

# Expeditionsrapport från R/V Svea

## Cruise report from R/V Svea



**Expedition:**

The International Bottom Trawl Survey (IBTS Q3)

**Expeditionens varaktighet:**

2020-08-23 - 2020-09-04

**Uppdragsgivare:**

Sveriges Lantbruksuniversitet (SLU) , Sveriges Meteorologiska och Hydrologiska Institut (SMHI), Havs- och Vattenmyndigheten (HaV)

### Summary

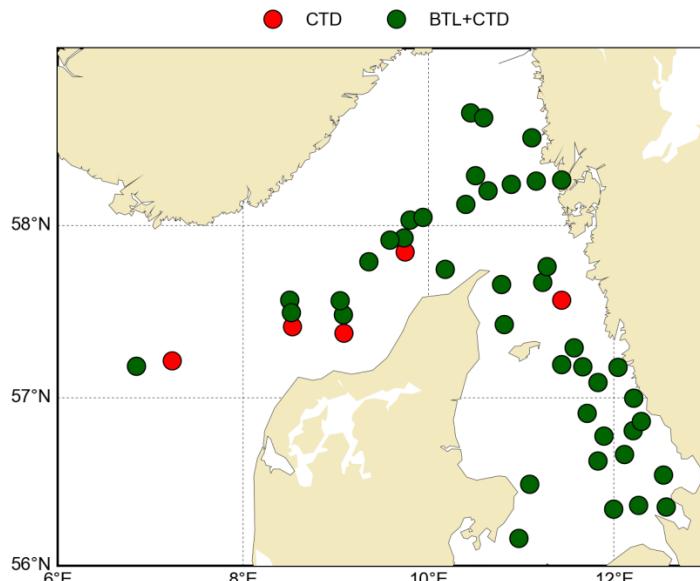
SMHI performed an oxygen survey within SLU-Aqua's cruise; the International Bottom Trawl Survey, that covers the Skagerrak and the Kattegat. SMHI joined the cruise to perform CTD measurements in connection to each trawl and to take water samples for the annual oxygen survey. Samples for nutrients and chlorophyll were also taken. Four of SMHIs standard stations; Släggö, Anholt E, Fladen and Å17 were visited during the cruise.

The oxygen situation in southern Kattegat was close to hypoxic. Oxygen concentrations near the limit of oxygen deficiency (< 2 ml/l) was found in the bottom water at most stations in the southern parts of the Kattegat. The concentrations ranged from 2.3 – 3.0 ml/l. Further north in Kattegat and in the Skagerrak the oxygen situation was good with bottom water concentrations above 4 ml/l. The only exception was the coastal station Släggö, in the outer part of the Gullmars fjord, where oxygen concentrations around 2.5 ml/l was found in the bottom water.

## PRELIMINÄRA RESULTAT

SMHI deltar under SLUs fiskeriexpedition IBTS-Q3 (International Bottom Trawl Survey, kvartal 3) för att genomföra syrgaskartreng i Västerhavet. SLU genomför beståndsuppskattning av bottenlevande fisk i Skagerrak och Kattegatt och SMHI tar CTD-kast vid varje tråldrag samt vattenprovtagning vid vissa stationer. Expeditionen startade i Lysekil söndagen den 23 augusti och avslutades i Lysekil fredagen den 4 september.

I Skagerrak besöktes totalt 24 stationer. Vid 20 av dessa togs CTD och vattenprover för syrgas, närsalter och klorofyll i hela vattenkolumnen. Vid resterande stationer togs CTD och vattenprov vid ytan och botten alternativt enbart CTD. Vid Släggö och Å17, som ingår i SMHIs ordinarie mätprogram, togs vattenprover och samtliga paramaterar som provtas vid SMHIs vanliga provtagning analyserades (syre, näringssämnen, klorofyll, zooplankton och fytoplankton). I Kattegatt besöktes 21 stationer. Vid merparten av dessa, däribland Anholt E och Fladen som båda ingår i SMHI:s mätprogram, togs CTD och vattenprover för näringssämnen, syrgas och klorofyll i hela vattenkolumnen. Vid övriga stationer togs CTD samt vattenprov från ytan och botten. Vid Anholt E provtogs också zooplankton och fytoplankton.



Figur 1. Provtagna stationer under IBTS-expeditionen. Gröna punkter visar var både CTD och vattenprovtagning genomförs och röda punkter visar där enbart CTD-kast har tagits.

Vindarna var till en början friska men var sedan mestadels svaga till måttliga under expeditionen med varierande vindriktningen. Högst vindstyrka uppmättes till omkring 12 m/s. Lufttemperaturen under expeditionsveckorna varierade från 14°C till 19°.

Denna rapport är baserad på data som genomgått en första kvalitetskontroll. När data publiceras hos datavärden kan vissa värden ha ändrats då ytterligare kvalitetsgranskning genomförs. Data från denna expedition publiceras så fort som möjligt på datavärdens hemsida, normalt sker detta inom en till två veckor efter avslutad expedition.

Data kan hämtas här: <http://www.smhi.se/klimatdata/oceanografi/havsmiljodata>

## Kattegatt

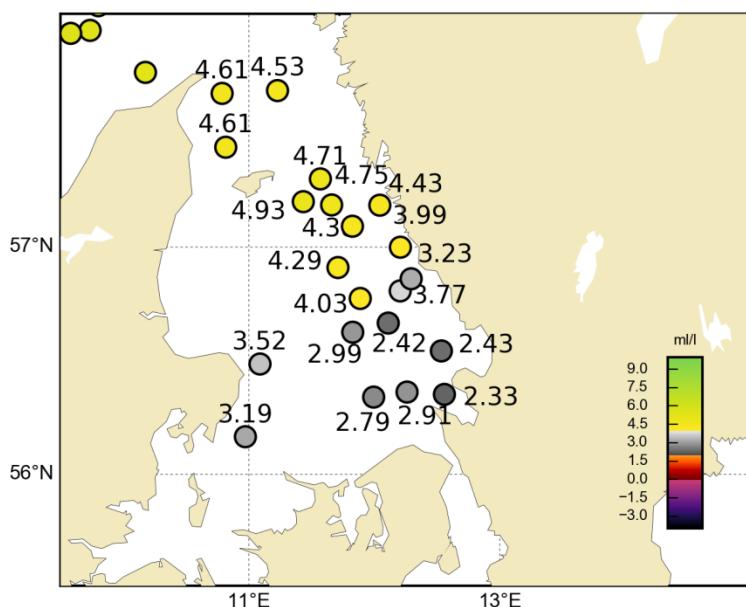
I Kattegatts södra delar återfanns stora områden där syrehalten låg strax över gränsen för syrebrist (2 ml/l). Syrebrist i södra Kattegatt är vanligt förekommande under sensommars och höst då stora mängder biologiskt material från ytvattnet skall brytas ned vid botten. På grund av termoklinens och haloklinens läge på omkring 10-15 meters djup och att det är relativt grunt i Kattegatt bildas ett tunt skikt närmast botten med dåligt vattenutbyte med ytagret. Syret förbrukas snabbt i detta tunna lager med djupvattnen och syrebrist eller helt syrefria förhållanden uppstår.

De lägsta syrgashalterna återfanns i Skälerviken och yttre Laholmsbukten, där halter omkring 2,3 ml/l uppmättes. I de öppna delarna av södra Kattegatt återfanns syrgashalter mellan 2,4 - 3,0 ml/l. Längre västerut mot den Danska kusten låg halterna i bottenvattnet något högre omkring 3,2 - 3,5 ml/l. I de norra och centrala delarna av Kattegatt var syresituationen bättre och syrgashalterna låg i huvudsak över 4 ml/l.

Temperaturen i ytvattnet var något högre i Kattegatt jämfört med Skagerrak och varierade omkring 17-18°C. Högst i de södra delarna och avtagande mot de norra delarna. Termoklinen återfanns på 10-15 meters djup och därunder avtog temperaturen gradvis mot botten. Salthalten varierade mellan 16-19 psu i de södra delarna till omkring 20-27 psu i de norra delarna. Haloklinen sammanföll med termoklinen och därunder i djupvattnet återfanns salthalter över 30 psu.

Närssalterna i ytvattnet var i stort sett förbrukade. Halterna av oorganiskt kväve låg under detektionsgränsen och fosfathalten varierade mellan 0,05 och 0,09 µmol/l. Silikathalten var högre i de södra och nordvästra delarna av Kattegatt medan halterna i de centrala delarna var låga. Halterna varierade mellan 0,2 – 4,4 µmol/l.

Fluorescensmätningar från CTDn indikerade planktonaktivitet på djup mellan 10-20 meters djup, strax under skiktningen där troligen bättre näringsförhållanden råder jämfört med ytvattnet där näringsämnen generellt var förbrukade.



Figur 2. Syrgashalten i bottenvattnet i Kattegatt. Halter under 2 ml/l indikerar syrebrist.

## Skagerrak

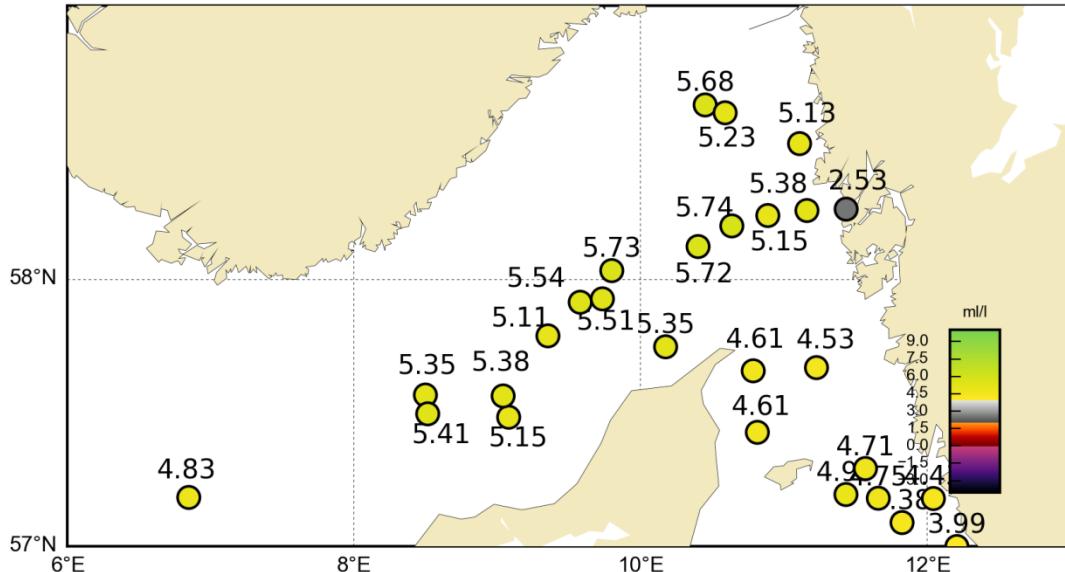
Syrgashalten i djupvattnet var god vid samtliga stationer som besöktes i utsjöområdet. Halterna varierade mellan 4,8 och 5,7 ml/l. Närmast kusten, vid Gullmarsfjordens mynning, vid stationen Släggö uppmättes den lägsta syregashalten, 2,5 ml/l, vilket är nära gränsen för syrebrist, 2,0 ml/l.

Ytvattentemperaturerna var något över det normala i hela Skagerrak och varierade mellan 16 och 18°C. Salthalten i ytan var generellt normal för årstiden och uppmättes till omkring 34,5 psu i de västra delarna av Skagerrak och i Nordsjön och till omkring 29-33 psu i de centrala delarna av Skagerrak. I de östra delarna av Skagerrak och längs den svenska västkusten var salthalten i ytan lägre och varierade mellan 23-28 psu.

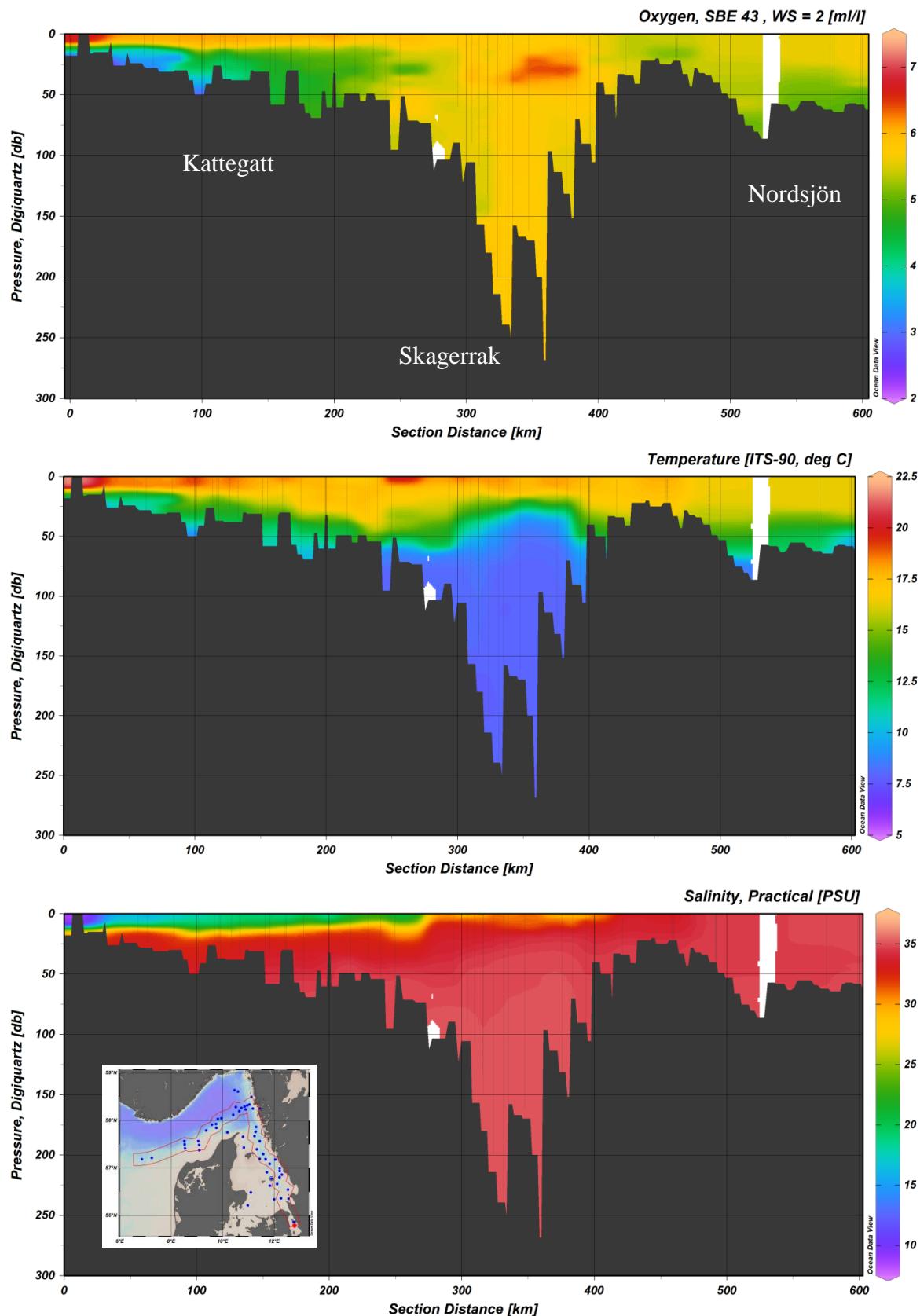
En tydlig termoklin återfanns från 10-20 meters djup. Därunder sjönk temperatur gradvis ner till omkring 50-75 meters djup där temperaturer på omkring 8°C återfanns. Denna temperatur återfanns på samtliga stationer ner till botten. Haloklinen sammanföll med termoklinen men därunder var salthalten i huvudsak konstant ner mot botten.

I ytvattnet var närsalterna i huvudsak förbrukade. Det lösta oorganiskt kvävet var förbrukat och fosfathalterna var också låga och varierade mellan 0,05 µmol/l. Silikathalten varierade mellan 0,2 längst västerut i Nordsjön till 1,3 µmol/l i de centrala delarna.

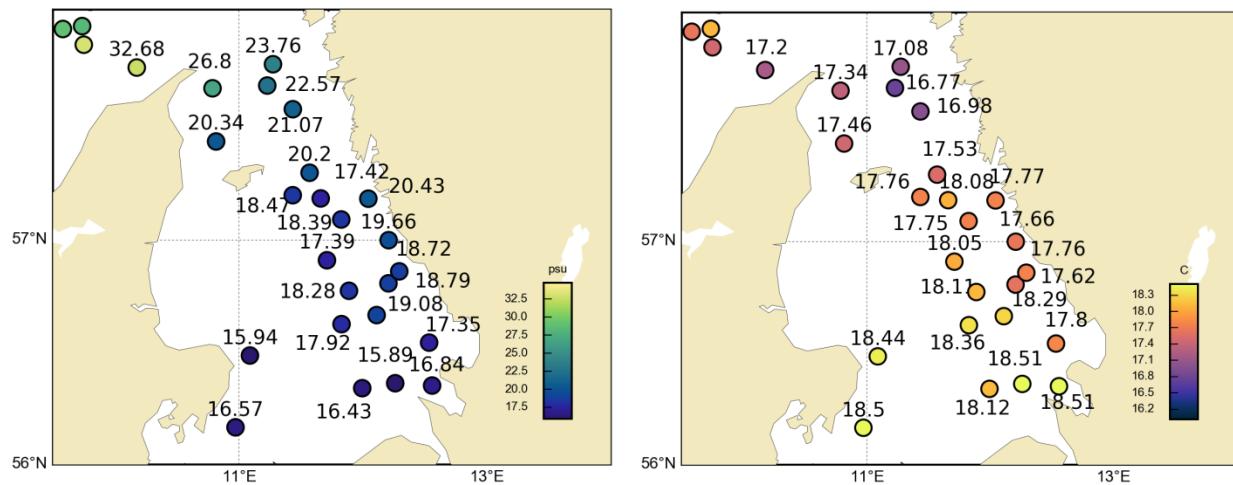
Planktonaktivitet, uppmätt med CTD-fluorescens, var mer varierande än i Kattegatt. Fluorescenstoppar återfanns på varierande djup från ytan ner till 40 meter.



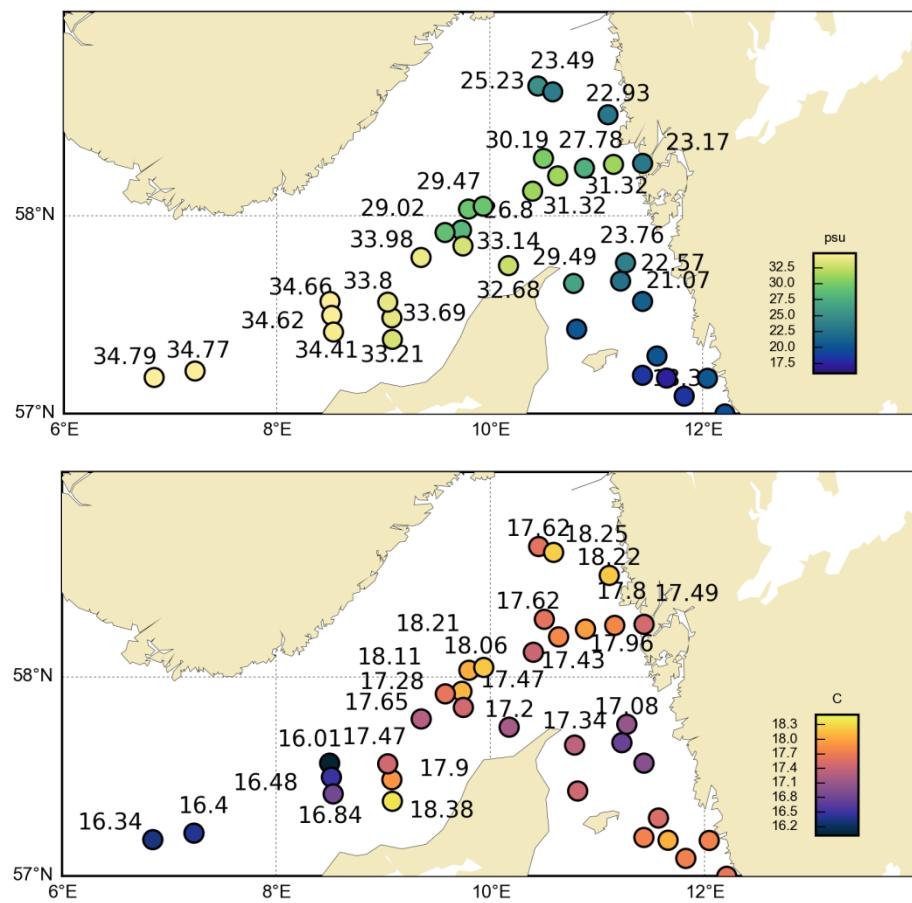
Figur 3. Syregashalten i bottenvattnet i Skagerrak.



Figur 4. Snitt som visar syre, temperatur och salthalt från Öresund genom Kattegatt, Skagerrak till Nordsjön.



Figur 5. Salthalt (t.v.) och temperatur (t.h) i Kattegatts ytvatten (0 m).



Figur 6. Salthalt (överst) och temperatur (nederst) i Skagerraks ytvatten (0 m).

## **DELTAGARE**

<b>Namn</b>	<b>Roll</b>	<b>Ben</b>	<b>Från</b>
Martin Hansson	Expeditionsledare	Vecka 35	SMHI
Sara Johansson	Kvalitetsansvarig	Vecka 35	SMHI
Johan Kronsell		Vecka 36	SMHI
Jenny Lycken	Kvalitetsansvarig	Vecka 36	SMHI

## **BILAGOR**

- Tabell över stationer, analyserade parametrar och antal provtagningsdjup
- Vertikalprofiler
- Figurer över månadsmedelvärden för SMHIs basstationer



Date: 2020-09-14  
Time: 10:44

Ship: SE  
Year: 2020

Ser no	Cru no	Stat code	Proj Stat name	Lat	Lon	Start date yyyyymmdd	Bottom time hhmm	Secchi depth m	Wind dir	Air temp C	Air vel hPa	WCWI pres	CZPP elac	No btl	No e	T	T	S	S	P	P	D	D	H	H	P	P	N	N	N	N	A	H	C
0523	17	SKSX00	IBT... 21.5 NNW HIRTSHALS	5755.73	00944.07	20200824	0410	86	28	9	13.9	1004	1240	----	10	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0524	17	SKSX00	IBT... 23 NNW HIRTSHALS	5754.98	00934.78	20200824	1030	120	24	8	15	1006	2630	----	11	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0525	17	SKSX00	IBT... DANADRAGET	5801.99	00947.99	20200824	1400	193	23	7	15.2	1006	1530	----	13	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0526	17	SKSX00	IBT... 28N HIRTSHALS	5802.83	00956.31	20200824	1650	166	23	10	15.7	1005	0130	----	12	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0528	17	SKEX00	IBT... 24.5 NNW SKAGEN	5807.33	01024.12	20200825	0410	164	27	5	13.8	1005	1230	----	13	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0529	17	SKEX00	IBT... 23.5 HÄTTAN	5811.88	01038.26	20200825	0915	240	25	6	15.7	1006	1130	----	14	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0530	17	SKEX00	IBT... 17 WSW LYSEKIL	5814.18	01053.33	20200825	1220	151	25	6	16.2	1006	1230	----	12	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0531	17	SKEX00	IBT... SÖRGRUNDET	5815.28	01109.71	20200825	1518	60	22	5	15.6	1004	2430	----	9	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0533	17	SKEX00	IBT... 17 WNW VÄDERÖBOD	5838.41	01027.09	20200826	0410	165	8	12	14.8	997	2630	----	13	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0534	17	SKEX00	IBT... 15 W VÄDERÖBOD	5836.7	01035.46	20200826	0705	146	5	12	14	997	2840	----	12	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0537	17	SKEX00	IBT... NV SKÄGGA	5829.96	01106.62	20200826	1440	54	5	7	17.6	1000	2830	----	9	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
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0539	17	SKSX00	IBT... 23 NW HANSTHOLM OST	5734.24	00829.96	20200827	0410	104	27	5	15.3	1006	2730	----	10	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0540	17	SKSX00	IBT... 23 N HANSTHOLM	5730.02	00830.93	20200827	0815	70	27	5	15.4	1008	2730	----	9	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0541	17	SKSX00	IBT... 16 N HANSTHOLM	5724.97	00831.94	20200827	1030	39	26	3	15.5	1008	1330	----	7	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0542	17	SKSX00	IBT... 20 W LÖKKEN	5722.74	00905.11	20200827	1410	21	24	6	16.1	1008	1330	----	5	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0543	17	SKSX00	IBT... 19 WNW LÖKKEN	5729.26	00904.83	20200827	1620	22	24	6	15.8	1008	1330	----	5	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0544	17	NSXX00	IBT... NORDSJÖN	5711.13	00650.87	20200828	0410	69	9	2	14.1	1004	1430	----	9	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0545	17	NSXX00	IBT... NORDSJÖN 2	5713.10	00713.93	20200828	0940	62	2	6	15.4	1002	1430	----	9	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0549	17	SKEX00	IBT... 7.5 N HIRTSHALS	5745.04	01010.53	20200829	0000	83	0	7	16.7	1002	1440	----	10	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0546	17	SKSX00	IBT... 27W HIRTSHALS	5734.04	00902.50	20200829	0410	38	4	11	15.5	999	2840	----	7	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
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0548	17	SKSX00	IBT... 17NNW HIRTSHALS	5750.93	00944.89	20200829	1230	53	9	10	16.1	1002	2840	----	8	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0550	17	KANX00	IBT... 14W VINGA	5740.39	01113.71	20200830	0410	44	24	1	15.7	1006	1120	----	8	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0551	17	KANX00	IBT... 8W VINGA	5734.25	01126.1	20200830	0720	52	11	3	16.3	1007	1520	----	8	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0552	17	KANX00	IBT... 8W STORA PÖLSAN	5745.90	01116.48	20200830	1040	57	19	3	16.4	1008	1320	----	9	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0553	17	FIBG27	BAS... SLÄGGÖ	5815.58	01126.12	20200830	1820	76	35	4	16.5	1010	1110	----	9	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-
0554	17	KANX00	IBT... W GROVES FLAK	5711.79	01126.04	20200831	0410	84	2	7	13.8	1013	1120	----	12	x	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-	x	-

Date: 2020-09-14  
Time: 10:44

Ship: SE  
Year: 2020

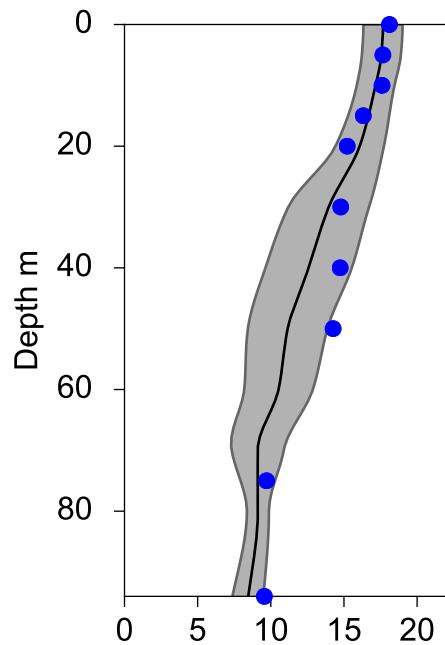
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0557	17	KAEX00	IBT...	7S ANHOLT KNOB	5637.70	01149.68	20200831	1500	36	31	7	16.3	1016	1130	---	8	x	x	-	x	-	x	x	x	-	-	x	-	x	-	-				
0558	17	KAEX29	BAS...	ANHOLT E	5640.12	01206.67	20200831	1700	65	7	32	8	16.3	1017	1240	---	10	x	x	-	x	x	x	x	-	-	x	-	x	-	-				
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0560	17	KAWX00	IBT...	6E GRENÄ	5629.33	01105.32	20200901	0940	18	2	5	16.1	1020	0120	---	4	x	x	-	x	x	x	x	-	-	x	-	x	-	-					
0563	17	KAES00	IBT...	SKÄLDERVIKEN	5621.28	01233.52	20200901	1755	24	9	3	18	1019	1520	---	5	x	x	-	x	x	x	x	x	-	x	-	x	-	-					
0564	17	KAEX00	IBT...	7NW KULLEN	5621.91	01215.66	20200901	1930	33	4	2	18	1019	9990	---	7	x	x	-	x	x	x	x	x	-	x	-	x	-	-					
0565	17	KAEX00	IBT...	6NE LYSEGRUND	5620.58	01159.70	20200901	2100	33	6	5	18.1	1019	9990	---	7	x	x	-	x	x	-	-	-	-	-	-	x	-	-					
0566	17	KAEL00	IBT...	YTTRÉ LAHOLMSBUKTEN	5632.77	01232.08	20200902	0435	25	2	7	14.4	1018	1330	---	6	x	x	-	x	x	-	x	x	-	x	-	x	-	-					
0567	17	KANX00	IBT...	SW MORUPS BANK	5648.55	01212.39	20200902	0830	39	4	7	16.0	1018	1330	---	8	x	x	-	x	x	-	x	x	-	x	-	x	-	-					
0568	17	KANX00	IBT...	MORUPS BANK	5651.72	01217.62	20200902	1030	28	3	7	17.2	1018	1720	---	7	x	x	-	x	x	-	x	x	-	x	-	x	-	-					
0569	17	KANX00	IBT...	GALTABÄCK	5659.96	01212.48	20200902	1310	37	5	5	18.6	1017	1220	---	8	x	x	-	x	x	-	-	-	-	-	-	x	-	-					
0570	17	KANX00	IBT...	INRE VÄRÖTUBEN	5710.88	01202.65	20200902	1600	36	34	3	18.4	1016	1520	---	8	x	x	-	x	x	-	x	x	-	x	-	x	-	-					
0571	17	KANX00	IBT...	SANDEN	5654.66	01142.62	20200903	0440	65	21	1	15.9	1013	1110	---	10	x	x	-	x	x	-	x	x	-	x	-	x	-	-					
0572	17	KANX00	IBT...	E FLÄDEN	5705.42	01149.53	20200903	0730	63	10	2	16.6	1013	1120	---	10	x	x	-	x	x	-	x	x	-	x	-	x	-	-					
0573	17	KANX25	IBT...	FLÄDEN	5710.95	01139.59	20200903	1000	76	19	4	17.6	1013	2720	---	12	-	x	-	x	x	-	x	x	-	x	-	x	-	-					
0574	17	KANX00	IBT...	10NNW NIDINGEN	5717.68	01134.21	20200903	1240	72	18	5	16.6	1012	2730	---	11	x	x	-	x	x	-	x	x	-	x	-	x	-	-					
0575	17	LAND	IBT...	4N BÖCHERS BANK	5223.9	01119.59	20200903	1645	41	17	5	16.7	1009	2830	---	8	x	x	-	x	x	-	x	x	-	x	-	x	-	-					
0576	17	KANX00	IBT...	LASO RANNA	5725.85	01048.94	20200904	0430	46	21	8	15.6	1007	2730	---	9	x	x	-	x	x	-	x	x	-	x	-	x	-	-					
0577	17	KANX00	IBT...	8SE SKAGEN	5739.67	01047.21	20200904	0800	26	23	11	16.2	1008	1540	---	6	x	x	-	x	x	-	x	x	-	x	-	x	-	-					

# Vertical profiles 21.5 NNW HIRTSHALS

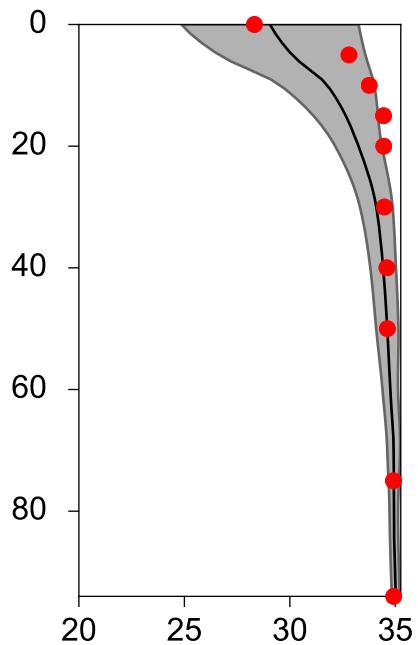
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-24

