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Report from the SMHI monitoring cruise with R/V Svea

photo: Ola Kalén, SMHI

Survey period: 2021-03-16 - 2021-03-22
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 expedition, which is part of the Swedish national marine monitoring programme, the Skagerrak, the Kattegat, the Sound and the Baltic Proper were visited. During the first part of the survey the winds were mostly from the north, and the air temperature was 0-2°C, but the wind direction changed to west and the temperature rose to 4-5°C during the later parts of the cruise.

The cold surface water that was present in the Skagerrak and the Kattegat during the previous survey had been mixed with deeper water, and the temperature was now 3.5-5°C. For the stations in the Baltic Proper the sea surface temperature was basically unchanged since the previous survey, and were at most stations 2.5-4°C. Except for the station in the southeastern Baltic Proper, the sea surface temperature was normal for the season at all stations.

The sea surface salinity in the Baltic Proper was normal to above normal for the season, and varied from 6.6 psu in the northern parts up to 8.4 psu in the Arkona Basin. In the Kattegat and the Skagerrak mostly normal salinity in the surface, with 23-25 psu in the Kattegat and 29-32 psu in the Skagerrak. The Sound also had a for the season normal average surface salinity, but a shallow stratification with significant difference in salinity in the upper and lower water mass was present.

Concentrations of nutrients in the Skagerrak and the Kattegat were normal for the season, with the exception of phosphorus at two stations in the Skagerrak, where levels were above normal. For the stations in the Baltic Proper it was obvious at which stations the spring bloom had started, since at these there was a lower concentration of nutrients in the surface water compared to the levels during the previous expedition. Measurements of chlorophyll fluorescence also confirmed that the spring bloom was ongoing in the Arkona Basin, the Bight of Hanö, and in the Bornholm Basin, and also at the coastal station RefM1V1 in Kalmarsund. In the other basins, the spring bloom had not yet started, but there was a slightly increased level of chlorophyll fluorescence in the surface of the Western Gotland Basin.

Oxygen concentration in the bottom water in the Skagerrak, the Kattegat and in the Sound was for the most parts normal for the season, with concentrations of 7 ml/l in the offshore stations in the Skagerrak, and just below 5 ml/l at Släggö, and between 5-6 ml/l in the Kattegat and the Sound. Also, the Arkona Basin in the Baltic Proper had good levels of oxygen in the bottom water, with concentrations of 7 ml/l. In the Bight of Hanö and the Bornholm Basin oxygen deficiency was found in the bottom water, and the levels were slightly lower compared to the previous expedition, and were now only 0.2-0.4 ml/l. At BCSIII-10 in the southeastern Baltic Proper the concentration was lower compared to the last visit, and was now below the level of oxygen deficiency with only 1.7 ml/l. At the deeper stations in the Eastern and Western Gotland Basin, oxygen deficiency was found from 70-80 meters depth, and anoxic conditions with hydrogen sulfide present were found from 90-100 meters depth.

Next expedition with R/V Svea is planned to 13th - 19th of April. It starts and ends in Lysekil.

RESULTS

The expedition was undertaken on board the Swedish research vessel Svea and started in Kalmar the 16th of March and ended in Lysekil the 22nd the same month.

The winds during the expedition were weak to moderate, and were mostly northerly during the first part of the expedition, but changed to westerly winds during the last part. The air temperature at the stations in the Baltic Proper was mostly 0-2°C, and at the stations in the Kattegat and the Skagerrak the air temperature was 4-5°C.

26 of the planned 27 regular monitoring stations were visited. A CTD-station, Å16 in the Skagerrak, was not sampled. Two extra stations were also sampled, one in connection with the deployment of the sea buoy at Huvudskär Ost, and one when a bottom system was deployed for the Country Administrative Board of Skåne about 4 nautical miles west of Kullen's lighthouse. One planned station close to Flinten7 in the Sound was not sampled due to external circumstances. At 3 stations west of the Sound and at 2 in the Baltic Proper samples for environmental DNA were taken for Åbo Akademi University. Water samples for selenium analysis were taken for EAWAG, Switzerland, at 3 stations in the Baltic Proper, 1 in the Kattegat and 1 in the Skagerrak. This type of sampling has been done before, and will continue until November this year. Phytoplankton was sampled for Uppsala University at 1 station in the Kattegat and 2 stations in the Skagerrak.

At Huvudskär Ost a sea buoy was deployed. It delivers data every hour and measures at discrete depth from the surface down to 60 meters depth. It measures temperature, conductivity and at several depth also oxygen. Current is also measured. Close to the surface chlorophyll fluorescence, turbidity and phycocyanin fluorescence are also measured, and weather parameters are measured by the surface part of the buoy. The buoy is planned to remain at place until December.

At the station in the Bight of Hanö the bottom system that has been in place since July 2020 was replaced. It measures temperature, salinity and oxygen concentration in the bottom water, and current in the water column. The replacement was intended to be done in January, but the weather conditions during Svea's visit in both January and February prevented this.

At BY2 in the Arkona Basin, an intercalibration with IOW was done. They were on site with R/V Elisabeth Mann Borgese. Parallel CTD-casts were made, and water samples were collected at both research vessels. The results will be exchanged. After BY2 the plan was to do parallel sampling with profiling instruments up to BY1, but due to technical issues, this was prevented.

Svea's instrument for measuring profiles during transit, the MVP, was planned to be used at 5 different transects. But due to technical issues with the MVP, not all planned transects were measured. Measured transects were BY39 and almost all the way to BY38, the Slupsk channel, from BY2 to BY1, and parts of the Å-transect in the Skagerrak. Svea's ferrybox and ADCP (used for current measurements) were collecting data during the whole cruise.

This report is based on data that have 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 and reports can be downloaded here:
https://www.smhi.se/en/publications/cruise-reports-from-the-marine-monitoring

The Skagerrak

The sea surface temperature had risen since February, and was 4.2-4.8°C, which is normal for the season. At the station P2 the temperature was 4.6°C, and this is almost 4°C higher than during the previous expedition, while at Släggö the sea surface temperature had only increased 1°C. The large increase in sea surface temperature was due to the thin cold surface layer present in February had been mixed with deeper lying water. At most stations the thermocline was found at 10-20 meters depth, but at Å13 the thermocline was less distinct. At both Å15 and Å14 the temperature from 20 and 35 meters respectively and deeper was stable. The deep water was also colder compared to previous months expedition. There was a relatively large temperature difference between Å17 and the other Å stations at 30-125 meters depth, where it was 2-3°C warmer at Å17 compared to the other stations.

The salinity in the sea surface was normal for the season, except at Å15, where is was 33 psu, which is above normal. At the other stations the salinity was 28-31 psu in the surface water. The halocline was at several stations found at 5-10 meters depth, which can be seen in the vertical profiles. In the deep water both temperature and salinity were normal for the season.

The levels of dissolved inorganic nitrogen in the surface water were normal for the season at all stations. Concentrations were down compared to February, except at Å17 where they had increased. Levels were between 2.7-3.9 µmol/l at all stations. Also, the concentrations of phosphate had decreased at all stations, except at Å17, which had a slightly higher level now compared to February. For Å15 and Å13 the levels were above normal for the season, but at other stations they were normal. Measured values were between 0.28-0.32 µmol/l. The concentrations of dissolved silicate were normal for the season at all stations, and had decreased since last visit. At the stations in open sea, the levels were 1.0-1.6 µmol/l and at Släggö, which is closer to the coast, 2.8 µmol/l. In the deep water there were differences between the stations. At Å17, the concentration of phosphate was above normal for the season between 30-100 meters depth, and both dissolved inorganic nitrogen and dissolved silicate were above normal at 50-100 meters depth. But at both Å15 and Å13, all nutrients from 30 meters and deeper were below or slightly below normal for the season. And at P2, the concentrations of nutrients in the deep water were also mostly below normal.

At both Å17 and Å15 a small chlorophyll fluorescence peak was found at 10-15 meters depth, and at P2, which is the southmost station in the Skagerrak, chlorophyll fluorescence was measured in the entire water column, although low levels. At the other stations the levels were close to zero. The spring bloom was past, and the water was clearer again. The secchi depth at Släggö was 11 meters in March, compared to 6 meters during the visit in February.

Oxygen concentration in the bottom water was about 7 ml/l at open sea, and 4.7 ml/l at the coastal station Släggö. At Å17, which is the stations most to the west, the oxygen concentrations from 200 meters and deeper was about 6.6 ml/l.

The Kattegat and the Sound

In Kattegat and the Sound, a well-mixed surface layer extending down to 5-8 meters depth was present. The temperature in this layer was 3.5-4.0°C, and the salinity was 22-24 psu in the Kattegat and 9 psu in the Sound. Below the surface layer the halocline and thermocline were found, and the stratification was very distinct in the Sound. The temperature below the thermocline was about 7°C and the salinity was a little above 32 psu in the Sound and about 34 psu at the deeper stations in the

Kattegat. At the coastal and shallow station N14 both salinity and temperature were increasing from 7 meters depth down to the bottom, and there was no water mass with constant temperature and salinity.

The mean sea surface temperature (0-10m) was normal for the season at all stations. Highest surface temperature was found at Fladen, the station most to the north in the Kattegat, with just above 4°C. The sea surface temperature was 2-3°C higher compared to February. The mean sea surface salinity was just above normal at Anholt E, 23 psu, but normal at the two other stations in the Kattegat. As a result of the shallow stratification in the Sound the mean salinity in the surface (0-10m) was about 12 psu, which is normal for the season. The large difference in salinity is visible in the vertical profile, where the salinity at 0 and 5 m was 9 psu, and at 10m 19 psu.

Levels of nutrients had decreased since last month, which is normal for the season, and is due to plankton growth when winter turns to spring and the light returns. In the Kattegat concentrations of phosphate were 0.13-0.21 µmol/l, dissolved inorganic nitrogen 0.3-1.3 µmol/l and dissolved silicate 1.0-1.3 µmol/l. In the Sound, the concentration of phosphate was 0.3 µmol/l, dissolved inorganic nitrogen 0.1 µmol/l and dissolved silicate 10 µmol/l. All values were normal for the season, with the exception of dissolved inorganic nitrogen in the Sound, which was slightly below.

The oxygen concentration in the bottom water was good, with 5-6 ml/l, lowest in the Sound.

Measurements of chlorophyll fluorescence with the sensor on the CTD indicated low activity in the Kattegat. In the Sound there was some activity from the surface down to the halocline, and almost no activity below the halocline.

The Baltic Proper

Unlike in February, it was now colder in the surface water of the Baltic Proper compared to the Kattegat and the Skagerrak. The sea surface temperatures at the stations in the Baltic Proper was between 2.6-3.7°C, with the exception of RefM1V1 and BY29, where the temperature was slightly lower. This was normal for the season in all basins, except in the southeastern Baltic Proper at BCSIII-10 where the surface temperature was measured to 3.7°C, which is slightly above normal temperature for the season. At many stations it was almost the same sea surface temperature as during the previous expedition, but for some the temperature in the surface water had dropped. At BY29 in the northern part of the Eastern Gotland Basin, it was 2.1°C, which is 2°C colder compared to the previous expedition. For the station in Kalmarsund, RefM1V1, which is shallow with just over 20 meters depth, the temperature had instead risen from -0.2°C in February to 1.9°C. Thermocline and halocline coincided at all stations.

The salinity of the surface water varied from 8.4 psu at BY2 in the Arkona Basin, which was above normal for the season at that station, to a minimum of 6.6 psu at BY29 in the northern part of the Eastern Gotland Basin. For BY29, the surface salinity was below normal for the season, but for both BY20 and BY15, which are also located in the Eastern Gotland Basin, the salinity in the surface water was above normal. Also at BSCIII-10 in the southeastern Baltic Proper salinity was above normal for the season. In the Western Gotland Basin, the halocline was found at a depth of 70-90 meters. Both salinity and temperature were above normal in the deep water. In the Eastern Gotland Basin, the halocline was found at 60-80 meters depth. Here, too, salinity and temperature in the deep water were above normal at most stations. For the Bornholm Basin, Bight of Hanö and the southeastern Baltic

Proper, the halocline was found at a depth of 50-60 meters. In the Arkona Basin, there was a weak stratification at a depth of about 17 meters and a stronger at a depth of 35-40 meters depth.

Nutrients in the surface water in the form of dissolved inorganic nitrogen had decreased since the last expedition at all stations. In the Arkona Basin, as well as at BY4, dissolved inorganic nitrogen was consumed. In the Bight of Hanö, at BY5 in the eastern Bornholm Basin and at the coastal station RefM1V1, levels had also decreased and were 0.8-1.6 µmol/l. At all of these southern stations, the fluorometer on CTD indicated the highest plankton activity in the Baltic Proper. At the other stations, the decrease was not as large, and measured levels ranged from 3.2 to 4.8 µmol/l. Phosphate levels had also decreased, mostly at the southern stations. At BY2 and BY4, the levels were above normal in February, but had decreased to below normal for the season now in March, with measured values of 0.2 and 0.45 µmol/l, respectively. With the exception of BCSIII-10 and BY15, where the levels were above normal, the levels at other stations were normal for the season. In the Arkona Basin, the concentrations were 0.2-0.4 µmol/l, and at most other stations the concentration in the surface water was 0.6-0.7 µmol/l, with the highest values at BCSIII-10 and BY15. The concentration of dissolved silicate in the surface water was basically unchanged since the previous expedition for the stations in the Eastern and Western Gotland Basins, as well as the southeastern Baltic Proper, where levels remained above normal for the season, 17-18 µmol/l. At RefM1V1, the Bight of Hanö, BY4 and in the Arkona Basin, the levels were normal for the season. In the Arkona Basin, and at BY4, values of 10-12 µmol/l were measured, and at the other stations 15-17 µmol/l.

Just as during the last expedition, the concentration of dissolved inorganic nitrogen at depths exceeding 100 meters in the Western Gotland Basin were generally above normal. The levels of dissolved silicate were in most cases also above normal for the season at these depths. At BY29 in the northern part of the Baltic Proper, dissolved silicate concentration in the entire water column was above normal. The concentration of dissolved inorganic nitrogen was also above normal in the deep water. At the stations in the Eastern Gotland Basin, the levels of dissolved inorganic nitrogen were at the depths where the oxygen content was close to 0 below normal, while the levels of phosphate were above normal at the same depth. Below this depth usually normal to slightly above normal levels of both phosphate and dissolved inorganic nitrogen. At the other stations further south, generally normal levels of the nutrients in the deeper water masses.

In the bottom water of the Arkona Basin, oxygen levels were good, with concentrations of about 7 ml/l. At the stations in the Bight of Hanö and the Bornholm Basin, there was an acute oxygen deficiency from 70 meters depth, and the levels in the bottom water were 0.2-0.4 ml/l. This is a decrease since February with 0.2-0.3 ml/l. However, the levels are within normal for the season in these areas. At BCSIII-10 in the southeastern Baltic Proper, the oxygen level in the bottom water was 1.7 ml/l, which is just below the level of acute oxygen deficiency and a clear deterioration from the visit in February when 3.7 ml/l was measured in the bottom water. For both Eastern and Western Gotland Basin, acute oxygen deficiency was found from a depth of 70-80 meters, and hydrogen sulphide was found from 90 meters depth. The situation is roughly the same for all deeper stations in the Eastern and Western Gotland Basin. Down to 60-70 meters depth oxygen levels are good, this is where the mixing from the surface reaches, below rapidly decreasing oxygen levels, and at a depth of 90 meters, hydrogen sulphide was found at some stations. At a depth of 100 meters, hydrogen sulphide was measured on all water samples except at BY20, where the sample at 100 meters contained neither dissolved oxygen nor hydrogen sulphide. At BY38, for example, in the Western Gotland Basin, the oxygen level at a depth of 70 meters was 6.2 ml/l, but at 80 meters only 0.14 ml/l and at 90 meters hydrogen sulphide was present. In February, the oxygen concentration at 90 meters was 2.8 ml/l.

Measurements of chlorophyll fluorescence showed high activity in the water column in the Arkona Basin, Bight of Hanö and the Bornholm Basin. And a high level of chlorophyll fluorescence was also measured at the coastal station RefM1V1 in Kalmarsund, where the spring bloom was in progress. In the Western Gotland Basin, and at BY29, there was an increased plankton activity near the surface, while in the Eastern Gotland Basin and in the southeastern Baltic Proper there was low activity and the spring bloom had not yet started there.

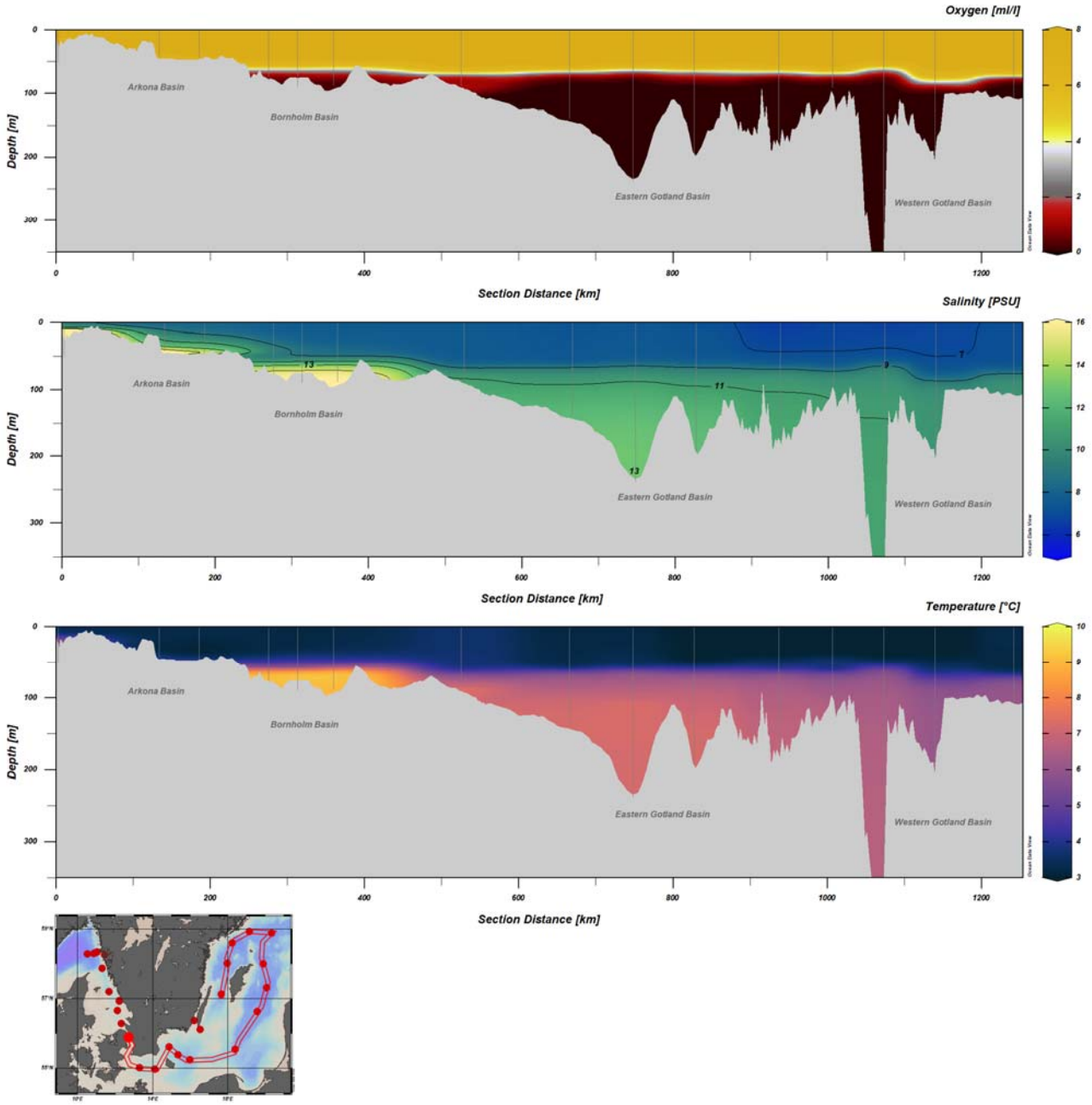

Figure 1. Transect showing CTD measurements of dissolved oxygen, salinity and temperature from the Sound through the Eastern Gotland Basin to the Western Gotland Basin.

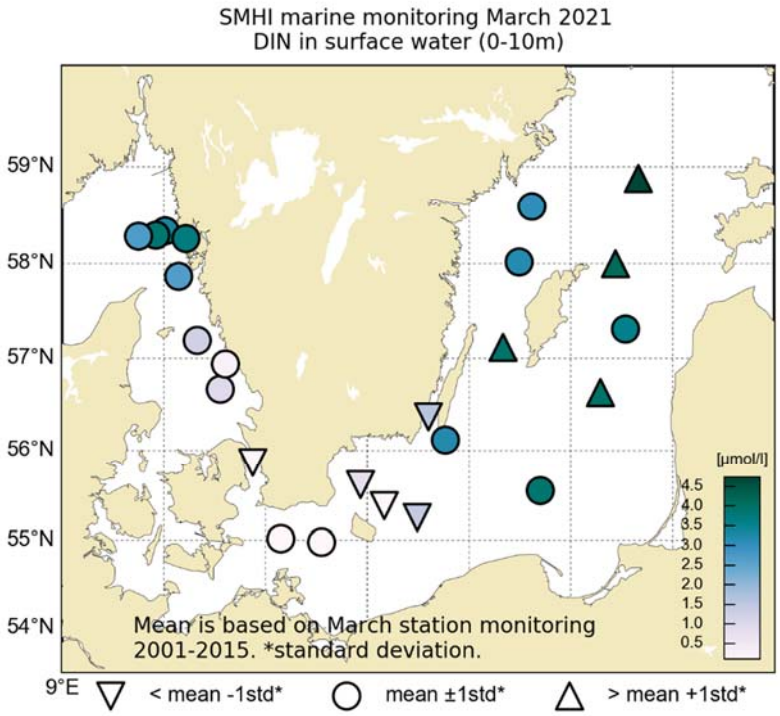

Figure 2. Concentration of dissolved inorganic nitrogen in the surface water (0-10m).

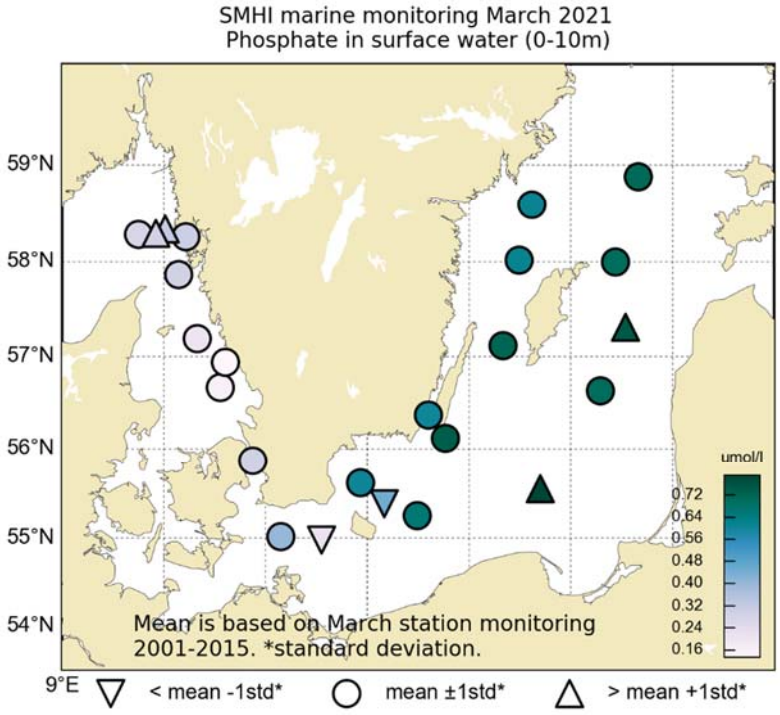

Figure 3. Concentration of phosphate in the surface water (0-10m).

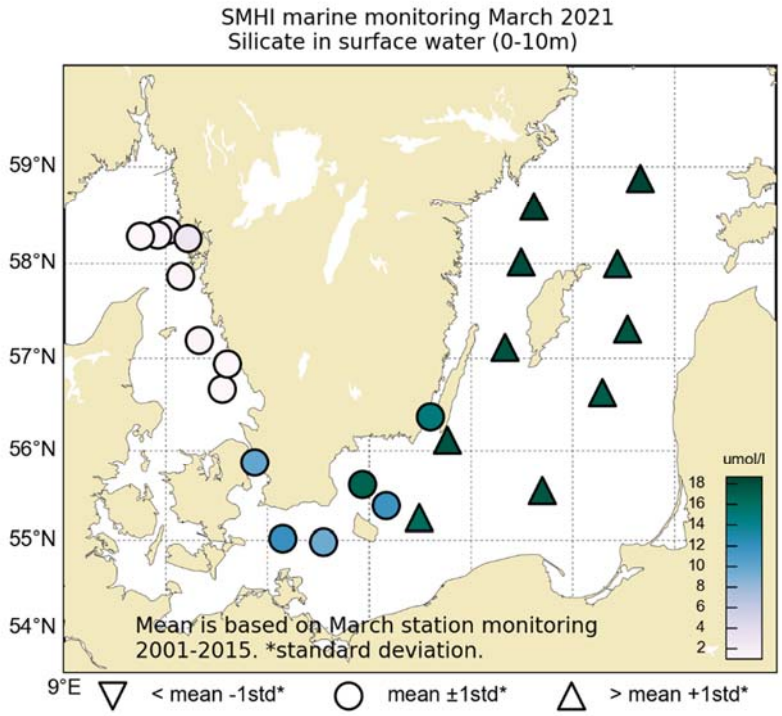

Figure 4. Concentration of silicate in the surface water (0-10m).

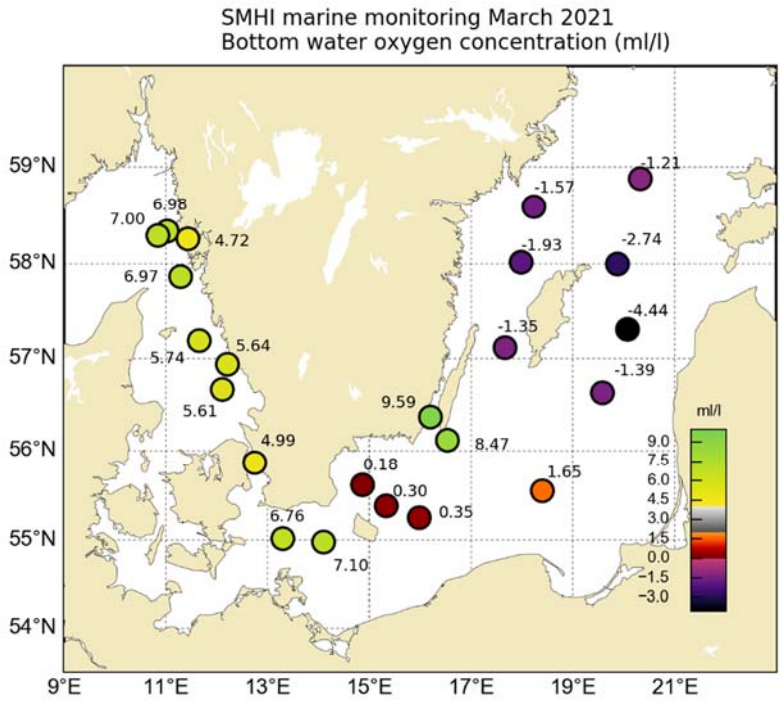

Figure 5. Oxygen concentration in the bottom water.

