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

Foto: Sara Johansson, SMHI

Survey period: 2022-06-13 to 2022-06-18

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 Administration (SMA)

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SUMMARY

During the cruise, which is part of the Swedish pelagic surveillance program, the Skagerrak, the Kattegat, the Sound and the southern parts of the Baltic Proper were visited. In the Baltic Proper, nutrient mapping was carried out.

The warming of the surface water continued in all sea areas and was within the normal range at most stations, the temperature in the surface water varied between 13–16 degrees, it was warmest in the Kattegat and coldest in the Baltic Proper. The salinity of the surface water was above normal at several stations in the Skagerrak and Kattegat but only at a few stations in the Baltic Proper.

The concentrations of nutrients in the surface water were generally low, as biological production assimilate most of the nutrients into organic material during the summer. At the vast majority of stations, the concentrations were within the normal range and for dissolved inorganic nitrogen, the concentration was below the reporting limit at all but three stations. Phosphate concentrations were highest in the southern Baltic Proper and lowest in the Skagerrak.

In the deep water in the Eastern and Western Gotland Basins, very high concentrations of ammonium were measured, approximately twice as high as the average value for the period 1991–2020.

The oxygen situation The Baltic Proper remains poor. Hydrogen sulphide was measured from 70–80 m in the Eastern and Western Gotland Basins, in Bornholm Basin and Hanö Bight acute oxygen deficiency was measured from 70 m. In the Eastern Gotland Basin there is a layer with low or immeasurable levels of hydrogen sulphide between 80–130 m while in the Western Gotland Basin it increases to high levels of hydrogen sulphide directly at 70 m.

SMHI's next cruise with R/V Svea is planned for 12th to 18th of July, starting in Lysekil and ending in Lysekil.

RESULTS

The cruise was performed onboard R/V Svea and began in Stockholm on 13th June and ended in Lysekil on 18th June.

The weather during the cruise was calm and mostly sunny. Throughout the week, the wind speed was 6-8 m/s. The wind direction was westerly to north-westerly and the temperature was around 14 degrees at night to 17-19 degrees during the day.

Measurements with Svea's MVP (Moving Vessel Profiler) which is used to measure temperature, salinity and oxygen profiles underway was run daytime (08-20) between stations and in the transect across Slupsk furrow. About 200 profiles were collected.

Both the Ferrybox (continuous measurements at a depth of 4 meters) and Svea's both ADCPs (current measurement) were running during the expedition. Water samples were also taken from the ferrybox between 08-12 for analysis of chlorophyll to then be used to calibrate chlorophyll fluorescence from the sensor on the ferry box with chlorophyll concentration analysed from water samples. A shorter test of ADCP at Huvudskär buoy was also performed to compare ADCP data from Svea and ADCP data from the Huvudskär buoy. Within a research project (CABLE - Central Baltic Circulation Experiment), an ADCP transect was carried out east of Gotska Sandön. The purpose of the research project is to better understand the water exchange between the North and East Gotland Basins.

A scientist from the research institute EAWAG in Switzerland participated during the cruise and took water samples, in the surface water, at the fluorescence max and below the stratification, for selenium on all the stations that were visited.

In addition to the regular sampling, extra phytoplankton samples were taken for Stockholm University at two stations in the Skagerrak and one in the Kattegat. This is part of an ongoing project ending in February 2023. During the trip, water samples were also taken from the ferrybox for analysis of chlorophyll to then be used to calibrate chlorophyll fluorescence from the sensor on the ferrybox with chlorophyll concentration analysed from water samples.

This report is based on data that has undergone an initial quality control. When additional quality control has been performed, certain values may change. Data from this cruise is 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 from SHARKweb here:
`https://www.smhi.se/klimatdata/oceanografi/havsmiljodata`

The Skagerrak

The warming of the surface water had continued since the last expedition and varied between 14–16°C, warmest by the coast, the surface temperature was within the normal range at all stations. The salinity of the surface water was about 30 psu in the open sea and a little lower, 27 psu at the station Släggö closest to the coast. The salinity was slightly above normal at a few stations and otherwise normal. There was a well-mixed surface layer down to between 5–10 m, shallowest at the

westernmost station Å17. At station P2 on the border between the Skagerrak and the Kattegat, the stratification in the surface was very weak and the surface temperature in the very top layer (0-5 m) was approximately one degree lower than at the other stations. At P2 there was instead a deeper halocline, at about 40 m.

The concentrations of nutrients in the surface water have been low since April when biological production consumed most of the available nutrients above the halocline. Below the halocline, however, there were increasing levels of nutrients. In the upper part of the deep water, around 20 m, the concentration of most nutrients was slightly above normal at all stations in the Å-transect down to around 70–100 m. The content of dissolved inorganic nitrogen in the surface water (DIN), was below the reporting limit, just like in May, except at station P2 where the concentration had increased slightly to 0.3 µmol/l, which is above normal. At the coastal station Släggö, the concentration of DIN had instead decreased since May and was now below the reporting limit. The concentrations of phosphate and silicate were normal for the season, about 0.04 µmol/l and 0.5–1.1 µmol/l, respectively. Only at the westernmost station, Å17, was the silicate content slightly above normal.

The oxygen situation in the bottom water was good at the open sea stations with concentrations around 6 ml/l. At the coastal station Släggö, the concentration was lower, just below 4 ml/l, which is the limit for oxygen deficiency. This is normal for this station during summer and fall.

Chlorophyll fluorescence measurements with CTD showed a lower plankton activity than in the Kattegat and the Baltic Proper, but with peaks in the fluorescence in the upper part of the halocline. At station Å13 there were also peaks in the fluorescence at 60 and 80 m depth. No Secchi depth could be measured in the Skagerrak as the waves were too high to give fair values with the measurement method.

The Kattegat and the Sound

The temperature in the Kattegat's surface water was normal for the month, around 15 degrees, which is about two degrees warmer than last month. In the Kattegat, thermocline and halocline coincided at all stations. There was a well-mixed surface layer down to a depth of about 5 m and then another sharp halocline at a depth of about 15 m where the salinity increased and the temperature dropped rapidly. The salinity of the surface water varied from 18 psu in the Sound (W Landskrona) to 27 psu at the station Fladen and was above normal, with the exception of the station N14 Falkenberg. Below the stratification at a depth of 15 m, both temperature and salinity were normal at all stations.

In the surface water, the concentration of all nutrients had decreased slightly since last month and was within the normal range. Only at station W Landskrona in the Sound was the concentration of phosphate and silicate lower than normal, which is related to the high salinity which shows that the water in the strait originates from the Kattegat where the salinity is higher and the concentration of nutrients is lower than in the Baltic Proper. In the deep water, below the stratification, the concentration of nutrients was normal at all stations except Anholt E where the concentrations of phosphate and silicate were slightly above normal.

No oxygen deficiency was found in the Kattegat, the oxygen concentration in the bottom water was within the normal range at all stations and varied between 4.6–5.4 ml/l.

CTD measurements of chlorophyll fluorescence indicated lower plankton activity than in the Baltic Proper, and it was only at station W Landskrona in the Sound that there was a clear peak in chlorophyll fluorescence at about 17m, which coincided with the depth of the halocline. The Secchi depth was 9-10 meters.

The Baltic Proper

The surface water in the Baltic Proper was about 5 degrees warmer compared to May and was now between 13-15 degrees, which is normal for the month or just above normal at some stations. The salinity in the surface water varied between 6–8 psu and was also normal for the month, except at the stations BY15 Gotland deep, BCS III-10 and BY4 where the salinity was slightly above normal. The thermocline was about 10 m deep in the Eastern and Western Gotland Basin and a little deeper 15-20 m in the Bornholm Basin, Hanö Bight and the Arkona Basin. Below the thermocline, the temperature decreased to about 4 degrees and then increased below the permanent halocline at 60 m to about 10 degrees. The temperature below the halocline was above normal (average for the period 1991–2020) in the Eastern and Western Gotland Basins and normal in the southern Baltic Proper.

The concentration of nutrients in the form of DIN (dissolved inorganic nitrogen) in the surface water was below the detection limit at all stations, which is normal during the summer when plankton take up readily available nitrogen. In the deep water in the Eastern and Western Gotland Basins, the concentration of DIN was well above normal at depths where hydrogen sulphide was present. Especially in the Western Gotland Basin, the content of ammonium was about twice as high as the mean value for the period 1991-2020.

The concentration of phosphate had decreased since May, it was still at levels above the reporting limit, but normal for the month. The concentration was lowest in the Eastern and Western Gotland Basins, about 0.1 µmol/l and highest in the southern Baltic Proper, about 0.2 µmol/l.

The silicate concentration in the surface water had decreased slightly since last month and varied between 8–14 µmol/l, lowest at station BY29 in the northern Baltic Proper and highest at station BY38 in Western Gotland Basin.

As usual, the oxygen situation was very poor in most of the Baltic Proper, only in the Arkona Basin, which is the shallowest basin with a bottom depth of just over 45 m, the bottom water was well oxygenated. In Hanö Bight and the Bornholm Basin, acute oxygen deficiency (<2ml O2/l) was found at a depth of 70 m and hydrogen sulphide was measured in the bottom water.

In the Western Gotland Basin, anoxic conditions were found already at a depth of 70 m at the southern one (BY38) of the two visited stations and very low oxygen concentration at the same depth at the northern one (BY32). In the Eastern Gotland Basin, hydrogen sulphide was measured from 80 m, but the concentrations were low or below the detection limit down to about 125 m depth in. Below a depth of 125 m, the hydrogen sulphide concentration increased rapidly to very high levels. Due to the very high levels, extra samples were taken for later analysis and dilution at the station BY15 to investigate whether the levels are outside the measuring range for the method used.

Fluorescence measurements from the CTD indicated plankton activity at all stations with one or more peaks around the depth of the thermocline. At several of the peaks, extra samples were taken for analysis of phytoplankton. The Secchi depth was 5-8 m.

More information about the algal situation can be found in the Algaware report for June:
https://www.smhi.se/publikationer/publikationer/algrapporter

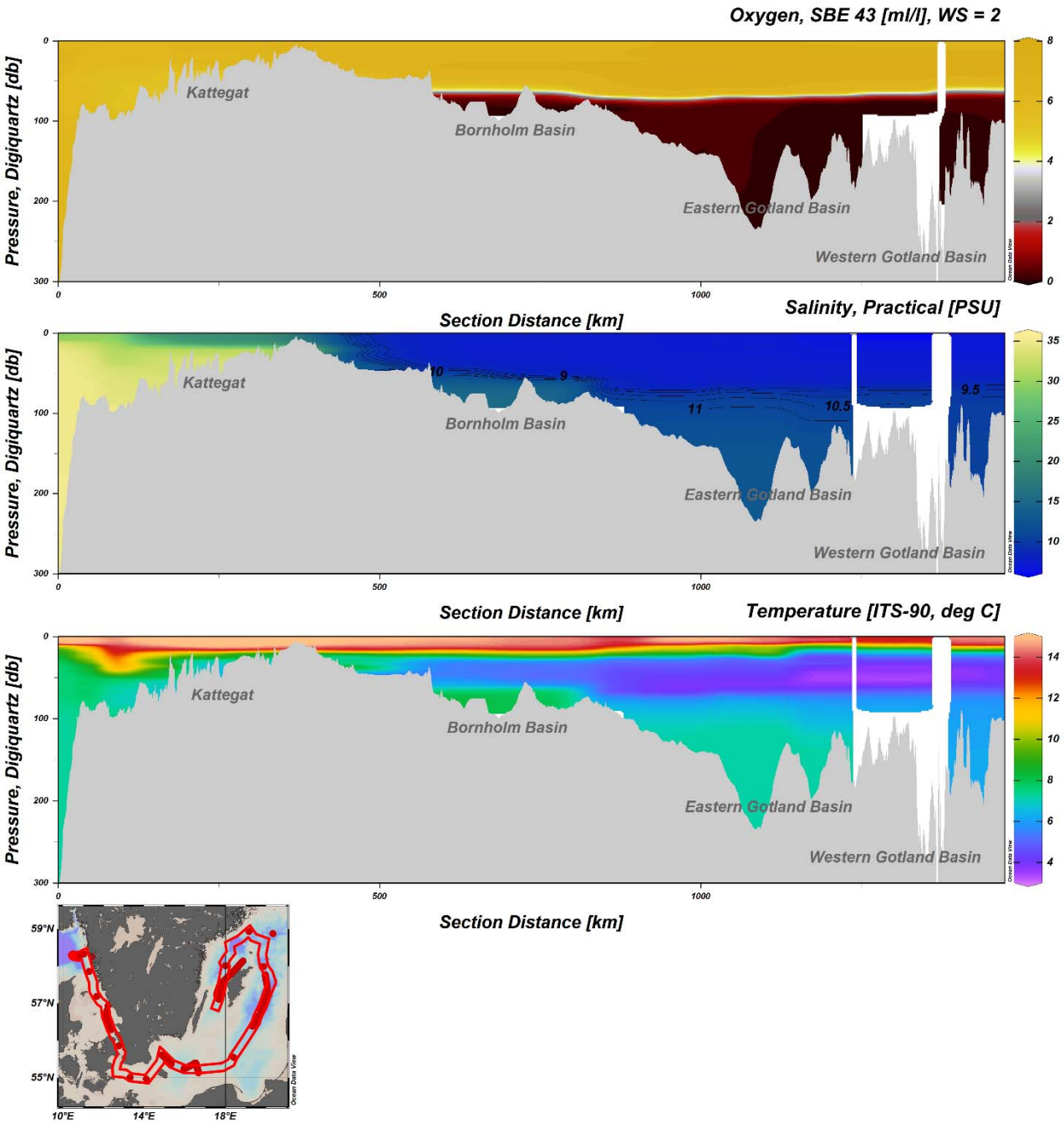


Figure 1. Transect showing CTD and MVP measurements of dissolved oxygen, salinity and temperature from Skagerrak, Kattegat, the Sound and to the Bornholm Basin. Data from major parts of the Baltic Proper is missing.

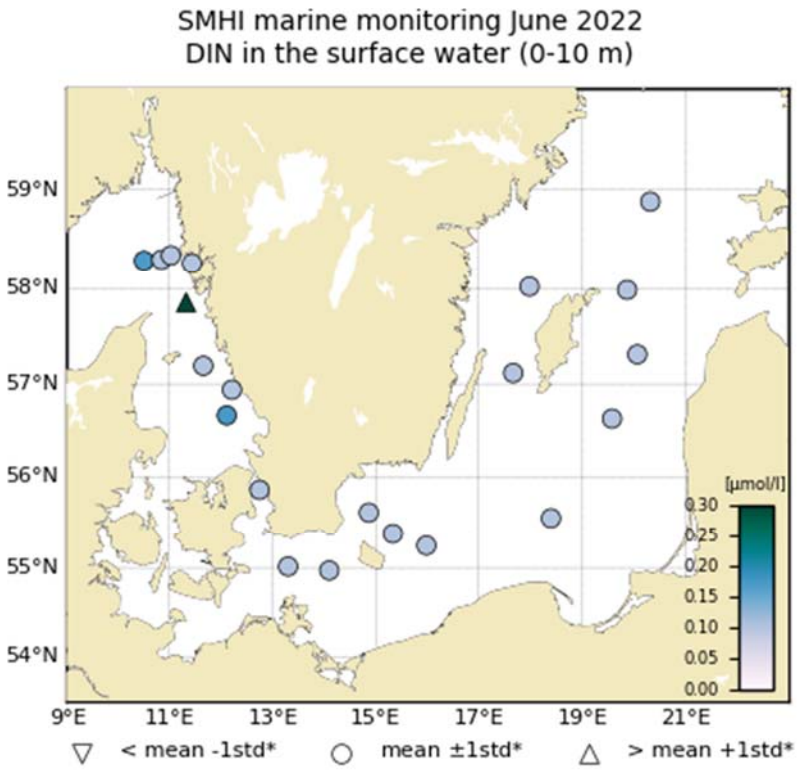


Figure 2. Concentration of dissolved inorganic nitrogen in the surface water (0-10m).

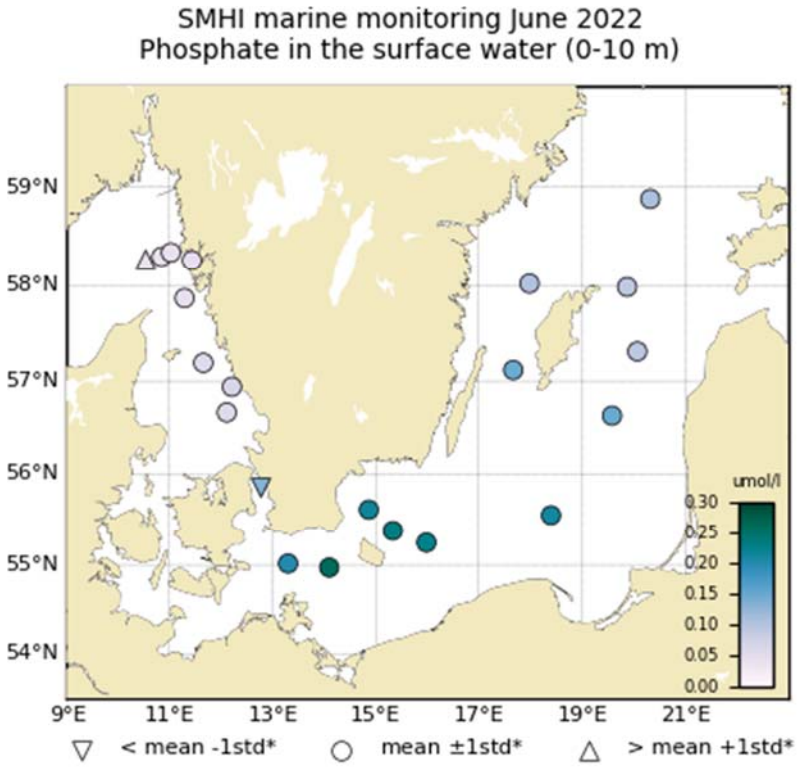


Figure 3. Concentration of phosphate in the surface water (0-10m).

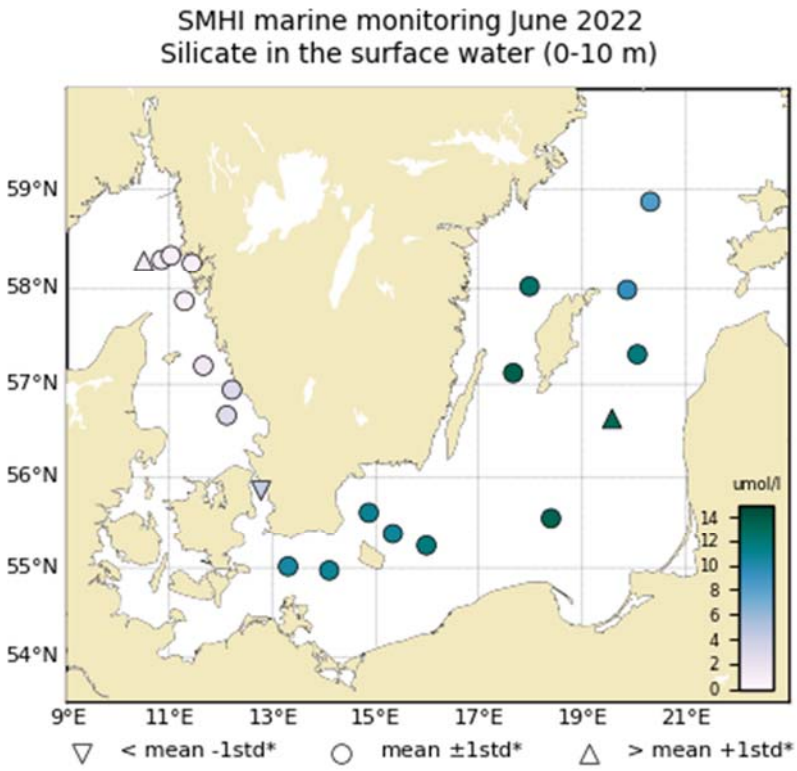


Figure 4. Concentration of silicate in the surface water (0-10m).

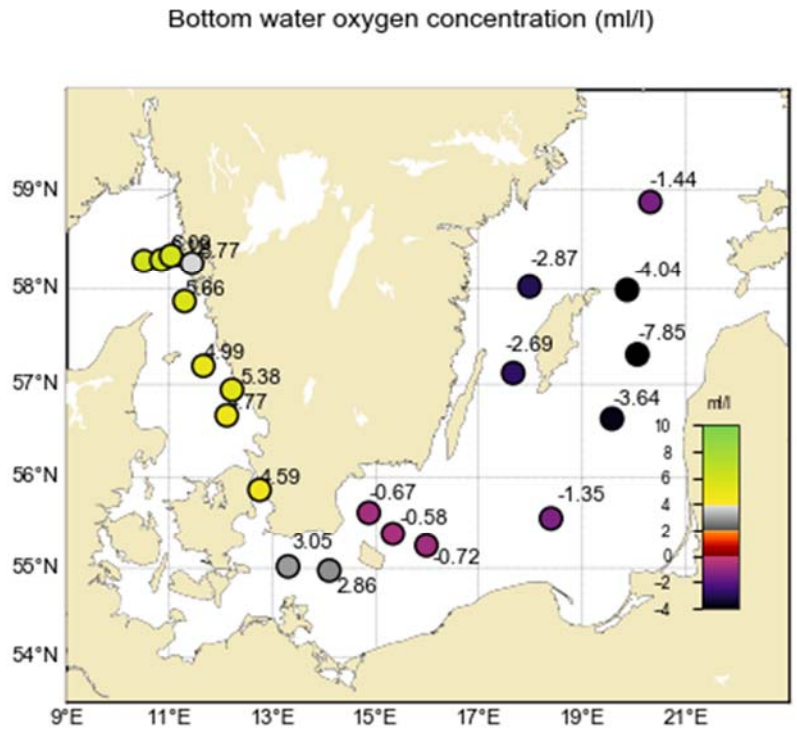


Figure 5. Oxygen concentration in the bottom water.

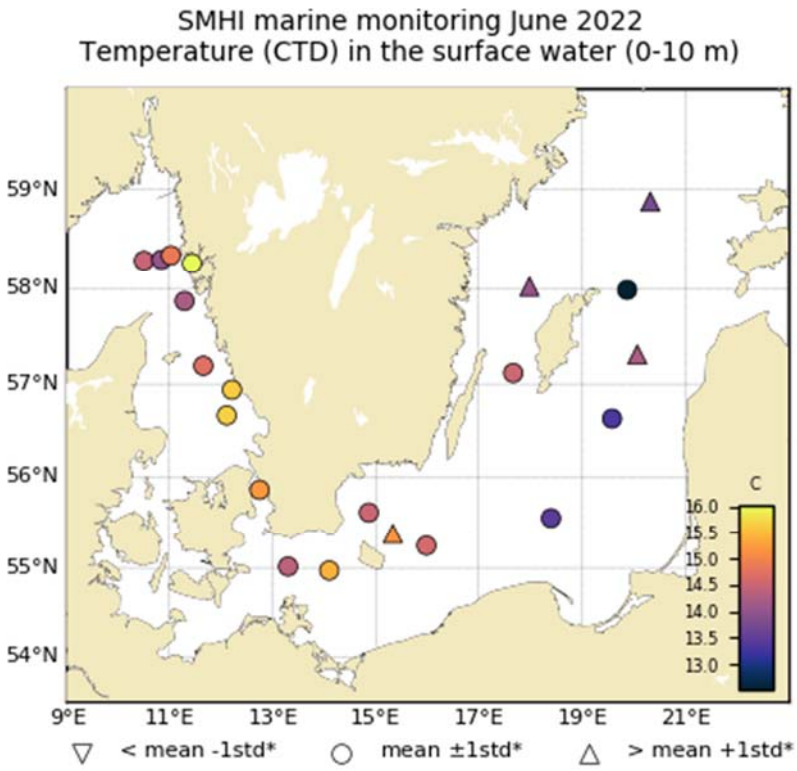


Figure 6. Temperature in the surface water (0-10m).

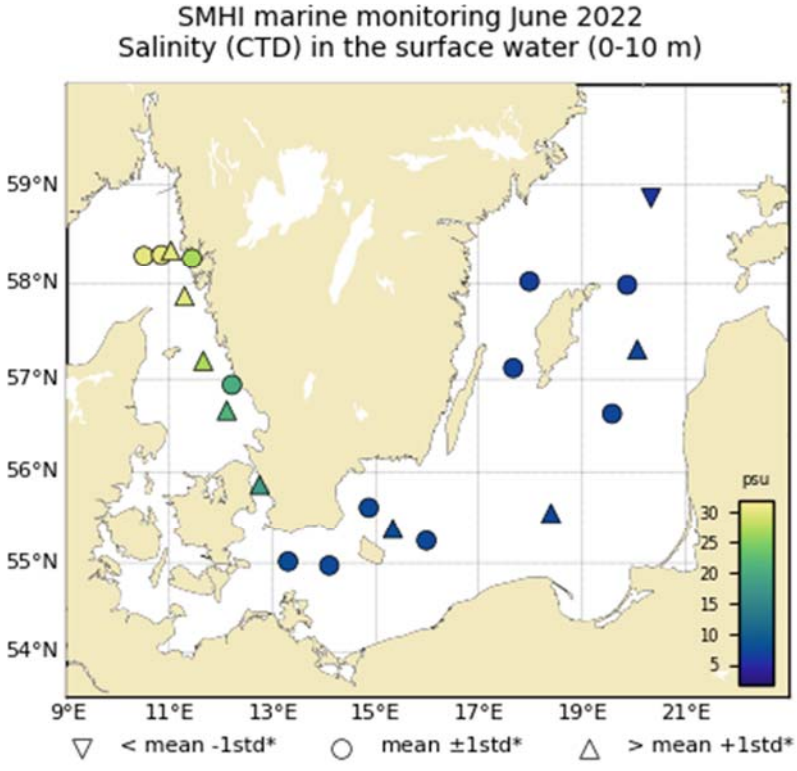


Figure 7. Salinity in the surface water (0-10m).

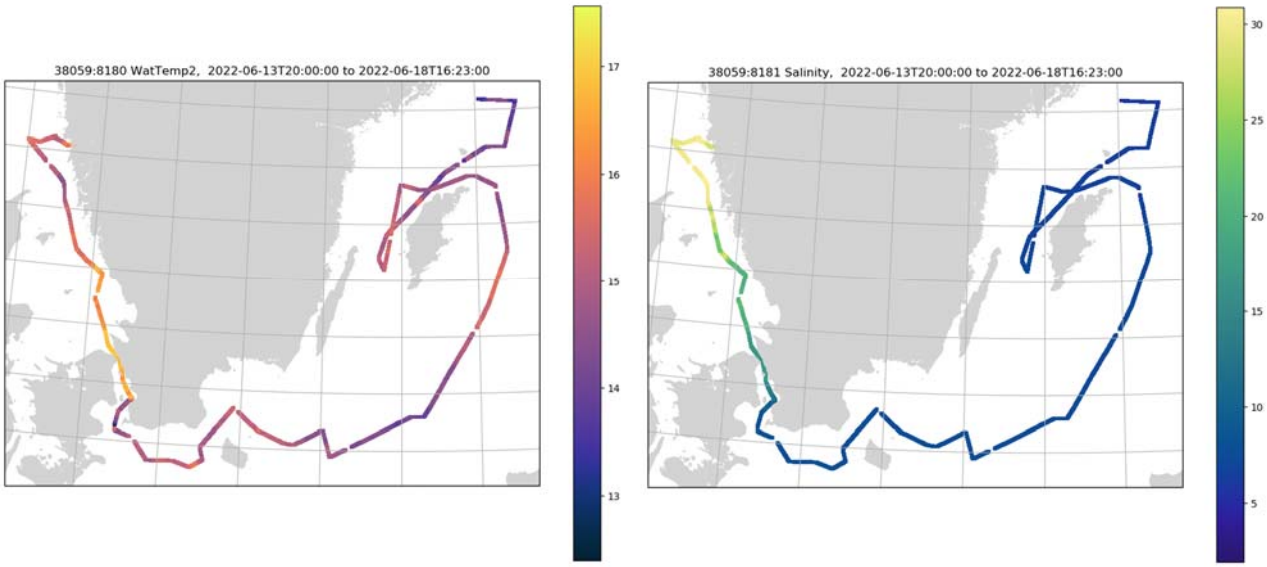


Figure 8. Surface water temperature (left) and salinity (right) from the ferrybox on Svea. Data has only undergone a rough quality control.

