Johan Kronsell

Swedish Meteorological and Hydrological Institute
Oceanographic Laboratory

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

Photo: Ola Kalén, SMHI

Survey period: 2022-10-19 to 2022-10-24

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)

Address:
Sven Källfelts Gata 15
426 71 Västra Frölunda

Telephone:
011-495 80 00

e-mail:
johan.kronsell@smhi.se
www:
http://www.smhi.se/

Summary

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

Cooling of the surface water had continued in all sea areas visited, and the sea surface temperature was 3-4 degrees lower compared to the previous expedition. At most stations the surface temperature was normal for the season. The salinity in the surface water of the Kattegat and the Skagerrak was normal for the season, but at several stations in the Baltic Proper sea surface salinity was slightly above normal.

Concentrations of nutrients in the surface water were generally normal for the season above the halocline. However, in the Kattegat, levels of both phosphate and silicate were slightly below normal at several stations.

The oxygen situation continues to be very bad in most parts of the Baltic Proper, only in the Arkona Basin was the bottom water well oxygenated. In the Hanö Bight and at the station in the south-eastern Baltic Sea, there was acute oxygen deficiency (< 2ml O_2/l) from depths of 70 and 80 metres, respectively, but no hydrogen sulphide was found. In the Bornholm Basin, there was acute oxygen deficiency from a depth of 70 meters, and hydrogen sulphide was found at 80 meters at BY5.

In the Western Gotland Basin, hydrogen sulphide was found at a depth of 70 meters at one of the stations. And in the Eastern Gotland Basin, oxygen-free conditions were measured at a depth of 80 meters, and hydrogen sulphide was detected at 90 meters depth. At the stations in both the Eastern and the Western Gotland Basin, levels of hydrogen sulphide were higher than normal in the deep water.

Fluorescence measurements from the CTD indicated low plankton activity down to the thermocline in all visited sea areas.

SMHI´s next cruise with R/V Svea is planned for 8th – 14th of November, starting in Falkenberg and ending in Kalmar.

RESULTS

The cruise was carried out on board R/V Svea and started in Kalmar the 19th of October and ended in Lysekil on October 24th.

The cruise started with clear and for the season cold weather, but during the cruise cloudiness increased, the air temperature rose and remained in the latter part at 10-12°C. During most of the week, the wind speed remained below 10 m/s. The wind direction was initially most northerly, but changed to westerly towards the middle of the week.

A visit to Östergarnsholm on the eastern coast of Gotland was made in order to change sensors on a moored system for Uppsala University. Two extra stations were sampled during the trip, this due to the incidents at the two gas pipelines in the southern Baltic Proper. The station in Flinträннan in the Sound was not sampled due to the traffic situation.

In addition to regular sampling, extra phytoplankton samples were taken for Stockholm University at two stations in the Skagerrak and one in the Kattegat. These extra samplings are to be made until February 2023. During the cruise, an IFCB (Imaging FlowCytobot) was also used. It was connected to the same water flow as Svea's ferrybox.

Measurements with Svea's MVP (Moving Vessel Profiler), which is used to measure temperature, salinity and oxygen profiles during transit at cruising speed, were made at several different transects; BY39-BY38, BY20 via Östergarnsholm to BY15, BY10 via BCSIII-10 further past the Slupsk Furrow, Hanöbukten-BY2, and Anholt-N14-Fladen-P2.

Both the ferrybox (continuous measurements at 4 metres depth) and Svea's ADCP (Acoustic Doppler Current Profiler) were collecting data during the cruise.

This report is based on data that has passed a first quality control. When data are published at the national oceanographic data centre, some values might have changed after further quality controls have been performed. Data from this cruise will be published as soon as possible at the data centre's webpage, normally within a week after the cruise. Some analyses are done after the expedition and will be published later. Data can be downloaded here: https://www.smhi.se/en/services/open-data/national-archive-for-oceanographic-data/download-data-1.153150

The Skagerrak

The temperature in the surface water (0-10 m) had decreased by about 3-4°C since previous cruise. At the coastal station Släggö, the temperature was below normal for the season with just under 12°C, and normal at the other stations with temperatures slightly below 13°C. Measurements with the CTD[1] showed at the offshore stations in the Skagerrak only small variations in temperature down to about 100 meters. Below this depth, temperatures of 7-8°C at the deepest stations. The salinity in the surface water varied from just under 27 psu near the coast to above 33 psu further west, which were normal for the season at all stations. Near the surface, at several stations, there was a well-mixed, very thin surface layer and below that slowly increasing salinity.

Concentration of dissolved inorganic nitrogen in the surface water, often referred to as DIN[2], was above normal at Å15, where the level was 1.4 µmol/l, normal at the other stations with 0.5-1.2 µmol/l. Deeper down in the water column values below normal at both Å17 and Å15, but normal concentrations at the other stations.

For phosphate, dissolved inorganic phosphorus or DIP[3] concentrations were normal in the surface water at all stations. The levels varied between 0.12-0.19 µmol/l, highest at Å15 and lowest at Å17 and Släggö. Just as for dissolved inorganic nitrogen, the levels of dissolved inorganic phosphorus in the deep water at Å17 and Å15 were below normal, normal at the other stations. Levels of silicate were normal in the surface water, with the exception of Å13 where it was slightly below normal for the season. Deeper down in the water column, mostly normal or slightly below normal values at all stations.

The oxygen situation in the Skagerrak was good with concentrations of 5-6 ml dissolved oxygen per litre of water closest to the bottom, slightly lower at Å13. At the coastal station Släggö, the oxygen content was significantly lower compared to open sea, and only 2.9 ml/l was measured at the bottom, which, however, falls within the normal range for the season. With colder water in the coming months, we can expect rising levels of dissolved oxygen at Släggö.

Chlorophyll fluorescence measurements from the CTD showed some plankton activity near the surface. The highest activity was measured in the surface water at Släggö. The secchi depth was 6 meters at the coast and the stations offshore were visited during the dark hours of the day and therefore lack values since secchi depth is measured in daylight.

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[1] CTD which stands for Conductivity, Temperature, Depth, is a profiling instrument. SMHI's CTD is also equipped with sensors that measure for example oxygen and fluorescence.

[2] Dissolved inorganic nitrogen, the sum of nitrate, nitrite and ammonium.

[3] Dissolved inorganic phosphorus occurs only as phosphate.

The Kattegat and the Sound

The temperature in the surface water of Kattegat was normal for the season and slightly above 12°C, which was also the temperature in the Sound, also normal for the season. This was about 3-4°C lower compared to the previous expedition. Deeper down in the water column normal temperatures and only weaker stratification in temperature. The sea surface salinity in the Kattegat was normal for the season and was around 22 psu. Below the surface layer there was a halocline at a depth of 15-25 meters and below that almost constant salinity down to the bottom, where the salinity was 34 psu. In the Sound, salinity in the surface was below normal for this time of year, barely 10 psu. Deeper in the water column normal salinity with 33-34 psu. The stratification in the Sound was very sharp, which is visible in the vertical profile for W Landskrona.

Concentrations of nutrient in the form of DIN were normal for the season in the surface waters of both the Kattegat and the Sound. In the Kattegat concentrations varied between 0.17-0.40 µmol/l and in the Sound 1.0 µmol/l. Levels of phosphate in the surface water were slightly below normal at both Fladen and Anholt, and normal at the other stations. For silicate, levels in the Kattegat were lower than normal for the season, and varied between 0.4-1.0 µmol/l. In the Sound, a significantly higher level was measured, 12.5 µmol/l, but this is normal. Deeper down in the water column, generally normal concentrations of all nutrients, except at Fladen, where concentrations of silicate from 60 meters and deeper were above normal.

The oxygen concentration in the bottom water of the Kattegat and the Sound were between 3-4 ml/l, which was lower than normal for the station Fladen, normal for the season at the other three stations.

CTD measurements of chlorophyll fluorescence indicated low plankton activity in the water column from the surface to the bottom at all stations in the Kattegat. In the Sound slightly higher values in the surface down to the halocline and below it lower and almost constant levels down to the bottom. The secchi depth in the Kattegat was 11-12 m.

The Baltic Proper

The surface water temperature was normal for the season in the area, with the exception of BY39 where the temperature was slightly below normal and at BY38 where it was instead slightly above normal. In the southern basins, the surface water temperature was slightly above 13°C. In the Eastern Gotland Basin the temperature was just below 12°C and in the Western Gotland Basin slightly below 13°C. The coldest surface temperature was measured at BY39 just south of Öland, only slightly above 9°C. At almost all stations there was a well-mixed surface layer with a clear thermocline at 30-40 meters deep. Below that, colder water down to the permanent stratification which at the deeper stations was found at a depth of 60-80 meters. Deep water temperatures were generally above normal at the deepest stations. In the Arkona Basin more uniform temperature throughout the whole water column.

The salinity in the surface water was normal or slightly above normal for the season, with the exception of BY20 in the northern part of the Eastern Gotland Basin where salinity was slightly below normal. The salinity of the surface water varied from just below 8 psu in the southwest to about 6.5 psu at the two stations BY32 and BY20 located in the northern parts. Deeper down in the water columns generally normal salinity. At the BY39 south of Öland, salinity was above normal from surface to bottom.

Concentration of nutrients in the form of DIN in the surface water was below reporting limit at the stations in the south, with the exception of BY5, and in the Eastern Gotland Basin, with the exception of BY20. In the Western Gotland Basin normal levels at all stations, 0.18-0.53 µmol/l. Also, normal levels at the coastal station Ref M1V1 in the Kalmar Strait with 0.68 µmol/l. In the deep water in both the Eastern and Western Gotland Basin levels above normal.

For phosphate, concentrations in the surface waters of the Baltic Proper were largely normal for the season, with the exception of BY39 with slightly below normal and BY38 with slightly above normal. In the southern basins concentrations of about 0.27 µmol/l and in the Eastern and Western Gotland Basins concentrations of 0.11-0.15 µmol/l. The highest concentrations were measured at Ref M1V1 and BY39 with 0.43 and 0.51 µmol/l, respectively. In the deep water of the Eastern Gotland Basin, concentrations above normal, otherwise mostly normal levels at the deeper water of the stations visited.

Silicate concentration in the surface water of the southern parts were 10-12 µmol/l, which was normal for this time of year. In the Gotland Basins slightly lower concentrations with 8-9 µmol/l. But at BY38 in the Western Gotland Basin below normal with only 3.6 µmol/l. Highest concentrations were measured at BY39 and Ref M1V1 with 12.4 and 13.5 µmol/l. In the deep water of both the Gotland Basins, levels were generally above normal.

The oxygen situation in the Arkona Basin was good with levels of above 4 ml/l in the bottom water. It is also the shallowest basin, with a bottom depth of just over 45 metres. Also in the Hanö Bight it was oxygenated all the way down to the bottom, with 2.5 ml/l at the bottom. However, the oxygen sensors connected to the CTD showed more than the bottle samples taken at standard depths and at a depth of about 75 meters the oxygen content was close to 0, but close the bottom there was a thin layer that had a higher oxygen content and a different salinity and temperature than the overlying water mass. In the Bornholm basin, acute oxygen deficiency (<2ml O_2/l) was found from a depth of 70 meters, and hydrogen sulphide was found at a depth of 80 meters at one of the stations. At BCSIII-10 in the south-eastern Baltic Proper, it was oxygenated all the way down to the bottom, but acute oxygen deficiency was found from a depth of about 80 meters.

In the Wester Gotland Basin, hydrogen sulphide was measured already at a depth of 70 meters at one of the stations. Levels of hydrogen sulphide in the deep water were higher than normal. In the Eastern Gotland Basin, oxygen-free conditions were measured at a depth of 80 meters, and hydrogen sulphide was detected from a depth of 90 meters. All stations in the Eastern Gotland Basin had higher levels of hydrogen sulphide than normal in the deep water.

Fluorescence measurements from the CTD indicated some plankton activity down to the thermocline. In general, the activity in the surface layer was uniform and peaks with slightly higher fluorescence were not found. The secchi depth was measured to be between 7-8 meters in the open sea, but only 5 m in the Kalmar Strait.

The two extra stations that were sampled near the broken gas pipelines were both located in the Bornholm Basin. It is difficult to see any clear impact based on the results we have right now. It is also difficult to state the exact conditions just before the incident as we normally do not sample at these locations. The extra stations were located 7 nautical miles from the northern leak, and were visited more than 14 days after gas stopped flowing out.

More information about the algae situation can be found in the Algaware report for October:
https://www.smhi.se/en/publications/publications/algal-situation-reports-2-1056

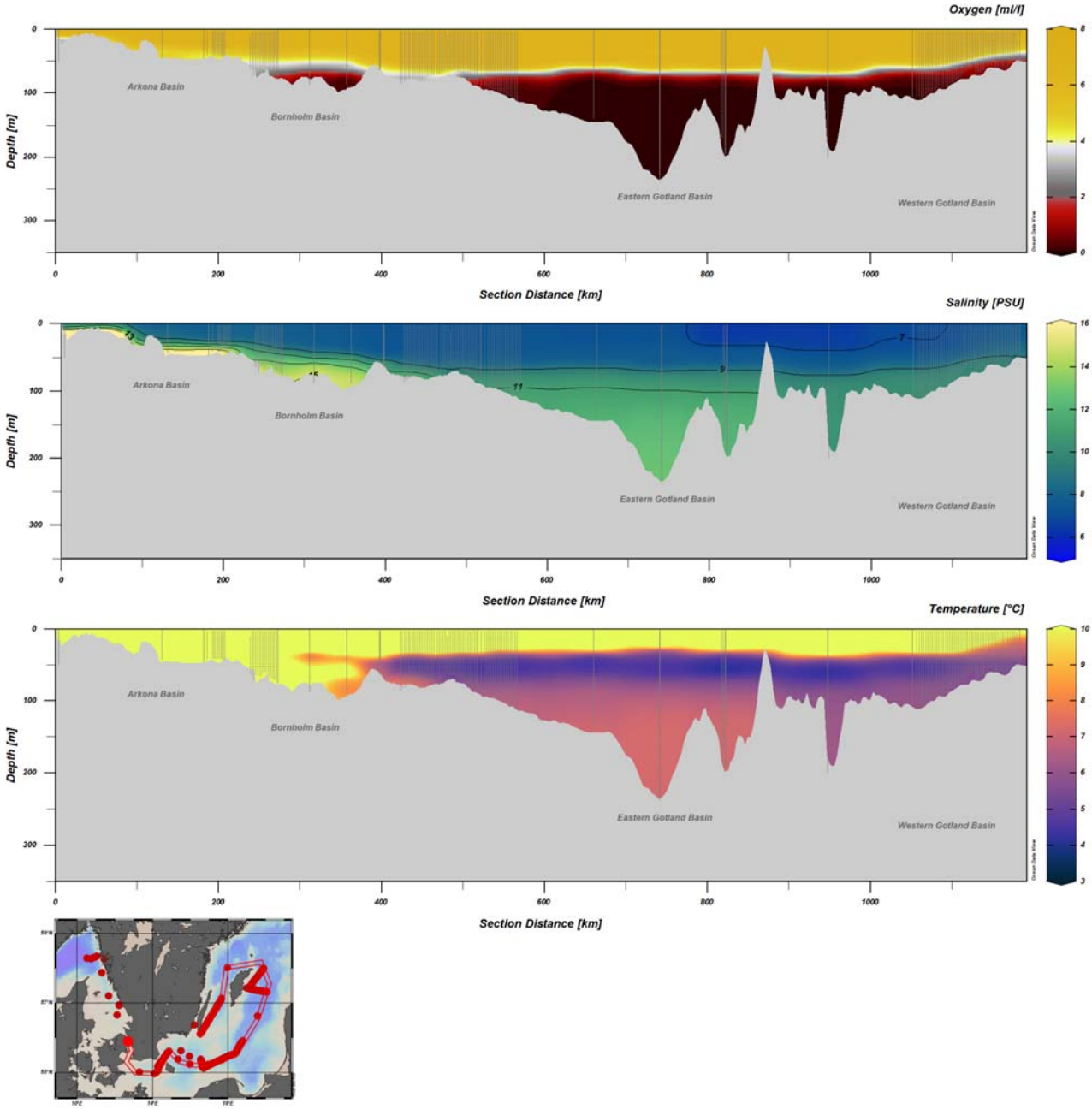


Figure 1. Transect showing CTD and MVP measurements of dissolved oxygen, salinity and temperature from the Sound through the Eastern Gotland Basin into the Western Gotland Basin.

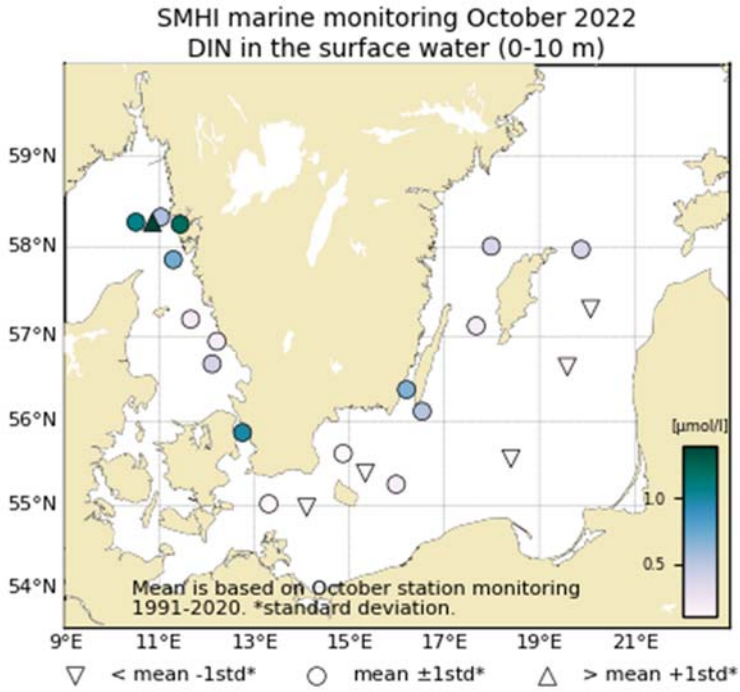


Figure 2. Concentration of dissolved inorganic nitrogen in the surface water (0-10 m).

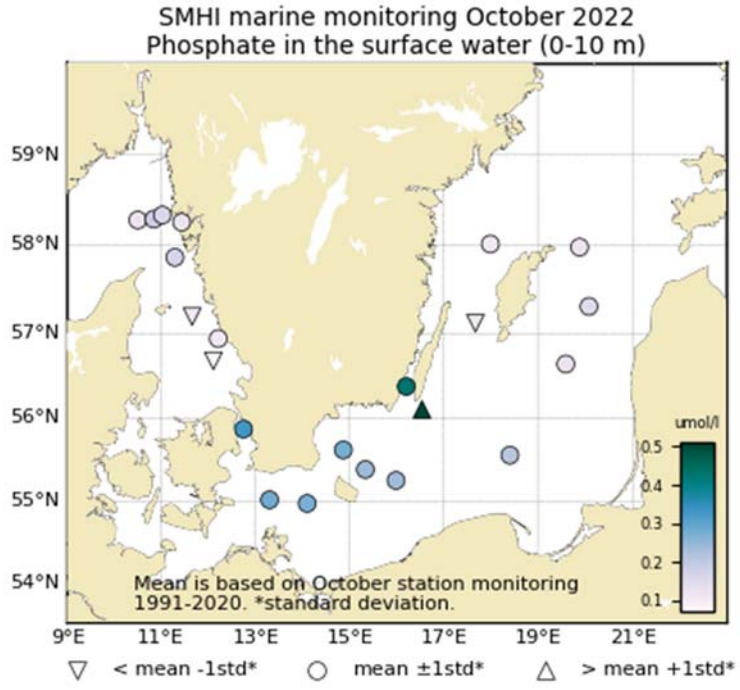


Figure 3. Concentration of phosphate in the surface water (0-10m).

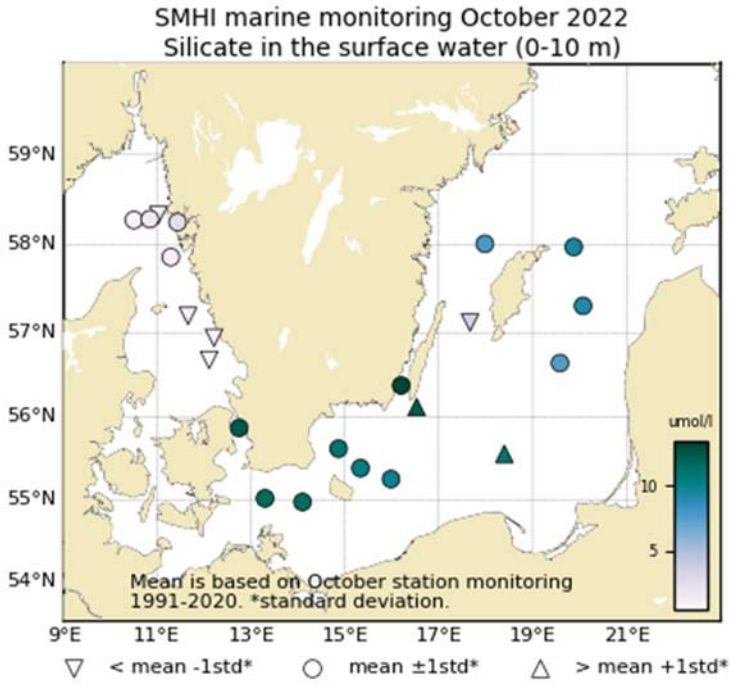


Figure 4. Concentration of silicate in the surface water (0-10m).

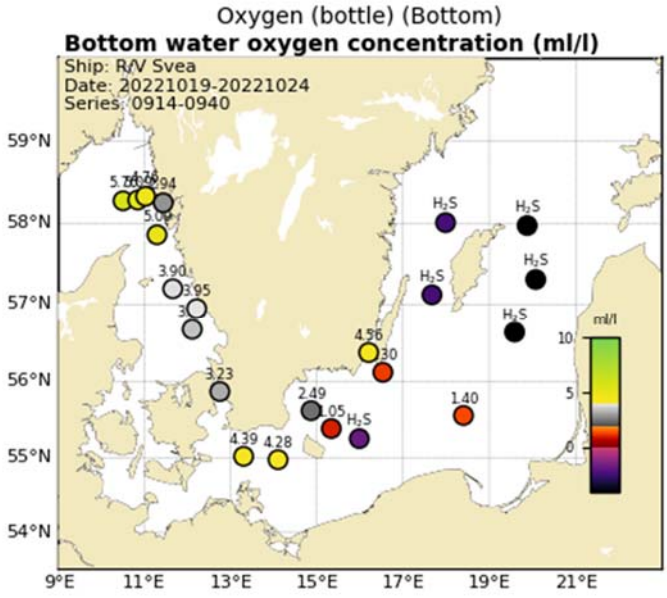


Figure 5. Oxygen concentration in the bottom water.

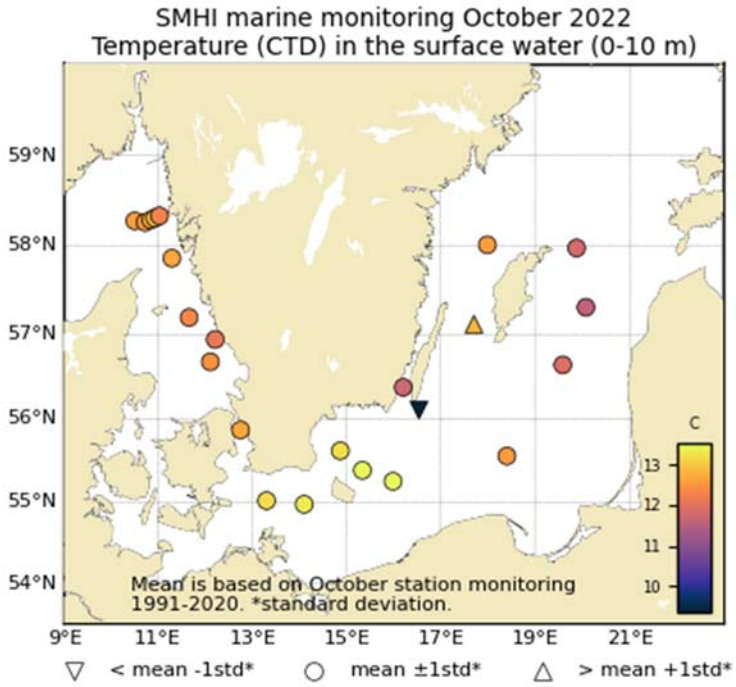


Figure 6. Temperature in the surface water (0-10m).

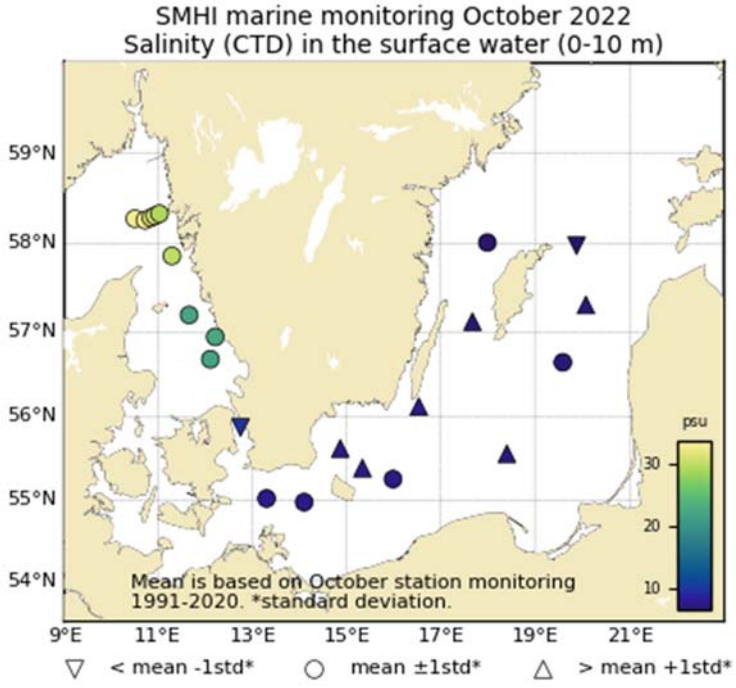


Figure 7. Salinity in the surface water (0-10m).