PARTICIPANTS

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Johan Kronsell	Cruise leader	SMHI
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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
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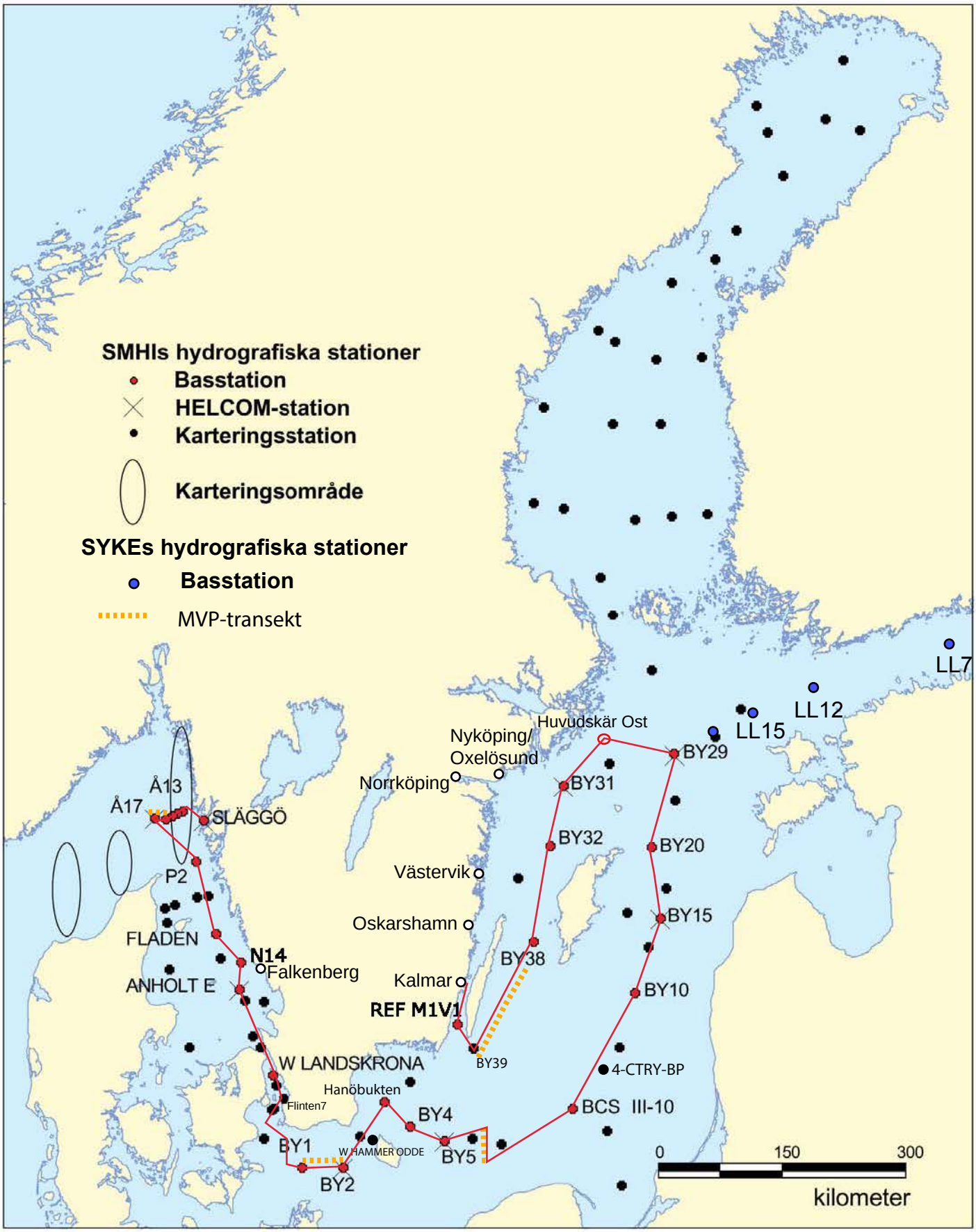
Date: 20210316-20210322
Series: 0249 - 0275



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Time: 15:49

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Year: 2021

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
0249	05	BPWK01	BAS...	REF M1V1	5622.23	01612.12	20210316	1500	21	2	04	4	1.8	1015	1520	-x--	5		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0250	05	BPSE49	BAS...	BY39 ÖLANDS S UDDE	5606.98	01632.16	20210316	1820	52		36	4	1.5	1017	9999	----	8		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
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0254	05	BPNX00	EXT...	HUVUDSKÄR	5855.81	01909.58	20210317	2200	93		36	5	0.5	1020	9990	----	12		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
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0256	05	BPEX26	BAS...	BY20 FÅRÖDJ	5759.88	01952.70	20210318	1000	197	13	31	6	2.0	1016	2730	----	17		x	x	-	x	-	x	x	x	x	-	x	x	x	x	-	-	x	-	-	-
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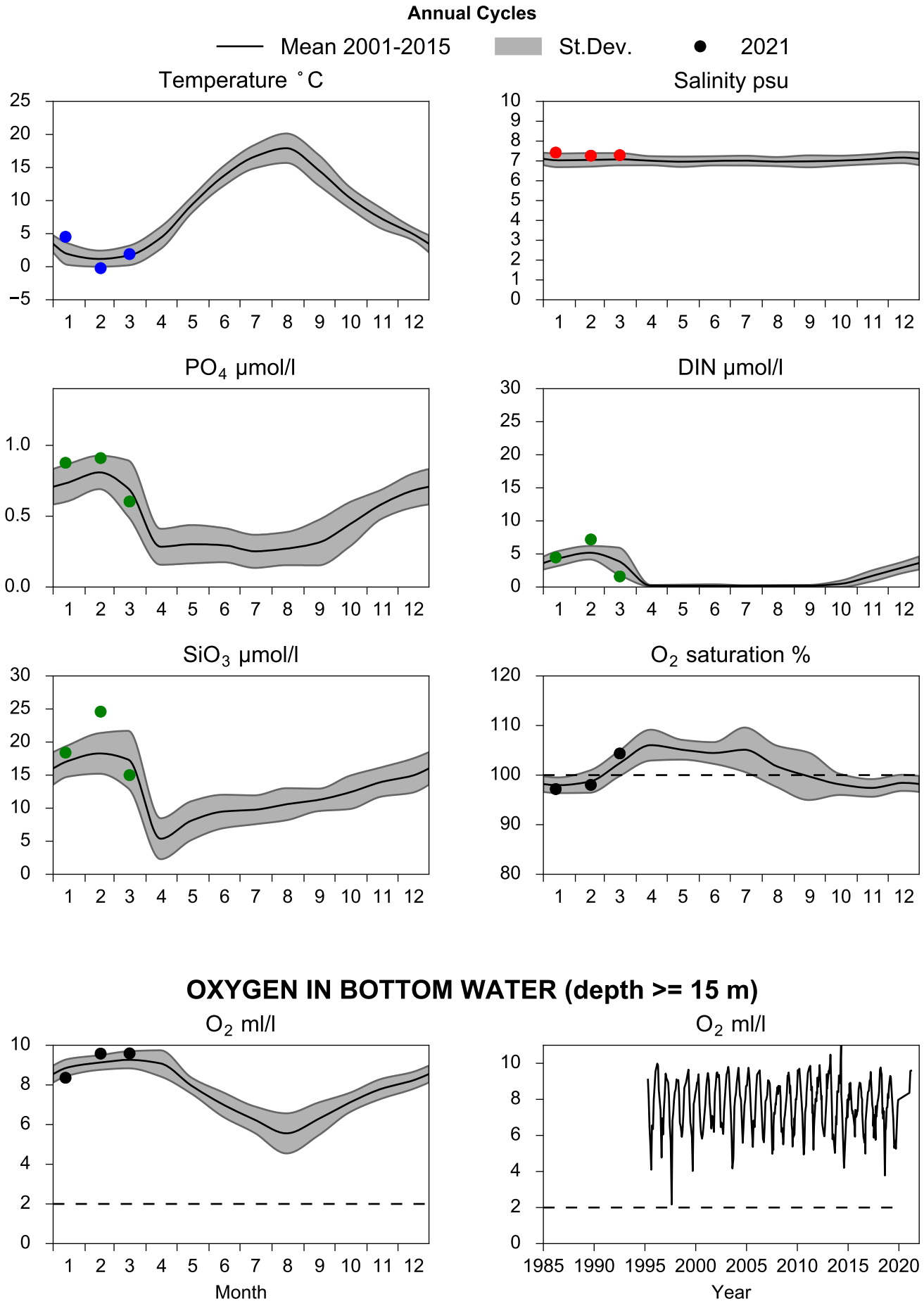
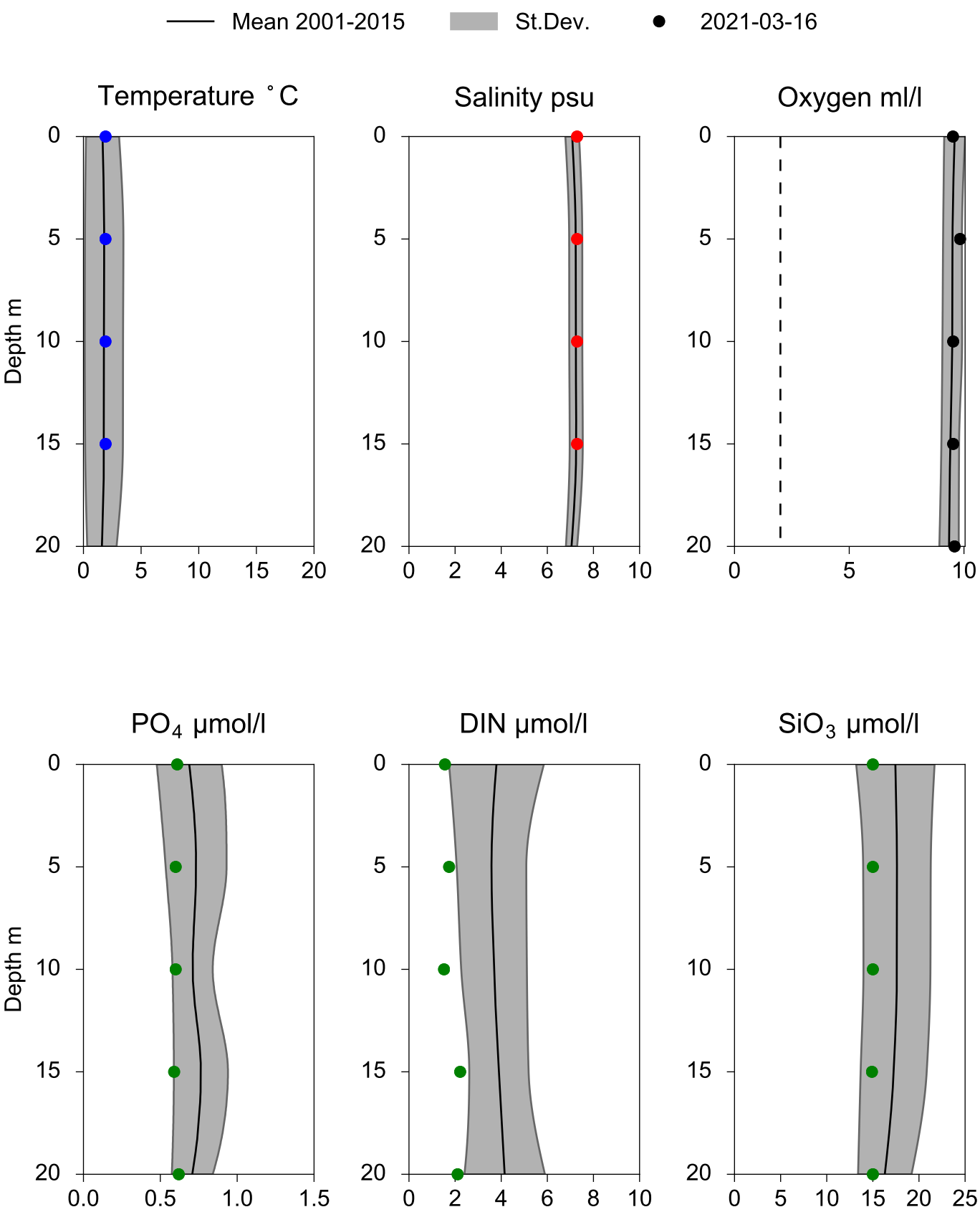
0266	05	KAEX00	EXT...	P22	5617.26	01220.01	20210321	0550	27		34	8	4.6	1008	1330	----	6		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0267	05	KAEX29	BAS...	ANHOLT E	5640.13	01206.69	20210321	0900	63	10	33	8	4.1	1013	1230	-x-x	10		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0268	05	KANX50	BAS...	N14 FALKENBERG	5656.39	01212.73	20210321	1150	31	8	32	10	4.7	1013	1430	-x--	7		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0269	05	KANX25	BAS...	FLADEN	5711.53	01139.47	20210321	1520	85	12	33	8	4.6	1012	1230	----	13		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0270	05	SKEX23	BAS...	P2	5752.00	01117.52	20210321	2010	95		36	3	5.2	1014	9990	----	10		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0271	05	SKEX14	BAS...	Å13	5820.38	01101.70	20210321	2350	93.5		31	4	4.5	1016	9990	----	10		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0272	05	SKEX16	BAS...	Å15	5817.65	01050.71	20210322	0120	135.5		29	5	4.4	1016	9990	----	12		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	-	-
0273	05	SKEX18	BAS...	Å17	5817.05	01030.25	20210322	0335	351		25	6	4.2	1016	9990	-x--	15		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-
0274	05	SKEX15	BAS...	Å14	5818.97	01056.57	20210322	0710	111		27	6	4.8	1013	1130	----	11		-	x	-	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-
0275	05	FIBG27	BAS...	SLÄGGÖ	5815.59	01126.11	20210322	0950	78	11	24	3	5.9	1013	0120	-x--	9		x	x	-	x	-	x	x	-	x	-	x	x	x	x	-	-	x	-	x	-

STATION REF M1V1 SURFACE WATER (0-10 m)



OXYGEN IN BOTTOM WATER (depth >= 15 m)

Vertical profiles REF M1V1
March

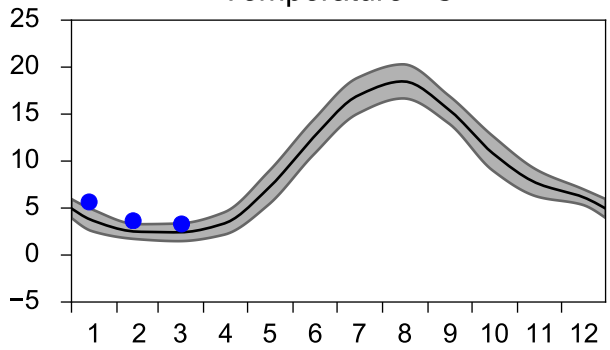


STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

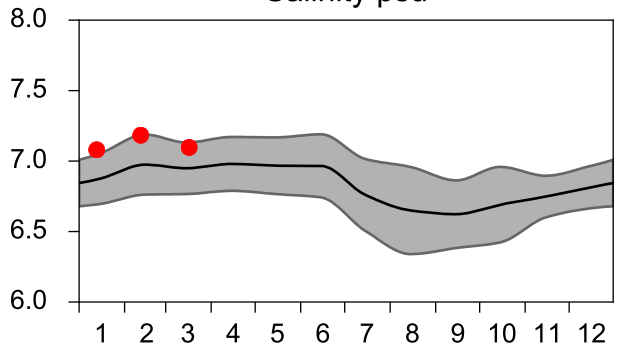
Annual Cycles

Mean 2001-2015 St.Dev. 2021

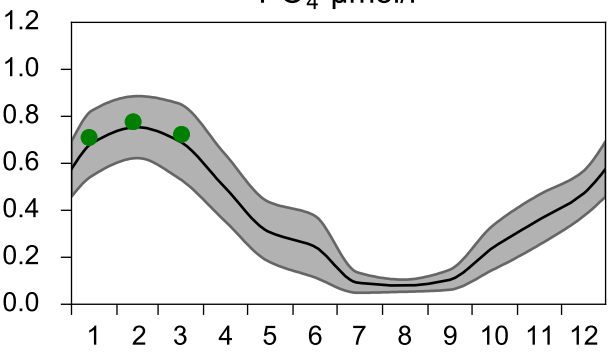
Temperature ˚C



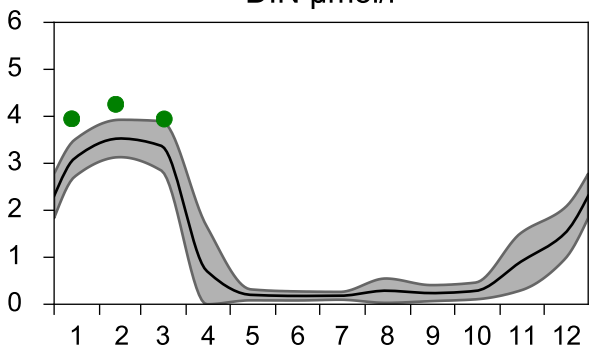
Salinity psu



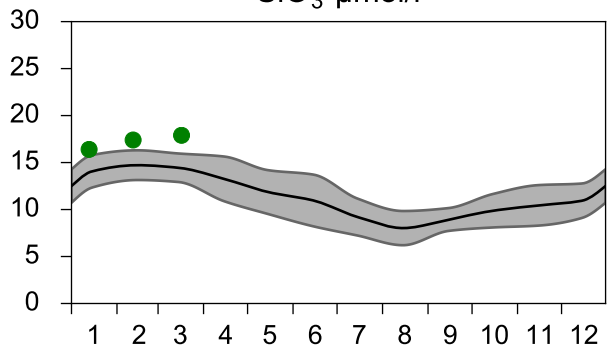
PO_4 µmol/l



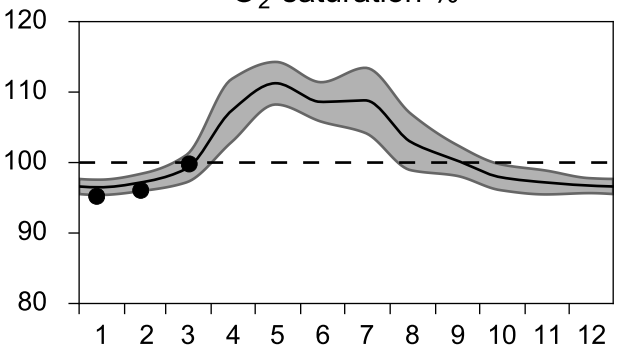
DIN µmol/l



SiO_3 µmol/l

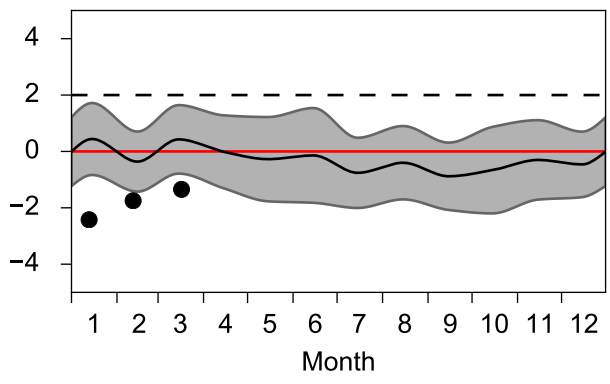


O_2 saturation %

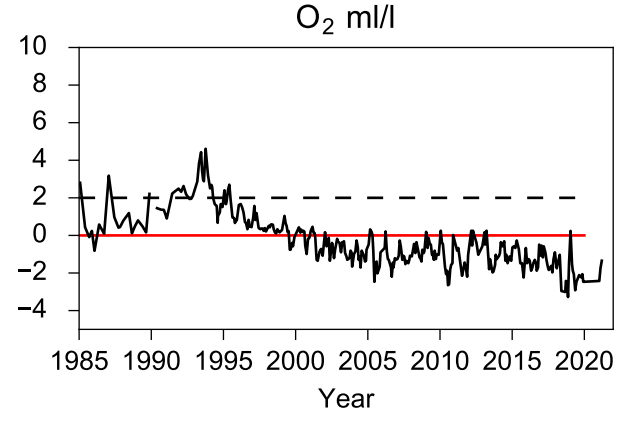


OXYGEN IN BOTTOM WATER (depth >= 100 m)

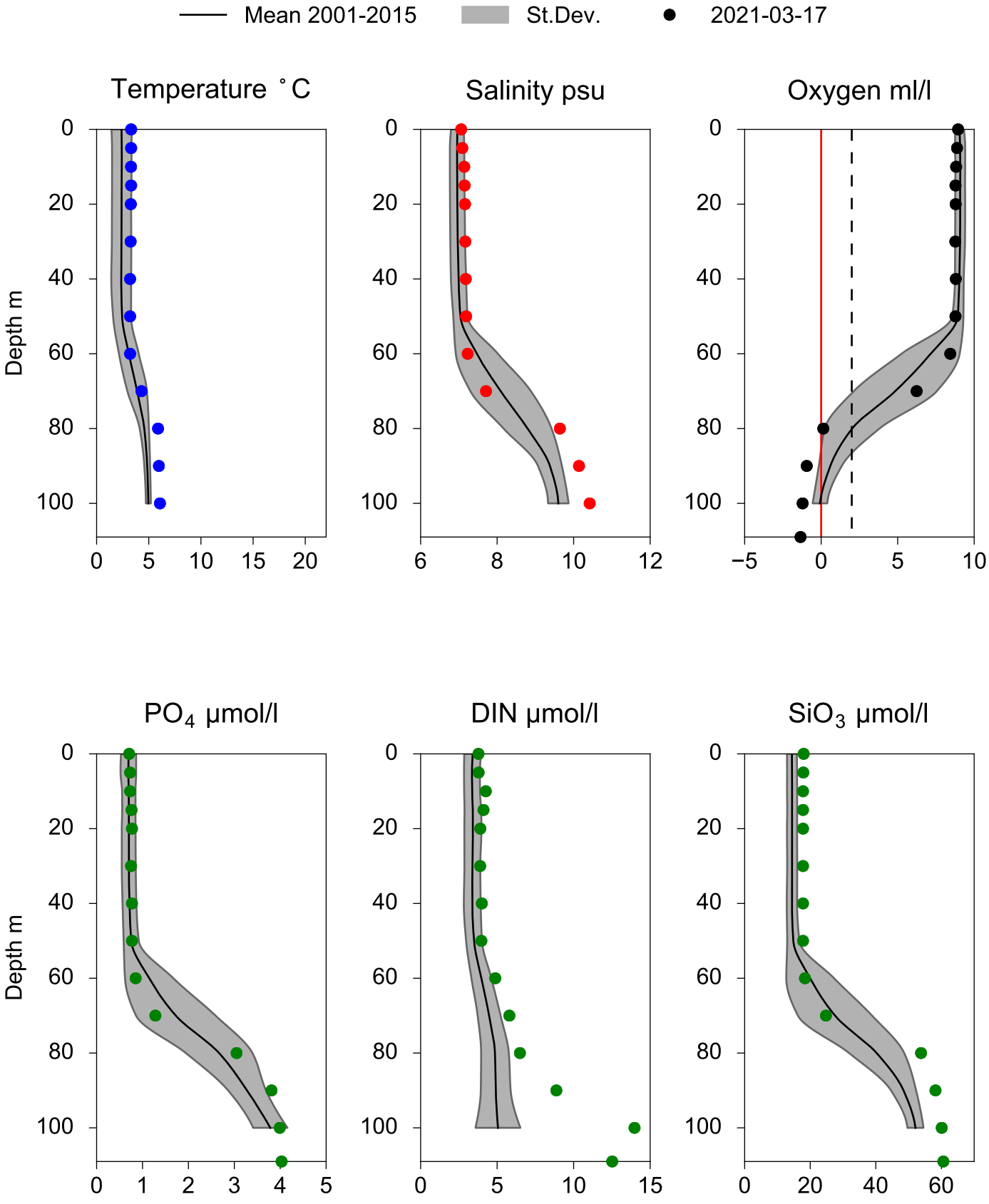
O_2 ml/l



O_2 ml/l



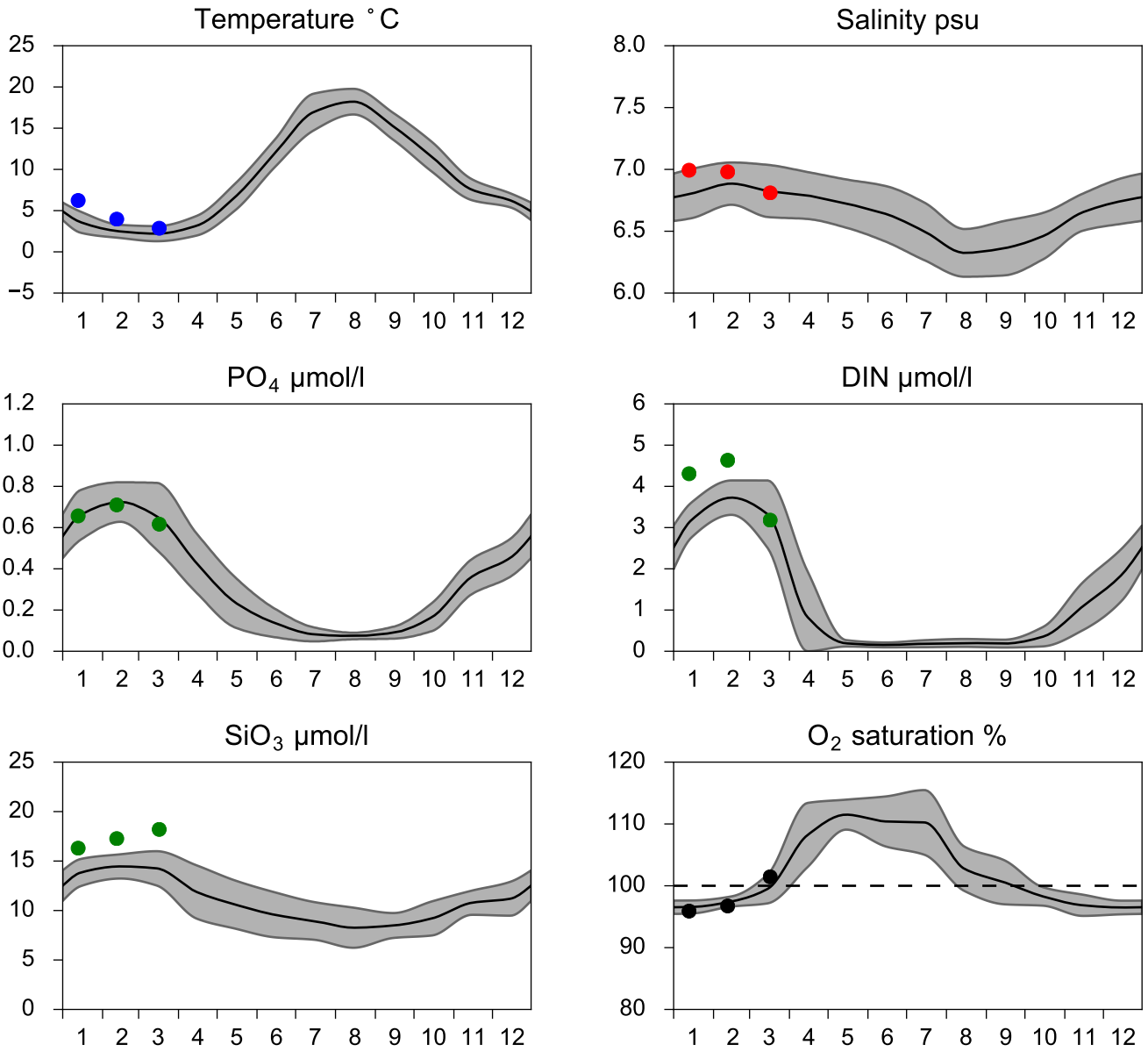
Vertical profiles BY38 KARLSÖDJ
March



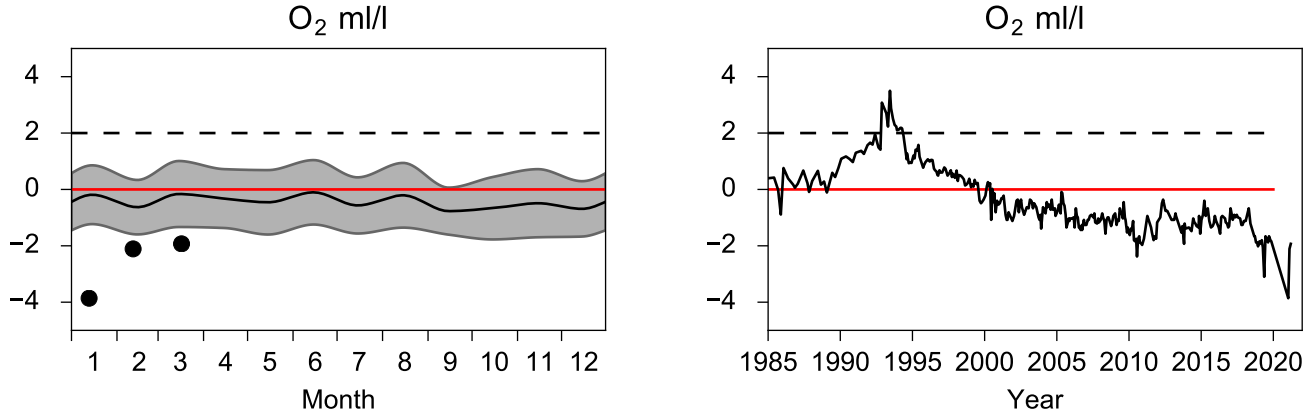
STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

Annual Cycles

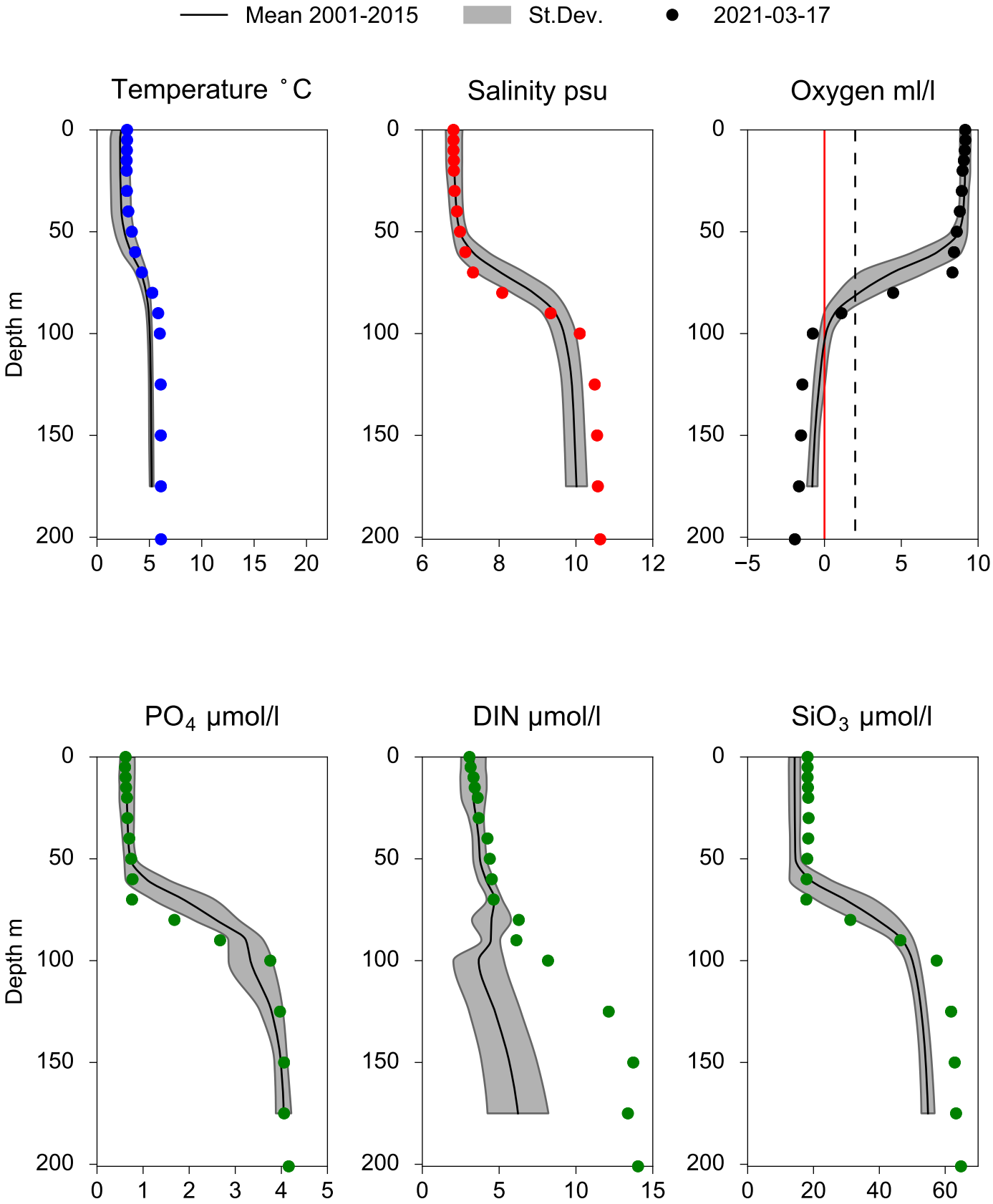
Mean 2001-2015 St.Dev. 2021



OXYGEN IN BOTTOM WATER (depth >= 175 m)



