Örjan Bäck

Swedish Meteorological and Hydrological Institute
Oceanographic Laboratory

2016-08-30
Dnr: S/Gbg-2016-105

Report from the SMHI monitoring cruise with R/V Aranda

Survey period: 2016-08-22 - 2016-08-29
Survey area: Skagerrak, Kattegat, the Sound and the Baltic Proper
Principal: Swedish Meteorological and Hydrological Institute, SMHI, and the Swedish Agency for Marine and Water Management, SWAM.

SUMMARY

The August expedition in the regular Swedish national marine monitoring programme covered the Skagerrak, the Kattegat, the Sound and the Baltic Proper. This report is based on data that only have undergone a first quality control. When data are published at the data host some values might have changed after further quality controls have been performed.

The temperature in the surface water was normal for the season and varied between 16 and 18 °C. The salinity in the surface waters on the west coast was normal, in the southwestern parts of the Baltic Proper it was slightly above normal and somewhat below normal in the northern parts of the Eastern Gotland Basin. There were salinity stratifications at around 10 to 20 meters in the Kattegat and near the coast in the Skagerrak, the thermocline varied in strength and depth but was usually found between 30 to 60 meters.

Nutrients, in the form of phosphate and inorganic nitrogen (nitrite, nitrate and ammonia) were depleted in the surface waters in the entire survey area. Not until below the halocline the nutrient concentrations increased. The concentration of silicate at the surface was normal or just above normal at a few stations.

Acute hypoxia (dissolved O_2 < 2 ml/l) was found from around 70 meters in the entire Baltic Proper. Hydrogen sulfide was only found close to the bottom, at 150 and 175 meters depth, at BY20 Fårö deep and at the bottom, 235 meters, at BY15 Gotland deep, and also from 80 meters and below in the Western Gotland Basin.

Next regular cruise is scheduled to start 12th of September.

Address:
Sven Källfelts Gata 15
SE-426 71 Västra Frölunda
Sweden

Telephone:
+4611-495 80 00

E-mail:
orjan.back@smhi.se
WWW:
http://www.smhi.se/

RESULTS

The expedition was conducted aboard the Finnish research Vessel Aranda. It started in Helsinki the 22th of August and ended in the same port on the 29th.

Throughout the expedition there were weak southerly winds, somewhat stronger in Kattegat and Skagerrak.

During the expedition some extra zooplankton samples were taken at the stations BY15, BY5, BY2, Anholt E and Släggö on behalf of Umeå University for future analysis of mercury.

Extra phytoplankton samples were taken at BY2, BY5, BY15, Ref M1V1 and Hanöbukten for researchers at the University of Gdansk, who will investigate occurrences of the algae toxin nodularin.

The ordinary CTD of SMHI could not be used due to technical errors, however the CTD from FMI (Finnish Meteorological Institute) aboard Aranda could be utilized during the expedition instead.

The Skagerrak

The temperature in the surface water was normal for the season and varied between 17 and 18 °C. The surface salinity was also normal for the season, between 25 and 27 psu closest to the coast and around 30 psu offshore. Closest to the coast there was a weak halocline at around 10 meters, further offshore there was no obvious stratification in salinity. The thermocline was found between 40 and 60 meters.

All nutrient concentrations were very low in the surface layers of the entire area, which is normal for the season. Phosphate concentrations varied around 0.08 µmol/l, nitrite, nitrate and ammonia concentrations were all under the limit of quantification (<0.02 µmol/l, <0.10 µmol/l and <0.2 µmol/l respectively). Silicate concentrations were around 2 µmol/l, which is normal or slightly above. Nutrient levels increased first at around 30 meters and further below the thermocline. At the uttermost stations, Å17 and Å15, higher concentrations of nutrients and lower oxygen levels were found at around 30 meters, which indicates biological decomposition that consumes oxygen and releases inorganic nutrients

The fluorescence peaked at 10 to 20 meters at all stations except at Å17, where the fluorescence was quite low overall with the highest values at the surface. At Släggö there was a very large peak at 20 meters.

The bottom water was well oxygenated in the whole area, which is normal.

The Kattegat and the Sound

The surface temperatures were normal for the season, around 18 °C. The surface salinity was also normal in the Kattegat, but somewhat lower than average for the season in the Sound down to 10 meters, around 9 psu. At N14 Falkenberg the surface salinity was 16 psu and at the rest of the stations in Kattegat 20-22 psu. There was a halocline, salinity stratification, in the area at around 10 to 20 meters. The thermocline was relatively weak at all stations with declining temperatures somewhere between 10 to 50 meters, the strongest gradient was found around 30 meters except in the Sound where halocline and a weak thermocline both could be found at 12 meters.

All nutrient concentrations in the surface layer were very low, which is normal during the summer. Phosphate concentrations varied between 0.06-0.10 µmol/l, inorganic nitrogen factions nitrite, nitrate and ammonia were all under the limit of quantification (<0.02 µmol/l, <0.10 µmol/l and <0.2 µmol/l respectively) except at N14 Falkenberg where levels of nitrite were around 0.1 µmol/l. Silicate varied between 1-2 µmol/l in Kattegat except on N14 Falkenberg where the concentration in the surface was 5.1 µmol/l, which is higher than normal. In the Sound the silicate concentration was just over 8 µmol/l, which is normal for the season. The concentration of nutrients starts to increase around 25-30 meters and below, just under the halocline, with values typical for the season.

Concentrations of dissolved oxygen were generally on normal levels, somewhat lower than normal between 30 and 60 meters at Fladen, and below 25 meters at the Sound with values around 2 ml/l, which is when acute hypoxia starts. A peak in fluorescence was observed at Fladen at around 20 meters. No obvious peaks were seen at the other stations, just somewhat higher values existed above or around the pycnocline.

The Baltic Proper

The temperature in the surface waters was generally normal for the month and varied between 16-18 °C, warmest in the southwestern parts of the Baltic Proper and coldest in the Eastern Gotland Basin, where temperatures were slightly below average. Surface salinity varied between 6 to just above 8 psu, just above normal in the southwestern parts and somewhat below normal in northern parts of the Eastern Gotland Basin.

The halocline in the Baltic Proper could be found around 60 meters, except in the Arkona Basin where it was situated at around 30-35 meters. A well-developed summer thermocline was present at 20-25 meters except in the Arkona Basin. There, temperatures were as high as 15 °C even at the bottom, at over 40 meters.

Nitrite concentrations in the upper layer were around 0.02-0.03 µmol/l, nitrate and ammonia concentrations were under the limit of quantification at <0.10 and <0.20 µmol/l respectively. Concentrations of phosphate in the surface were normal for the summer, about 0.10 µmol/l. Silicate concentrations were higher than normal in the eastern parts, varying between 11 and 13 µmol/l, whereas in the western parts, the concentrations were typical for the season at around 9 µmol/l. The nutrient concentrations increased below the halocline in the entire area, but with lower concentrations than normal in the northeast at BY 15 Gotland deep and BY20 Fårö deep.

There was a sharp transition between the oxic and anoxic layer which started at around 80 meters in the Western Gotland Basin, at both BY32 Norrköping deep and BY38 Karlsö deep acute hypoxia appeared already at 70 meters and hydrogen sulfide (anoxic conditions) from 80 meters and below. Oxygen levels below 2ml/l, acute hypoxia, were also found in the Eastern Gotland basin from 70 meters and below. Hydrogen sulfide however, was only found at the northernmost station, BY20 Fårö deep, at 150 and 175 meters. Acute hypoxia was also observed at Hanöbukten from about 60 meters and below, and in the Bornholm Basin from just below 70 meters. These are similar conditions that were measured in June, but somewhat worse in the Western Gotland Basin.

Measurements of fluorescence indicate biological activity in the surface layer in the entire Baltic Proper with peaks around 0-10 meters. Plankton was at many places visible by naked eye, especially at BY1 where plankton where lumped together resembling large snowflakes. Surface accumulations of plankton could be seen in the Hanö Bay and in the Bornholm Basin.

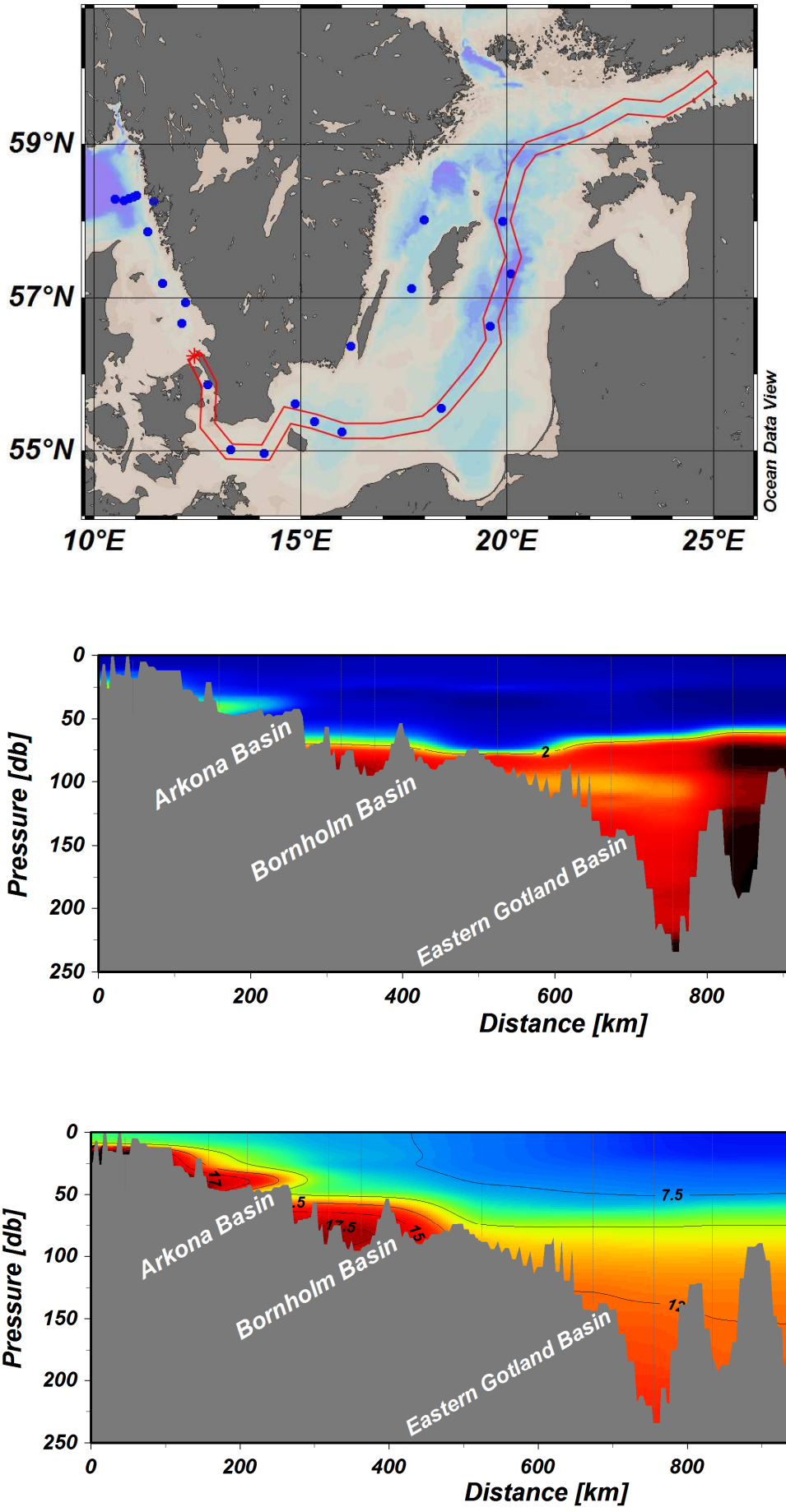


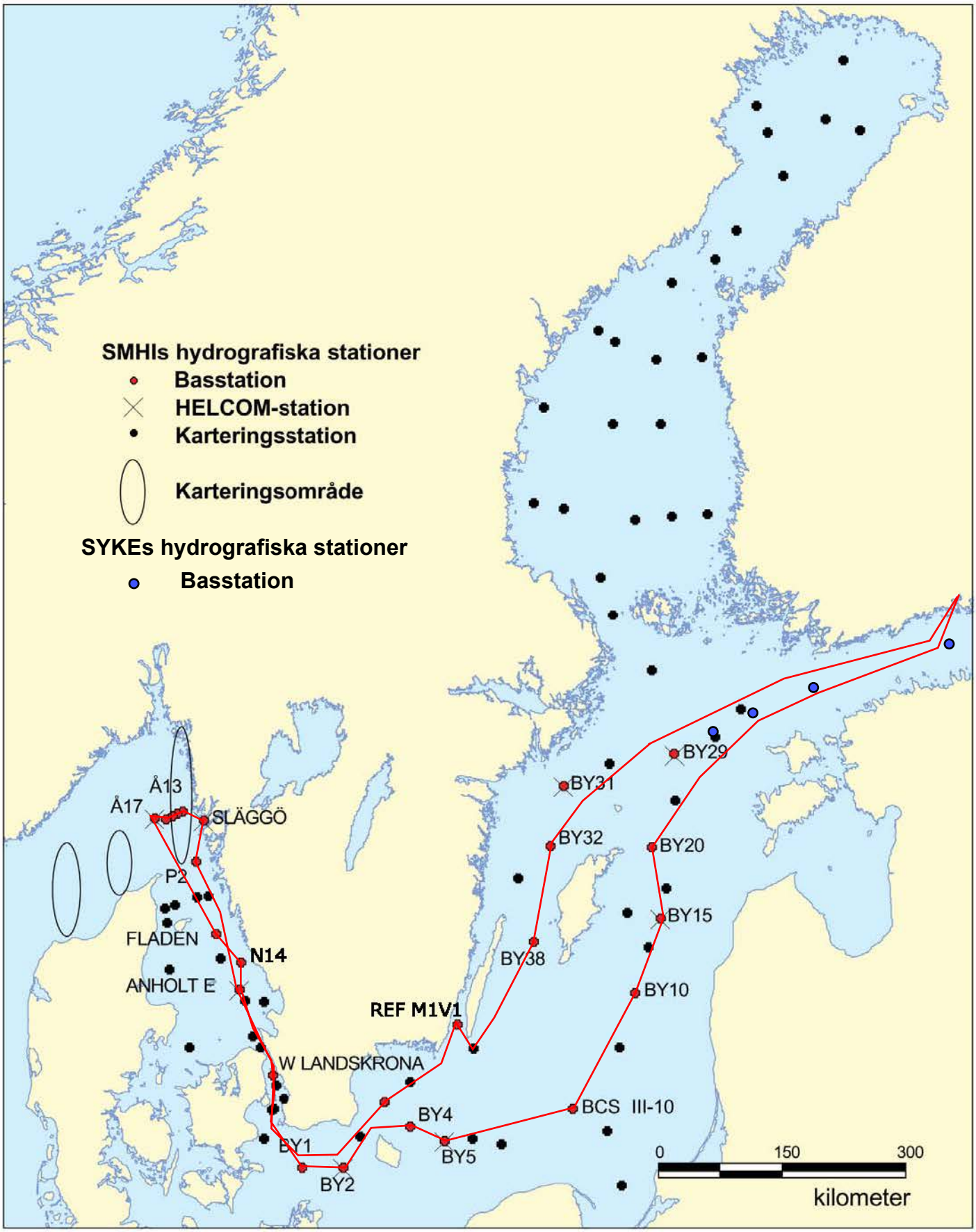
Figure 1. Transect showing oxygen and salinity through the Baltic Proper, from the Sound to the Eastern Gotland Basin.

PARTICIPANTS

Name		Institute
Örjan Bäck	Chief Scientist	SMHI
Sara Johansson		SMHI
Karin Wesslander		SMHI
Sari Sipilä		SMHI
Johan Håkansson		SMHI

APPENDICES

- Track chart
- Table over stations, analyzed parameters and number of sampling depths
- Map showing bottom oxygen concentrations
- Vertical profiles for normal monitoring stations
- Monthly average surface water plots for normal monitoring stations


SMHIs hydrografiska stationer
Basstation
HELCOM-station
Karteringsstation
Karteringsområde
SYKEs hydrografiska stationer
Basstation
Å13
Å17
SLÄGGÖ
P2
FLADEN
N14
ANHOLT E
REF M1V1
W LANDSKRONA
BY1
BY2
BY4
BY5
BY38
BY31
BY32
BY29
BY20
BY15
BY10
BCS III-10
0
150
300
kilometer

Date: 2016-08-30

Ship: SN, AR
Year: 2016

Ser no	Stat code	Proj	Stat name	Lat	Lon	Start date yyyymmdd	Start time hhmm	Bottom depth m	Secchi depth m	Wind di	Wind ve	Air temp C	Air pres hPa	WCWI (Weath Cloud Waves Iceob)	No de	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	Cphl	Doc	Poc	Toc	Pon	Lignin	Yellow	Al	Urea	Cndc_25	Comnt_visit
0449	BPEX26	BAS	BY20 FÅRÖDJUPET	5759.891	01952.731	2016-08-23	07:40	200	5	27	4	16	1020	1630	17	x	x	-	x	-	x	-	x	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	x
0450	BPEX21	BAS	BY15 GOTLANDSDJ	5718.73	02004.572	2016-08-23	13:45	240	5	17	2.1	16	1021	2730	22	-	x	-	x	x	x	-	x	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0451	BPEX13	BAS	BY10	5638.019	01935.092	2016-08-23	20:00	144		10	1.0	16	1023	9999	15	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0452	BPSE11	BAS	BCS III-10	5533.32	01824.009	2016-08-24	03:15	90		08	2	17	1025	1120	12	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0453	BPSB07	BAS	BY5 BORNHOLMSDJ	5515	01559.049	2016-08-24	11:00	91	7	29	2.0	17	1027	1220	12	x	x	-	x	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0454	BPSB06	BAS	BY4 CHRISTIANSÖ	5522.98	01520.031	2016-08-24	14:50	92	5	16	3	18	1026	1210	12	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0455	BPSA03	BAS	BY2 ARKONA	5458.271	01405.934	2016-08-24	20:20	47		13	4.7	18	1024	9999	11	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0456	BPSA02	BAS	BY1	5500.948	01318.051	2016-08-25	00:10	46		15	7.1	18	1023	9999	8	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0457	SOCX39	BAS	W LANDSKRONA	5551.999	01244.904	2016-08-25	06:15	51	5	15	6	18	1022	1120	9	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0458	KAEX29	BAS	ANHOLT E	5640.121	01206.668	2016-08-25	10:50	63	12	16	7	19	1019	1530	10	x	x	-	x	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0459	KANX50	BAS	N14 FALKENBERG	5656.4	01212.711	2016-08-25	14:00	32	10	16	9.9	20	1018	1130	9	x	x	-	x	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0460	KANX25	BAS	FLADEN	5711.563	01139.472	2016-08-25	16:50	86	11	16	8.8	19	1016	1330	12	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0461	SKEX18	BAS	Å17	5817.059	01030.266	2016-08-25	23:30	349		13	5	18	1014	9990	15	x	x	-	x	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0462	SKEX17	BAS	Å16	5816.029	01043.459	2016-08-26	01:40	201		16	6	18	1013	9990	13	-	x	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0463	SKEX16	BAS	Å15	5817.62	01050.709	2016-08-26	02:50	136		08	15	18	1012	9990	12	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0464	SKEX15	BAS	Å14	5818.93	01056.538	2016-08-26	04:10	109		16	8.0	18	1012	2830	11	-	x	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0465	SKEX14	BAS	Å13	5820.371	01101.67	2016-08-26	05:20	107		14	8.7	18	1011	1120	10	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0466	FIBG27	BAS	SLÄGGÖ	5815.589	01126.139	2016-08-26	07:45	76	9	16	7.2	21	1010	0020	11	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	x
0467	SKEX23	BAS	P2	5752	01117.521	2016-08-26	11:25	95	11	17	10.5	18	1009	2740	10	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0468	KAEX29	BAS	ANHOLT E	5640.12	01206.668	2016-08-26	18:25	63		30	11	18	1015	1730	10	x	x	-	x	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0469	BPSH05	BAS	HANÖBUKTEN	5537.037	01452.038	2016-08-27	10:05	80	5	23	4	17	1020	1120	11	x	x	-	x	-	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0470	BPWK01	BAS	Ref M1V1	5622.252	01612.116	2016-08-27	16:30	21		30	4.4	21	1018	1320	7	x	x	-	x	x	x	-	-	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0471	BPWX45	BAS	BY38 KARLSÖDJ	5707.032	01740.121	2016-08-28	02:00	110		01	3	17	1018	9990	14	x	x	-	x	-	x	-	x	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-
0472	BPWX38	BAS	BY32 NORRKÖPING	5801.008	01759.056	2016-08-28	07:20	201	7	16	1.6	16	1019	1520	17	x	x	-	x	-	x	-	x	x	-	x	x	x	x	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-

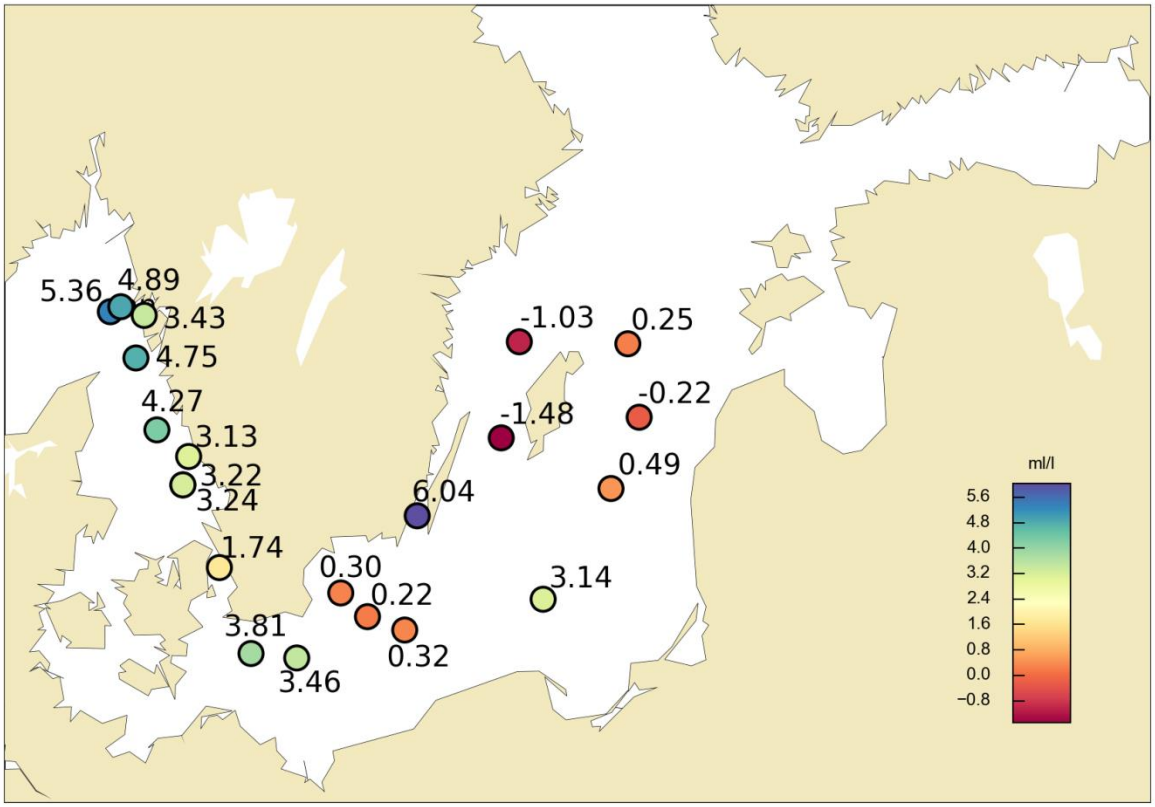
Bottom water oxygen concentration (ml/l)

Country: Finland

Ship: Aranda

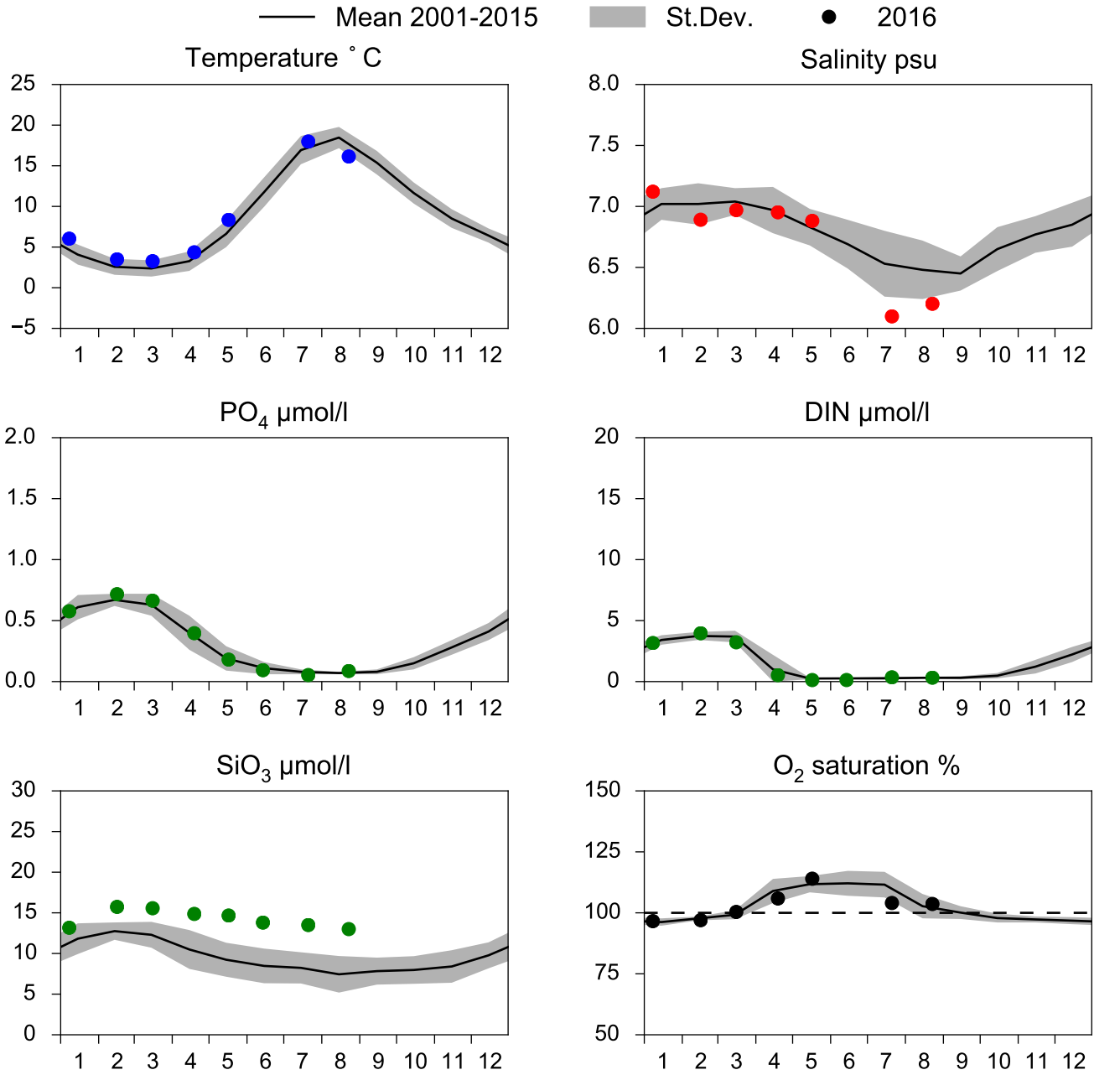
Date: 20160822 - 20160829

Series: 0449 – 0472

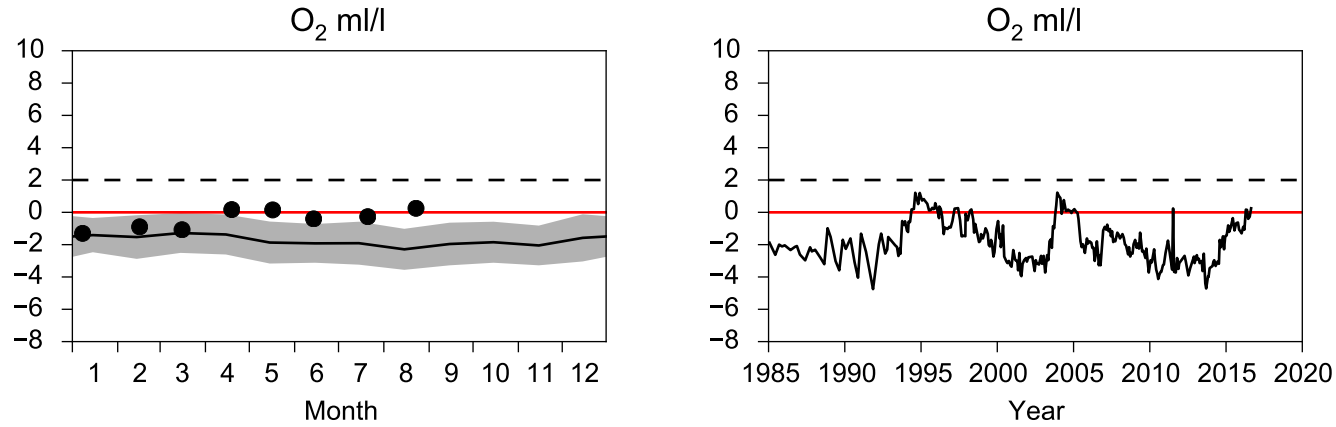


STATION BY20 FÅRÖDJ SURFACE WATER (0-10m)

