

Rapport från SMHIs utsjöexpedition med R/V Aranda



Expeditionens varaktighet: 2014-09-01 - 2014-09-08
Undersökningsområde: Skagerrak, Kattegatt och egentliga Östersjön
Uppdragsgivare: SMHI samt Havs- och Vattenmyndigheten

SAMMANFATTNING

Under expeditionen, vilken ingick i det svenska havsövervakningsprogrammet, besöktes Skagerrak, Kattegatt och egentliga Östersjön. Denna rapport är baserad på preliminära, endast delvis kvalitetskontrollerade data.

Vattentemperaturen i ytlagret var fortsatt över det normala i Skagerrak och i egentliga Östersjön. I Skagerrak återfanns termoklinen ovanligt djup, på 70-100 meter. Närsalterna i ytvattnet uppvisade, för årstiden normala värden, förutom i västra och östra Gotlandsbassängen där silikathalter över det normala noterades.

I Arkonabassängen var syresituationen god i de västra delarna medan de östra var påverkade av akut syrebrist från djup överstigande 35 meter. I östra Gotlandsbassängen hade syreförhållandena åter försämrats i de centrala delarna och helt syrefria förhållanden återfanns från djup överstigande 125 meter och akut syrebrist från 80 meters djup. I de södra delarna av östra Gotlandsbassängen noterades dock bottenvatten med hög syrehalt vilket indikerar att en ny puls av syresatt vatten hade nått östra Gotlandsbassängen. I västra Gotlandsbassängen var syresituationen allvarlig då akut syrebrist redan förekom från djup överstigande 55-65 meter och svavelväte från 75 meters djup. Även vid Släggö i Gullmarsfjordens mynning noterades akut syrebrist i bottenvattnet.

Nästa ordinarie expedition är planerad till vecka 43. Då kommer Skagerrak, Kattegatt och egentliga Östersjön att besökas.

PRELIMINÄRA RESULTAT

Expeditionen genomfördes ombord det finska forskningsfartyget Aranda och startade i Helsingfors den 1:e september och avslutades i Hangö den 8:e. Vindarna under expeditionen var svaga till måttliga, mestadels från nordost och syd. Lufttemperaturen varierade mellan 15-18°C.

För att följa syresituationen i Egentliga Östersjön besöktes två extra stationer utöver de ordinarie 25 stationerna. Vattenprover togs också för att utvärdera en ny molekylärbiologisk metodik för planktonanalys. Proverna kommer att analyseras både med mikroskop och genom att rDNA sekvenseras. Provtagningen, som påbörjades sommaren 2014, är ett samarbete mellan SMHI och KTH Science for Life Laboratory och planeras fortsätta ca ett år. Under expeditionen insamlade dessutom forskare från Umeå och Stockholms universitet vattenprover för analys av metyl- och totalkviksilver. Syftet med mätningarna är att undersöka rådande koncentrationer och bioackumulation av kvicksilver i Östersjön samt att utvärdera lämpliga provtagningsmetoder.

Skagerrak

Termoklinen återfanns ovanligt djup, på 70-100 meter, och temperaturen i det övre lagret var varmare än normalt, omkring 15-17°C. Haloklinen var ojämnt utvecklad i området och återfanns på 5-20 meters djup. Salthalten i hela vattenpelaren uppvisade normala halter. Samtliga närsalter i ytlagret uppvisade låga koncentrationer vilket är typiskt för årstiden. Fosfathalterna varierade mellan 0,04 och 0,12 $\mu\text{mol/l}$, silikat från 0,1 till 1,6 $\mu\text{mol/l}$ medan koncentrationerna av oorganiskt kväve (nitrit + nitrat) låg under detektionsgränsen ($< 0,10 \mu\text{mol/l}$) i hela området.

Det lägsta syrevärdet uppmättes i bottenvattnet vid stationen Släggö i Gullmarfjordens mynning, 2,0 ml/l vilket också är gränsen för akut syrebrist.

Kattegatt och Öresund

Jämfört med de höga ytvattentemperaturer som uppmättes i augusti var temperaturen nu åter normal och låg strax över 17°C i området. Termoklinen återfanns på 30-40 meters djup i de centrala delarna och kring 10-15 meters djup i Öresund samt längs svenska kusten. Salthalten i ytvattnet var normal eller något lägre än normalt och varierade mellan 15,8-22,1 psu i Kattegatt och omkring 8,5 psu i Öresund. Haloklinen återfanns på 10-20 meters djup.

Halterna av näringsämnen i ytvattnet låg inom det normala för årstiden förutom vid Anholt E där silikathalten var över det normala, 5,7 $\mu\text{mol/l}$. I övriga områden varierade silikathalten mellan 0,3-1,3 $\mu\text{mol/l}$ och i Öresund uppmättes 9,3 $\mu\text{mol/l}$. Fosfathalten varierade mellan 0,05-0,13 $\mu\text{mol/l}$, medan den i Öresund låg på 0,18 $\mu\text{mol/l}$. Halten av nitrit + nitrat var under detektionsgränsen ($< 0,10 \mu\text{mol/l}$).

I Kattegatt och Öresund var syrgashalterna i djupvattnet normala och varierade mellan 2,6 - 3,9 ml/l, lägst i Öresund.

Egentliga Östersjön

Vattentemperaturen i ytlagret låg över det normala i hela området, 15,6-17,5°C och termoklinen återfanns på 20-30 meters djup. Salthalten i ytvattnet var normal och låg mellan 6,4 och 8,5 psu. Haloklinen återfanns på omkring 60 till 70 meters djup i västra och östra Gotlandsbassängen, medan den låg grundare i de södra delarna, på djup mellan 35 och 50 meter.

Samtliga närsalter, i ytlagret, uppvisade normala halter för årstiden förutom silikat som var över det normala, 9,3-11,9 $\mu\text{mol/l}$, i östra och västra Gotlandsbassängen. I övriga områden varierade silikathalten mellan 7,2-9,0 $\mu\text{mol/l}$. Fosfathalterna låg i intervallet 0,06-0,18 $\mu\text{mol/l}$ och oorganiskt kväve (nitrit + nitrat) var helt förbrukat i ytvattnet och låg under detektionsgränsen i hela området.



Till följd av ett inflöde genom Öresund på $\sim 25 \text{ km}^3$ under mitten av augusti var den västra delen av Arkonabassängen väl syresatt, medan akut syrebrist förekom i de östra delarna av bassängen från botten till 35 meters djup. I Bornholmsbassängen och Hanöbukten förekom akut syrebrist från 60-65 meters djup.

Vid Gotlandsdjupet (BY15), där en första puls av syresatt bottenvatten nådde området under sommaren, noterades åter svavelväte från djup överstigande 125 meter och akut syrebrist från 80 meters djup. I de södra delarna av östra Gotlandsbassängen, vid BY10, återfanns akut syrebrist från 65-70 meters djup men inget svavelväte noterades i bottenvattnet. Vid en extra provtagningsstation söder därom återfanns syrehalter på omkring 3,0 ml/l närmast botten och upp till 100 meters djup. Detta indikerar att en andra puls av syresatt bottenvatten har nått bassängens södra delar. De pulser av syresatt vatten som observerats i den sydöstra delen av Egentliga Östersjön och i östra Gotlandsbassängen nu och under sommaren kan härröra från de två inflöden genom Öresund som observerades i februari och mars tidigare i år på vardera $\sim 30 \text{ km}^3$.

I västra Gotlandsbassängen var syresituationen allvarlig då akut syrebrist redan förekom från djup överstigande 55-65 meter och svavelväte från 75 meters djup.

DELTAGARE

Namn

Martin Hansson Expeditionsledare
Sari Sipilä (Helsingfors – Lysekil)
Karin Wesslander
Sara Johansson
Daniel Bergman-Sjöstrand
Arne Svensson (Lysekil – Hangö)
Erik Björn (Helsingfors -Lysekil)
Anna Sorensen

Från

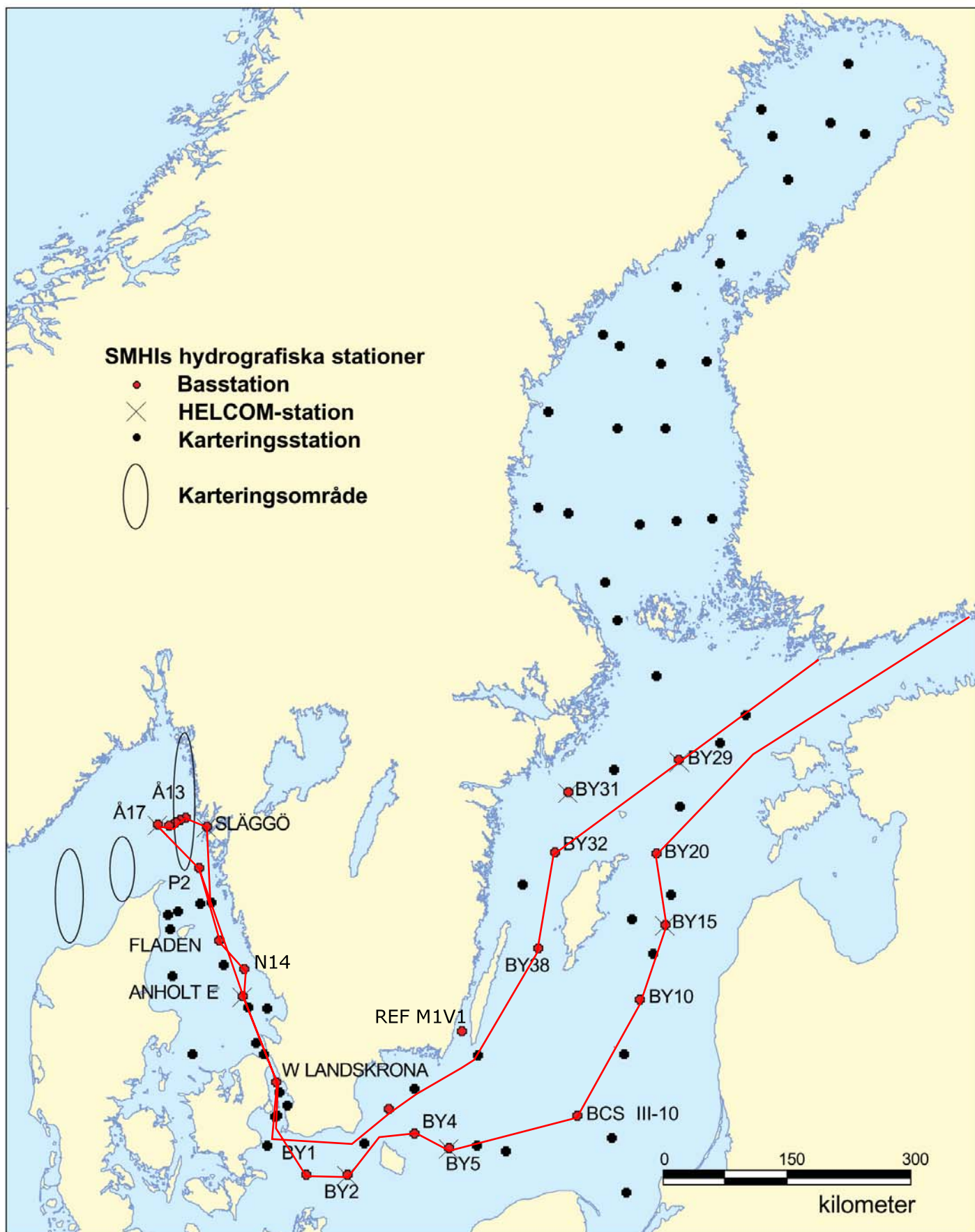
SMHI
SMHI
SMHI
SMHI
SMHI
SMHI
Umeå universitet
Stockholm universitet

BILAGOR

- Färdkarta
- Tabell över stationer, antal parametrar och provtagningsdjup
- Karta över syrehalter i bottenvattnet
- Vertikalprofiler för basstationer
- Månadsmedelvärdesplottar för ytvatten

TRACKCHART

Country: Sweden
 Ship: R/V ARANDA
 Date: 20140901-20140907
 Series:



Date: 2014-09-07
Time: 12:33

S er no	Stat code	P ro j	Station-----	Lat-----	Lon-----	Date yyyymmdd	Time hhmm utc	Bottom depth m	Secchi depth m	Wind di ve	Air temp C	Air pres hPa	WCSI elec aoae hd	C PPCPZT Hrhhoo Cilyooa PrP l	No de	T S e a m l p l n	P O h x y S P	H 2 o o P P	P T N N N N	N T N N N N	A S h o l i u i o 3 m g n u n	S H L P T C O O C m m	P T C O O C m m	T C O O C m m		
0552	BPEX26BAS	BY20	FÄRÖDJ	N5800	E1953	20140902	0552	191	7	04 2	15.0	1023	1120	x - -x----	17	x x	- x	x x	x x	x x	x x	x -	x -	- -	- -	x
0553	BPEX21BAS	BY15	GOTLANDSDJ	N5720	E2003	20140902	0950	239	8	00 0	17.9	1024	1320	x -xxxx--	19	x x	- x	x x	x x	x x	x x	x x	x -	- -	- -	x
0554	BPEX21BAS	BY15	GOTLANDSDJ	N5720	E2003	20140902	1120	239	8	05 1	17.0	1025	1420	x -----	6	x x	- x	x x	x x	x x	x x	- x	- -	- -	- -	x
0555	BPEX13BAS	BY10		N5638	E1935	20140902	1605	144	7	03 4	15.8	1025	1120	x -x-x----	15	x x	- x	- x	x x	x x	x x	- x	- -	- -	- -	x
0556	BPSE00BAS	BY9 W		N5607.20	E1901.00	20140902	1955	128		05 5	15.6	1026	9990	x -----	14	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	x
0557	BPSE11BAS	BCS III-10		N5533.3	E1824	20140903	0010	90		06 5	15.7	1027	9990	x -x-x----	12	x x	- x	- x	x x	x x	x x	- x	- -	- -	- -	x
0558	BPSE08BAS	STOLPE TRÖSKEL		N5516.5	E1631	20140903	0655	65		05 5	15.7	1028	1230	x -----	9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	x
0559	BPSB07BAS	BY5	BORNHOLMSDJ	N5515	E1559	20140903	0905	90	8	07 6	15.8	1029	1130	x -xxxx--	12	x x	- x	- x	x x	x x	x x	x x	- -	- -	- -	x
0560	BPSB06BAS	BY4	CHRISTIANSÖ	N5523	E1520	20140903	1240	91	9	08 5	16.0	1028	1120	x -x-x----	12	x x	- x	- x	x x	x x	x x	- x	- -	- -	- -	-
0561	BPSA03BAS	BY2	ARKONA	N5500	E1405	20140903	1840	47		08 6	16.3	1027	1130	x -xxxx--	8	x x	- x	- x	x x	x x	x x	- x	- -	- -	- -	x
0562	BPSA02BAS	BY1		N5500	E1318	20140903	2216	46		09 7	16.2	1027	9990	x -x-x----	8	x x	- x	- x	x x	x x	x x	- x	- -	- -	- -	x
0563	SOCX39BAS	W LANDSKRONA		N5552.0	E1245.0	20140904	0415	49		08 5	13.0	1027	1130	x -x-x----	9	x x	- x	- x	x x	x x	x x	- x	- -	- -	- -	x
0564	KAEX29BAS	ANHOLT E		N5640.0	E1207.0	20140904	0935	63	8	11 5	15.4	1027	1130	x -xxxx--	10	x x	- x	- x	x x	x x	x x	- x	- -	- -	- -	x
0565	KANX50BAS	N14 FALKENBERG		N5656.40	E1212.70	20140904	1205	32	7	16 6	16.9	1027	1130	x -xxxx--	7	x x	- x	- x	x x	x x	x x	- x	- -	- -	- -	x
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0568	SKEX18BAS	Å17		N5816.5	E1030.8	20140904	2330	350		19 5	16.7	1023	9990	x -xx----	15	x x	- x	- x	x x	x x	x x	- x	- -	- -	- -	x
0569	SKEX17BAS	Å16		N5816	E1043.5	20140905	0205	202																		

Bottom water oxygen concentration (ml/l)

Country: Finland

Ship : Aranda

Date : 20140902-20140907

Series : 0552-0577



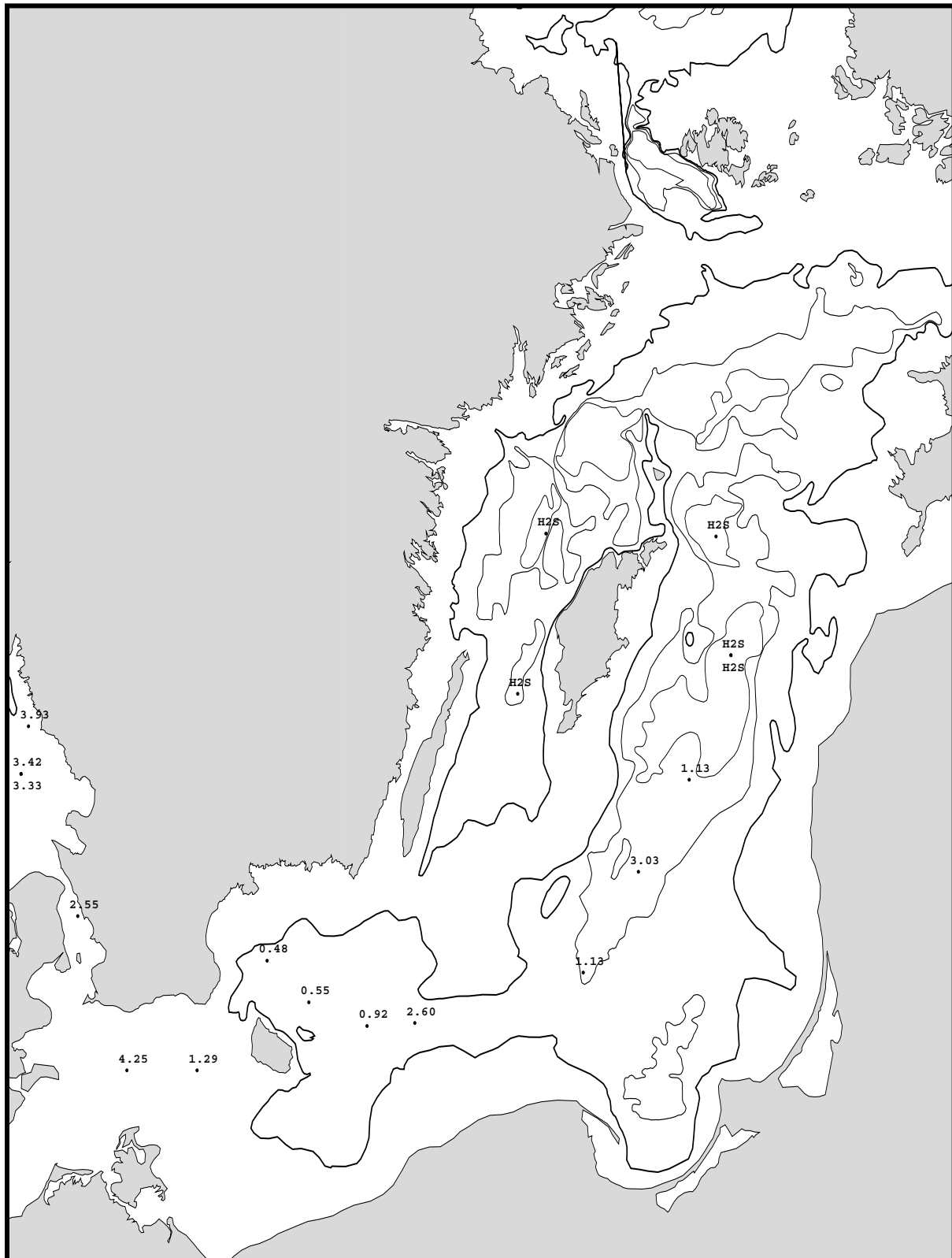
Bottom water oxygen concentration (ml/l)

Country: Finland

Ship : Aranda

Date : 20140902-20140907

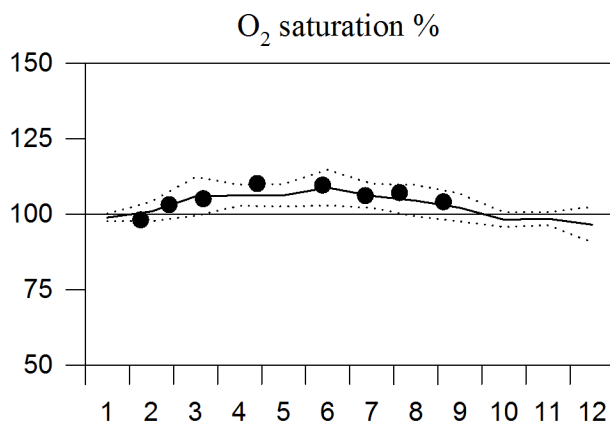
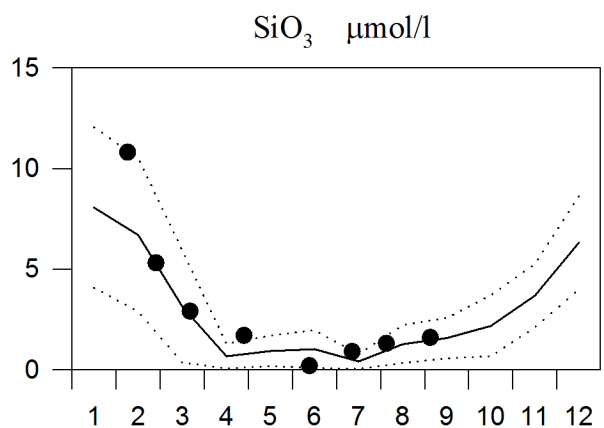
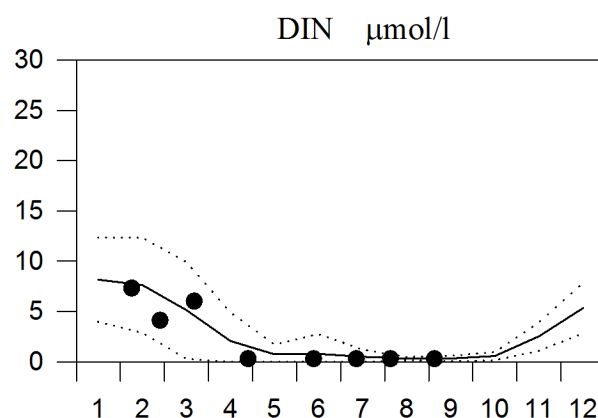
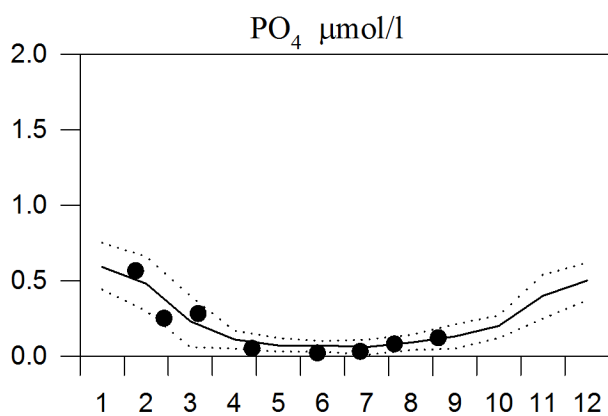
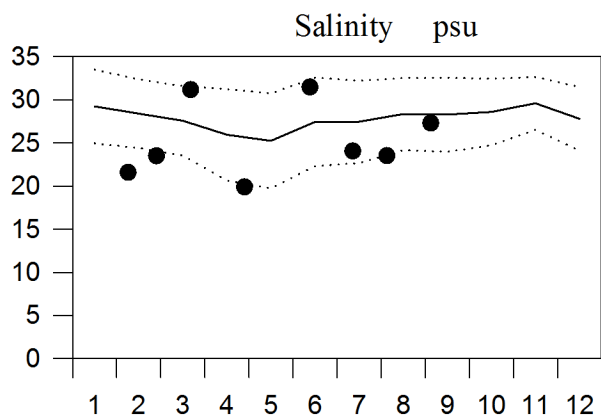
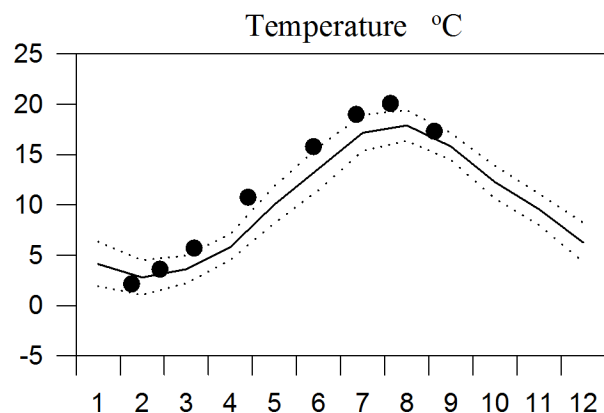
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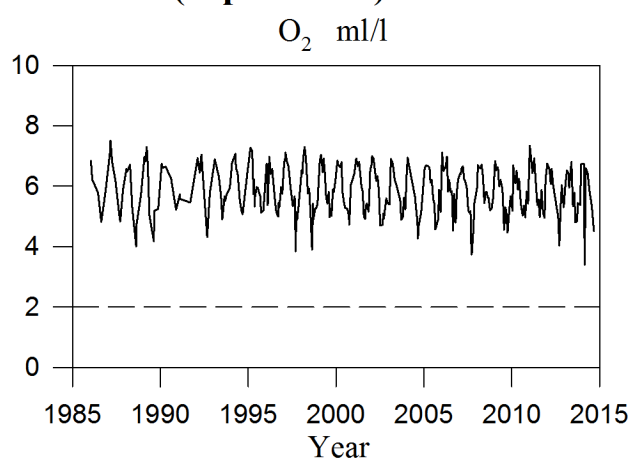
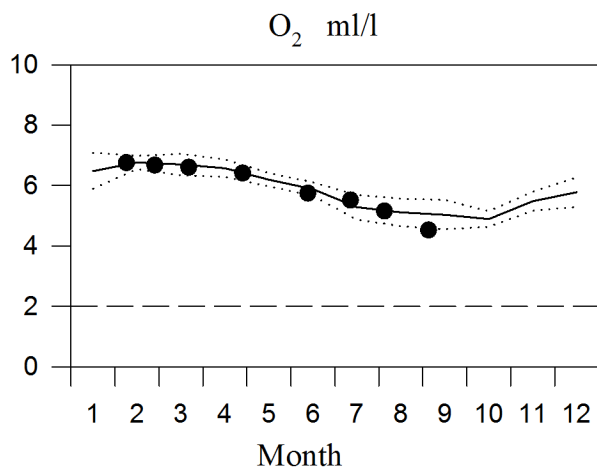
STATION P2 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

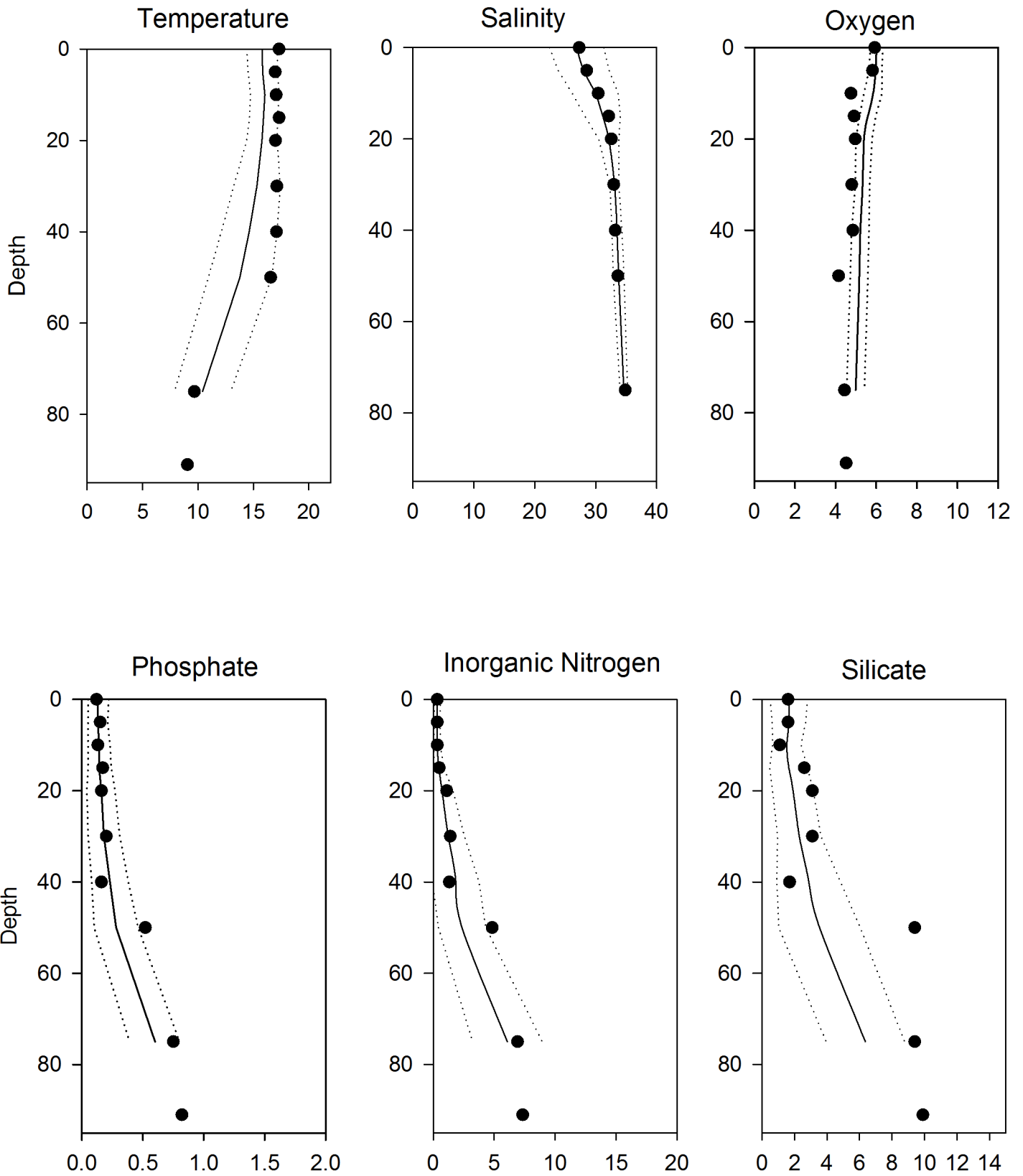


OXYGEN IN BOTTOM WATER (depth >75m)