Vertical profiles BY32 NORRKÖPINGSDJ
March

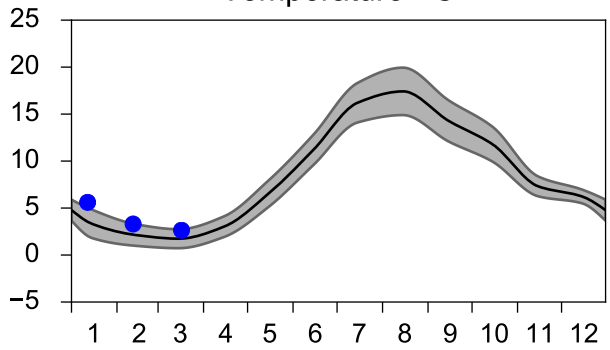


STATION BY31 LANDSORTSDJ SURFACE WATER (0-10 m)

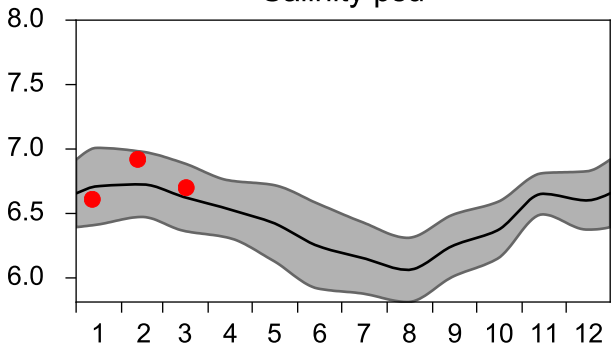
Annual Cycles

Mean 2001-2015 St.Dev. 2021

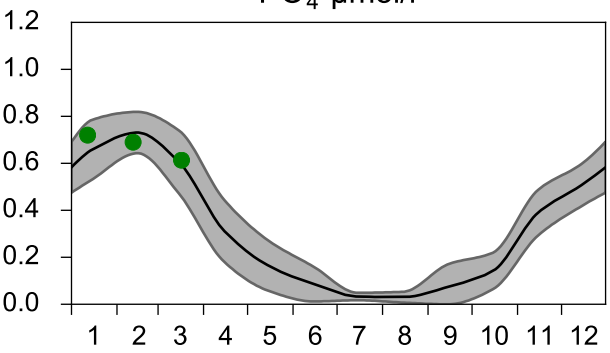
Temperature ˚C



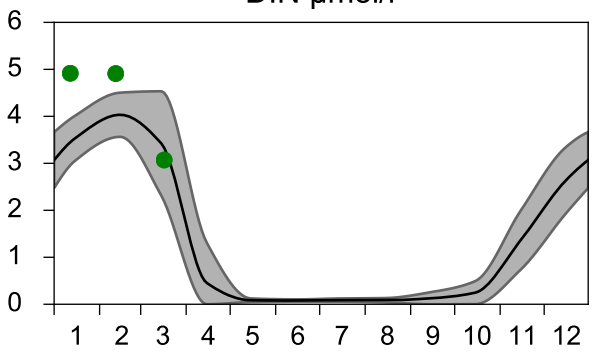
Salinity psu



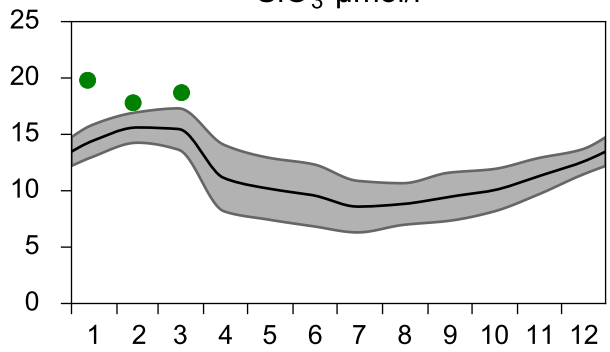
PO_4 µmol/l



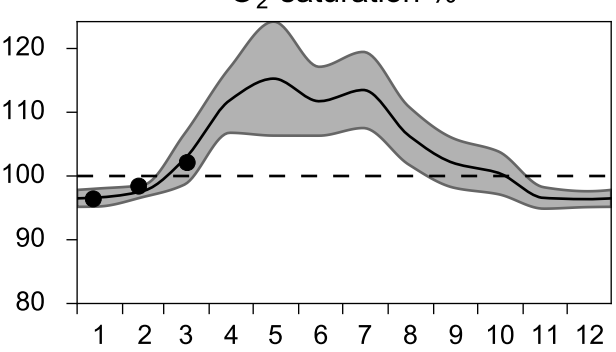
DIN µmol/l



SiO_3 µmol/l

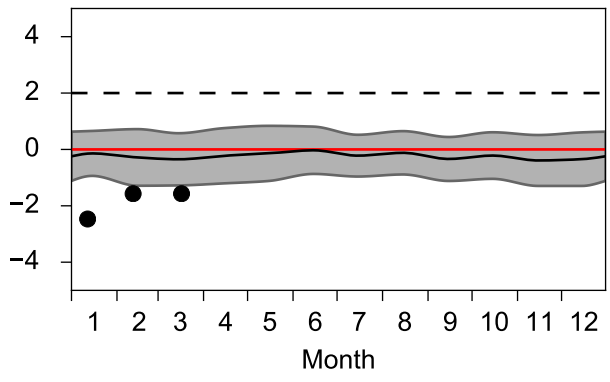


O_2 saturation %

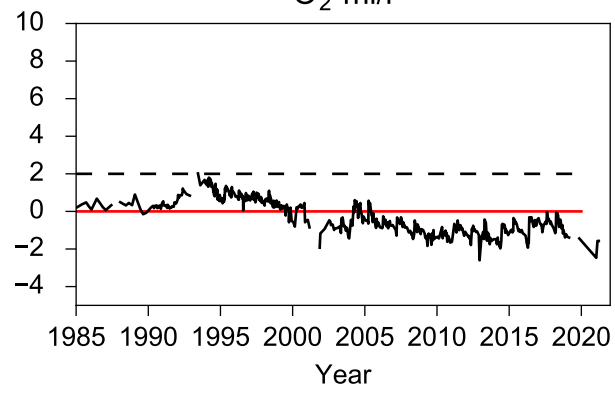


OXYGEN IN BOTTOM WATER (depth >= 419 m)

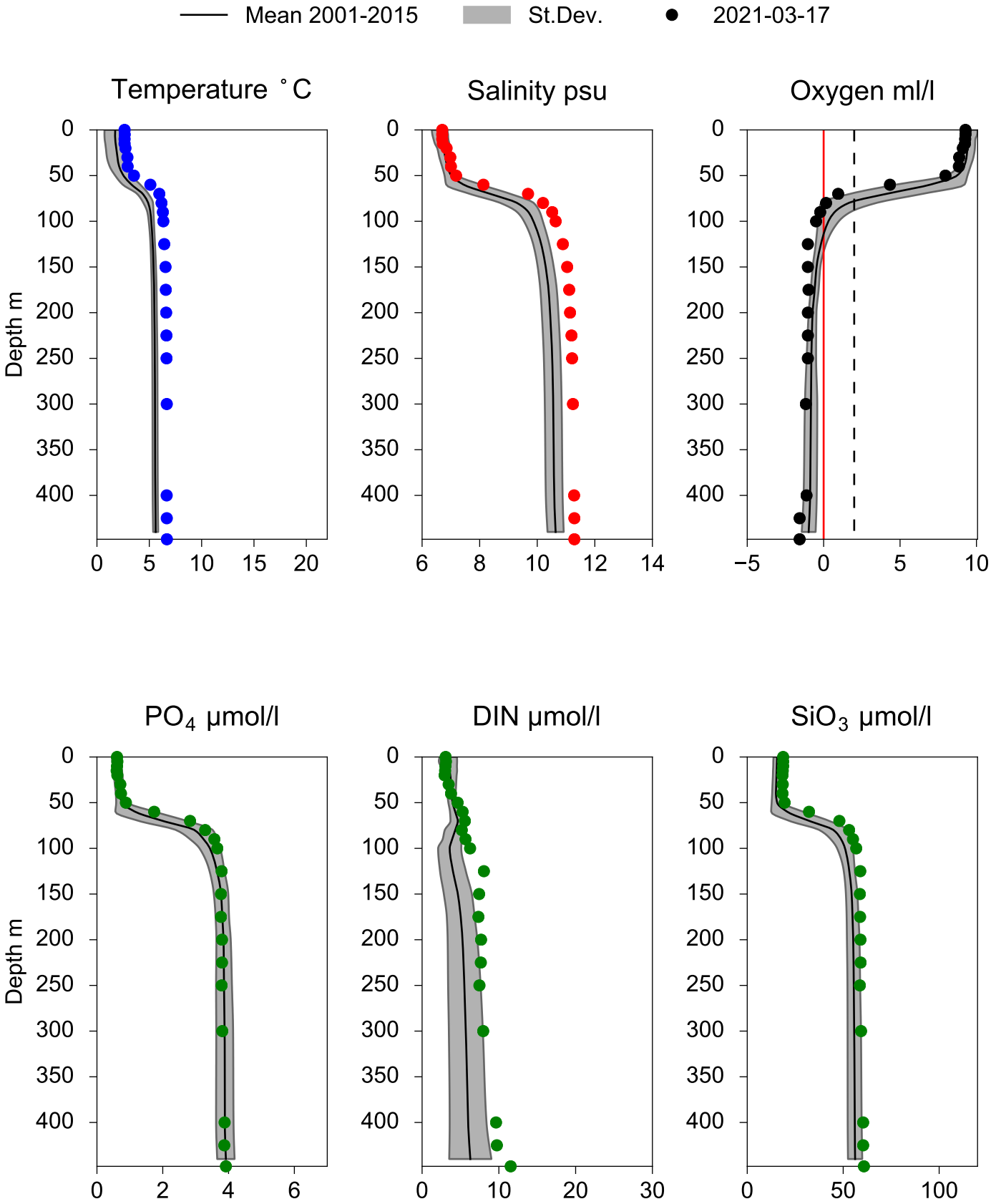
O_2 ml/l



O_2 ml/l



Vertical profiles BY31 LANDSORTSDJ
March

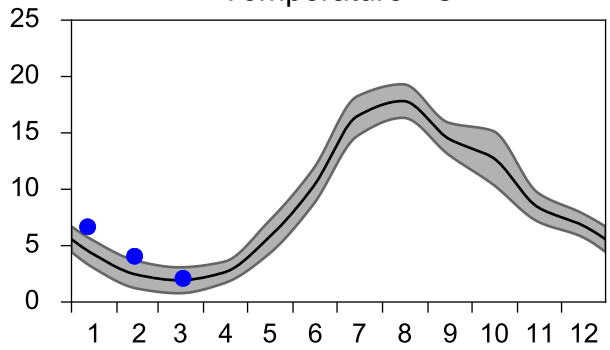


STATION BY29 / LL19 SURFACE WATER (0-10 m)

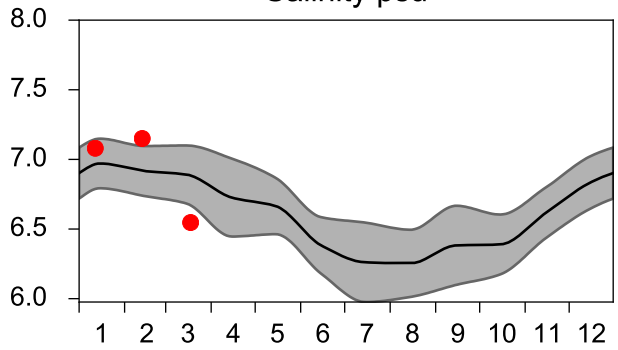
Annual Cycles

Mean 2001-2015 St.Dev. 2021

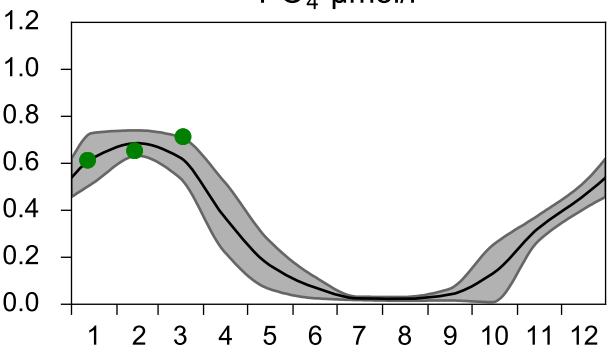
Temperature ˚C



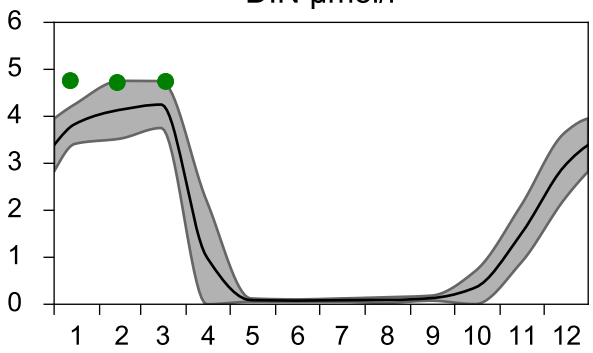
Salinity psu



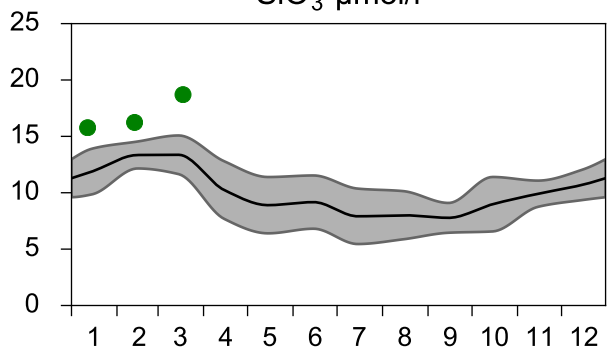
PO_4 µmol/l



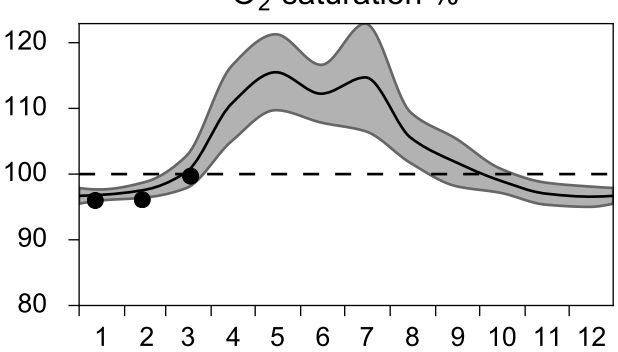
DIN µmol/l



SiO_3 µmol/l

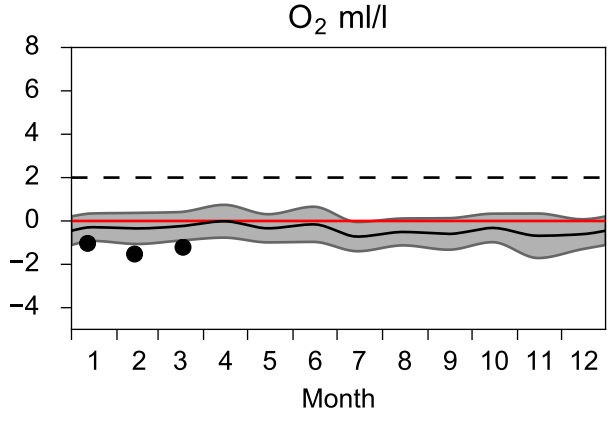


O_2 saturation %

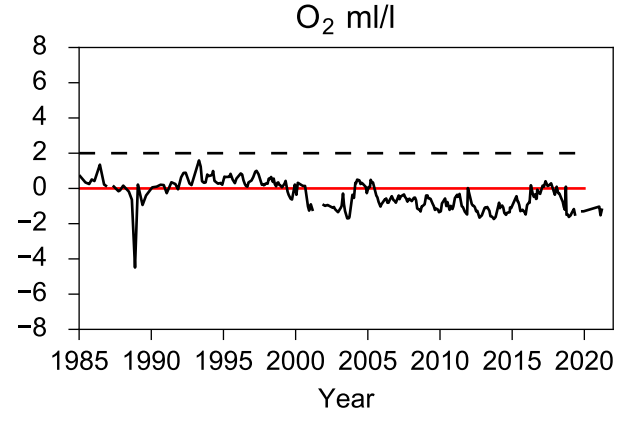


OXYGEN IN BOTTOM WATER (depth >= 150 m)

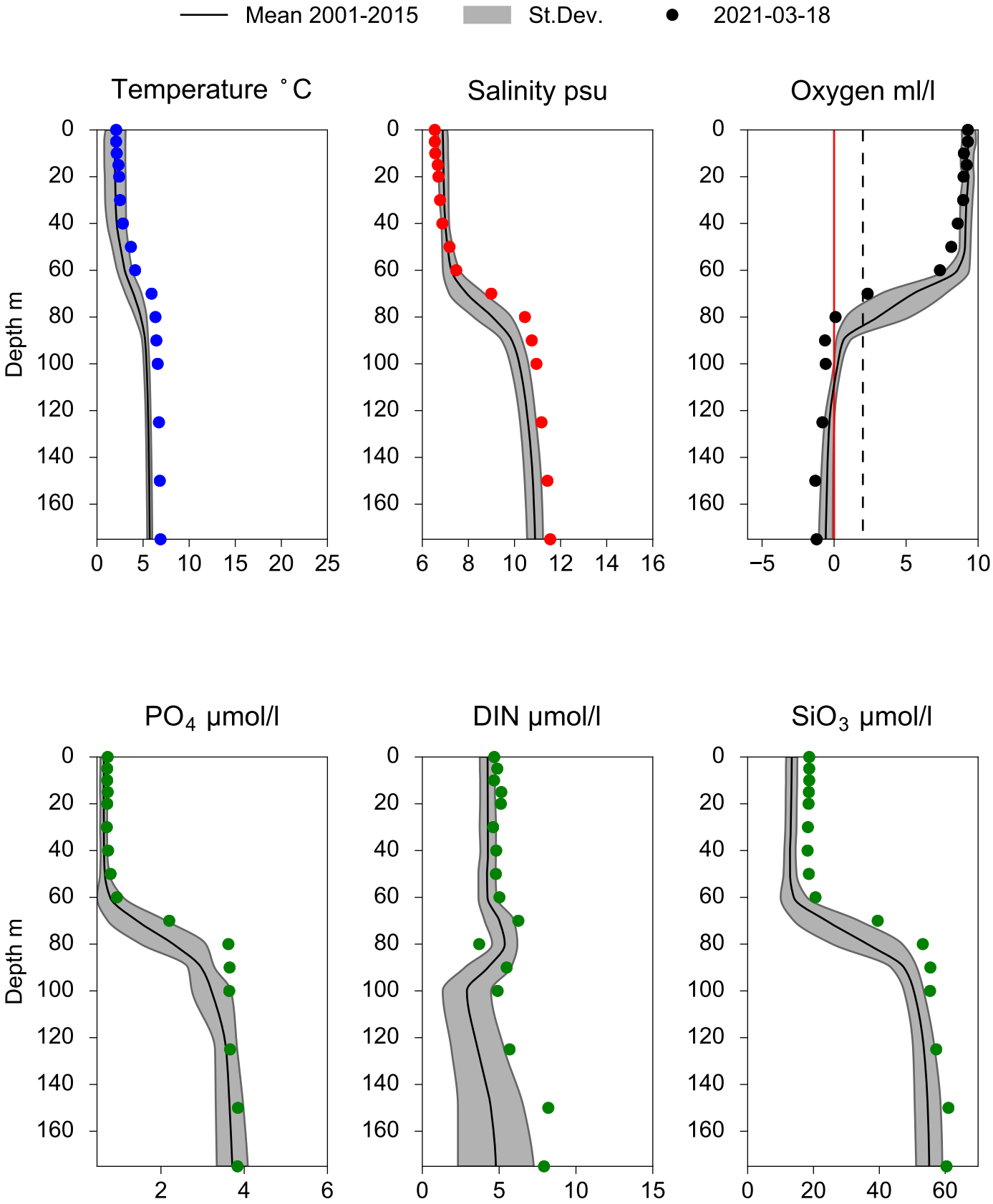
O_2 ml/l



O_2 ml/l

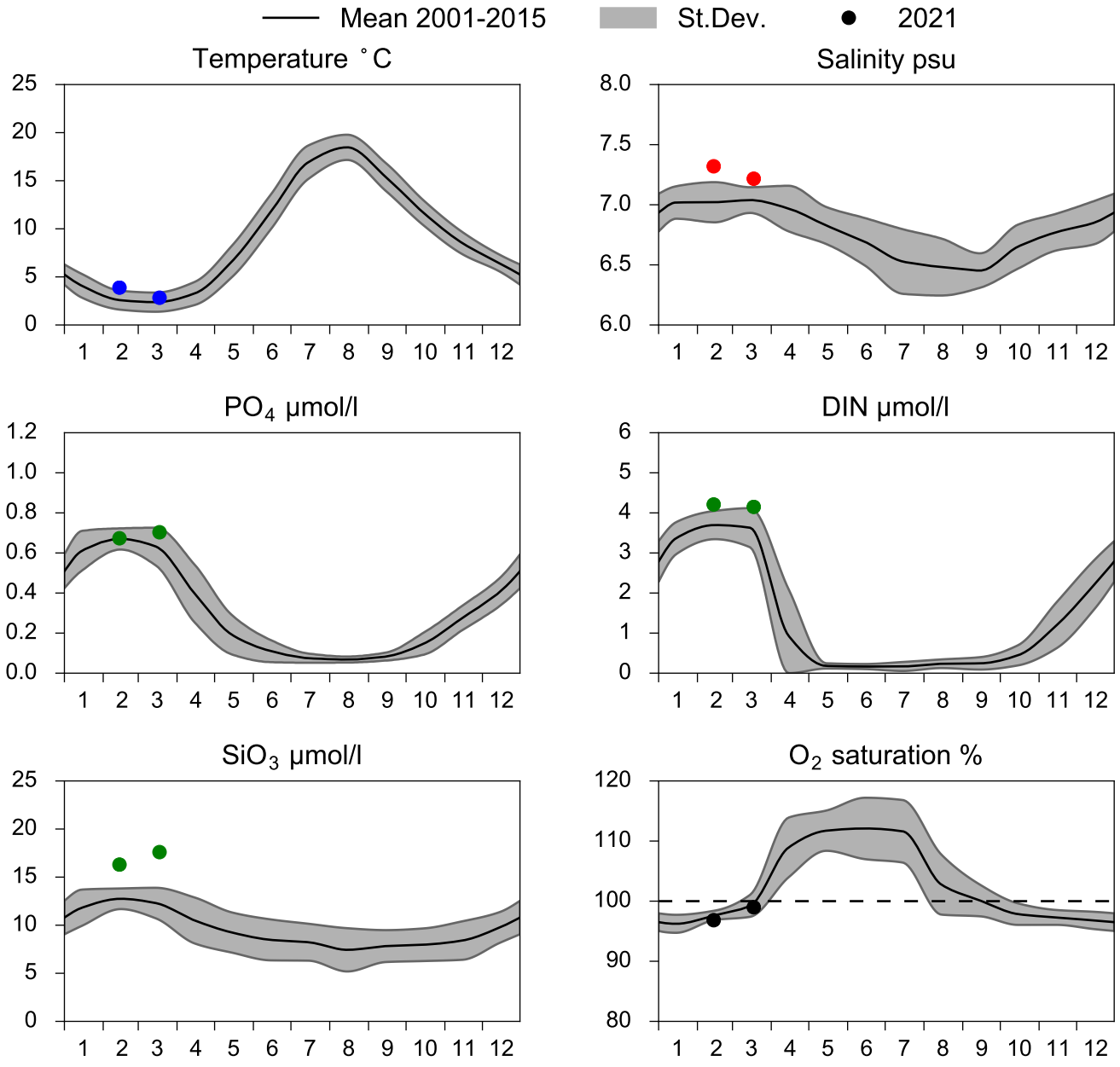


Vertical profiles BY29 / LL19
March

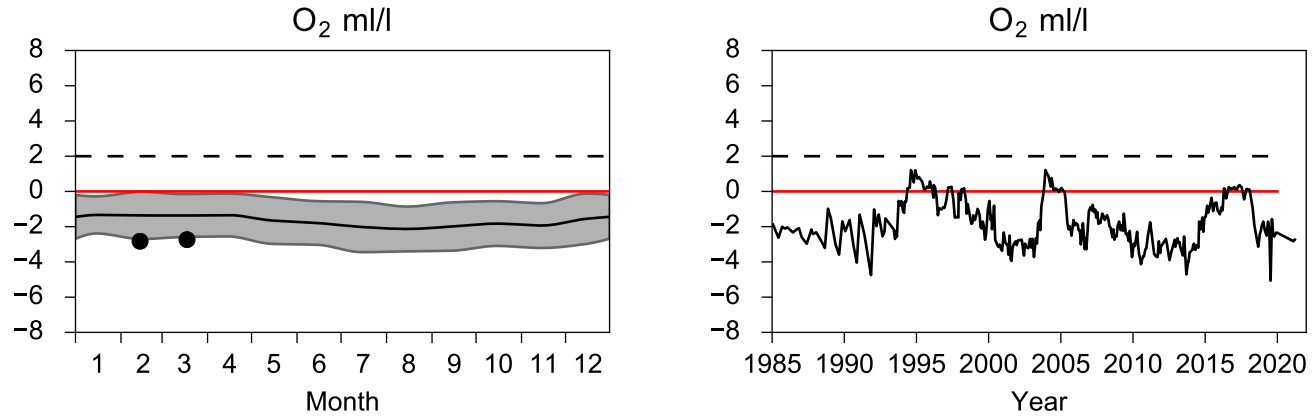


STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

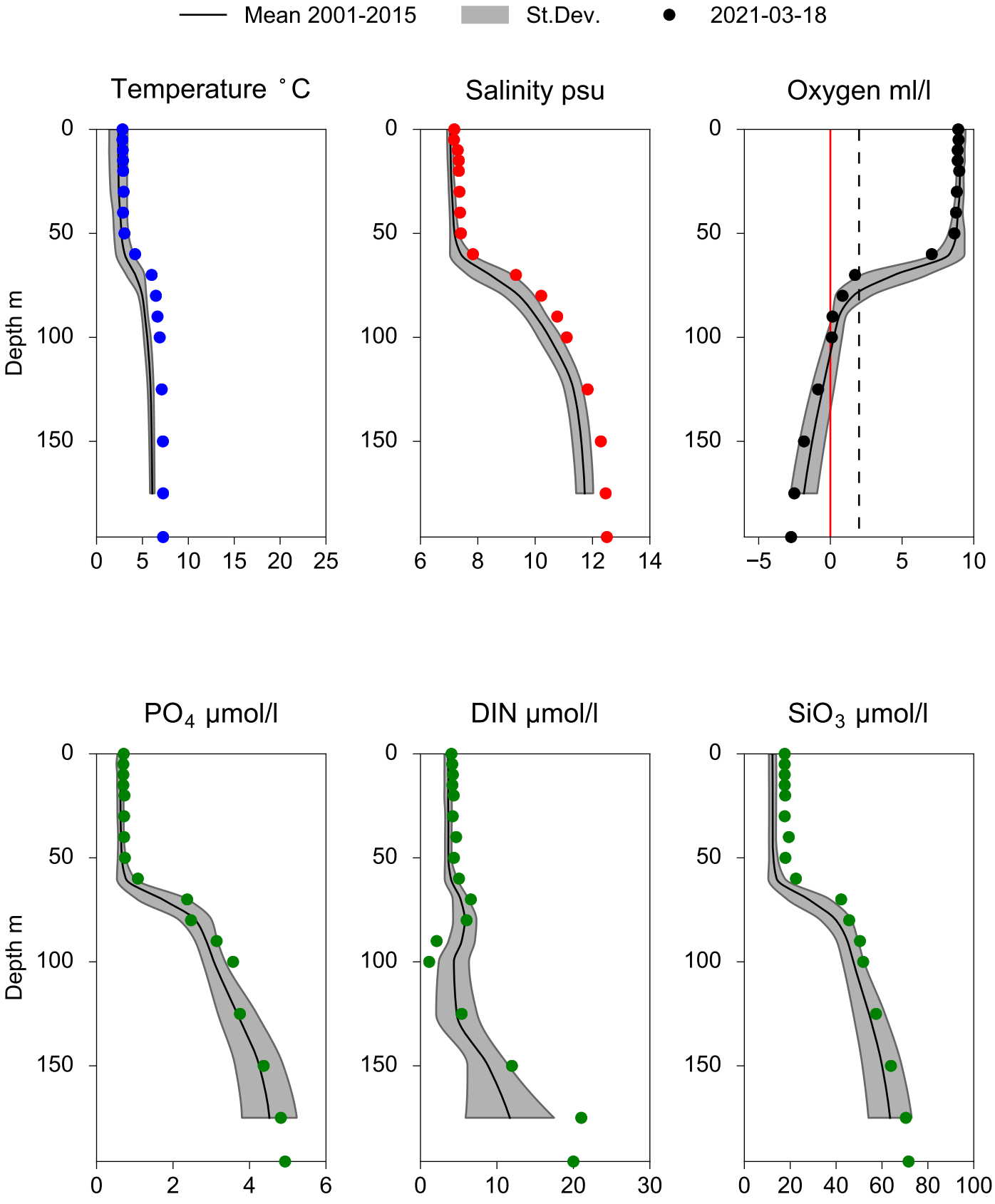
Annual Cycles



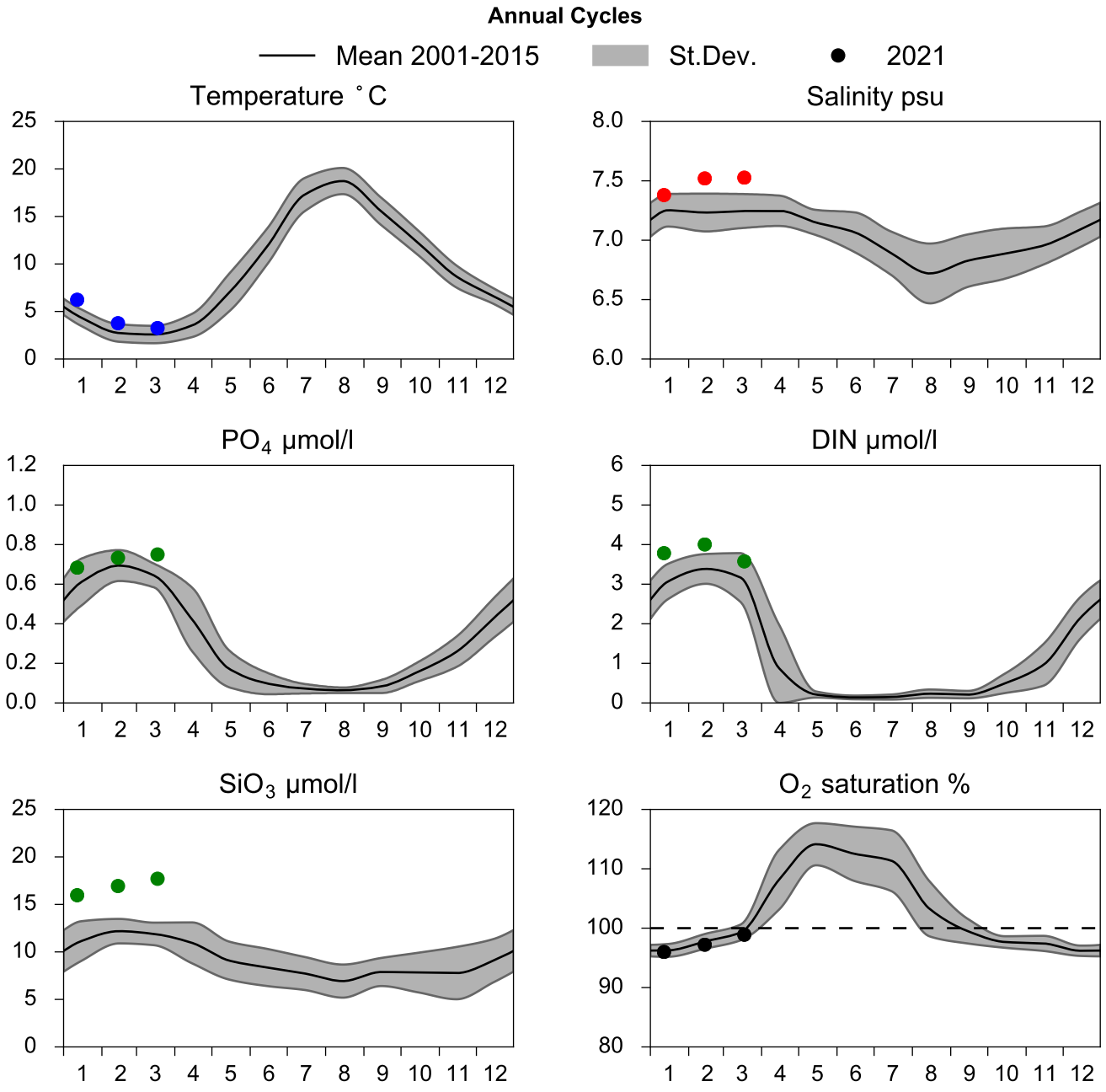
OXYGEN IN BOTTOM WATER (depth >= 175 m)



