Bodil Thorstensson

Swedish Meteorological and Hydrological Institute
Oceanographical Laboratory

1998-03-23
Dnr: Sh-1998-063

CRUISE REPORT FROM R/V ARGOS

Survey period: 980315-980320

Survey area: The Skagerrak, the Kattegat, the Sound and the Baltic Proper

Principal: SMHI

SUMMARY

The expedition was performed within SMHIs regular marine monitoring programme and covered the Skagerrak, the Kattegat, the Sound and the Baltic Proper.
The weather was either totally cloudy or quite clear with sunshine. The first part of the expedition had winds from the Southeast to the South, the later part winds from the West to the North. Sometimes the wind was within the limit of gale. The surface temperatures were between 1.5 and 3.5°C in the Baltic, between 3.5 and 4°C in the Sound and the Kattegat and between 3.5 and 5.5°C in the Skagerrak. In the Baltic there were still winter conditions with high values of nutrients and no algae bloom could be observed. No hydrogen sulphide was found, but there was lack of oxygen at the Fårö Deep from 175 m and down. Phytoplankton production was seen in the Kattegat and in the Skagerrak.

Address:
Byggnad 31 Nya Varvet
SE-426 71 Västra Frölunda
SWEDEN

Telephone:
+46 11 495 8000
Telefax:
+46 31 751 8980

E-mail:
shark@smhi.se
WWW:
http://www.smhi.se/sgn0102/nodc/

PRELIMINARY RESULTS

The expedition, which was a part of SMHI's ordinary monitoring programme, began in Karlskrona the 15th of March and ended in Göteborg the 20th of March. The weather varied between cloudy and clear. During the first part of the week south-easterly to easterly winds were dominating with precipitation as snow. During the later part, in the southern Baltic and the Kattegat, winds between west and north dominated, occasionally reaching gale force.

The Skagerrak

The sea surface temperature varied between 3.5 and 4°C along the Swedish coast and between 5 and 5.5°C in the outer Skagerrak. In particular along the Swedish coast the nutrient concentrations were lower in a surface layer of 5-20 m depth, where a ongoing production was observed, than in layers below. Less secchi-depth than normal for the season and high fluorescence also proved this.

The Kattegatt and the Sound

The sea surface temperature varied between 3.5 and 4°C. The oxygen saturation was 70% and 40 m at stations W Landskrona and Anholt E. At Anholt E and Läsö Ränna respectively strong indications on an algae bloom was observed. The fluorescence was high and very high respectively, and the nutrient concentrations were low down to 15-20 m depth. At the stations Kullen and Fladen a current with Baltic water with lower salinity and higher nutrient concentrations (nitrate and silicate) was observed.

The Baltic Sea

The sea surface temperature varied between 1.5 and 3.5°C. At the station Fårö Deep the oxygen was depleted from 175 m and below, still no hydrogen sulphide had been formed. The oxygen concentration was less than 2 ml/l below 80 m depth. At the Gotland Deep this boundary resided deeper, at 125 m. The nutrient concentrations were still high and no algae bloom was observed. The Secchi-depth in the Baltic Sea was about 10 m.

PARTICIPANTS

Name	From
Bodil Thorstensson, chief scientist	SMHI Oceanographical lab.
Tuulikki Jaako	- ″ -
Mats Ohlson	- ″ -
Jan Szaron	- ″ -
Bo Juhlin	SMHI Norrköping

APPENDICES

- Track chart
- Table over stations, parameters and sampling depths
- Map showing bottom oxygen concentrations
- Monthly avarage plots for selected stations
- Profiles for selected stations

SMHI ***** Hydrographic Ship: 14-Argos ****** Date: 1998-03-23
Ocean lab ***** series Year: 1998 ****** Time: 10:21

Ser no	Stat code	Proj	Station	Lat	Lon	Date yymmdd	Time hhmm utc	Bott deph m	Mld m	Secc deph m	Wind di	Wind ve	Air temp C	Air pres hPa	WCSI elec aoae tu hd	C t d	PPCPZZT Hrhhoor Cilyooa motPBw PrP l	No de m p n	T e a l	S a l i n	P h i g	O x y g	H 2 S	P o 4 P	T o t P	N o 2 N	N o 3 N	N o 4 N	T o t N	A l k	S i O 3	H u m	L i g n	P O N	P O C	T O C	C o m m
0250	BPSB07BMP	BY5	BORNHOLMSDJ	N5515	E1559	980316	0420	91			18	8	4.0	1023	2720	x	-xxx---	12	x	x	x	x	-	x	x	x	x	x	x	x	x	-	-	-	-	-
0251	BPSE11BMP	BCS III-10		N5533.3	E1824	980316	1145	90		11	18	8	4.0	1024	2830	x	--xx---	12	x	x	x	x	-	x	x	x	x	x	x	x	x	-	-	-	-	-
0252	BPEX13BAS	BY10		N5638	E1935	980316	1805	146			16	8	2.0	1024	9930	x	--x----	15	x	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	x
0253	BPEX21BMP	BY15	GOTLANDSDJ	N5720	E2003	980316	2250	246			16	8	2.2	1022	9930	x	--xx---	19	x	x	x	x	-	x	x	x	x	x	x	x	x	-	-	-	-	-
0254	BPEX21BAS	BY15	GOTLANDSDJ	N5720	E2003	980317	0010	245			16	10	2.2	1022	9930	-	-------	5	x	x	-	x	-	x	-	x	x	-	-	-	x	-	-	-	-	-	x
0255	BPEX26BAS	BY20	FÅRÖDJ	N5800	E1953	980317	0430	202			14	12	2.6	1020	7840	x	--x----	17	x	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	-	-
0256	BPNX33BAS	BY27		N5917.8	E2134	980317	1300	182			18	11	5.5	1023	2830	x	-------	16	x	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	-	x
0257	BPNX35BAS	BY29		N5853	E2019	980317	1740	170			21	15	2.5	1020	9940	x	-xx---	16	x	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	-	-
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0260	BPWX45BAS	BY38	KARLSÖDJ	N5707	E1740	980318	1010	115		9	23	12	5.0	1012	1130	x	-xx---	14	x	x	x	x	-	x	x	x	x	x	x	x	x	x	-	-	-	-	-
0261	BPSE49BAS	BY39	ÖLANDS S UDDE	N5607	E1632	980318	1600	48		9	23	12	5.9	1015	1230	x	-------	8	-	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	-	-
0262	BPSB06BAS	BY4	CHRISTIANSÖ	N5523	E1520	980318	2130	93			27	10	4.2	1020	9930	x	-------	12	x	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	-	x
0263	BPSA03BMP	BY2	ARKONA	N5500	E1405	980319	0325	49			32	15	3.4	1024	9940	x	-xx---	8	x	x	x	x	-	x	x	x	x	x	x	x	x	x	-	-	-	-	-
0264	BPSA02BAS	BY1		N5500	E1318	980319	0700	47		6	32	12	4.8	1028	0040	x	-------	8	x	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	-	x
0265	SOSX00BAS	T0		N5528	E1242	980319	1015	9		9	32	12	5.2	1029	1220	x	--x----	2	-	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	-	x
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0276	KANX09BAS	LÄSÖ RÄNNA		N5717.6	E1044.5	980320	1905	43			30	6	4.4	1028	9920	x	-xx---	8	x	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	-	-

T R A C K C H A R T

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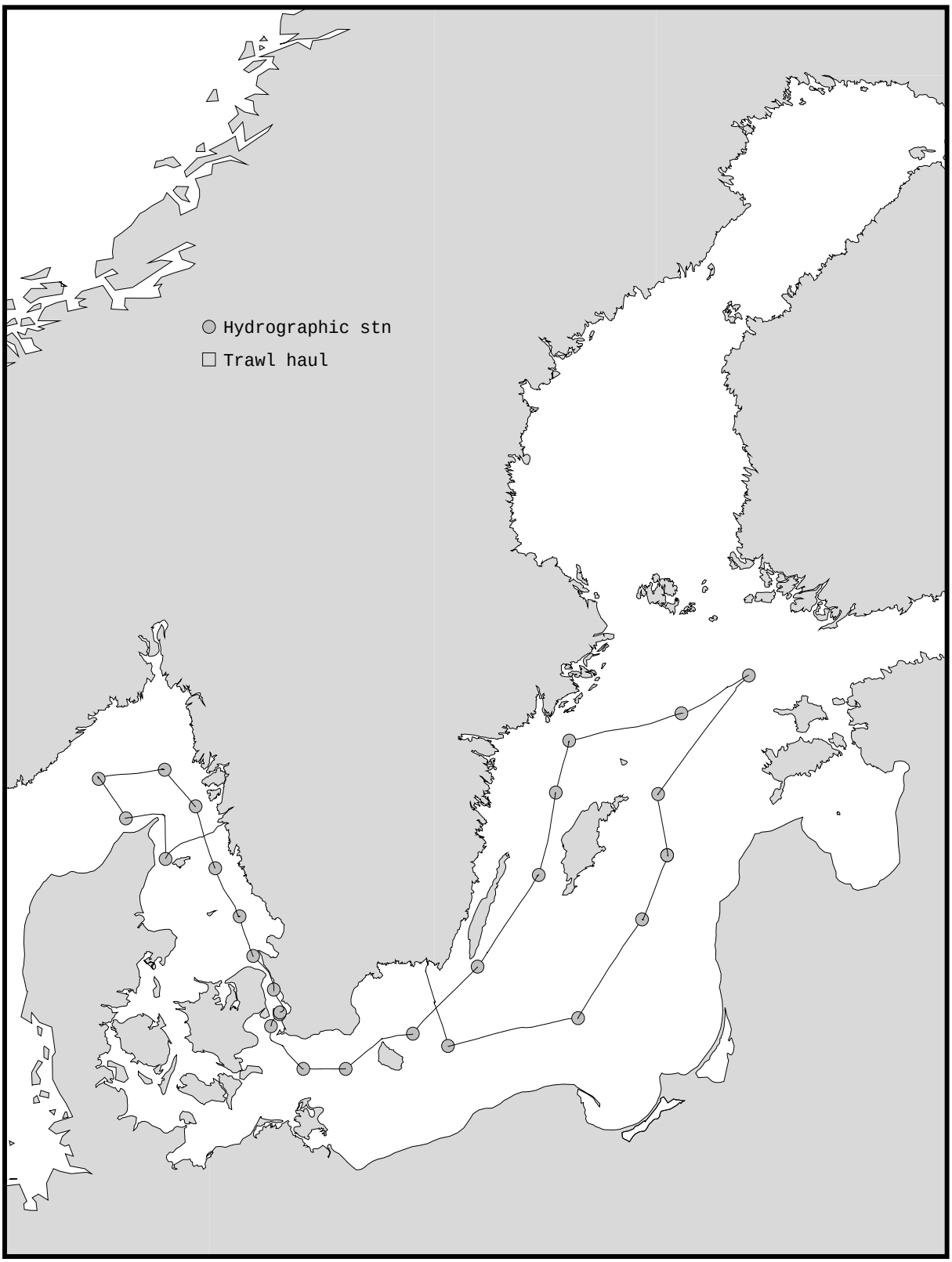
Ship : Argos
Date : 980315-980320
Series : 0250-0276



CSR RefNo: 1998-77AR/0250-0276

Bottom water oxygen concentration (ml/l)

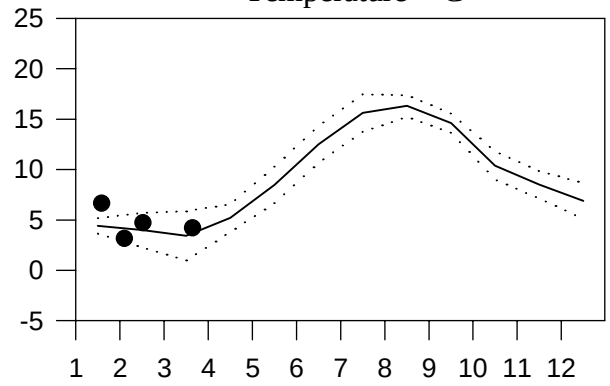
Country: Sweden
Ship: Argos
Date: 980316-980320
Series: 0250-0276

STATION P2 SURFACE WATER (0-15 m)