PARTICIPANTS

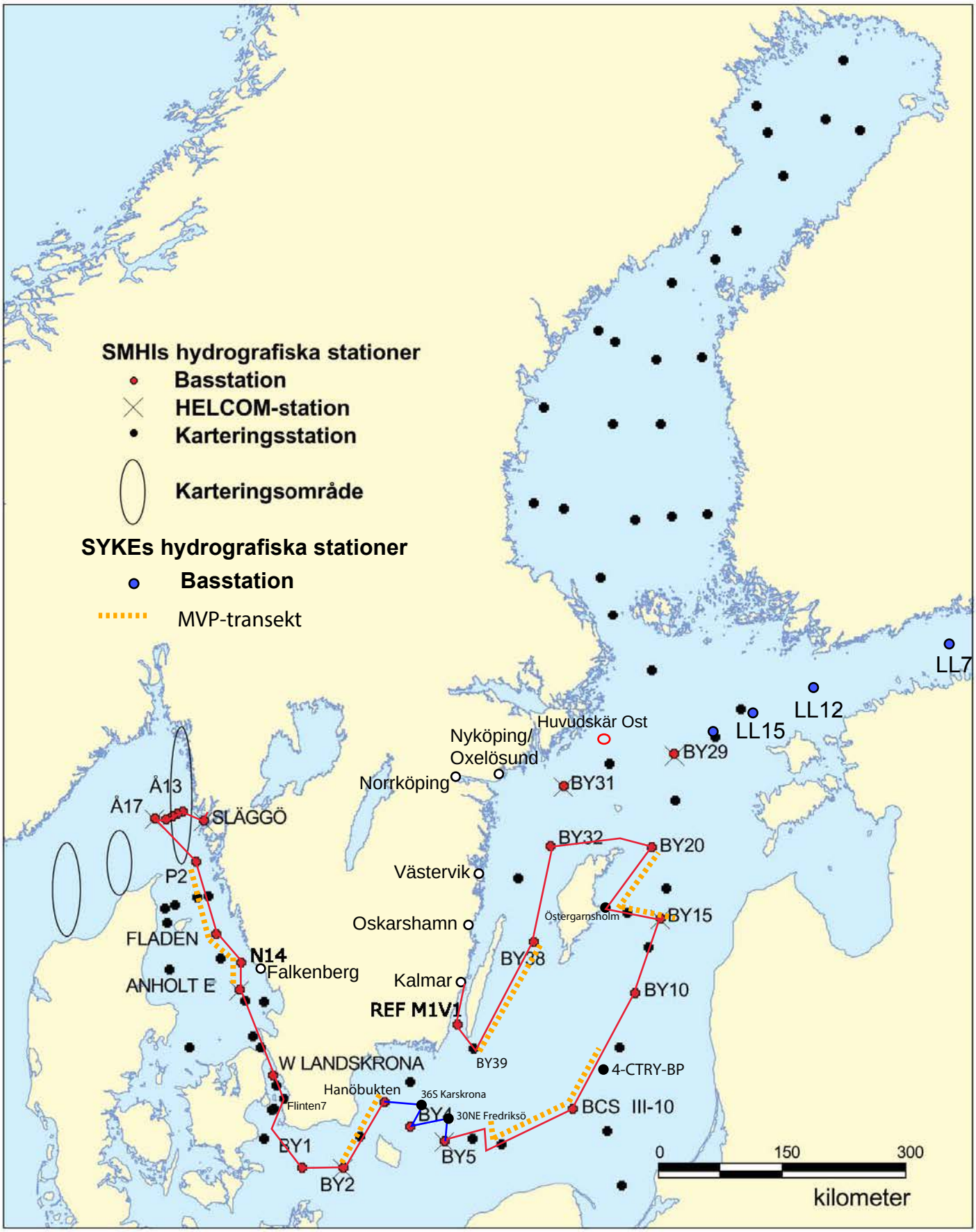
Name	Role	Institute
Johan Kronsell	Chief Scientist	SMHI
Monica Lindner	Quality controller	SMHI
Sari Sipilä		SMHI
Ann-Turi Skjevik		SMHI
Kristin Andreasson		SMHI
Helena Björnberg		SMHI

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

TRACKCHART
Country: Sweden
Ship: R/V Svea
Date: 20221019-20221024
Series: 0914 - 0940



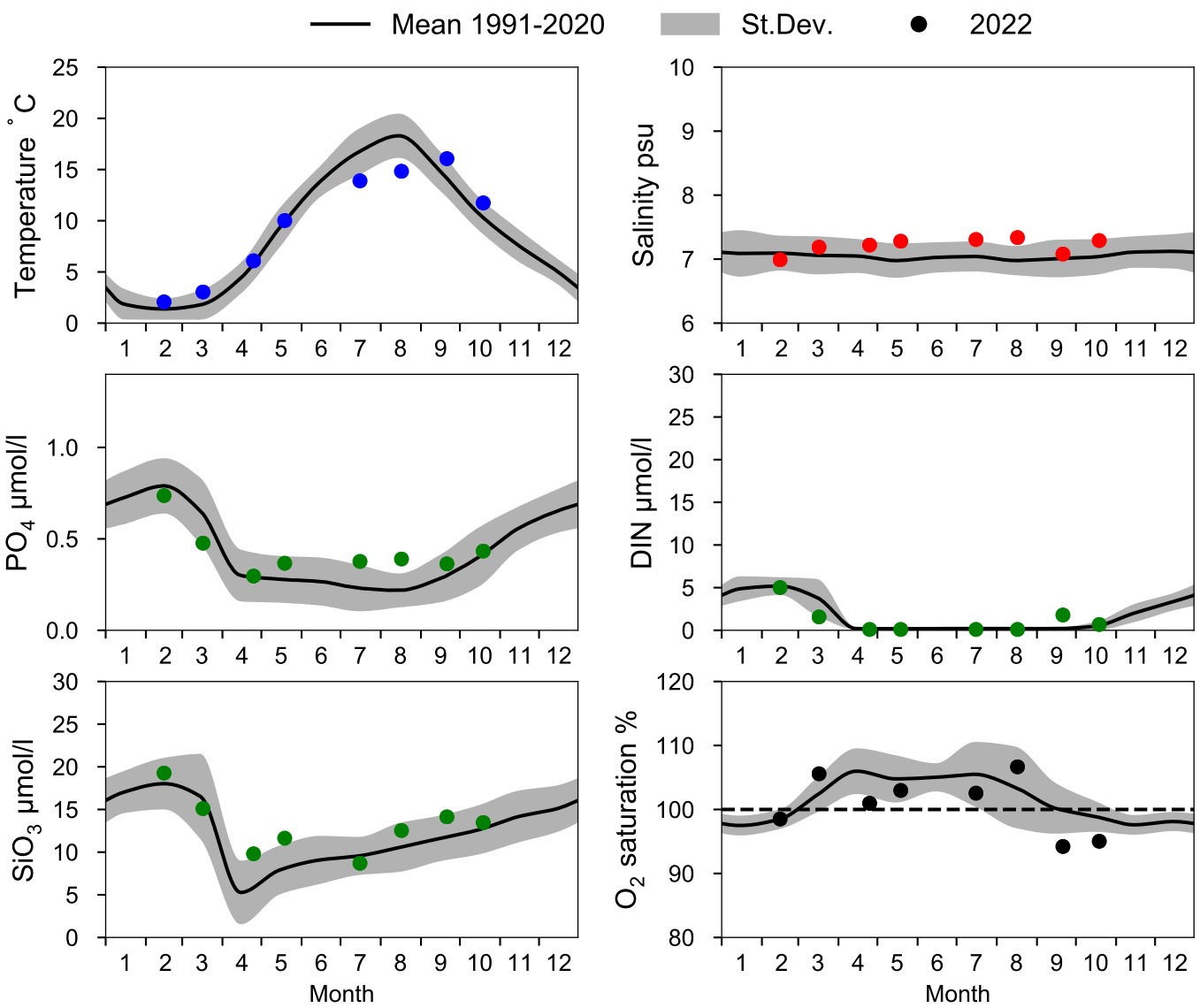
Date: 2022-11-16
Time: 18:05

Ship: SE
Year: 2022

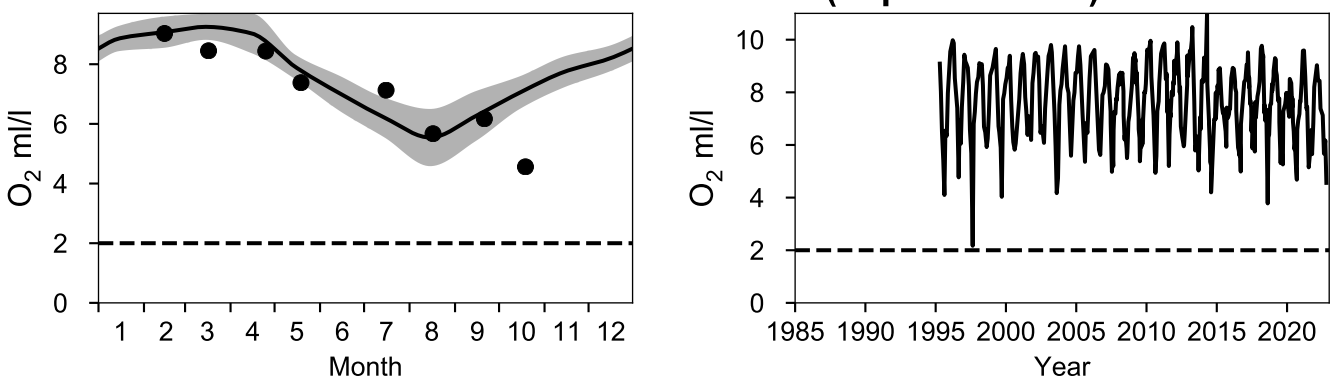
Ser no	Cru no	Stat code	Proj	Stat name	Lat	Lon	Start date yyyymmdd	Start time hhmm	Bottom depth m	Secchi depth m	Wind dir	Wind vel	Air temp C	Air pres hPa	WCWI	CZPHP	No de	No btl	Temp_btl	Temp_ctd	Salt_btl	Salt_ctd	Ph	Doxy_btl	Doxy_ctd	H2S	Phos	Ptot	Ntri	Ntra	Ntrz	Amon	Ntot	Alky	Sio3-si	Humus	Comnt_visit	Comnt_samp
0914	18	BPWK01	BAS...	REF M1V1	5622.23	01612.06	20221019	0604	21	5	33	10	5.3	1026	1220	xx---	5		x	x	x	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	-	-
0915	18	BPSE49	BAS...	BY39 ÖLANDS S UDDE	5606.96	01631.85	20221019	0940	50	8	33	7	6.7	1028	1220	x----	8		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0916	18	BPWX45	BAS...	BY38 KARLSÖDJ	5707.01	01740.11	20221019	1705	110		33	8.10	9.10	1027	9990	x----	14		x	x	x	x	-	x	x	x	x	-	x	x	x	x	-	-	x	x	-	-
0917	18	BPWX38	BAS...	BY32 NORRKÖPINGSDJ	5800.99	01759.08	20221019	2345	205		28	7	8.0	1026	9990	x----	17		x	x	-	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	-	-
0918	18	BPEX26	BAS...	BY20 FÅRÖDJ	5758.84	01952.66	20221020	0640	198	8	28	6.5	8.7	1020	1130	x---x	17		x	x	-	x	x	x	x	x	x	-	x	x	x	x	-	x	x	-	x	-
0919	18	BPEX00	EXT...	ÖSTERGARNSHOLM	5734.37	01859.63	20221020	1344	22		29	7	9.5	1021	1120	-----	6		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0920	18	BPEX21	BAS...	BY15 GOTLANDSDJ	5718.57	02004.57	20221020	1800	240		30	4.9	9.6	1020	9990	xx---	23		x	x	-	x	x	x	x	x	x	-	x	x	x	x	-	x	x	x	-	-
0921	18	BPEX13	BAS...	BY10	5638.02	01935.15	20221021	0050	143		21	7	9.8	1023	9990	x----	15		x	x	x	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	-	-
0922	18	BPSE11	BAS...	BCS III-10	5533.29	01824.00	20221021	0900	90	8	15	12	9.8	1017	2830	x----	12		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	x	-	-
0923	18	BPSB07	BAS...	BY5 BORNHOLMSDJ	5515.00	01559.04	20221021	1859	90		16	6.3	11.9	1008	9990	xx---	12		x	x	x	x	x	x	x	x	x	-	x	x	x	x	-	x	x	x	-	-
0924	18	BPSB00	EXT...	30NE FREDRIKSÖ	5528.16	01557.39	20221021	2210	84		18	6	11.9	1012	9990	xx---	11		x	x	x	x	x	x	x	x	x	-	x	x	x	x	-	x	x	x	x	-
0925	18	BPSB06	BAS...	BY4 CHRISTIANSÖ	5522.97	01520.07	20221022	0150	92		19	5	12.2	1011	9990	x----	12		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0926	18	BPSB00	EXT...	36S KARLSKRONA	5537.46	01529.71	20221022	0410	67		20	3	12.4	1011	9990	xx---	10		x	x	x	x	x	x	x	-	x	-	x	x	x	x	-	x	x	x	-	-
0927	18	BPSH05	BAS...	HANÖBUKTEN	5537.07	01451.91	20221022	0733	80	8	28	3	12.4	1007	2720	x---x	11		x	x	x	x	x	x	x	-	x	-	x	x	x	x	-	x	x	-	-	-
0928	18	BPSA03	BAS...	BY2 ARKONA	5458.26	01405.93	20221022	1320	46	7	27	7	12.6	1009	4830	xx---	8		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	x	-	-
0929	18	BPSA02	BAS...	BY1	5500.94	01318.03	20221022	1815	46		26	4	11.8	1011	9990	x----	8		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0930	18	SOCX39	BAS...	W LANDSKRONA	5551.99	01244.92	20221023	0130	52		23	4	12.7	1014	9990	x----	9		x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	-	-
0931	18	KAEX29	BAS...	ANHOLT E	5640.15	01206.52	20221023	0650	60	12	25	10	11.9	1014	2620	xx--x	10		x	x	x	x	x	x	x	-	x	x	x	x	x	x	x	x	x	x	-	-
0932	18	KANX50	BAS...	N14 FALKENBERG	5656.42	01212.69	20221023	1000	31	11	25	6	11.9	1014	2620	xx---	7		x	x	-	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	-	-
0933	18	KANX25	BAS...	FLADEN	5711.58	01139.47	20221023	1325	84	11	23	6	11.7	1014	2830	x----	13		x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	-	-
0934	18	SKEX23	BAS...	P2	5752.00	01117.52	20221023	1800	93		21	4	11.9	1013	9990	x----	10		x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	-	-
0935	18	SKEX18	BAS...	Å17	5817.05	01030.25	20221023	2320	351			7	11.4	1012	9990	xx---	15		x	x	-	x	x	x	x	-	x	x	x	x	x	x	x	x	x	-	-	-
0936	18	SKEX17	BAS...	Å16	5816.03	01043.43	20221024	0130	203		14	8	11.5	1011	9990	-----	13		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0937	18	SKEX16	BAS...	Å15	5817.66	01050.70	20221024	0300	136		08	10	10.3	1010	9990	x----	12		x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	-	-
0938	18	SKEX15	BAS...	Å14	5818.93	01056.05	20221024	0355	112		09	10	10.0	1009	9990	-----	11		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0939	18	SKEX14	BAS...	Å13	5820.37	01101.66	20221024	0450	105		09	11	10.2	1009	9990	x----	10		x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	x	x
0940	18	FIBG27	BAS...	SLÄGGÖ	5815.59	01126.14	20221024	0656	75	6	07	9	9.8	1007	2820	xx---	9		x	x	x	x	-	x	x	-	x	x	x	x	x	x	x	-	x	-	-	-

STATION REF M1V1 SURFACE WATER (0-10 m)

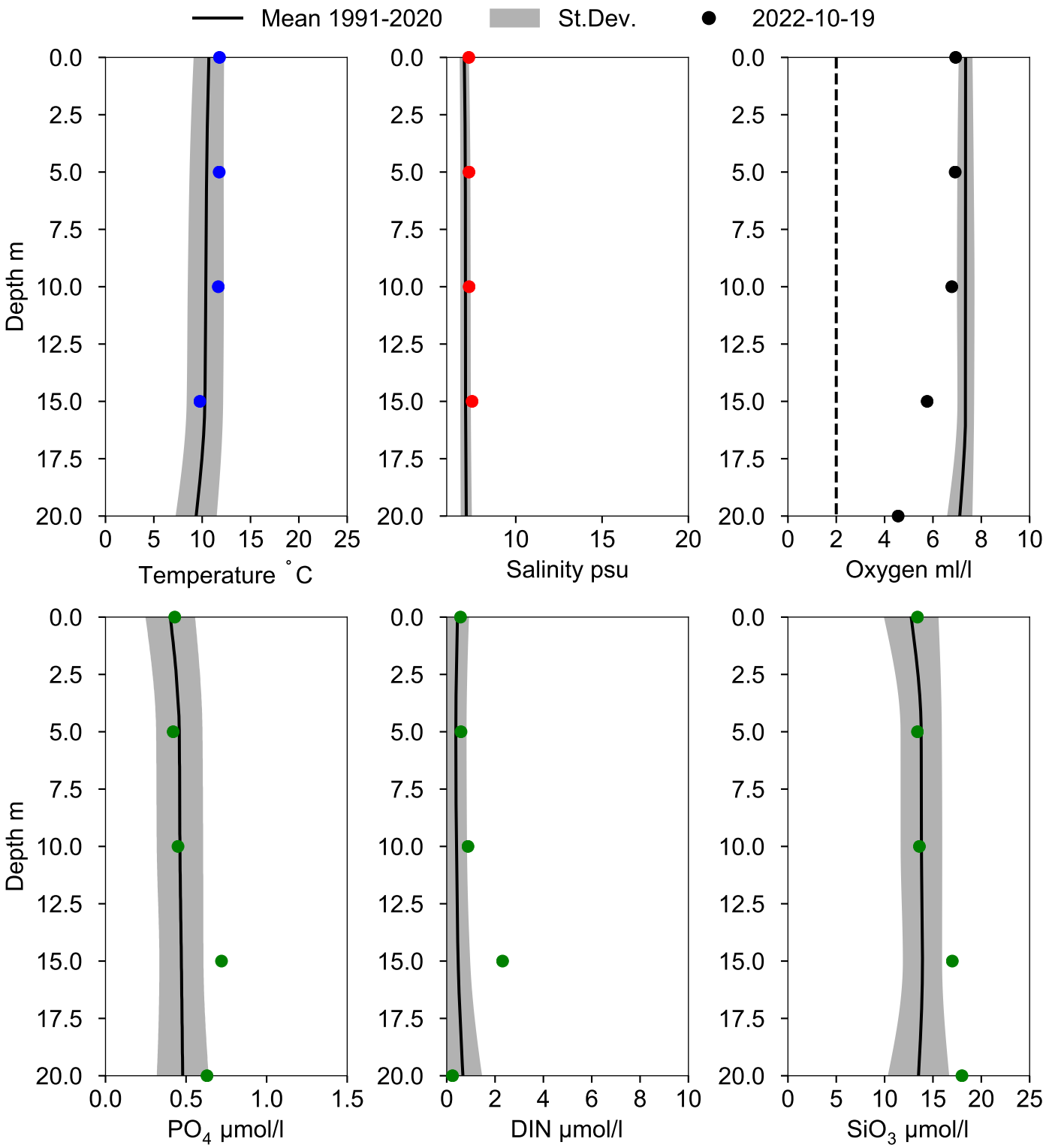
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 15 m)

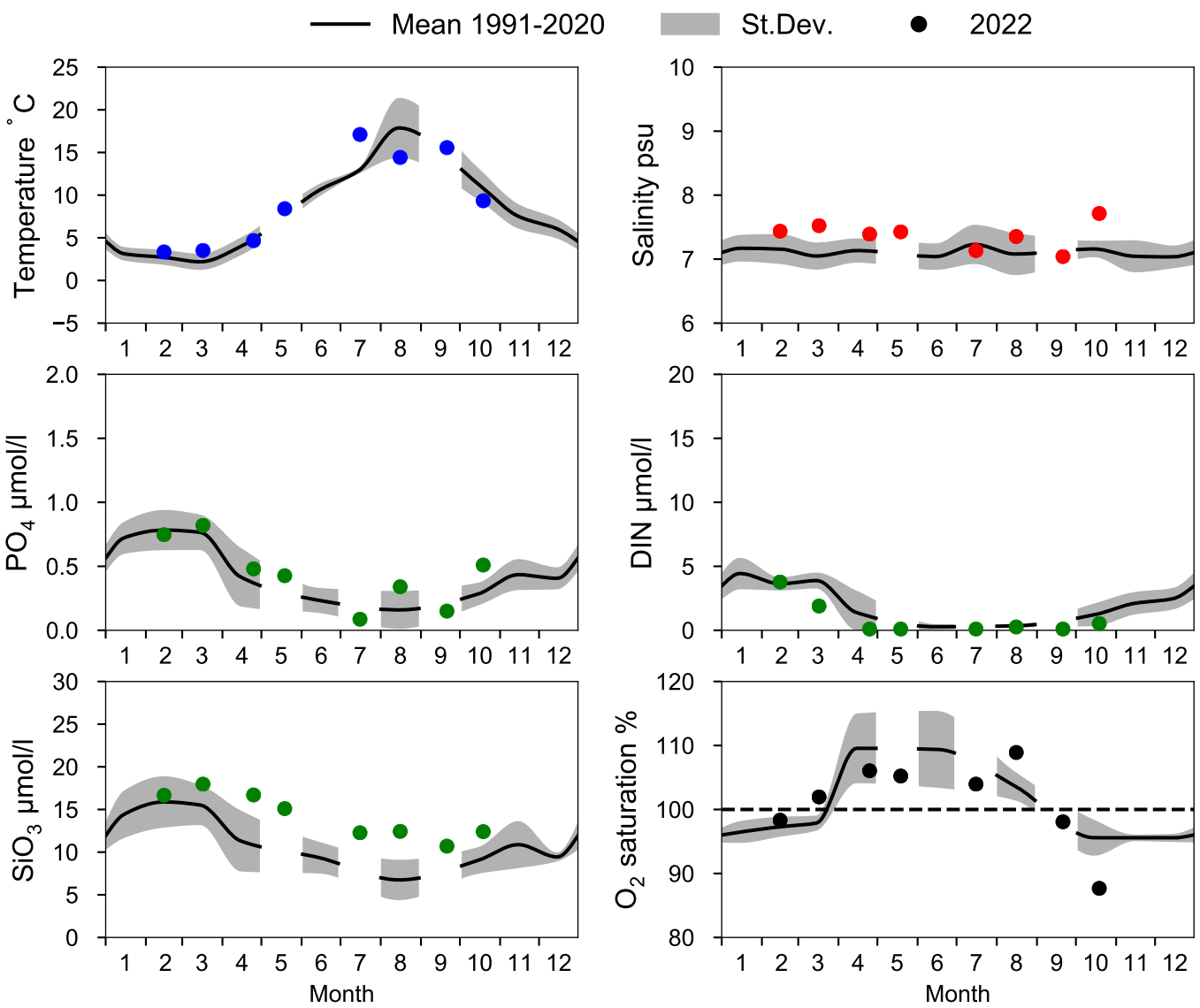


Vertical profiles REF M1V1
October

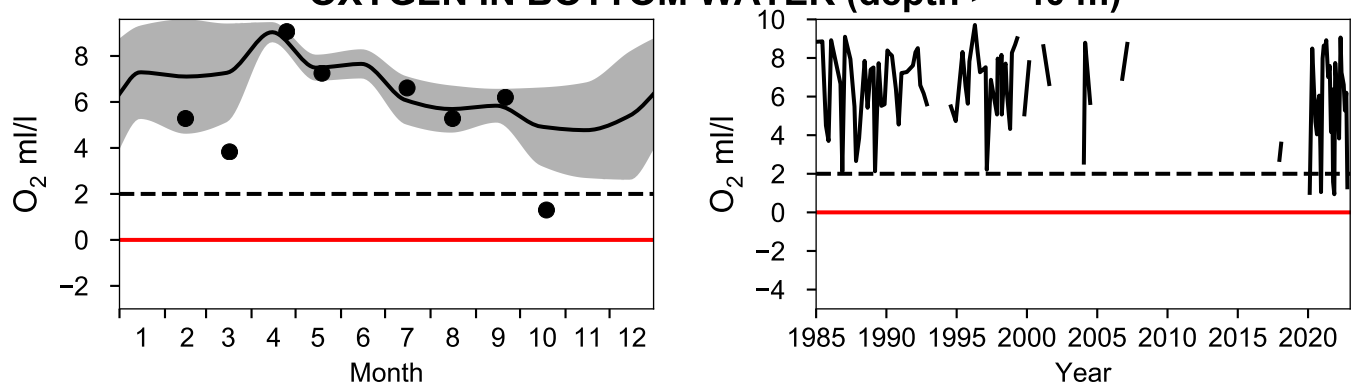


STATION BY39 ÖLANDS S UDDE SURFACE WATER (0-10 m)

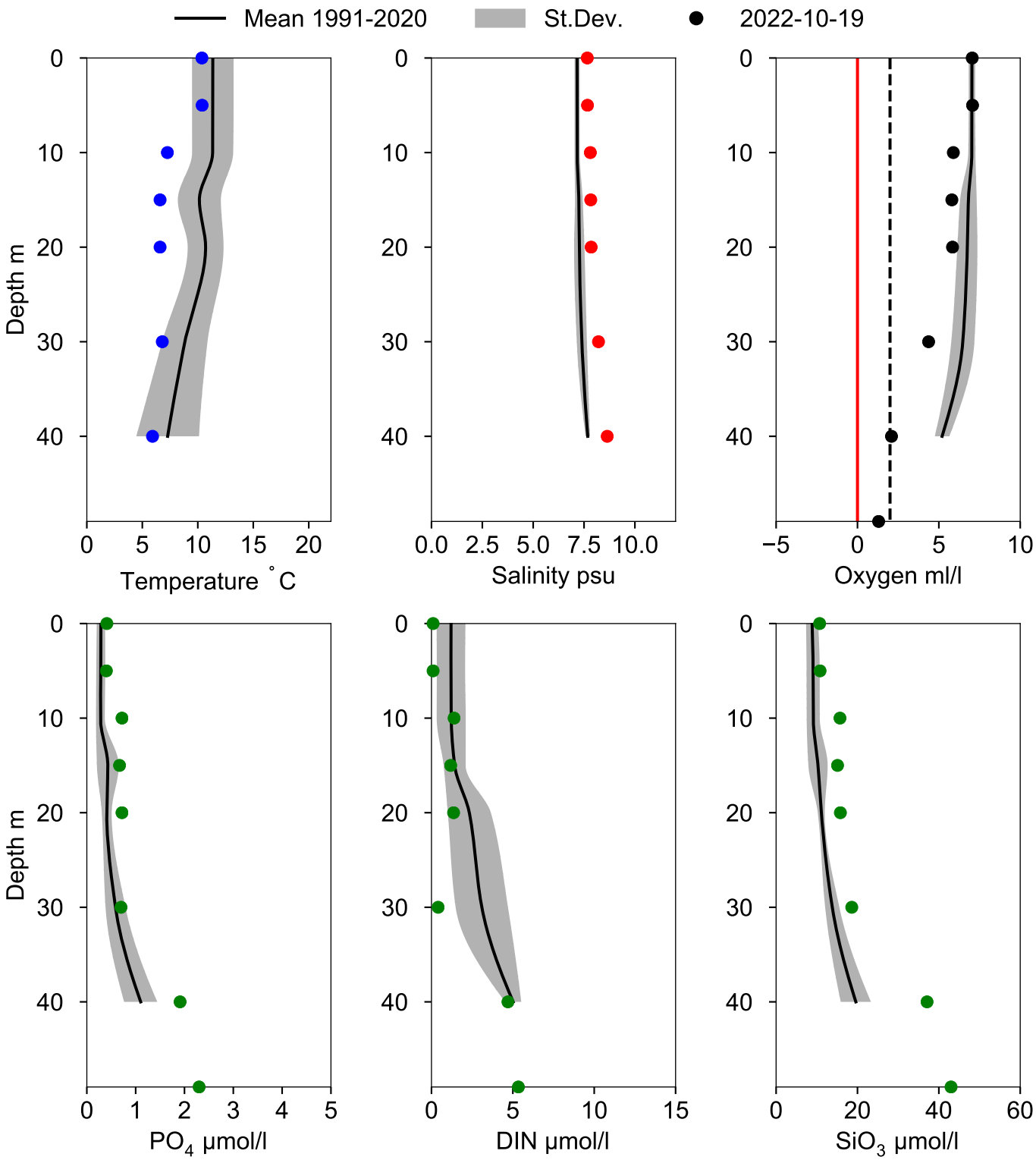
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

