

Management Unit of the North Sea
Mathematical Models

R/V BELGICA Cruise 97/14

OMEX II - BIOCHEMISTRY Programme

**Belgian GLOBAL CHANGE and sustainable
development Programme**

BMM-MDO/98-11/DWTC-GL-CH/OMEX/Report



R/V BELGICA CRUISE 97/14.

Belgian GLOBAL CHANGE and sustainable development Programme

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R/V BELGICA CRUISE 97/14.

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OMEX II - BIOGEOCHEMISTRY Programme

1. INTRODUCTION.

The RV Belgica cruise 97/14 has been conducted in the framework of the EEC MAST III, the Ocean Margin Exchange project "OMEX II", with the research efforts focussed on the upwelling zone along the Spanish coast, as well as the Belgian Global Change and sustainable development programme. For the latter, a two days sampling programme was executed on the La Chapelle Banc. The RV Belgica cruise 97/14 started on 18 June 1997 at Bordeaux, following the EC "BIOGEST" cruise which took place on the Gironde estuary.

On 19 June a shakedown station was carried out, 40 miles north to Gijón, in front of the Spanish coast. On 20 June a rendez-vous with the RRS Charles Darwin took place in position N 42 29 28 W 09 25 48 (station IC1A). Afterwards samples were exchanged between the two vessels at the Bay of Vigo. The RV Belgica arrived at Vigo on 20 June at 8h15 GMT for the embarkation of 5 foreign scientists.

The Belgica left Vigo on 21 June at 08h and started the transect O2T at 11h05. Although the weather conditions were not optimal, only 5 stations (11, 13, 23, 28 and 30) have been omitted while an additional intermediate station (V1) was added to the programme. After 9 days at sea, the Belgica arrived again at Vigo on 30 June at 8h.

The Belgica left the harbour of Vigo on 02 July and headed for Banc de la Chapelle where the stations 43 to 51 were sampled, station 47 being a 27 hours sampling station. The Belgica arrived at Zeebrugge on 07 July 1997.

Dr. M. Elskens (VUB) was the principal scientist aboard the BELGICA for this cruise. The following laboratories have participated :

- * Université de Liège (ULg) - Laboratoire d'Océanologie.
- * Université Libre de Bruxelles (ULB) - Laboratoire d'Océanographie.
- * Vrije Universiteit Brussel (VUB) - Laboratorium voor Analytische Scheikunde.
- * Instituto de Investigaciones Marinas (IIM), Vigo, Spain.
- * Forschungszentrum für Marine Geowissenschaften der Universität (Geomar), Kiel, Germany.
- * British Oceanographic Data Centre (BODC), Merseyside, UK.
- * Instituto Superior Técnico, Lisbon, Portugal.
- * Management Unit of the North Sea Mathematical Model (MUMM).

MUMM was mainly involved in the automatic data acquisition and logging of oceanographic,

meteorological and navigational data (ODASII computer logging, 74 Sea-Bird SCTD casts and 13 Sea-Bird light profile casts).

In addition to the data acquisition task, general assistance was offered in using the on board scientific instrumentation and related infrastructure, the Niskin bottle sampling, etc ...

Also samples for laboratory salinity and chlorophyll a measurements were taken, and these samples have been analyzed in MUMM's laboratory at Oostende.

The present report describes the computer logged oceanographic, meteorological and navigational data gathered during this cruise. Also the results of the laboratory salinity measurements are included.

2. COMPUTER LOGGED OCEANOGRAPHIC, NAVIGATIONAL AND METEOROLOGICAL DATA.

2.1. Navigational instrumentation

During this cruise, the data from the following navigational instruments connected to the shipborn computer system were logged by the so called Oceanographic Data Acquisition Software system "ODASII" :

- * SERCEL NR103 DGPS positioning system with an accuracy of 3 to 5 m using the Sercel beacons for differential corrections.
- * MAGNAVOX 200MX DGPS positioning system with an accuracy of ca. 5 m using IALA beacons for the differential correction .
- * Anshutz STD12 Gyro Compass.
- * Raytheon DSN450 Doppler speed log and bathymetric depth.
- * Atlas Deso 20 Scientific Echosounder.

The Atlas Deso 20 is equipped with 2 transducers (33 kHz and 210 kHz). The 33 kHz transducer has a depth range of ca. 1500 m in good weather conditions.

2.2. Oceanographic instrumentation

The seasurface temperature was measured continuously with the remote temperature sensor of the Sea-Bird SBE21 thermosalinograph as well as with a Rosemount temperature sensor, both installed at the inlet of the non-toxic seawater circuit situated at the bow of the vessel.

The Sea-Bird SBE21 thermosalinograph, installed in the wet lab, is also connected to the non-toxic seawater circuit. The salinity was measured continuously using a personal

computer with a dedicated software package from Sea-Bird. The processed data were continuously (every 6 sec.) transmitted to the HP1000/A400 data acquisition computer. The specifications of this thermosalinograph are found in table 1.

Parameter	Units	Range	Accuracy
TEMPERATURE	°C	-5 - +35	0.01 °C / 6 months
CONDUCTIVITY	S/m	0 - 7	0.001 S / m / month

Table 1. Sea-Bird SBE21 thermosalinograph specifications.

Salinity and density are calculated from conductivity, temperature and depth, in accordance to the 1978 Practical Salinity Scale from the IEEE Journal of Oceanic Engineering, January 1980.

A Turner Designs 10-AU-005 fluorimeter, also connected to the special seawater circuit, was used to measure chlorophyll concentrations during the full campaign. The data were also transmitted to the HP1000/A400 data acquisition computer.

At regular time-intervals samples have been taken from the seawater circuit in order to postcalibrate the SBE21 thermosalinograph and the Turner Designs fluorometer data.

The vertical light profiles have been taken with a LiCor LI-192-SA PAR sensor mounted on a Sea-Bird SBE19 SCTD profiler. The PAR sensor has a measuring range of 0 to 10.000 $\mu\text{mol s}^{-1} \text{m}^{-2}$ with an accuracy of 5 %.

SCTD vertical profiles have been taken with the Sea-Bird SBE09*plus* CTD profiler integrated with the Sea-Bird carousel water sampling system SBE32. The specifications of this CTD profiling system are given in table 2.

Parameter	Units	Range	Accuracy (guaranteed)
DEPTH	m	0 - 3000	0.1 % of full scale range
TEMPERATURE	°C	-5 - +35	0.01 °C / 6 months
CONDUCTIVITY	S/m	0 - 6	0.001 S / m / month
DIS. OXYGEN	$\mu\text{mol/kg}$	0 - 600	5 $\mu\text{mol} / \text{kg} / \text{day}$

Table 2. Sea-Bird SBE09*plus* specifications.

2.3. Meteorological instrumentation

Following parameters were measured by the Friedrichs meteorological station :

- windspeed
- winddirection
- airtemperature
- atmospheric pressure

In addition a solar radiation measuring device from Kipp & Zonen was installed.

The outputs of these sensors are analogous signals that are measured with the Hewlett Packard HP44701A 4 ½ digit digital voltmeter incorporated in the ODASII system. Table 3 gives a review of the specifications of the meteo sensors.

Parameter	Units	Range	Precision
WIND SPEED	m/s	0 - 41	0.2
WIND DIRECTION	degrees	0 - 360	2
ATMOSPHERIC PRESSURE	mbar	950 - 1050	1.5
AIR TEMPERATURE	°C	-35 - +45	0.2
SOLAR RADIATION	Watt/m ²	0 - 1000	10

Table 3. Meteo sensor specifications.

The meteosensors as well as the digital voltmeter are calibrated every year.

3. DATA ACQUISITION SYSTEM.

3.1. ODASII data acquisition and processing system.

A Hewlett Packard HP1000 Model A400 real-time minicomputer system with 26 RS-232 interfaces and a Hewlett Packard HP3852A data acquisition system (for analogous signals) were used to acquire meteorological, hydrological and navigational data at a 10 seconds interval.

The HP1000/A400 minicomputer is implemented as a black box. All input devices are connected through RS232 type interfaces to this real-time computer. The data acquisition software collects the sensor data and delivers this raw data to the data processing software implemented on a HP9000/748i-100 UNIX workstation. This on-line data processing software converts the raw data from the different input devices into physical units and stores the data in an Informix relational database.

The data presentation software is based on a Client Server model. The oceanographic data in the Informix database on the UNIX workstation are obtained on personal computer through a local area network (thin ethernet LAN). These personal computer presentation units are installed in the labs, in the computerroom and on the bridge and are accessible by all scientists on board for the production of real-time listings, graphs and trackplots.

3.2. SCTD - Horizontal profiling system.

The Sea-Bird SBE21 thermosalinograph data were recorded continuously to obtain horizontal salinity and water temperature profiles during the trajectories or time profiles at the fixed stations. The sensors are interrogated every 6 seconds using the dedicated Sea-Bird data acquisition and presentation software installed on a personal computer. The converted values were transmitted in real-time to the ODASII system.

3.3. SCTD - Vertical profiling system.

The Sea-Bird SBE09*plus* STD system measures the depth of the sensor package, water temperature, conductivity and dissolved oxygen at a rate of 24 samples per second. These data were averaged in the Sea-Bird deck unit over a 0.5 sec. time interval.

The averaged data are plotted in real-time on the PC display, allowing for an immediate decision of the water sampling depths. The Sea-Bird CTD software also allows to mark the SCTD data when water bottle samples are taken so that the SCTD and related parameters are known at the exact depth.

3.4. Data file inventory.

The underway data acquired with the ODASII system are stored in an Informix relational database. The references for these data are :

-campaign : ST9714A

-PDC : N9910S

The datafiles created with the Sea-Bird CTD systems during the BELGICA cruise 97/14 have the following file names.

Filename	Acquisition rate	Type of data	Duration
st9714an9910s1	10"	navig. + meteo + ocean.	Full campaign.
971400A.DAT to 971451A.DAT (for a complete list see appendix 1)	0.5"	CTD vertical profile	Stations 00A to 51A.
L08A.DAT L08B.DAT L12A.DAT L14A.DAT L19A.DAT L26A.DAT L31A.DAT L37A.DAT L38A.DAT L38B.DAT L40A.DAT L42A.DAT L47A.DAT	0.5"	Light profile	Stations 08, 12, 14, 19, 26, 31, 37, 38, 40, 42 and 47.

Table 4. Data file inventory.

These file names or derivatives occur on the different listings and plots.

4. REMARKS CONCERNING DATA ACQUISITION AND DATA VALIDITY.

4.1. Position registration.

During the whole OMEX cruise, the DGPS based navigation system Sercel NR103 was used as the primary positioning instrument. The Magnavox MX200 DGPS system was used as a backup system.

4.2. Salinity measurements.

4.2.1. Validation of the SCTD salinity measurements.

During the campaign vertical SCTD profiles have been taken with the SBE model *09plus* SCTD system. The SBE*09plus* SCTD system was equipped with two SBE-3 temperature sensors and two SBE-4 conductivity sensors. The second pair of sensors was only used at two SCTD stations (stations 0A and 43A).

At different locations and multiple depths water samples have been taken to validate the salinity data of the SBE*09plus* system. The water samples have been analysed in MUMM's laboratory at Oostende with a Guildline Portasal Model 8410 laboratory salinometer.

The Guildline Portasal salinometer is calibrated using IAPSO standard seawater capsules obtained from Ocean Scientific International (UK).

The results of the Guildline Portasal salinometer have been compared with the Sea-Bird SBE*09plus* salinity measurements (see Table 3, Appendix 7 and Figure 4, Appendix 7).

	Standard deviation ppt	Mean error ppt	Corrolation coëff.
SBE <i>09plus</i> - Guildline leg b	0.00165	0.01508	0.99994
SBE <i>09plus</i> - Guildline leg c	0.00425	0.01992	0.99944
SBE <i>09plus</i> - Guildline leg d	0.00232	0.02383	1

The salinity and the density data in table 2 (Appendix 4) have been corrected for these mean errors as follows :

corrected salinity : leg b : measured salinity - 0.015
leg c : measured salinity - 0.020
leg d : measured salinity - 0.024

corrected density : leg b : measured density - 0.012
leg c : measured density - 0.016
leg d : measured density - 0.019

4.2.2. Salinity spiking of the SCTD measurements.

In order to improve the performance of the salinity measurements, the Sea-Bird SBE09*plus* has a Temperature and Conductivity (TC) duct with an inertia-balanced pump flow.

The salinity spiking alignment computer program has been applied on the SCTD data (sampling speed 12 samples per second) to minimize the salinity spiking.

See also "JGOFS 90, RV BELGICA cruise 90/18, MUMM contribution Volume I : Report, J. Backers, A. Pollentier."

4.3. Chlorophyll measurements.

The range of the Turner Designs 10-AU-005 fluorometer is set at MUMM's laboratory using a dilution of standard chlorophyll a in acetone. The blank is set with Milli-Q water. This setting is done to get a fixed reference only.

The fluorescence data available at MUMM - Oostende has been correlated to the chlorophyll data (Lorenzen method) of samples taken at regular intervals during the cruise (cfr BODC) :

leg b (against 8 discrete samples) : $\text{chlorophyll} = 0.26978 + 0.04224 * \text{fluorescence}$, $R^2 = 0.74$

leg c (against 42 discrete samples; split into two batches) :

prior to the jump : $\text{chlorophyll} = 0.85252 + 0.07965 * \text{fluorescence}$, $R^2 = 0.92$

after : $\text{chlorophyll} = 1.12427 + 0.06266 * \text{fluorescence}$, $R^2 = 0.93$

leg d (against 11 discrete samples, 1 deleted): $\text{chlorophyll} = 3.0078 + 0.10779 * \text{fluorescence}$, $R^2 = 0.71$); when applied, calibration produced negative values for the period 02/07 18h10 to 03/07 11h30; that group of data was processed in a way that every negative value was set to zero.

(see plots in Appendix 3)

4.4. Irradiance measurements.

Appendix 6 gives the vertical profiles of light penetration (irradiance). Due to a problem with the logarithmic amplifier in the SeaCat profiler the data, especially in the low range, are of poor quality and should be interpreted with care.

4.5. Data validity.

One of the features of the ODASII package is that it verifies all subsystems, instruments and parameters interrogated.

To each parameter value, subsequently logged in the ODASII database, two bytes are added to take into account these data validity checks.

The validity is also shown on the data listings and transferred to the ASCII files. The following code is used :

Code	Meaning
M	Malfunction of a subsystem.
U	No update of the data since the previous logged value.
V	Data not valid (e.g. test on data string format failed).
D	Range error of the DVM subsystem.
R	Lower/upper range test.
G	Gradient test.
=	Not used.
S	Suspected data indication given by e.g. a positioning system.

5. REVIEW OF LISTINGS AND PLOTS IN APPENDICES.

APPENDIX 1 :

Table 1 gives the position, the waterdepth, the date and the time of the SCTD vertical profiles. All these profiles have been taken with the Sea-Bird SBE09*plus* SCTD system.

Figure 1 gives a map with a view of the trackplot and all the sampling stations while figure 2 and 3 show a detail of traject of the cruise 97/14, respectively leg c (Spanish coast) and leg d (Banc de la Chapelle).

APPENDIX 2 :

In figures 4 to 10, the vector averaged windspeed and direction, the air temperature, the solar radiation and the atmospheric pressure are plotted in function of time. These data were acquired with the Friedrichs meteo system, have been edited and have been averaged over a 10 minute time interval.

APPENDIX 3 :

In figures 11 to 17 the surface watertemperature, the salinity and the fluorecence are plotted in function of time. These data were acquired with the Sea-Bird SBE21 thermosalinograph and the Turner Designs fluorometer. The plotted data have been edited by BODC.

APPENDIX 4 :

The results of the Guildline Portasal salinometer have been compared with the Sea-Bird SBE09*plus* salinity measurements in Table 2 and Figure 4.

Table 3 gives the values of the oceanographic parameters at the SCTD water sampling points.

APPENDIX 5:

The verical profiles of the temperature, the salinity, the density, the dissolved oxygen and the backscatterance are shown for all stations.

APPENDIX 6:

Finally, the graphplots of the incident light vs. depth for the stations 08, 12, 14, 19, 26, 31, 37, 38, 40, 42 en 47 are given.

APPENDIX 7 :

The results of the Guildline Portasal salinometer have been compared with the Sea-Bird SBE09*plus* salinity measurements in Table 3 and Figure 4.

Appendix 1.

Plot with station annotations and list of positions.

SERCEL NR103 : DGPS position

ATLAS DESO-20 : waterdepth

Table 1. Position SCTD stations OMEX 97/14.

Station number	Date 1997	Time of V.P.(¹)	Latitude	Longitude	Water Depth [m]	Data file
00A	19-Jun	08:00 am	N44 16 02.08	W 6 03 10.44	> 2000	971400A
IC1A	20-Jun	03:38 am	N42 29 28.22	W 9 25 48.18	590	9714IC1A
01A	21-Jun	11:09 am	N41 59 49.61	W 9 00 00.37	100	971401A
02A	21-Jun	12:52 pm	N42 00 01.16	W 9 14 00.67	147	971402A
03A	21-Jun	15:23 pm	N41 59 53.32	W 9 21 19.23	262	971403A
04A	21-Jun	17:38 pm	N41 59 57.21	W 9 39 30.59	2060	971404A
05A	21-Jun	20:49 pm	N42 00 05.73	W10 00 15.41	> 2000	971405A
06A	22-Jun	02:45 am	N42 08 56.34	W 8 57 33.24	93	971406A
07A	22-Jun	04:38 am	N42 08 52.17	W 9 02 51.73	131	971407A
08A	22-Jun	06:28 am	N42 09 03.18	W 9 08 29.09	144	971408A
08B	22-Jun	08:22 am	N42 08 23.70	W 9 09 31.71	147	971408B
09A	22-Jun	12:02 pm	N42 09 06.41	W 9 19 06.97	218	971409A
09B	22-Jun	14:03 pm	N42 09 29.42	W 9 20 31.83	231	971409B
10A	22-Jun	16:39 pm	N42 09 09.00	W 9 43 58.76	> 2000	971410A
10B	22-Jun	20:58 pm	N42 09 13.09	W 9 43 44.35	> 2000	971410B
12A	23-Jun	03:59 am	N42 09 02.80	W10 18 09.79	> 2000	971412A
12B	23-Jun	05:05 am	N42 08 58.43	W10 18 30.45	> 2000	971412B
12C	23-Jun	07:41 am	N42 08 45.21	W10 19 14.68	> 2000	971412C
V1A	23-Jun	13:03 pm	N42 16 28.75	W 9 35 22.98	1560	9714V1A
14A	23-Jun	16:02 pm	N42 19 55.25	W 9 12 06.18	157	971414A
15A	23-Jun	18:12 pm	N42 19 51.84	W 9 24 08.67	263	971415A
16A	23-Jun	20:24 pm	N42 20 00.49	W 9 42 04.10	> 2000	971416A
17A	23-Jun	23:23 pm	N42 20 13.51	W10 00 06.15	> 2000	971417A
18A	24-Jun	04:53 am	N42 29 56.54	W 9 10 57.93	85	971418A
19A	24-Jun	06:17 am	N42 30 11.47	W 9 17 30.74	143	971419A
19B	24-Jun	07:39 am	N42 30 22.45	W 9 16 51.09	134	971419B
20A	24-Jun	10:15 am	N42 29 45.97	W 9 25 26.07	553	971420A
21A	24-Jun	11:57 am	N42 30 03.45	W 9 38 01.84	> 1800	971421A
21B	24-Jun	13:15 pm	N42 30 13.79	W 9 38 04.94	> 1800	971421B
22A	24-Jun	16:42 pm	N42 30 32.75	W10 00 35.30	> 2000	971422A
24A	24-Jun	23:31 pm	N42 40 02.31	W 9 12 34.49	100	971424A
25A	25-Jun	04:01 am	N42 39 58.48	W 9 24 38.31	139	971425A
25B	25-Jun	05:12 am	N42 39 34.50	W 9 24 35.08	142	971425B
26A	25-Jun	07:35 am	N42 39 54.08	W 9 32 11.48	360	971426A
27A	25-Jun	11:05 am	N42 40 00.06	W 9 42 25.22	1391	971427A
27B	25-Jun	13:41 pm	N42 39 10.75	W 9 42 43.70	1485	971427B
29A	26-Jun	01:08 am	N42 40 06.67	W10 18 05.95	> 2000	971429A
29B	26-Jun	03:24 am	N42 40 19.27	W10 19 28.38	> 2000	971429B
29C	26-Jun	04:13 am	N42 40 43.26	W10 19 55.61	> 2000	971429C
31A	26-Jun	09:33 am	N42 50 03.93	W 9 23 45.82	142	971431A
32A	26-Jun	12:13 pm	N42 49 55.26	W 9 36 45.04	770	971432A
33A	26-Jun	13:53 pm	N42 50 00.59	W 9 44 44.25	1750	971433A
34A	26-Jun	16:52 pm	N42 50 10.36	W 9 59 56.95	> 2000	971434A

Station number	Date 1997	Time of V.P.(¹)	Latitude	Longitude	Water Depth [m]	Data file
35A	26-Jun	19:48 pm	N42 50 10.25	W10 17 55.65	> 2000	971435A
36A	27-Jun	02:41 am	N42 59 59.69	W 9 18 11.70	43	971436A
37A	27-Jun	03:39 am	N42 59 51.51	W 9 23 59.15	123	971437A
37B	27-Jun	05:02 am	N43 00 10.08	W 9 23 53.38	118	971437B
37C	27-Jun	08:45 am	N43 00 36.66	W 9 24 00.01	129	971437C
38A	27-Jun	13:10 pm	N42 59 50.90	W 9 31 10.85	221	971438A
39A	27-Jun	17:09 pm	N43 00 07.87	W 9 38 55.22	1600	971439A
40A	28-Jun	02:59 am	N43 00 10.51	W 9 49 22.29	> 2000	971440A
40B	28-Jun	05:05 am	N43 00 11.26	W 9 49 22.48	> 2000	971440B
40C	28-Jun	11:26 am	N42 59 51.94	W 9 49 34.49	> 2000	971440C
40D	28-Jun	13:44 pm	N42 59 46.60	W 9 49 07.81	> 2000	971440D
41A	28-Jun	20:12 pm	N43 00 00.48	W10 00 36.55	> 2000	971441A
42A	29-Jun	02:47 am	N43 00 30.03	W10 17 51.20	> 2000	971442A
42B	29-Jun	04:33 am	N43 00 07.36	W10 18 02.36	> 2000	971442B
42C	29-Jun	09:27 am	N43 00 25.70	W10 18 23.42	> 2000	971442C
42D	29-Jun	11:48 am	N43 00 09.73	W10 17 47.24	> 2000	971442D
43A	03-Jul	12:10 pm	N47 09 26.75	W 7 23 50.43	> 2000	971443A
43B	03-Jul	14:22 pm	N47 09 23.66	W 7 24 05.80	> 2000	971443B
44A	03-Jul	15:37 pm	N47 12 57.88	W 7 21 43.69	> 2000	971444A
45A	03-Jul	17:00 pm	N47 16 27.77	W 7 19 59.17	> 2000	971445A
46A	03-Jul	17:54 pm	N47 20 19.67	W 7 18 06.61	> 2000	971446A
47A	03-Jul	19:10 pm	N47 24 05.54	W 7 15 56.99	> 2000	971447A
47B	04-Jul	03:57 am	N47 24 02.25	W 7 16 02.81	> 2000	971447B
47C	04-Jul	06:06 am	N47 23 54.75	W 7 16 05.21	> 2000	971447C
47D	04-Jul	10:04 am	N47 23 53.10	W 7 15 58.96	> 2000	971447D
47E	04-Jul	14:31 pm	N47 24 02.93	W 7 16 05.52	> 2000	971447E
47F	04-Jul	18:00 pm	N47 23 54.52	W 7 16 06.91	> 2000	971447F
48A	05-Jul	00:18 am	N47 27 39.10	W 7 14 32.61	1646	971448A
49A	05-Jul	01:25 am	N47 31 32.66	W 7 12 29.27	550	971449A
50A	05-Jul	02:22 am	N47 35 10.00	W 7 10 27.58	167	971450A
51A	05-Jul	04:59 am	N47 38 24.10	W 7 08 10.84	170	971451A

Remarks:

(¹) The time noted is the starttime (GMT) of the vertical profile.

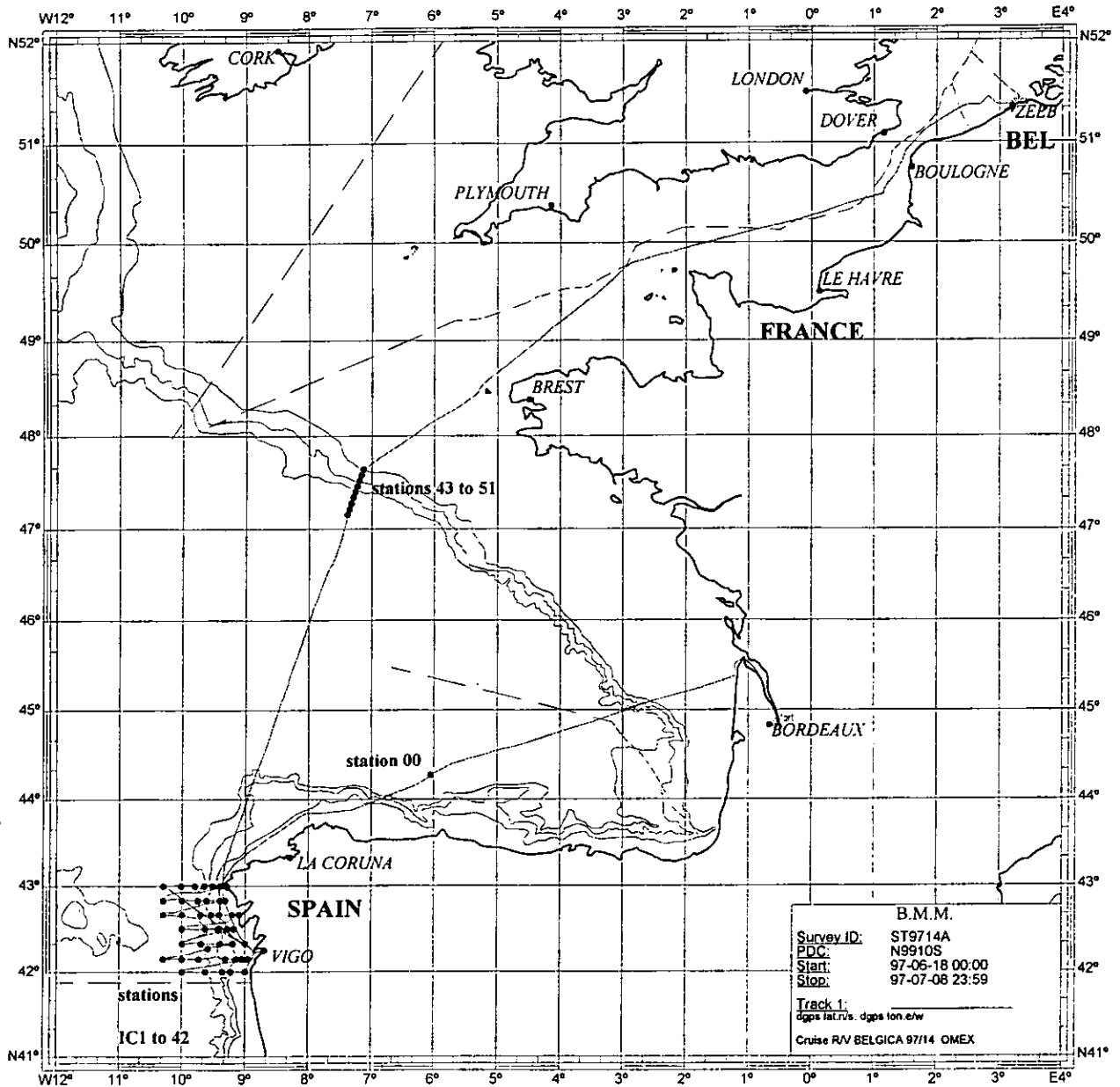


Figure 1

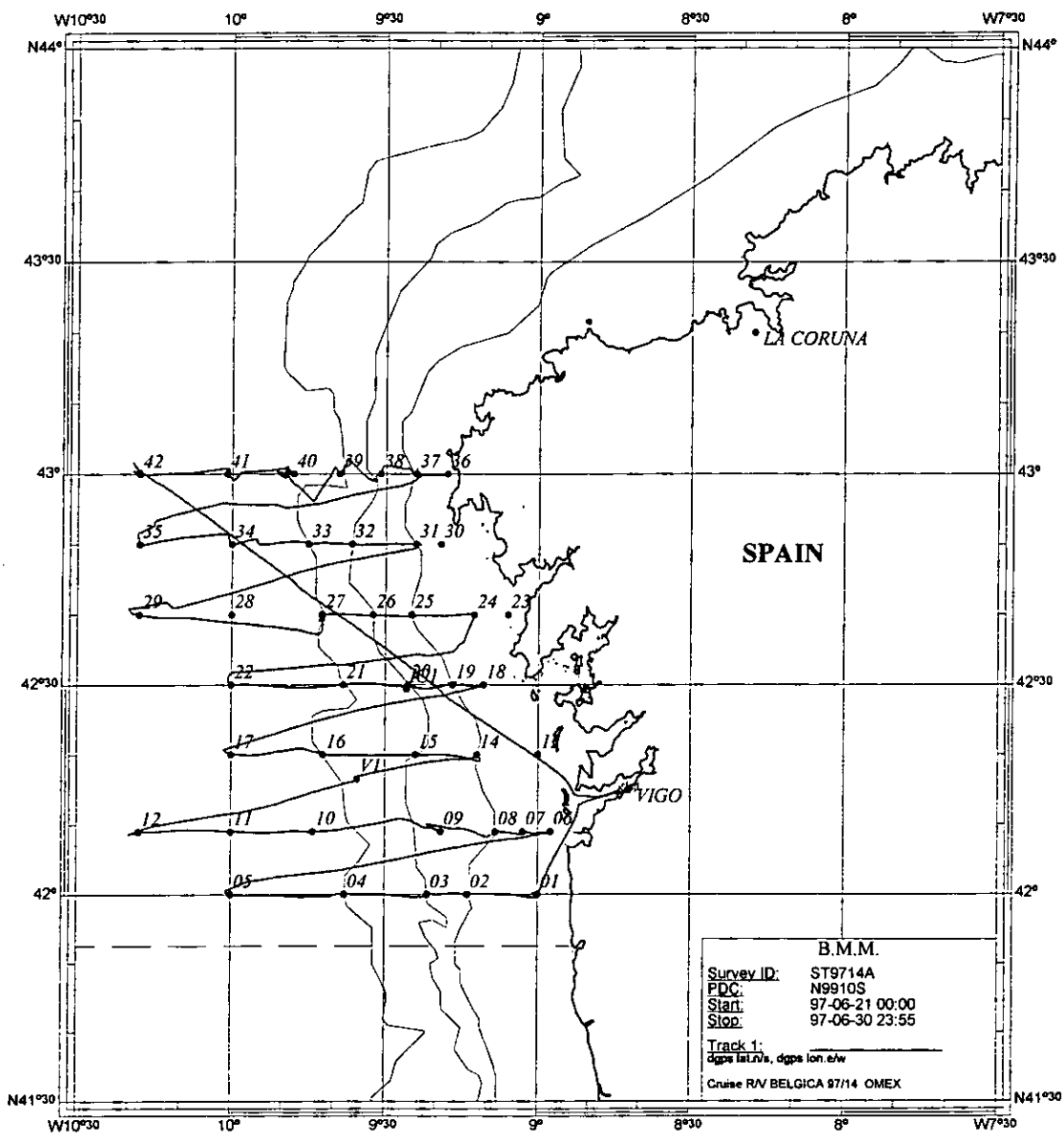


Figure 2

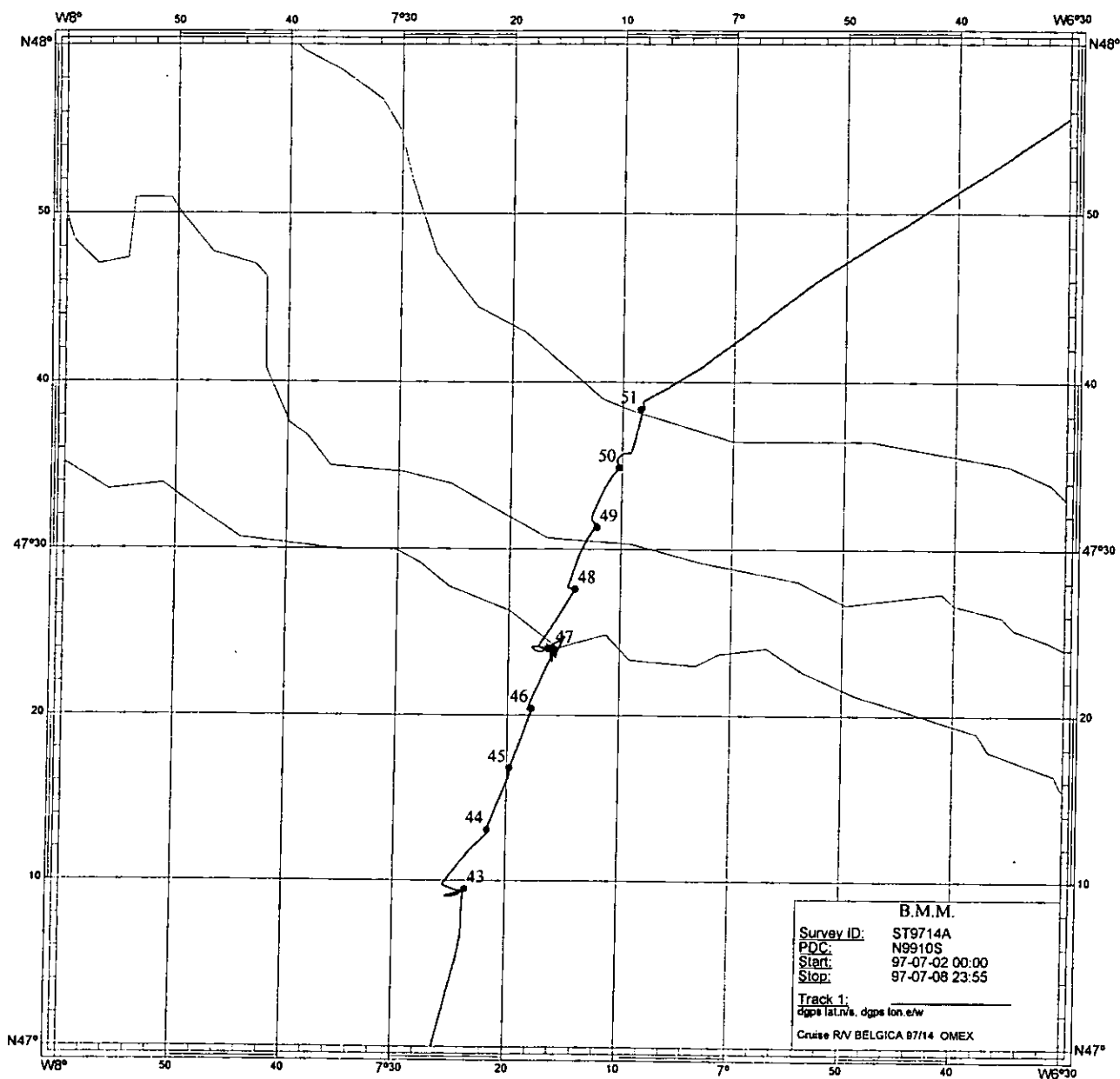


Figure 3

Appendix 2.

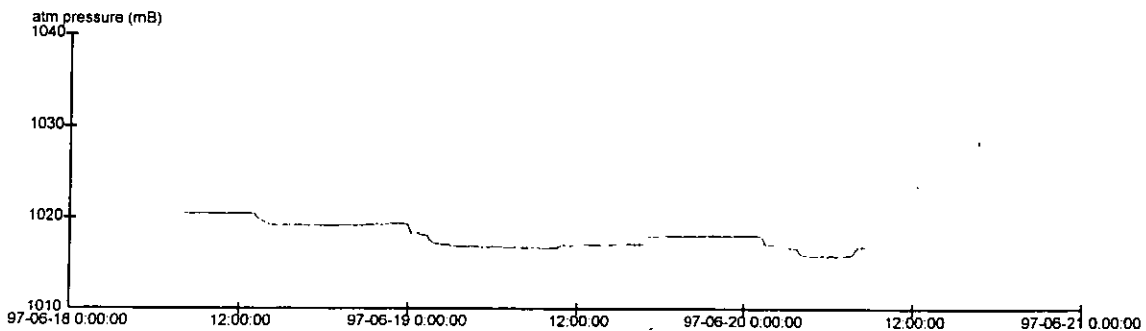
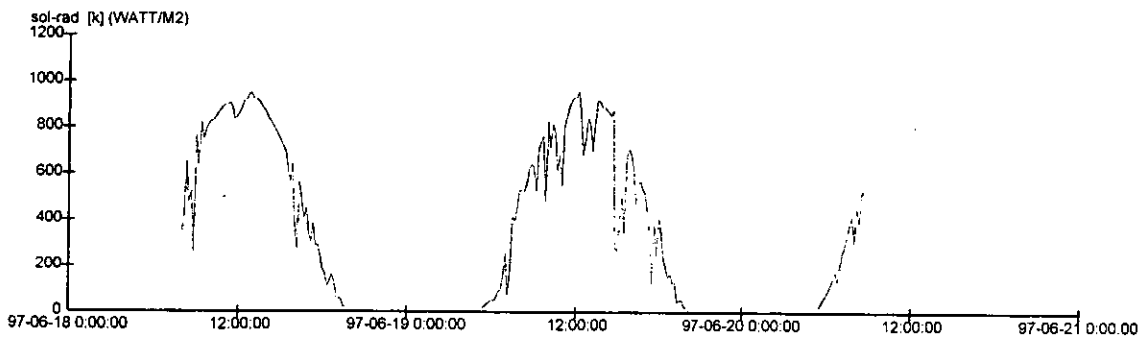
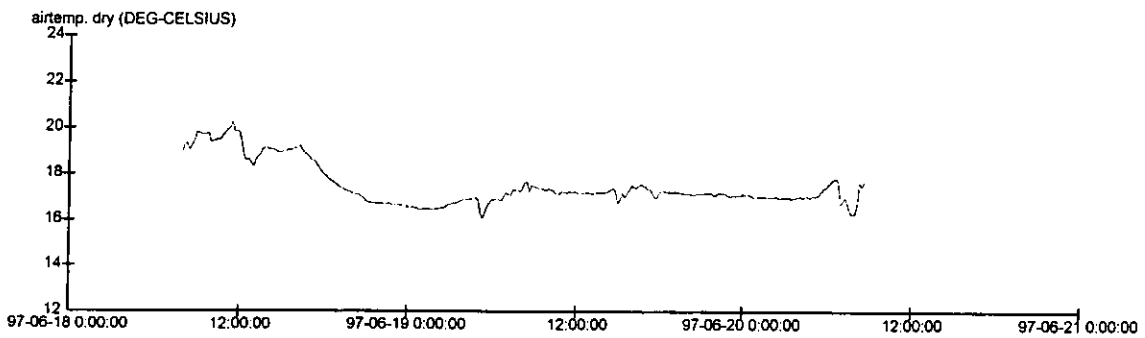
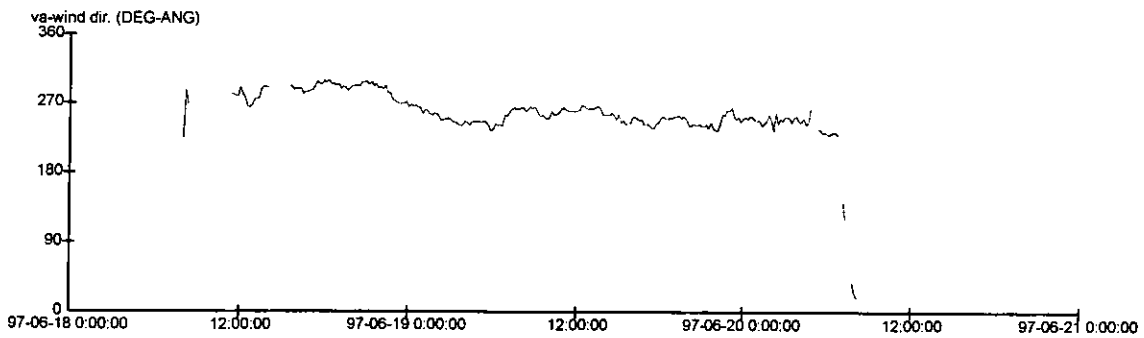
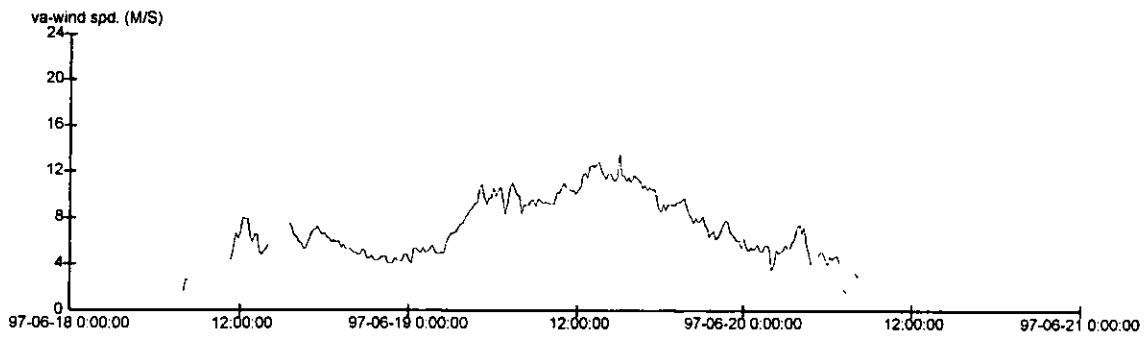
Meteorological data during the complete campaign.