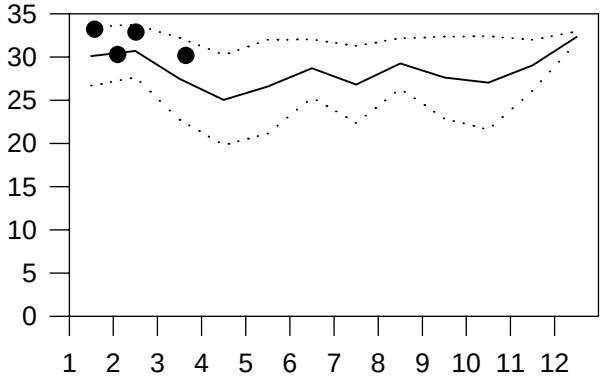
Annual Cycles

Mean 1986-1995 ····· St.Dev. ● 1998

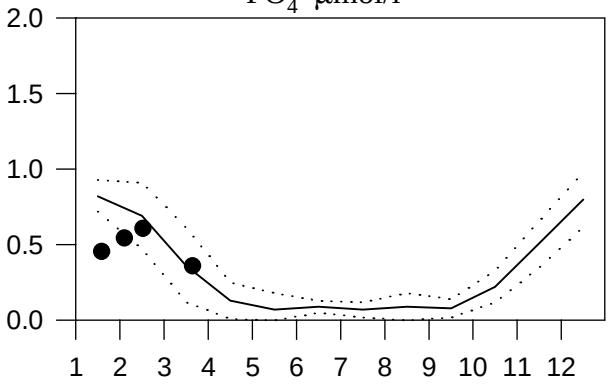
Temperature °C



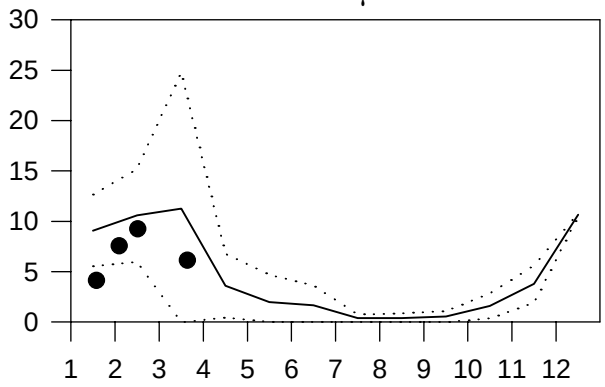
Salinity psu



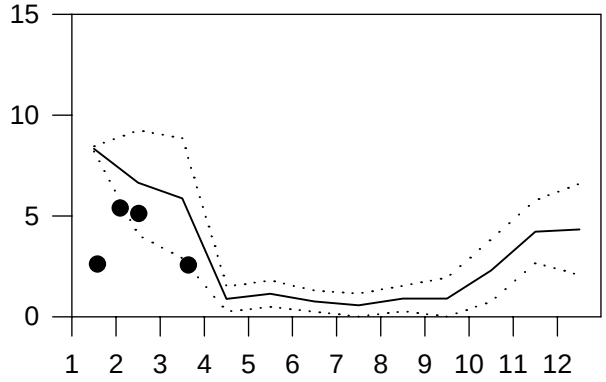
PO_4 µmol/l



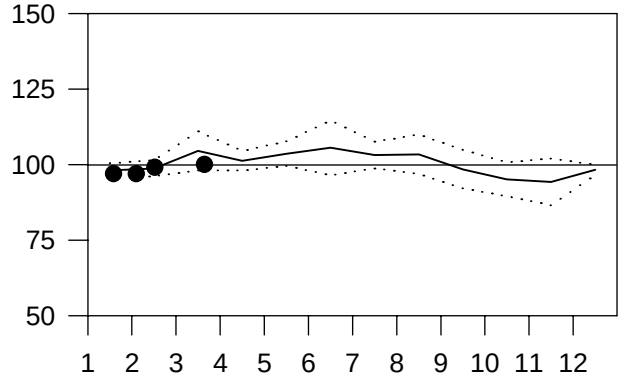
DIN µmol/l



SiO_3 µmol/l

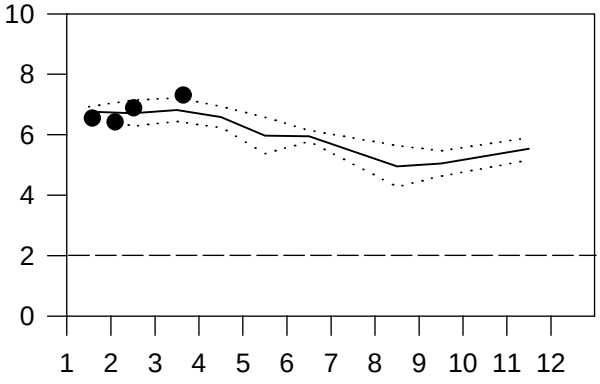


O_2 saturation %

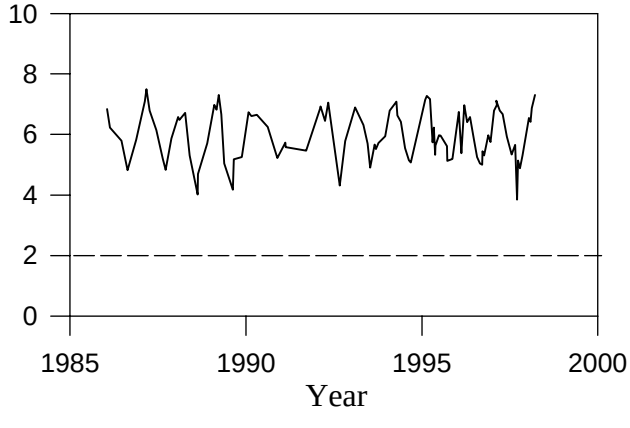


OXYGEN IN BOTTOM WATER

O_2 ml/l

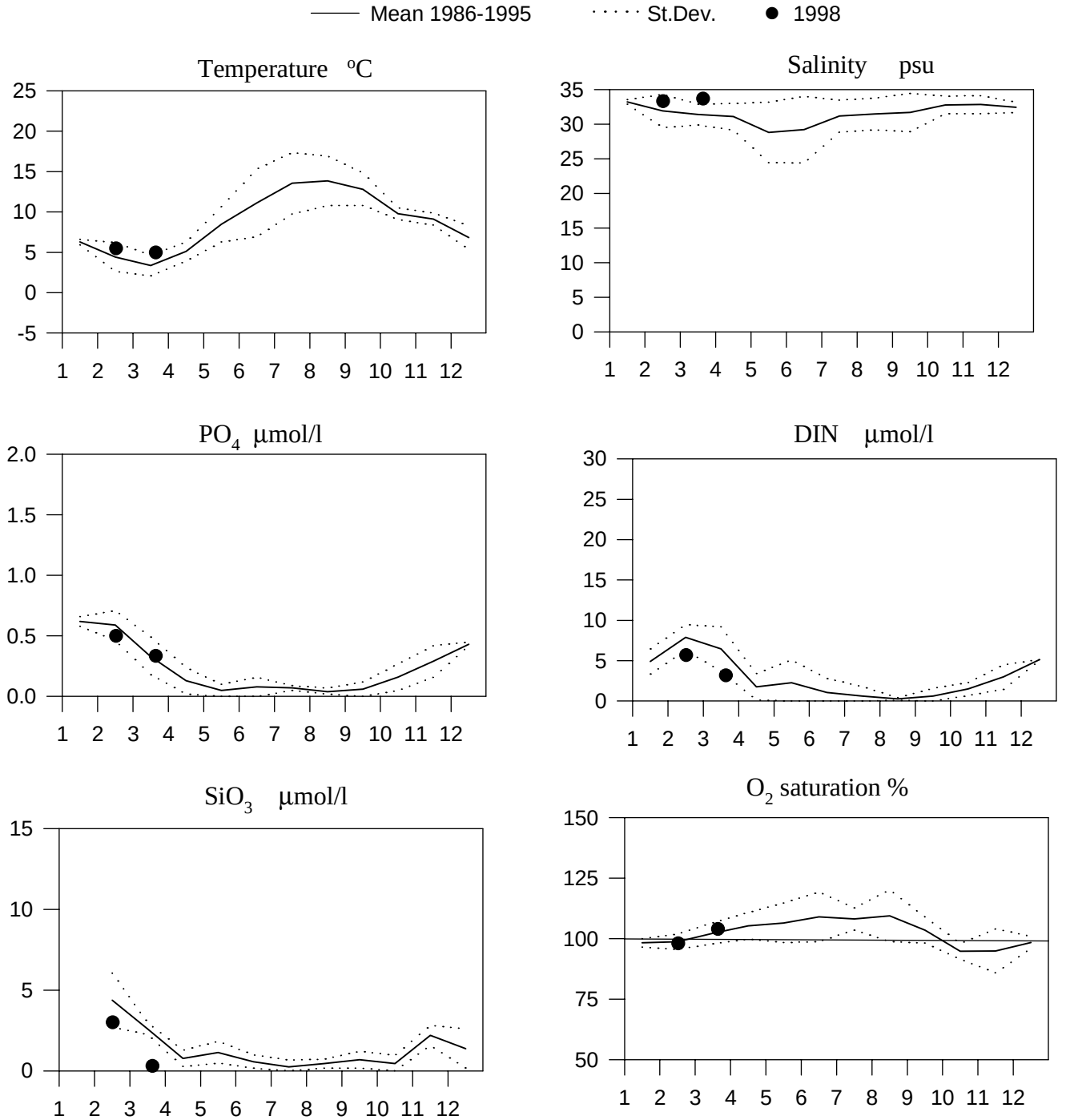


O_2 ml/l

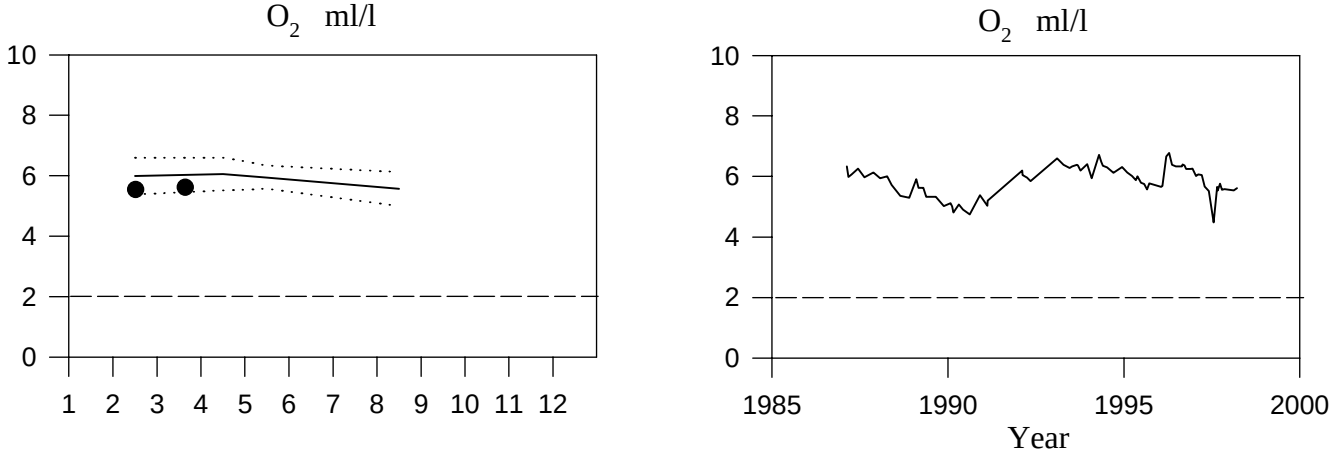


STATION M6 SURFACE WATER (0-15 m)

Annual Cycles



OXYGEN IN BOTTOM WATER

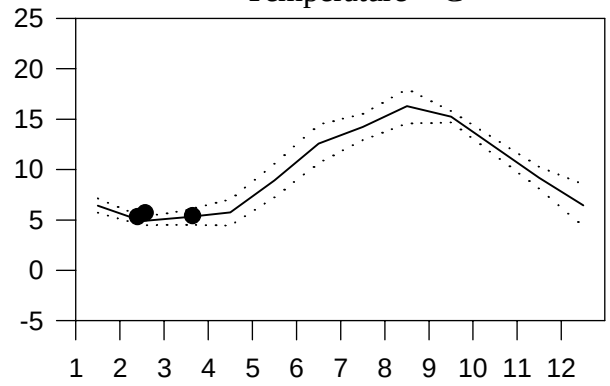


STATION HS5 SURFACE WATER (0-15 m)

