ELF EXPLORATION ANGOLA

EEA Girassol
Deep Water Current Measurements
Interim Report - Phase 1 Final
22-Sep-97 to 09-Dec-97

Fugro GEOS Reference No. C10328/1488

January 1998

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Report Type:		Oceanographic	
Report Issue:		Final	
Reference Number:		C10328/1488	
	Name	Signature	Date
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SUMMARY

Acting on behalf of Elf Exploration Angola (EEA), Fugro Global Environmental and Ocean Sciences (Fugro GEOS) have undertaken a programme of current measurements in the GIRASSOL field, Block 17, offshore Angola.

Data from Phase 1 (22-Sep-97 to 09-Dec-97) of the measurement programme are presented in the main body of this report. The nominal position of the mooring was 7° 40.20'S, 011° 40.95'E, in a total water depth of 1,385m.

A 300kHz Workhorse Acoustic Doppler Current Profiler (ADCP), a 150kHz Broadband ADCP and 6 Recording Current Meters (RCMs) were deployed to collect current speed and direction data throughout the water column.

Current velocity data from all instruments are presented in this report at 10 selected depths. The data from ADCP bins are shown with all the Aanderaa current meters, (3 ADCP bins and 1 Workhorse bin). All current speeds are quoted in ms^{-1} and current directions are towards which the current is flowing.

Temperature-salinity-depth profiles from a profiling CTD were taken after both deployments of the mooring.

During measurement Phase 1 recorded current speeds were relatively low, typically between $0.1ms^{-1}$ and $0.3ms^{-1}$, with a maximum of $0.68ms^{-1}$ at 15m and 27m below the surface. A strong pycnocline at approximately 50m depth acts as a barrier for energy transfer, and flows above this depth were significantly greater than for the rest of the water column.

All instruments performed well. RCMs 2 and 3 did not record speed, the former due to fouling of the rotor and the latter because of a mechanical fault in the rotor. RCM5 did not record conductivity because of a leak in the conductivity sensor. All RCMs recorded direction data. The Workhorse and ADCP recorded data throughout the deployment period.

1. INTRODUCTION

1.1 Overview

On behalf of Elf Exploration Angola (EEA Contract Number DS 142), Fugro Global Environmental and Ocean Sciences Limited (Fugro GEOS) are undertaking a long term programme of current measurements in the GIRASSOL field, Block 17, offshore Angola (Figure 1). The nominal position of the mooring was 7° 40.20'S, 011° 40.95'E, in a total water depth of 1,385m. Data from Phase 1 (22-Sep-97 to 09-Dec-97) of the measurement programme are presented in this report. This report describes details of the design, mobilisation and deployment of the mooring and the data collected between the mobilisation and the first service visit.

A 300kHz Workhorse Acoustic Doppler Current Profiler (ADCP), a 150kHz Broadband ADCP and 6 Recording Current Meters (RCMs) were deployed to collect current speed and direction data throughout the water column.

1.2 Study Objectives

The data will be used to help in riser design for the Girassol field production well, located approximately 2km east of the mooring position. Start-up is planned to begin in October 2000.

1.3 Regional Context

The nominal position of the mooring was 7° 40.20'S, 011° 40.95'E, in a total water depth of 1,385m, shown in Figure 1. The echo sounder of the boat was unable to determine the water depth; depths were determined from the Geoteam-Wimpol site survey chart supplied by EEA. The mooring is located on the 1,385m slope contour.

Very few *in situ* current measurements have been undertaken offshore Angola. Exxon Production undertook current measurements in Block 15 at 6° 03'S, 11° 10'E in 1,000m water depth in 1995. They found that conditions were generally benign throughout the year, with a maximum recorded value of 0.75ms^{-1} at 31m below MSL. Fugro GEOS will undertake a review of the available literature and satellite data for the final report.

2. REPORT STRUCTURE

This report is presented in accordance with the specifications set out in the recommendations for standard presentation and reporting of measured metocean data, included in EEP Contract Number DS 142.

This report presents data from the deployment so far. Similar reports will be issued after each subsequent service visit and a final report will be issued presenting all of the data collected, and detailing monthly and seasonal analyses.

Sections 1 to 3 of this report give an introduction to the project and outline of the report structure, with frames of reference and horizontal/vertical control details. Section 4 describes the methodology of instrument set-up and mooring deployment and recovery techniques. Details of quality control measures are presented in Section 5. The results are presented and discussed in Sections 6 and 7 respectively. Tables and figures are included before and after the main body of text respectively, preceded by a list of contents.

Specific technical details are presented in a series of appendices which conclude this report. Appendix A describes the quality control procedures for processing ADCP data. Appendices B to E contain details of the equipment and survey logs.

3. FRAMES OF REFERENCE

3.1 Units and Conventions

The following list outlines the units and conventions adopted in this study. Where possible, units have been expressed in the SI convention.

- Current speed and velocity are expressed in metres per second (ms^{-1} or m/s).
- Current direction is expressed in compass points (N, NNE, NE etc) or degrees relative to True North (°True) and describes the direction towards which the current is flowing.
- Vertical positions of oceanographic instrumentation are given in metres above the sea bed or below MSL.
- Water temperature is the temperature at specific depths, measured in Celsius (°C).
- Salinity is presented in PSU.
- Occurrence and exceedence statistics are expressed in actual numbers of occurrences and as percentages.

3.2 Corrections and Datums

- All times are quoted relative to Greenwich Mean Time (GMT); local time is GMT +1.
- Magnetic declination correction applied: 7.2° W, IGRF 1997.
- Positions are given as latitude and longitude, WGS-84 spheroid and datum.

3.3 Parameter Descriptions

The following table provides summary descriptions of all parameters measured during the survey programme.

PARAMETER	UNITS	DESCRIPTION	COMMENTS
u(z)	ms^{-1}	Current Velocity	20-minute vector-average current velocity in defined 4m or 8m layer of water column or at instrument depth
s	ms^{-1}	Scalar Current Speed	Scalar speed associated with vector-average velocity
θ	deg	Current Direction	Direction (to) associated with vector-average velocity
u_p	ms^{-1}	Principal Current Velocity	Velocity component resolved onto slope axis 150° (+ve)
u_t	ms^{-1}	Transverse Current Velocity	Velocity component resolved perpendicular to slope axis 240° (+ve)
E	dB	Echo Amplitude	Ensemble average echo strength (in given bin)
PGP	%	Percentage Good Pings	Percentage of echo returns in a data ensemble of acceptable signal strength (in given bin)
t	°C	Water Temperature	Temperature measured at depth of ADCP
p	°	ADCP Pitch	Tilt of ADCP around axis Beam 1-2
r	°	ADCP Roll	Tilt of ADCP around axis Beam 3-4
hd	°	ADCP Heading	Direction of horizontal component of Beam 3

3.4 Abbreviations and Acronyms

Abbreviations used in this report are defined below:

- ADCP — Acoustic Doppler Current Profiler.
- Fugro GEOS — Fugro Global Environmental and Ocean Sciences Ltd.
- EEA — Elf Exploration Angola.
- EEP — Elf Exploration Production.
- GMT — Greenwich Mean Time.
- MSL — Mean Sea Level.
- PSU — Practical Salinity Unit.
- CTD — Conductivity Temperature Depth Meter.
- DSU — Data Storage Unit.
- GPS — Global Positioning System.
- WGS-84 — World Geodetic System - 1984.
- IGRF — International Geomagnetic Reference Field.

4. METHODOLOGY

4.1 Instrumentation and Sampling

Two Acoustic Doppler Current Profilers (ADCP) and six Aanderaa Recording Current Meters (RCM-7/8) were deployed on a deep water mooring on 22 September 1997. The configuration of the mooring is shown in Figure 2. The mooring was designed to enable the collection of long term current speed and direction data throughout the water column.

The upward looking RDI 300kHz Workhorse ADCP was configured to measure current speed and direction at 20 minute intervals in 4m bins from a depth of 45m below mean sea level (MSL) to the surface. The near-surface deployment of the ADCPs improved the resolution of measurement in the upper 200m of the water column. The upward looking RDI 150kHz Broadband ADCP was deployed at 205m below MSL to measure current speed and direction at 8m intervals between this level and the workhorse. RCMs were mounted at 385m, 585m, 785m, 985m, 1,185m, and 1,370m below MSL. All RCMs were configured to sample at 20 minute intervals.

Each twenty minute measurement or 'ensemble' was calculated as an average of a number of separate readings or acoustic 'pings' made within the twenty minute interval. The Workhorse ensembles and the ADCP ensembles consisted of 45 and 25 pings respectively, giving a short term velocity error of $0.004ms^{-1}$ in both cases. The velocity error calculations are described in detail in Appendix A.

All of the instrumentation used during the measurement programme were configured to measure temperature and the RCMs were also configured to measure conductivity. In addition to time series data obtained from the moored instruments, temperature-salinity-depth profiles from a profiling Seabird CTD were performed during the mooring deployment and service recovery. These data were recorded at 0.5 second intervals and have been used to check RCM temperature and salinity sensors and to provide detailed temperature and salinity profiles. The downcast results are illustrated in Figure 12.1 and 12.2. These profiles have been compared with spot measurements of temperature and salinity from instruments on the mooring to confirm the accuracy of the instruments.

4.2 Equipment Performance

All instruments performed well. The Broadband ADCP was noisier than expected, and Fugro GEOS are in close consultation with the manufacturers to rectify the problem before the next service visit. RCMs 2 and 3 did not record speed, the former due to fouling of the rotor and the latter because of a mechanical fault in the rotor. RCM5 did not record conductivity because of a leak in the conductivity sensor. Where necessary, sensors and RCMs were returned to the UK for repair.

INSTRUMENT	DEPTH	% DATA RECOVERY (BEFORE QUALITY CONTROL)				CAUSE
	(m below MSL)	SPEED	DIRECTION	TEMP	SALINITY	
WORKHORSE	11	100	100	100	N/A	N/A
ADCP	57	100	100	100	N/A	N/A
RCM1	385	100	100	100	100	N/A
RCM2	585	0	100	100	100	Rotor fouling
RCM3	785	0	100	100	100	Mechanical fault
RCM4	985	100	100	100	100	N/A
RCM5	1185	100	100	100	0	Sensor leak
RCM6	1370	100	100	100	100	N/A

4.3 Operations

Daily operations logsheets, describing survey activities, are presented in Appendix B together with a list of personnel engaged in each phase of the work. The principal activities relating to this project are summarised in the following table. Detailed daily survey report sheets are presented in Appendix D to cover the on-site components of the work.

DATE	ACTIVITY	PERSONNEL
05-Dec-97	Personnel depart Swindon	C L Primrose W J A Humphries
09-Dec-97	Recovery of mooring and data; servicing of instruments	C L Primrose W J A Humphries
10-Dec-97	Redeployment of mooring	C L Primrose W J A Humphries
12-Dec-97	Personnel depart Luanda	C L Primrose W J A Humphries
13-Dec-97	Personnel arrive Swindon	C L Primrose W J A Humphries
Jan-98	Interim Report - Phase 1 preparation	C L Primrose

The mooring used was a single point mooring, with a sinker weight and single acoustic release and subsurface buoyancy. Deployment of the mooring was by the anchor last method over the stern of the vessel.

4.3.1 Mobilisation

Two Fugro GEOS personnel were mobilised to Luanda on 18 September 1997. One day was spent preparing the equipment at the ELF Base, and the vessel MV 'OIL Tempest' was mobilised on 20 September 1997. The mooring was deployed on 22 September 1997. The vessel was demobilised on 23 September 1997.

4.3.2 First Service Visit

Two Fugro GEOS personnel were mobilised from Swindon on 5 December 1997. Access to the ELF Base was difficult during the two weekend days; this time was spent planning and discussing the service visit. One day was spent at the ELF Base checking equipment and winding wires onto the winch. An inventory of equipment was made to check what had been stolen during the break-in to the ELF Base in November 1997. One Workhorse and one ADCP battery had been damaged by rainwater entering the container. The visible holes were sealed. The MV 'OIL Tempest' was mobilised on 8 December 1997. The current meter mooring was recovered on 9 December 1997, serviced, and then re-deployed on 10 December 1997. The vessel was demobilised in Luanda on 11 December 1997.

5. DATA ANALYSIS AND QUALITY CONTROL

5.1 Calibration Procedures

All instrumentation was calibrated prior to mobilisation, either by the manufacturer or at Fugro GEOS' facilities in Swindon, UK, and pre-deployment calibration checks were carried out prior to deployment.

5.2 Quality Control

During the service visit between 5 and 13 December 1997, data were up-loaded from the recording instrumentation and converted to engineering units. Initial validation checks were performed on the data to ensure satisfactory performance before the instruments were re-deployed. Two copies of the data were made, one for return to the UK for processing and analysis, and one to be retained by EEA in Luanda.

On return from site, data were transferred to the Fugro GEOS' VAX 4000/200 computer for processing and analysis. Initial validation checks were applied to the data to define erroneous values for editing prior to further analysis. Consideration was given to:

- Timing of data points.
- Data points outside the physical limits of the sensors or the environment.
- Rates of change between data points.

Checks were made for timing errors by comparing switch-on and switch-off times with manual observations.

Directional data were corrected for magnetic declination to give results expressed in Degrees True. The local magnetic declination is 7.2°W.

Quality control procedures are detailed in Appendix A. Routine ADCP quality control was performed on the data. Data from the uppermost 6% of the water column above the Workhorse were affected by sidelobe reflection from the sea surface and were error flagged. Records with less than 25% good pings were also flagged.

Time series of all data were plotted, and reviewed by an experienced oceanographer, to allow identification and removal of all erroneous records. A number of anomalous increases and decreases in current speed were identified and manually removed.

In agreement with EEP, ten depth levels were selected for further analysis: Workhorse ADCP Bin 8, Broadband ADCP Bins 18, 10 and 1, and the six RCMs. To allow comparison with data collected in future phases, it is intended to select the same depths in future reports for this mooring.

5.3 Statistical Analysis

After all erroneous records had been removed from the data set, analyses were performed using a combination of in-house software routines. Statistical data consist of maxima and means of observed current speed, joint frequency distributions of speed and direction, and percentage exceedence of observed current speed. The presentation of the statistical results and all plots is described in Section 6.

6. PRESENTATION OF RESULTS

Quality controlled data are presented in all tables and figures in this report.

- The measurement location in shown in Figure 1.
- The deployment configuration is shown in Figure 2.

6.1 Tabulations

Summary statistics of measurement and % data returns are given in Table 1. Statistical parameters include the maximum current speed event and the associated direction along with the mean scalar current speed and the % data return for each measurement bin.

6.1.1 Statistical Parameters of Current Speed and Direction

Joint frequency distributions of observed current speed and direction were calculated for current data from ten selected depths. Results are shown in Tables 2.1 to 2.8. Percentage exceedences of observed current speed, for the same period, are shown in Table 3.

6.1.2 Summary Statistics of Temperature and Salinity

Summary statistics of temperature and salinity are shown in Table 4.

6.2 Graphical Presentations

6.2.1 Current Speed and Direction

All valid depths of speed data, recorded by the Workhorse, ADCP and RCMs are presented as stacked time series in Figures 3.1.1 to 3.4.4. All valid bins of direction data, recorded by the Workhorse, ADCP and RCMs are presented as stacked time series in Figures 4.1.1 to 4.4.4.

Figures 5.1 to 5.4 present stacked, superimposed current speed (red) and direction (blue) time series traces for ten selected depths.

6.2.2 Polar Scatter Diagrams of Observed Current Velocity

Polar plots of each selected depth, showing each observed current speed and direction data record as a discrete point, are shown in Figures 6.1 to 6.8.

6.2.3 Time Slice Plots of Along-Slope Velocity

Figures 7.1.1 to 7.2.2 present depth/time plots, colour flooded to show polarity and intensity of current velocity component resolved onto along-slope axial direction (150° true). Green shading indicates a positive (toward south-south-west) flow component and red indicates a negative (toward north-north-east) flow component.

6.2.4 Current Profiles at Times of Maximum Observed Speed

Instantaneous profiles corresponding to the data record of maximum measured current velocity for each selected depth are shown in Figures 8.1 to 8.10. Each plot shows current speed and direction profiles together with an isometric 'stick' representation of velocity profile. The current speed from RCM4 was forced onto RCMs 2 and 3 which had not measured speed; the direction of currents measured by these RCMs were consistent.

6.2.5 Statistical Summary Current Speed Profiles

Figure 9 presents omni-directional current speed profile plots. The figure shows statistical profiles corresponding to 50% and 10% exceedence, and maximum speed for each depth.

6.2.6 Temperature, Conductivity and Salinity Data

A time series plot of sea water temperature is presented in an overlaid plot in Figure 10. Salinity data are presented in time series form in Figure 11. These plots present data from near-surface to near-bed.

Conductivity and temperature profiles performed following the initial deployment of the mooring and following the first service visit are presented in Figures 12.1 and 12.2 respectively.

6.2.7 Events 1 to 12

Figures 13.1.1 to 13.12.3 present a closer examination of 12 events. A time slice plot of along-slope velocity for one event is followed by a series of hourly profiles of current speed and direction and isometric vector profiles. This sequence of plots is repeated for each event. The current speed from RCM4 was forced onto RCMs 2 and 3 which had not measured speed; the direction of currents measured by these RCMs were consistent.

7. DISCUSSION OF RESULTS

The following section presents results for the mooring by parameter type. No monthly or seasonal analyses have been performed, as these will be incorporated into the Final Report once the year-long data set has been collected.

7.1 Current Speed and Direction

Recorded current speeds are relatively low, typically of the order of 0.1ms^{-1} to 0.3ms^{-1}. The maximum observed current speed for this period of measurement was 0.68ms^{-1}, recorded at a depth of 15m below MSL on 24-Nov-97 02:20GMT and at 27m below MSL on 28-Nov-97 05:00GMT. Current speed decreased rapidly with depth in the top 100m, with much lower speeds below (Figure 9, Table 1). A small increase in speed in the order of 0.05ms^{-1} was observed at 1,200m below MSL.

Current directions during the measurement period were approximately aligned in an across slope orientation (150°). The observed current direction was predominantly towards the south-east in the upper 50m, and towards the south below this. Scatter in the current direction measurements was greatest between approximately 100m and 500m below MSL (Figures 6.1 to 6.10). The currents flow mainly towards the south-east below this (Figures 4.1.1 to 4.4.4).

Current directions in the mixed surface layer flowed mainly towards the east for the first part of the deployment. Current directions moved towards the south-east half-way through the deployment, maintaining this direction until the end of the deployment when currents began to flow towards the south-west (Figures 4.1.1 to 4.1.4, Figures 7.2.1 to 7.2.4).

The mean current speed was equal to 0.12ms^{-1} averaged throughout the whole depth. Current speeds in the upper 11m exceeded 0.43ms^{-1} for 10%, and 0.54ms^{-1} for 2%, of the deployment period.

The oceanography off the Angolan coast has not been extensively studied, but the literature indicates a relatively strong southerly flowing coastal surface current (the Angola Current) which usually peters out somewhere between 14 and 17 degrees south (depending on the season). During Atlantic Nino events this current is enhanced and pushes even further south into the Benguela system off Namibia. Further offshore, there may also be some south-easterly flow in association with a cyclonic gyre which is thought to sit off the Angolan coast (centred at about 4°E), (Reference 1). Low surface salinities may be related to the outflow from the Congo river.

The results obtained during this measurement period therefore appear to agree with the available literature. A more extensive review of the literature will be undertaken for the Final Report at the end of the year's collection of data.

7.2 Temperature, Conductivity, Salinity and Density

Sea water temperatures during the measurement period were relatively steady temporally and spatially through depth for the majority of the deployment period (Figure 10). Maximum temperatures ranged between 25.2°C near-surface and 4.3°C near-bed. Corresponding minimum temperatures were 16.5°C and 3.9°C respectively (Table 4).

Variations in temperature were minimal near-bed. Temperature near-surface was steady until early November when the surface waters began to warm; variations of the order of 4°C occurred between 17 November 1997 and the end of the deployment period (Figure 10). The temperatures in the upper 200m of the water column, measured by the Workhorse and ADCP, were approximately 14°C and 10°C higher than those at depth between the period 22 September to 14 November 1997. At the end of the deployment period, near-surface temperatures were approximately 20°C higher than those at depth (Figure 10).

Salinities did not vary significantly through the deployment period (Figure 11). Salinity at 15m above the bed was of the order of 35.5PSU compared with 34.5PSU mid-depth and 35PSU at 385m below MSL. The salinities measured by the RCMs were adjusted slightly based on the results of the CTD deployments. Salinties very close to the bed were not measured by the CTD.

Temperature and salinity profiles presented in Figures 12.1 and 12.2 show the profiles derived from CTD casts post the initial deployment and subsequent to the redeployment of the ADCP following the service visit. A strong pycnocline (density gradient) is present at approximately 50m depth in the December cast. The pycnocline acts as a strong barrier to downward energy transfer, encouraging high velocity shear in this region. Flows above this depth were significantly greater than for the rest of the water column. Above this pycnocline, salinities are lower and temperatures higher. A bottom water mass with higher density compared with near-surface appears to be present.

7.3 Events 1 to 12

A number of different periods of the data were selected to examine in greater detail. Events were chosen in particular if they had either consistent uniform profiles which are likely to induce vortex-induced vibration or if they had strongly sheared profiles. For Figures 13.1.1 to 13.12.3 the current speed from RCM4 was forced onto RCMs 2 and 3 which had not measured speed; the direction of currents measured by these RCMs were consistent.

Event 1 (30-Sep-97)

There is a pronounced flow in the bottom 400m of the water column, mainly towards the south-east, of around 0.2ms^{-1}. Between 1,000m and 200m below MSL the flow is weak with a variable direction.

There is strong shear at around 200m below MSL. There are stronger flows in the upper layer with a progressive rotation of direction from the north-east to the south-east.

Event 2 (07-Oct-97)

There is uniform flow of around 0.2ms^{-1} towards the south-east beneath 400m below MSL which persists through the day. There is shear at around 200m below MSL with stronger flows in the layer above with a progressive rotation of direction from the north-east to the south-east.

Event 3 (09-Oct-97)

Uniform speeds below 200m below MSL, though direction is variable. Shear at 200m below MSL with stronger speeds in upper layer towards the north.

Event 4 (18-Oct-97)

Small pronounced flow near-bed. Direction variable but mainly towards south-east near-bed and east at 400m below MSL. Shear at 200m below MSL.

Event 5 (24-Oct-97)

Low speed constant with depth between 200m below MSL and bed, with negligible flow at 1,200m below MSL. Direction variable. Shear at 200m below MSL with flows in the mixed surface layer reaching around 0.4ms^{-1}.

Event 6 (15-Nov-97)

Pronounced flow in the bottom 400m of the water column, mainly towards the south-east, of around 0.2ms^{-1}. Between 1,000m and 200m below MSL the flow is weak with a variable direction. There is strong shear at around 200m below MSL. There are stronger flows in the upper layer with a progressive rotation of direction from the south-west to the south-east.

Event 7 (19-Nov-97)

Uniform speed from 200m to 1,200m below MSL with very low flows at bed. Direction variable but consistently towards the south-east between 600 and 1,200m below MSL in the second half of the day. Shear at 200m below MSL leading to strong flows of around 0.7ms^{-1} at the surface. Direction rotates clockwise from north at 200m below MSL to south near-surface.

Event 8 (21-Nov-97)

Direction fairly consistent with depth from 400m below MSL to near-bed in first half of day. Speeds very low at these depths. Flows towards the east in the second half of the day appear to be associated with minimal speeds near-bed. Shear at 200m below MSL with strong flows near-surface.

Event 9 (25-Nov-97)

Pronounced flow in bottom 400m. Weak flows with variable direction between 1,000m and 200m below MSL. Shear at 200m below MSL. Direction in mixed layer towards the south for much of the day.

Event 10 (27-Nov-97)

Pronounced flow in bottom 400m below MSL with low speeds between 1,200m and 200m below MSL. Direction approximately south-east in this zone for much of the day. Strong shear at bottom of mixed layer with strong flows at the surface.

Event 11 (03-Dec-97)

Negligible speeds with variable direction between 200m and 1,200m below MSL throughout the day. Shear at 200m below MSL leading to increased flows in the surface layer.

Event 12 (08-Dec-97)

Low speeds below 200m below MSL with increased speeds near-bed. Minimum at 200m below MSL. Direction north-west in bottom 400m rotating anticlockwise to east at 200m below. Direction towards south in the surface layer, speeds increasing to approximately 0.3ms^{-1}.

8. REFERENCES

COLE JAMES (1998) Private communication.

TABLES

LIST OF TABLES

INSTRUMENT (serial number)	DEPTH (m below MSL)	HEIGHT (m above bed)	CURRENT SPEED (ms^{-1})			DATE OF MAXIMUM	%DATA RETURN
			MAXIMUM	10%-ILE	SCALAR MEAN		
WH BIN 8	11	1374	0.65	0.43	0.26	19-Nov-97 19:40	87
WH BIN 7	15	1370	0.68	0.44	0.28	24-Nov-97 02:20	88
WH BIN 6	19	1366	0.66	0.46	0.30	28-Nov-97 16:40	87
WH BIN 5	23	1362	0.67	0.45	0.28	21-Nov-97 11:40	86
WH BIN 4	27	1358	0.68	0.41	0.26	28-Nov-97 05:00	85
WH BIN 3	31	1354	0.58	0.38	0.23	28-Nov-97 05:00	86
WH BIN 2	35	1350	0.58	0.35	0.21	24-Nov-97 02:00	86
WH BIN 1	39	1346	0.49	0.32	0.18	24-Nov-97 02:00	85
ADCP BIN 18	57	1328	0.35	0.22	0.14	06-Dec-97 09:40	81
ADCP BIN 17	65	1320	0.31	0.20	0.12	07-Dec-97 19:40	81
ADCP BIN 16	73	1312	0.30	0.19	0.12	06-Dec-97 01:00	81
ADCP BIN 15	81	1304	0.27	0.17	0.11	06-Dec-97 08:40	82
ADCP BIN 14	89	1296	0.24	0.16	0.10	06-Dec-97 10:20	81
ADCP BIN 13	97	1288	0.23	0.14	0.09	05-Oct-97 19:00	81
ADCP BIN 12	105	1280	0.22	0.14	0.09	03-Oct-97 21:40	81
ADCP BIN 11	113	1272	0.22	0.14	0.08	29-Sep-97 10:00	81
ADCP BIN 10	121	1264	0.23	0.13	0.08	29-Sep-97 10:00	82
ADCP BIN 9	129	1256	0.23	0.13	0.08	29-Sep-97 10:00	81
ADCP BIN 8	137	1248	0.23	0.13	0.08	13-Oct-97 01:40	82
ADCP BIN 7	145	1240	0.21	0.13	0.08	02-Oct-97 16:20	81
ADCP BIN 6	153	1232	0.19	0.12	0.07	29-Sep-97 23:20	81
ADCP BIN 5	161	1224	0.20	0.12	0.07	18-Oct-97 19:20	80
ADCP BIN 4	169	1216	0.20	0.11	0.07	02-Oct-97 14:00	81
ADCP BIN 3	177	1208	0.20	0.11	0.07	09-Oct-97 05:40	80
ADCP BIN 2	185	1200	0.19	0.11	0.07	13-Oct-97 19:00	81
ADCP BIN 1	193	1192	0.16	0.10	0.06	09-Oct-97 05:00	82
RCM1 (11398)	385	1000	0.17	0.09	0.05	29-Sep-97 20:20	100
RCM2 (12418)	585	800	N/A	N/A	N/A	N/A	0
RCM3 (11400)	785	600	N/A	N/A	N/A	N/A	0
RCM4 (12417)	985	400	0.19	0.11	0.06	06-Oct-97 02:20	100
RCM5 (11260)	1185	200	0.25	0.16	0.07	14-Nov-97 22:00	100
RCM6 (11492)	1370	15	0.23	0.14	0.08	30-Sep-97 08:40	100

Instruments:
RDI 300KkHz Workhorse (Serial No. 0393)
RDI 150kHz Broadband ADCP (Serial No. 02308)
RCM7/8 11398/12418/11400/12417/11260/11492
Analysis period:
22-Sep-97 to 09-Dec-97

Location: Block 17 - GIRASSOL
Position: 7 40.20'S, 011 40.95'E
Sampling Interval: 20 mins

TABLE 1.1 Current Speed Summary Statistics

CURRENT DIRECTION		10-MIN MEAN CURRENT SPEED (ms^{-1})														TOTAL OCCURRENCES
		0.00-<0.05	0.05-<0.10	0.10-<0.15	0.15-<0.20	0.20-<0.25	0.25-<0.30	0.30-<0.35	0.35-<0.40	0.40-<0.45	0.45-<0.50	0.50-<0.55	0.55-<0.60	0.60-<0.65	0.65-<0.70	
000-<022.5	n	5	33	28	26	11	20	3								126
	%	0.1	0.7	0.6	0.5	0.2	0.4	0.1								2.6
022.5-<045	n	9	31	53	42	35	14	9	2	1						196
	%	0.2	0.6	1.1	0.9	0.7	0.3	0.2	<0.05	<0.05						4.0
045-<067.5	n	15	41	66	45	63	66	56	35	15	4	3	2			411
	%	0.3	0.8	1.4	0.9	1.3	1.4	1.2	0.7	0.3	0.1	0.1	<0.05			8.5
067.5-<090	n	10	51	67	86	67	60	76	80	47	34	27	11	1		617
	%	0.2	1.1	1.4	1.8	1.4	1.2	1.6	1.7	1.0	0.7	0.6	0.2	<0.05		12.7
090-<112.5	n	13	38	50	68	43	68	50	40	15	11	3	2			401
	%	0.3	0.8	1.0	1.4	0.9	1.4	1.0	0.8	0.3	0.2	0.1	<0.05			8.3
112.5-<135	n	8	30	39	50	67	83	73	40	22	16	31	10	11		480
	%	0.2	0.6	0.8	1.0	1.4	1.7	1.5	0.8	0.5	0.3	0.6	0.2	0.2		9.9
135-<157.5	n	13	27	42	71	97	109	139	95	23	20	12	9	2		659
	%	0.3	0.6	0.9	1.5	2.0	2.3	2.9	2.0	0.5	0.4	0.2	0.2	<0.05		13.6
157.5-<180	n	13	29	42	60	62	92	106	69	53	40	36	17	5		624
	%	0.3	0.6	0.9	1.2	1.3	1.9	2.2	1.4	1.1	0.8	0.7	0.4	0.1		12.9
180-<202.5	n	10	29	22	38	36	76	100	79	58	44	18	13	1	1	525
	%	0.2	0.6	0.5	0.8	0.7	1.6	2.1	1.6	1.2	0.9	0.4	0.3	<0.05	<0.05	10.8
202.5-<225	n	5	23	26	33	27	60	69	43	15	8	1				310
	%	0.1	0.5	0.5	0.7	0.6	1.2	1.4	0.9	0.3	0.2	<0.05				6.4
225-<247.5	n	8	22	21	17	20	29	33	18	4	2					174
	%	0.2	0.5	0.4	0.4	0.4	0.6	0.7	0.4	0.1	<0.05					3.6
247.5-<270	n	15	13	16	5	7	4	6								66
	%	0.3	0.3	0.3	0.1	0.1	0.1	0.1								1.4
270-<292.5	n	9	16	8	1											34
	%	0.2	0.3	0.2	<0.05											0.7
292.5-<315	n	6	20	23	6	1										56
	%	0.1	0.4	0.5	0.1	<0.05										1.2
315-<337.5	n	13	36	16	14											79
	%	0.3	0.7	0.3	0.3											1.6
337.5-<360	n	7	30	27	19											83
	%	0.1	0.6	0.6	0.4											1.7
TOTAL OCCURRENCES	n	159	469	546	581	536	681	720	501	253	179	131	64	20	1	4841
	%	3.3	9.7	11.3	12.0	11.1	14.1	14.9	10.3	5.2	3.7	2.7	1.3	0.4	<0.05	100.0
TOTAL EXCEEDENCE	%	100.0	96.7	87.0	75.7	63.7	52.7	38.6	23.7	13.4	8.2	4.5	1.8	0.4	0.0	

Number of missing records: 755
Records out of range: 0 (<Min), 0 (>Max)
Sampling interval: 20 mins
Period of data: 22-SEP-97 13:00 to 09-DEC-97 06:00 GMT

Measurement depth: 11m
Depth of water: 1385m
Position: 7 40.20'S, 011 40.95'E
(BLOCK 17 - GIRASSOL)
Instrument: ADCP (Serial No: 393)

TABLE 2.1 Joint Frequency Distribution of 10-min Mean Current Speed and Direction at Workhorse Bin 8 (11m Below MSL)

C10328/1488/Tab2.xls

Updated Date: 15-Jan-98

CURRENT DIRECTION		10-MIN MEAN CURRENT SPEED (ms^{-1})														TOTAL OCCURRENCES
		0.00-<0.05	0.05-<0.10	0.10-<0.15	0.15-<0.20	0.20-<0.25	0.25-<0.30	0.30-<0.35	0.35-<0.40	0.40-<0.45	0.45-<0.50	0.50-<0.55	0.55-<0.60	0.60-<0.65	0.65-<0.70	
000-<022.5	n	16	88	114	78	46	4									346
	%	0.4	1.9	2.5	1.7	1.0	0.1									7.6
022.5-<045	n	21	115	268	212	46	10	4								676
	%	0.5	2.5	5.9	4.7	1.0	0.2	0.1								14.8
045-<067.5	n	37	153	257	193	40	7									687
	%	0.8	3.4	5.6	4.2	0.9	0.2									15.1
067.5-<090	n	38	169	166	61	5	1									440
	%	0.8	3.7	3.6	1.3	0.1	<0.05									9.7
090-<112.5	n	35	217	139	41											432
	%	0.8	4.8	3.1	0.9											9.5
112.5-<135	n	30	157	129	41	11	1									369
	%	0.7	3.4	2.8	0.9	0.2	<0.05									8.1
135-<157.5	n	28	77	141	118	104	60	14	1							543
	%	0.6	1.7	3.1	2.6	2.3	1.3	0.3	<0.05							11.9
157.5-<180	n	14	61	105	137	205	93	11								626
	%	0.3	1.3	2.3	3.0	4.5	2.0	0.2								13.7
180-<202.5	n	8	19	36	50	57	27	4								201
	%	0.2	0.4	0.8	1.1	1.3	0.6	0.1								4.4
202.5-<225	n	11	5	1	4											21
	%	0.2	0.1	<0.05	0.1											0.5
225-<247.5	n	8	1	1												10
	%	0.2	<0.05	<0.05												0.2
247.5-<270	n	8	6													14
	%	0.2	0.1													0.3
270-<292.5	n	13	9													22
	%	0.3	0.2													0.5
292.5-<315	n	22	9													31
	%	0.5	0.2													0.7
315-<337.5	n	18	14	8												40
	%	0.4	0.3	0.2												0.9
337.5-<360	n	18	35	31	8	3										95
	%	0.4	0.8	0.7	0.2	0.1										2.1
TOTAL OCCURRENCES	n	325	1135	1396	943	517	203	33	1							4553
	%	7.1	24.9	30.7	20.7	11.4	4.5	0.7	<0.05							100.0
TOTAL EXCEEDENCE	%	100.0	92.9	67.9	37.3	16.6	5.2	0.7	0.0							

