Bengt Yhlen

Swedish Meteorological and Hydrological Institute
Oceanographical Laboratory

1997-10-22
Dnr: SaO-1997-226

CRUISE REPORT FROM R/V ARGOS

Survey period: 971012-971017

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

Principal: SMHI

SUMMARY

The expedition was performed within SMHIs regular monitoring programme and covered the Skagerrak, the Kattegat, the Sound and the Baltic Proper. The weather was dominated by weak to moderate northerly winds. The surface water temperatures showed normal values. In the surface water of the Skagerrak the nutrient contents were low. In the surface water of the Kattegatt and the Baltic, outside the Sound area, the nitrogen componds were below or close to the detection limit, whereas both phosphate, 0.1-0.2 µmol/l, and silicate, 0.2-0.7, in the Kattegatt and, 6-10, µmol/l in the Baltic was present.
The oxygen conditions in the bottom water are displayed in a figure. Hydrogen sulphide was observed in the deep water of the East Gotland Basin (stations: BY10, BY15 and BY20). The concentration close to bottom in the Gotland deep is now almost 50 µmol/l.
No visible algae blooms were observed in any of the sea areas.

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PRELIMINARY RESULTS

The expedition, which was part of SMHIs regular marine monitoring programme, commenced in Karlskrona and ended in Göteborg. The weather during the expedition was dominated by weak to moderate northerly winds. During the last 24 hours of the expedition rather strong winds from south started.

The Skagerrak

The temperature in the surface water varied between 11.0 and 12.3°C which is or the season normal. The nutrient concentrations in the surface water were low, which also is typical for this time of the year. The in situ fluorescens in the area was low which indicated that the primary production not went on.

The Kattegatt and the Sound

The surface water temperatures varied between 10.7 and 11.8°C, which is normal for the season. The thermocline was weakly developed and was in the Kattegatt situated above 10 meters depth. The nitrogen components in the surface water outside the Sound area were exhausted, all registered values were below or very close to the detection limits, which is normal for the season. Also here was the in situ fluorescens low.The lowest oxygen value in the deep water of the Kattegatt was registered at station Anholt E, 2.13 ml/l at 50 m depth, corresponding to a saturation of 35%. The oxygen concentration in the deep water of the Sound was 3.81 ml/l (63% saturation) at station W Landskrona.

Östersjön

The surface temperature was normal for the season and varied between 12.7°C and 10.0°C, with the lowest value in the north. The thermocline was found at 30 to 40 m depth in the whole area, except the Arkona bassin where it was situated 10 m shallower. The nutrient concentrations in the surface water were typical for this time of the year; phosphate 0.10-0.20 µmol/l, nitrate around the detection limit of 0.10 µmol/l and silicate 6-10 µmol/l. The in situ fluorescens indicated that the autumn bloom not yet had started. The oxygen conditions in the bottom water are displayed in a figure. They were all low except in the Arkona Bassin. Oxygen concentrations below 2 ml/l were found between 60 and 70 m in the Bornholm Bassin, between 80 and 90 m in the Eastern Gotland Bassin, between 70 and 80 m in the Nothern Gotland Bassin and between 70 to 90 m in the Western Gotland Bassin. Hydrogen sulphide was found in the Gotland and Fårö deeps below 200 metres depth and at station BY10 at a depth of 140 meters.The concentration close to the bottom at the Gotland Deep is approching 50 µmol/l.

PARTICIPANTS

Name	From
Bengt Yhlen, chief scientist	SMHI Oceanographical lab.
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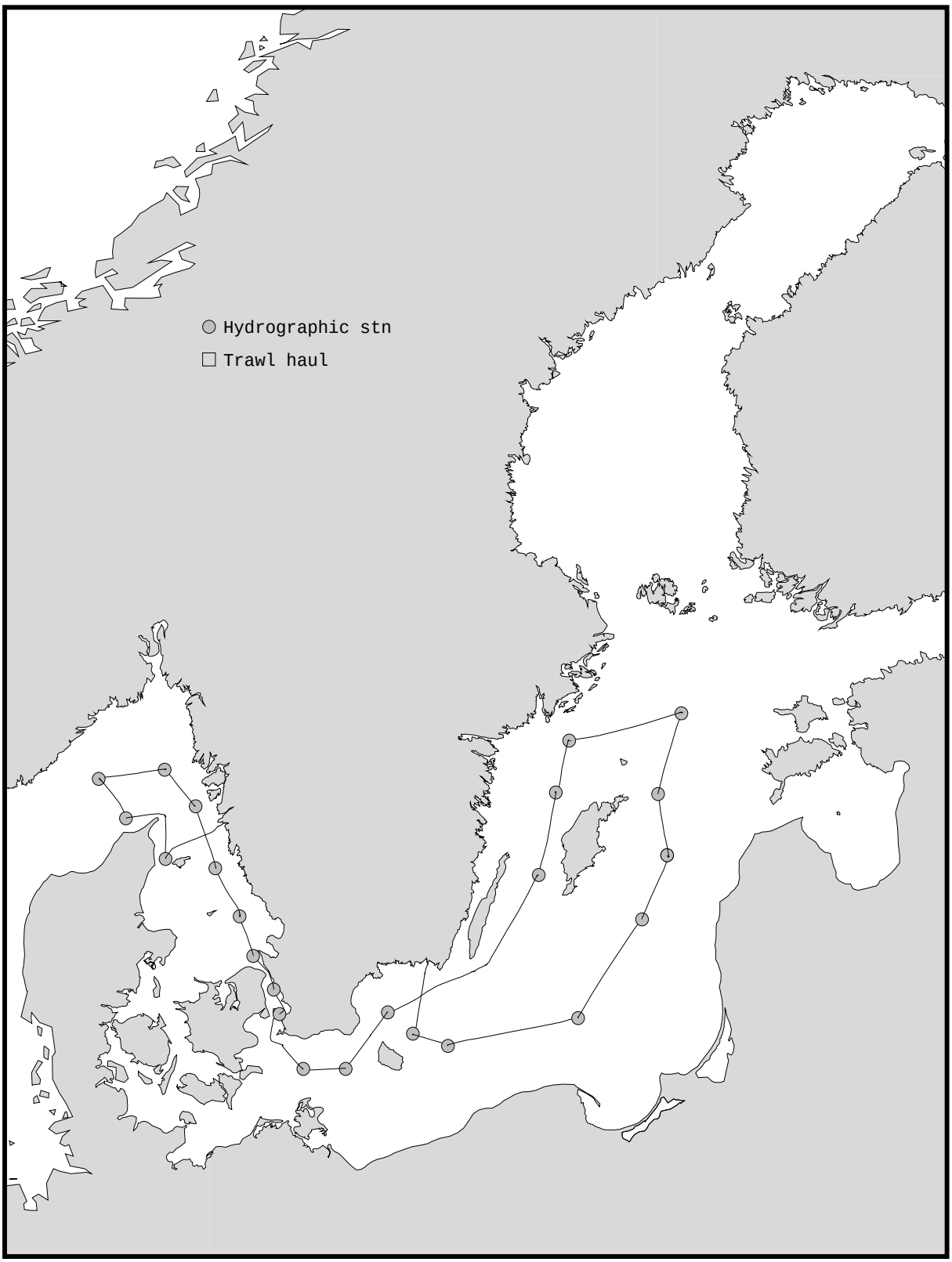
Tuulikki Jaako	-”-
Marie Larsson	-”-
Mats Ohlson	-”-

APPENDICES

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

T R A C K C H A R T

Country: Sweden
Ship : Argos
Date : 971012-971017
Series : 0671-0697



CSR RefNo: 1997-77AR/0671-0697

Bottom water oxygen concentration (ml/l)

Country: Sweden
Ship: Argos
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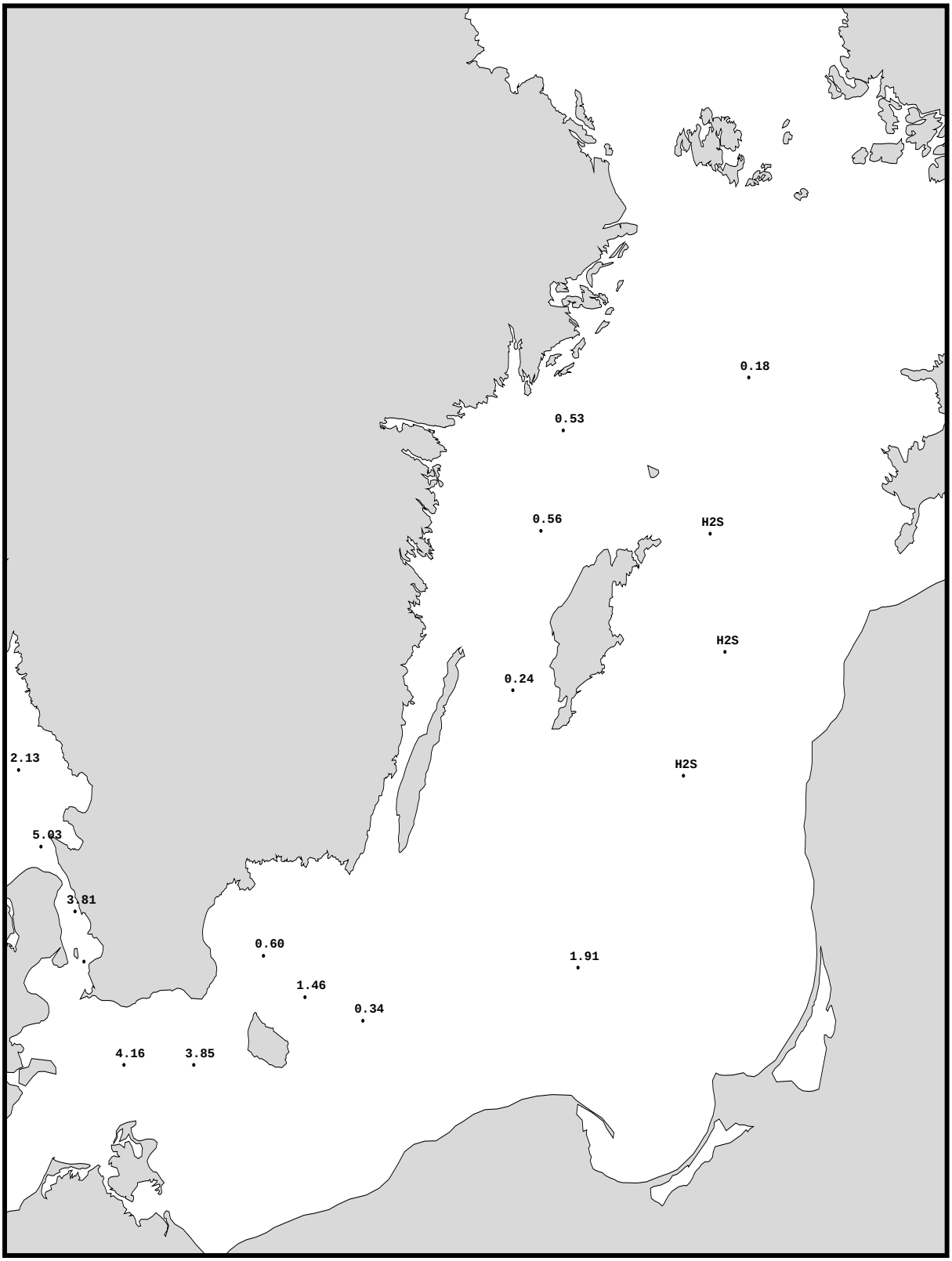
Series: 0671-0694



