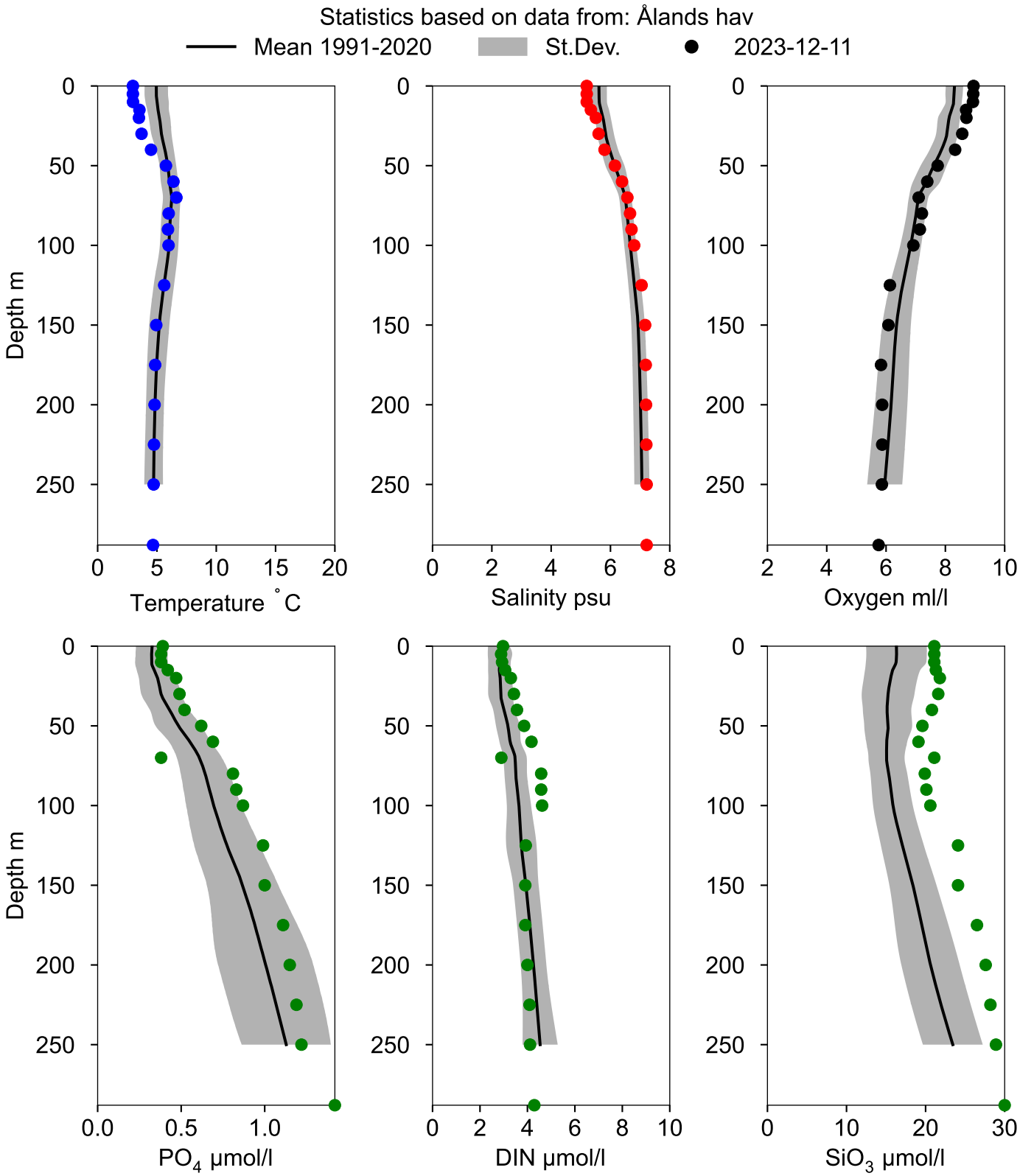
Vertical profiles SR3/C24
December



Vertical profiles F33 GRUNDKALLEN
December

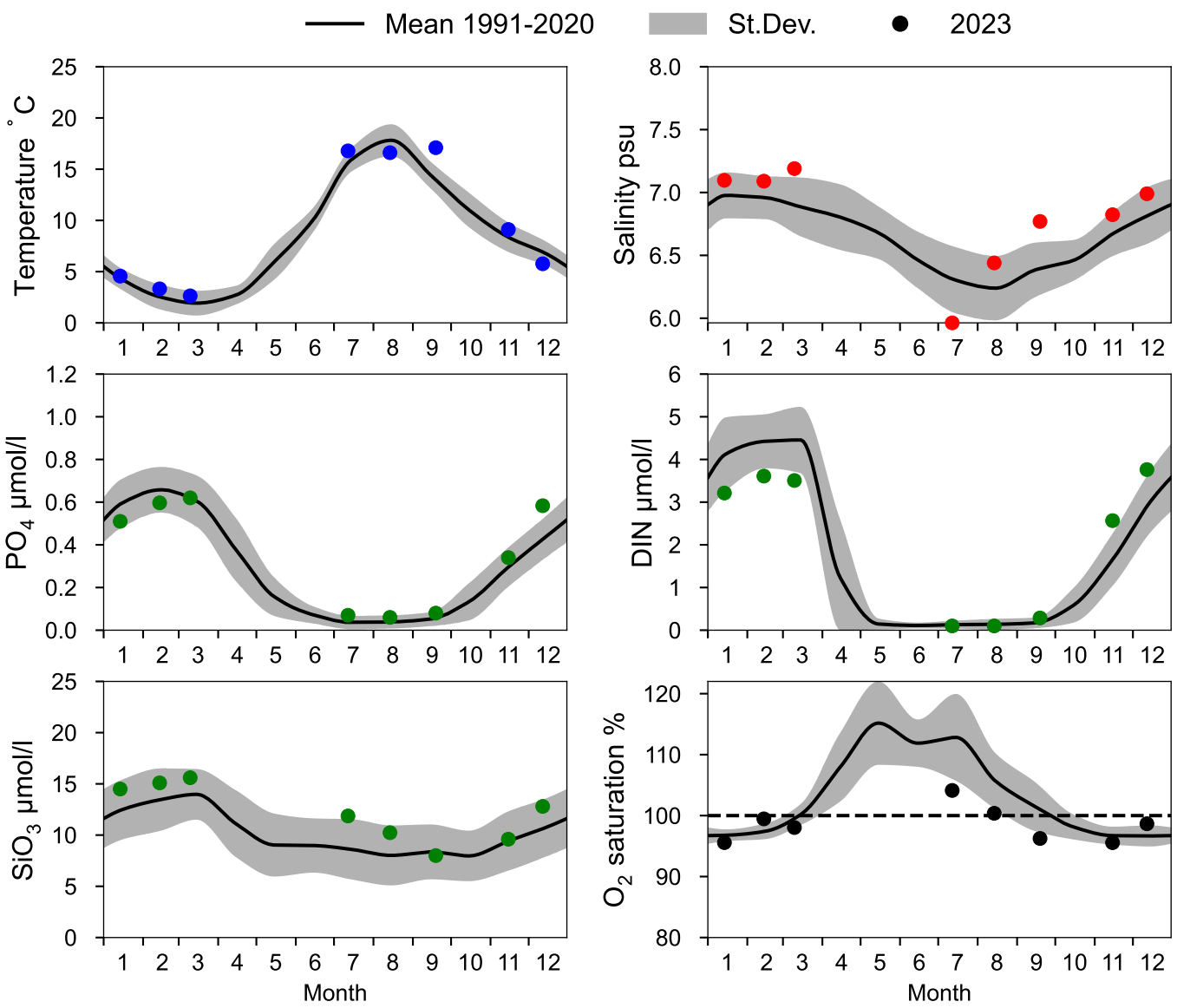


Vertical profiles F64 SOLOVJEVA
December

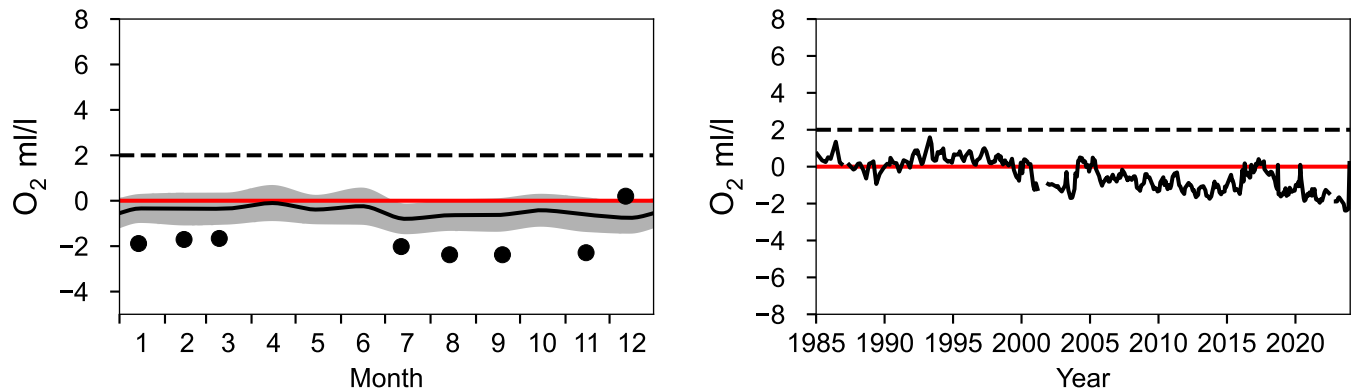


STATION BY29 / LL19 SURFACE WATER (0-10 m)

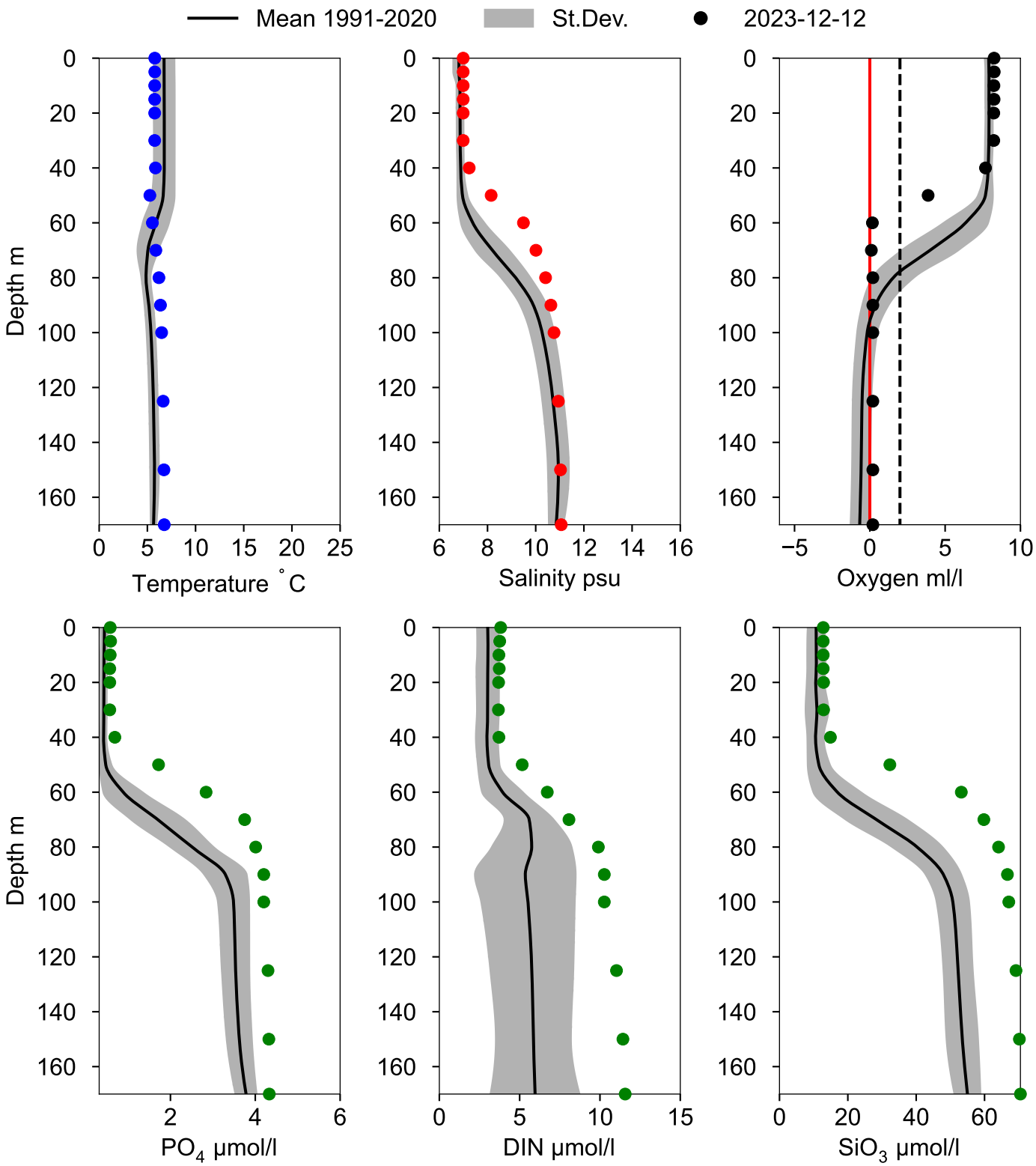
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 150 m)

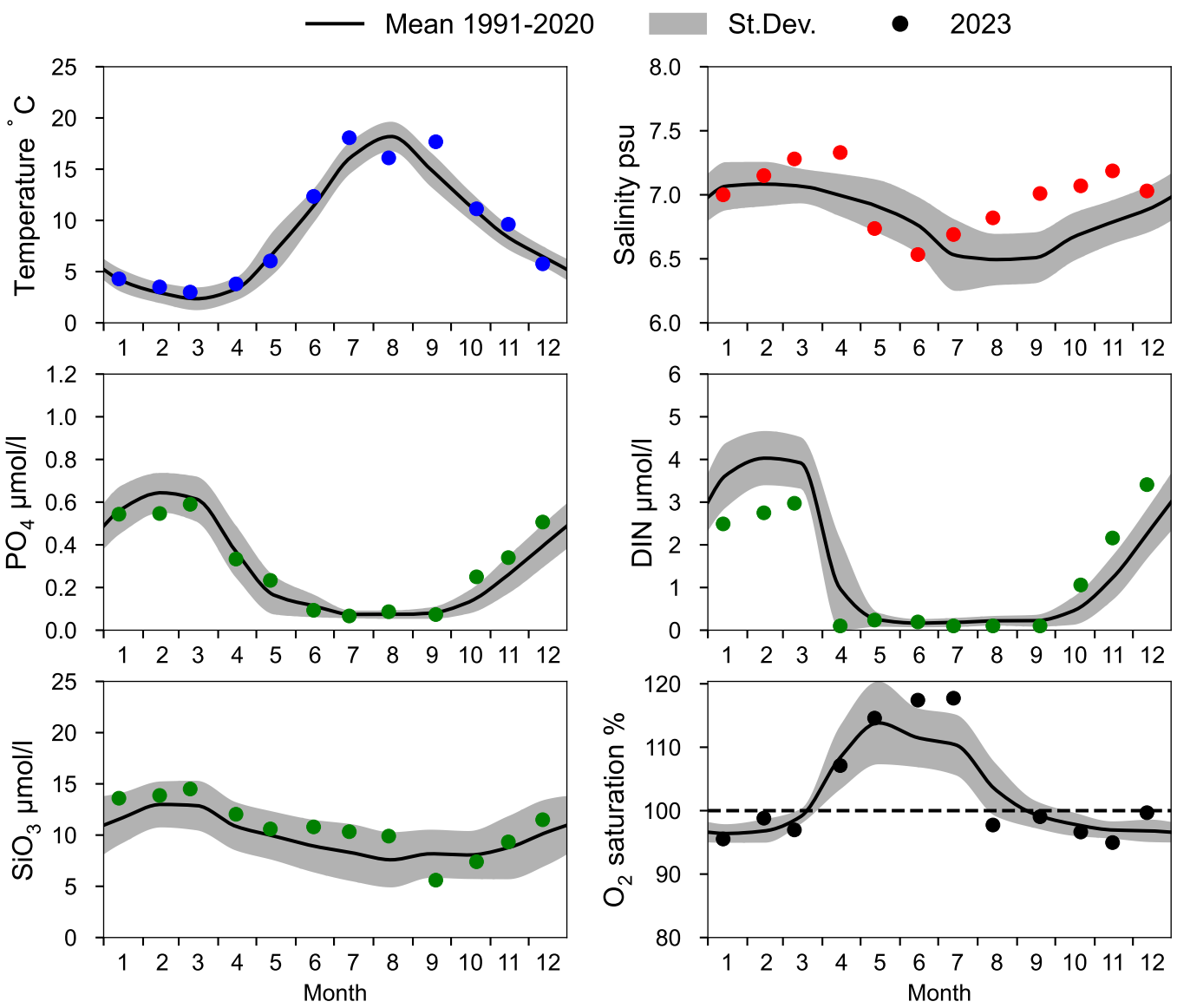


Vertical profiles BY29 / LL19
December

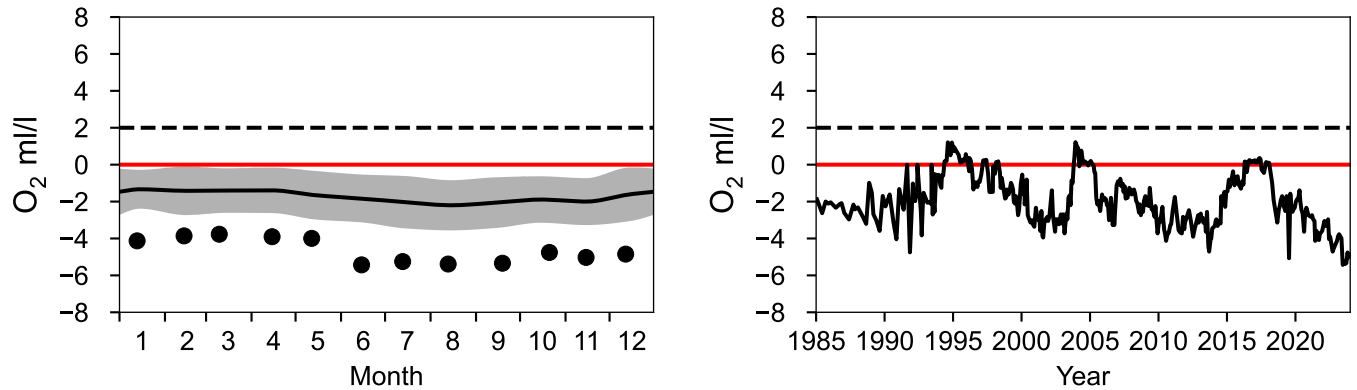


STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

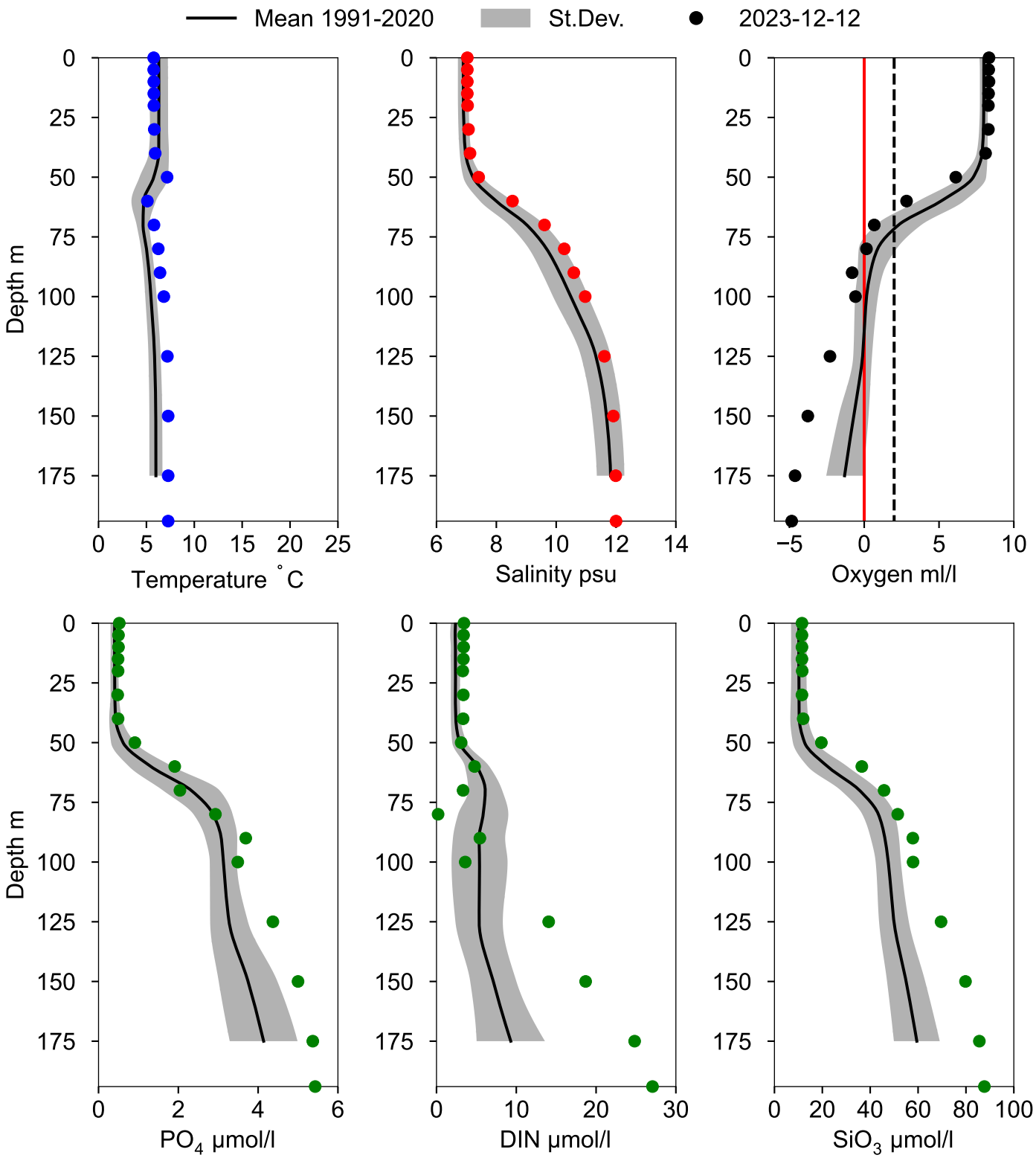
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)