Number of missing records: 1043
Records out of range: 0 (<Min), 0 (>Max)
Sampling interval: 20 mins
Period of data: 22-SEP-97 13:00 to 09-DEC-97 06:00 GMT

Measurement depth: 57m
Depth of water: 1385m
Position: 7 40.20'S, 011 40.95'E
(BLOCK 17 - GIRASSOL)
Instrument: ADCP (Serial No: 02308)

TABLE 2.2 Joint Frequency Distribution of 10-min Mean Current Speed and Direction at ADCP Bin 18 (57m Below MSL)

C10328/1488/Tab2.xls

Updated Date: 15-Jan-98

CURRENT DIRECTION		10-MIN MEAN CURRENT SPEED (ms^{-1})														TOTAL OCCURRENCES
		0.00-<0.05	0.05-<0.10	0.10-<0.15	0.15-<0.20	0.20-<0.25	0.25-<0.30	0.30-<0.35	0.35-<0.40	0.40-<0.45	0.45-<0.50	0.50-<0.55	0.55-<0.60	0.60-<0.65	0.65-<0.70	
000-<022.5	n	73	253	271	45	3										645
	%	1.6	5.5	5.9	1.0	0.1										14.1
022.5-<045	n	76	291	274	88	13										742
	%	1.7	6.4	6.0	1.9	0.3										16.2
045-<067.5	n	95	247	198	34	4										578
	%	2.1	5.4	4.3	0.7	0.1										12.6
067.5-<090	n	86	228	103	9											426
	%	1.9	5.0	2.3	0.2											9.3
090-<112.5	n	80	132	29	3											244
	%	1.7	2.9	0.6	0.1											5.3
112.5-<135	n	81	158	36	1											276
	%	1.8	3.5	0.8	<0.05											6.0
135-<157.5	n	93	94	36	9											232
	%	2.0	2.1	0.8	0.2											5.1
157.5-<180	n	86	134	36	20											276
	%	1.9	2.9	0.8	0.4											6.0
180-<202.5	n	75	124	60	4											263
	%	1.6	2.7	1.3	0.1											5.8
202.5-<225	n	46	75	22												143
	%	1.0	1.6	0.5												3.1
225-<247.5	n	44	43	2												89
	%	1.0	0.9	<0.05												1.9
247.5-<270	n	41	29	1												71
	%	0.9	0.6	<0.05												1.6
270-<292.5	n	37	27	5												69
	%	0.8	0.6	0.1												1.5
292.5-<315	n	45	32	5	1											83
	%	1.0	0.7	0.1	<0.05											1.8
315-<337.5	n	41	60	30	3											134
	%	0.9	1.3	0.7	0.1											2.9
337.5-<360	n	63	131	99	8											301
	%	1.4	2.9	2.2	0.2											6.6
TOTAL OCCURRENCES	n	1062	2058	1207	225	20										4572
	%	23.2	45.0	26.4	4.9	0.4										100.0
TOTAL EXCEEDENCE	%	100.0	76.8	31.8	5.4	0.4										

Number of missing records: 1024
Records out of range: 0 (<Min), 0 (>Max)
Sampling interval: 20 mins
Period of data: 22-SEP-97 13:00 to 09-DEC-97 06:00 GMT

Measurement depth: 121m
Depth of water: 1385m
Position: 7 40.20'S, 011 40.95'E
(BLOCK 17 - GIRASSOL)
Instrument: ADCP (Serial No: 02308)

TABLE 2.3 Joint Frequency Distribution of 10-min Mean Current Speed and Direction at ADCP Bin 10 (121m Below MSL)

C10328/1488/Tab2.xls

Updated Date: 15-Jan-98

CURRENT DIRECTION		10-MIN MEAN CURRENT SPEED (ms^{-1})														TOTAL OCCURRENCES
		0.00-<0.05	0.05-<0.10	0.10-<0.15	0.15-<0.20	0.20-<0.25	0.25-<0.30	0.30-<0.35	0.35-<0.40	0.40-<0.45	0.45-<0.50	0.50-<0.55	0.55-<0.60	0.60-<0.65	0.65-<0.70	
000-<022.5	n	198	497	121												816
	%	4.3	10.8	2.6												17.8
022.5-<045	n	154	394	89												637
	%	3.4	8.6	1.9												13.9
045-<067.5	n	140	233	53	3											429
	%	3.1	5.1	1.2	0.1											9.4
067.5-<090	n	121	142	21												284
	%	2.6	3.1	0.5												6.2
090-<112.5	n	77	93	10												180
	%	1.7	2.0	0.2												3.9
112.5-<135	n	74	60	4	1											139
	%	1.6	1.3	0.1	<0.05											3.0
135-<157.5	n	84	38	5												127
	%	1.8	0.8	0.1												2.8
157.5-<180	n	80	38	1												119
	%	1.7	0.8	<0.05												2.6
180-<202.5	n	76	26													102
	%	1.7	0.6													2.2
202.5-<225	n	77	36													113
	%	1.7	0.8													2.5
225-<247.5	n	52	32													84
	%	1.1	0.7													1.8
247.5-<270	n	71	59	6												136
	%	1.5	1.3	0.1												3.0
270-<292.5	n	94	91	4	1											190
	%	2.0	2.0	0.1	<0.05											4.1
292.5-<315	n	99	108	10												217
	%	2.2	2.4	0.2												4.7
315-<337.5	n	140	175	36	3											354
	%	3.1	3.8	0.8	0.1											7.7
337.5-<360	n	163	385	110	1											659
	%	3.6	8.4	2.4	<0.05											14.4
TOTAL OCCURRENCES	n	1700	2407	470	9											4586
	%	37.1	52.5	10.2	0.2											100.0
TOTAL EXCEEDENCE	%	100.0	62.9	10.4	0.2											

Number of missing records: 1010
Records out of range: 0 (<Min), 0 (>Max)
Sampling interval: 20 mins
Period of data: 22-SEP-97 13:00 to 09-DEC-97 06:00 GMT

Measurement depth: 193m
Depth of water: 1385m
Position: 7 40.20'S, 011 40.95'E
(BLOCK 17 - GIRASSOL)
Instrument: ADCP (Serial No: 02308)

TABLE 2.4 Joint Frequency Distribution of 10-min Mean Current Speed and Direction at ADCP Bin 1 (193m Below MSL)

C10326/1488/Tab2.xls

Updated Date: 15-Jan-98

CURRENT DIRECTION		10-MIN MEAN CURRENT SPEED (ms^{-1})														TOTAL OCCURRENCES
		0.00-<0.05	0.05-<0.10	0.10-<0.15	0.15-<0.20	0.20-<0.25	0.25-<0.30	0.30-<0.35	0.35-<0.40	0.40-<0.45	0.45-<0.50	0.50-<0.55	0.55-<0.60	0.60-<0.65	0.65-<0.70	
000-<022.5	n	102	144	7												253
	%	1.8	2.6	0.1												4.5
022.5-<045	n	168	222	20												410
	%	3.0	4.0	0.4												7.3
045-<067.5	n	243	161	21												425
	%	4.3	2.9	0.4												7.6
067.5-<090	n	257	164	15												436
	%	4.6	2.9	0.3												7.8
090-<112.5	n	315	156	1												472
	%	5.6	2.8	<0.05												8.4
112.5-<135	n	439	170	14												623
	%	7.8	3.0	0.3												11.1
135-<157.5	n	281	159	10												450
	%	5.0	2.8	0.2												8.0
157.5-<180	n	156	113													269
	%	2.8	2.0													4.8
180-<202.5	n	143	260	64												467
	%	2.6	4.6	1.1												8.3
202.5-<225	n	145	379	102												626
	%	2.6	6.8	1.8												11.2
225-<247.5	n	147	214	60	2											423
	%	2.6	3.8	1.1	<0.05											7.6
247.5-<270	n	82	132	24												238
	%	1.5	2.4	0.4												4.3
270-<292.5	n	105	74	10												189
	%	1.9	1.3	0.2												3.4
292.5-<315	n	59	9													68
	%	1.1	0.2													1.2
315-<337.5	n	62	24													86
	%	1.1	0.4													1.5
337.5-<360	n	81	77	3												161
	%	1.4	1.4	0.1												2.9
TOTAL OCCURRENCES	n	2785	2458	351	2											5596
	%	49.8	43.9	6.3	<0.05											100.0
TOTAL EXCEEDENCE	%	100.0	50.2	6.3	0.0											

Number of missing records: 0
Records out of range: 0 (<Min), 0 (>Max)
Sampling interval: 20 mins
Period of data: 22-SEP-97 13:00 to 09-DEC-97 06:00 GMT

Measurement depth: 385m
Depth of water: 1385m
Position: 7 40.20'S, 011 40.95'E
(BLOCK 17 - GIRASSOL FIELD)
Instrument: RCM (Serial No:11398)

TABLE 2.5 Joint Frequency Distribution of 10-min Mean Current Speed and Direction at RCM1 (385m Below MSL)

C10328/1488/Tab2.xls

Updated Date: 15-Jan-98

CURRENT DIRECTION		10-MIN MEAN CURRENT SPEED (ms^{-1})														TOTAL OCCURRENCES
		0.00-<0.05	0.05-<0.10	0.10-<0.15	0.15-<0.20	0.20-<0.25	0.25-<0.30	0.30-<0.35	0.35-<0.40	0.40-<0.45	0.45-<0.50	0.50-<0.55	0.55-<0.60	0.60-<0.65	0.65-<0.70	
000-<022.5	n	77	11													88
	%	1.4	0.2													1.6
022.5-<045	n	96	4													100
	%	1.7	0.1													1.8
045-<067.5	n	126	23													149
	%	2.3	0.4													2.7
067.5-<090	n	185	27	5												217
	%	3.3	0.5	0.1												3.9
090-<112.5	n	153	222	55	16											446
	%	2.7	4.0	1.0	0.3											8.0
112.5-<135	n	230	740	349	116											1435
	%	4.1	13.2	6.2	2.1											25.6
135-<157.5	n	290	632	167	23											1112
	%	5.2	11.3	3.0	0.4											19.9
157.5-<180	n	325	441	30												796
	%	5.8	7.9	0.5												14.2
180-<202.5	n	194	97													291
	%	3.5	1.7													5.2
202.5-<225	n	89	44													133
	%	1.6	0.8													2.4
225-<247.5	n	74	19													93
	%	1.3	0.3													1.7
247.5-<270	n	70	53													123
	%	1.3	0.9													2.2
270-<292.5	n	114	55													169
	%	2.0	1.0													3.0
292.5-<315	n	143	55	1												199
	%	2.6	1.0	<0.05												3.6
315-<337.5	n	106	41													147
	%	1.9	0.7													2.6
337.5-<360	n	82	16													98
	%	1.5	0.3													1.8
TOTAL OCCURRENCES	n	2354	2480	607	155											5596
	%	42.1	44.3	10.8	2.8											100.0
TOTAL EXCEEDENCE	%	100.0	57.9	13.6	2.8											

Number of missing records: 0
Records out of range: 0 (<Min), 0 (>Max)
Sampling interval: 20 mins
Period of data: 22-SEP-97 13:00 to 09-DEC-97 06:00 GMT

Measurement depth: 985m
Depth of water: 1385m
Position: 7 40.20'S, 011 40.95'E
(BLOCK 17 - GIRASSOL FIELD)
Instrument: RCM (Serial No: 12417)

TABLE 2.6 Joint Frequency Distribution of 10-min Mean Current Speed and Direction at RCM4 (985m Below MSL)

C10328/1488/Tab2.xls

Updated Date: 15-Jan-98

CURRENT DIRECTION		10-MIN MEAN CURRENT SPEED (ms^{-1})														TOTAL OCCURRENCES
		0.00-<0.05	0.05-<0.10	0.10-<0.15	0.15-<0.20	0.20-<0.25	0.25-<0.30	0.30-<0.35	0.35-<0.40	0.40-<0.45	0.45-<0.50	0.50-<0.55	0.55-<0.60	0.60-<0.65	0.65-<0.70	
000-<022.5	n	129	15													144
	%	2.3	0.3													2.6
022.5-<045	n	238	5													243
	%	4.3	0.1													4.3
045-<067.5	n	358	12													370
	%	6.4	0.2													6.6
067.5-<090	n	439	56	9												504
	%	7.8	1.0	0.2												9.0
090-<112.5	n	426	167	61	11											665
	%	7.6	3.0	1.1	0.2											11.9
112.5-<135	n	338	514	588	261	5										1706
	%	6.0	9.2	10.5	4.7	0.1										30.5
135-<157.5	n	154	254	295	220	142	2									1067
	%	2.8	4.5	5.3	3.9	2.5	<0.05									19.1
157.5-<180	n	56	28	3												87
	%	1.0	0.5	0.1												1.6
180-<202.5	n	49	5													54
	%	0.9	0.1													1.0
202.5-<225	n	37	1													38
	%	0.7	<0.05													0.7
225-<247.5	n	44														44
	%	0.8														0.8
247.5-<270	n	19														19
	%	0.3														0.3
270-<292.5	n	17														17
	%	0.3														0.3
292.5-<315	n	107	20		4											131
	%	1.9	0.4		0.1											2.3
315-<337.5	n	121	46	33	22											222
	%	2.2	0.8	0.6	0.4											4.0
337.5-<360	n	176	58	42	9											285
	%	3.1	1.0	0.8	0.2											5.1
TOTAL OCCURRENCES	n	2708	1181	1031	527	147	2									5596
	%	48.4	21.1	18.4	9.4	2.6	<0.05									100.0
TOTAL EXCEEDENCE	%	100.0	51.6	30.5	12.1	2.7	0.0									

Number of missing records: 0
Records out of range: 0 (<Min), 0 (>Max)
Sampling interval: 20 mins
Period of data: 22-SEP-97 13:00 to 09-DEC-97 06:00 GMT

Measurement depth: 1185m
Depth of water: 1385m
Position: 7 40.20'S, 011 40.95'E
(BLOCK 17 - GIRASSOL FIELD)
Instrument: RCM (Serial No: 11260)

TABLE 2.7 Joint Frequency Distribution of 10-min Mean Current Speed and Direction at RCM5 (1185m Below MSL)

C10328/1488/Tab2.xls

Updated Date: 15-Jan-98

CURRENT DIRECTION		10-MIN MEAN CURRENT SPEED (ms^{-1})														TOTAL OCCURRENCES
		0.00-<0.05	0.05-<0.10	0.10-<0.15	0.15-<0.20	0.20-<0.25	0.25-<0.30	0.30-<0.35	0.35-<0.40	0.40-<0.45	0.45-<0.50	0.50-<0.55	0.55-<0.60	0.60-<0.65	0.65-<0.70	
000-<022.5	n	89	42	18												149
	%	1.6	0.8	0.3												2.7
022.5-<045	n	59	48	4												111
	%	1.1	0.9	0.1												2.0
045-<067.5	n	108	48													156
	%	1.9	0.9													2.8
067.5-<090	n	205	106	19												330
	%	3.7	1.9	0.3												5.9
090-<112.5	n	133	254	162	10											559
	%	2.4	4.5	2.9	0.2											10.0
112.5-<135	n	223	536	388	124											1271
	%	4.0	9.6	6.9	2.2											22.7
135-<157.5	n	108	375	429	107	26										1045
	%	1.9	6.7	7.7	1.9	0.5										18.7
157.5-<180	n	97	218	132	40	1										488
	%	1.7	3.9	2.4	0.7	<0.05										8.7
180-<202.5	n	31	78	25												134
	%	0.6	1.4	0.4												2.4
202.5-<225	n	31	54	7												92
	%	0.6	1.0	0.1												1.6
225-<247.5	n	106	42	4												152
	%	1.9	0.8	0.1												2.7
247.5-<270	n	99	34	7												140
	%	1.8	0.6	0.1												2.5
270-<292.5	n	108	65	38												211
	%	1.9	1.2	0.7												3.8
292.5-<315	n	82	129	109	31	15										366
	%	1.5	2.3	1.9	0.6	0.3										6.5
315-<337.5	n	31	132	50	22											235
	%	0.6	2.4	0.9	0.4											4.2
337.5-<360	n	57	78	22												157
	%	1.0	1.4	0.4												2.8
TOTAL OCCURRENCES	n	1567	2239	1414	334	42										5596
	%	28.0	40.0	25.3	6.0	0.8										100.0
TOTAL EXCEEDENCE	%	100.0	72.0	32.0	6.7	0.8										

Number of missing records: 0
Records out of range: 0 (<Min), 0 (>Max)
Sampling interval: 20 mins
Period of data: 22-SEP-97 13:00 to 09-DEC-97 06:00 GMT

Measurement depth: 1370m
Depth of water: 1385m
Position: 7 40.20'S, 011 40.95'E
(BLOCK 17 - GIRASSOL FIELD)
Instrument: RCM (Serial No: 11492)

TABLE 2.8 Joint Frequency Distribution of 10-min Mean Current Speed and Direction at RCM6 (1370m Below MSL)

C10328/1488/Tab2.xls

Updated Date: 15-Jan-98

EEA GIRASSOL BLOCK 17 - GIRASSOL				Position: 7 40.20'S, 011 40.95'E													DEPTH OF WATER: 1385m
LEVEL	DATES	DEPTH BELOW MSL (m)	HEIGHT ABOVE BED (m)	EXCEEDENCE OF OBSERVED CURRENT SPEED (ms^{-1})													MAXIMUM
				90%	80%	70%	60%	50%	40%	30%	20%	10%	8%	6%	4%	2%	1%	
WH BIN 8	22-Sep-97 to 09-Dec-97	11	1374	0.09	0.13	0.17	0.22	0.26	0.29	0.33	0.36	0.43	0.45	0.48	0.50	0.54	0.57	0.65
ADCP BIN 18	22-Sep-97 to 09-Dec-97	57	1328	0.06	0.08	0.10	0.11	0.13	0.14	0.16	0.19	0.22	0.23	0.24	0.26	0.28	0.29	0.35
ADCP BIN 10	22-Sep-97 to 09-Dec-97	121	1264	0.03	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.23
ADCP BIN 1	22-Sep-97 to 09-Dec-97	193	1192	0.02	0.04	0.04	0.05	0.06	0.07	0.07	0.08	0.10	0.10	0.11	0.11	0.12	0.13	0.16
RCM1	22-Sep-97 to 09-Dec-97	385	1000	0.02	0.04	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.10	0.11	0.12	0.12	0.17
RCM2	22-Sep-97 to 09-Dec-97	585	800															N/A
RCM3	22-Sep-97 to 09-Dec-97	785	600															N/A
RCM4	22-Sep-97 to 09-Dec-97	985	400	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.11	0.12	0.13	0.14	0.16	0.16	0.19
RCM5	22-Sep-97 to 09-Dec-97	1185	200	0.02	0.03	0.05	0.07	0.08	0.10	0.12	0.14	0.16	0.17	0.18	0.20	0.21	0.22	0.25
RCM6	22-Sep-97 to 09-Dec-97	1370	15	0.03	0.05	0.07	0.07	0.08	0.09	0.11	0.12	0.14	0.15	0.15	0.16	0.18	0.20	0.23

Instruments:
RDI 300KkHz Workhorse (Serial No. 0393)
RDI 150kHz Broadband ADCP (Serial No. 02308)
RCM7/8 11398/12418/11400/12417/11260/11492

Sampling Interval: 20 mins

TABLE 3 Percentage Exceedence of Observed Current Speed - Selected ADCP Bins, 22-Sep-97 to 09-Dec-97

EEA GIRASSOL BLOCK 17 - GIRASSOL		Position: 7 40.20'S, 011 40.95'E						Depth of Water: 1385m	
INSTRUMENT	DEPTH (m below MSL)	TEMPERATURE (DEG C)			% DATA RETURN	SALINITY (PSU)			% DATA RETURN
		MAX	MEAN	MIN		MAX	MEAN	MIN	
WORKHORSE	11	25.2	18.8	16.5	100.0	N/A	N/A	N/A	N/A
ADCP	57	14.9	14.4	13.8	100.0	N/A	N/A	N/A	N/A
RCM1	385	10.1	9.6	8.8	100.0	35.0	34.9	34.7	100.0
RCM2	585	7.6	6.6	6.0	100.0	34.9	34.8	34.6	100.0
RCM3	785	5.2	4.9	4.6	100.0	34.6	34.5	34.4	100.0
RCM4	985	4.5	4.3	4.2	100.0	34.7	34.6	34.5	100.0
RCM5	1185	4.3	4.2	4.0	100.0	N/A	N/A	N/A	0.0
RCM6	1370	4.3	4.1	3.9	100.0	35.7	35.5	34.9	100.0

Instruments:
RDI 300KkHz Workhorse (Serial No. 0393)
RDI 150kHz Broadband ADCP (Serial No. 02308)
RCM7/8 11398/12418/11400/12417/11260/11492

Analysis period:
22-Sep-97 to 09-Dec-97
Salinity adjusted following CTD measurements

TABLE 4 Summary Statistics of Temperature and Salinity

FIGURES

LIST OF FIGURES

Observed Current Direction, ADCP Bins 10 to 18

Observed Current Direction, ADCP Bins 1 to 9

Observed Current Direction, RCMs

Stacked Time Series of Observed Parameters Measured by Workhorse, ADCP and RCMs

Observed Current Scatter Plots for Workhorse, ADCP and RCM - 22-Sep-97 to 09-Dec-97

Time-Slice Plots of Along and Across Slope Components of Current Velocity for Workhorse, ADCP and RCM

Time-slice Plots of Along and Across Slope Components of Current Velocity for Workhorse

Current Profiles at Times of Observed Current Speed Maxima, 22-Sep-97 to 09-Dec-97

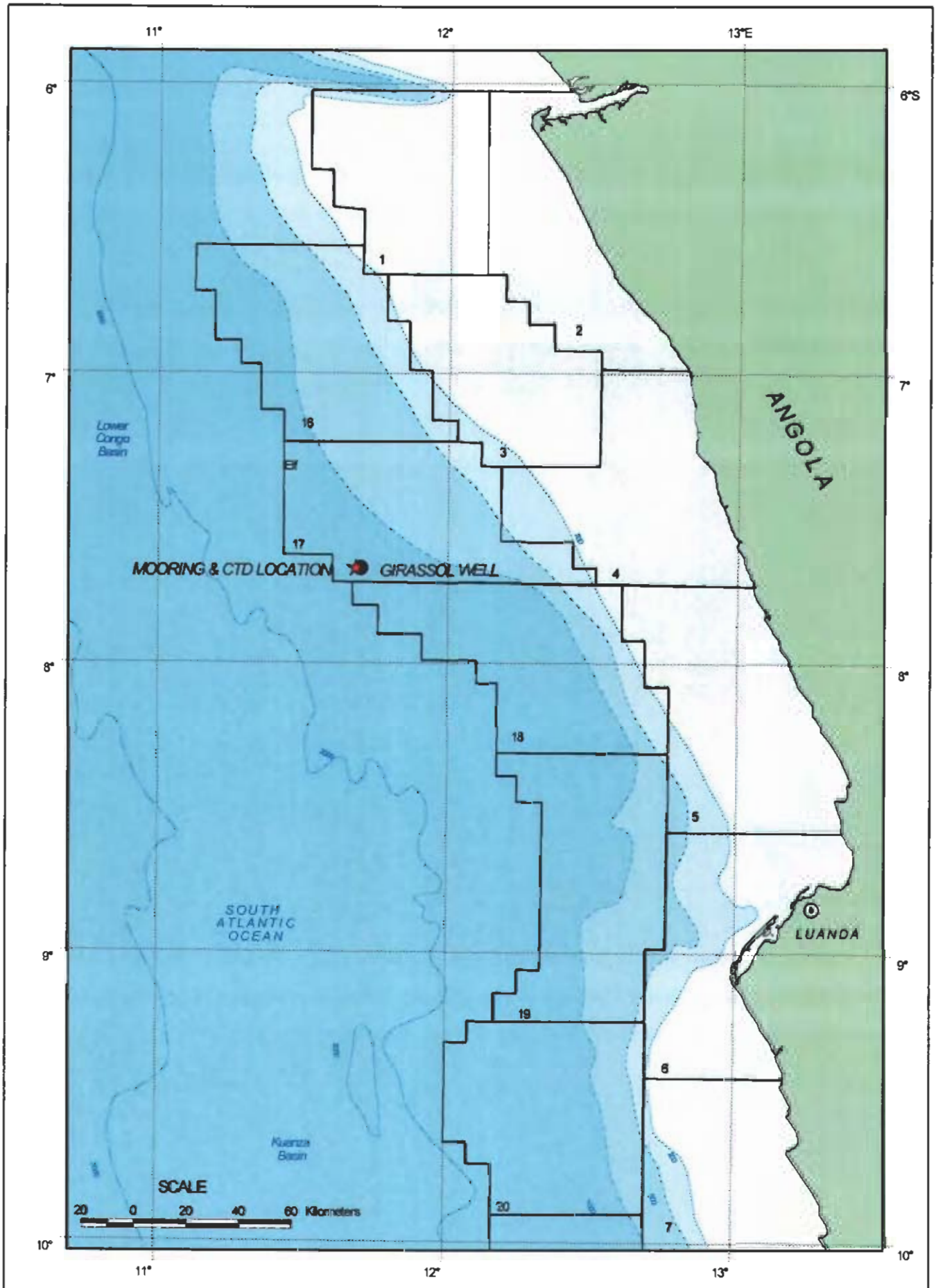
Current Speed Statistical Profile Plot

Time Series of Sea Water Temperature - ADCP and RCM

Time Series of Sea Water Salinity - RCM

Temperature and Salinity Profiles

Events 1 to 10 Along and Across Slope Components of Current Velocity, Hourly Profiles of Current Speed and Direction, Hourly Isometric Profiles



LEGEND

- Girasol Well (7.6727°S 11.69954°E)
- Mooring and CTD Location (07.6700°S 11.6825°E) Depth 1395m
- Concession Blocks

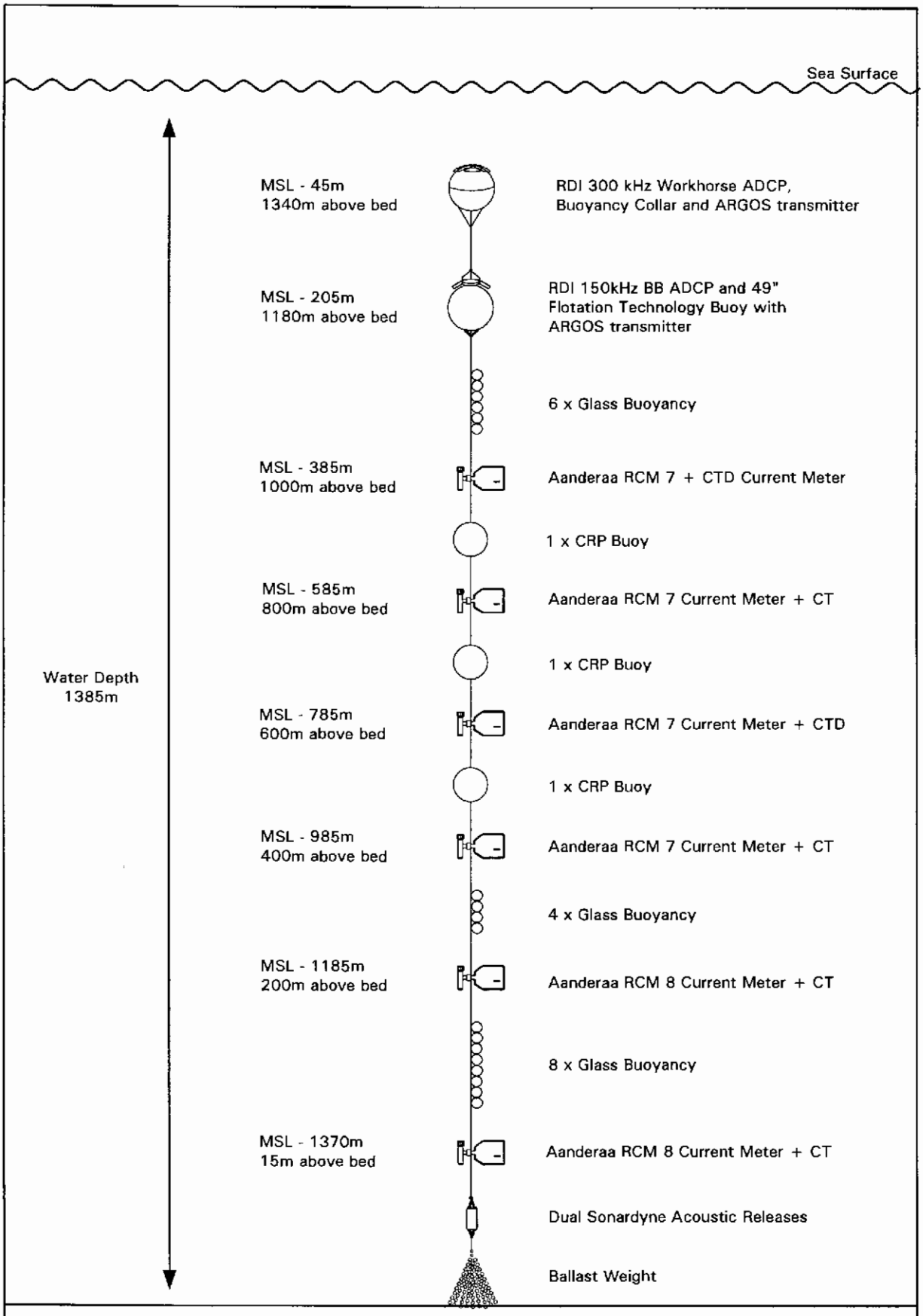
EEA GIRASSOL MOORING - BLOCK 17 PHASE 1

MOORING LOCATION MAP

Geos Ref: C10328 / 1488
Figure No: 1
Plot Date: 28-JAN-98

PROJECTION INFORMATION
PROJECTION: Transverse Mercator
SPHEROID: WGS84

GEOS

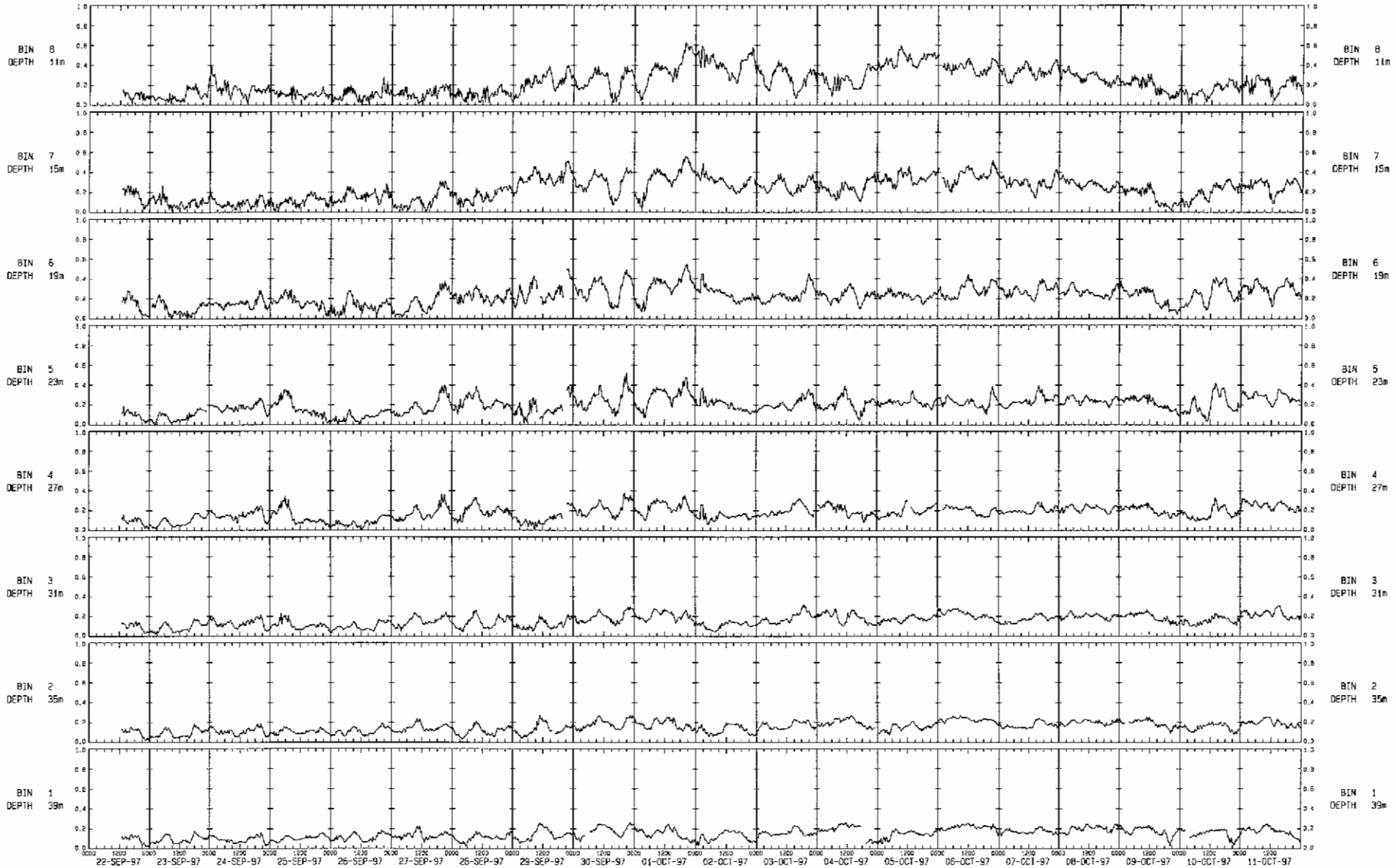


NOT TO SCALE

GEOS

EEA Girassol
Deepwater Current Measurements
Mooring Configuration

Ref No: C10328/1488
Figure: 2
Revised 15-01-98



NOTES:

INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	45m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 1 TO 8