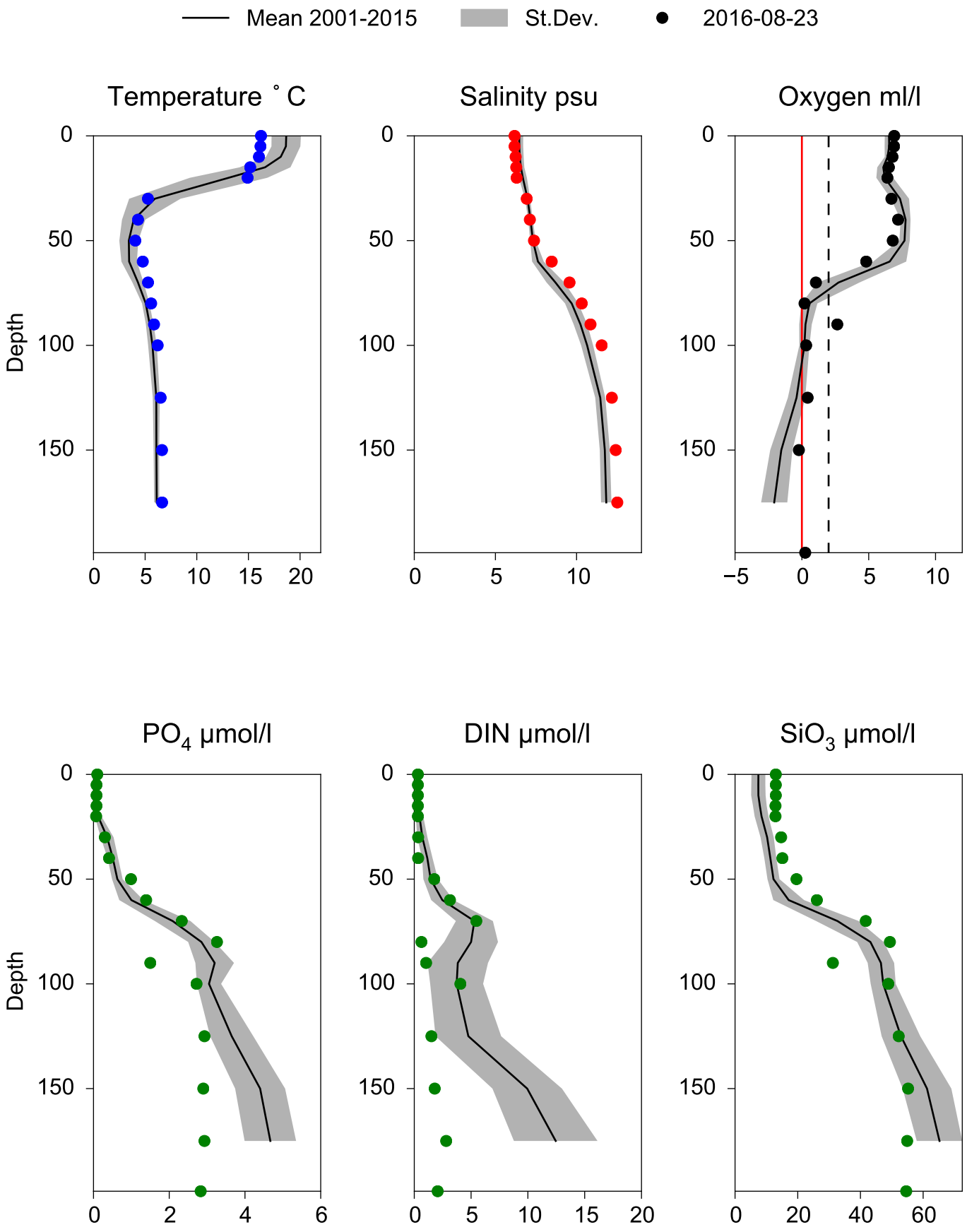
Annual Cycles



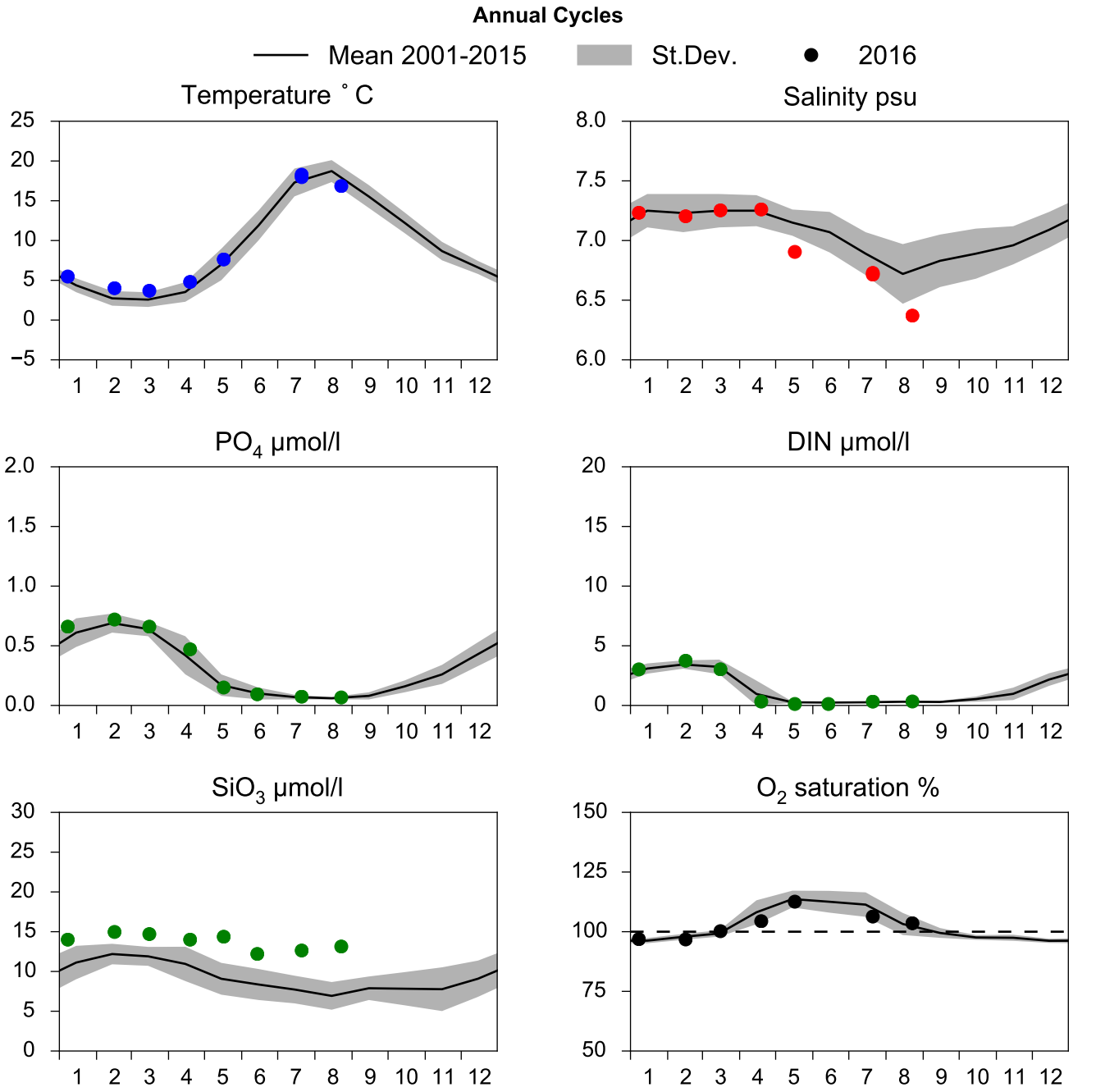
OXYGEN IN BOTTOM WATER (depth >= 175 m)



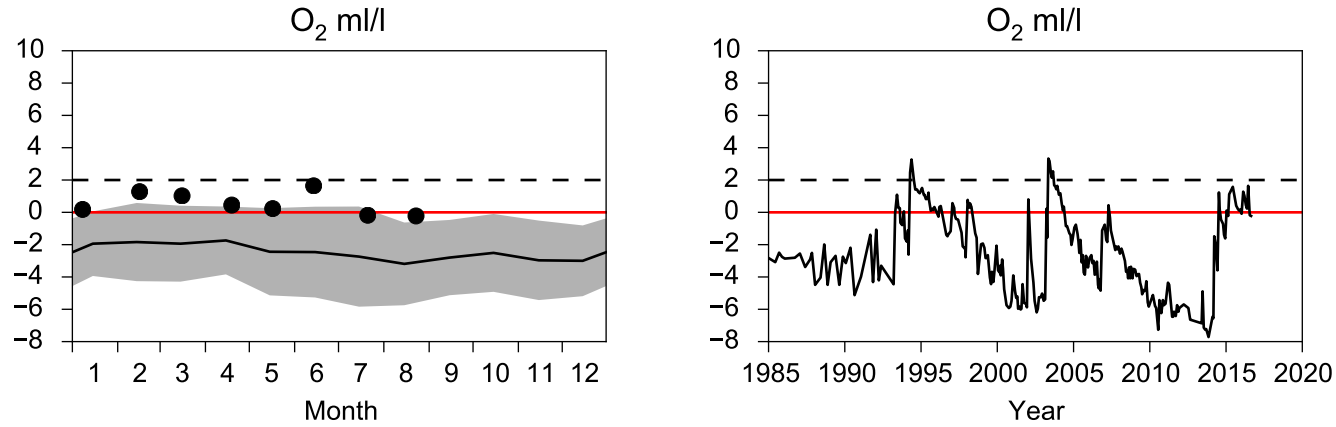
Vertical profiles BY20 FÅRÖDJ
August



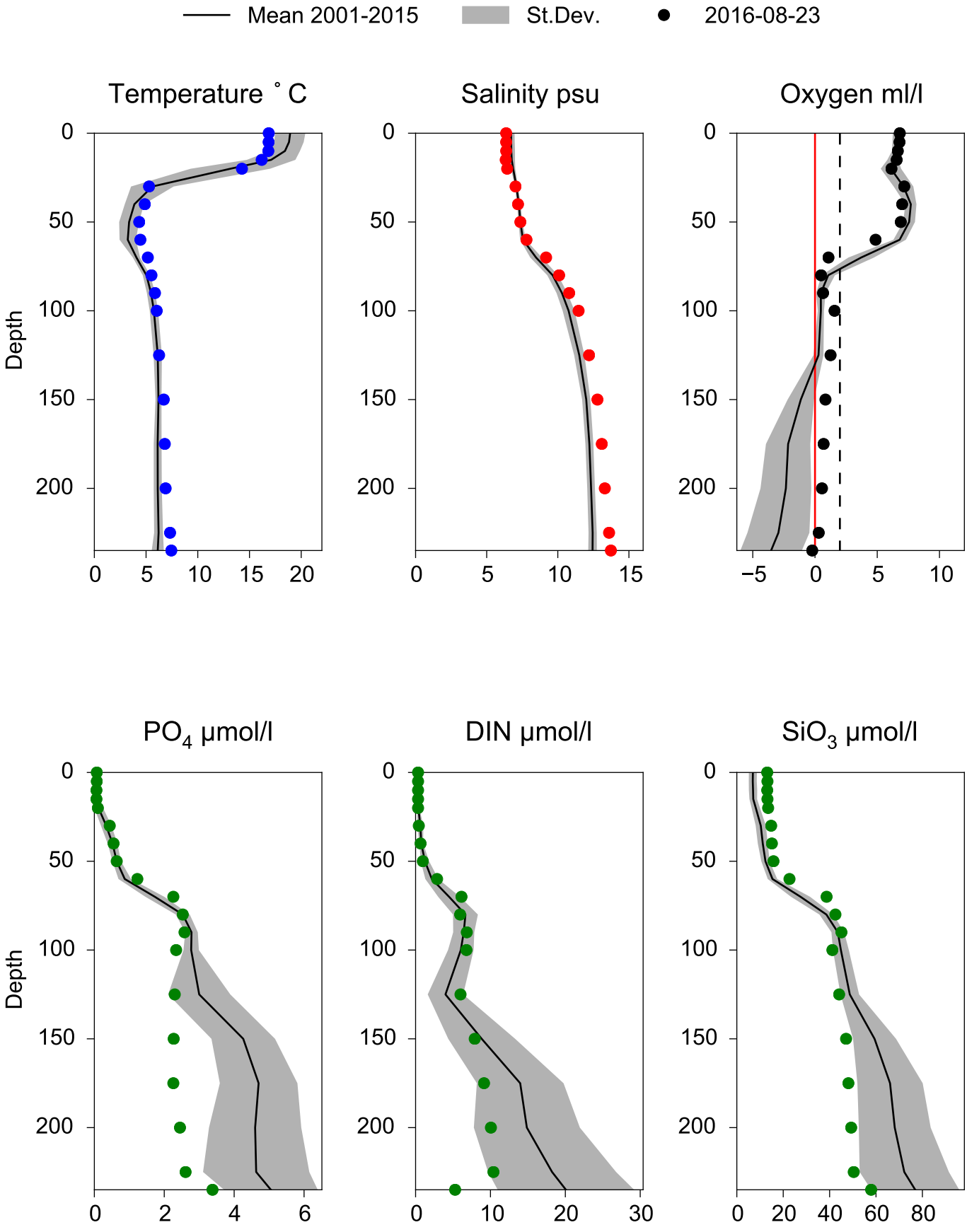
STATION BY15 GOTLANDSDJ SURFACE WATER (0-10m)



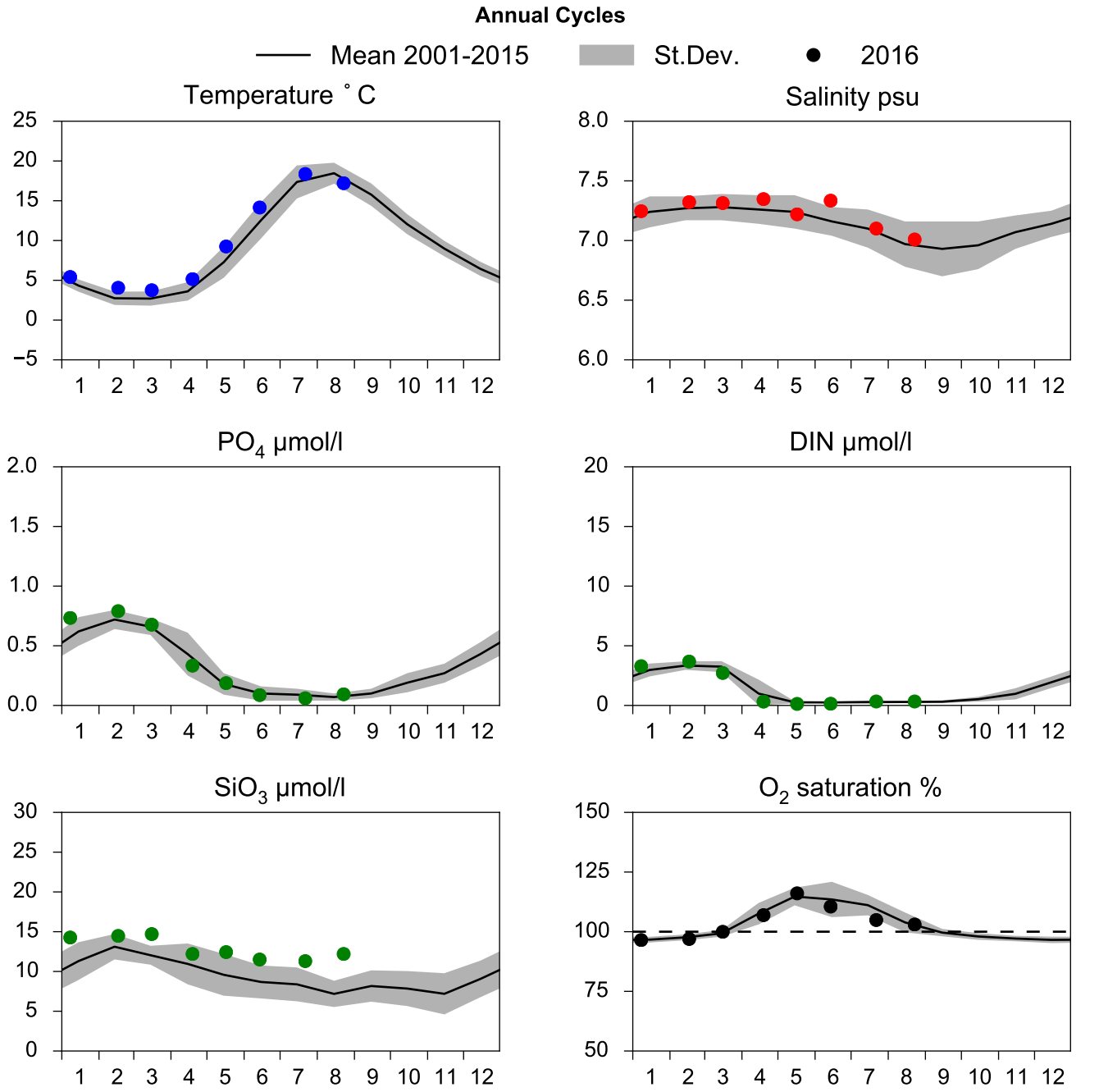
OXYGEN IN BOTTOM WATER (depth >= 225 m)



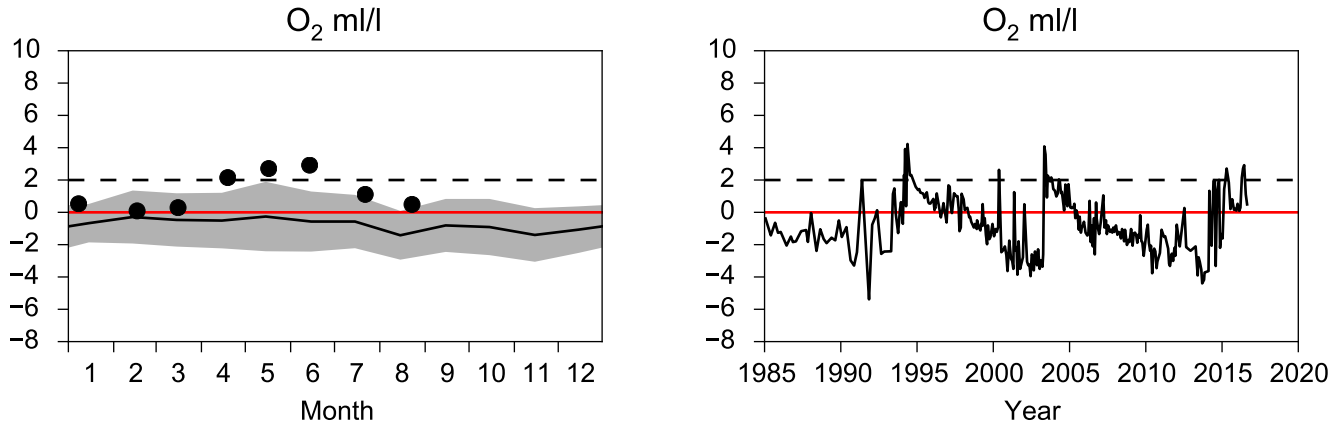
Vertical profiles BY15 GOTLANDSDJ
August



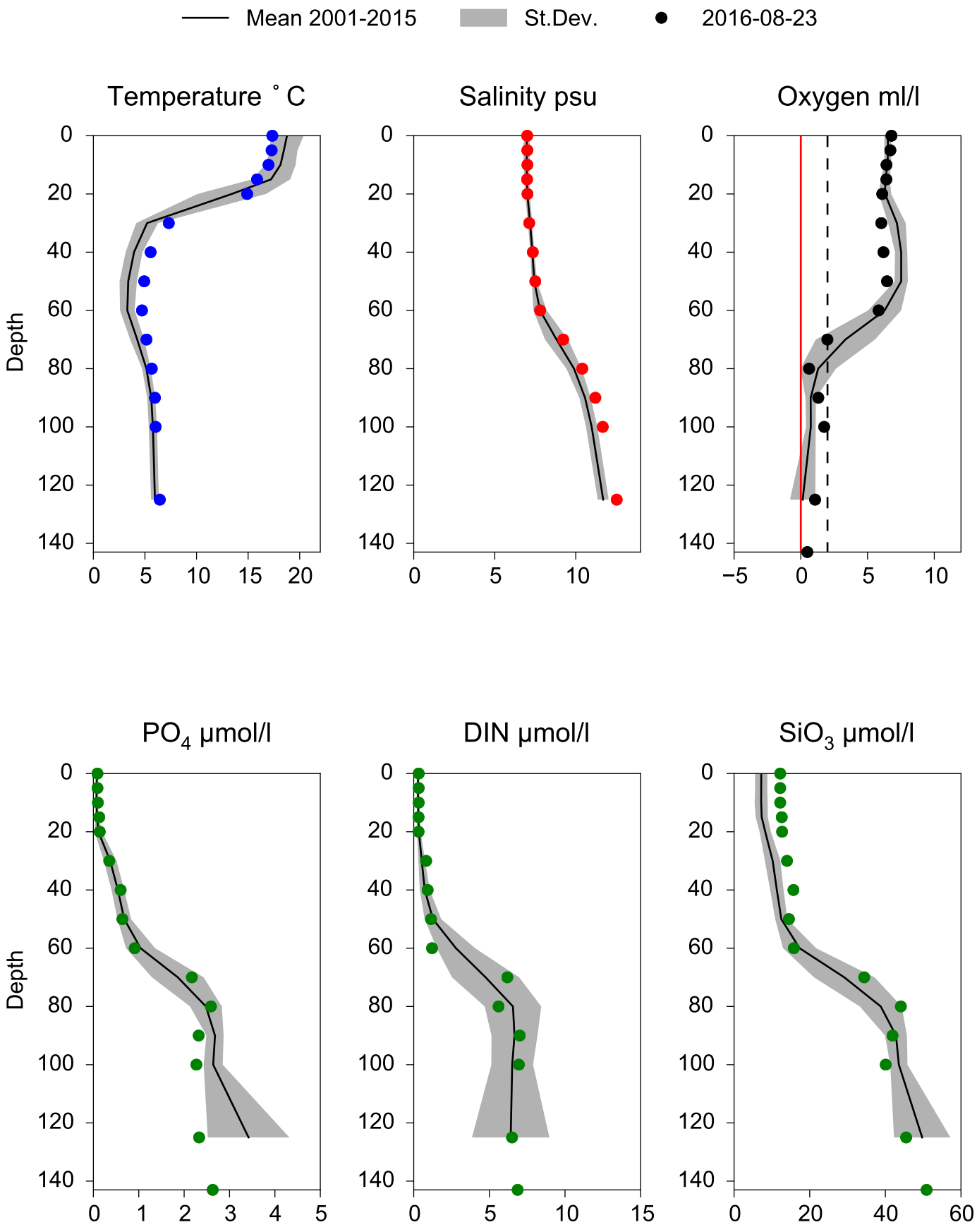
STATION BY10 SURFACE WATER (0-10m)



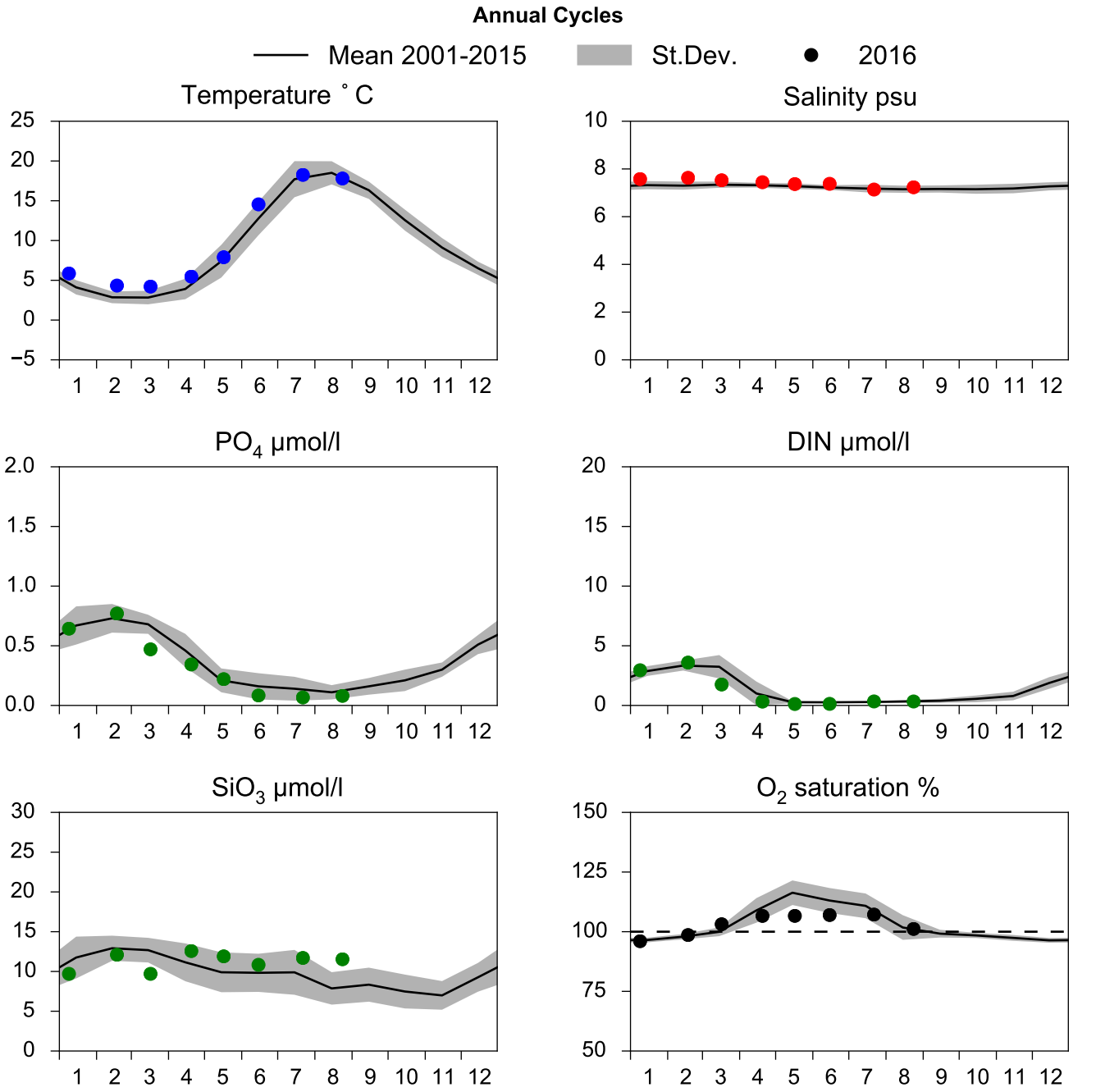
OXYGEN IN BOTTOM WATER (depth >= 125 m)



