Management Unit of the North Sea
Mathematical Models

R/V BELGICA Cruise 98/15

OMEX II phase 2 - BIOCHEMISTRY Programme

Belgian GLOBAL CHANGE and SUSTAINABLE DEVELOPMENT Programme

BMM-MDO/99-02/DWTC-GL-CH/OMEX/Report

- 1999 -

BMM

BEHEERSEENHEID MATHEMATISCH MODEL VAN
DE NOORDZEE

Oostende, de 02.04.99

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In antwoord op

Bijlage(n)
2

cc

Concerns : BELGICA OMEX cruises 1997/14 & 1998/15

Please find enclosed a copy of the reports of MUMM's contribution to the above mentioned BELGICA cruises.

I trust these reports will be of some help in preparing the second OMEX II annual workshop 25-27 April '99.

Yours sincerely,

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R/V BELGICA CRUISE 98/15.

Belgian GLOBAL CHANGE and SUSTAINABLE DEVELOPMENT Programme

OMEX II - BIOGEOCHEMISTRY Programme

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1. INTRODUCTION.

On 14 June 1998 the RV Belgica left Zeebrugge and headed for the harbour of Lisboa. During this **leg A** only underway parameters were measured. The RV Belgica arrived in Lisboa on 20 June and participated to the "EXPO '98. The Oceans, a heritage for the future." (20 June until 25 June).

During the **leg B** from Lisboa to Vigo the CTD systems were installed and tested by MUMM. The RV Belgica arrived at Vigo on 26 June at 11h00 GMT for the embarkation of 10 scientists.

The cruise 98/15 (**leg C**) started on 27 June. This cruise has been conducted in the framework of the Ocean Margin Exchange project "**OMEX II**" (EEC MAST III programme) with the research efforts focussed on the upwelling zone along the Spanish coast. 33 stations have been sampled in front of the Spanish coast. With the exception of transect O2T (42°N), the same transects O2N to O2S as during cruise R/V Belgica 97/14 were sampled. On 02 July the weather conditions were too bad for taking CTD casts and it was decided to measure underway parameters along the coast and in the Ria de Arosa and the Ria de Muros. After 12 days at sea, the Belgica arrived at La Coruña on 7 July at 14h.

The Belgica left the harbour of La Coruña on 10 July and headed for the La Chapelle Bank (**leg D**) where the stations 39 to 47 were sampled. These 9 stations were sampled in the frame of the **Belgian Global Change and sustainable development programme**. The Belgica arrived at Zeebrugge on 14 July 1998.

Dr. M. Frankignoulle (ULg) was the principal scientist aboard the BELGICA for the main part of the cruise. Dr. M. Elskens (VUB) was the principal scientist during the leg La Coruña-Zeebrugge.

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 Investigacions Marinas (IIM), Vigo, Spain.
* Forschungszentrum für Marine Geowissenschaften der Universität (Geomar), Kiel, Germany.
* British Oceanographic Data Centre (BODC), Merseyside, UK.

* Plymouth Marine Laboratory, Remote Sensing Data Analysis Service (PML-RSDAS), UK.
* University of Algarve, Faro (UAL), 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, 51 Sea-Bird SCTD casts and 21 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 and chlorophyll 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 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 22 Scientific Echosounder.
  The Atlas Deso 22 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.
* TSS 320B Heave Compensator.
  The data of the Atlas Deso 22 echosounder are corrected for the heave by the TSS 320B.
* Furuno Echosounder FCV381.
  The Furuno is also equipped with 2 transducers (28 kHz and 88 kHz). Only the 28 kHz transducer with a depth range of ca. 2000 m in good weather conditions is used .

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 times 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 μmol s^{-1} 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	µmol/kg	0 - 600	5 µmol / kg / 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/m²	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 : ST9815A
-PDC : N9910S

The datafiles created with the Sea-Bird CTD systems during the BELGICA cruise 98/15 have the following file names.

Filename	Acquisition rate	Type of data	Duration
st9815an9910s1	10"	navig. + meteo + oceano.	Full campaign.
981501A.DAT to 981547A.DAT (for a complete list see appendix 1)	0.5"	CTD vertical profile	Stations 01A to 47A.
L02a00.dat L02b00.dat L04a00.dat L05a00.dat L19a00.dat L20a00.dat L20b00.dat L23a00.dat L23b00.dat L25a00.dat L26a00.dat L26b00.dat L27a00.dat L33a00.dat L33b00.dat L33ba00.dat L34a00.dat L34ba00.dat L35a00.dat L35b00.dat L35ba00.dat L37a00.dat L38a00.dat L38b00.dat L38c00.dat L43a00.dat L43b00.dat	0.5"	Light profile	Stations 02, 04, 05, 19,20,23,25,26,27,33,34, 35,37,38 and 43.

Table 4. Data file inventory.

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

4. DATA PROCESSING AND DATA VALIDITY.

4.1. Navigational data.

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. Meteorological data.

The meteo data are stored on board the Belgica in the Informix database with a 10 sec. interval. At the MUMM Measuring Service spikes have been eliminated while also the data have been averaged over a 10 min. interval. For the windspeed and -direction the data were vector averaged.

4.3. Oceanographic data.

4.3.1 Underway data.

4.3.1.1. Editing and averaging.

The data of the legs A and B have been edited and averaged over a 30" time interval at MUMM.
The data of the main legs C and D have been edited by BODC and have also been averaged over a 30" time interval.

4.3.1.2. Salinity and temperature calibrations.

For legs A and B no calibrations have been applied due to the absence of discrete samples.
For leg C the calibration of the seawatertemperature against 25 surface CTD samples gave an offset of -0.006 deg C with a STD of 0.016 (cfr. BODC).
The calibration of the salinity against 44 CTD and watersamples gave an offset of -0.005 PSU and a STD of 0.005 (cfr. BODC).
For leg D the temperature calibration gave +0.003 deg C (STD = 0.017) while the salinity calibration gave an offset of -0.005 PSU (STD =0.005) (cfr. BODC).

4.3.1.3. 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 aceton. 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 c : the fluorometer shows stepping at the following times :
28.06.1998 10h57
29.06.1998 15h07
30.06.1998 07h06
05.07.1998 18h57

After correction of the data the following correlation was applied (cfr. BODC):
chlorophyll = -0.526 + 0.118*fluorescence, R^2 = 0.85, n = 34

Leg d (against 15 discrete samples) : chlorophyll = -0.301 + 0.073*fluorescence
(see plots in Appendix 3)

4.3.2 CTD data

4.3.2.1 Validation of the SCTD salinity measurements.

During the campaign vertical SCTD profiles have been taken with the SBE model 09*plus* SCTD system. The SBE09*plus* SCTD system was equipped with a SBE-3 temperature sensor and a SBE-4 conductivity sensor.

At different locations and multiple depths water samples have been taken to validate the salinity data of the SBE09*plus* 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 the Institute of Oceanographic Sciences (UK).

The results of the Guildline Portasal salinometer have been compared with the Sea-Bird SBE09*plus* salinity measurements (see Table 3, Appendix 7 and Figure 4, Appendix 7).

	Standard deviation ppt	Mean error ppt	Corrolation coëff.
SBE09*plus* - Guildline leg c	0.0055	0.0041	0.999413
SBE09*plus* - Guildline leg d	0.0028	0.0082	0.972731

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

corrected salinity : leg c : measured salinity - 0.0041
leg d : measured salinity - 0.0082

corrected density : leg c : measured density - 0.0032
leg d : measured density - 0.0064

4.3.2.2. 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.".

4.4. 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 98/15, respectively leg c (Spanish coast) and leg d (Banc de la Chapelle).

APPENDIX 2 :
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 :
The surface watertemperature, the salinity and the fluorescence are plotted in function of time. These data were acquired with the Sea-Bird SBE21 thermosalinograph and the Turner Designs fluorometer.

APPENDIX 4 :
Table 2 gives the values of the oceanographic parameters at the SCTD water sampling points.

APPENDIX 5:
The vertical 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 a number of stations 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

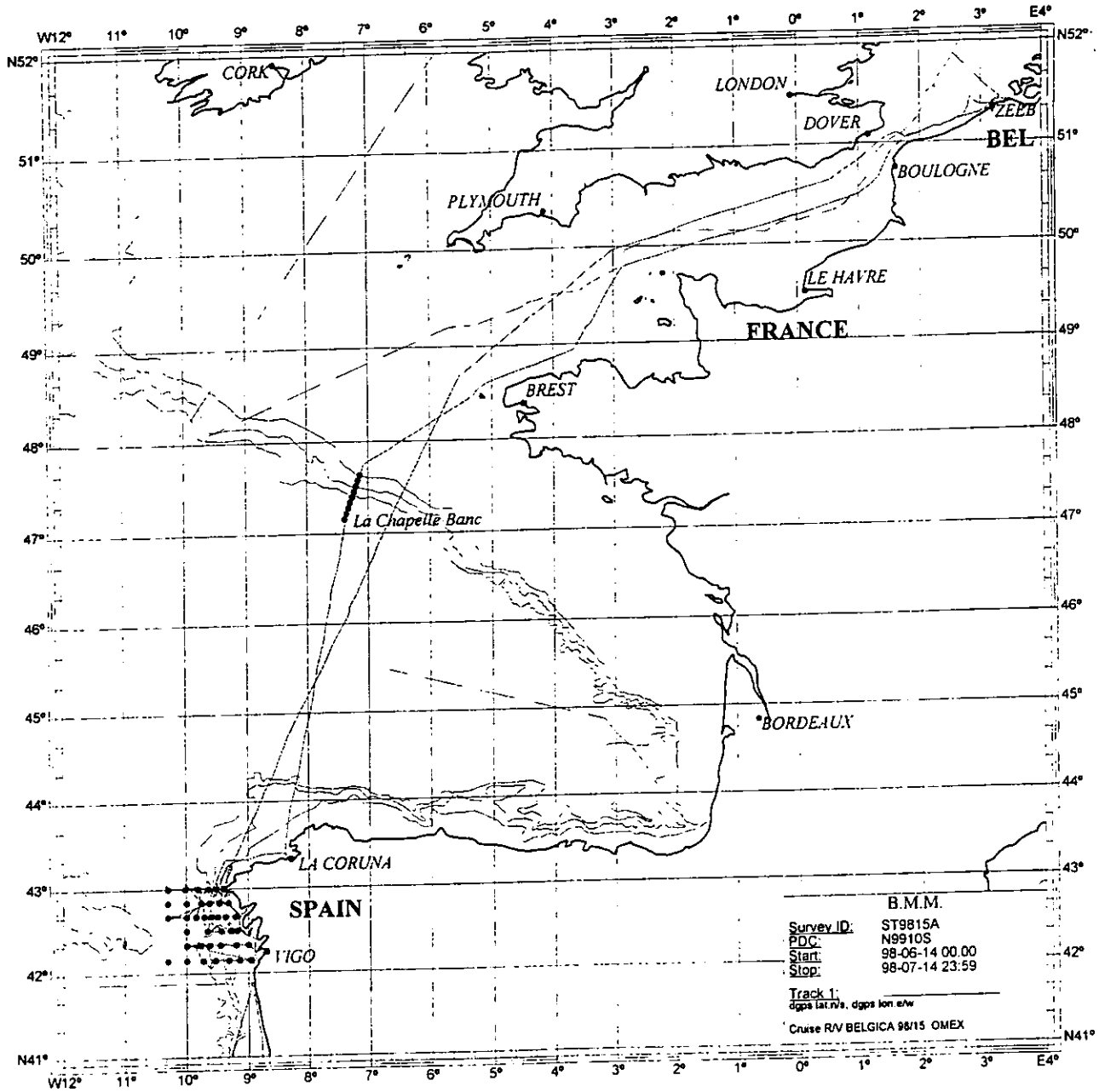

W12°
11°
10°
9°
8°
7°
6°
5°
4°
3°
2°
1°
0°
1°
2°
3°
E4°
N52°
N41°
CORK
LONDON
DOVER
ZEEB
BEL
BOULOGNE
PLYMOUTH
LE HAVRE
FRANCE
BREST
La Chapelle Banc
BORDEAUX
LA CORUNA
SPAIN
VIGO
51°
50°
49°
48°
47°
46°
45°
44°
43°
42°
B.M.M.
Survey ID: ST9815A
PDC: N9910S
Start: 98-06-14 00.00
Stop: 98-07-14 23:59
Track 1:
dgps lat.n/s, dgps lon.e/w
Cruise R/V BELGICA 98/15 OMEX

Figure 1.

Table 1. Position SCTD stations OMEX 98/15.

Station number	Date 1998	Time of V.P.(1)	Latitude	Longitude	Water Depth [m]	Data file
R08	27-Jun	15:05 pm	N42 19 53.41	W 9 00 12.60	95	981508A
R09	27-Jun	16:34 pm	N42 19 57.00	W 9 12 18.36	156	981509A
R13	27-Jun	19:59 pm	N42 20 00.60	W 9 59 52.80	2600	981513A
S01	28-Jun	03:41 am	N42 08 49.20	W 8 57 32.40	92	981501A
S02	28-Jun	05:06 am	N42 08 49.92	W 9 08 21.84	146	981502A
S03	28-Jun	11:52 am	N42 08 54.64	W 9 18 52.49	216	981503A
S04	28-Jun	14:12 pm	N42 08 54.75	W 9 32 36.95	1310	981504A
S05	29-Jun	08:45 am	N42 08 34.44	W 9 44 03.48	2250	981505A
Q15	29-Jun	20:57 pm	N42 30 33.84	W 9 19 03.36	151	981515A
Q14	29-Jun	21:45 pm	N42 29 52.38	W 9 10 55.74	89	981514A
P20	30-Jun	03:54 am	N42 39 51.76	W 9 22 01.47	131	981520A
P19	30-Jun	11:12 am	N42 40 06.71	W 9 12 42.84	102	981519A
P21	30-Jun	13:56 pm	N42 39 50.41	W 9 30 12.60	196	981521A
P22	30-Jun	15:27 pm	N42 40 10.93	W 9 36 34.56	1200	981522A
Q17	30-Jun	18:01 pm	N42 30 00.18	W 9 39 40.77	1182	981517A
Q16	30-Jun	20:45 pm	N42 29 57.85	W 9 26 19.68	1050	981516A
P23	1-Jul	04:47 am	N42 39 37.44	W 9 42 11.52	1421	981523A
P24	1-Jul	15:20 pm	N42 39 36.36	W 9 50 47.76	1974	981524A
O28	1-Jul	21:36 pm	N42 50 06.65	W 9 28 12.33	163	981528A
N33	2-Jul	05:03 am	N43 00 10.43	W 9 23 43.80	127	981533A
O27	2-Jul	11:21 am	N42 49 55.56	W 9 19 23.88	127	981527A
N35	3-Jul	04:44 pm	N42 59 57.85	W 9 39 00.72	1587	981535A
N34	3-Jul	15:20 pm	N42 59 47.77	W 9 30 52.92	206	981534A
N36	3-Jul	18:08 pm	N42 59 48.47	W 9 48 25.92	1500	981536A
N38	4-Jul	04:44 pm	N43 00 05.39	W10 18 14.04		981538A
N37	4-Jul	15:11 pm	N43 00 13.32	W10 01 06.60		981537A
O29	4-Jul	20:35 pm	N42 49 46.71	W 9 37 55.00	820	981529A
P26	5-Jul	05:19 am	N42 39 14.03	W10 18 50.40	>2500	981526A
P25	5-Jul	13:16 pm	N42 40 02.29	W 9 59 59.64	2308	981525A
O30	5-Jul	19:47 pm	N42 49 54.84	W 9 46 05.52	>2000	981530A
N33B	6-Jul	07:18 am	N43 00 00.00	W 9 23 55.68	124	981533B
N35B	6-Jul	11:59 am	N43 00 17.65	W 9 38 43.80	1436	981535B
N34B	6-Jul	14:18 pm	N42 59 57.74	W 9 31 02.75	305	981534B
LC39	11-Jul	04:18 am	N47 16 47.29	W 7 20 24.36		981539A
LC40	11-Jul	05:01 am	N47 20 27.52	W 7 18 05.38		981540A
LC41	11-Jul	05:50 am	N47 24 00.67	W 7 16 10.43		981541A
LC42	11-Jul	06:46 am	N47 27 33.14	W 7 13 48.04		981542A
LC43	11-Jul	07:56 am	N47 31 19.20	W 7 11 44.16		981543A
LC44	12-Jul	06:13 am	N47 35 08.17	W 7 10 28.20	171	981544A
LC45	12-Jul	06:48 am	N47 38 19.75	W 7 08 27.52	170	981545A
LC46	12-Jul	07:41 am	N47 41 33.72	W 7 06 19.08	165	981546A
LC47	12-Jul	08:28 am	N47 45 02.15	W 7 04 41.52	171	981547A

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

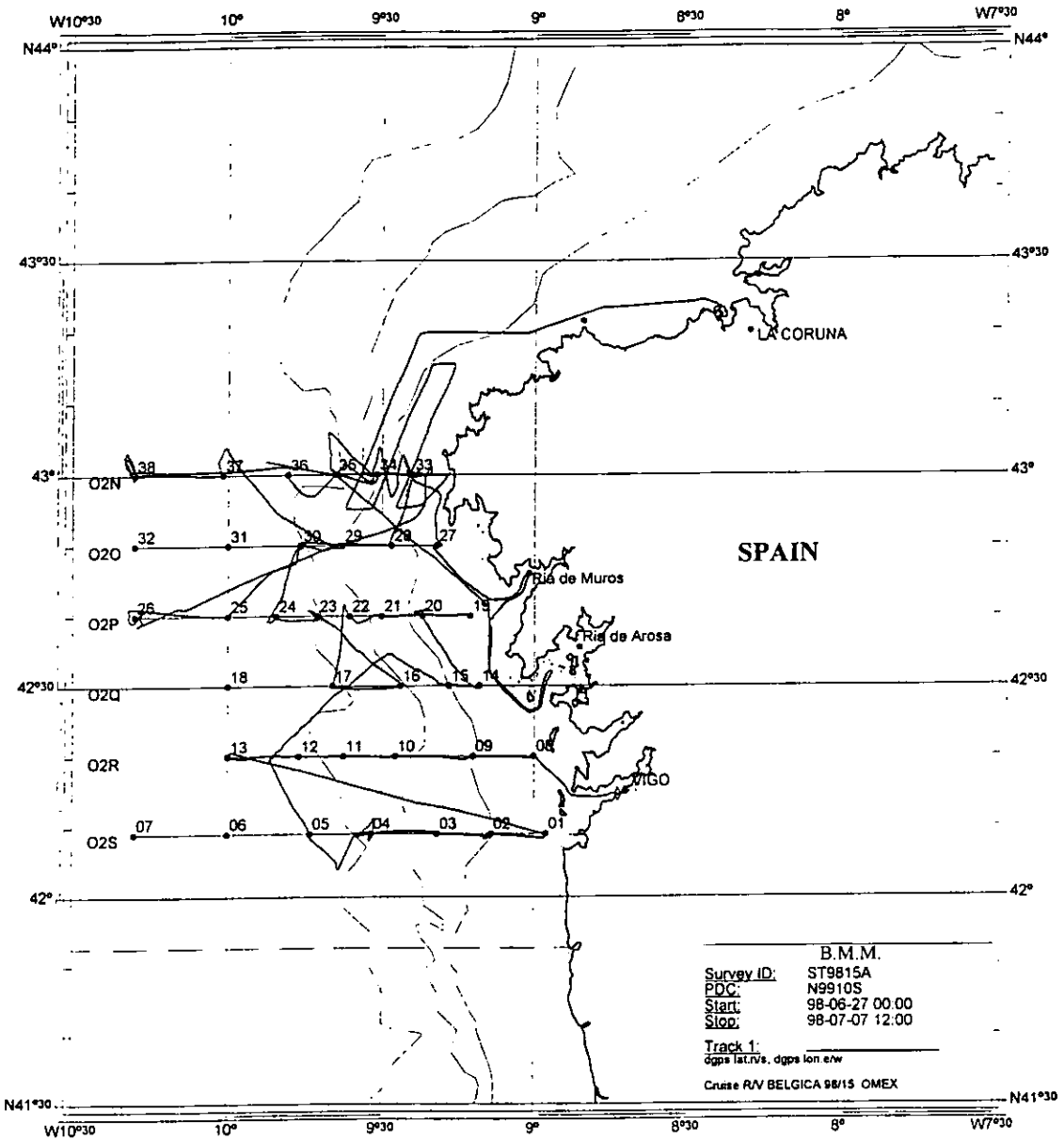
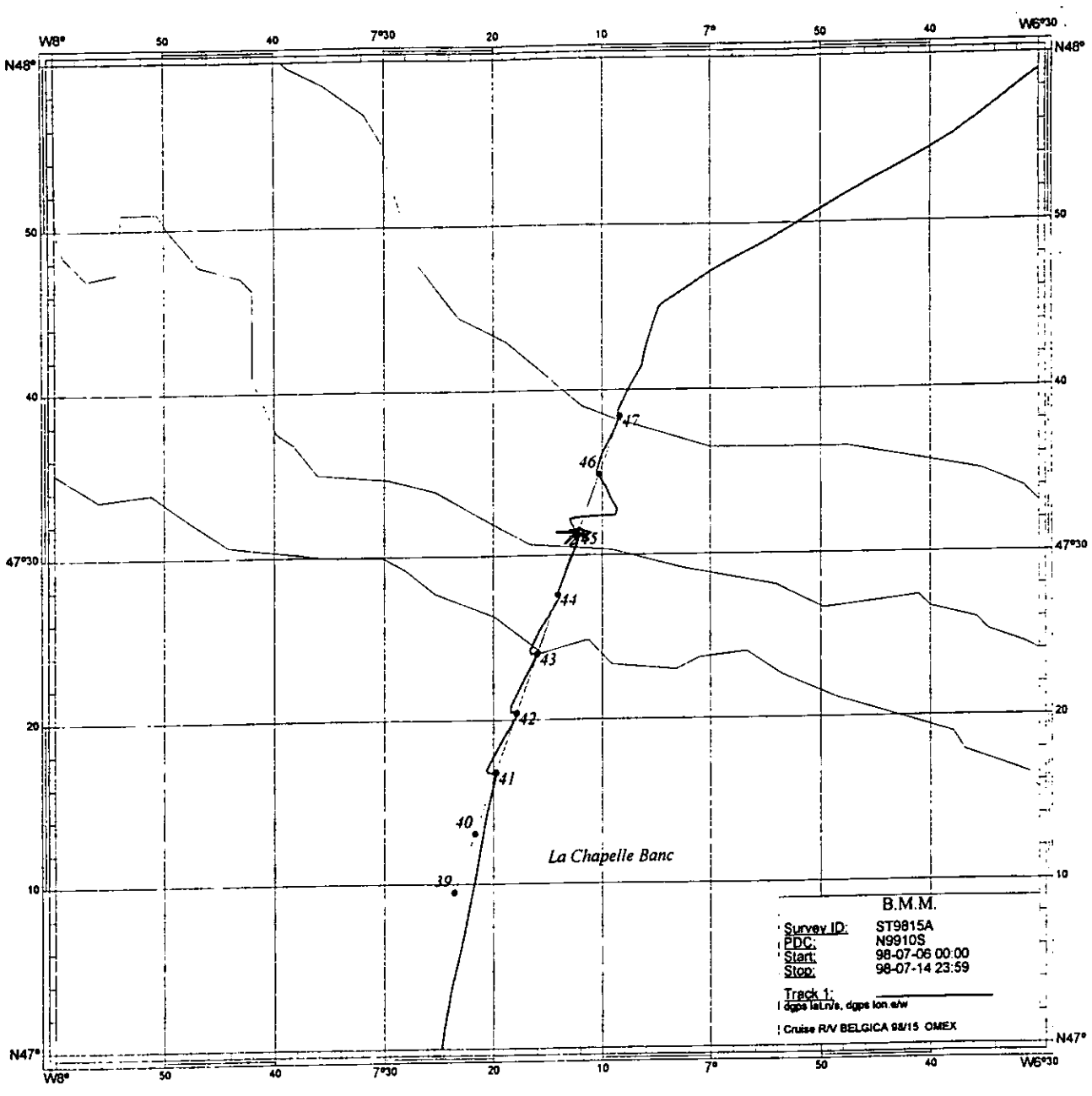

W10°30
10°
9°30
9°
8°30
8°
W7°30
N44°
43°30
43°
42°30
42°
N41°30
LA CORUNA
SPAIN
Ria de Muros
Ria de Arosa
VIGO
O2N
O2O
O2P
O2Q
O2R
O2S
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
09
08
07
06
05
04
03
02
01
B.M.M.
Survey ID: ST9815A
PDC: N9910S
Start: 98-06-27 00:00
Stop: 98-07-07 12:00
Track 1:
dgps lat.n/s, dgps lon.e/w
Cruise R/V BELGICA 98/15 OMEX

Figure 2.


W8°
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40
7°30
20
10
7°
50
40
W6°30
N48°
50
40
47°30
20
10
N47°
47
46
45
44
43
42
41
40
39
La Chapelle Banc
B.M.M.
Survey ID: ST9815A
PDC: N9910S
Start: 98-07-06 00:00
Stop: 98-07-14 23:59
Track 1:
dgps lat.n/s, dgps lon.e/w
Cruise R/V BELGICA 98/15 OMEX

Figure 3.

Appendix 2.

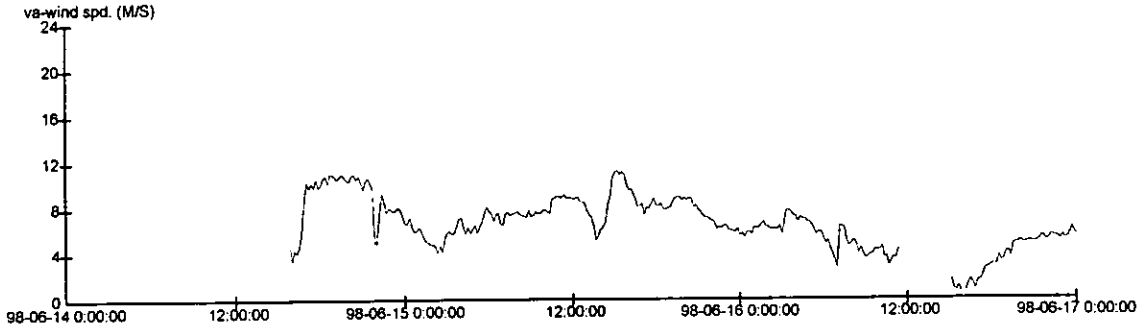
Meteorological data during the complete campaign.

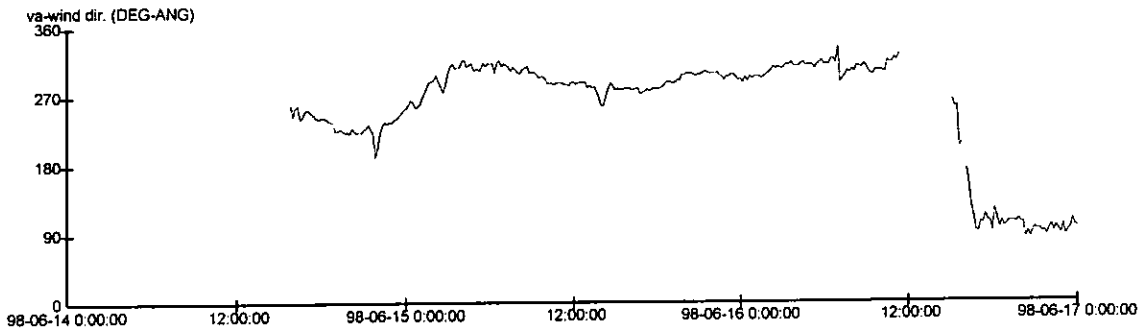
FRIEDRICHS : windspeed and -direction, airtemperature, atm. pressure

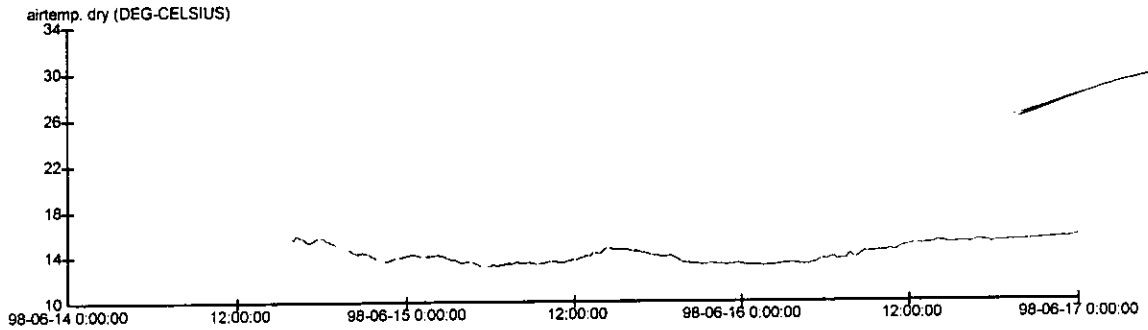
KIPP & ZONEN : solar radiation

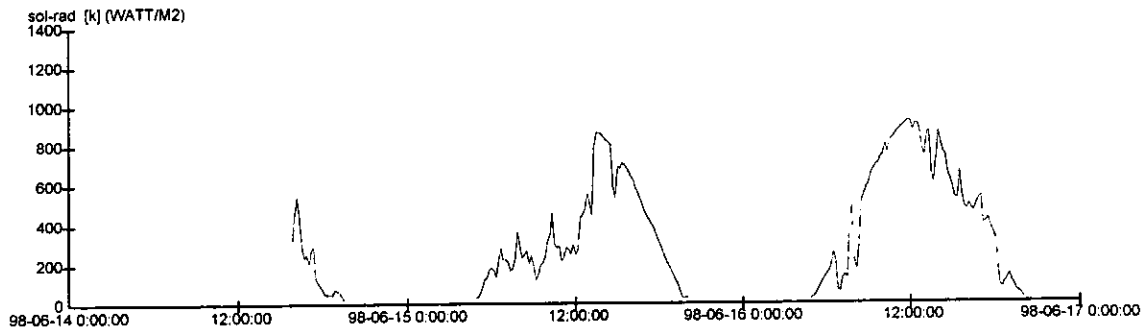
RV BELGICA - CRUISE 98/15

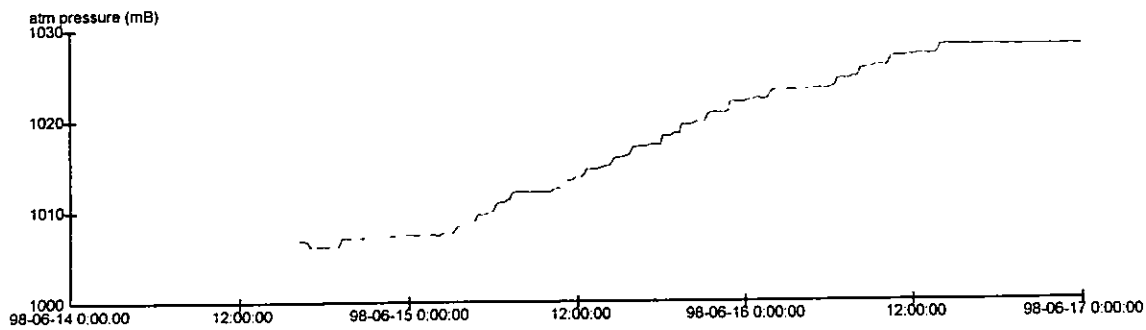
14.06.98 0:00 - 17.06.98 0:00









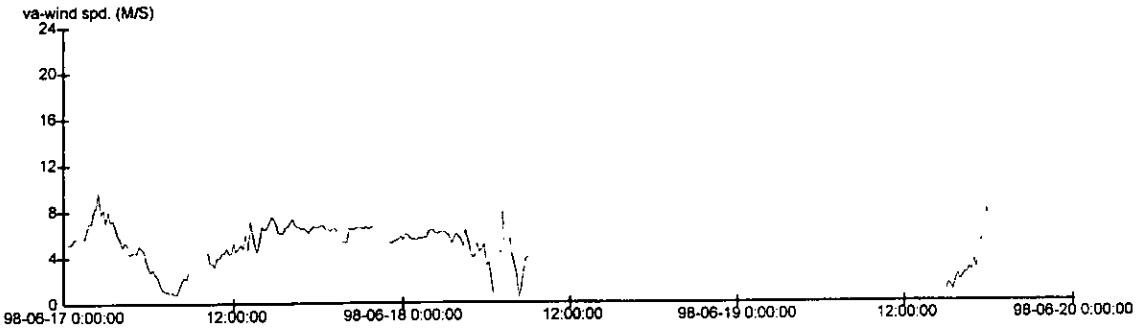


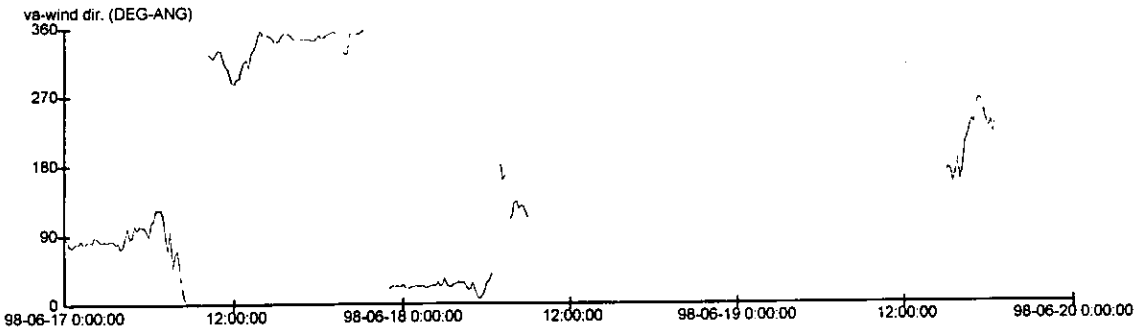
— atm pressure mB — sol-rad [k] WATT/M2 — airtemp. dry DEG-CELSIUS — va-wind dir. DEG-ANG — va-wind spd. M/S

