Martin Hansson

Swedish Meteorological and Hydrological Institute
Oceanographic Laboratory

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

Photo: The CTD-hangar door is opening for sampling, Skagerrak, March 2023, Martin Hansson, SMHI

Survey period:	2023-03-09 - 2023-03-15
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)

Adress:
Sven Källfelts Gata 15
426 71 Västra Frölunda

Telephone:
011-495 80 00

E-mail:
Martin.Hansson@smhi.se
WWW:
http://www.smhi.se/

SUMMARY

During the cruise, which is part of the Swedish pelagic monitoring program, the Skagerrak, Kattegat, the Sound, and the Baltic Proper were visited. In addition to SMHI's regular sampling, during the cruise, a monitoring buoy was deployed at Huvudskär, and Uppsala University's measuring instruments were serviced at Östergarnsholm, east of Gotland.

The nutrient concentration in the surface waters of the Skagerrak and Kattegat had generally started to decrease due to ongoing spring bloom. High winter levels were still found in the Baltic Proper. The beginning of the spring bloom could only be noted in the southern parts of the Baltic Proper. In the deep water of the Baltic Proper, nutrient and hydrogen sulphide levels remained very high. In the deep basins around Gotland, there was no oxygen from 70-80 m. In the Eastern Gotland Basin, hydrogen sulphide levels increased rapidly to record levels below 125 m, and in the Western Gotland Basin, levels of hydrogen sulphide and nutrients were much higher than normal.

The next regular expedition with Svea is planned for April 12-18, starting in Lysekil and ending in Gothenburg.

RESULTS

The cruise was carried out aboard R/V Svea, starting in Kalmar on March 9 and ending in Lysekil on March 15. The cruise began with light winds, but winds increased to gale force in the south-eastern Baltic Sea. In the Bornholm Basin, the winds decreased before increasing to storm in the gusts when Svea was in the Sound and southern Kattegat. The cruise ended with light to moderate winds in Skagerrak. The air temperature varied between 2 and 8 degrees.

SMHI's ocean monitoring buoy at Huvudskär was deployed during the cruise, and sensor replacement, service, and maintenance were carried out on Uppsala University's anchored CO2 measurement system at Östergarnsholm, east of Gotland. In the southern Kattegat, a bottom rig (P22) was to be replaced for the Skåne County Administrative Board, but strong winds and darkness caused the pickup and deployment to be cancelled.

Three researchers from SMHI and SciLifeLab/KTH joined the cruise for sampling with Svea's IFCB (Imaging FlowCytobot, which is a type of instrument used to automatically capture images of microscopic particles) and for taking filtered phytoplankton samples within the AMIME-project.

Svea's instruments for continuous measurements of surface water and currents, Ferrybox and ADCP (Acoustic Doppler Current Profiler), were in operation throughout the expedition (see figures 8 and 9). Svea's profiling instrument, MVP (Moving Vessel Profiler), was operated during the daytime from Kalmar to the southwest Baltic Sea, where the MVP was unfortunately lost due to cable breakage.

During the cruise, a cable broke on the oxygen analysis instrument, and at many stations, oxygen analysis in water samples at depths between 5 and 30 m was cancelled. Therefore, oxygen concentration measurements from these depths are only available from the CTD oxygen sensor. At these depths, where there is no oxygen deficiency, analyses from water samples and oxygen sensor measurements also match well.

Extra phytoplankton samples from surface water were taken at the Släggö and Anholt E stations for a project carried out at Uppsala and Stockholm universities.

The report is based on data that has undergone initial quality control and has been compared to monthly averages for the period 1991-2020. When further quality review is conducted, some values may change. Values reported in the report have been rounded to the nearest tenth and may differ from published values. Data is published as soon as possible on the data host's website, usually within about a week after the expedition ends. Some analyses are performed after the expedition and are therefore published later.

Data can be downloaded here:https://sharkweb.smhi.se/hamta-data/

The Skagerrak

The temperature in the surface water (0-10 m) of Skagerrak had decreased by an additional 1-2 degrees in the open sea since February and now varied between 3-5°C, which is normal for the season. The salinity in the surface water of the open sea varied between 28-31 psu, which is normal, except at P2 where it is higher than normal at 33 psu.

The temperature and salinity stratification coincided and were found slightly deeper in the southern and central parts around 20-25 meters deep, while somewhat shallower closer to the Swedish coast, 10-15 meters deep.

Nutrient levels in the surface water had started to decrease due to the spring bloom and levels were normal for the season, except for phosphate, which showed slightly higher levels than normal in the southern and central parts of Skagerrak. Nutrient levels in the deep water were normal for the season. Chlorophyll fluorescence, which is a measure of phytoplankton activity, showed ongoing plankton activity throughout the surface water down to the stratification.

No oxygen deficiency was noted in Skagerrak. However, at the outer stations in Skagerrak, oxygen levels were lower than normal, 5.7-6.0 ml/l. At the coastal station Släggö, where oxygen deficiency is sometimes observed in the bottom water, the oxygen situation was good with a concentration just below 6 ml/l, which is normal for the season.

The Kattegat and the Sound

The temperature in the surface water (0-10 m) in the Kattegat and the Sound was normal for the season. Compared to the measurements in February, the temperature was unchanged or had decreased slightly, ranging between 3-4°C. The salinity of the surface water was higher than normal in the northern and central parts of the Kattegat, 26-27 psu, while normal values were noted in the Sound, 10-21 psu. In the Kattegat, there was a temperature and salinity gradient at 10-20 m depth.

In the open sea areas of the Kattegat, phytoplankton activity had been ongoing for some time, which was reflected in the measurements of chlorophyll fluorescence, and also in the concentration of nutrients, which had generally decreased further since February. The concentration of inorganic nitrogen, phosphorus, and silica was normal in the well-mixed surface layer. The silica concentration, which was lower than normal in February, had now increased somewhat and was now showing normal values. In the deep water, nutrient concentrations were normal or slightly below normal, especially the concentration of inorganic nitrogen was much lower than normal.

The oxygen situation in the deep water of the Kattegat was good. No oxygen deficiency (<4 ml/l) was measured.

The Baltic Proper

The temperature of the surface water had decreased slightly since the measurements taken in February and varied between 2-4 °C. The temperature was normal for the season. It was warmest in the southern basins and colder further north. The salinity of the surface water varied between 7-9 psu, which was higher than normal at many stations.

The surface water was well-mixed down to a depth of 50-70 m where the halocline began. At shallower stations in the Arkona Basin, the halocline was around 40 m. In the deep water, the temperature was above normal while the salinity was normal or slightly above normal. Just like in February, nutrient and hydrogen sulphide levels increased sharply around 125 m and were above normal at greater depths in the Eastern Gotland Basin. In the Northern Baltic Proper and Western Gotland Basin, the hydrogen sulphide concentration remained lower than in the Eastern Gotland Basin but still higher than normal. Nutrient levels also increased to above normal at the sharp transition between oxygenated and anoxic water. Hydrogen sulphide was measured at all stations except in the Bornholm Basin, Hanö Bight, and Arkona Basin. At BCSIII-10 in the south-eastern Baltic Sea, the oxygen situation had deteriorated in the deep water where it was oxygenated in February, and now completely anoxic conditions with hydrogen sulphide were observed from a depth of 80 m. In the Eastern and Western Gotland Basins, it was anoxic from 70-80 m, while in the Northern Baltic Proper, it became anoxic at around 80 m. In the Arkona Basin, the bottom water was well-oxygenated with concentrations above 6-7 ml/l. In the Hanö Bight and the Bornholm Basin, there was acute oxygen deficiency (<2 ml/l) from depths exceeding 60-80 m, and concentrations in the bottom water were around 2 ml/l. Compared to the oxygen measurements in February, when an inflow clearly had a positive impact on the oxygen situation, the oxygen situation was now deteriorating again. The deterioration of the oxygen situation observed at BCSIII-10 may possibly be linked to this inflow, as anoxic water from the Bornholm Basin is pushed forward into the central parts of the Baltic Sea before the inflow reaches the area.

Compared to the measurements in February, the concentration of nutrients in the surface water had generally increased, and had likely reached the maximum winter pool before the spring bloom consumes dissolved nutrients in the surface water. At the stations in the Arkona and Bornholm Basins, the concentration of dissolved inorganic nitrogen had decreased slightly, while the concentration of phosphate had increased slightly at the same stations, probably due to the beginning of the spring bloom in the area. This was also weakly reflected in increased chlorophyll fluorescence in the surface layer from the CTD in the same area.

In other parts of the Baltic Sea, the spring bloom had not yet started, which was evident from the high water clarity. Water clarity was measured to be up to 16 meters at the southern tip of Öland and 10-12 meters in other parts. Chlorophyll fluorescence in the surface layer measured from the CTD was also low in the central deep basins.

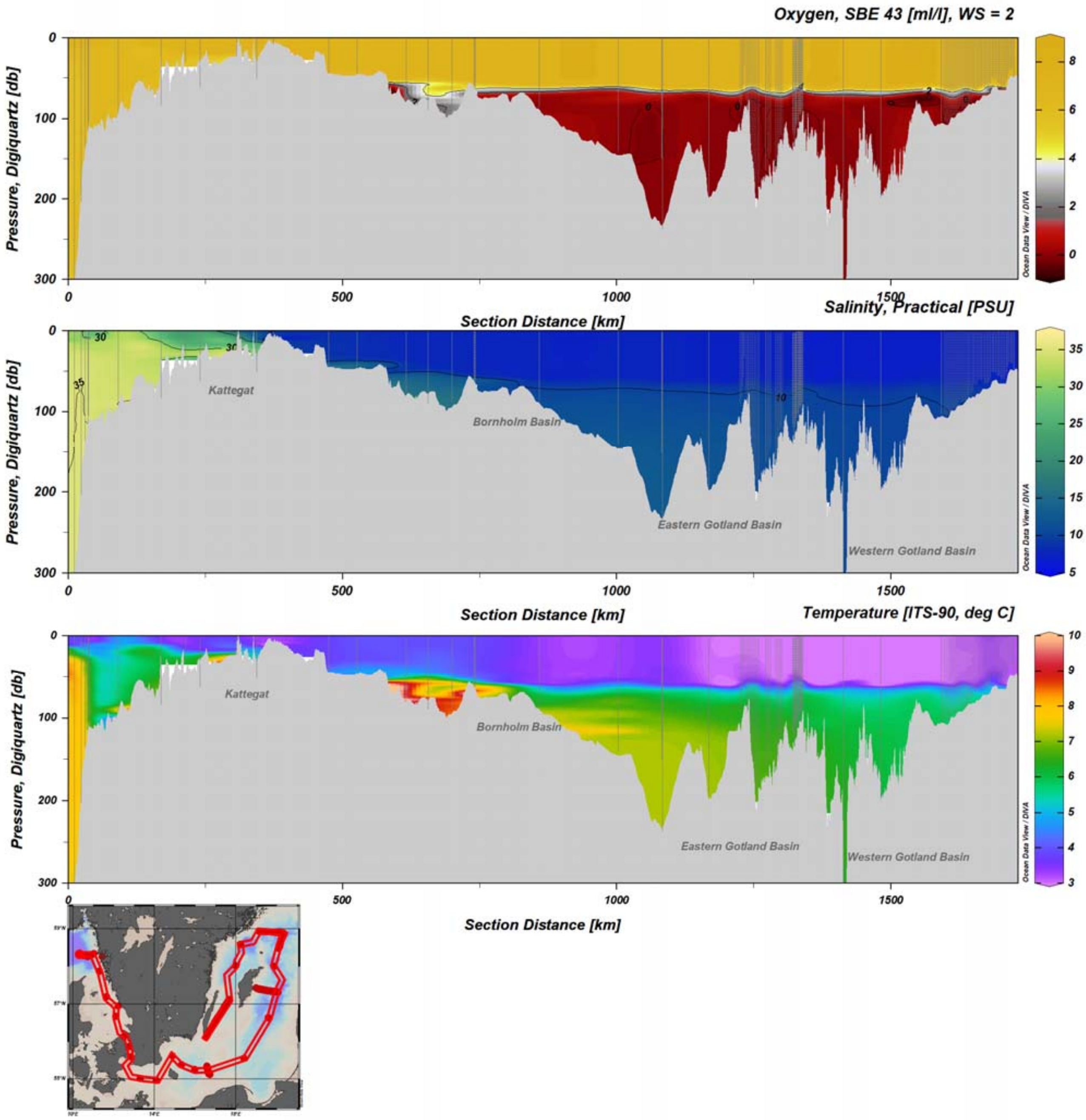


Figure 1. Section showing temperature, salinity and oxygen concentration from the Skagerrak, through the Sound and further up through the Baltic Sea proper according to the map (bottom). The figure is created in Ocean Data View with DIVA-interpolation.

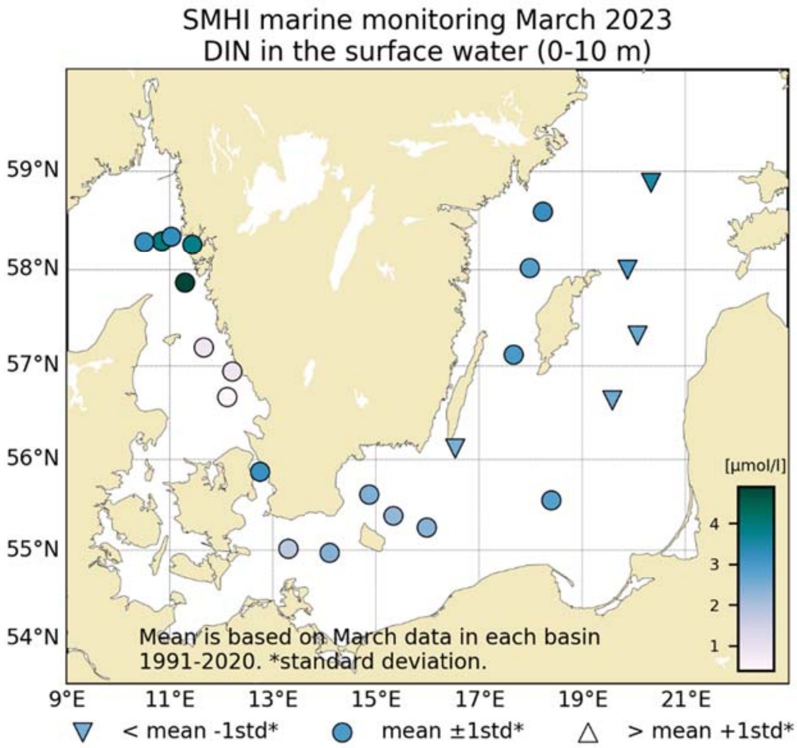


Figure 2. The concentration of dissolved inorganic nitrogen (DIN) in the surface water (0–10m). The mean value is based on February data within each basin from 1991–2020.

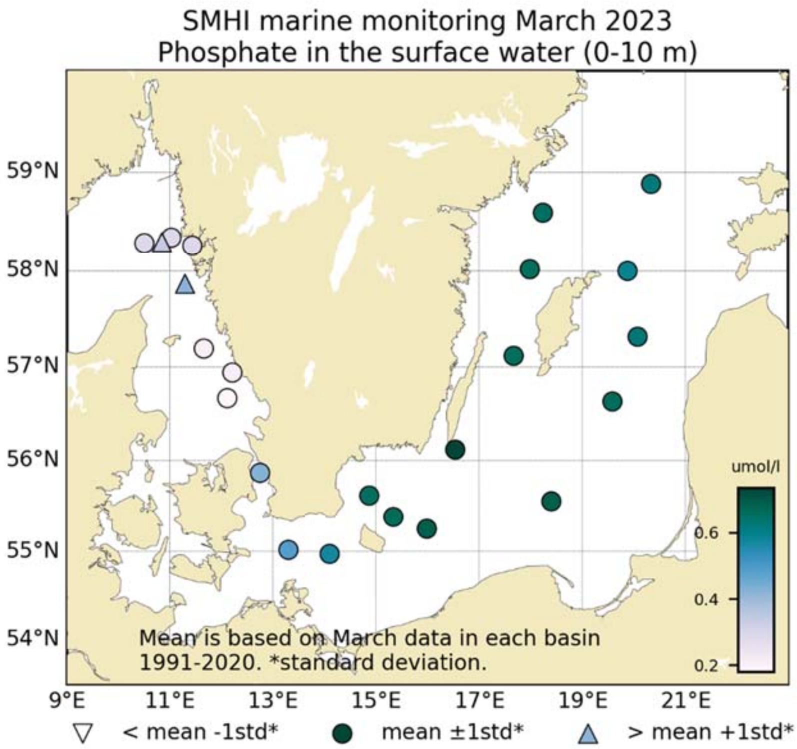


Figure 3. The concentration of phosphate in the surface water (0– 0 m). The mean value is based on January data within each basin from 1991–2020.

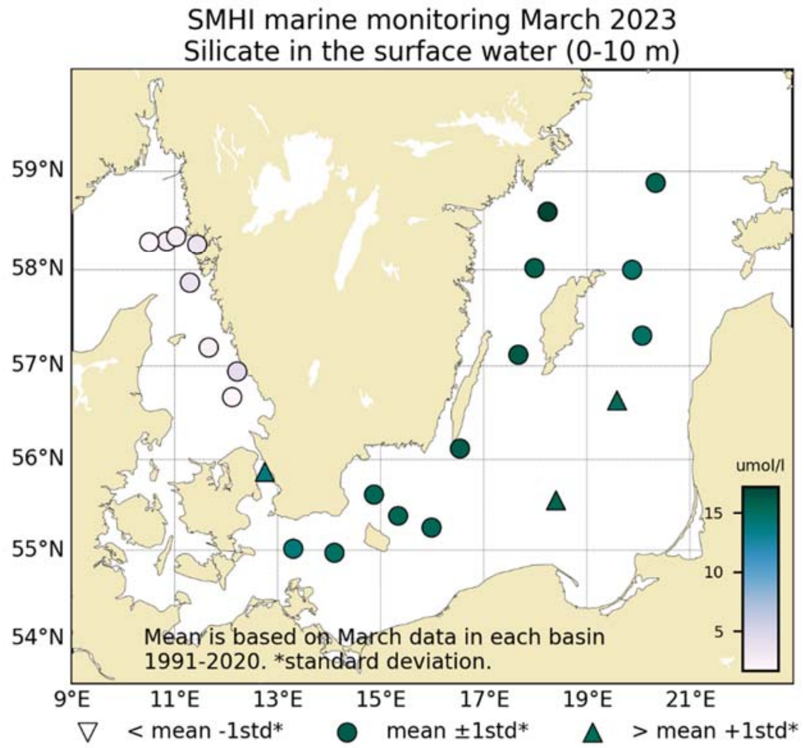


Figure 4. The concentration of silicate in the surface water (0–10 m). The mean value is based on February data within each basin from 1991–2020.

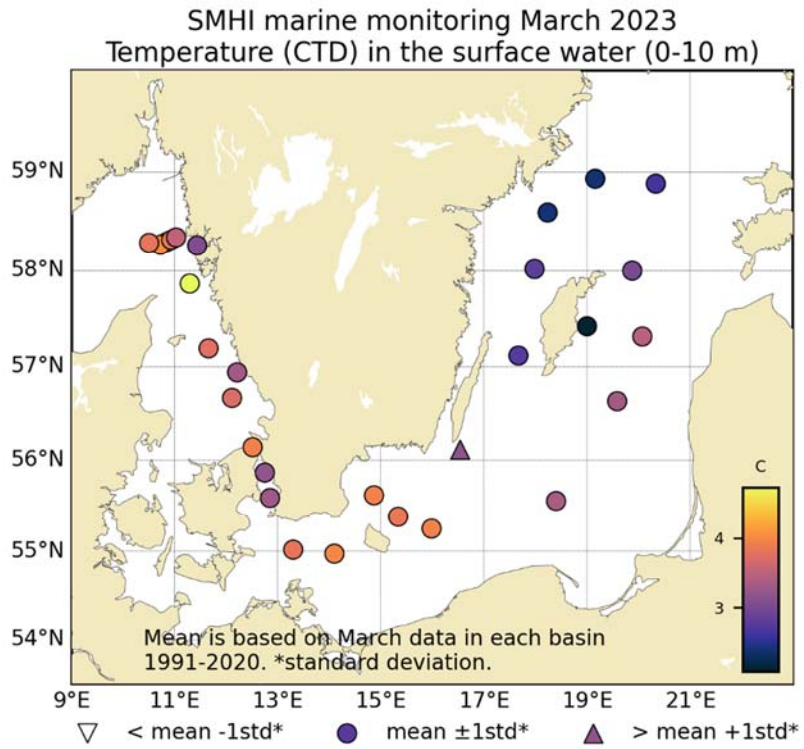


Figure 5. Temperature in the surface water (0–10 m). The mean value is based on February data within each basin from 1991–2020.

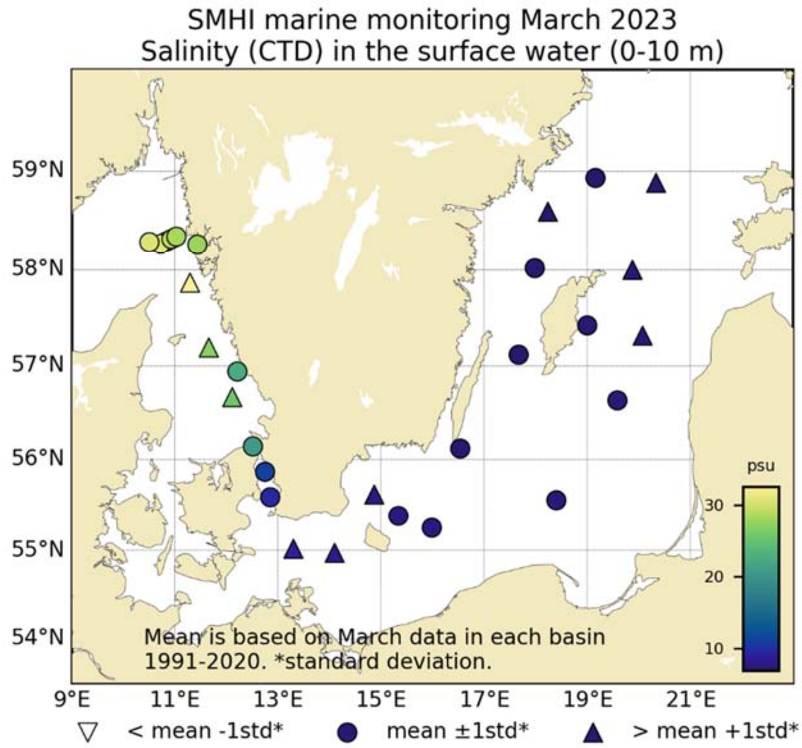


Figure 6. Salinity in the surface water (0–10 m). The mean value is based on February data within each basin from 1991–2020.

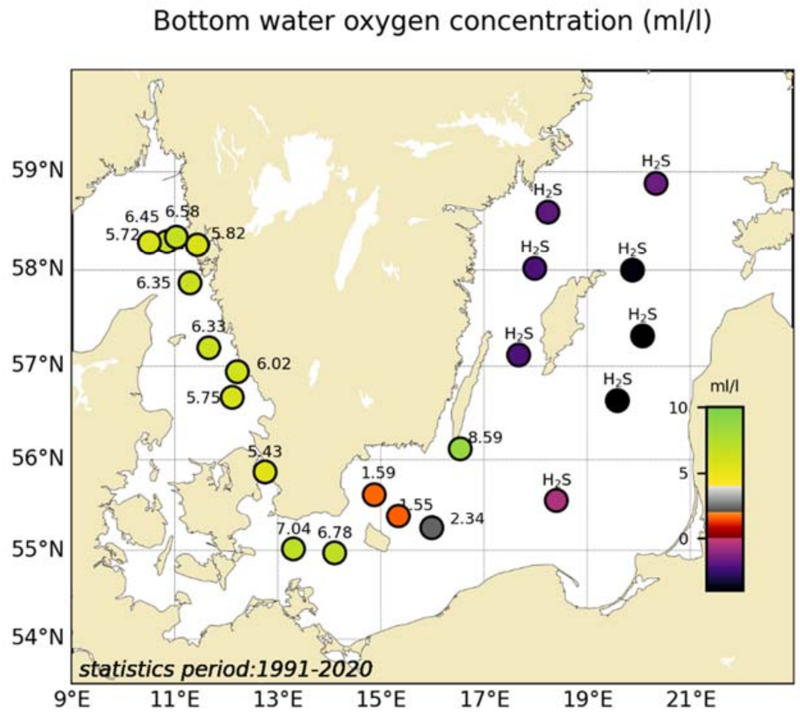


Figure 7. The concentration of oxygen (in ml/l) in the bottom water, about 1 m above the bottom. Note that the value is not compared against statistics in the same way as Figures 2–6 and therefore only circles are shown in the graph. Presence of hydrogen sulphide is illustrated as negative oxygen concentration.

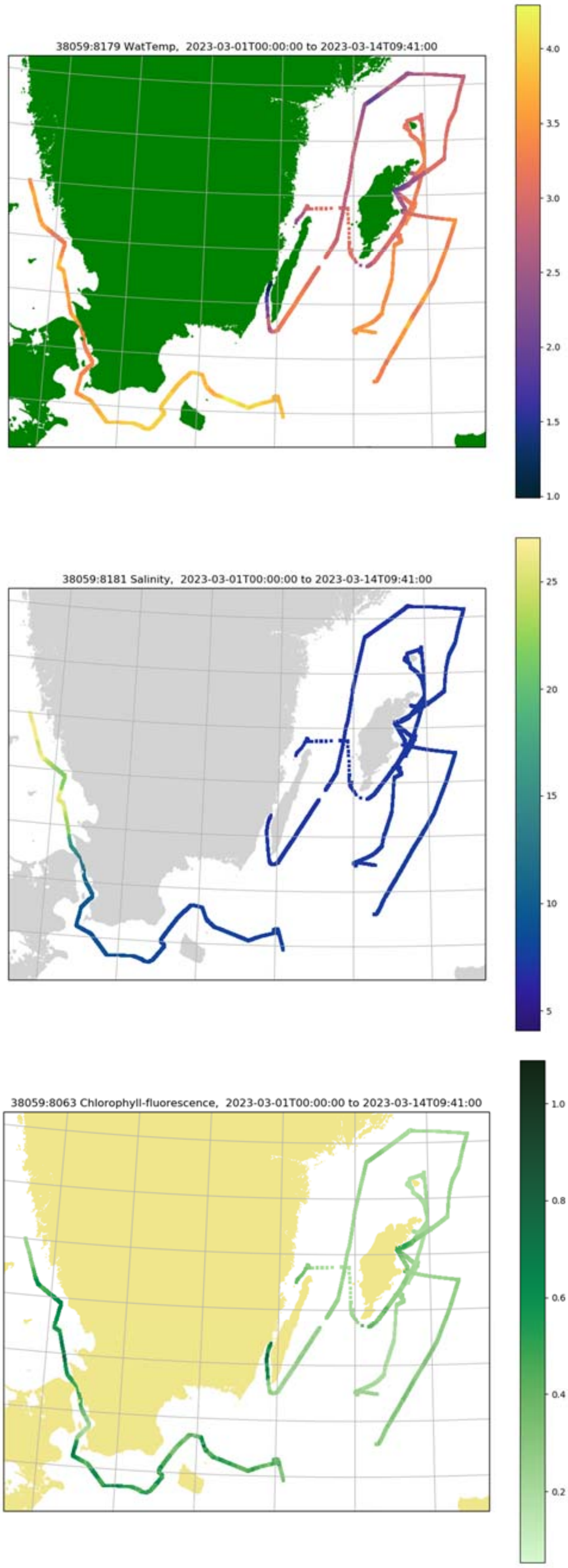


Figure 8. Temperature (top), salinity (middle) and chlorophyll fluorescence (bottom) in the surface water measured with Svea's ferrybox. The maps show data from both the previous cruises as well as SMHI's regular cruise. The data has undergone only a rough quality control.

PARTICIPANTS

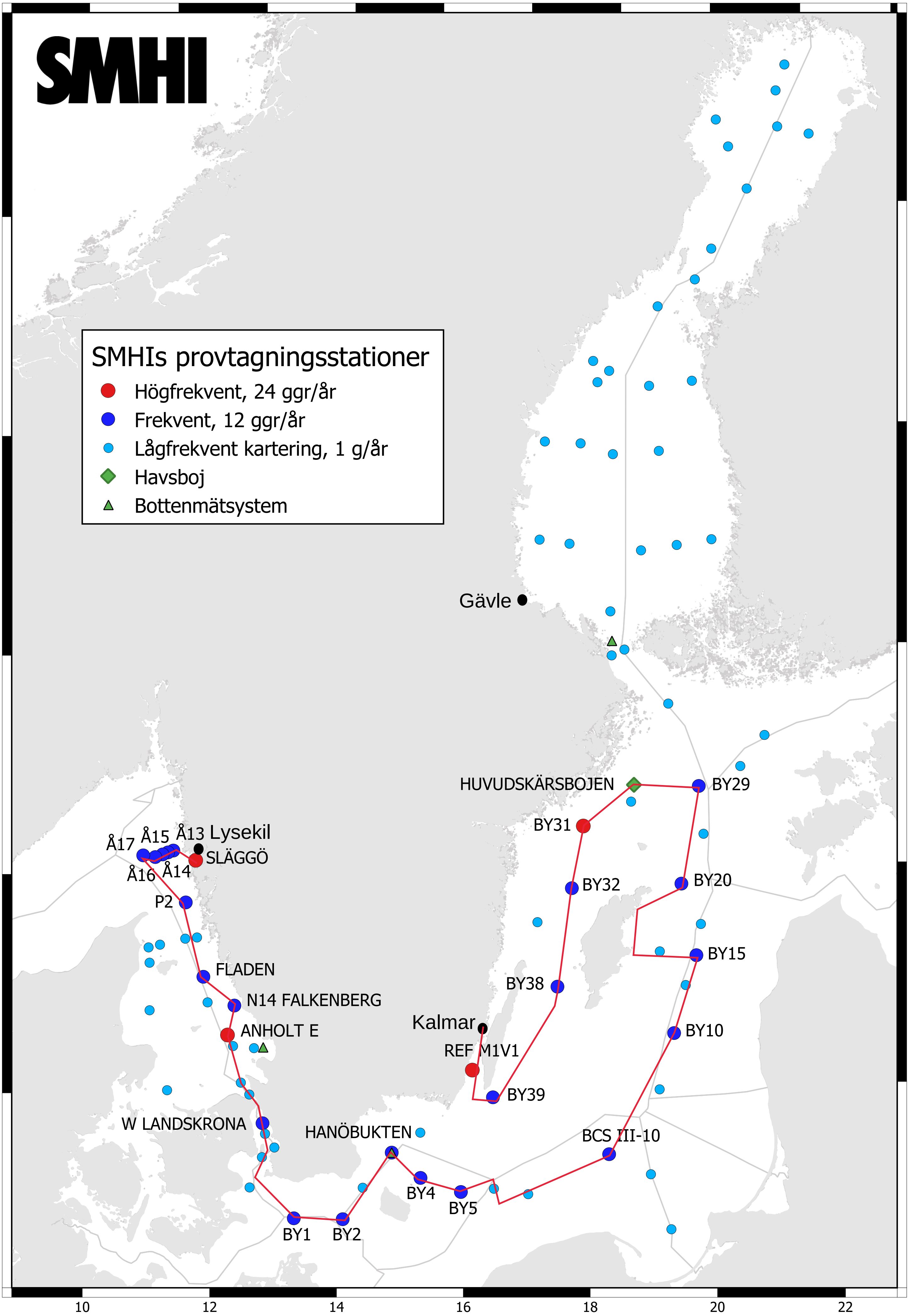
Name	Role	Institute
Martin Hansson	Chief Scientist, Oceanographer	SMHI
Lena Viktorsson	Oceanographer	SMHI
Ola Karlén	Oceanographer	SMHI
Johan Håkansson	Chemist	SMHI
Johanna Linders	Chemist	SMHI
Johan Kronsell	Buoy technicians	SMHI
Fredrik Waldh	Buoy technicians	SMHI
Greger Bergman	Head of SMHI observations unit	SMHI
Anders Hulthén	Head of SMHI marine technicians' unit	SMHI
Bengt Karlsson	Researcher, AMIME-project	SMHI
Karin Garefelt	Researcher, AMIME- project	SciLifeLab/KTH
Krzysztof Jurdzinski	Researcher, AMIME- project	SciLifeLab/KTH

APPENDICES

- Track chart
- Table of stations, analysed parameters and number of sampling depths
- Vertical profiles
- Annual cycles of surface water (0 – 10 m) and oxygen development in the bottom water.

