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

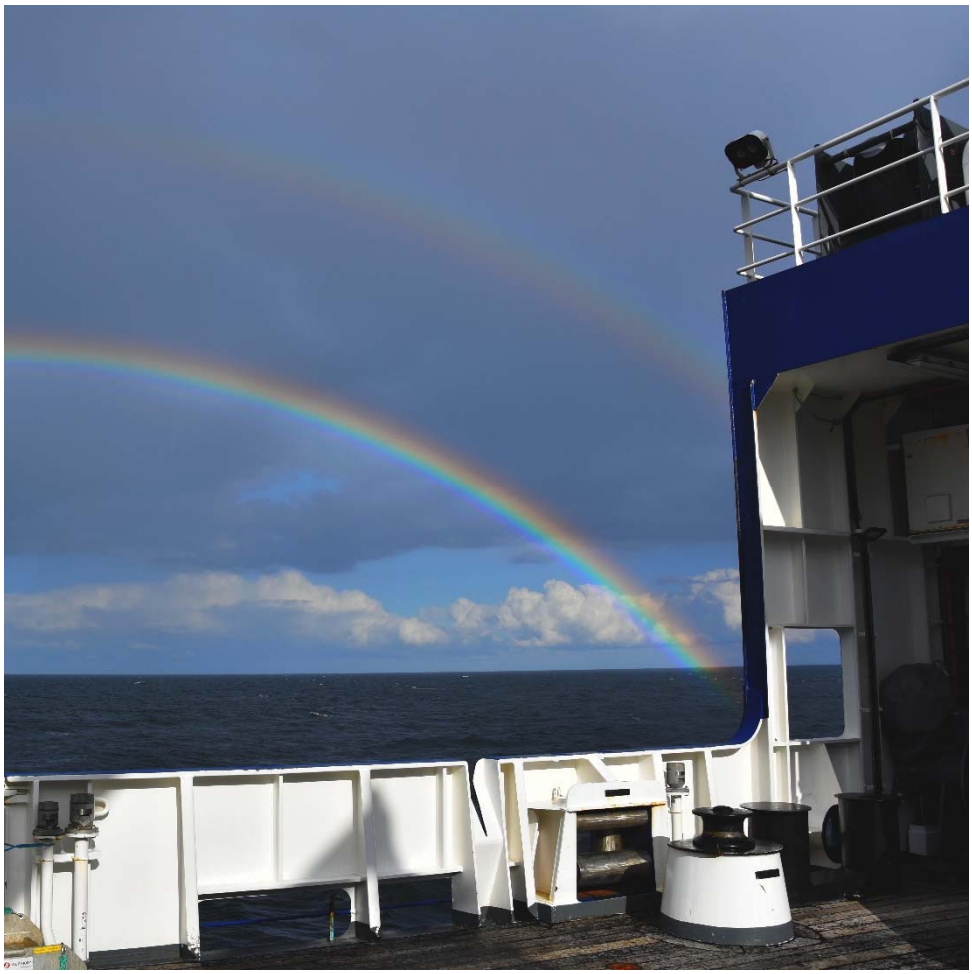

Photo: Johan Kronsell, SMHI

Survey period: 2024-06-02 - 2024-06-07

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)

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SUMMARY

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

The sunny and calm weather in May led to surface water temperatures increasing by up to 10°C since the previous expedition at stations in the Baltic Proper, and by 5–6°C in the Skagerrak and the Kattegat.

Concentrations of nutrients in the form of dissolved inorganic phosphorus (phosphate) and dissolved inorganic nitrogen in the surface water were, with few exceptions, normal for the season in the sea areas visited. For silicon in the form of silicate, concentrations were above normal in large parts of the Baltic Proper and the Sound, while in the Skagerrak and the Kattegat, normal or slightly below normal concentrations.

In the deep water it is mainly the deeper stations in the Baltic Proper that have concentrations of nutrients above normal, in particular dissolved inorganic nitrogen and silicon. Concentrations of silicon were at some stations in the Baltic Proper above normal at all sampled depth.

The oxygen situation in the Skagerrak and the Kattegat, as well as the Arkona Basin, was good. In Hanö Bay and the Bornholm Basin, as well as at the station in the south-eastern Baltic Proper, acute oxygen deficiency (<2 ml/l) was recorded. In both the Western and Eastern Gotland Basins, acute oxygen deficiency occurred at a depth of 70 meters. And hydrogen sulphide was present at 80 meters in the Western Gotland Basins, and at 90-meters depth in the Eastern Gotland Basins. In several cases, hydrogen sulphide concentrations were above normal.

The next scheduled expedition with the vessel Svea is planned for July 13–19, starting in Falkenberg and ending in Lysekil.

RESULTS

The expedition was carried out on board the R/V Svea and started in Kalmar on the evening of June 1st, and ended in Lysekil on the 7th of June.

During the beginning of the expedition the winds were mainly light to moderate, while towards the end of the expedition they were moderate to fresh. The wind direction was variable at first, but towards the end predominantly south-westerly. The air temperature remained between 10–18 °C, with the highest temperatures measured at the beginning of the cruise.

At all stations, surface water was sampled for a project where algal toxins produced by cyanobacteria are studied. The project is a collaboration between SMHI, SLU and the Swedish Food Agency, and sampling is also planned to be carried out during the expeditions in July, August and September.

Svea's Ferrybox, used for continuous surface water measurements, was in operation throughout the expedition. Between two stations in the south-eastern Baltic Sea, Svea's MVP (Moving Vessel Profiler) was used, providing profiles of temperature, salinity, oxygen, and chlorophyll fluorescence while underway.

At two stations in the Baltic Proper, BY38 and BY2, additional samples were taken as part of a collaboration with VOTO. Water samples from standard depths from the surface down to 30 meters, were collected to investigate the presence of cyanobacteria in the water column, with the aim of determining if future cyanobacteria blooms can be predicted. Measurements will also be conducted during the expeditions in July and August.

Samples were also taken as part of the AMIME project. Water samples were collected from the Ferrybox, and images were captured using the IFCB. Measurements for the project will be carried out during the expeditions in July-September as well. Additional phytoplankton samples from surface water were collected at the stations Anholt E, Å17, and Släggö for Uppsala University. At Anholt E, extra samples of microzooplankton were also collected for Gothenburg University.

This report is based on data that has undergone initial quality control and is compared against the monthly average for the period 1991–2020. After further quality review, some values may change. The values reported have been rounded to the nearest tenth and may therefore differ from published values. Data is published as soon as possible on the data host's website. Some analyses are conducted post-expedition and are published later, thus not included in this report.

Information about SMHI's data hosting service and to download data:
https://www.smhi.se/en/services/open-data/national-archive-for-oceanographic-data/download-data-1.153150

More information about the algal situation is available in the Algaware-report:
https://www.smhi.se/en/publications/publications/algal-situation-reports-2-1056

The Skagerrak

The surface water temperature (0–10 m) in the Skagerrak had increased by about 5°C since the previous expedition, now ranging between 14–15°C, which is normal for June. The salinity in the surface water at the westernmost station, Å17, was below normal at approximately 26 psu, while the other offshore stations showed normal or above normal salinity levels, ranging from 31–33 psu. At Släggö, which is closer to the coast, a salinity of 25 psu was recorded. The stratification of temperature and salinity coincided and was distinct at several stations, observed at depths of 10–20 meters.

Concentrations of nutrients in the surface water, in the form of dissolved inorganic nitrogen (DIN), were very low at the northern stations, and only at Släggö and P2 were levels above detectable limit, at 0.91 and 0.17 µmol/l, respectively. However, all values were normal for the season. Concentrations of dissolved inorganic phosphorus (DIP) in the form of phosphate were also low, which is typical for this time of year. Measured levels ranged from 0.02 to 0.06 µmol/l, with the highest level recorded at Släggö. Silicon concentrations in the surface water were normal or below normal. Offshore, concentrations ranged from 0.10 to 0.13 µmol/l, and at Släggö, the level was 0.50 µmol/l. Nutrient concentrations in the deep water were generally within normal ranges.

Chlorophyll fluorescence measurements from the CTD, which indicate phytoplankton activity, showed a peak at 5 meters depth at Släggö, while at Å17, a peak was found at around 15 meters, just below the thermocline. At the other stations, levels were more even, and at P2, the activity remained nearly constant from the surface down to just over 50 meters. Secchi depth was only measured at Släggö, where it was just 4 meters.

Oxygen conditions in the bottom water of the Skagerrak were good, with values close to 6 ml/l at the offshore stations and 4.6 ml/l at the coastal station Släggö. These values were normal for the season at all stations.

The Kattegat and the Sound

The surface water temperature in the Kattegat was around 16°C, which was slightly above normal for Fladen and Anholt E. At the station in the Sound, the surface water temperature was just under 13°C, which was below normal. For the Kattegat, this was an increase of 5–6°C since the previous expedition, and for the Sound, it was an increase of just over 2°C. Surface salinity in the Kattegat was normal for the season, ranging from 17.3 to 19.9 psu, whereas in the Sound, it was above normal with 21.6 psu. At all stations, a distinct halocline and thermocline were present at depths of 8–20 meters. The higher surface salinity (0-10m) in the Sound compared to the Kattegat is due to the shallower stratification in the Sound, which means that the water below the halocline, influenced the reported salinity. Below the halocline, all stations showed uniform salinity levels, with bottom salinities ranging from 33.7 psu in the Sound to 34.6 psu in the northern Kattegat.

Nutrient levels in the form of DIN and DIP were low in the surface water at all stations in the Kattegat, which is typical for this time of year. Silicon levels were normal for the season in the Kattegat, with

values ranging from 1.9 to 3.0 µmol/l. In the Sound, both DIN and DIP concentrations in the surface water were above normal. Silicon levels were also higher than normal for the season. The reason for the elevated nutrient levels in the Sound's surface water was the shallow surface stratification, which means that the water below the stratification, which normally contains higher nutrient concentrations, affected the reported results. This is clearly evident in the vertical profiles for W Landskrona.

In the deep water, nutrient levels were mostly normal of nutrients, but silicon levels in the Sound were above normal from 10 meters down to the bottom. Levels of DIN and DIP were also above normal at depths of 10–15 meters in the Sound.

Measurements of chlorophyll fluorescence indicated an activity peak coinciding with stratification at all stations in the Kattegat. This was particularly pronounced at Anholt E and N14. In the Sound, no activity peak was observed; instead, the chlorophyll fluorescence level was uniform from the surface down to the stratification. The Secchi depth was 6 meters.

Oxygen conditions at the bottom waters of both the Kattegat and the Sound were good, with levels between 5.6–5.9 ml/l in the Kattegat and 4.5 ml/l in the Sound.

The Baltic Proper

Surface water temperatures were above normal for the season at most stations in the Baltic Proper. At several stations, the temperature ranged between 14–15°C. In the Western Gotland Basin, temperatures were slightly lower and normal for the season, while at BY31 below normal at just under 10°C. In Hanö Bay and at BY4, surface temperatures were also normal. Compared to the previous expedition, there was a significant increase in temperature; at BY29 in the northern part of the Eastern Gotland Basin, the temperature in May was 4.6°C compared to 15.1°C in June.

Surface water salinity was normal or above normal at the northern stations and normal or below normal at the southern and southwestern stations. Salinity varied between 7–8 psu, except in the Western Gotland Basin where it was slightly below 7 psu. The highest surface salinities were measured at BY15 and BY10, just below 7.4 psu. At BY29 in the north, salinity was above normal from the surface down to a depth of 50 meters.

At some stations, a well-mixed surface layer with uniform temperature was found down to 10 meters, while at others, a homogeneous surface layer was absent. This may be due to some mixing caused by the vessel during measurements, which could affect thin surface layers. The more permanent stratification of both temperature and salinity was observed at depths of 60–80 meters in both the Eastern and Western Gotland Basins. In these basins, deep water temperatures were often above normal, as shown in vertical profiles from stations such as BY31 and BY29. In the shallower basins in the south and southwest, stratification was not as deep, and more homogeneous layers with respect to salinity and temperature were not present as in the deeper basins. Salinity and temperature remained mostly within normal ranges in the deeper water masses of the southern basins.

Nutrients in the surface water, in the form of dissolved inorganic nitrogen, were virtually depleted at all stations and were below safe detection limits, which is typical for this time of year. Concentrations of dissolved inorganic phosphorus in the surface water were normal, except at BY5, where the level was slightly below normal. Measured values ranged between 0.07–0.29 µmol/l, with the highest concentration at BY39. Silicon levels in the surface water were above normal at most stations, with generally higher concentrations in the southern areas. Measured values ranged from 9.2–16.1 µmol/l. In the deep water of both the Eastern and Western Gotland Basins, all nutrients were above normal at several stations, such as at BY15 from 150 meters depth or BY31 from 80 meters depth. At the shallower stations, only silicon typically showed above-normal levels in the deeper water masses, and at the stations in the Arkona Basin, silicon concentrations were above normal from surface to bottom.

The oxygen situation in the bottom water of the Baltic Proper is bad. Good oxygen conditions in the bottom water were found only in the Arkona Basin. In the Bornholm basin and at BCSIII-10 in the south-eastern Baltic Proper, oxygen deficiency (<2 ml/l) was present from a depth of 80 metres. At BCSIII-10, the oxygen level in the bottom water was 0.2 ml/l, which is below normal. For Hanö Bay and the Bornholm Basin, oxygen levels in the bottom water were 1.1–1.4 ml/l, which is within normal range. In both the Eastern and Western Gotland Basins, acute oxygen deficiency was measured from

a depth of 70 meters and completely oxygen-free conditions with hydrogen sulphide was present from a depth of 80 meters in the Western Gotland basin and from a depth of 90 meters in the Eastern Gotland basin. For both basins, the hydrogen sulphide content in the bottom water is higher than normal, which is seen both in the vertical profiles and the diagrams showing oxygen content over time, where the presence of hydrogen sulphide is shown as negative oxygen values.

At several stations, peaks of chlorophyll fluorescence were observed at depths of 10–20 meters. Oxygen levels exceeding 10 ml/l were also recorded, further indicating high plankton activity. In the Arkona Basin, no peaks were observed; instead, levels of chlorophyll fluorescence were more uniform down to about 15 meters, and below levels decreased.

Secchi depth measurements were made at several stations; in the southern basins between 5–6 meters, and at BY29, the Secchi depth was 8 meters. The shallowest Secchi depth was recorded at BY10, with only 4 meters.

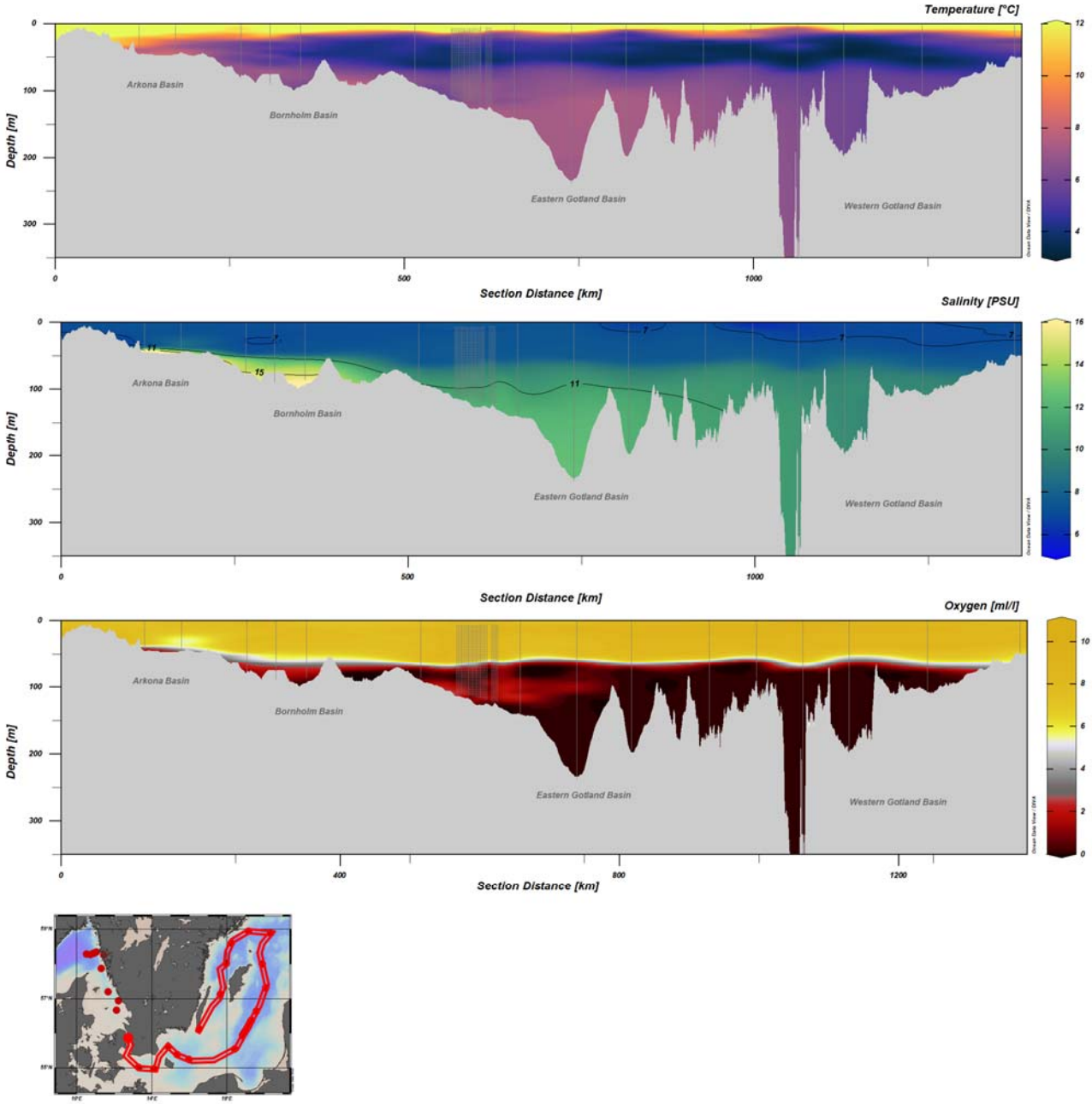

Figure 1. Transect showing CTD measurement of temperature, salinity and oxygen concentration from the Sound, through the Southern and Eastern Baltic Proper into the Western Baltic Proper.

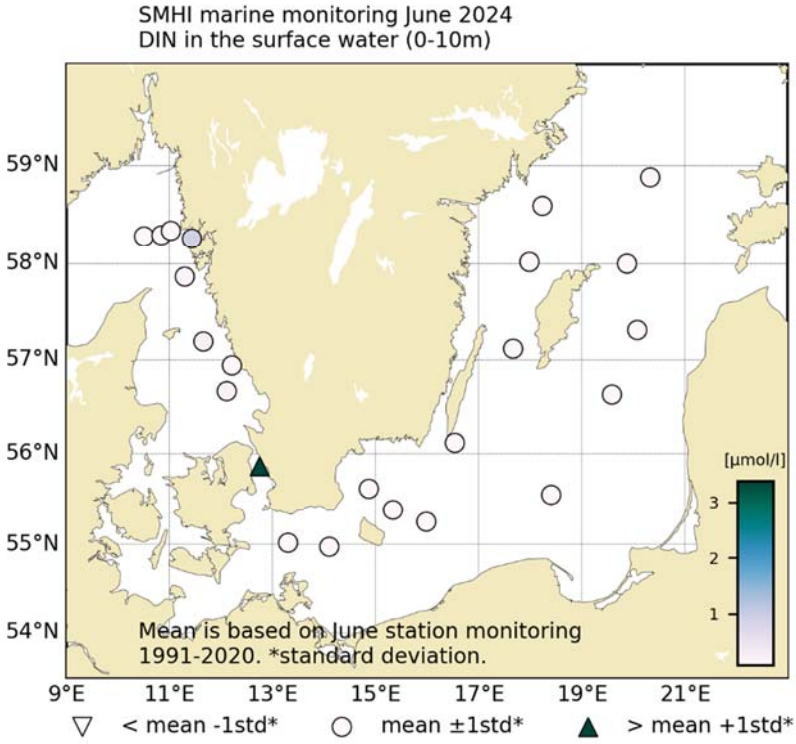

Figure 2. Concentration of dissolved inorganic nitrogen (DIN) in the surface water (0–10m). Mean is based on data from the month within each basin during the years 1991 – 2020.

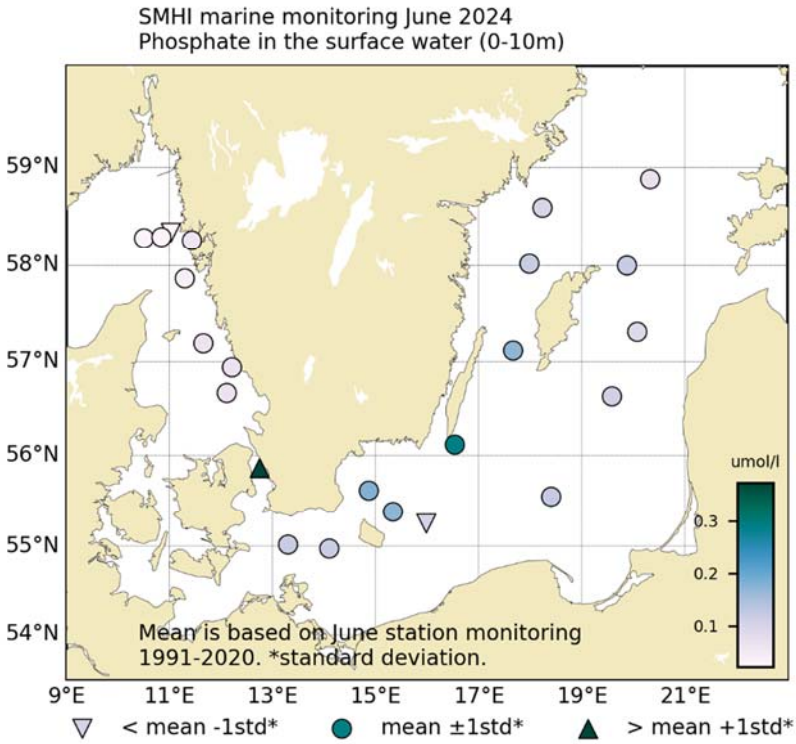

Figure 3. Concentration of phosphate in the surface water (0–10m). Mean is based on data from the month within each basin during the years 1991 – 2020.

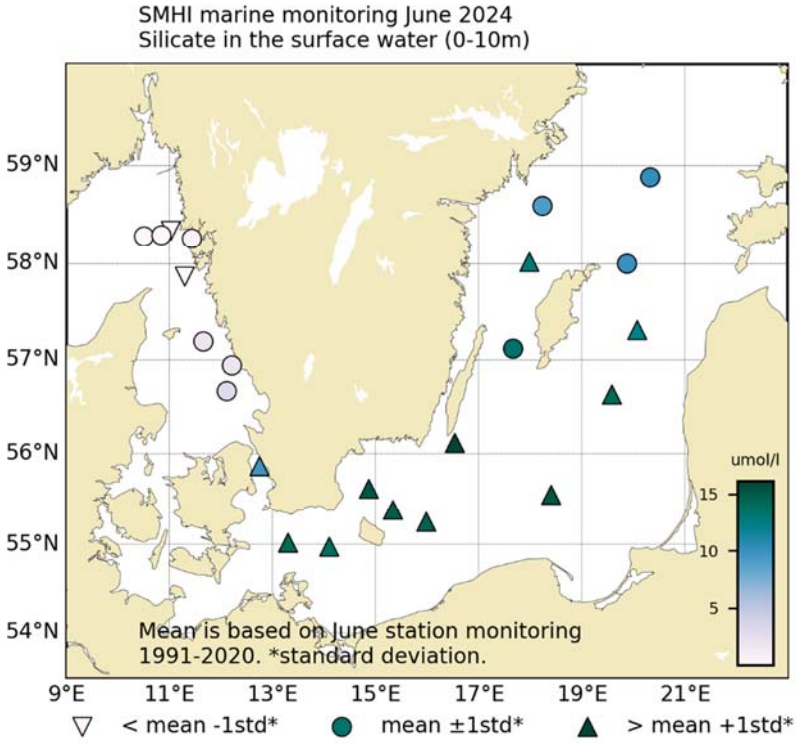

Figure 4. Concentration of silicate in the surface water (0–10m). Mean is based on data from the month within each basin during the years 1991 – 2020.

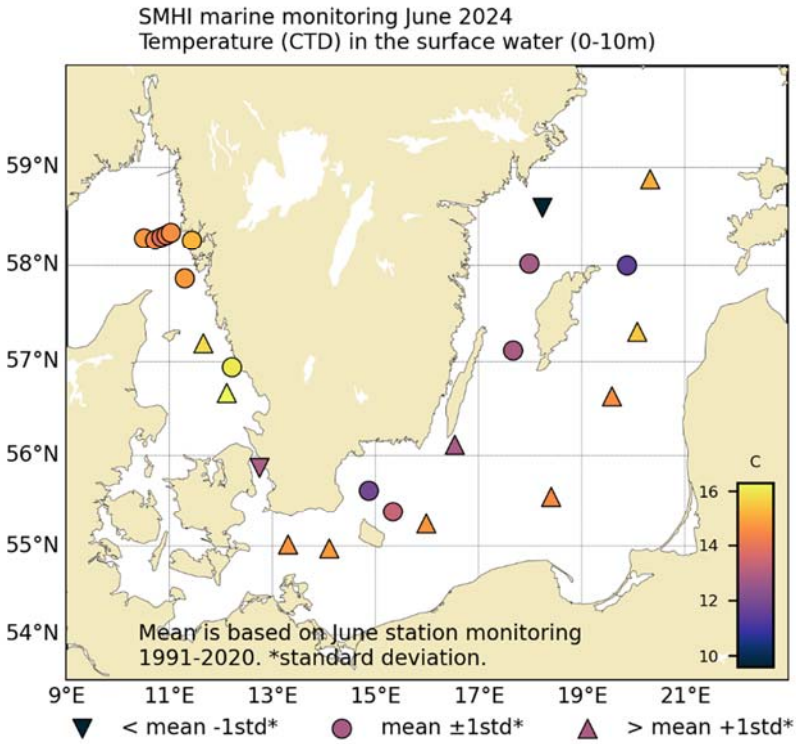

Figure 5. Temperature in the surface water (0–10m). Mean is based on data from the month within each basin during the years 1991 – 2020.

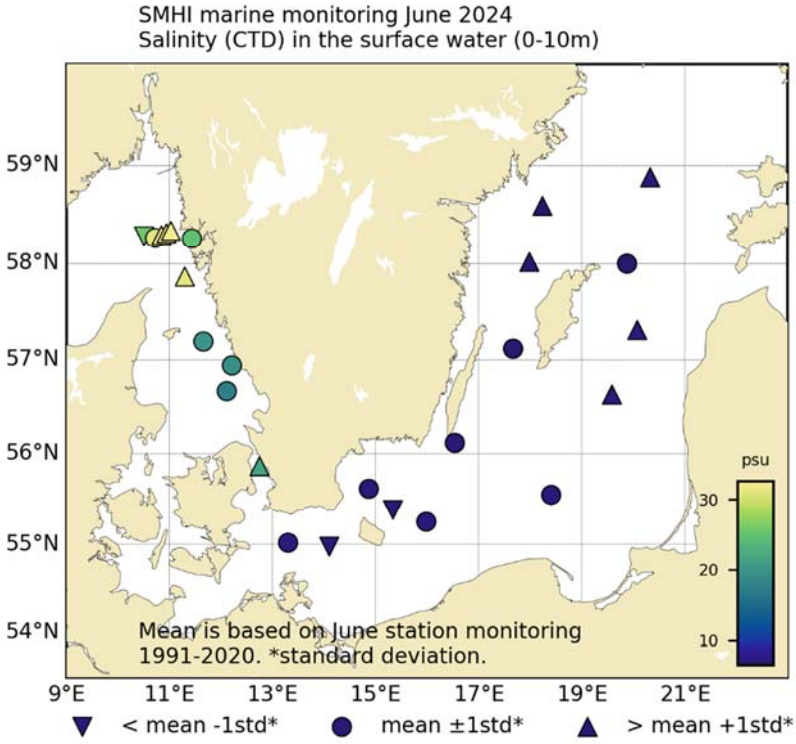

Figure 6. Salinity in the surface water (0–10m). Mean is based on data from the month within each basin during the years 1991 – 2020.

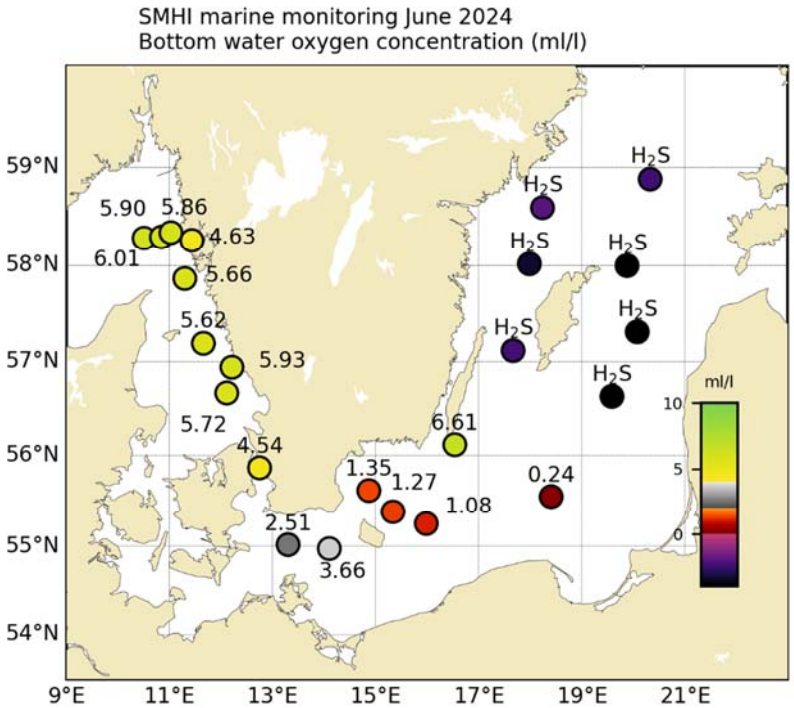

Figure 7. Concentration of dissolved oxygen in the bottom water, approximately 1 m above the sea bed. Note that values have not been compared with statistics as in similar figures and only circles are shown.