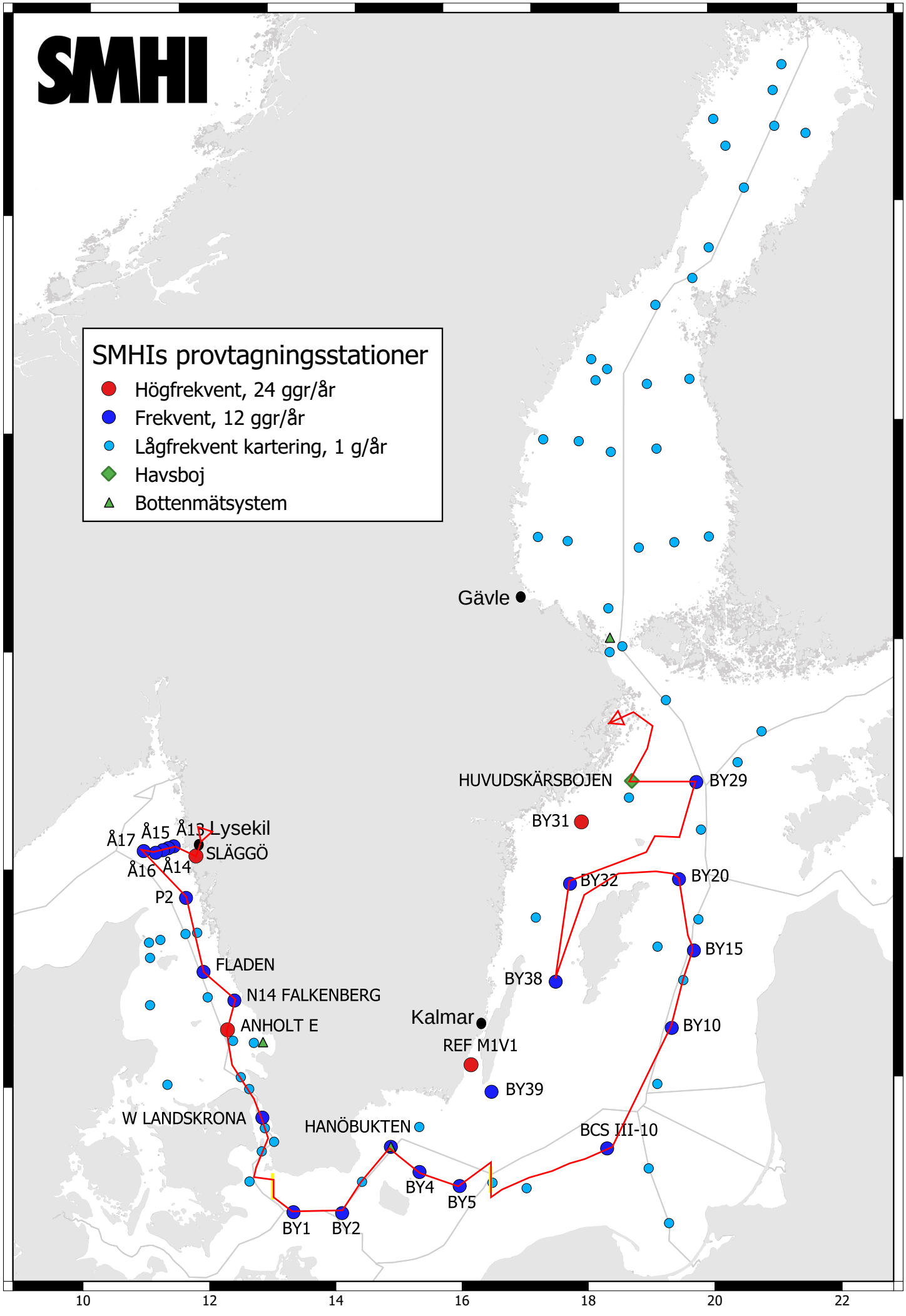
PARTICIPANTS

Name	Role	Institute
Lena Viktorsson	Chief scientist	SMHI
Johan Håkansson	Quality manager	SMHI
Martin Hansson		SMHI
Sara Johansson		SMHI
Anna-Kerstin Thell		SMHI
Zoé Le Bras	Researcher from Schweiz	EAWAG

APPENDICES

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

SMHI
Havs och Vatten myndigheten


SMHI
SMHIs provtagningsstationer
Högfrekvent, 24 ggr/år
Frekvent, 12 ggr/år
Lågfrekvent kartering, 1 g/år
Havsboj
Bottenmätsystem
Gävle
HUVUDSKÄRSBOJEN
BY29
BY31
BY32
BY20
BY15
BY38
BY10
Kalmar
REF M1V1
BY39
BCS III-10
HANÖBUKTEN
BY4
BY5
BY1
BY2
W LANDSKRONA
N14 FALKENBERG
ANHOLT E
FLADEN
P2
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Å17
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Lysekil
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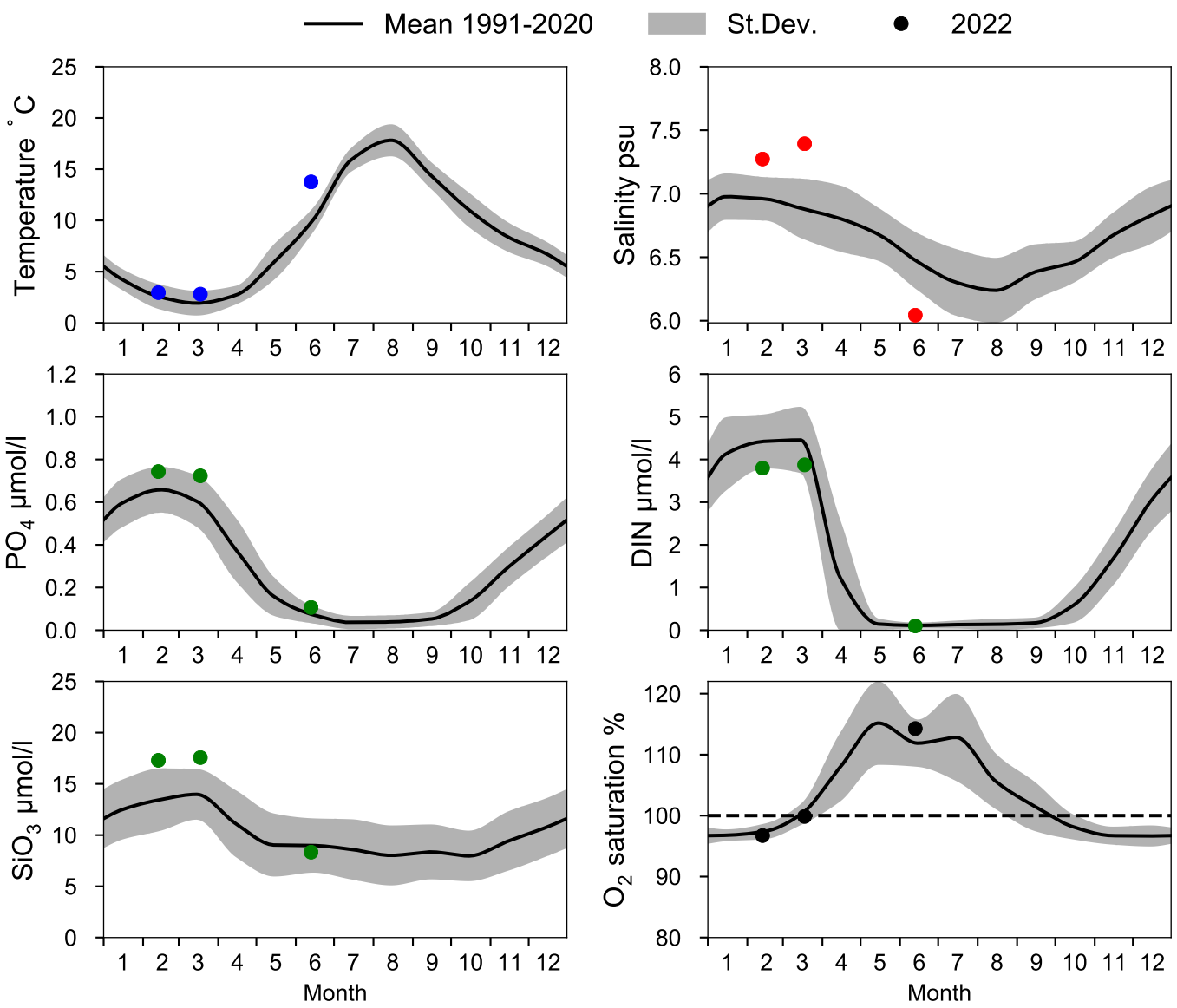
Date: 2022-06-21
Time: 21:53

Ship: SE
Year: 2022

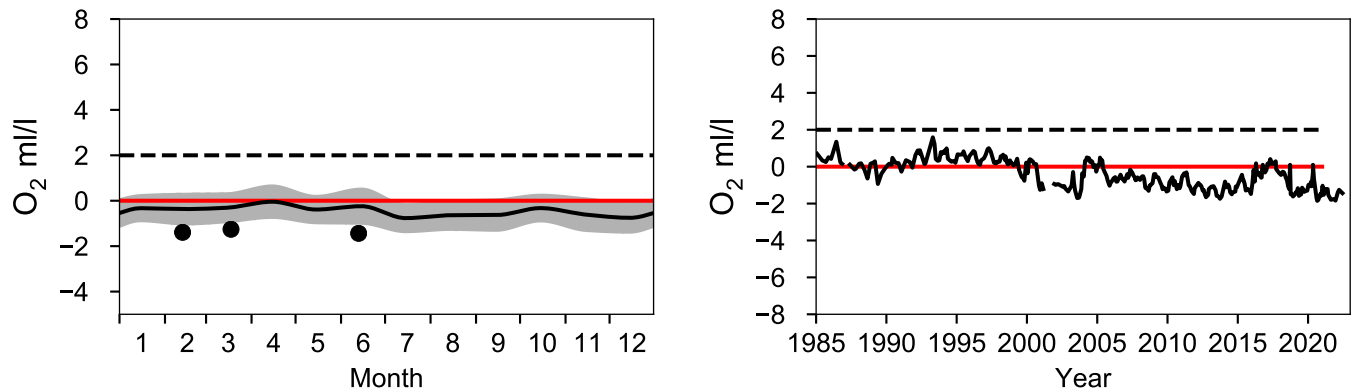
Ser no	Cru no	Stat code	Proj	Stat name	Lat	Lon	Start date yyyymmdd	Start time hhmm	Bottom depth m	Secchi depth m	Wind dir	Wind vel	Air temp C	Air pres hPa	WCWI elac aove tueo hdsb	CZPP hohp loy apt o p	No de	No btl	Temp_btl	Temp_ctd	Salt_btl	Salt_ctd	Ph	Doxy_btl	Doxy_ctd	H2s	Phos	Ptot	Ntri	Ntra	Ntrz	Amon	Ntot	Alky	Sio3-si	Humus	Comnt_visit	Comnt_samp
0511	11	BPNX00	EXT...	HUVUDSKÄR	5856.18	01909.31	20220613	1805	90		23	7	13.8	1009	1730	----	12		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0512	11	BPNX35	BAS...	BY29 / LL19	5852.94	02019.7	20220613	2220	178		22	6	13.8	1006	9990	x---	16	16	x	x	-	x	-	x	x	x	x	x	x	x	x	x	x	-	x	-	x	-
0513	11	BPWX00	EXT...	W GOTLAND TESTKAST	5752.36	01823.91	20220614	0830	101		30	7	14.3	1009	1330	----	13		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0514	11	BPWX45	BAS...	BY38 KARLSÖDJ	5707.02	01740.13	20220614	1430	114	7	22	3	19.1	1011	1320	x---	14	14	x	x	x	x	-	x	x	x	x	x	x	x	x	x	x	-	x	x	x	-
0515	11	BPWX38	BAS...	BY32 NORRKÖPINGSDJ	5801.00	01759.05	20220614	2035	205		27	6	14.6	1012	9920	x---	17	17	x	x	-	x	-	x	x	x	x	x	x	x	x	x	x	-	x	-	-	-
0516	11	BPEX26	BAS...	BY20 FÅRÖDJ	5758.88	01952.71	20220615	0335	203	5	31	7	14.7	1015	1230	x---	17	17	x	x	-	x	-	x	x	x	x	x	x	x	x	x	x	-	x	-	x	-
0517	11	BPEX21	BAS...	BY15 GOTLANDSDJ	5718.72	02004.57	20220615	0915	249	7	29	3	17.4	1014	1230	xxx-	24	24	x	x	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-	-
0518	11	BPEX13	BAS...	BY10	5638.01	01935.15	20220615	1450	147	6	25	6	15.2	1019	1330	x---	15	15	x	x	x	x	-	x	x	x	x	x	x	x	x	x	x	-	x	-	x	-
0519	11	BPSE11	BAS...	BCS III-10	5533.31	01824.09	20220615	2335	90		22	9	13.8	1015	9990	x---	12	12	x	x	x	x	-	x	x	x	x	x	x	x	x	x	x	-	x	x	x	-
0520	11	BPSB07	BAS...	BY5 BORNHOLMSDJ	5514.99	01559.07	20220616	1050	91	7	28	6	14.9	1019	1230	xxx-	12	12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-
0521	11	BPSB06	BAS...	BY4 CHRISTIANSÖ	5522.96	01520.02	20220616	1445	94	8	26	9	15.2	1016	1130	x---	12	12	x	x	x	x	-	x	x	x	x	x	x	x	x	x	x	-	x	-	x	-
0522	11	BPSH05	BAS...	HANÖBUKTEN	5537.03	01452.02	20220616	1740	80	8	29	5	16.6	1016	1130	x---	11	11	x	x	x	x	-	x	x	x	x	x	x	x	x	x	x	-	x	-	x	-
0523	11	BPSA03	BAS...	BY2 ARKONA	5458.27	01405.94	20220616	2310	47		30	8	15.9	1021	9990	xxx-	8	8	x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	x	x	-
0524	11	BPSA02	BAS...	BY1	5500.94	01318.04	20220617	0305	47		30	6	14.9	1023	1430	x---	8	8	x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	x	-
0525	11	SOCX39	BAS...	W LANDSKRONA	5552.00	01244.88	20220617	1000	50	9	00	4	18.2	1020	4620	x---	9	9	x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	x	-
0526	11	KAEX29	BAS...	ANHOLT E	5640.11	01206.67	20220617	1615	62	10	25	6	16.6	1021	2830	xxx-	10	10	x	x	x	x	x	x	x	-	x	x	x	x	x	x	x	x	x	x	x	-
0527	11	KANX50	BAS...	N14 FALKENBERG	5656.40	01212.69	20220617	1910	30		21	6	16	1019	2830	xxx-	7	7	x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	x	-
0528	11	KANX25	BAS...	FLADEN	5711.54	01139.40	20220617	2215	84		18	12	16.2	1012	9990	x---	13	13	x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	x	-
0529	11	SKEX23	BAS...	P2	5752	01117.51	20220618	0310	93		26	11	14.5	1007	1640	x---	10	10	x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	x	-
0530	11	SKEX18	BAS...	Å17	5817.1	01030.20	20220618	0702	340		26	12	15.3	1010	1140	xxx-	15	15	x	x	-	x	x	x	x	-	x	x	x	x	x	x	x	x	x	-	x	-
0531	11	SKEX16	BAS...	Å15	5817.74	01050.61	20220618	1050	135		27	14	14.8	1011	1640	x---	12	12	x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	x	-
0532	11	SKEX14	BAS...	Å13	5820.37	01101.67	20220618	1210	90		26	12	14.9	1011	1240	x---	10	10	x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	x	-
0533	11	FIBG27	BAS...	SLÄGGÖ	5815.58	01126.14	20220618	1210	74		26	14	14.7	1007	1130	x-x-	9	9	x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	x	-

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

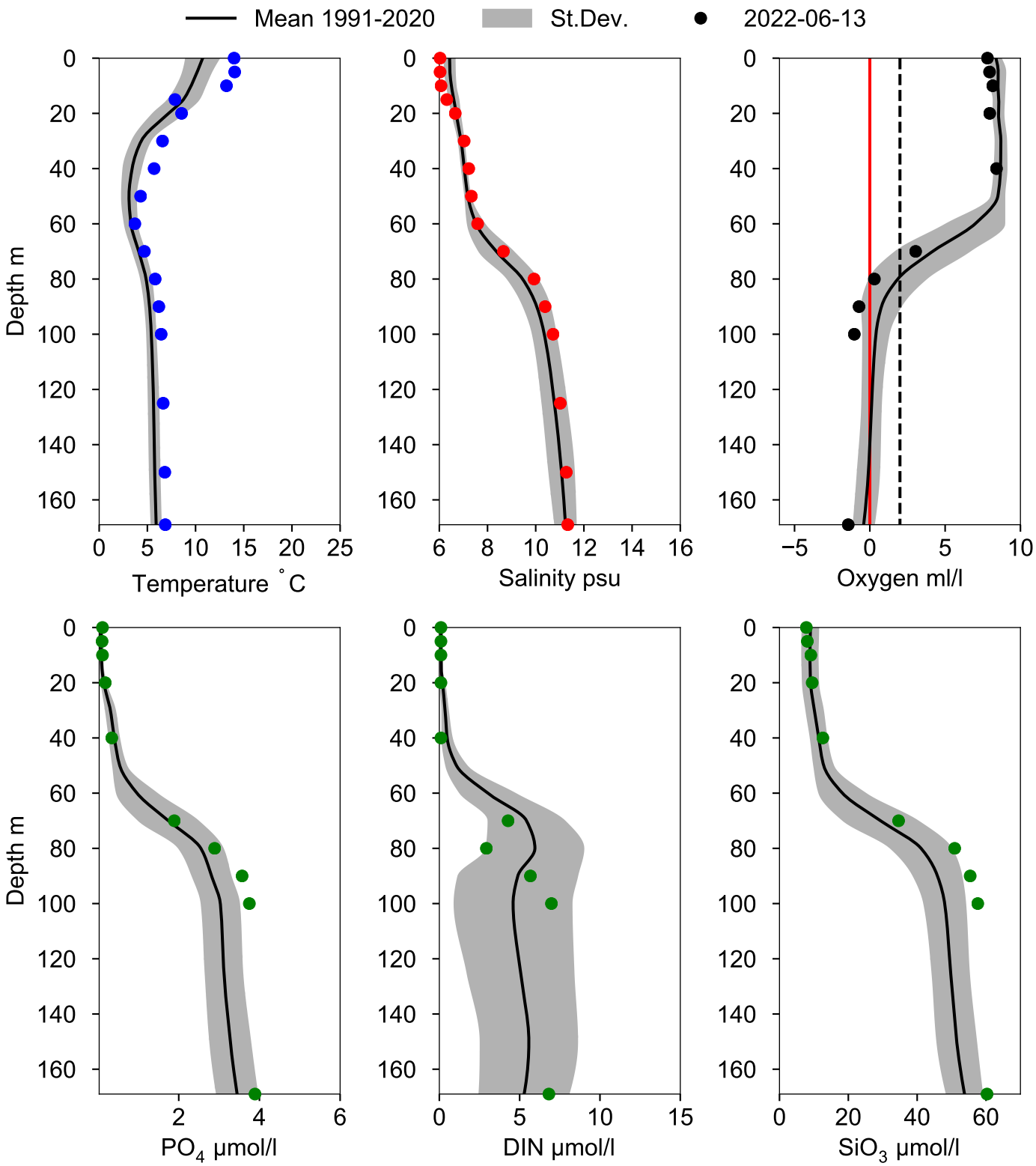
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 150 m)

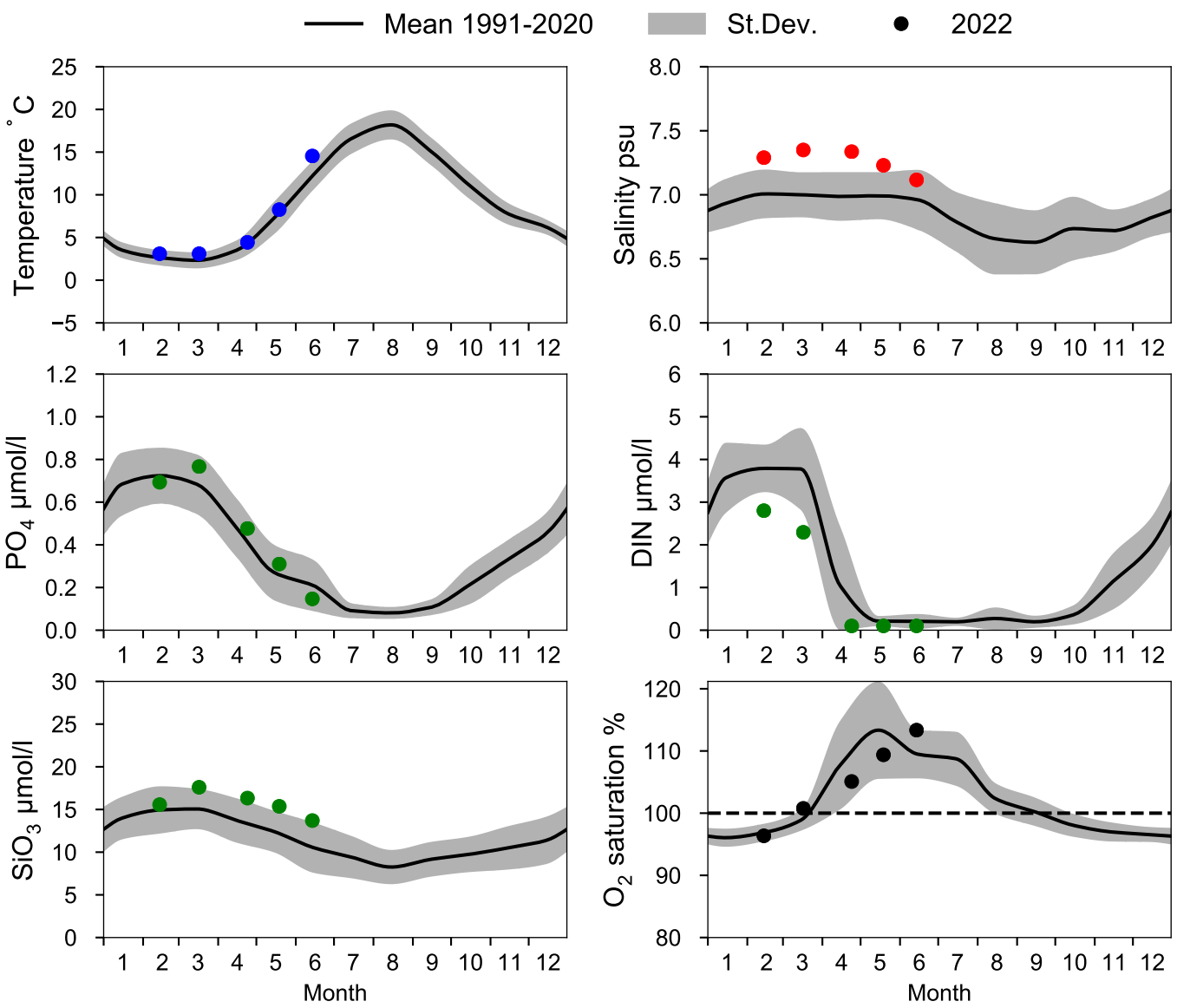


Vertical profiles BY29 / LL19
June

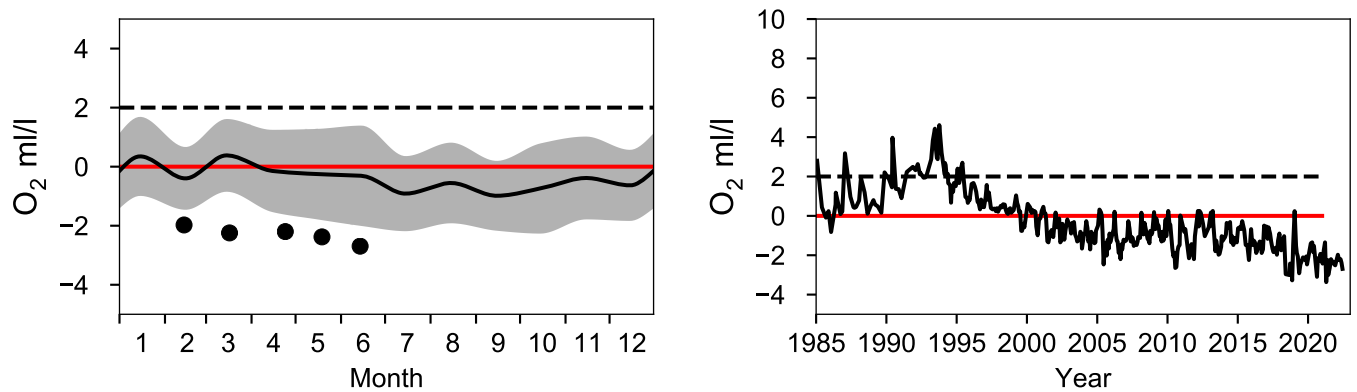


STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

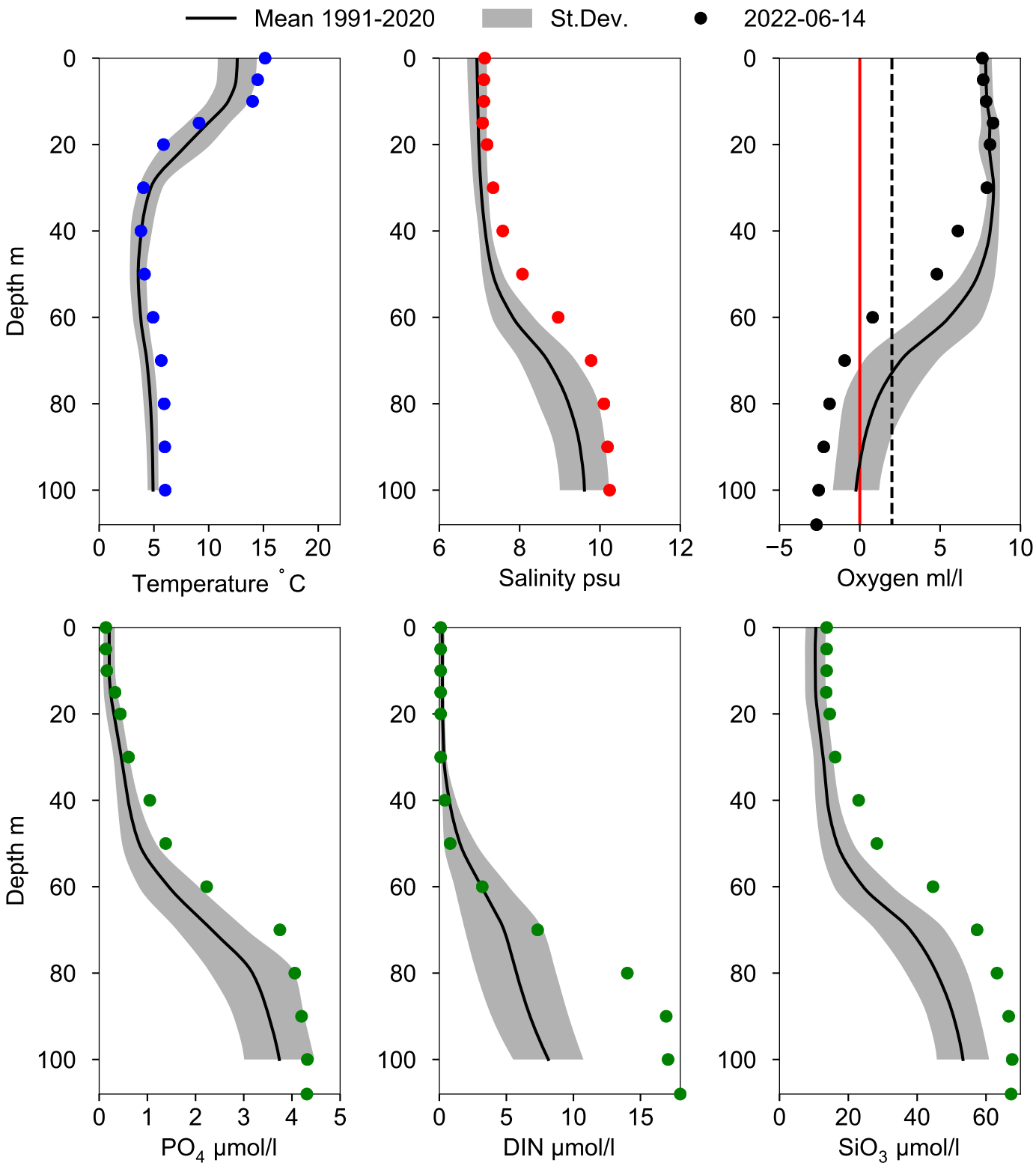
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 100 m)