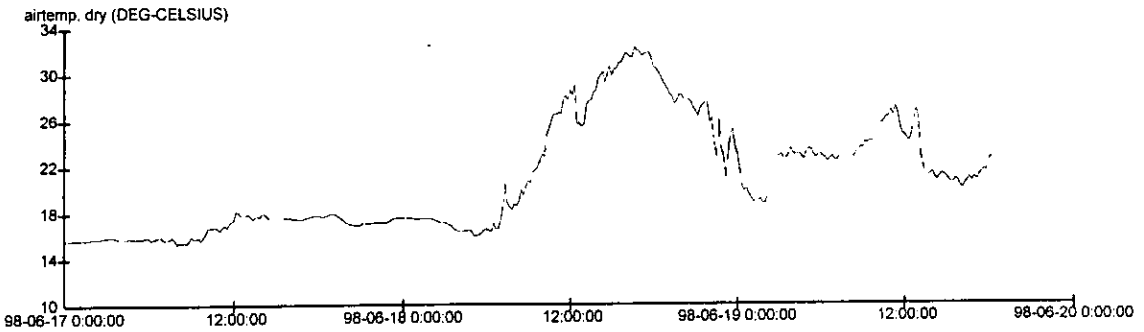
BMM-MEETDIENST OOSTENDE

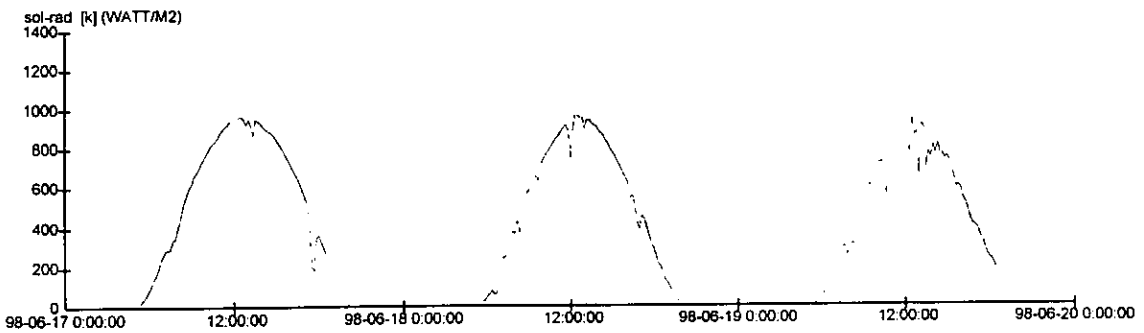
RV BELGICA - CRUISE 98/15

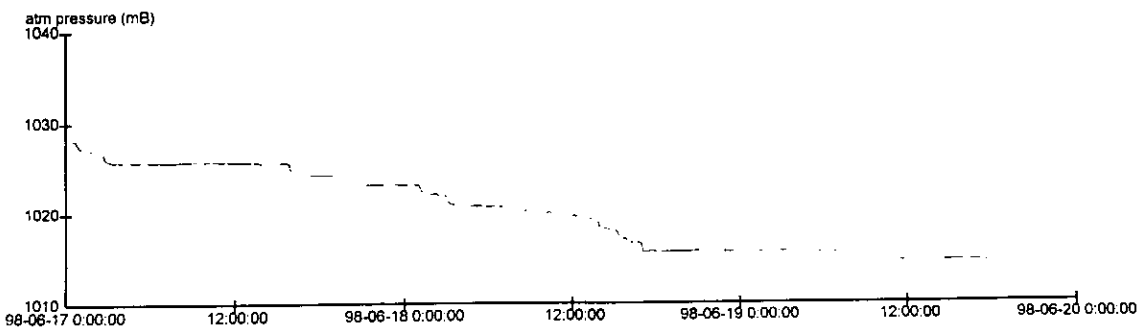
17.06.98 0:00 - 20.06.98 0:00









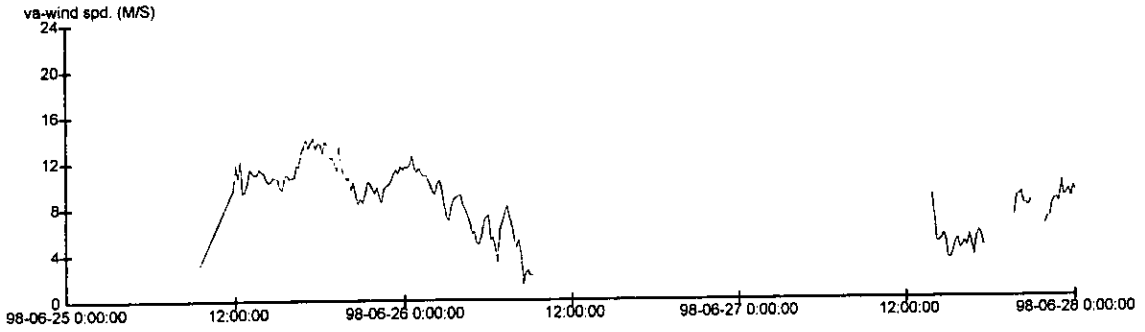


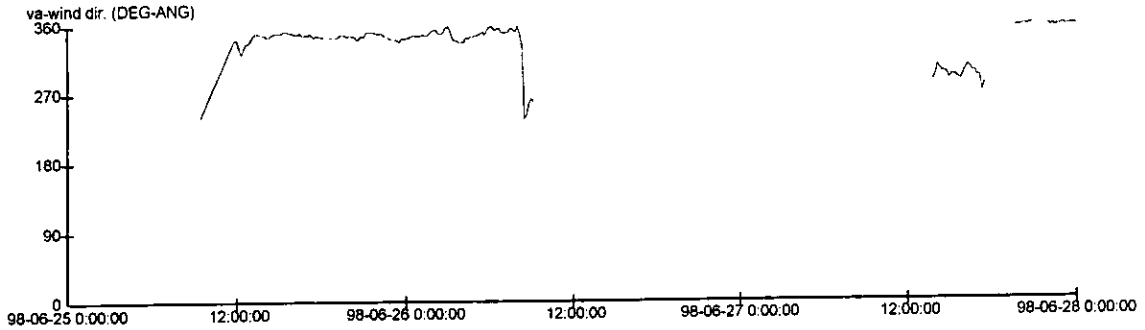
— atm pressure mB — sol-rad [k] WATT/M2 — airtemp. dry DEG-CELSIUS — va-wind dir. DEG-ANG — va-wind spd. M/S

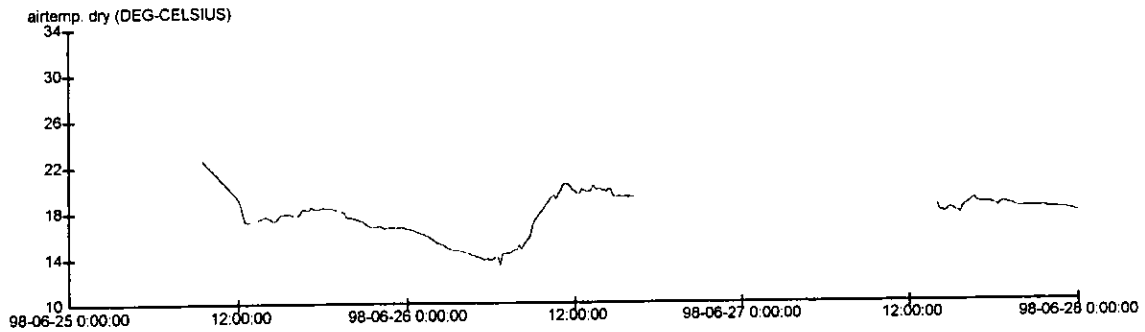
BMM-MEETDIENST OOSTENDE

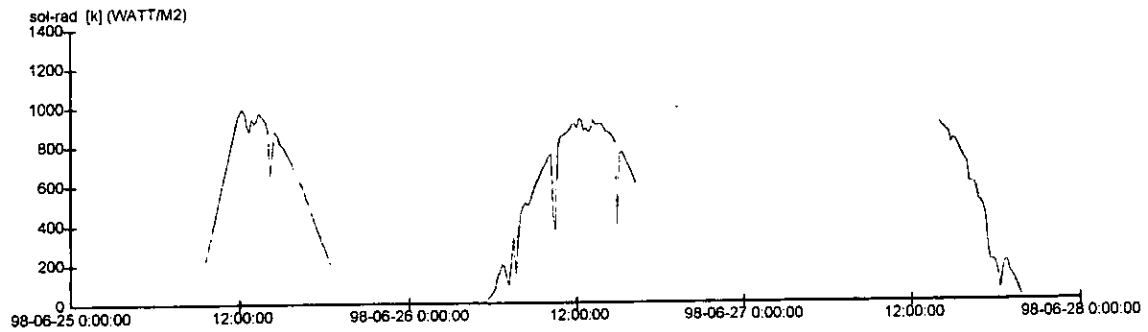
RV BELGICA - CRUISE 98/15

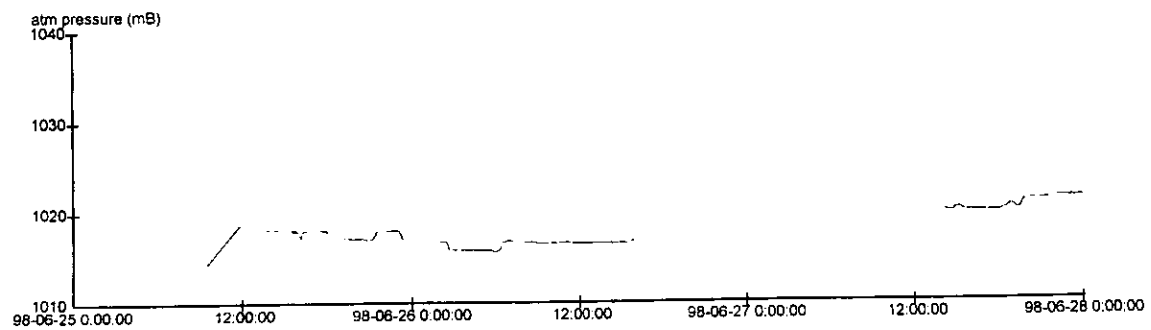
25.06.98 0:00 - 28.06.98 0:00









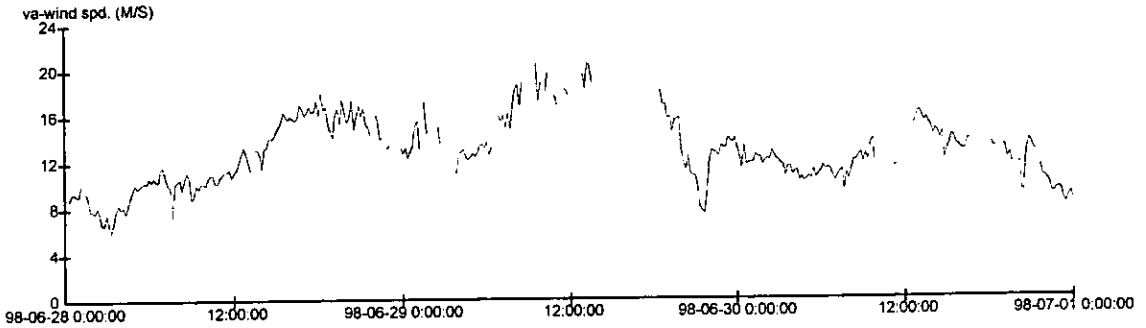


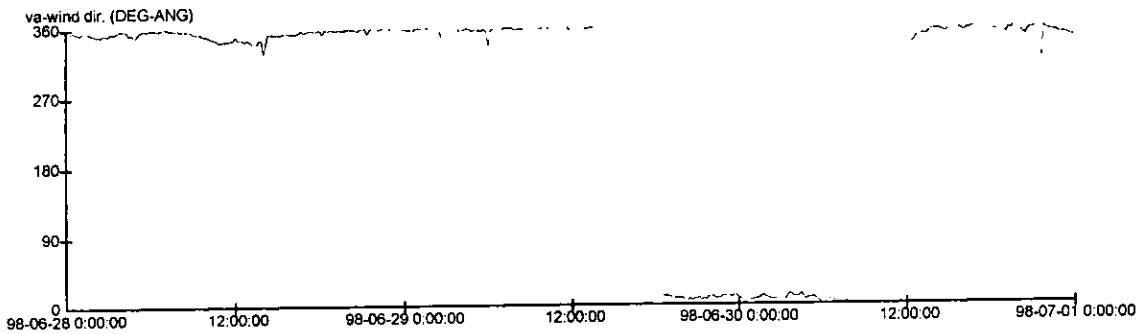
— atm pressure mB — sol-rad [k] WATT/M2 — airtemp. dry DEG-CELSIUS — va-wind dir. DEG-ANG — va-wind spd. M/S

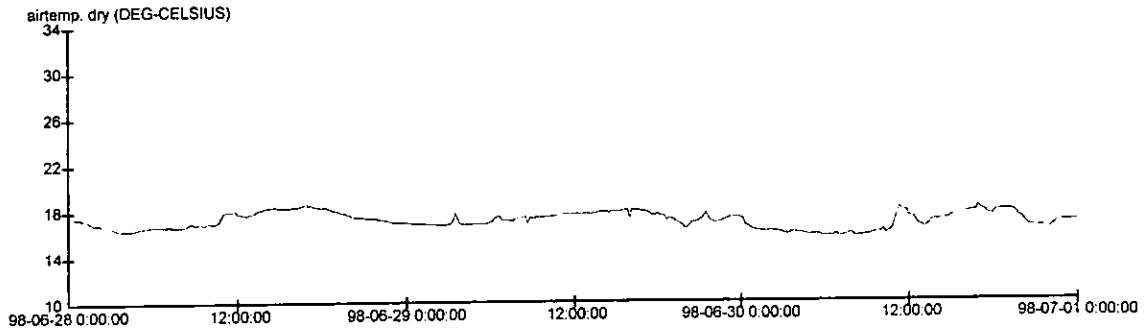
BMM-MEETDIENST OOSTENDE

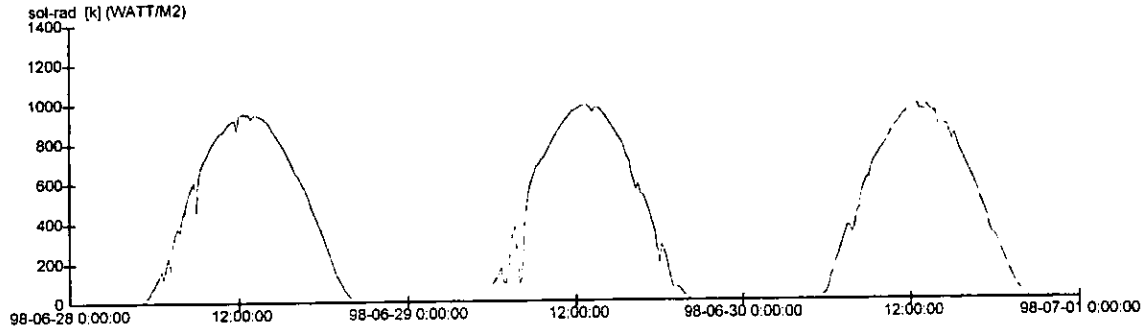
RV BELGICA - CRUISE 98/15

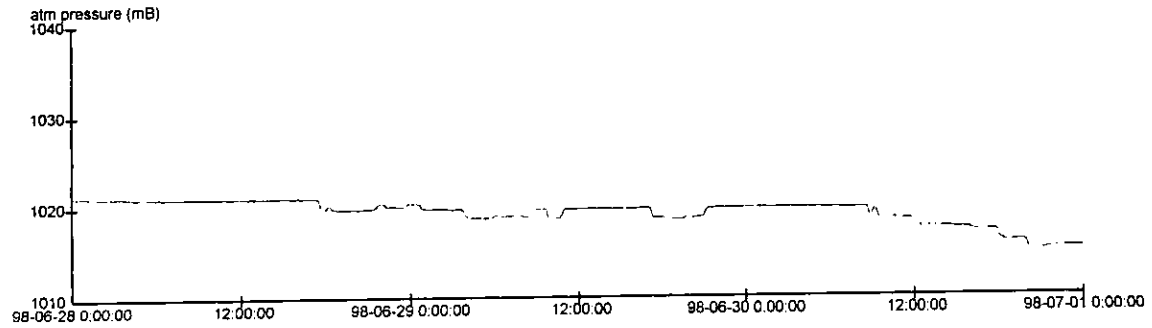
28.06.98 0:00 - 01.07.98 0:00









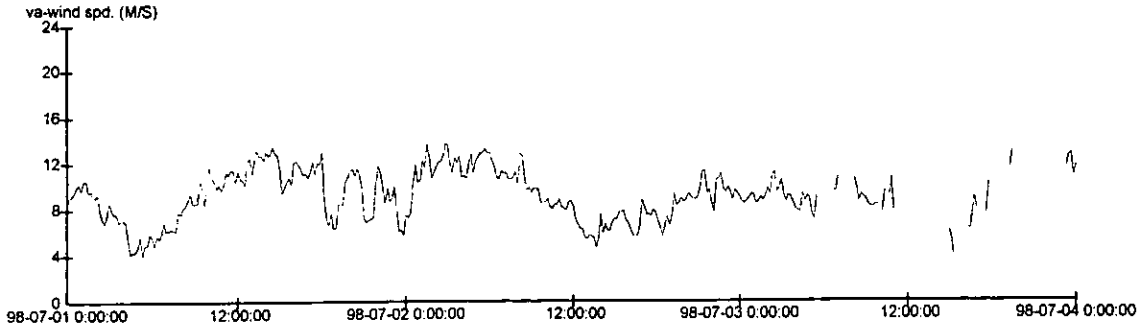


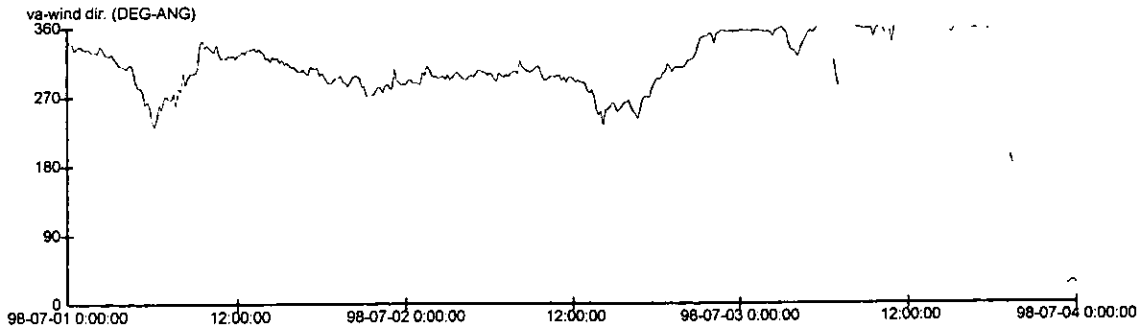
— atm pressure mB — sol-rad [k] WATT/M2 — airtemp. dry DEG-CELSIUS — va-wind dir. DEG-ANG — va-wind spd. M/S

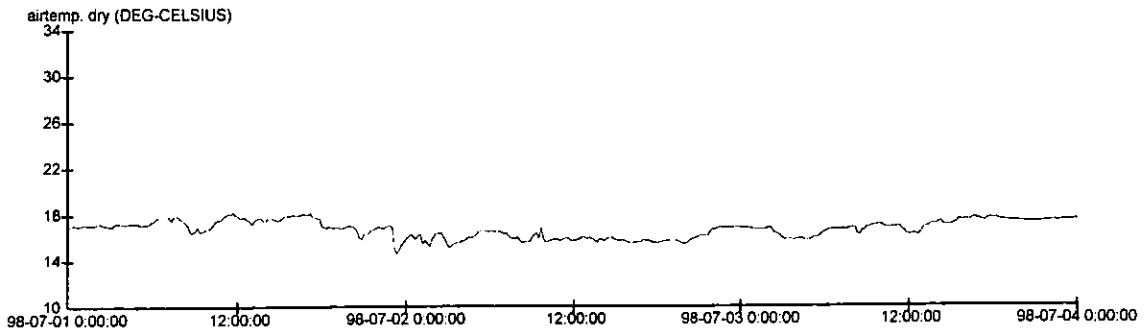
BMM-MEETDIENST OOSTENDE

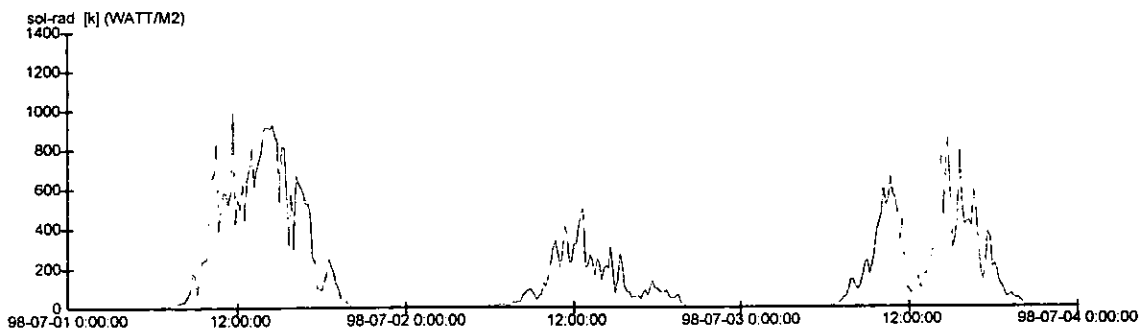
RV BELGICA - CRUISE 98/15

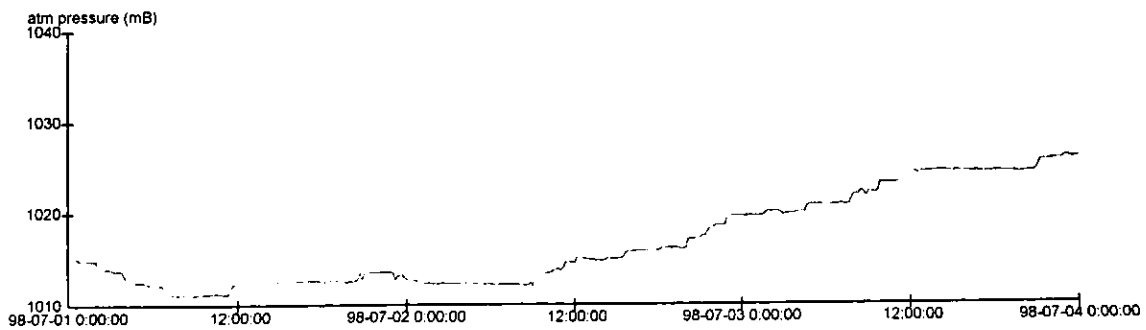
01.07.98 0:00 - 04.07.98 0:00









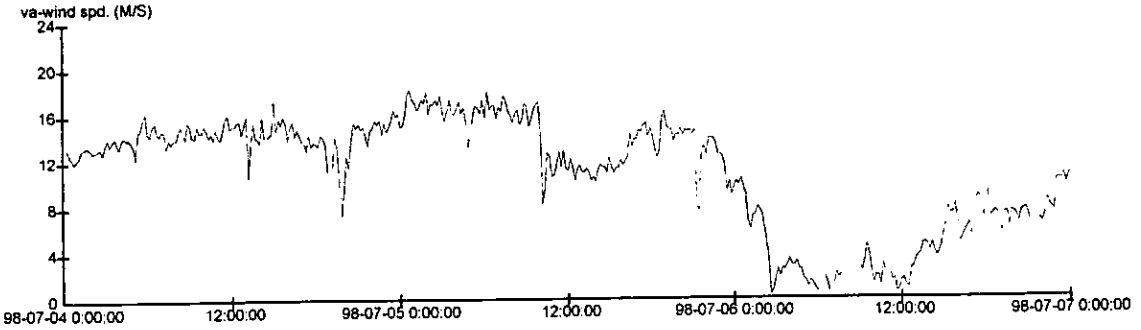


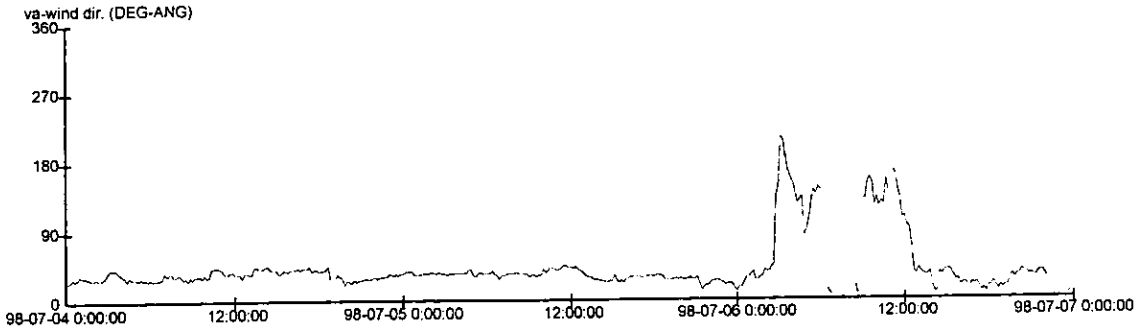
— atm pressure mB — sol-rad [k] WATT/M2 — airtemp. dry DEG-CELSIUS — va-wind dir. DEG-ANG — va-wind spd. M/S

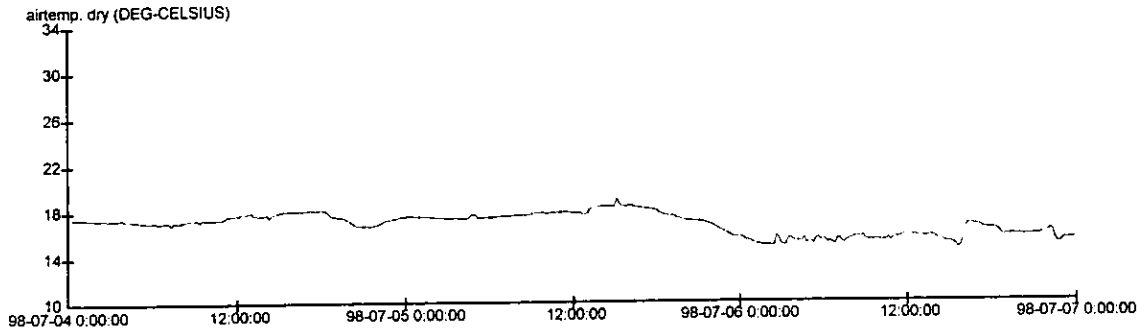
BMM-MEETDIENST OOSTENDE

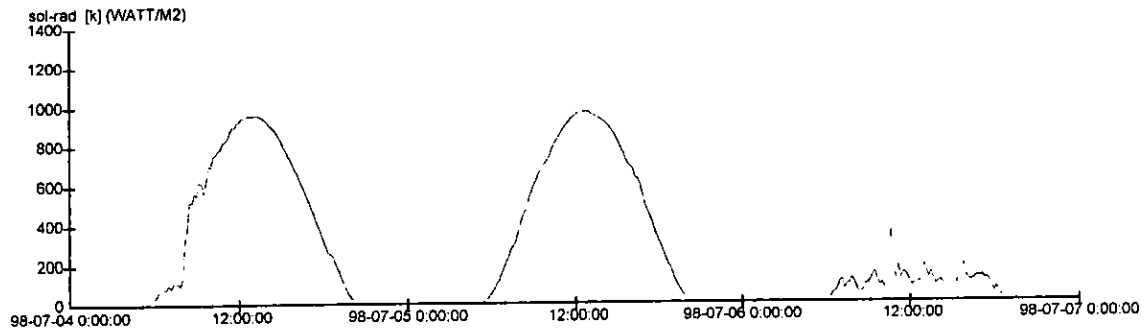
RV BELGICA - CRUISE 98/15

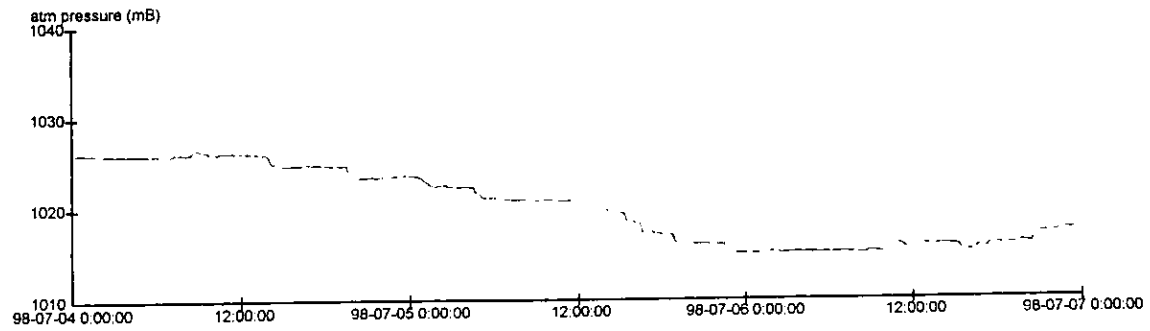
04.07.98 0:00 - 07.07.98 0:00









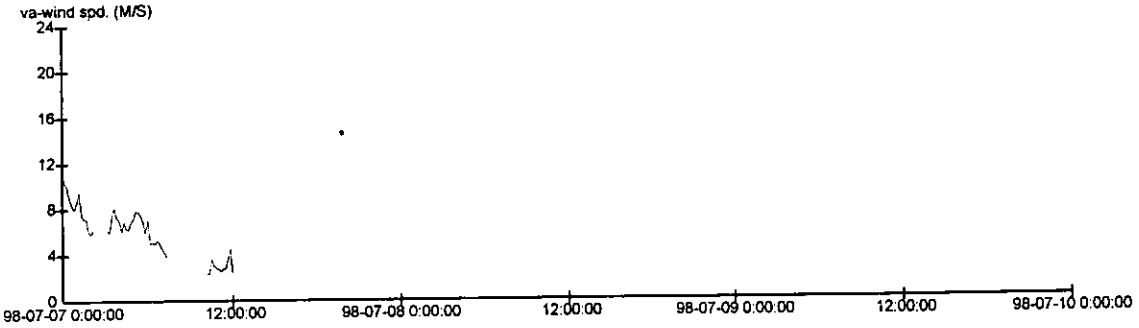


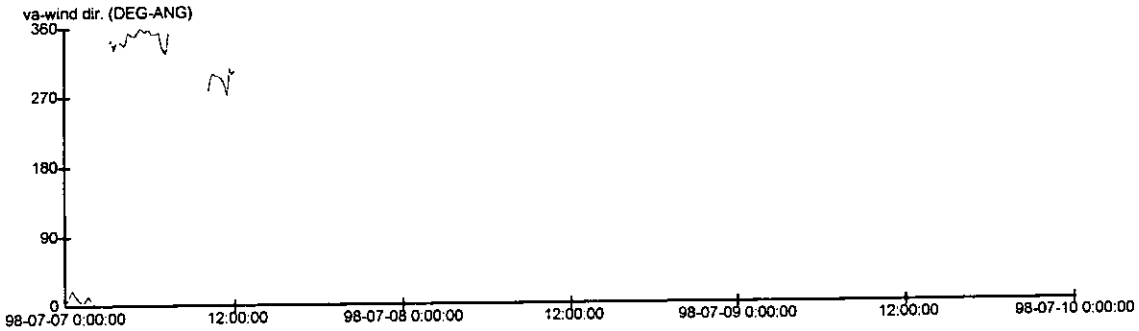
— atm pressure mB — sol-rad [k] WATT/M2 — airtemp. dry DEG-CELSIUS — va-wind dir. DEG-ANG — va-wind spd. M/S