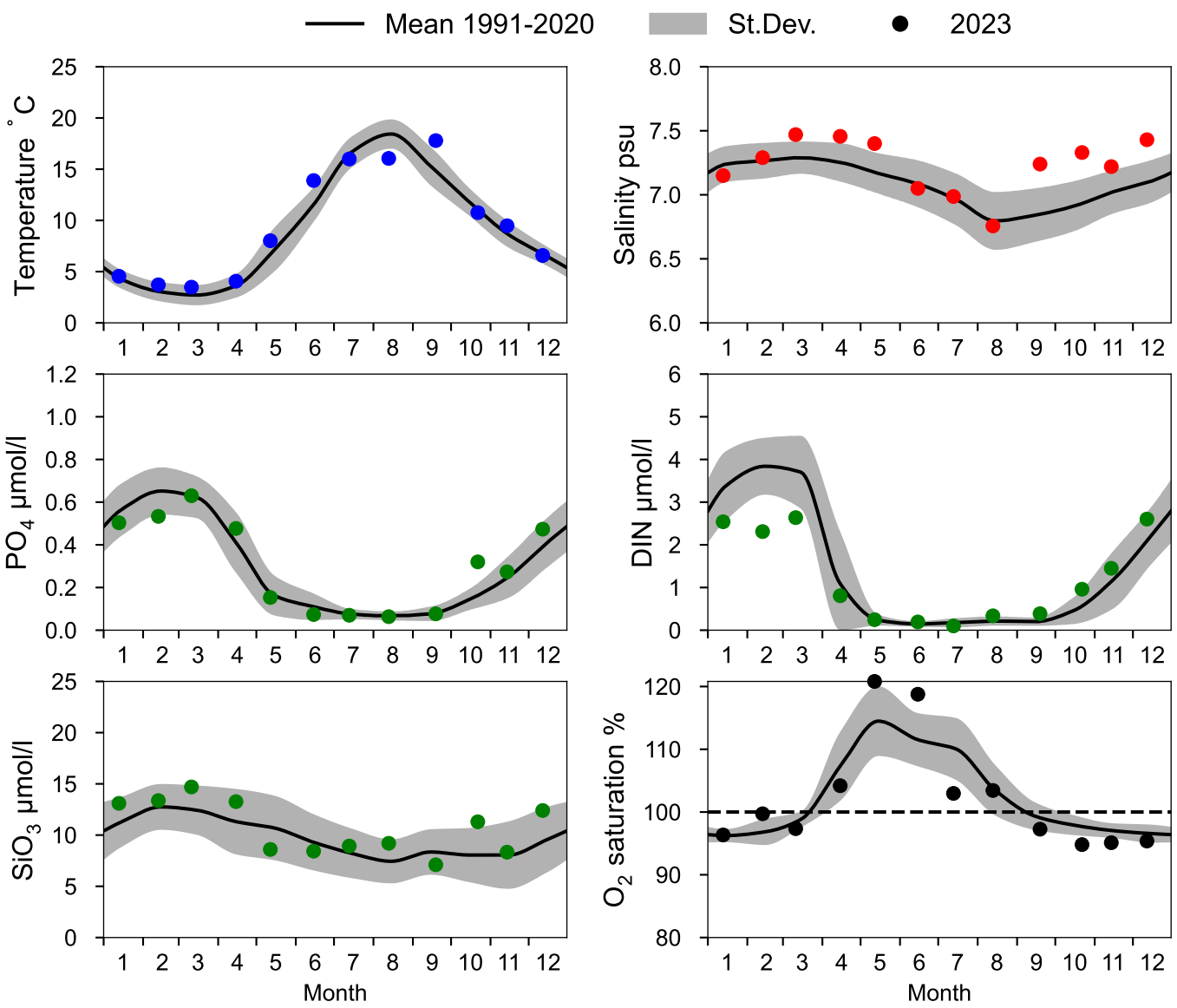


Vertical profiles BY20 FÅRÖDJ
December

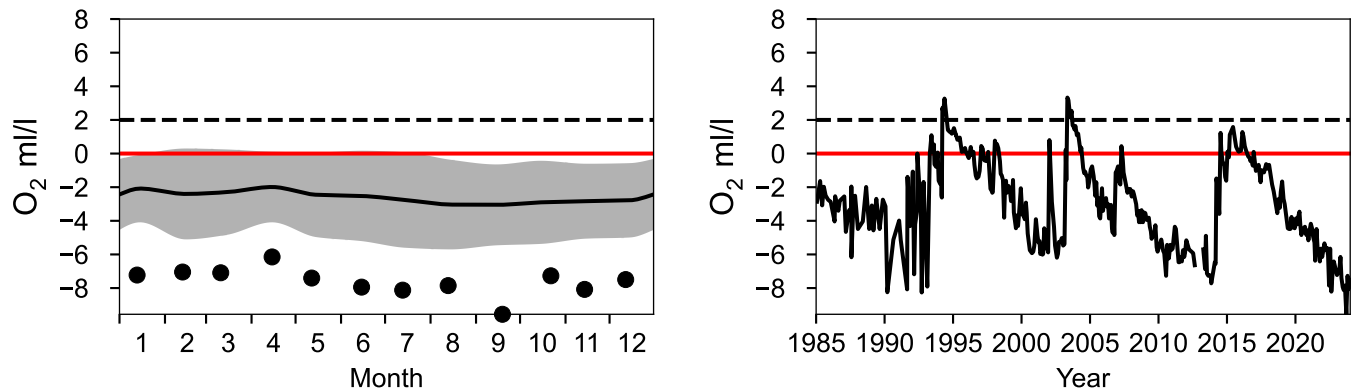


STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

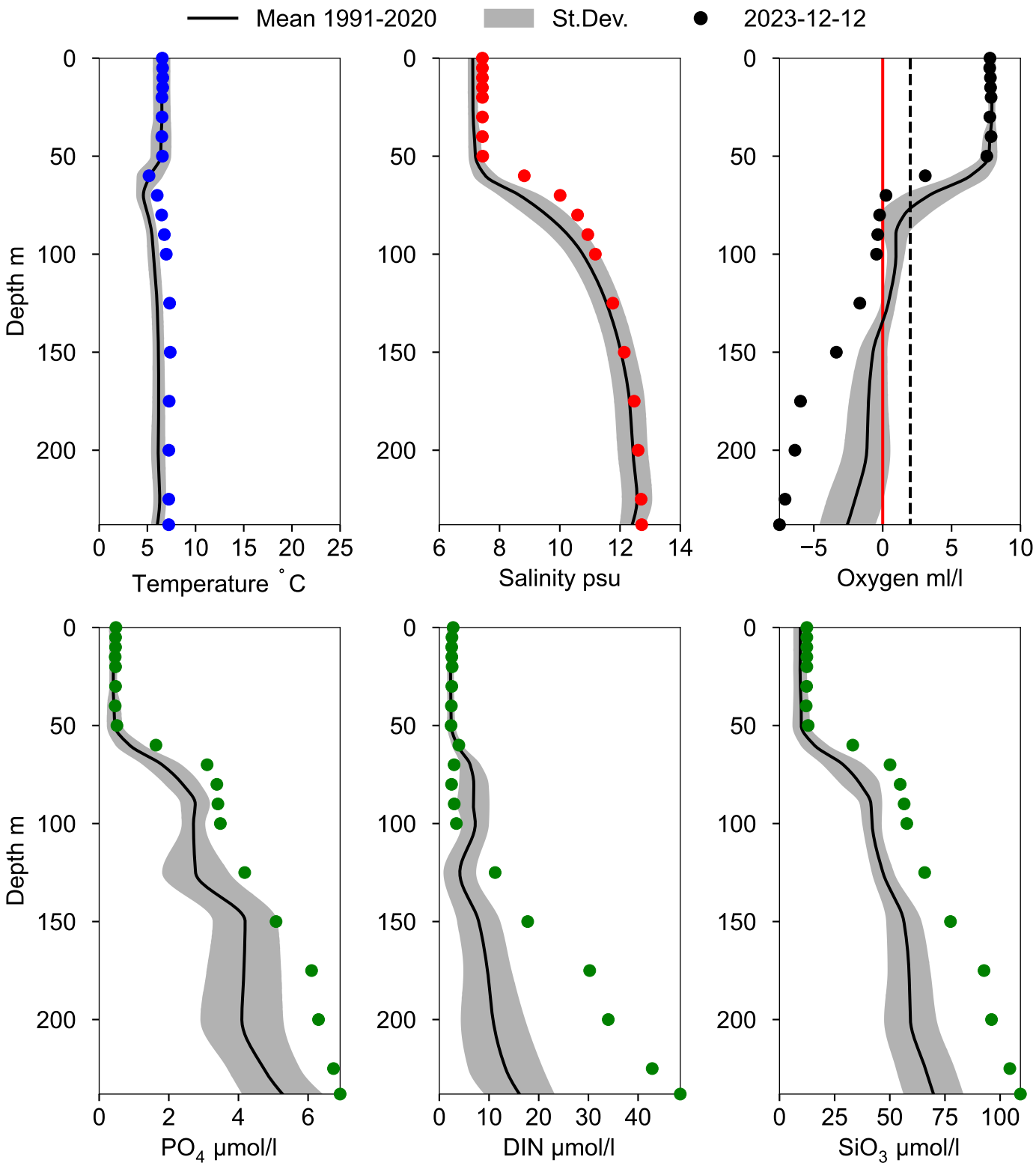
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 225 m)

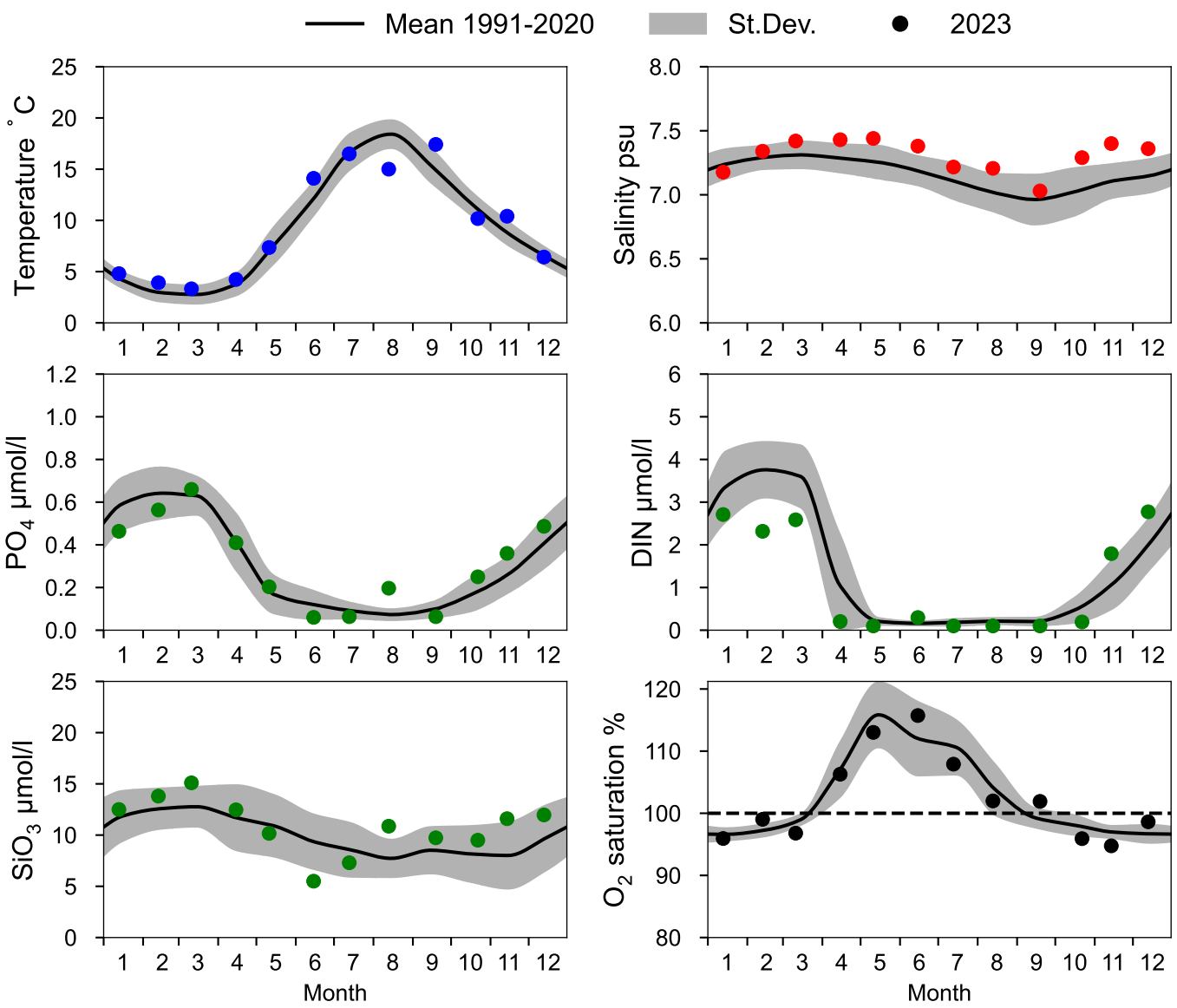


Vertical profiles BY15 GOTLANDSDJ
December

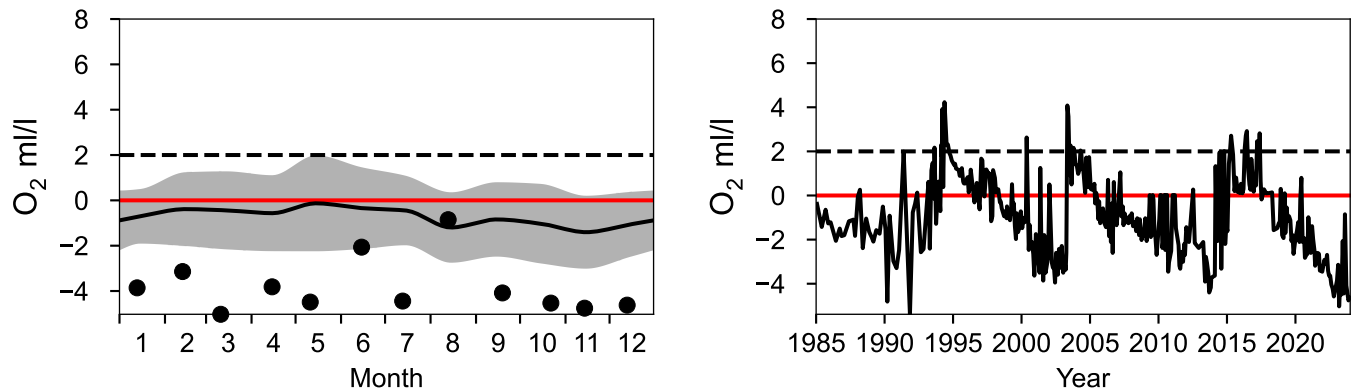


STATION BY10 SURFACE WATER (0-10 m)

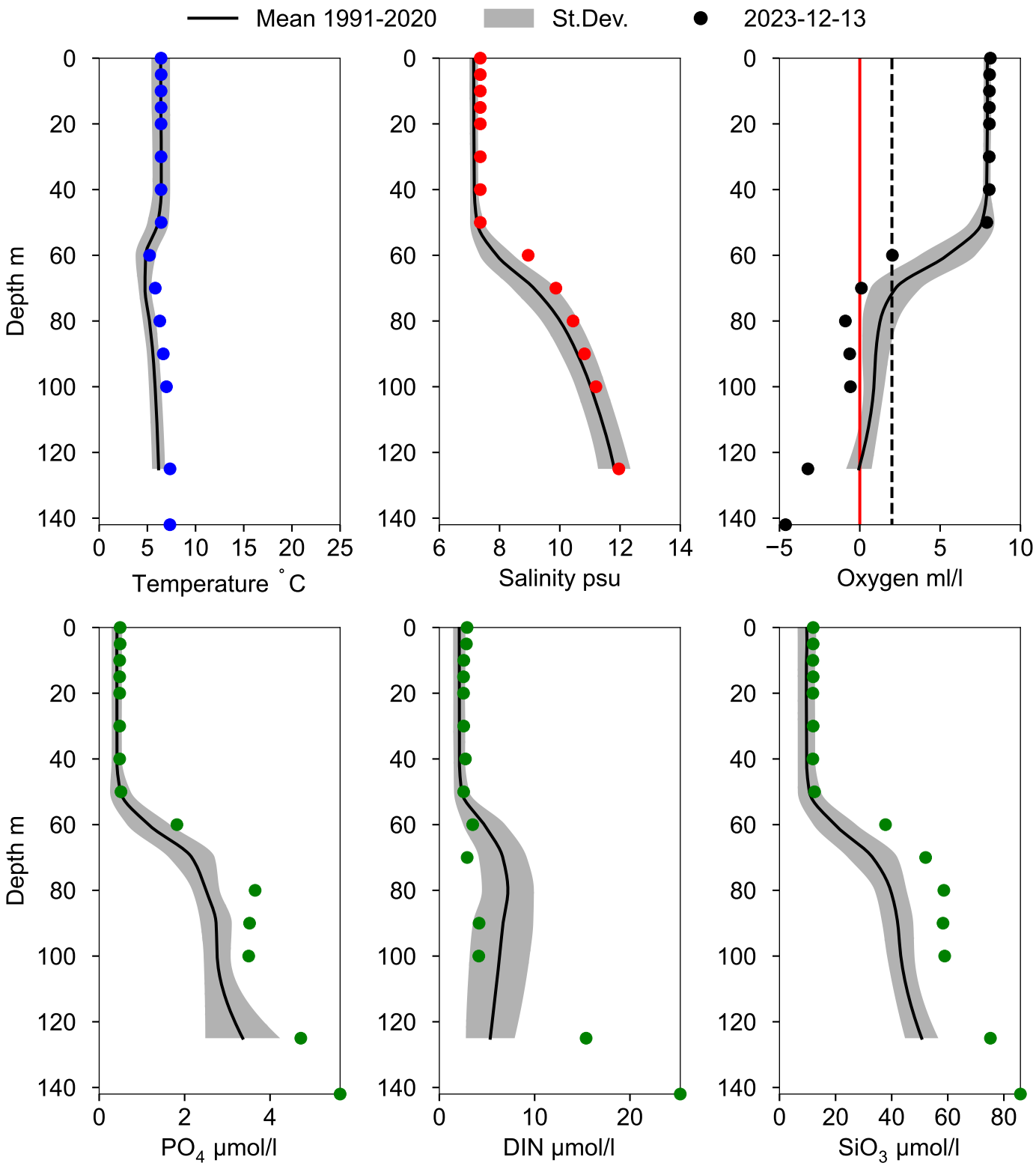
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