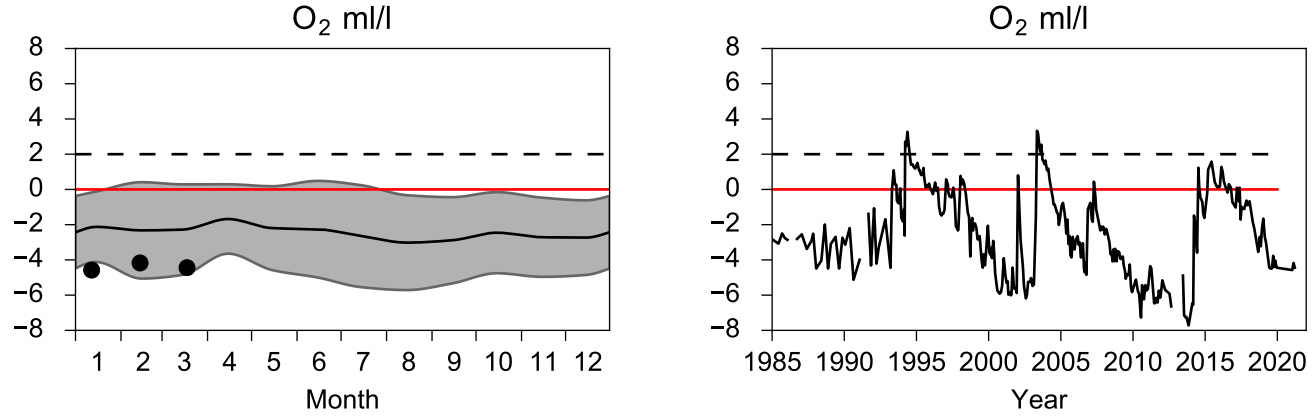
Vertical profiles BY20 FÅRÖDJ
March



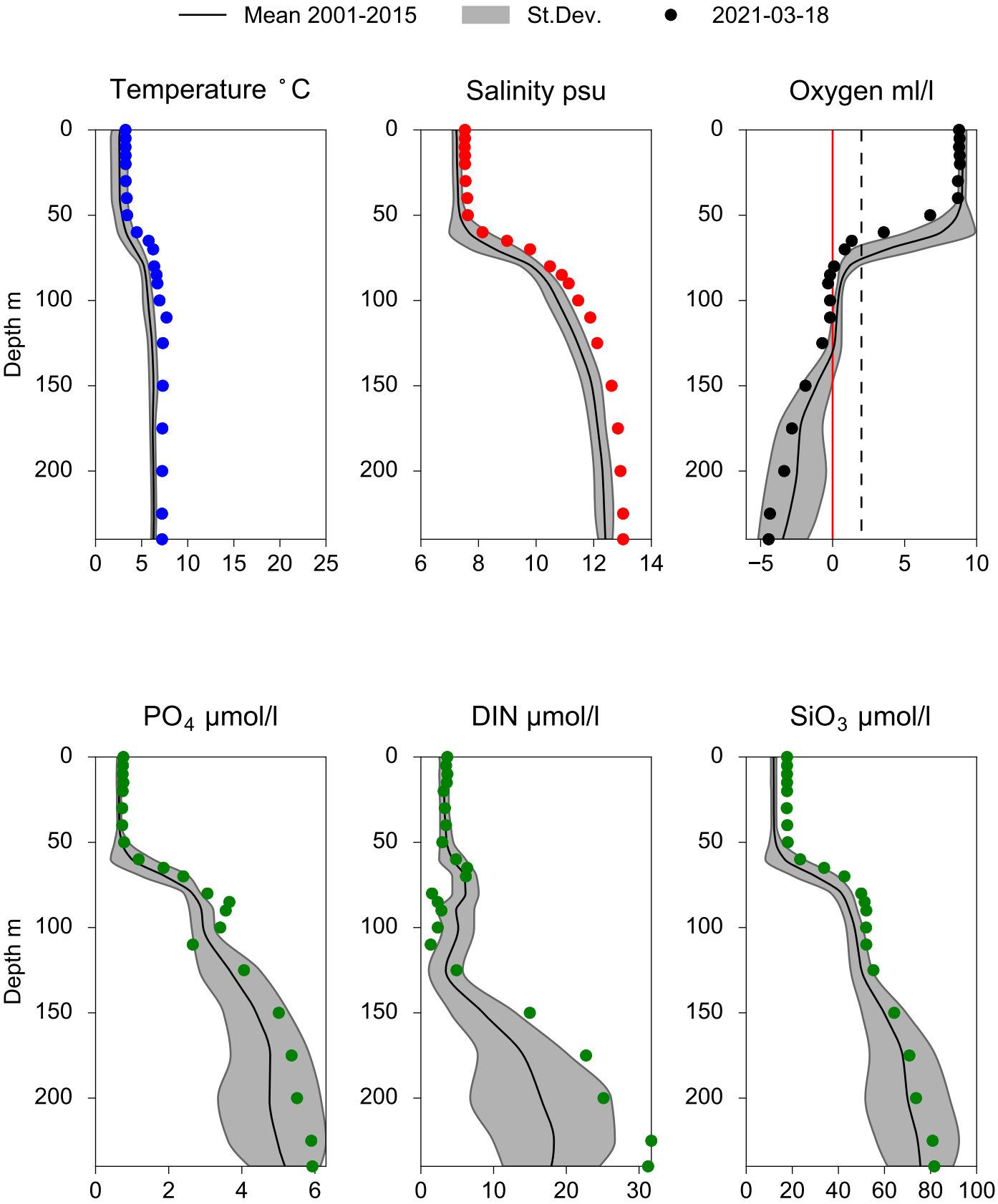
STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)



OXYGEN IN BOTTOM WATER (depth >= 225 m)

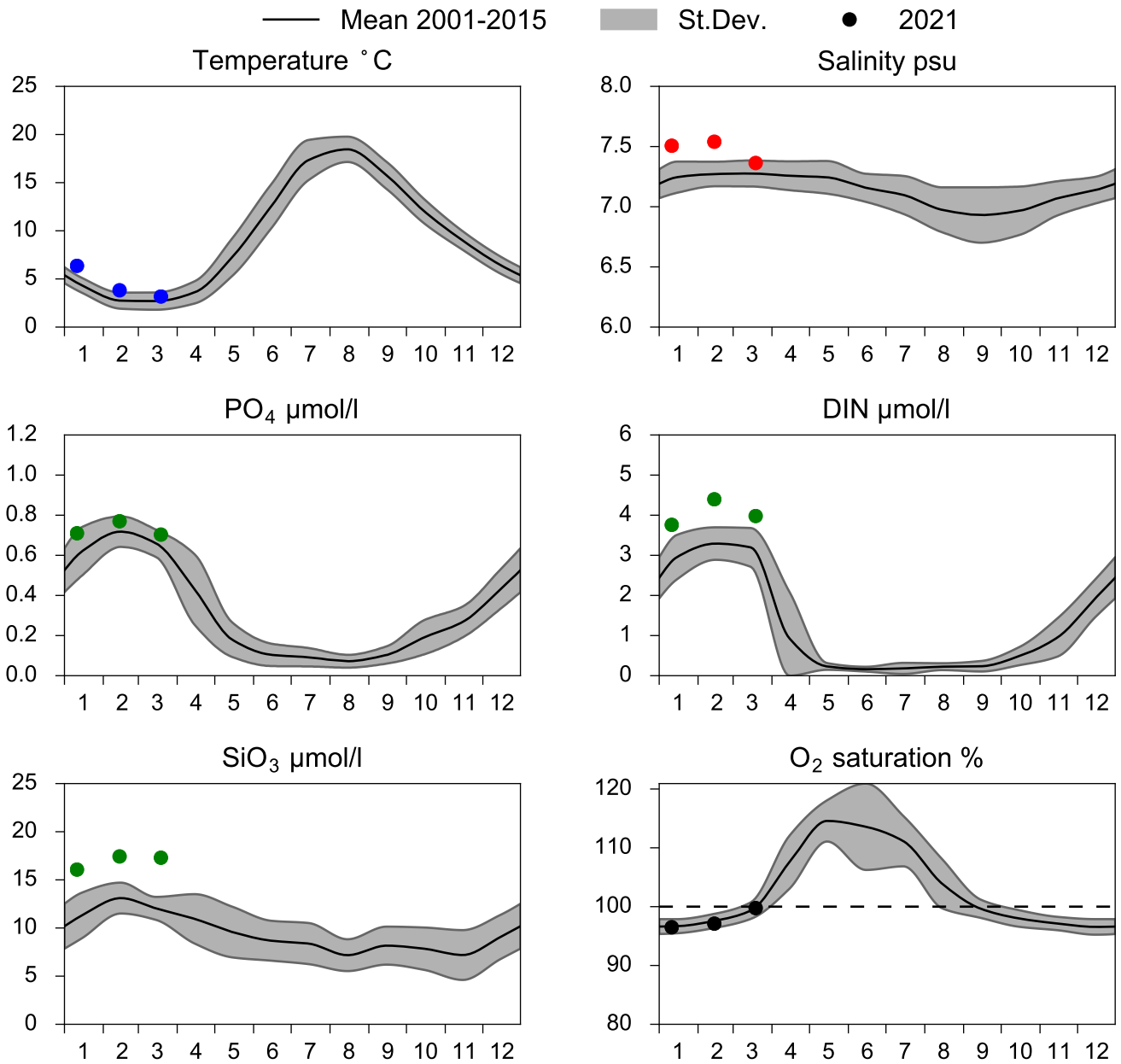


Vertical profiles BY15 GOTLANDSDJ
March

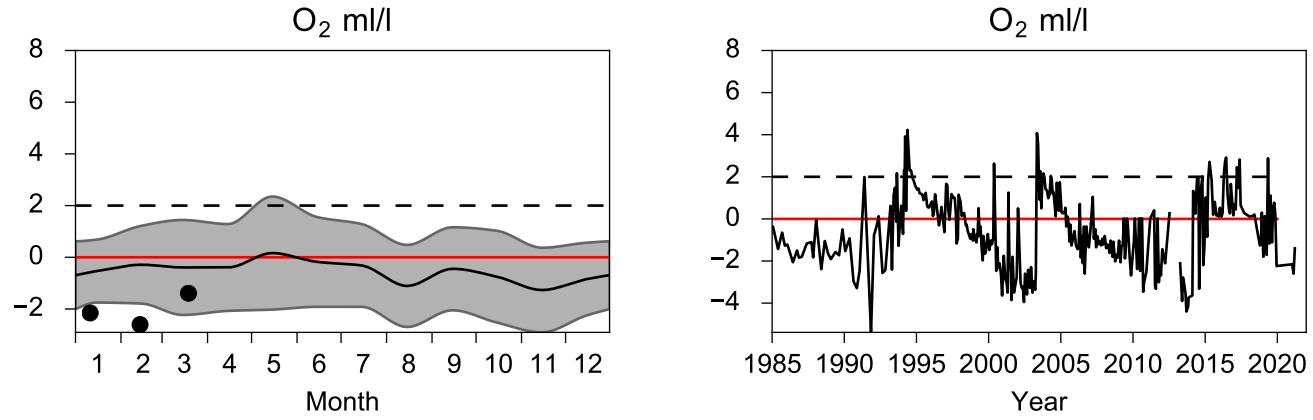


STATION BY10 SURFACE WATER (0-10 m)

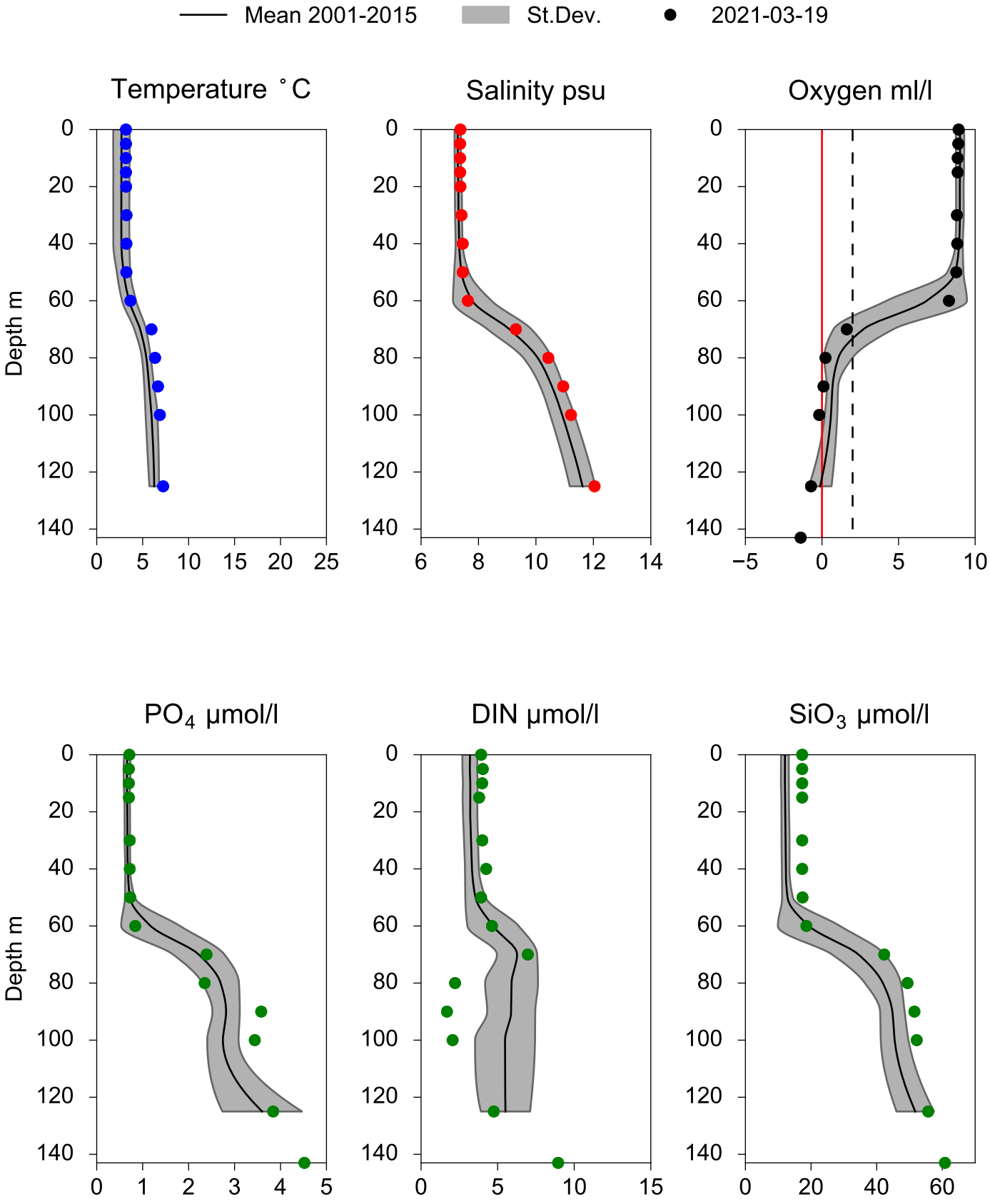
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)



Vertical profiles BY10
March

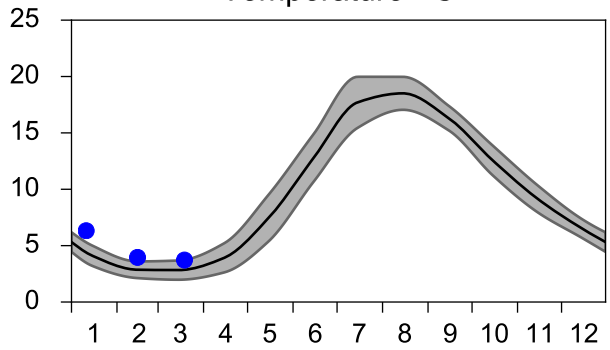


STATION BCS III-10 SURFACE WATER (0-10 m)

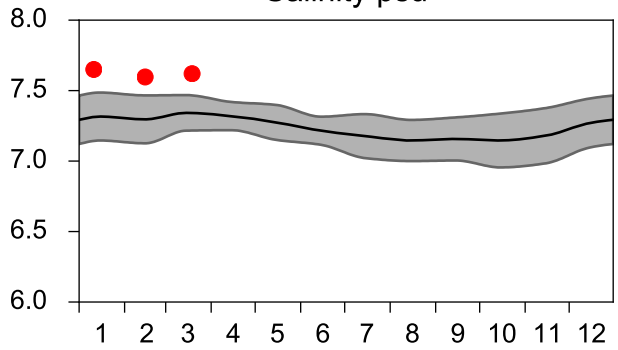
Annual Cycles

Mean 2001-2015 St.Dev. 2021

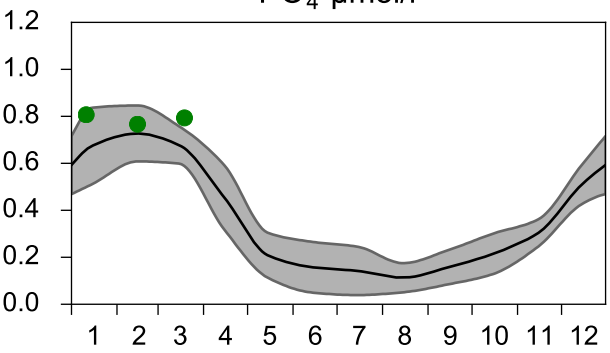
Temperature ˚C



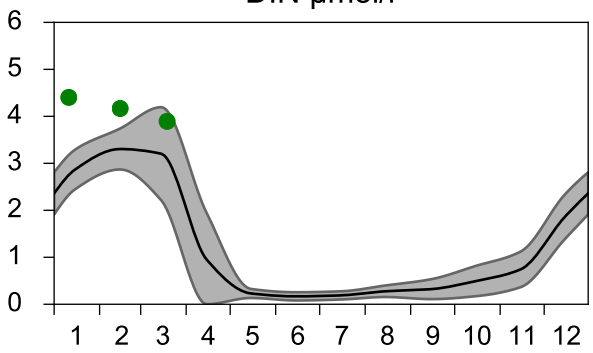
Salinity psu



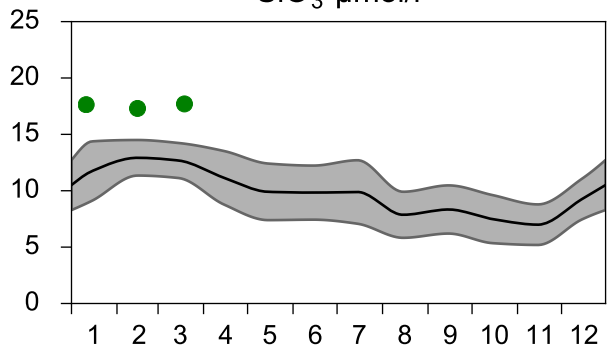
PO_4 µmol/l



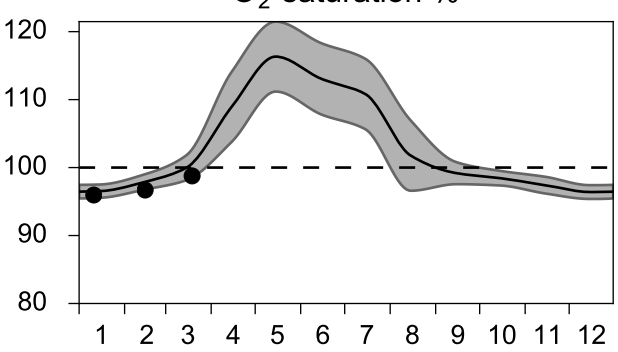
DIN µmol/l



SiO_3 µmol/l

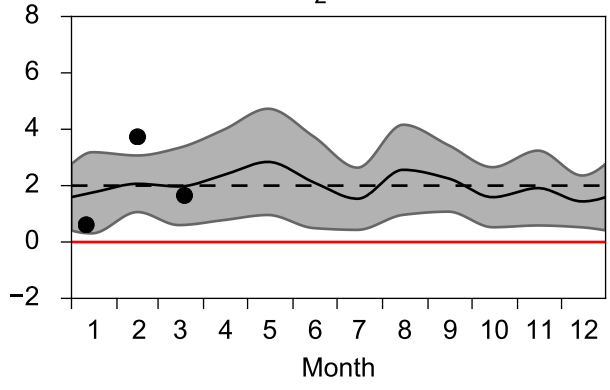


O_2 saturation %

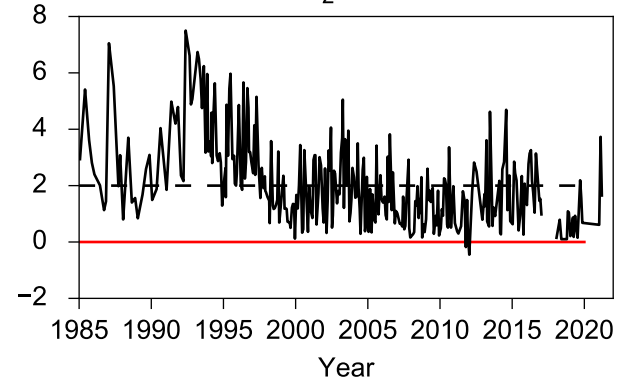


OXYGEN IN BOTTOM WATER (depth >= 80 m)