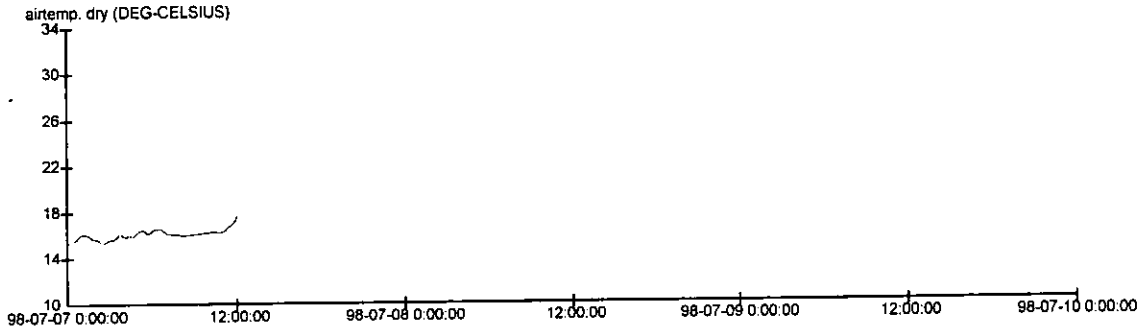
BMM-MEETDIENST OOSTENDE

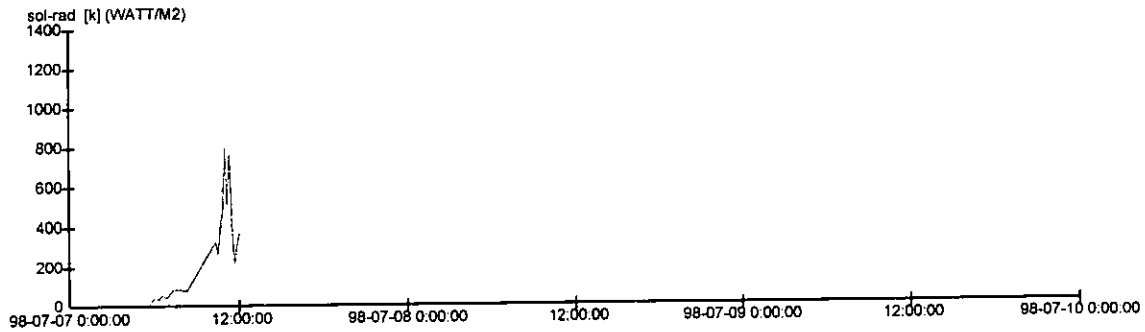
RV BELGICA - CRUISE 98/15

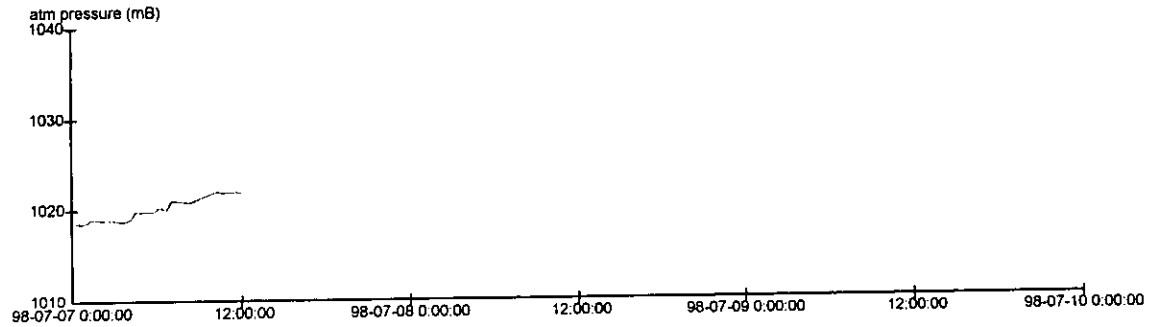
07.07.98 0:00 - 10.07.98 0:00









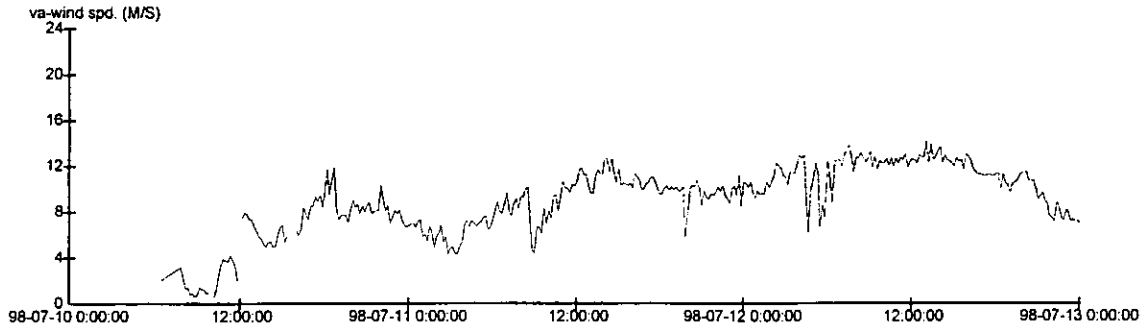


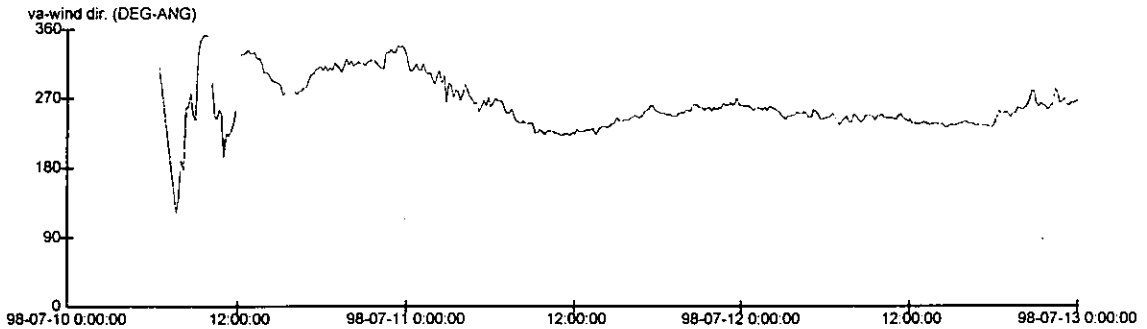
— atm pressure mB — sol-rad [k] WATT/M2 — airtemp. dry DEG-CELSIUS — va-wind dir. DEG-ANG — va-wind spd. M/S

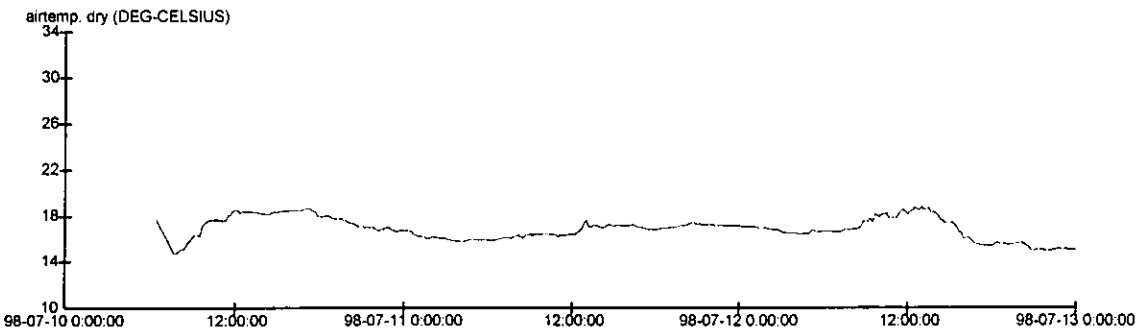
BMM-MEETDIENST OOSTENDE

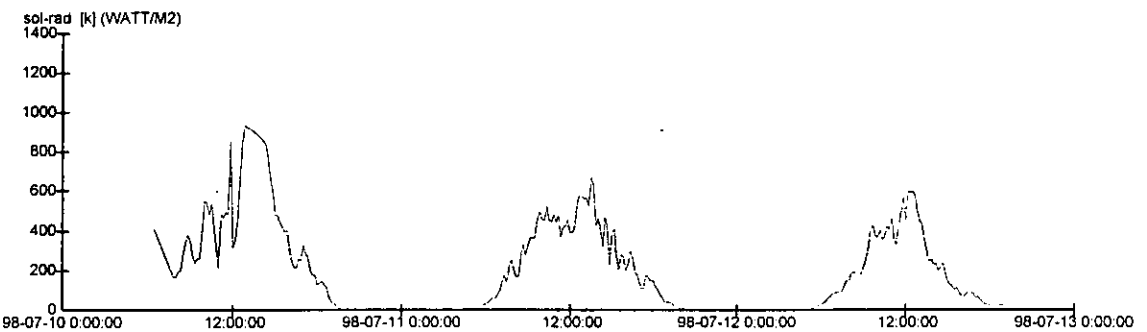
RV BELGICA - CRUISE 98/15

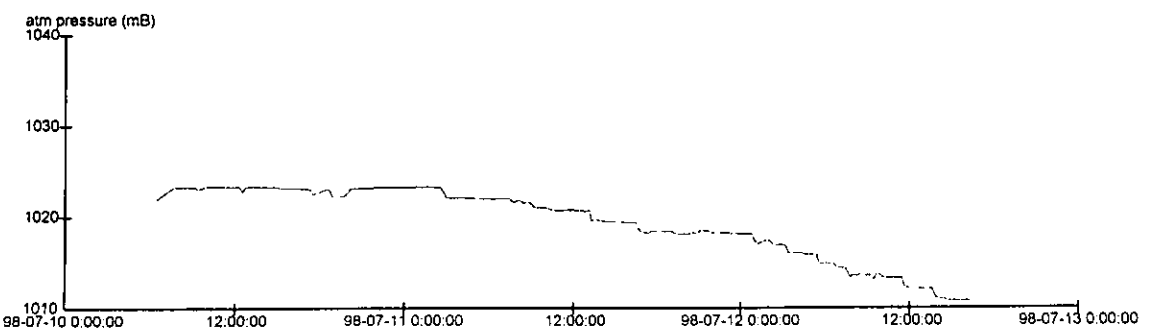
10.07.98 0:00 - 13.07.98 0:00









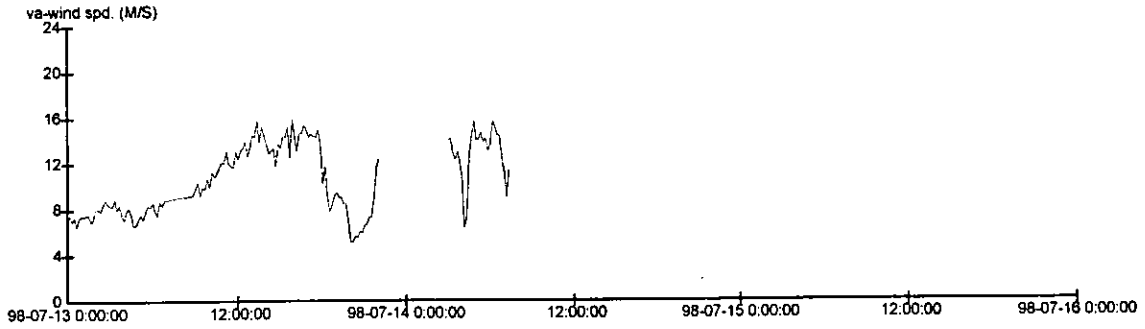


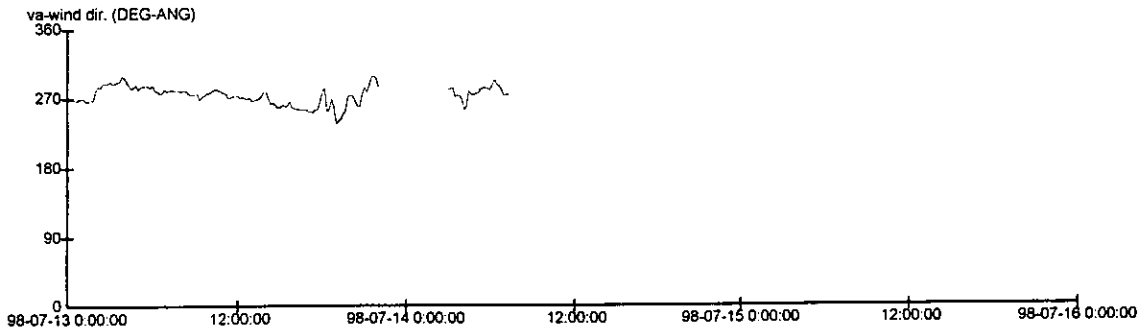
— atm pressure mB — sol-rad [k] WATT/M2 — airtemp. dry DEG-CELSIUS — va-wind dir. DEG-ANG — va-wind spd. M/S

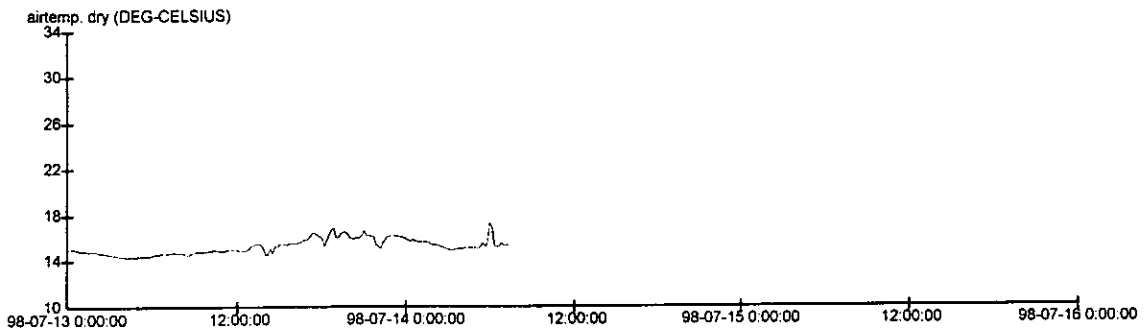
BMM-MEETDIENST OOSTENDE

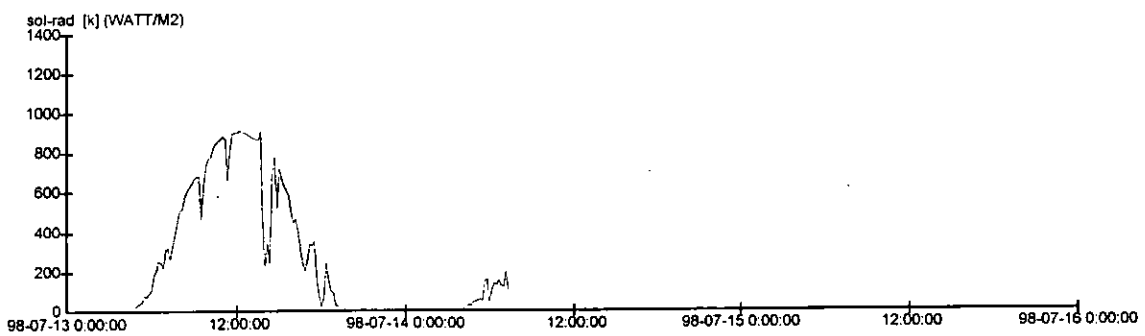
RV BELGICA - CRUISE 98/15

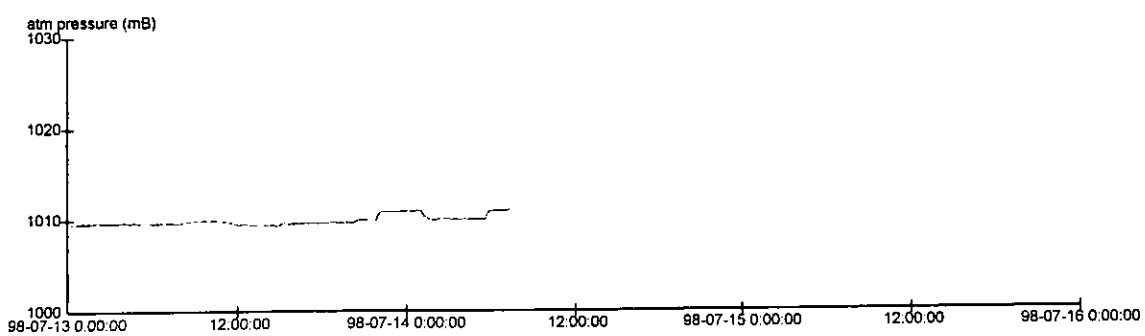
13.07.98 0:00 - 16.07.98 0:00











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

Appendix 3.

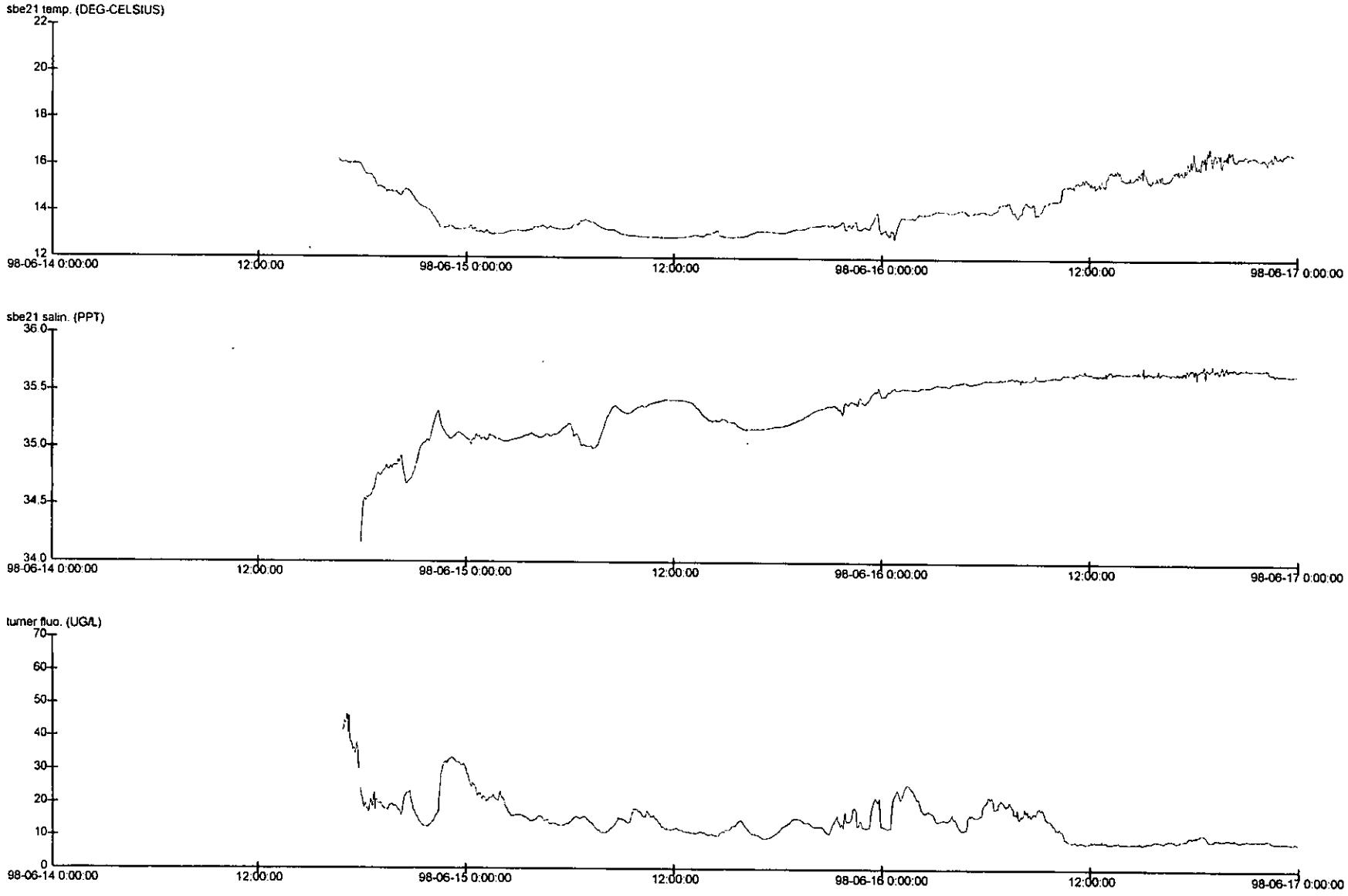
Horizontal profiles.

SEA-BIRD SBE21 : watertemperature, salinity

TURNER DESIGNS : fluorescence (14.06 - 27.06)
chlorophyll (28.06 - 14.07)