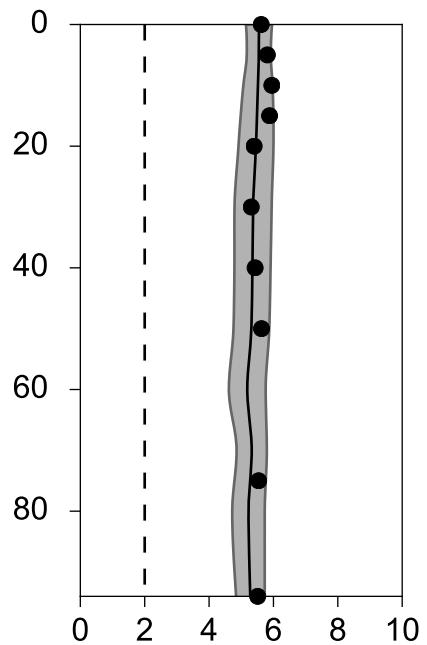
Temperature °C



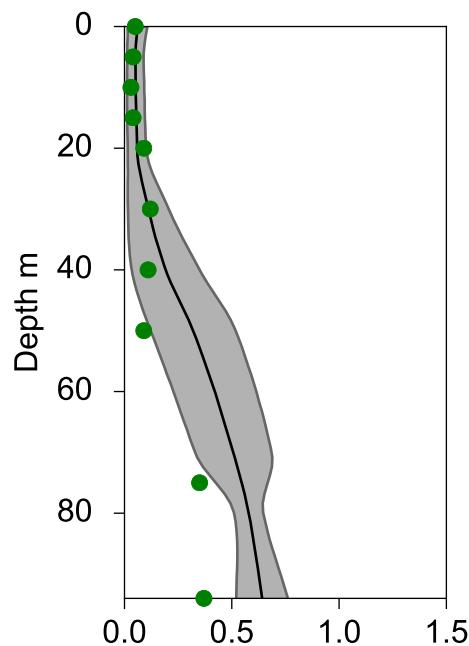
Salinity psu



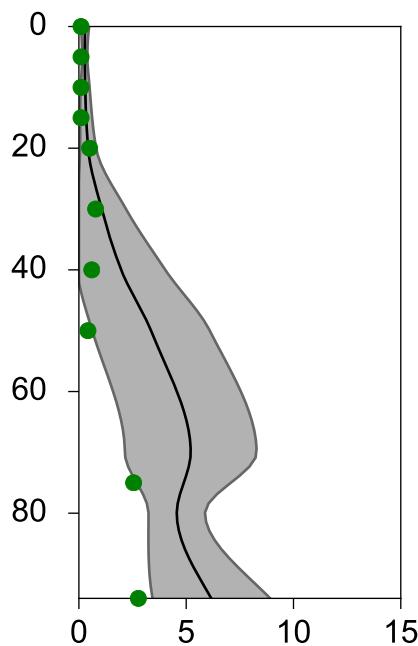
Oxygen ml/l



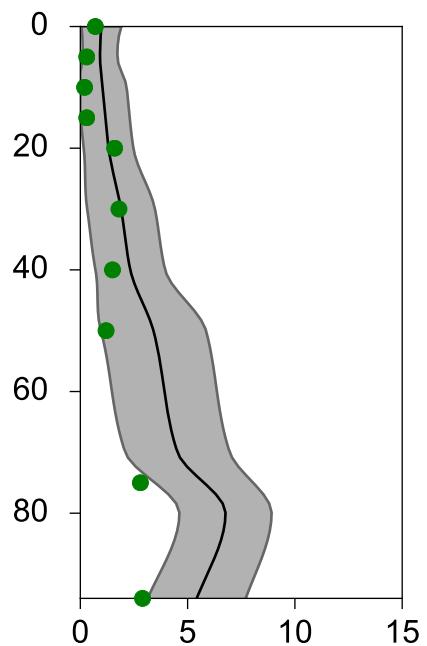
PO<sub>4</sub> µmol/l



DIN µmol/l



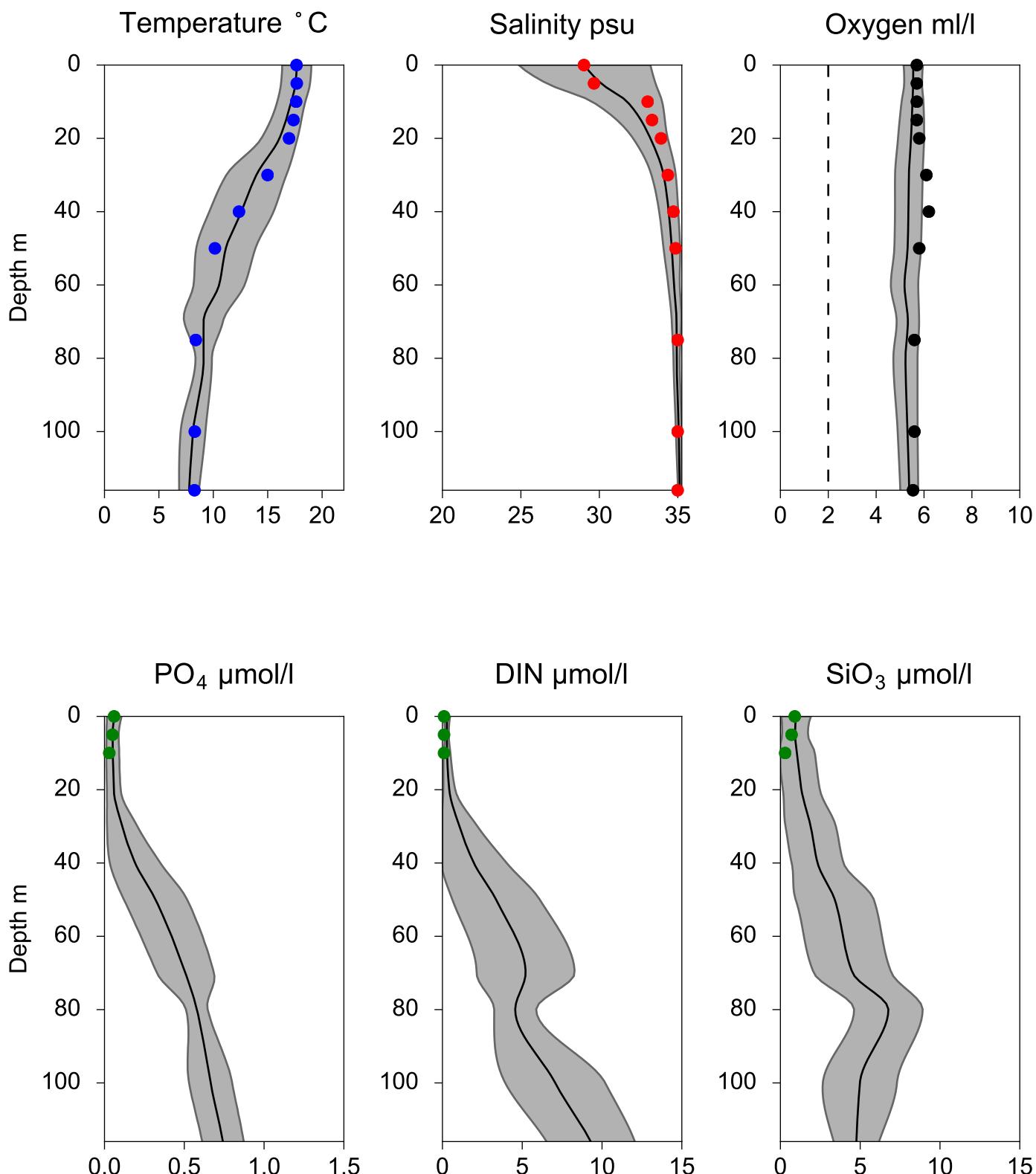
SiO<sub>3</sub> µmol/l



# Vertical profiles 23 NNW HIRTSHALS

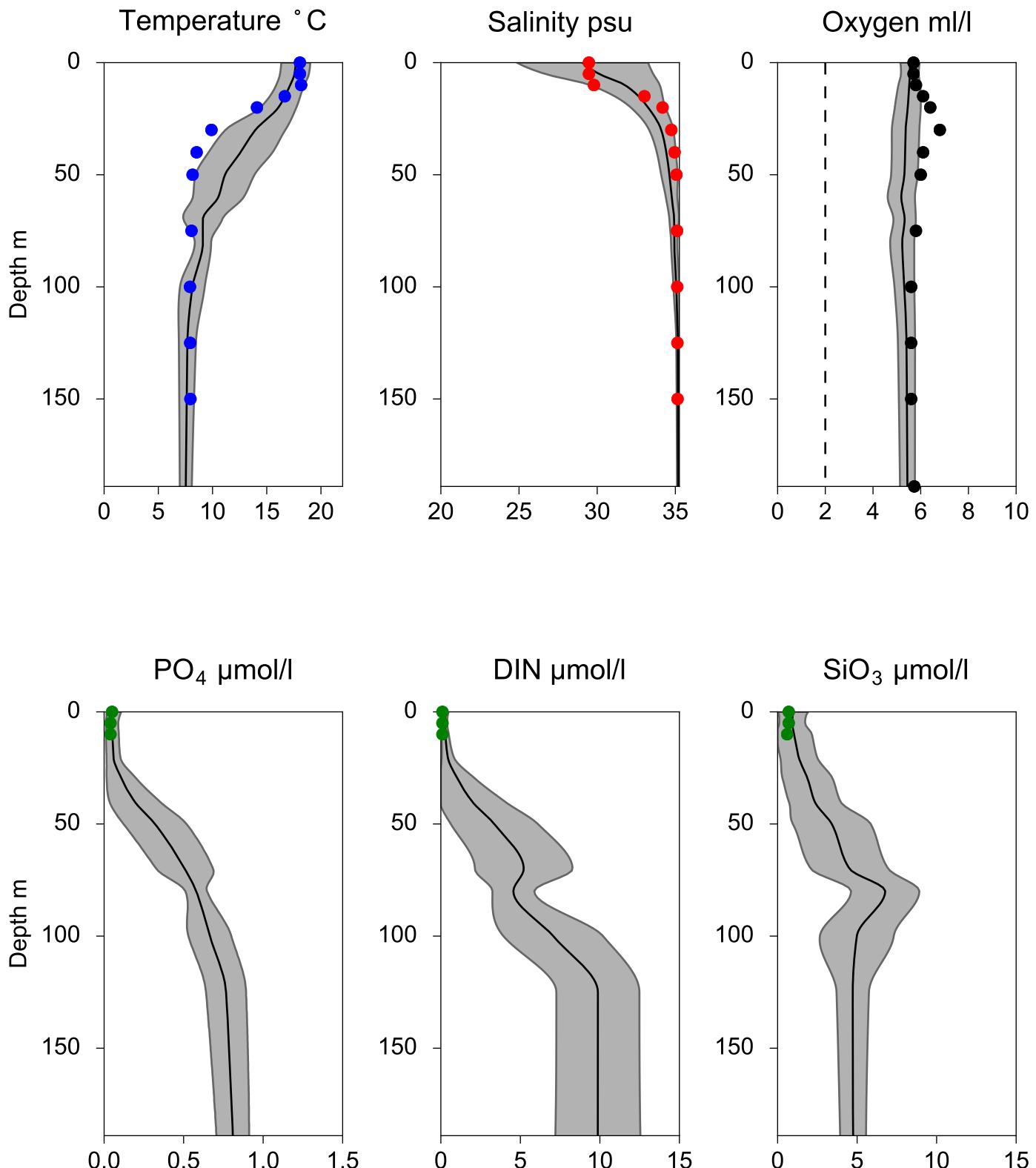
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-24



# Vertical profiles DANADRAGET August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-24

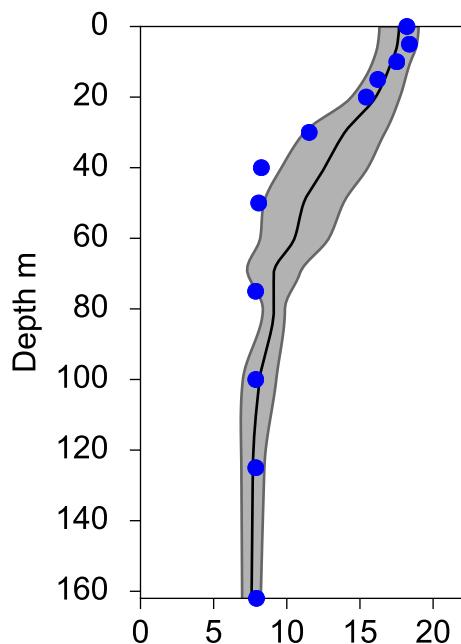


# Vertical profiles 28N HIRTSHALS

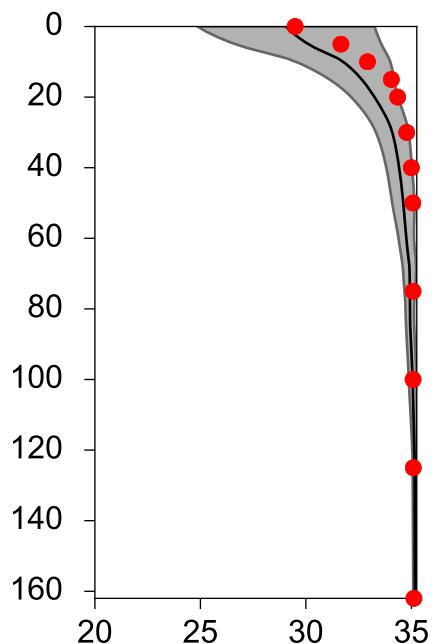
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-24

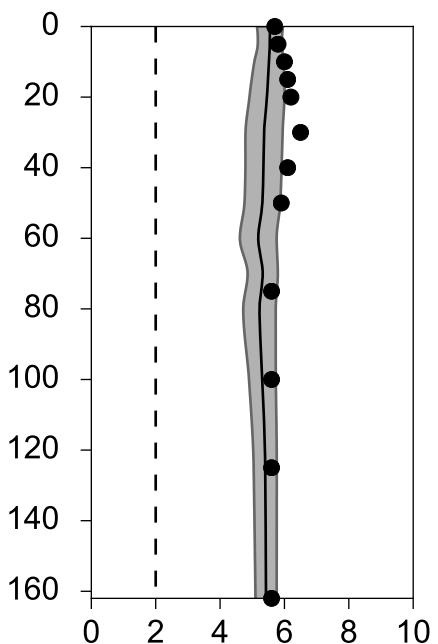
Temperature °C



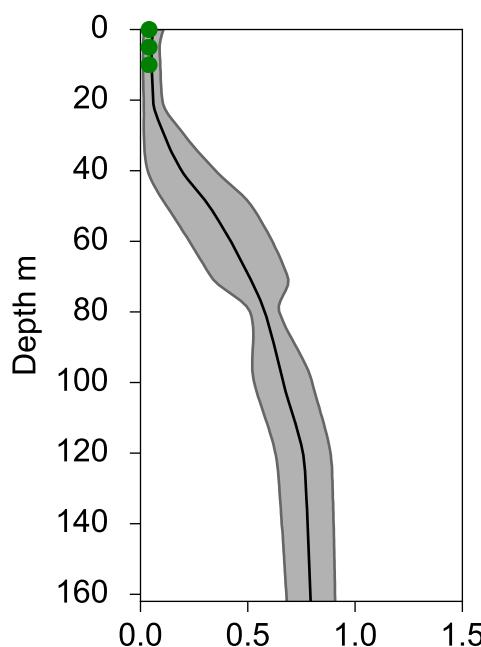
Salinity psu



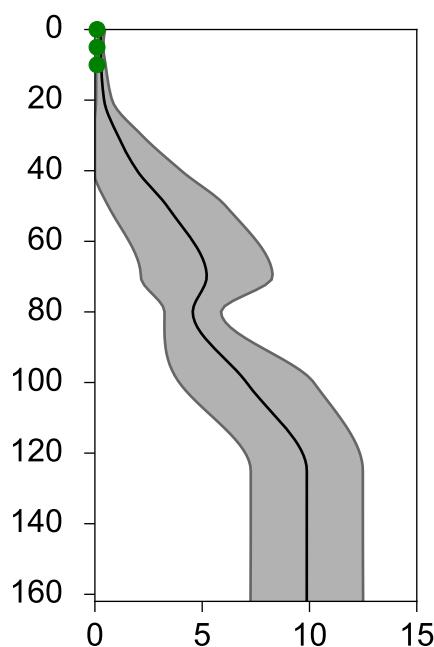
Oxygen ml/l



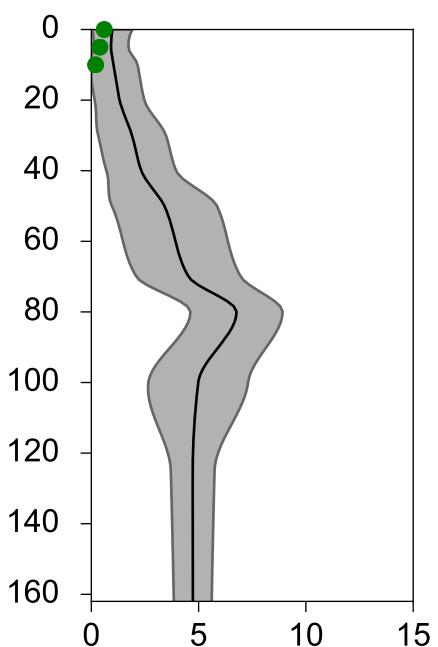
PO<sub>4</sub> µmol/l



DIN µmol/l



SiO<sub>3</sub> µmol/l

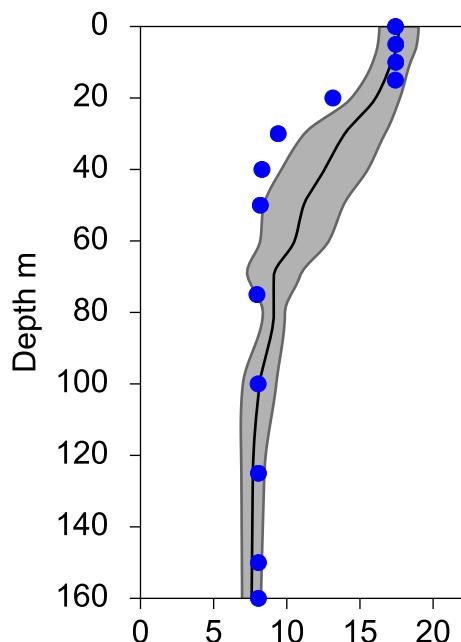


# Vertical profiles 24.5 NNW SKAGEN

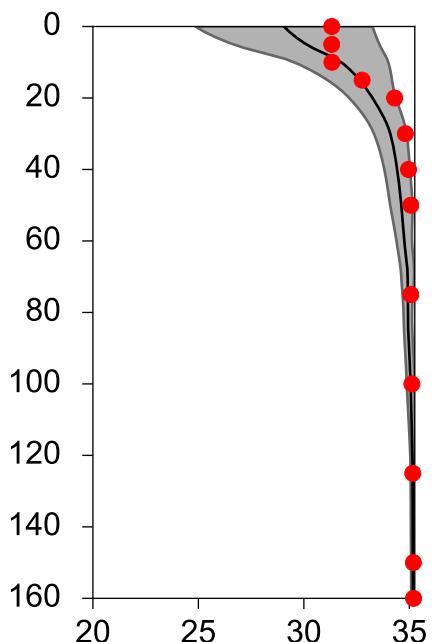
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-25

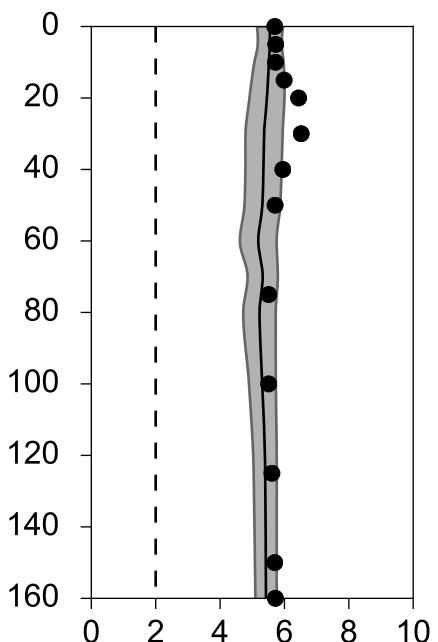
Temperature °C



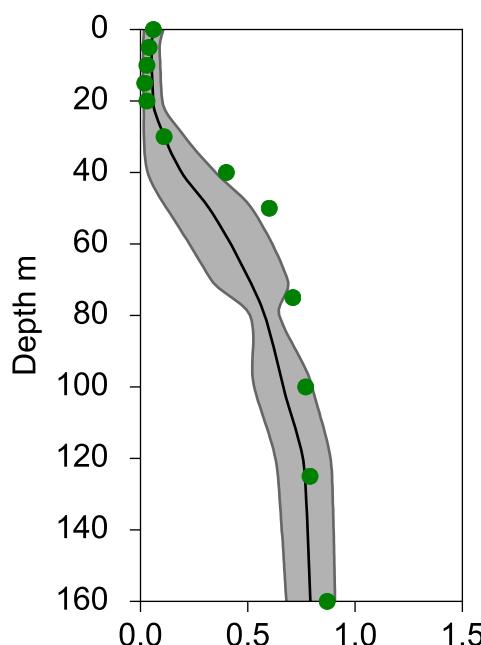
Salinity psu



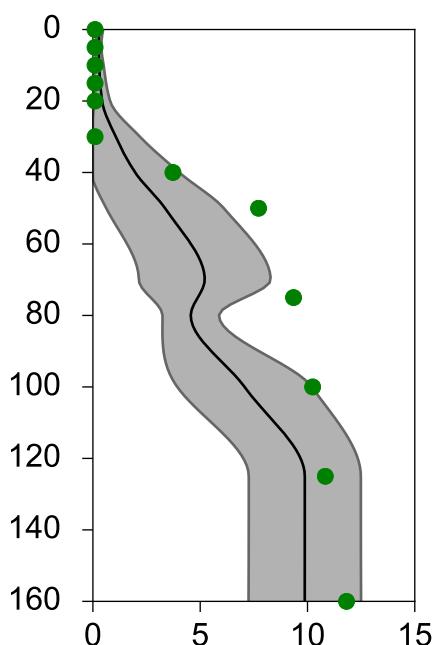
Oxygen ml/l



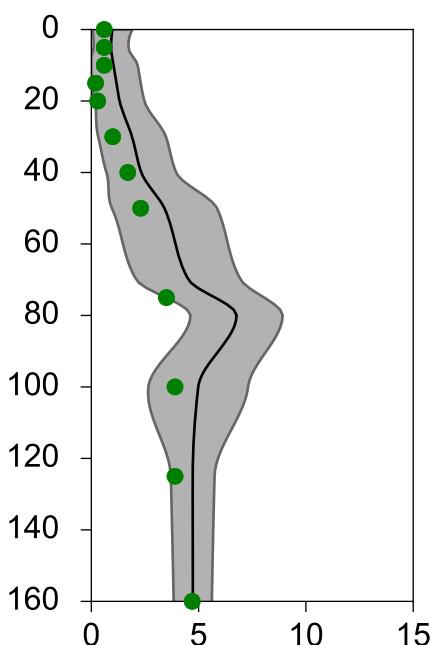
PO<sub>4</sub> µmol/l



DIN µmol/l

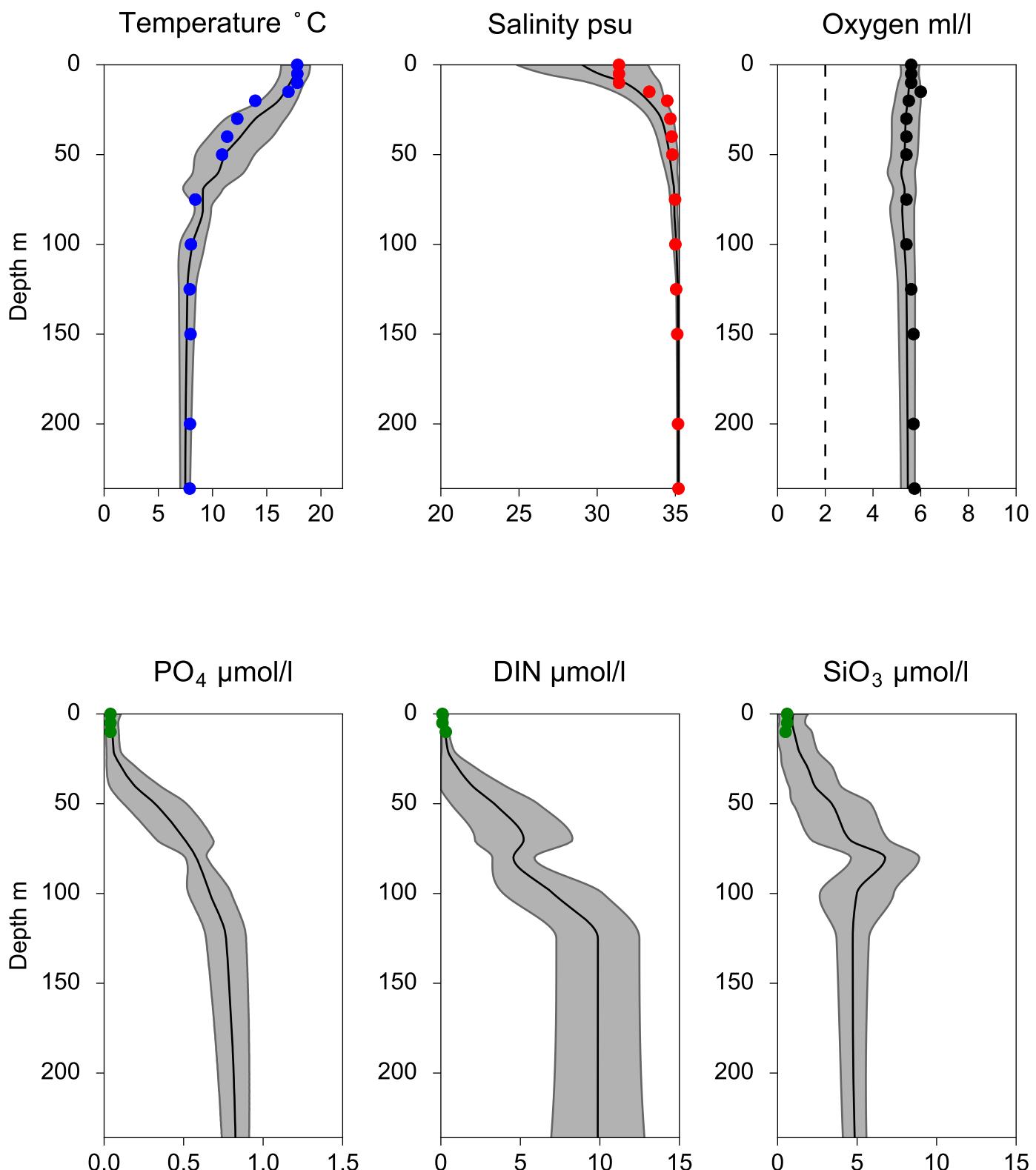


SiO<sub>3</sub> µmol/l



# Vertical profiles 23.5 HÄTTAN August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-25

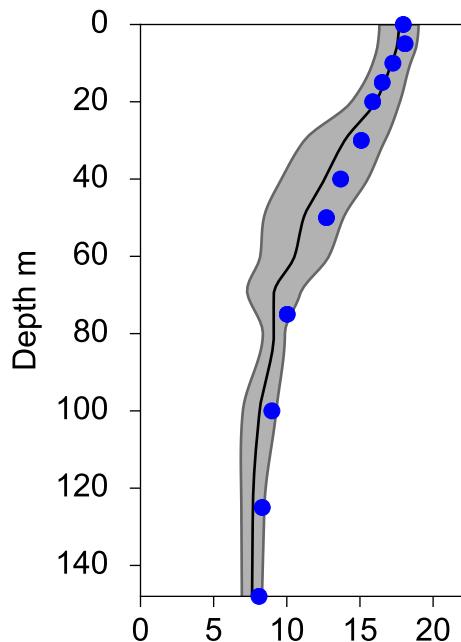


# Vertical profiles 17 WSW LYSEKIL

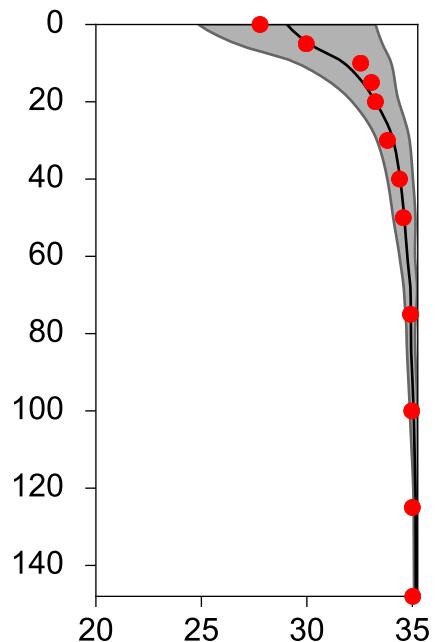
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-25