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
Å17
Å15
Å13
Lysekil
SLÄGGÖ
Å16
Å14
P2
BY32
BY20
BY15
FLADEN
BY38
N14 FALKENBERG
Kalmar
ANHOLT E
BY10
REF M1V1
BY39
W LANDSKRONA
HANÖBUKTEN
BCS III-10
BY4
BY5
BY1
BY2
64
62
60
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56
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12
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16
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22

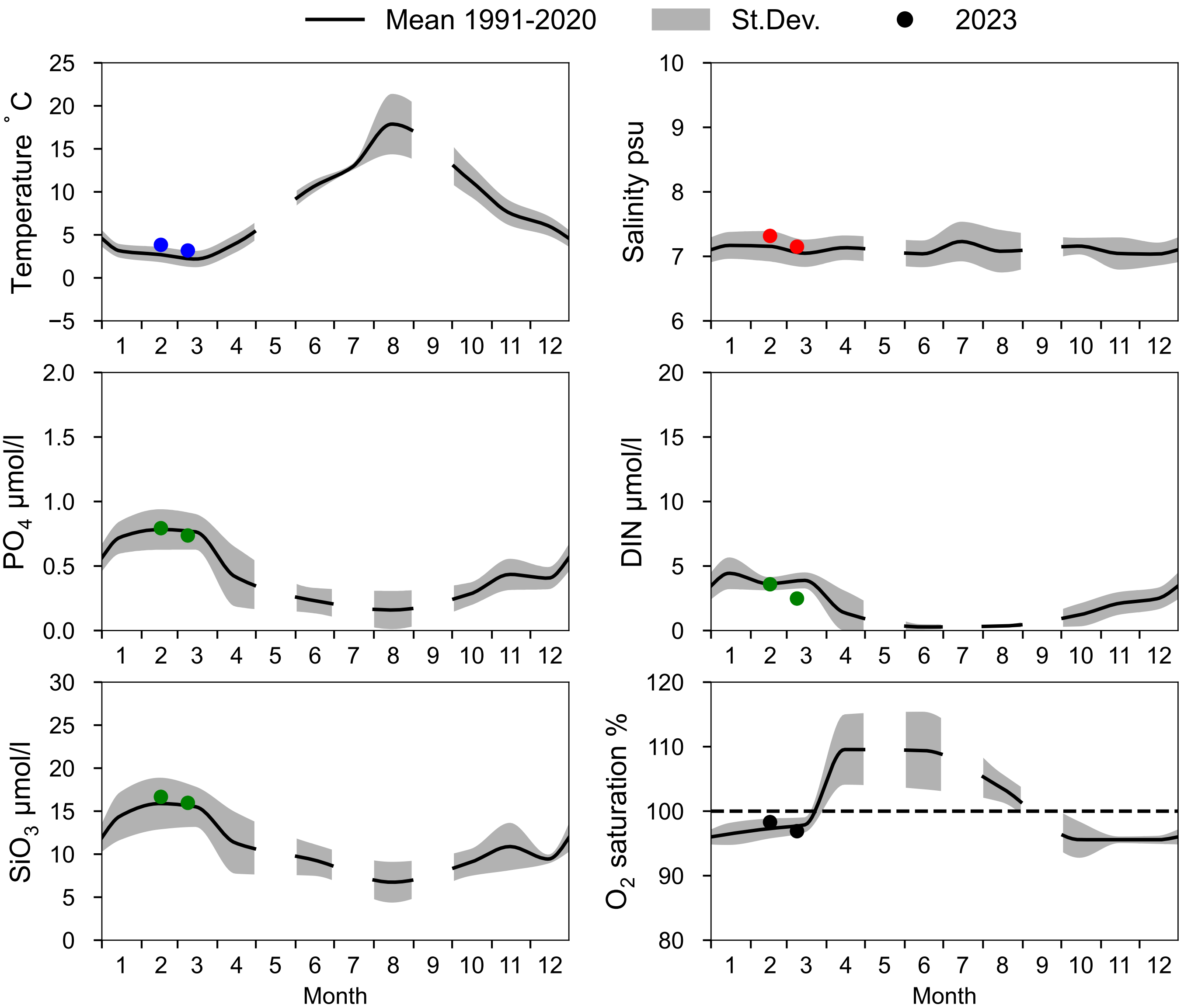
Date: 2023-04-18
Time: 15:52

Ship: SE
Year: 2023

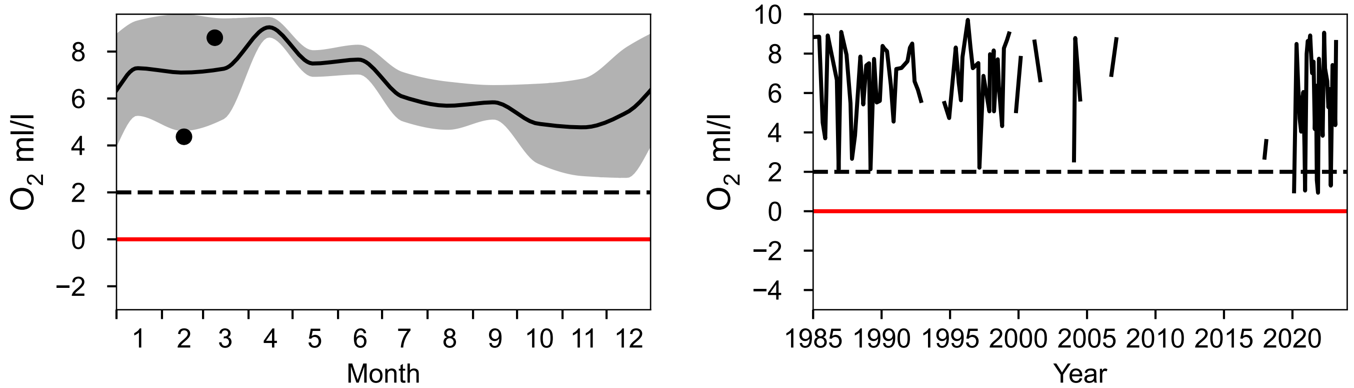
Ser no	Cru no	Stat code	Proj	Stat name	Lat	Lon	Start date yyyymmdd	Start time hhmm	Bottom depth m	Secchi depth m	Wind dir	Wind vel	Air temp C	Air pres hPa	WCWI (Weath Cloud Waves Iceob)	CZPP (Chla Zoop Phytop Pp)	No de	No btl	Temp_btl	Temp_ctd	Salt_btl	Salt_ctd	Ph	Doxy_btl	Doxy_ctd	H2s	Phos	Ptot	Ntri	Ntra	Ntrz	Amon	Ntot	Alky	Sio3-si	Humus	Comnt_visit	Comnt_samp
0236	05	BPSE49	BAS...	BY39 ÖLANDS S UDDE	5607.03	01632.17	20230309	0009	49	16	19	3	-0.4	1002	1320	-x--	8		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0237	05	BPWX45	BAS...	BY38 KARLSÖDJ	5706.99	01740.15	20230309	1758	110		20	9	0.43	1002	1330	----	14		x	x	x	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	x	-
0238	05	BPWX38	BAS...	BY32 NORRKÖPINGSDJ	5800.98	01758.97	20230309	2340	201		21	10	0.74	1001	9990	----	17		x	x	-	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	-	-
0239	05	BPNX37	BAS...	BY31 LANDSORTSDJ	5835.62	01814.18	20230310	0430	449		21	9	1.1	999	9990	-x--	23		x	x	-	x	x	x	x	x	x	-	x	x	x	x	-	-	x	-	x	-
0240	05	BPNX00	EXT...	HUVUDSKÄR	5855.94	01909.55	20230310	1028	92		18	9	1.4	1001	1330	----	10		x	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0241	05	BPNX35	BAS...	BY29 / LL19	5853	02020.09	20230310	1500	167	12	15	8	-0.4	1002	1230	----	16		-	x	-	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	x	-
0242	05	BPEX26	BAS...	BY20 FÅRÖDJ	5759.9	01952.66	20230310	2220	198		11	8	-1.0	999	9990	----	17		x	x	-	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	x	-
0243	05	BPEX00	EXT...	ÖSTERGARNSHOLM	5725.41	01860	20230311	0910	22		35	8	-0.5	995	2820	----	5		x	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0244	05	BPEX21	BAS...	BY15 GOTLANDSDJ	5718.99	02004.42	20230311	1406	240		32	16	-0.3	995	2840	---x	23		x	x	-	x	x	x	x	x	x	-	x	x	x	x	-	-	x	-	x	-
0245	05	BPEX13	BAS...	BY10	5638.01	01935.09	20230311	1945	143		29	12	0.8	999	9990	----	15		x	x	x	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	-	-
0246	05	BPSE11	BAS...	BCS III-10	5533.29	01824.04	20230312	0445	90		30	14	1.3	1001	9990	----	12		x	x	x	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	x	-
0247	05	BPSB07	BAS...	BY5 BORNHOLMSDJ	5515.01	01559.08	20230312	1800	89		24	7	2.8	1009	9990	-x--	12		x	x	x	x	x	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0248	05	BPSB06	BAS...	BY4 CHRISTIANSÖ	5522.93	01520.17	20230312	2120	92		21	8	2.7	1007	9990	----	12		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0249	05	BPSH05	BAS...	HANÖBUKTEN	5537.07	01452.06	20230313	0313	79		18	10	2.4	1003	9990	----	11		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0250	05	BPSA03	BAS...	BY2 ARKONA	5458.26	01405.94	20230313	0540	46		19	12	4.6	998	2840	-x--	8		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0251	05	BPSA02	BAS...	BY1	5500.95	01317.96	20230313	0950	46	11	18	13	5.4	991	2830	----	8		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0252	05	SOSX00	EXT...	FLINTEN-7	5535.30	01250.98	20230313	1450	9		23	11	9.8	998	2830	----	2		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0253	05	SOCX39	BAS...	W LANDSKRONA	5551.97	01244.93	20230313	1715	53		14	24	984	9	2830	----	9		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0254	05	SONX00	EXT...	1 SW SVINBÅDAN	5608.47	01230.79	20230313	2021	26		23	17	9	982	9990	----	6		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	x	-
0255	05	KAEX29	BAS...	ANHOLT E	5640.13	01206.78	20230314	0030	63		22	14	6.5	980	9990	----	10		x	x	x	x	x	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0256	05	KANX50	BAS...	N14 FALKENBERG	5656.4	01212.71	20230314	0310	32		21	12	5.2	979	9990	----	7		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0257	05	KANX25	BAS...	FLADEN	5711.54	01139.46	20230314	0615	84	9	26	10	3.5	980	2830	----	13		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0258	05	SKEX23	BAS...	P2	5751.99	01117.58	20230314	1133	93	7	34	4	3.4	984	2820	----	10		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0259	05	SKEX16	BAS...	Å15	5817.61	01050.65	20230314	1545	138	10	33	9	3.1	989	1430	----	12		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0260	05	SKEX17	BAS...	Å16	5816.01	01043.42	20230314	1650	200		29	10	3.2	991	2430	----	13		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0261	05	SKEX18	BAS...	Å17	5817.06	01030.26	20230314	1820	351		28	11	3.4	993	9990	-x--	15		x	x	-	x	x	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0262	05	SKEX15	BAS...	Å14	5818.97	01055.97	20230314	2100	115		29	12	3.2	995	9990	----	11		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0263	05	SKEX14	BAS...	Å13	5820.43	01101.69	20230314	2150	107		29	13	2.4	995	9990	----	10		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0264	05	FIBG27	BAS...	SLÄGGÖ	5815.58	01126.13	20230315	0015	72		29	10	2.0	997	9990	-x--	9		x	x	x	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-

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

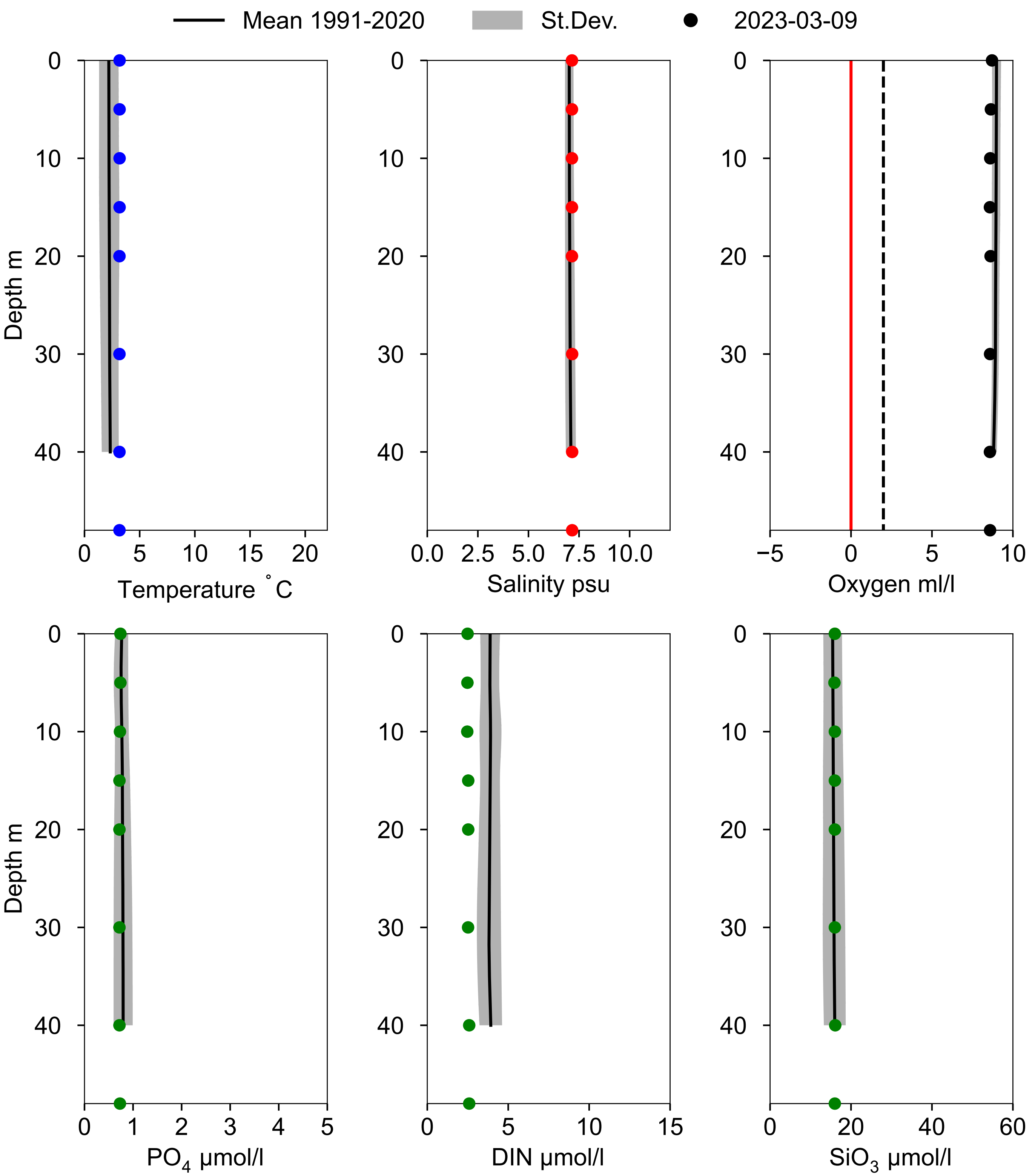
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

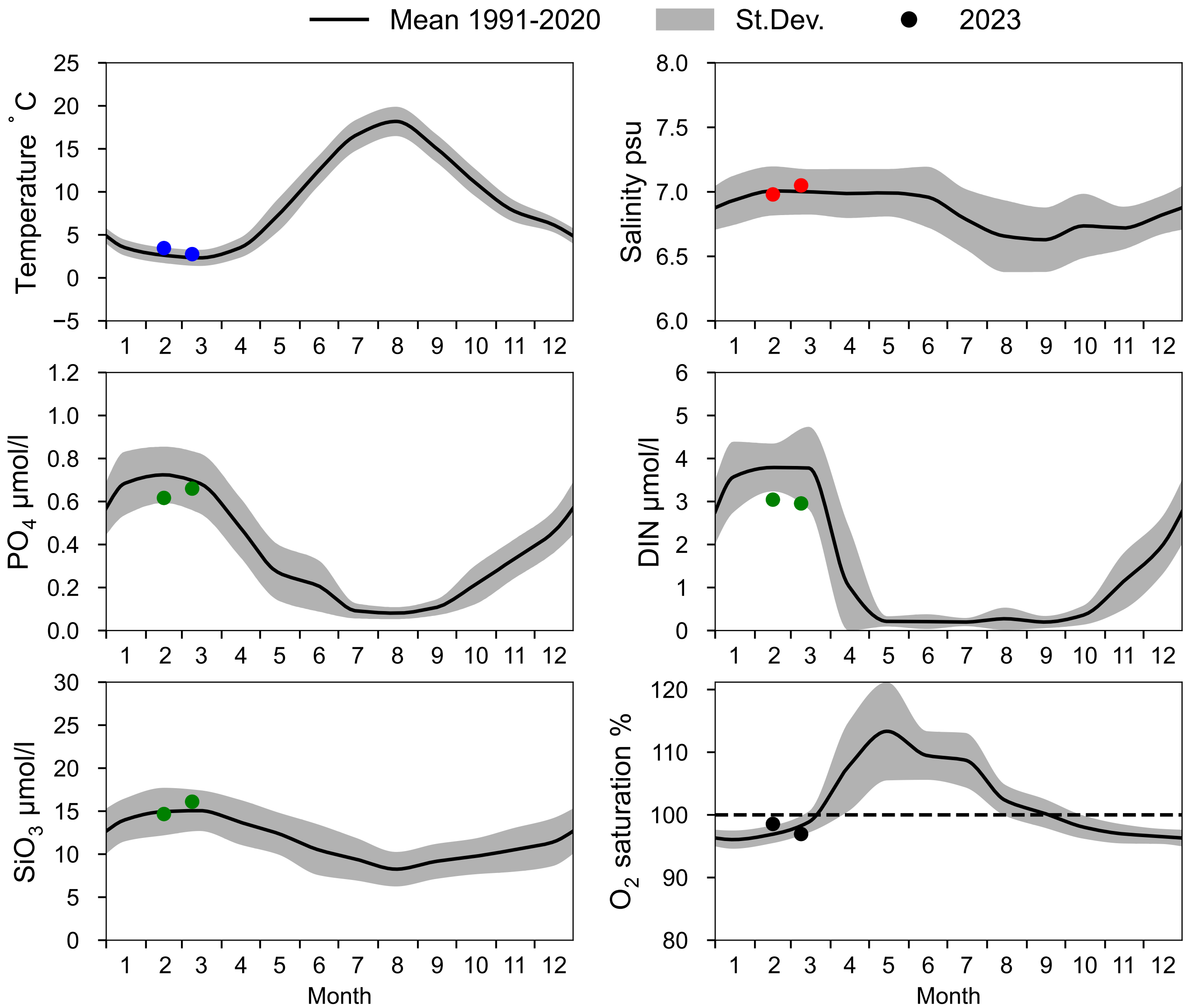


Vertical profiles BY39 ÖLANDS S UDDE
March

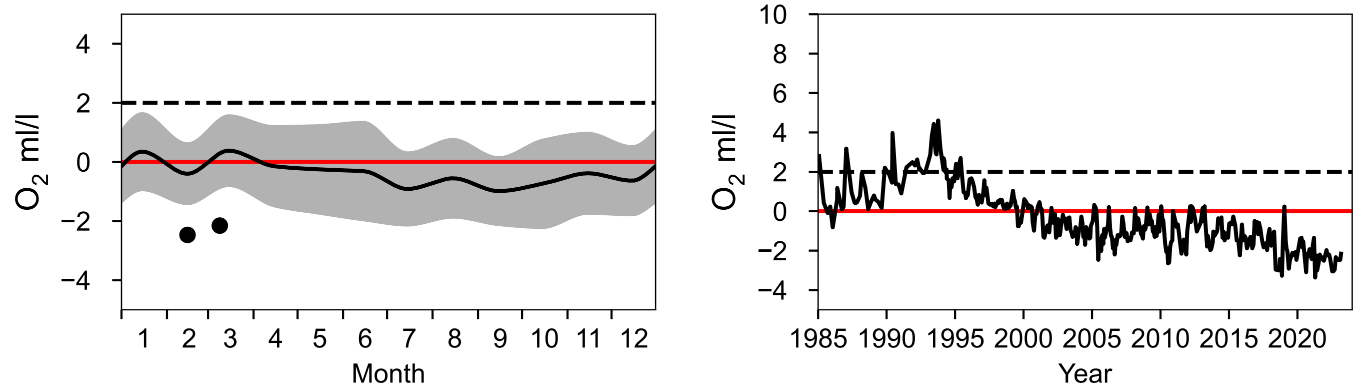


STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

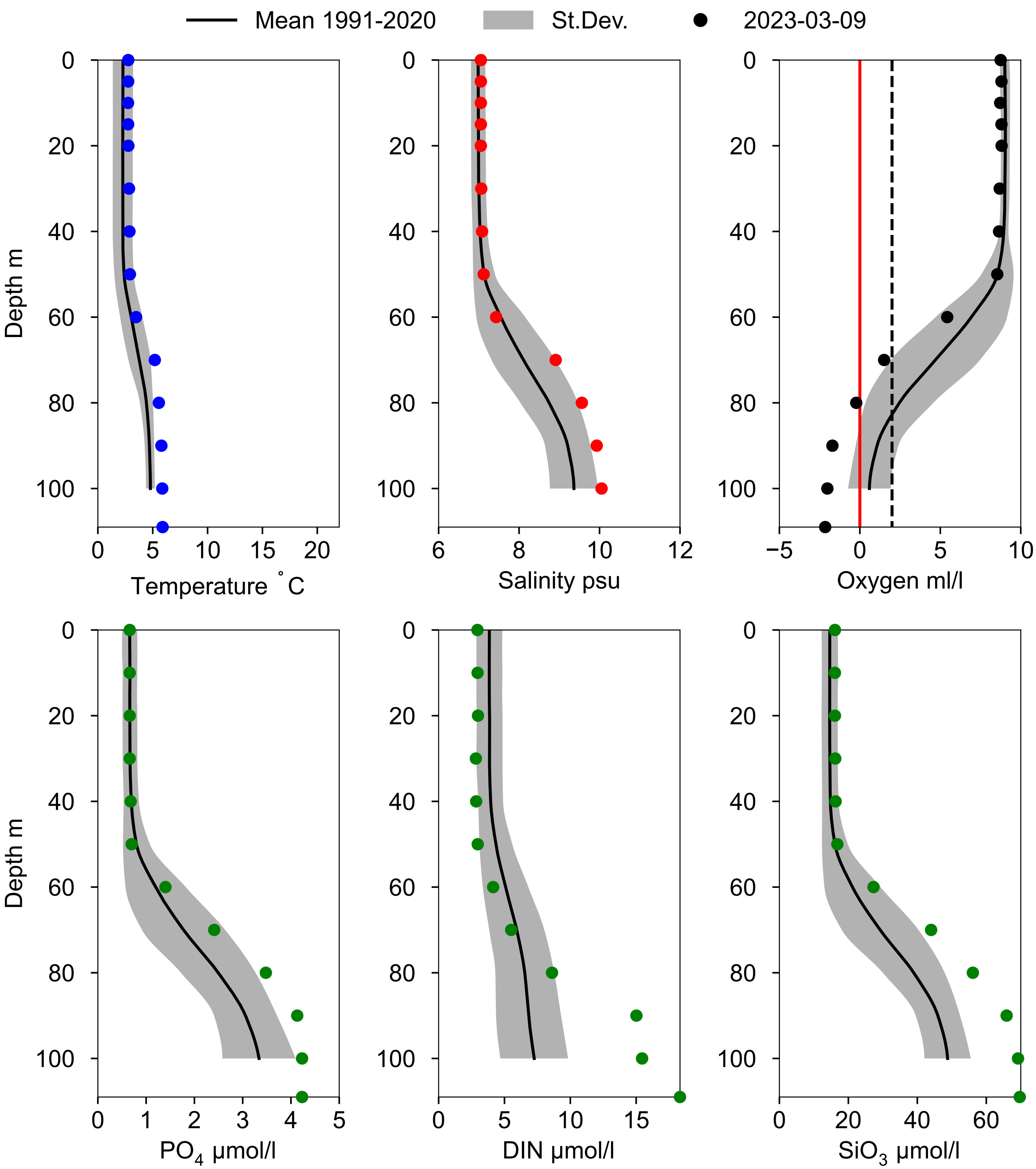
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 100 m)

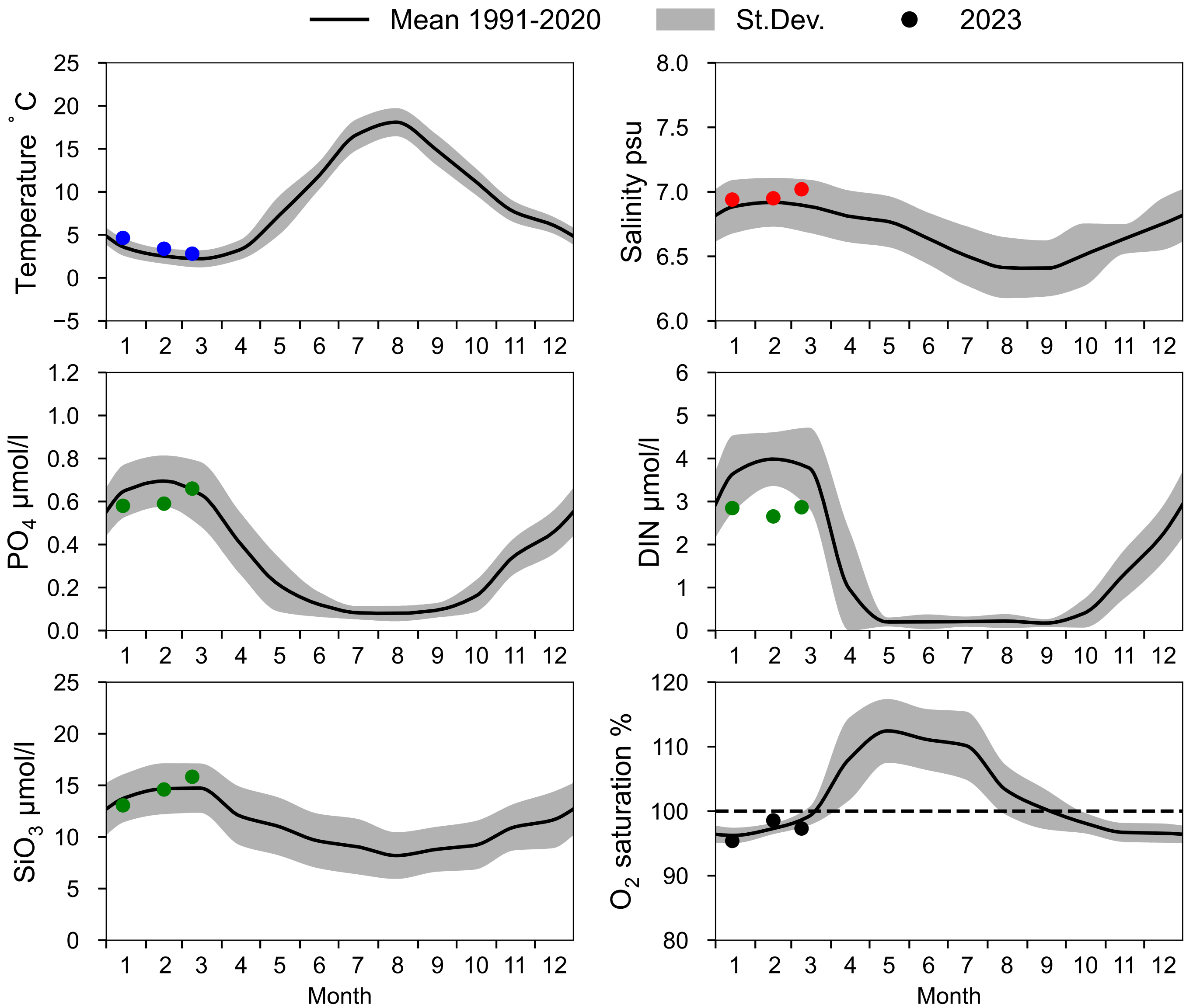


Vertical profiles BY38 KARLSÖDJ
March

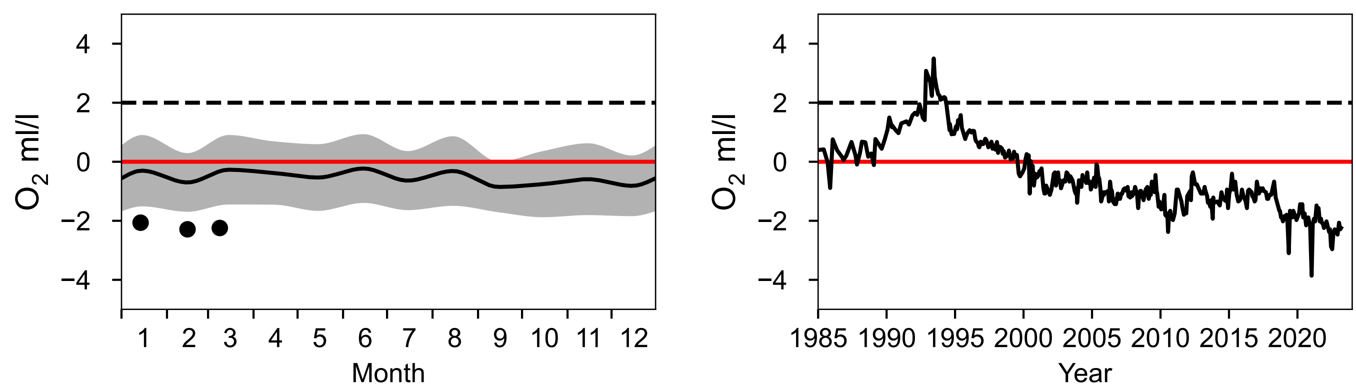


STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

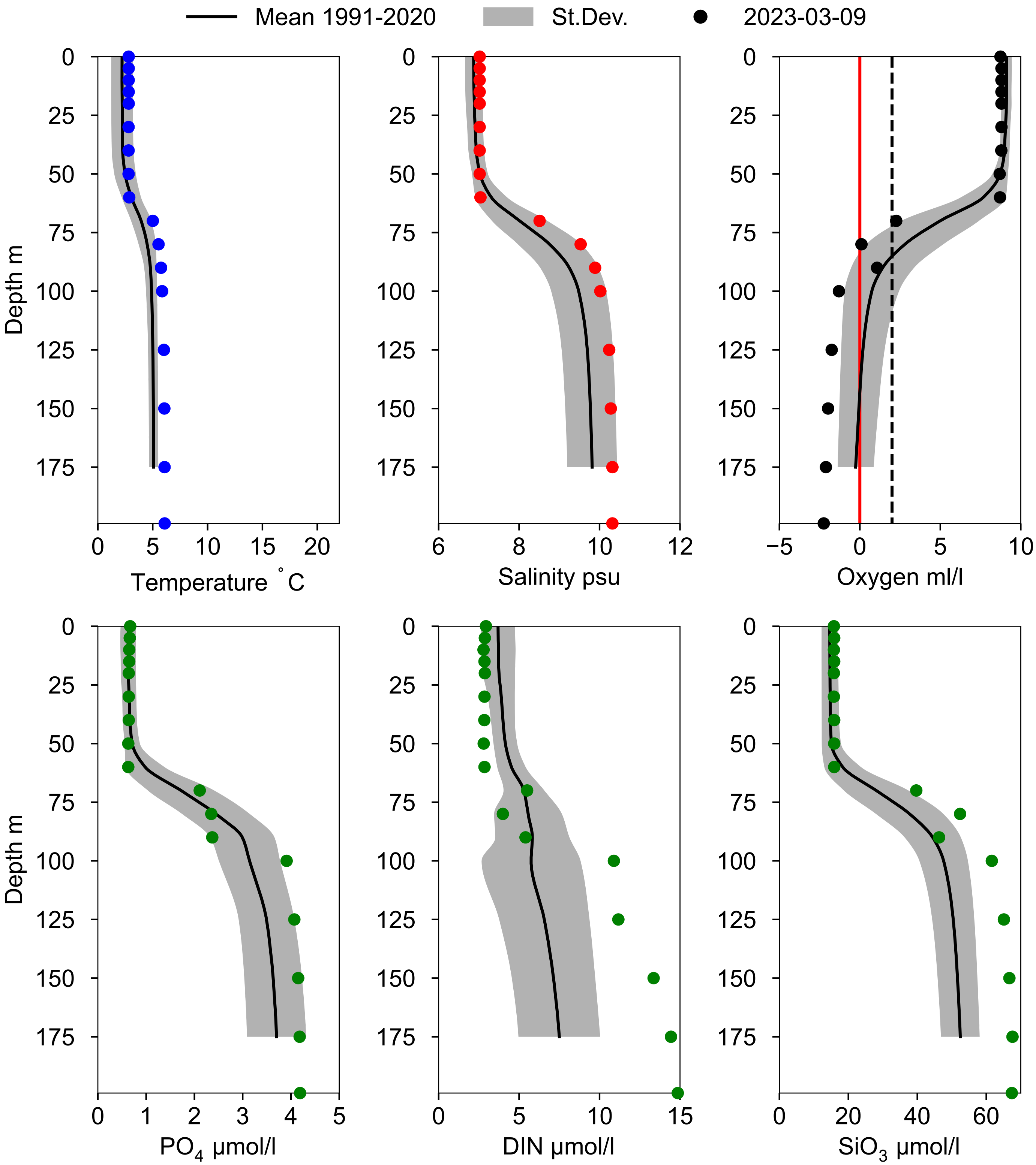
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)

