

Rapport från SMHIs utsjöexpedition med R/V Aranda



Expeditionens varaktighet:	2019-05-09 – 2019-05-16
Uppdragsgivare:	Sveriges Meteorologiska och Hydrologiska Institut (SMHI), Havs- och Vattenmyndigheten (HaV)
Samarbetspartner:	Finlands miljöcentral (SYKE)

SAMMANFATTNING

Under expeditionen, som ingår i det svenska pelagiala övervakningsprogrammet, besöktes Skagerrak, Kattegatt, Öresund, Egentliga Östersjön och Finska Viken.

Normala ytvattentemperaturer och salthalter noterades i samtliga havsområden. Ytsalthalten var över det normala i delar av Skagerrak samt i Östra Gotlandsbassängen och i Hanöbukten. Djupvattnet i hela Egentliga Östersjön uppvisade temperaturer och salthalter över eller mycket över det normala.

Vårblomningen hade förbrukat medparten av näringsämnena i ytvattnet men förhöjda halter noterades fortsatt för kisel i Skagerrak, Kattegatt och stora delar av Egentliga Östersjön. Viss planktonaktivitet förekom i både Västerhavet som tydliga fluorescensmaxima men i Östersjön var planktonaktiviteten jämnt fördelad i ytskiktet ner till 20 meters djup.

I Västra Gotlandsbassängen noterades svavelvätehalter mycket över det normala i djupvattnet. Svavelväte uppmättes också i Östra och Norra Gotlandsbassängen samt i Finska Viken. I Östra Gotlandsbassängen var det helt syrefritt (då svavelväte bildas) från 130 meter i de centrala delarna och från 90 meter i Fårödjupet längre norrut. I Västra och Norra Gotlandsbassängen samt i Finska Viken var det helt syrefritt från 80–90 meter. I hela Egentliga Östersjön och Finska Viken var det akut syrebrist ($< 2\text{ml/l}$) från 65–75 meters djup.

Nästa ordinarie expedition är planerad till 10:e – 17:e juni.

RESULTAT

Expeditionen genomfördes ombord på det finska fartyget Aranda och startade i Helsingfors den 9 maj och avslutades i Helsingfors den 16 maj. Vindarna var till en början friska från nordost men avtog sedan till svaga eller måttliga vindar i huvudsak från norr. Lufttemperaturen varierade mellan 7–10 °C och det var mestadels klart väder.

Under expeditionen utfördes utöver ordinarie provtagning även provtagning för bestämning av DNA inom projektet ”DNA-streckkodning av marina växtplankton” finansierat av Havs- och Vattenmyndigheten som omfattar alla nationella övervakningsstationer där plankton provtas och kommer pågå under hela 2019.

Vid några stationer togs vatten- och planktonprover för mätning av selen åt EAWAG i Schweiz (Swiss Federal Institute of Aquatic Science and Technology) samt extra planktonprover för Åbo Akademi som mäter DNA.

Totalt besöktes 30 stationer och en översikt över provtagna stationer och parametrar finns i bilagan till rapporten. I norra Egentliga Östersjön samt i Finska viken besöktes 4 stationer som igår i SMHIs samarbetet med Finlands Miljöcentral (SYKE). En referensmätning med CTD genomfördes också vid SMHIs havsboj vid Huvudskär. Stationen vid Släggö kunde inte besökas av Aranda p.g.a. att svenska försvaret inte ger Aranda tillstånd eftersom det är ett Finskt statsfartyg. Släggöprovtagningen utförs istället av SMHI separat med ett inhyrt fartyg från Kristinebergs Marina Forskningsstation. Data från denna provtagning, som utfördes samma vecka som Arandas expedition, ingår i denna rapport.

Analys av planktonprover finns presenterade i den separata algrapporten ”AlgAware” som publiceras på SMHIs hemsida strax efter expeditionen.

<https://www.smhi.se/publikationer/publikationer/algrapporter>

Denna rapport är baserad på data som genomgått en första kvalitetskontroll. När data publiceras hos datavärden kan vissa värden ha ändrats då ytterligare kvalitetsgranskning genomförts. Data från denna expedition publiceras så fort som möjligt på datavärdens hemsida, normalt sker detta inom en vecka efter avslutad expedition. Vissa analyser görs efter expeditionen och publiceras senare.

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

Skagerrak

Temperatur och salthalt i ytvattnet var normala i Skagerrak, temperaturen var strax över 9 °C och salthalten varierade från 27 till 29 psu i central Skagerrak. I den södra delen, vid P2, samt närmast kusten, vid Släggö, var salthalten högre än normalt, 31 psu respektive 28 psu. En svagt utvecklad haloklin (salthaltssprångskikt) observerades mellan 5 och 15 meter. Ytskiktet (0–10 m) hade börjat värmas upp något men något tydlig och skarp termoklin (temperatursprångskikt) noterades inte.

Vårblomningen hade förbrukat merparten av näringen i ytskiktet och det var låga koncentrationer av löst oorganiskt kväve (DIN) och fosfat vilket är normalt för den här tiden av året. Dock var halten av kisel i yttersta Skagerrak över det normala, 2,1 µmol/l, och vid Släggö var kiselhalten lägre än normalt, 0,6 µmol/l. Koncentrationen av DIN och fosfat låg kring detektionsgränsen (0,3 µmol/l respektive 0,5 µmol/l). Kiselhalten varierade i övrigt mellan 0,9 till 1,2 µmol/l. Under haloklinen

noterades generellt sett något lägre halter av näringsämnen än normalt förutom närmast kusten, vid Å13, där halterna var normala eller strax över normalt. Samma förhållanden noterades i april.

Syrgaskoncentrationerna var normala förutom vid Å17 (300 meter) där det precis som i april var något lägre syrgaskoncentration än normalt.

I öppna Skagerrak var fluorescensen i ytskiktet låg men något djupare, strax under haloklinen, mellan 15 och 25 meter, noterades fluorescenstoppar. Vid Släggö noterades hög planktonaktivitet i ytan och en fluorescenstopp på 10 meter. Siktdjupet var omkring 9 meter i de centrala delarna av Skagerrak och 7 meter närmast kusten.

Kattegatt och Öresund

I Kattegatt varierade ytvattentemperaturen omkring 9-10 °C, vilket är normalt för årstiden. Salthalten i ytskiktet varierade mellan 18 och 22 psu, och i Öresund noterades 14 psu. Haloklinen i Kattegatt låg mellan 5–20 meter och under den var salthalten omkring 33 psu och temperaturen varierade kring 5-7 °C vilket är varmare än normalt. I Öresund var det en stark salthaltsskiktning kring 10–15 meters djup.

Näringsämnena, DIN och fosfat, i ytvattnet var för årstiden normala med låga koncentrationer. Fosfat varierade mellan 0,06–0,15 µmol/l och DIN låg på 0,3 µmol/l. Koncentrationen av kisel var högre än normalt i Kattegatts ytvatten och varierade mellan 2,7–5,0 µmol/l. Under språngskiktet, i både Kattegatt och Öresund, var koncentrationerna av samtliga näringsämnen normala eller strax under det normala för årstiden.

Syrgasförhållandena i bottenvattnet var goda och som lägst uppmättes 5,0 ml/l vid W Landskrona. På samtliga stationer i Kattegatt noterades fluorescenstoppar omkring 10–20 meters djup. Vid Fladen var fluorescenstoppen kraftig mellan 15-20 meters djup. Siktdjupet varierade mellan 6-7 meter.

Egentliga Östersjön och Finska Viken

Uppvärmningen av ytskiktet fortsatte i maj och temperaturen varierade med normala värden mellan som varmast ~9 °C i Arkonabassängen till som kallast 4,5 °C i centrala Finska viken. Termoklinen återfanns på omkring 20 metersdjup och där under, ner till haloklinen, återfanns kallare "vintervatten". Temperaturen i djupvattnet, under haloklinen, var högre eller mycket högre än normalt vid samtliga besökta stationer.

Salthalten i ytskiktet varierade mellan 5,4–8,1 psu, högst var salthalten i Arkonabassängen och lägst i centrala Finska Viken. I Arkonabassängen samt i den Östra Gotlandsbassängen var salthalten högre än normalt, medan den var lägre än normalt i Hanöbukten samt i Norra Gotlandsbassängen. I Arkonabassängen började haloklinen kring 35 meter och i Bornholmsbassängen samt i Hanöbukten från 50 till 55 metersdjup. I övriga områden låg haloklinen på omkring 60-70 meters djup. I djupvattnet var salthalten, precis som temperaturen, över eller mycket över det som normalt uppmäts. Detta beror troligen på de senaste inflödena under 2018 till Östersjön har varit varma och med hög salthalt, möjligen som ett resultat av förra årets varma sommar.

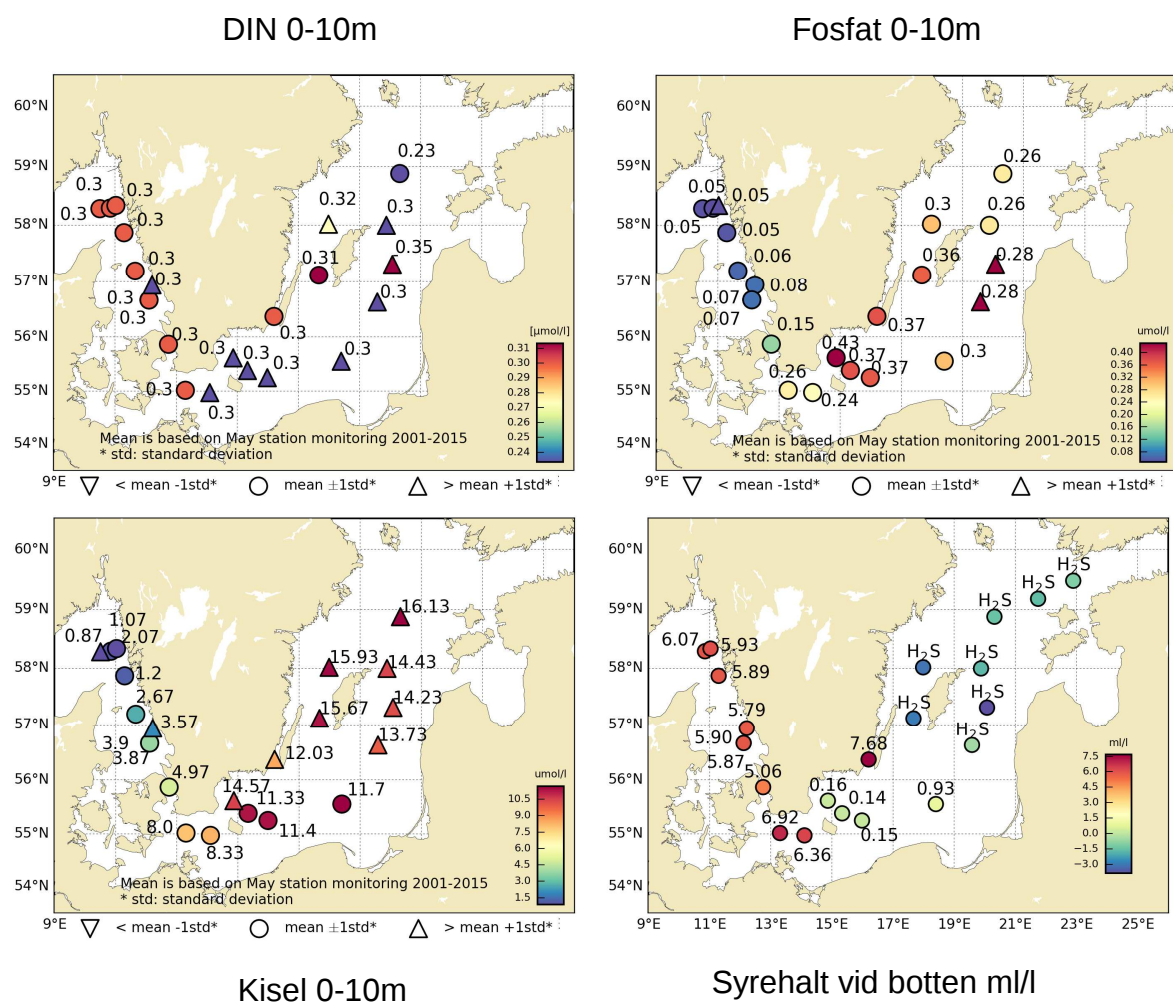
DIN var förbrukat ner till 30-50 meter i större delen av Egentliga Östersjön, vilket är normalt för årstiden. Koncentrationen av DIN i ytvattnet låg under detektionsgränsen på 0,3 µmol/l.

Koncentrationen av fosfat var i stort normala för årstiden förutom i de centrala delarna av Östra Gotlandsbassängen där halterna var något högre än normalt. Halterna av fosfat varierade mellan 0,2–0,4 $\mu\text{mol/l}$ med de lägsta halterna i Arkonabassängen och Östra Gotlandsbassängen.

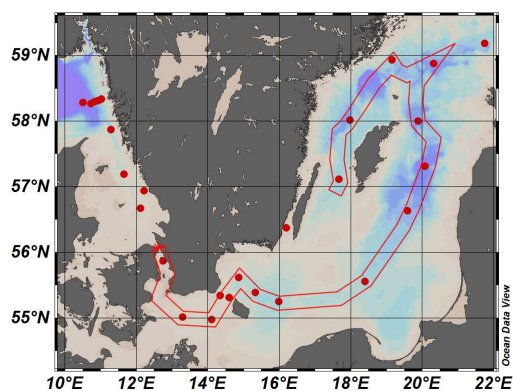
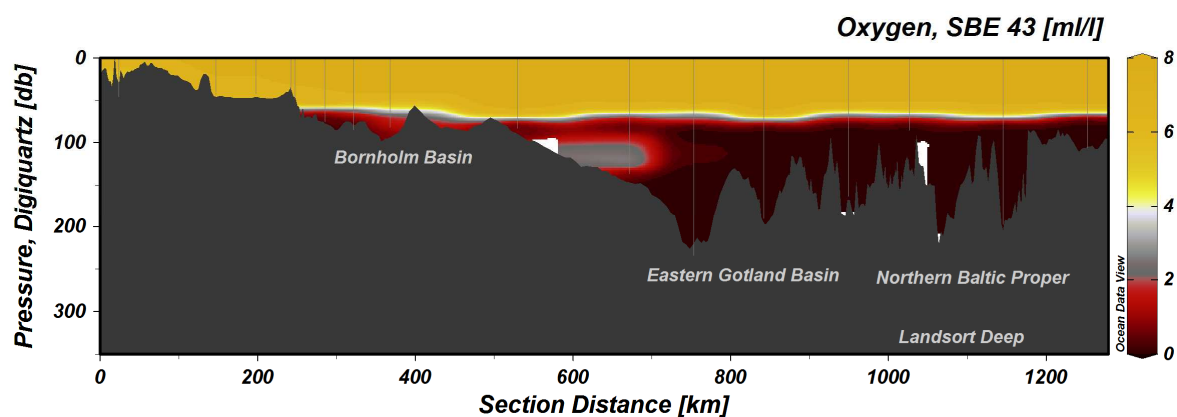
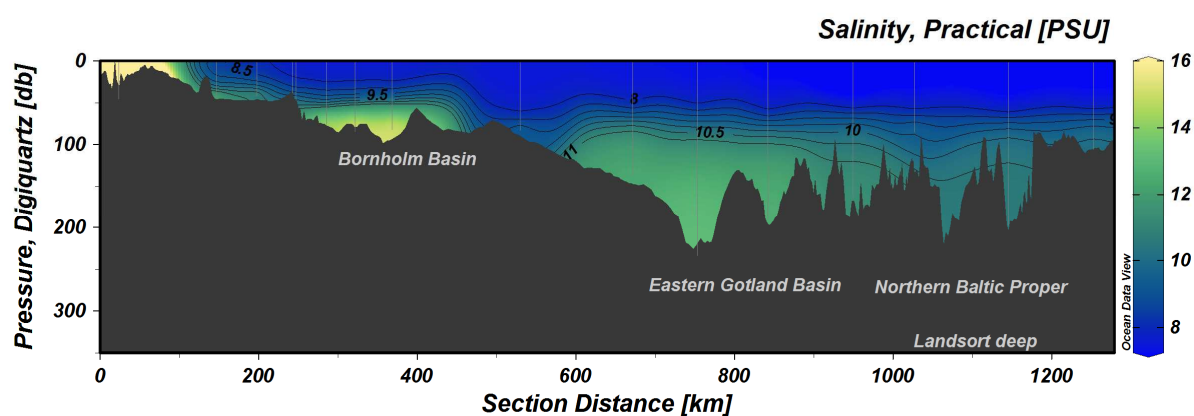
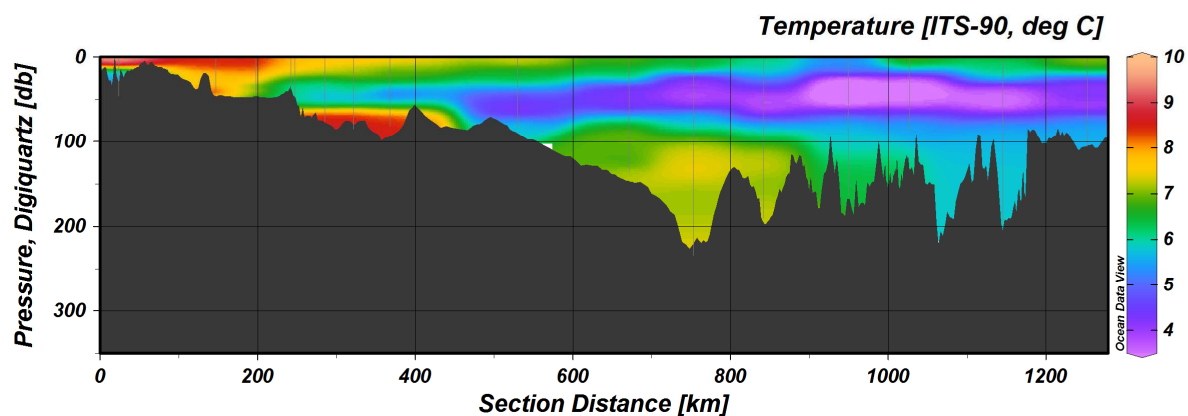
Koncentrationen av kisel i ytvattnet varierade mellan 8,0 $\mu\text{mol/l}$ i Arkonabassängen till 16,3 $\mu\text{mol/l}$ i Norra Gotlandsbassängen. I Östra, Norra, Västra Gotlandsbassängen, Hanöbukten samt vid kusten var nivåerna av kisel över eller mycket över det normala. Under haloklinen, i djupvattnet, noterades högre närsaltshalter än normalt i Västra Gotlandsbassängen, Bornholmsbassängen och i Hanöbukten. I Östra och Norra Gotlandsbassängen var det ett lager med lägre DIN-koncentrationer kring 80–100 meter där det även var låga koncentrationer av syre. I detta område uppmättes också högre fluorescens. Troligen beror detta på bakteriell aktivitet i detta skikt.

I Bornholmsbassängen och Hanöbukten noterades syrefria förhållanden, eller syrehalter mycket nära noll från 70-80 metersdjup och det var det akut syrebrist ($< 2\text{ml/l}$) redan från ungefär 60 meters djup. I övriga bassängerna var det akut syrebrist från ~70 meters djup. Svavelväte uppmättes i Östra, Västra och Norra Gotlandsbassängen. I Östra Gotlandsbassängen var det helt syrefritt (då svavelväte bildas) från 130 meter i Gotlandsdjupet (BY15) och från 90 meter i Fårödjupet (BY20) och i Norra Gotlandsbassängen. I Västra och Norra Gotlandsbassängen var det helt syrefritt från 80 – 90 meter och halterna av svavelväte i djupvattnet var mycket högre än normalt. I Finska vikens central och yttre delar noterades akut syrebrist från 60 meters djup och helt syrefria förhållanden från omkring 70 meters djup.

Från ytan ner till omkring 20 meters djup noterades hög fluorescens i hela det undersökta området, vilket tyder på en fortsatt pågående vårblomning. Siktdjupet varierade mellan 8 och 11 meter, djupast i Östra Gotlandsbassängen.



Figur 1. Koncentration av DIN, fosfat och kisel i ytvattnet 0 – 10 meter. Syresituationen i bottenvattnet, H₂S står för svavelväte, vilket bildas då det är helt syrefritt.



Figur 2. Snitt som visar syre- och salthalt från Öresund, genom Egentliga Östersjön, till Västra Gotlandsbassängen. Data som visas i figurerna kommer ifrån de stationer som faller innanför markeringen.

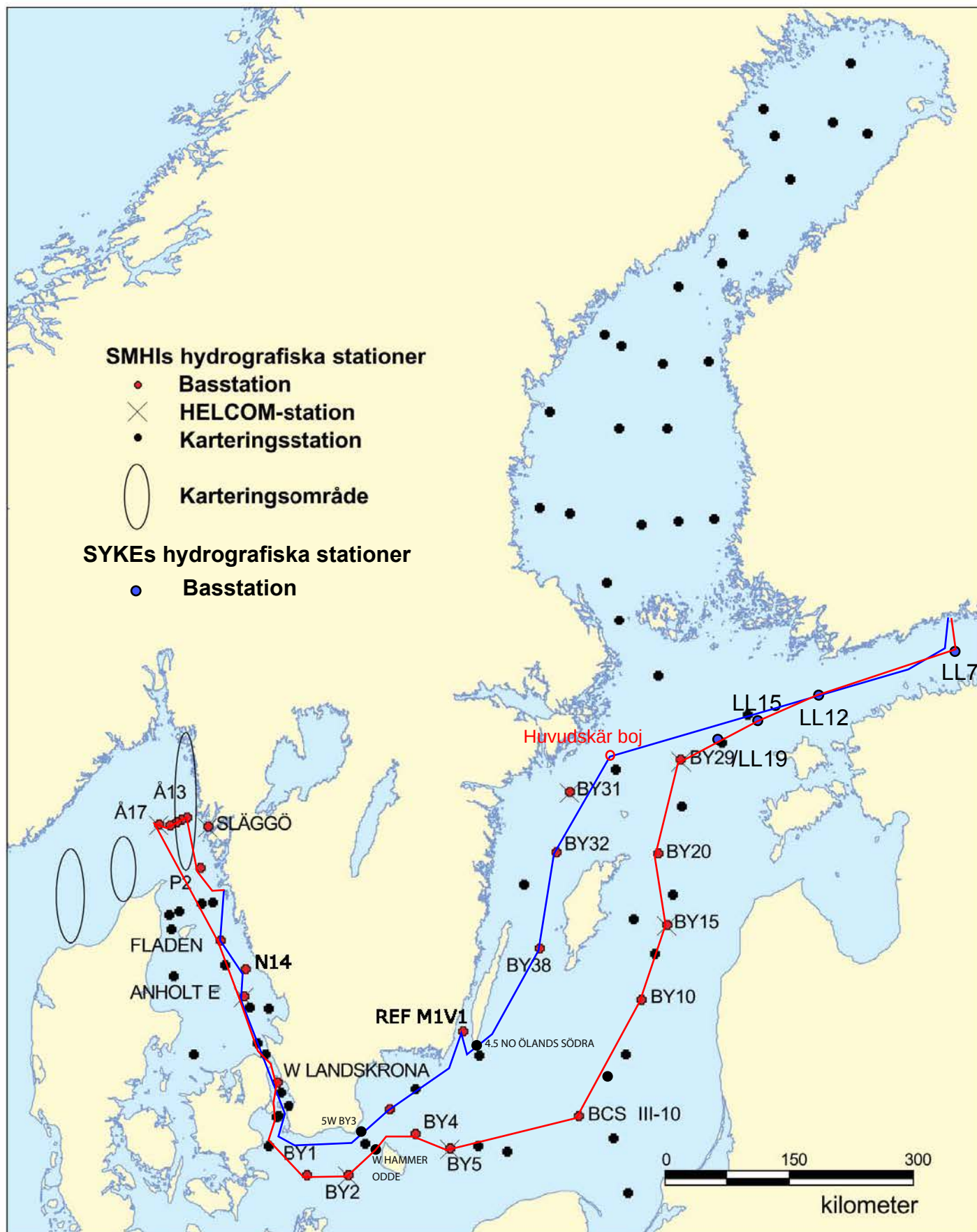
DELTAGARE

Namn	Delsträcka	Roll	Från
Sari Sipilä		Expeditionsledare	SMHI
Johan Håkansson		Kvalitetsansvarig	SMHI
Ola Kalén			SMHI
Madeleine Nilsson	Helsingfors-Göteborg		SMHI
Lars Anderson	Göteborg - Helsingfors		SMHI
Ann-Turi Skjevik	Helsingfors - Göteborg		SMHI
Anna-Kerstin Thell	Göteborg - Helsingfors		SMHI

BILAGOR

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

TRACKCHART
Country: Sweden
Ship: R/V Aranda
Date: 20190509-20190516
Series: 0268-0298



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

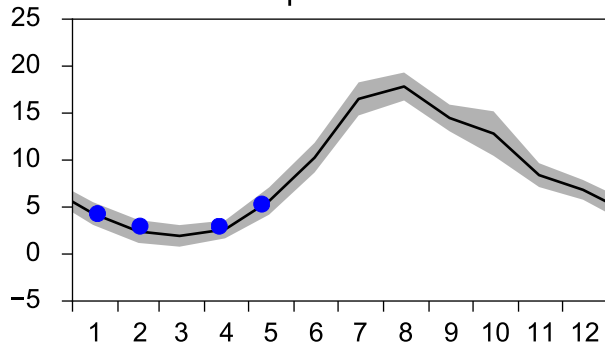
Annual Cycles

— Mean 2001-2015

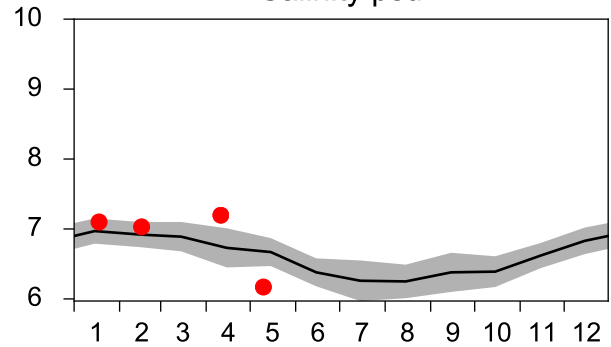
■ St.Dev.

● 2019

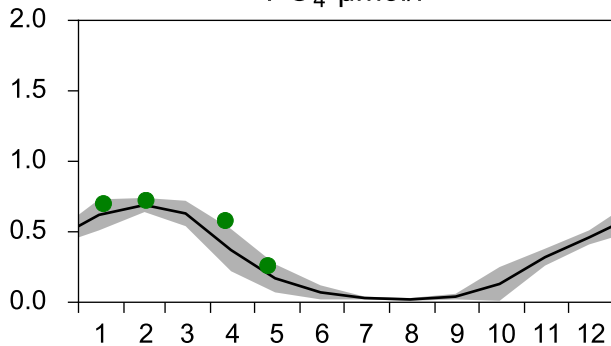
Temperature °C



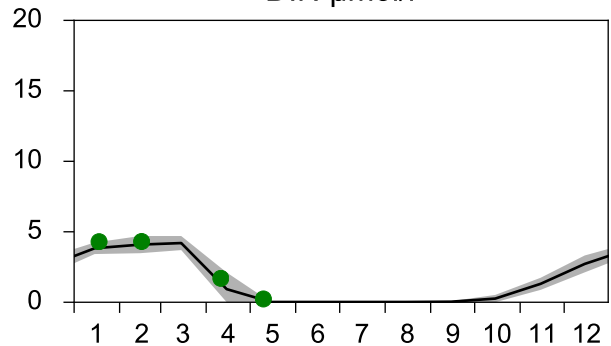
Salinity psu



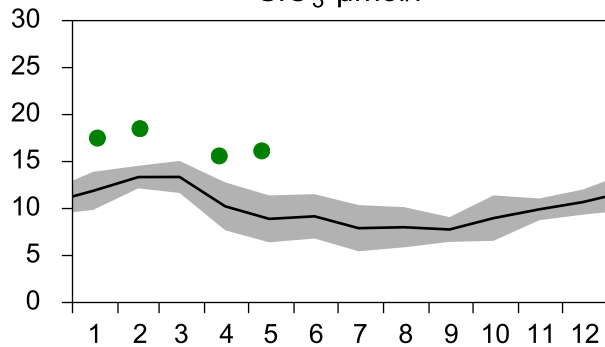
PO₄ µmol/l



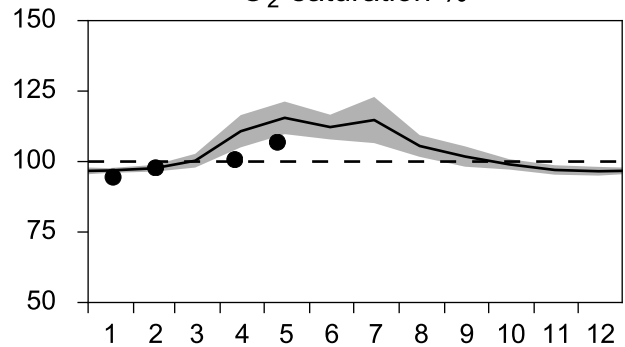
DIN µmol/l



SiO₃ µmol/l

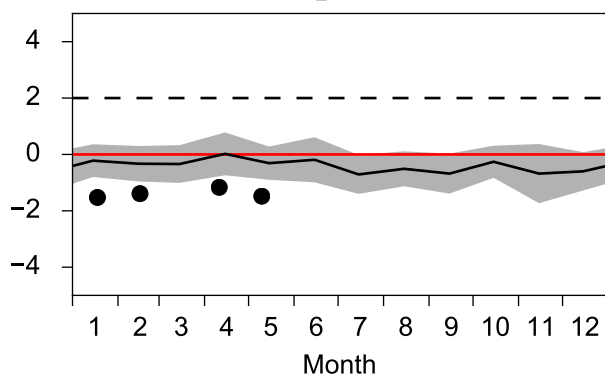


O₂ saturation %

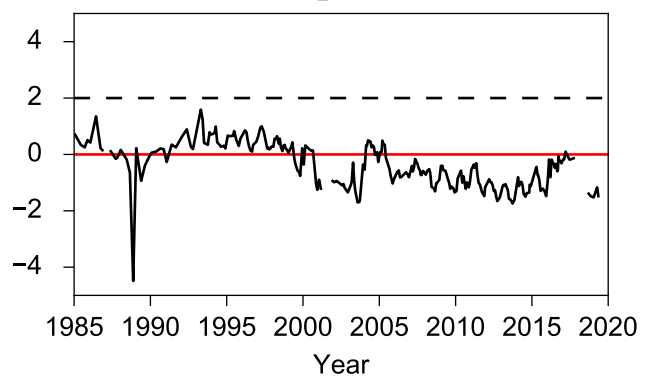


OXYGEN IN BOTTOM WATER (depth >= 150 m)

O₂ ml/l



O₂ ml/l

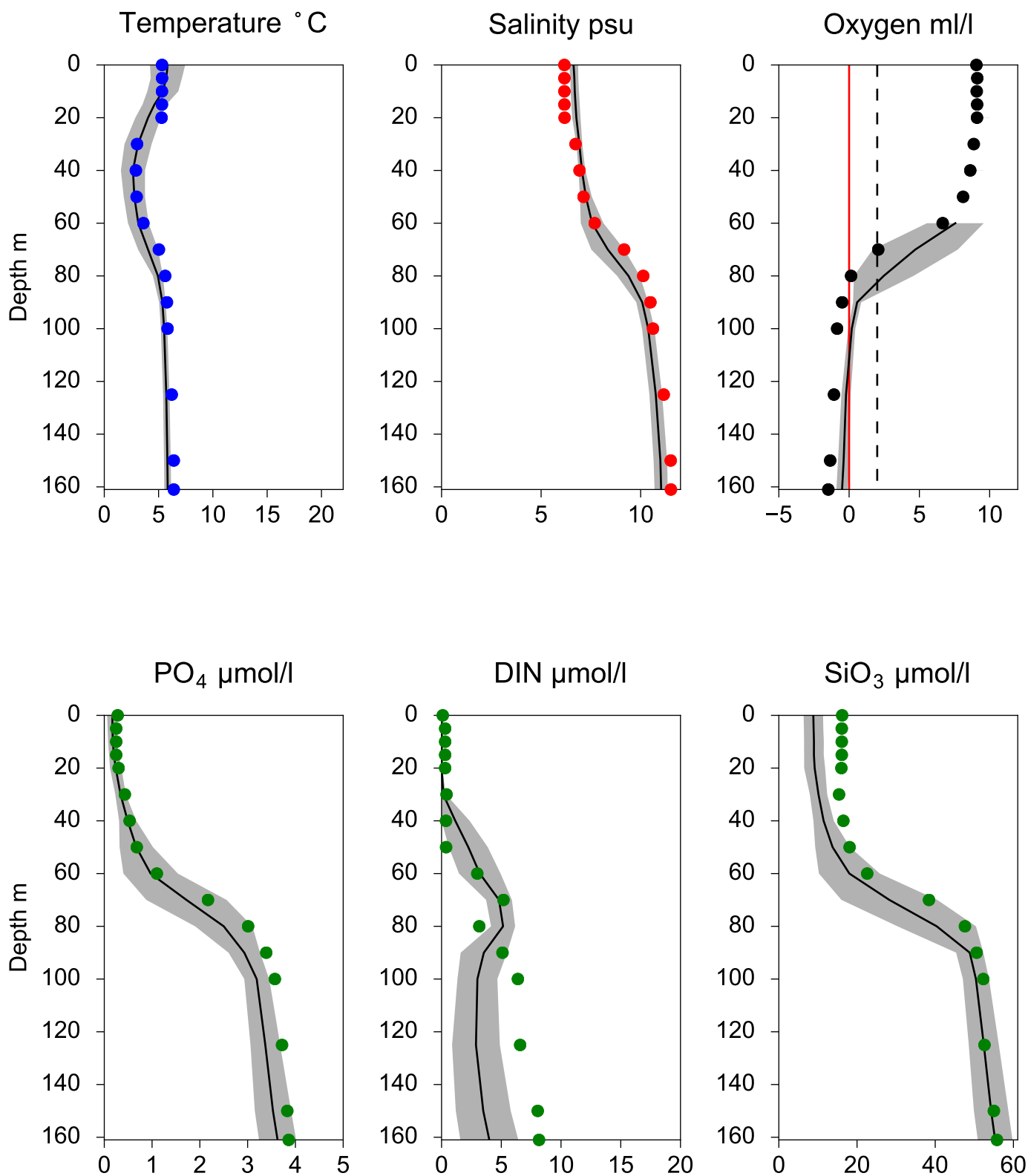


Vertical profiles BY29 / LL19 May

— Mean 2001-2015

■ St.Dev.