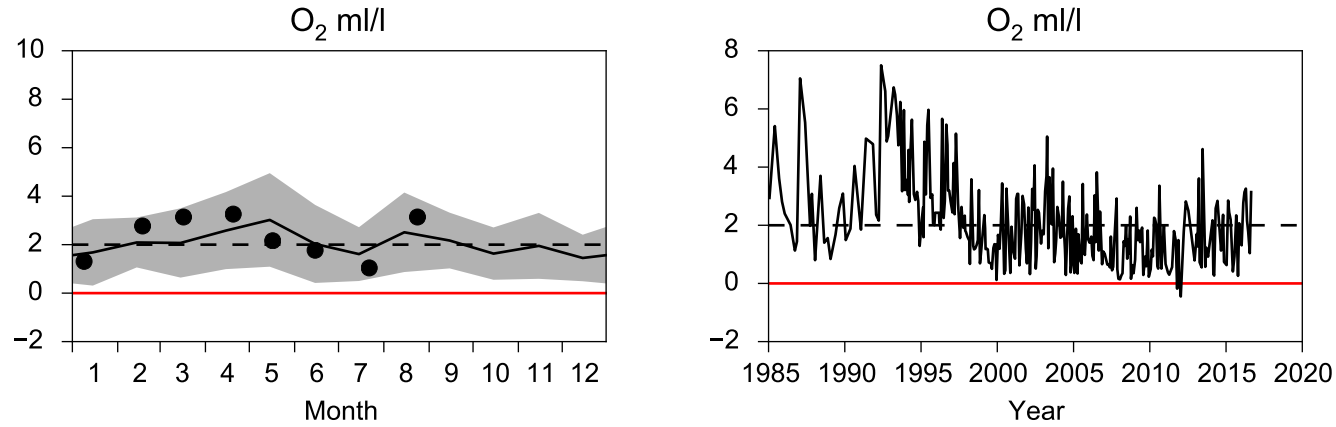
Vertical profiles BY10
August



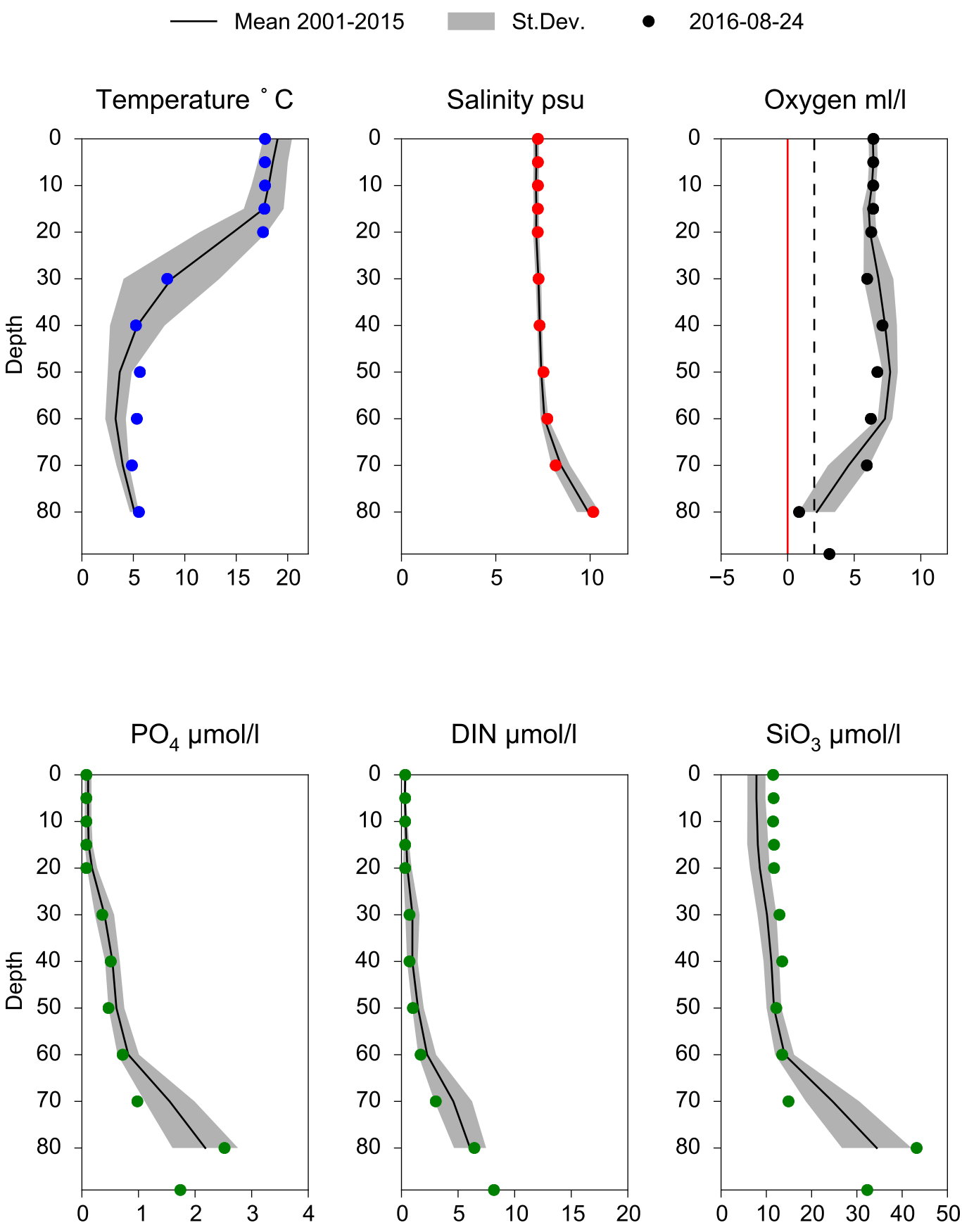
STATION BCS III-10 SURFACE WATER (0-10m)



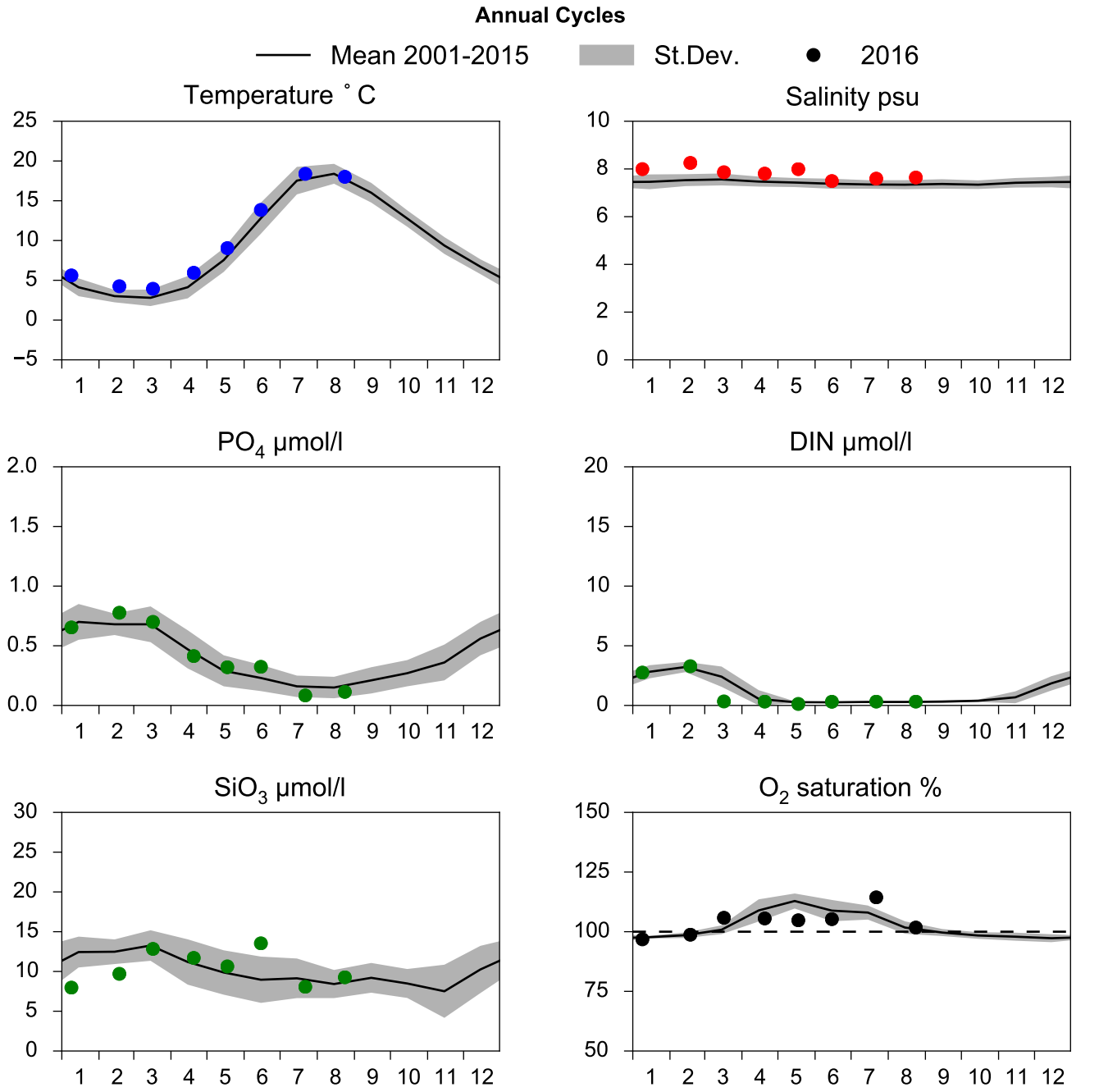
OXYGEN IN BOTTOM WATER (depth >= 80 m)



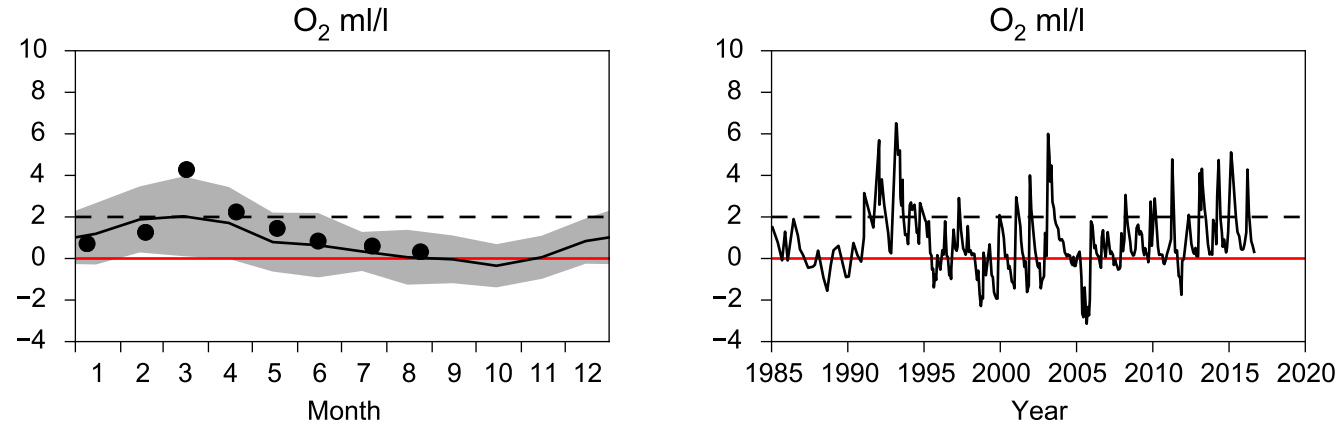
Vertical profiles BCS III-10
August



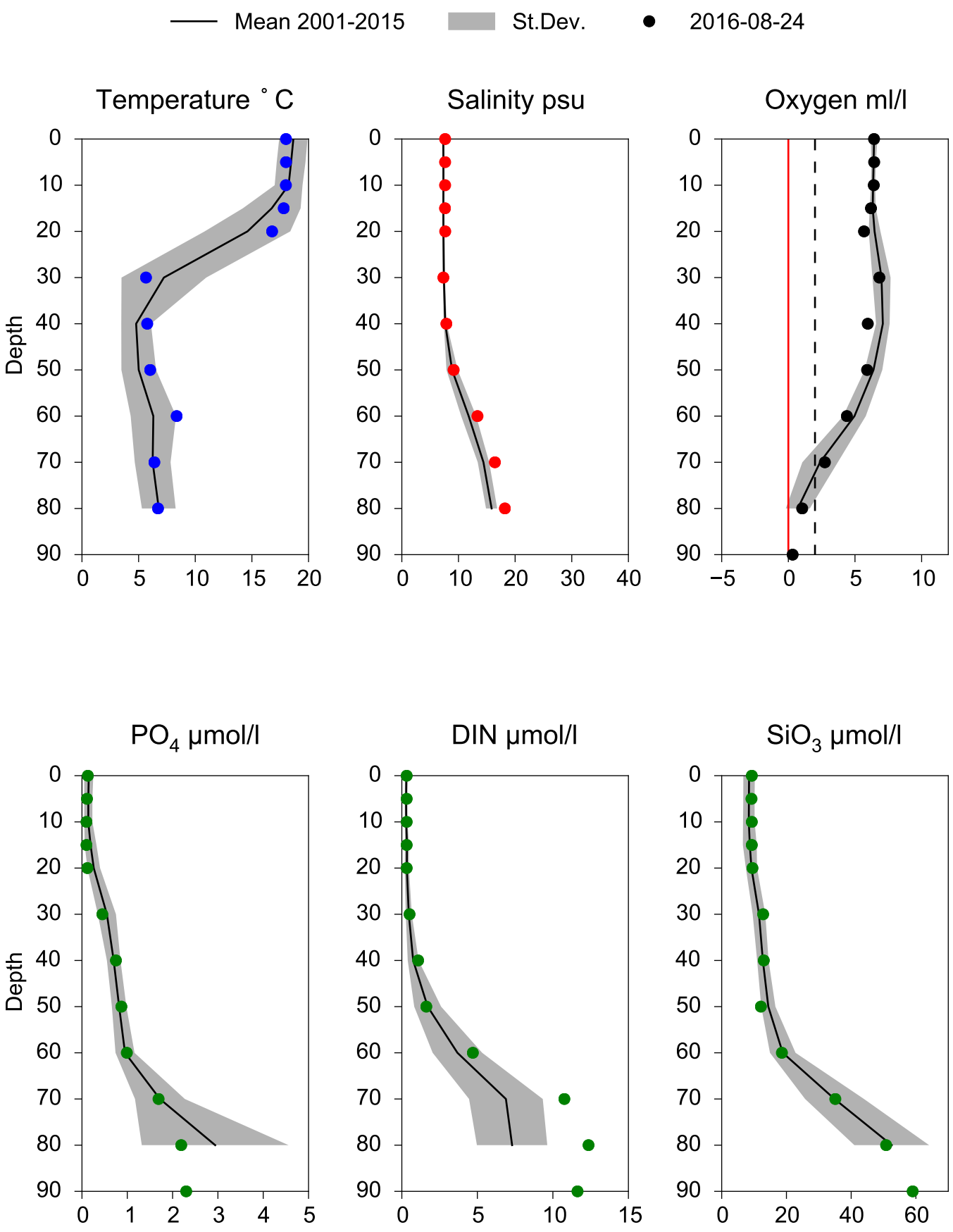
STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10m)



OXYGEN IN BOTTOM WATER (depth >= 80 m)



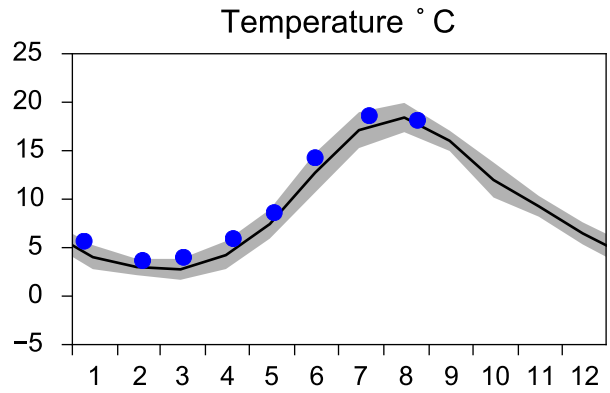
Vertical profiles BY5 BORNHOLMSDJ
August

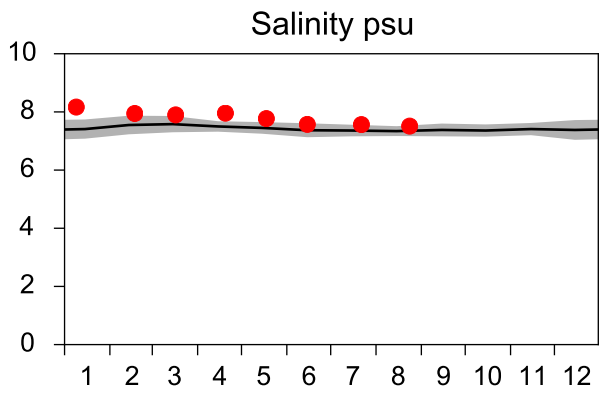


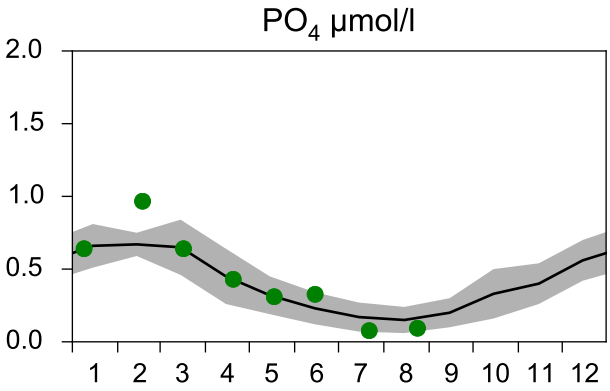
STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10m)

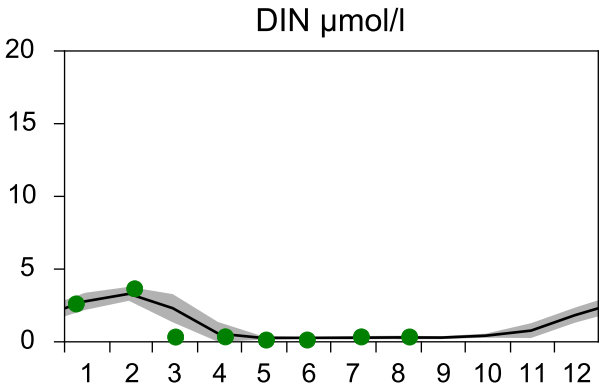
Annual Cycles

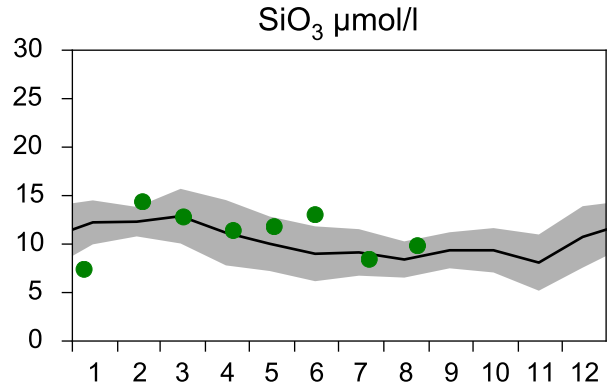
Mean 2001-2015 St.Dev. 2016

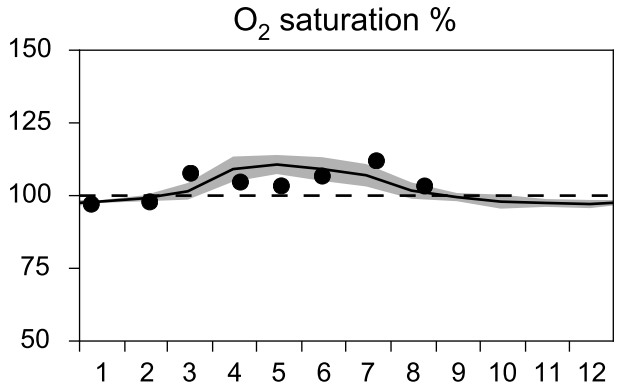




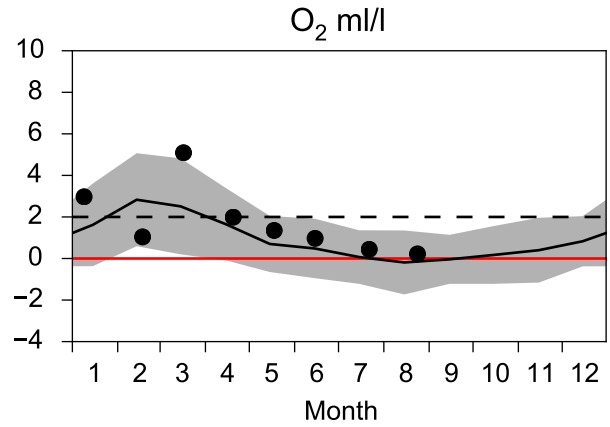


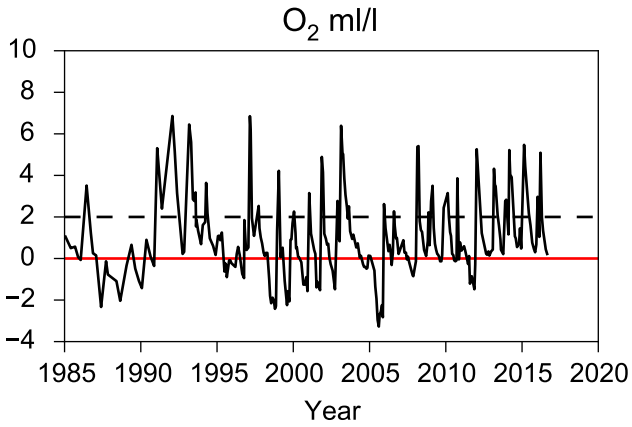




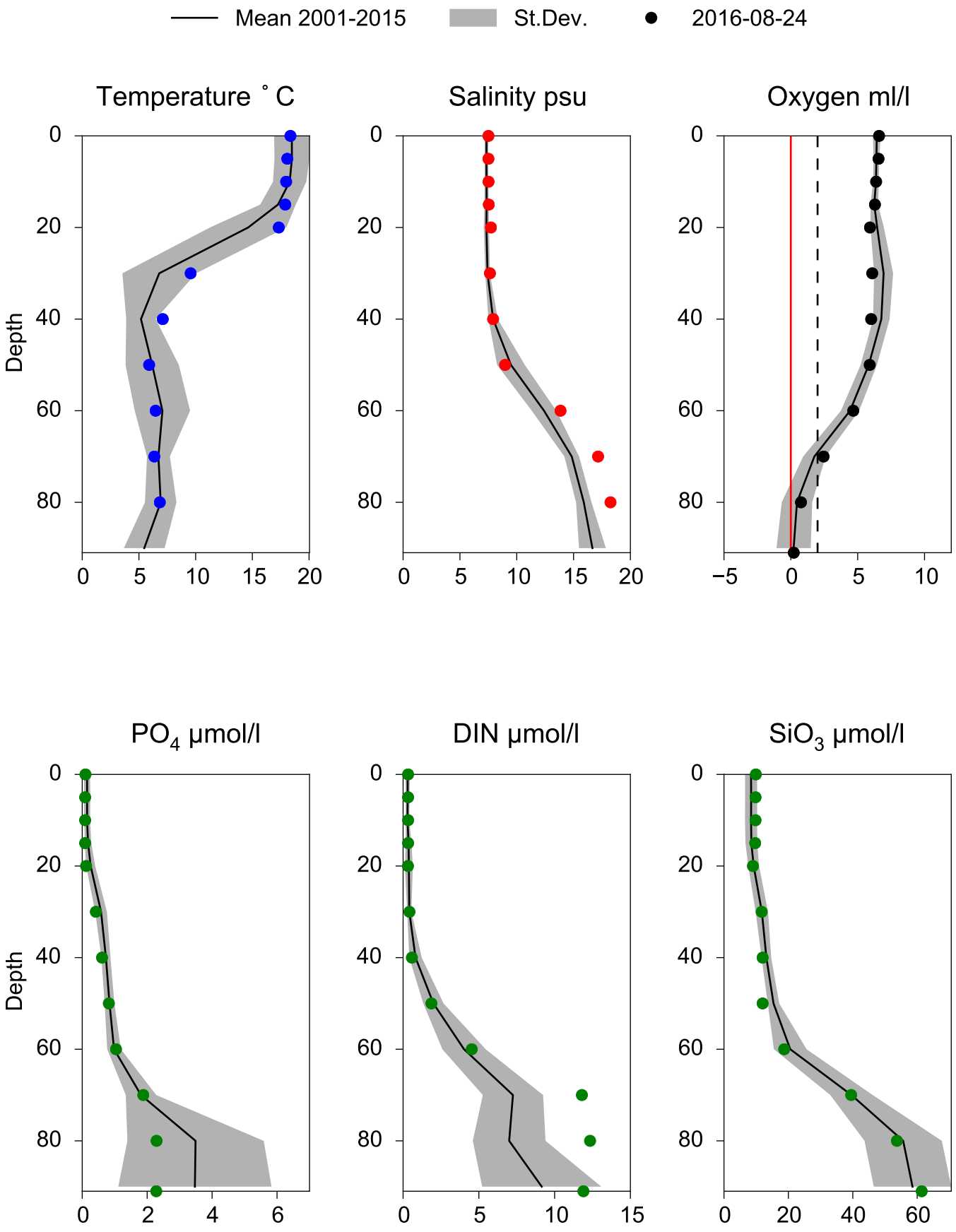


OXYGEN IN BOTTOM WATER (depth >= 80 m)





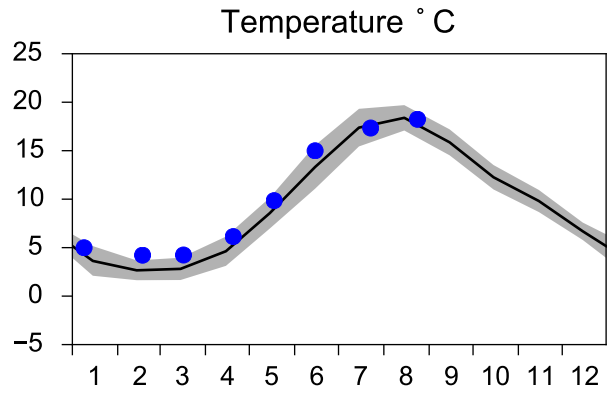
Vertical profiles BY4 CHRISTIANSÖ
August

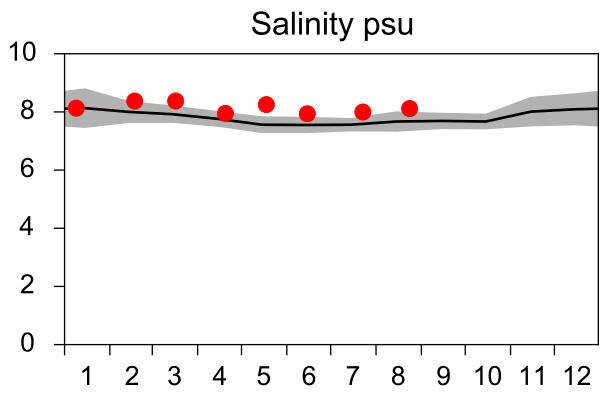


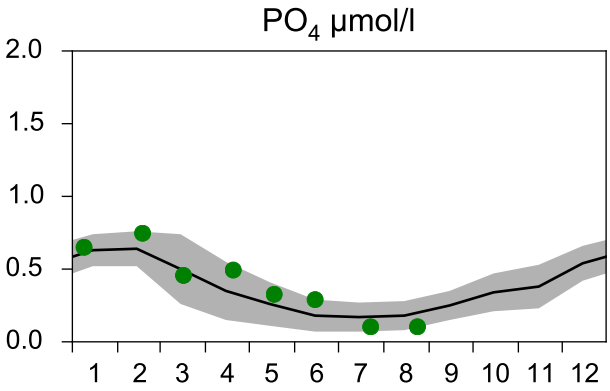
STATION BY2 ARKONA SURFACE WATER (0-10m)