PARTICIPANTS

Name	Role	Institute
Johan Kronsell	Chief Scientist, Oceanographer	SMHI
Ola Kalén	Oceanographer	SMHI
Johan Håkansson	Quality Manager, Chemist	SMHI
Sari Sipilä	Marine chemist	SMHI
Daniel Bergman-Sjöstrand	Oceanographic Engineer	SMHI
Mikael Hedblom	Marine Biologist	SMHI

APPENDICES

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

SMHI

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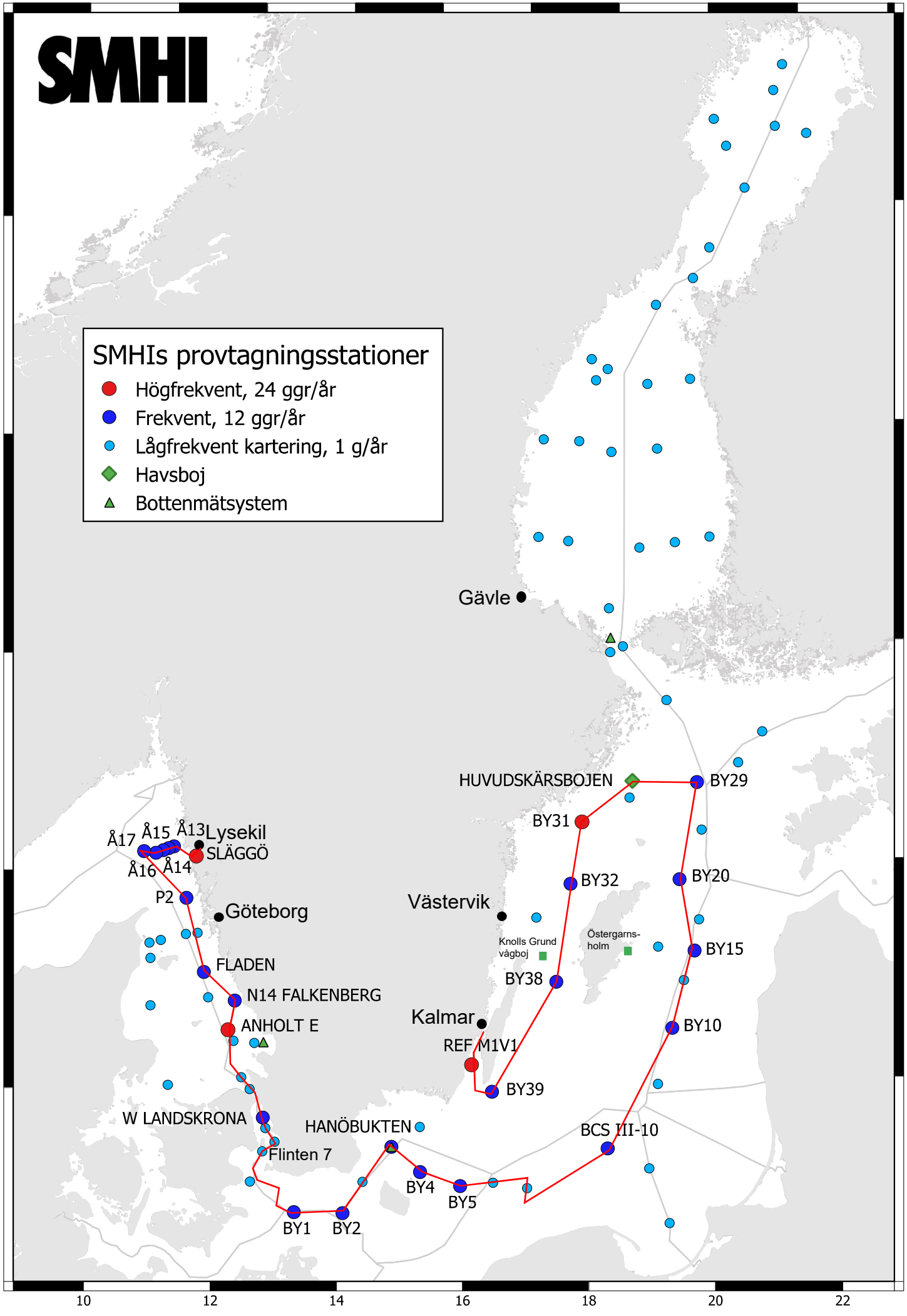
Havs och Vatten myndigheten


SMHI
SMHIs provtagningsstationer
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Frekvent, 12 ggr/år
Lågfrekvent kartering, 1 g/år
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Bottenmätsystem
Gävle
HUVUDSKÄRSBOJEN
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Year: 2024

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 (Chla 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
0531	13	BPSE49	BAS...	BY39 ÖLANDS S UDDE	5607.00	01632.23	20240602	0640	50	6	36	5	15.6	1013	1520	-x--	8		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0532	13	BPWX45	BAS...	BY38 KARLSÖDJ	5707.02	01740.07	20240602	1505	108	6	36	5	15.8	1013	1220	---x	14		x	x	-	x	x	x	x	x	x	-	x	x	x	x	-	-	x	-	x	-
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0535	13	BPNX00	EXT...	HUVUDSKÄR BUOY	5856.18	01909.5	20240603	0720	91		15	3	17.5	1009	1220	----	6		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
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0543	13	BPSH05	BAS...	HANÖBUKTEN	5537.08	01452.13	20240605	0930	78	6	21	10	15.0	1004	2830	----	11		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
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0547	13	KAEX29	BAS...	ANHOLT E	5640.16	01206.74	20240606	1000	60		23	10	13.4	1011	1640	-x-x	10		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
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0549	13	KANX25	BAS...	FLADEN	5711.56	01139.48	20240606	1620	84	6	24	6		1011	1540	----	13		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0550	13	SKEX23	BAS...	P2	5751.94	01117.84	20240606	2140	92		24	10		1011	9990	----	10		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
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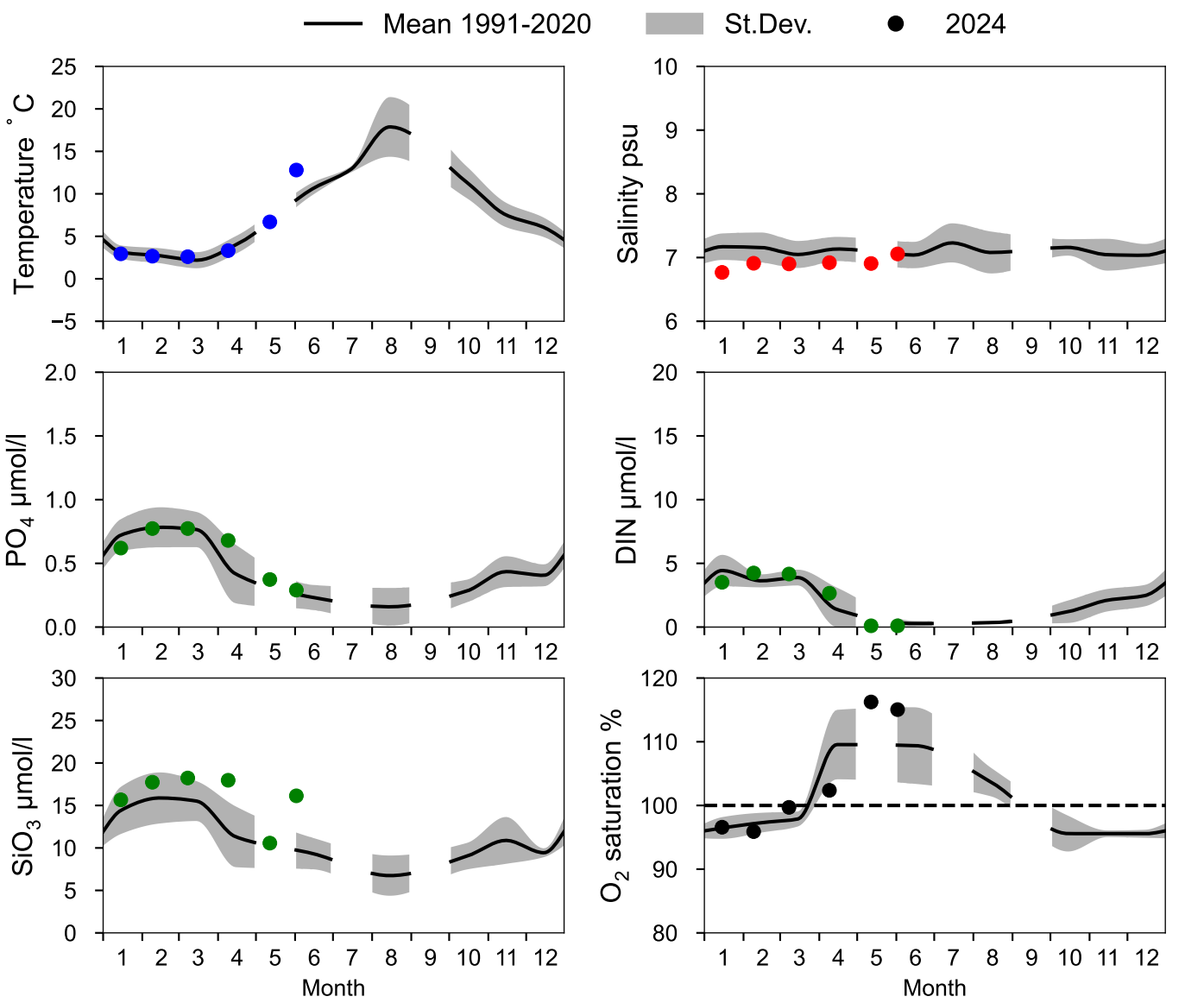
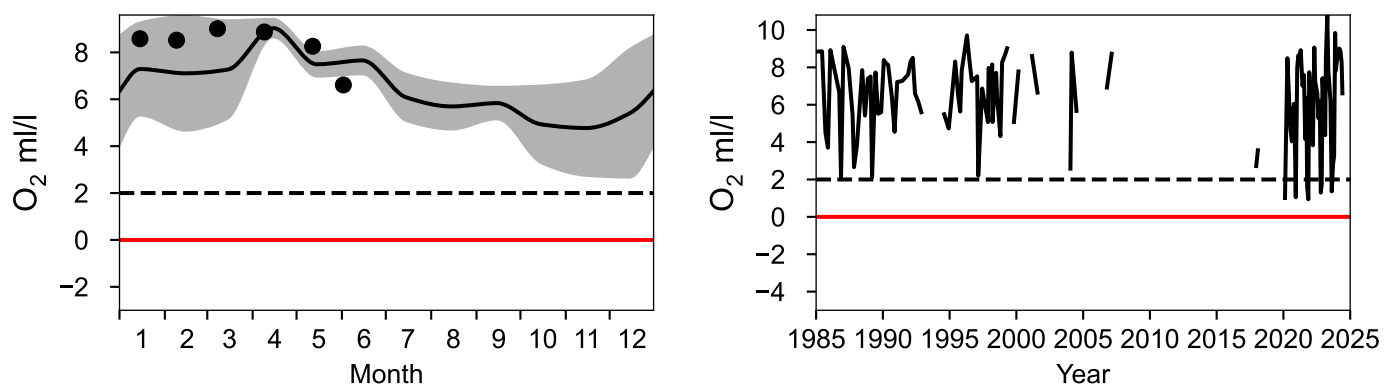
0553	13	SKEX16	BAS...	Å15	5817.66	01050.65	20240607	0615	136		25	6		1011	2740	----	12		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0554	13	SKEX15	BAS...	Å14	5818.92	01056.5	20240607	0730	111		23	6		1011	2740	----	11		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0555	13	SKEX14	BAS...	Å13	5820.4	01101.67	20240607	0830	102		24	7		1011	2740	----	10		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0556	13	FIBG27	BAS...	SLÄGGÖ	5815.6	01126.11	20240607	1100	74	4	20	8		1011	2720	-x--	9		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-

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

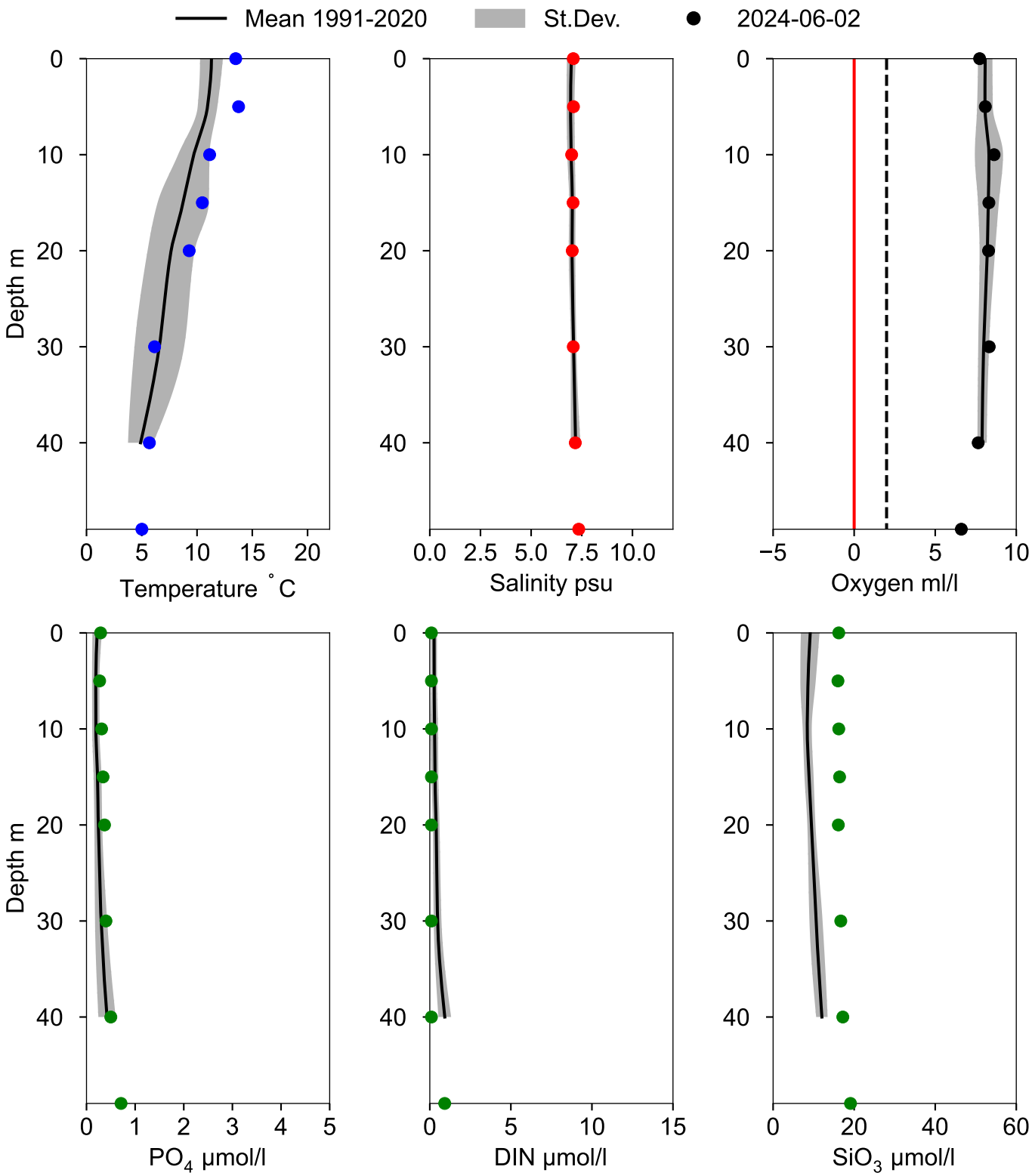
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

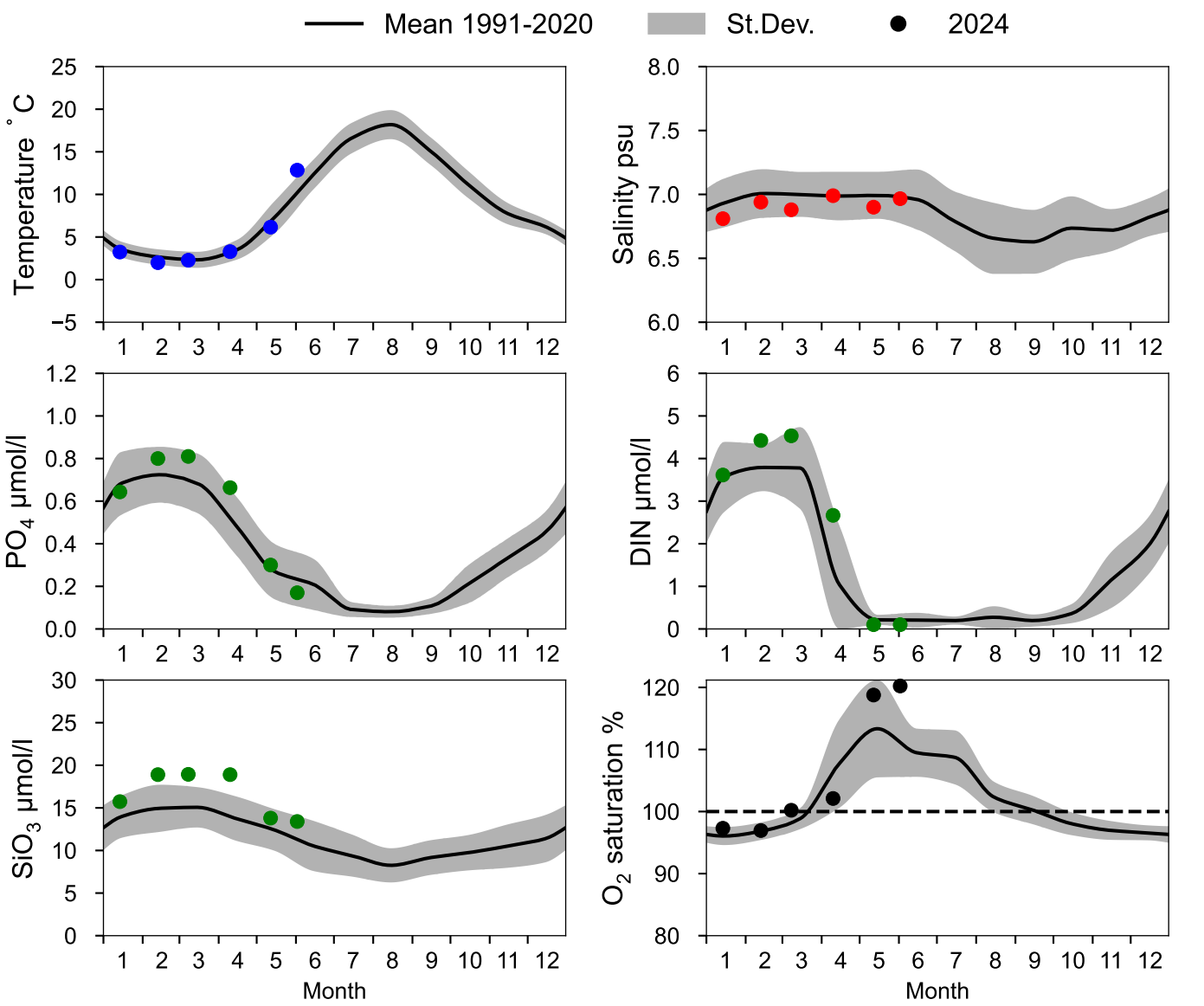


Vertical profiles BY39 ÖLANDS S UDDE
June

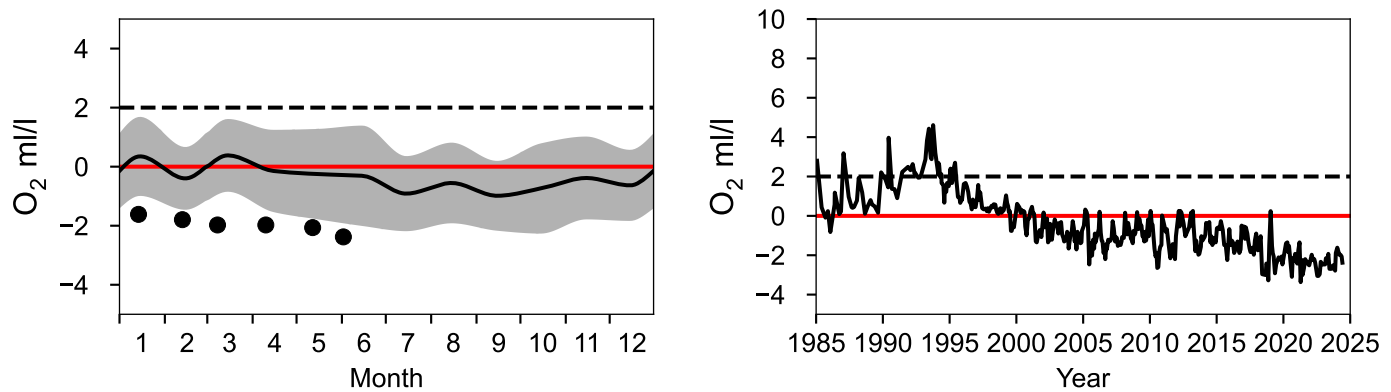


STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

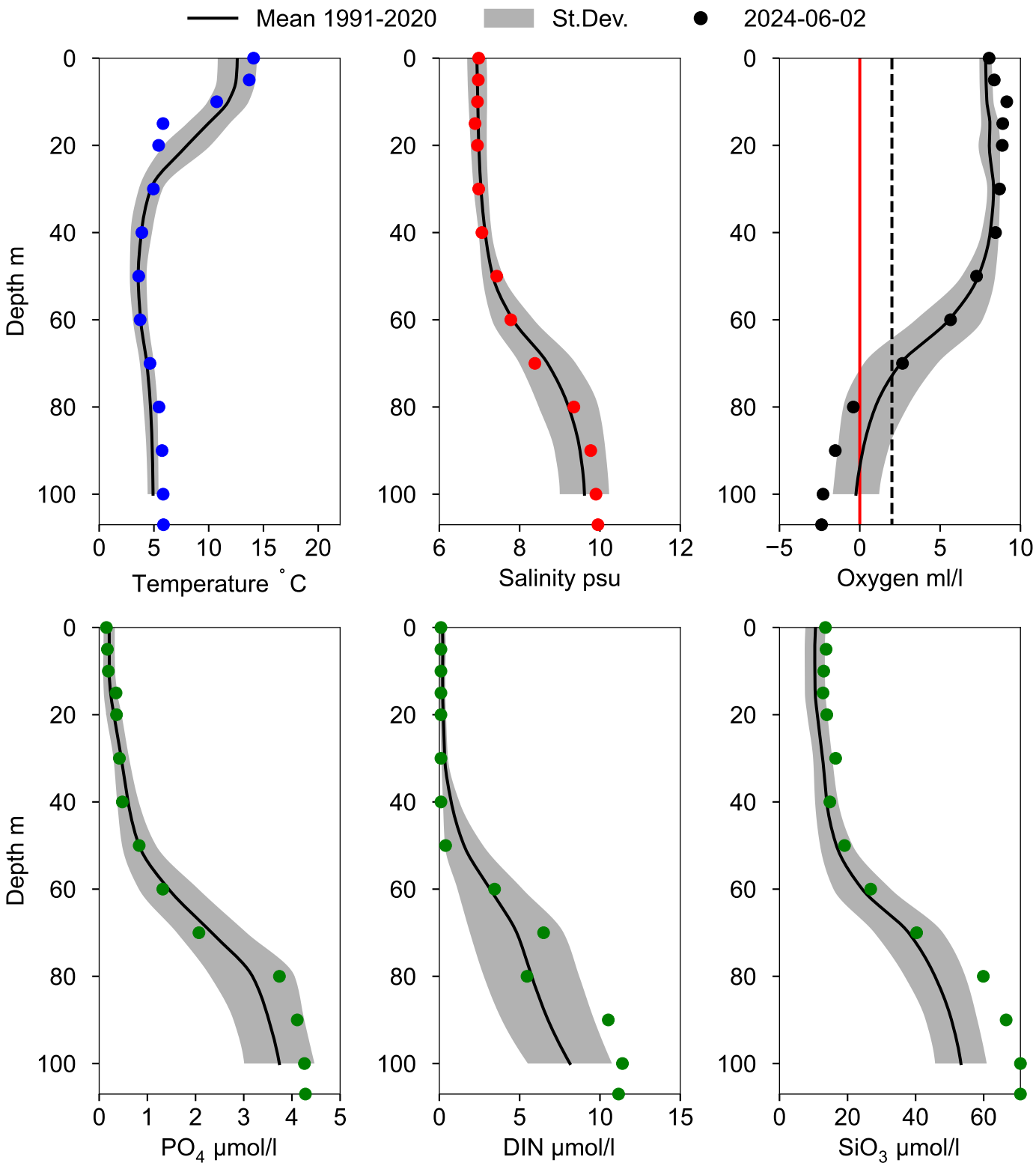
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 100 m)

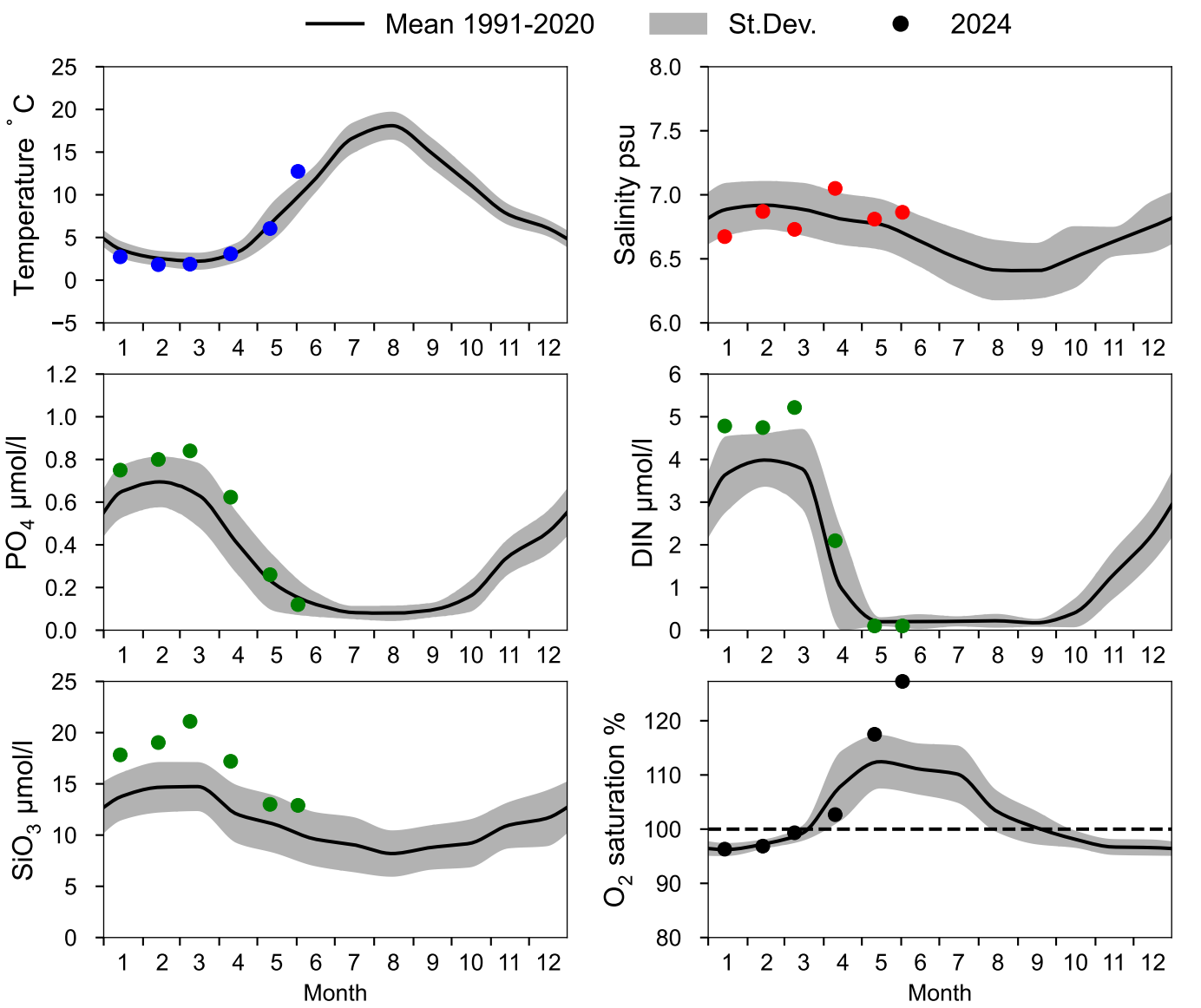


Vertical profiles BY38 KARLSÖDJ
June

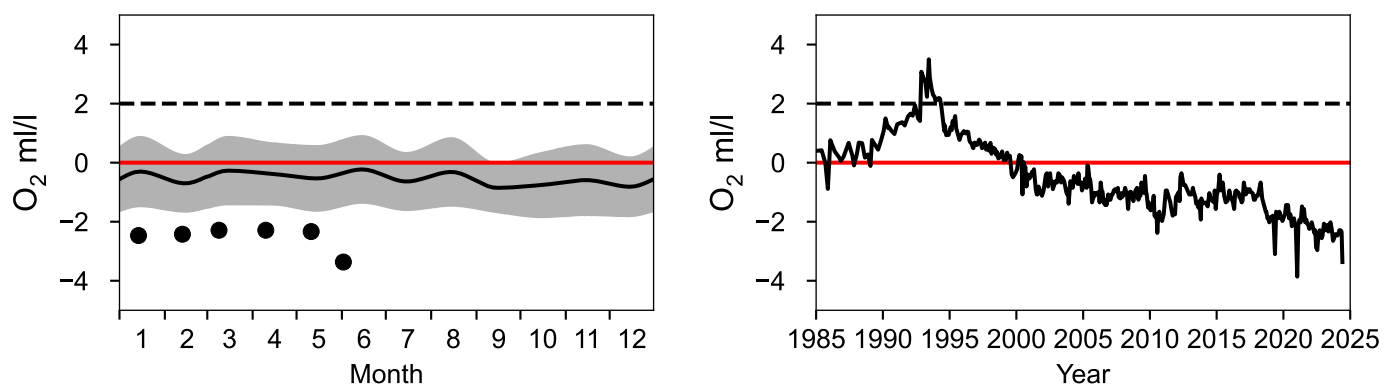


STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

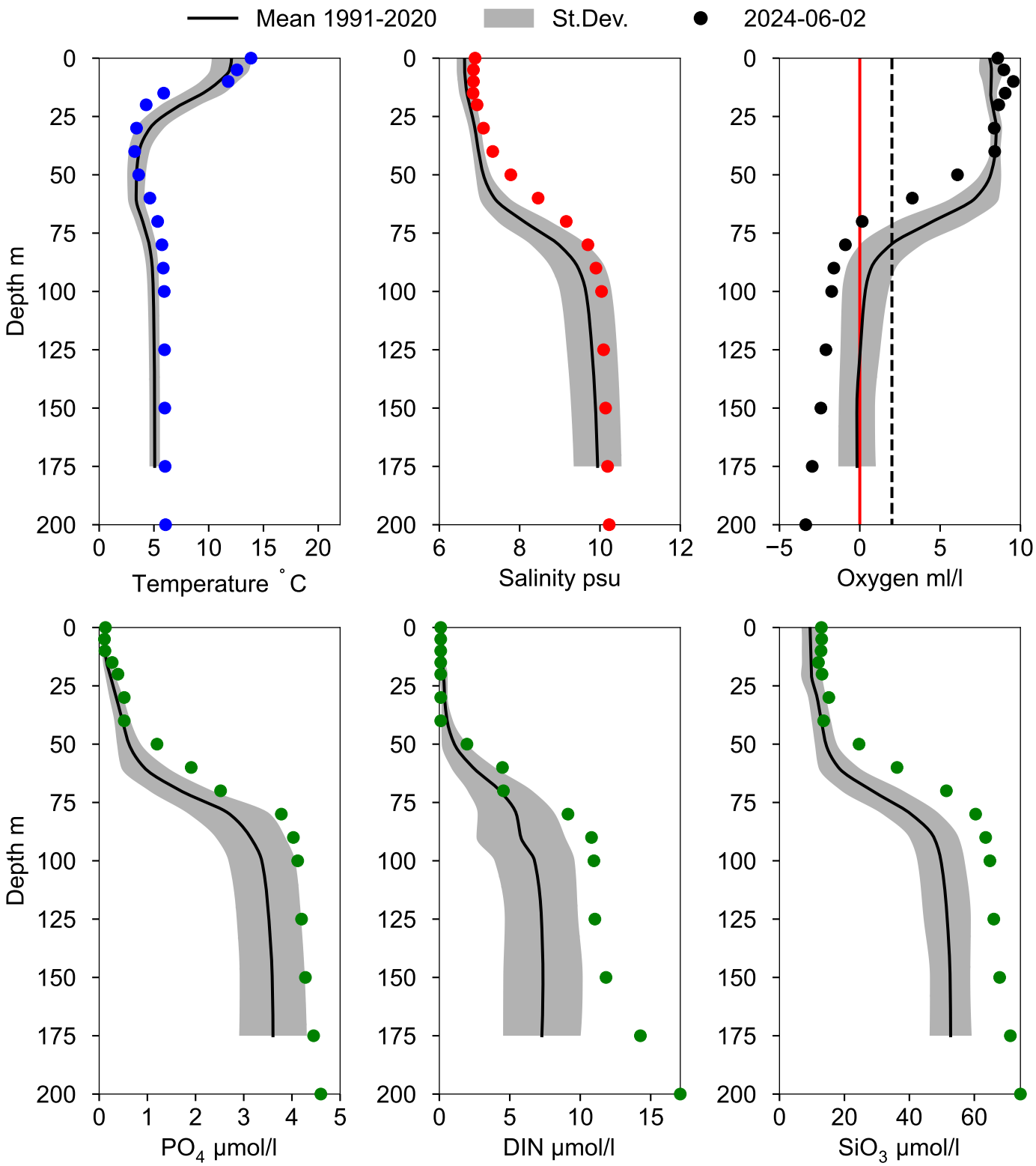
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)