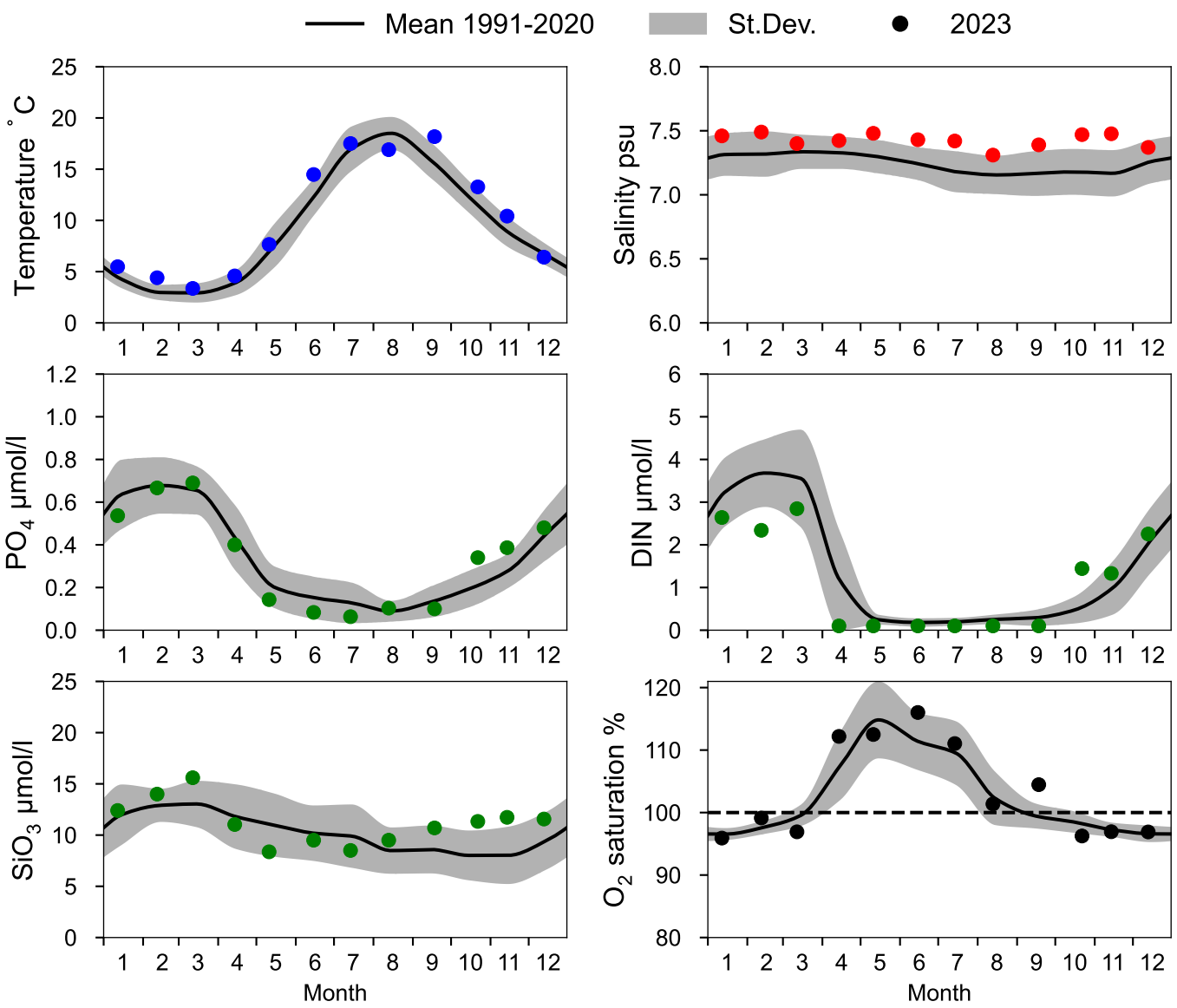


Vertical profiles BY10
December

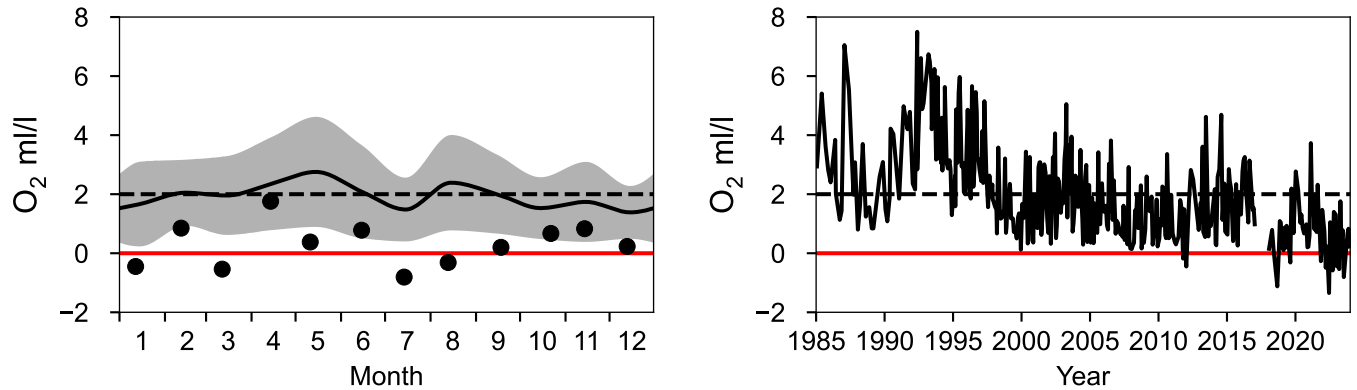


STATION BCS III-10 SURFACE WATER (0-10 m)

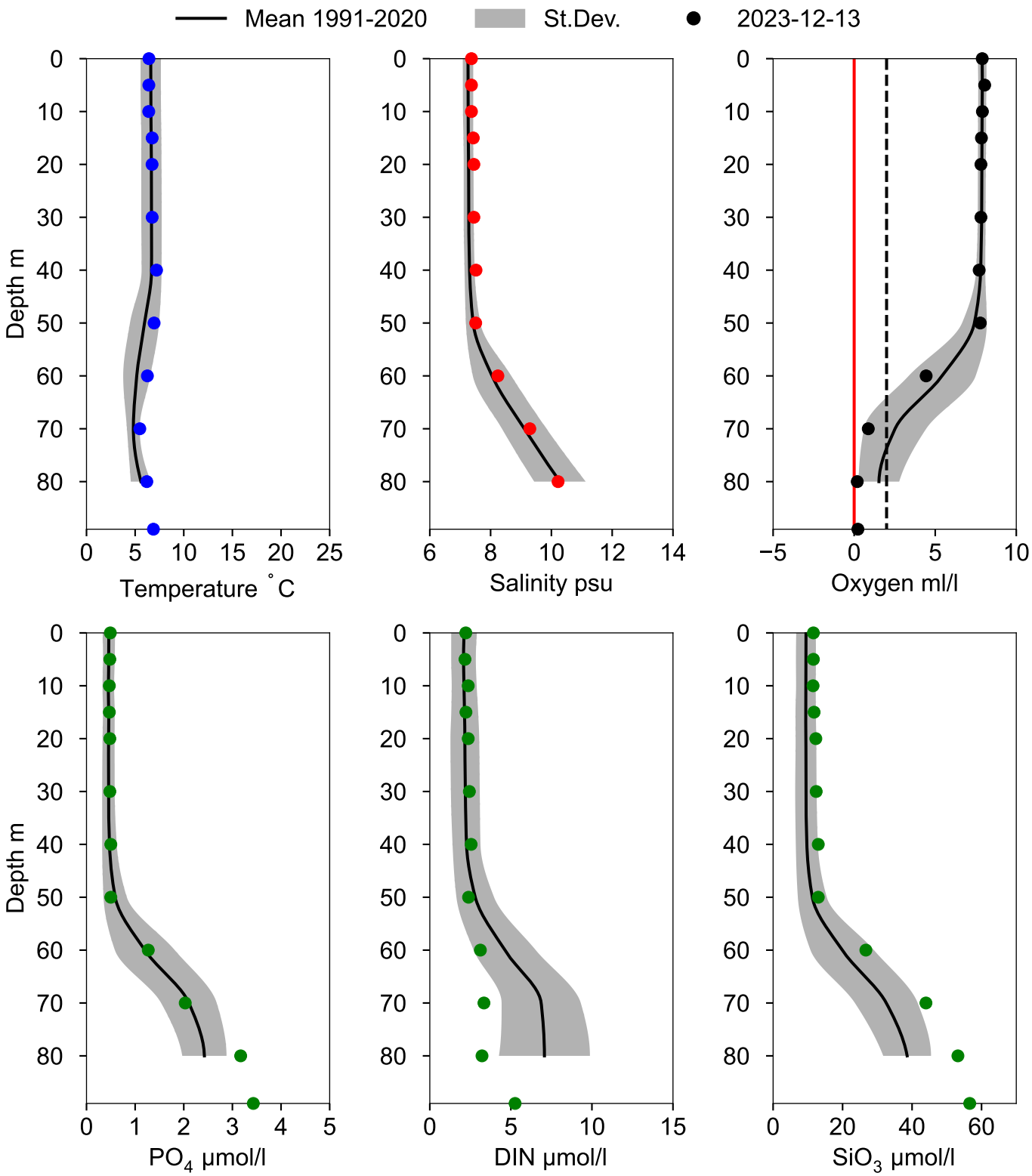
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

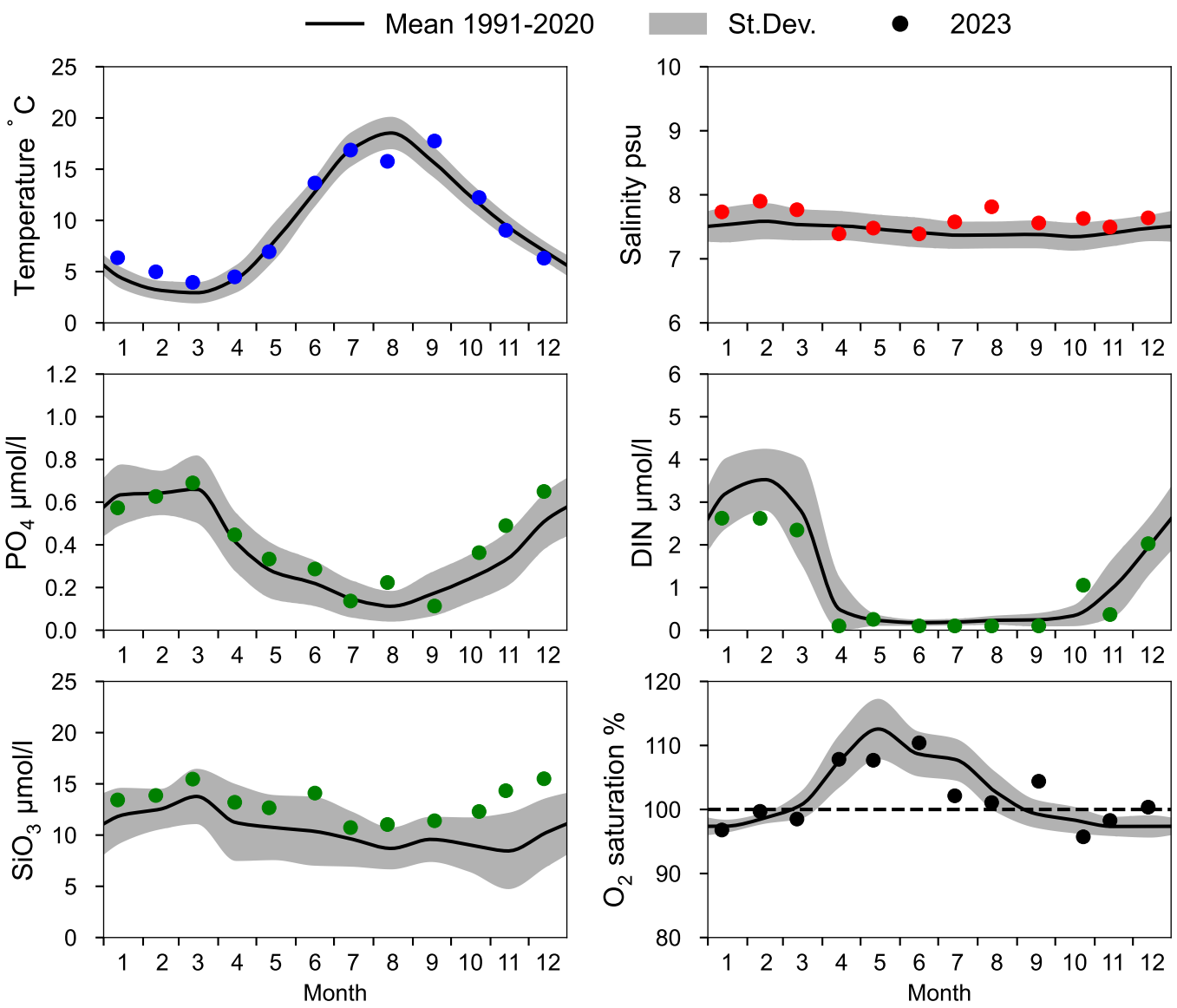


Vertical profiles BCS III-10
December

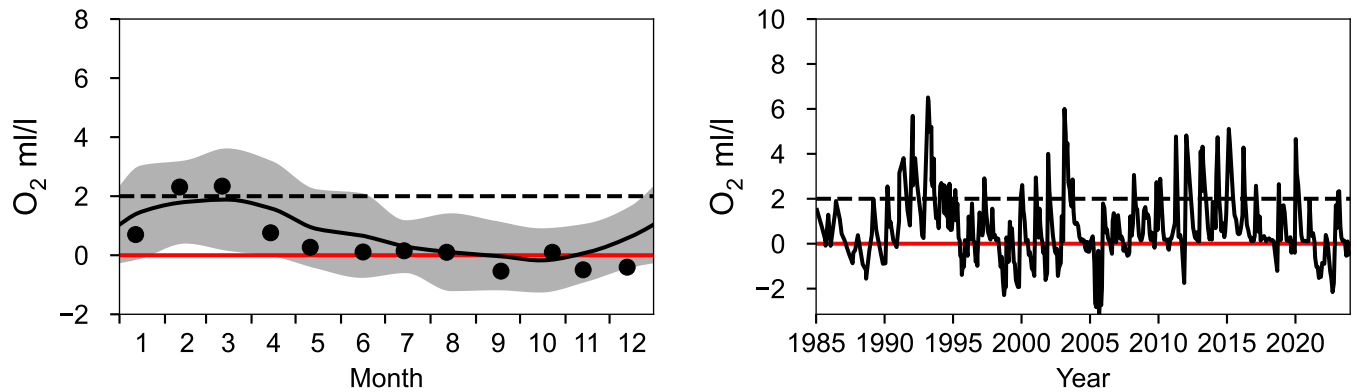


STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

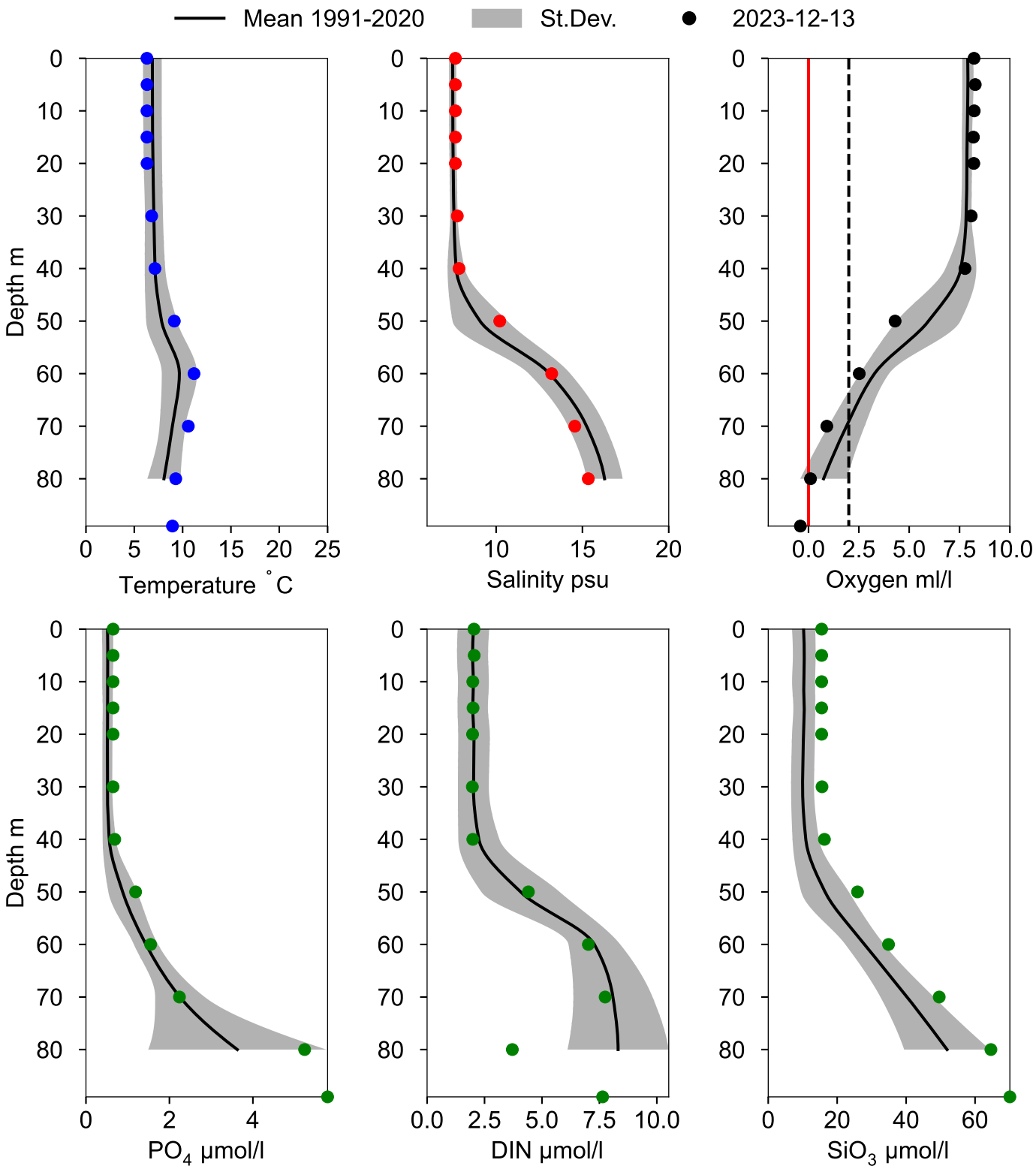
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