SMHI ***** Hydrographic Ship: 14-Argos ****** Date: 1997-10-20
Ocean lab ***** series Year: 1997 ****** Time: 10:01

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 m	S a l i	P h i g	O x y	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 a l	S i O 3	H u m u s	L i g n i	P O N	P O C	T O C	C o m m
0671	BPSB06BAS	BY4	CHRISTIANSÖ	N5523	E1520	971013	0245	94			32	7	8.5	996	9930	x	-------	12	x	x	-	x	-	x	x	x	x	x	x	-	x	-	-	-	-	-	-
0672	BPSB07BAS	BY5	BORNHOLMSDJ	N5515	E1559	971013	0540	93		6	32	6	10.4	996	1330	x	-xxx---	13	x	x	x	x	-	x	x	x	x	x	-	x	x	-	-	-	-	-	-
0673	BPSE11BAS	BCS III-10		N5533.3	E1824	971013	1325	90		8	30	5	10.6	1000	1330	x	-xxx---	13	x	x	x	x	-	x	x	x	x	x	x	x	x	-	-	-	-	-	-
0674	BPEX13BAS	BY10		N5638	E1935	971013	2015	148			34	6	8.9	1000	9920	x	--x----	16	x	x	-	x	x	x	x	x	x	x	-	x	-	-	-	-	-	-
0675	BPEX21BAS	BY15	GOTLANDSDJ	N5720	E2003	971014	0105	249			32	7	7.3	1002	9930	x	-xxx---	20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-	-	-	-	-
0676	BPEX21BAS	BY15	GOTLANDSDJ	N5720	E2003	971014	0220	249			32	7	7.3	1002	9930	-	-------	6	x	x	-	x	x	x	x	x	x	-	x	-	x	-	-	-	-	-	-
0677	BPEX26BAS	BY20	FÅRÖDJ	N5800	E1953	971014	0705	205		8	36	9	6.0	1005	2730	x	--x----	18	x	x	-	x	x	x	x	x	x	x	-	x	-	-	-	-	-	-
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0679	BPNX37BAS	BY31	LANDSORTSDJ	N5835	E1814	971014	1930	460			32	6	6.0	1009	9930	x	-xx---	24	x	x	x	x	-	x	x	x	x	x	x	x	x	-	-	-	-	-	-
0680	BPWX38BAS	BY32	NORRKÖPINGSDJ	N5801	E1759	971015	0015	215			32	7	6.6	1008	9930	x	--x----	17	x	x	-	x	-	x	x	x	x	x	-	-	x	-	-	-	-	-	-
0681	BPWX45BAS	BY38	KARLSÖDJ	N5707	E1740	971015	0625	114			34	7	5.7	1008	7730	x	--x----	15	x	x	x	x	-	x	x	x	x	x	x	x	x	-	-	-	-	-	-
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0683	BPSA03BAS	BY2	ARKONA	N5500	E1405	971015	2145	48			36	8	7.0	1011	9930	x	-xxx---	9	x	x	x	x	-	x	x	x	x	x	x	x	x	-	-	-	-	-	-
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0687	KAEX33BAS	KULLEN		N5614	E1222.2	971016	0935	24		7	36	5	5.0	1016	1120	x	-------	5	x	x	-	x	-	x	-	x	x	-	-	-	x	-	-	-	-	-	-
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0689	KANX25BAS	FLADEN		N5711.5	E1140	971016	1530	75			34	3	11	1016	2720	x	-xx---	11	x	x	x	x	-	x	x	x	x	x	x	x	x	-	-	-	-	-	-	-
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0691	SKEX17BAS	Å16		N5816	E1043.5	971016	2235	190			18	3	7.8	1016	9920	x	--x----	13	x	x	-	x	-	x	-	x	x	x	x	x	-	x	-	-	-	-	-	-
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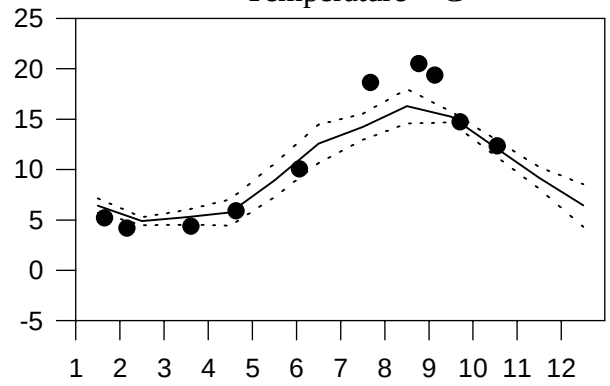
STATION HS5 SURFACE WATER (0-15 m)

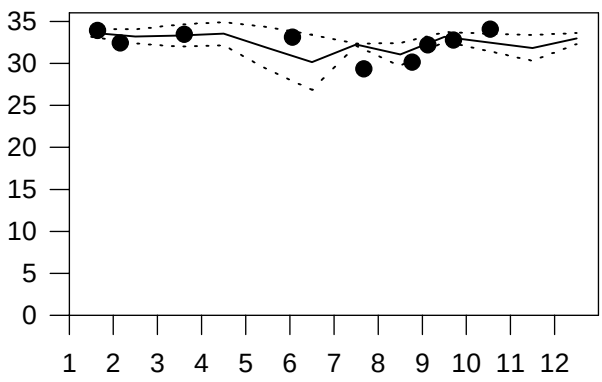
Annual Cycles

Mean 1986-1995 St.Dev. 1997

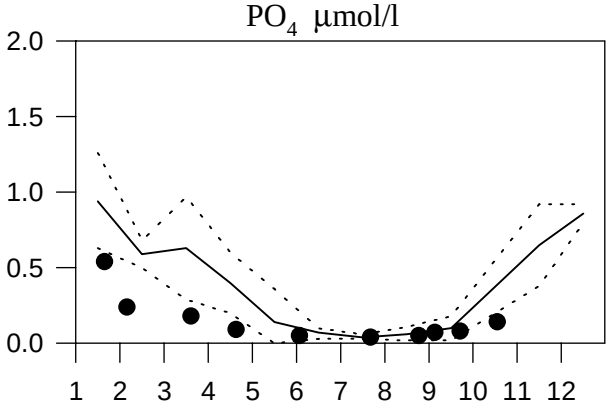
Temperature °C



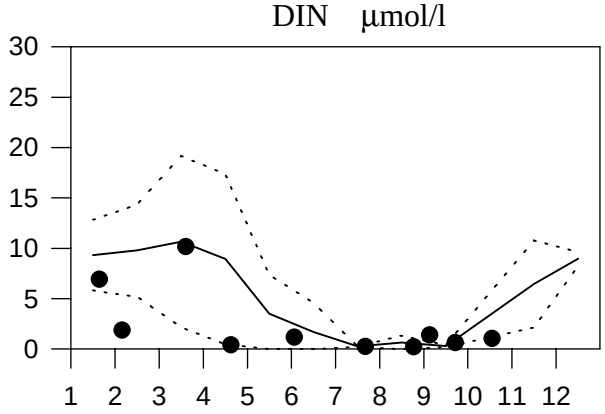
Salinity psu



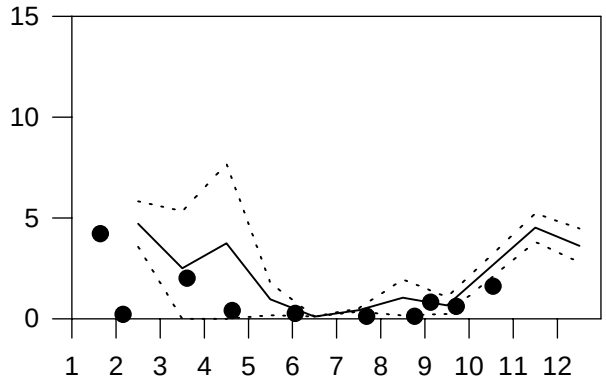
PO_4 µmol/l



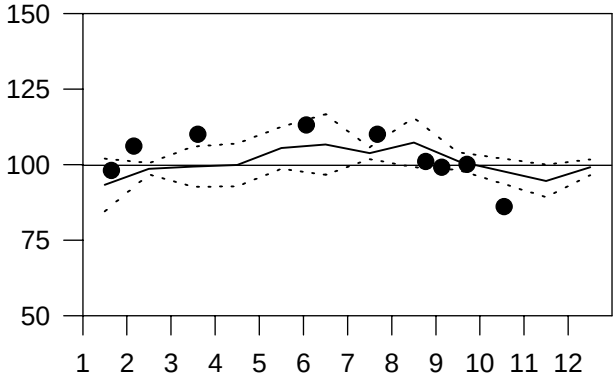
DIN µmol/l



SiO_3 µmol/l

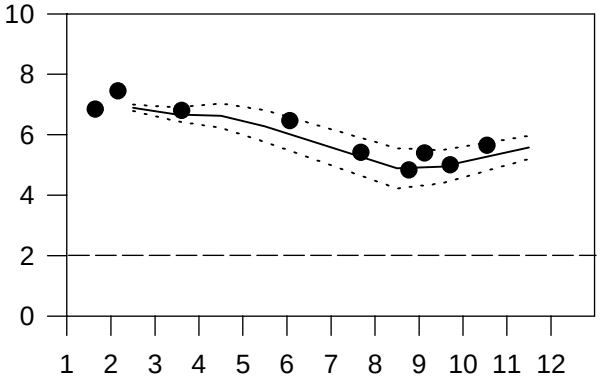


O_2 saturation %

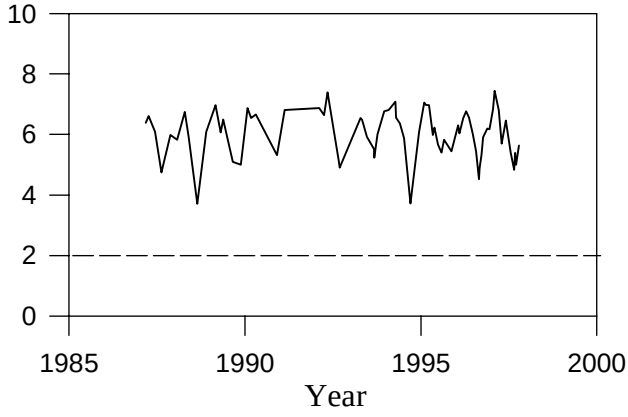


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

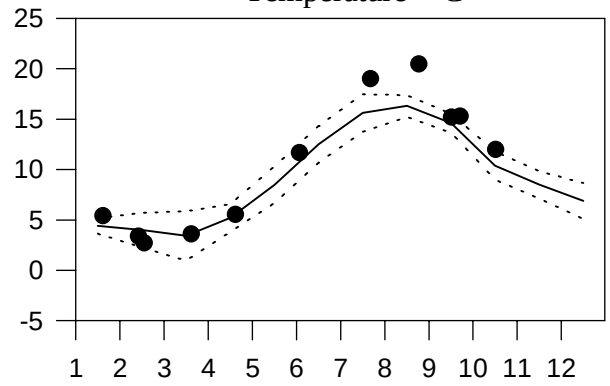


STATION P2 SURFACE WATER (0-15 m)