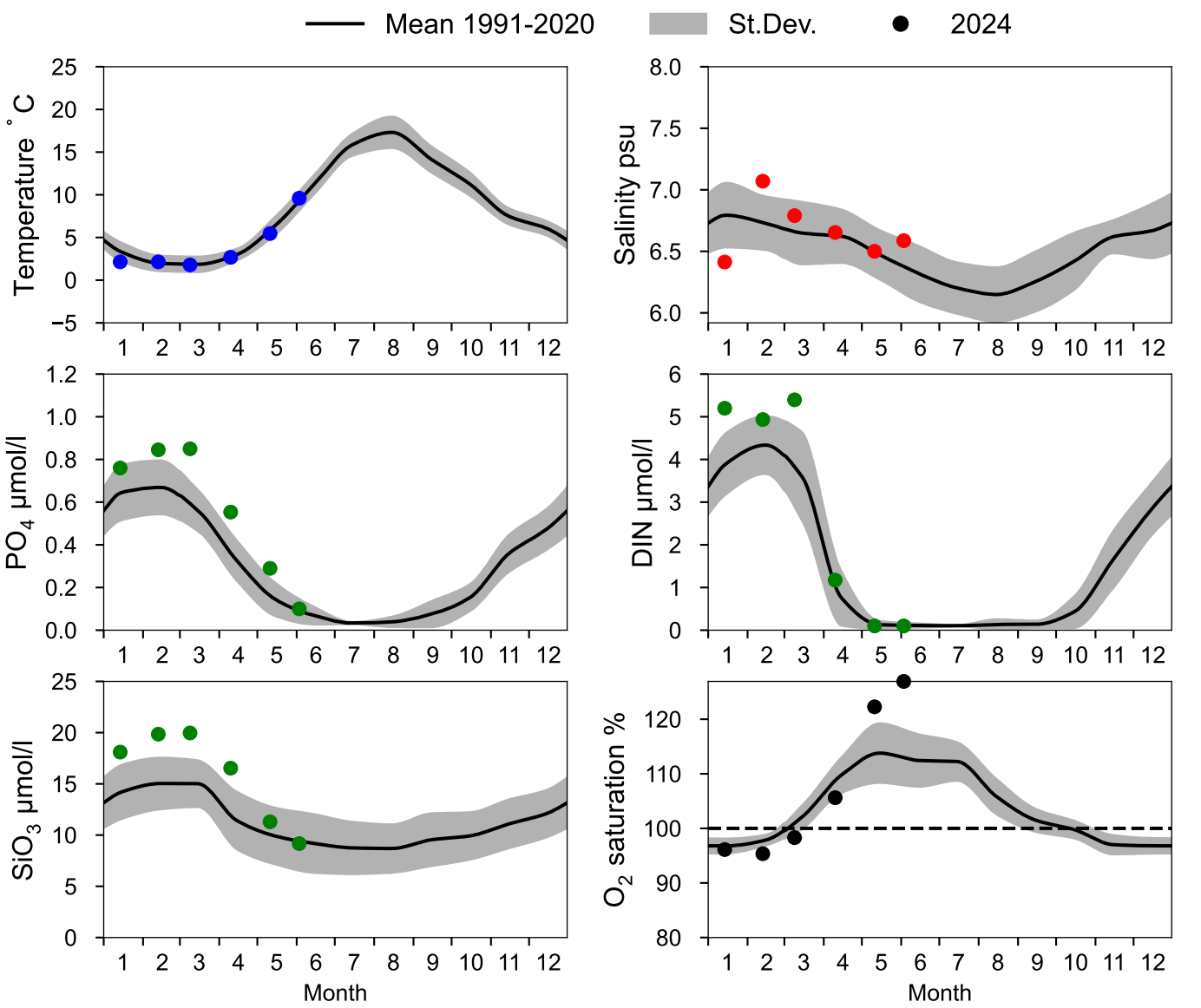


Vertical profiles BY32 NORRKÖPINGSDJ
June

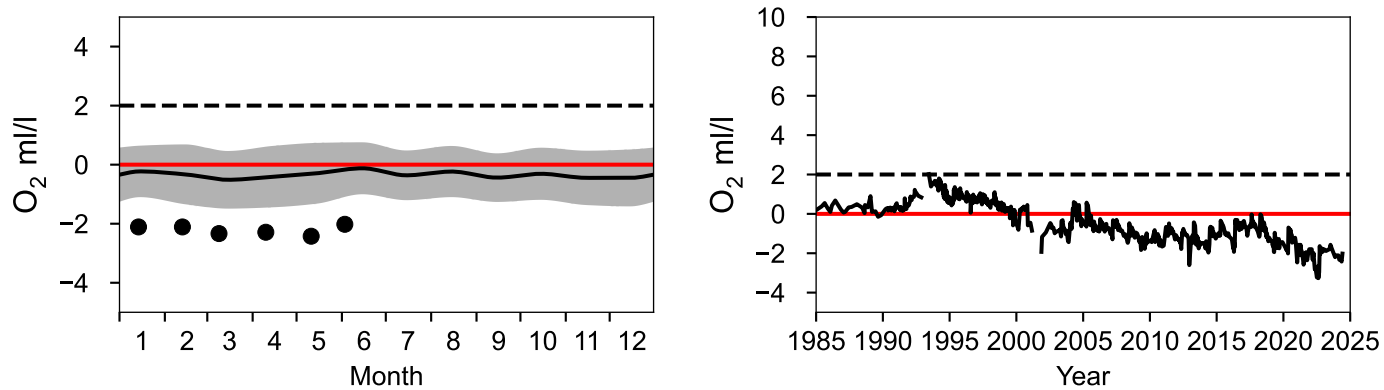


STATION BY31 LANDSORTSDJ SURFACE WATER (0-10 m)

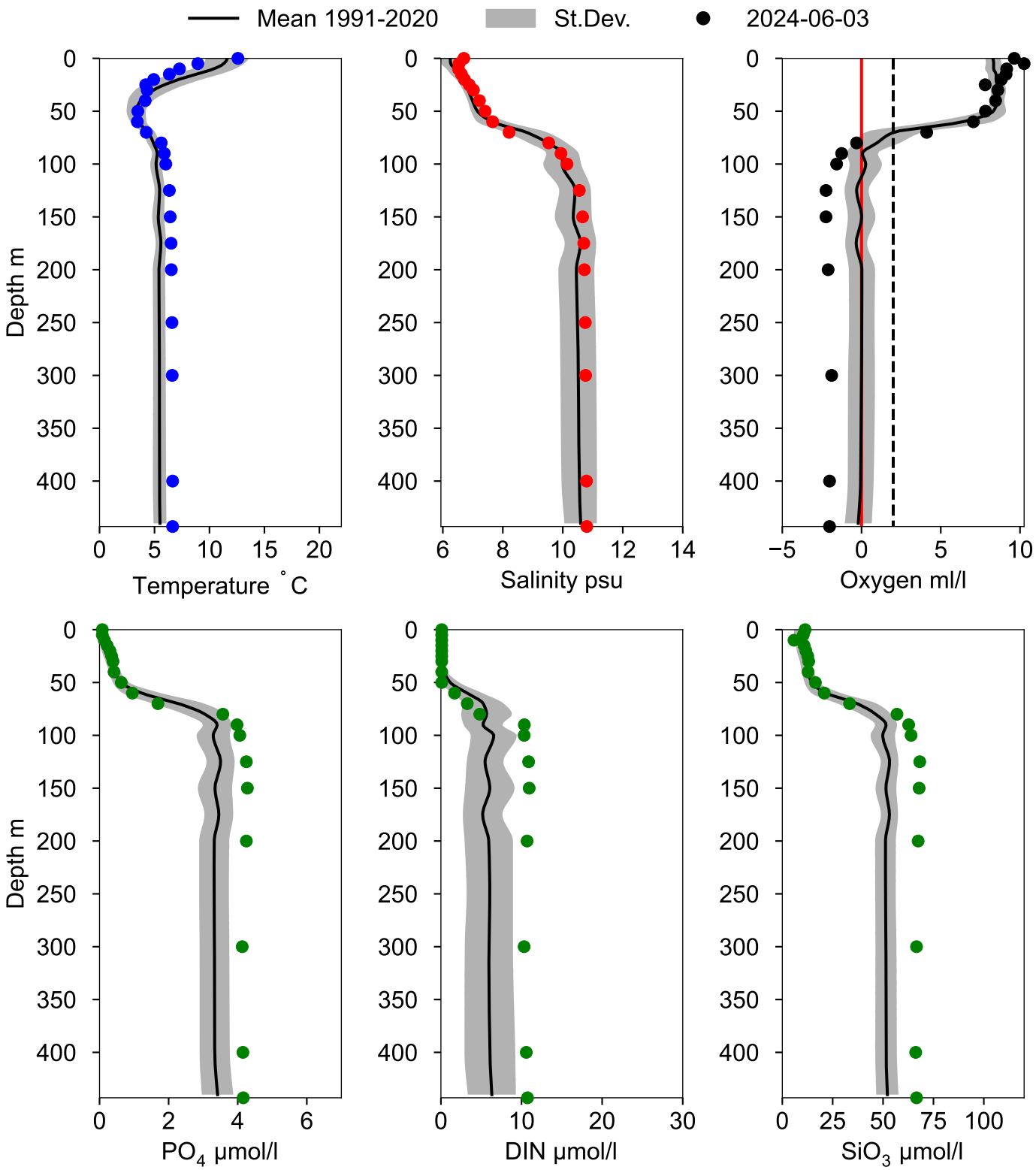
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 419 m)

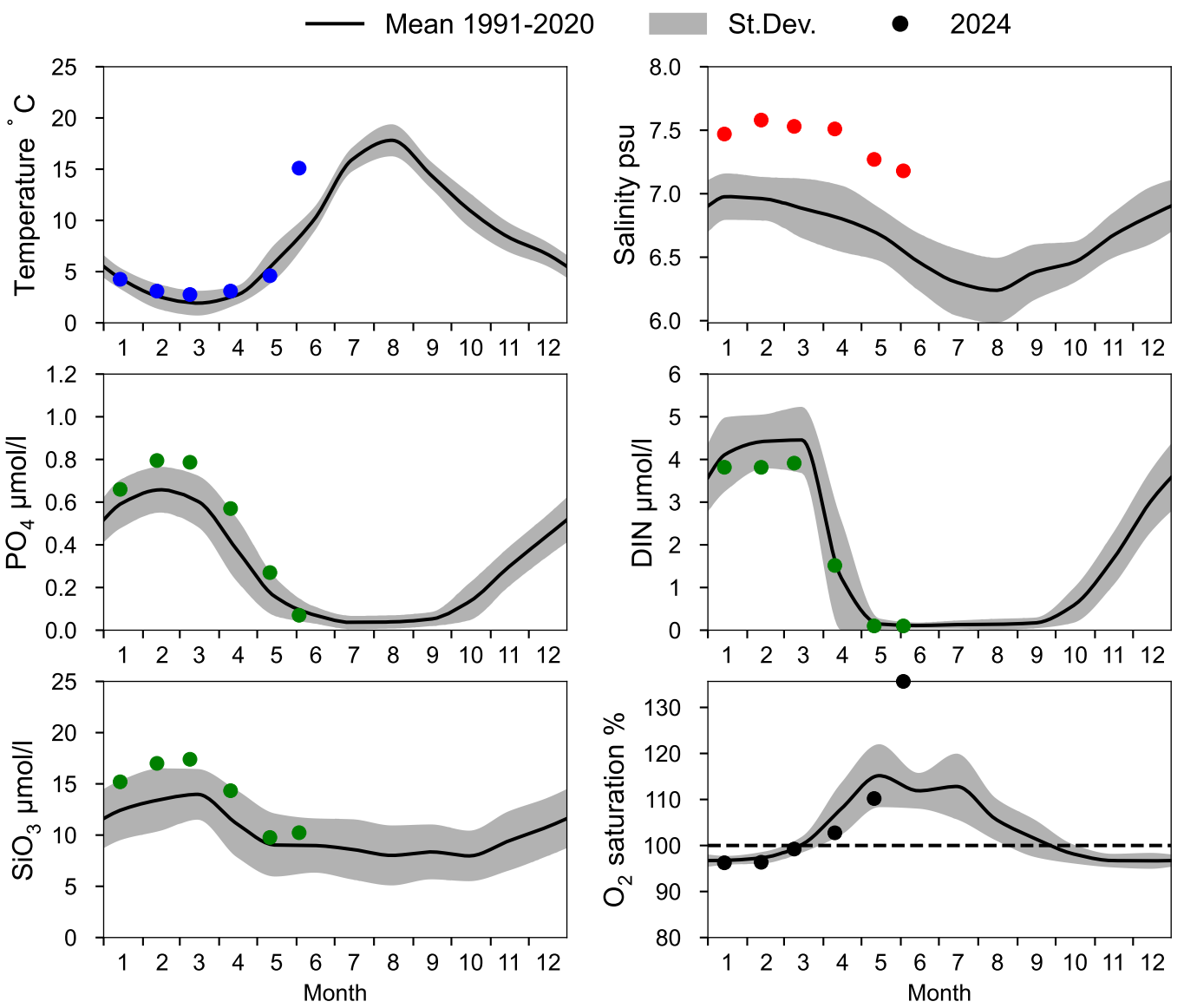


Vertical profiles BY31 LANDSORTSDJ
June

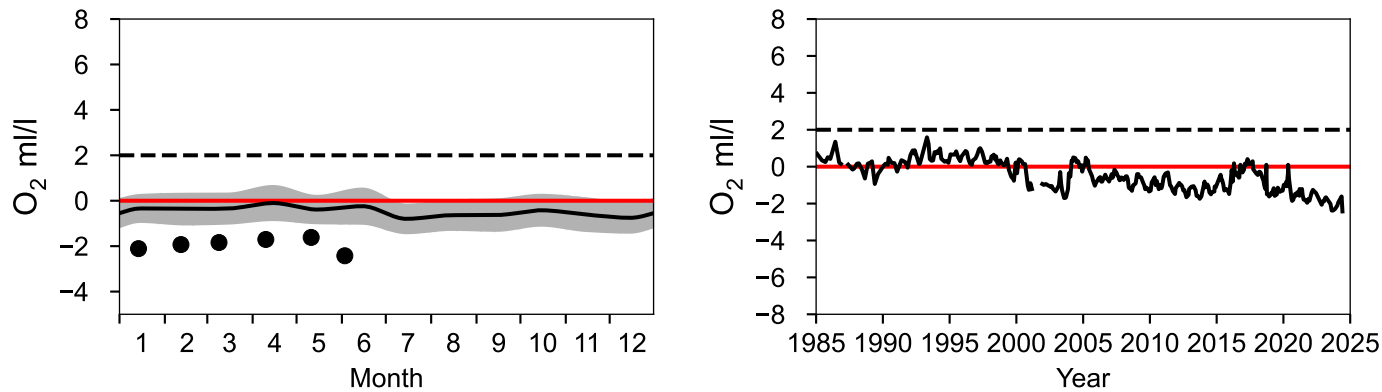


STATION BY29 / LL19 SURFACE WATER (0-10 m)

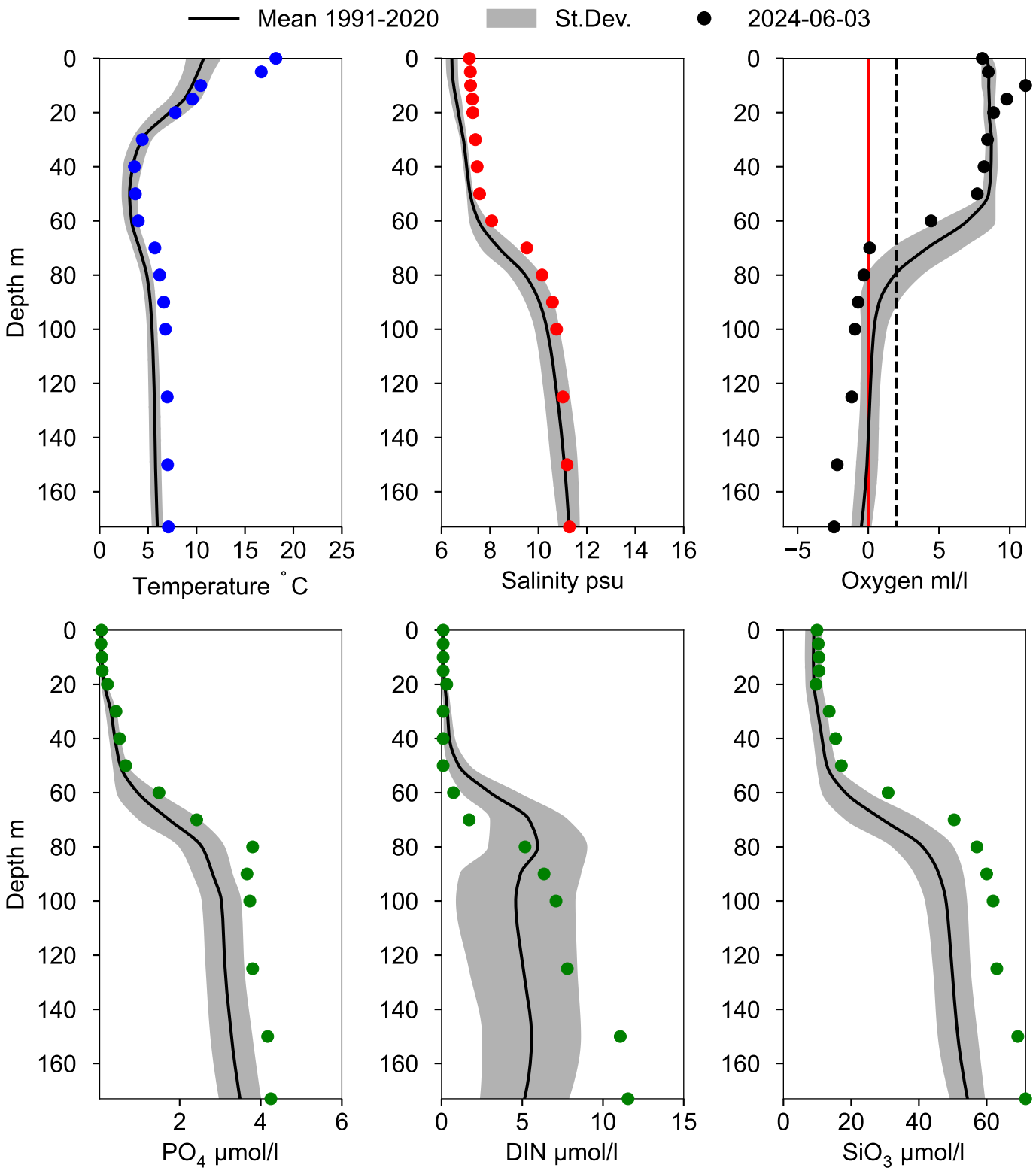
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 150 m)

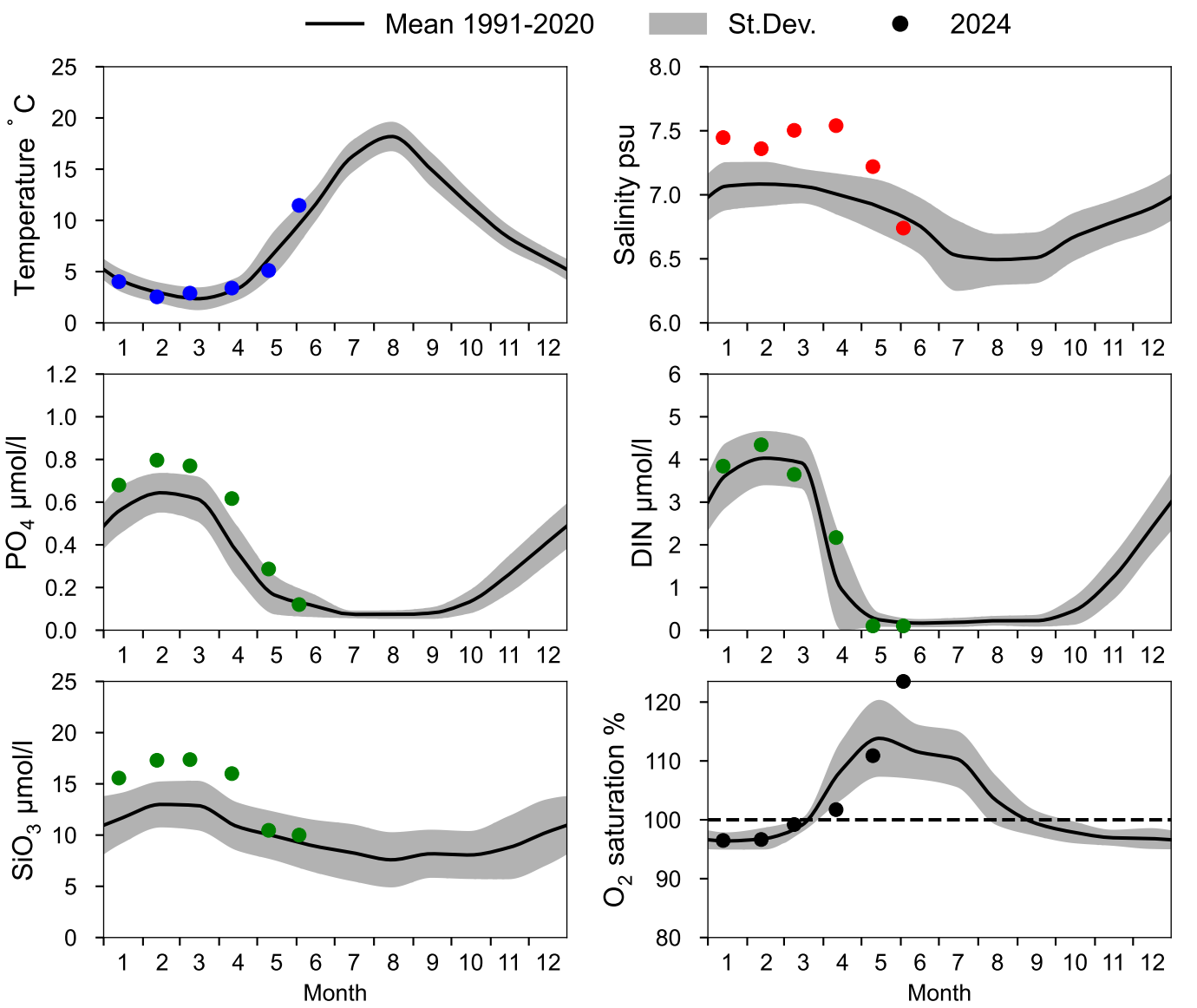


Vertical profiles BY29 / LL19
June

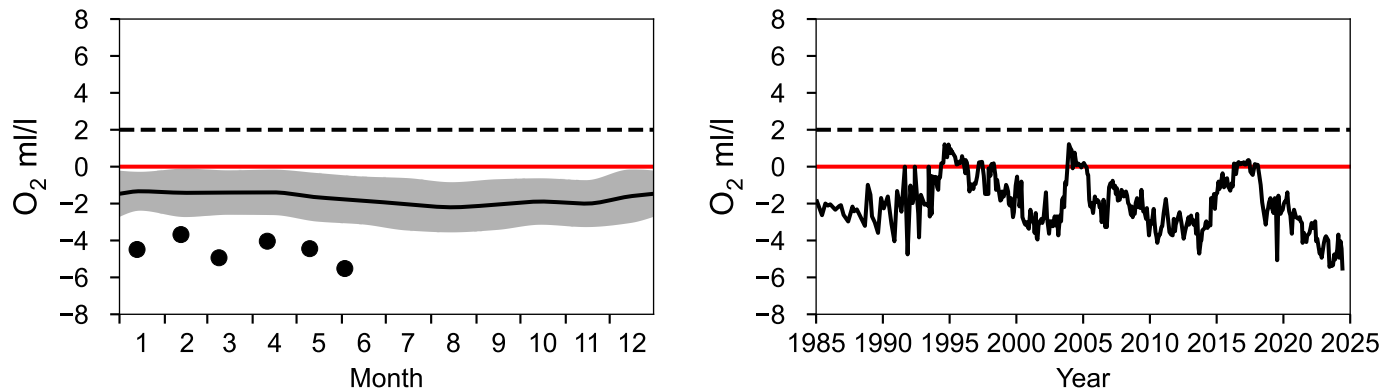


STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

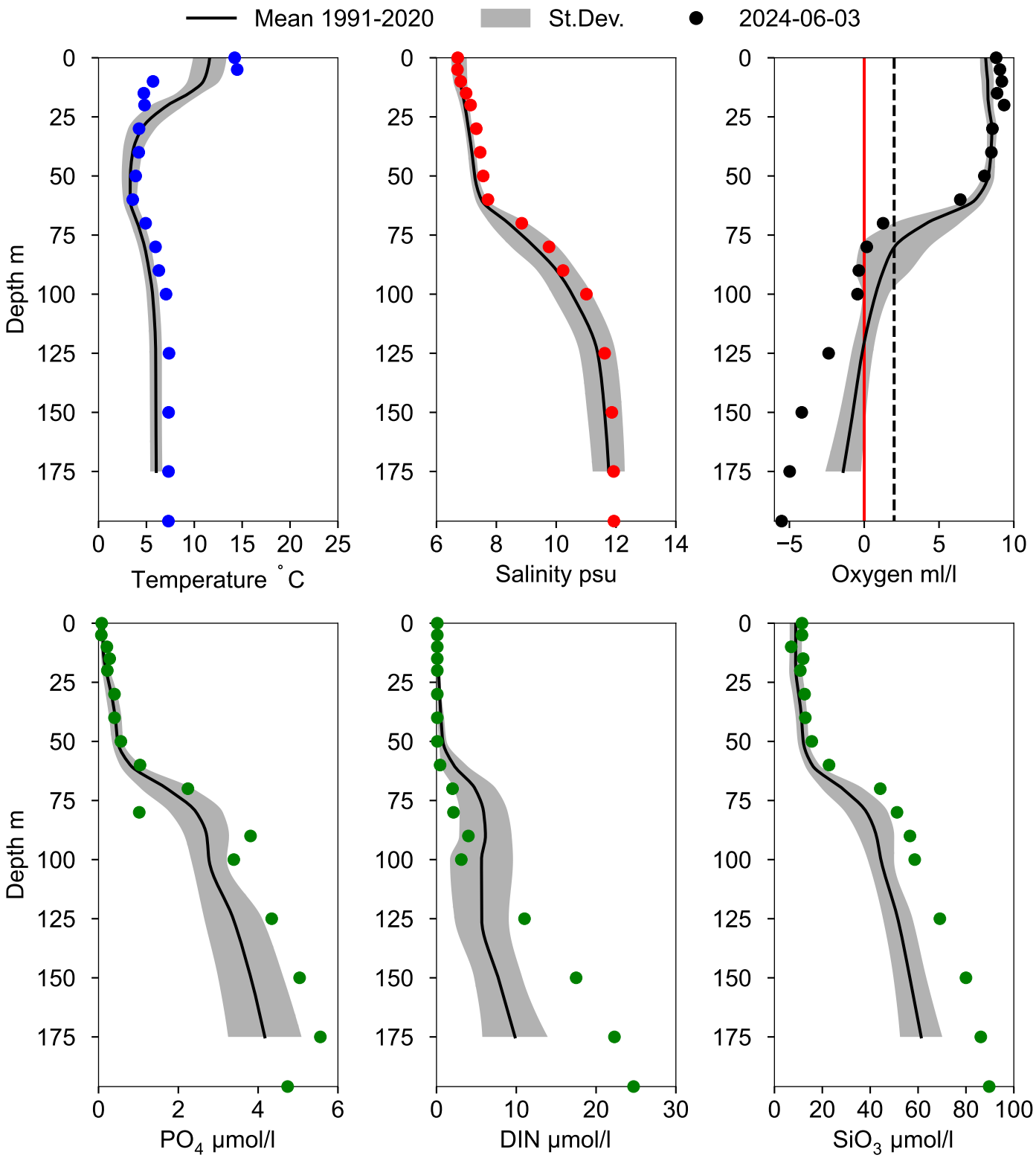
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)

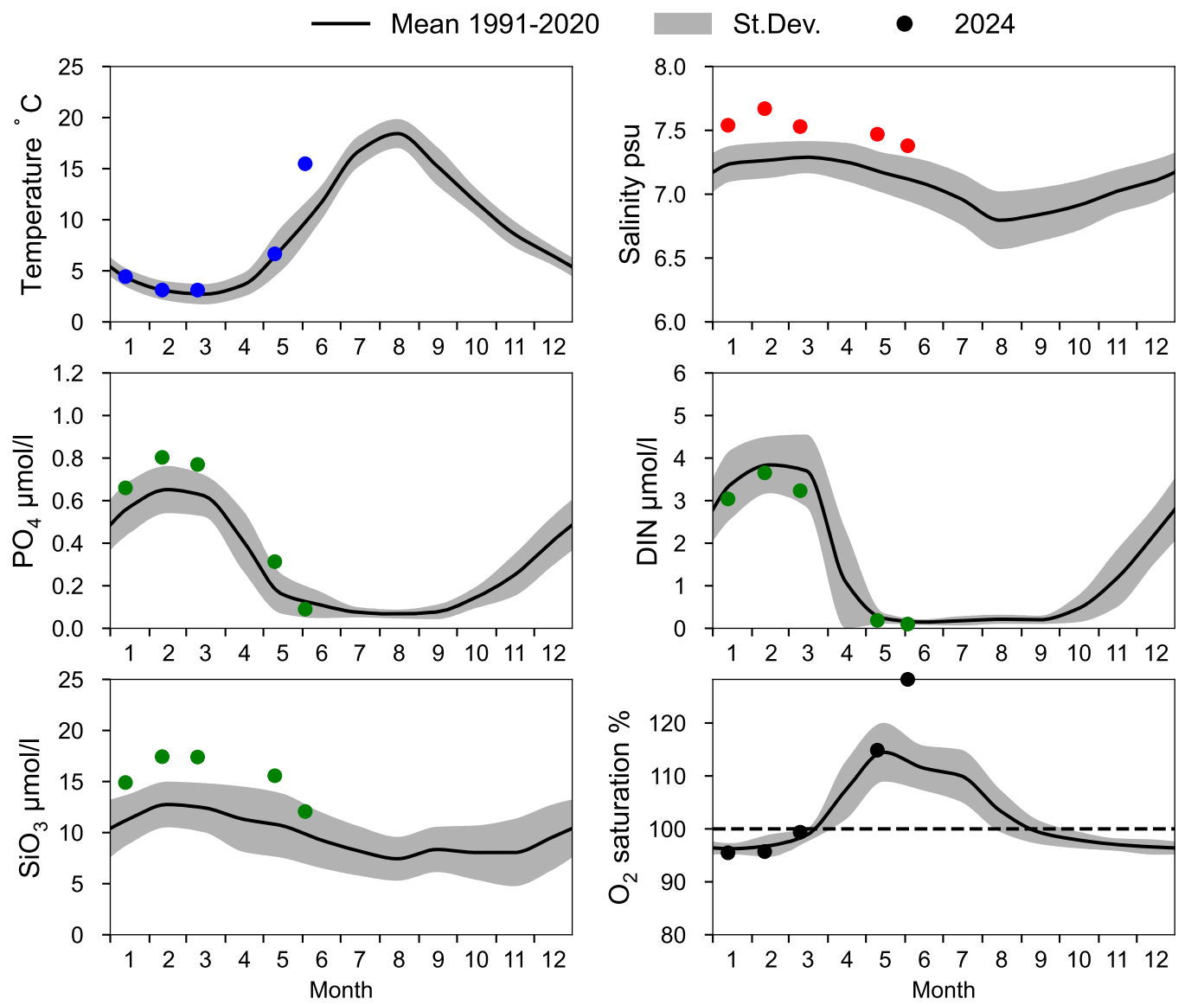


Vertical profiles BY20 FÅRÖDJ
June

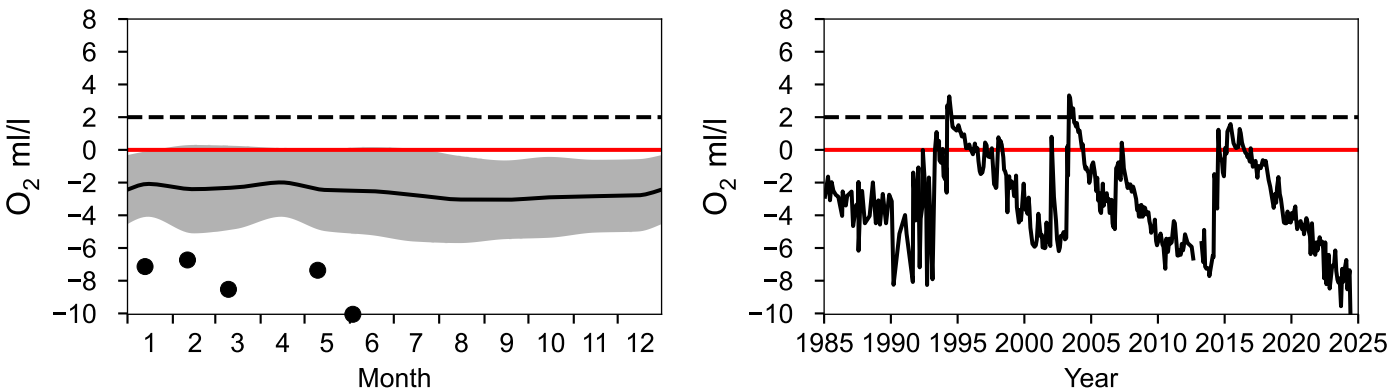


STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

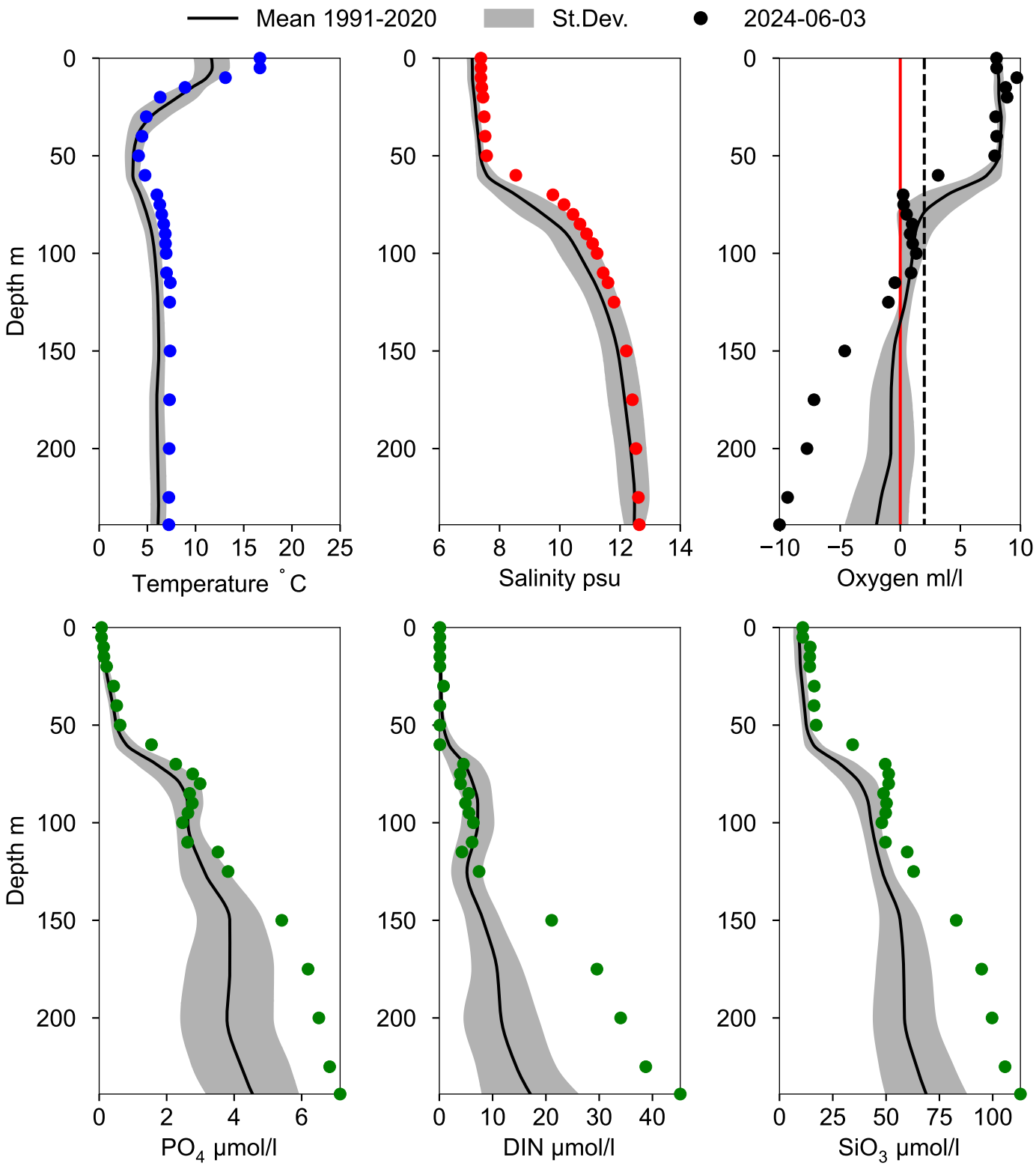
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 225 m)