Vertical profiles P2 September

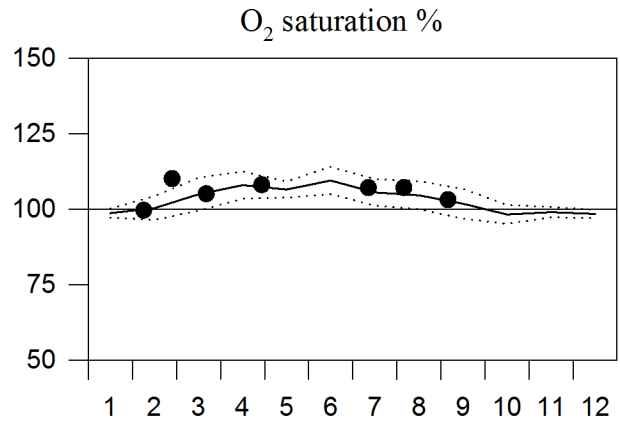
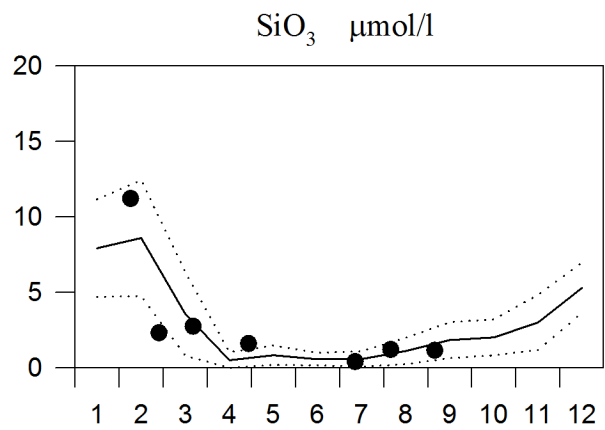
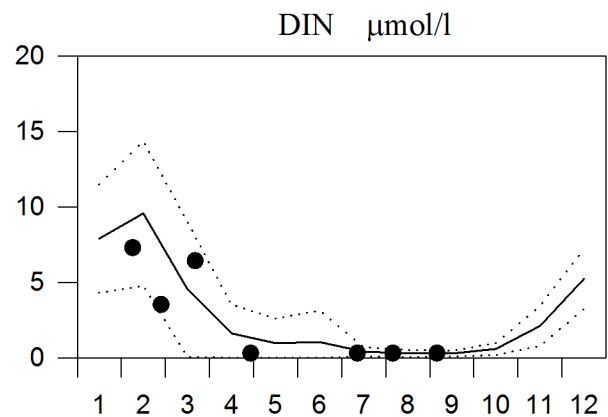
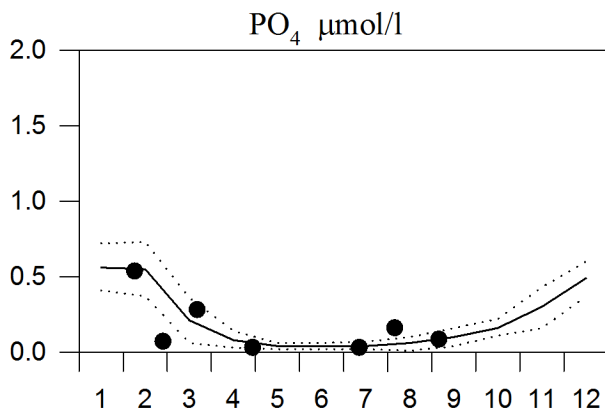
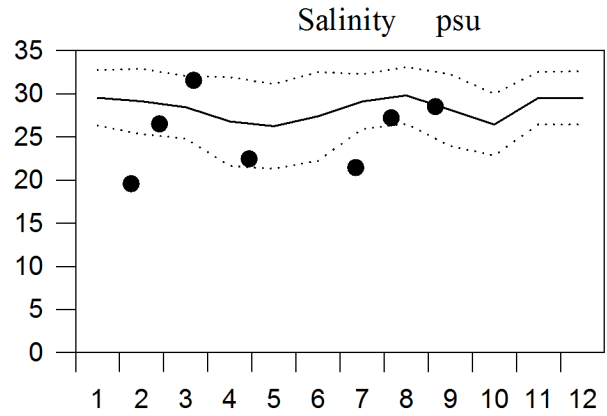
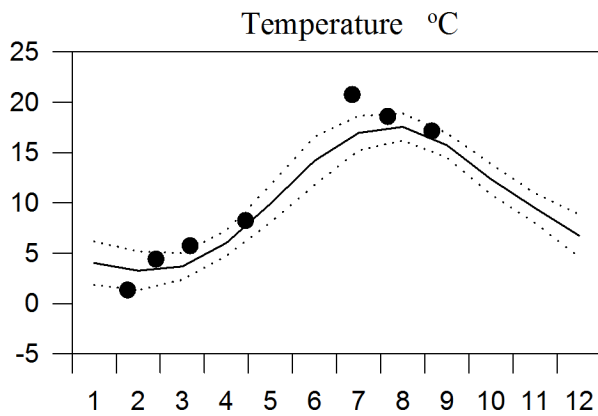
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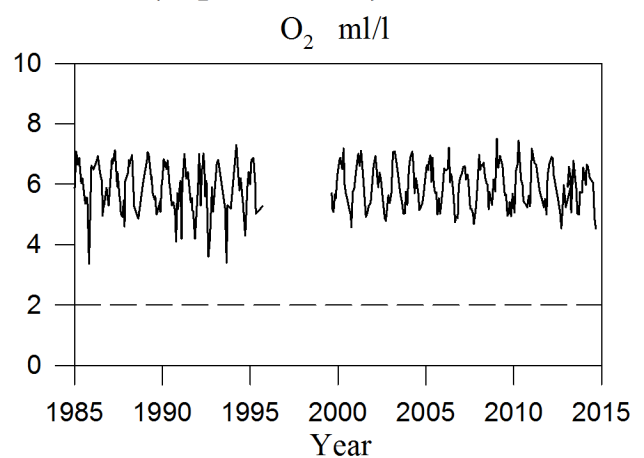
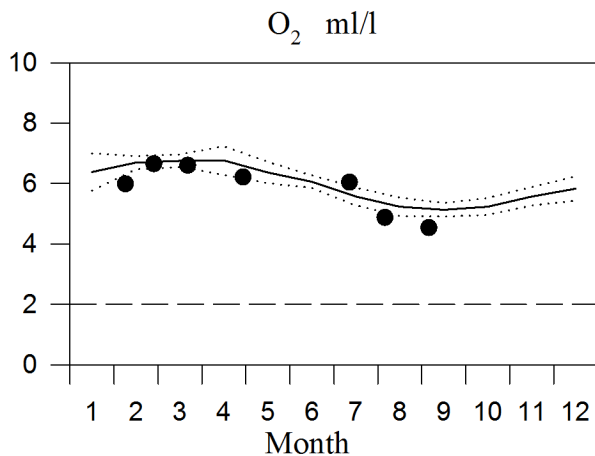
STATION Å13 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

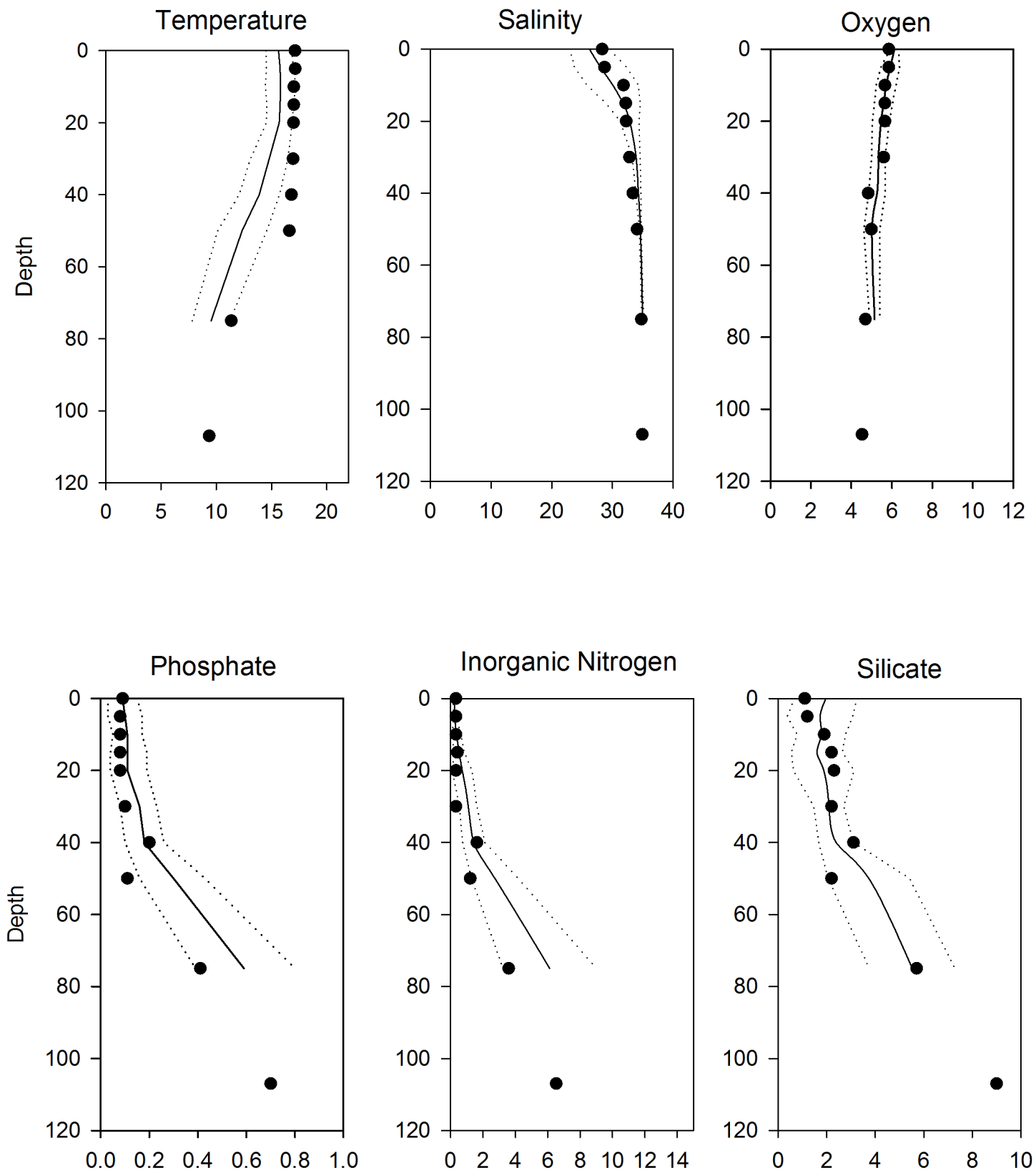


OXYGEN IN BOTTOM WATER (depth >=75m)



Vertical profiles Å13 September

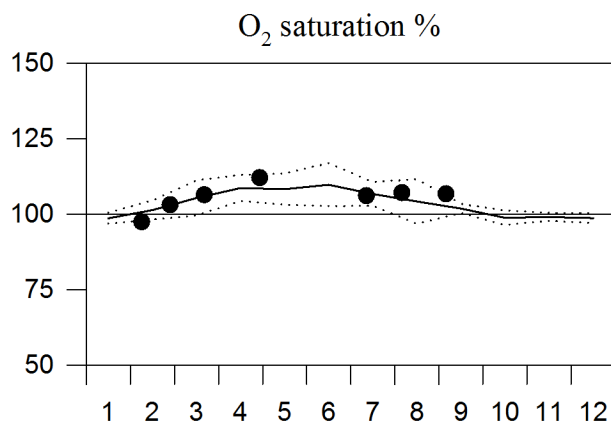
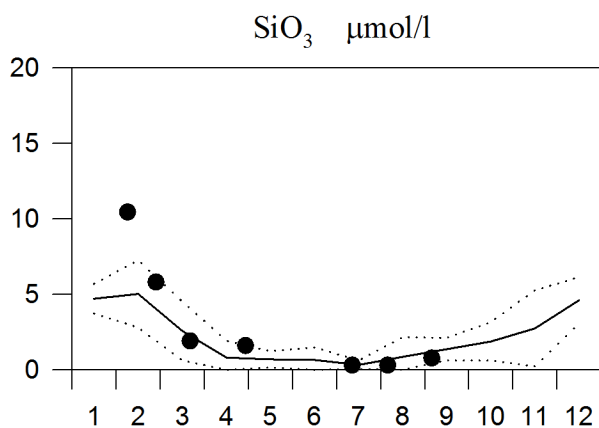
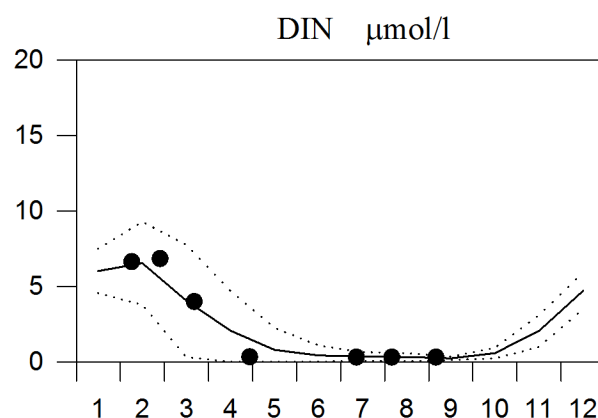
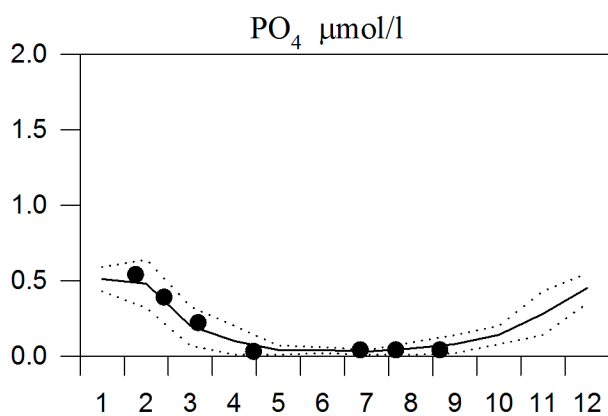
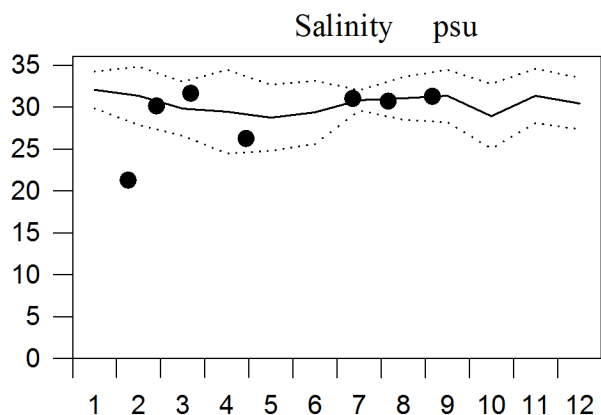
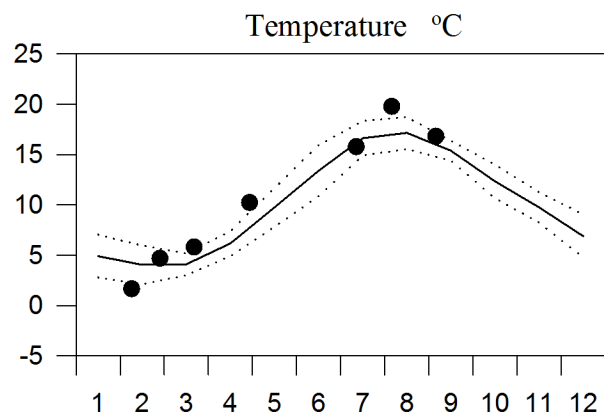
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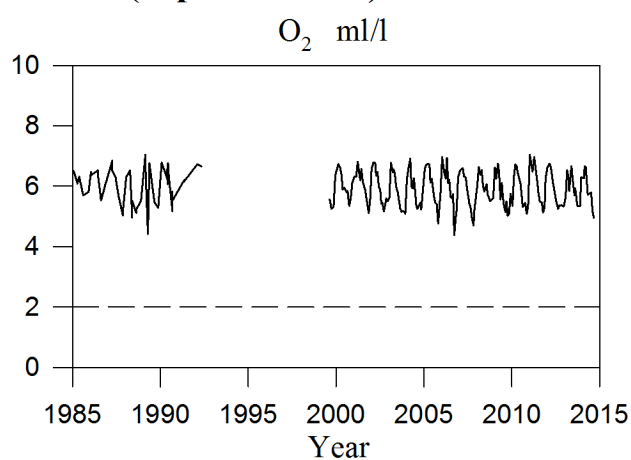
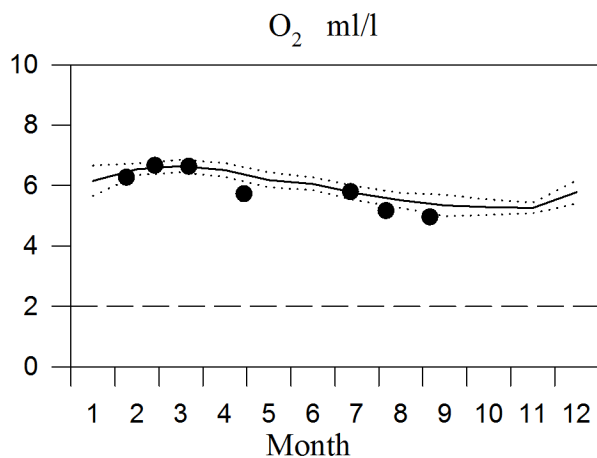
STATION Å15 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

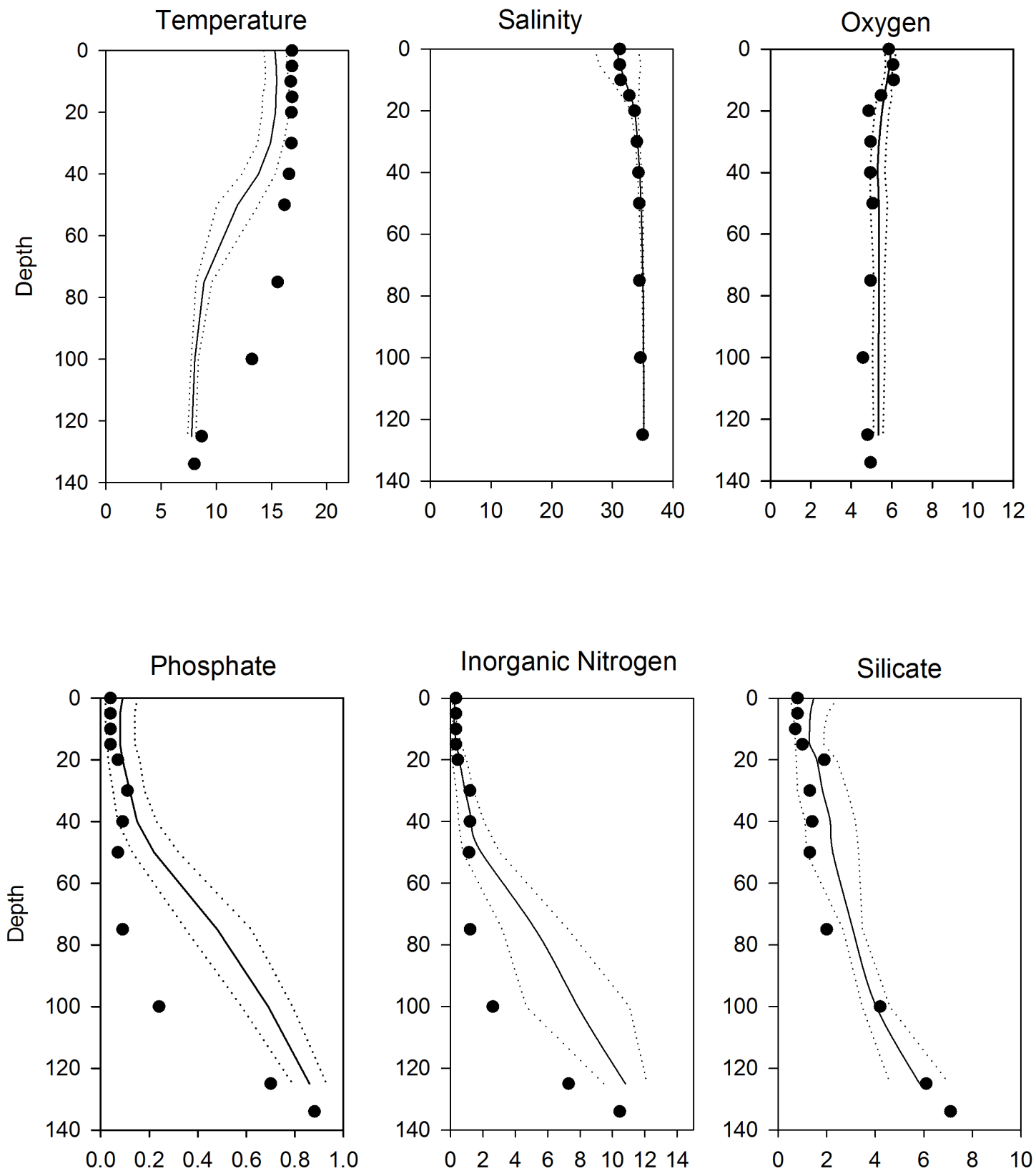


OXYGEN IN BOTTOM WATER (depth >=125m)



Vertical profiles Å15 September

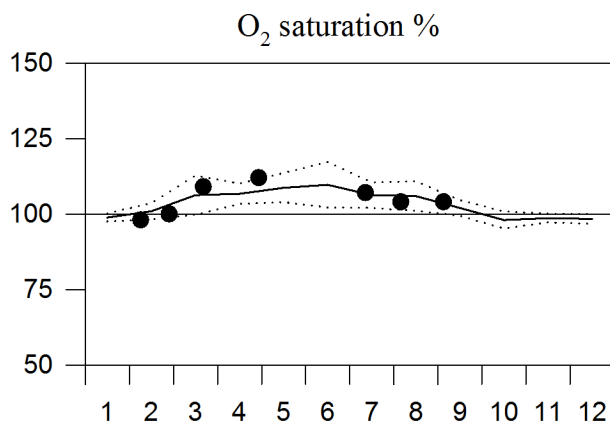
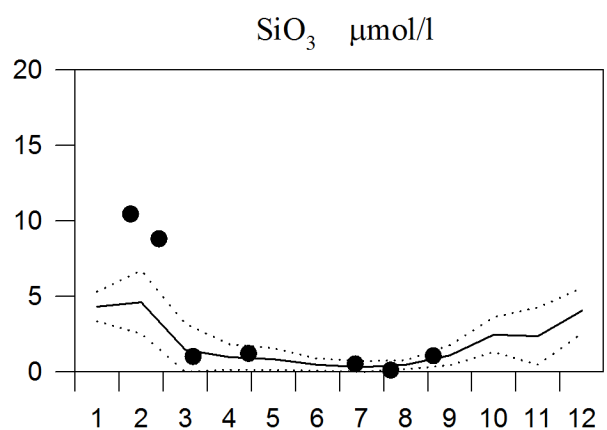
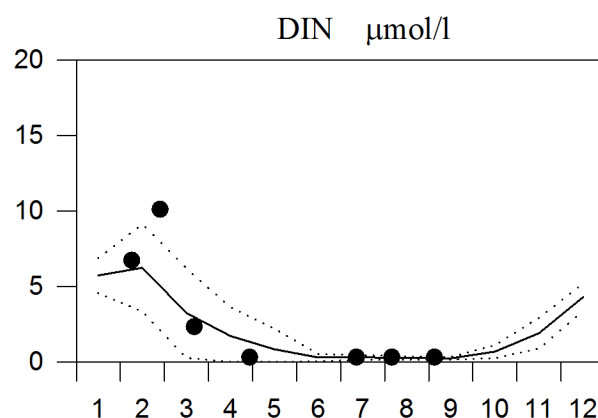
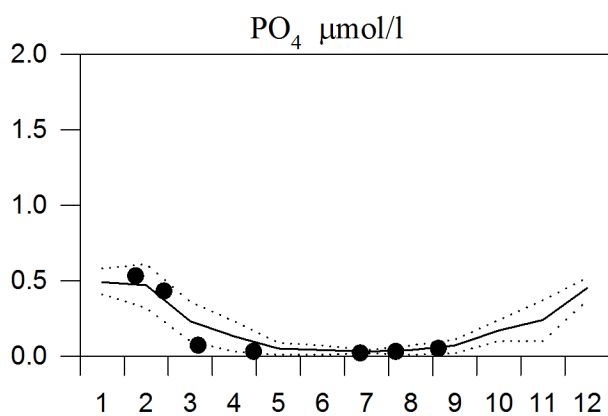
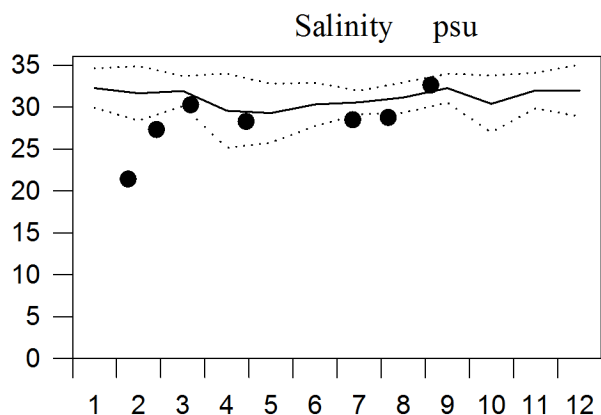
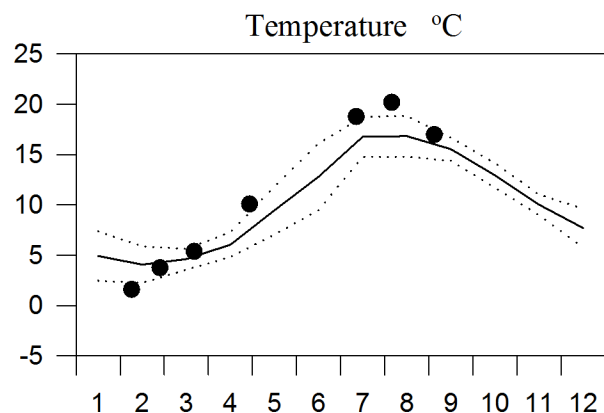
—— Mean 1996-2010 St.Dev. ● 2014



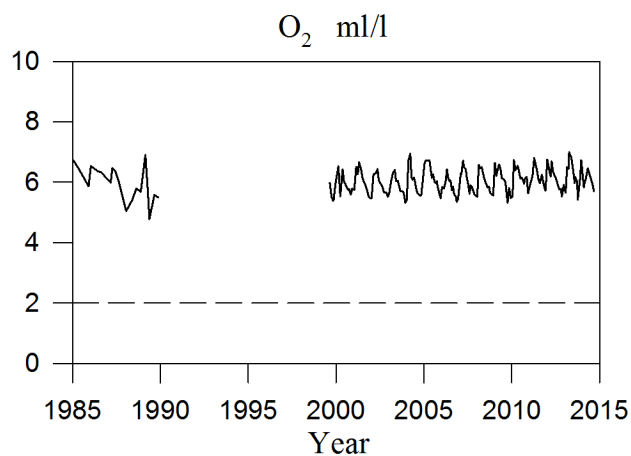
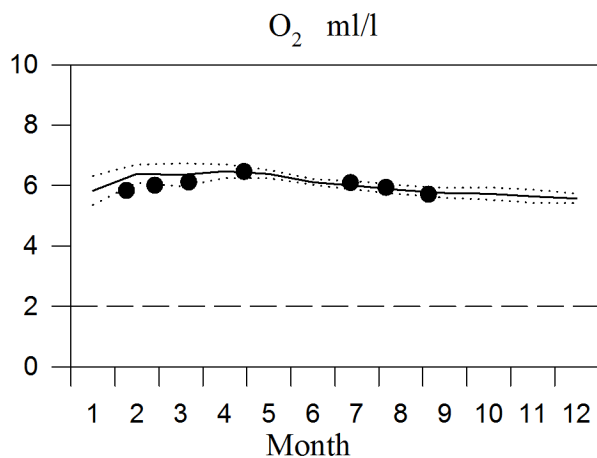
STATION Å17 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014



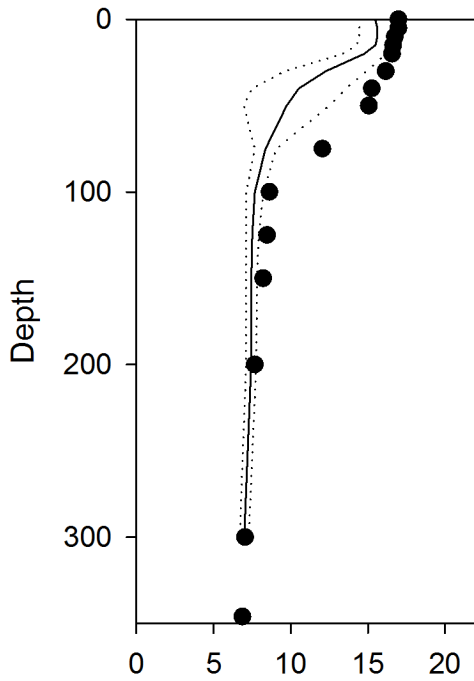
OXYGEN IN BOTTOM WATER (depth = 300m)