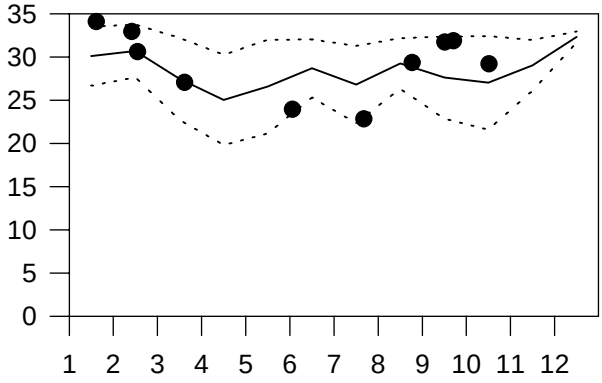
Annual Cycles

Mean 1986-1995 St.Dev. 1997

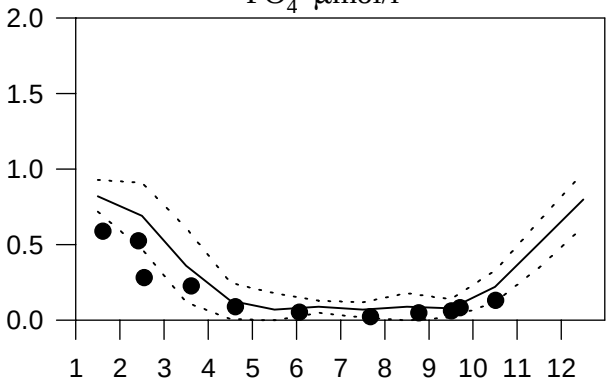
Temperature °C



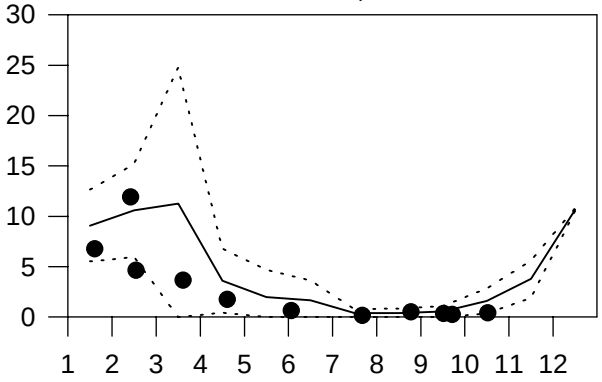
Salinity psu



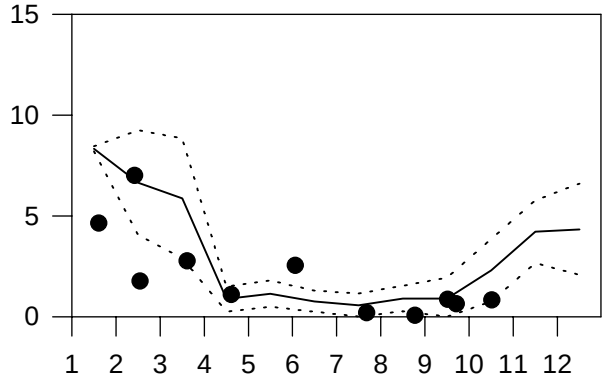
PO_4 µmol/l



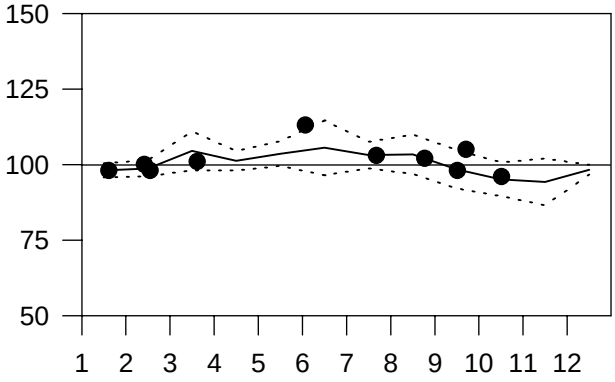
DIN µmol/l



SiO_3 µmol/l

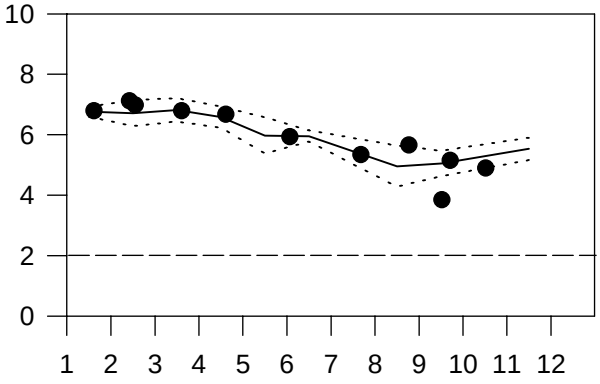


O_2 saturation %

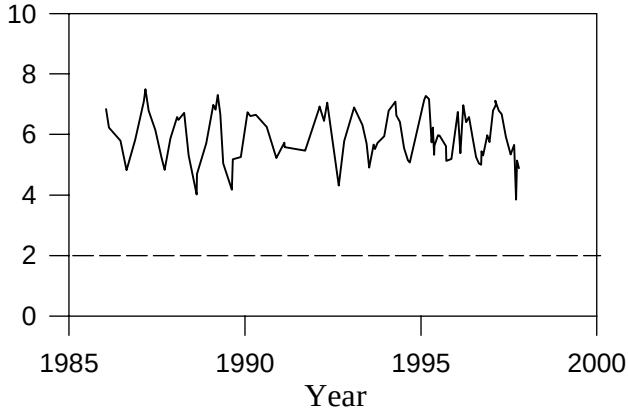


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

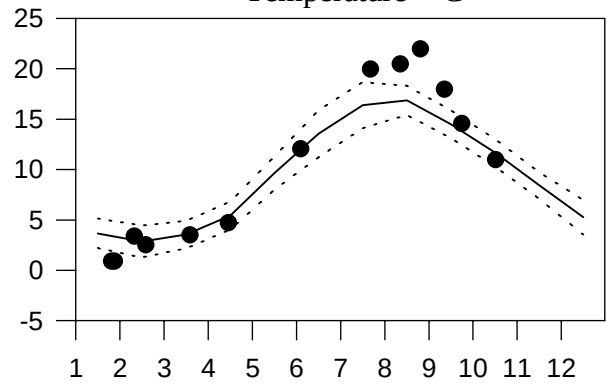


STATION FLADEN SURFACE WATER (0-15 m)

Annual Cycles

Mean 1986-1995 St.Dev. 1997

Temperature °C



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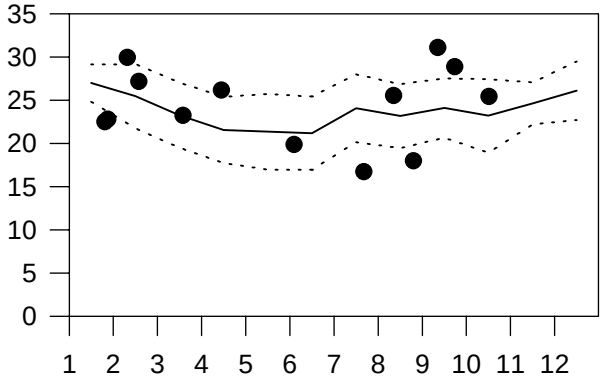
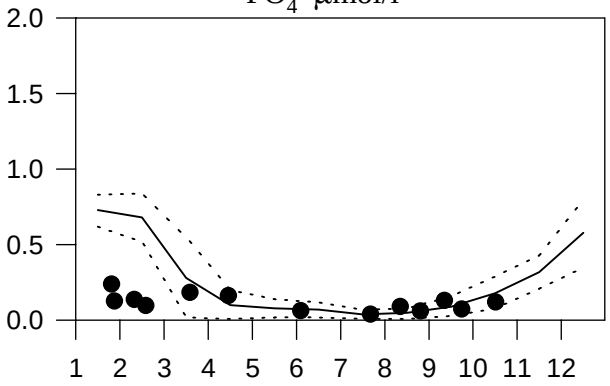
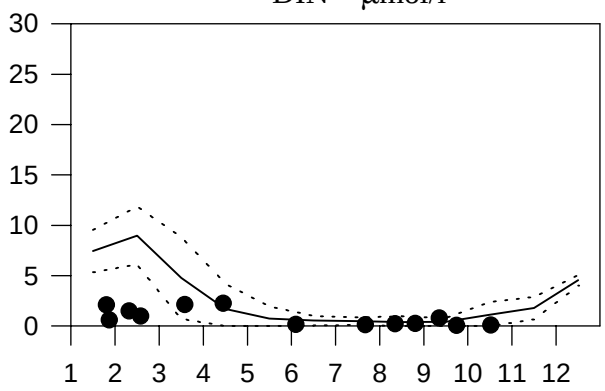


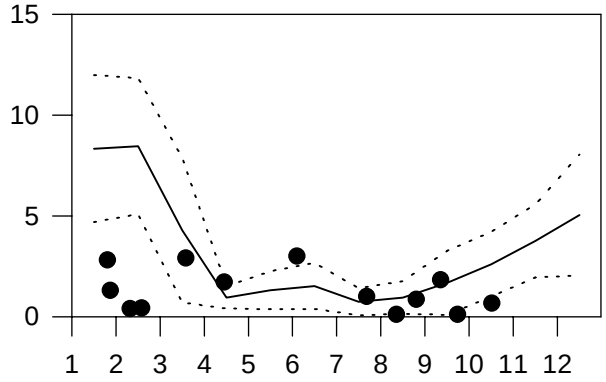
PO_4 µmol/l



DIN µmol/l



SiO_3 µmol/l



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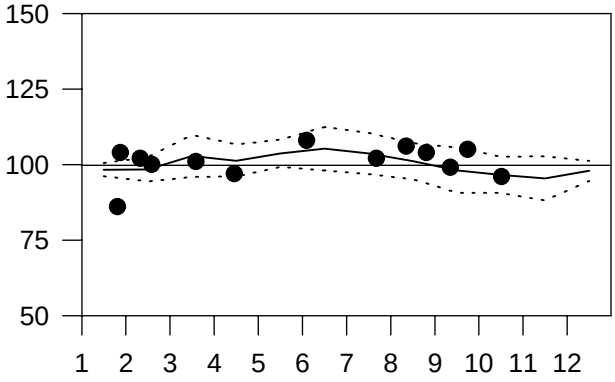
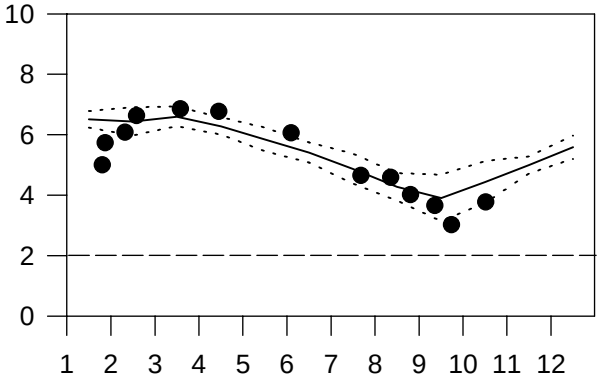