● 2019-05-10



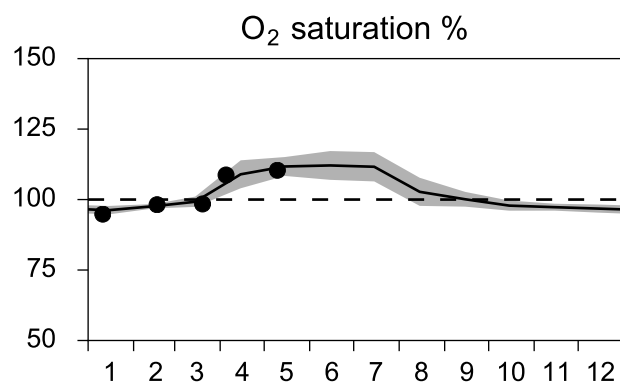
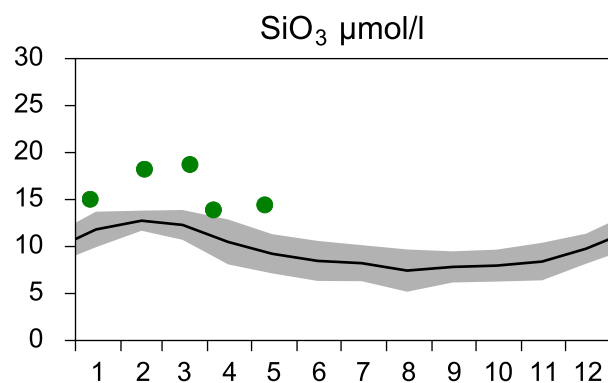
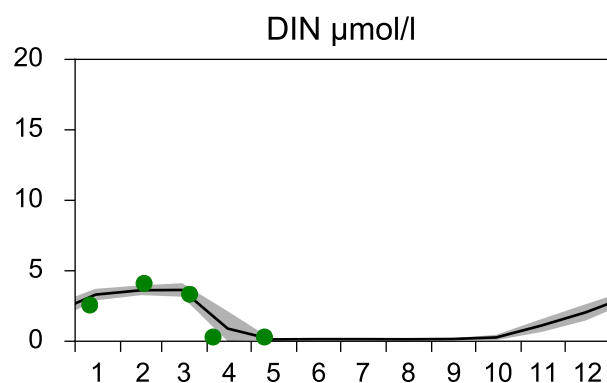
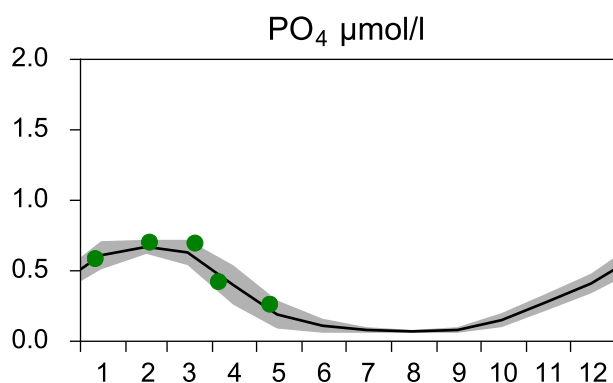
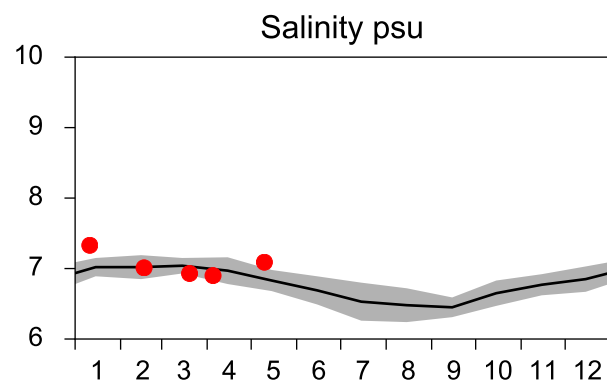
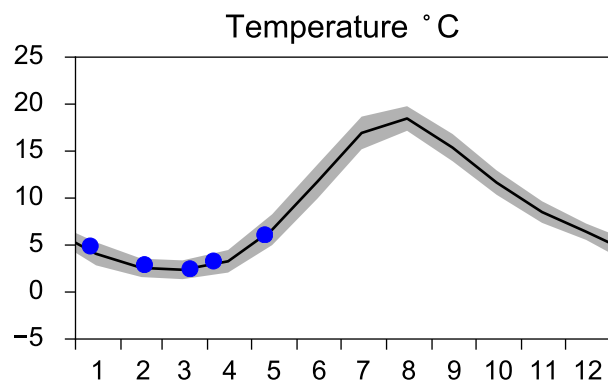
STATION BY20 FÅRÖDJ SURFACE WATER (0-10 m)

Annual Cycles

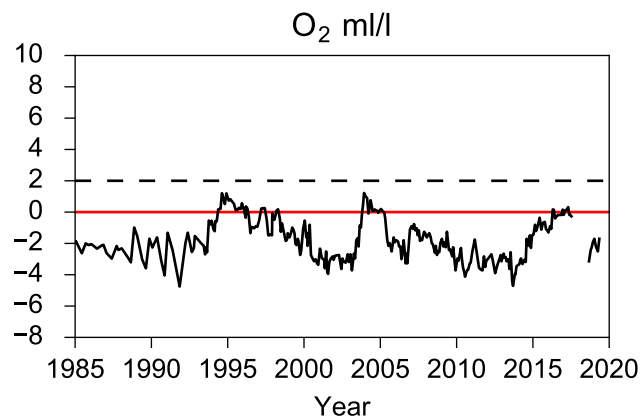
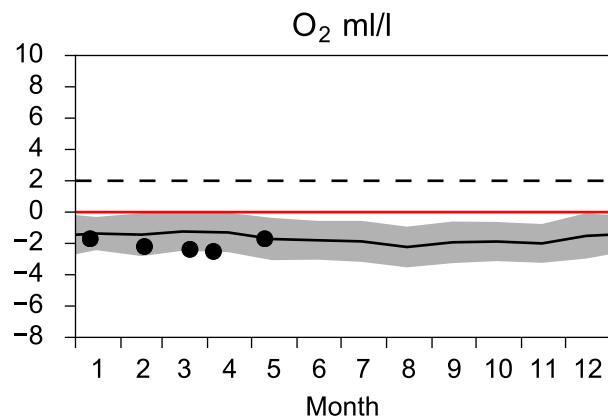
— Mean 2001-2015

■ St.Dev.

● 2019



OXYGEN IN BOTTOM WATER (depth >= 175 m)

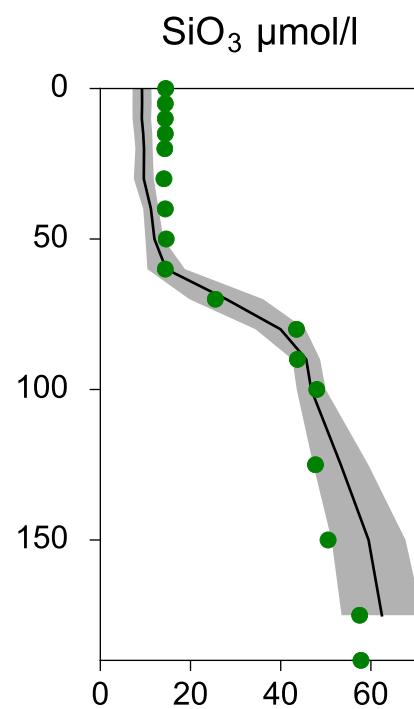
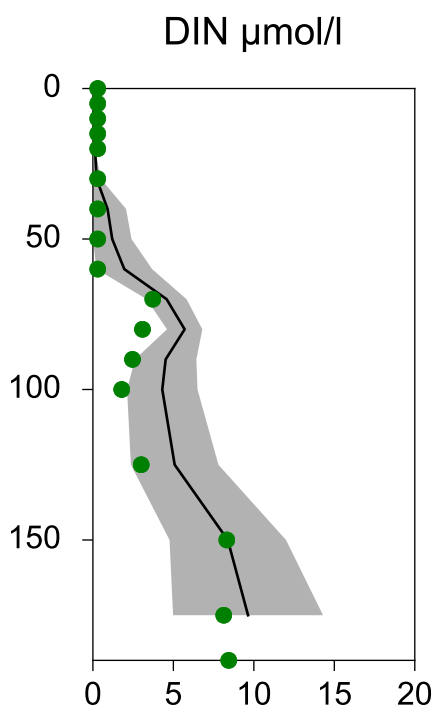
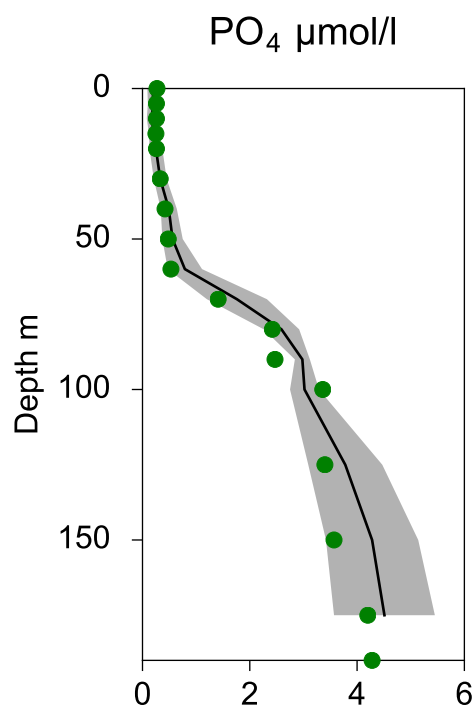
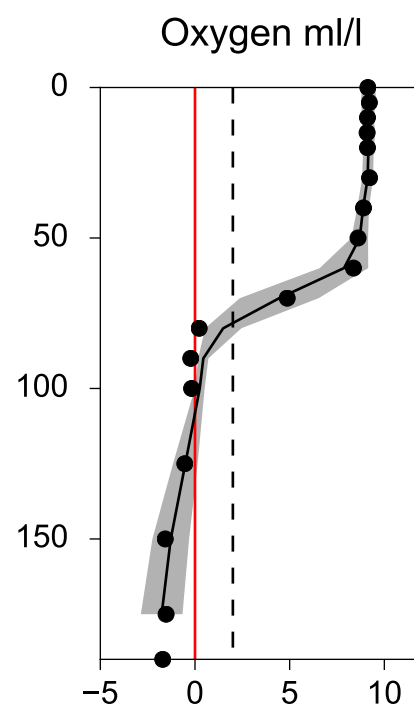
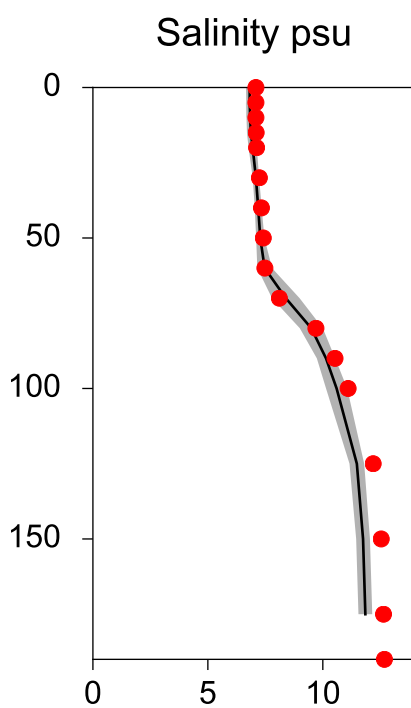
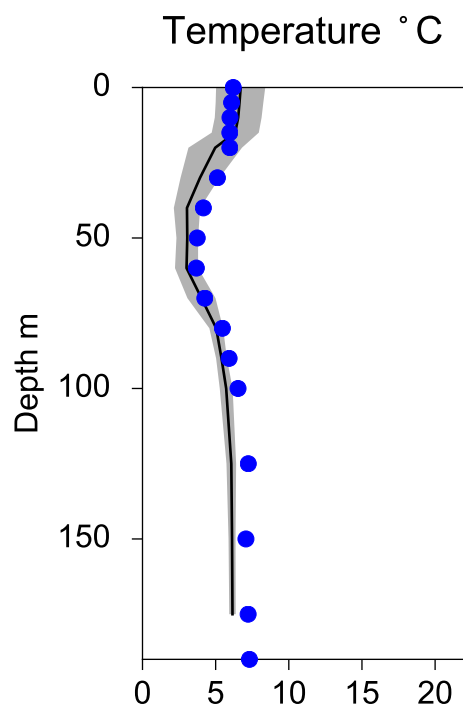


Vertical profiles BY20 FÅRÖDJ May

— Mean 2001-2015

■ St.Dev.

● 2019-05-10



STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

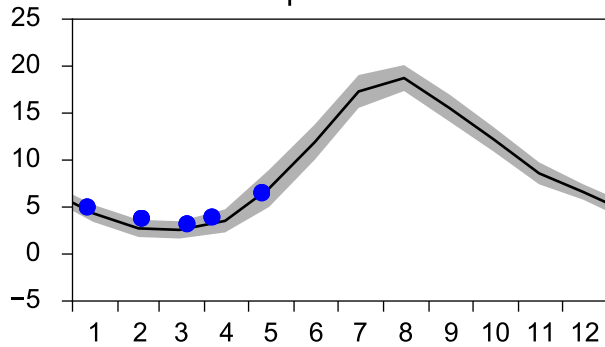
Annual Cycles

— Mean 2001-2015

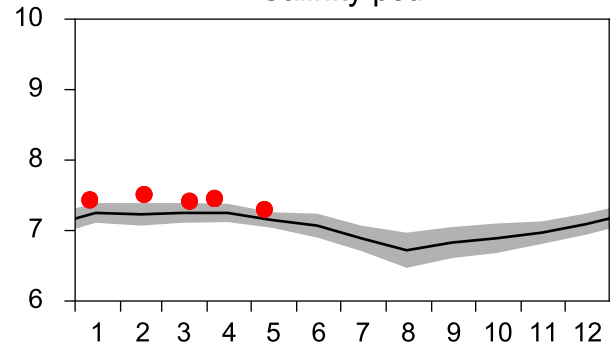
■ St.Dev.

● 2019

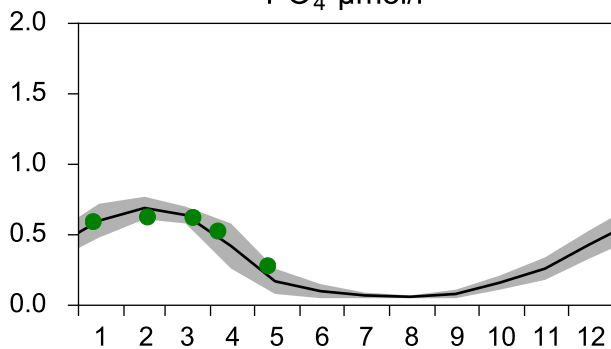
Temperature °C



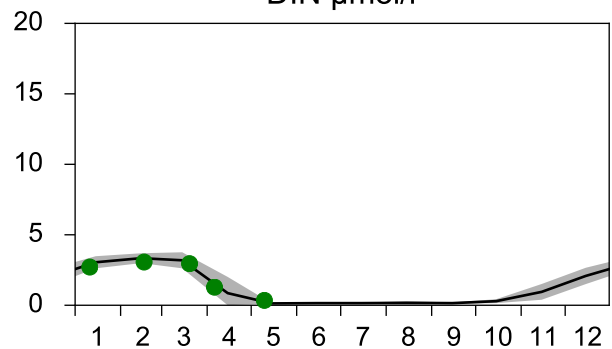
Salinity psu



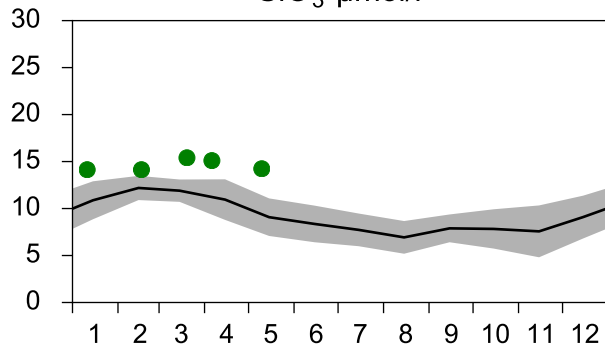
PO₄ µmol/l



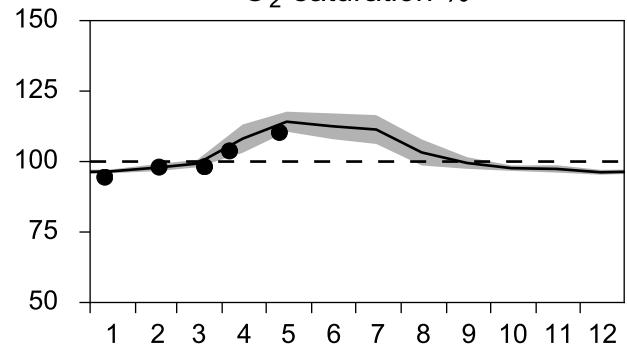
DIN µmol/l



SiO₃ µmol/l

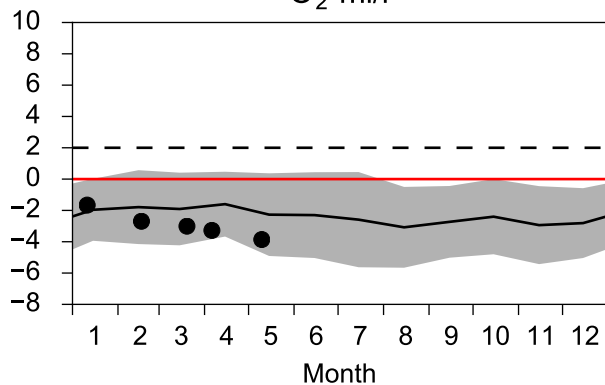


O₂ saturation %

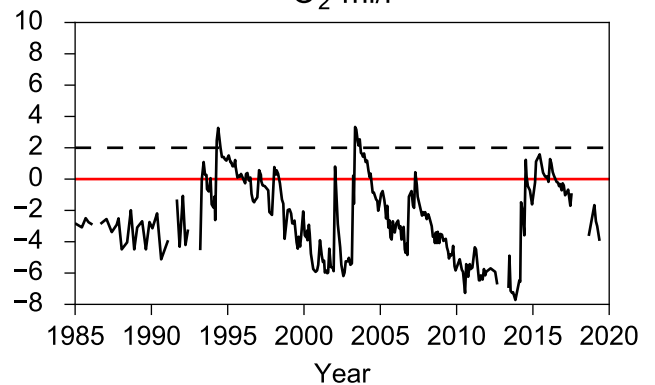


OXYGEN IN BOTTOM WATER (depth >= 225 m)

O₂ ml/l

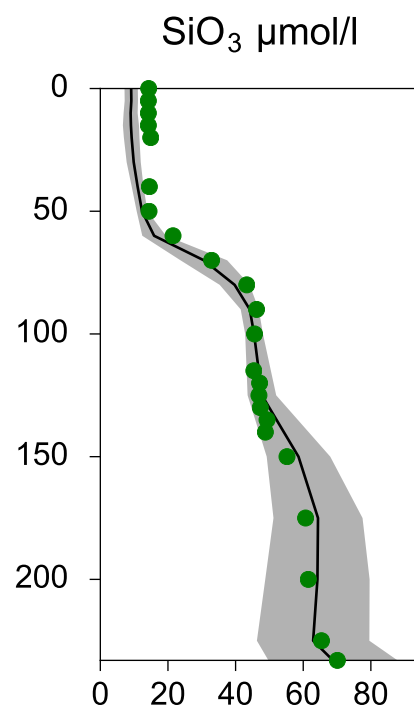
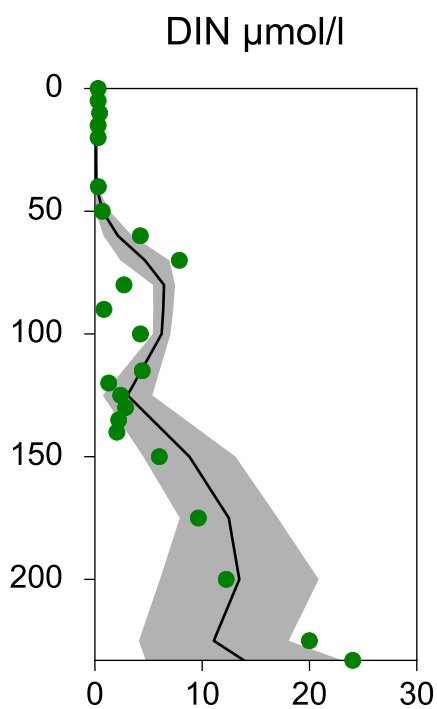
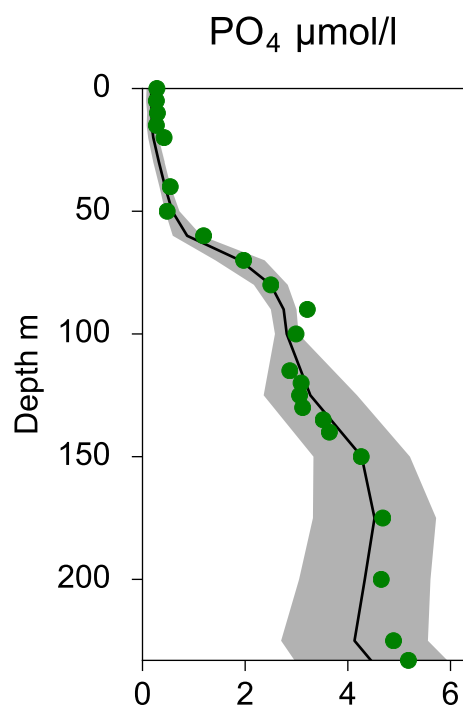
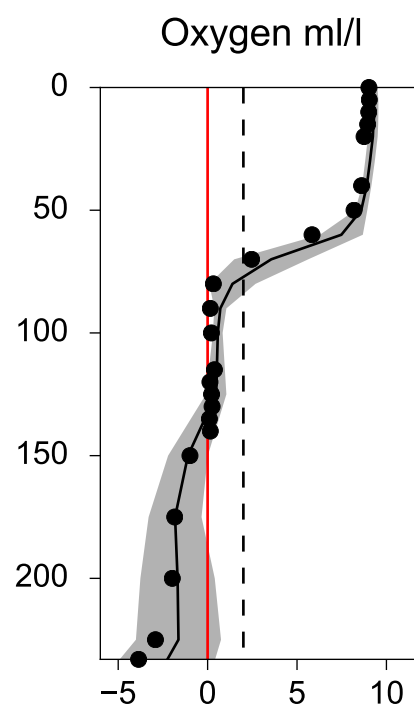
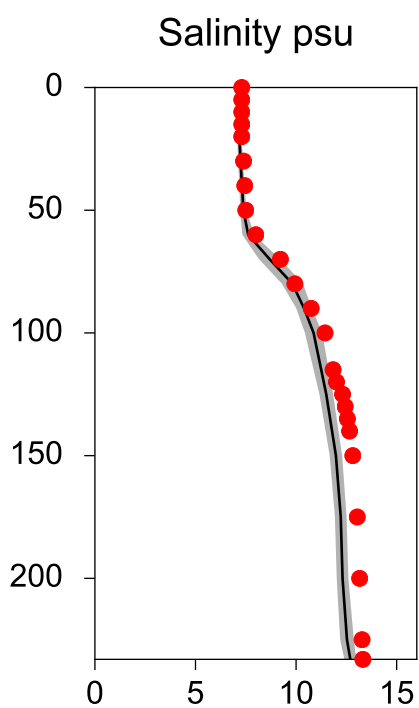
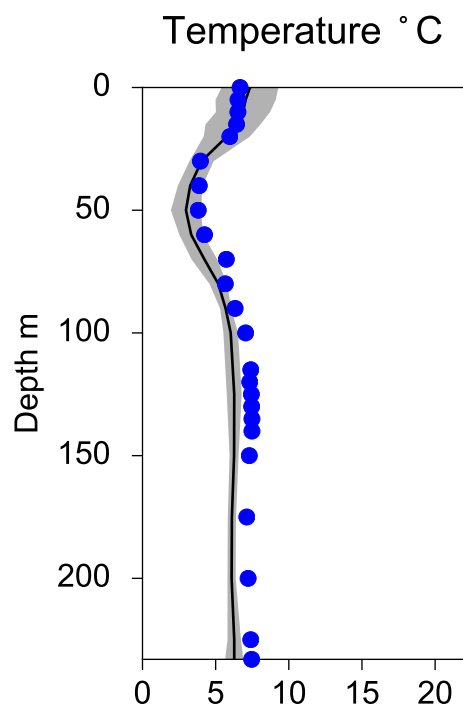


O₂ ml/l



Vertical profiles BY15 GOTLANDSDJ May

— Mean 2001-2015 St.Dev. • 2019-05-10



STATION BY15 GOTLANDSDJ SURFACE WATER (0-10 m)

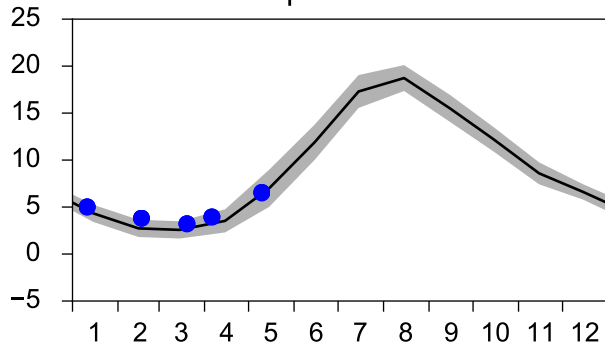
Annual Cycles

— Mean 2001-2015

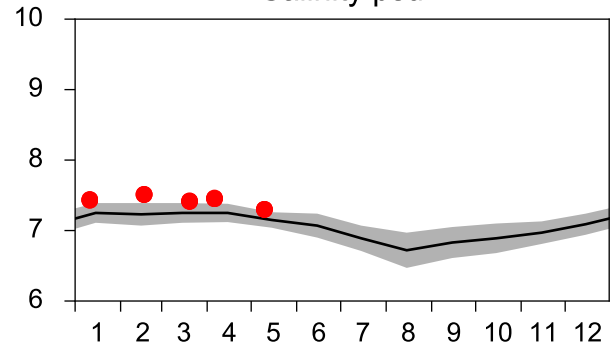
■ St.Dev.

● 2019

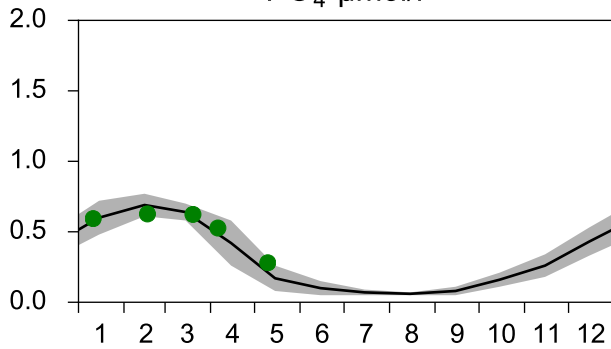
Temperature °C



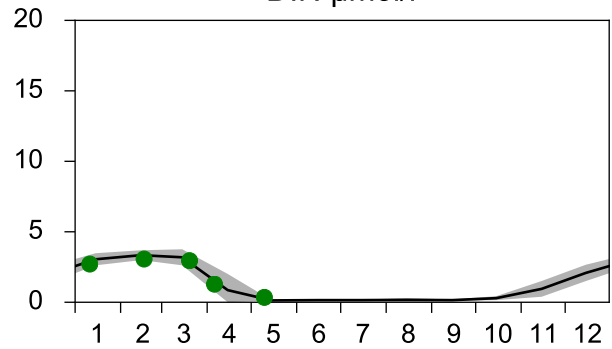
Salinity psu



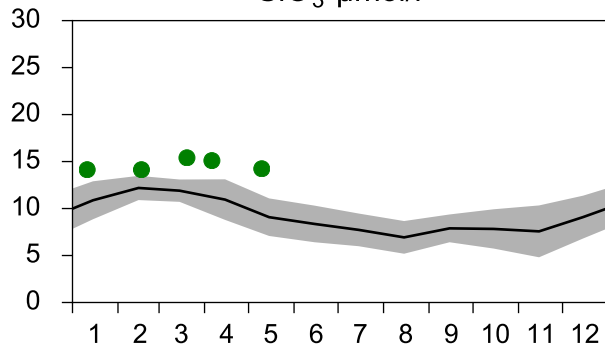
PO₄ µmol/l



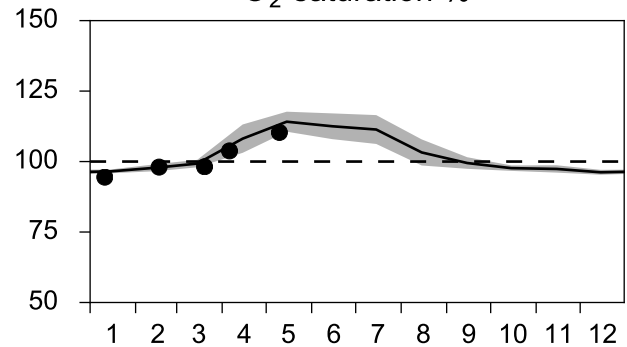
DIN µmol/l



SiO₃ µmol/l

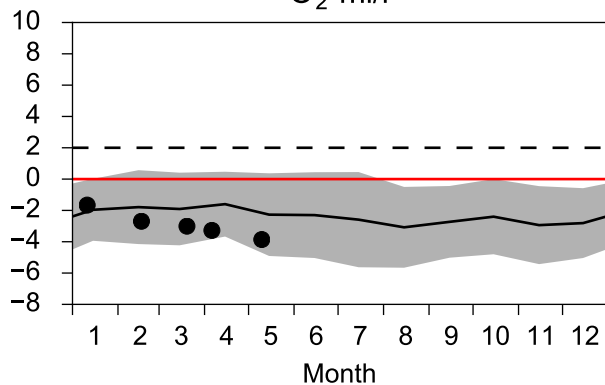


O₂ saturation %

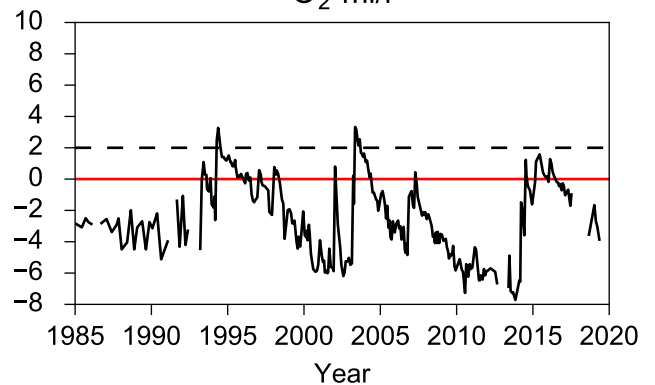


OXYGEN IN BOTTOM WATER (depth >= 225 m)

O₂ ml/l

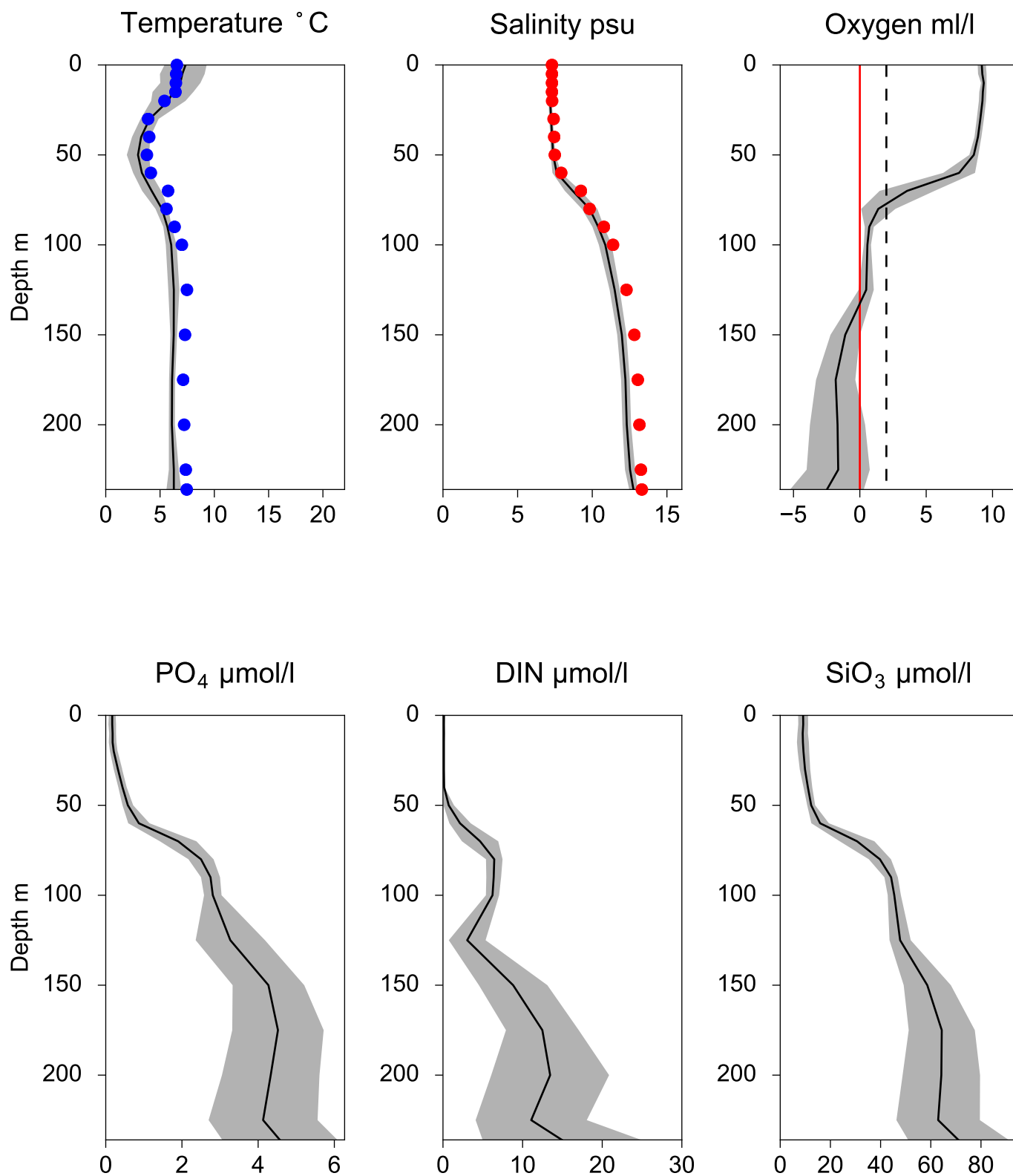


O₂ ml/l



Vertical profiles BY15 GOTLANDSDJ May

— Mean 2001-2015 ■ St.Dev. ● 2019-05-10



STATION BY10 SURFACE WATER (0-10 m)

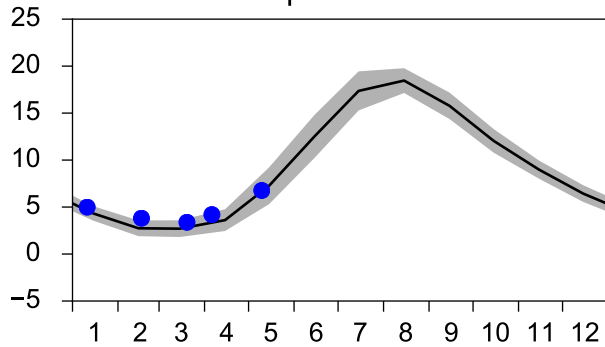
Annual Cycles

— Mean 2001-2015

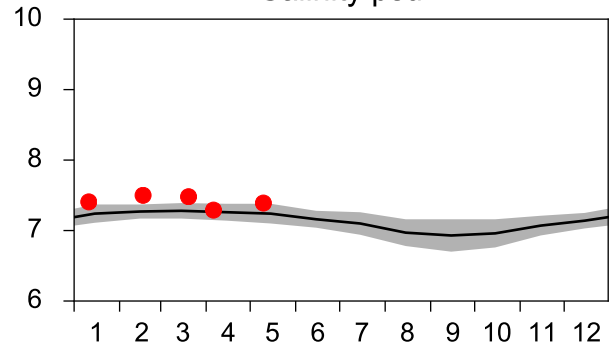
■ St.Dev.