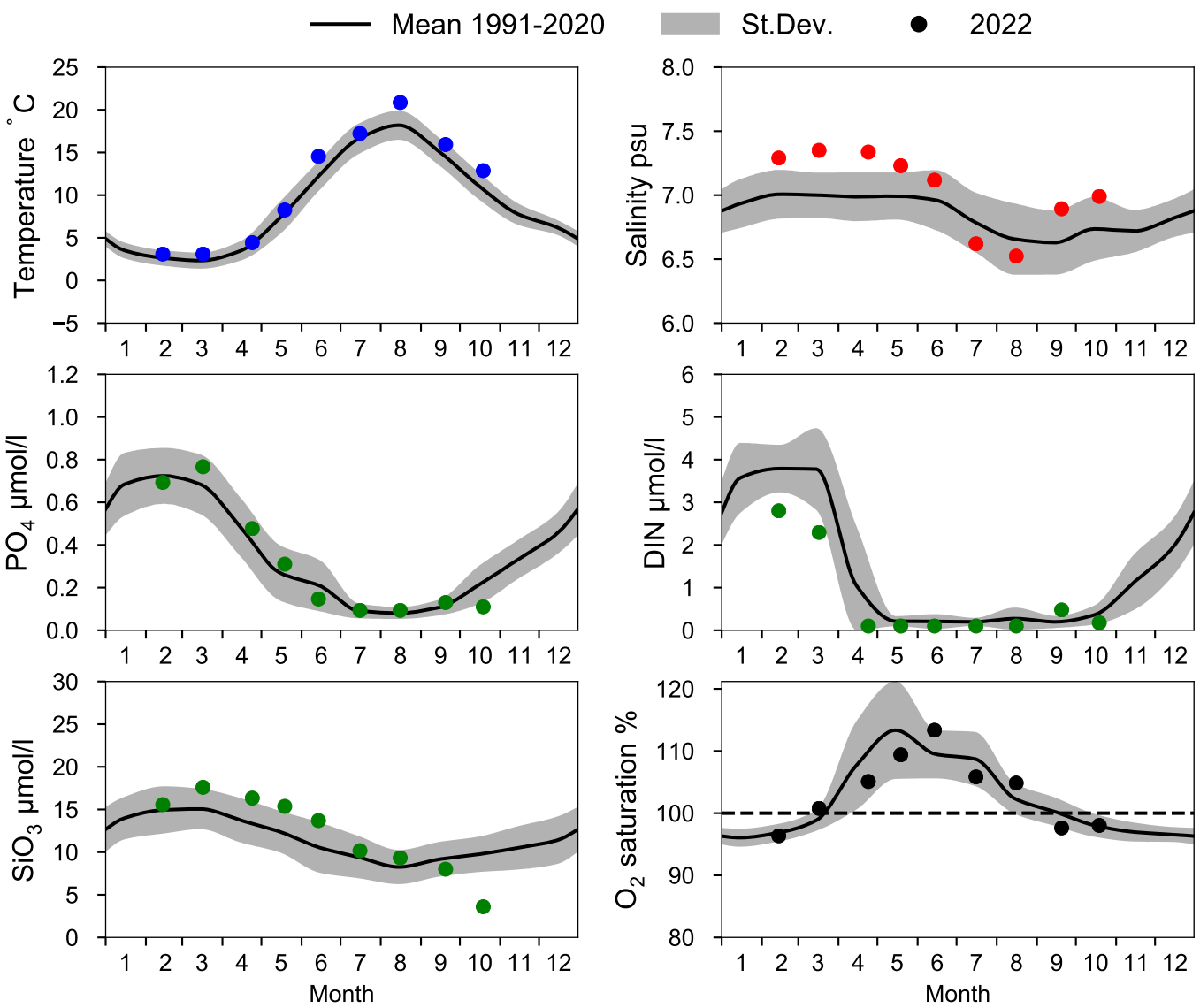


Vertical profiles BY39 ÖLANDS S UDDE
October

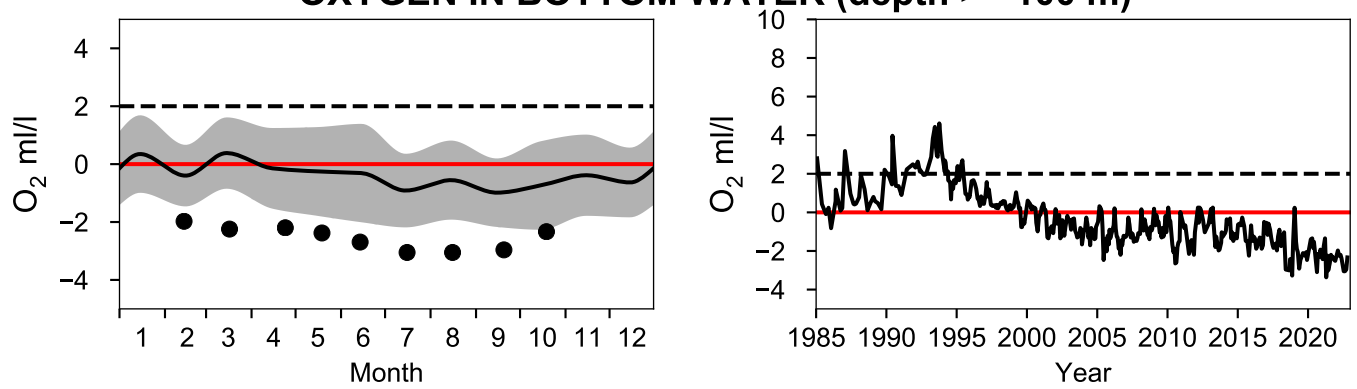


STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

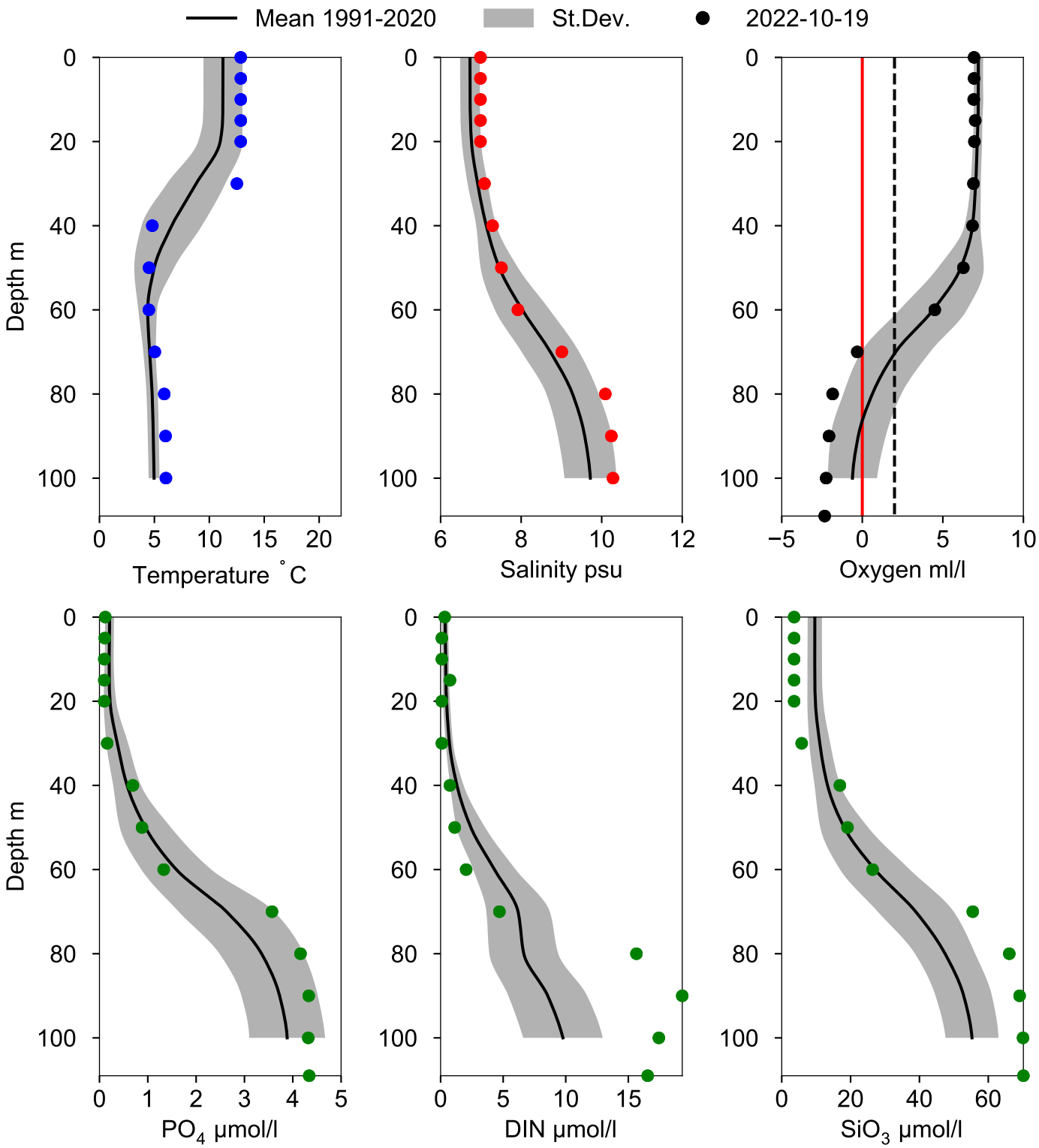
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 100 m)

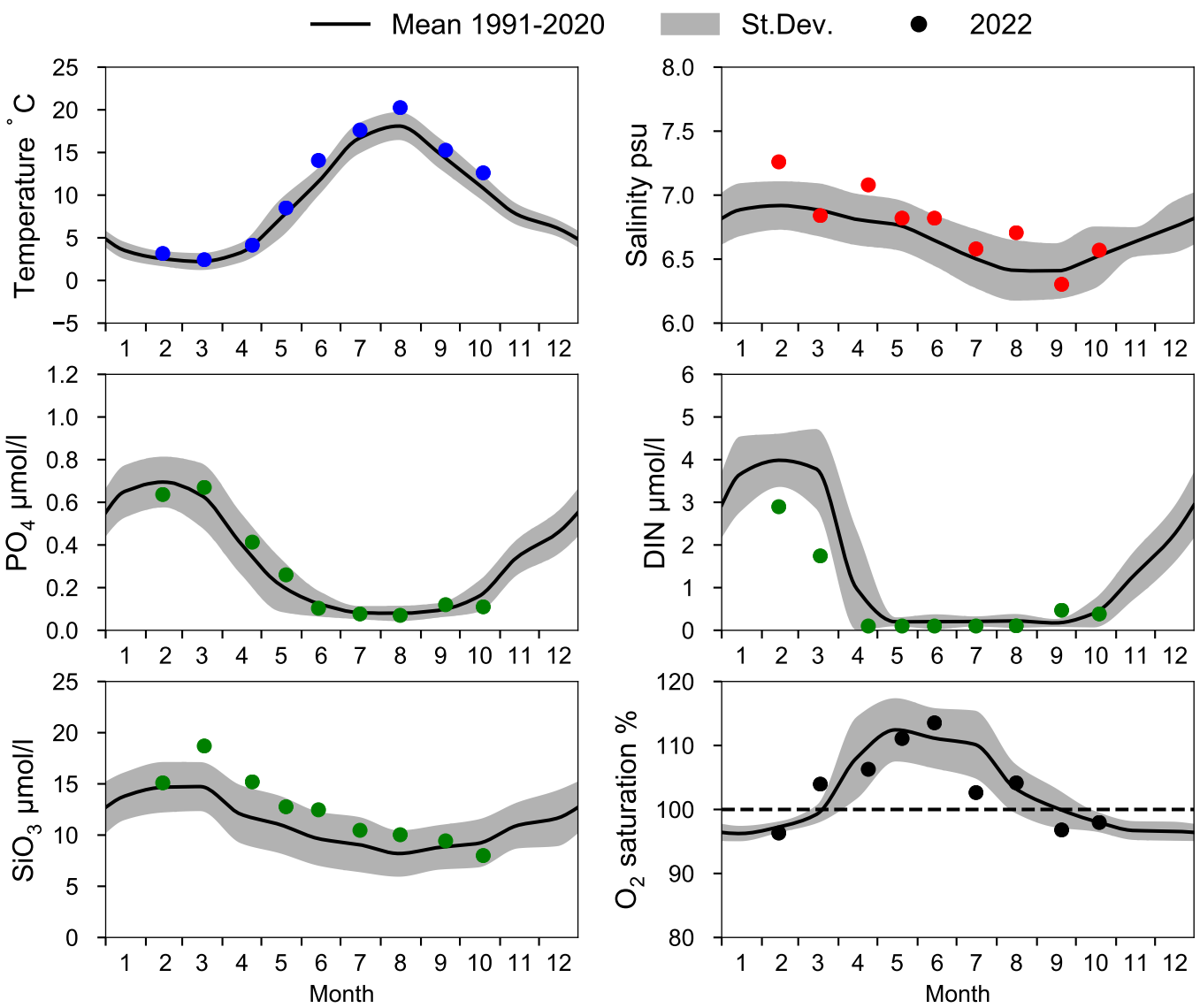


Vertical profiles BY38 KARLSÖDJ
October

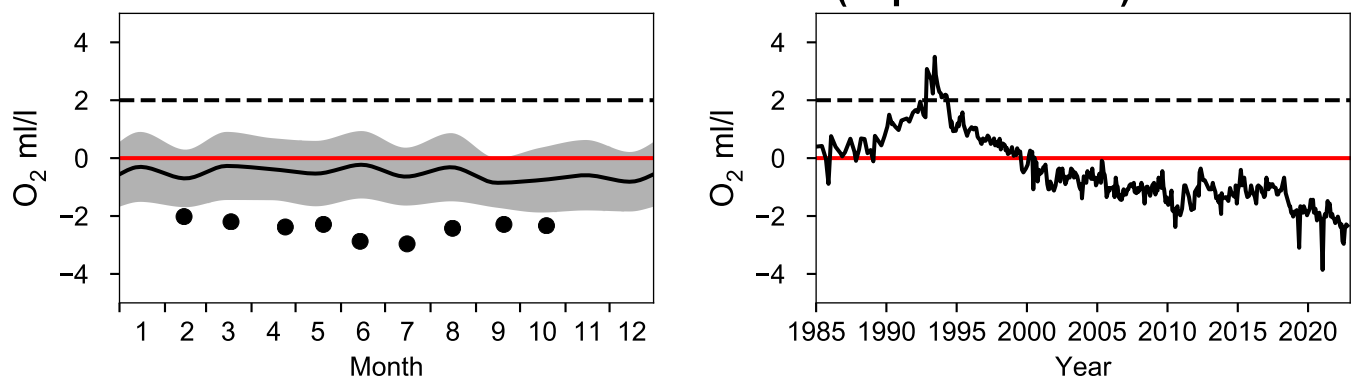


STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

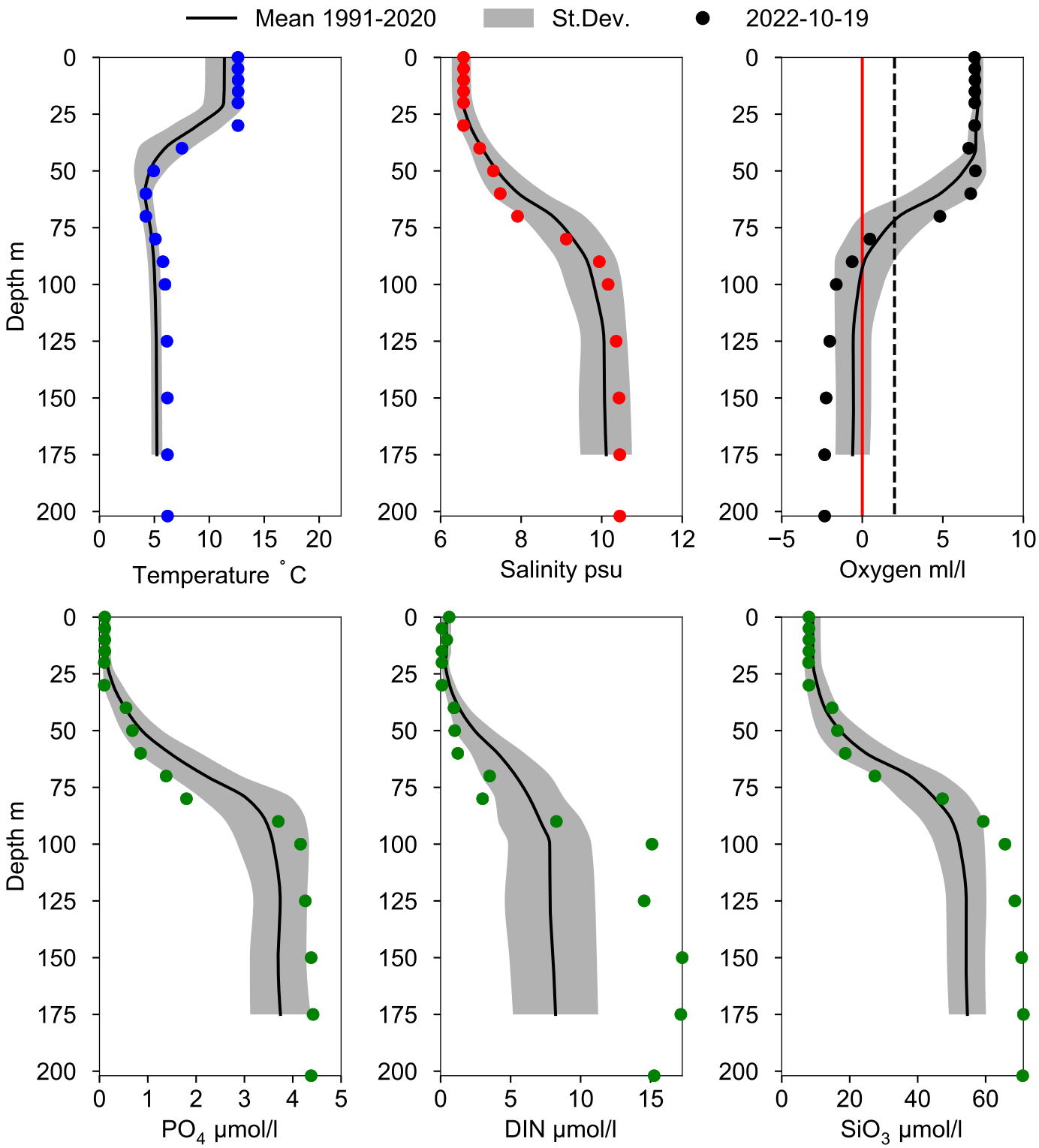
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)

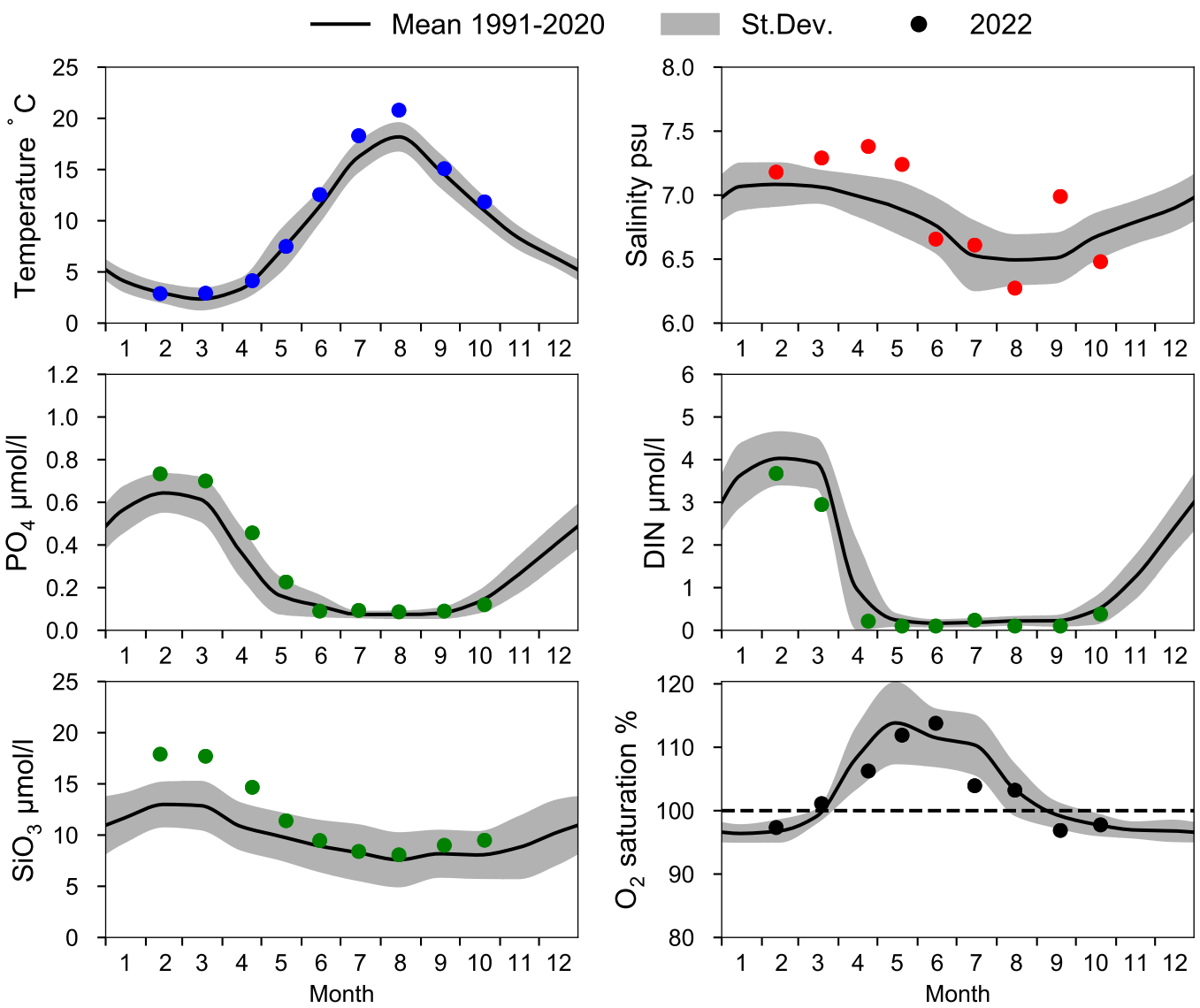


Vertical profiles BY32 NORRKÖPINGSDJ
October

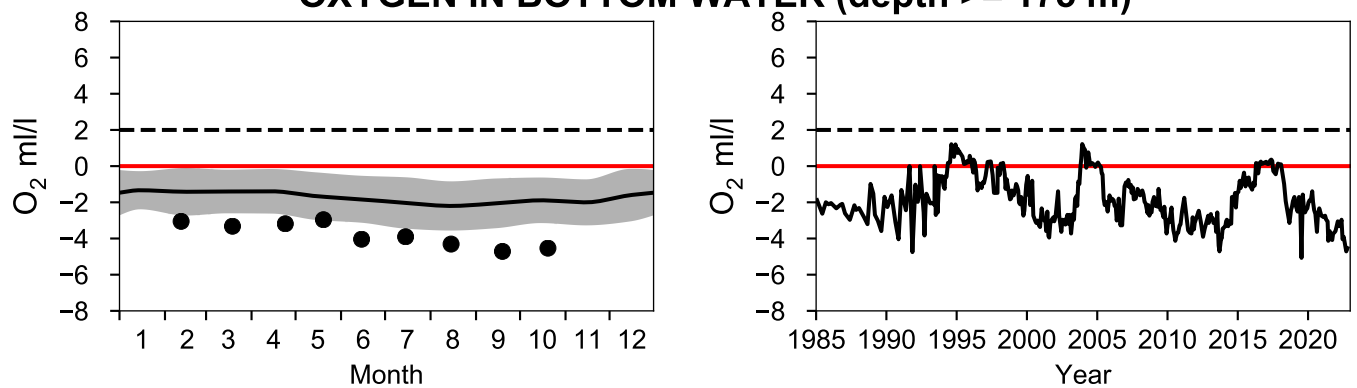


STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

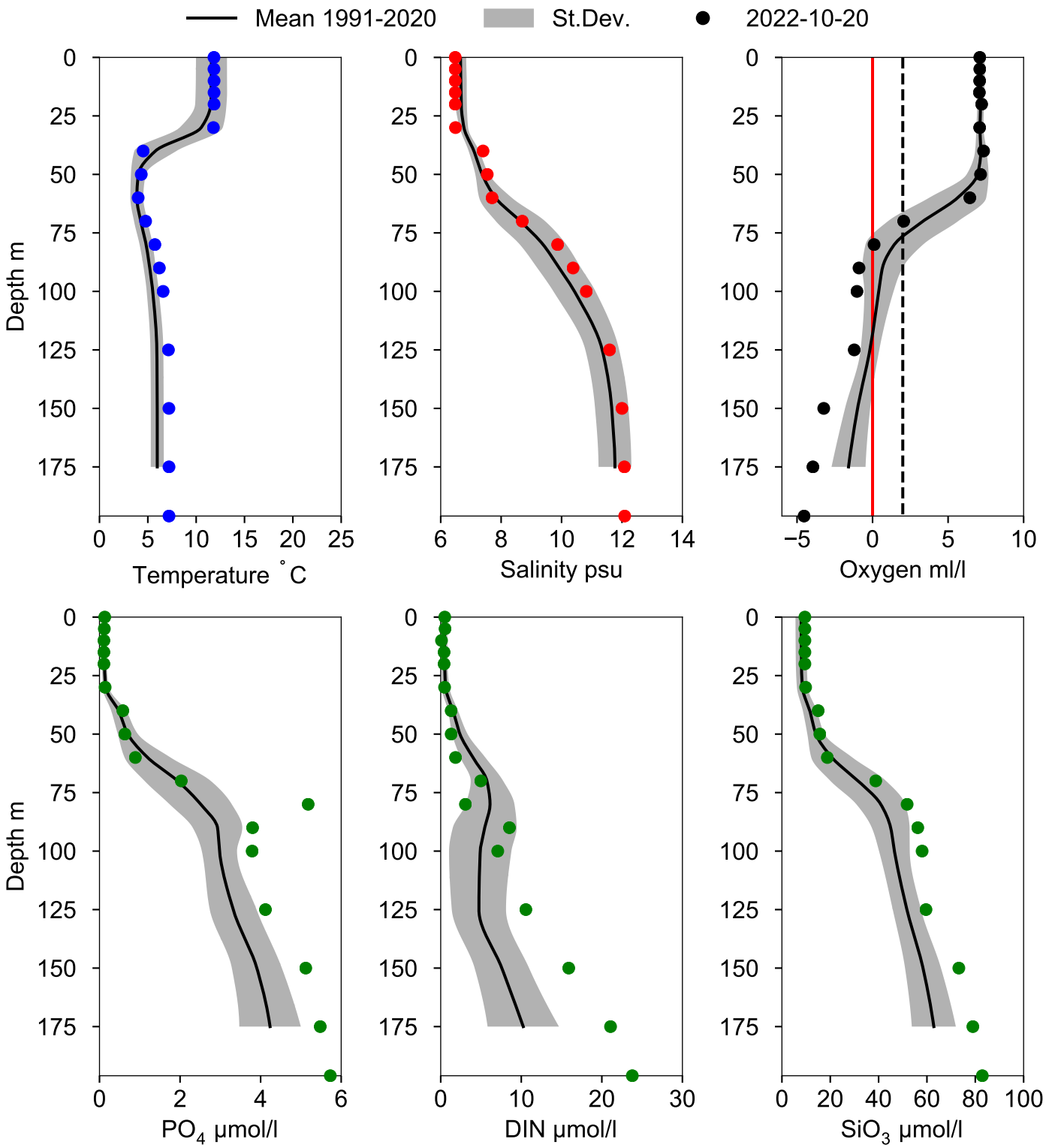
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)

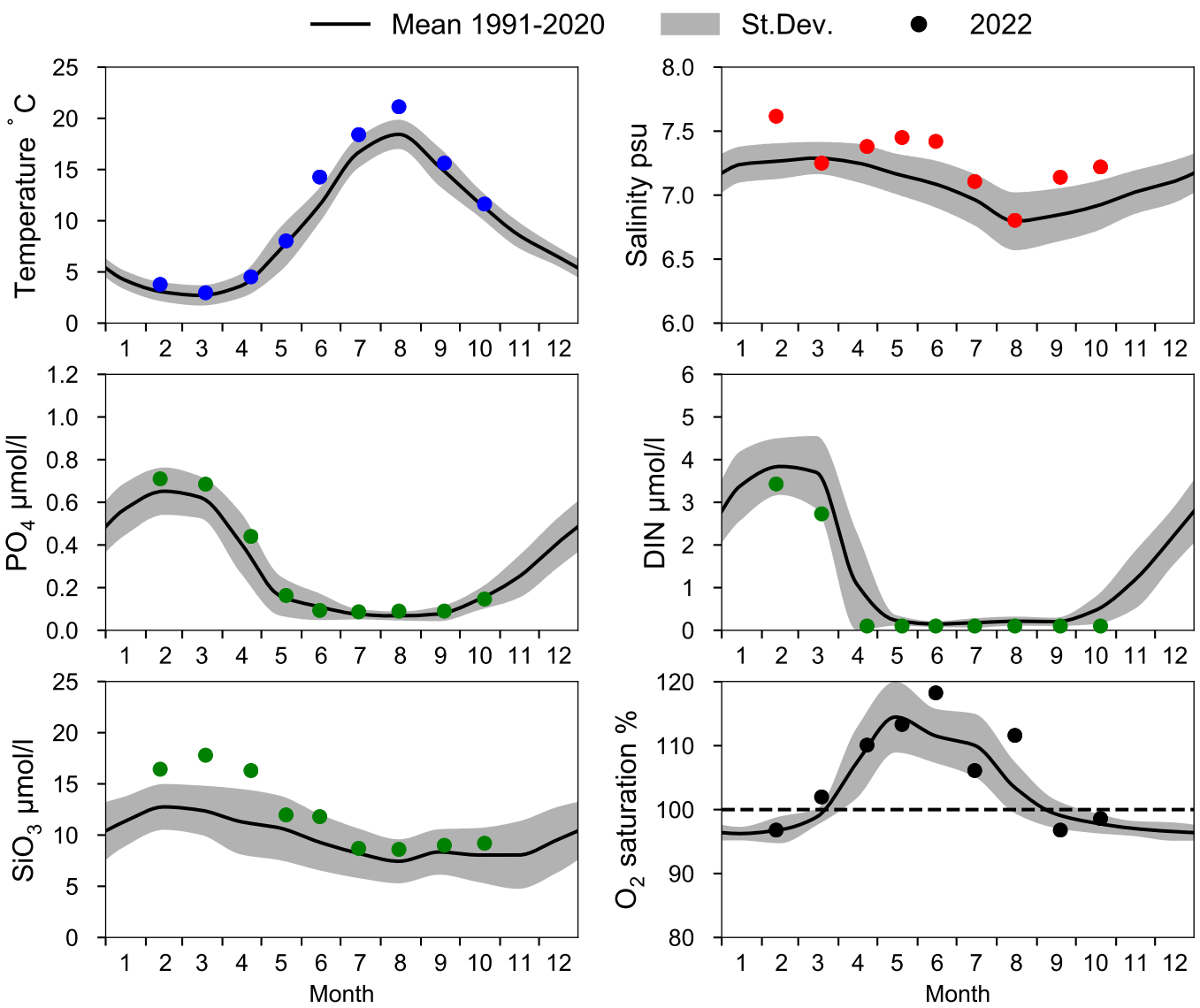


Vertical profiles BY20 FÅRÖDJ
October

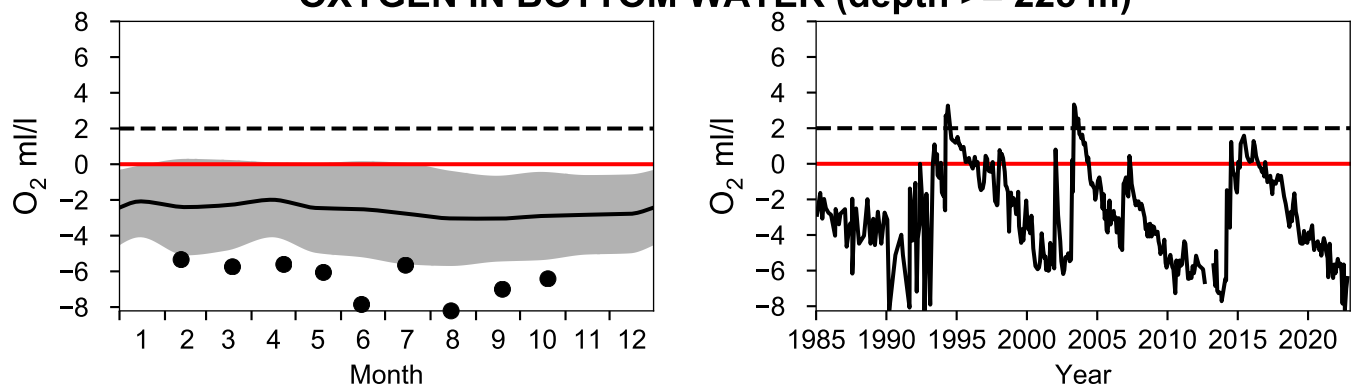


STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

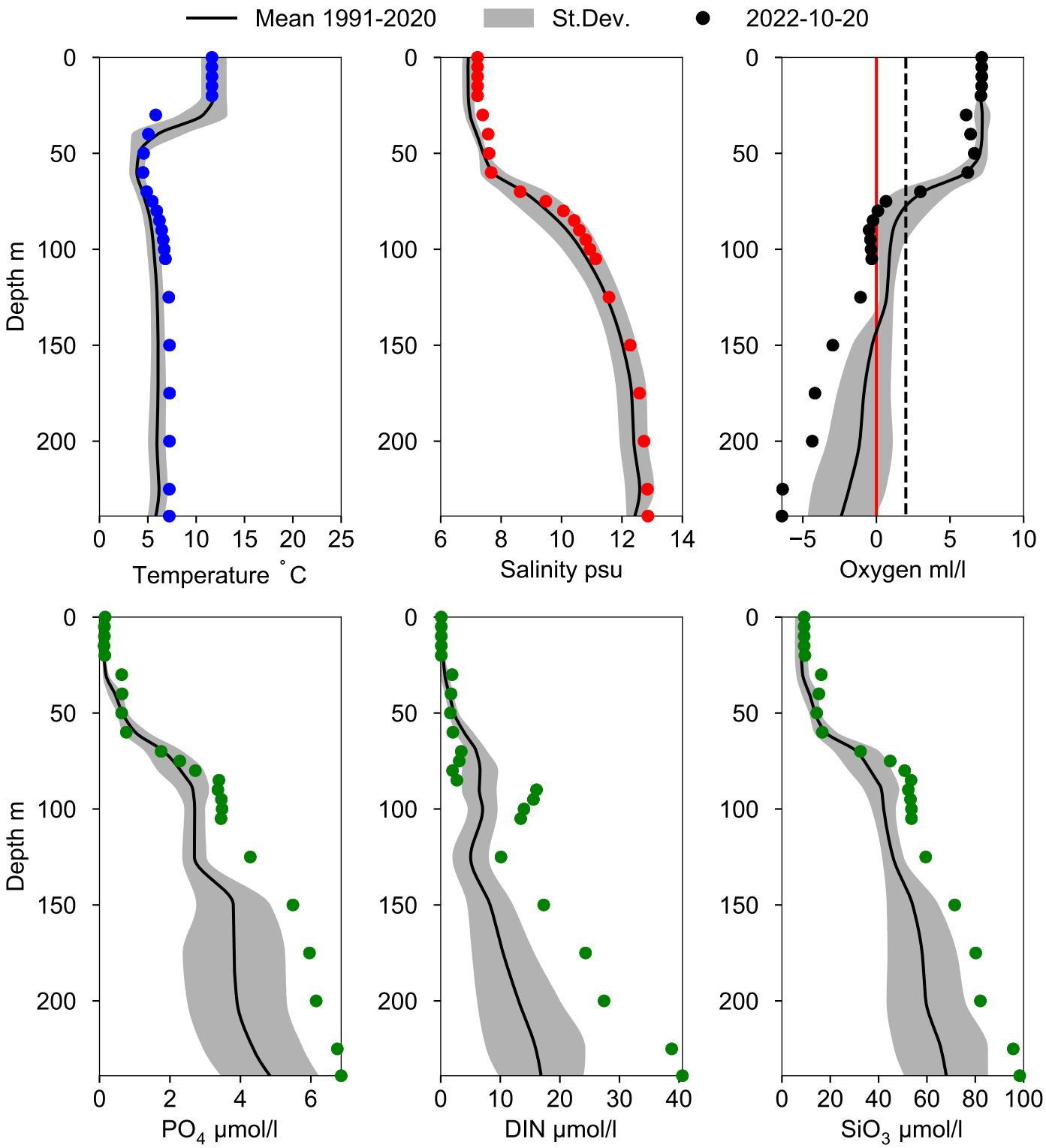
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 225 m)