RV BELGICA - CRUISE 98/15

14.06.98 0:00 - 17.06.98 0:00



sbe21 temp. DEG-CELSIUS

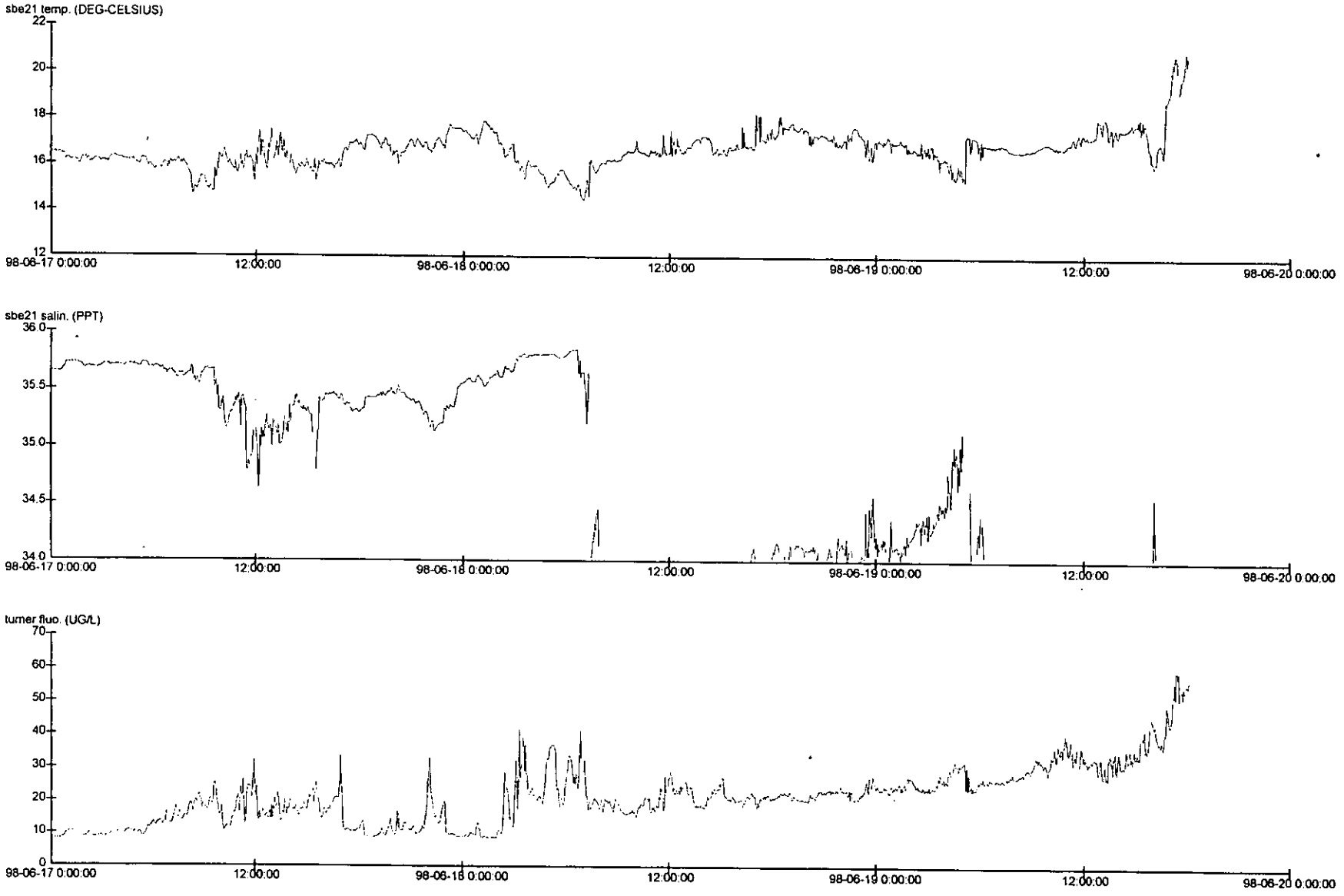
sbe21 salin. PPT

turner fluo. UG/L

BMM-MEETDIENST OOSTENDE

RV BELGICA - CRUISE 98/15

17.06.98 0:00 - 20.06.98 0:00



sbe21 temp.
DEG-CELSIUS

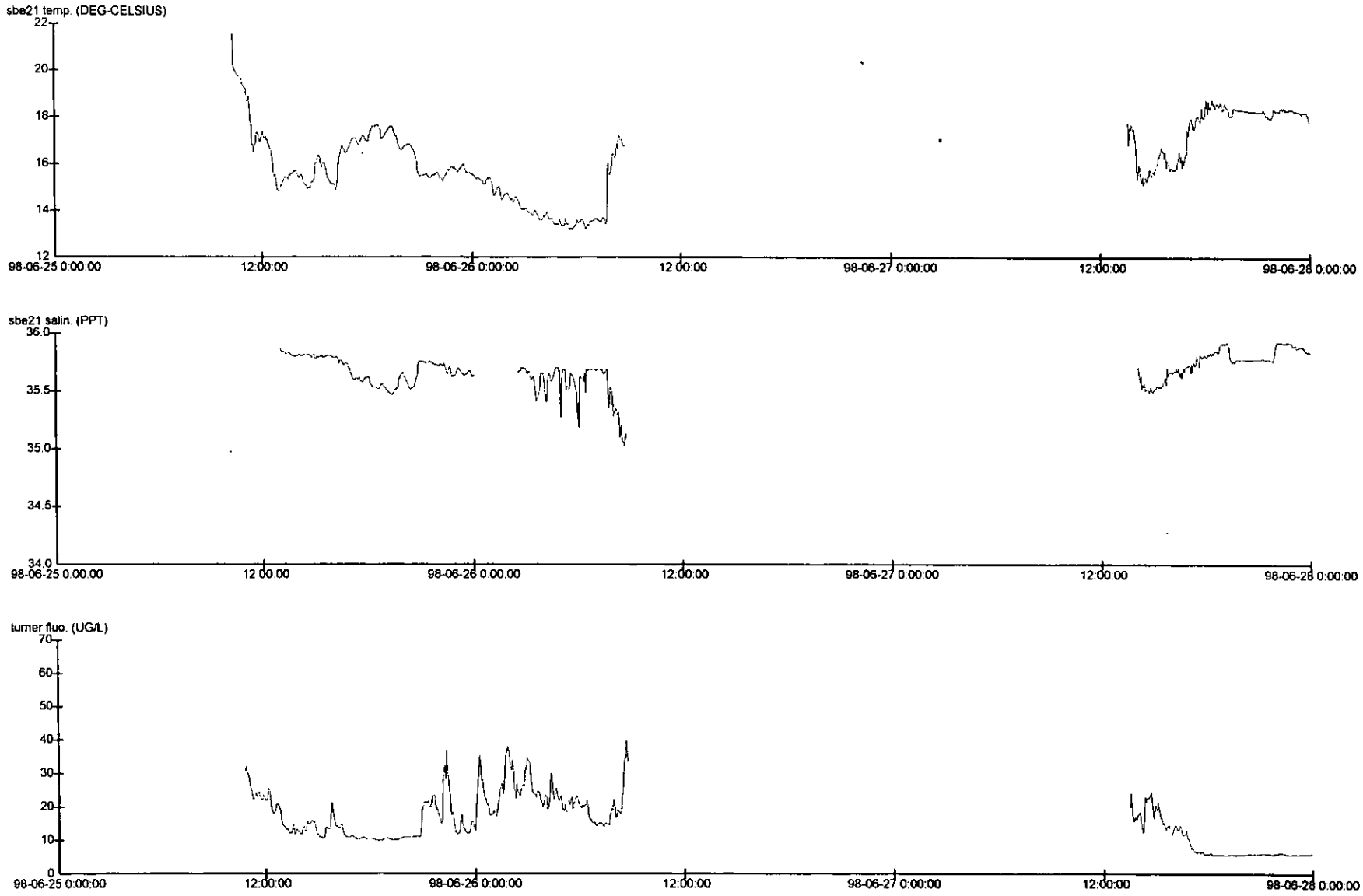
sbe21 salin.
PPT

turner fluo.
UG/L

BMM-MEETDIENST OOSTENDE

RV BELGICA - CRUISE 98/15

25.06.98 0:00 - 28.06.98 0:00



sbe21 temp.
DEG-CELSIUS

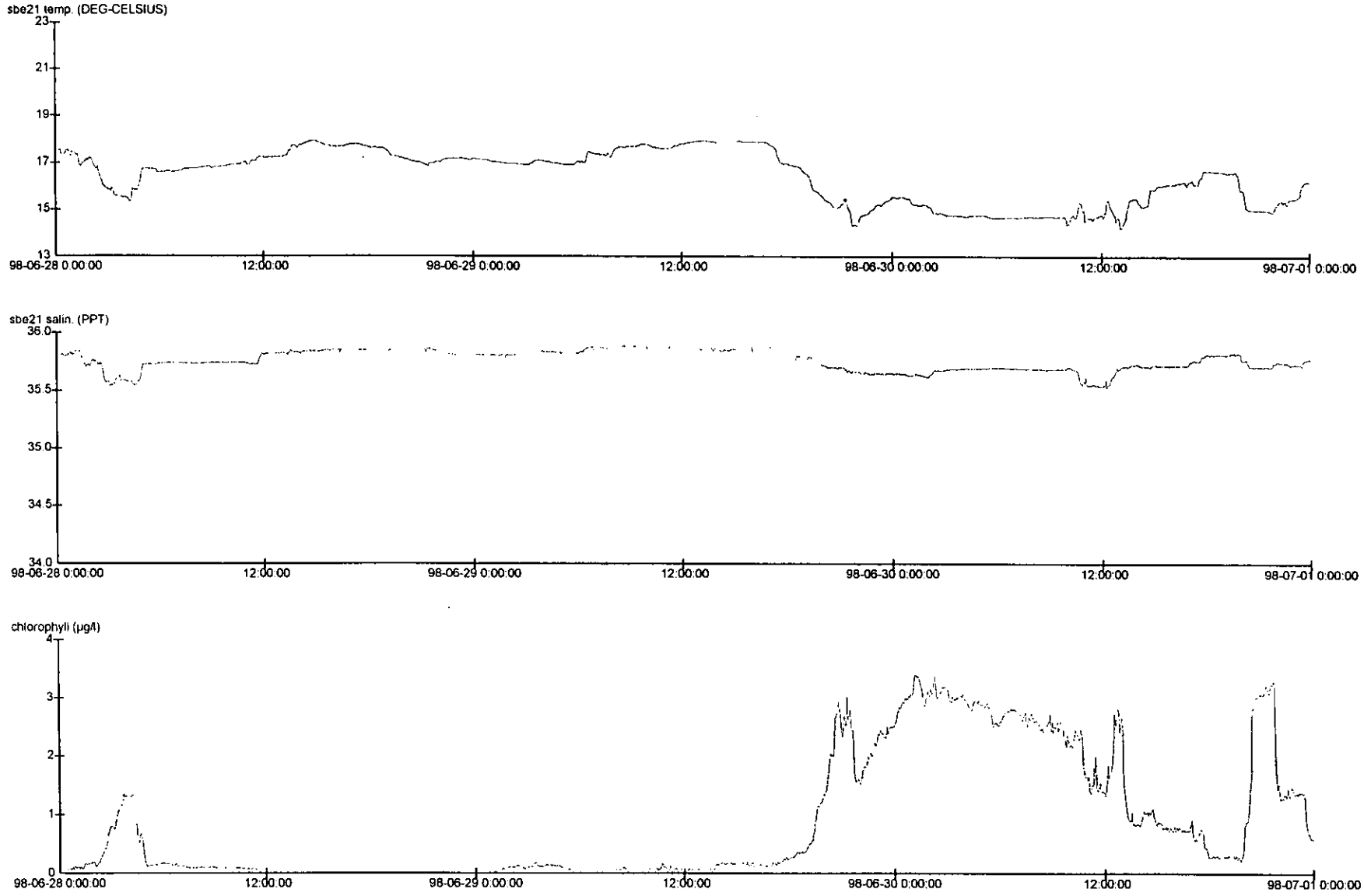
sbe21 salin.
PPT

turner fluo.
UG/L

BMM-MEETDIENST OOSTENDE

RV BELGICA - CRUISE 98/15

28.06.98 0:00 - 01.07.98 0:00



sbe21 temp.
DEG-CELSIUS

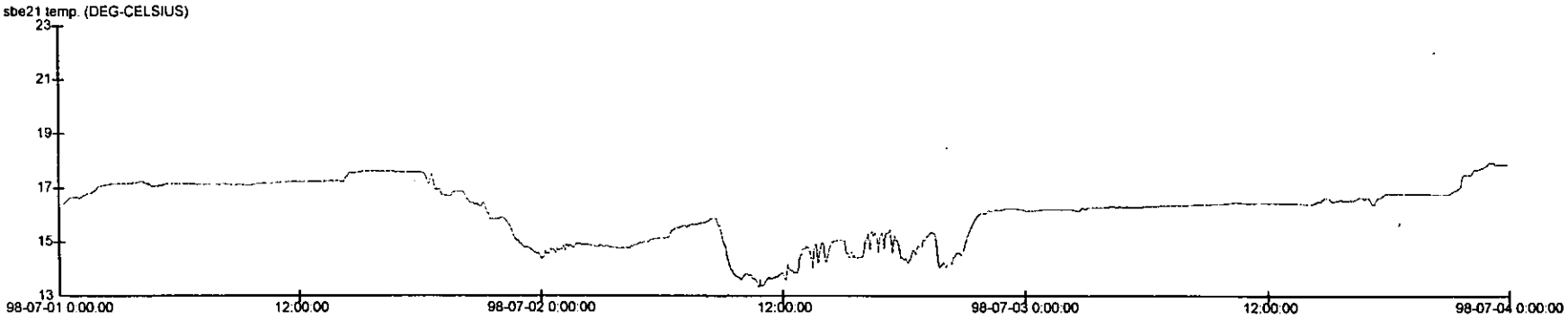
sbe21 salin.
PPT

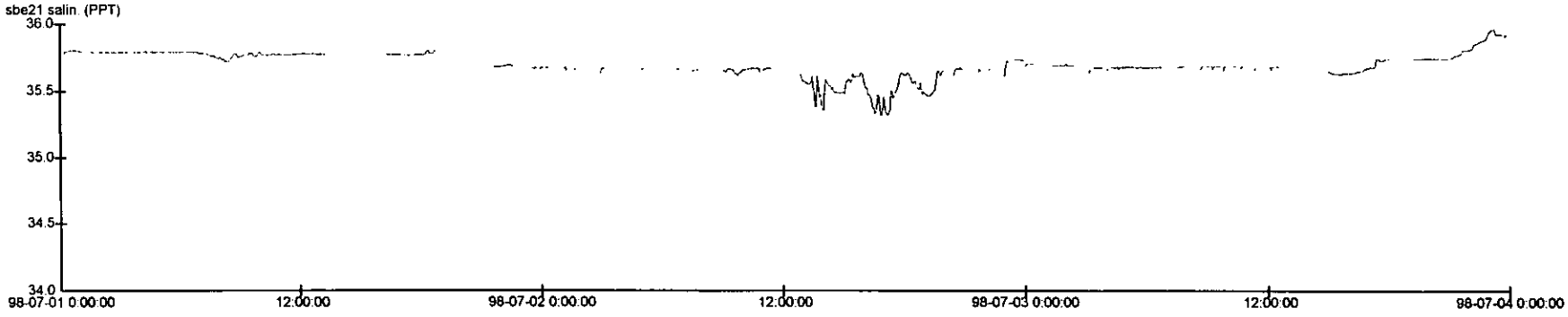
chlorophyll
µg/l

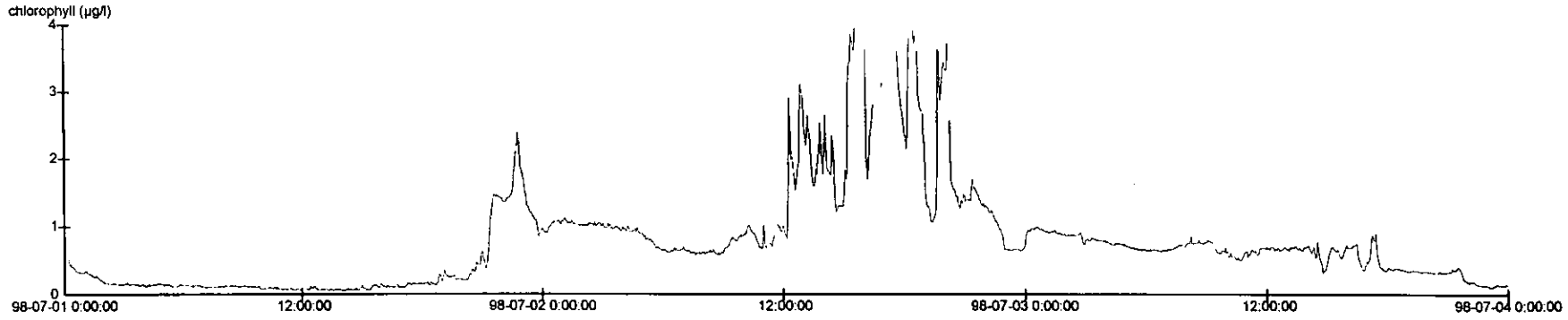
BMM-MEETDIENST OOSTENDE

RV BELGICA - CRUISE 98/15

01.07.98 0:00 - 04.07.98 0:00







sbe21 temp. DEG-CELSIUS

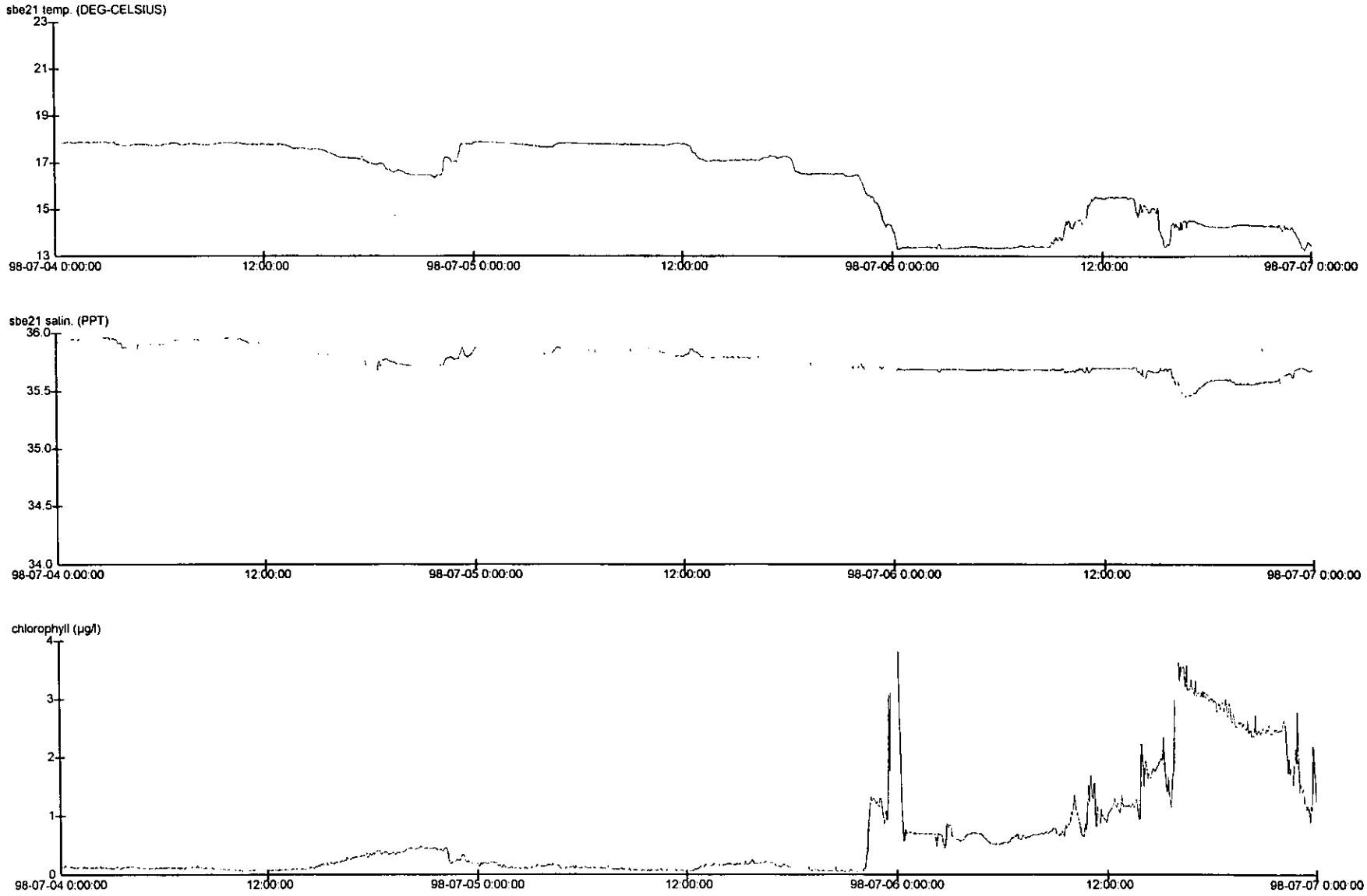
sbe21 salin. PPT

chlorophyll µg/l

BMM-MEETDIENST OOSTENDE

RV BELGICA - CRUISE 98/15

04.07.98 0:00 - 07.07.98 0:00



sbe21 temp. DEG-CELSIUS

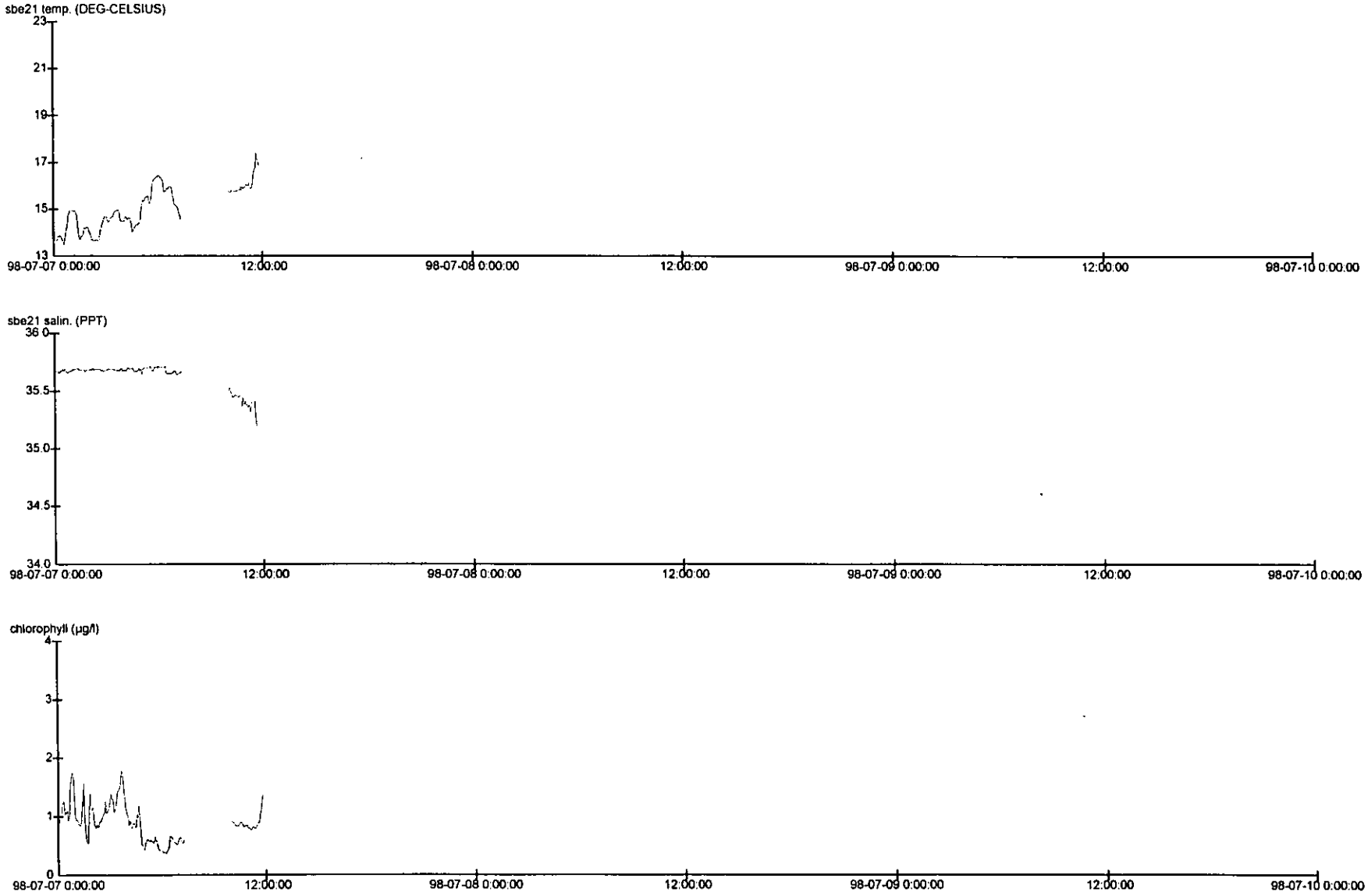
sbe21 salin. PPT

chlorophyll µg/l

BMM-MEETDIENST OOSTENDE

RV BELGICA - CRUISE 98/15

07.07.98 0:00 - 10.07.98 0:00



sbe21 temp. DEG-CELSIUS

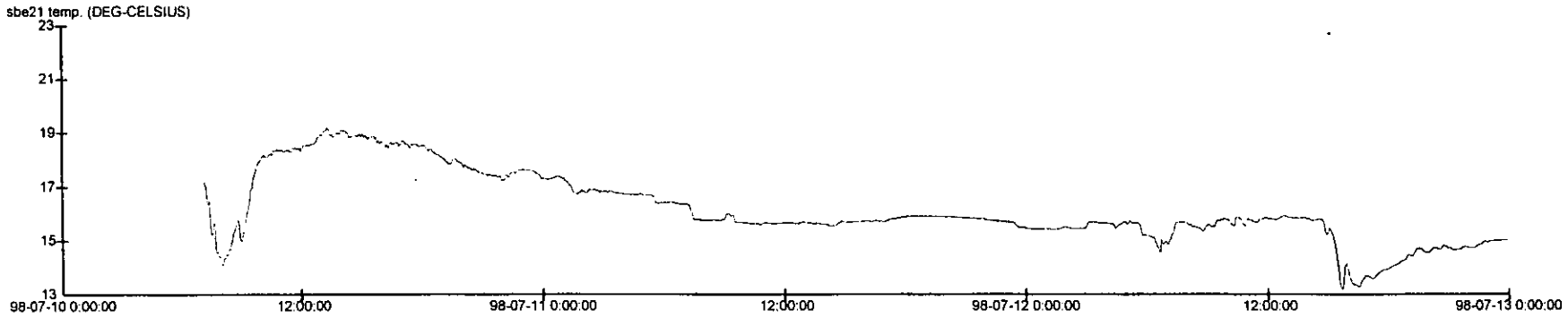
sbe21 salin. PPT

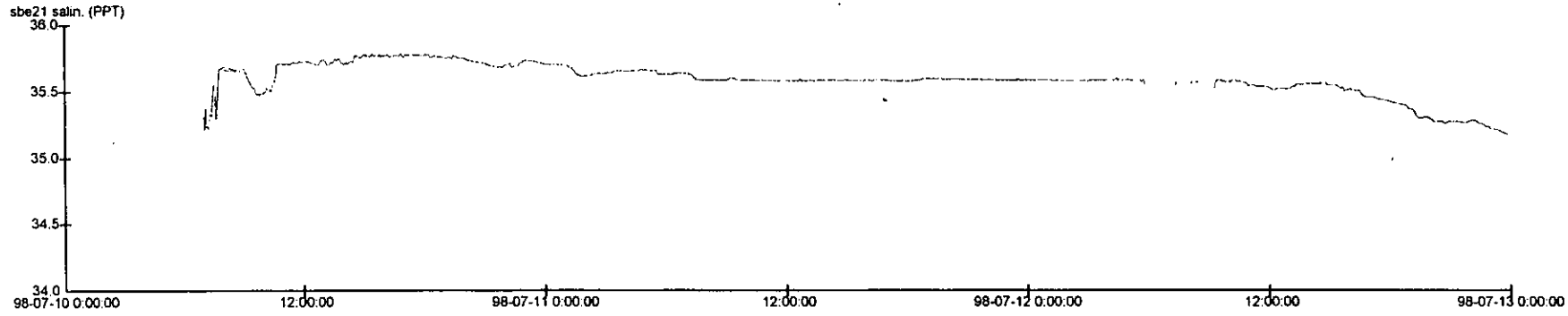
chlorophyll µg/l

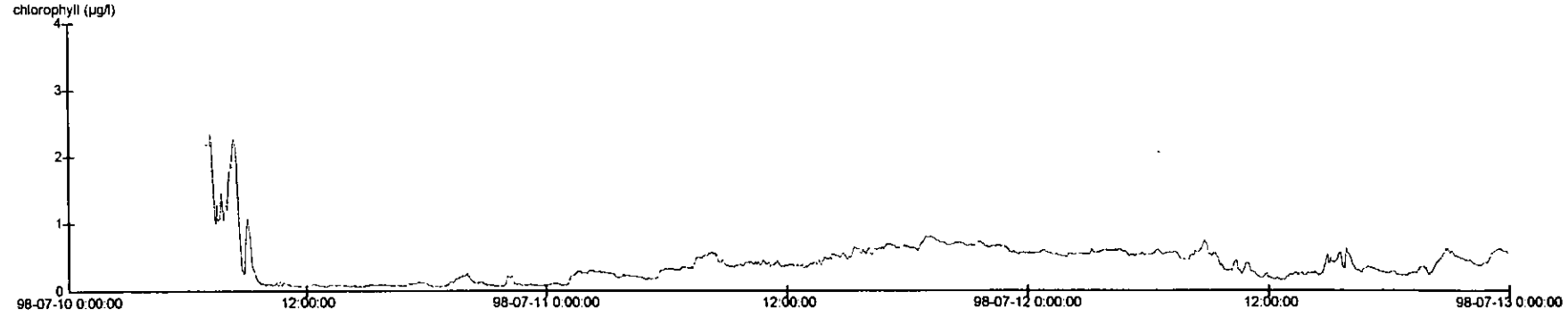
BMM-MEETDIENST OOSTENDE

RV BELGICA - CRUISE 98/15

10.07.98 0:00 - 13.07.98 0:00







sbe21 temp. DEG-CELSIUS

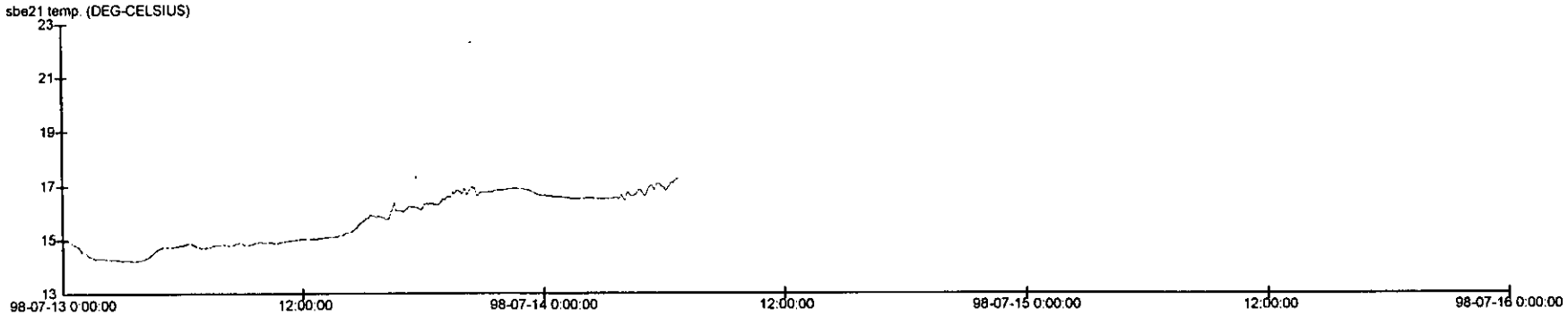
sbe21 salin. PPT

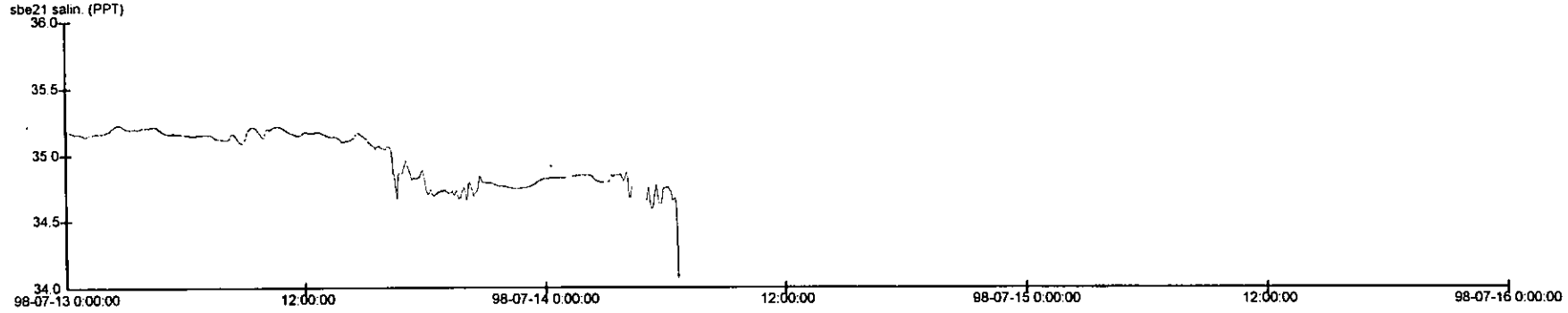
chlorophyll µg/l

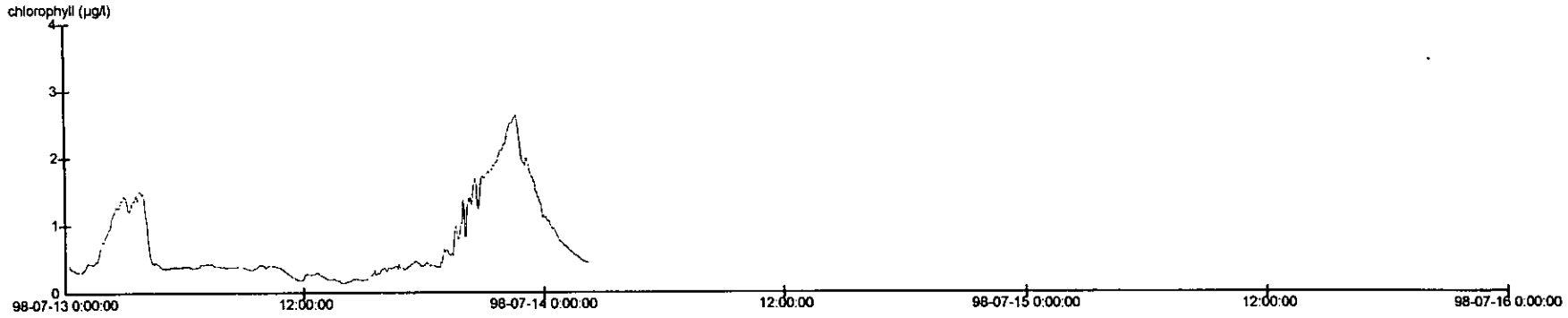
BMM-MEETDIENST OOSTENDE

RV BELGICA - CRUISE 98/15

13.07.98 0:00 - 16.07.98 0:00







sbe21 temp. DEG-CELSIUS

sbe21 salin. PPT

chlorophyll µg/l

BMM-MEETDIENST OOSTENDE

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 [%]
08A	O2R08	87.3	1,7	88.0	35.719	12.400	27.073	66.9	230.9	88.9
09A	O2R09	147.2	1,7	148.4	35.728	12.485	27.064		238.0	91.8
13A	O2R13	1743.0	1,7	1765.1	35.133	4.785	27.824	2.8	272.1	88.0
01A	O2S01	79.7	1	80.3	35.723	12.436	27.068	4.3	226.0	87.1
		59.4	3	59.9	35.740	12.762	27.016	2.9	238.3	92.4
		39.4	5	39.7	35.742	13.201	26.928	2.8	248.0	97.1
		19.5	7	19.6	35.687	14.220	26.672	2.9	269.0	107.5
		9.6	9	9.7	35.651	14.714	26.537	2.9	283.8	114.5
02A	O2S02	59.6	1-4	60.1	35.931	14.561	26.789	2.9	265.7	107.1
		9.1	5-12	9.2	35.721	16.723	26.134	2.9	280.3	117.7
02B	O2S02	125.8	1,2	126.9	35.756	12.795	27.024	2.9	246.1	95.6
		99.3	3	100.2	35.788	13.280	26.949	2.8	253.5	99.4
		79.5	4	80.2	35.851	13.739	26.903	2.7	260.5	103.2
		59.7	5,6	60.2	35.928	14.469	26.806	2.7	264.2	106.3
		39.2	7	39.6	35.872	15.236	26.594	2.7	274.5	112.1
		19.4	8	19.6	35.721	16.571	26.170	2.6	282.2	118.1
		9.5	9,10	9.6	35.734	16.739	26.140	2.5	280.9	118.0
03A	O2S03	201.1	1	202.9	35.728	12.463	27.070	3.2	238.9	92.1
		147.7	2	149.0	35.774	12.899	27.018	2.7	252.1	98.1
		99.9	3	100.8	35.846	13.573	26.934	2.7	260.9	103.0
		81.2	4	81.9	35.883	13.907	26.892	2.6	262.8	104.5
		60.6	5	61.2	35.911	14.190	26.853	2.6	264.5	105.8
		40.7	6	41.1	35.903	15.022	26.665	2.6	275.9	112.2
		19.0	7	19.2	35.819	17.087	26.123	2.5	276.0	116.8
		9.4	8	9.5	35.815	17.205	26.091	2.4	275.2	116.7
04A	O2S04	100.3	1,2	101.1	35.910	14.003	26.893	2.7	264.6	105.4
		79.3	3,4	80.0	35.944	14.337	26.848	2.8	265.8	106.6
		59.8	5,6	60.3	35.947	14.571	26.798	2.8	267.1	107.6
		40.0	7,8	40.3	35.936	15.322	26.623	2.7	278.8	114.1
		19.5	9,10	19.7	35.909	16.532	26.324	2.6	277.3	116.1
		9.6	11,12	9.7	35.835	17.856	25.948	2.5	271.4	116.5
04B	O2S04	1251.9	1	1266.3	36.082	10.341	27.766	2.7	212.3	78.4
		1099.4	2	1111.6	36.110	10.867	27.691	2.7	207.0	77.4
		999.8	3	1010.7	36.153	11.275	27.648	2.6	204.9	77.3
		899.4	4	908.9	36.131	11.412	27.602	2.6	204.9	77.5
		800.1	5	808.4	36.067	11.571	27.521	2.6	206.8	78.4
		600.1	6	606.1	35.811	11.290	27.368	2.6	214.3	80.6
		399.2	7	402.9	35.614	11.303	27.207	2.6	233.1	87.6
		200.4	8	202.2	35.753	12.707	27.041	2.6	244.5	94.8
		150.2	9	151.6	35.816	13.228	26.983	2.6	248.6	97.4
04C	O2S04	35.1	1-4	35.4	35.960	14.817	26.754	2.7	273.8	110.9
		9.9	5-12	10.0	35.820	16.926	26.162	2.6	278.4	117.4

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 [%]
05A	O2S05	398.3	1	402.0	35.618	11.292	27.213	2.7	233.3	87.7
		198.9	2	200.7	35.776	12.887	27.023	2.6	246.2	95.8
		149.1	3	150.4	35.843	13.450	26.959	2.6	251.8	99.2
		99.2	4	100.0	35.915	14.024	26.892	2.6	260.5	103.8
		79.2	5	79.9	35.930	14.161	26.875	2.6	262.4	104.9
		59.9	6	60.4	35.955	14.369	26.849	2.6	262.6	105.4
		38.7	7	39.0	35.973	14.933	26.739	2.6	269.8	109.6
		19.7		19.9	35.877	17.672	26.025	2.5	269.3	115.3
		9.0	9	9.0	35.883	17.715	26.019	2.4	267.2	114.4
15A	O2Q15	136.6	1,7	137.8	35.743	12.692	27.034	2.8	247.3	95.8
14A	O2Q14	74.9	1,7	75.6	35.743	12.732	27.025	3.3	243.3	94.3
20A	O2P20	39.6	1-4	39.9	35.744	13.567	26.854	2.5	264.2	104.2
		9.4	5-12	9.5	35.695	14.723	26.569	2.8	286.9	115.8
20B	O2P20	121.4	1	122.4	35.735	12.535	27.059	3.0	243.5	94.0
		100.1	2	101.0	35.751	12.841	27.010	2.7	253.2	98.4
		79.2	3	79.9	35.756	13.159	26.949	2.6	262.0	102.5
		59.0	4	59.6	35.748	13.717	26.827	2.6	266.1	105.3
		39.3	5	39.7	35.733	14.340	26.683	2.6	275.1	110.2
		19.4	6	19.6	35.696	14.759	26.563	2.8	288.7	116.6
		9.4	7	9.5	35.695	14.778	26.557	2.7	290.5	117.4
19A	O2P19	90.9	1	91.7	35.730	12.527	27.056	2.8	243.1	93.8
		81.5	2	82.2	35.729	12.527	27.055	2.9	241.5	93.2
		60.9	3	61.4	35.731	12.656	27.030	2.6	246.2	95.3
		39.4	4	39.7	35.721	13.157	26.921	2.6	248.2	97.1
		19.8	5	20.0	35.618	14.126	26.639	2.7	281.1	112.1
		9.2	6	9.3	35.548	14.584	26.486	2.7	295.8	118.9
21A	O2P21	200.1	1	201.9	35.715	12.358	27.080	2.8	244.4	94.0
		150.0	2	151.4	35.745	12.650	27.045	2.6	246.8	95.5
		99.6	3	100.5	35.826	13.507	26.932	2.5	256.2	101.0
		79.1	4	79.8	35.846	14.009	26.842	2.4	260.6	103.8
		59.6	5	60.1	35.790	14.547	26.683	2.5	269.5	108.5
		40.5	6	40.8	35.784	15.131	26.549	2.4	276.4	112.5
		19.3	7	19.4	35.734	15.355	26.460	2.4	282.5	115.5
		9.8	8	9.9	35.717	15.319	26.454	2.4	285.4	116.6
22A	O2P22	900.4	1	910.0	36.093	11.317	27.591	2.5	205.8	77.7
		798.5	2	806.8	36.024	11.387	27.522	2.5	206.0	77.8
		599.6	3	605.6	35.892	11.369	27.417	2.5	210.2	79.3
		399.4	4	403.2	35.619	11.085	27.251	2.5	226.4	84.7
		199.7	5	201.5	35.780	12.980	27.007	2.4	247.2	96.4
		150.1	6	151.4	35.827	13.481	26.940	2.3	255.6	100.7
		99.7	7	100.5	35.866	13.951	26.870	2.3	260.8	103.7
		79.7	8	80.4	35.870	13.995	26.863	2.3	260.8	103.9
		59.5	9	60.0	35.863	14.621	26.723	2.3	265.8	107.2
		40.3	10	40.7	35.831	15.008	26.613	2.3	269.7	109.6
		19.7	11	19.8	35.721	15.887	26.329	2.4	283.2	117.0
		10.3	12	10.4	35.721	16.083	26.284	2.3	283.7	117.7

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 [%]
17A	O2Q17	1737.3	1,7	1759.3	35.095	4.513	27.823	2.7	275.0	88.3
16A	O2Q16	804.9	1,7	813.2	36.039	11.459	27.519	2.6	207.1	78.3
23A	O2P23	59.6	1-4	60.1	35.793	16.897	26.150	2.7	273.8	115.4
		9.6	5-12	9.7	35.792	17.074	26.105	2.5	272.5	115.2
23B	O2P23	99.8	1	100.6	35.865	14.119	26.834	2.7	263.4	105.1
		79.4	2	80.1	35.864	14.243	26.806	2.7	263.3	105.4
		59.8	3	60.3	35.852	15.084	26.612	2.8	272.3	110.8
		40.2	4	40.5	35.795	16.973	26.133	2.6	274.7	116.0
		19.5	5	19.7	35.795	17.141	26.091	2.4	272.7	115.4
		8.8	6	8.9	35.791	17.161	26.084	2.4	272.2	115.3
23C	O2P23	1600.1	1	1619.9	35.316	5.868	27.839	2.8	257.6	85.6
		1499.8	2	1518.0	35.511	7.037	27.838	2.8	250.1	85.5
		1249.9	3	1264.3	36.002	9.692	27.814	2.6	217.4	79.1
		1100.3	4	1112.5	36.064	10.451	27.729	2.7	208.1	77.1
		999.9	5	1010.7	36.049	10.774	27.658	2.7	205.2	76.5
		899.5	6	909.1	36.051	11.108	27.597	2.7	204.0	76.6
		798.4	7	806.6	35.996	11.179	27.538	2.7	205.5	77.3
		599.4	8	605.3	35.824	11.275	27.381	2.7	212.7	80.0
		399.3	9	403.1	35.645	11.214	27.248	2.7	226.8	85.1
		198.8	10	200.6	35.738	12.552	27.060	2.6	242.6	93.7
		149.2	11	150.6	35.795	13.120	26.989	2.6	250.1	97.8
24A	O2P24	1720.4	1	1742.1	35.118	4.596	27.832	2.6	272.3	87.6
		1500.4	2	1518.5	35.465	6.800	27.835	2.5	247.2	84.0
		1249.3	3	1263.6	36.097	10.238	27.795	2.4	212.2	78.2
		1099.0	4	1111.2	36.124	10.754	27.722	2.5	205.2	76.5
		1000.3	5	1011.2	36.104	11.002	27.659	2.5	203.8	76.4
		899.2	6	908.7	36.075	11.245	27.590	2.5	203.5	76.7
		799.6	7	807.9	36.054	11.485	27.527	2.5	204.2	77.3
		599.5	8	605.4	35.778	11.233	27.353	2.6	213.5	80.2
		399.1	9	402.9	35.636	11.446	27.198	2.6	231.3	87.2
		200.1	10	201.9	35.746	12.646	27.048	2.5	240.9	93.2
		150.5	11	151.8	35.784	13.063	26.992	2.4	259.4	101.3
24B	O2P24	100	1	100.8	35.850	13.642	26.922	2.6	260.3	102.9
		80.1	2	80.7	35.892	14.020	26.875	2.6	259.1	103.2
		59.1	3	59.6	35.884	14.509	26.763	2.6	265.5	106.9
		40.8	4	41.1	35.898	15.890	26.465	2.6	279.3	115.5
		19.9	5	20.1	35.769	17.570	25.968	2.4	269.0	114.8
		10.2	6	10.2	35.770	17.586	25.964	2.3	268.0	114.4
28A	O2O28	150.0	1,7	151.3	35.709	12.274	27.091	3.2	242.9	93.2
33A	O2N33	39.6	1-4	40.0	35.686	13.783	26.764	2.8	255.4	101.1
		7.9	5-12	8.0	35.670	15.002	26.488	2.7	269.4	109.3
33B	O2N33	121.4	1	122.5	35.701	12.338	27.071	3.8	246.5	94.8
		100.2	2	101.0	35.703	12.391	27.062	3.2	245.1	94.3
		79.3	3	80.0	35.715	12.557	27.038	2.8	247.4	95.6
		59.3	4	59.9	35.691	13.643	26.798	2.8	250.3	98.8
		40.0	5	40.3	35.684	14.374	26.637	2.6	259.7	104.1