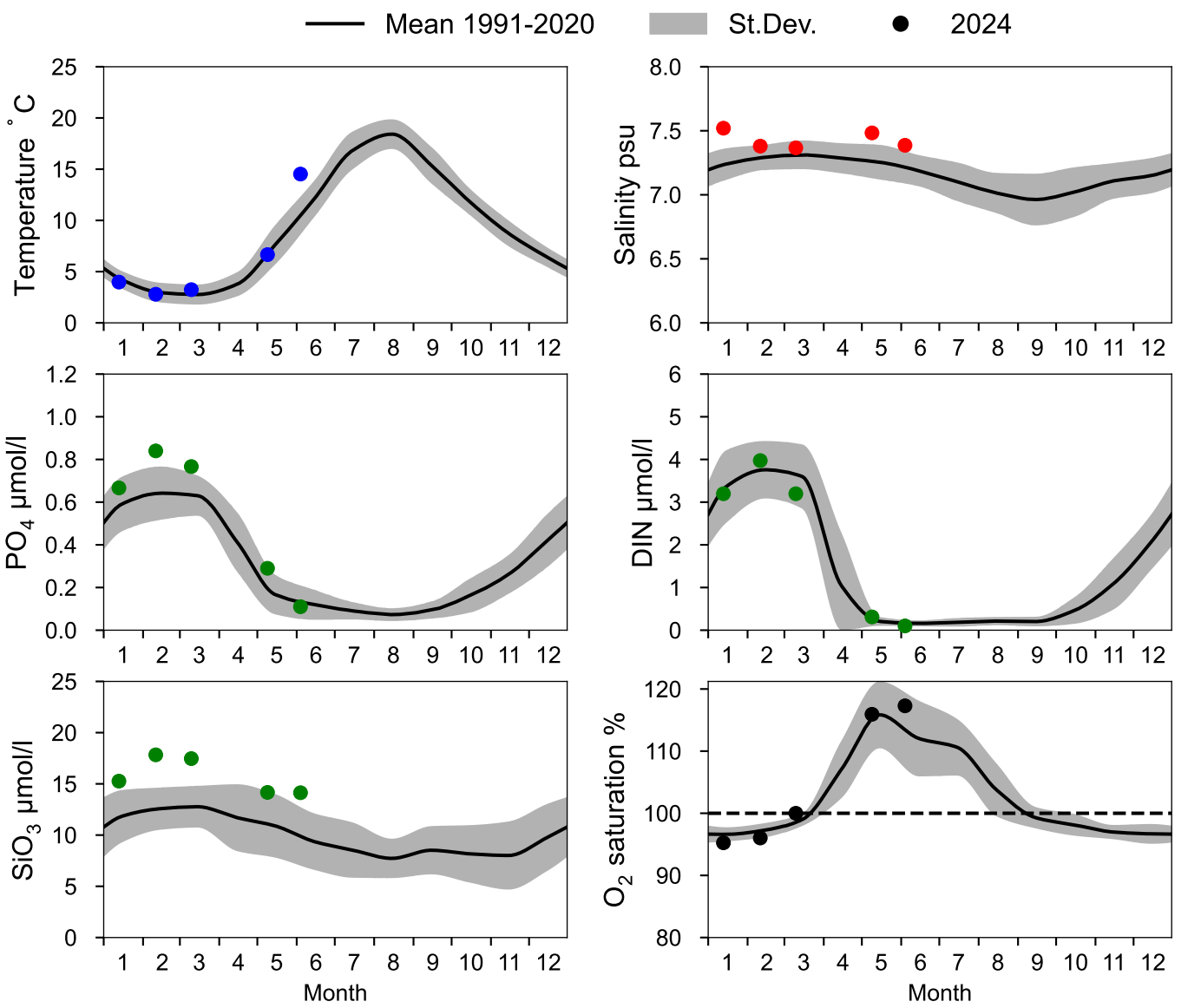


Vertical profiles BY15 GOTLANDSDJ
June

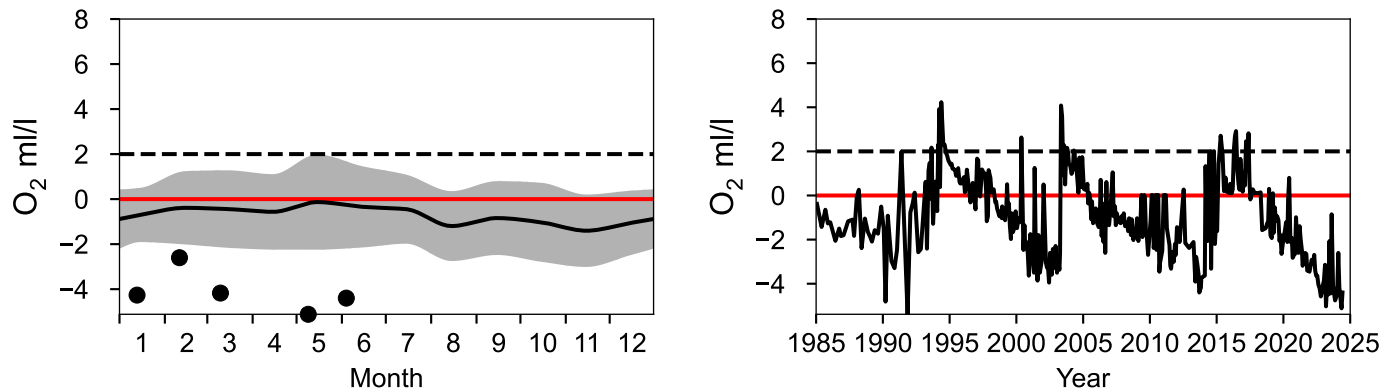


STATION BY10 SURFACE WATER (0-10 m)

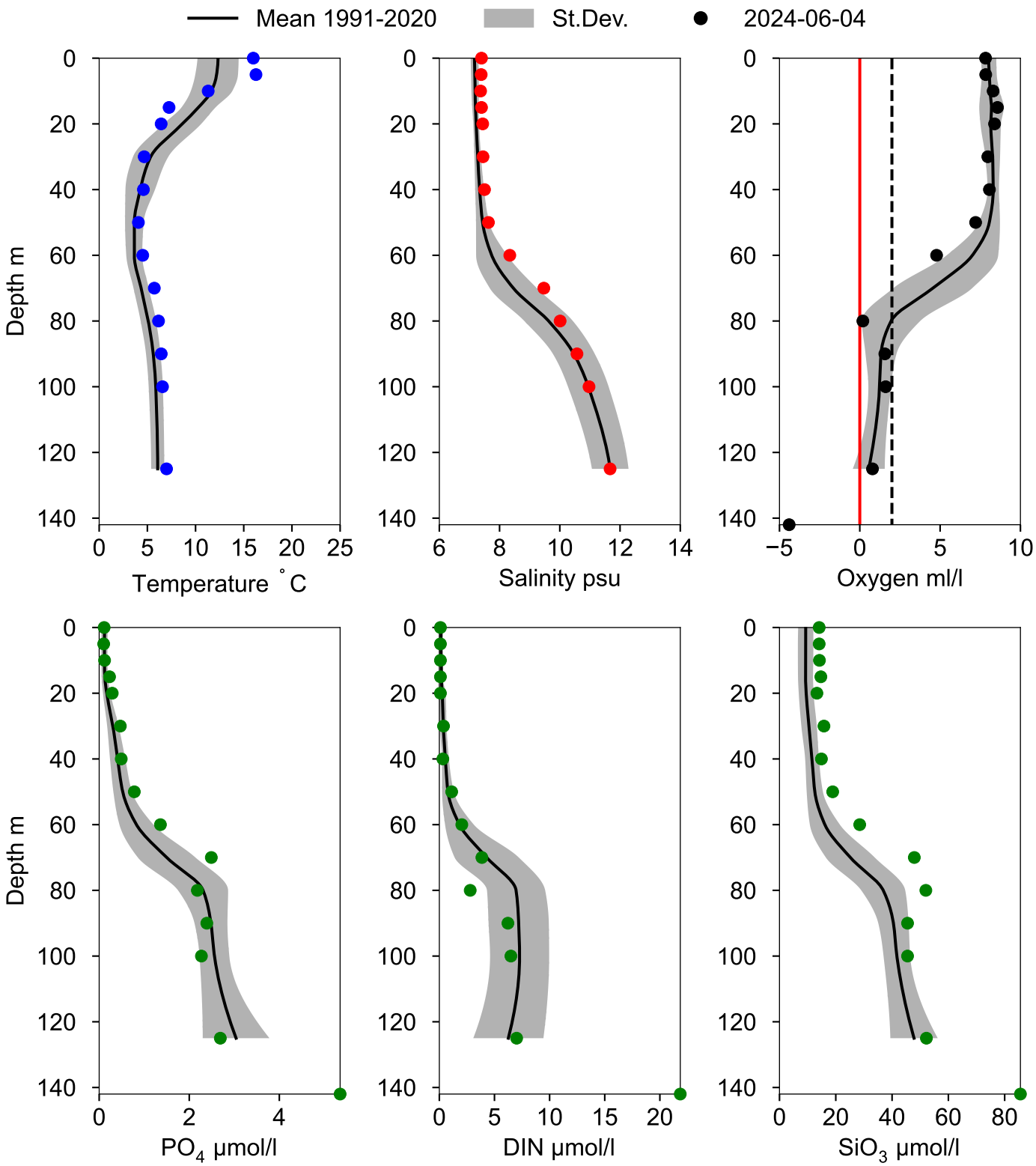
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

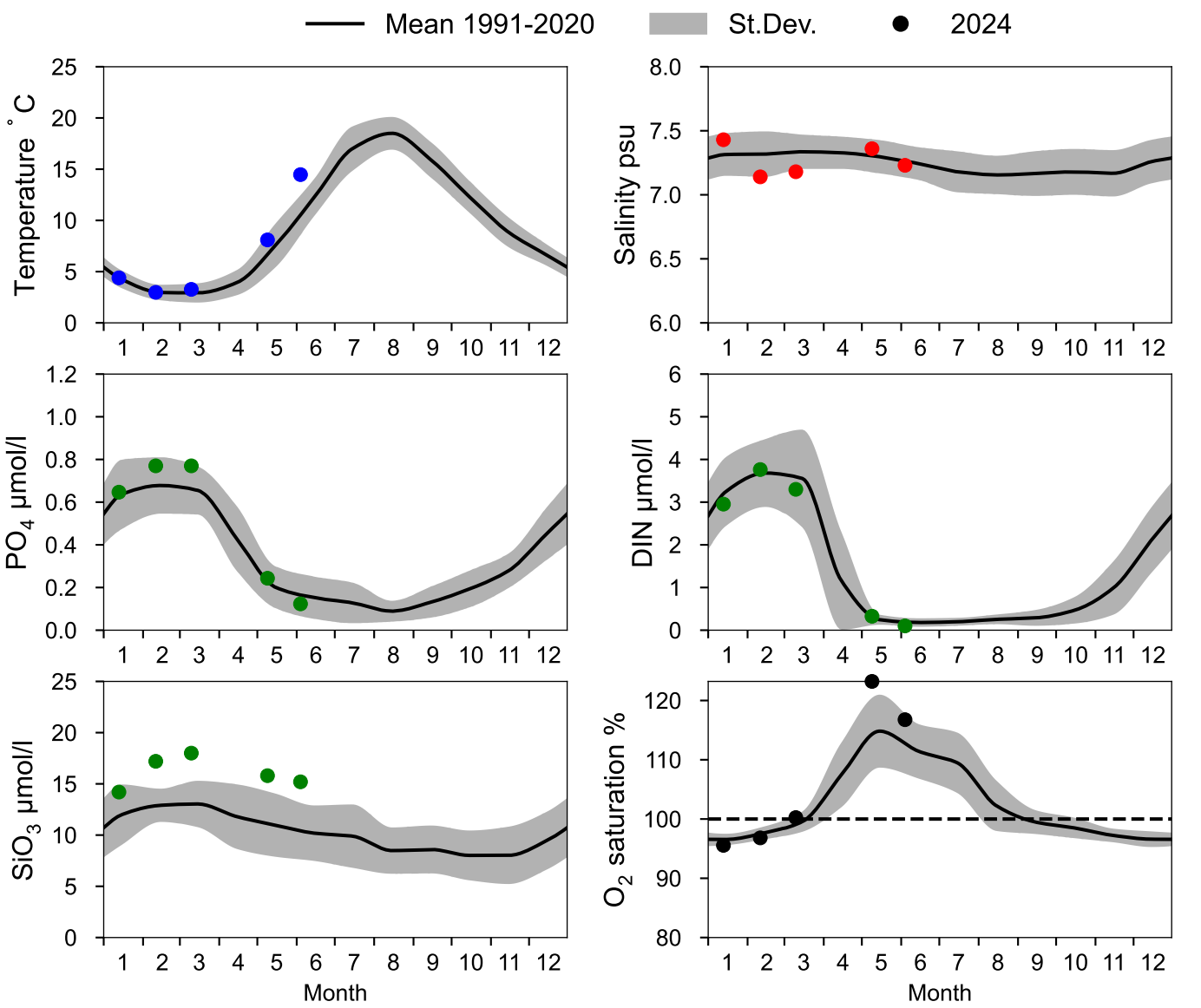


Vertical profiles BY10
June

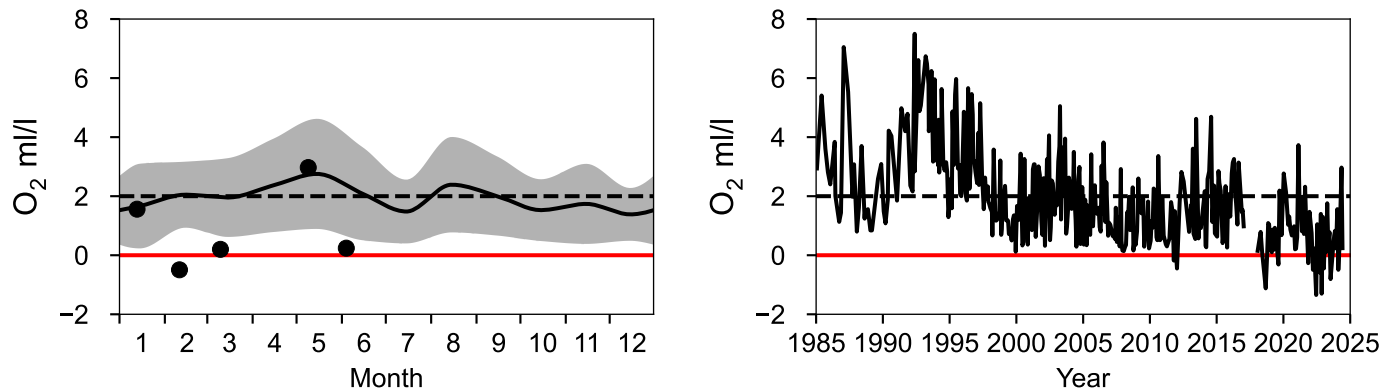


STATION BCS III-10 SURFACE WATER (0-10 m)

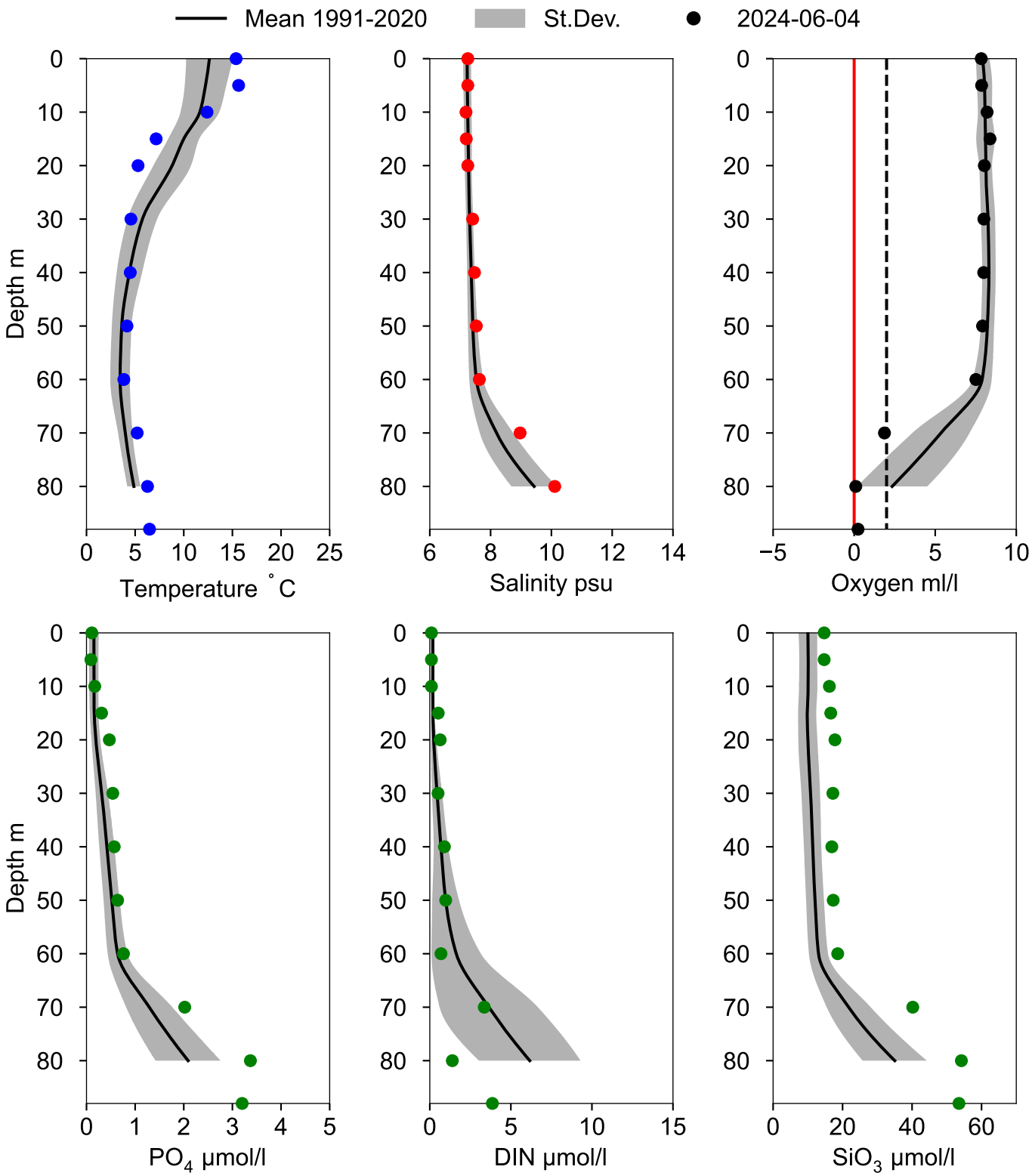
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

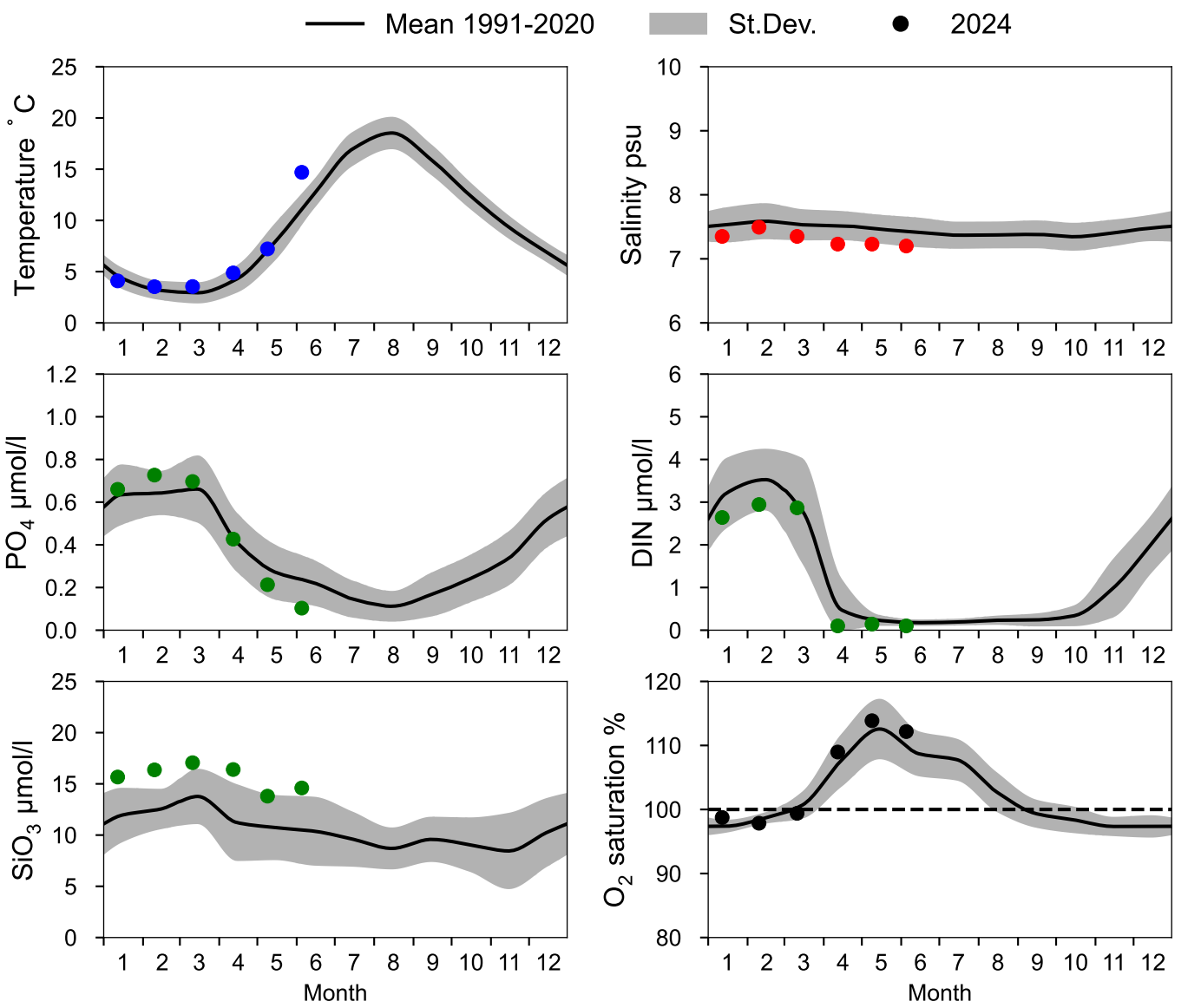


Vertical profiles BCS III-10
June

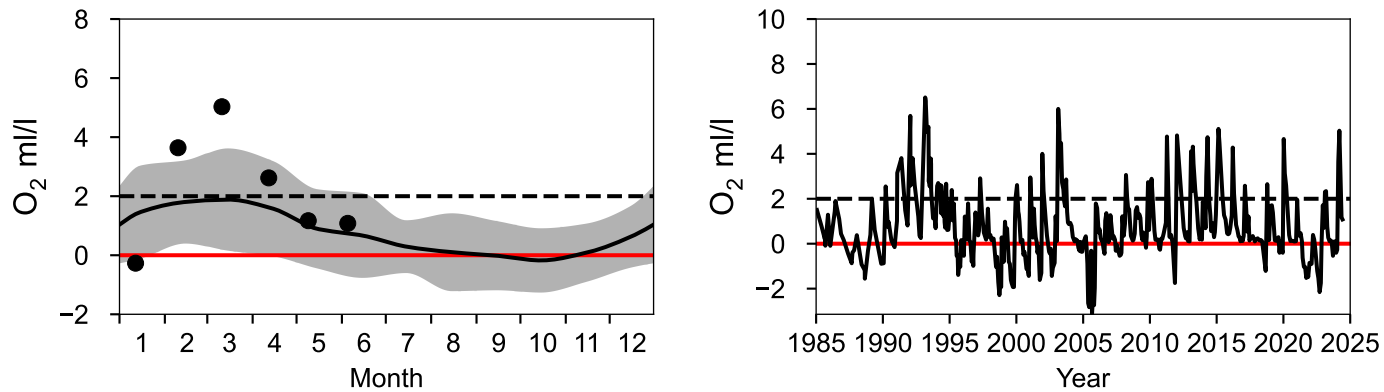


STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

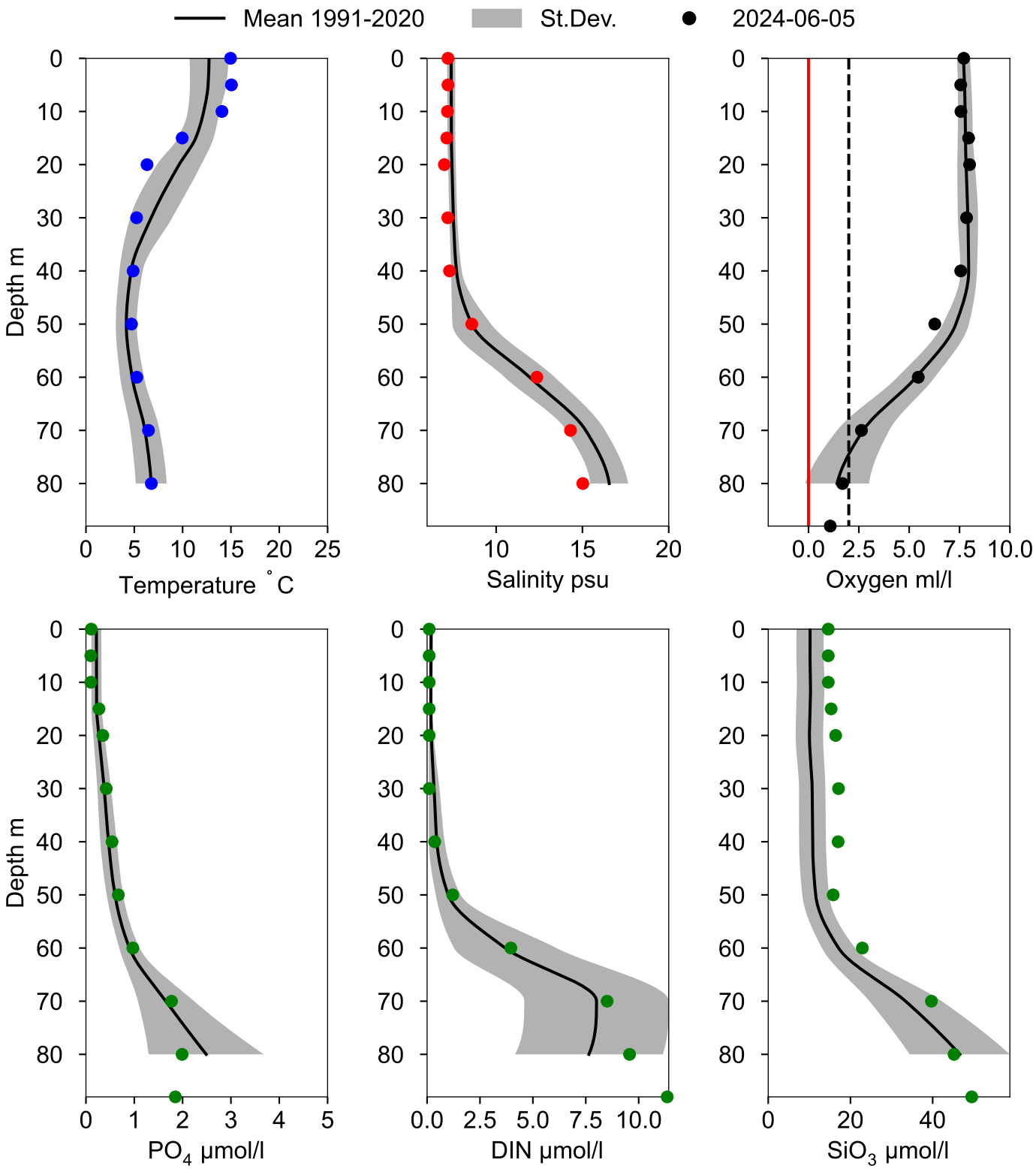
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