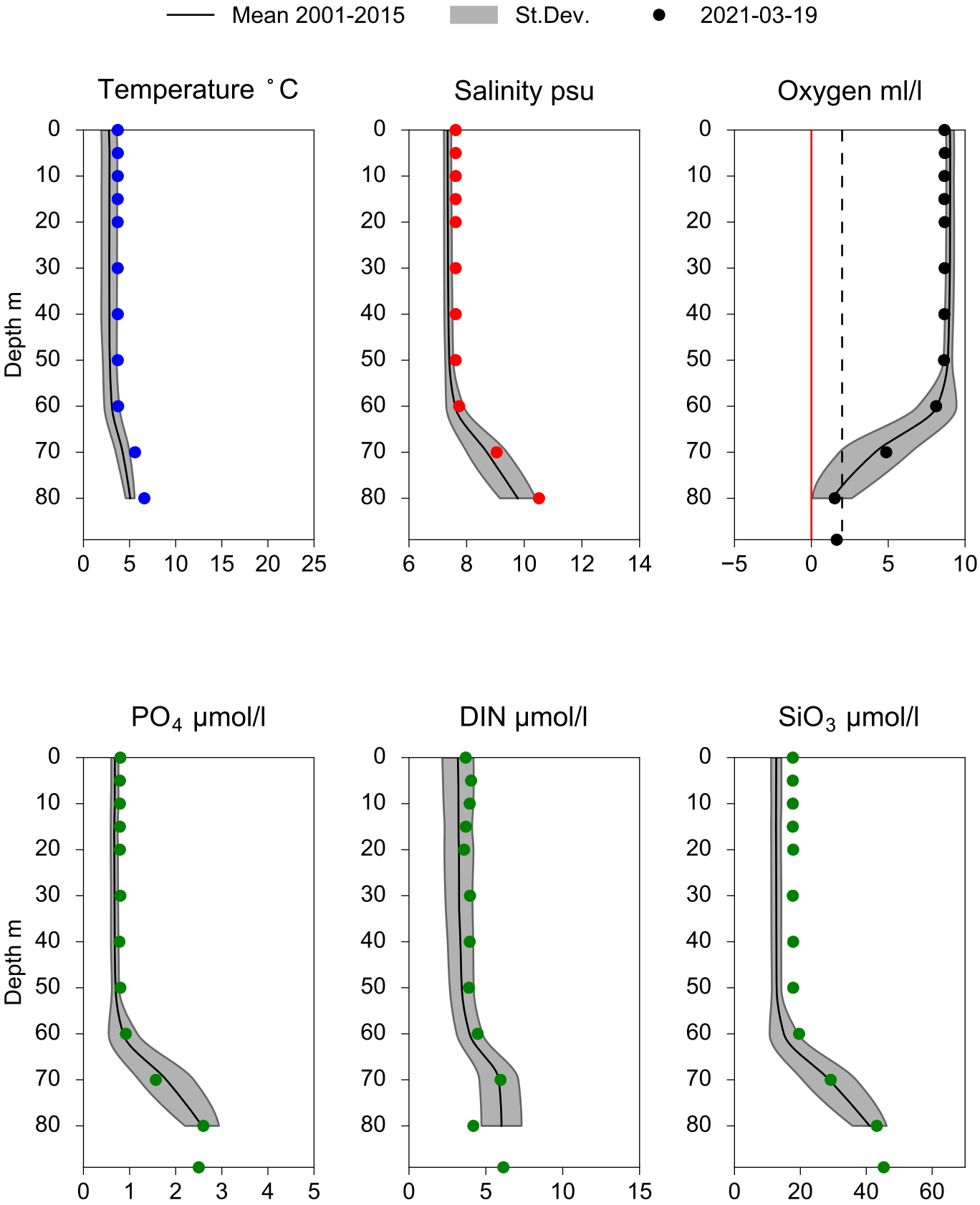
O_2 ml/l



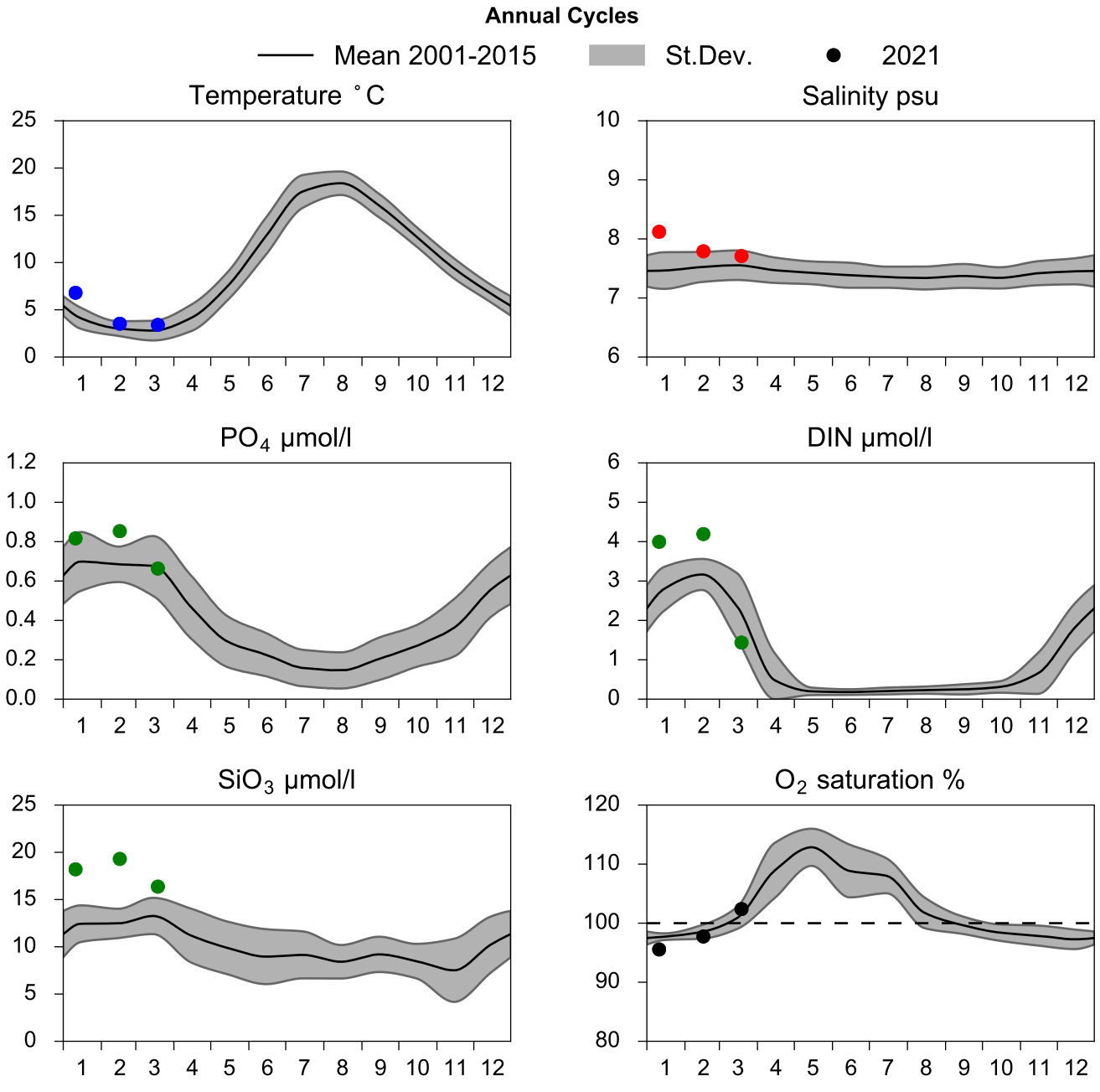
O_2 ml/l



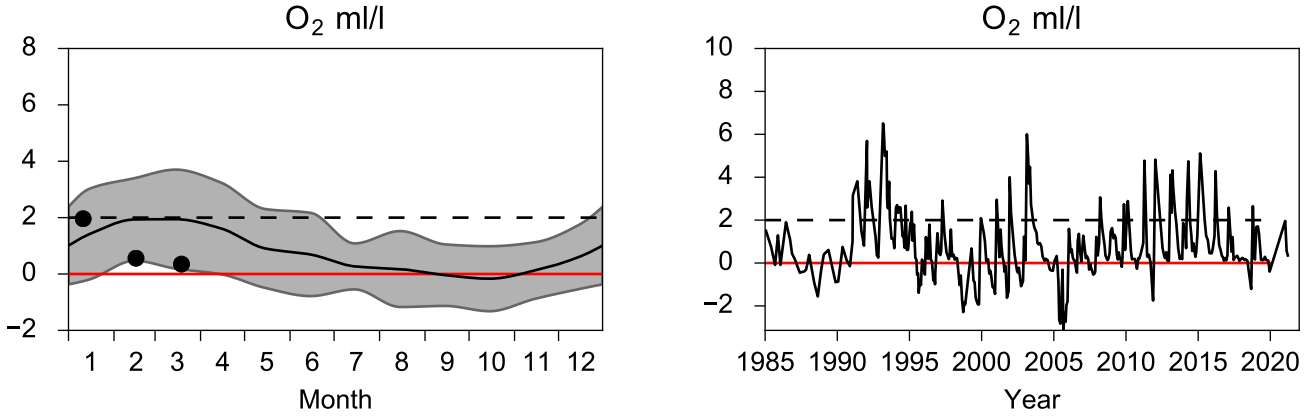
Vertical profiles BCS III-10
March



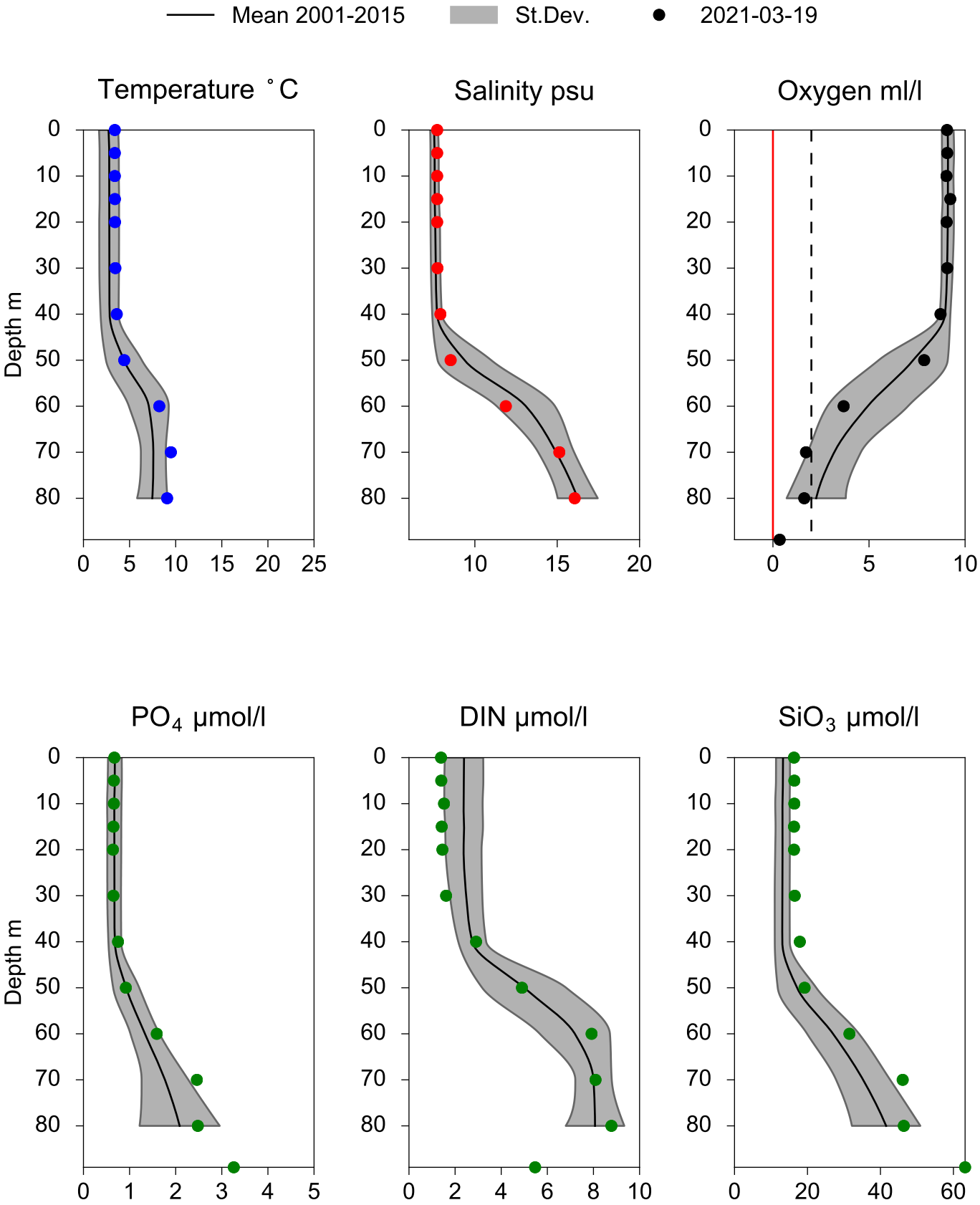
STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)



OXYGEN IN BOTTOM WATER (depth >= 80 m)

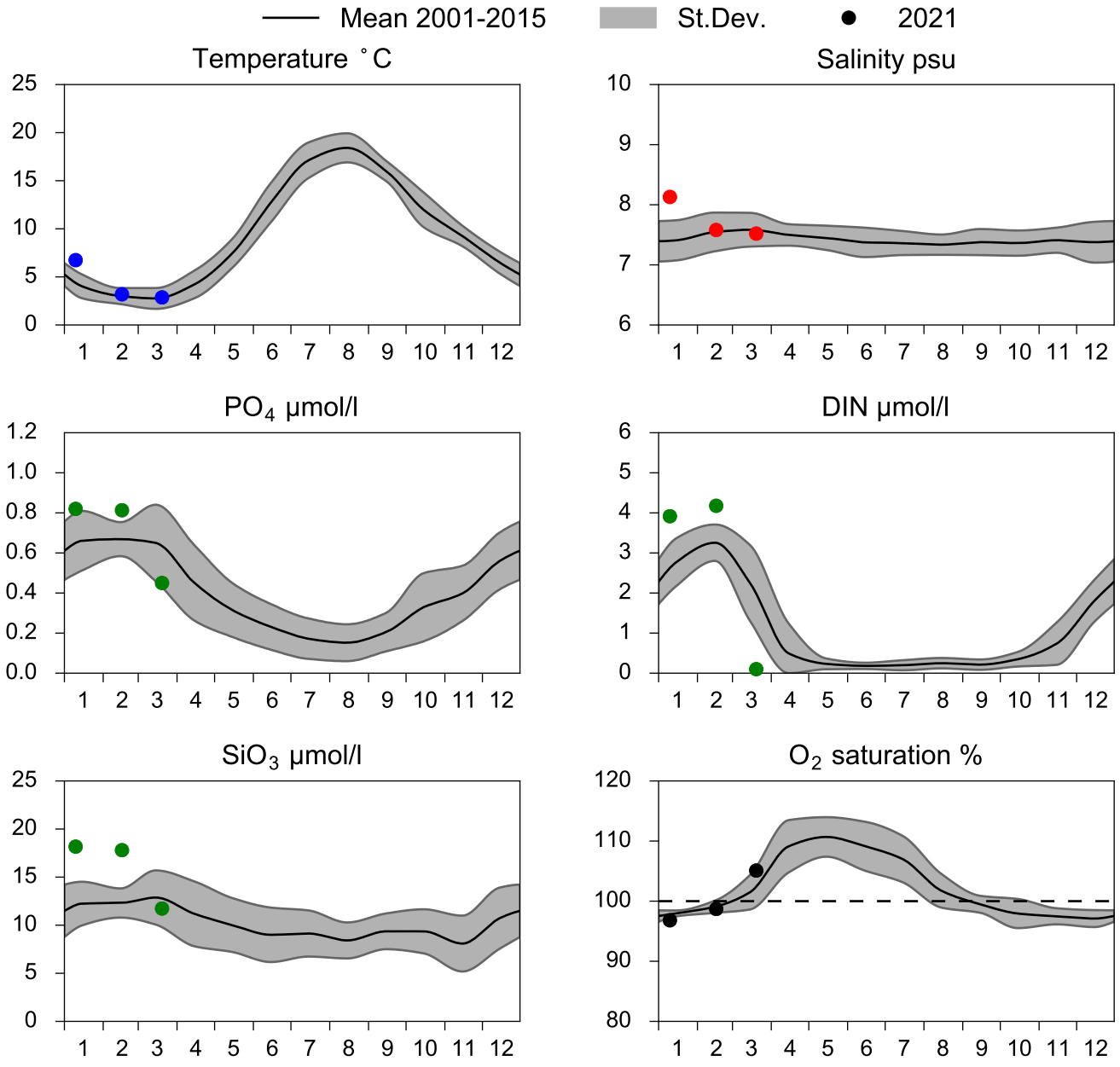


Vertical profiles BY5 BORNHOLMSDJ
March

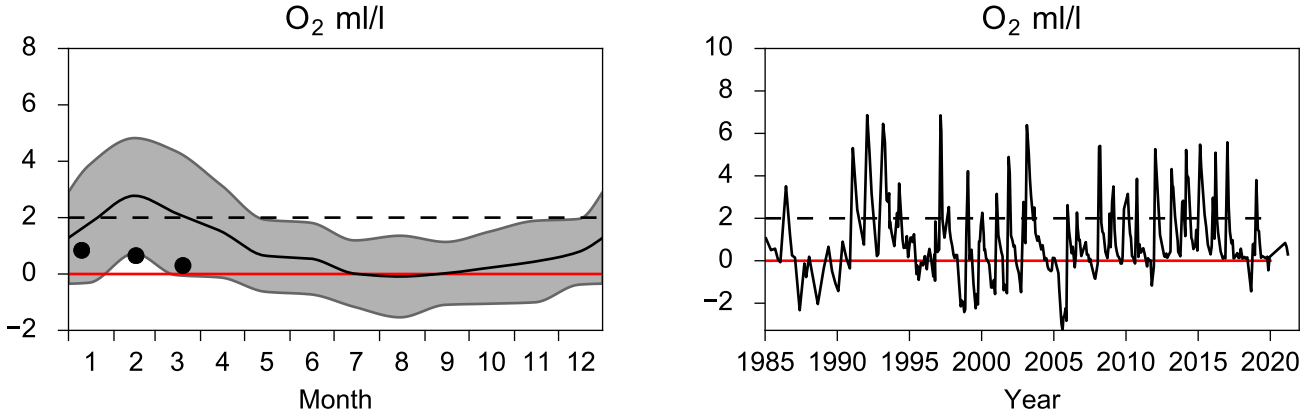


STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

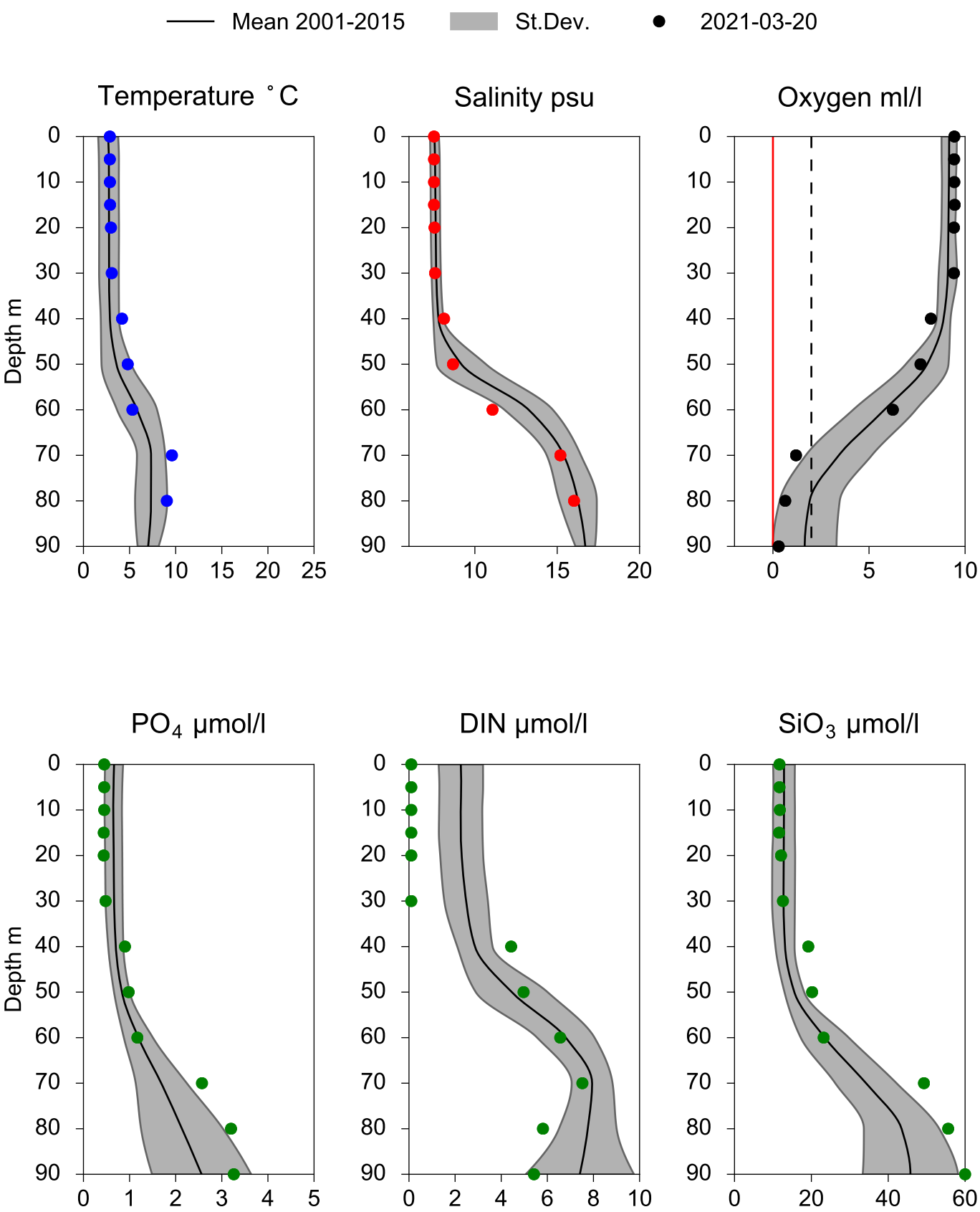
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 80 m)

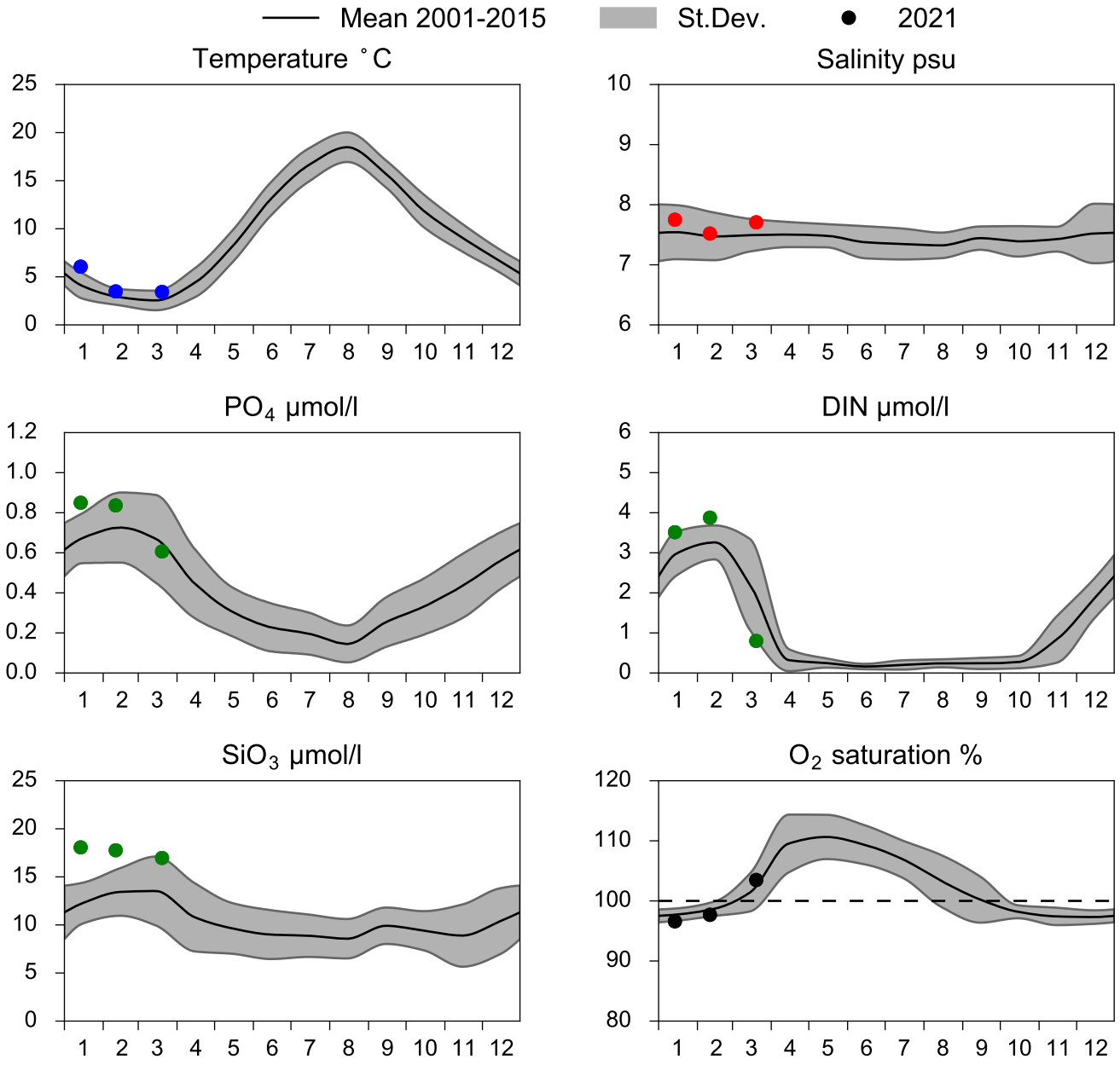


Vertical profiles BY4 CHRISTIANSÖ
March

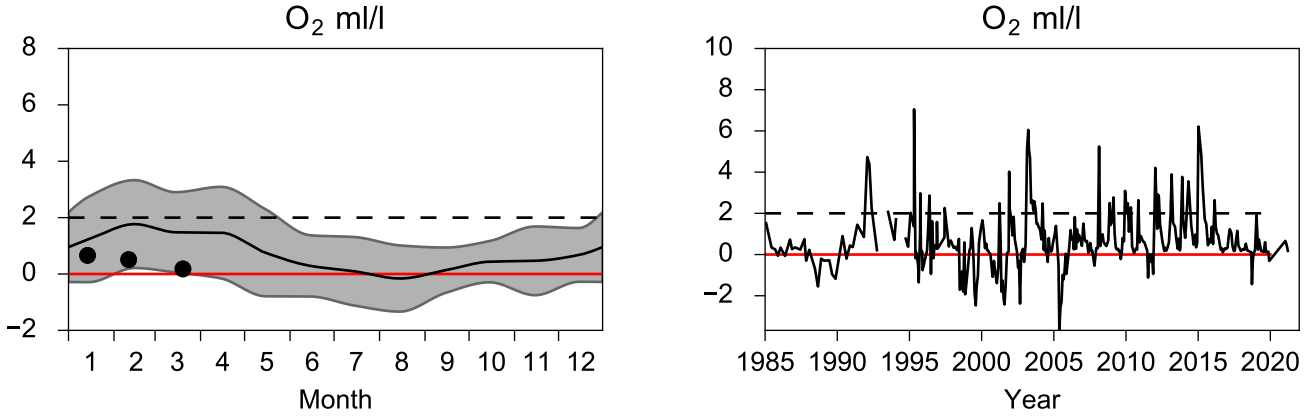


STATION HANÖBUKTEN SURFACE WATER (0-10 m)

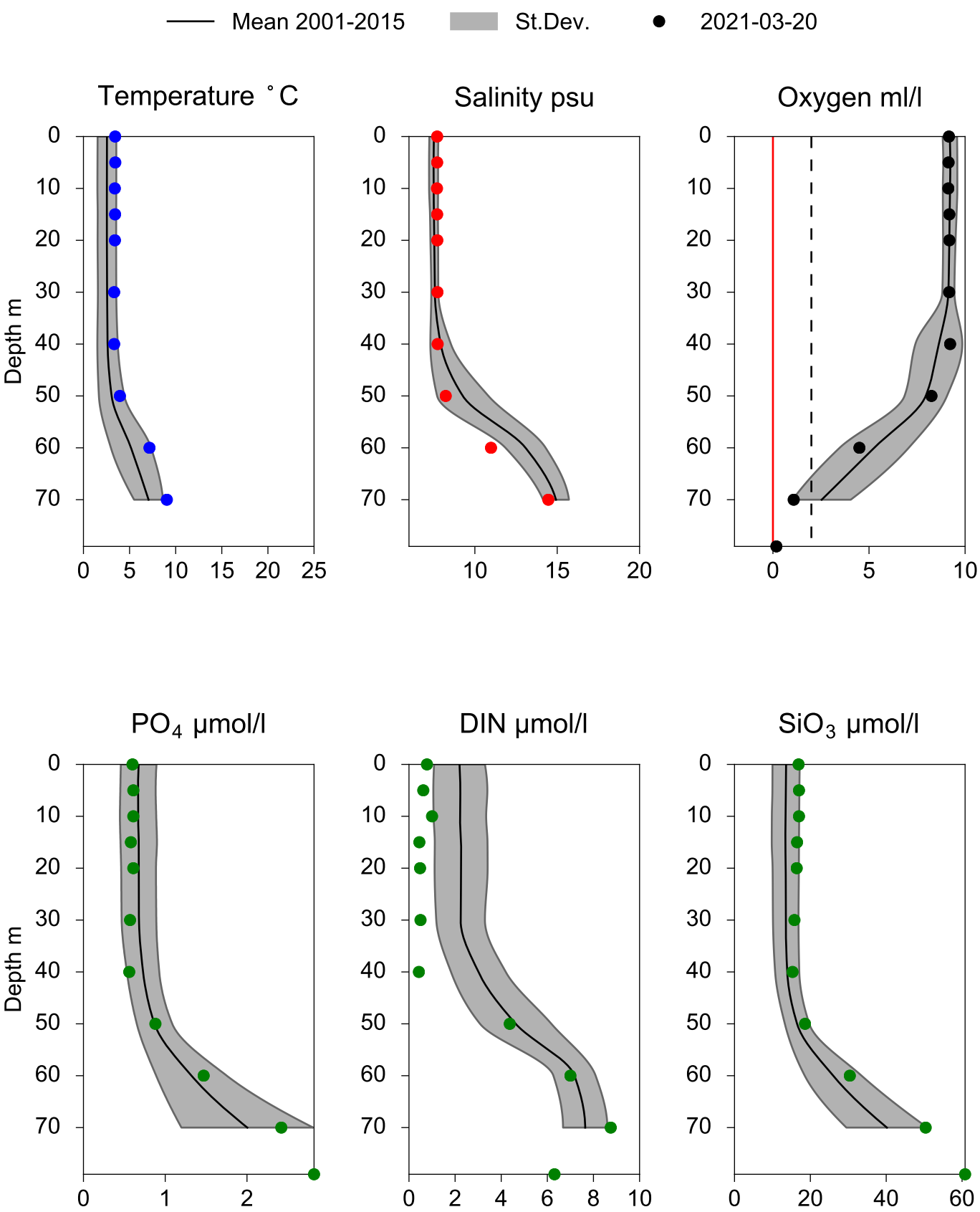
Annual Cycles



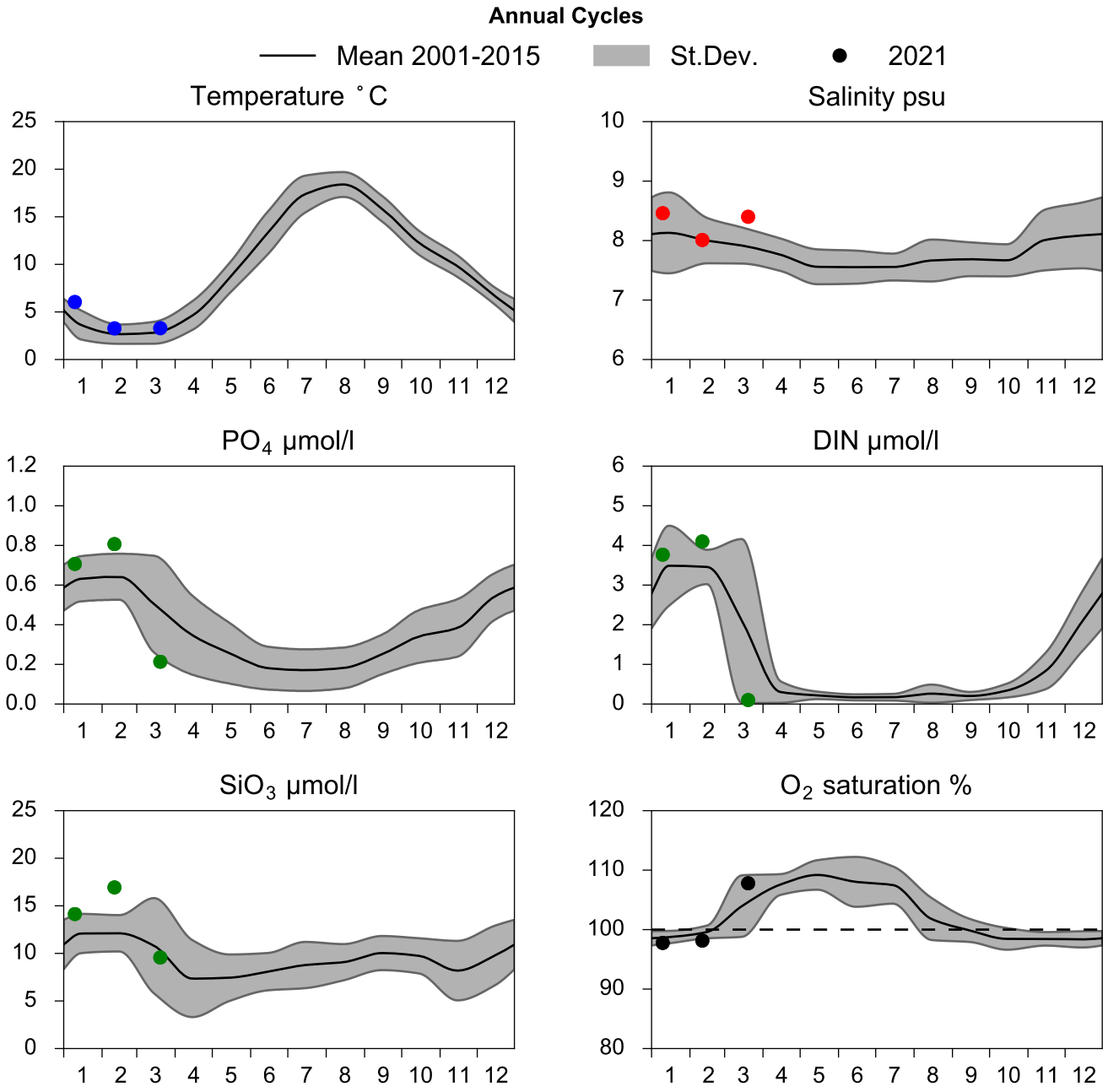
OXYGEN IN BOTTOM WATER (depth >= 70 m)