22-SEP-97 TO 11-OCT-97

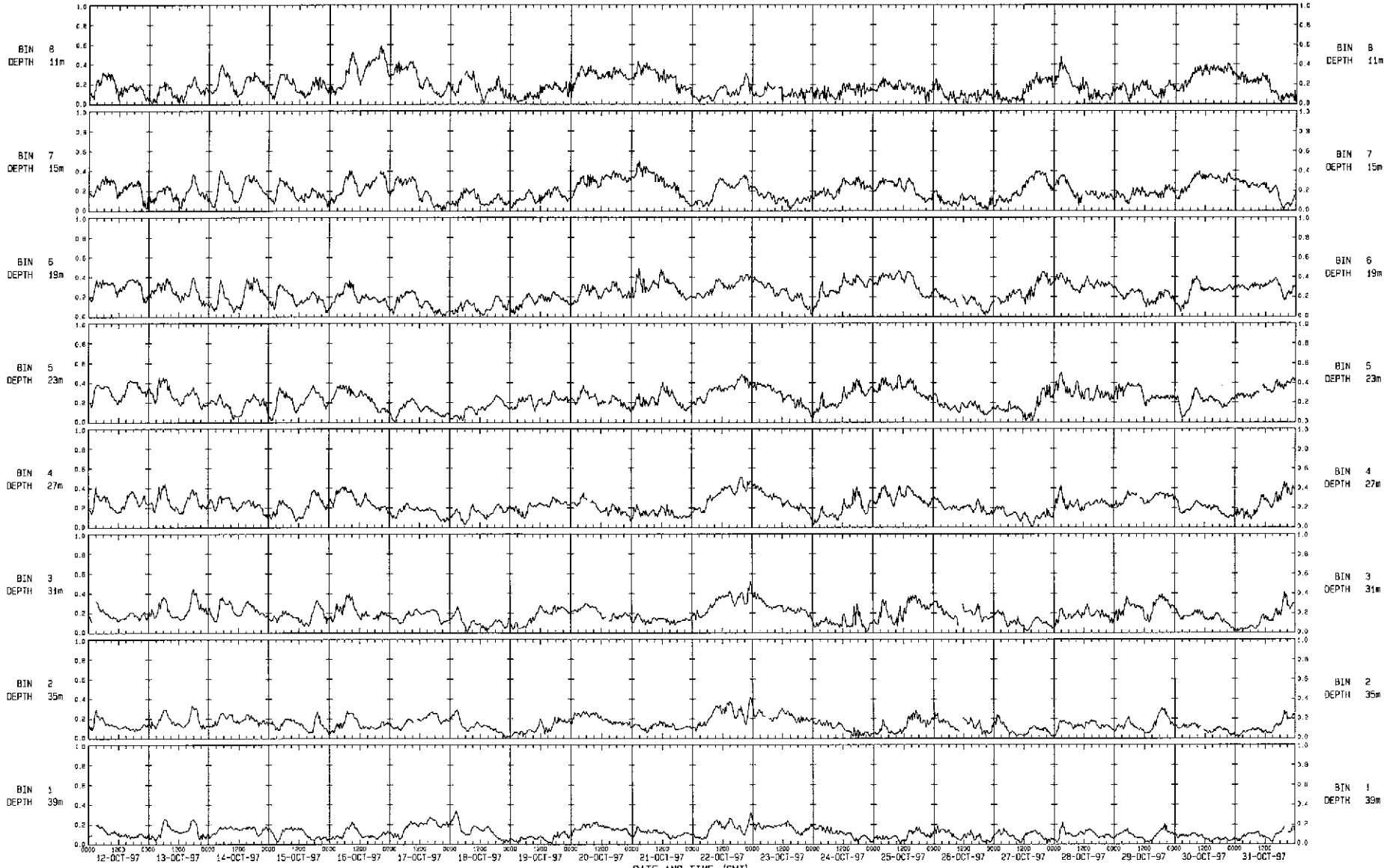
GEOS

REF. NO: 10328/1488

FIGURE NO: 3.1.1

PLOT DATE: 15-JAN-98

FILE: ANGWHSPD1



NOTES:

INSTRUMENT TYPE: RDI 300KHZ ADCP
SERIAL NUMBER: 0393 (TRANSDUCER)
LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
WATER DEPTH: 1385m
INSTRUMENT DEPTH: 45m
SAMPLING INTERVAL: 20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 1 TO 8

12-OCT-97 TO 31-OCT-97

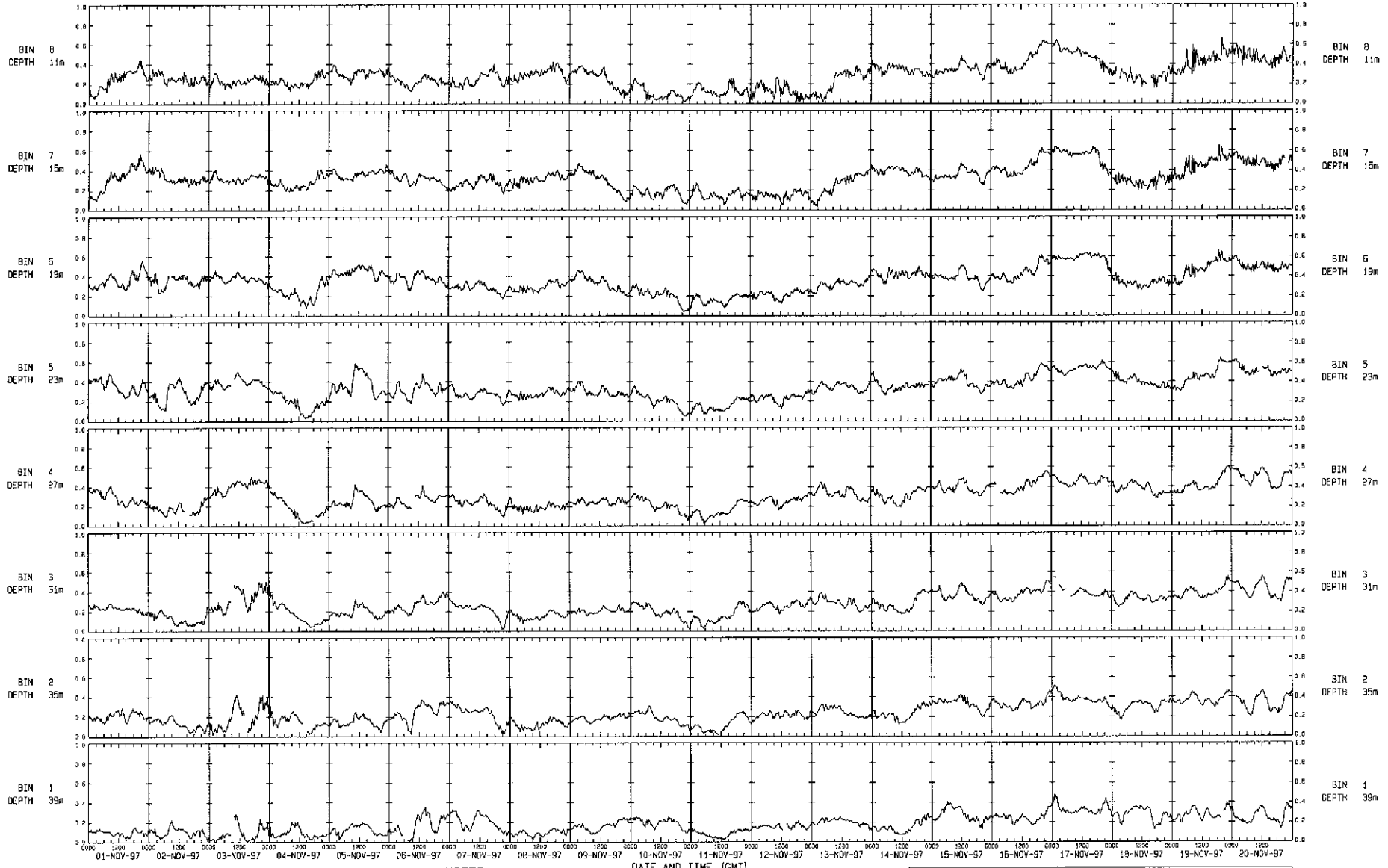
GEOS

REF. NO: 10328/1488

FIGURE NO: 3.1.2

PLOT DATE: 15-JAN-98

FILE: ANGWHSP02



NOTES:

INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	45m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 1 TO 8

01-NOV-97 TO 20-NOV-97

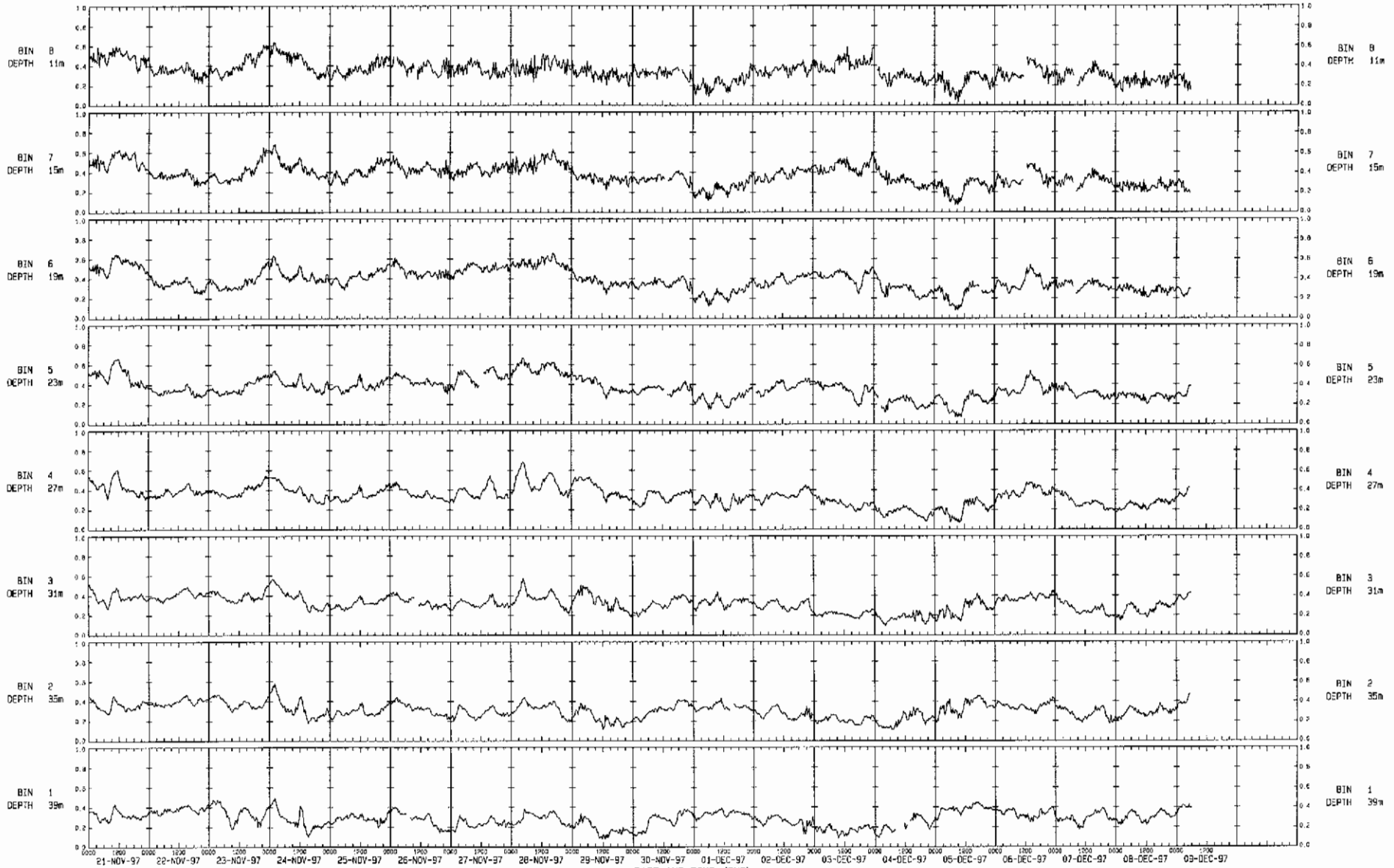
GEOS

REF. NO: 10328/1488

FIGURE NO: 3.1.3

PLOT DATE: 15-JAN-98

FILE: ANGM:PSD3



NOTES:

INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	45m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 1 TO 8

21-NOV-97 TO 09-DEC-97

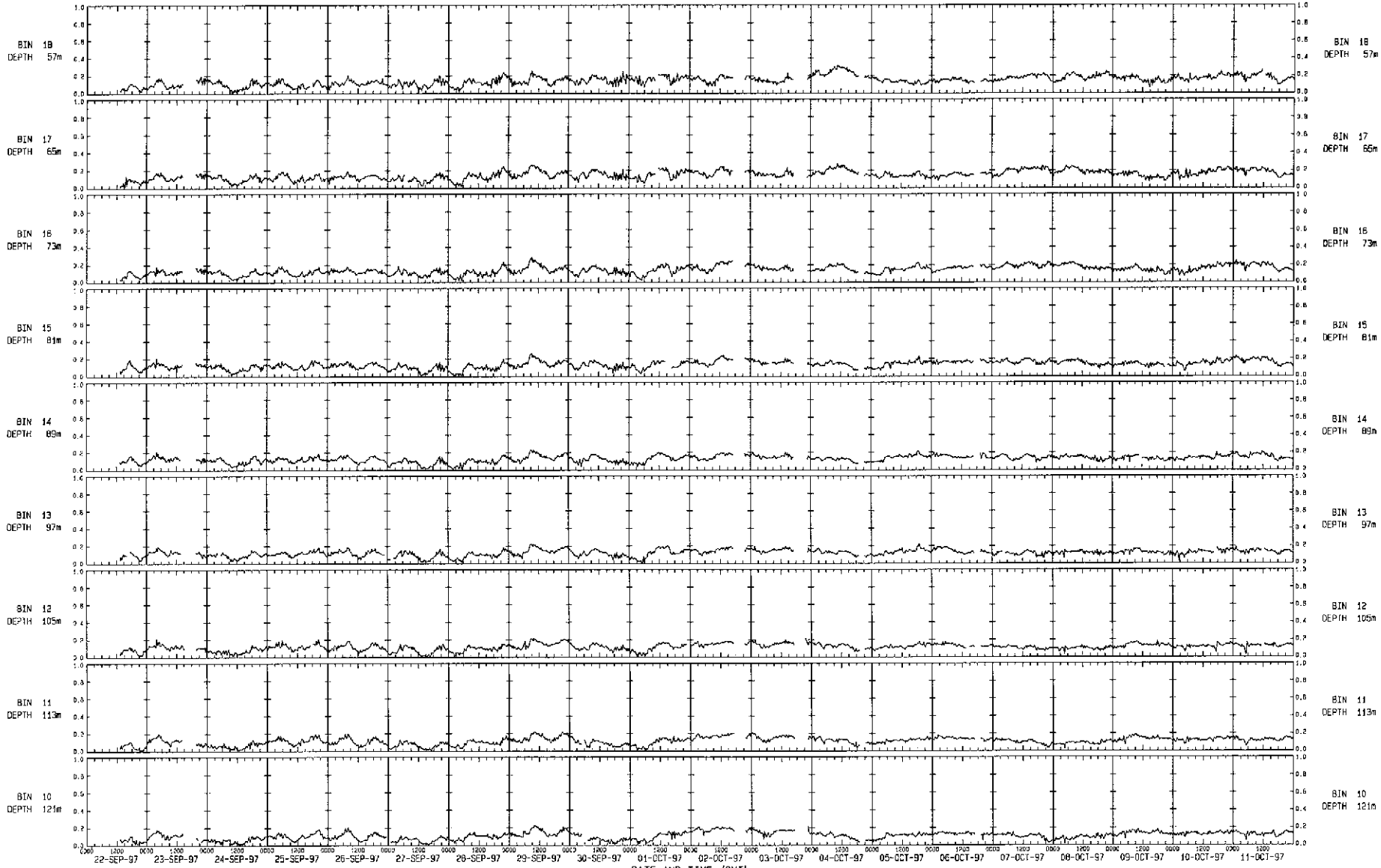
GEOS

REF. NO: 10328/1488

FIGURE NO: 3.1.4

PLOT DATE: 29-JAN-98

FILE: ANGNHSP04



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 10 TO 18

22-SEP-97 TO 11-OCT-97

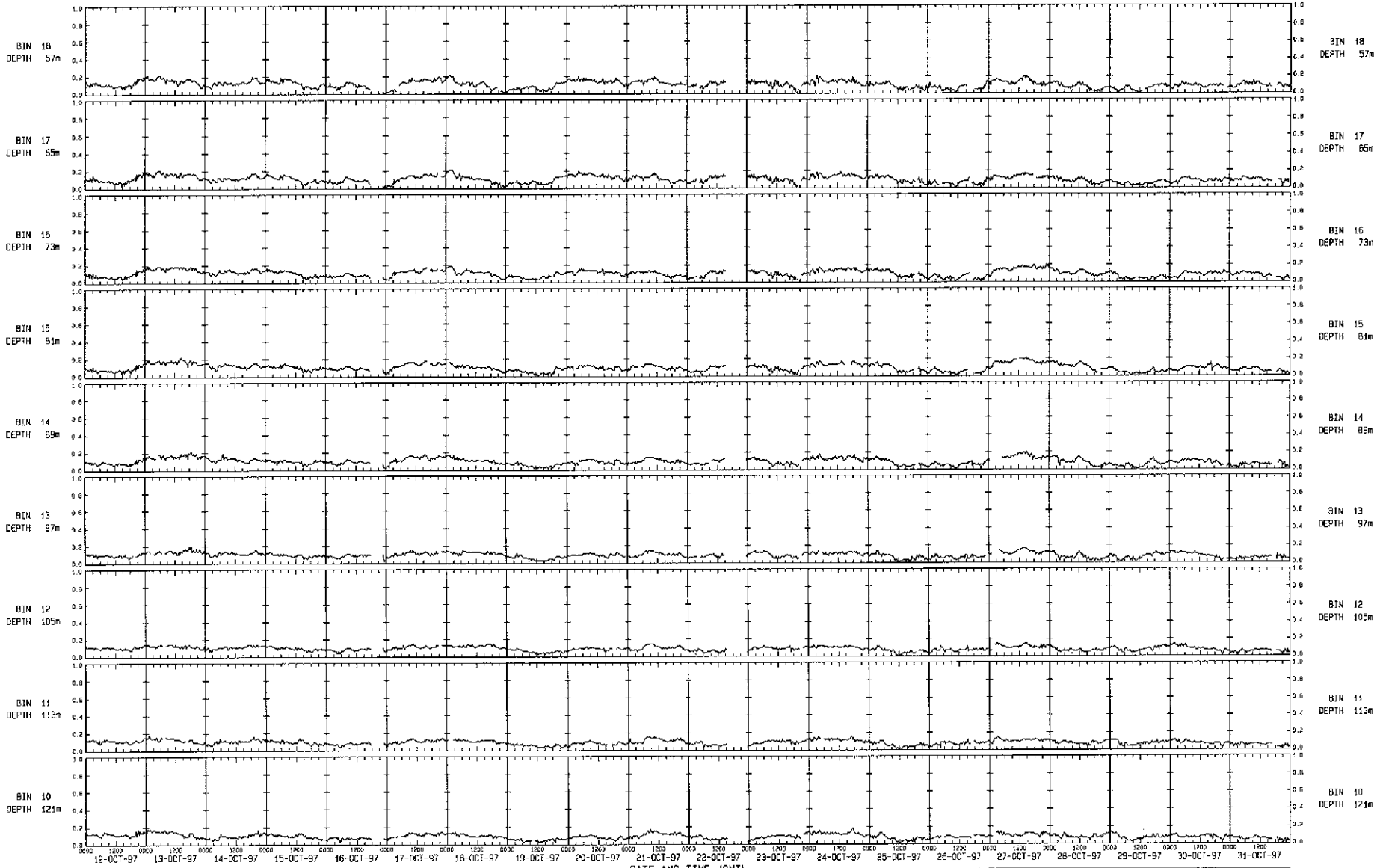
GEOS

REF. NO: 10328/1488

FIGURE NO: 3.2.1

PLOT DATE: 22-JAN-98

FILE: ANGSPE1



NOTES:

INSTRUMENT TYPE: RDI 150KHZ ADCP
SERIAL NUMBER: 02308 (TRANSDUCER)
LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
WATER DEPTH: 1385m
INSTRUMENT DEPTH: 205m
SAMPLING INTERVAL: 20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 10 TO 18