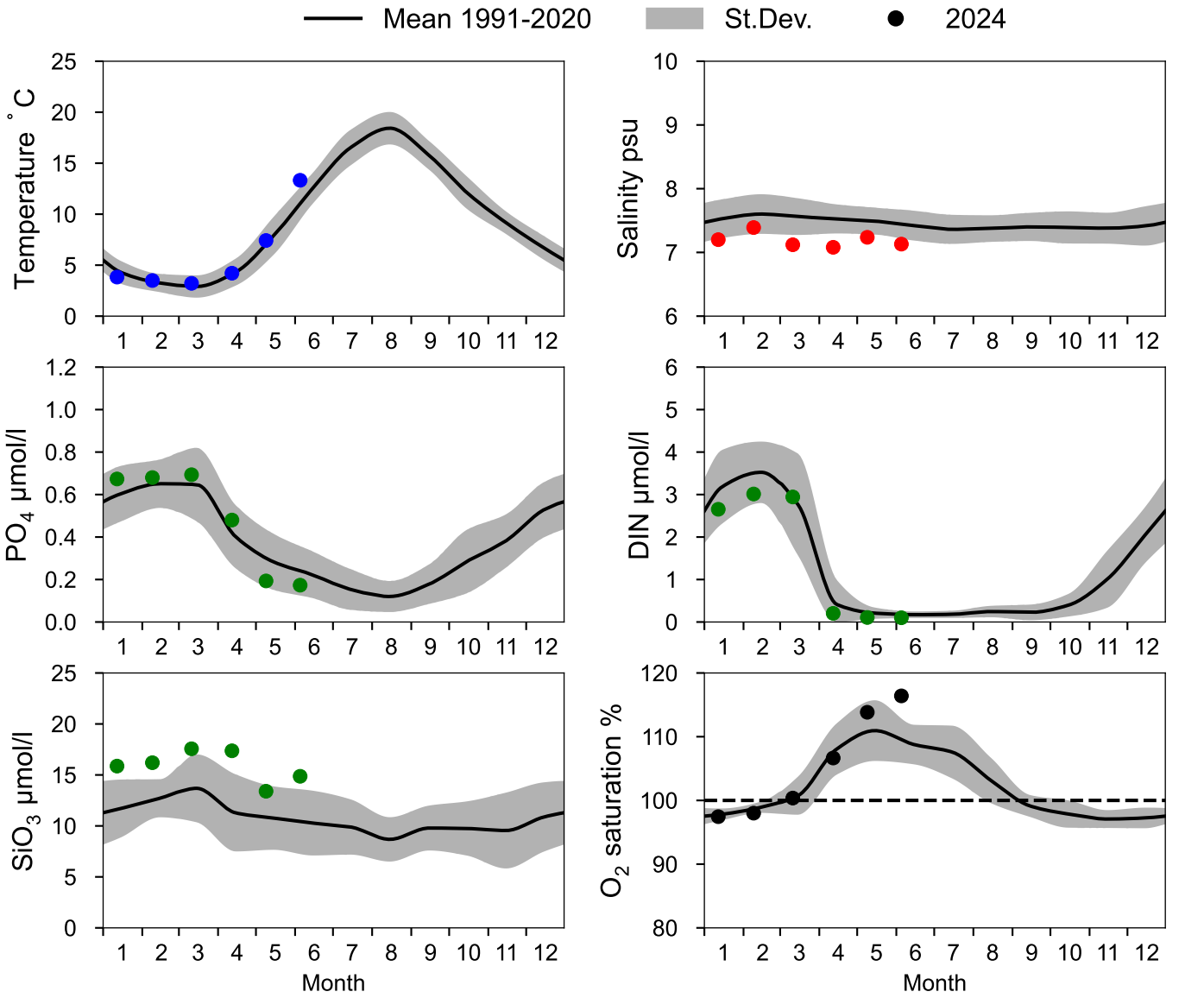


Vertical profiles BY5 BORNHOLMSDJ
June

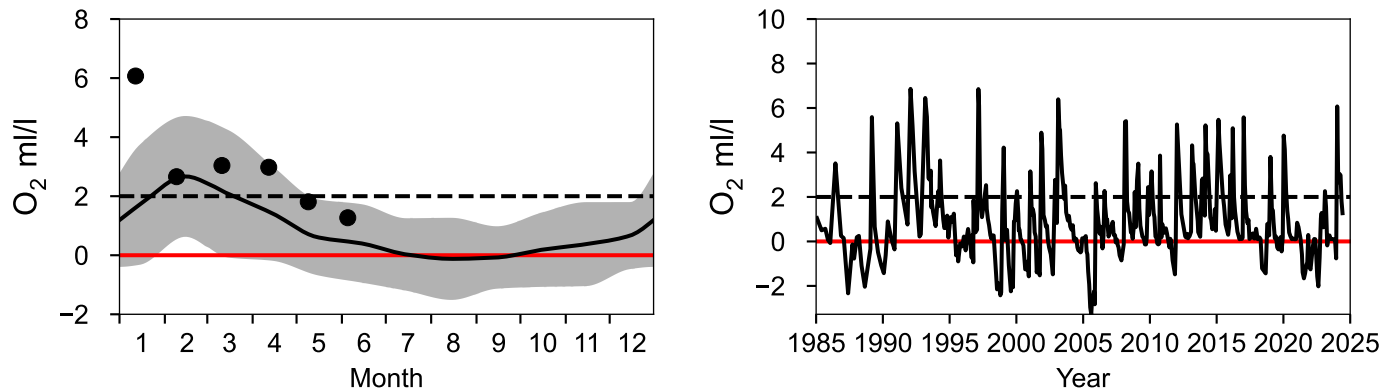


STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

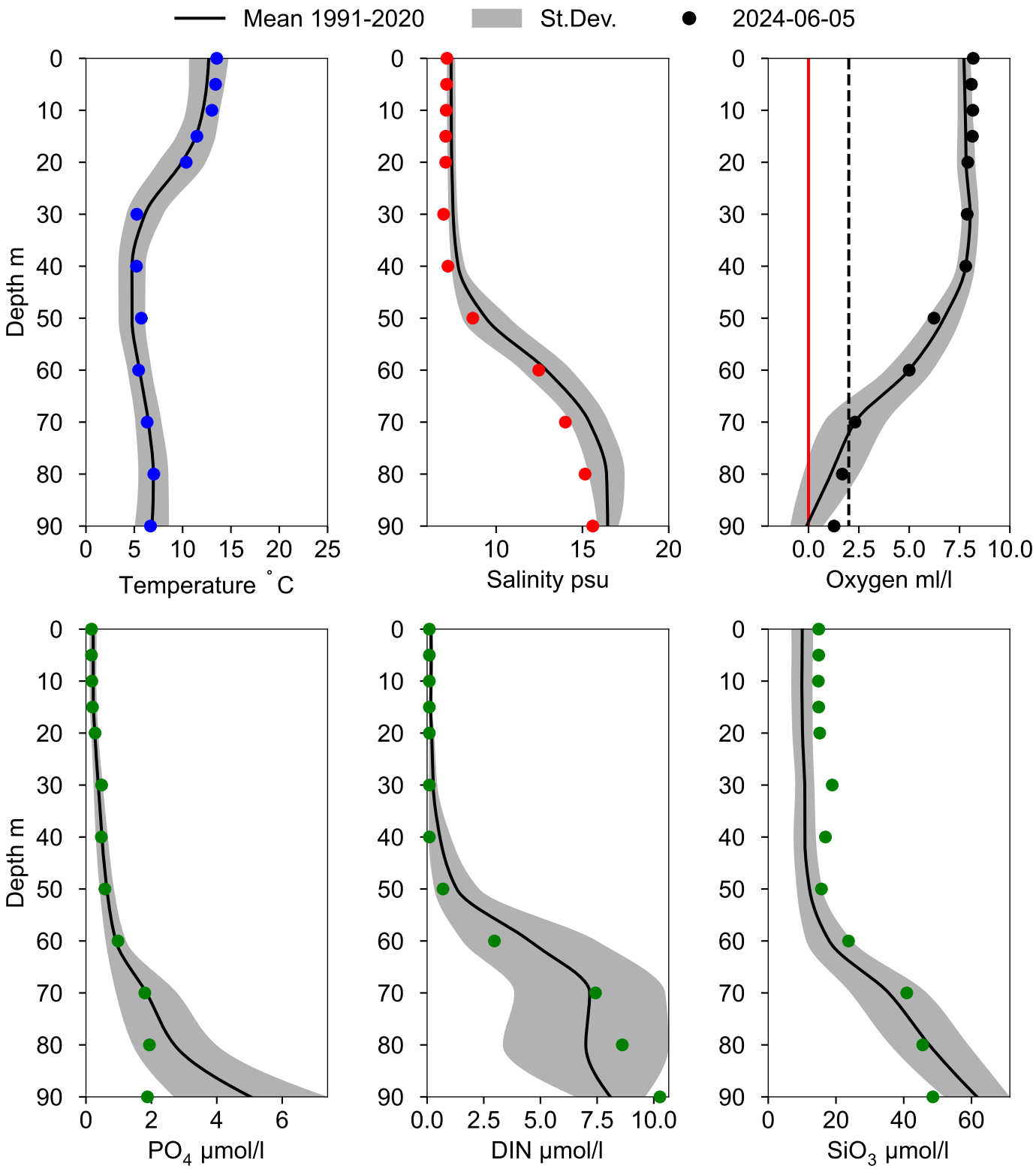
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

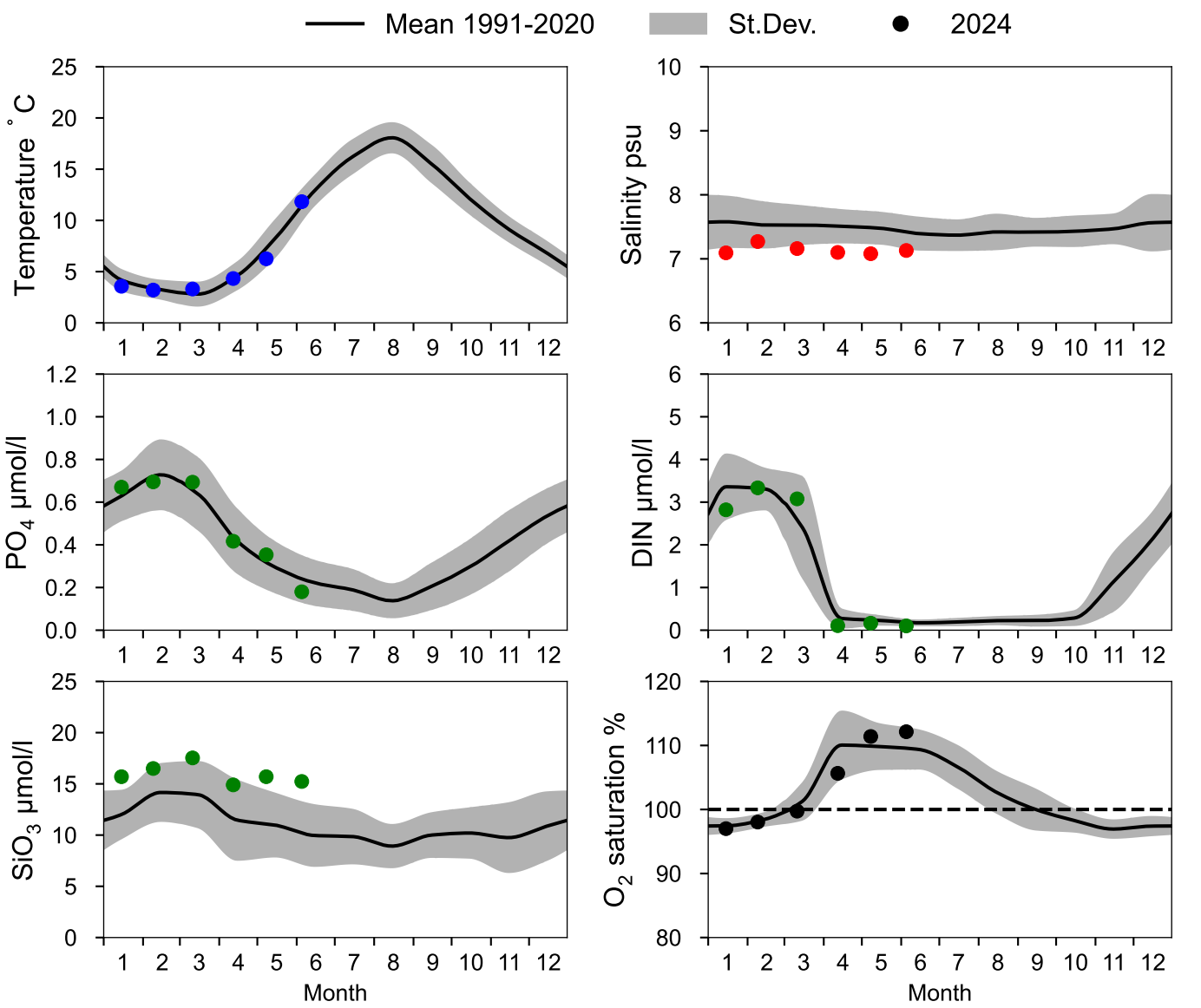


Vertical profiles BY4 CHRISTIANSÖ
June

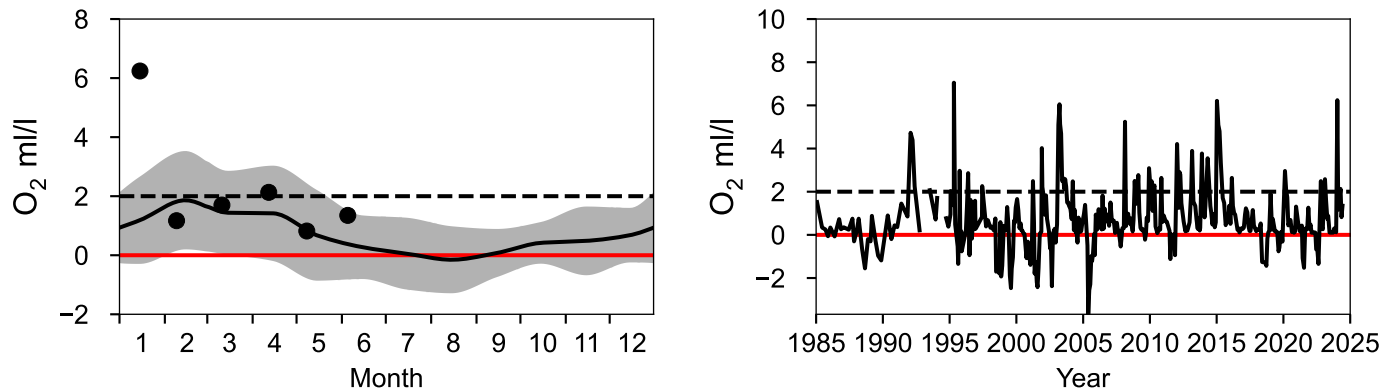


STATION HANÖBUKTEN SURFACE WATER (0-10 m)

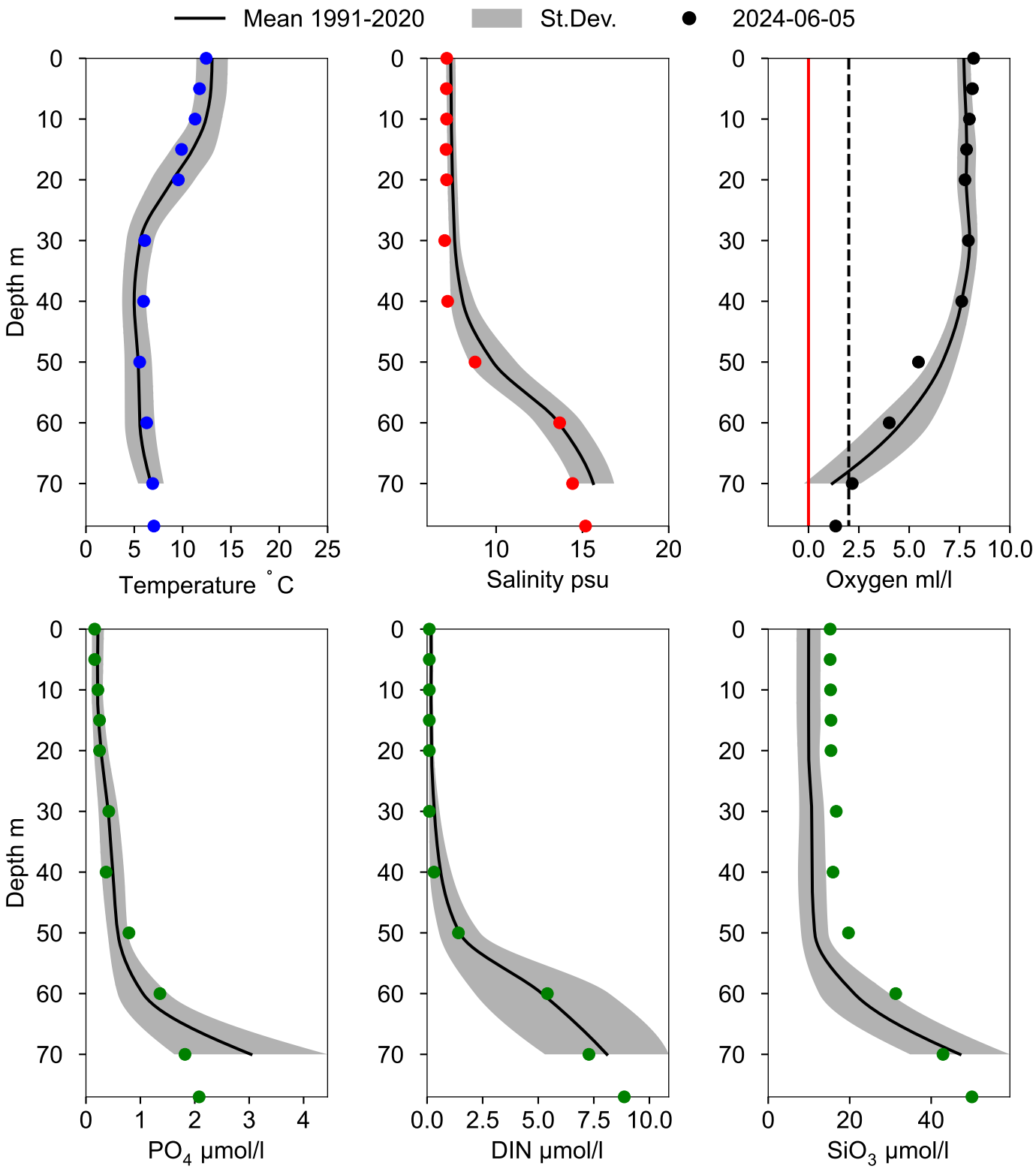
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 70 m)

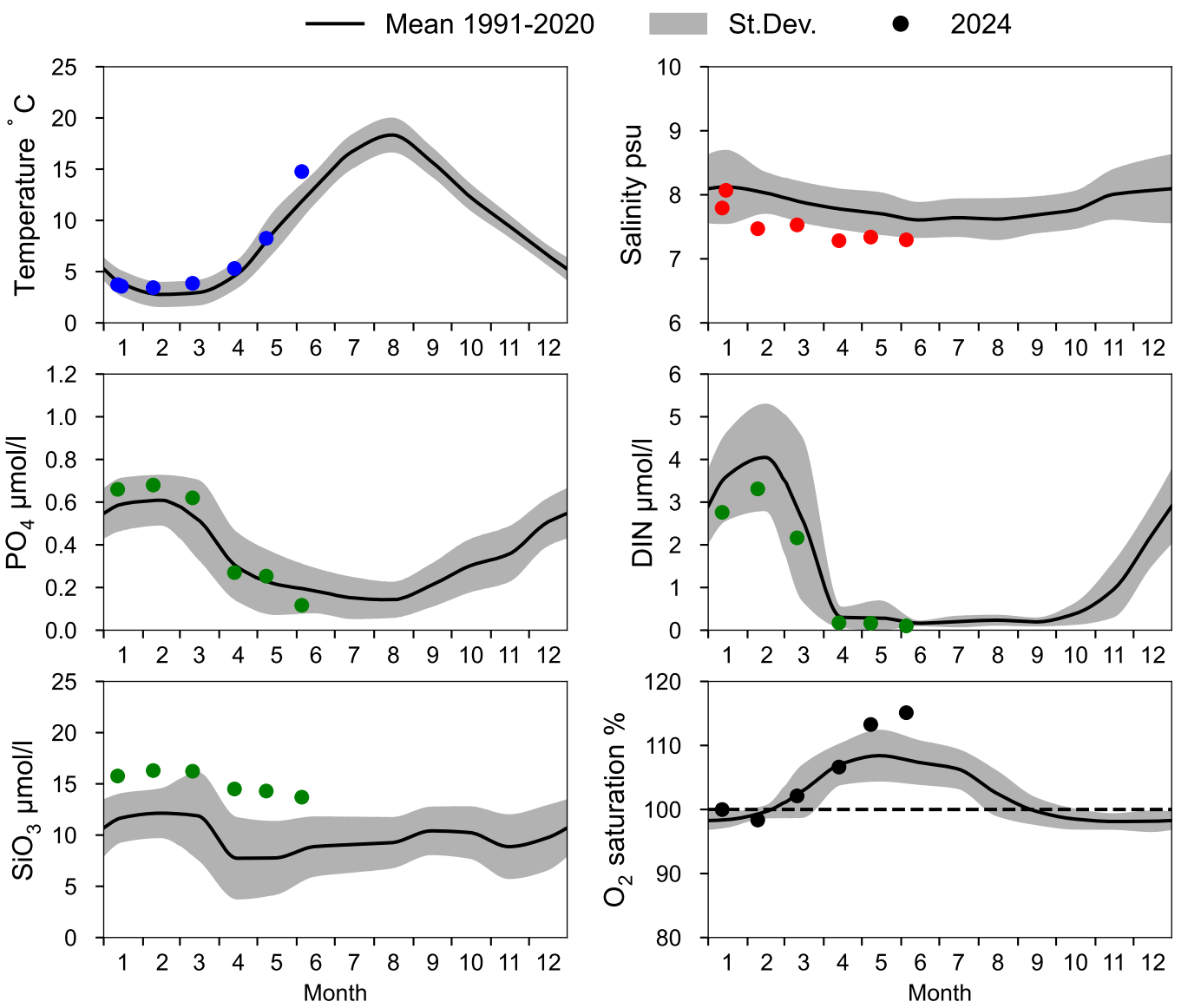


Vertical profiles HANÖBUKTEN
June

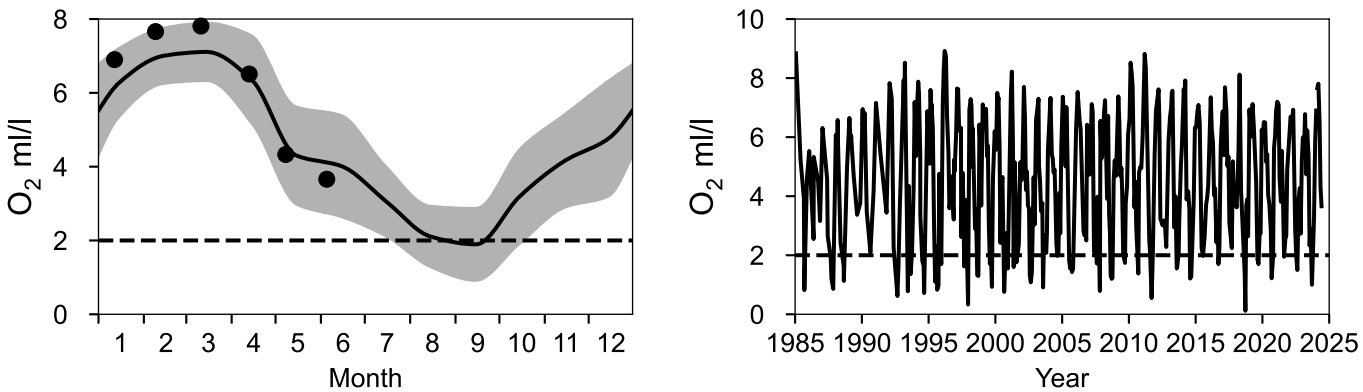


STATION BY2 ARKONA SURFACE WATER (0-10 m)

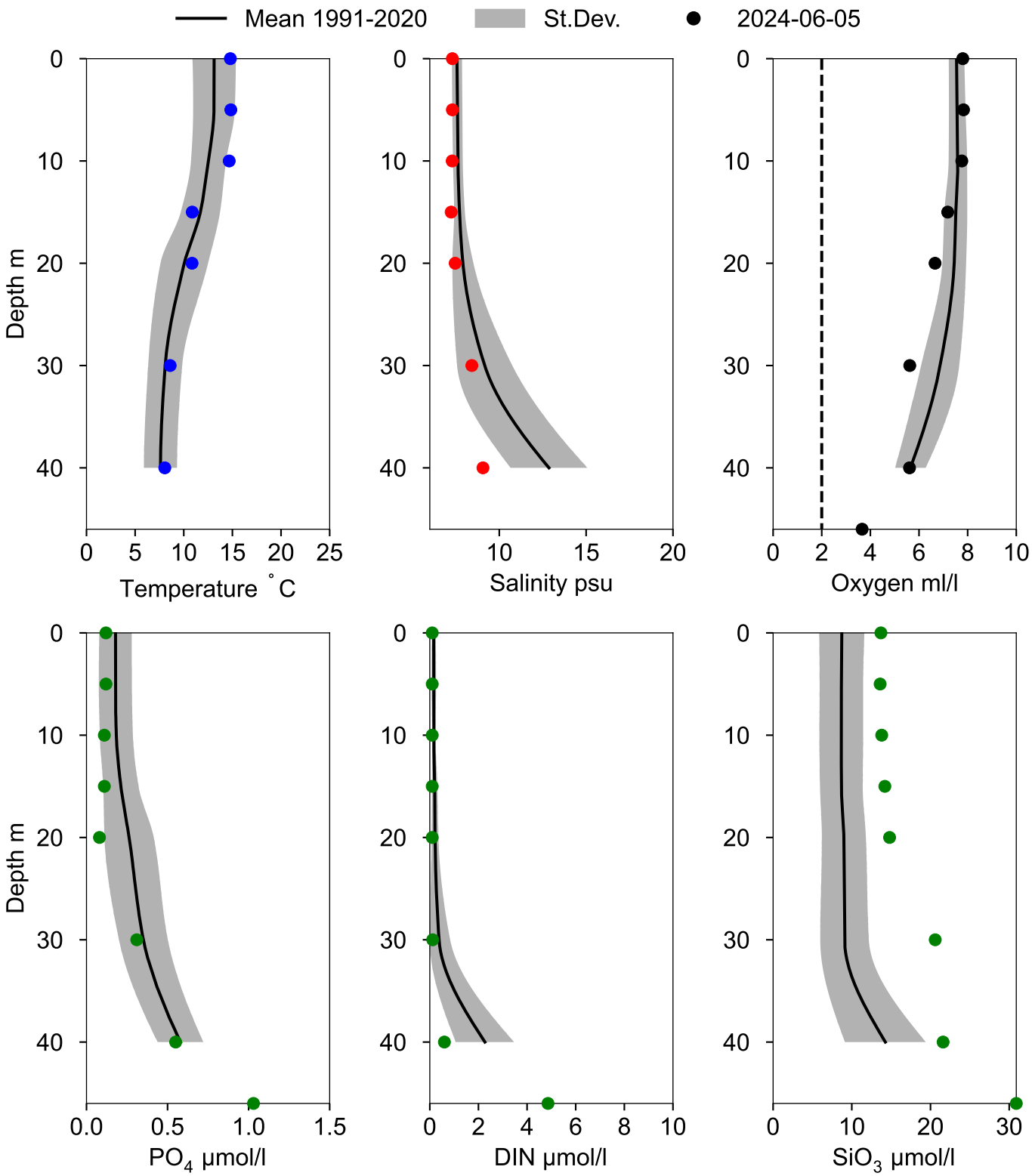
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

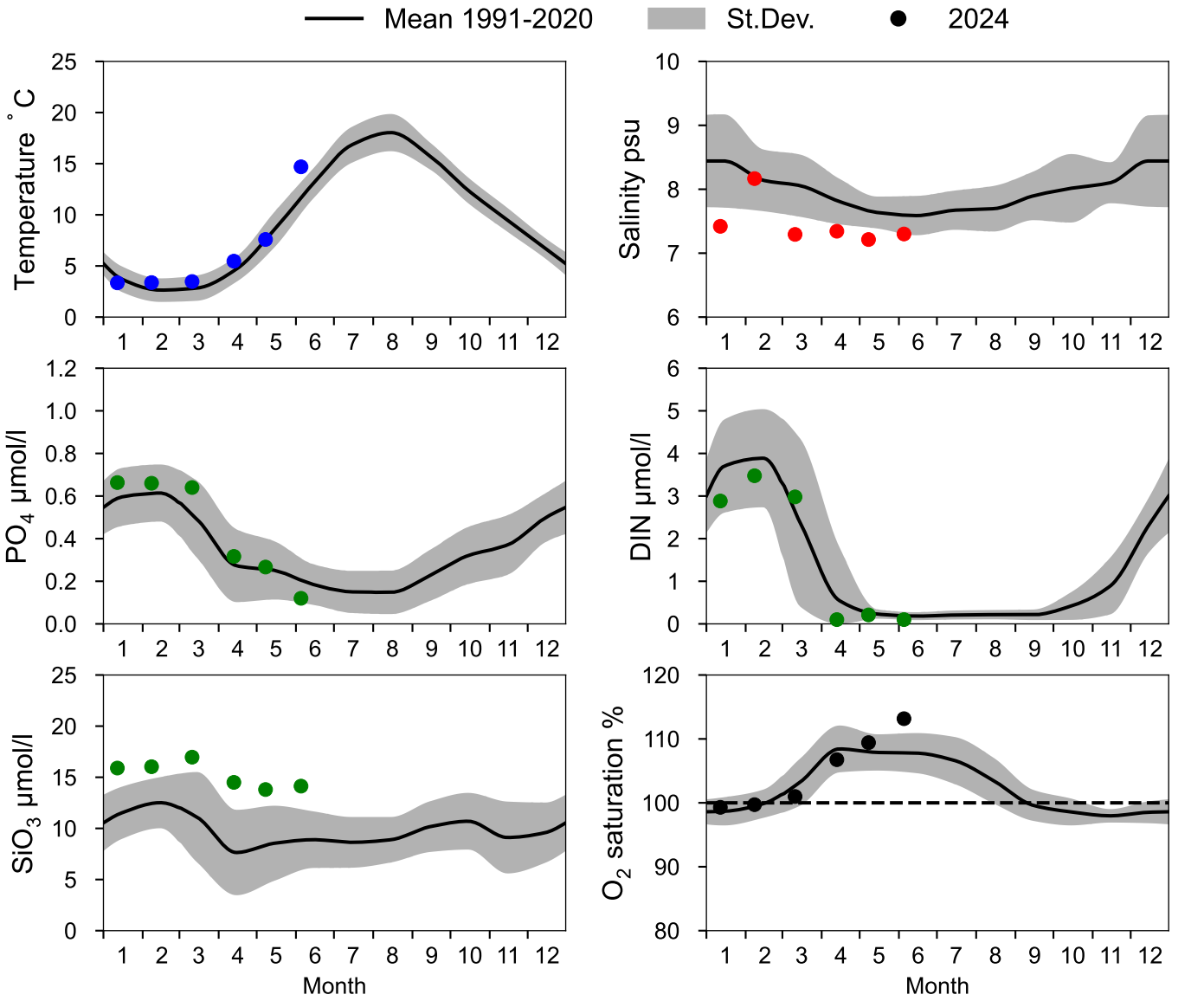


Vertical profiles BY2 ARKONA
June

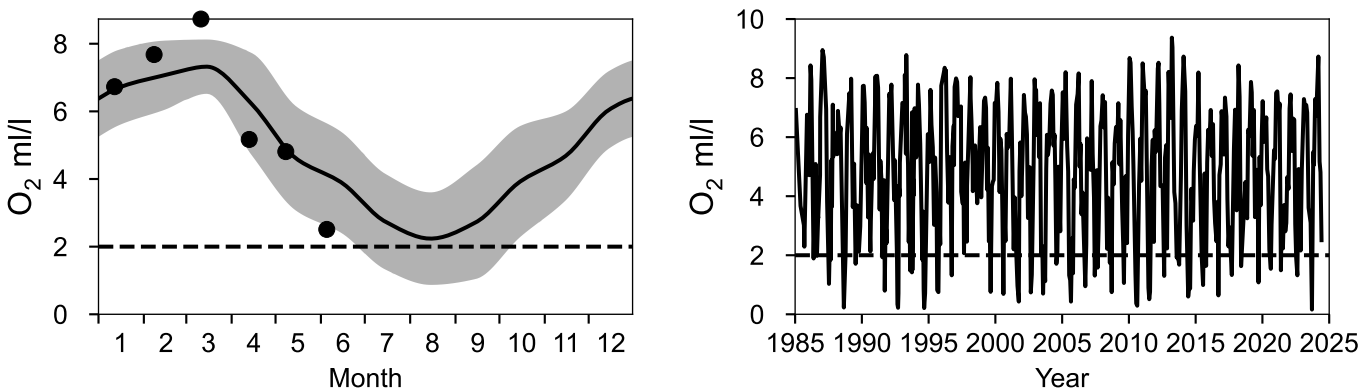


STATION BY1 SURFACE WATER (0-10 m)