OXYGEN IN BOTTOM WATER

O_2 ml/l



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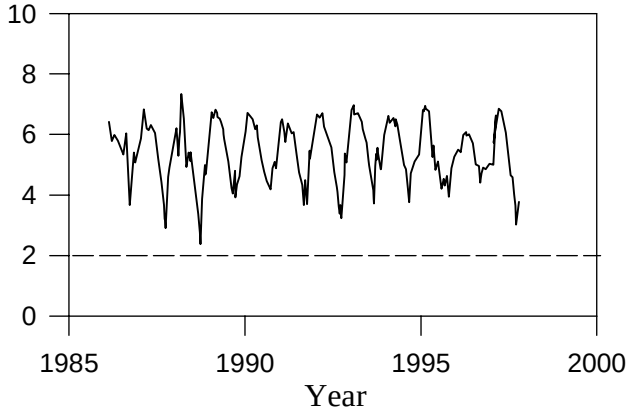
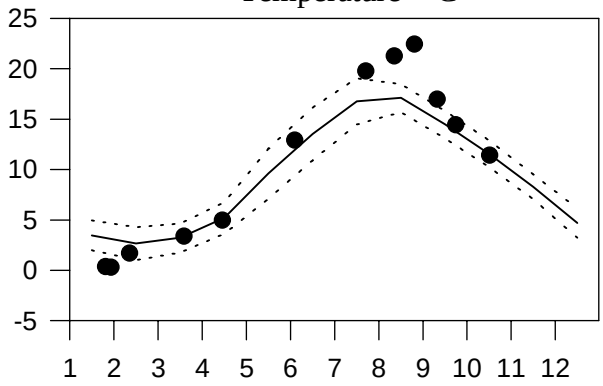


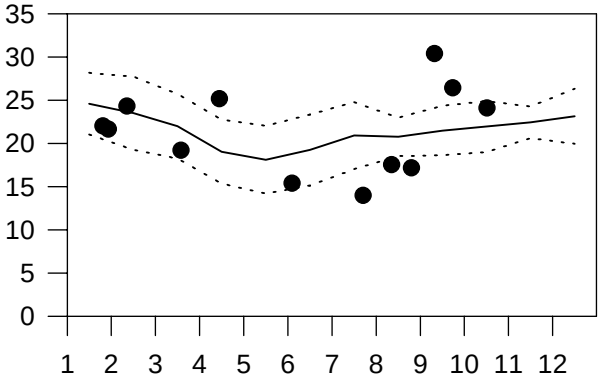
STATION ANHOLT E SURFACE WATER (above halocline)

Annual Cycles

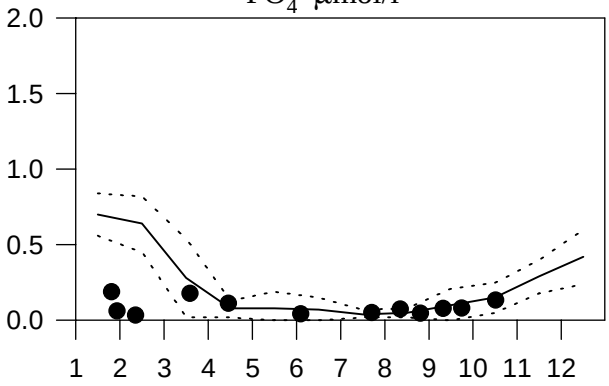
Temperature °C



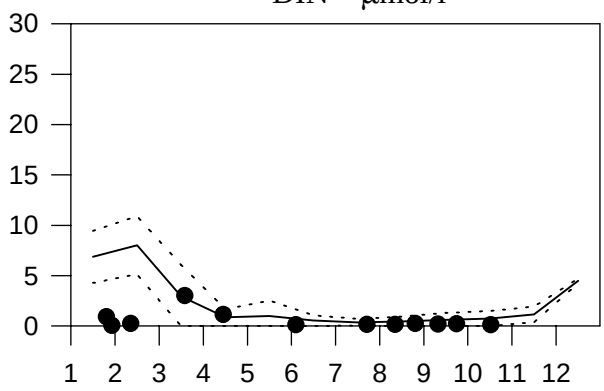
Salinity psu



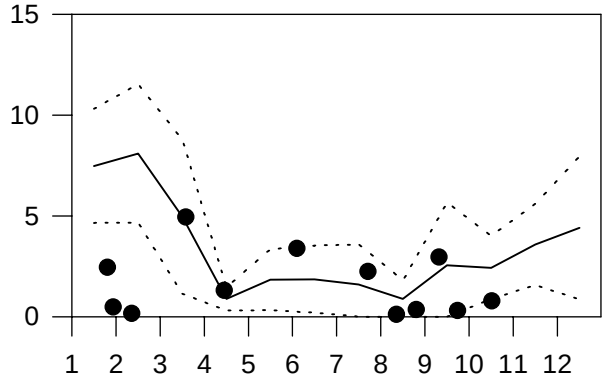
PO_4 µmol/l



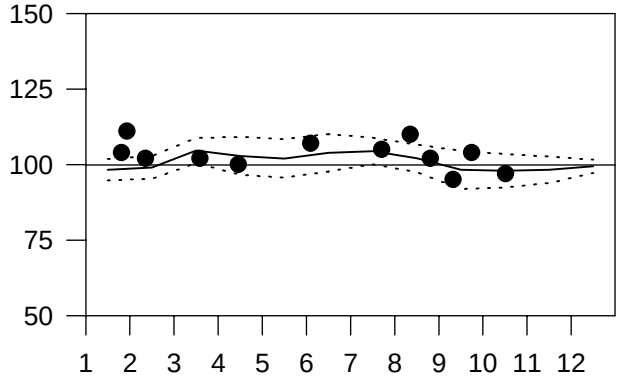
DIN µmol/l



SiO_3 µmol/l

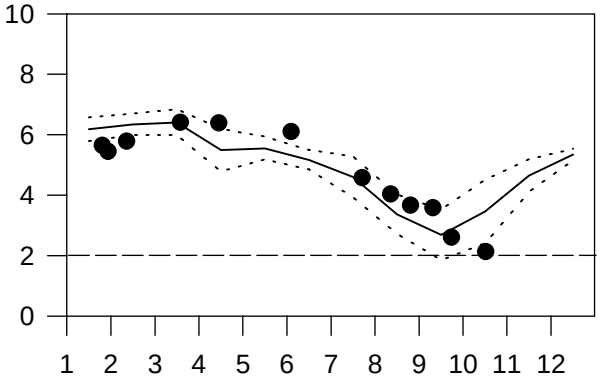


O_2 saturation %

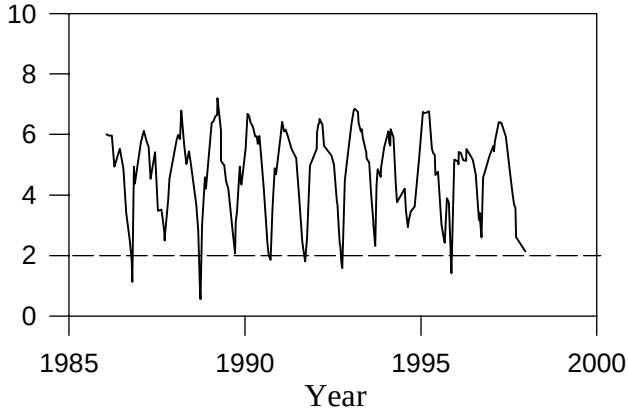


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

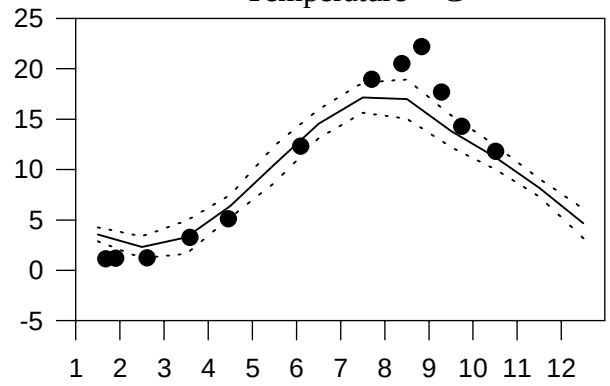


STATION W LANDSKRONA SURFACE WATER (0-15 m)