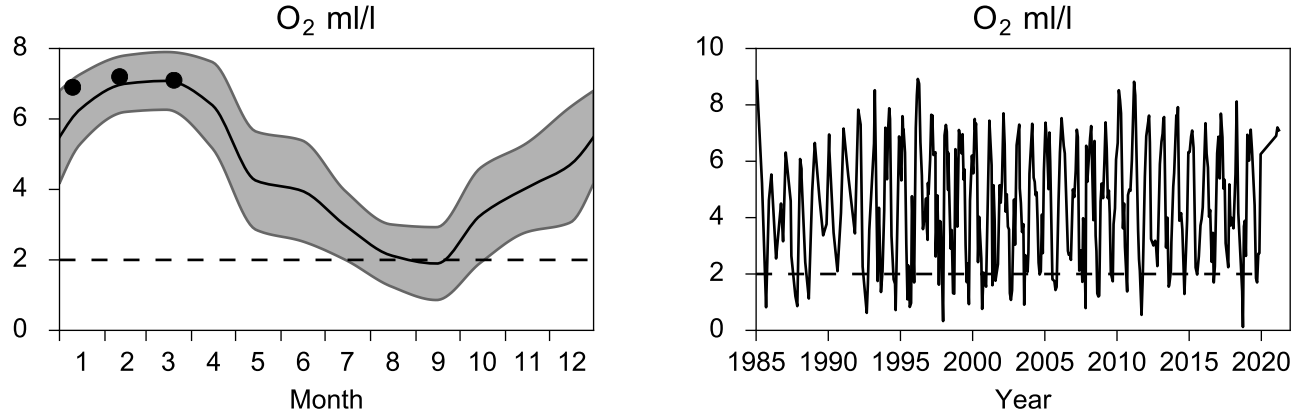
Vertical profiles HANÖBUKTEN
March



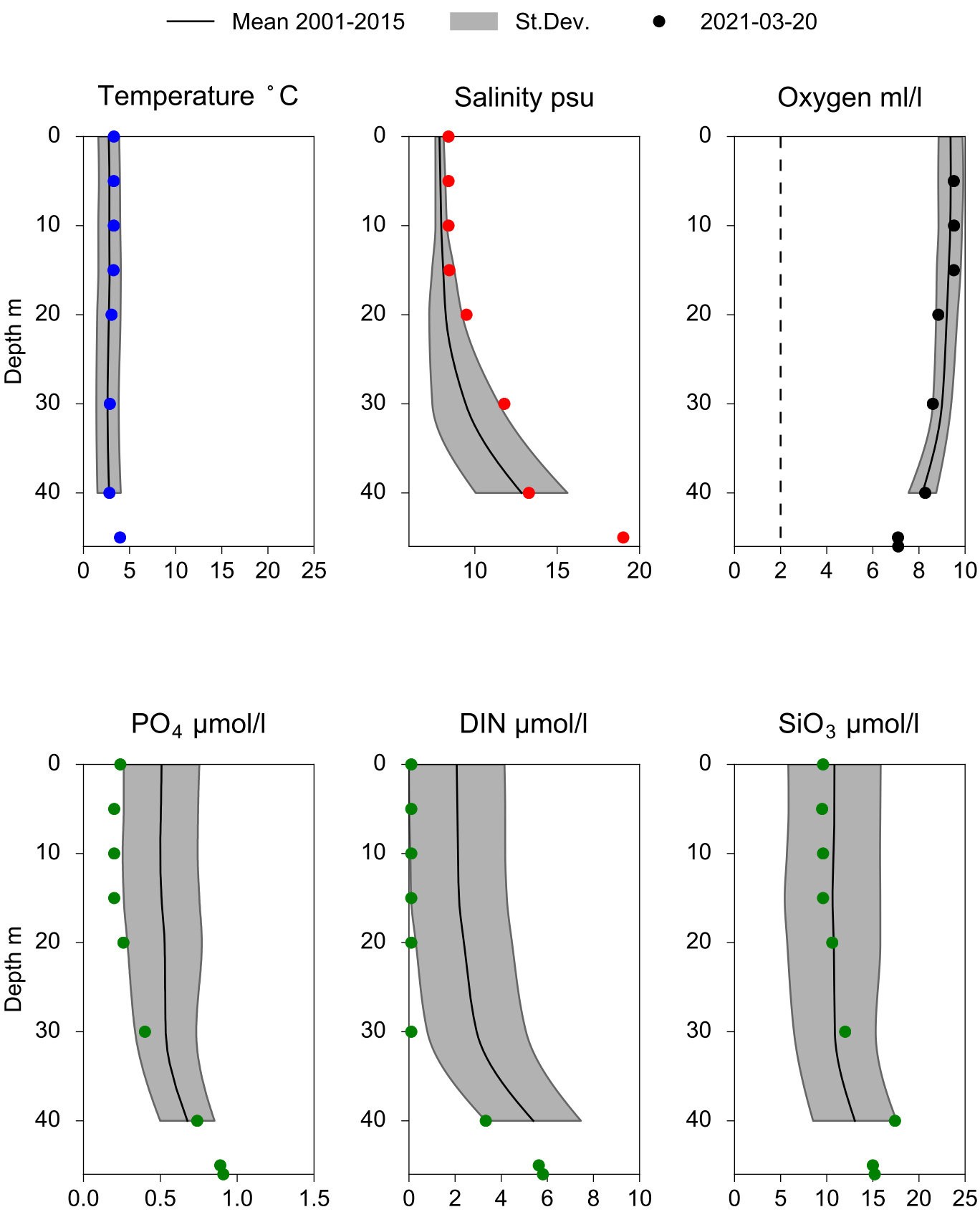
STATION BY2 ARKONA SURFACE WATER (0-10 m)



OXYGEN IN BOTTOM WATER (depth >= 40 m)

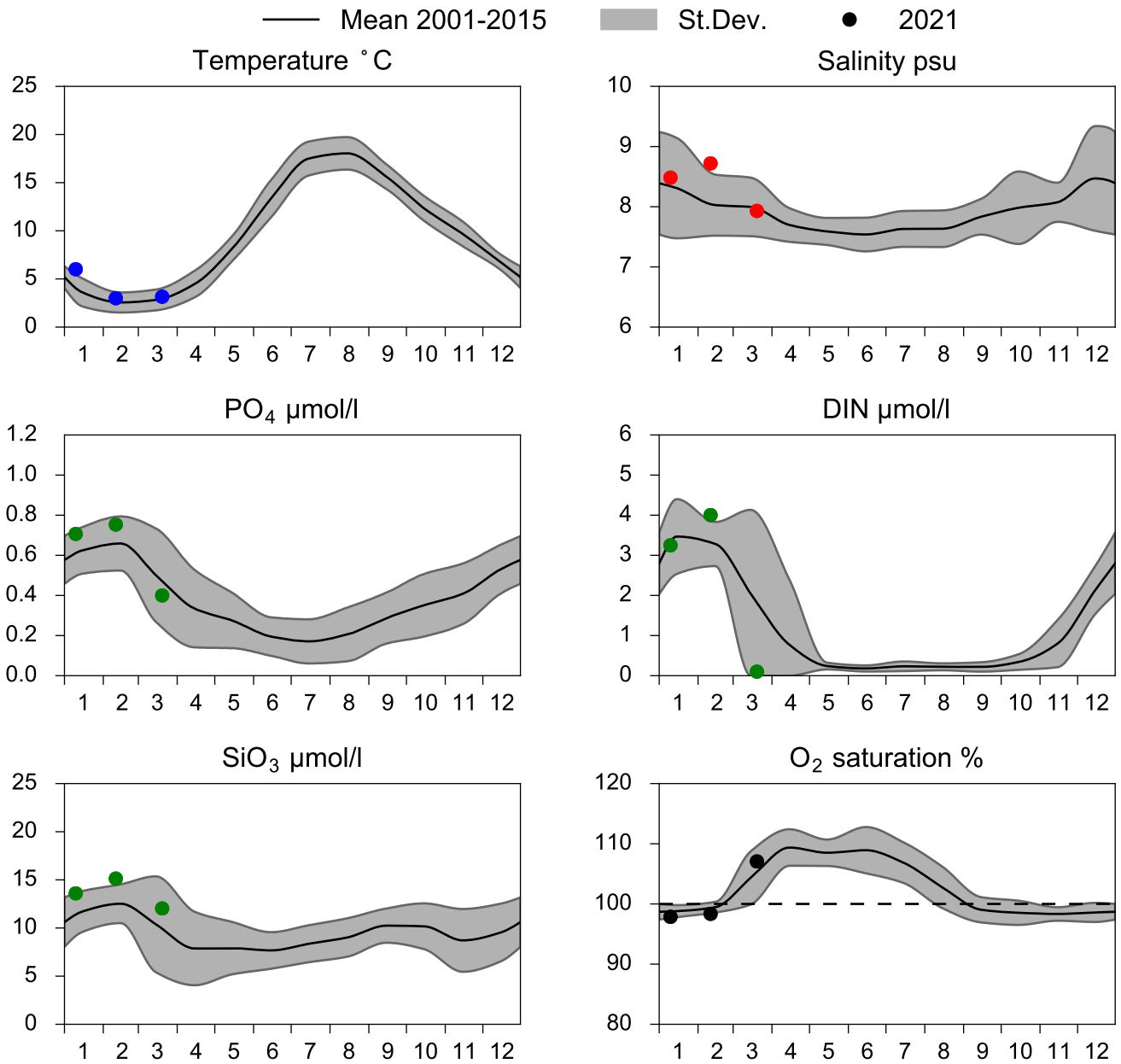


Vertical profiles BY2 ARKONA
March

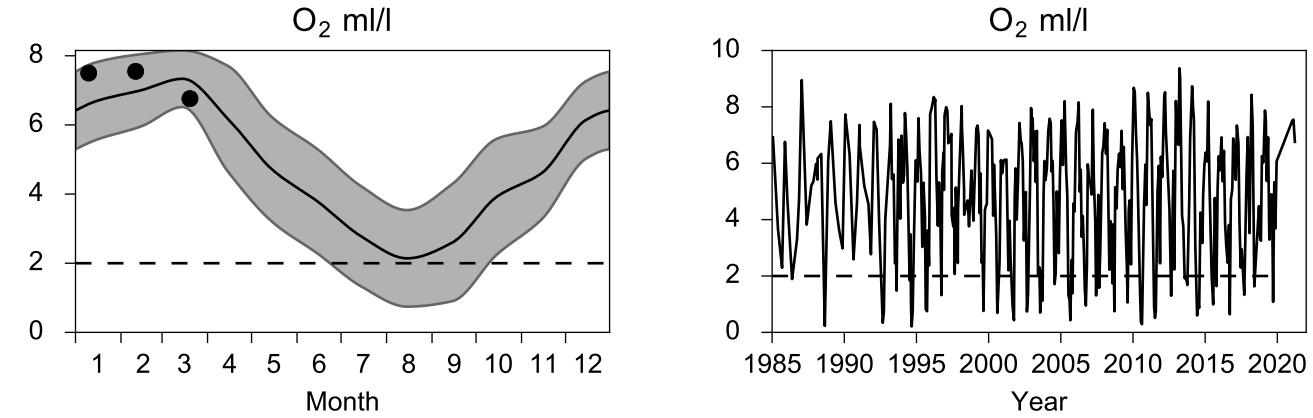


STATION BY1 SURFACE WATER (0-10 m)

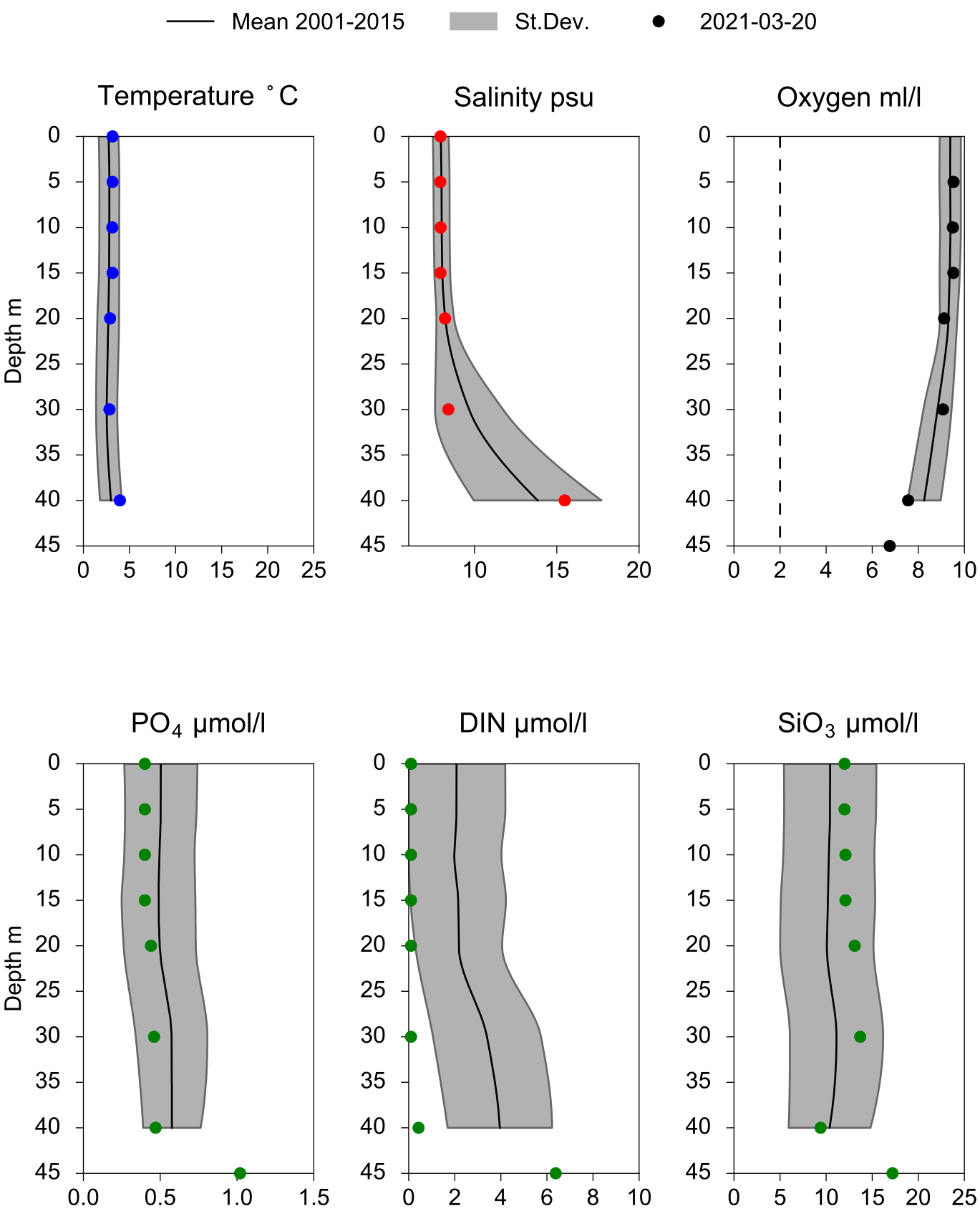
Annual Cycles



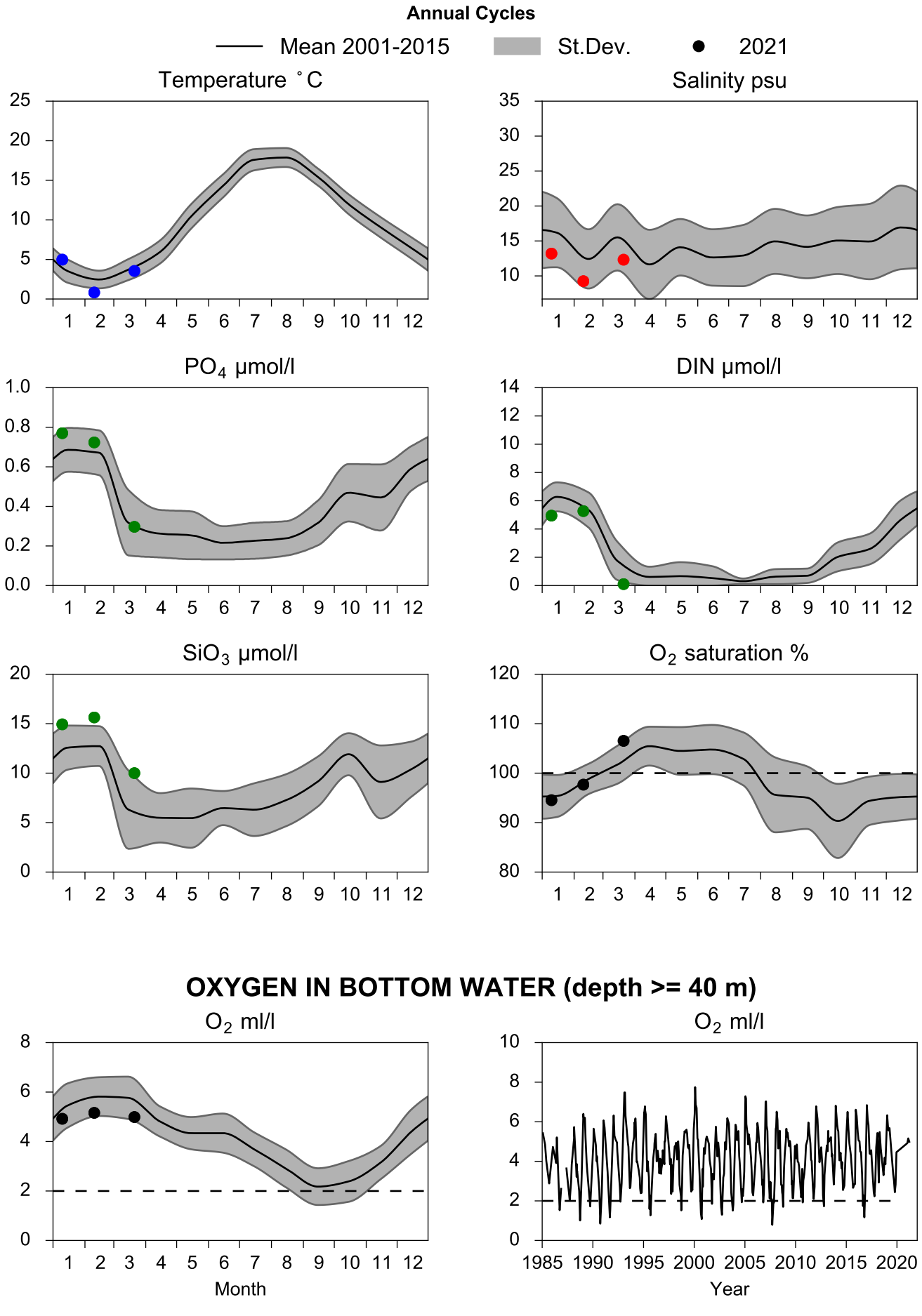
OXYGEN IN BOTTOM WATER (depth >= 40 m)



Vertical profiles BY1
March

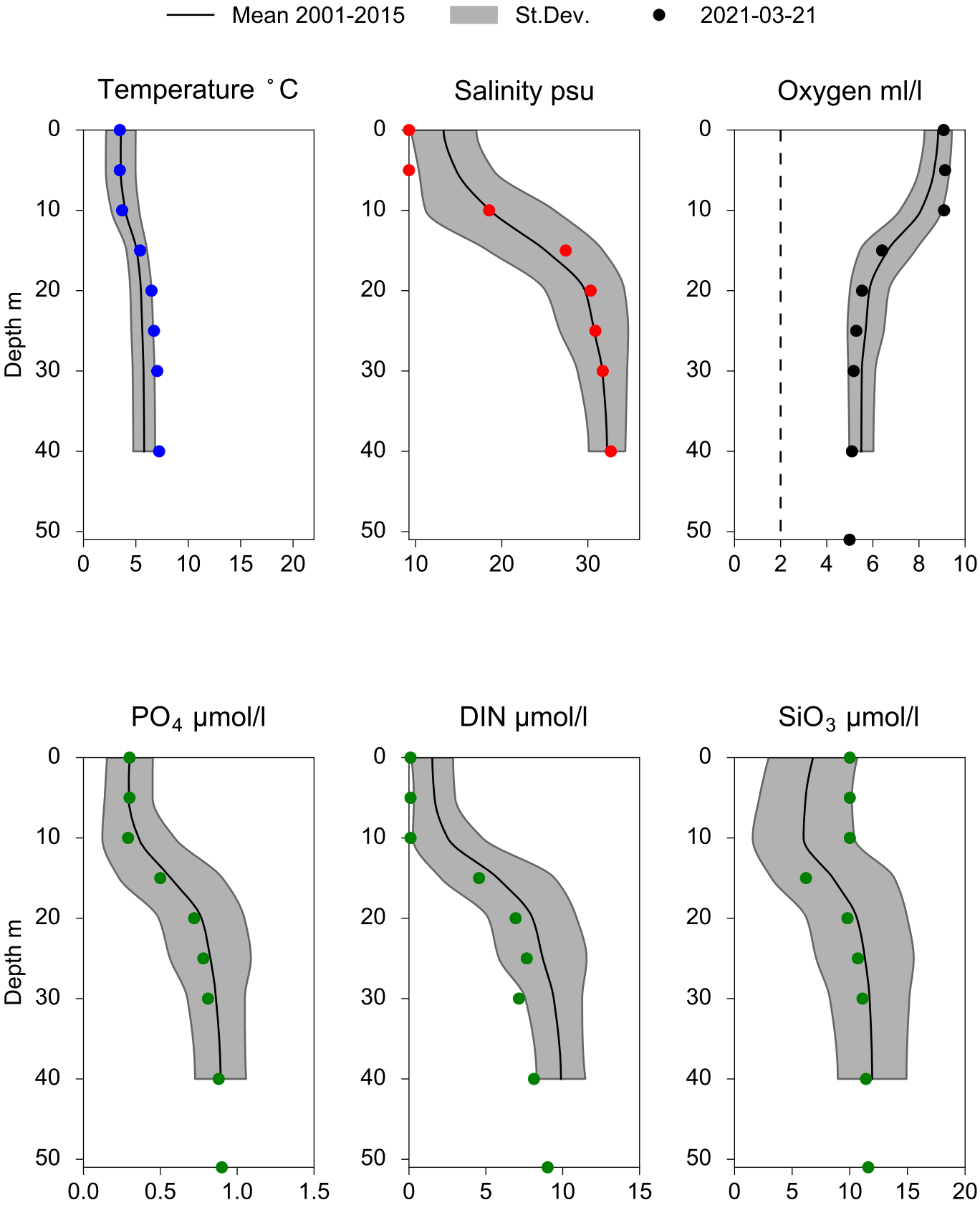


STATION W LANDSKRONA SURFACE WATER (0-10 m)



OXYGEN IN BOTTOM WATER (depth >= 40 m)

Vertical profiles W LANDSKRONA
March

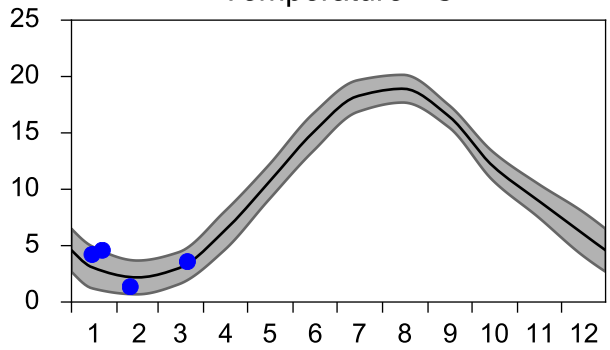


STATION ANHOLT E SURFACE WATER (0-10 m)

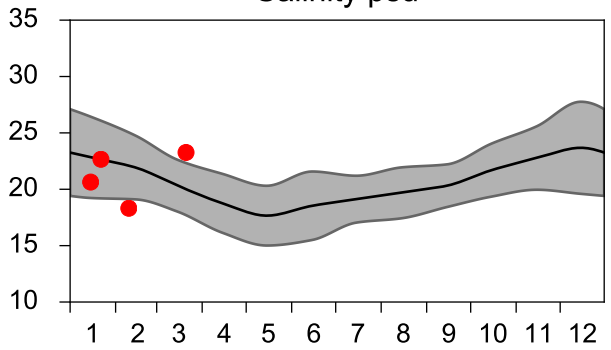
Annual Cycles

Mean 2001-2015 St.Dev. 2021

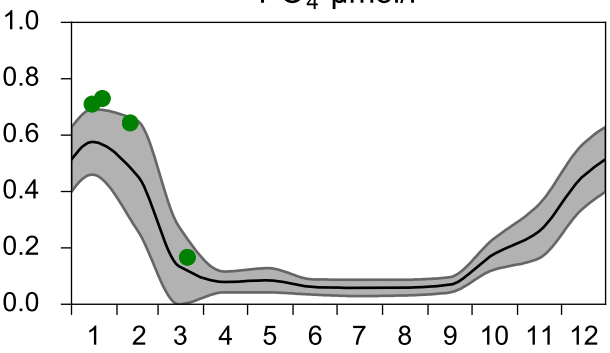
Temperature ˚C



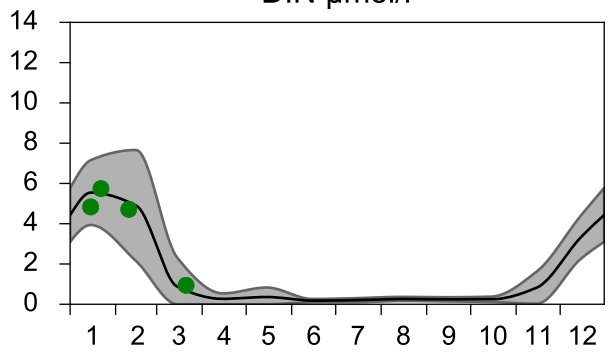
Salinity psu



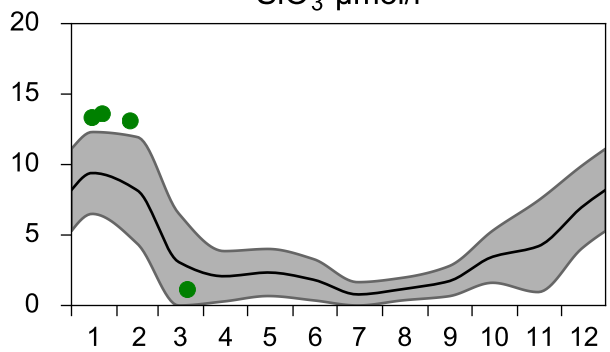
PO_4 µmol/l



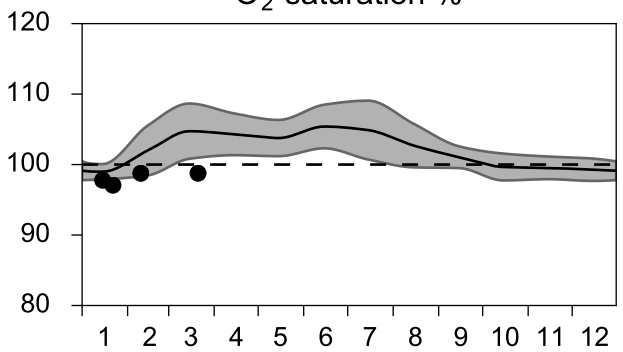
DIN µmol/l



SiO_3 µmol/l

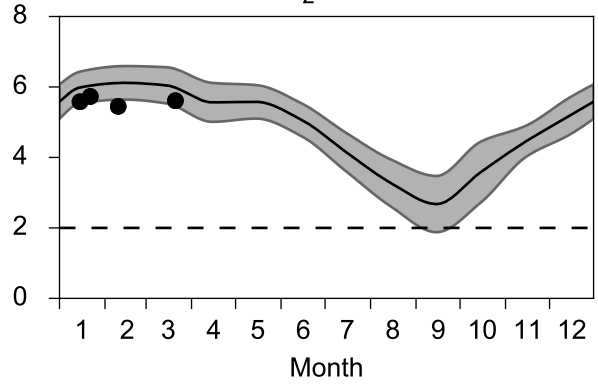


O_2 saturation %

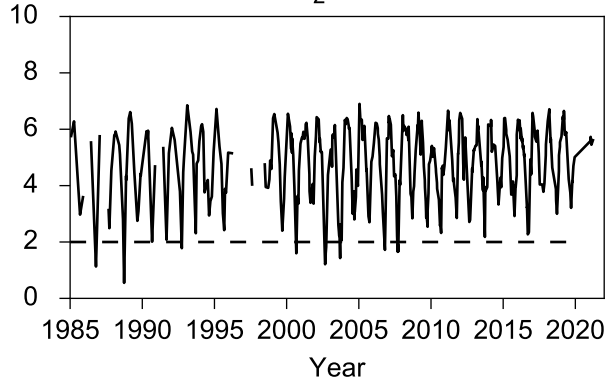


OXYGEN IN BOTTOM WATER (depth >= 52 m)