● 2019

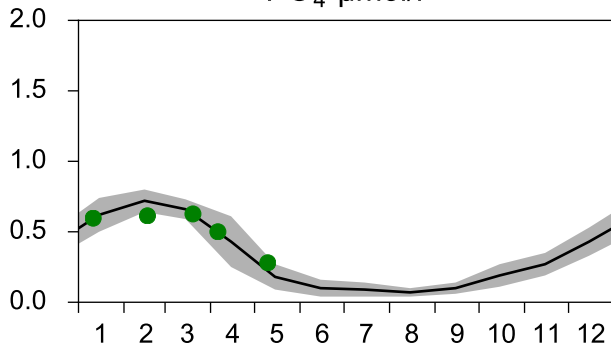
Temperature °C



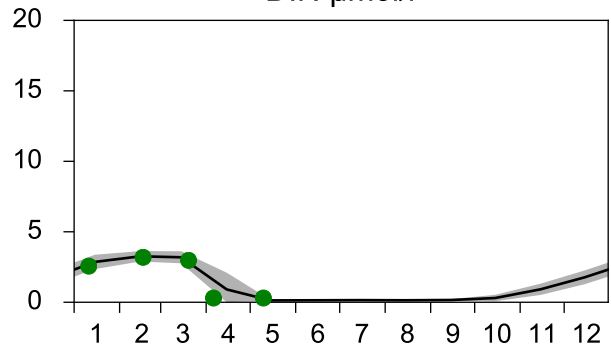
Salinity psu



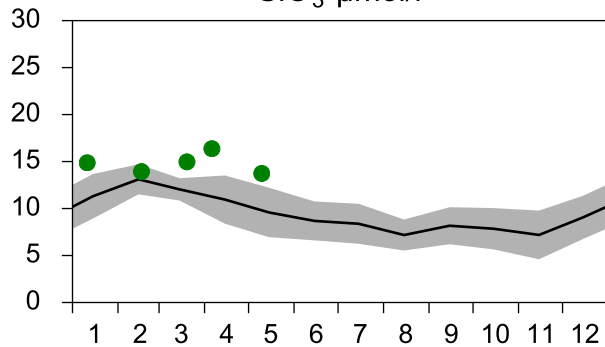
PO₄ µmol/l



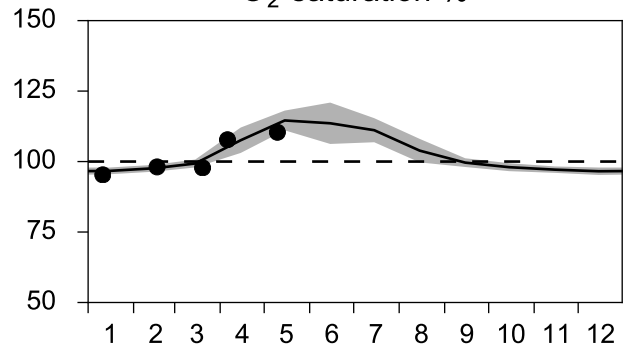
DIN µmol/l



SiO₃ µmol/l

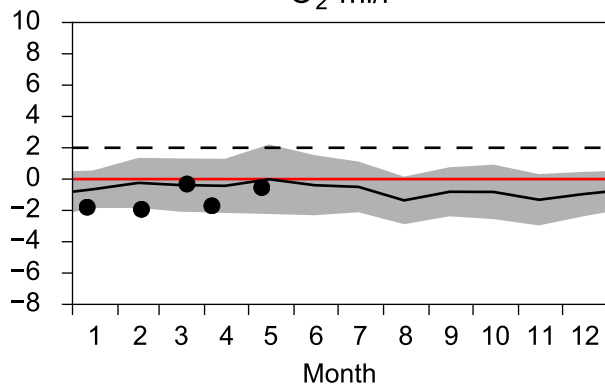


O₂ saturation %

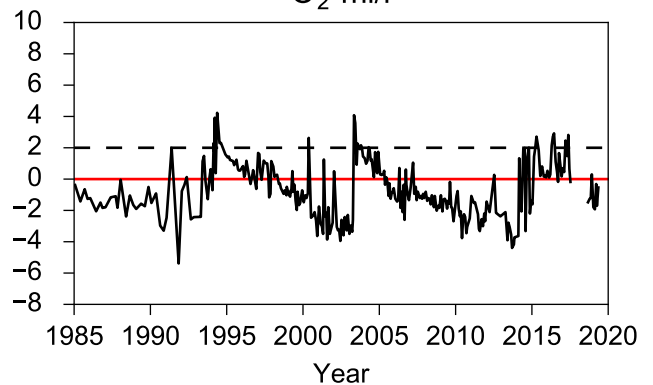


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l



O₂ ml/l

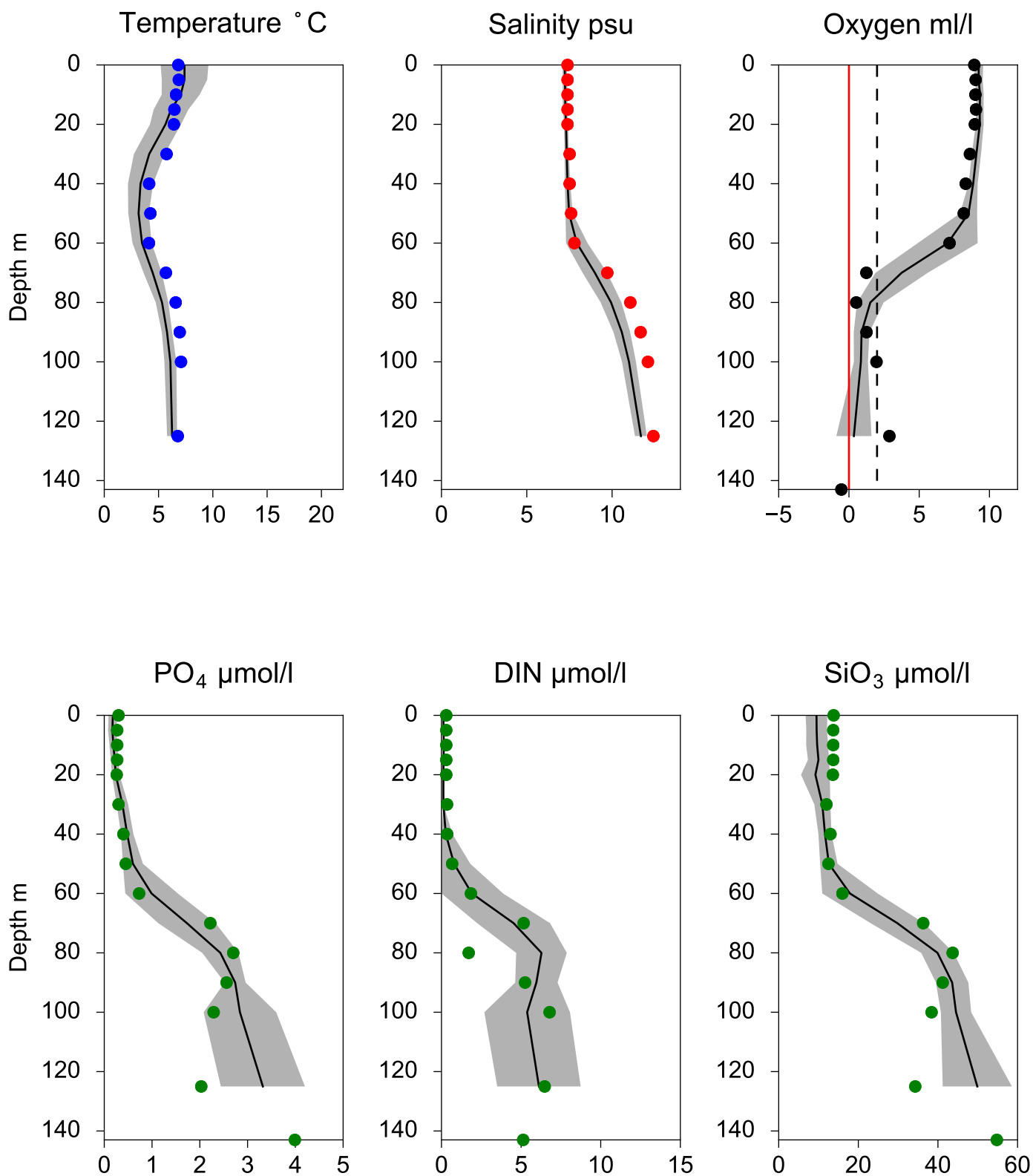


Vertical profiles BY10 May

— Mean 2001-2015

■ St.Dev.

● 2019-05-10



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

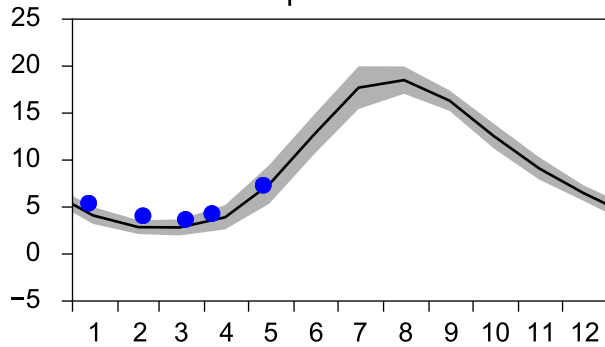
Annual Cycles

— Mean 2001-2015

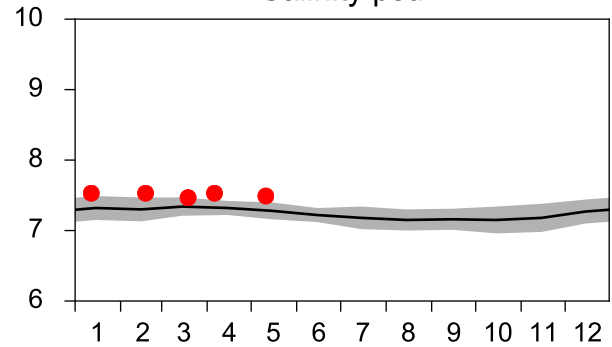
■ St.Dev.

● 2019

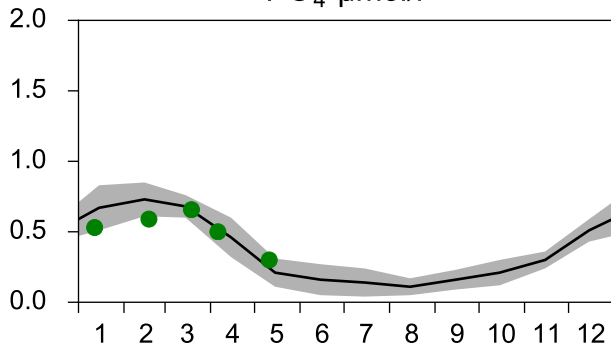
Temperature °C



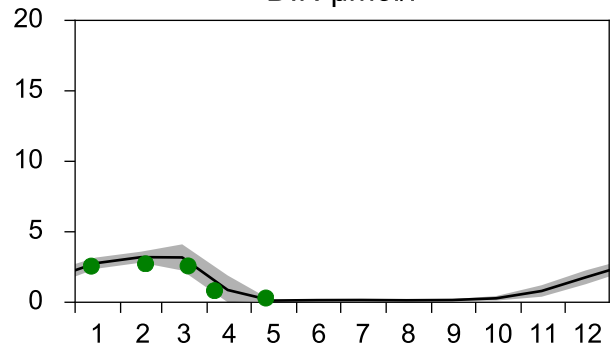
Salinity psu



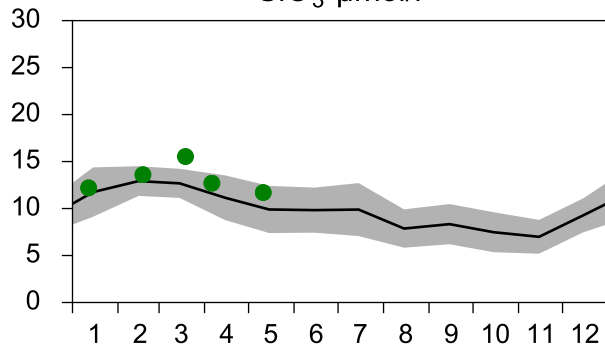
PO₄ µmol/l



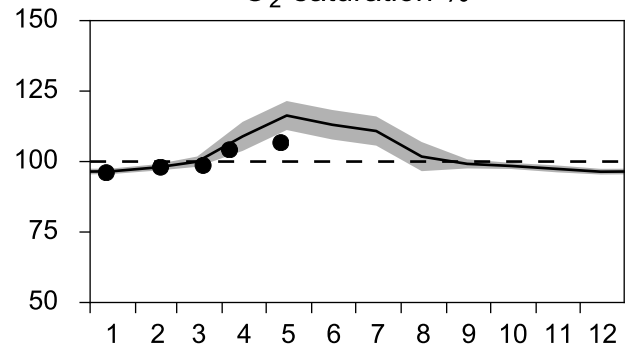
DIN µmol/l



SiO₃ µmol/l

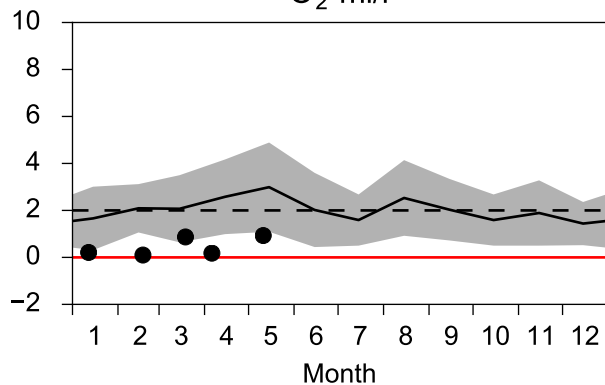


O₂ saturation %

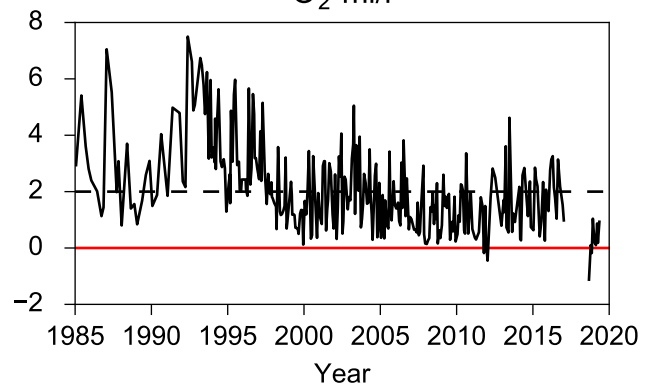


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l

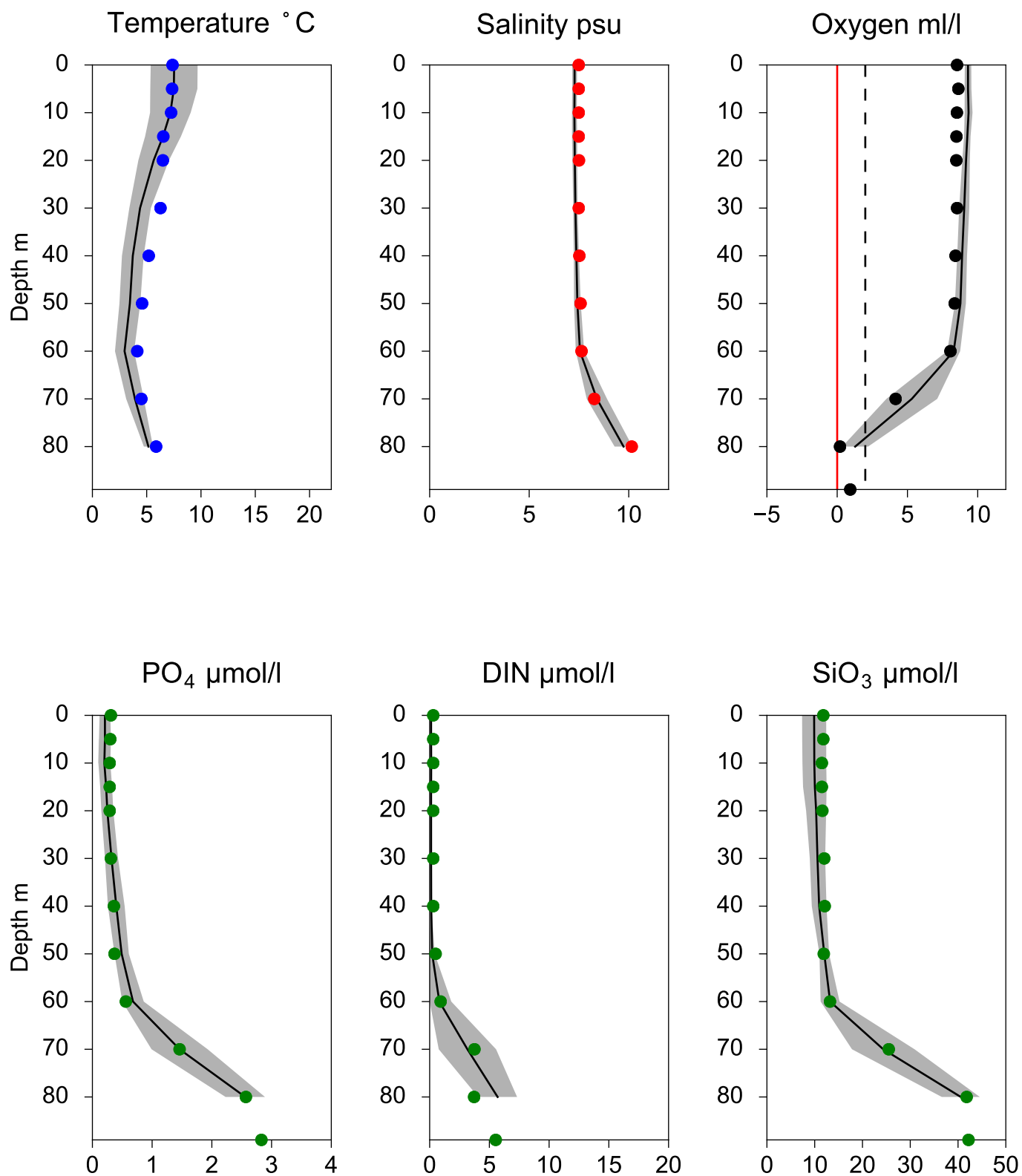


O₂ ml/l



Vertical profiles BCS III-10 May

— Mean 2001-2015 ■ St.Dev. ● 2019-05-11



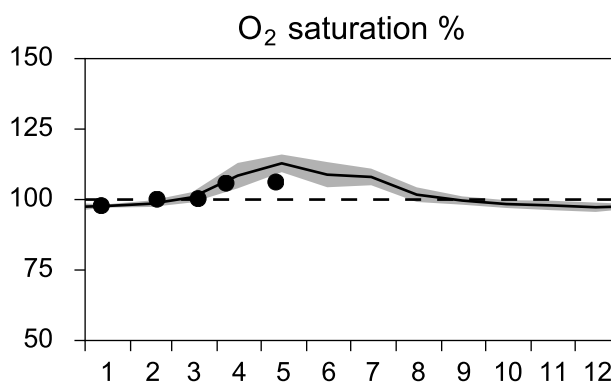
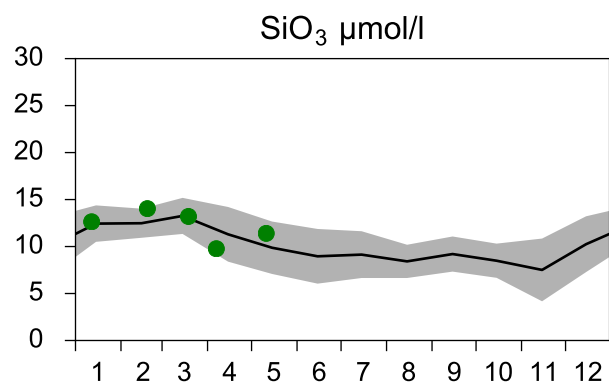
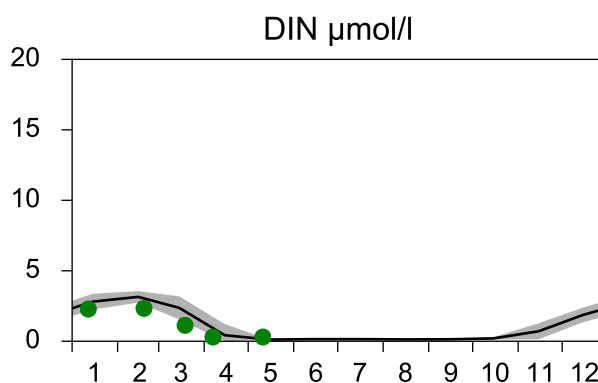
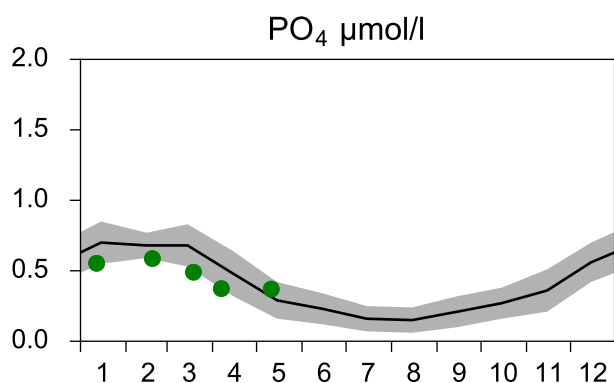
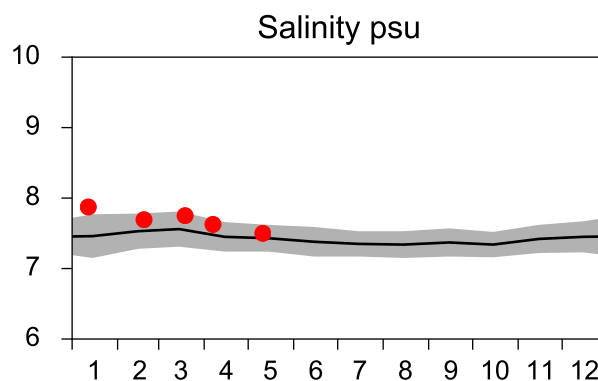
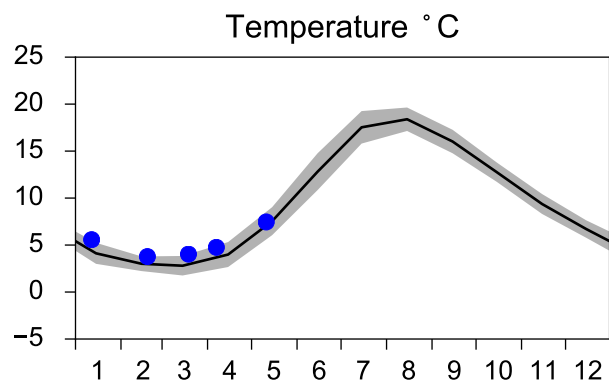
STATION BY5 BORNHOLMSDJ SURFACE WATER (0-10 m)

Annual Cycles

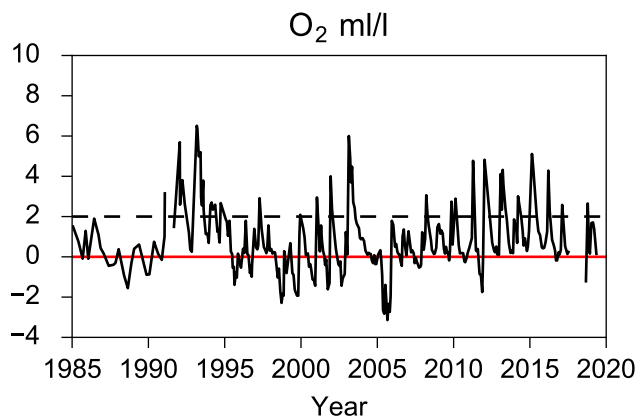
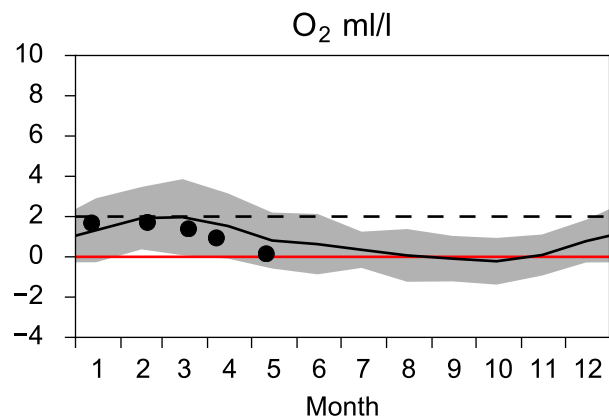
— Mean 2001-2015

■ St.Dev.

● 2019

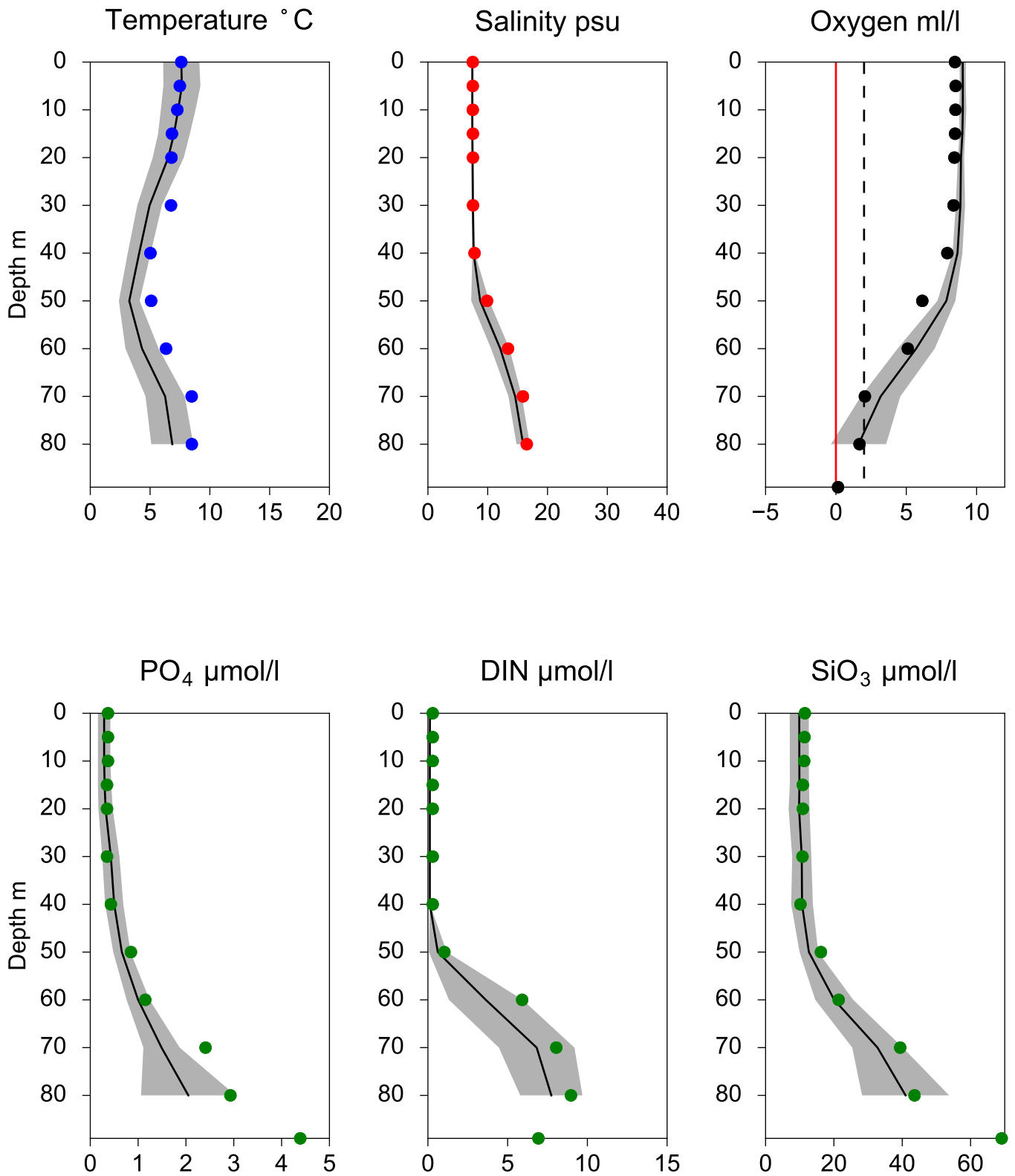


OXYGEN IN BOTTOM WATER (depth >= 80 m)



Vertical profiles BY5 BORNHOLMSDJ May

— Mean 2001-2015 St.Dev. • 2019-05-11



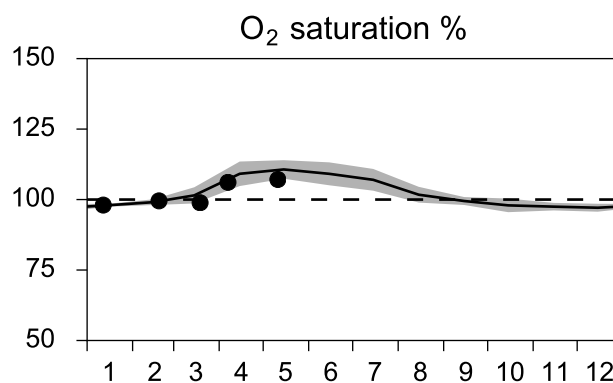
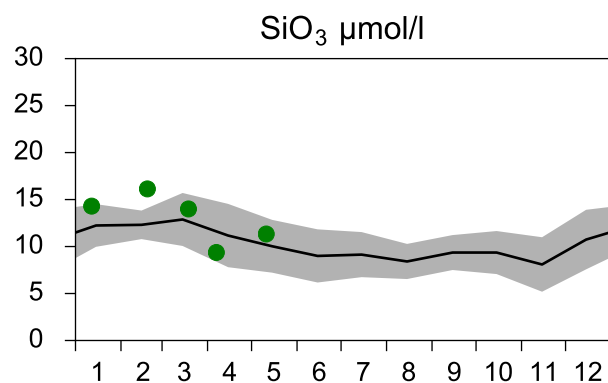
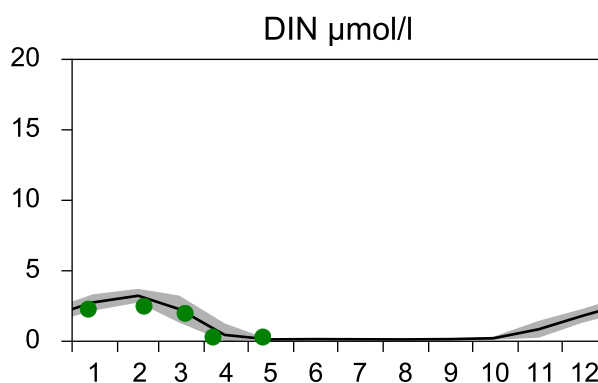
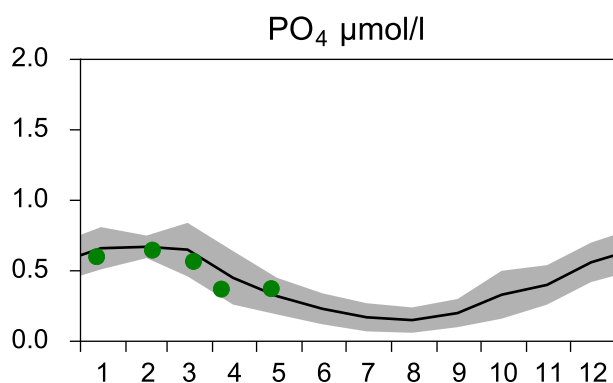
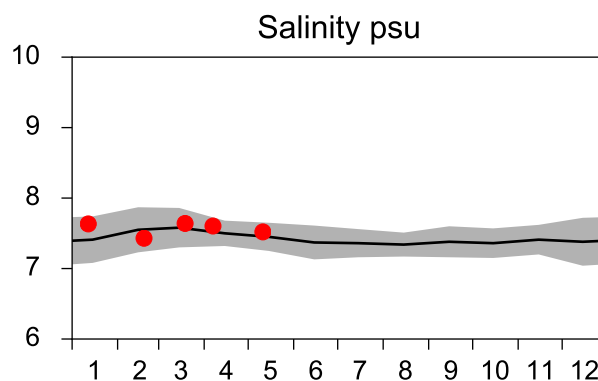
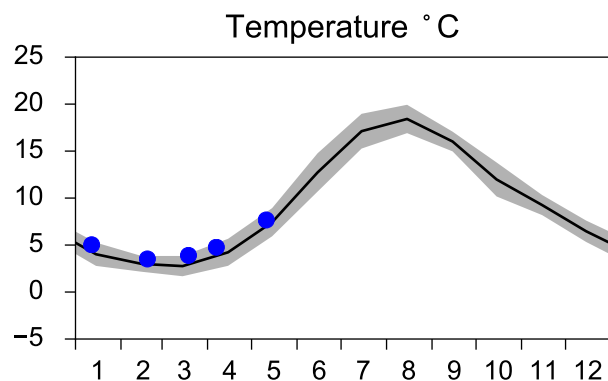
STATION BY4 CHRISTIANSÖ SURFACE WATER (0-10 m)

Annual Cycles

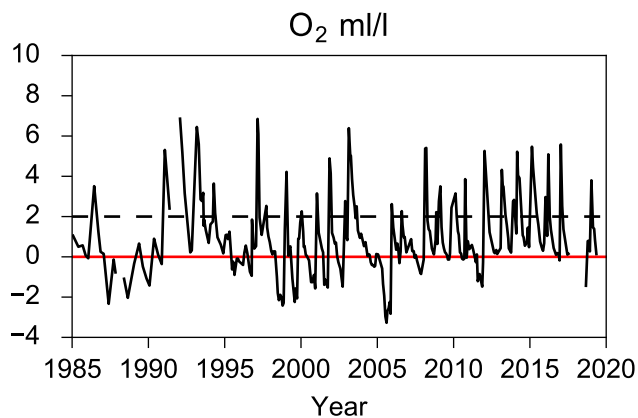
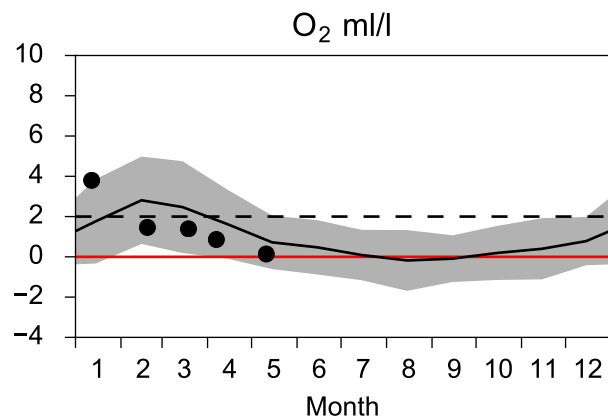
— Mean 2001-2015

■ St.Dev.

● 2019



OXYGEN IN BOTTOM WATER (depth >= 80 m)

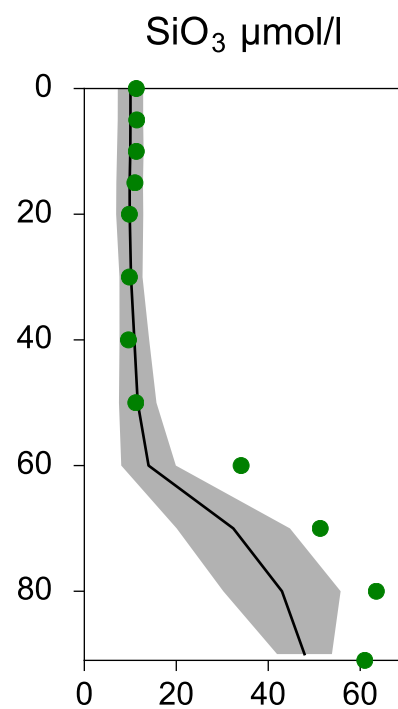
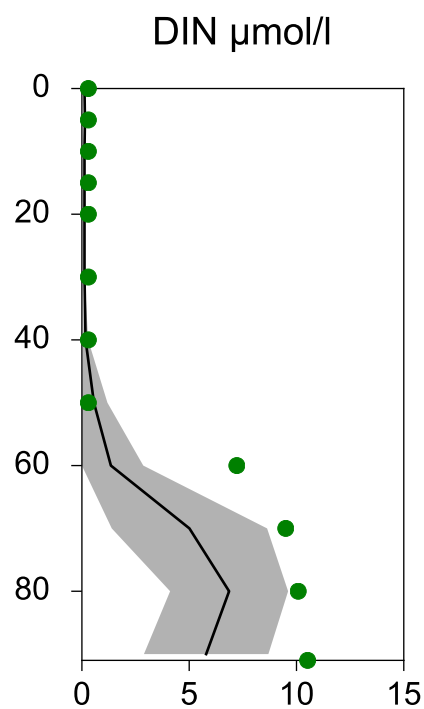
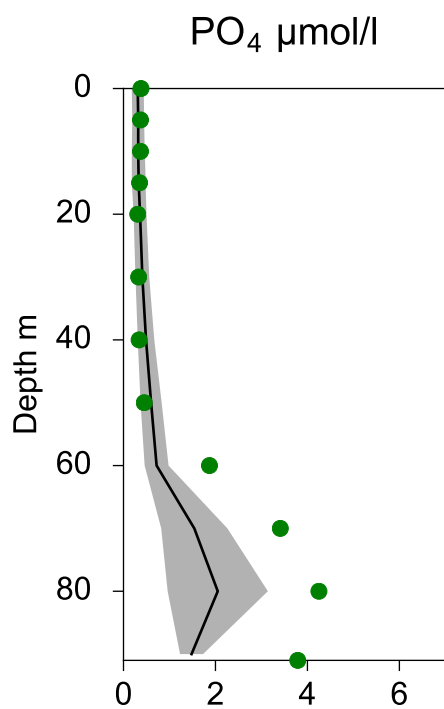
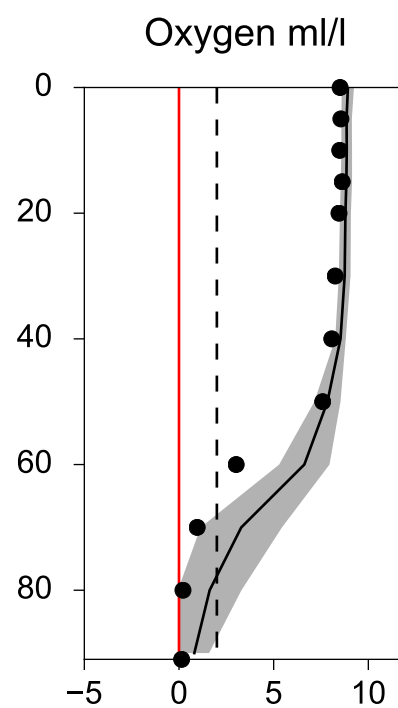
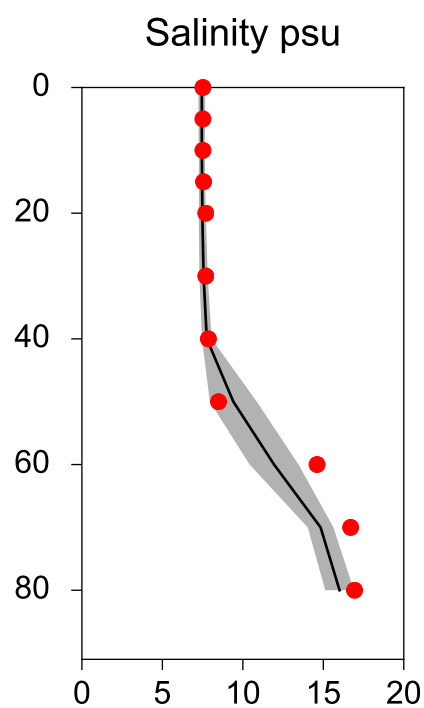
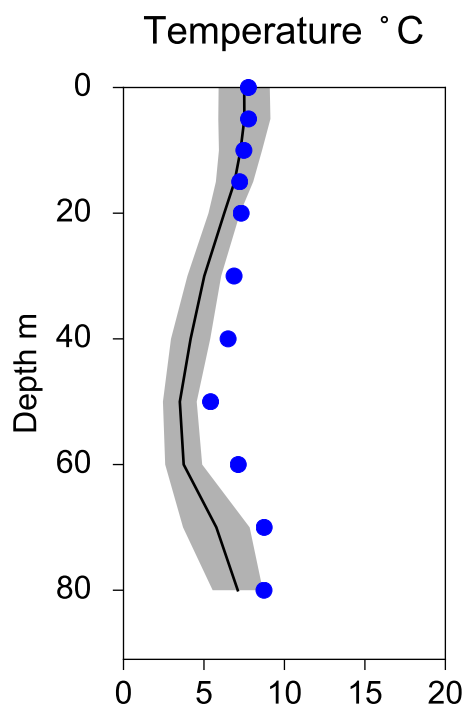


Vertical profiles BY4 CHRISTIANSÖ May

— Mean 2001-2015

■ St.Dev.