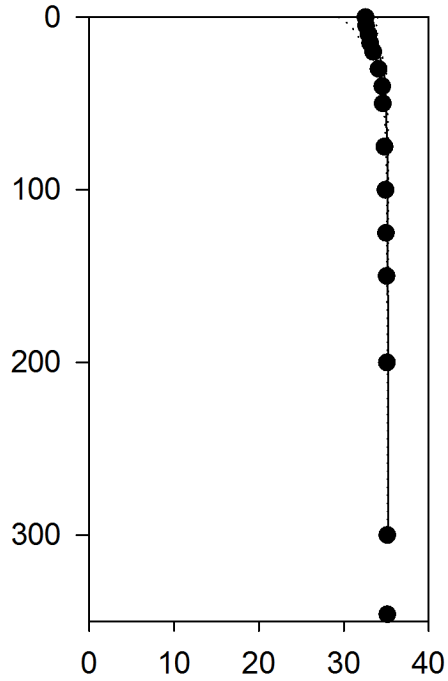
Vertical profiles Å17 September

— Mean 1996-2010 St.Dev. ● 2014

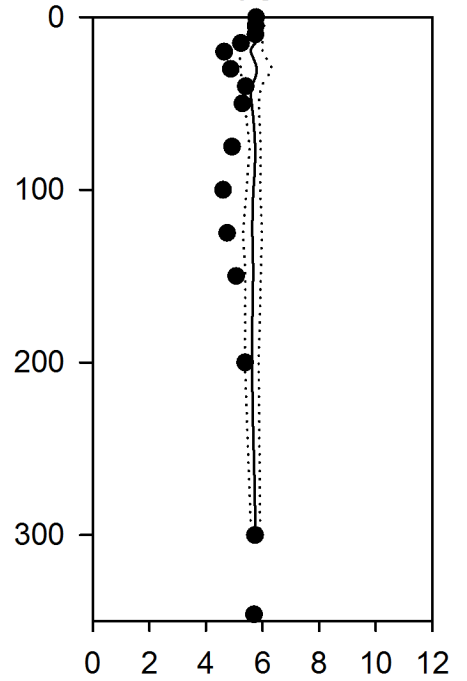
Temperature



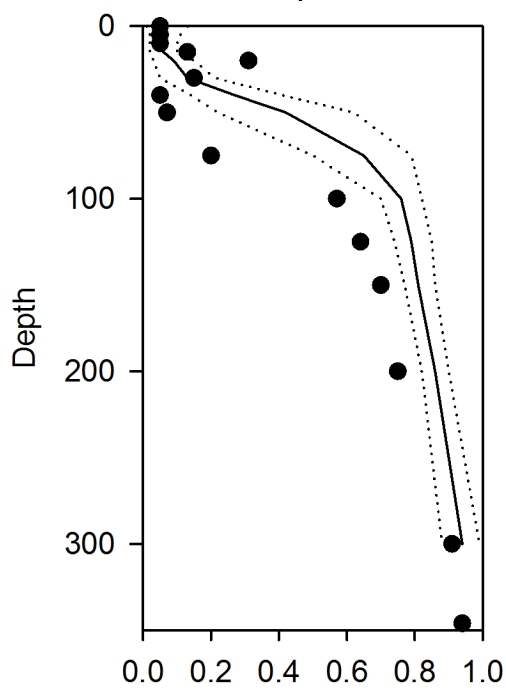
Salinity



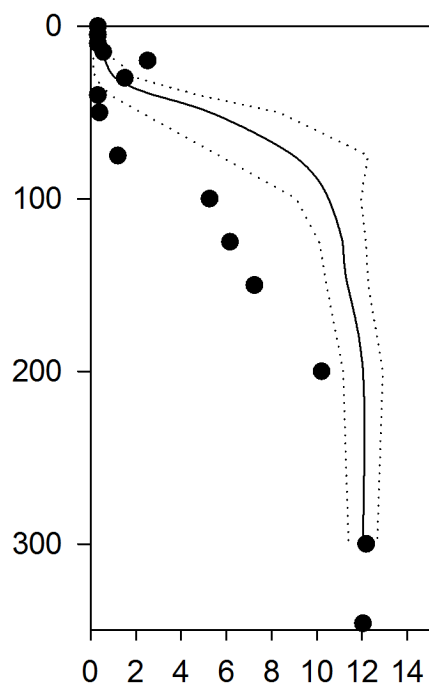
Oxygen



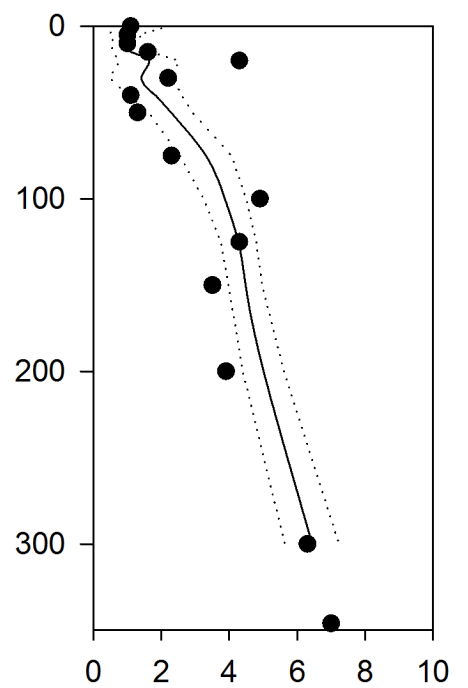
Phosphate



Inorganic Nitrogen



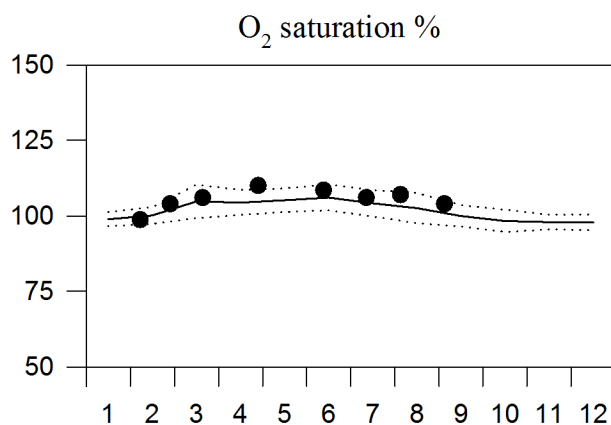
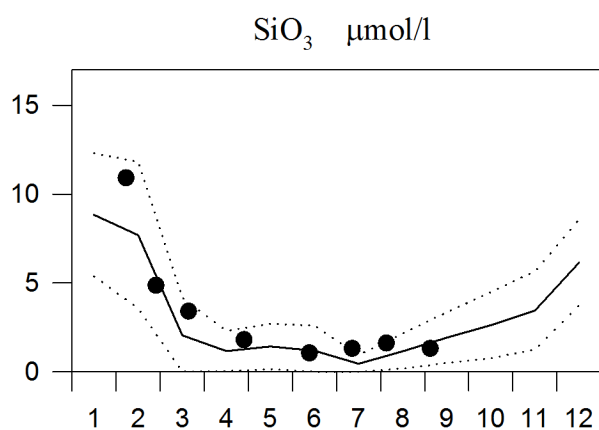
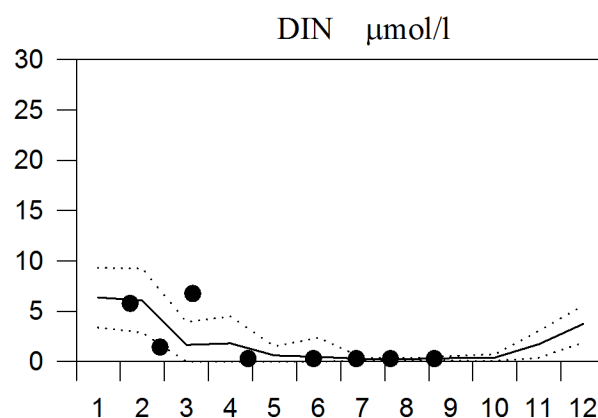
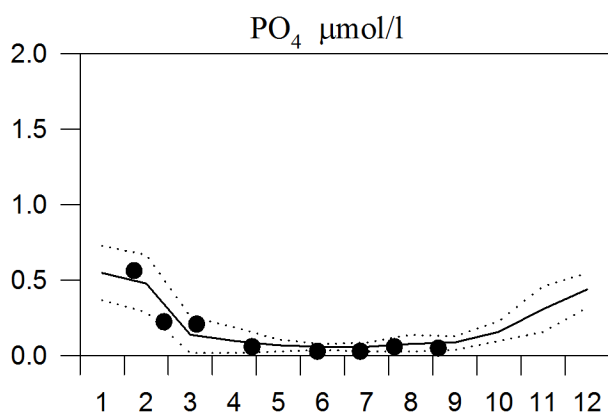
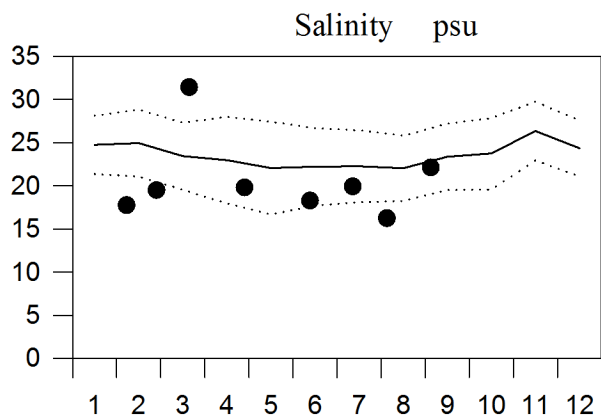
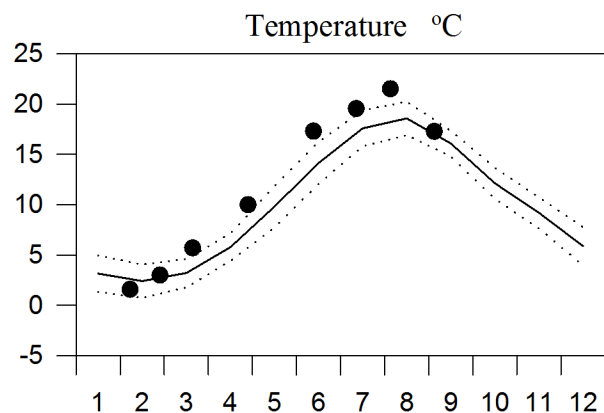
Silicate



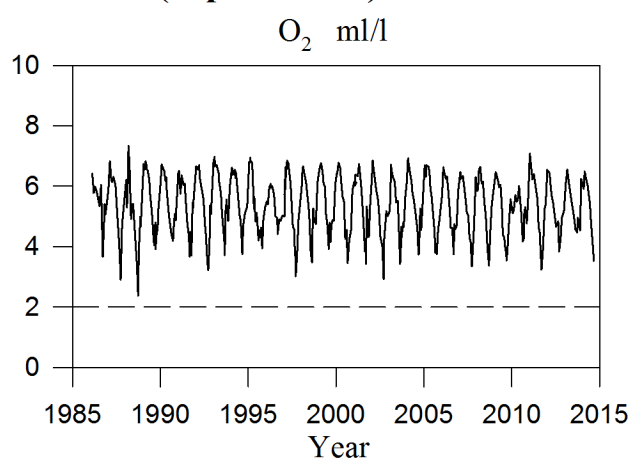
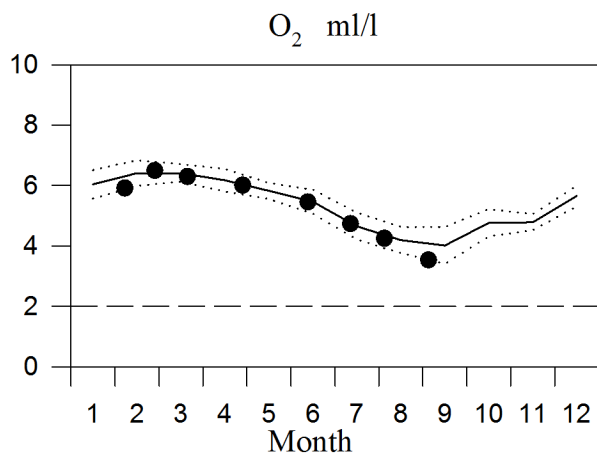
STATION FLADEN SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

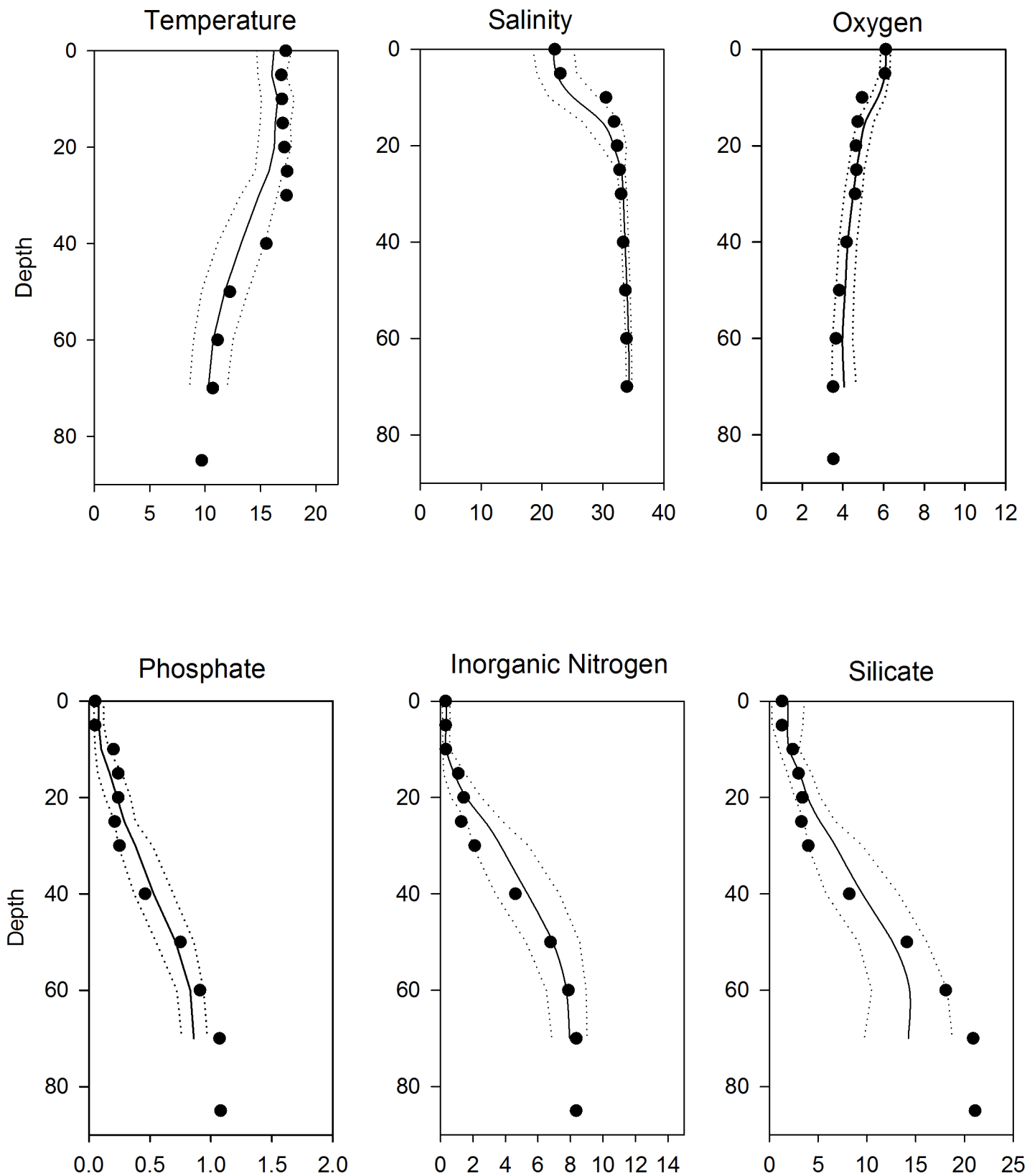


OXYGEN IN BOTTOM WATER (depth > 70m)



Vertical profiles Fladen September

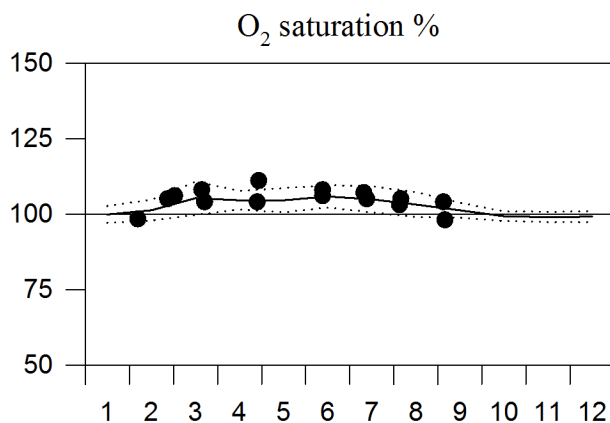
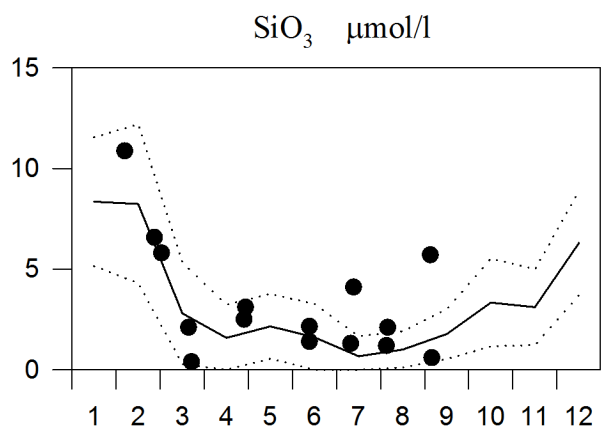
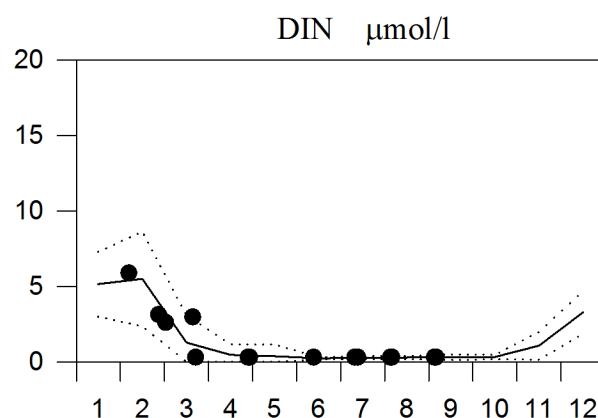
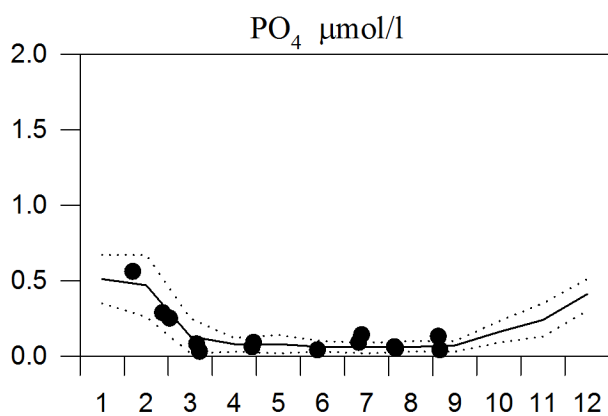
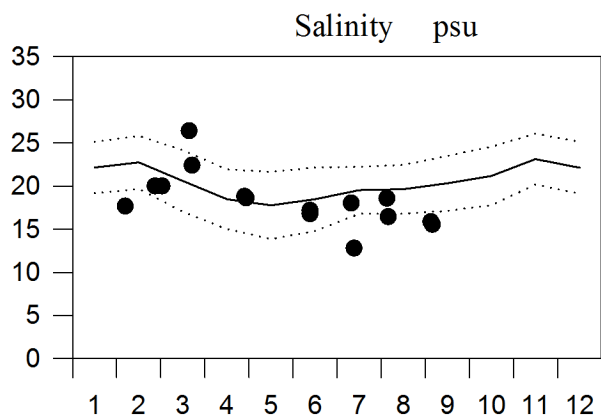
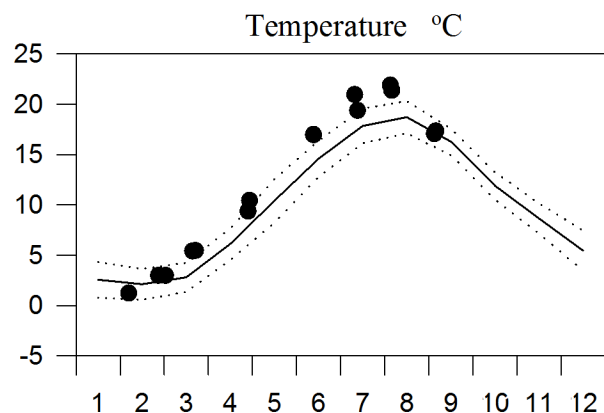
—— Mean 1996-2010 St.Dev. ● 2014



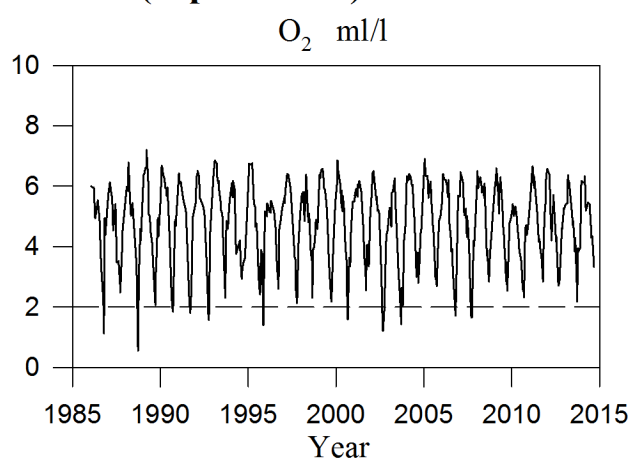
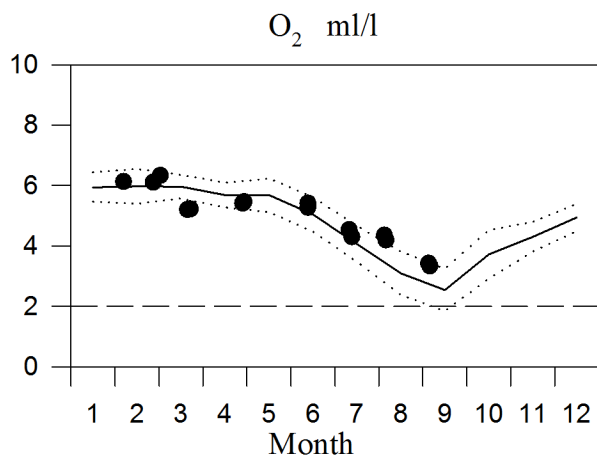
STATION ANHOLT E SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

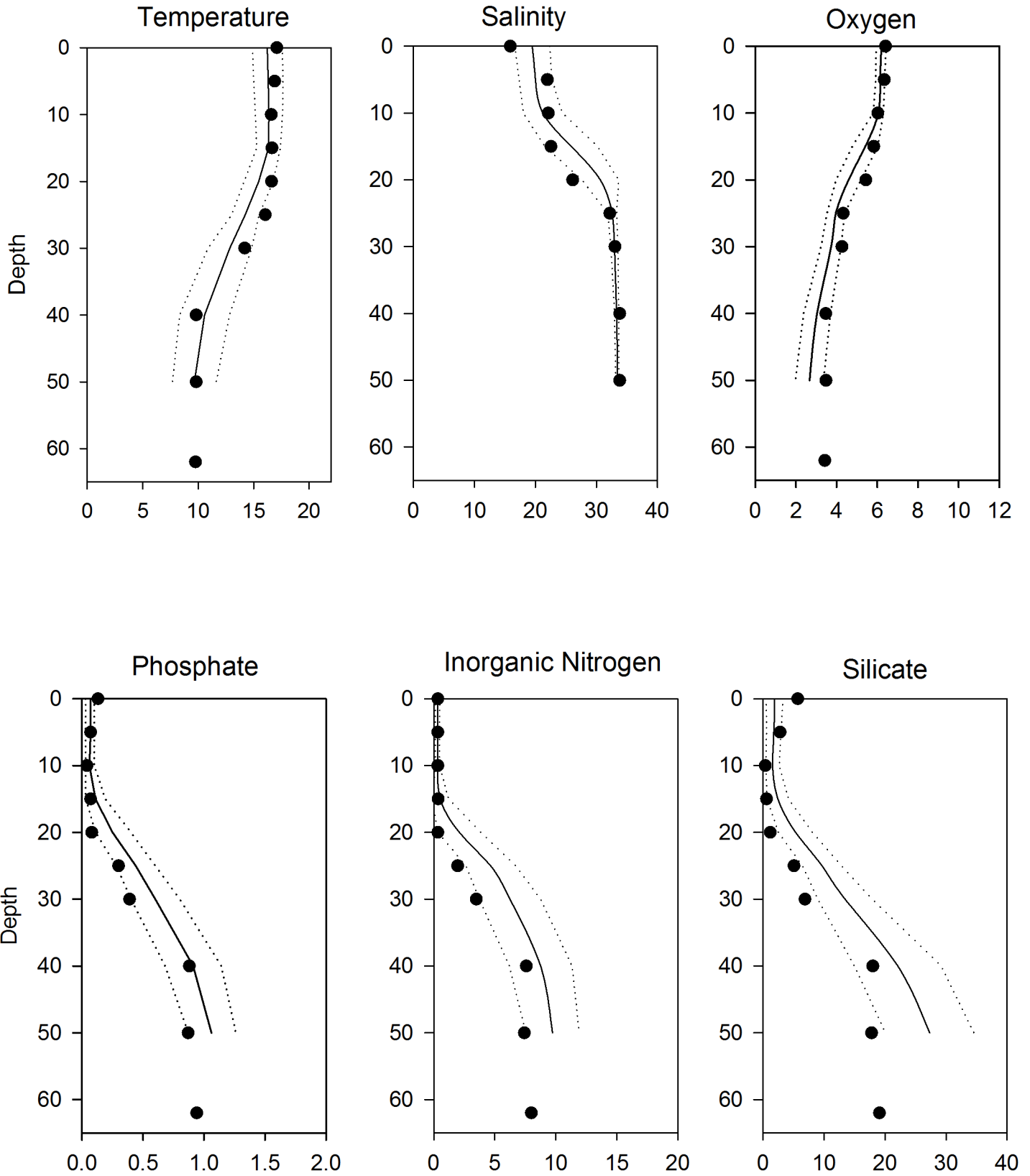


OXYGEN IN BOTTOM WATER (depth > 50m)



Vertical profiles Anholt E September

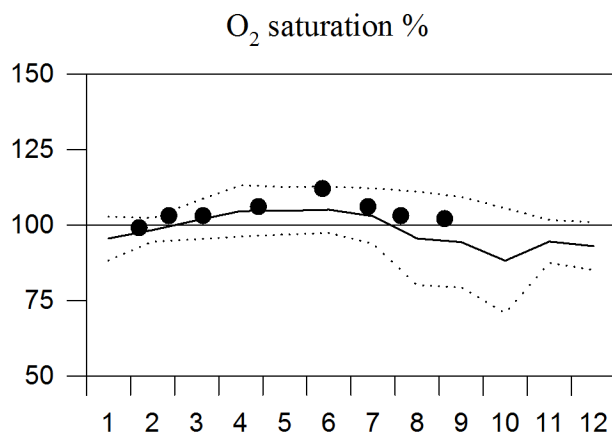
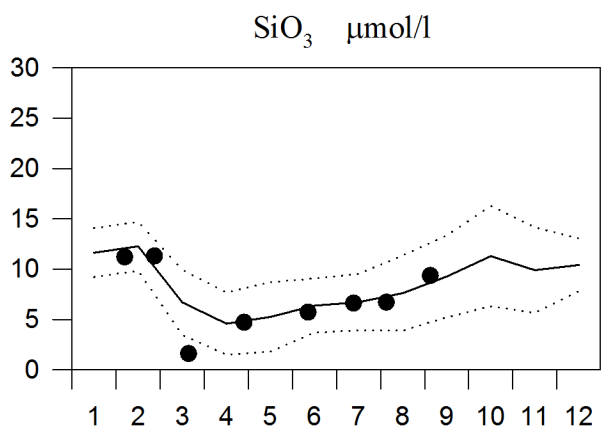
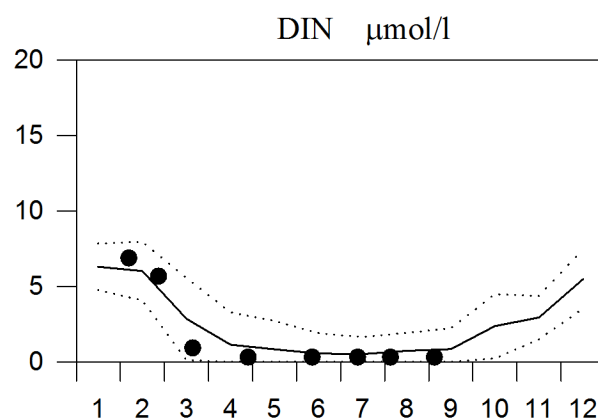
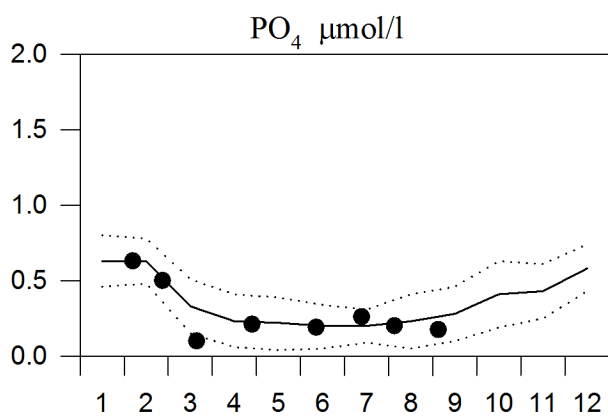
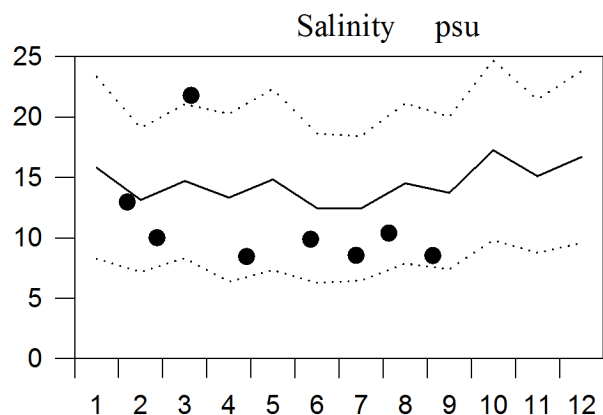
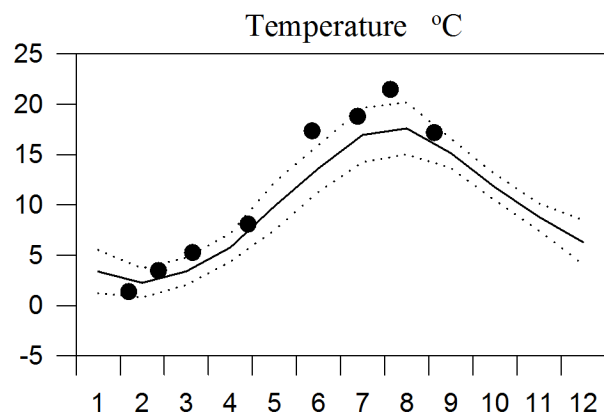
— Mean 1996-2010 St.Dev. ● 2014