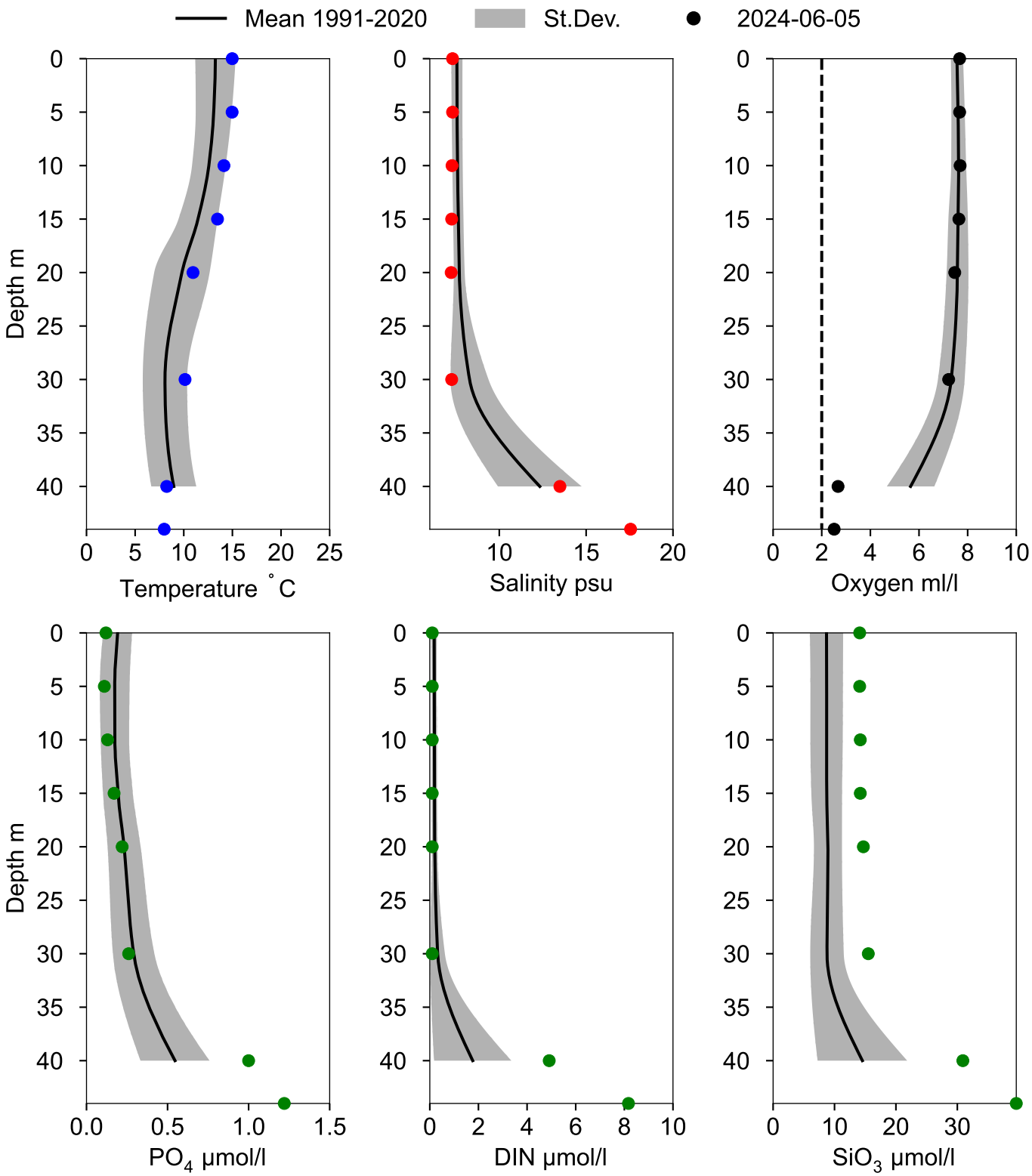
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 39 m)

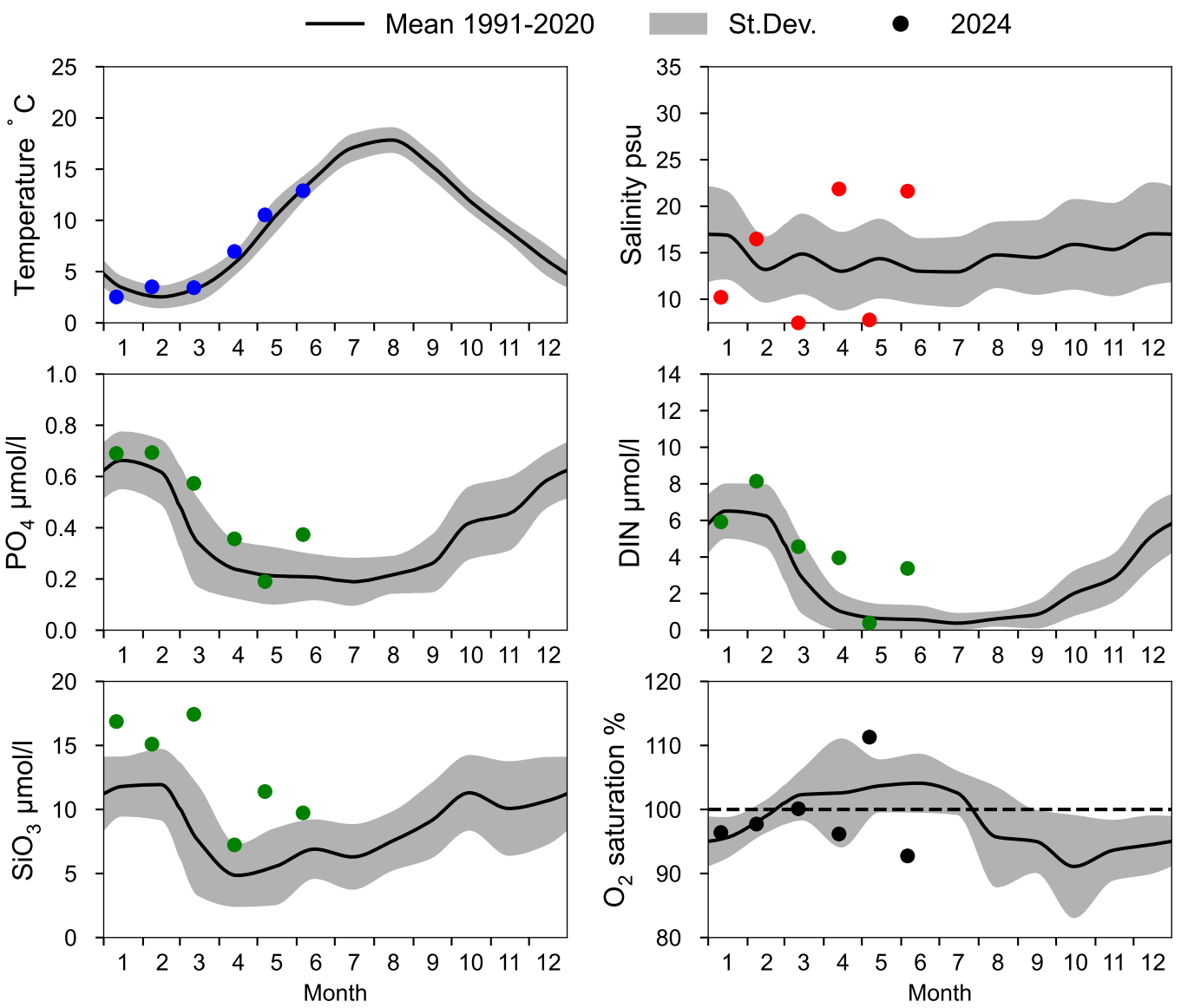


Vertical profiles BY1
June

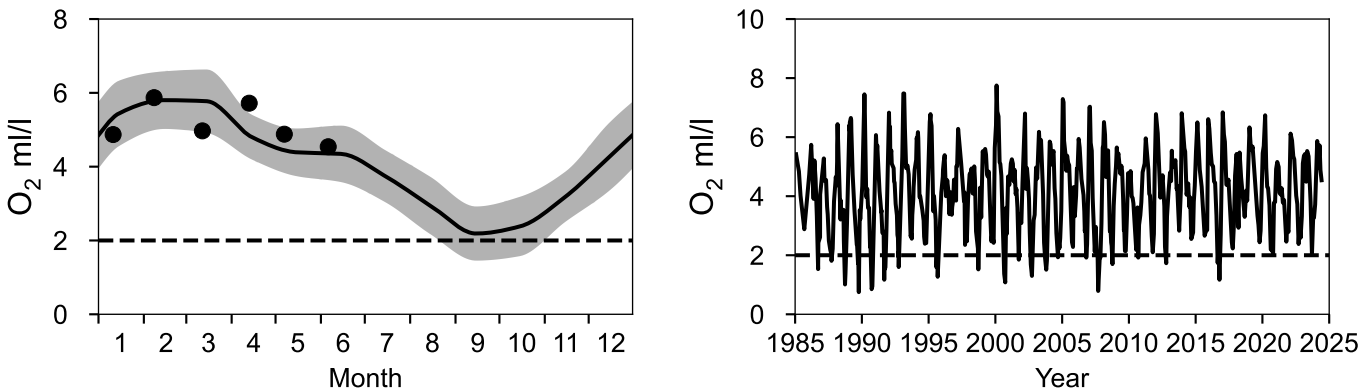


STATION W LANDSKRONA SURFACE WATER (0-10 m)

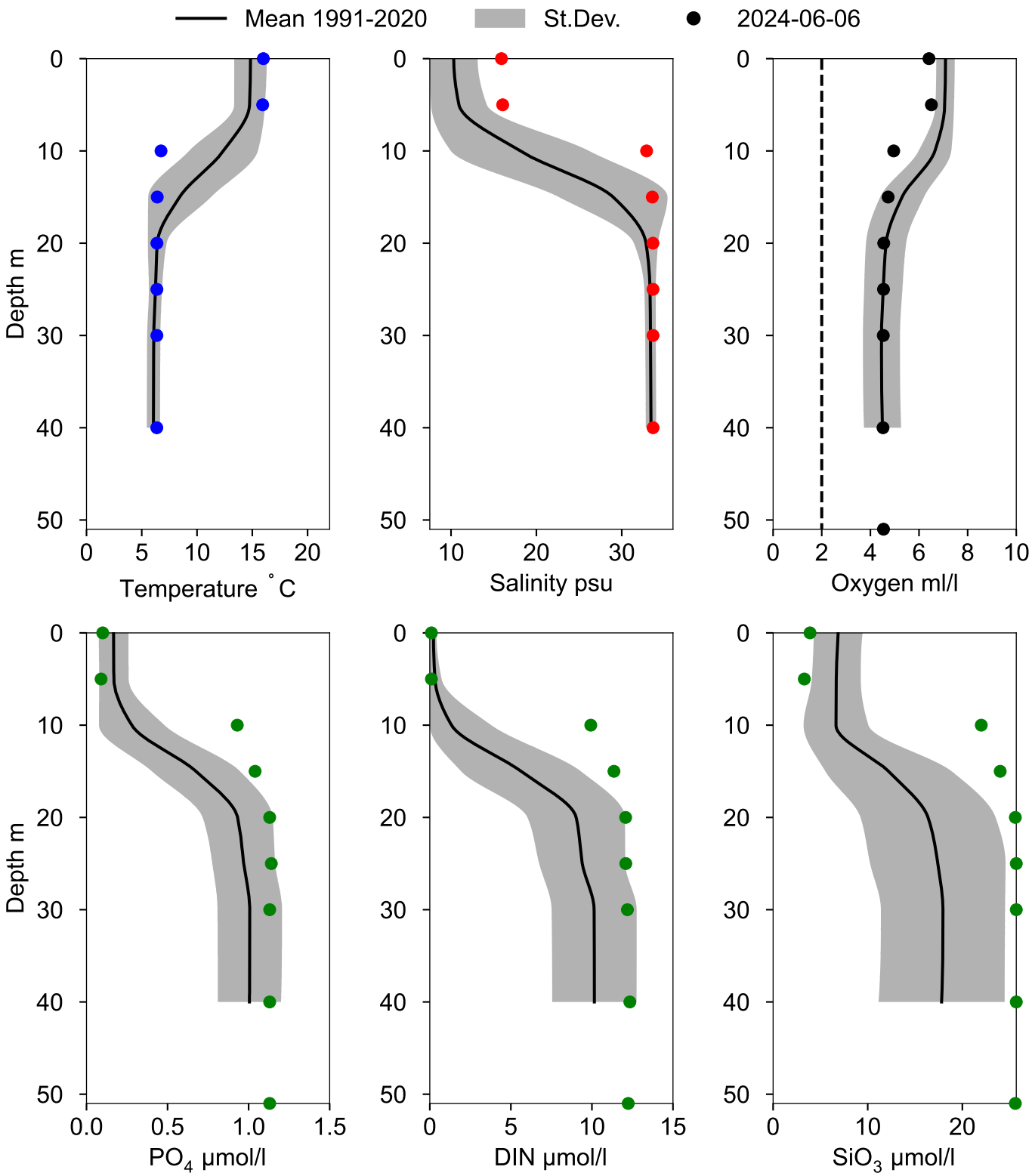
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

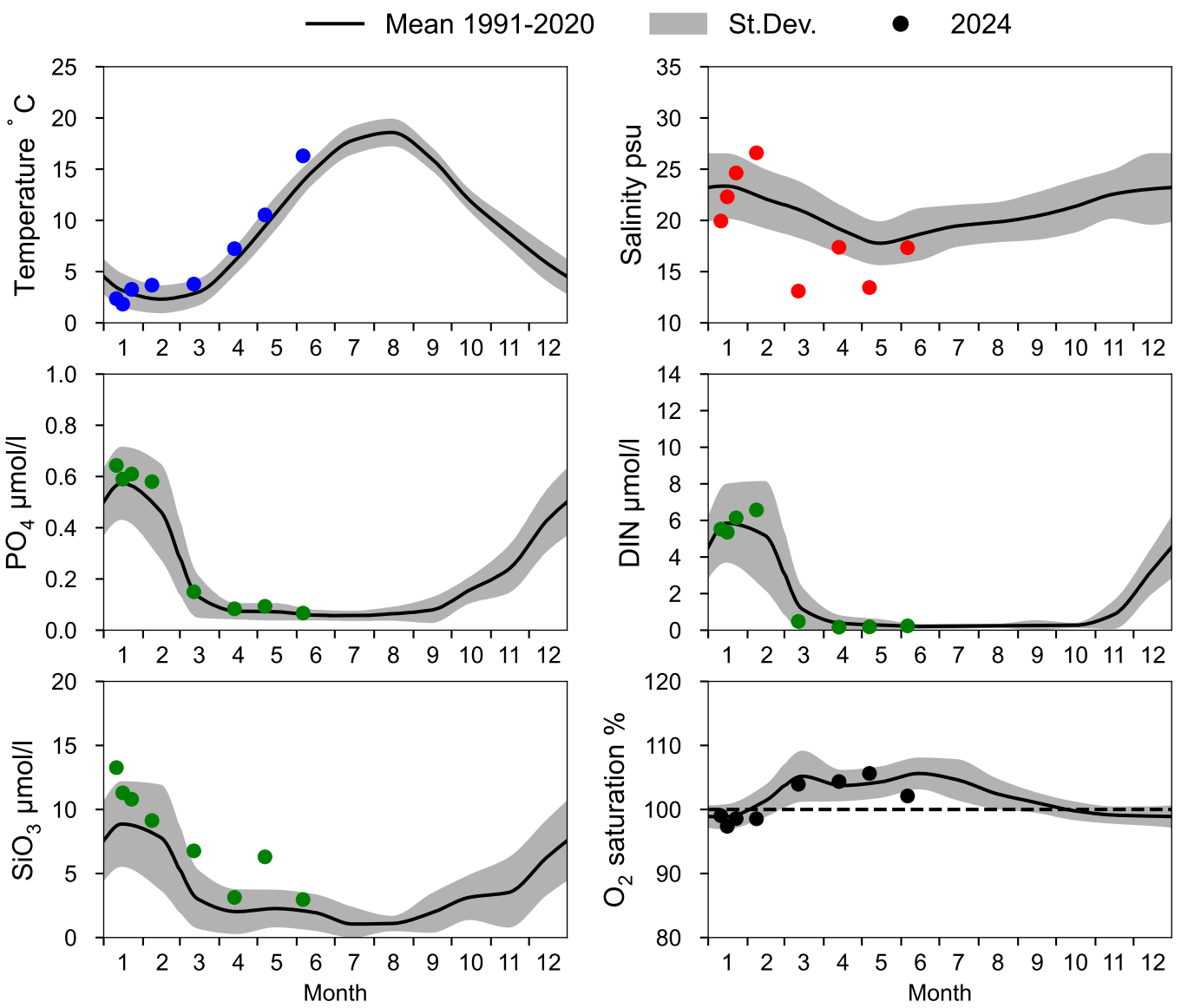


Vertical profiles W LANDSKRONA
June

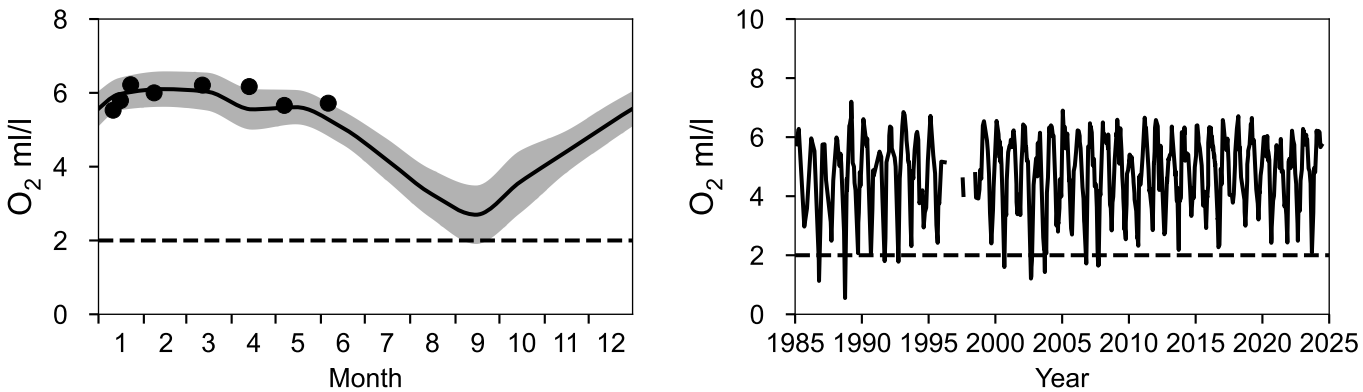


STATION ANHOLT E SURFACE WATER (0-10 m)

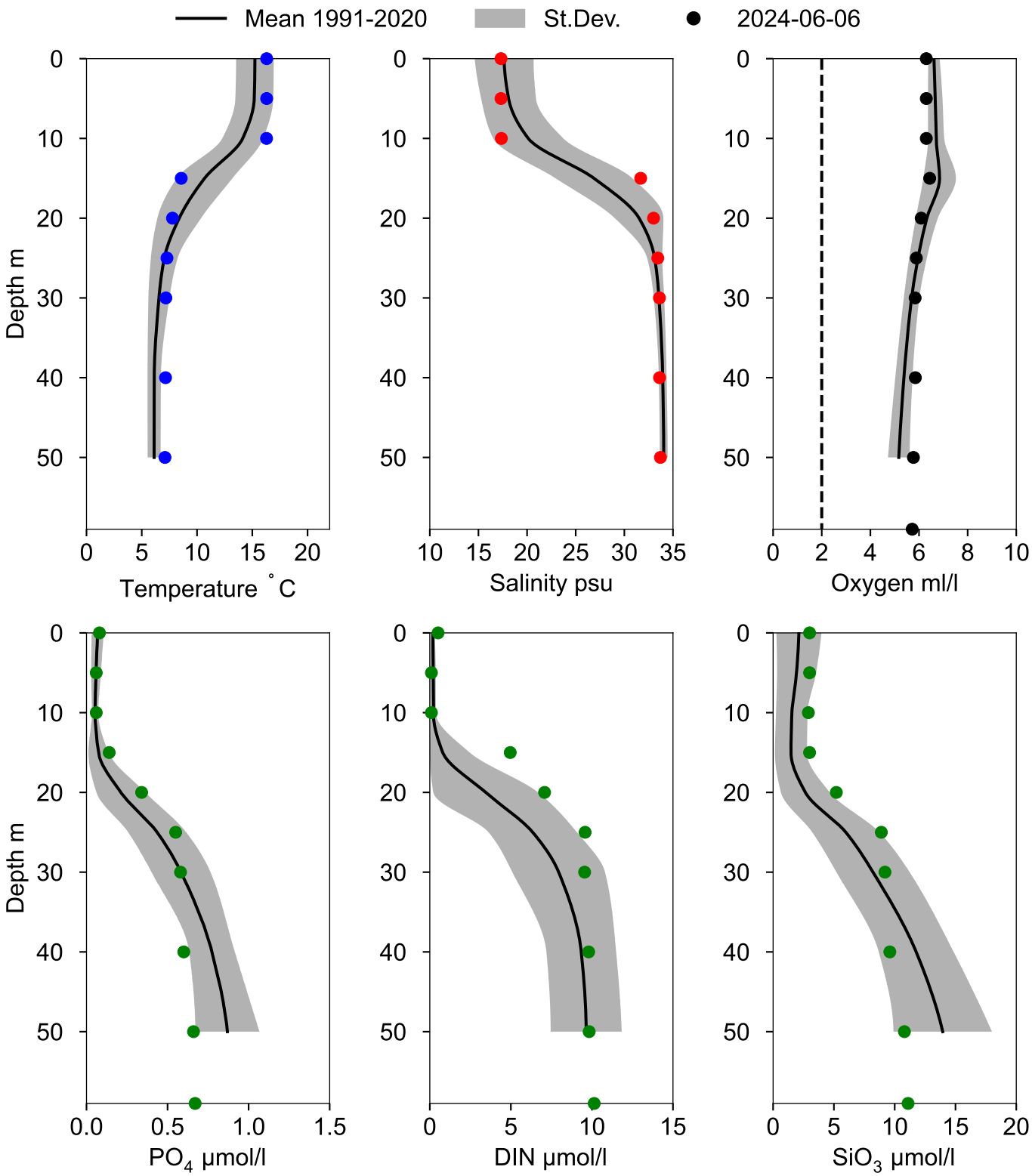
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 52 m)

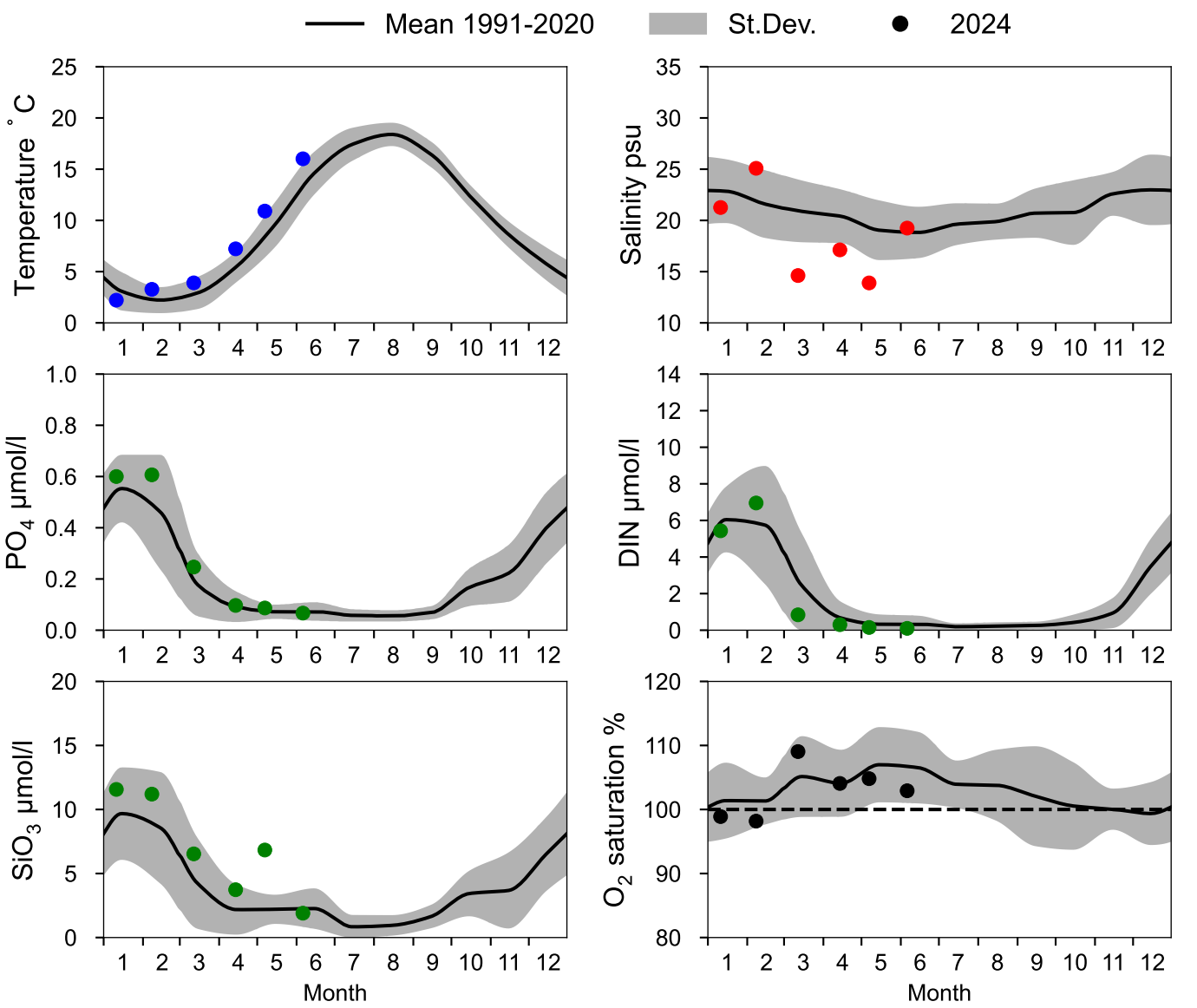


Vertical profiles ANHOLT E
June

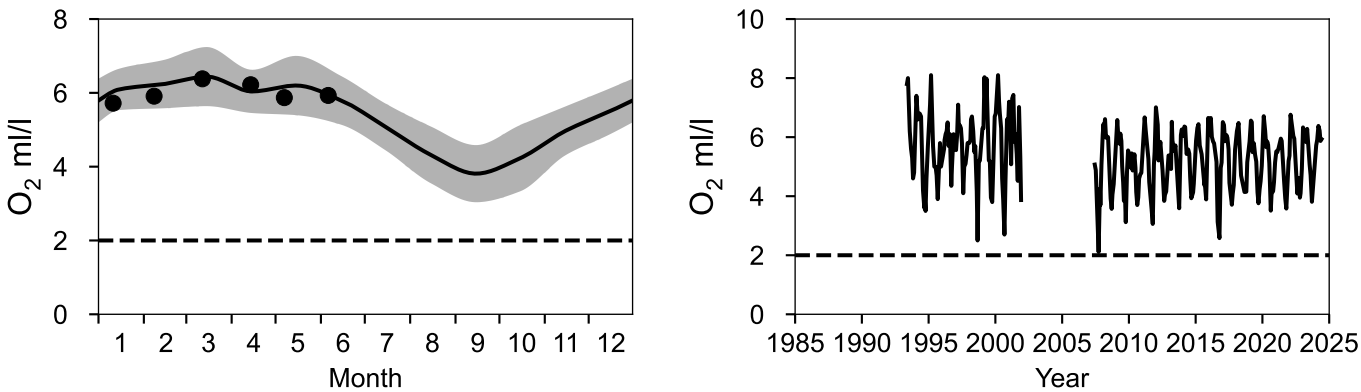


STATION N14 FALKENBERG SURFACE WATER (0-10 m)

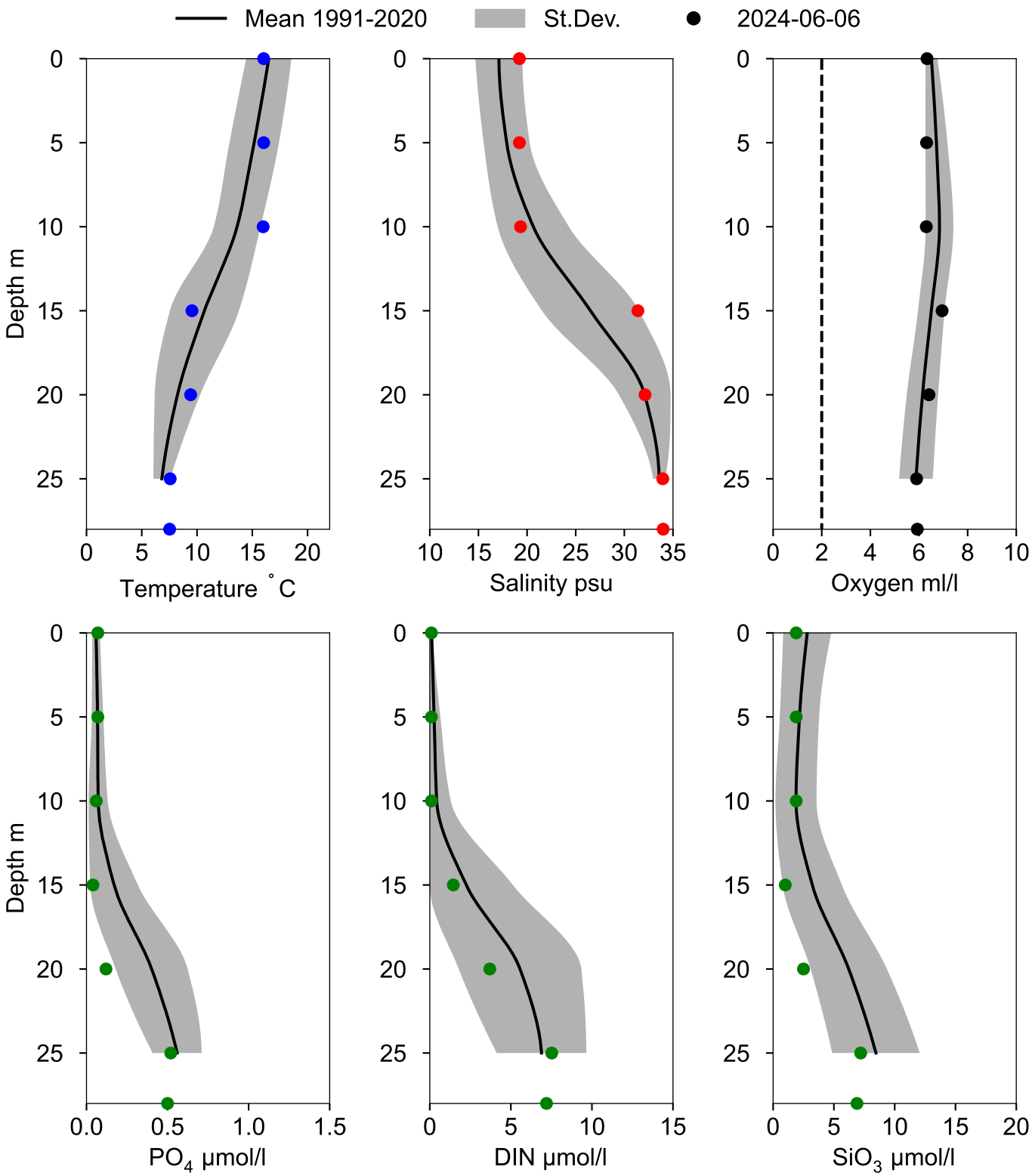
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 25 m)

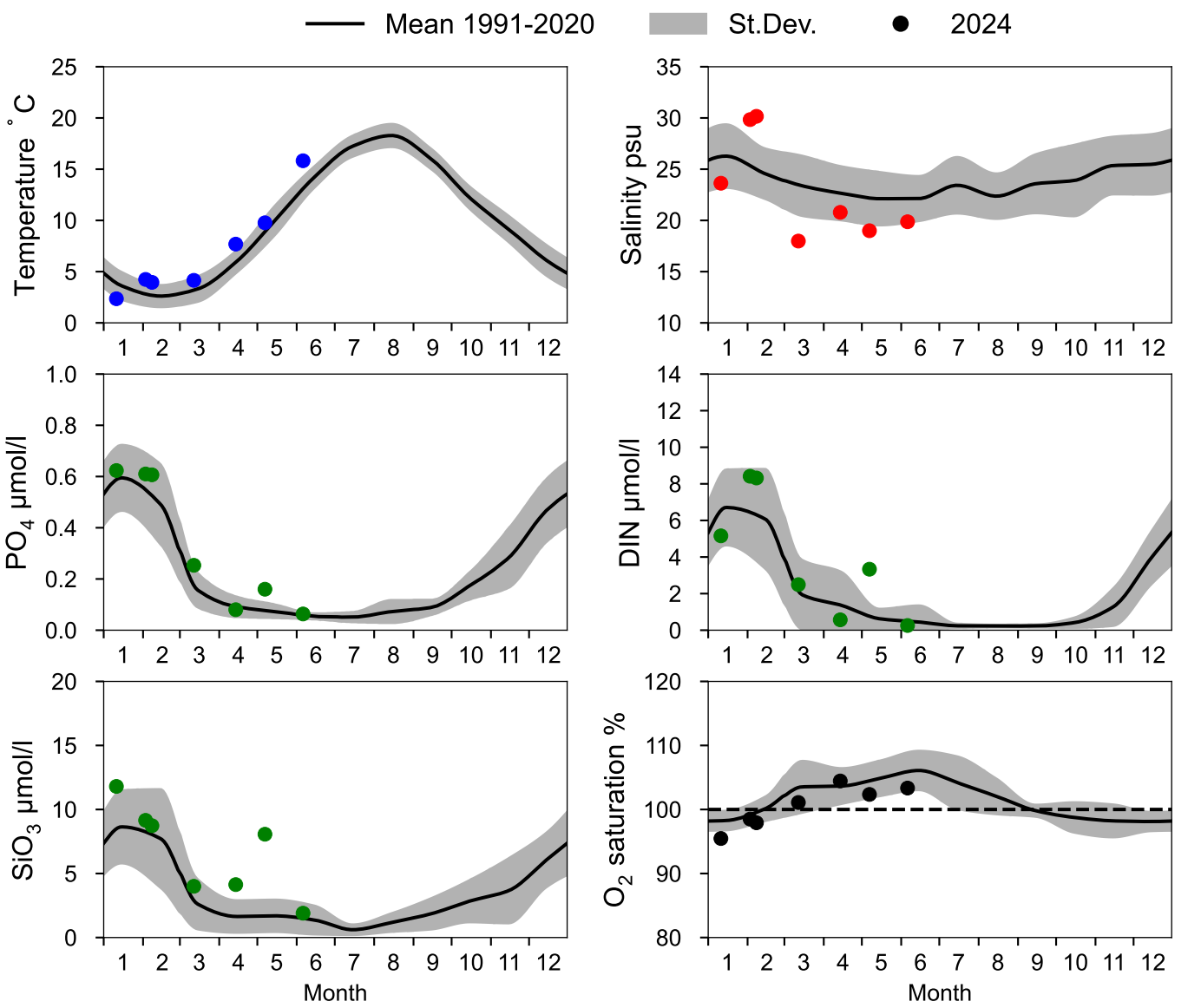


Vertical profiles N14 FALKENBERG
June

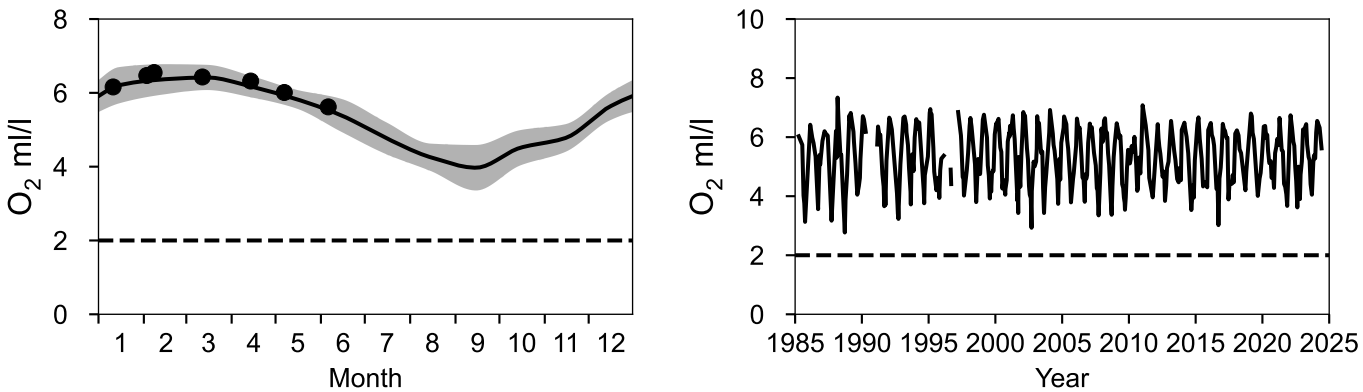


STATION FLADEN SURFACE WATER (0-10 m)