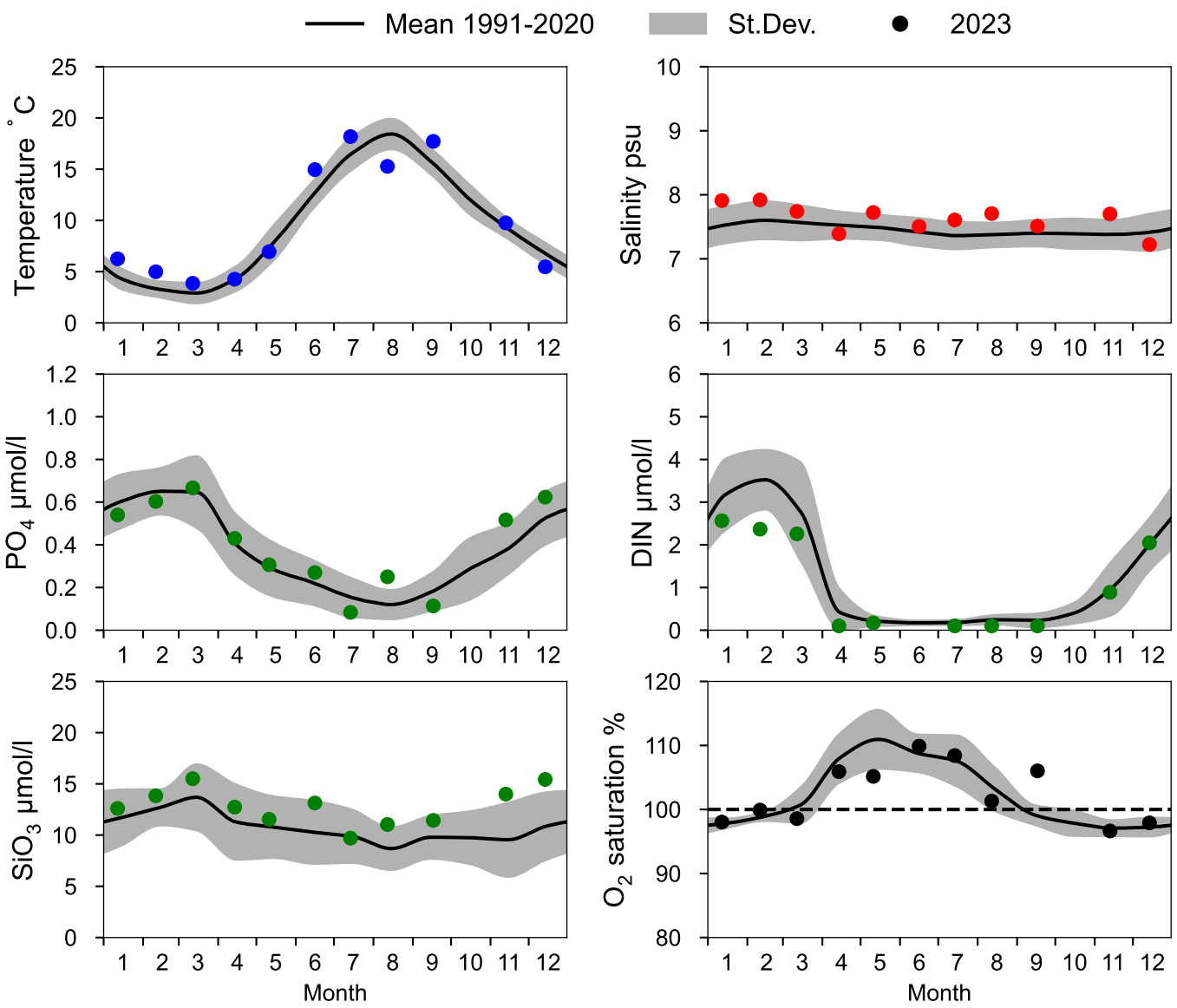


Vertical profiles BY5 BORNHOLMSDJ
December

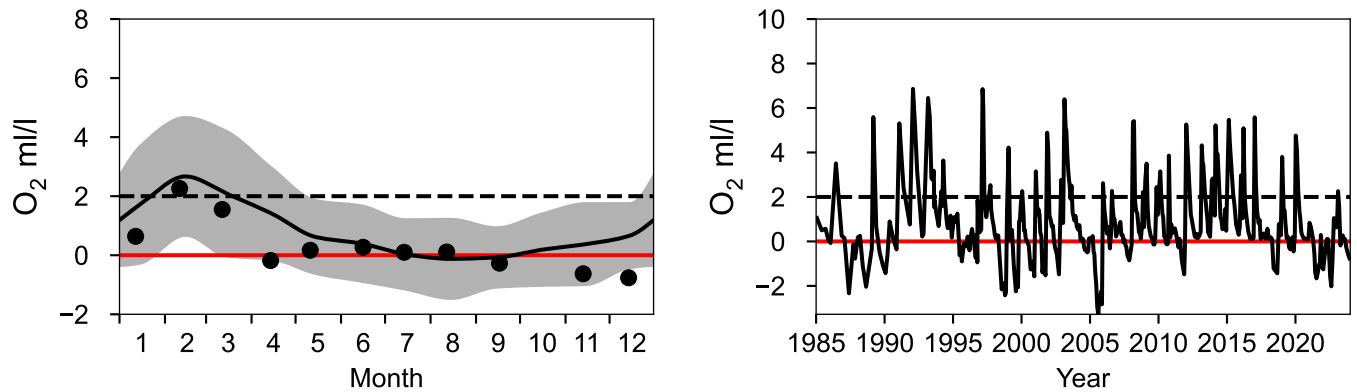


STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

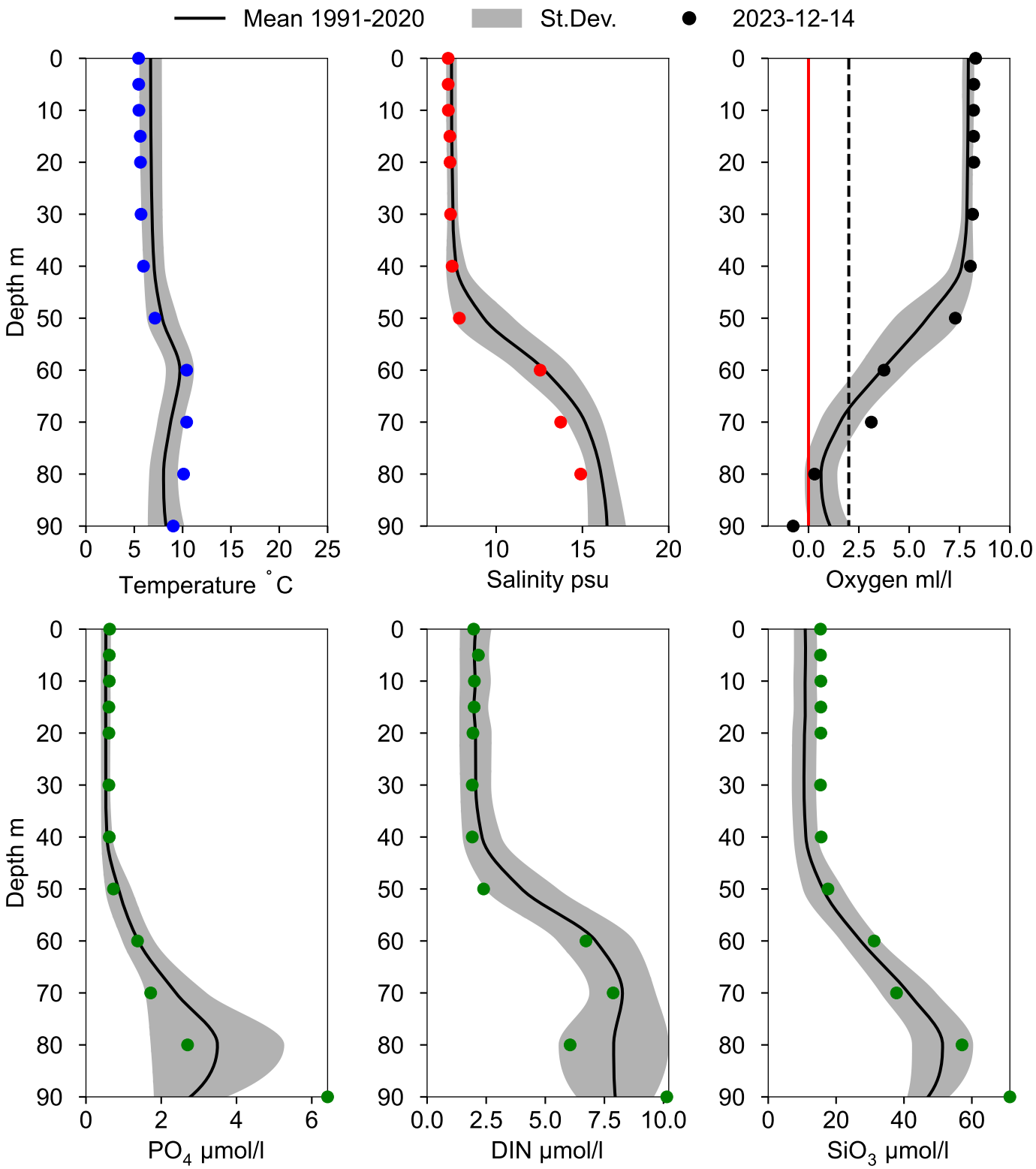
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

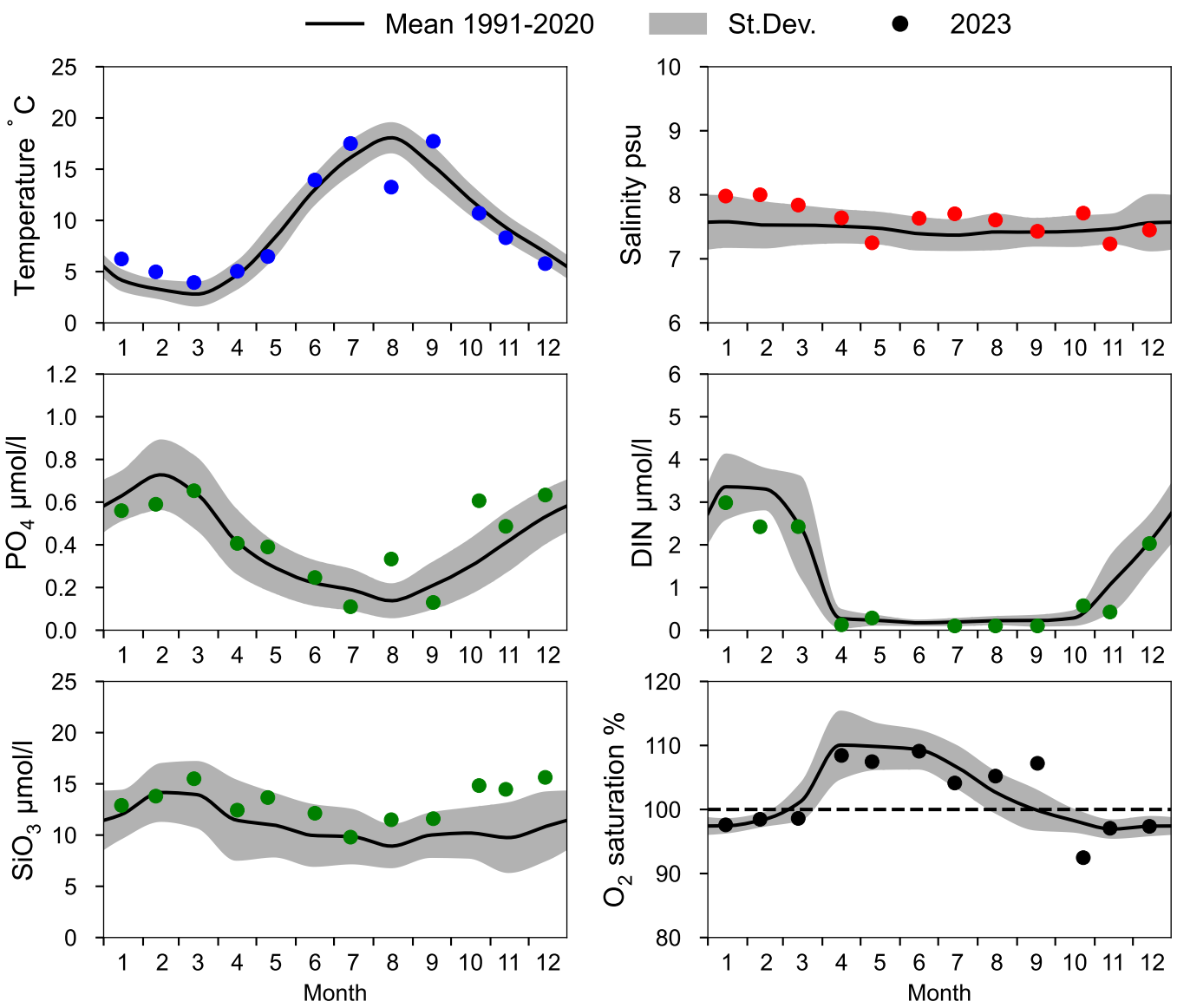


Vertical profiles BY4 CHRISTIANSÖ
December

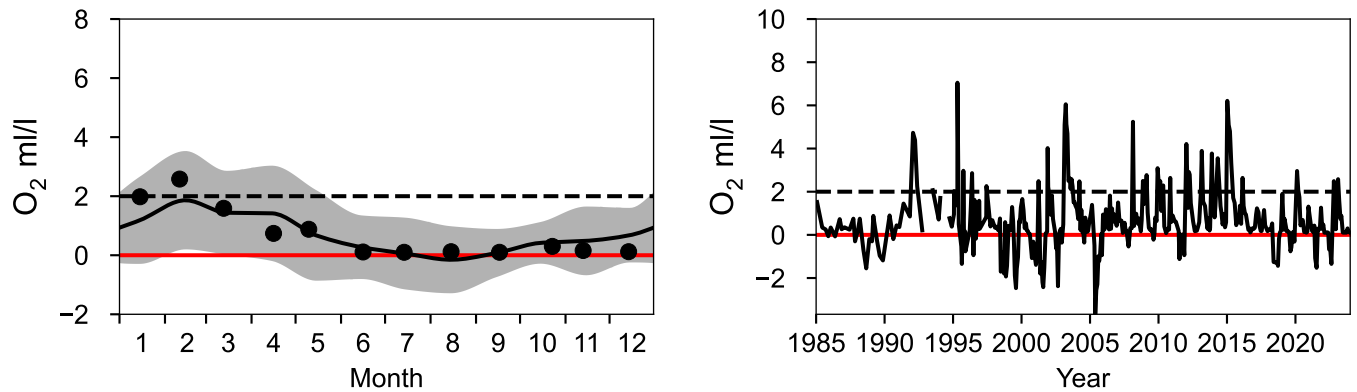


STATION HANÖBUKTEN SURFACE WATER (0-10 m)

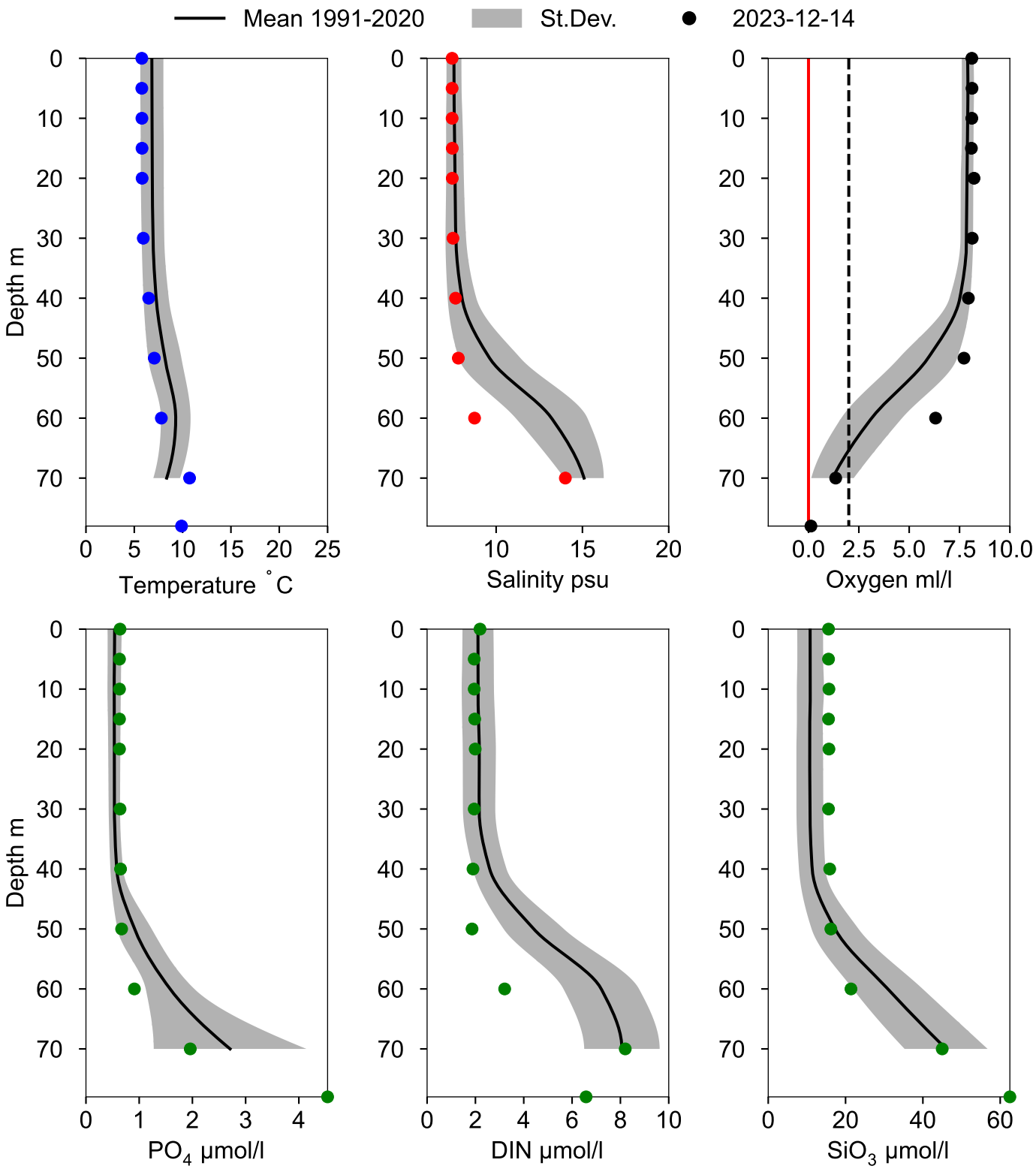
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 70 m)

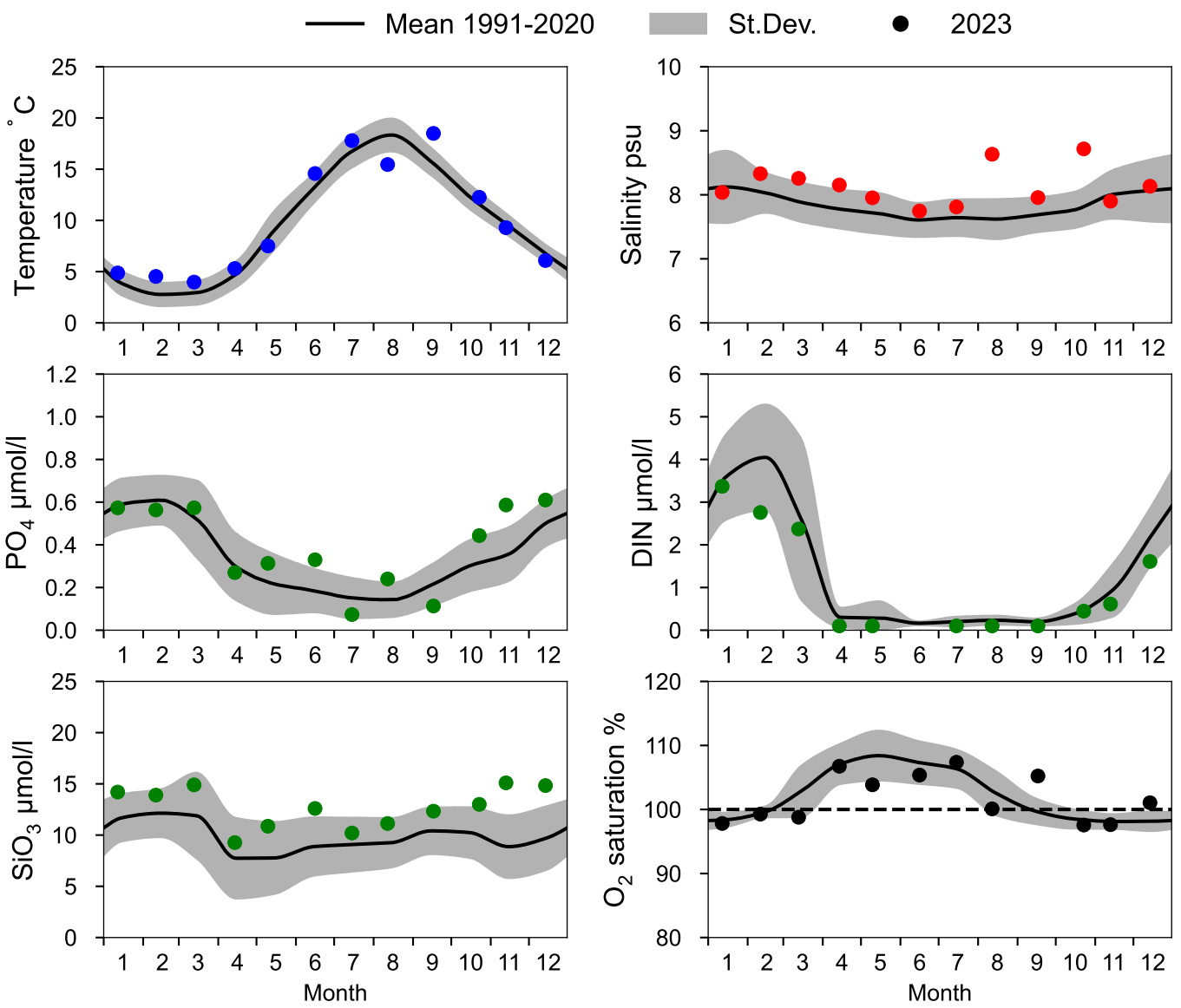


Vertical profiles HANÖBUKTEN
December

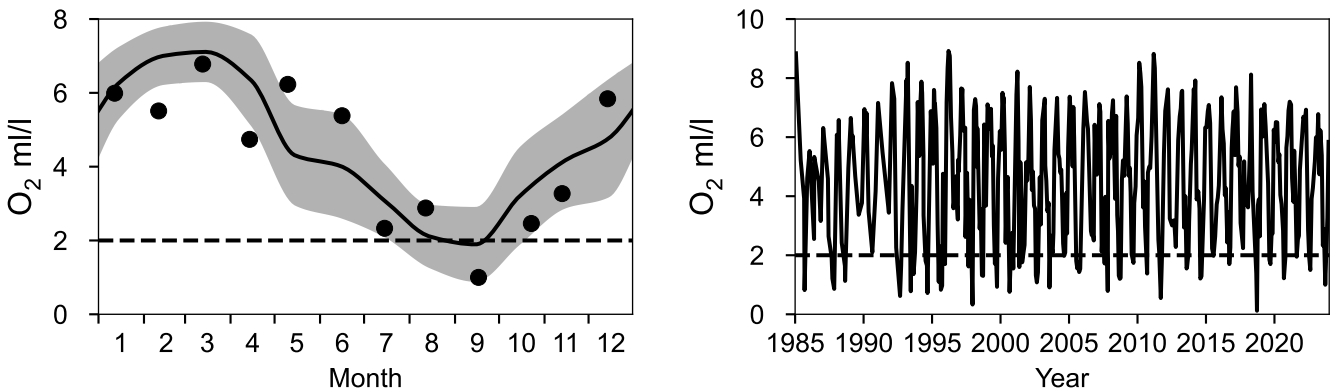


STATION BY2 ARKONA SURFACE WATER (0-10 m)