● 2019-05-11



STATION BY2 ARKONA SURFACE WATER (0-10 m)

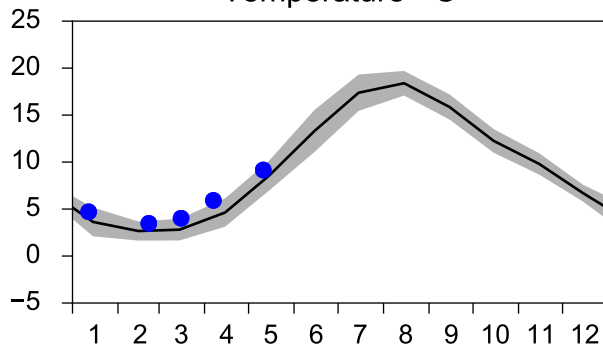
Annual Cycles

— Mean 2001-2015

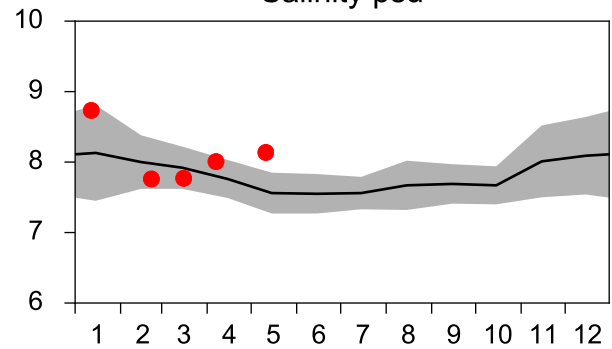
■ St.Dev.

● 2019

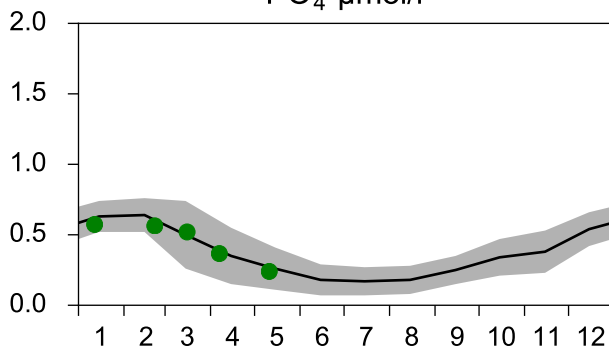
Temperature °C



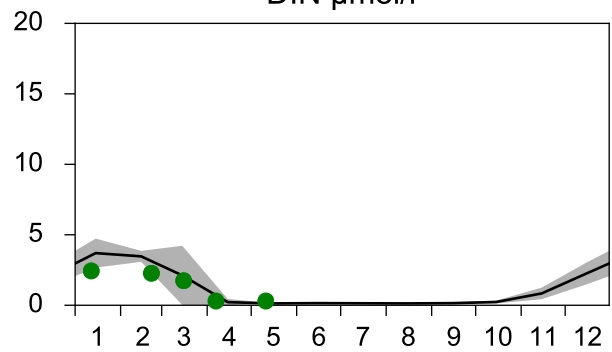
Salinity psu



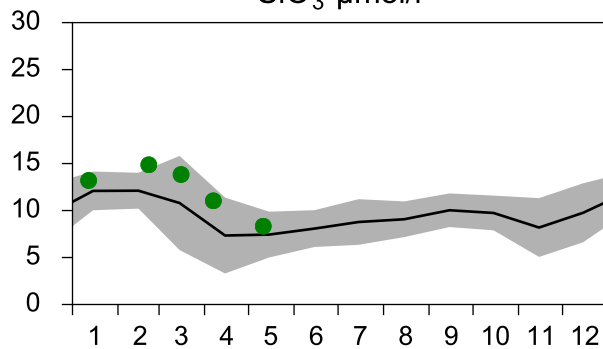
PO₄ µmol/l



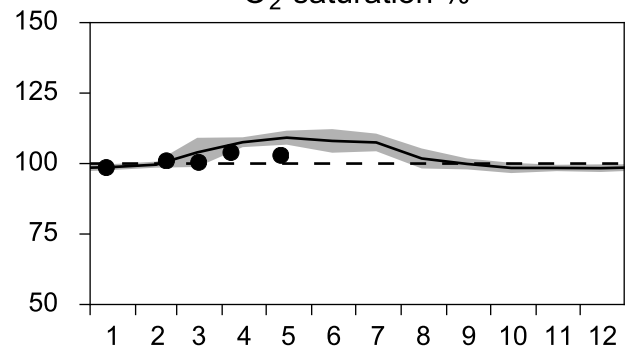
DIN µmol/l



SiO₃ µmol/l

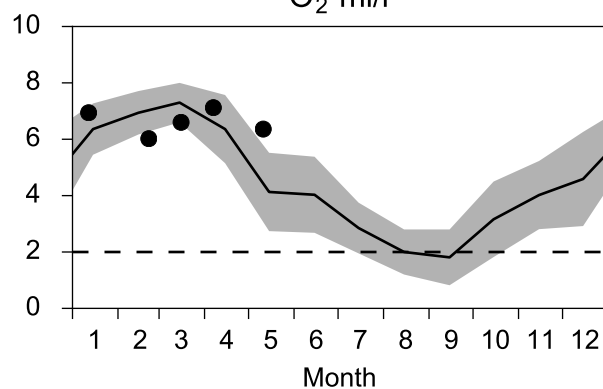


O₂ saturation %

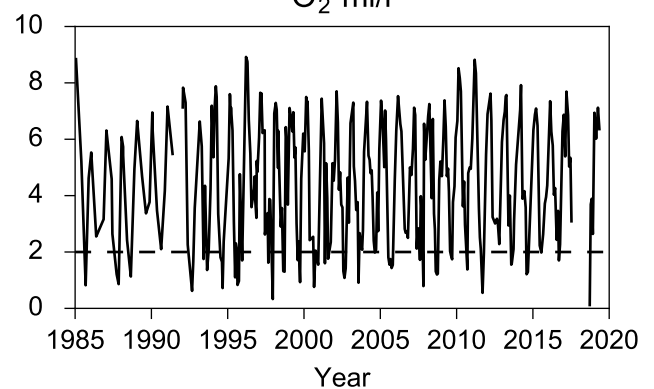


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

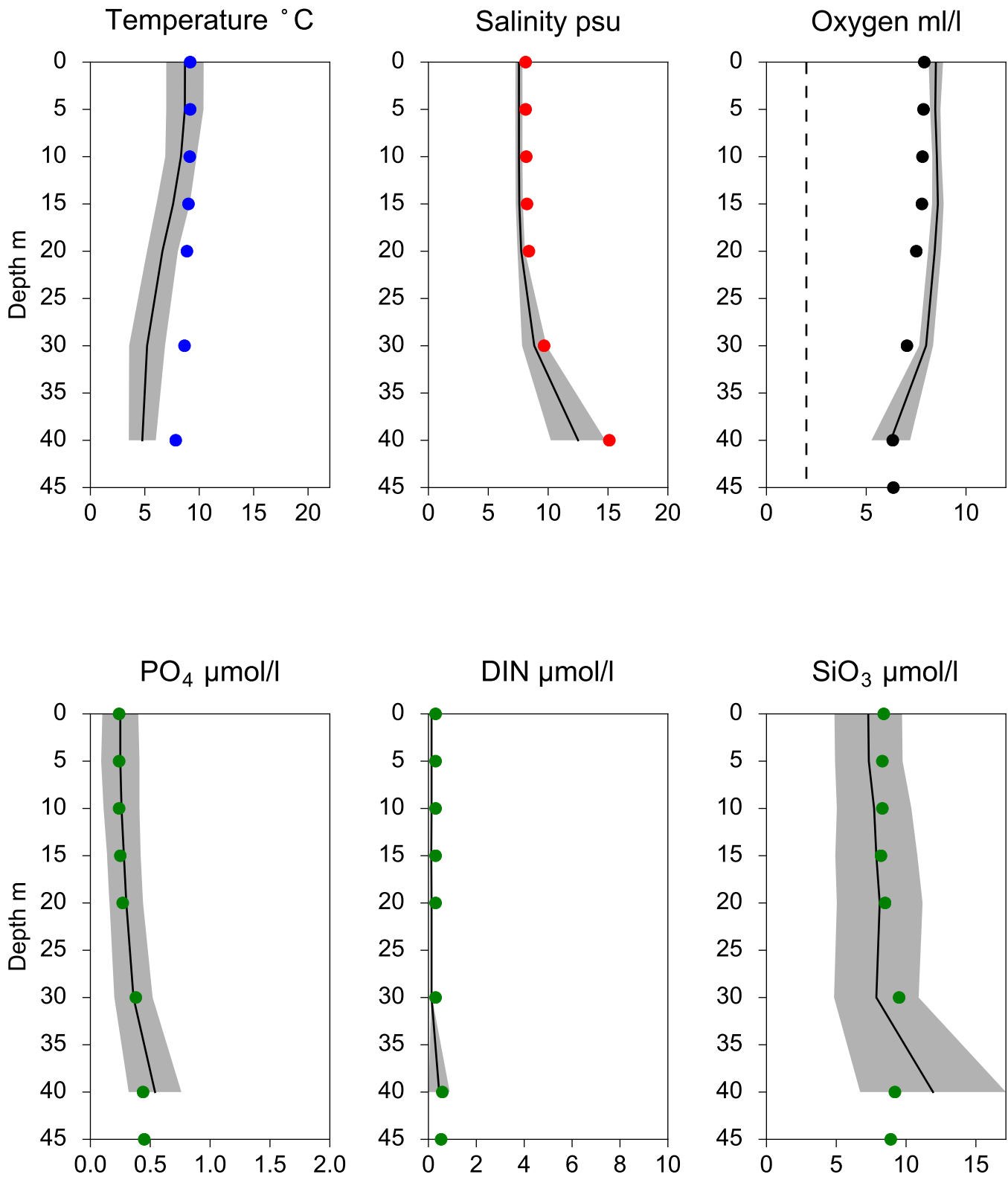


O₂ ml/l



Vertical profiles BY2 ARKONA May

— Mean 2001-2015 St.Dev. • 2019-05-11



STATION BY1 SURFACE WATER (0-10 m)

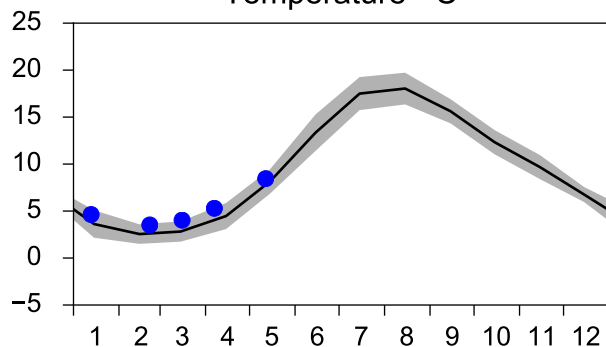
Annual Cycles

— Mean 2001-2015

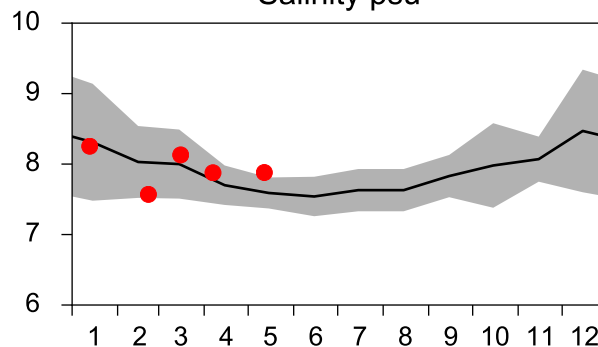
■ St.Dev.

● 2019

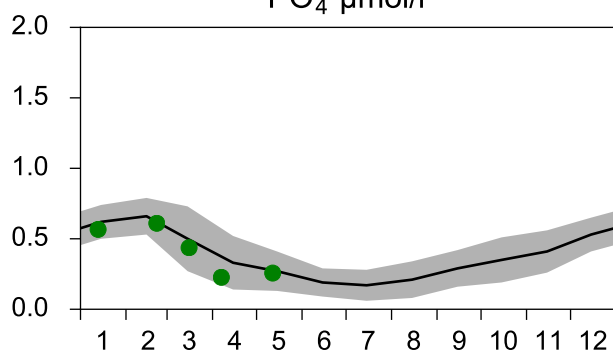
Temperature °C



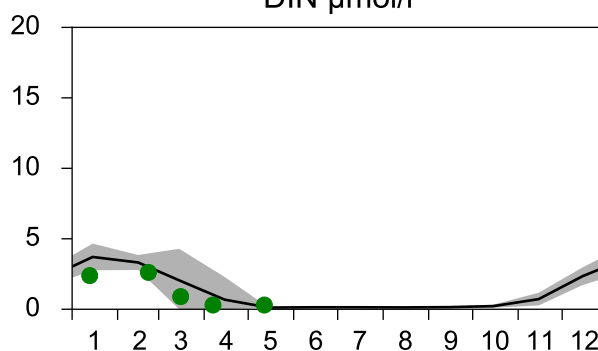
Salinity psu



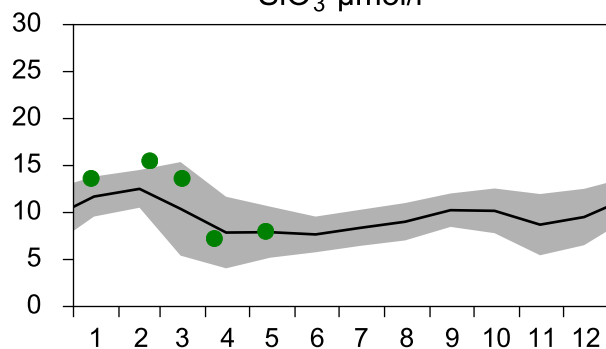
PO₄ µmol/l



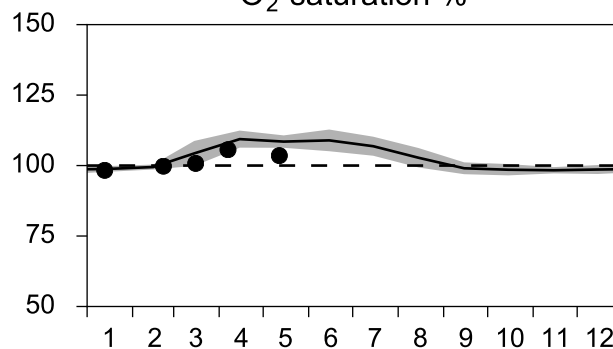
DIN µmol/l



SiO₃ µmol/l

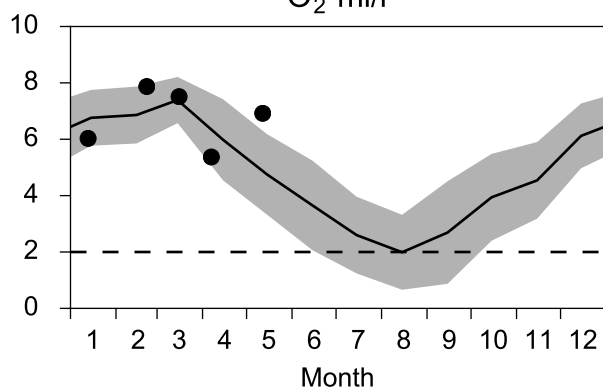


O₂ saturation %

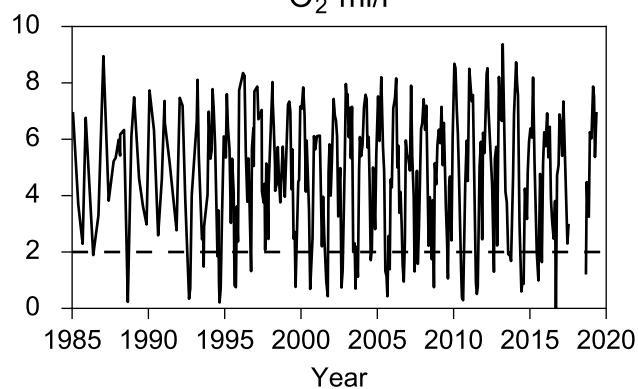


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l



O₂ ml/l



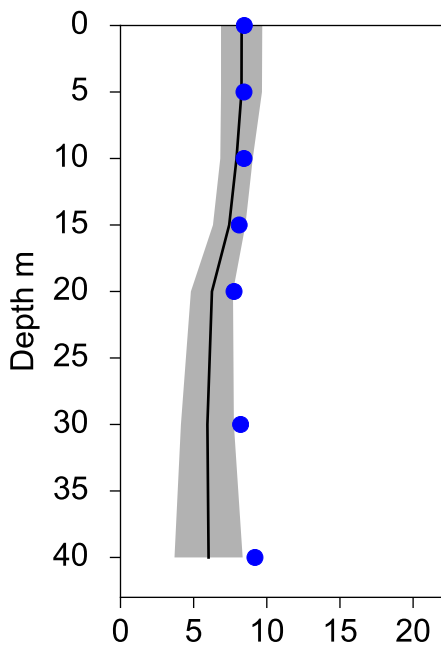
Vertical profiles BY1 May

— Mean 2001-2015

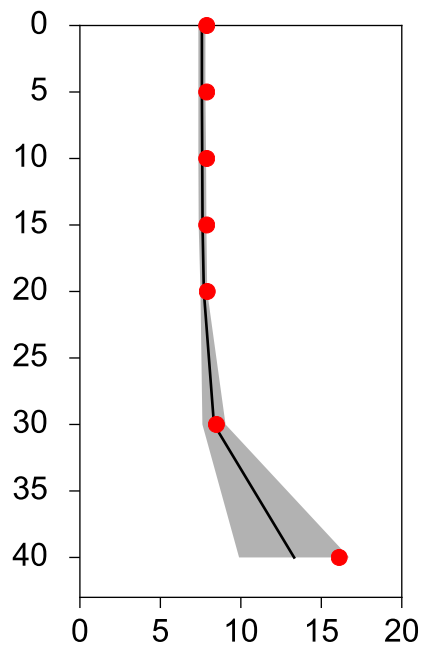
■ St.Dev.

● 2019-05-12

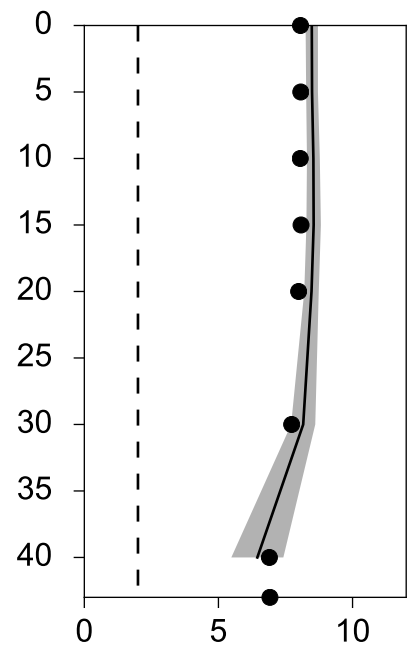
Temperature °C



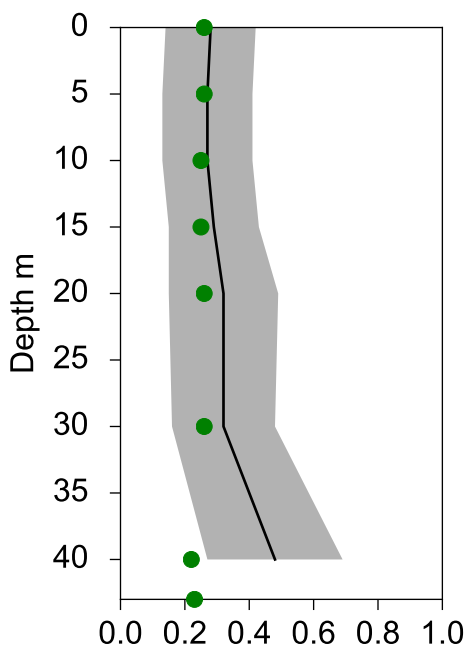
Salinity psu



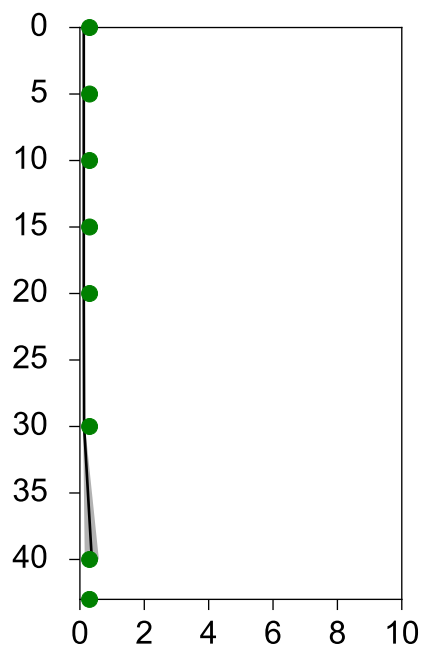
Oxygen ml/l



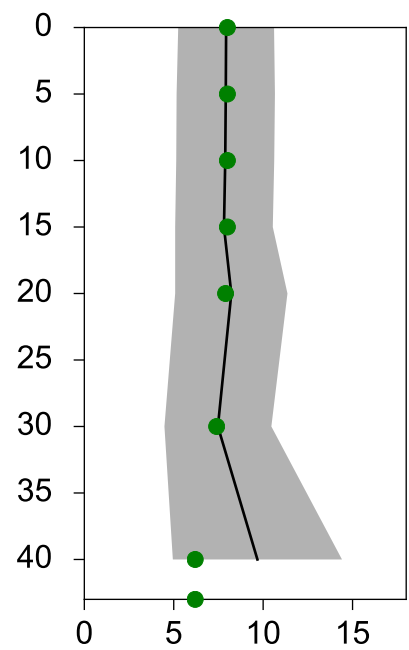
PO₄ μmol/l



DIN μmol/l



SiO₃ μmol/l



STATION W LANDSKRONA SURFACE WATER (0-10 m)

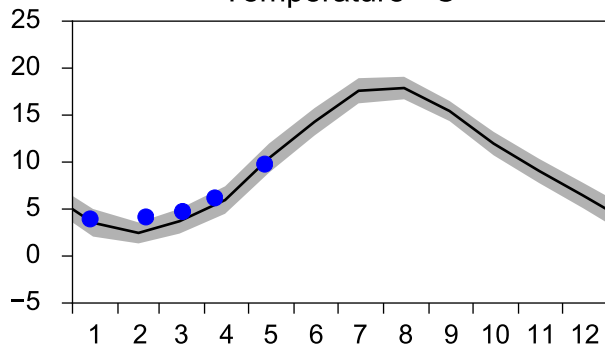
Annual Cycles

— Mean 2001-2015

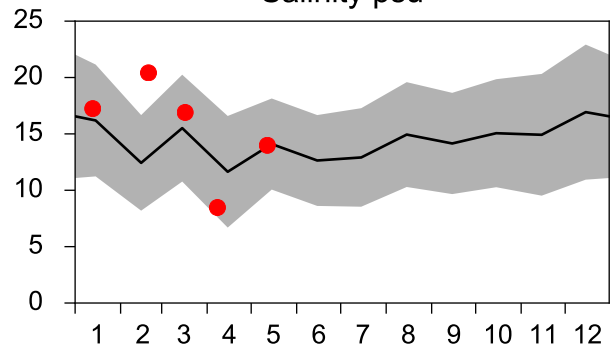
■ St.Dev.

● 2019

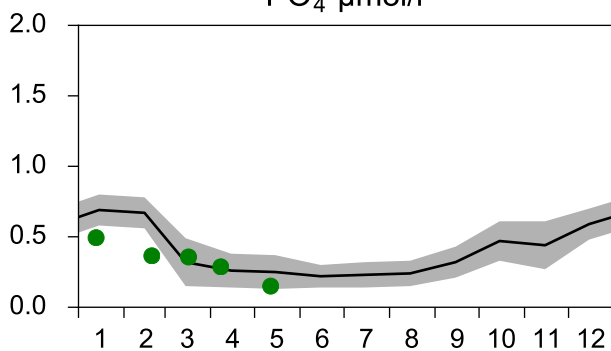
Temperature °C



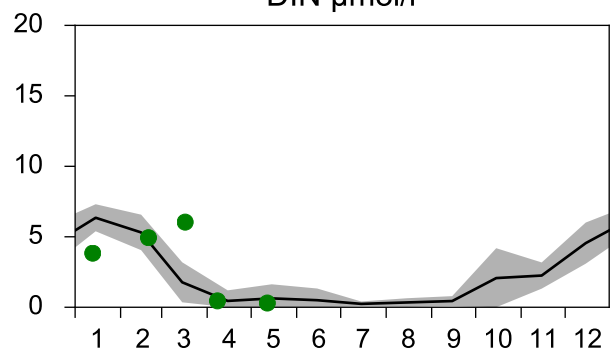
Salinity psu



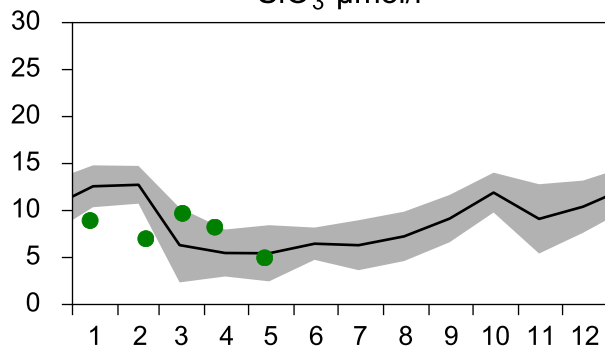
PO₄ µmol/l



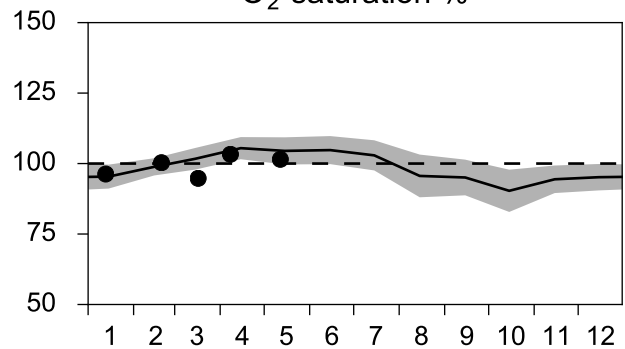
DIN µmol/l



SiO₃ µmol/l

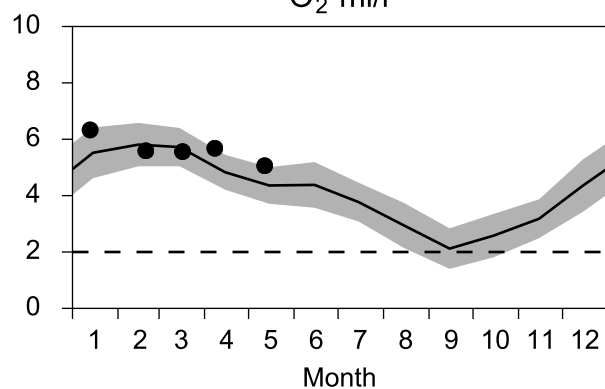


O₂ saturation %

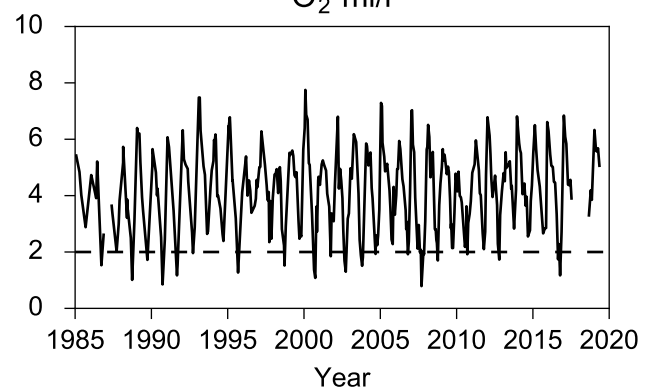


OXYGEN IN BOTTOM WATER (depth >= 40 m)

O₂ ml/l

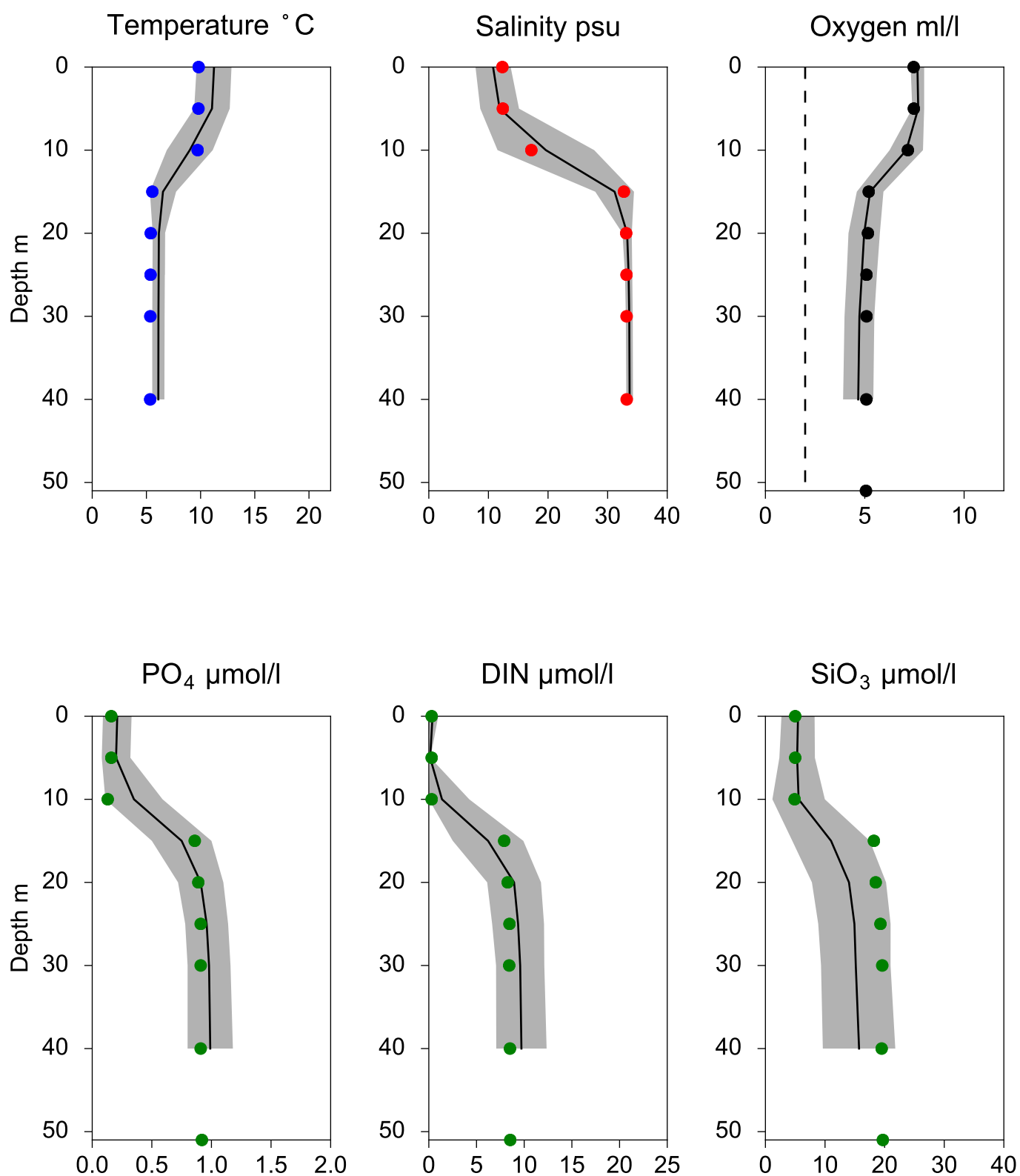


O₂ ml/l



Vertical profiles W LANDSKRONA May

— Mean 2001-2015 St.Dev. • 2019-05-12



STATION ANHOLT E SURFACE WATER (0-10 m)

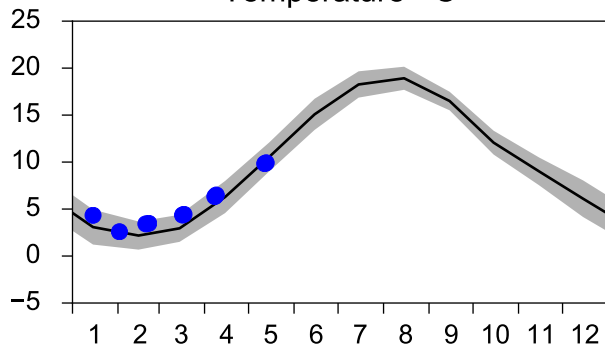
Annual Cycles

— Mean 2001-2015

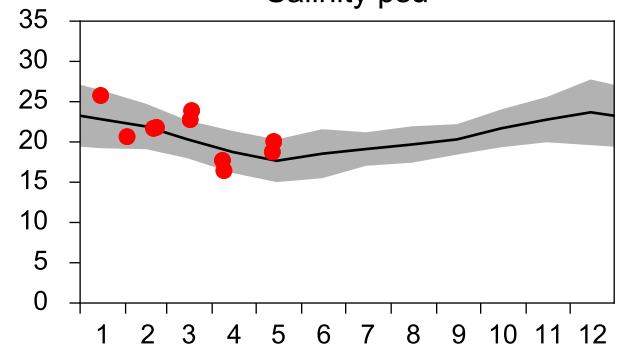
■ St.Dev.