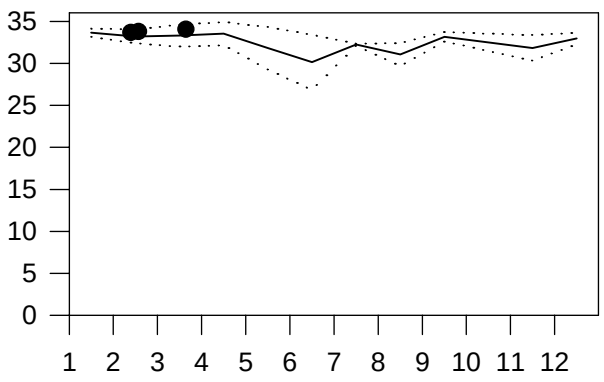
Annual Cycles

Mean 1986-1995 ····· St.Dev. ● 1998

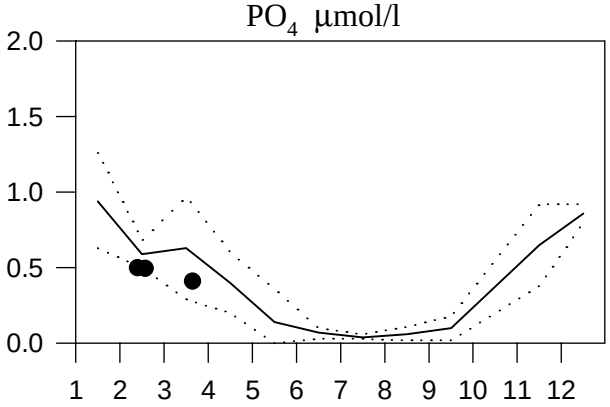
Temperature °C



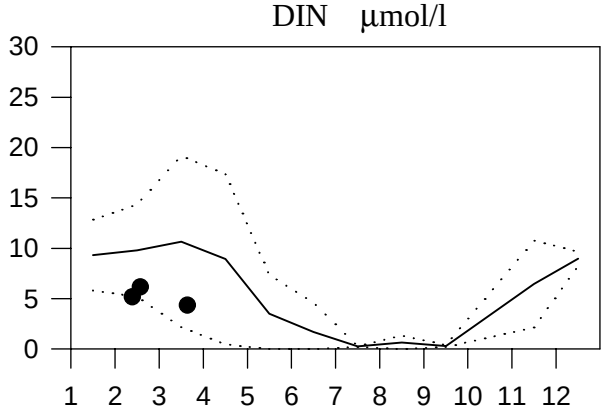
Salinity psu



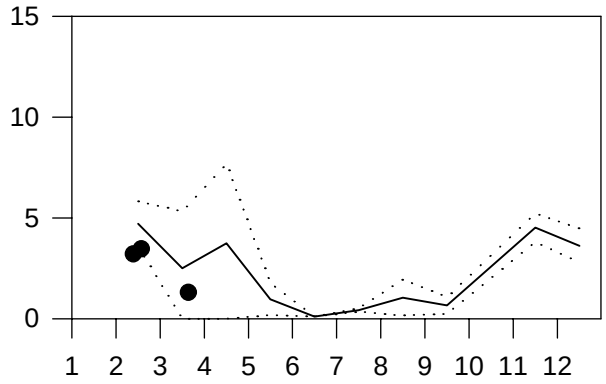
PO_4 µmol/l



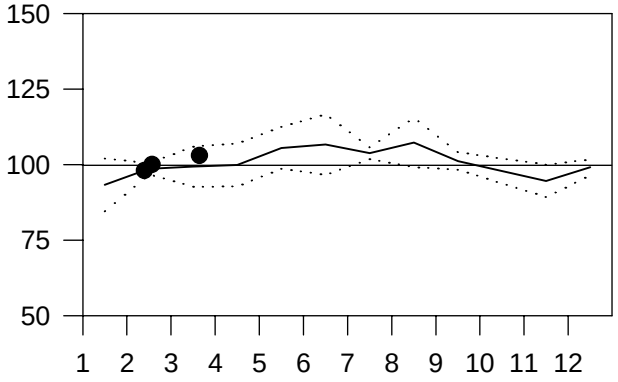
DIN µmol/l



SiO_3 µmol/l

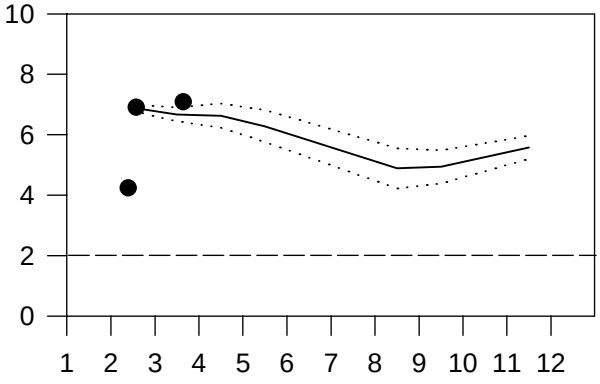


O_2 saturation %



OXYGEN IN BOTTOM WATER

O_2 ml/l



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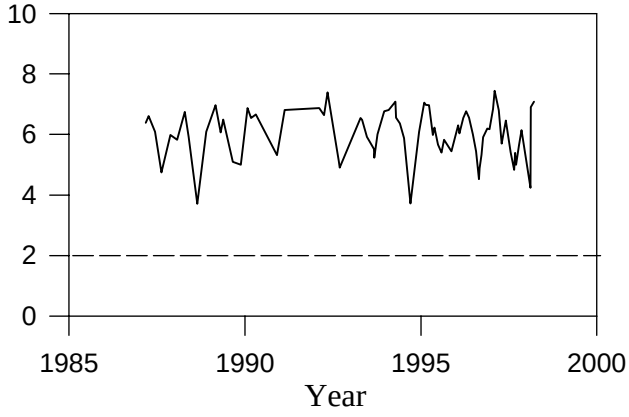
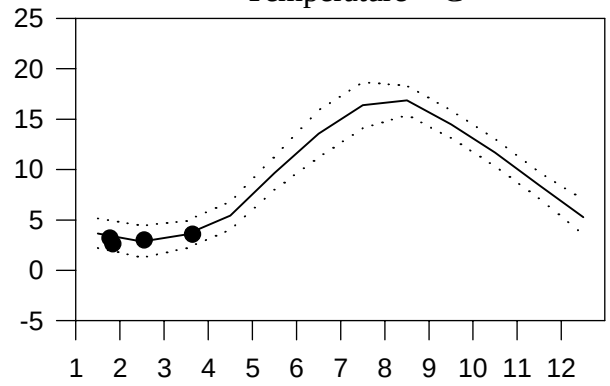


STATION FLADEN SURFACE WATER (0-15 m)

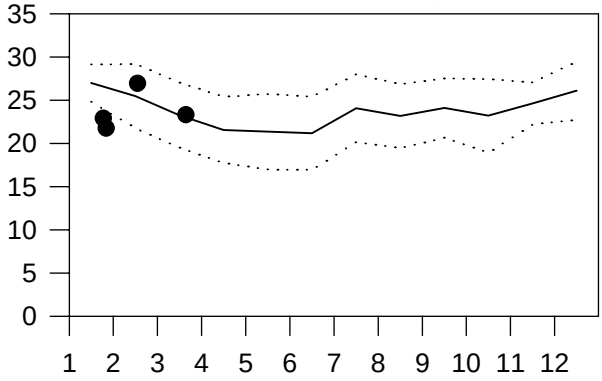
Annual Cycles

Mean 1986-1995 ····· St.Dev. ● 1998

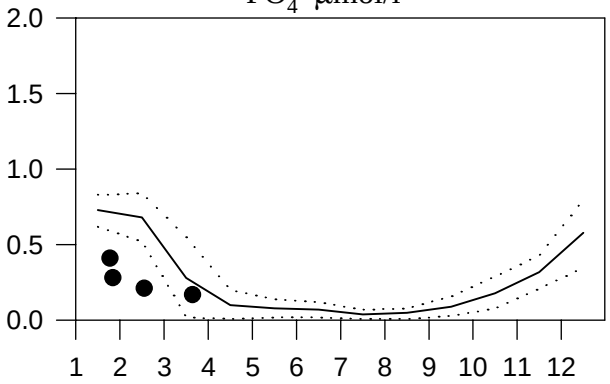
Temperature °C



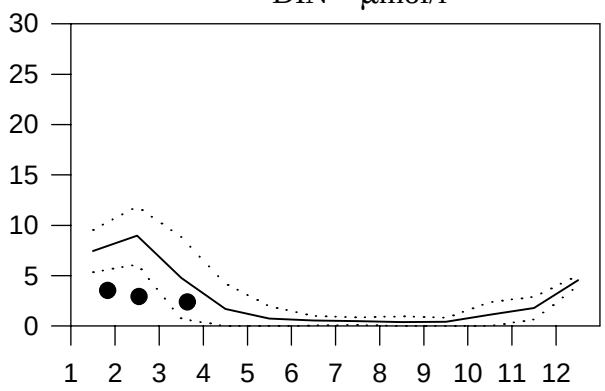
Salinity psu



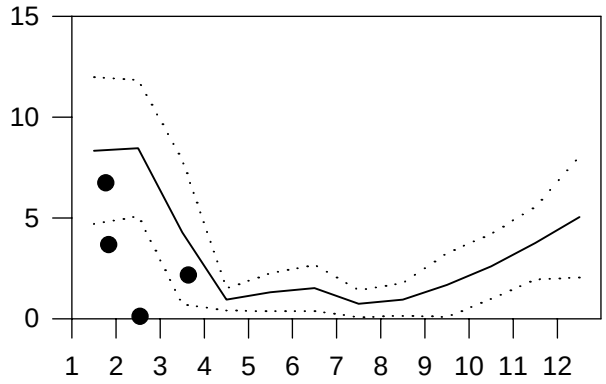
PO_4 µmol/l



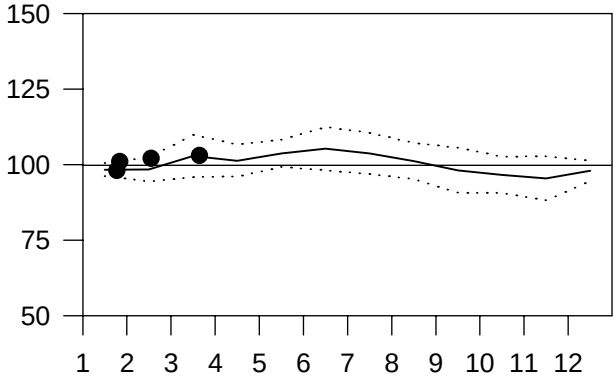
DIN µmol/l



SiO_3 µmol/l

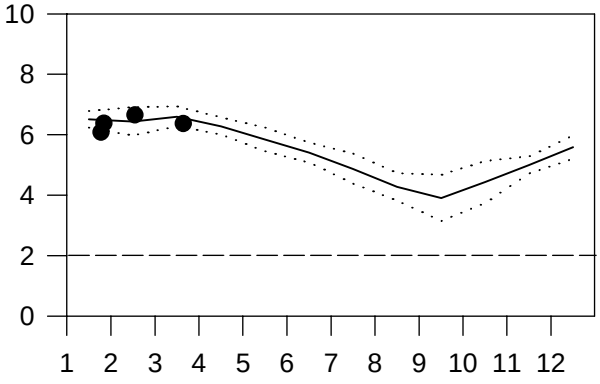


O_2 saturation %

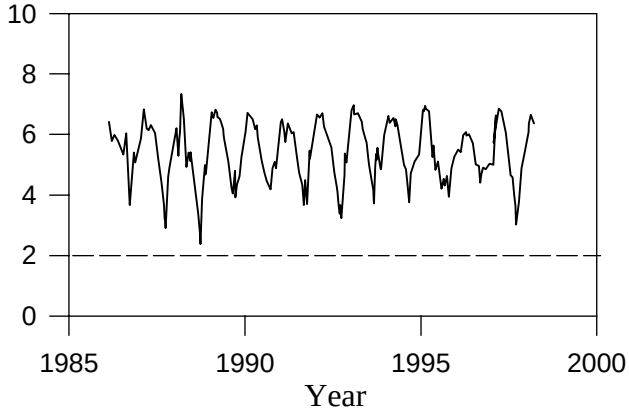


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

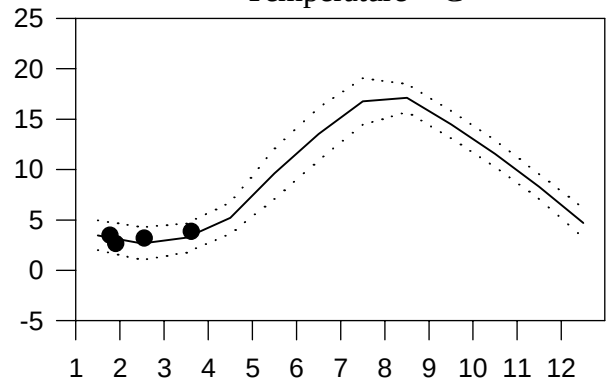


STATION ANHOLT E SURFACE WATER (above halocline)