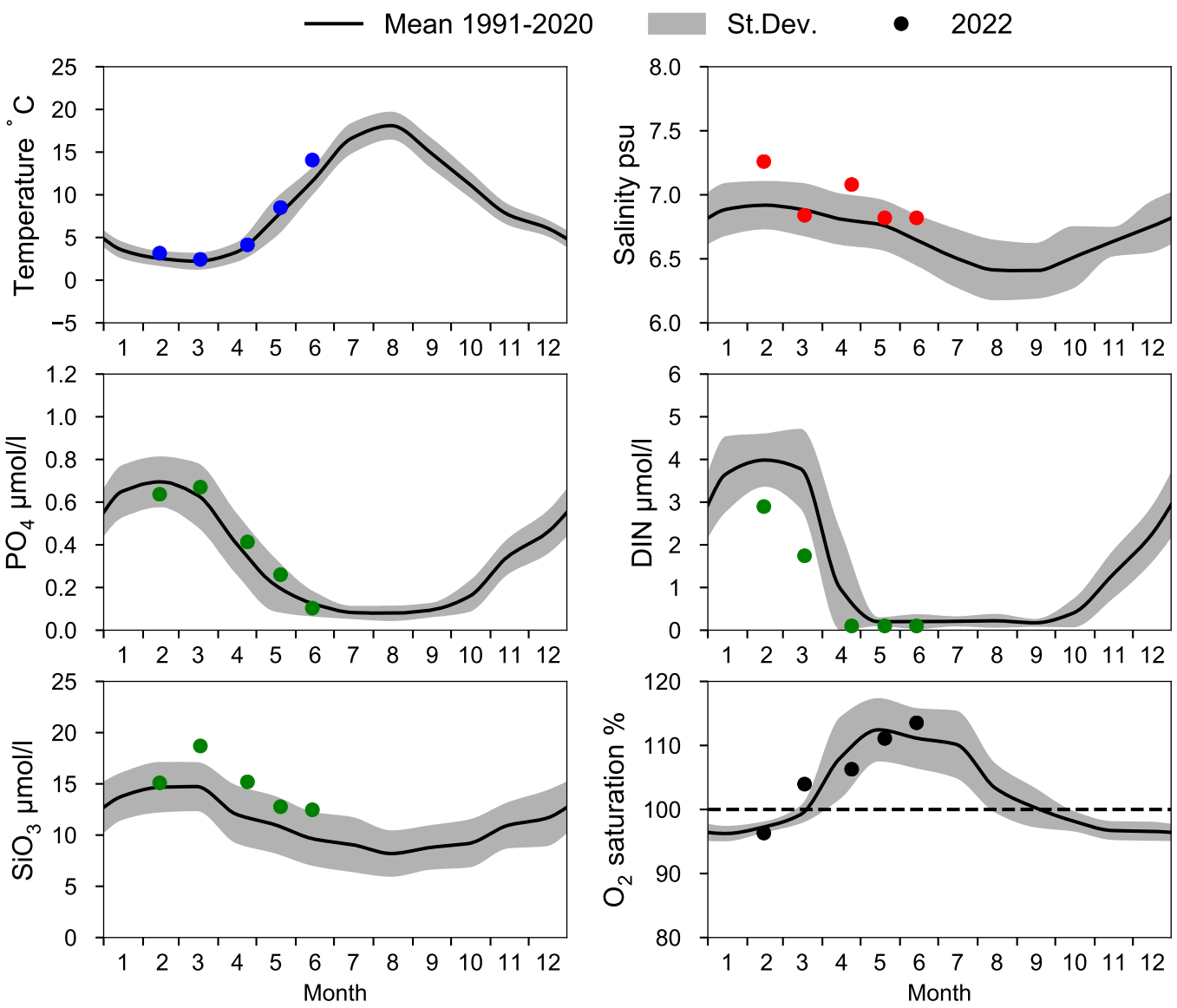


Vertical profiles BY38 KARLSÖDJ
June

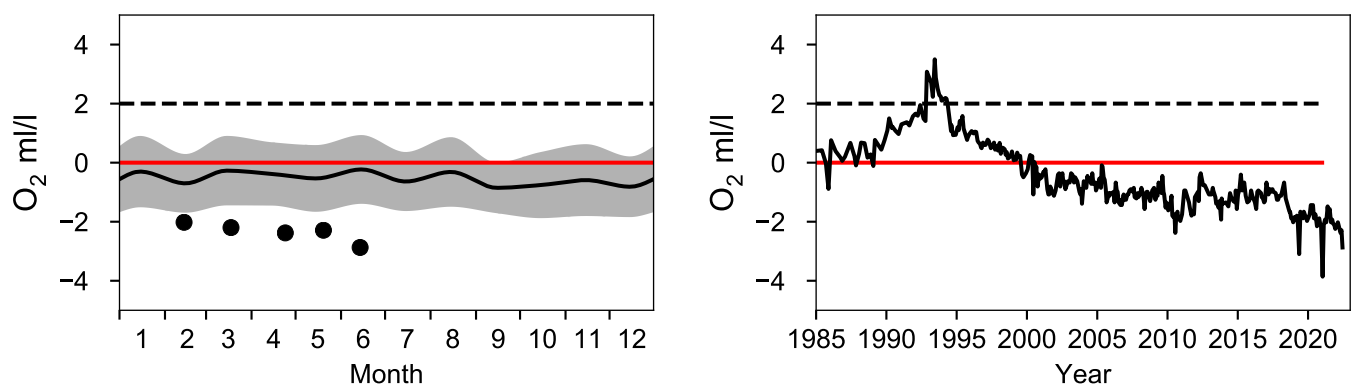


STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

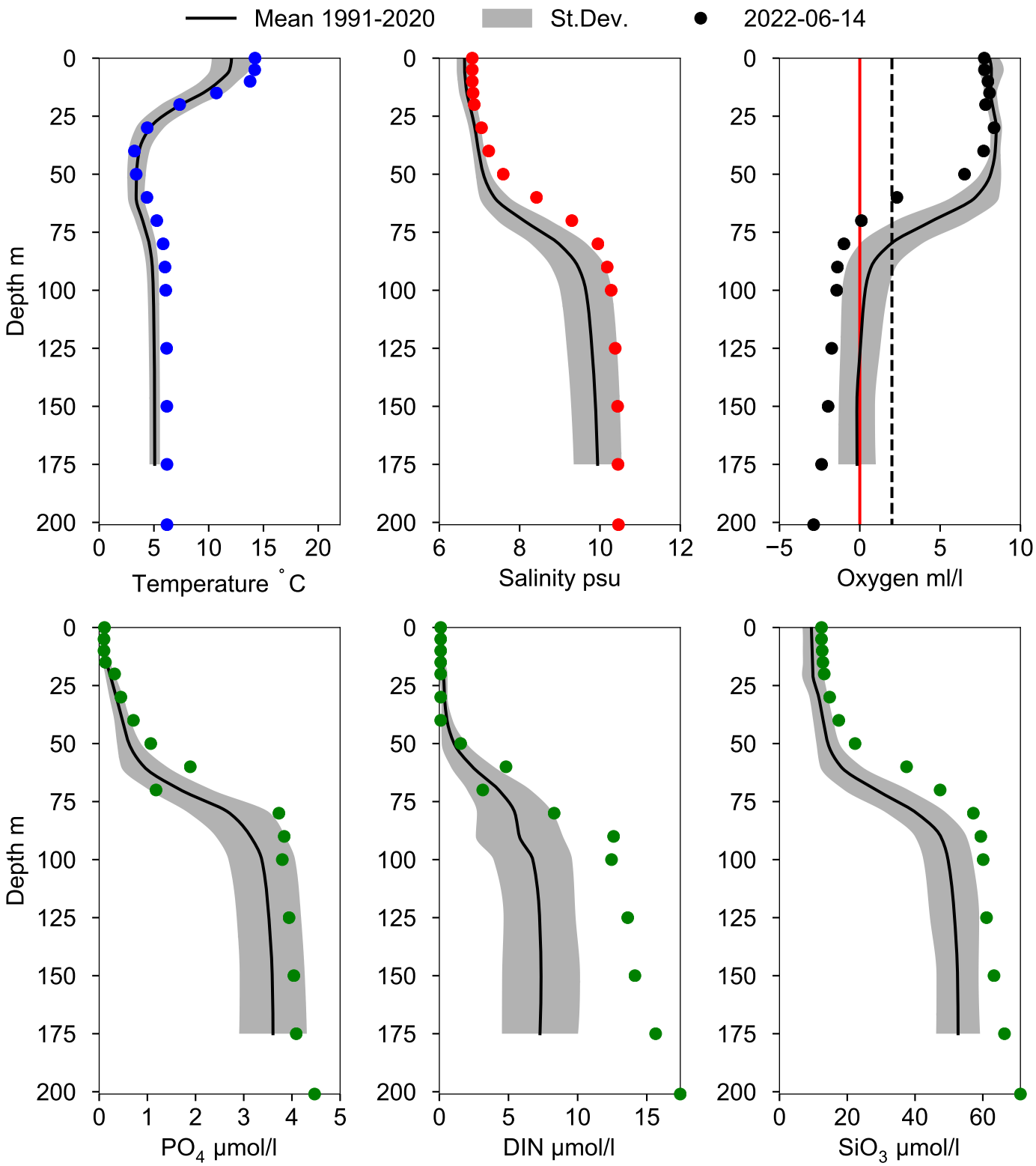
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)

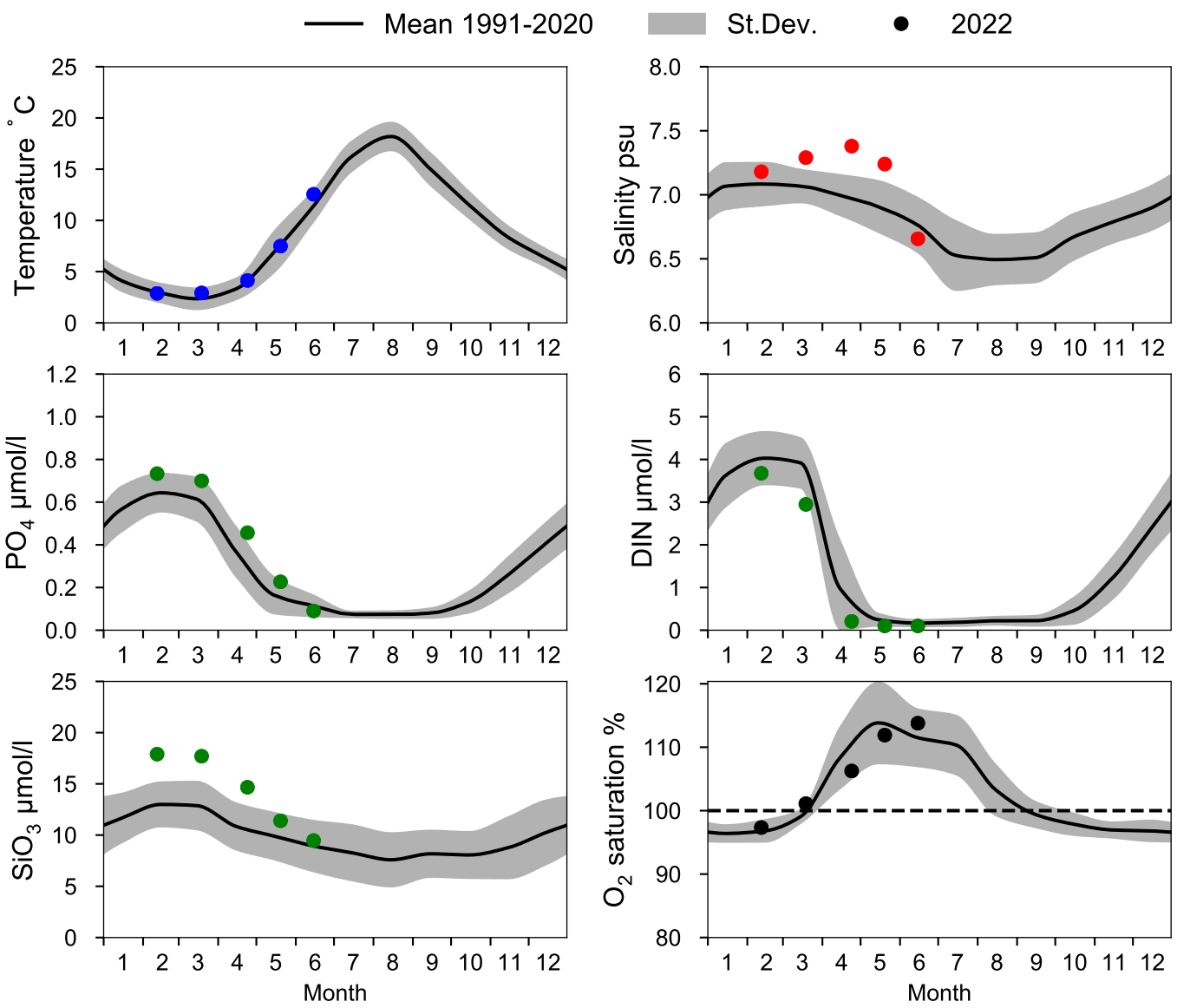


Vertical profiles BY32 NORRKÖPINGSDJ
June

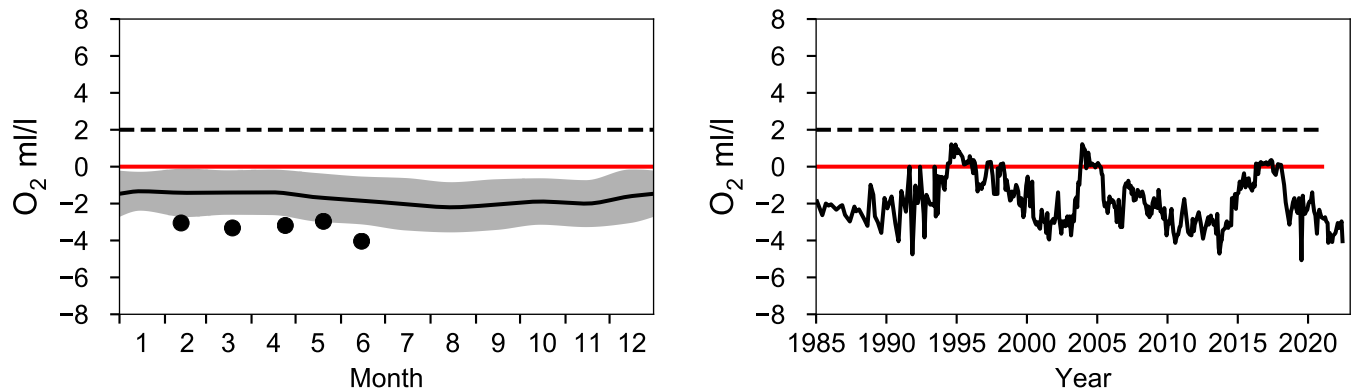


STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

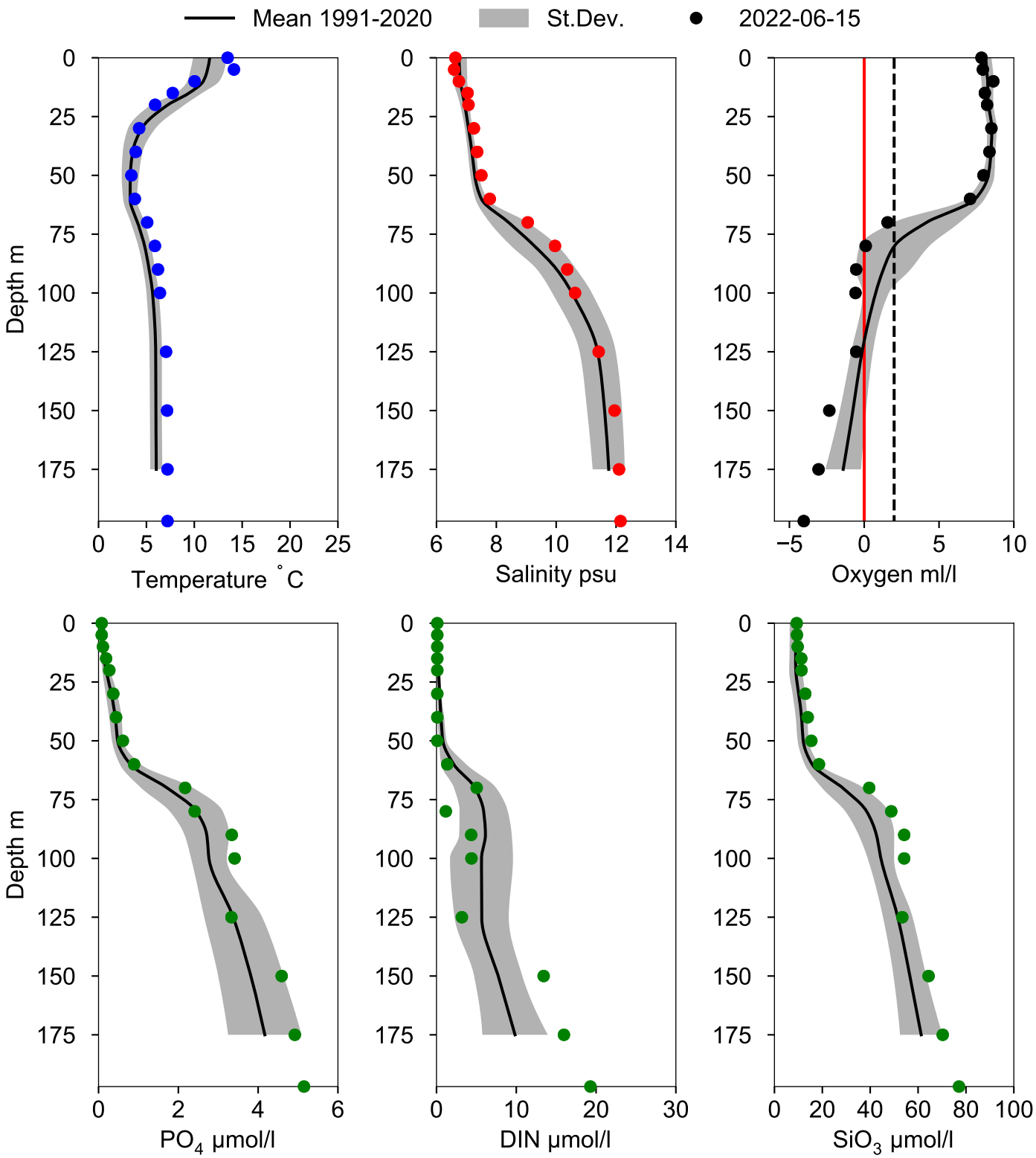
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)

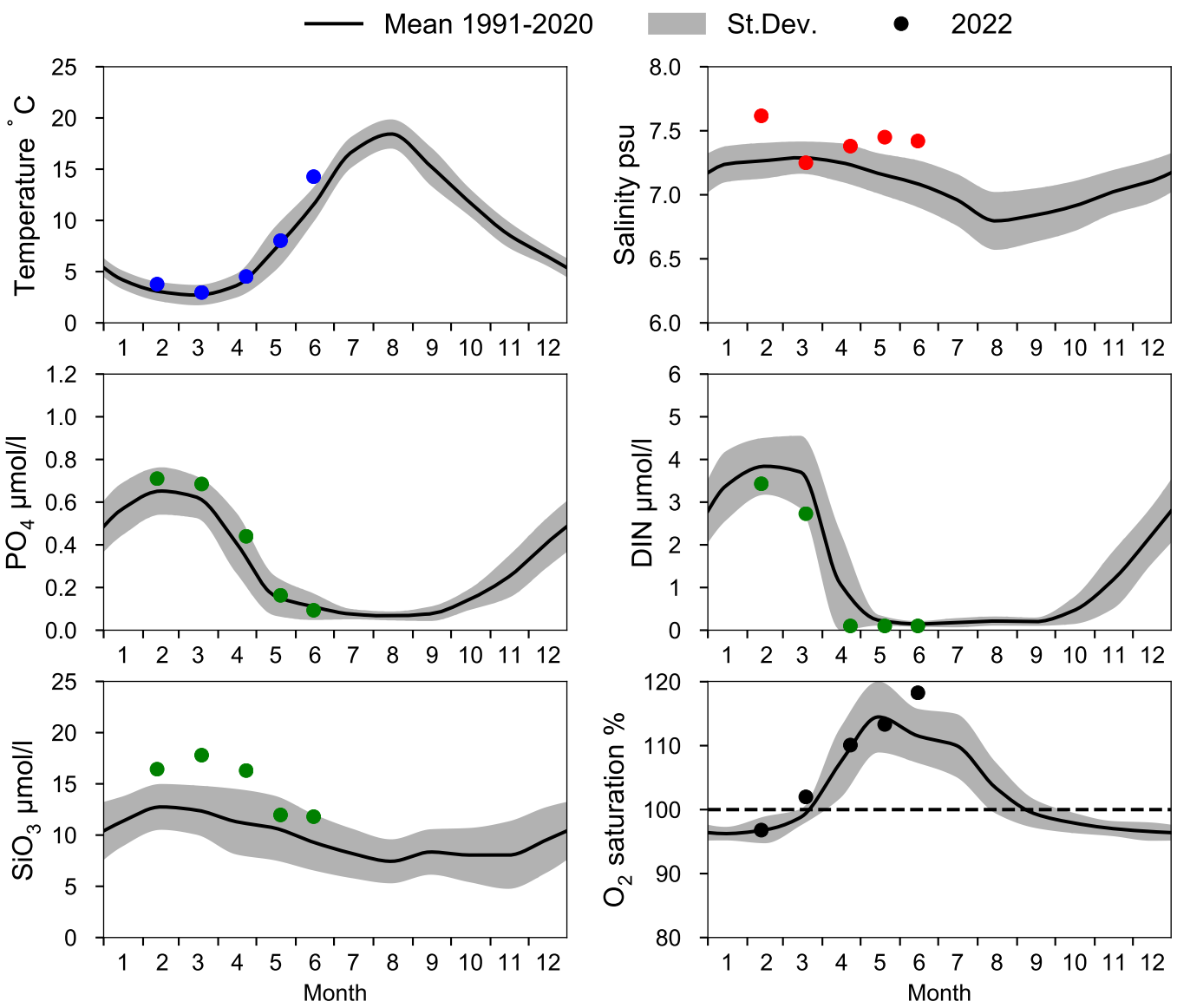


Vertical profiles BY20 FÅRÖDJ
June

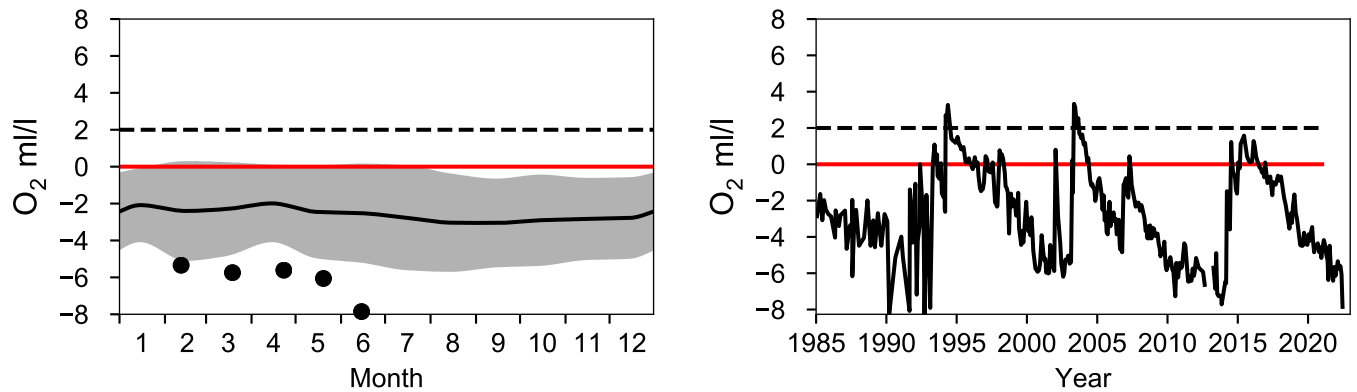


STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

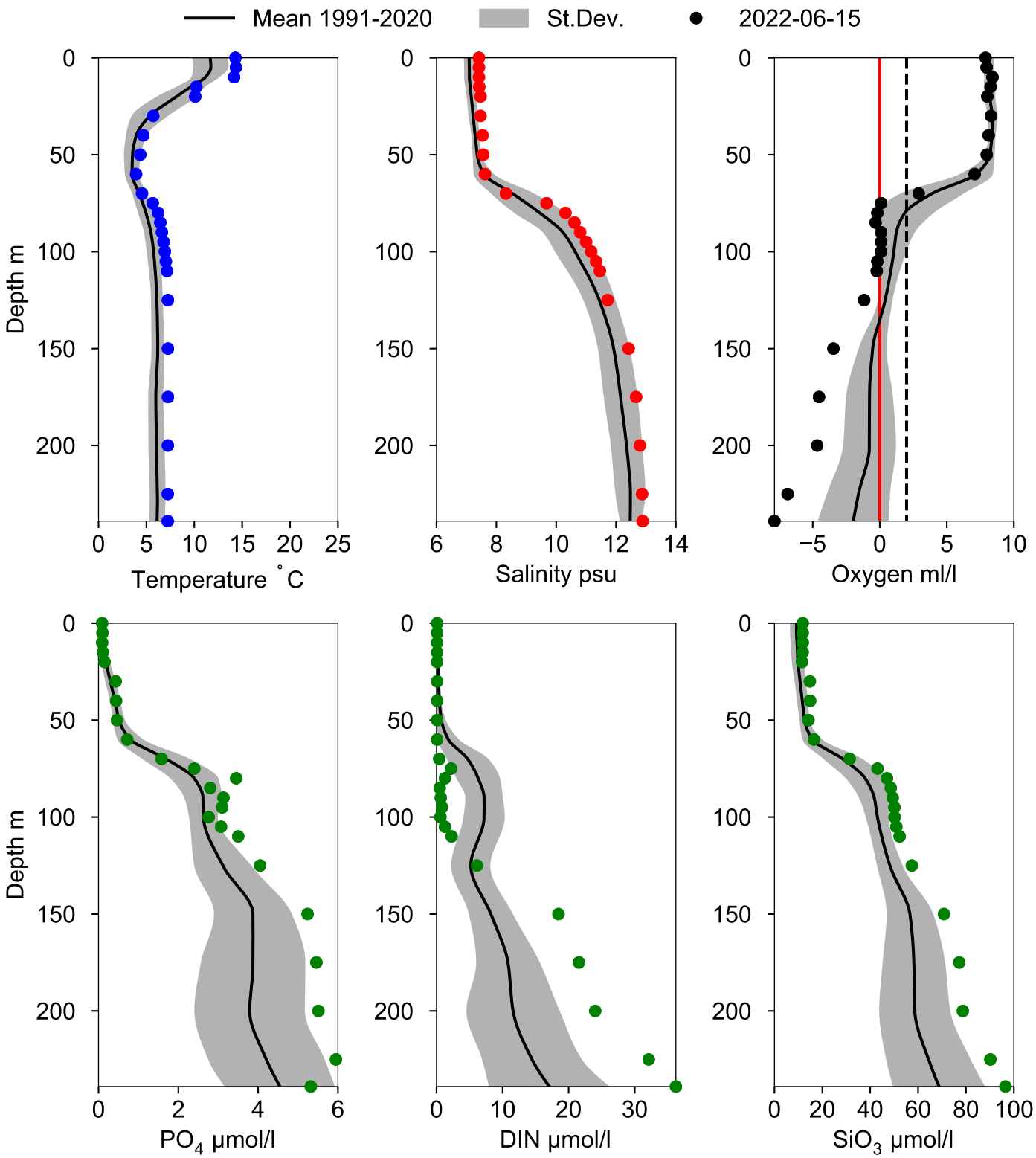
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 225 m)