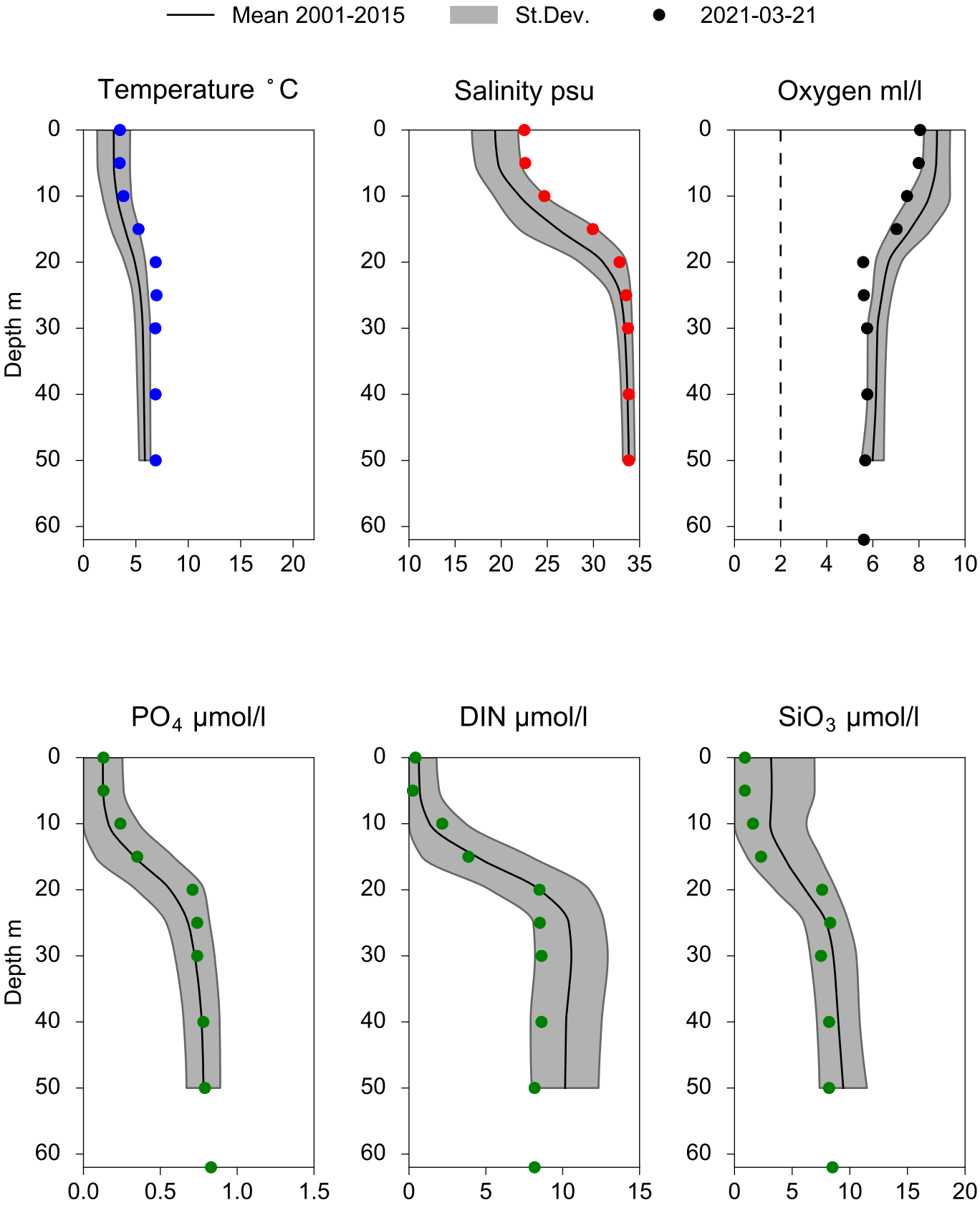
O_2 ml/l



O_2 ml/l



Vertical profiles ANHOLT E
March

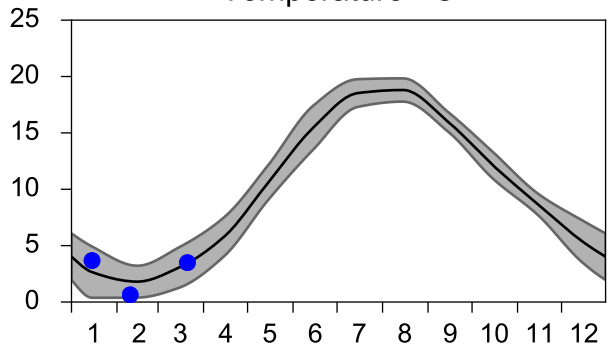


STATION N14 FALKENBERG SURFACE WATER (0-10 m)

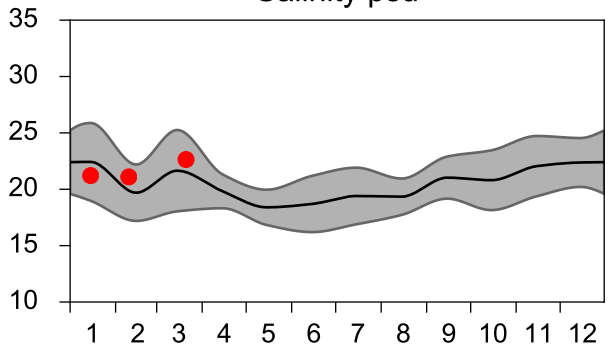
Annual Cycles

Mean 2001-2015 St.Dev. 2021

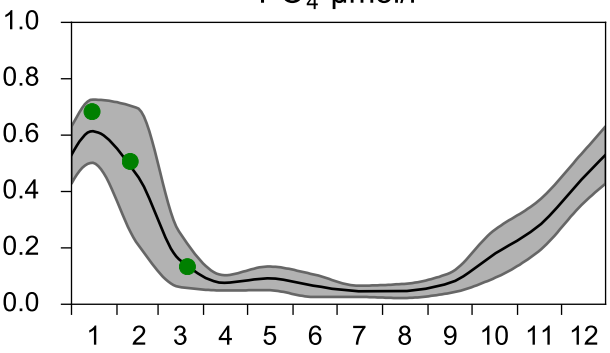
Temperature ˚C



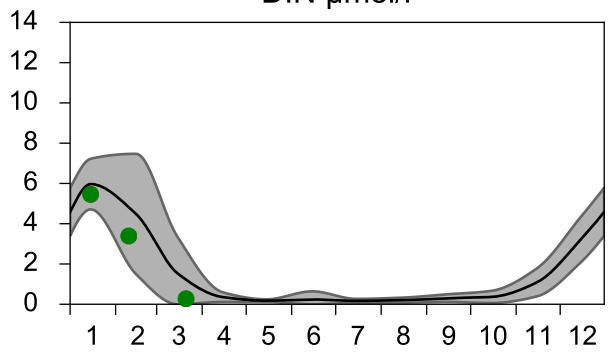
Salinity psu



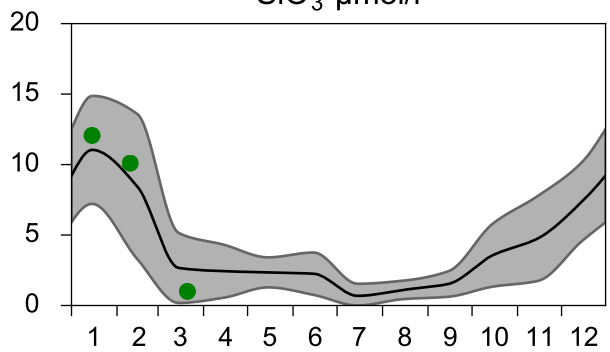
PO_4 µmol/l



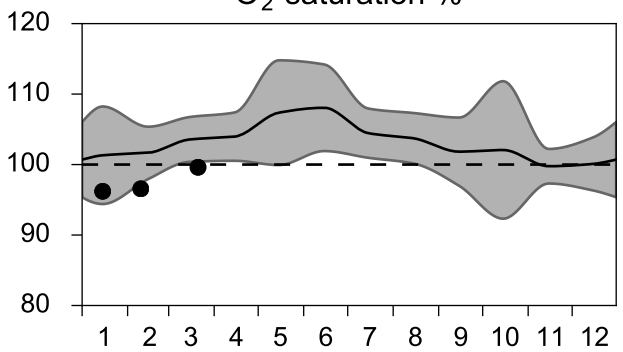
DIN µmol/l



SiO_3 µmol/l

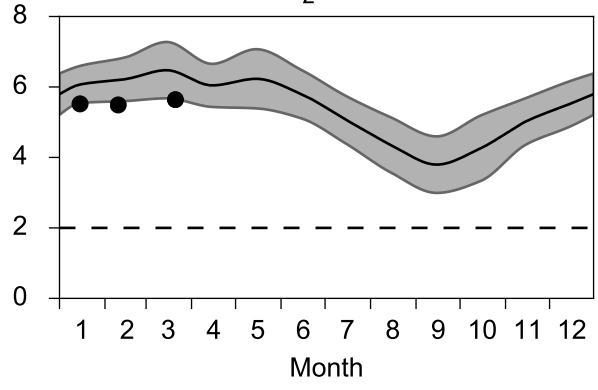


O_2 saturation %

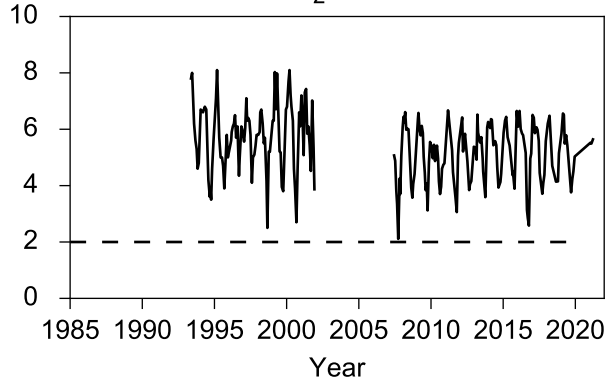


OXYGEN IN BOTTOM WATER (depth >= 20 m)

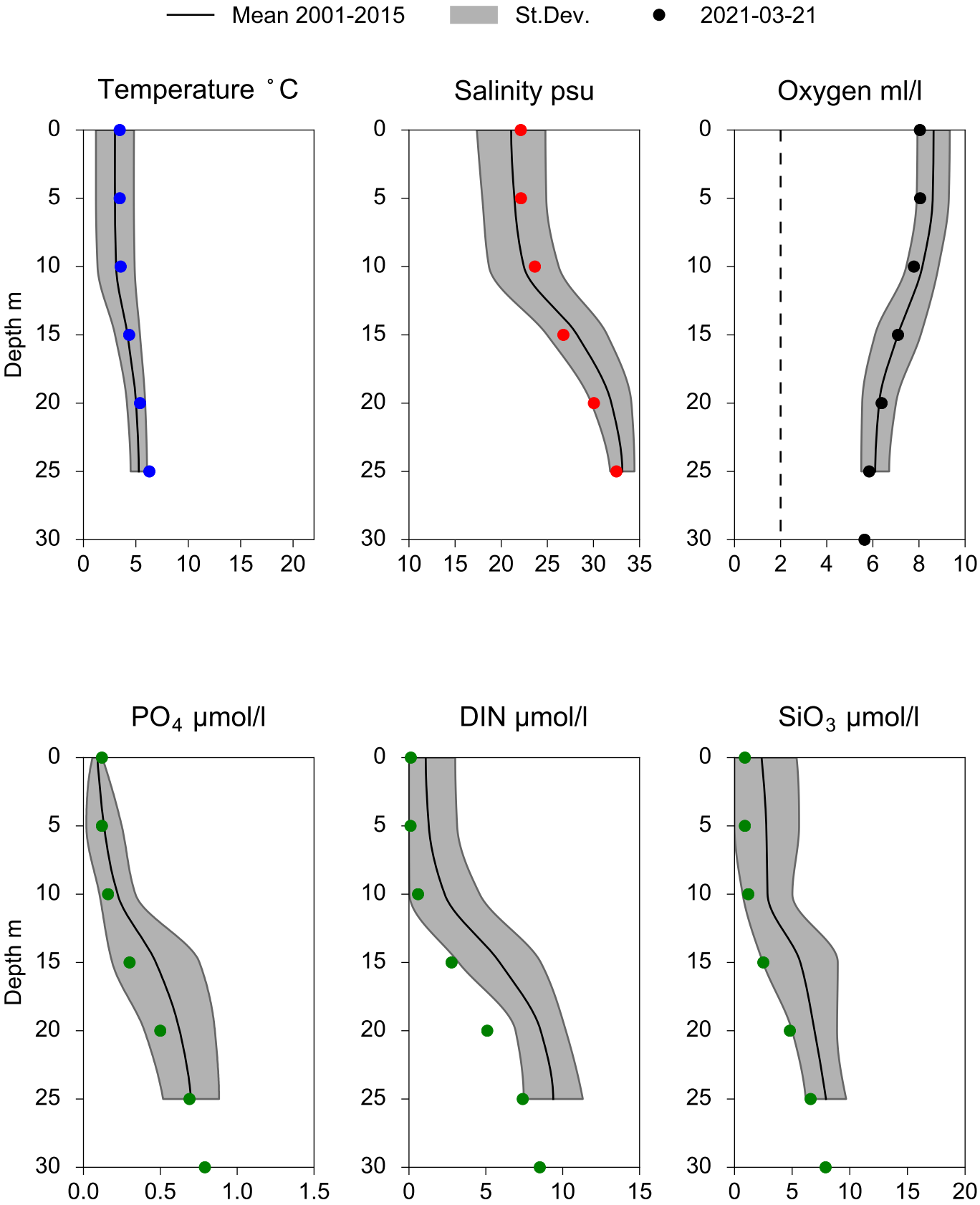
O_2 ml/l



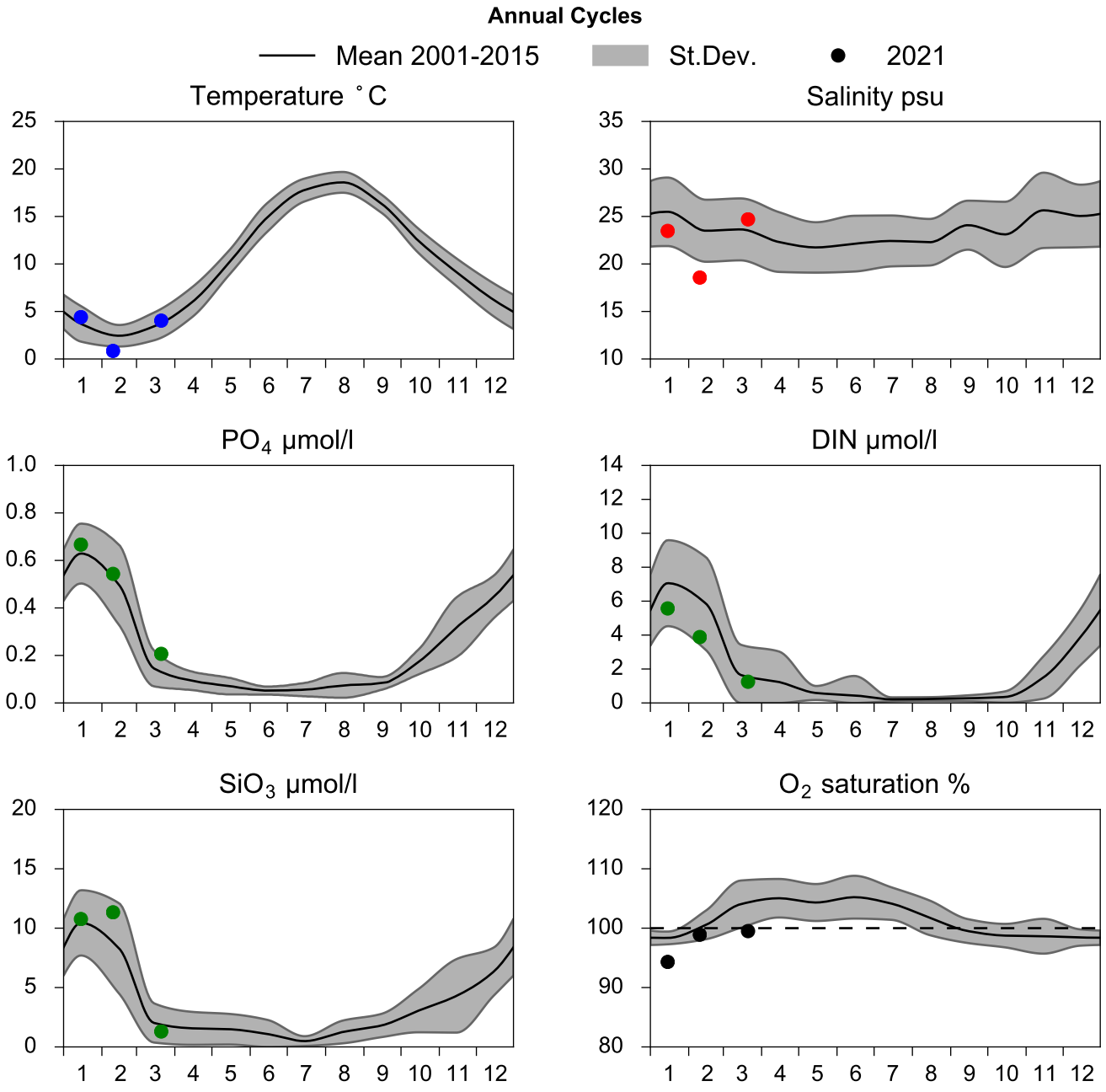
O_2 ml/l



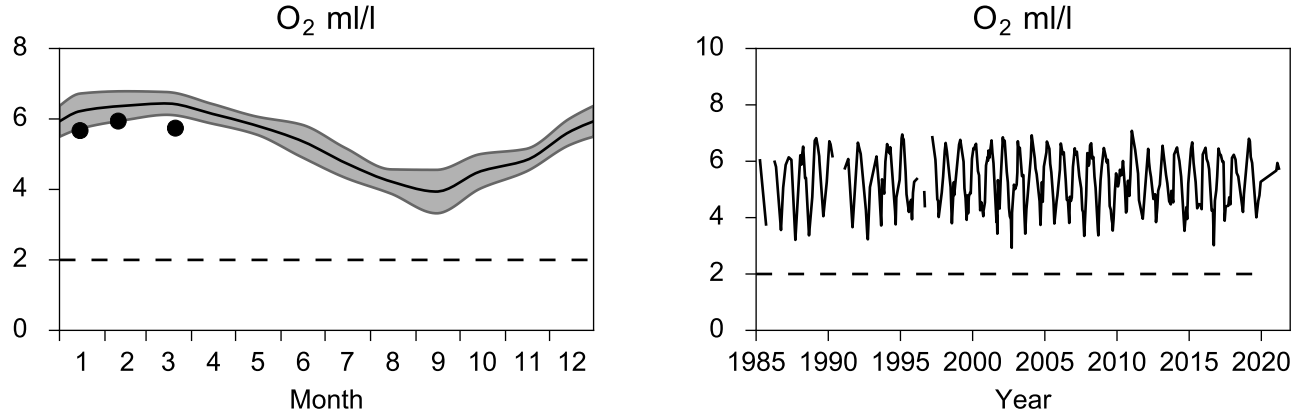
Vertical profiles N14 FALKENBERG
March



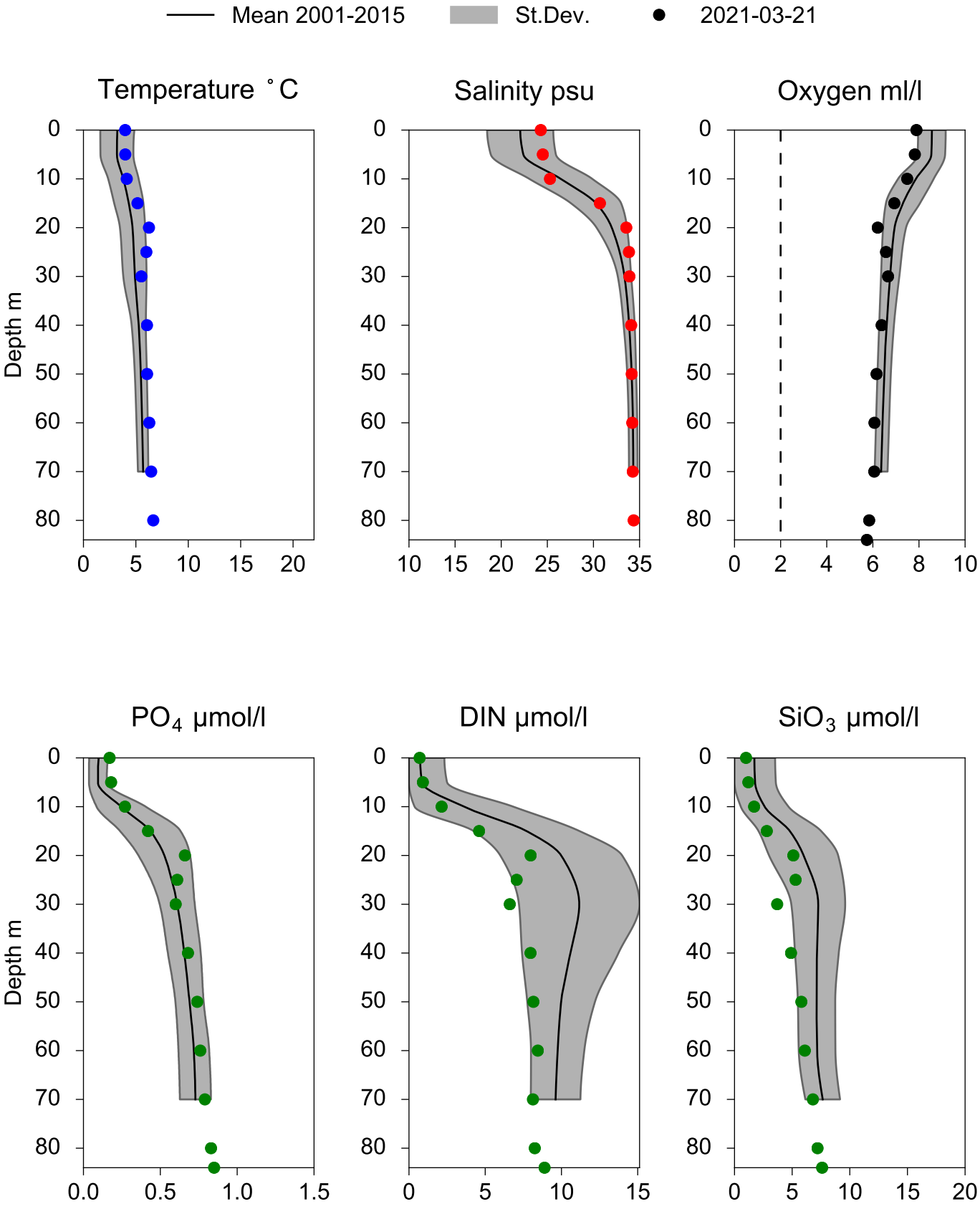
STATION FLADEN SURFACE WATER (0-10 m)



OXYGEN IN BOTTOM WATER (depth >= 74 m)

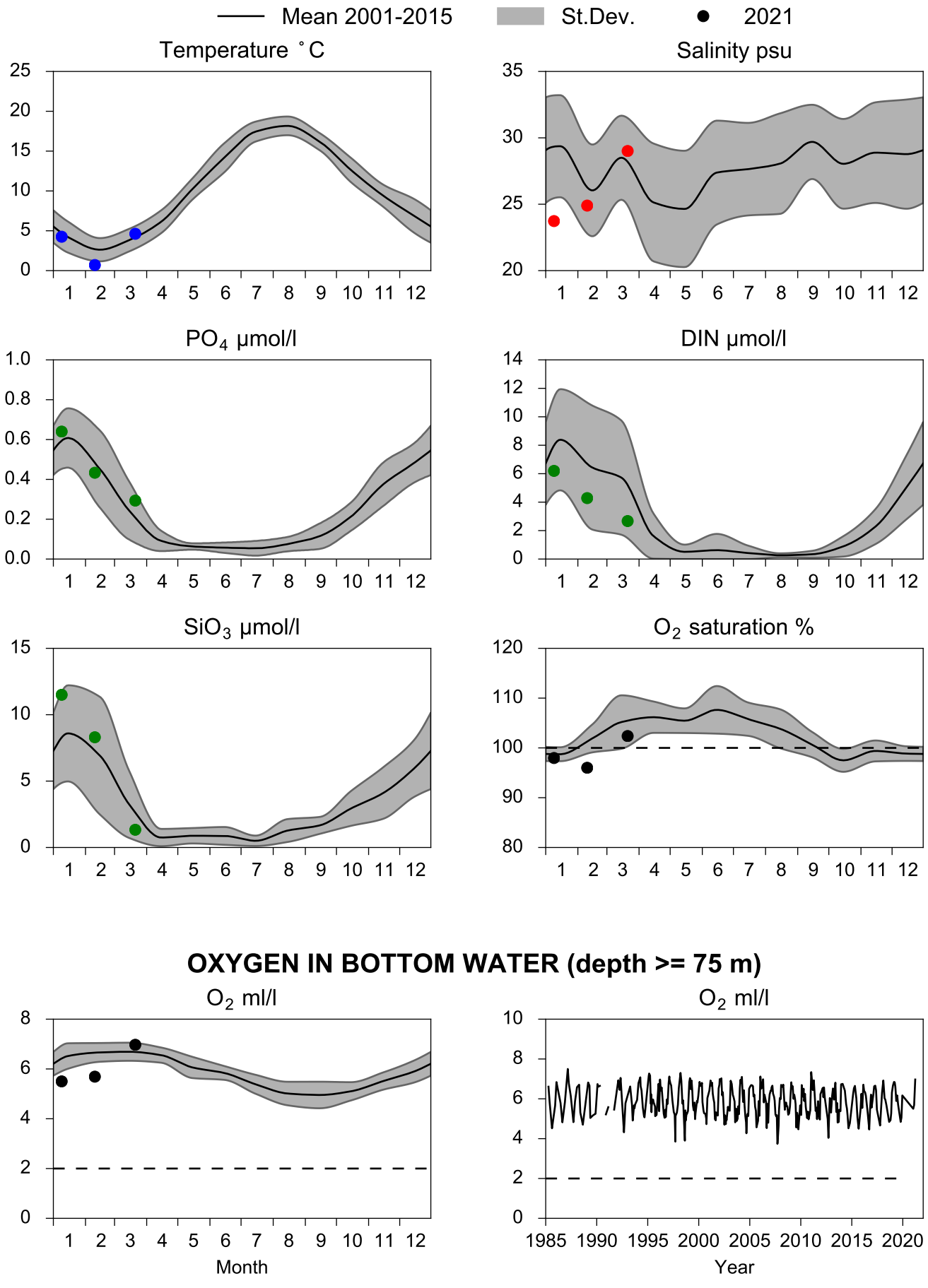


Vertical profiles FLADEN
March



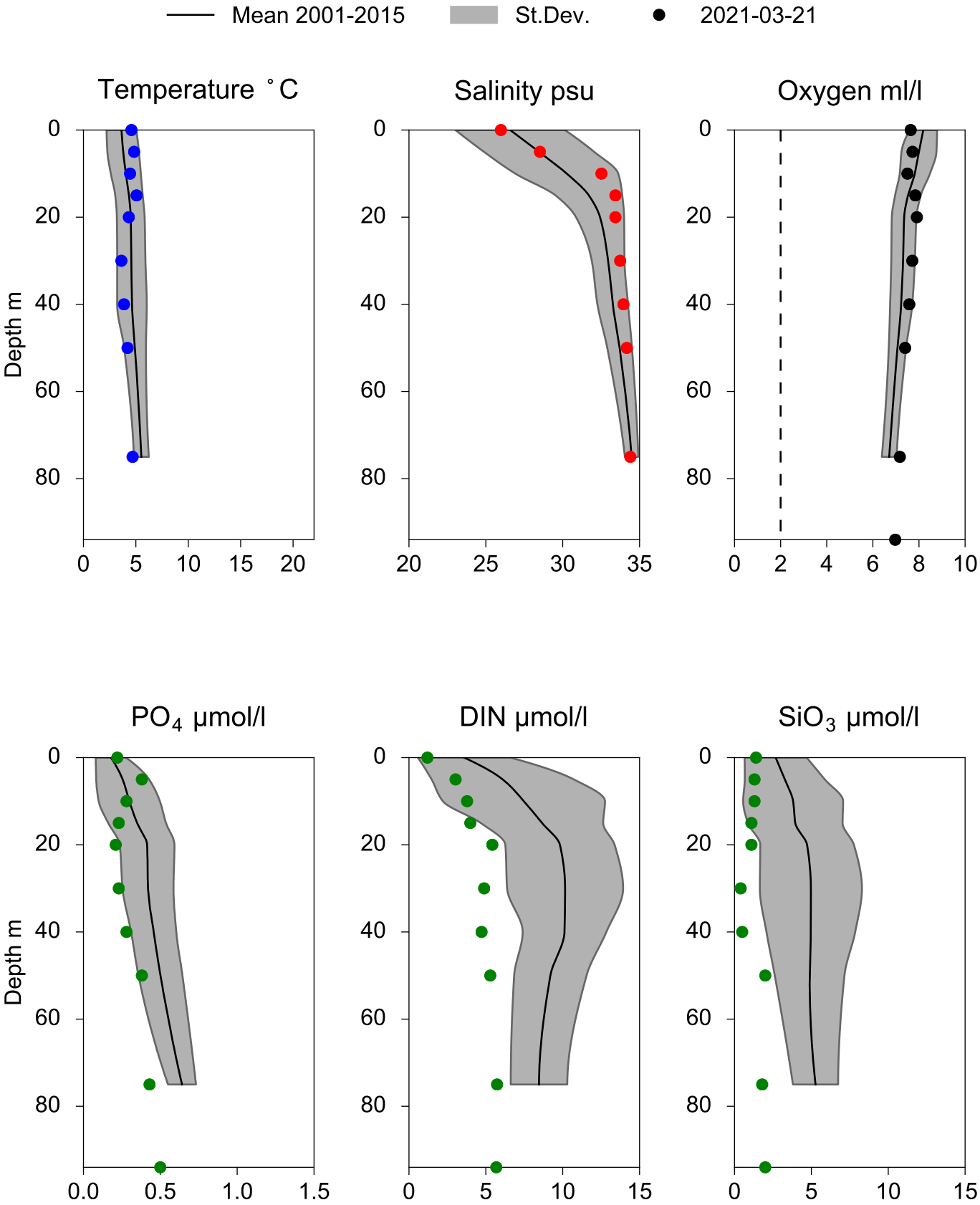
STATION P2 SURFACE WATER (0-10 m)