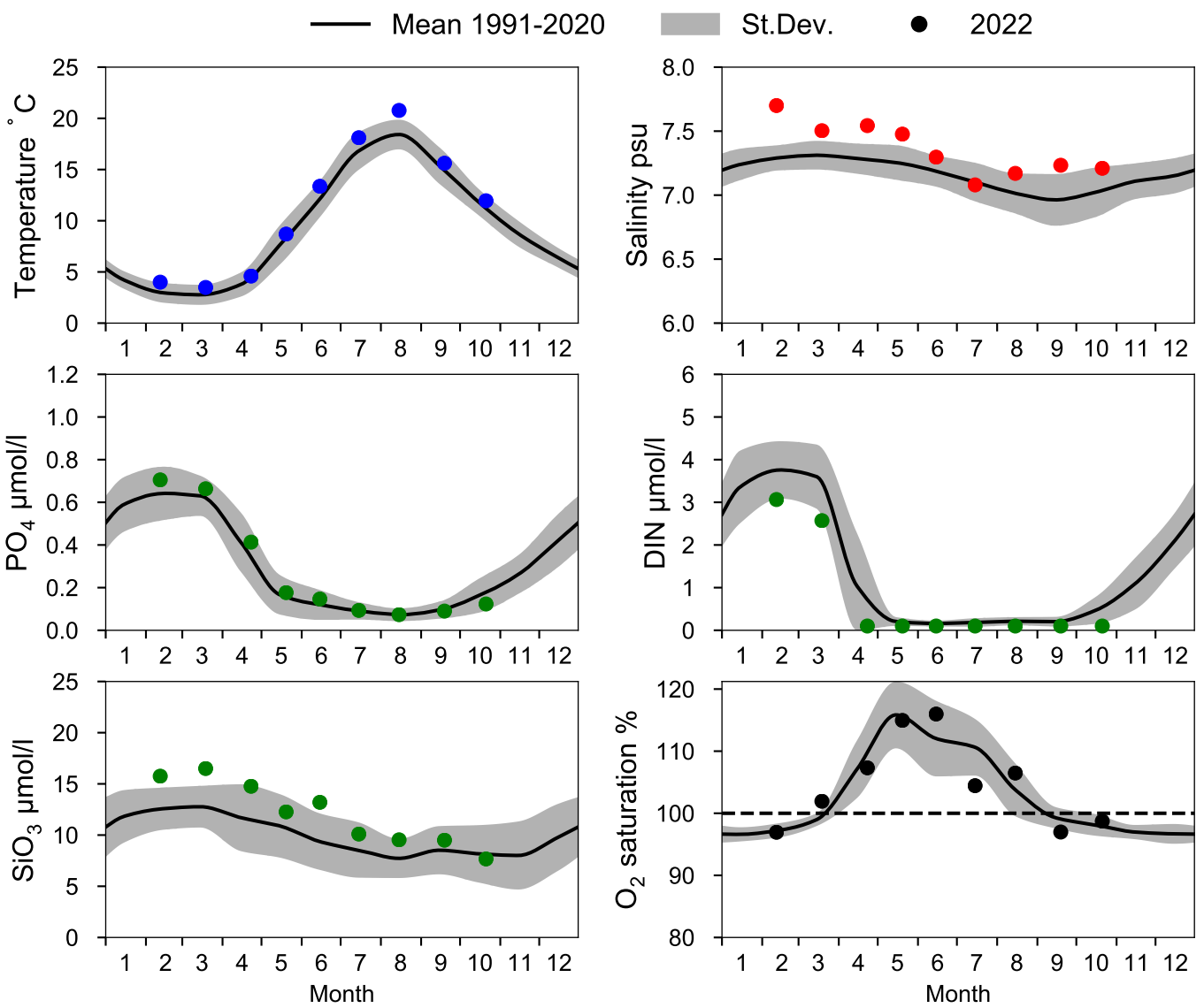


Vertical profiles BY15 GOTLANDSDJ
October

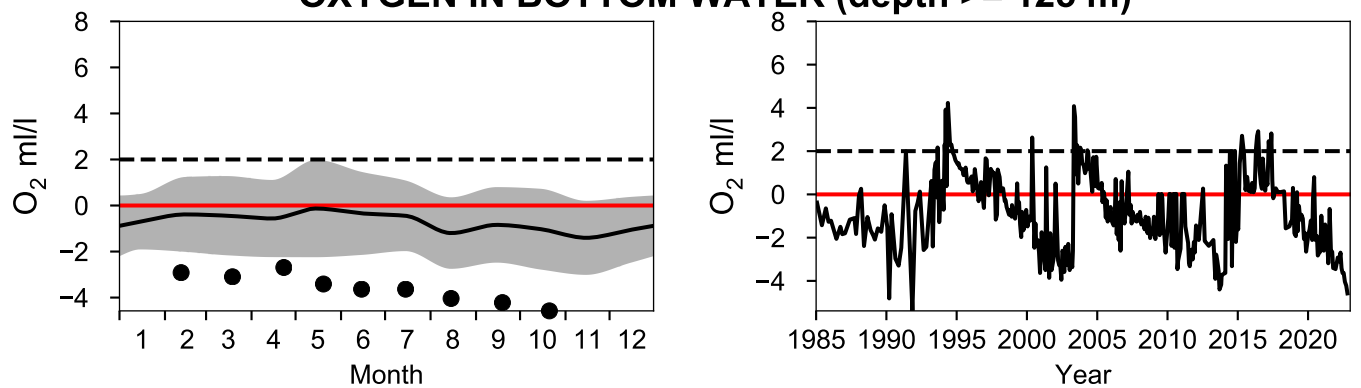


STATION BY10 SURFACE WATER (0-10 m)

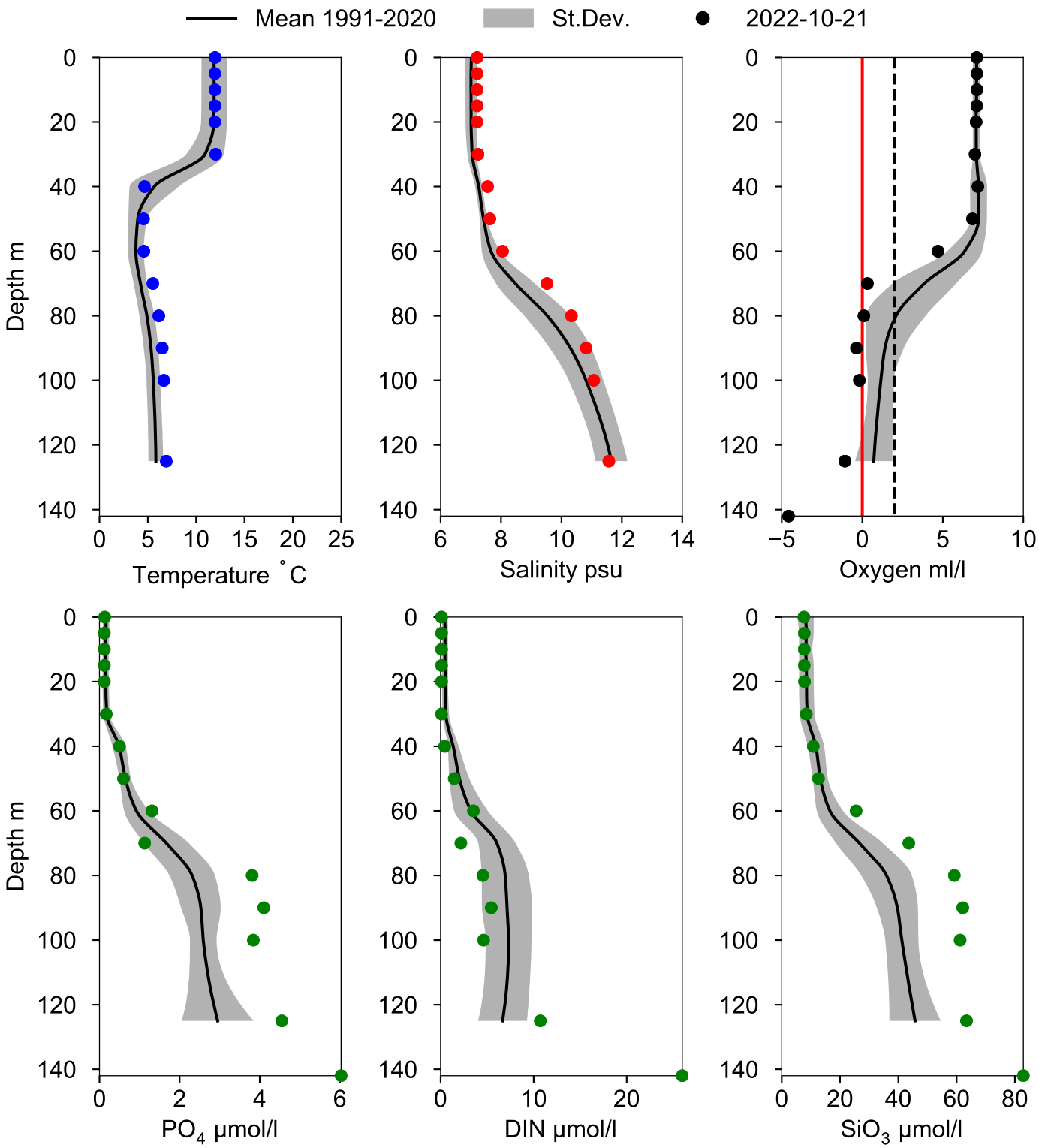
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

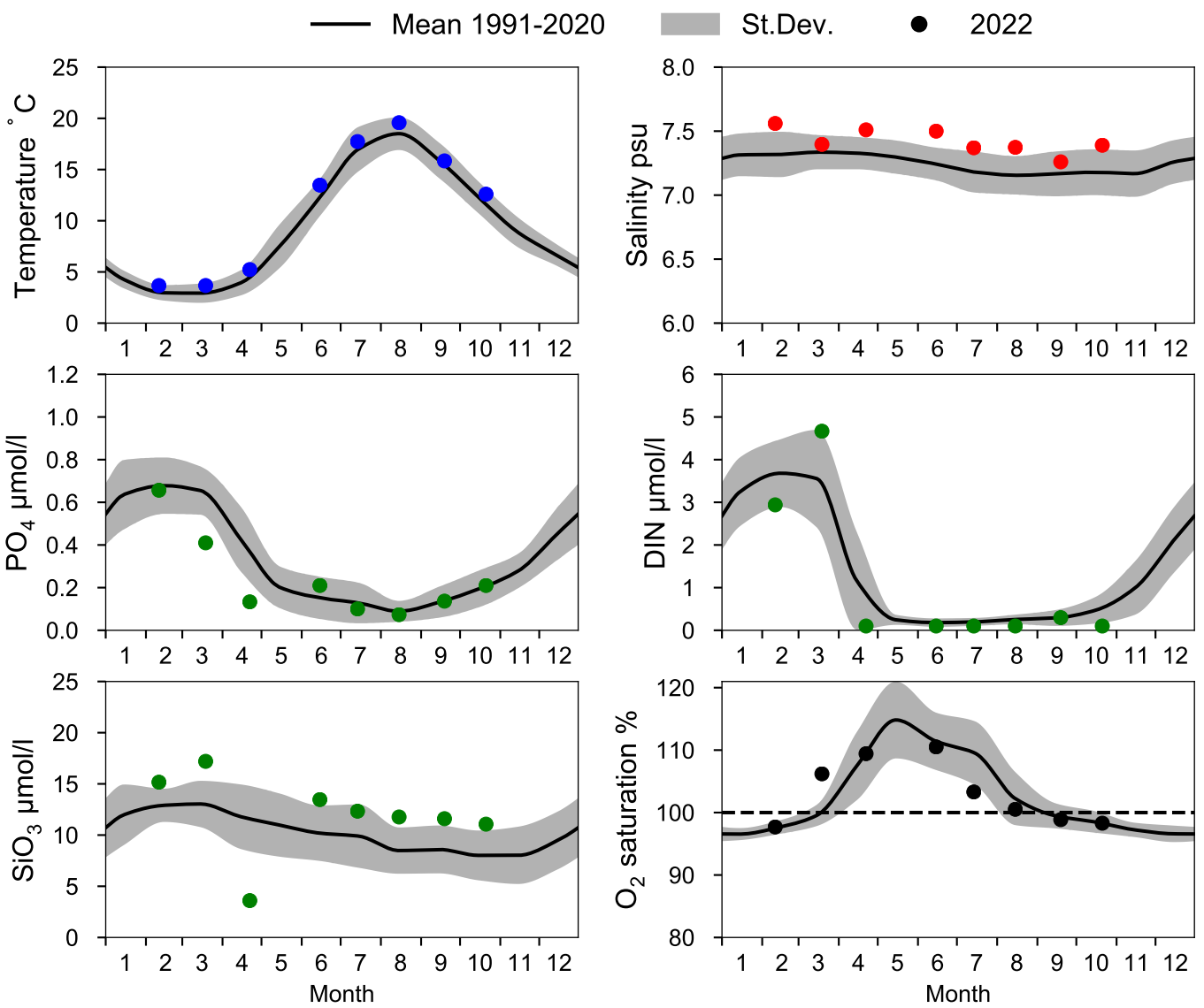


Vertical profiles BY10
October

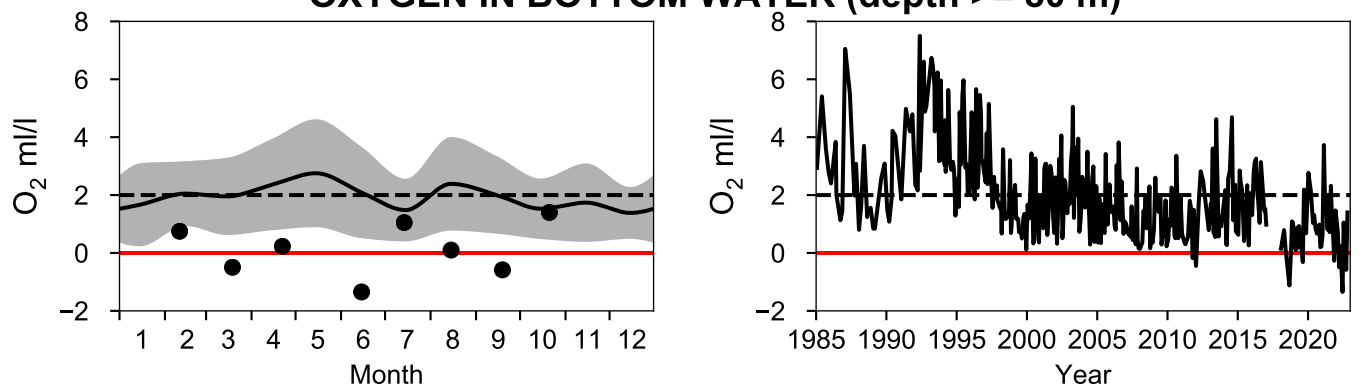


STATION BCS III-10 SURFACE WATER (0-10 m)

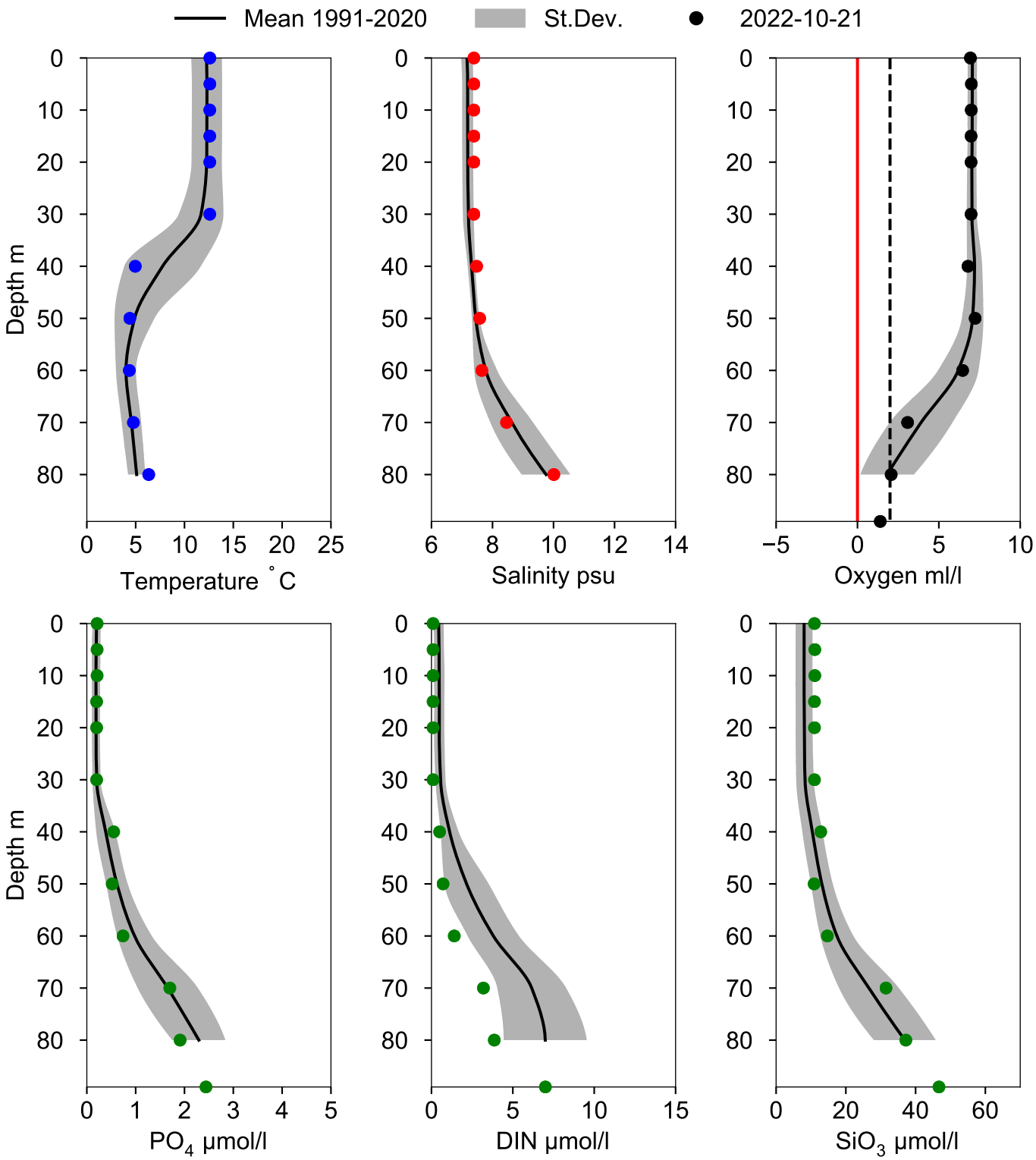
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

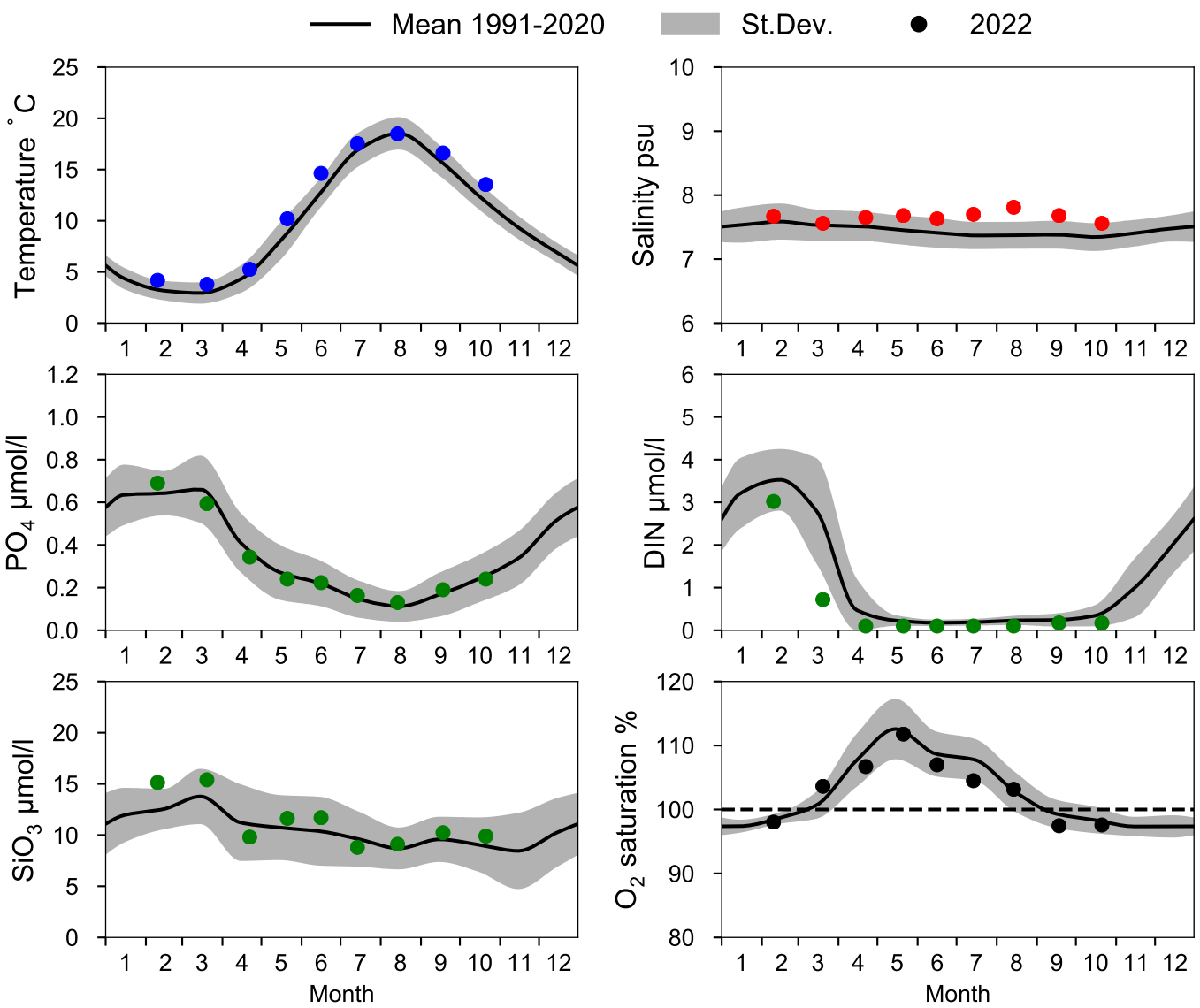


Vertical profiles BCS III-10
October

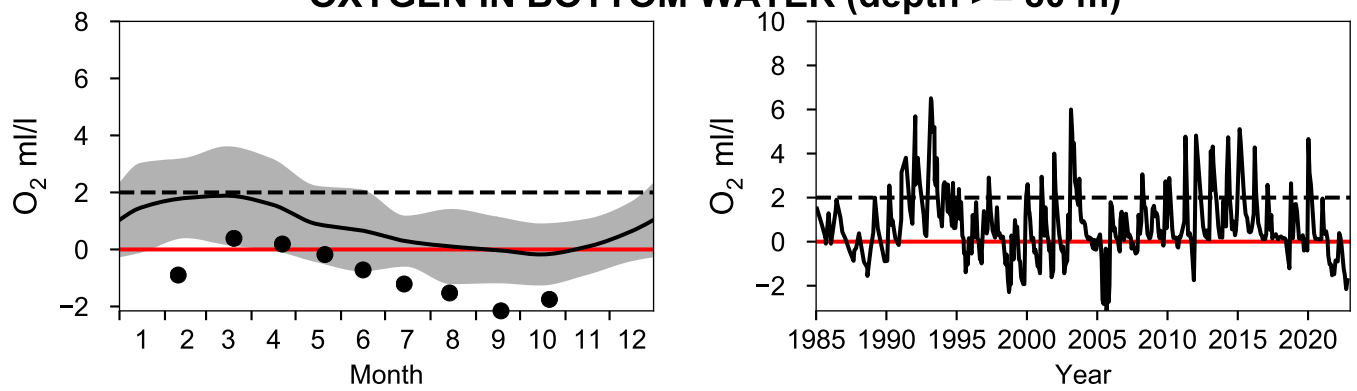


STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

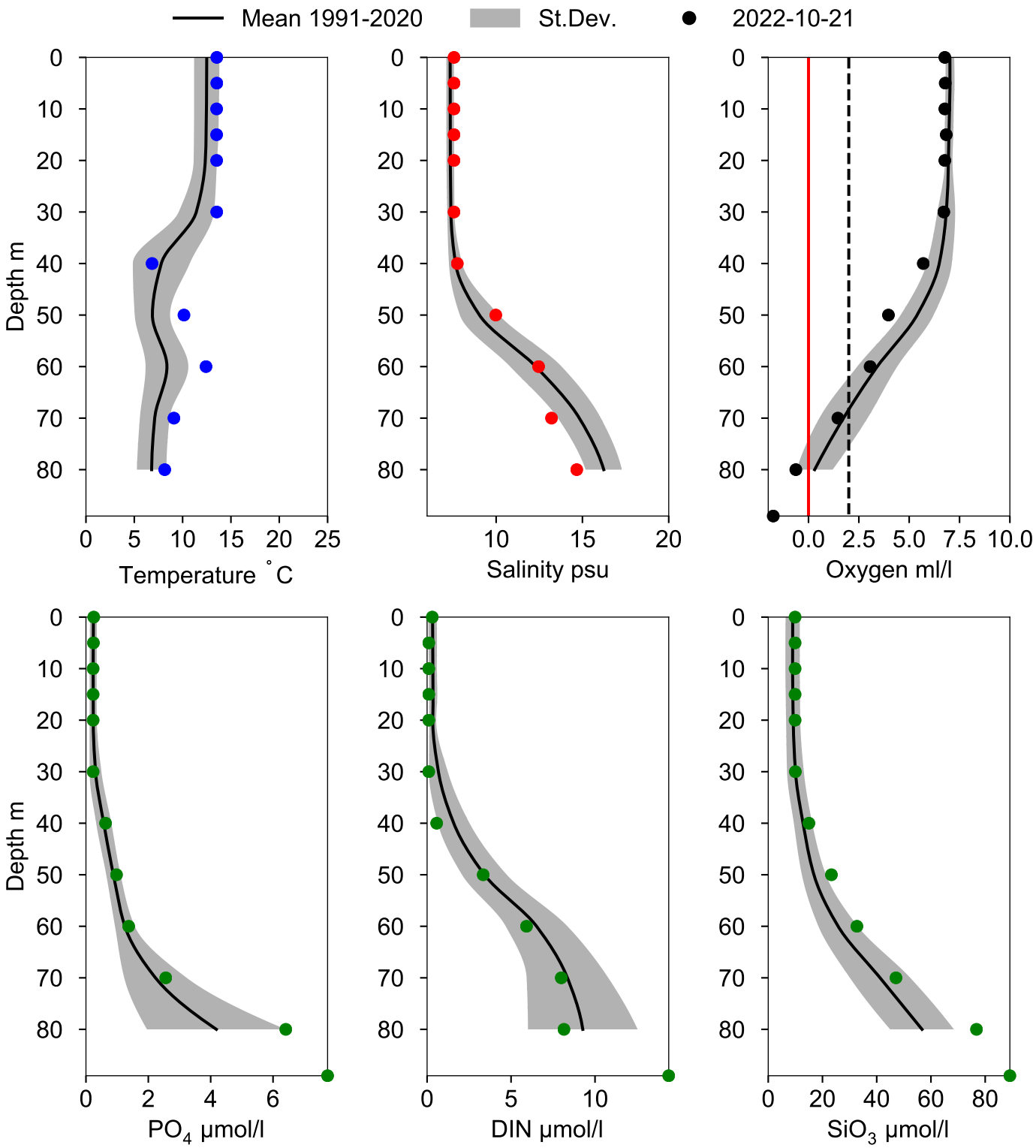
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