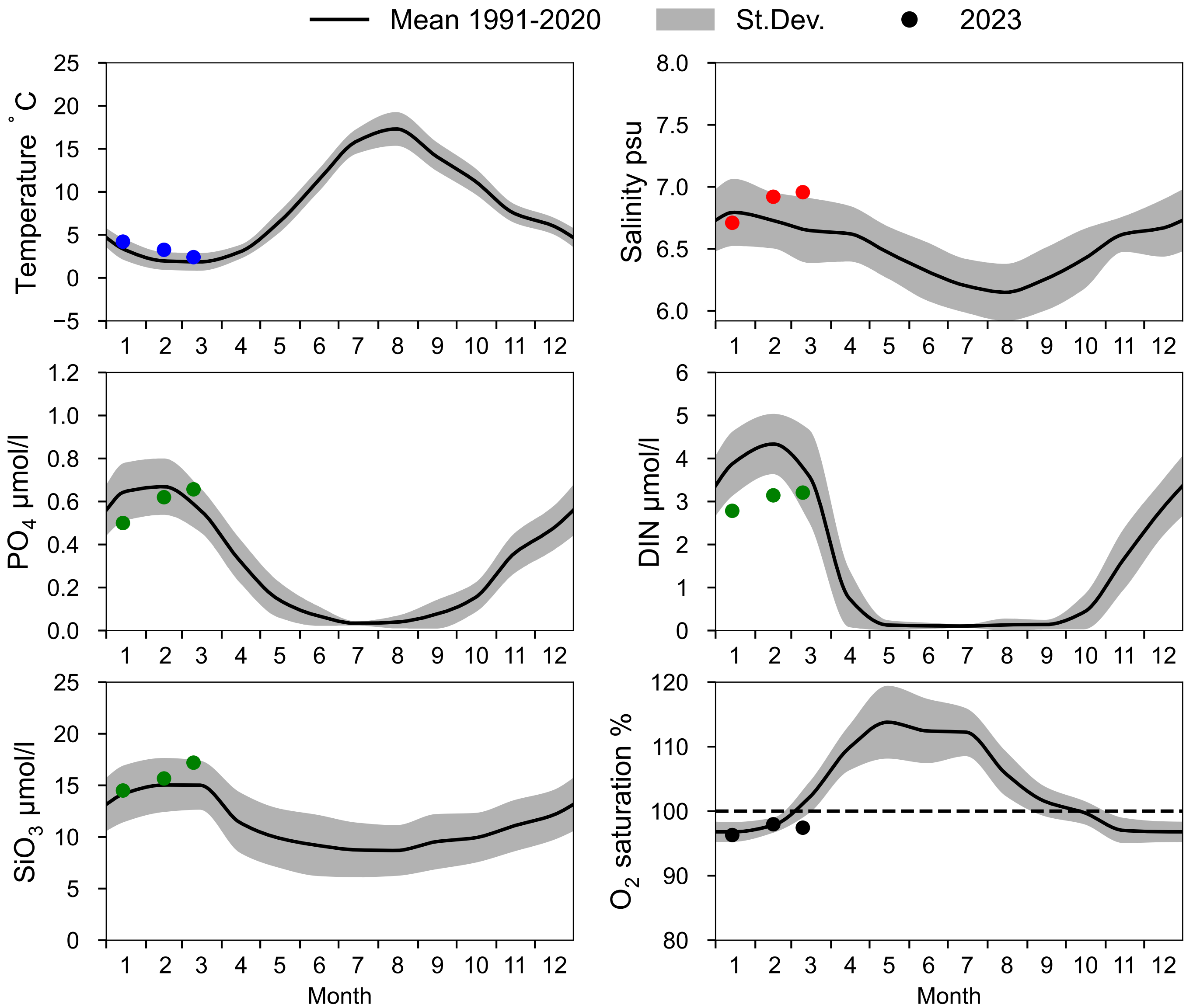


Vertical profiles BY32 NORRKÖPINGSDJ
March

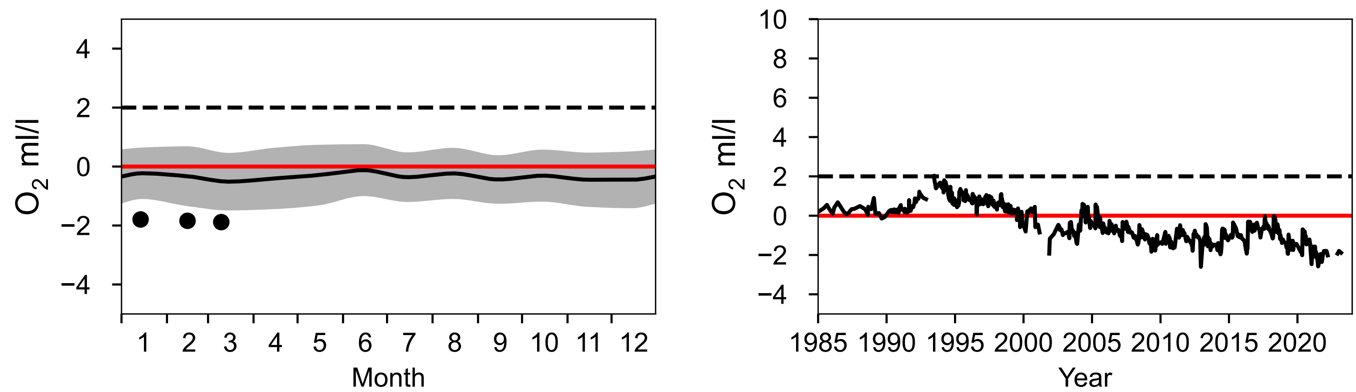


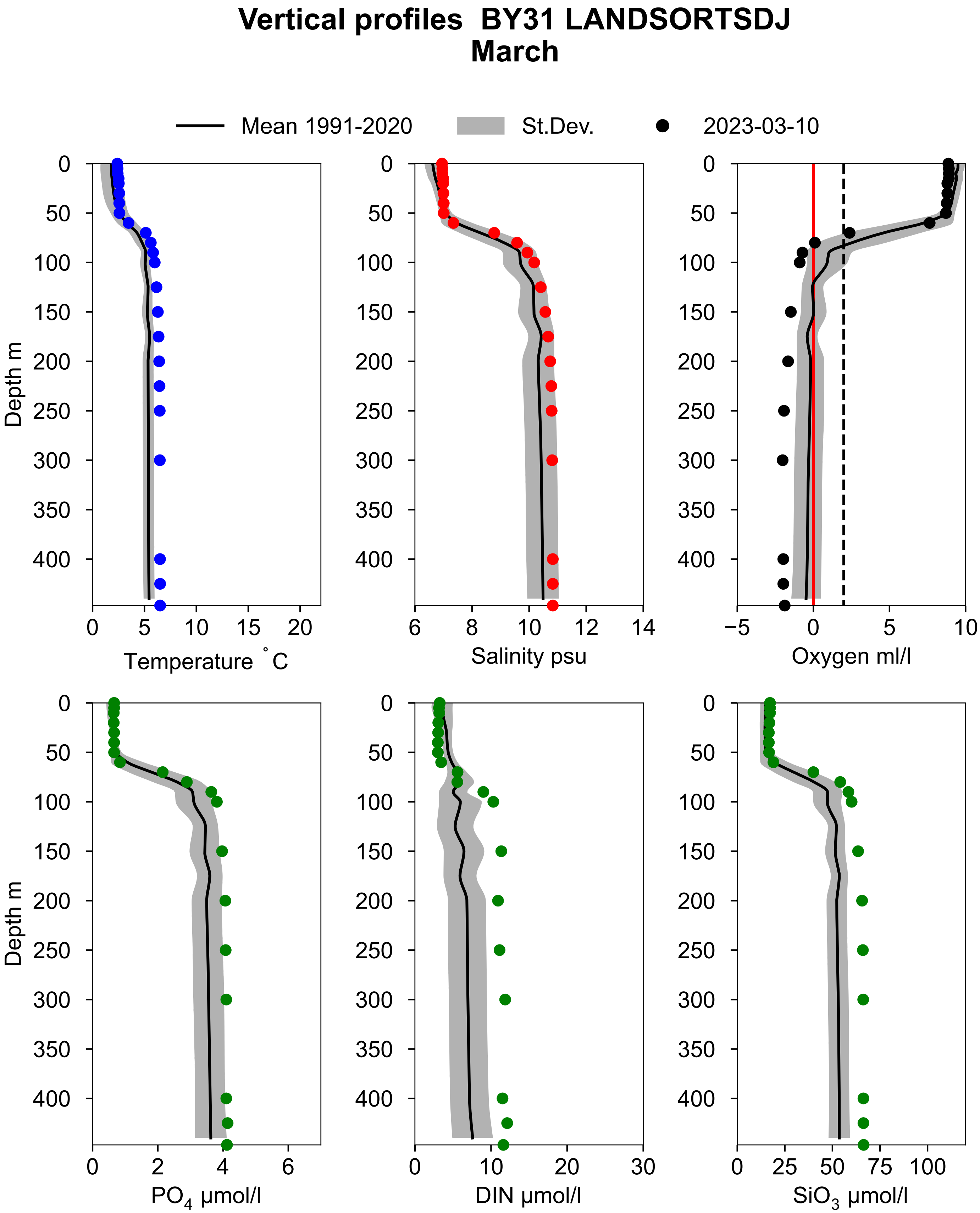
STATION BY31 LANDSORTSDJ SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 419 m)

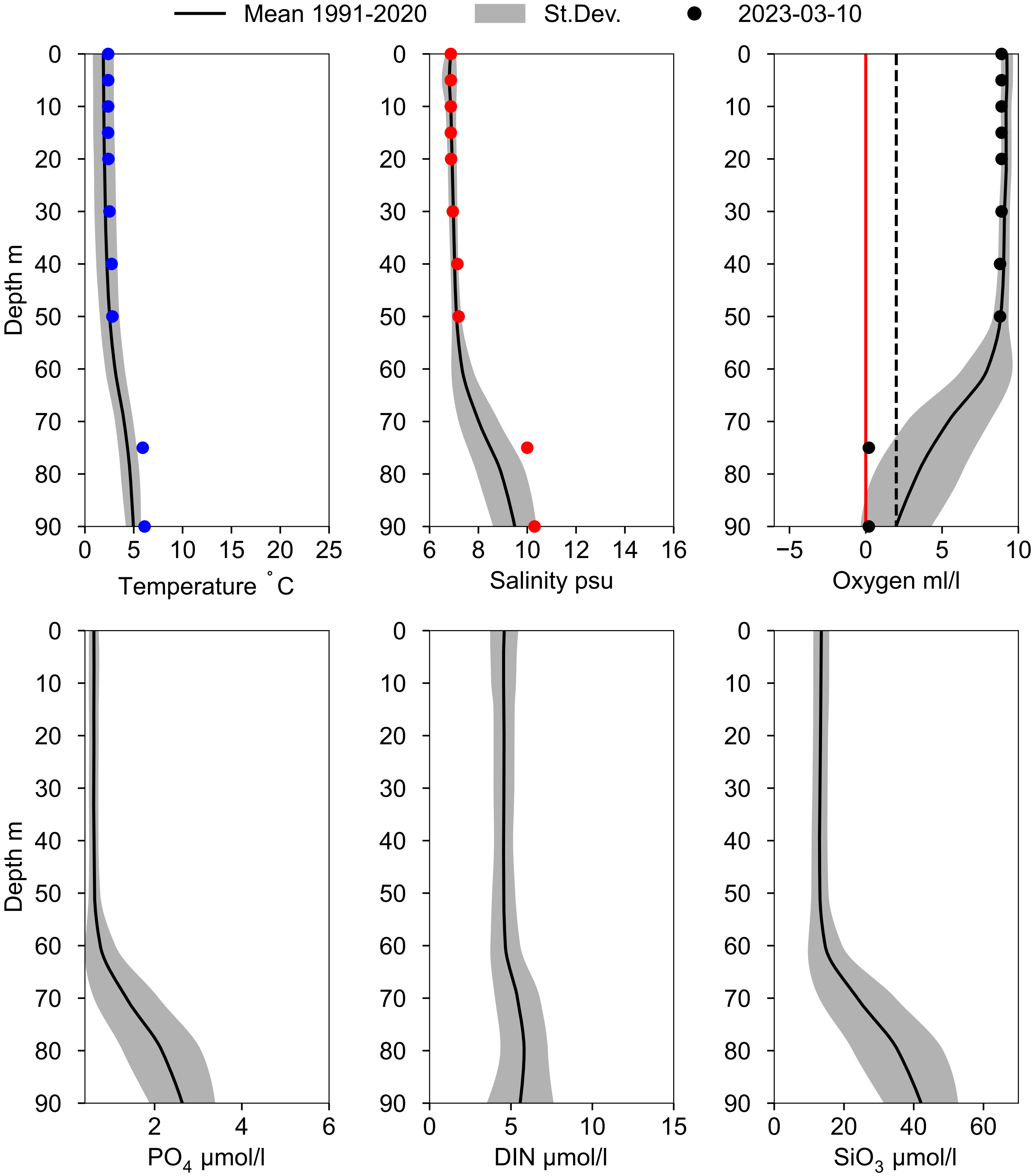




Vertical profiles BY31 LANDSORTSDJ
March
Mean 1991-2020
St.Dev.
2023-03-10
Depth m
Temperature °C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

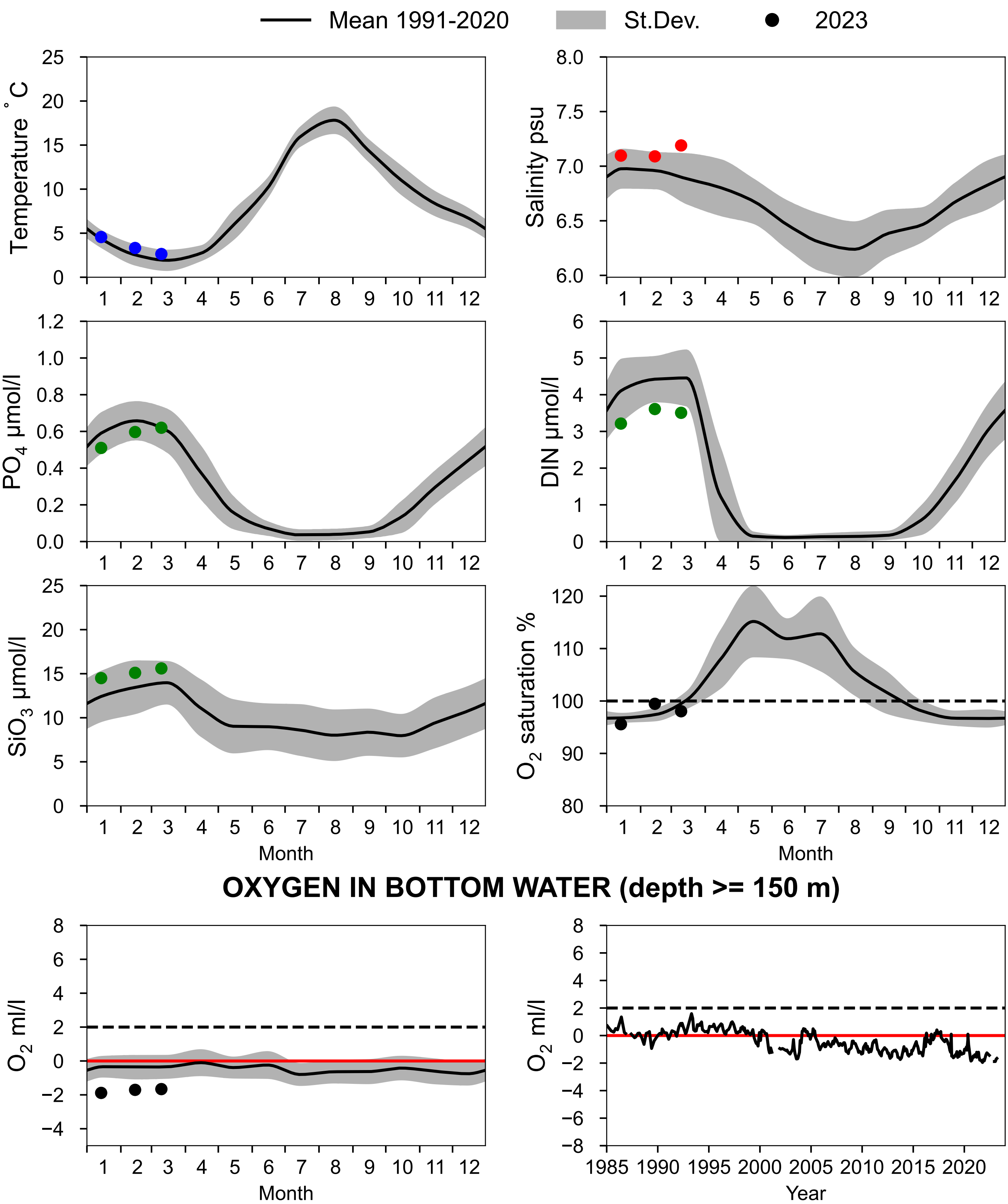
Vertical profiles HUVUDSKÄR
March

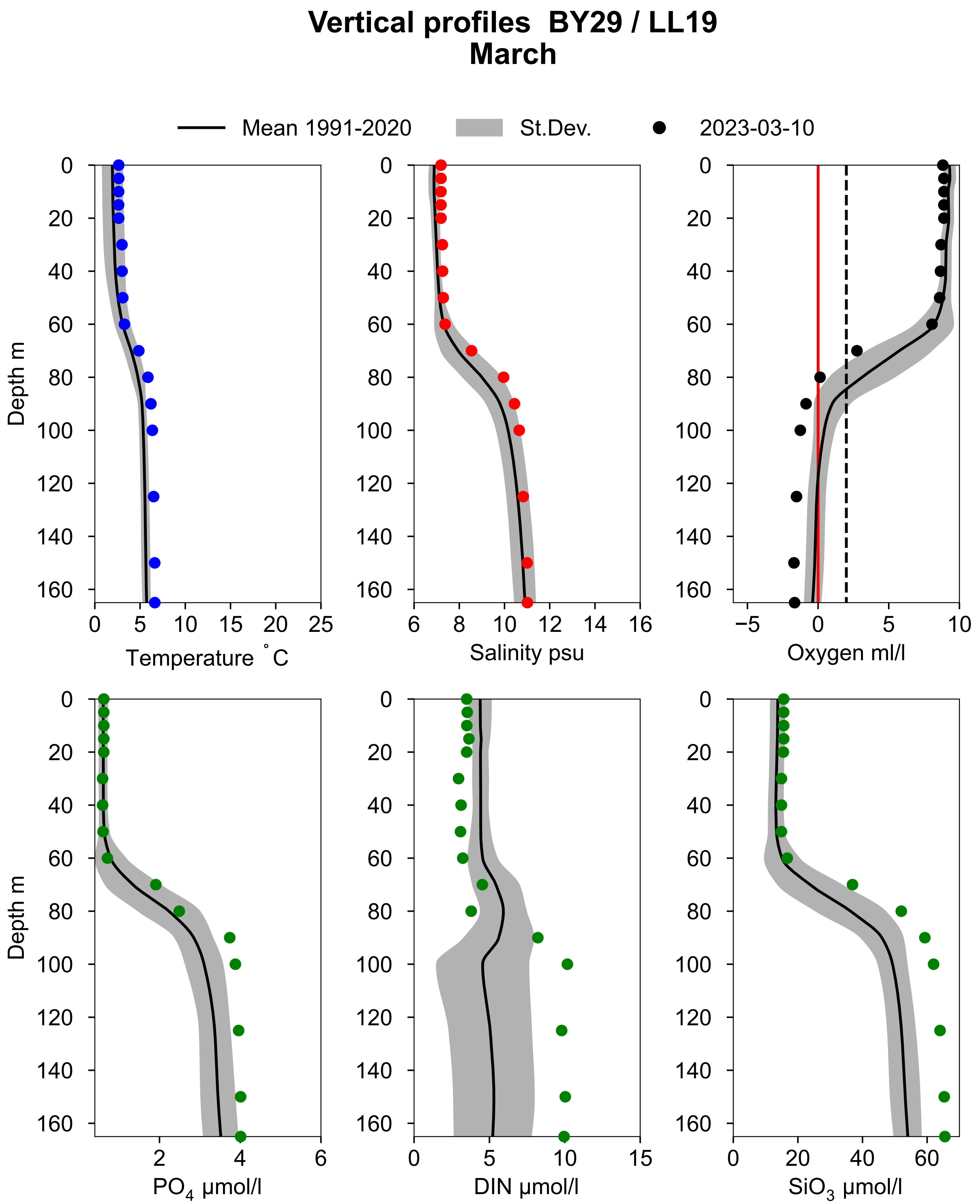
Statistics based on data from: Norra Egentliga Östersjön



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

Annual Cycles

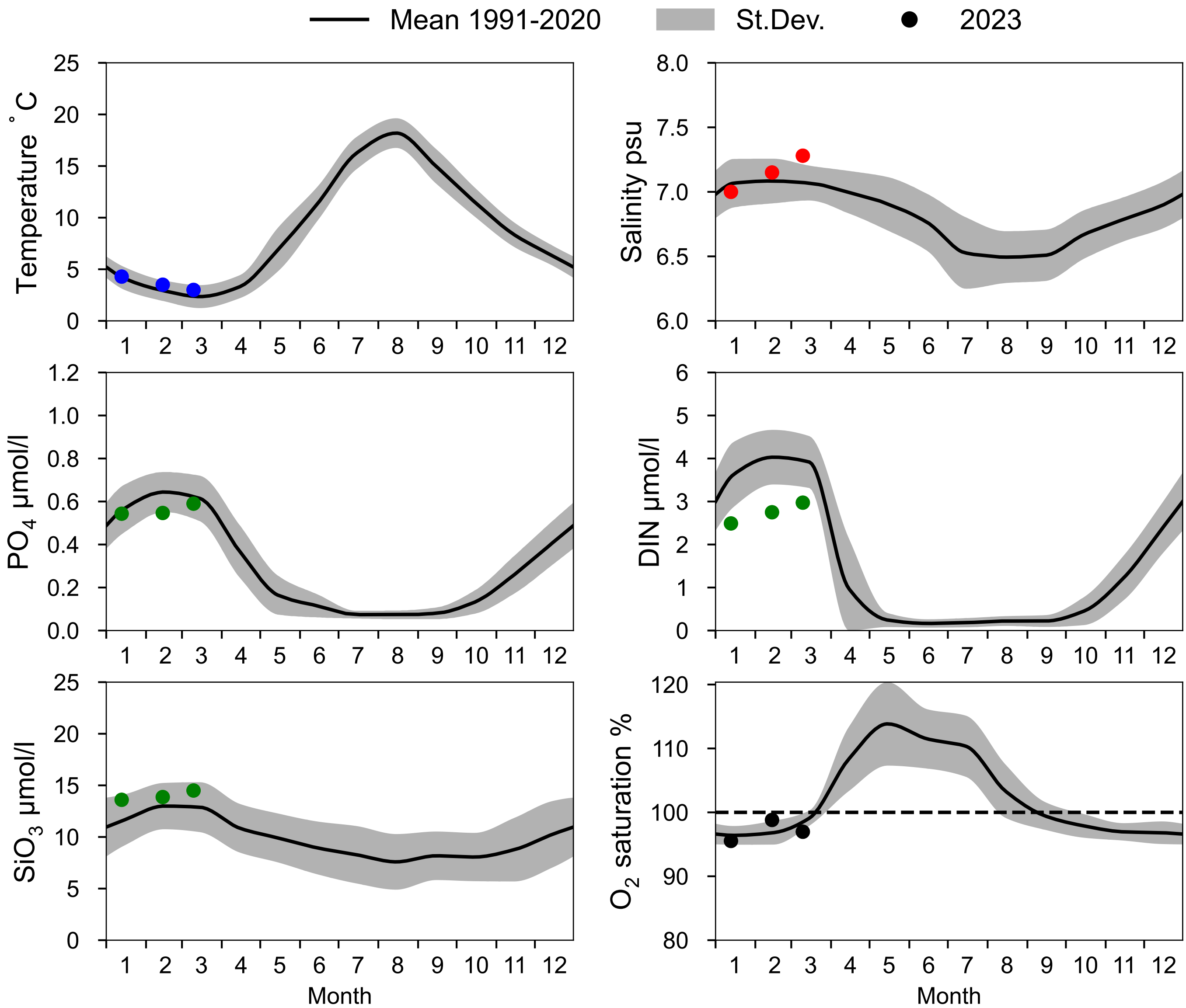




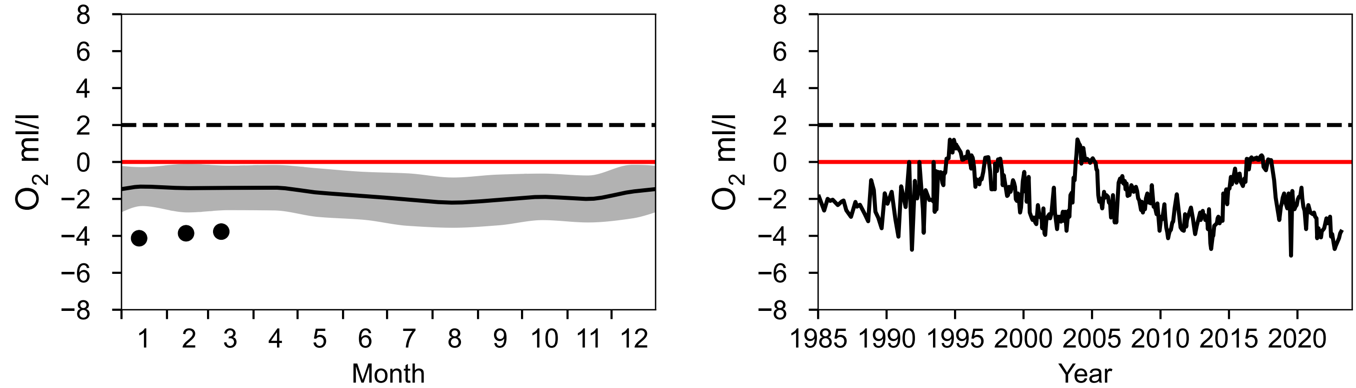
Vertical profiles BY29 / LL19
March
Mean 1991-2020
St.Dev.
2023-03-10
Depth m
Temperature ˚C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

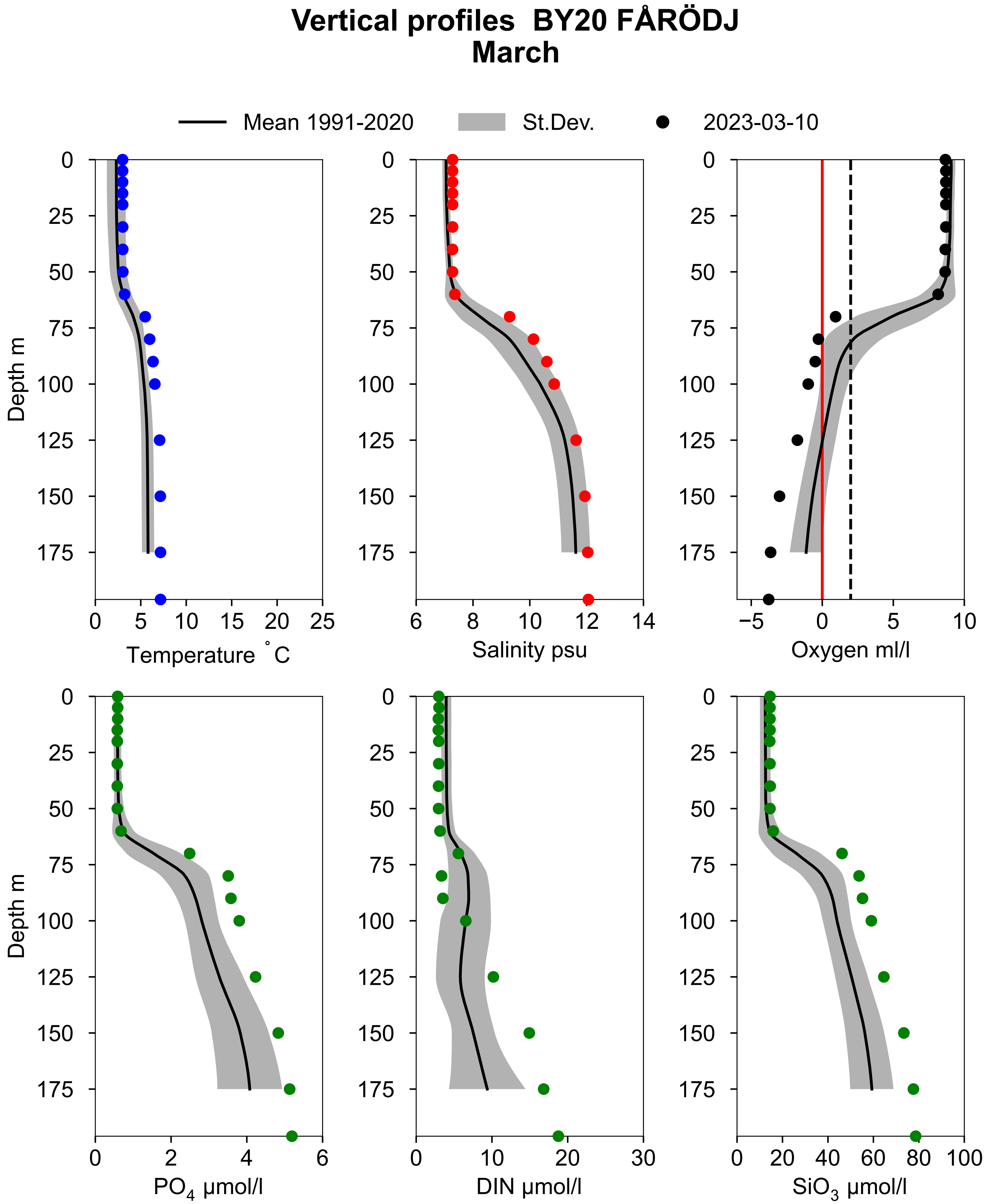
STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

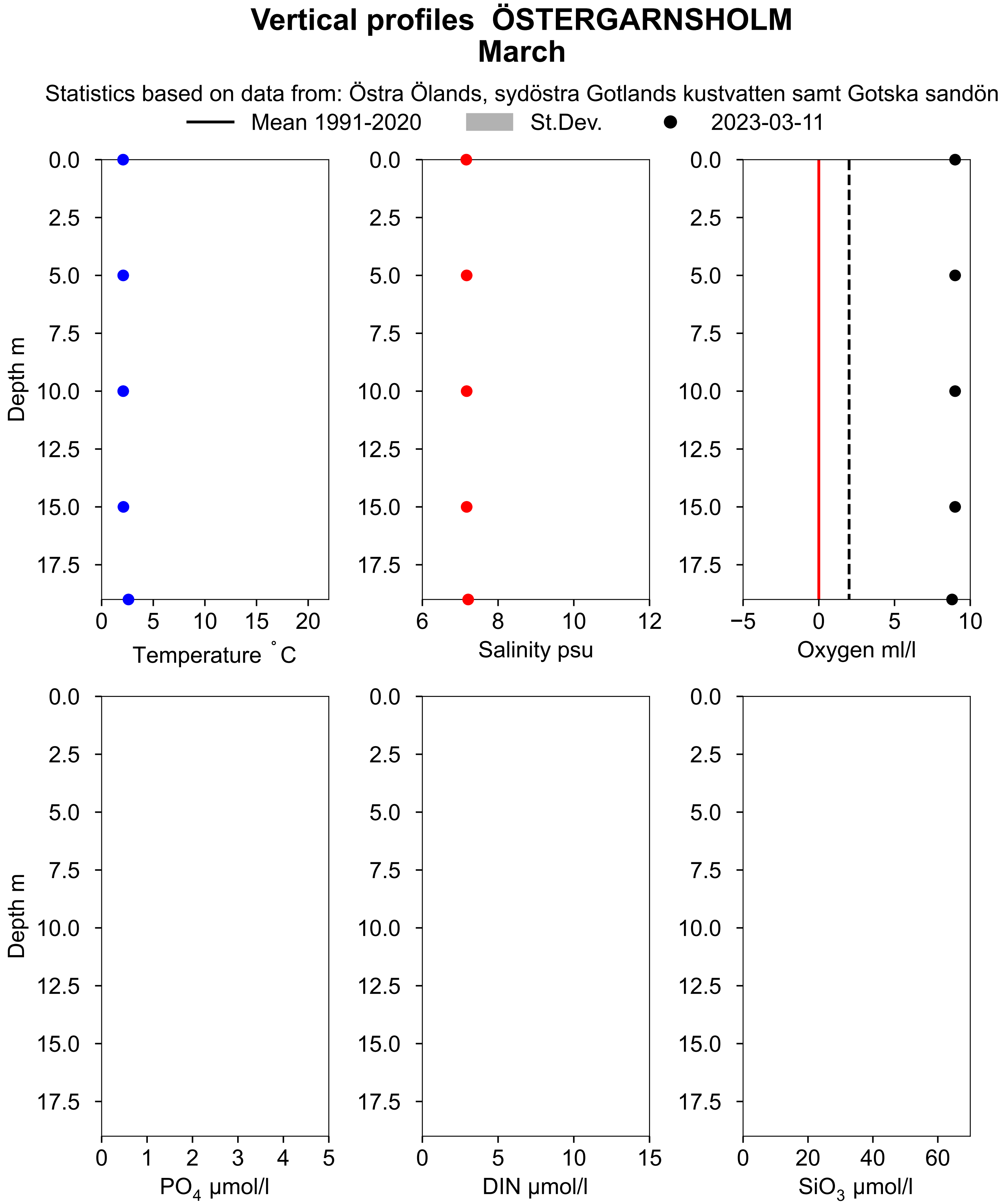
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 175 m)



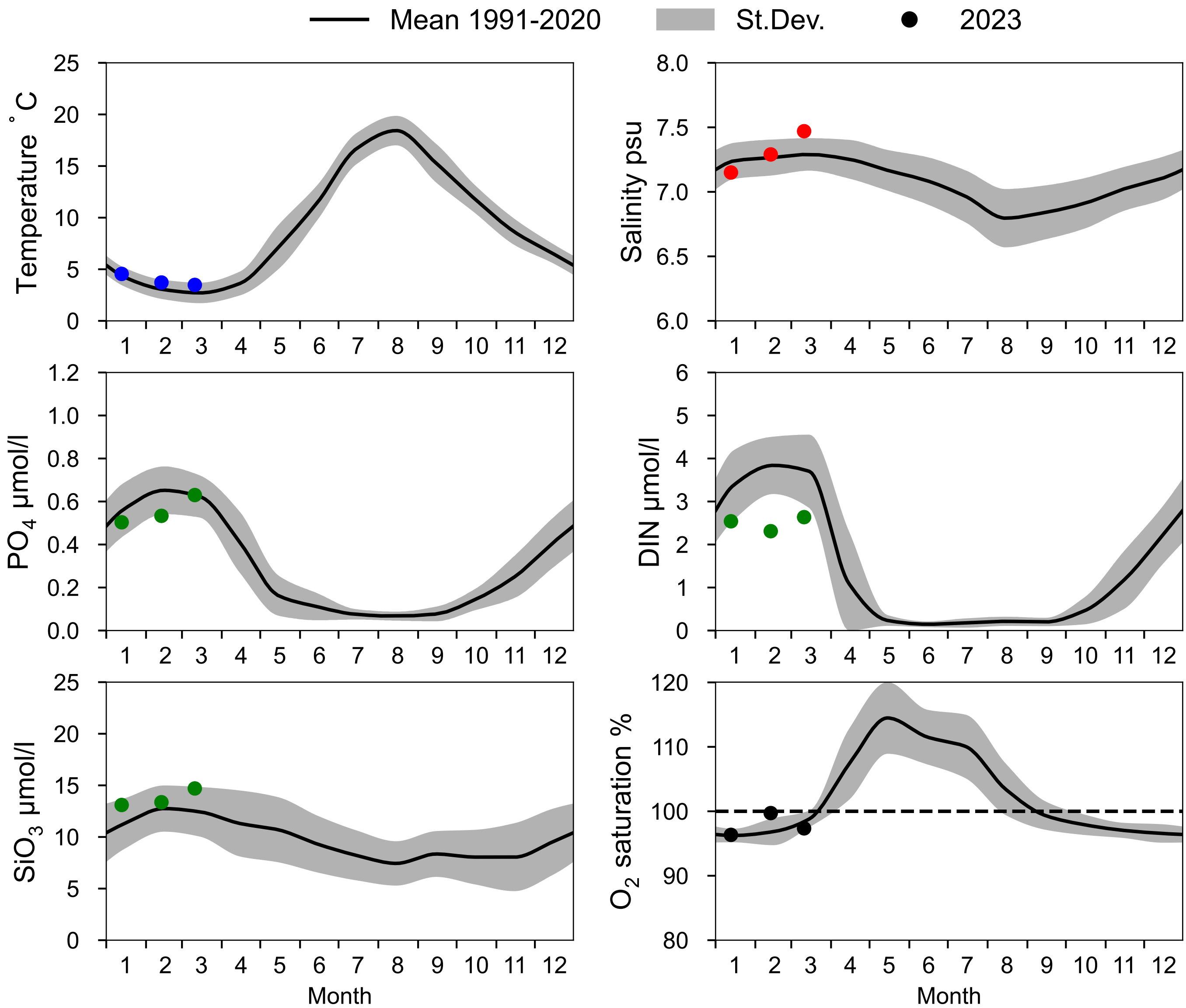

Vertical profiles BY20 FÅRÖDJ
March
Mean 1991-2020
St.Dev.
2023-03-10
Depth m
Temperature ˚C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l