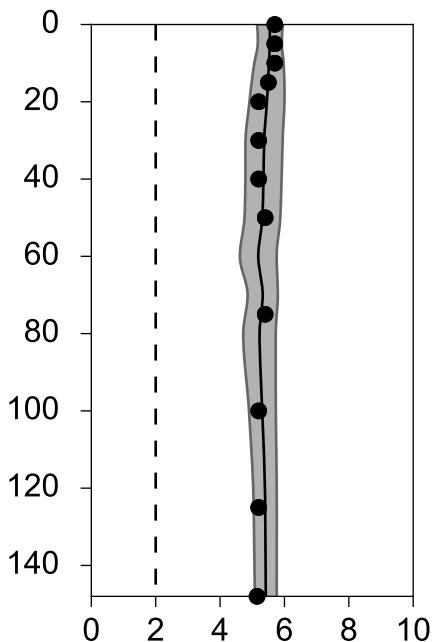
Temperature °C



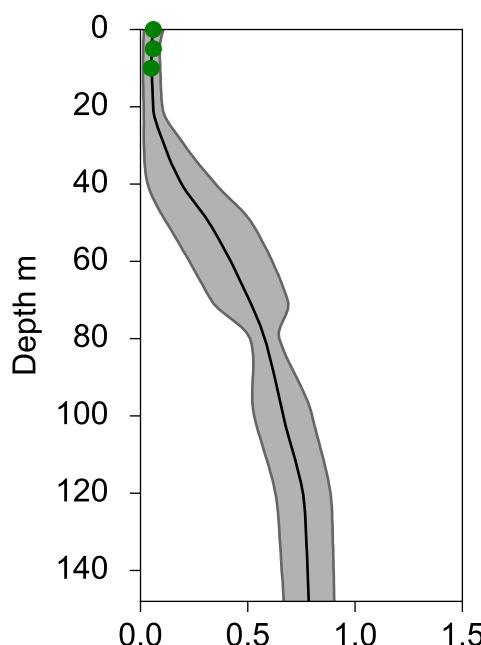
Salinity psu



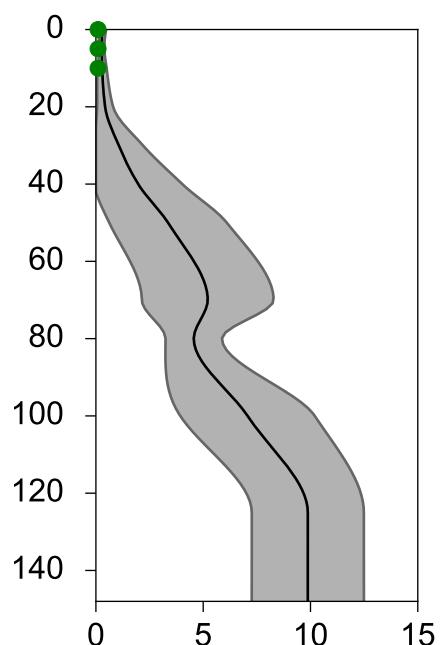
Oxygen ml/l



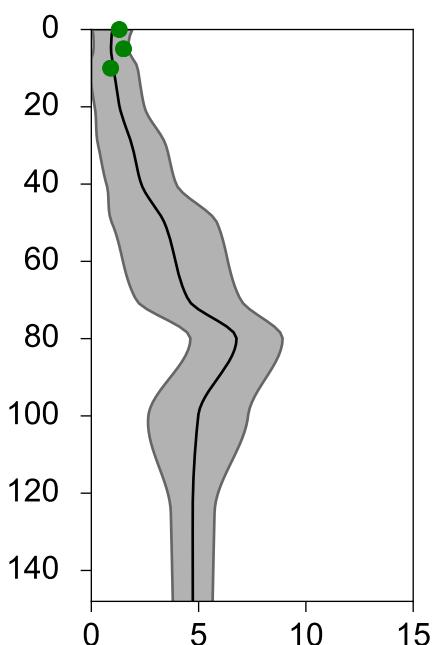
PO<sub>4</sub> µmol/l



DIN µmol/l



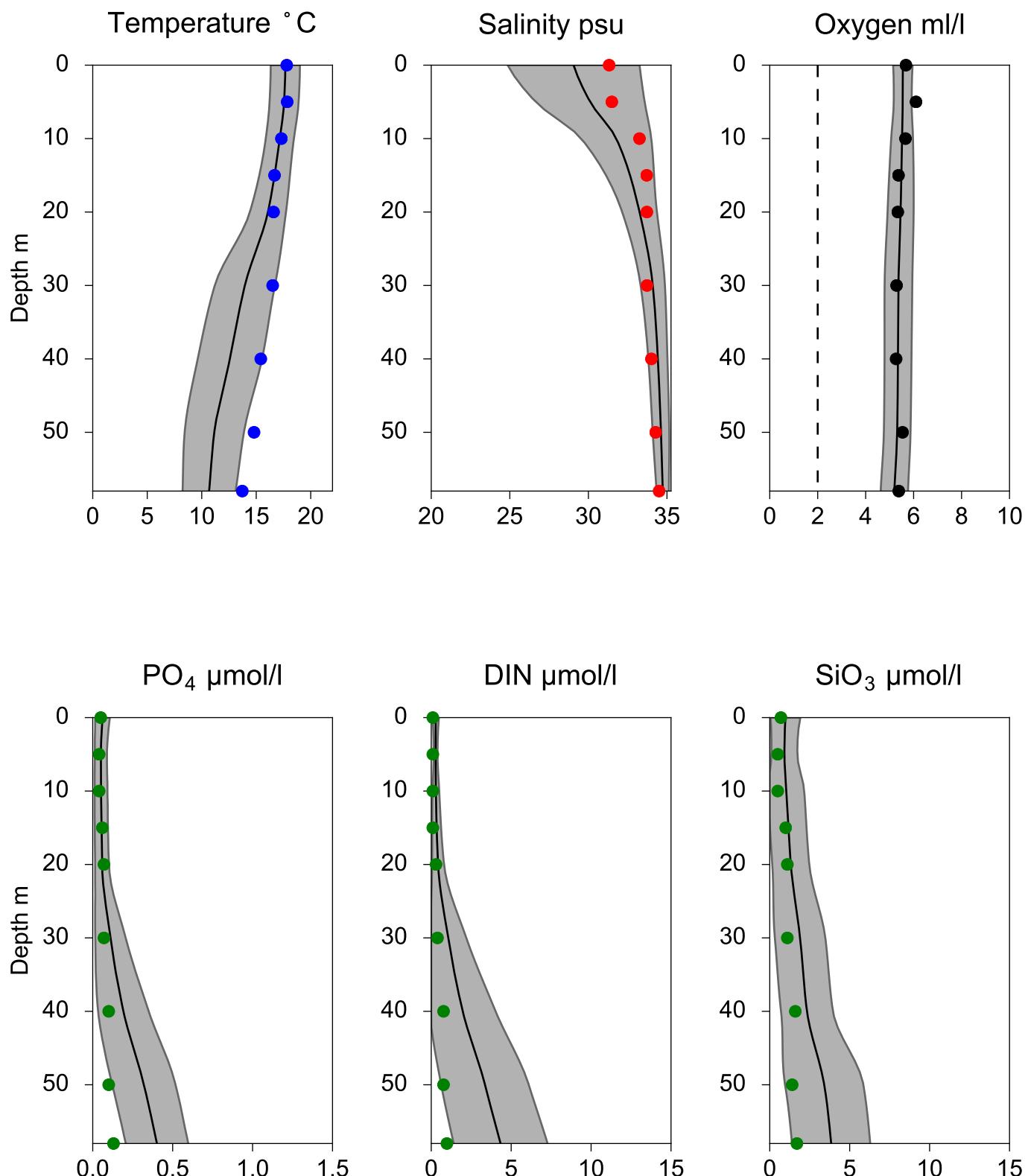
SiO<sub>3</sub> µmol/l



# Vertical profiles SÖRGRUNDET

## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-25

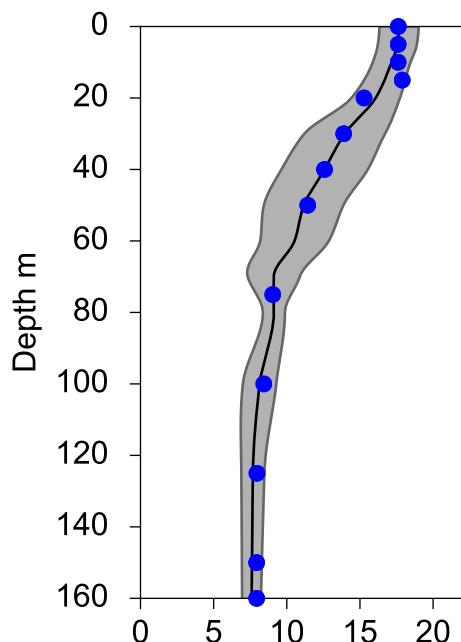


# Vertical profiles 17 WNW VÄDERÖBOD

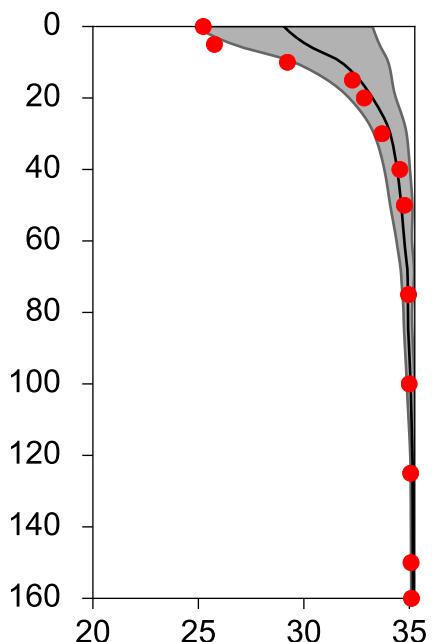
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-26

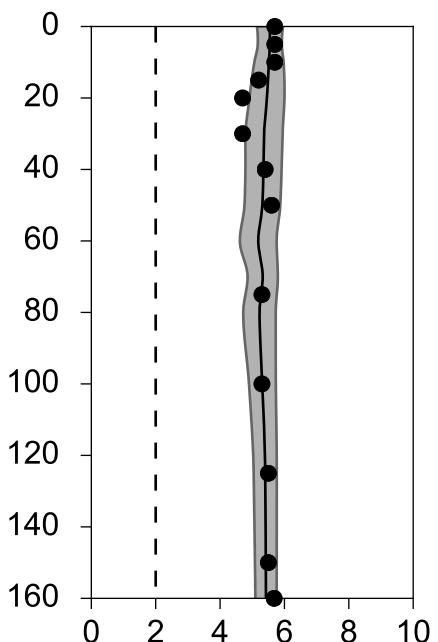
Temperature °C



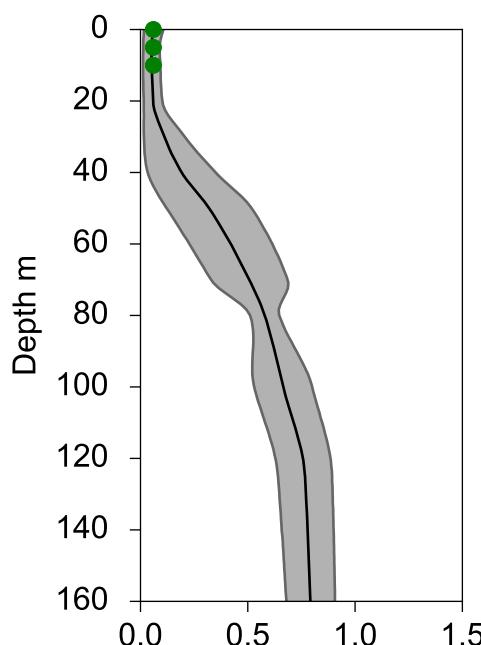
Salinity psu



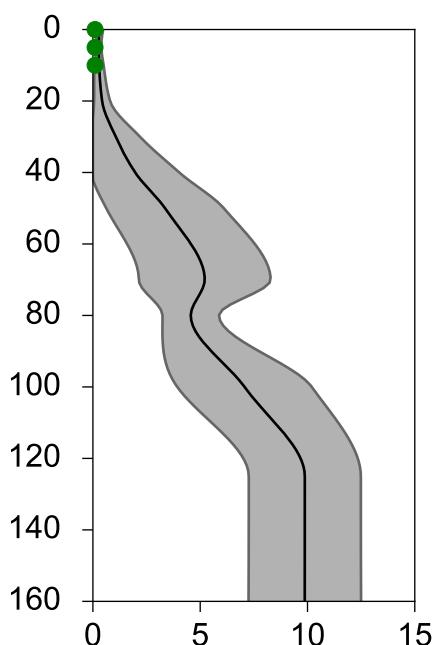
Oxygen ml/l



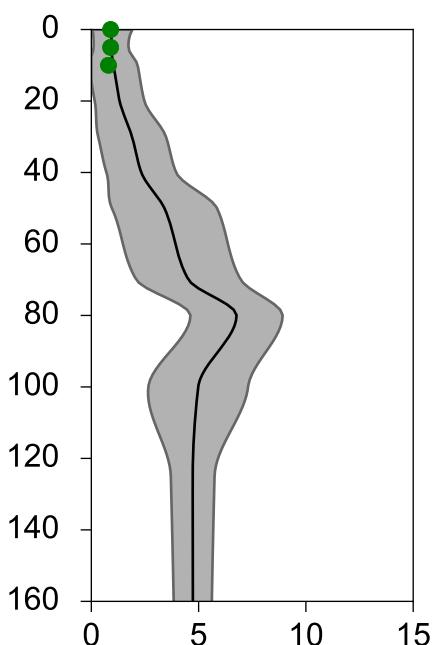
PO<sub>4</sub> µmol/l



DIN µmol/l



SiO<sub>3</sub> µmol/l

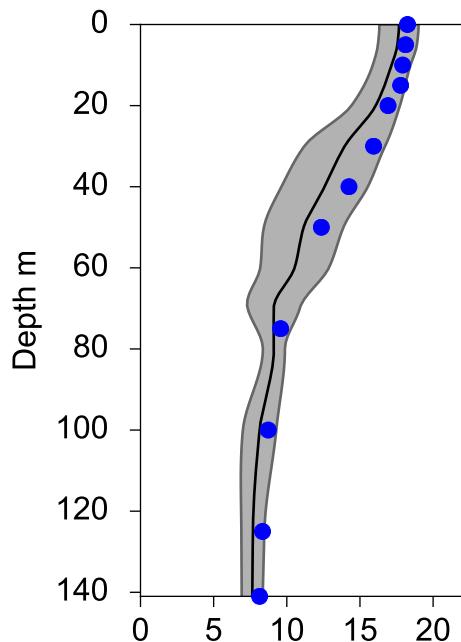


# Vertical profiles 15 W VÄDERÖBOD

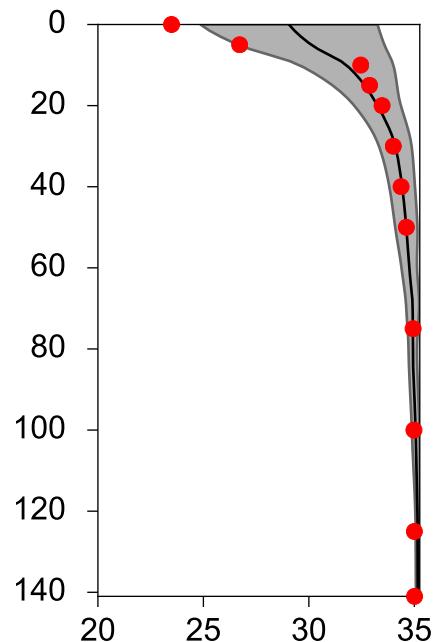
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-26

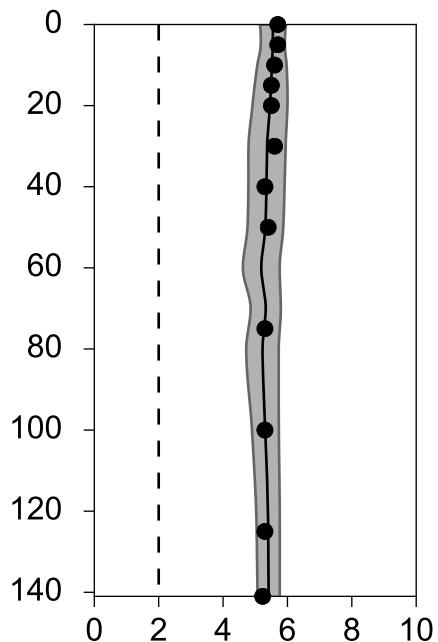
Temperature °C



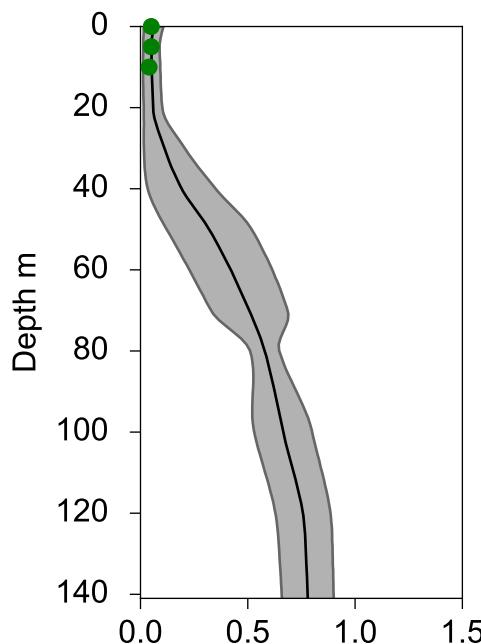
Salinity psu



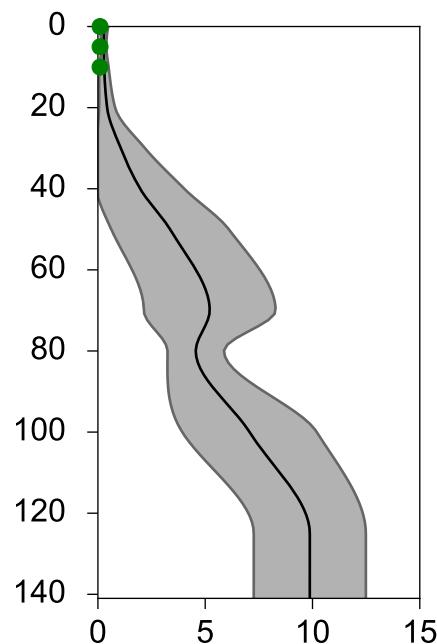
Oxygen ml/l



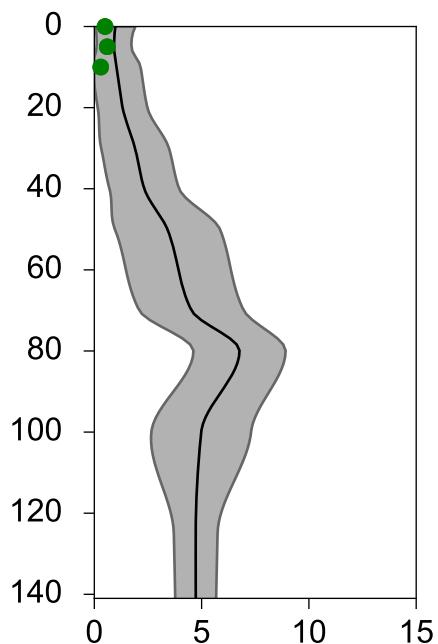
PO<sub>4</sub> µmol/l



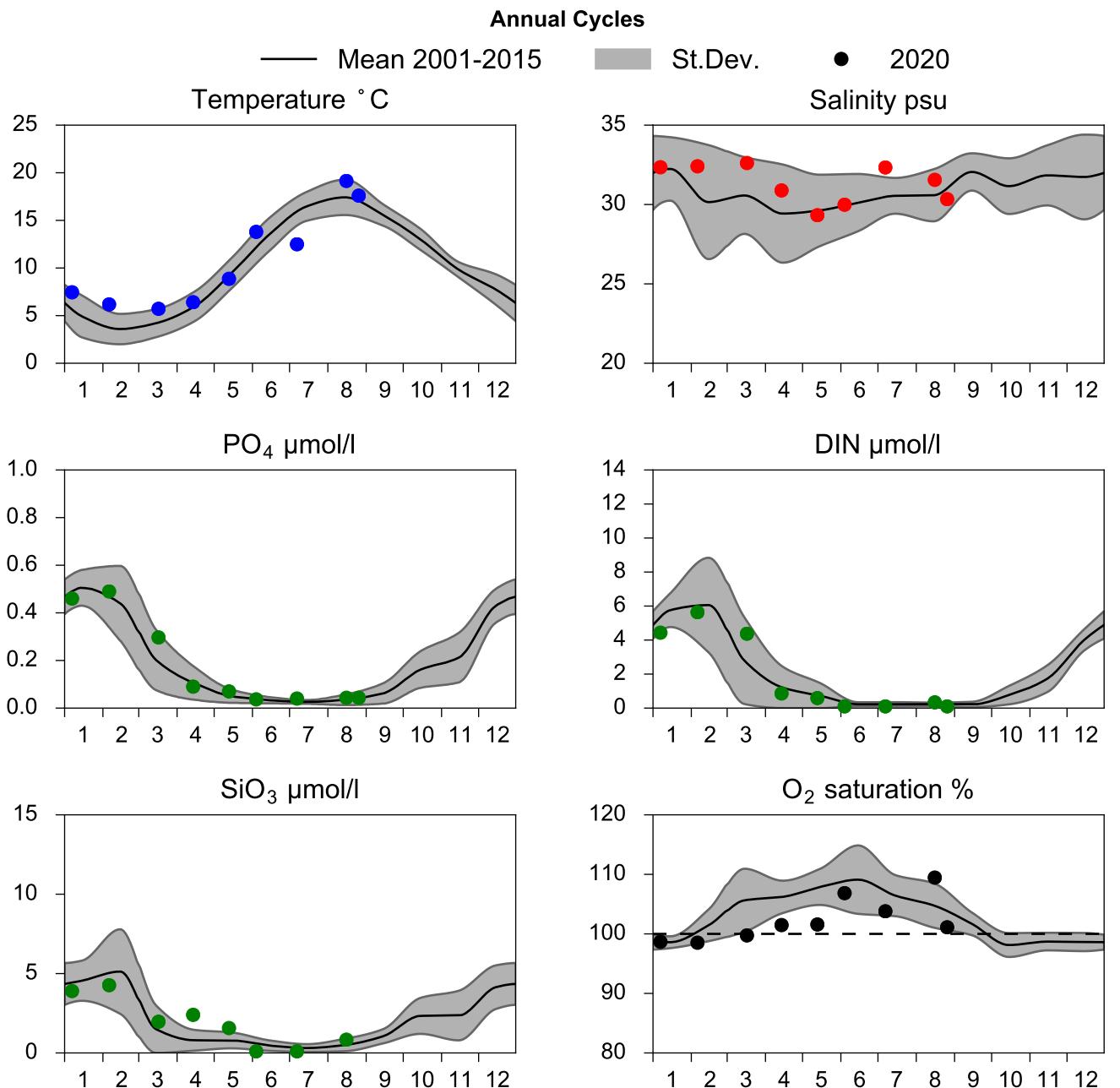
DIN µmol/l



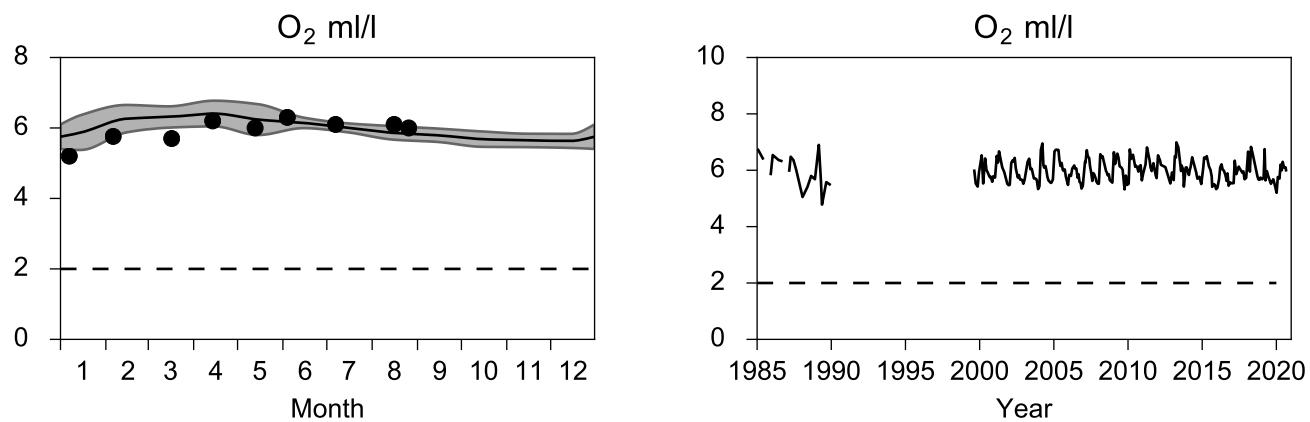
SiO<sub>3</sub> µmol/l



## STATION Å17 SURFACE WATER (0-10 m)



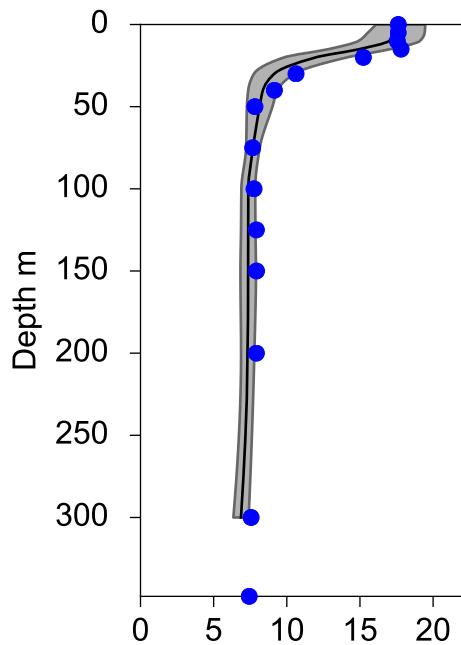
## OXYGEN IN BOTTOM WATER (depth >= 300 m)



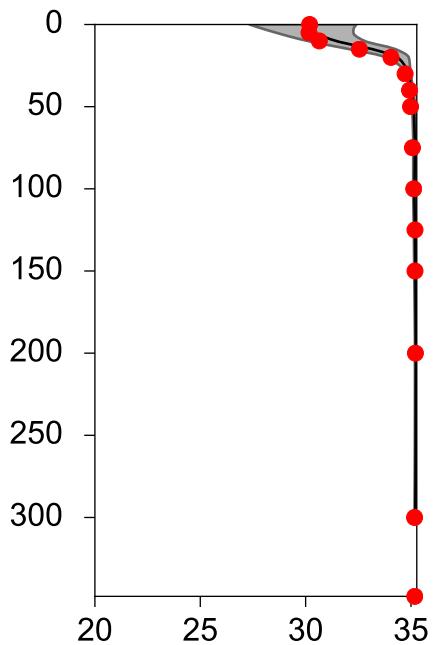
## Vertical profiles Å17 August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-26

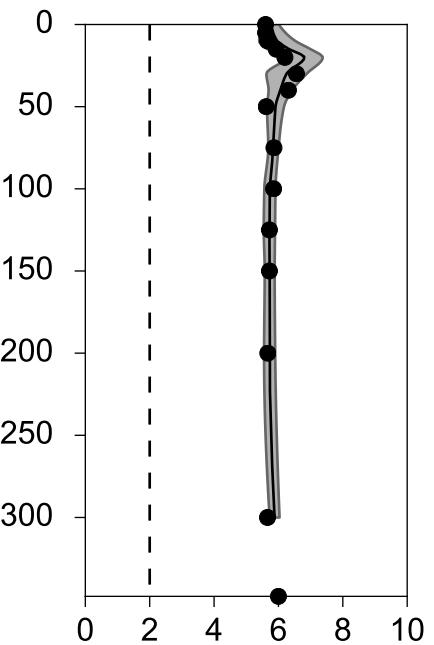
Temperature °C



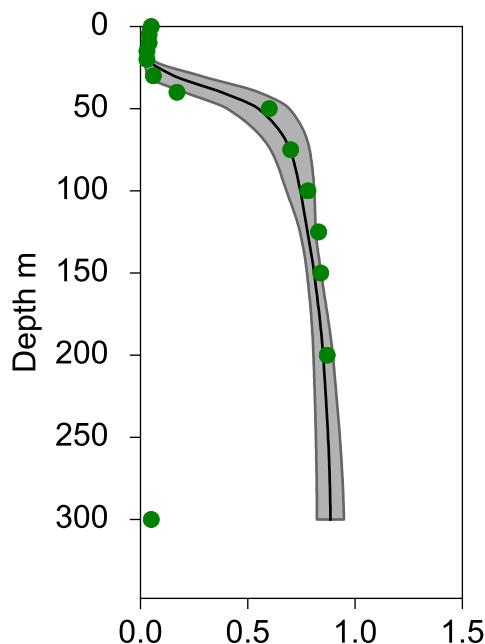
Salinity psu



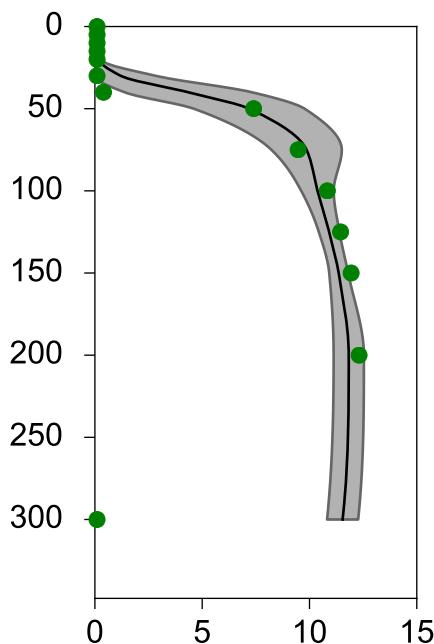
Oxygen ml/l



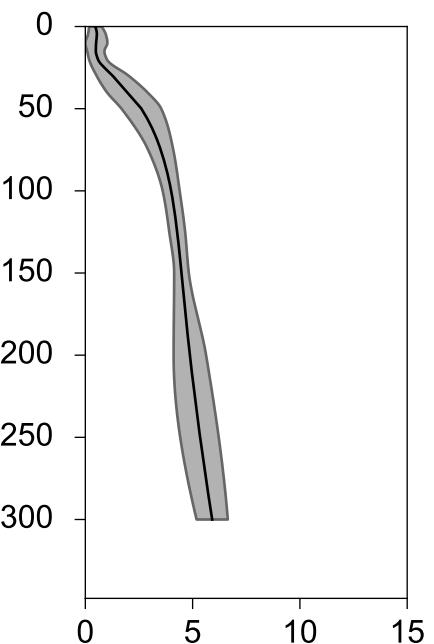
PO<sub>4</sub> µmol/l



DIN µmol/l

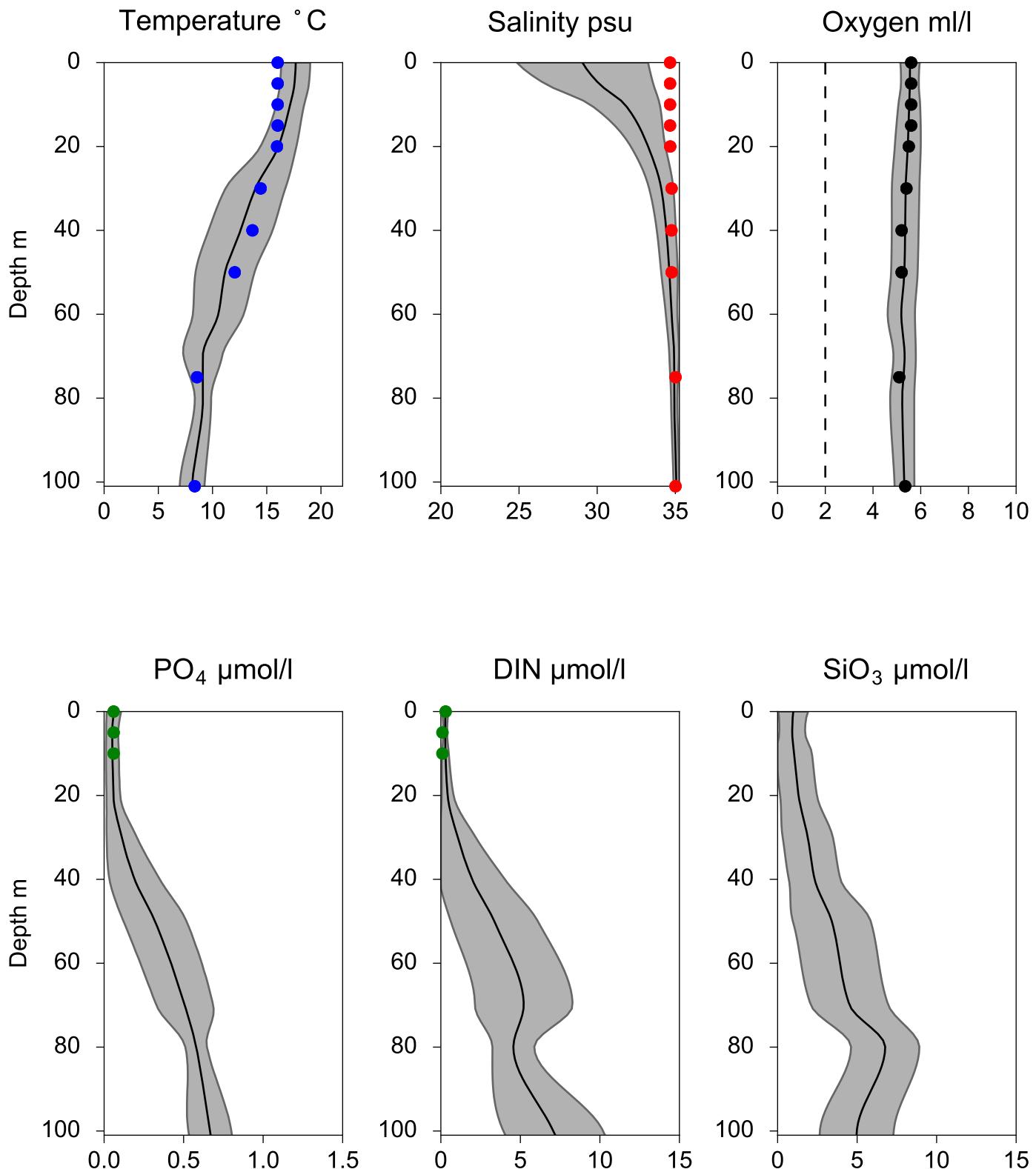


SiO<sub>3</sub> µmol/l



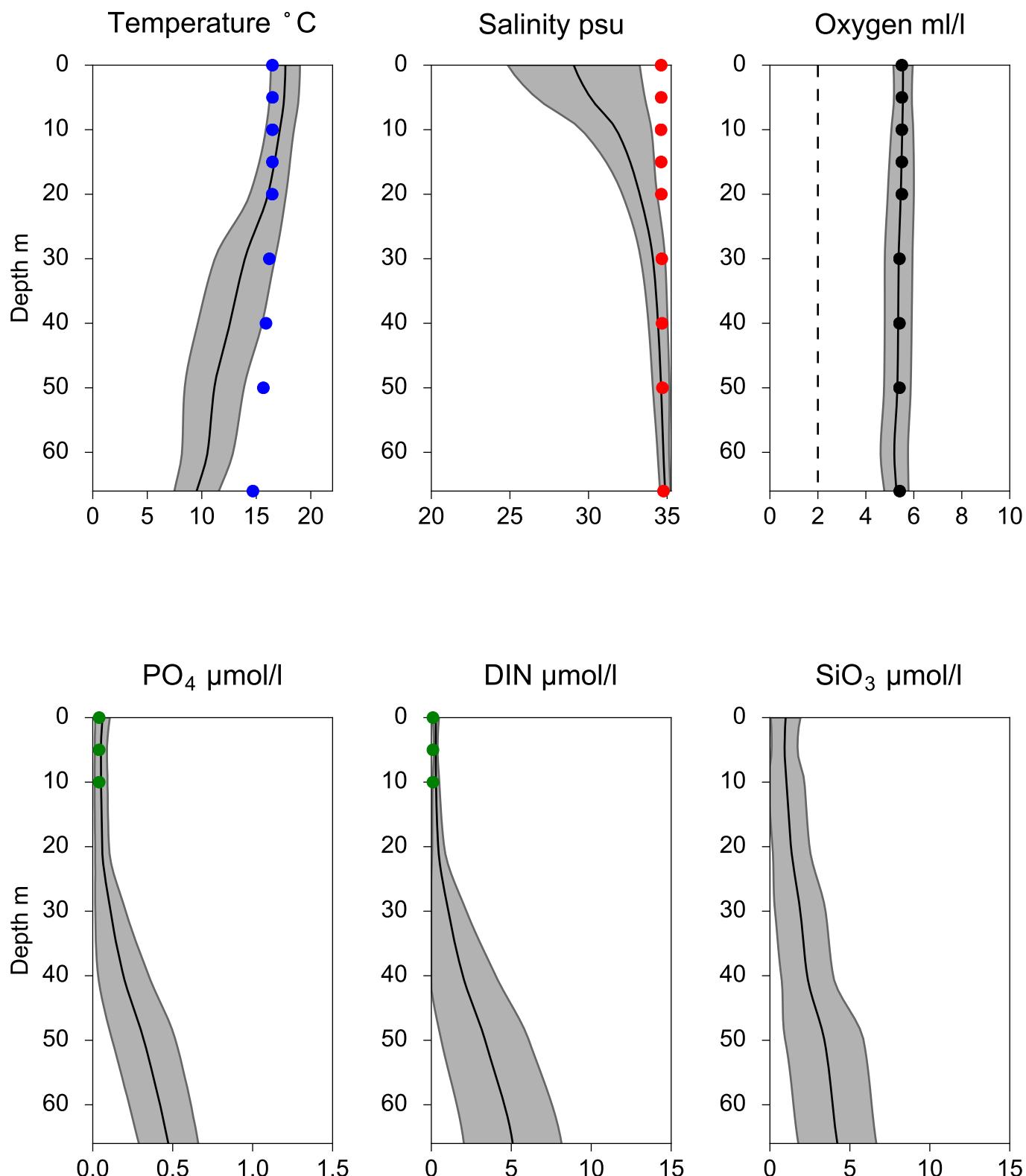
# Vertical profiles 23 NW HANSTHOLM OST August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-27