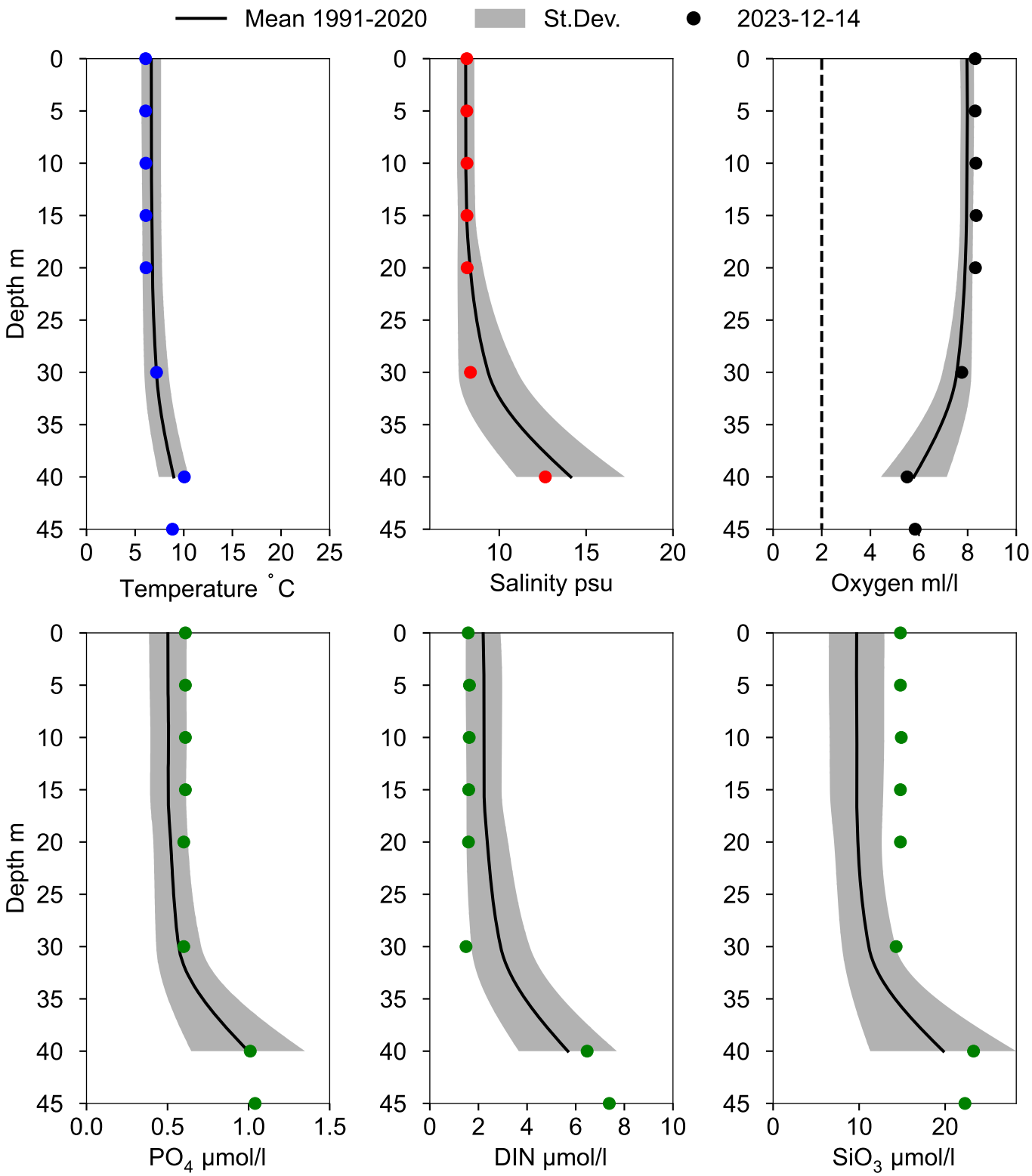
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

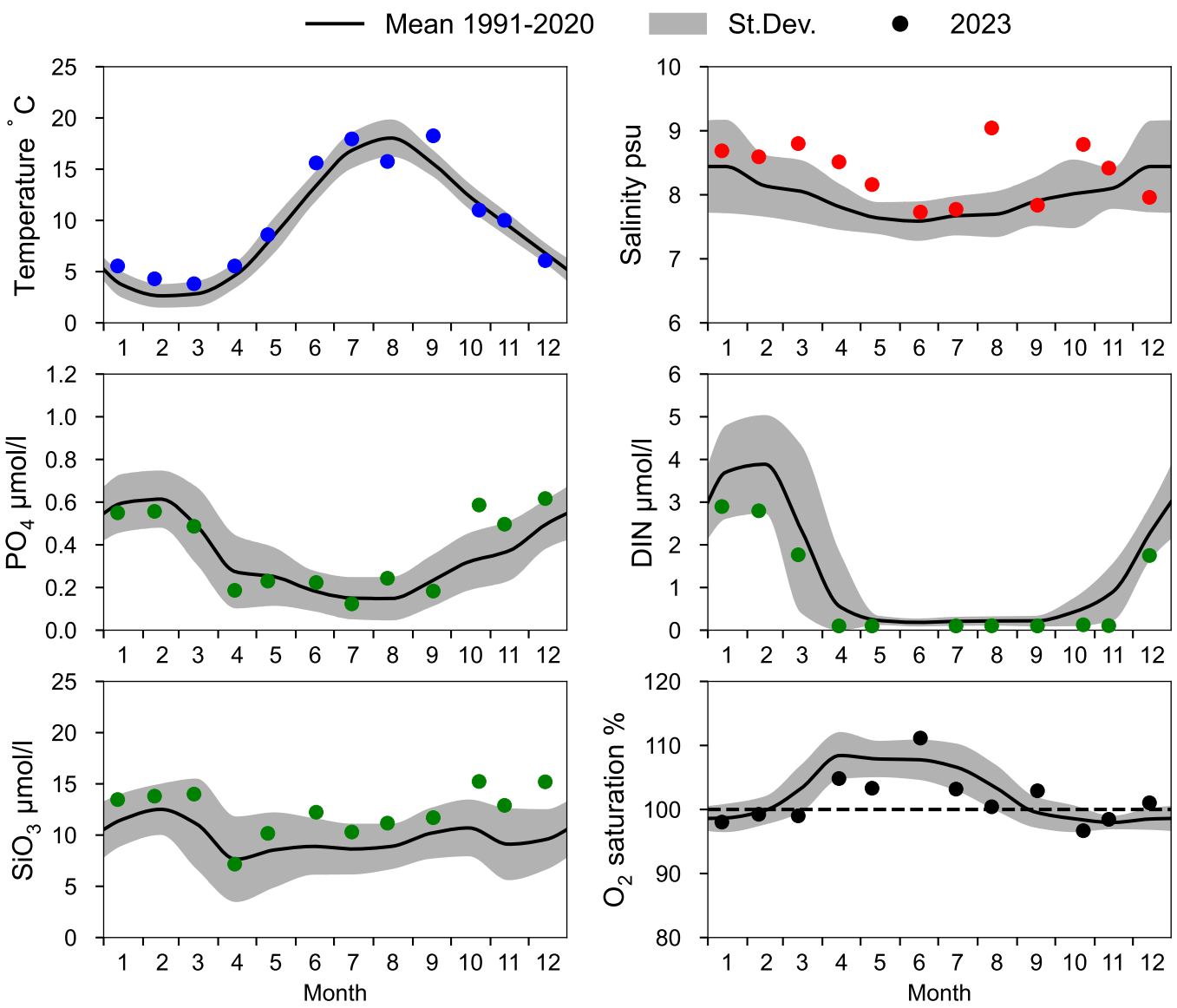


Vertical profiles BY2 ARKONA
December

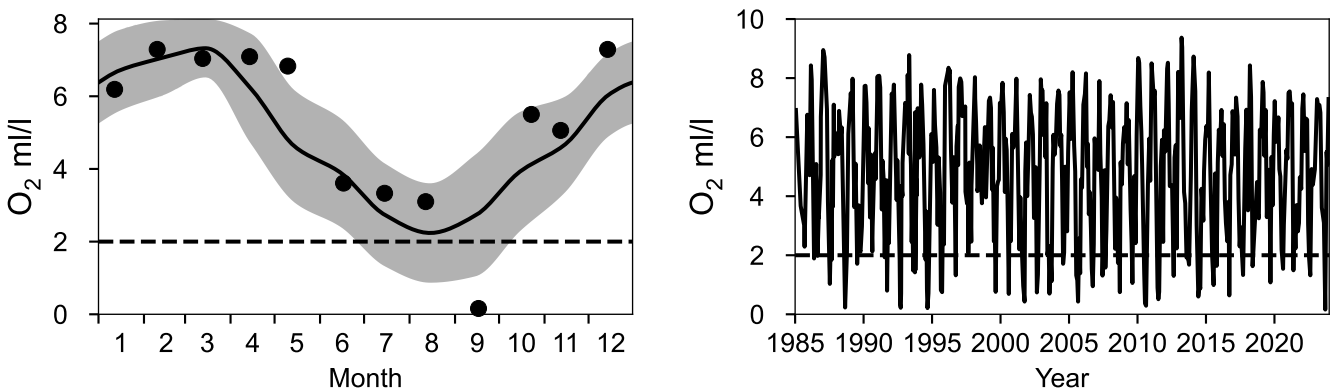


STATION BY1 SURFACE WATER (0-10 m)

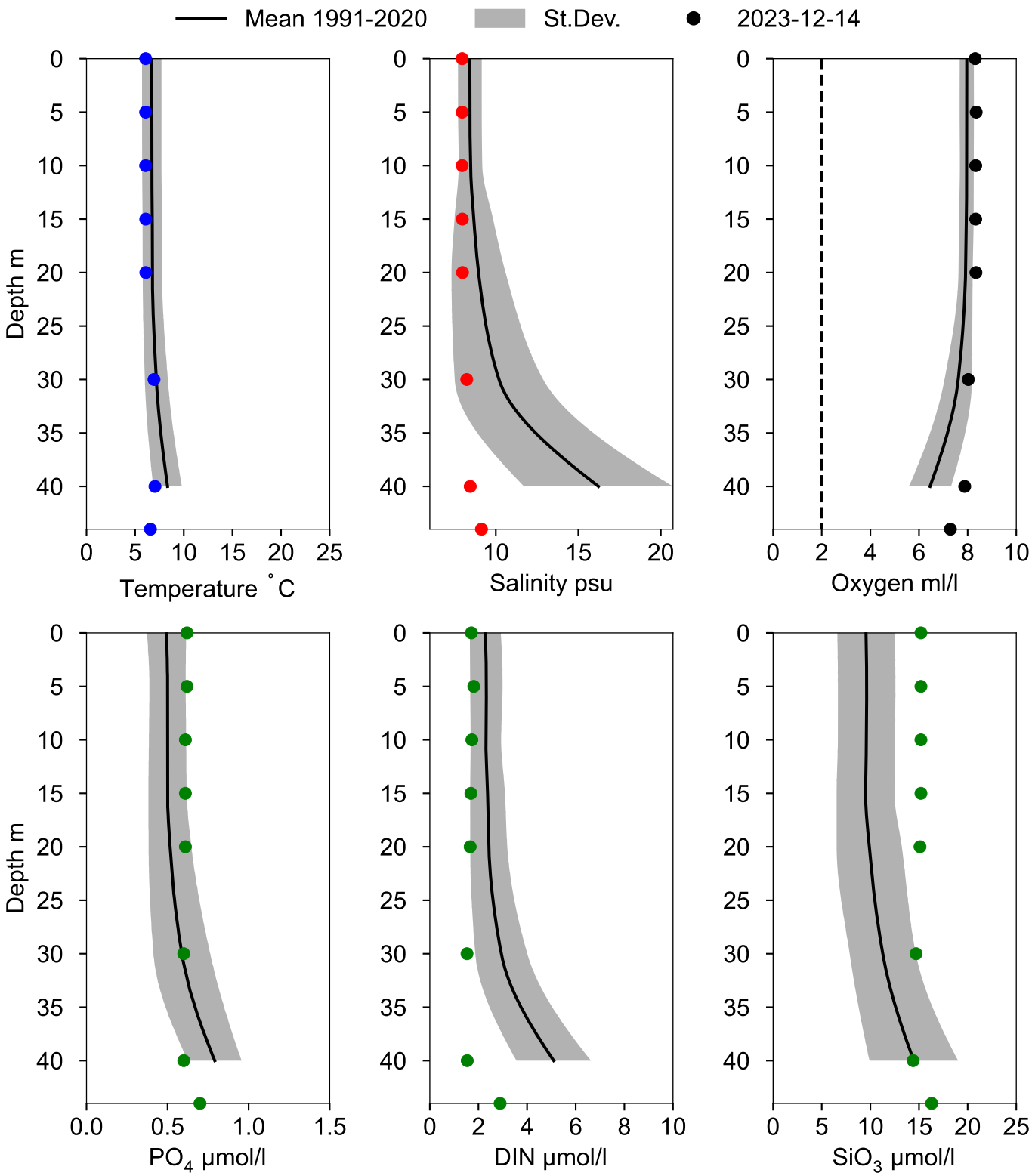
Annual Cycles



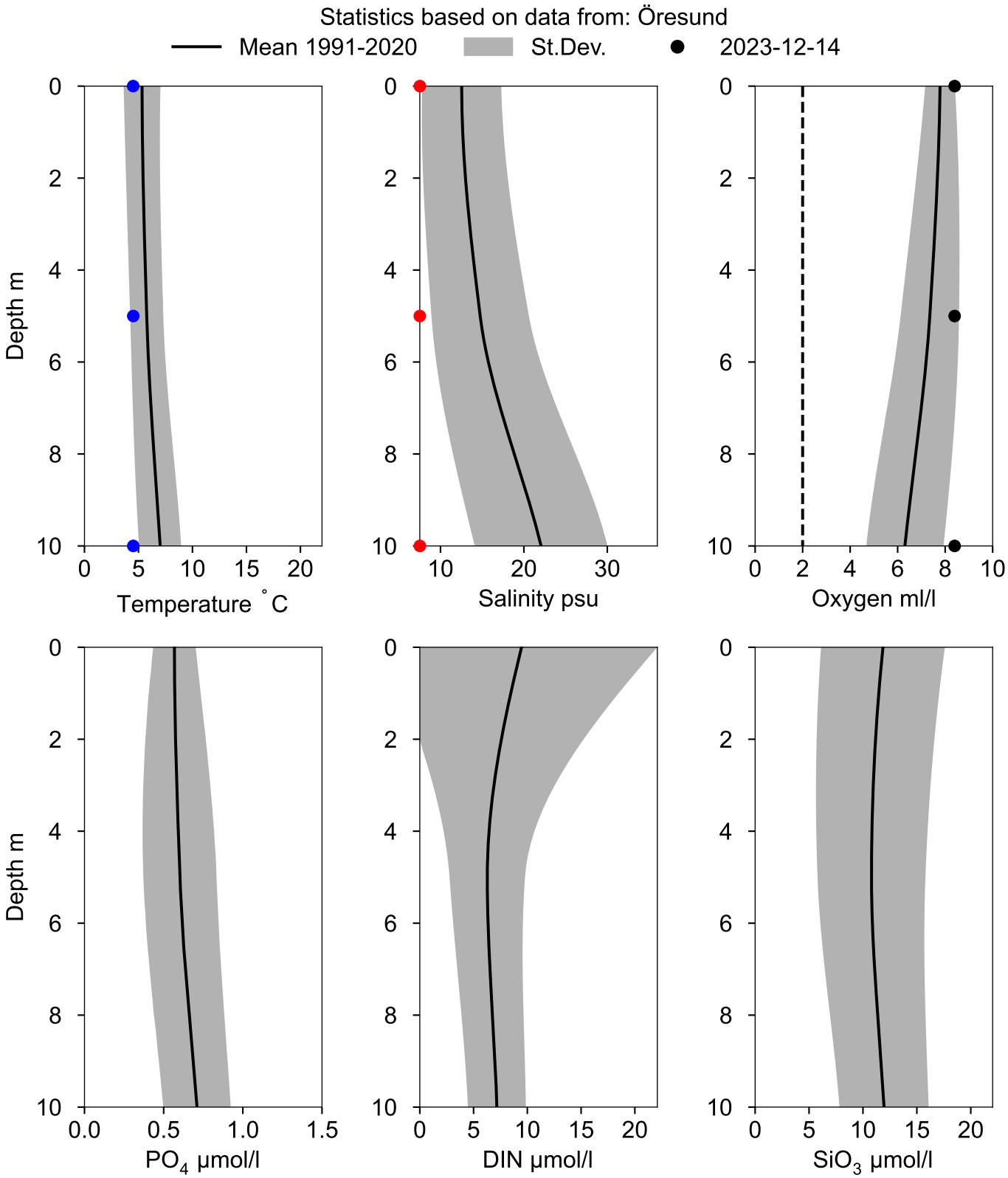
OXYGEN IN BOTTOM WATER (depth >= 39 m)



Vertical profiles BY1
December

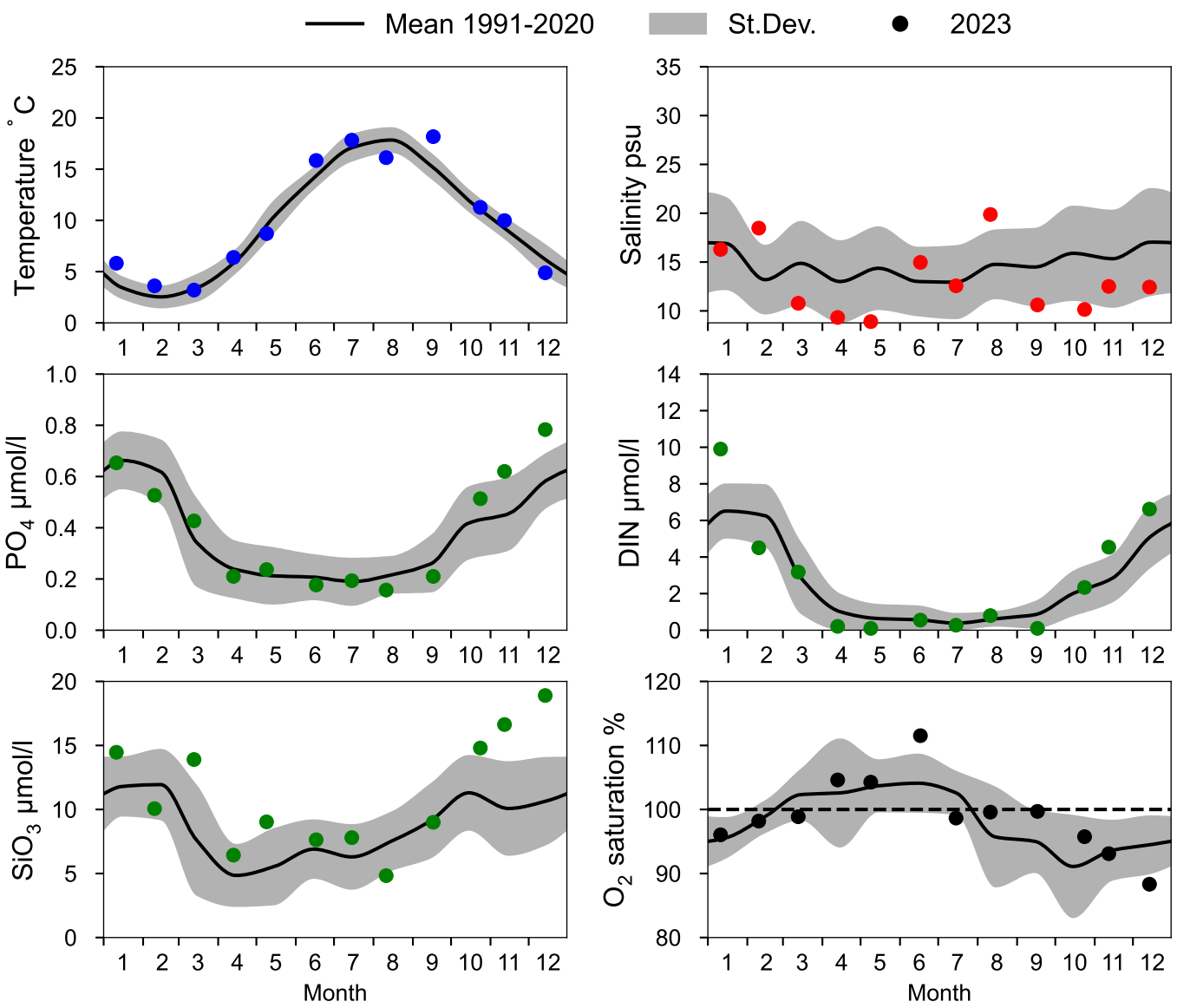


Vertical profiles FLINTEN7
December

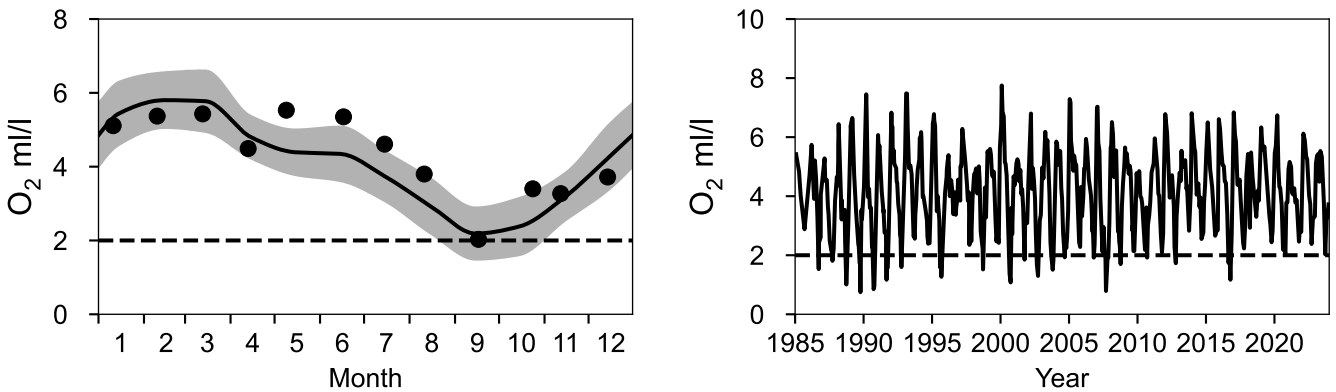


STATION W LANDSKRONA SURFACE WATER (0-10 m)