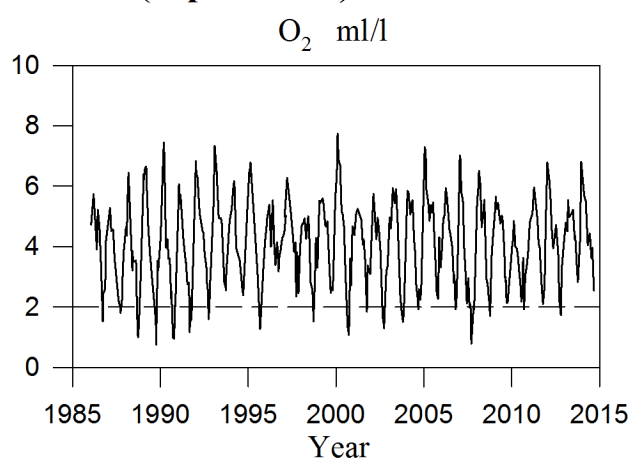
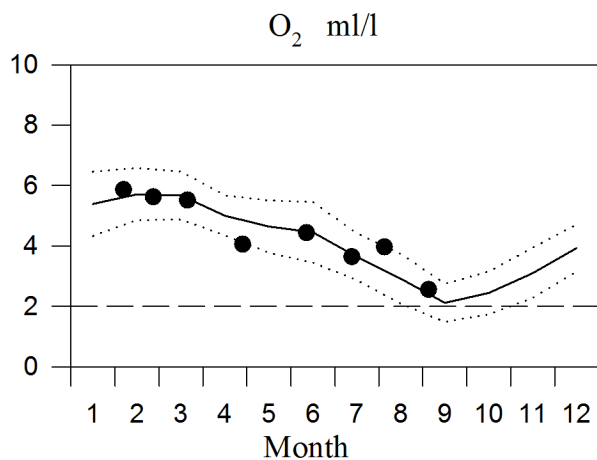
STATION W LANDSKRONA SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

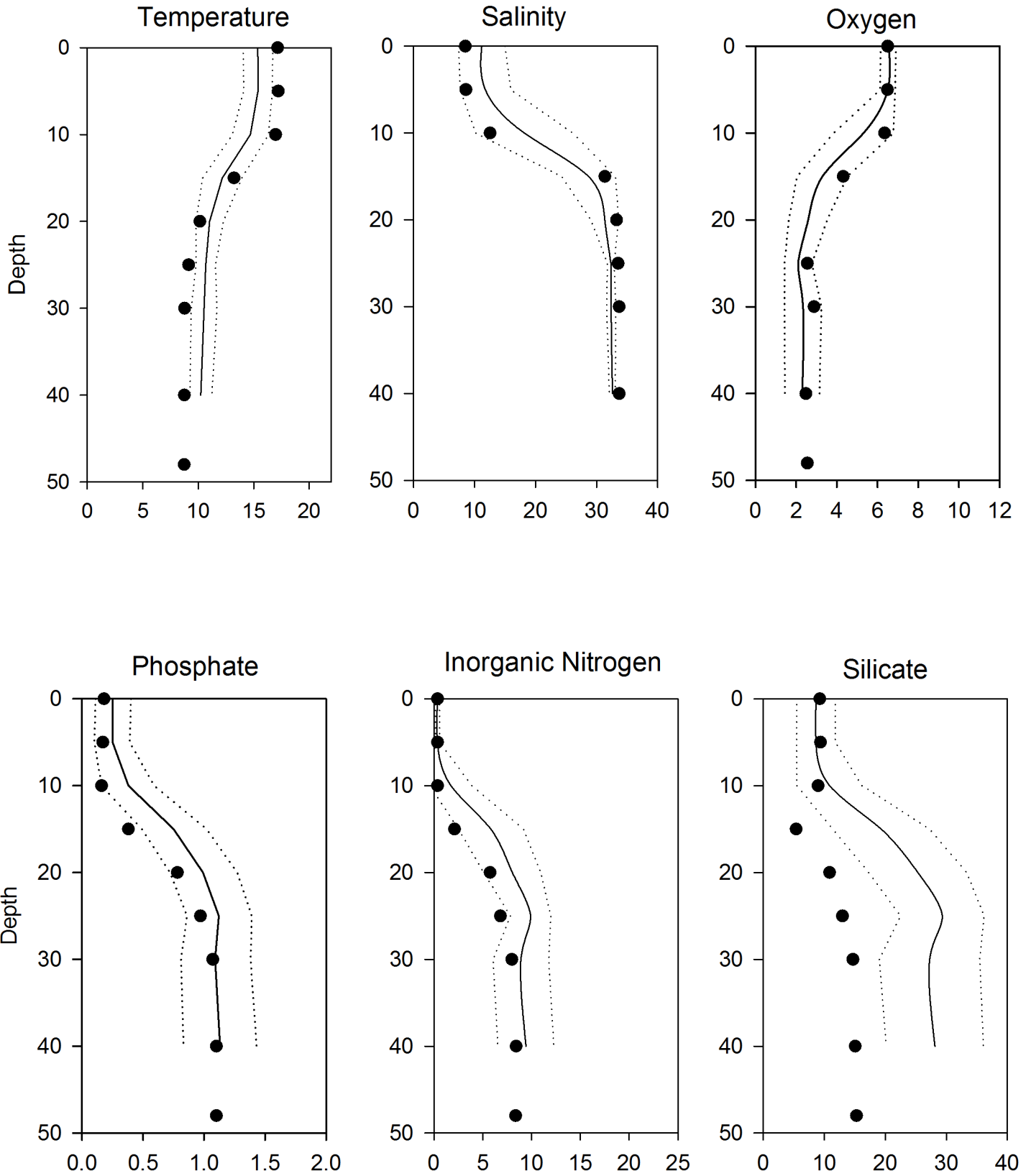


OXYGEN IN BOTTOM WATER (depth >40m)



Vertical profiles W Landskrona September

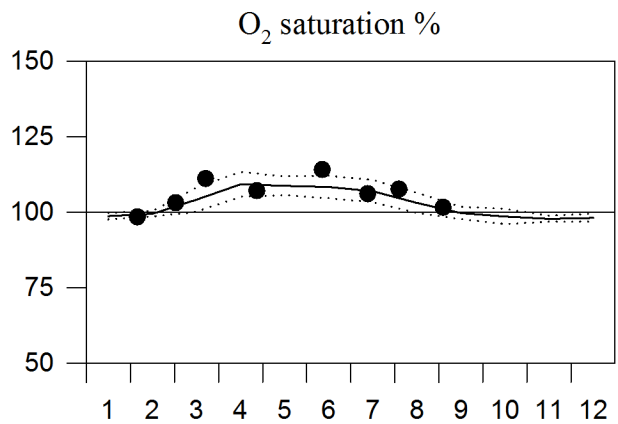
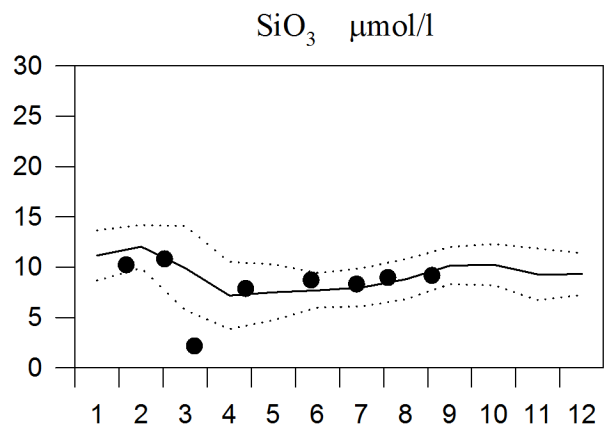
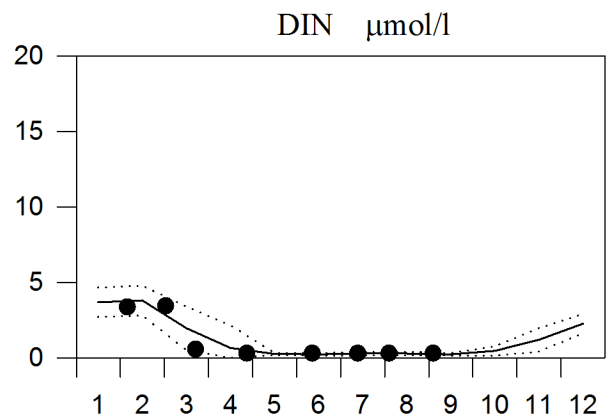
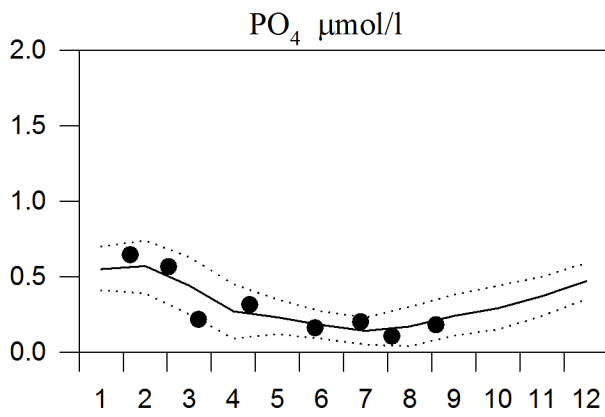
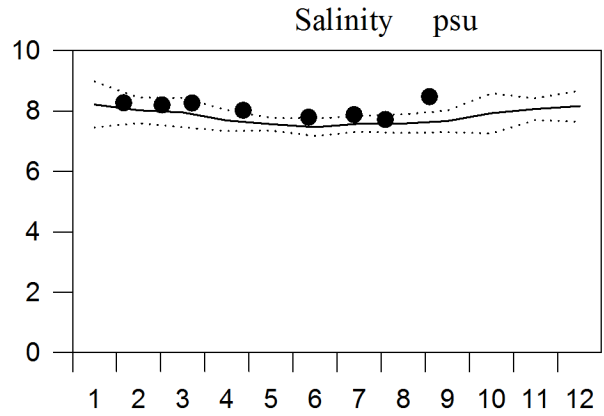
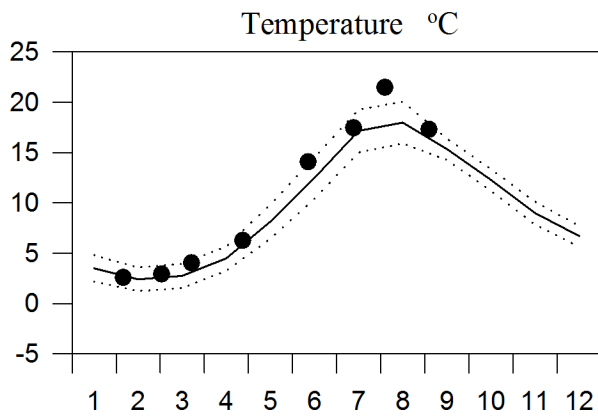
— Mean 1996-2010 St.Dev. ● 2014



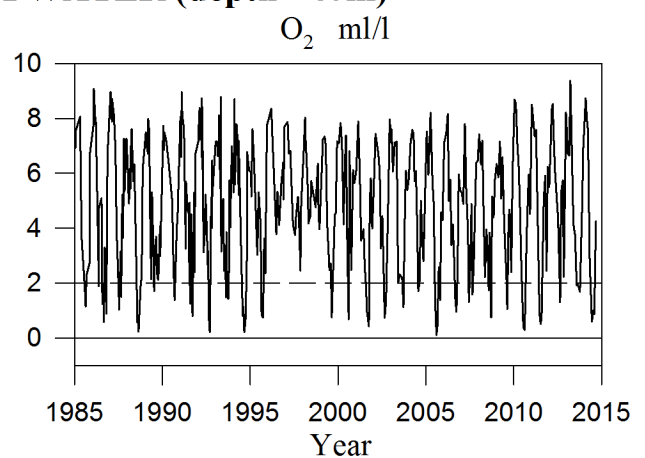
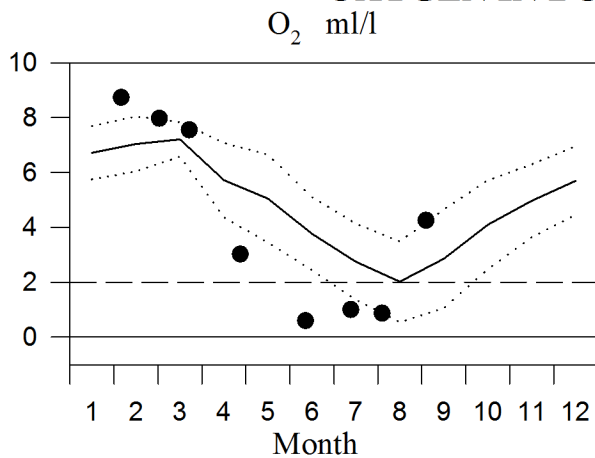
STATION BY1 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

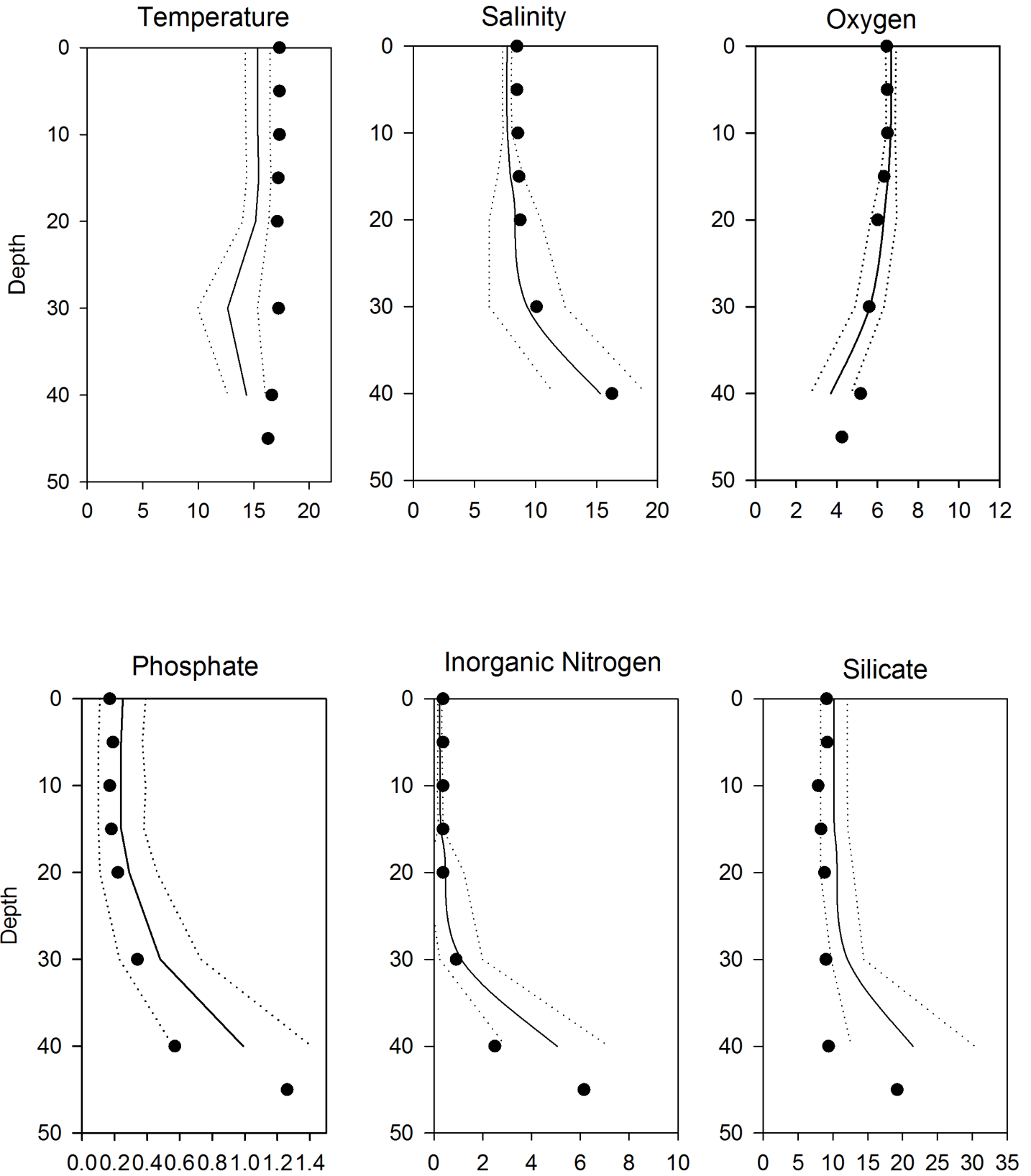


OXYGEN IN BOTTOM WATER (depth >40m)



Vertical profiles BY1 September

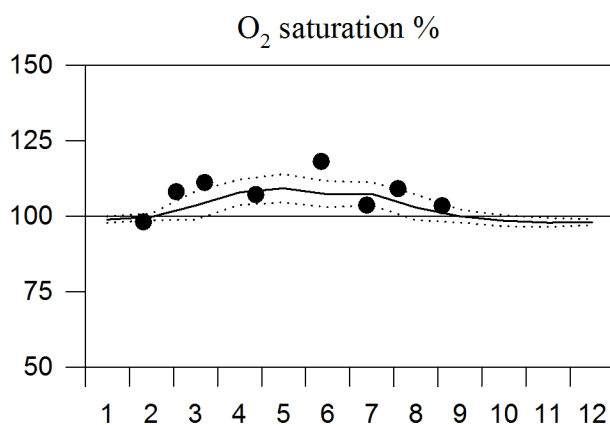
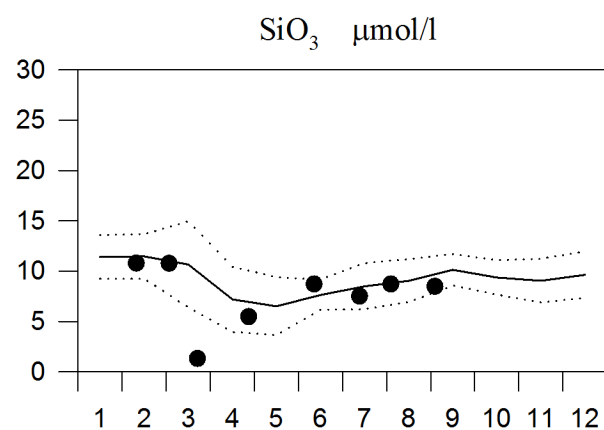
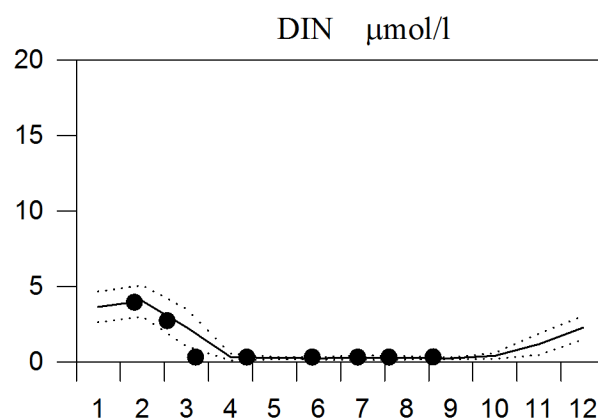
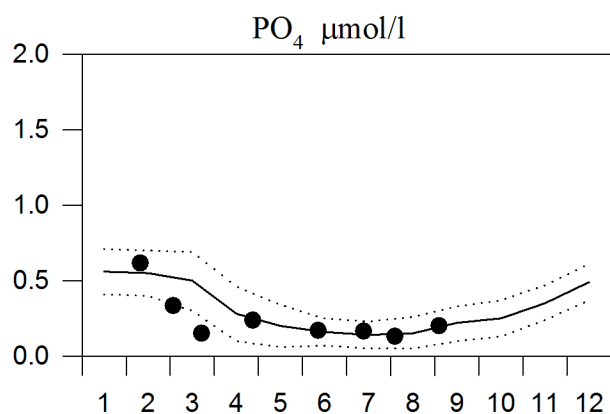
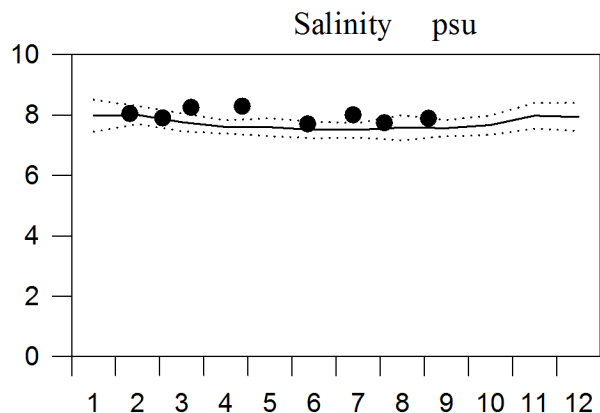
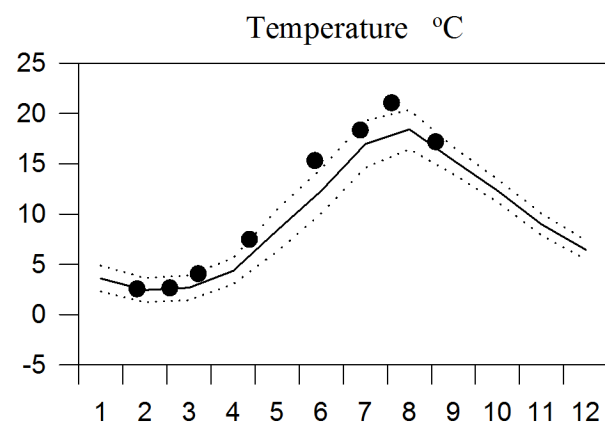
— Mean 1996-2010 St.Dev. ● 2014



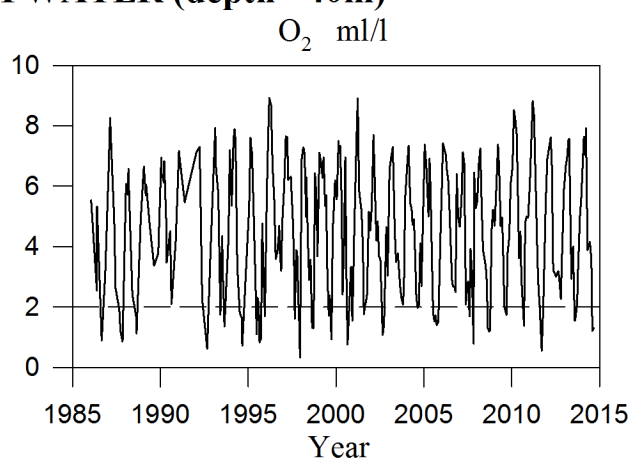
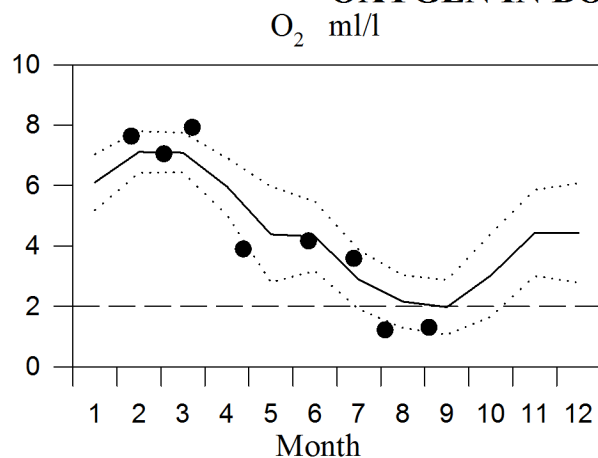
STATION BY2 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

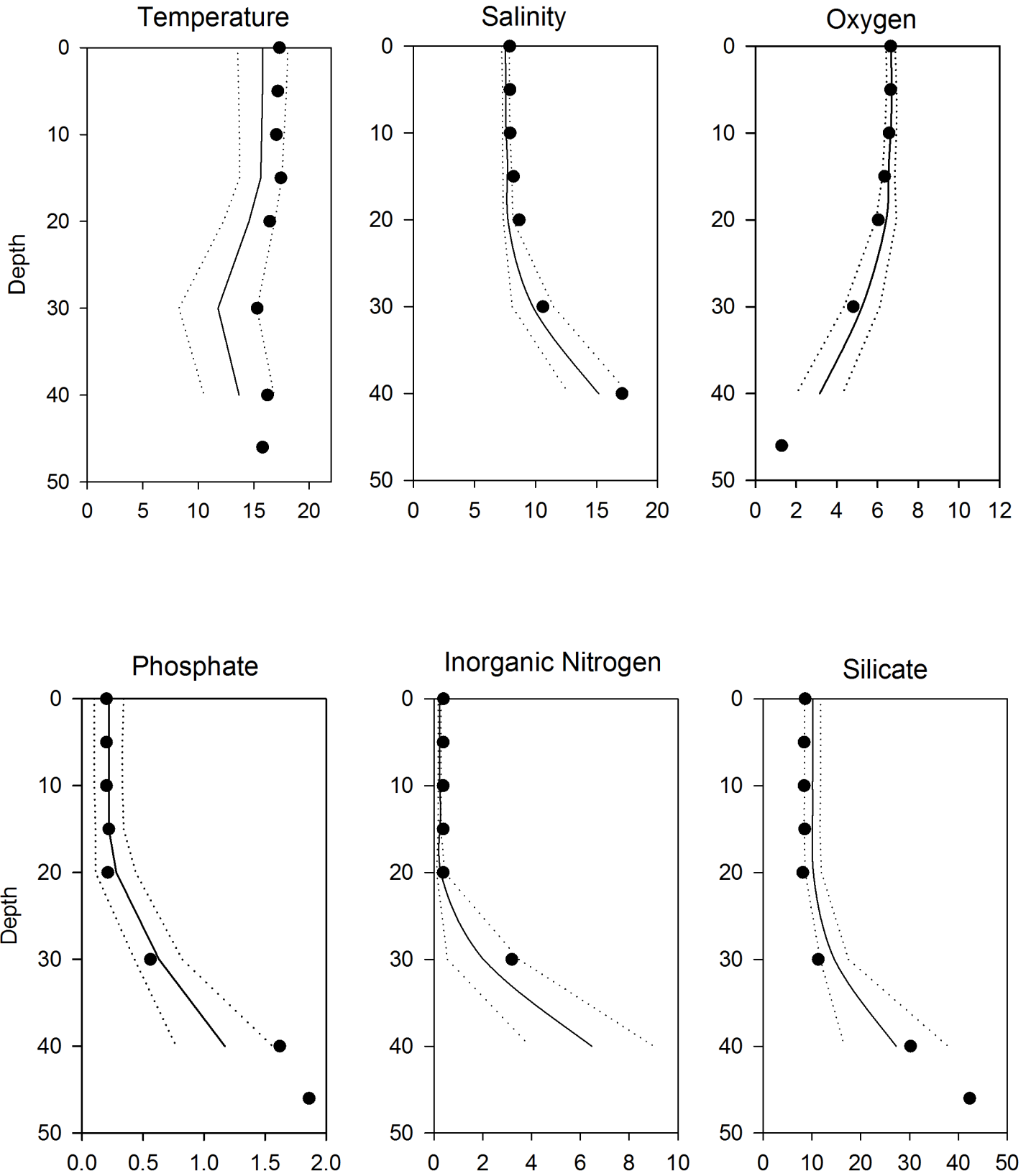


OXYGEN IN BOTTOM WATER (depth >40m)



Vertical profiles BY2 September

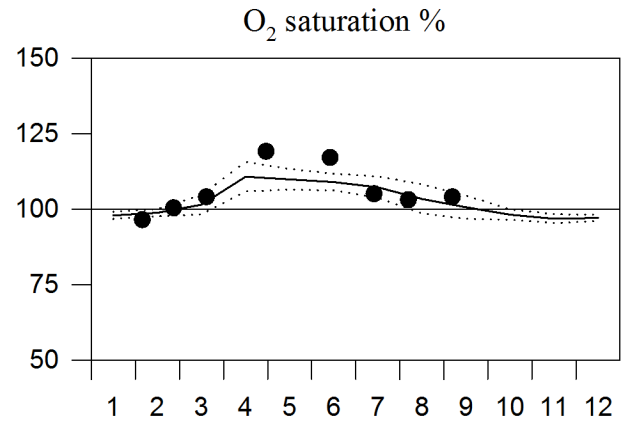
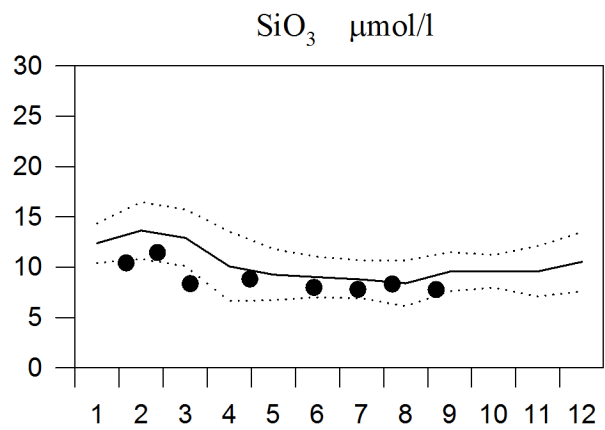
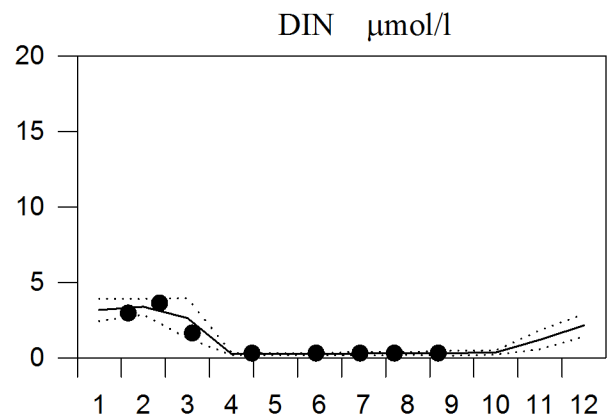
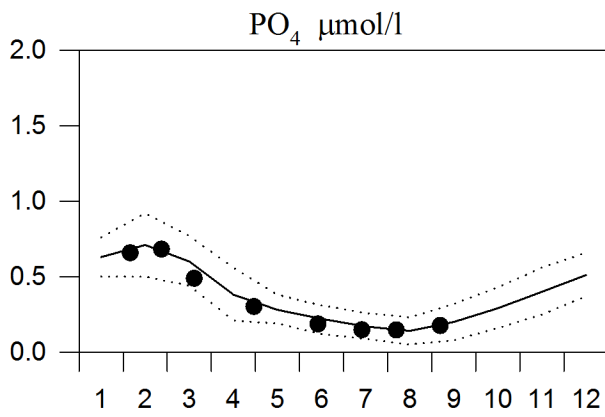
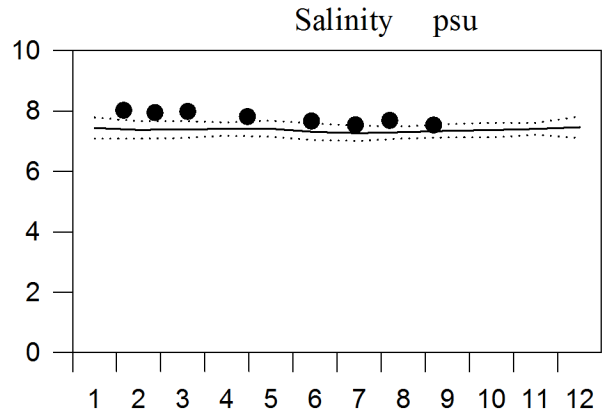
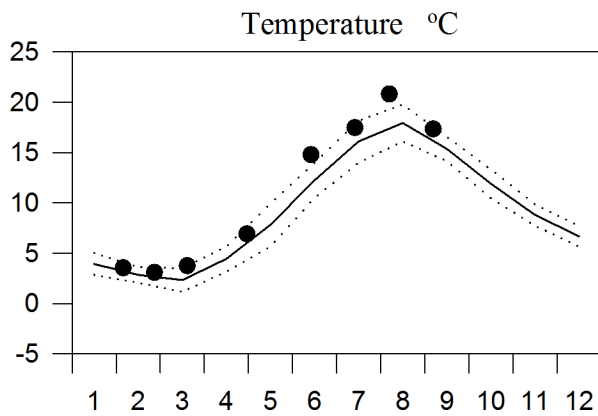
— Mean 1996-2010 St.Dev. ● 2014