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 [%]
		19.8	6	20.0	35.671	15.186	26.449	2.5	269.4	109.7
		9.6	7	9.6	35.672	15.189	26.449	2.5	270.0	110.0
27A	O2O27	110.7	1	111.7	35.672	11.897	27.134	3.3	233.7	89.0
		98.2	2	99.1	35.694	12.210	27.090	3.2	232.9	89.3
		81.6	3	82.3	35.706	12.564	27.030	3.1	236.9	91.5
		57.8	4	58.3	35.714	13.133	26.921	2.8	249.7	97.6
		40.2	5	40.5	35.712	13.401	26.864	2.7	250.3	98.4
		19.7	6	19.8	35.689	13.500	26.825	2.7	255.6	100.6
		10.6	7	10.7	35.673	13.580	26.796	2.8	261.6	103.2
35A	O2N35	61.0	1-4	61.6	35.749	13.568	26.858	2.7	264.9	104.5
		9.3	5-12	9.3	35.684	16.243	26.218	2.6	277.7	115.5
35B	O2N35	1499.3	1	1517.4	35.445	6.567	27.850	2.7	246.6	83.3
		1249.6	2	1263.9	36.016	9.887	27.792	2.6	213.2	78.0
		1099.1	3	1111.3	36.114	10.688	27.726	2.6	204.7	76.2
		1000	4	1010.9	36.116	10.959	27.676	2.6	202.3	75.8
		899.2	5	908.7	36.092	11.265	27.599	2.6	200.8	75.7
		800.2	6	808.5	36.060	11.421	27.544	2.6	201.0	76.0
		600.4	7	606.3	35.885	11.370	27.412	2.6	206.2	77.8
		399.8	8	403.5	35.584	11.171	27.208	2.6	237.1	88.8
		199.1	9	200.8	35.687	12.272	27.075	2.5	258.4	99.2
		149.7	10	151.0	35.707	12.562	27.033	2.6	261.2	100.9
		101.6	11	102.5	35.717	12.777	26.996	2.5	261.6	101.5
35C	O2N35	80.1	1	80.8	35.733	13.102	26.943	2.7	264.2	103.2
		58.8	2	59.3	35.770	14.002	26.784	2.7	269.4	107.2
		38.7	3	39.0	35.747	15.550	26.426	2.7	274.3	112.6
		19.0	4	19.1	35.710	16.113	26.269	2.6	273.4	113.4
		9.2	5	9.3	35.684	16.379	26.186	2.5	271.5	113.2
34A	O2N34	201.3	1	203.1	35.678	12.012	27.119	3.0	237.7	90.8
		149.7	2	151.0	35.699	12.328	27.073	2.6	250.4	96.2
		100.9	3	101.8	35.719	12.623	27.028	2.5	255.8	98.9
		79.1	4	79.8	35.734	12.993	26.965	2.5	258.4	100.7
		59.6	5	60.1	35.719	13.536	26.842	2.5	252.0	99.3
		39.8	6	40.1	35.730	14.678	26.607	2.4	265.3	107.0
		19.7	7	19.8	35.660	16.243	26.200	2.3	274.9	114.3
		9.9	8	10	35.634	16.544	26.109	2.1	271.4	113.5
36A	O2N36	1737.1	1	1759.1	35.157	4.872	27.833	2.6	262.6	85.1
		1499.7	2	1517.8	35.580	7.426	27.838	2.5	233.1	80.4
		1250.2	3	1264.5	36.122	10.438	27.780	2.4	201.8	74.7
		1099.6	4	1111.9	36.148	10.931	27.709	2.5	197.0	73.8
		999.7	5	1010.6	36.122	11.092	27.657	2.5	194.8	73.2
		899.6	6	909.1	36.111	11.301	27.608	2.5	194.9	73.5
		798.4	7	806.7	36.081	11.456	27.553	2.5	195.7	74.0
		600.2	8	606.1	35.825	11.261	27.385	2.5	202.0	76.0
		399.1	9	402.8	35.616	11.195	27.229	2.5	218.1	81.8
		200.7	10	202.5	35.677	12.116	27.098	2.5	235.8	90.2
		149.6	11	150.9	35.730	12.573	27.049	2.4	242.6	93.7

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 [%]
36B	O2N36	101.9	1	102.8	35.786	13.065	26.992	2.6	255.4	99.7
		80.0	2	80.7	35.807	13.365	26.946	2.7	254.1	99.9
		59.8	3	60.3	35.771	13.672	26.854	2.6	260.1	102.9
		39.5	4	39.9	35.828	15.820	26.427	2.6	268.6	110.9
		19.7	5	19.9	35.744	16.768	26.142	2.5	263.7	110.8
		9.6	6	9.6	35.746	16.777	26.141	2.4	262.2	110.2
38A	O2N38	60.3	1-4	60.8	35.870	14.474	26.760	2.6	258.7	104.0
		9.4	5-12	9.4	35.918	17.806	26.024	2.5	254.0	109.0
38B	O2N38	1725.8	1	1747.6	35.047	4.268	27.811	2.6	266.5	85.0
		1499.6	2	1517.7	35.299	5.935	27.816	2.6	245.1	81.5
		1250.2	3	1264.5	35.745	8.733	27.768	2.5	210.8	75.0
		1099.6	4	1111.8	35.912	9.864	27.712	2.5	199.2	72.8
		1000.0	5	1010.9	35.961	10.396	27.656	2.5	194.9	72.0
		900.1	6	909.7	35.947	10.718	27.585	2.5	193.5	72.0
		799.9	7	808.2	35.882	10.876	27.504	2.6	195.1	72.8
		600.1	8	606.0	35.661	10.818	27.338	2.5	207.8	77.3
		400.0	9	403.7	35.625	11.432	27.192	2.5	218.0	82.2
		200.1	10	201.9	35.722	12.507	27.057	2.5	237.7	91.7
		149.6	11	150.9	35.822	13.300	26.974	2.4	233.5	91.6
		99.3	12	100.2	35.905	13.959	26.899	2.3	241.8	96.3
38C	O2N38	81.9	1	82.6	35.934	14.171	26.875	2.6	246.6	98.6
		59.4	2	59.9	35.943	14.325	26.849	2.7	246.3	98.8
		38.9	3	39.2	35.938	14.969	26.704	2.7	255.1	103.6
		19.9	4	20.1	35.939	17.821	26.036	2.6	248.9	106.8
		8.4	5	8.5	35.945	17.824	26.040	2.5	248.2	106.6
37A	O2N37	101.1	1	102.0	35.800	13.210	26.973	2.5	248.0	97.1
		79.3	2	80.0	35.819	13.605	26.905	2.5	249.5	98.5
		59.2	3	59.7	35.852	14.462	26.749	2.5	256.0	102.9
		39.4	4	39.8	35.885	15.904	26.452	2.5	266.0	110.0
		19.9	5	20.1	35.826	17.577	26.010	2.4	254.6	108.7
		9.6	6	9.7	35.827	17.581	26.009	2.2	253.8	108.4
37B	O2N37	1000.3	1	1011.2	36.084	10.968	27.650	2.5	193.6	72.5
		898.9	2	908.4	36.048	11.171	27.582	2.5	192.5	72.4
		798.7	3	807.0	36.051	11.489	27.524	2.5	194.2	73.5
		699.8	4	706.8	35.901	11.373	27.425	2.5	197.5	74.5
		600.0	5	605.9	35.774	11.238	27.349	2.5	202.5	76.1
		501.3	6	506.1	35.672	11.170	27.280	2.5	210.1	78.8
		398.9	7	402.7	35.621	11.336	27.207	2.5	218.5	82.2
		300.5	8	303.3	35.620	11.618	27.151	2.5	227.3	86.0
		200.2	9	202.0	35.690	12.242	27.084	2.4	241.3	92.6
		150.6	10	151.9	35.739	12.658	27.038	2.4	249.8	96.7
29A	O2O29	800.6	1,7	808.9	36.074	11.330	27.571	2.4	195.7	73.8
26A	O2P26	59.7	1-4	60.2	35.844	14.287	26.780	2.6	255.5	102.3
		9.8	5-12	9.9	35.868	17.845	25.976	2.5	251.1	107.8
26B	O2P26	1732.6	1	1754.5	35.014	4.139	27.798	2.6	268.6	85.4
		1499.6	2	1517.7	35.230	5.614	27.801	2.6	248.4	81.9

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 [%]
		1249.5	3	1263.8	35.879	9.430	27.761	2.5	207.1	74.9
		1100.1	4	1112.3	36.010	10.235	27.724	2.6	199.1	73.4
		999.0	5	1009.8	36.047	10.567	27.693	2.5	196.2	72.8
		899.8	6	909.3	36.046	10.860	27.637	2.6	194.4	72.6
		800.7	7	809.0	35.913	10.728	27.555	2.6	195.4	72.7
		599.7	8	605.6	35.699	10.808	27.369	2.6	206.2	76.8
		399.6	9	403.4	35.590	11.239	27.201	2.6	226.0	84.8
		200.5	10	202.3	35.704	12.350	27.073	2.5	245.2	94.3
		149.3	11	150.7	35.744	12.673	27.040	2.5	241.7	93.6
		98.6	12	99.4	35.799	13.133	26.988	2.5	242.8	95.0
26C	O2P26	81.5	1	82.2	35.820	13.381	26.953	2.6	249.6	98.1
		60.3	3	60.8	35.838	13.847	26.869	2.7	250.3	99.4
		39.6	5	39.9	35.844	17.006	26.163	2.7	261.4	110.5
		19.7	7	19.8	35.877	17.779	26.000	2.5	251.7	107.9
		10.3	9	10.4	35.878	17.798	25.995	2.4	250.9	107.7
25A	O2P25	1731.2	1	1753.0	35.075	4.408	27.818	2.5	260.3	83.3
		1498.6	2	1516.7	35.470	6.830	27.834	2.5	233.0	79.2
		1249.6	3	1264.0	35.909	9.415	27.787	2.4	204.5	74.0
		1100.1	4	1112.3	35.984	10.066	27.733	2.5	197.6	72.5
		1000.3	5	1011.2	36.036	10.656	27.668	2.5	192.2	71.5
		899.3	6	908.9	36.051	11.093	27.599	2.5	190.7	71.6
		799.4	7	807.7	36.021	11.300	27.535	2.5	191.3	72.1
		600.2	8	606.2	35.767	11.232	27.345	2.6	200.4	75.3
		400.2	9	403.9	35.625	11.352	27.207	2.6	215.3	81.0
		200.4	10	202.2	35.705	12.370	27.070	2.5	249.2	95.9
		149.6	11	150.9	35.737	12.693	27.030	2.4	249.6	96.7
		99.8	12	100.7	35.771	13.092	26.975	2.5	248.5	97.1
25B	O2P25	80.9	1	81.6	35.786	13.417	26.919	2.6	251.4	98.9
		59.8	2	60.3	35.791	13.922	26.817	2.6	254.9	101.3
		40.1	3	40.4	35.802	14.812	26.634	2.6	261.9	106.0
		20.0	4	20.1	35.786	16.943	26.132	2.6	254.6	107.4
		10.1	5-12	10.2	35.794	17.090	26.103	2.5	253.2	107.1
30A	O2O30	1744.8	1,3,5,7,9, 11	1766.9	35.180	4.950	27.842	2.6	251.0	81.5
33BA	O2N33	39.6	1-4	40.0	35.708	13.005	26.942	2.7	235.7	91.9
		9.0	5-12	9.1	35.688	13.434	26.838	2.7	247.3	97.2
33BB	O2N33	120.0	1	121.1	35.715	12.444	27.062	3.0	220.1	84.8
		100.2	2	101.0	35.721	12.564	27.042	2.8	224.0	86.6
		80.6	3	81.3	35.726	12.699	27.018	2.7	233.4	90.4
		59.8	4	60.3	35.707	13.047	26.933	2.8	236.5	92.3
		39.7	5	40.0	35.708	13.074	26.927	2.7	237.3	92.6
		19.7	6	19.9	35.704	13.100	26.919	2.7	237.4	92.7
		9.7	7	9.8	35.685	13.359	26.851	2.8	241.0	94.6
35BA	O2N35	1467.1	17	1484.7	35.870	9.065	27.817	2.7	210.7	75.6
34BA	O2N34	200.3	17	202.1	35.682	12.047	27.115	2.6	223.9	85.5
39A	O2LC39	300.1	17	302.8	35.616	11.555	27.160	2.3	255.4	96.5

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 [%]
40A	O2LC40	299.1	17	301.9	35.610	11.536	27.158	2.5	258.7	97.7
41A	O2LC41	301.5	17	304.3	35.597	11.502	27.155	2.4	245.7	92.8
42A	O2LC42	300.1	17	302.8	35.587	11.371	27.172	2.6	244.2	91.9
43A	O2LC43	722.1	1	729.5	35.626	10.315	27.402	2.6	218.4	80.4
		598.9	2	604.8	35.587	10.785	27.285	2.6	228.2	84.8
		400.7	3	404.5	35.606	11.330	27.197	2.6	241.6	90.9
		199.7	4	201.5	35.638	11.761	27.135	2.6	252.5	95.9
		149.7	5	151.0	35.672	12.133	27.090	2.5	256.4	98.1
		99.8	6	100.6	35.667	12.349	27.043	2.6	254.5	97.8
		79.9	7	80.5	35.671	12.711	26.973	2.6	257.5	99.7
		58.5	8	59.0	35.668	12.882	26.936	2.6	258.2	100.4
		39.3	9	39.6	35.614	14.668	26.520	2.6	266.9	107.5
		19.5	10	19.7	35.584	15.772	26.250	2.6	267.5	110.1
		9.0	11	9.1	35.586	15.772	26.251	2.5	267.8	110.3
43B	O2LC43	299.5	1	302.2	35.633	11.768	27.133	2.5	249.1	94.6
		199.6	2	201.3	35.644	12.009	27.093	2.6	250.6	95.6
		100.4	3	101.2	35.657	12.579	26.989	2.5	255.0	98.5
		80.1	4	80.8	35.656	12.960	26.912	2.5	256.6	99.9
		60.8	5	61.4	35.646	13.559	26.781	2.6	259.1	102.1
		41.4	6	41.7	35.641	13.766	26.733	2.6	260.3	103.0
		19.5	7	19.6	35.609	14.926	26.458	2.6	270.3	109.5
		8.9	8	9.0	35.582	15.593	26.288	2.6	268.8	110.3
43C	O2LC43	302.0	17	304.7	35.628	11.639	27.154	2.6	246.2	93.2
43D	O2LC43	301.9	17	304.7	35.624	11.549	27.167	2.6	245.2	92.7
43E	O2LC43	300.5	1	303.3	35.619	11.445	27.183	2.6	243.8	91.9
		200.8	2	202.6	35.639	11.819	27.126	2.6	247.9	94.2
		100.9	3	101.8	35.653	12.368	27.027	2.7	251.1	96.6
		80.8	4	81.5	35.658	12.610	26.983	2.6	253.6	98.0
		58.5	5	59.0	35.659	12.921	26.921	2.6	254.9	99.2
		39.6	6	40.0	35.644	13.644	26.761	2.6	259.4	102.4
		19.9	7	20.1	35.606	15.010	26.438	2.6	264.6	107.3
		9.2	8	9.3	35.582	15.675	26.270	2.5	267.1	109.8
43F	O2LC43	300.6	17	303.4	35.611	11.330	27.198	2.6	241.8	90.9
43G	O2LC43	300.0	17	302.8	35.615	11.398	27.189	2.6	243.0	91.6
43H	O2LC43	302.0	1	304.7	35.607	11.298	27.201	2.6	241.6	90.8
		200.9	2	202.7	35.628	11.613	27.156	2.6	245.2	92.8
		100.7	3	101.6	35.651	12.069	27.084	2.6	250.3	95.6
		79.6	4	80.3	35.652	12.231	27.053	2.6	251.0	96.2
		60.0	5	60.5	35.657	12.415	27.020	2.6	251.7	96.9
		39.5	6	39.8	35.660	13.053	26.895	2.6	256.4	100.0
		19.9	7	20.1	35.587	15.823	26.241	2.6	266.5	109.8
		10.0	8	10.1	35.582	15.916	26.215	2.5	266.8	110.2
43I	O2LC43	302.5	17	305.3	35.611	11.335	27.197	2.6	242.0	91.0
43J	O2LC43	300.3	17	303.1	35.622	11.499	27.175	2.6	244.0	92.1
43K	O2LC43	301.0	-	303.7	35.623	11.532	27.170	2.6	244.9	92.5
		199.6	2	201.4	35.633	11.702	27.143	2.7	247.5	93.8

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 [%]
		99.5	3	100.4	35.652	12.123	27.074	2.6	250.1	95.7
		80.2	4	80.9	35.659	12.765	26.953	2.7	253.6	98.3
		59.8	5	60.3	35.656	13.186	26.865	2.6	256.3	100.3
		40.5	6	40.8	35.642	14.103	26.663	2.6	261.1	104.0
		19.7	7	19.9	35.588	15.841	26.237	2.6	267.0	110.1
		10.8	8	10.9	35.590	15.838	26.239	2.5	267.0	110.1
43L	O2LC43	300.9	17	303.7	35.630	11.664	27.151	2.6	245.7	93.1
43M	O2LC43	300.6	17	303.4	35.631	11.678	27.148	2.7	246.1	93.3
43N	O2LC43	300.5	17	303.3	35.634	11.778	27.132	2.7	246.1	93.5
43O	O2LC43	59.8	1-6	60.3	35.654	12.447	27.011	2.7	252.1	97.1
		8.8	7-12	8.9	35.607	15.314	26.370	2.8	267.4	109.1
44A	O2LC43	150.0	17	151.4	35.626	11.694	27.138	2.7	244.9	92.9
45A	O2LC43	150.5	17	151.8	35.647	12.291	27.039	2.8	247.9	95.2
46A	O2LC43	150.4	17	151.7	35.654	12.304	27.042	2.8	249.6	95.9
47A	O2LC43	149.3	17	150.6	35.654	12.385	27.026	2.8	248.3	95.5

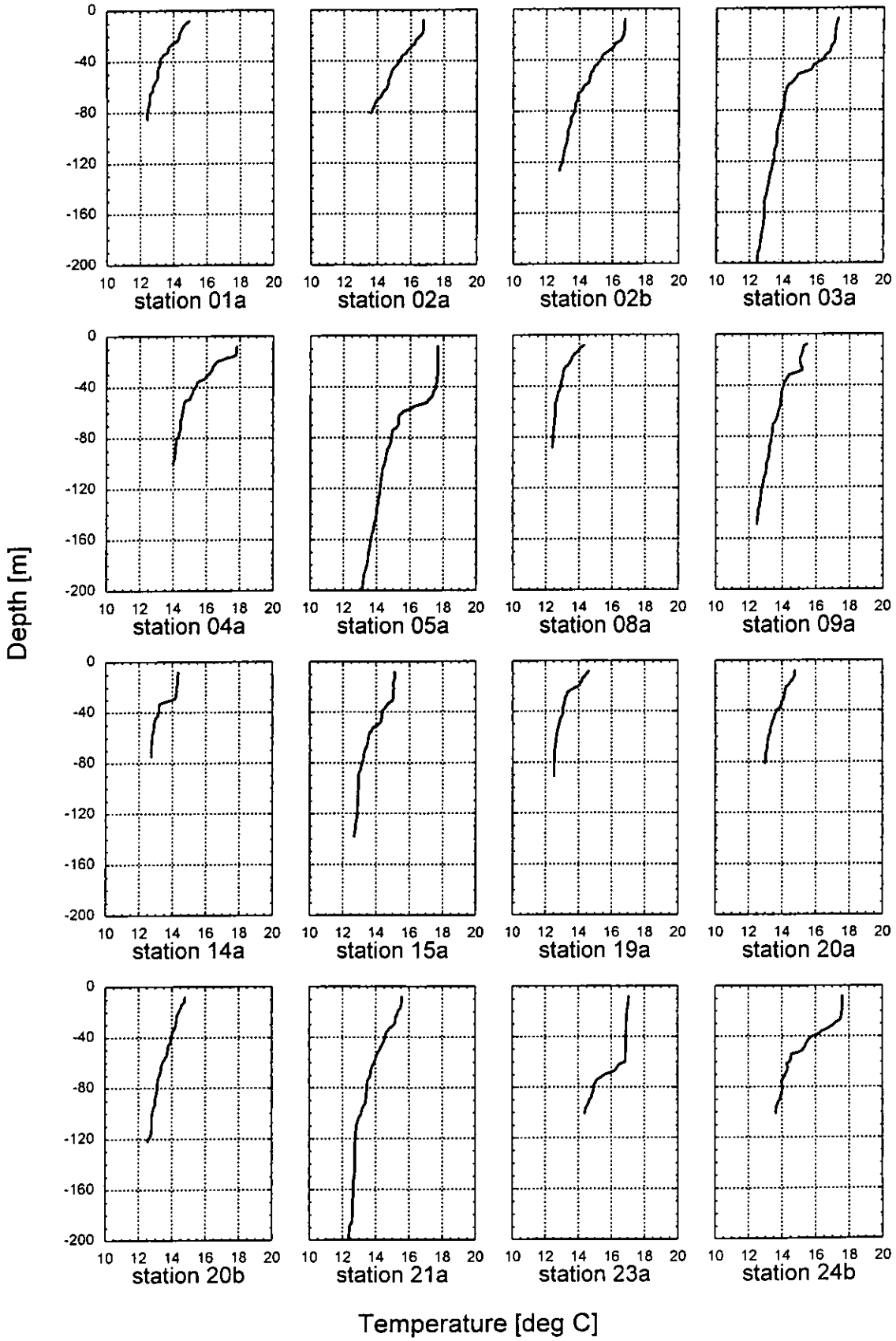
Appendix 5.

Vertical profiles with SCTD.