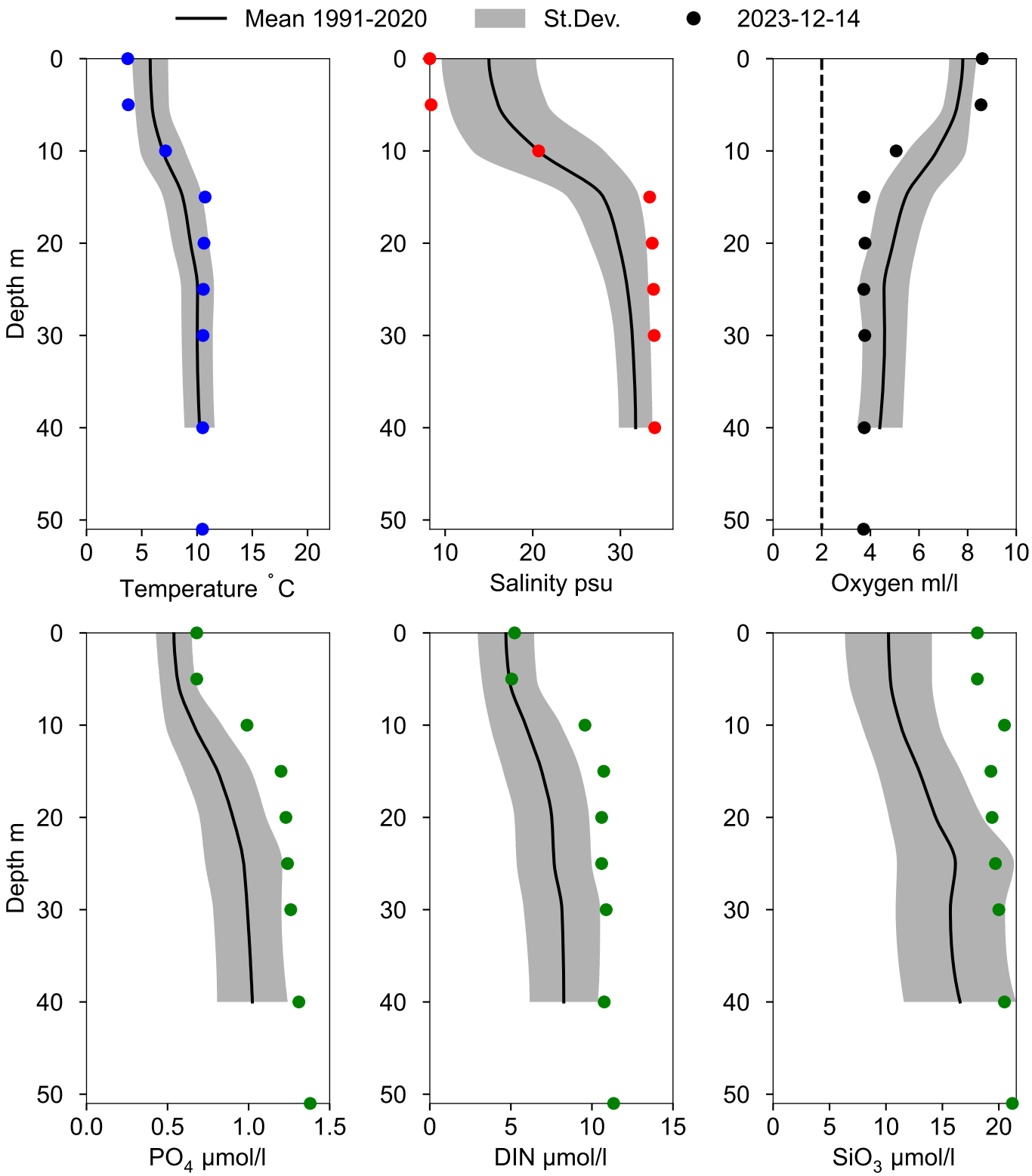
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

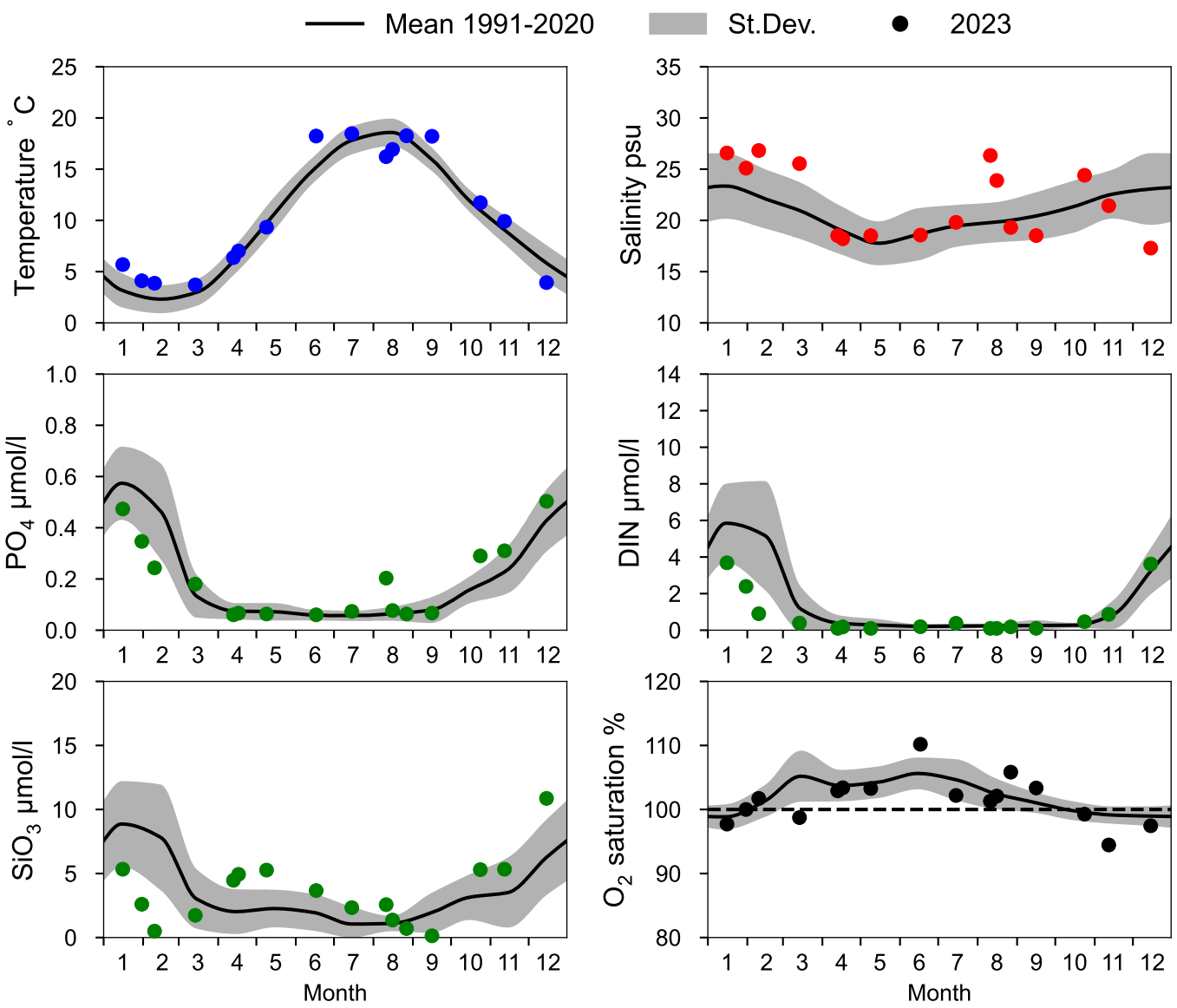


Vertical profiles W LANDSKRONA
December

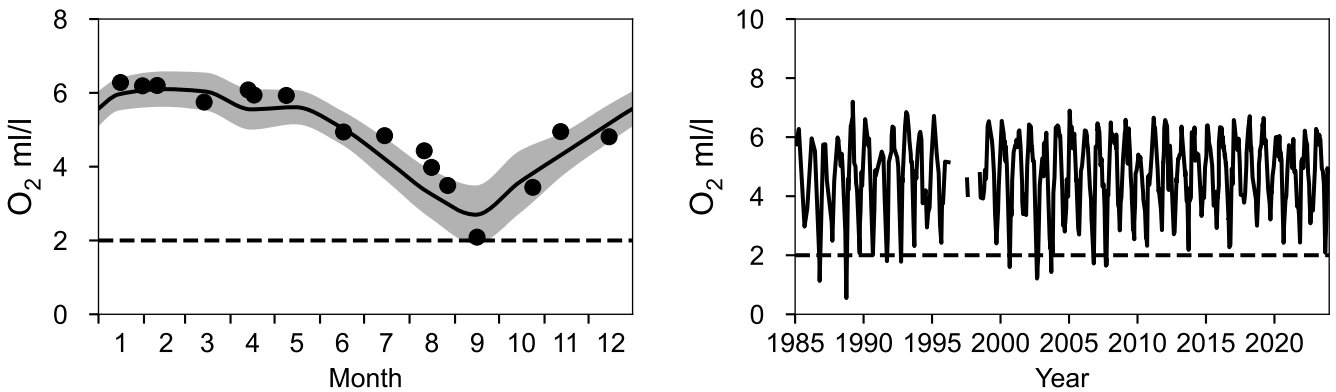


STATION ANHOLT E SURFACE WATER (0-10 m)

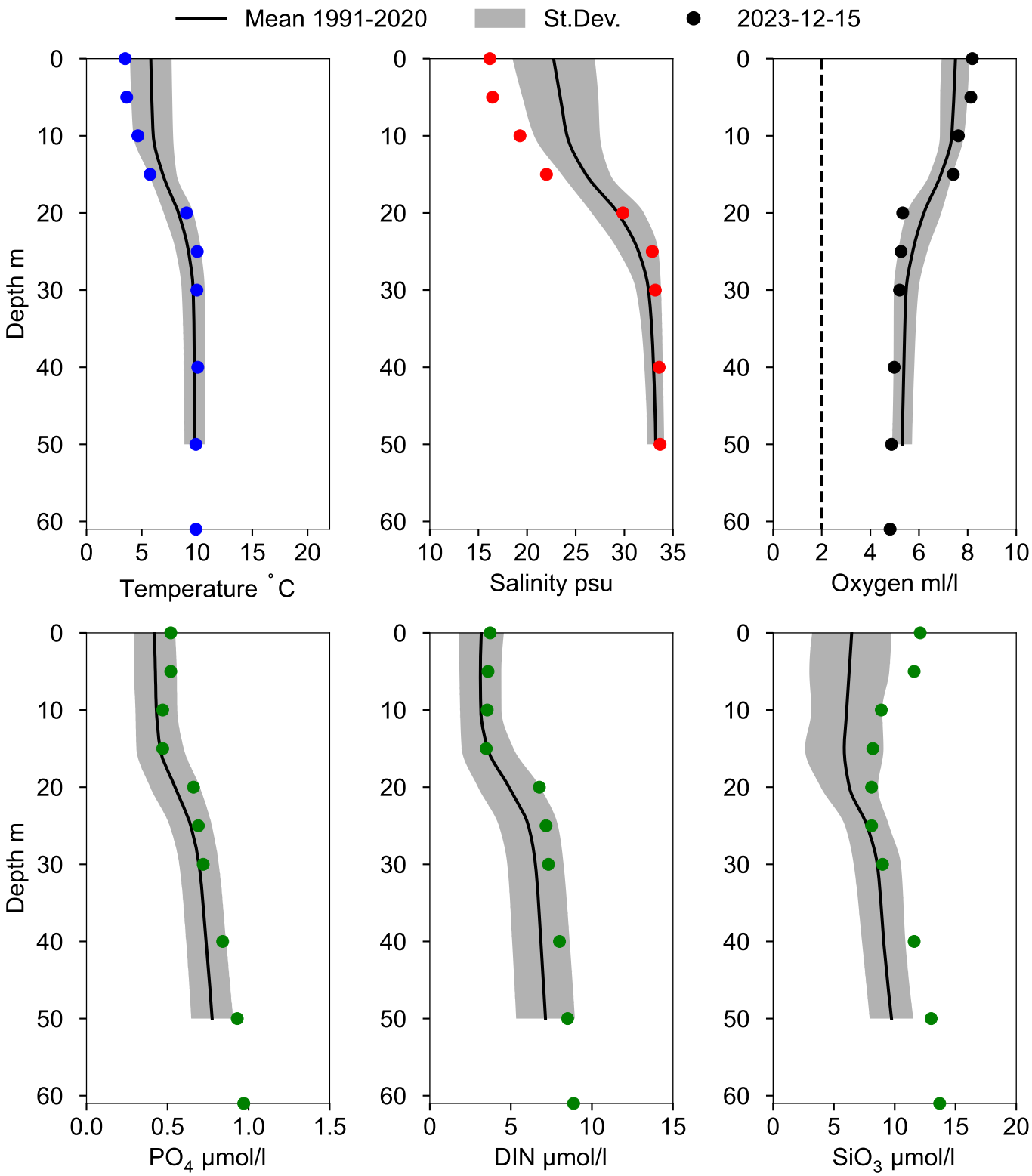
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 52 m)

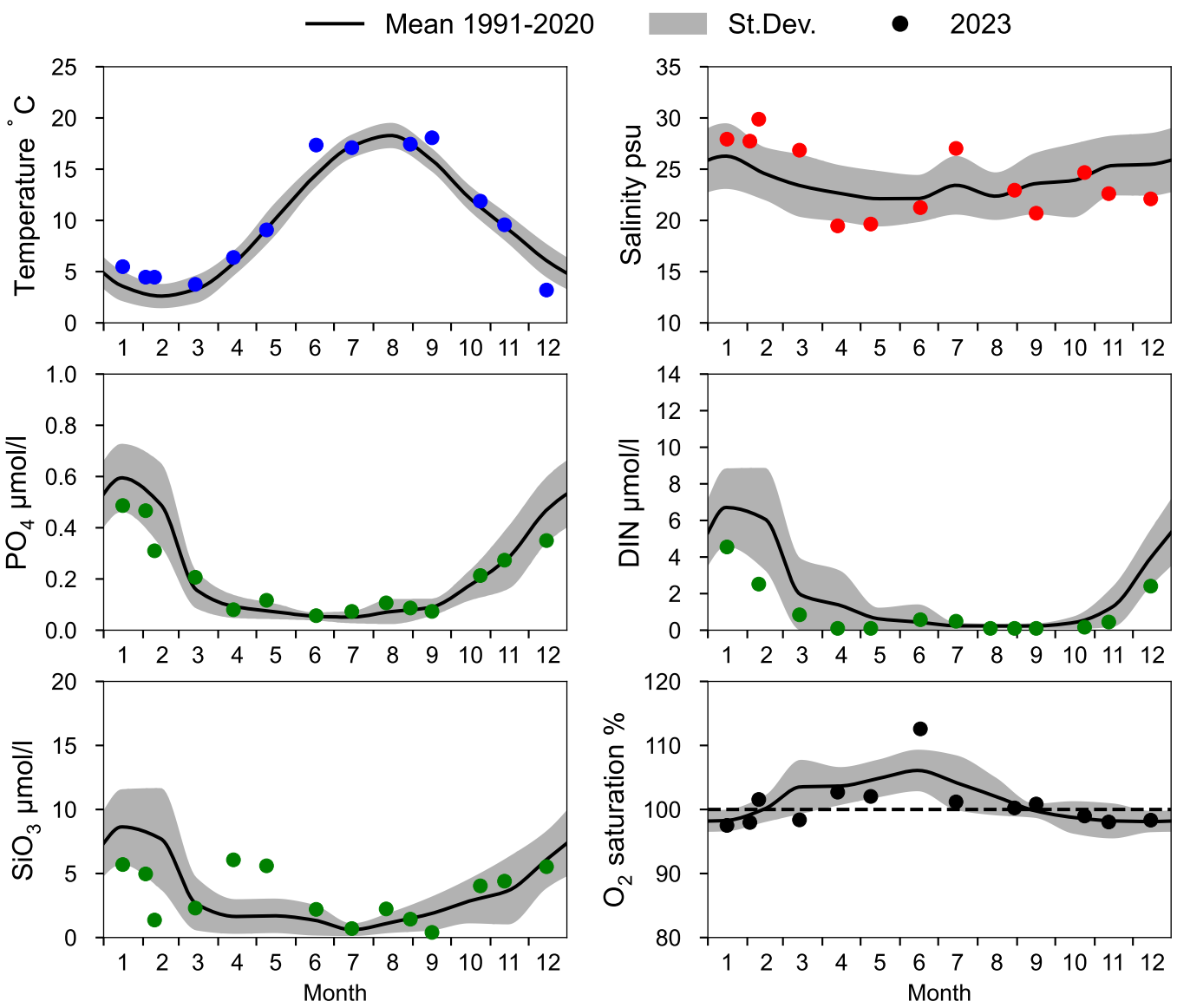


Vertical profiles ANHOLT E
December

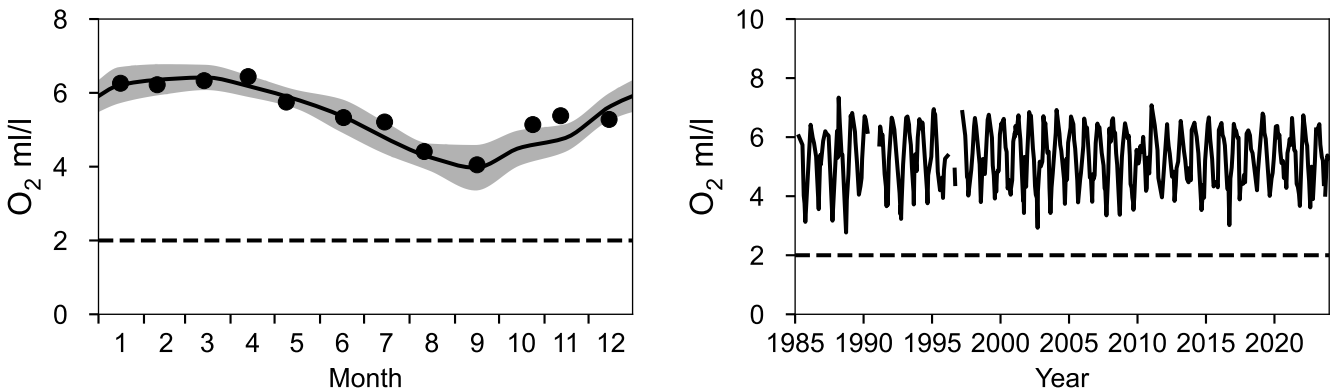


STATION FLADEN SURFACE WATER (0-10 m)

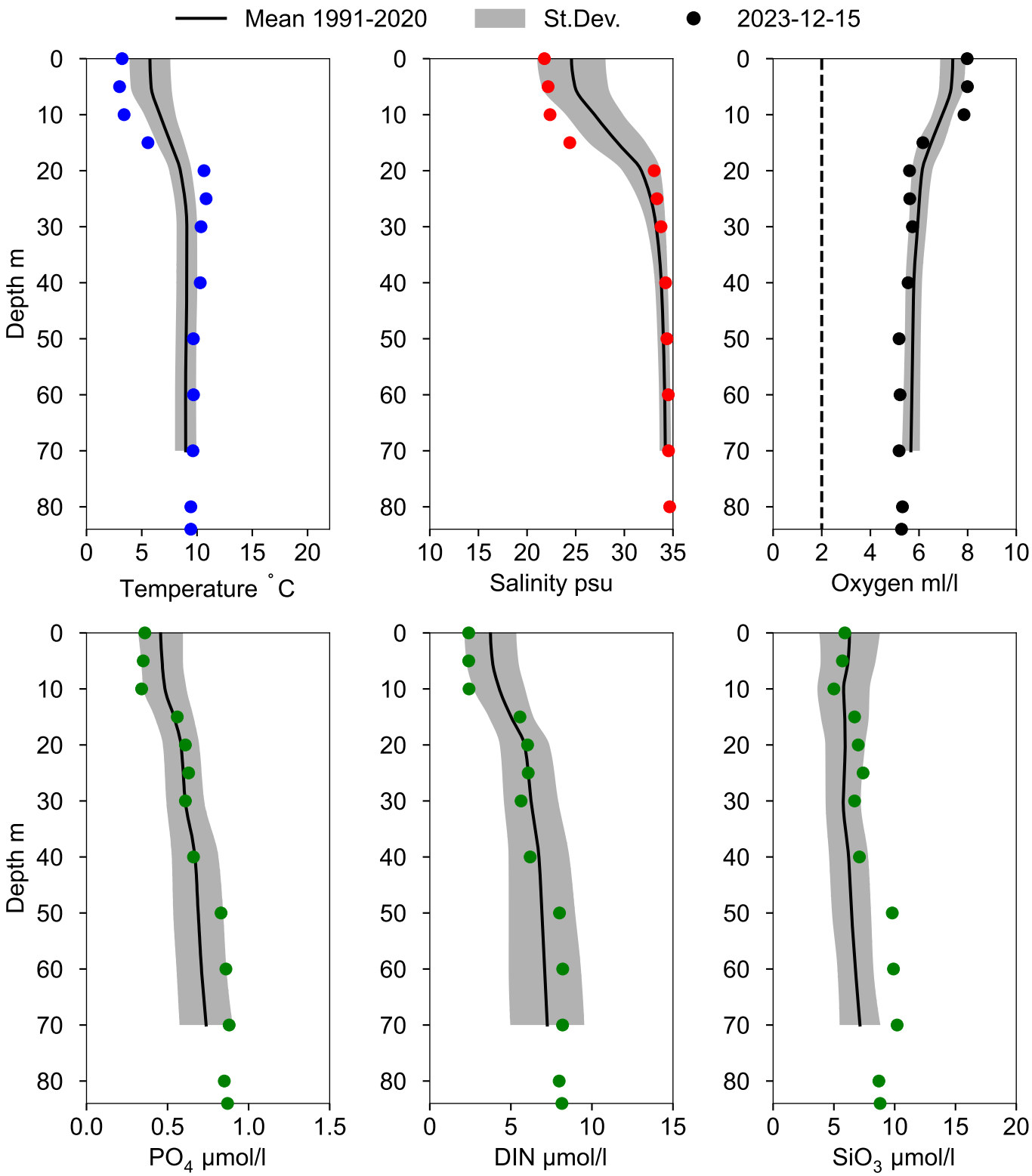
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 74 m)