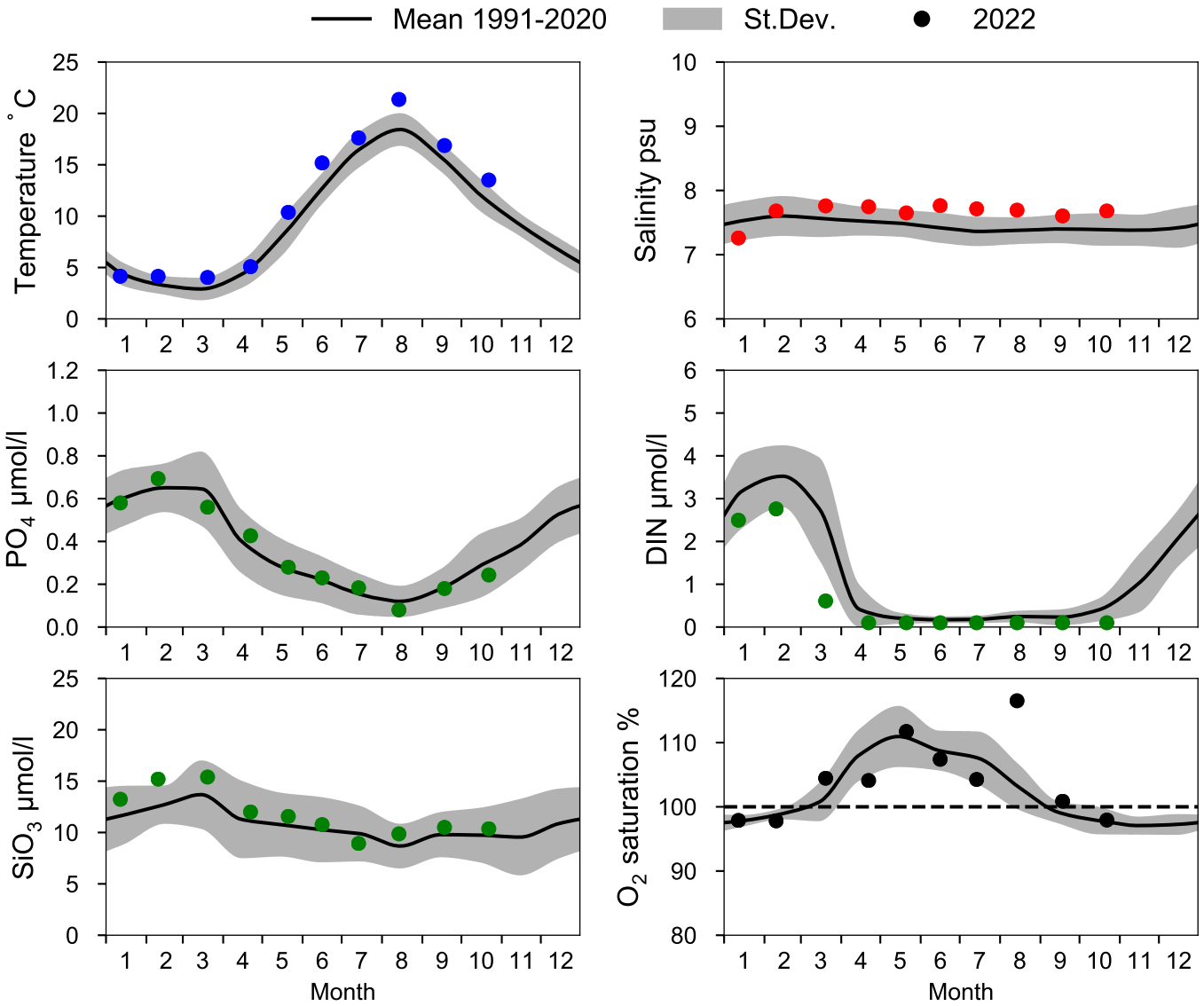


Vertical profiles BY5 BORNHOLMSDJ
October

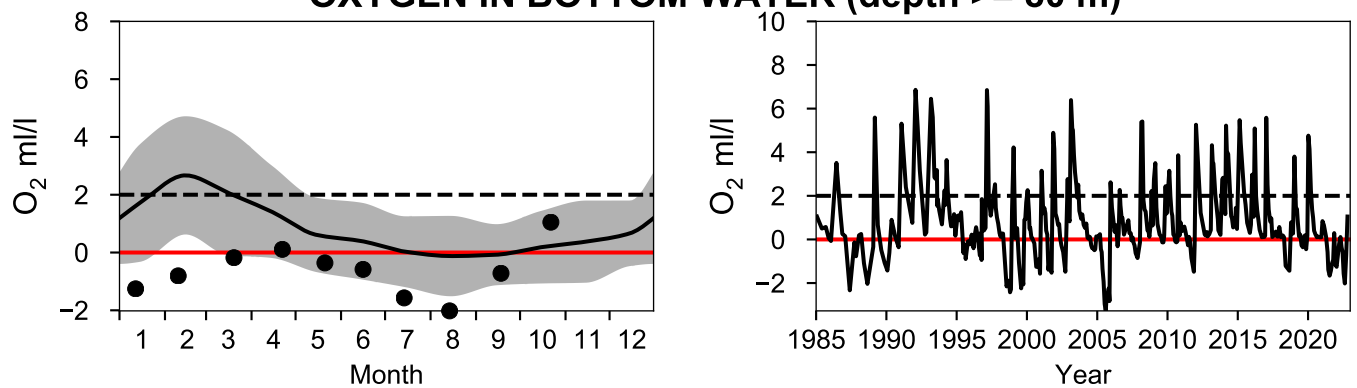


STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

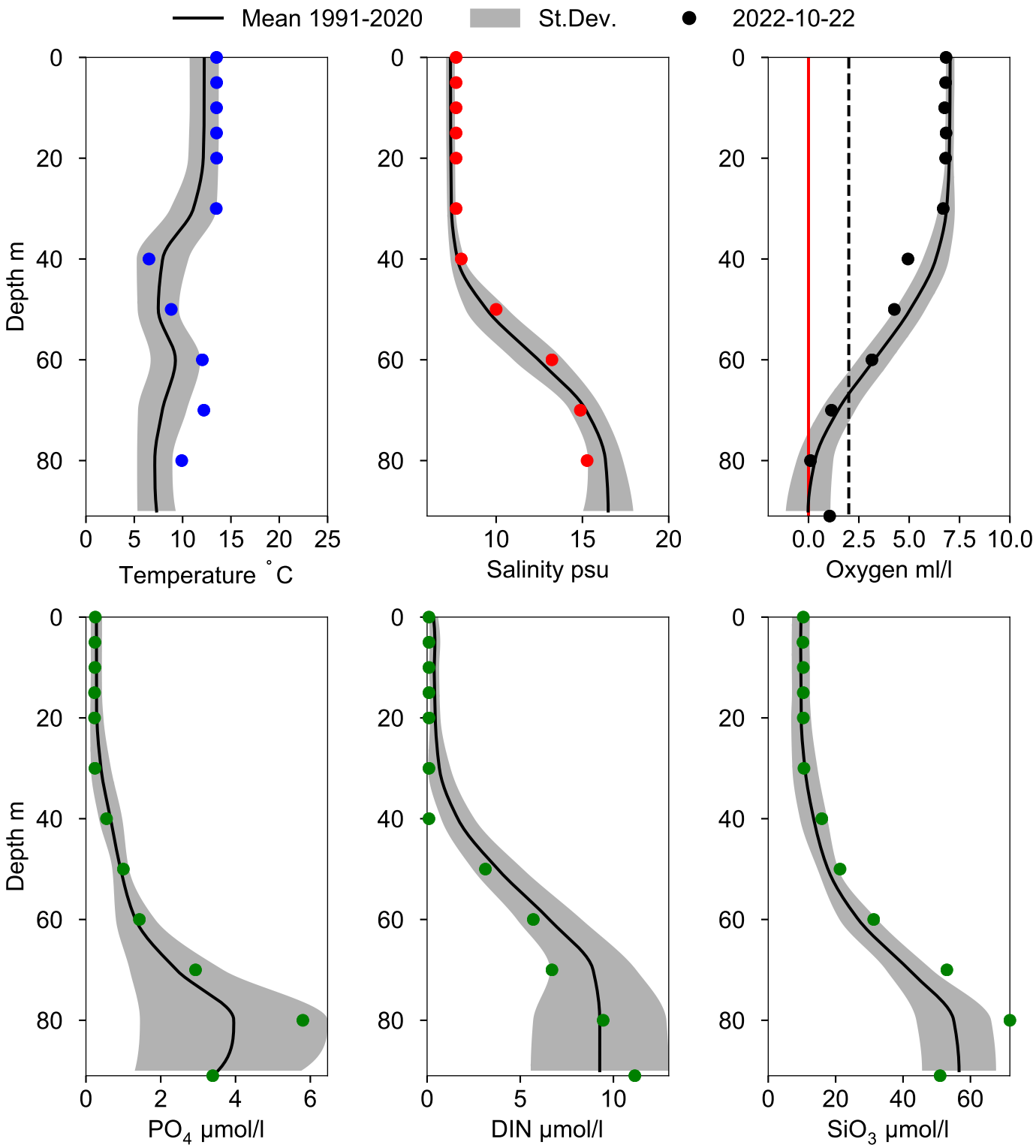
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

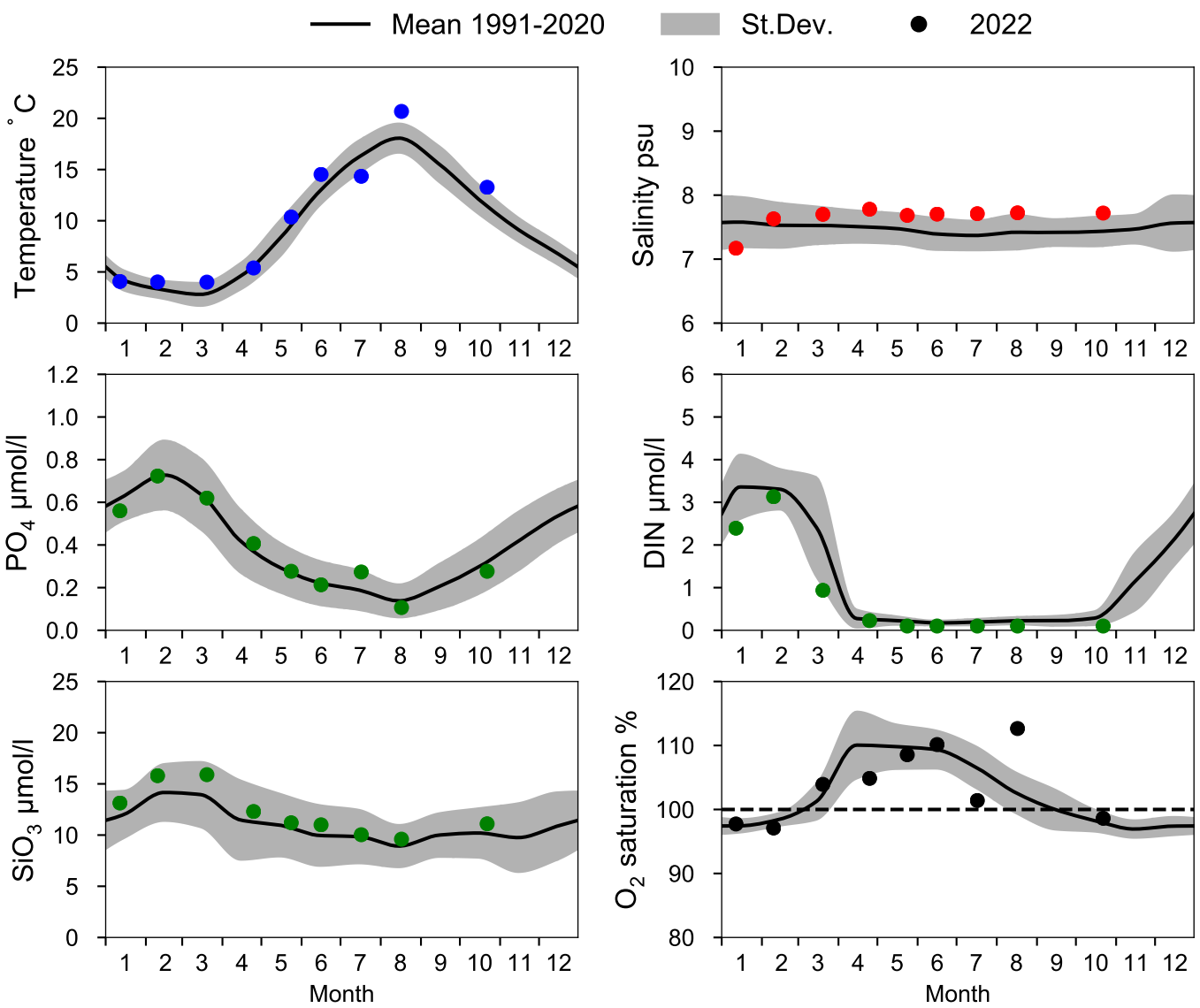


Vertical profiles BY4 CHRISTIANSÖ
October

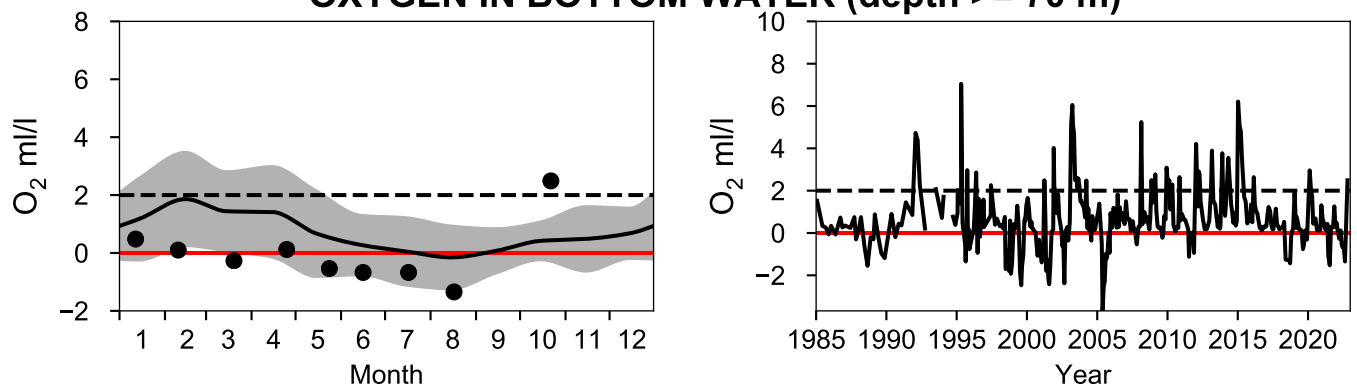


STATION HANÖBUKTEN SURFACE WATER (0-10 m)

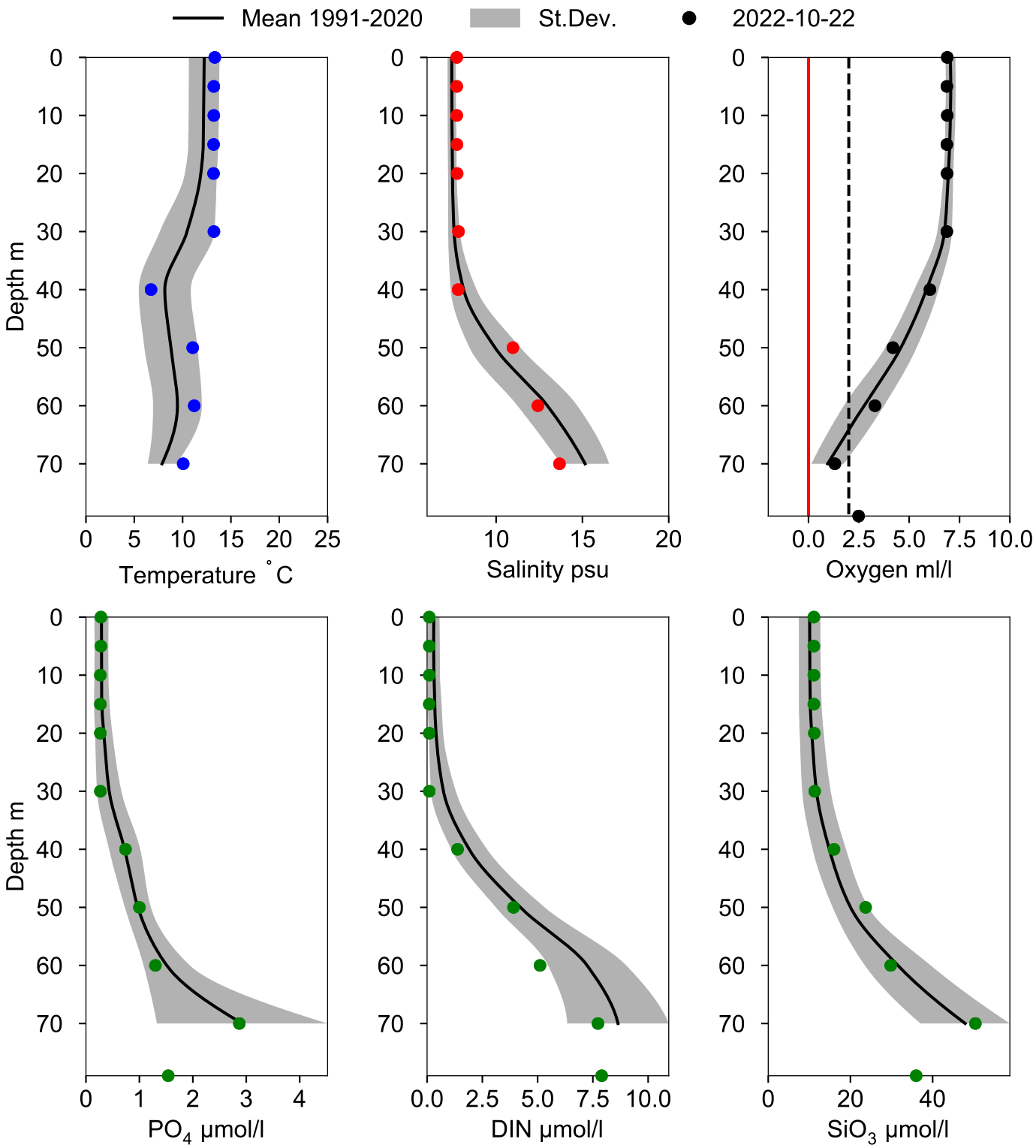
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 70 m)

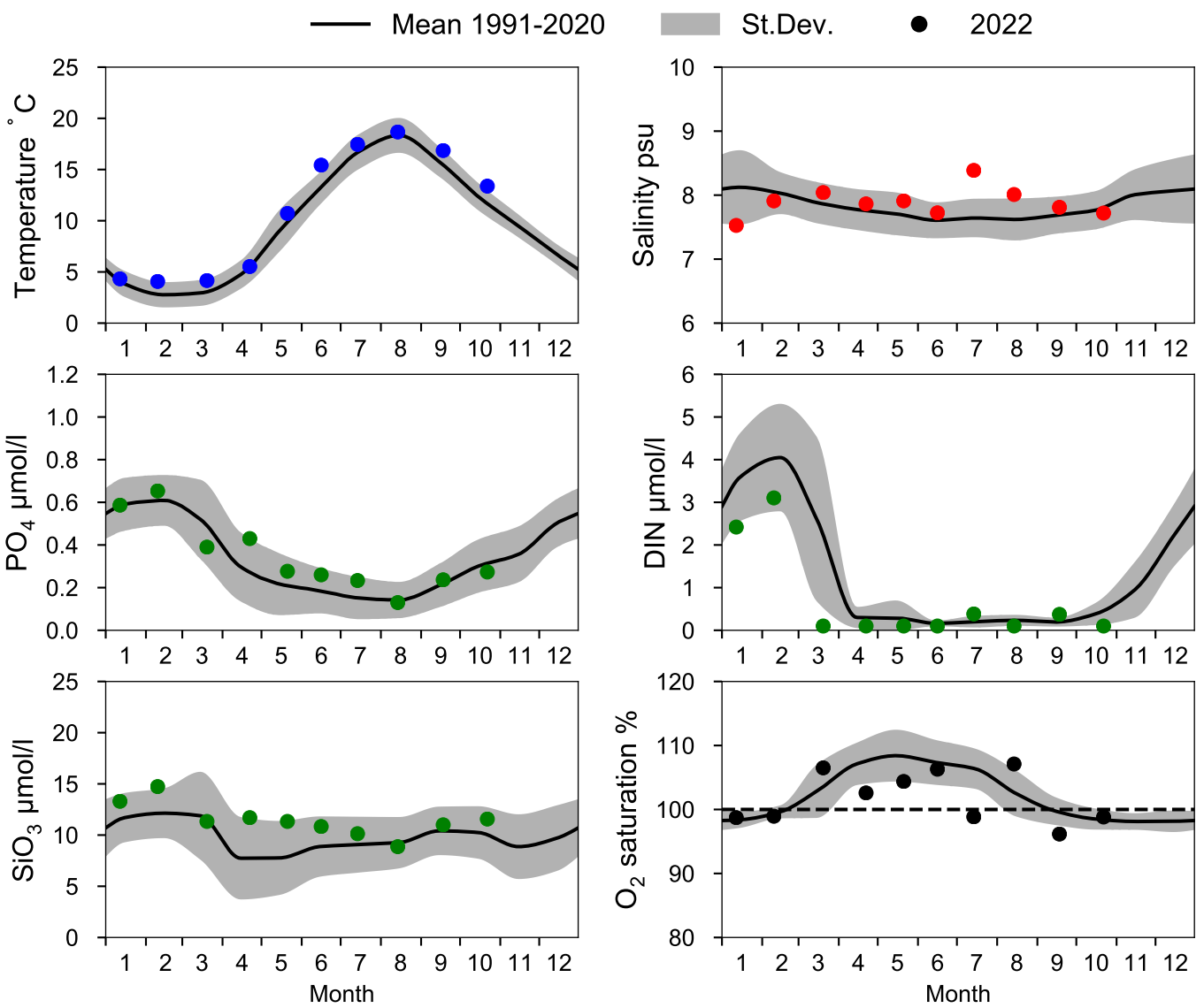


Vertical profiles HANÖBUKTEN
October

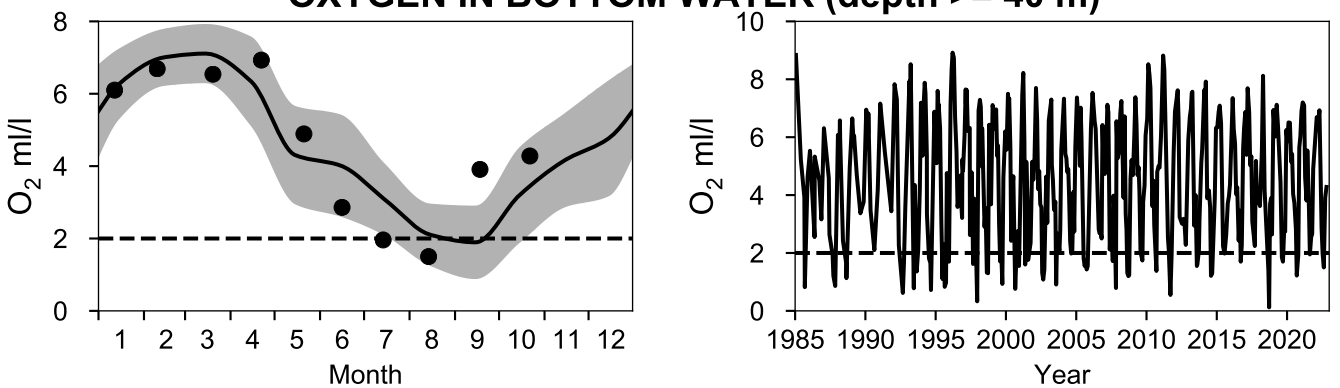


STATION BY2 ARKONA SURFACE WATER (0-10 m)

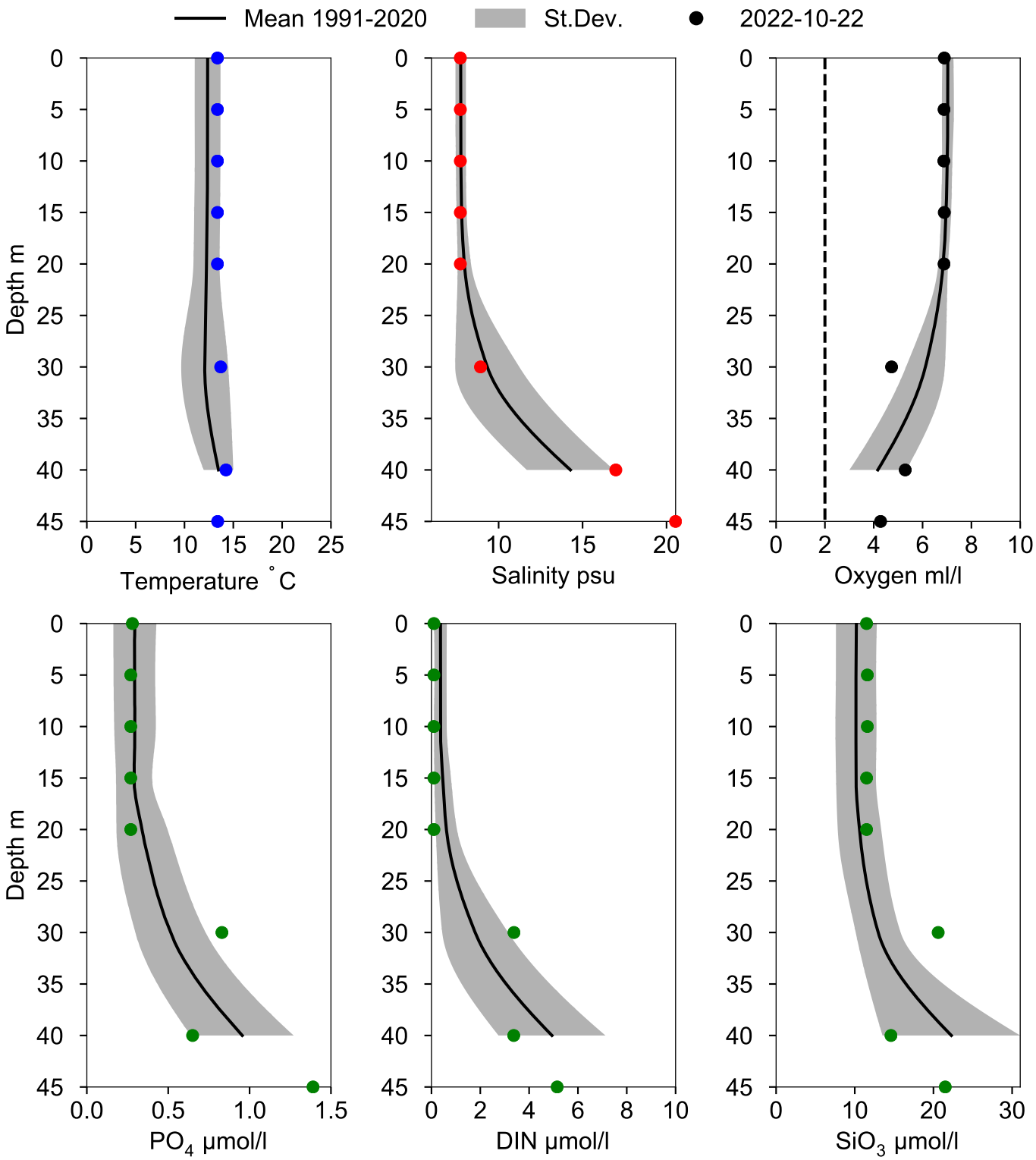
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