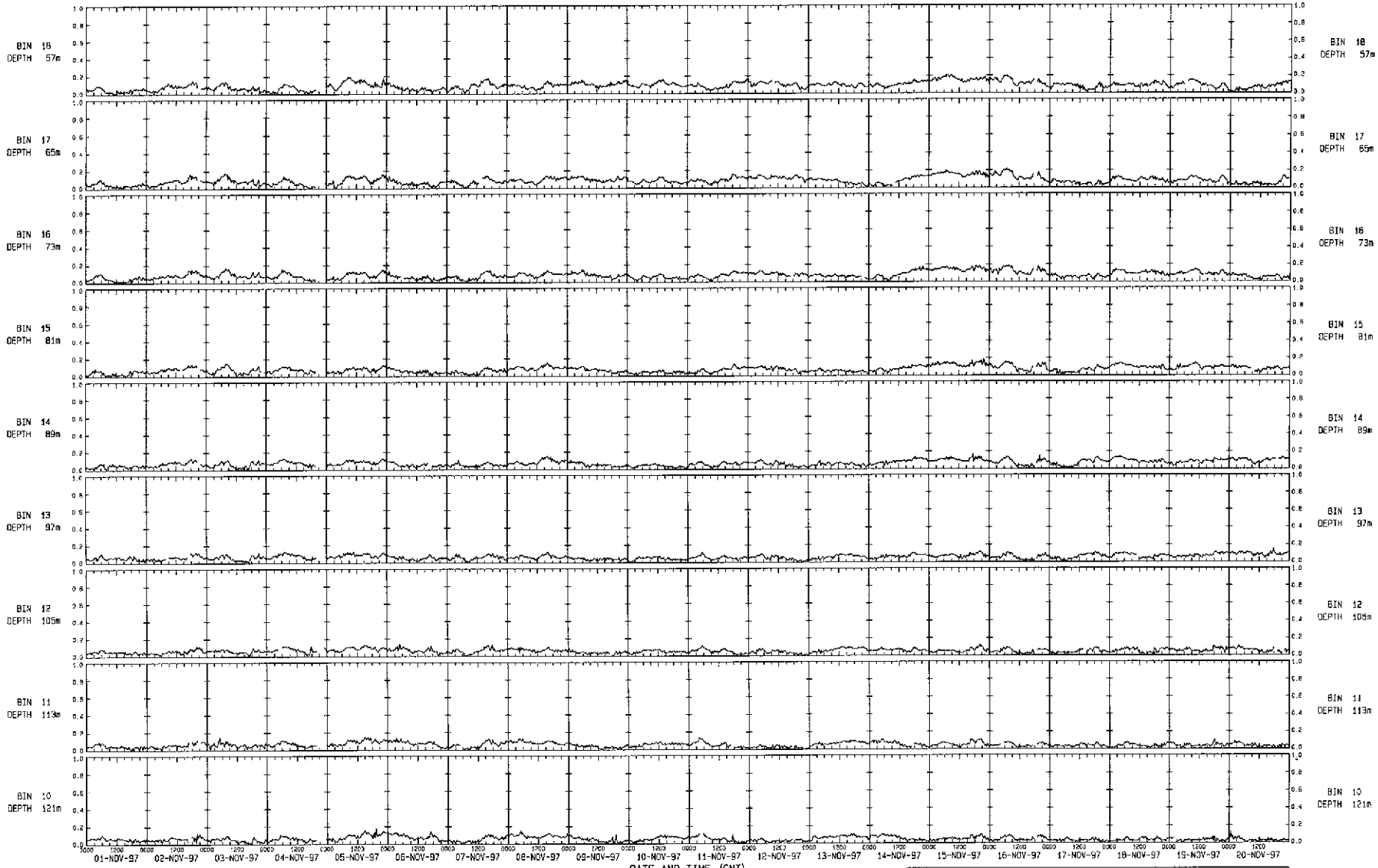
12-OCT-97 TO 31-OCT-97

GEOS

REF. NO: 10328/1488

FIGURE NO: 3.2.2

PLOT DATE: 22-JAN-98 FILE: ANGSPE2



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 10 TO 18

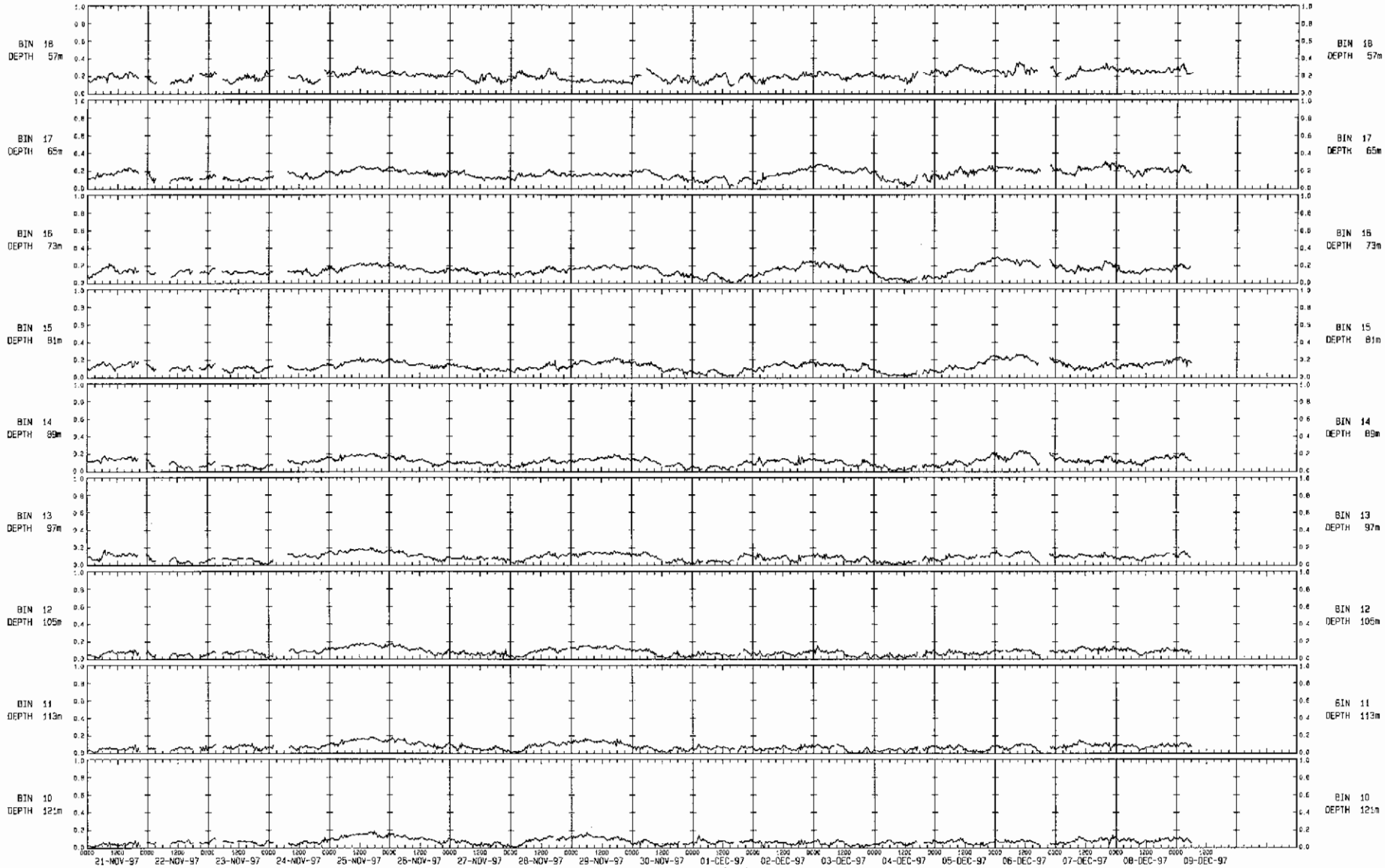
01-NOV-97 TO 20-NOV-97

GEOS

REF. NO: 10328/1488

FIGURE NO: 3.2.3

PLOT DATE: 22-JAN-98 FILE: ANGSPE3



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 10 TO 18

21-NOV-97 TO 09-DEC-97

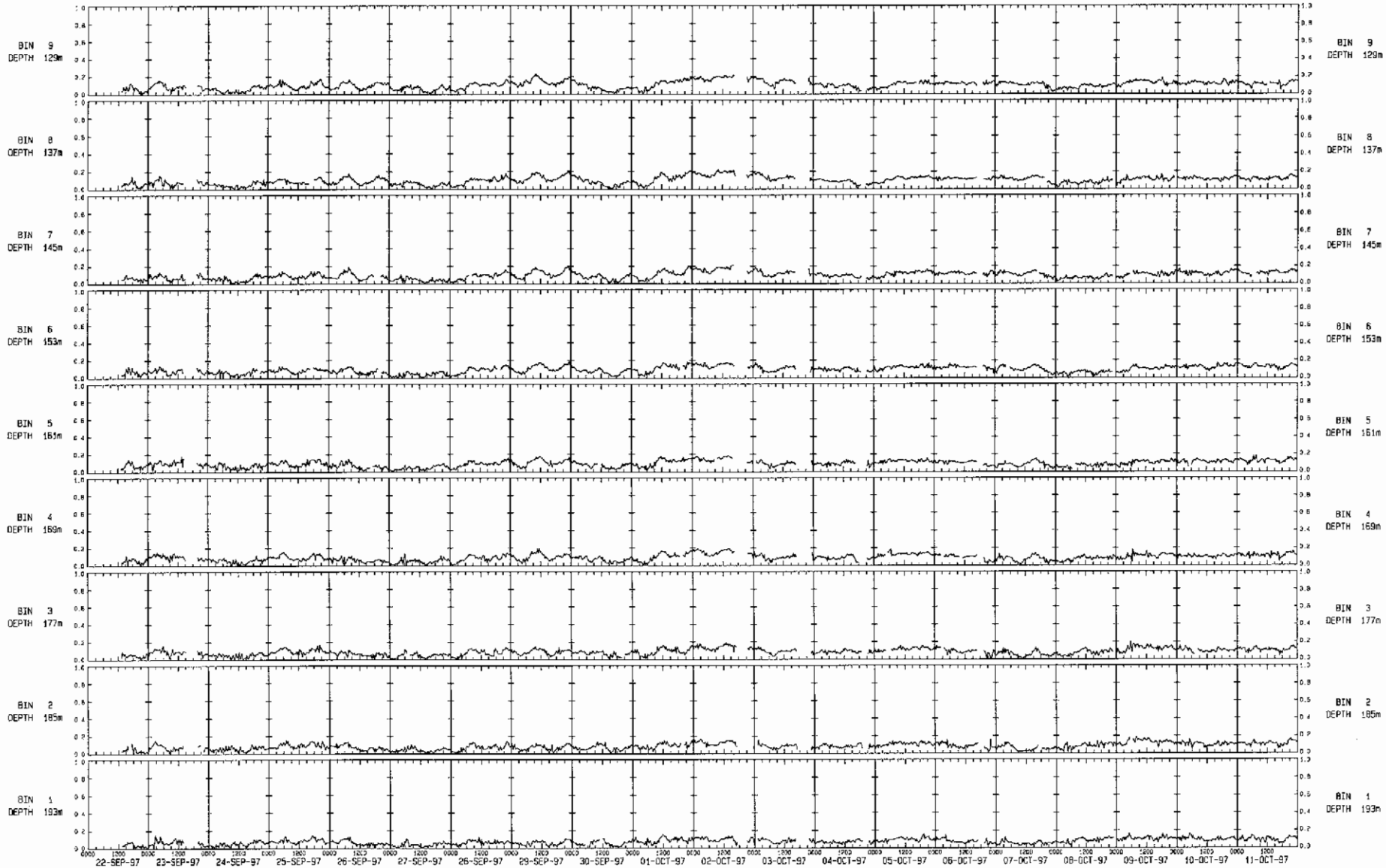
GEOS

REF. NO: 10328/1488

FIGURE NO: 3.2.4

PLOT DATE: 29-JAN-98

FILE: ANGSPE4



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 1 TO 9

22-SEP-97 TO 11-OCT-97

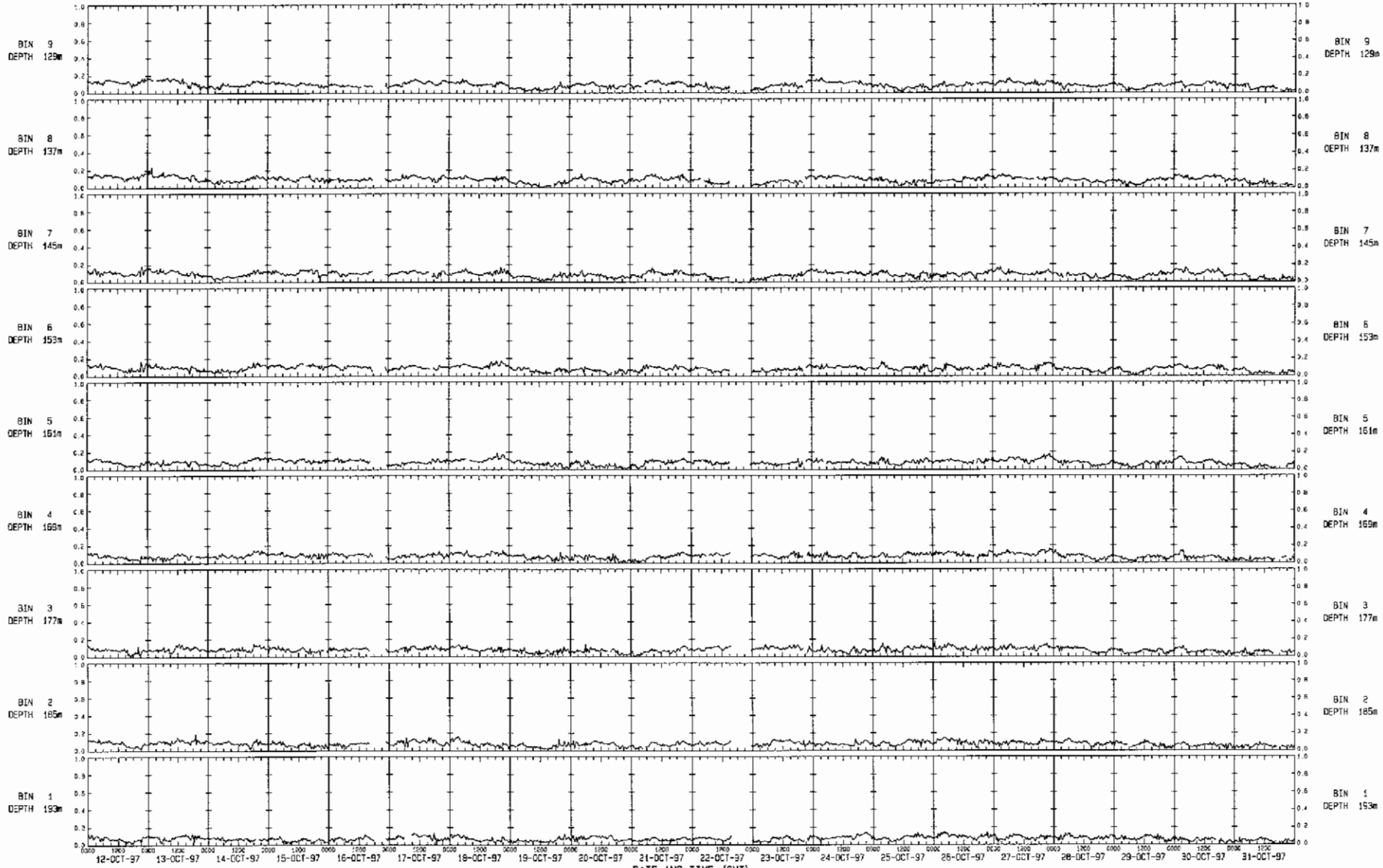
GEOS

REF. NO: 10320/1486

FIGURE NO: 3.3.1

PLOT DATE: 22-JAN-98

FILE: ANGSP31



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 1 TO 9

12-OCT-97 TO 31-OCT-97

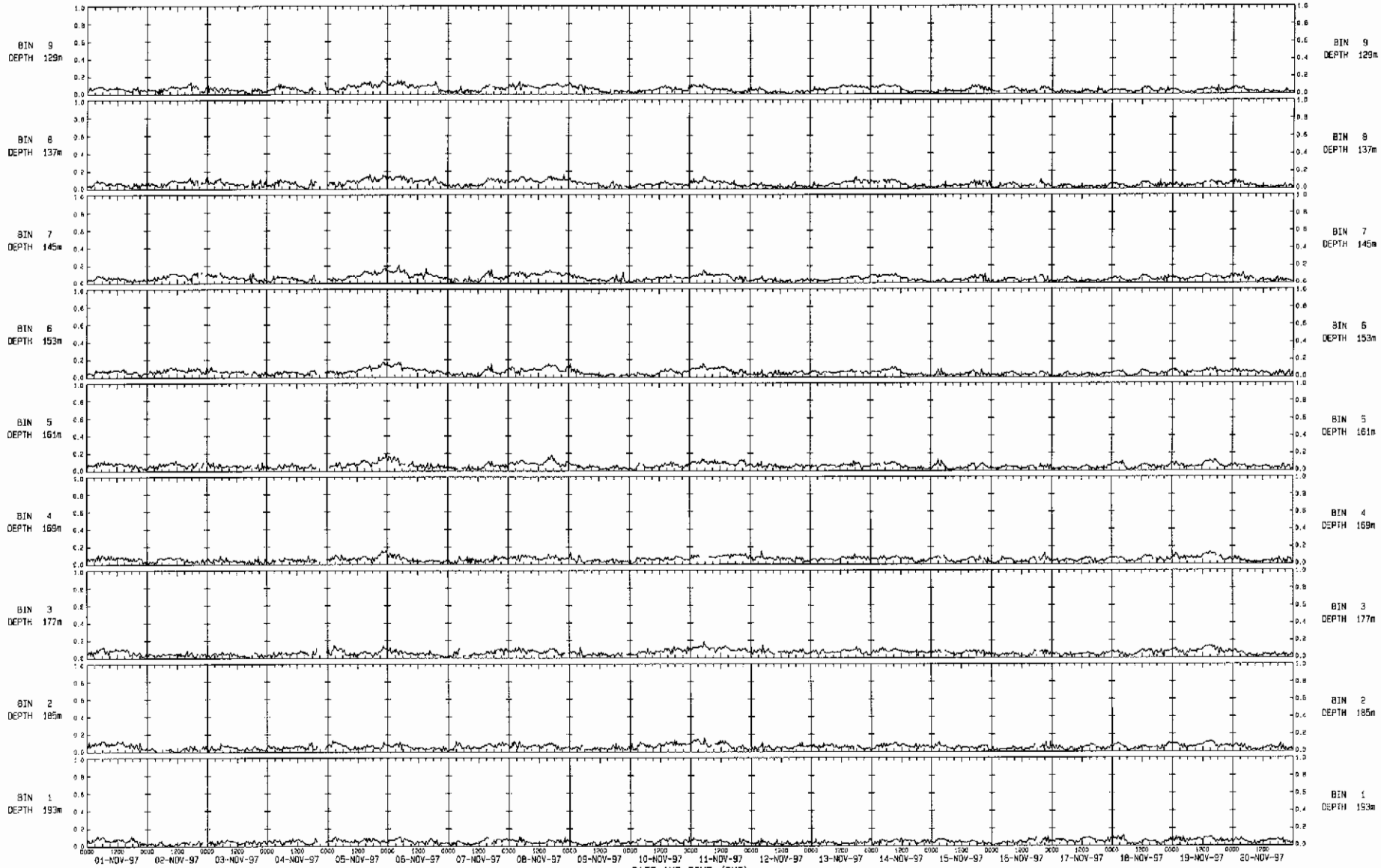
GEOS

REF. NO: 10328/148B

FIGURE NO: 3.3.2

PLOT DATE: 22-JAN-98

FILE: ANGSP02



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 1 TO 9

01-NOV-97 TO 20-NOV-97

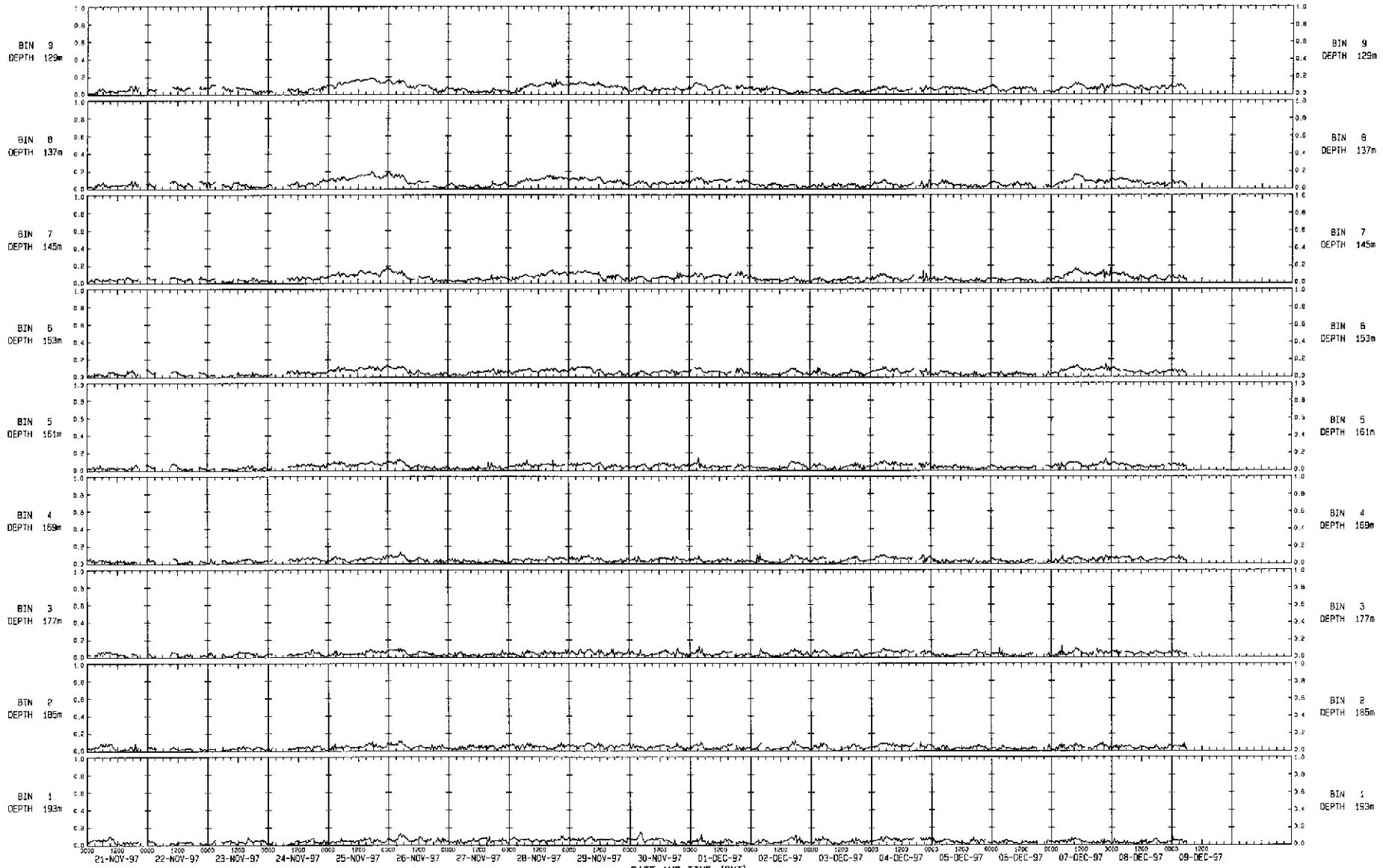
GEOS

REF. NO: 10328/1486

FIGURE NO: 3.3.3

PLOT DATE: 22-JAN-98

FILE: ANGSPD3



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

BINS 1 TO 9

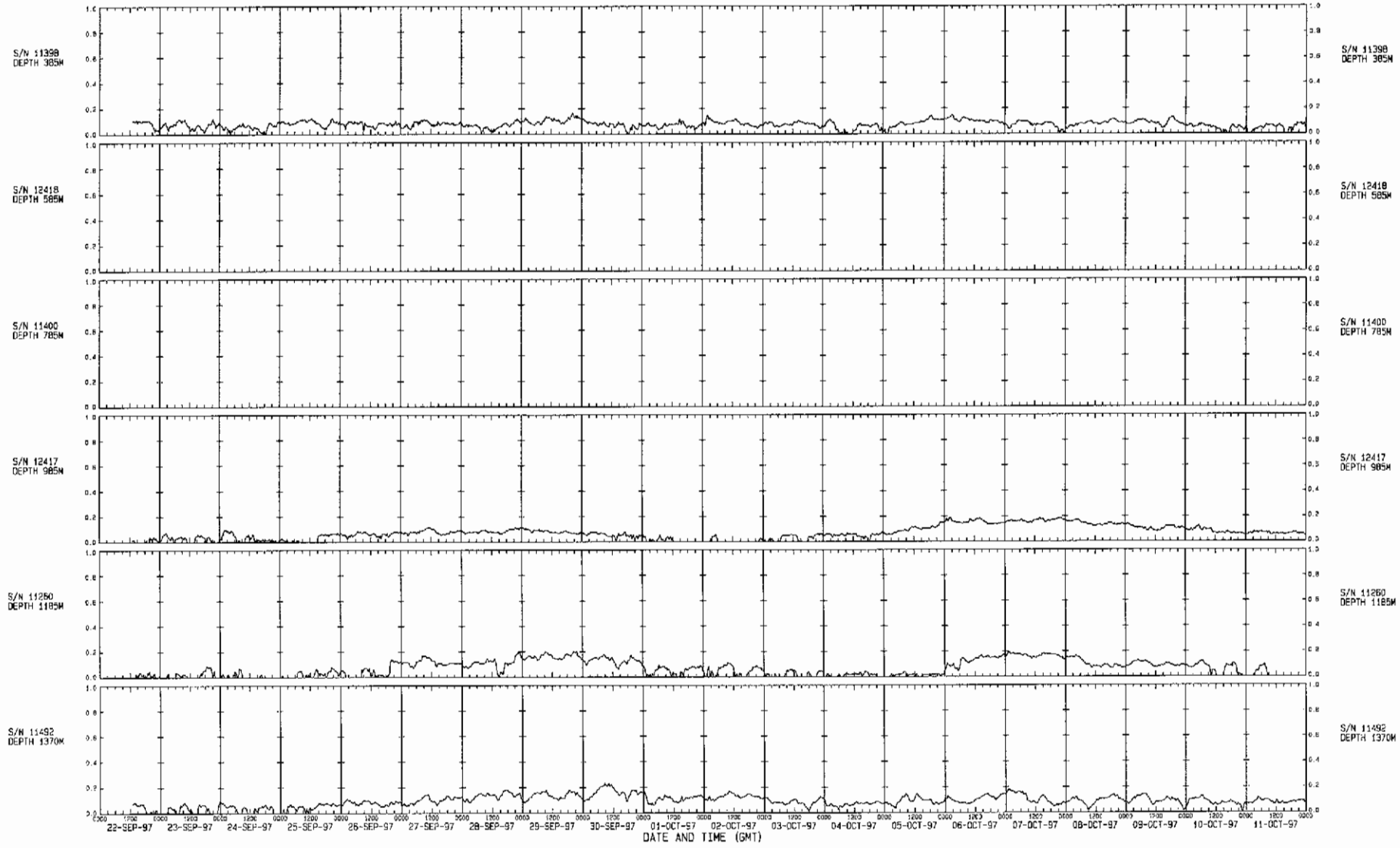
21-NOV-97 TO 09-DEC-97

GEOS

REF. NO: 10328/1488

FIGURE NO: 3.3.4

PLOT DATE: 29-JAN-98 FILE: ANGSP04



NOTES:

INSTRUMENT TYPE:	AANDERAA RCM 7/8
SERIAL NOS:	11398/12418/11400 12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	385M/585M/785M 985M/1185M/1370M
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

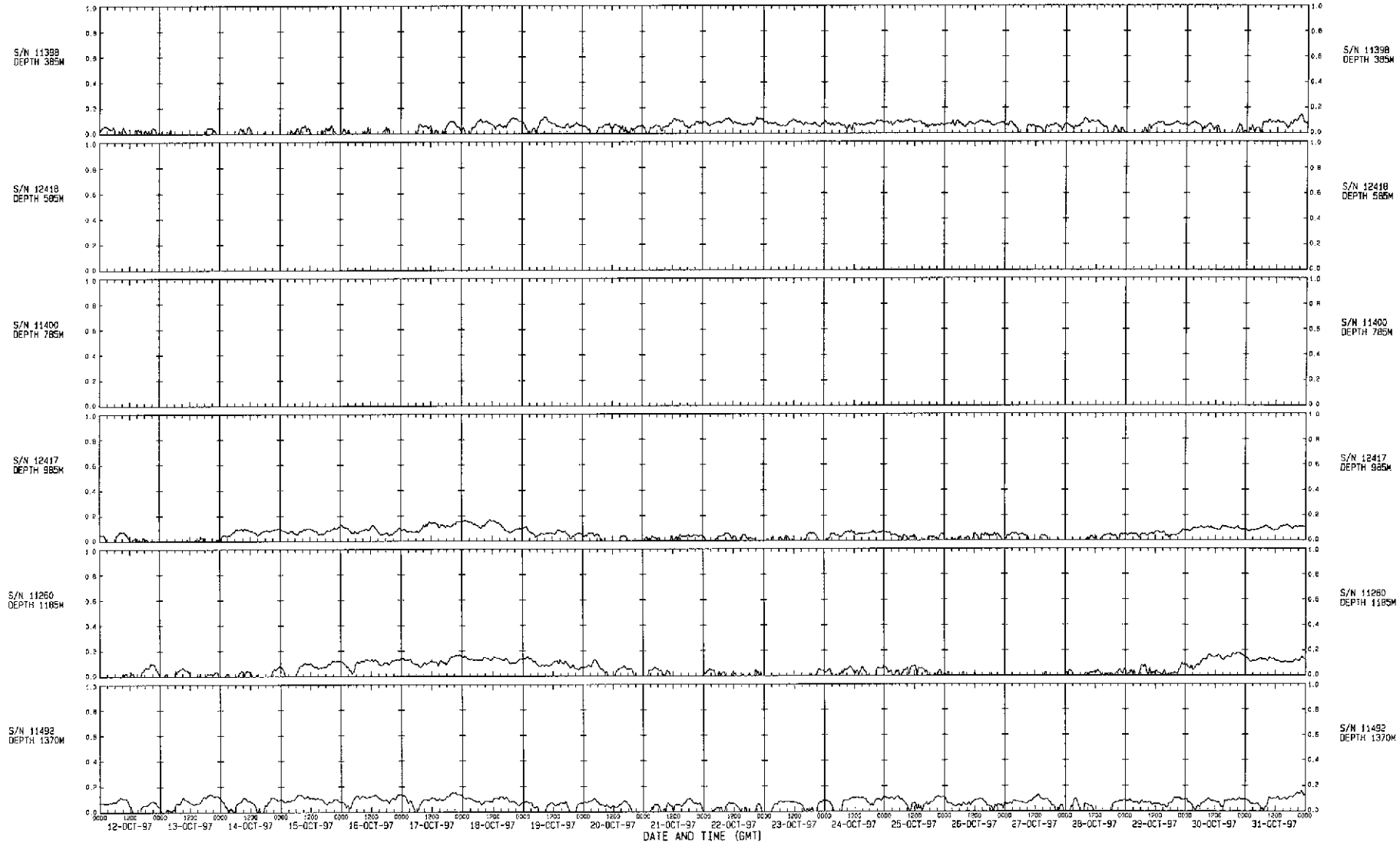
RCMS

22-SEP-97 TO 11-OCT-97

GEOS

REF. NO:	10328/148B
FIGURE NO:	3.4.1

PLOT DATE: 21-JAN-98 FILE: SPEE01



NOTES:

INSTRUMENT TYPE:	AANDERAA RCM 7/8
SERIAL NOS:	11398/12418/11400 12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S. 011 40.95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	385M/585M/785M 985M/1185M/1370M
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

RCMS

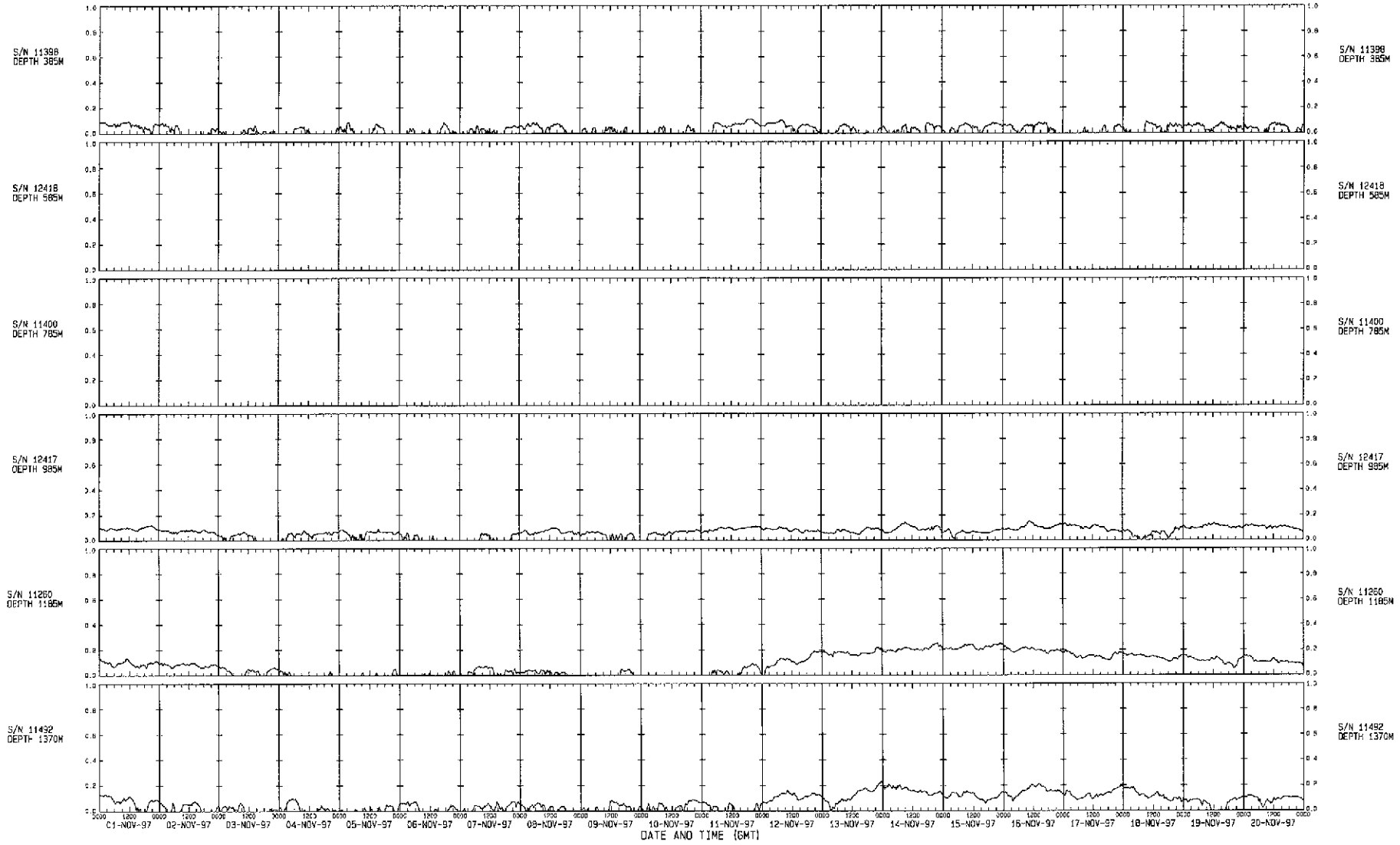
12-OCT-97 TO 31-OCT-97

GEOS

REF. NO: 10328/1488

FIGURE NO: 3.4.2

PLOT DATE: 21-JAN-98 FILE: SPEED2



NOTES:

INSTRUMENT TYPE:	AANDERAA RCM 7/8
SERIAL NOS.	11398/12418/11400
	12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	385M/585M/785M
	985M/1185M/1370M
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

RCMS

01-NOV-97 TO 20-NOV-97

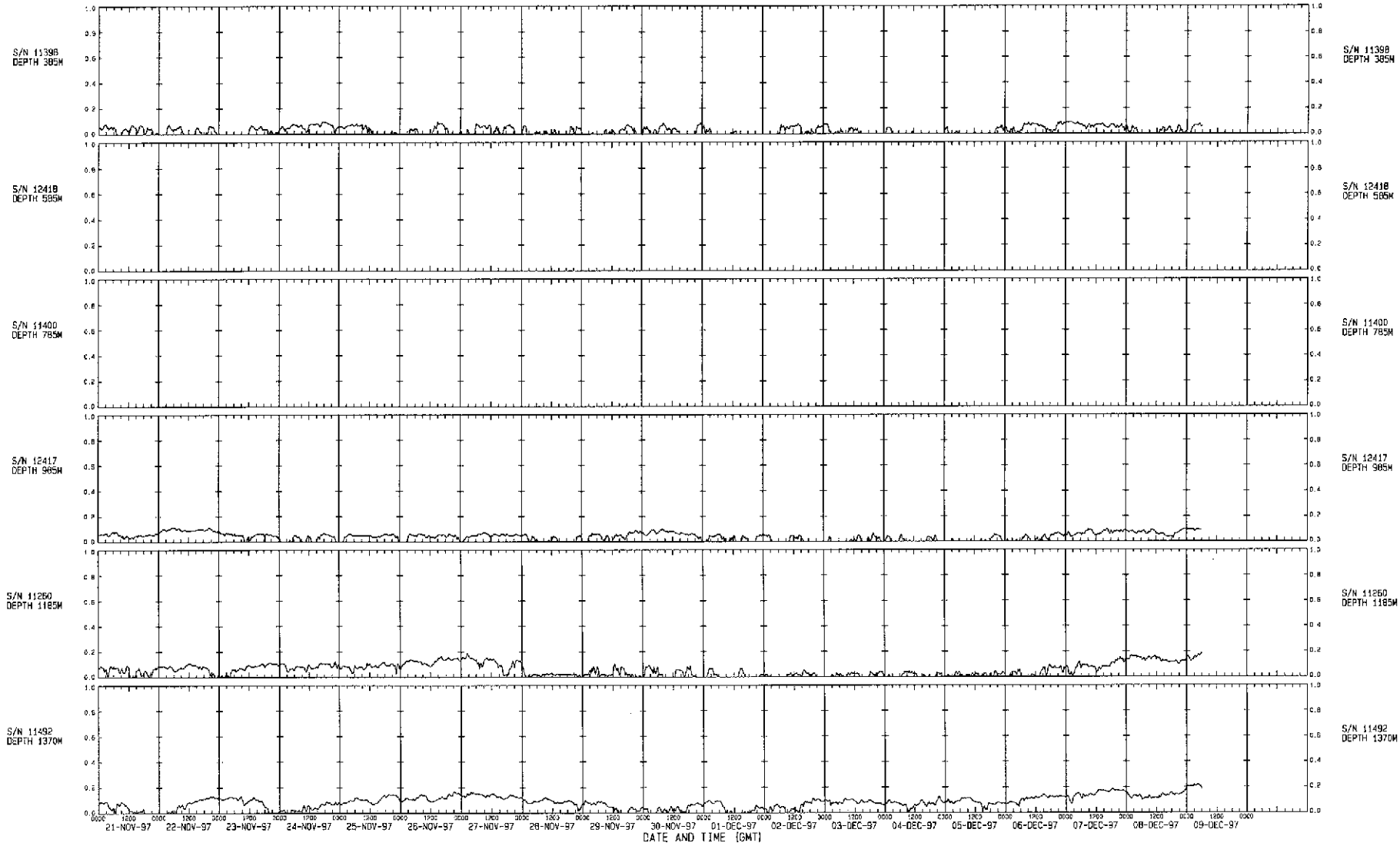
GEOS

REF. NO: 10328/1488

FIGURE NO: 3.4.3

PLOT DATE: 21-JAN-98

FILE: SPEED3



NOTES:

INSTRUMENT TYPE:	AANDERAA RCM 7/8
SERIAL NOS:	11398/12418/11400 12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	385M/585M/785M 985M/1185M/1370M
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED (M/S)

RCMS

21-NOV-97 TO 09-DEC-97

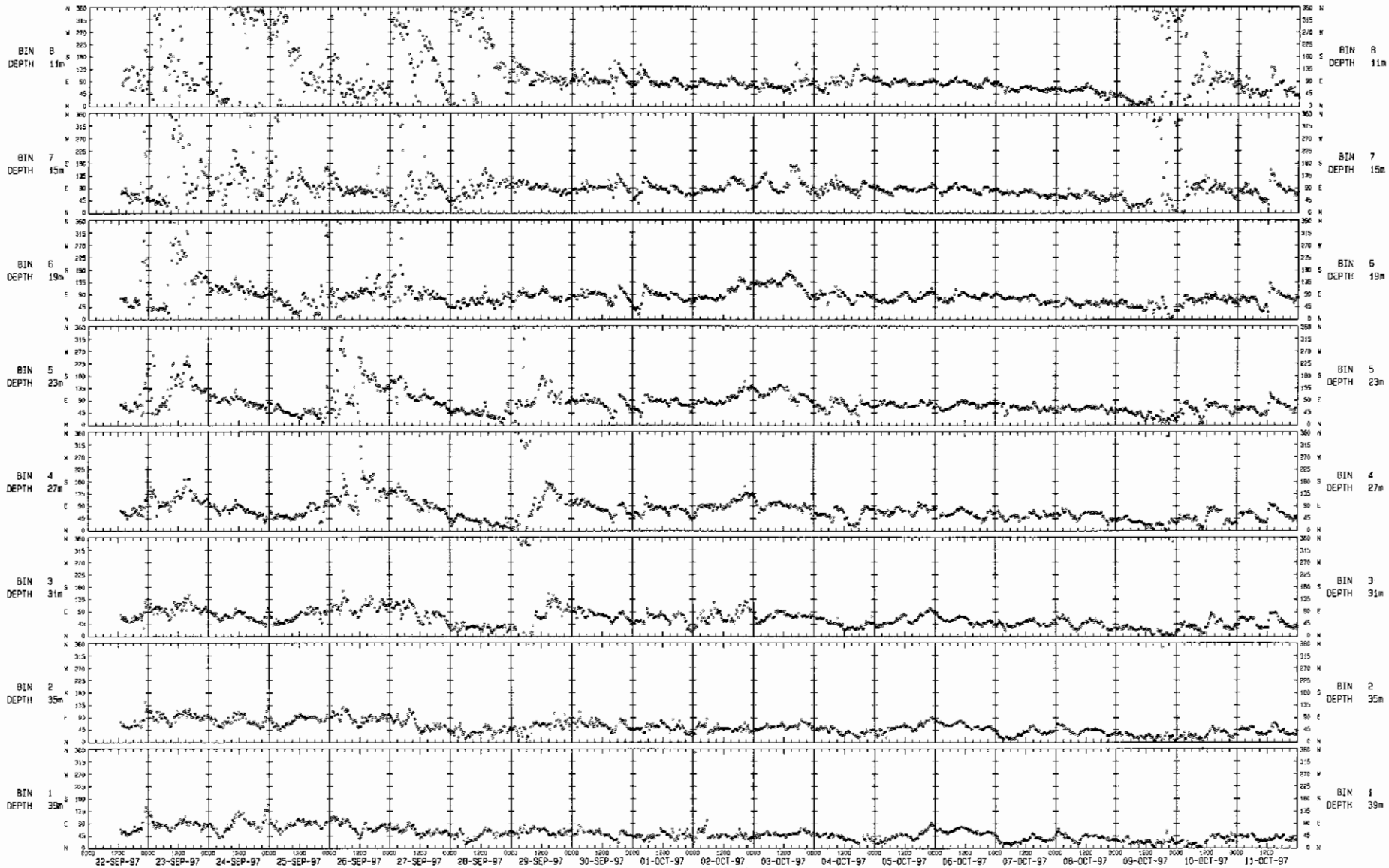
GEOS

REF. NO: 10328/1488

FIGURE NO: 3.4.4

PLOT DATE: 29-JAN-98

FILE: SPEED4



NOTES:

INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	45m
SAMPLING INTERVAL:	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

BINS 1 TO 8

22-SEP-97 TO 11-OCT-97

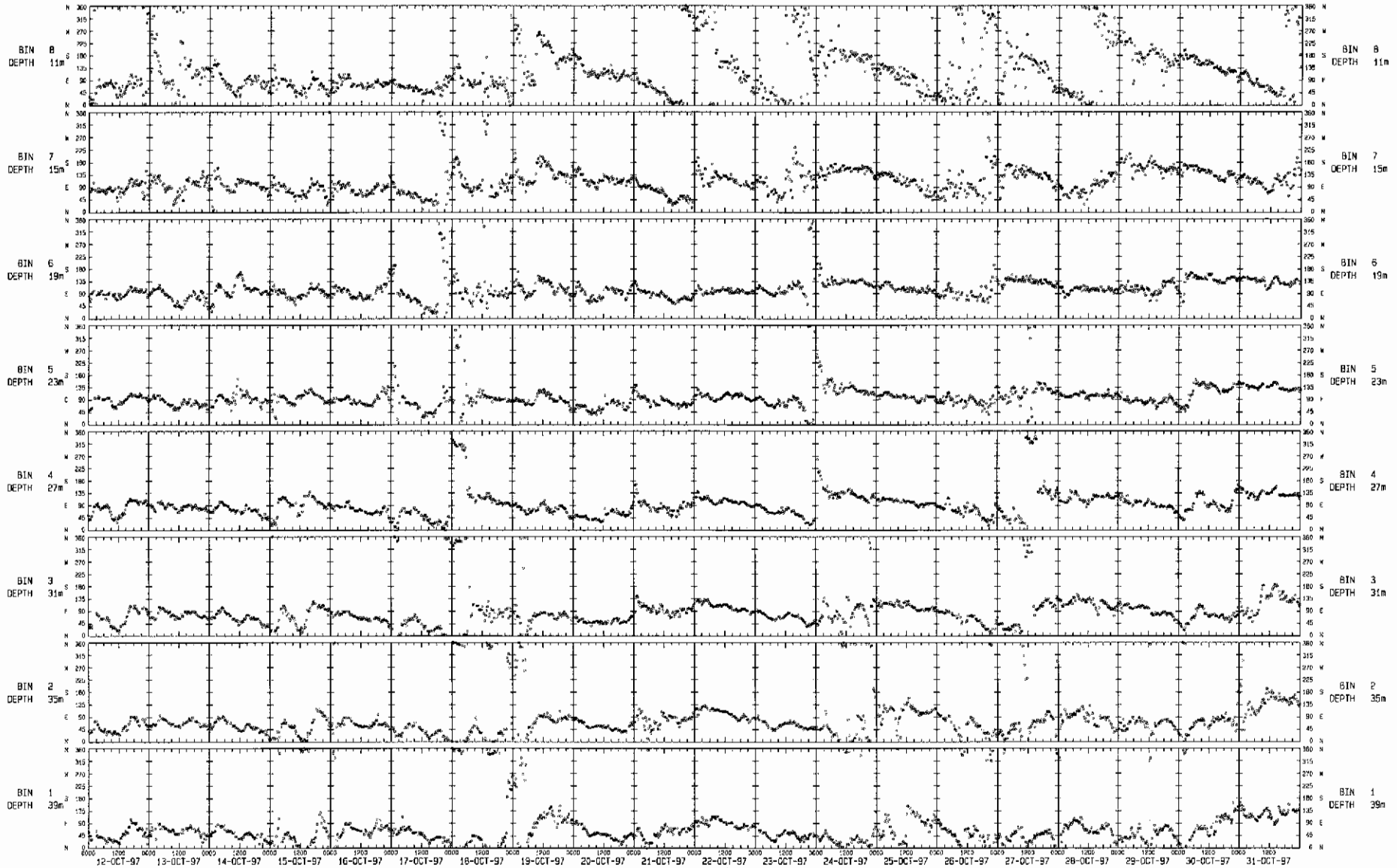
GEOS

REF. NO: C10328

FIGURE NO: 4.1.1

PLOT DATE: 15-JAN-98

FILE: ANGWHDIR1



NOTES:

INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1365m
INSTRUMENT DEPTH:	45m
SAMPLING INTERVAL:	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