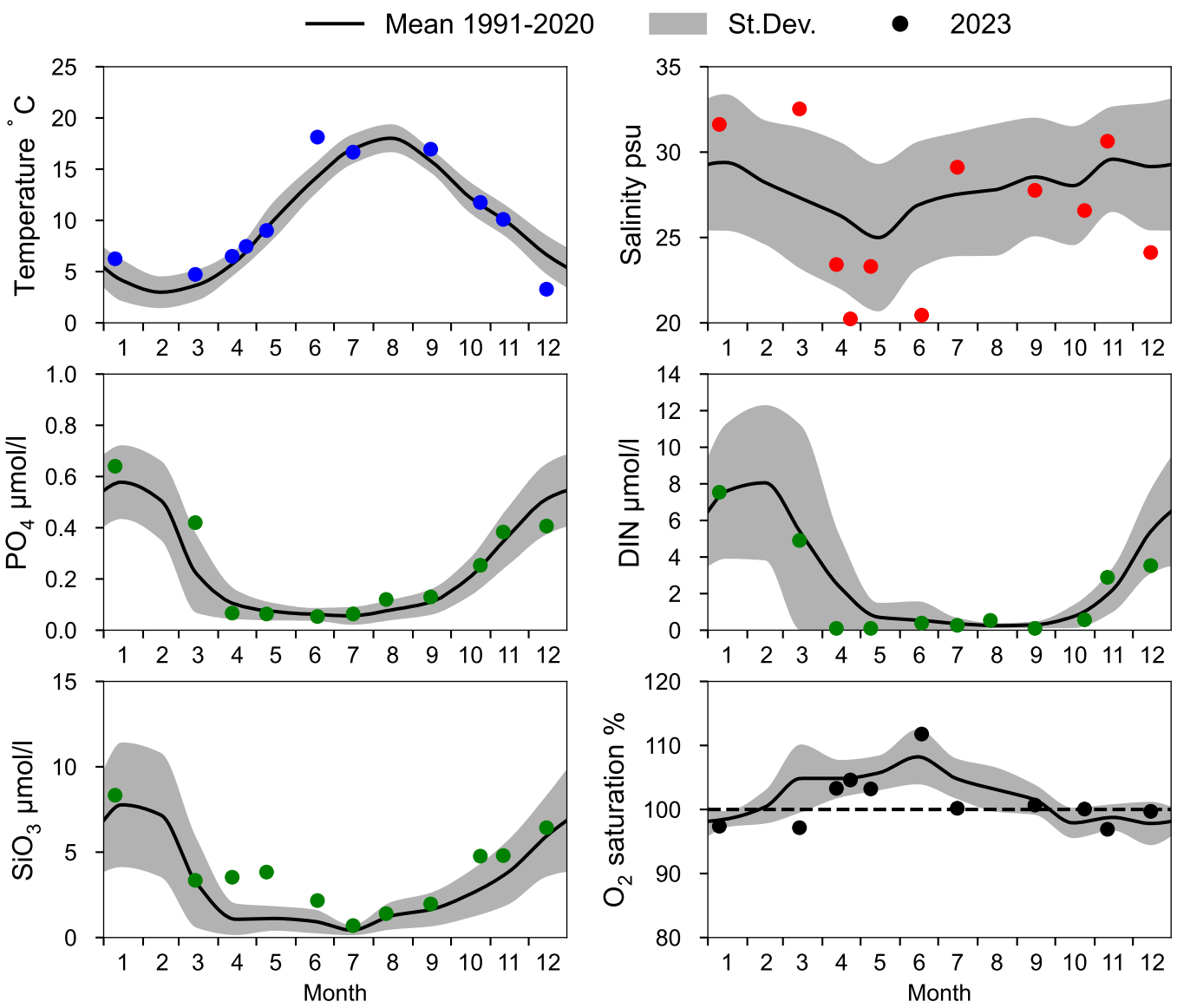


Vertical profiles FLADEN
December

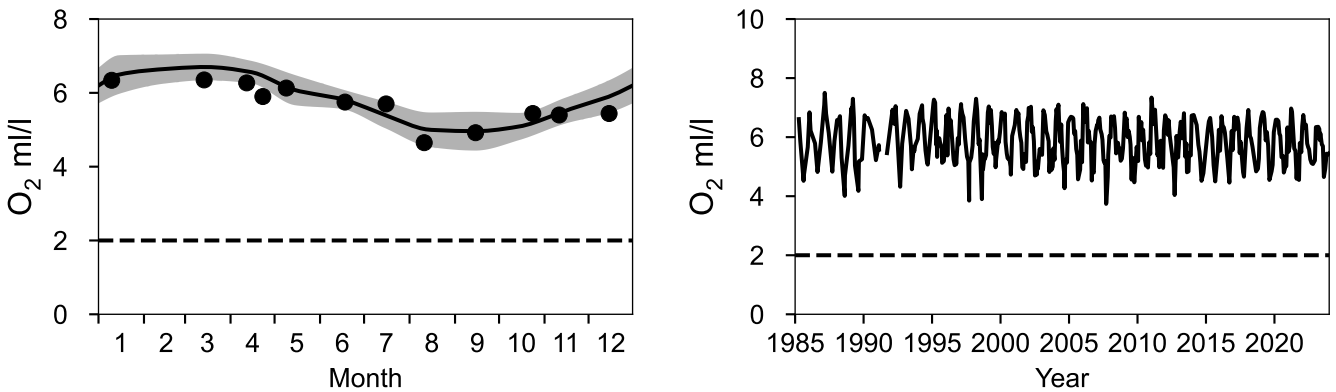


STATION P2 SURFACE WATER (0-10 m)

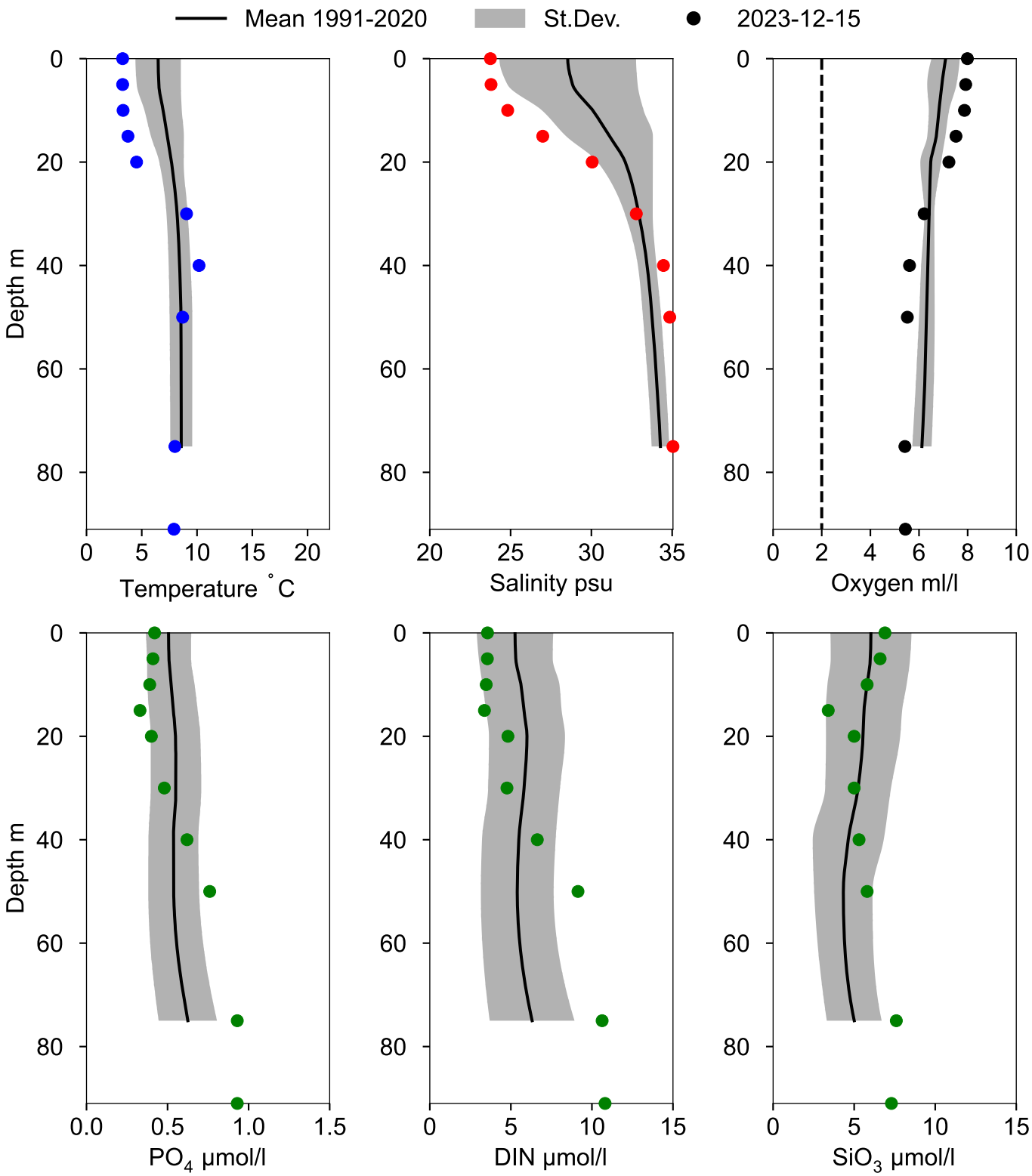
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 75 m)

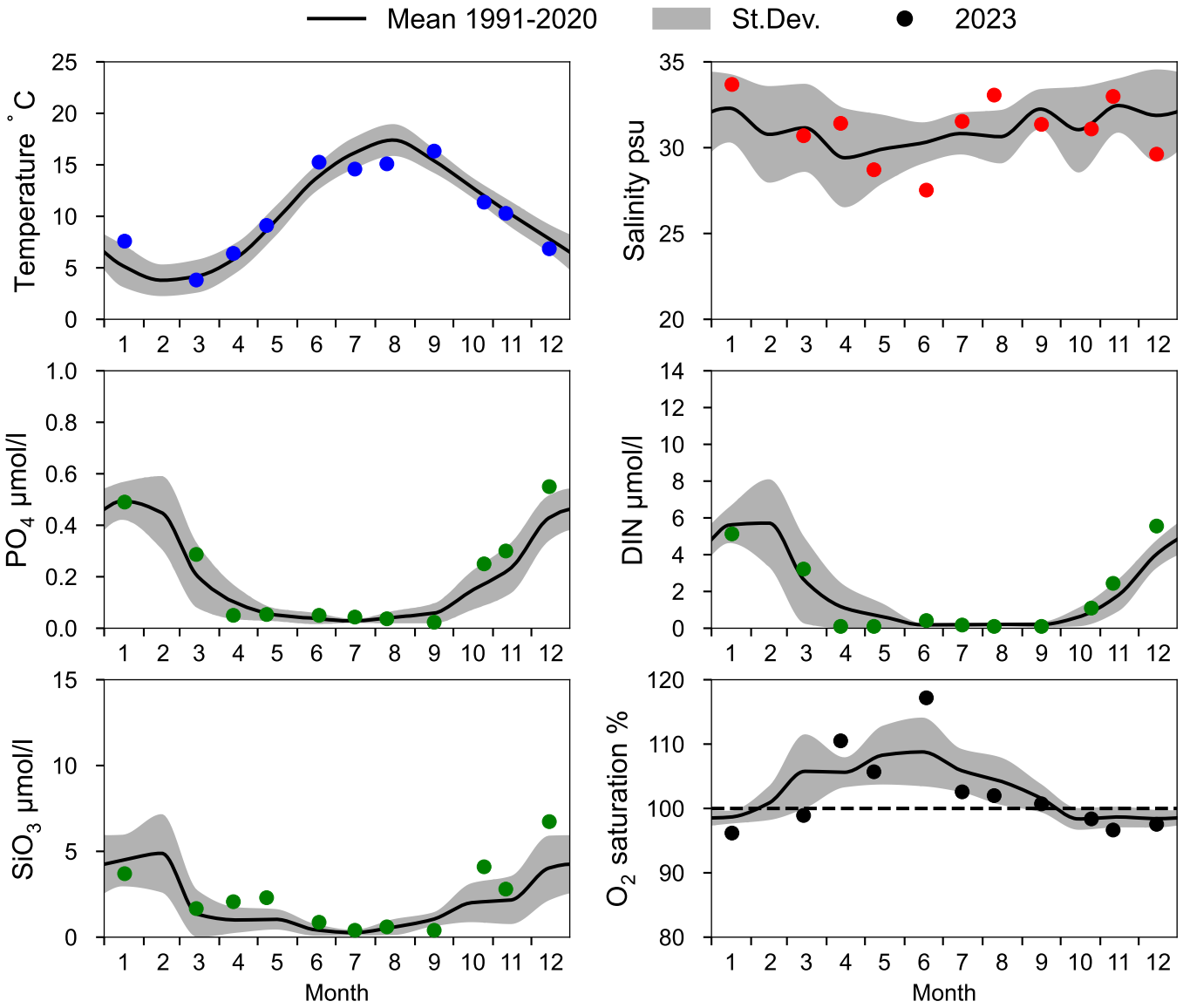


Vertical profiles P2
December

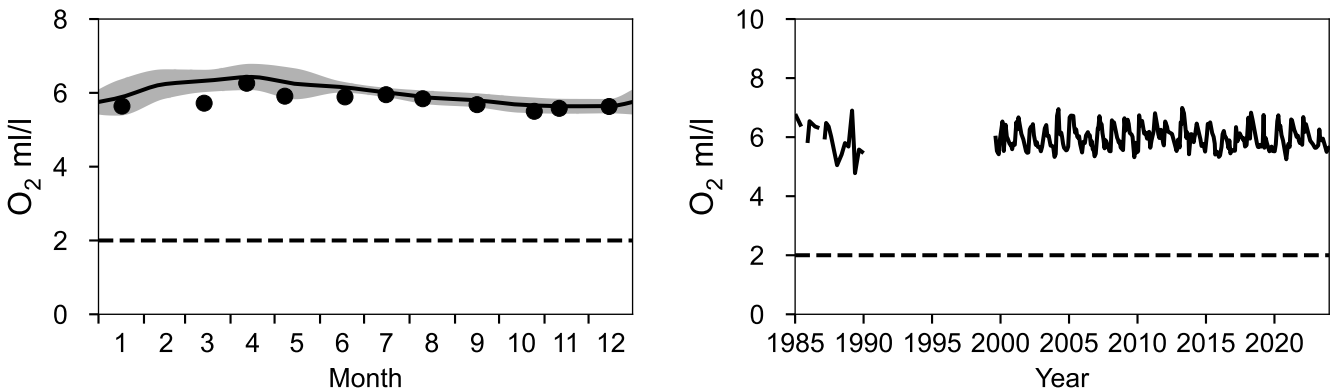


STATION Å17 SURFACE WATER (0-10 m)

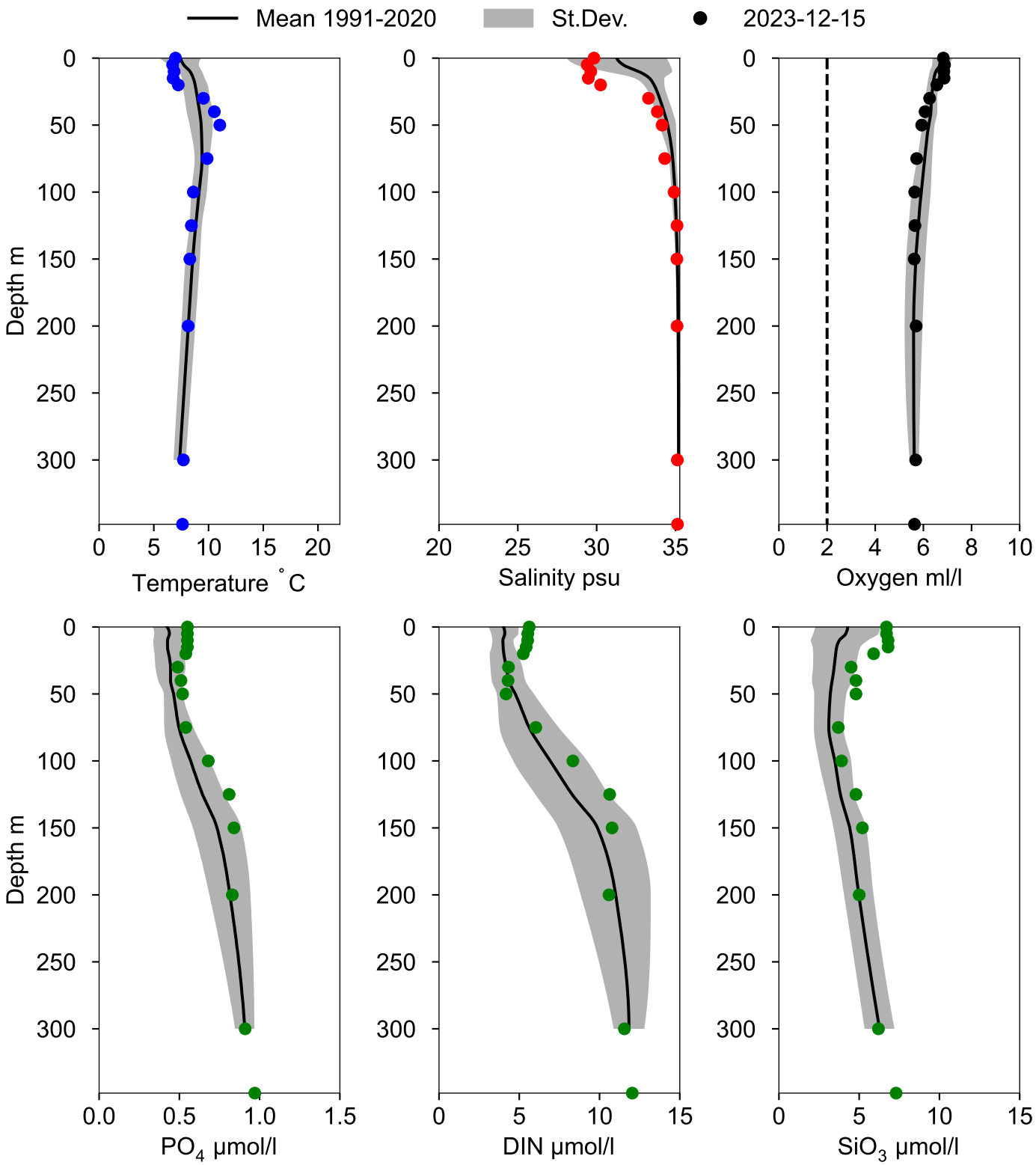
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 300 m)