# Vertical profiles 23 N HANSTHOLM August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-27

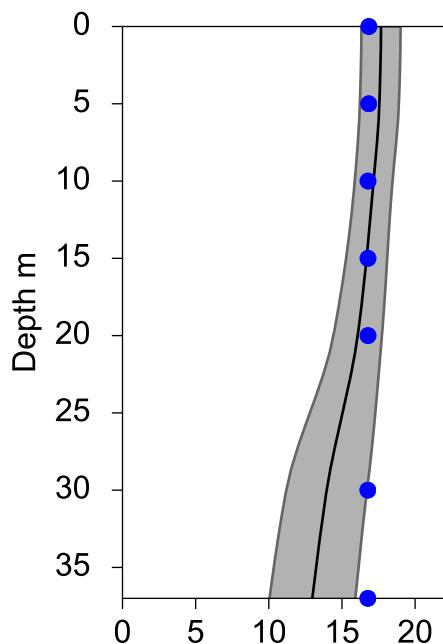


# Vertical profiles 16 N HANSTHOLM

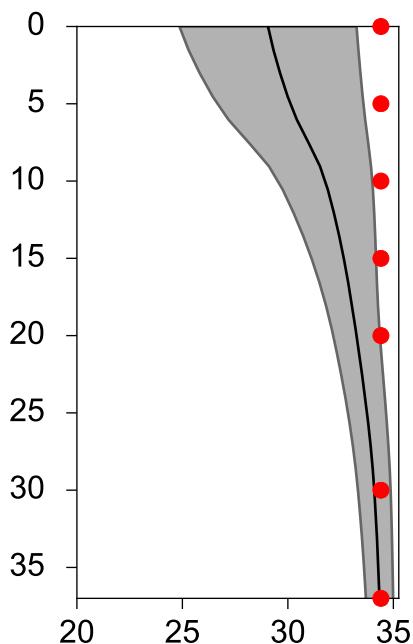
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-27

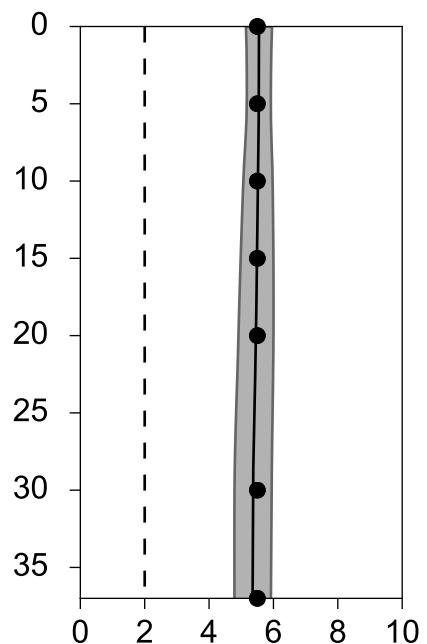
Temperature °C



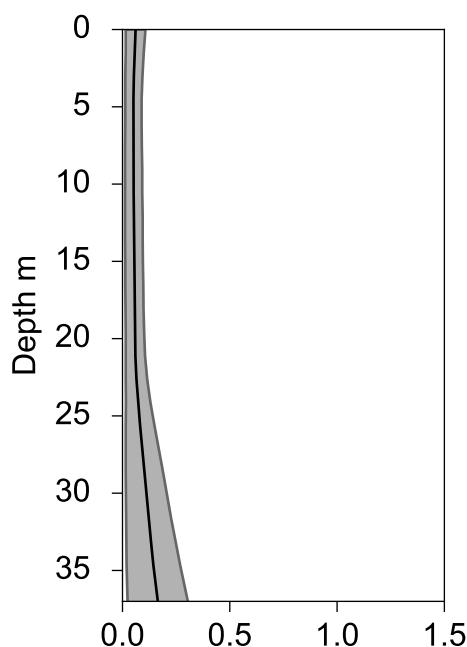
Salinity psu



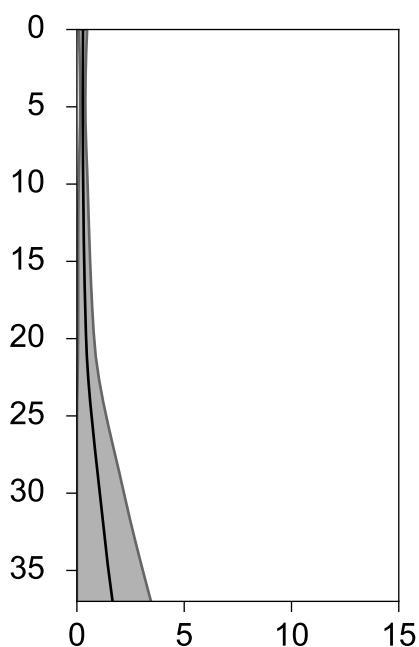
Oxygen ml/l



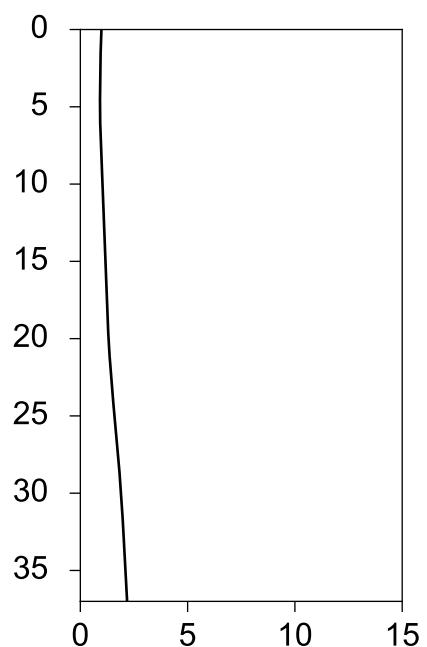
PO<sub>4</sub> µmol/l



DIN µmol/l



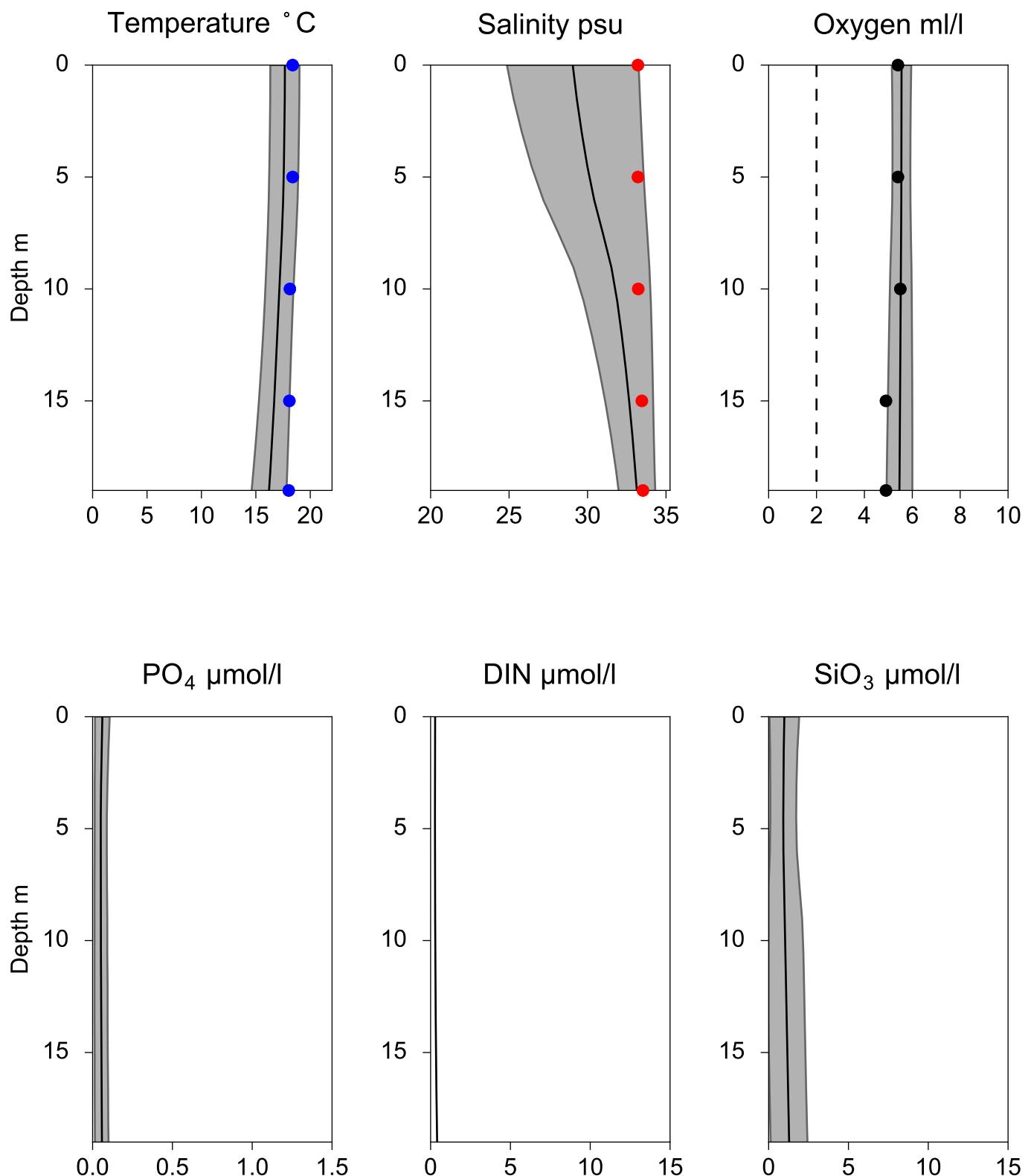
SiO<sub>3</sub> µmol/l



# Vertical profiles 20 W LÖKKEN

## August

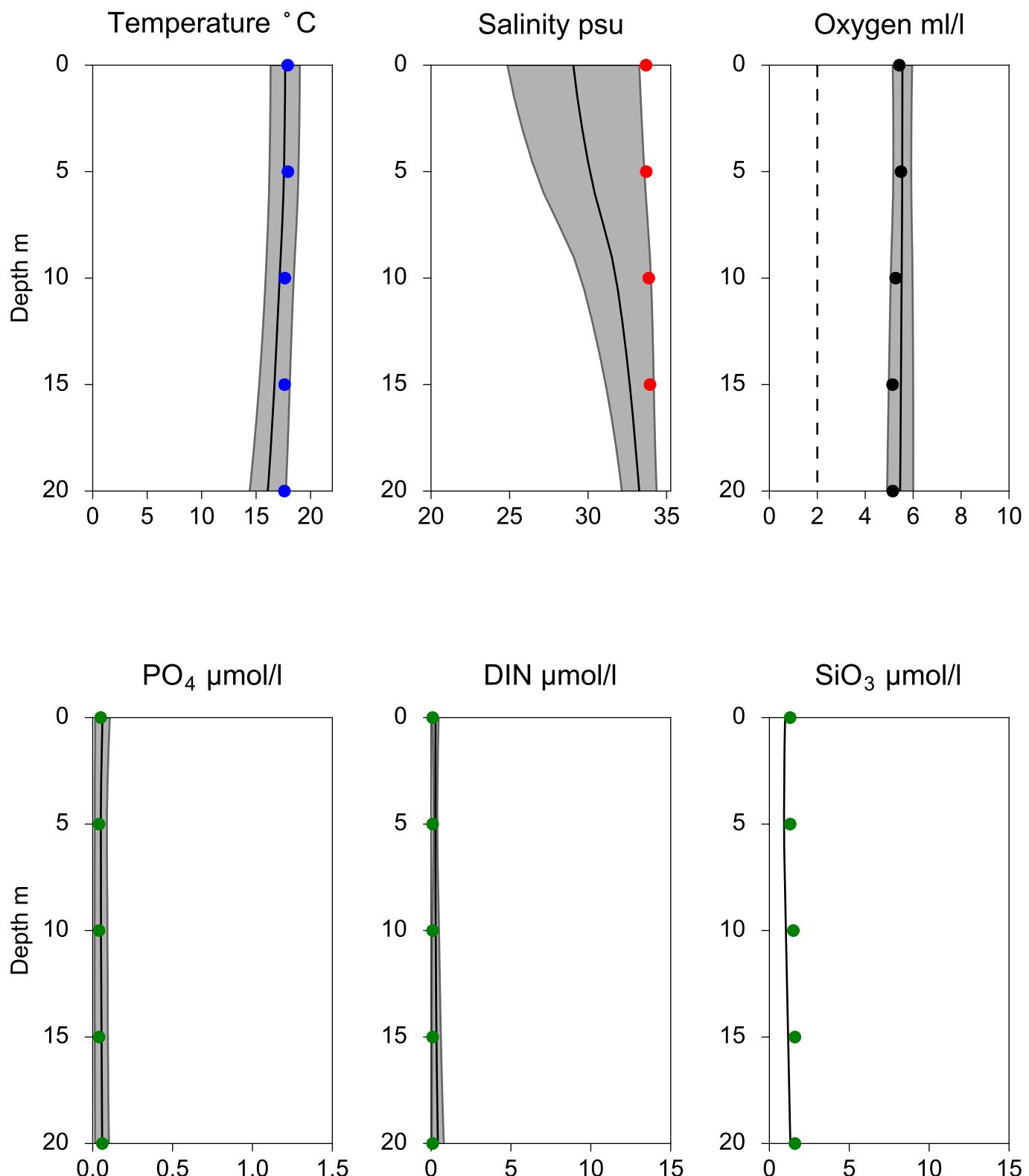
— Mean 2001-2015    ■ St.Dev.    ● 2020-08-27



# Vertical profiles 19 WNW LÖKKEN

## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-27

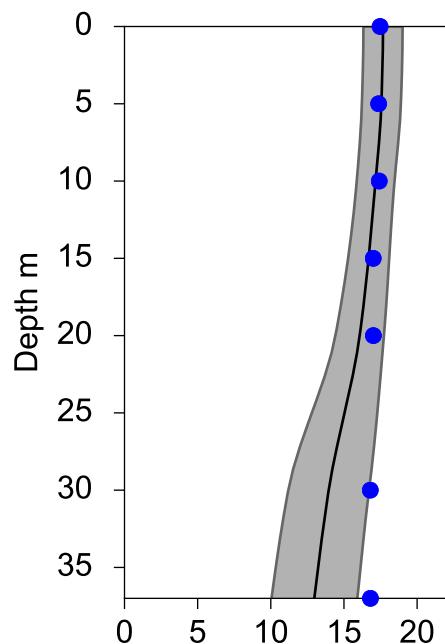


# Vertical profiles 27W HIRTSHALS

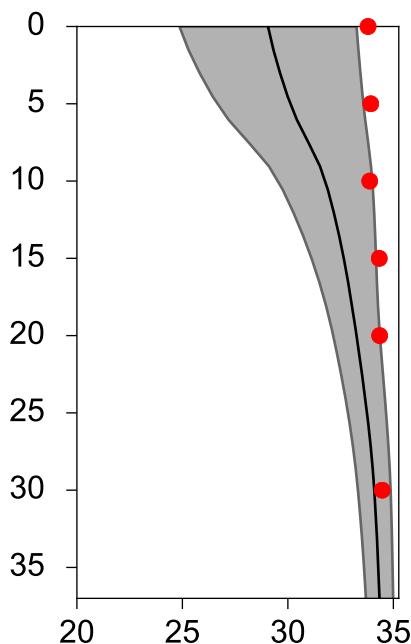
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-29

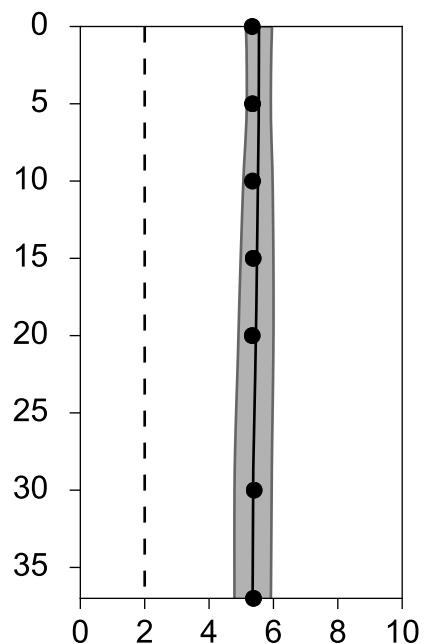
Temperature °C



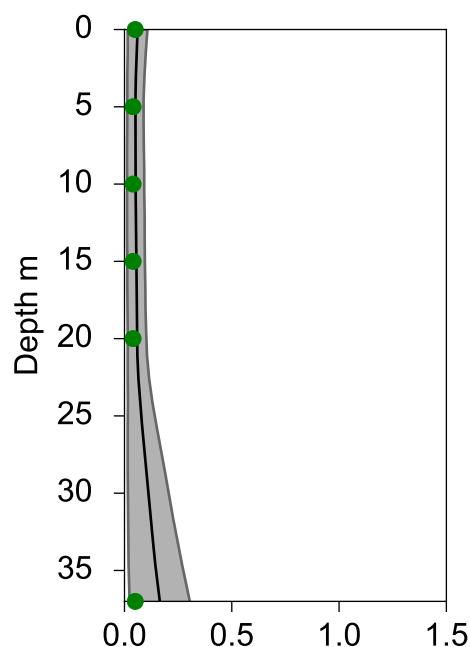
Salinity psu



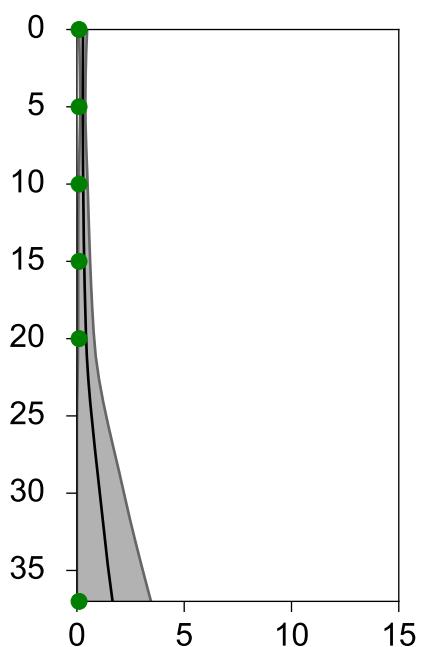
Oxygen ml/l



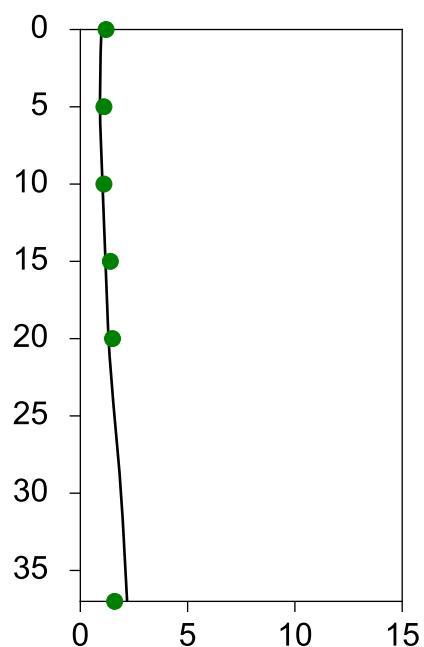
PO<sub>4</sub> µmol/l



DIN µmol/l



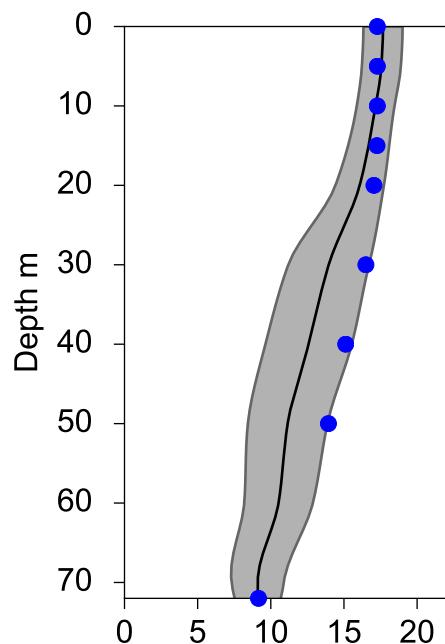
SiO<sub>3</sub> µmol/l



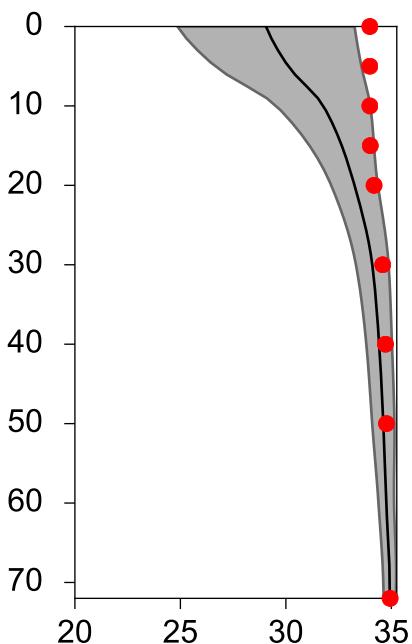
## Vertical profiles 4NNE REVET August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-29

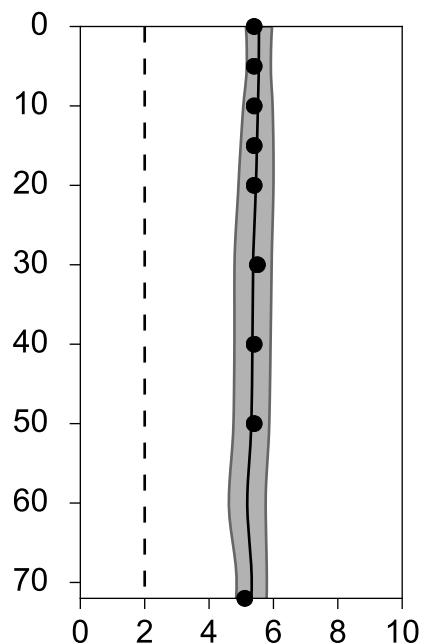
Temperature °C



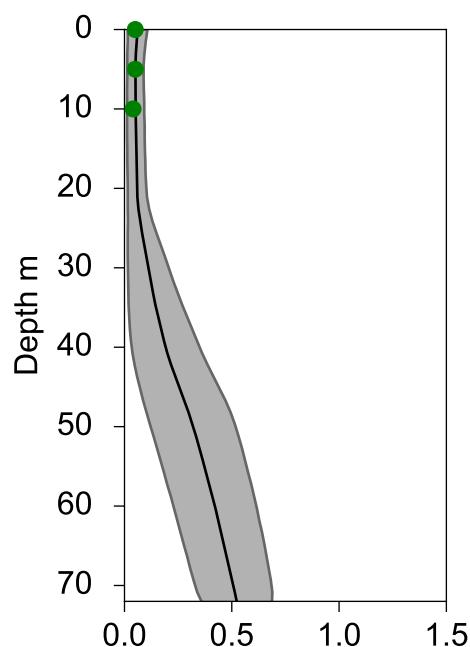
Salinity psu



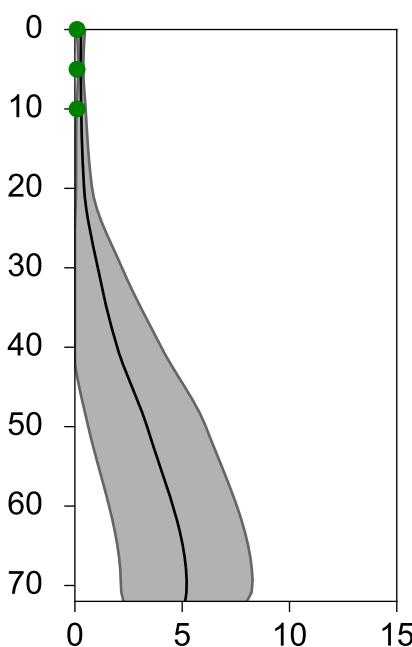
Oxygen ml/l



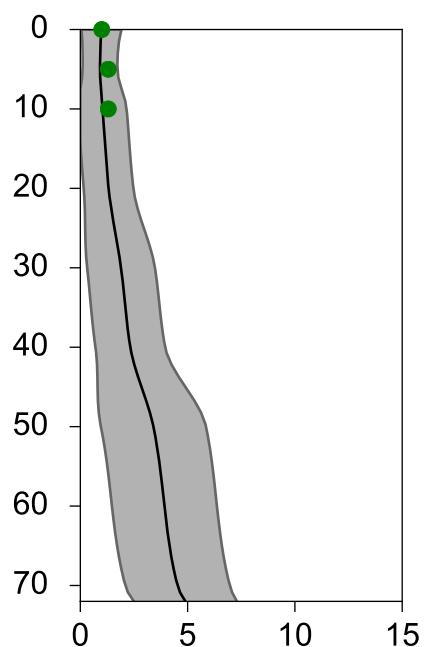
PO<sub>4</sub> µmol/l



DIN µmol/l



SiO<sub>3</sub> µmol/l

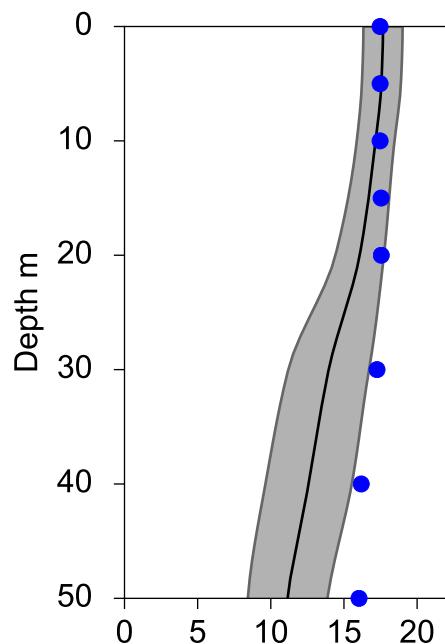


# Vertical profiles 17NNW HIRTSHALS

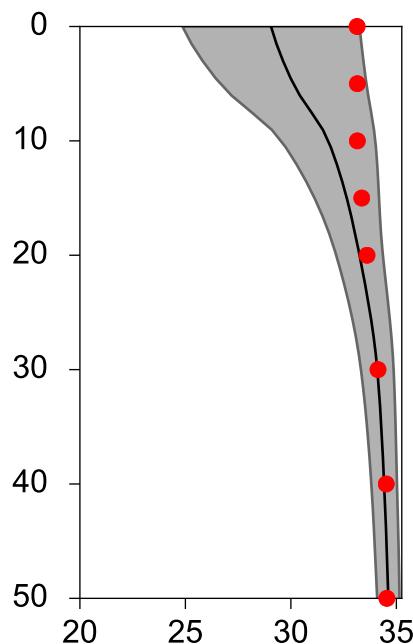
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-29

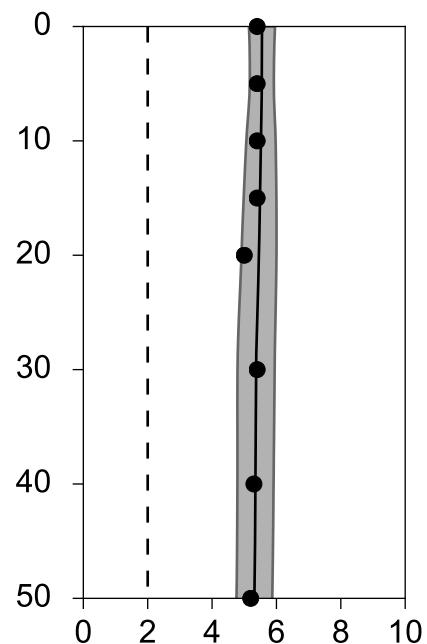
Temperature °C



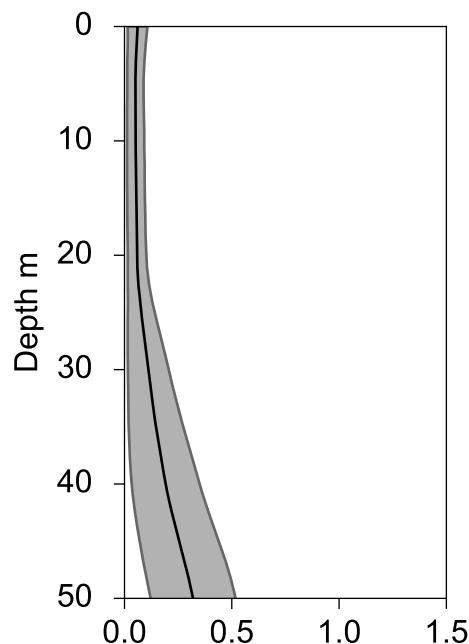
Salinity psu



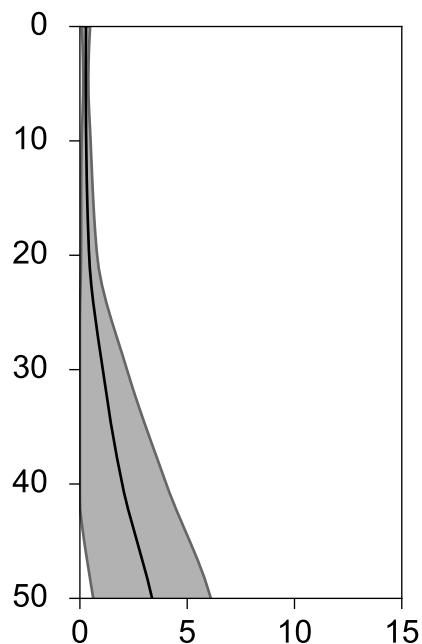
Oxygen ml/l



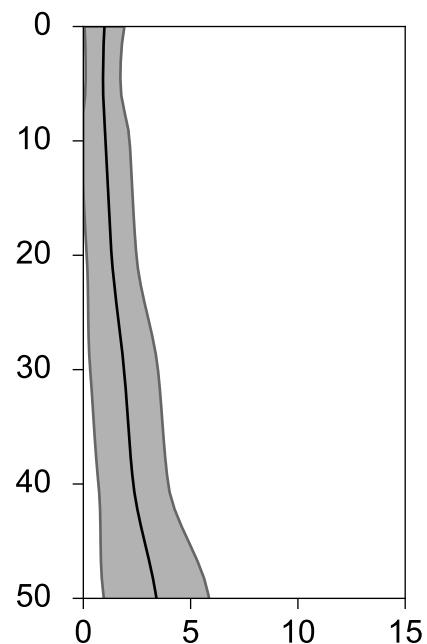
PO<sub>4</sub> µmol/l



DIN µmol/l



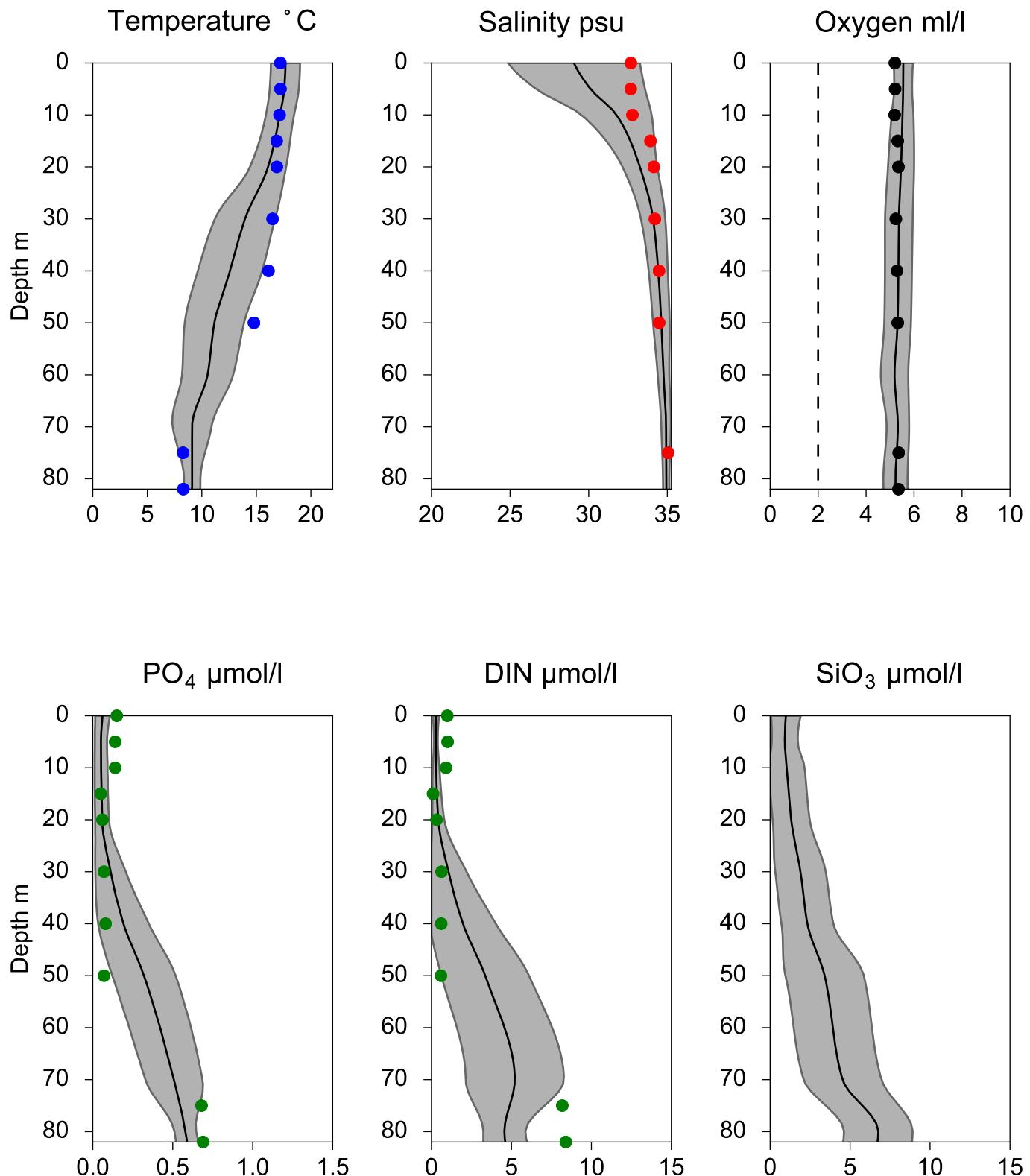
SiO<sub>3</sub> µmol/l



# Vertical profiles 7.5 N HIRTSHALS

## August

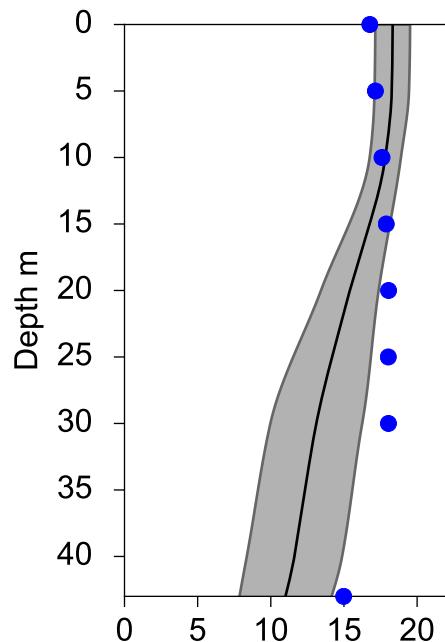
— Mean 2001-2015    ■ St.Dev.    ● 2020-08-29