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

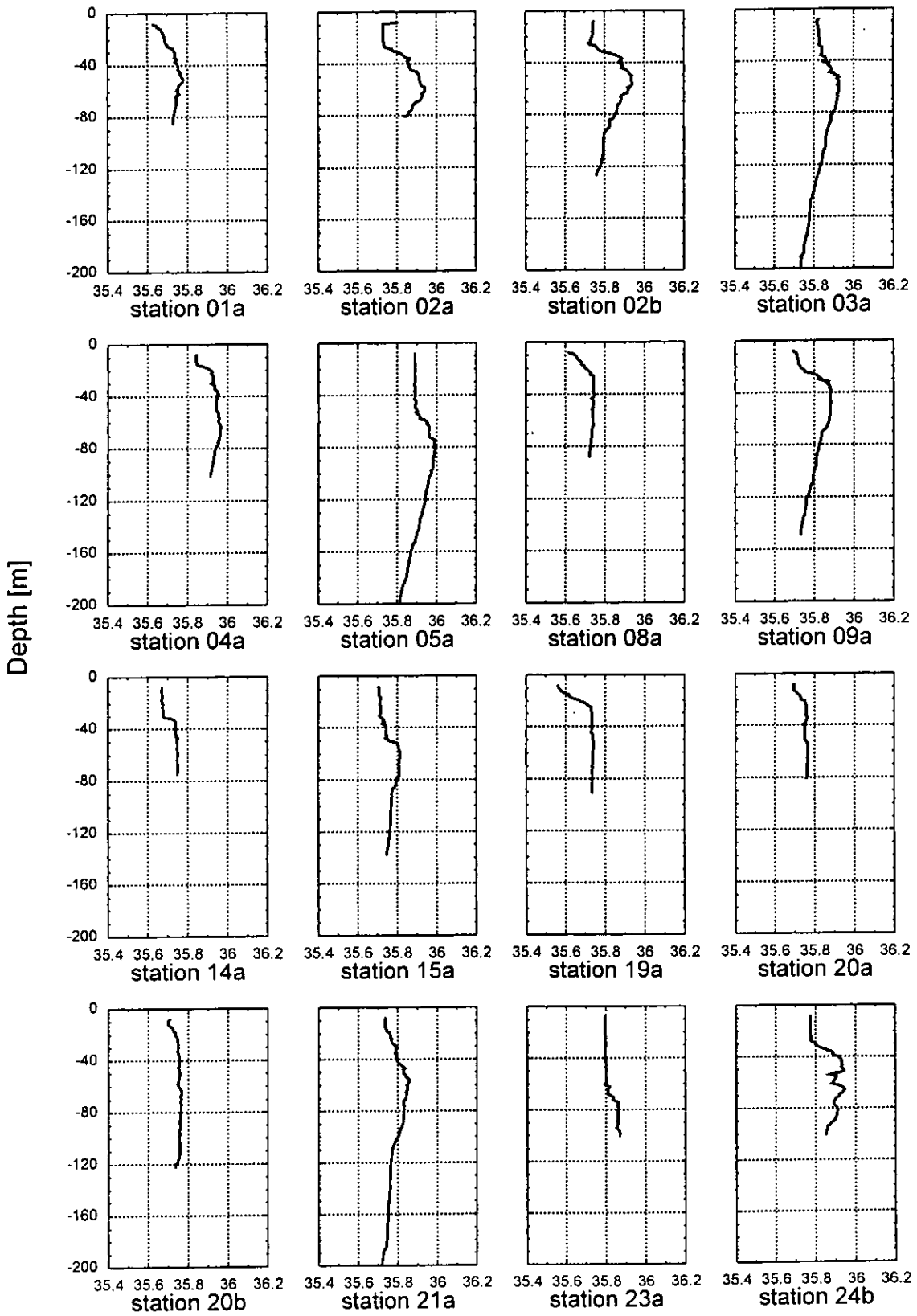
CTD Profiles cruise 98/15

Stations 01a - 24b Surface casts



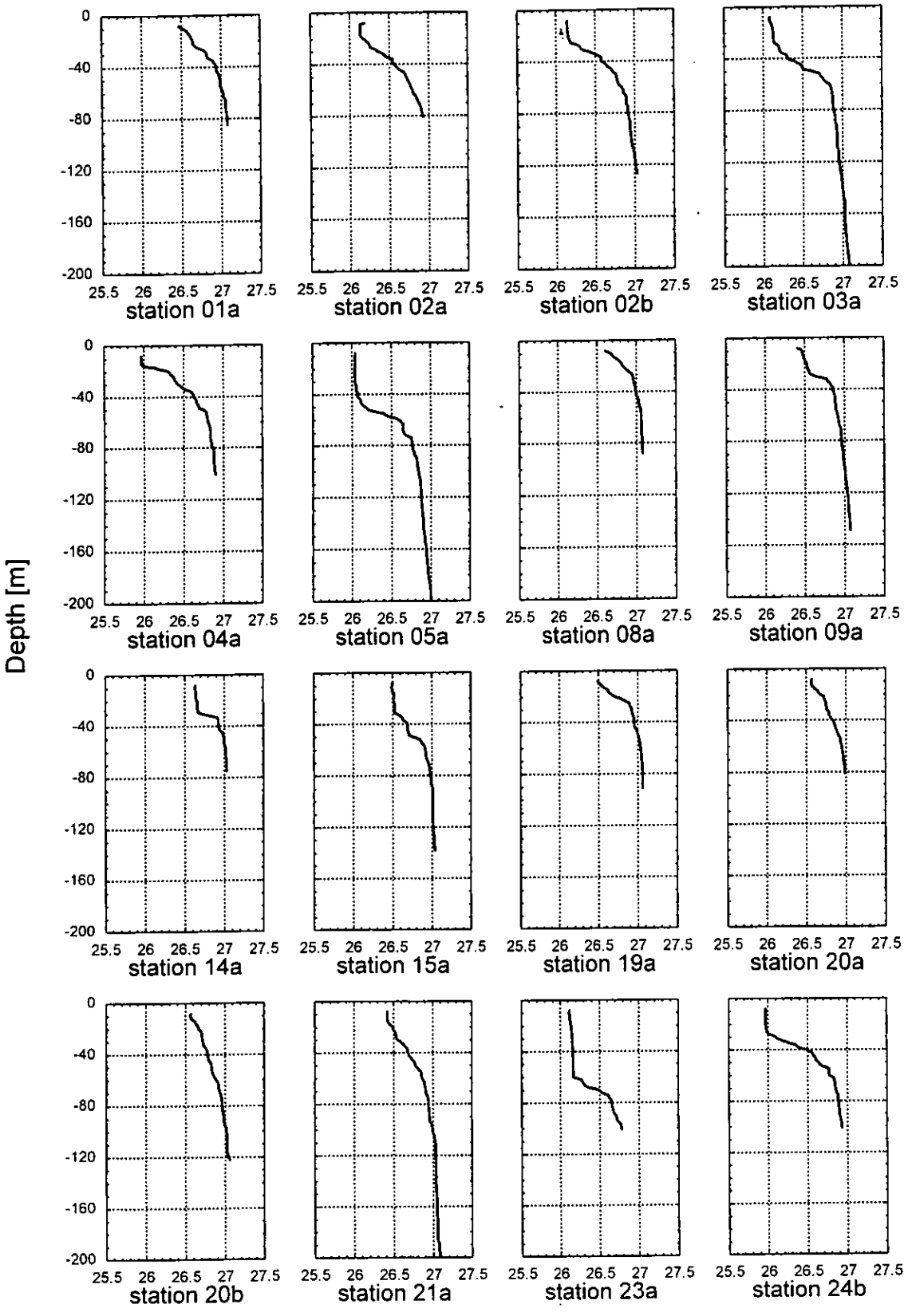
CTD Profiles cruise 98/15

Stations 01a - 24b Surface casts



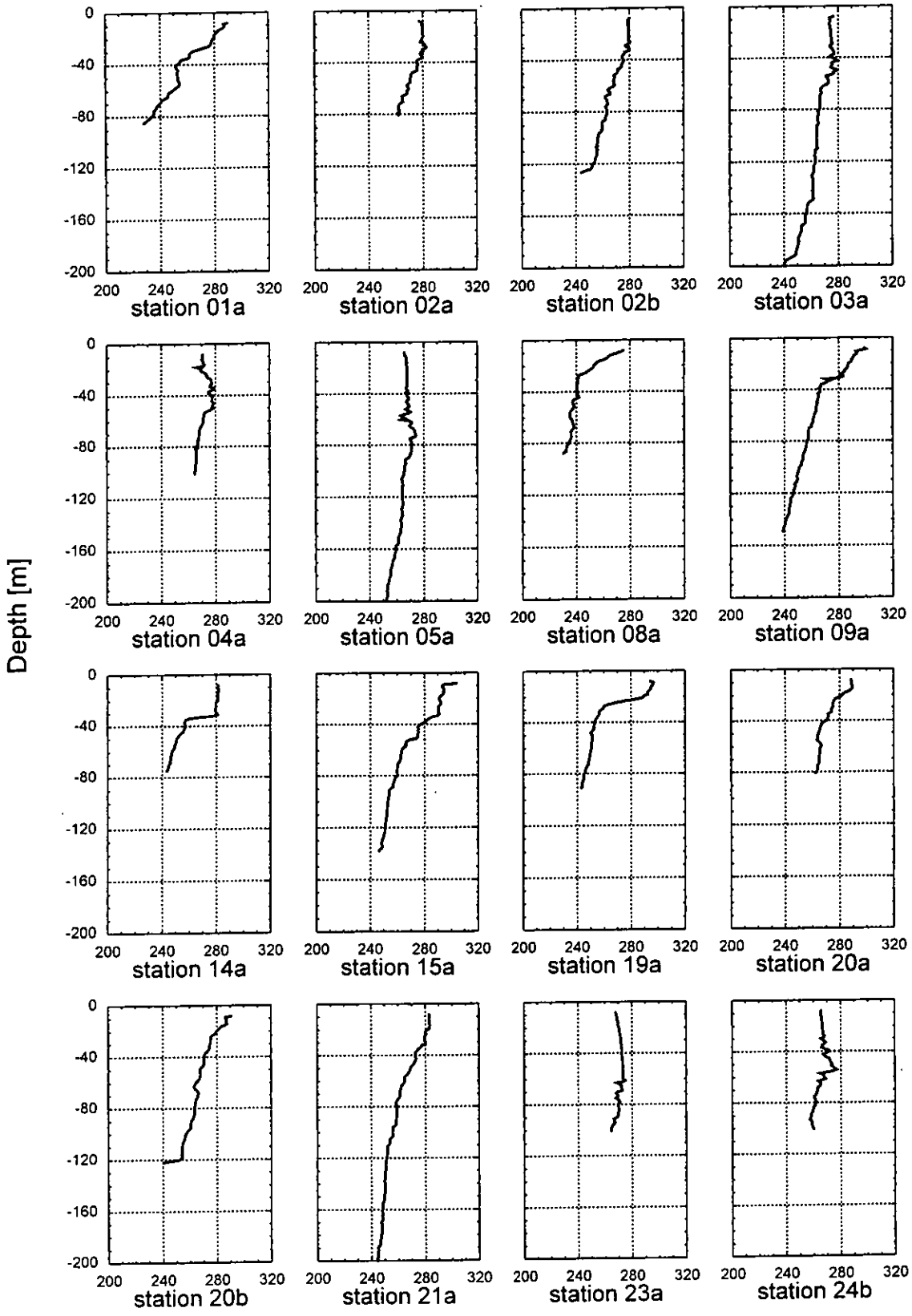
CTD Profiles cruise 98/15

Stations 01a - 24b Surface casts



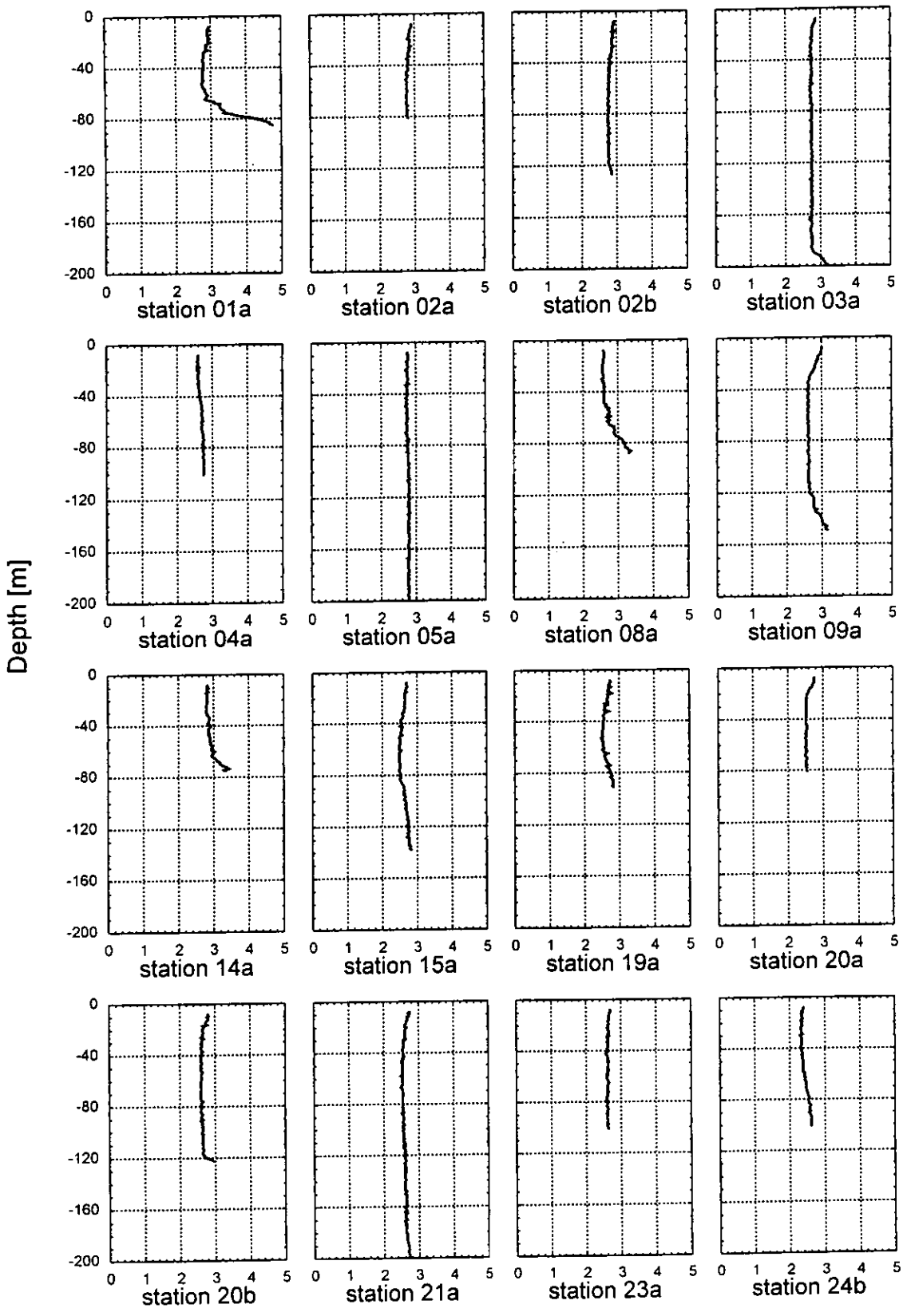
CTD Profiles cruise 98/15

Stations 01a - 24b Surface casts



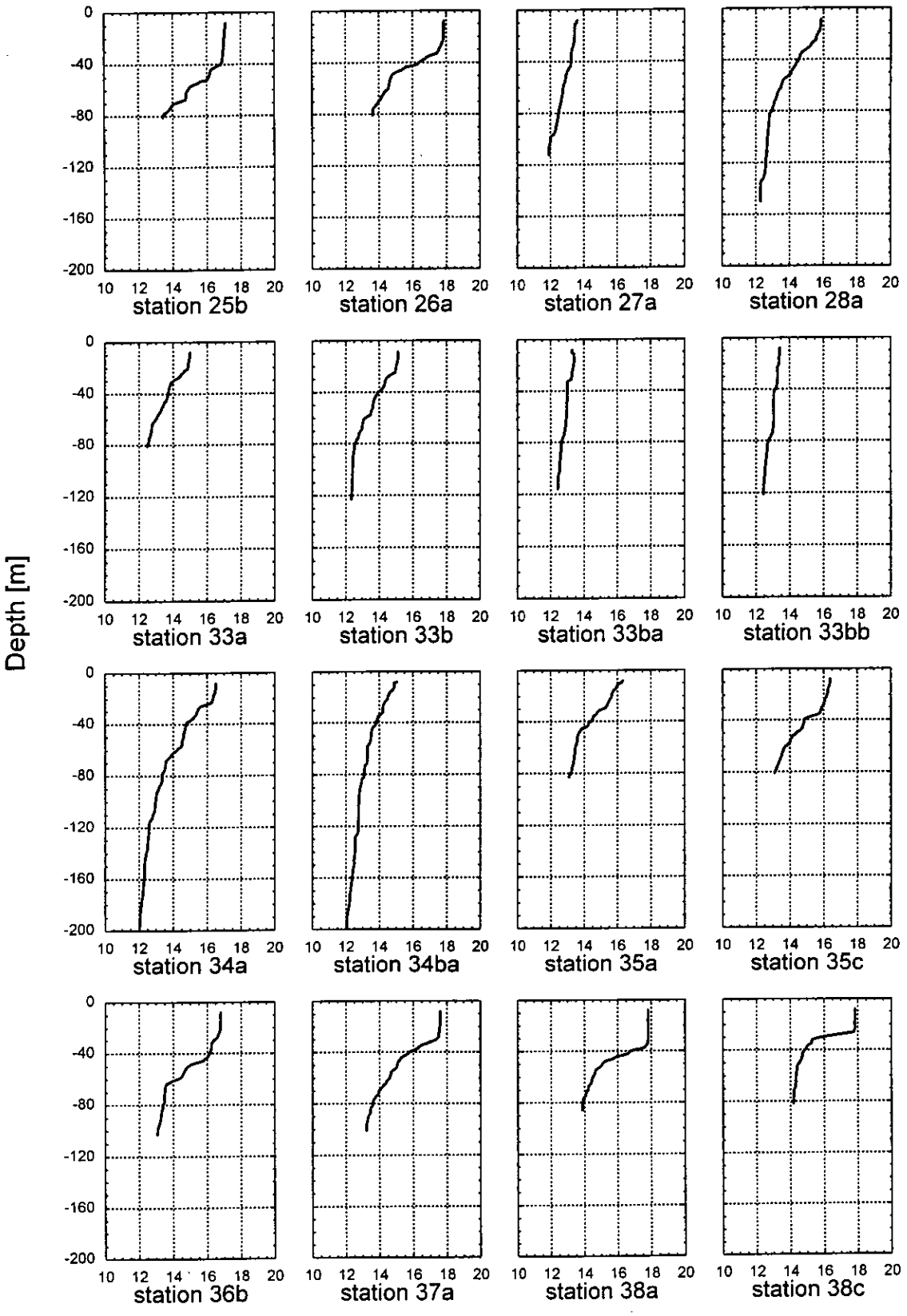
CTD Profiles cruise 98/15

Stations 01a - 24b Surface casts



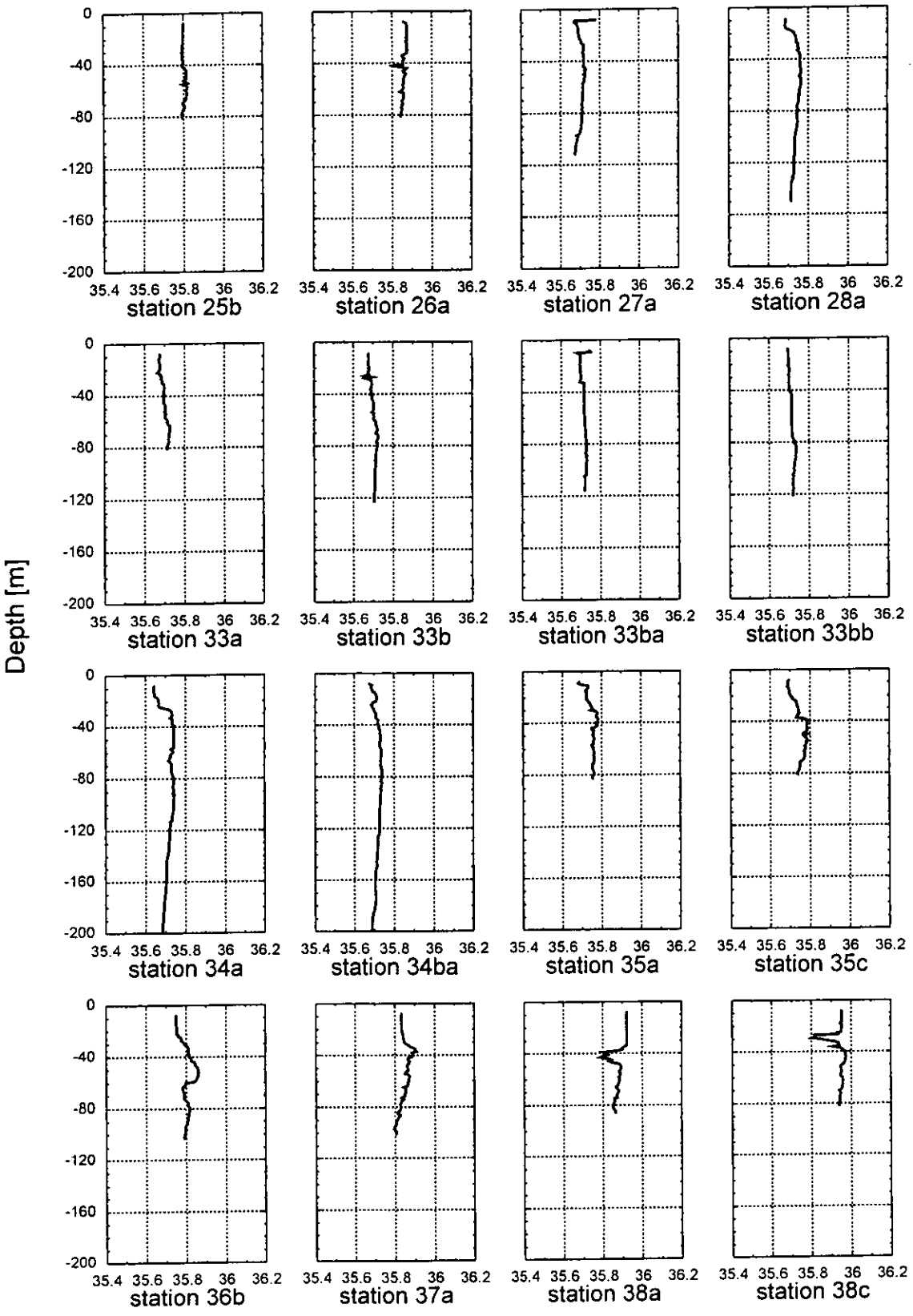
CTD Profiles cruise 98/15

Stations 25b - 38c Surface casts



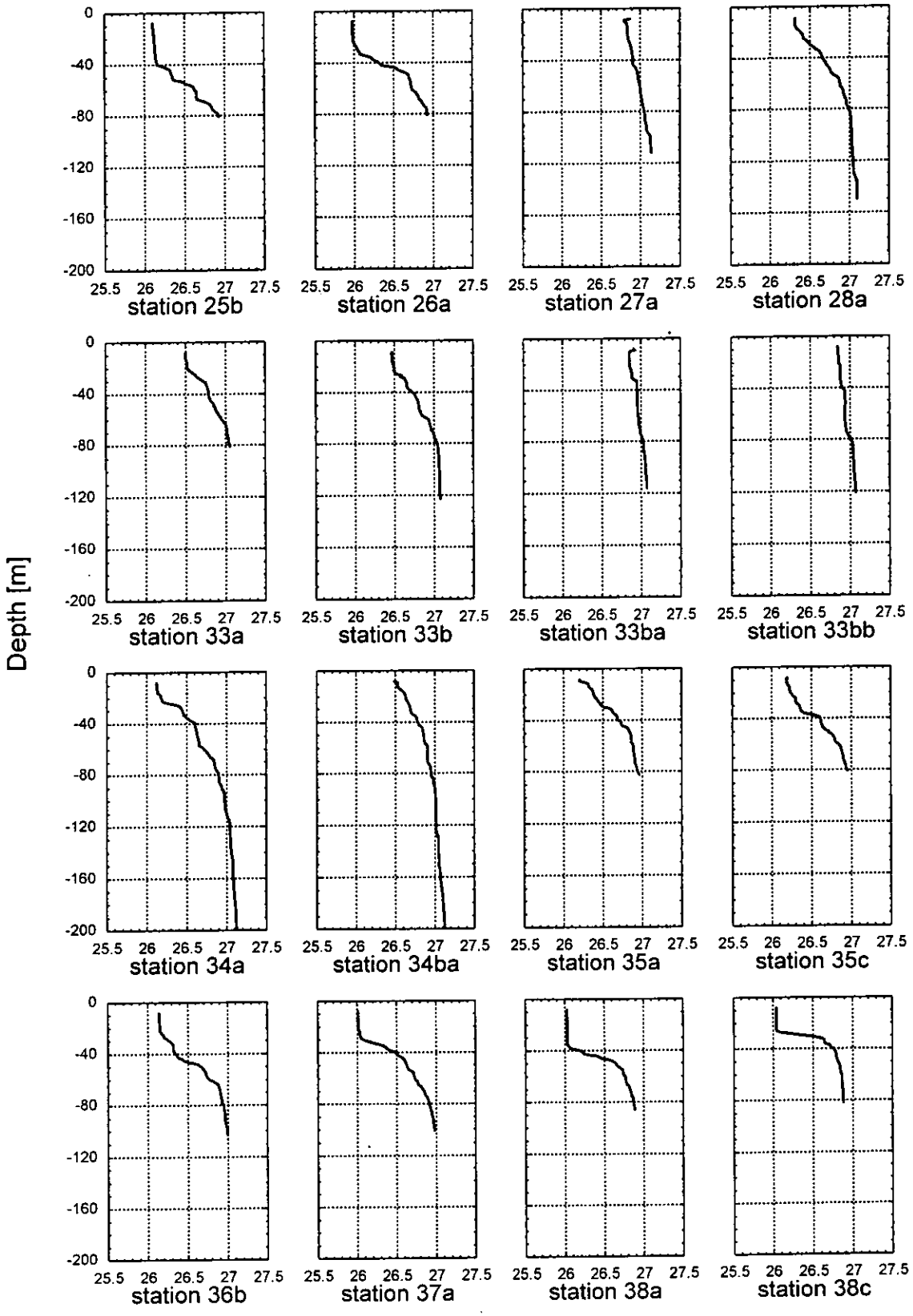
CTD Profiles cruise 98/15

Stations 25b - 38c Surface casts



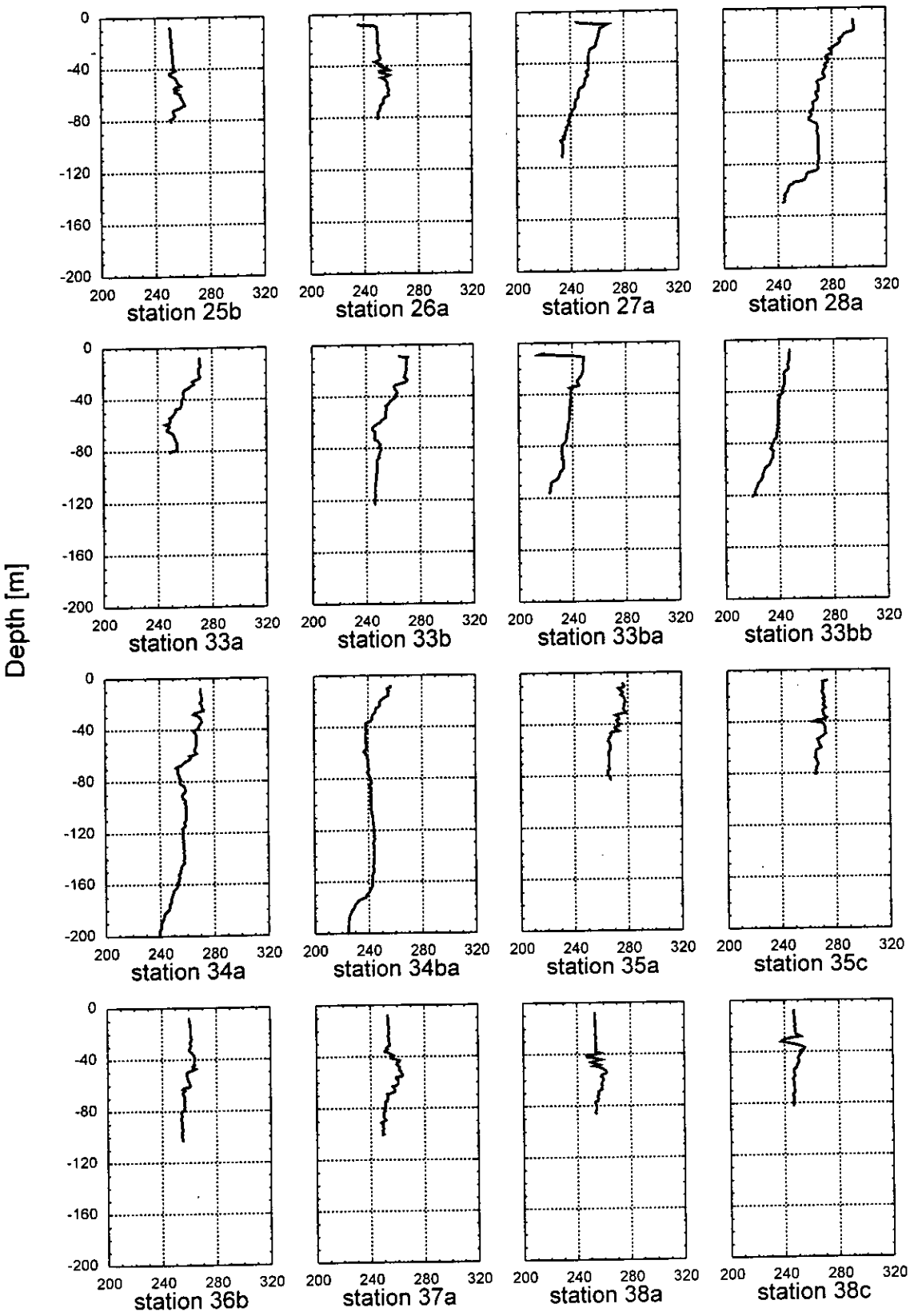
CTD Profiles cruise 98/15

Stations 25b - 38c Surface casts



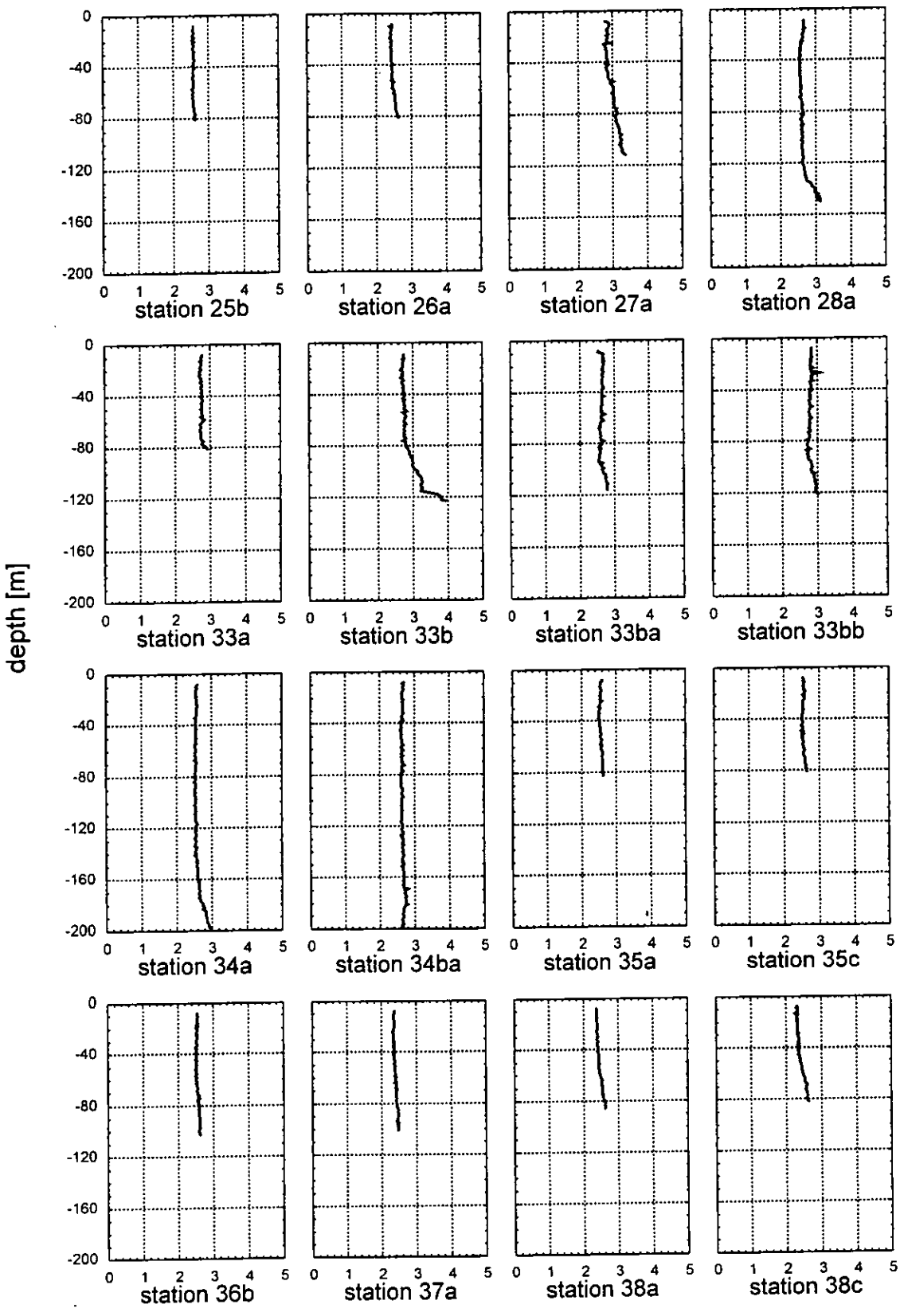
CTD Profiles cruise 98/15

Stations 25b - 38c Surface casts



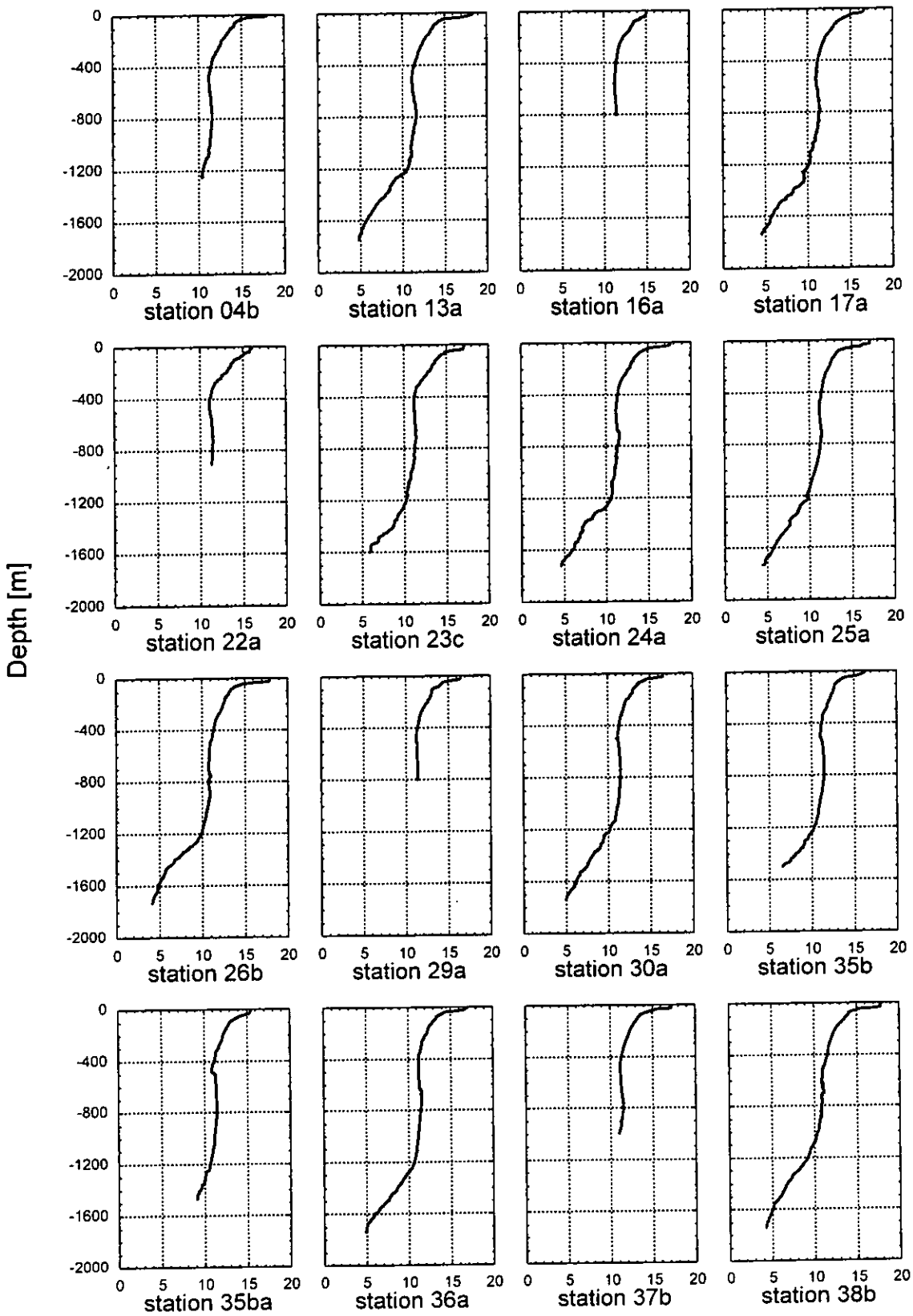
CTD Profiles cruise 98/15

Stations 25b - 38c Surface casts



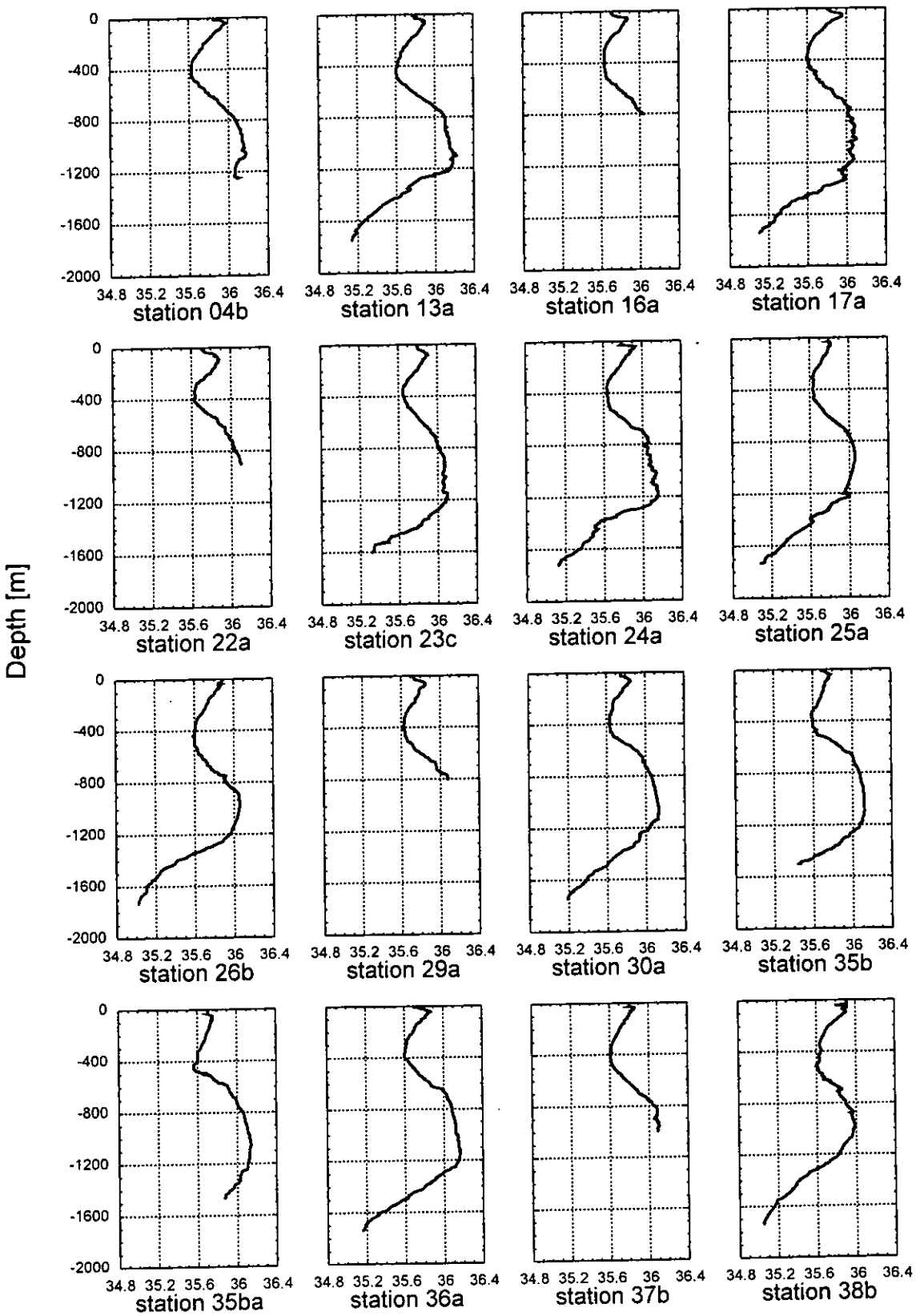
CTD profiles cruise 98/15

Stations 04b - 38b Deep casts



CTD Profiles cruise 98/15

Stations 04b - 38b Deep casts



CTD Profiles cruise 98/15

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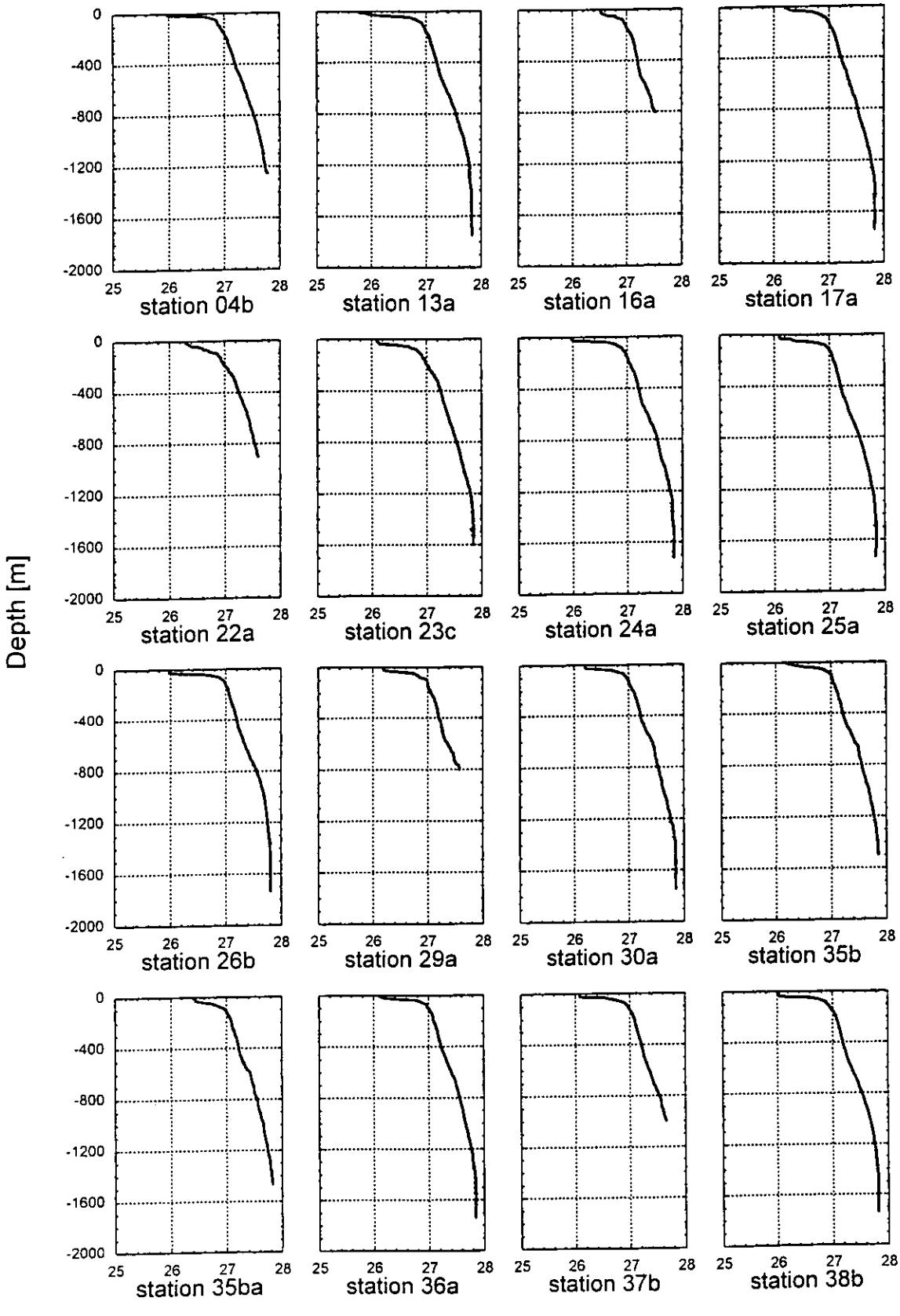
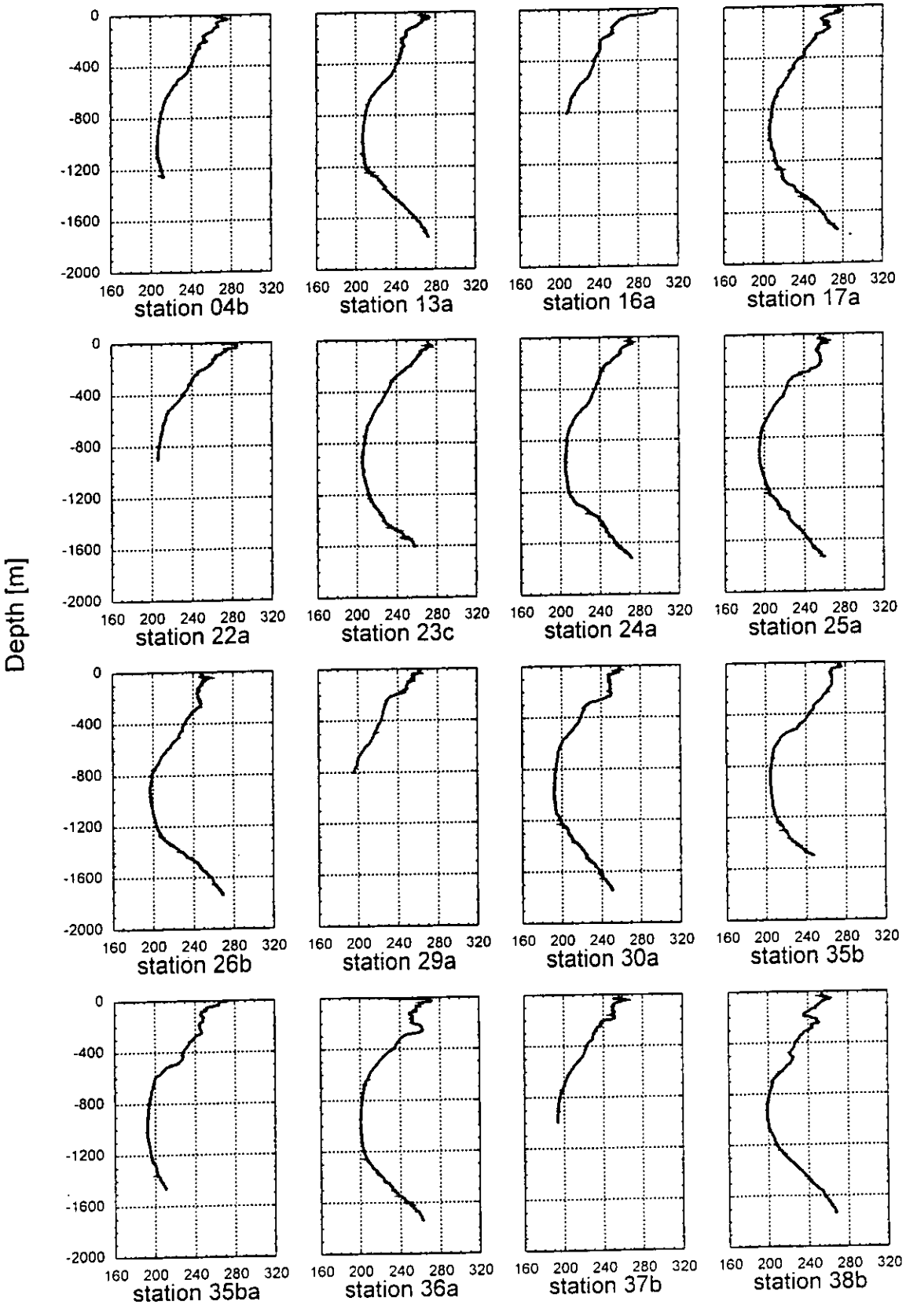