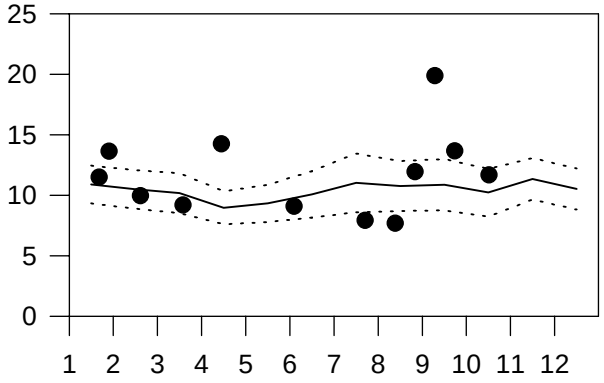
Annual Cycles

Mean 1986-1995 St.Dev. 1997

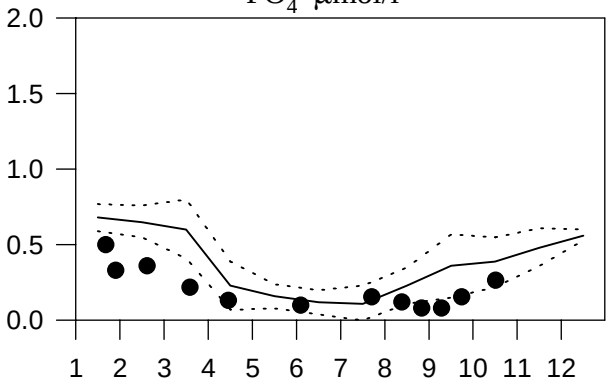
Temperature °C



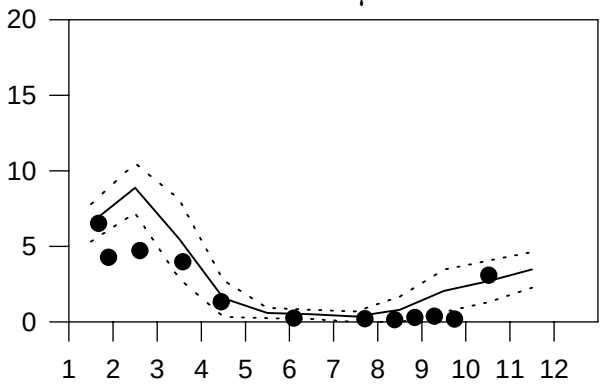
Salinity psu



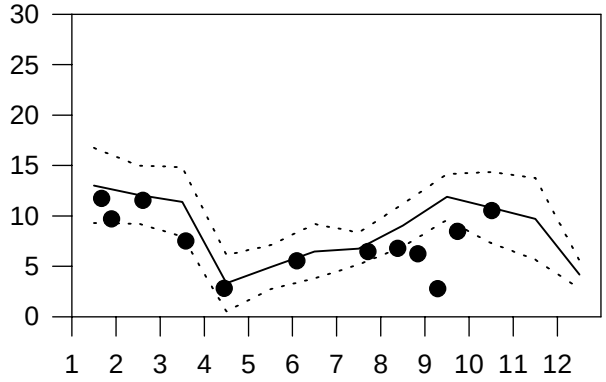
PO_4 µmol/l



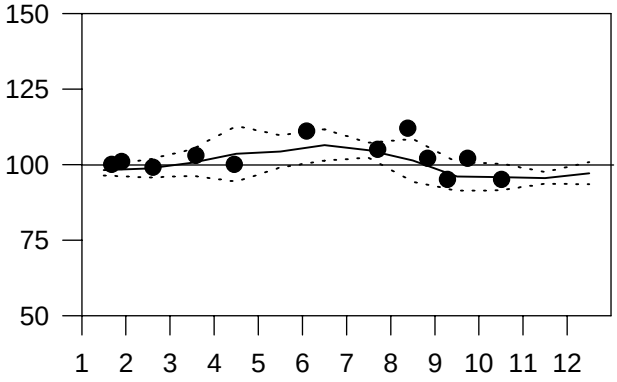
DIN µmol/l



SiO_3 µmol/l

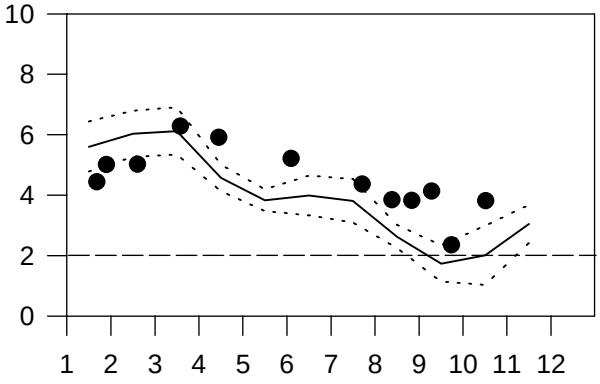


O_2 saturation %

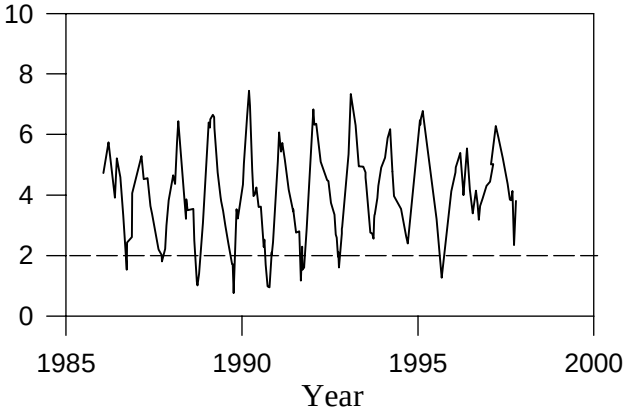


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

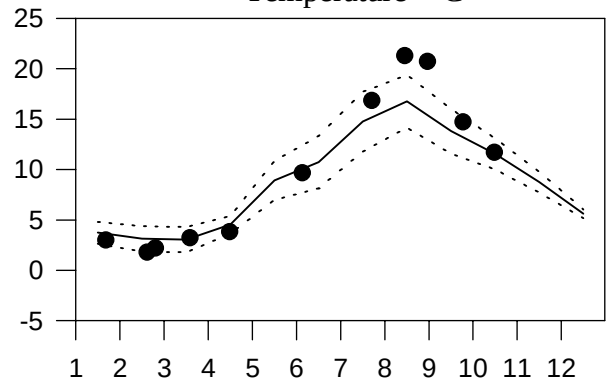


STATION BY2 SURFACE WATER (0-15 m)

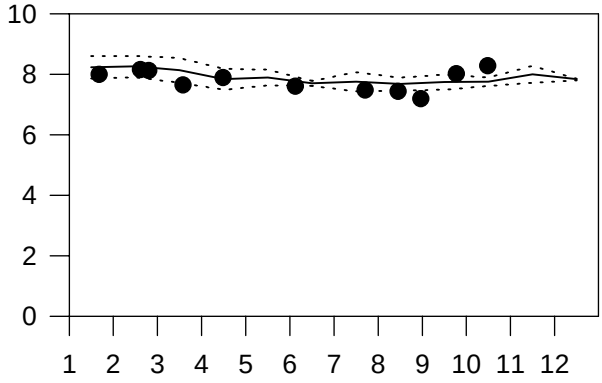
Annual Cycles

Mean 1986-1995 St.Dev. 1997

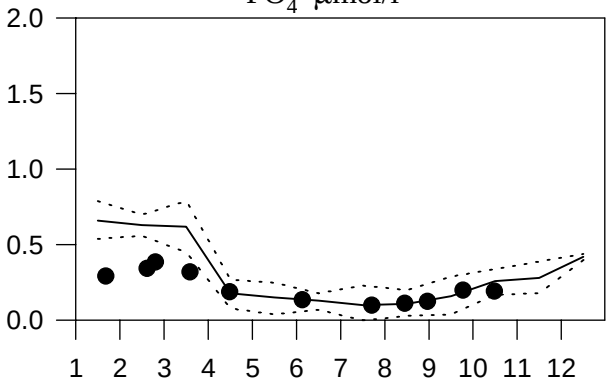
Temperature °C



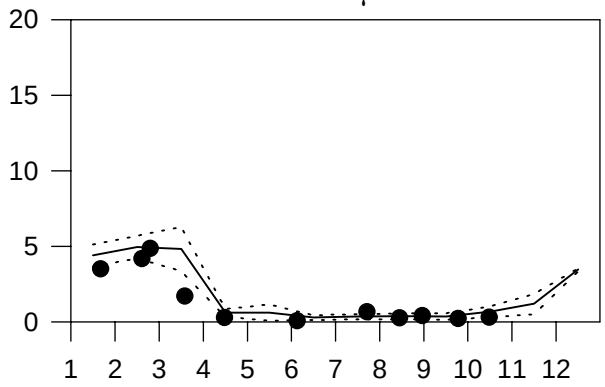
Salinity psu



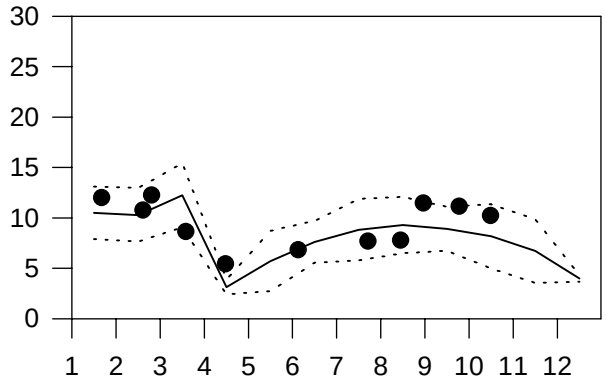
PO_4 µmol/l



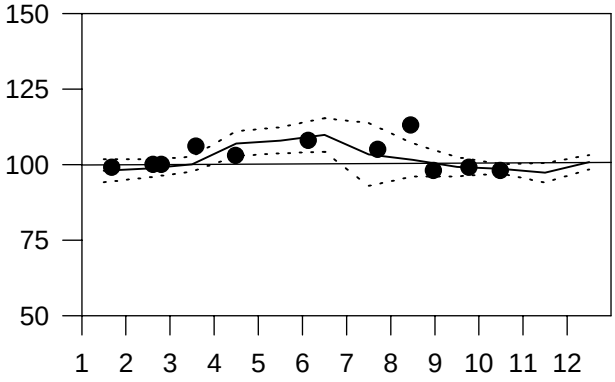
DIN µmol/l



SiO_3 µmol/l

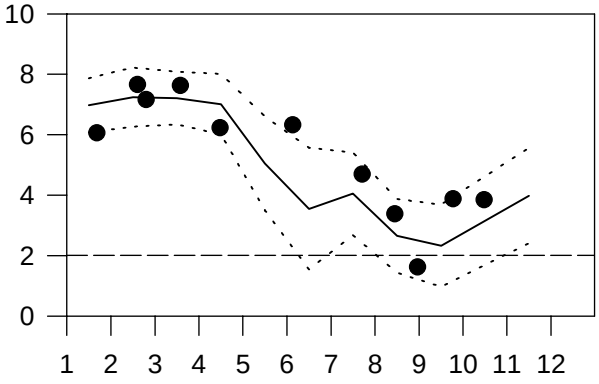


O_2 saturation %

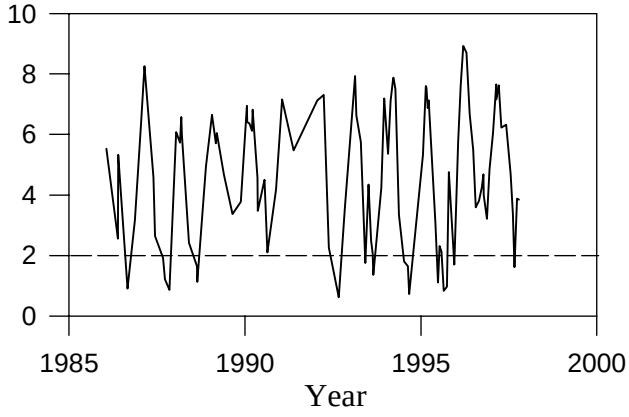


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

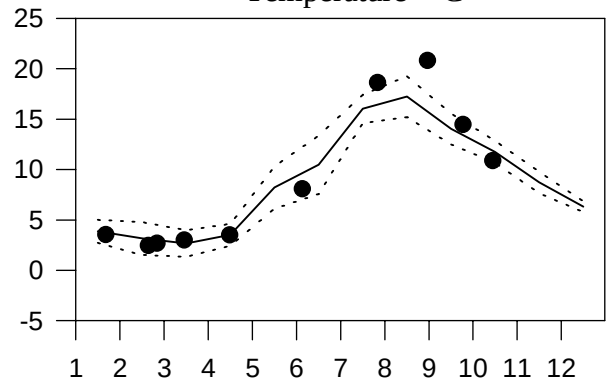


STATION BY5 SURFACE WATER (0-15 m)