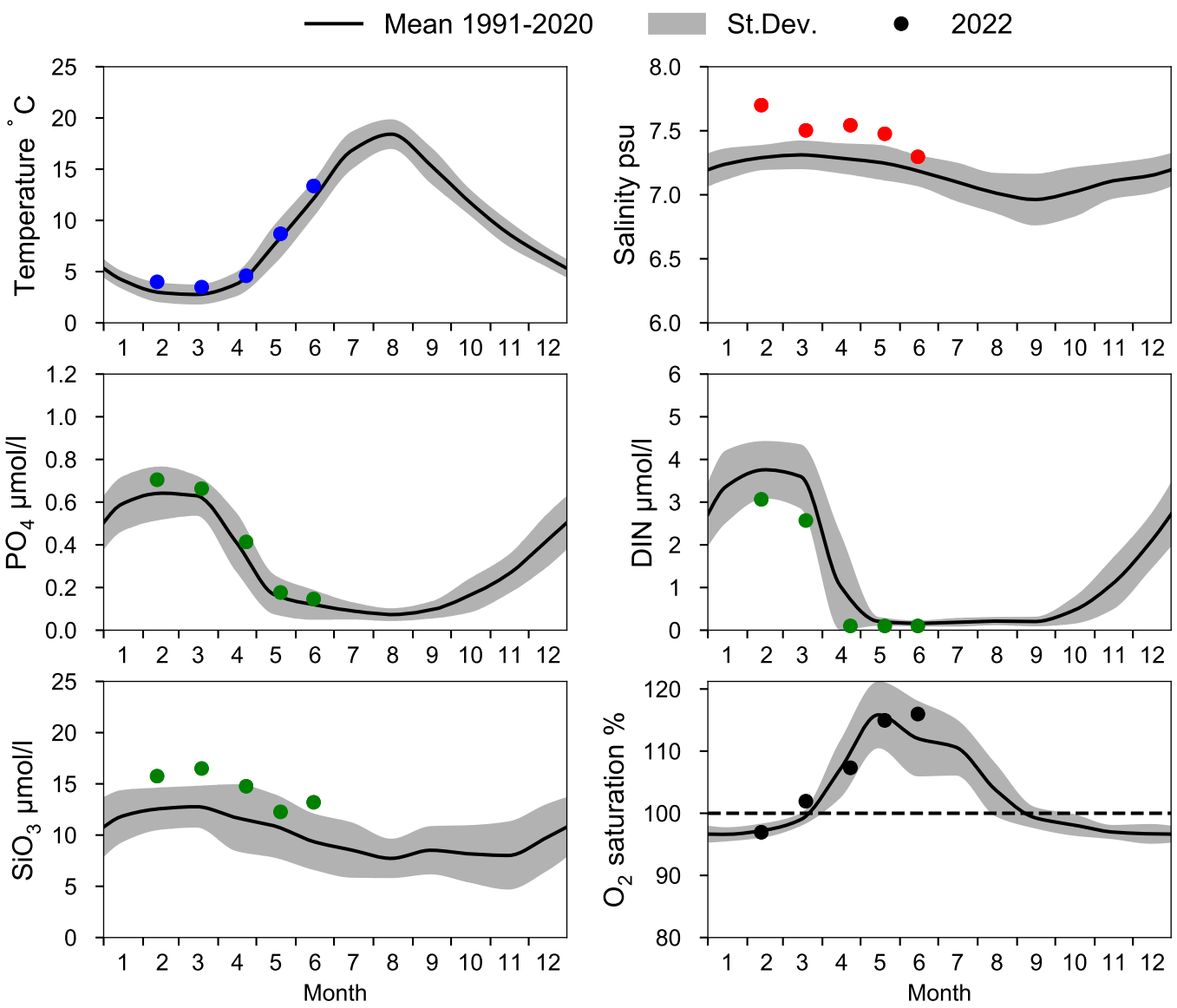


Vertical profiles BY15 GOTLANDSDJ
June

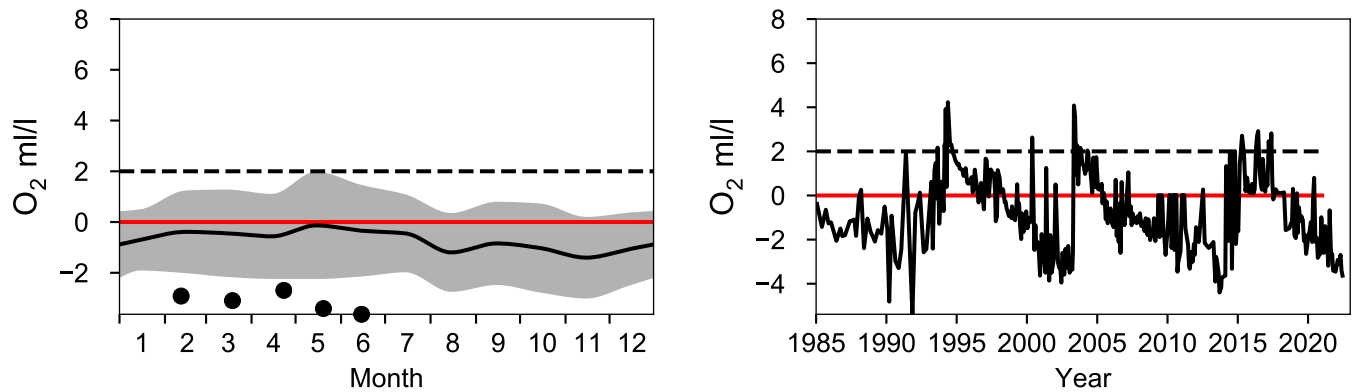


STATION BY10 SURFACE WATER (0-10 m)

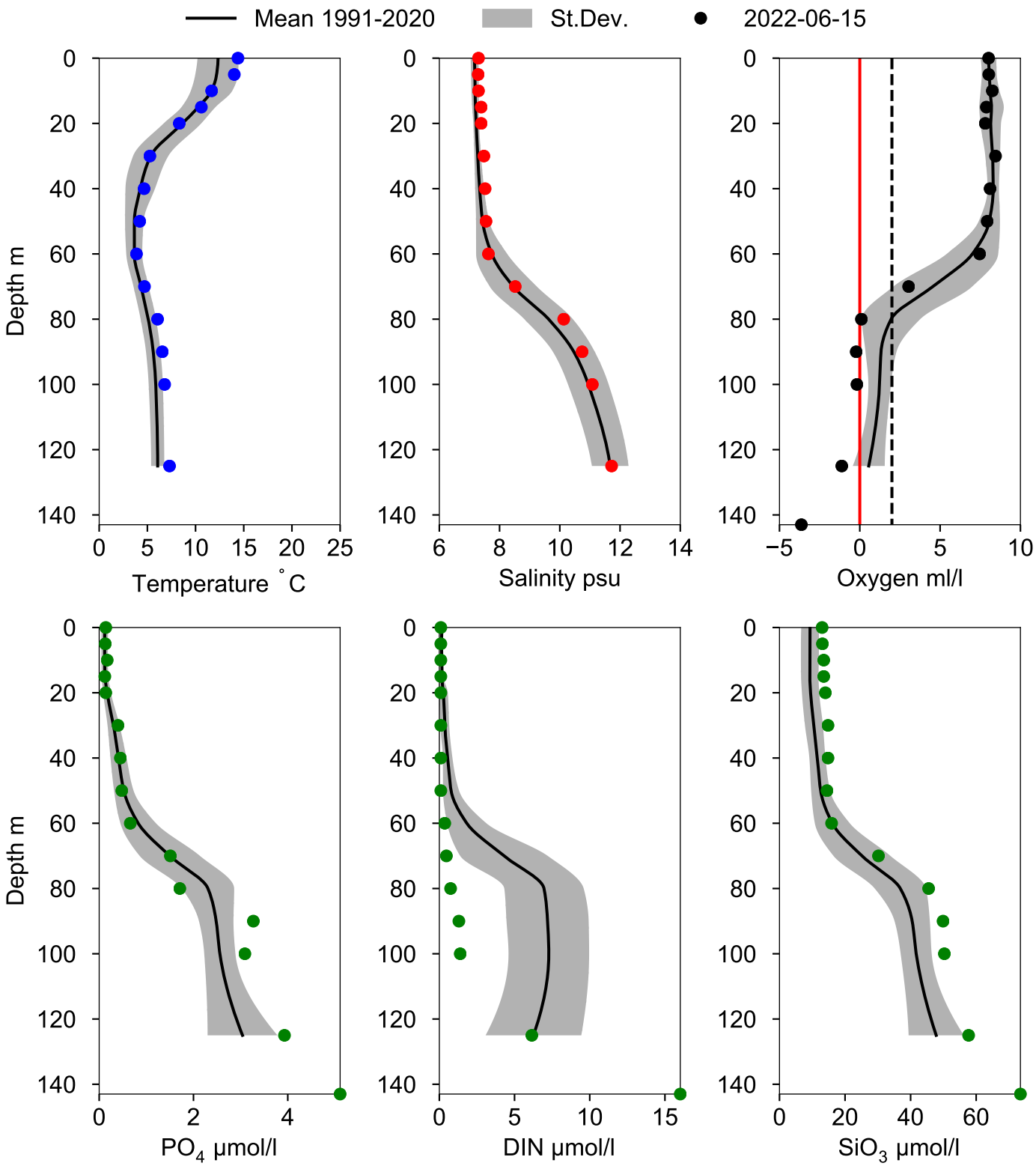
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

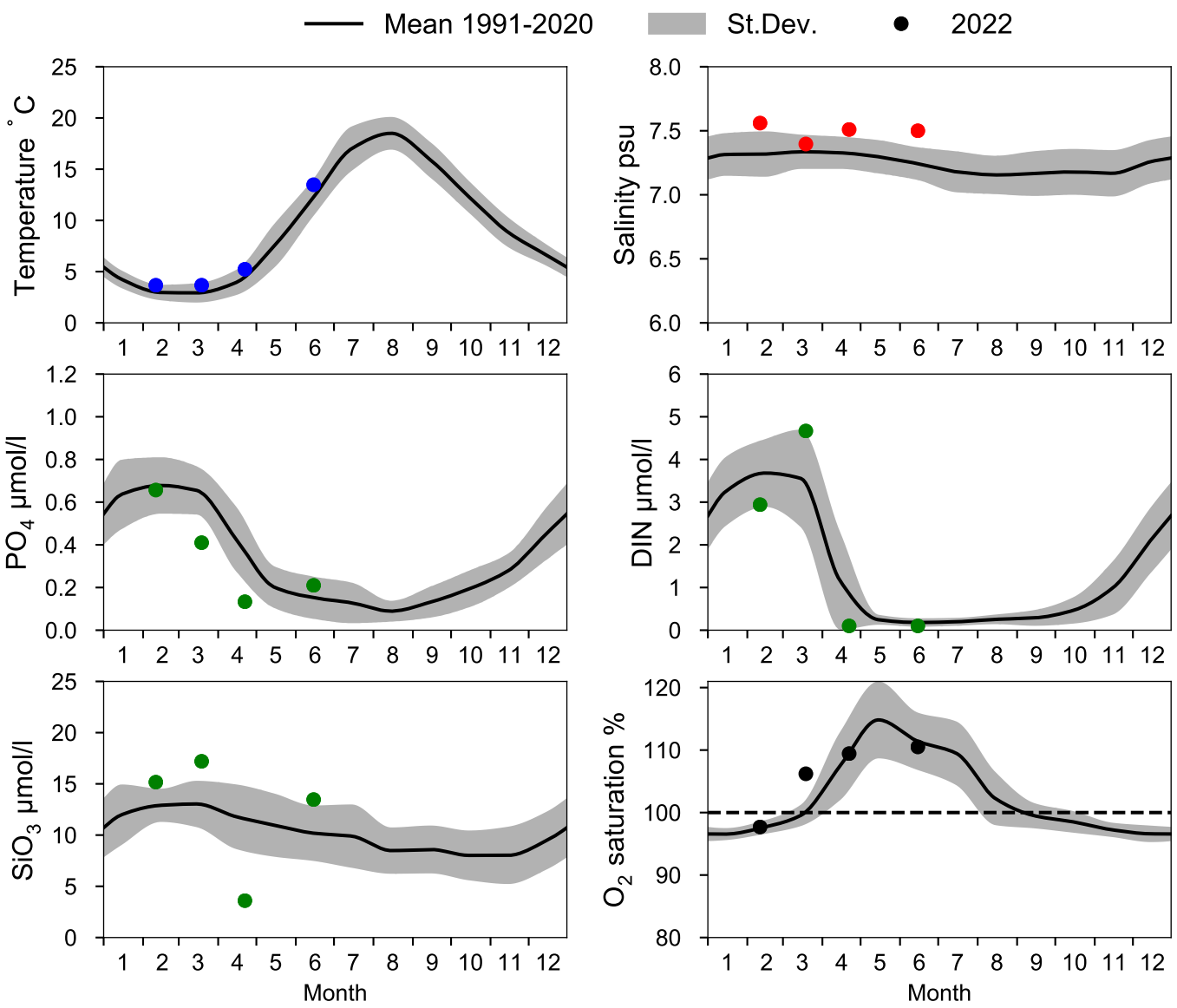


Vertical profiles BY10
June

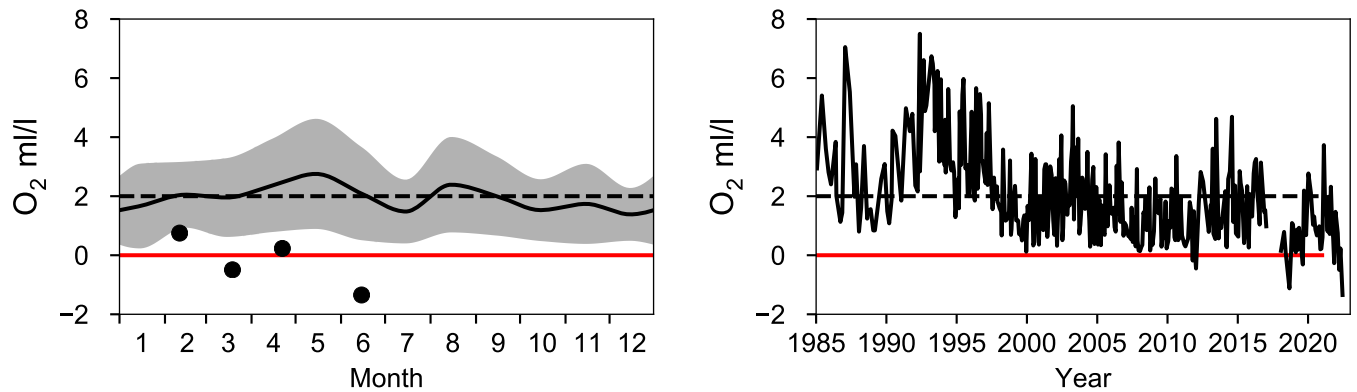


STATION BCS III-10 SURFACE WATER (0-10 m)

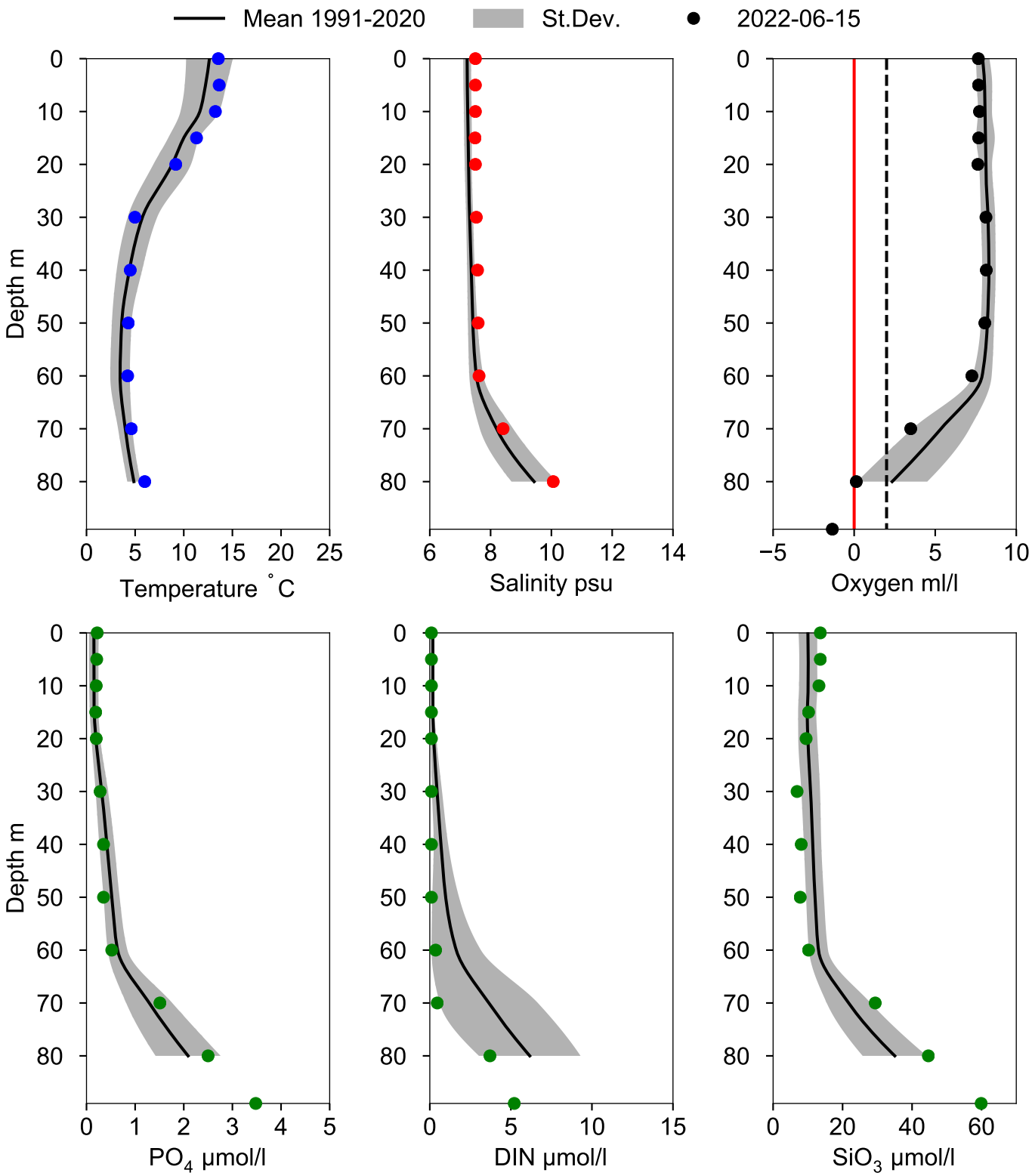
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

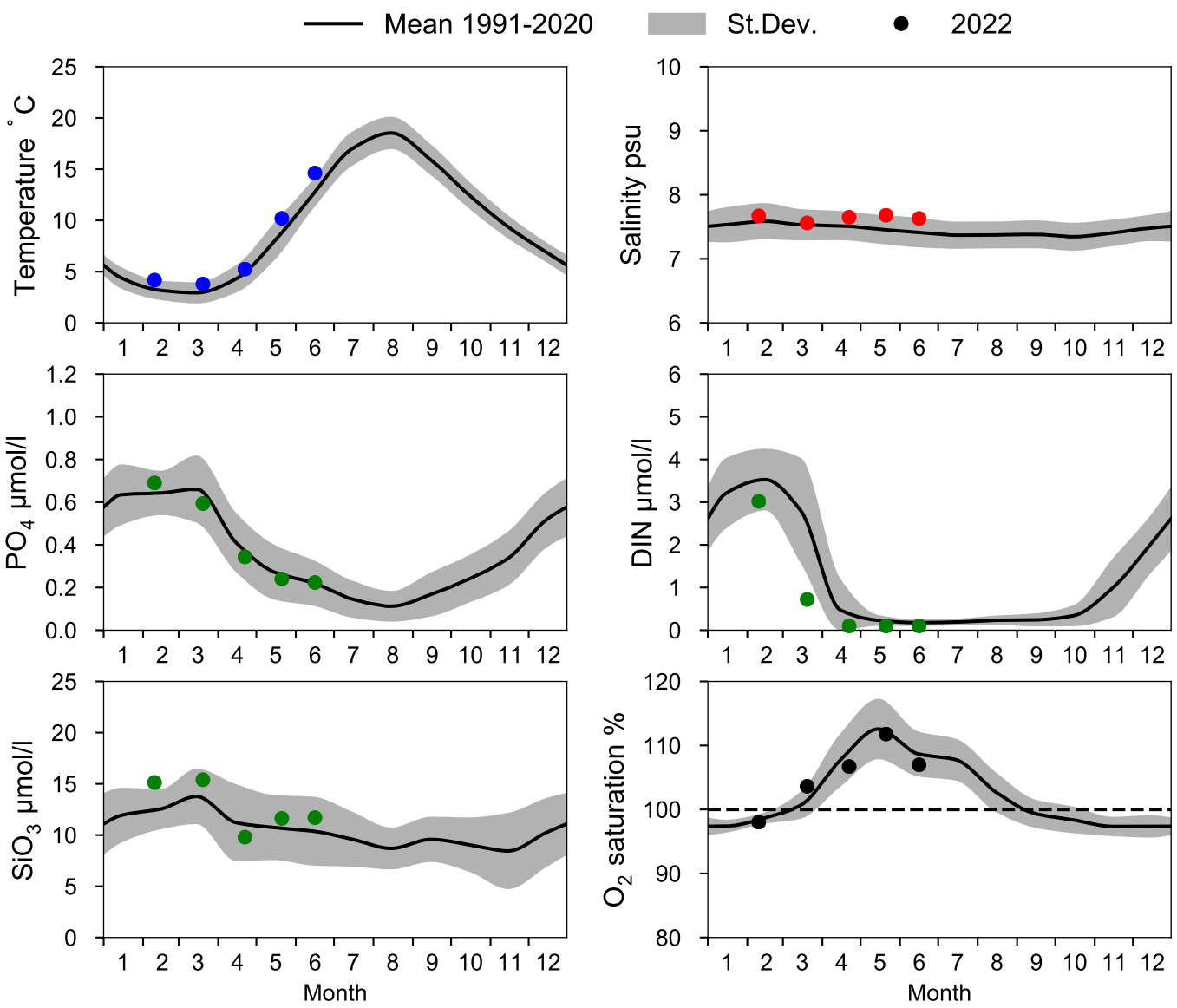


Vertical profiles BCS III-10
June

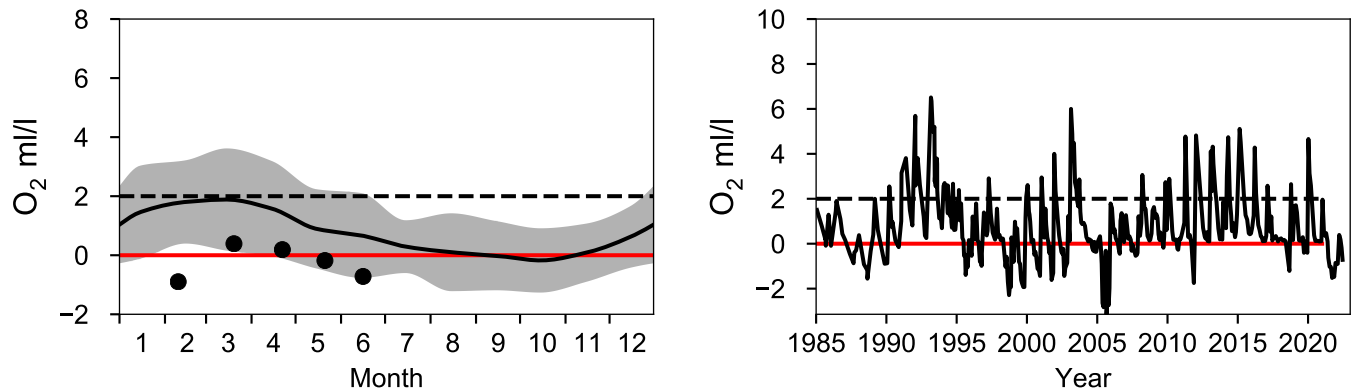


STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

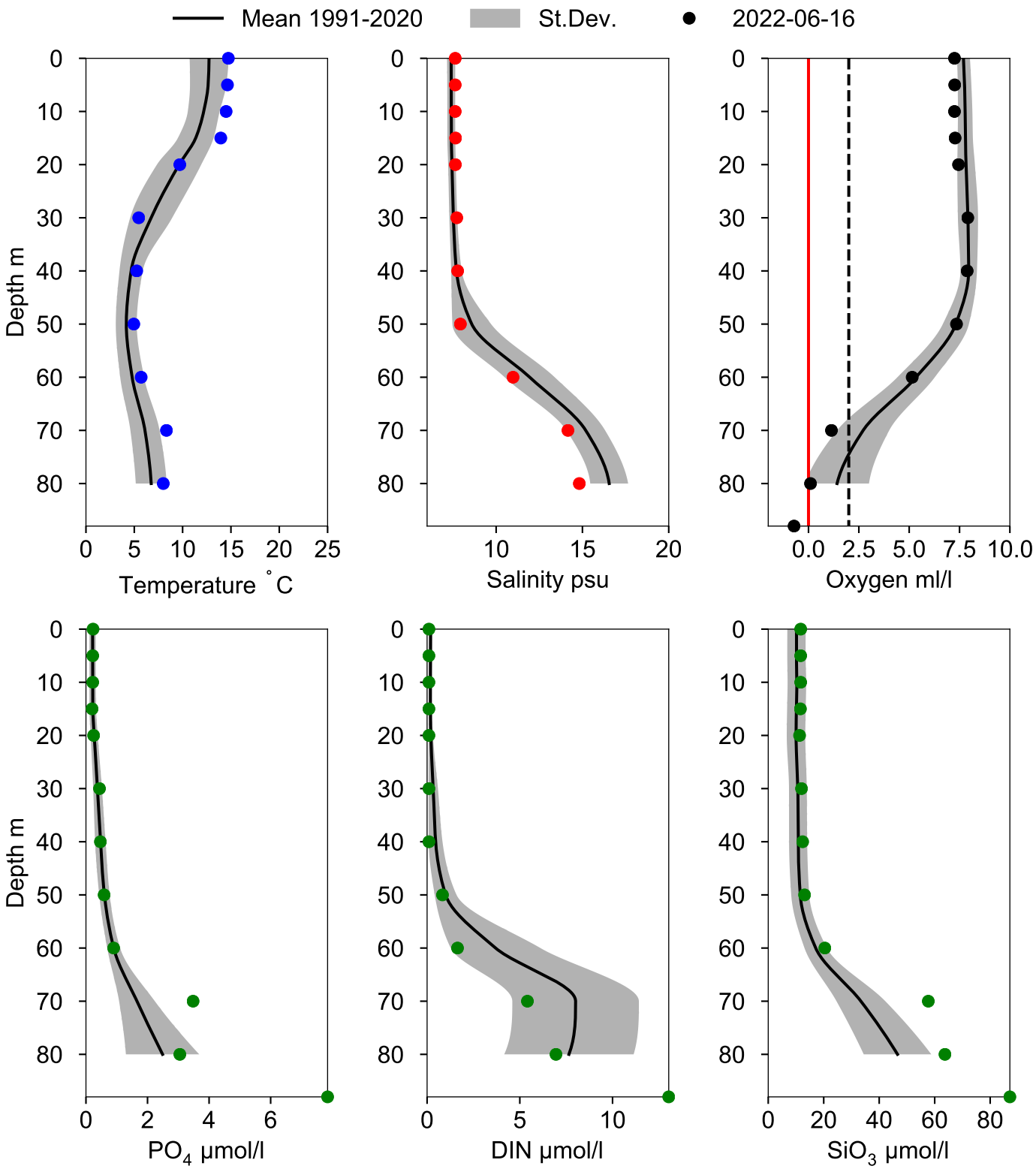
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