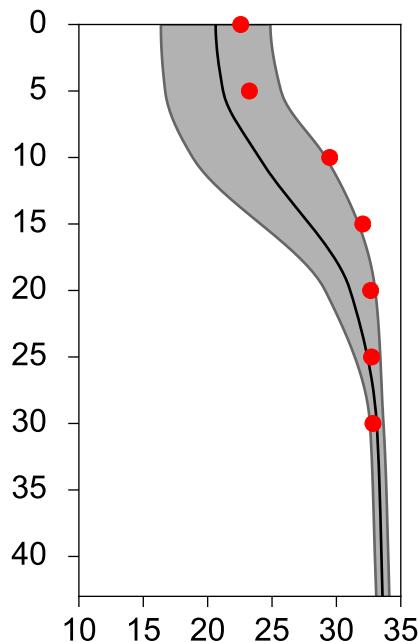
## Vertical profiles 14W VINGA August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-30

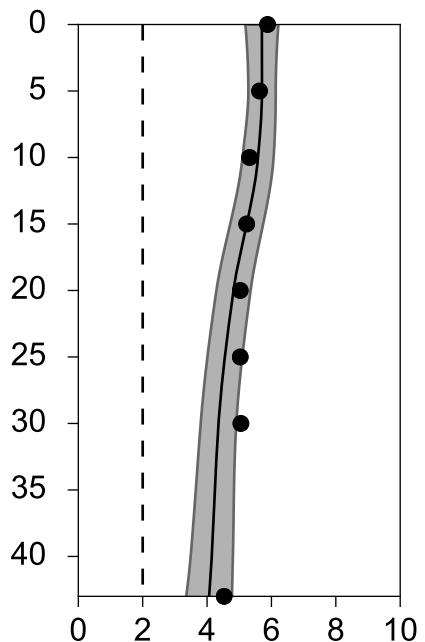
Temperature °C



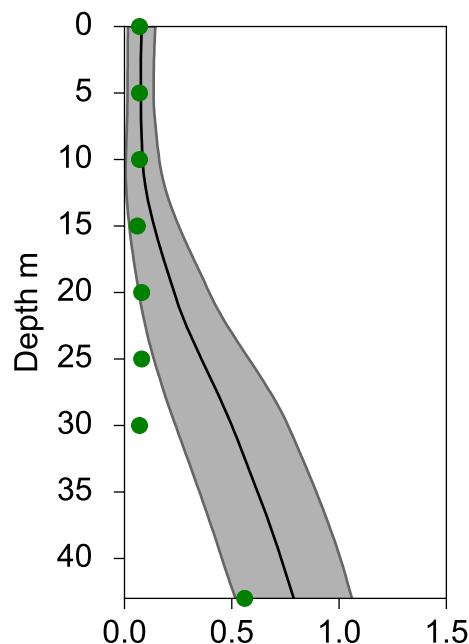
Salinity psu



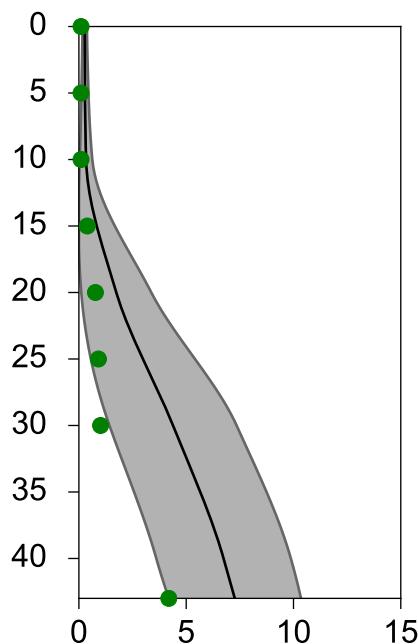
Oxygen ml/l



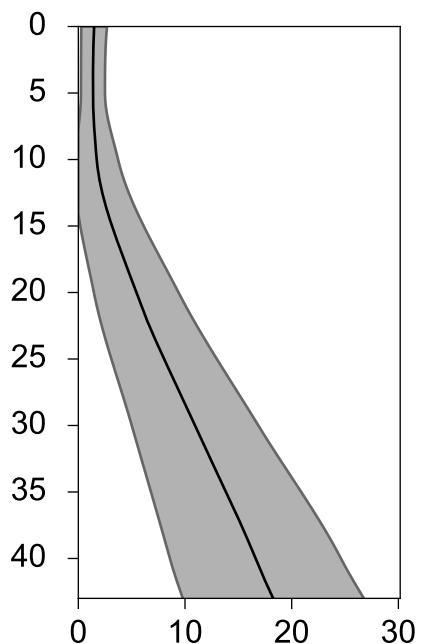
PO<sub>4</sub> µmol/l



DIN µmol/l



SiO<sub>3</sub> µmol/l

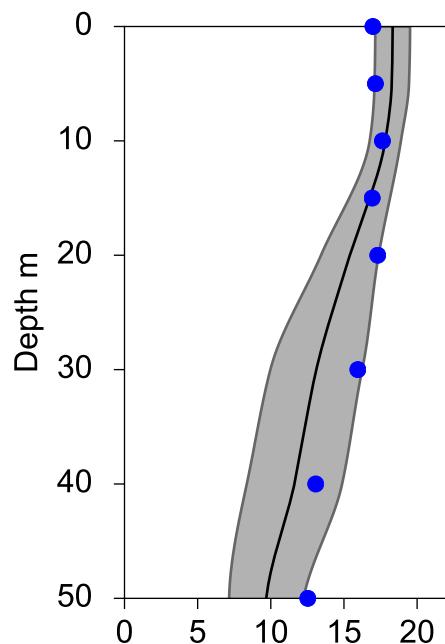


# Vertical profiles 8W VINGA

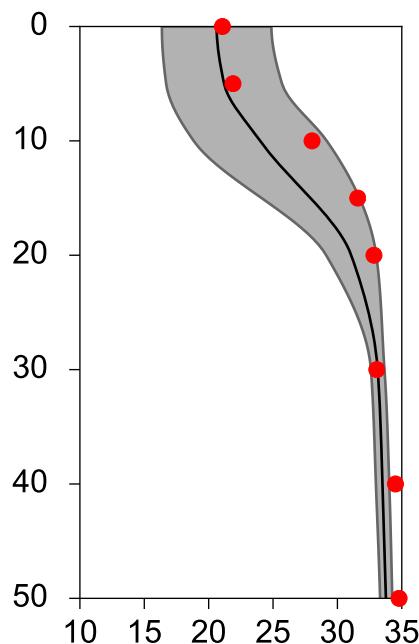
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-30

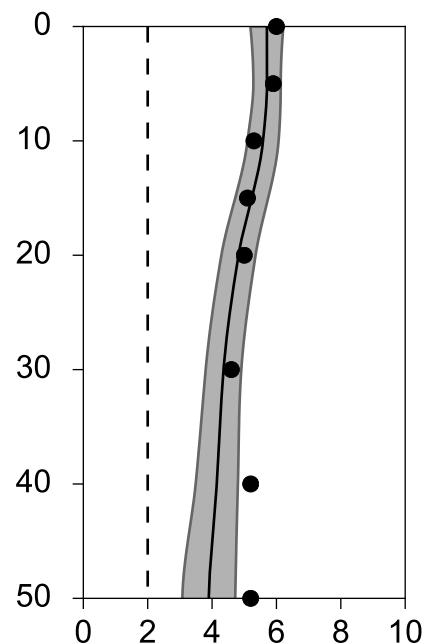
Temperature °C



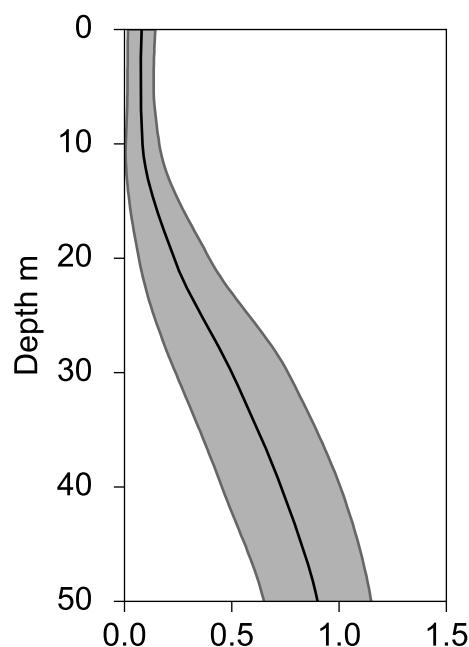
Salinity psu



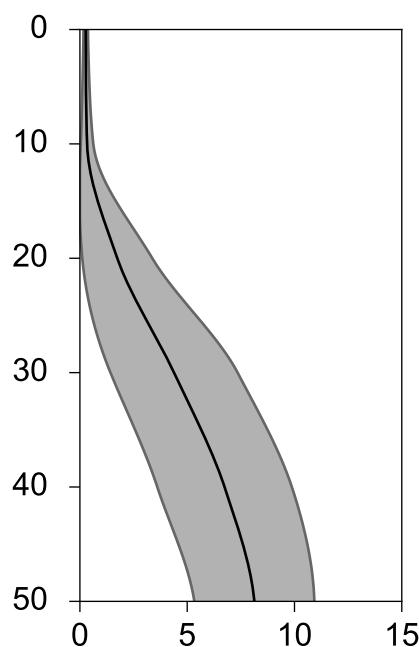
Oxygen ml/l



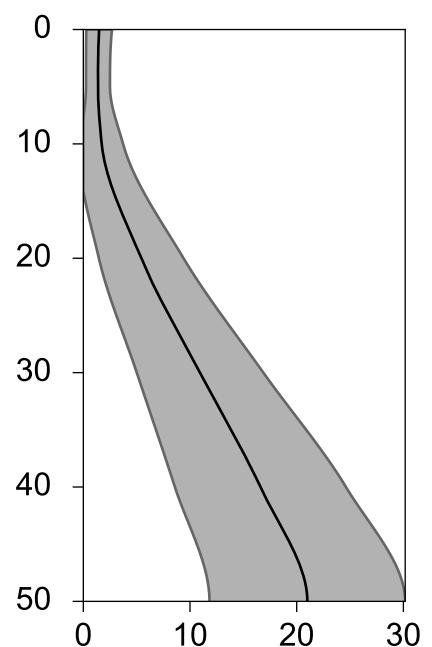
PO<sub>4</sub> µmol/l



DIN µmol/l



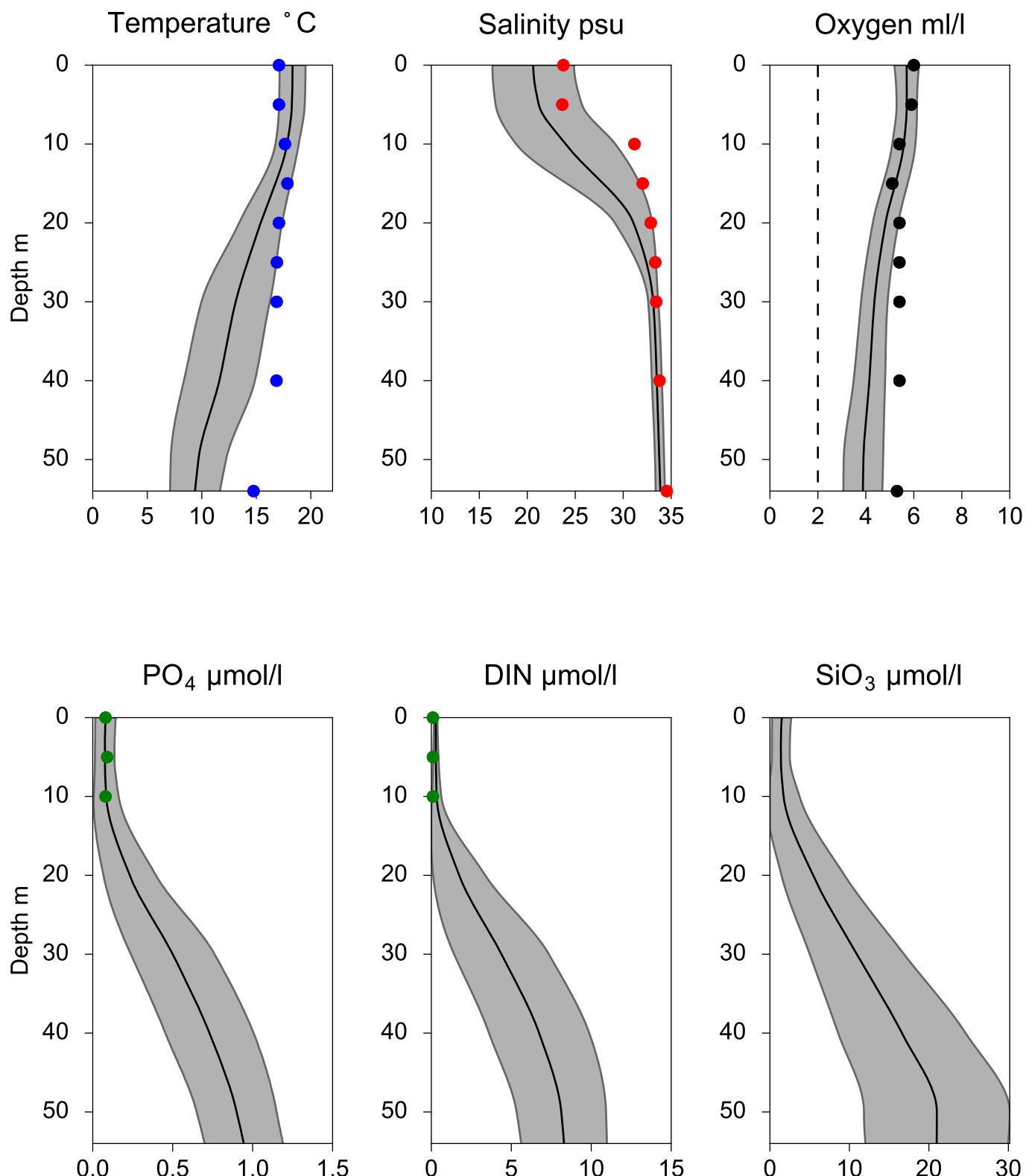
SiO<sub>3</sub> µmol/l



# Vertical profiles 8W STORA PÖLSAN

## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-30



# STATION SLÄGGÖ SURFACE WATER (0-10 m)

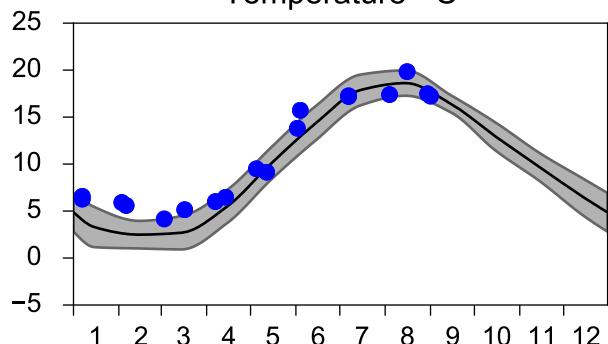
Annual Cycles

— Mean 2001-2015

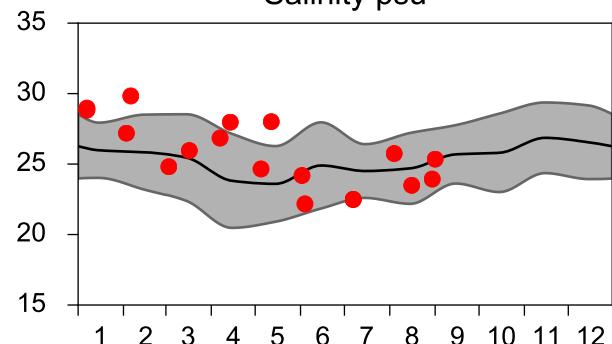
■ St.Dev.

● 2020

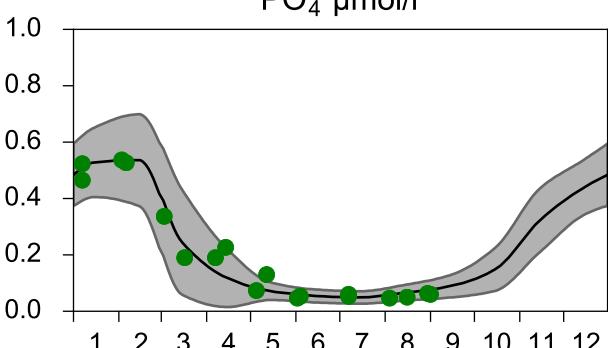
Temperature °C



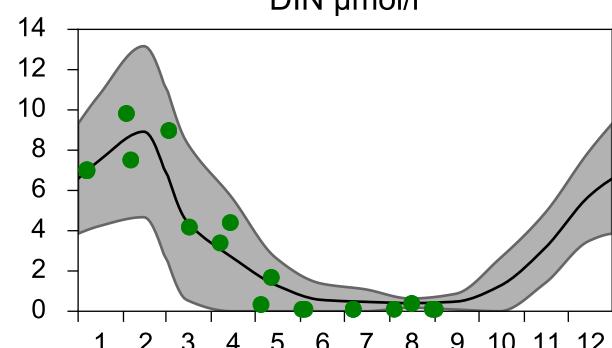
Salinity psu



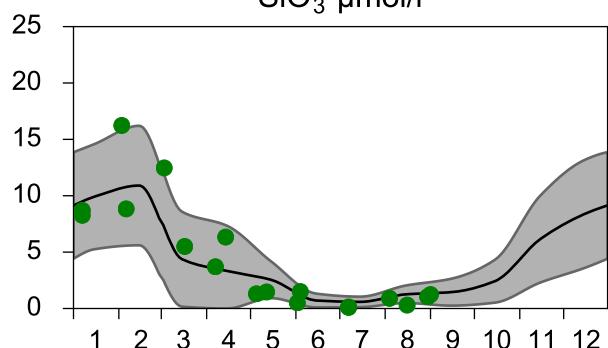
PO<sub>4</sub> µmol/l



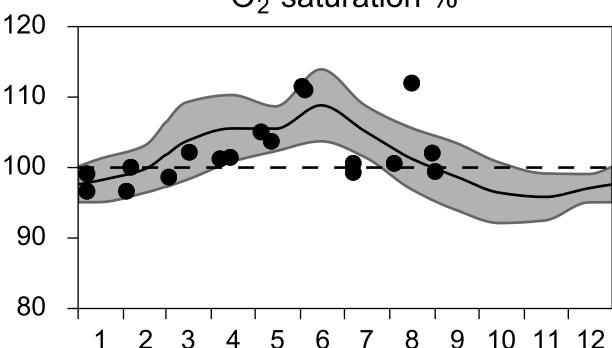
DIN µmol/l



SiO<sub>3</sub> µmol/l

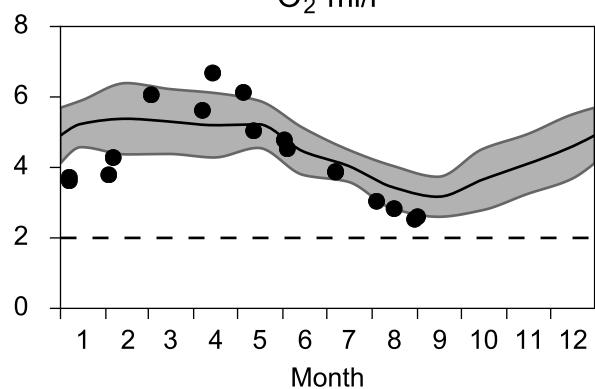


O<sub>2</sub> saturation %

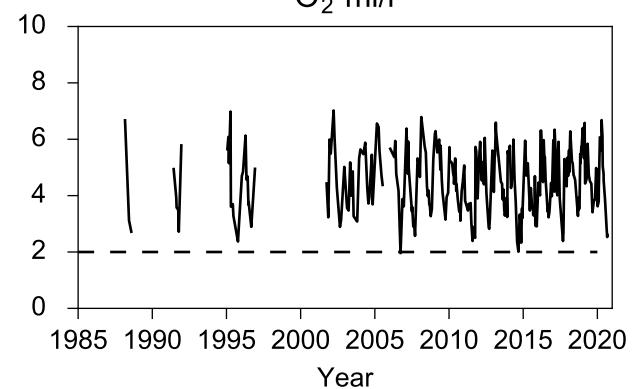


## OXYGEN IN BOTTOM WATER (depth >= 64 m)

O<sub>2</sub> ml/l



O<sub>2</sub> ml/l

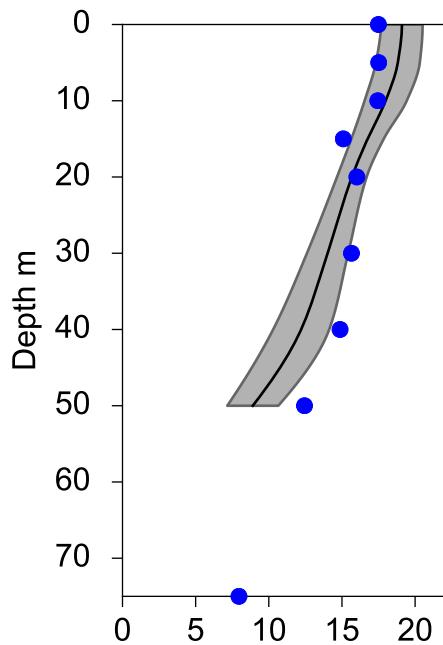


# Vertical profiles SLÄGGÖ

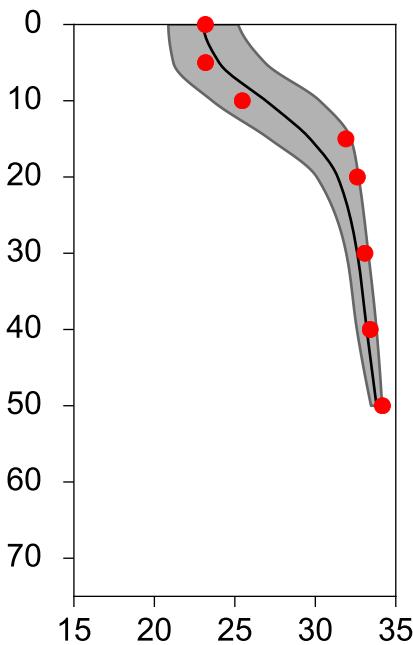
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-30

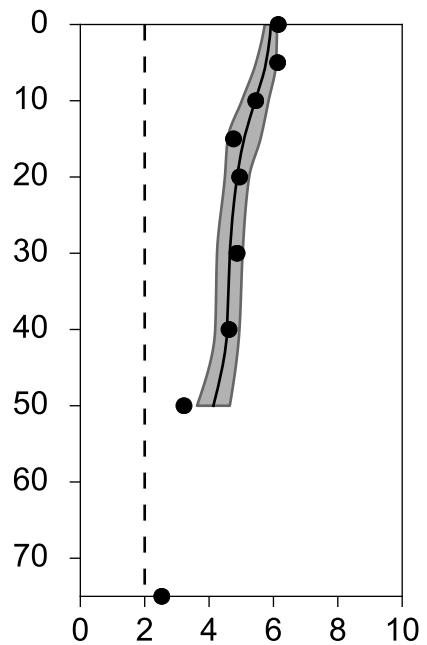
Temperature °C



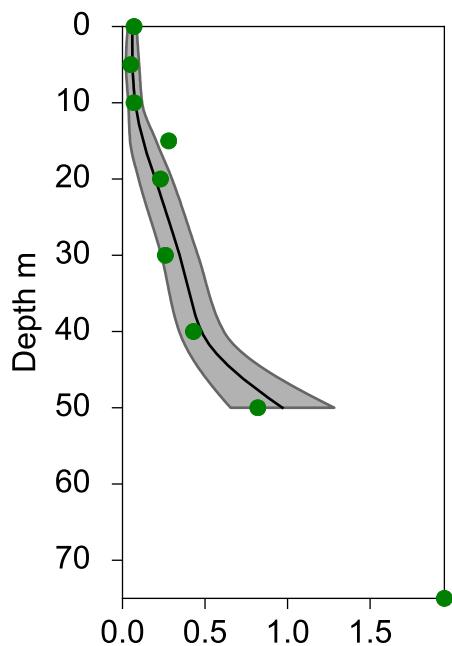
Salinity psu



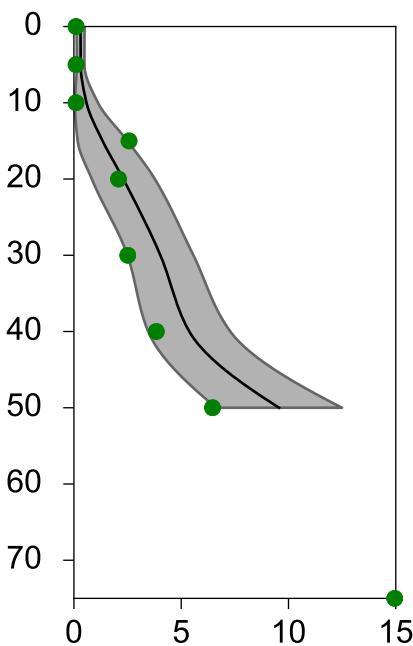
Oxygen ml/l



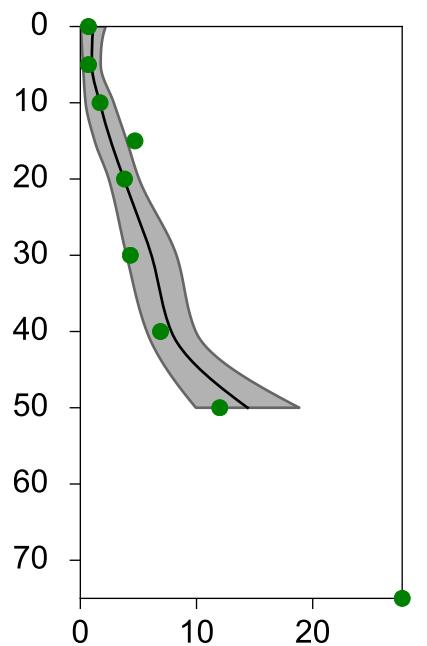
PO<sub>4</sub> µmol/l



DIN µmol/l



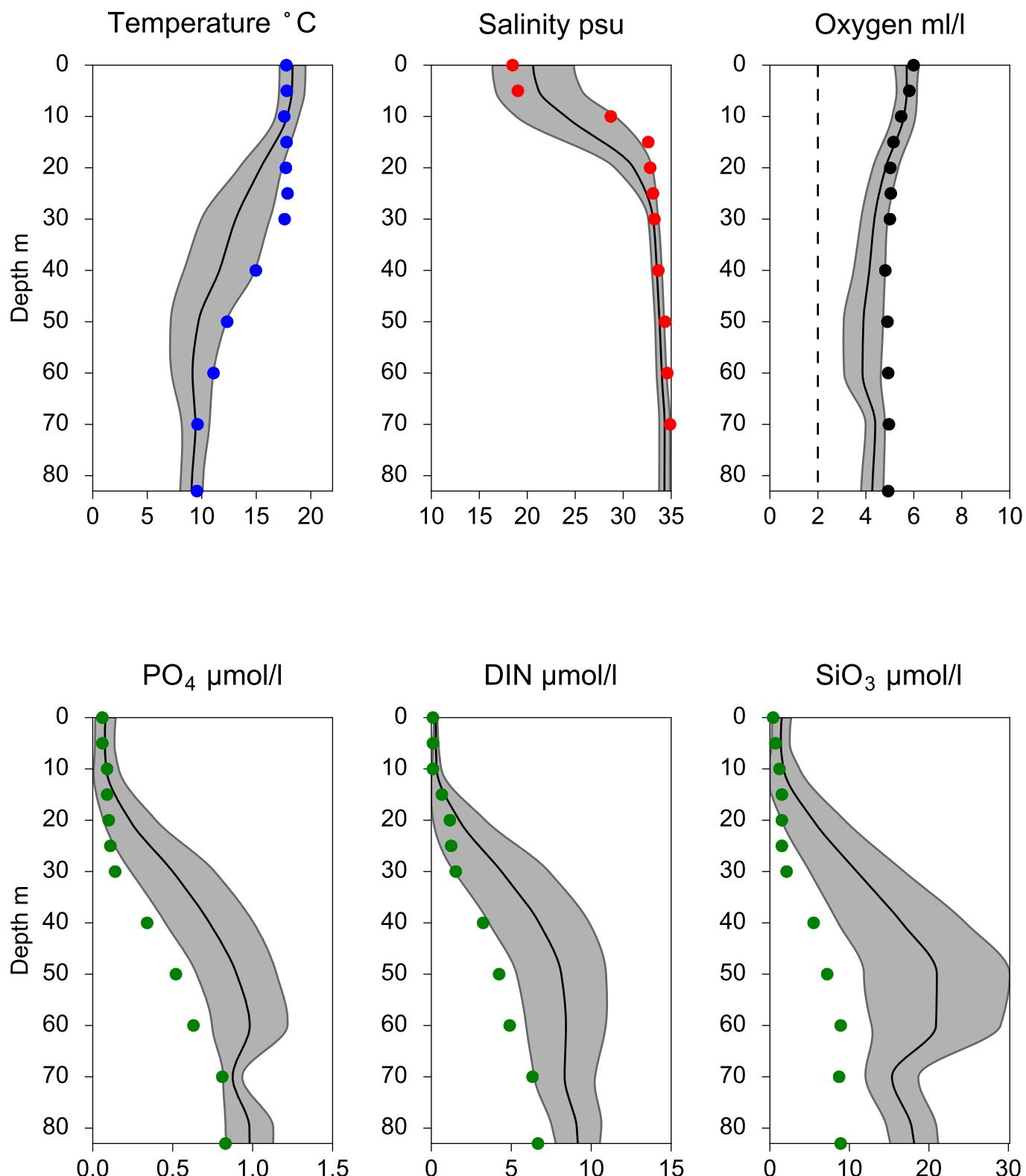
SiO<sub>3</sub> µmol/l



# Vertical profiles W GROVES FLAK

## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-31

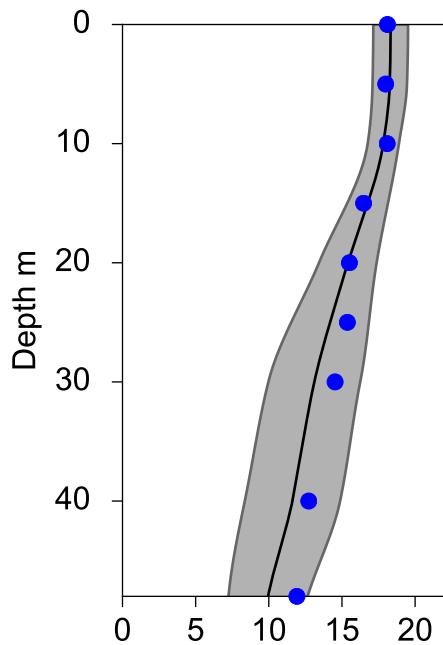


# Vertical profiles FYRBANKEN

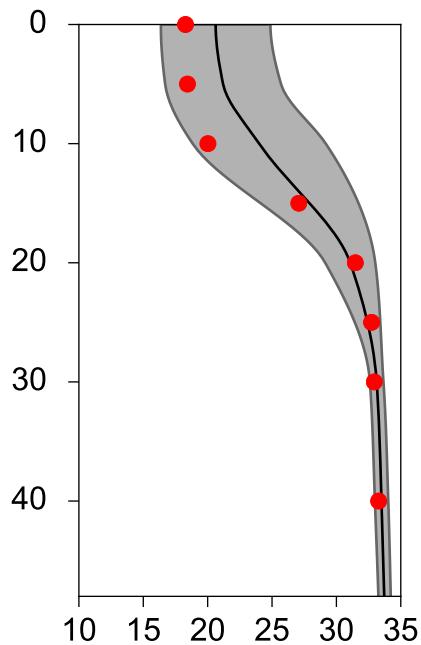
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-31