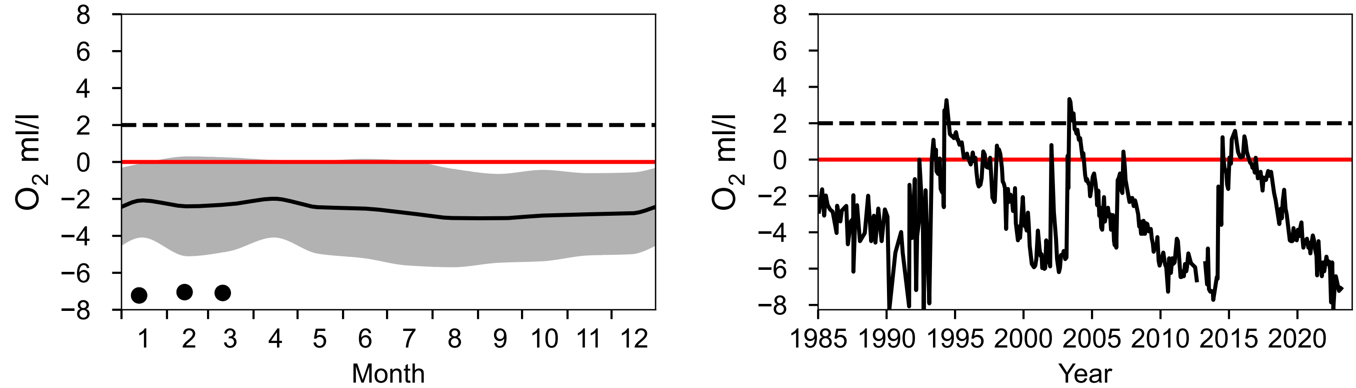
Vertical profiles ÖSTERGARNSHOLM
March
Statistics based on data from: Östra Ölands, sydöstra Gotlands kustvatten samt Gotska sandön
Mean 1991-2020
St.Dev.
2023-03-11
Depth m
Temperature °C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

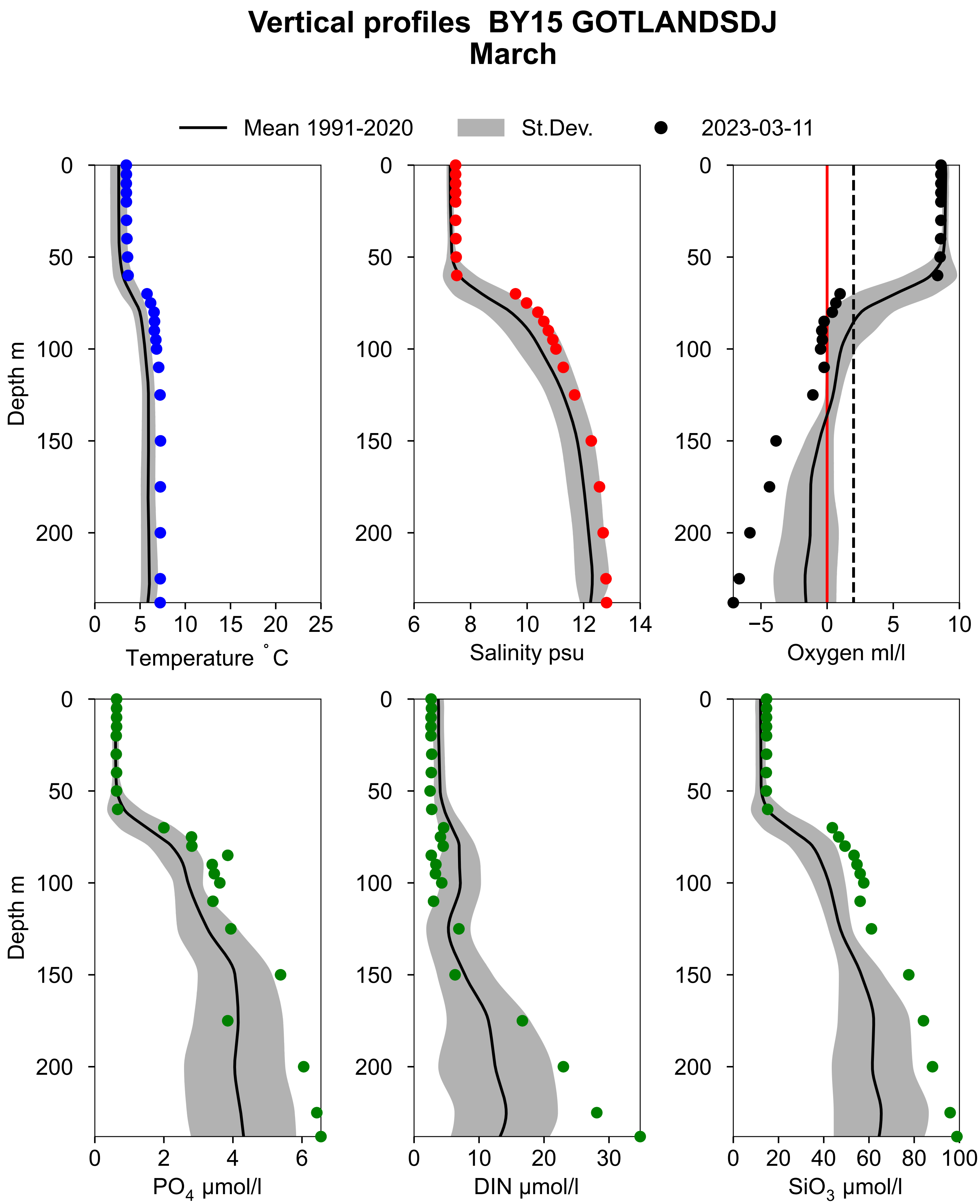
STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

Annual Cycles



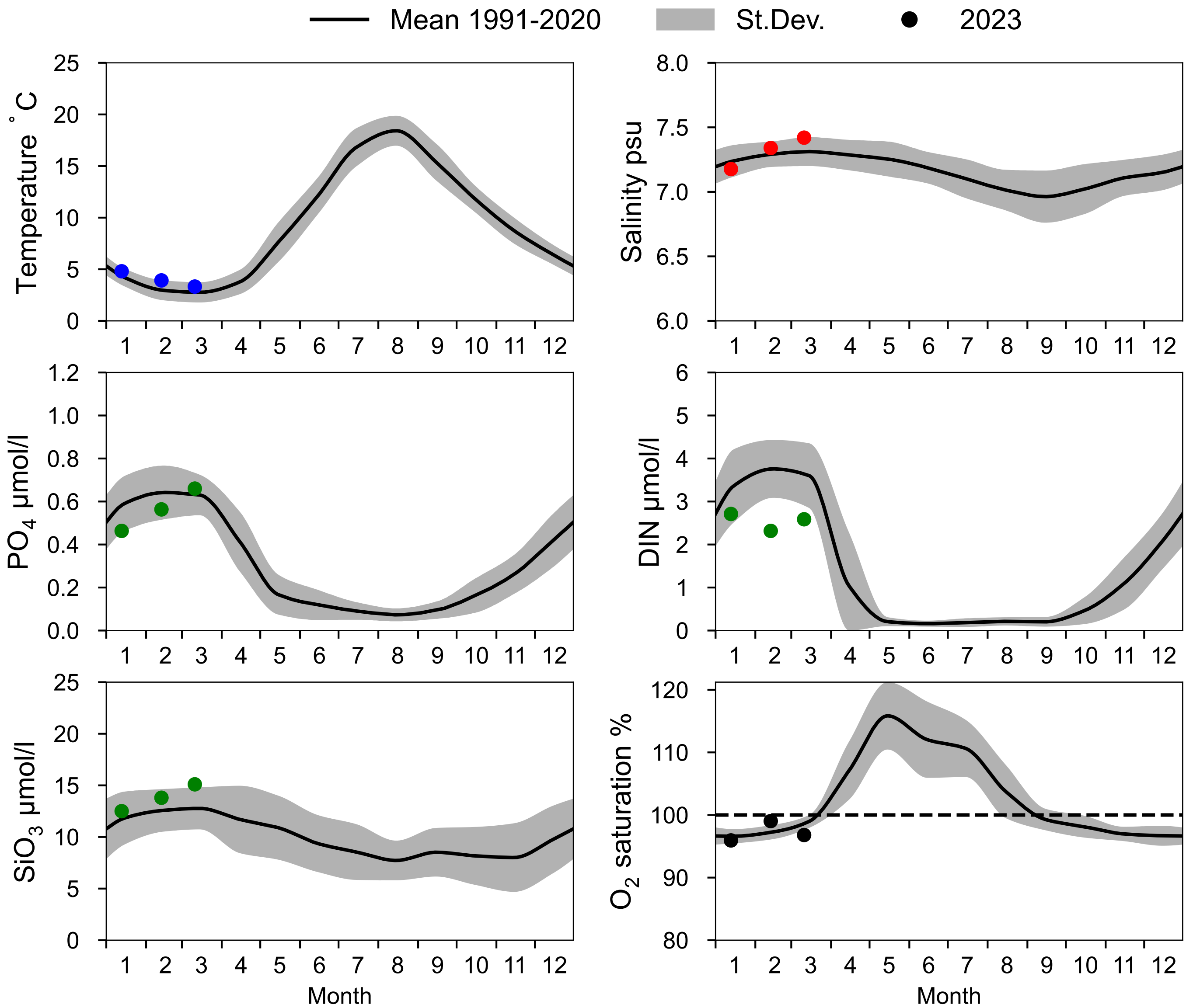
OXYGEN IN BOTTOM WATER (depth >= 225 m)



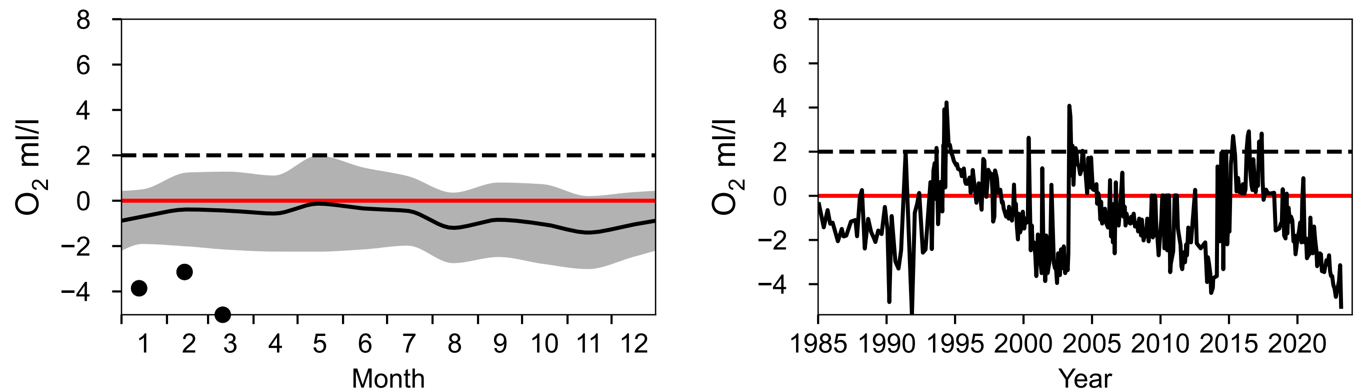

Vertical profiles BY15 GOTLANDSDJ
March
Mean 1991-2020
St.Dev.
2023-03-11
Depth m
Temperature °C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

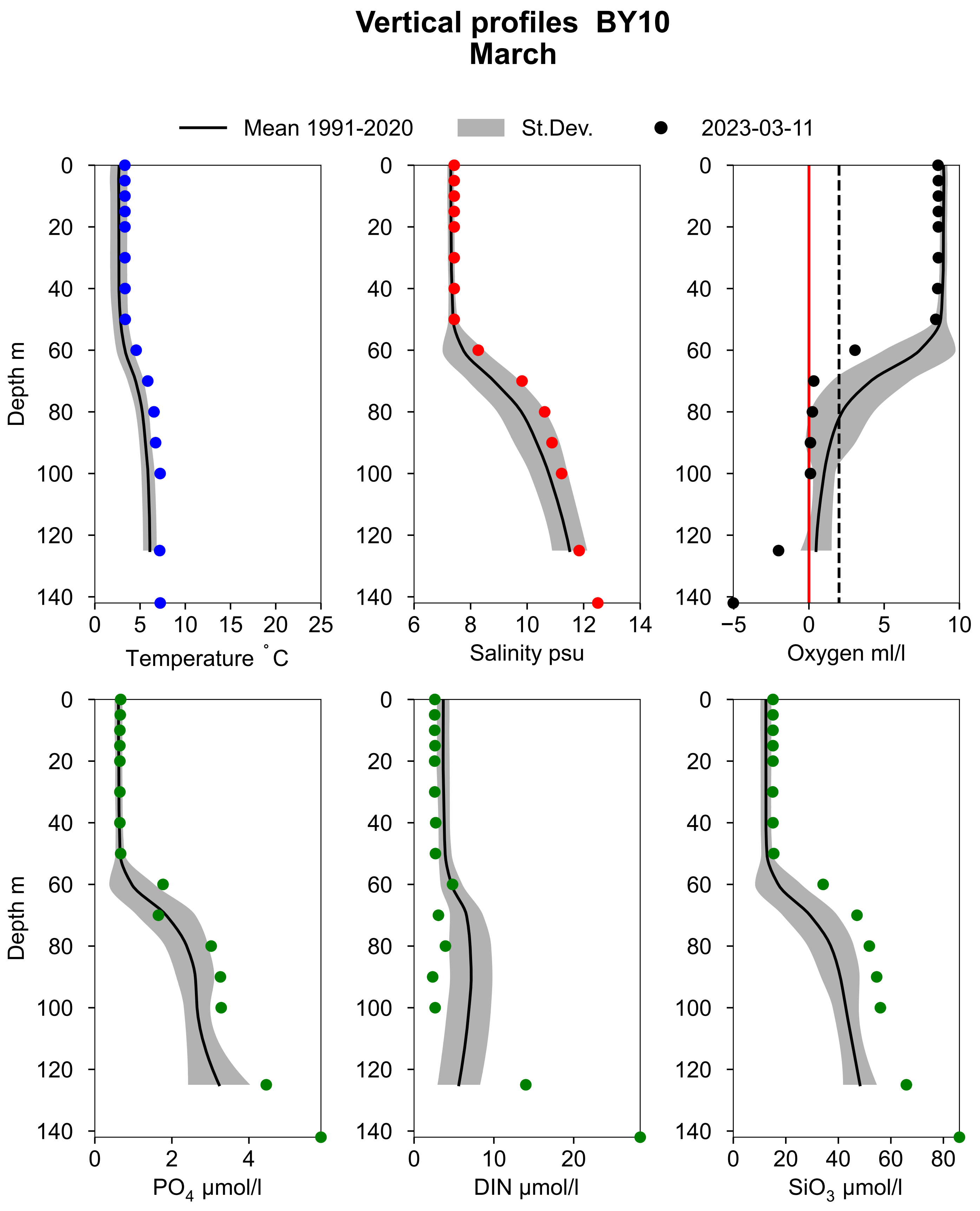
STATION BY10 SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

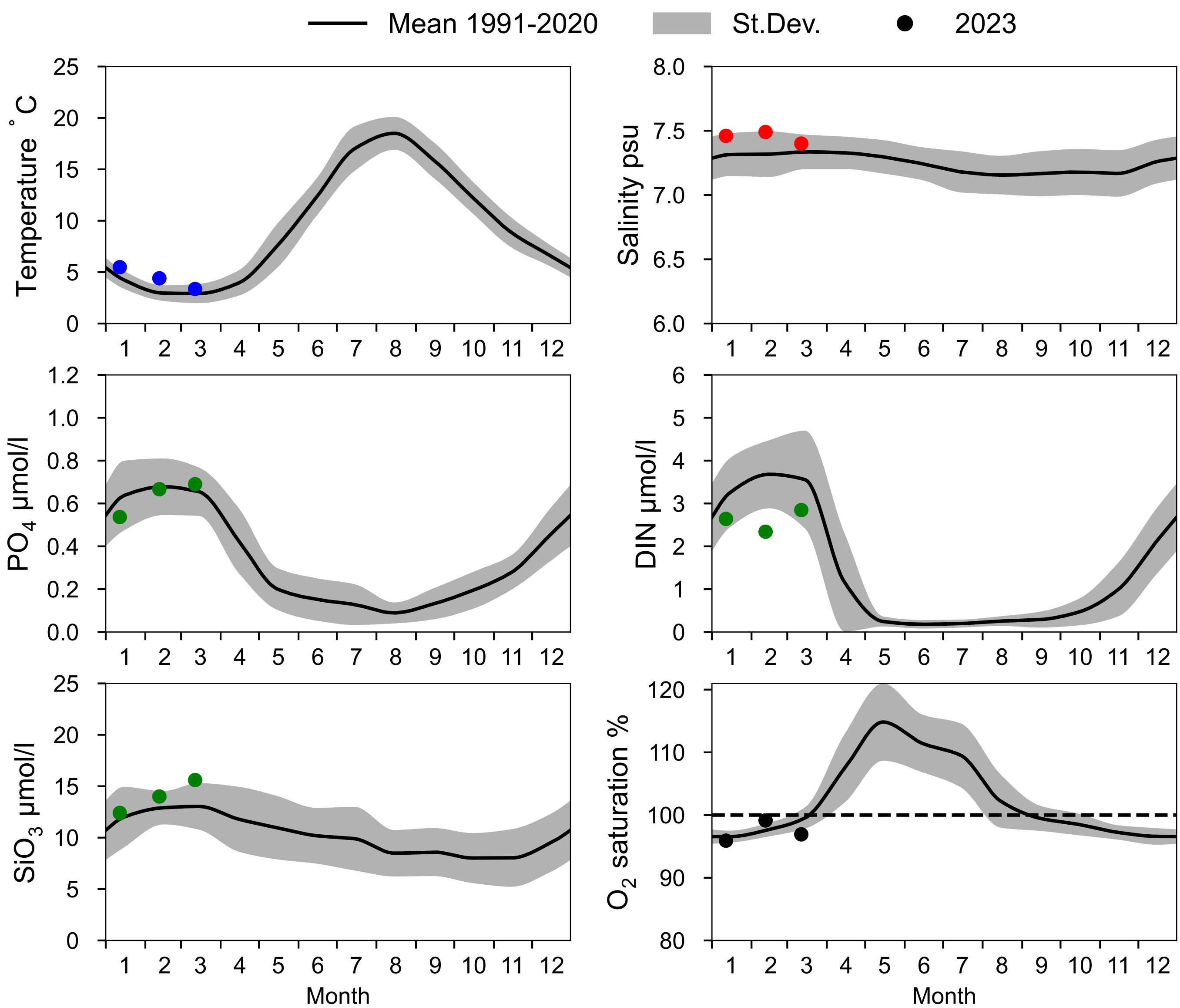




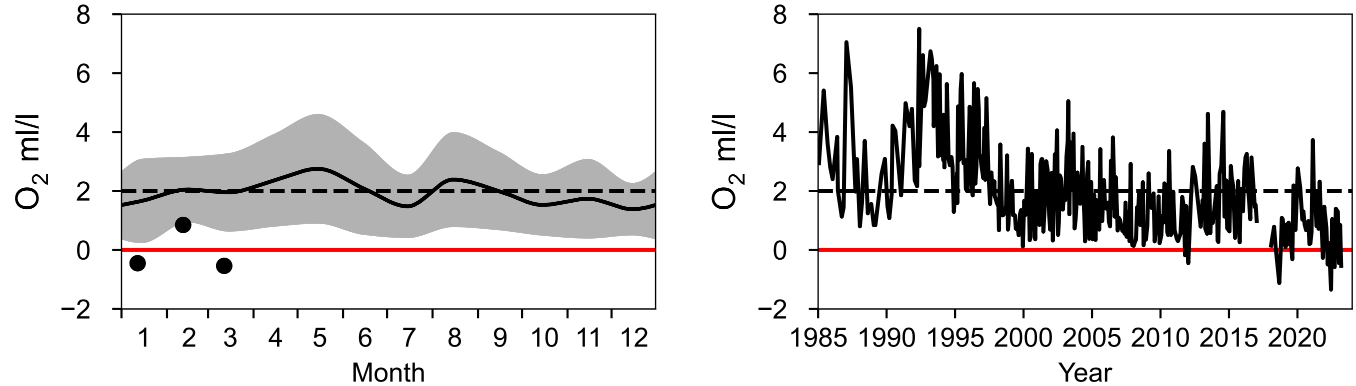
Vertical profiles BY10
March
Mean 1991-2020
St.Dev.
2023-03-11
Depth m
Temperature °C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

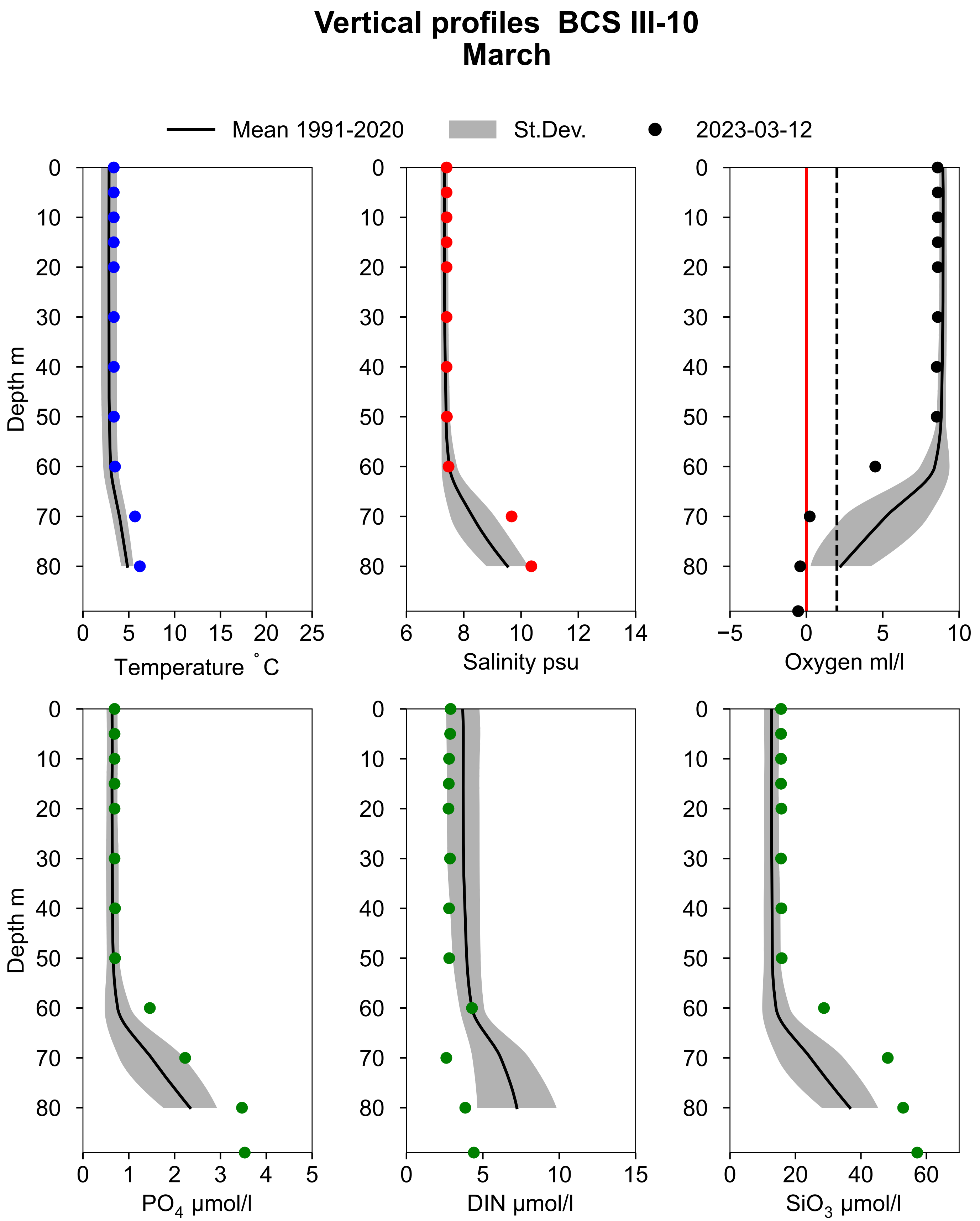
STATION BCS III-10 SURFACE WATER (0-10 m)

Annual Cycles



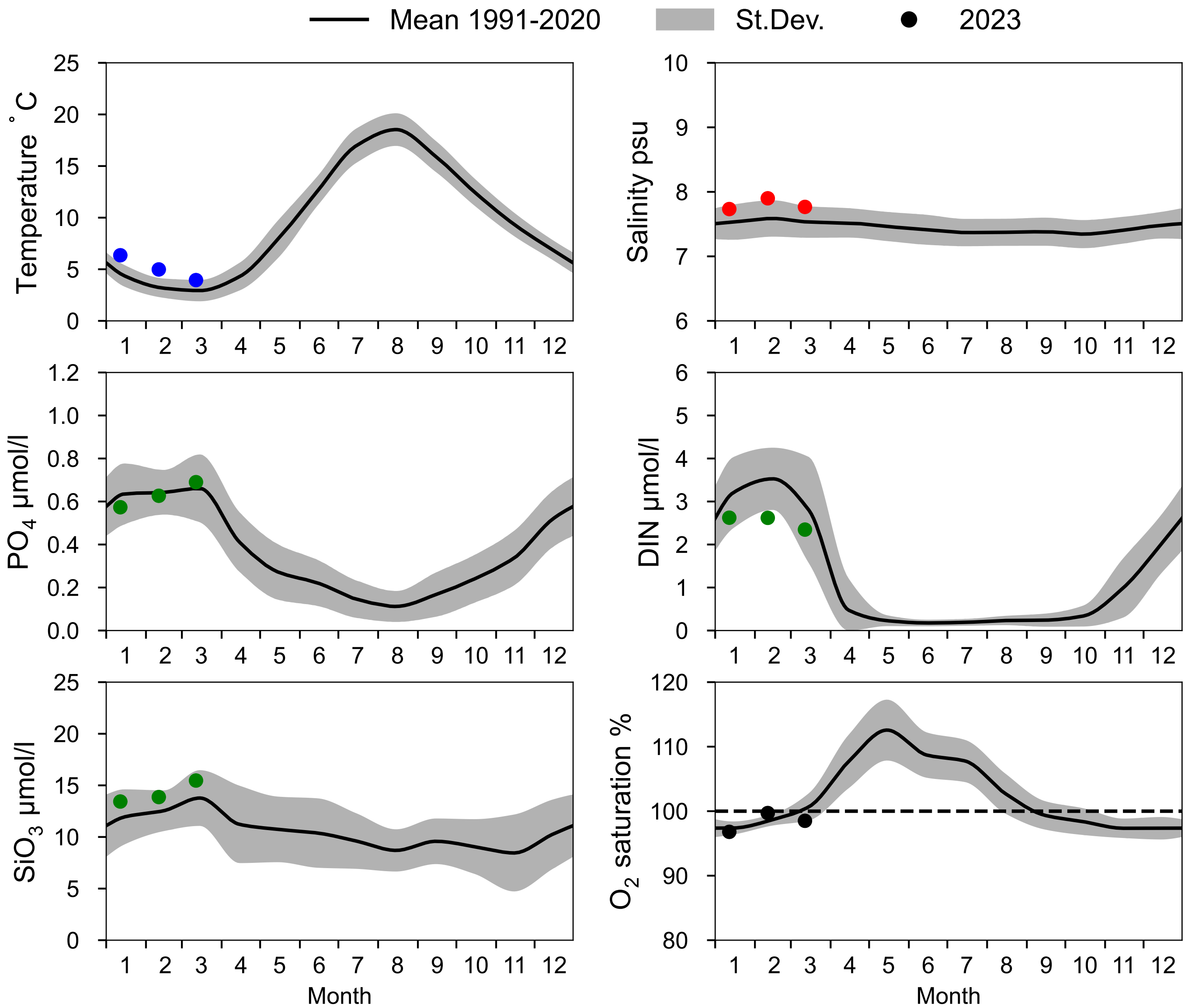
OXYGEN IN BOTTOM WATER (depth >= 80 m)



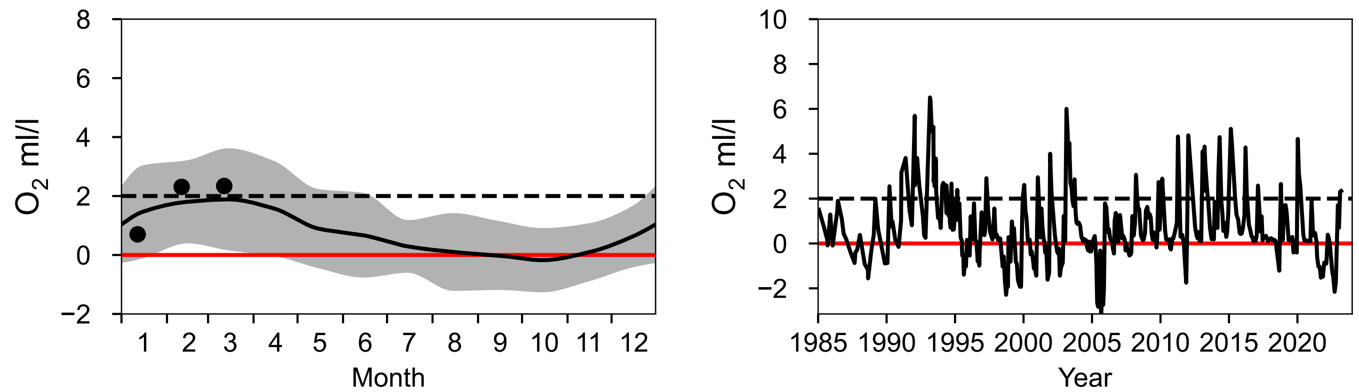

Vertical profiles BCS III-10
March
Mean 1991-2020
St.Dev.
2023-03-12
Depth m
Temperature ˚C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

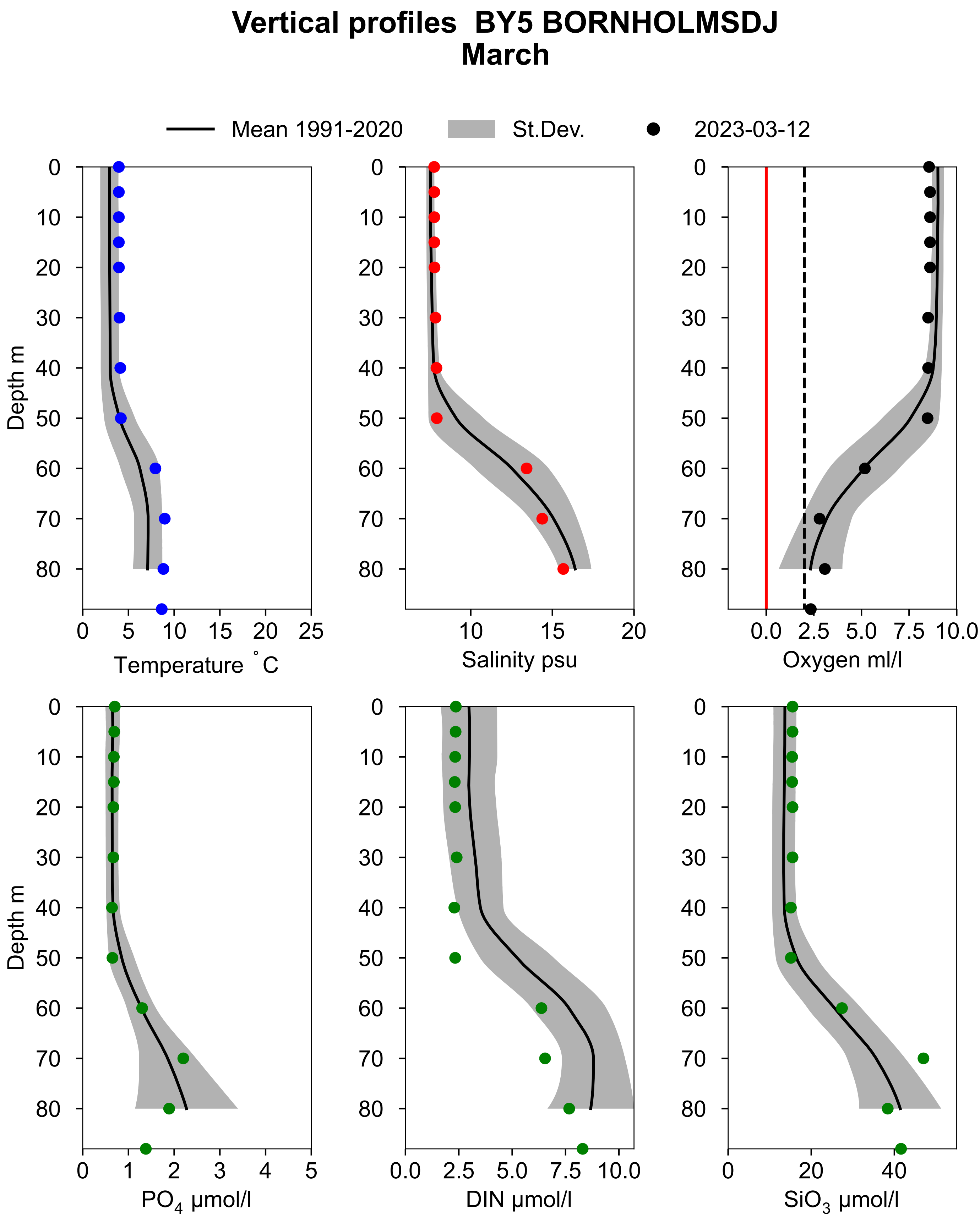
STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