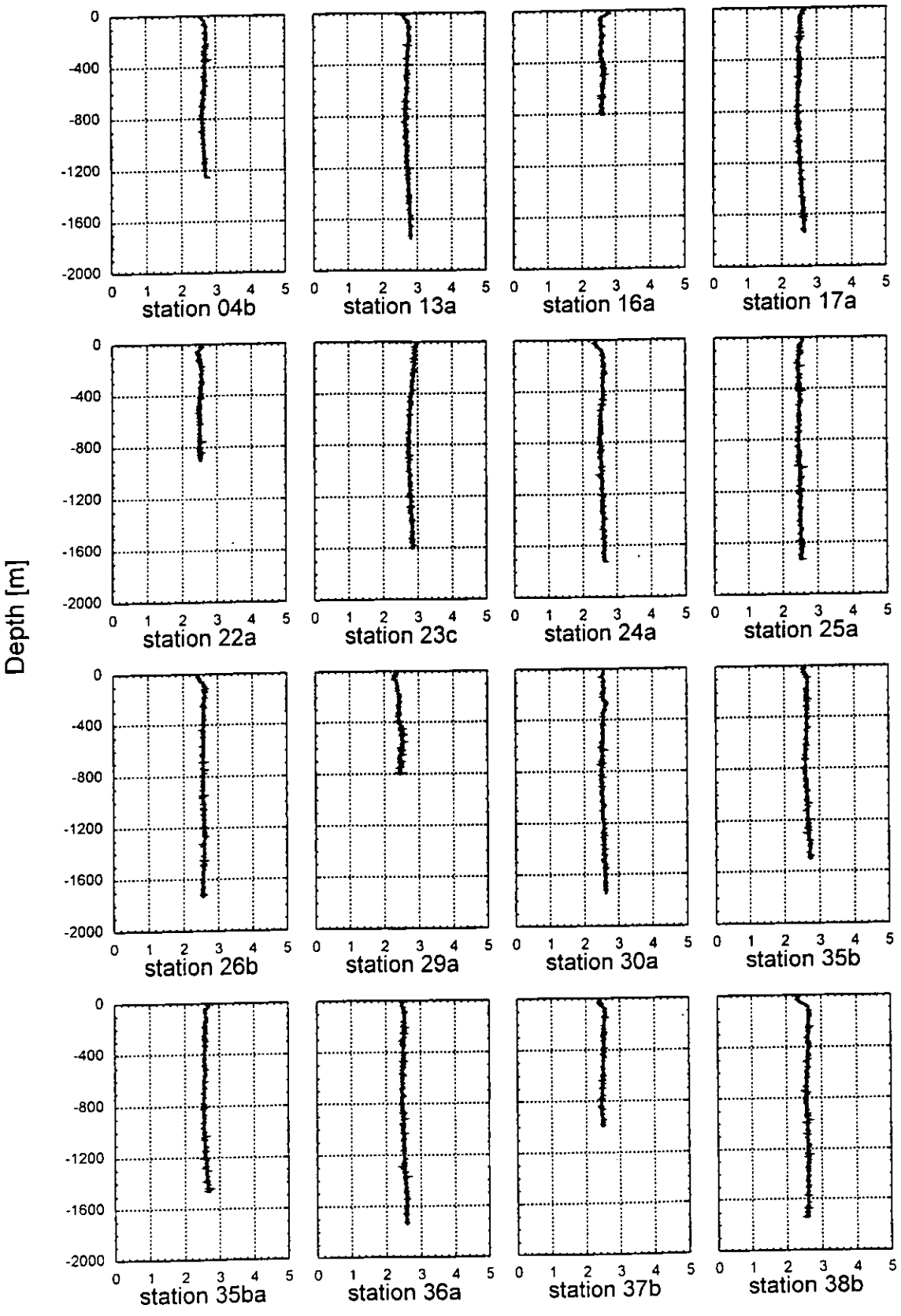
CTD Profiles cruise 98/15

Stations 04b - 38b Deep casts



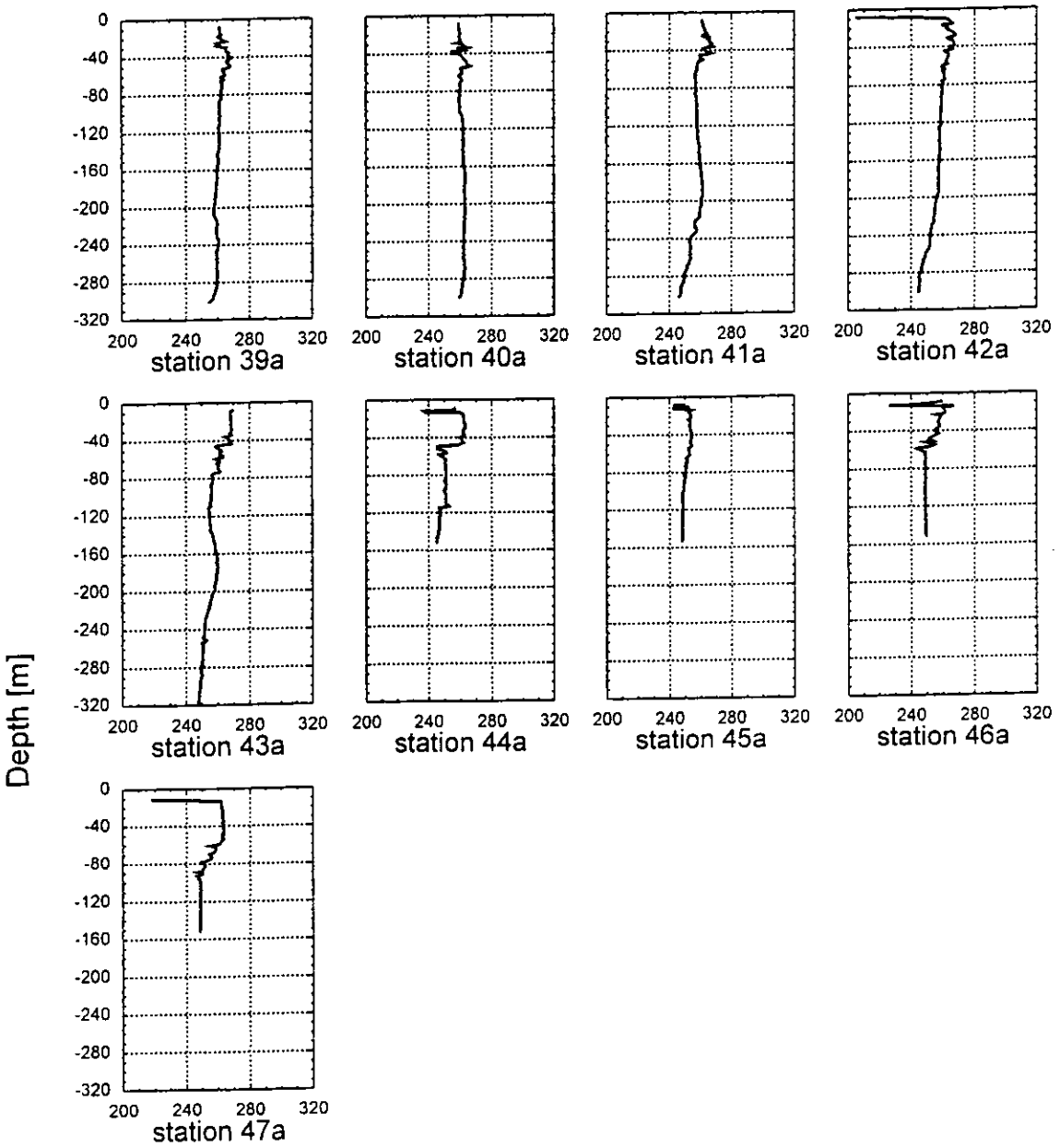
CTD Profiles cruise 98/15

Stations 04b - 38b Deep casts



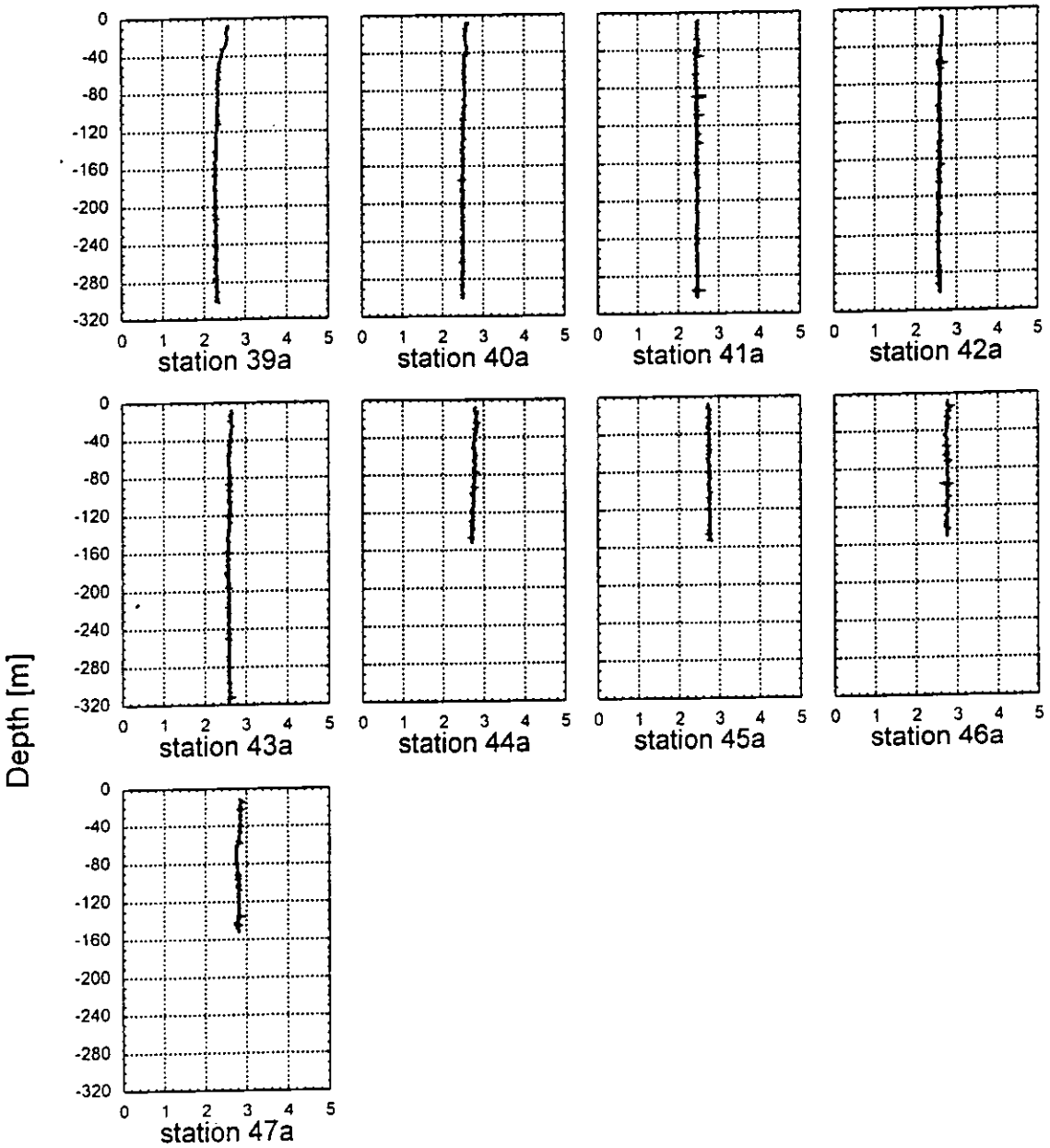
CTD Profiles cruise 98/15

Stations La Chapelle Bank



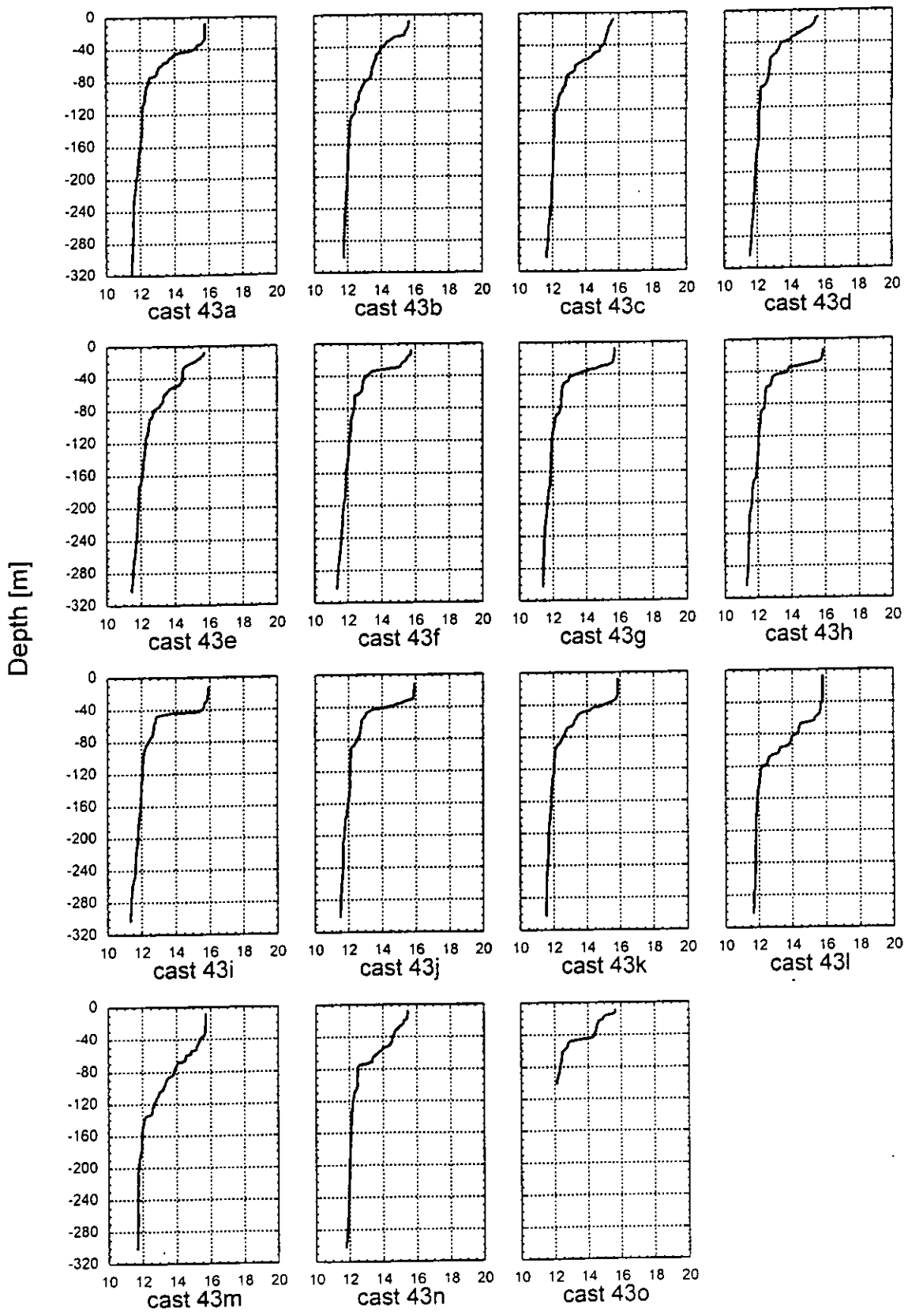
CTD Profiles cruise 98/15

Stations La Chapelle Bank



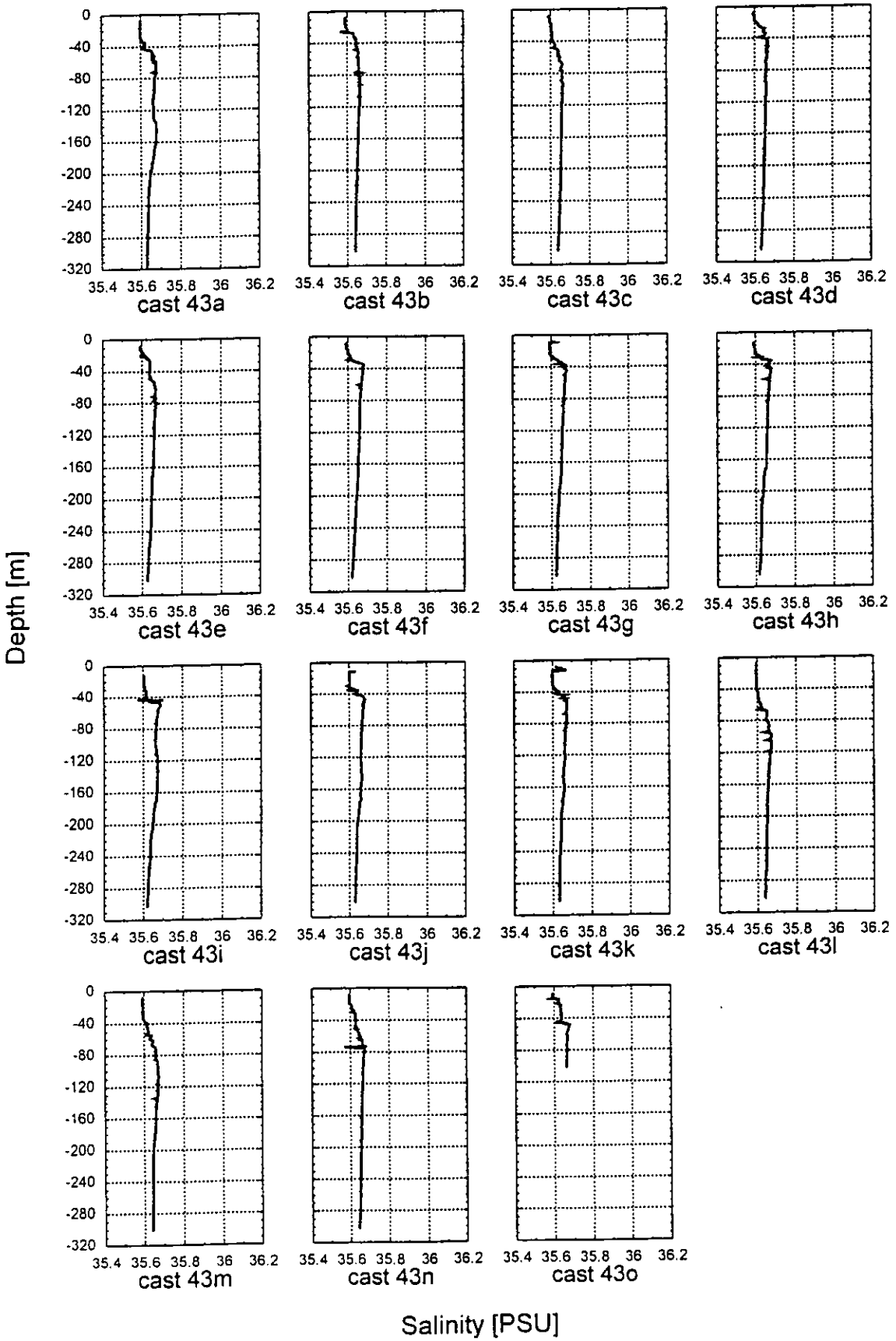
CTD Profiles cruise 98/15

Station 43 - La Chapelle Bank



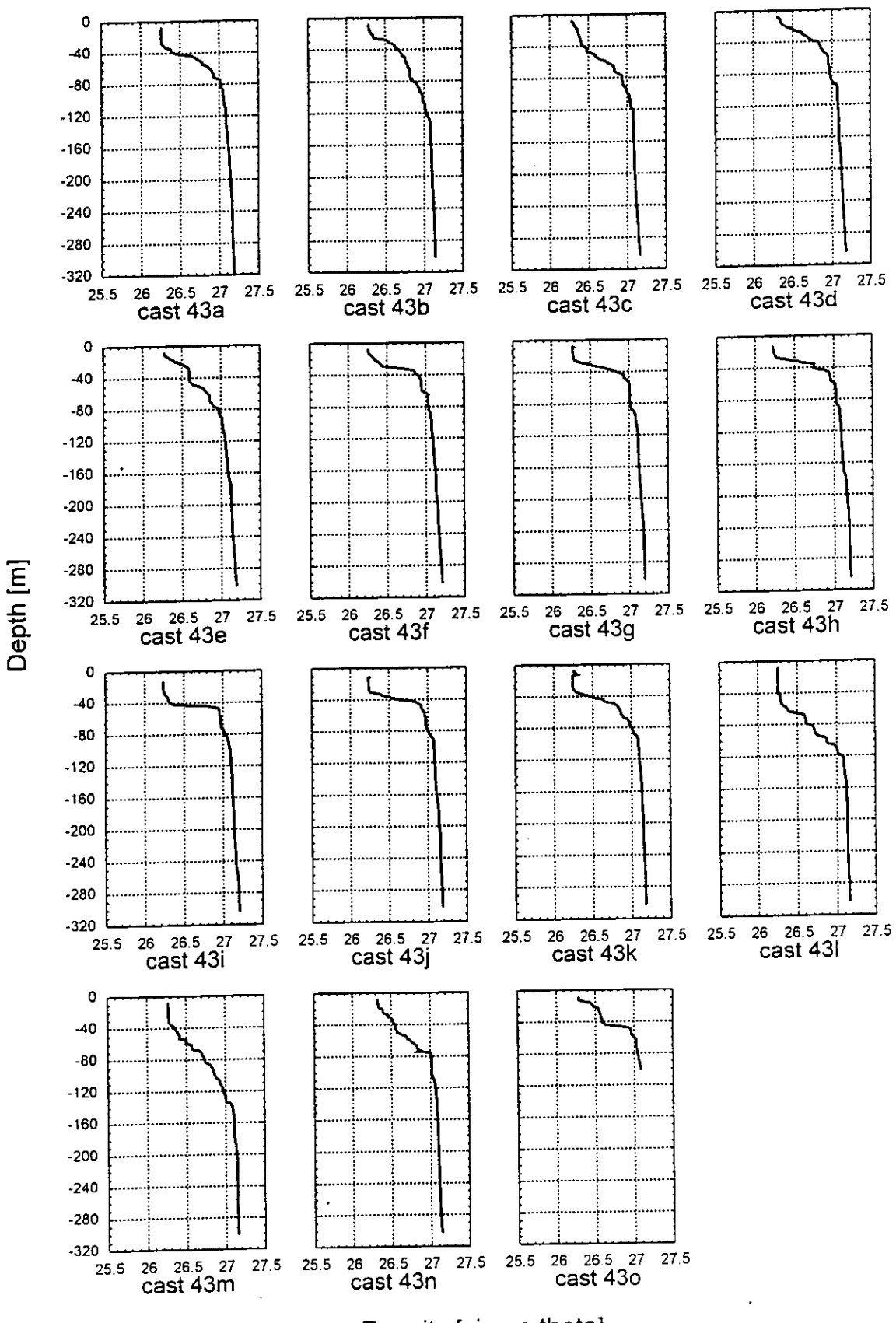
CTD Profiles cruise 98/15

Station 43 - La Chapelle Bank



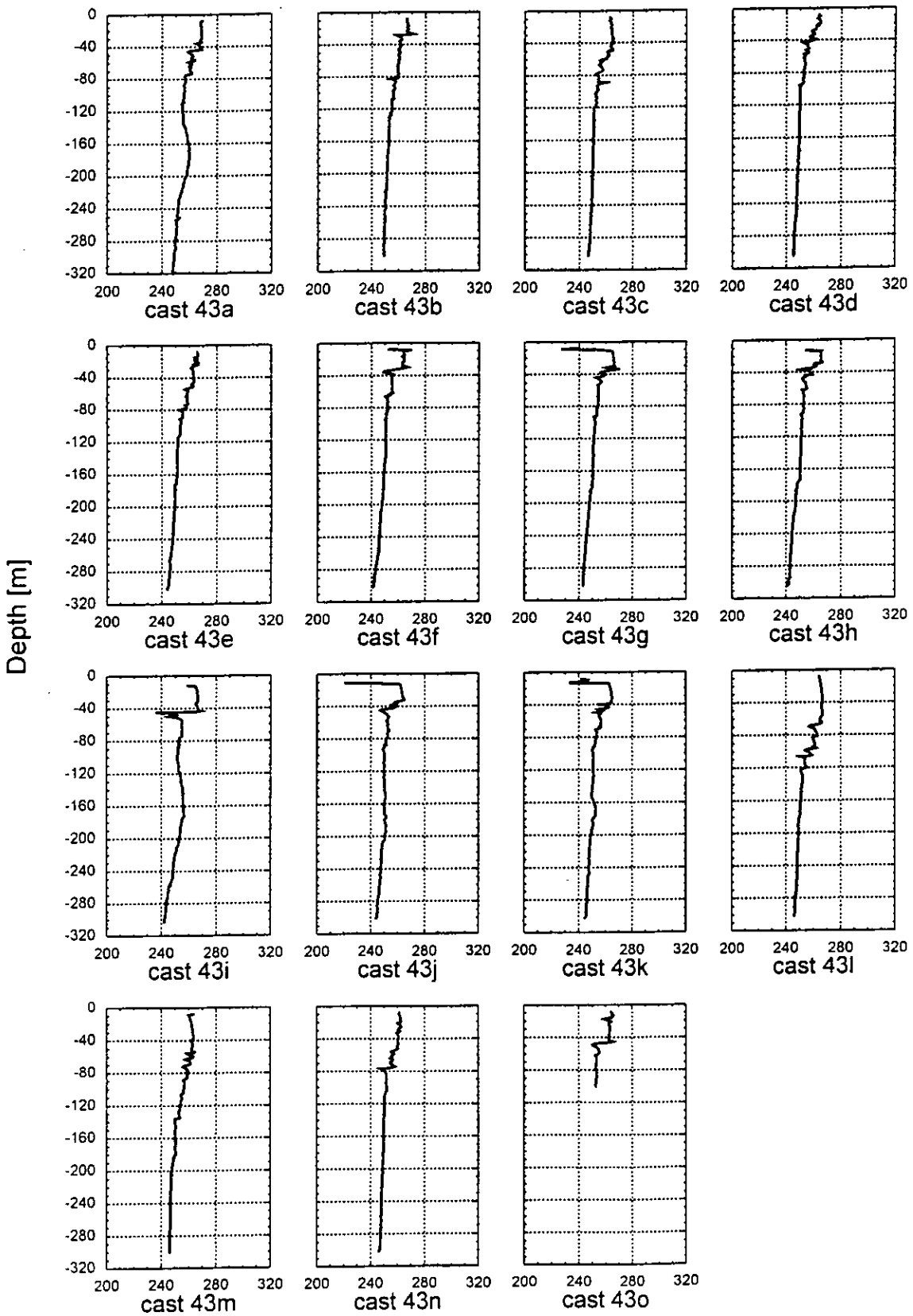
CTD Profiles cruise 98/15

Station 43 - La Chapelle Bank



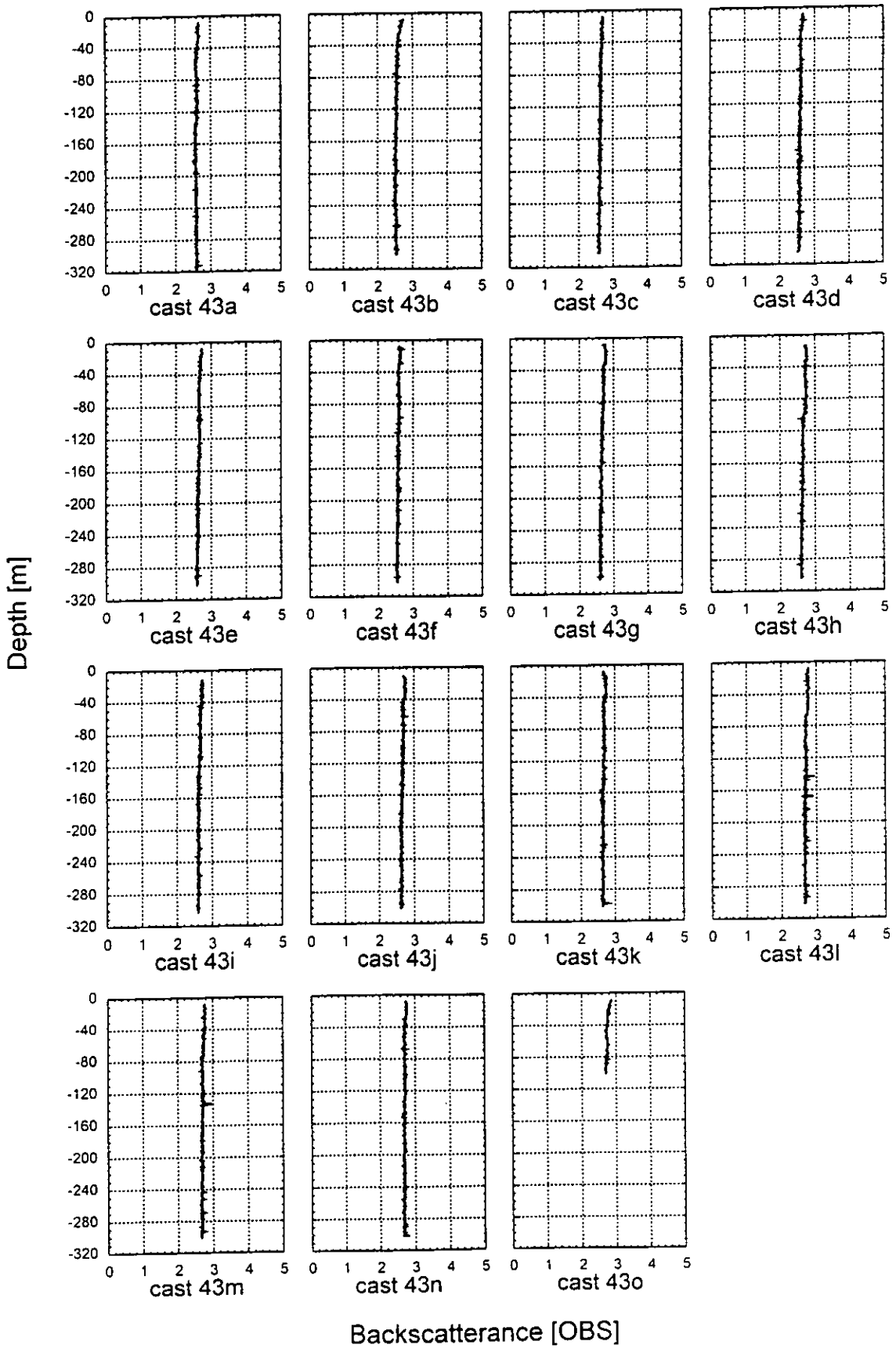
CTD Profiles cruise 98/15

Station 43 - La Chapelle Bank



CTD Profiles cruise 98/15

Station 43 - La Chapelle Bank

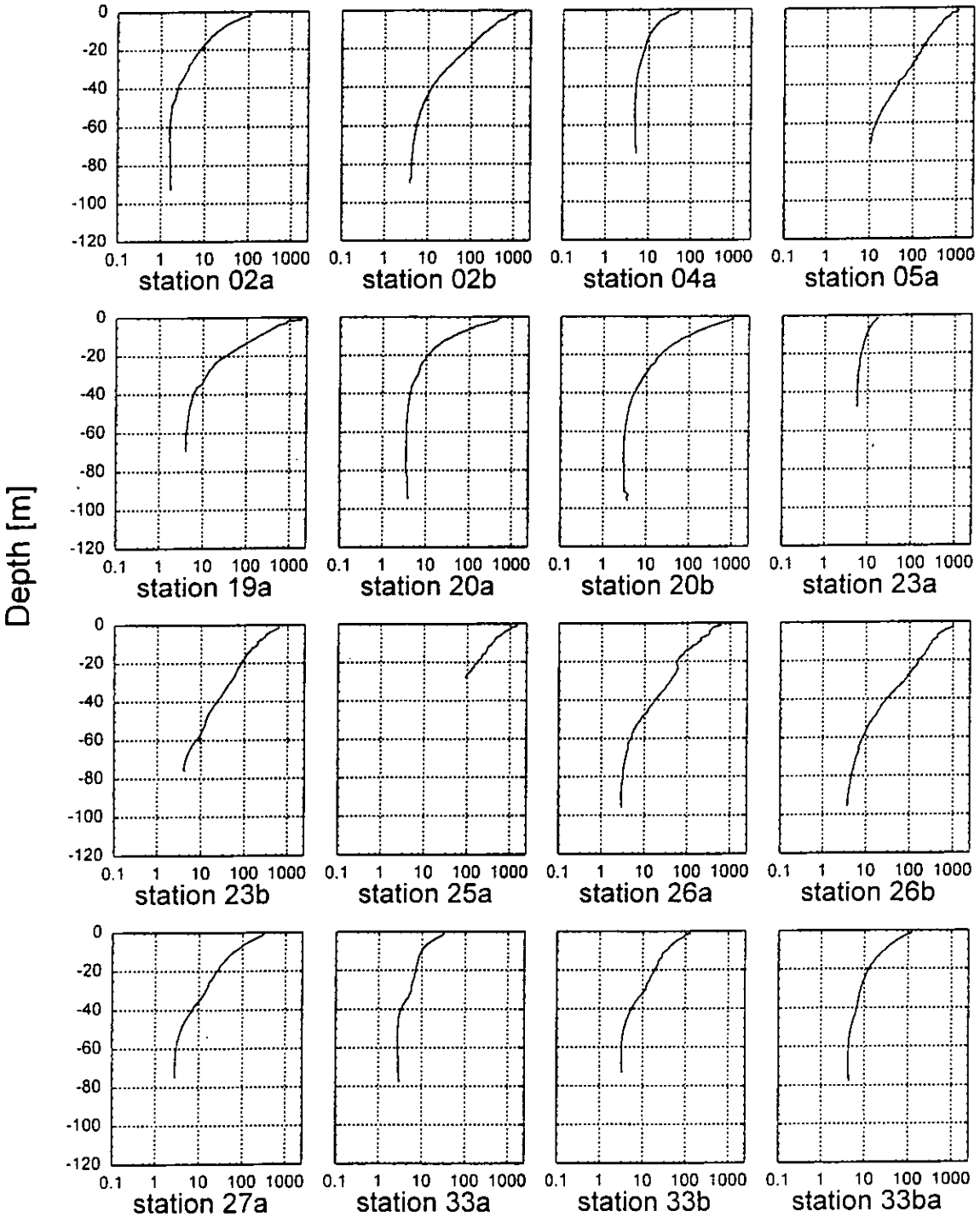


Appendix 6.

Vertical profiles of incident light (PAR sensor).

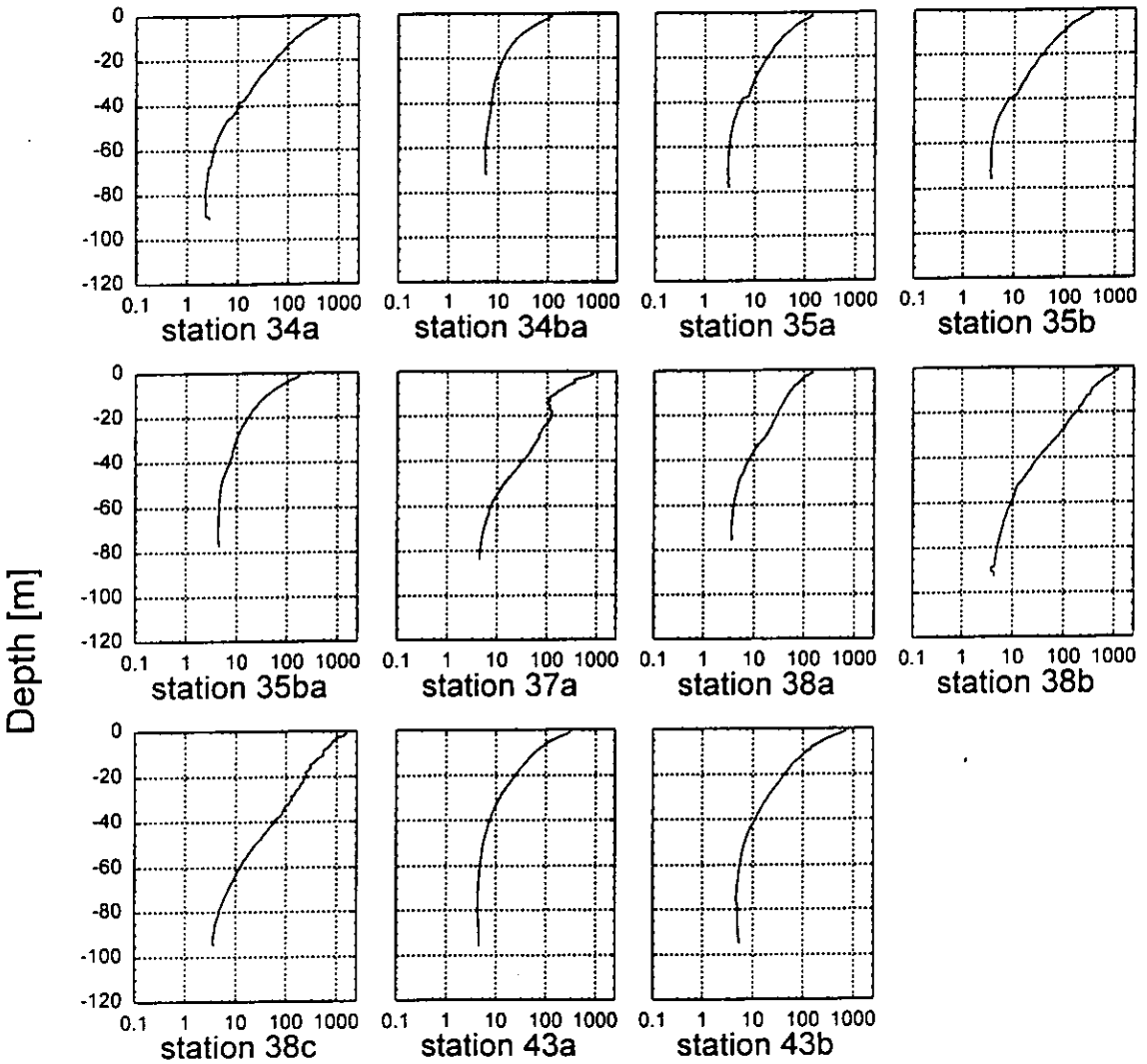
Light Profiles cruise 98/15

Stations 02a - 33ba



Light Profiles cruise 98/15

Stations 34a - 43b



Irradiance [PAR]

Appendix 7.

Comparison SEABIRD SBE09*plus* versus Guildline Portasal salinometer data.

data SEABIRD SBE09*plus* versus GUILDLINE PORTASAL salinometer
error SEABIRD SBE09*plus* versus GUILDLINE PORTASAL salinometer

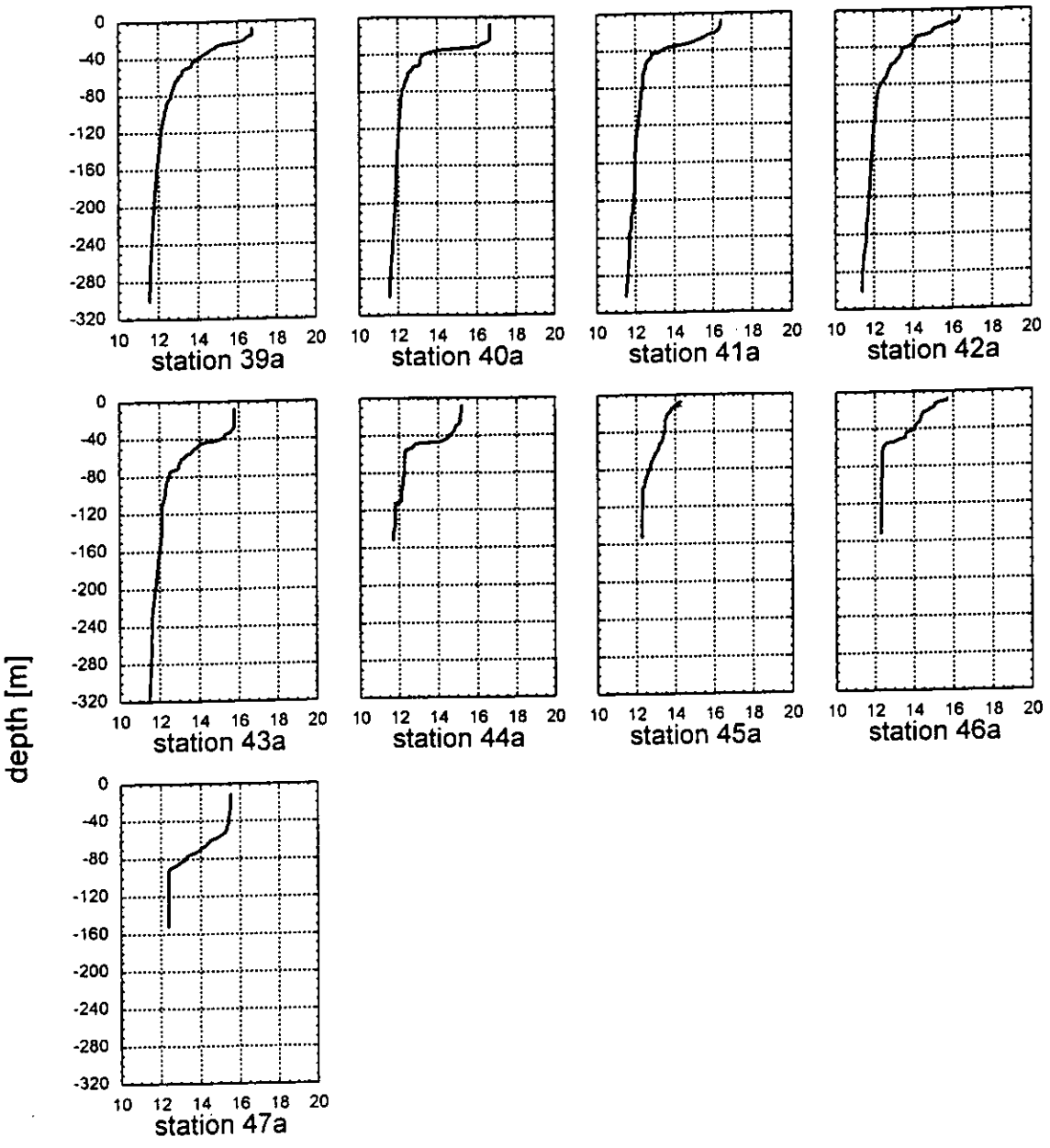
Table 3. Data Sea-Bird SBE09*plus* versus Guildline Portasal salinometer.

station	depth (m)	niskin	marker data sbe09 salinity	guildline portasal salinity	difference portasal-sbe09 marker data	bottle data sbe09 salinity	bottle data sbe09 st. dev.	difference portasal-sbe09 bottle data
01A	10	9	35.6555	35.6484	-0.0071	35.6567	0.0007	-0.0083
01A	80	1	35.7273	35.7212	-0.0061	35.7276	0.0001	-0.0064
02A	9	10	35.7253	35.7277	0.0024	35.7301	0.0003	-0.0024
02A	60	1	35.9355	35.9322	-0.0033	35.9353	0.0017	-0.0031
02B	10	10	35.7381	35.7337	-0.0044	35.7388	0.0015	-0.0051
02B	126	1	35.7600	35.7639	0.0039	35.7591	0.0001	0.0048
03A	9	8	35.8194	35.8155	-0.0039	35.8195	0.0004	-0.0040
03A	201	1	35.7325	35.7272	-0.0053	35.7322	0.0001	-0.0050
04A	10	12	35.8396	35.8520	0.0124	35.8433	0.0019	0.0087
04A	100	1	35.9139	35.9116	-0.0023	35.9136	0.0001	-0.0020
04B	150	9	35.8204	35.8127	-0.0077	35.8213	0.0004	-0.0086
04B	1252	1	36.0866	36.0829	-0.0037	36.0842	0.0013	-0.0013
04C	10	12	35.8241	35.8249	0.0008	35.8325	0.0016	-0.0076
04C	35	1	35.9640	35.9600	-0.0040	35.9650	0.0017	-0.0050
05A	39	7	35.9775	35.9723	-0.0052	35.9751	0.0013	-0.0028
05A	398	1	35.6223	35.6144	-0.0079	35.6178	0.0001	-0.0034
08A	87	7	35.7236	35.7185	-0.0051	35.7221	0.0002	-0.0036
09A	147	7	35.7321	35.7277	-0.0044	35.7317	0.0002	-0.0040
13A	1743	7	35.1375	35.1326	-0.0049	35.1372	0.0005	-0.0046
14A	75	1	35.7476	35.7408	-0.0068	35.7473	0.0001	-0.0065
15A	137	1	35.7471	35.7459	-0.0012	35.7464	0.0004	-0.0005
16A	805	1	36.0427	36.0331	-0.0096	36.0414	0.0004	-0.0083
17A	1737	1	35.0994	35.0954	-0.0040	35.0998	0.0004	-0.0044
19A	9	6	35.5525	35.5869	0.0344	35.5556	0.0011	0.0313
19A	91	1	35.7338	35.7267	-0.0071	35.7335	0.0002	-0.0068
20A	9	12	35.6989	35.7011	0.0022	35.6981	0.0003	0.0030
20A	40	1	35.7478	35.7436	-0.0042	35.7484	0.0009	-0.0048
20B	9	7	35.6989	35.6959	-0.0030	35.6985	0.0001	-0.0026
20B	121	1	35.7389	35.7393	0.0004	35.7382	0.0003	0.0011
21A	10	8	35.7212	35.7195	-0.0017	35.7217	0.0004	-0.0022
21A	200	1	35.7189	35.7156	-0.0033	35.7156	0.0007	0.0000
22A	10	12	35.7251	35.7227	-0.0024	35.7237	0.0006	-0.0010
22A	900	1	36.0974	36.0915	-0.0059	36.0971	0.0004	-0.0056
23A	10	12	35.7966	35.7905	-0.0061	35.7964	0.0005	-0.0059
23A	60	1	35.7970	35.7933	-0.0037	35.7975	0.0002	-0.0042
23B	9	6	35.7956	35.7894	-0.0062	35.7956	0.0002	-0.0062
23B	100	1	35.8692	35.8608	-0.0084	35.8690	0.0003	-0.0082
23C	149	11	35.7991	35.7900	-0.0091	35.7995	0.0002	-0.0095
23C	1600	1	35.3196	35.3152	-0.0044	35.3199	0.0004	-0.0047
24A	150	11	35.7877	35.7823	-0.0054	35.7874	0.0002	-0.0051
24A	1720	1	35.1221	35.1171	-0.0050	35.1222	0.0001	-0.0051
24B	10	6	35.7742	35.7689	-0.0053	35.7745	0.0001	-0.0056
24B	100	1	35.8537	35.8503	-0.0034	35.8526	0.0006	-0.0023
25A	100	12	35.7756	35.7674	-0.0082	35.7756	0.0004	-0.0082
25A	1731	1	35.0787	35.0828	0.0041	35.0874	0.0053	-0.0046