● 2019

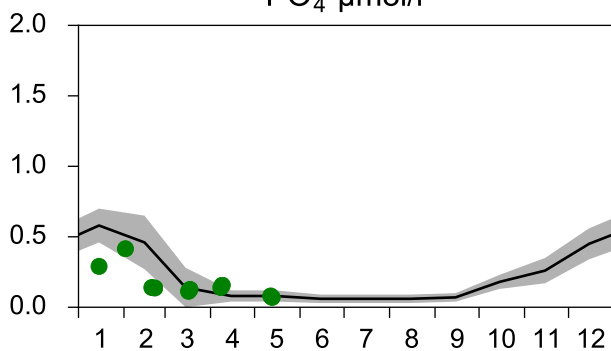
Temperature °C



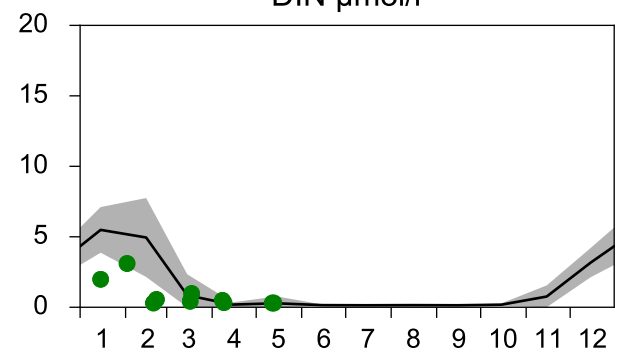
Salinity psu



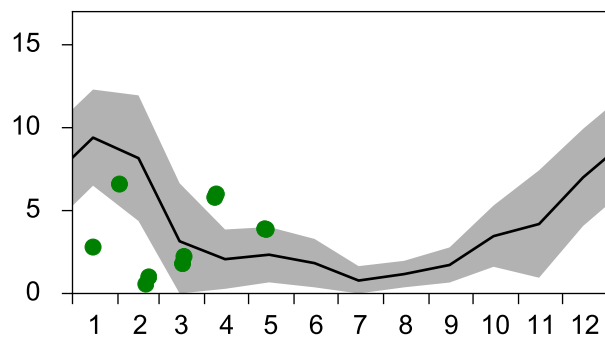
PO₄ µmol/l



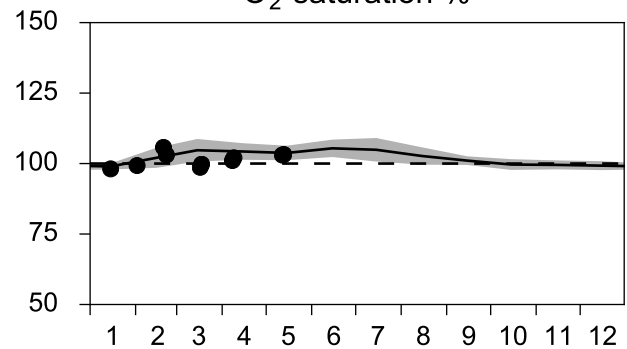
DIN µmol/l



SiO₃ µmol/l

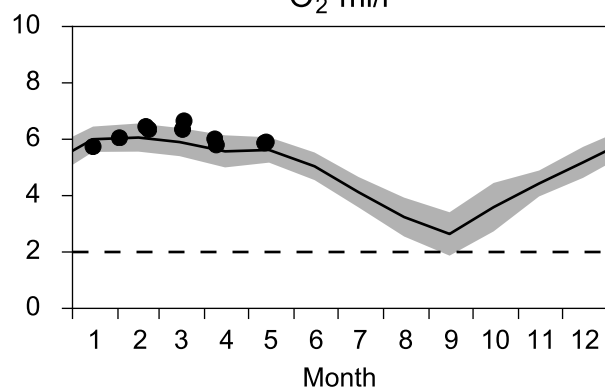


O₂ saturation %

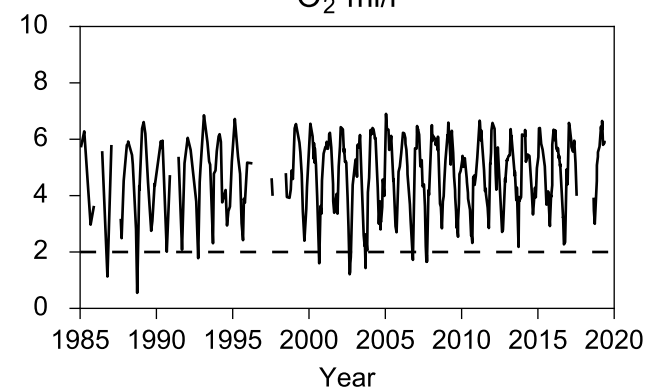


OXYGEN IN BOTTOM WATER (depth >= 52 m)

O₂ ml/l



O₂ ml/l



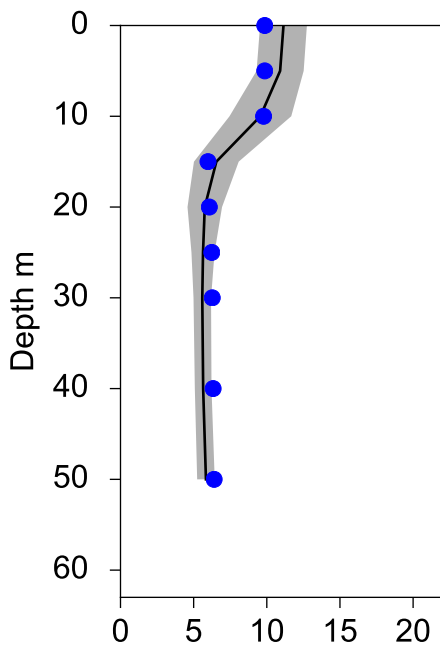
Vertical profiles ANHOLT E May

— Mean 2001-2015

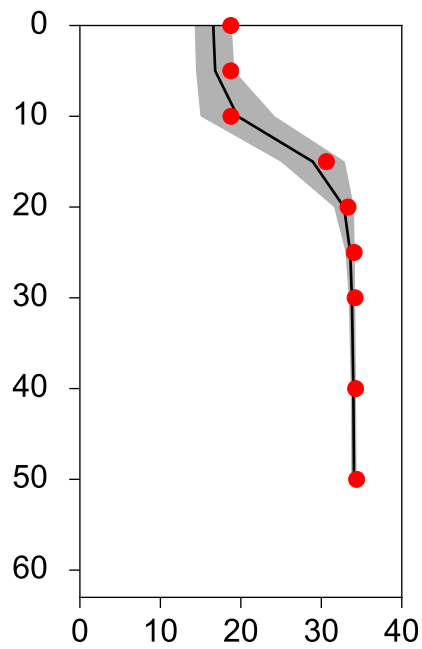
■ St.Dev.

● 2019-05-12

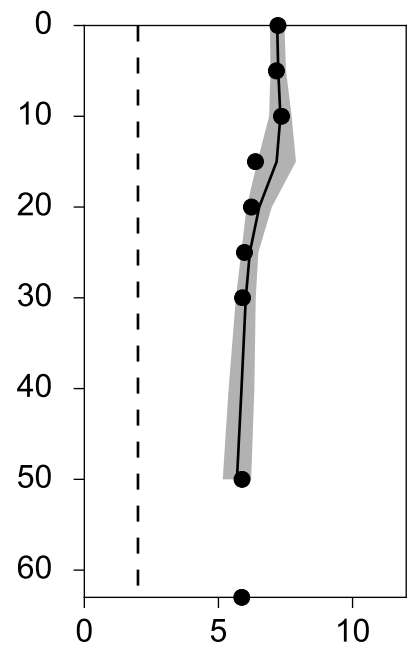
Temperature °C



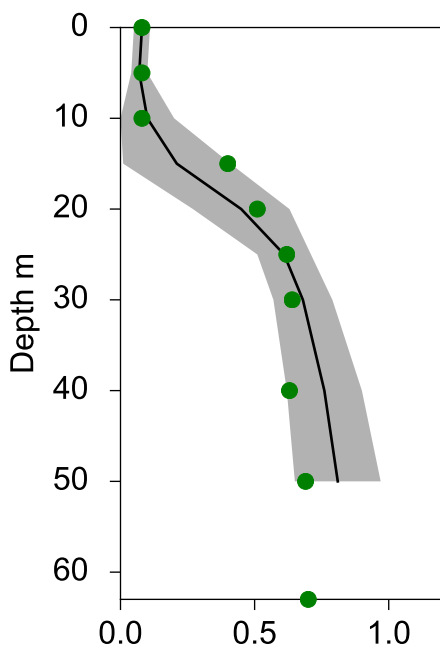
Salinity psu



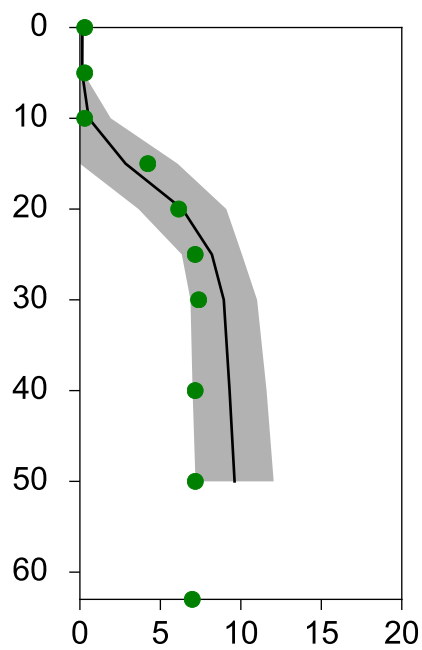
Oxygen ml/l



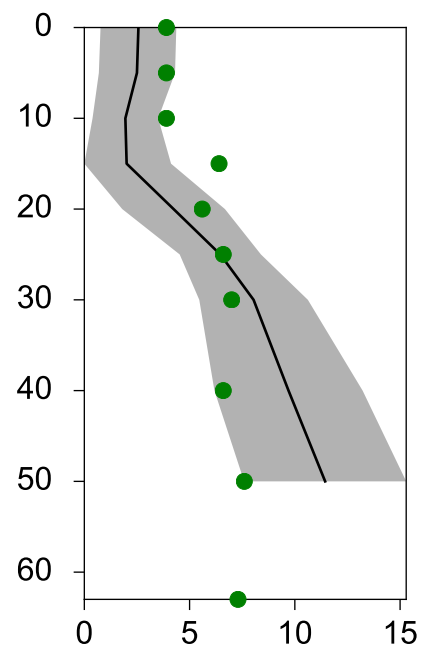
PO₄ μmol/l



DIN μmol/l



SiO₃ μmol/l



STATION Å17 SURFACE WATER (0-10 m)

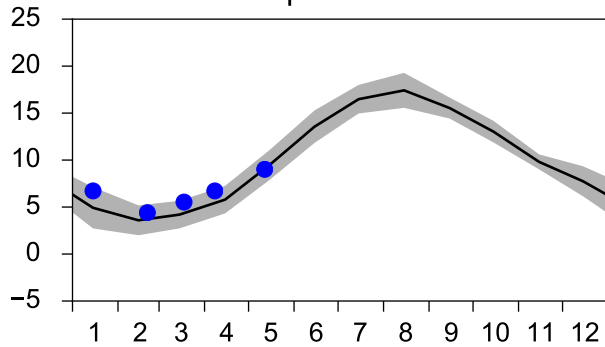
Annual Cycles

— Mean 2001-2015

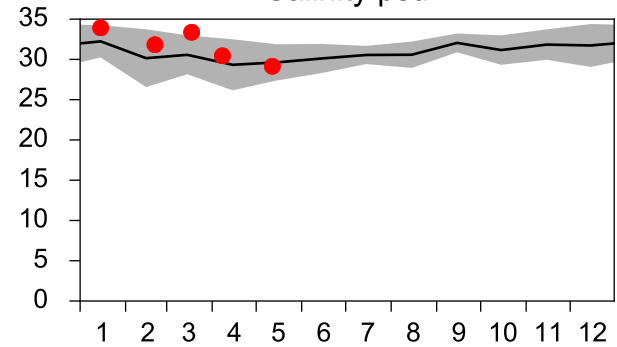
■ St.Dev.

● 2019

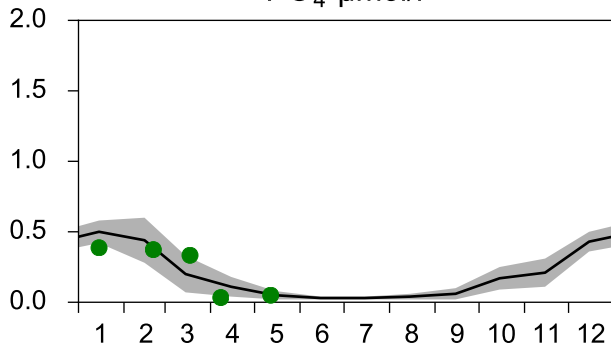
Temperature °C



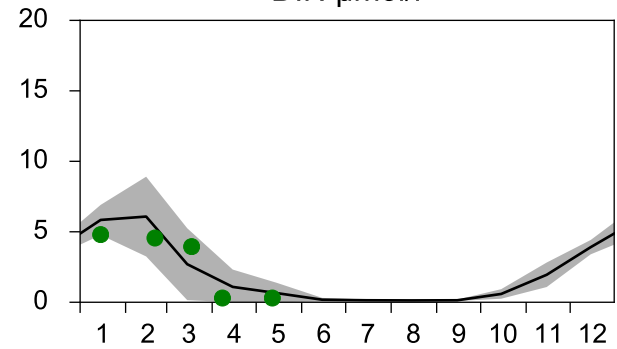
Salinity psu



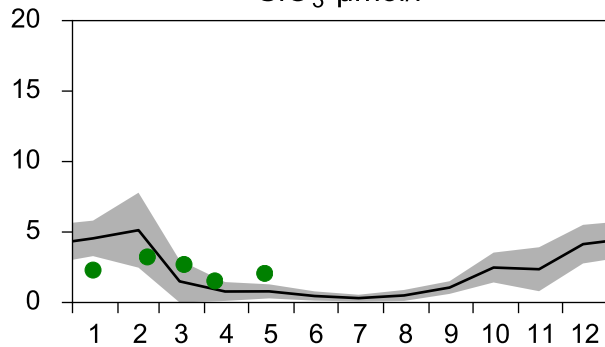
PO₄ µmol/l



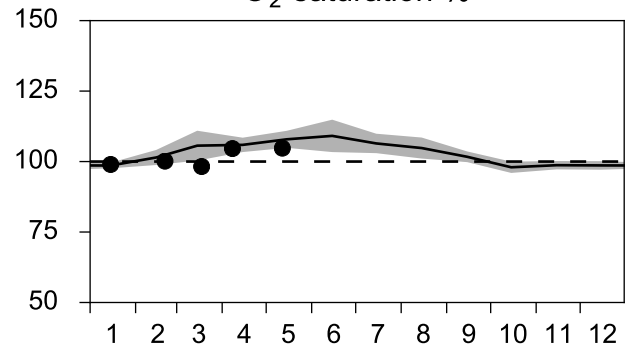
DIN µmol/l



SiO₃ µmol/l

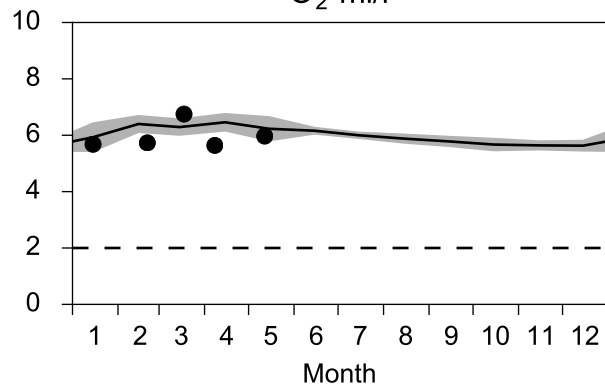


O₂ saturation %

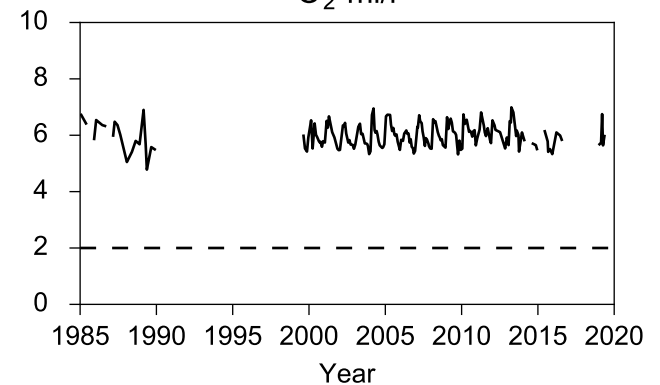


OXYGEN IN BOTTOM WATER (depth >= 300 m)

O₂ ml/l



O₂ ml/l

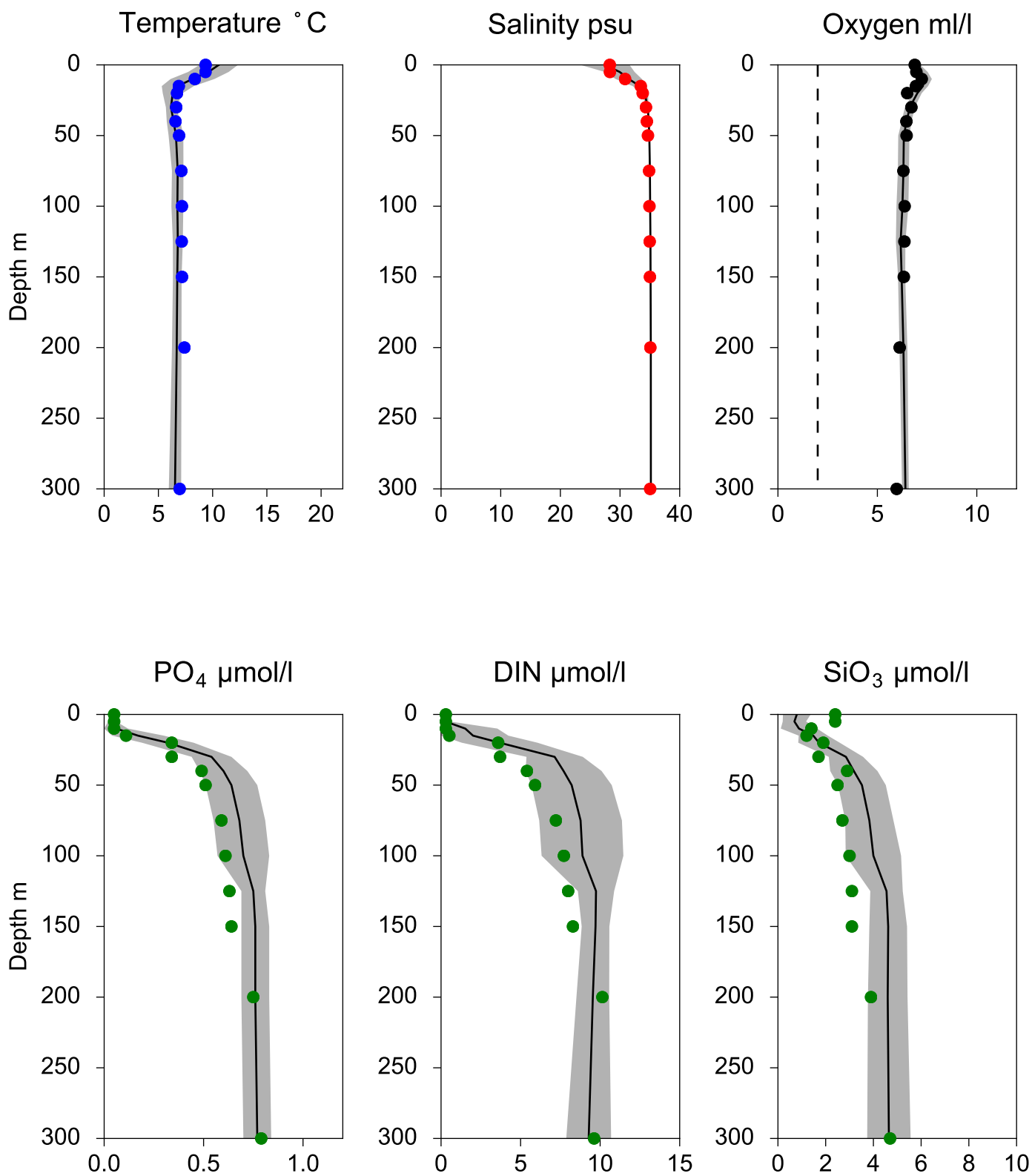


Vertical profiles A17 May

— Mean 2001-2015

■ St.Dev.

● 2019-05-12



STATION Å15 SURFACE WATER (0-10 m)

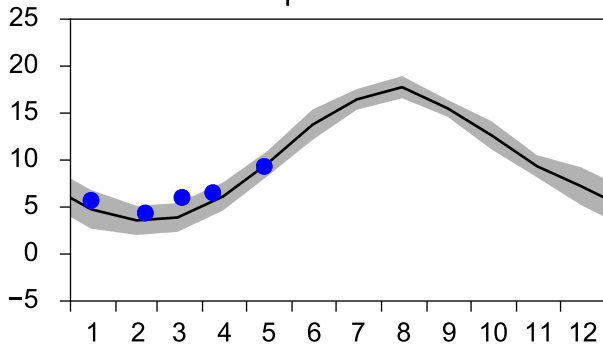
Annual Cycles

— Mean 2001-2015

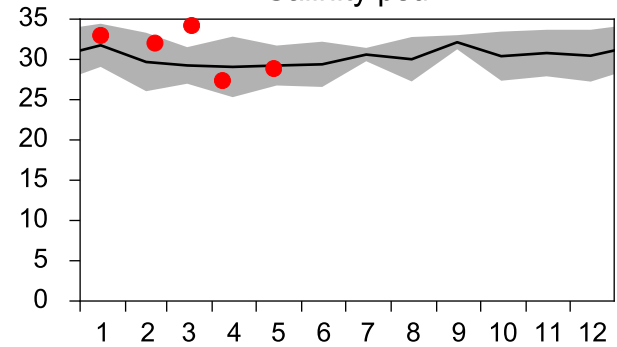
■ St.Dev.

● 2019

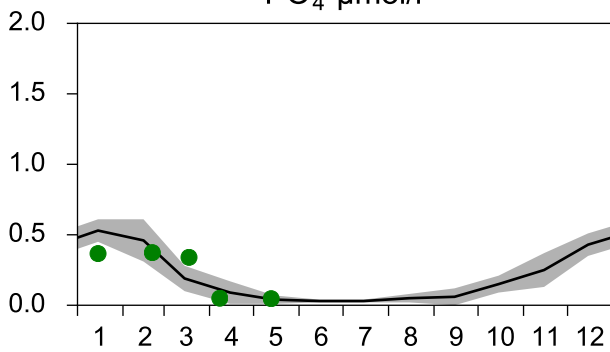
Temperature °C



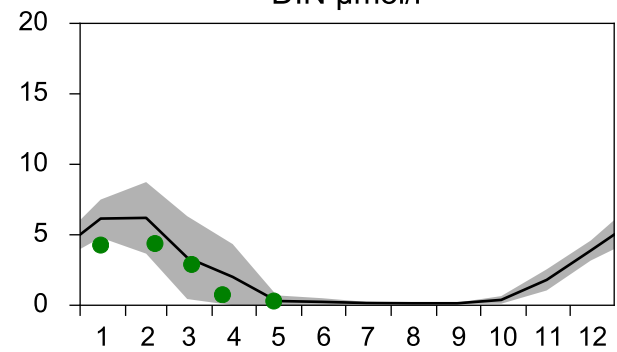
Salinity psu



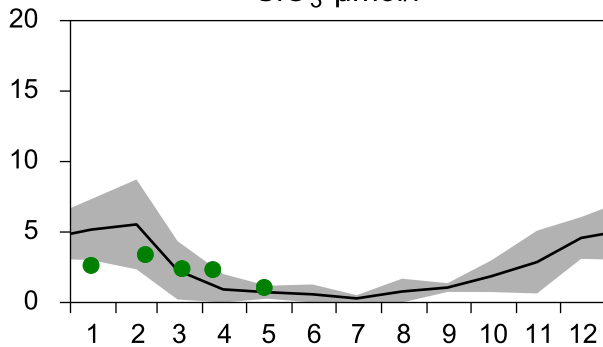
PO₄ µmol/l



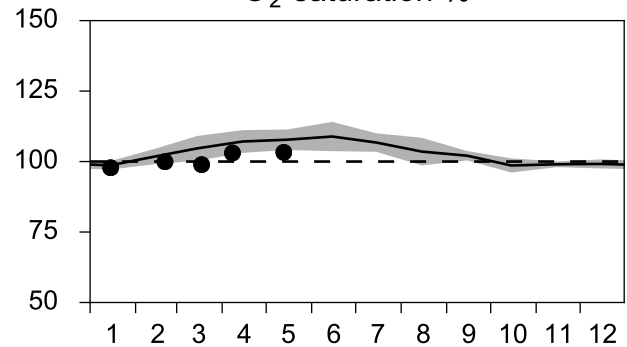
DIN µmol/l



SiO₃ µmol/l

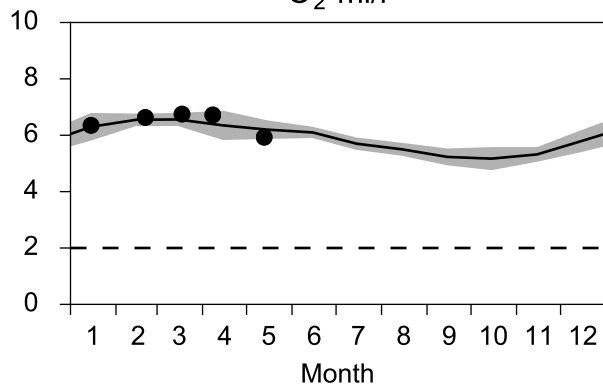


O₂ saturation %

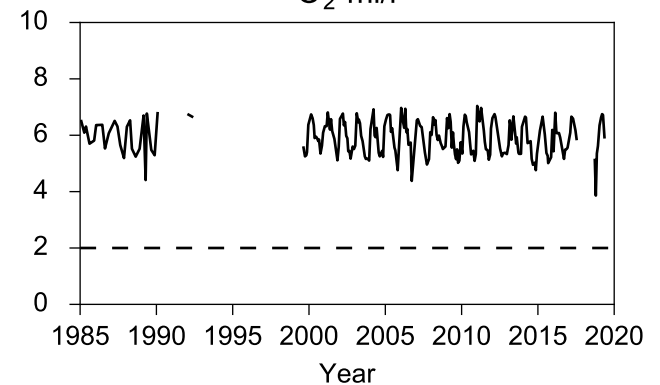


OXYGEN IN BOTTOM WATER (depth >= 125 m)

O₂ ml/l



O₂ ml/l

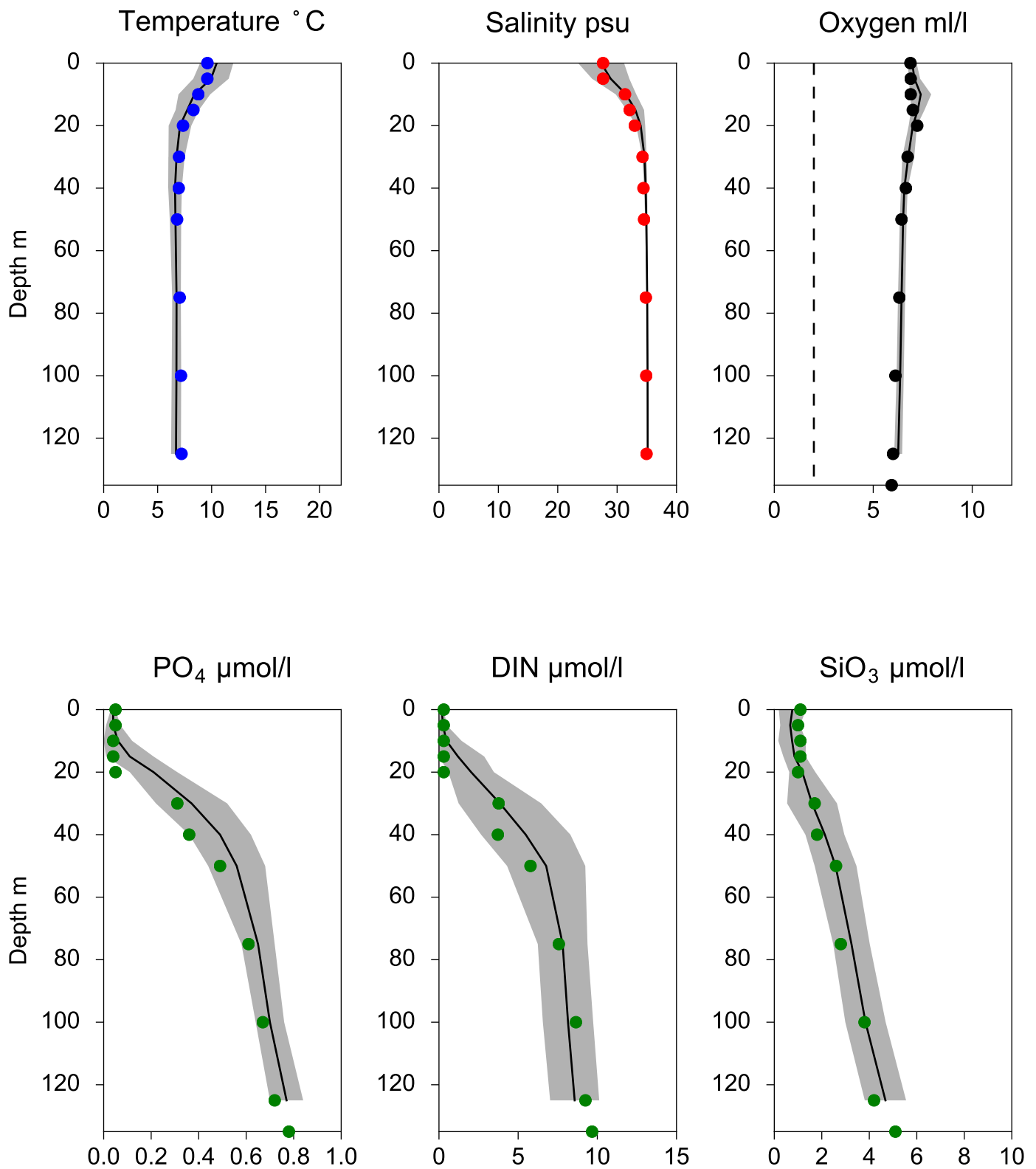


Vertical profiles A15 May

— Mean 2001-2015

■ St.Dev.

● 2019-05-13



STATION Å13 SURFACE WATER (0-10 m)

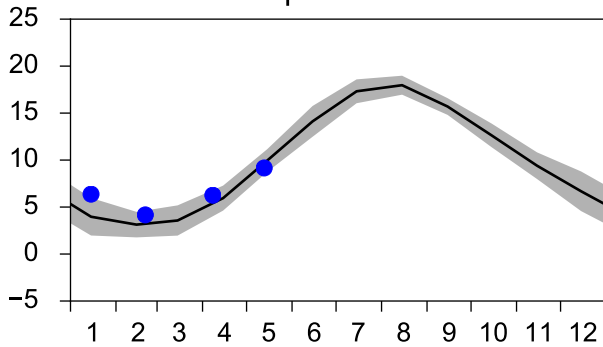
Annual Cycles

— Mean 2001-2015

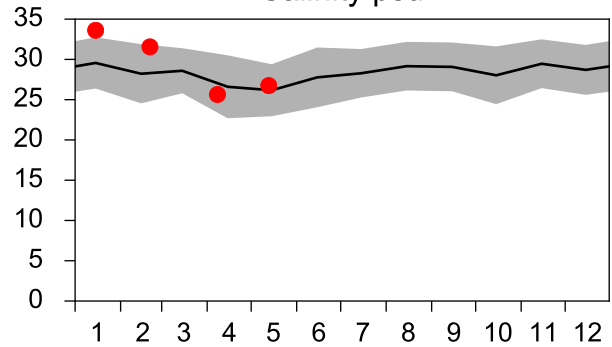
■ St.Dev.

● 2019

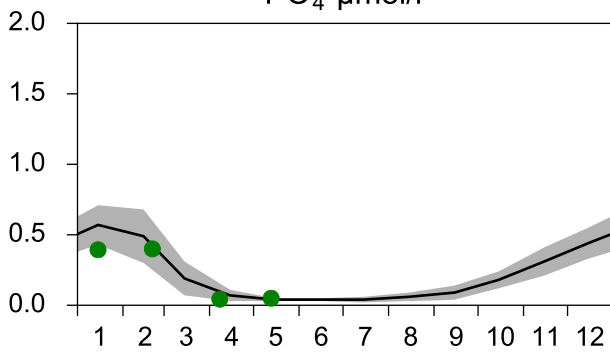
Temperature °C



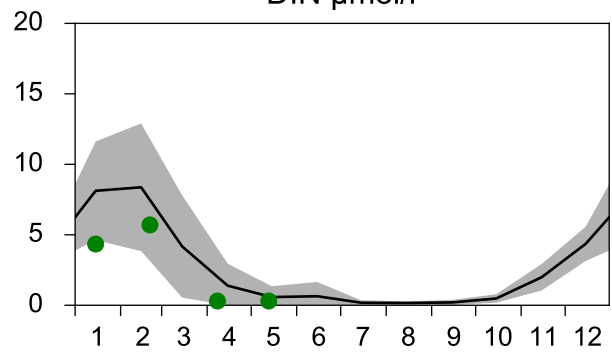
Salinity psu



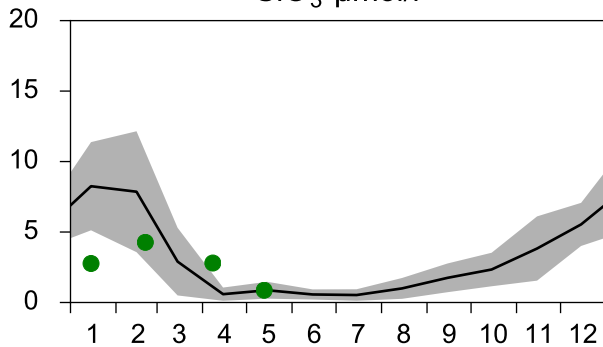
PO₄ µmol/l



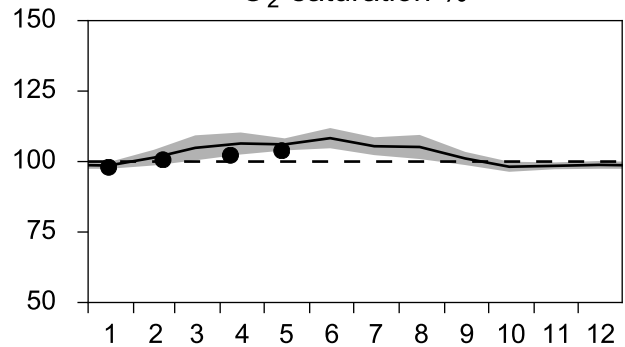
DIN µmol/l



SiO₃ µmol/l

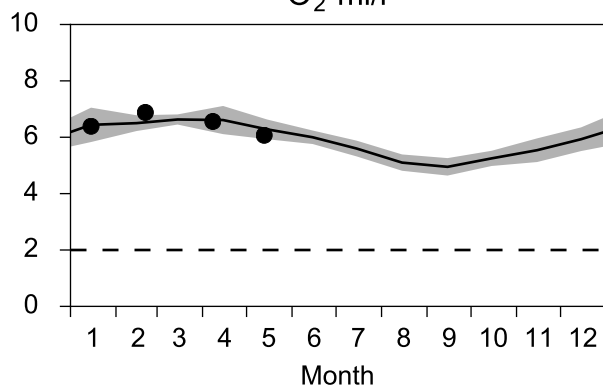


O₂ saturation %

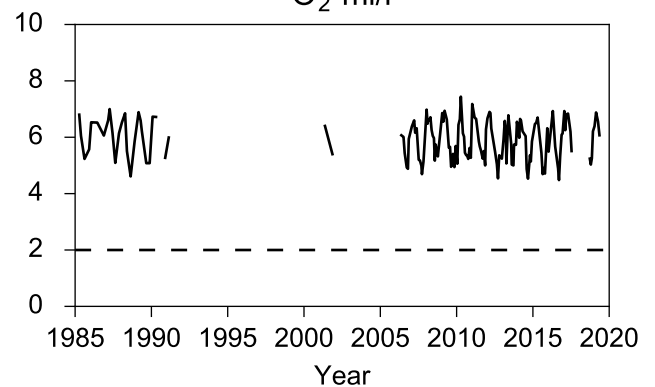


OXYGEN IN BOTTOM WATER (depth >= 80 m)

O₂ ml/l



O₂ ml/l

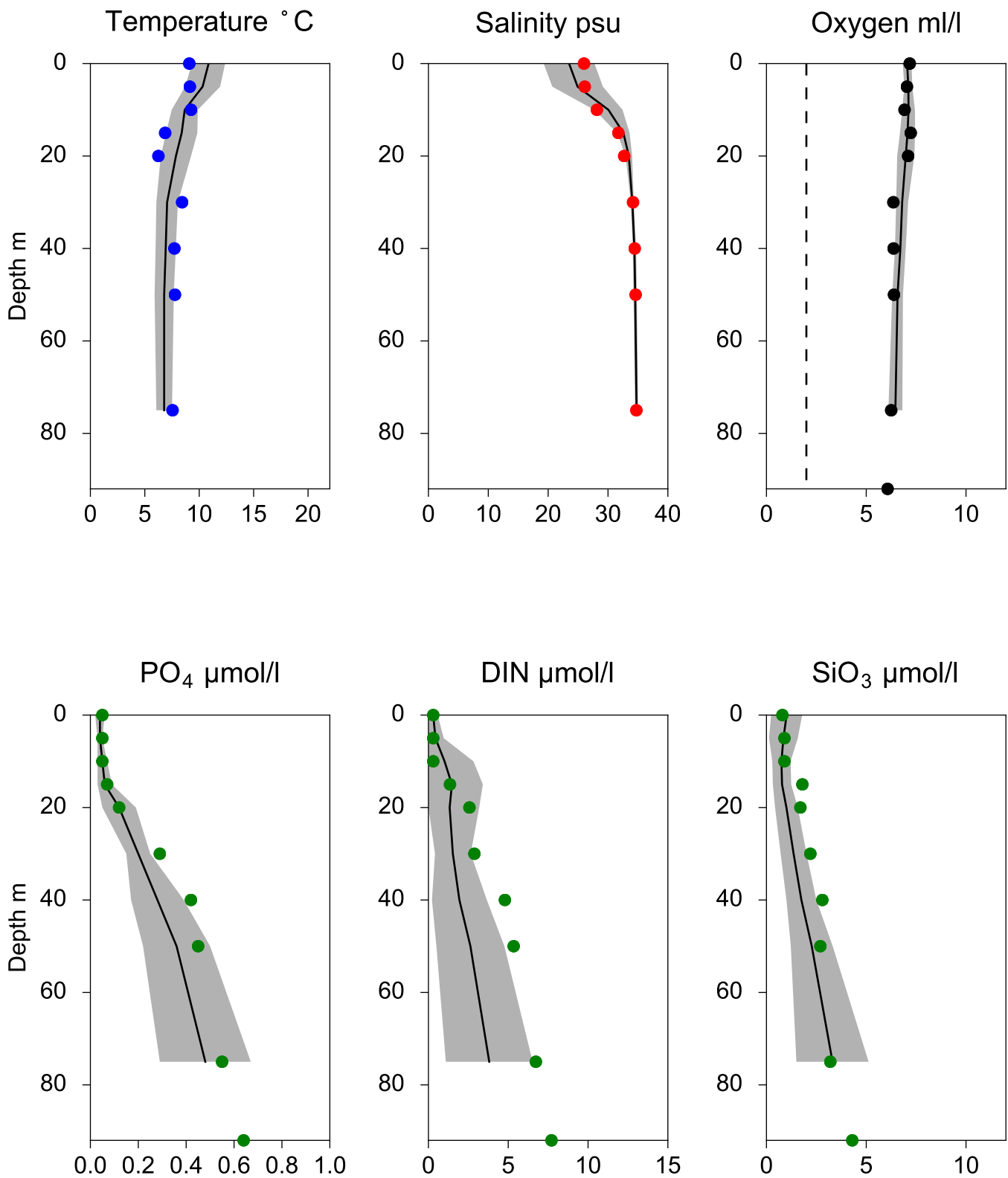


Vertical profiles Å13 May

— Mean 2001-2015

■ St.Dev.