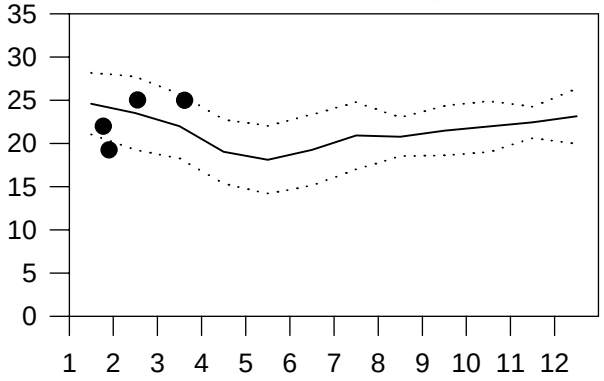
Annual Cycles

Mean 1986-1995 ····· St.Dev. ● 1998

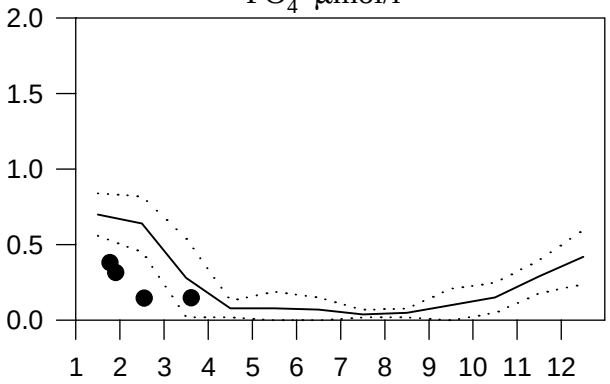
Temperature °C



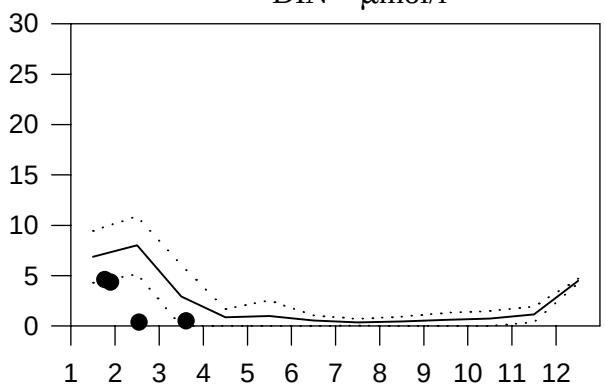
Salinity psu



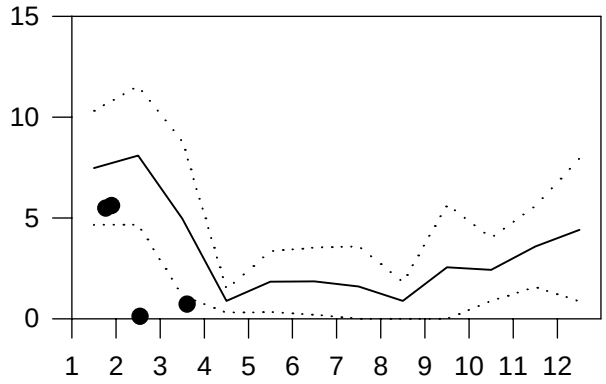
PO_4 µmol/l



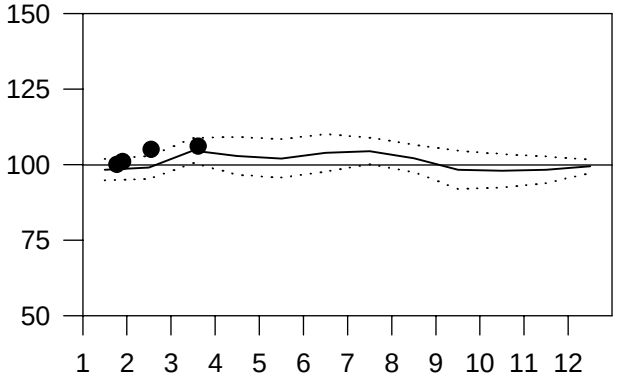
DIN µmol/l



SiO_3 µmol/l

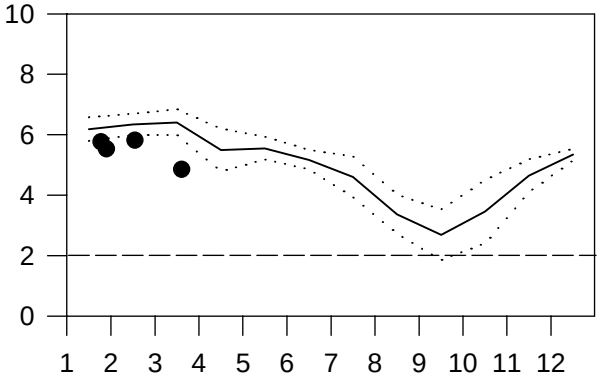


O_2 saturation %

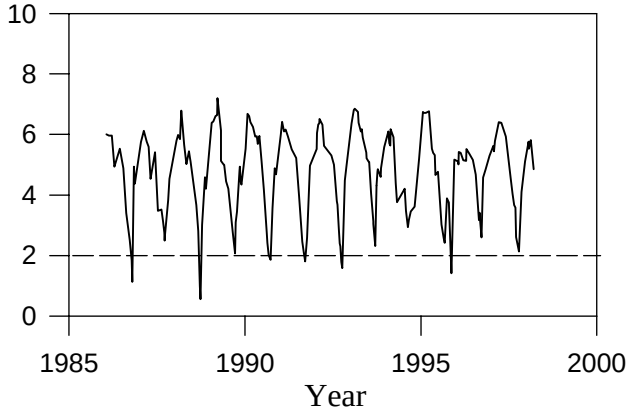


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

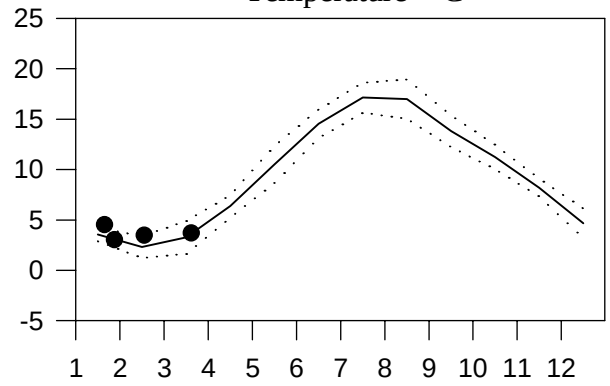


STATION W LANDSKRONA SURFACE WATER (0-15 m)

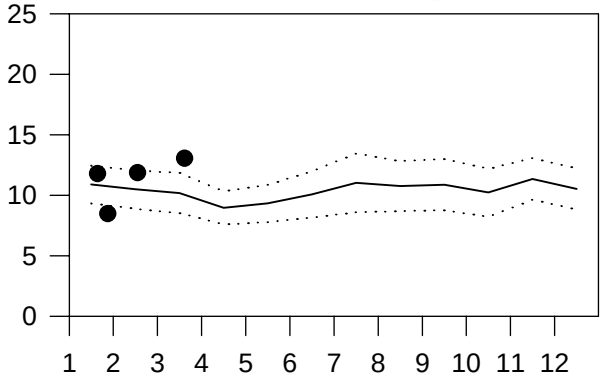
Annual Cycles

Mean 1986-1995 ····· St.Dev. ● 1997

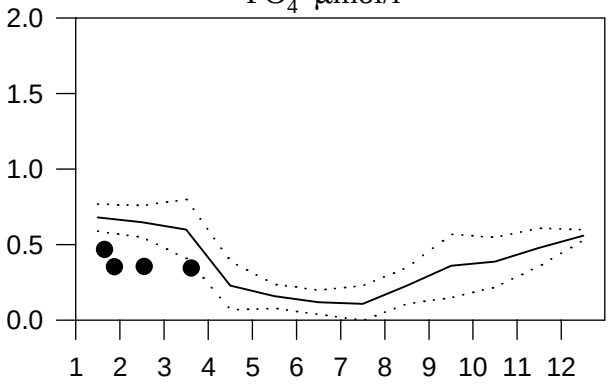
Temperature °C



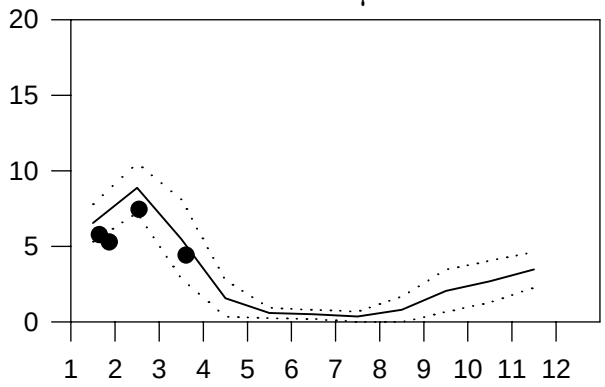
Salinity psu



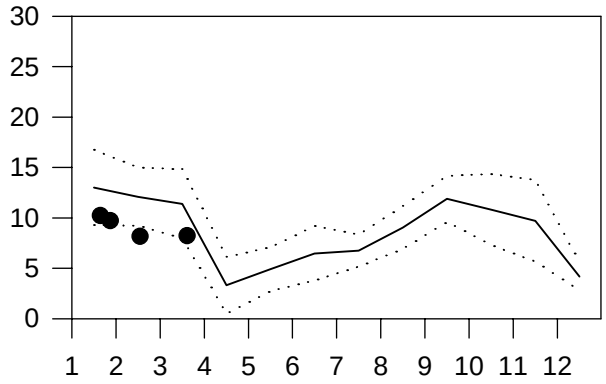
PO_4 µmol/l



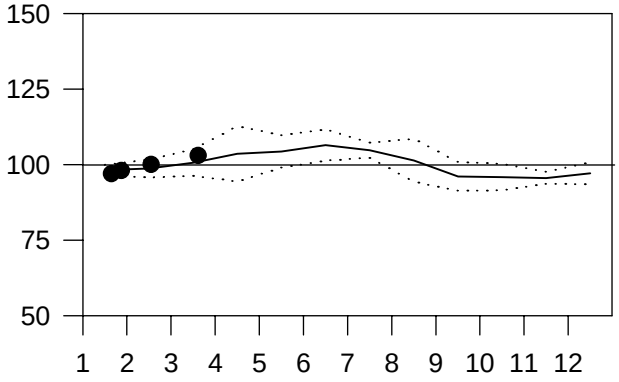
DIN µmol/l



SiO_3 µmol/l

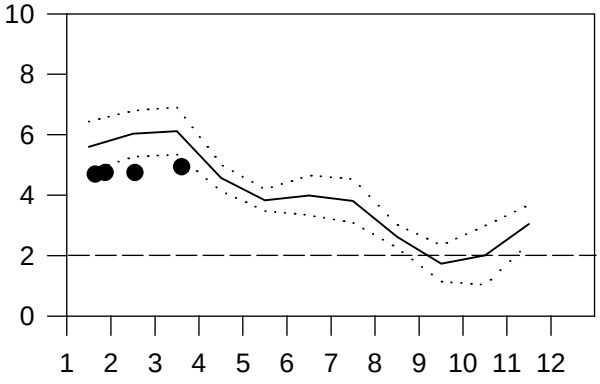


O_2 saturation %

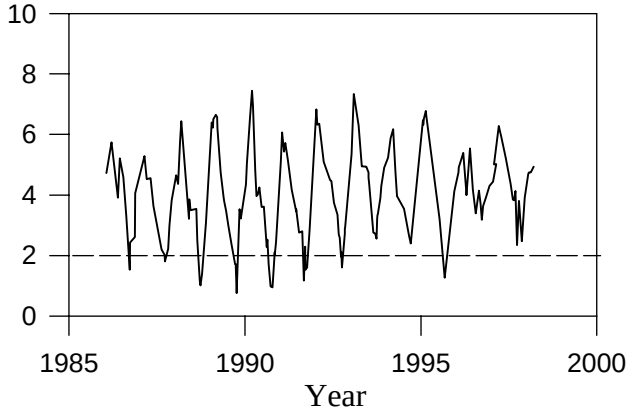


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

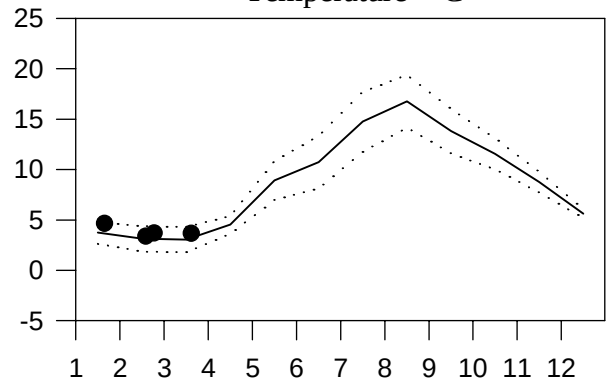


STATION BY2 SURFACE WATER (0-15 m)