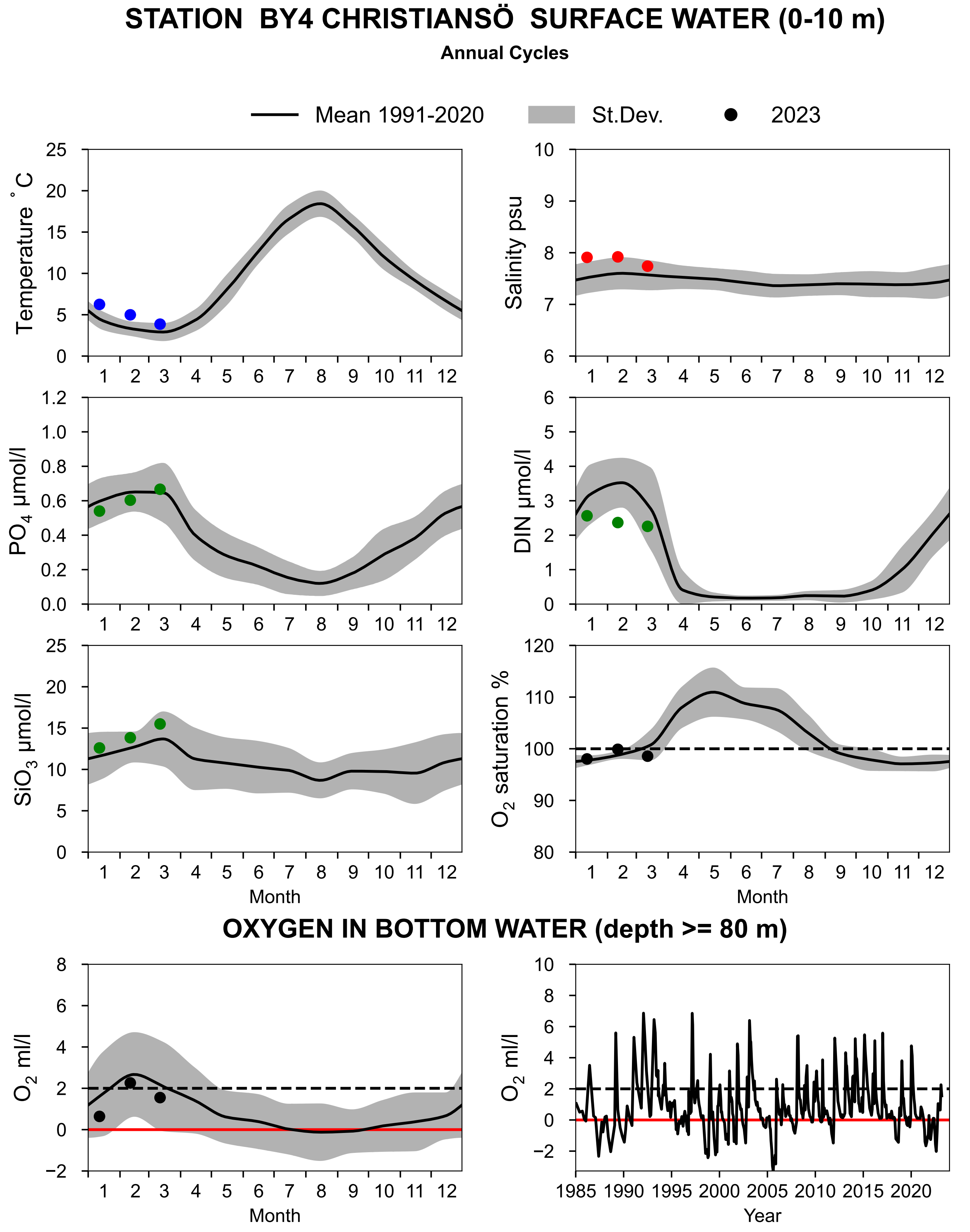
Annual Cycles

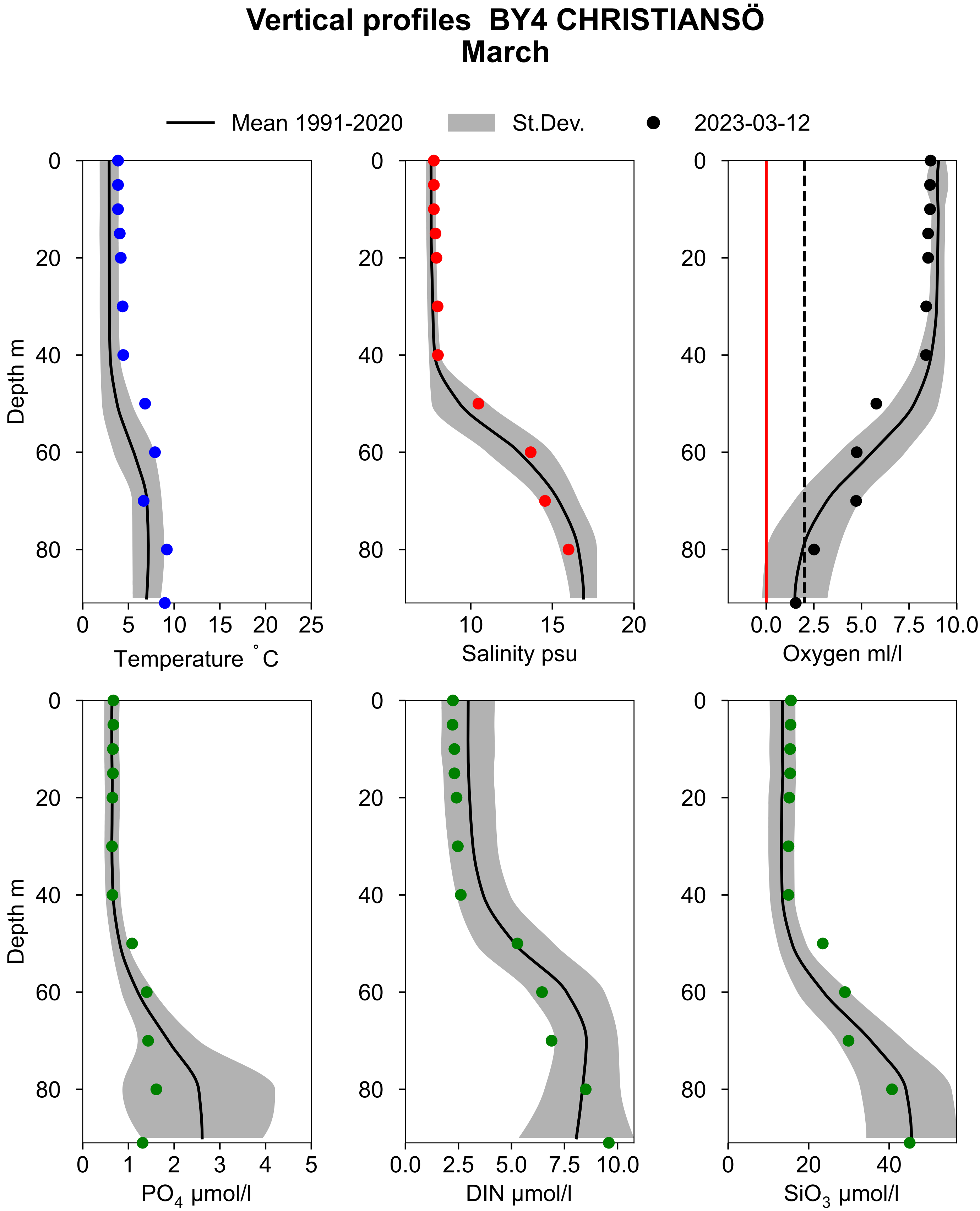


OXYGEN IN BOTTOM WATER (depth >= 80 m)



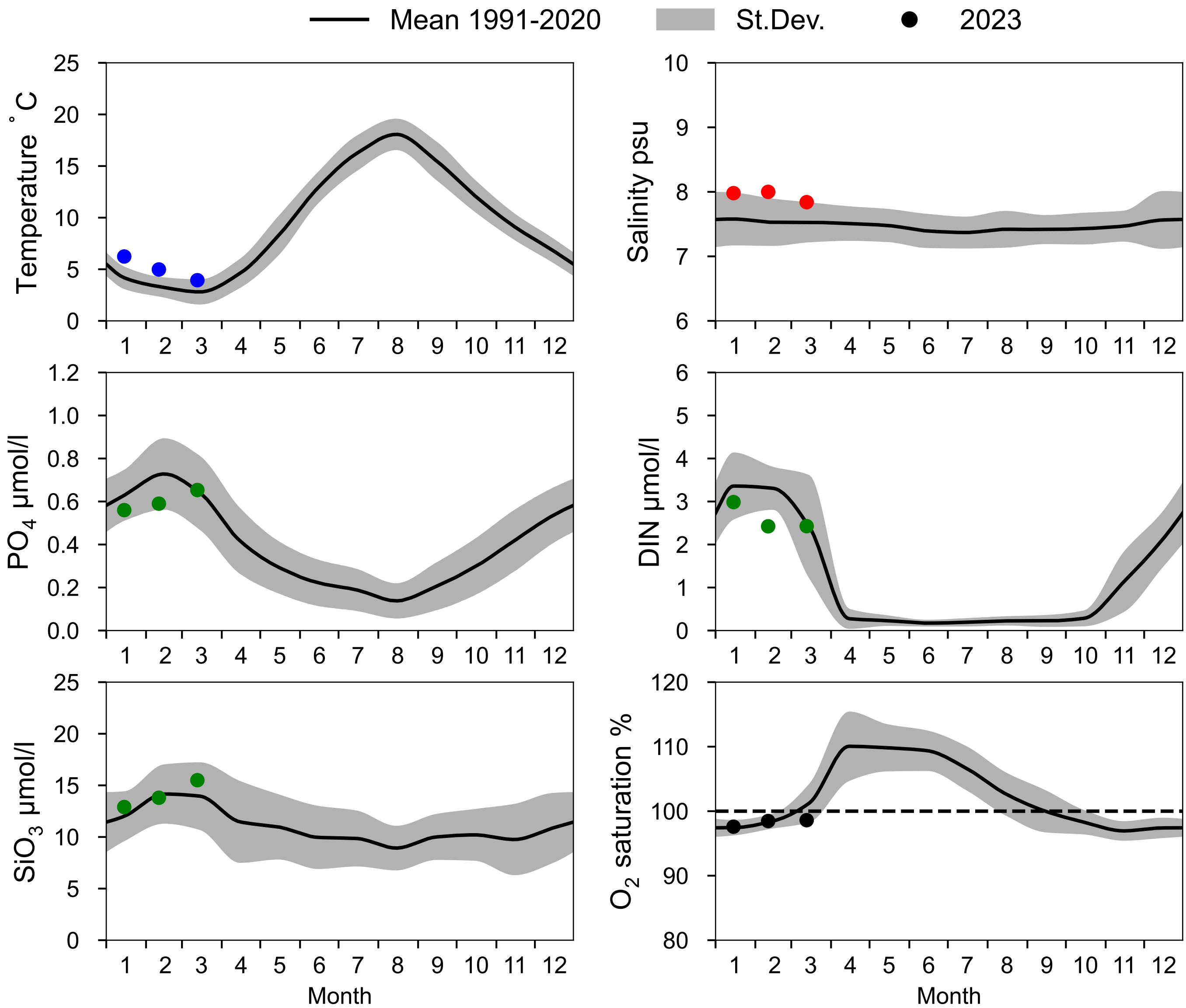

Vertical profiles BY5 BORNHOLMSDJ
March
Mean 1991-2020
St.Dev.
2023-03-12
Depth m
Temperature ˚C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l


STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)
Annual Cycles
Mean 1991-2020
St.Dev.
2023
Temperature °C
Salinity psu
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l
O2 saturation %
Month
OXYGEN IN BOTTOM WATER (depth >= 80 m)
O2 ml/l
Year

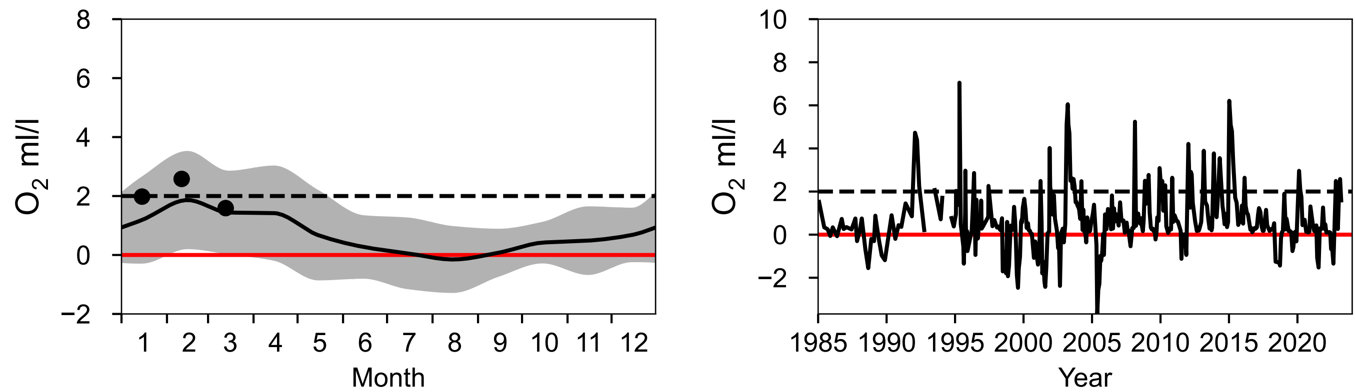

Vertical profiles BY4 CHRISTIANSÖ
March
Mean 1991-2020
St.Dev.
2023-03-12
Depth m
Temperature ˚C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

STATION HANÖBUKTEN SURFACE WATER (0-10 m)

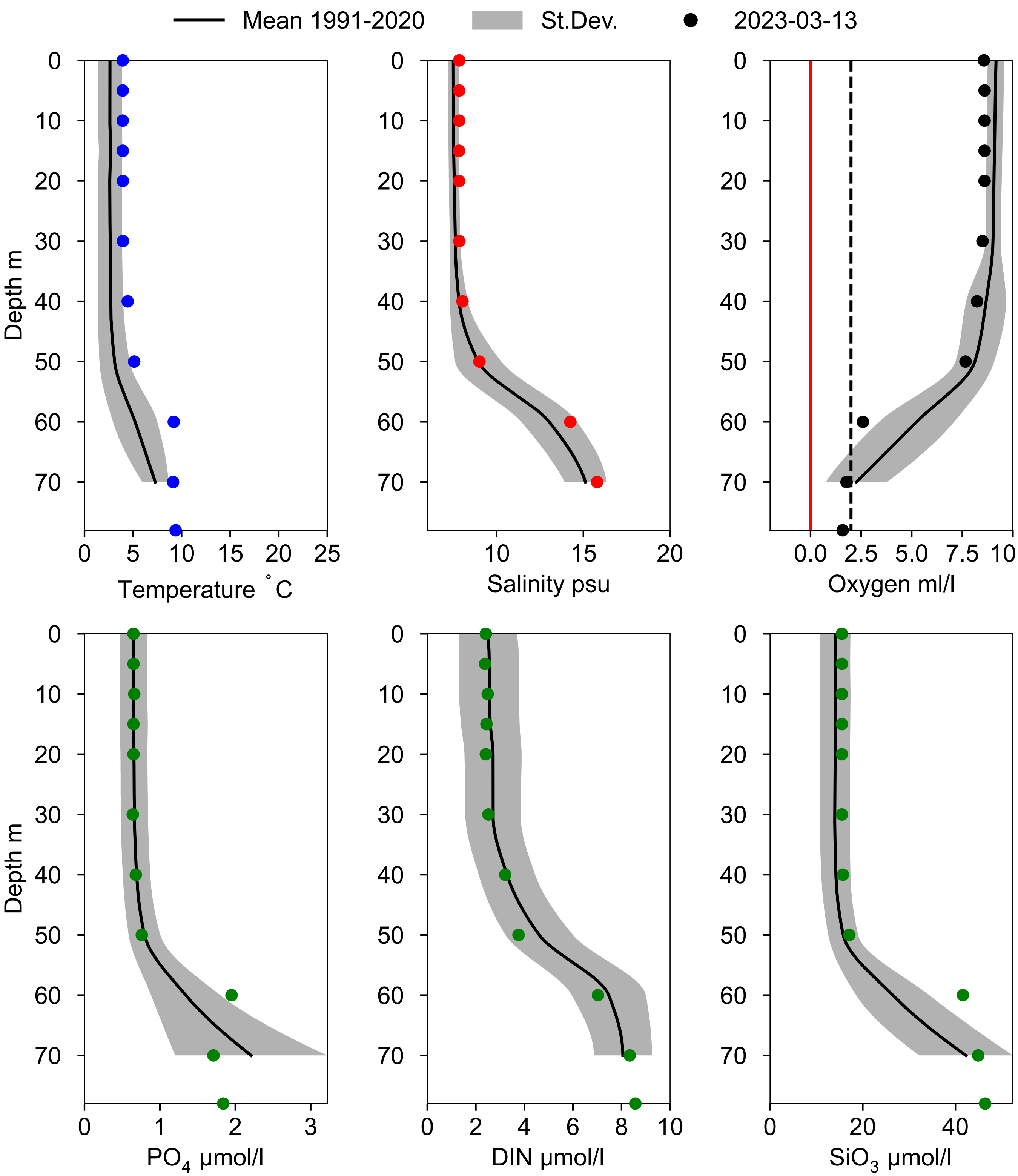
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 70 m)

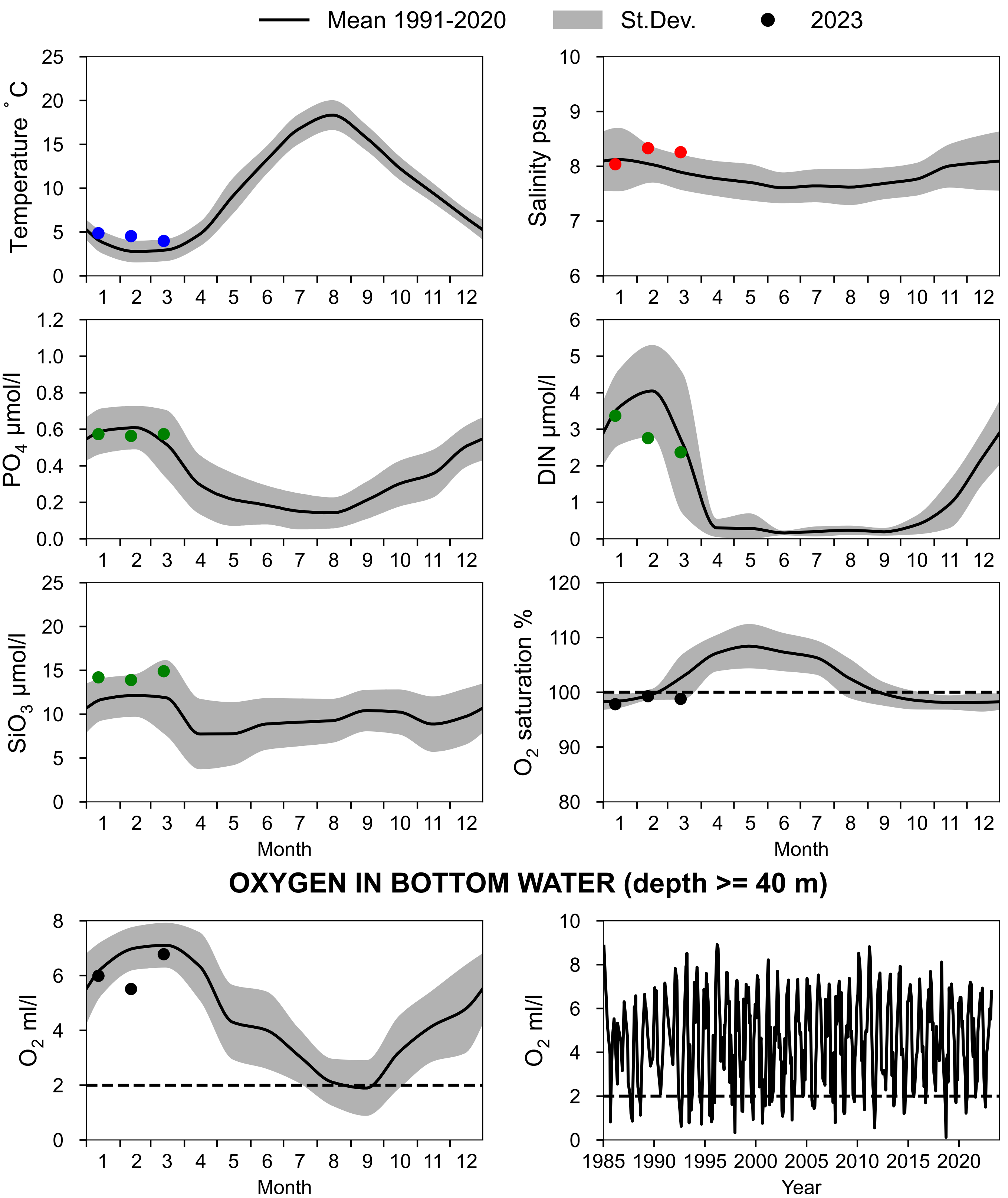


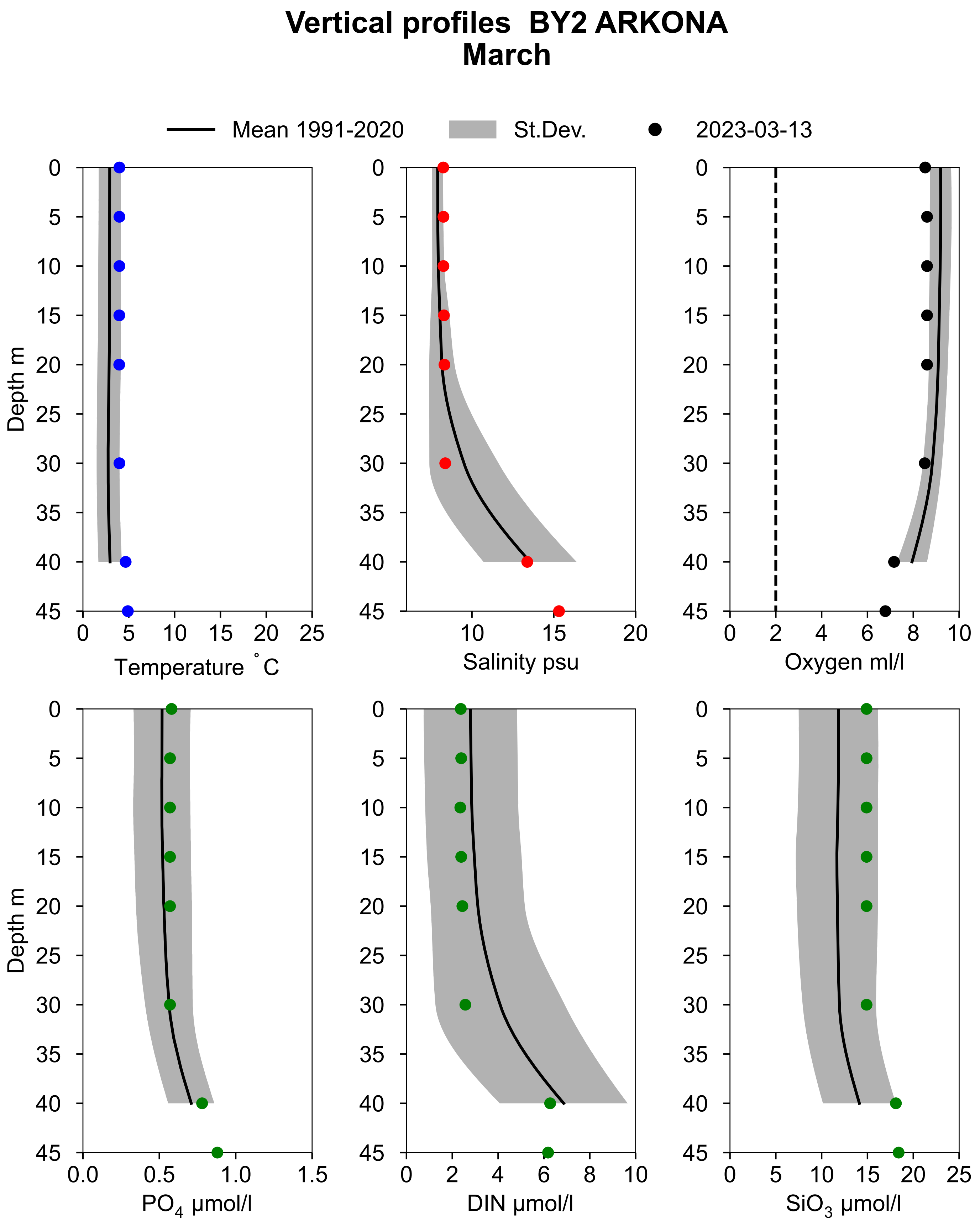
Vertical profiles HANÖBUKTEN
March



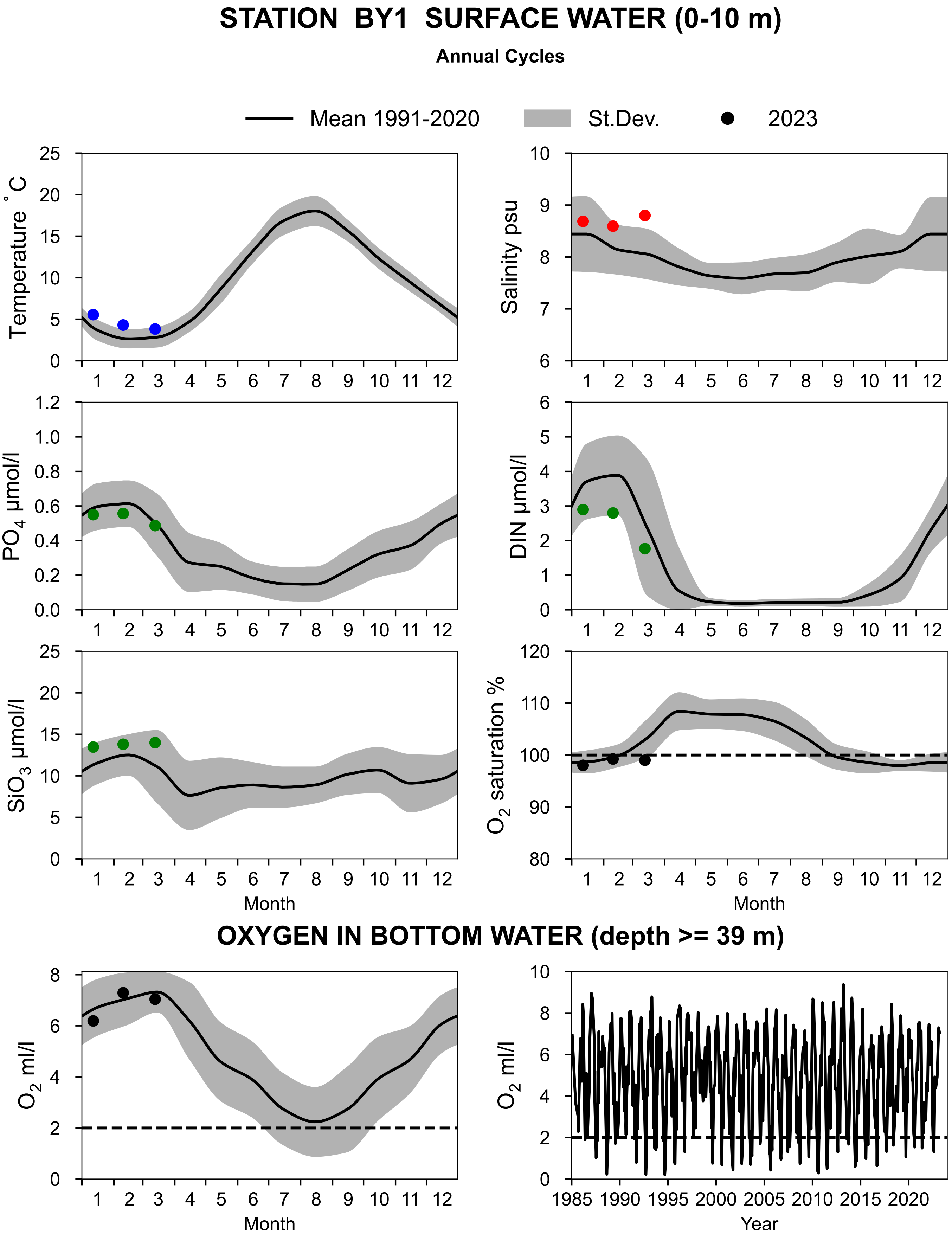
STATION BY2 ARKONA SURFACE WATER (0-10 m)

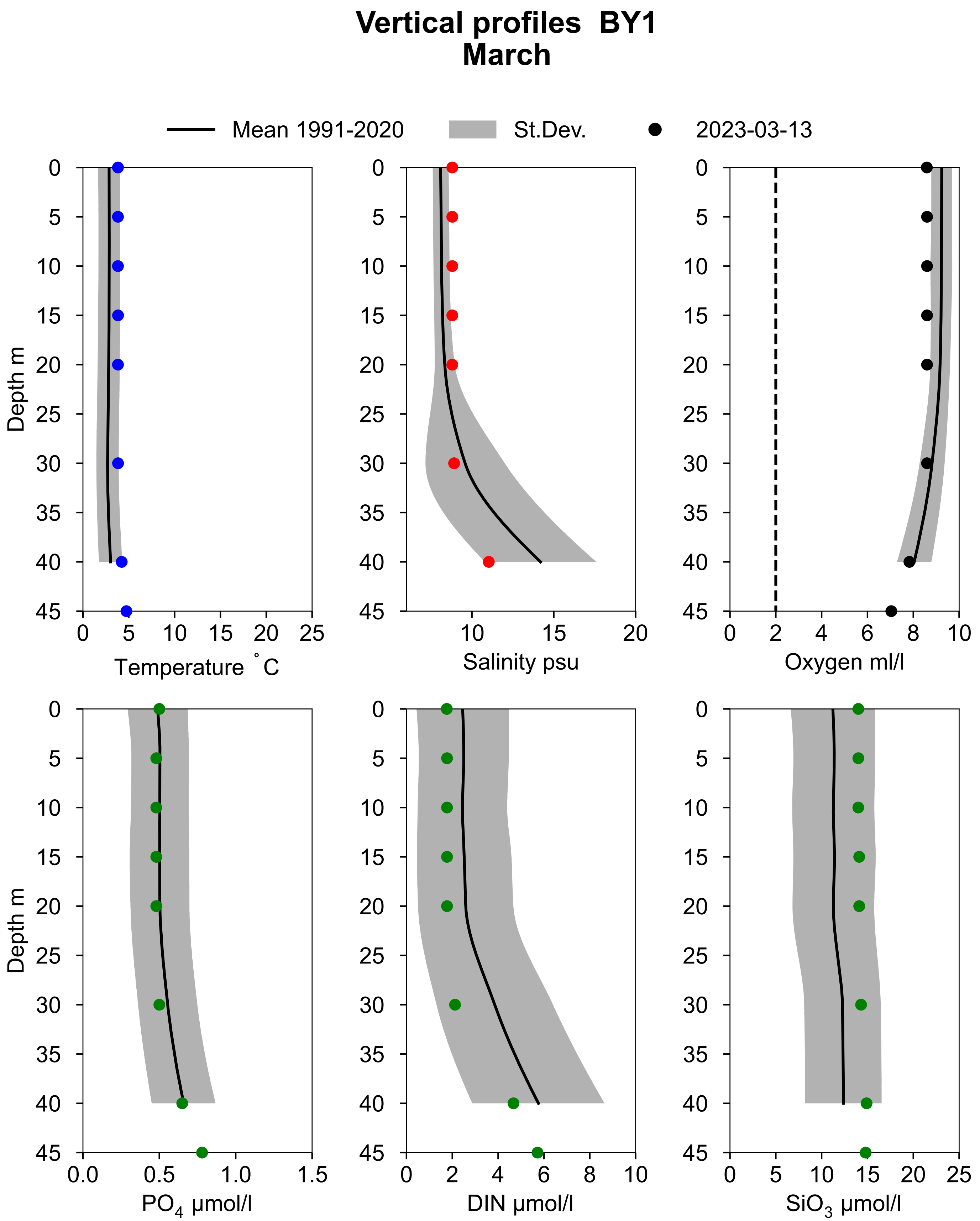
Annual Cycles





Vertical profiles BY2 ARKONA
March
Mean 1991-2020
St.Dev.
2023-03-13
Depth m
Temperature °C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l


STATION BY1 SURFACE WATER (0-10 m)
Annual Cycles
Mean 1991-2020
St.Dev.
2023
Temperature °C
Salinity psu
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l
O2 saturation %
Month
OXYGEN IN BOTTOM WATER (depth >= 39 m)
O2 ml/l
Year