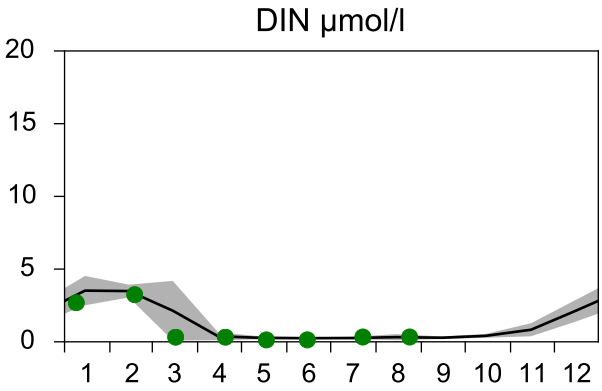
Annual Cycles

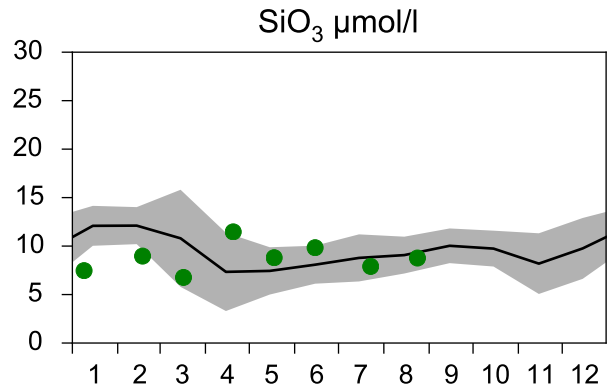
Mean 2001-2015 St.Dev. 2016

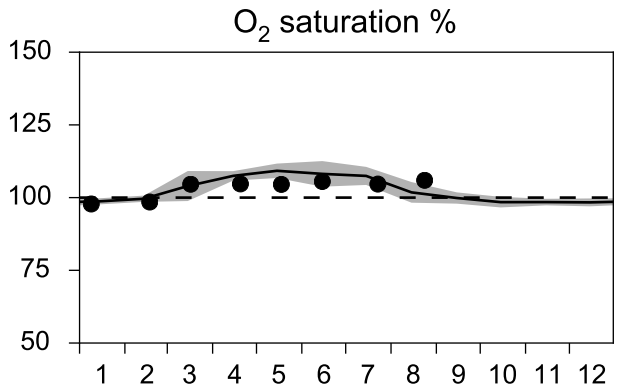




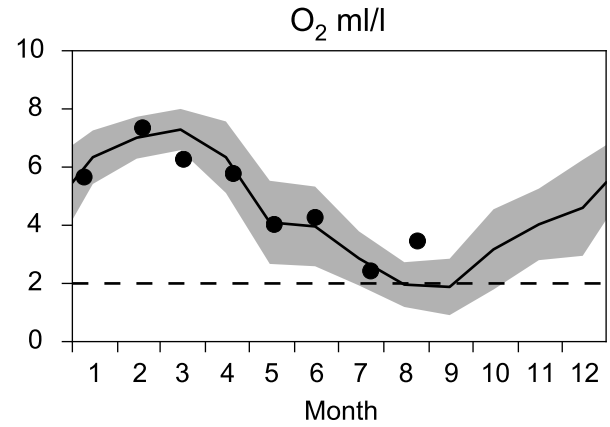


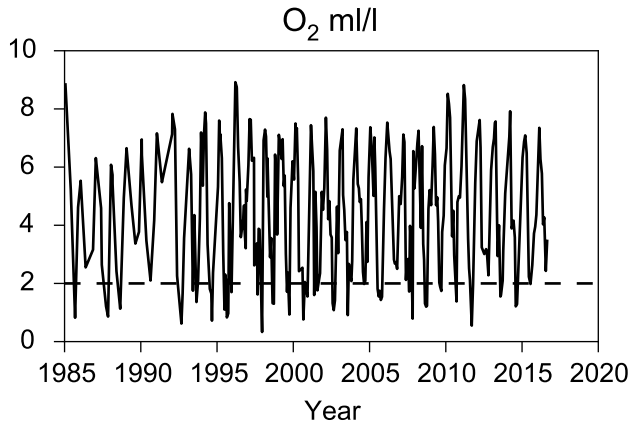




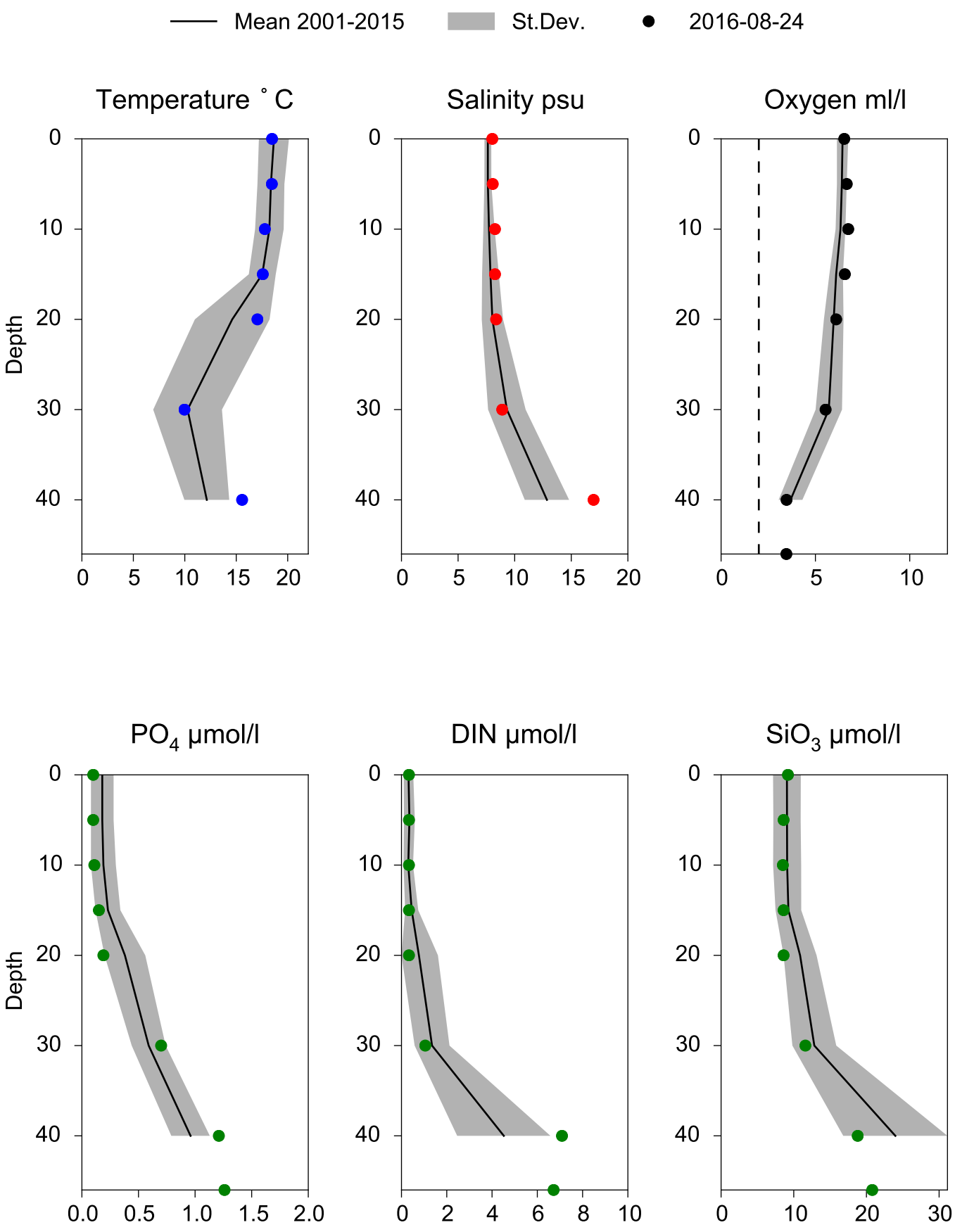


OXYGEN IN BOTTOM WATER (depth >= 40 m)

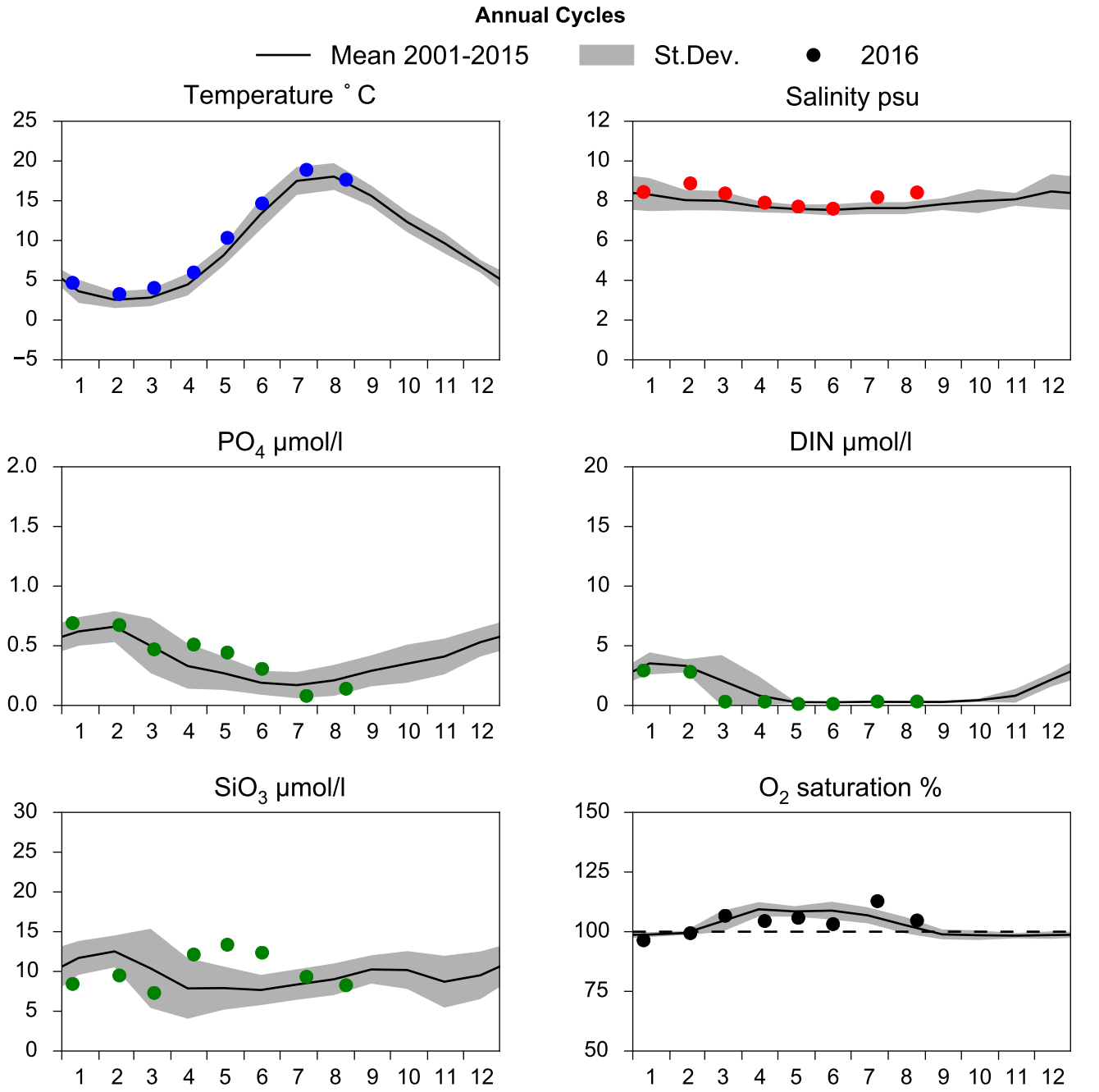




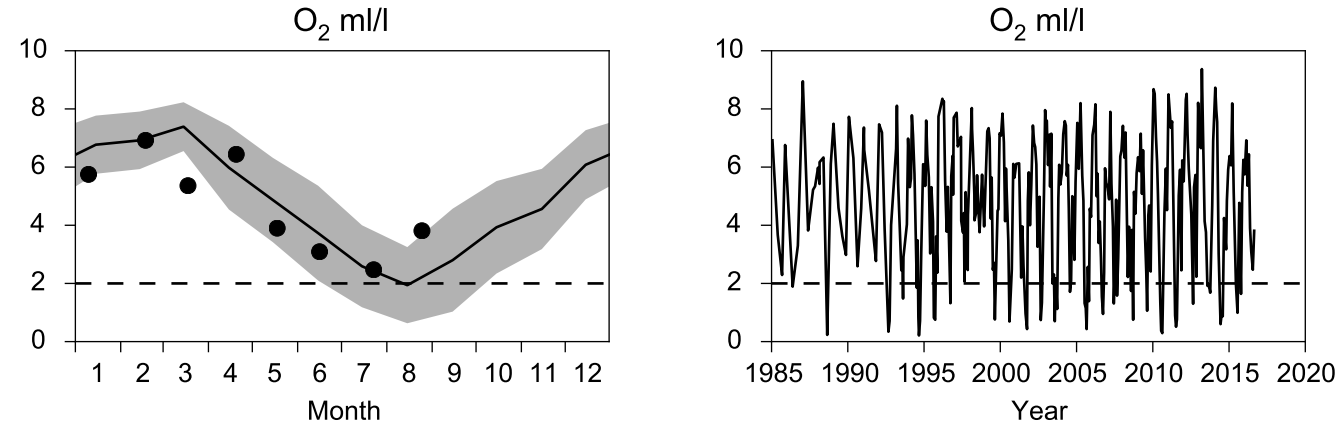
Vertical profiles BY2 ARKONA
August



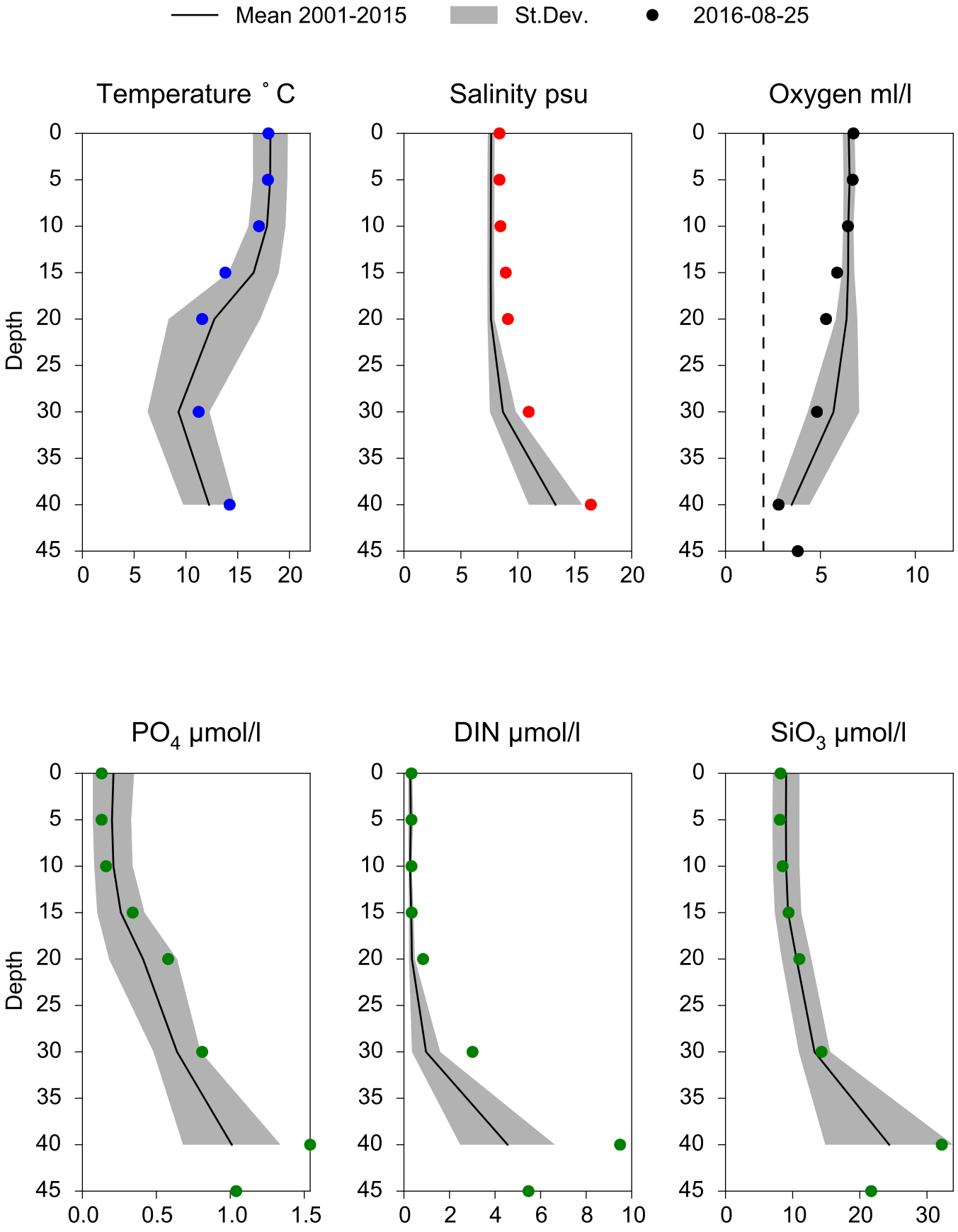
STATION BY1 SURFACE WATER (0-10m)



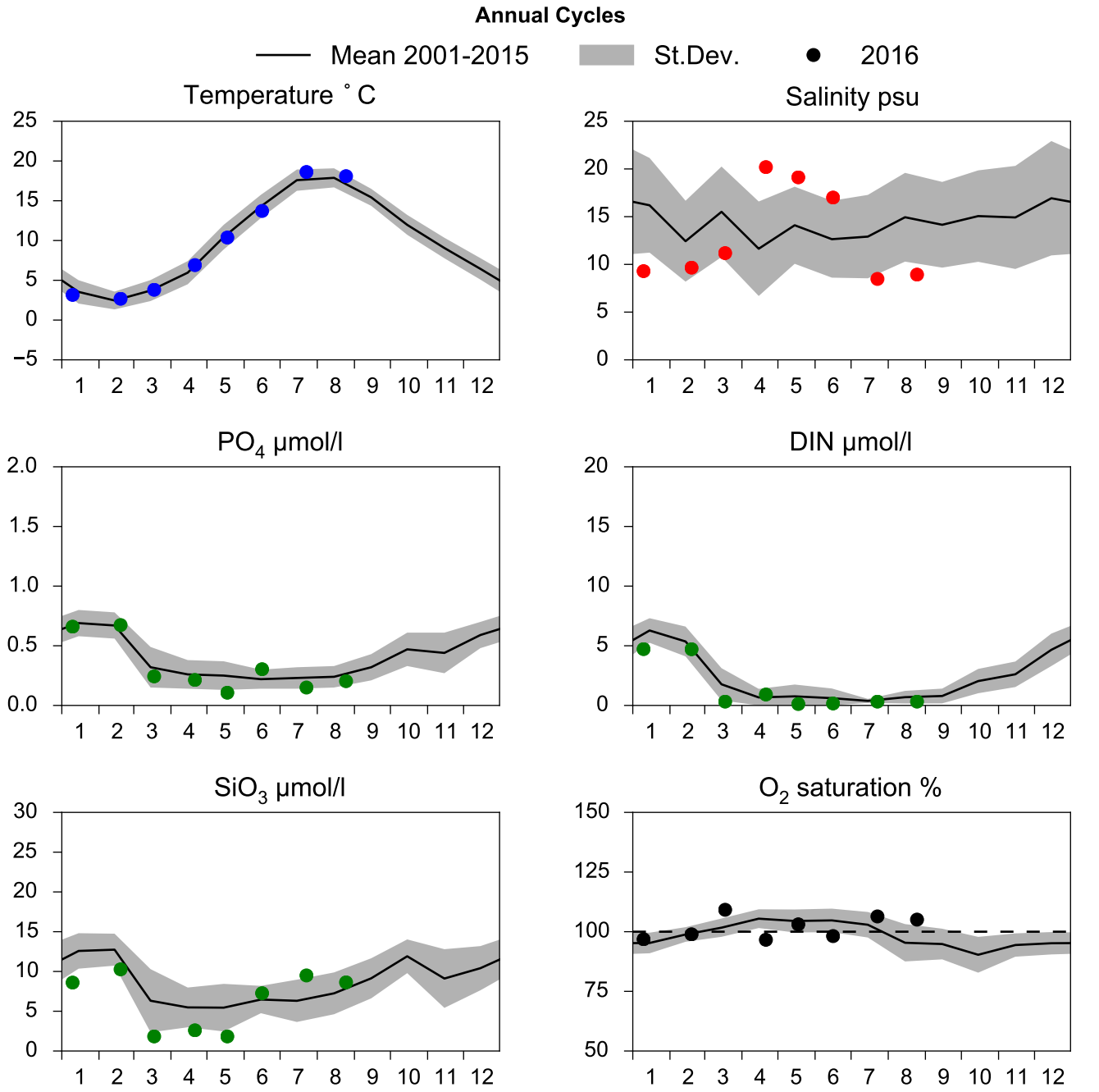
OXYGEN IN BOTTOM WATER (depth >= 40 m)



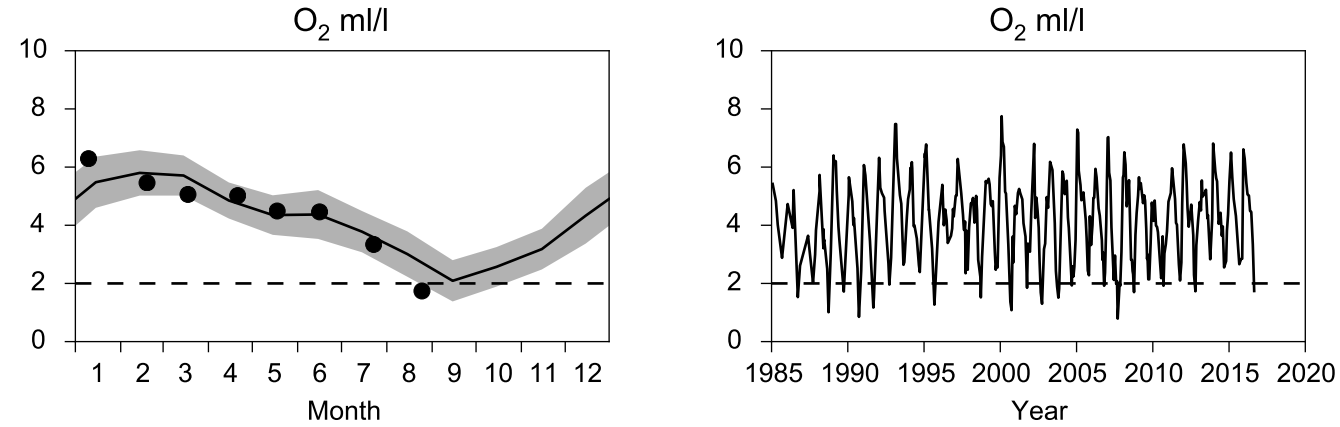
Vertical profiles BY1
August



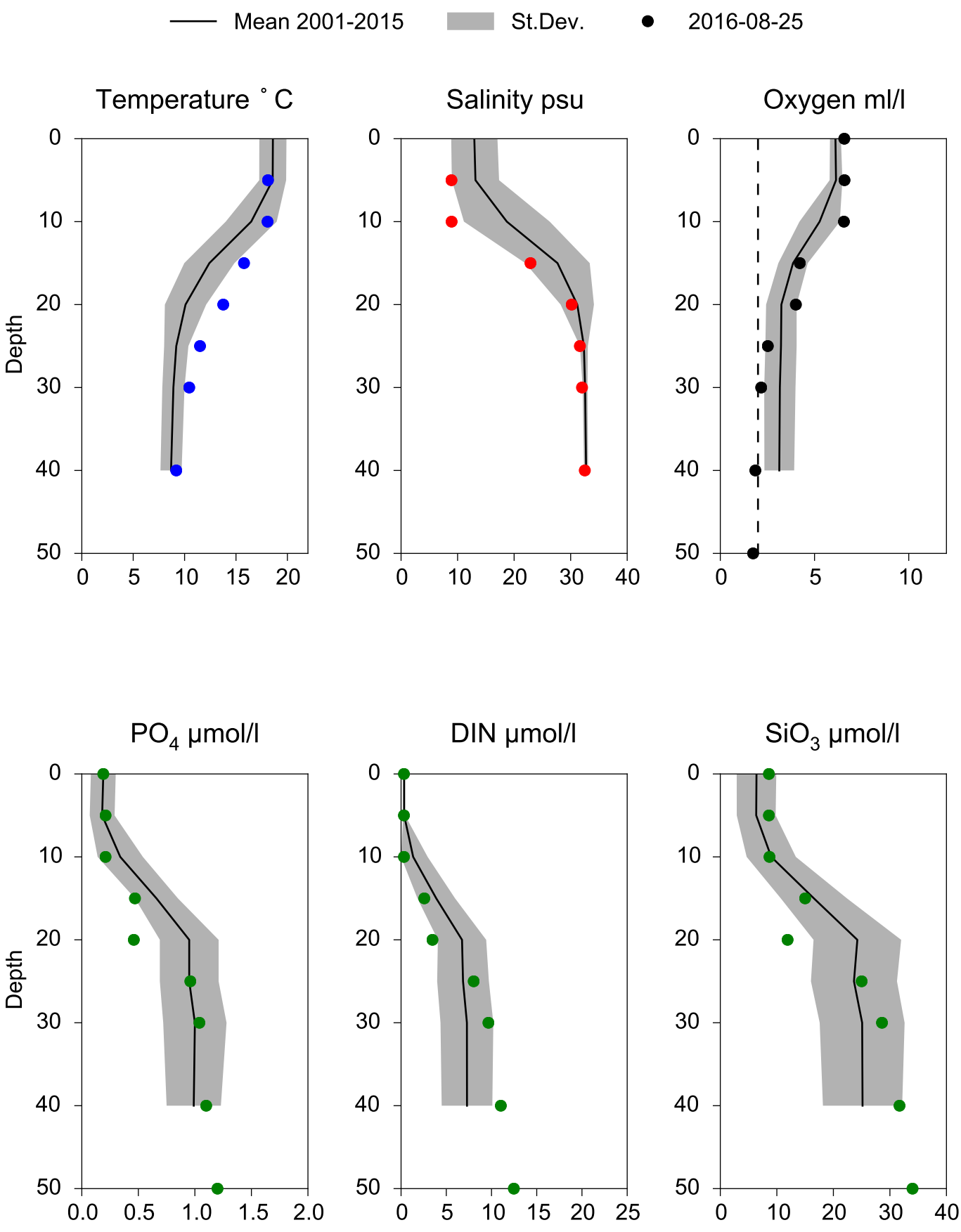
STATION W LANDSKRONA SURFACE WATER (0-10m)



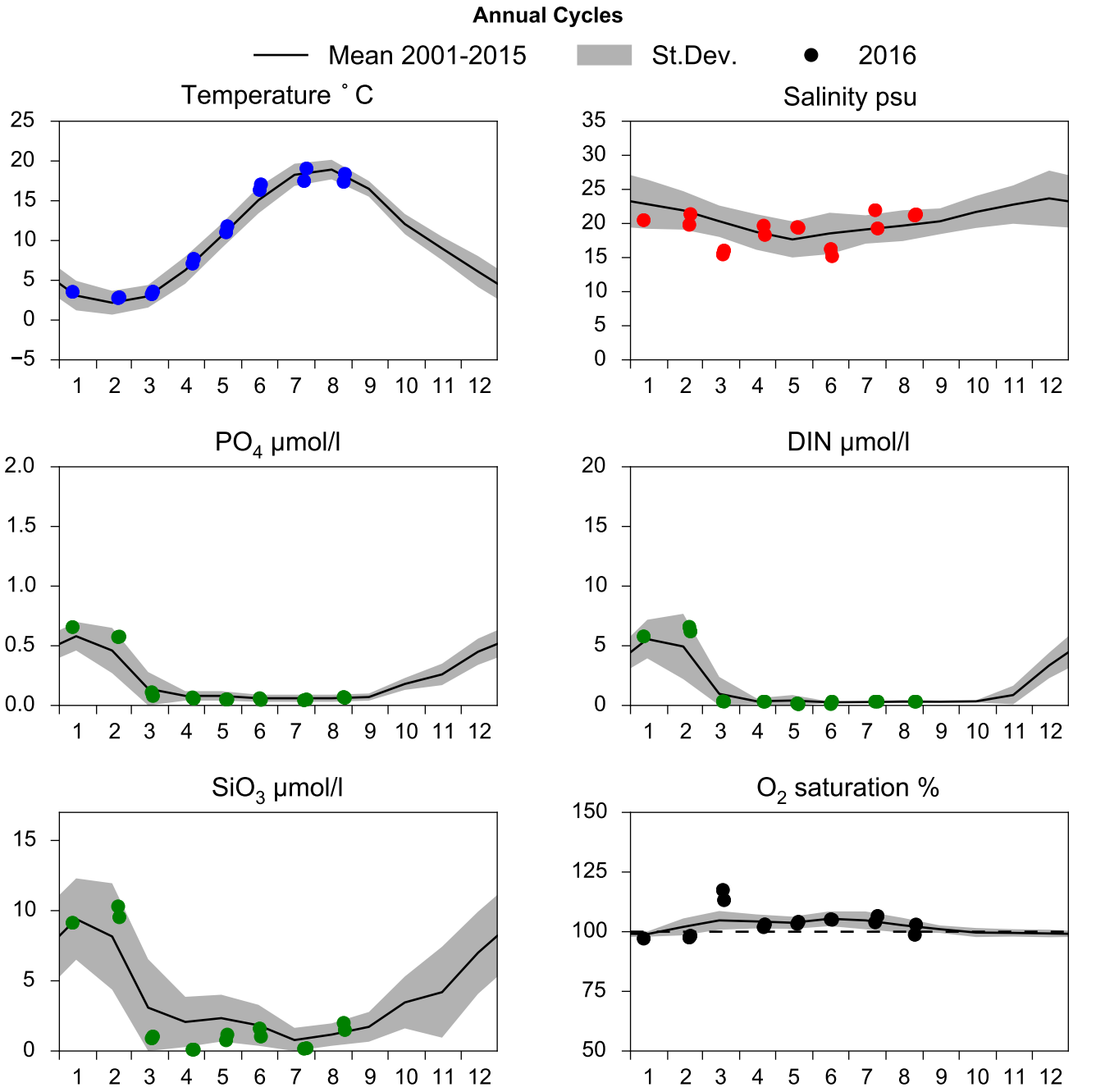
OXYGEN IN BOTTOM WATER (depth >= 40 m)