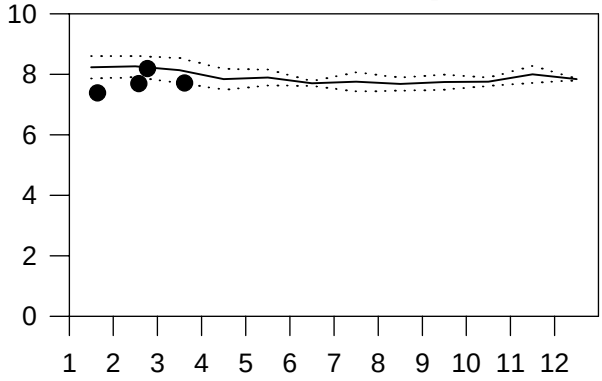
Annual Cycles

Mean 1986-1995 ····· St.Dev. ● 1998

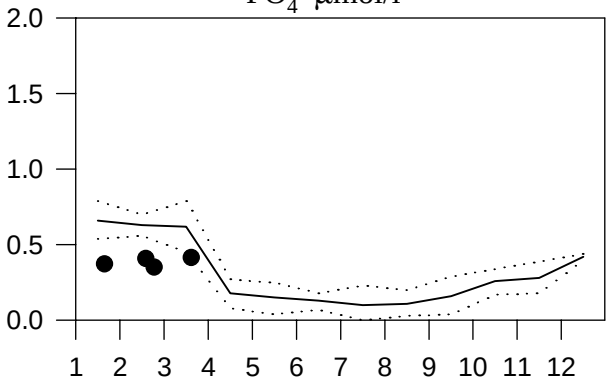
Temperature °C



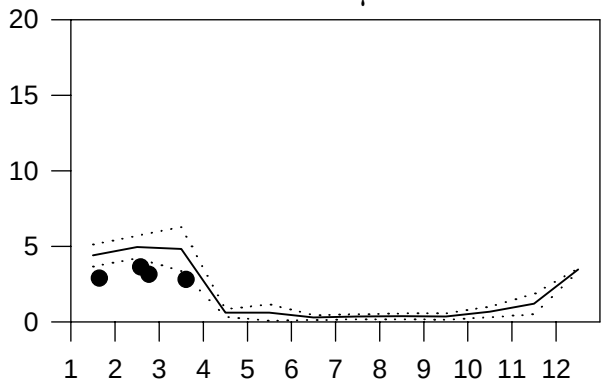
Salinity psu



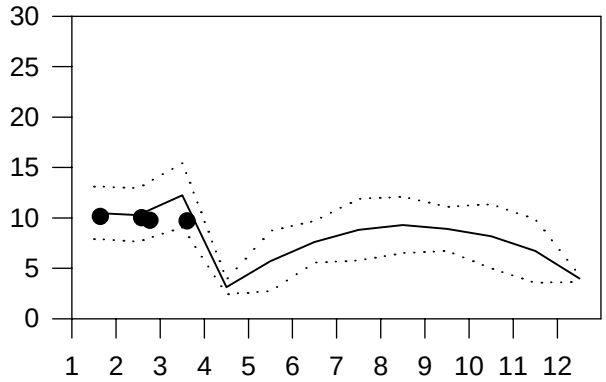
PO_4 µmol/l



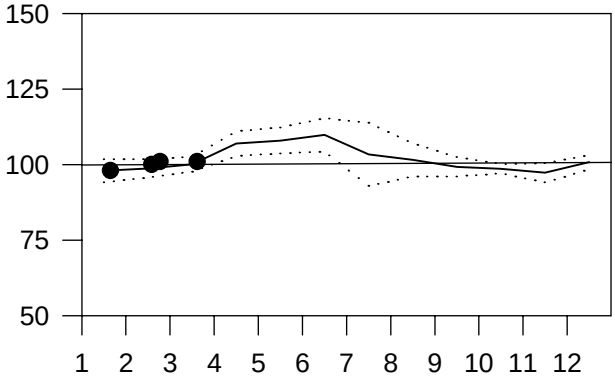
DIN µmol/l



SiO_3 µmol/l

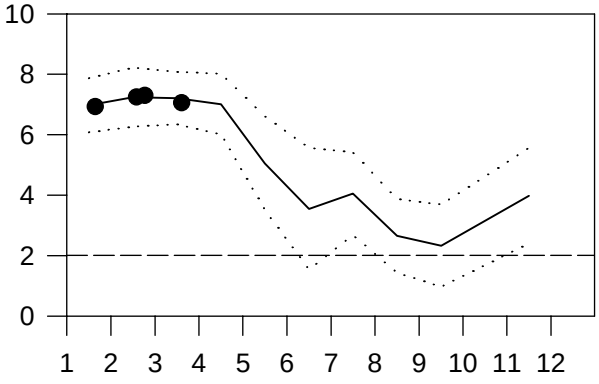


O_2 saturation %

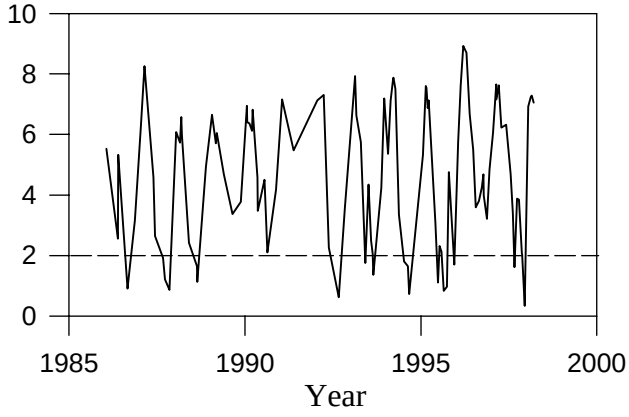


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

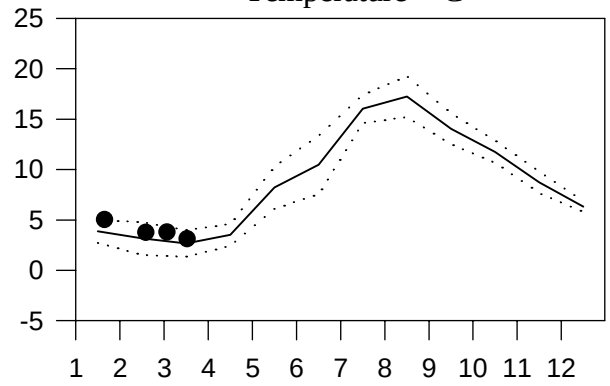


STATION BY5 SURFACE WATER (0-15 m)