Annual Cycles



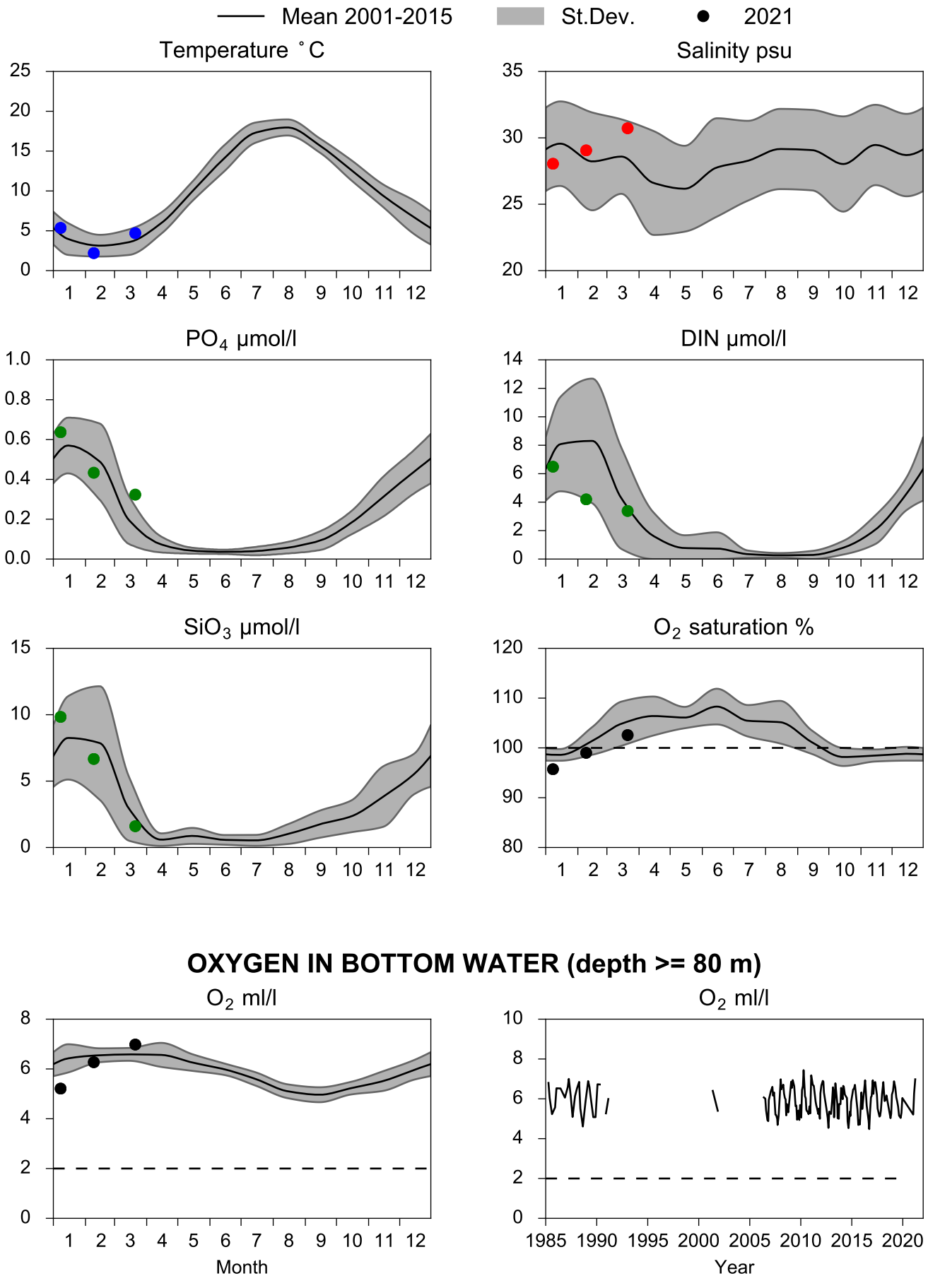
OXYGEN IN BOTTOM WATER (depth >= 75 m)

Vertical profiles P2
March



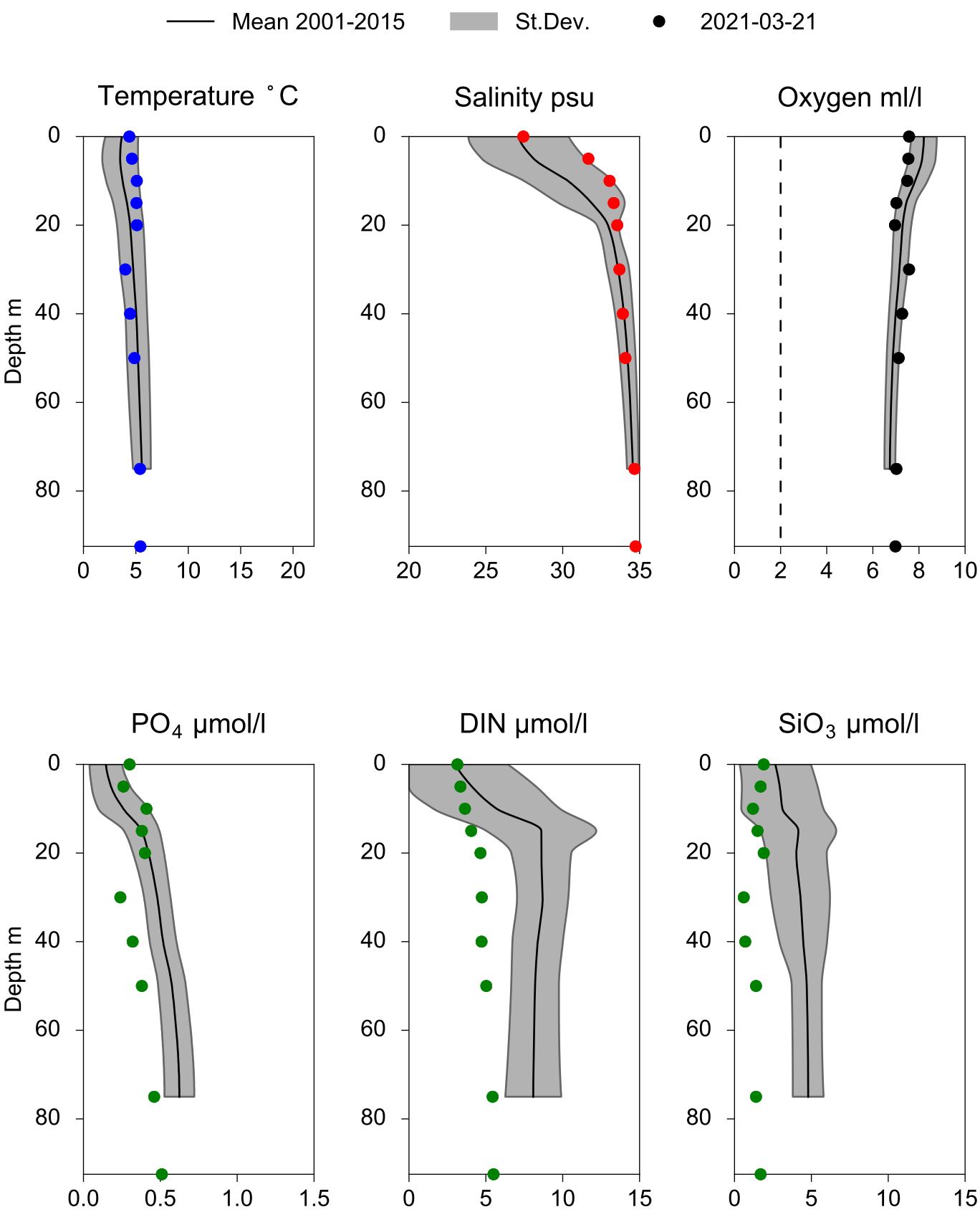
STATION Å13 SURFACE WATER (0-10 m)

Annual Cycles



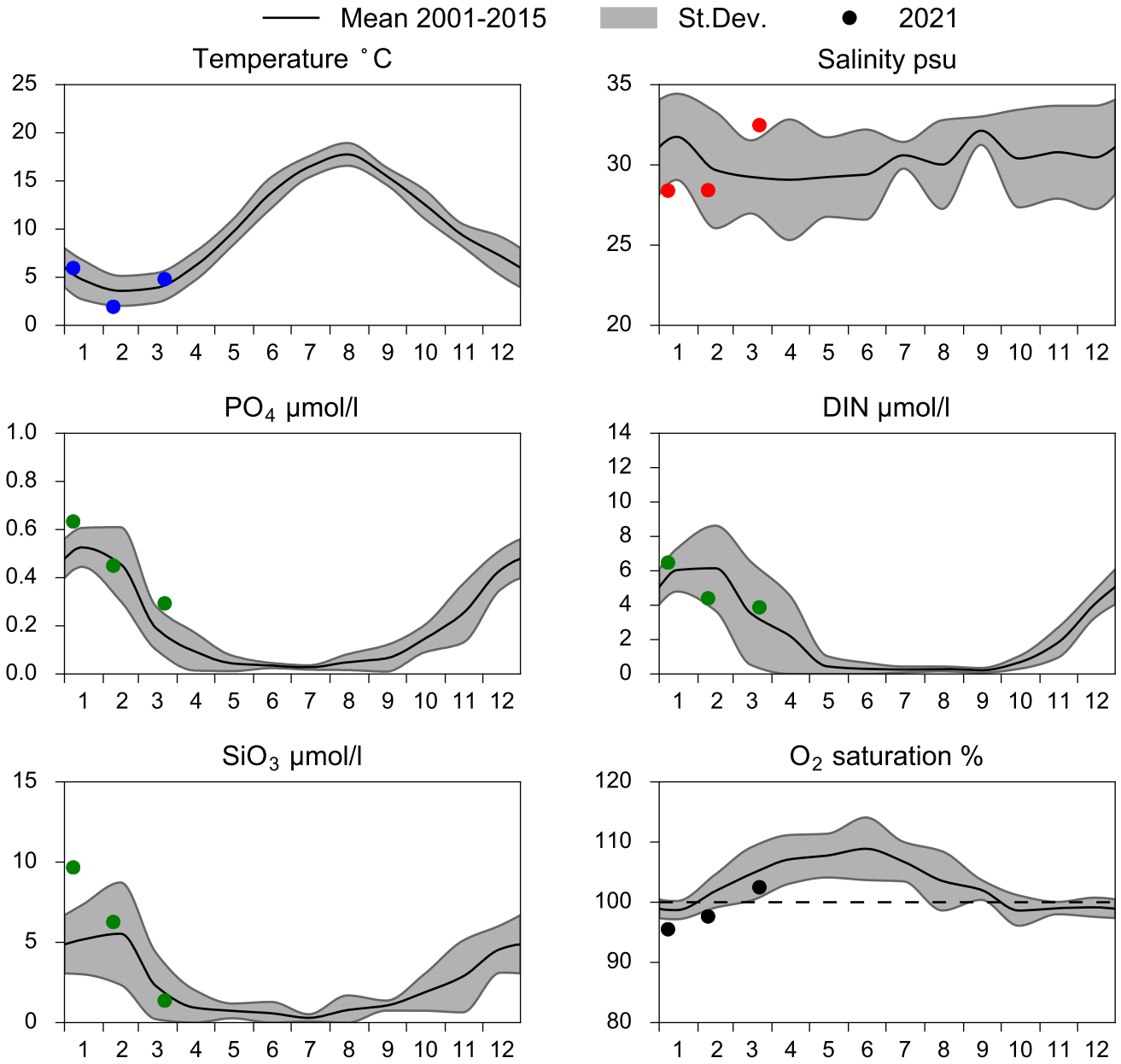
OXYGEN IN BOTTOM WATER (depth >= 80 m)

Vertical profiles Å13
March

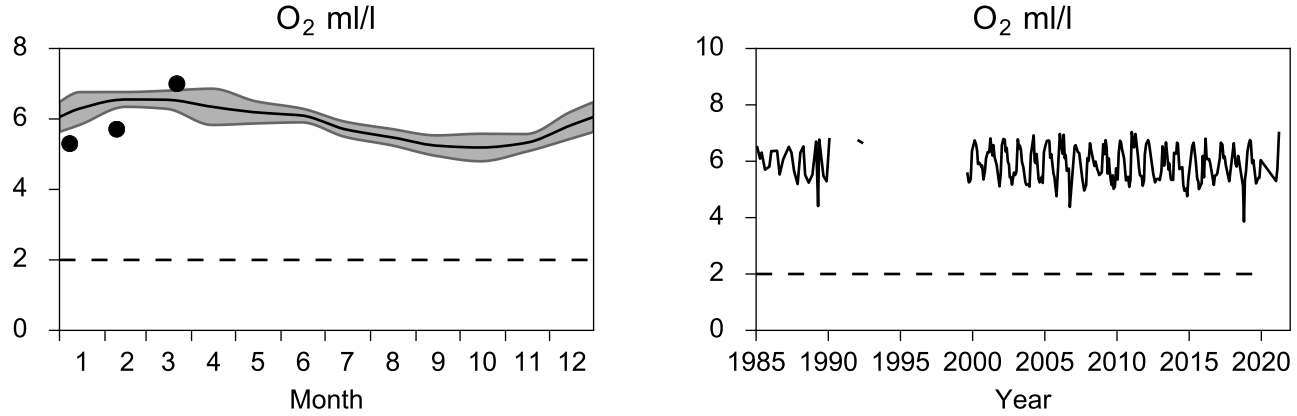


STATION Å15 SURFACE WATER (0-10 m)

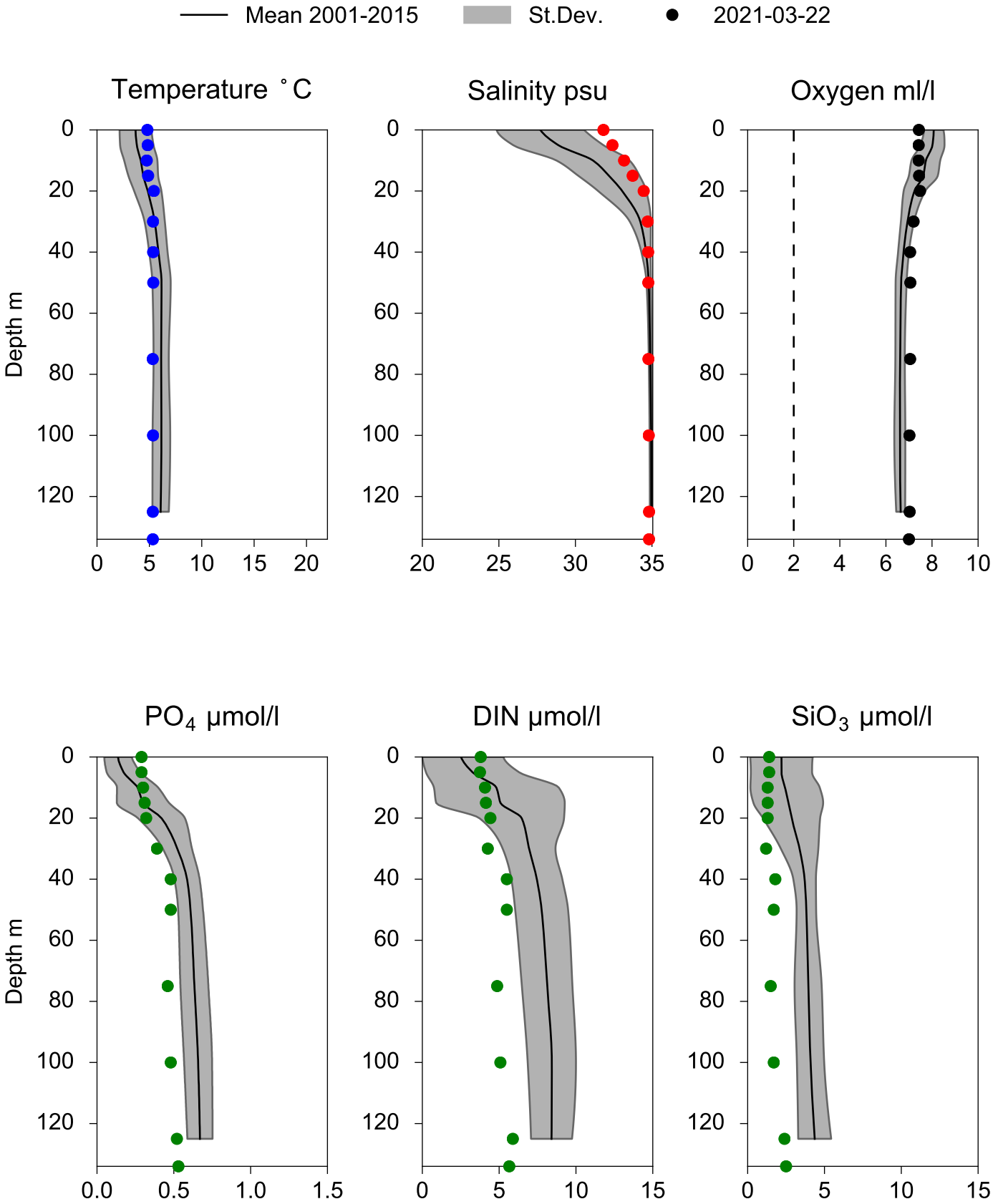
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)

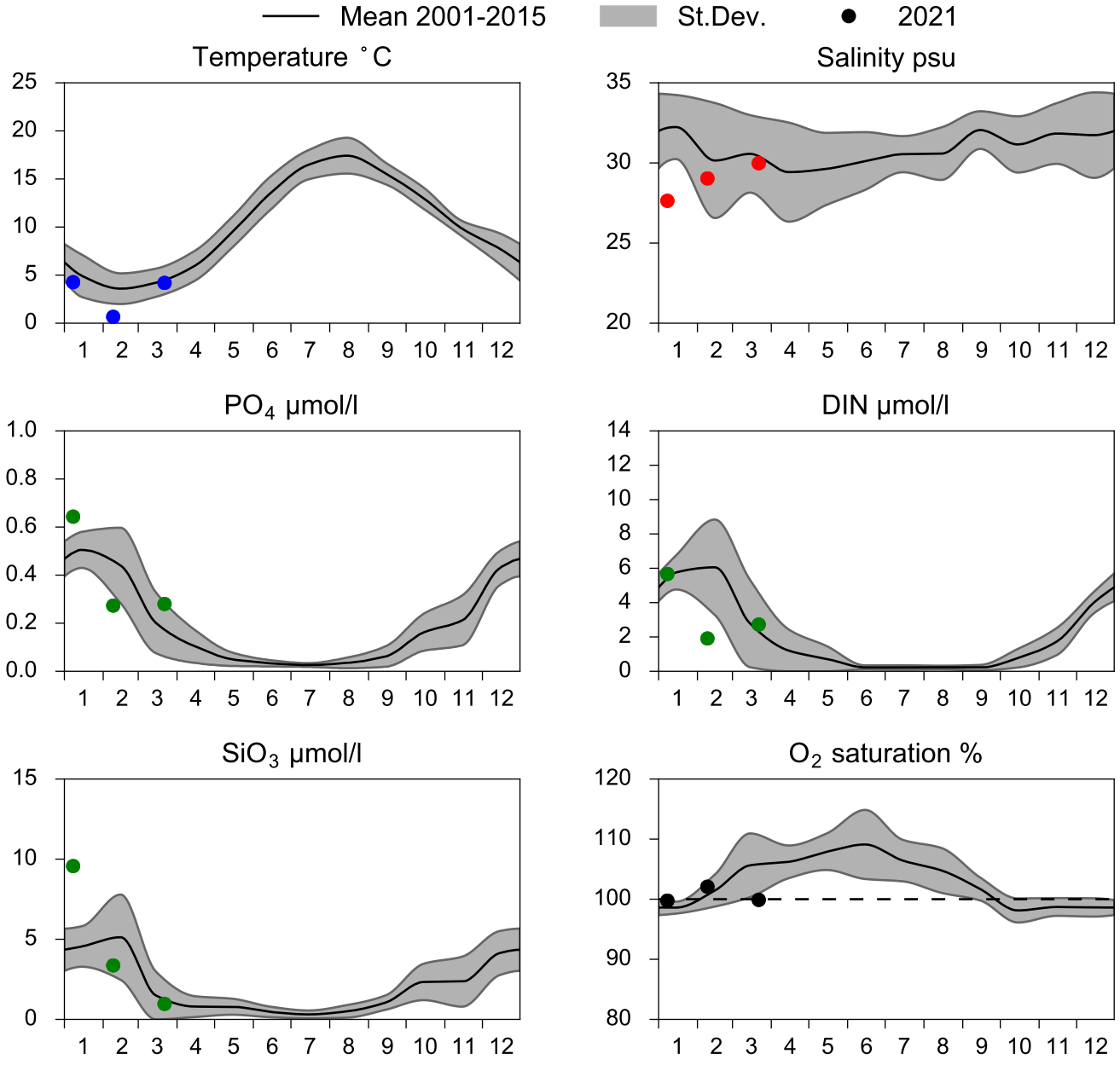


Vertical profiles Å15
March

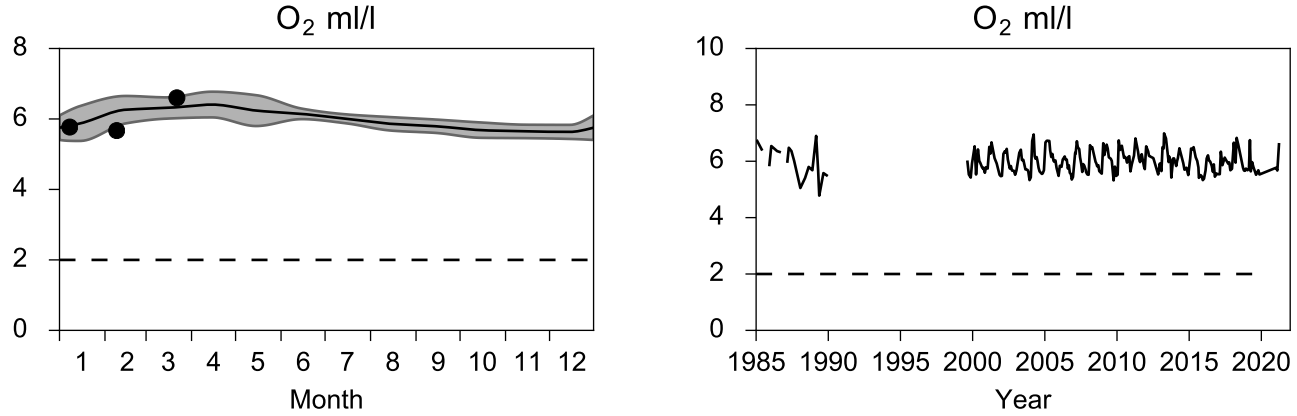


STATION Å17 SURFACE WATER (0-10 m)

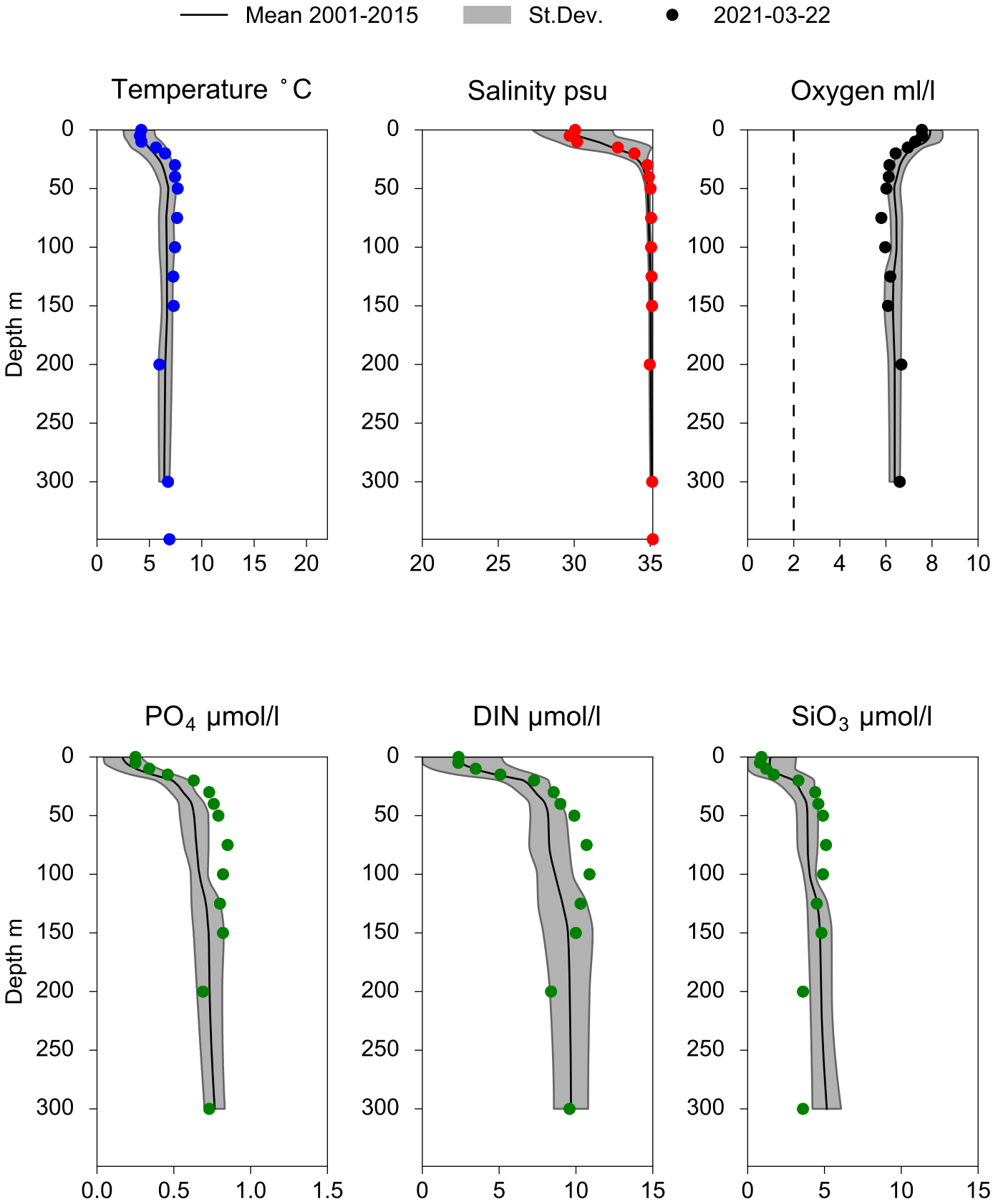
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 300 m)

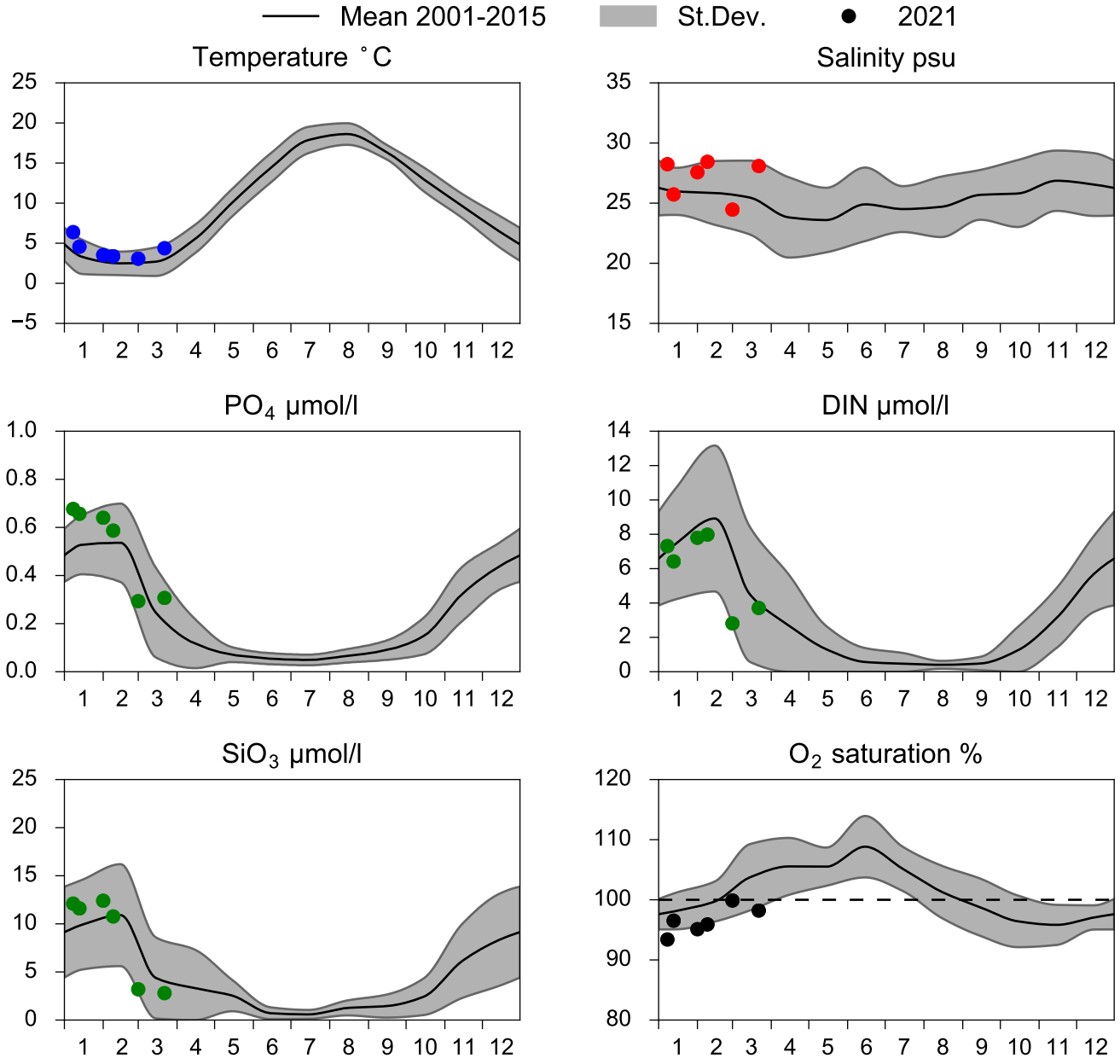


Vertical profiles Å17
March

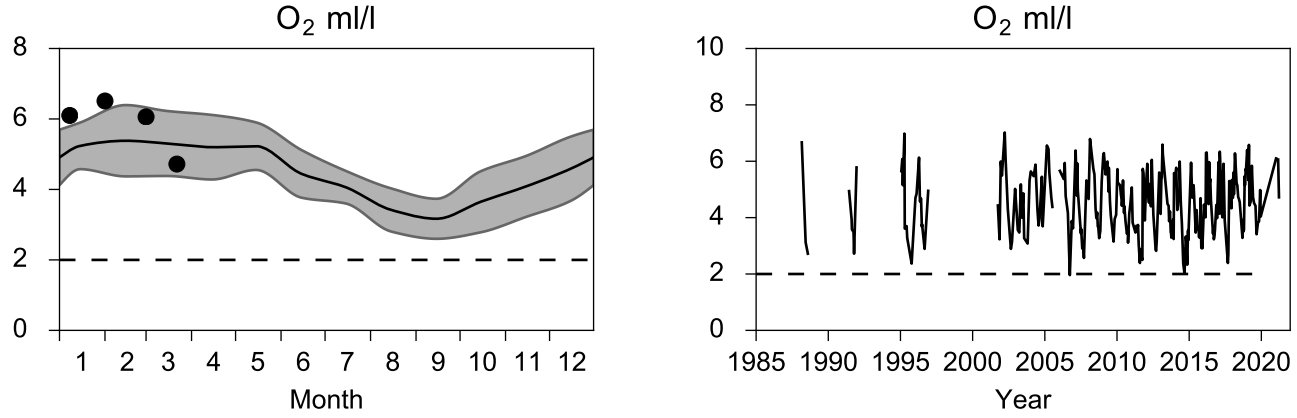


STATION SLÄGGÖ SURFACE WATER (0-10 m)

Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 64 m)



Vertical profiles SLÄGGÖ
March