FRIEDRICHS : windspeed and -direction, airtemperature, atm. pressure

KIPP & ZONEN : solar radiation

RV BELGICA - CRUISE 97/14

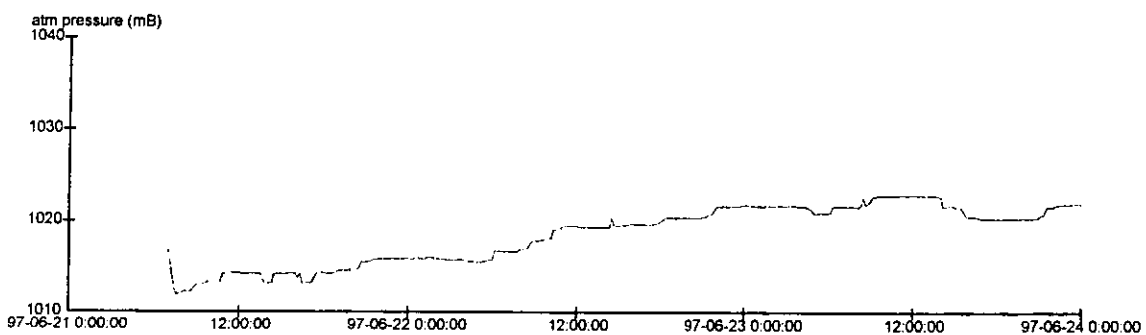
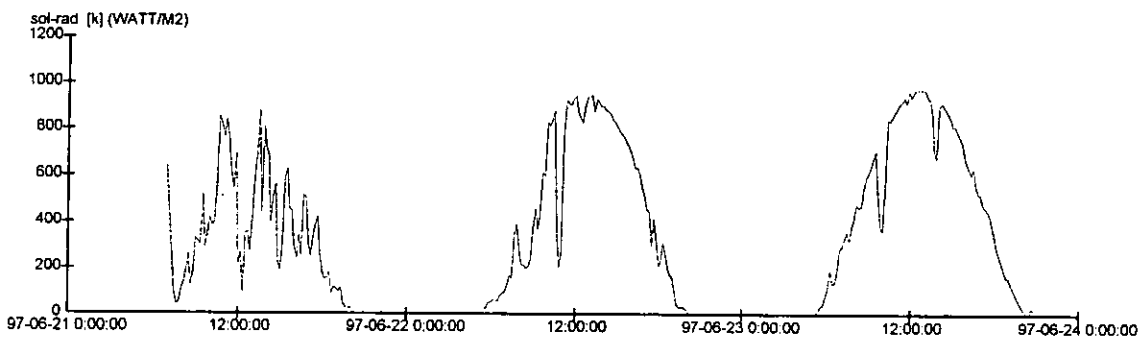
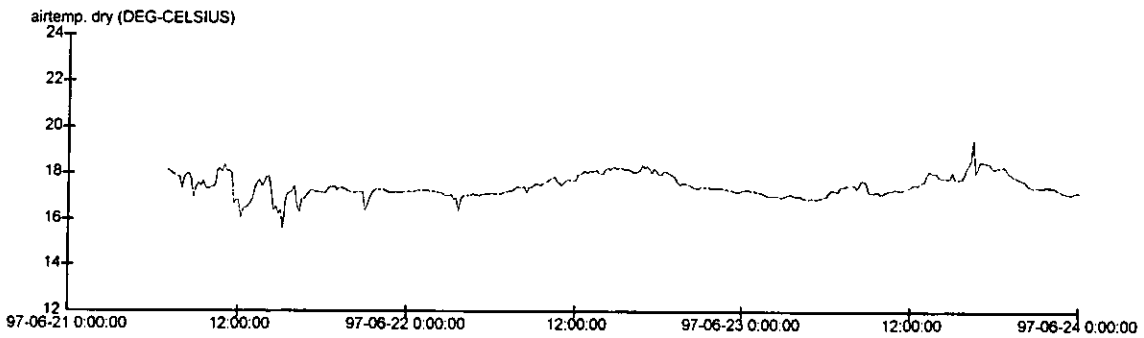
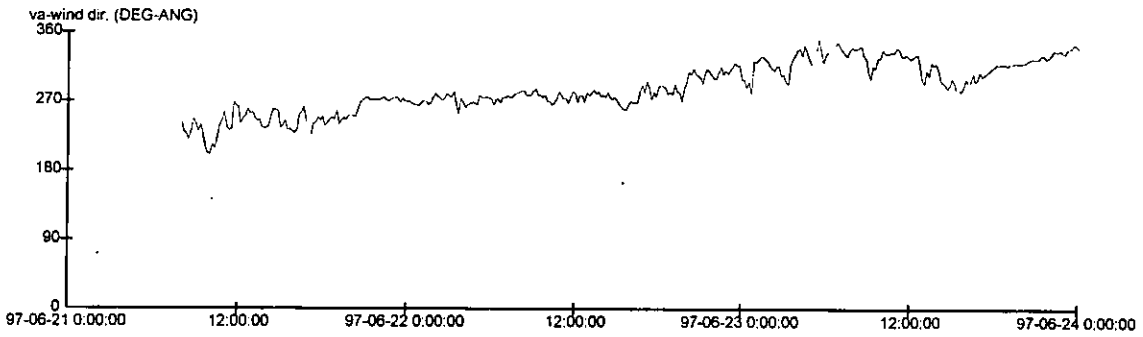
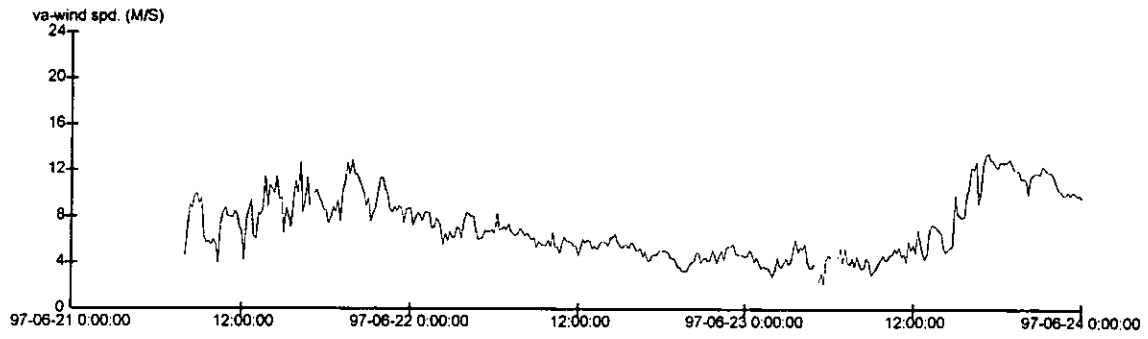
18.06.97 0:00 - 21.06.97 0:00



— atm pressure mB
— sol-rad [kJ] WATT/M2
- - - airtemp. dry DEG-CELSIUS
— va-wind dir. DEG-ANG
— va-wind spd. M/S

RV BELGICA - CRUISE 97/14

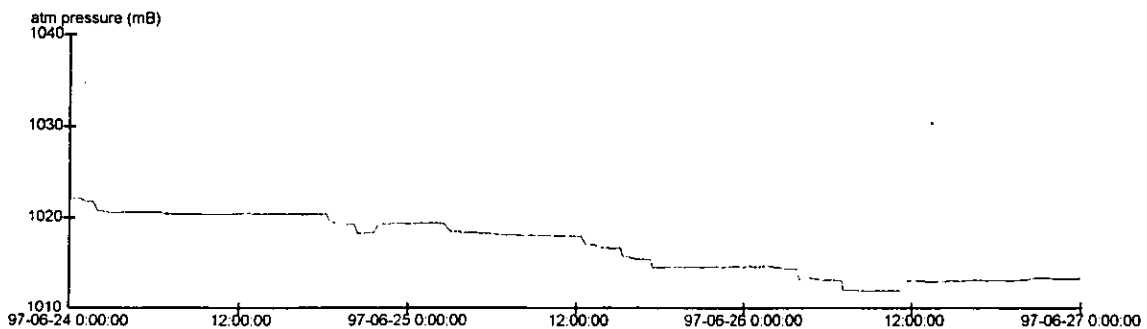
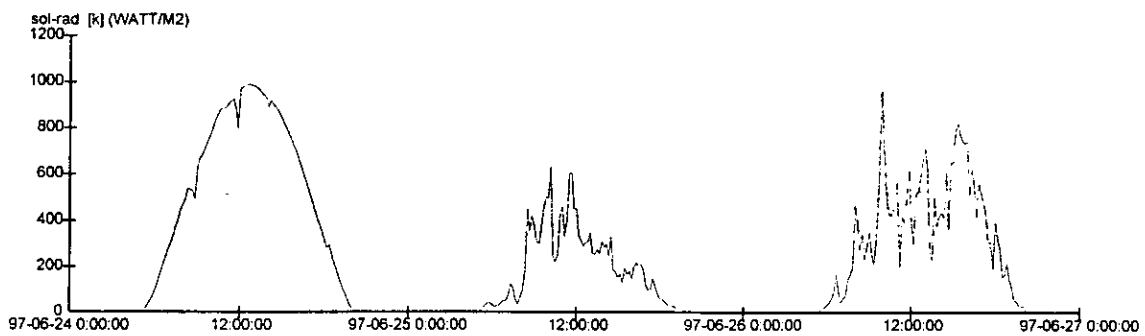
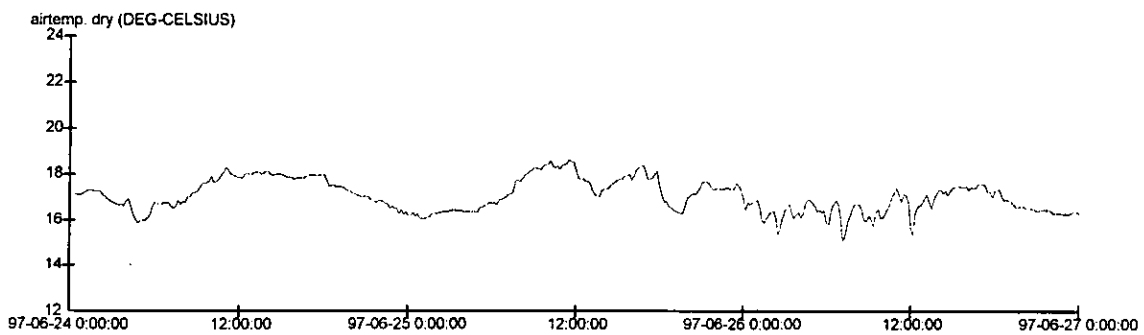
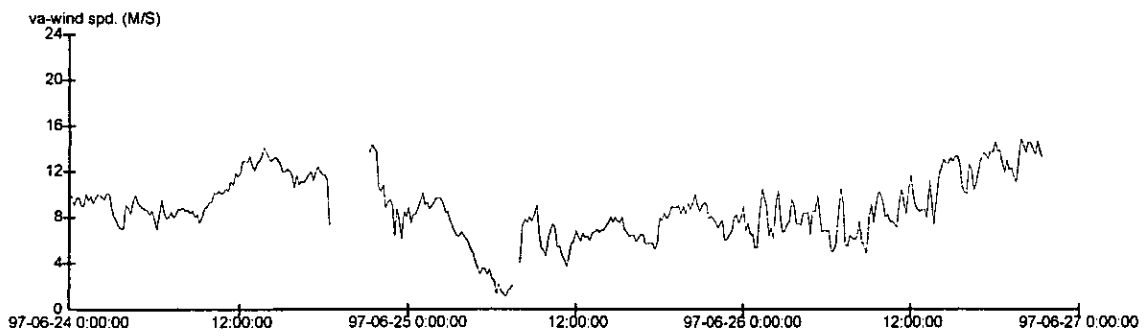
21.06.97 0:00 - 24.06.97 0:00



— atm pressure mB
— sol-rad [k] WATT/M2
— airtemp. dry DEG-CELSIUS
— va-wind dir. DEG-ANG
— va-wind spd. M/S

RV BELGICA - CRUISE 97/14

24.06.97 0:00 - 27.06.97 0:00



— atm pressure
mB

— sol-rad [k]
WATT/M2

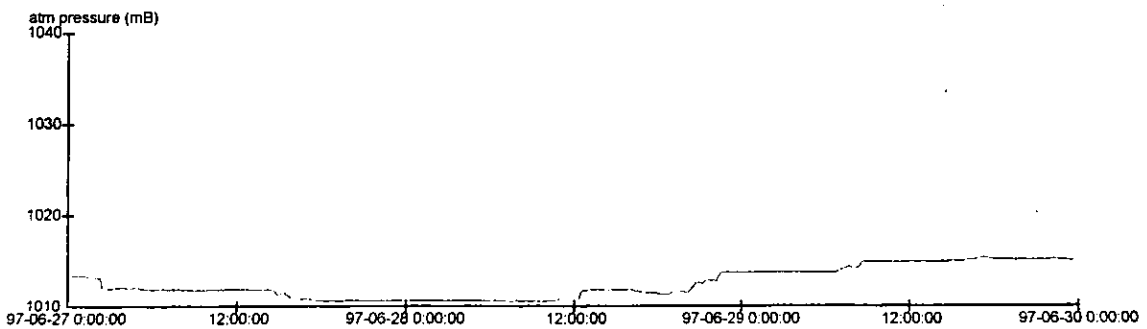
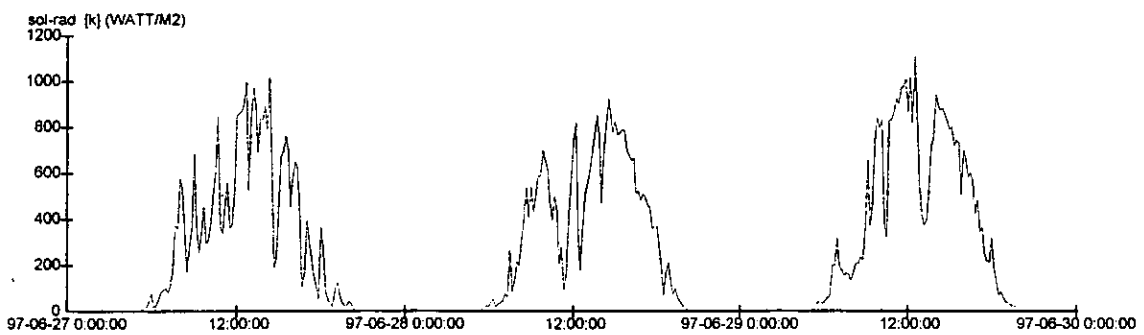
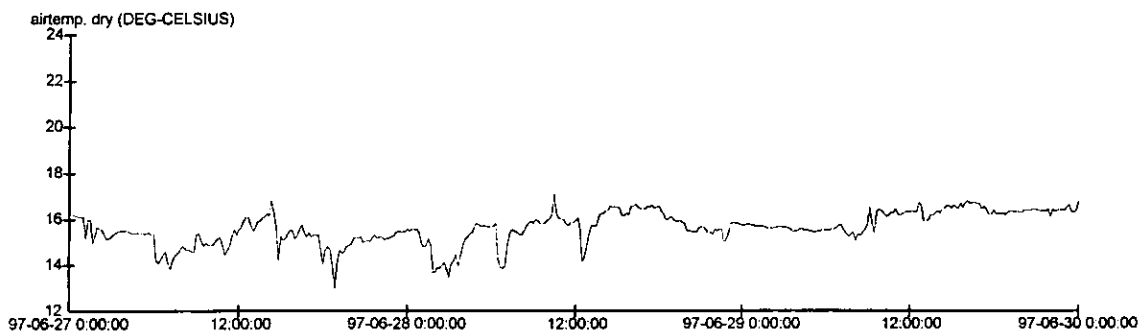
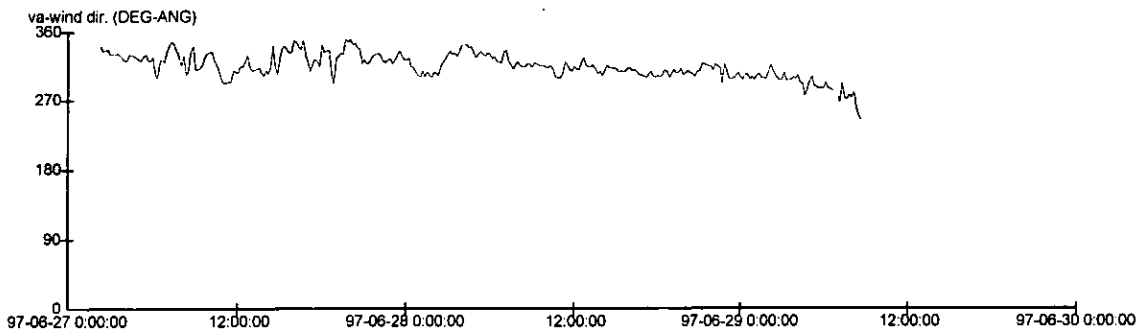
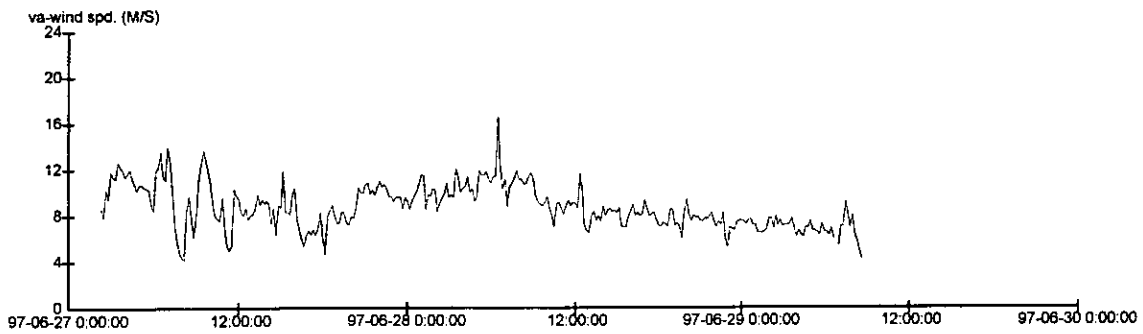
— airtemp. dry
DEG-CELSIUS

— va-wind dir.
DEG-ANG

— va-wind spd.
M/S

RV BELGICA - CRUISE 97/14

27.06.97 0:00 - 30.06.97 0:00



— atm pressure
mB

— sol-rad [k]
WATT/M2

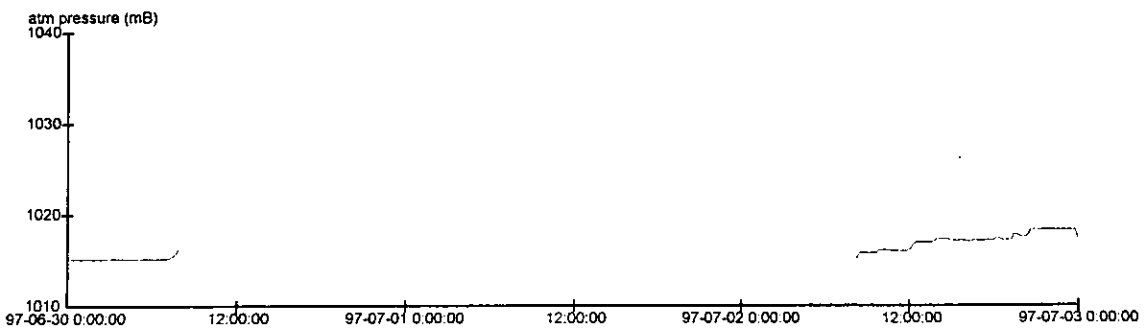
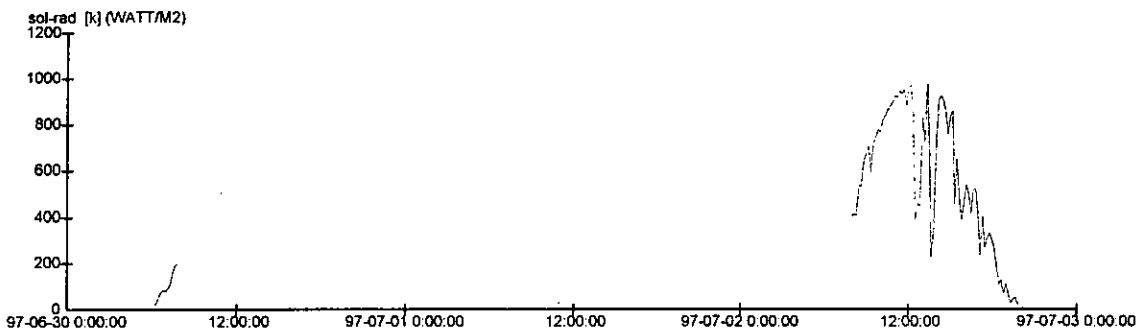
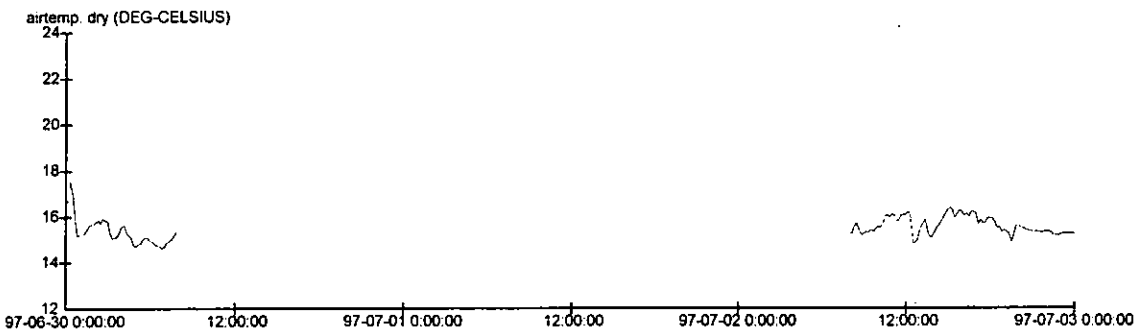
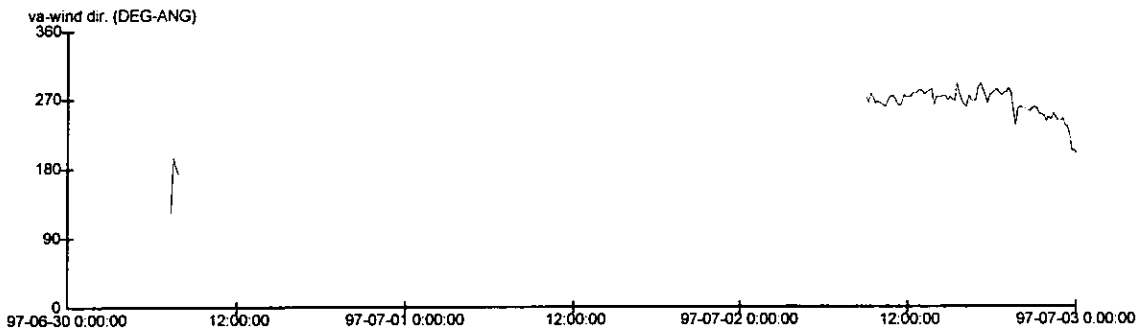
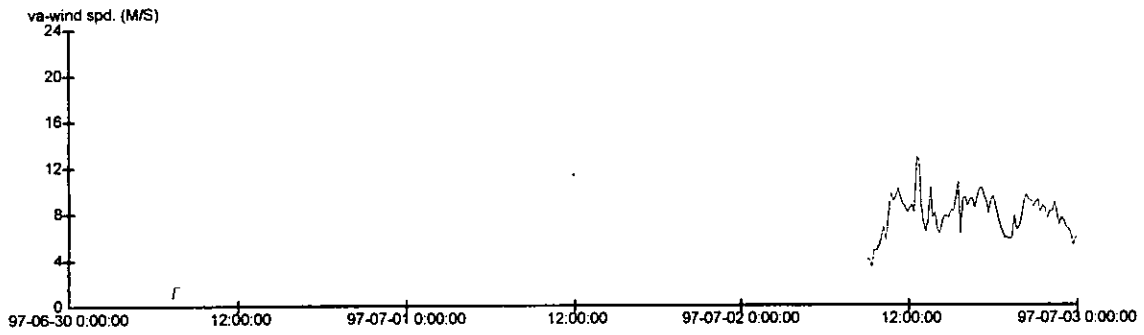
— airtemp. dry
DEG-CELSIUS

— va-wind dir.
DEG-ANG

— va-wind spd.
M/S

RV BELGICA - CRUISE 97/14

30.06.97 0:00 - 03.07.97 0:00



— atm pressure
mB

— sol-rad [k]
WATT/M2

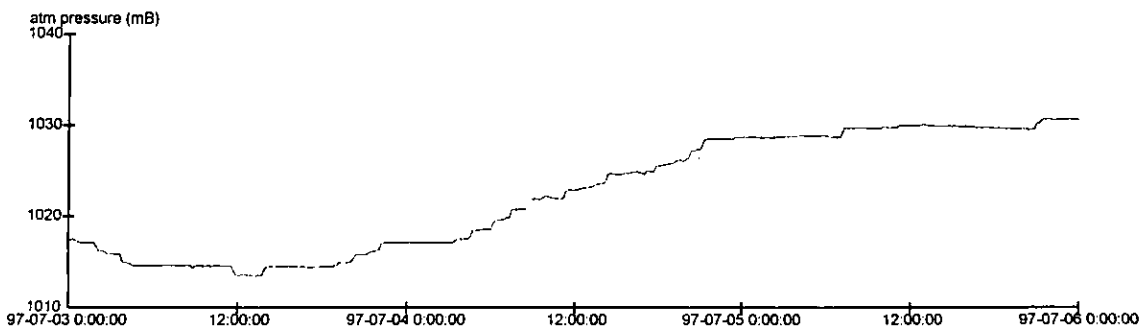
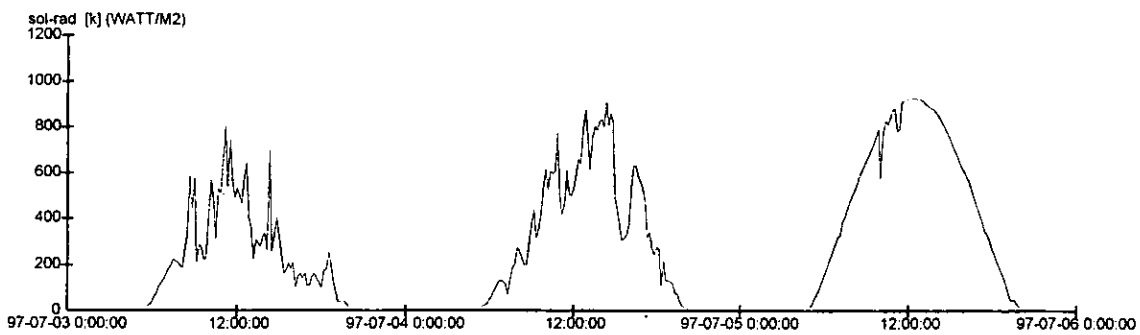
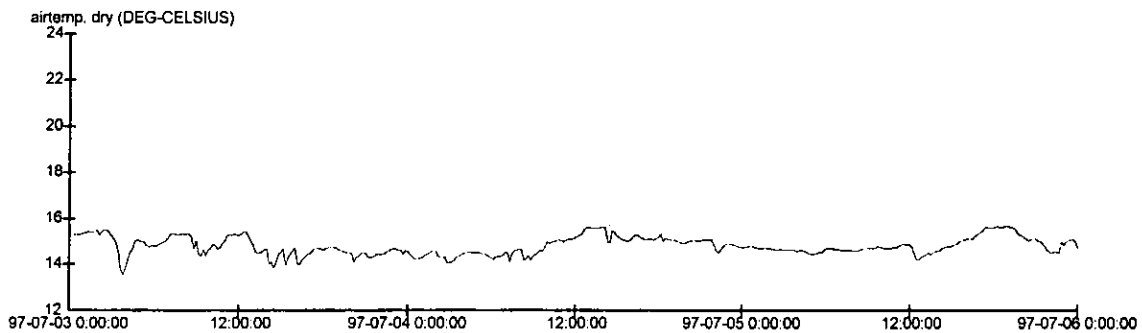
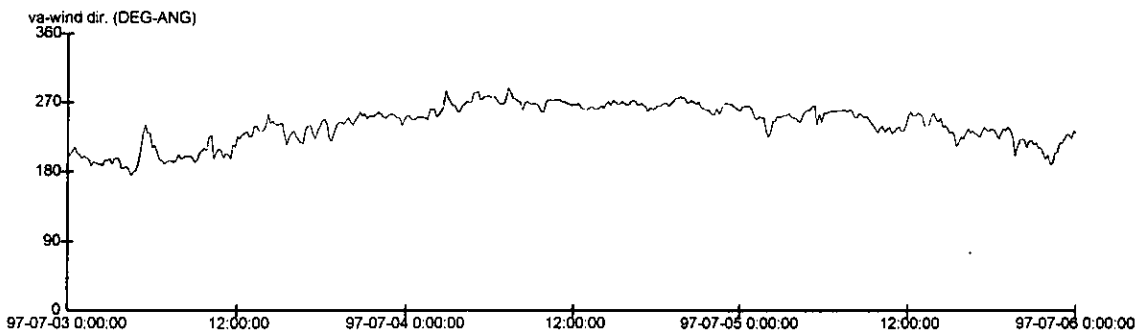
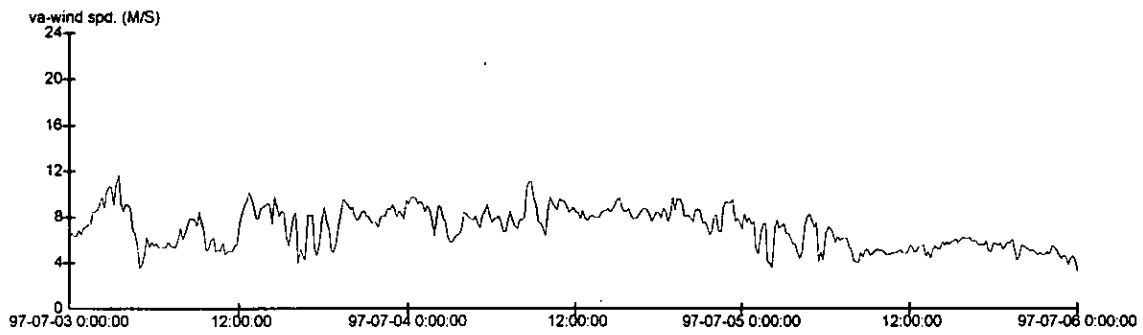
— airtemp. dry
DEG-CELSIUS

— va-wind dir.
DEG-ANG

— va-wind spd.
M/S

RV BELGICA - CRUISE 97/14

03.07.97 0:00 - 06.07.97 0:00



— atm pressure
mB

— sol-rad [k]
WATT/M2

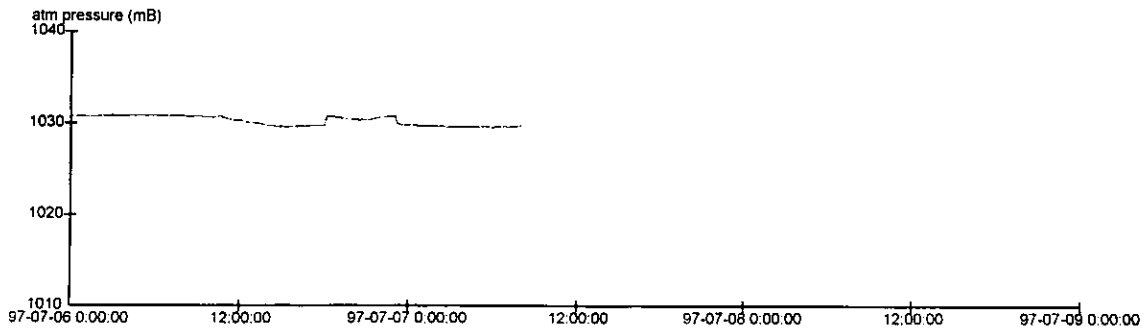
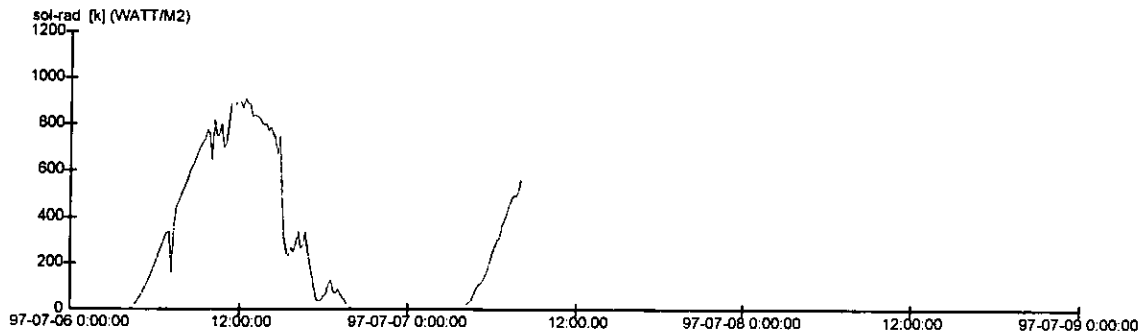
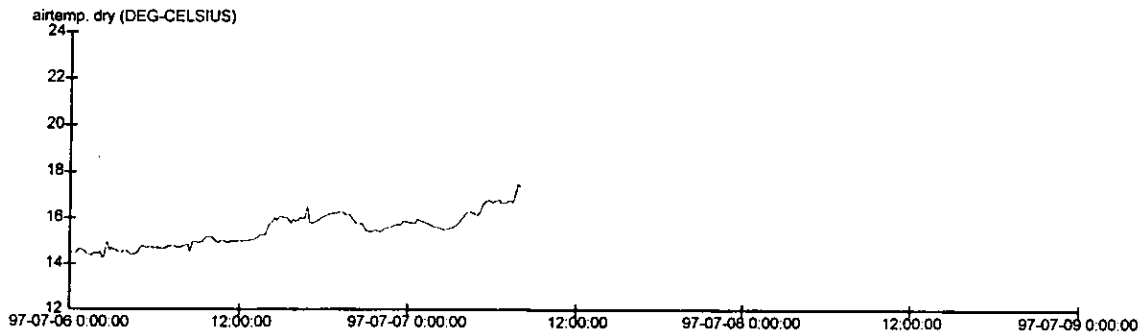
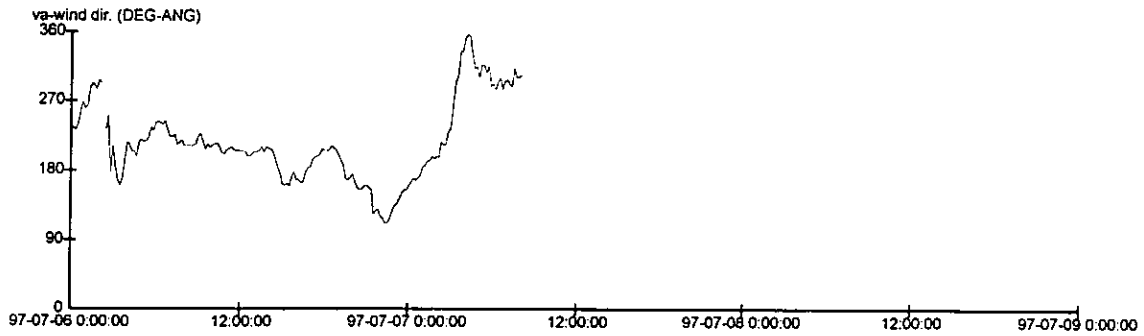
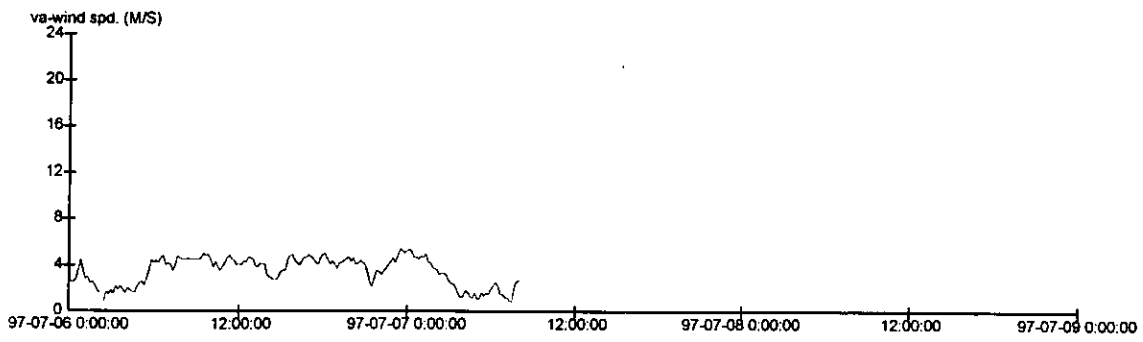
— airtemp. dry
DEG-CELSIUS

— va-wind dir.
DEG-ANG

— va-wind spd.
M/S

RV BELGICA - CRUISE 97/14

06.07.97 0:00 - 09.07.97 0:00



— atm pressure
mB

— sol-rad [k]
WATT/M2

— airtemp. dry
DEG-CELSIUS

— va-wind dir.
DEG-ANG

— va-wind spd.
M/S

Appendix 3.