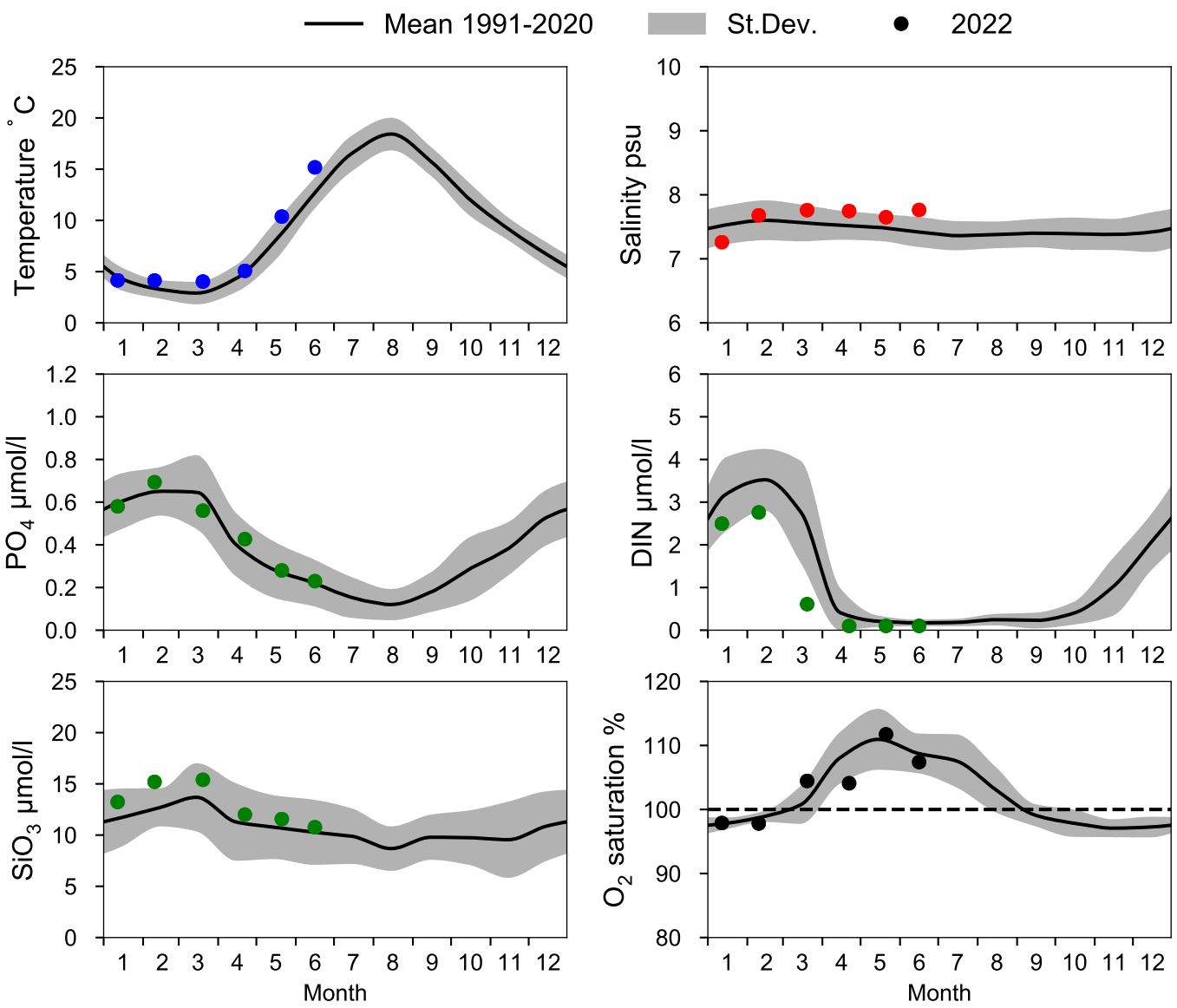


Vertical profiles BY5 BORNHOLMSDJ
June

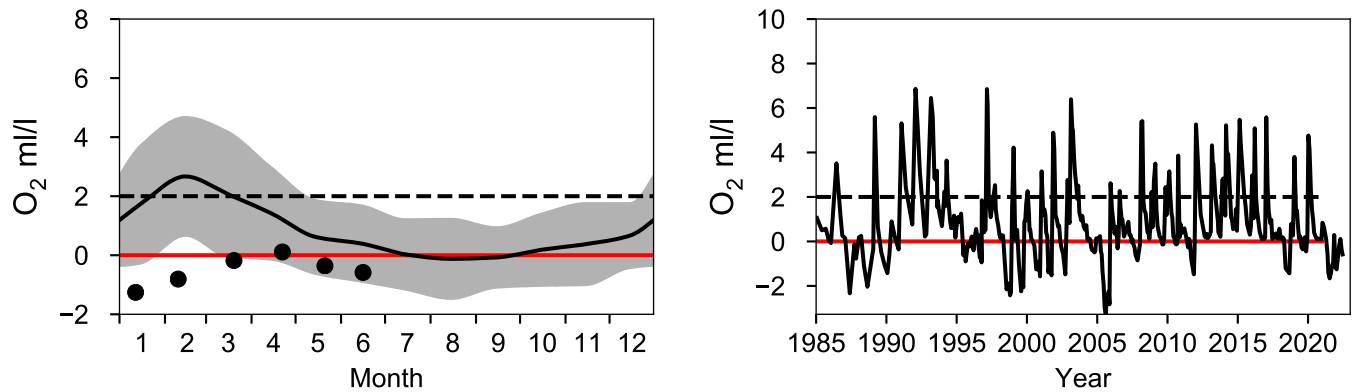


STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

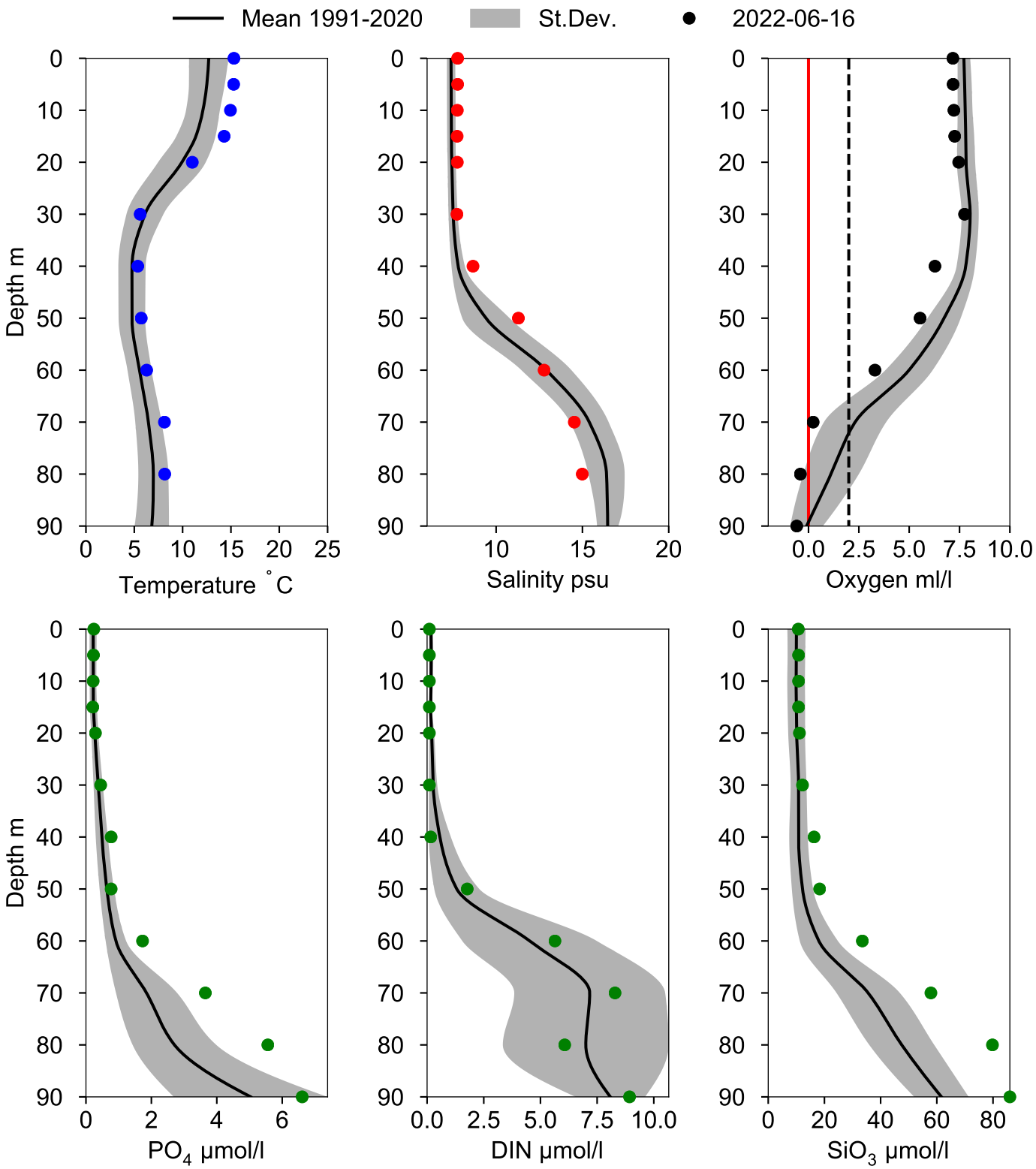
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

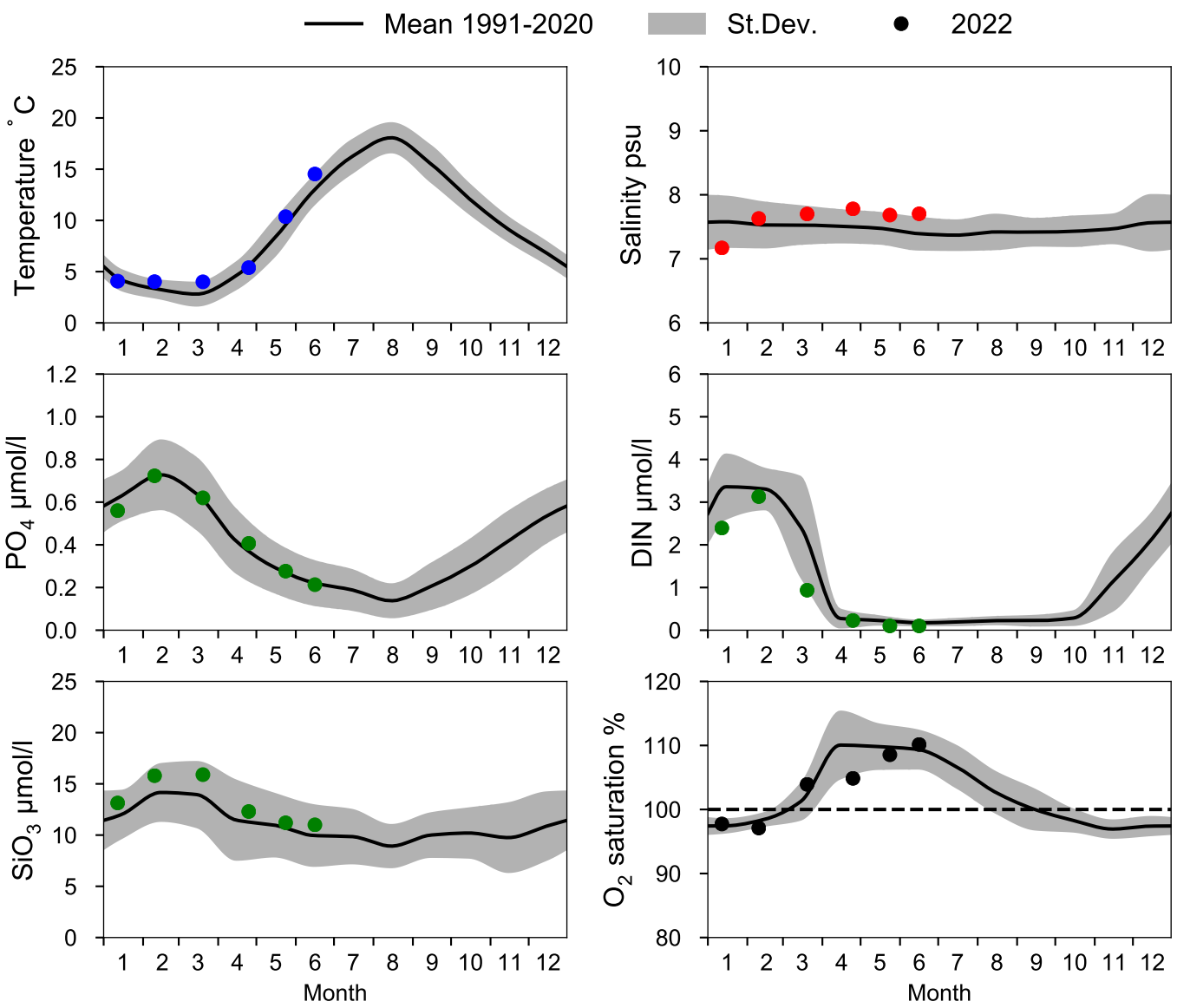


Vertical profiles BY4 CHRISTIANSÖ
June

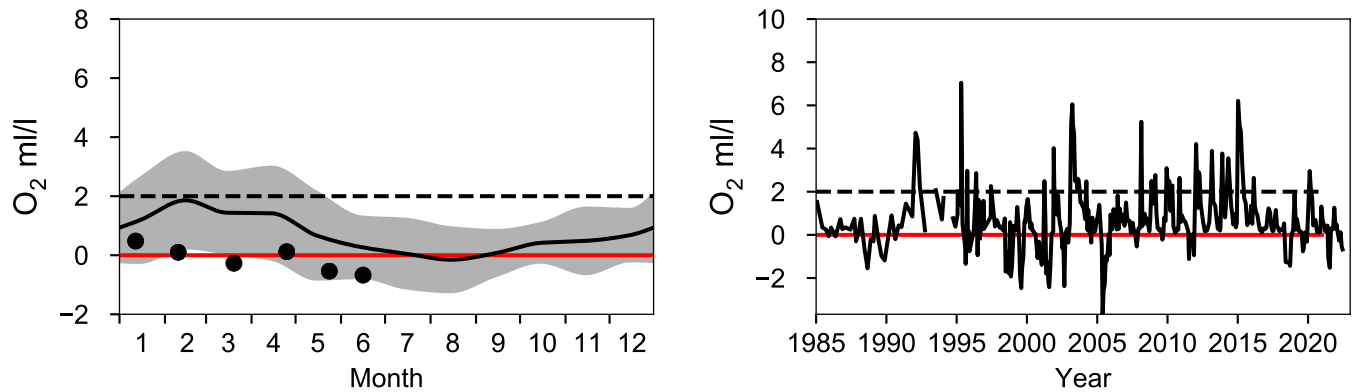


STATION HANÖBUKTEN SURFACE WATER (0-10 m)

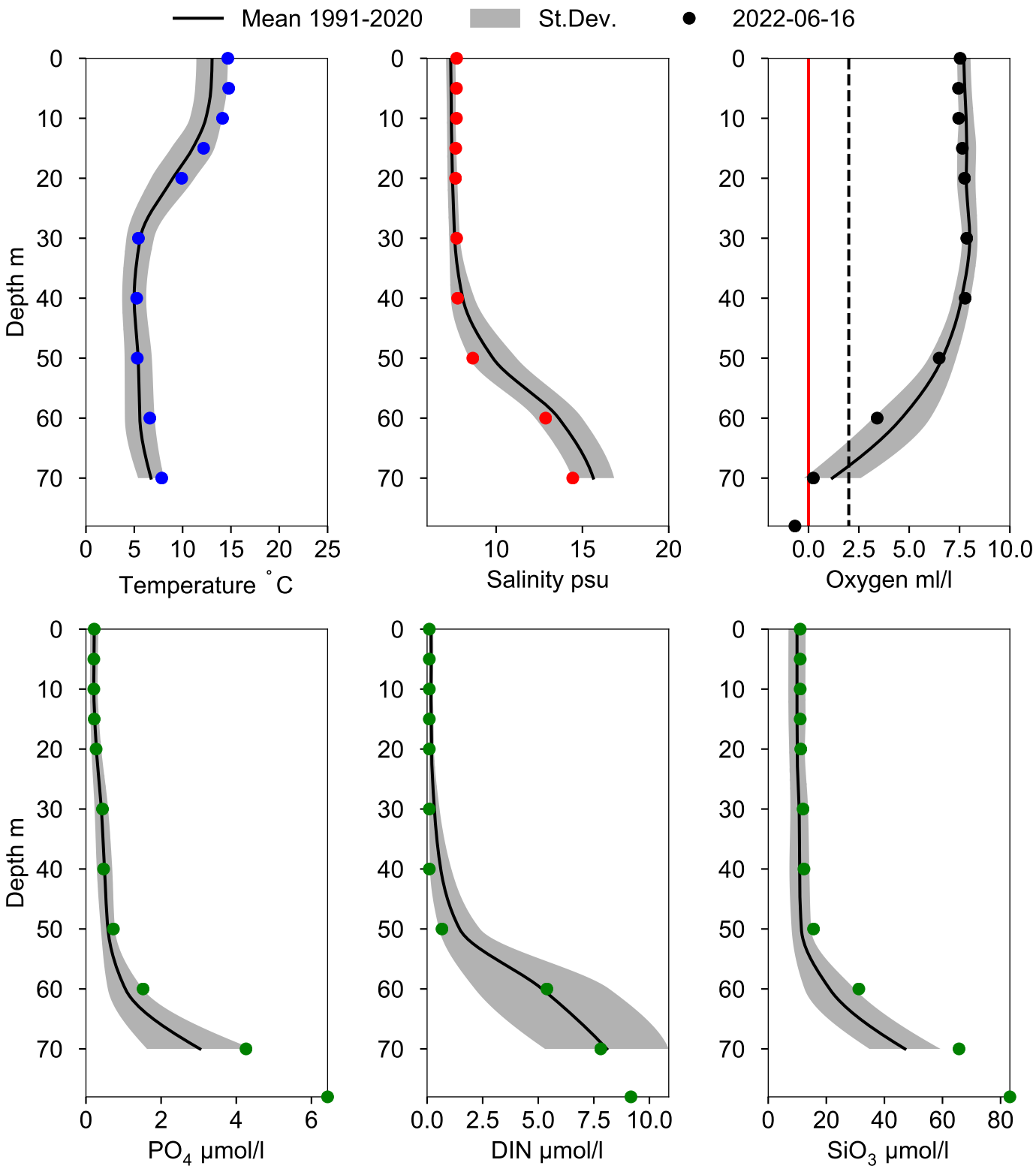
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 70 m)

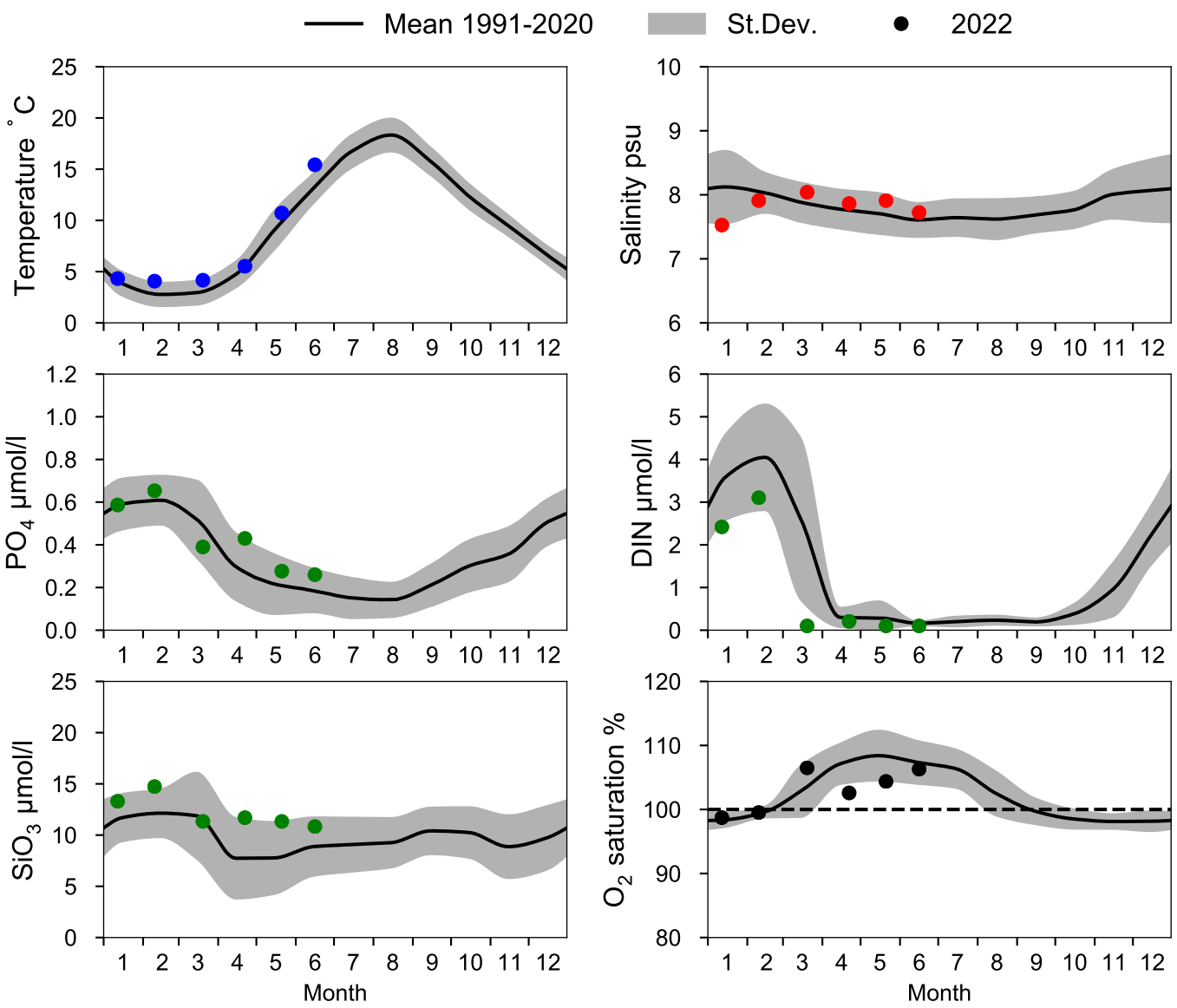


Vertical profiles HANÖBUKTEN
June

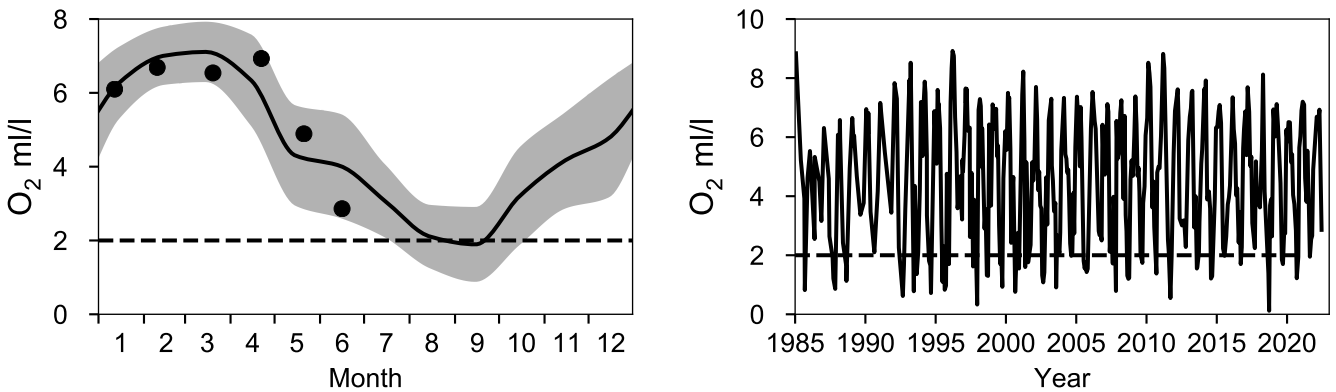


STATION BY2 ARKONA SURFACE WATER (0-10 m)

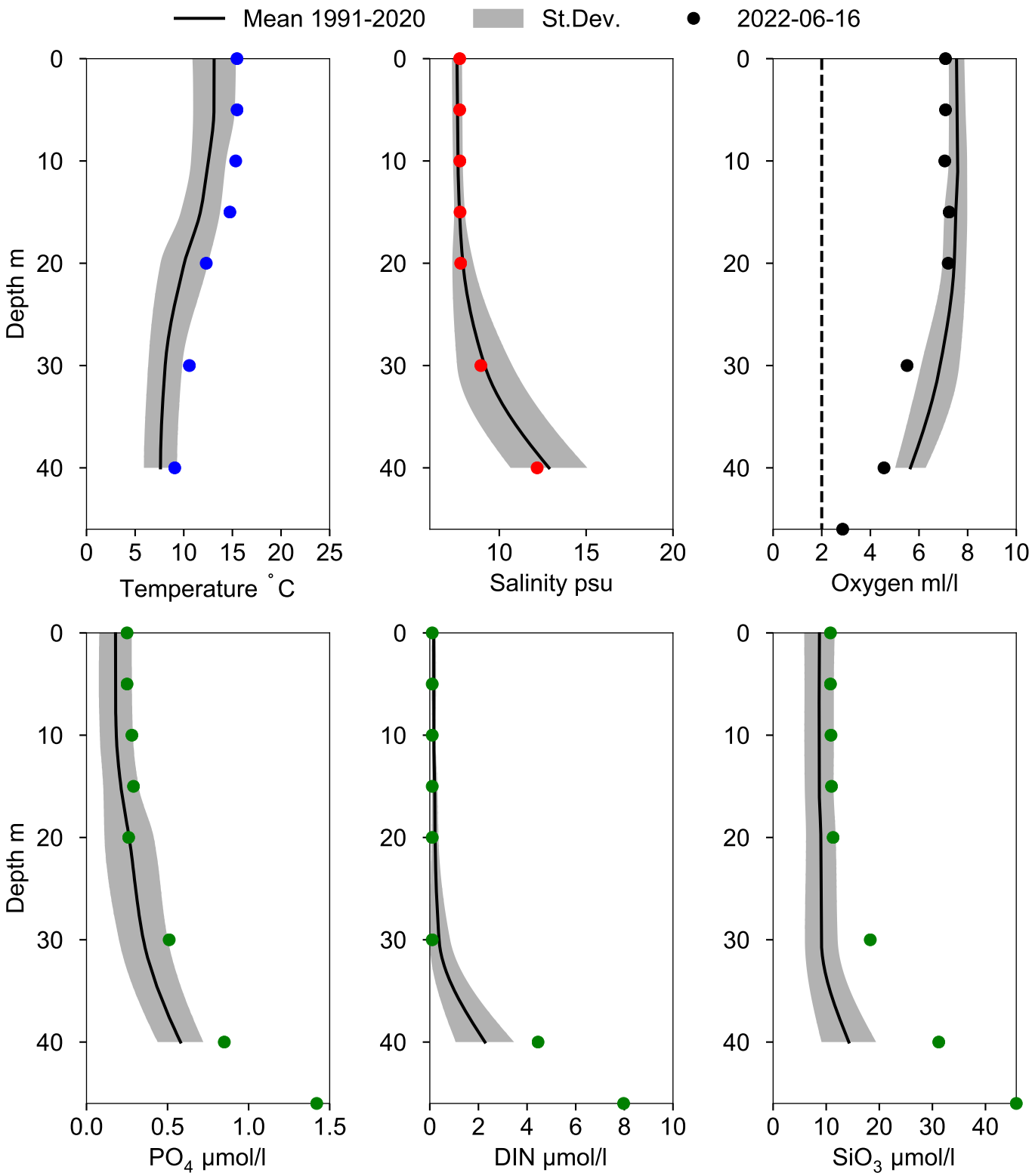
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

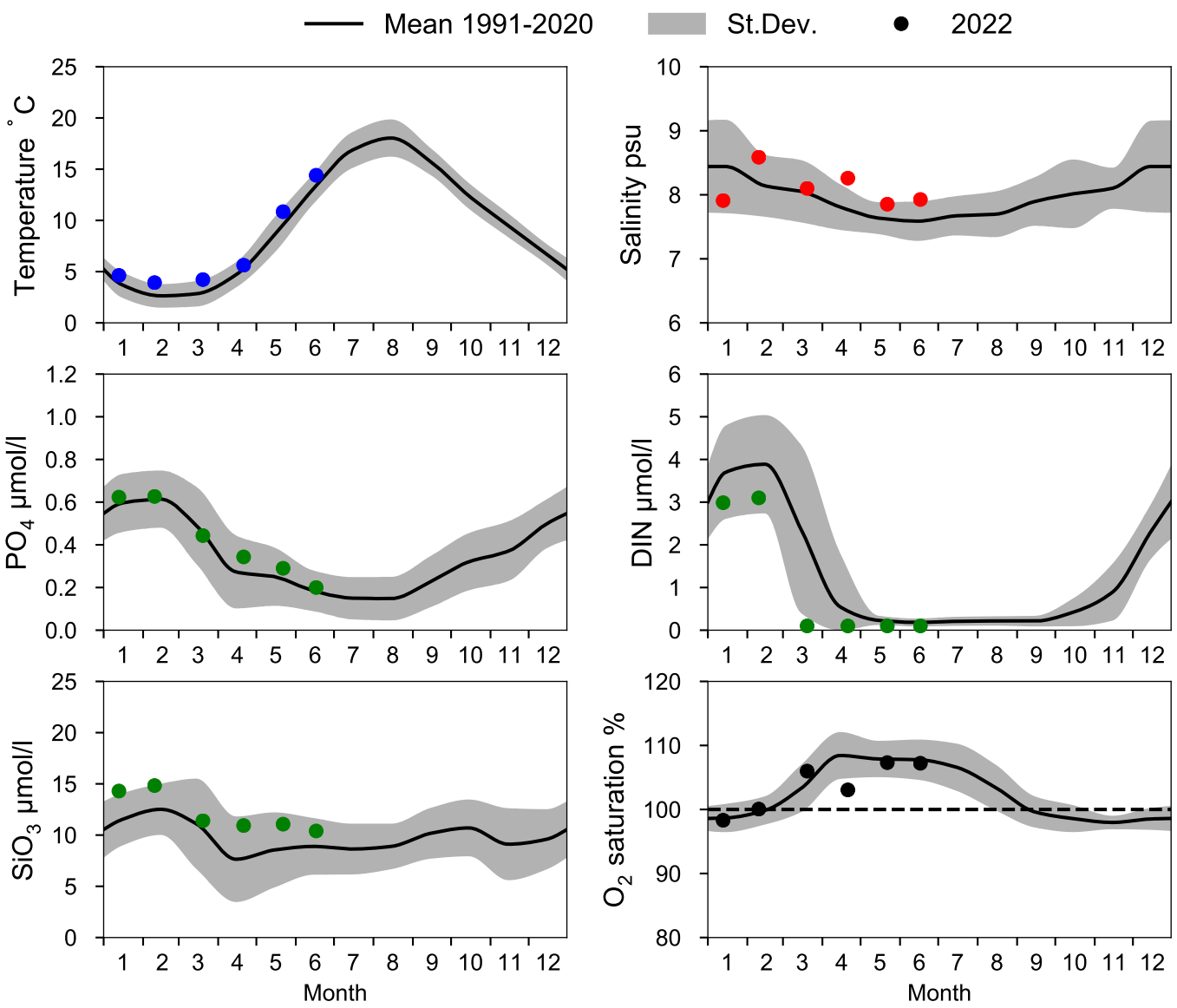


Vertical profiles BY2 ARKONA
June

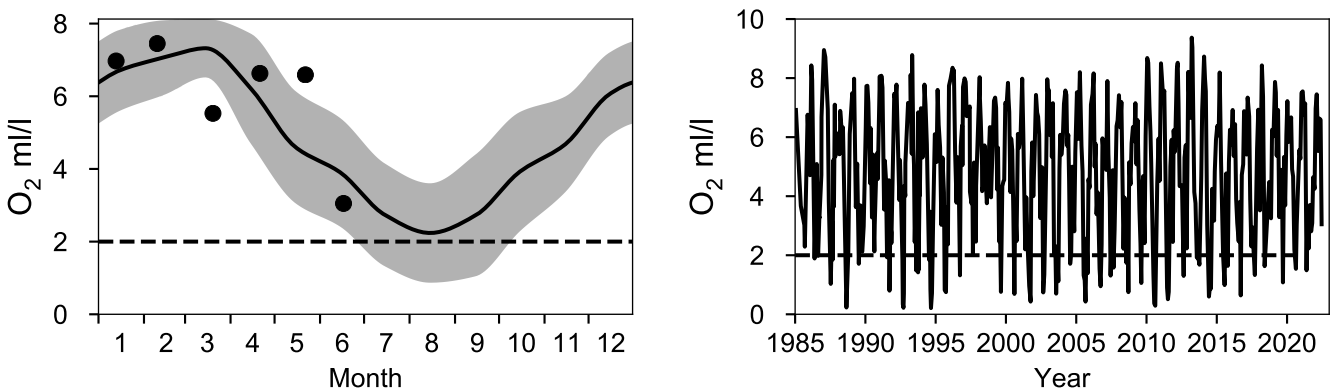


STATION BY1 SURFACE WATER (0-10 m)