● 2019-05-13



STATION P2 SURFACE WATER (0-10 m)

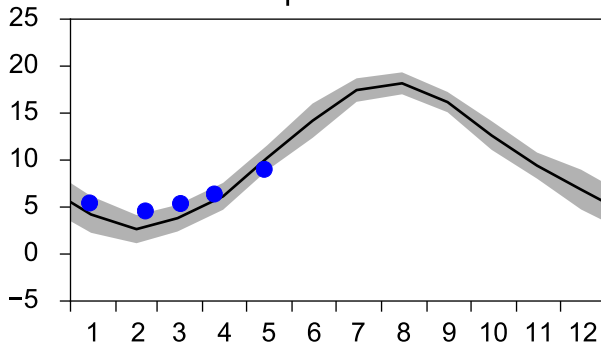
Annual Cycles

— Mean 2001-2015

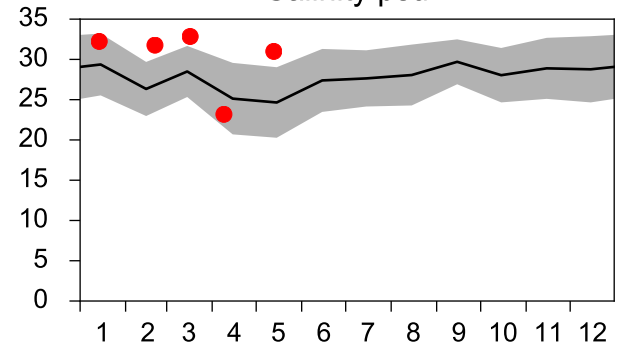
■ St.Dev.

● 2019

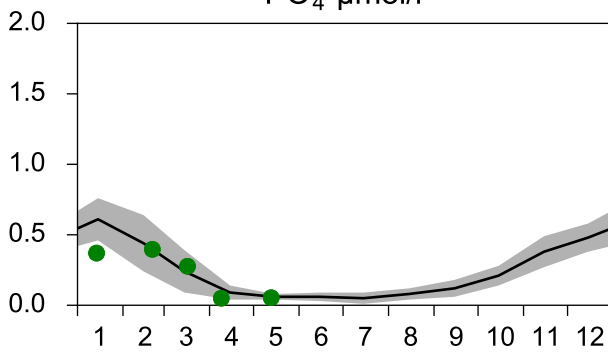
Temperature °C



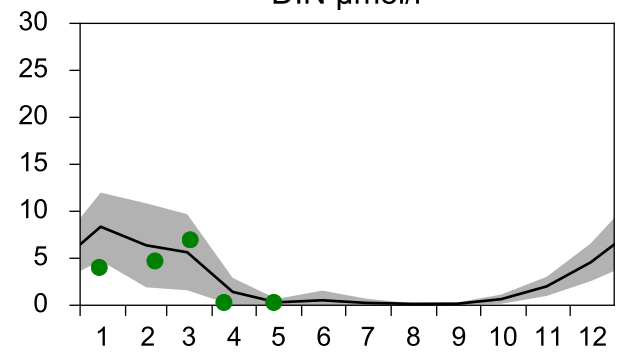
Salinity psu



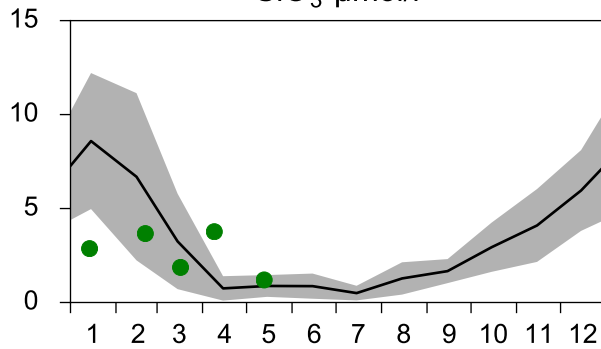
PO₄ µmol/l



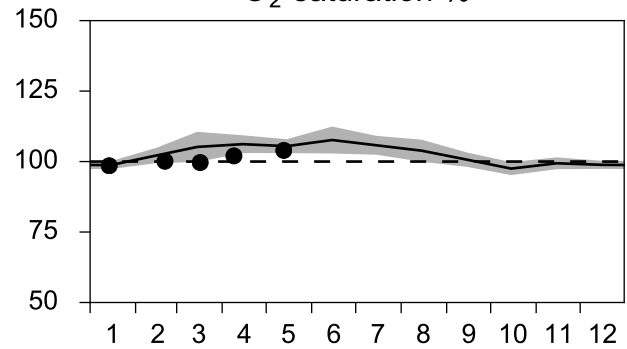
DIN µmol/l



SiO₃ µmol/l

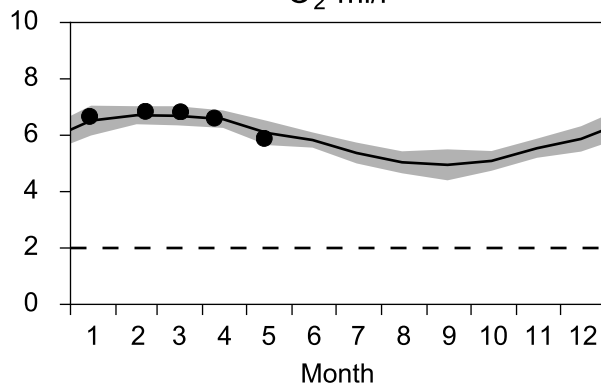


O₂ saturation %

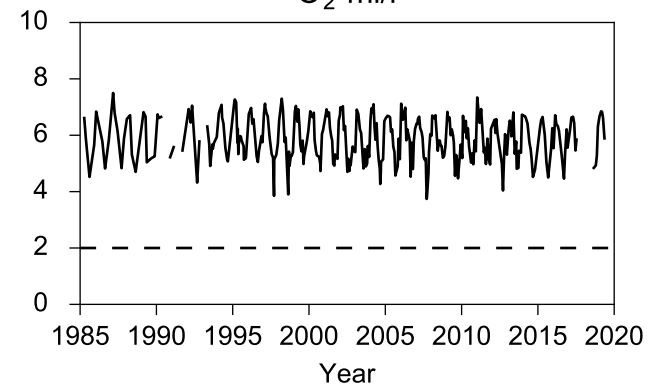


OXOGEN IN BOTTOM WATER (depth >= 75 m)

O₂ ml/l



O₂ ml/l

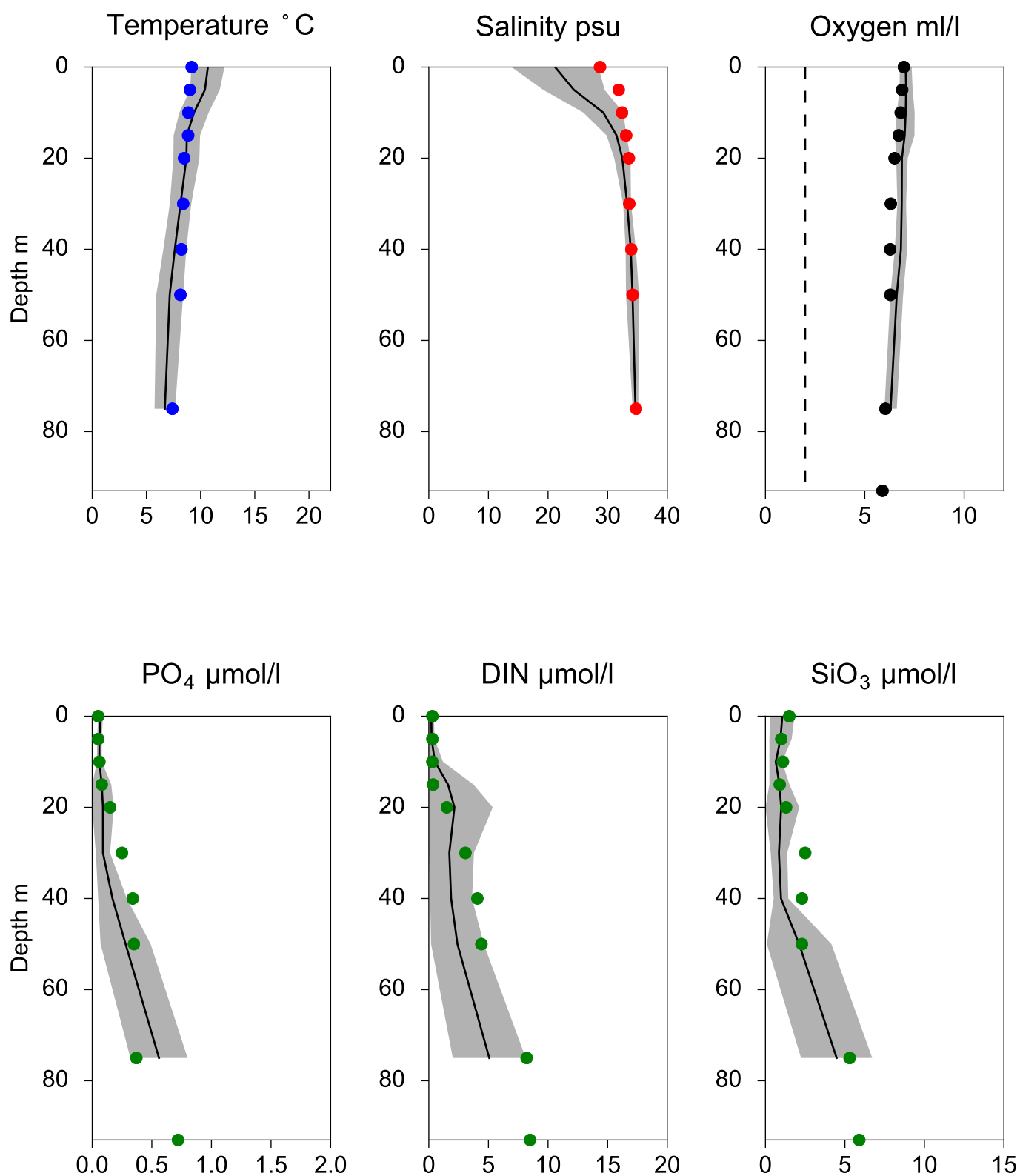


Vertical profiles P2 May

— Mean 2001-2015

■ St.Dev.

● 2019-05-13



STATION FLADEN SURFACE WATER (0-10 m)

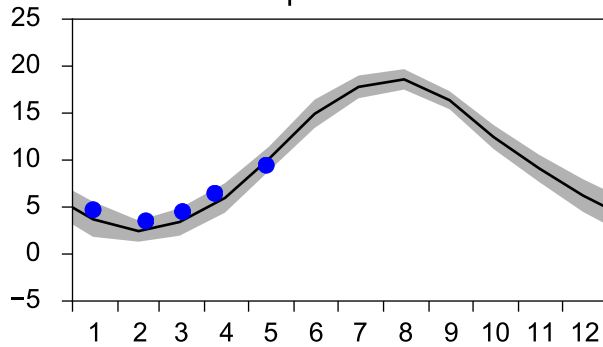
Annual Cycles

— Mean 2001-2015

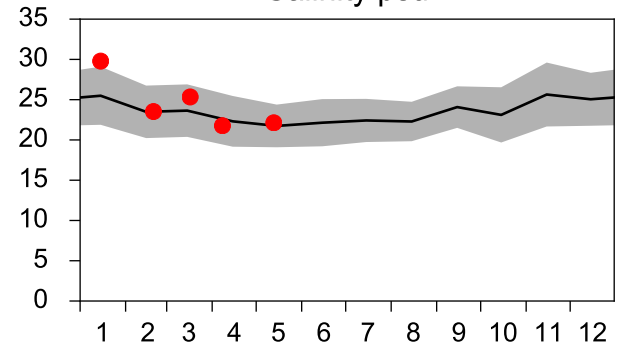
■ St.Dev.

● 2019

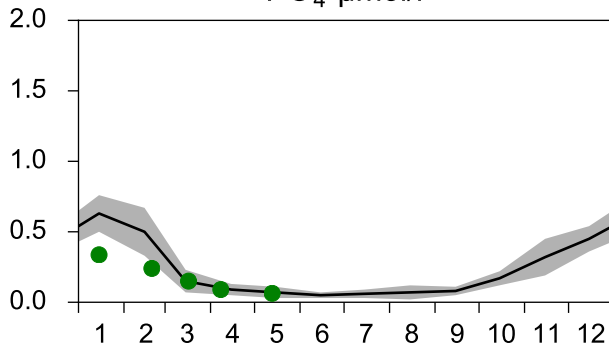
Temperature °C



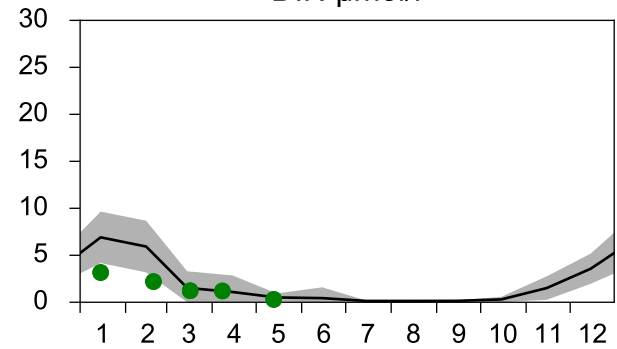
Salinity psu



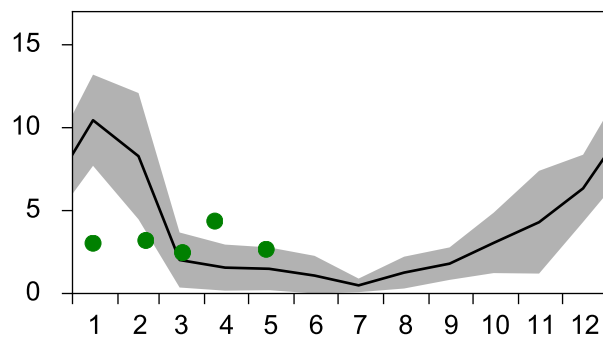
PO₄ µmol/l



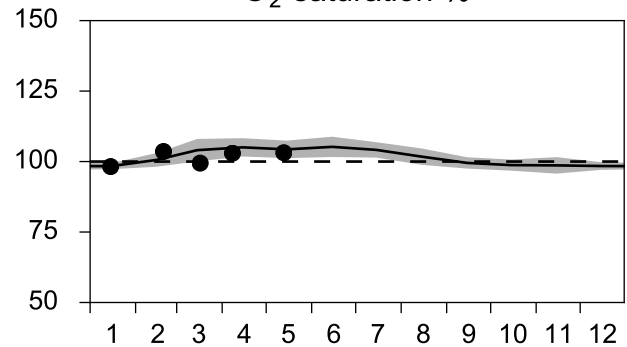
DIN µmol/l



SiO₃ µmol/l

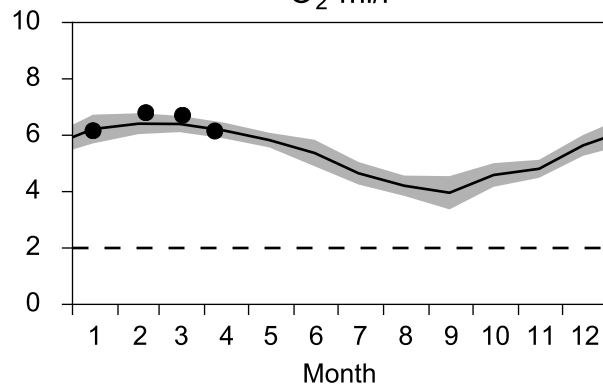


O₂ saturation %

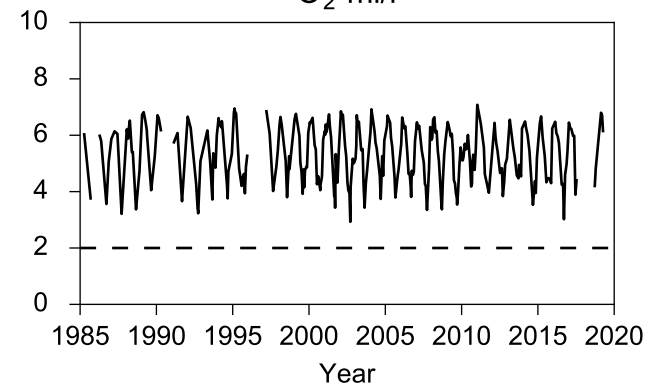


OXYGEN IN BOTTOM WATER (depth >= 74 m)

O₂ ml/l



O₂ ml/l



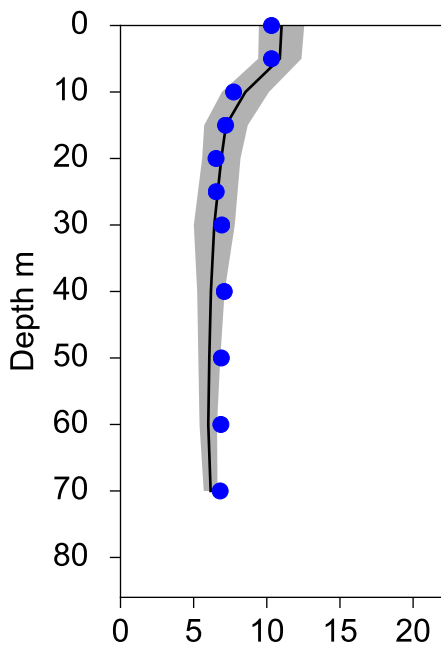
Vertical profiles FLADEN May

— Mean 2001-2015

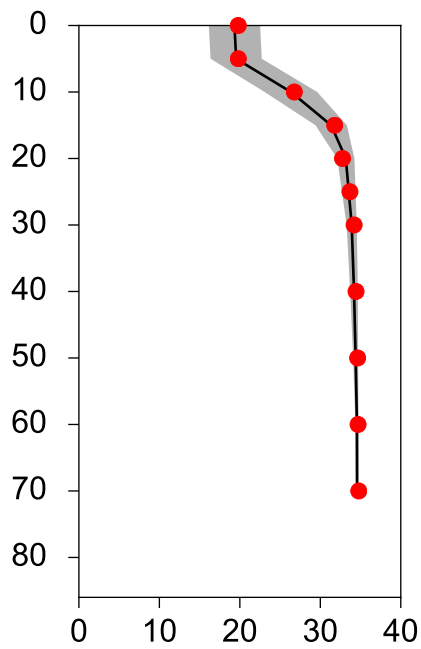
■ St.Dev.

● 2019-05-13

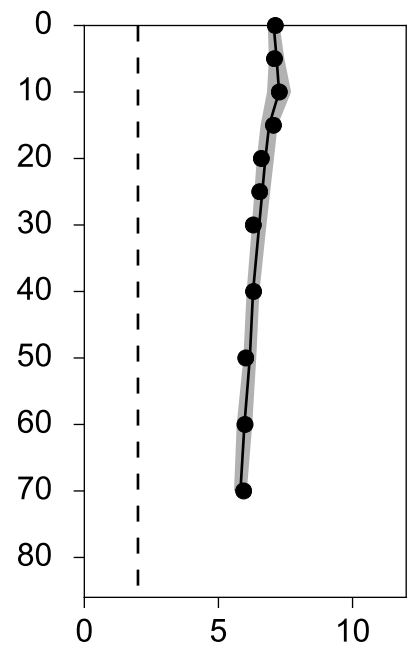
Temperature °C



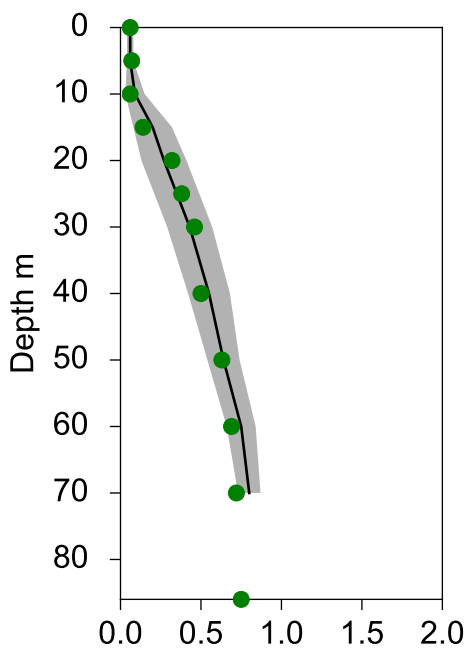
Salinity psu



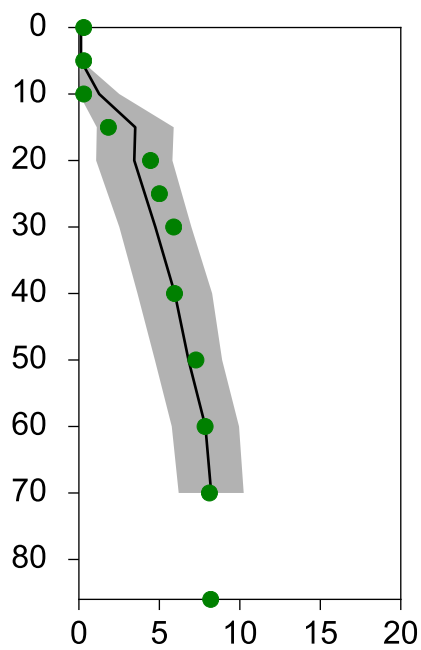
Oxygen ml/l



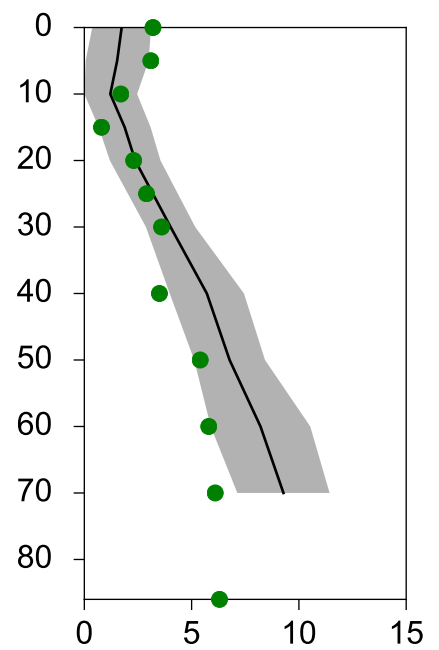
PO₄ μmol/l



DIN μmol/l



SiO₃ μmol/l



STATION N14 FALKENBERG SURFACE WATER (0-10 m)

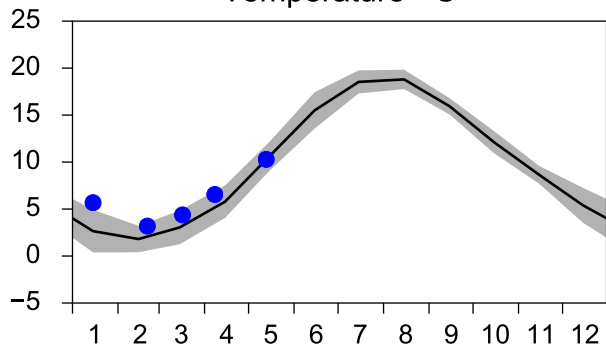
Annual Cycles

— Mean 2001-2015

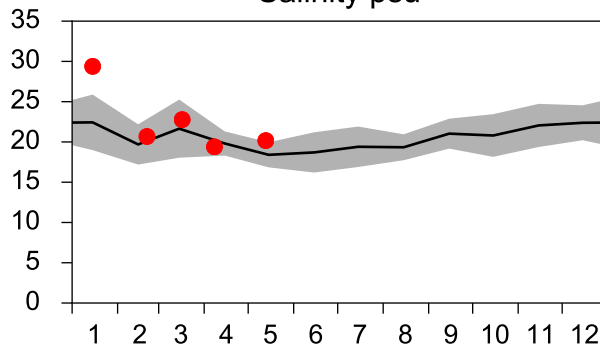
■ St.Dev.

● 2019

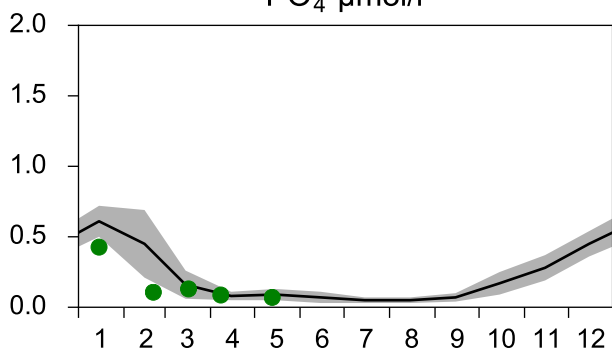
Temperature °C



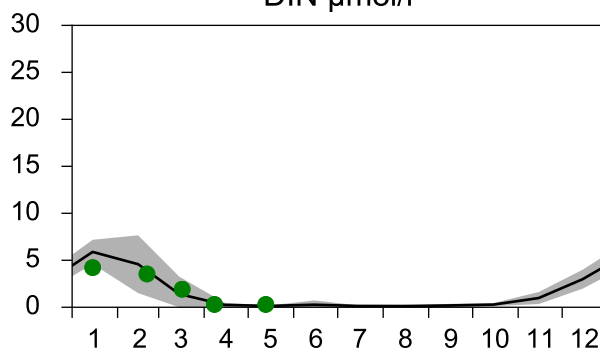
Salinity psu



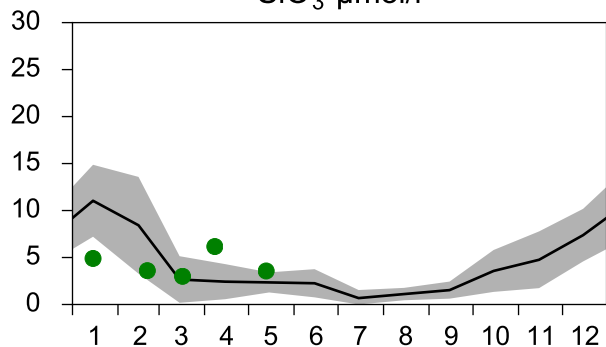
PO₄ µmol/l



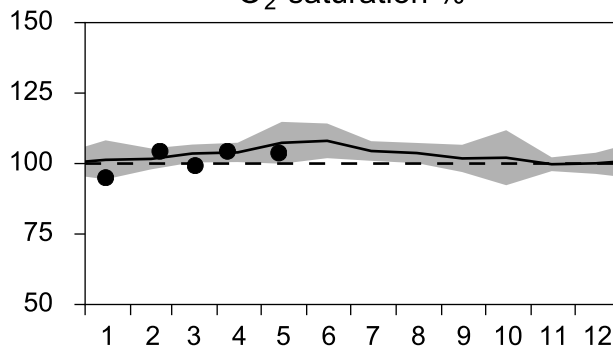
DIN µmol/l



SiO₃ µmol/l

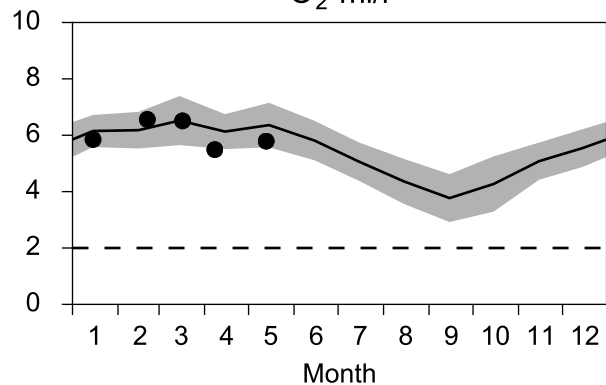


O₂ saturation %

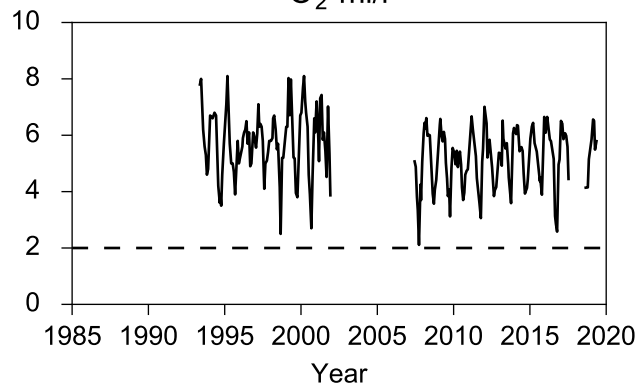


OXOGEN IN BOTTOM WATER (depth >= 25 m)

O₂ ml/l



O₂ ml/l

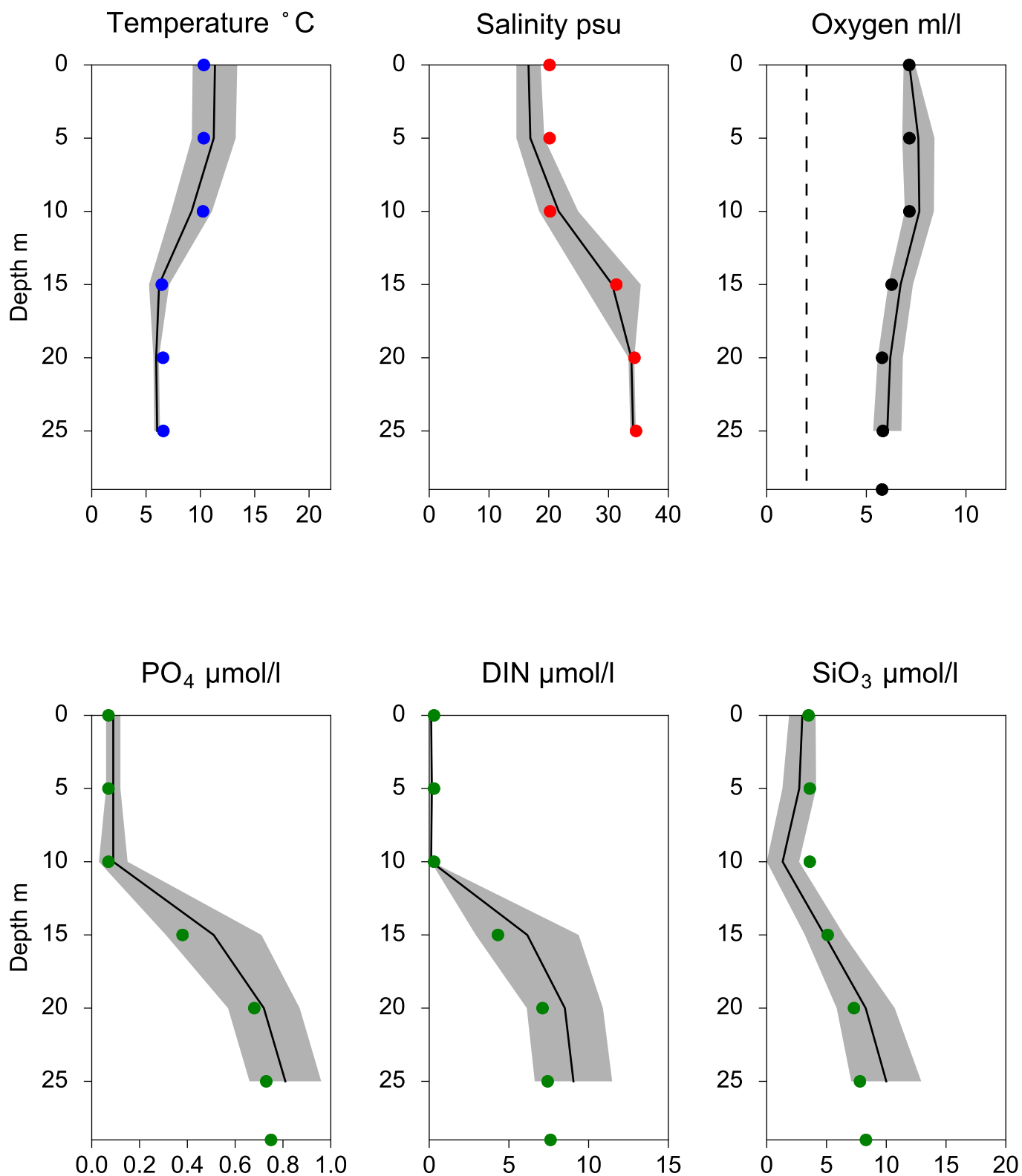


Vertical profiles N14 FALKENBERG May

— Mean 2001-2015

■ St.Dev.