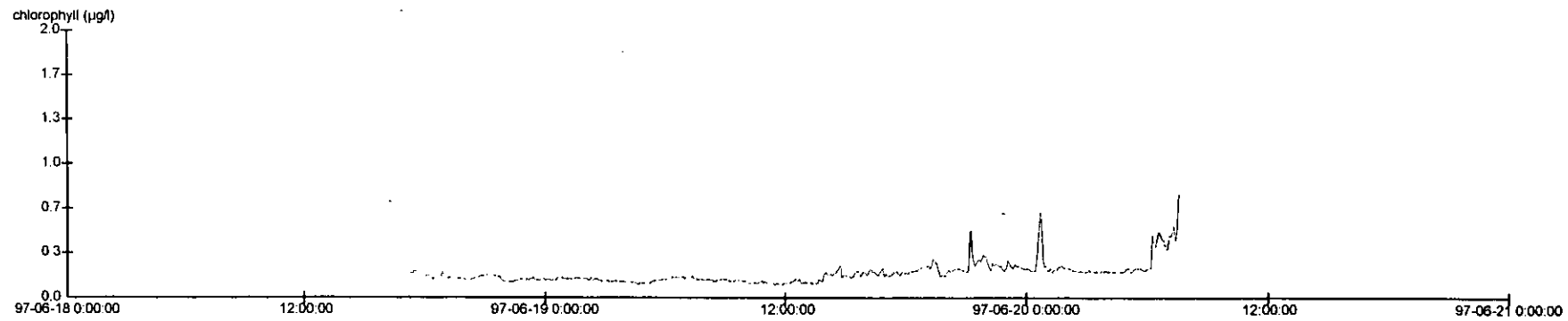
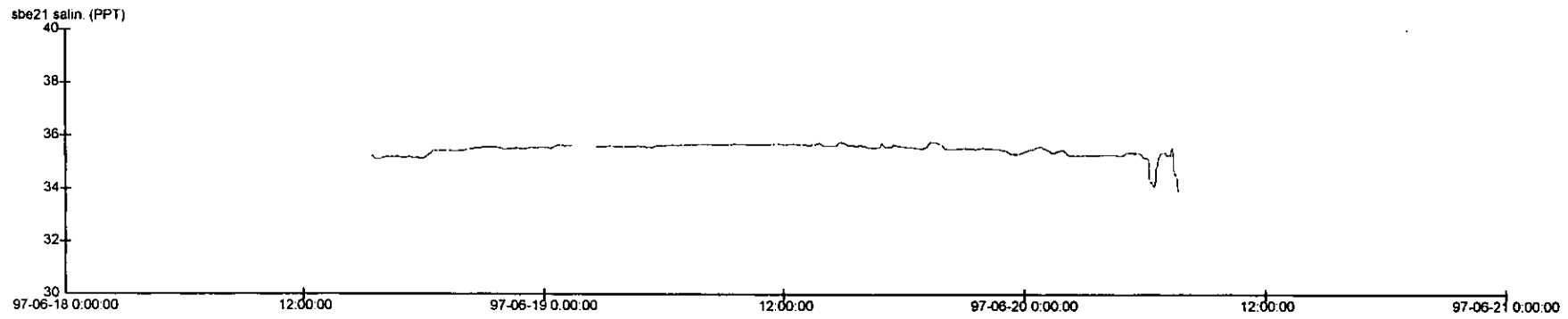
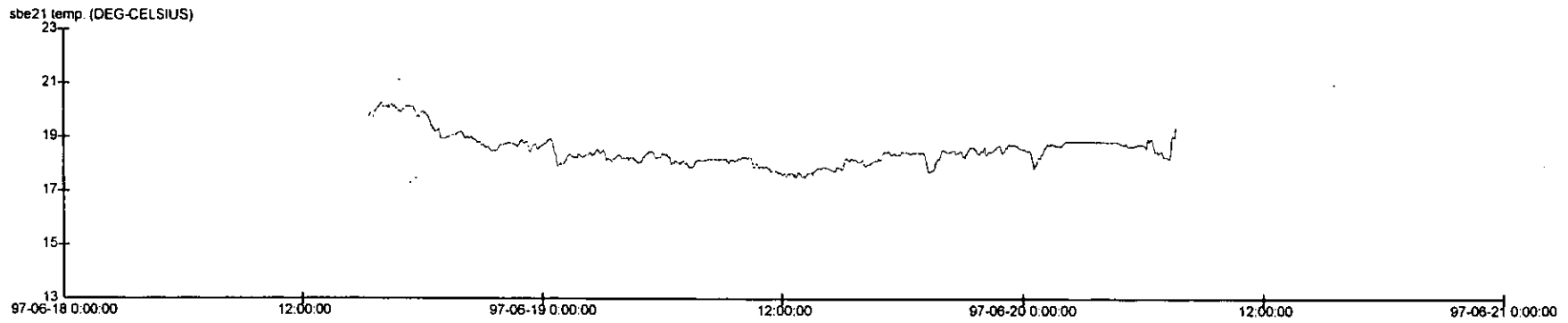
Horizontal profiles.

SEA-BIRD SBE21 : watertemperature, salinity

TURNER DESIGNS : fluorescence

RV BELGICA - CRUISE 97/14

18.06.97 0:00 - 21.06.97 0:00

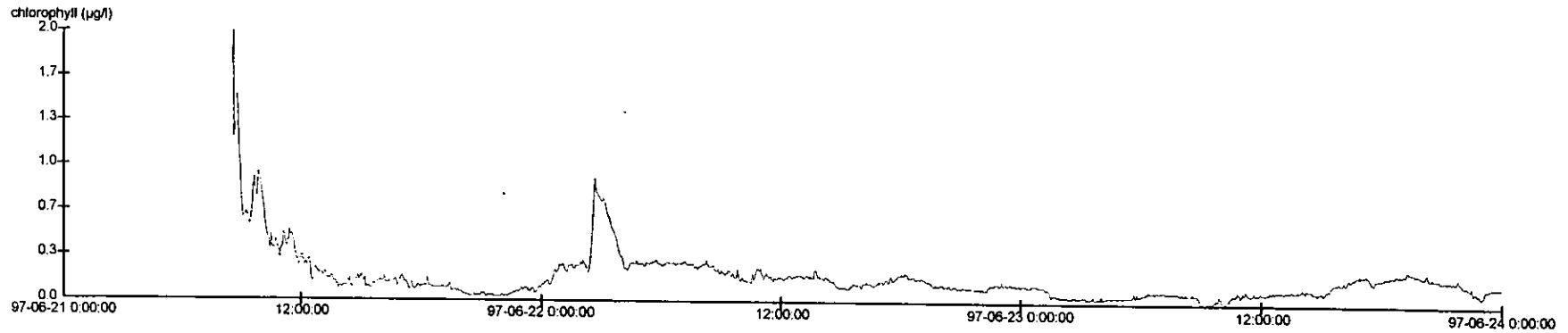
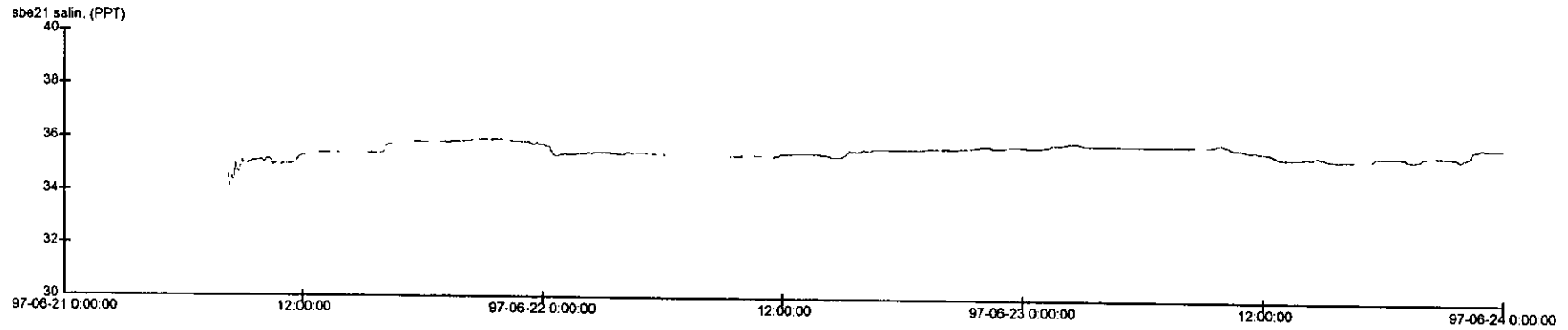
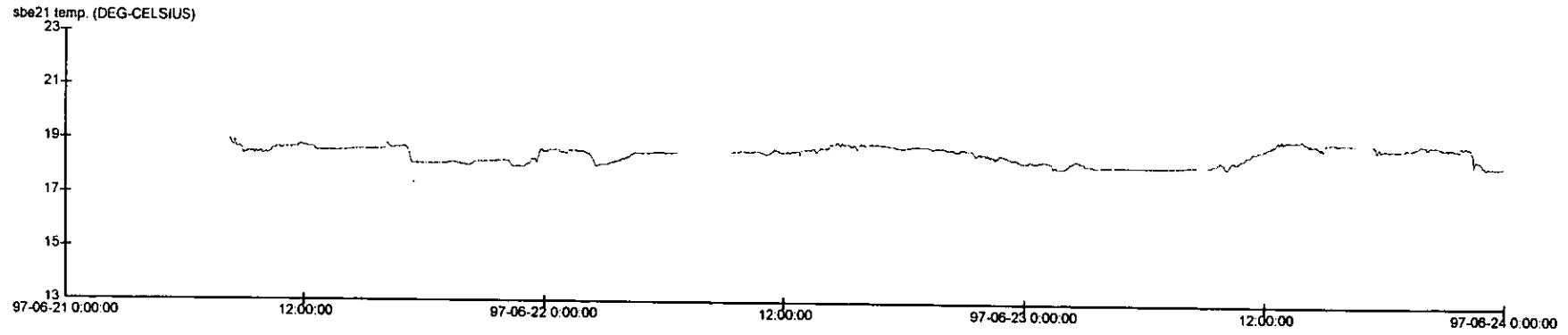


— sbe21 temp.
DEG-CELSIUS

— sbe21 salin.
PPT

— chlorophyll
 $\mu\text{g/l}$

RV BELGICA - CRUISE 97/14
21.06.97 0:00 - 24.06.97 0:00



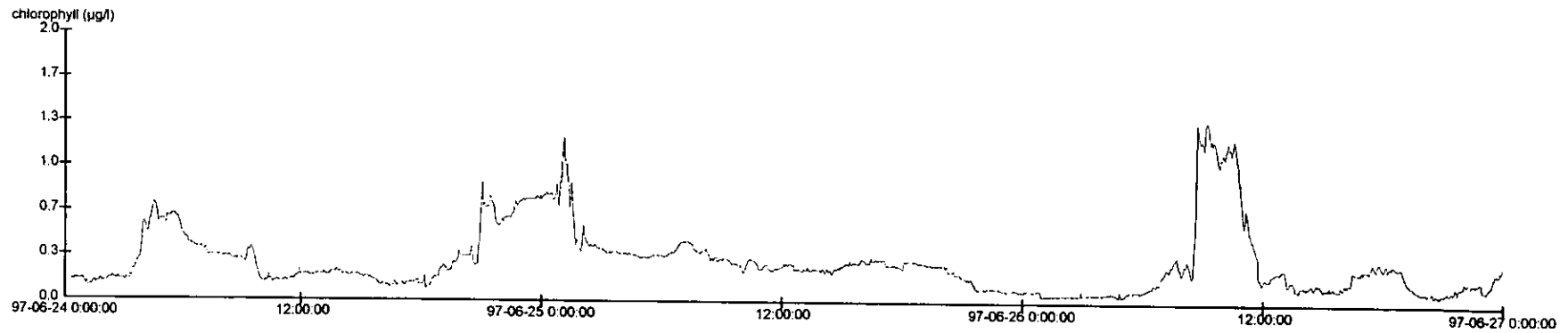
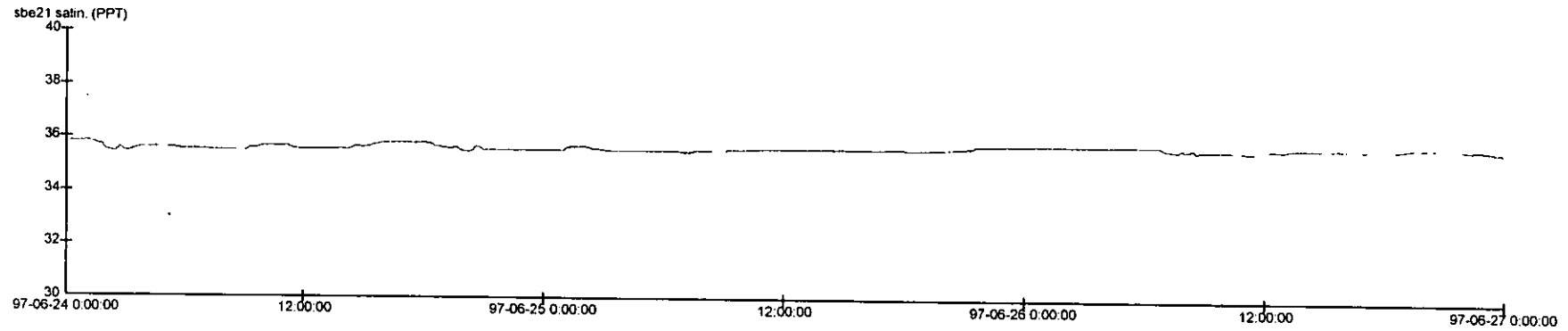
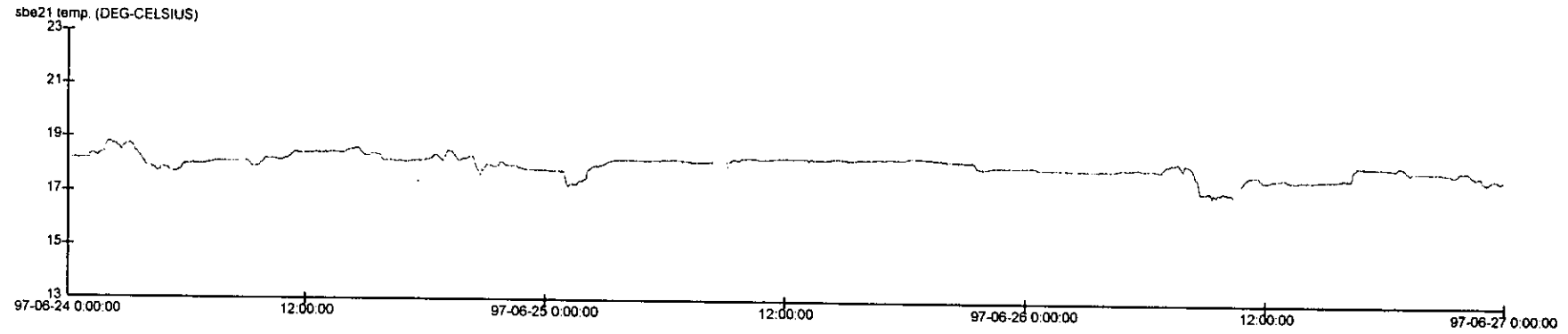
— sbe21 temp.
DEG-CELSIUS

— sbe21 salin.
PPT

— chlorophyll
µg/l

RV BELGICA - CRUISE 97/14

24.06.97 0:00 - 27.06.97 0:00



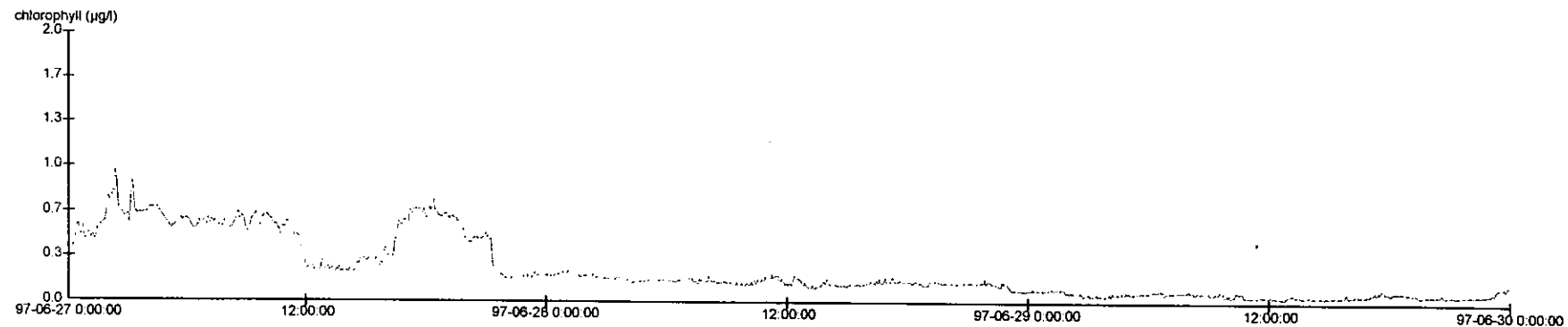
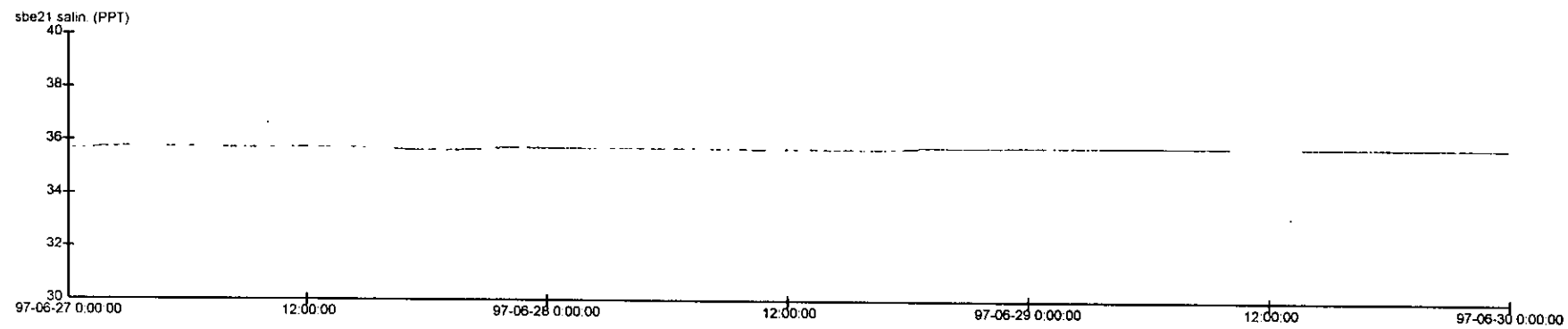
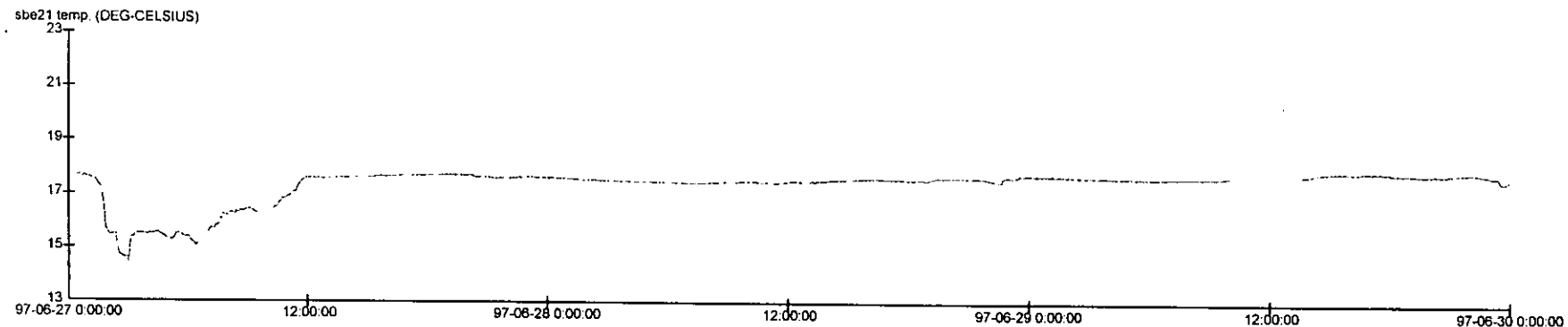
— sbe21 temp.
DEG-CELSIUS

— sbe21 salin.
PPT

— chlorophyll
 $\mu\text{g/l}$

RV BELGICA - CRUISE 97/14

27.06.97 0:00 - 30.06.97 0:00



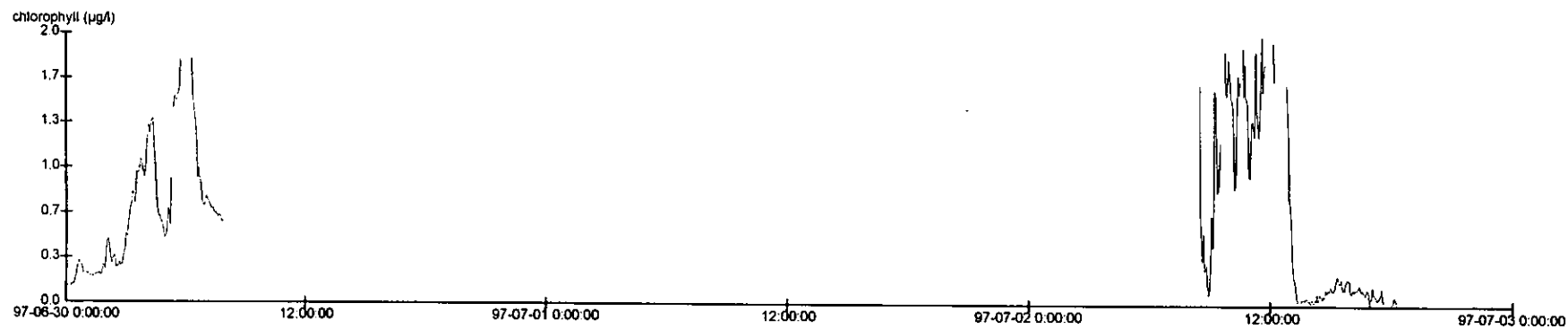
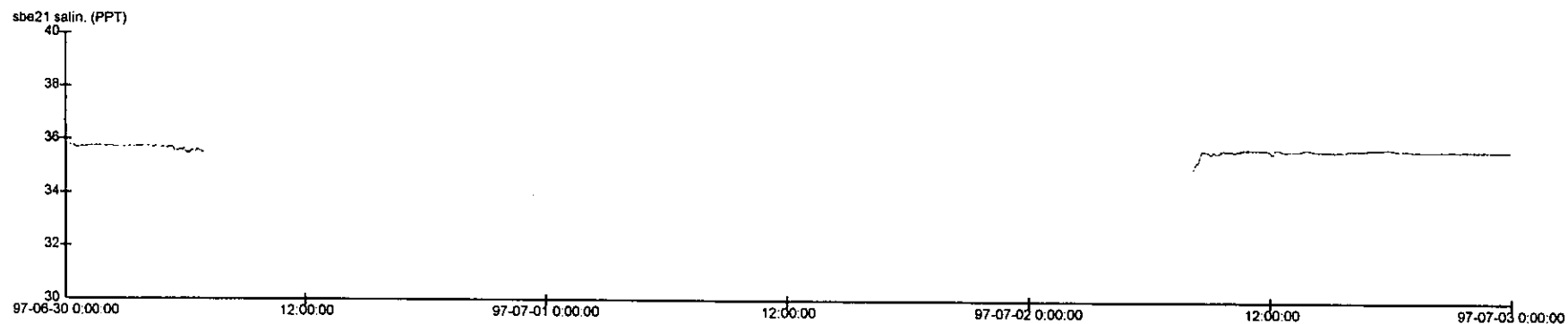
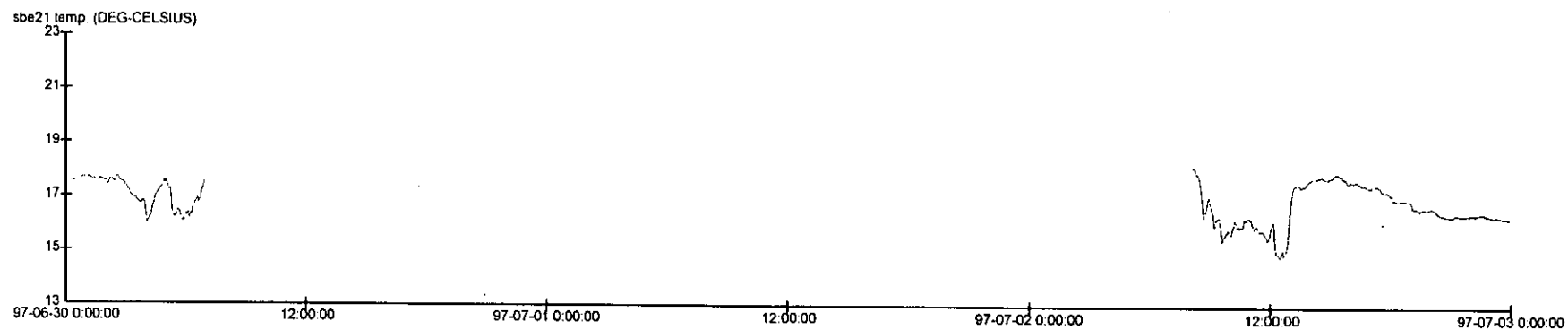
— sbe21 temp.
DEG-CELSIUS

— sbe21 salin.
PPT

— chlorophyll
µg/l

RV BELGICA - CRUISE 97/14

30.06.97 0:00 - 03.07.97 0:00



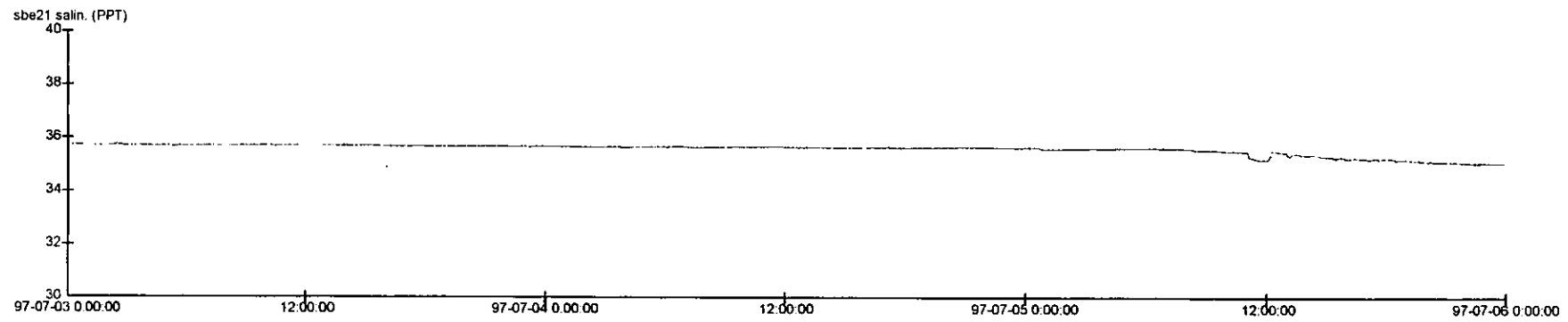
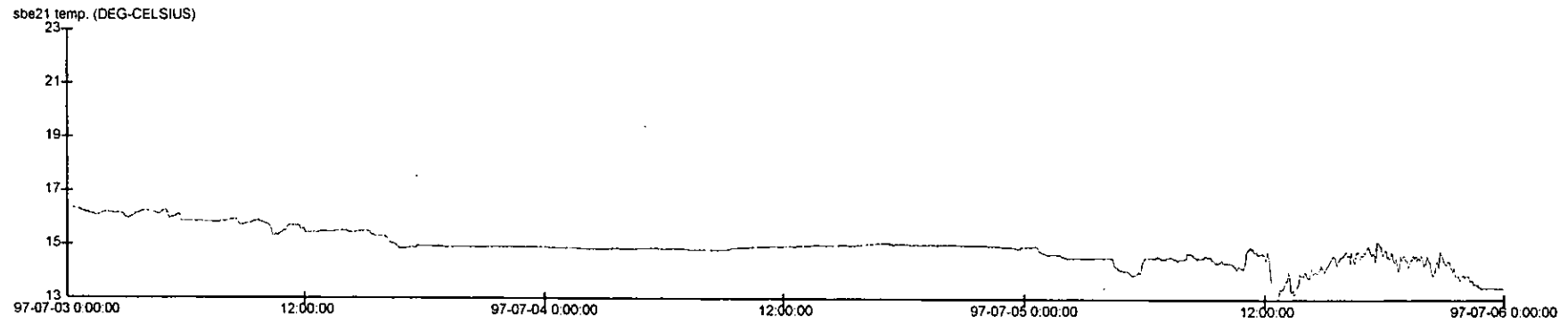
— sbe21 temp.
DEG-CELSIUS

— sbe21 salin.
PPT

— chlorophyll
 $\mu\text{g/l}$

RV BELGICA - CRUISE 97/14

03.07.97 0:00 - 06.07.97 0:00



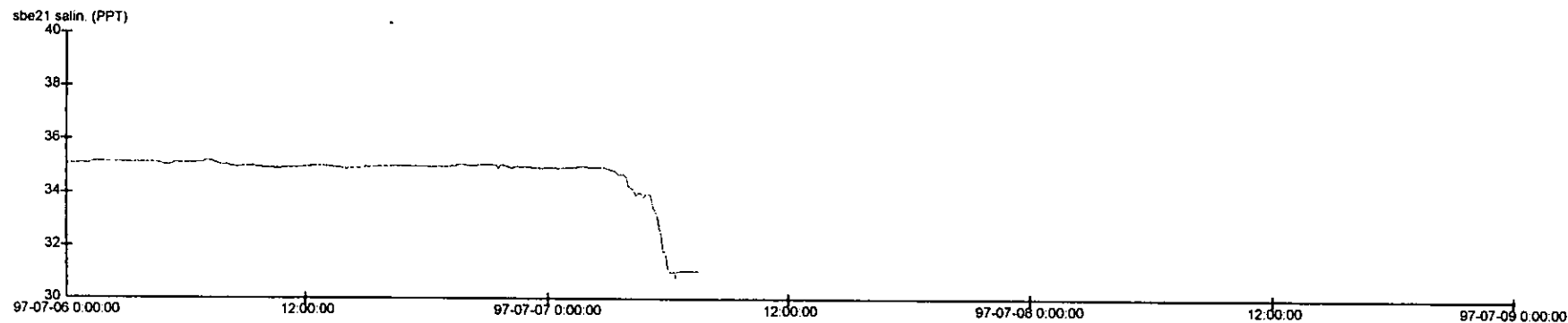
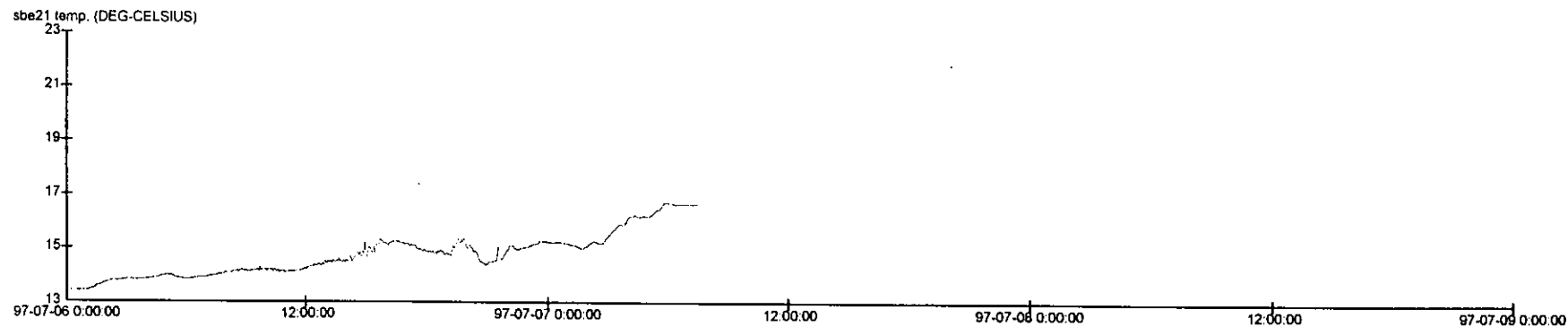
— sbe21 temp.
DEG-CELSIUS

— sbe21 salin.
PPT

— chlorophyll
 $\mu\text{g/l}$

RV BELGICA - CRUISE 97/14

06.07.97 0:00 - 09.07.97 0:00



— sbe21 temp.
DEG-CELSIUS

— sbe21 salin.
PPT

— chlorophyll
µg/l

Appendix 4.

SCTD data at the sampling depths.

SEA-BIRD SBE09*plus* : salinity, watertemperature, density,
DO, backscatterance

Table 2. SCTD Data.

Cast Identifier	BODC Site	Bottle Depth [m]	Bottle Number(s)	CTD Pressure [db]	CTD Salinity [PSU]	CTD Temp. ITS-90 [°C]	CTD Density [Sigma-θ]	CTD OBS [FTU]	CTD Oxygen [μmol/kg]	CTD O2 Sat [%]
971400A		497.2	1-12	502	35.549	10.793	27.2527	2.17	215.084	
9714IC1A	O2IC1	590.94	1	596.77	35.749	11.241	27.329	2.39	198.236	74.505
9714IC1A	O2IC1	400.13	2	403.89	35.64	11.581	27.1761	2.39	212.437	80.358
9714IC1A	O2IC1	199.86	3	201.64	35.764	12.755	27.0396	2.42	217.817	84.514
9714IC1A	O2IC1	150.57	4	151.89	35.812	13.125	27.0009	2.39	219.474	85.838
9714IC1A	O2IC1	99.658	5	100.52	35.889	13.932	26.8918	2.39	225.088	89.544
9714IC1A	O2IC1	80.308	6	81	35.896	14.238	26.8317	2.39	228.175	91.337
9714IC1A	O2IC1	60.598	7	61.117	35.915	15.379	26.5949	2.42	236.269	96.763
9714IC1A	O2IC1	38.039	8	38.363	35.896	17.036	26.195	2.44	245.419	103.79
9714IC1A	O2IC1	28.539	9	28.781	35.893	17.576	26.061	2.44	244.393	104.42
9714IC1A	O2IC1	19.651	10	19.817	35.438	18.689	25.436	2.56	234.899	102.17
9714IC1A	O2IC1	10.849	11	10.941	35.305	18.836	25.2963	2.56	232.778	101.44
9714IC1A	O2IC1	4.796	12	4.837	35.306	18.834	25.2968	2.56	232.515	101.32
971401A	O2T01	90.524	1	91.306	35.801	13.057	27.0042	3.39	211.957	82.778
971401A	O2T01	51.298	7	51.736	35.908	14.411	26.8019	2.78	197.201	79.222
971402A	O2T02	141.56		142.8	35.894	13.705	26.9445	3.27	210.986	83.553
971402A	O2T02	121.81	1	122.87	35.926	13.975	26.9117	2.74	212.946	84.81
971402A	O2T02	100.04	2	100.91	35.967	14.254	26.8835	2.71	211.231	84.626
971402A	O2T02	79.905	34	80.594	35.943	14.404	26.8314	2.71	221.839	89.13
971402A	O2T02	61.165	56	61.689	35.917	15.602	26.5458	2.69	239.777	98.636
971402A	O2T02	41.387	78	41.74	35.795	17.68	25.9615	2.78	242.389	103.7
971402A	O2T02	21.07	9,10	21.249	35.597	18.401	25.6297	2.93	237.776	102.98
971402A	O2T02	10.979	11,12	11.072	35.442	18.58	25.4654	3.03	235.581	102.27
971403A	O2T03	247.74	1	249.98	35.72	12.433	27.0702	2.69	218.954	84.367
971403A	O2T03	80.566	7	81.26	35.922	14.148	26.8704	2.61	225.219	90.009
971404A	O2T04	1414.6	1	1431.4	35.552	7.4284	27.8139	2.54	209.234	72.196
971404A	O2T04	1000.1	7	1011	36.179	11.303	27.6625	2.56	177.459	66.99
971405A	O2T05	1422.4	1	1439.3	35.543	7.2571	27.8318	2.54	210.613	72.383
971405A	O2T05	1000.3	4	1011.2	36.01	10.675	27.6441	2.54	178.836	66.531
971405A	O2T05	849.57	7	858.49	36.127	11.6	27.5628	2.59	178.278	67.699
971405A	O2T05	400.56	10	404.33	35.595	11.445	27.1664	2.54	213.713	80.586
971406A	O2S06	85.626	12	86.364	35.781	12.893	27.0215	3.44	211.04	82.13
971406A	O2S06	79.459	34	80.143	35.781	12.898	27.0207	3.32	210.985	82.119
971406A	O2S06	59.157	56	59.663	35.86	13.497	26.9586	2.91	206.693	81.488
971406A	O2S06	39.66	78	39.998	35.922	14.534	26.7858	2.76	192.228	77.424
971406A	O2S06	20.021	9,10	20.19	35.795	17.006	26.1237	2.71	222.472	93.968
971406A	O2S06	9.603	11,12	9.684	35.495	18.114	25.6231	2.71	235.096	101.2
971407A	O2S07	119.59	1	120.63	35.742	12.597	27.0512	3.08	214.663	83.009
971407A	O2S07	99.495	2	100.36	35.82	13.177	26.9951	2.88	208.753	81.74
971407A	O2S07	78.621	3,4	79.298	35.897	14.494	26.7769	2.69	203.865	82.031
971407A	O2S07	60.378	5,6	60.895	35.884	15.925	26.4466	2.61	231.637	95.872
971407A	O2S07	38.833	7,8	39.164	35.864	17.151	26.1422	2.64	235.835	99.935