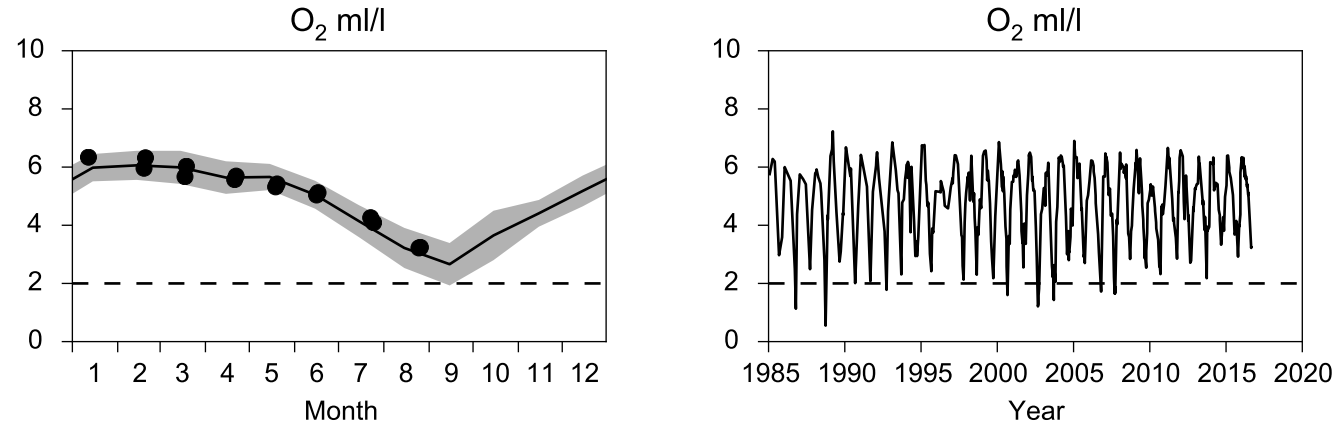
Vertical profiles W LANDSKRONA
August



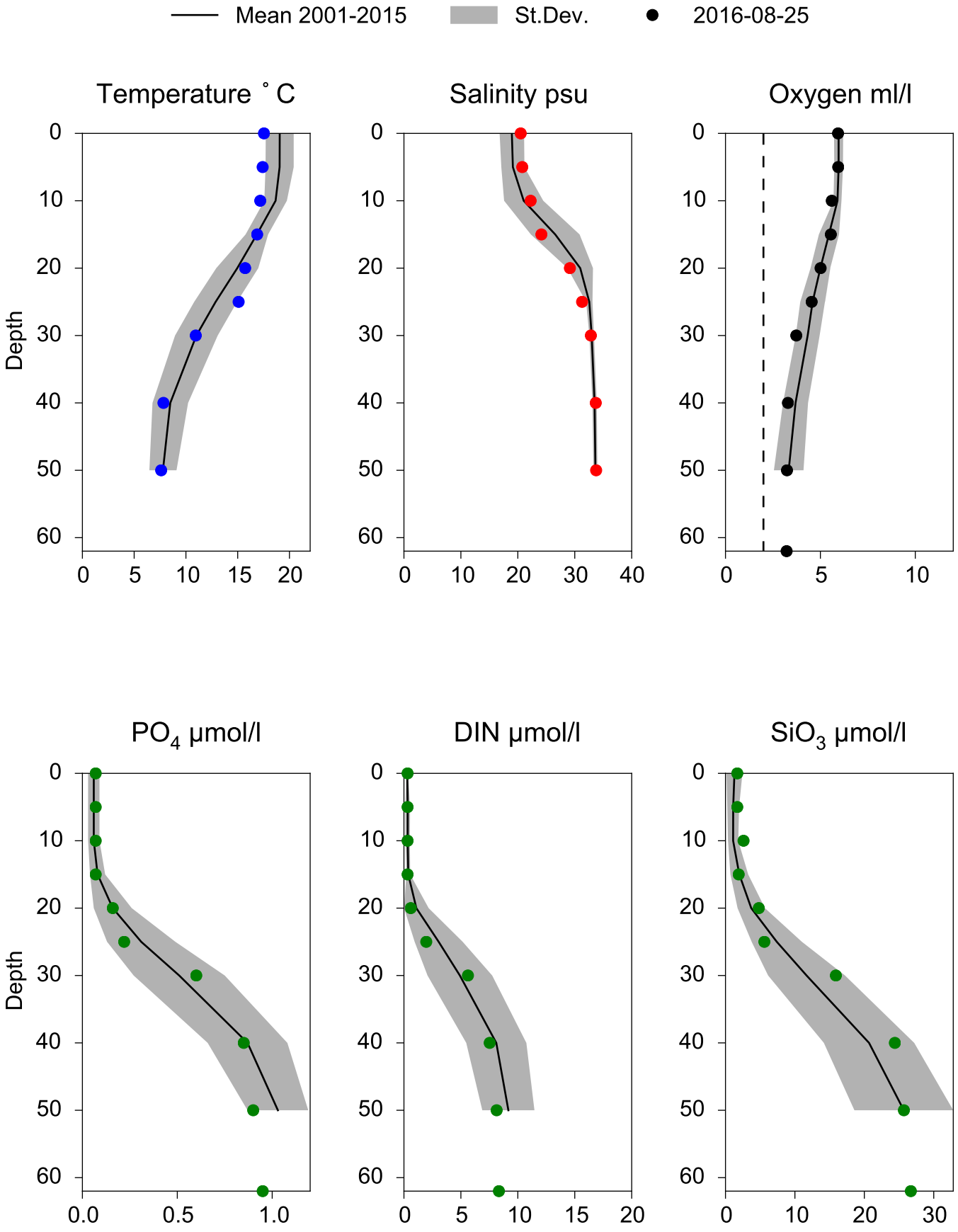
STATION ANHOLT E SURFACE WATER (0-10m)



OXYGEN IN BOTTOM WATER (depth >= 45 m)



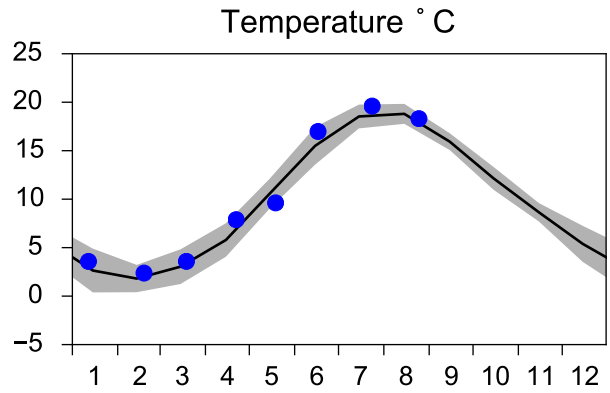
Vertical profiles ANHOLT E
August

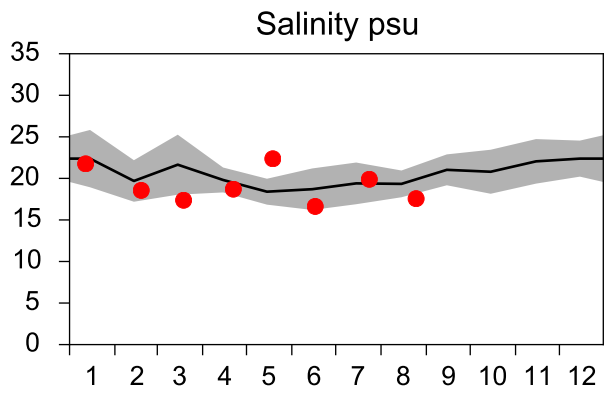


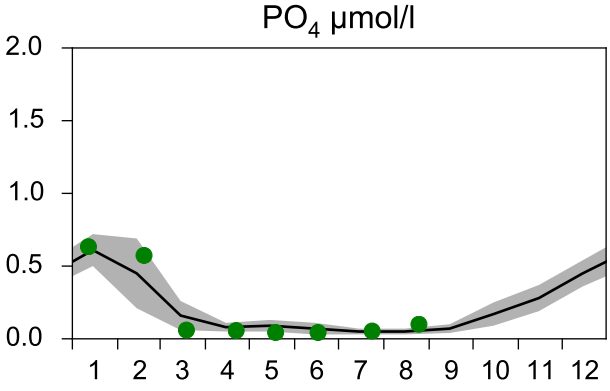
STATION N14 FALKENBERG SURFACE WATER (0-10m)

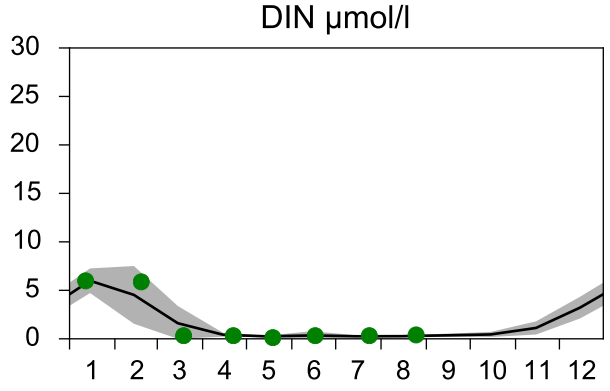
Annual Cycles

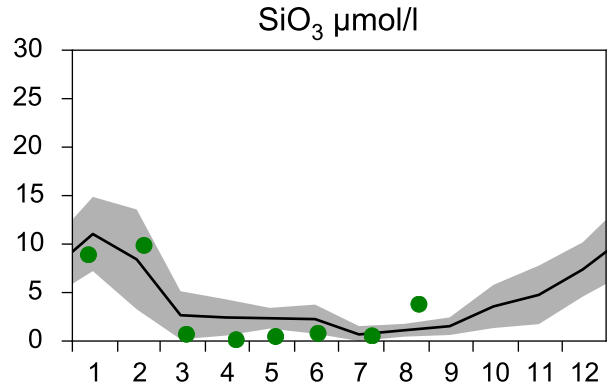
Mean 2001-2015 St.Dev. 2016

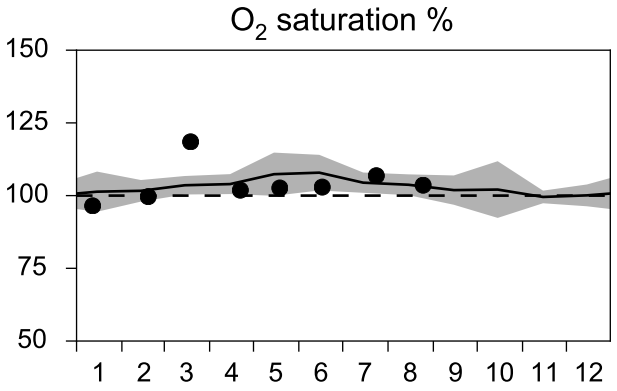




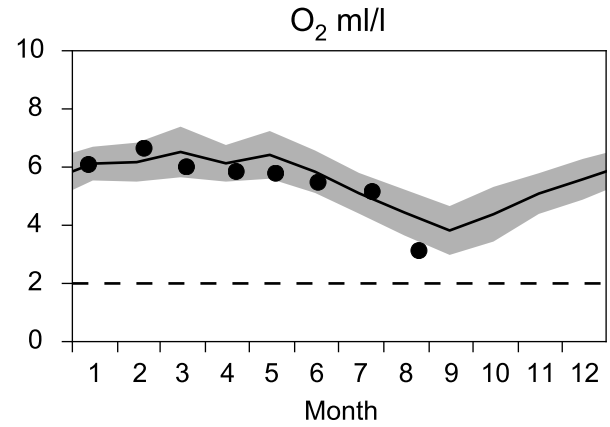


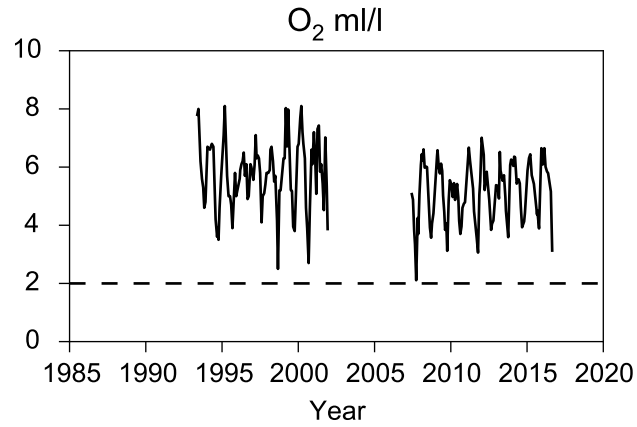




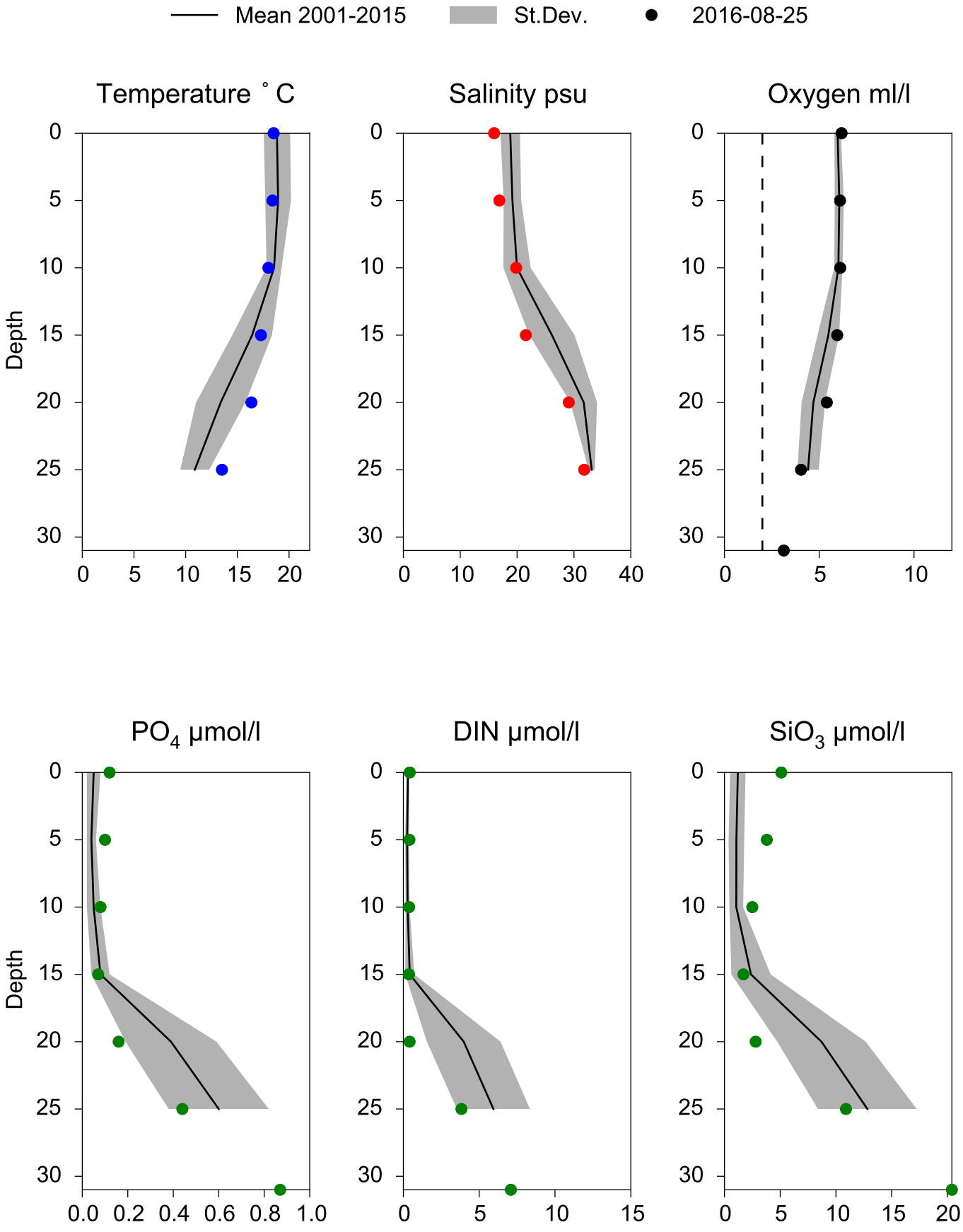


OXYGEN IN BOTTOM WATER (depth >= 25 m)

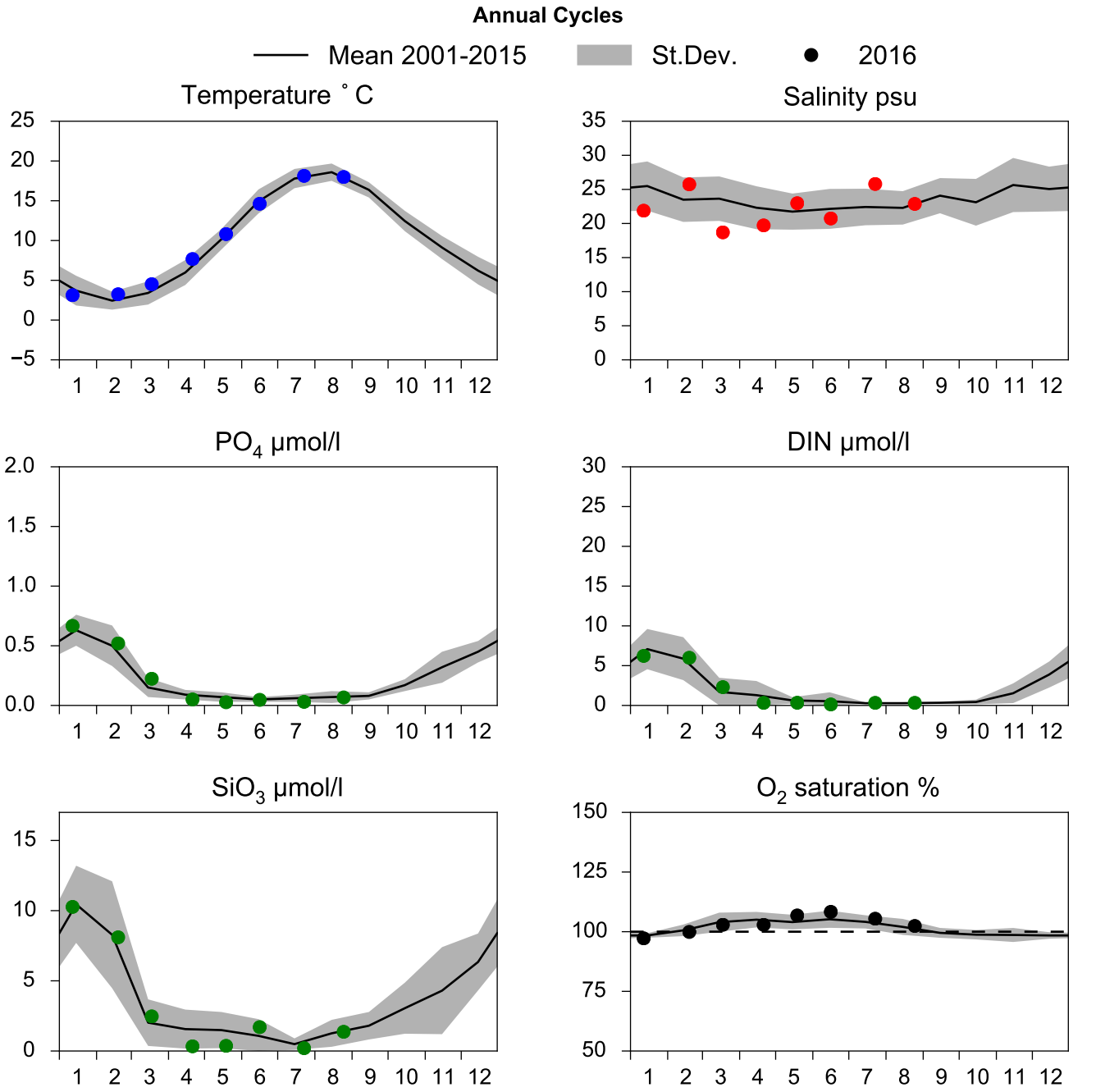




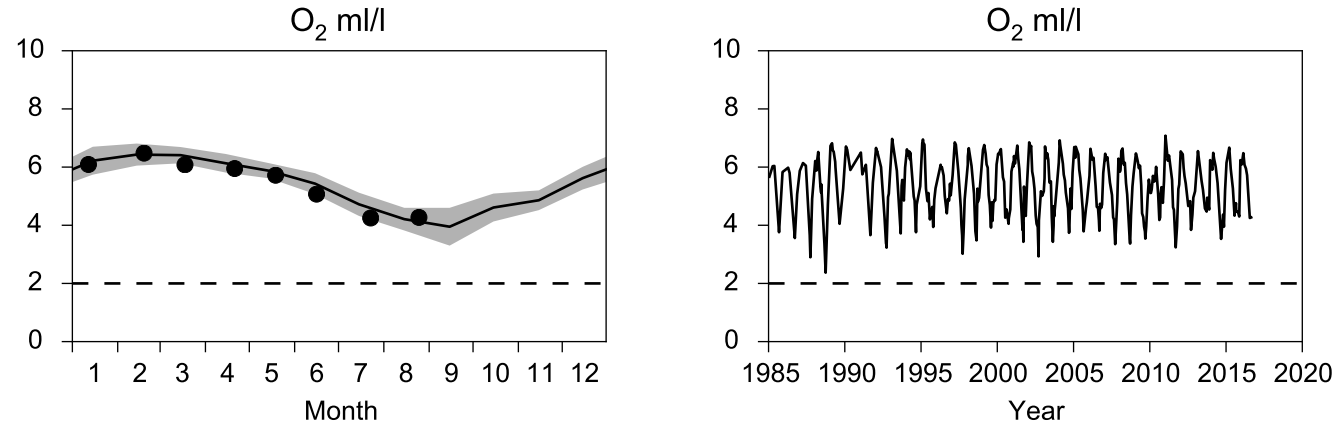
Vertical profiles N14 FALKENBERG
August



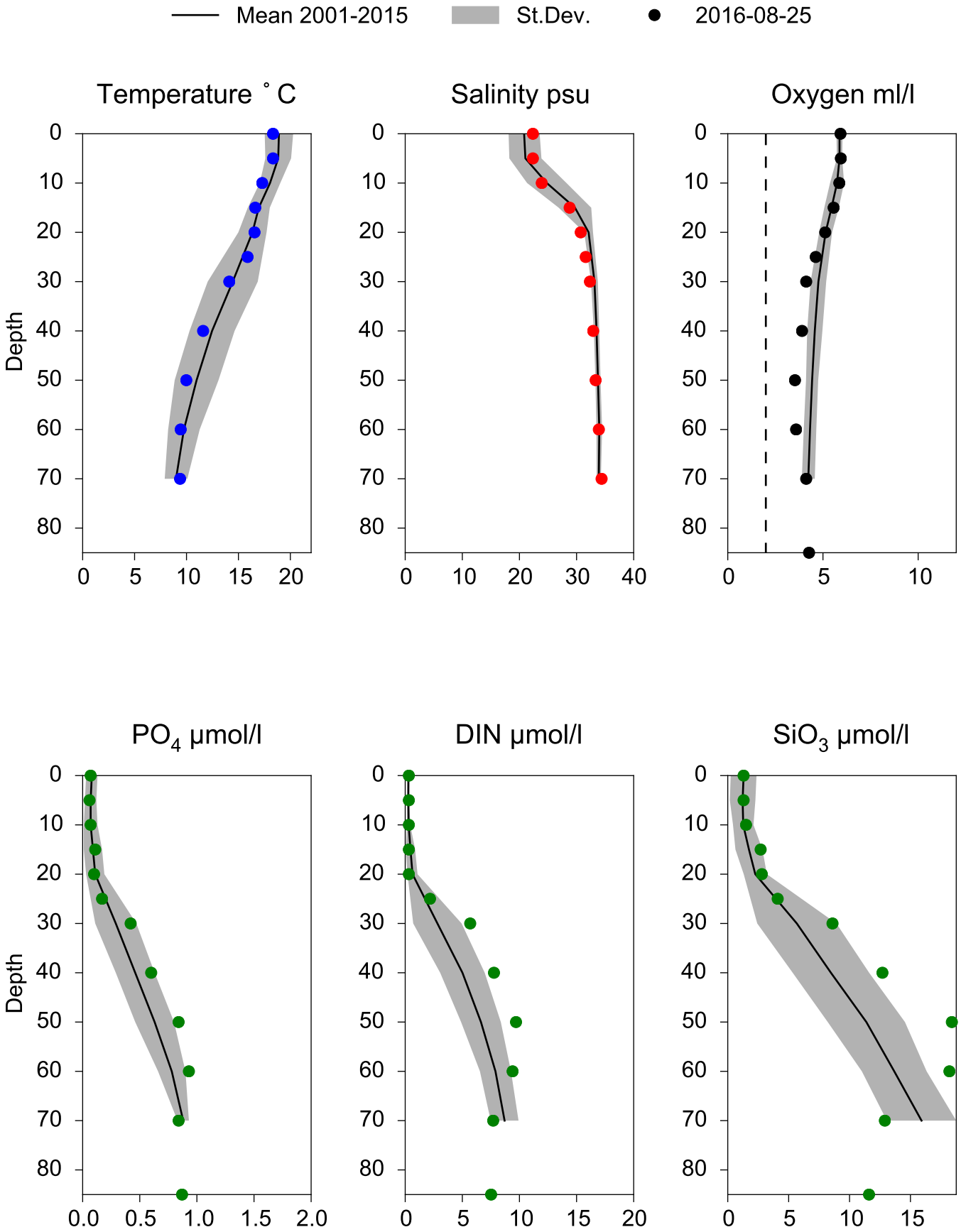
STATION FLADEN SURFACE WATER (0-10m)



OXYGEN IN BOTTOM WATER (depth >= 65 m)



Vertical profiles FLADEN
August

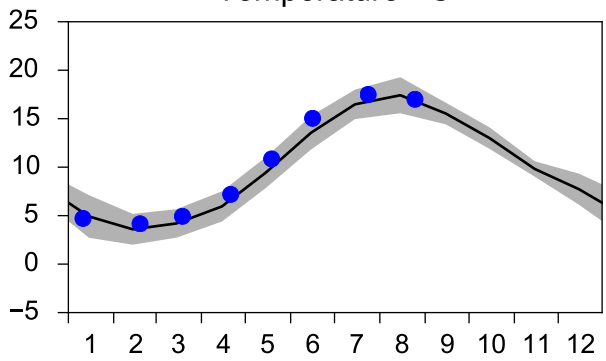


STATION Å17 SURFACE WATER (0-10m)

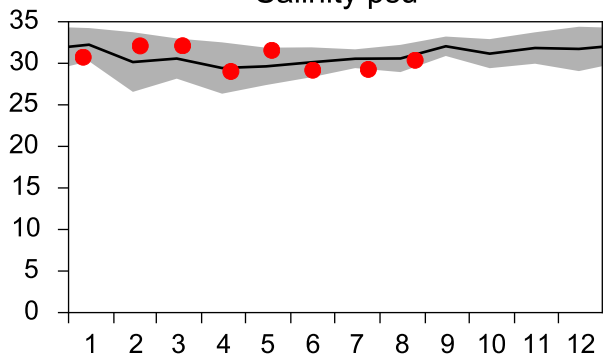
Annual Cycles

Mean 2001-2015 St.Dev. 2016

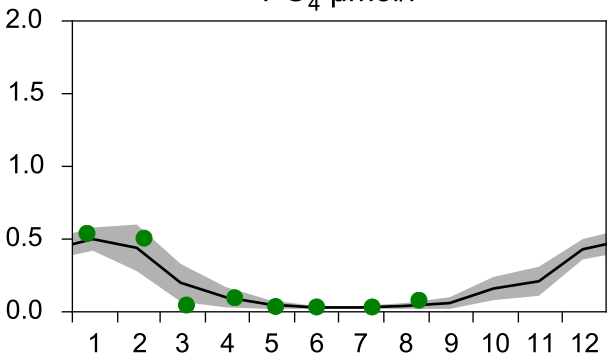
Temperature ˚C



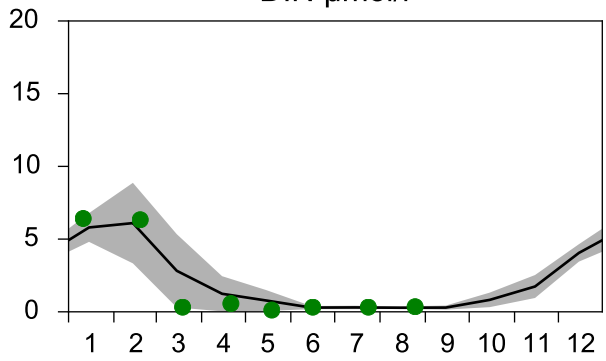
Salinity psu



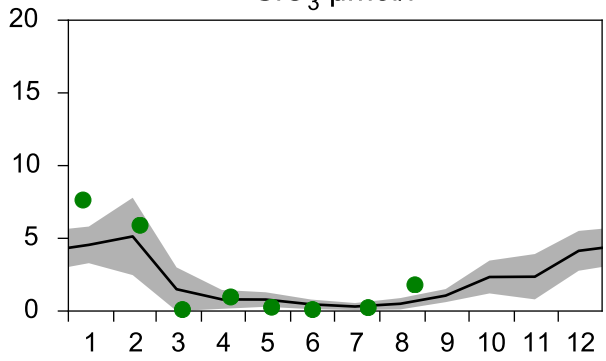
PO_4 µmol/l



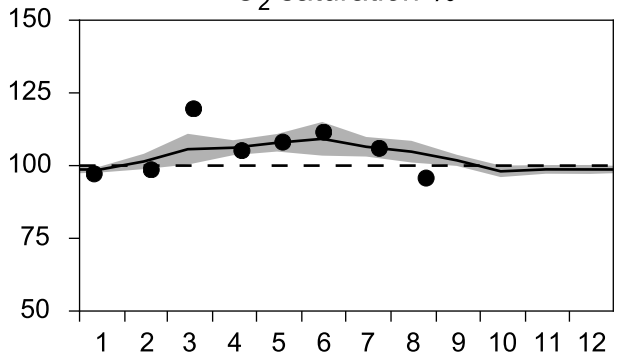
DIN µmol/l



SiO_3 µmol/l

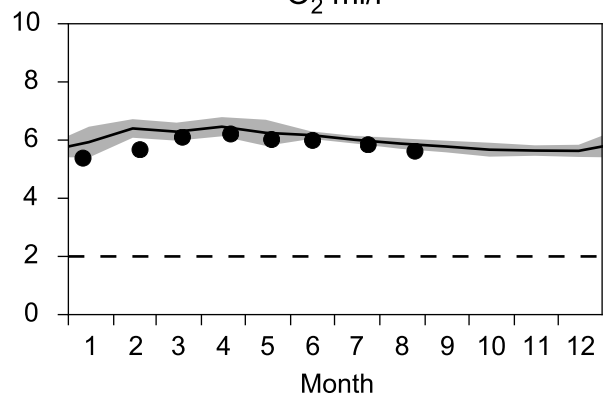


O_2 saturation %

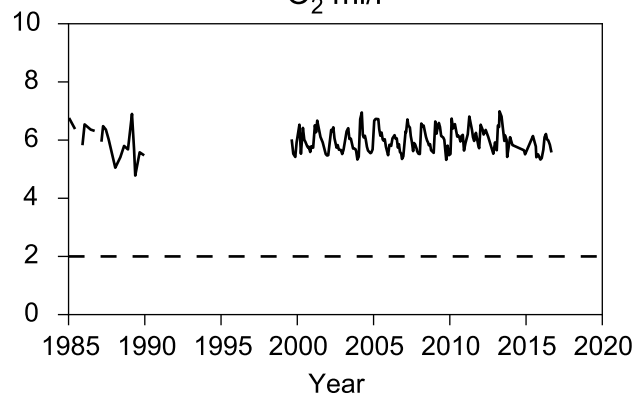


OXYGEN IN BOTTOM WATER (depth >= 300 m)