● 2019-05-13



STATION ANHOLT E SURFACE WATER (0-10 m)

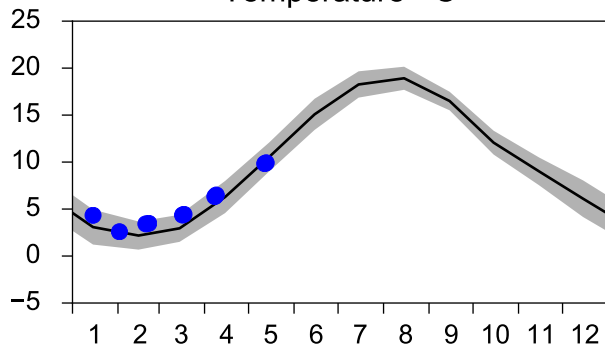
Annual Cycles

— Mean 2001-2015

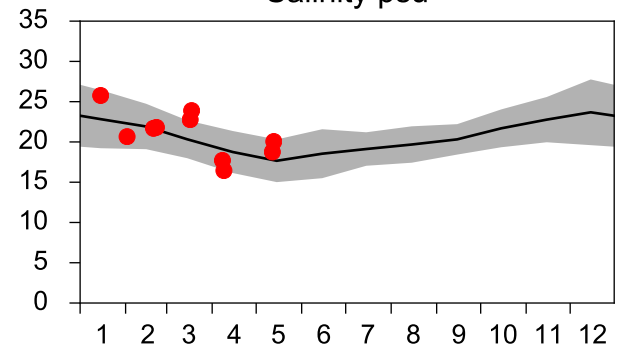
■ St.Dev.

● 2019

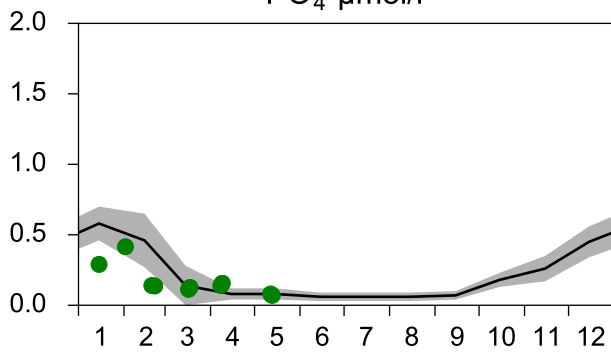
Temperature °C



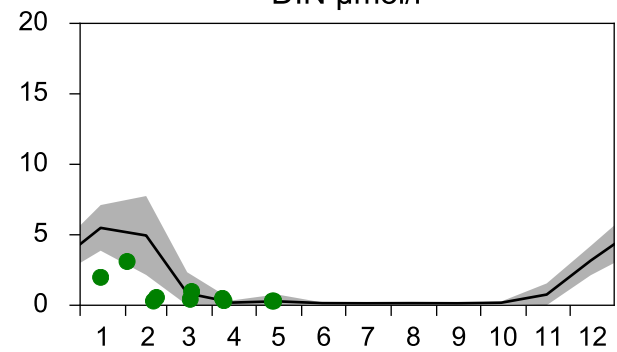
Salinity psu



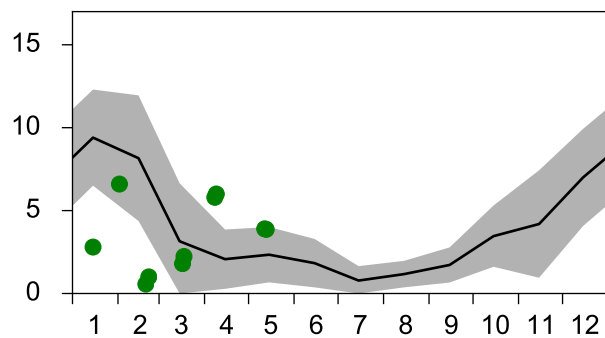
PO₄ µmol/l



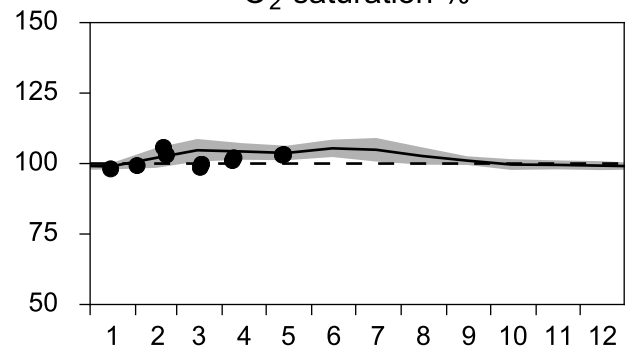
DIN µmol/l



SiO₃ µmol/l

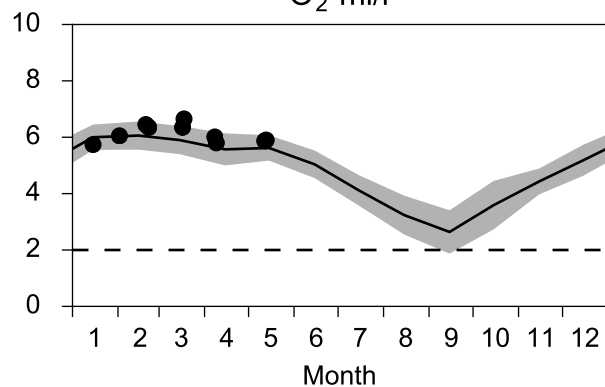


O₂ saturation %

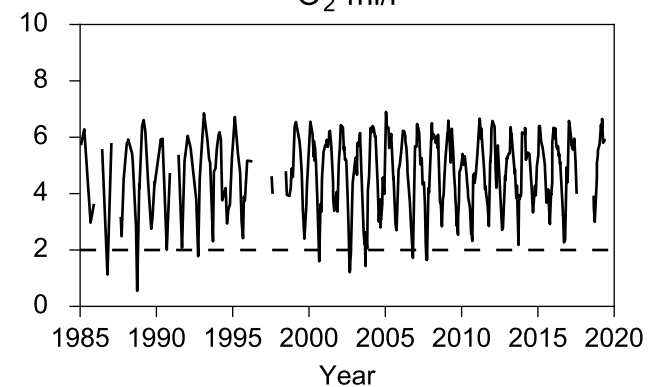


OXYGEN IN BOTTOM WATER (depth >= 52 m)

O₂ ml/l



O₂ ml/l

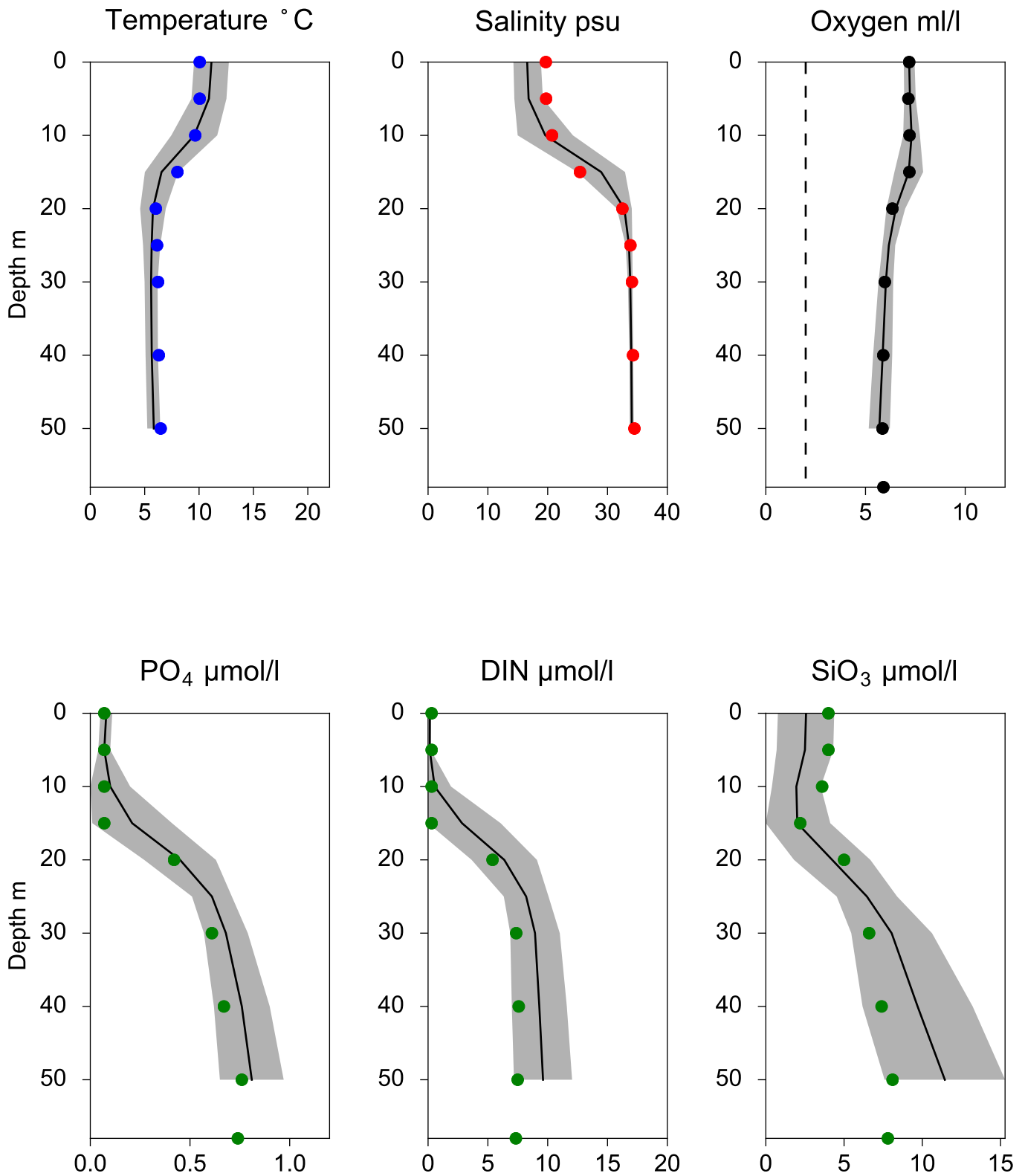


Vertical profiles ANHOLT E May

— Mean 2001-2015

■ St.Dev.

● 2019-05-13



STATION HANÖBUKTEN SURFACE WATER (0-10 m)

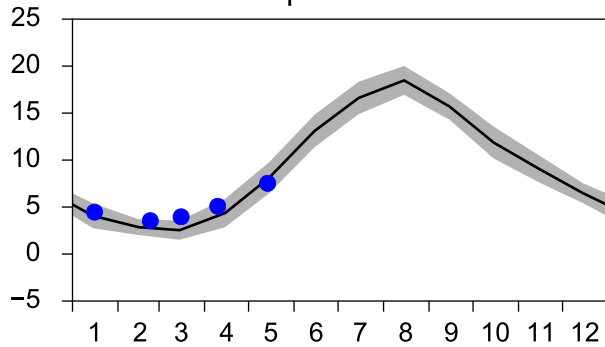
Annual Cycles

— Mean 2001-2015

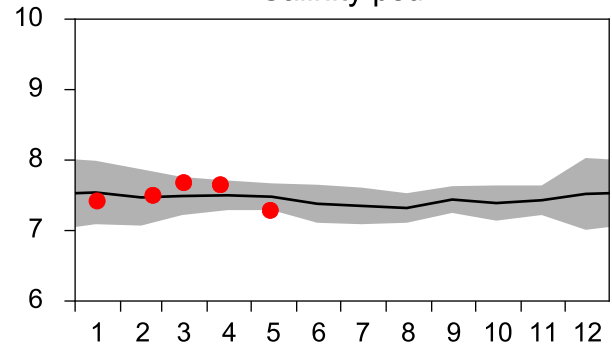
■ St.Dev.

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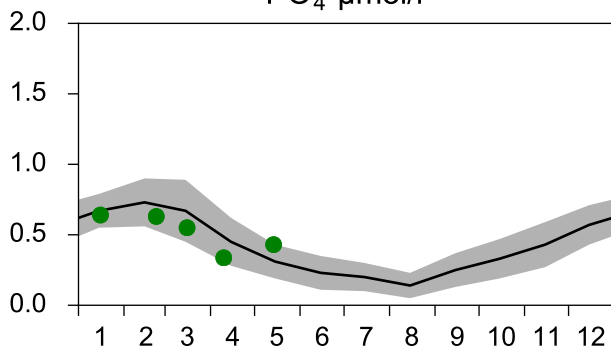
Temperature °C



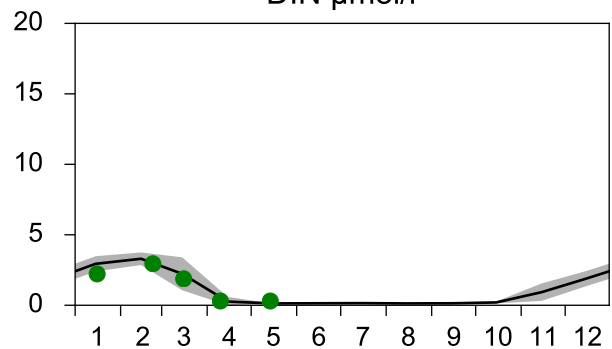
Salinity psu



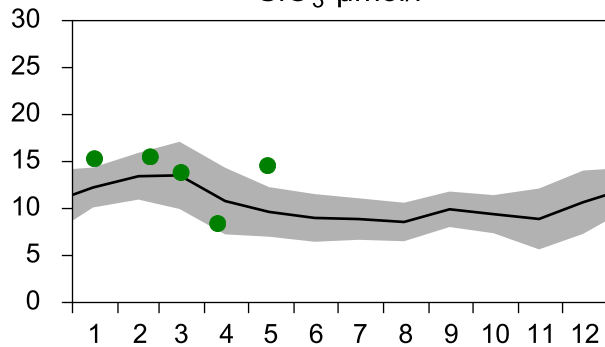
PO₄ µmol/l



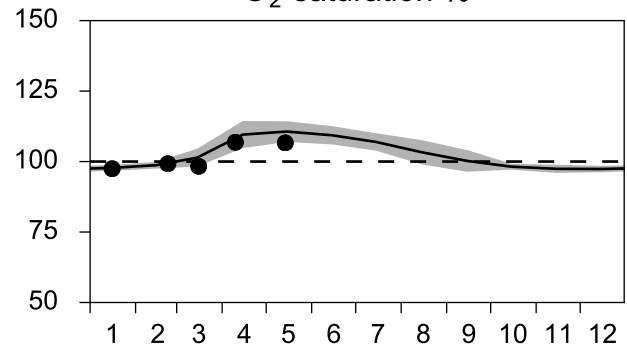
DIN µmol/l



SiO₃ µmol/l

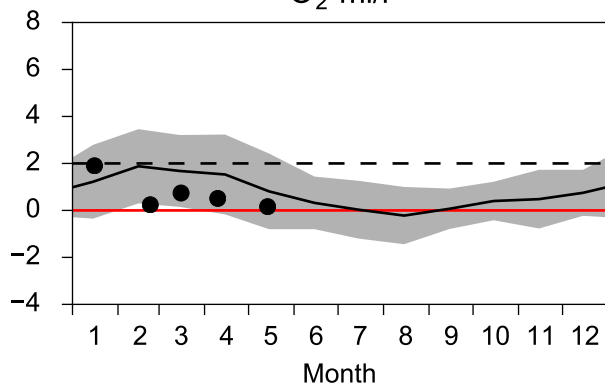


O₂ saturation %

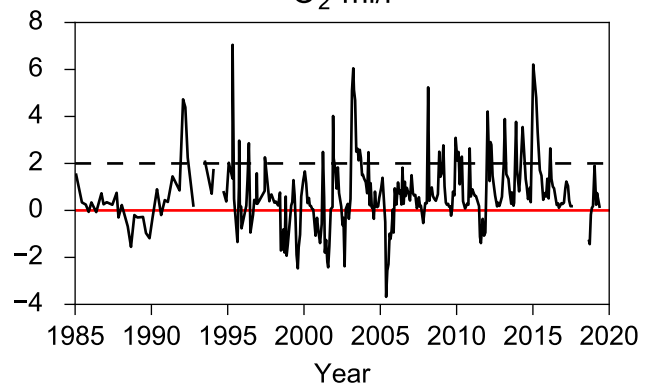


OXYGEN IN BOTTOM WATER (depth >= 70 m)

O₂ ml/l



O₂ ml/l



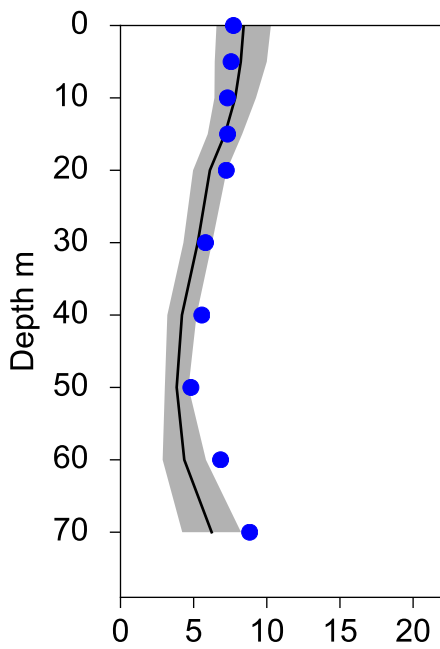
Vertical profiles HANÖBUKTEN May

— Mean 2001-2015

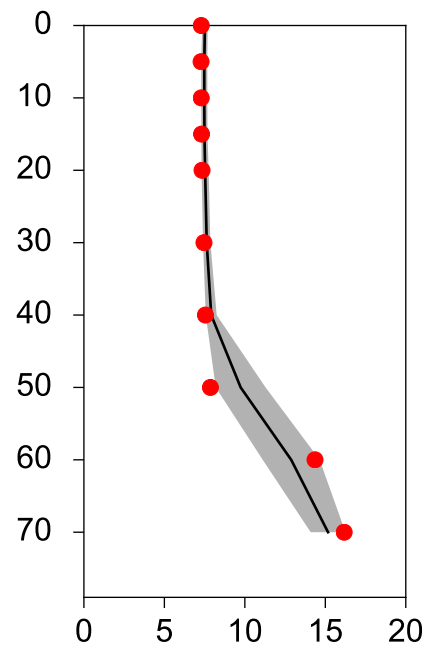
■ St.Dev.

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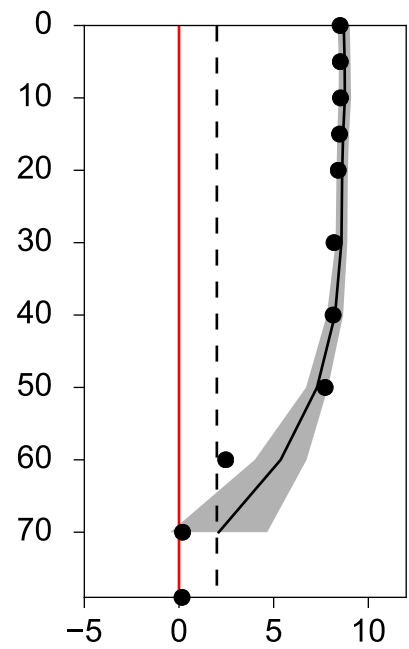
Temperature °C



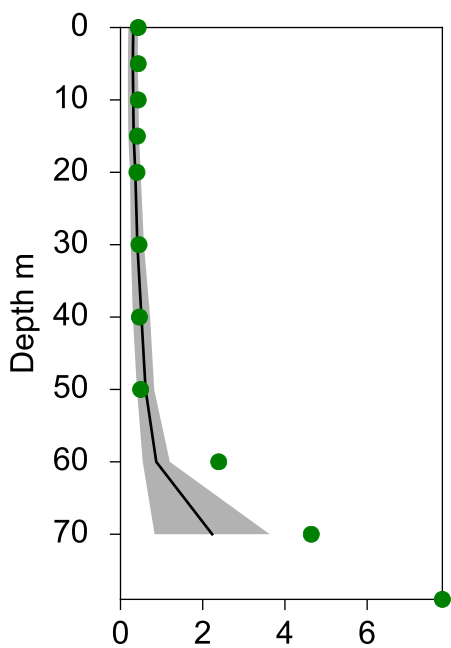
Salinity psu



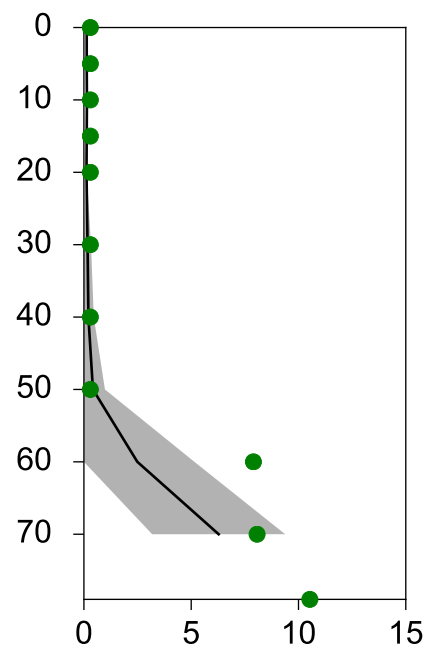
Oxygen ml/l



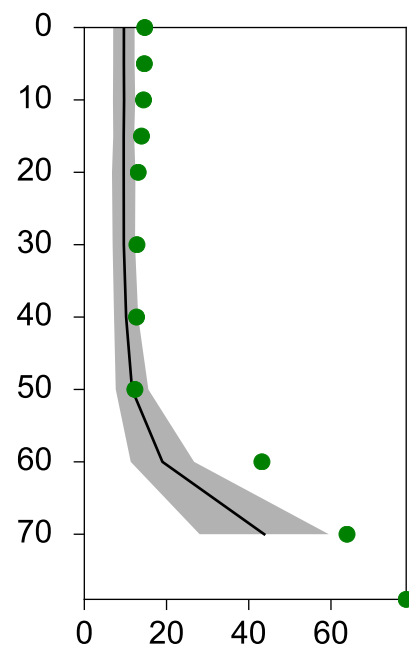
PO₄ μmol/l



DIN μmol/l



SiO₃ μmol/l



STATION REF M1V1 SURFACE WATER (0-10 m)

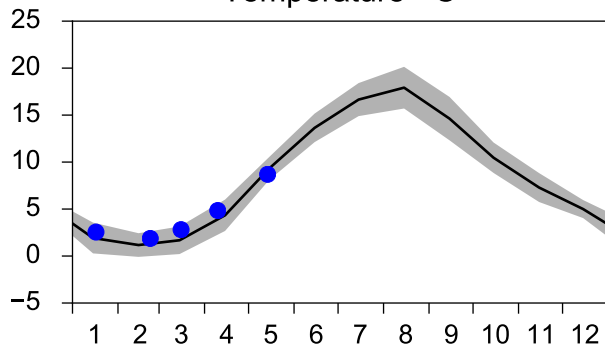
Annual Cycles

— Mean 2001-2015

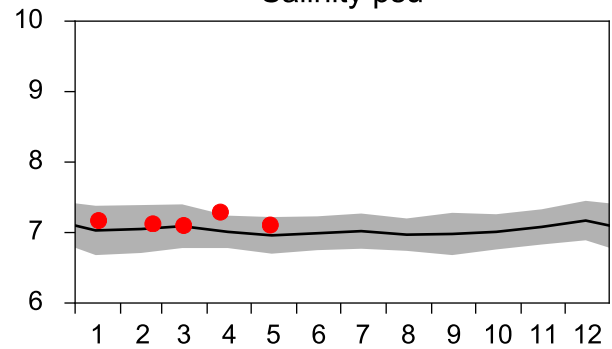
■ St.Dev.

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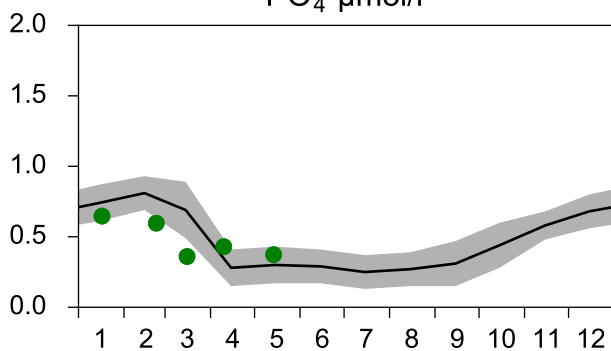
Temperature °C



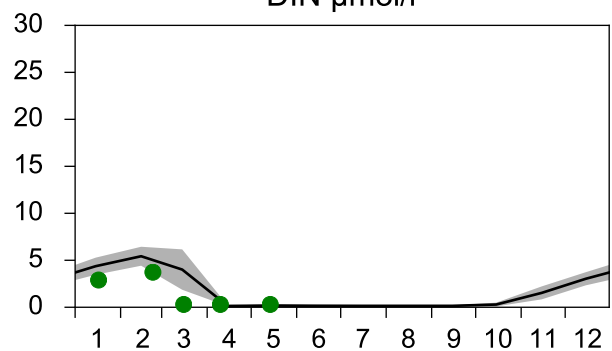
Salinity psu



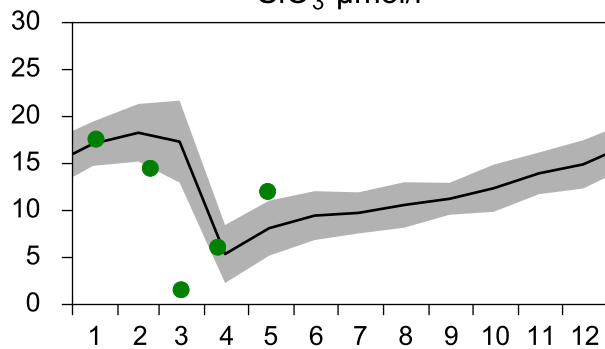
PO₄ µmol/l



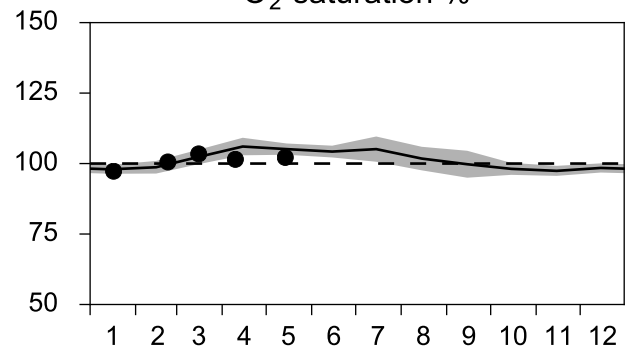
DIN µmol/l



SiO₃ µmol/l

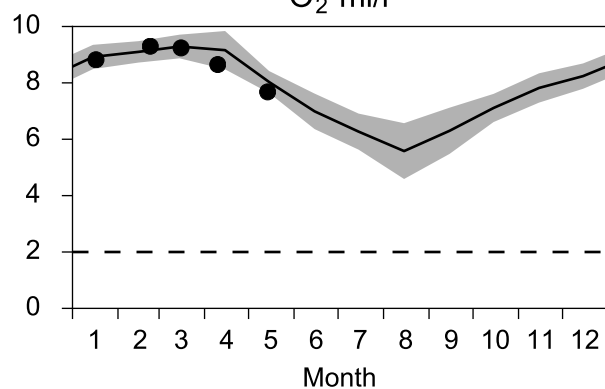


O₂ saturation %

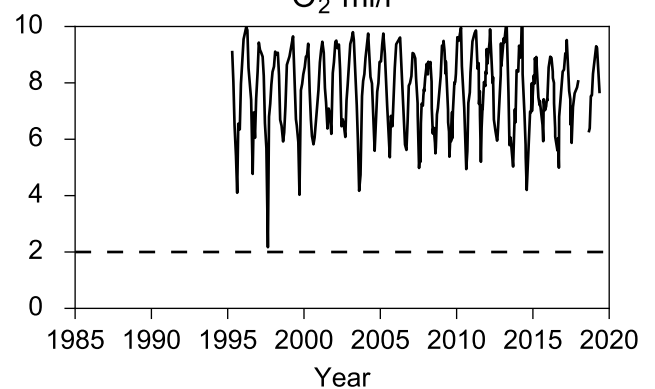


OXYGEN IN BOTTOM WATER (depth >= 17 m)

O₂ ml/l

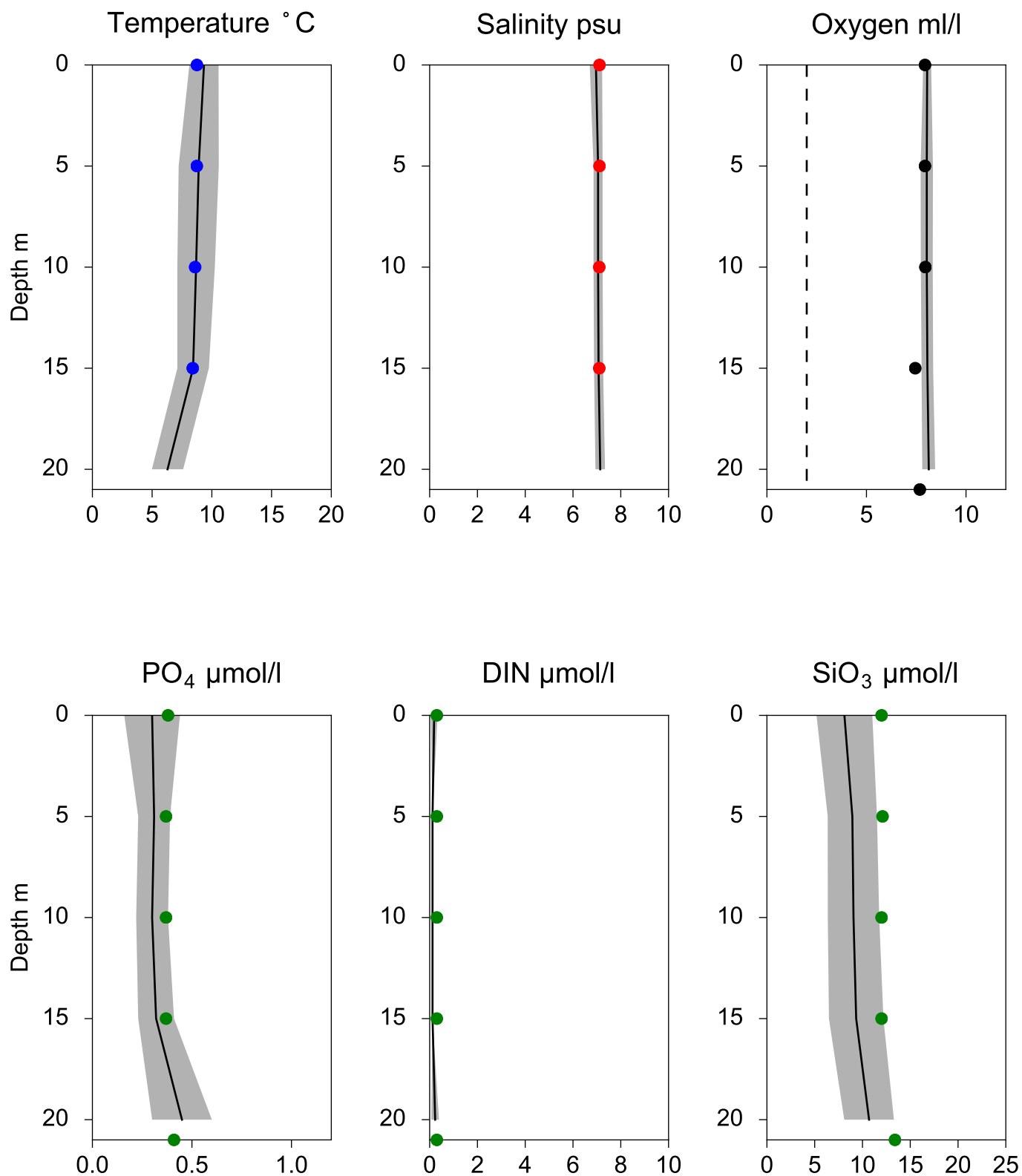


O₂ ml/l



Vertical profiles REF M1V1 May

— Mean 2001-2015 St.Dev. • 2019-05-14



STATION BY38 KARLSÖDJ SURFACE WATER (0-10 m)

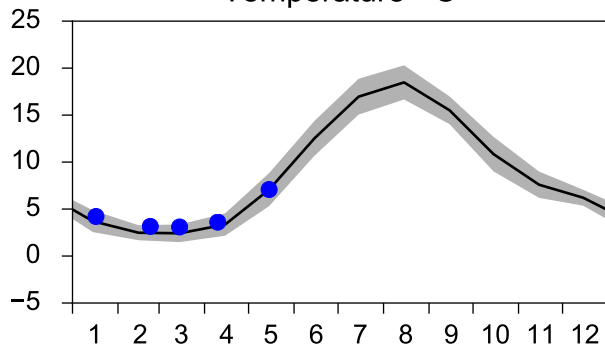
Annual Cycles

— Mean 2001-2015

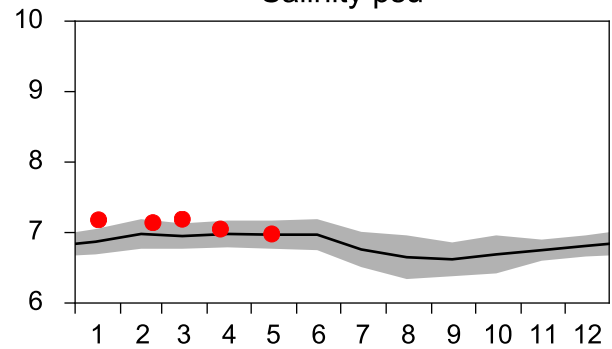
■ St.Dev.