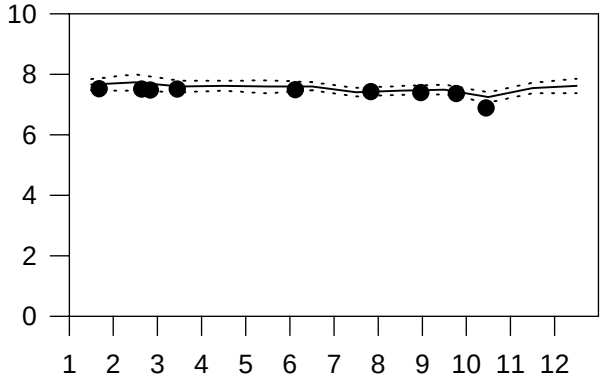
Annual Cycles

Mean 1986-1995 St.Dev. 1997

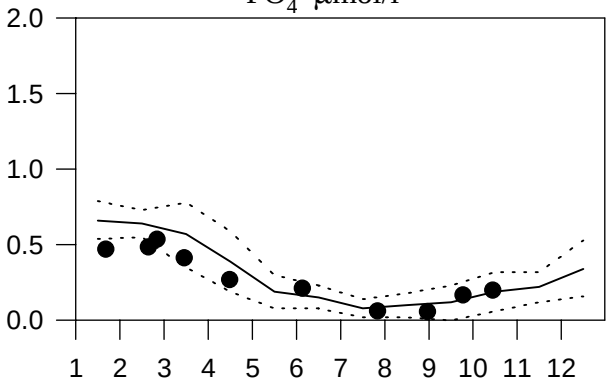
Temperature °C



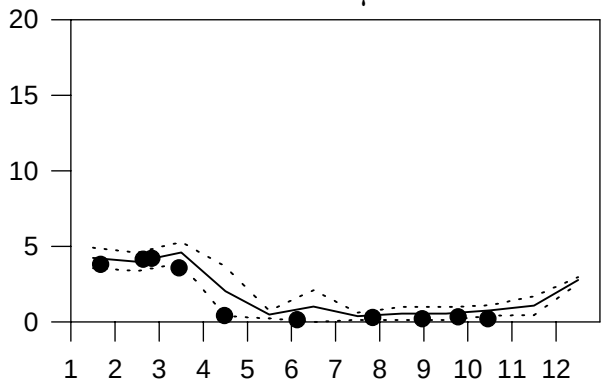
Salinity psu



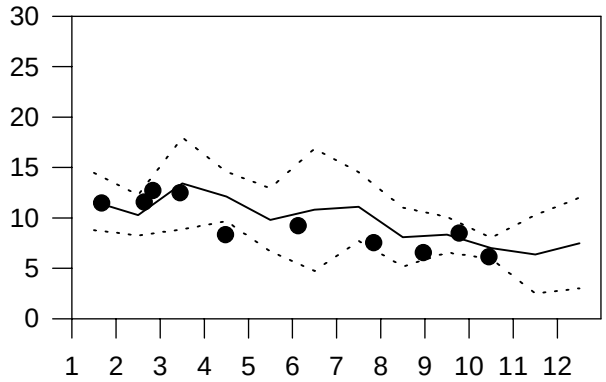
PO_4 µmol/l



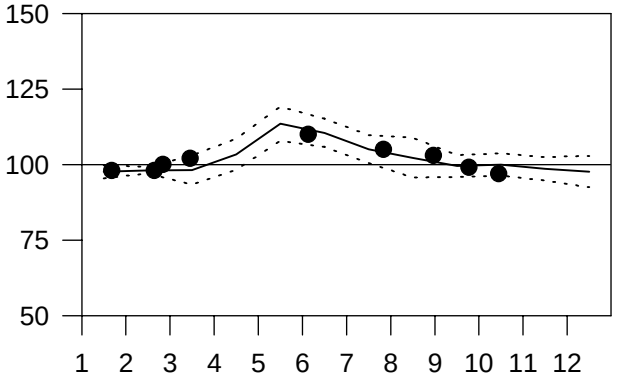
DIN µmol/l



SiO_3 µmol/l

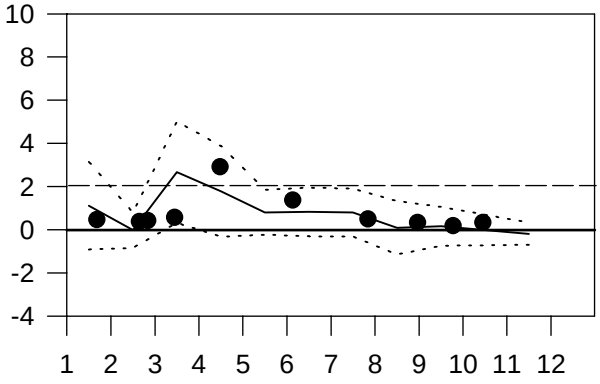


O_2 saturation %

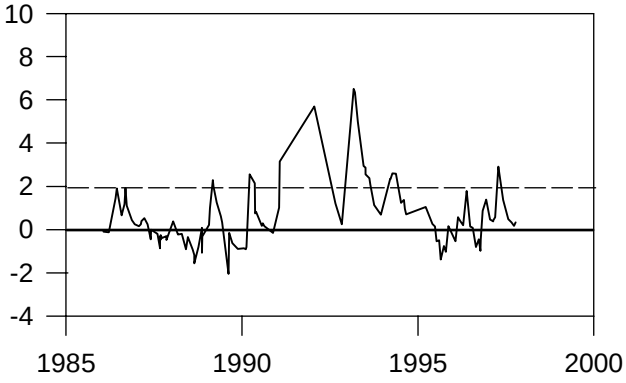


OXYGEN IN BOTTOM WATER

O_2 ml/l



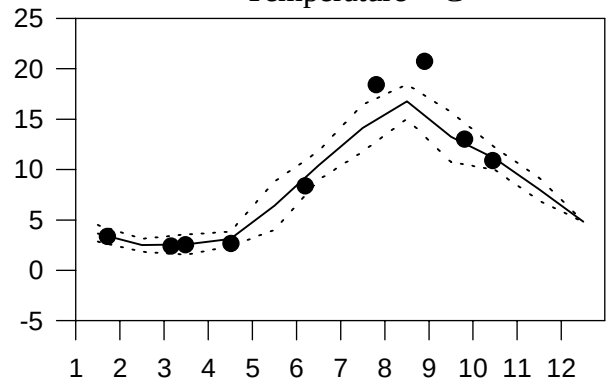
O_2 ml/l



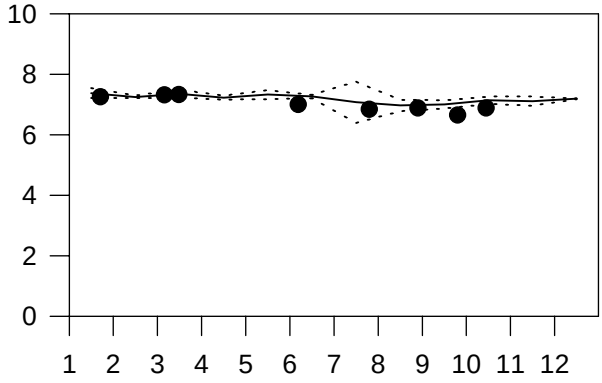
STATION BY15 SURFACE WATER (0-15 m)

Annual Cycles

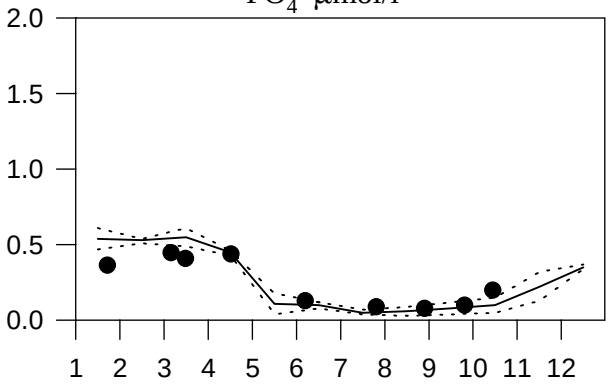
Temperature °C



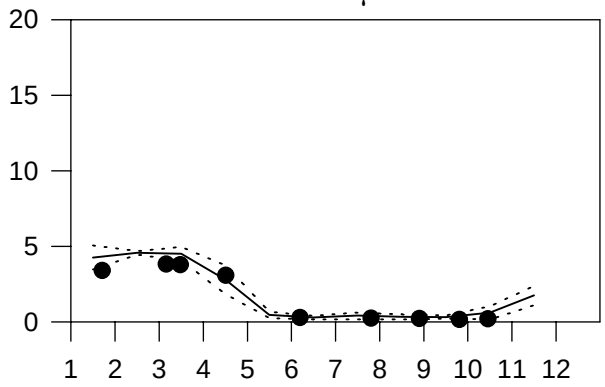
Salinity psu



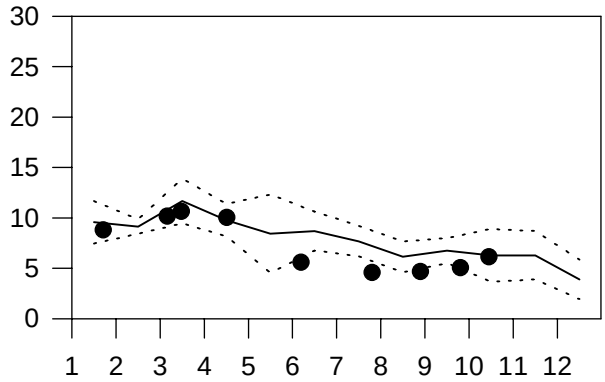
PO_4 µmol/l



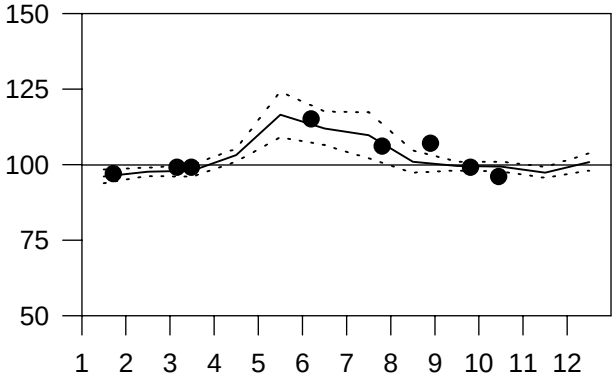
DIN µmol/l



SiO_3 µmol/l

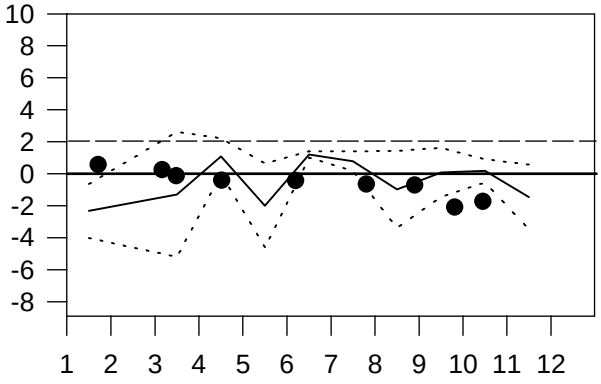


O_2 saturation %

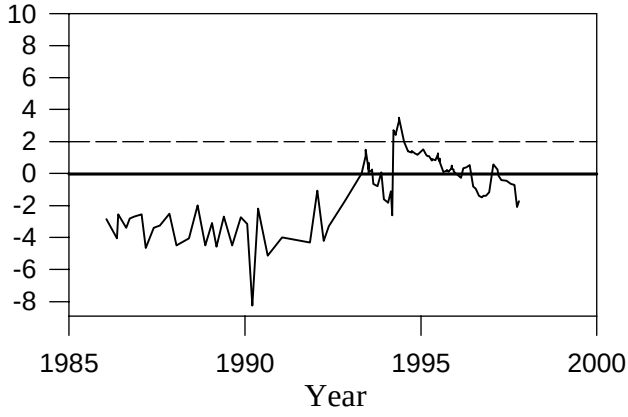


OXYGEN IN BOTTOM WATER

O_2 ml/l



O_2 ml/l

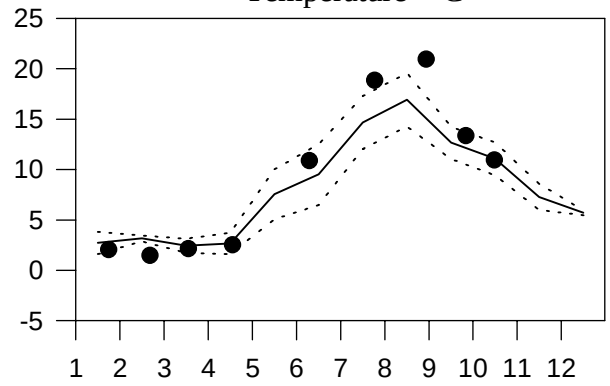


STATION BY38 SURFACE WATER (0-15 m)