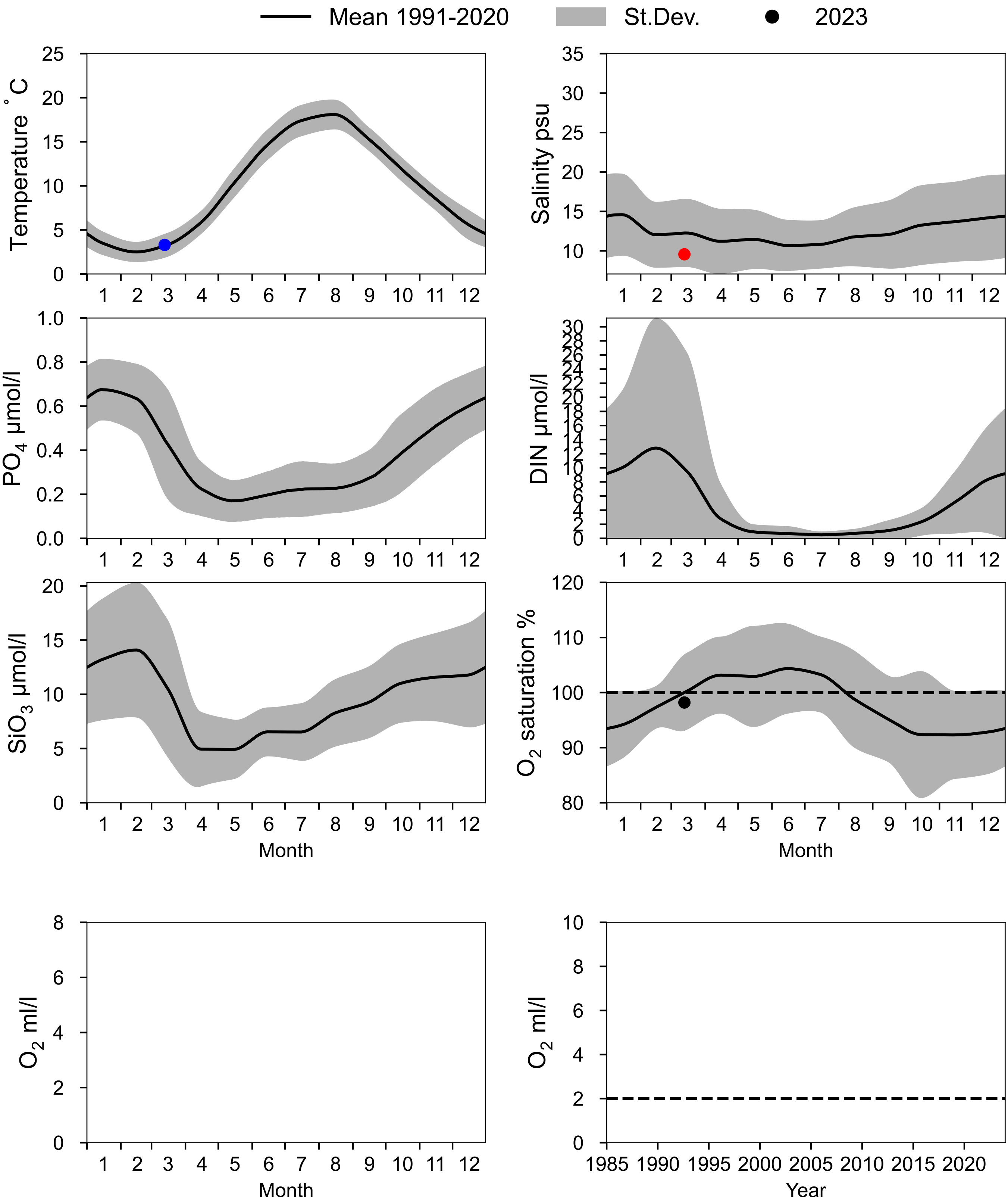


Vertical profiles BY1
March
Mean 1991-2020
St.Dev.
2023-03-13
Depth m
Temperature °C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

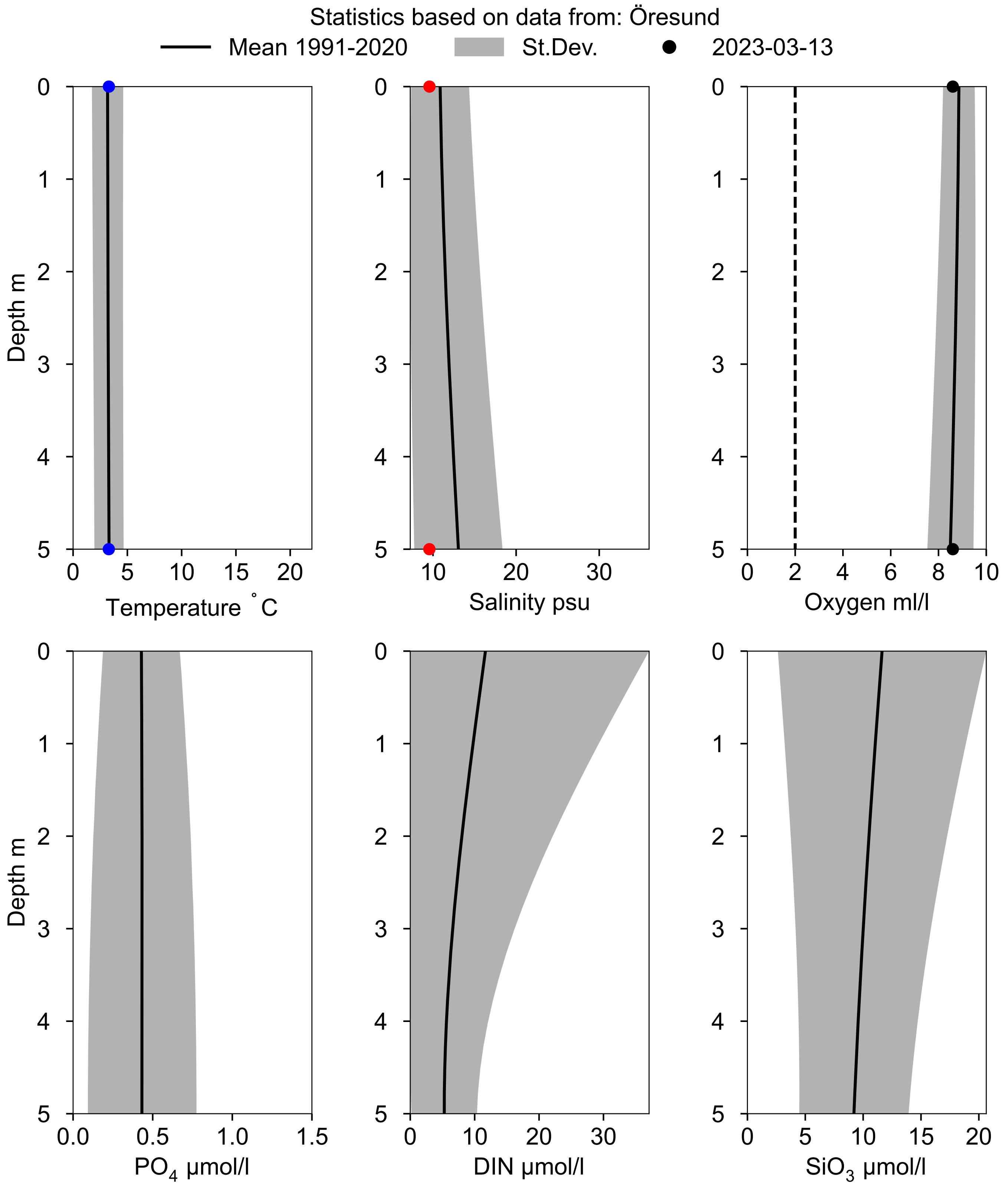
STATION FLINTEN-7 SURFACE WATER (0-10 m)

Annual Cycles

Statistics based on data from: Öresund

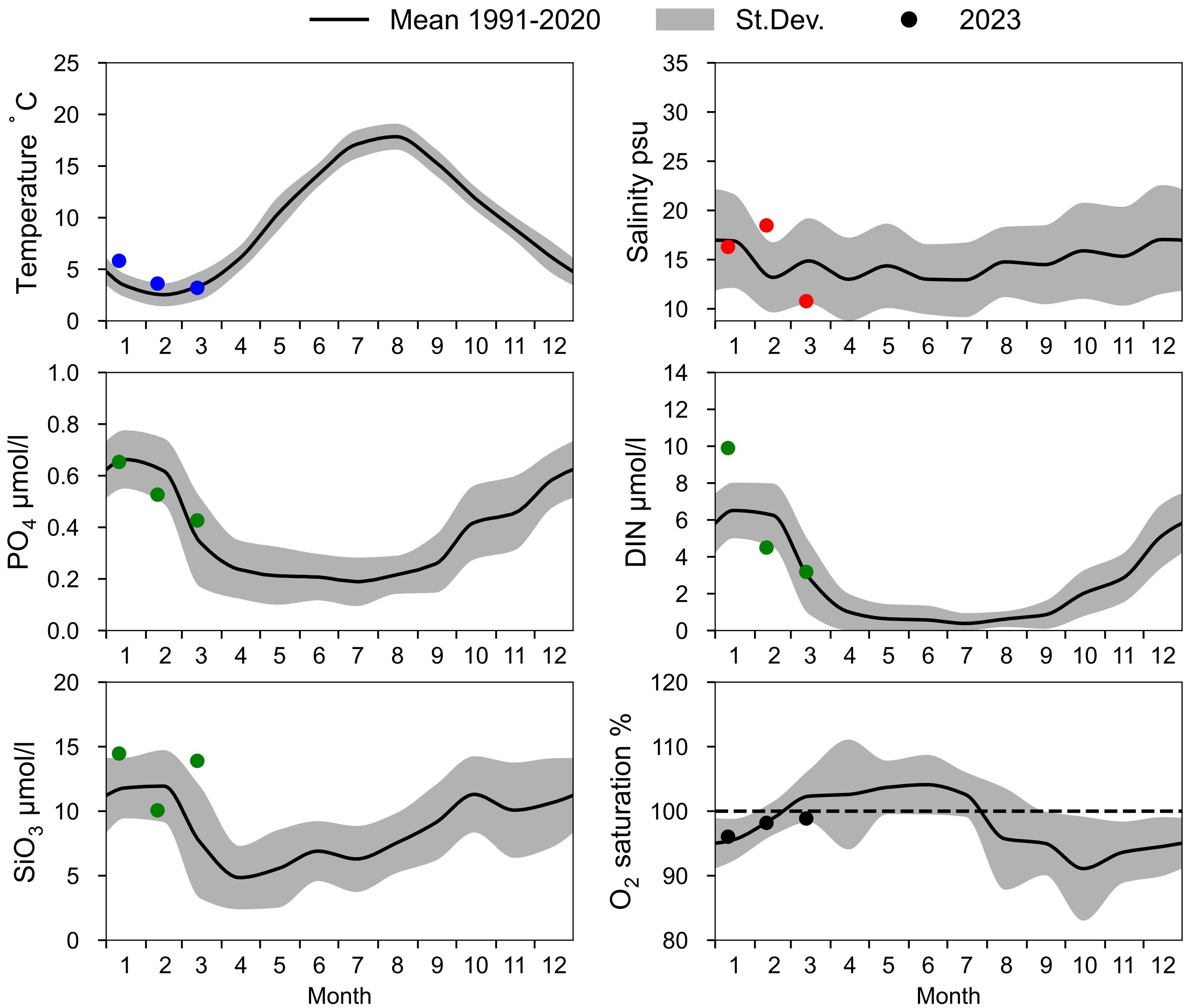


Vertical profiles FLINTEN-7
March

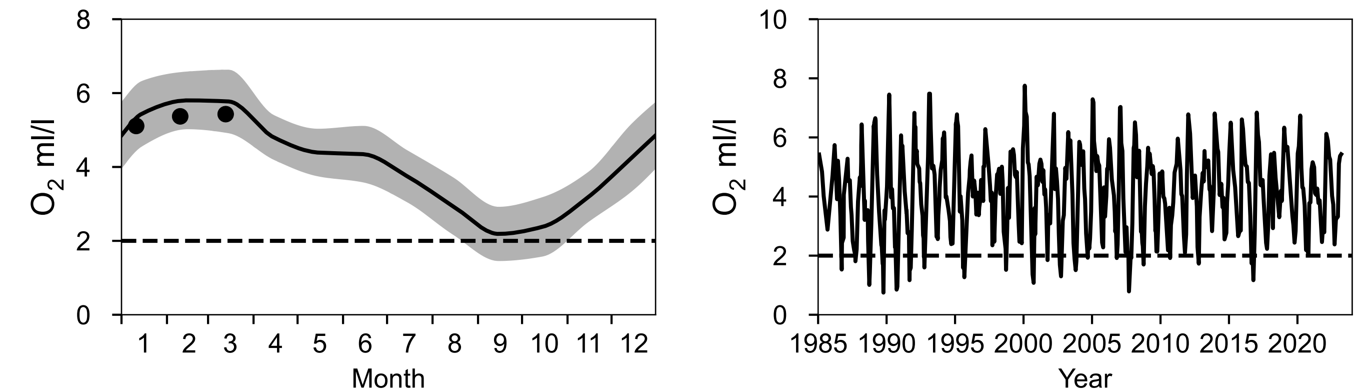


STATION W LANDSKRONA SURFACE WATER (0-10 m)

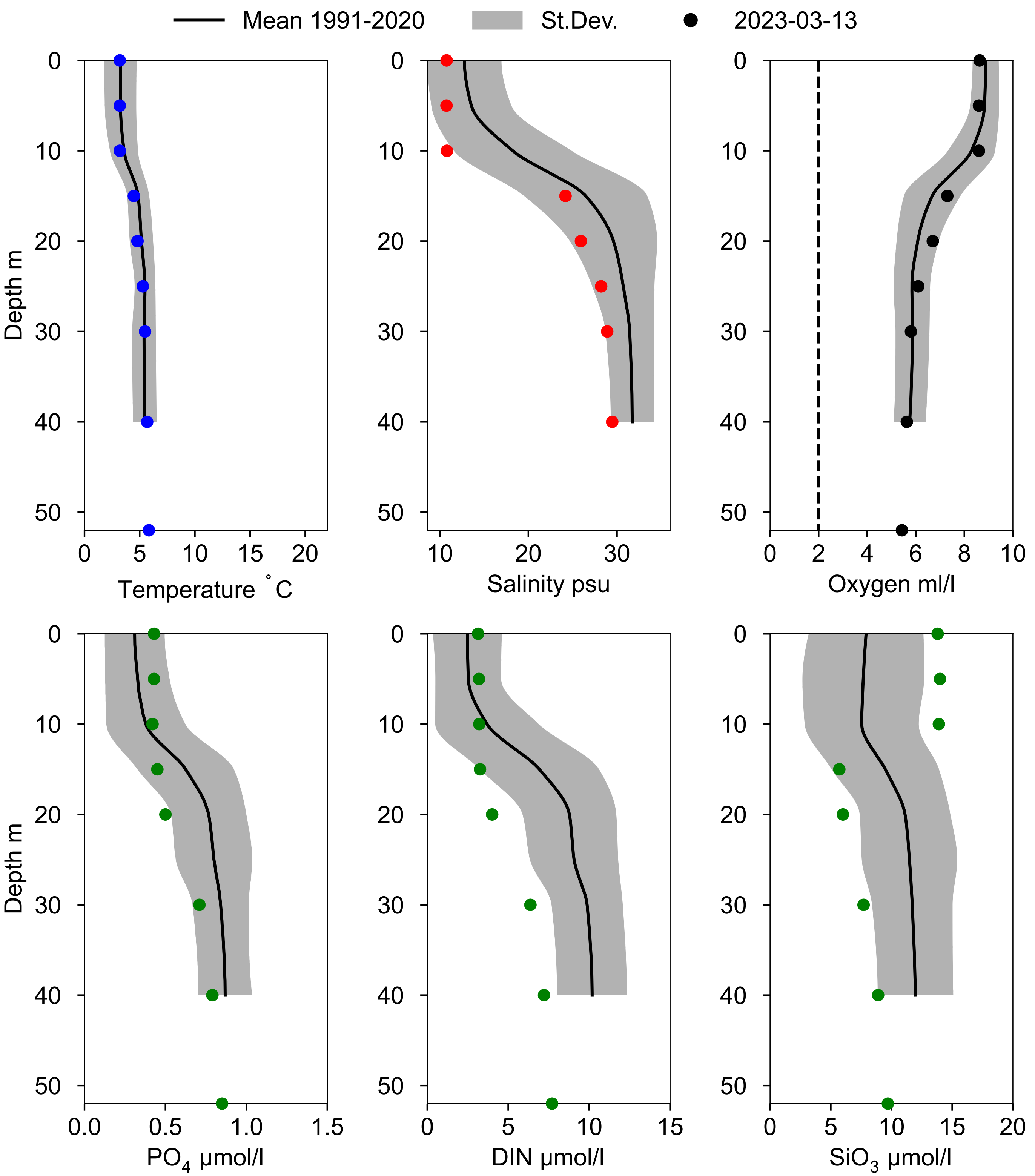
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 40 m)

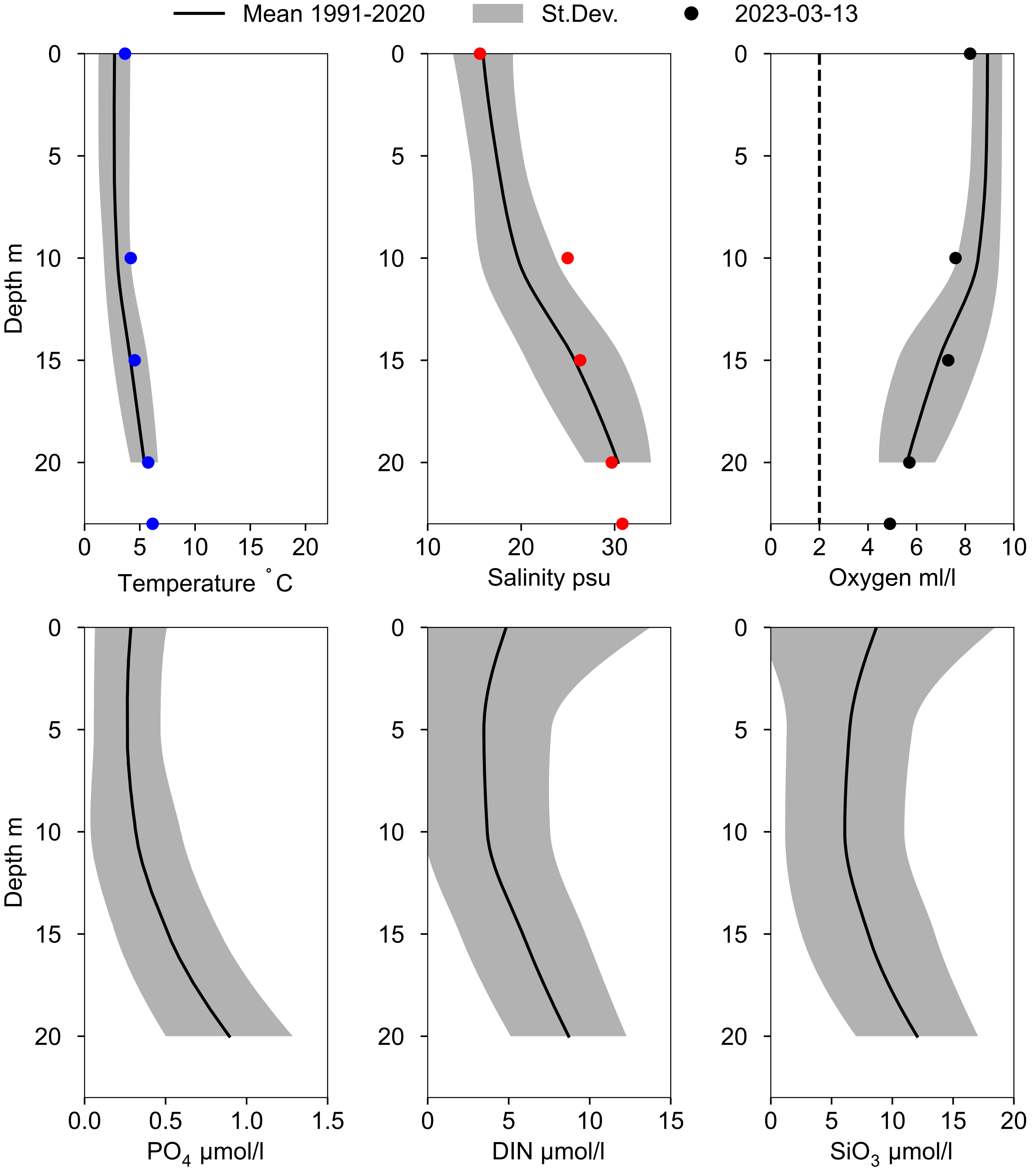


Vertical profiles W LANDSKRONA
March



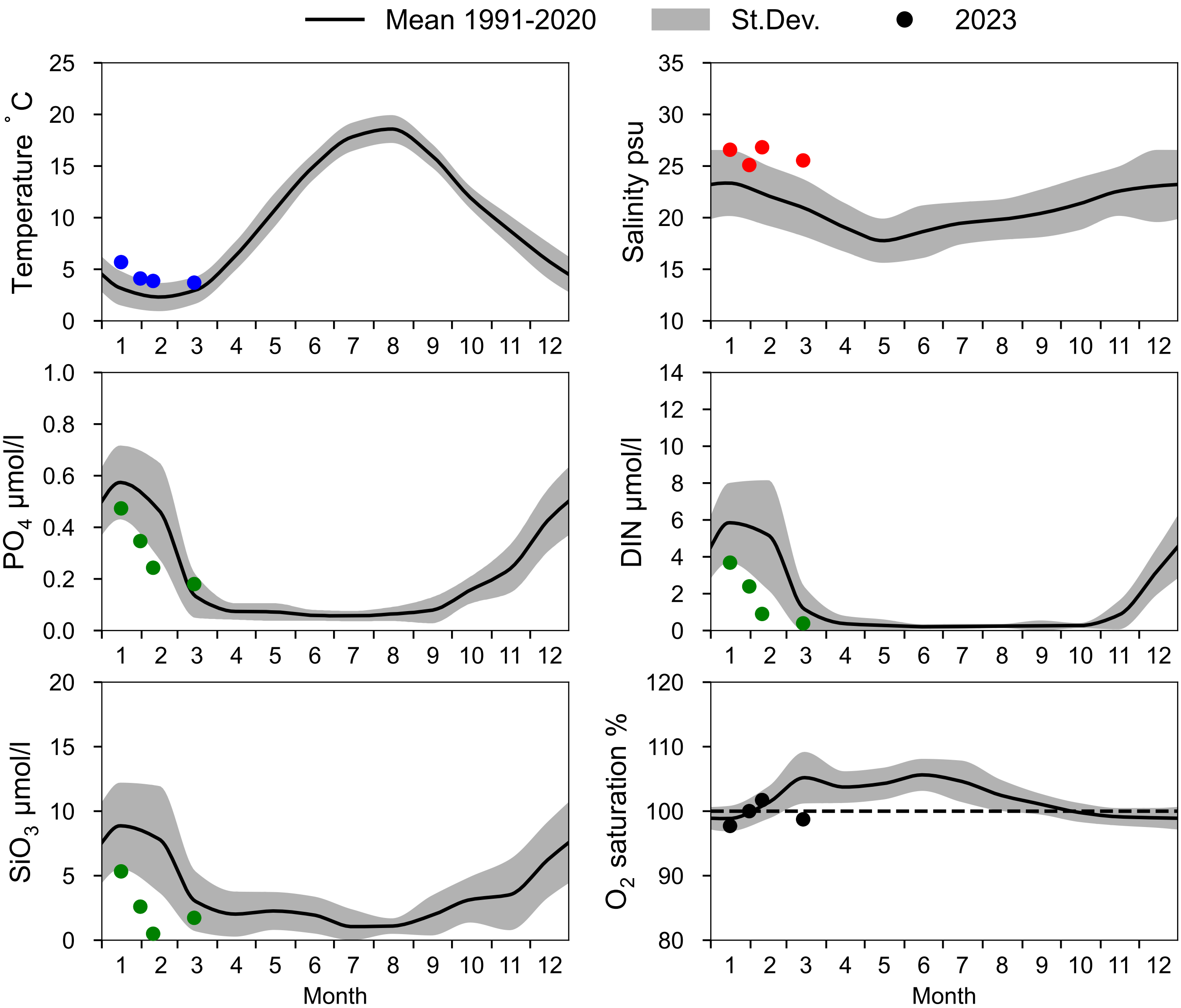
Vertical profiles 1 SW SVINBÅDAN
March

Statistics based on data from: Södra Hallands och norra Öresunds kustvatten

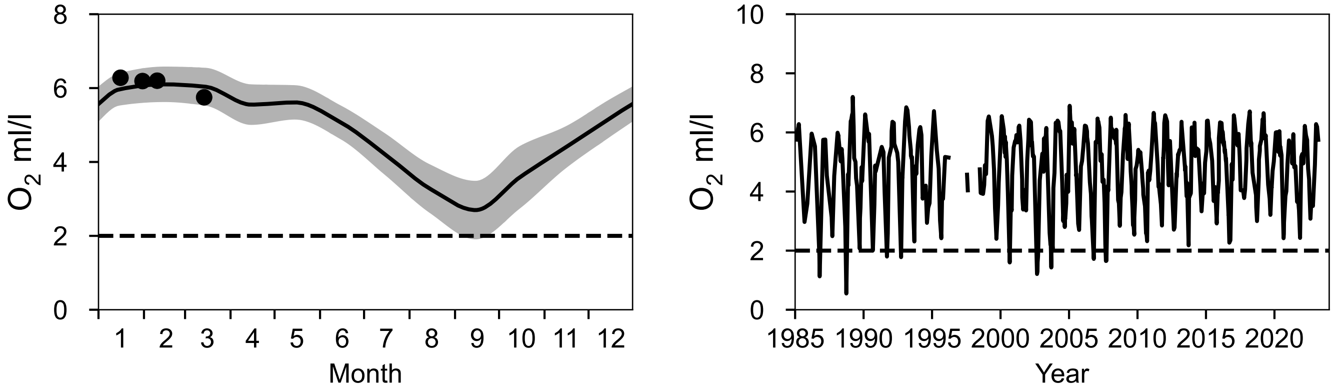


STATION ANHOLT E SURFACE WATER (0-10 m)

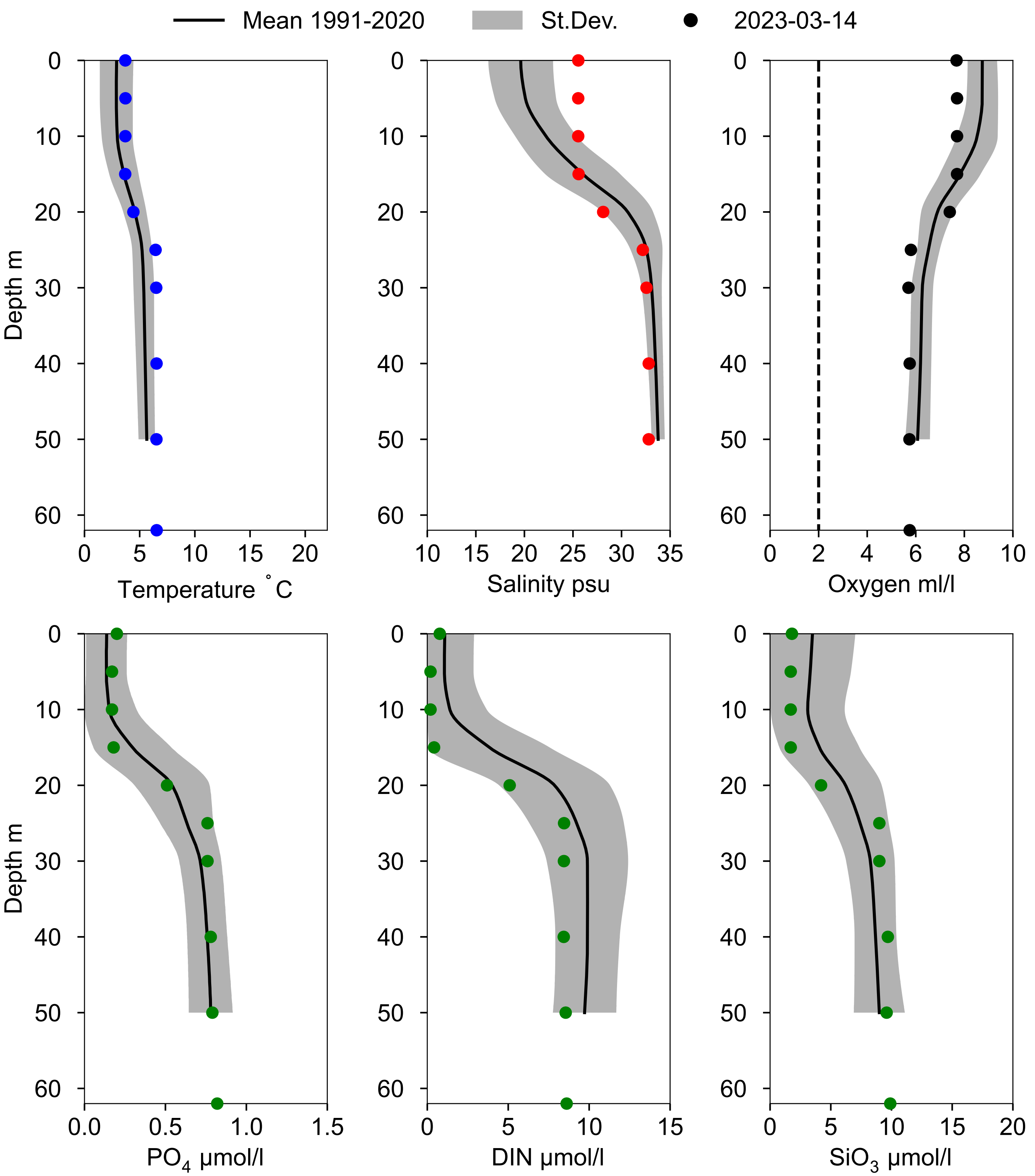
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 52 m)

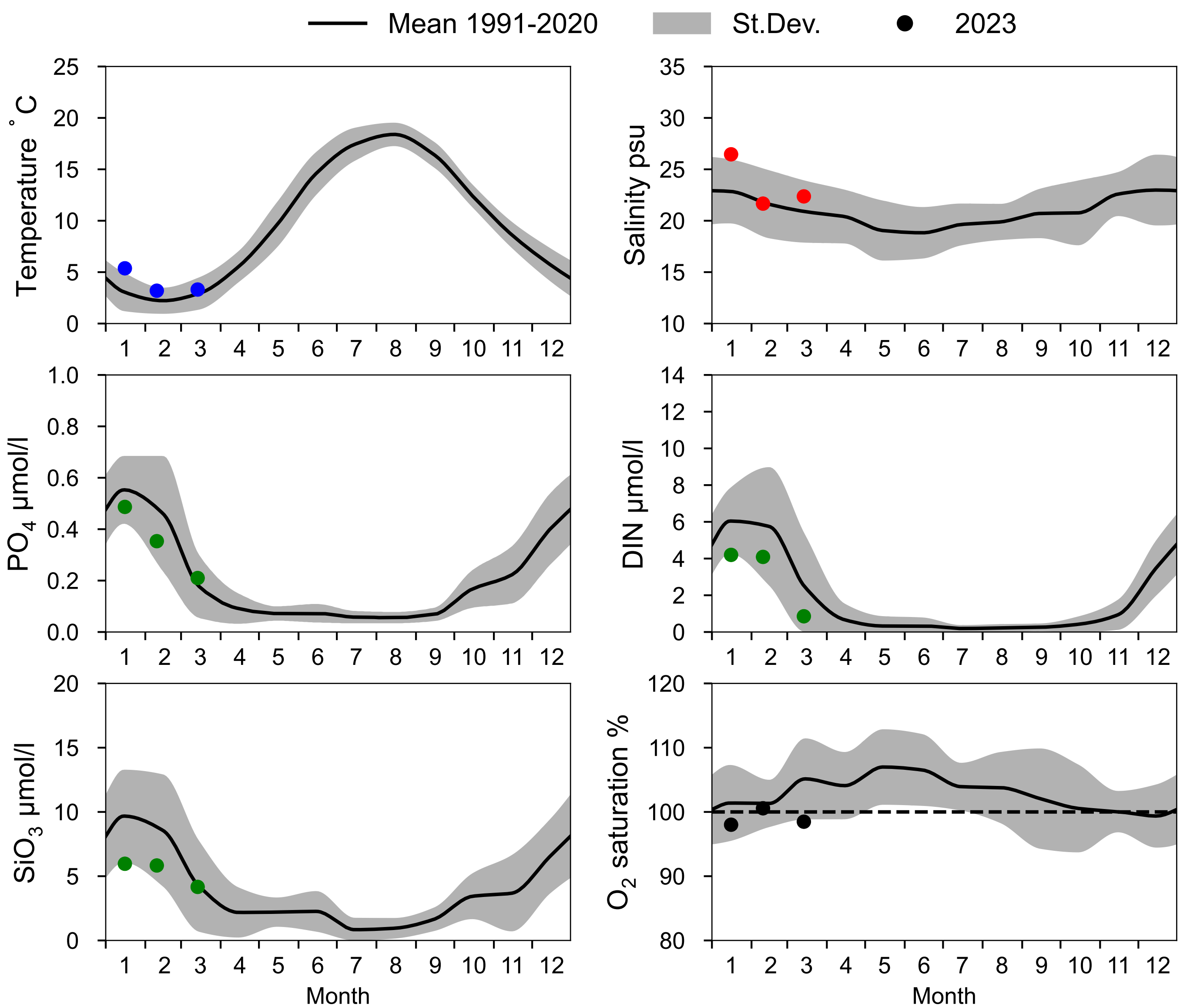


Vertical profiles ANHOLT E
March

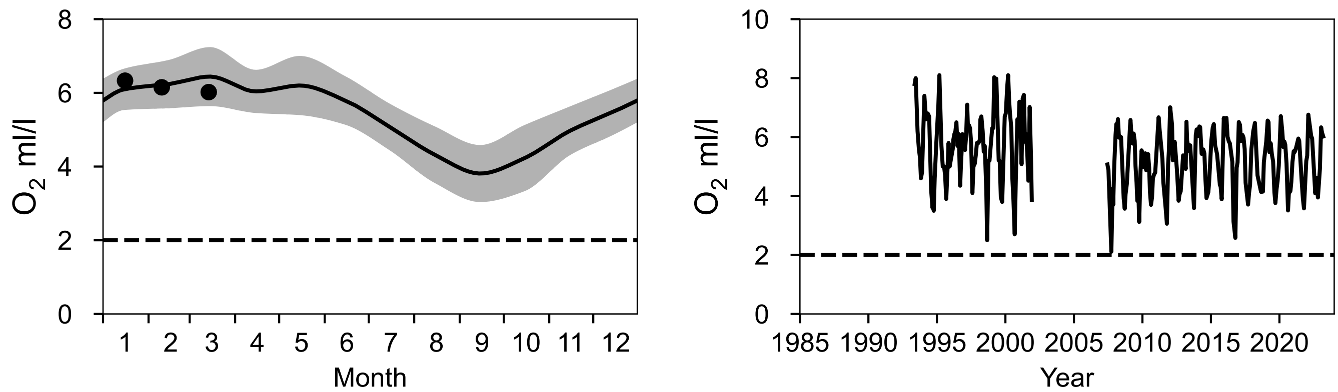


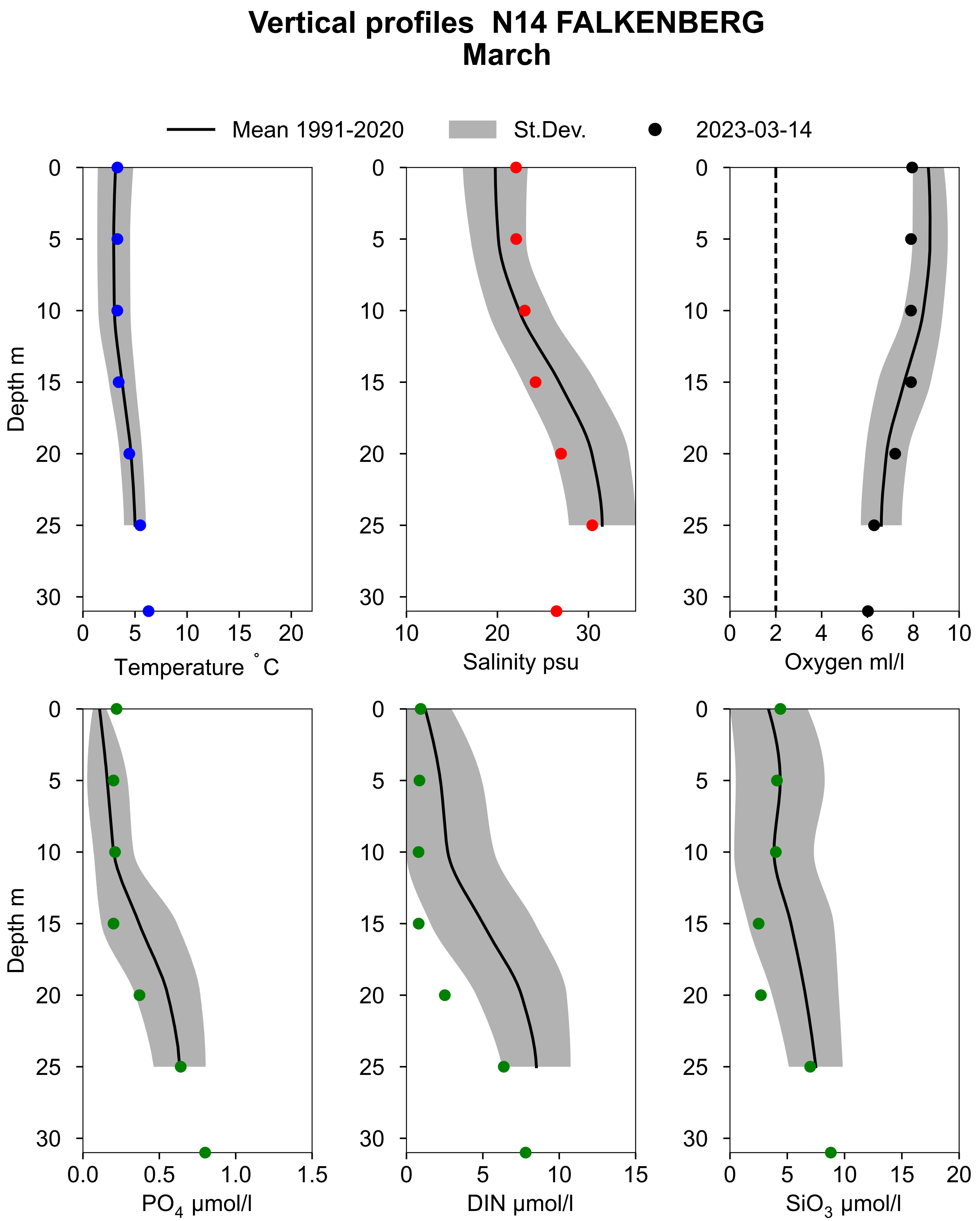
STATION N14 FALKENBERG SURFACE WATER (0-10 m)