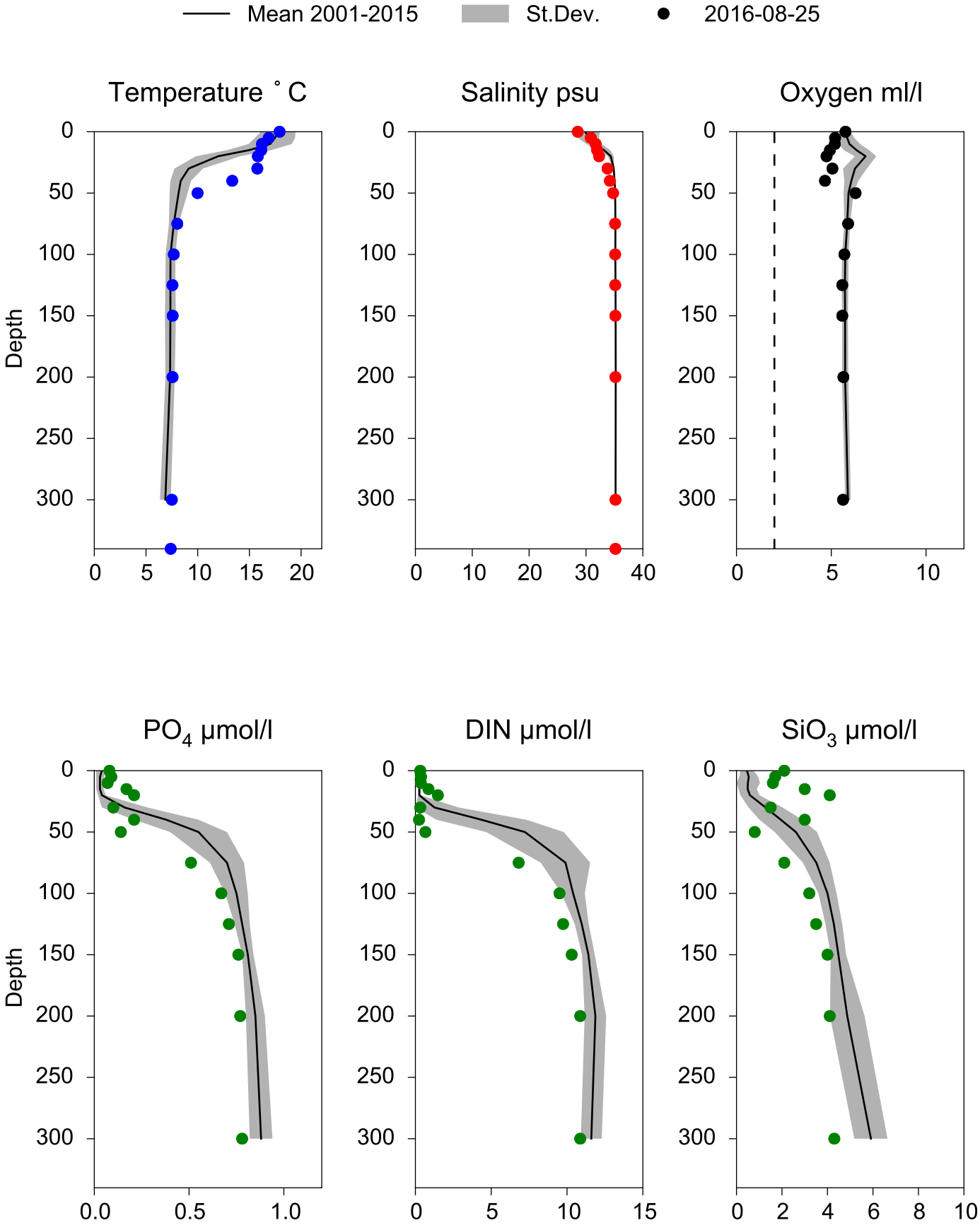
O_2 ml/l



O_2 ml/l

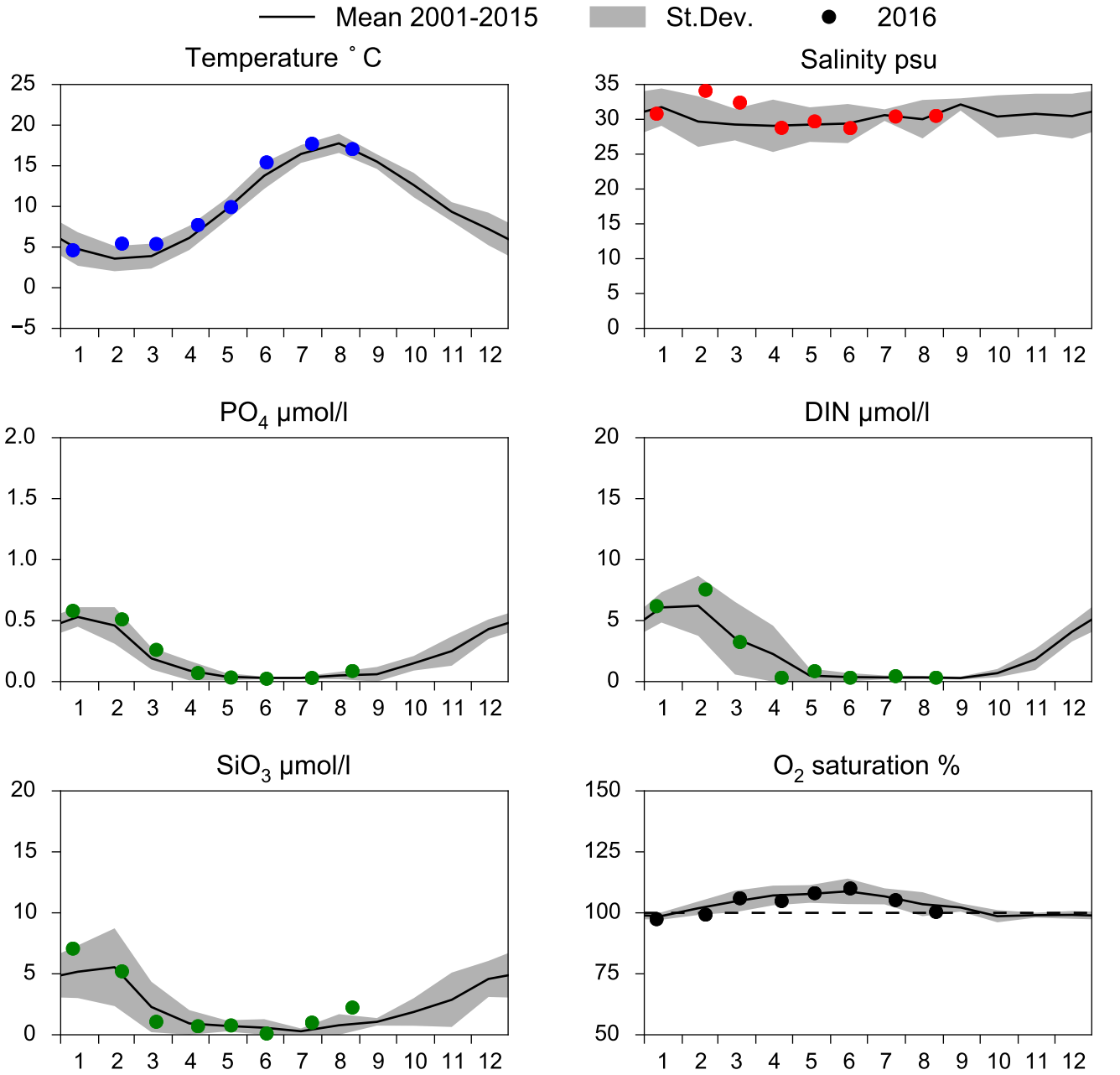


Vertical profiles Å17
August

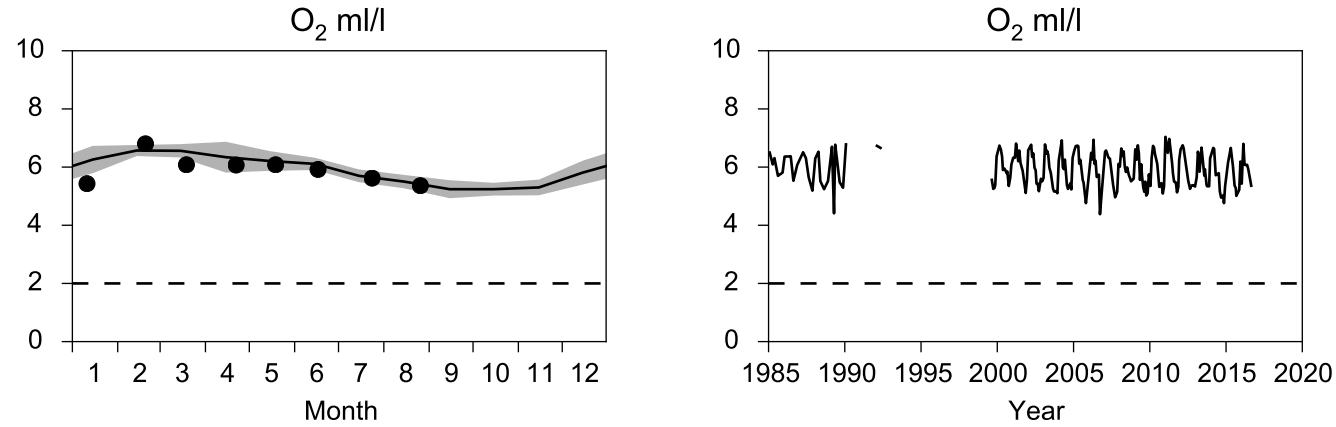


STATION Å15 SURFACE WATER (0-10m)

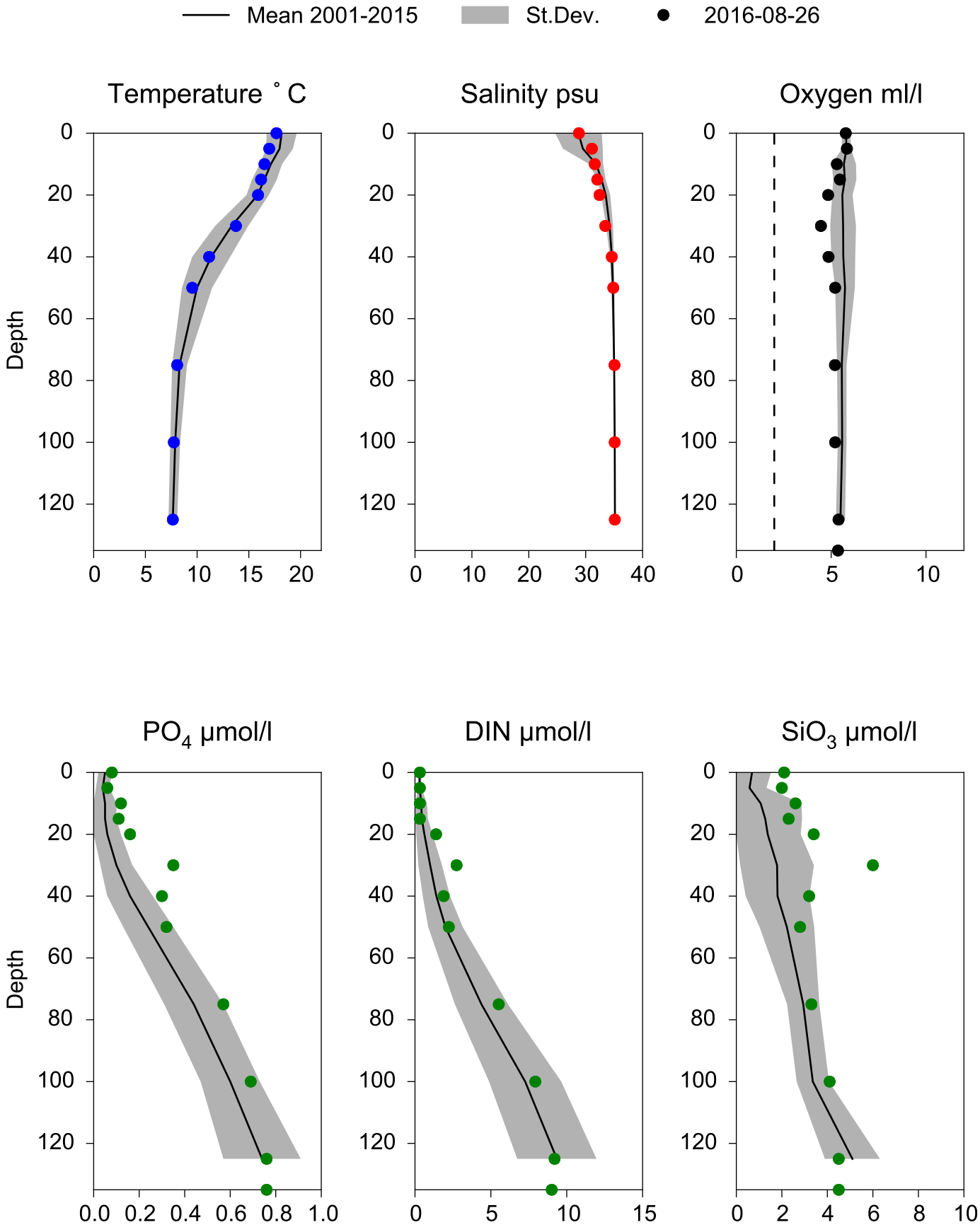
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 125 m)



Vertical profiles Å15
August

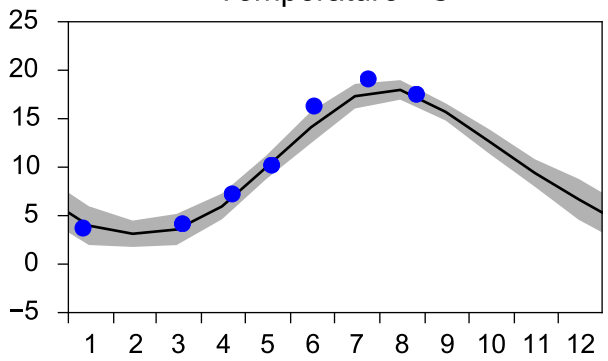


STATION Å13 SURFACE WATER (0-10m)

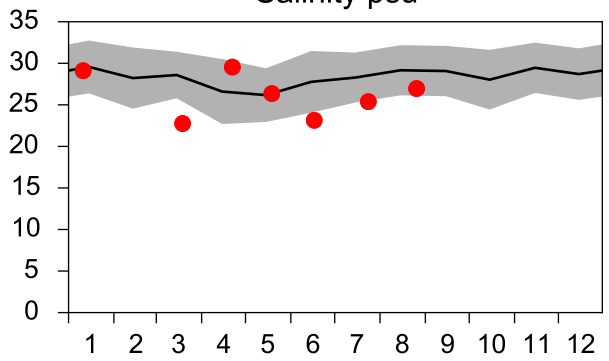
Annual Cycles

Mean 2001-2015 St.Dev. 2016

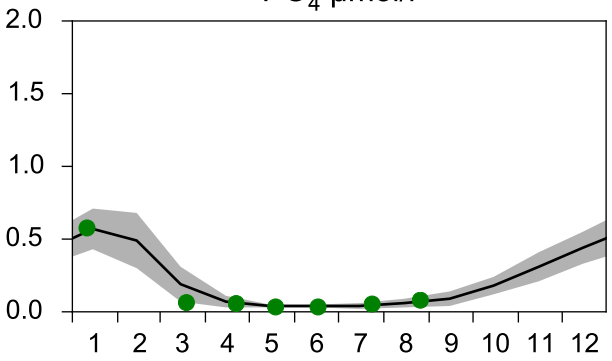
Temperature ˚C



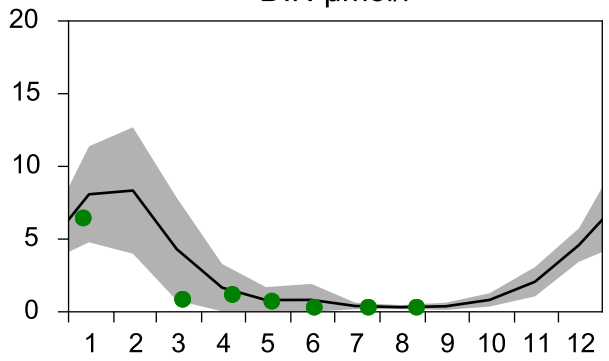
Salinity psu



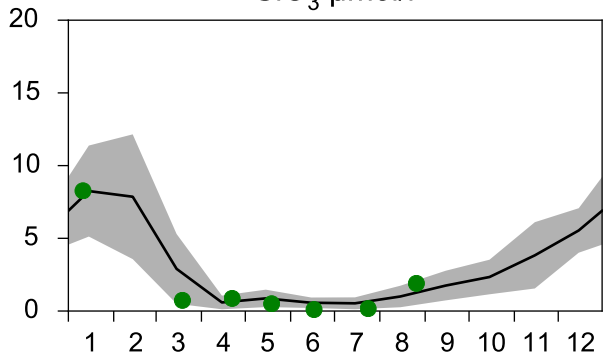
PO_4 µmol/l



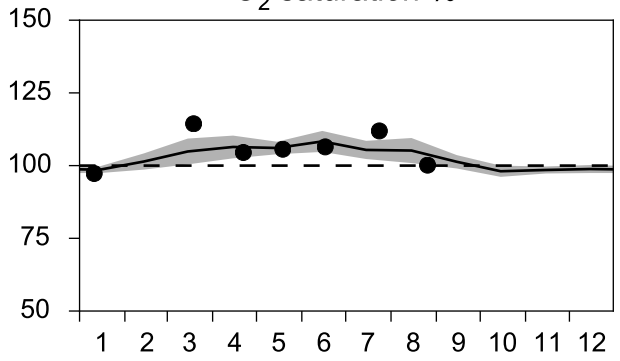
DIN µmol/l



SiO_3 µmol/l

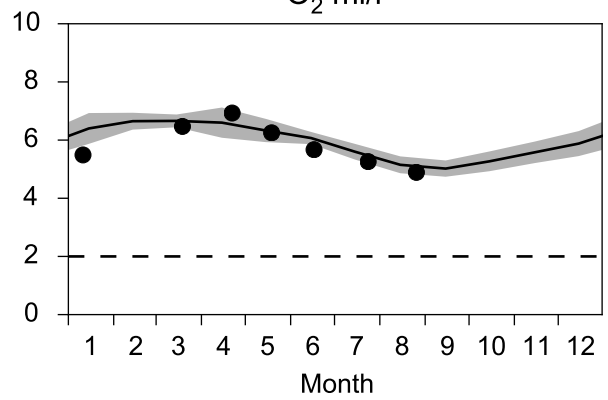


O_2 saturation %

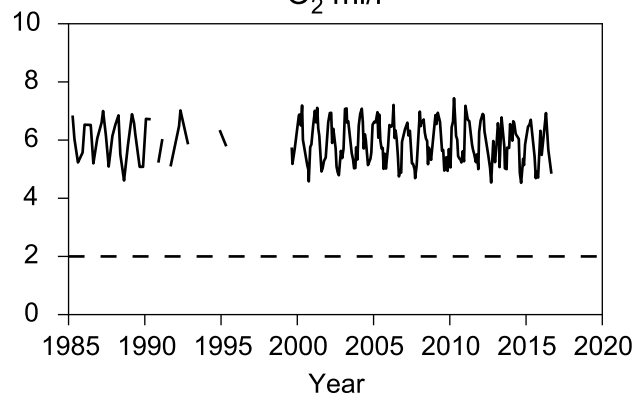


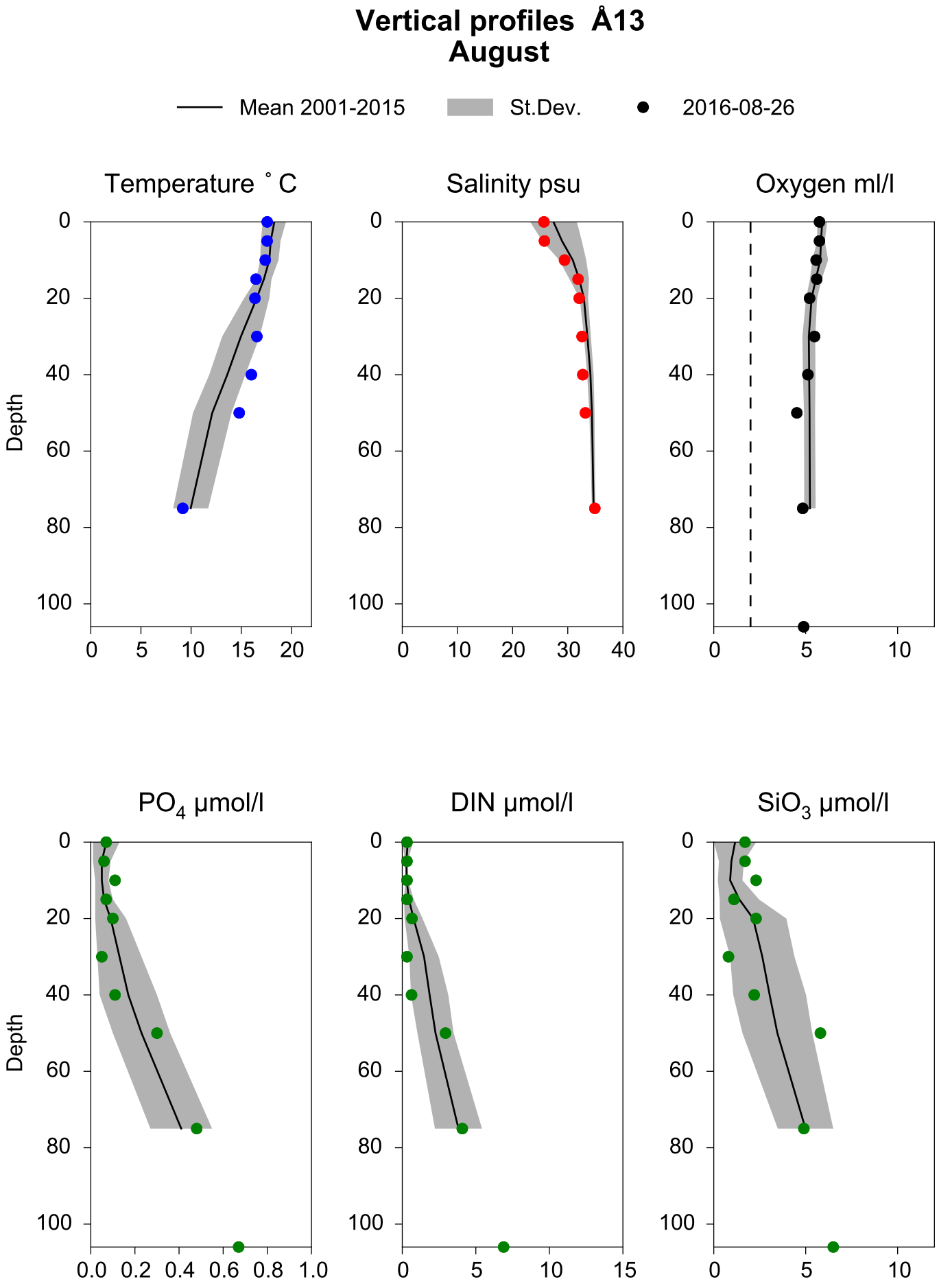
OXYGEN IN BOTTOM WATER (depth >= 75 m)

O_2 ml/l

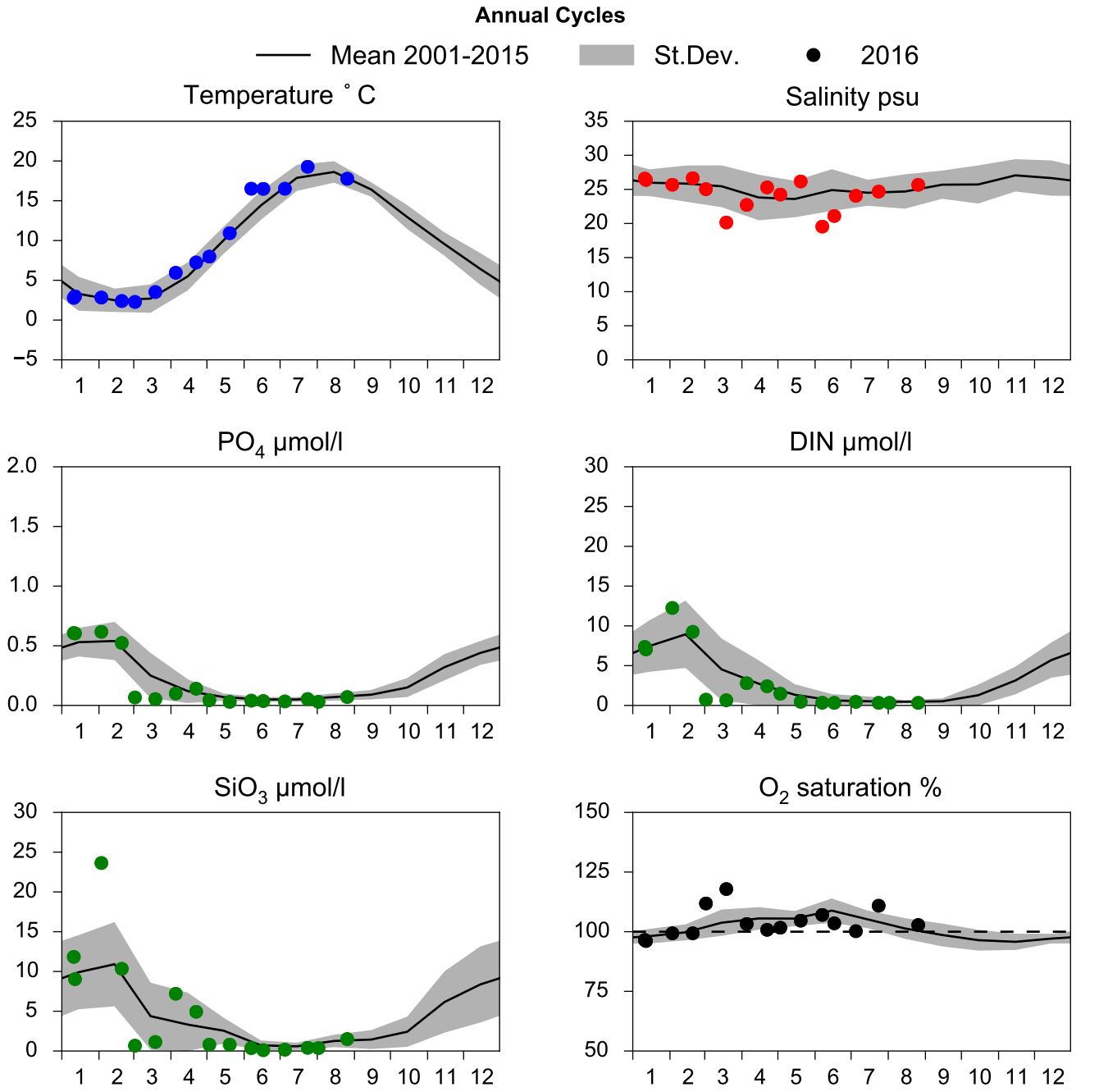


O_2 ml/l

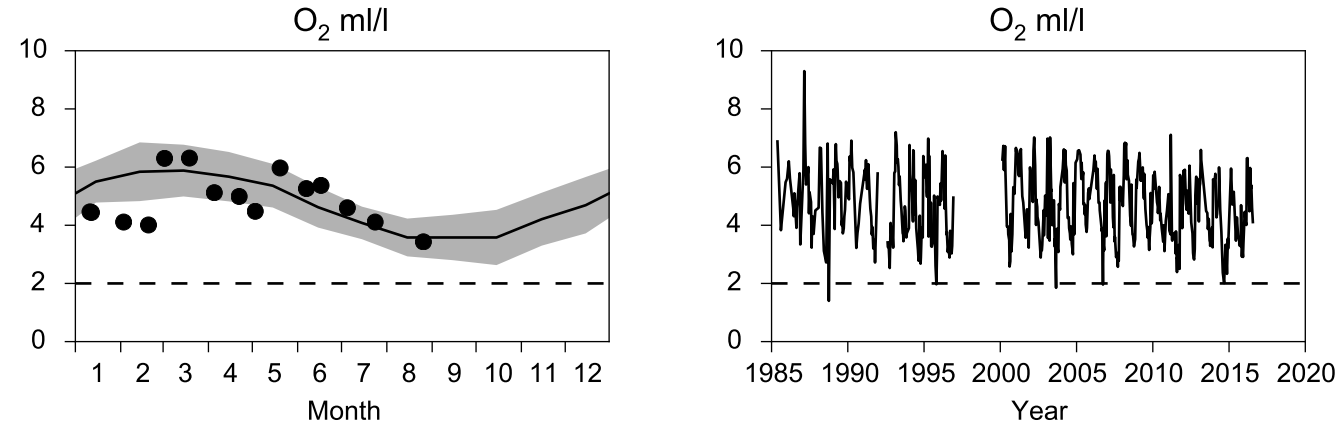



Vertical profiles Å13
August
Mean 2001-2015
St.Dev.
2016-08-26
Temperature ˚ C
Salinity psu
Oxygen ml/l
PO4 µmol/l
DIN µmol/l
SiO3 µmol/l
Depth
0
20
40
60
80
100
0 5 10 15 20
0 10 20 30 40
0 5 10
0.0 0.2 0.4 0.6 0.8 1.0
0 5 10 15