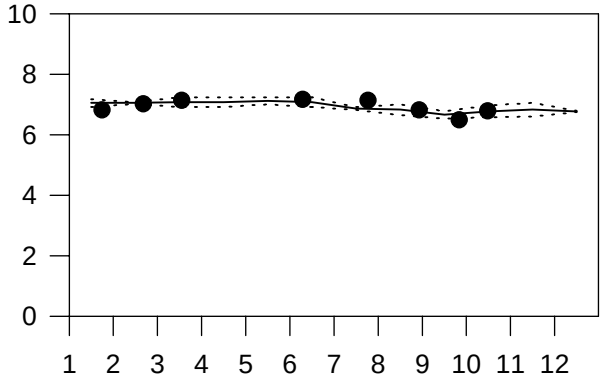
Annual Cycles

Mean 1986-1995 St.Dev. 1997

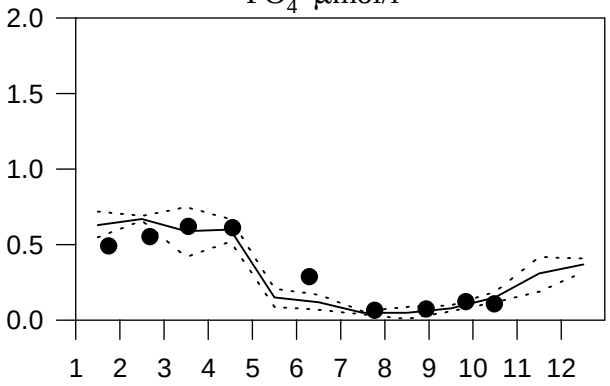
Temperature °C



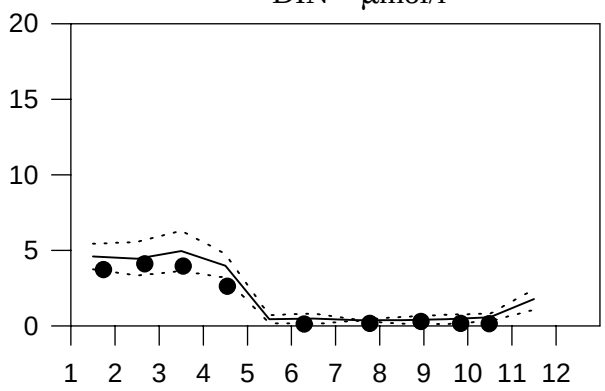
Salinity psu



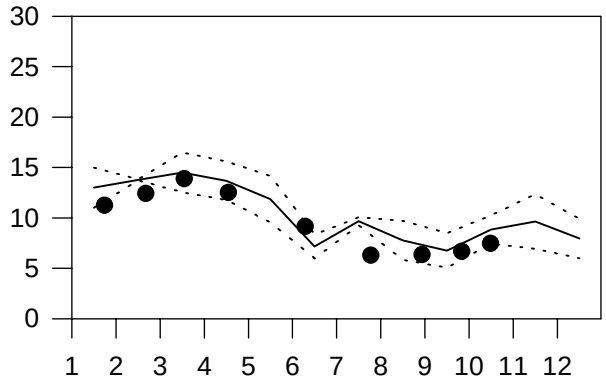
PO_4 µmol/l



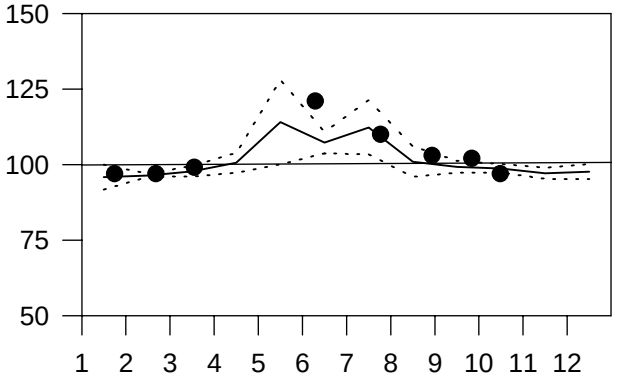
DIN µmol/l



SiO_3 µmol/l

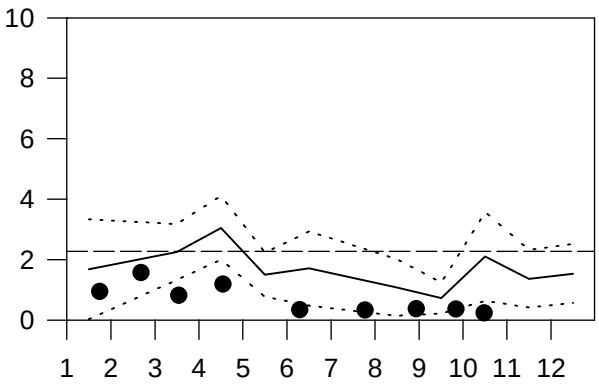


O_2 saturation %

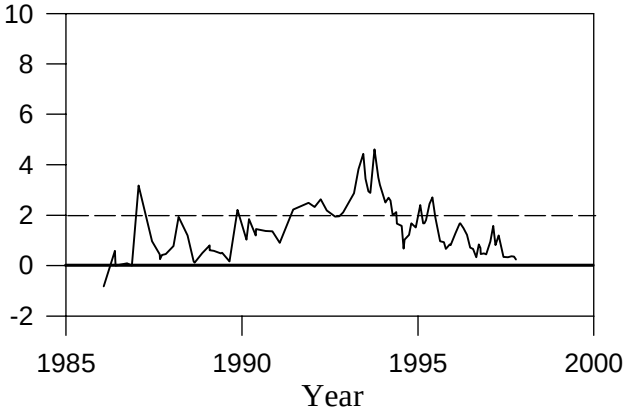