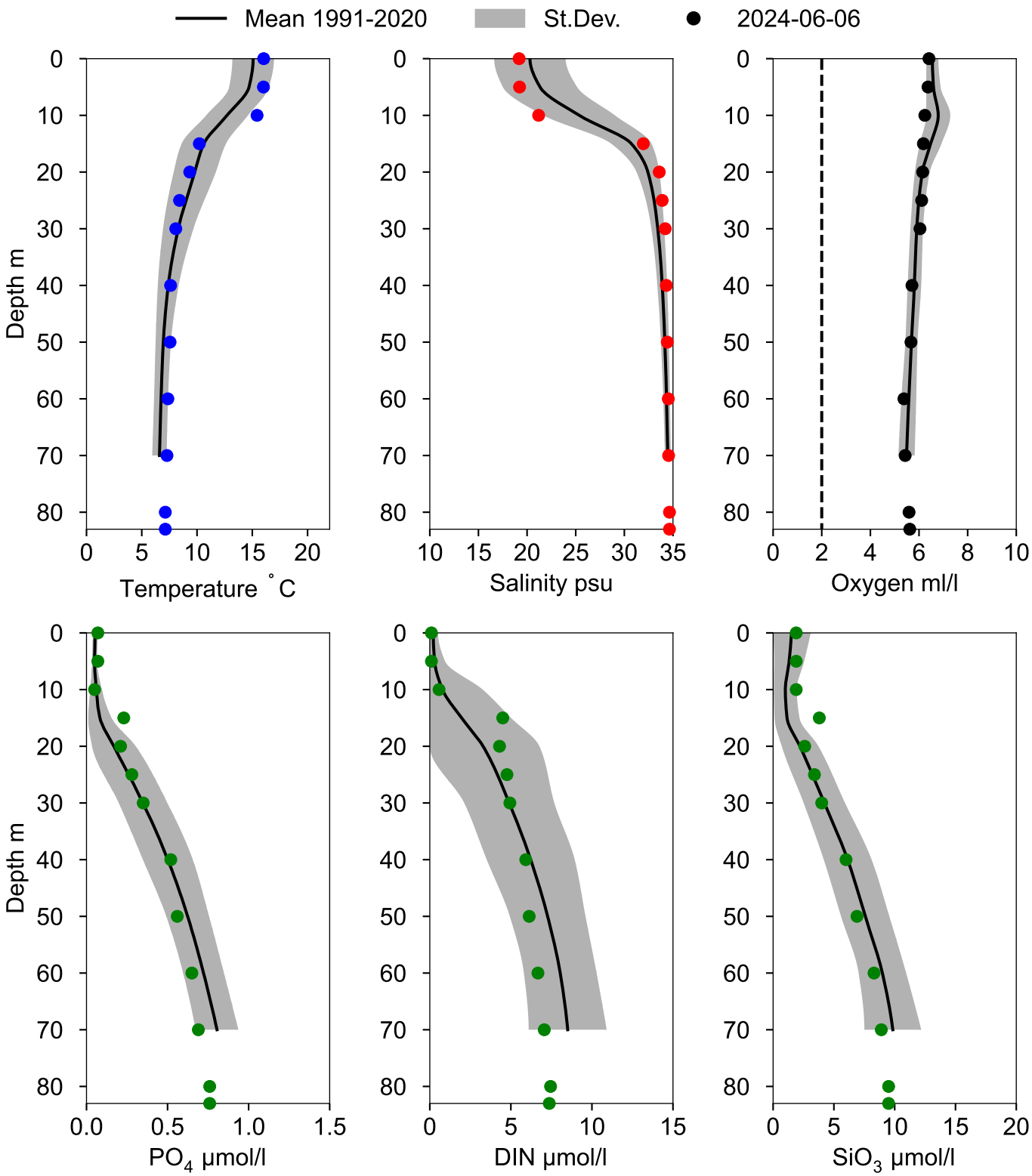
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 74 m)

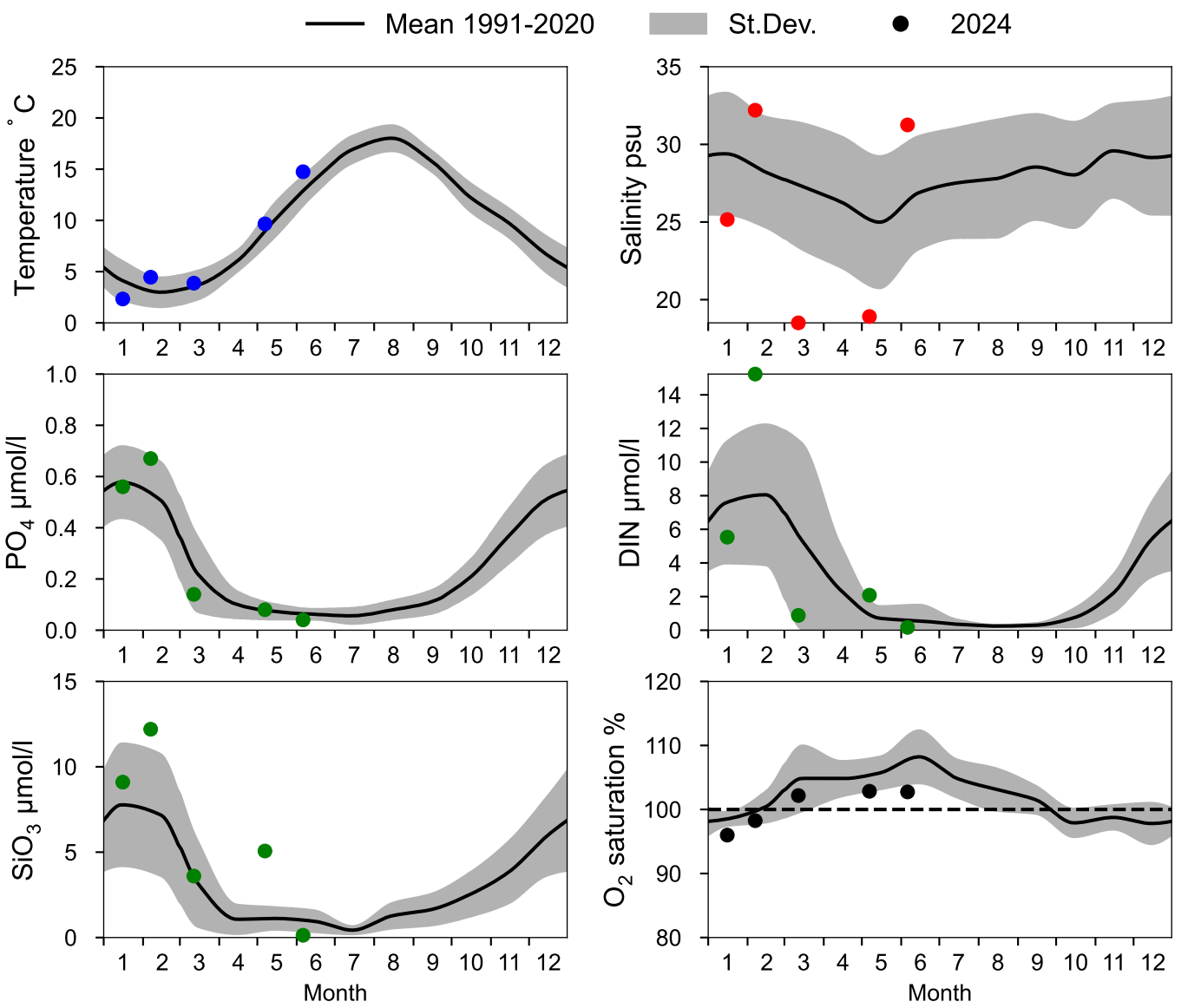


Vertical profiles FLADEN
June

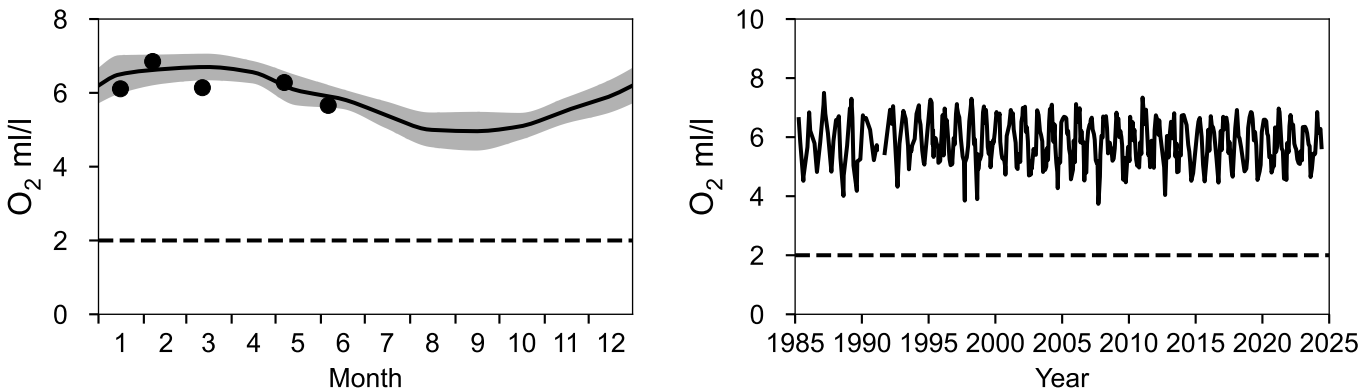


STATION P2 SURFACE WATER (0-10 m)

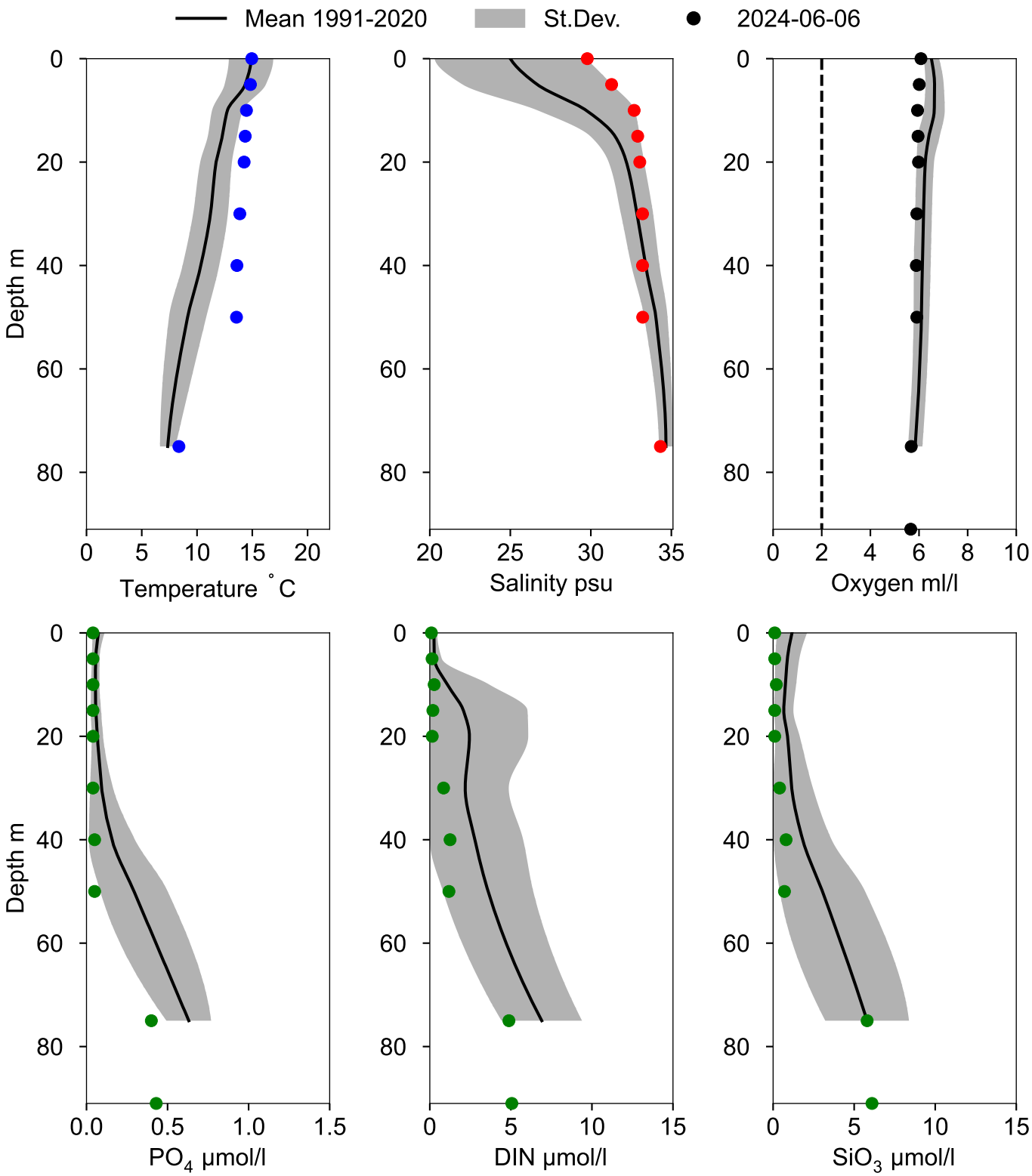
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 75 m)

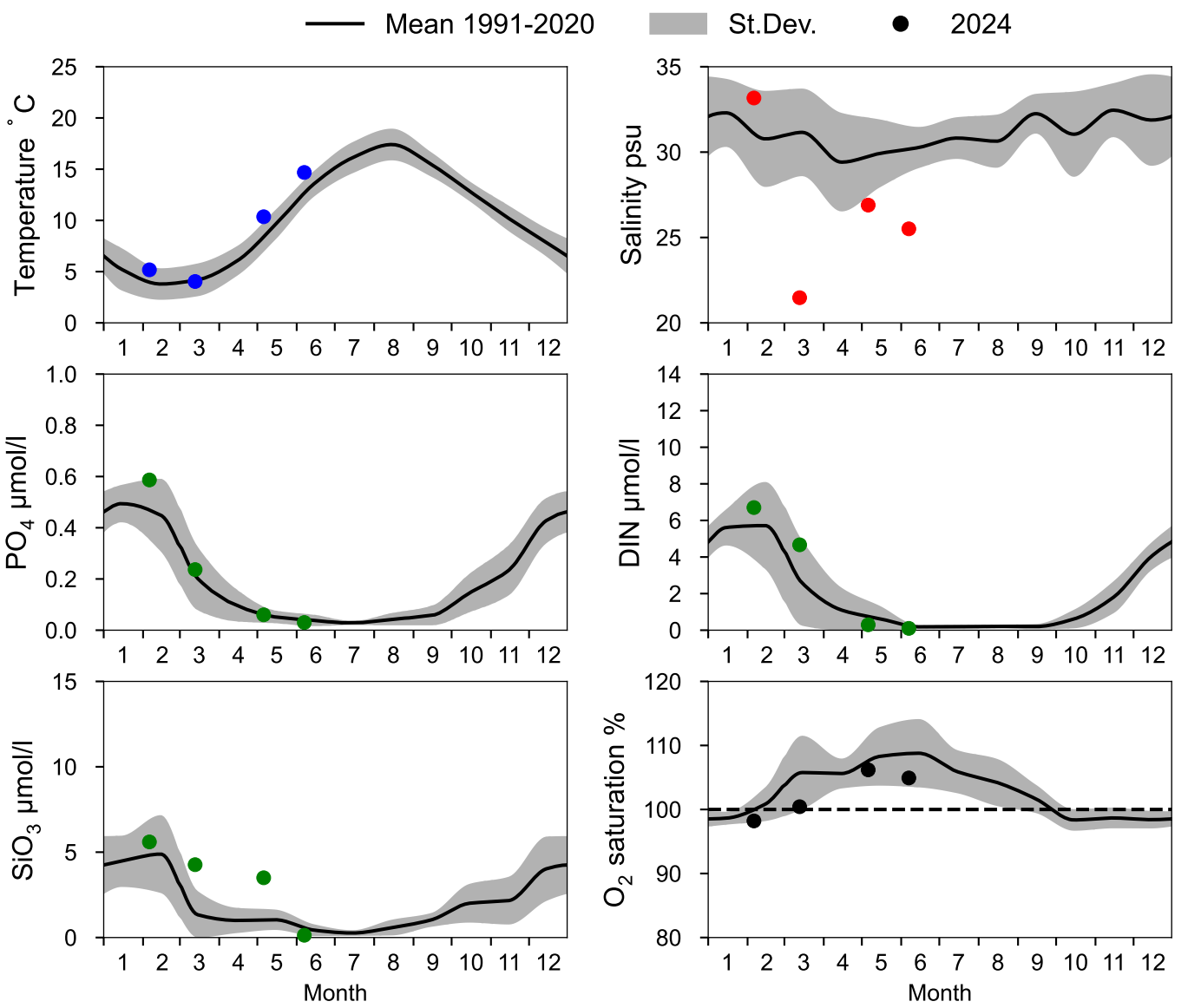


Vertical profiles P2
June

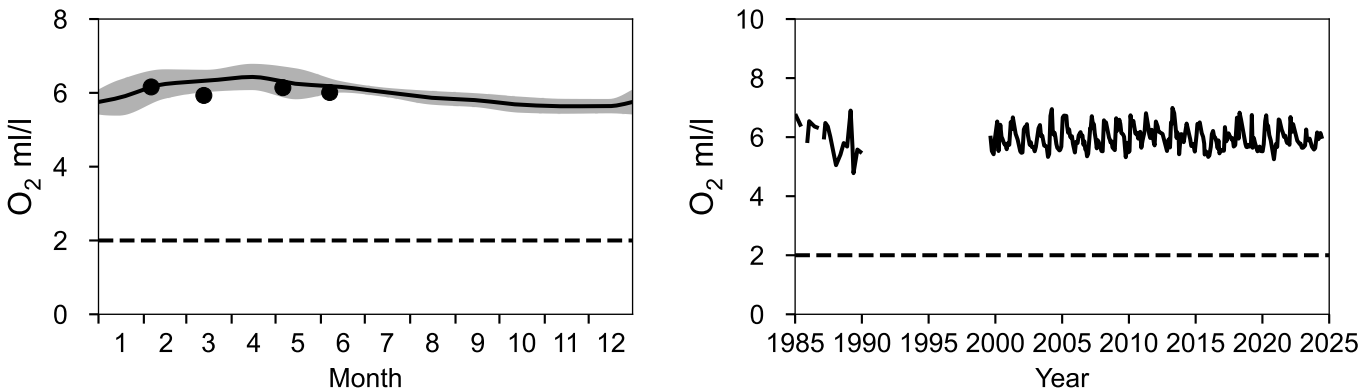


STATION Å17 SURFACE WATER (0-10 m)

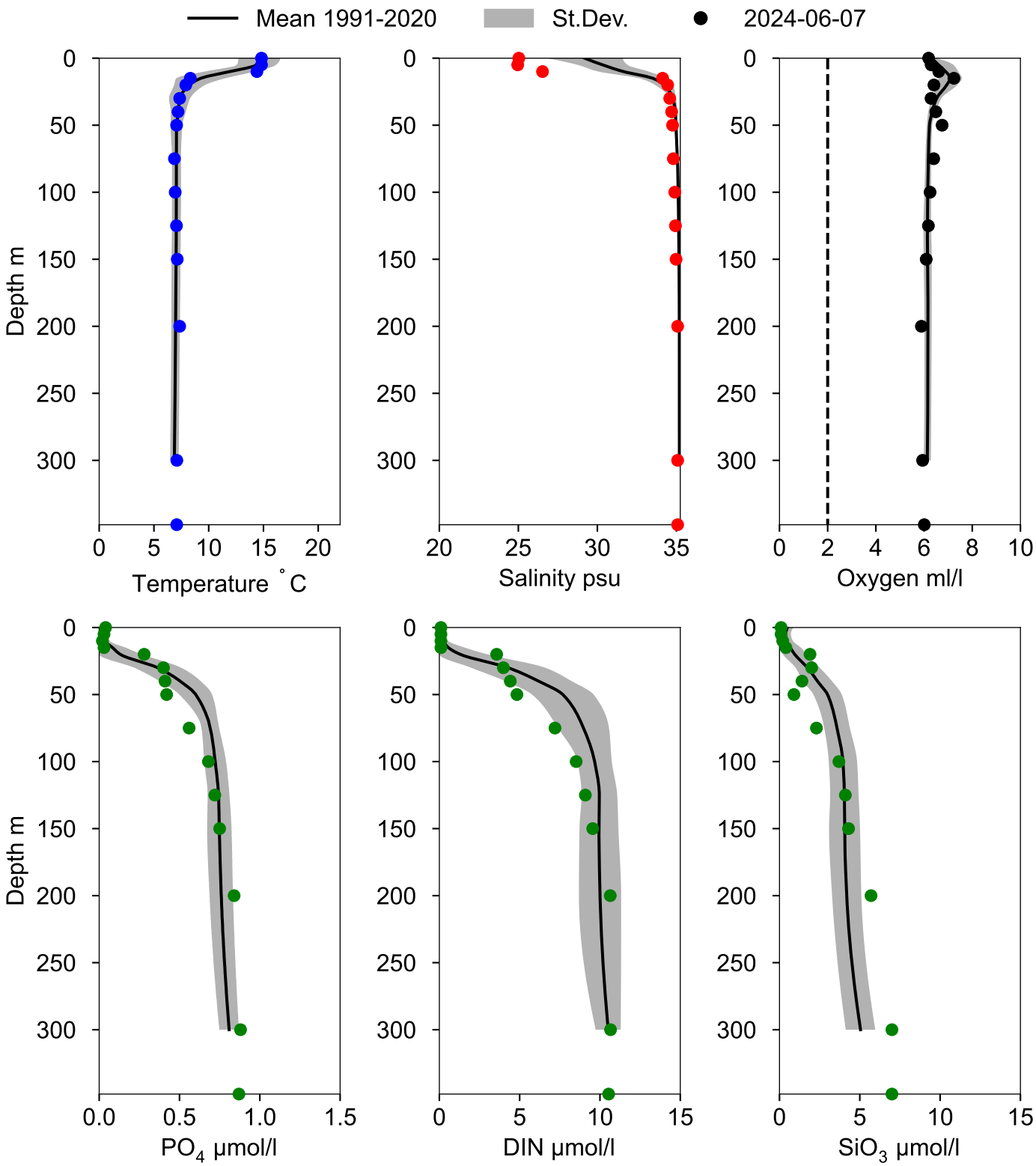
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 300 m)

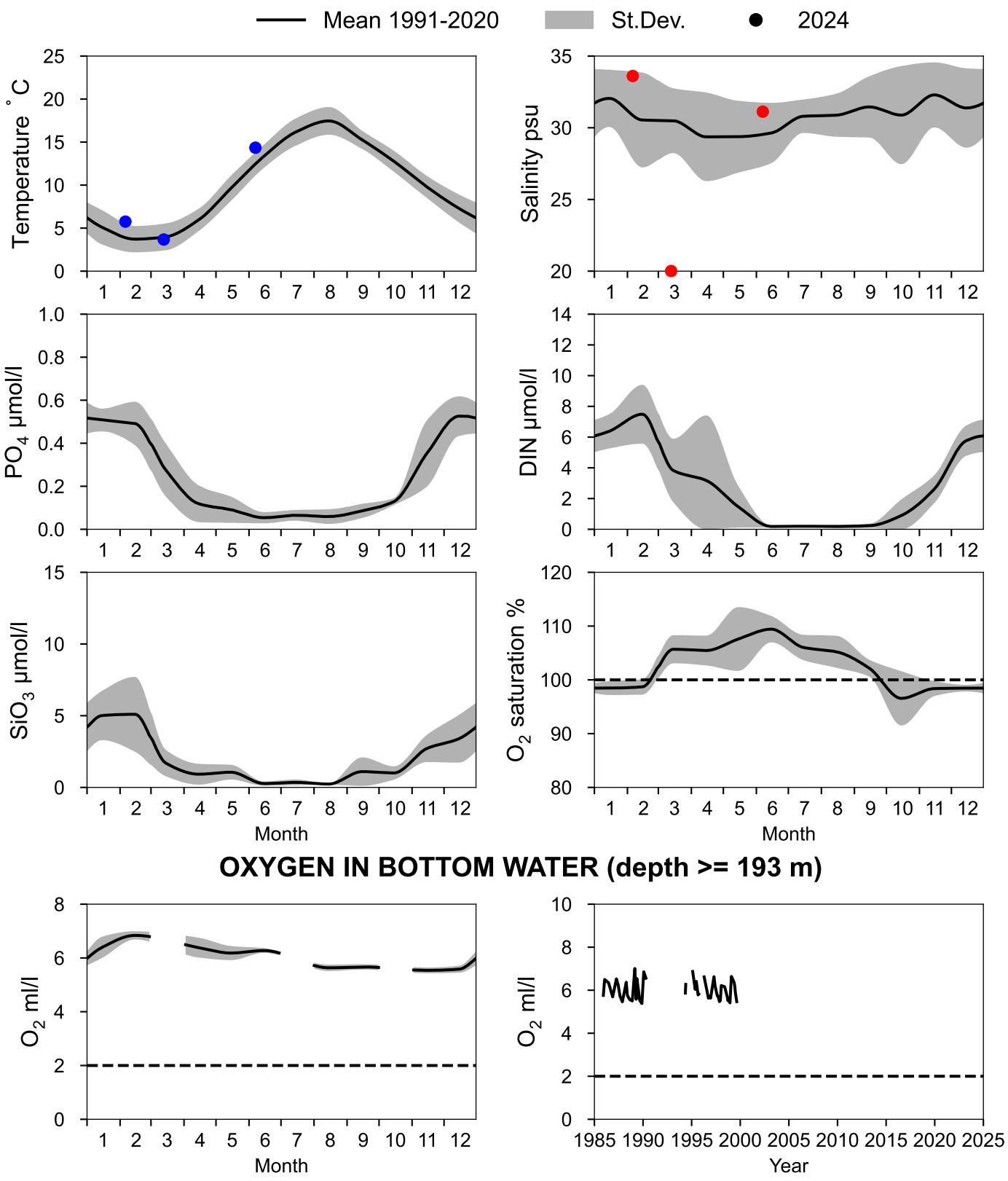


Vertical profiles Å17
June



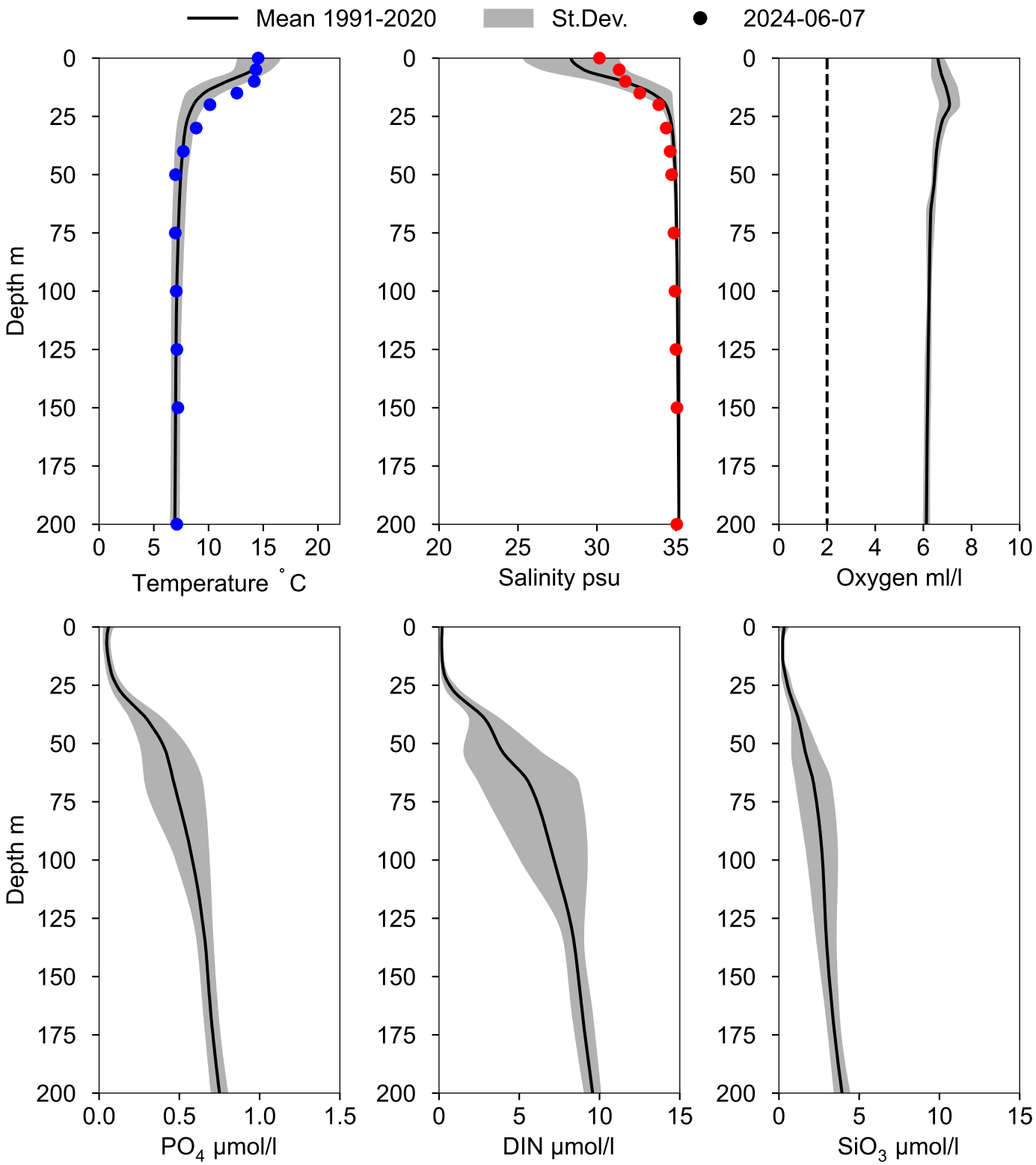
STATION Å16 SURFACE WATER (0-10 m)