● 2019

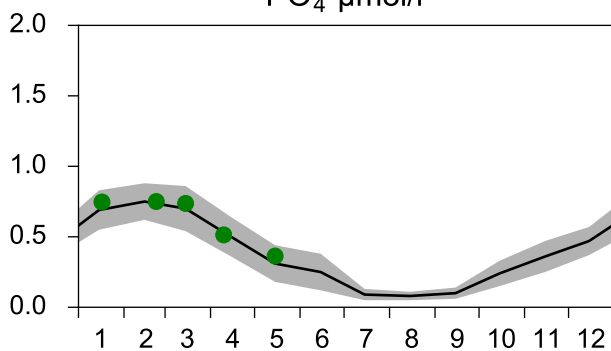
Temperature °C



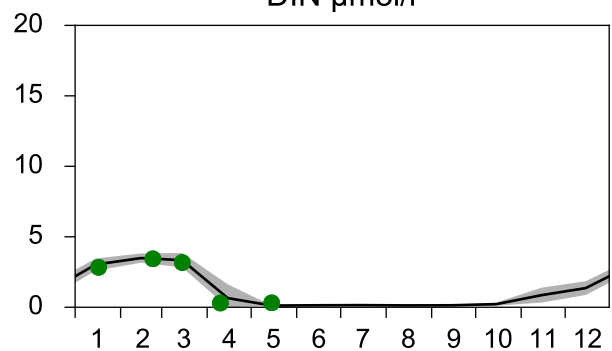
Salinity psu



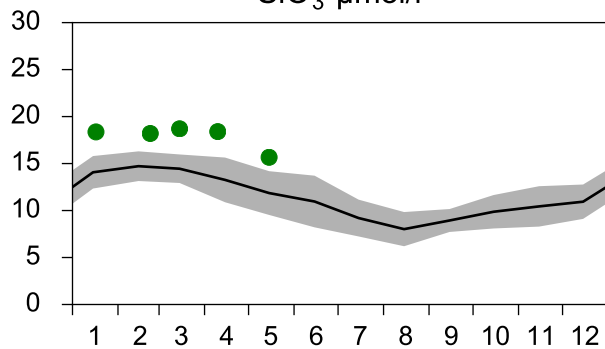
PO₄ µmol/l



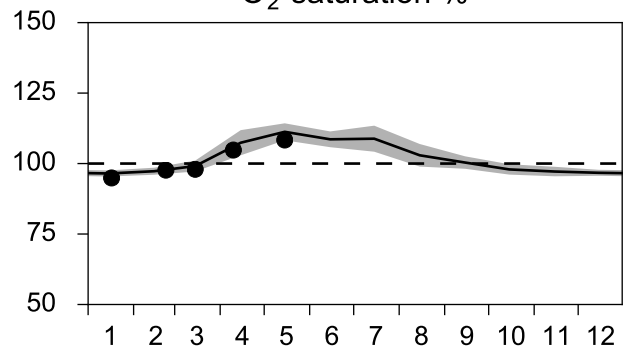
DIN µmol/l



SiO₃ µmol/l

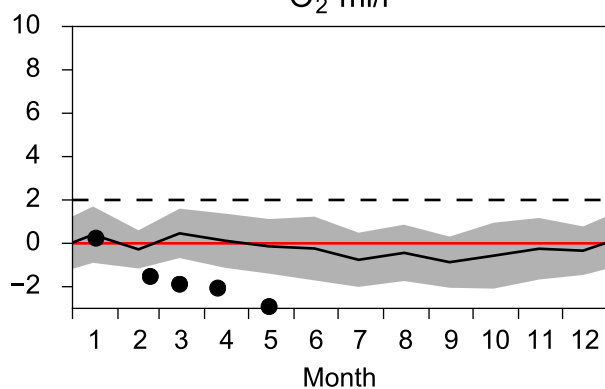


O₂ saturation %

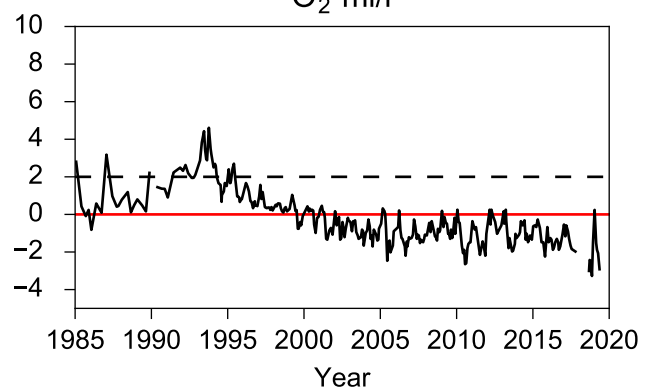


OXYGEN IN BOTTOM WATER (depth >= 100 m)

O₂ ml/l



O₂ ml/l

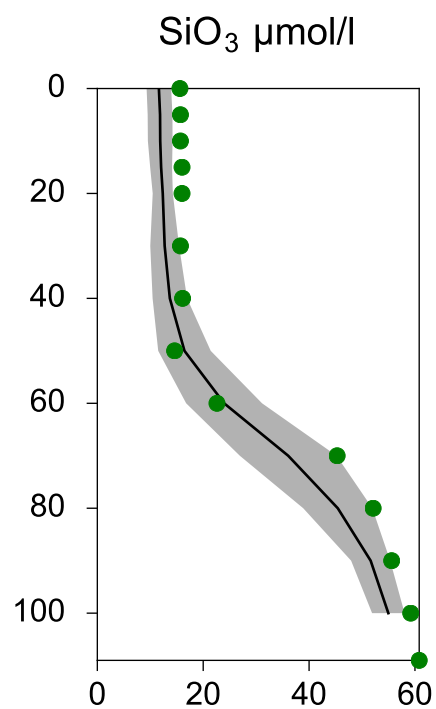
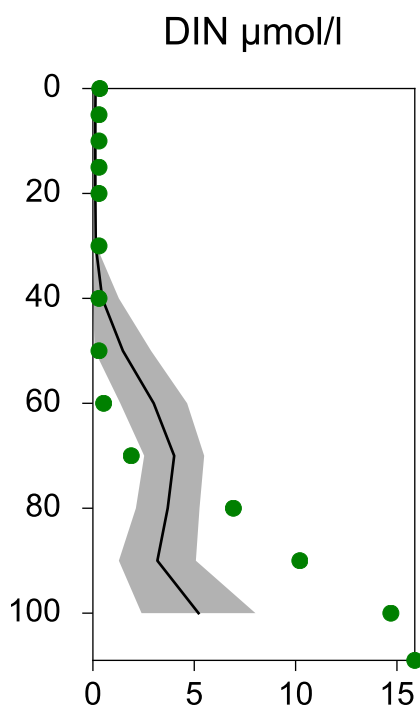
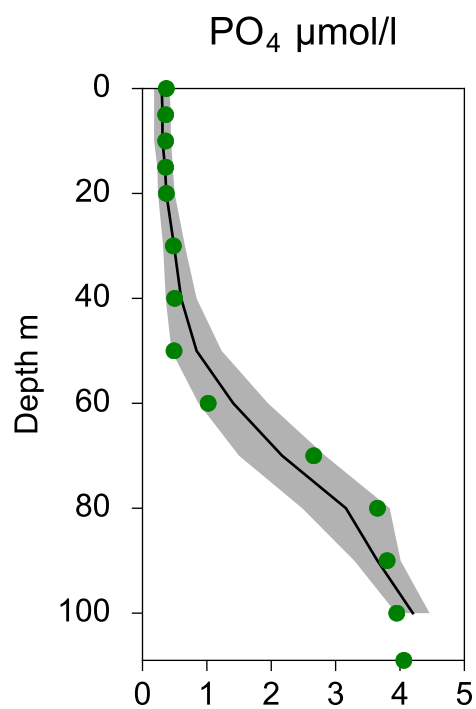
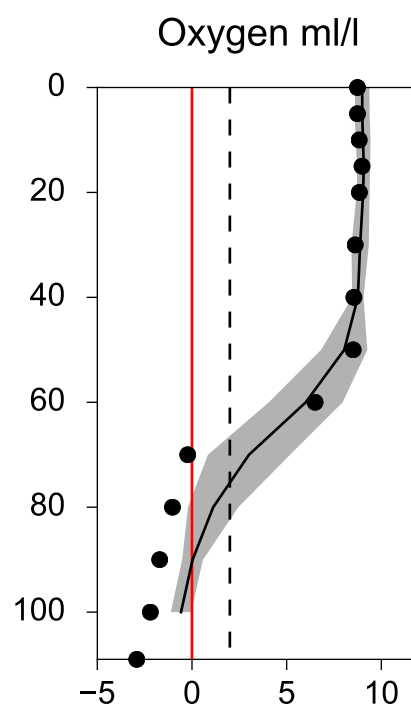
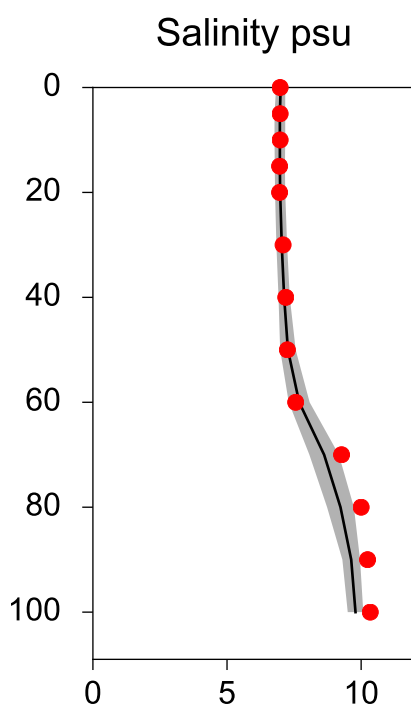
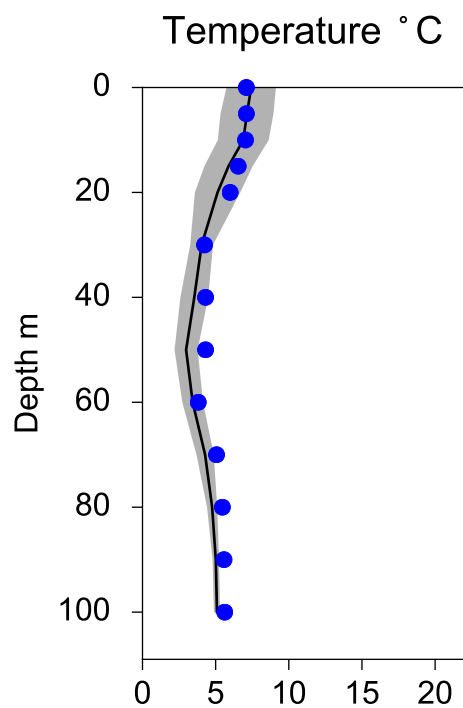


Vertical profiles BY38 KARLSÖDJ May

— Mean 2001-2015

■ St.Dev.

● 2019-05-15



STATION BY32 NORRKÖPINGSDJ SURFACE WATER (0-10 m)

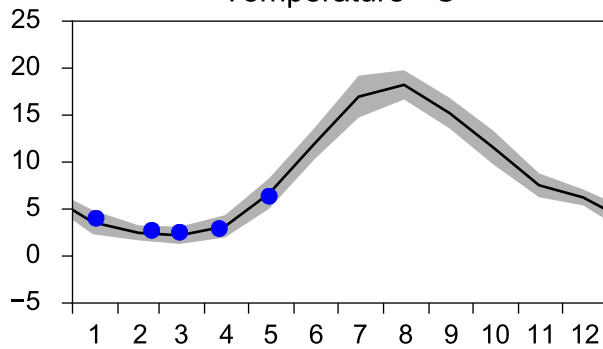
Annual Cycles

— Mean 2001-2015

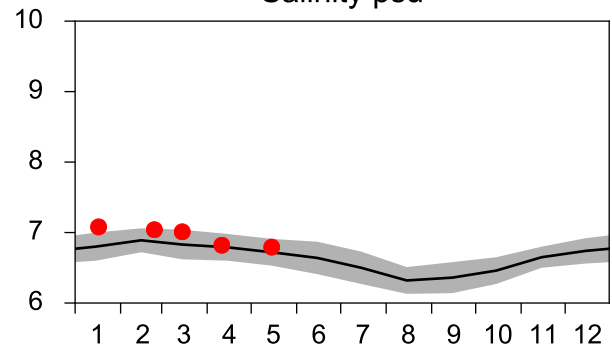
■ St.Dev.

● 2019

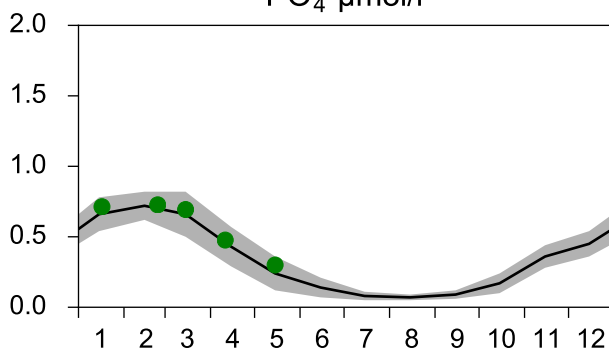
Temperature °C



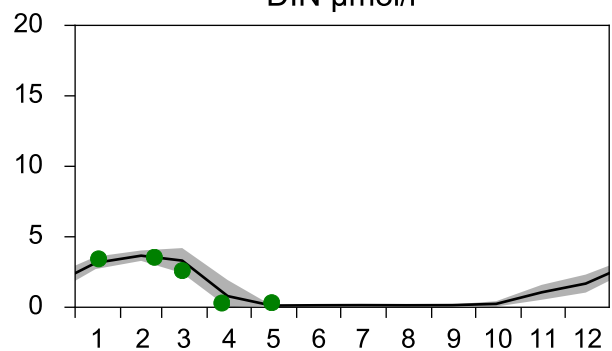
Salinity psu



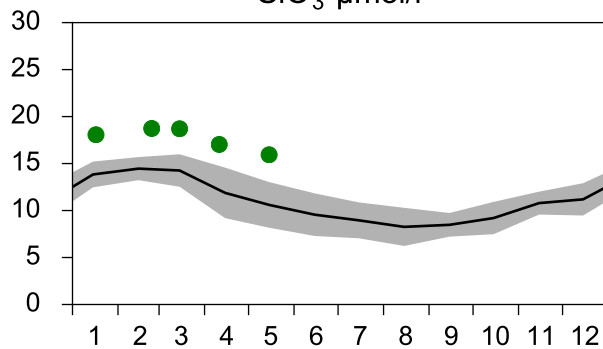
PO₄ µmol/l



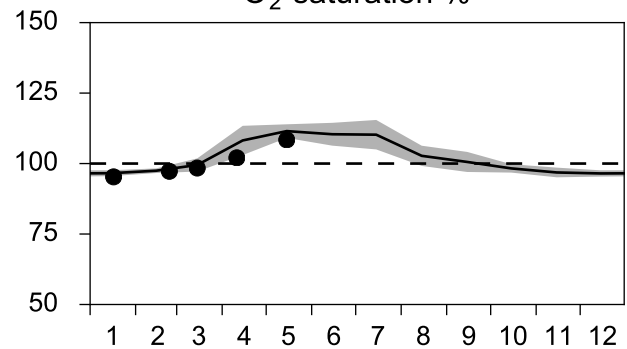
DIN µmol/l



SiO₃ µmol/l

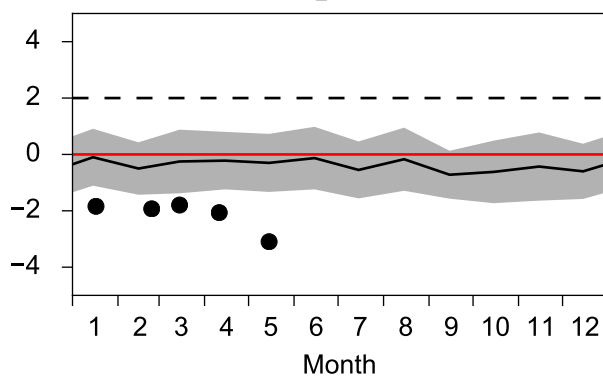


O₂ saturation %

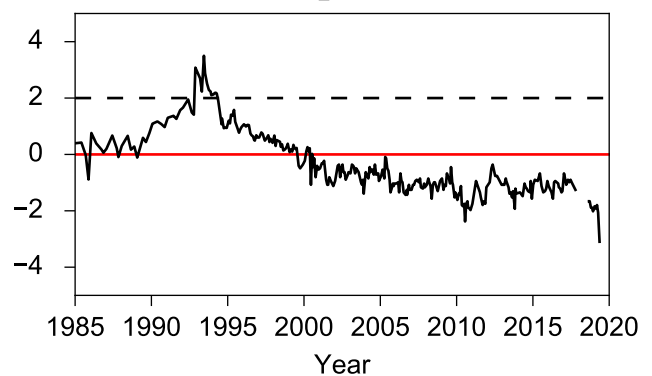


OXYGEN IN BOTTOM WATER (depth >= 175 m)

O₂ ml/l

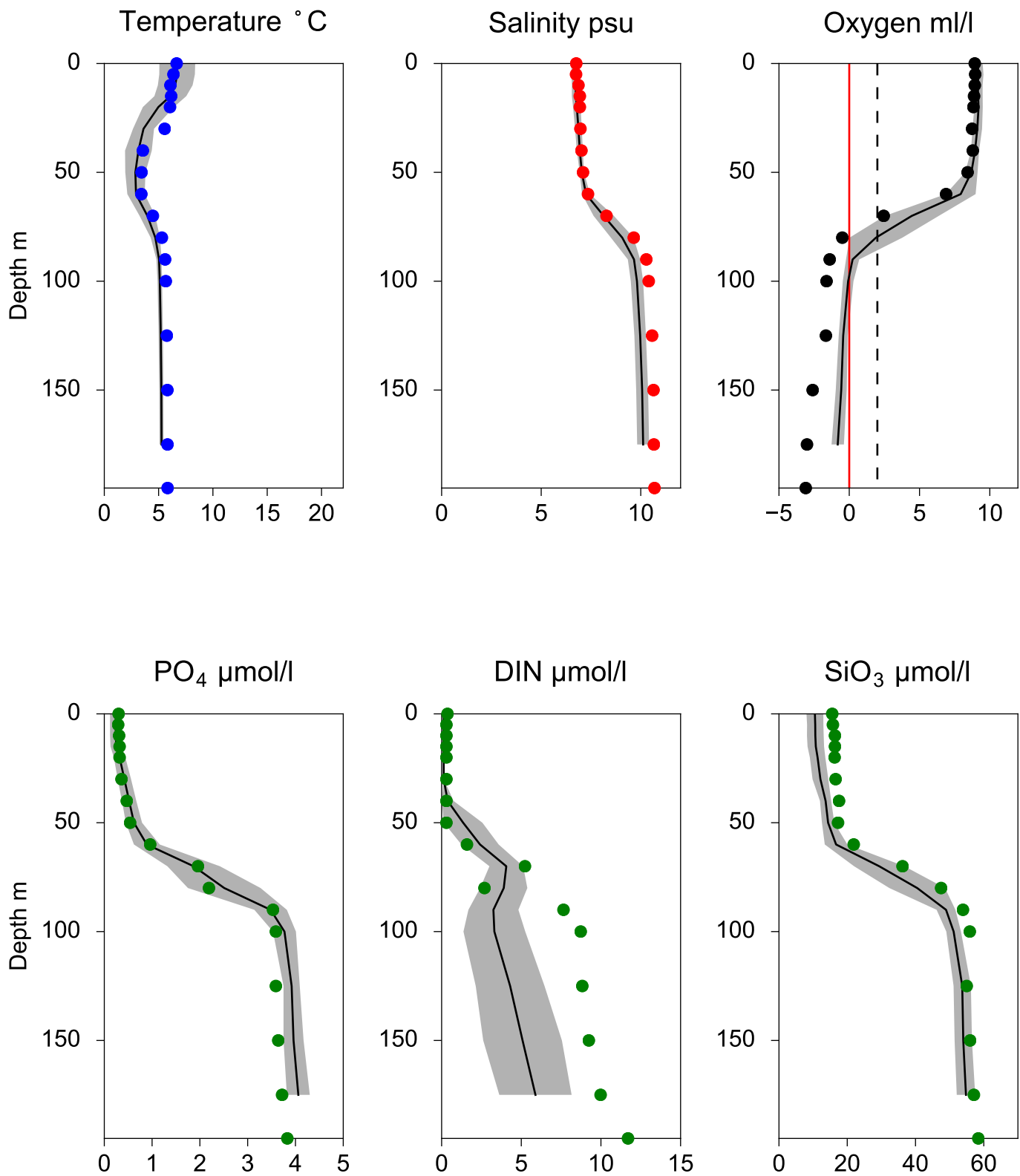


O₂ ml/l



Vertical profiles BY32 NORRKÖPINGSDJ May

— Mean 2001-2015 St.Dev. • 2019-05-15



STATION SLÄGGÖ SURFACE WATER (0-10 m)

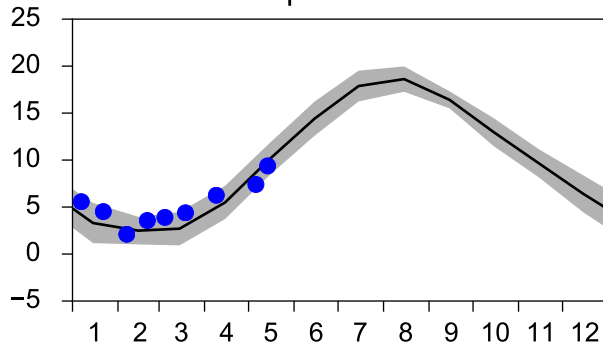
Annual Cycles

— Mean 2001-2015

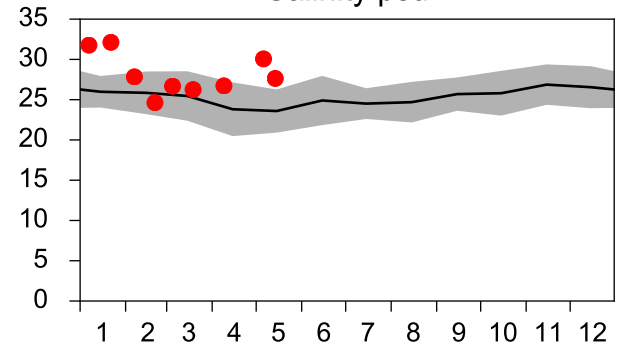
■ St.Dev.

● 2019

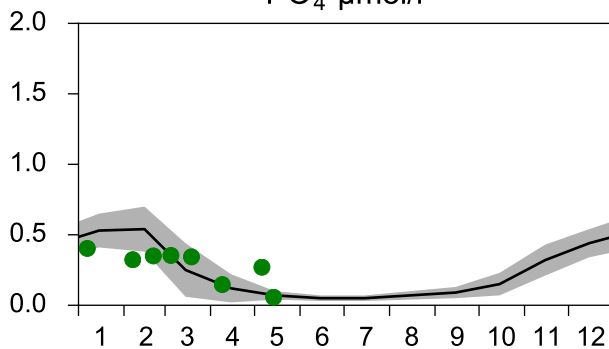
Temperature °C



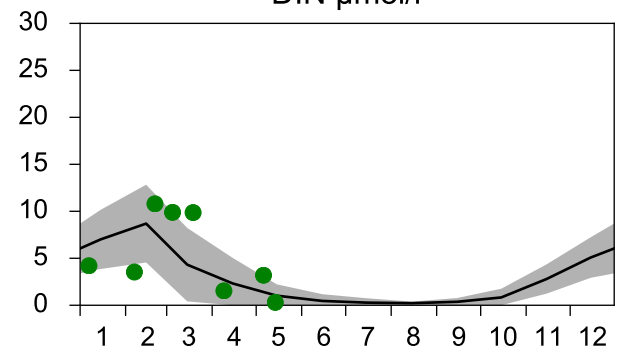
Salinity psu



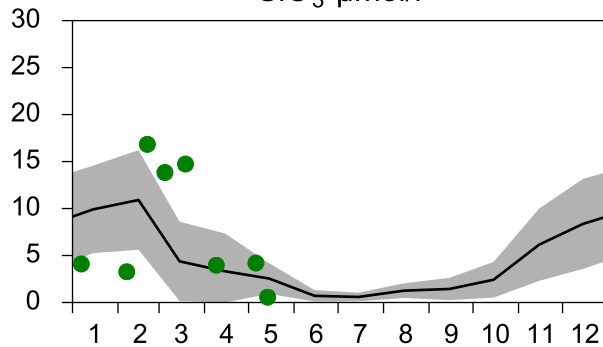
PO₄ µmol/l



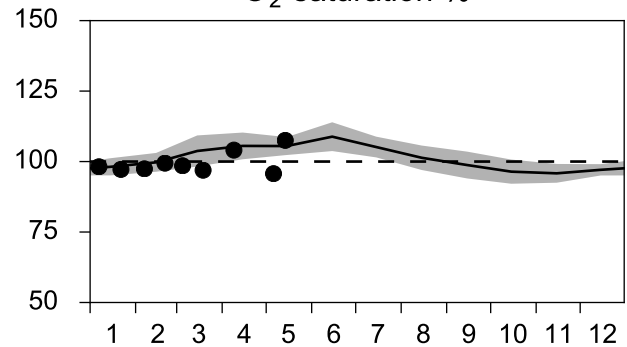
DIN µmol/l



SiO₃ µmol/l

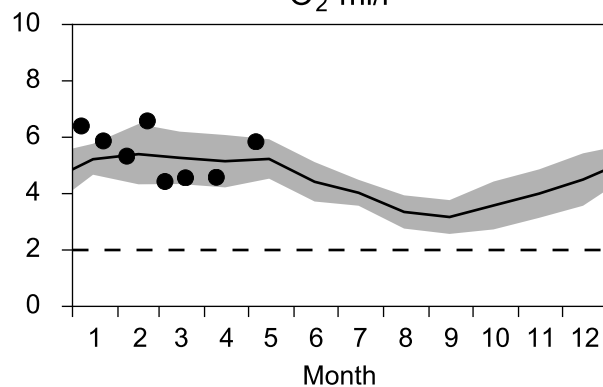


O₂ saturation %

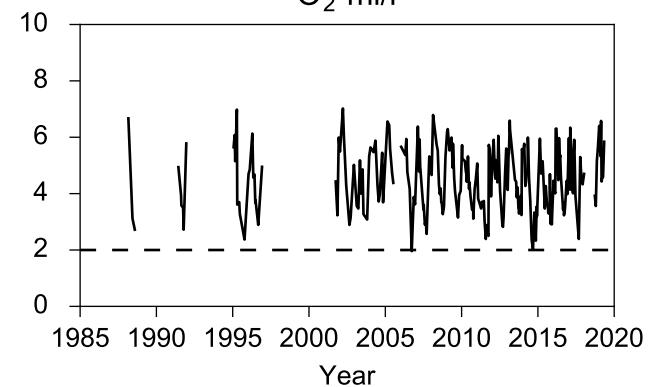


OXYGEN IN BOTTOM WATER (depth >= 64 m)

O₂ ml/l



O₂ ml/l

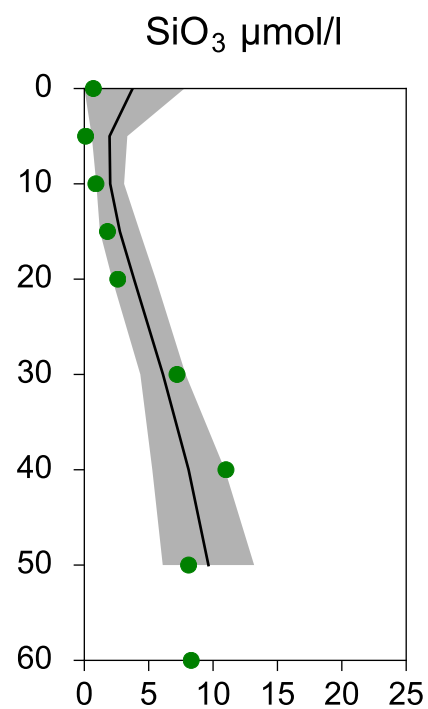
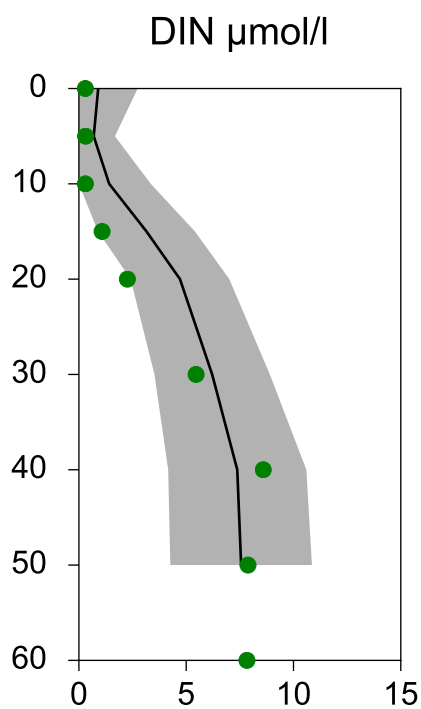
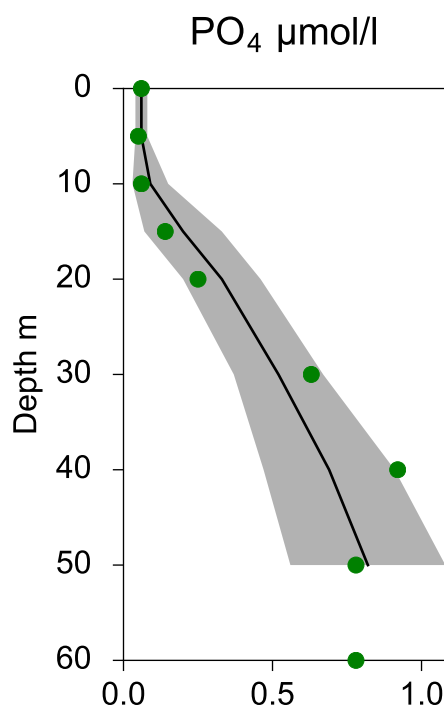
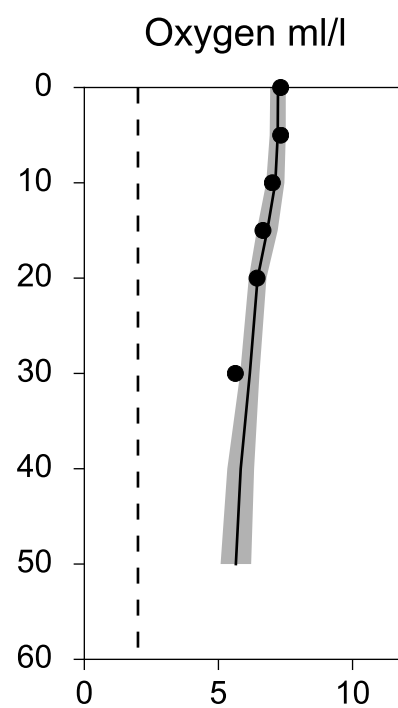
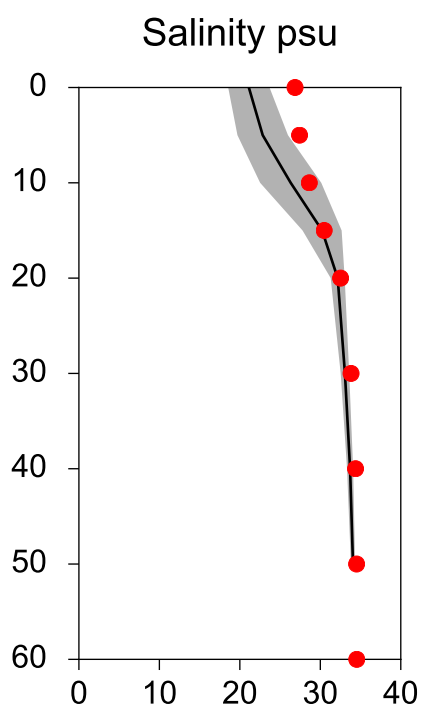
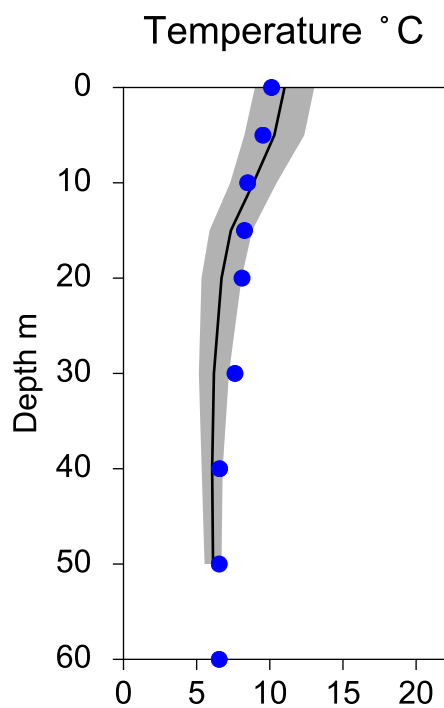


Vertical profiles SLÄGGÖ May

— Mean 2001-2015

■ St.Dev.

● 2019-05-14



STATION SLÄGGÖ SURFACE WATER (0-10 m)

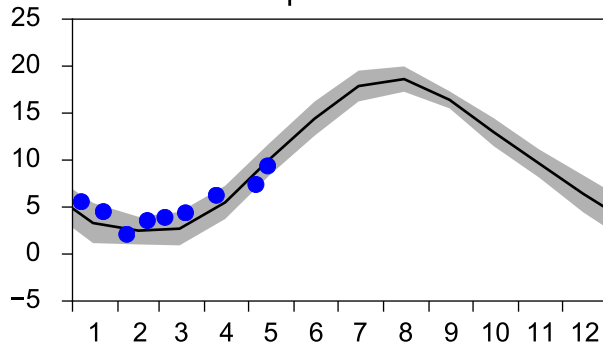
Annual Cycles

— Mean 2001-2015

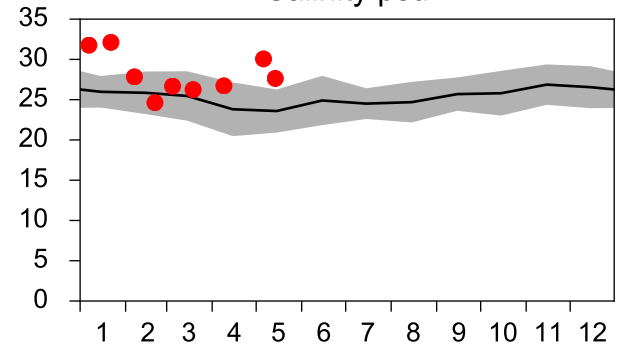
■ St.Dev.

● 2019

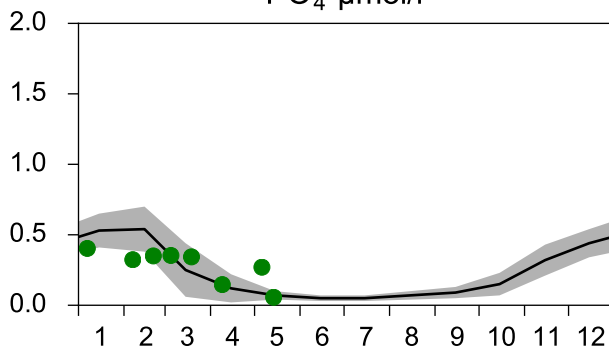
Temperature °C



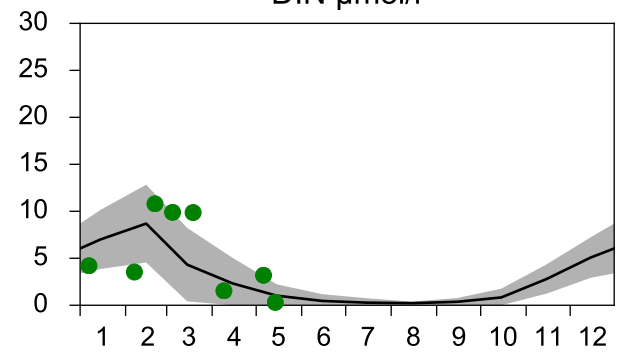
Salinity psu



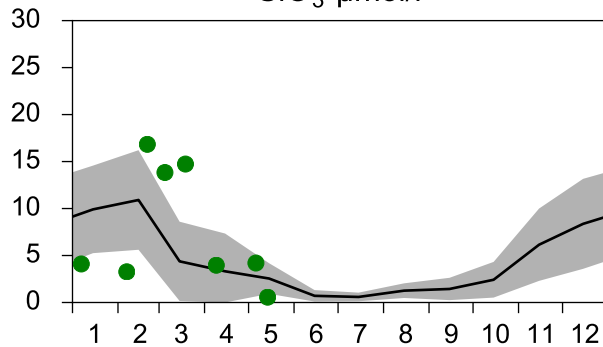
PO₄ µmol/l



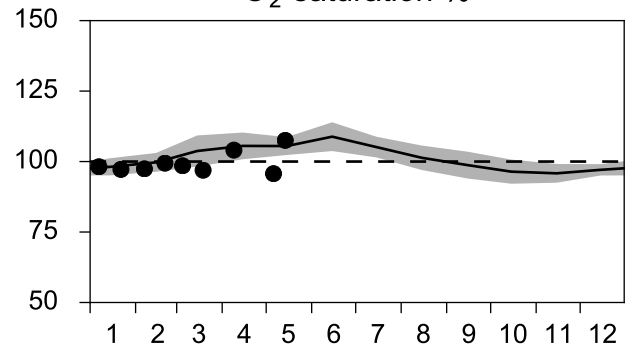
DIN µmol/l



SiO₃ µmol/l

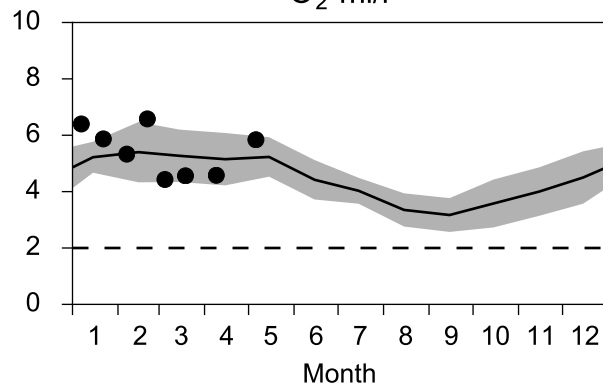


O₂ saturation %

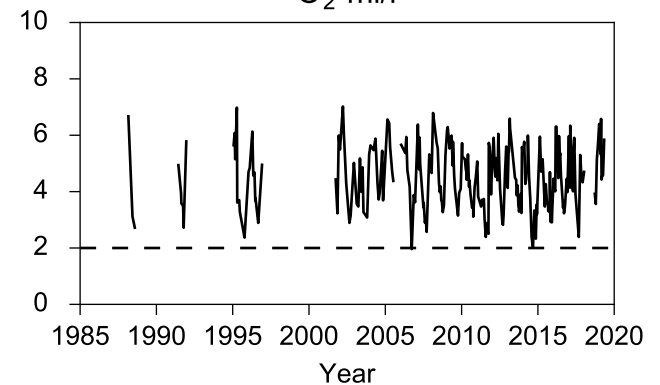


OXYGEN IN BOTTOM WATER (depth >= 64 m)

O₂ ml/l



O₂ ml/l



Vertical profiles SLÄGGÖ May

— Mean 2001-2015

■ St.Dev.

● 2019-05-06