OXYGEN IN BOTTOM WATER

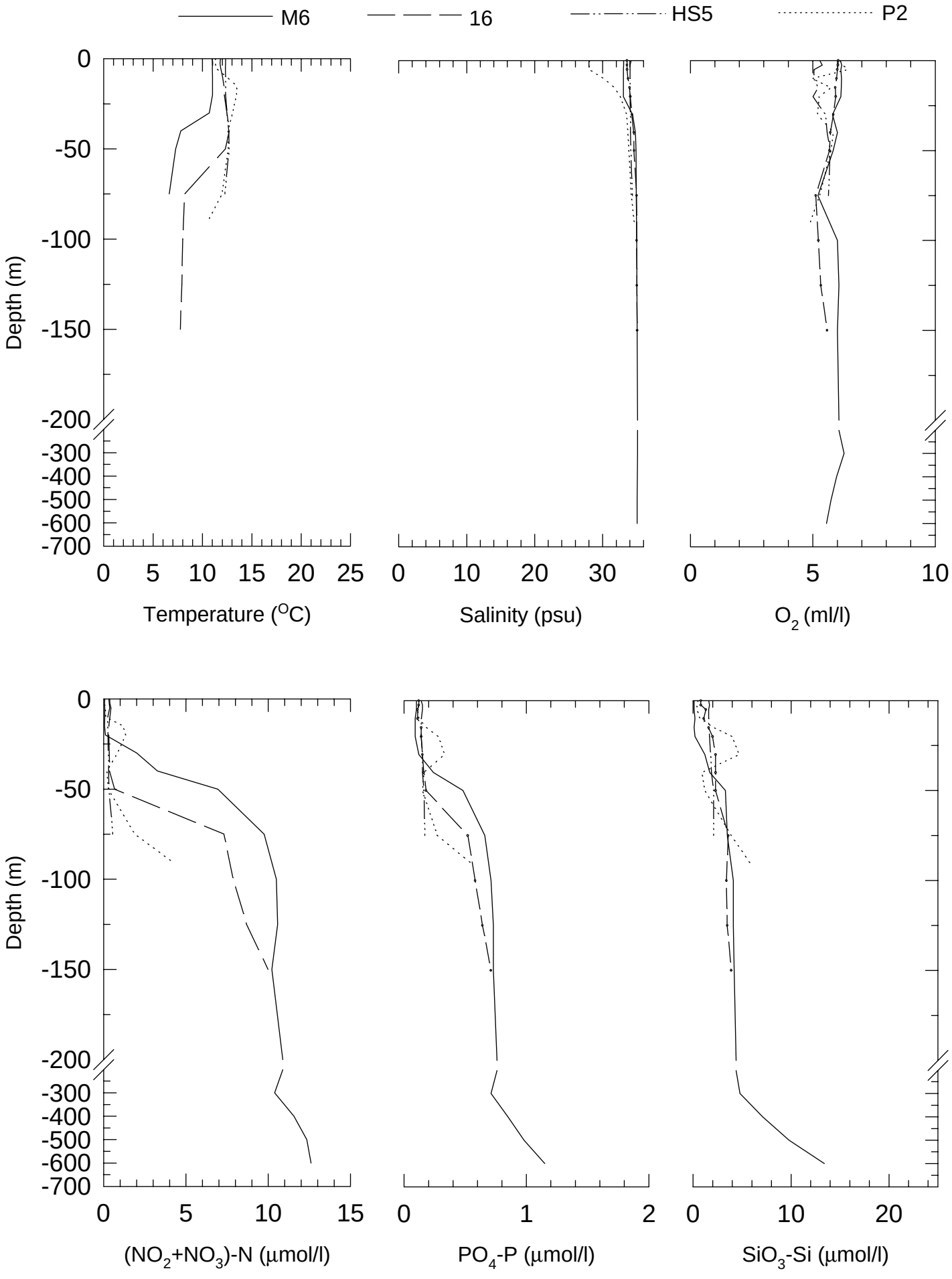
O_2 ml/l



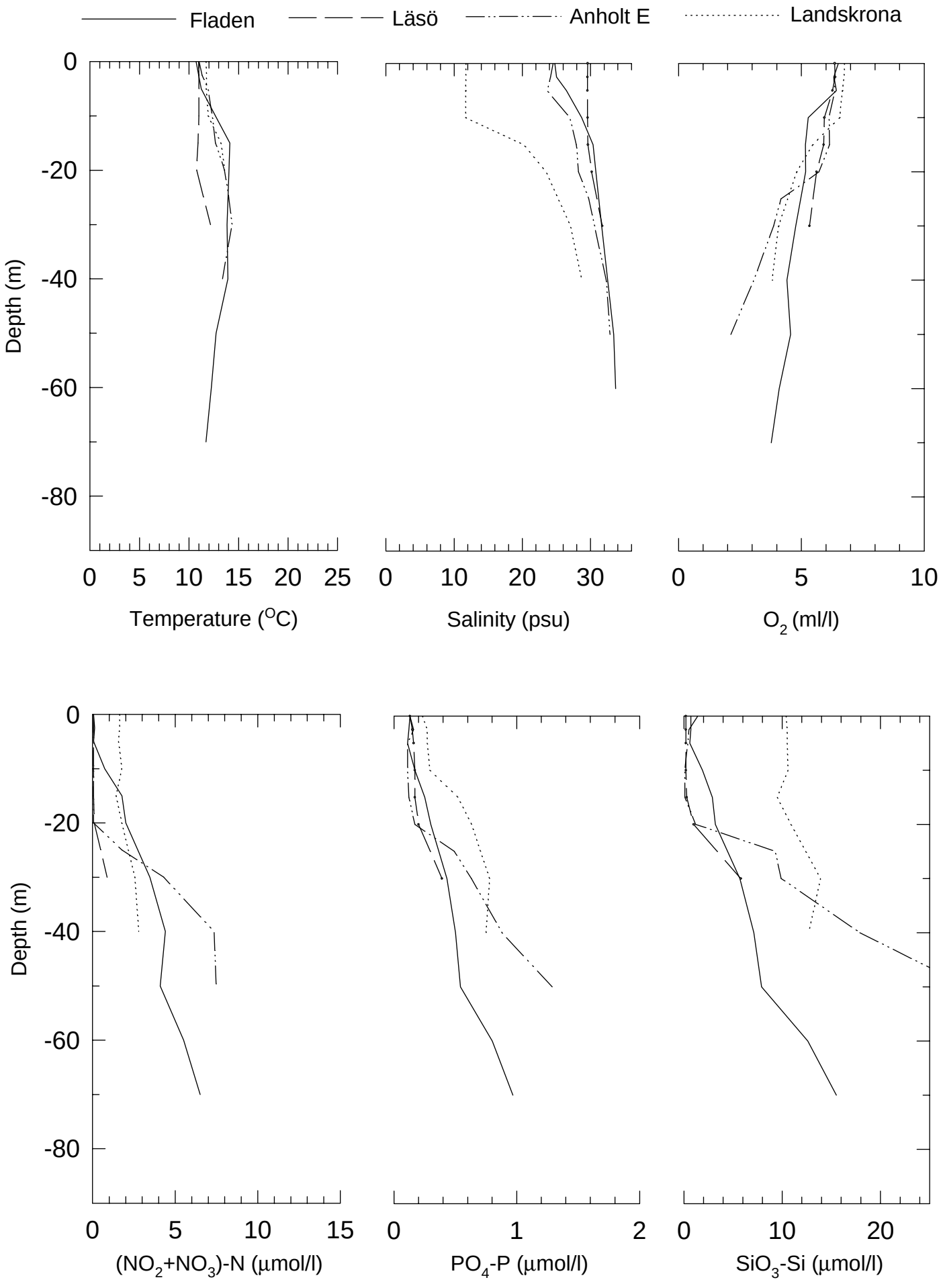
O_2 ml/l

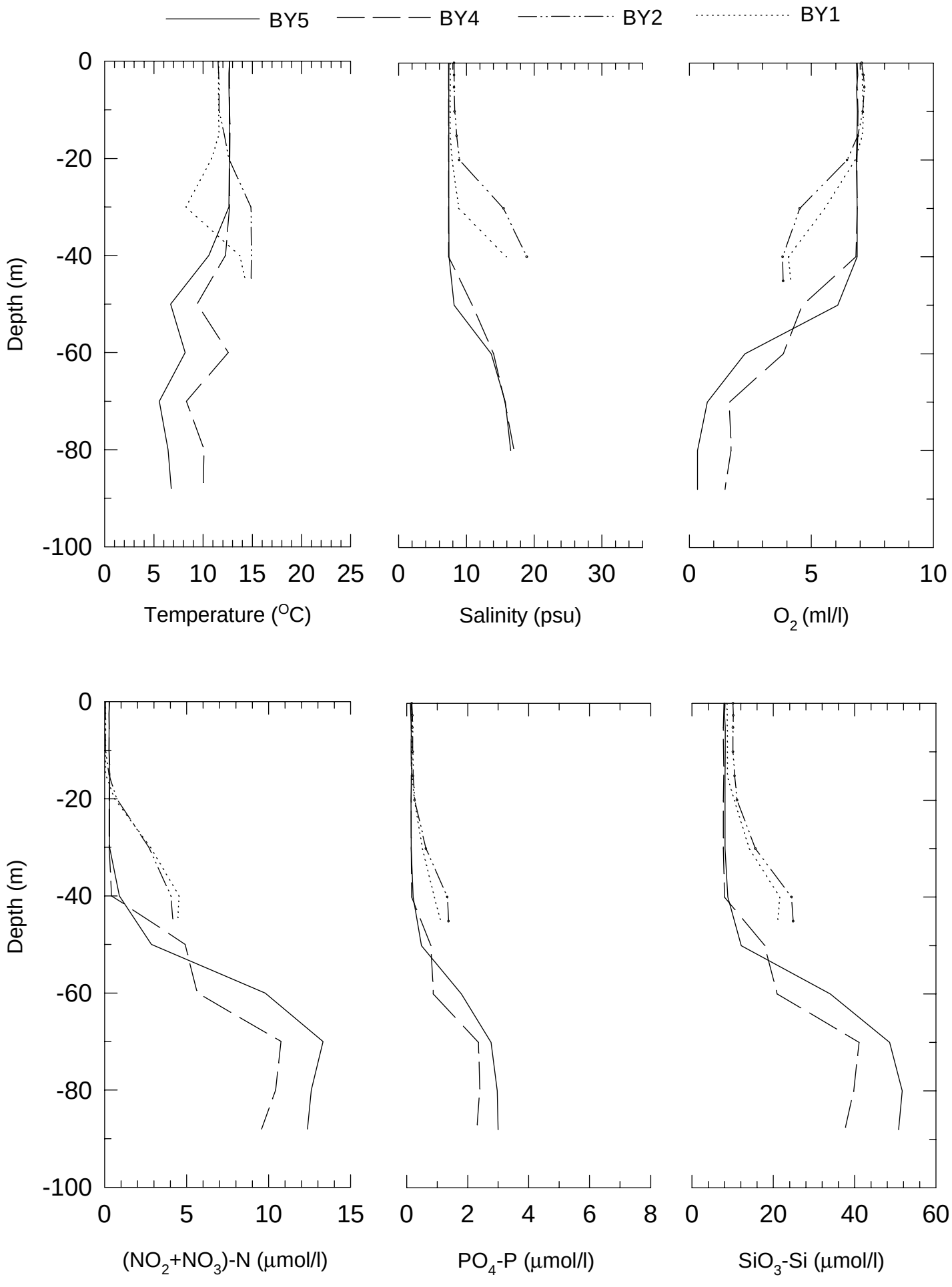


SKAGERRAK week 42 -97

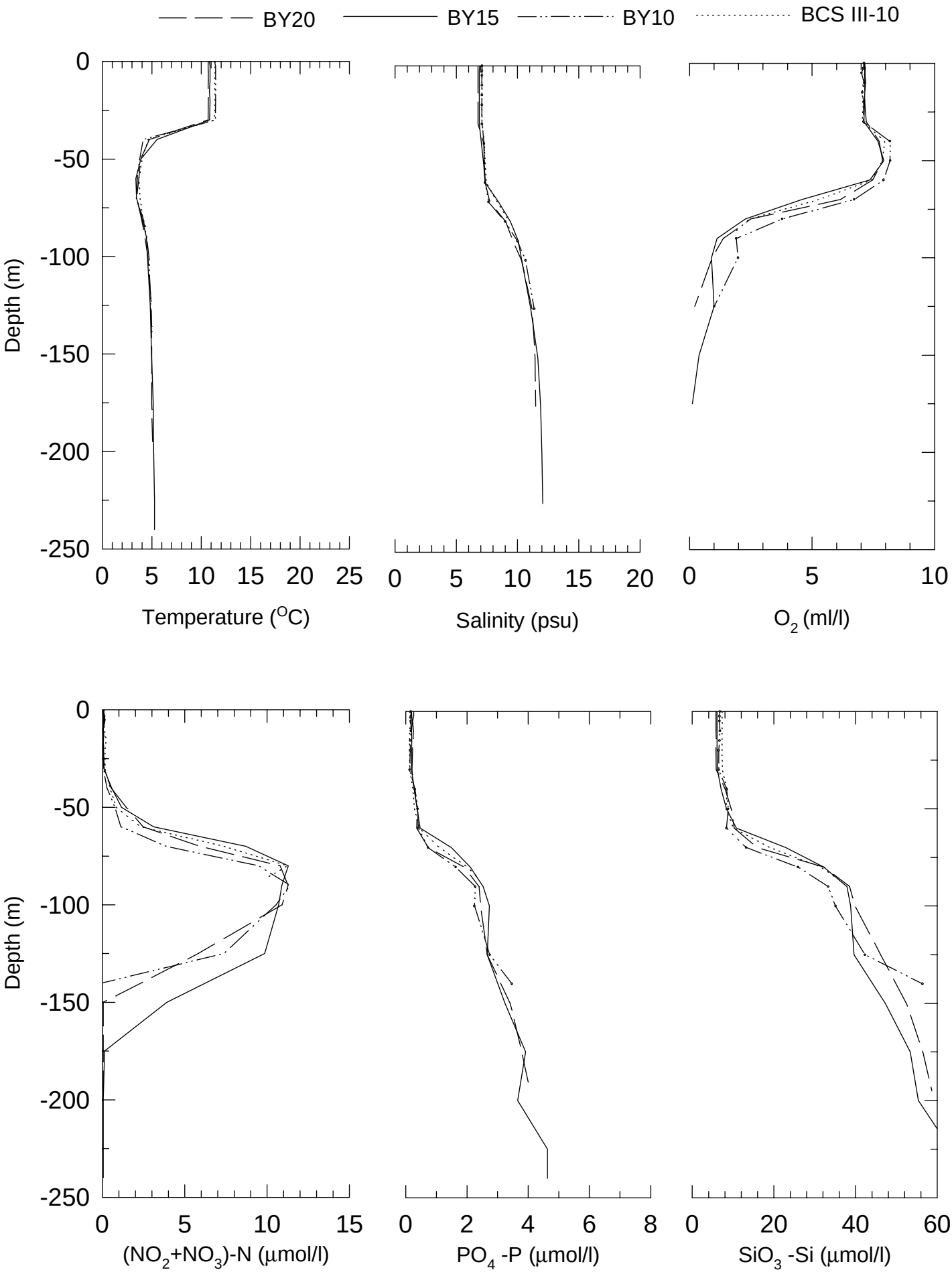


KATTEGAT and THE SOUND week 42 -97




SOUTH BALTIC week 42 -97
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 week 42 -97



WEST BALTIC week 42 -97