BINS 1 TO 8

12-OCT-97 TO 31-OCT-97

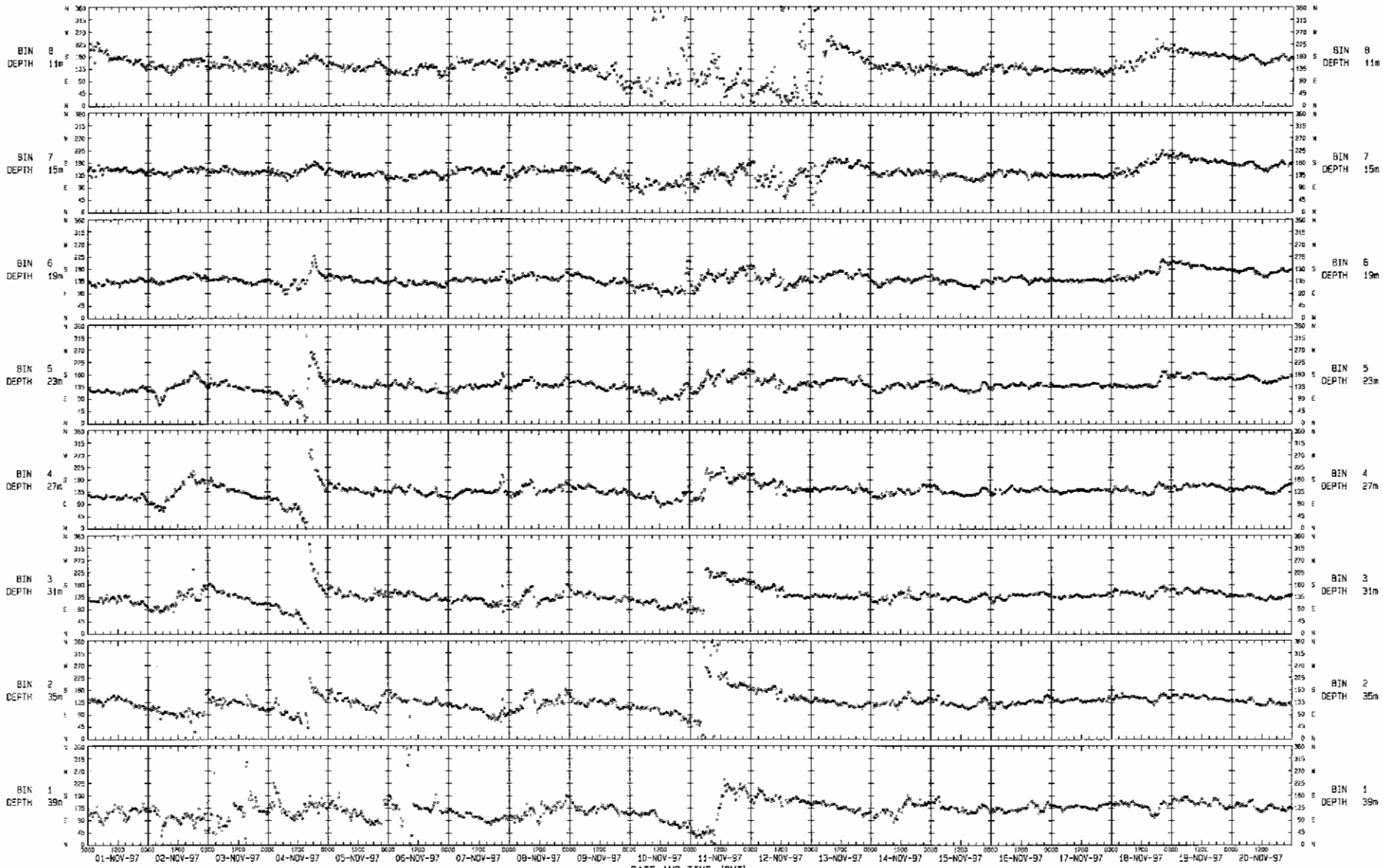
GEOS

REF. NO: C10328

FIGURE NO: 4.1.2

PLOT DATE: 15-JAN-98

FILE: ANGMHDIR2



NOTES:

INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	45m
SAMPLING INTERVAL:	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

BINS 1 TO 8

01-NOV-97 TO 20-NOV-97

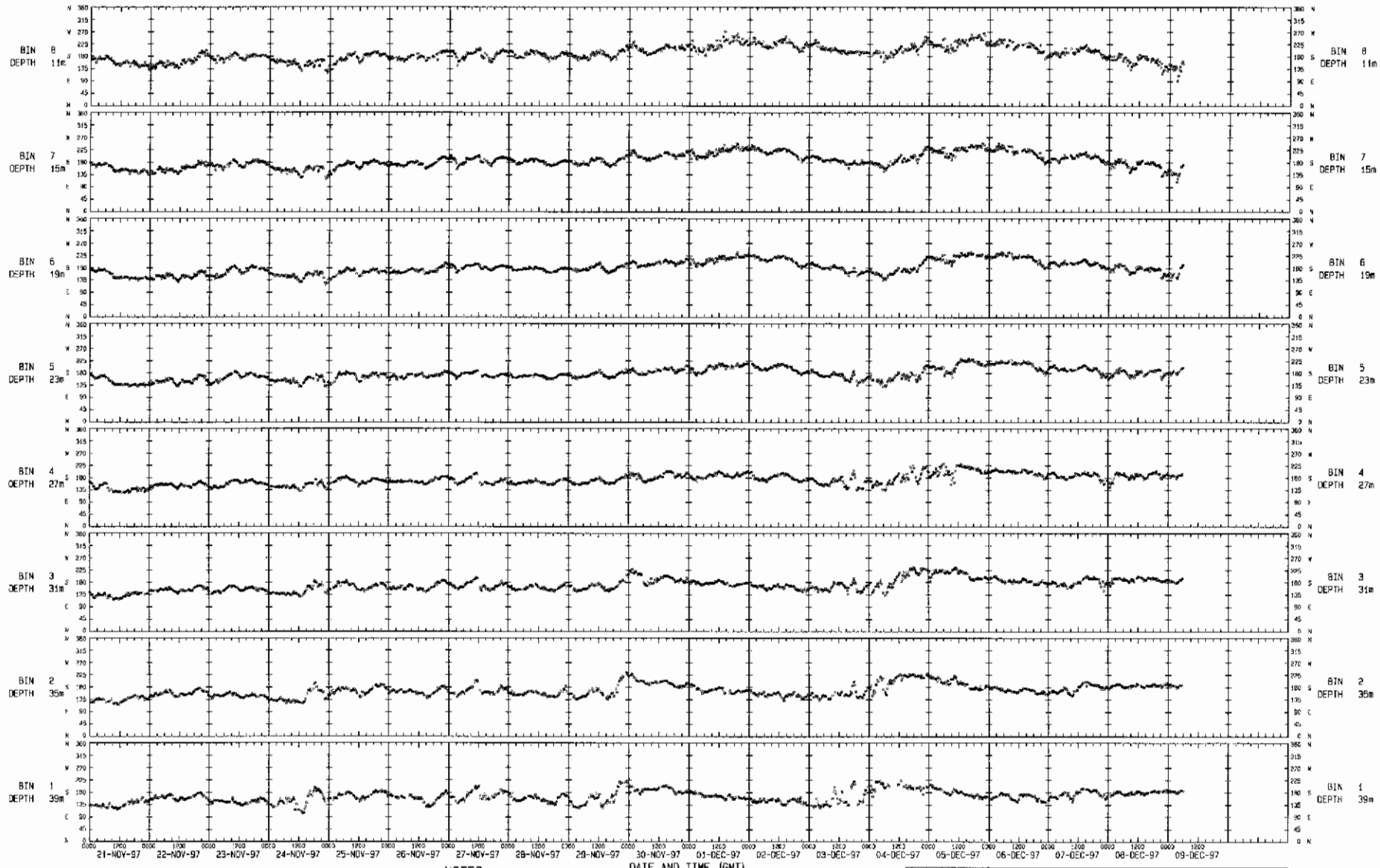
GEOS

REF. NO: C10328

FIGURE NO: 4.1.3

PLOT DATE: 15-JAN-98 FILE: ANGWHDIR3

01AB238-0900



NOTES:

INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	45m
SAMPLING INTERVAL:	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

BINS 1 TO 8

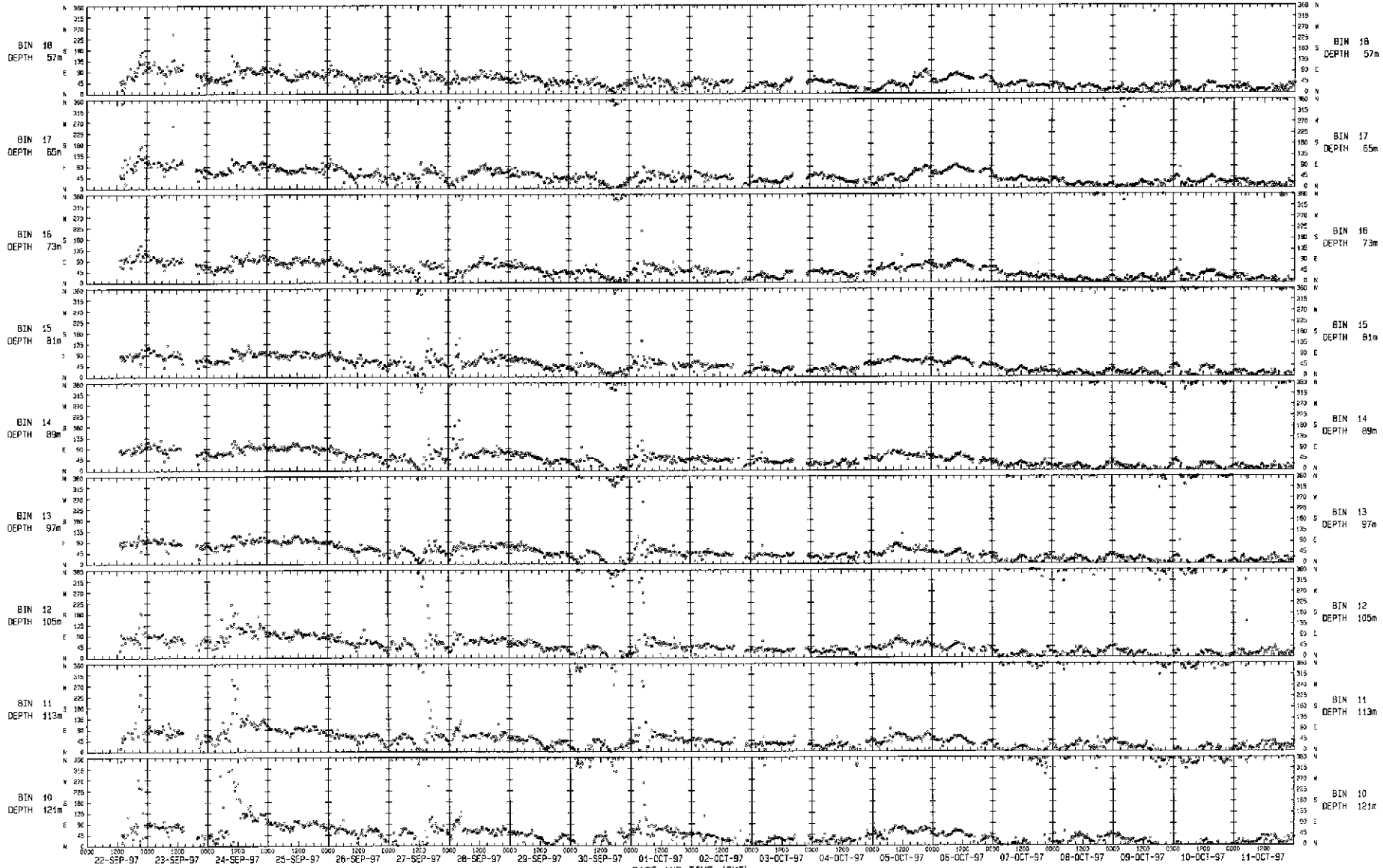
21-NOV-97 TO 09-DEC-97

GEOS

REF. NO: C10328

FIGURE NO: 4.1.4

PLOT DATE: 29-JAN-98 FILE: ANGNRDIR4



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION

BINS 10 TO 18

22-SEP-97 TO 11-OCT-97

GEOS

REF. NO: 10328/1488

FIGURE NO: 4.2.1

PLOT DATE: 15-JAN-98 FILE: ANGDIE1

NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION

BINS 10 TO 18

12-OCT-97 TO 31-OCT-97

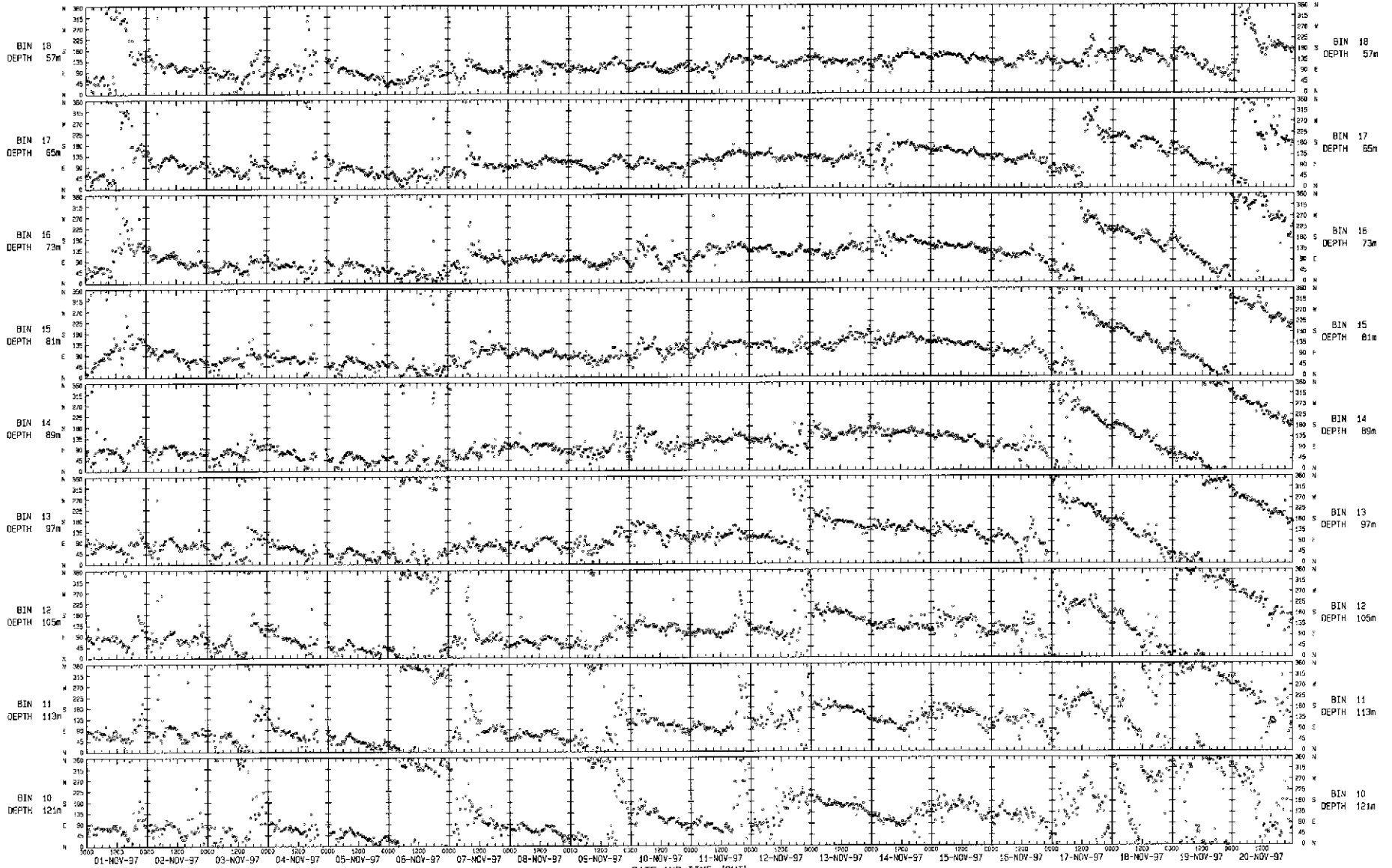
GEOS

REF. NO: 10328/1488

FIGURE NO: 4.2.2

PLOT DATE: 15-JAN-98

FILE: ANGDIE2



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION

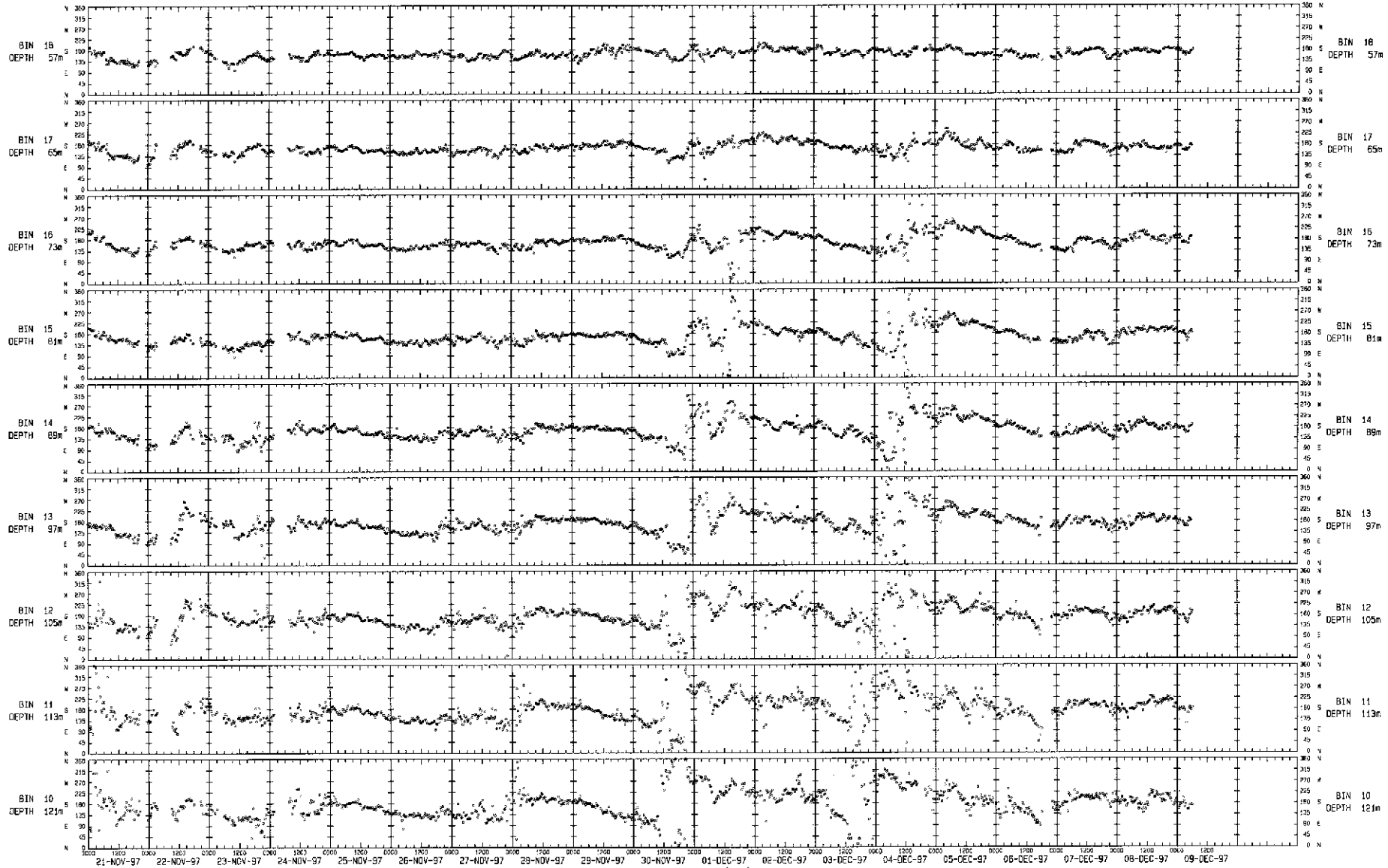
BINS 10 TO 18

01-NOV-97 TO 20-NOV-97

GEOS

REF. NO:	10328/1488
FIGURE NO:	4.2.3

PLOT DATE: 15-JAN-98 FILE: ANGDIE3



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1388m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION

BINS 10 TO 18

21-NOV-97 TO 09-DEC-97

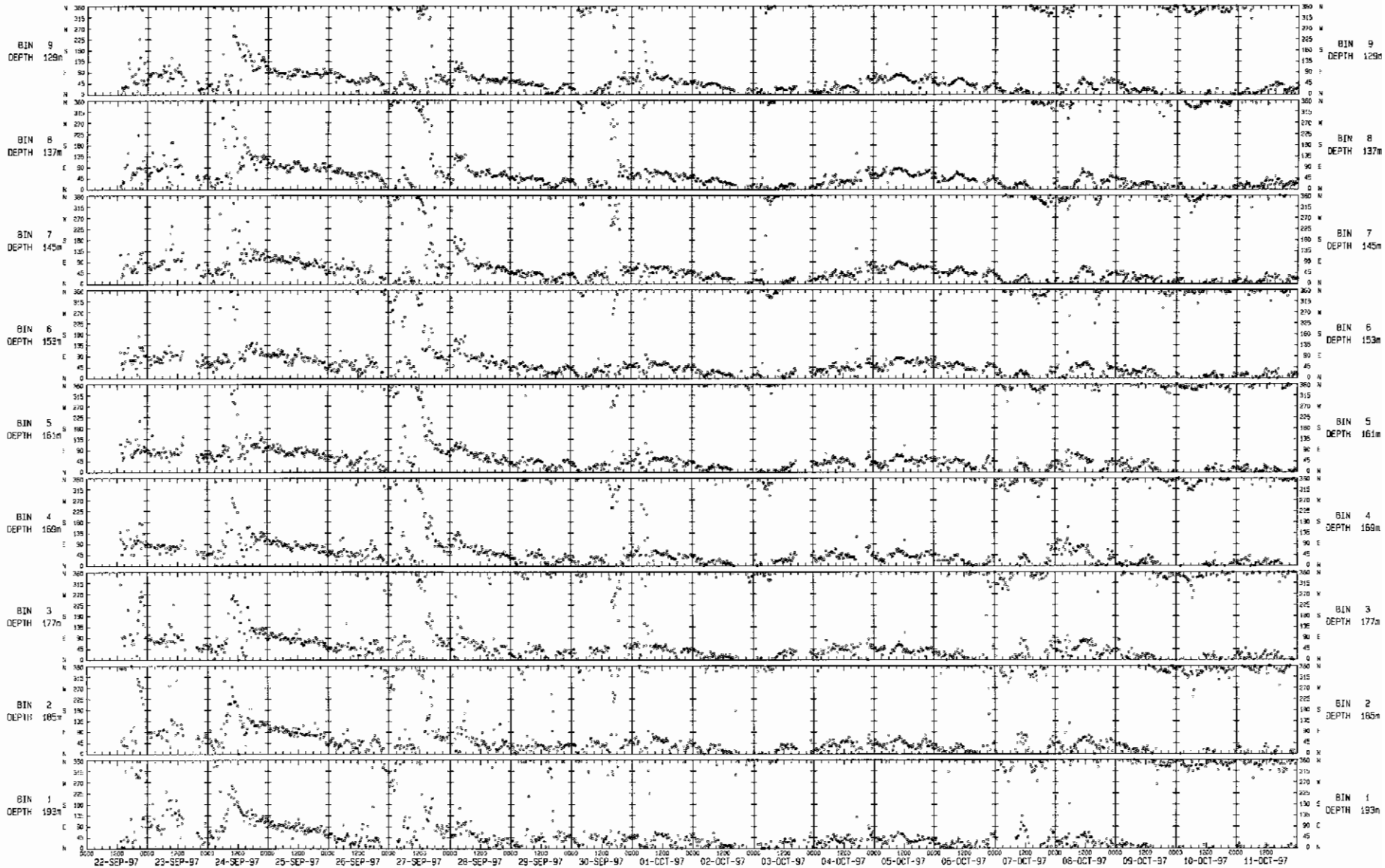
GEOS

REF. NO: 10328/1488

FIGURE NO: 4.2.4

PLOT DATE: 29-JAN-98

FILE: ANGDIE4



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

BINS 1 TO 9

22-SEP-97 TO 11-OCT-97

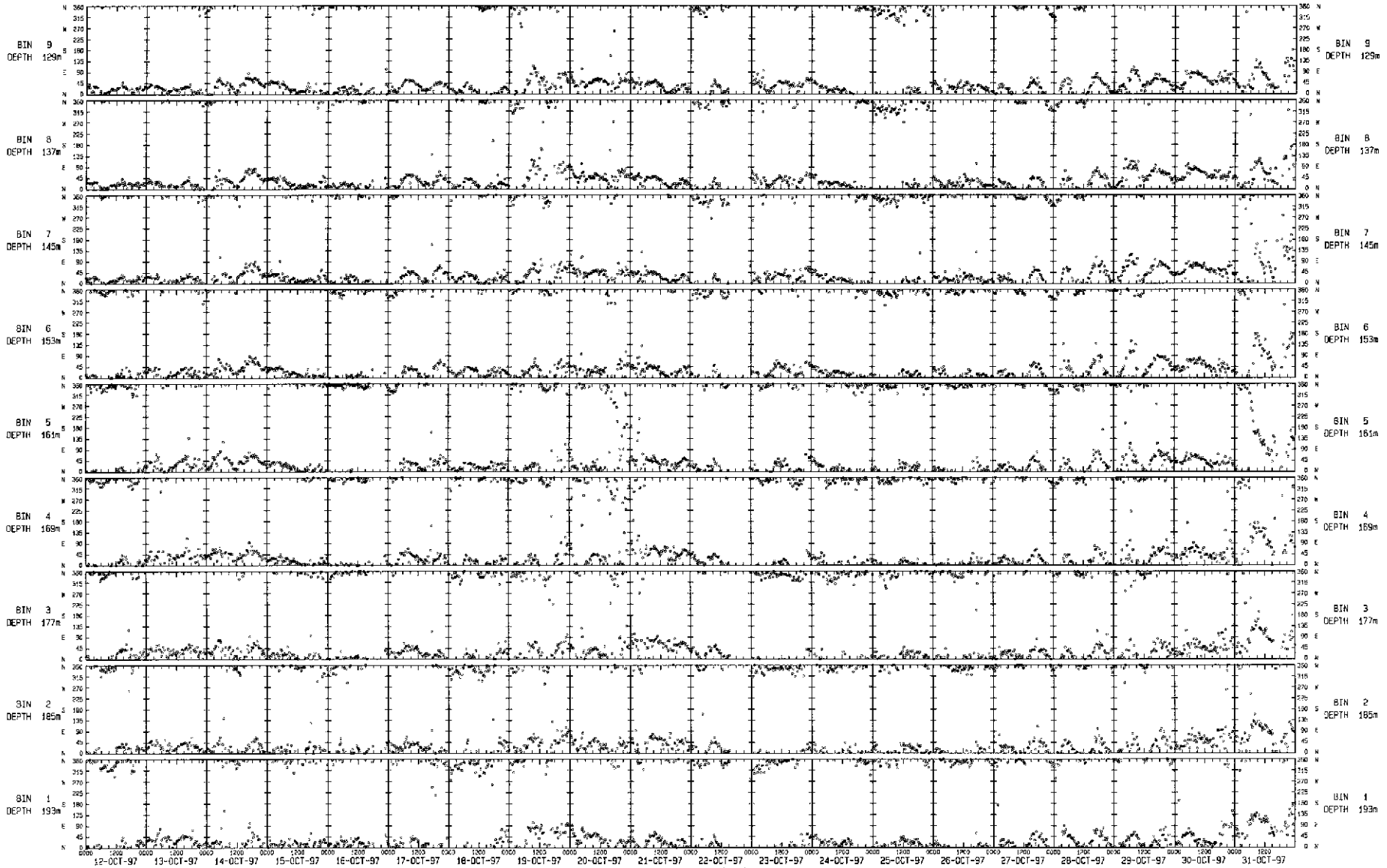
GEOS

REF. NO: 10328/1488

FIGURE NO: 4.3.1

PLOT DATE: 15-JAN-98 FILE: ANGDIR1

01AB238-0900



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

BINS 1 TO 9

12-OCT-97 TO 31-OCT-97

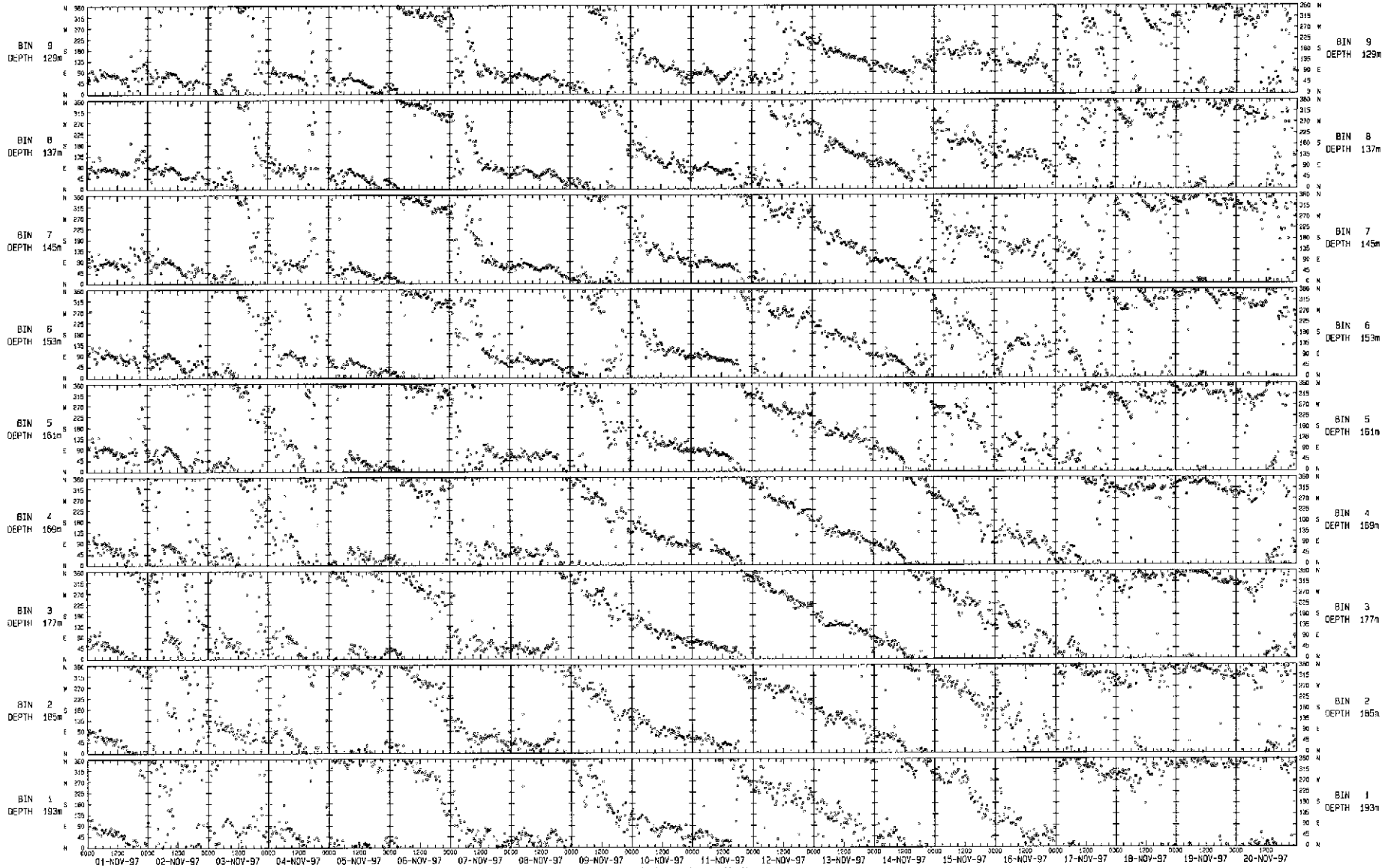
GEOS

REF. NO: 10328/1488

FIGURE NO: 4.3.2

PLOT DATE: 15-JAN-98 FILE: ANGDIR2

01AB238-0900



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

BINS 1 TO 9

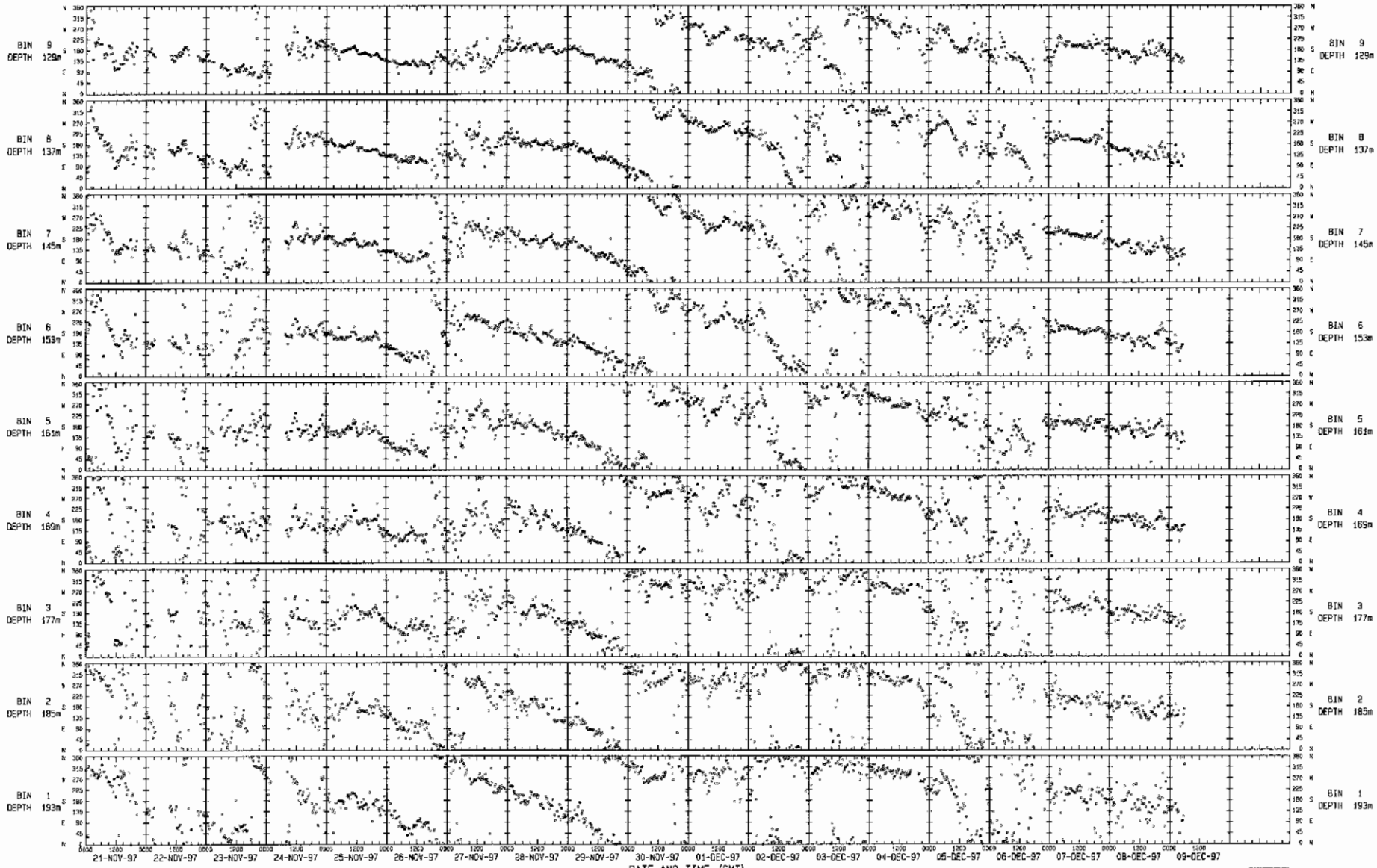
01-NOV-97 TO 20-NOV-97

GEOS

REF. NO: 1032B/1488

FIGURE NO: 4.3.3

PLOT DATE: 15-JAN-98 FILE: ANGDIR3



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

BINS 1 TO 9

21-NOV-97 TO 09-DEC-97

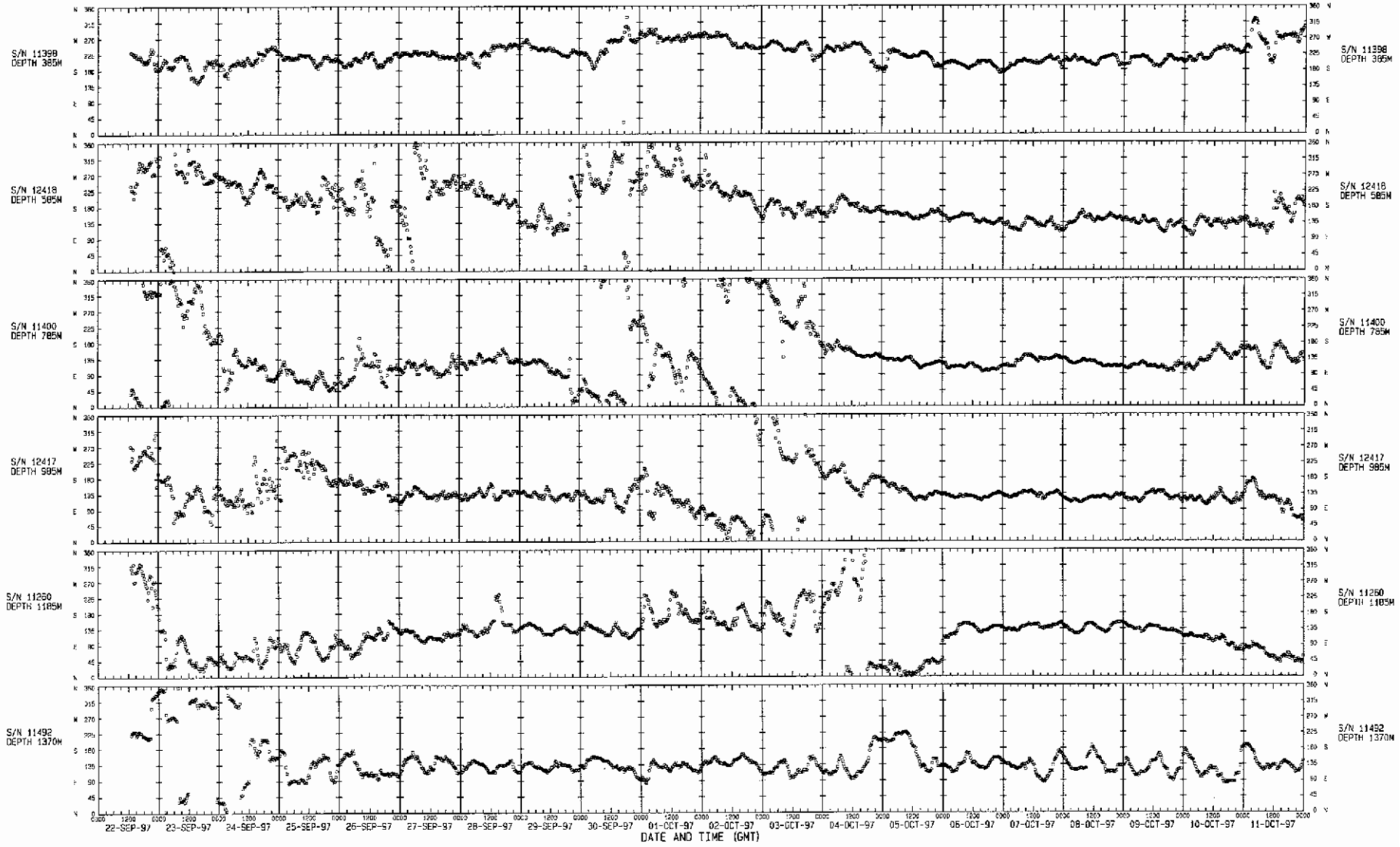
GEOS

REF. NO: 10328/148B

FIGURE NO: 4.3.4

PLOT DATE: 29-JAN-98

FILE: ANGDIR4



NOTES:

INSTRUMENT TYPE:	AANDERAA RCM 7/8
SERIAL NOS:	11398/12418/11400 12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	385M/585M/785M 985M/1185M/1370M
SAMPLING INTERAVAL:	20 MINS
WATER DEPTH:	1385m

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

RCMS

22-SEP-97 TO 11-OCT-97

GEOS

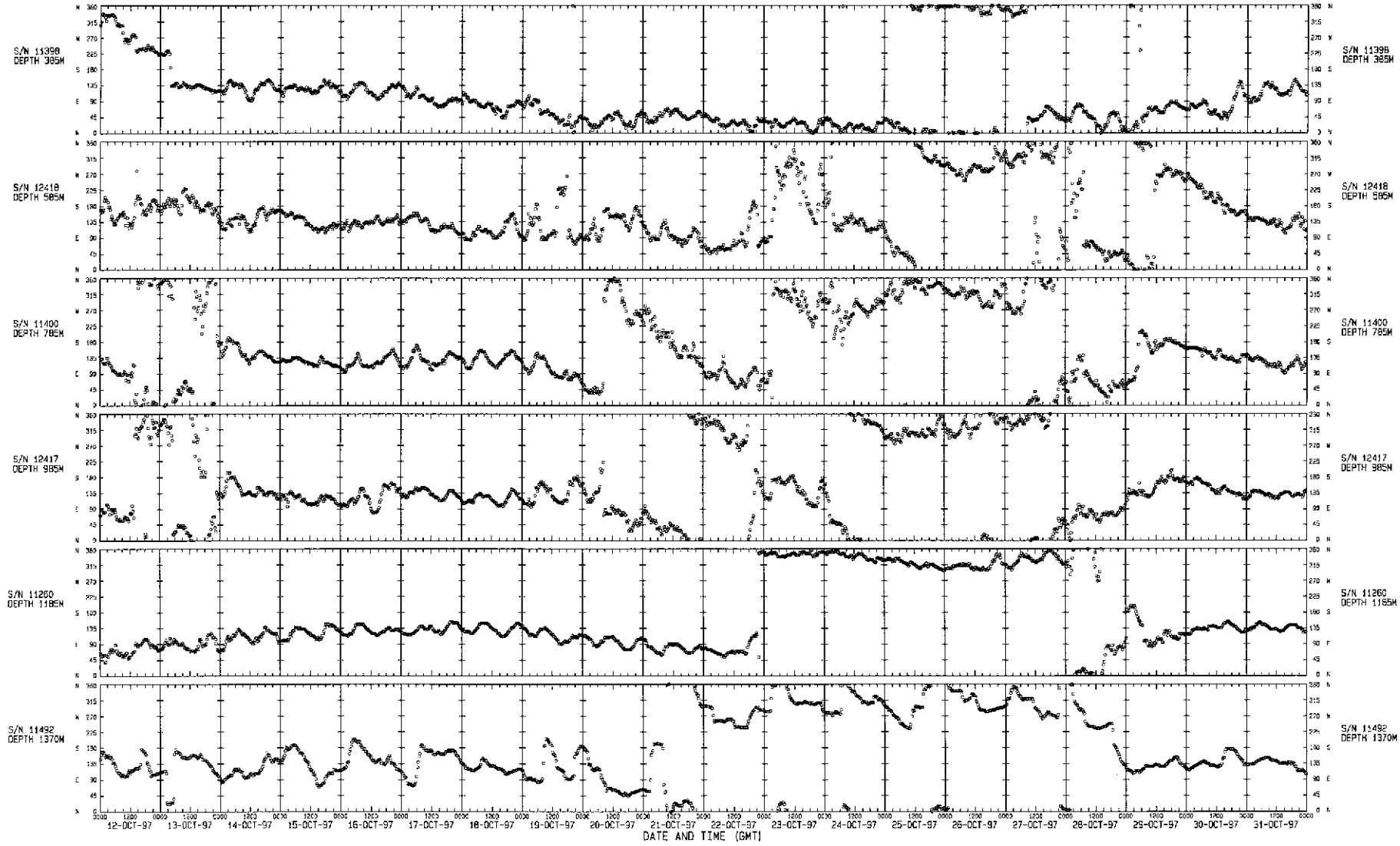
REF. NO: 10328/1488

FIGURE NO: 4.4.1

PLOT DATE: 15-JAN-98

FILE: DIR1

01AB238-0900



NOTES:

INSTRUMENT TYPE:	AANDERAA RCM 7/8
SERIAL NOS:	11398/12418/11400
	12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	385M/585M/785M
	985M/1165M/1370M
SAMPLING INTERVAL:	20 MINS
WATER DEPTH:	1385m

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

RCMS

12-OCT-97 TO 31-OCT-97

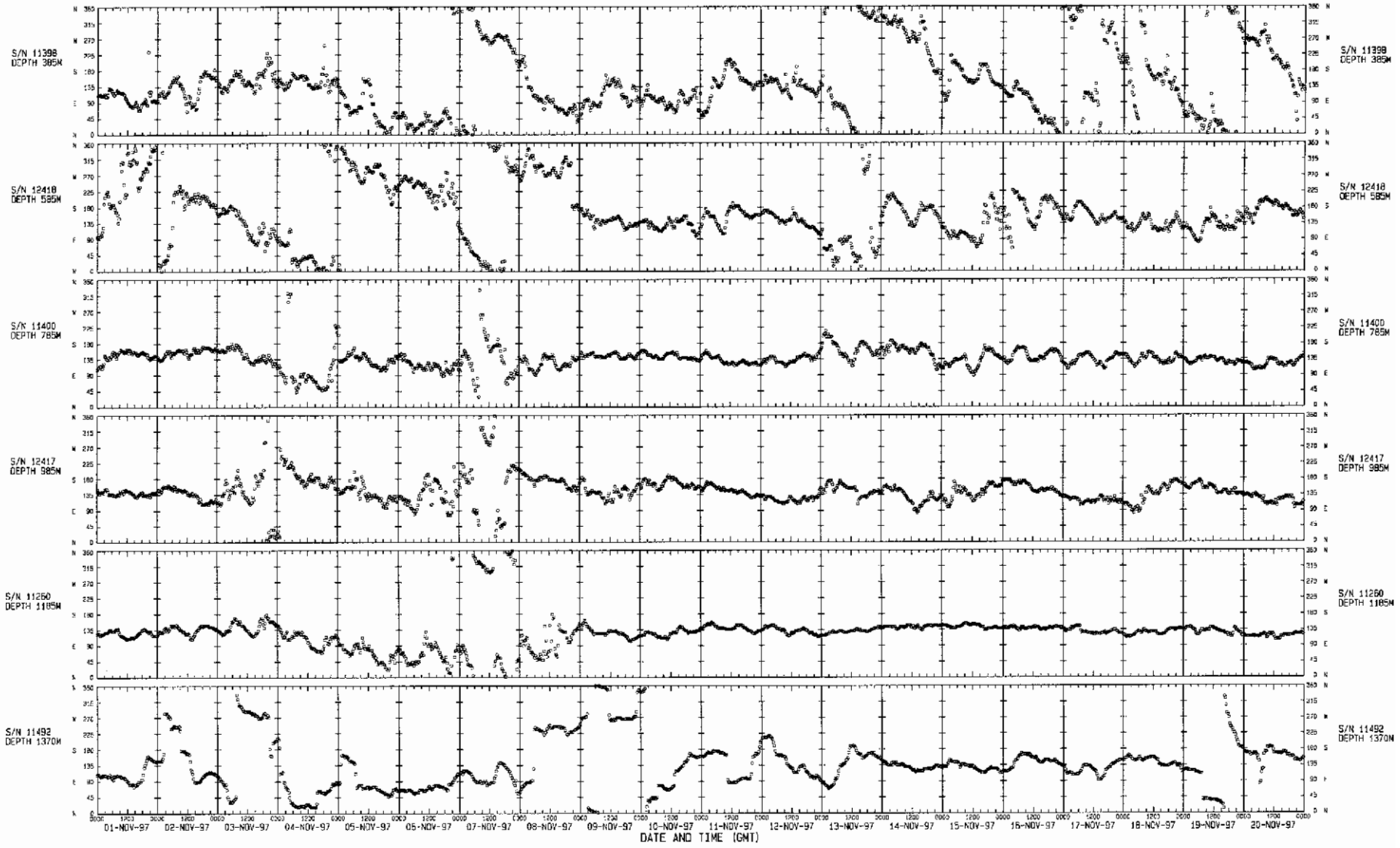
GEOS

REF. NO: 10328/1488

FIGURE NO: 4.4.2

PLOT DATE: 15-JAN-98

FILE: DIR2



NOTES:

INSTRUMENT TYPE:	AANDERAA RCM 7/8
SERIAL NOS:	11398/12418/11400 12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	385M/585M/785M 985M/1185M/1370M
SAMPLING INTERVAL:	20 MINS
WATER DEPTH:	1385m

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

RCMS

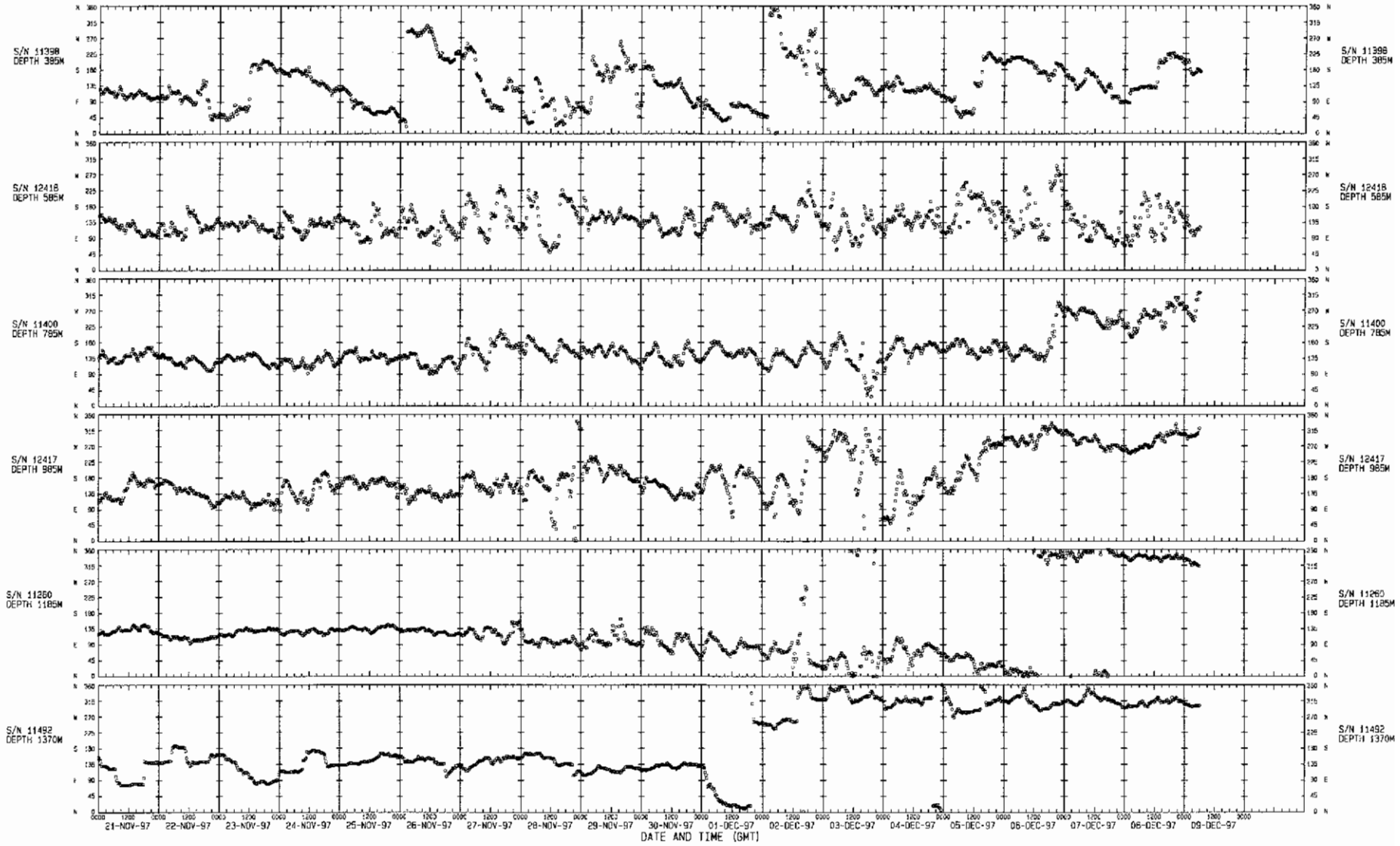
01-NOV-97 TO 20-NOV-97

GEOS

REF. NO: 10328/1488

FIGURE NO: 4.4.3

PLOT DATE: 15-JAN-98 FILE: DIR3



NOTES:

INSTRUMENT TYPE:	AANDERAA RCM 7/8
SERIAL NOS:	11398/12418/11400
	12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	385M/585M/785M
	985M/1185M/1370M
SAMPLING INTERVAL:	20 MINS
WATER DEPTH:	1385m

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT DIRECTION (DEG TRUE)

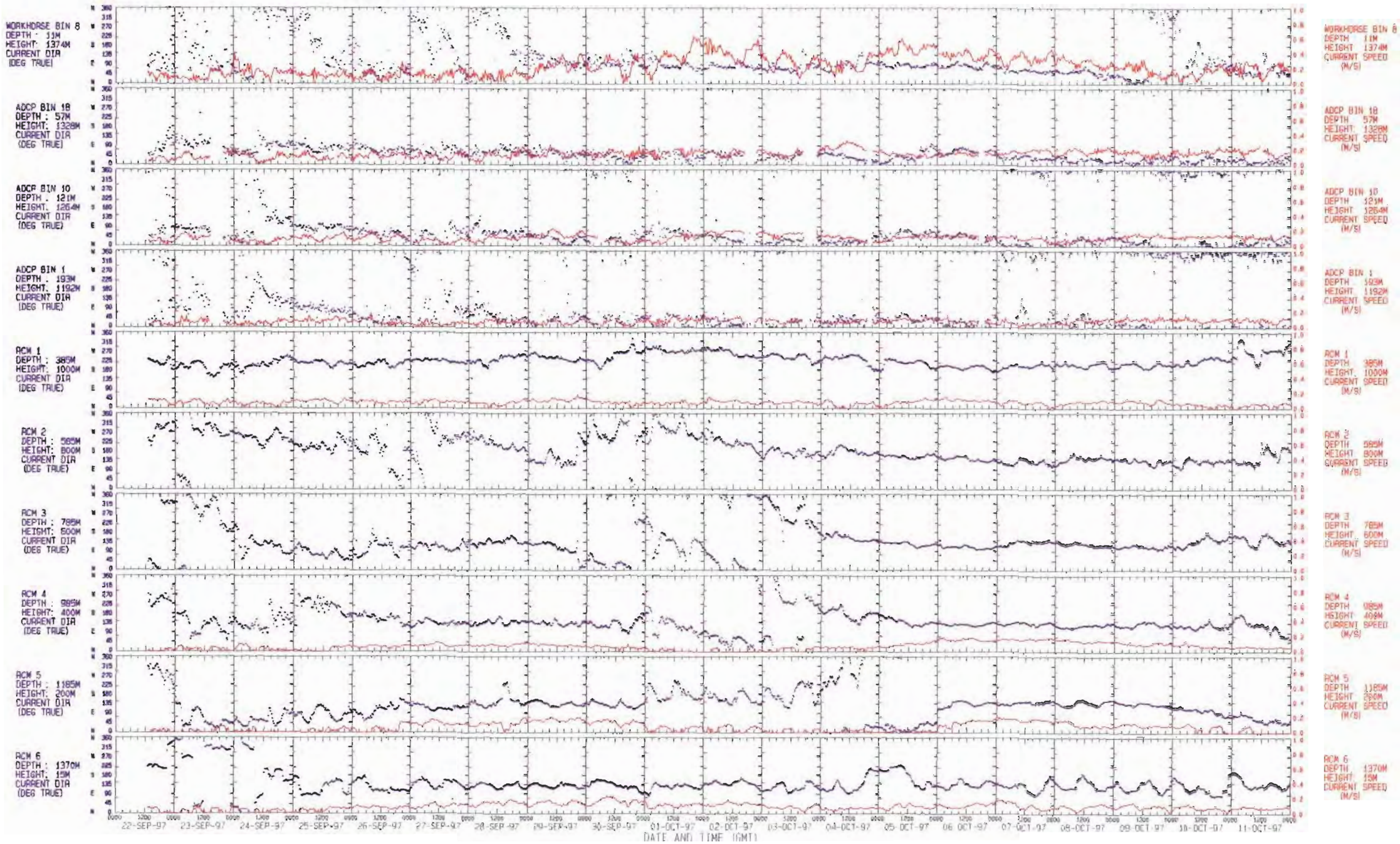
RCMS

21-NOV-97 TO 09-DEC-97

GEOS

REF. NO:	10328/148B
FIGURE NO:	4.4.4

PLOT DATE: 29-JAN-98 FILE: DIR4



NOTES:

INSTRUMENT TYPE:	RDI 300 KHZ WORKHORSE RDI 150 KHZ ADCP AANDERAA RCM 7/8
SERIAL NOS:	0393/02308 11398/12418/11400 12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40 20'S, 011 40 95'E
WATER DEPTH	1385M
INSTRUMENT DEPTH:	45M/205M 385M/585M/785M 985M/1185M/1370M
SAMPLING INTERVAL	20 MINS
WATER DEPTH	1385m

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED AND DIRECTION

WORKHORSE, ADCP AND RCMS

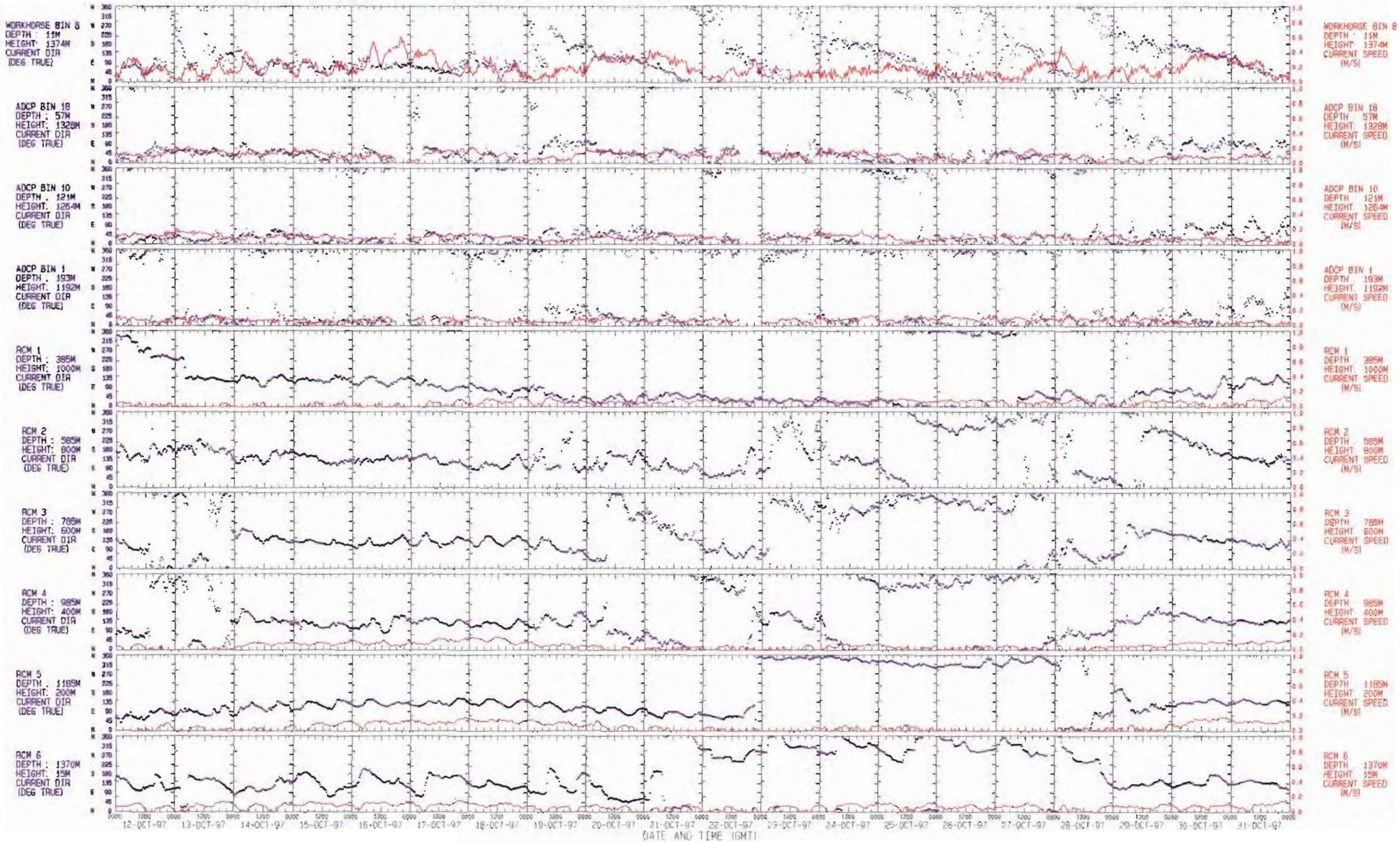
22-SEP-97 TO 11-OCT-97

GEOS

REF. NO: 10328/1488

FIGURE NO: 5.1

PLOT DATE: 23-JAN-98 FILE: ANGISPDIR1



NOTES:

INSTRUMENT TYPE:	RDI 300 KHZ WORKHORSE RDI 150 KHZ ADCP AANDERAA RCM 7/8
SERIAL NOS:	0393/02308 11398/12418/11400 12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40 20'S, 011 40 95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	45M/205M 385M/585M/785M 985M/1185M/1370M
SAMPLING INTERVAL:	20 MINS
WATER DEPTH:	1385m

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED AND DIRECTION

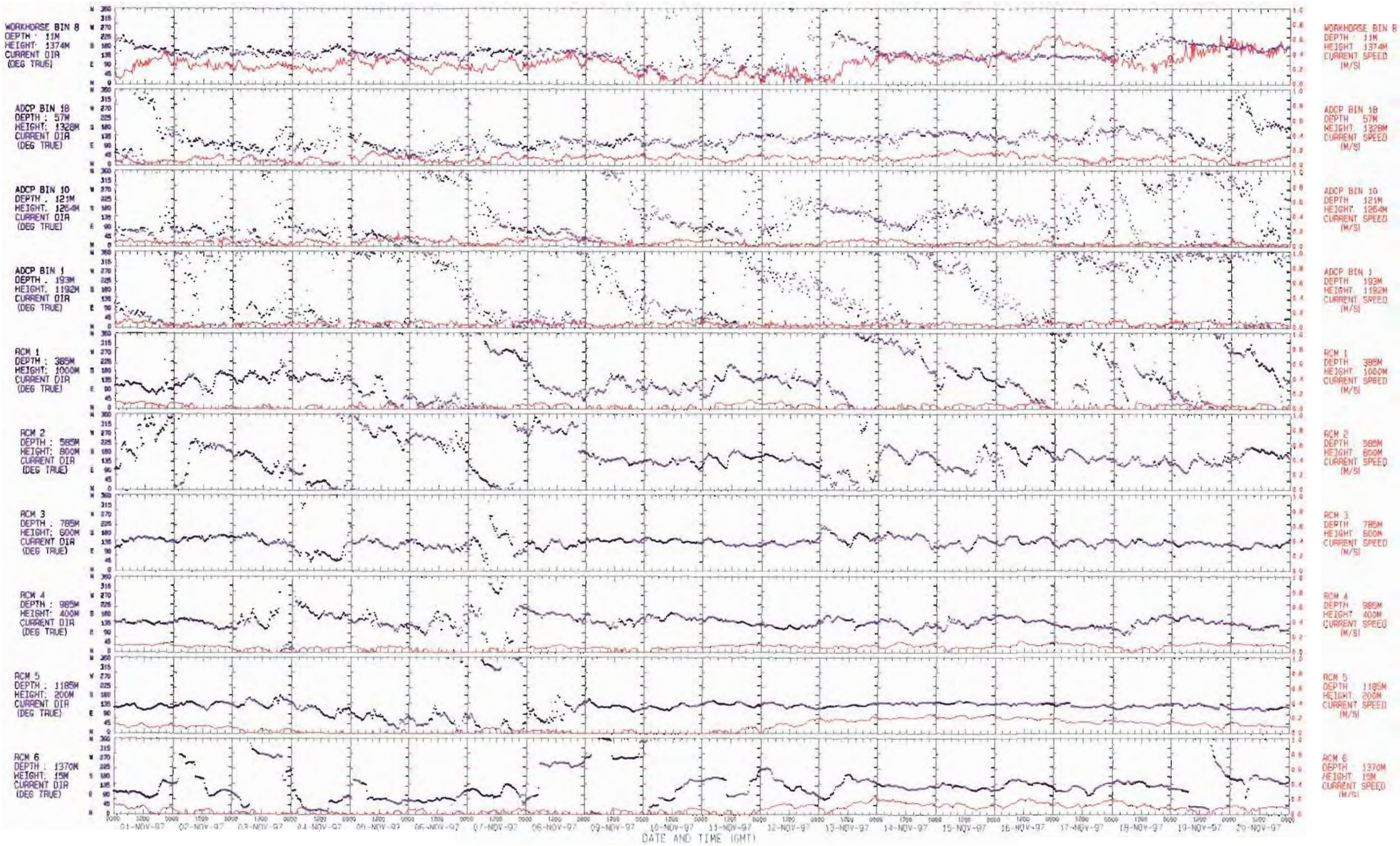
WORKHORSE, ADCP AND RCMS

12-OCT-97 TO 31-OCT-97

GEOS

REF. NO:	10328/1488
FIGURE NO:	5.2

PLOT DATE: 23-JAN-98 FILE: ANGISPDIR2



NOTES:

INSTRUMENT TYPE:	RDI 300 KHZ WORKHORSE RDI 150 KHZ ADCP AANDERAA RCM 7/8
SERIAL NOS:	0393/02308 11398/12418/11400 12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40 20'S, 011 40 95'E
WATER DEPTH	1385M
INSTRUMENT DEPTH:	45M/205M 385M/585M/785M 985M/1185M/1370M
SAMPLING INTERVAL:	20 MINS
WATER DEPTH	1385m

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

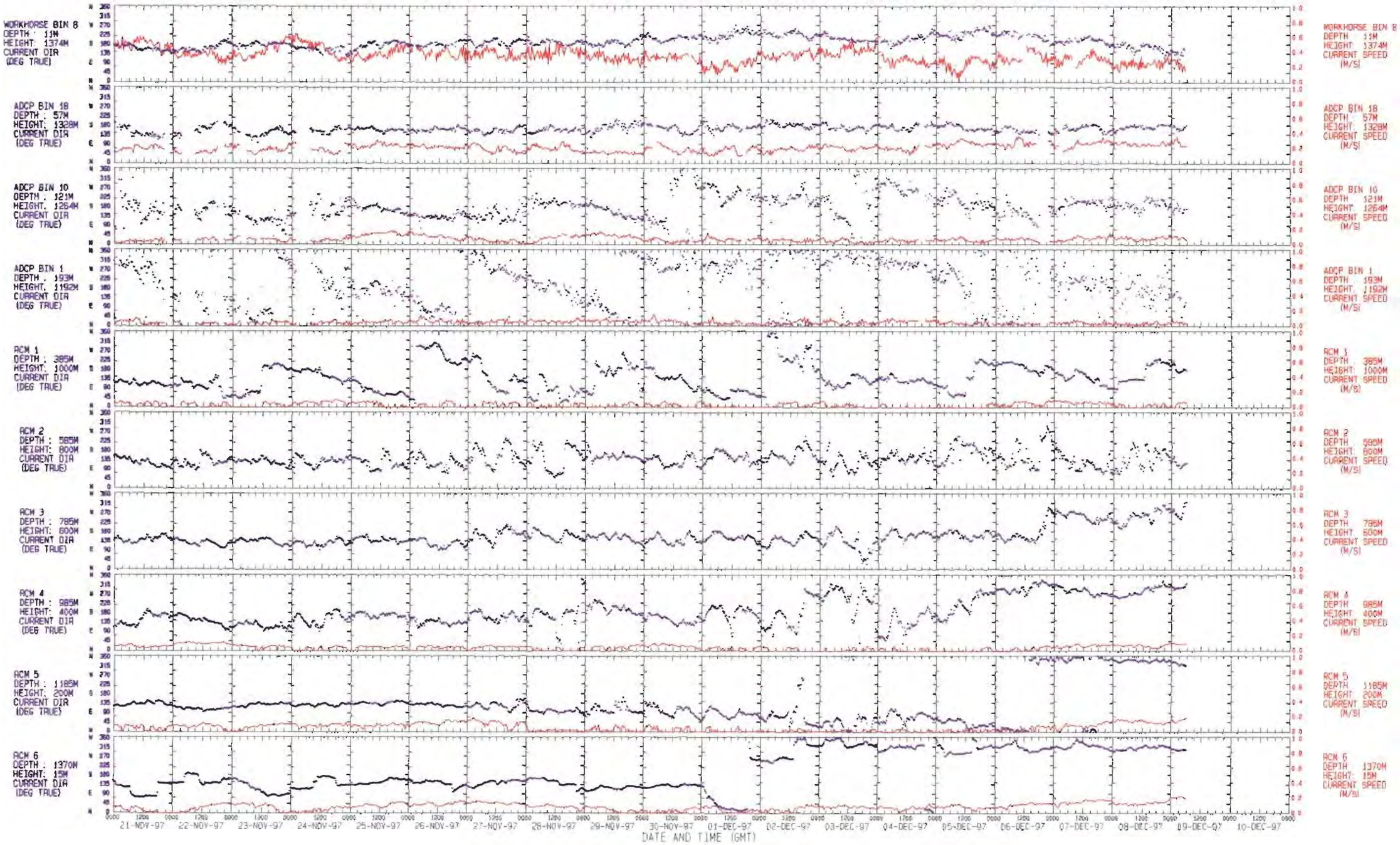
OBSERVED CURRENT SPEED AND DIRECTION

WORKHORSE, ADCP AND RCMS

01-NOV-97 TO 20-NOV-97

REF. NO:	10328/1488
FIGURE NO:	5.3

PLOT DATE: 23-JAN-98 FILE ANGISPOIR3



NOTES:

INSTRUMENT TYPE:	RDI 300 KHZ WORKHORSE RDI 150 KHZ ADCP AANDERAA RCM 7/8
SERIAL NOS:	0393/02308 11398/12418/11400 12417/11260/11492
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40 20'S, 011 40 95'E
WATER DEPTH:	1385M
INSTRUMENT DEPTH:	45M/205M 385M/585M/785M 985M/1185M/1370M
SAMPLING INTERVAL:	20 MINS
WATER DEPTH	1385m