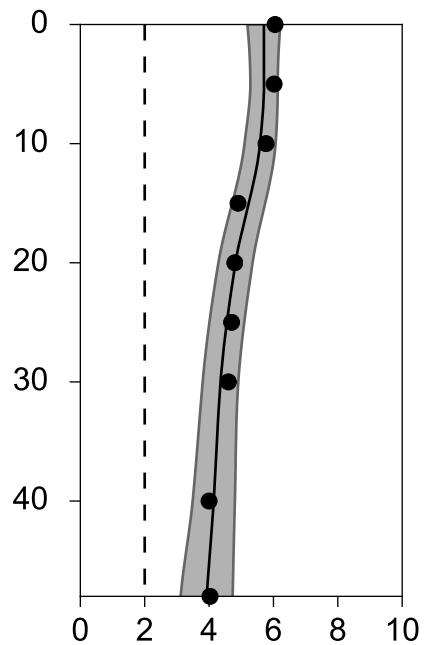
Temperature °C



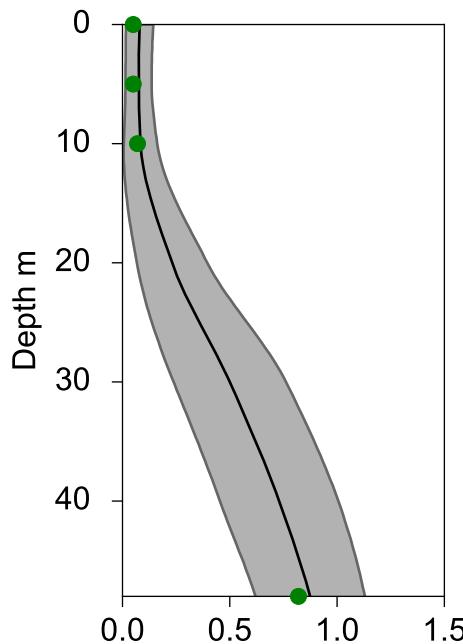
Salinity psu



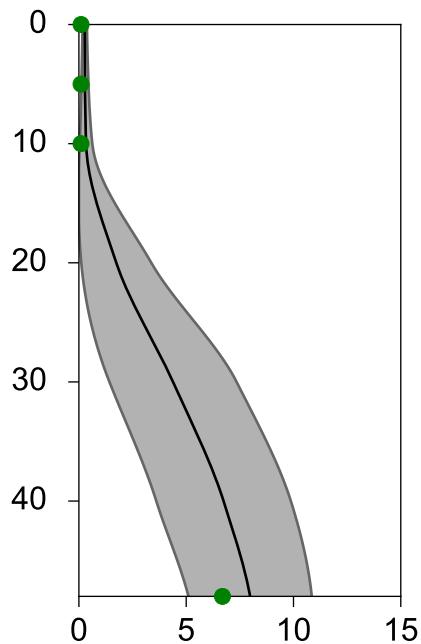
Oxygen ml/l



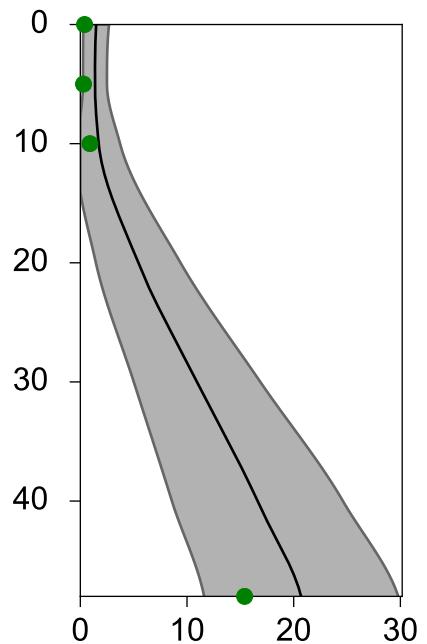
PO<sub>4</sub> µmol/l



DIN µmol/l



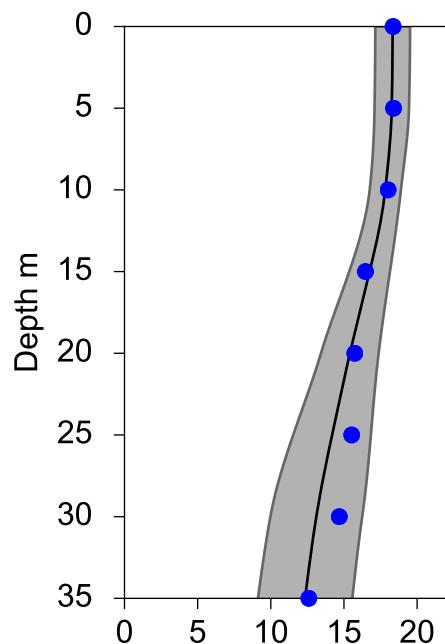
SiO<sub>3</sub> µmol/l



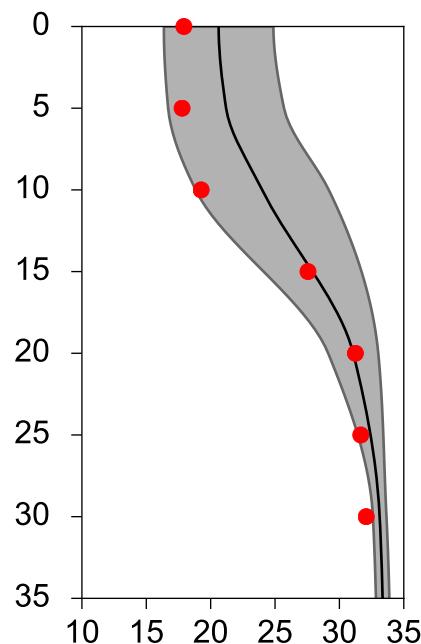
## Vertical profiles 7S ANHOLT KNOB August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-31

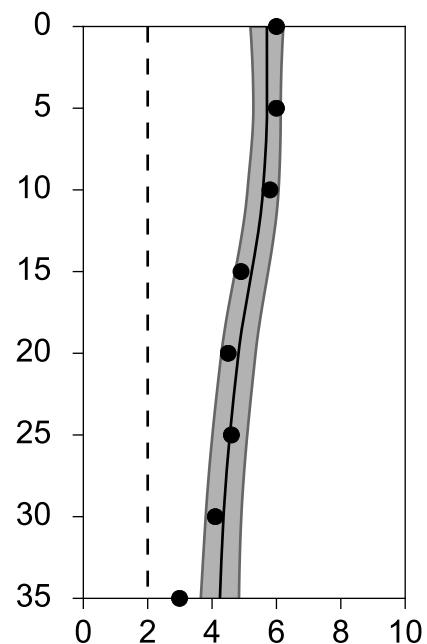
Temperature °C



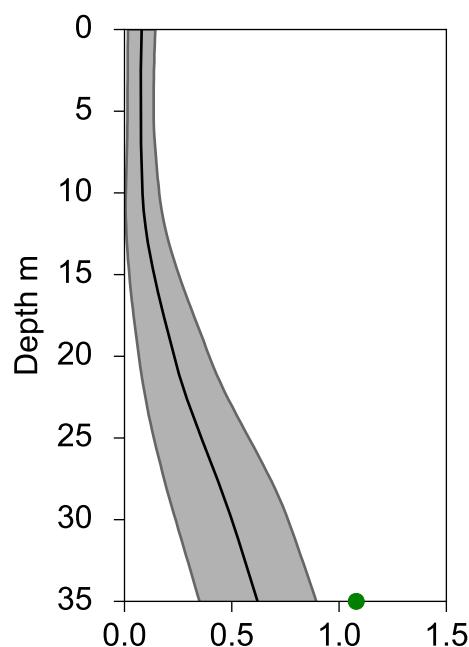
Salinity psu



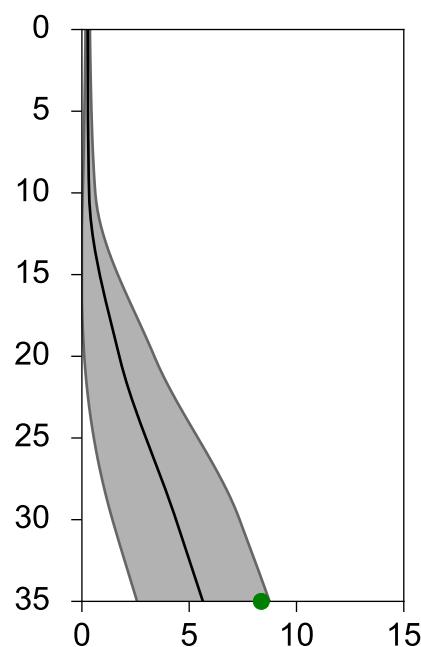
Oxygen ml/l



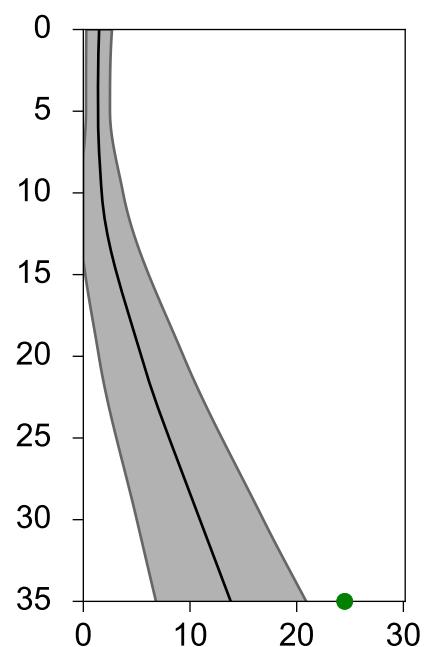
PO<sub>4</sub> µmol/l



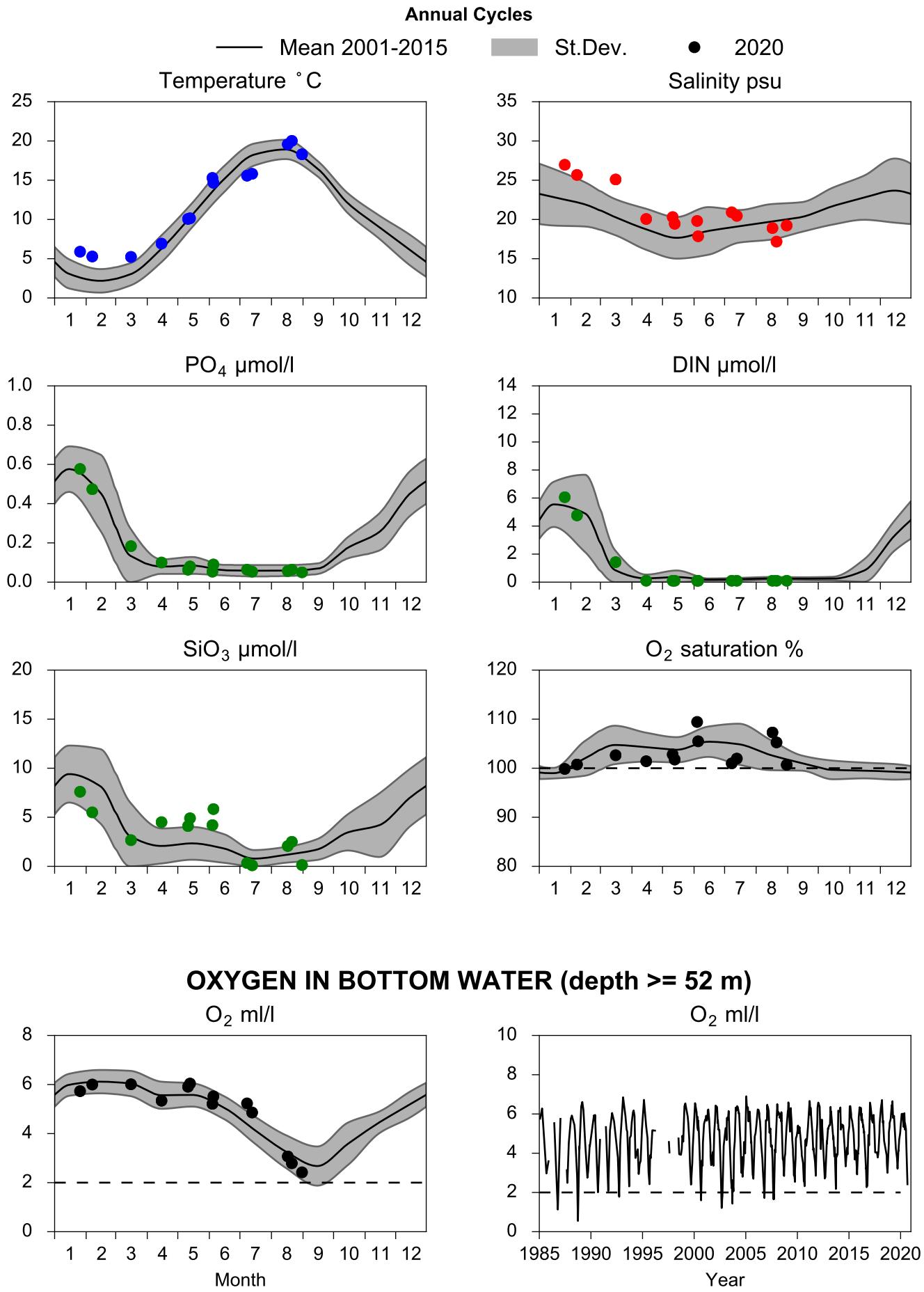
DIN µmol/l



SiO<sub>3</sub> µmol/l



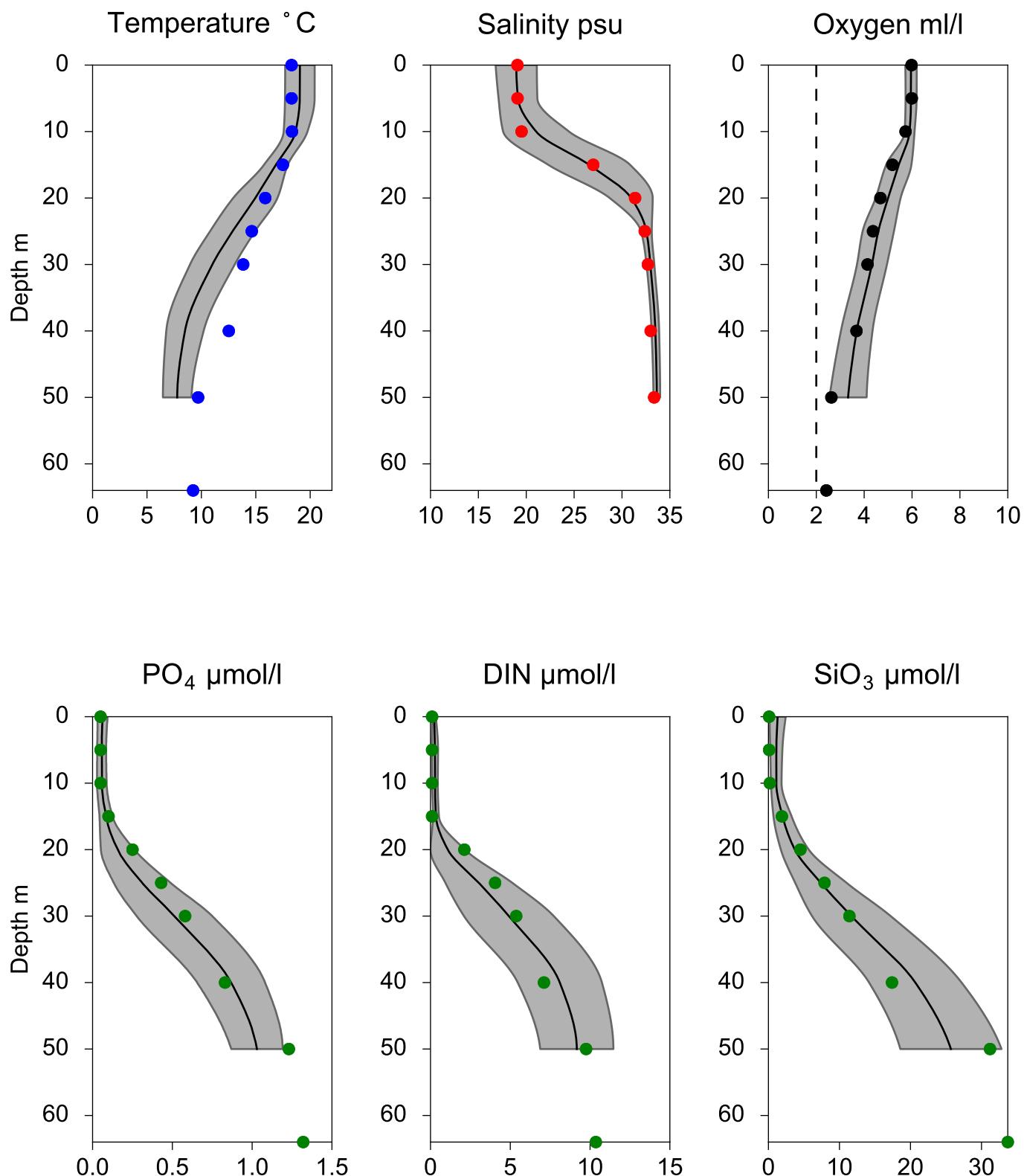
## STATION ANHOLT E SURFACE WATER (0-10 m)



# Vertical profiles ANHOLT E

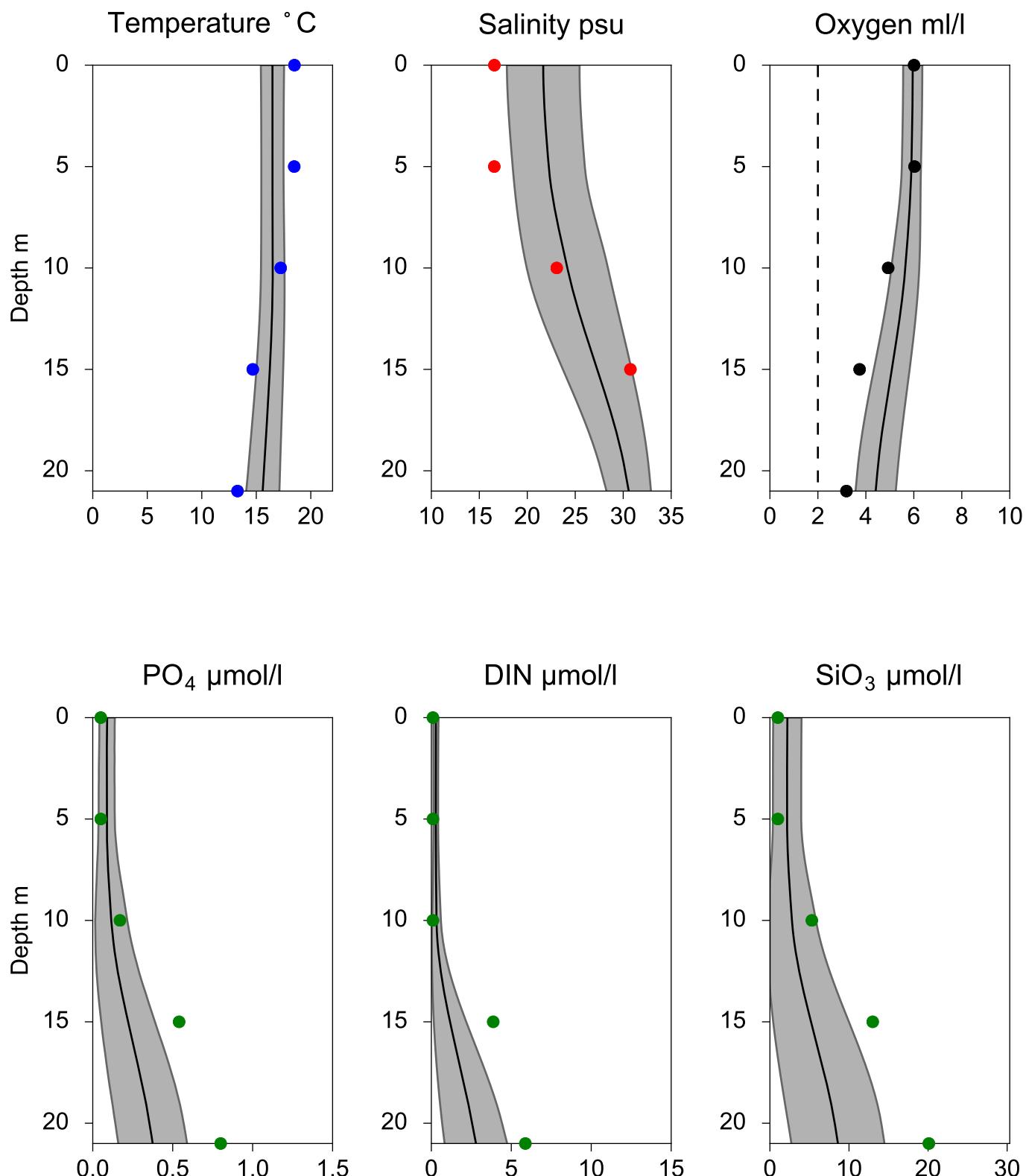
## August

— Mean 2001-2015    ■ St.Dev.    ● 2020-08-31



# Vertical profiles 7N HJELM September

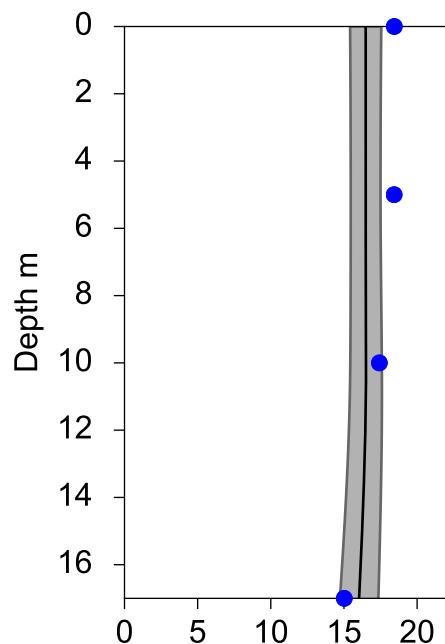
— Mean 2001-2015    ■ St.Dev.    ● 2020-09-01



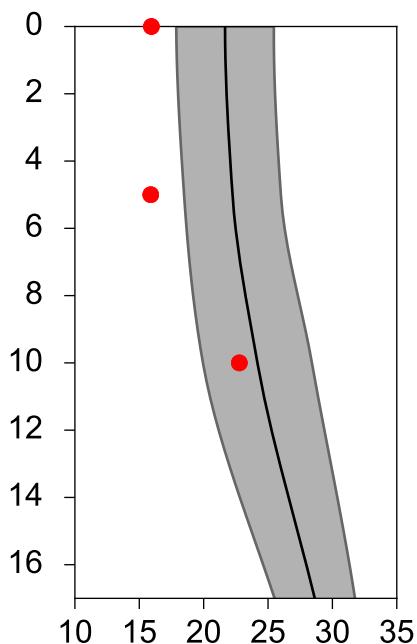
# Vertical profiles 6E GRENÅ September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-01

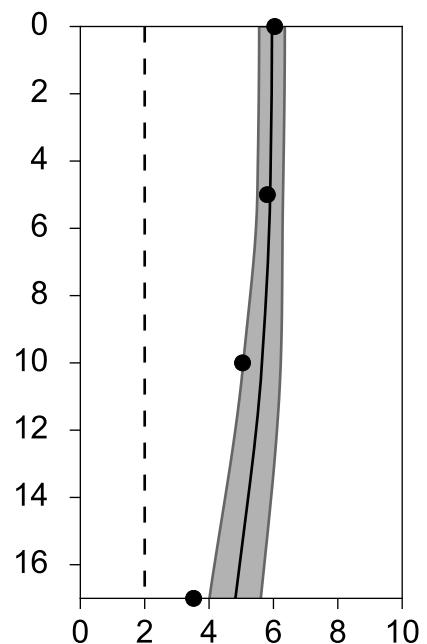
Temperature °C



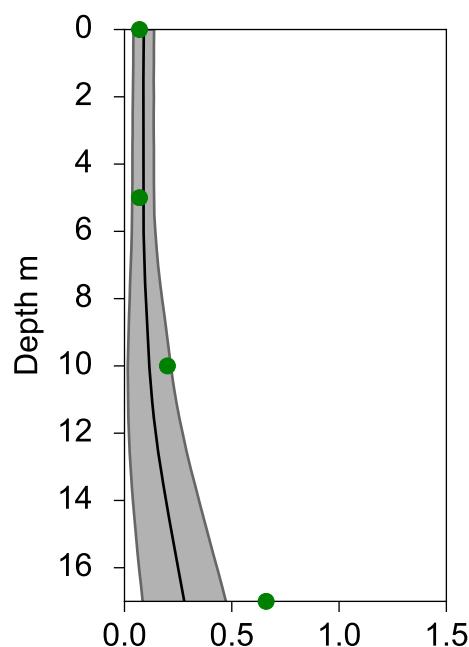
Salinity psu



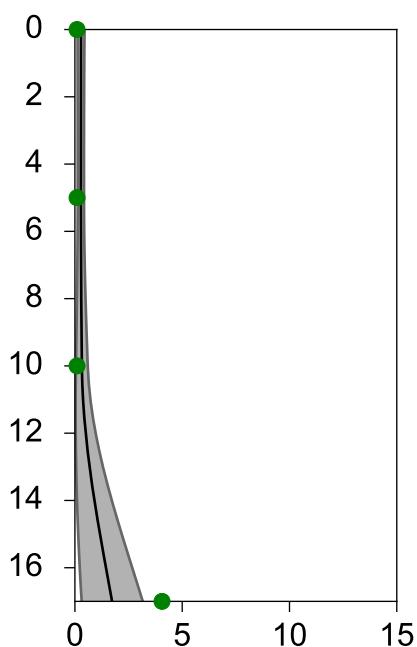
Oxygen ml/l



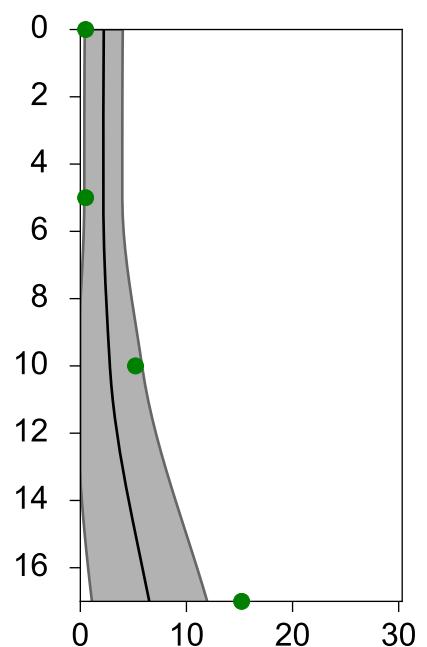
PO<sub>4</sub> µmol/l



DIN µmol/l



SiO<sub>3</sub> µmol/l

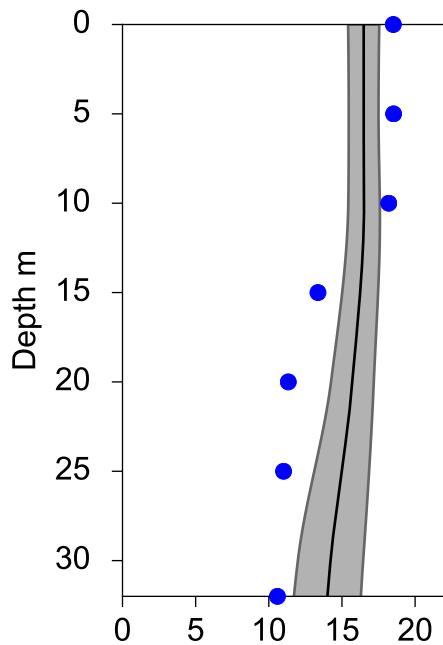


# Vertical profiles 7NW KULLEN

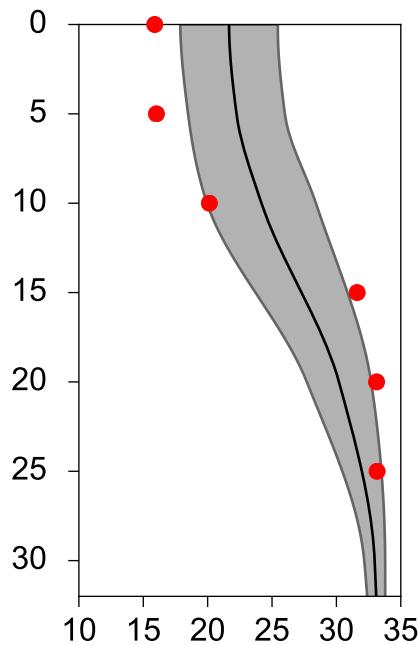
## September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-01