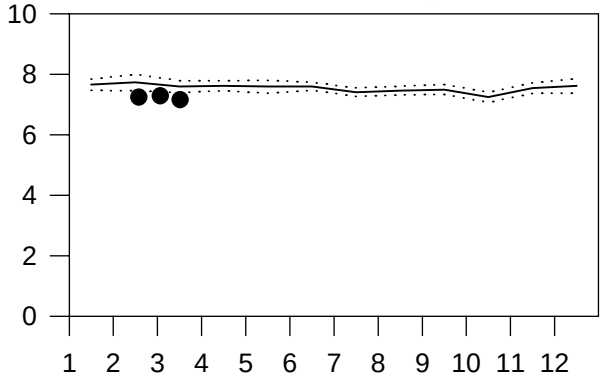
Annual Cycles

Mean 1986-1995 ····· St.Dev. ● 1998

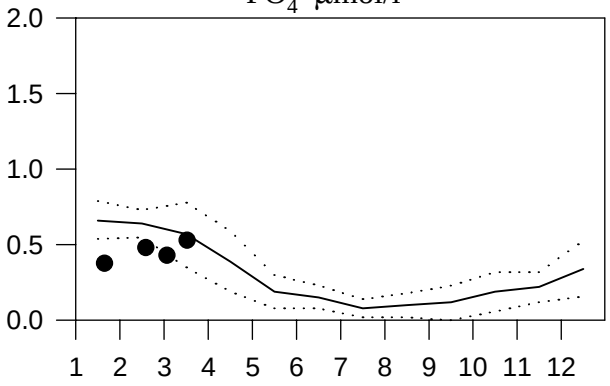
Temperature °C



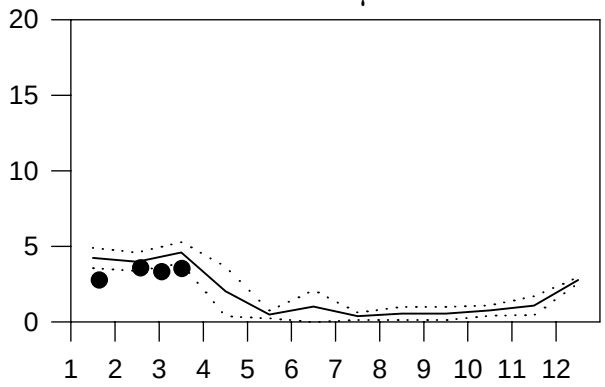
Salinity psu



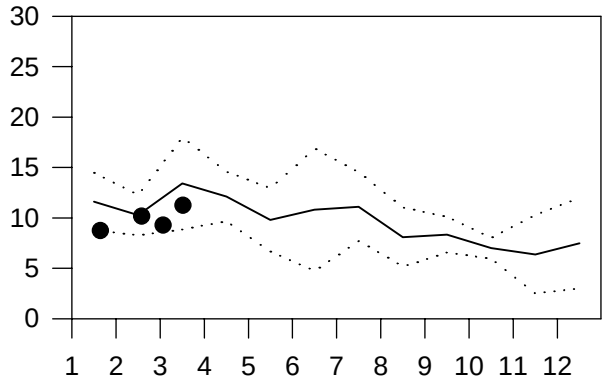
PO_4 µmol/l



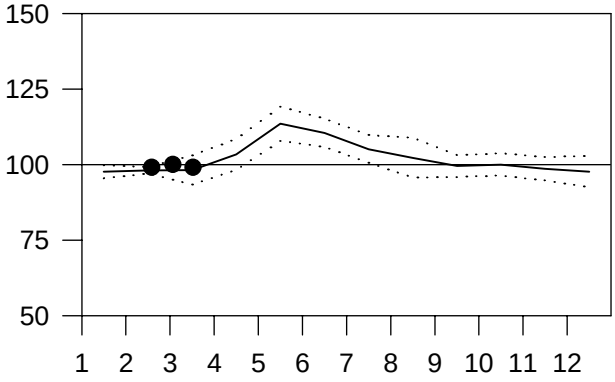
DIN µmol/l



SiO_3 µmol/l

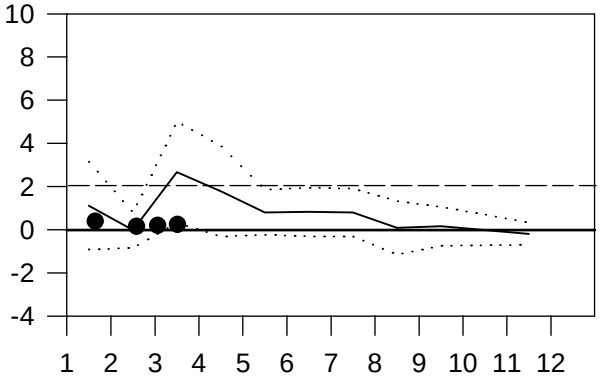


O_2 saturation %

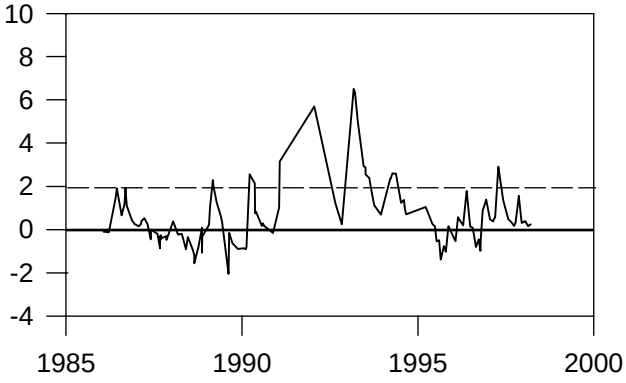


OXYGEN IN BOTTOM WATER

O_2 ml/l



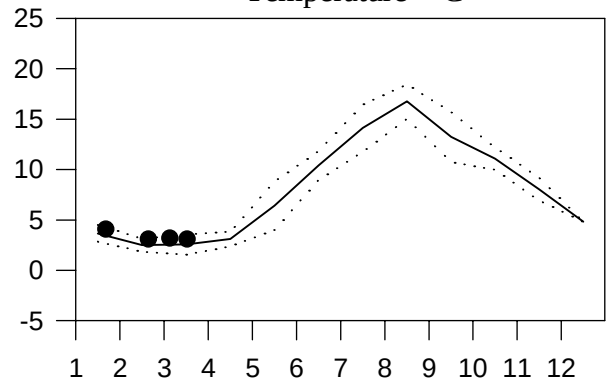
O_2 ml/l



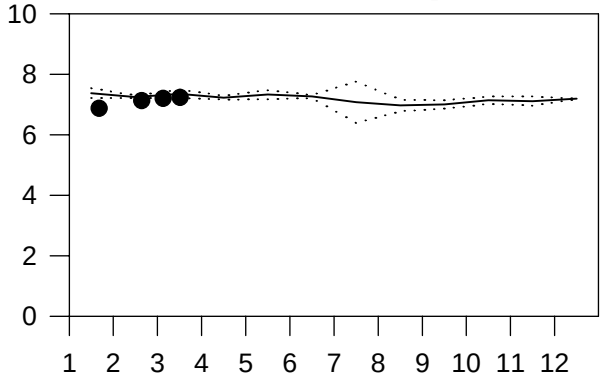
STATION BY15 SURFACE WATER (0-15 m)

Annual Cycles

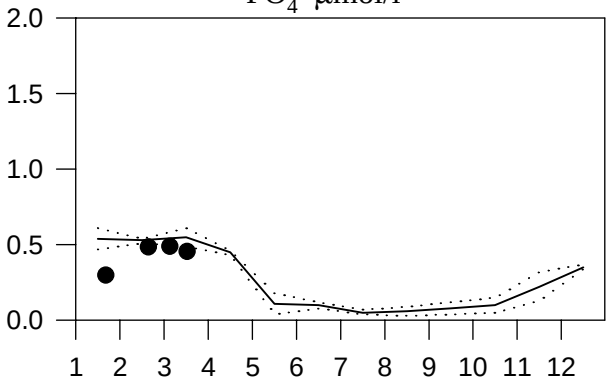
Temperature °C



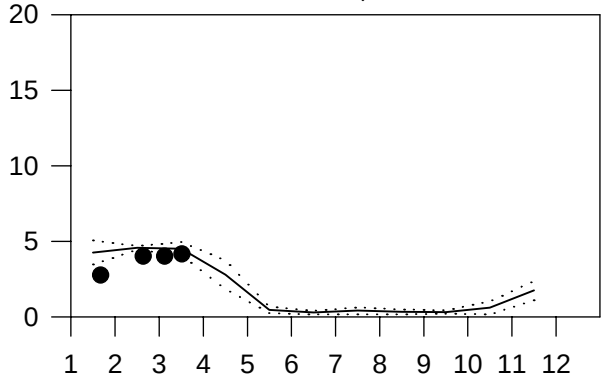
Salinity psu



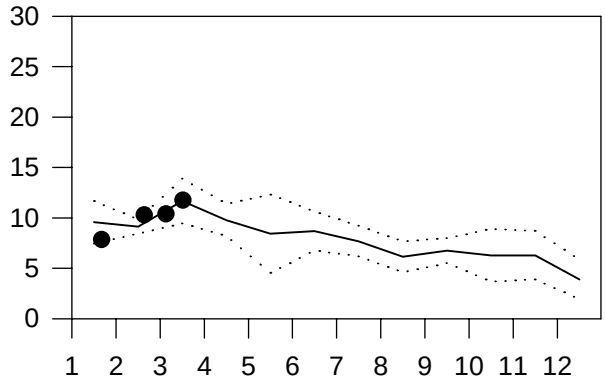
PO_4 µmol/l



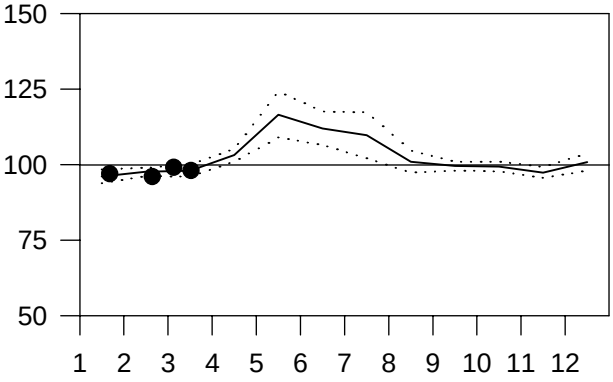
DIN µmol/l



SiO_3 µmol/l

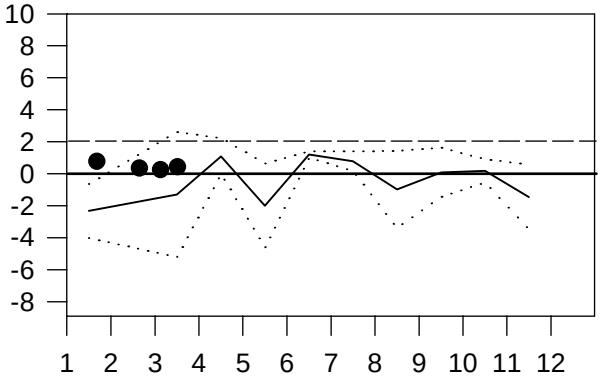


O_2 saturation %

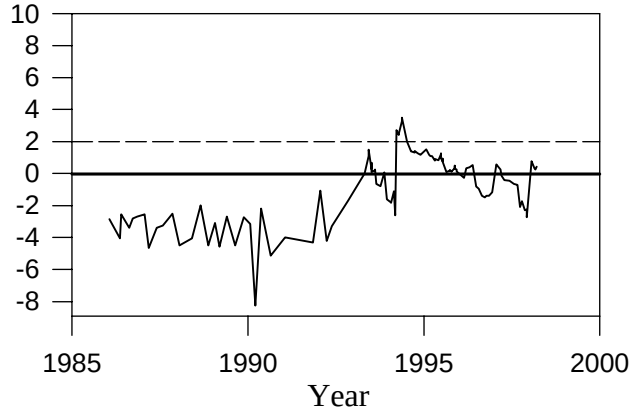


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

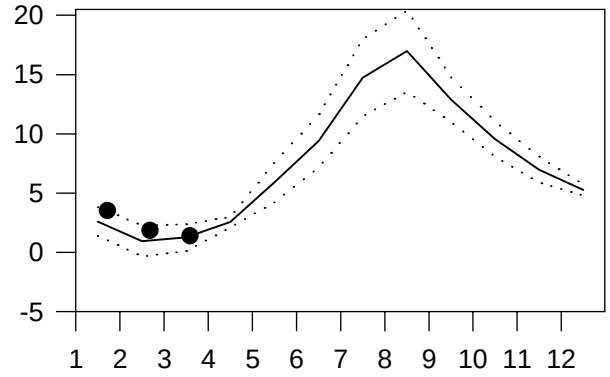


STATION BY31 SURFACE WATER (0-15 m)