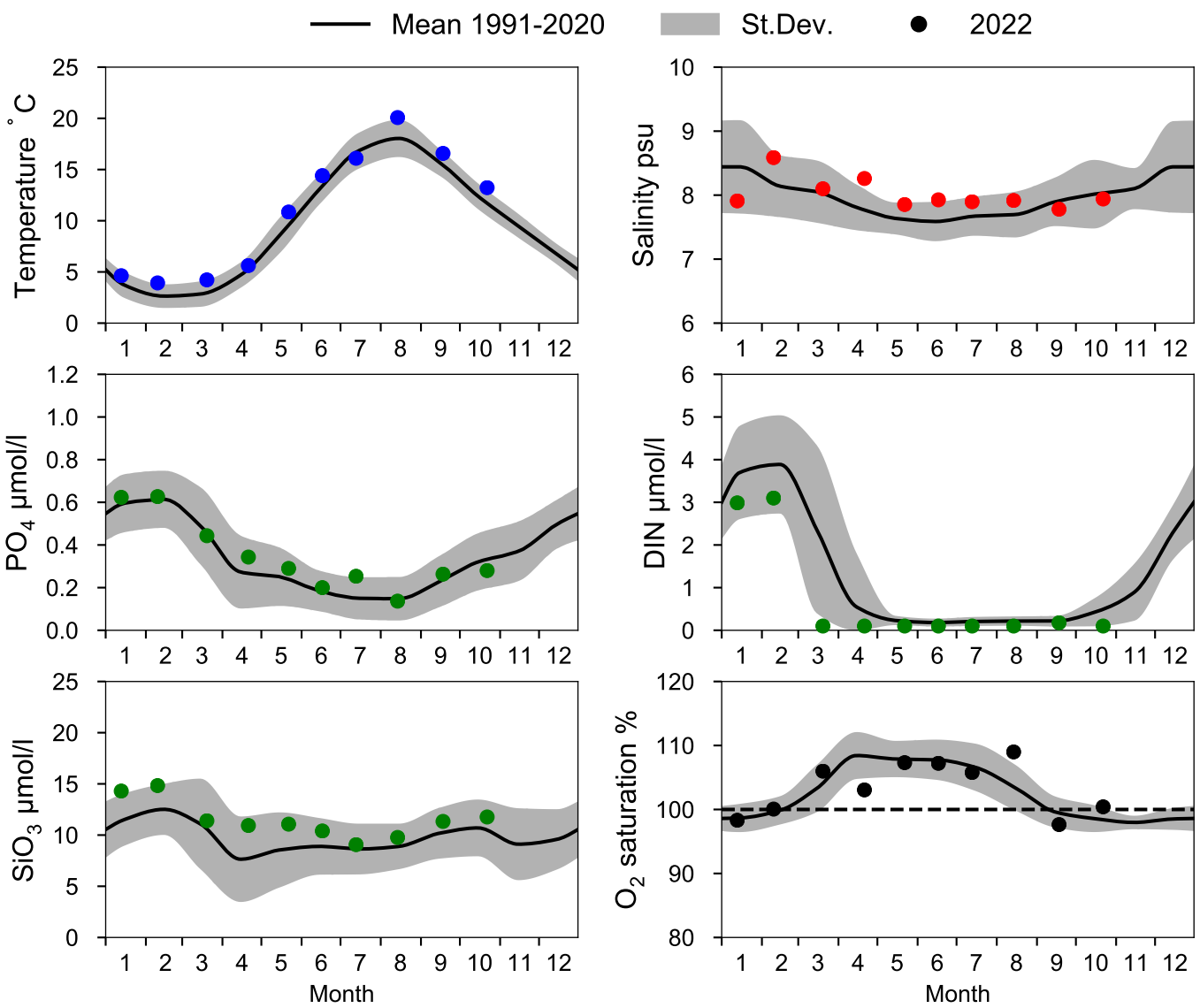


Vertical profiles BY2 ARKONA
October

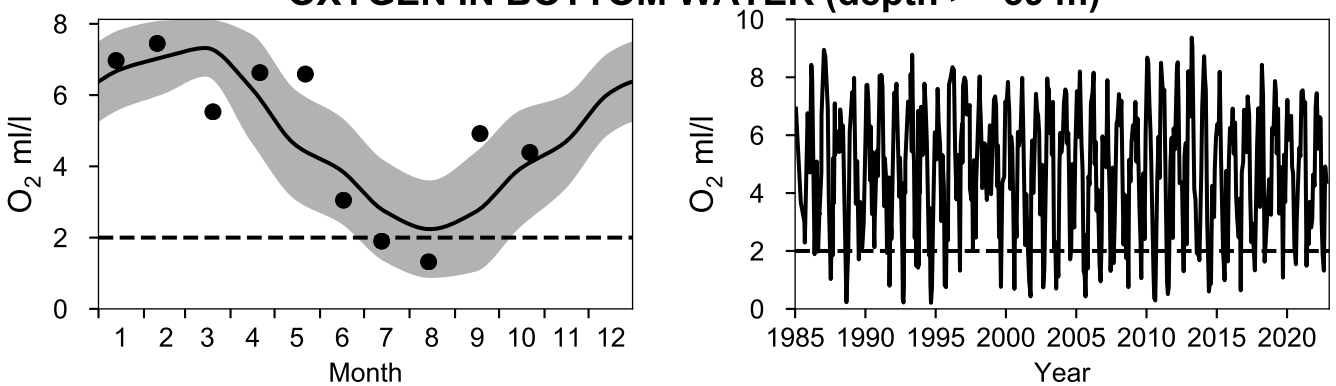


STATION BY1 SURFACE WATER (0-10 m)

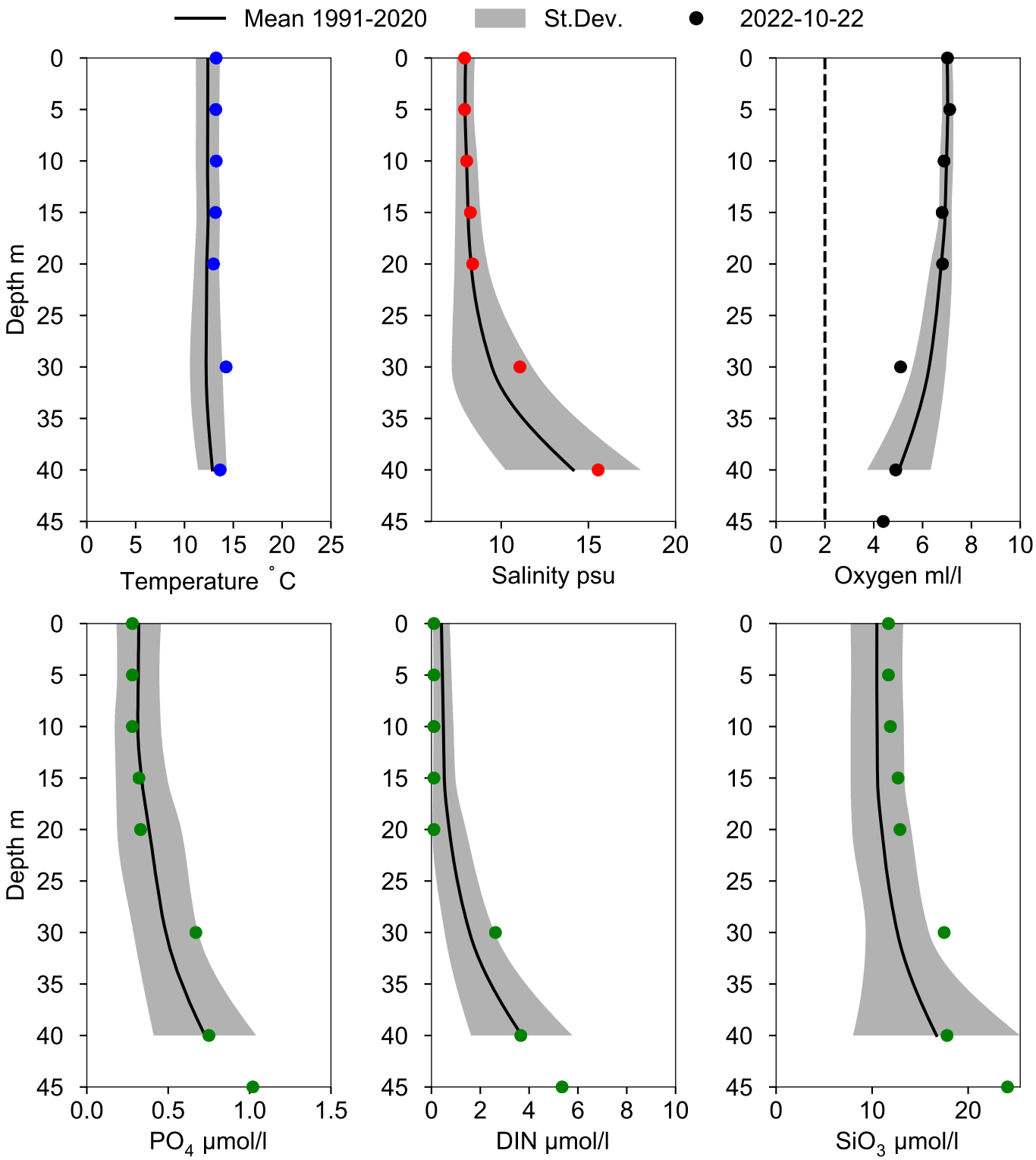
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 39 m)

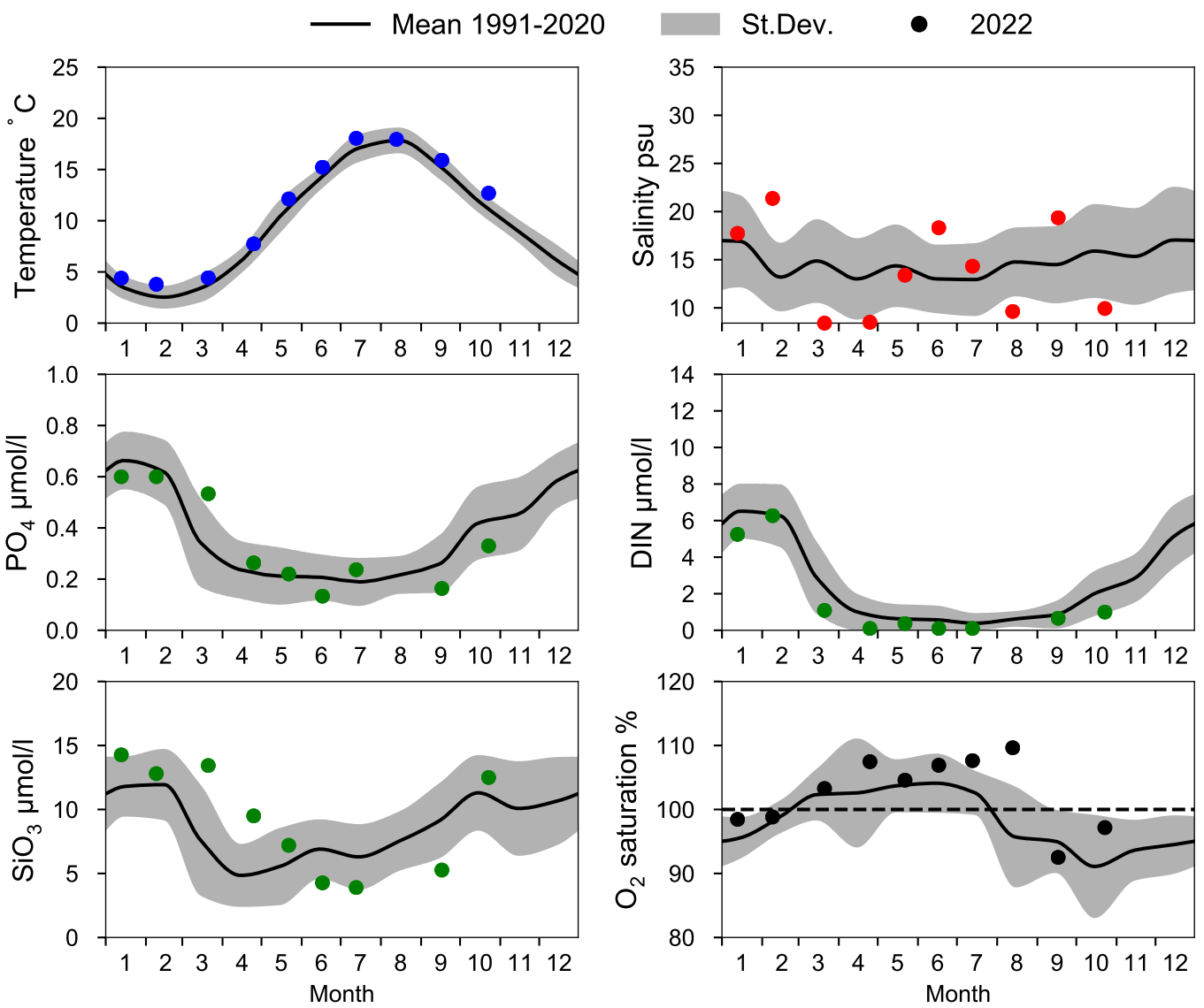


Vertical profiles BY1
October

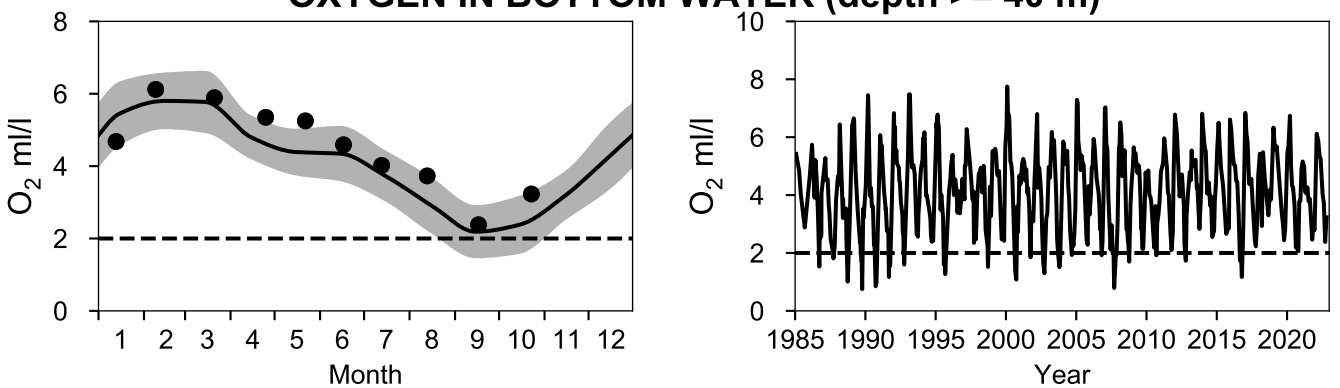


STATION W LANDSKRONA SURFACE WATER (0-10 m)

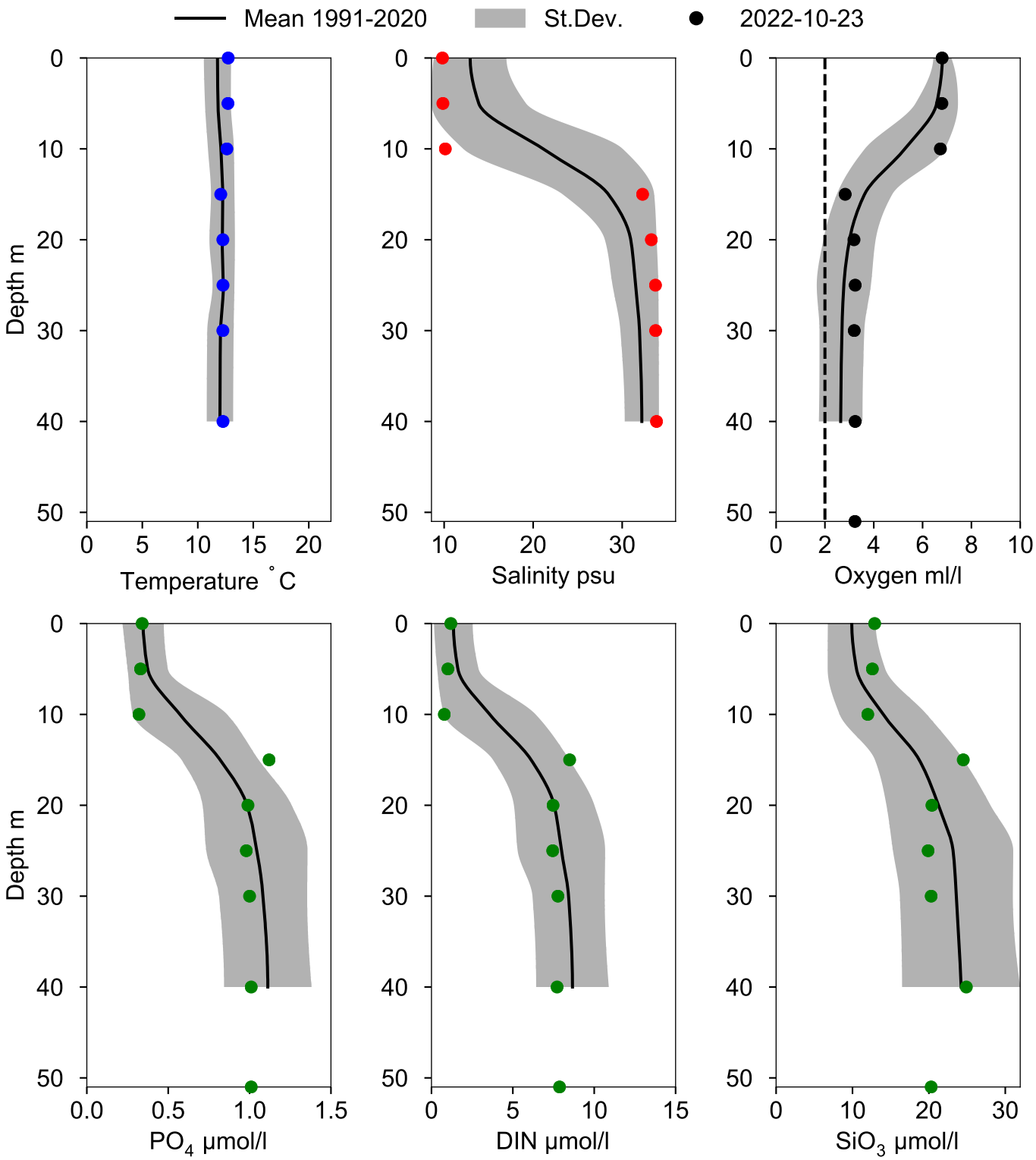
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

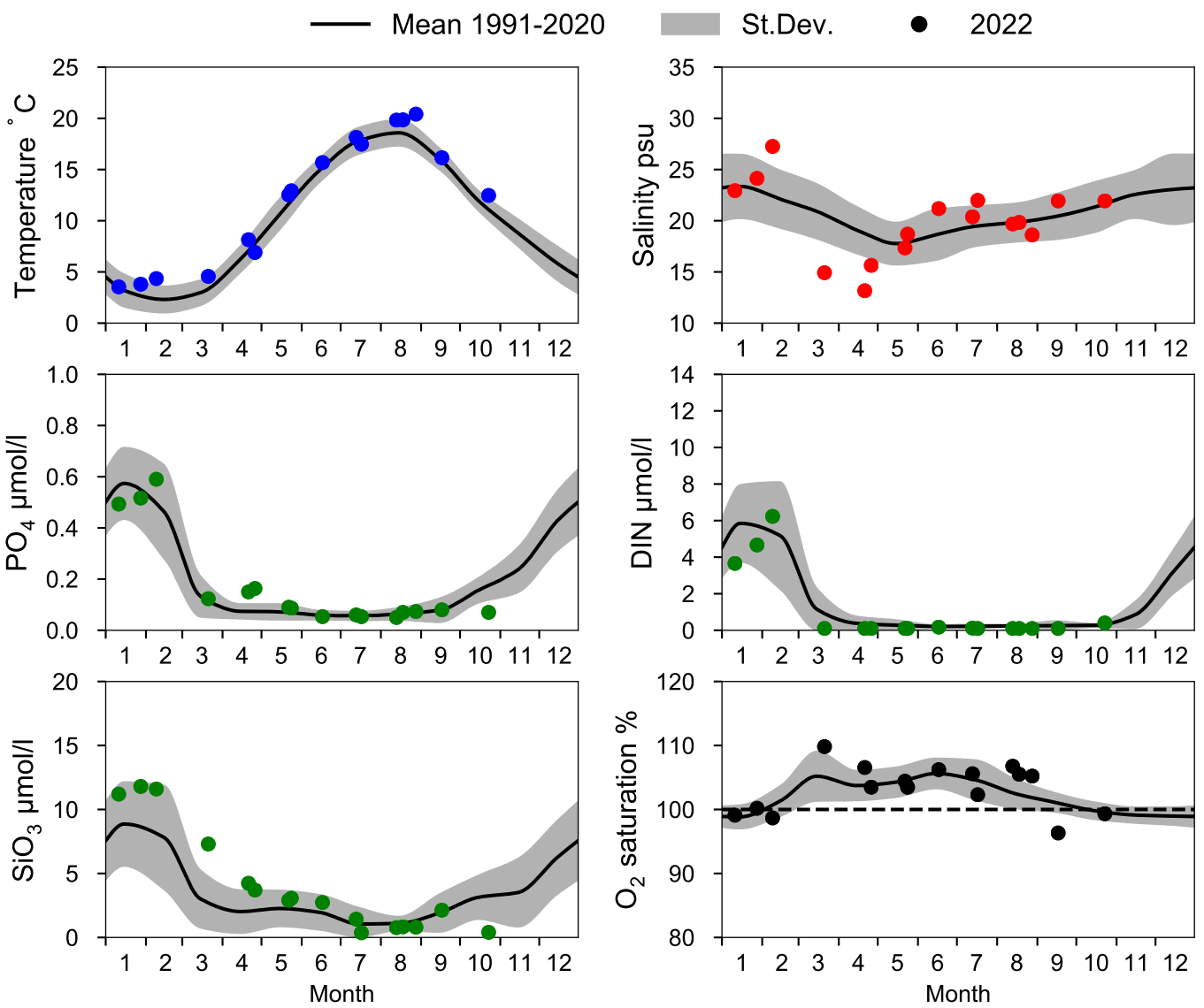


Vertical profiles W LANDSKRONA
October

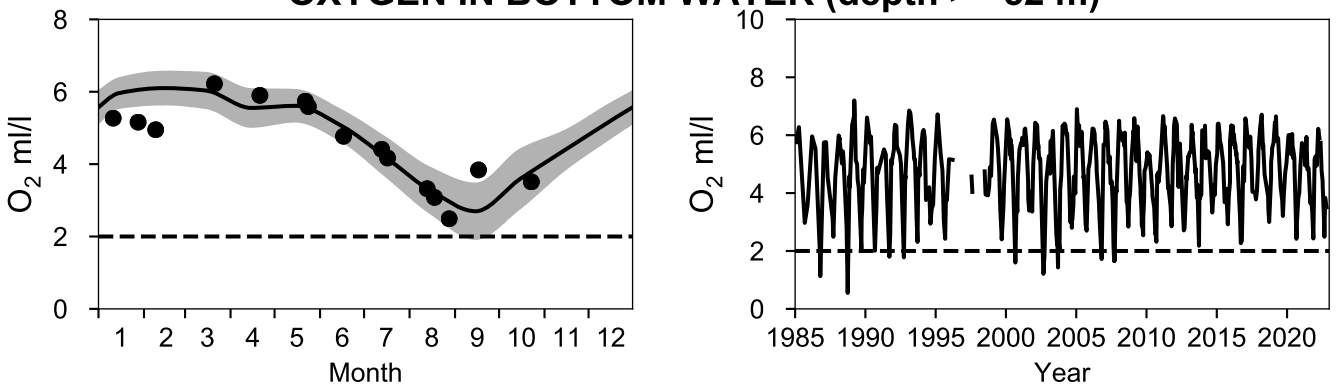


STATION ANHOLT E SURFACE WATER (0-10 m)

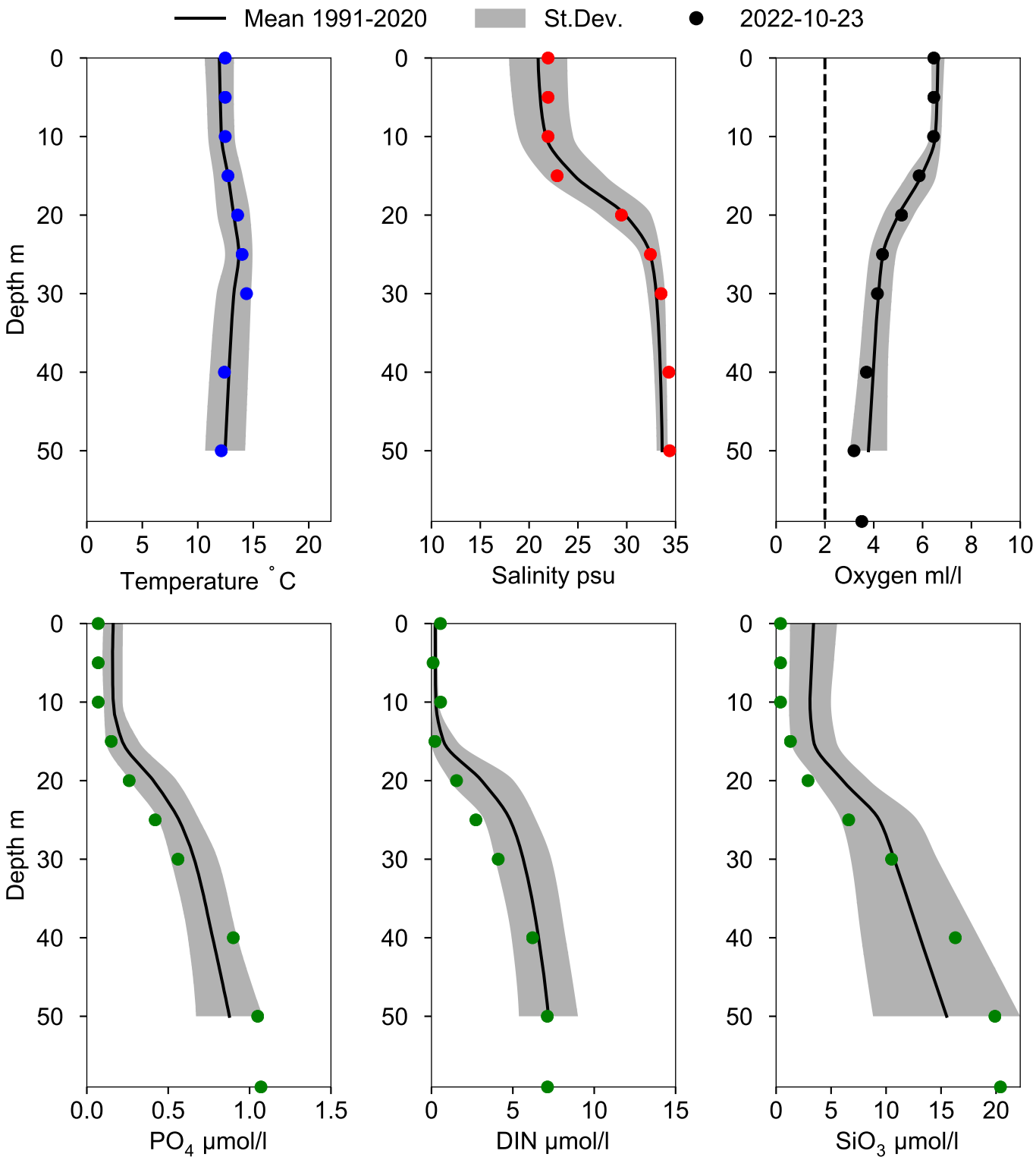
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 52 m)