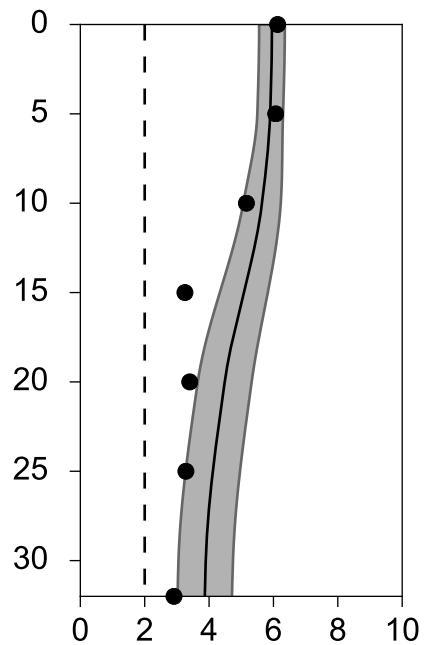
Temperature °C



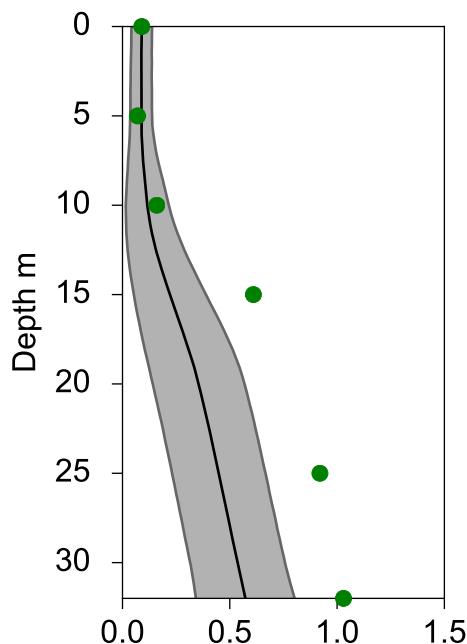
Salinity psu



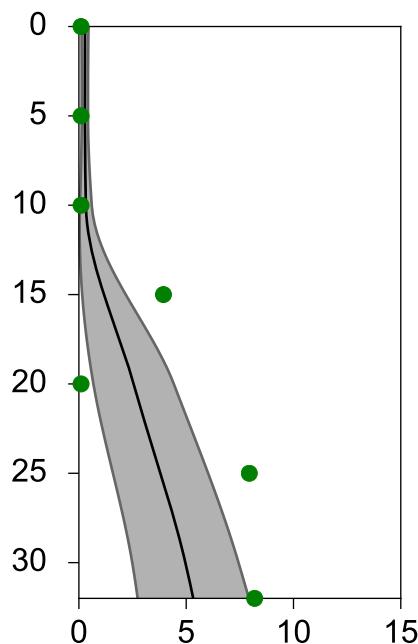
Oxygen ml/l



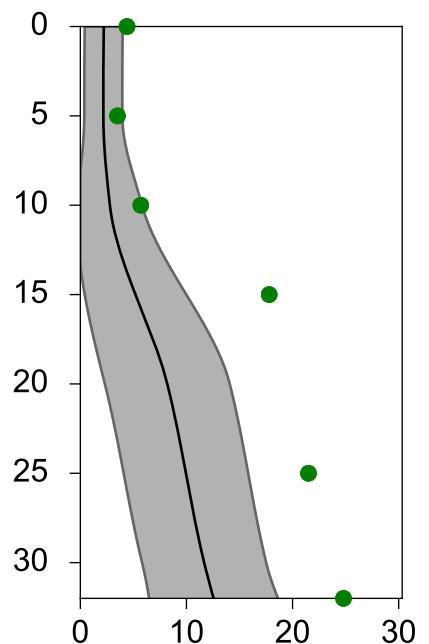
PO<sub>4</sub> µmol/l



DIN µmol/l



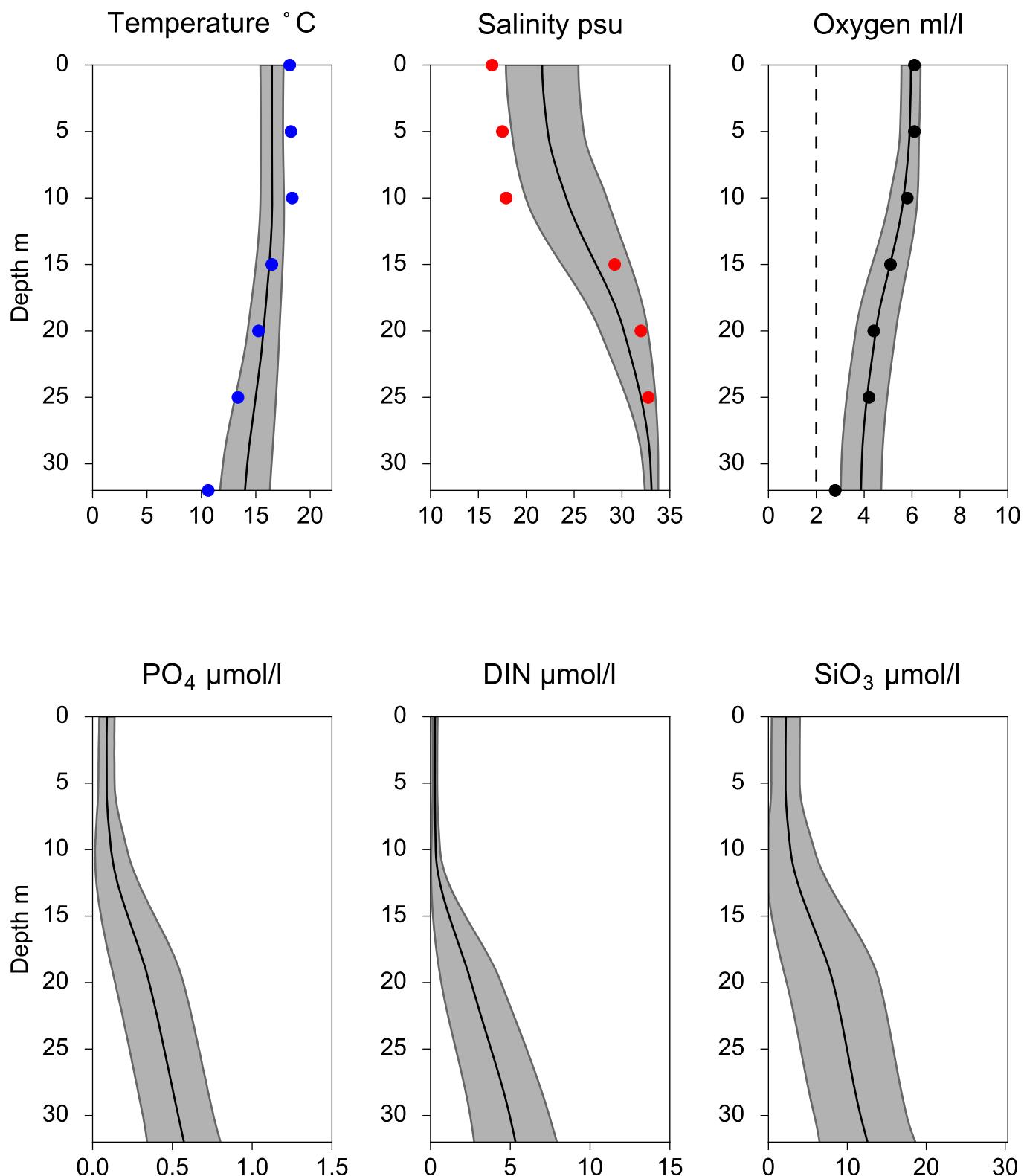
SiO<sub>3</sub> µmol/l



# Vertical profiles 6NE LYSEGRUND

## September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-01

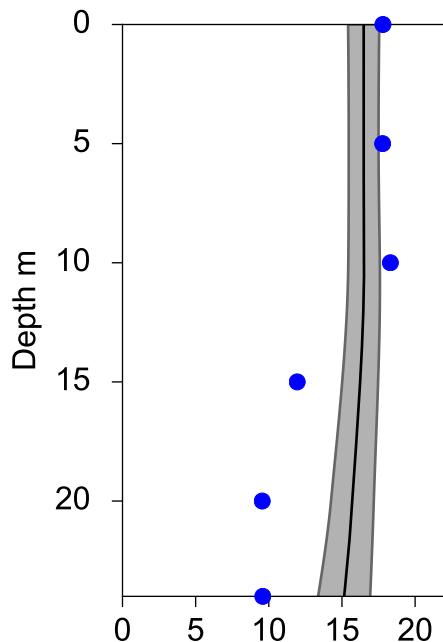


# Vertical profiles YTTRE LAHOLMSBUKTEN

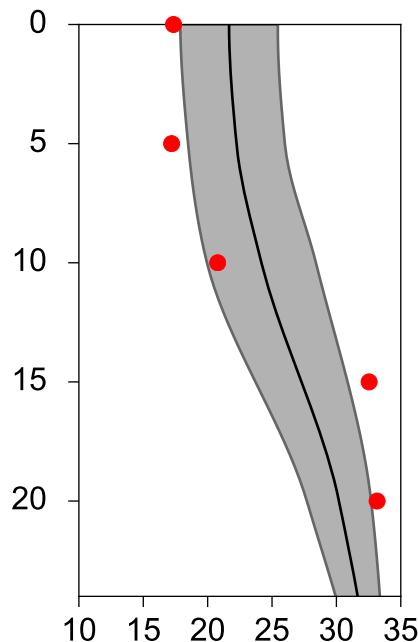
## September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-02

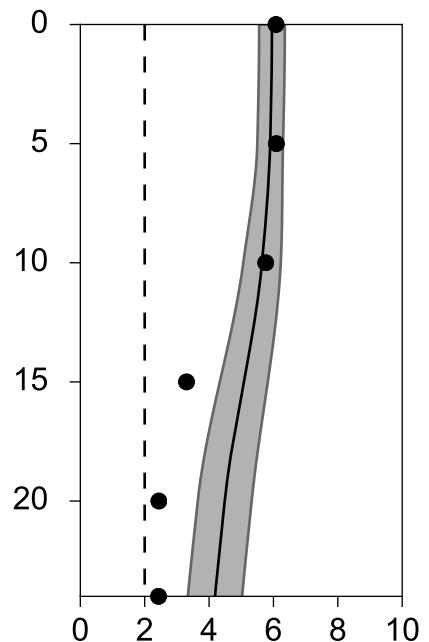
Temperature °C



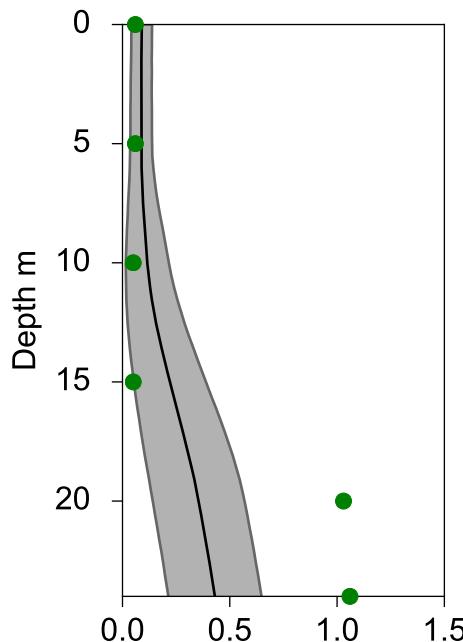
Salinity psu



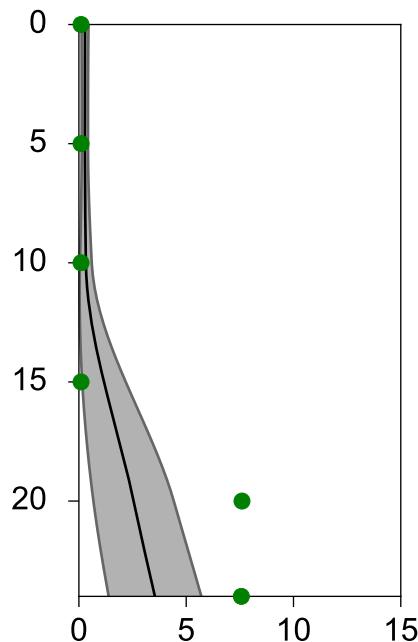
Oxygen ml/l



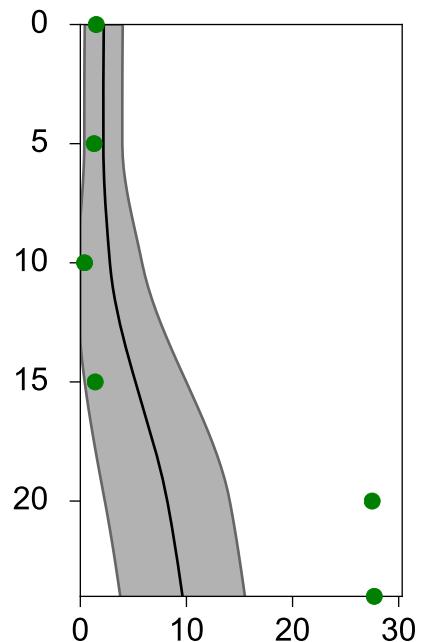
PO<sub>4</sub> µmol/l



DIN µmol/l



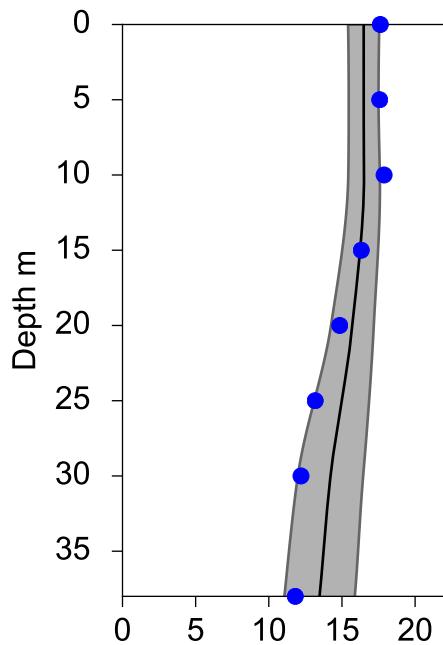
SiO<sub>3</sub> µmol/l



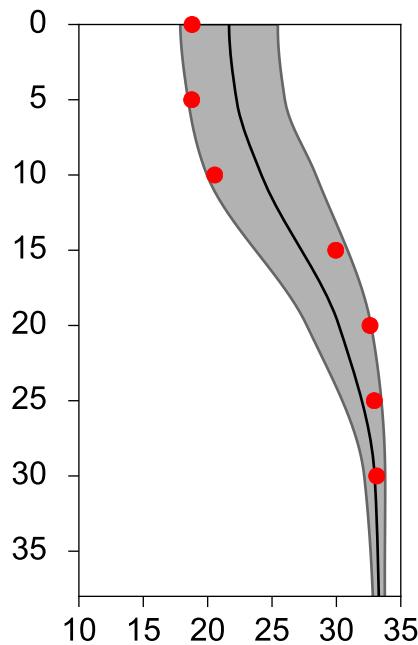
# Vertical profiles SW MORUPS BANK September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-02

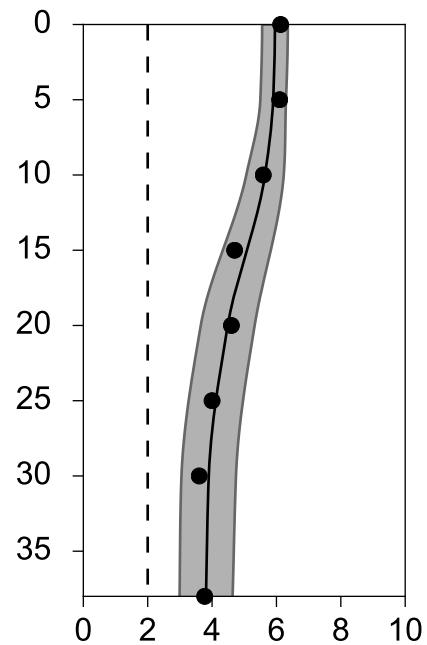
Temperature °C



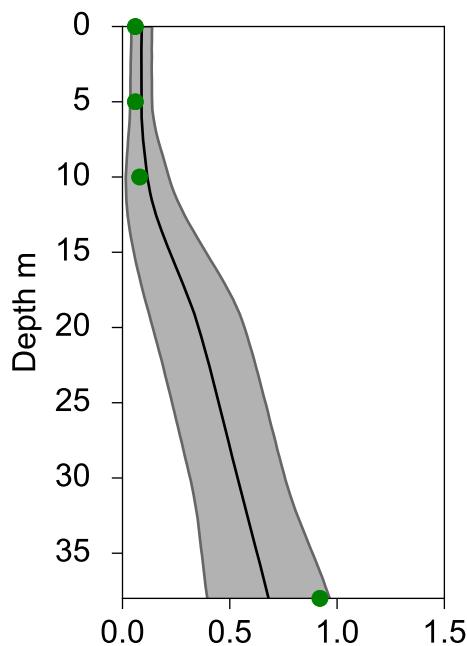
Salinity psu



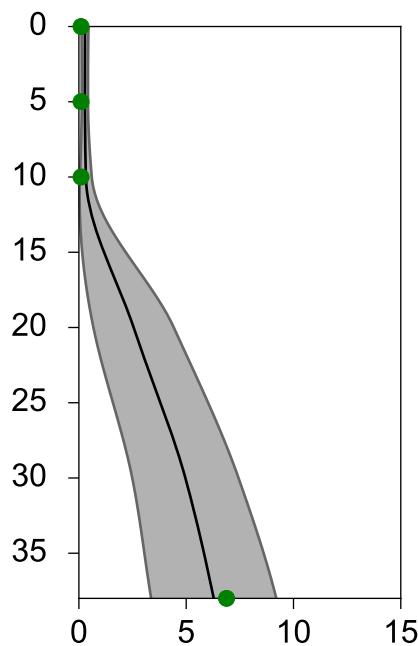
Oxygen ml/l



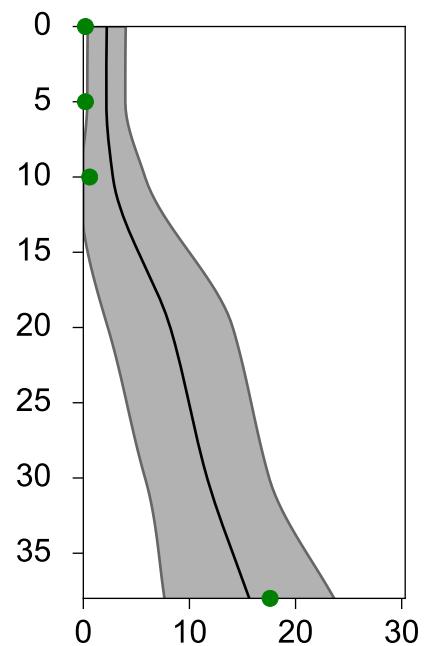
PO<sub>4</sub> µmol/l



DIN µmol/l

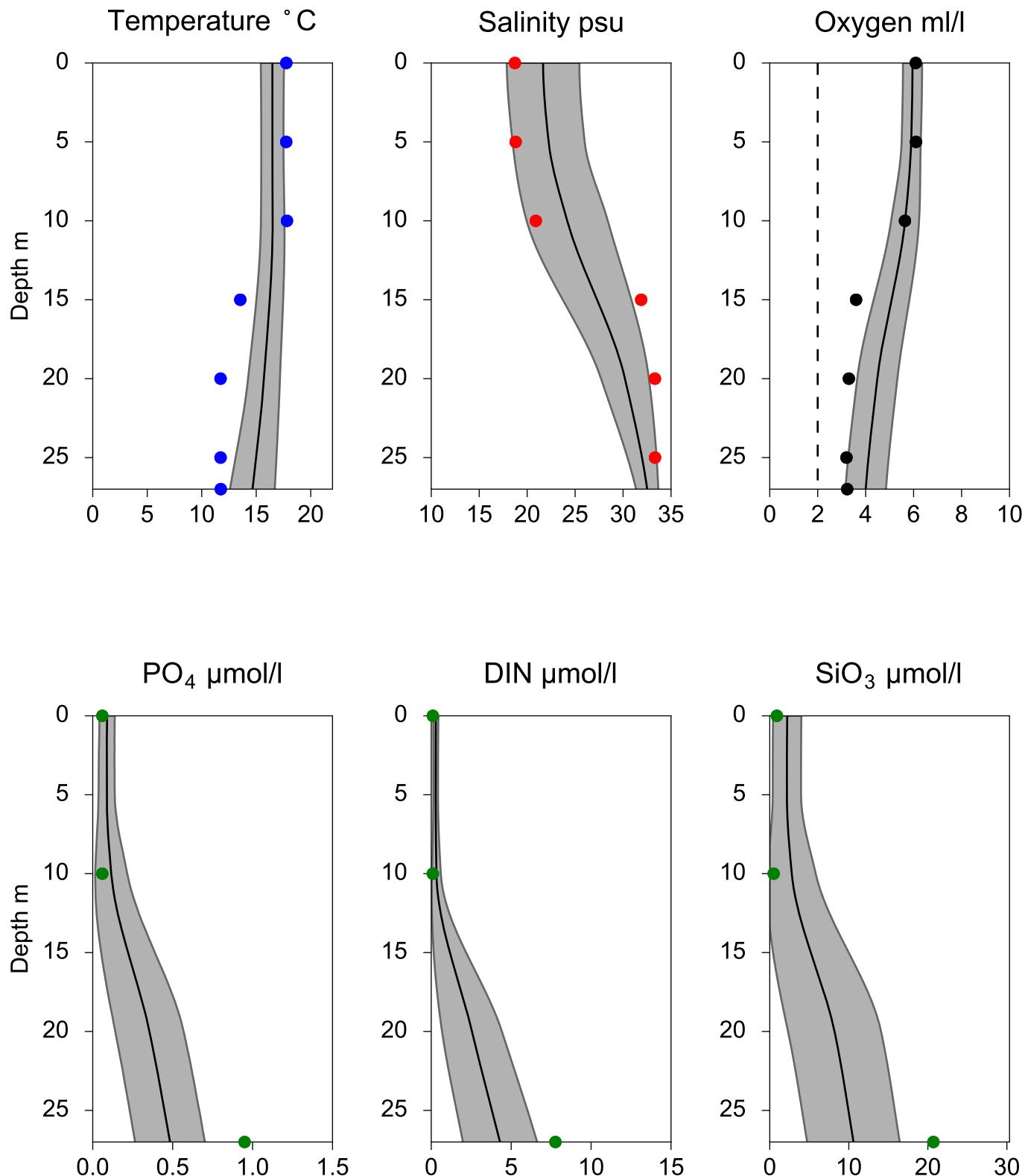


SiO<sub>3</sub> µmol/l



## Vertical profiles MORUPS BANK September

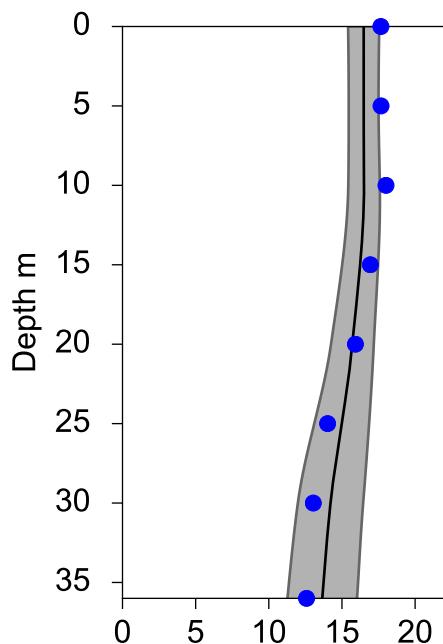
— Mean 2001-2015    ■ St.Dev.    ● 2020-09-02



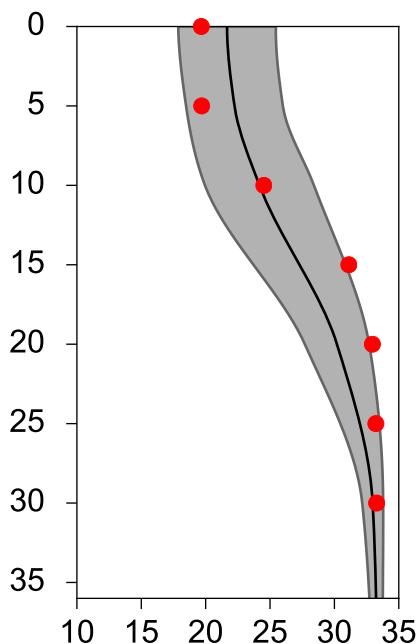
# Vertical profiles GALTABÄCK September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-02

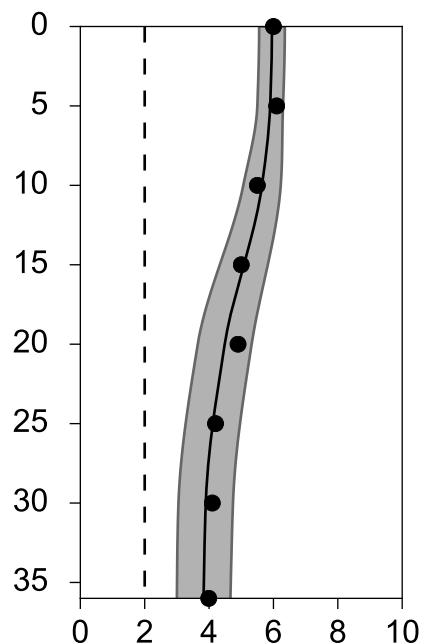
Temperature °C



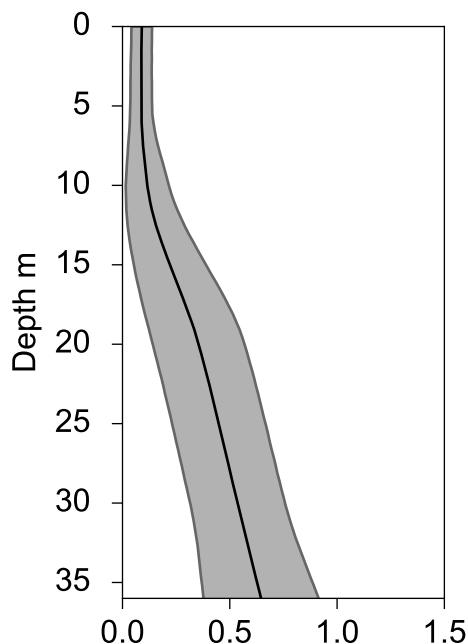
Salinity psu



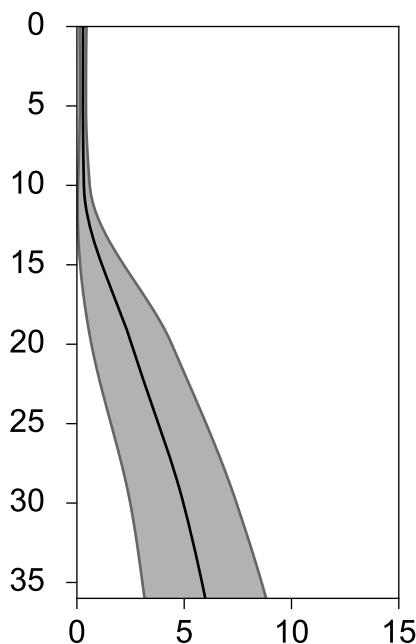
Oxygen ml/l



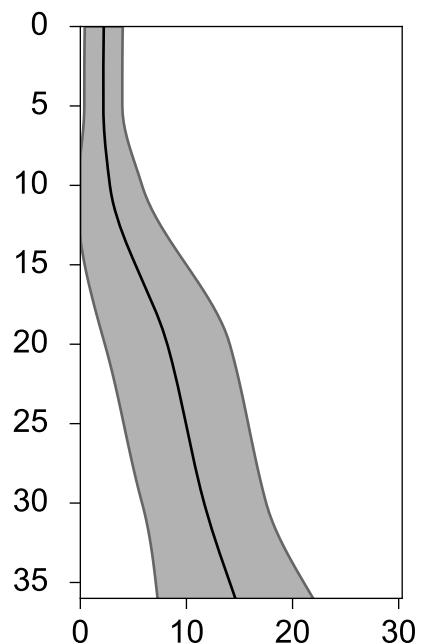
PO<sub>4</sub> µmol/l



DIN µmol/l



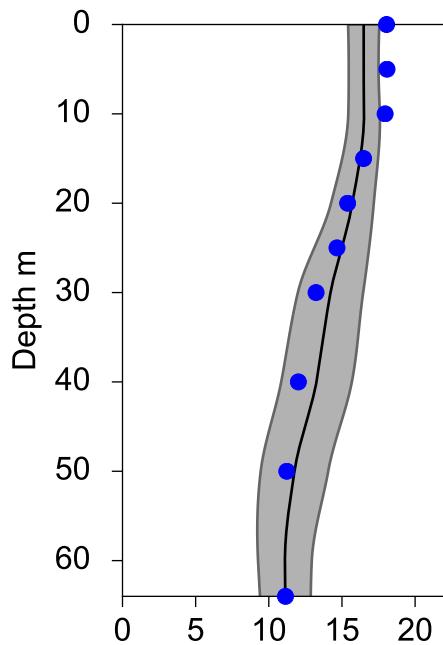
SiO<sub>3</sub> µmol/l



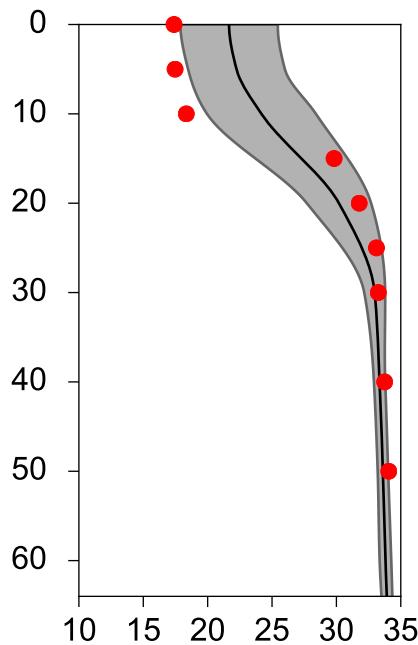
## Vertical profiles SANDEN September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-03

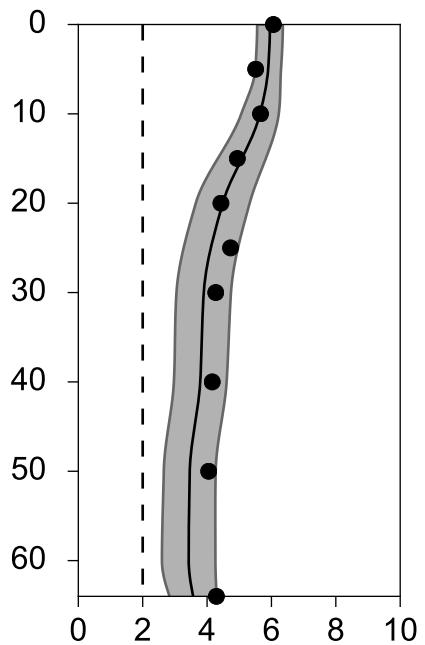
Temperature °C



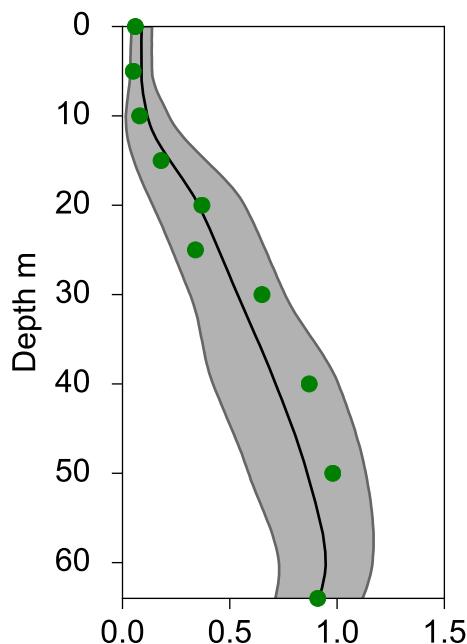
Salinity psu



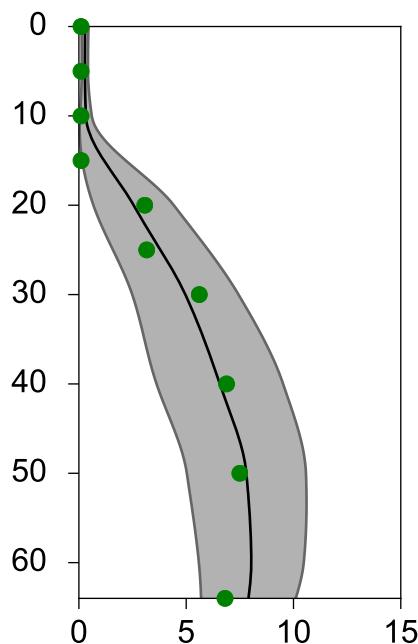
Oxygen ml/l



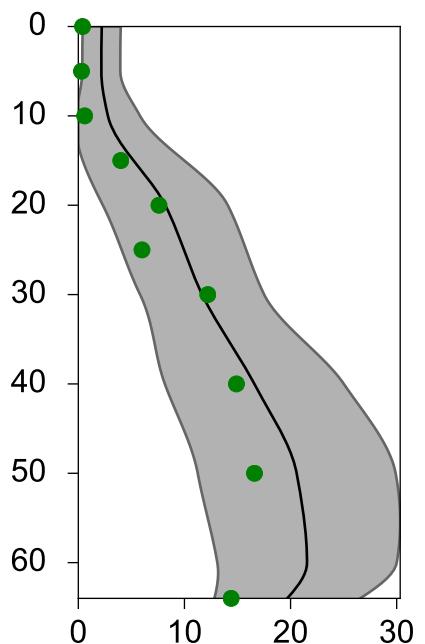
PO<sub>4</sub> µmol/l



DIN µmol/l



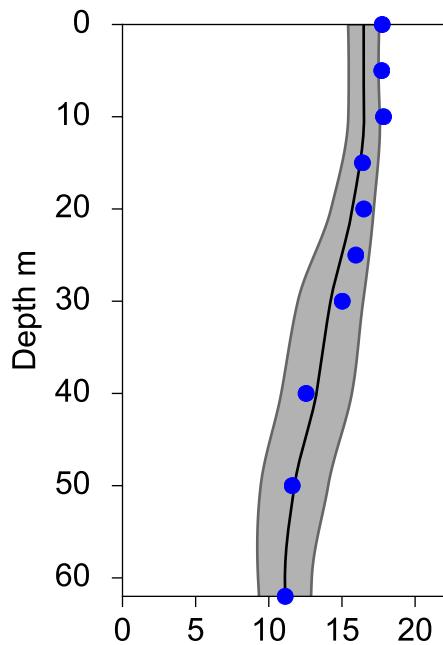
SiO<sub>3</sub> µmol/l



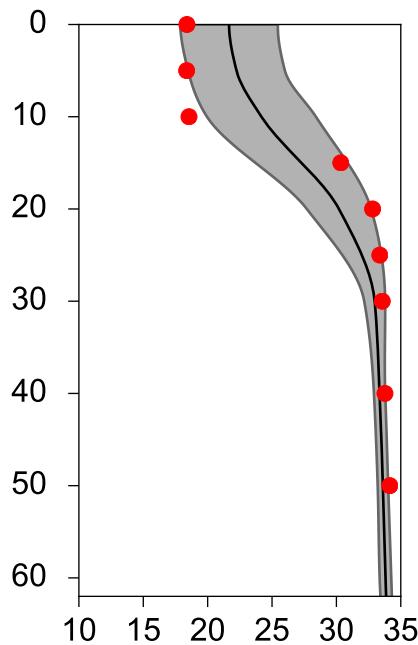
## Vertical profiles E FLADEN September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-03