Cast Identifier	BODC Site	Bottle Depth [m]	Bottle Number(s)	CTD Pressure [db]	CTD Salinity [PSU]	CTD Temp. ITS-90 [°C]	CTD Density [Sigma-θ]	CTD OBS [FTU]	CTD Oxygen [μmol/kg]	CTD O2 Sat [%]
971407A	O2S07	19.362	9,10	19.526	35.634	18.238	25.699	2.69	232.52	100.42
971407A	O2S07	9.625	11,12	9.706	35.48	18.553	25.501	2.69	231.973	100.68
971408A	O2S08	140.92	1	142.16	35.789	12.97	27.014	3	215.65	84.063
971408A	O2S08	100.45	2	101.32	35.928	14.246	26.855	2.71	203.409	81.458
971408A	O2S08	81.315	3,4	82.016	35.9	15.364	26.587	2.66	212.422	86.966
971408A	O2S08	59.483	5,6	59.992	35.873	16.352	26.339	2.69	217.012	90.561
971408A	O2S08	41.691	7,8	42.046	35.833	17.58	26.014	2.71	228.272	97.503
971408A	O2S08	20.462	9,10	20.635	35.672	18.163	25.747	2.76	230.326	99.361
971408A	O2S08	9.529	11,12	9.609	35.41	18.561	25.446	2.76	231.11	100.27
971408B	O2S08	69.013	1	69.606	35.893	15.73	26.499	2.71	211.697	87.291
971408B	O2S08	61.335	2	61.86	35.871	16.359	26.336	2.74	218.035	90.999
971408B	O2S08	39.993	3,4	40.334	35.798	17.795	25.935	2.74	226.055	96.928
971408B	O2S08	9.6625	5-12	9.8	35.398	18.586	25.43	2.83	230.1	99.9
971409A	O2S09	211.52	1	213.41	35.761	12.774	27.034	2.93	215.349	83.591
971409A	O2S09	199.98	2	201.76	35.766	12.845	27.023	2.88	215.533	83.788
971409A	O2S09	149.83	3	151.14	35.877	13.598	26.954	2.71	213.071	84.185
971409A	O2S09	99.842	4	100.71	35.937	13.991	26.916	2.66	209.768	83.578
971409A	O2S09	79.587	5	80.272	35.95	14.144	26.893	2.69	210.243	84.035
971409A	O2S09	59.048	6	59.554	35.906	15.599	26.538	2.74	228.752	94.089
971409A	O2S09	40.218	7,8	40.561	35.894	16.84	26.24	2.76	236.126	99.485
971409A	O2S09	20.345	9,10	20.517	35.695	18.022	25.8	2.83	238.331	102.56
971409A	O2S09	9.078	11,12	9.155	35.485	18.524	25.512	3.03	232.922	101.04
971409B	O2S09	59.02	1-3	59.525	35.948	15.049	26.694	2.83	232.628	94.679
971409B	O2S09	39.069	4-6	39.401	35.895	16.542	26.311	2.83	240.723	100.84
971409B	O2S09	19.795	7-9	19.963	35.464	18.447	25.517	2.91	234.384	101.51
971409B	O2S09	9.195	10-12	9.272	35.462	18.506	25.5	3	233.423	101.2
971410A	O2S10	1435.6	1	1452.7	35.651	7.8284	27.834	2.54	204.68	71.323
971410A	O2S10	1250	2	1264.4	35.828	9.1578	27.765	2.54	190.132	68.344
971410A	O2S10	1099.3	3	1111.5	36.088	10.65	27.712	2.64	178.316	66.339
971410A	O2S10	999.41	4	1010.3	36.148	11.13	27.67	2.64	176.739	66.459
971410A	O2S10	897.13	5	906.66	36.127	11.329	27.614	2.56	176.771	66.743
971410A	O2S10	799.29	6	807.58	36.071	11.522	27.533	2.56	178.706	67.723
971410A	O2S10	600.39	7	606.33	35.733	11.108	27.341	2.56	190.165	71.264
971410A	O2S10	399.33	8	403.08	35.63	11.6	27.164	2.61	210.738	79.744
971410A	O2S10	199.43	9*	201.21	35.765	12.743	27.042	2.64	211.545	82.065
971410A	O2S10	149.79	10	151.1	35.832	13.302	26.98	2.59	216.823	85.125
971410A	O2S10	124.57	11	125.65	35.842	13.412	26.965	2.61	218.382	85.935
971410A	O2S10	100.72	12	101.59	35.869	13.714	26.922	2.61	219.964	87.11
971410B	O2S10	200.95	1	202.74	35.758	12.685	27.049	2.61	212.504	82.334
971410B	O2S10	99.44	2,3	100.3	35.899	14.184	26.846	2.56	224.151	89.634
971410B	O2S10	79.888	4,5	80.576	35.889	15.228	26.61	2.59	241.788	98.716
971410B	O2S10	59.102	6,7	59.608	35.87	16.55	26.29	2.61	246.591	103.3
971410B	O2S10	40.596	8,9	40.942	35.867	17.824	25.981	2.66	240.058	103.04
971410B	O2S10	19.151	10,11	19.313	35.802	18.36	25.797	2.69	233.45	101.17
971410B	O2S10	10.063	12	10.148	35.742	18.701	25.665	2.71	232.164	101.21
971412A	O2S12	59.533	1,2	60.043	35.887	14.622	26.74	2.64	247.462	99.82

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971412A	O2S12	9.61	3-12	9.691	35.879	18.155	25.907	2.64	234.159	101.14
971412B	O2S12	1432.5	1	1449.6	35.321	6.1257	27.808	2.59	220.216	73.603
971412B	O2S12	1248.7	2	1263	35.773	8.7687	27.784	2.47	193.583	68.958
971412B	O2S12	1099.2	3	1111.4	35.926	9.8872	27.718	2.54	182.621	66.751
971412B	O2S12	999.78	4	1010.6	35.907	10.212	27.645	2.59	179.687	66.135
971412B	O2S12	899.1	5	908.65	35.85	10.325	27.579	2.59	179.325	66.135
971412B	O2S12	799.66	6	807.97	35.777	10.465	27.495	2.56	181.48	67.099
971412B	O2S12	598.57	7	604.49	35.606	10.858	27.287	2.56	198.432	73.9
971412B	O2S12	398.77	8	402.51	35.575	11.388	27.161	2.52	215.043	80.978
971412B	O2S12	198.25	9	200.02	35.699	12.404	27.059	2.56	220.257	84.806
971412B	O2S12	149.19	10	150.5	35.768	13.009	26.99	2.61	227.042	88.563
971412B	O2S12	123.59	11	124.67	35.811	13.391	26.945	2.61	230.263	90.553
971412B	O2S12	100.7	12	101.58	35.851	13.675	26.916	2.61	229.281	90.715
971412C	O2S12	99.623	1	100.48	35.838	13.593	26.923	2.66	231.448	91.413
971412C	O2S12	80.513	2	81.206	35.88	14.161	26.835	2.69	237.968	95.103
971412C	O2S12	69.054	3	69.647	35.881	14.634	26.734	2.66	247.637	99.911
971412C	O2S12	59.778	4,5	60.29	35.917	15.171	26.643	2.69	256.503	104.62
971412C	O2S12	40.218	6,7	40.56	35.866	17.269	26.115	2.61	242.742	103.1
971412C	O2S12	20.643	8,9	20.818	35.877	18.144	25.908	2.61	232.825	100.54
971412C	O2S12	9.895	10,11,12	9.978	35.88	18.162	25.906	2.74	232.164	100.29
9714V1A	V1	100.73	1	101.6	35.887	13.85	26.907	2.56	220.534	87.587
9714V1A	V1	79.598	2	80.283	35.887	14.089	26.856	2.61	224.246	89.492
9714V1A	V1	60.139	3,4	60.654	35.889	14.952	26.67	2.61	232.385	94.359
9714V1A	V1	50.346	5,6	50.776	35.89	15.597	26.526	2.64	240.057	98.725
9714V1A	V1	39.324	7,8	39.659	35.884	16.495	26.314	2.61	245.039	102.55
9714V1A	V1	20.083	9,10	20.253	35.779	18.222	25.814	2.69	237.962	102.84
9714V1A	V1	9.586	11,12	9.667	35.45	18.753	25.428	2.69	232.547	101.28
971414A	O2R14	145.42	1	146.69	35.798	13.048	27.005	2.71	216.74	84.629
971414A	O2R14	99.333	2	100.19	35.884	13.975	26.879	2.59	224.306	89.31
971414A	O2R14	79.983	3,4	80.672	35.903	14.56	26.767	2.61	228.523	92.077
971414A	O2R14	59.804	5,6	60.317	35.891	16.258	26.375	2.61	229.503	95.61
971414A	O2R14	39.115	7,8	39.448	35.641	18.108	25.737	2.69	236.803	102.03
971414A	O2R14	19.568	9,10	19.734	35.384	18.793	25.368	2.71	233.065	101.54
971414A	O2R14	9.578	11,12	9.659	35.388	19.015	25.314	2.76	232.205	101.58
971415A	O2R15	259.4	1	261.75	35.672	12.038	27.11	2.66	213.049	81.39
971415A	O2R15	199.45	2,3	201.23	35.742	12.621	27.049	2.61	215.161	83.243
971415A	O2R15	150.19	4,5	151.51	35.825	13.266	26.982	2.61	217.553	85.344
971415A	O2R15	99.365	6,7	100.23	35.869	13.776	26.909	2.64	223.189	88.497
971415A	O2R15	79.372	8	80.056	35.881	14.172	26.834	2.61	225.807	90.264
971415A	O2R15	59.812	9	60.324	35.89	14.521	26.765	2.64	227.493	91.583
971415A	O2R15	38.697	10	39.026	35.887	15.487	26.548	2.64	237.821	97.592
971416A	O2R16	1418	1	1434.8	35.724	8.299	27.821	2.61	199.006	70.124
971416A	O2R16	1200.1	4	1213.7	36.13	10.626	27.751	2.61	179.262	66.676
971416A	O2R16	900.03	7	909.6	36.153	11.52	27.6	3.17	176.166	66.796
971416A	O2R16	400.54	10	404.3	35.615	11.443	27.182	2.61	208.178	78.506
971417A	O2R17	1371.2	1	1387.4	35.778	8.6325	27.812	2.54	195.504	69.434

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971417A	O2R17	999.68	4	1010.5	36.17	11.353	27.646	2.61	175.169	66.192
971417A	O2R17	400.26	7	404.02	35.585	11.459	27.155	2.61	215.426	81.25
971417A	O2R17	199.95	10	201.73	35.758	12.861	27.014	2.61	223.517	86.916
941718A	O2Q18	70.479	1	71.085	35.838	13.398	26.963	3.1	202.533	79.674
941718A	O2Q18	39.497	7	39.833	35.866	14.695	26.708	2.74	201.743	81.485
971419A	O2Q19	59.585	1-4	60.095	35.863	14.299	26.792	2.69	203.314	81.47
971419A	O2Q19	9.017	5-12	9.093	35.566	18.019	25.701	2.81	233.991	100.6
971419B	O2Q19	129.85	1	130.98	35.788	12.914	27.024	3.3	208.008	80.99
971419B	O2Q19	100.03	2	100.9	35.853	13.446	26.966	3.2	206.351	81.264
971419B	O2Q19	79.095	3	79.777	35.88	13.796	26.912	2.76	205.072	81.353
971419B	O2Q19	60.025	4	60.539	35.857	14.268	26.794	2.86	200.959	80.472
971419B	O2Q19	38.764	5	39.094	35.772	16.49	26.229	2.81	215.902	90.277
971419B	O2Q19	59.931	6	60.444	35.862	14.262	26.799	2.91	201.024	80.491
971419B	O2Q19	45.241	7	45.626	35.827	15.678	26.459	2.86	204.805	84.325
971419B	O2Q19	34.601	8	34.895	35.684	16.952	26.051	2.83	225.535	95.091
971419B	O2Q19	18.946	9	19.106	35.589	17.983	25.727	2.88	234.902	100.94
971419B	O2Q19	9.545	10,11	9.625	35.535	18.11	25.655	2.86	234.341	100.9
971420A	O2Q20	545	1	550.31	35.837	11.285	27.388	2.66	188.645	71.013
971420A	O2Q20	149.39	7	150.7	35.781	12.989	27.005	2.66	218.927	85.369
971421A	O2Q21	1428	1	1445	35.664	7.8958	27.835	2.61	202.468	70.667
971421A	O2Q21	499.36	7	504.18	35.66	11.201	27.265	2.64	198.838	74.624
971421B	O2Q21	80.452	1	81.145	35.883	14.012	26.87	2.76	227.181	90.52
971421B	O2Q21	70.08	3	70.682	35.902	14.448	26.79	2.71	226.496	91.055
971421B	O2Q21	49.653	5	50.077	35.885	15.632	26.514	2.69	238.639	98.204
971421B	O2Q21	29.6	7	29.852	35.81	17.699	25.967	2.71	240.18	102.81
971421B	O2Q21	19.431	9	19.595	35.646	18.288	25.695	2.71	235.504	101.82
971421B	O2Q21	9.837	11	9.92	35.598	18.462	25.615	2.74	232.751	100.92
971422A	O2Q22	1422.4	1	1439.3	35.448	6.818	27.817	2.54	212.208	72.147
971422A	O2Q22	999.2	4	1010.1	36.072	10.874	27.657	2.61	176.202	65.86
971422A	O2Q22	498.48	7	503.28	35.561	11.024	27.219	2.61	207.415	77.495
971422A	O2Q22	199.36	10	201.13	35.773	12.749	27.047	2.59	208.629	80.947
971424A	O2P24	89.842	1,2	90.618	35.74	12.637	27.041	3.17	208.568	80.718
971424A	O2P24	79.583	3,4	80.269	35.768	12.892	27.012	3.22	206.18	80.231
971424A	O2P24	59.731	5,6	60.243	35.803	13.324	26.951	2.98	202.026	79.336
971424A	O2P24	39.453	7,8	39.789	35.839	14.278	26.777	2.91	198.312	79.418
971424A	O2P24	19.675	9,10	19.841	35.796	16.198	26.315	2.86	213.029	88.588
971424A	O2P24	9.86	11,12	9.944	35.581	17.823	25.761	2.88	239.169	102.45
971425A	O2P25	59.333	1-4	59.841	35.881	14.6	26.741	2.74	231.79	93.454
971425A	O2P25	9.195	5-12	9.273	35.567	18.242	25.646	2.83	233.193	100.68
971425B	O2P25	130.47	1	131.62	35.831	13.314	26.977	3	214.542	84.25
971425B	O2P25	99.67	2	100.53	35.892	14.135	26.85	2.69	222.538	88.897
971425B	O2P25	79.482	3,4	80.166	35.883	15.074	26.638	2.69	229.975	93.603
971425B	O2P25	59.508	5,6	60.018	35.847	16.37	26.315	2.78	231.584	96.66
971425B	O2P25	39.53	7,8	39.866	35.743	17.438	25.981	2.81	236.596	100.72
971425B	O2P25	19.442	9,10	19.606	35.581	18.225	25.662	2.83	233.636	100.84
971425B	O2P25	9.628	11,12	9.71	35.579	18.227	25.659	2.91	233.169	100.65

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971426A	O2P26	360.56	1,2	363.92	35.637	11.492	27.189	2.76	209.012	78.915
971426A	O2P26	199.58	3,4	201.36	35.756	12.762	27.032	2.59	216.744	84.108
971426A	O2P26	149.57	5,6	150.88	35.795	13.226	26.967	2.59	225.91	88.532
971426A	O2P26	100.08	7	100.95	35.847	13.724	26.903	2.61	225.249	89.206
971426A	O2P26	79.703	8	80.39	35.892	14.451	26.782	2.69	223.43	89.823
971426A	O2P26	59.485	9	59.994	35.885	15.5	26.544	2.71	233.861	95.99
971426A	O2P26	39.794	10	40.132	35.739	17.57	25.945	2.69	237.14	101.21
971426A	O2P26	19.132	11	19.294	35.599	18.177	25.688	2.78	231.616	99.895
971426A	O2P26	10.094	12	10.179	35.6	18.178	25.688	2.78	231.698	99.932
971427A	O2P27	1420.7	1	1437.6	35.696	8.0739	27.833	2.56	201.331	70.57
971427A	O2P27	1249.5	2	1263.8	36.021	10.111	27.758	2.59	181.87	66.846
971427A	O2P27	1100.4	3	1112.6	36.116	10.937	27.683	2.61	175.604	65.746
971427A	O2P27	1000.3	4	1011.2	36.139	11.264	27.639	2.61	175.822	66.298
971427A	O2P27	900.15	5	909.71	36.106	11.416	27.582	2.64	176.368	66.704
971427A	O2P27	799.94	6	808.24	36.039	11.428	27.525	2.64	177.848	67.249
971427A	O2P27	599.32	7	605.25	35.785	11.153	27.373	2.64	185.366	69.558
971427A	O2P27	400.02	8	403.78	35.563	11.162	27.193	2.59	209.63	78.554
971427A	O2P27	199.71	9	201.49	35.734	12.575	27.052	2.56	215.206	83.176
971427A	O2P27	149.61	10	150.93	35.898	13.712	26.946	2.59	219.209	86.824
971427A	O2P27	124.88	11	125.97	35.941	14.026	26.913	2.64	221.98	88.509
971427A	O2P27	100.37	12	101.24	35.965	14.214	26.89	2.69	223.871	89.618
971427B	O2P27	99.543	1	100.41	35.975	14.305	26.879	2.71	225.156	90.303
971427B	O2P27	79.96	2	80.649	35.995	14.64	26.82	2.74	231.155	93.346
971427B	O2P27	69.873	3	70.474	35.993	14.959	26.749	2.71	242.909	98.716
971427B	O2P27	59.548	4	60.058	35.957	15.725	26.549	2.69	248.665	102.57
971427B	O2P27	48.98	5	49.398	35.91	16.55	26.321	2.64	244.724	102.54
971427B	O2P27	40.277	6	40.62	35.778	17.456	26.003	2.74	239.388	101.97
971427B	O2P27	20.229	10	20.4	35.671	18.273	25.718	2.71	232.975	100.71
971427B	O2P27	10.249	11,12	10.335	35.672	18.287	25.715	2.78	232.475	100.52
971429A	O2P29	1416.5	1	1433.4	35.797	8.6894	27.819	2.64	194.632	69.222
971429A	O2P29	1248.6	2	1263	36.055	10.182	27.771	2.56	182.2	67.086
971429A	O2P29	1100.6	3	1112.8	36.068	10.669	27.693	2.59	176.607	65.72
971429A	O2P29	1000.3	4	1011.2	36.026	10.816	27.631	2.61	176.114	65.725
971429A	O2P29	899	5	908.55	36.007	11.094	27.564	2.64	175.962	66.051
971429A	O2P29	799.11	6	807.4	35.946	11.163	27.502	2.56	177.671	66.761
971429A	O2P29	599.74	7	605.67	35.713	11.054	27.335	2.59	189.505	70.926
971429A	O2P29	399.39	8	403.14	35.592	11.401	27.172	2.59	208.975	78.725
971429A	O2P29	198.87	9	200.64	35.813	13.15	26.998	2.61	216.942	84.895
971429A	O2P29	149.62	10	150.94	35.88	13.684	26.938	2.61	223.06	88.287
971429A	O2P29	124.56	11	125.65	35.922	13.968	26.91	2.66	223.723	89.088
971429A	O2P29	98.983	12	99.84	35.928	14.13	26.88	2.69	226.202	90.373
971429B	O2P29	100.73	1,2	101.61	35.923	14.075	26.887	2.74	228.192	91.064
971429B	O2P29	79.063	3,4	79.744	35.948	14.343	26.849	2.74	229.8	92.219
971429B	O2P29	58.715	5,6	59.217	35.946	15.498	26.592	2.69	248.019	101.84
971429B	O2P29	38.679	7,8	39.008	35.876	17.58	26.048	2.66	236.944	101.24
971429B	O2P29	20.473	9,10	20.646	35.842	17.974	25.924	2.69	231.178	99.487

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971429B	O2P29	9.71	11,12	9.792	35.842	17.968	25.925	2.71	232.076	99.863
971429C	O2P29	58.948	1-4	59.453	35.954	14.812	26.75	2.76	239.308	96.944
971429C	O2P29	9.72	5-12	9.802	35.841	17.968	25.924	2.71	232.397	100
971431A	O2O31	134.75	1	135.93	35.653	11.942	27.111	2.98	216.777	82.637
971431A	O2O31	78.904	2,3	79.583	35.878	13.842	26.901	2.66	215.352	85.509
971431A	O2O31	60.814	4,5	61.335	35.888	14.166	26.84	2.69	218.865	87.481
971431A	O2O31	41.02	6,7	41.369	35.81	15.124	26.57	2.76	216.943	88.343
971431A	O2O31	19.089	8	19.251	35.718	16.367	26.215	2.86	220.36	91.888
971431A	O2O31	9.019	9,10	9.095	35.694	17.134	26.015	2.93	232.423	98.343
971432A	O2O32	799.36	1	807.66	36.043	11.318	27.549	2.64	179.1	67.566
971432A	O2O32	400.47	7	404.24	35.601	11.191	27.218	2.61	205.508	77.077
971433B	O2O33	99.59	1	100.45	35.848	14.068	26.831	2.66	222.202	88.616
971433B	O2O33	79.544	3	80.229	35.849	14.758	26.682	2.66	229.544	92.821
971433B	O2O33	59.569	5	60.079	35.835	15.771	26.444	2.69	239.775	98.909
971433B	O2O33	38.947	7	39.279	35.804	17.219	26.08	2.66	240.369	101.95
971433B	O2O33	19.63	9	19.796	35.804	17.59	25.989	2.66	234.827	100.3
971433B	O2O33	10.15	11	10.236	35.805	17.648	25.975	2.69	234.469	100.26
971434A	O2O34	1422.2	1	1439.1	35.583	7.5742	27.818	2.61	204.419	70.787
971434A	O2O34	998.17	4	1009	36.111	11.063	27.654	2.64	175.779	65.987
971434A	O2O34	399.9	7	403.66	35.603	11.392	27.182	2.66	210.396	79.25
971434A	O2O34	199.51	10	201.29	35.723	12.471	27.064	2.66	212.749	82.043
971435A	O2O35	1401.2	1	1417.8	35.704	8.1592	27.827	2.66	200.27	70.337
971435A	O2O35	1080.2	4	1092.2	36.122	10.915	27.69	2.64	175.918	65.836
971435A	O2O35	500.46	7	505.29	35.536	10.877	27.227	2.59	211.579	78.788
971436A	O2N36	36.675	1	36.987	35.819	13.72	26.879	3.03	202.398	80.135
971437A	O2N37	117.09	1	118.11	35.715	12.482	27.054	3.74	213.542	82.364
971437A	O2N37	99.622	2	100.48	35.736	12.62	27.042	2.98	212.56	82.232
971437A	O2N37	79.006	3	79.686	35.766	12.859	27.017	2.86	211.291	82.163
971437A	O2N37	60.204	4,5	60.72	35.794	13.355	26.937	2.95	206.675	81.206
971437A	O2N37	40.383	6,7	40.727	35.799	13.829	26.842	2.95	206.045	81.748
971437A	O2N37	20.555	9,10	20.729	35.774	15.063	26.555	2.95	220.275	89.568
971437A	O2N37	9.274	11,12	9.352	35.751	15.487	26.442	3.03	221.339	90.744
971437B	O2N37	60.583	1-3	61.102	35.785	14.121	26.77	2.95	208.384	83.159
971437B	O2N37	8.559	4-12	8.631	35.758	15.253	26.5	3.08	219.659	89.645
971437C	O2N37	100.92	1	101.79	35.771	12.953	27.002	3	209.142	81.488
971437C	O2N37	77.819	3	78.489	35.79	13.858	26.83	2.83	206.808	82.094
971437C	O2N37	59.206	5	59.712	35.786	14.542	26.68	2.83	213.528	85.935
971437C	O2N37	38.791	7	39.121	35.766	15.356	26.485	2.88	219.13	89.616
971437C	O2N37	19.937	9	20.105	35.742	16.067	26.303	2.88	224.907	93.255
971437C	O2N37	10.612	11	10.702	35.74	16.303	26.247	2.88	226.133	94.192
971438A	O2N38	199.51	1	201.29	35.636	11.747	27.136	2.61	216.029	82.003
971438A	O2N38	150.64	2	151.96	35.733	12.707	27.024	2.69	220.741	85.549
971438A	O2N38	100.63	3	101.5	35.821	13.581	26.912	2.69	219.723	86.749
971438A	O2N38	80.639	4	81.334	35.828	13.647	26.904	2.69	219.206	86.665
971438A	O2N38	71.199	5	71.811	35.831	13.927	26.847	2.71	226.574	90.091
971438A	O2N38	60.389	6,7	60.907	35.826	14.725	26.671	2.69	227.285	91.831

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971438A	O2N38	39.68	8	40.018	35.818	16.156	26.341	2.74	229.185	95.243
971438A	O2N38	28.41	9	28.652	35.792	16.608	26.216	2.78	228.364	95.719
971438A	O2N38	21.142	10	21.321	35.753	17.539	25.962	2.76	234.918	100.21
971438A	O2N38	9.205	11,12	9.283	35.755	17.608	25.947	2.88	234.297	100.08
971439A	O2N39	1250.2	1	1264.5	35.96	9.643	27.789	2.59	186.992	68.001
971439A	O2N39	998.74	2	1009.6	36.114	10.959	27.674	2.64	177.542	66.502
971439A	O2N39	800.77	3	809.08	36.046	11.383	27.539	2.69	177.389	67.015
971439A	O2N39	599.83	4	605.76	35.87	11.265	27.418	2.66	184.074	69.279
971439A	O2N39	401.2	5	404.98	35.575	11.178	27.2	2.66	211.127	79.15
971439A	O2N39	200.71	6	202.5	35.759	12.72	27.043	2.64	214.38	83.12
971439A	O2N39	98.488	7	99.341	35.874	13.661	26.936	2.66	219.89	86.99
971439A	O2N39	79.696	8	80.383	35.883	13.847	26.904	2.69	221.223	87.852
971439A	O2N39	61.207	9	61.731	35.863	14.718	26.701	2.71	237.362	95.914
971439A	O2N39	41.025	10	41.374	35.717	17.19	26.02	2.74	235.982	99.973
971439A	O2N39	18.97	11	19.131	35.675	17.712	25.86	2.78	234.971	100.51
971439A	O2N39	8.917	12	8.992	35.668	17.728	25.851	2.76	235.106	100.59
971440A	O2N40	1420	1	1436.9	35.722	8.2581	27.826	2.69	199.517	70.238
971440A	O2N40	1250.1	2	1264.4	36.035	9.9881	27.789	2.64	184.322	67.573
971440A	O2N40	1100.6	3	1112.8	36.122	10.754	27.72	2.66	177.961	66.37
971440A	O2N40	999.94	4	1010.8	36.13	11.131	27.656	2.69	176.313	66.292
971440A	O2N40	899.93	5	909.49	36.093	11.287	27.596	2.71	176.263	66.476
971440A	O2N40	800.06	6	808.37	36.048	11.445	27.529	2.69	177.721	67.229
971440A	O2N40	599.67	7	605.6	35.637	10.7	27.339	2.71	193.324	71.77
971440A	O2N40	399.36	8	403.11	35.554	11.052	27.207	2.66	213.823	79.933
971440A	O2N40	200.9	9	202.69	35.698	12.266	27.085	2.69	215.612	82.777
971440A	O2N40	150.33	10	151.65	35.81	13.155	26.993	2.66	220.824	86.422
971440A	O2N40	125.6	11	126.7	35.865	13.51	26.962	2.69	219.109	86.408
971440A	O2N40	99.137	12	99.996	35.895	13.778	26.929	2.69	218.825	86.787
971440B	O2N40	60.705	1-4	61.225	35.874	14.799	26.692	2.69	230.274	93.209
971440B	O2N40	9.011	5-12	9.087	35.743	17.516	25.96	2.66	233.75	99.661
971440C	O2N40	99.565	1	100.43	35.891	14.423	26.788	2.71	227.137	91.261
971440C	O2N40	78.05	2	78.722	35.883	14.64	26.734	2.71	230.762	93.116
971440C	O2N40	59.609	3	60.119	35.86	15.449	26.537	2.71	241.62	99.059
971440C	O2N40	48.639	4,5	49.054	35.861	15.552	26.514	2.74	242.854	99.767
971440C	O2N40	39.092	6,7	39.425	35.833	16.342	26.31	2.78	244.616	102.03
971440C	O2N40	18.676	8,9	18.834	35.768	17.482	25.988	2.81	233.981	99.712
971440C	O2N40	9.278	10-12	9.356	35.746	17.509	25.964	2.88	234.214	99.848
971440D	O2N40	100.16	1,2	101.03	35.896	13.797	26.925	2.74	219.912	87.251
971440D	O2N40	69.831	3,4	70.431	35.902	14.056	26.874	2.71	222.197	88.626
971440D	O2N40	60.311	5,6	60.828	35.896	14.342	26.808	2.74	226.416	90.827
971440D	O2N40	50.005	7,8	50.432	35.869	15.23	26.592	2.78	241.339	98.522
971440D	O2N40	29.043	9,10	29.289	35.84	16.205	26.347	2.81	242.6	100.93
971440D	O2N40	9.257	11,12	9.335	35.742	17.52	25.958	2.86	236.018	100.63
971441A	O2N41	1426.4	1-3	1443.4	35.769	8.5105	27.825	2.54	197.413	69.916
971441A	O2N41	1080.8	4,5	1092.8	36.137	10.953	27.695	2.59	177.296	66.412
971441A	O2N41	1019	6	1030.2	36.136	11.061	27.674	2.56	176.66	66.325

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971441A	O2N41	600.32	7,8	606.25	35.69	11.022	27.323	2.59	192.945	72.151
971441A	O2N41	479.52	9,10	484.12	35.596	11.173	27.219	2.59	205.666	77.105
971441A	O2N41	78.75	11,12	79.429	35.906	13.752	26.9419	2.71	200.184	79.358
971442A	O2N42	1418.5	1	1435.3	35.674	7.9899	27.8284	2.54	201.581	70.512
971442A	O2N42	1250.4	2	1264.8	36.057	10.146	27.7795	2.56	182.975	67.321
971442A	O2N42	1100	3	1112.2	36.104	10.791	27.6996	2.59	177.118	66.1
971442A	O2N42	1000.1	4	1011	36.126	11.142	27.6504	2.59	176.233	66.275
971442A	O2N42	900.15	5	909.72	36.071	11.227	27.5897	2.61	176.234	66.37
971442A	O2N42	800.82	6	809.13	35.985	11.276	27.5111	2.61	178.08	67.094
971442A	O2N42	599.59	7	605.52	35.559	10.673	27.2836	2.56	202.869	75.228
971442A	O2N42	400.03	8	403.79	35.597	11.45	27.1666	2.61	213.203	80.404
971442A	O2N42	199.14	9	200.91	35.778	12.781	27.0453	2.59	211.923	82.283
971442A	O2N42	149.76	10	151.08	35.852	13.283	26.9995	2.61	213.104	83.644
971442A	O2N42	124.27	11	125.35	35.91	13.681	26.9612	2.59	215.878	85.458
971442A	O2N42	99.006	12	99.863	35.937	13.955	26.9235	2.64	220.023	87.599
971442B	O2N42	57.008	1-4	57.495	35.961	15.159	26.6793	2.74	245.911	100.31
971442B	O2N42	9.199	5-12	9.277	35.843	17.695	25.9929	2.76	232.747	99.637
971442C	O2N42	99.353	1	100.21	35.963	14.299	26.8702	2.56	226.47	90.81
971442C	O2N42	79.861	2,3	80.549	35.96	14.77	26.7655	2.56	238.887	96.696
971442C	O2N42	70.2	4	70.803	35.959	15.033	26.706	2.61	244.19	99.359
971442C	O2N42	58.854	5	59.358	35.936	16.168	26.4306	2.54	247.576	102.99
971442C	O2N42	49.331	6	49.752	35.872	16.981	26.1894	2.59	247.219	104.42
971442C	O2N42	40.221	7	40.563	35.845	17.696	25.9953	2.56	232.906	99.71
971442C	O2N42	19.618	8	19.784	35.845	17.698	25.994	2.66	232.794	99.666
971442C	O2N42	10.195	9,10	10.281	35.846	17.704	25.9926	2.74	232.806	99.683
971442D	O2N42	139.59		140.81	35.891	13.555	26.9732	2.47	215.553	85.1
971442D	O2N42	59.832	1,4,7,10	60.344	35.957	14.923	26.7287	2.56	243.258	98.762
971443A	O2LC43	1417.2	1	1434	35.327	6.4893	27.7655	2.2	212.053	71.485
971443A	O2LC43	1249.4	2	1263.7	35.514	7.8289	27.7237	2.22	197.883	68.889
971443A	O2LC43	1099.7	3	1111.9	35.668	9.0571	27.6526	2.25	186.077	66.662
971443A	O2LC43	999.72	4	1010.6	35.726	9.6396	27.601	2.27	182.08	66.101
971443A	O2LC43	899.58	5	909.14	35.689	9.8401	27.536	2.27	183.478	66.883
971443A	O2LC43	800.79	6	809.11	35.667	10.165	27.4612	2.3	185.658	68.147
971443A	O2LC43	600.25	7	606.18	35.541	10.573	27.2869	2.34	205.565	76.055
971443A	O2LC43	399.73	8	403.48	35.552	11.163	27.1845	2.34	219.66	82.311
971443A	O2LC43	199.59	9	201.37	35.621	11.802	27.1142	2.3	236.771	89.976
971443A	O2LC43	149.79	10	151.11	35.638	11.962	27.0952	2.27	238.53	90.96
971443A	O2LC43	124.28	11	125.36	35.657	12.164	27.0707	2.27	238.027	91.164
971443A	O2LC43	100.21	12	101.08	35.677	12.394	27.0411	2.32	236.563	91.053
971443B	O2LC43	99.427	1,2	100.29	35.68	12.431	27.036	2.3	237.614	91.531
971443B	O2LC43	79.697	3,4	80.383	35.703	12.883	26.9633	2.3	237.351	92.305
971443B	O2LC43	60.032	5,6	60.546	35.713	13.476	26.8495	2.3	244.317	96.184
971443B	O2LC43	40.039	7,8	40.38	35.698	15.356	26.4319	2.34	244.285	99.859
971443B	O2LC43	19.523	9,10	19.688	35.704	15.434	26.4179	2.34	243.521	99.705
971443B	O2LC43	9.693	11,12	9.775	35.703	15.446	26.4148	2.37	243.415	99.685
971444A	O2LC44	299.71	1	302.46	35.581	11.448	27.1518	2.27	230.137	86.778

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971444A	O2LC44	149.76	7	151.08	35.639	11.971	27.0948	2.3	240.148	91.594
971445A	O2LC45	249.63	1	251.89	35.599	11.579	27.1403	2.3	235.928	89.22
971446A	O2LC46	299.83	1	302.57	35.586	11.353	27.1737	2.37	235.157	88.495
971447A	O2LC47	1415.6	1	1432.4	35.352	6.5951	27.7713	2.34	211.73	71.565
971447A	O2LC47	1249.2	2	1263.5	35.511	7.7548	27.7323	2.32	199.577	69.36
971447A	O2LC47	1098.8	3	1111	35.604	8.6216	27.6713	2.37	193.827	68.737
971447A	O2LC47	999.05	4	1009.9	35.641	9.1496	27.6147	2.37	190.608	68.412
971447A	O2LC47	899.98	5	909.55	35.708	9.9132	27.539	2.37	185.028	67.566
971447A	O2LC47	799.04	6	807.34	35.673	10.015	27.4921	2.42	186.013	68.059
971447A	O2LC47	600.31	7	606.25	35.577	10.474	27.3324	2.42	206.246	76.164
971447A	O2LC47	400.83	8	404.6	35.572	11.041	27.2226	2.42	222.127	83.03
971447A	O2LC47	299.94	9	302.68	35.594	11.367	27.1775	2.37	228.445	86
971447B	O2LC47	99.605		100.47	35.661	12.575	26.9924	2.34	236.136	91.222
971447B	O2LC47	9.691	1-12	9.773	35.666	14.846	26.5193	2.52	248.527	100.55
971447C	O2LC47	299.51	1	302.25	35.592	11.342	27.1804	2.37	230.226	86.623
971447C	O2LC47	199.84	2	201.63	35.609	11.627	27.1377	2.32	233.996	88.586
971447C	O2LC47	149.79	3	151.11	35.622	11.792	27.1155	2.37	238.219	90.507
971447C	O2LC47	100.13	4	101	35.642	12.109	27.0694	2.34	238.845	91.364
971447C	O2LC47	79.565	5	80.25	35.653	12.387	27.023	2.37	237.001	91.194
971447C	O2LC47	59.71	6	60.221	35.662	12.748	26.9579	2.39	236.207	91.576
971447C	O2LC47	39.303	7	39.638	35.666	13.643	26.7781	2.39	241.293	95.286
971447C	O2LC47	18.542	8	18.699	35.674	14.862	26.522	2.47	247.721	100.26
971447C	O2LC47	10.8	9	10.891	35.677	14.867	26.5235	2.56	247.225	100.07
971447D	O2LC47	300.14	1	302.88	35.585	11.309	27.1814	2.32	230.755	86.757
971447D	O2LC47	199.93	2	201.72	35.607	11.619	27.1382	2.32	232.644	88.057
971447D	O2LC47	149.29	3	150.6	35.621	11.803	27.1127	2.32	233.852	88.868
971447D	O2LC47	100.19	4	101.06	35.649	12.404	27.017	2.32	234.455	90.242
971447D	O2LC47	79.444	5	80.129	35.664	13.028	26.9036	2.34	235.872	91.978
971447D	O2LC47	60.172	6	60.688	35.666	13.699	26.7667	2.37	238.68	94.362
971447D	O2LC47	39.988	7	40.328	35.675	14.634	26.5737	2.44	244.345	98.446
971447D	O2LC47	19.547	8	19.712	35.678	14.885	26.5205	2.47	246.667	99.883
971447D	O2LC47	9.701	9	9.783	35.679	14.909	26.5154	2.49	246.271	99.769
971447E	O2LC47	299.85	1	302.6	35.594	11.408	27.1701	2.25	230.433	86.825
971447E	O2LC47	199.8	2	201.58	35.609	11.667	27.1308	2.25	234.827	88.976
971447E	O2LC47	149.97	3	151.28	35.632	11.952	27.0927	2.22	236.655	90.222
971447E	O2LC47	99.261	4	100.12	35.656	12.577	26.9884	2.22	236.239	91.262
971447E	O2LC47	79.863	5	80.551	35.664	13.049	26.8996	2.22	237.008	92.462
971447E	O2LC47	59.93	6	60.444	35.669	13.702	26.7679	2.27	239.673	94.762
971447E	O2LC47	38.793	7	39.123	35.67	14.62	26.5725	2.34	245.708	98.964
971447E	O2LC47	19.383	8	19.547	35.666	14.851	26.5184	2.44	248.524	100.56
971447E	O2LC47	9.897	9	9.98	35.656	14.922	26.4949	2.49	250.745	101.59
971447F	O2LC47	300.2	1	302.95	35.589	11.331	27.1802	2.22	230.012	86.522
971447F	O2LC47	199.71	2	201.49	35.605	11.582	27.1433	2.15	233.942	88.478
971447F	O2LC47	149.43	3	150.74	35.616	11.757	27.1179	2.2	234.995	89.213
971447F	O2LC47	99.361	4	100.22	35.642	12.083	27.074	2.25	238.569	91.208
971447F	O2LC47	79.529	5	80.214	35.651	12.355	27.0277	2.2	236.695	91.015

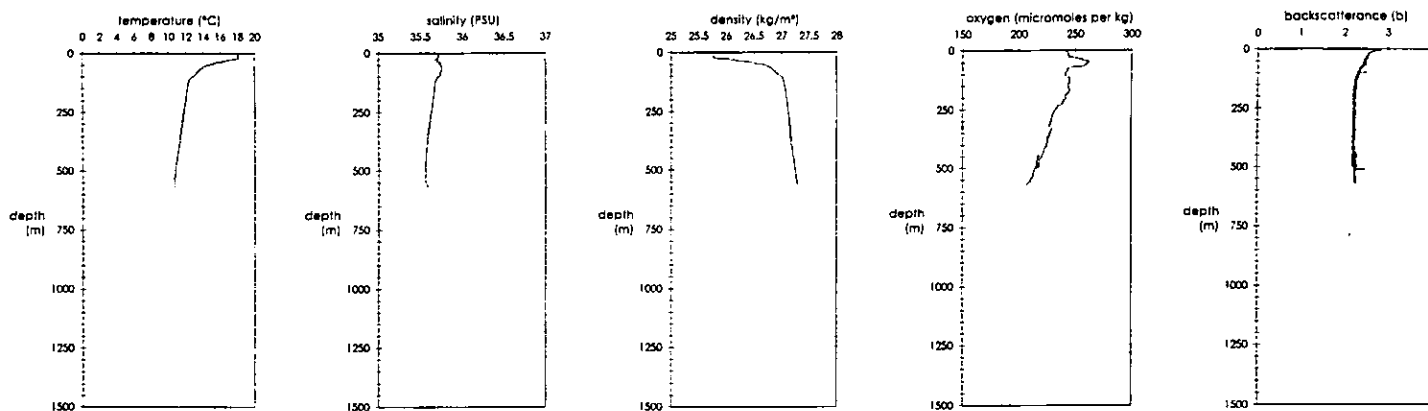
Cast Identifier	BODC Site	Bottle Depth [m]	Bottle Number(s)	CTD Pressure (db)	CTD Salinity [PSU]	CTD Temp. ITS-90 [°C]	CTD Density [Sigma-θ]	CTD OBS [FTU]	CTD Oxygen [μmol/kg]	CTD O2 Sat [%]
971447F	O2LC47	59.601	6	60.112	35.66	12.827	26.9402	2.22	236.052	91.665
971447F	O2LC47	39.806	7	40.145	35.668	13.79	26.7487	2.22	239.029	94.676
971447F	O2LC47	19.331	8	19.494	35.676	14.888	26.5181	2.34	247.833	100.36
971447F	O2LC47	9.77	9	9.852	35.661	15.022	26.4769	2.39	250.35	101.64
971448A	O2LC48	300.42	1	303.17	35.595	11.464	27.1602	2.22	234.118	88.317
971449A	O2LC49	303	1	305.8	35.596	11.416	27.1699	2.34	226.599	85.394
971450A	O2LC50	154.51	1	155.87	35.616	11.876	27.0949	2.39	228.758	87.063
971451A	O2LC51	160.21	1	161.62	35.624	12.32	27.0158	2.47	231.235	88.833
971451A	O2LC51	99.038	2	99.896	35.632	12.595	26.9659	2.39	231.934	89.618
971451A	O2LC51	79.455	3,4	80.139	35.636	13.173	26.8529	2.3	237.701	92.95
971451A	O2LC51	59.532	5,6	60.042	35.637	14.037	26.673	2.37	248.194	98.778
971451A	O2LC51	39.236	7,8	39.57	35.64	14.045	26.6735	2.34	247.362	98.466
971451A	O2LC51	19.614	9,10	19.78	35.641	14.055	26.6711	2.39	247.759	98.643
971451A	O2LC51	9.639	11,12	9.72	35.641	14.057	26.6706	2.37	247.877	98.694

Appendix 5.