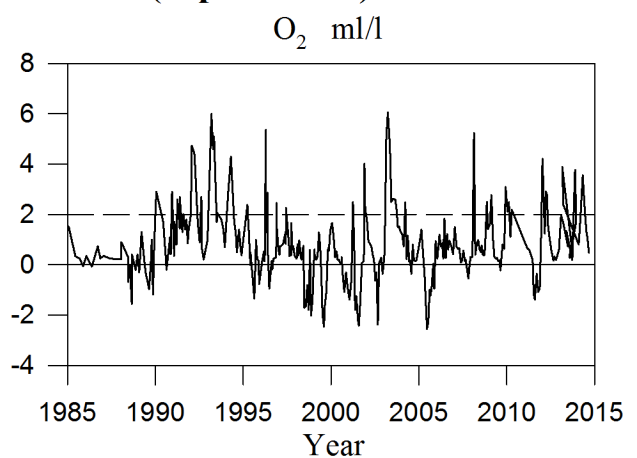
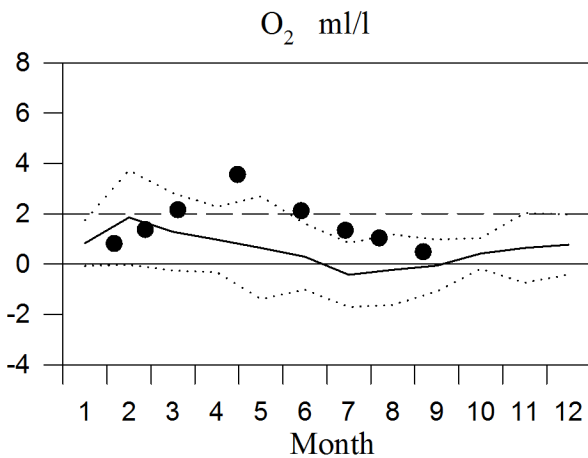
STATION HANÖBUKTEN SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

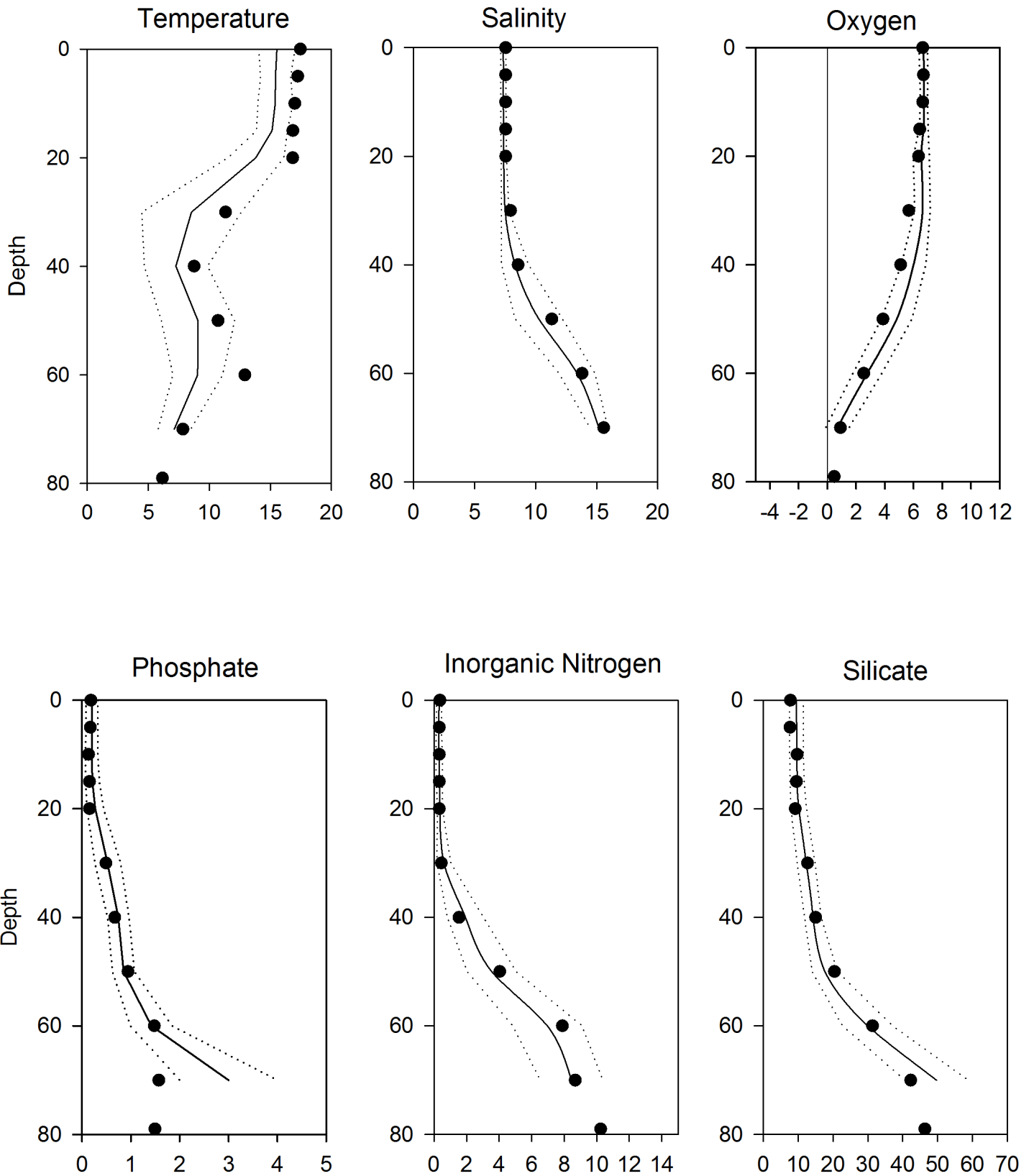


OXYGEN IN BOTTOM WATER (depth > 70m)



Vertical profiles Hanöbukten September

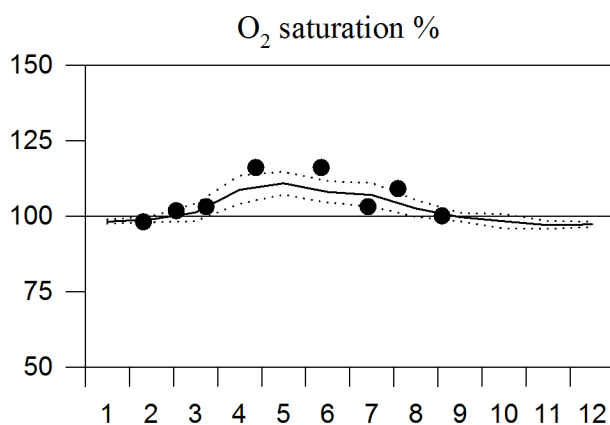
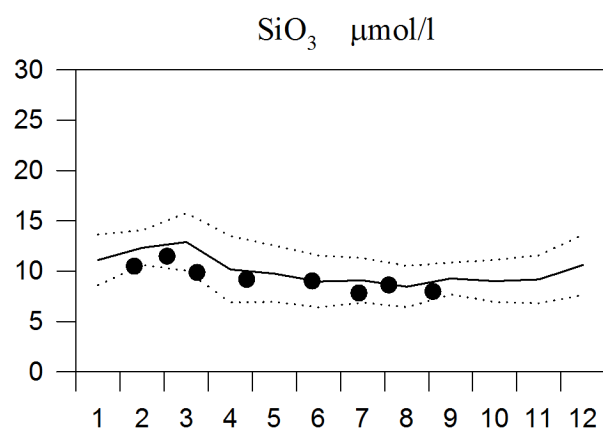
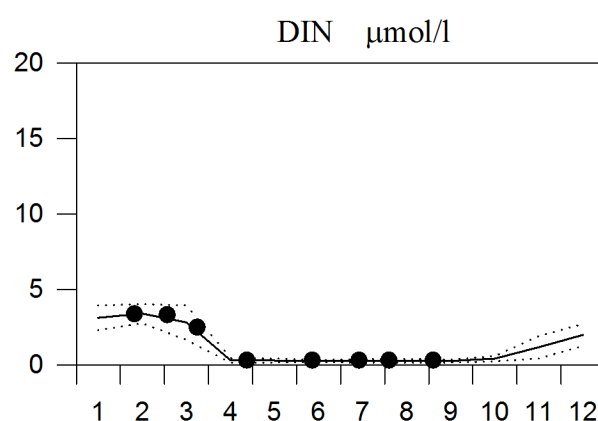
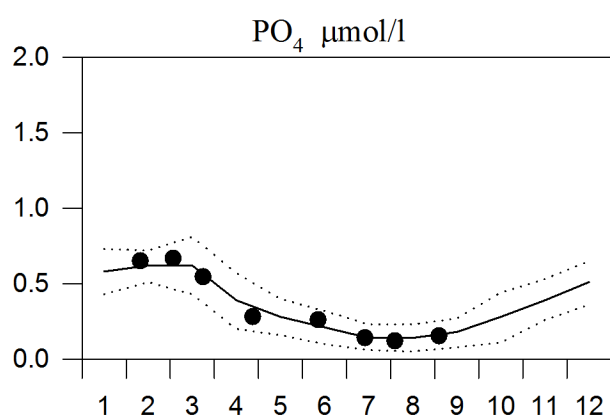
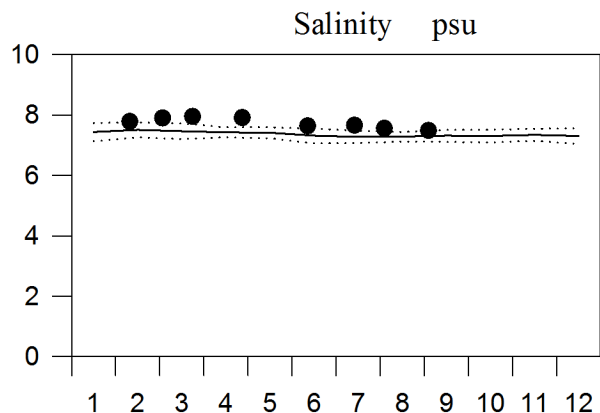
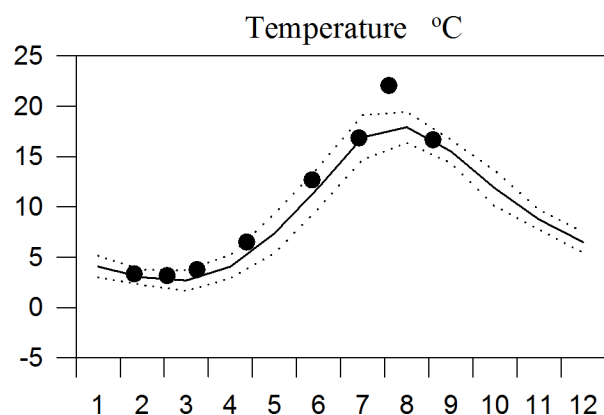
— Mean 1996-2010 St.Dev. ● 2014



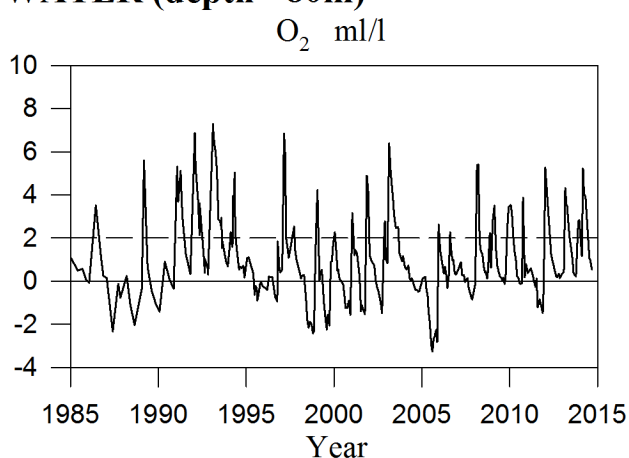
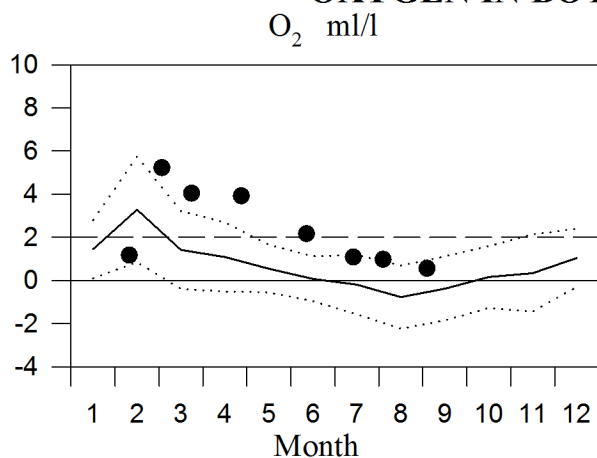
STATION BY4 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014



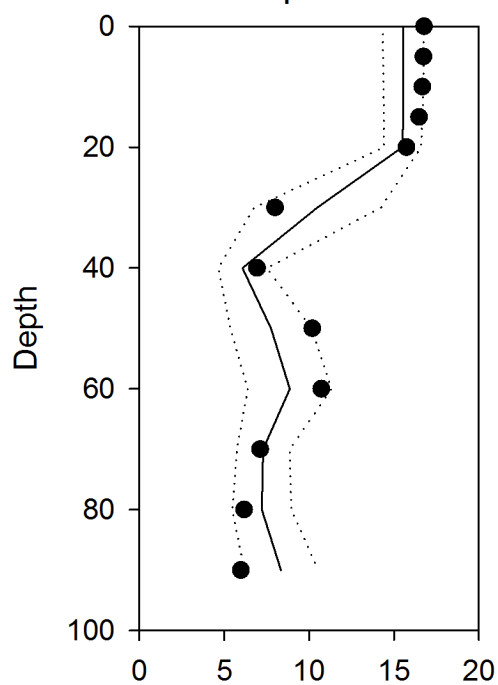
OXYGEN IN BOTTOM WATER (depth >80m)



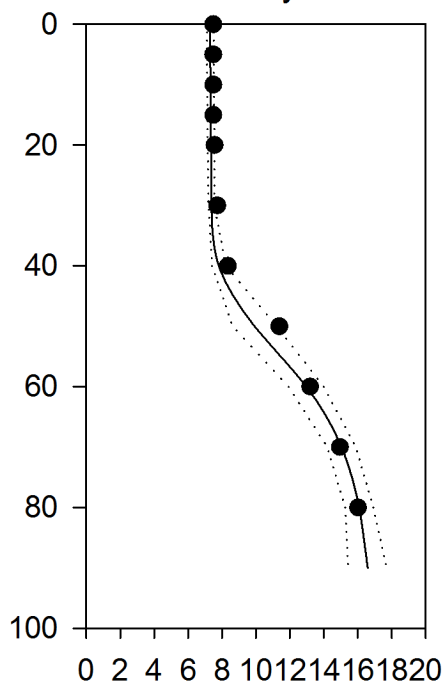
Vertical profiles BY4 September

— Mean 1996-2010 St.Dev. ● 2014

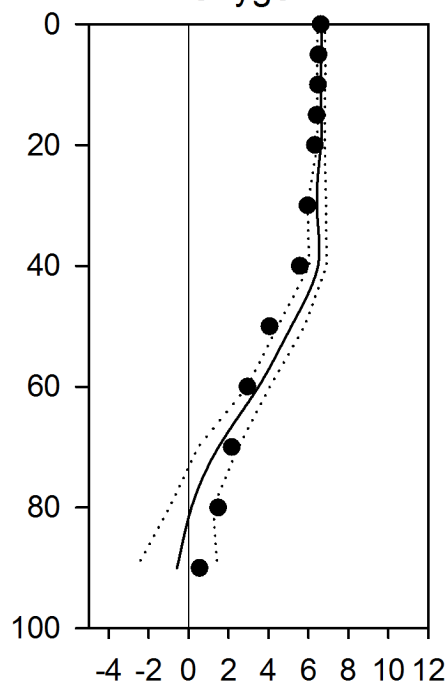
Temperature



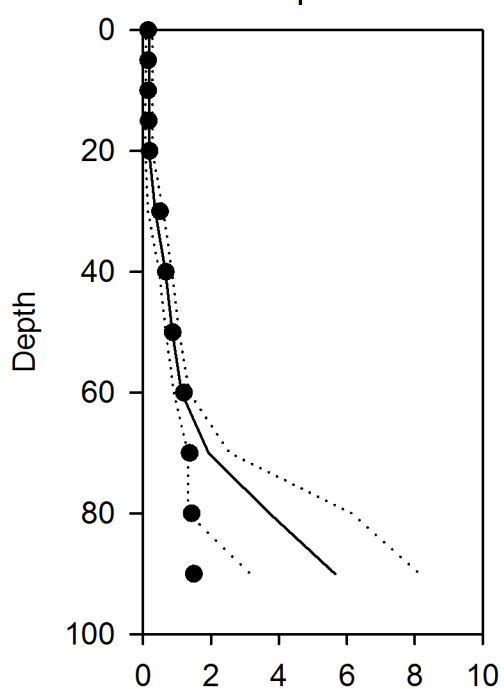
Salinity



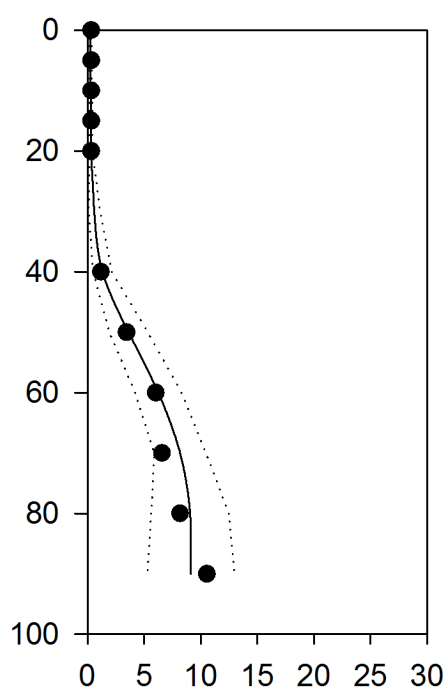
Oxygen



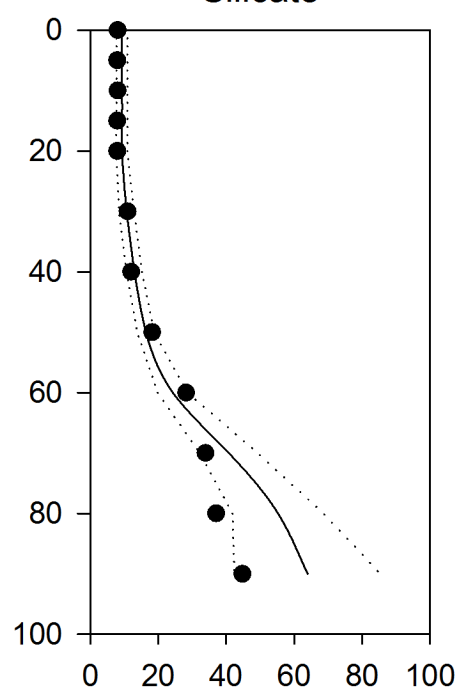
Phosphate



Inorganic Nitrogen



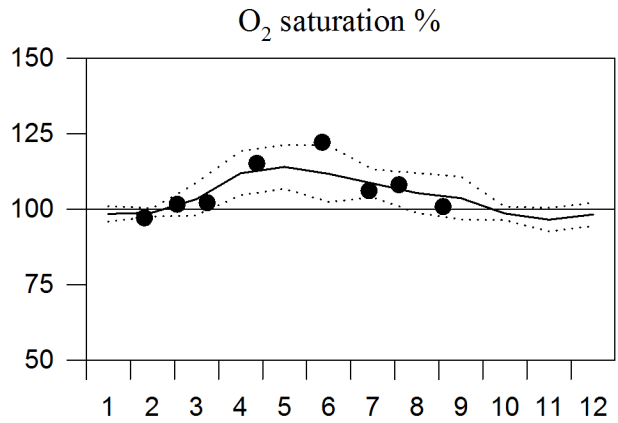
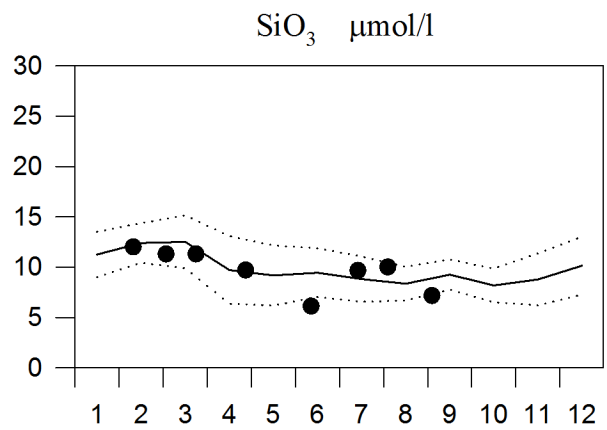
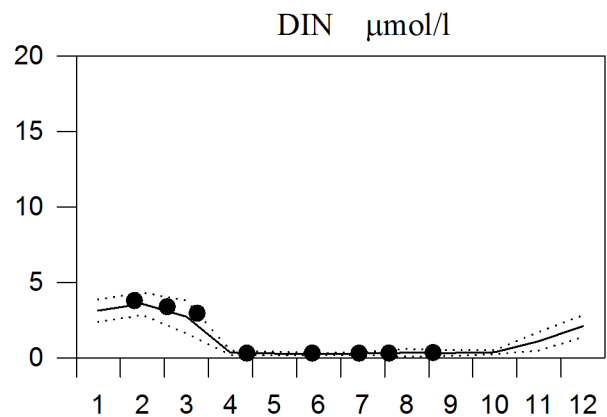
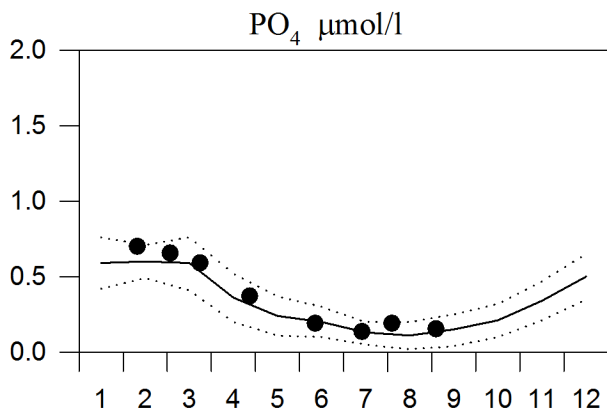
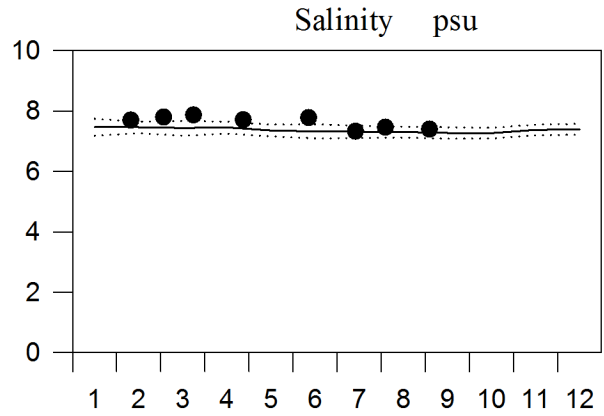
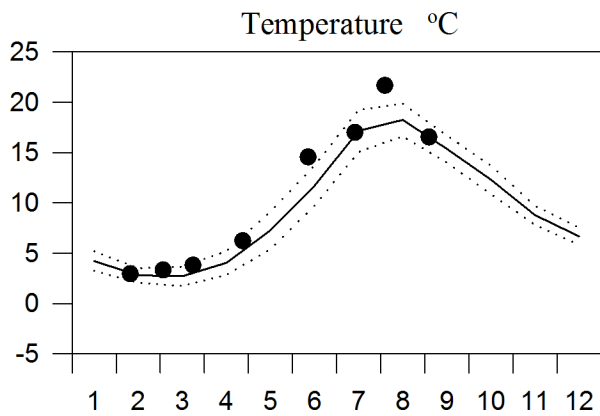
Silicate



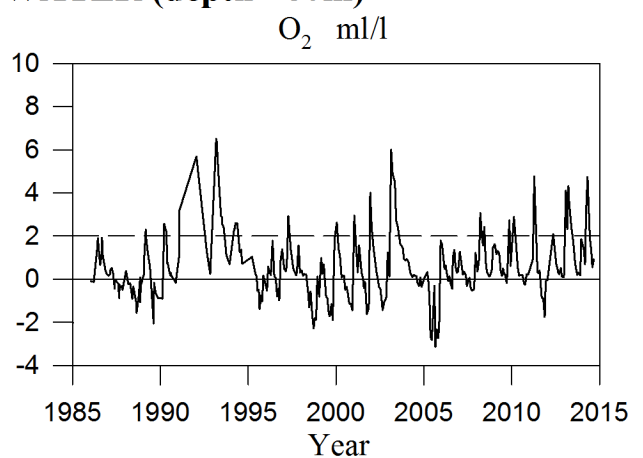
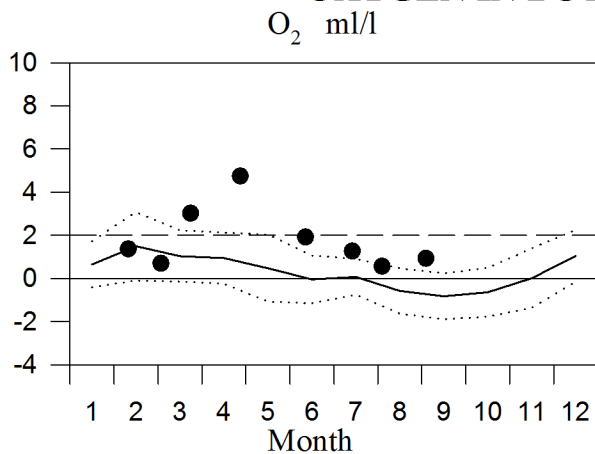
STATION BY5 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

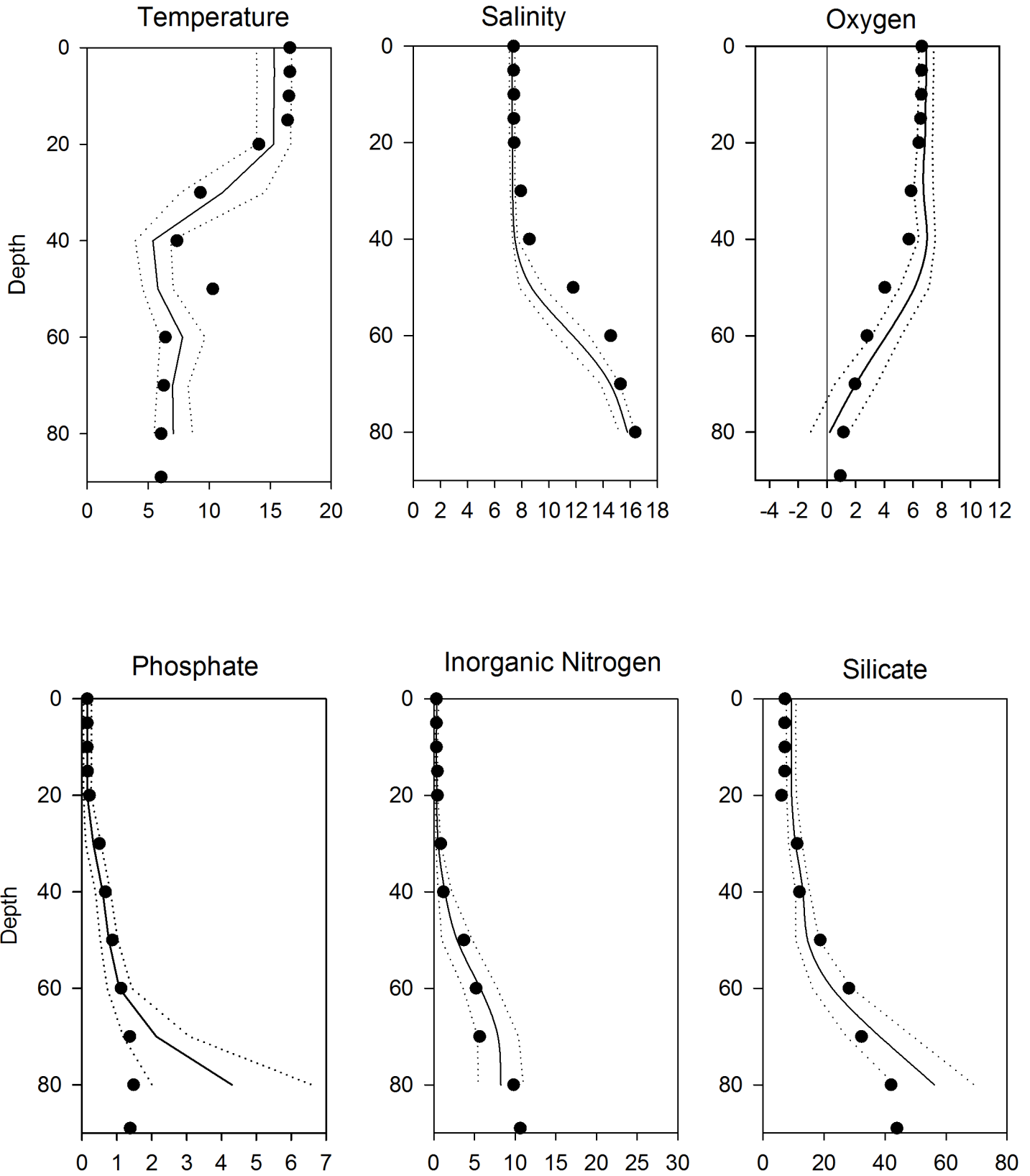


OXYGEN IN BOTTOM WATER (depth >80m)