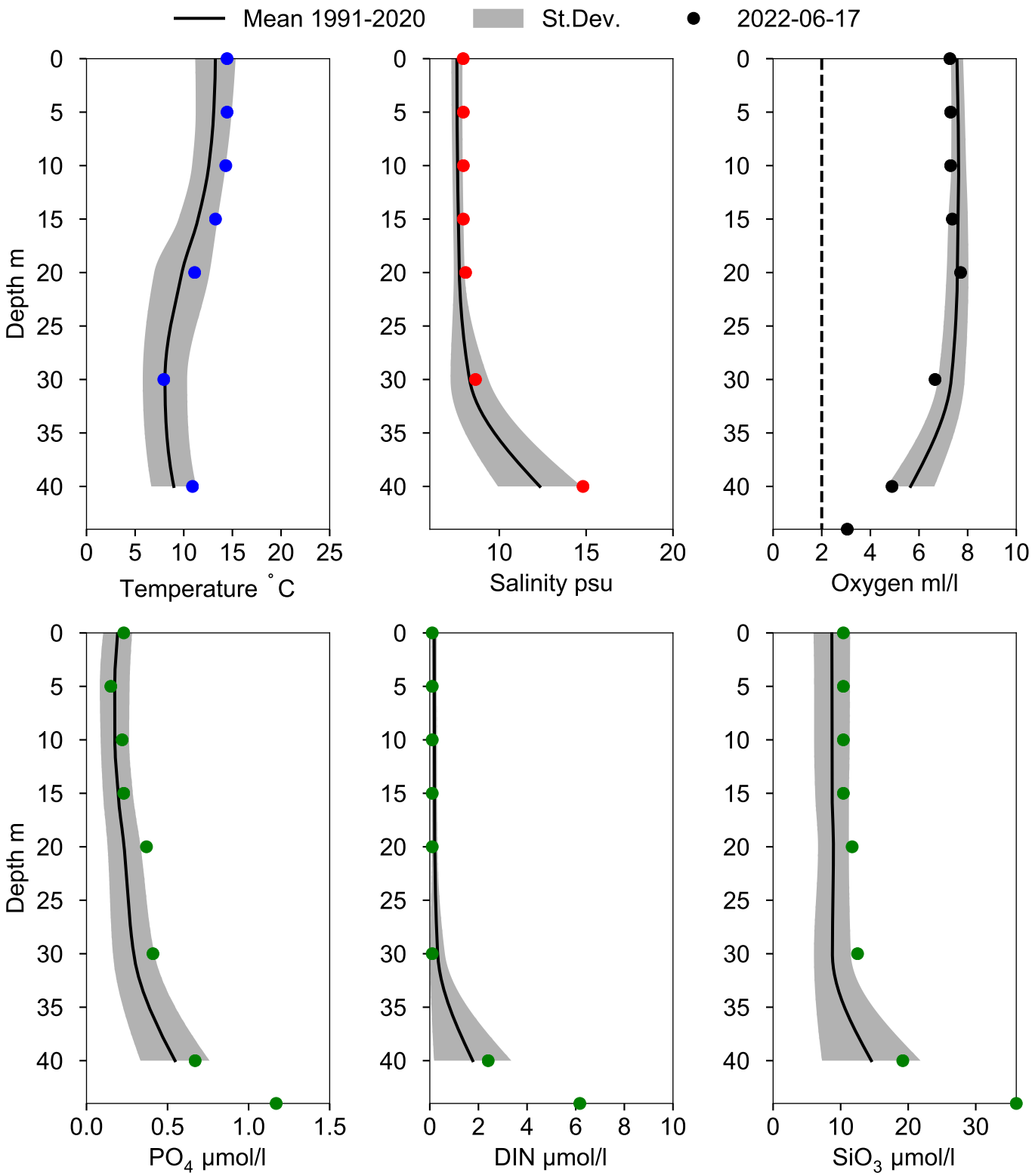
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 39 m)

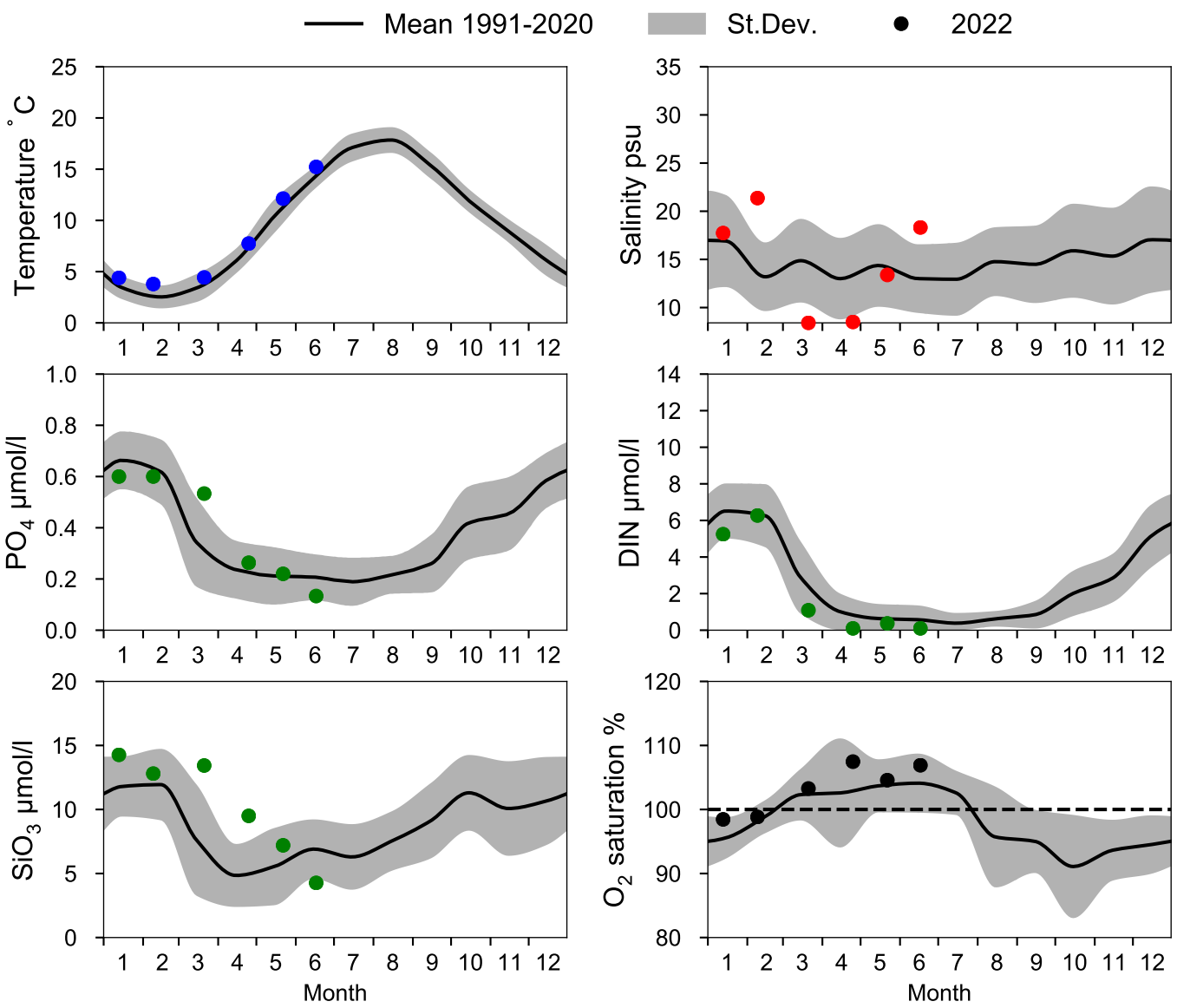


Vertical profiles BY1
June

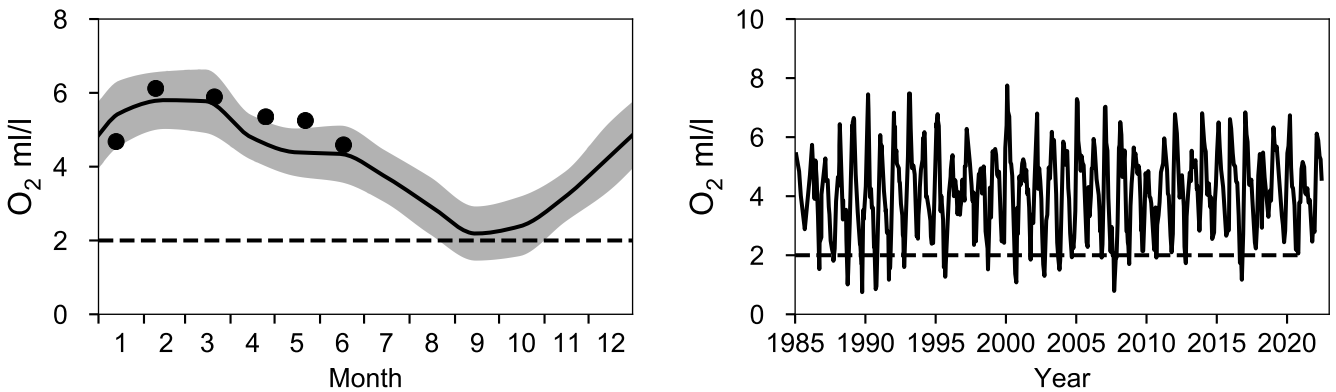


STATION W LANDSKRONA SURFACE WATER (0-10 m)

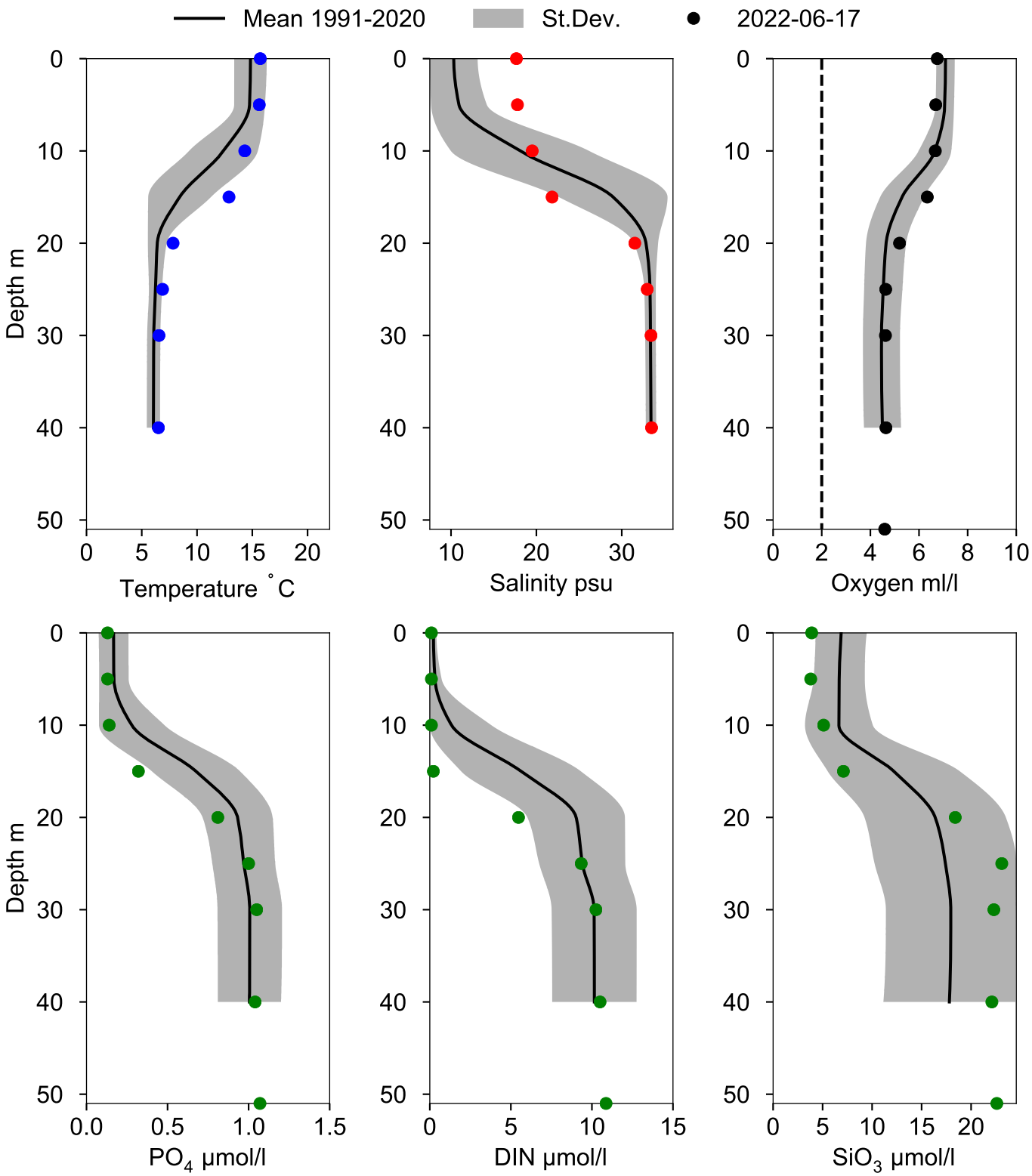
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

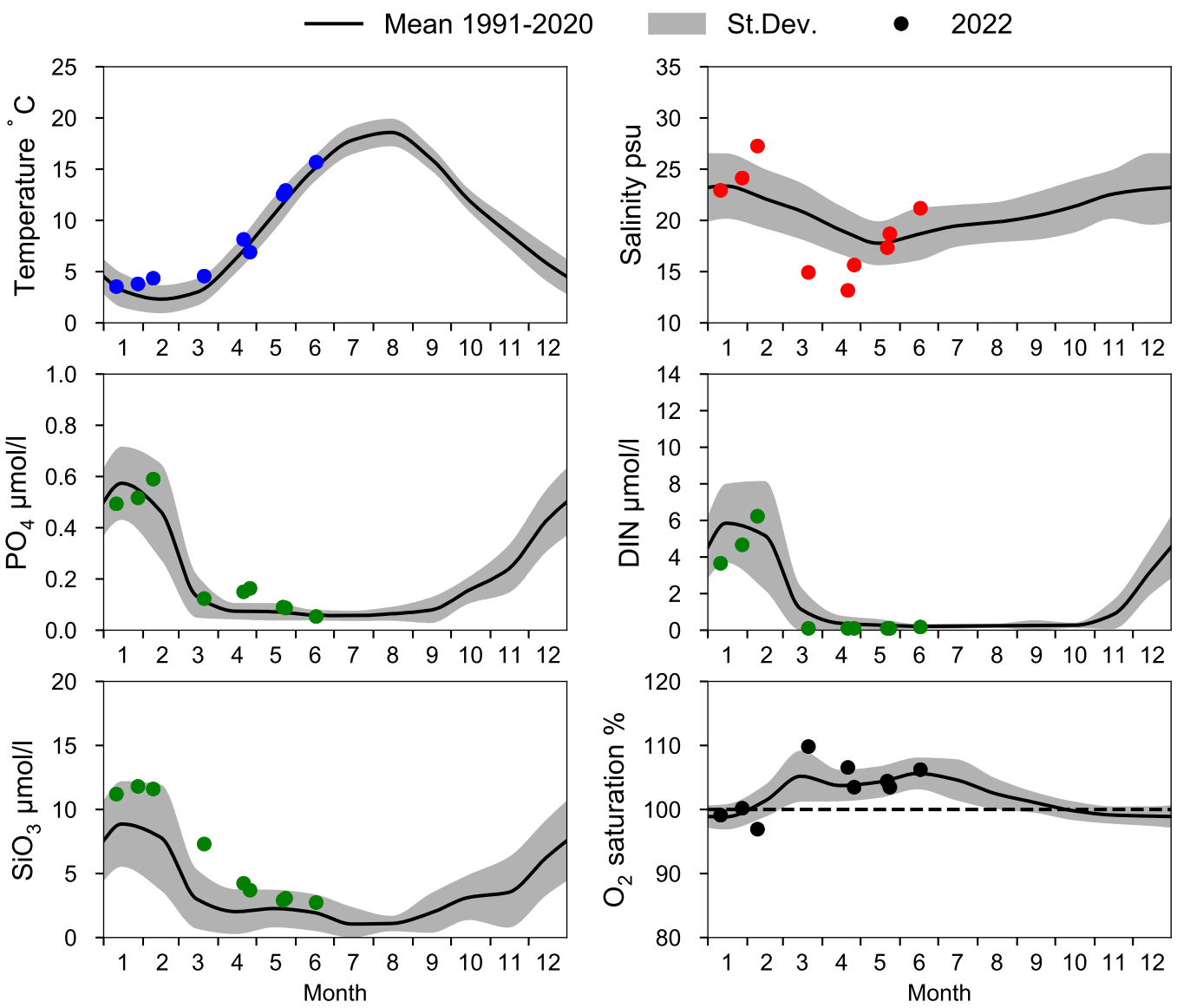


Vertical profiles W LANDSKRONA
June

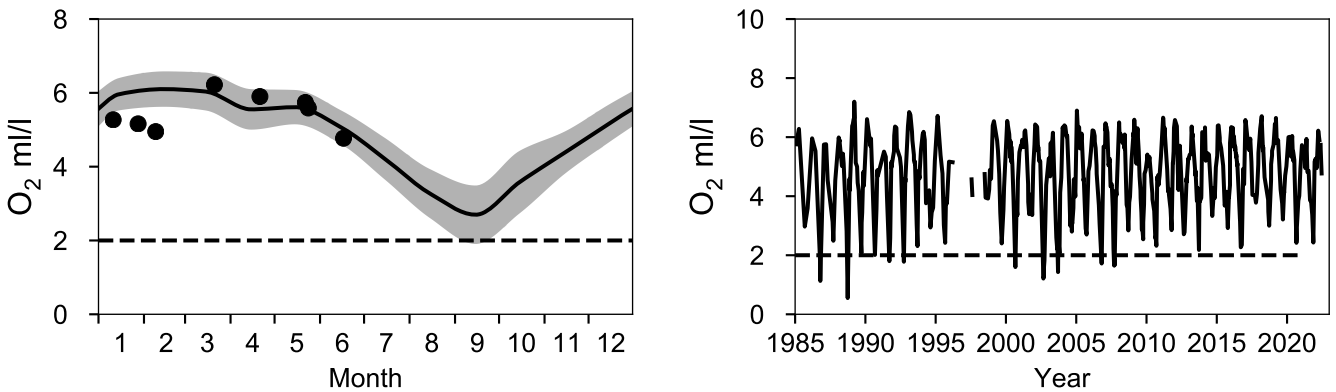


STATION ANHOLT E SURFACE WATER (0-10 m)

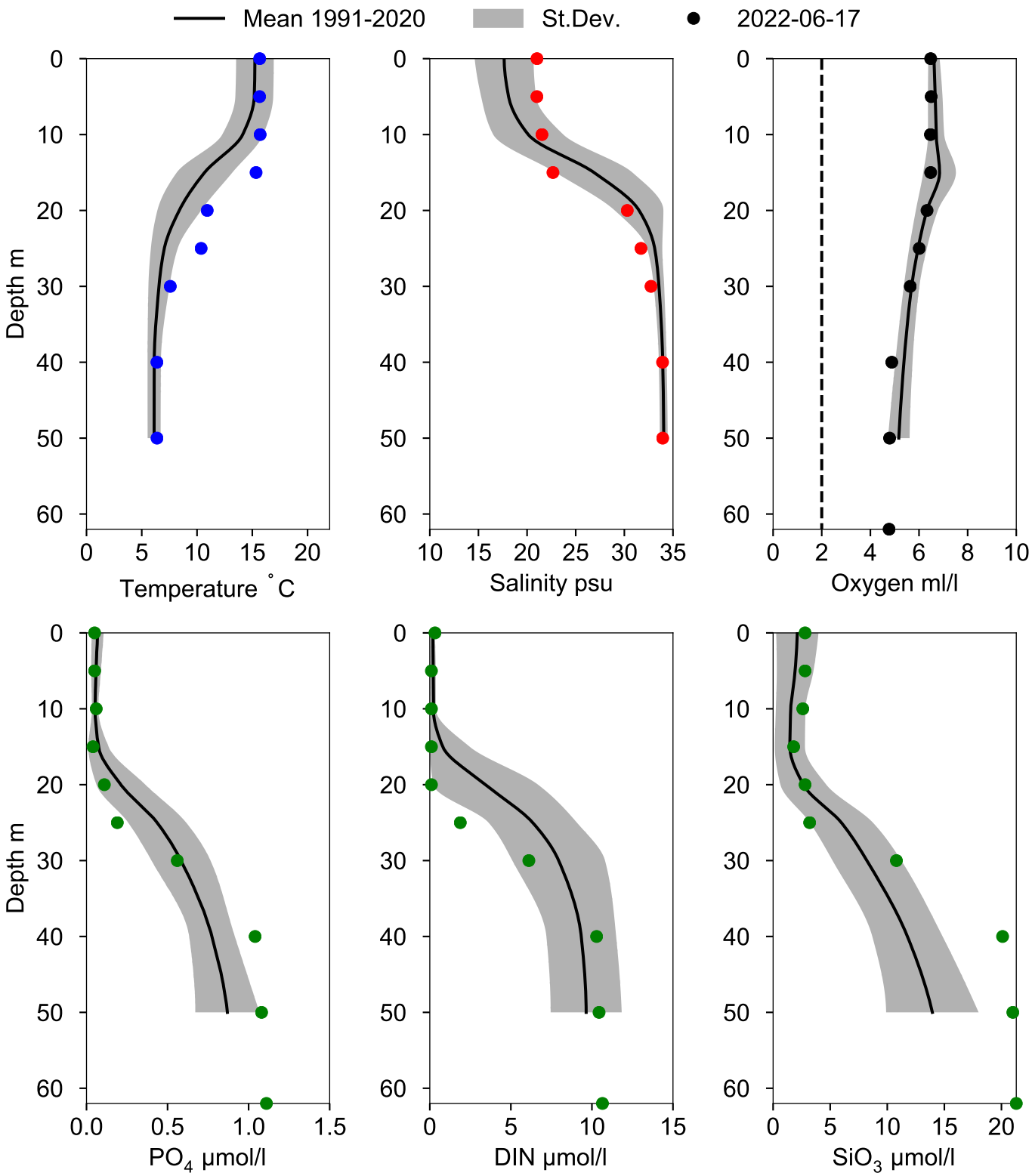
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 52 m)

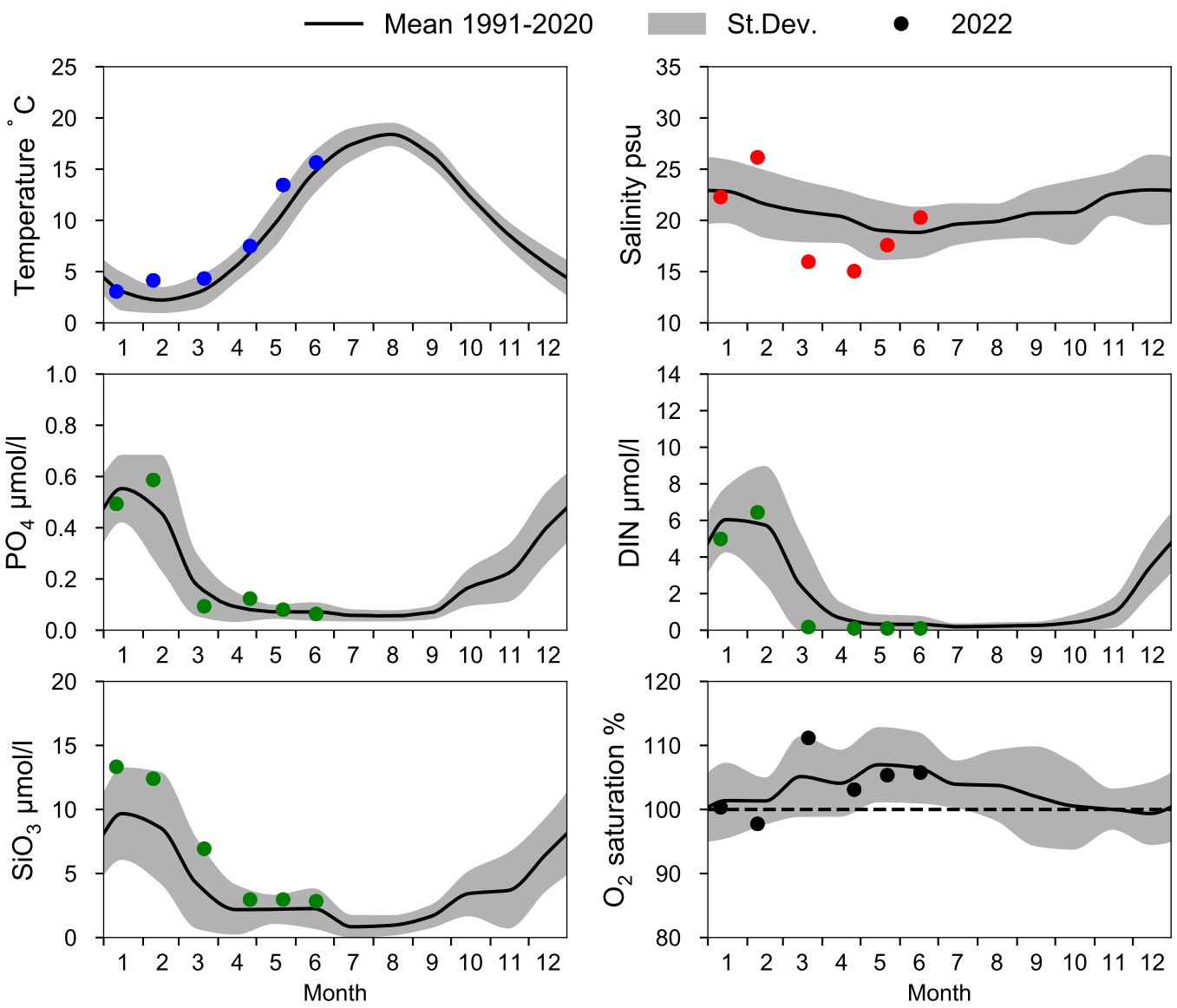


Vertical profiles ANHOLT E
June

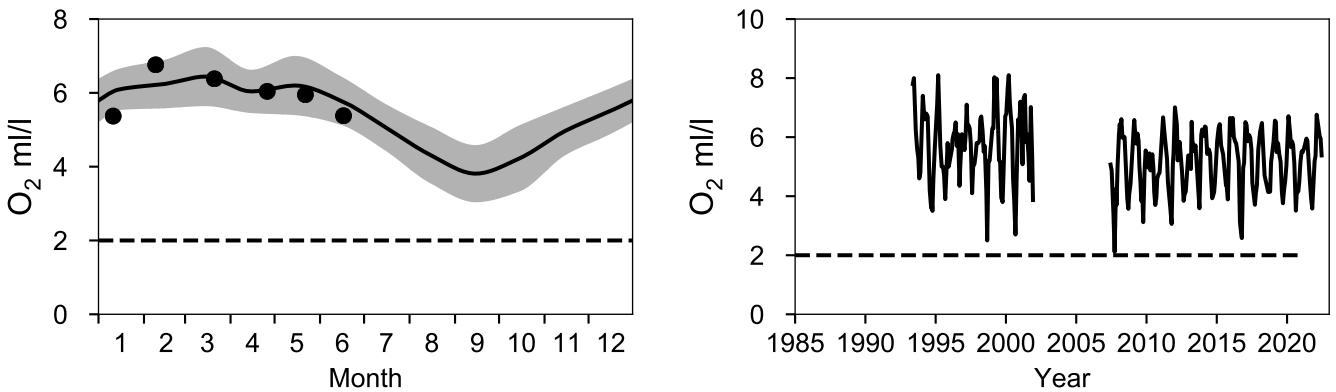


STATION N14 FALKENBERG SURFACE WATER (0-10 m)