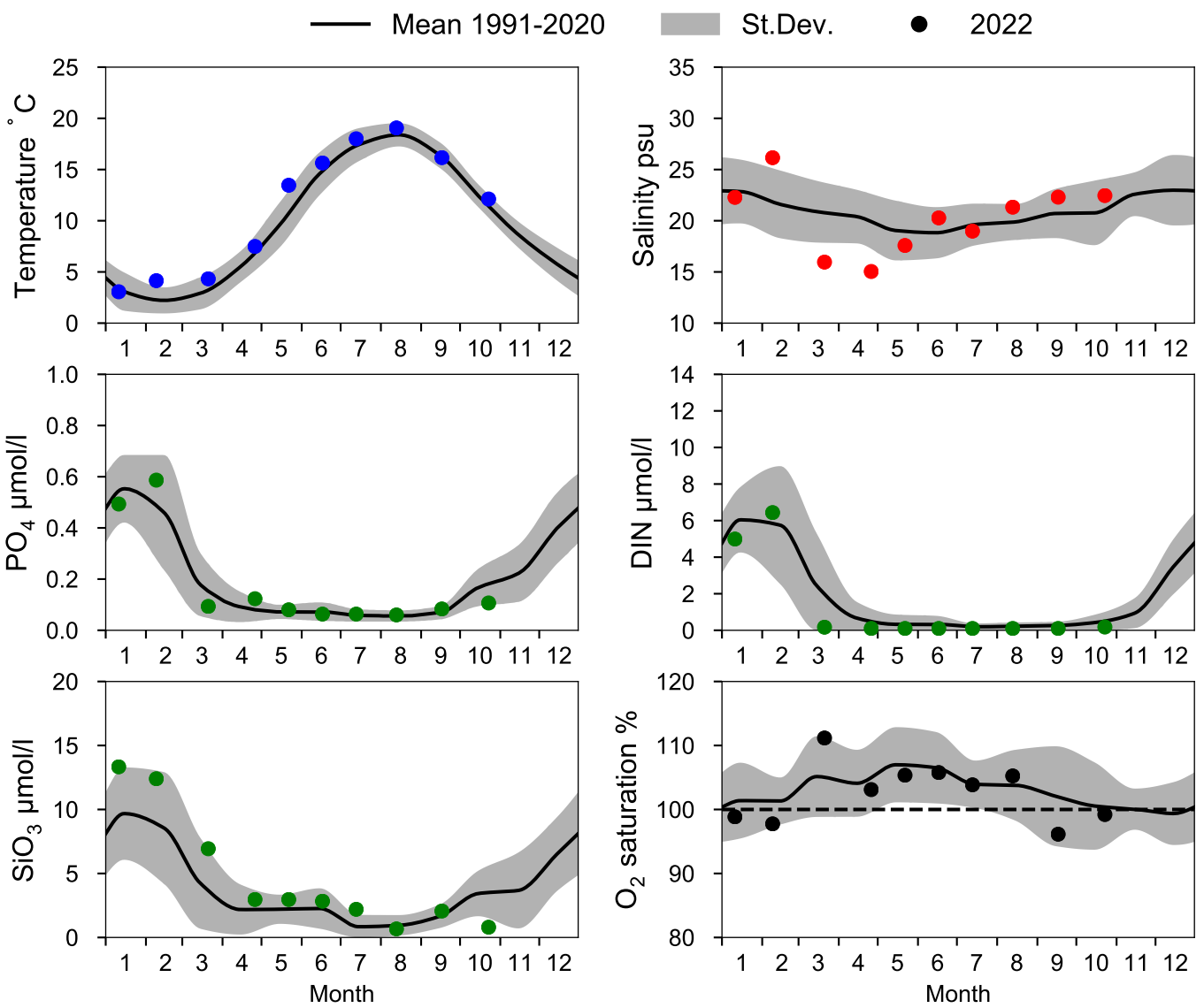


Vertical profiles ANHOLT E
October

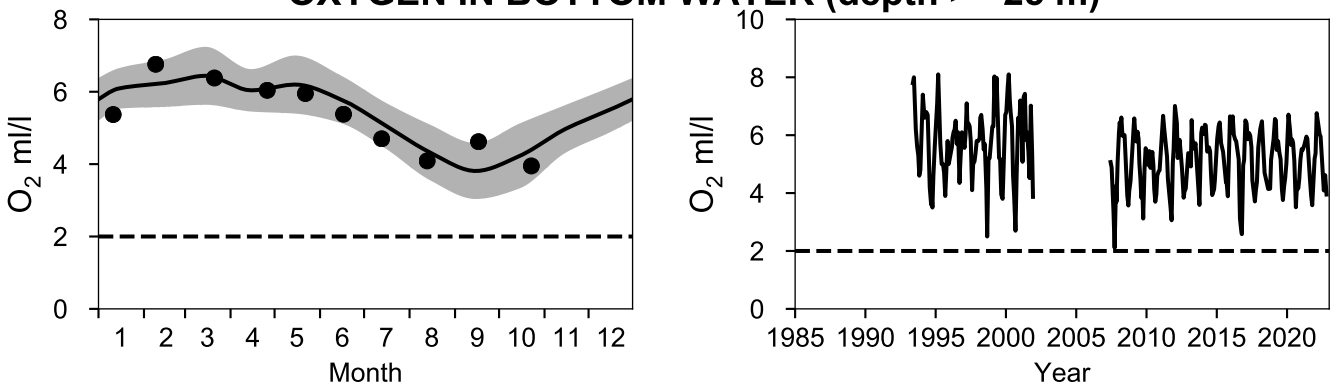


STATION N14 FALKENBERG SURFACE WATER (0-10 m)

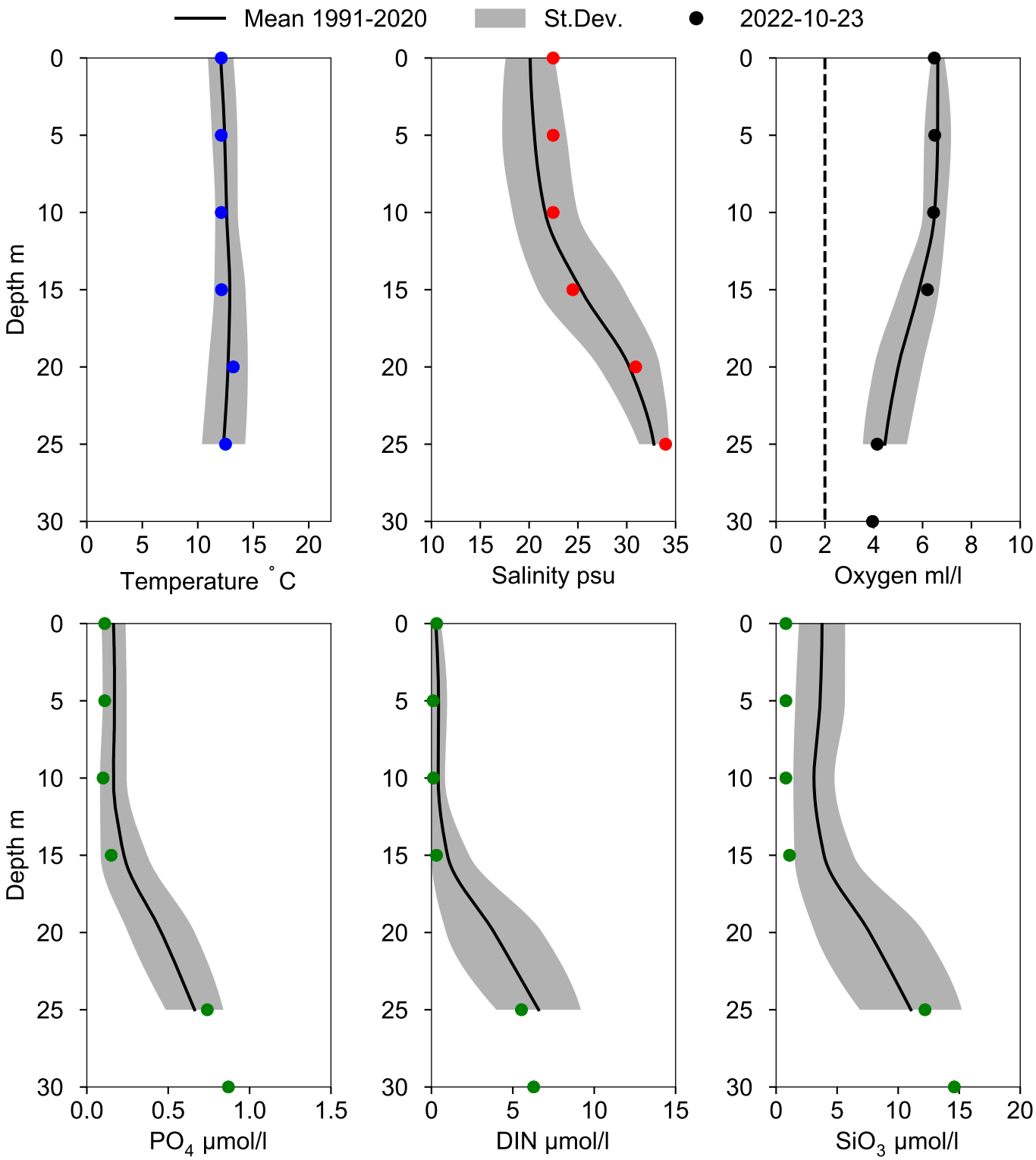
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 25 m)

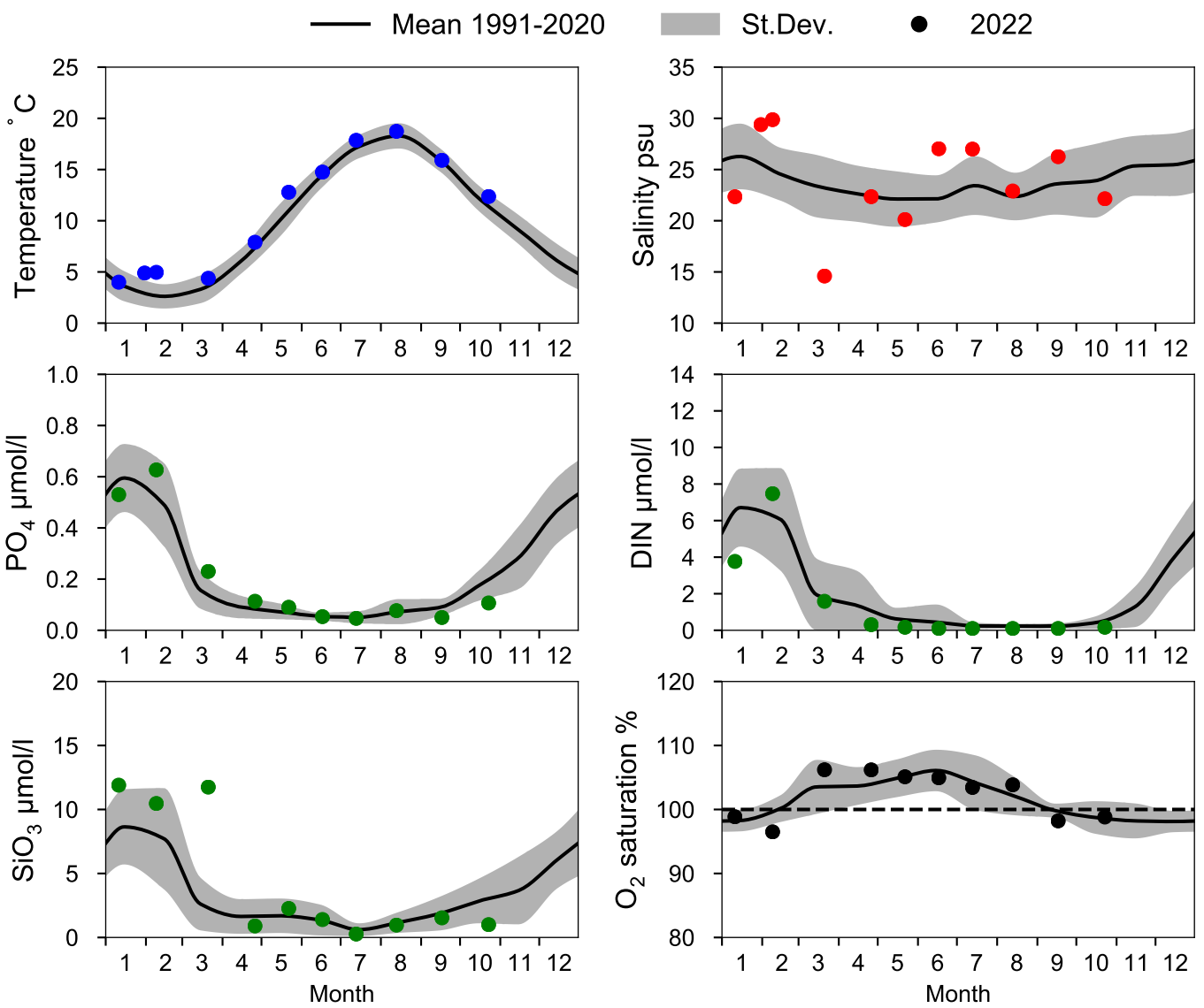


Vertical profiles N14 FALKENBERG
October

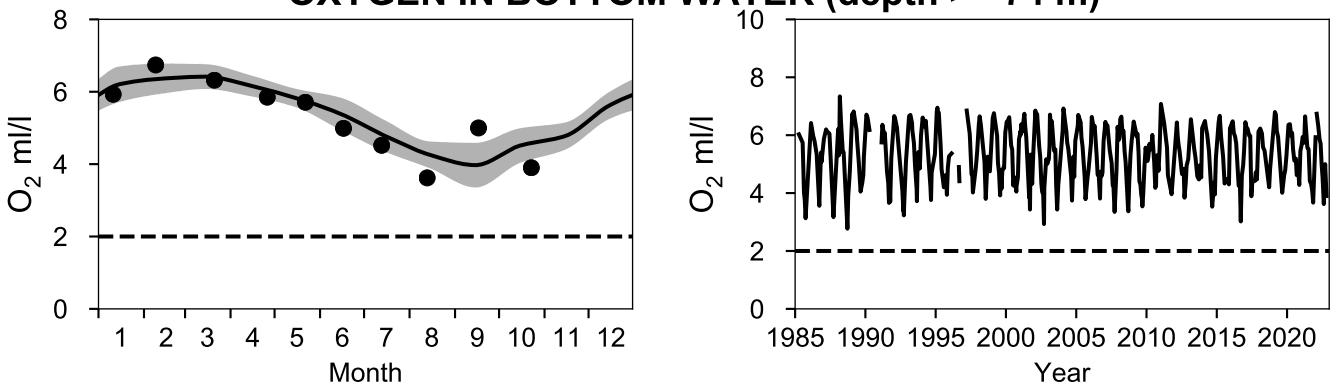


STATION FLADEN SURFACE WATER (0-10 m)

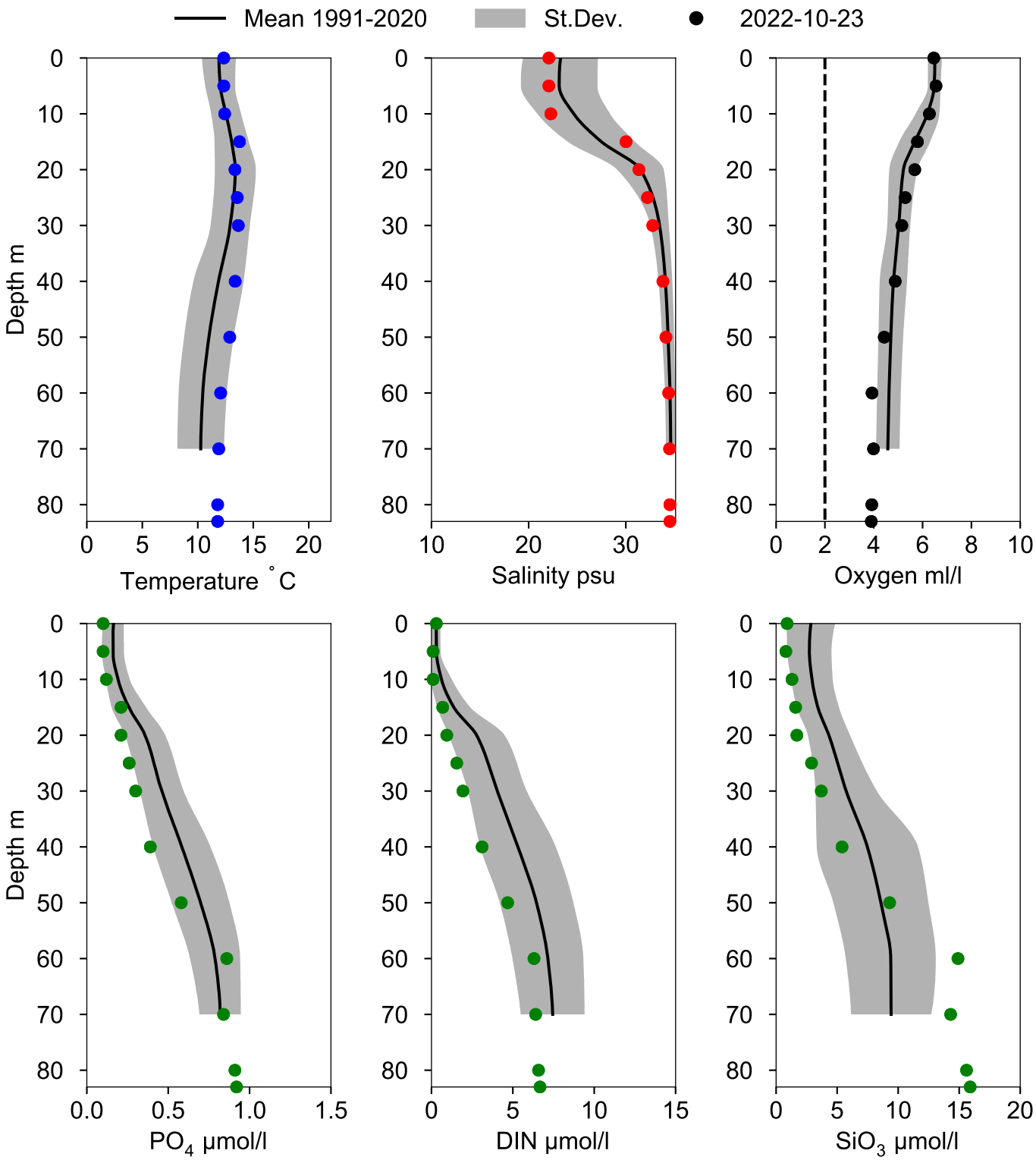
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 74 m)

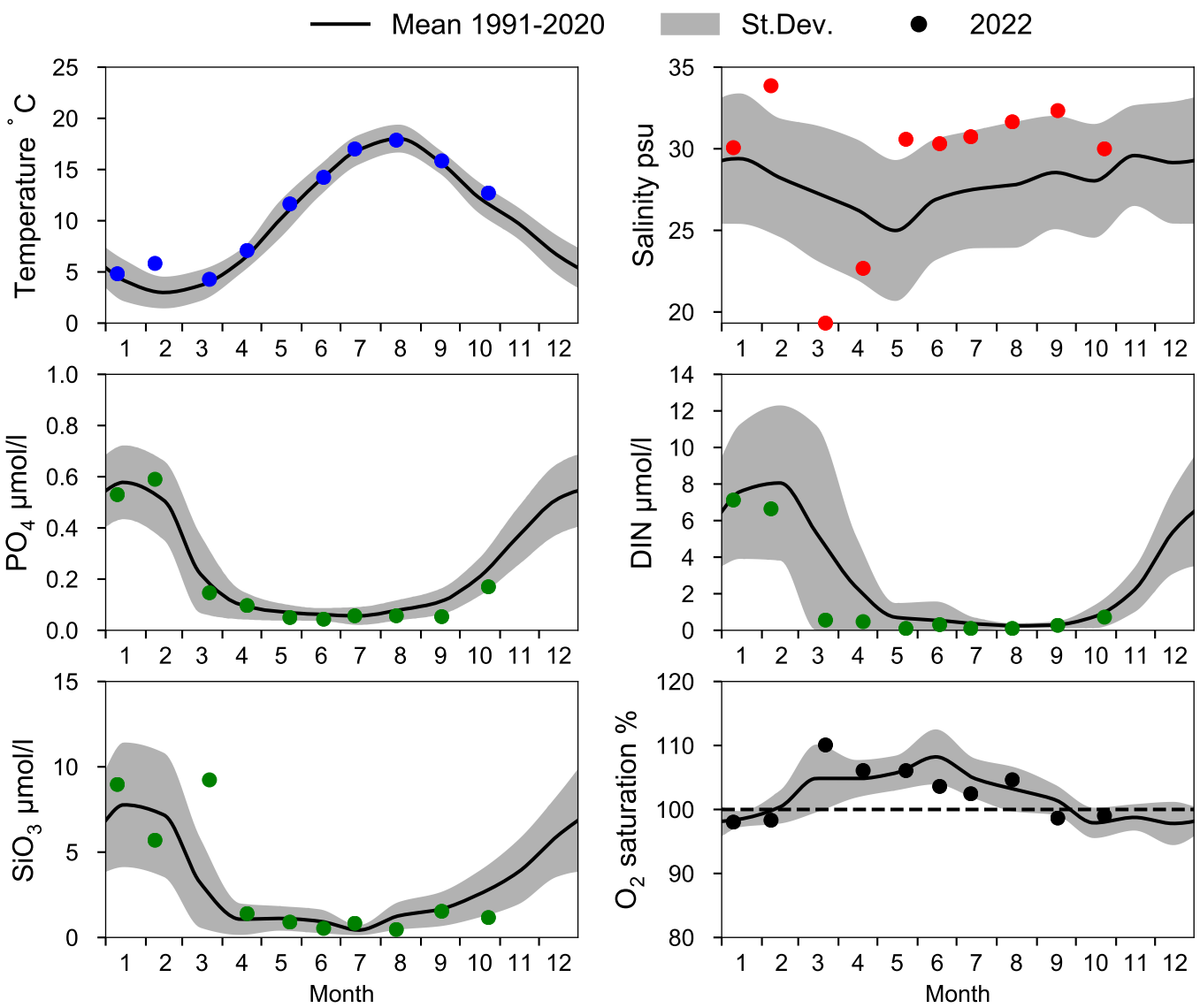


Vertical profiles FLADEN
October

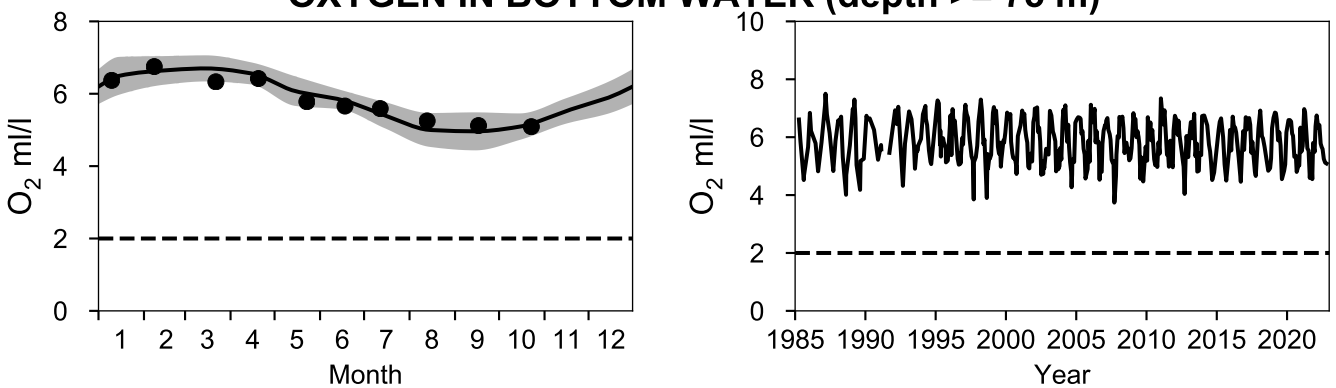


STATION P2 SURFACE WATER (0-10 m)

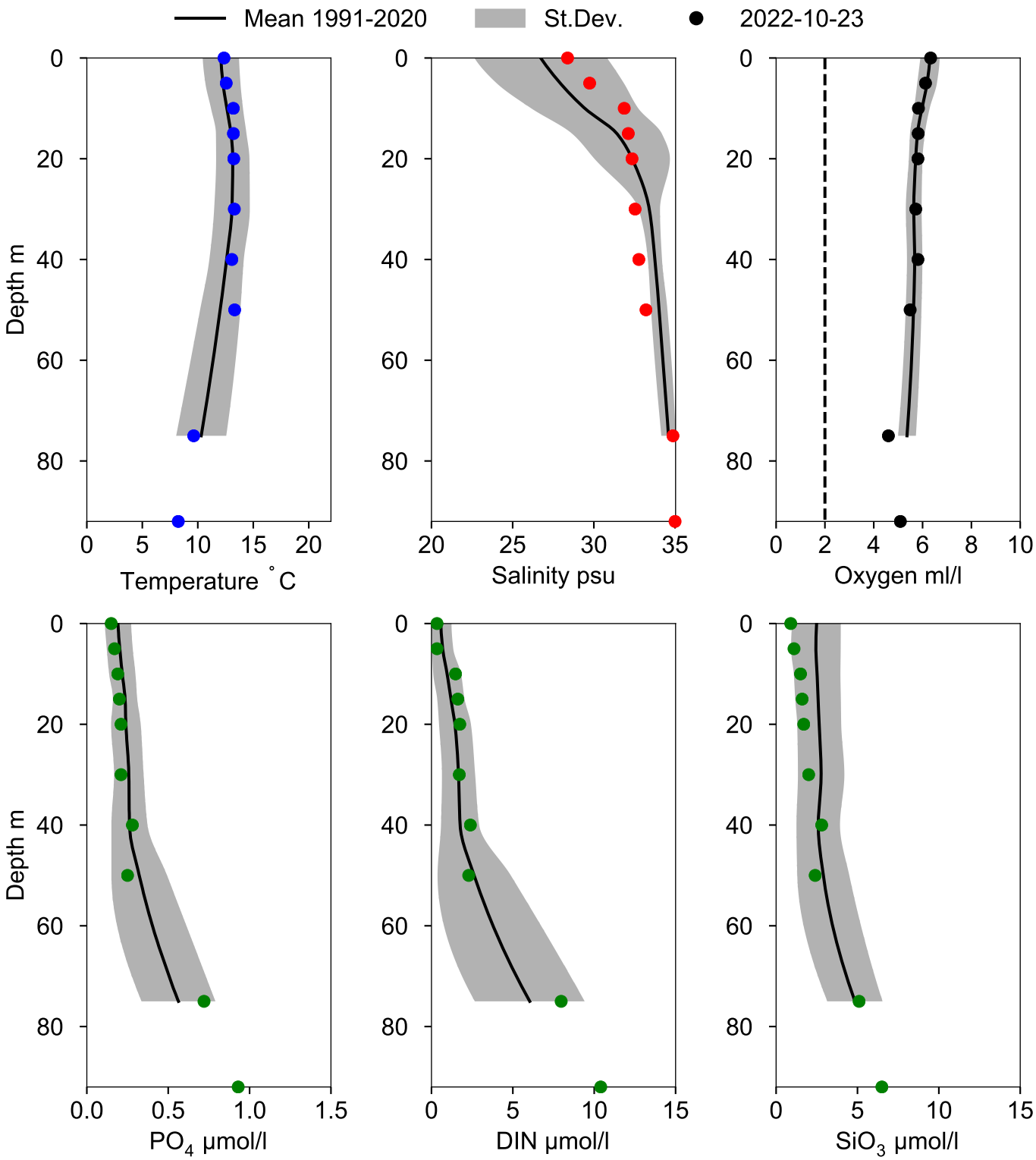
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 75 m)

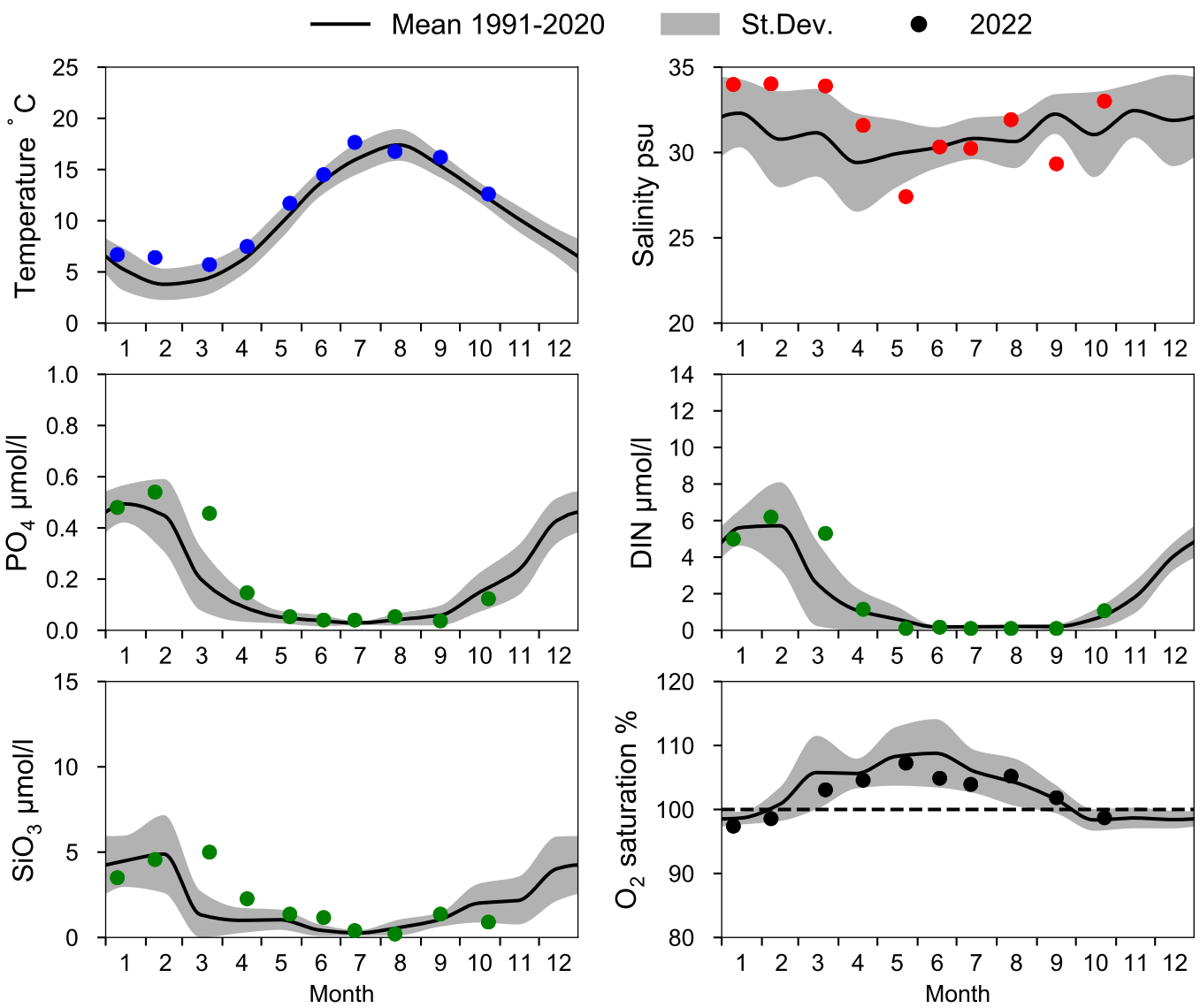


Vertical profiles P2
October

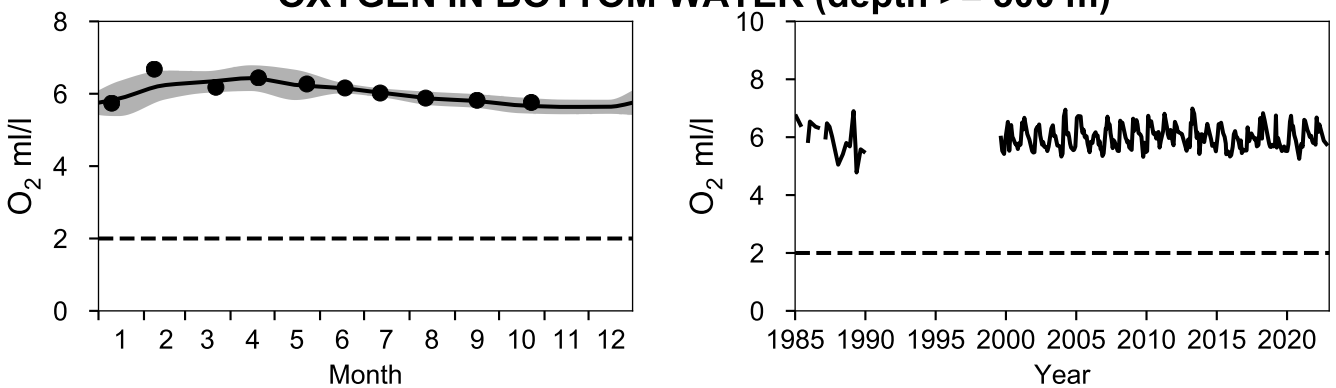


STATION Å17 SURFACE WATER (0-10 m)