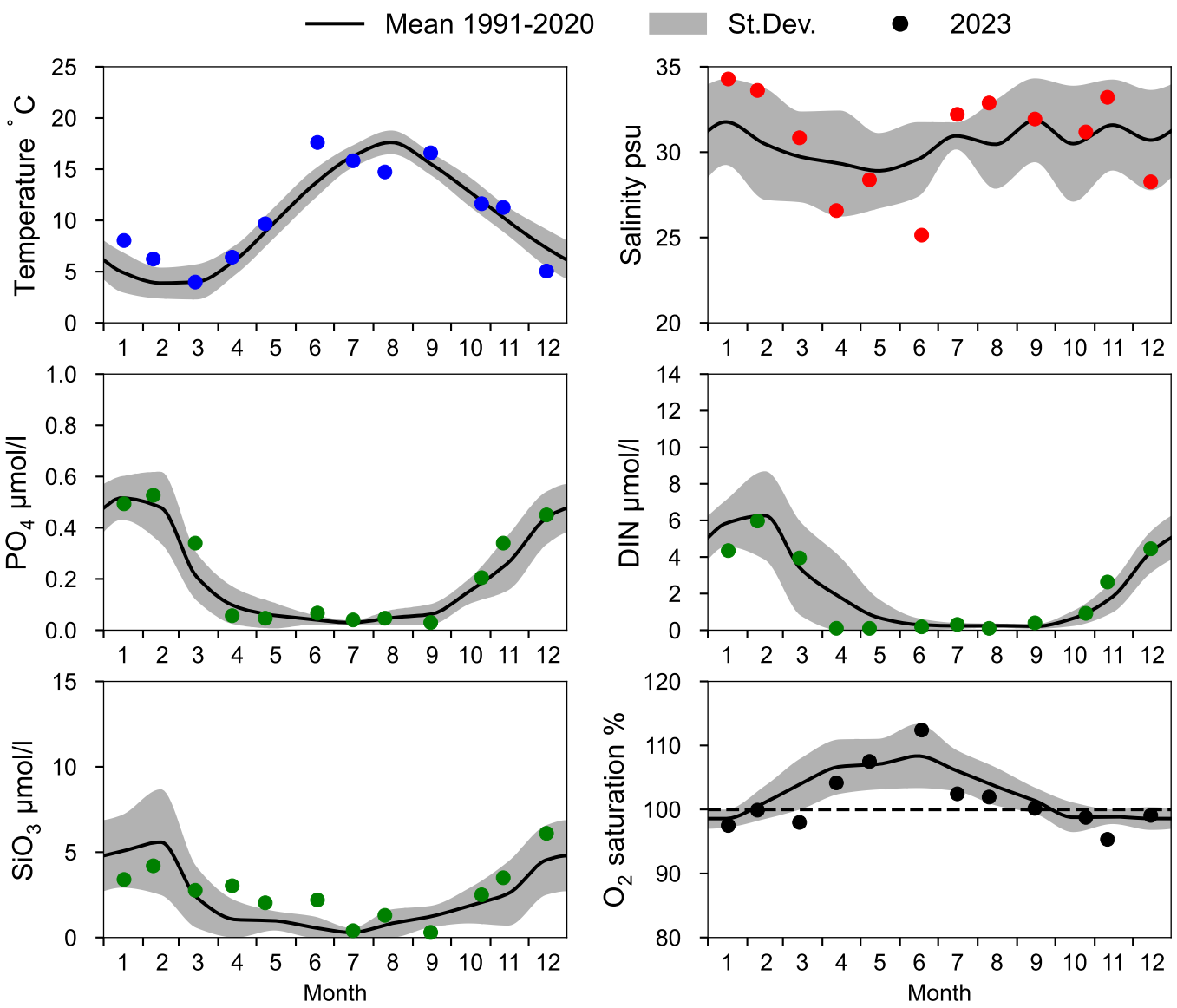


Vertical profiles Å17
December

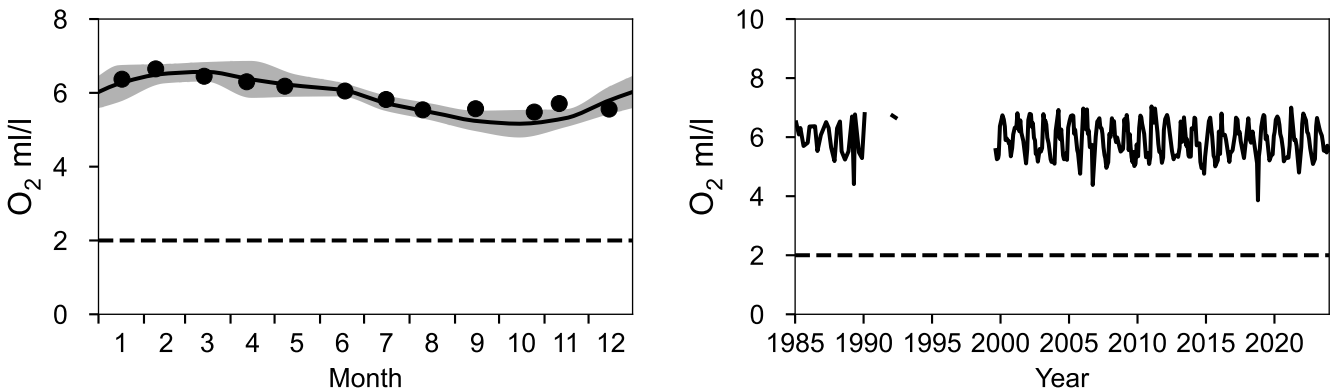


STATION Å15 SURFACE WATER (0-10 m)

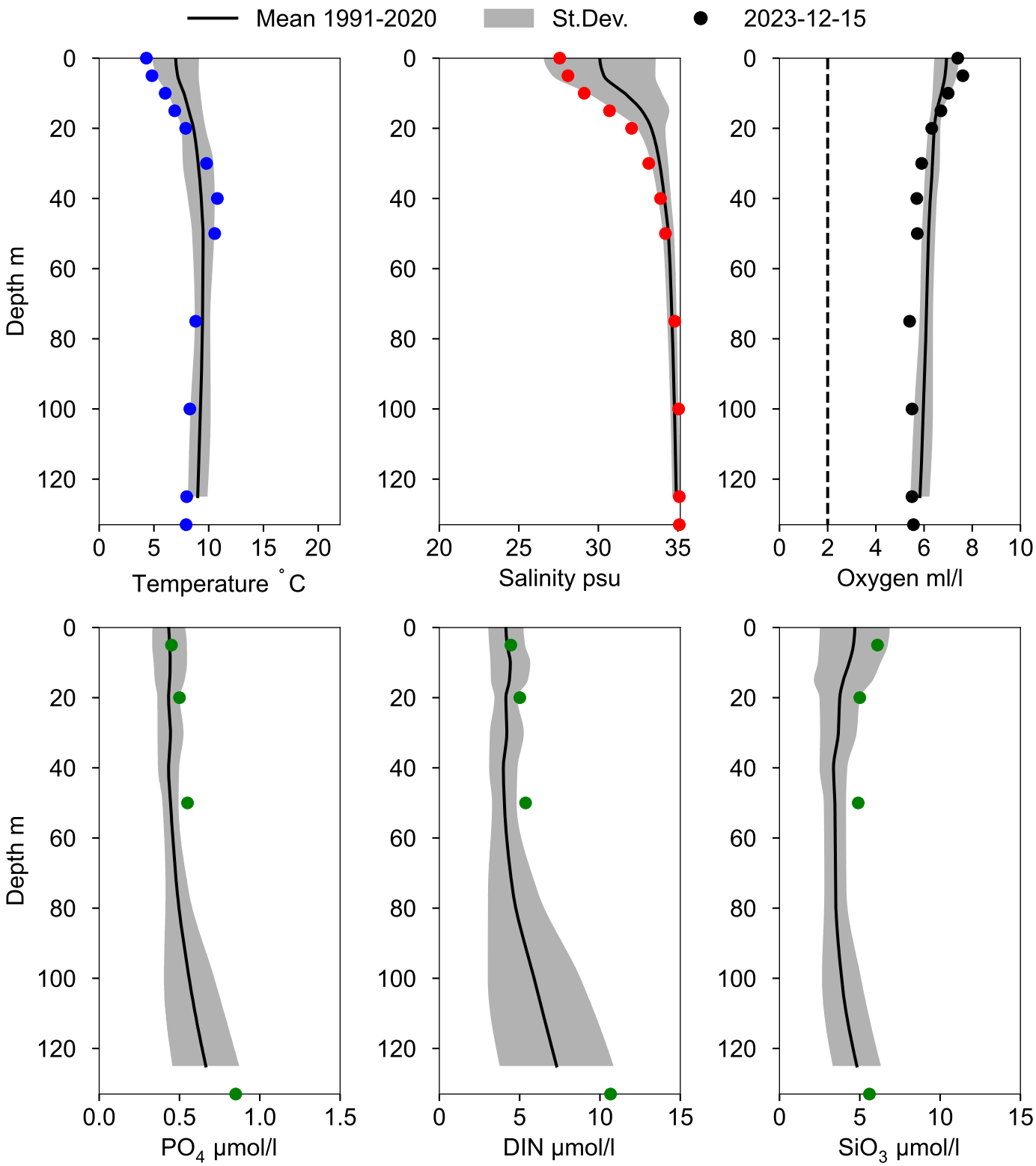
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

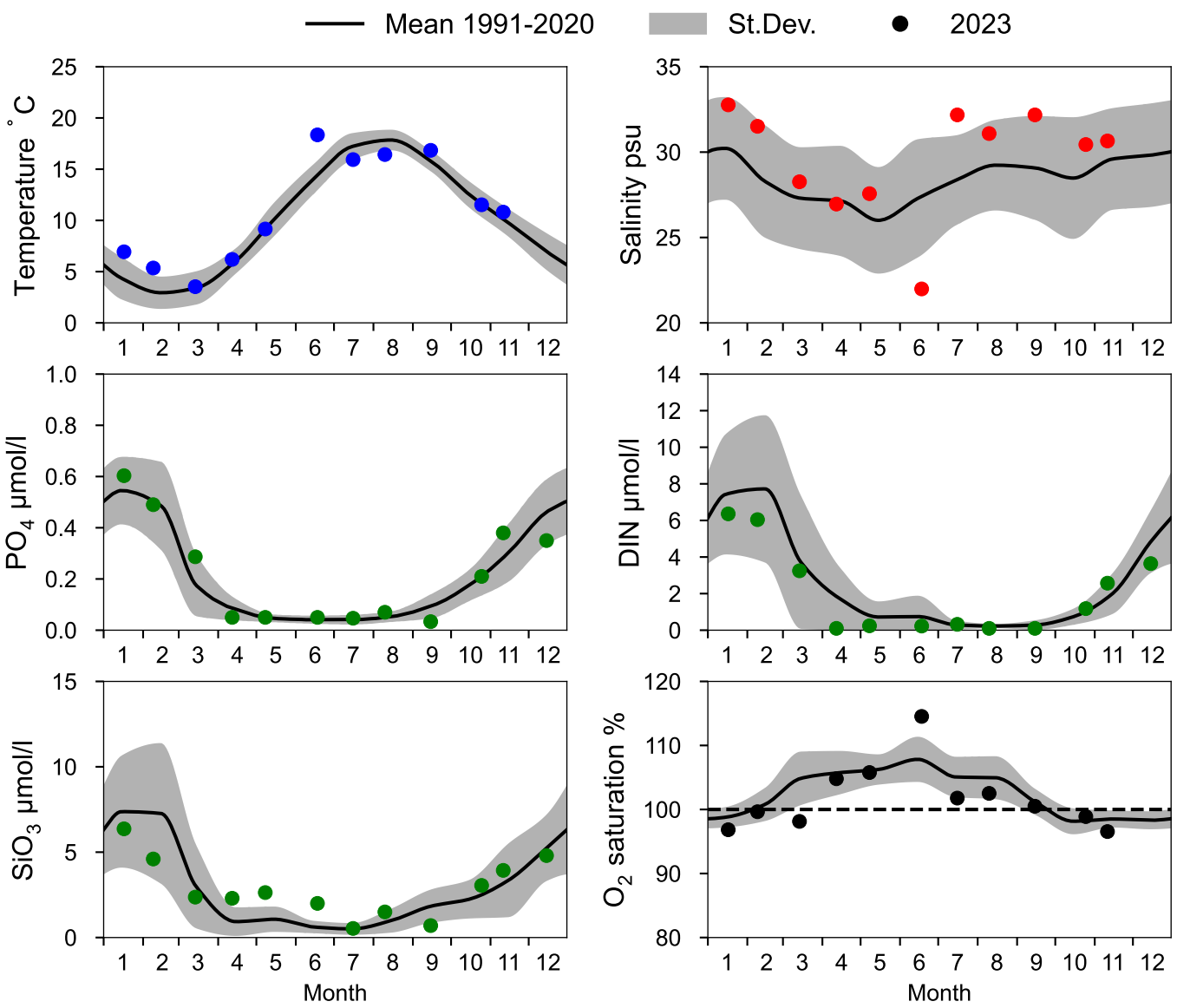


Vertical profiles Å15
December

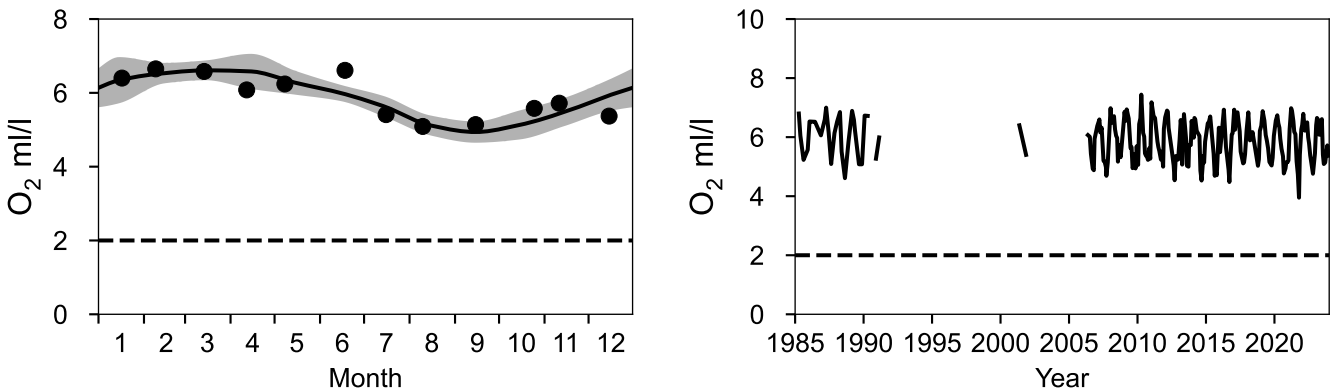


STATION Å13 SURFACE WATER (0-10 m)

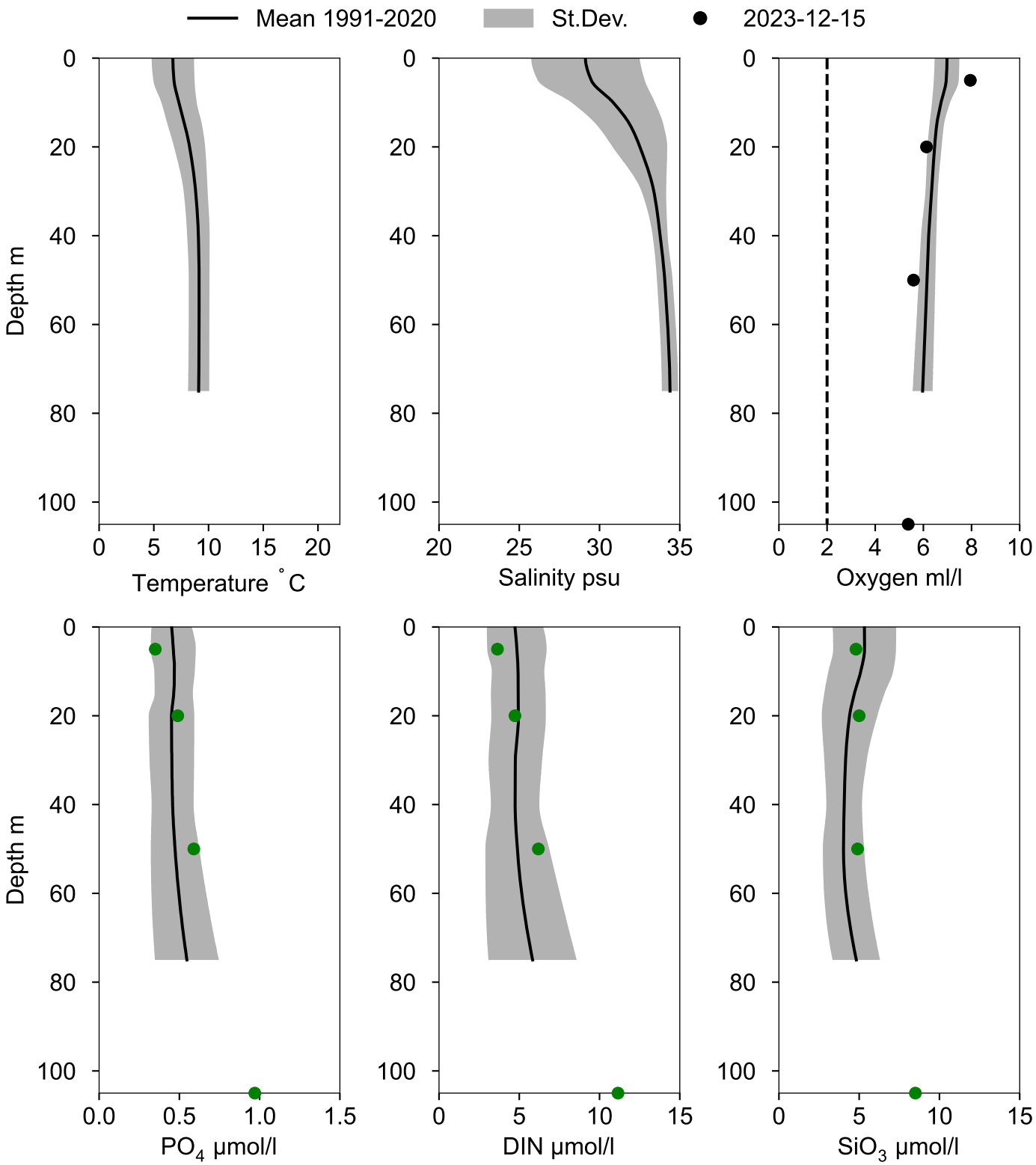
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 82 m)

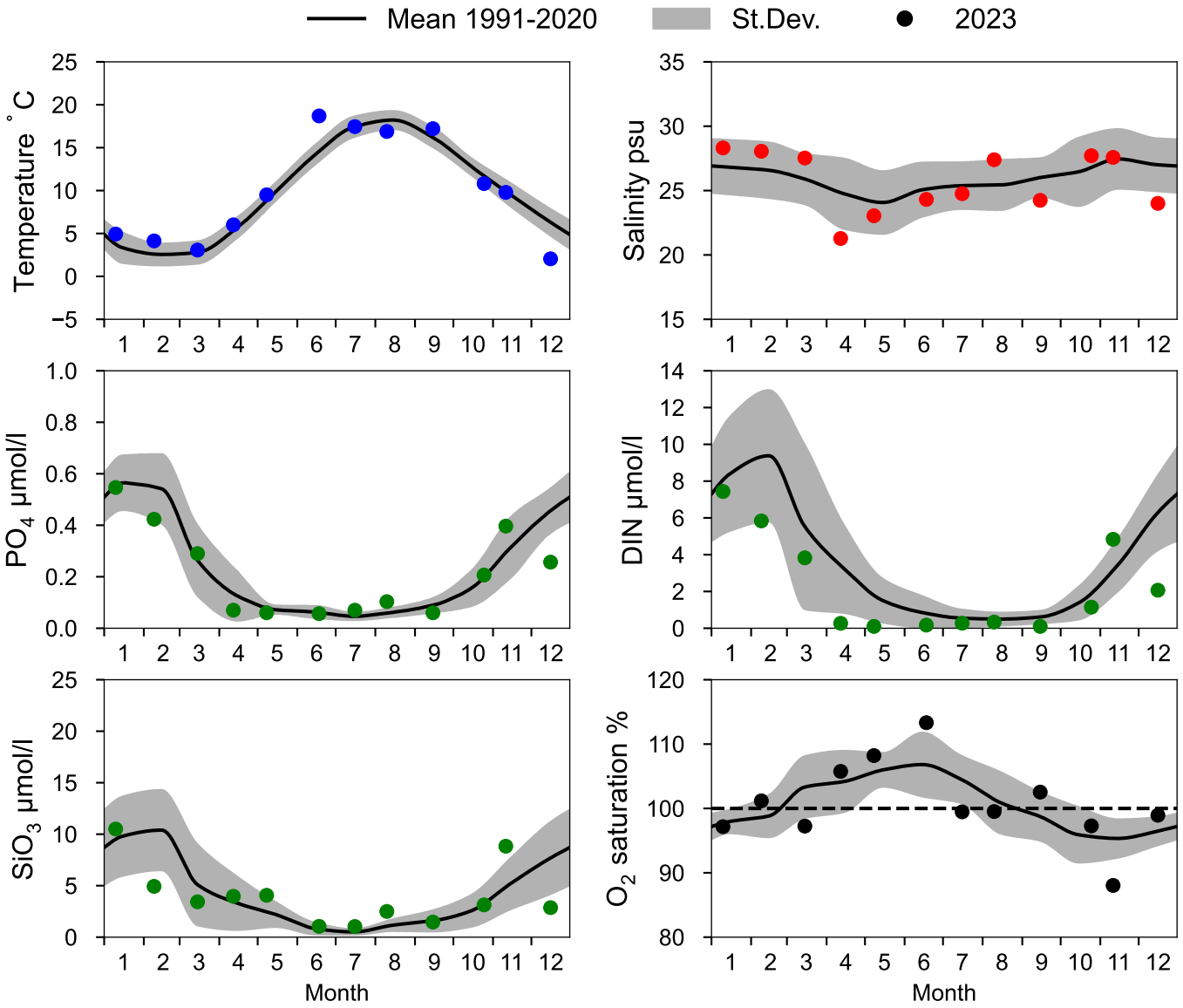


Vertical profiles Å13
December

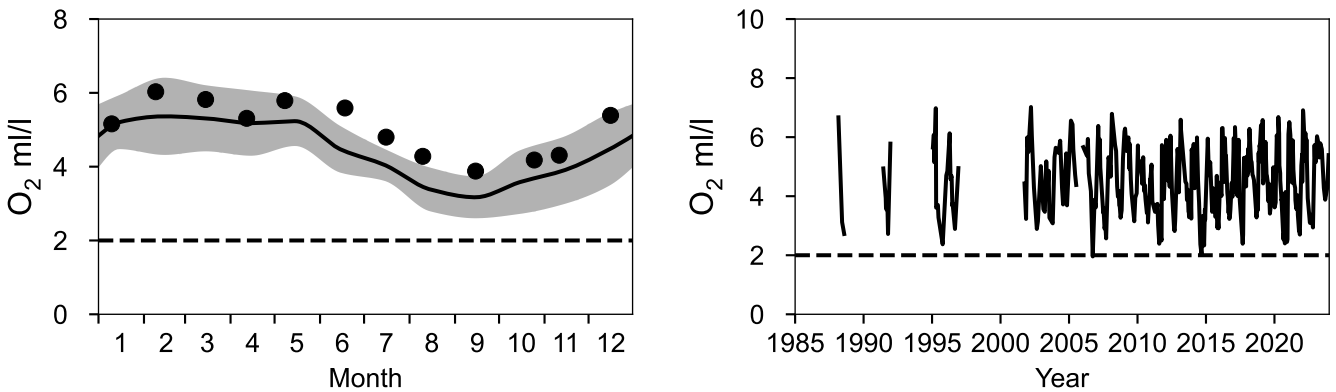


STATION SLÄGGÖ SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 64 m)



Vertical profiles SLÄGGÖ
December