Annual Cycles



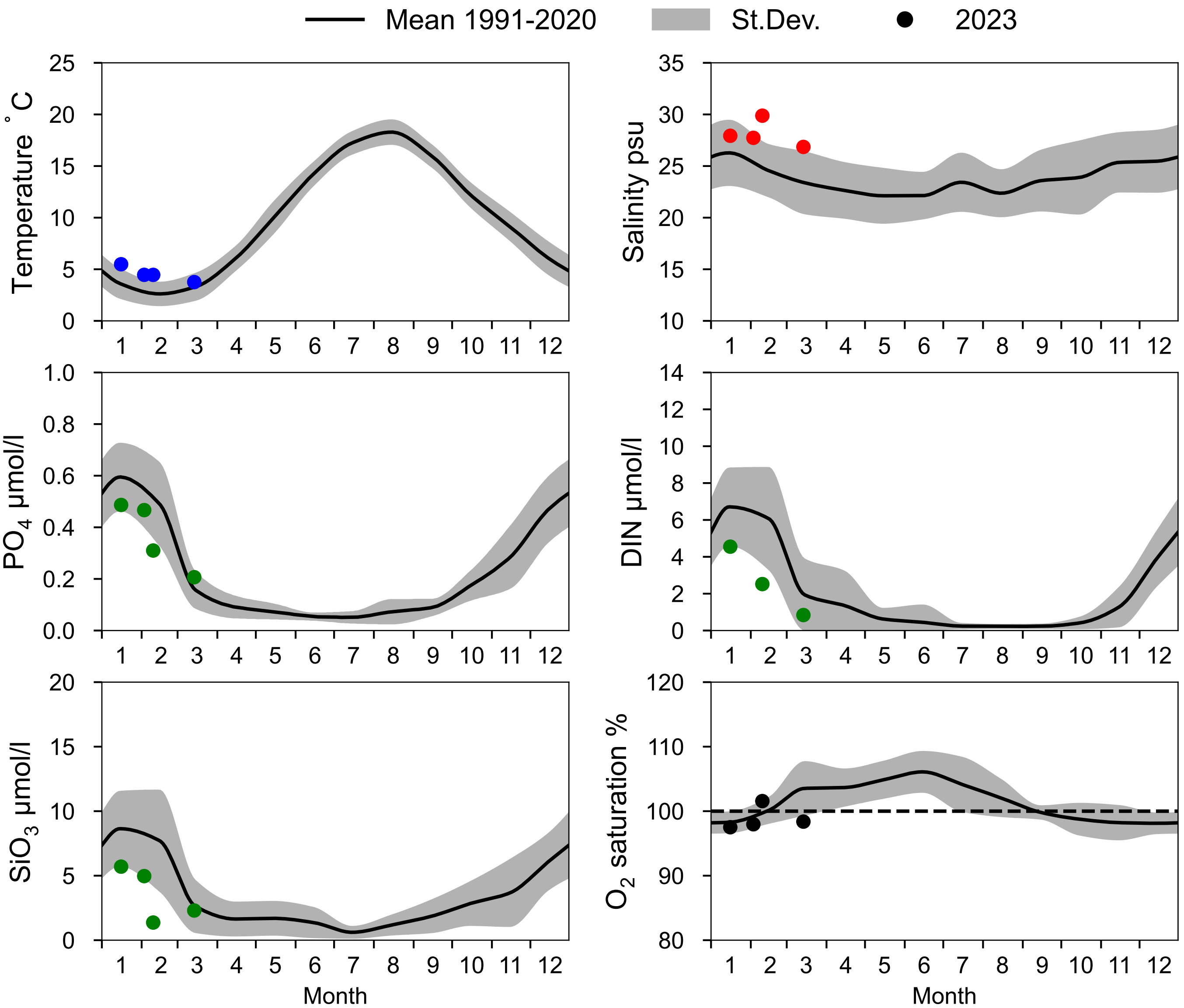
OXYGEN IN BOTTOM WATER (depth >= 25 m)



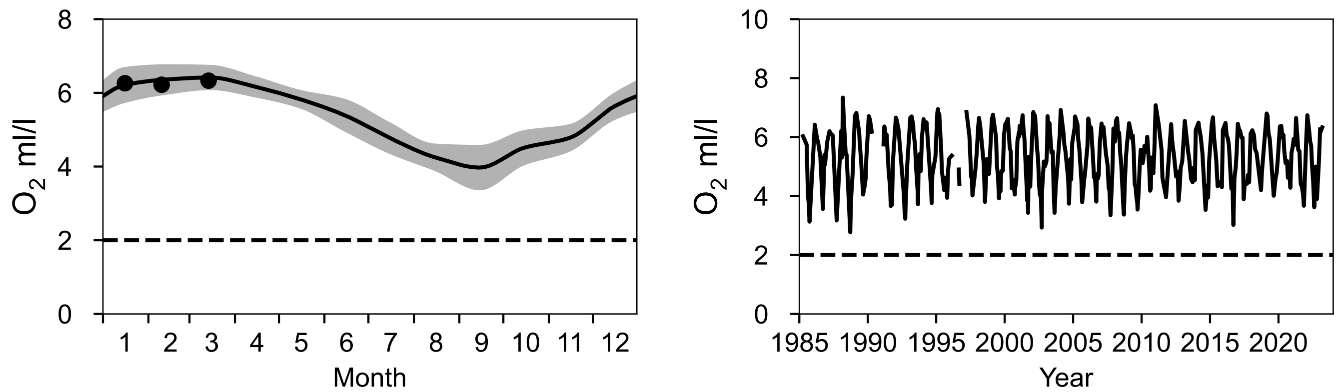

Vertical profiles N14 FALKENBERG
March
Mean 1991-2020
St.Dev.
2023-03-14
Depth m
Temperature °C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

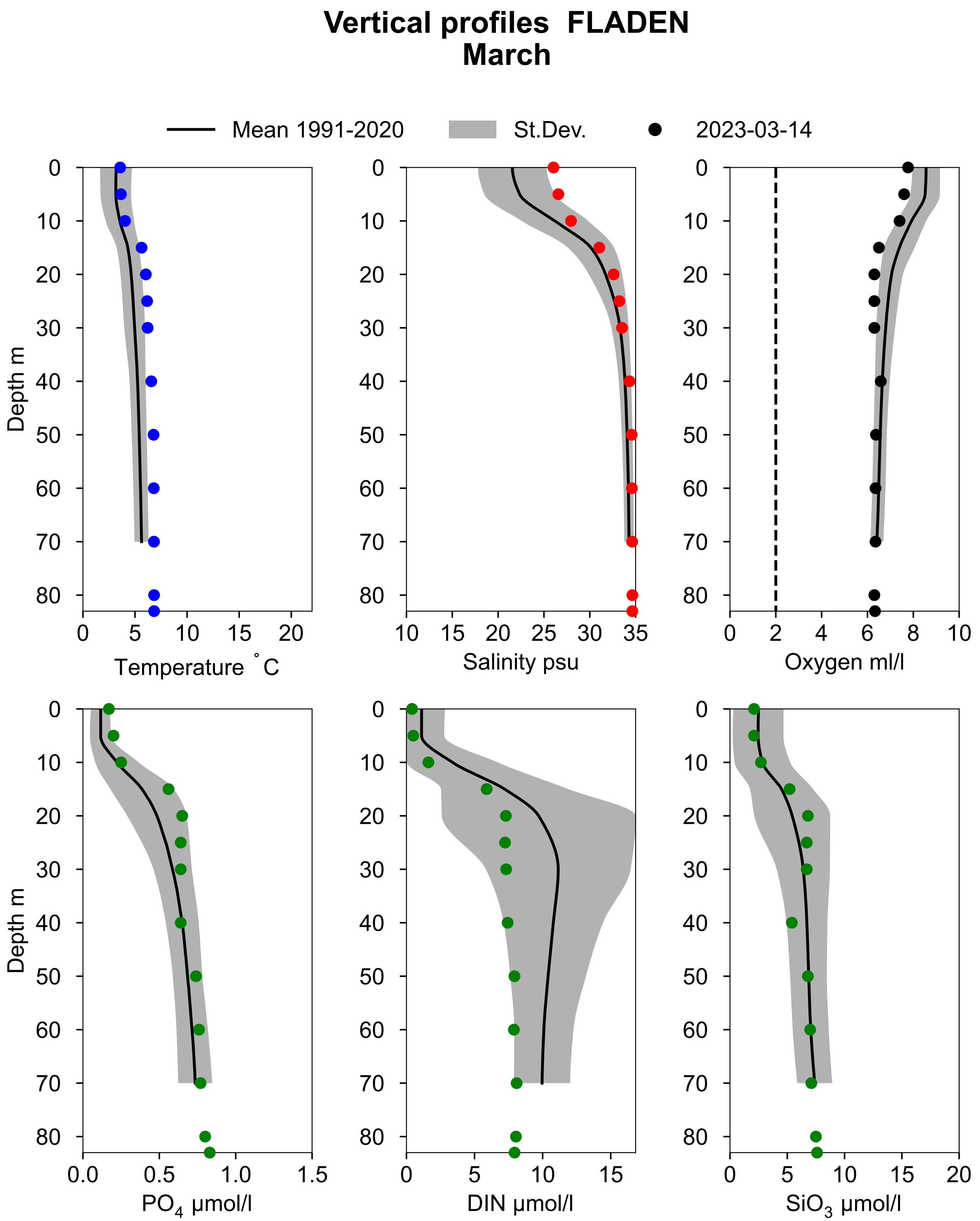
STATION FLADEN SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 74 m)

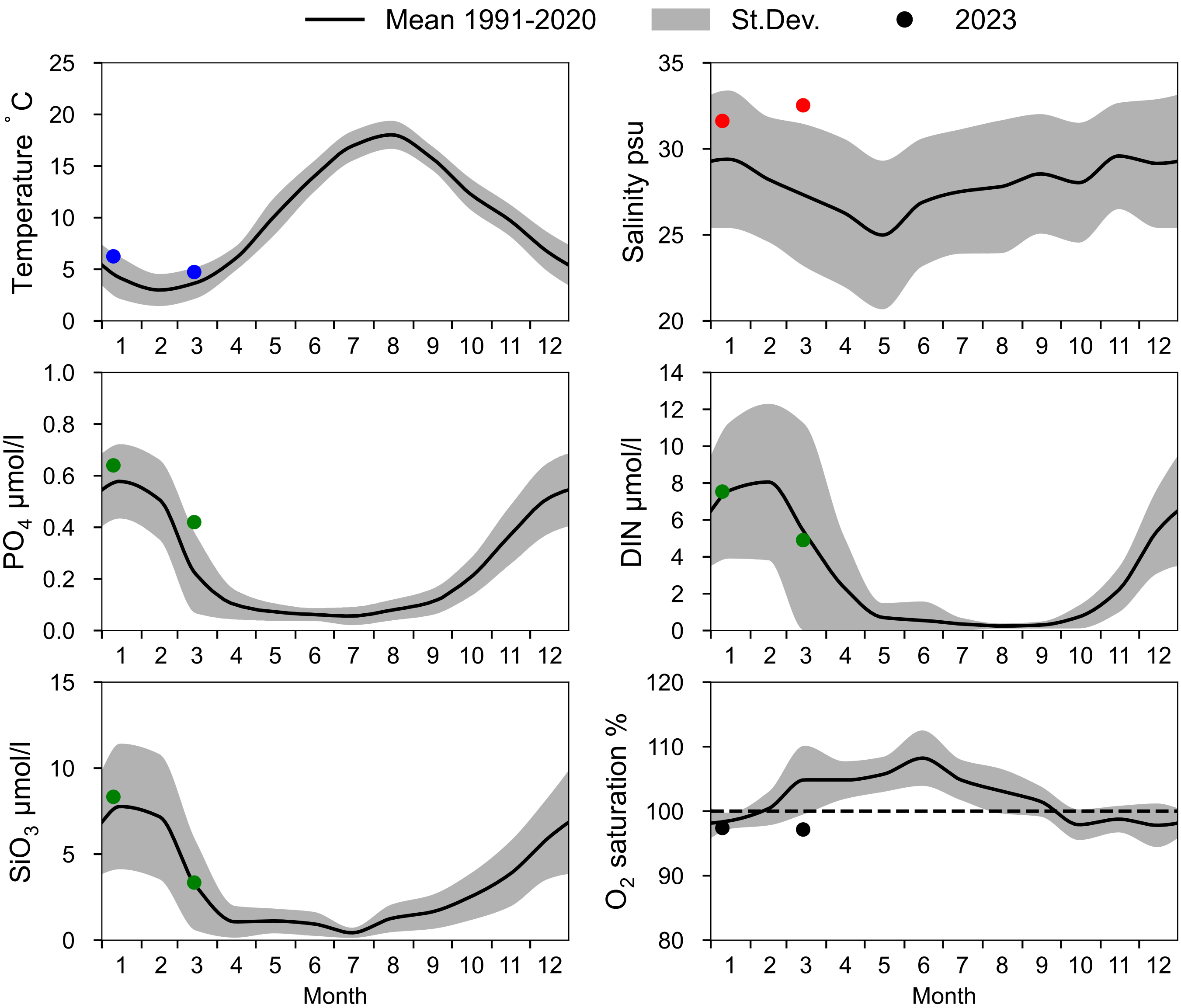




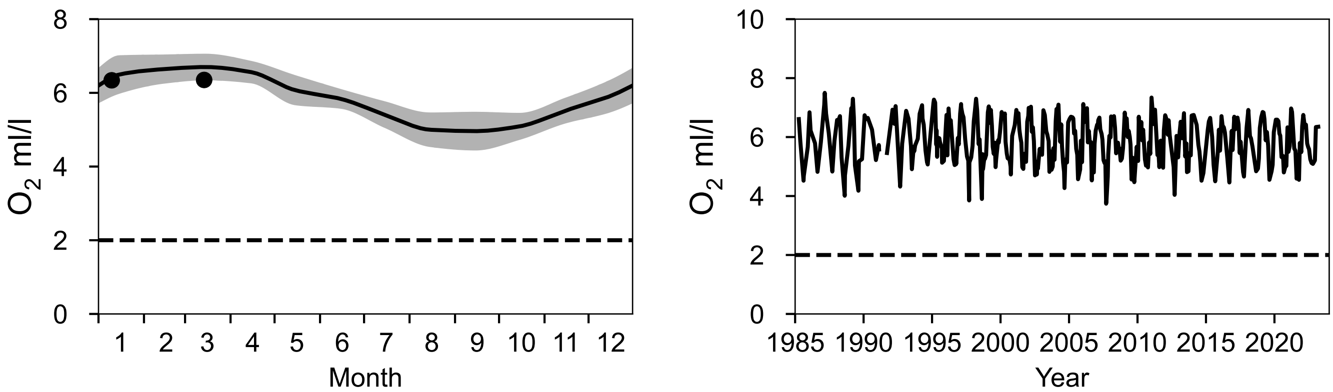
Vertical profiles FLADEN
March
Mean 1991-2020
St.Dev.
2023-03-14
Depth m
Temperature ˚C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

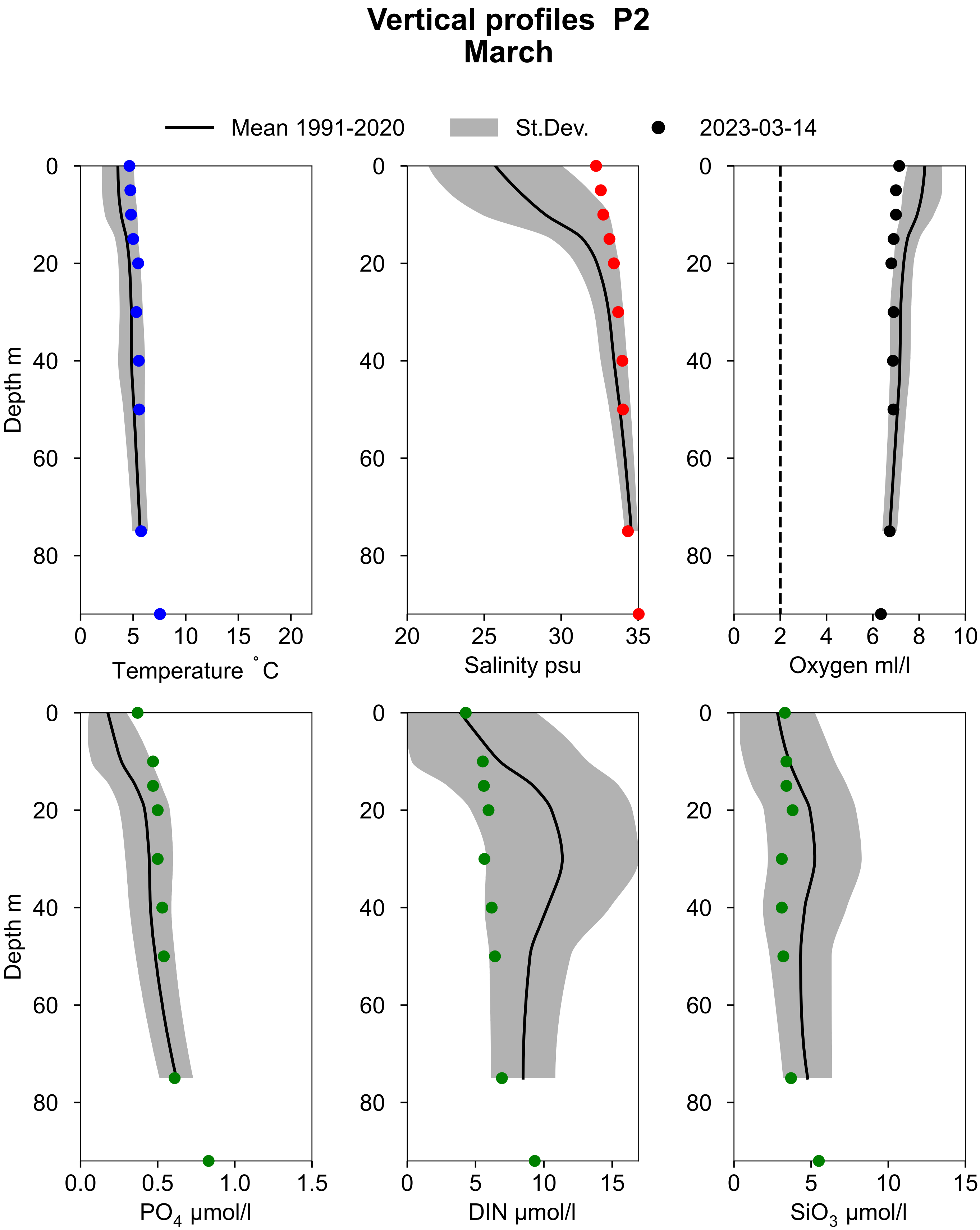
STATION P2 SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 75 m)

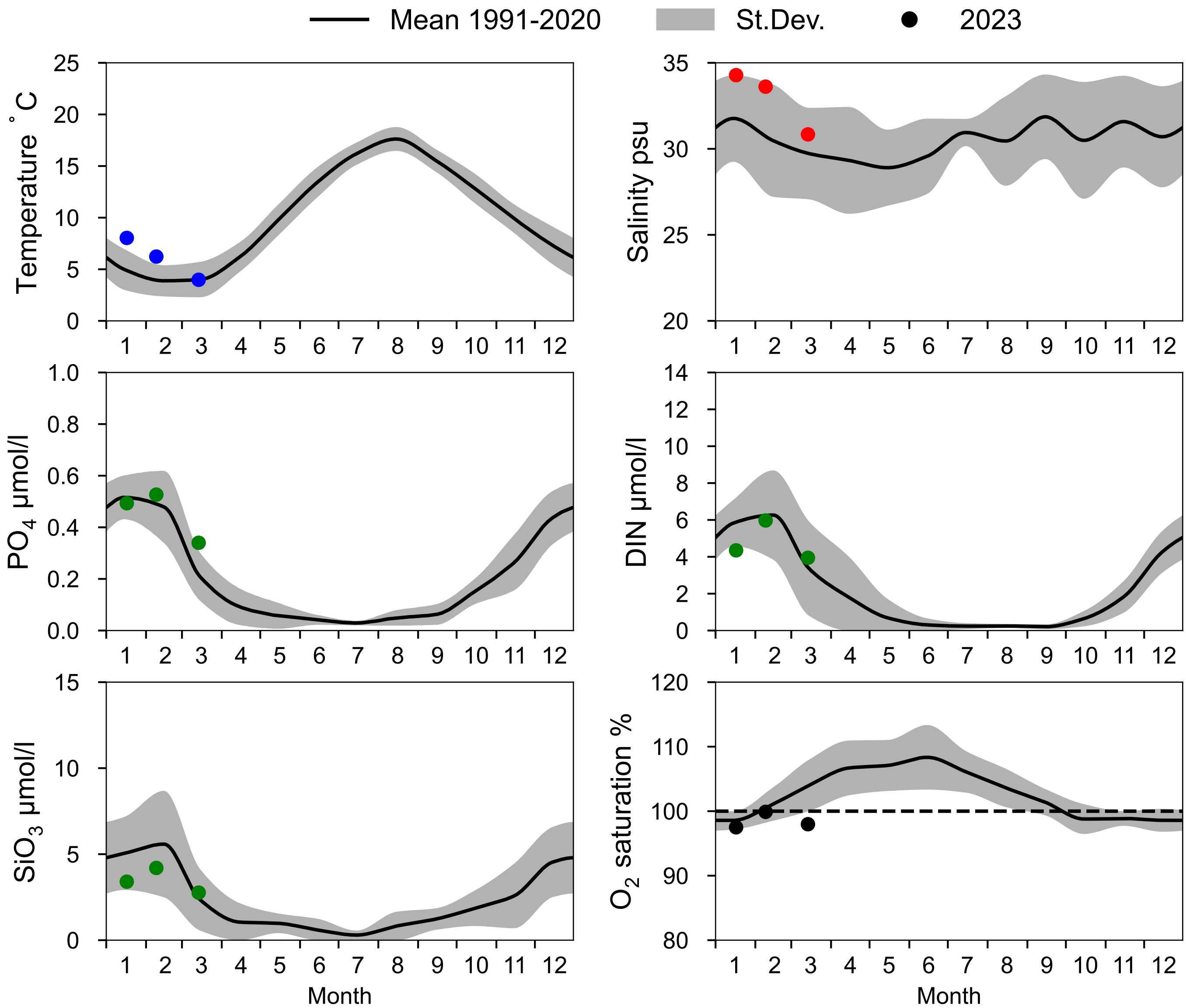




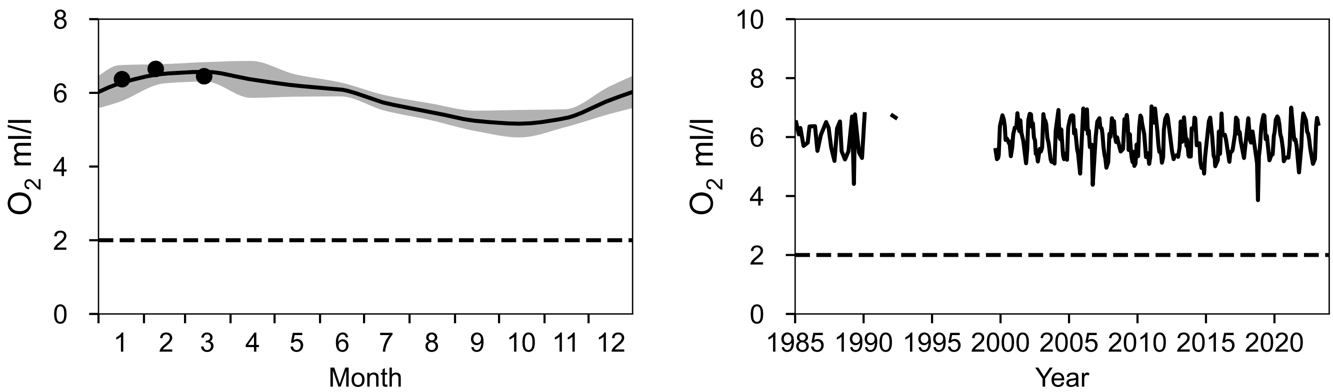
Vertical profiles P2
March
Mean 1991-2020
St.Dev.
2023-03-14
Depth m
Temperature °C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

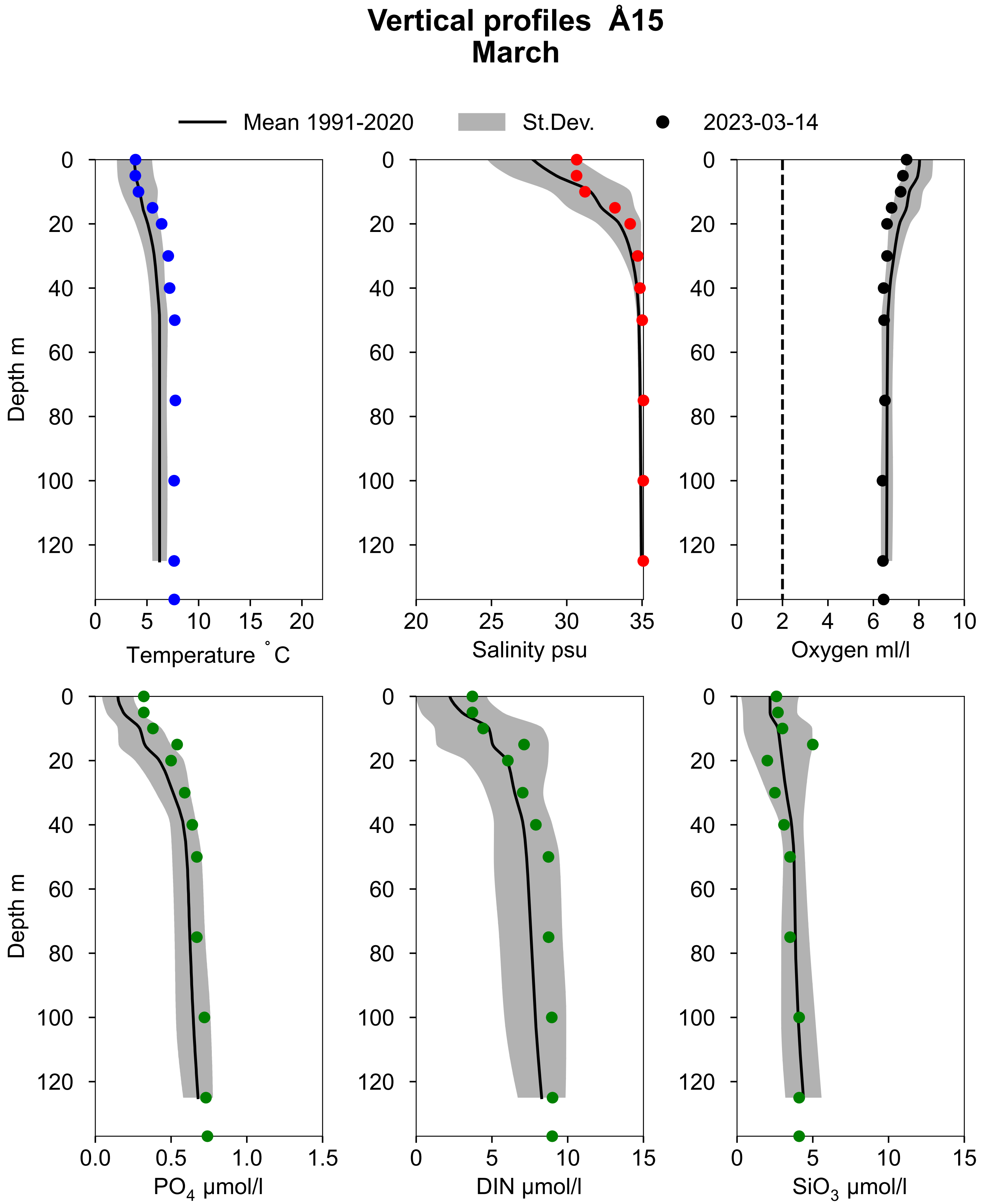
STATION Å15 SURFACE WATER (0-10 m)