Vertical profiles BY5 September

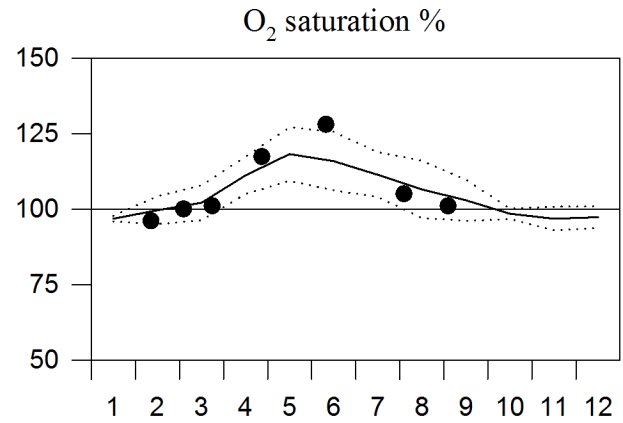
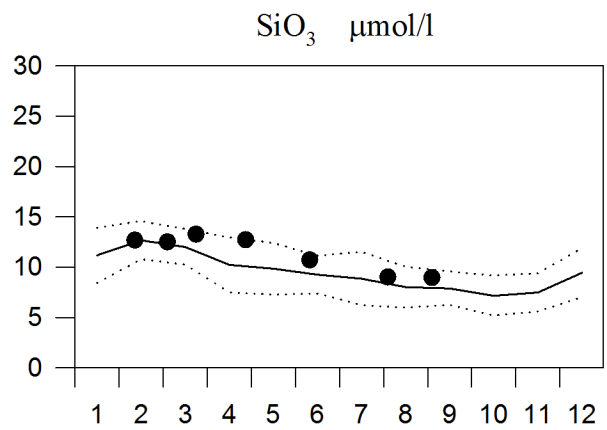
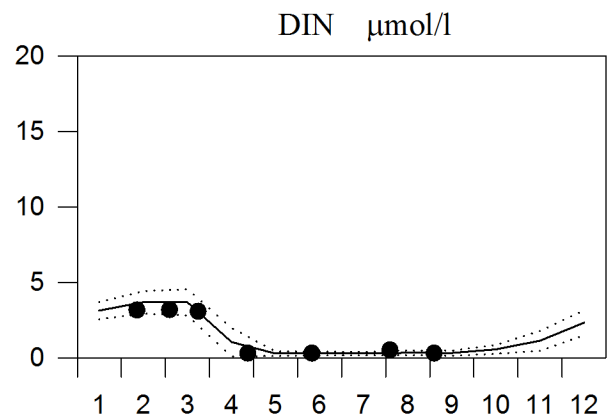
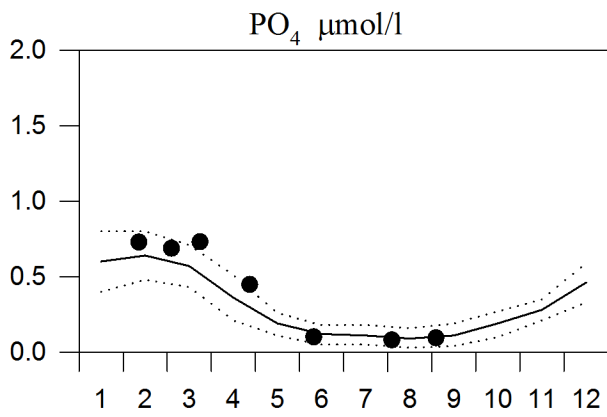
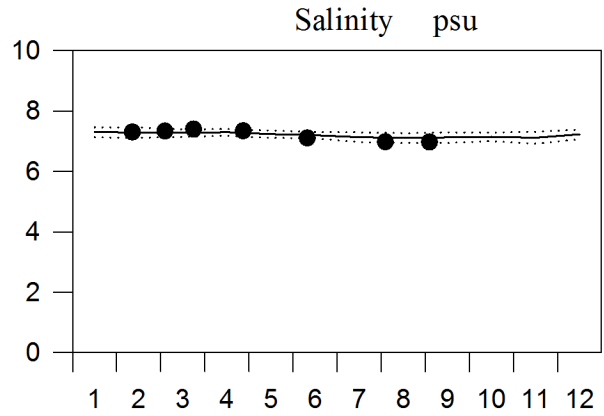
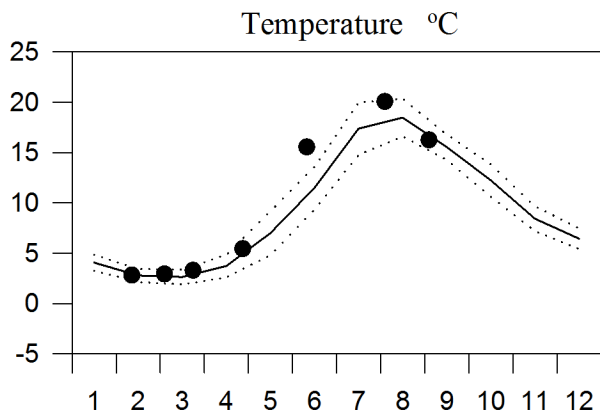
— Mean 1996-2010 St.Dev. ● 2014



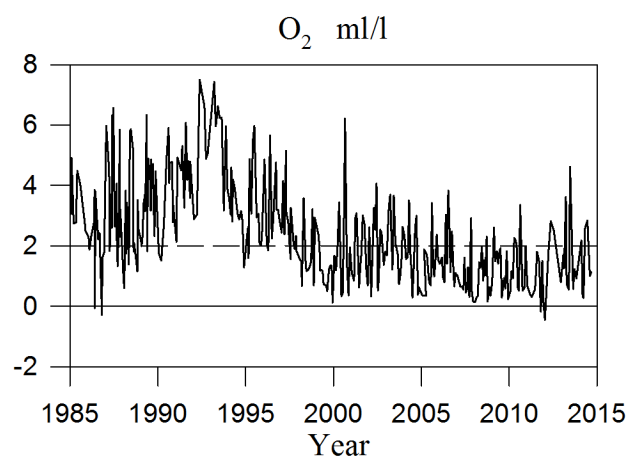
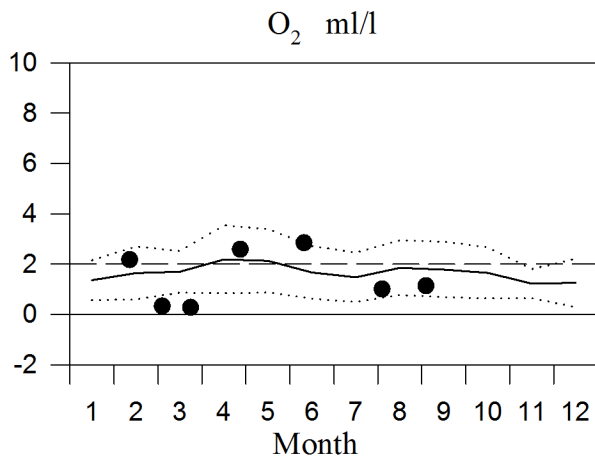
STATION BCS III-10 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

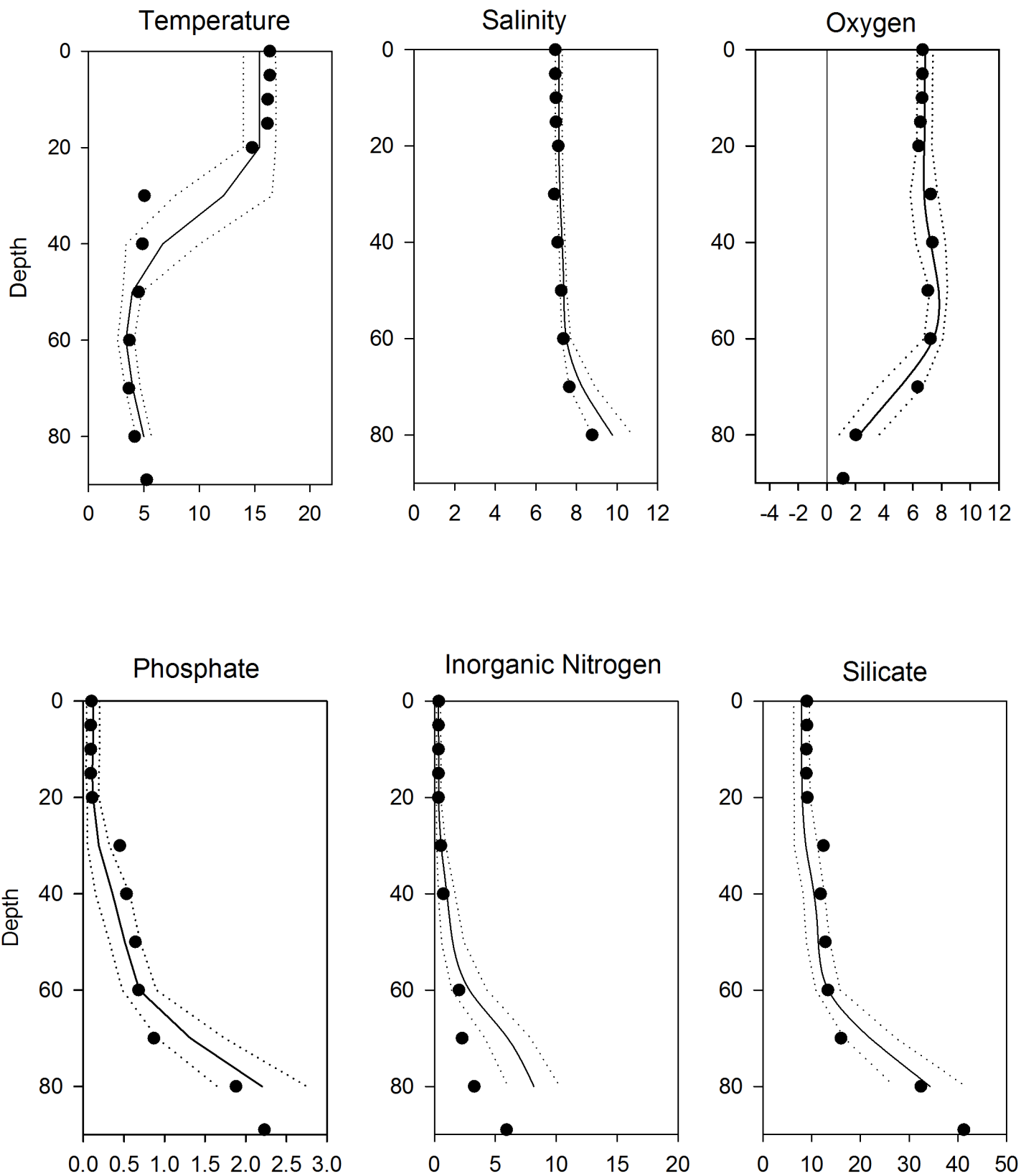


OXYGEN IN BOTTOM WATER (depth > 80m)



Vertical profiles BCS III-10 September

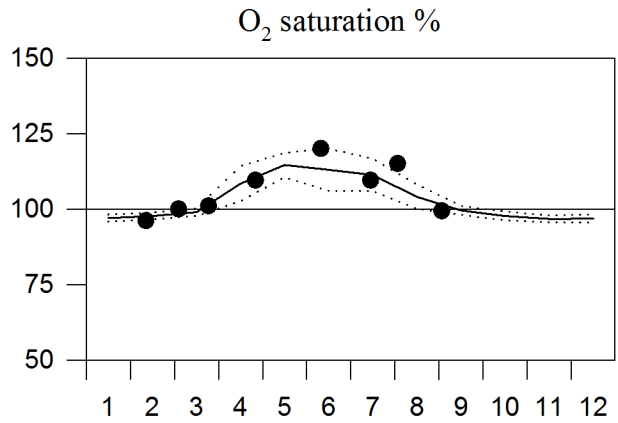
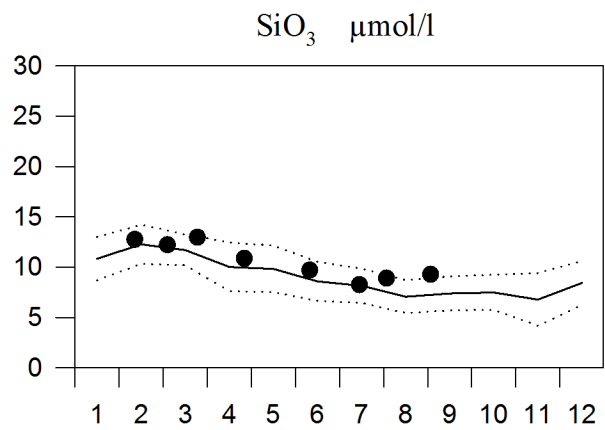
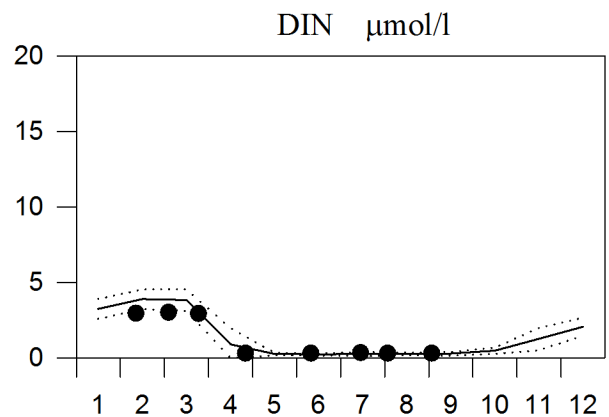
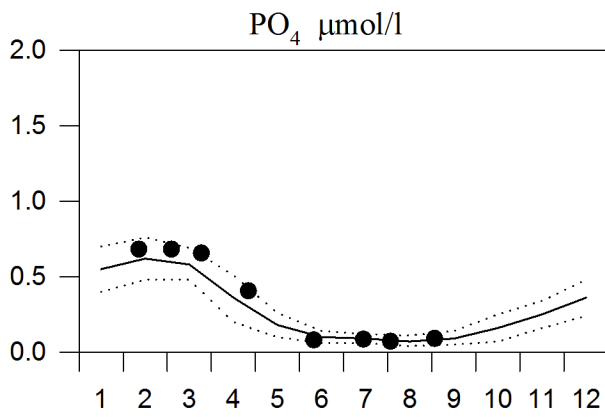
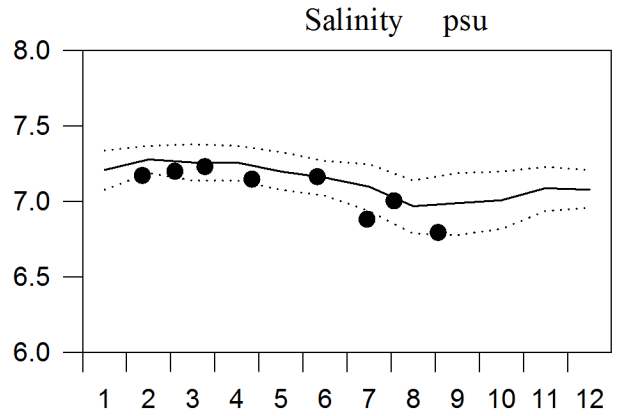
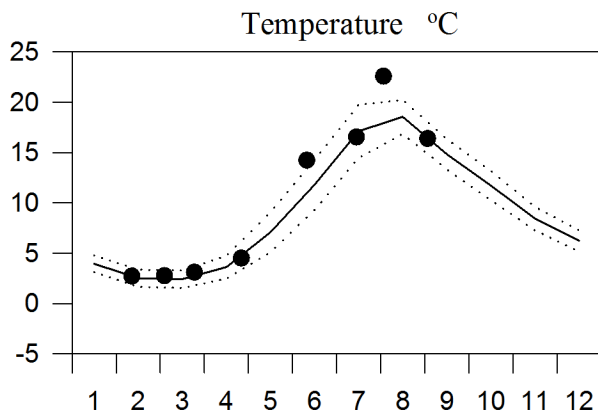
— Mean 1996-2010 St.Dev. ● 2014



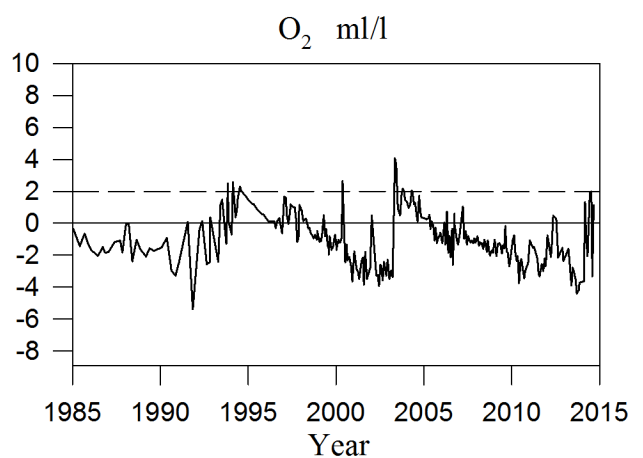
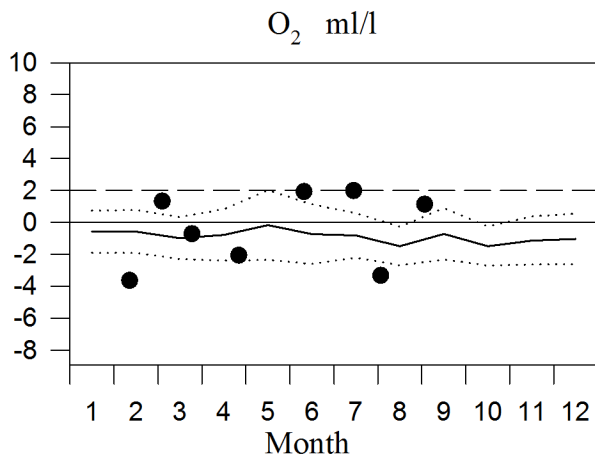
STATION BY10 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

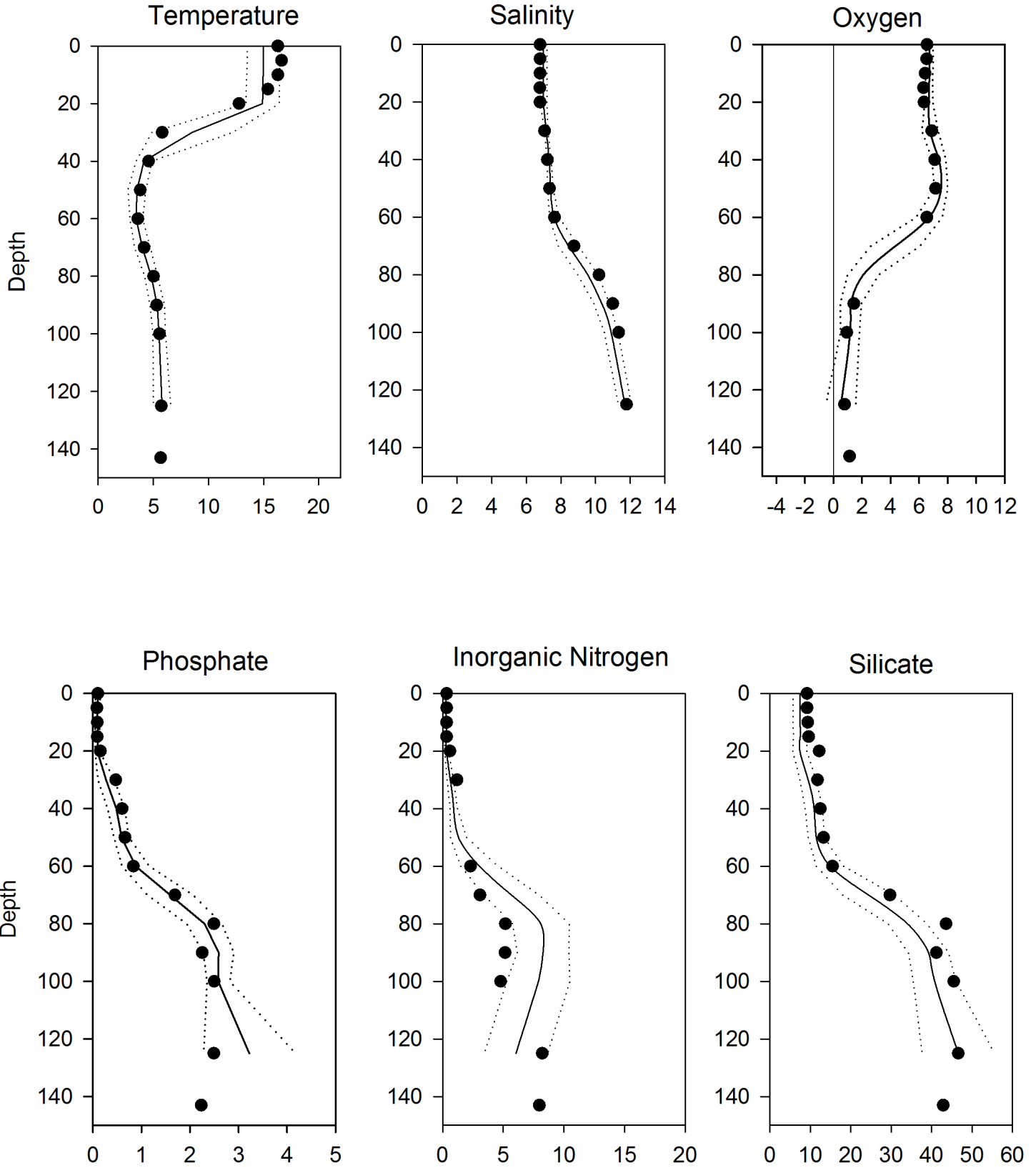


OXYGEN IN BOTTOM WATER (depth >125m)



Vertical profiles BY10 September

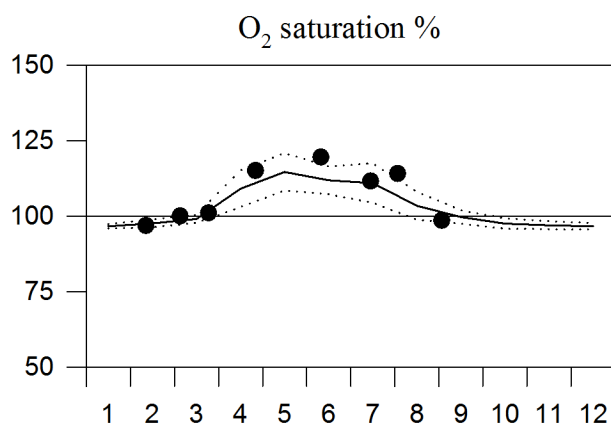
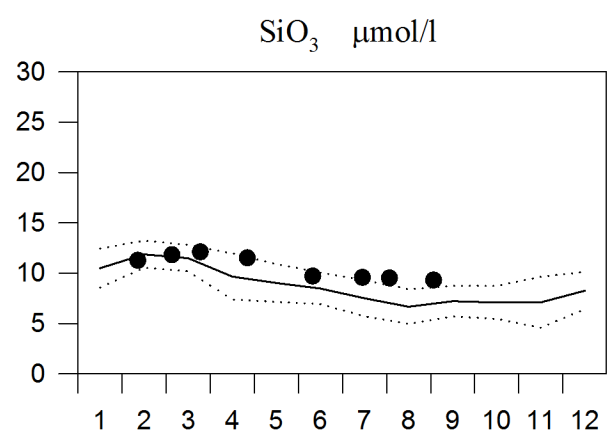
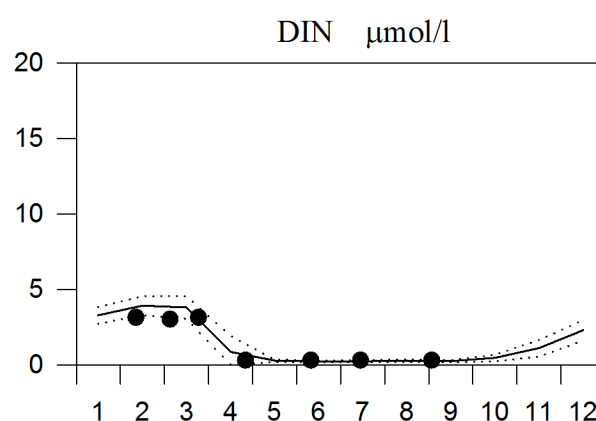
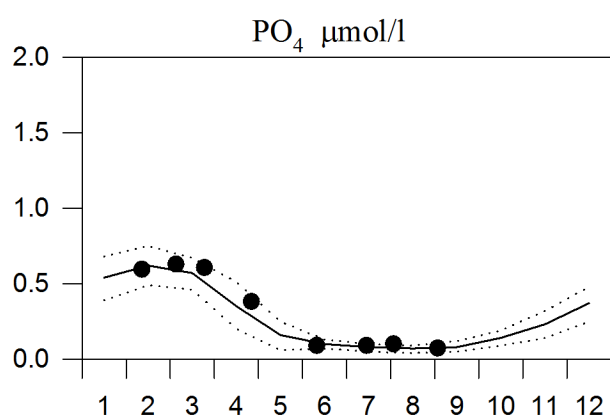
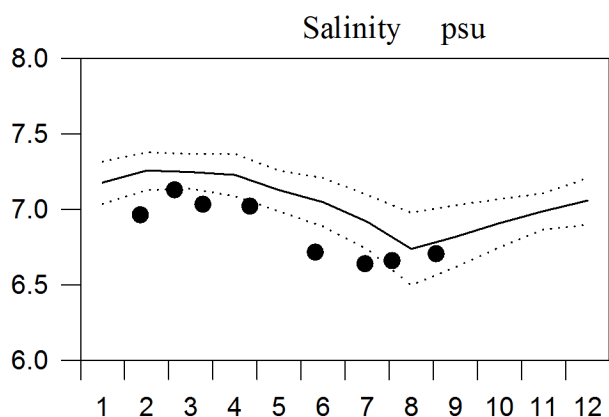
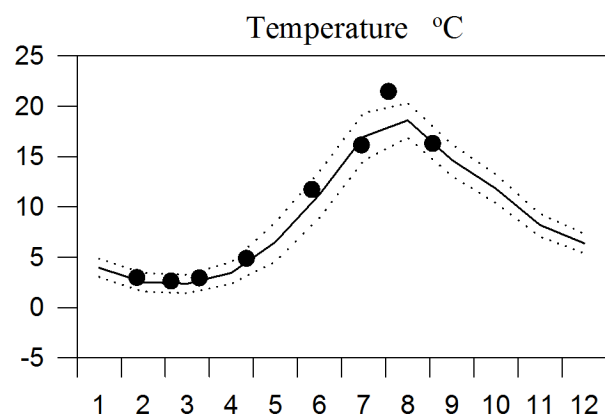
— Mean 1996-2010 St.Dev. ● 2014



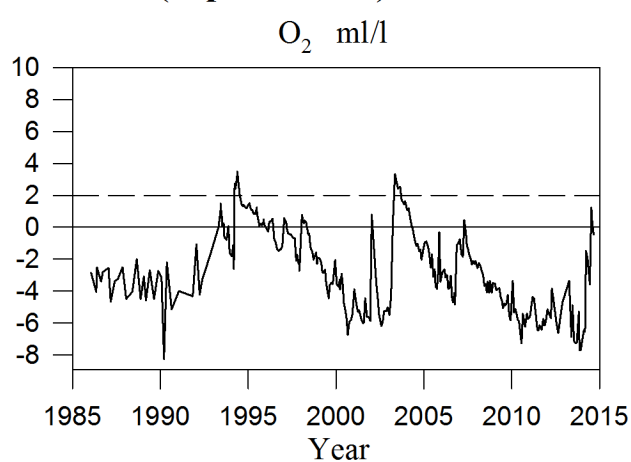
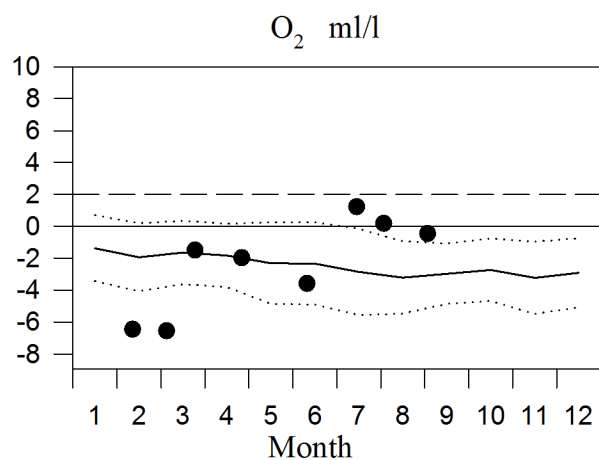
STATION BY15 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014



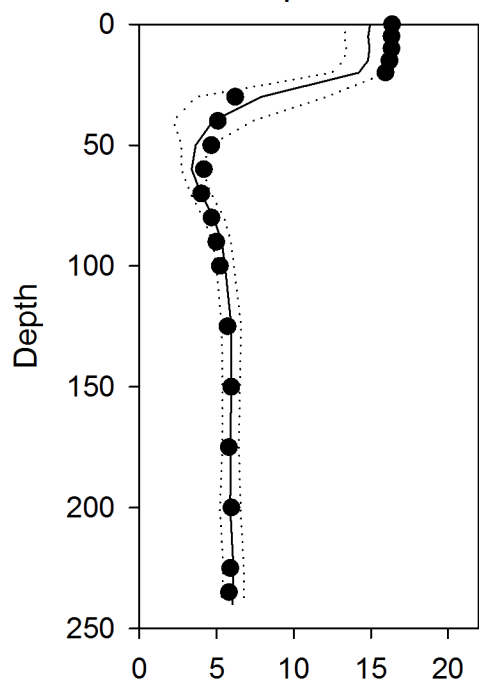
OXYGEN IN BOTTOM WATER (depth >225m)