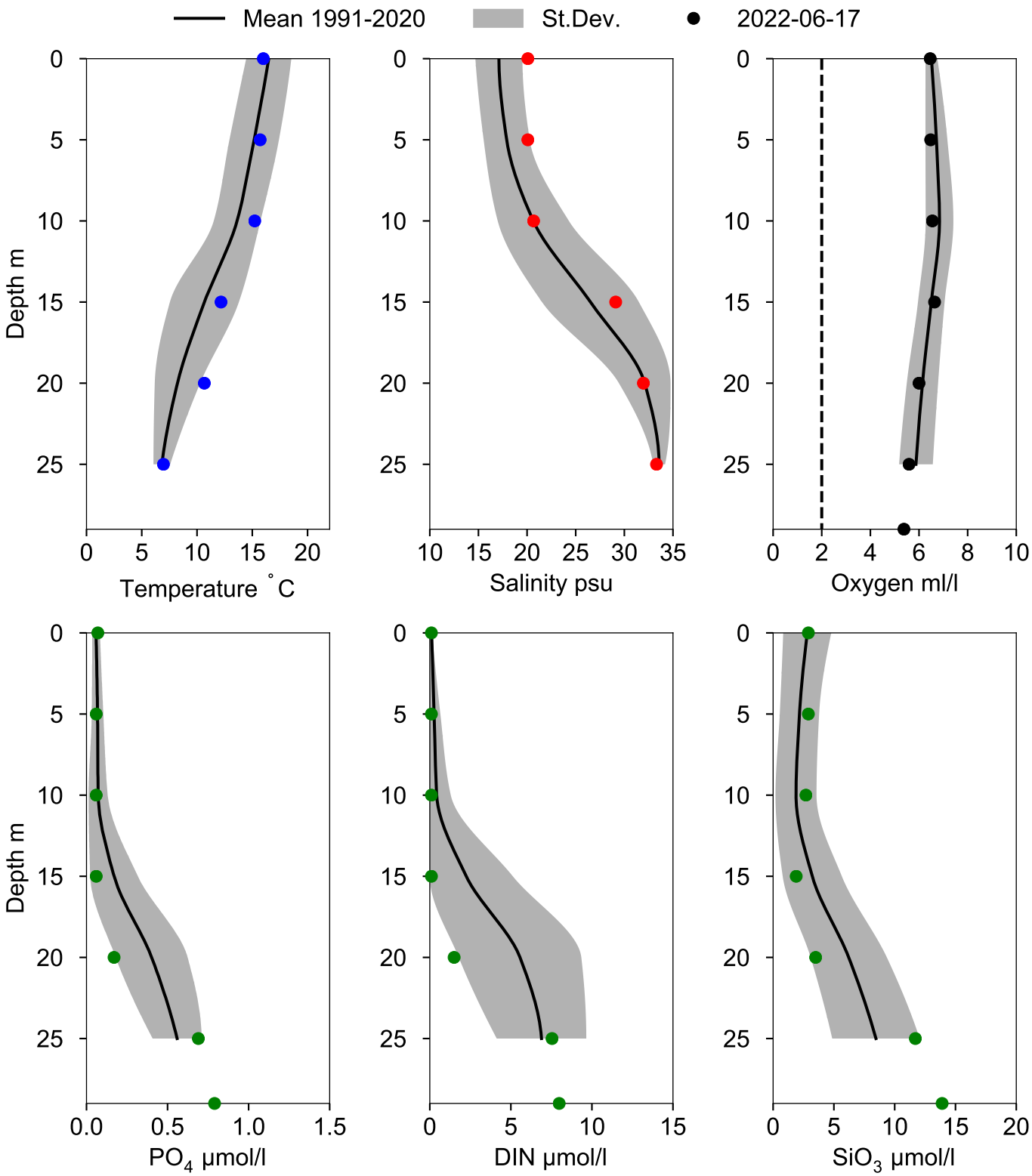
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 25 m)

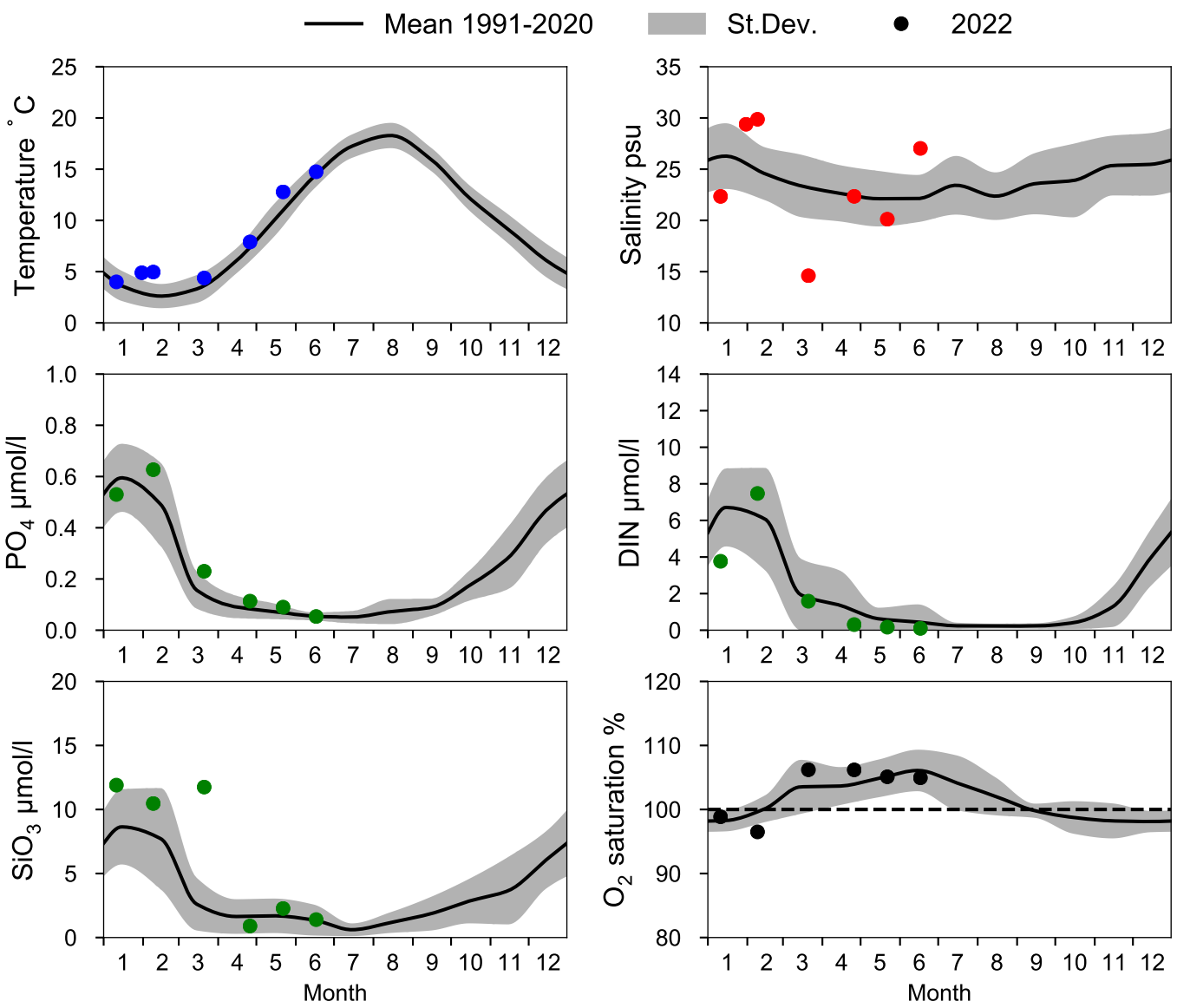


Vertical profiles N14 FALKENBERG
June

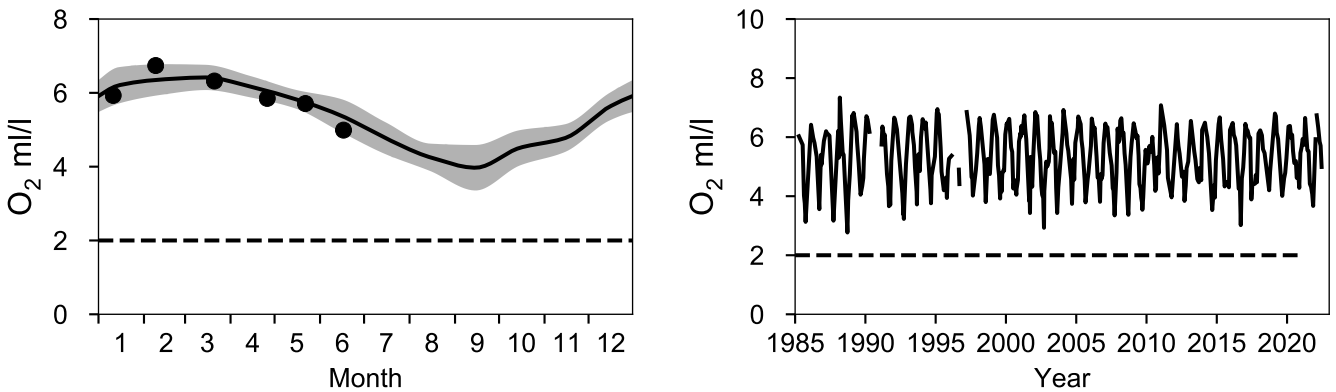


STATION FLADEN SURFACE WATER (0-10 m)

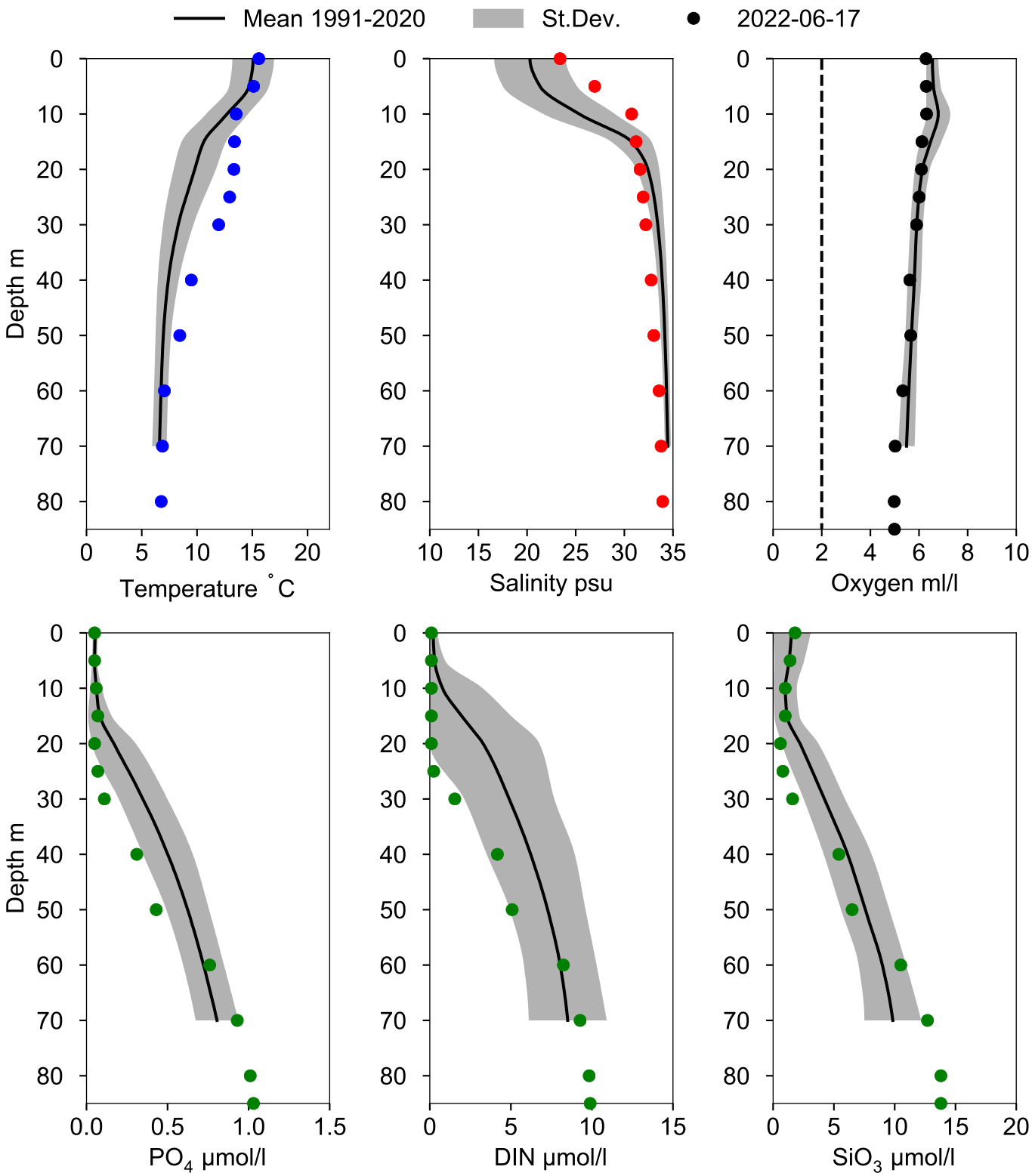
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 74 m)

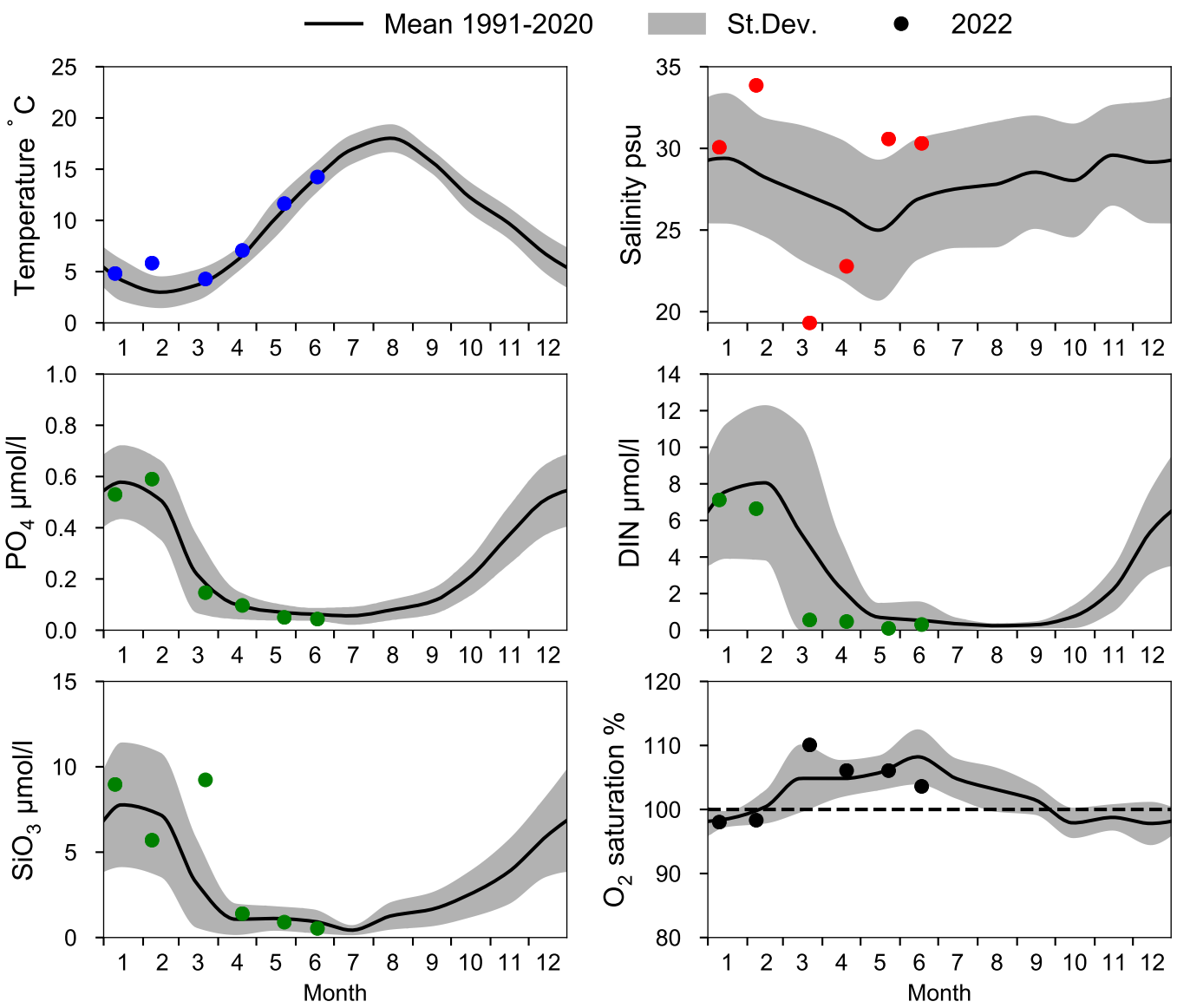


Vertical profiles FLADEN
June

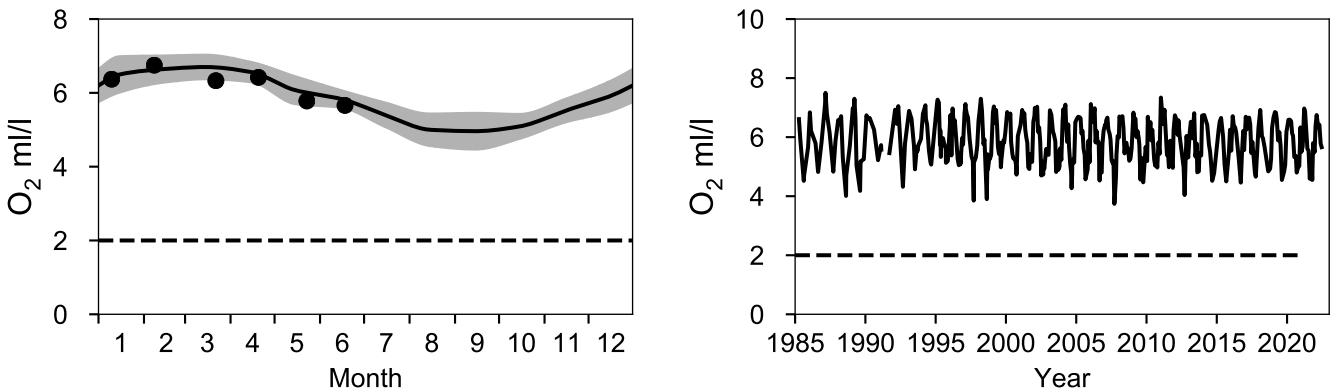


STATION P2 SURFACE WATER (0-10 m)

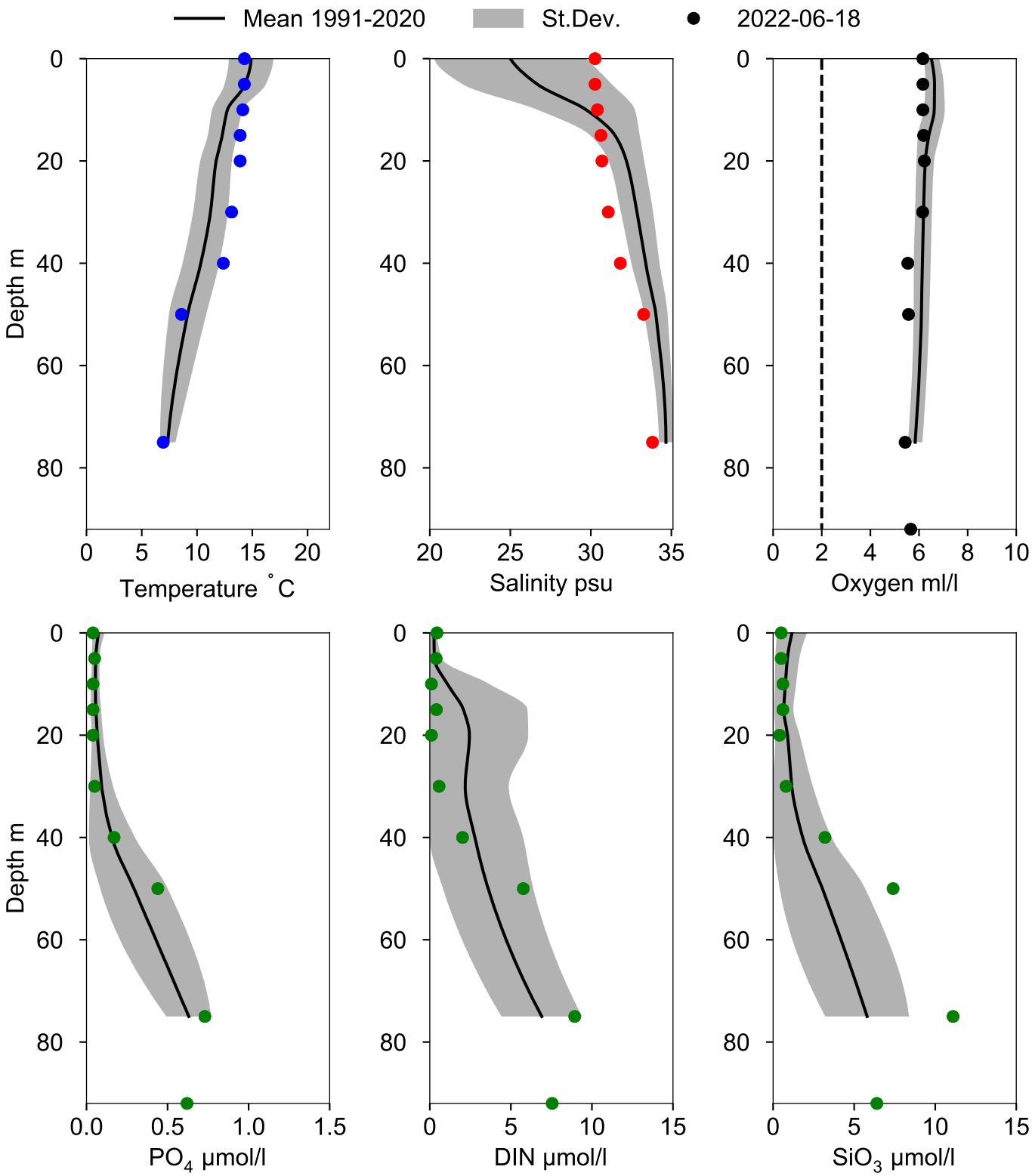
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 75 m)

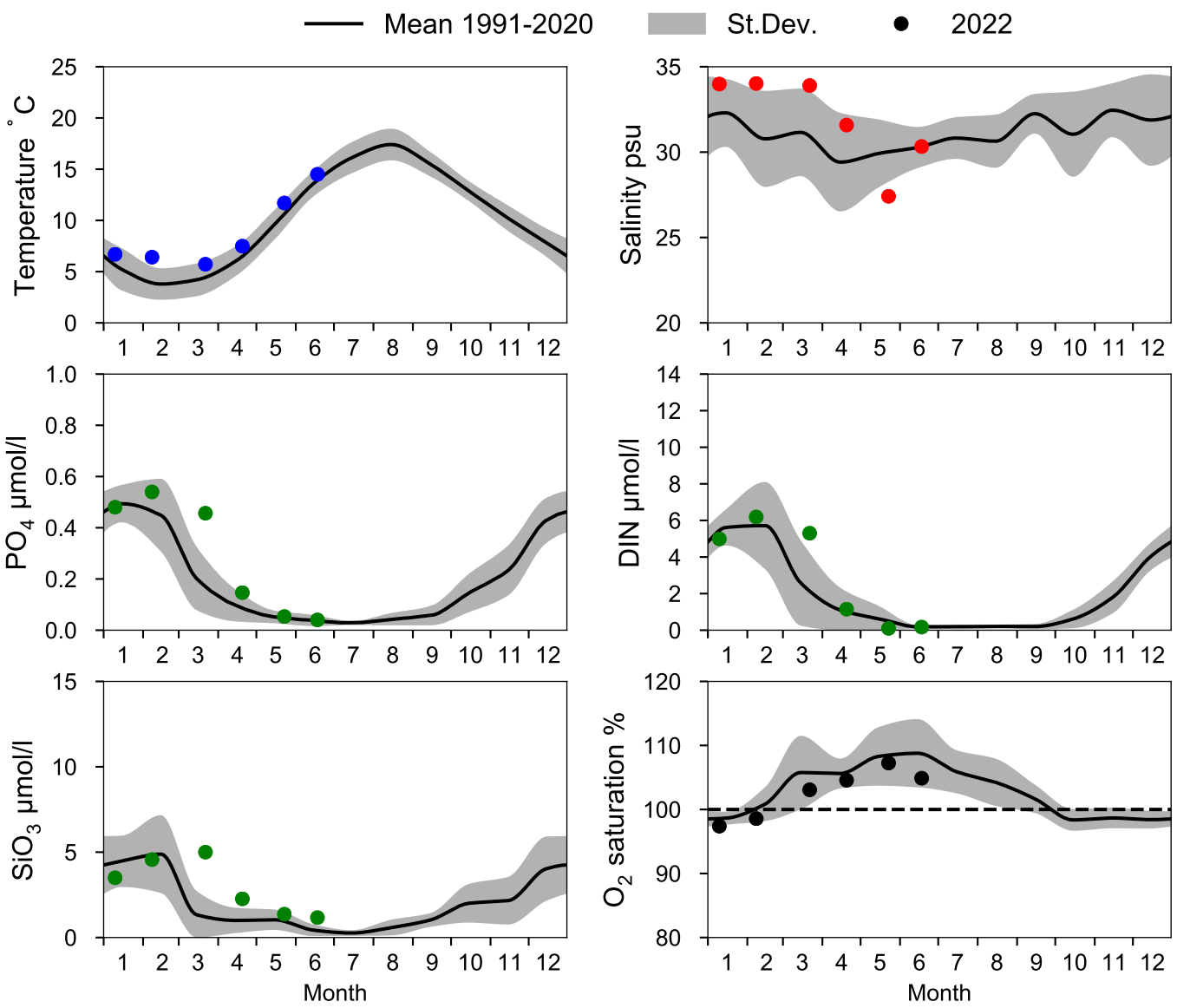


Vertical profiles P2
June

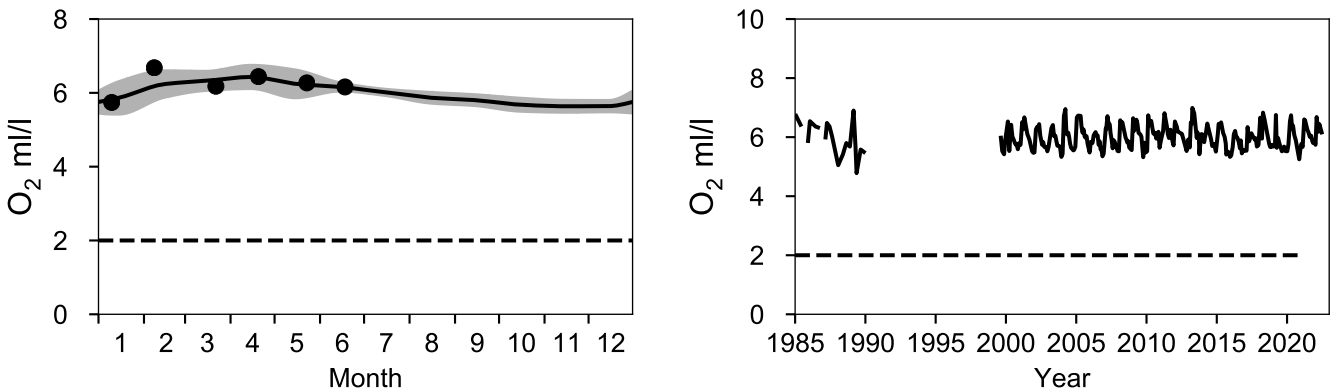


STATION Å17 SURFACE WATER (0-10 m)