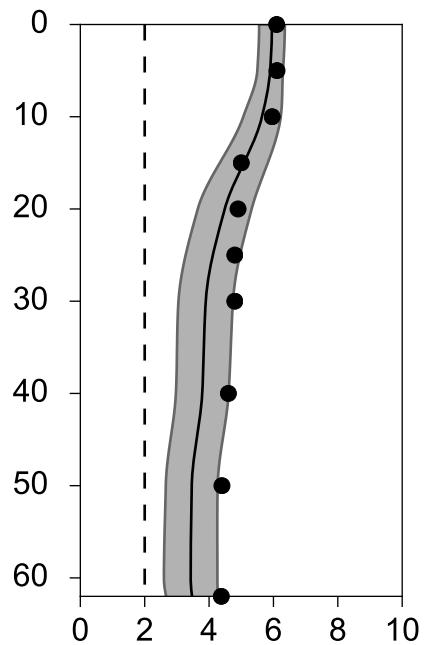
Temperature °C



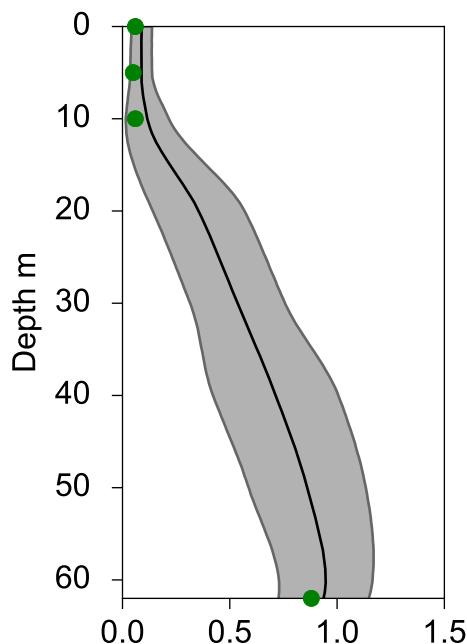
Salinity psu



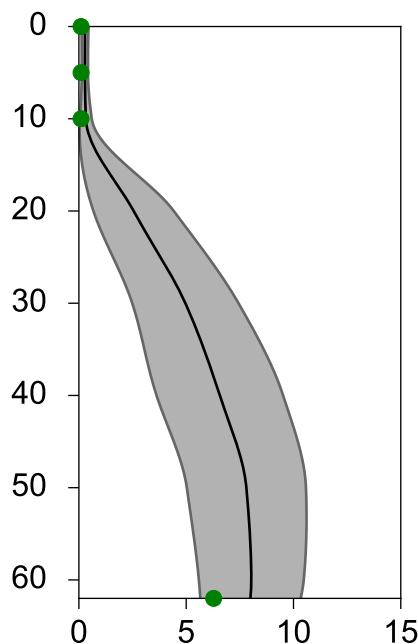
Oxygen ml/l



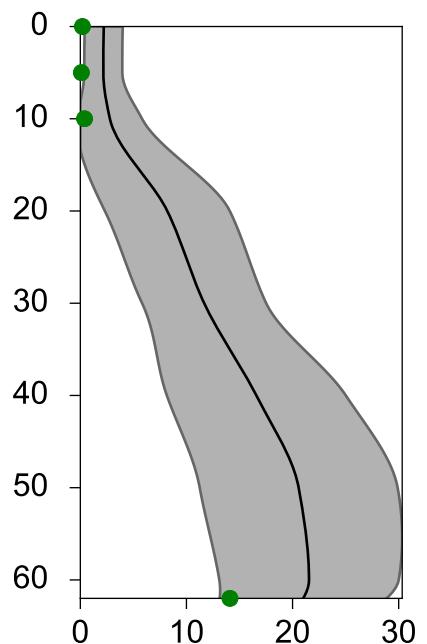
PO<sub>4</sub> µmol/l



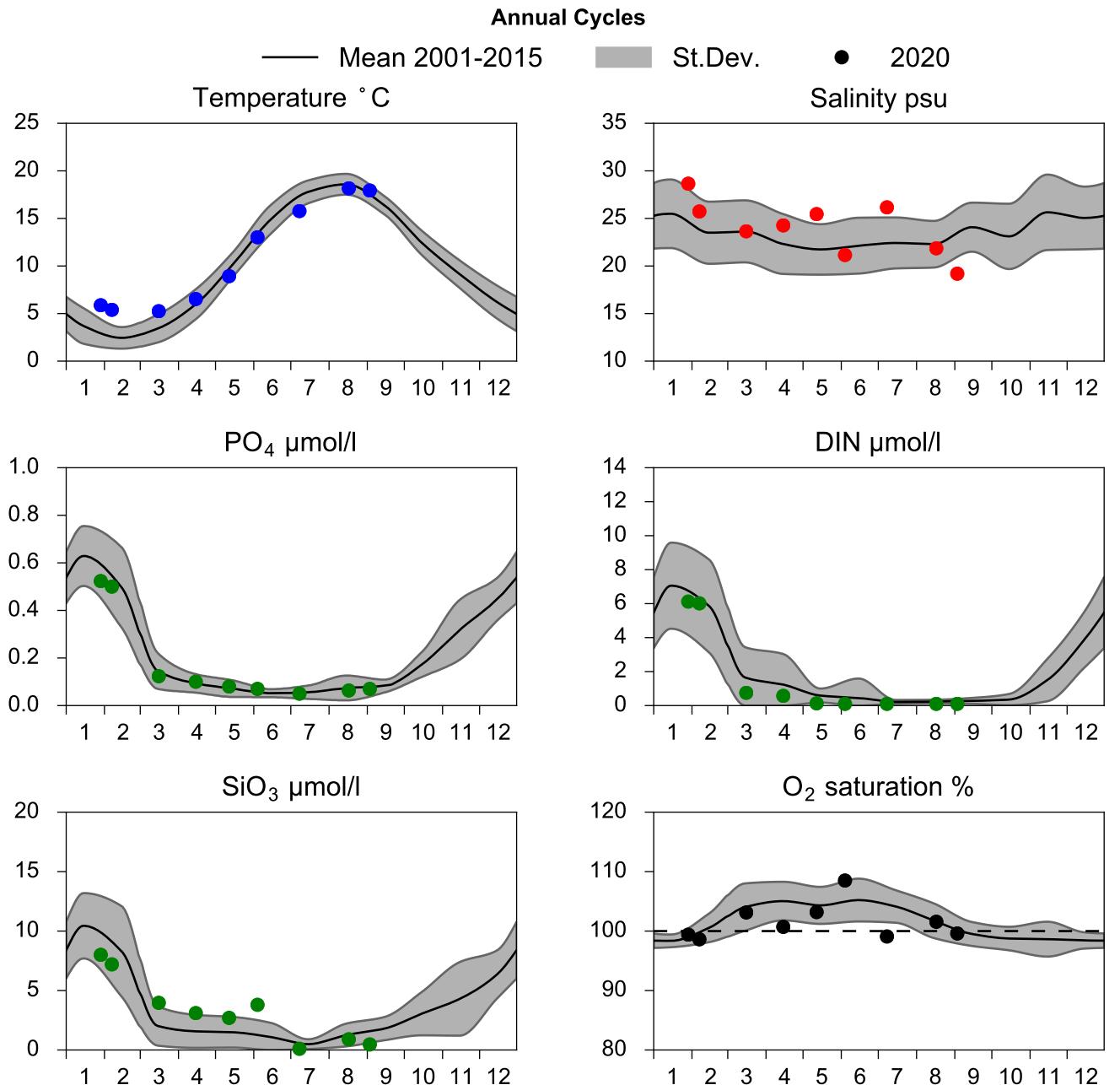
DIN µmol/l



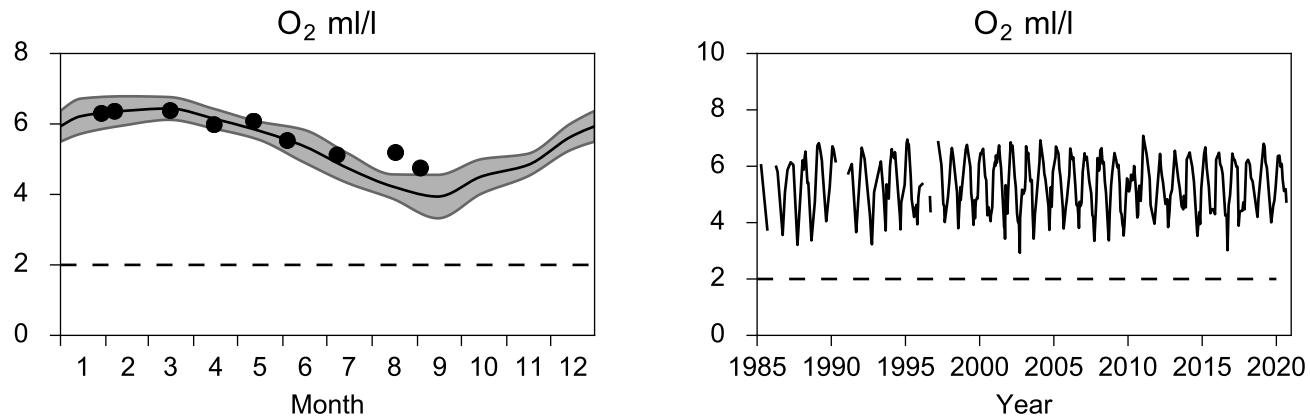
SiO<sub>3</sub> µmol/l



# STATION FLADEN SURFACE WATER (0-10 m)



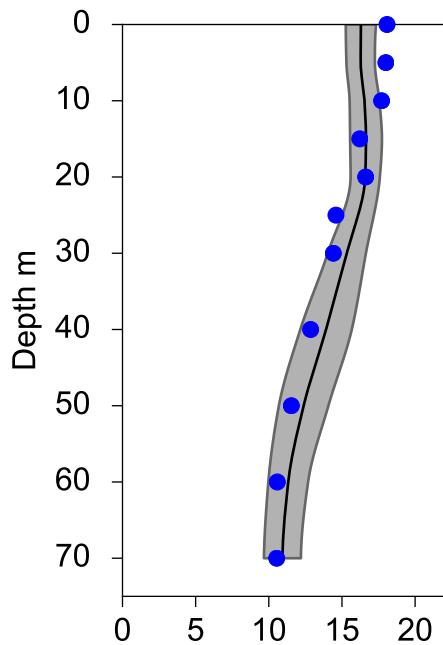
# OXYGEN IN BOTTOM WATER (depth $\geq 74 \text{ m}$ )



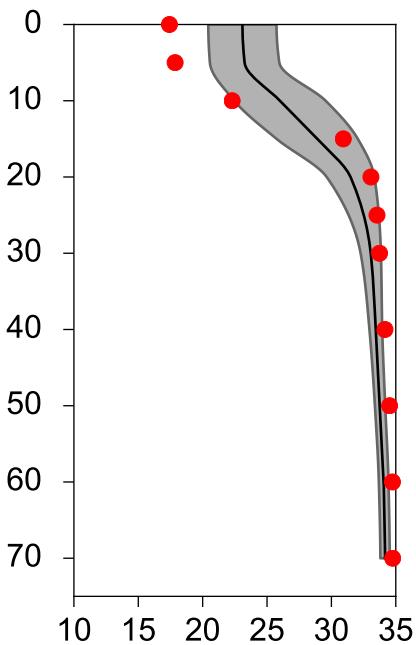
## Vertical profiles FLADEN September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-03

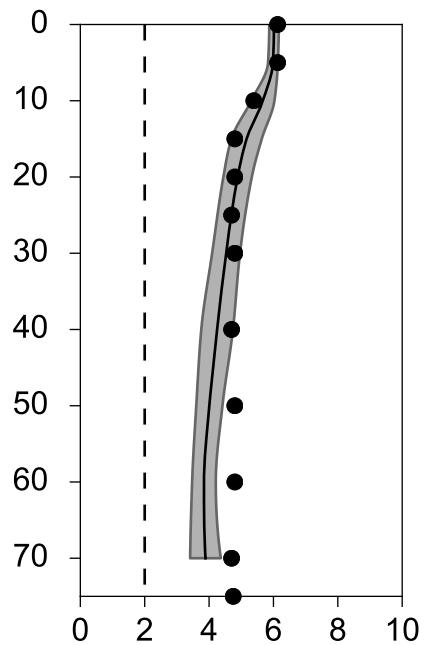
Temperature °C



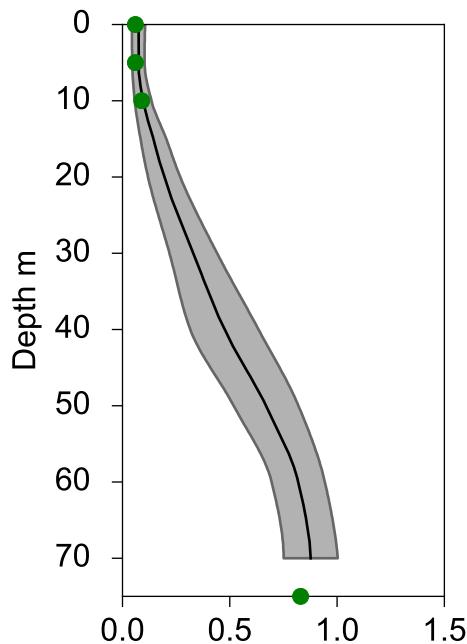
Salinity psu



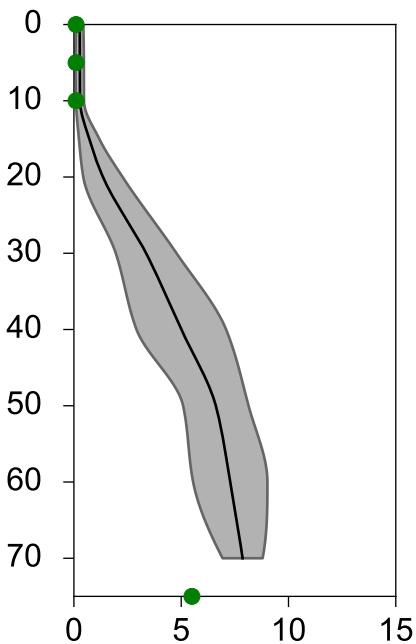
Oxygen ml/l



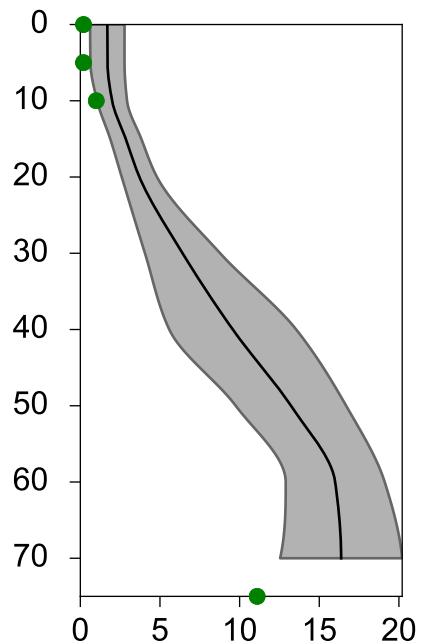
PO<sub>4</sub> µmol/l



DIN µmol/l



SiO<sub>3</sub> µmol/l

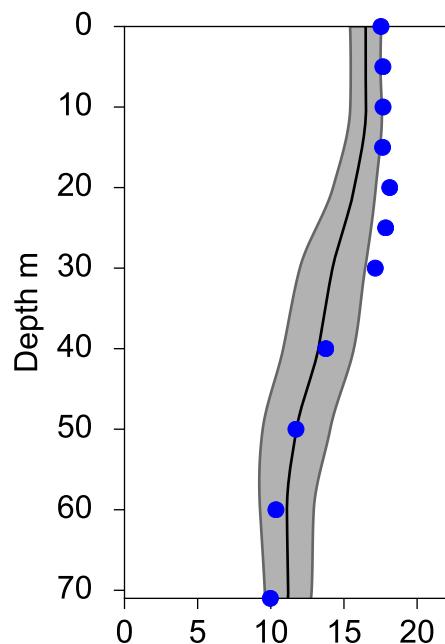


# Vertical profiles 10WNW NIDINGEN

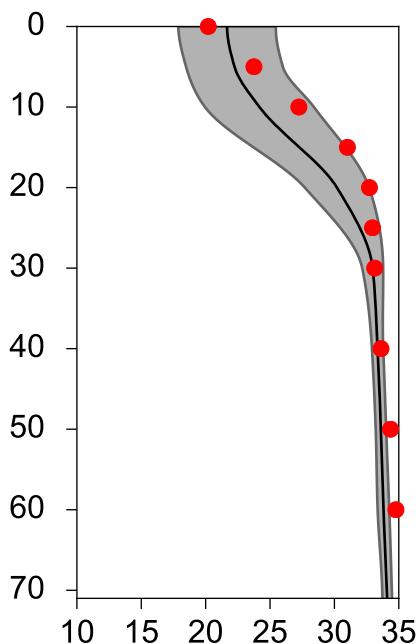
## September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-03

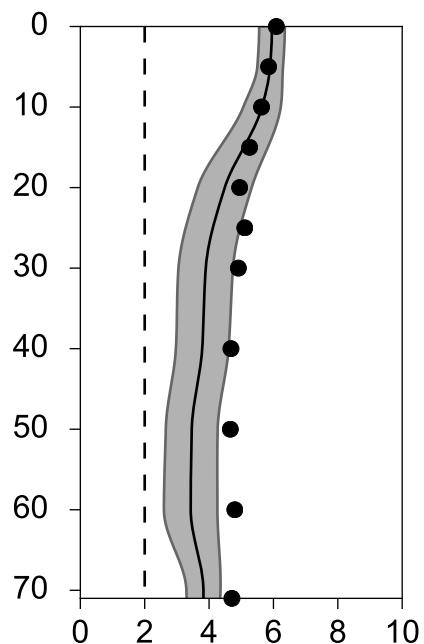
Temperature °C



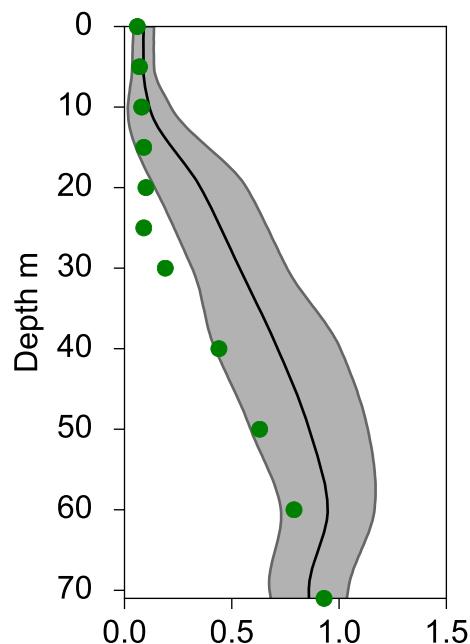
Salinity psu



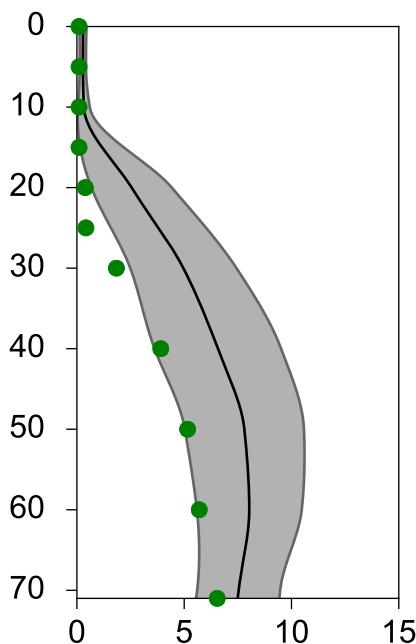
Oxygen ml/l



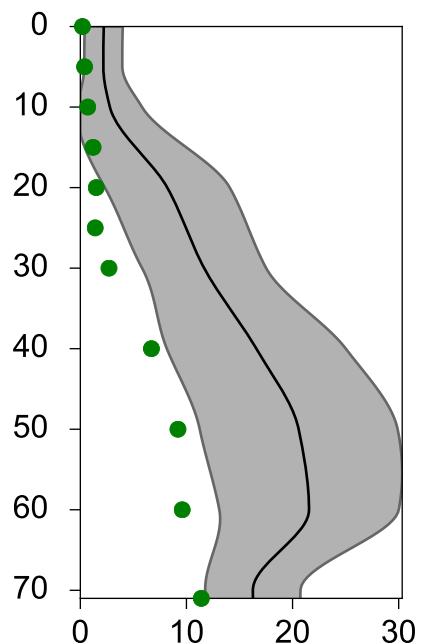
PO<sub>4</sub> µmol/l



DIN µmol/l



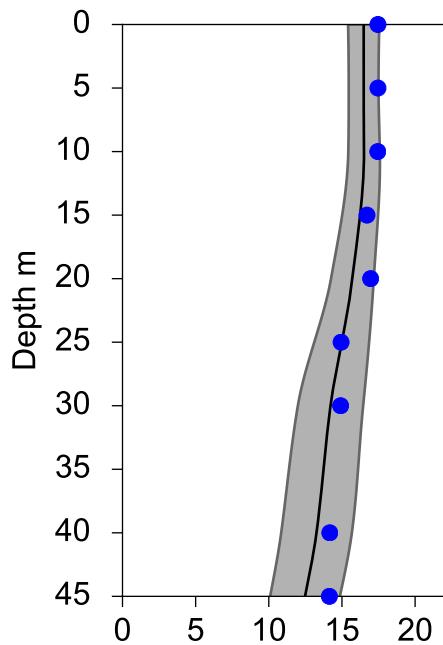
SiO<sub>3</sub> µmol/l



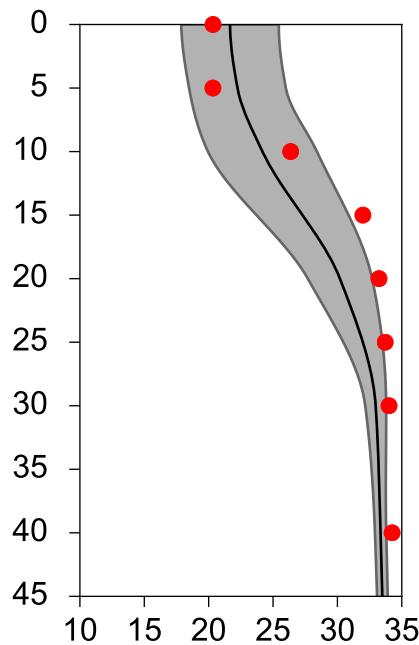
# Vertical profiles LASO RANNA September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-04

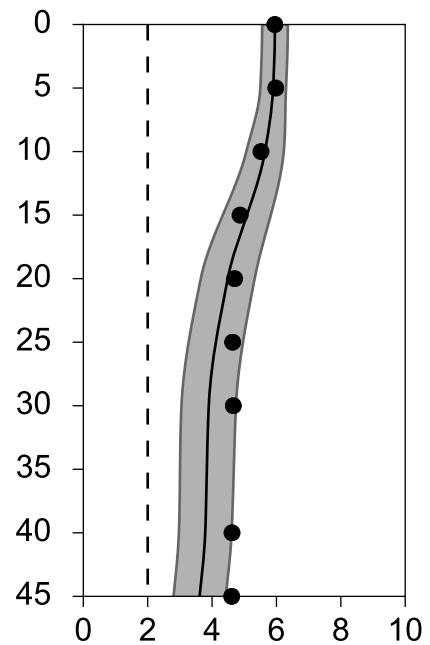
Temperature °C



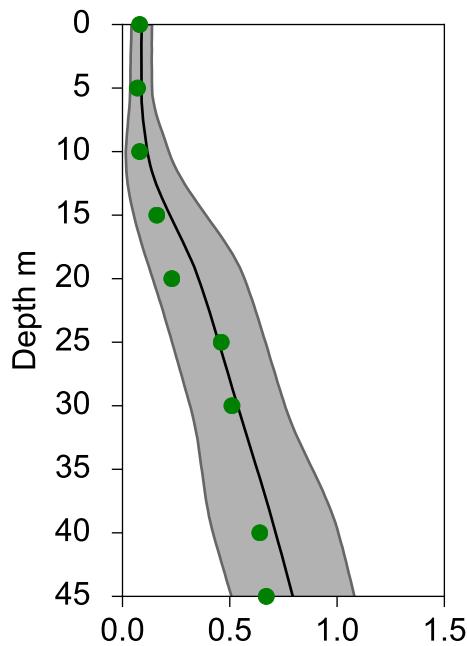
Salinity psu



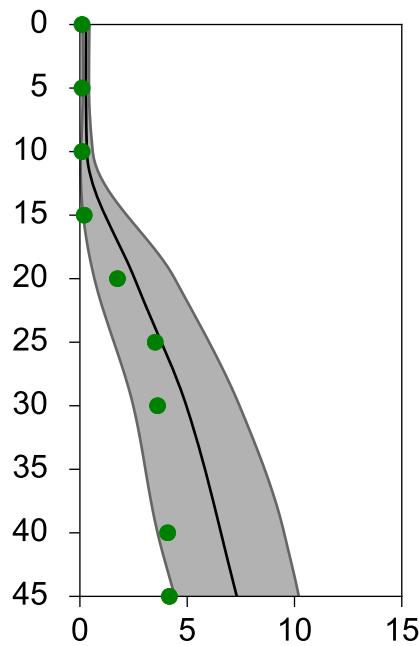
Oxygen ml/l



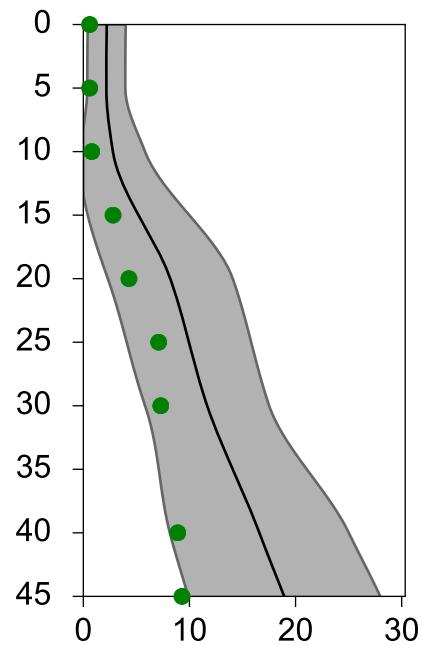
PO<sub>4</sub> µmol/l



DIN µmol/l



SiO<sub>3</sub> µmol/l

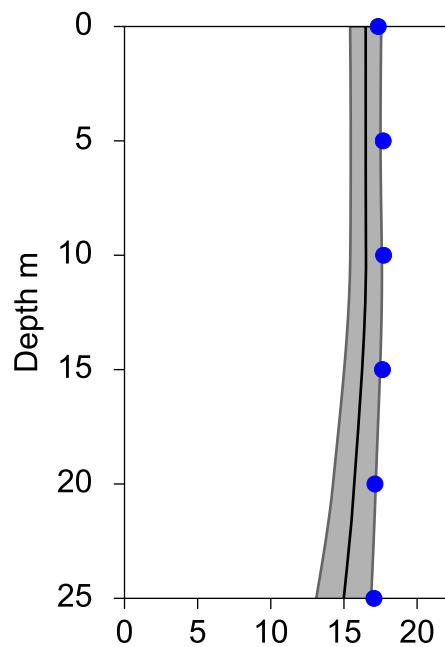


# Vertical profiles 8SE SKAGEN

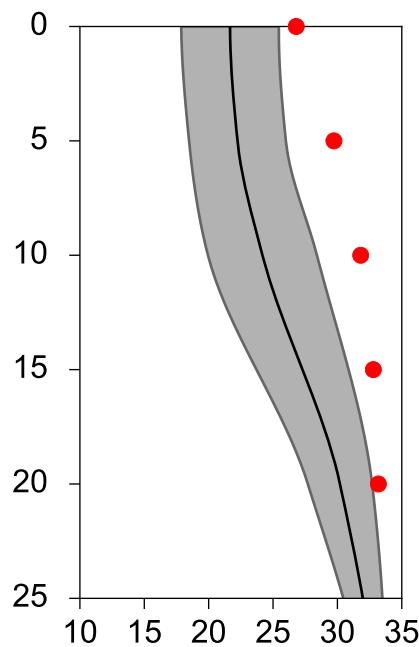
## September

— Mean 2001-2015    ■ St.Dev.    ● 2020-09-04

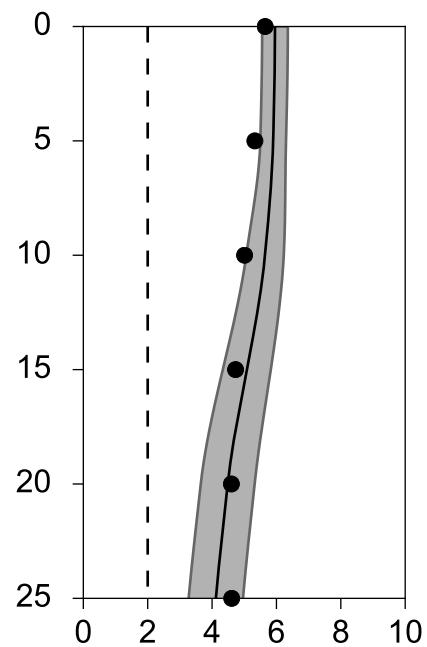
Temperature °C



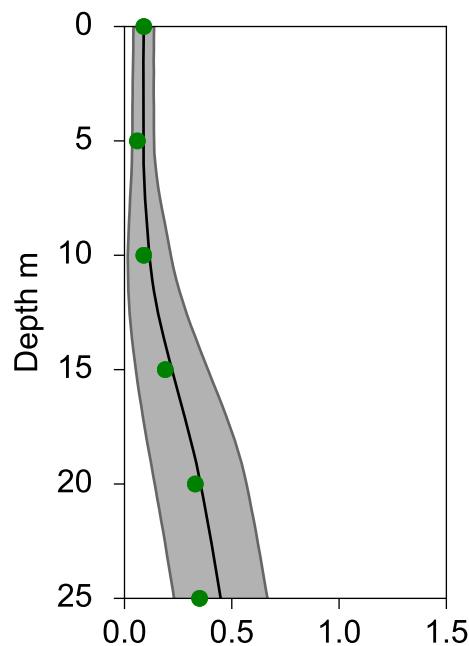
Salinity psu



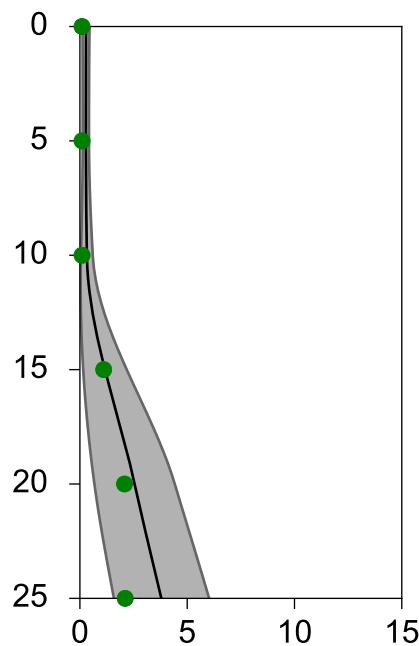
Oxygen ml/l



PO<sub>4</sub> µmol/l



DIN µmol/l



SiO<sub>3</sub> µmol/l