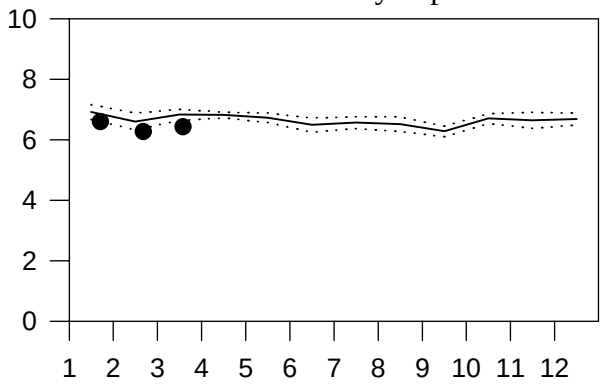
Annual Cycles

Mean 1986-1995 ····· St.Dev. ● 1998

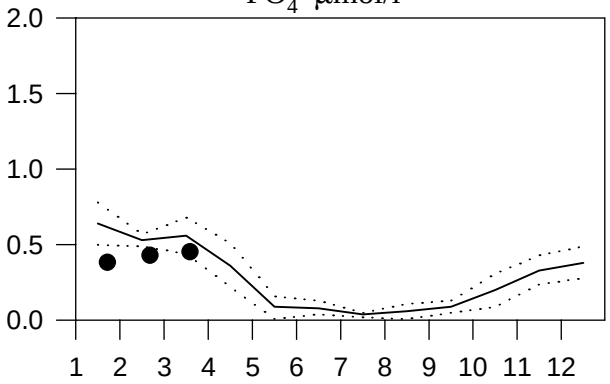
Temperature °C



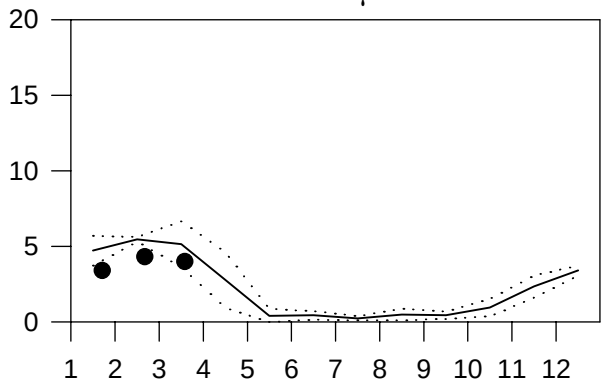
Salinity psu



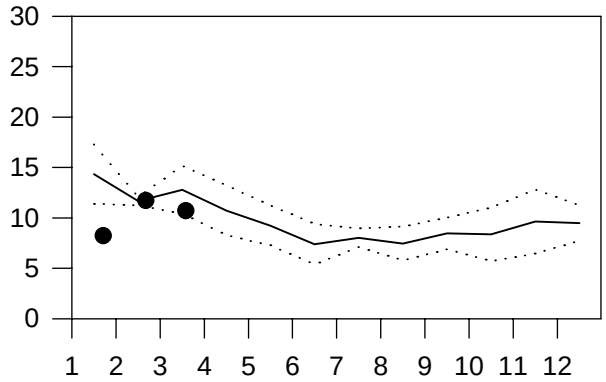
PO_4 µmol/l



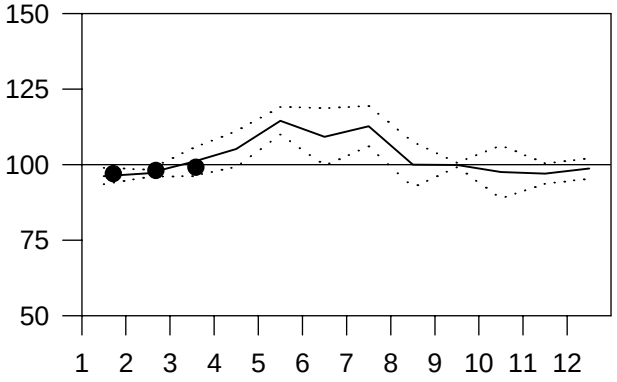
DIN µmol/l



SiO_3 µmol/l

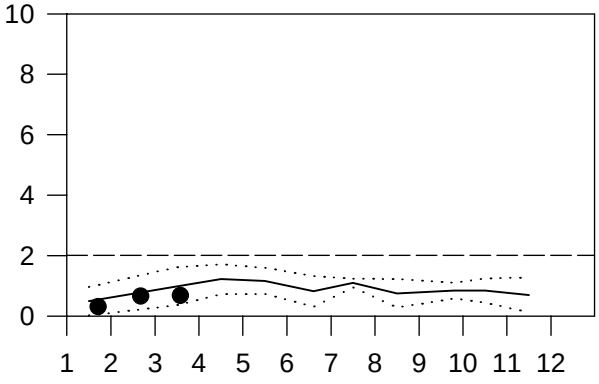


O_2 saturation %

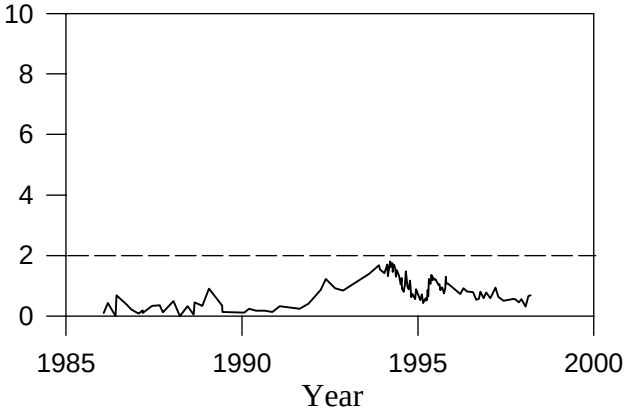


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

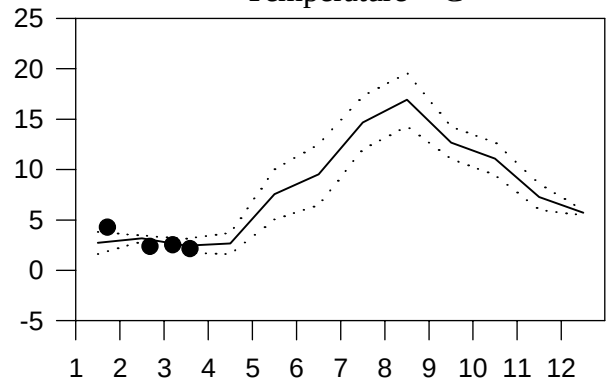


STATION BY38 SURFACE WATER (0-15 m)