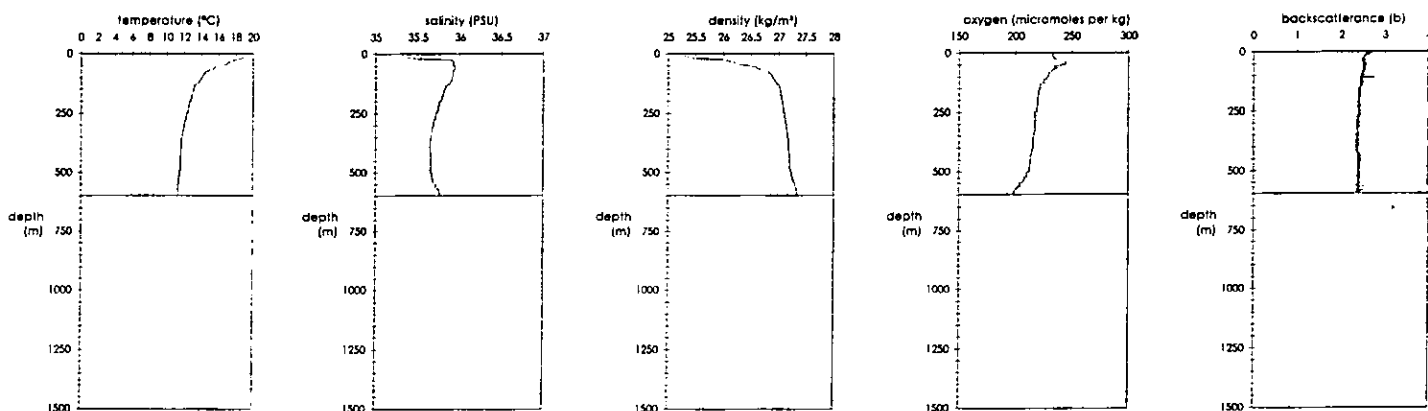
Vertical profiles with SCTD.