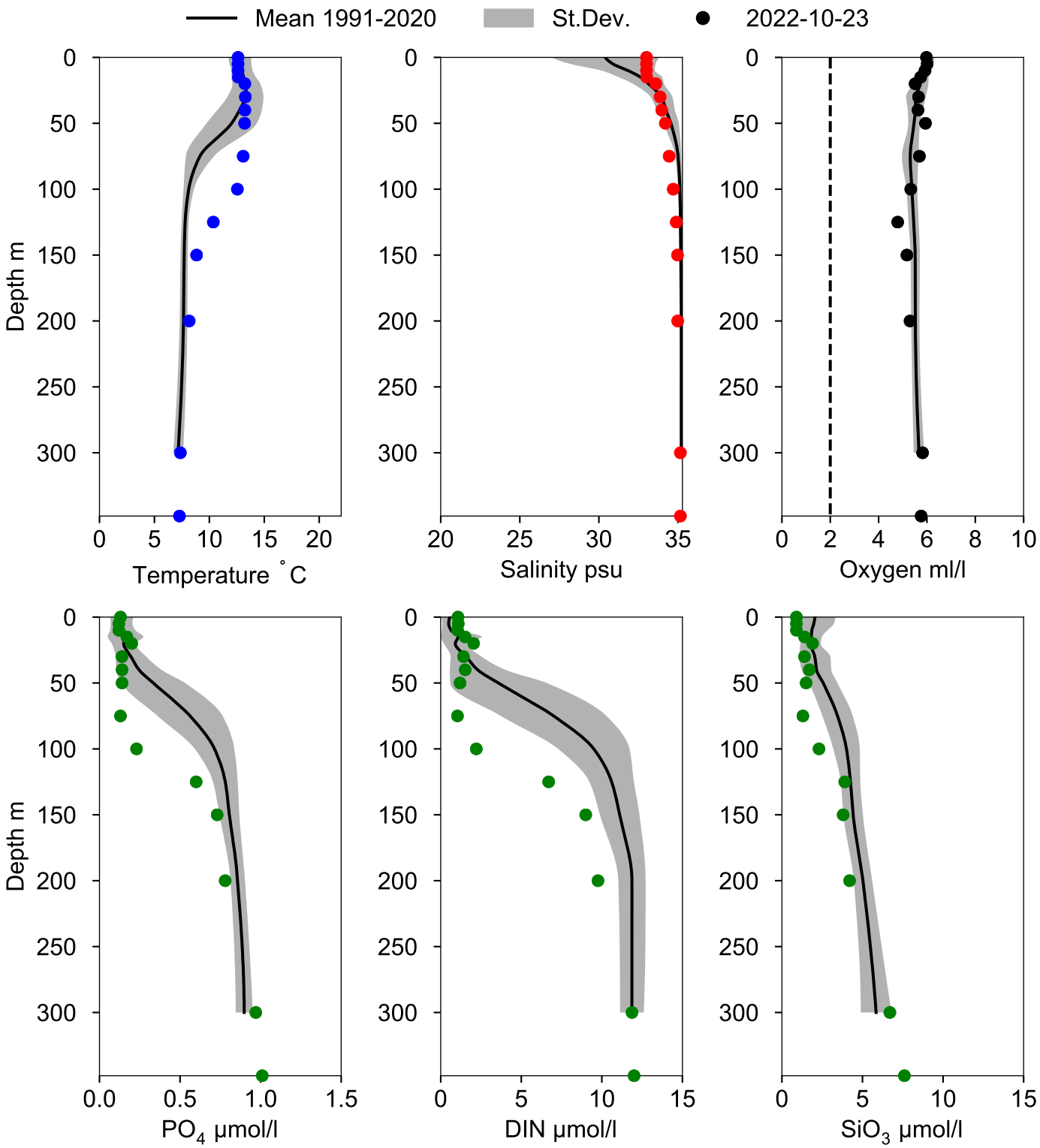
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 300 m)

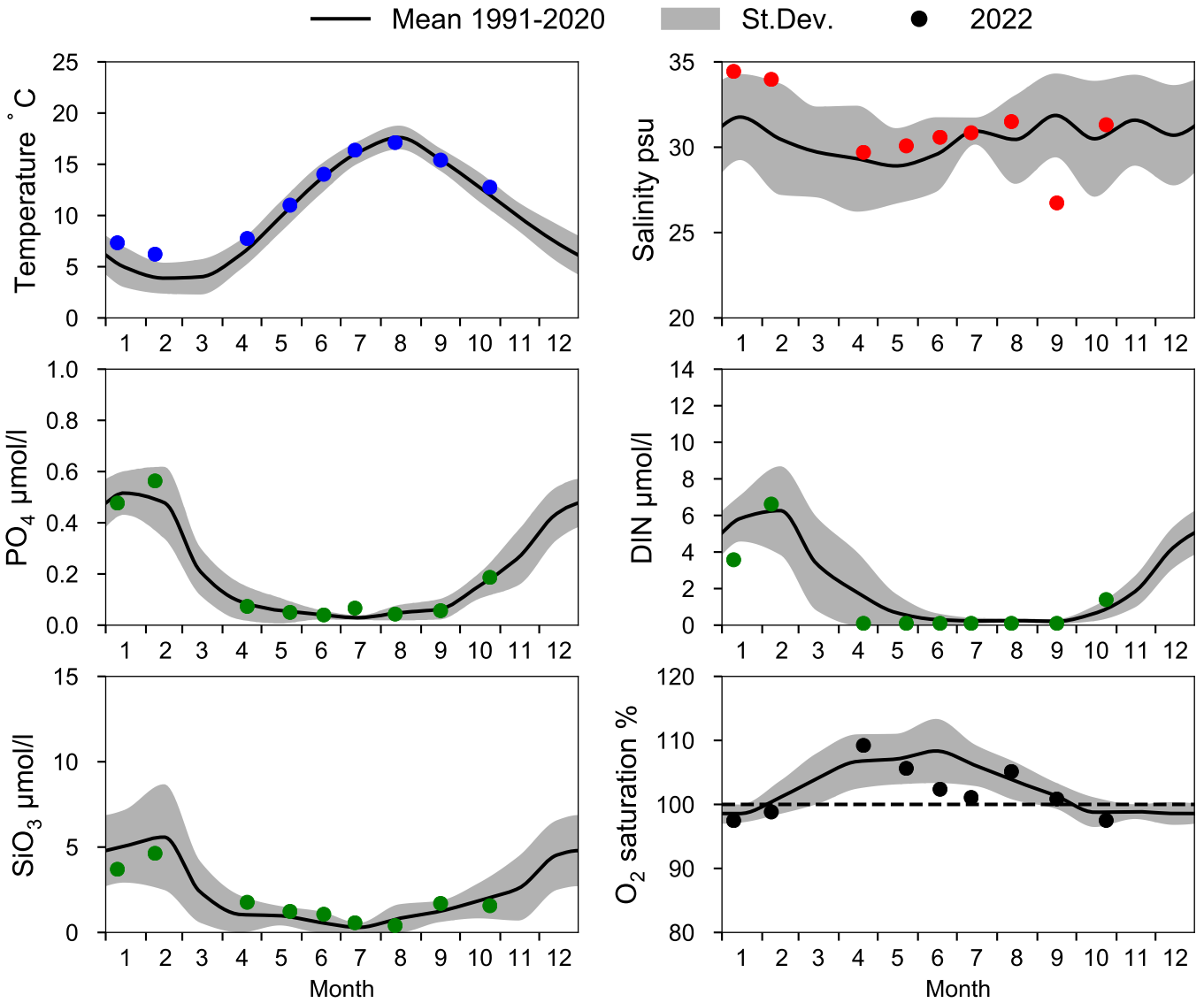


Vertical profiles Å17
October

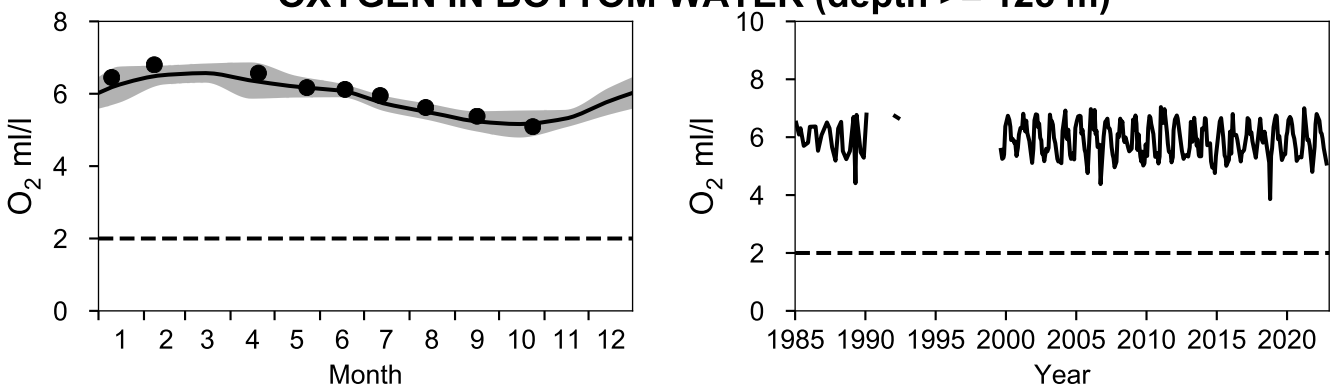


STATION Å15 SURFACE WATER (0-10 m)

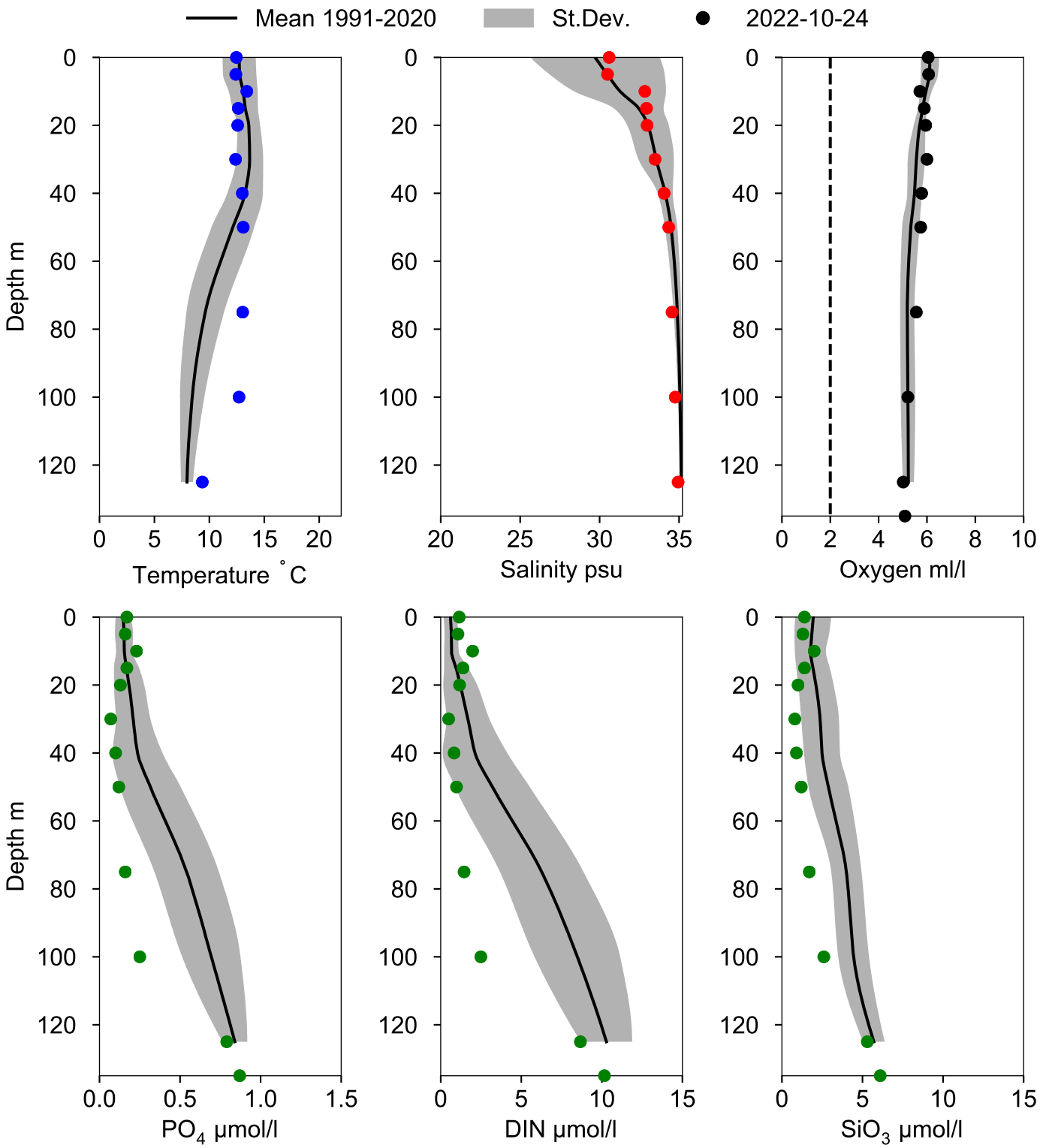
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

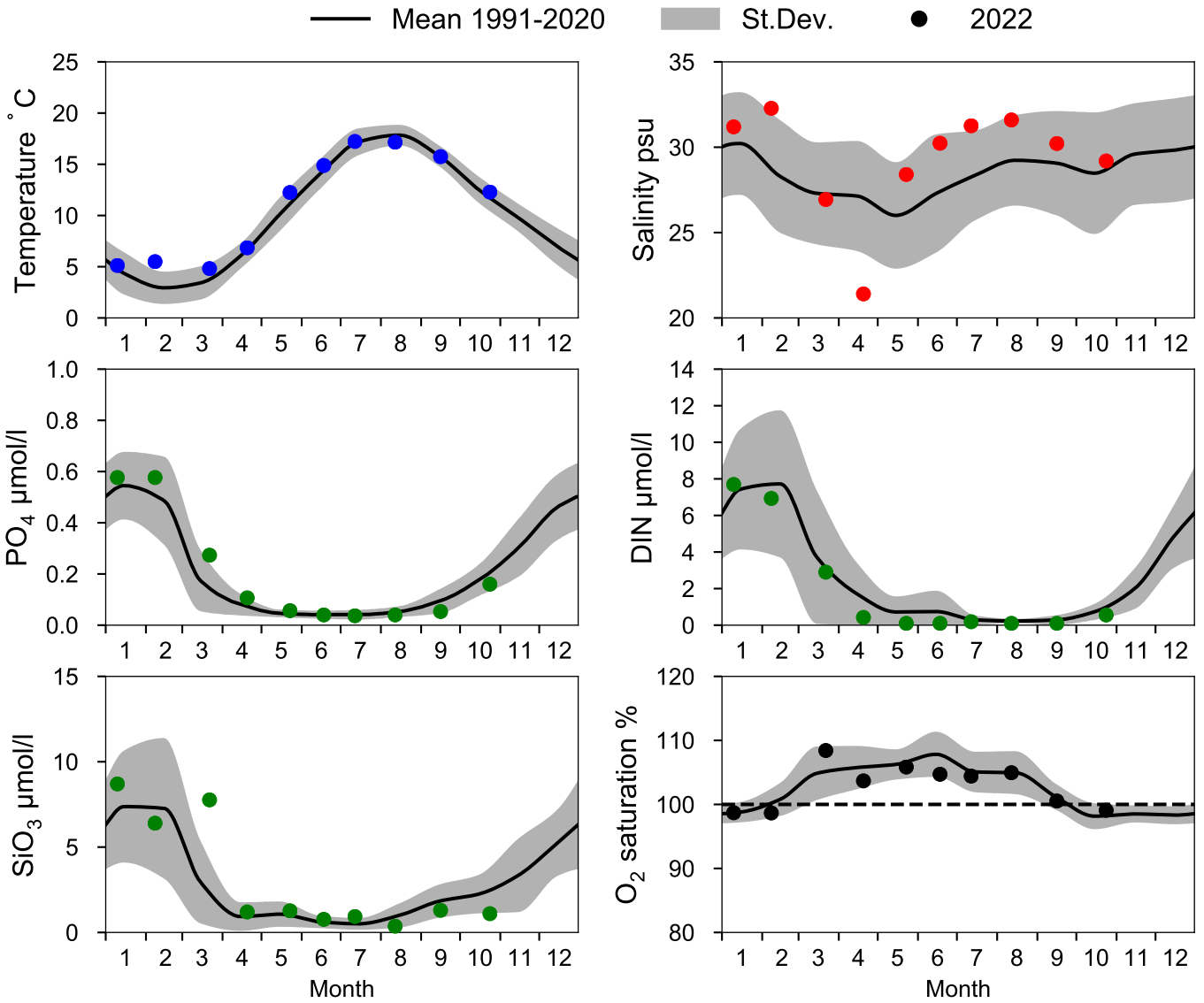


Vertical profiles Å15
October

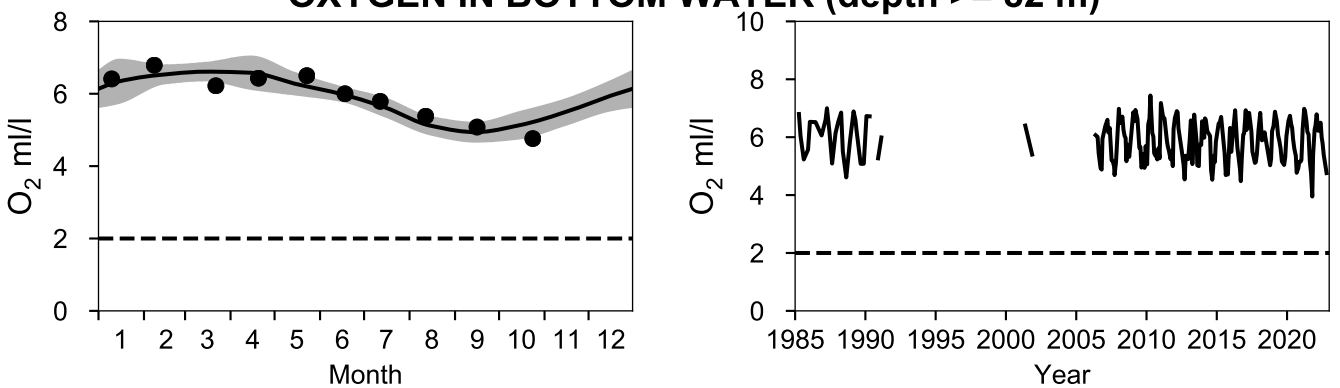


STATION Å13 SURFACE WATER (0-10 m)

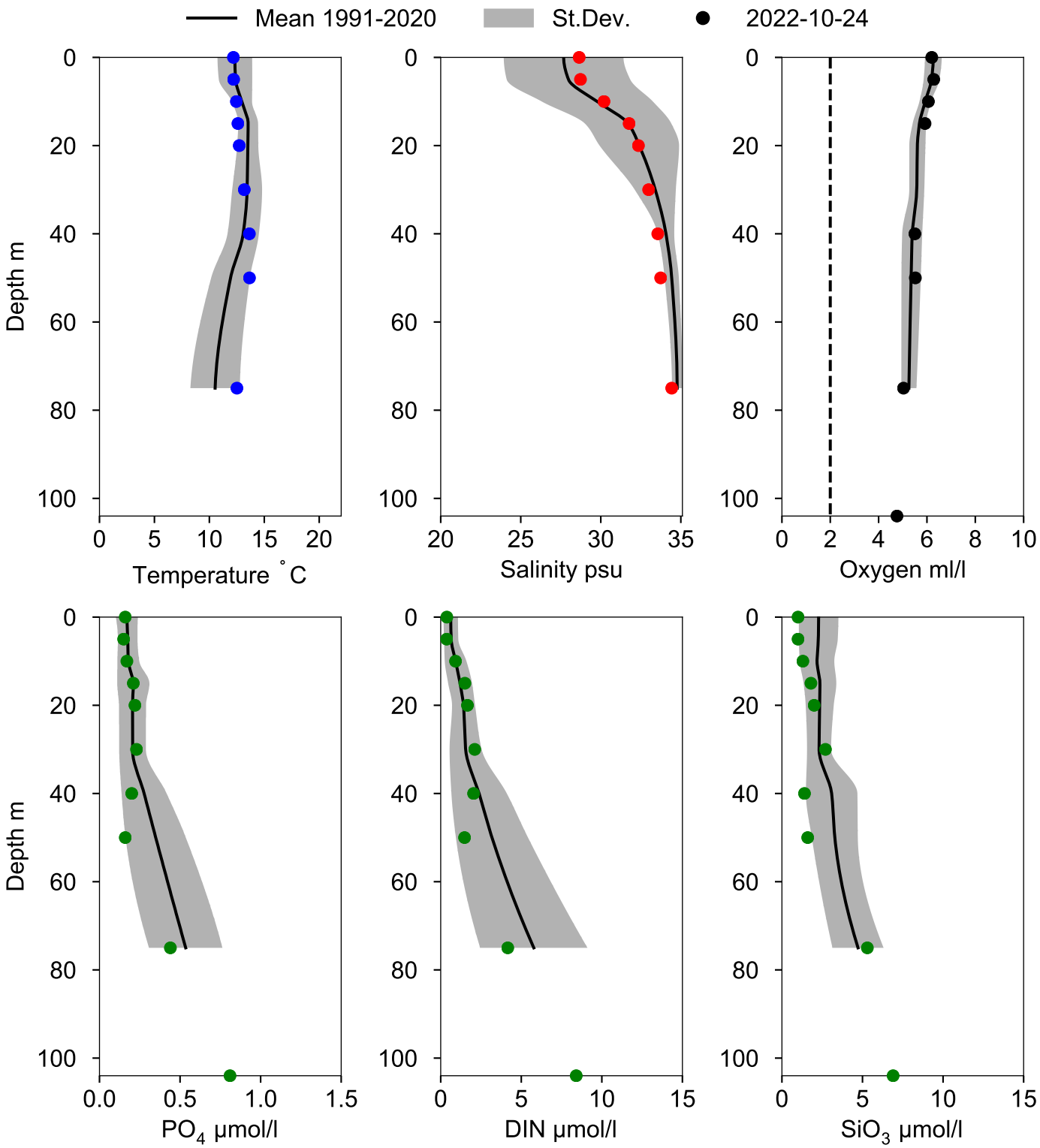
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 82 m)

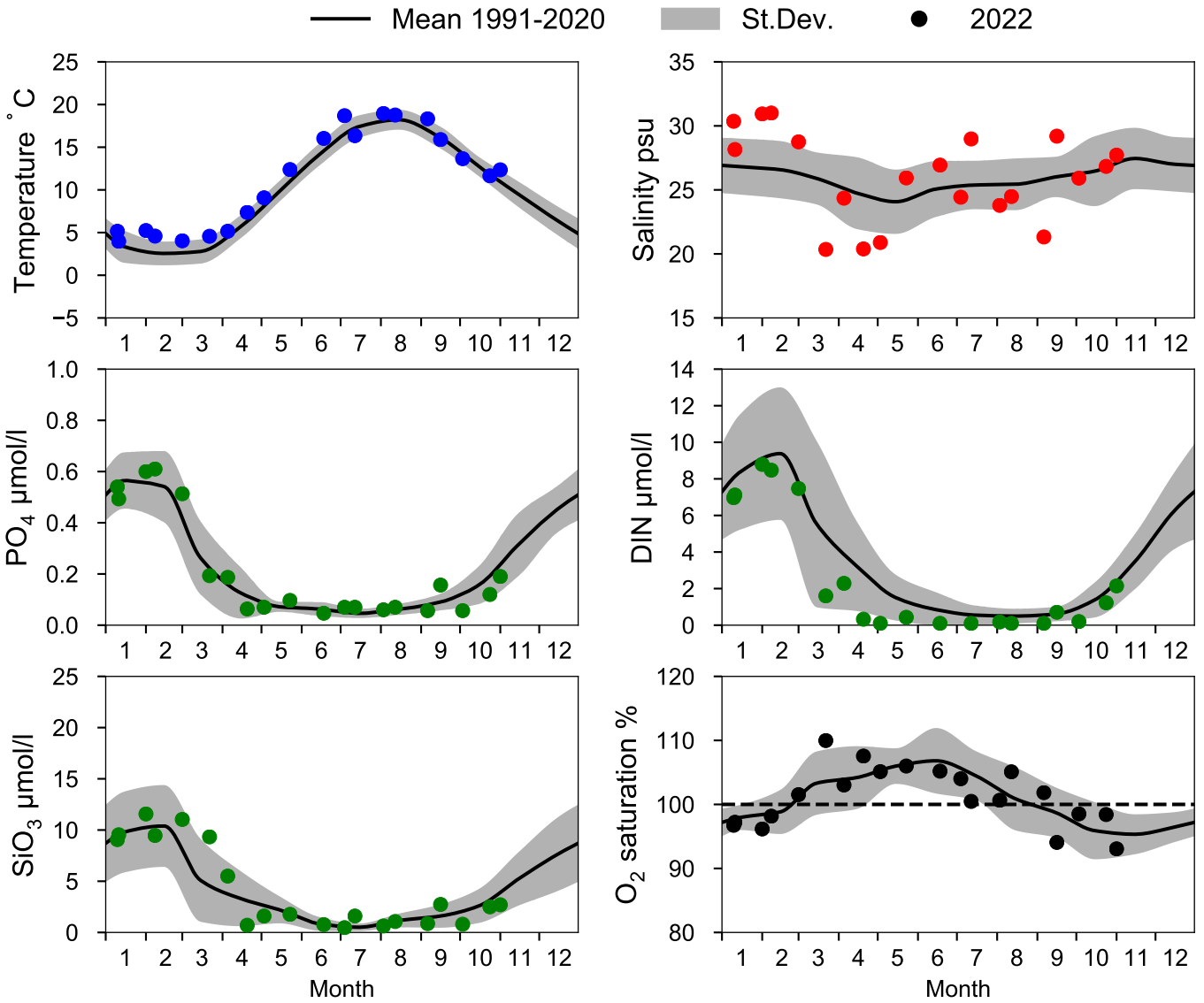


Vertical profiles Å13
October

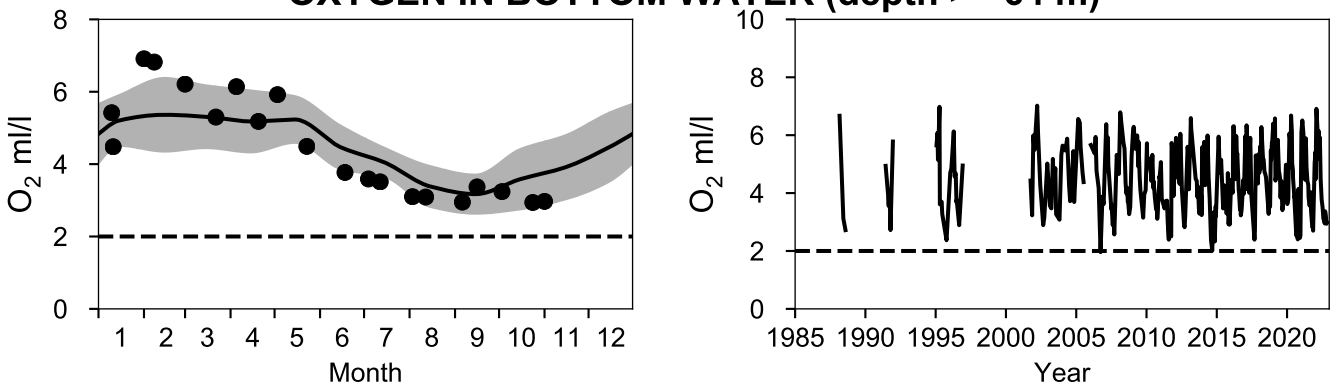


STATION SLÄGGÖ SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 64 m)



Vertical profiles SLÄGGÖ
October