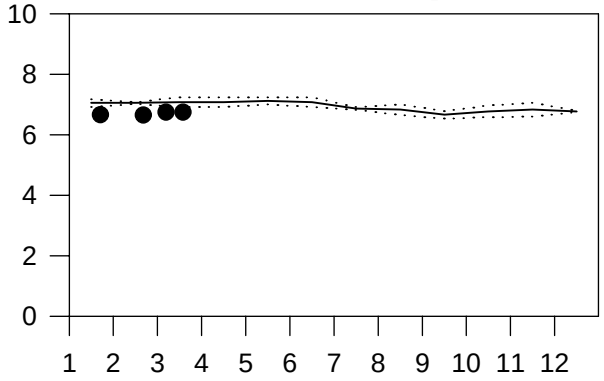
Annual Cycles

Mean 1986-1995 ····· St.Dev. ● 1998

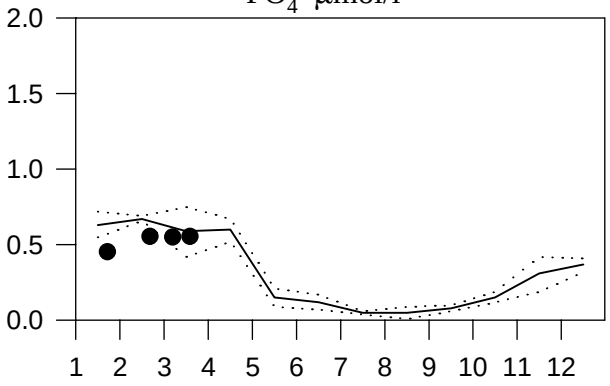
Temperature °C



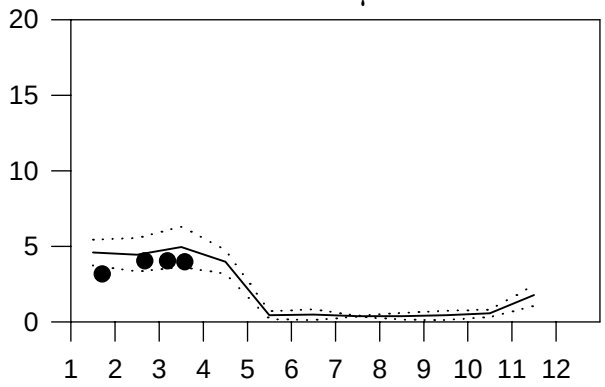
Salinity psu



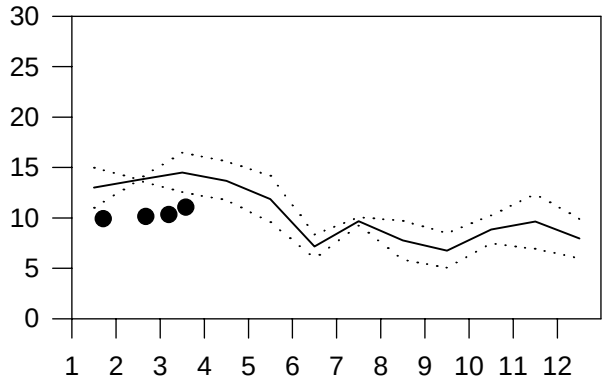
PO_4 µmol/l



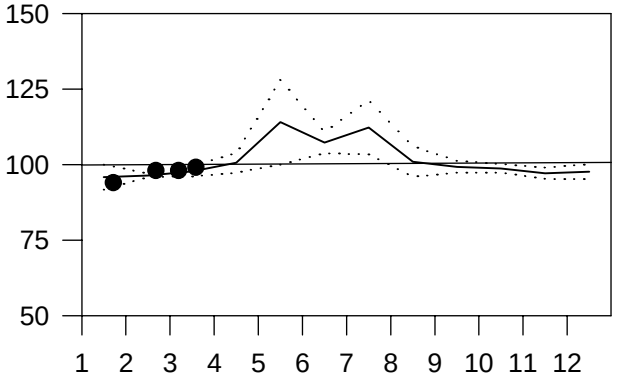
DIN µmol/l



SiO_3 µmol/l

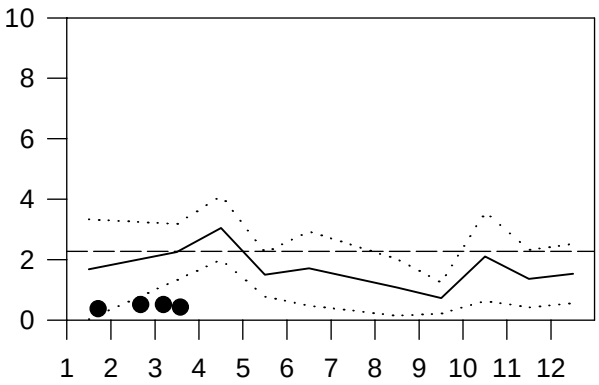


O_2 saturation %

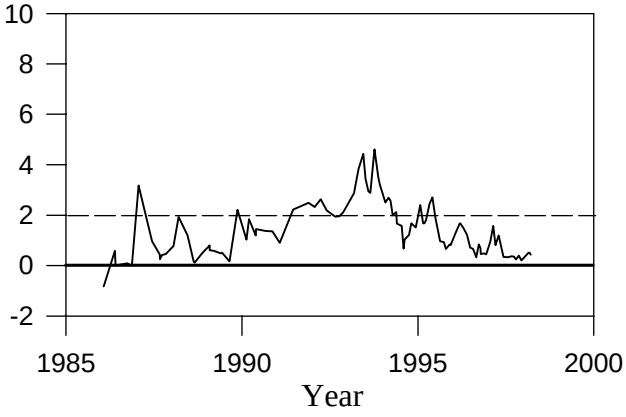


OXYGEN IN BOTTOM WATER

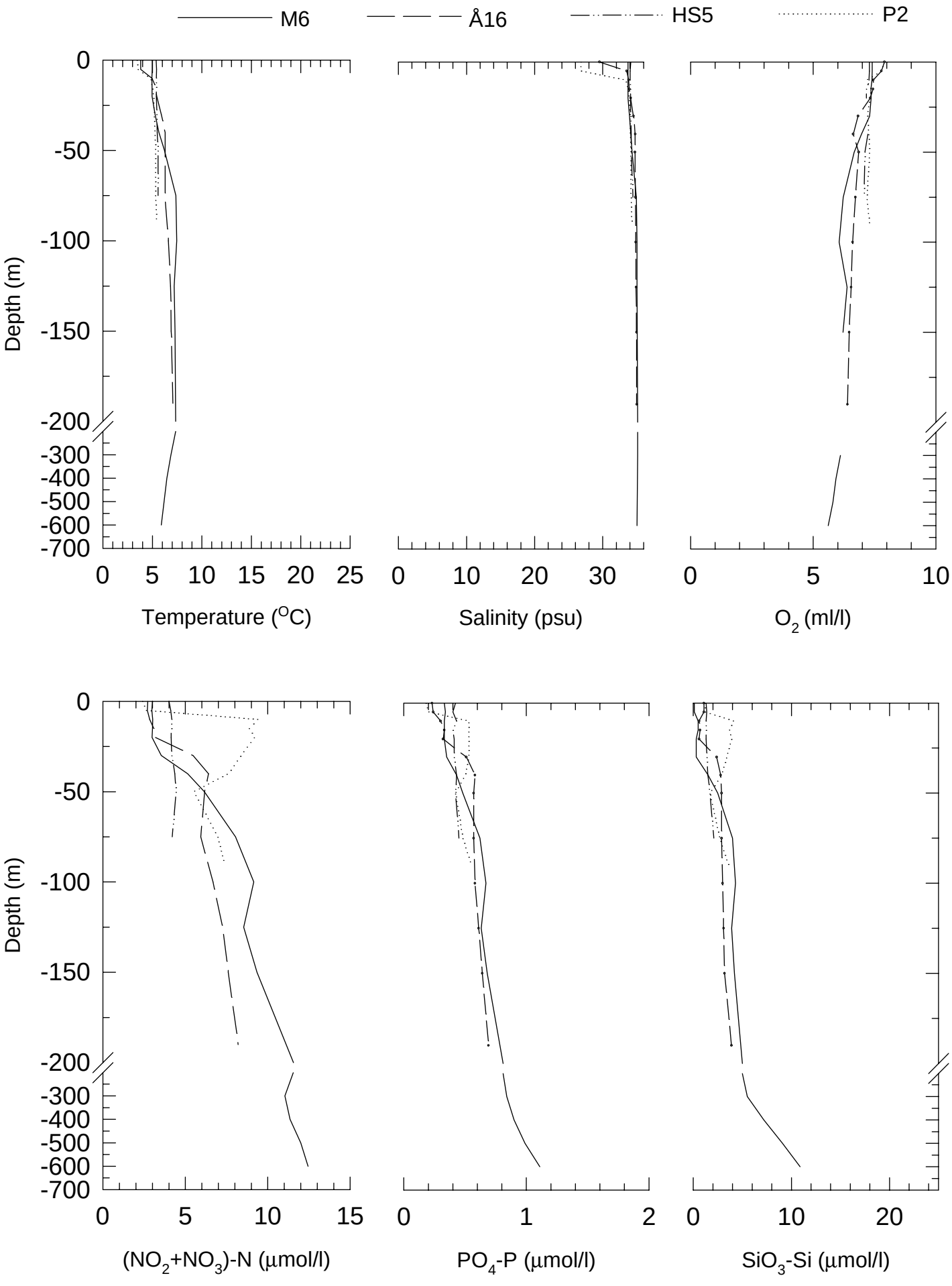
O_2 ml/l



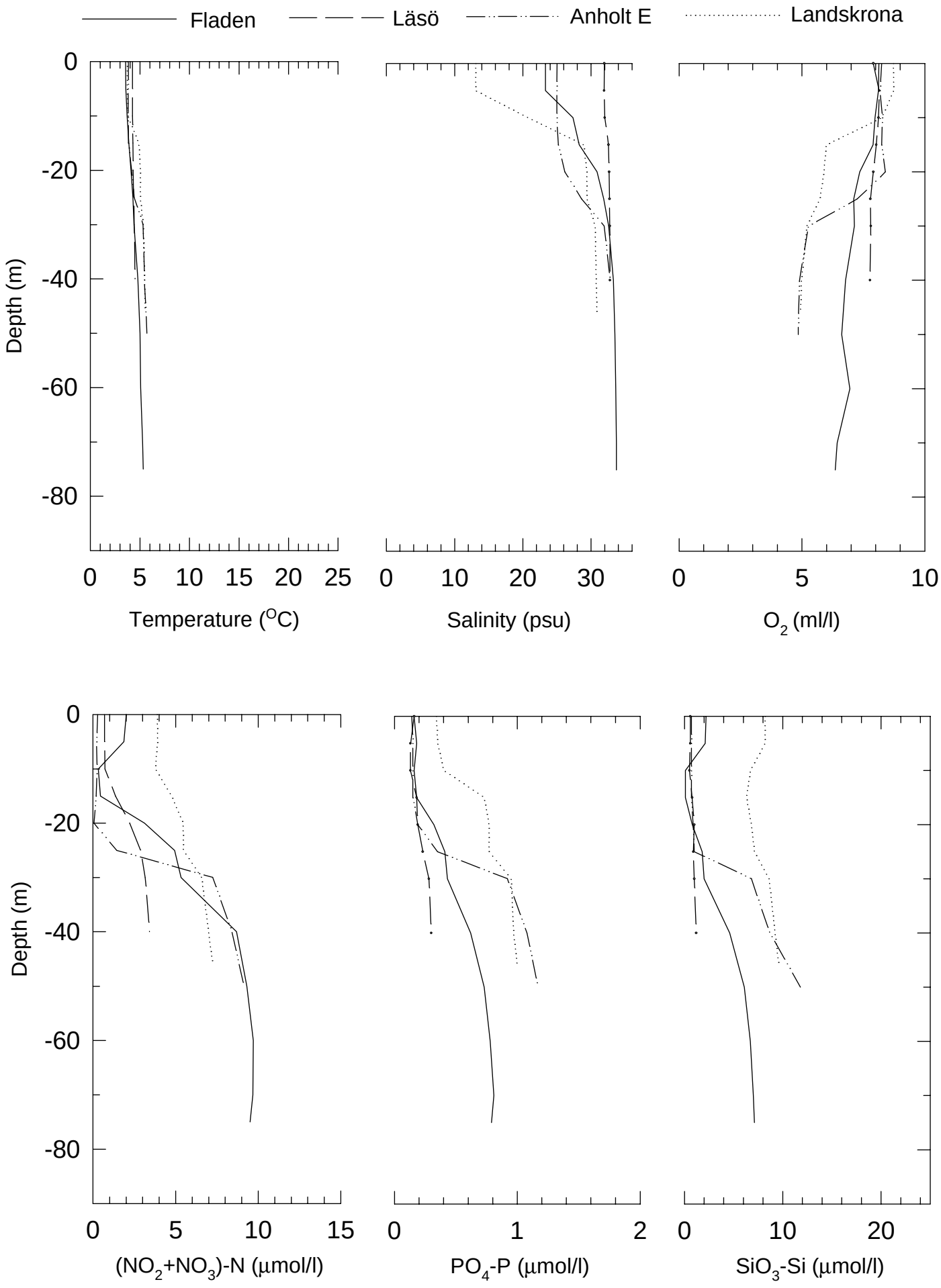
O_2 ml/l

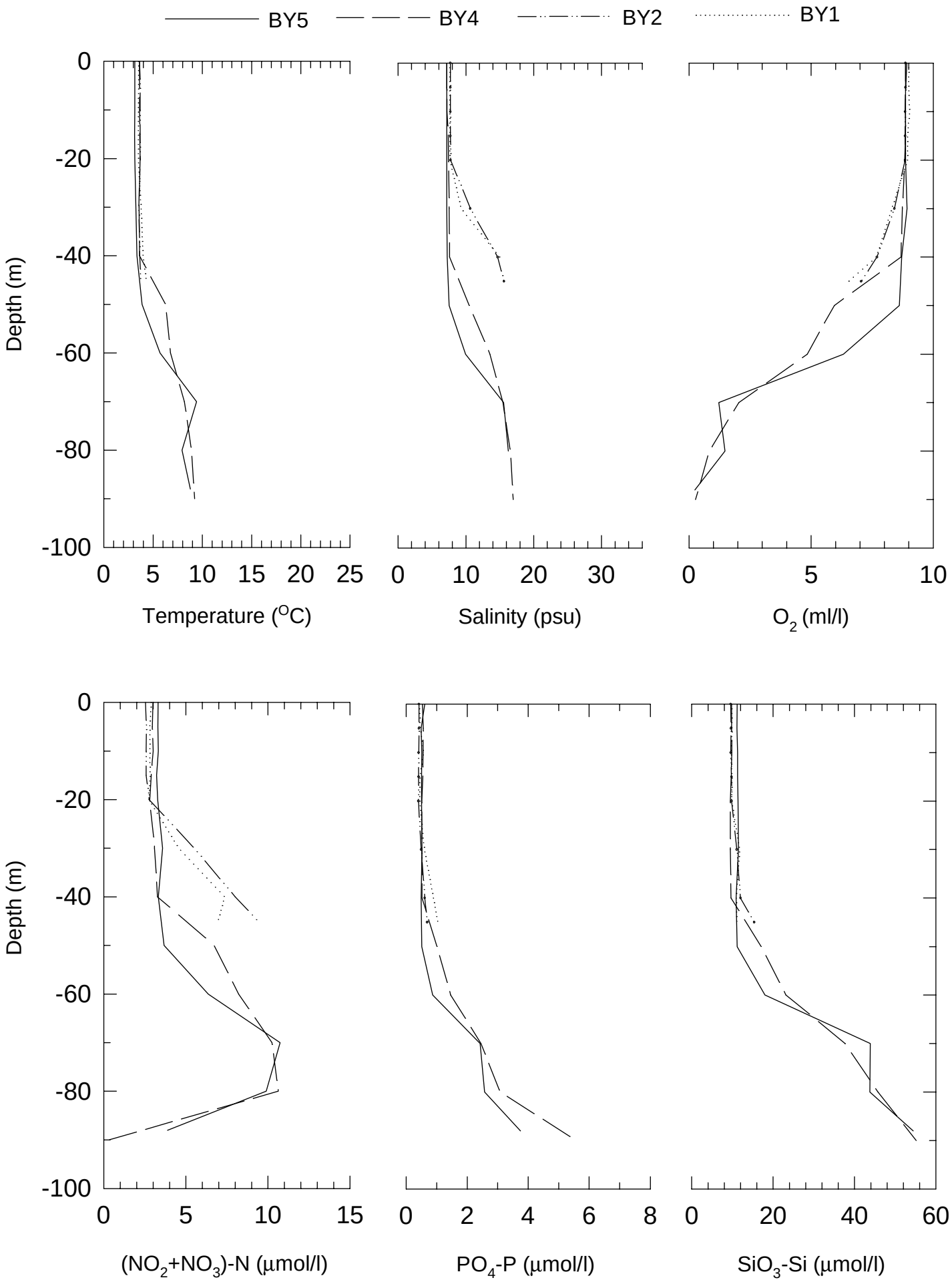


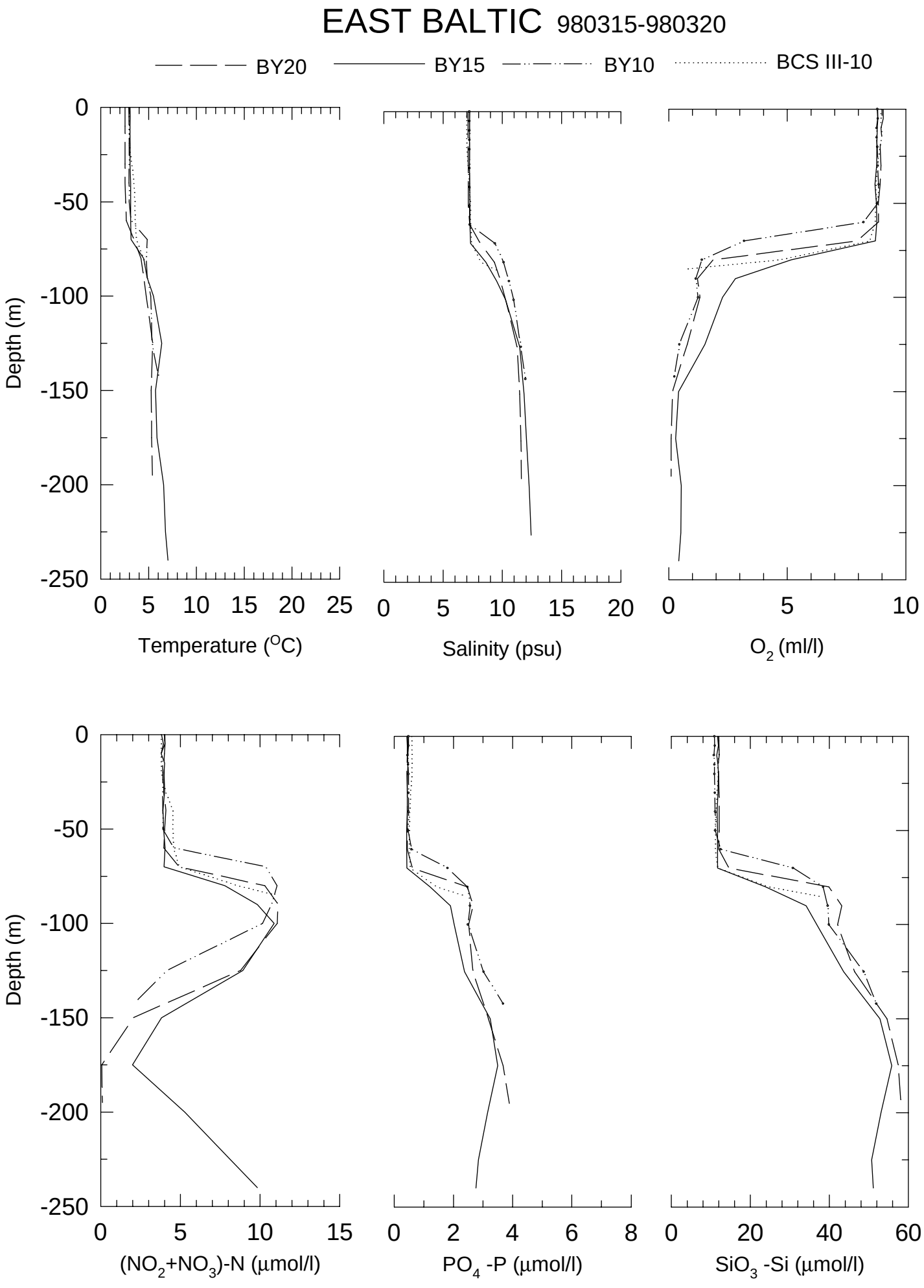
SKAGERRAK 980315-980320



KATTEGAT and THE SOUND 980315-980320




SOUTH BALTIC 980315-980320
BY5
BY4
BY2
BY1
Depth (m)
0
-20
-40
-60
-80
-100
0 5 10 15 20 25
Temperature (°C)
0 10 20 30
Salinity (psu)
0 5 10
O2 (ml/l)
0 5 10 15
(NO2+NO3)-N (µmol/l)
0 2 4 6 8
PO4-P (µmol/l)
0 20 40 60
SiO3-Si (µmol/l)


EAST BALTIC 980315-980320
BY20
BY15
BY10
BCS III-10
Depth (m)
0
-50
-100
-150
-200
-250
0 5 10 15 20 25
Temperature (°C)
0 5 10 15 20
Salinity (psu)
0 5 10
O2 (ml/l)
0 5 10 15
(NO2+NO3)-N (µmol/l)
0 2 4 6 8
PO4 -P (µmol/l)
0 20 40 60
SiO3 -Si (µmol/l)

WEST BALTIC 980315-980320