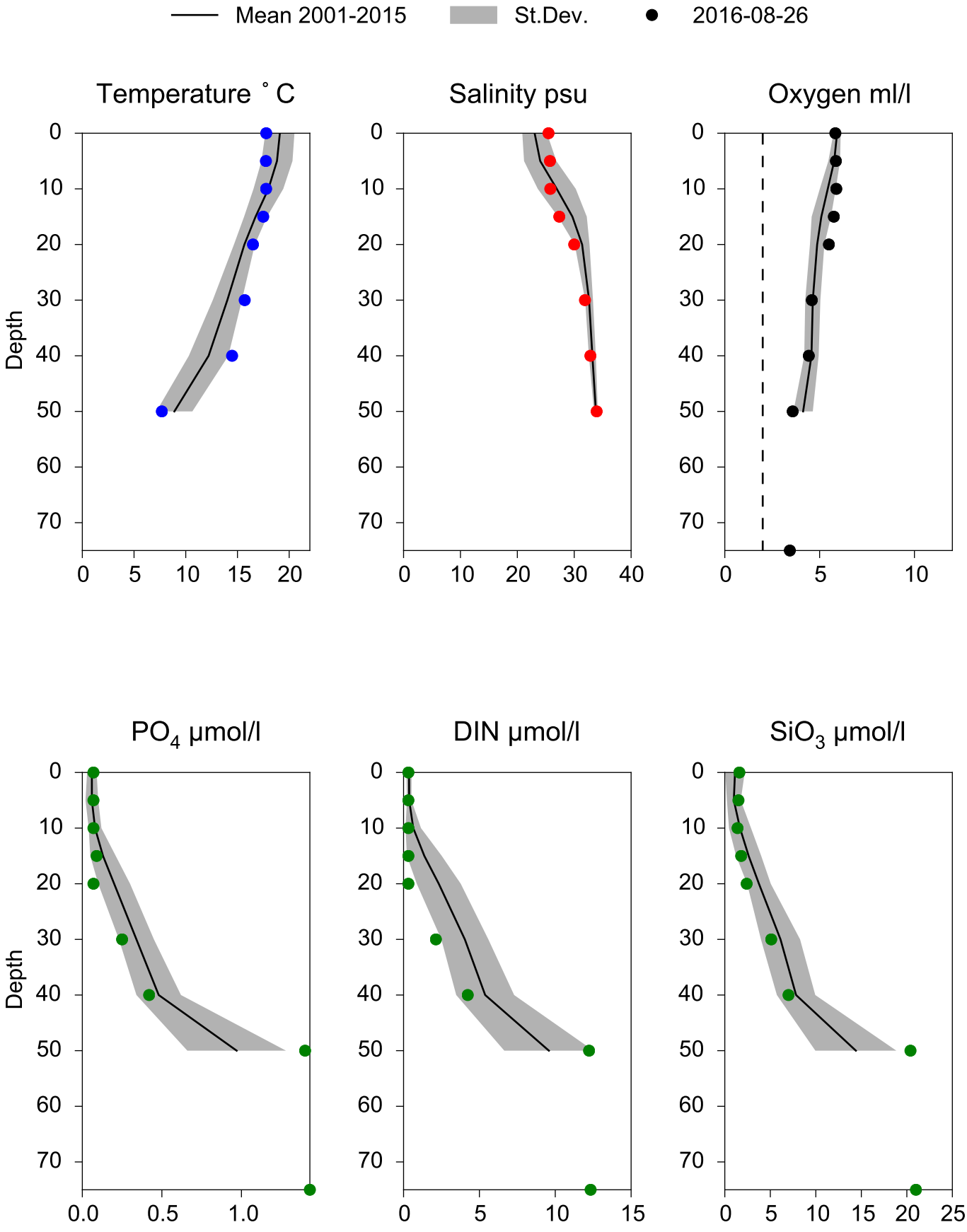
STATION SLÄGGÖ SURFACE WATER (0-10m)



OXYGEN IN BOTTOM WATER (depth >= 50 m)



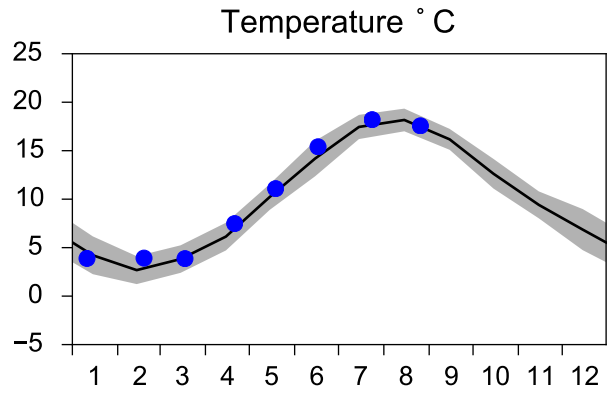
Vertical profiles SLÄGGÖ
August

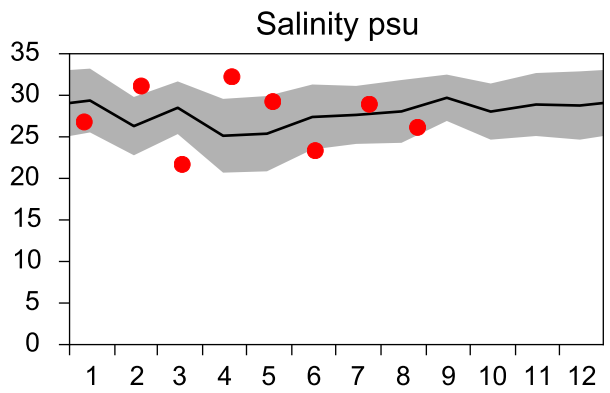


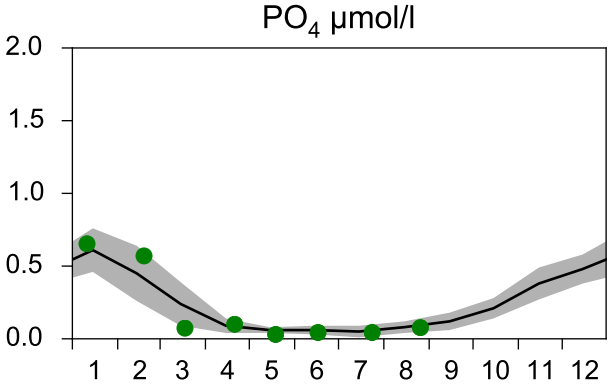
STATION P2 SURFACE WATER (0-10m)

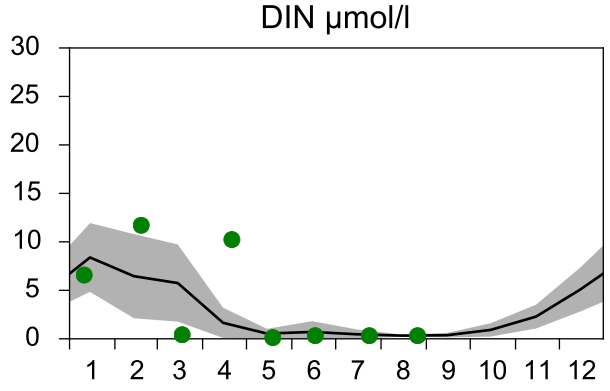
Annual Cycles

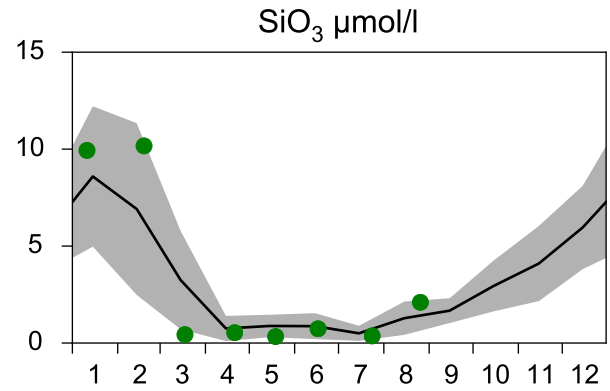
Mean 2001-2015 St.Dev. 2016

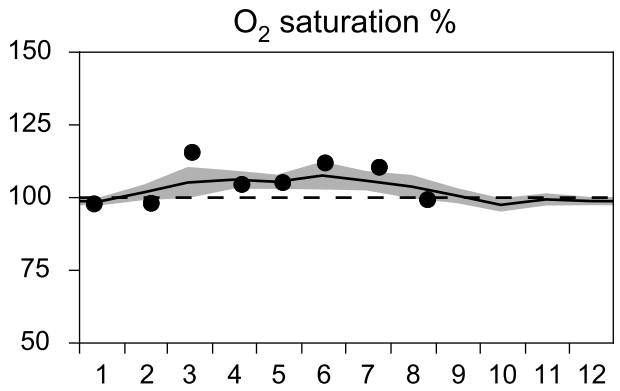




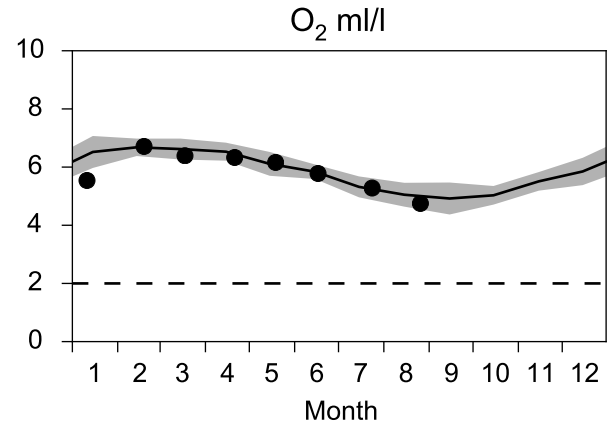


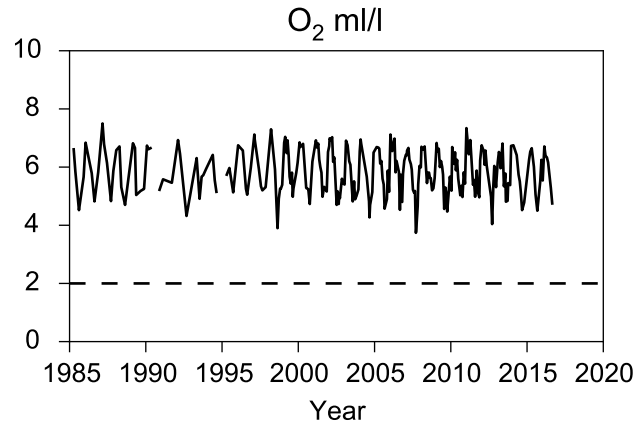




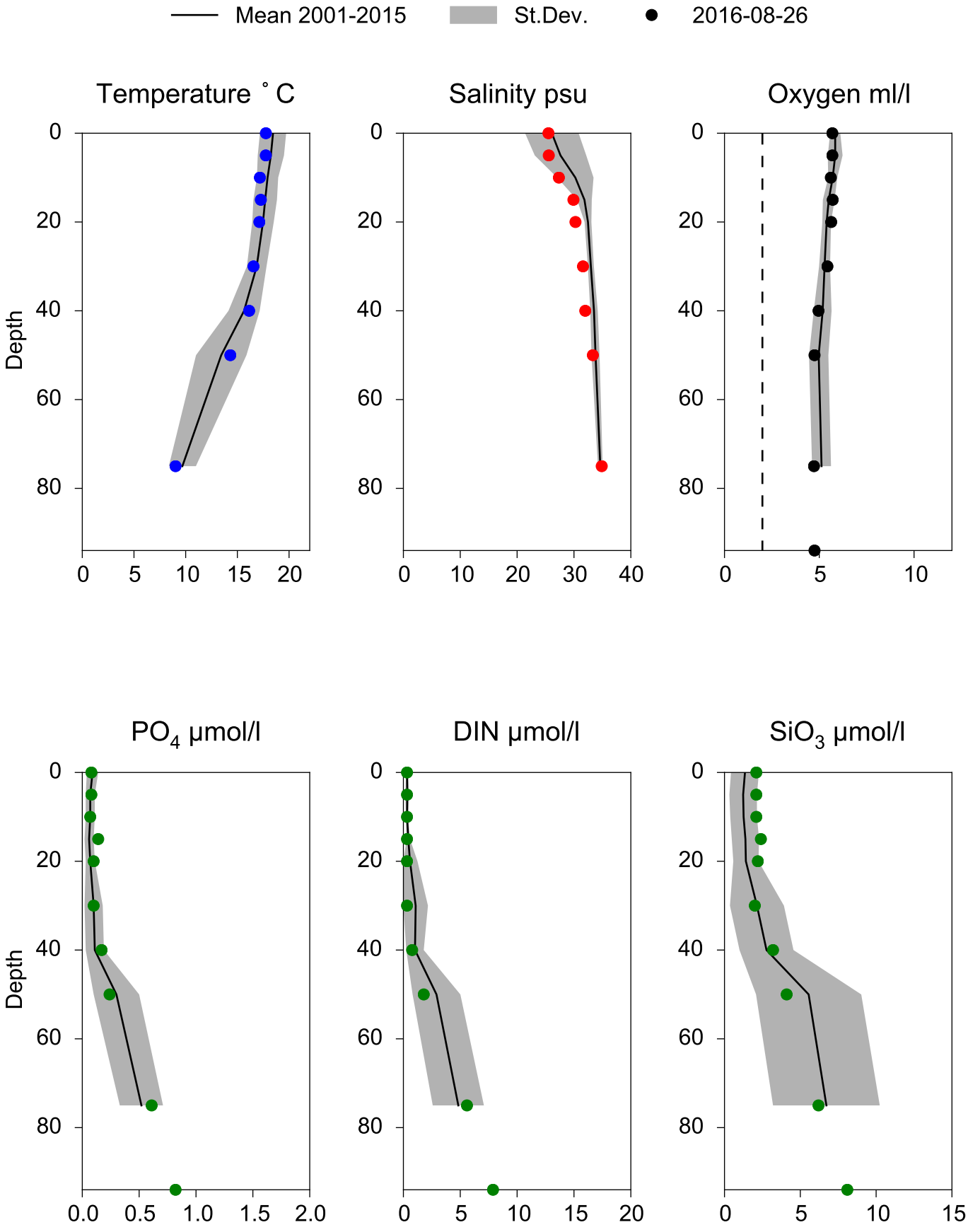


OXYGEN IN BOTTOM WATER (depth >= 80 m)

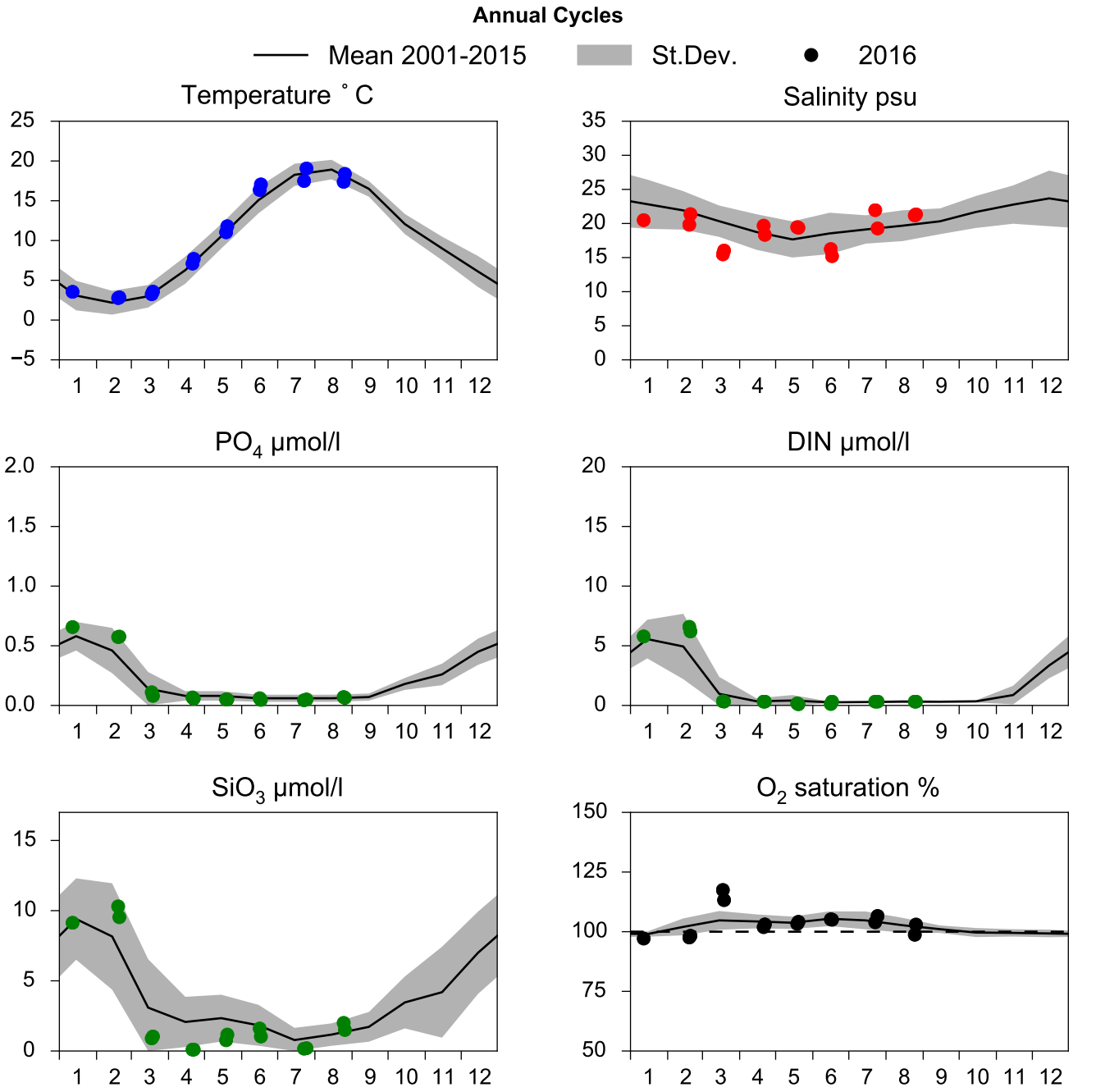




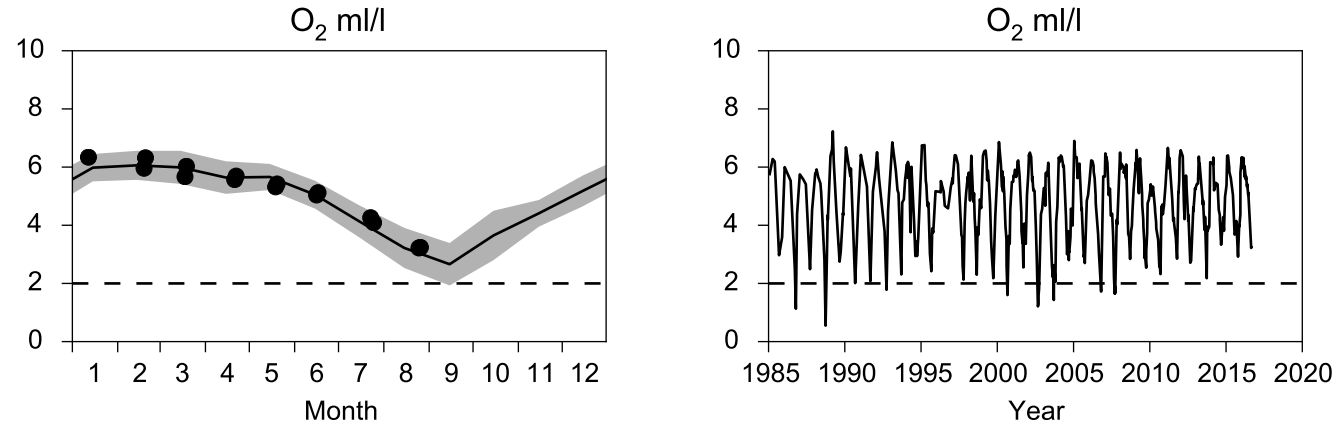
Vertical profiles P2
August



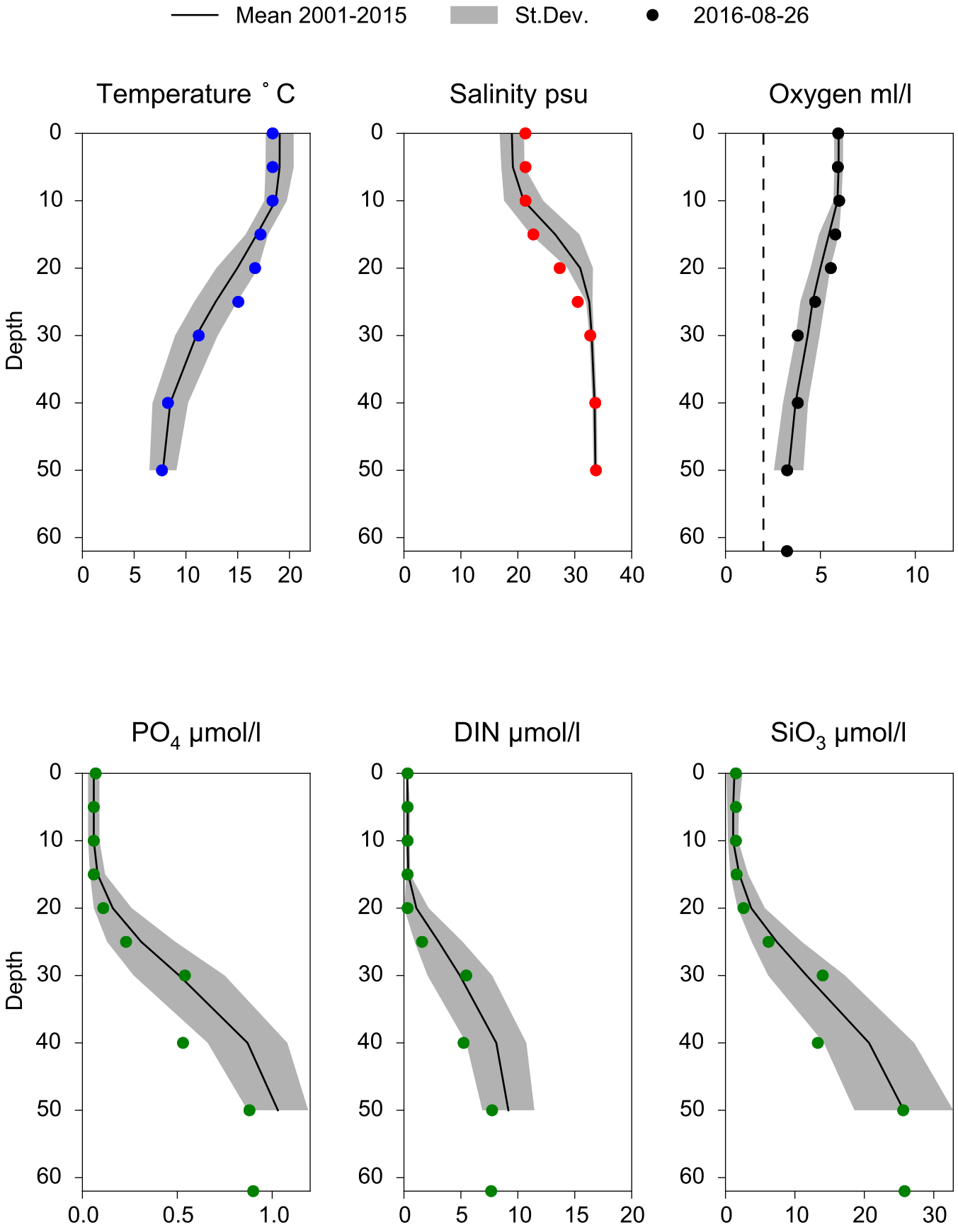
STATION ANHOLT E SURFACE WATER (0-10m)



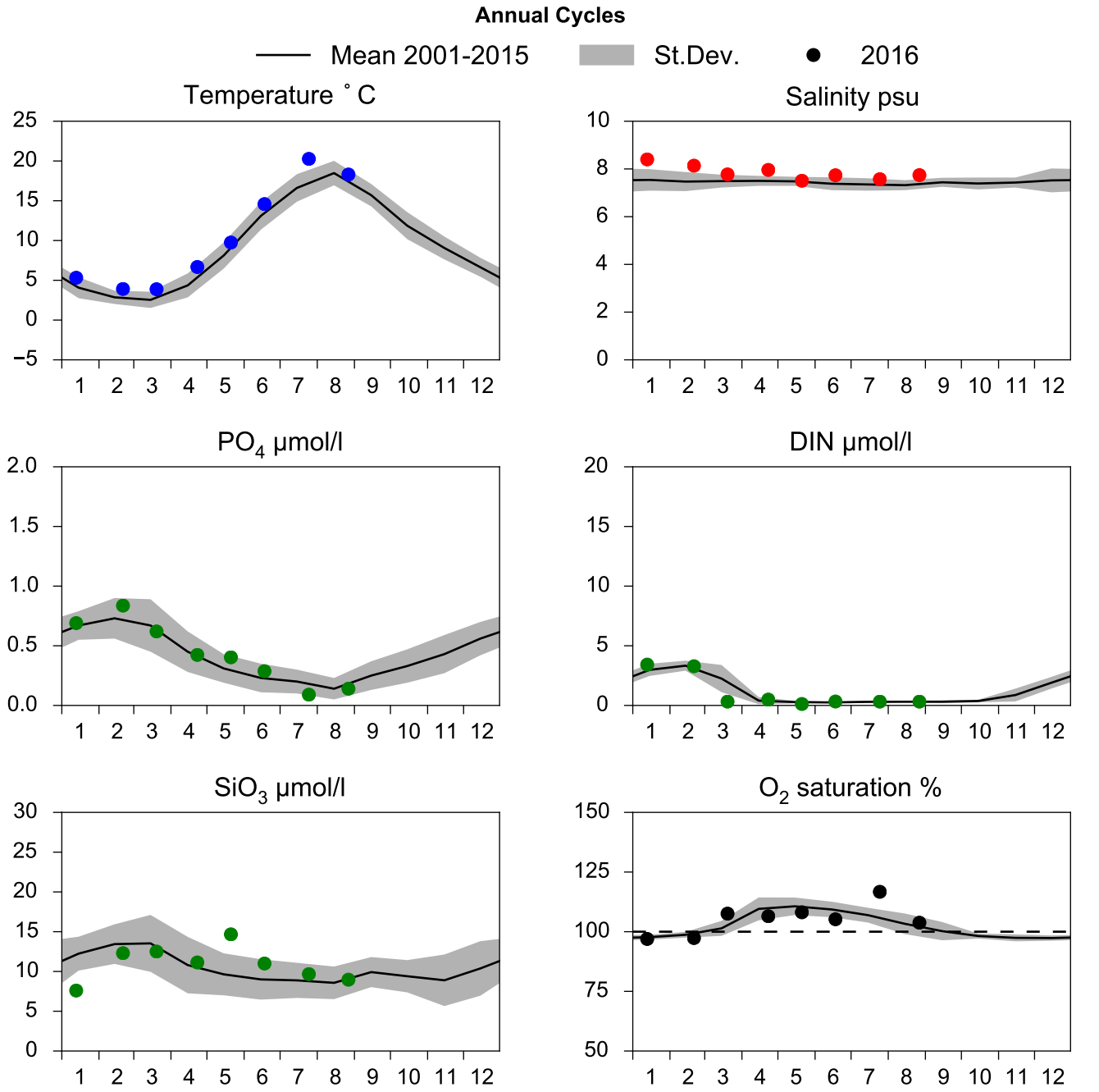
OXYGEN IN BOTTOM WATER (depth >= 45 m)