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT SPEED AND DIRECTION

WORKHORSE, ADCP AND RCMS

21-NOV-97 TO 09-DEC-97

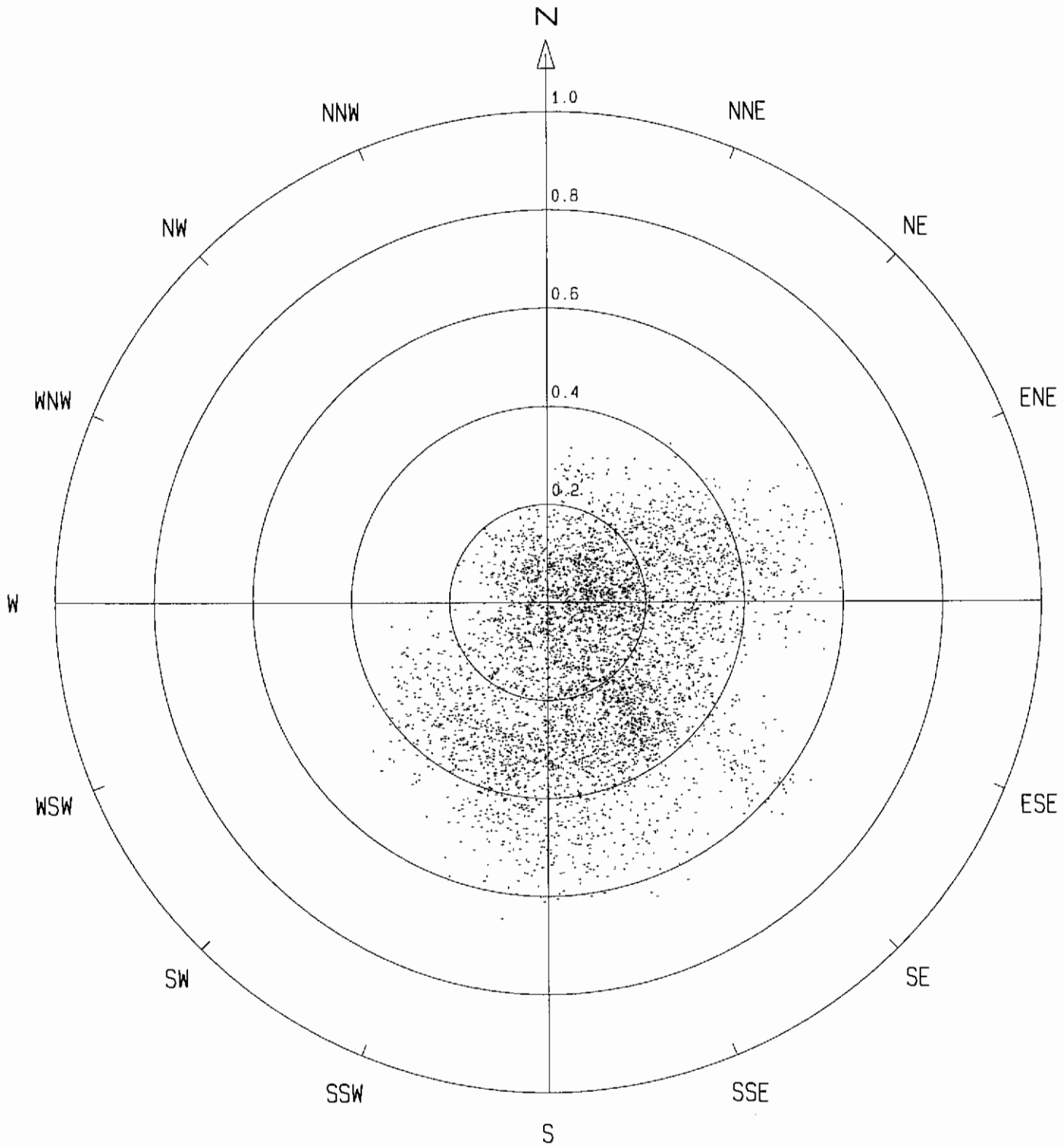
GEOS

REF. NO: 10328/1488

FIGURE NO: 5.4

PLOT DATE: 28-JAN-98

FILE: AN61SP01R4



DIRECTION IS DEGREES TRUE
SPEED IS M/S

NUMBER OF MISSING RECORDS: 755
RECORDS OUT OF RANGE: 0 (<THRESHOLD), 0 (>MAX)
NUMBER OF RECORDS: 4841
SAMPLING INTERVAL: 20 MINS
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

MEASUREMENT DEPTH: 1374M ABOVE BED
DEPTH OF WATER: 50M
SERIAL NO.: 0393
TYPE OF METER: BB ADCP
POSITION: 7 40.20'S, 011 40.95'E

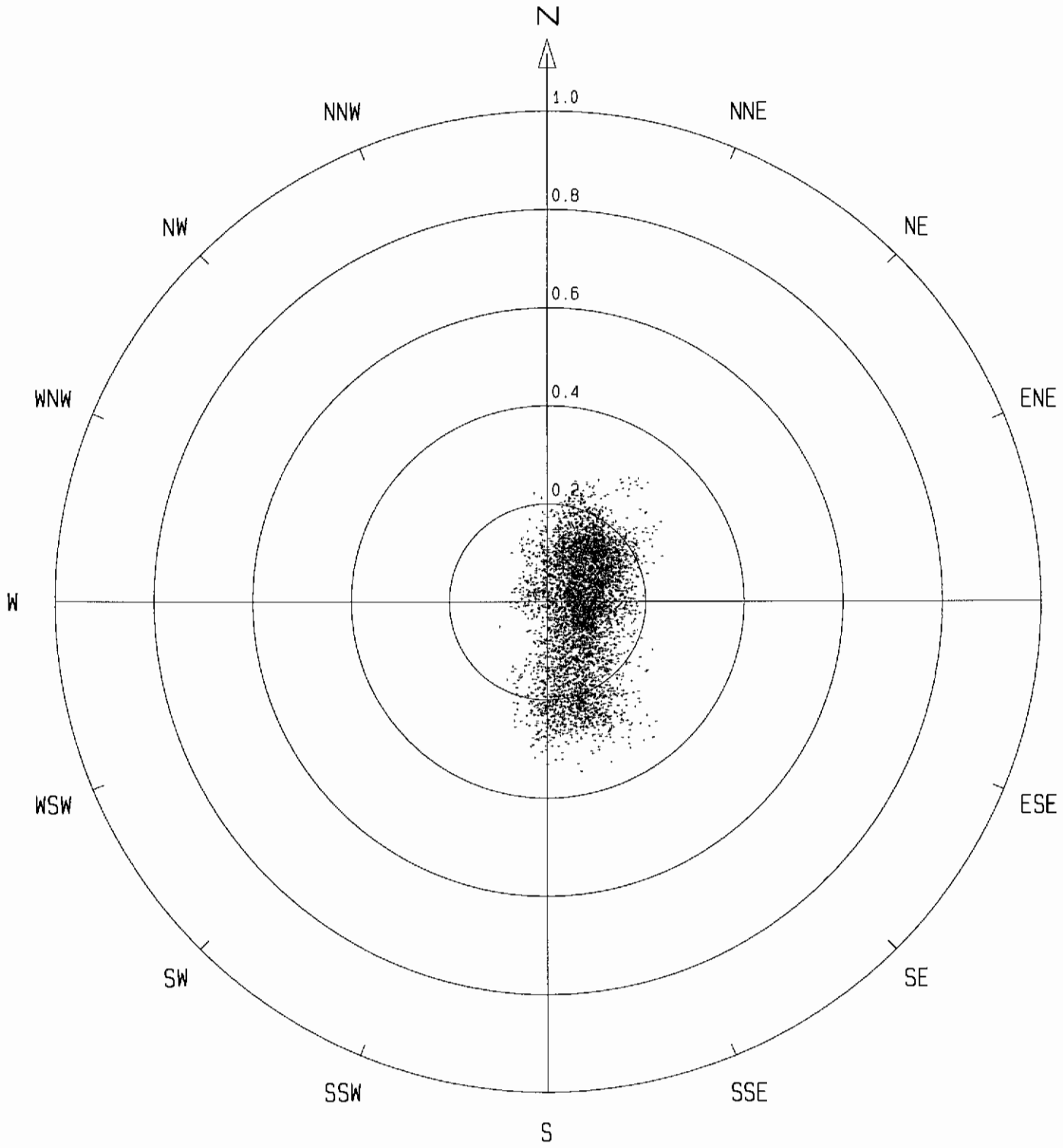
GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY SCATTER GRAPH
WORKHORSE - 11M BELOW MSL - BIN 8

REF NO C10328
FIG NO 6.1

PLOT DATE: 21-JAN-98
FILE: BINBSCT



DIRECTION IS DEGREES TRUE
SPEED IS M/S

NUMBER OF MISSING RECORDS: 1043
RECORDS OUT OF RANGE: 0 (<THRESHOLD), 0 (>MAX)
NUMBER OF RECORDS: 4553
SAMPLING INTERVAL: 20 MINS
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

MEASUREMENT DEPTH: 1328M ABOVE BED
DEPTH OF WATER: 200M
SERIAL NO.: 0230B
TYPE OF METER: BB ADCP
POSITION: 7 40.20'S, 011 40.95'E

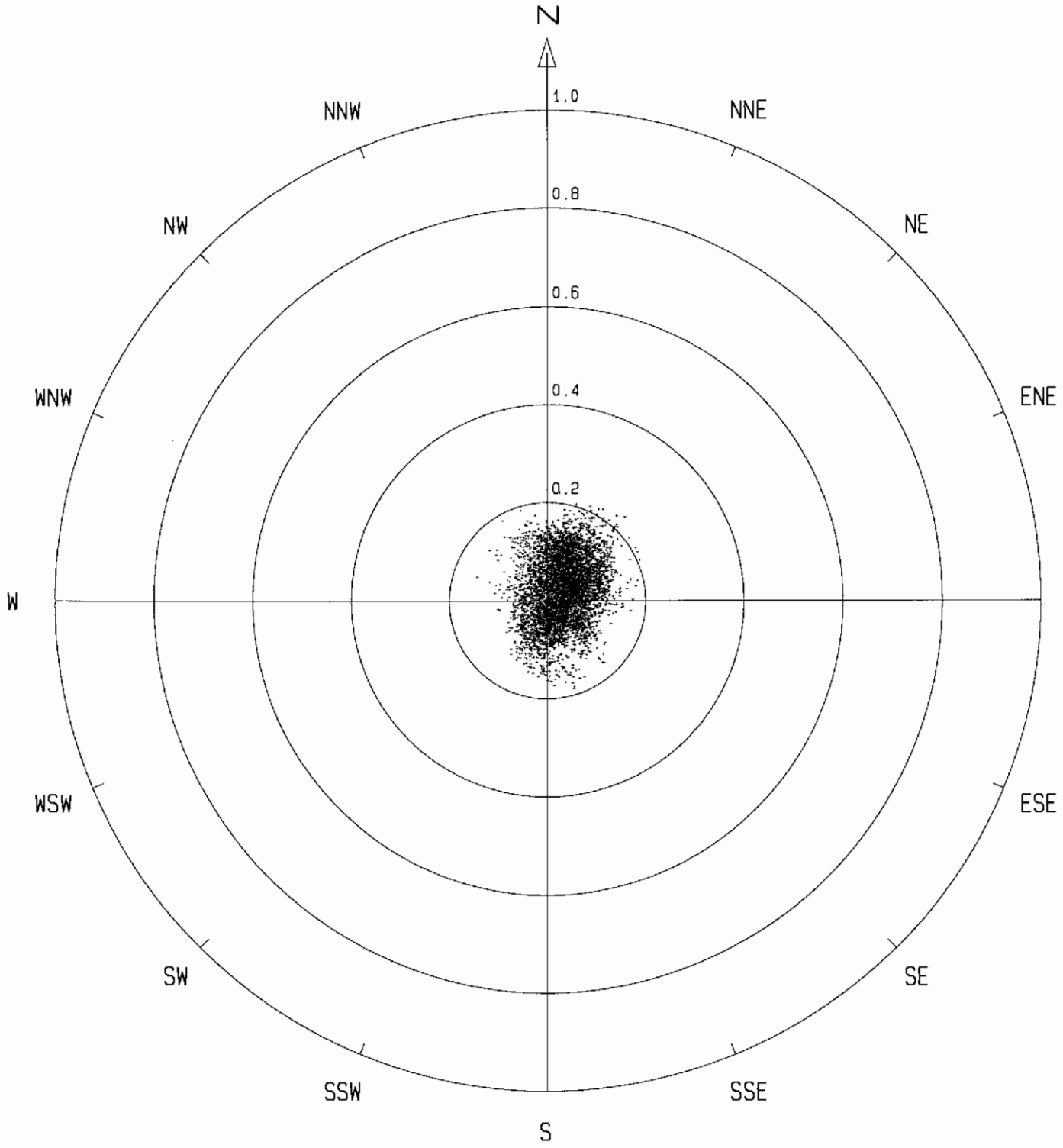
GEOS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY SCATTER GRAPH
ADCP - 57M BELOW MSL - BIN 1B

REF NO C10328
FIG NO 6.2

PLOT DATE: 21-JAN-98
FILE: BIN18SCT



DIRECTION IS DEGREES TRUE
SPEED IS M/S

NUMBER OF MISSING RECORDS: 1024
RECORDS OUT OF RANGE: 0 (<THRESHOLD), 0 (>MAX)
NUMBER OF RECORDS: 4572
SAMPLING INTERVAL: 20 MINS
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

MEASUREMENT DEPTH: 1264M ABOVE BED
DEPTH OF WATER: 200M
SERIAL NO.: 02308
TYPE OF METER: 88 ADCP
POSITION: 7 40.20'S, 011 40.95'E

GEOS

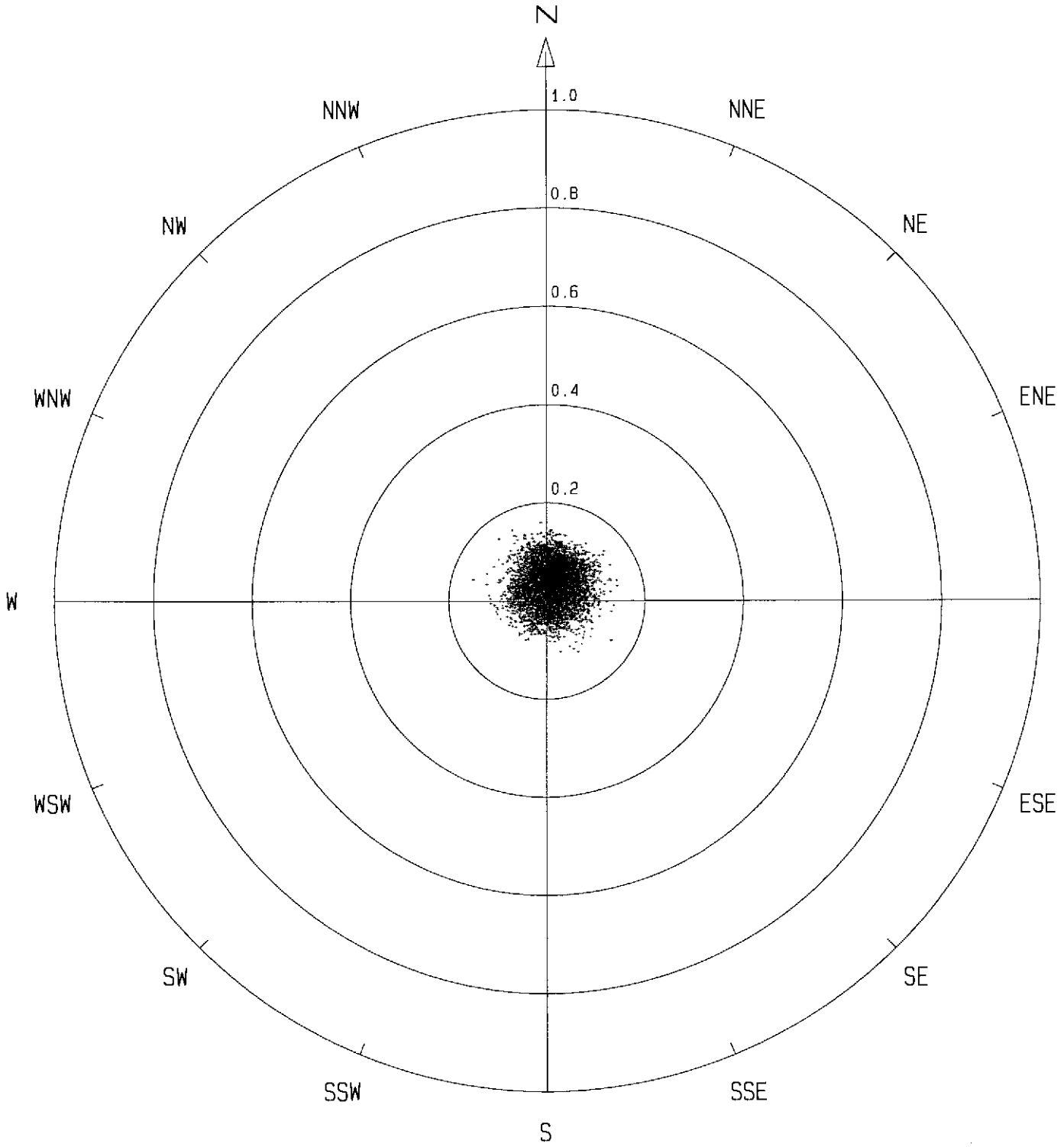
EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY SCATTER GRAPH
ADCP - 121M BELOW MSL - BIN 10

REF NO C10328
FIG NO 6.3

PLOT DATE: 21-JAN-98

FILE: BIN10SCT



DIRECTION IS DEGREES TRUE
SPEED IS M/S

NUMBER OF MISSING RECORDS: 1010
RECORDS OUT OF RANGE: 0 (<THRESHOLD), 0 (>MAX)
NUMBER OF RECORDS: 4586
SAMPLING INTERVAL: 20 MINS
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

MEASUREMENT DEPTH: 1192M ABOVE BED
DEPTH OF WATER: 200M
SERIAL NO.: 0230B
TYPE OF METER: BB ADCP
POSITION: 7 40.20'S, 011 40.95'E

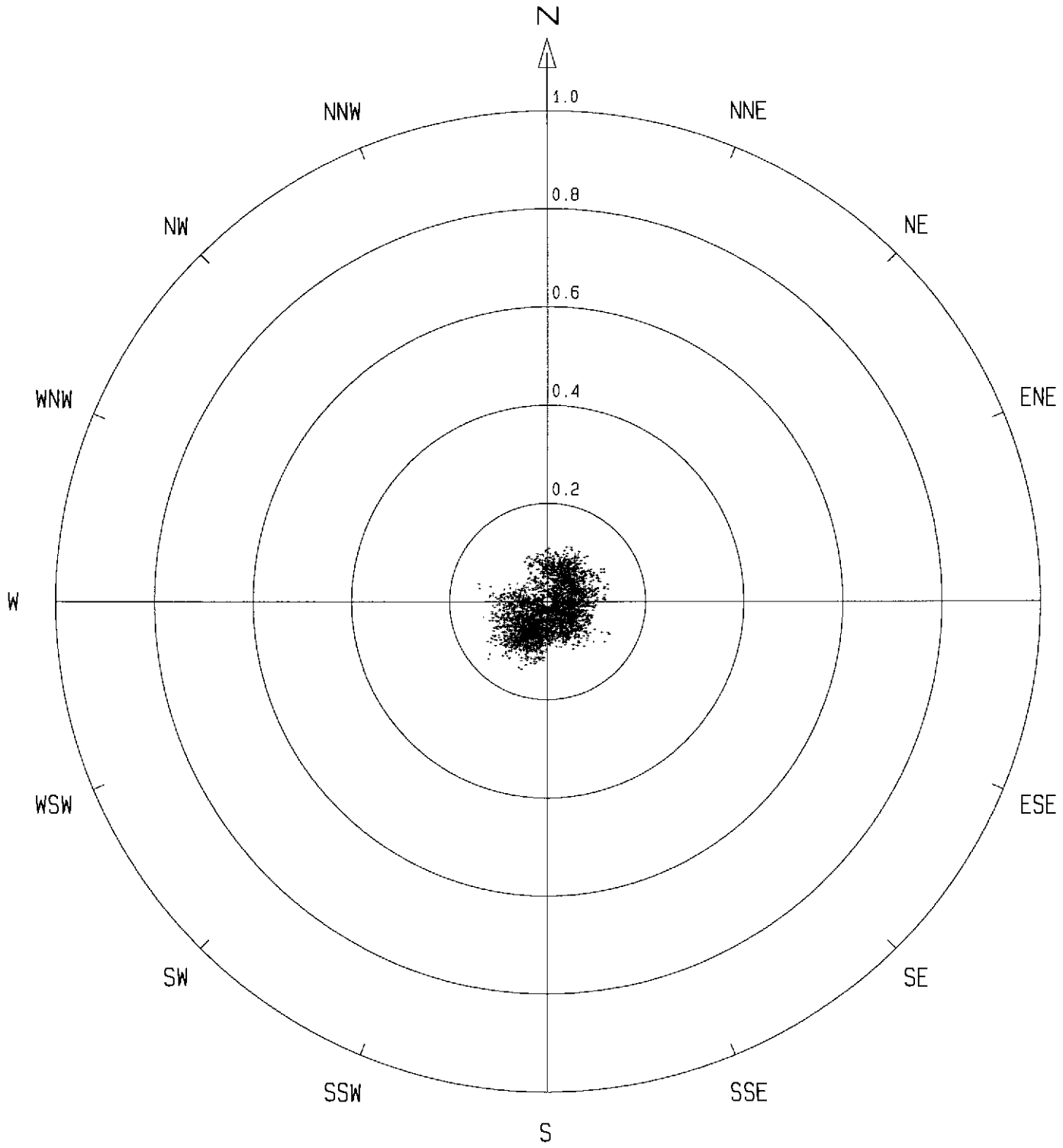
GEOS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY SCATTER GRAPH
ADCP - 193M BELOW MSL - BIN 1

REF NO C10328
FIG NO 6.4

PLOT DATE: 21-JAN-98
FILE: BIN1SCT



DIRECTION IS DEGREES TRUE
SPEED IS M/S

NUMBER OF MISSING RECORDS: 0
RECORDS OUT OF RANGE: 1567 (<0.01m/s THRESHOLD), 0 (>MAX)
NUMBER OF RECORDS: 4029
SAMPLING INTERVAL: 20 MINS
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

INSTRUMENT DEPTH: 1000M ABOVE BED
DEPTH OF WATER: 1385M
SERIAL NO.: 11398
TYPE OF METER: AANDERAA RCM7
POSITION: 7 40.20'S, 011 40.95'E

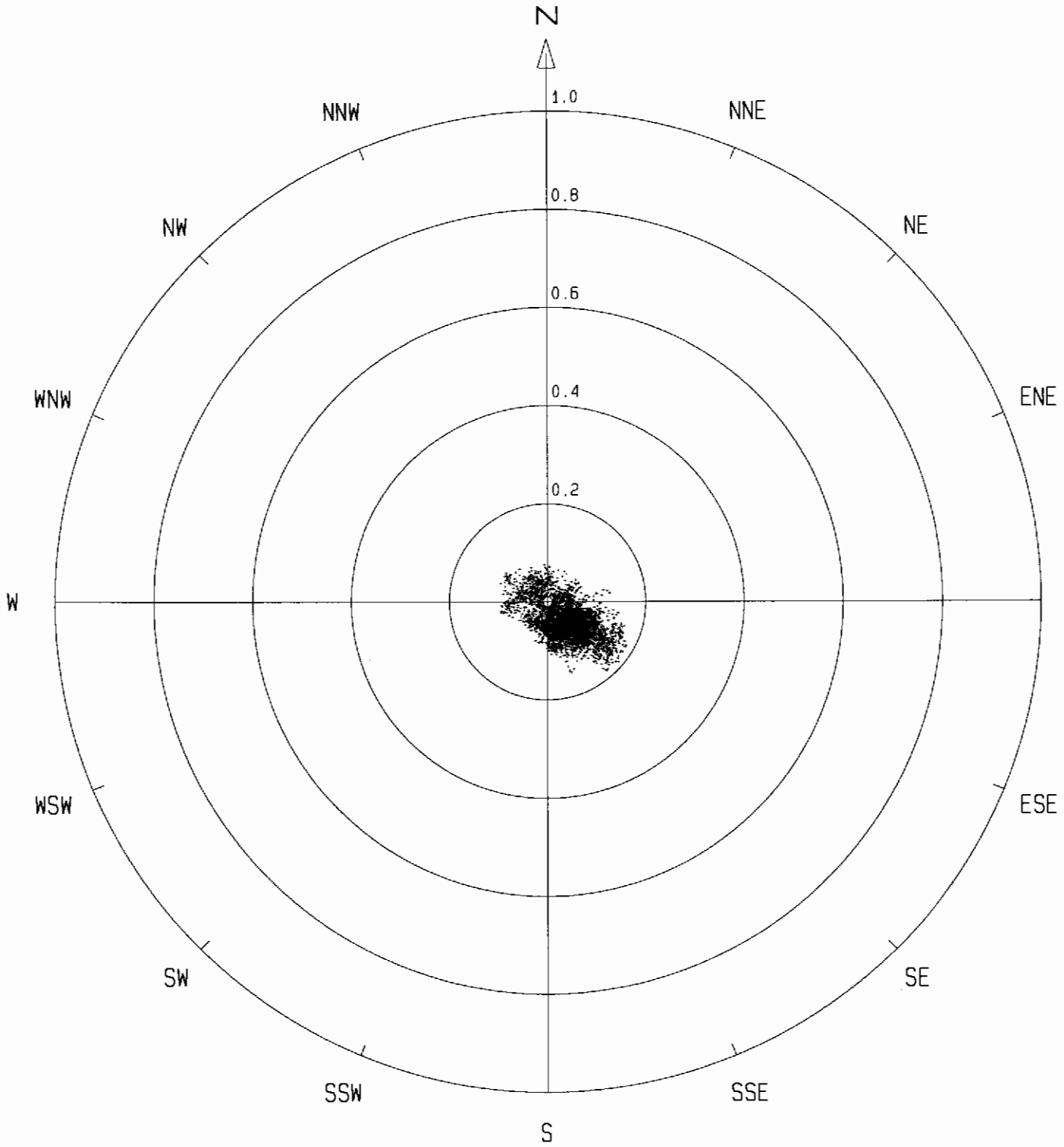
GEOS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY SCATTER GRAPH
RCM1 - 385M BELOW MSL - RCM 11398

REF NO C10328
FIG NO 6.5

PLOT DATE: 21-JAN-98
FILE: 1398SCT



DIRECTION IS DEGREES TRUE
SPEED IS M/S

NUMBER OF MISSING RECORDS: 0
RECORDS OUT OF RANGE: 1123 (<0.01m/s THRESHOLD), 0 (>MAX)
NUMBER OF RECORDS: 4473
SAMPLING INTERVAL: 20 MINS
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

INSTRUMENT DEPTH: 400M ABOVE BED
DEPTH OF WATER: 1385M
SERIAL NO.: 12417
TYPE OF METER: AANDERAA RCM7
POSITION: 7 40.20'S, 011 40.95'E

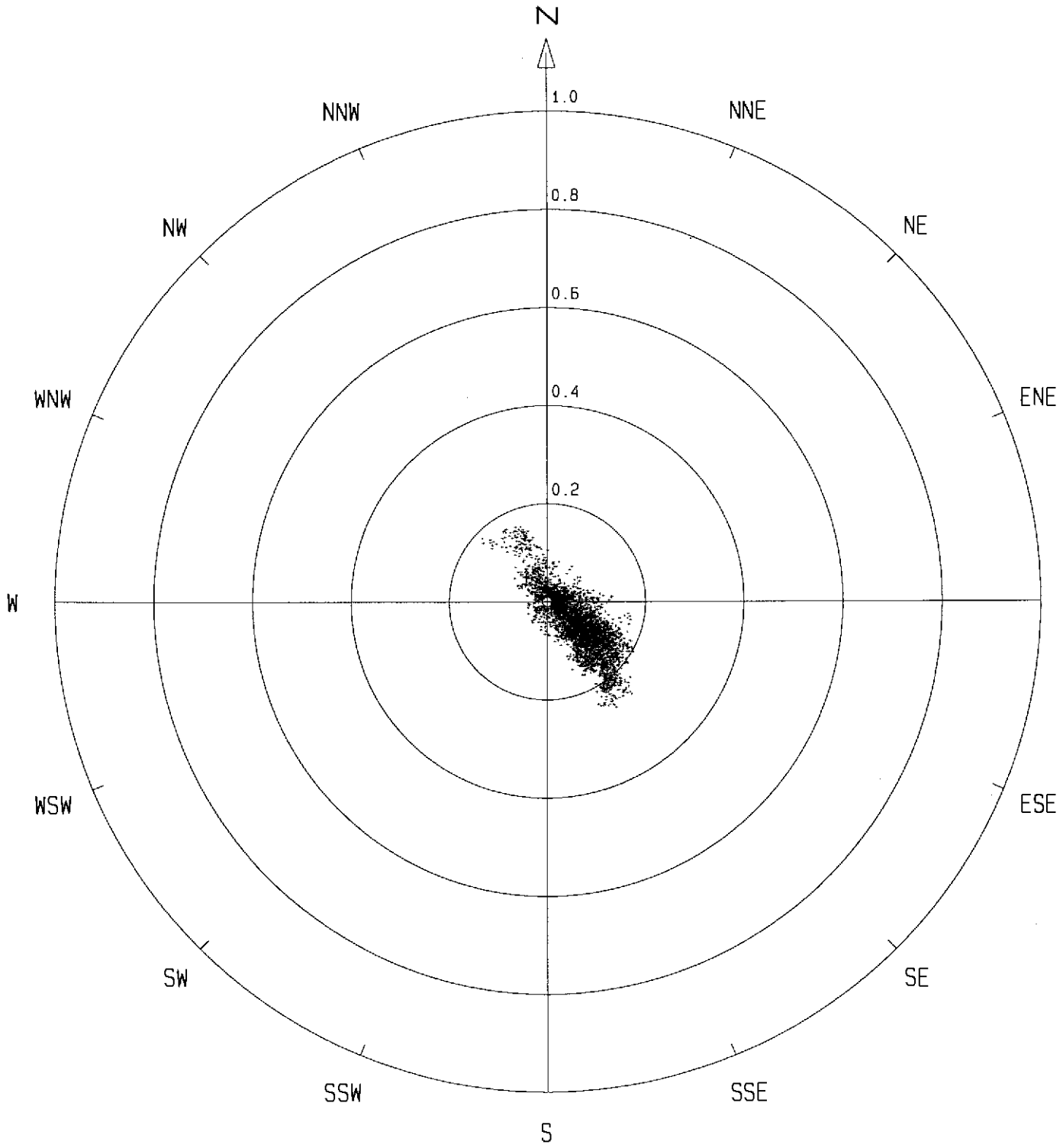
GEOS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY SCATTER GRAPH
RCM4 - 985M BELOW MSL - RCM 12417

REF NO C10328
FIG NO 6.6

PLOT DATE: 21-JAN-98
FILE: 2417SCT



DIRECTION IS DEGREES TRUE
SPEED IS M/S

NUMBER OF MISSING RECORDS: 0
RECORDS OUT OF RANGE: 1559 (<0.01m/s THRESHOLD), 0 (>MAX)
NUMBER OF RECORDS: 4037
SAMPLING INTERVAL: 20 MINS
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

INSTRUMENT DEPTH: 200M ABOVE BED
DEPTH OF WATER: 1385M
SERIAL NO.: 11260
TYPE OF METER: AANDERAA RCM8
POSITION: 7 40.20'S, 011 40.95'E

GEOS

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY SCATTER GRAPH

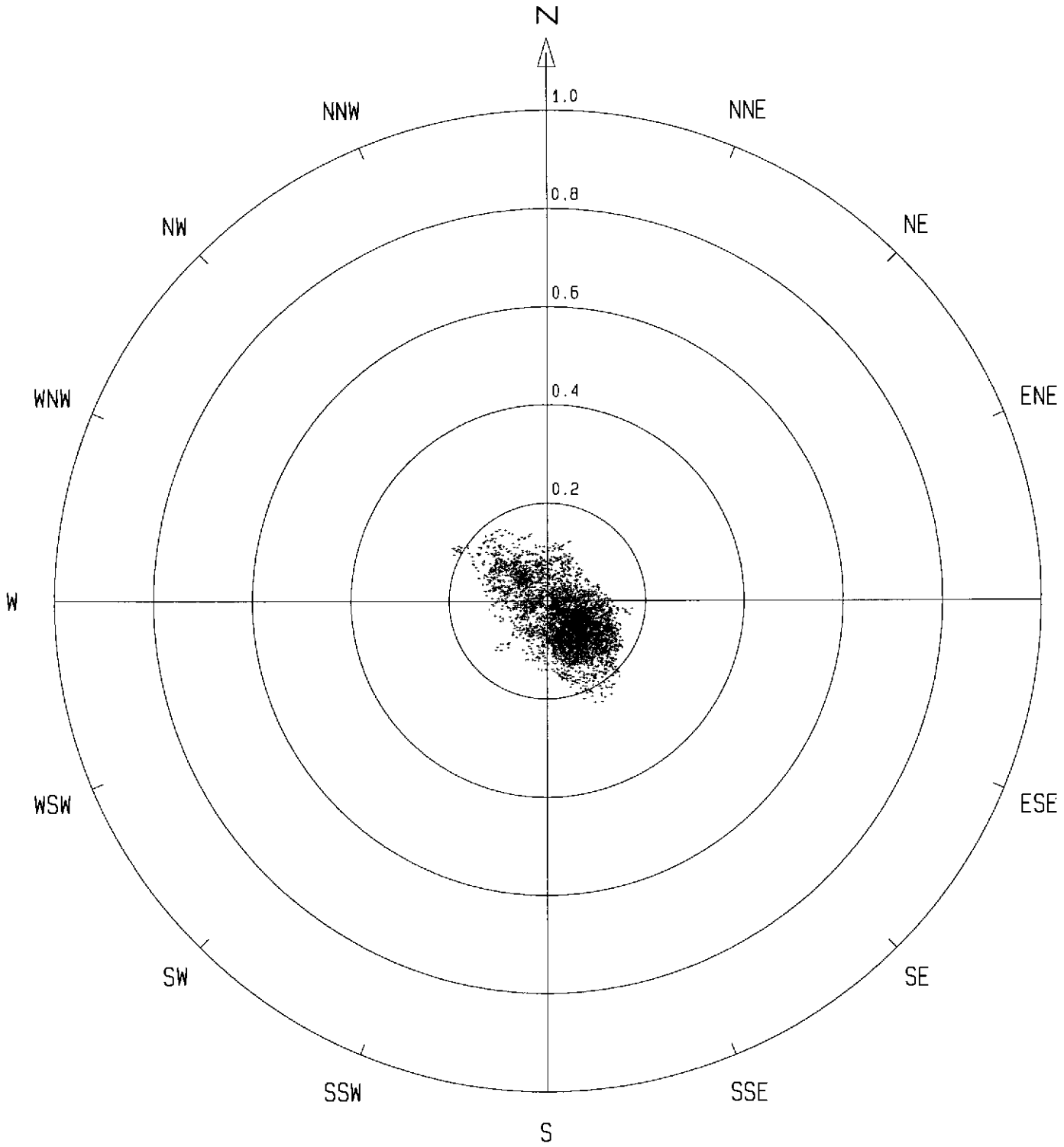
RCM5 - 1185M BELOW MSL - RCM 11260

REF NO C1032B

FIG NO 6.7

PLOT DATE: 21-JAN-98

FILE: 1260SCT



DIRECTION IS DEGREES TRUE
SPEED IS M/S

NUMBER OF MISSING RECORDS: 0
RECORDS OUT OF RANGE: 747 (<0.01m/s THRESHOLD), 0 (>MAX)
NUMBER OF RECORDS: 4849
SAMPLING INTERVAL: 20 MINS
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