25B	10	5	35.7984	35.7916	-0.0068	35.7979	0.0002	-0.0063
25B	81	1	35.7902	35.7810	-0.0092	35.7883	0.0003	-0.0073
26A	10	12	35.8718	35.8684	-0.0034	35.8738	0.0002	-0.0054
26A	60	1	35.8482	35.8436	-0.0046	35.8494	0.0003	-0.0058
26B	99	12	35.8032	35.7964	-0.0068	35.8034	0.0004	-0.0070
26B	1733	1	35.0182	35.0112	-0.0070	35.0180	0.0001	-0.0068
26C	10	9	35.8824	35.8770	-0.0054	35.8826	0.0001	-0.0056
26C	81	1	35.8242	35.8188	-0.0054	35.8248	0.0003	-0.0060
27A	11	7	35.6770	35.6735	-0.0035	35.6777	0.0004	-0.0042
27A	111	1	35.6759	35.6698	-0.0061	35.6758	0.0001	-0.0060
28A	150	1	35.7130	35.7065	-0.0065	35.7131	0.0002	-0.0066
29A	801	1	36.0783	36.0701	-0.0082	36.0809	0.0012	-0.0108
30A	1745	1	35.1843	35.1775	-0.0068	35.1842	0.0004	-0.0067
33A	8	12	35.6740	35.6693	-0.0047	35.6750	0.0003	-0.0057
33A	40	1	35.6899	35.6865	-0.0034	35.6913	0.0004	-0.0048
33B	10	7	35.6764	35.6709	-0.0055	35.6764	0.0001	-0.0055
33B	121	1	35.7048	35.7079	0.0031	35.7043	0.0001	0.0036
33BA	9	12	35.6921	35.6859	-0.0062	35.6933	0.0002	-0.0074
33BA	40	1	35.7122	35.7025	-0.0097	35.7104	0.0011	-0.0079
33BB	10	7	35.6887	35.6900	0.0013	35.6949	0.0006	-0.0049

33BB	120	1	35.7195	35.7119	-0.0076	35.7199	0.0008	-0.0080
34A	10	8	35.6381	35.6355	-0.0026	35.6395	0.0004	-0.0040
34A	201	1	35.6822	35.6763	-0.0059	35.6822	0.0004	-0.0059
34BA	200	1	35.6857	35.6788	-0.0069	35.6861	0.0004	-0.0073
35A	9	11	35.6882	35.6874	-0.0008	35.6922	0.0017	-0.0048
35A	61	1	35.7528	35.7511	-0.0017	35.7532	0.0003	-0.0021
35B	102	11	35.7210	35.7134	-0.0076	35.7208	0.0005	-0.0074
35B	1499	1	35.4496	35.4435	-0.0061	35.4449	0.0036	-0.0014
35BA	1467	1	35.8738	35.8651	-0.0087	35.8757	0.0003	-0.0106
35C	9	5	35.6881	35.6876	-0.0005	35.6888	0.0004	-0.0012
35C	80	1	35.7374	35.7318	-0.0056	35.7346	0.0012	-0.0028
36A	150	11	35.7344	35.7533	0.0189	35.7343	0.0005	0.0190
36A	1737	1	35.1610	35.1604	-0.0006	35.1582	0.0014	0.0022
36B	10	6	35.7505	35.7445	-0.0060	35.7499	0.0001	-0.0054
36B	102	1	35.7899	35.7845	-0.0054	35.7887	0.0004	-0.0042
37A	10	6	35.8308	35.8262	-0.0046	35.8313	0.0006	-0.0051
37A	101	1	35.8040	35.7962	-0.0078	35.8018	0.0012	-0.0056
37B	151	10	35.7426	35.7351	-0.0075	35.7421	0.0009	-0.0070
37B	1000	1	36.0886	36.0812	-0.0074	36.0888	0.0003	-0.0076
38A	9	12	35.9220	35.9160	-0.0060	35.9217	0.0004	-0.0057
38A	60	1	35.8745	35.8701	-0.0044	35.8757	0.0002	-0.0056
38B	99	12	35.9091	35.9007	-0.0084	35.9101	0.0002	-0.0094
38B	1726	1	35.0514	35.0432	-0.0082	35.0478	0.0002	-0.0046
38C	8	5	35.9492	35.9401	-0.0091	35.9487	0.0003	-0.0086
38C	82	1	35.9378	35.9312	-0.0066	35.9378	0.0001	-0.0066
39A	300	1	35.6243	35.6158	-0.0085	35.6244	0.0001	-0.0086
40A	300	1	35.6178	35.6103	-0.0075	35.6174	0.0001	-0.0071
41A	300	1	35.6051	35.5977	-0.0074	35.6051	0.0001	-0.0074
42A	300	1	35.5956	35.5873	-0.0083	35.5955	0.0001	-0.0082
43A	720	1	35.6339	35.6215	-0.0124	35.6340	0.0015	-0.0125
43B	300	1	35.6417	35.6355	-0.0062	35.6414	0.0002	-0.0059
43C	300	7	35.6367	35.6280	-0.0087	35.6365	0.0001	-0.0085
43D	300	1	35.6319	35.6282	-0.0037	35.6318	0.0003	-0.0036
43E	300	1	35.6270	35.6181	-0.0089	35.6265	0.0001	-0.0084
43F	300	1	35.6188	35.6107	-0.0081	35.6193	0.0005	-0.0086
43G	300	1	35.6233	35.6137	-0.0096	35.6230	0.0003	-0.0093
43H	300	1	35.6155	35.6187	0.0032	35.6160	0.0002	0.0027
43I	300	1	35.6189	35.6101	-0.0088	35.6192	0.0003	-0.0091
43J	300	1	35.6298	35.6203	-0.0095	35.6296	0.0001	-0.0093
43K	200	1	35.6314	35.6316	0.0002	35.6405	0.0001	-0.0089
43L	300	1	35.6385	35.6284	-0.0101	35.6379	0.0004	-0.0095
43M	300	1	35.6390	35.6295	-0.0095	35.6397	0.0001	-0.0102
43N	300	1	35.6424	35.6325	-0.0099	35.6426	0.0002	-0.0101
43O	60	1	35.6617	35.6540	-0.0077	35.6626	0.0002	-0.0086
44A	150	1	35.6342	35.6256	-0.0086	35.6338	0.0009	-0.0082
45A	150	1	35.6549	35.6455	-0.0094	35.6551	0.0001	-0.0096
46A	150	1	35.6624	35.6527	-0.0097	35.6620	0.0003	-0.0093
47A	150	1	35.6619	35.6517	-0.0102	35.6619	0.0001	-0.0102

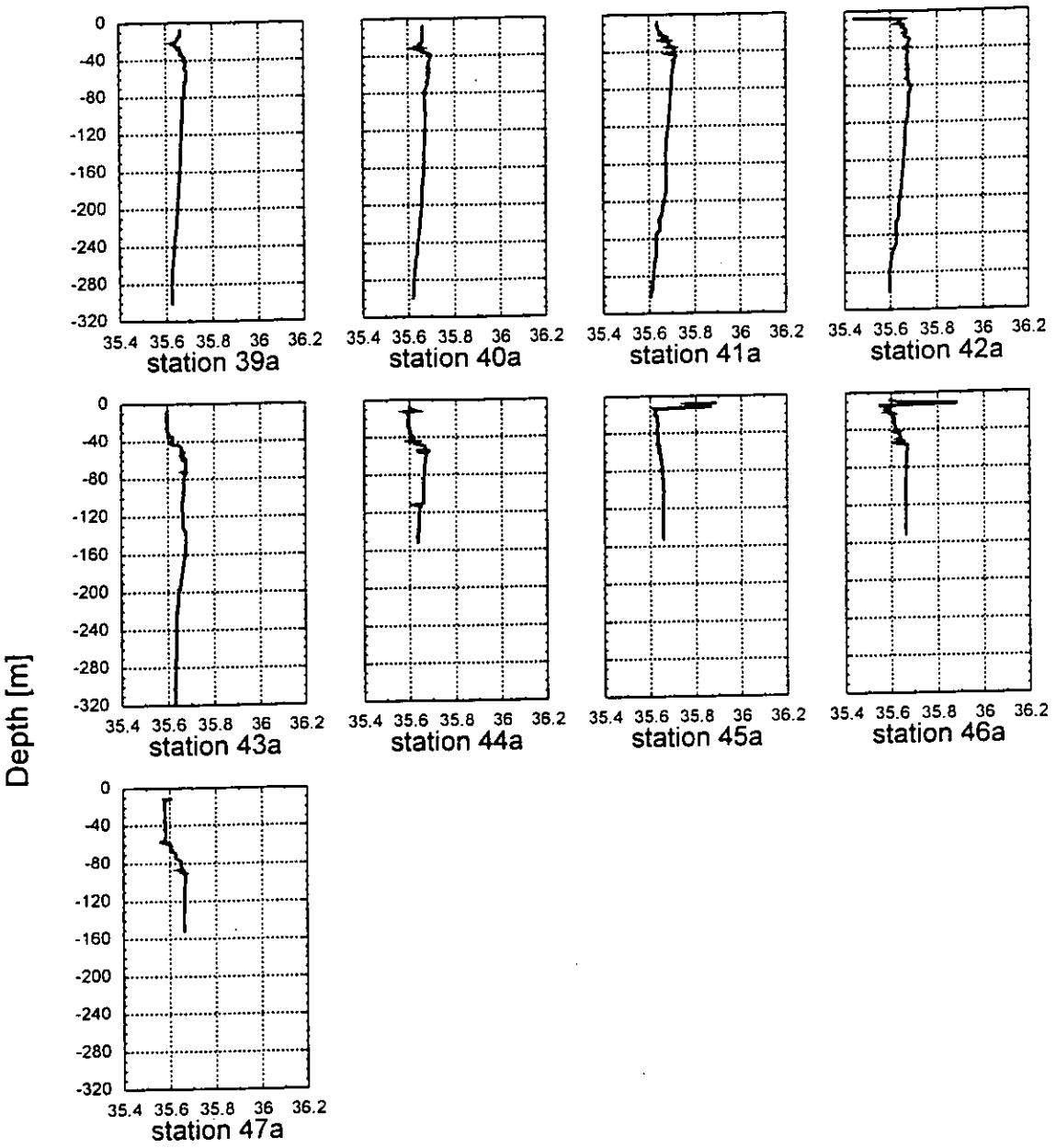
CTD Profiles cruise 98/15

Stations La Chapelle Bank



CTD Profiles cruise 98/15

Stations La Chapelle Bank



CTD Profiles cruise 98/15

Stations La Chapelle Bank

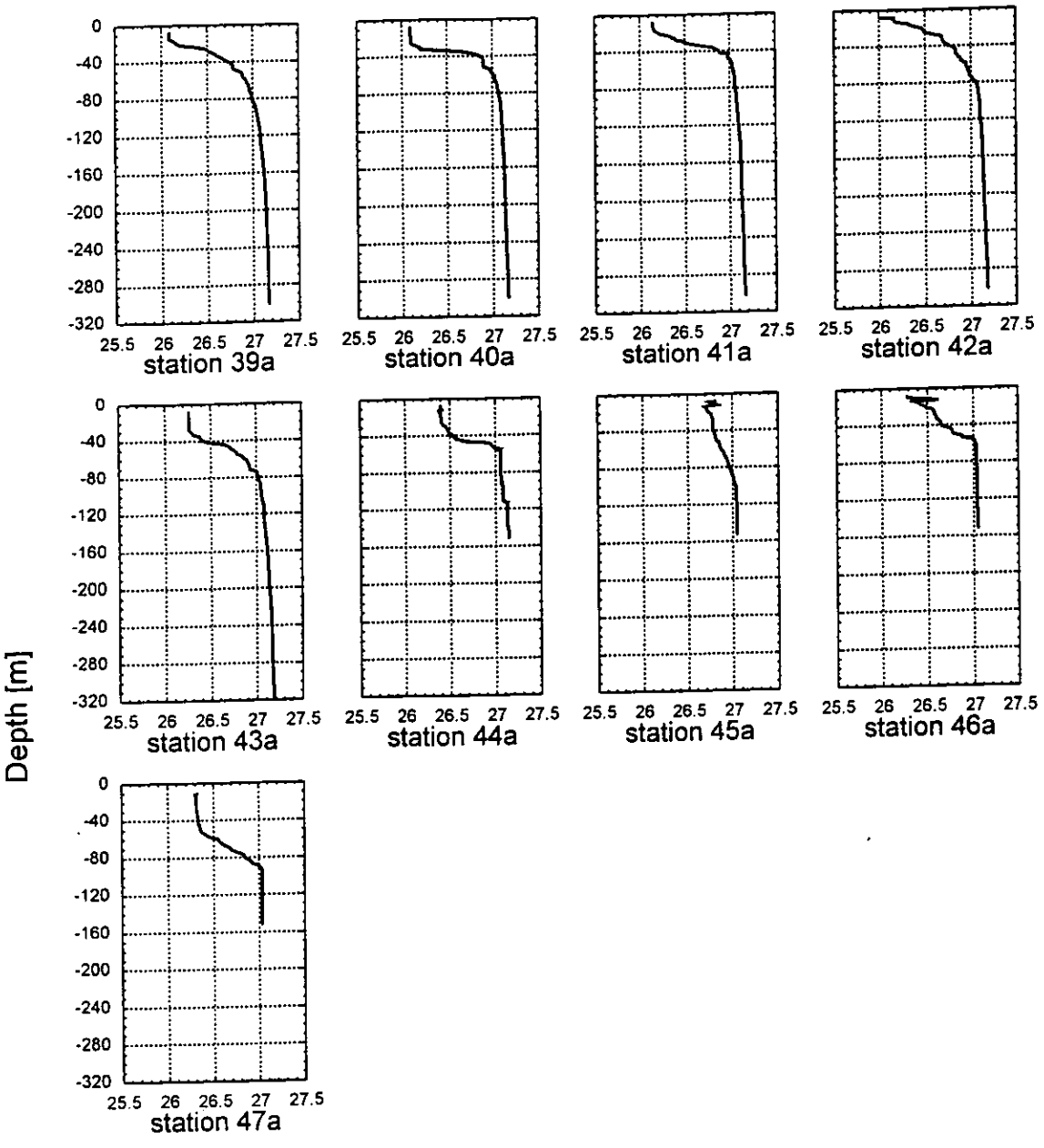


Figure 4. Error SBE09 versus Guildline Portasal