SEA-BIRD SBE09*plus* : salinity, watertemperature, density, DO

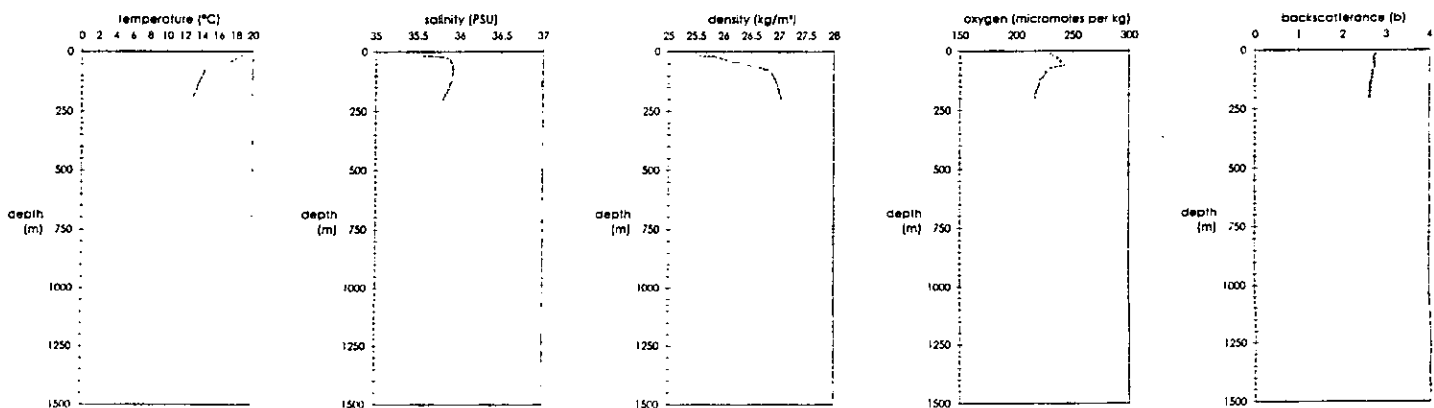
station 00 cast A



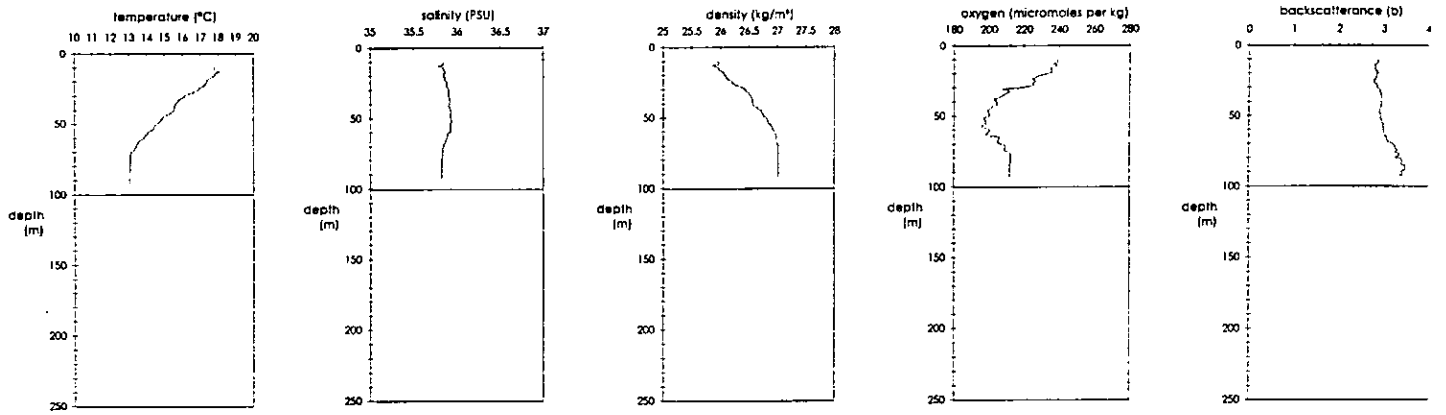
station IC1 cast A



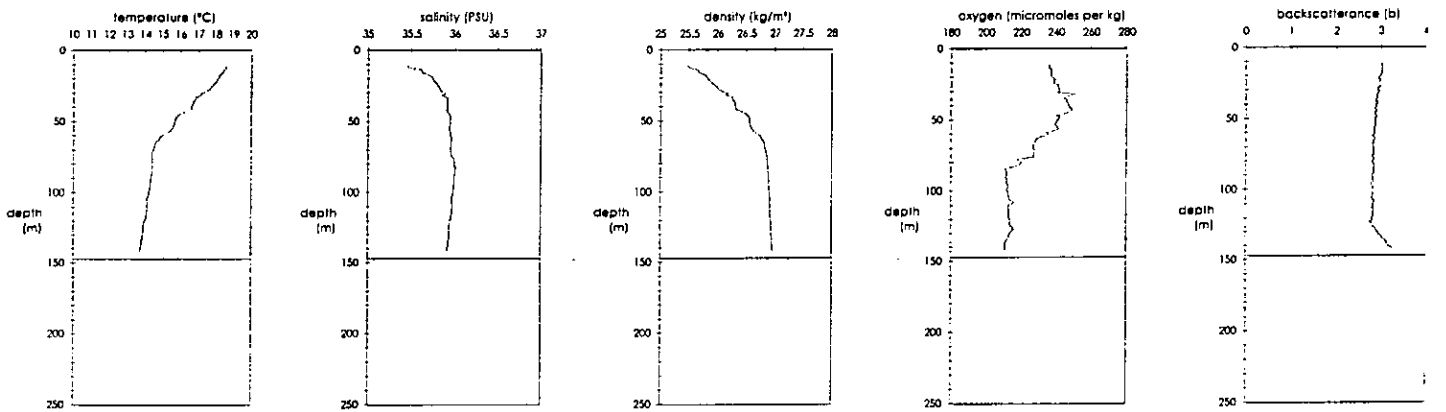
station V1 cast A



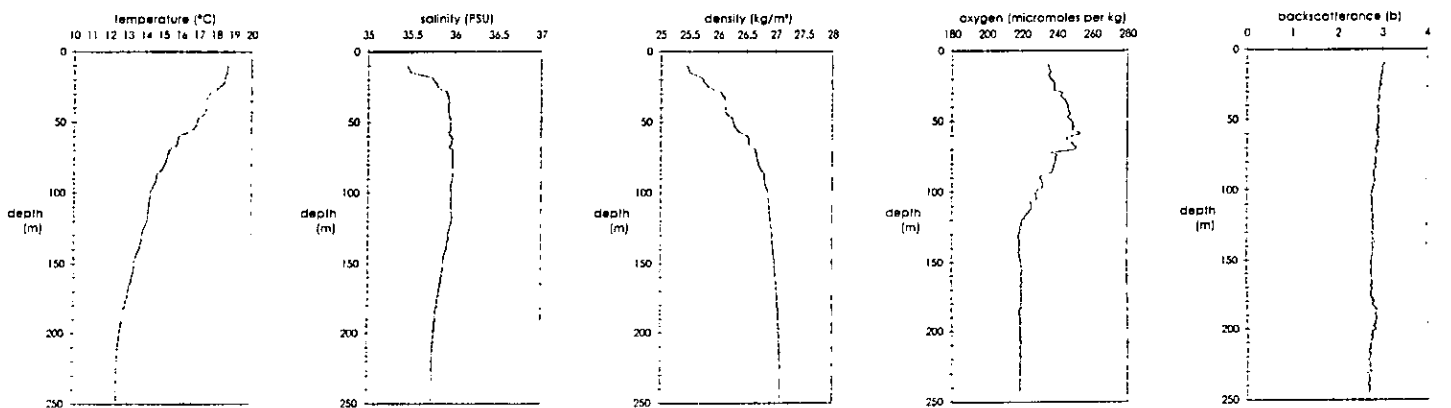
station 01 cast A



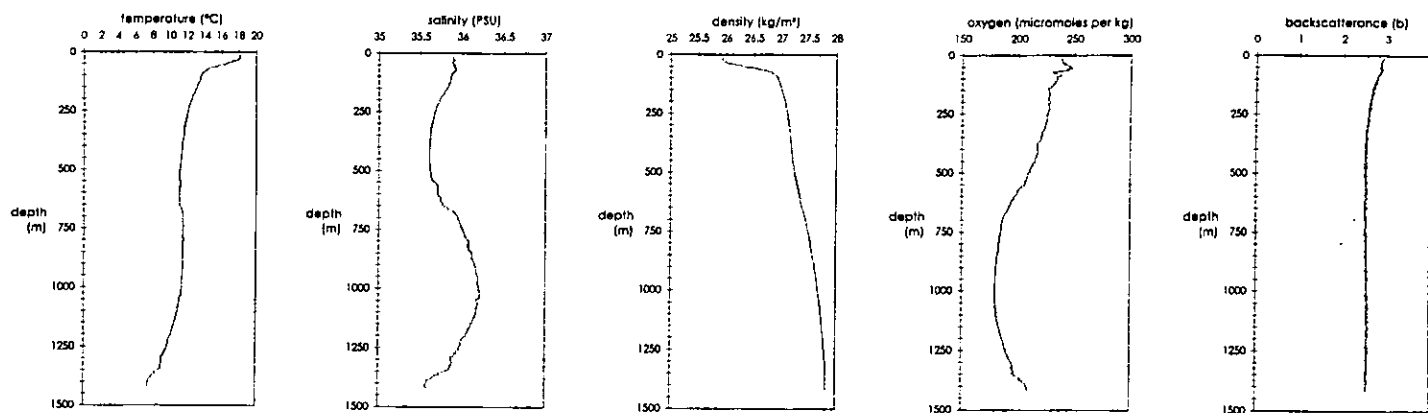
station 02 cast A



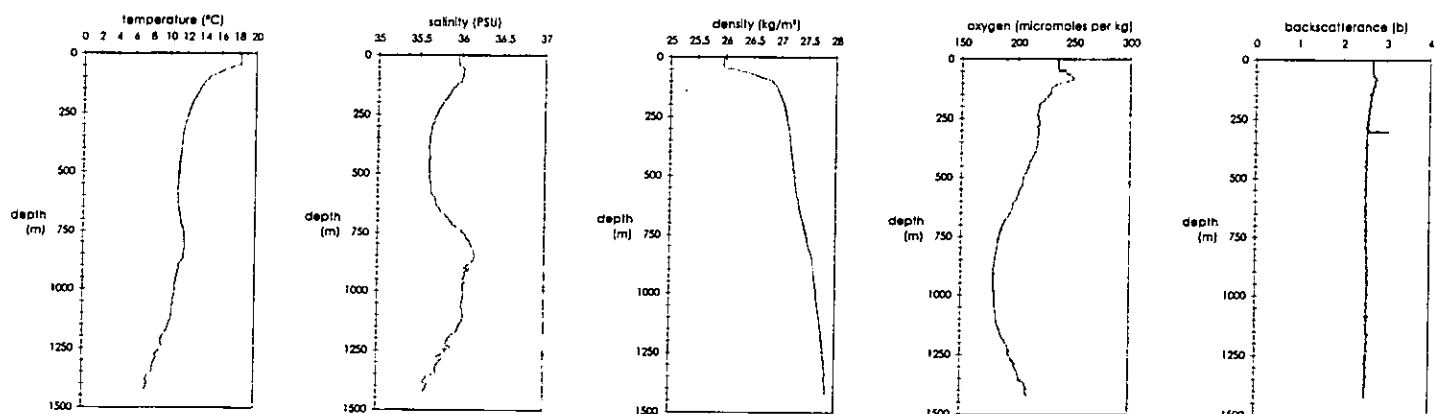
station 03 cast A



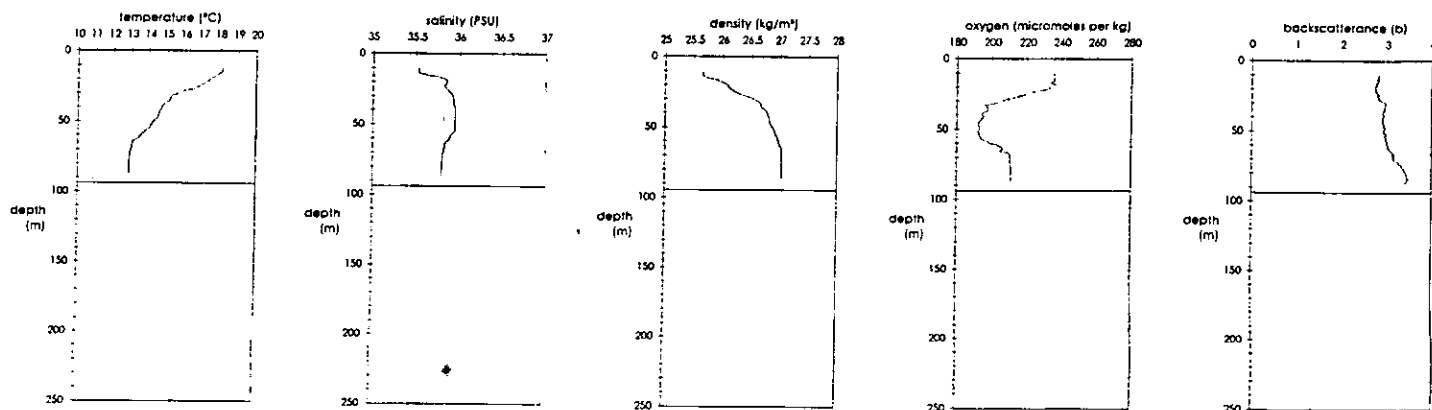
station 04 cast A



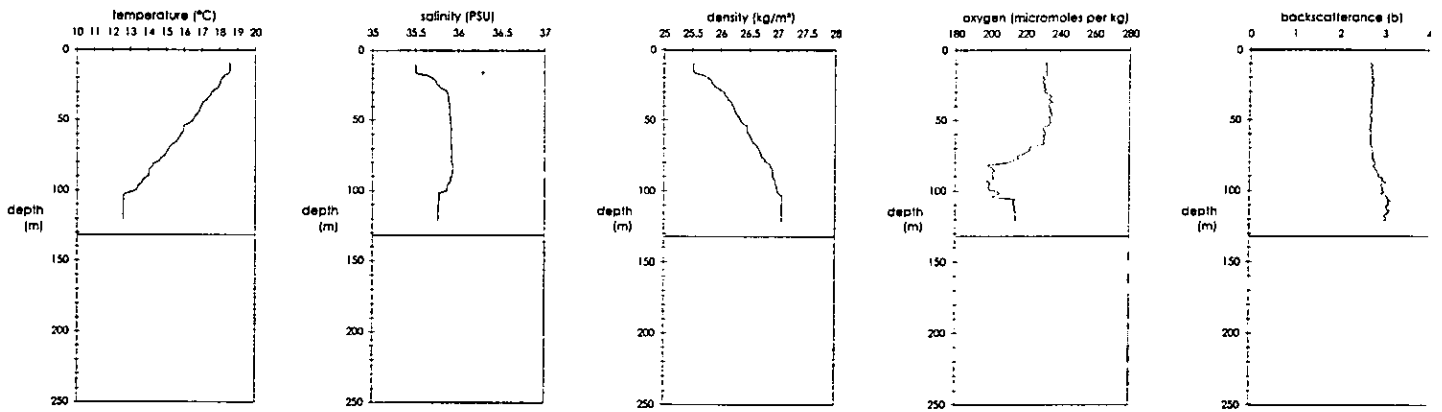
station 05 cast A



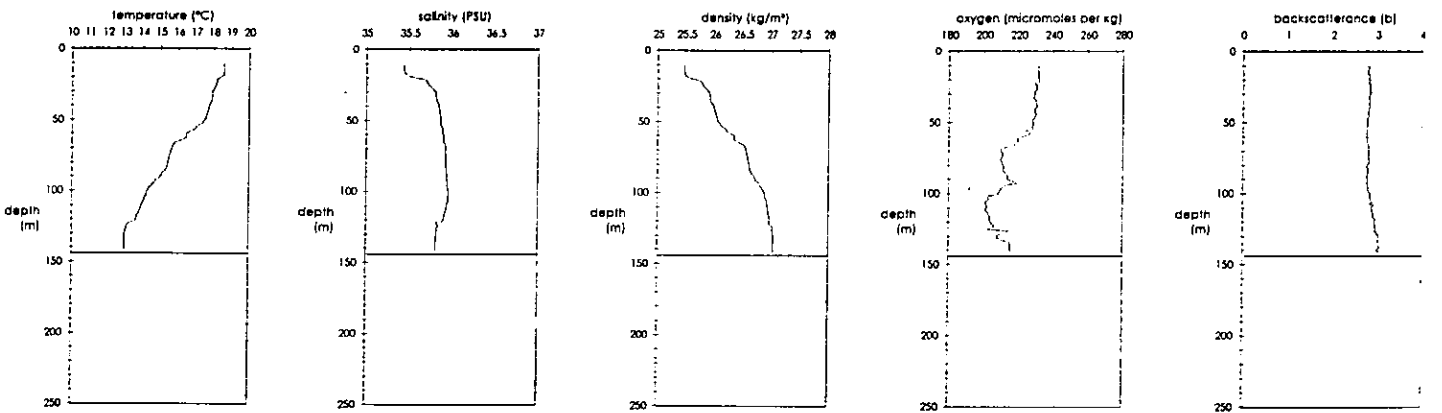
station 06 cast A



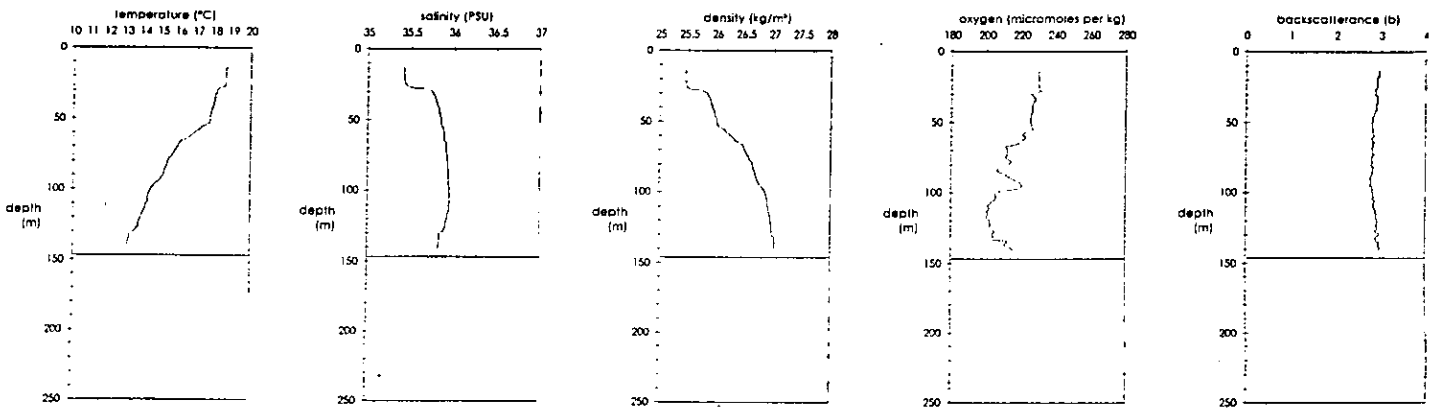
station 07 cast A



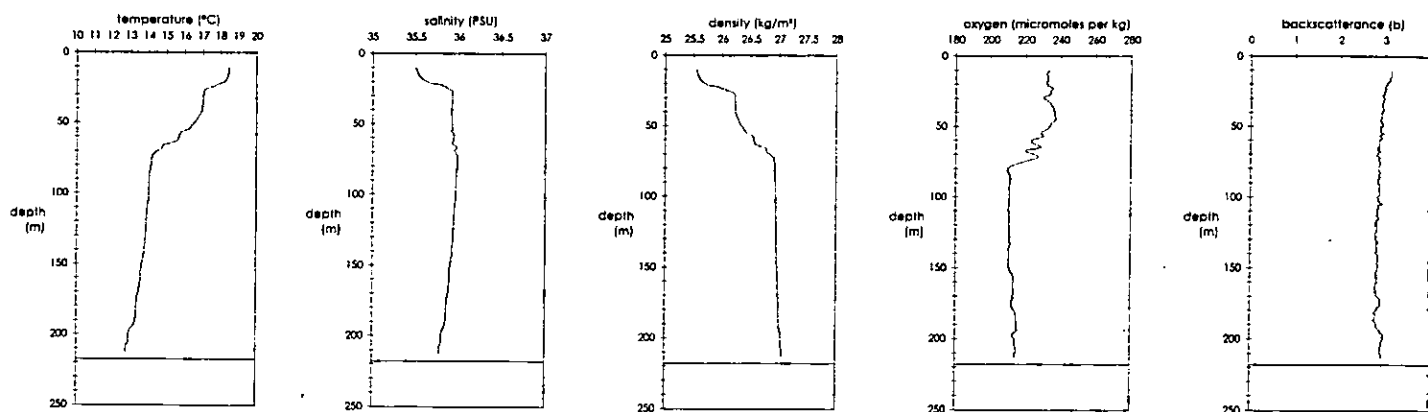
station 08 cast A



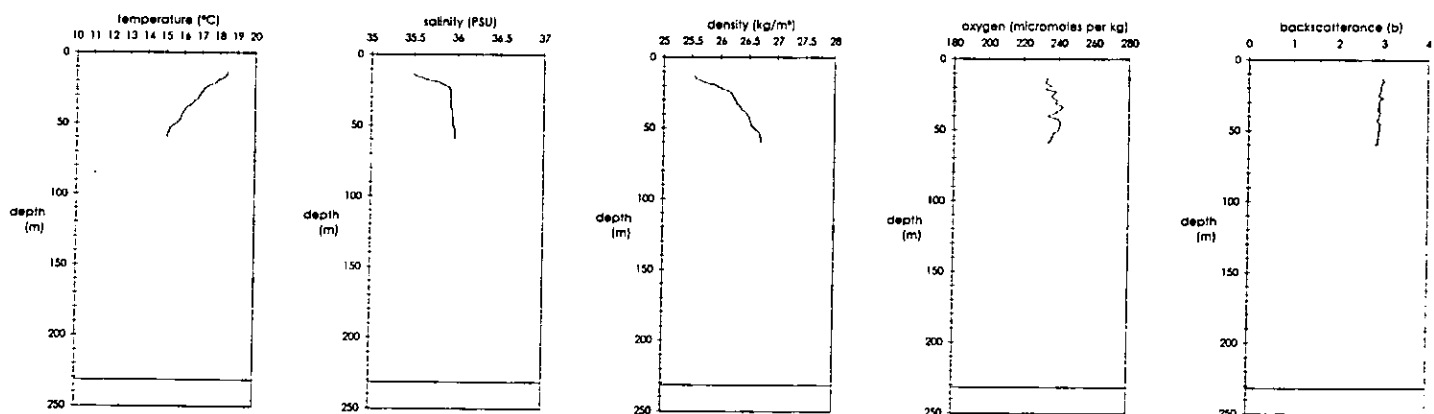
station 08 cast B



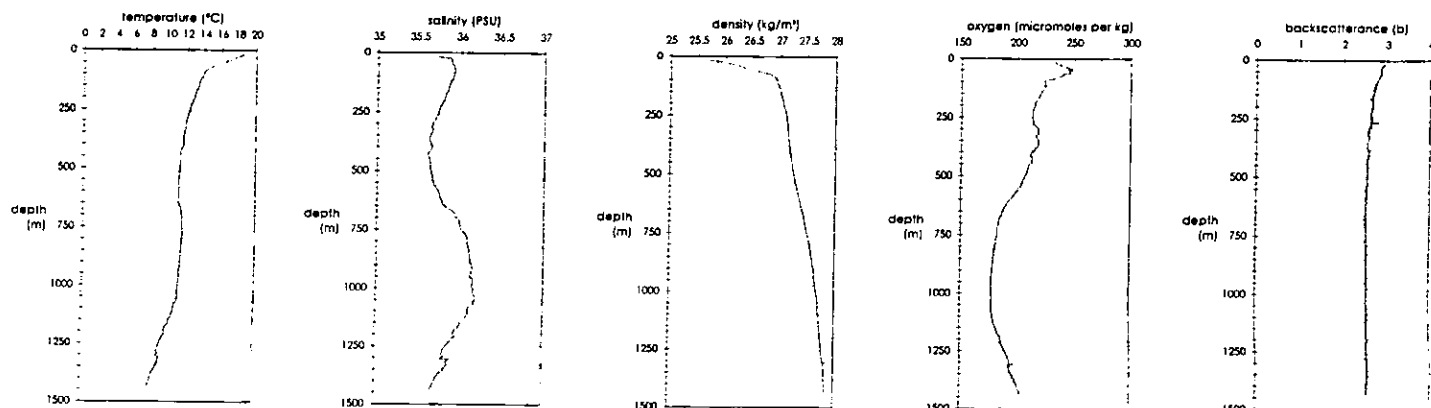
station 09 cast A



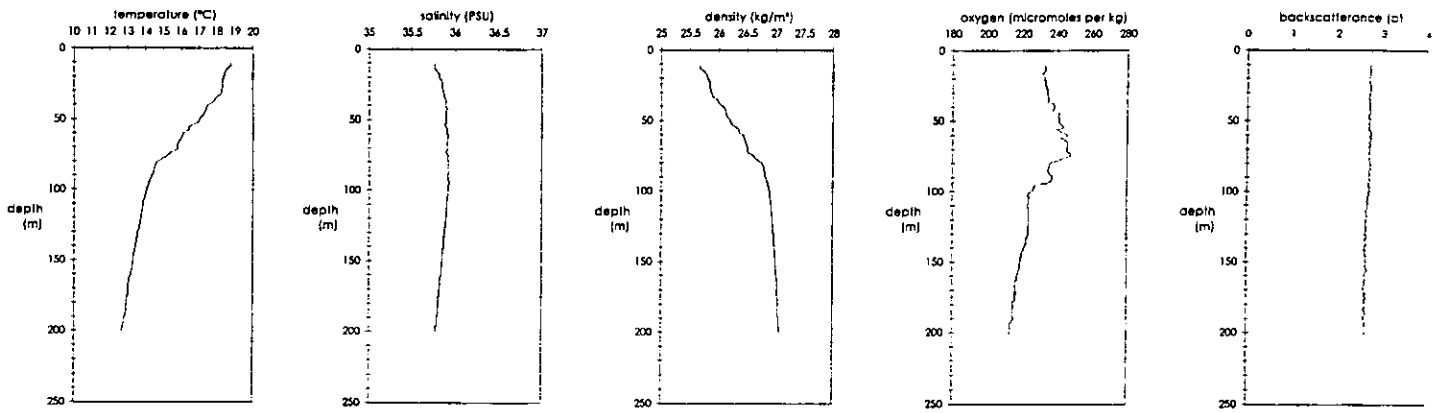
station 09 cast B



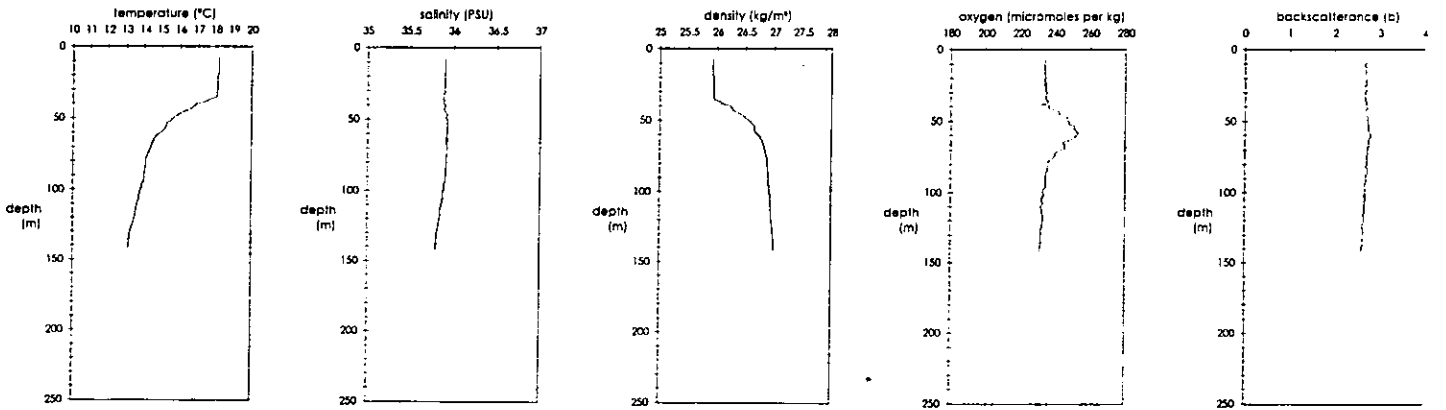
station 10 cast A



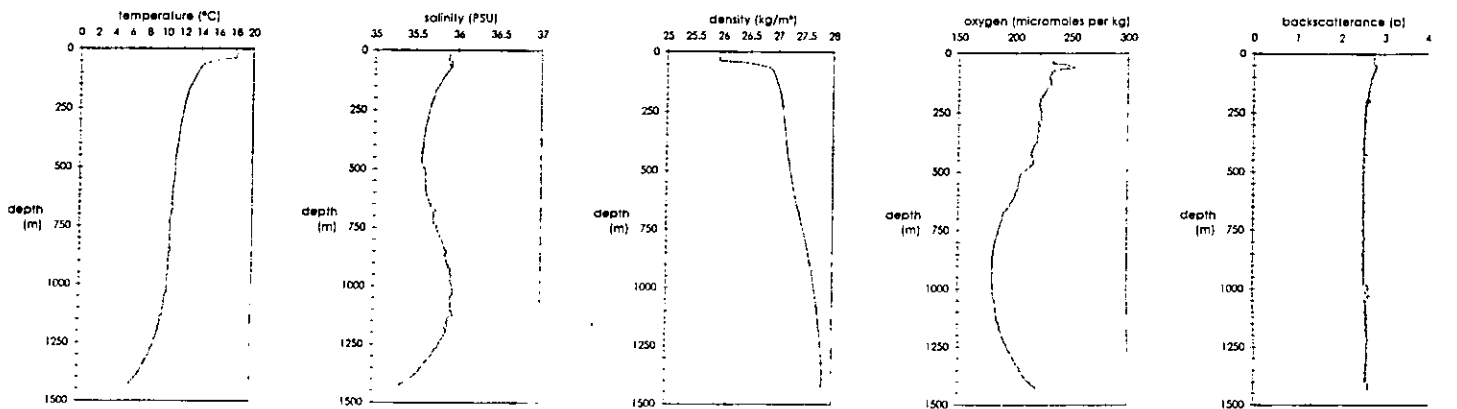
station 10 cast B



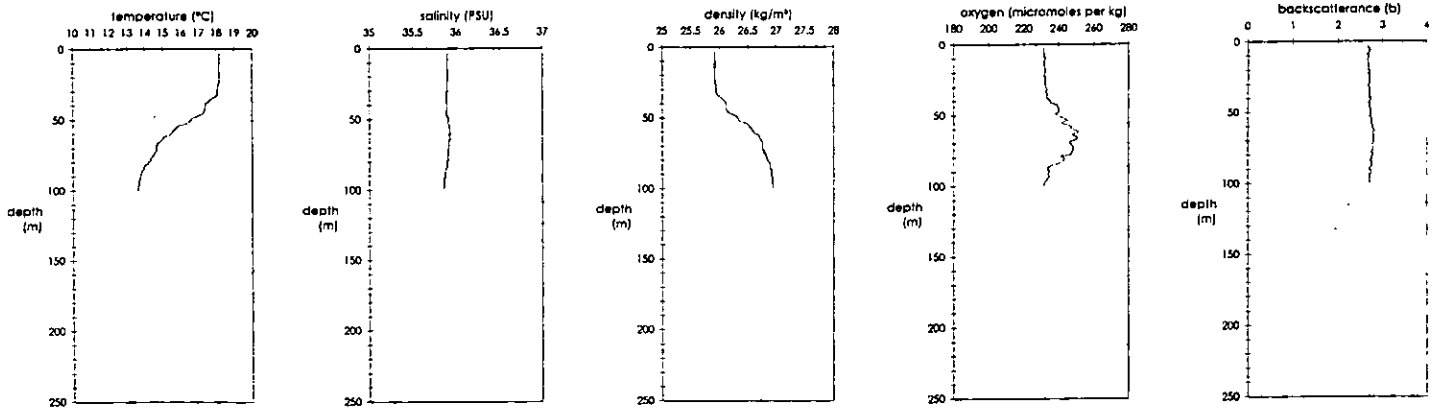
station 12 cast A



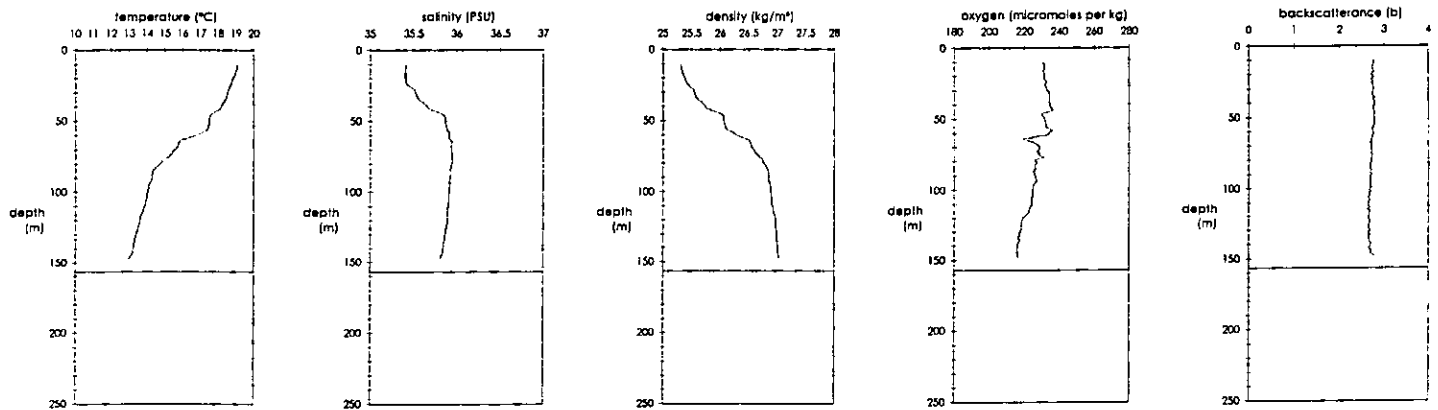
station 12 cast B



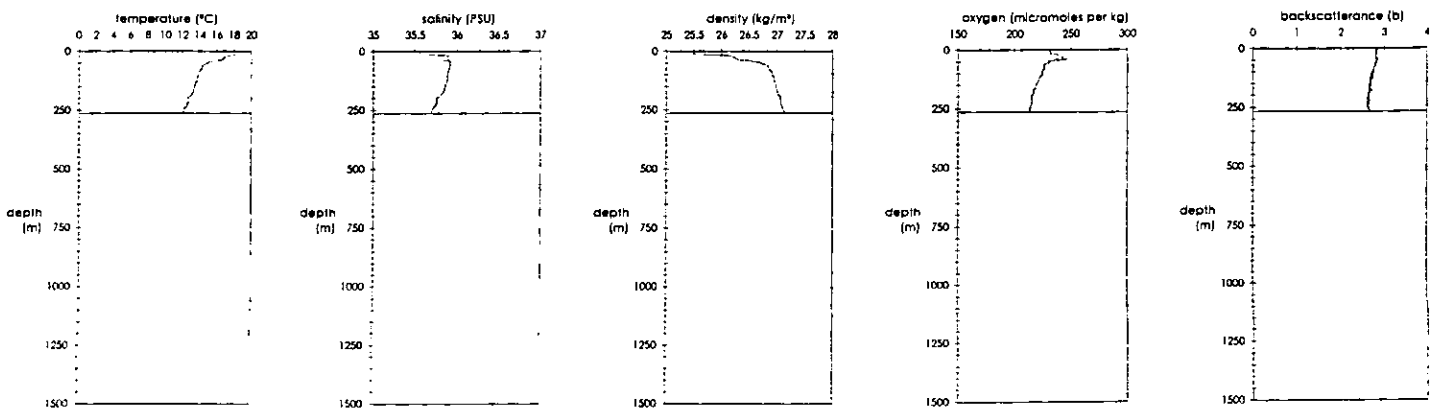
station 12 cast C



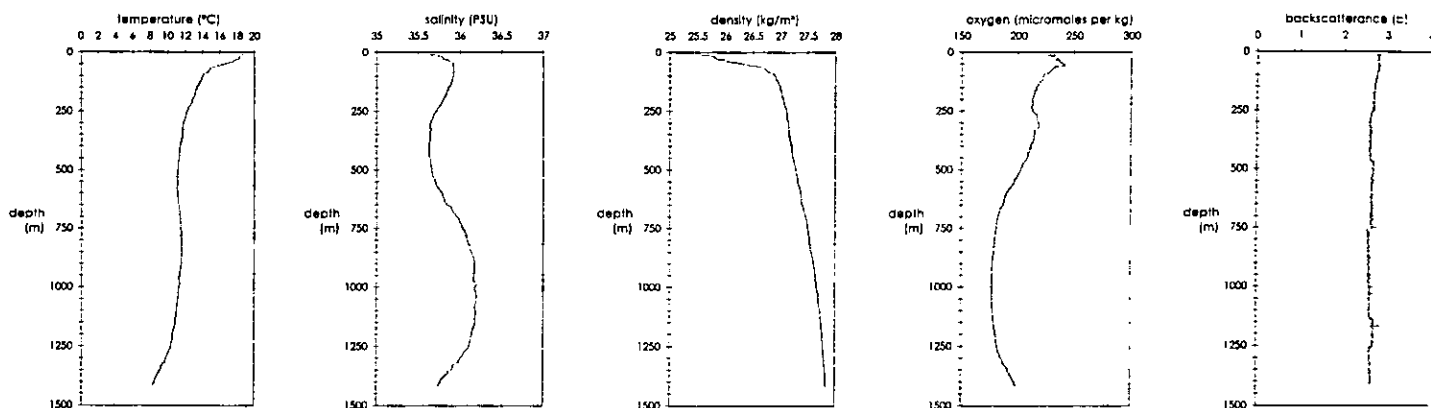
station 14 cast A



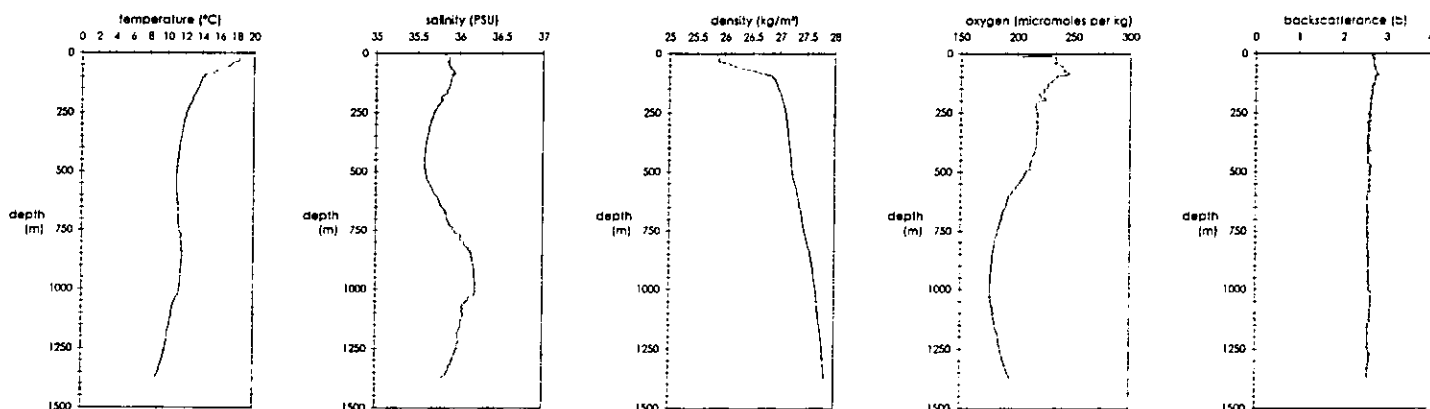
station 15 cast A



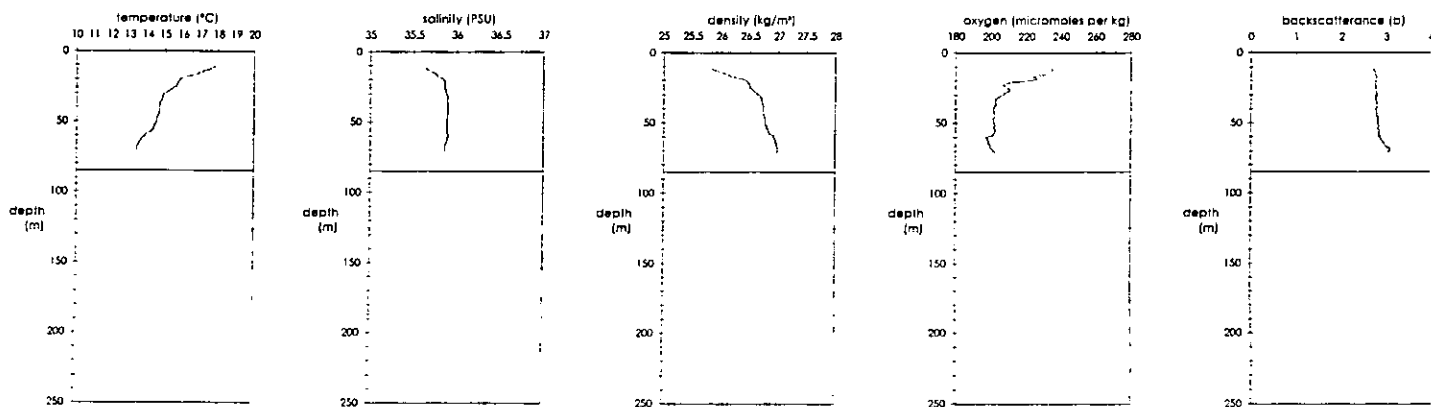
station 16 cast C



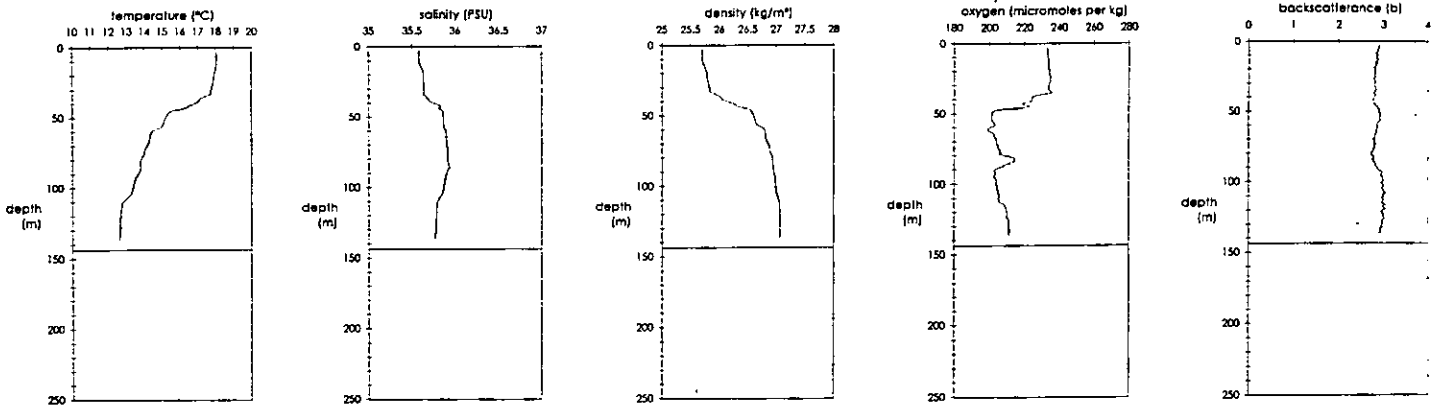
station 17 cast A



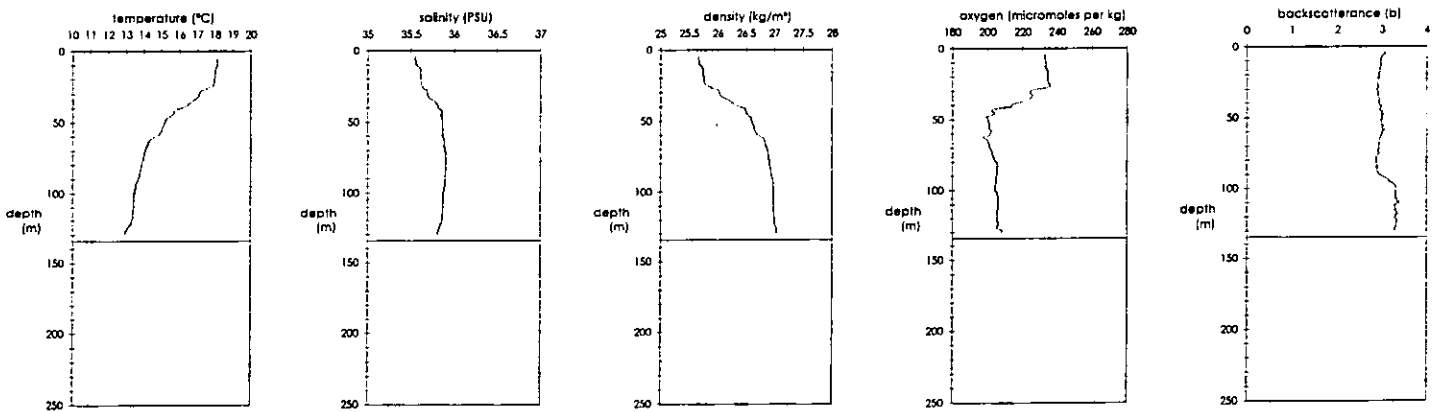
station 18 cast A



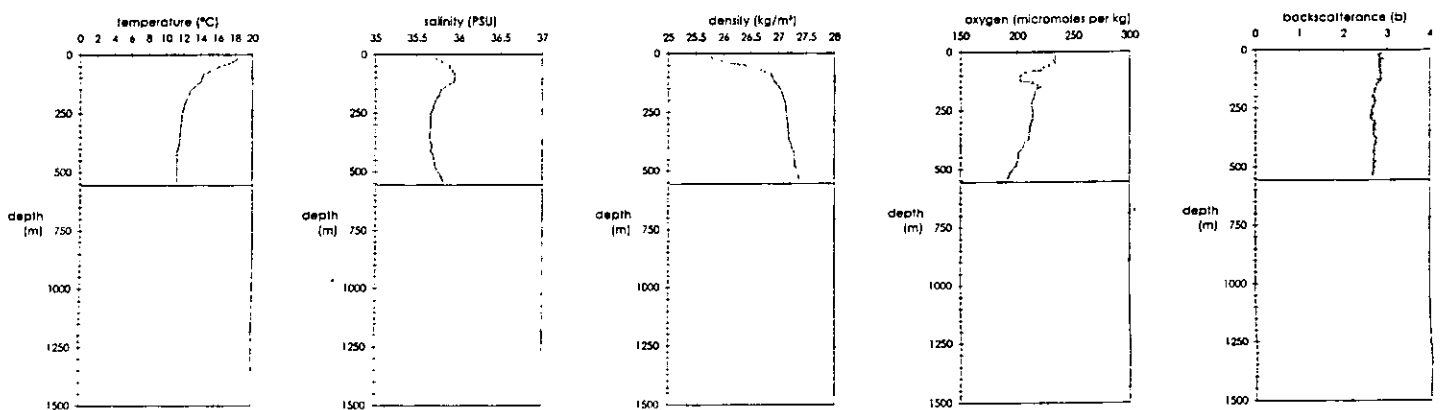
station 19 cast A



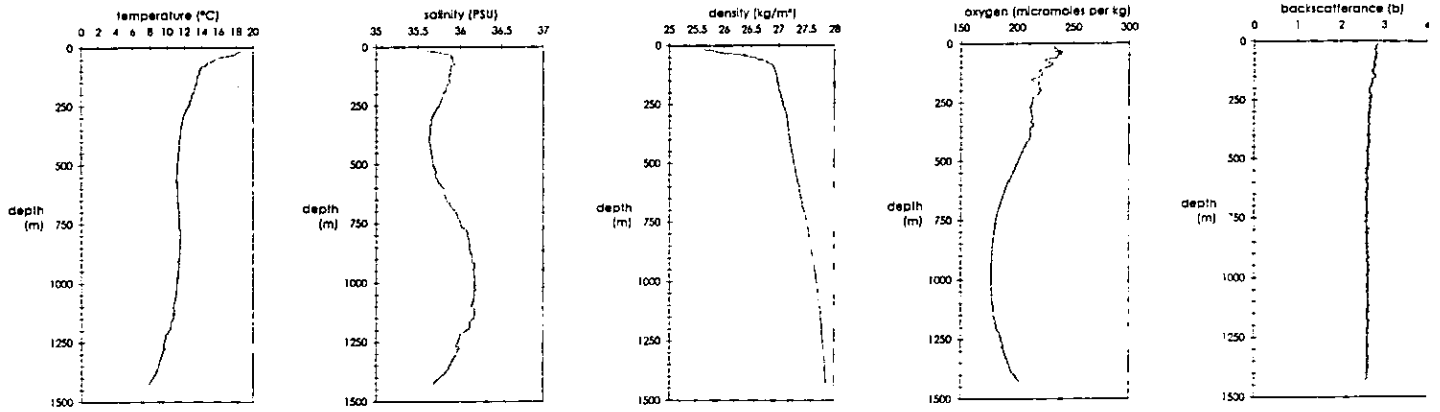
station 19 cast B



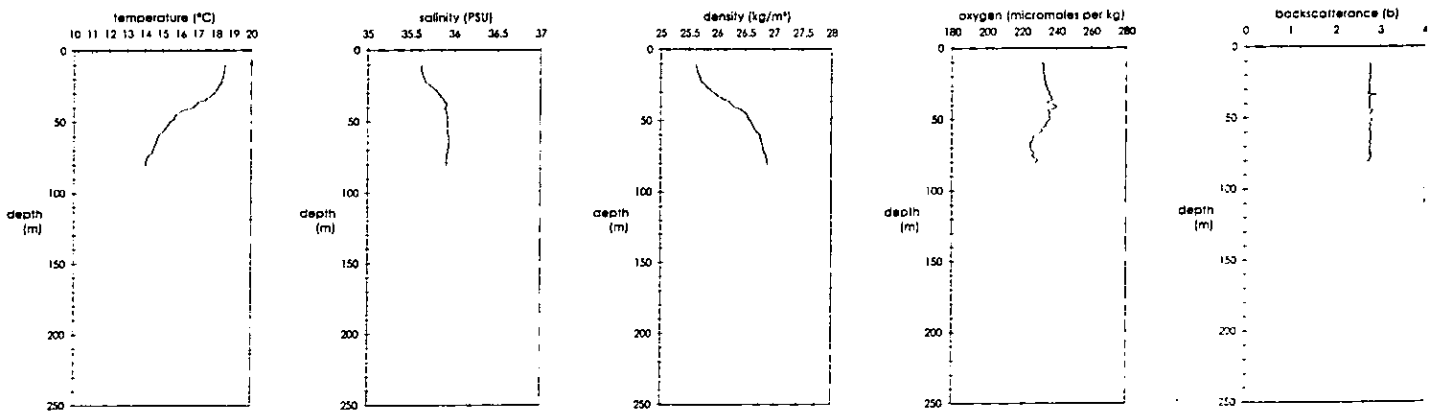
station 20 cast A



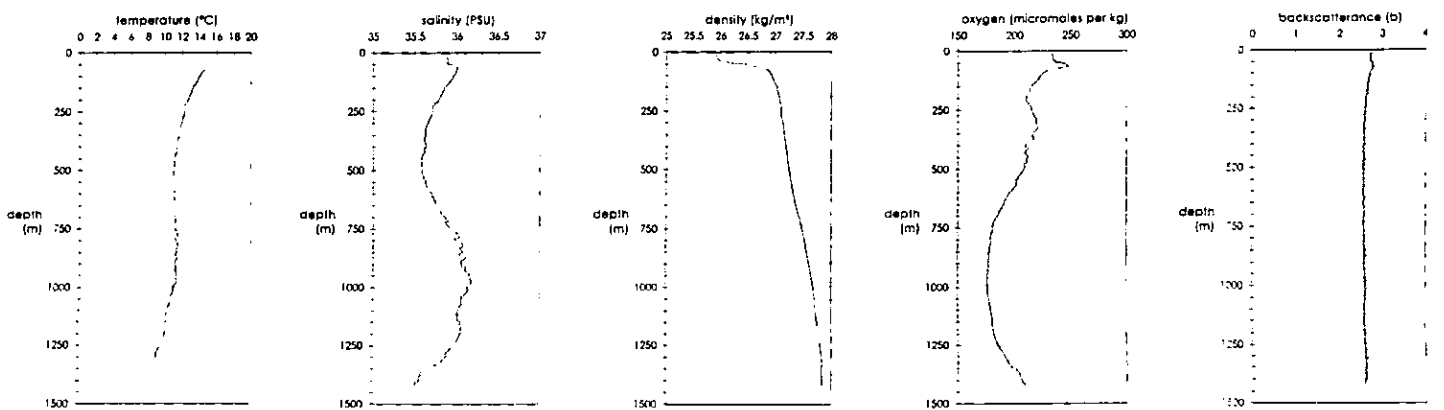
station 21 cast A



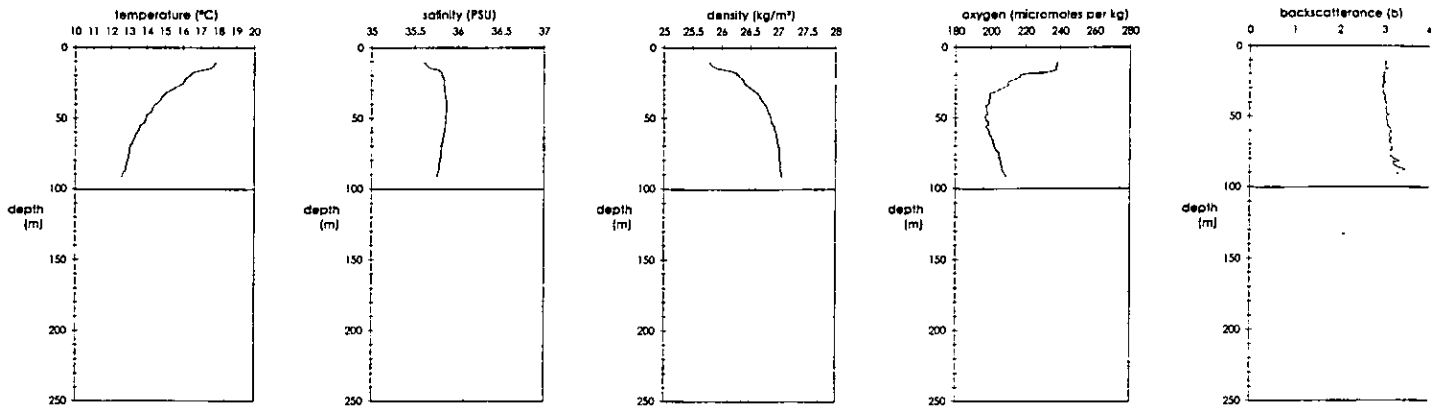
station 21 cast B



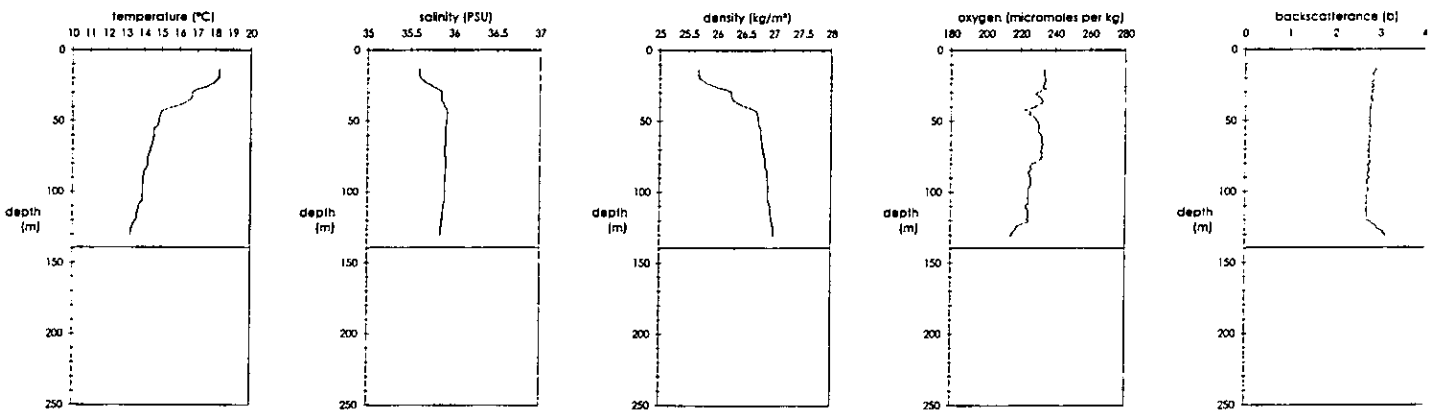
station 22 cast A



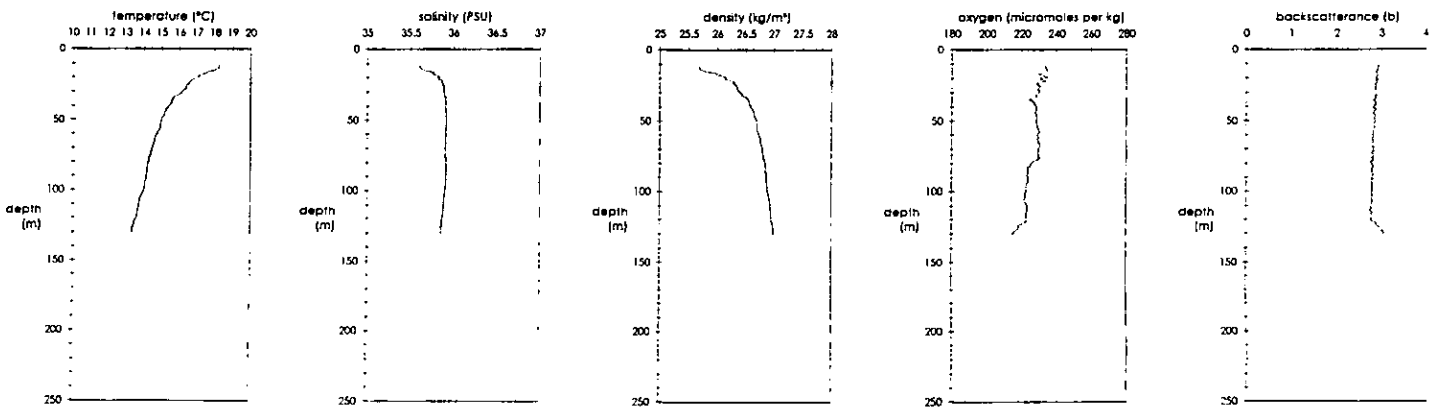
station 24 cast A



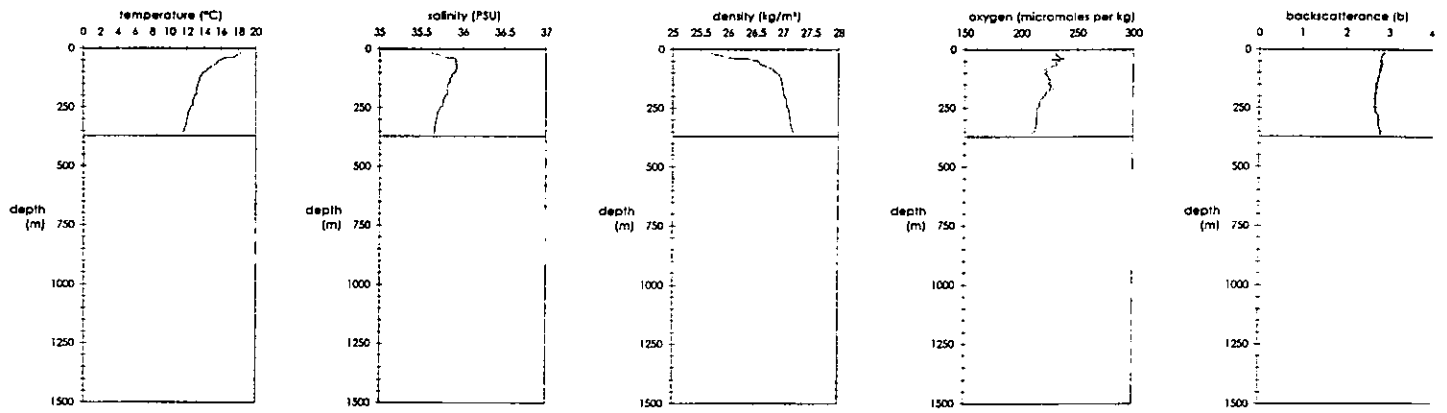
station 25 cast A



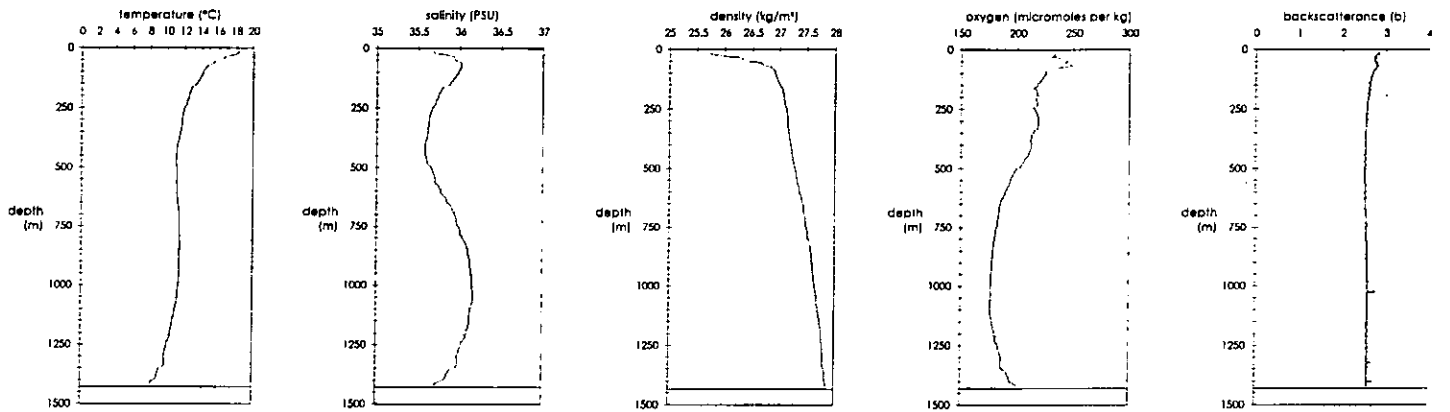
station 25 cast B



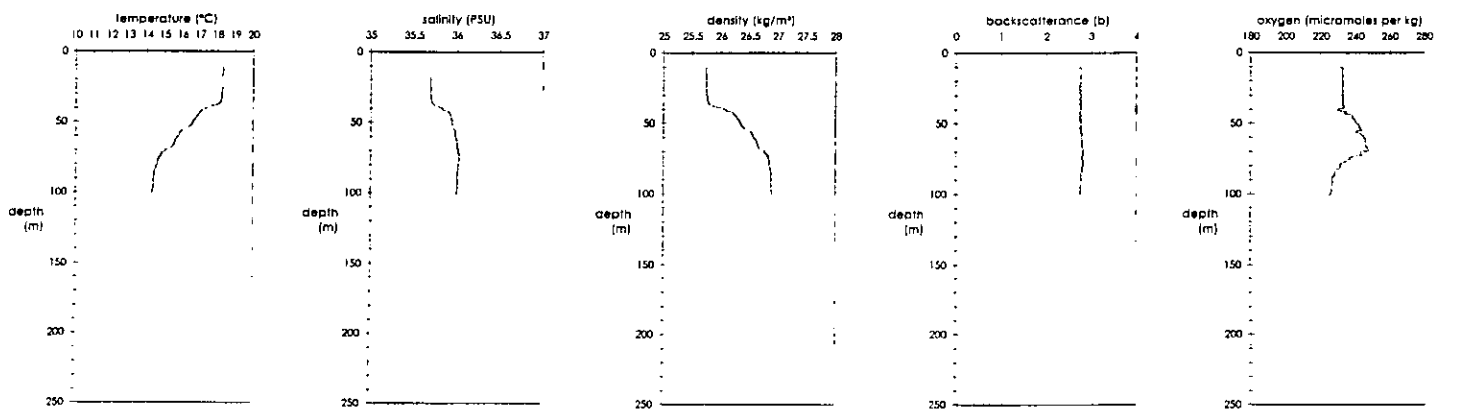
station 26 cast A



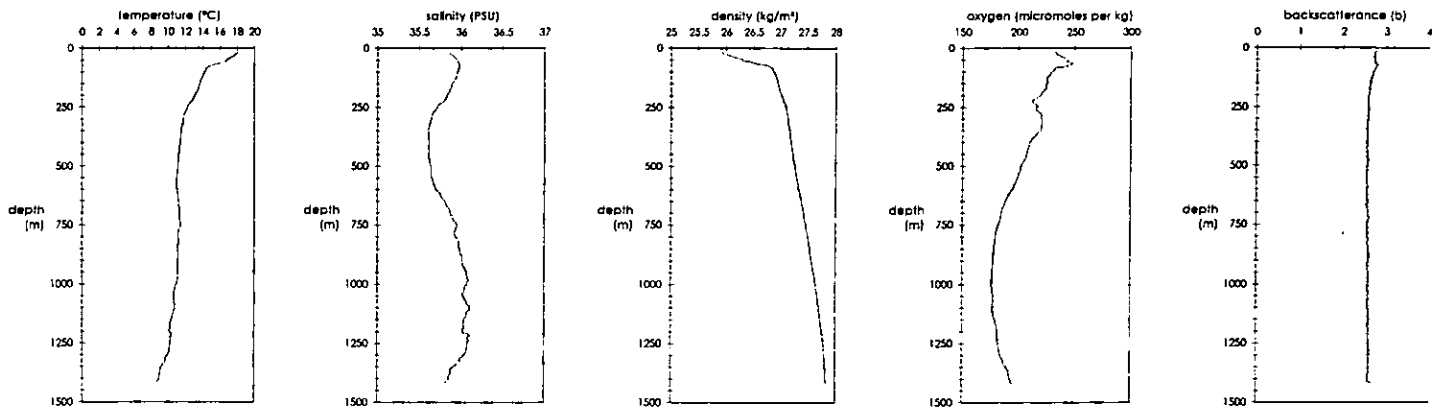
station 27 cast A



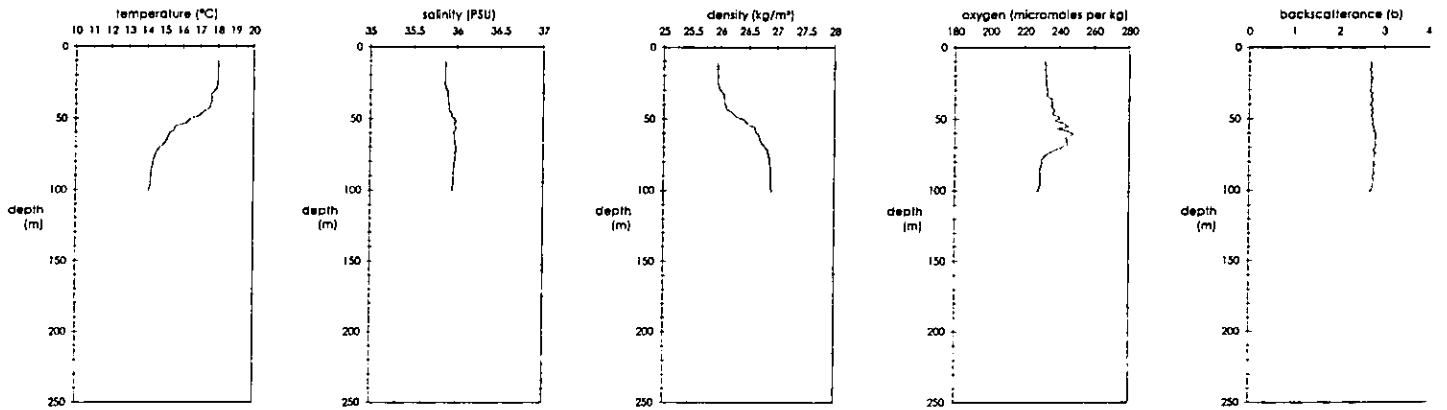
station 27 cast B



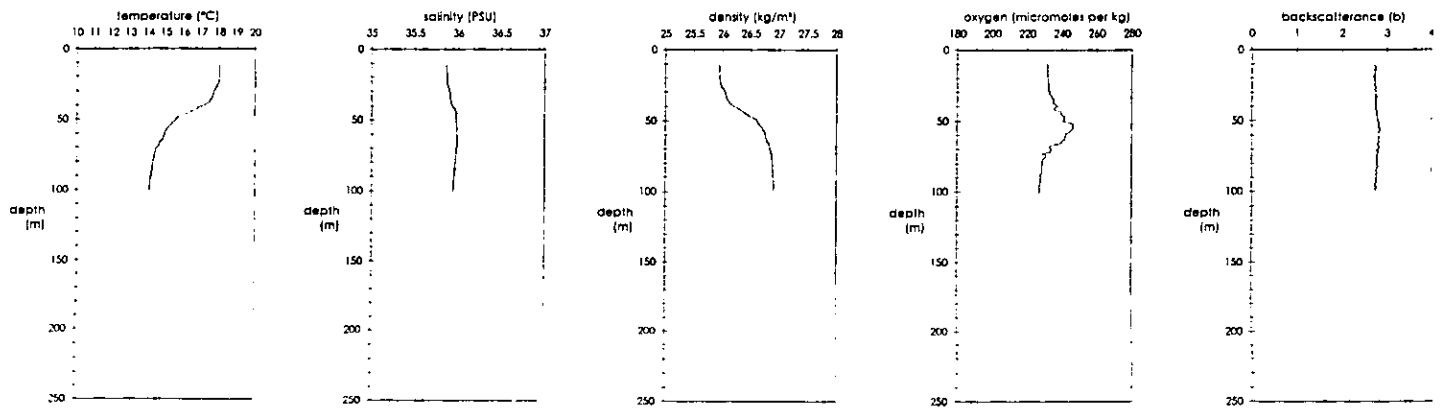
station 29 cast A



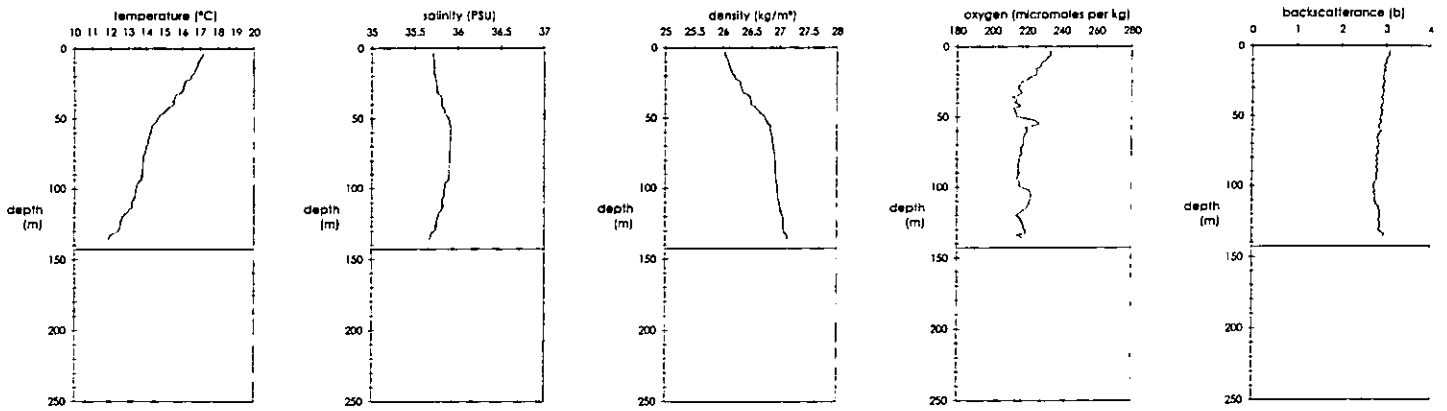
station 29 cast B



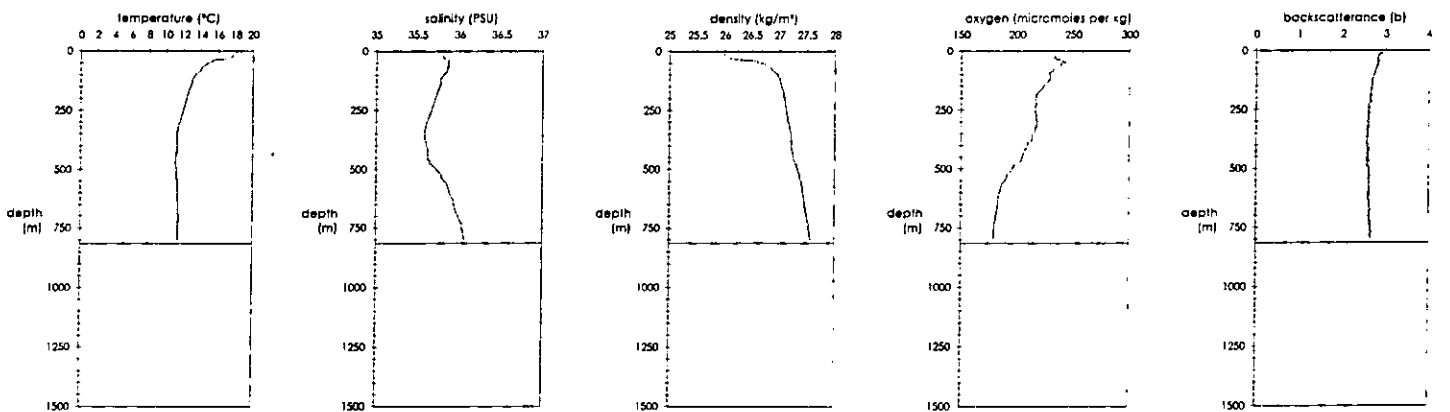
station 29 cast C



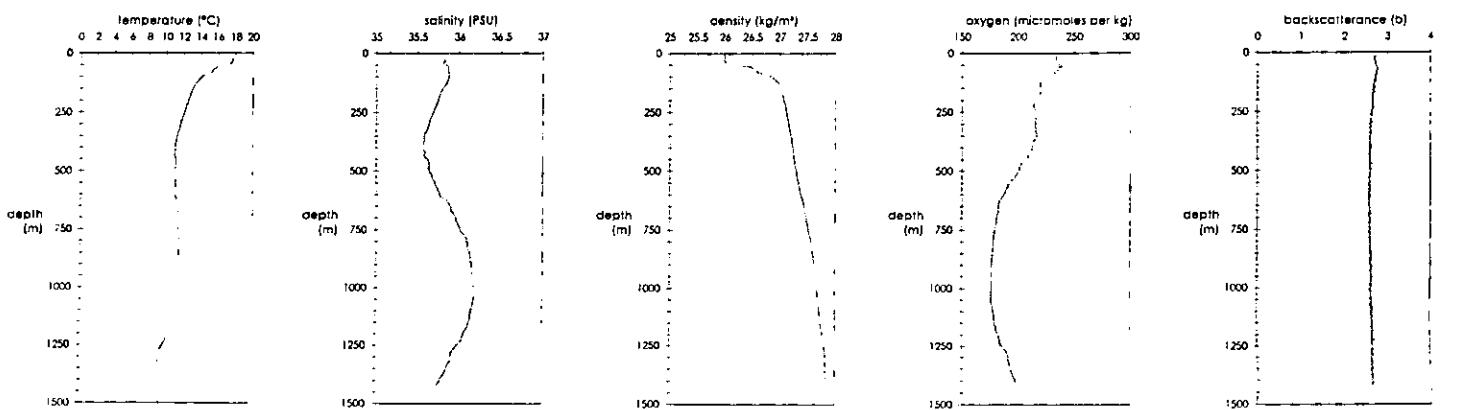
station 31 cast A



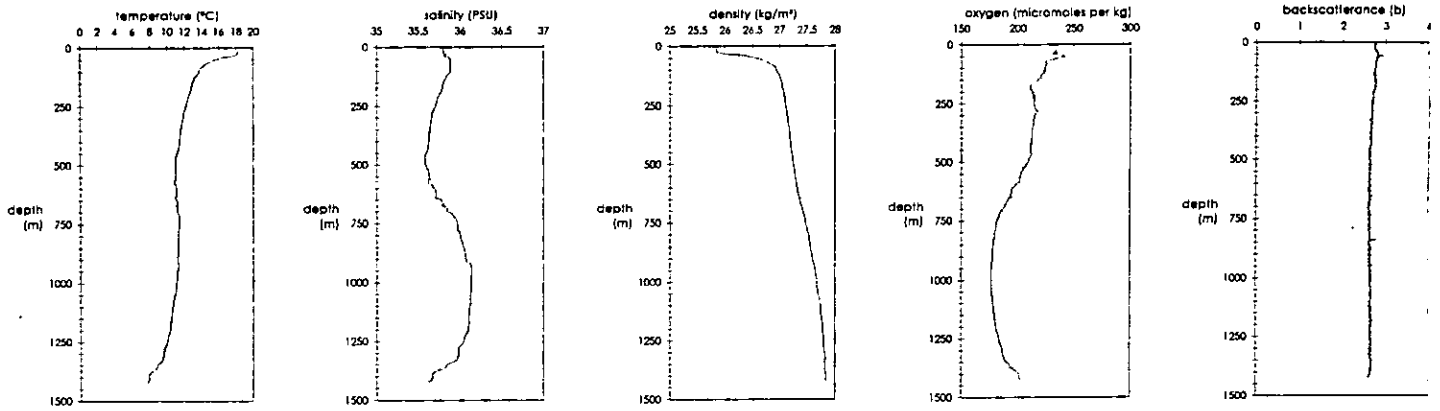
station 32 cast A



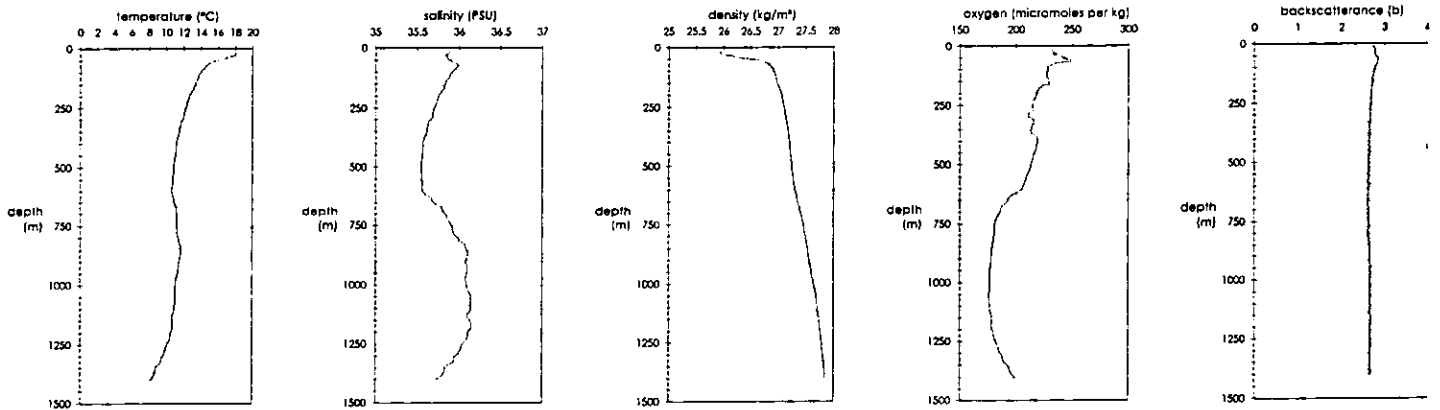
station 33 cast A



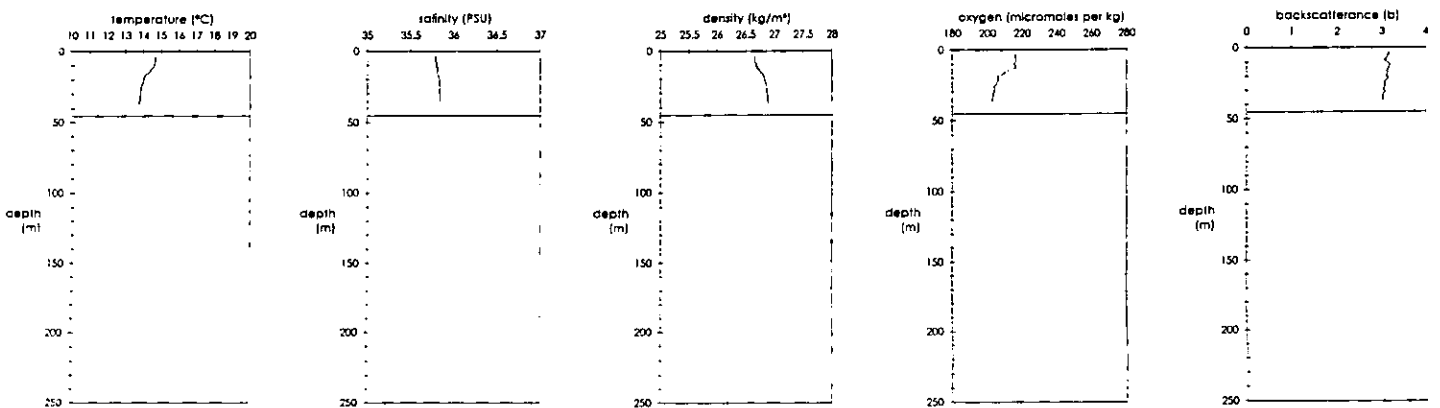
station 34 cast A



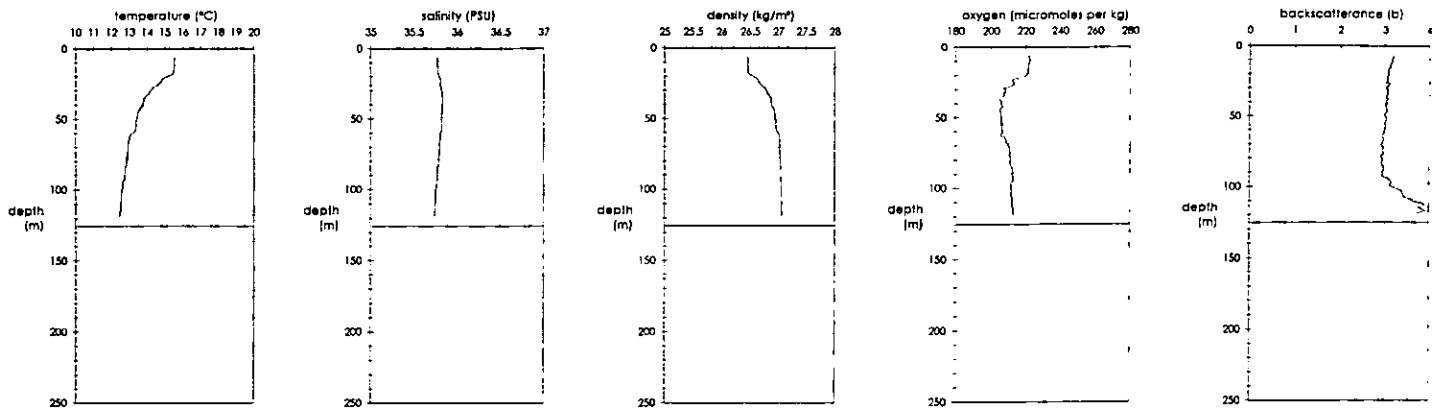
station 35 cast A



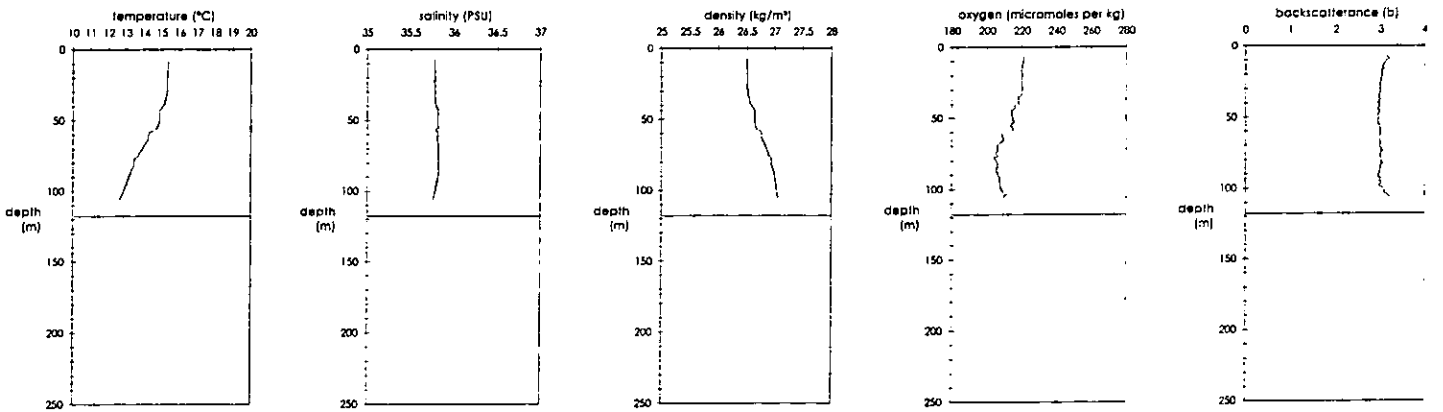
station 36 cast A



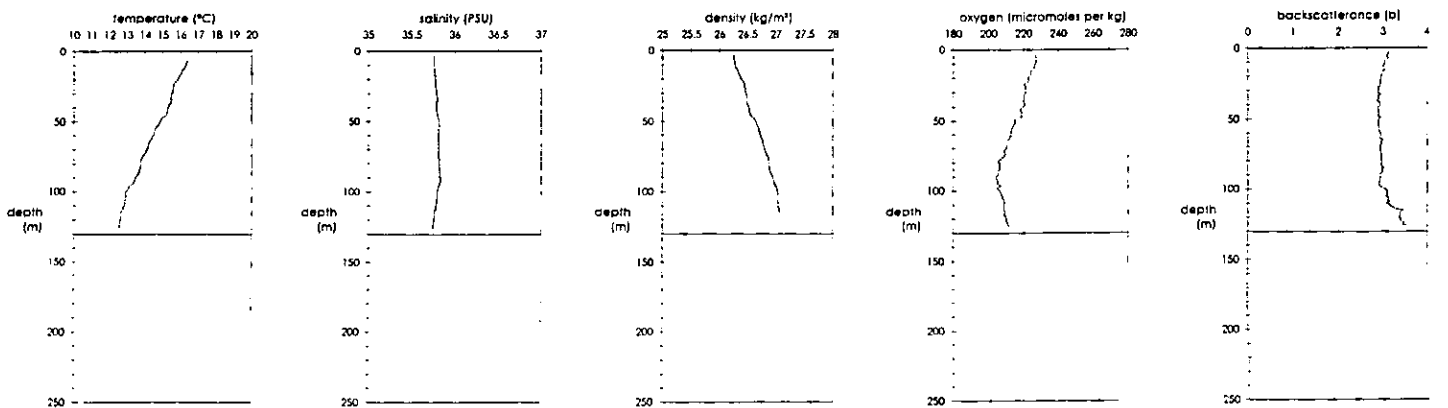
station 37 cast A



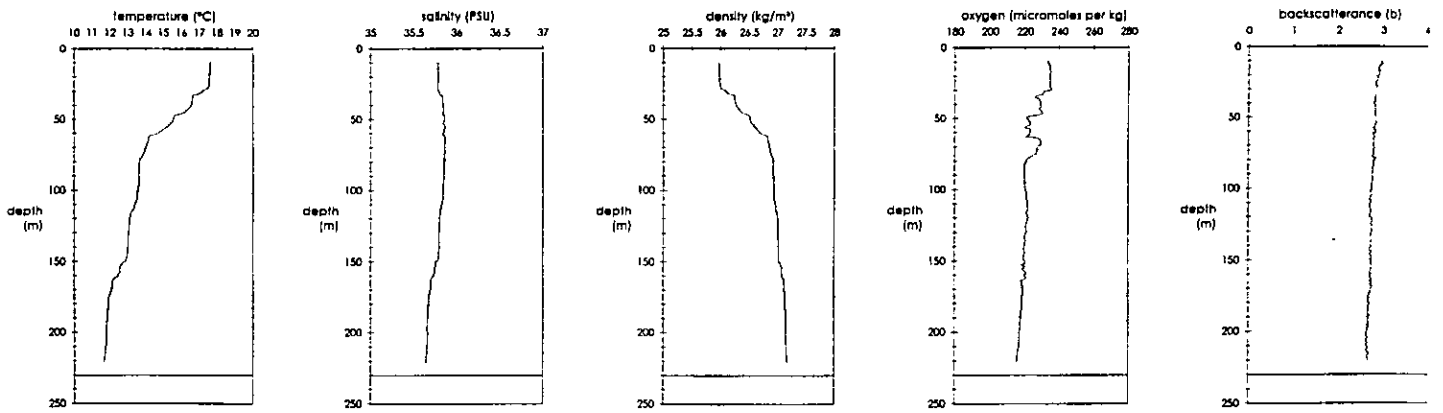
station 37 cast B



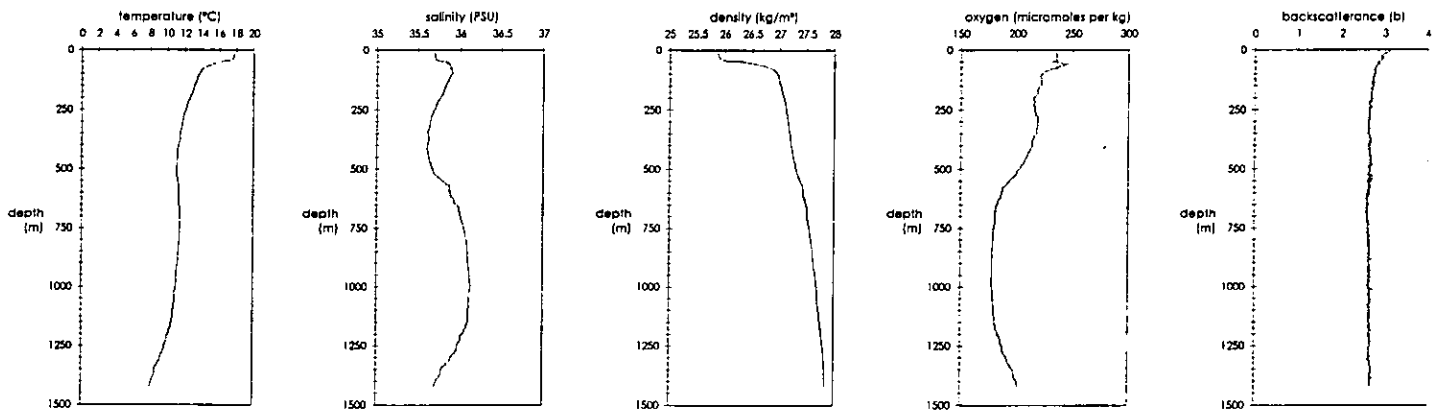
station 37 cast C



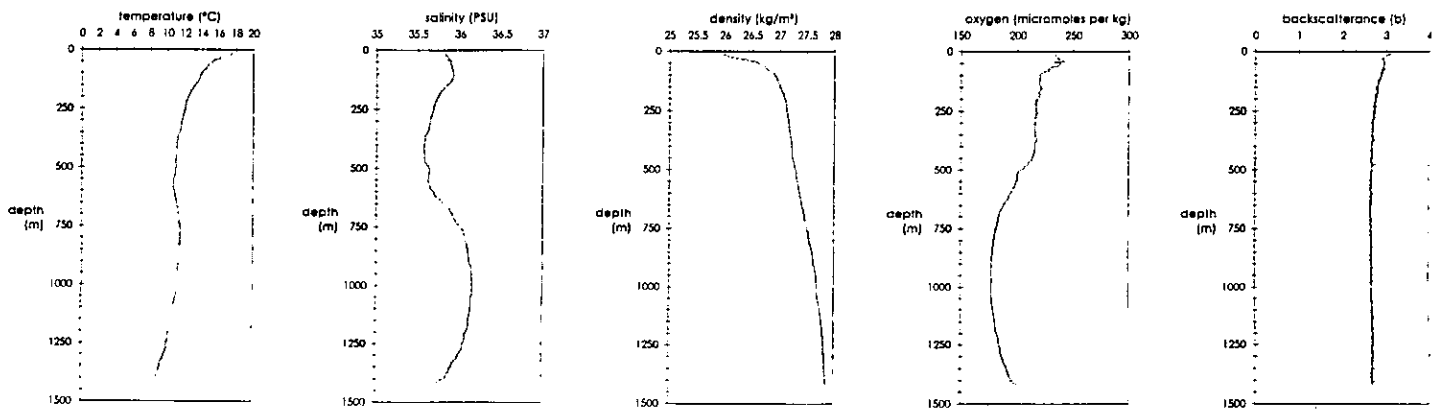
station 38 cast A



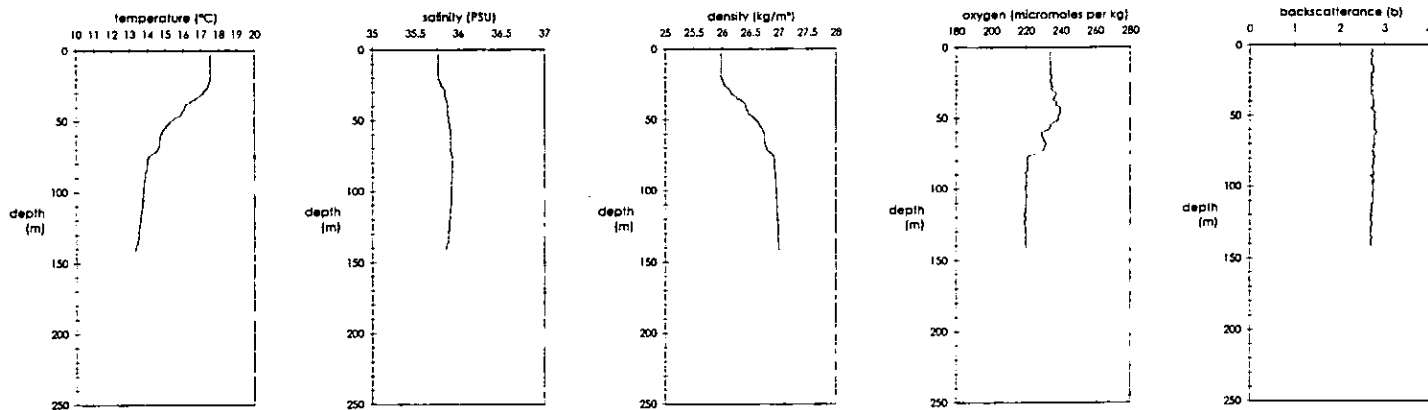
station 39 cast A



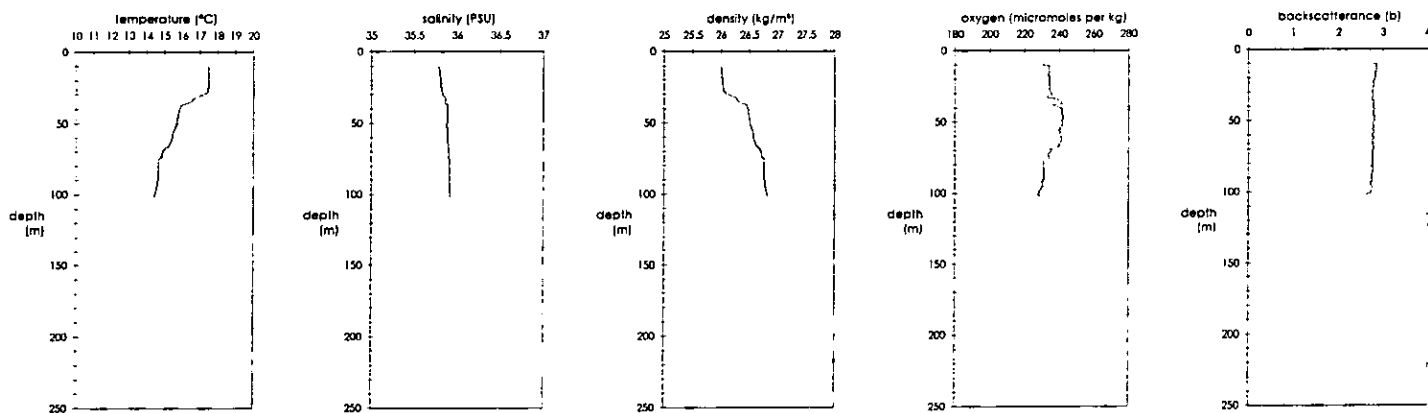
station 40 cast A



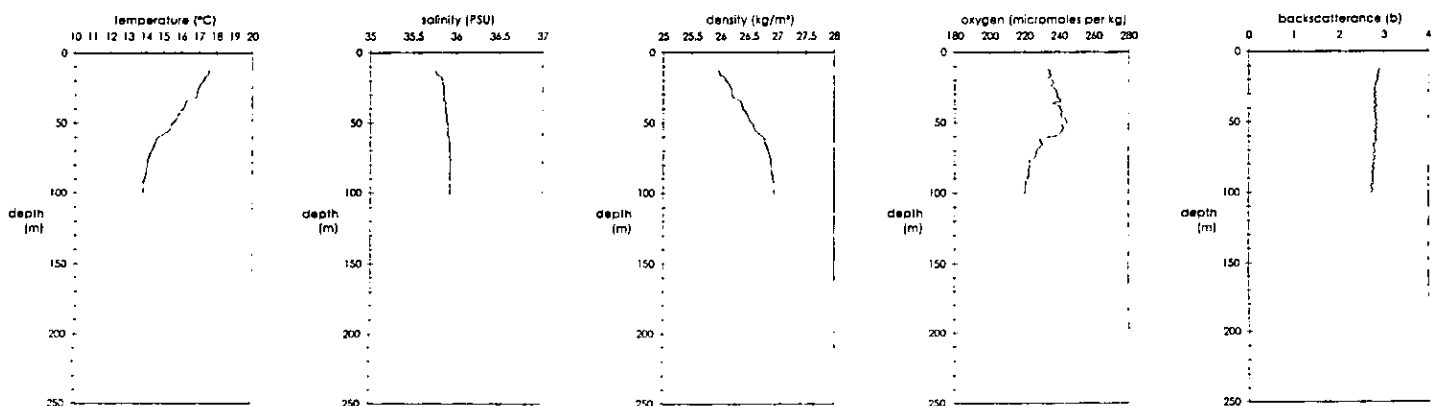
station 40 cast B



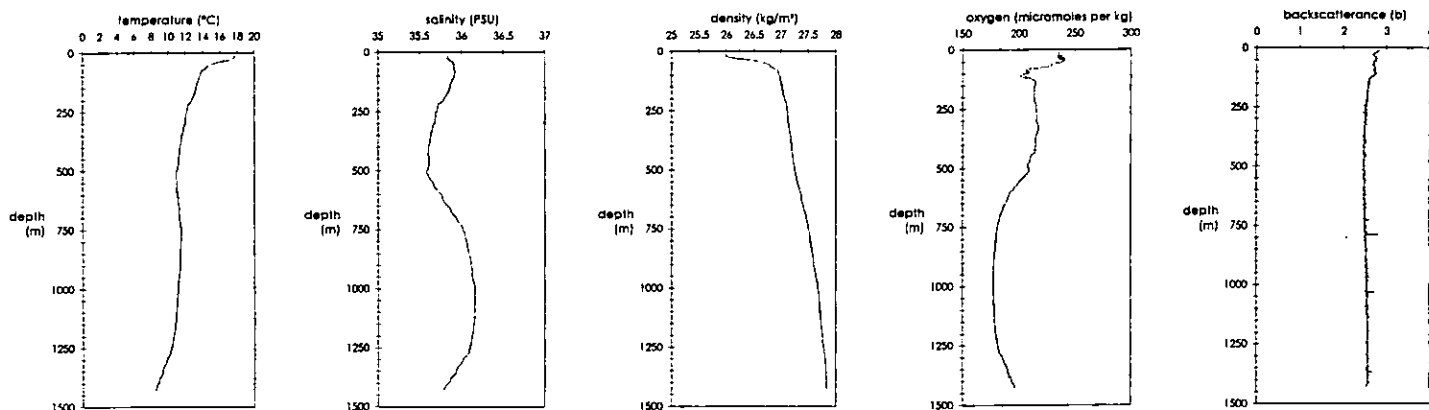
station 40 cast C



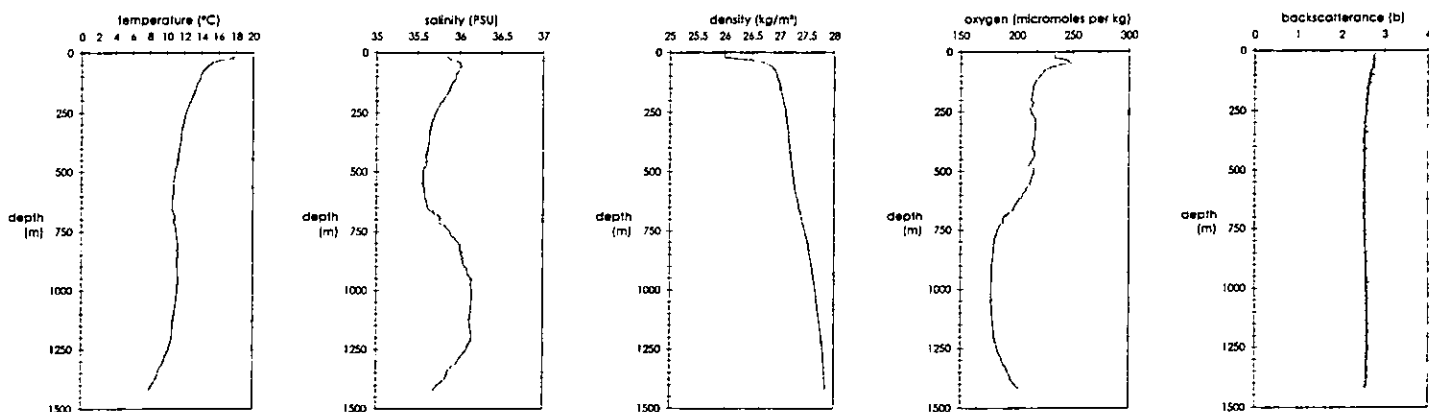
station 40 cast D



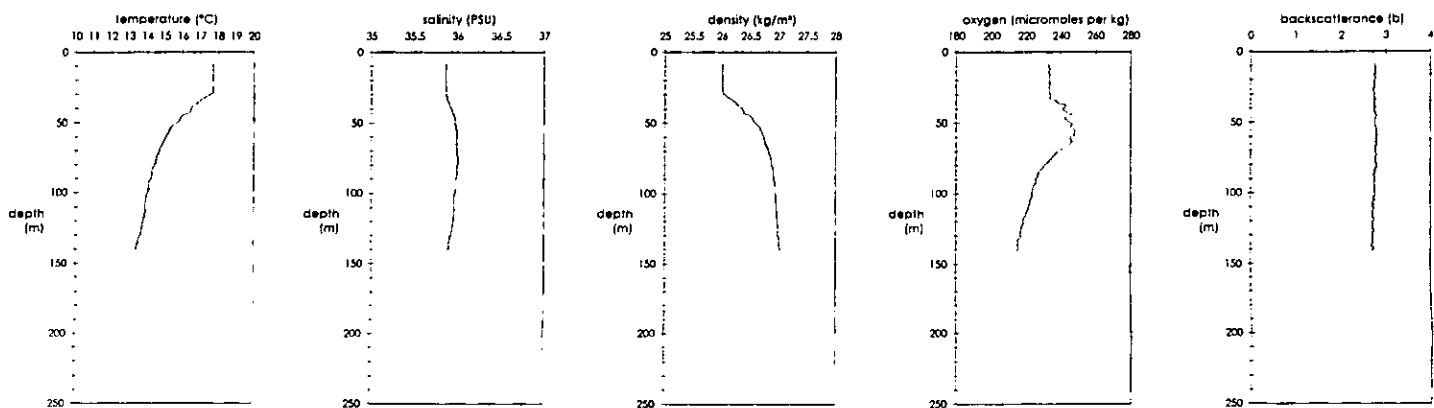
station 41 cast A



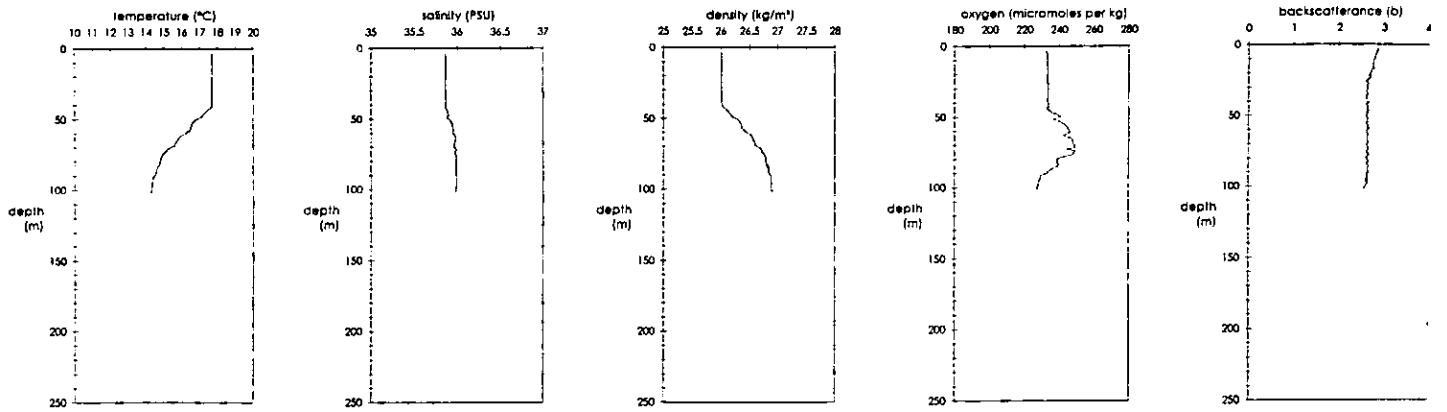
station 42 cast A



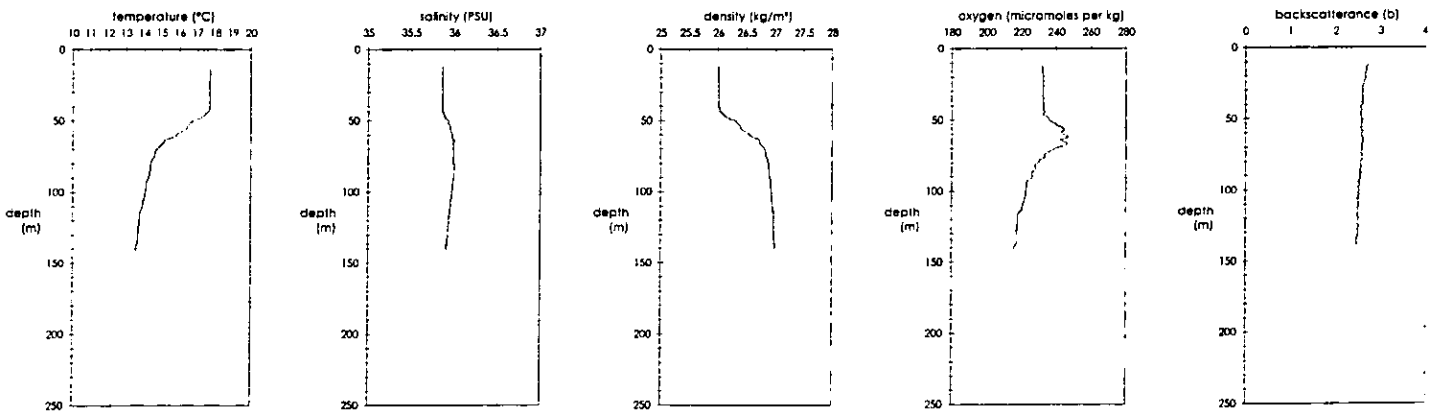
station 42 cast B



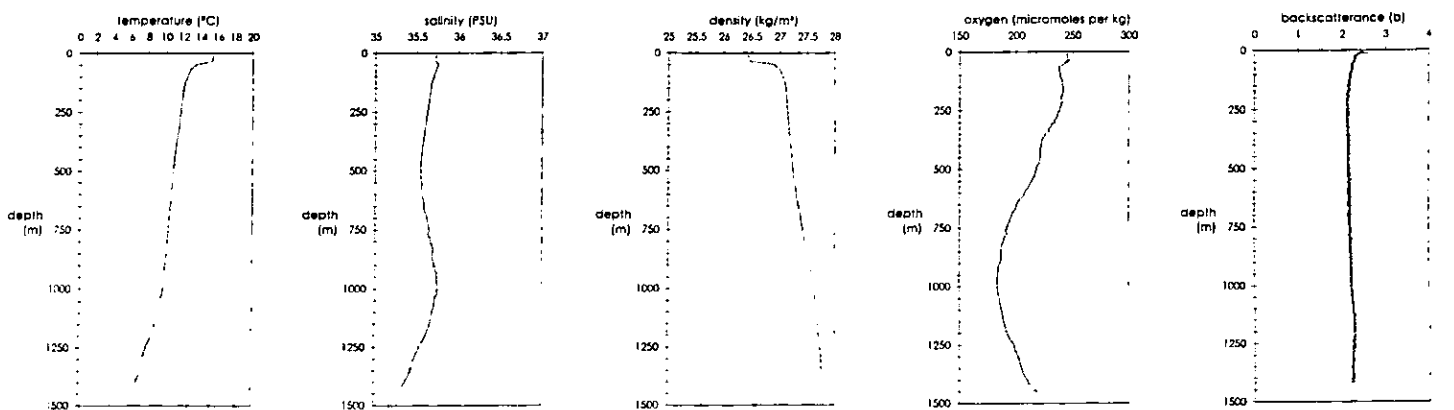
station 42 cast C



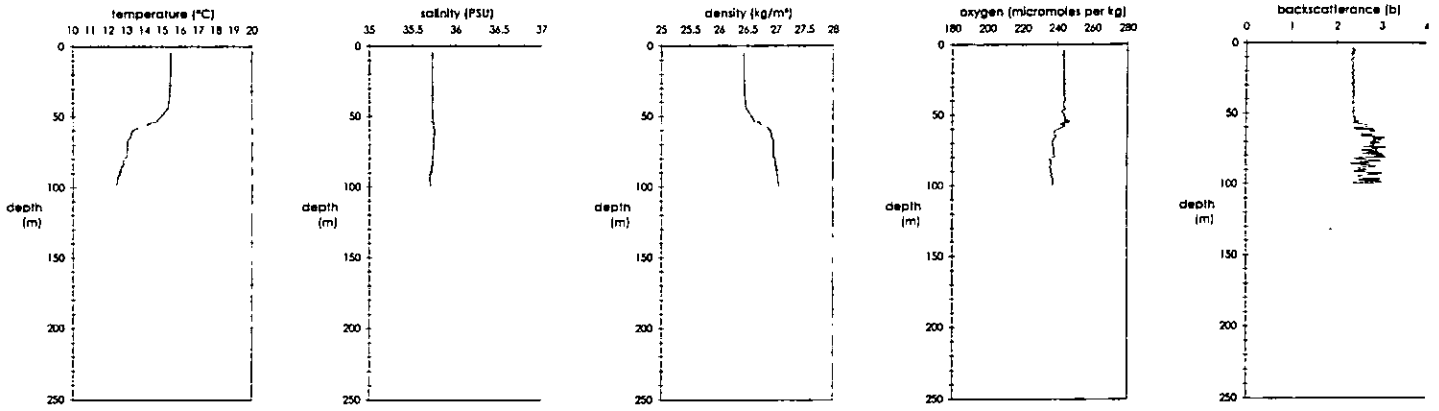
station 42 cast D



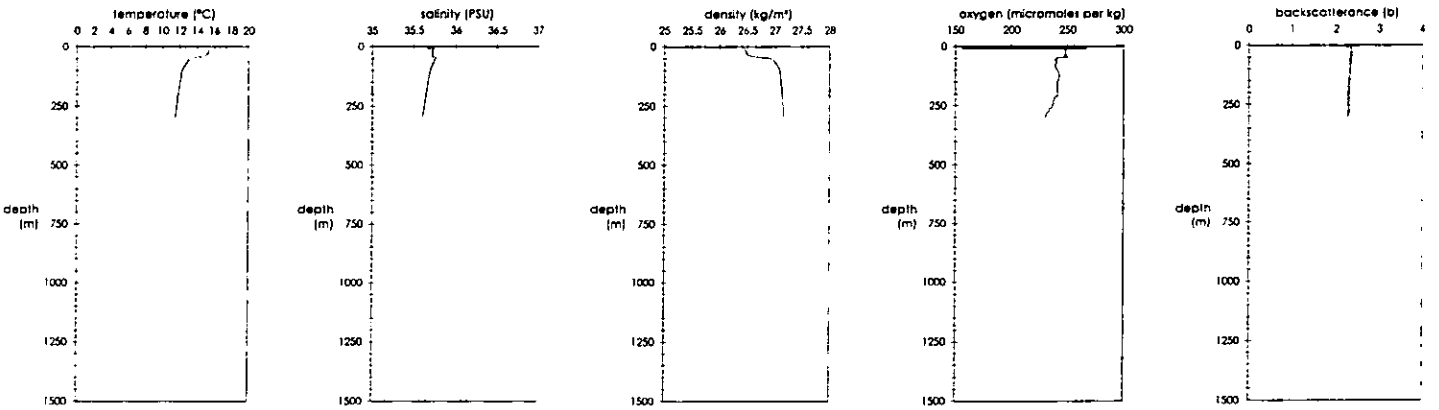