Annual Cycles



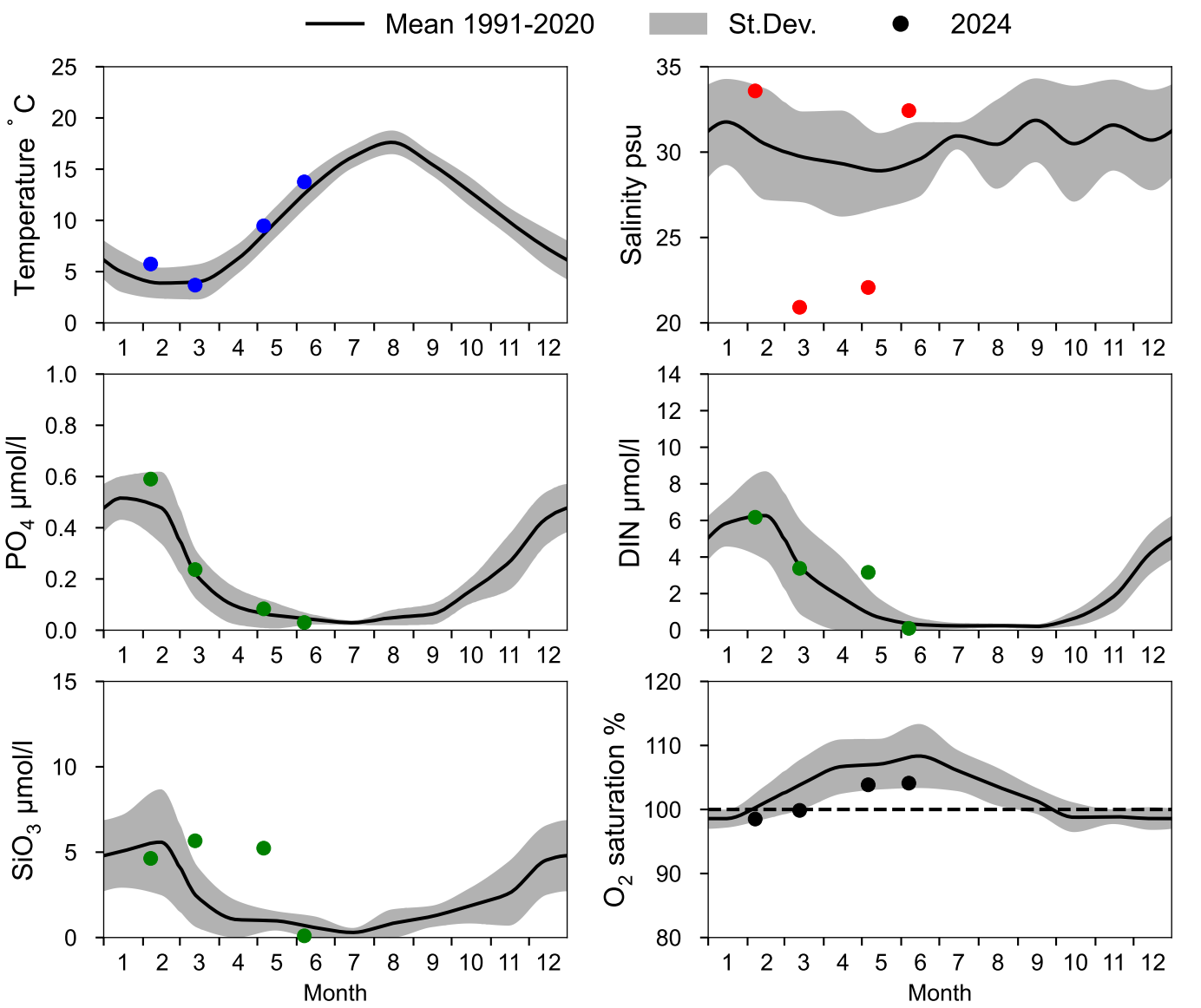
OXYGEN IN BOTTOM WATER (depth >= 193 m)

Vertical profiles Å16
June

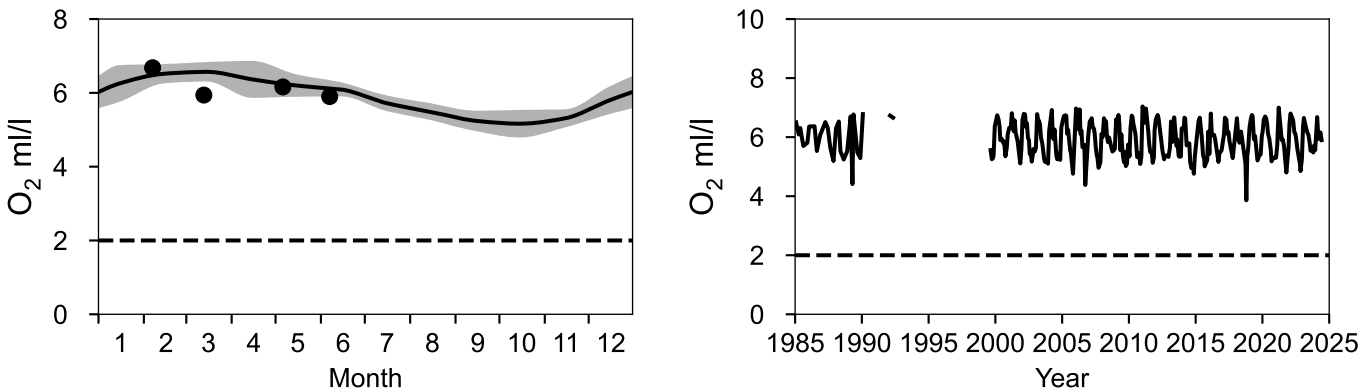


STATION Å15 SURFACE WATER (0-10 m)

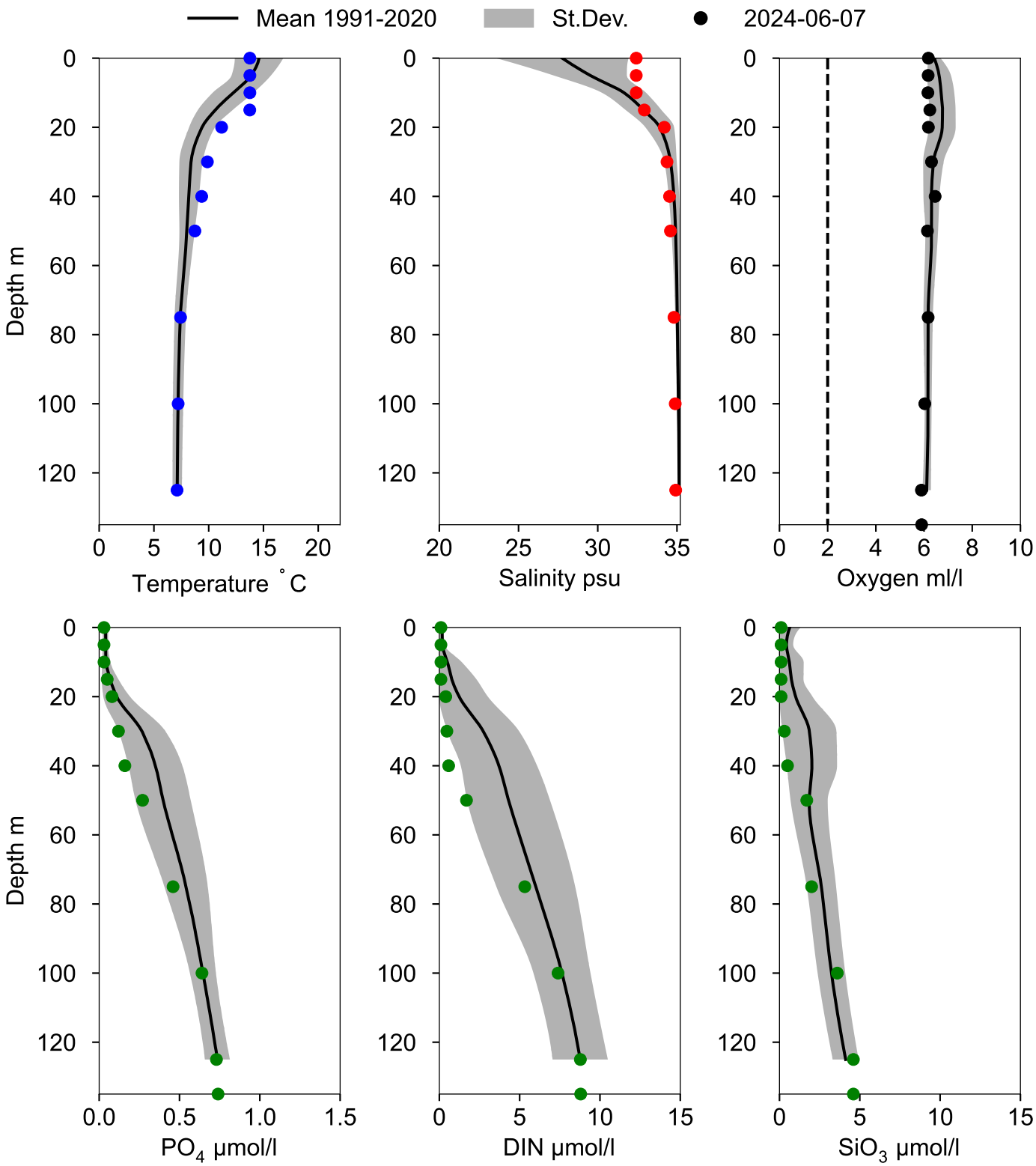
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

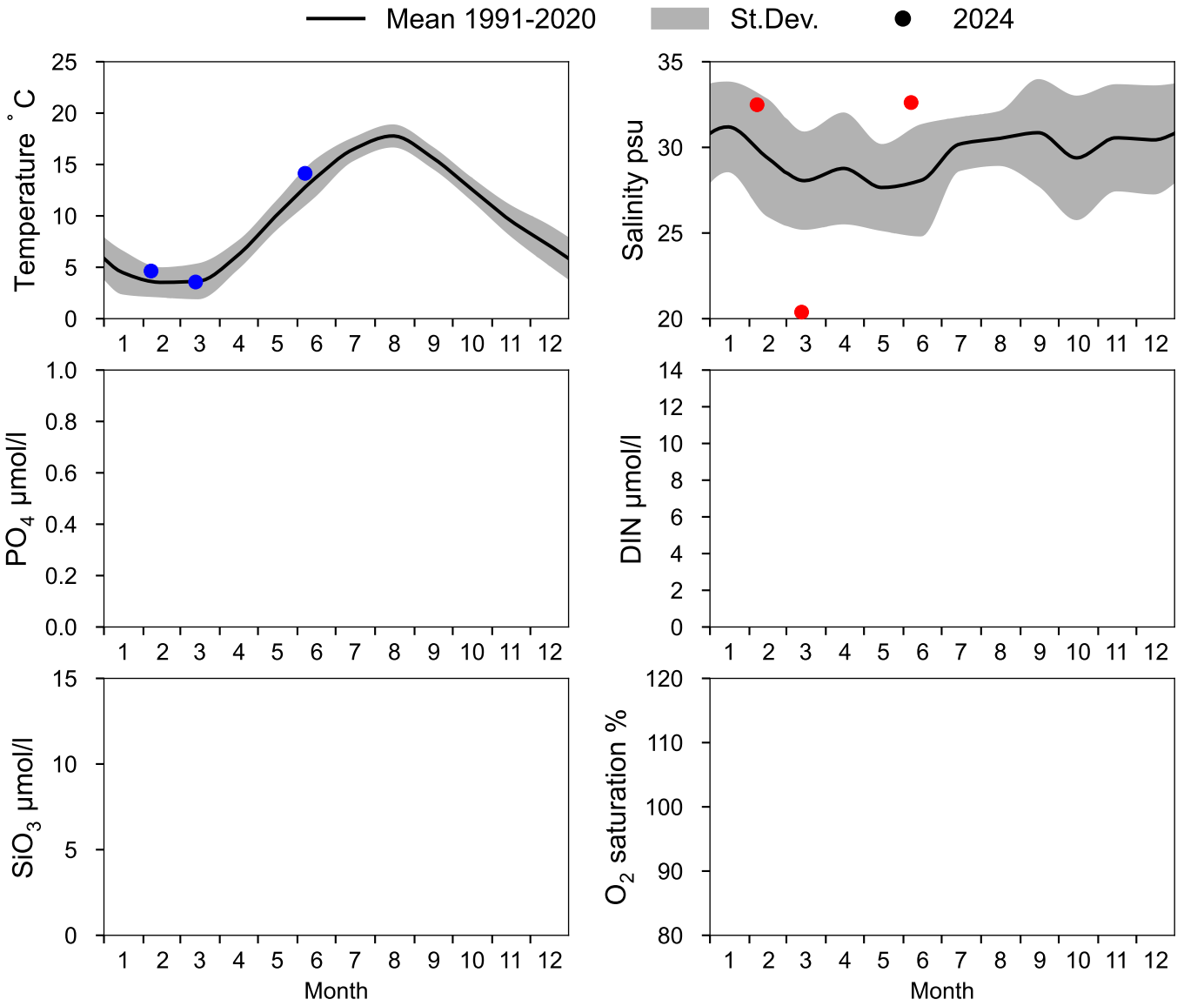


Vertical profiles Å15
June

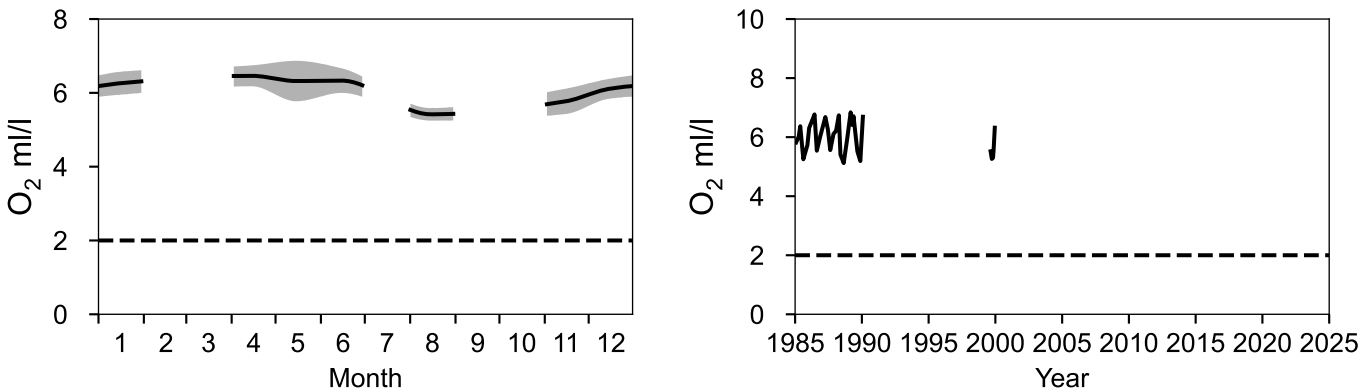


STATION Å14 SURFACE WATER (0-10 m)

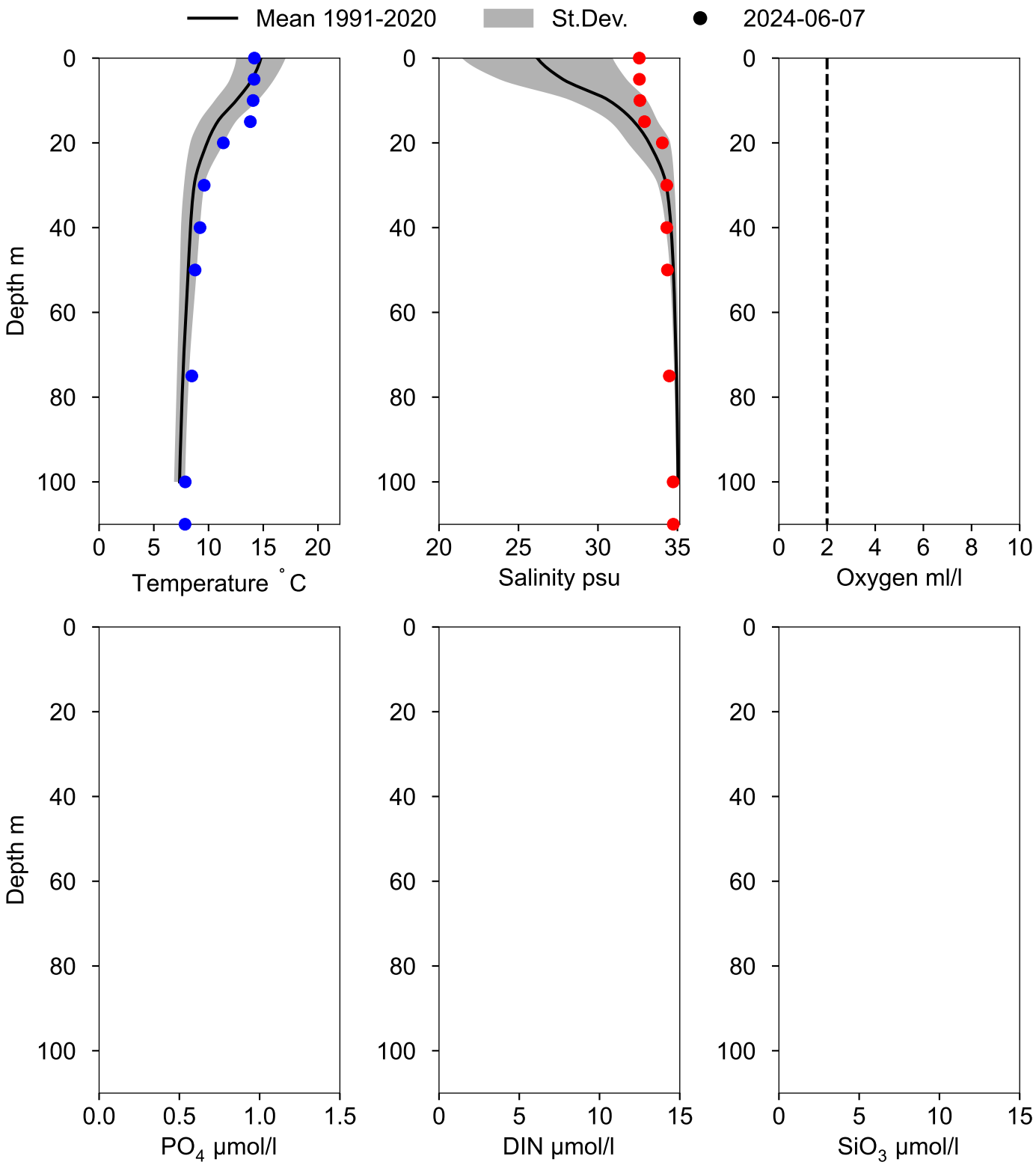
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 100 m)

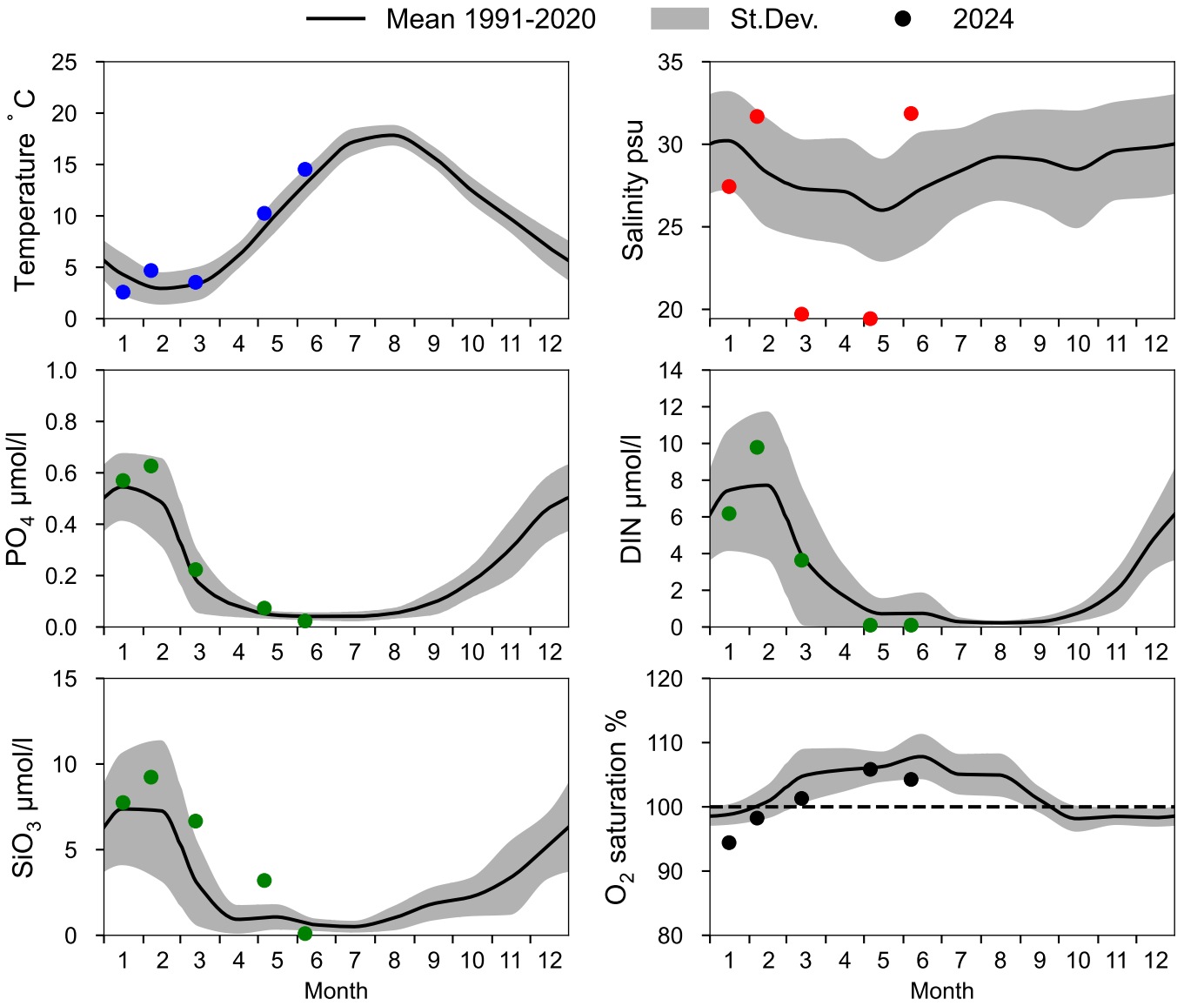


Vertical profiles Å14
June

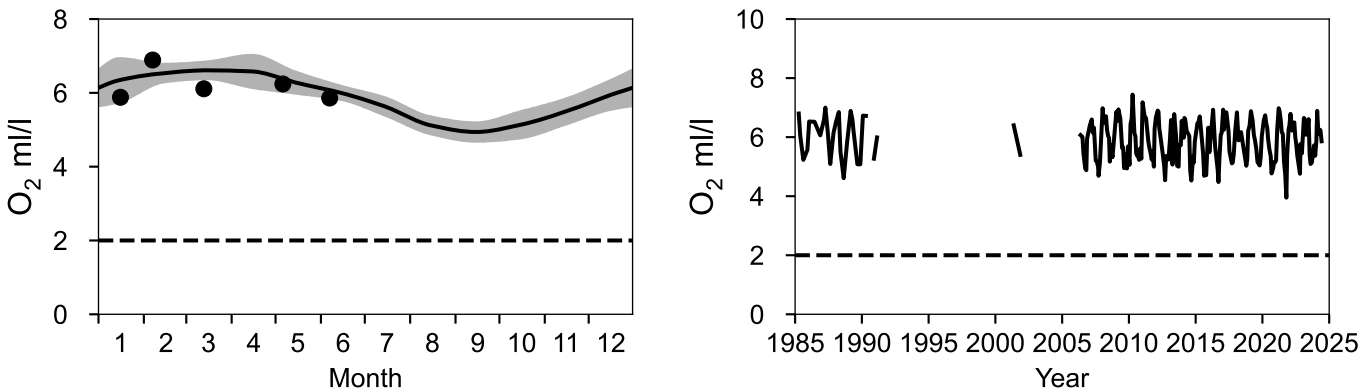


STATION Å13 SURFACE WATER (0-10 m)

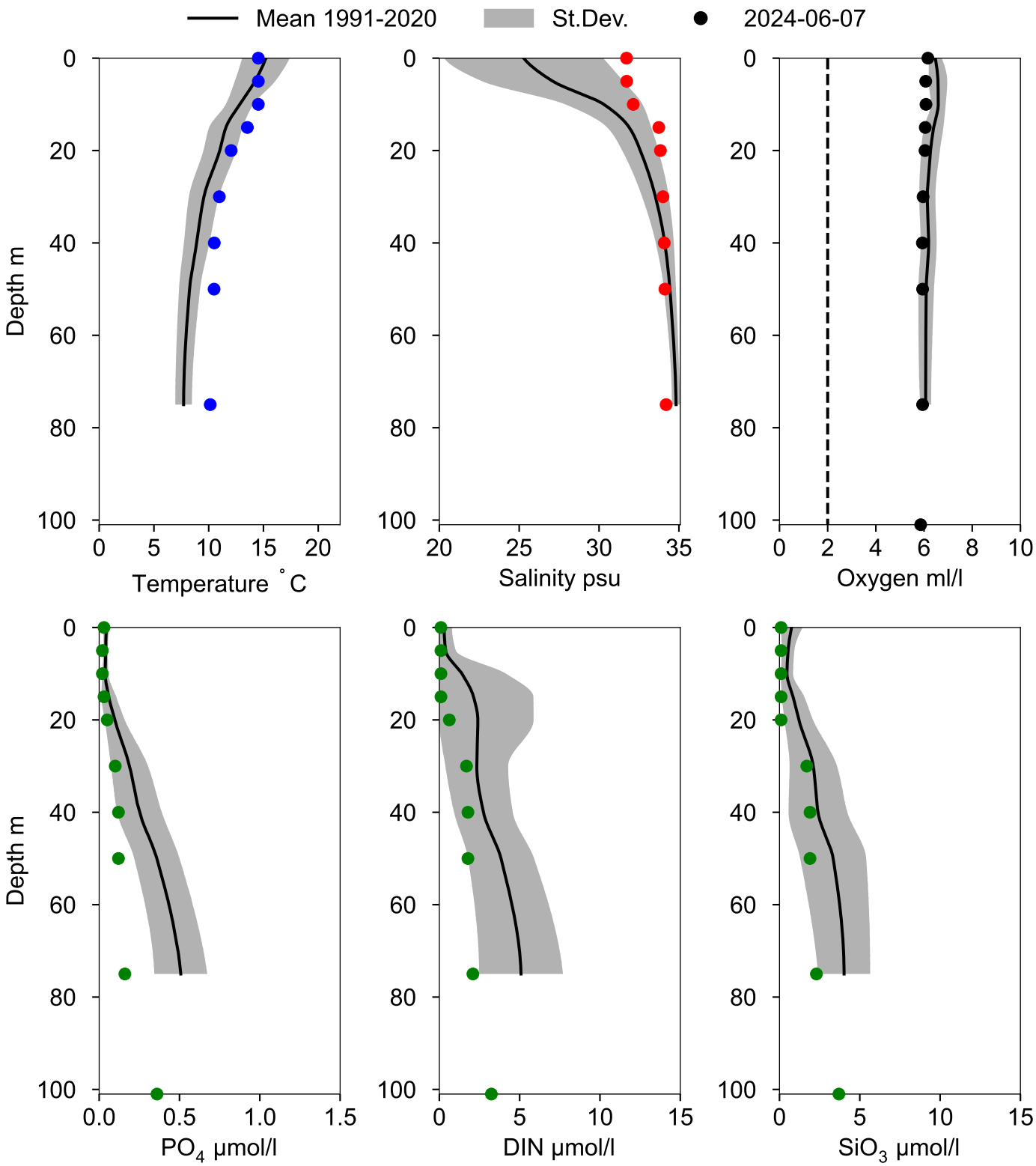
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 82 m)

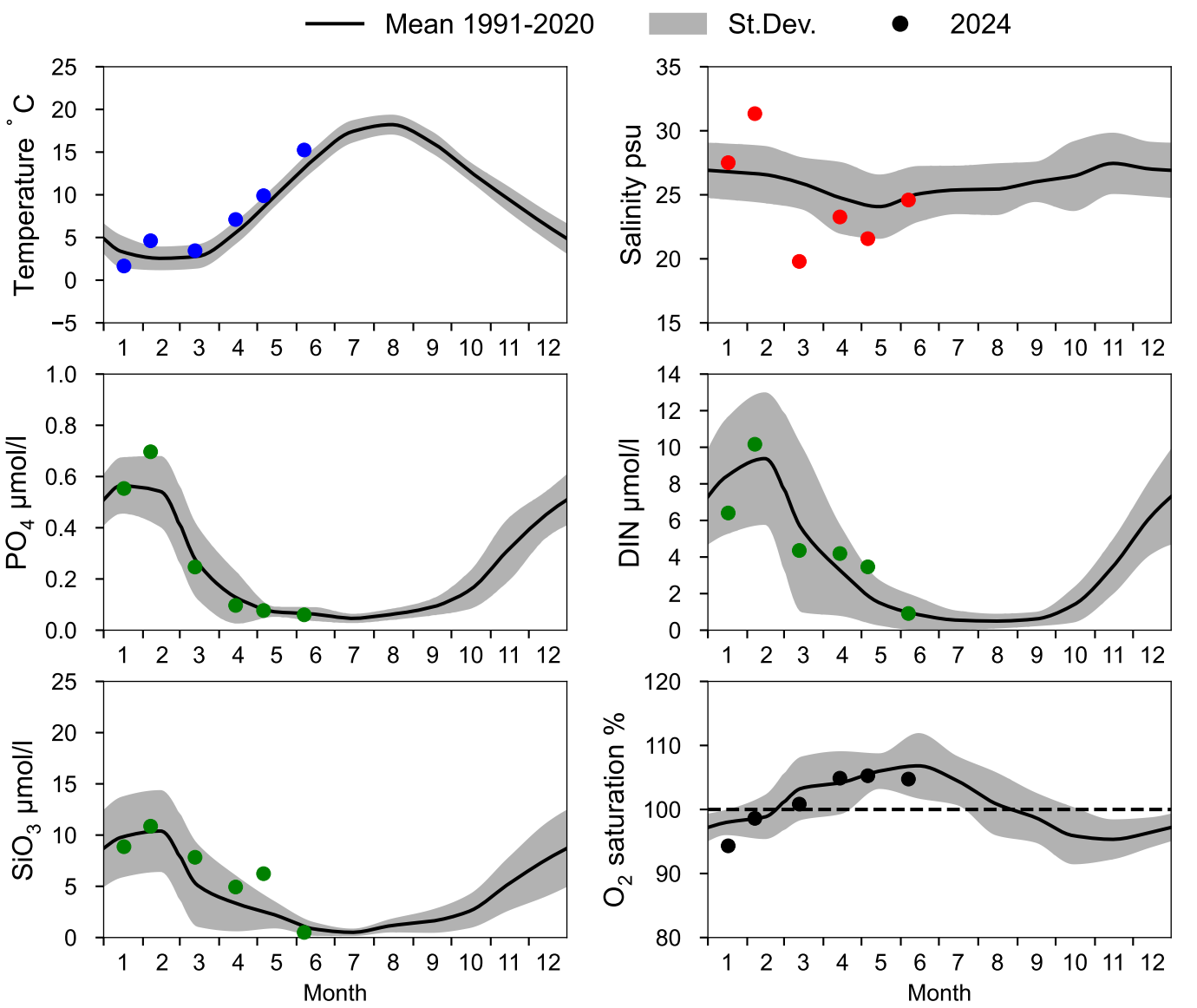


Vertical profiles Å13
June

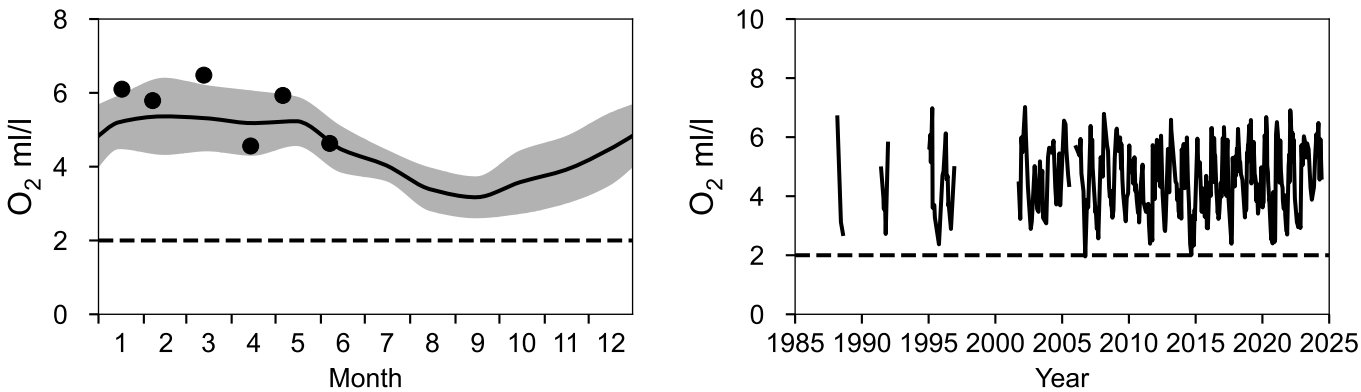


STATION SLÄGGÖ SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 64 m)



Vertical profiles SLÄGGÖ
June