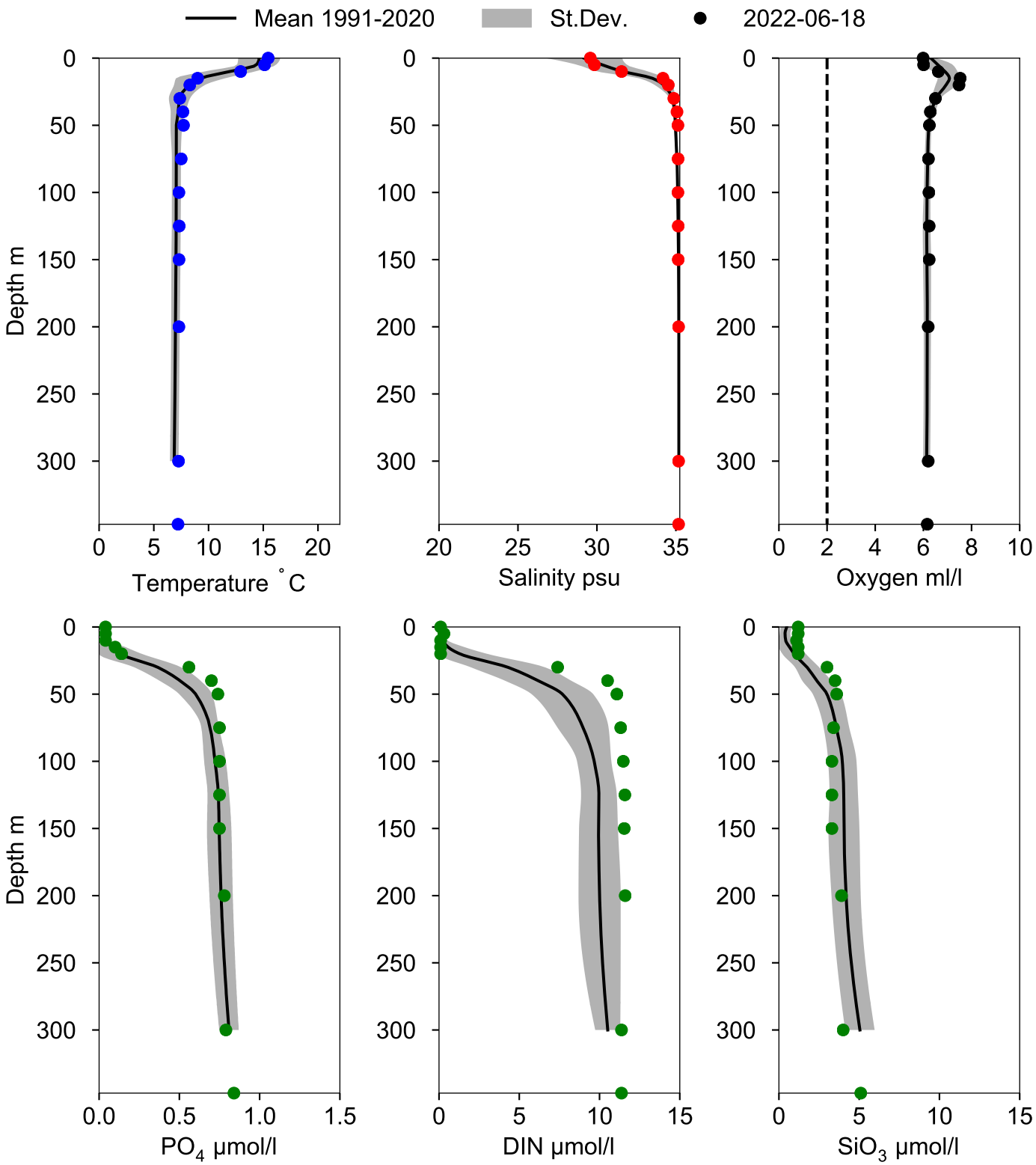
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 300 m)

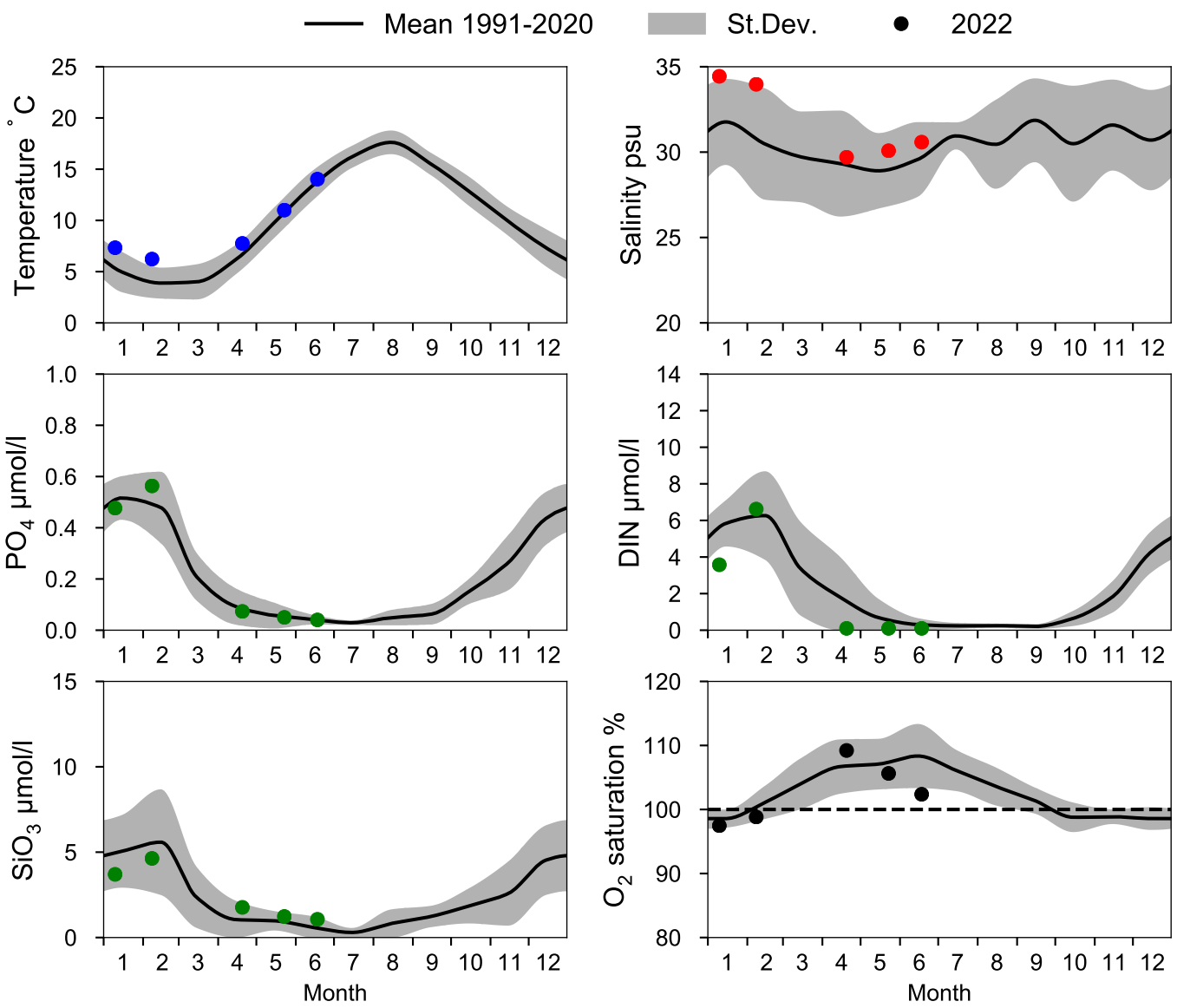


Vertical profiles Å17
June

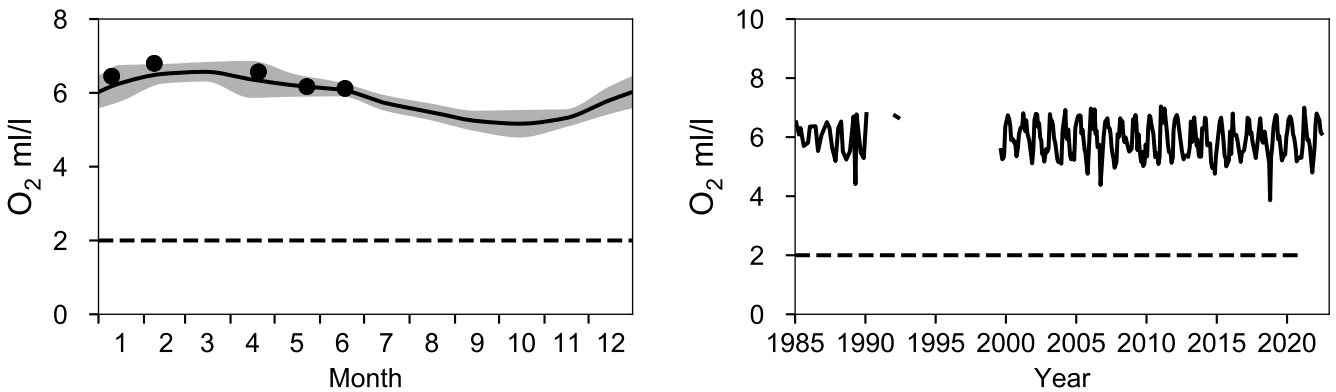


STATION Å15 SURFACE WATER (0-10 m)

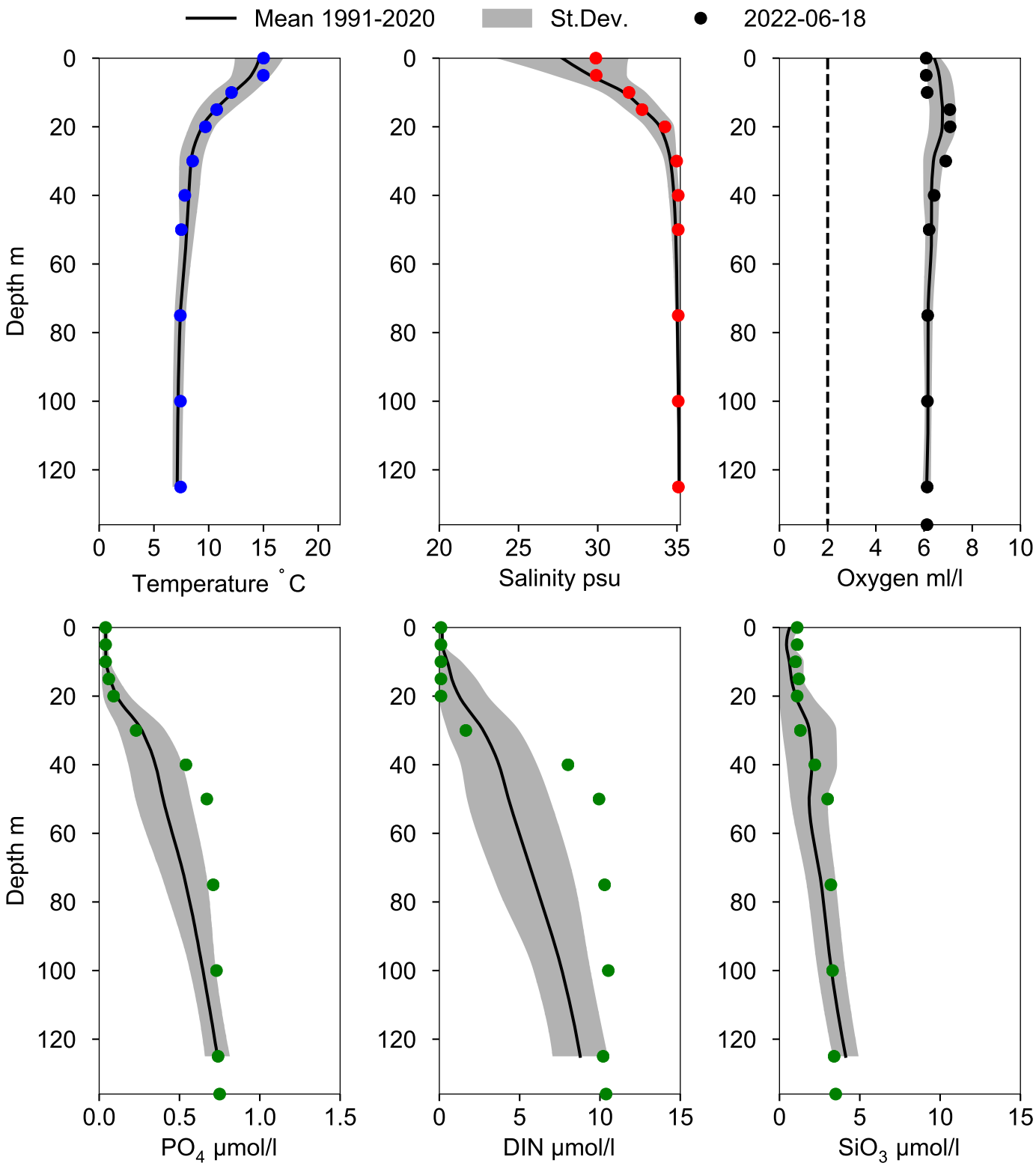
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

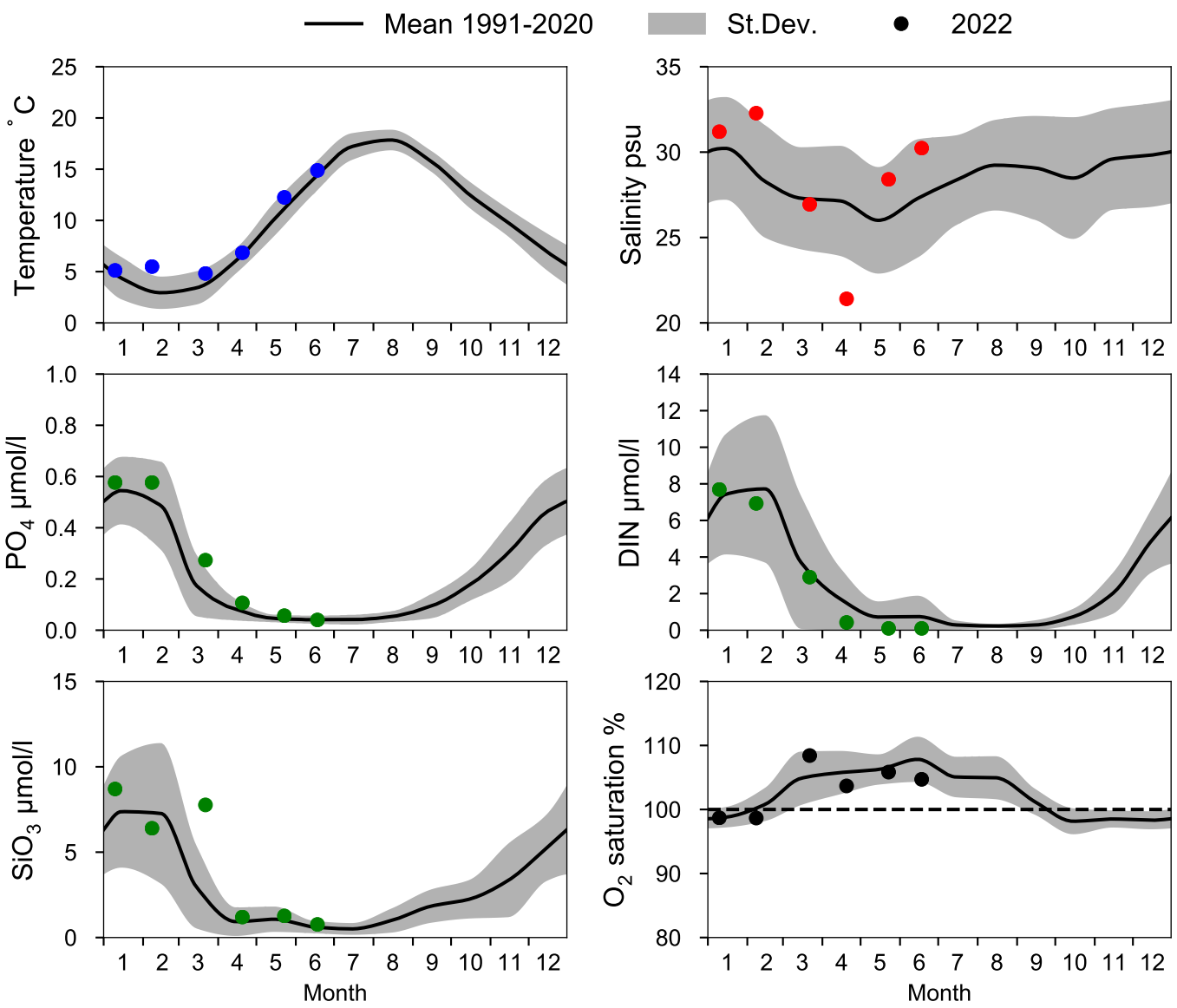


Vertical profiles Å15
June

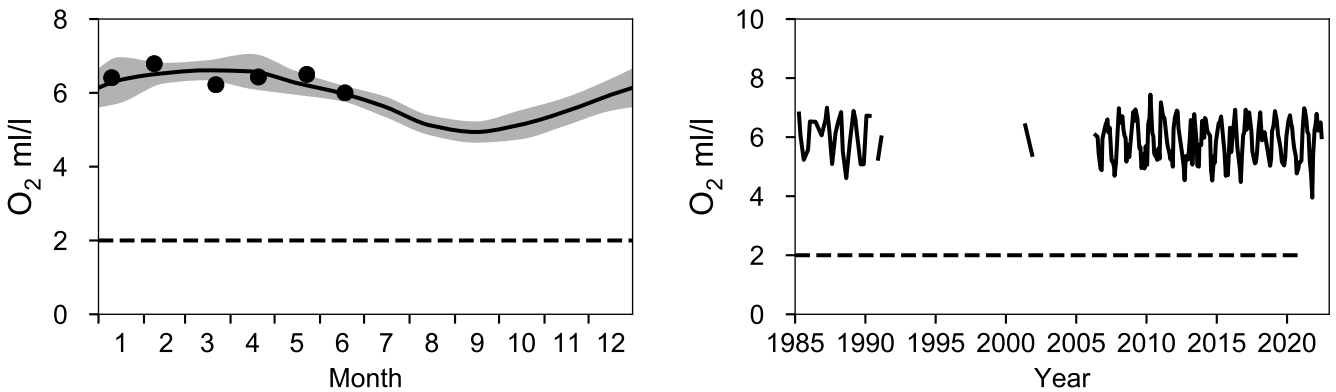


STATION Å13 SURFACE WATER (0-10 m)

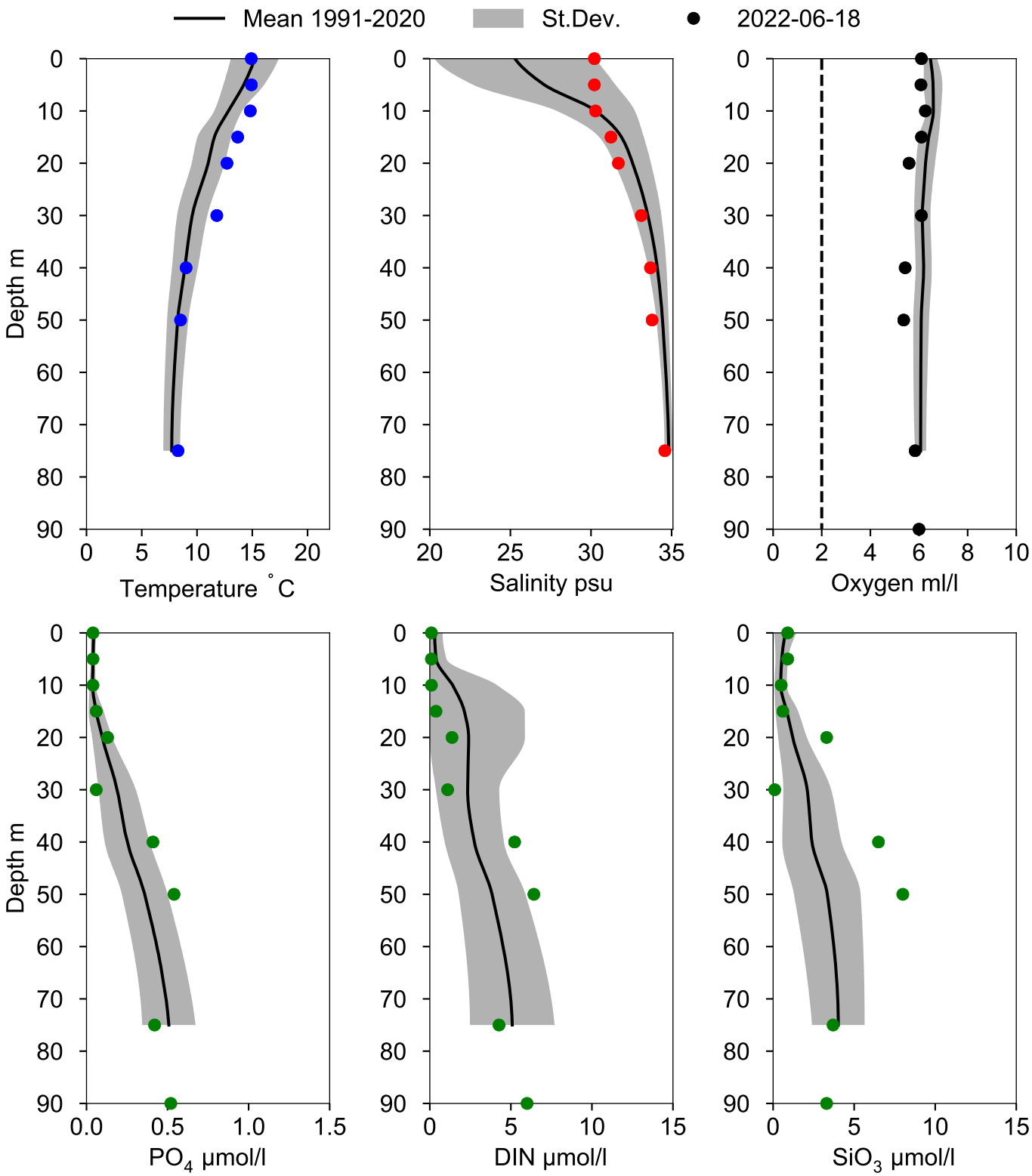
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 82 m)

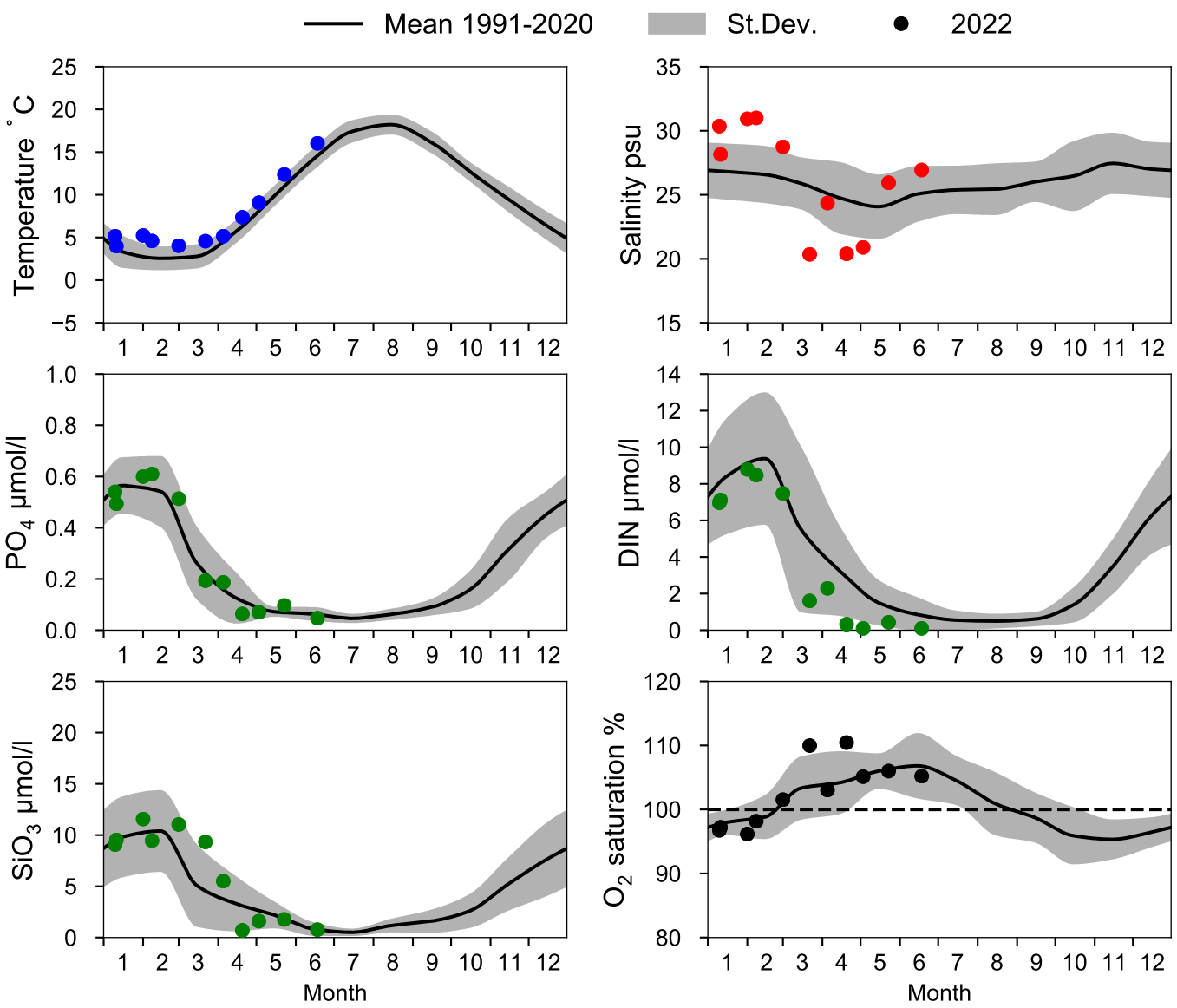


Vertical profiles Å13
June

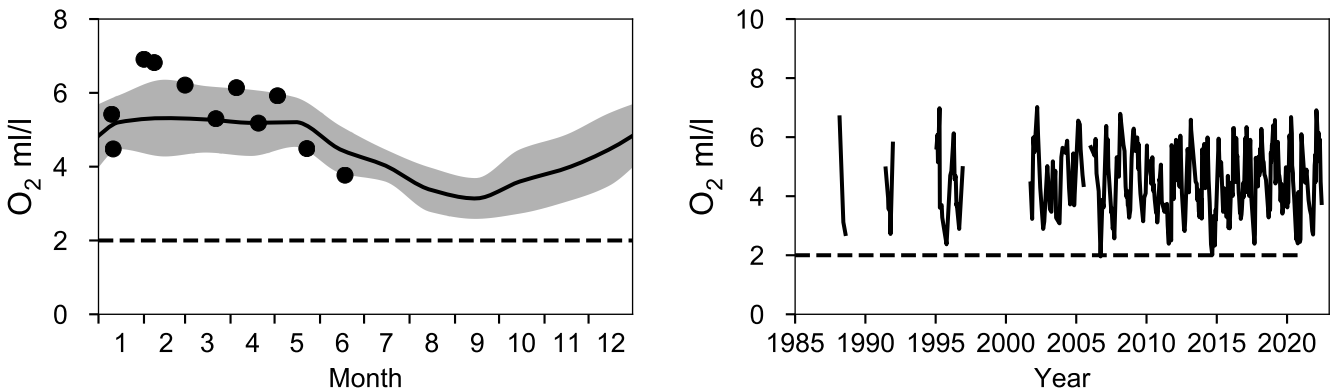


STATION SLÄGGÖ SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 64 m)



Vertical profiles SLÄGGÖ
June