station 43 cast A



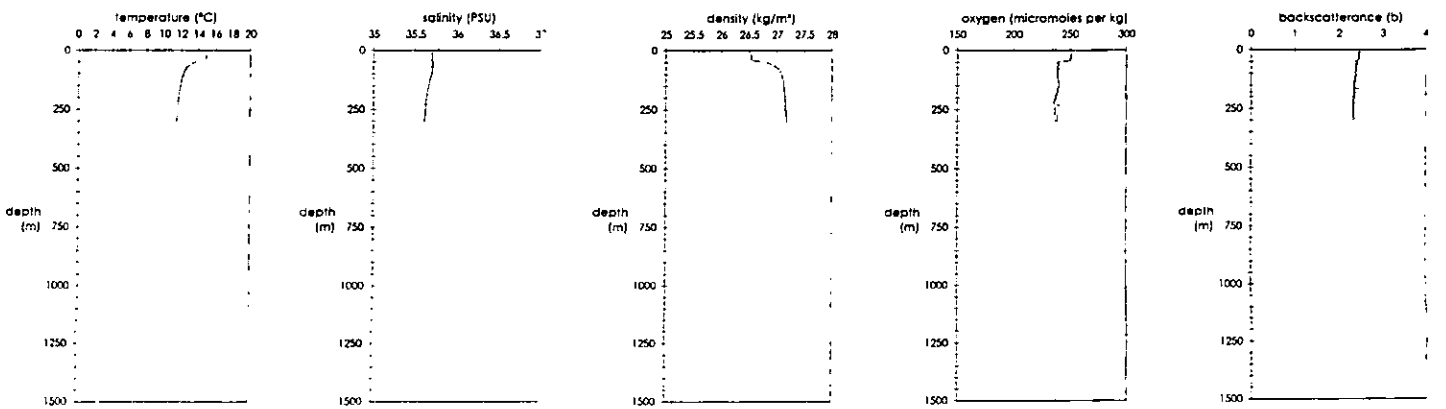
station 43 cast B



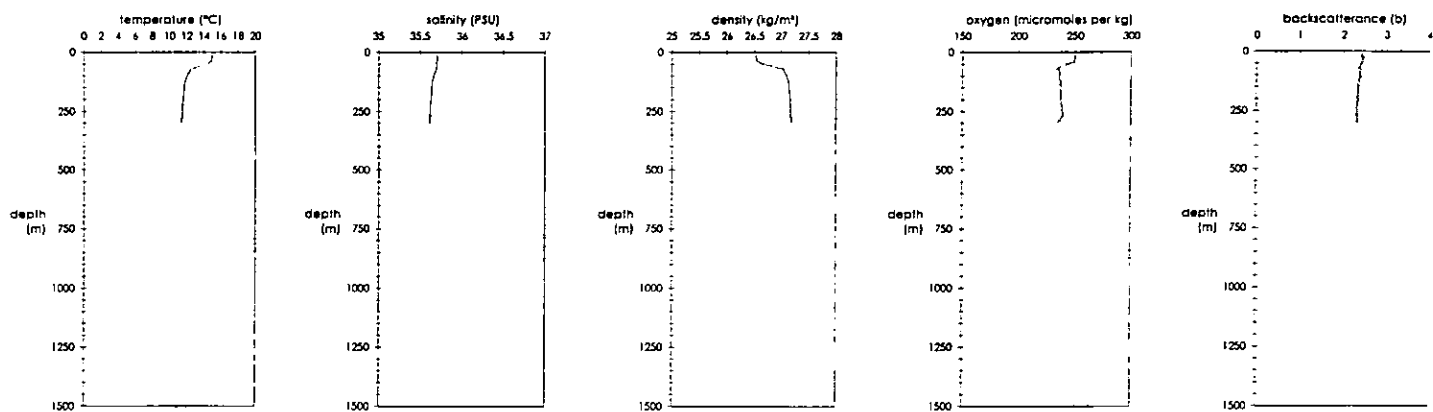
station 44 cast A



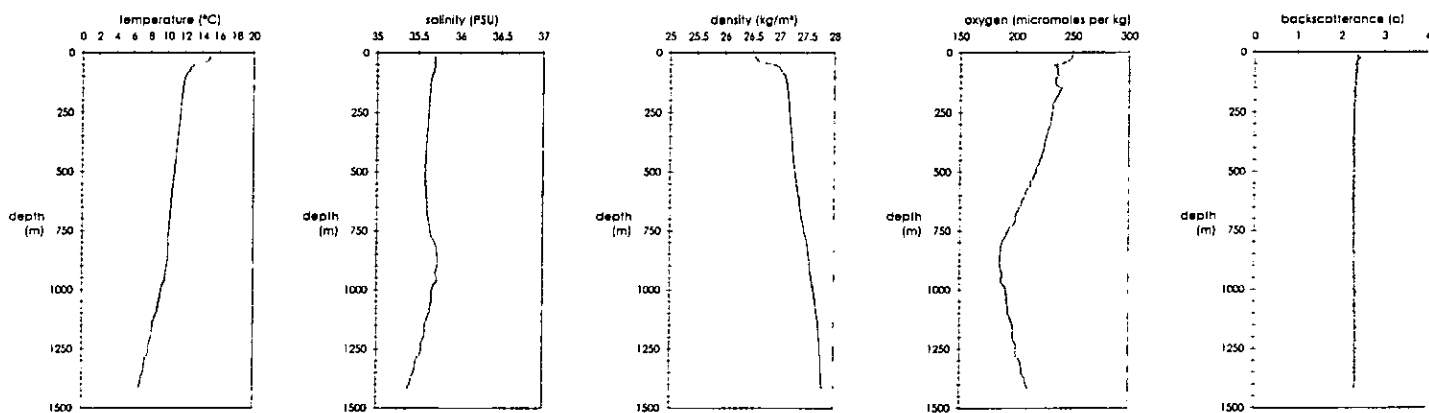
station 45 cast A



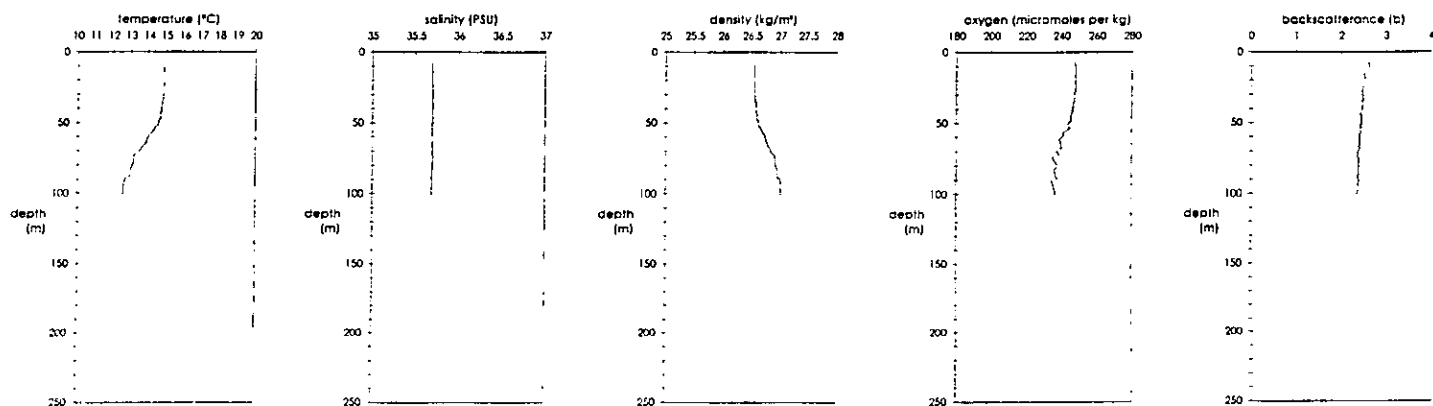
station 46 cast A



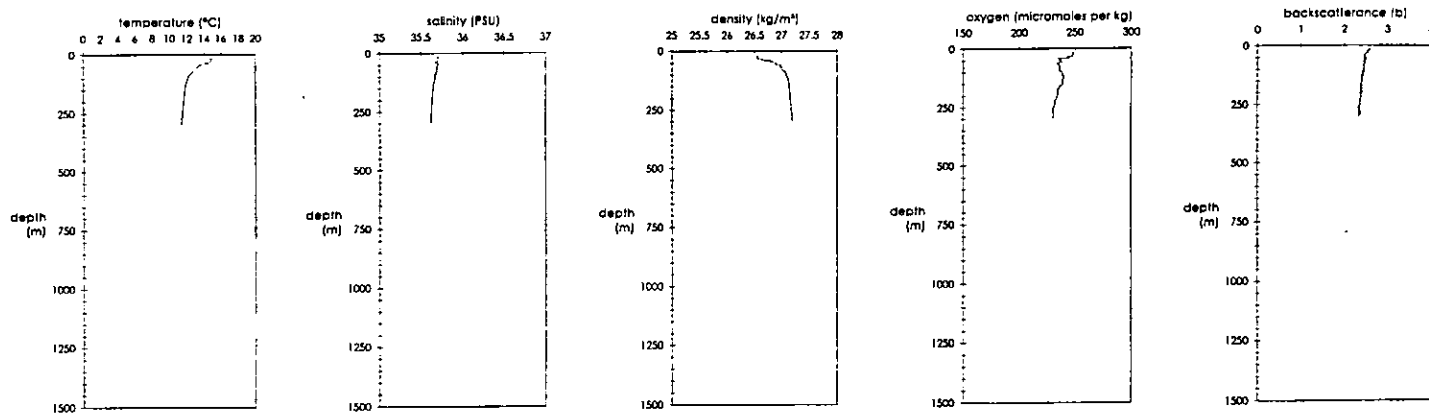
station 47 cast A



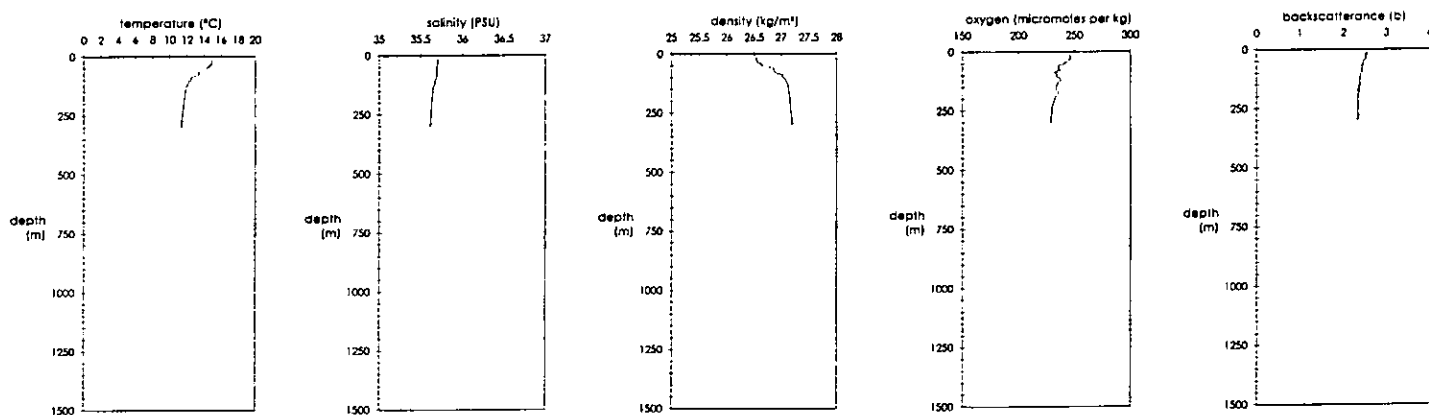
station 47 cast B



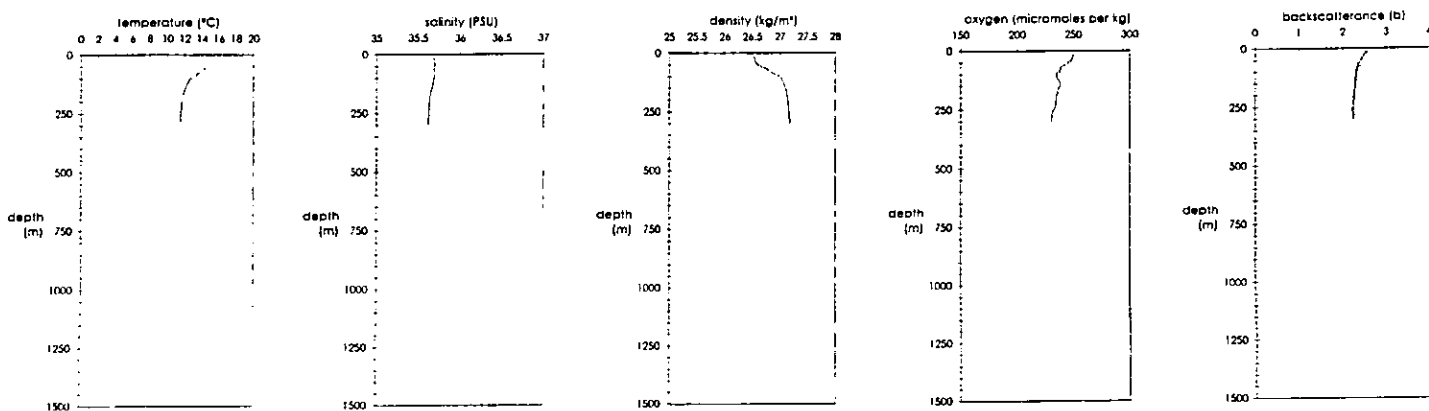
station 47 cast C



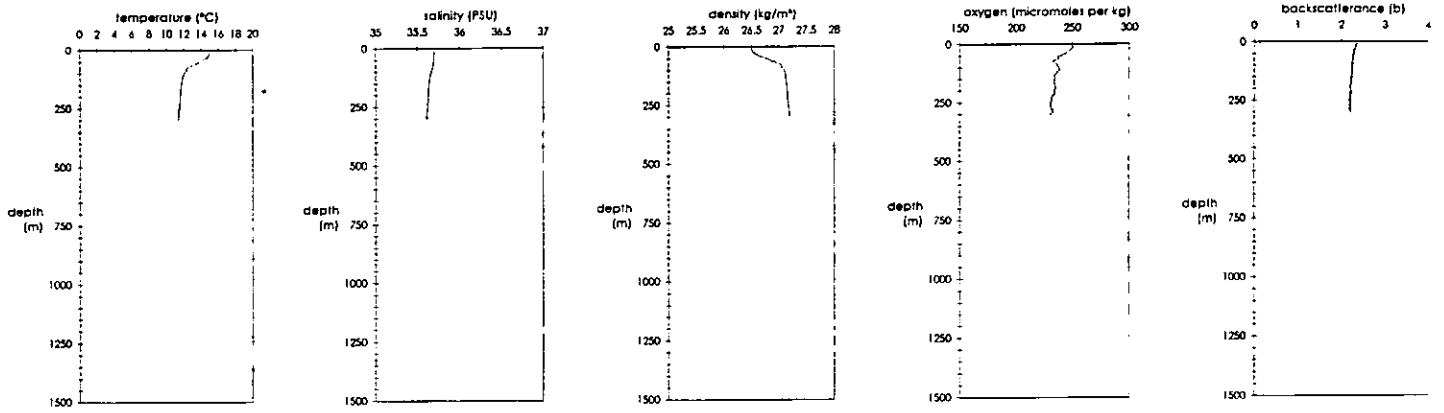
station 47 cast D



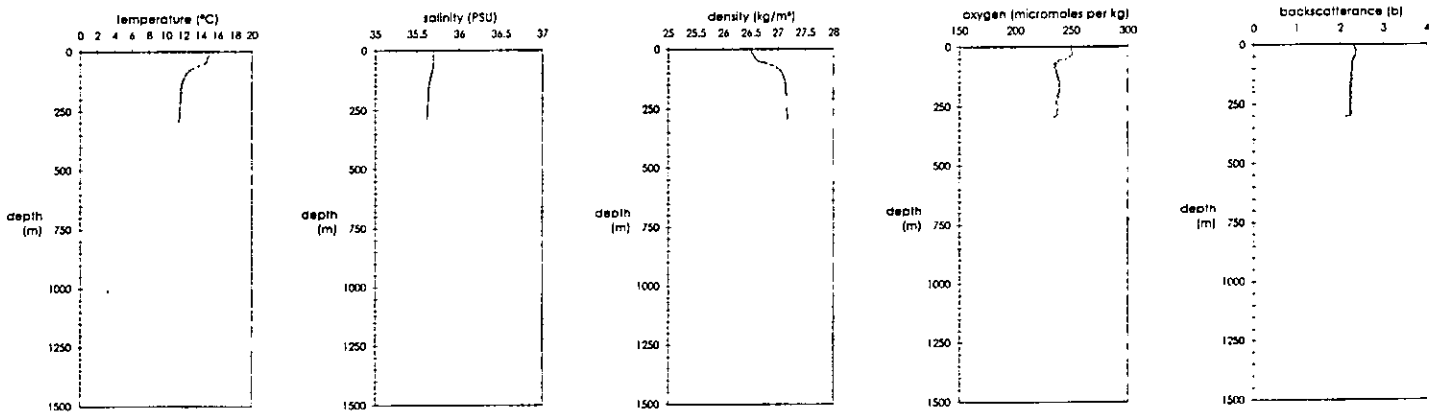
station 47 cast E



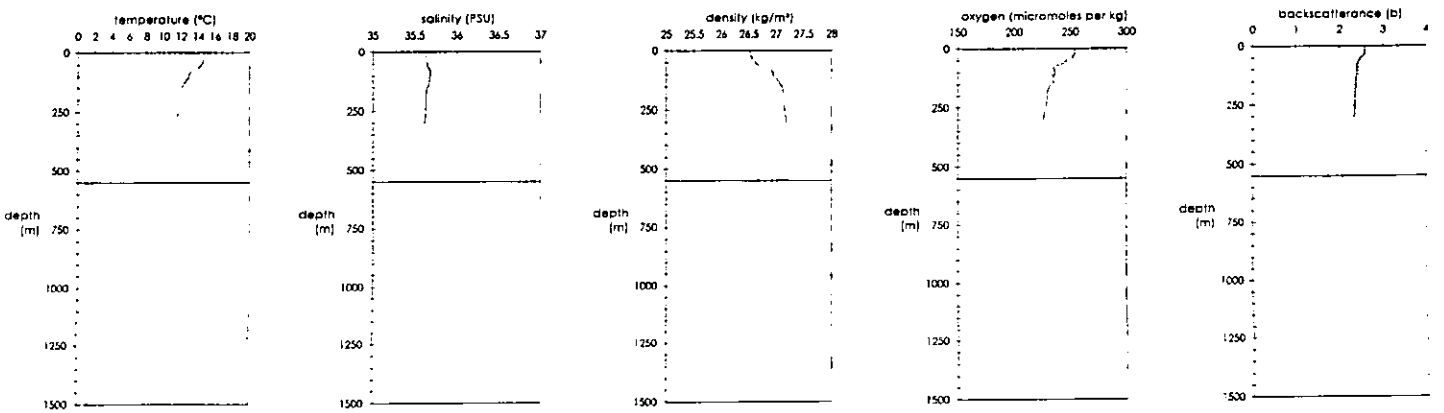
station 47 cast F



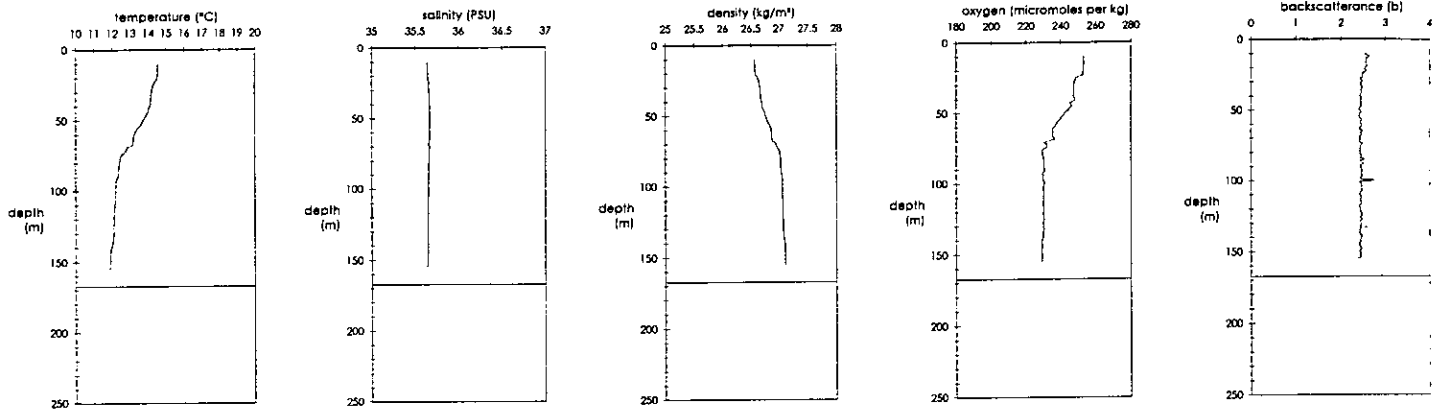
station 48 cast A



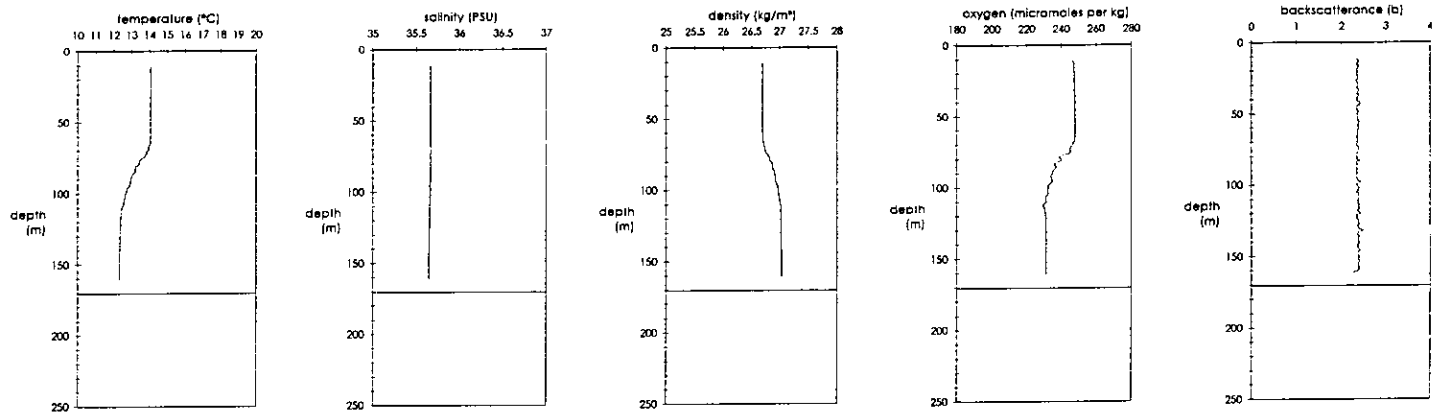
station 49 cast A



station 50 cast A



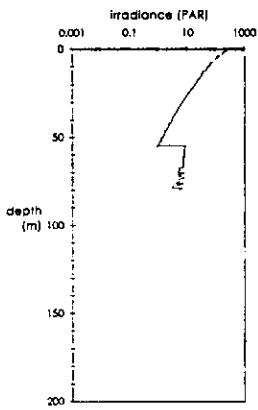
station 51 cast A



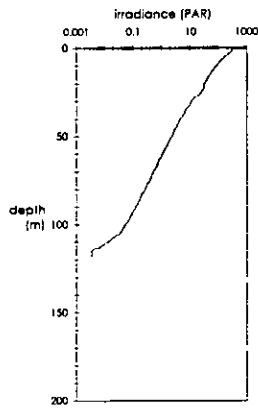
Appendix 6.

Vertical profiles of incident light (PAR sensor).

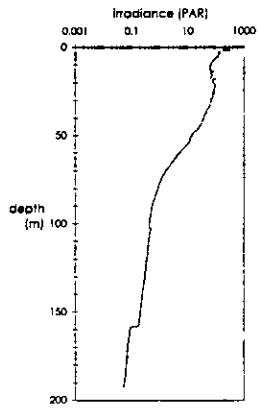
08 A



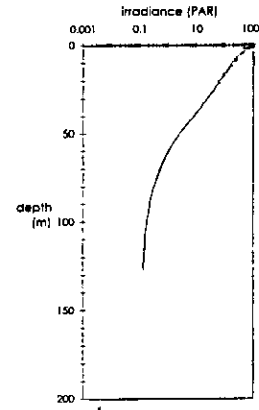
08 B



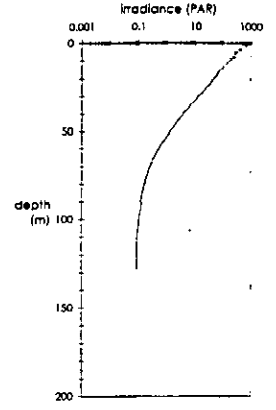
12 A



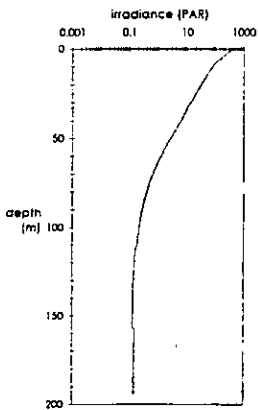
14 A



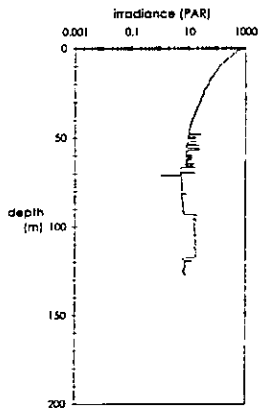
19A



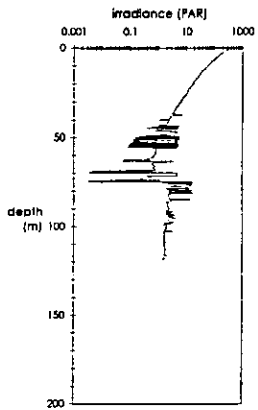
26 A



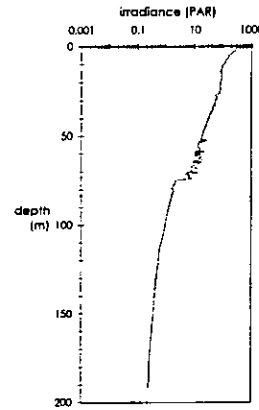
31 B



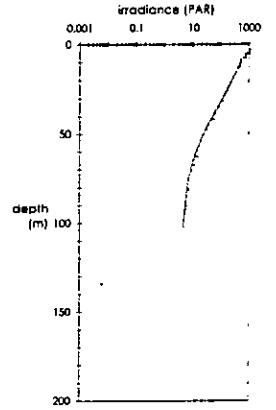
37 A



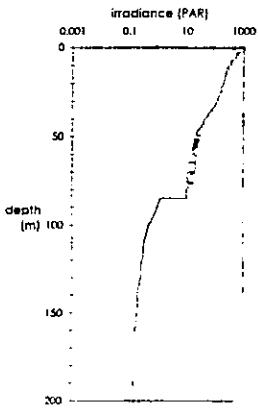
38 A



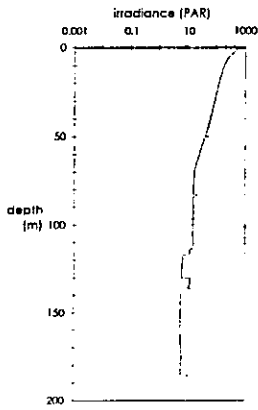
38B



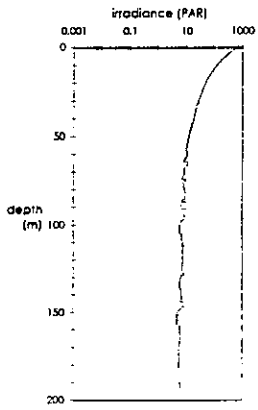
40 A



42 A



47 A



Appendix 7.

Comparison SEABIRD SBE09plus versus Guildline Portasal salinometer data.

data SEABIRD SBE09plus versus GUILDLINE PORTASAL salinometer
error SEABIRD SBE09plus versus GUILDLINE PORTASAL salinometer

Table 3. Data Sea-Bird SBE09plus versus Guildline Portasal salinometer.

station	cast	depth (m)	niskin	guildline portasal salinity	bottle data sbe09 salinity	bottle data sbe09 st. dev.	marker data sbe09 salinity	difference portasal-sbe09 bottle data	difference portasal-sbe09 marker data
IC 1	A	580	1	35.748	35.765	0	35.764	0.0169	0.0164
IC 1	A	400	2	35.6392	35.656	0	35.655	0.0163	0.0161
IC 1	A	200	3	35.7611	35.778	0.002	35.779	0.0168	0.0179
IC 1	A	100	5	35.8903	35.904	0	35.904	0.0142	0.0141
IC 1	A	60	7	35.9188	35.932	0.002	35.93	0.0136	0.0112
IC 1	A	5	12	35.3081	35.321	0	35.321	0.0127	0.0124
1	A	90	1	35.8043	35.821	0	35.821	0.0171	0.0166
1	A	50	7	35.9109	35.928	0	35.928	0.0169	0.0167
2	A	120	1	35.937	35.95	0.002	35.946	0.0132	0.009
2	A	10	12	35.4472	35.462	0	35.462	0.0143	0.0146
3	A	250	1	35.7231	35.74	0	35.74	0.0167	0.0167
3	A	80	7	35.9232	35.941	0.001	35.942	0.0179	0.0186
4	A	1414	1	35.5525	35.575	0.001	35.572	0.0223	0.0191
5	A	1420	1	35.5456	35.563	0	35.563	0.0175	0.0179
5	A	1000	4	36.01	36.029	0	36.03	0.0191	0.0197
5	A	850	7	36.1286	36.147	0	36.147	0.0179	0.0186
5	A	400	10	35.5917	35.609	0	35.615	0.0173	0.0237
6	A	85	2	35.7821	35.8	0	35.801	0.0183	0.0185
6	A	40	8	35.9248	35.942	0.001	35.942	0.0175	0.0169
7	A	120	1	35.7441	35.762	0	35.762	0.0176	0.0175
7	A	60	6	35.8927	35.906	0.003	35.904	0.0132	0.0111
8	A	140	1	35.7912	35.808	0	35.809	0.017	0.0175
8	A	80	4	35.9049	35.923	0.001	35.92	0.0184	0.0155
8	A	10	12	35.4148	35.43	0	35.43	0.0154	0.0153
9	A	210	1	35.7635	35.78	0	35.781	0.0163	0.0173
9	A	80	5	35.9521	35.97	0	35.97	0.0182	0.0179
15	A	260	1	35.6744	35.692	0	35.692	0.0172	0.0175
15	A	200	2	35.7445	35.761	0	35.762	0.0168	0.0177
15	A	200	3	35.7445	35.762	0	35.762	0.0173	0.0177
15	A	150	4	35.8277	35.846	0	35.845	0.0178	0.0173
15	A	150	5	35.8277	35.845	0	35.845	0.0176	0.0173
15	A	100	6	35.8661	35.891	0	35.889	0.0244	0.0231
15	A	100	7	35.8728	35.89	0.001	35.889	0.017	0.0164
15	A	80	8	35.8827	35.901	0	35.901	0.0187	0.0187
15	A	60	9	35.8911	35.909	0.001	35.91	0.0181	0.0191
15	A	40	10	35.8938	35.909	0	35.907	0.0149	0.013