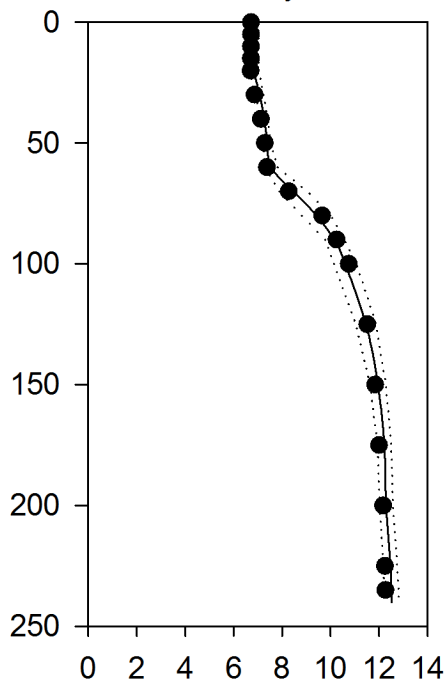
Vertical profiles BY15 September

— Mean 1996-2010 St.Dev. ● 2014

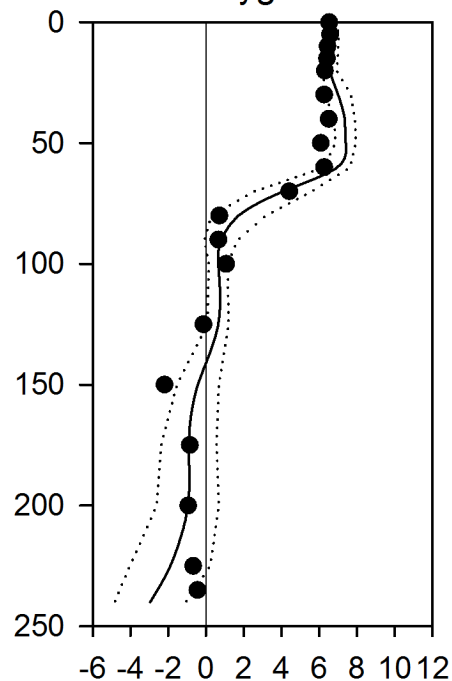
Temperature



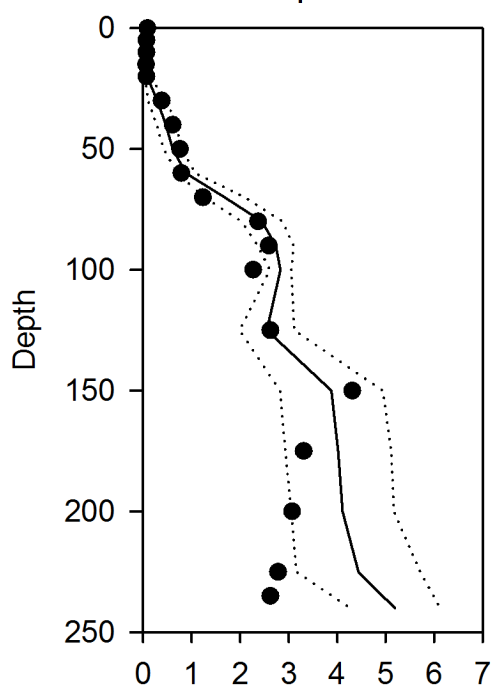
Salinity



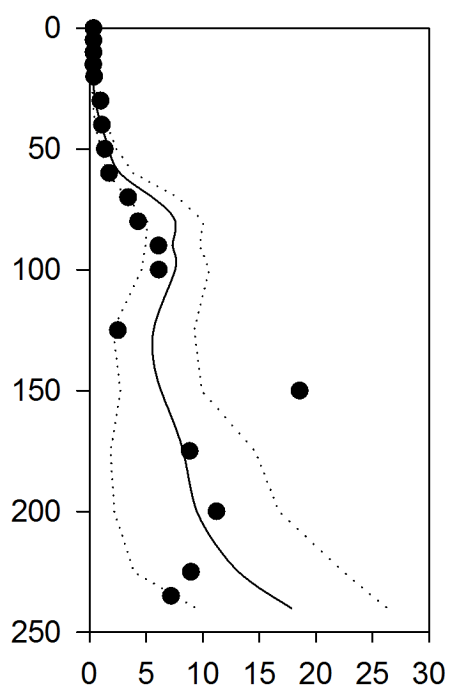
Oxygen



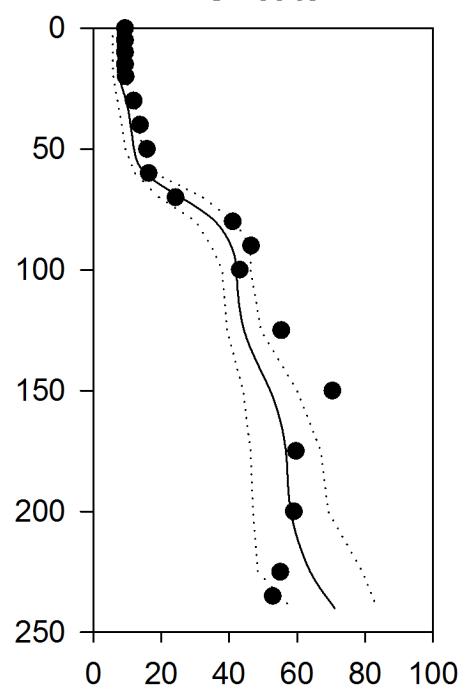
Phosphate



Inorganic Nitrogen



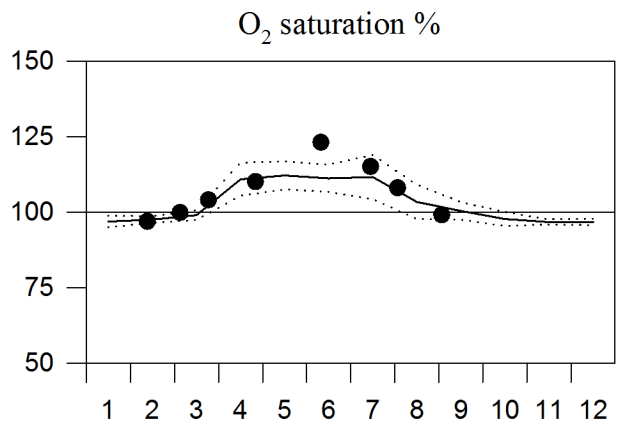
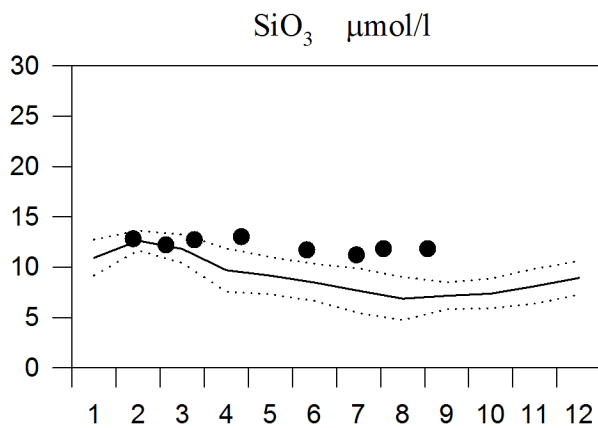
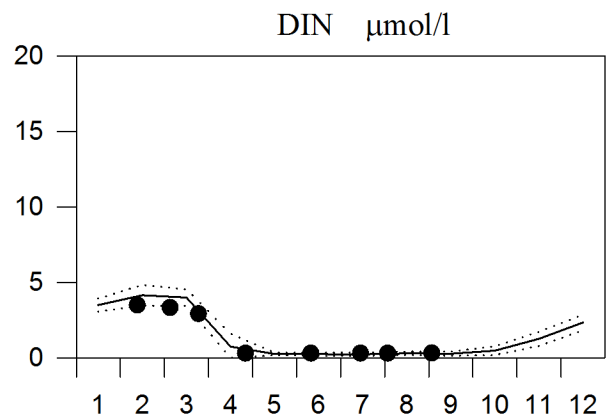
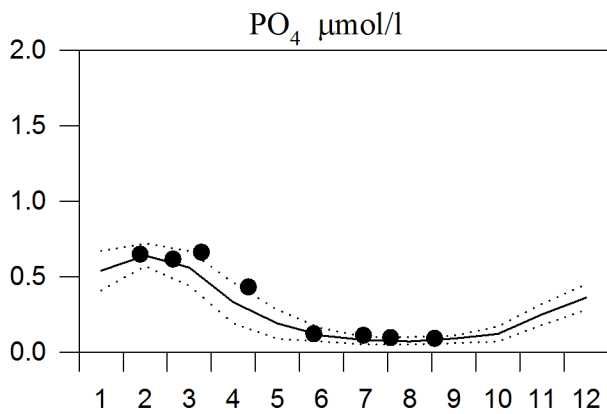
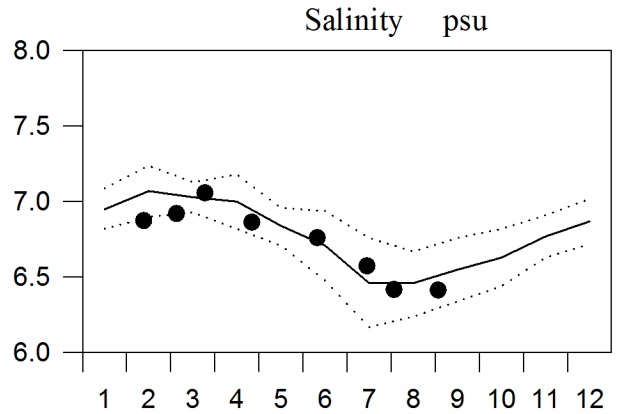
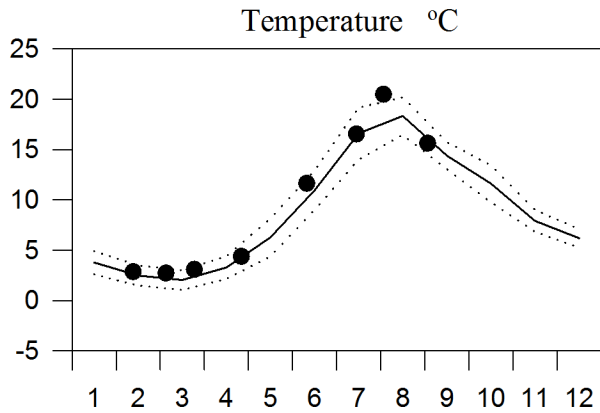
Silicate



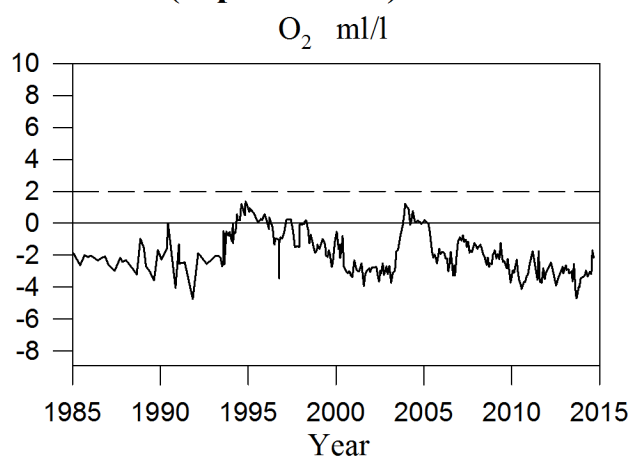
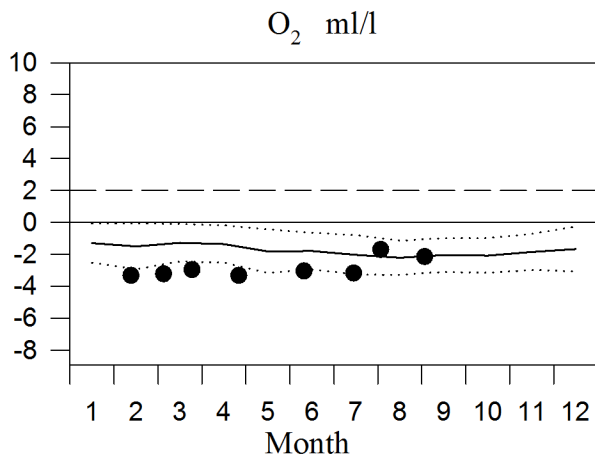
STATION BY20 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014



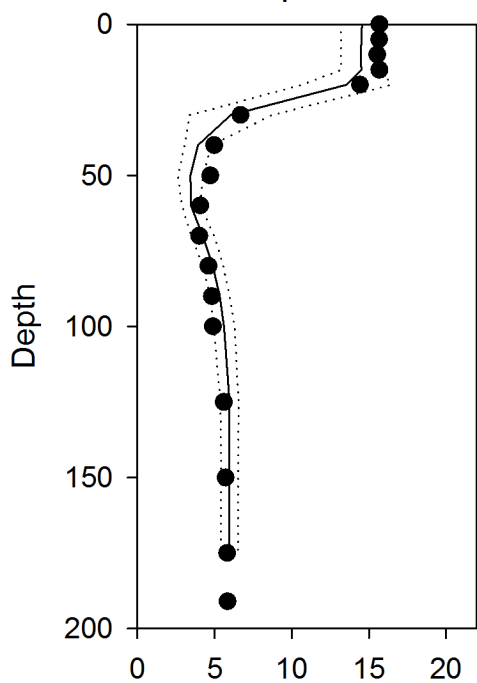
OXYGEN IN BOTTOM WATER (depth >175m)



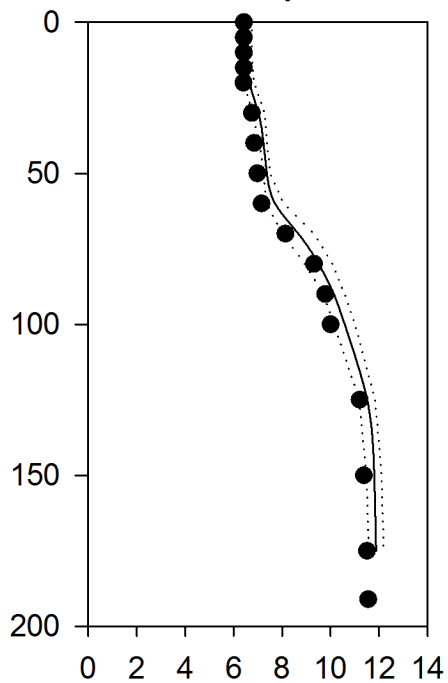
Vertical profiles BY20 September

— Mean 1996-2010 St.Dev. ● 2014

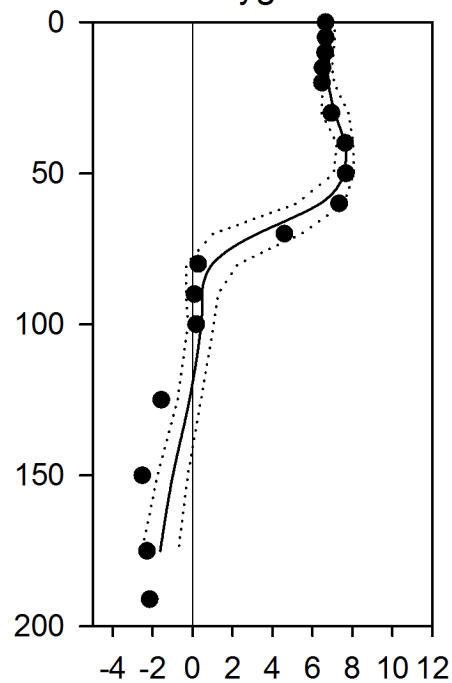
Temperature



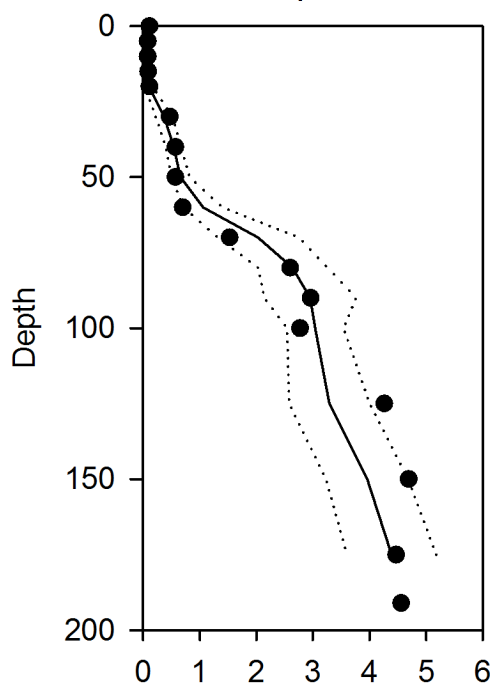
Salinity



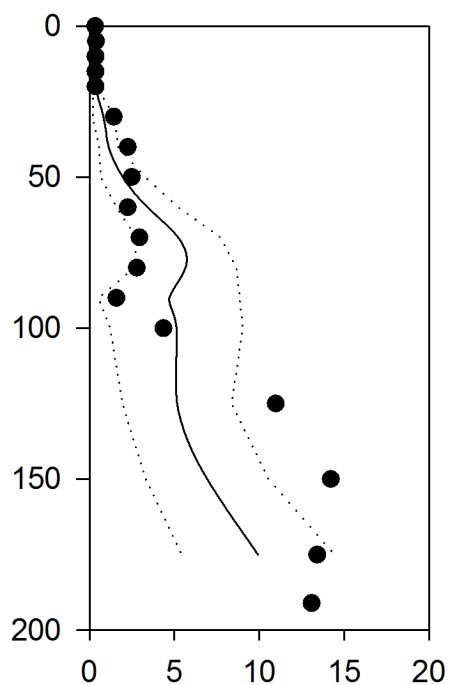
Oxygen



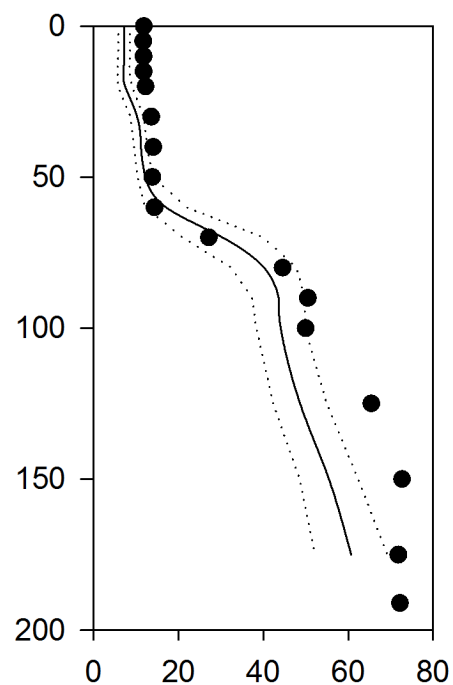
Phosphate



Inorganic Nitrogen



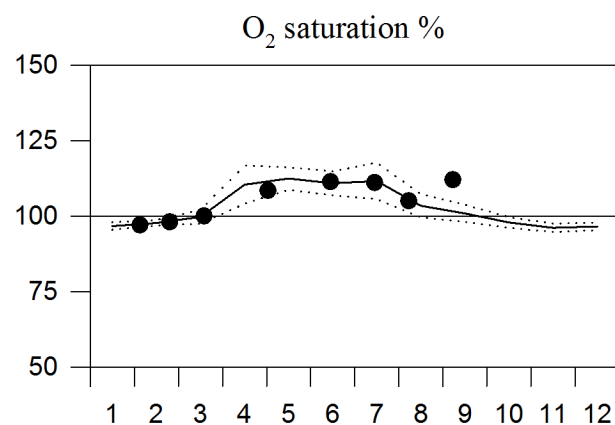
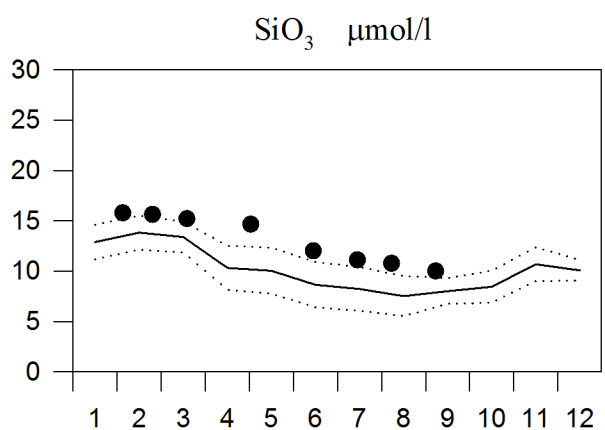
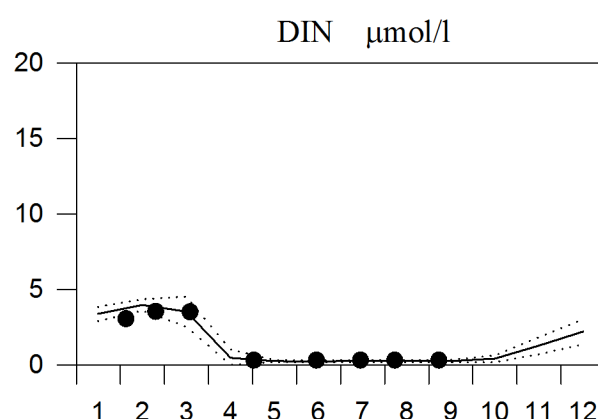
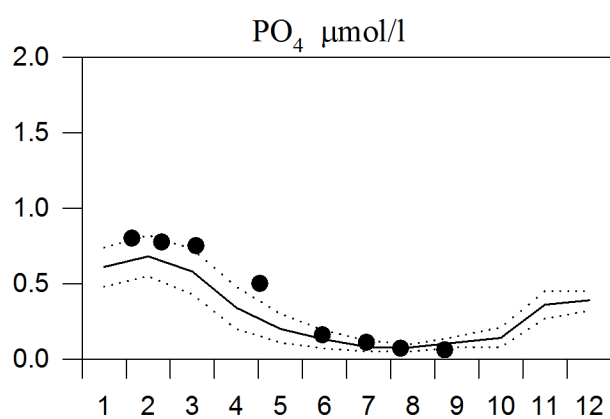
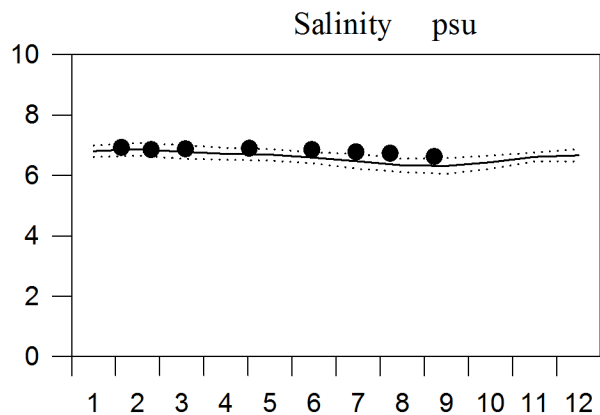
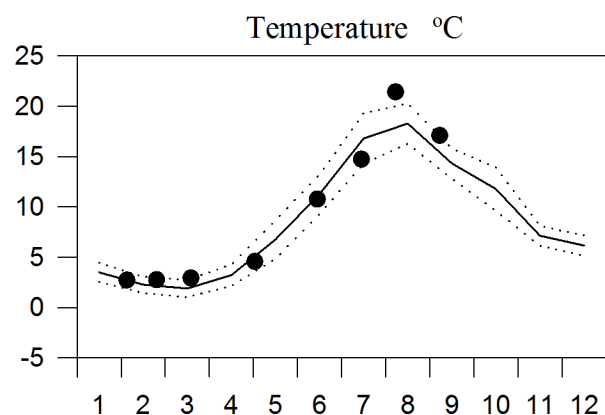
Silicate



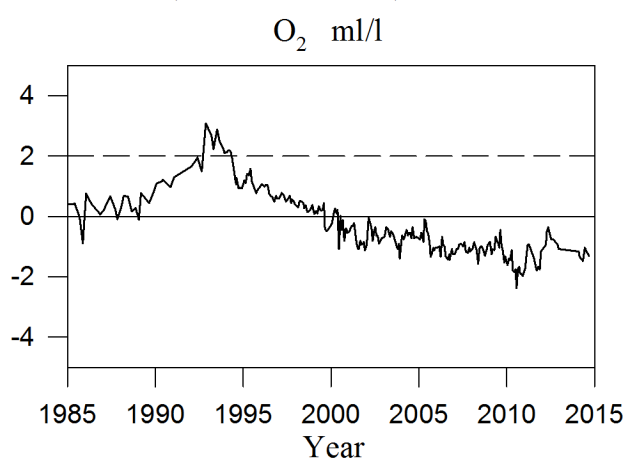
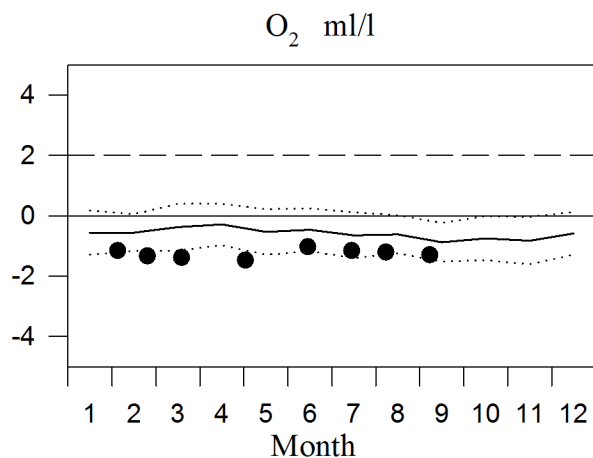
STATION BY32 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014



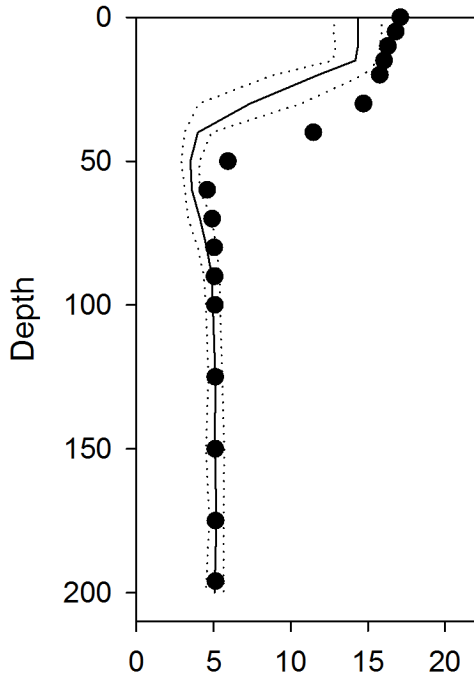
OXYGEN IN BOTTOM WATER (depth > 175m)