Annual Cycles



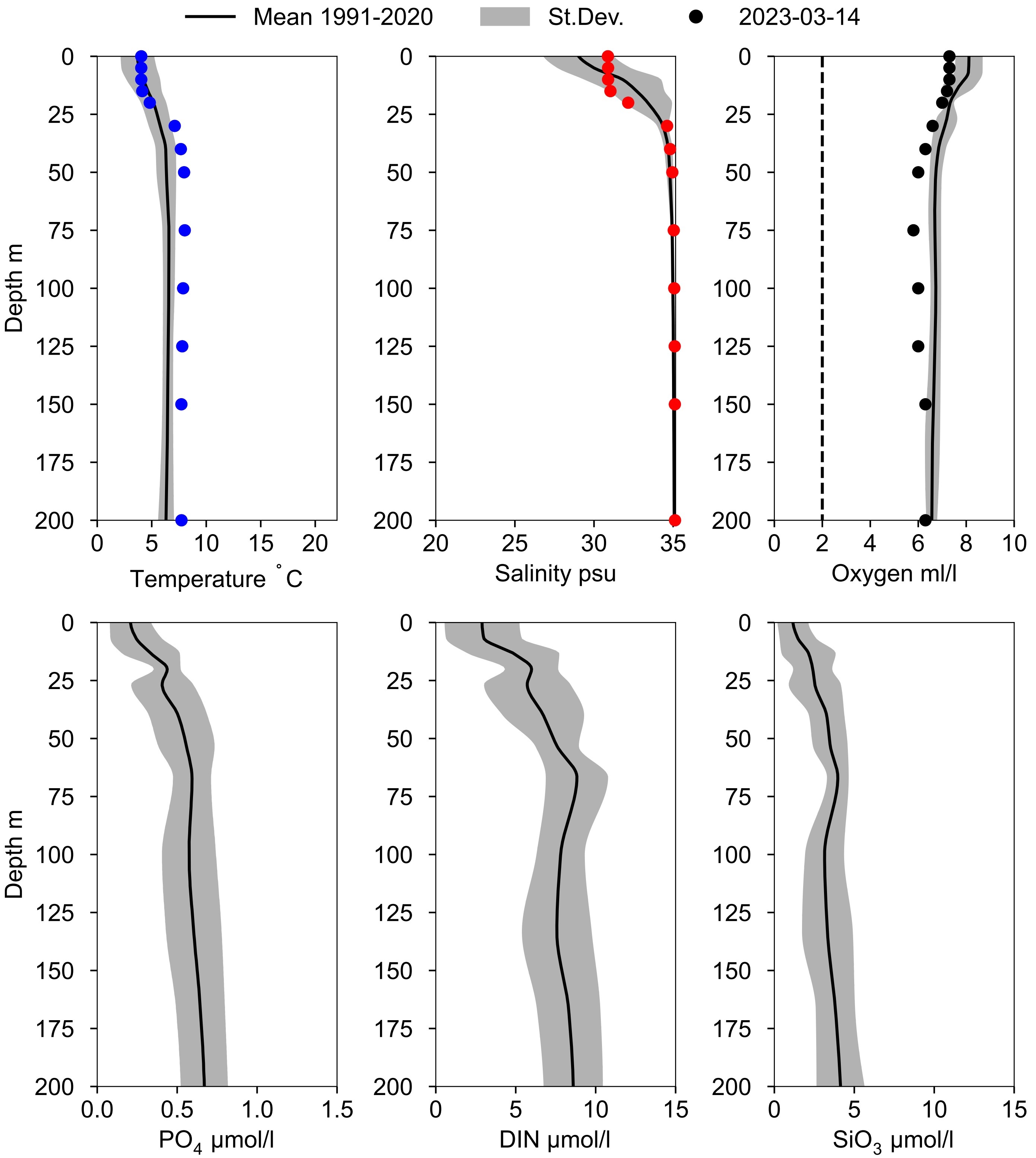
OXYGEN IN BOTTOM WATER (depth >= 125 m)





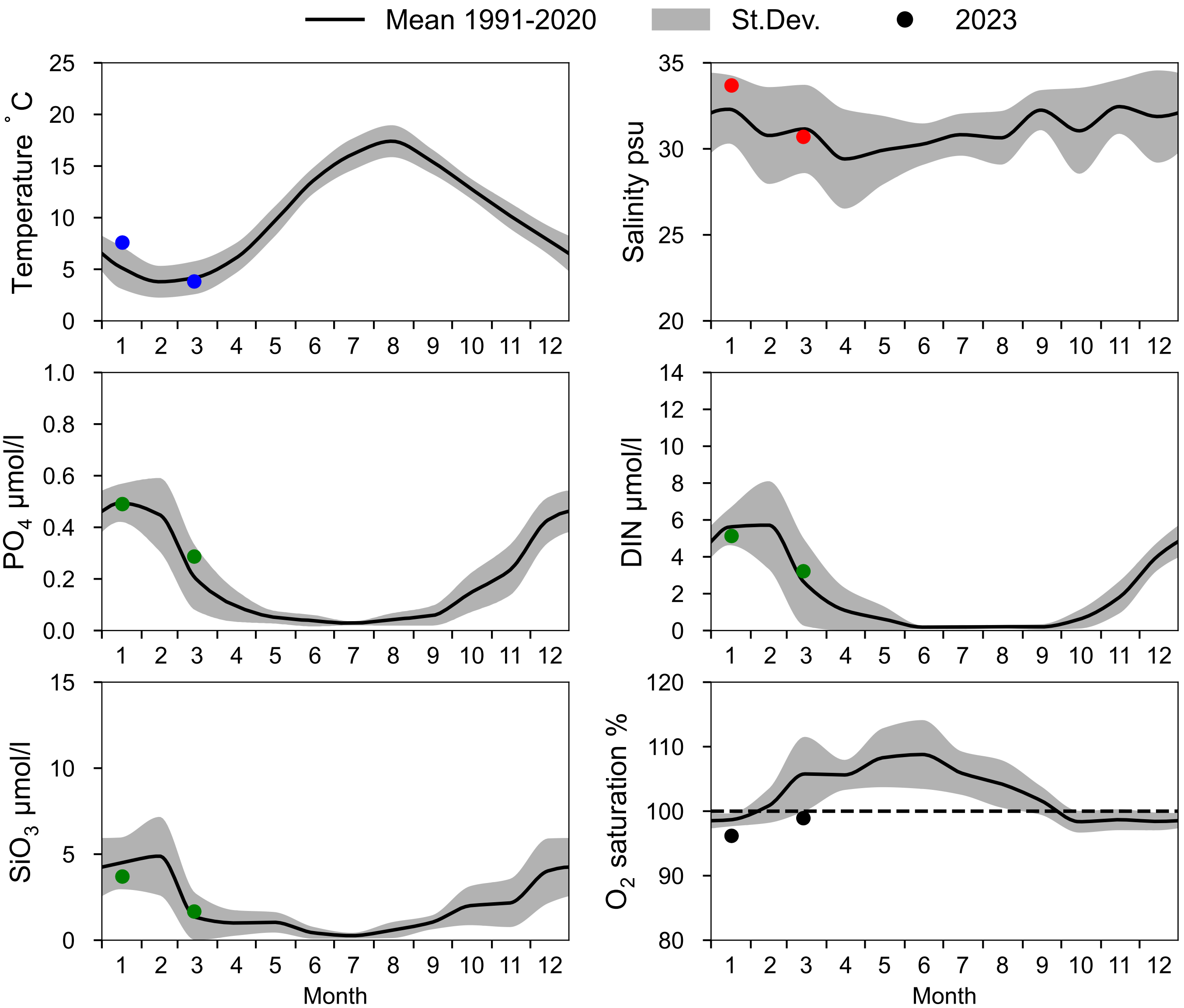
Vertical profiles Å15
March
Mean 1991-2020
St.Dev.
2023-03-14
Depth m
Temperature ˚C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

Vertical profiles Å16
March

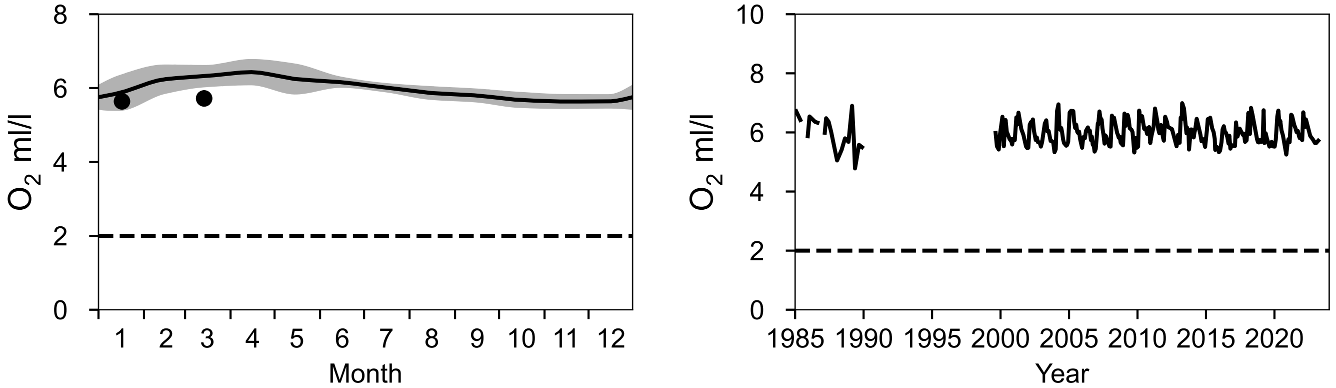


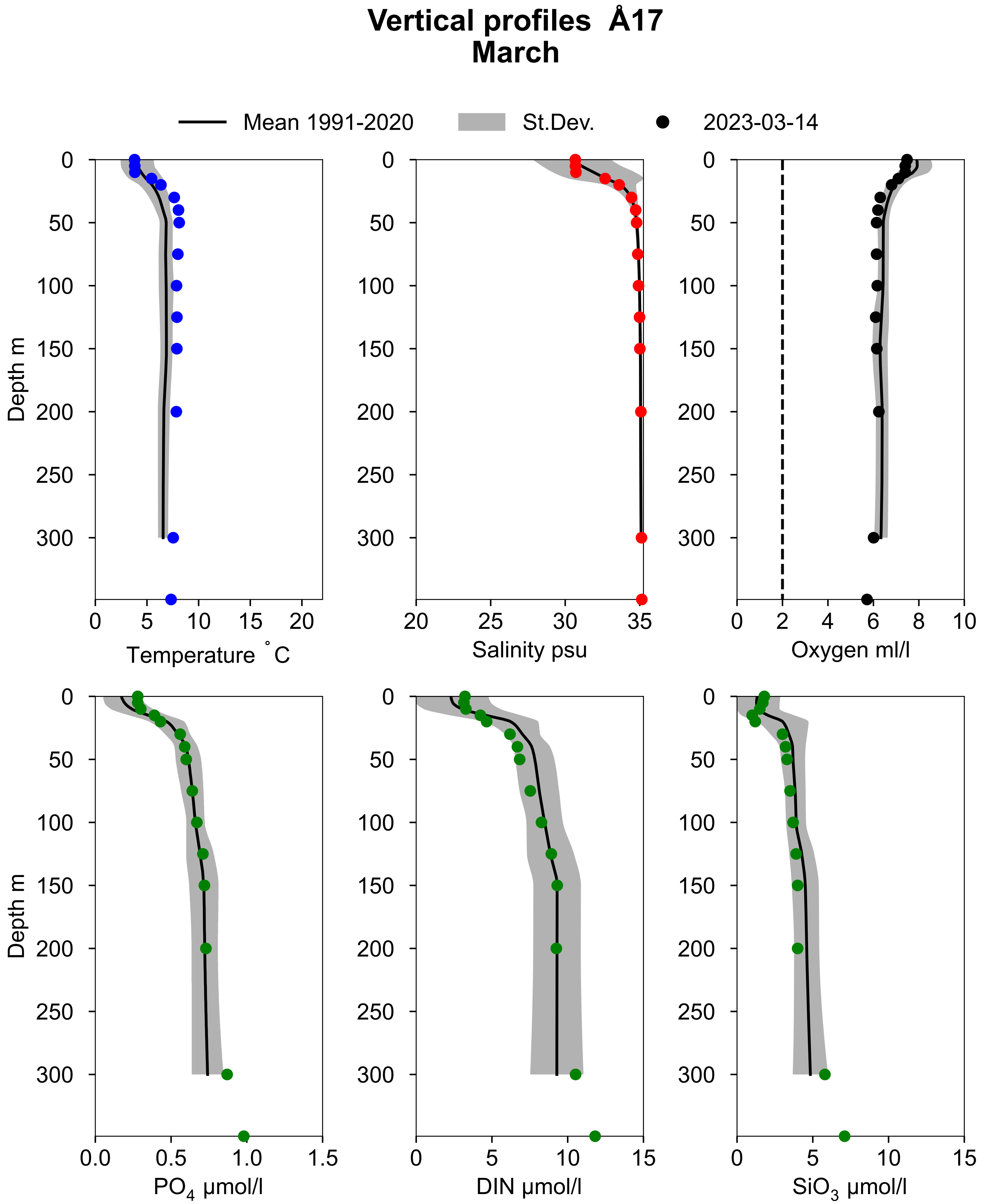
STATION Å17 SURFACE WATER (0-10 m)

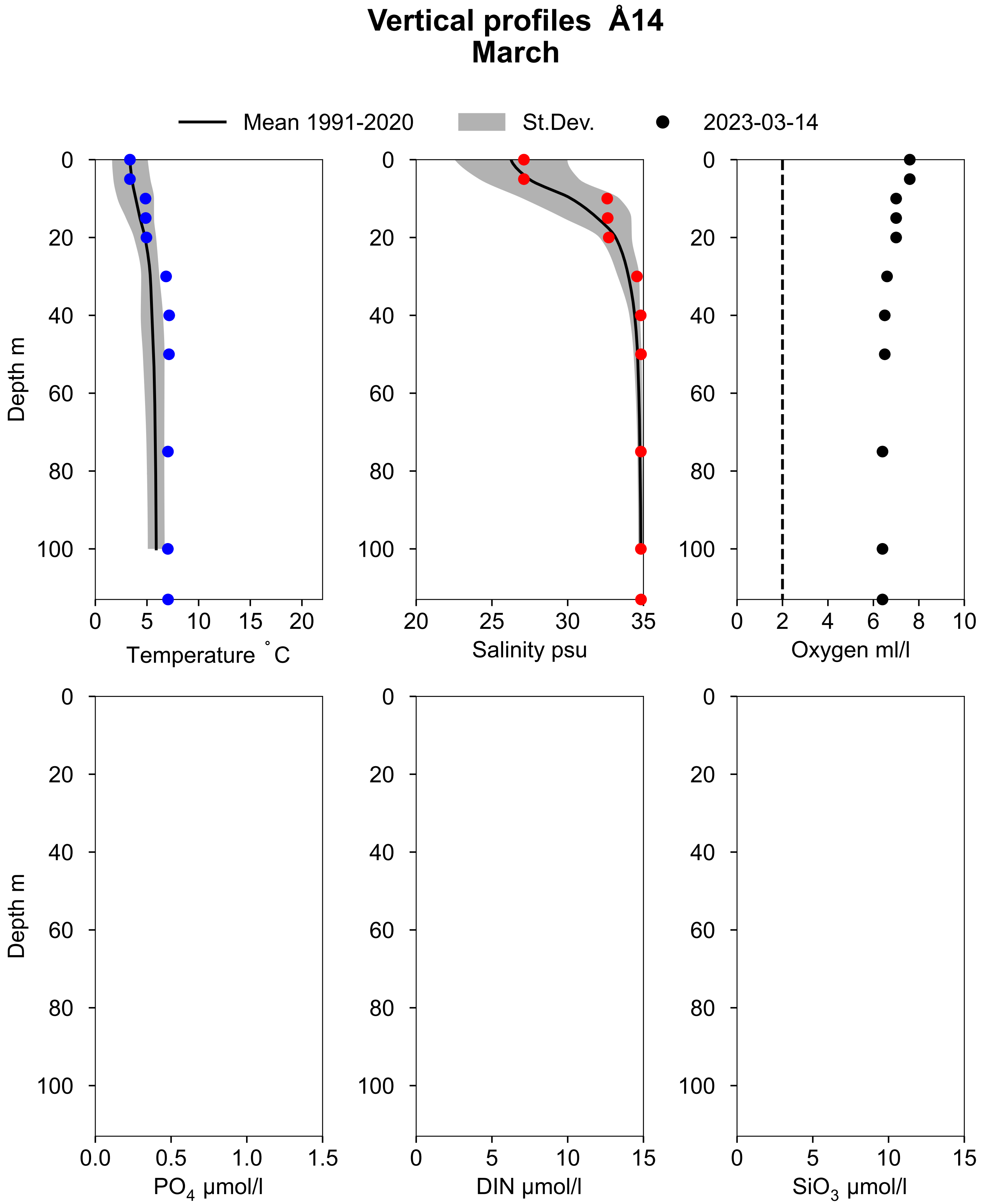
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 300 m)

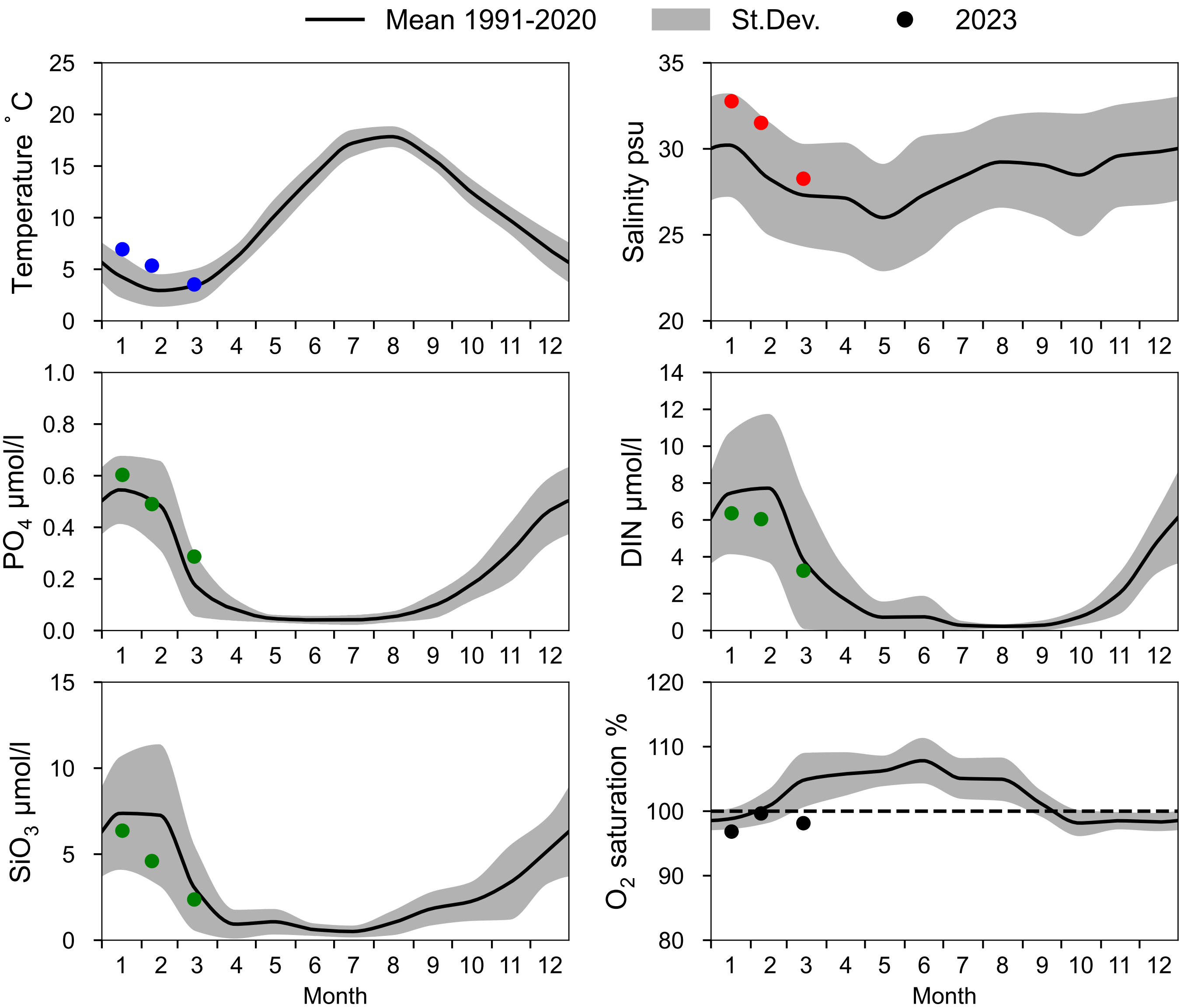



Vertical profiles Å17
March
Mean 1991-2020
St.Dev.
2023-03-14
Depth m
Temperature °C
Salinity psu
Oxygen ml/l
PO_4 µmol/l
DIN µmol/l
SiO_3 µmol/l

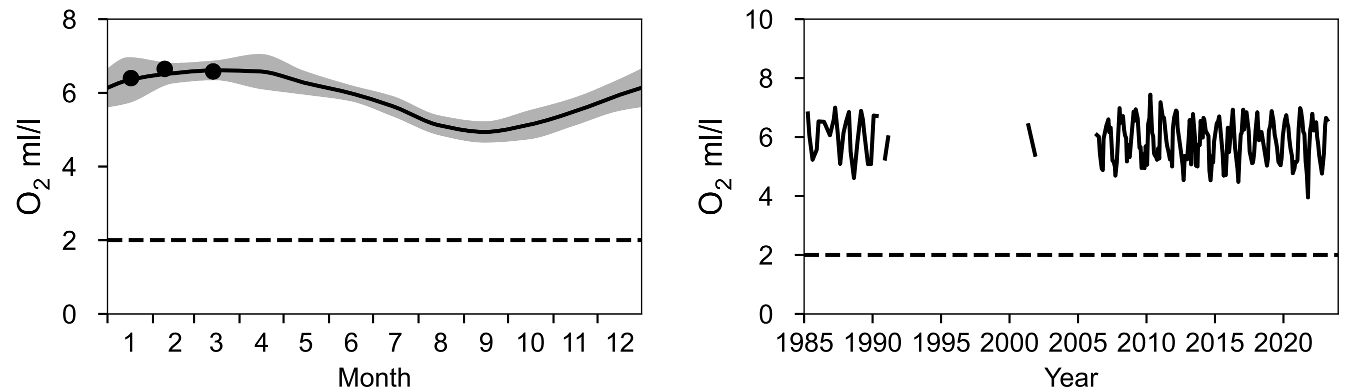

Vertical profiles Å14
March
Mean 1991-2020
St.Dev.
2023-03-14
Depth m
Temperature ˚C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l

STATION Å13 SURFACE WATER (0-10 m)

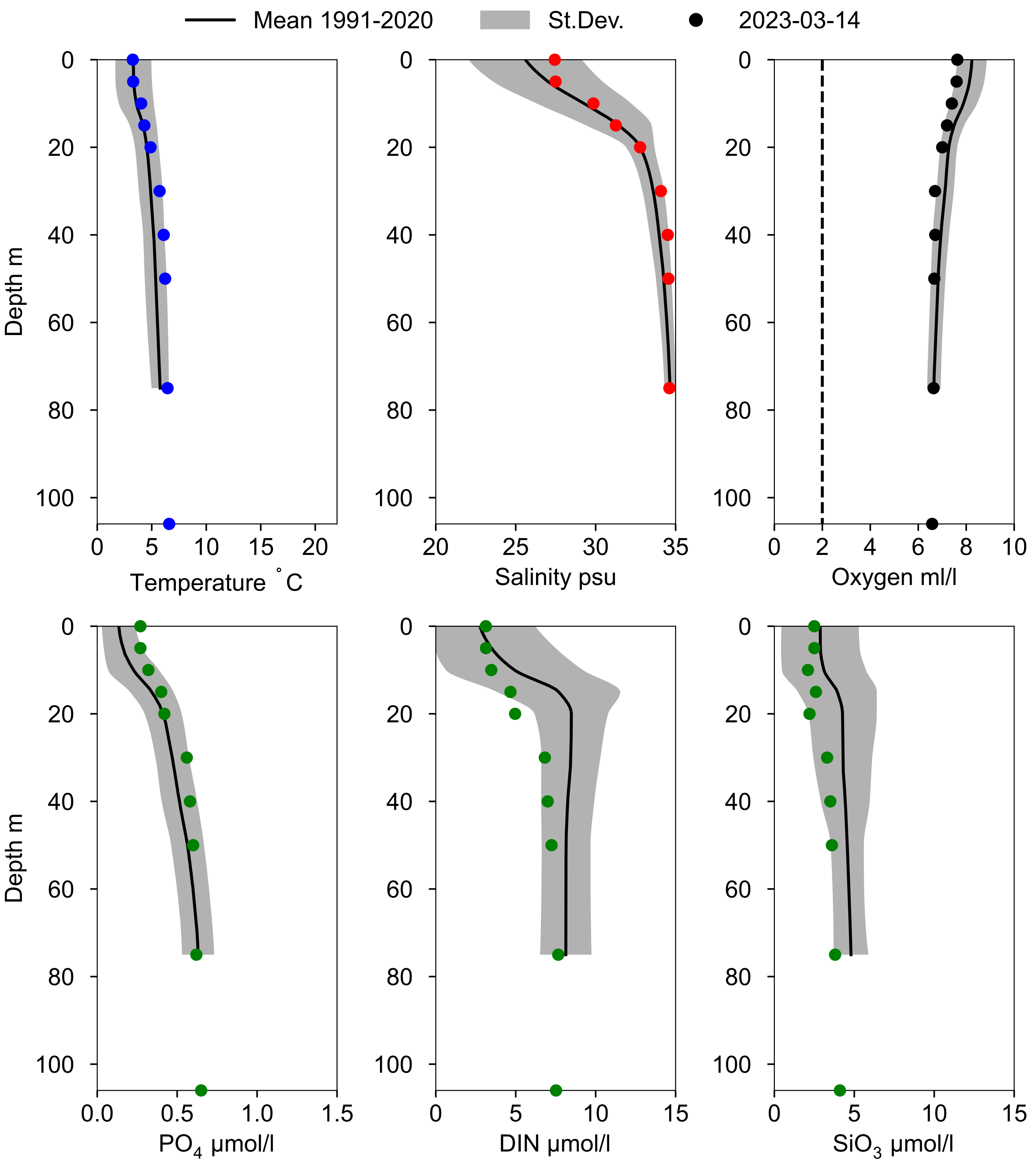
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 82 m)

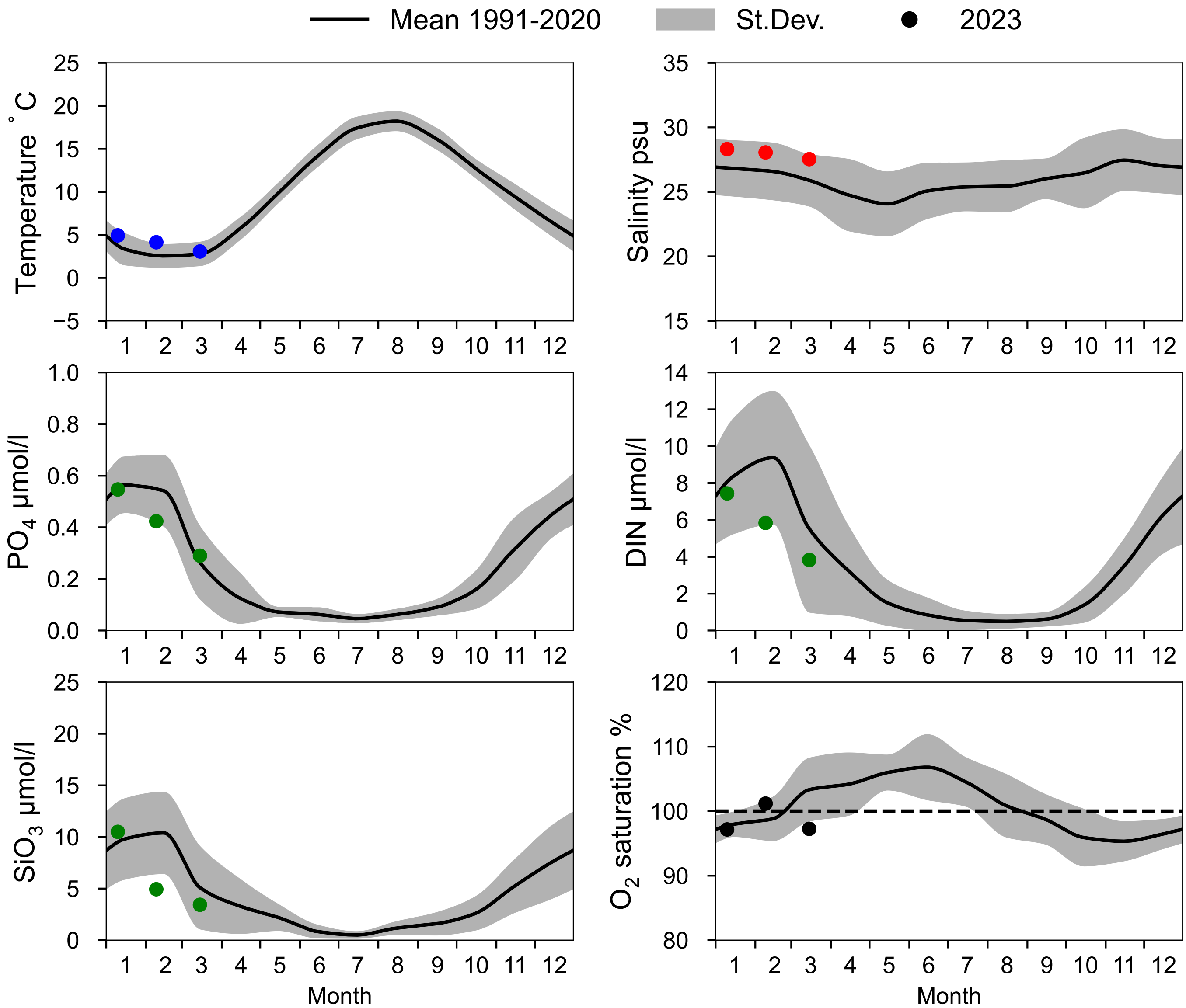


Vertical profiles Å13
March

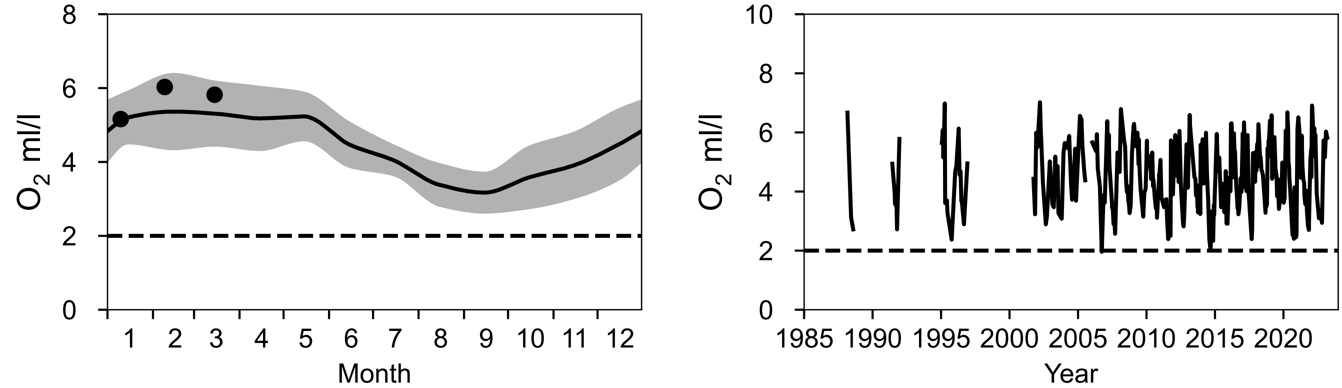


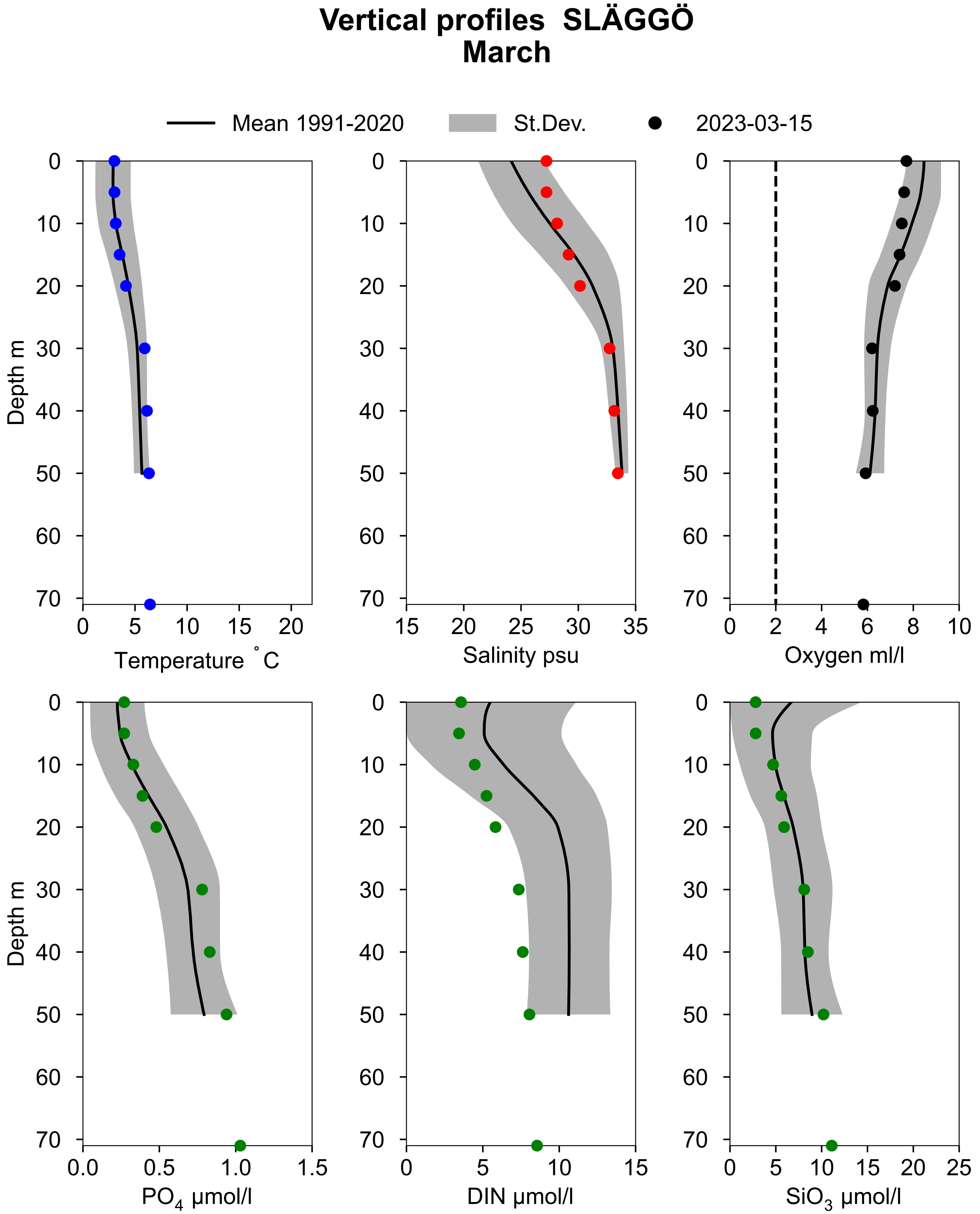
STATION SLÄGGÖ SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 64 m)




Vertical profiles SLÄGGÖ
March
Mean 1991-2020
St.Dev.
2023-03-15
Depth m
Temperature ˚C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l