16	A	1410	1	35.7243	35.743	0	35.744	0.0191	0.0195
16	A	1200	4	36.1298	36.15	0	36.15	0.0201	0.02
16	A	900	7	36.1532	36.173	0	36.173	0.02	0.02
16	A	400	10	35.615	35.635	0	35.635	0.0201	0.0197
17	A	1371	1	35.7789	35.798	0	35.798	0.0193	0.0196
17	A	1000	4	36.1699	36.191	0.001	36.19	0.0211	0.0205
17	A	400	7	35.5853	35.605	0	35.605	0.0195	0.0194
17	A	200	10	35.7587	35.774	0	35.778	0.0157	0.0192
18	A	70	1	35.8407	35.86	0.001	35.858	0.0191	0.0177
18	A	40	7	35.8685	35.887	0	35.886	0.0183	0.0172
19	B	130	1	35.7916	35.807	0.001	35.808	0.0158	0.016
20	A	542	1	35.8261	35.859	0.006	35.857	0.0328	0.0311
20	A	150	7	35.7813	35.803	0.001	35.801	0.0214	0.02
21	A	1428	1	35.6637	35.683	0	35.684	0.0197	0.0208
21	A	500	7	35.6601	35.681	0	35.681	0.0205	0.0204
21	B	80	1	35.8831	35.903	0.001	35.904	0.0196	0.0204
21	B	50	5	35.8899	35.906	0	35.905	0.0161	0.0147
21	B	10	11	35.6012	35.62	0	35.618	0.0184	0.0168
22	A	1430	1	35.4488	35.468	0	35.468	0.0187	0.0189
22	A	1000	4	36.0842	36.086	0.004	36.092	0.0021	0.0077

22	A	500	7	35.5612	35.581	0	35.581	0.0195	0.0194
22	A	200	10	35.7607	35.794	0	35.792	0.0328	0.0318
26	A	360	1	35.6344	35.655	0	35.657	0.0202	0.0224
27	A	1421	1	35.7005	35.721	0.001	35.716	0.0205	0.0151
27	A	100	12	35.9688	35.986	0	35.985	0.0168	0.0161
29	C	60	3	35.9565	35.976	0	35.974	0.0191	0.0171
29	C	10	10	35.8435	35.862	0	35.861	0.019	0.0174
32	A	800	1	36.0417	36.064	0	36.063	0.0222	0.0214
32	A	400	7	35.5984	35.622	0.001	35.621	0.0235	0.023
34	A	1420	1	35.5826	35.6	0.003	35.603	0.0171	0.0205
34	A	1000	4	36.1084	36.131	0.001	36.131	0.0226	0.023
34	A	400	7	35.6019	35.623	0	35.623	0.0206	0.0209
34	A	200	10	35.7227	35.742	0.002	35.743	0.0188	0.0207
35	A	1400	1	35.7013	35.719	0.002	35.724	0.0173	0.0229
35	A	1080	4	36.1191	36.142	0	36.142	0.023	0.0225
35	A	500	7	35.5363	35.556	0	35.556	0.02	0.0201
36	A	34	1	35.8174	35.837	0.002	35.839	0.0199	0.0211
38	A	10	12	35.7548	35.776	0	35.776	0.0207	0.0207
40	A	1420	1	35.7144	35.738	0.001	35.742	0.024	0.0277
40	A	1000	4	36.1222	36.151	0	36.151	0.0283	0.0283
40	C	10	12	35.7429	35.767	0	35.766	0.0238	0.0229
41	A	1428	1A	35.7623	35.788	0.001	35.789	0.0253	0.0267
41	A	1428	2	35.7631	35.787	0.001	35.789	0.024	0.0259
41	A	1428	3	35.7619	35.786	0	35.789	0.0245	0.0271
41	A	1080	4	36.1318	36.157	0	36.157	0.025	0.0249
41	A	1080	5	36.1302	36.157	0	36.157	0.0265	0.0265
41	A	1020	6	36.1306	36.156	0	36.156	0.0252	0.0253
41	A	600	7	35.6843	35.71	0	35.71	0.0256	0.0259
41	A	600	8	35.6827	35.709	0.001	35.71	0.0268	0.0275
41	A	480	9	35.5909	35.614	0.001	35.616	0.0228	0.0251
41	A	480	10	35.5901	35.613	0.002	35.616	0.0229	0.0259
41	A	80	11	35.9026	35.927	0.001	35.926	0.024	0.0236
41	A	80	12	35.9041	35.926	0.001	35.926	0.0219	0.0221
41	A	1428	1B	35.7627	35.788	0.001	35.789	0.0249	0.0263
41	A	1428	1C	35.7627	35.788	0.001	35.789	0.0249	0.0263
43	A	1418	1	35.3259	35.351	0	35.351	0.0248	0.0249
43	A	1000	4	35.7263	35.75	0	35.75	0.0239	0.0238
43	A	600	7	35.5414	35.565	0	35.565	0.0234	0.0232
44	A	300	1	35.5833	35.604	0	35.605	0.0206	0.0212
44	A	150	7	35.638	35.663	0	35.663	0.0254	0.0251
45	A	250	1	35.5976	35.623	0	35.623	0.0252	0.025
46	A	300	1	35.5845	35.61	0	35.61	0.0252	0.0253
47	A	1420	1	35.3523	35.375	0	35.376	0.0231	0.0237
47	A	900	5	35.7065	35.733	0	35.732	0.0268	0.0259
47	D	300	1	35.5857	35.609	0	35.609	0.0233	0.0235
47	D	80	5	35.663	35.69	0	35.688	0.0266	0.0248
47	E	300	1	35.5948	35.618	0	35.618	0.0237	0.0236
47	E	80	5	35.6657	35.689	0	35.688	0.0232	0.0225
47	F	300	1	35.5877	35.613	0	35.613	0.0256	0.0253
48	A	300	1	35.5948	35.619	0	35.619	0.0241	0.0241
49	A	300	1	35.6004	35.619	0	35.62	0.019	0.0194
50	A	155	1	35.6146	35.64	0	35.64	0.0252	0.0252
51	A	160	1	35.6225	35.648	0	35.648	0.0257	0.0257
VI	A	100	1	35.8907	35.909	0		0.0179	

Figure 4. Error SBE09 versus Guildline Portasal