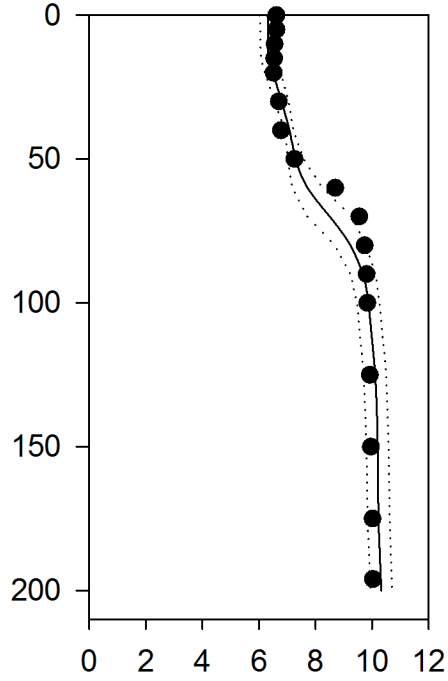
Vertical profiles BY32 September

— Mean 1996-2010 St.Dev. ● 2014

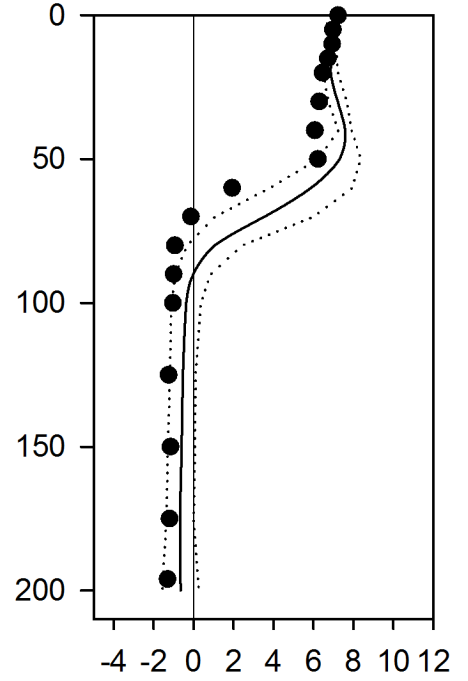
Temperature



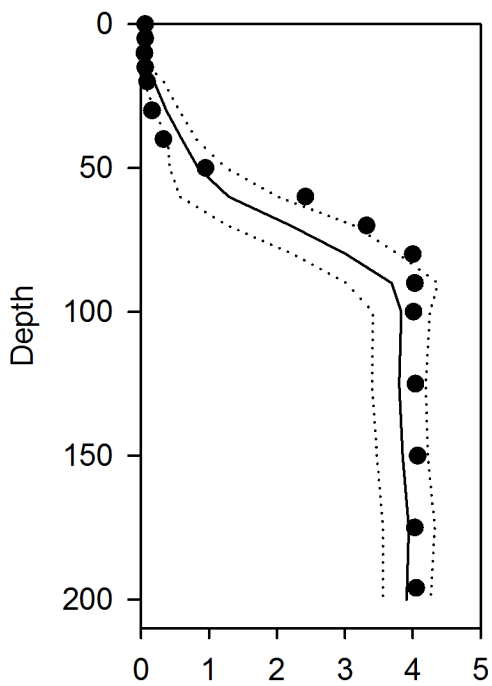
Salinity



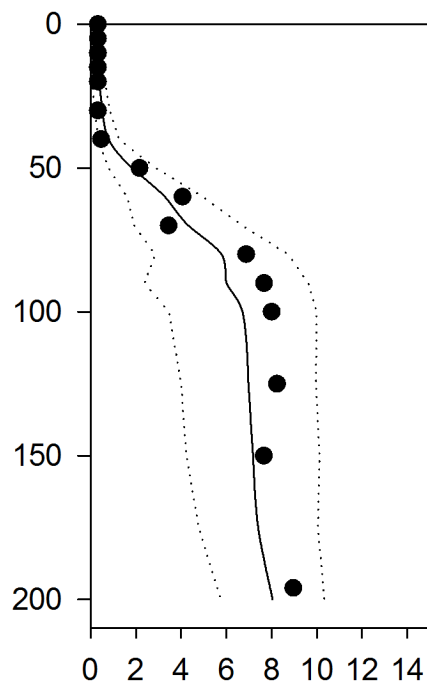
Oxygen



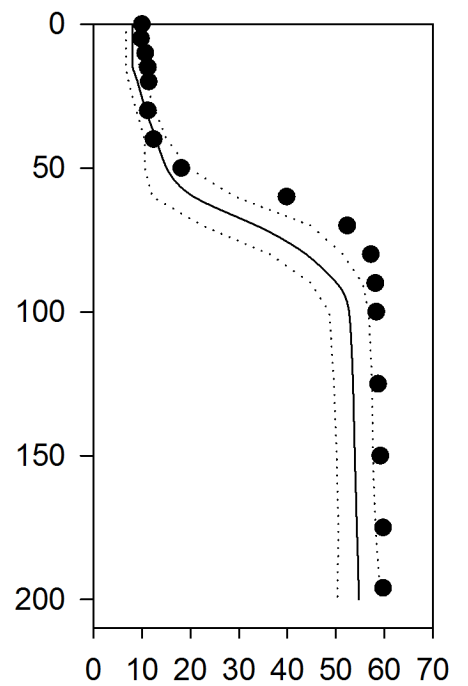
Phosphate



Inorganic Nitrogen



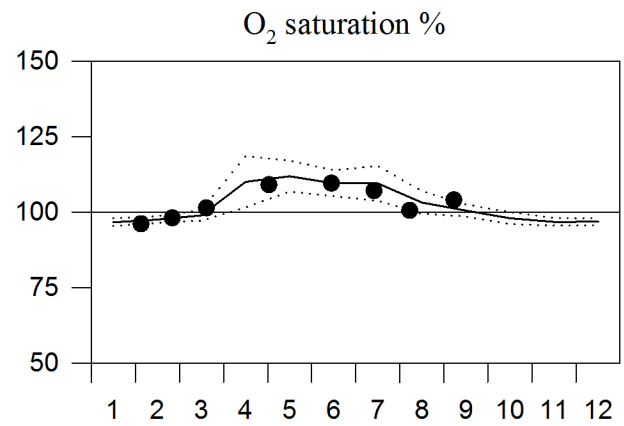
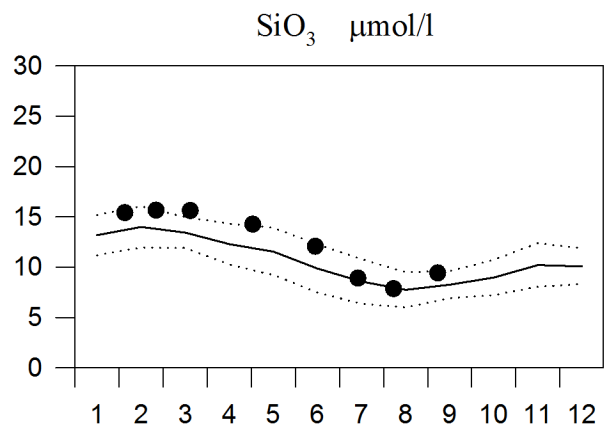
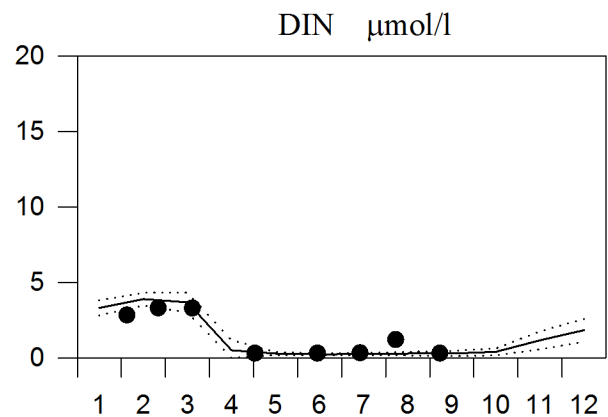
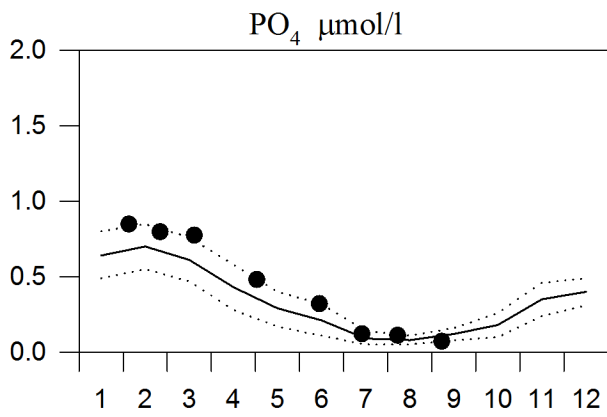
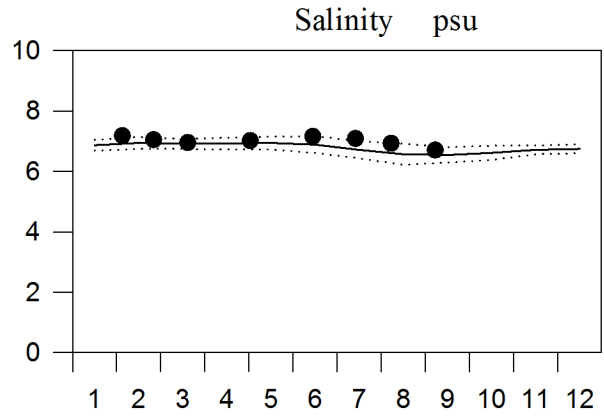
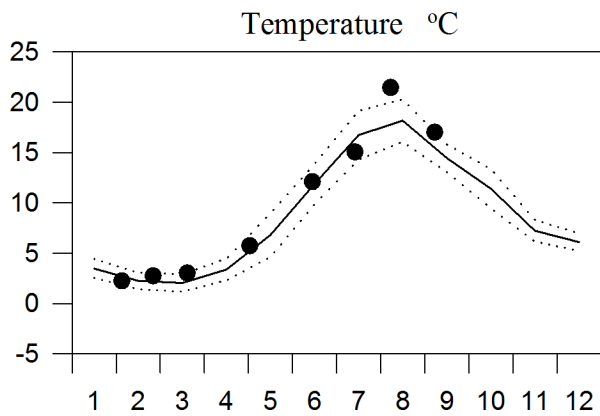
Silicate



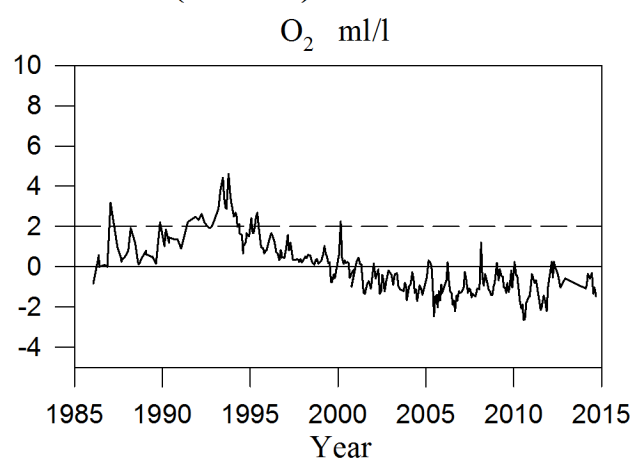
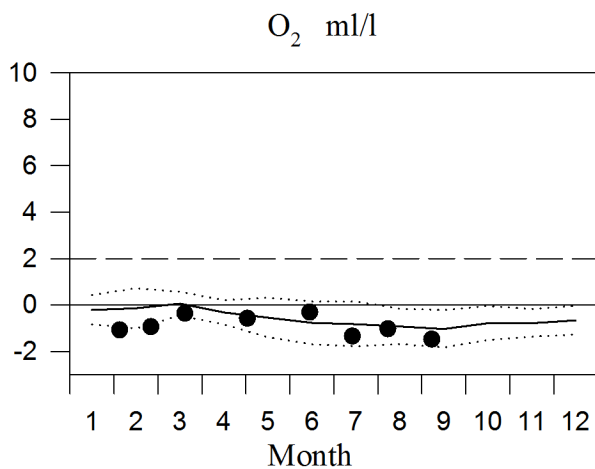
STATION BY38 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014



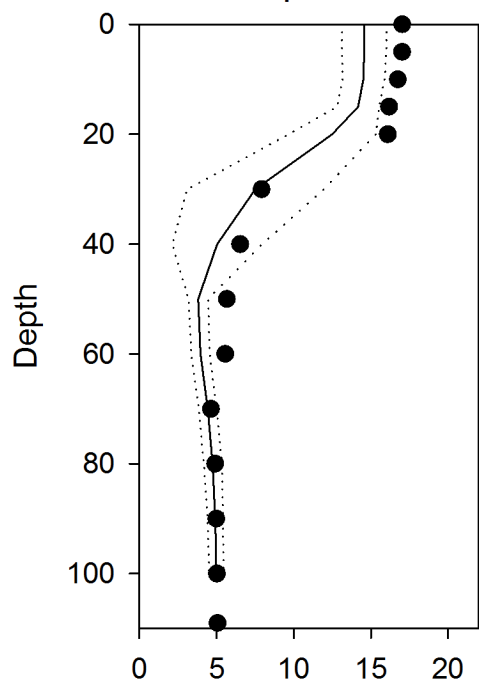
OXYGEN IN BOTTOM WATER (> 100m)



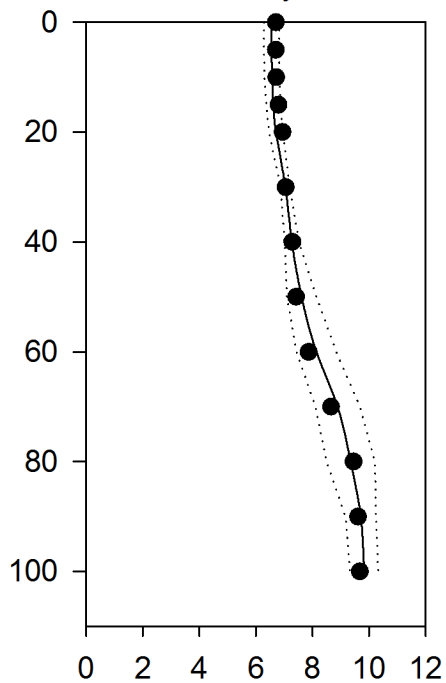
Vertical profiles BY38 September

— Mean 1996-2010 St.Dev. ● 2014

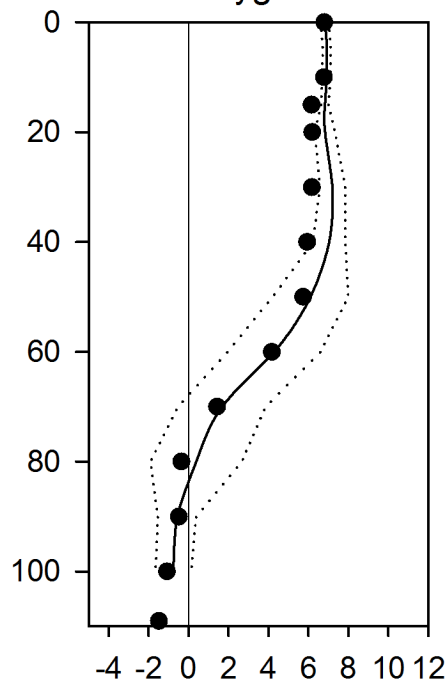
Temperature



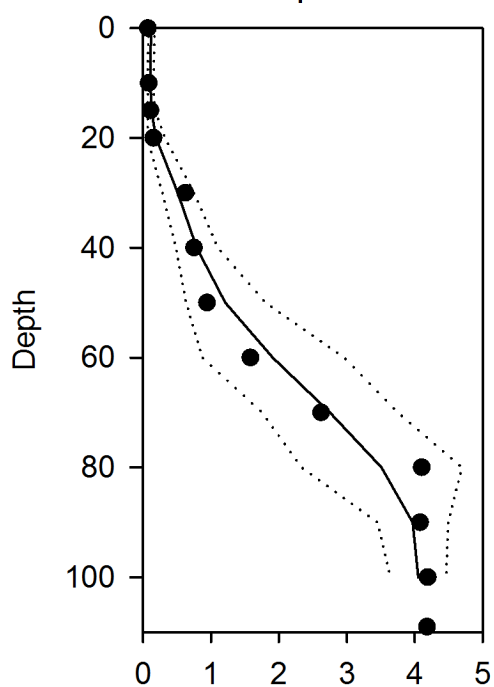
Salinity



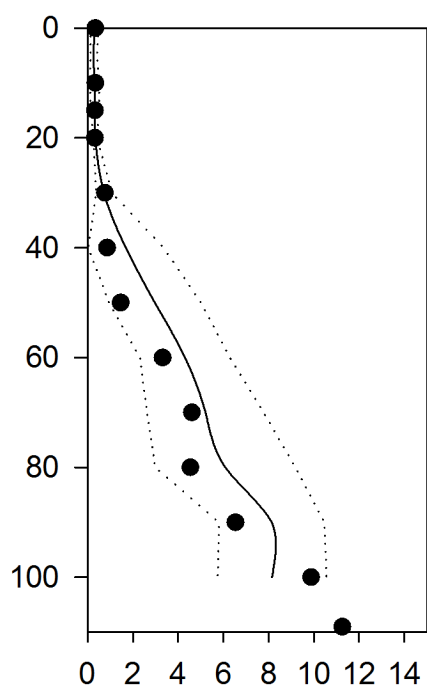
Oxygen



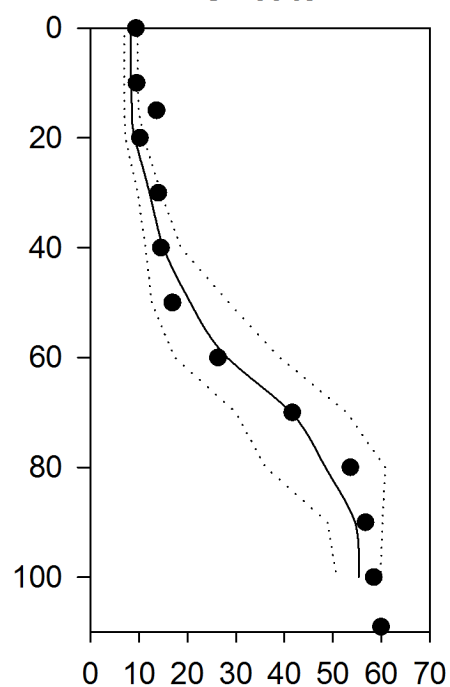
Phosphate



Inorganic Nitrogen



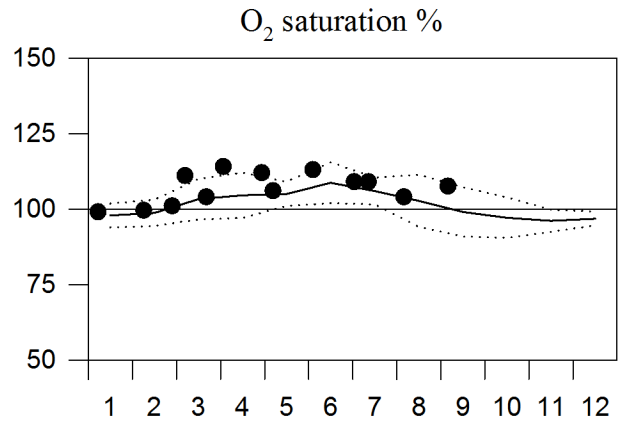
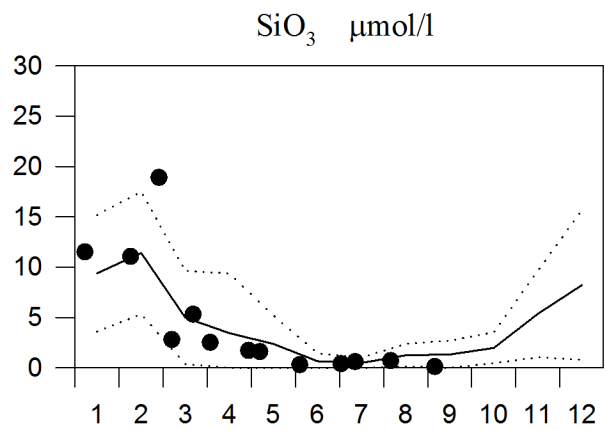
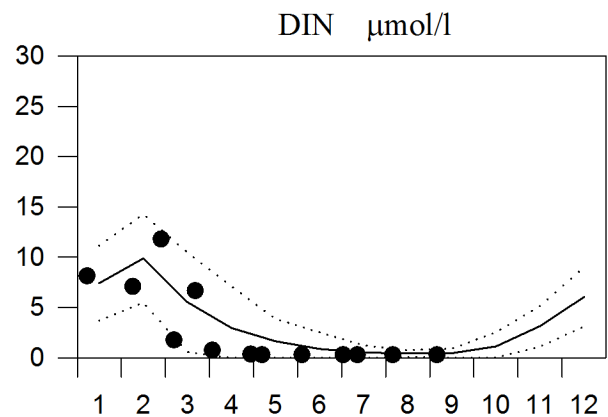
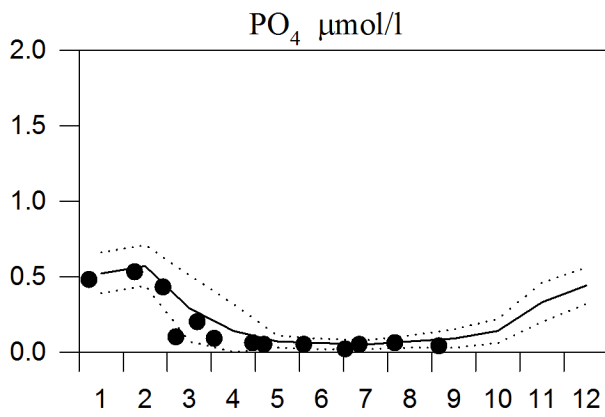
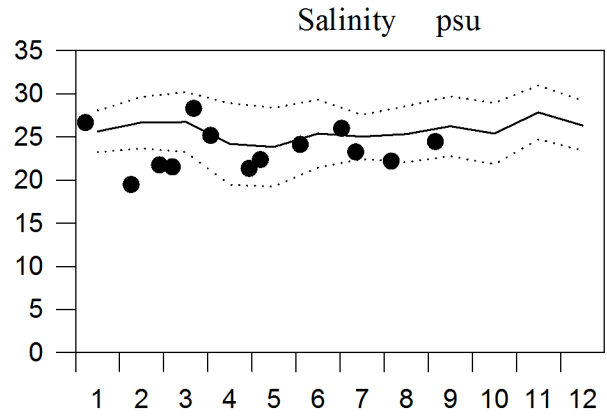
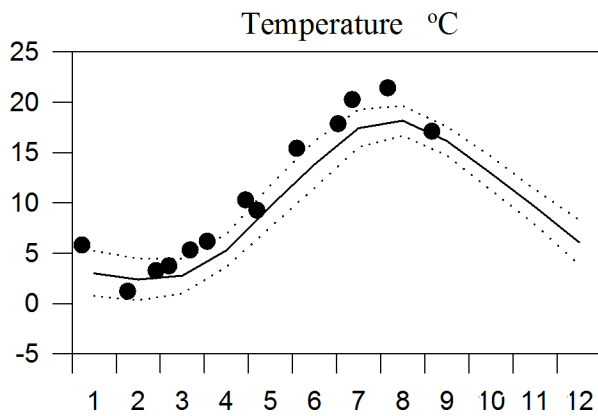
Silicate



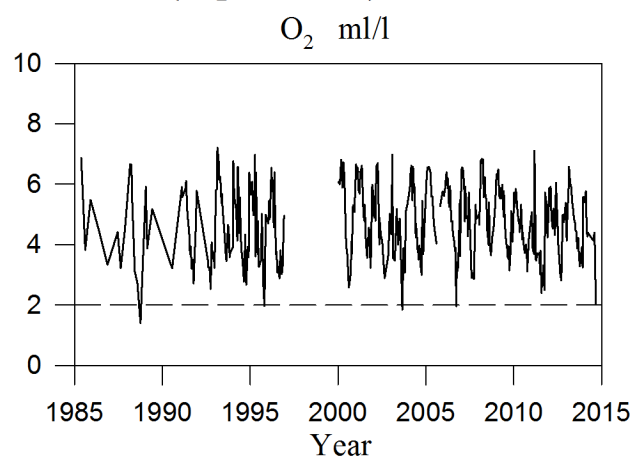
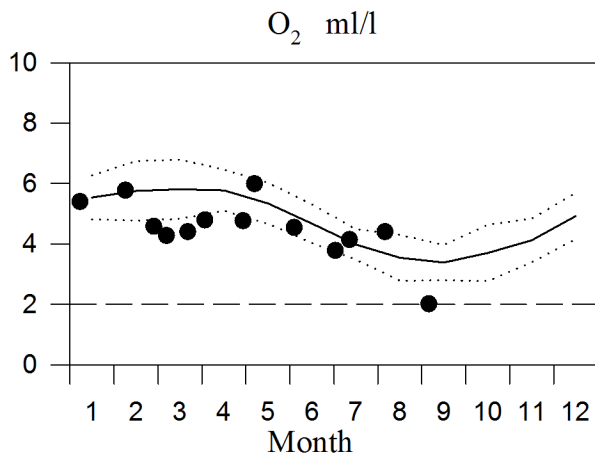
STATION SLÄGGÖ SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2014

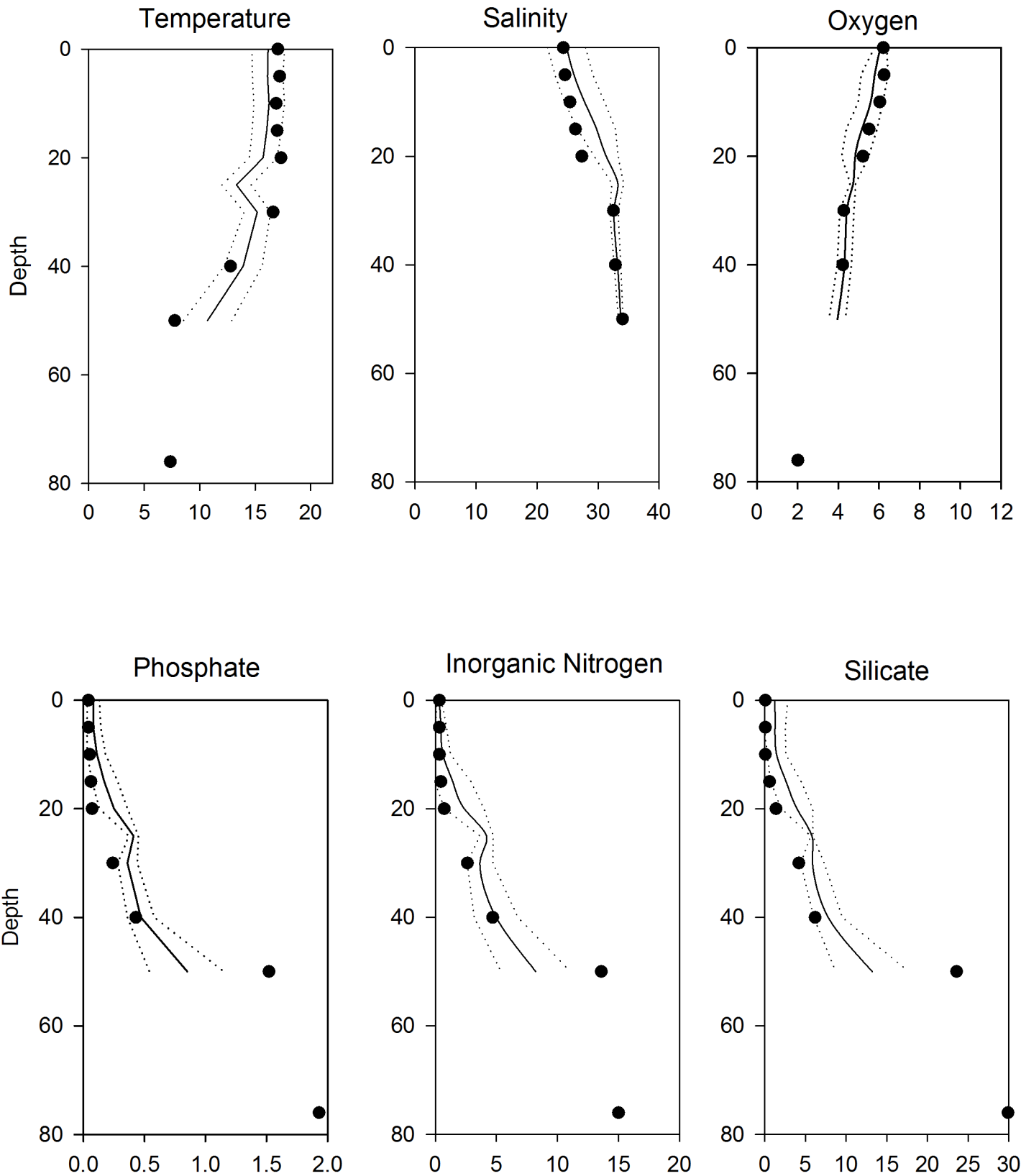


OXYGEN IN BOTTOM WATER (depth >50m)



Vertical profiles Släggö September

— Mean 1996-2010 St.Dev. ● 2014



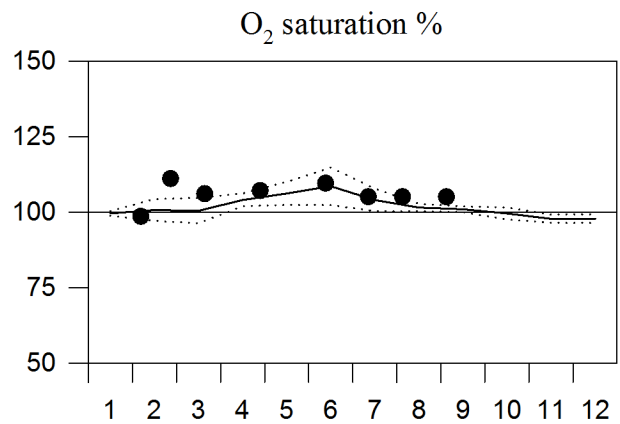
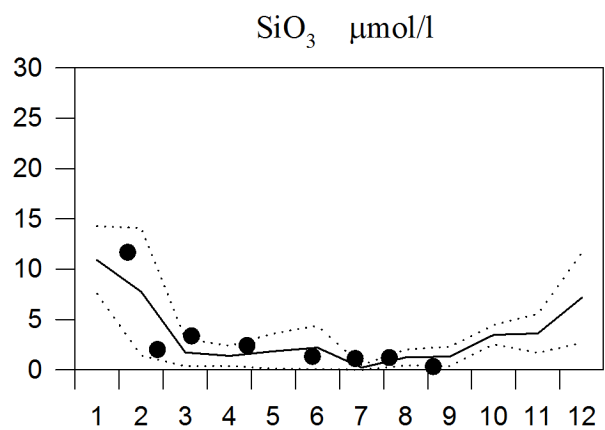
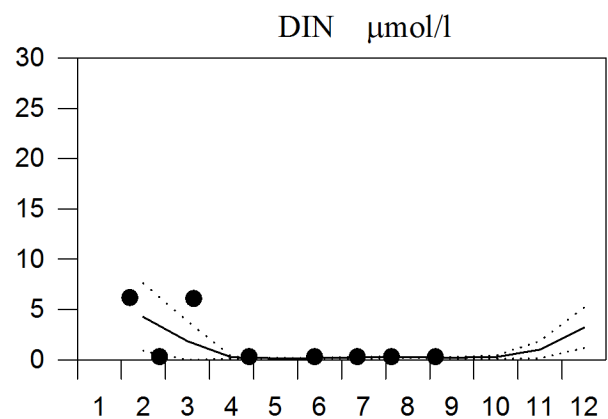
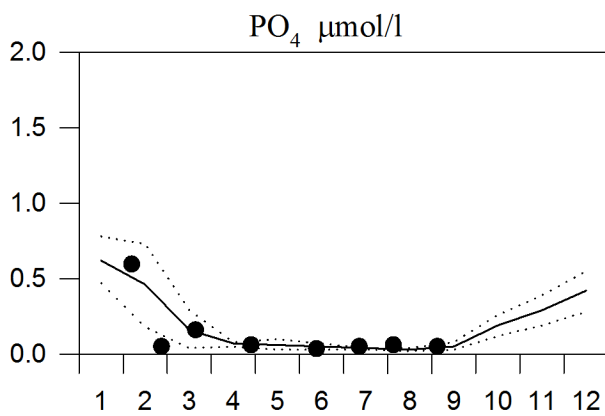
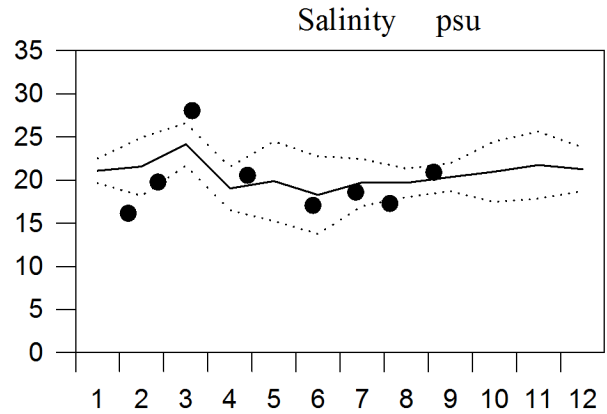
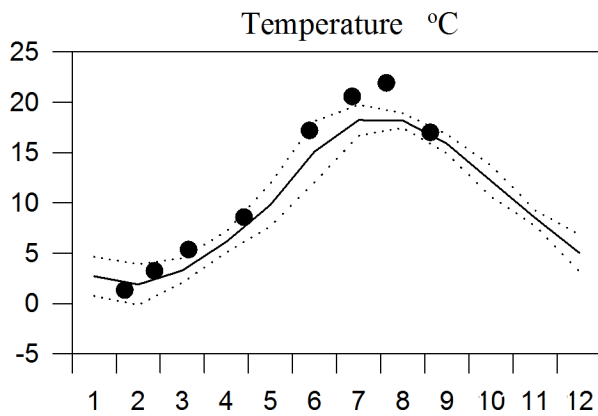
STATION N14 Falkenberg SURFACE WATER

Annual Cycles

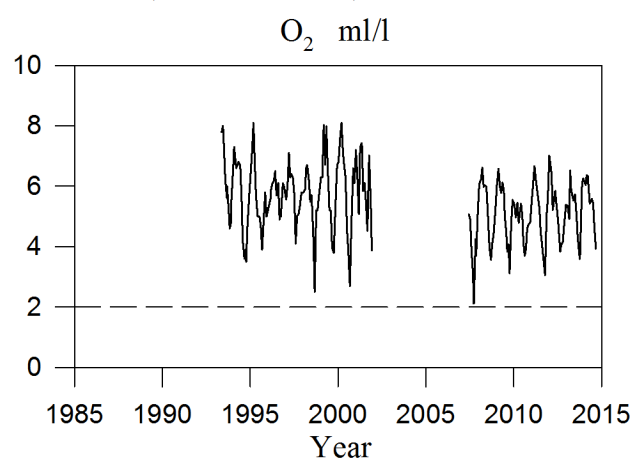
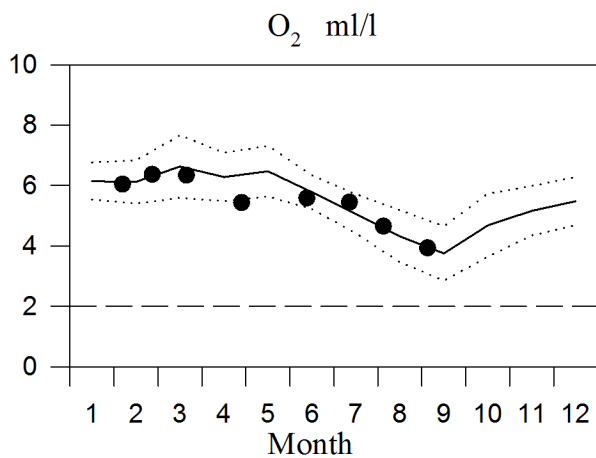
— Mean 2007-2010

..... St.Dev.

● 2014



OXYGEN IN BOTTOM WATER (depth > 25m)



Vertical profiles N14 Falkenberg September

— Mean 1996-2010 St.Dev. ● 2014