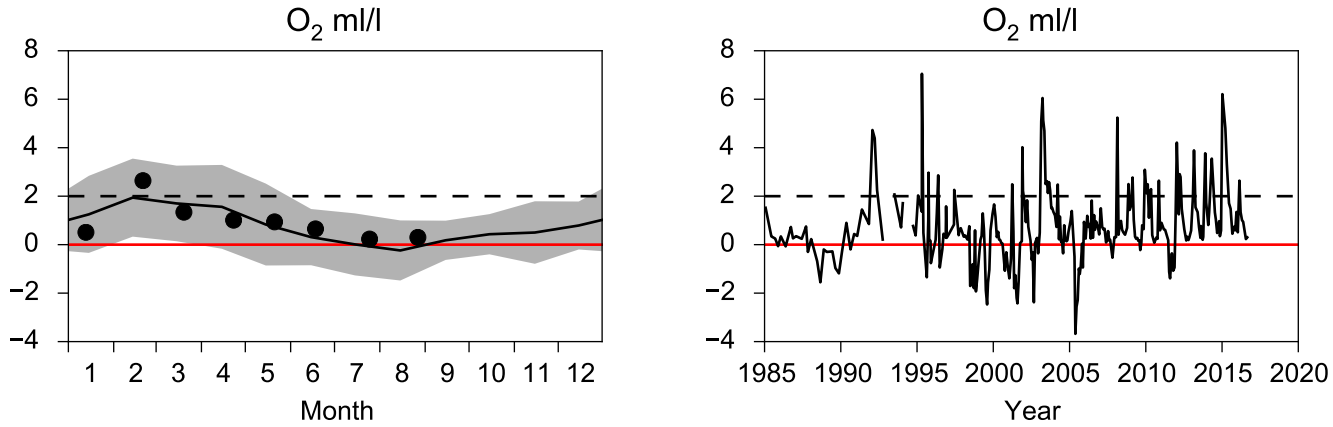
Vertical profiles ANHOLT E
August



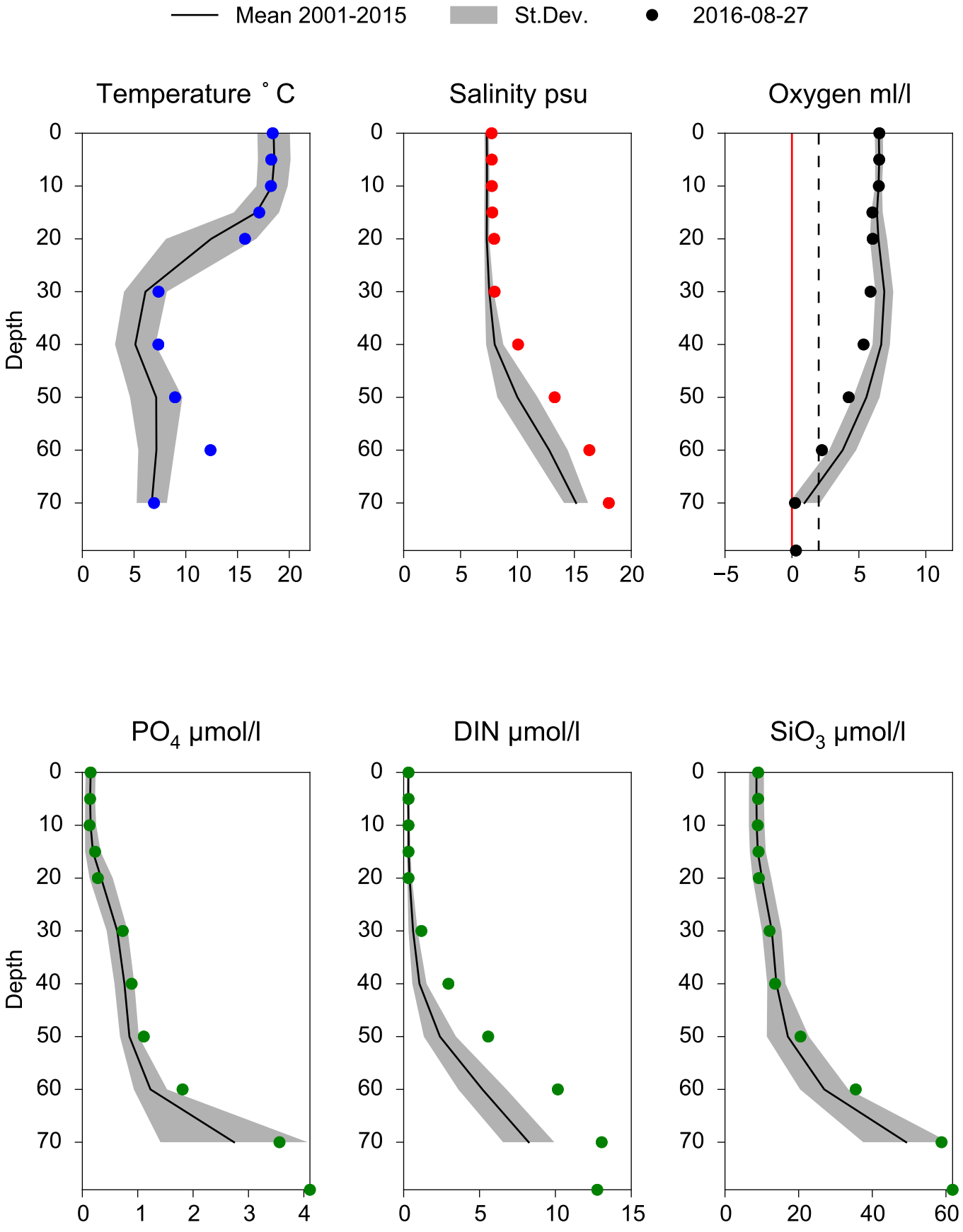
STATION HANÖBUKTEN SURFACE WATER (0-10m)



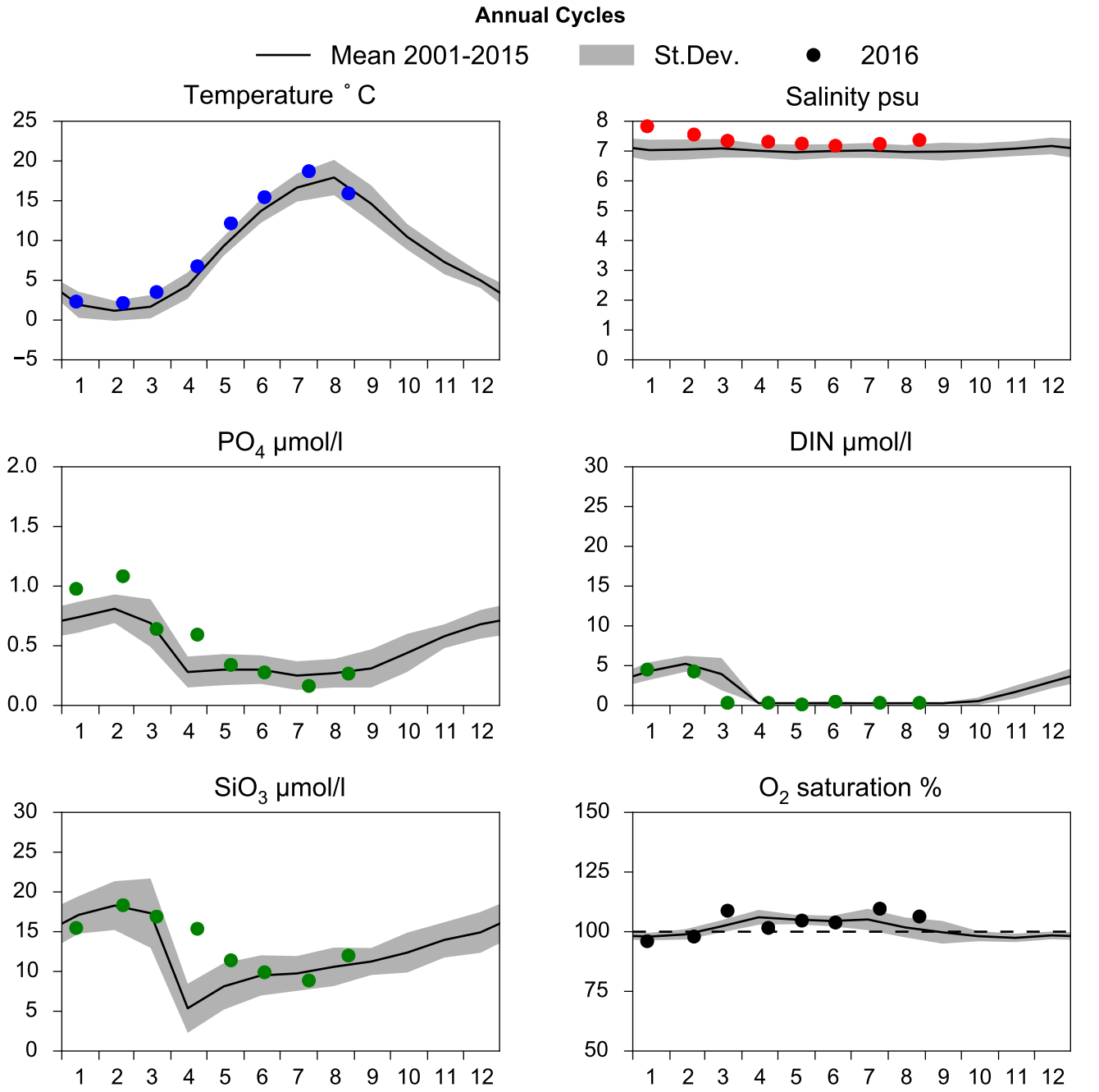
OXYGEN IN BOTTOM WATER (depth >= 70 m)



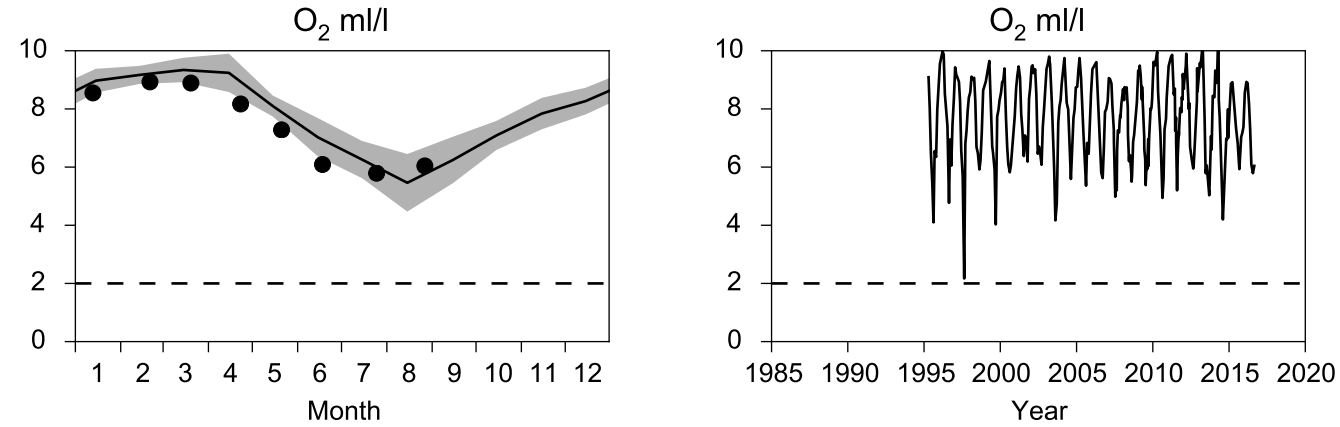
Vertical profiles HANÖBUKTEN
August



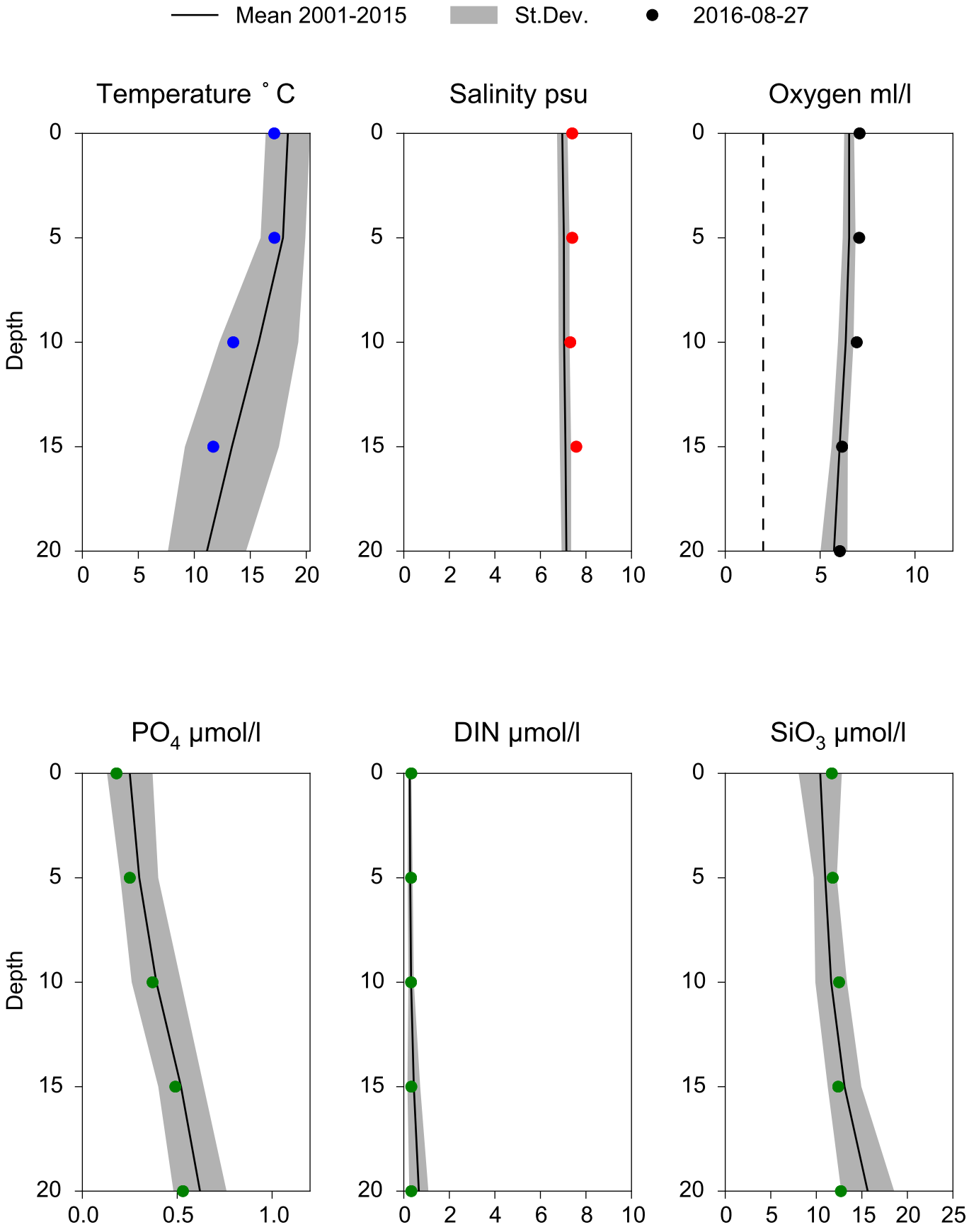
STATION REF M1V1 SURFACE WATER (0-10m)



OXYGEN IN BOTTOM WATER (depth >= 17 m)

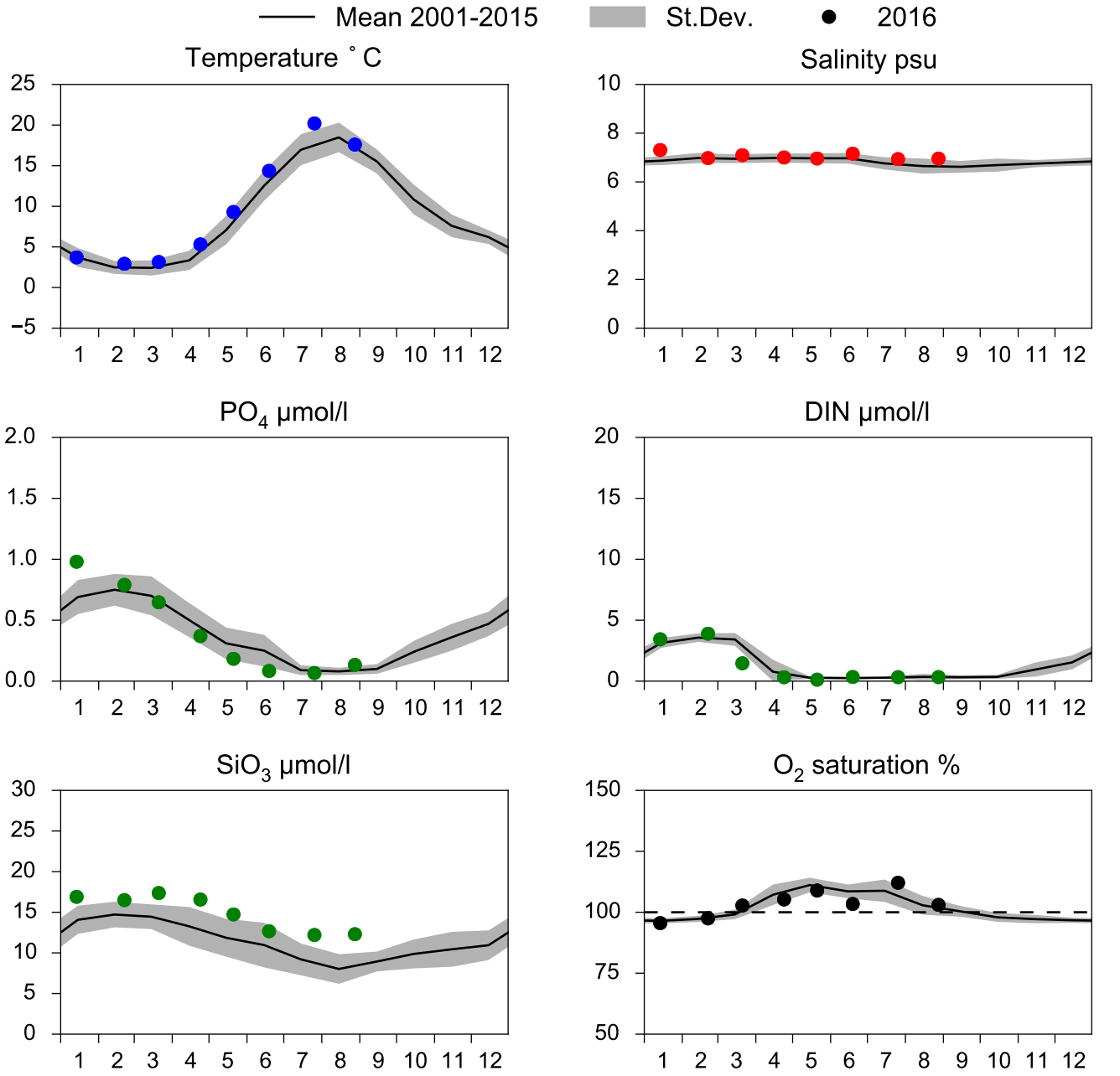


Vertical profiles REF M1V1
August

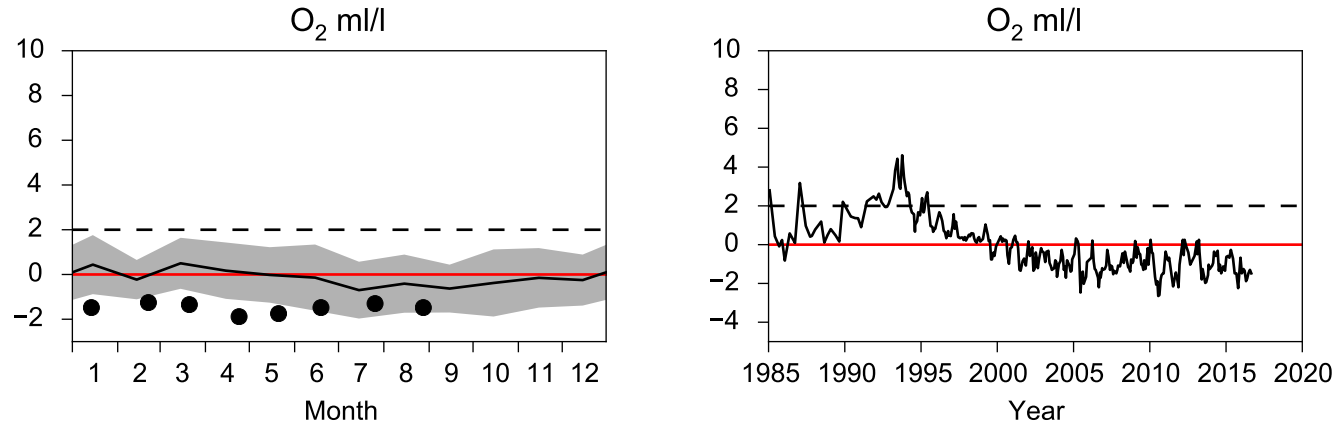


STATION BY38 KARLSÖDJ SURFACE WATER (0-10m)

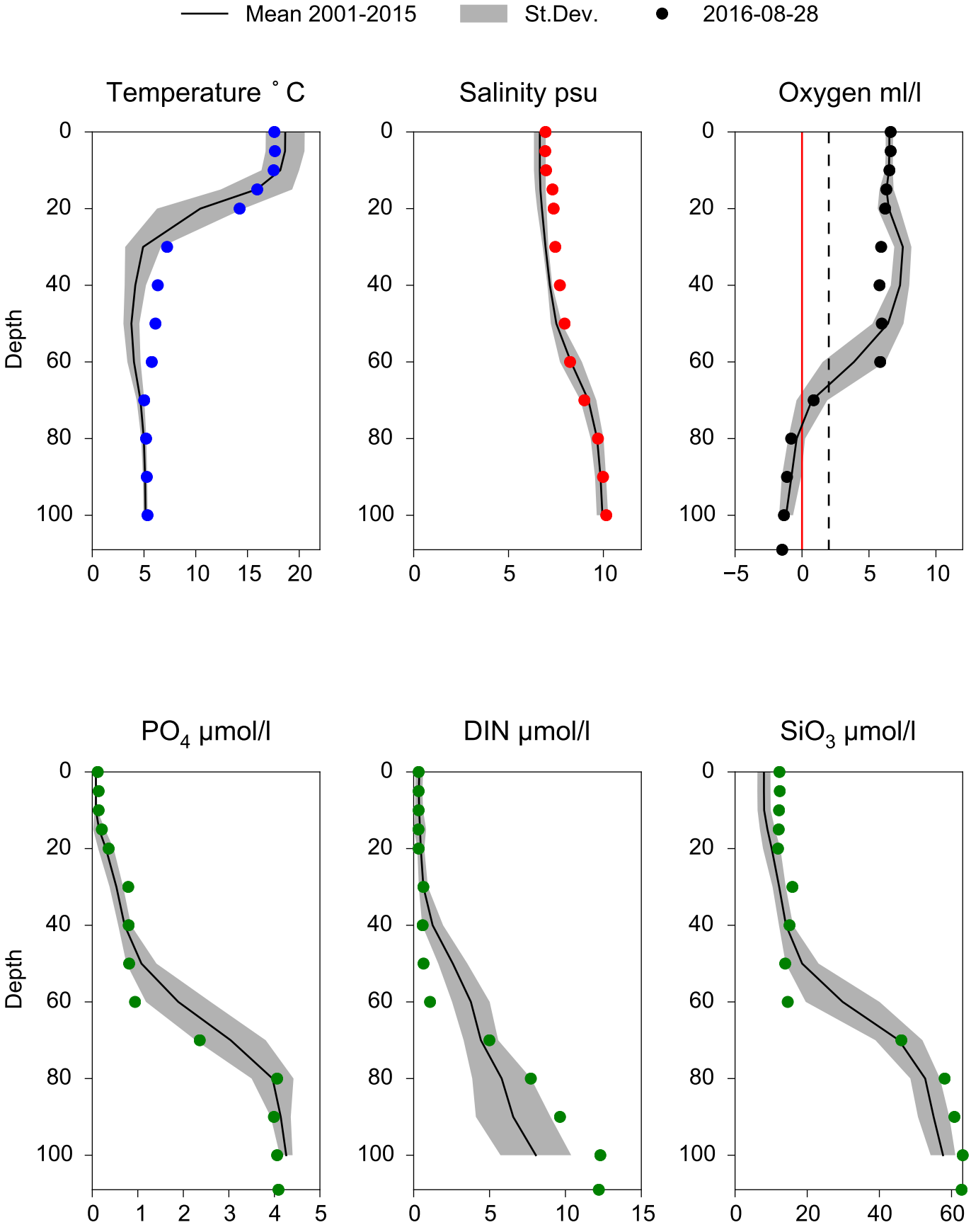
Annual Cycles



OXYGEN IN BOTTOM WATER (depth >= 100 m)



Vertical profiles BY38 KARLSÖDJ
August

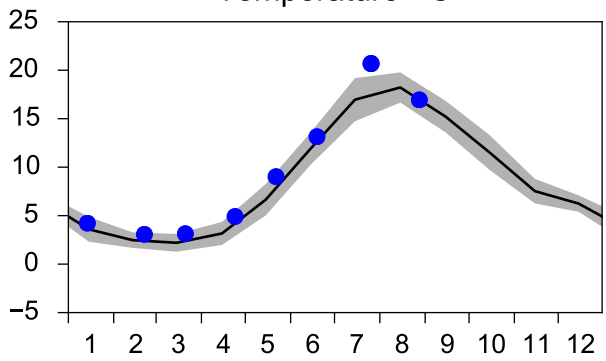


STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10m)

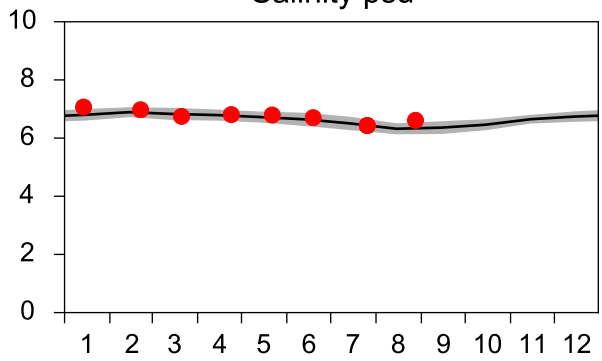
Annual Cycles

Mean 2001-2015 St.Dev. 2016

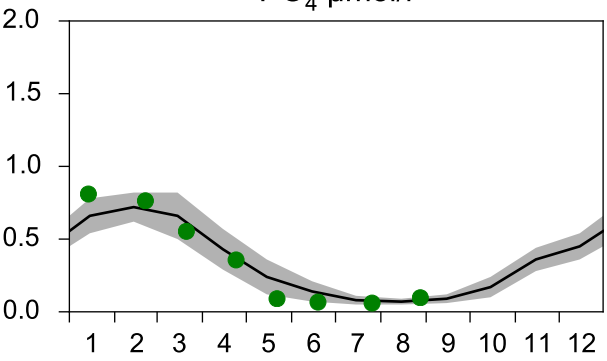
Temperature ˚C



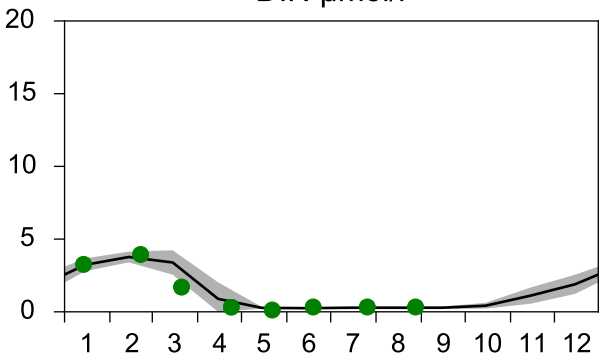
Salinity psu



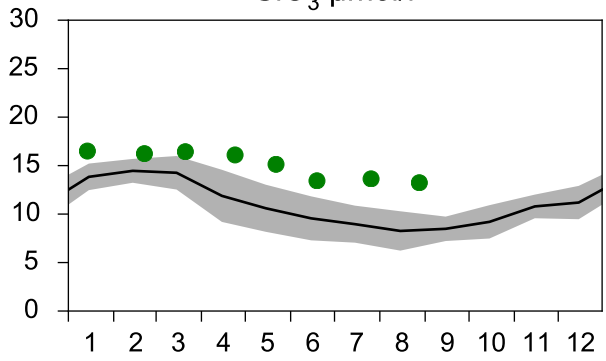
PO_4 µmol/l



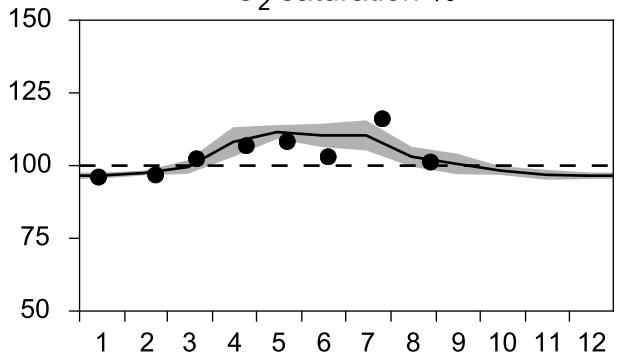
DIN µmol/l



SiO_3 µmol/l

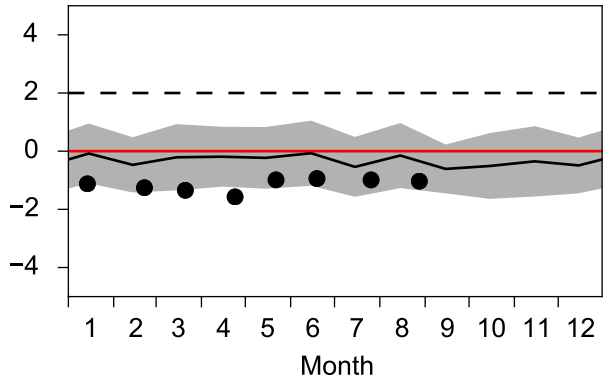


O_2 saturation %

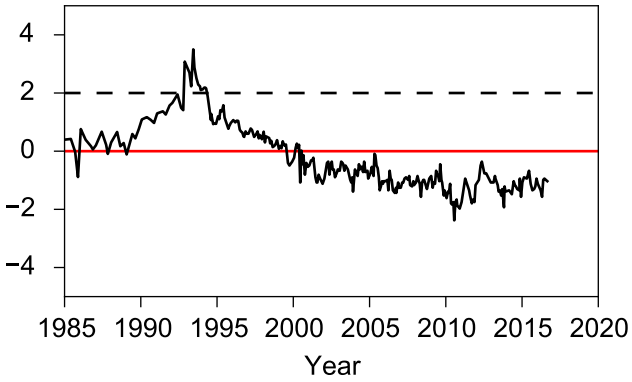


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O_2 ml/l



O_2 ml/l



Vertical profiles BY32 NORRKÖPINGSDJ
August