INSTRUMENT DEPTH: 15M ABOVE BED
DEPTH OF WATER: 1385M
SERIAL NO.: 11492
TYPE OF METER: AANDERAA RCM8
POSITION: 7 40.20'S, 011 40.95'E

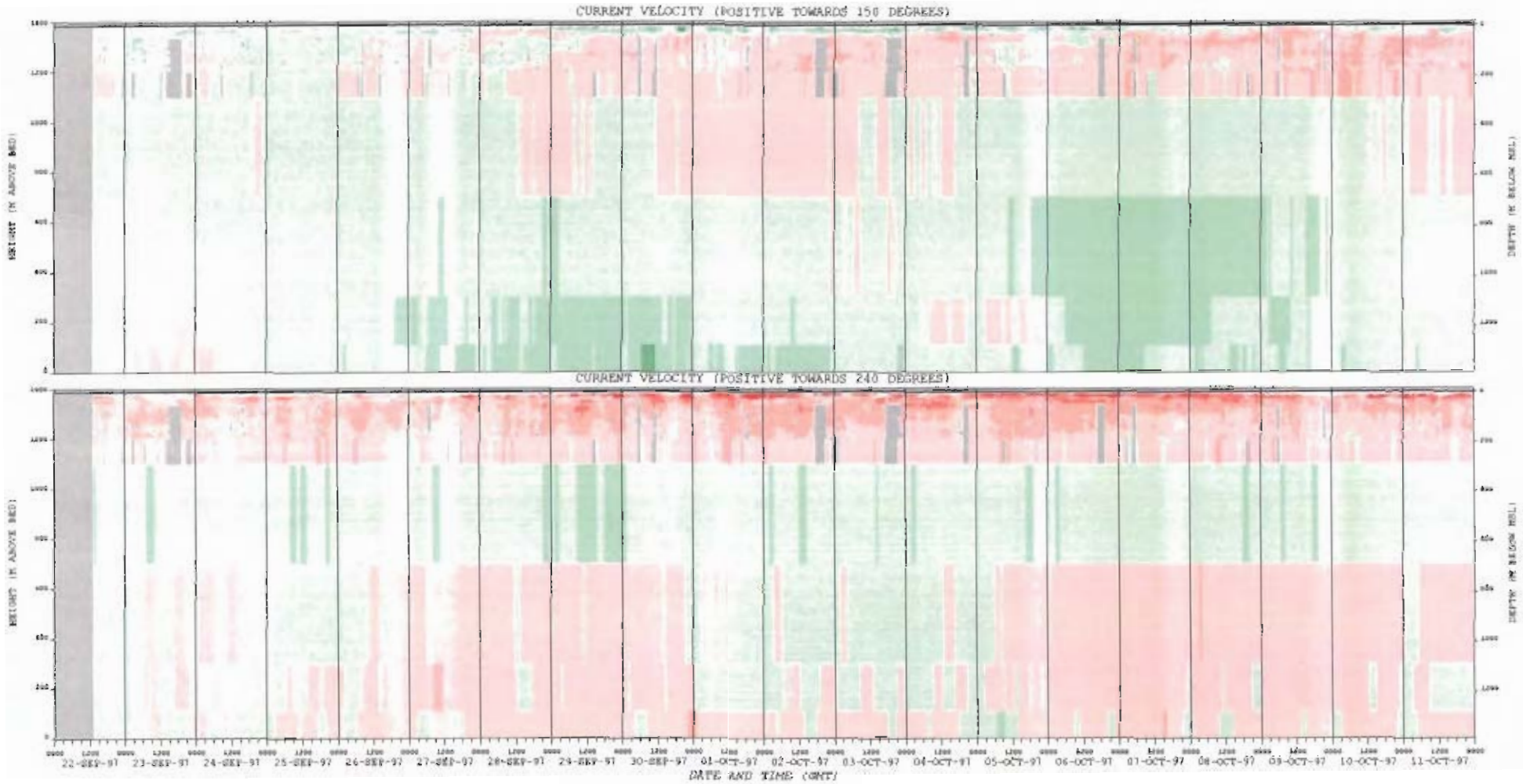
GEOS

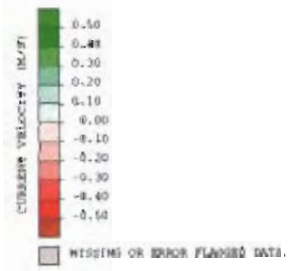
EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY SCATTER GRAPH
RCM6 - 1370M BELOW MSL - RCM 11492

REF NO C10328
FIG NO 6.B

PLOT DATE: 21-JAN-98
FILE: 14925CT





NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHz WORKHORSE ADCP RDI 150KHz ADCP AANDERAA RCM7/8
SERIAL NUMBERS:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

KEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

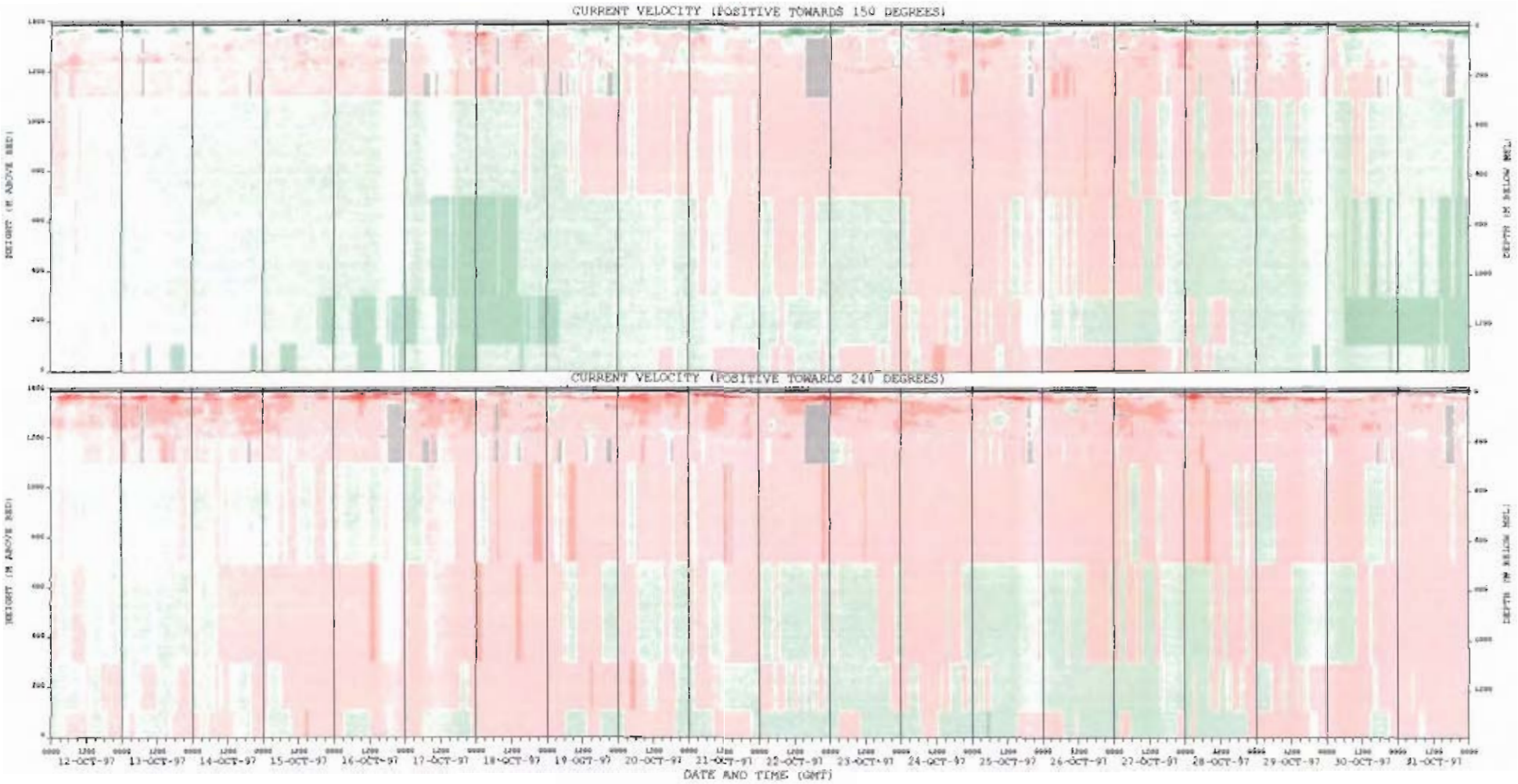
22-SEP-97 TO 11-OCT-97

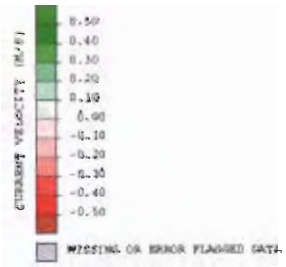
GES

REF. NO: 10328/1488

FIGURE NO: 7.1.1

01AB238-0900





NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02306 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

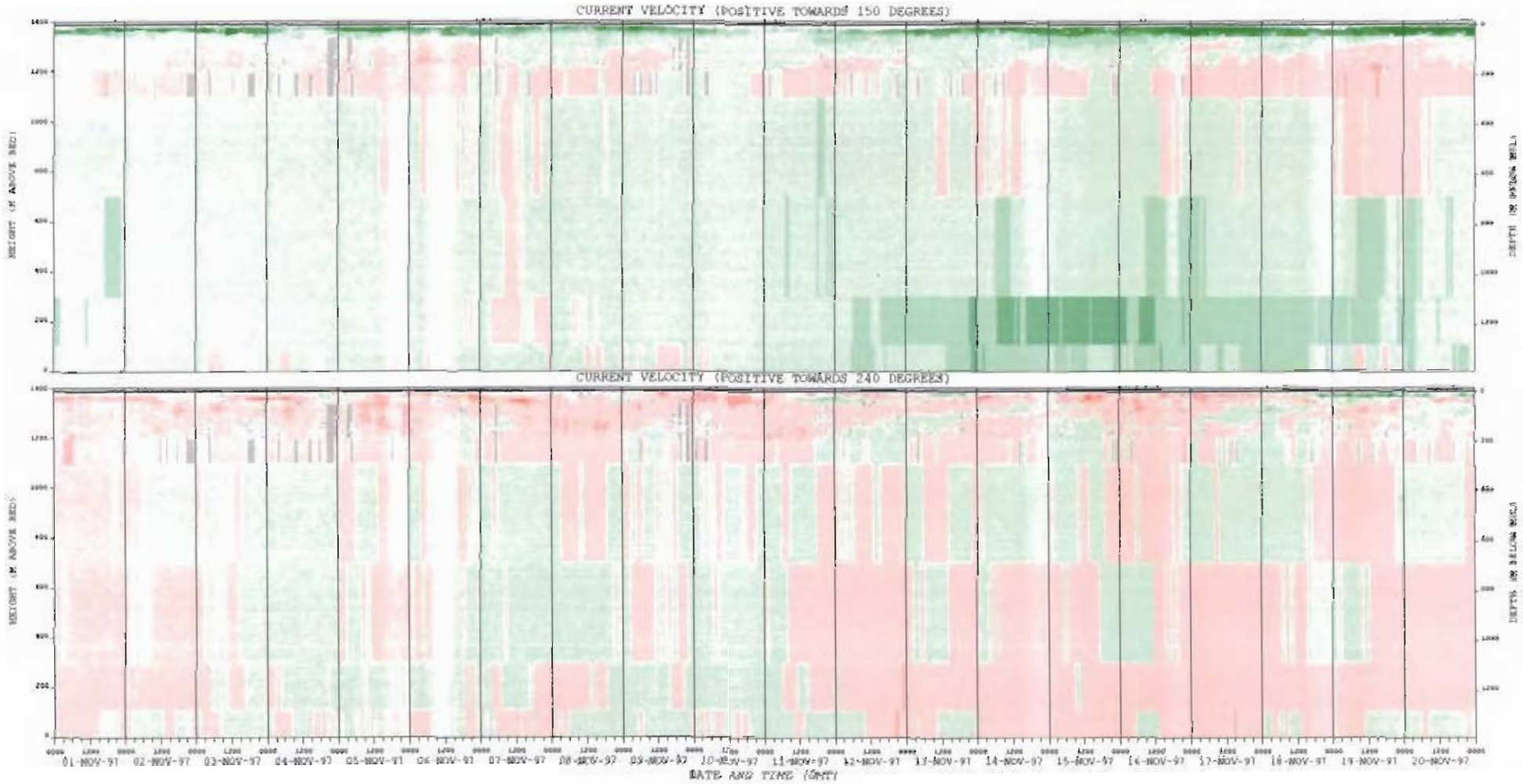
BEE GIRASSOL DEEPWATER CURRENT MEASUREMENTS

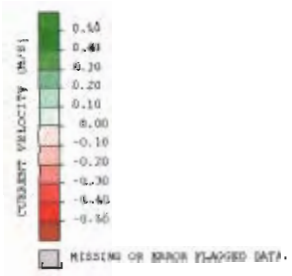
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

12-OCT-97 TO 31-OCT-97

REF. NO: 10328/1488

FIGURE NO: 7.4.2





NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBERS:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

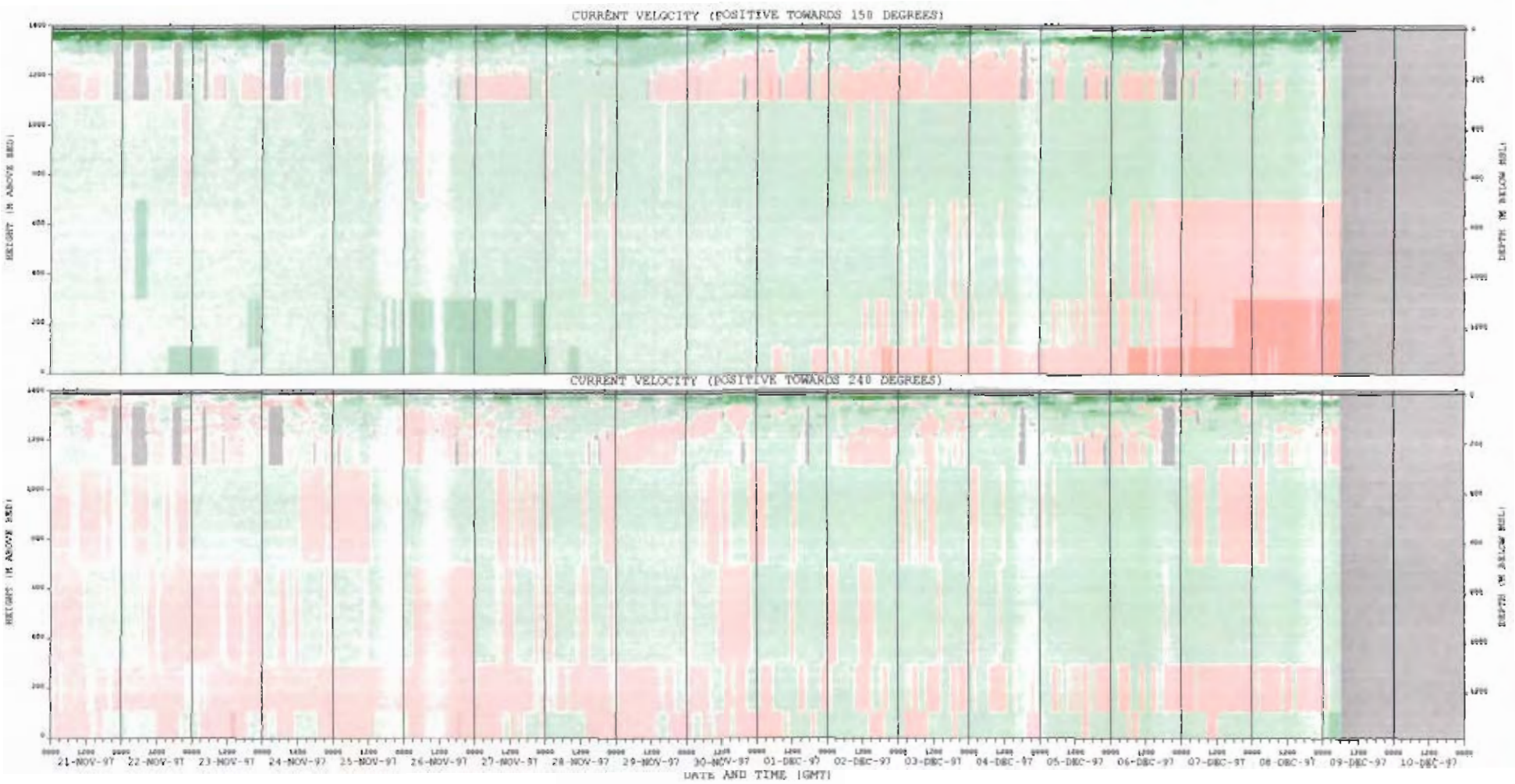
ESA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

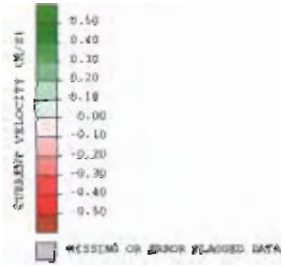
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

01-NOV-97 TO 20-NOV-97

REF. NOS 10328/1488

FIGURE NOS 7.1.3





NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'E, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBERS:	0393 02308 11398/12418/11468 12417/11260/11492
SAMPLING INTERVAL:	20mins

ESA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

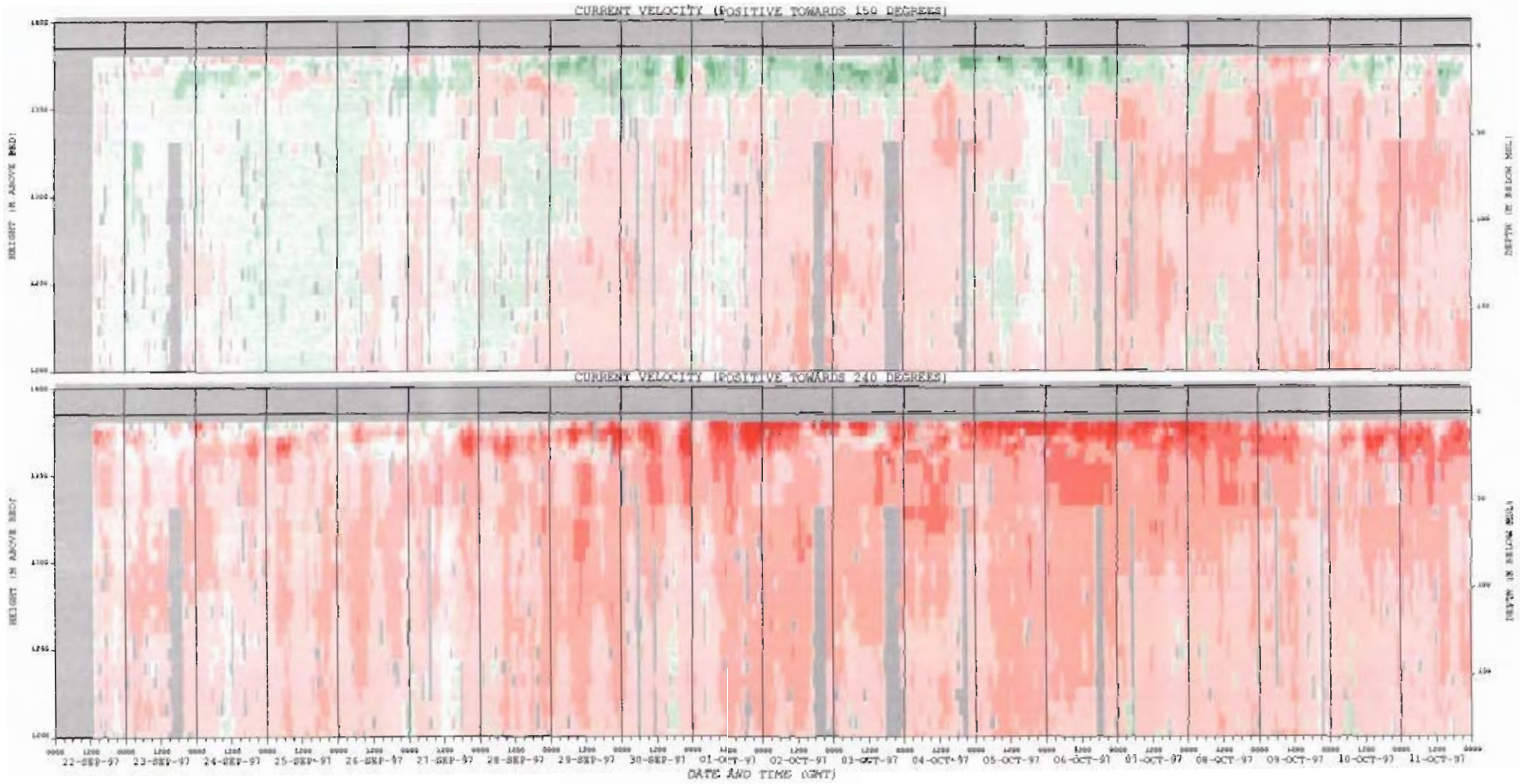
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

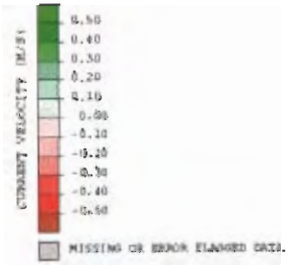
21-NOV-97 TO 09-DEC-97

REF. NO: 10328/1498

FIGURE NO: 7.1.8

01AB238-0900





NOTES:

LOCATION:	BLOCK 15 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBERS:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

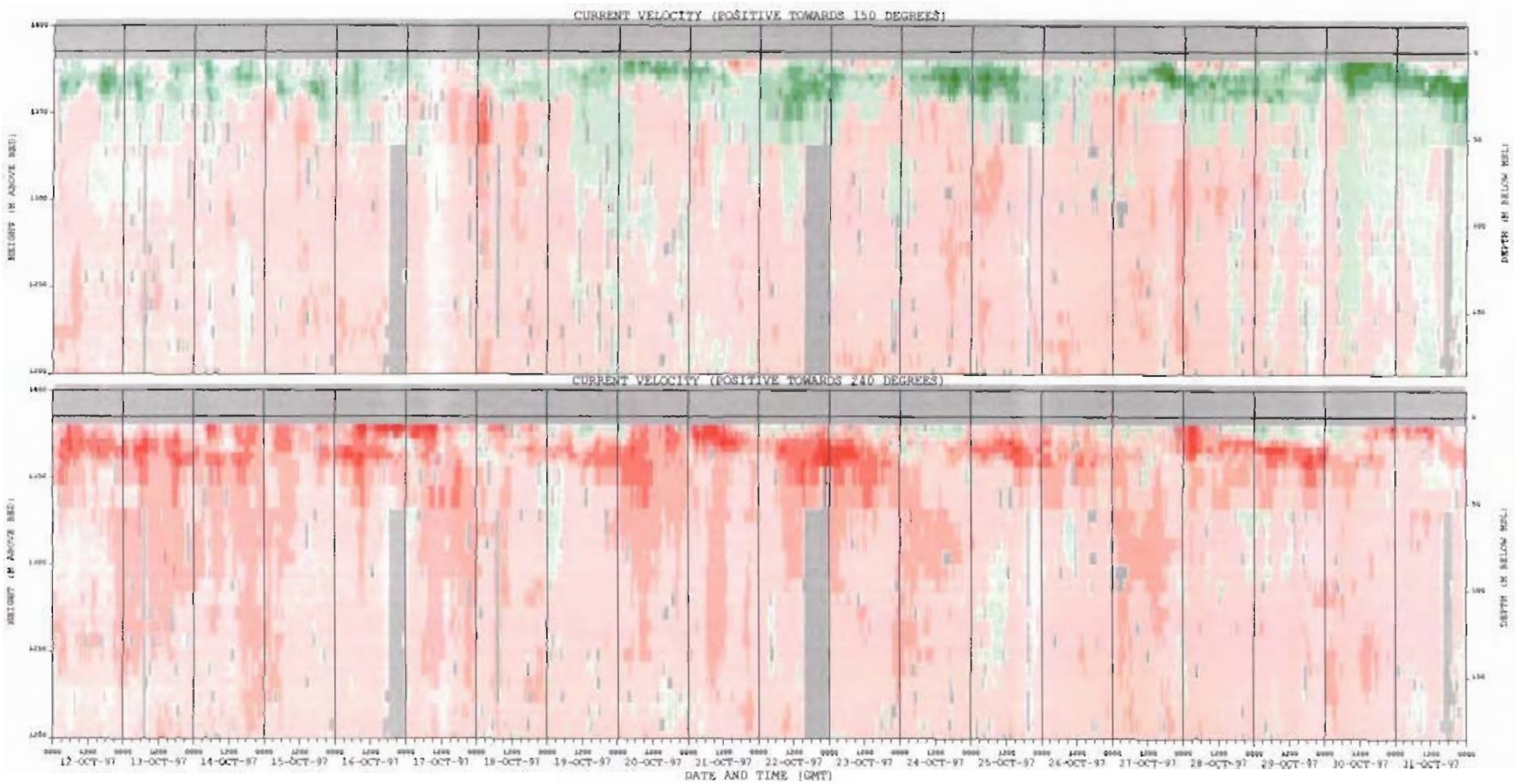
BSR GIRASSOL DEEPWATER CURRENT MEASUREMENTS

TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

22-SEP-97 TO 11-OCT-97

REF. NOS: 10320/1488

FIGURE NO: 7.2.1



CURRENT VELOCITY (M/S)

0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50

MISSING OR ERROR FLAGGED DATA

NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

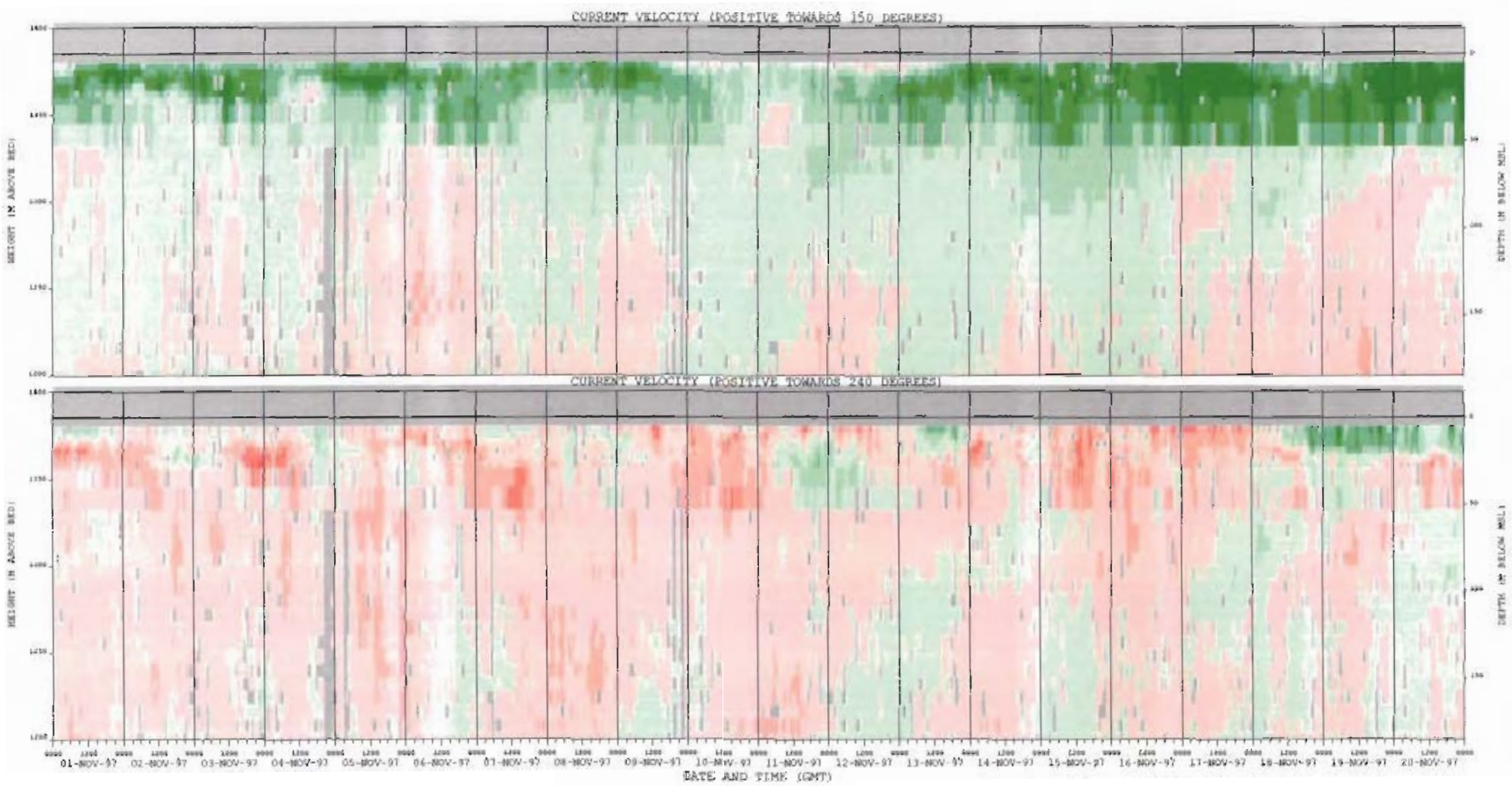
ERA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

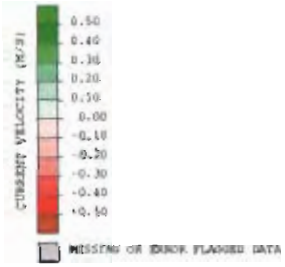
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

12-OCT-97 TO 31-OCT-97

REF. NO: 10328/1488

FIGURE NO: 7.2.2





NOTES:

LOCATION:	BLOCK 37 - GIRASOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11405 12417/12240/11492
SAMPLING INTERVAL:	20mins

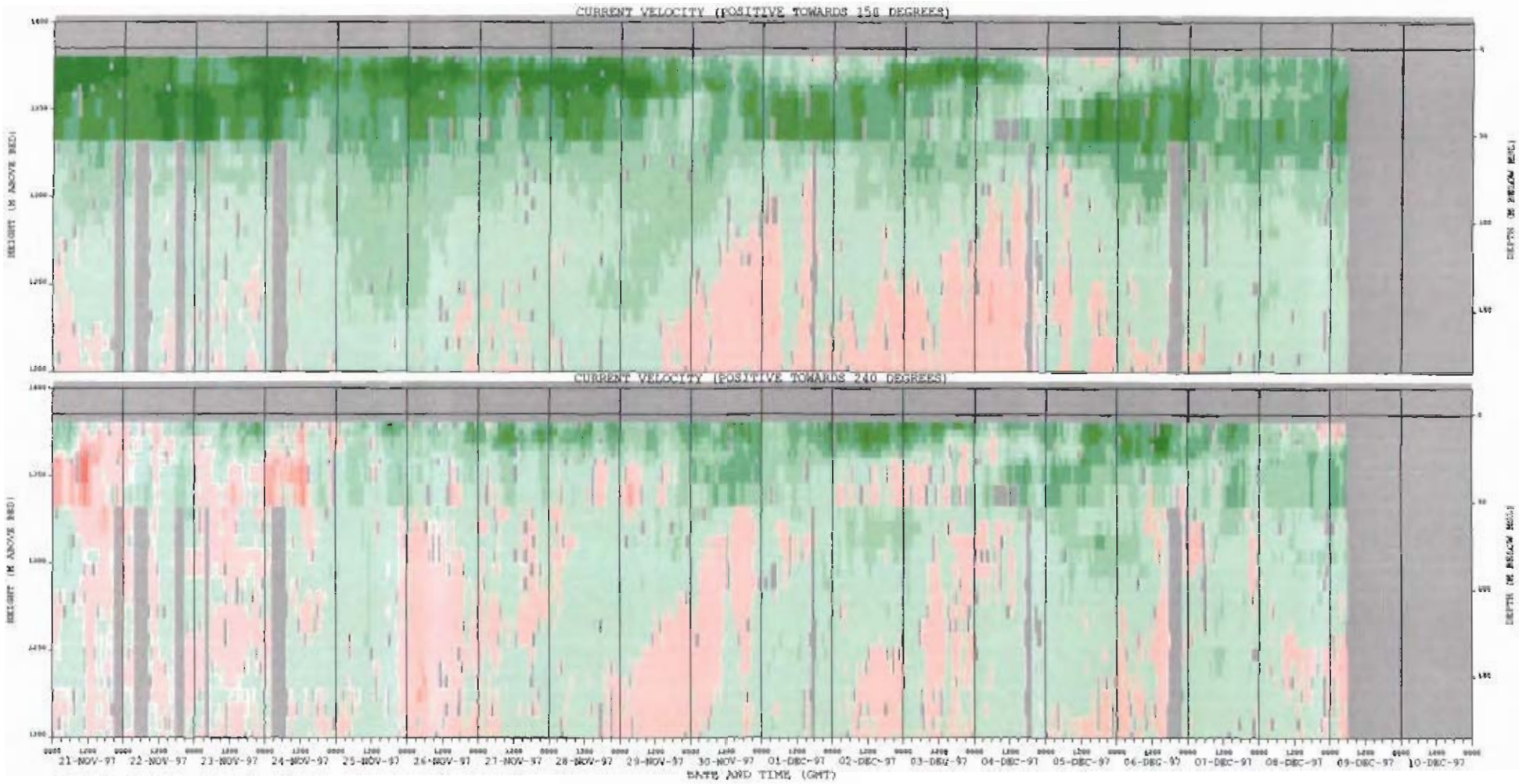
NEA GIRASOL DEEPWATER CURRENT MEASUREMENTS

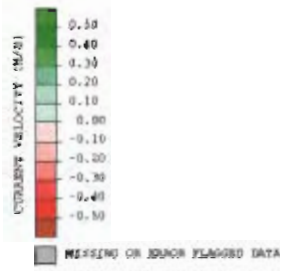
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

01-NOV-97 TO 20-NOV-97

REF. NO: 96328/1488

FIGURE NO: 7.2.3





NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11240/11492
SAMPLING INTERVAL:	20MINS

ESA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

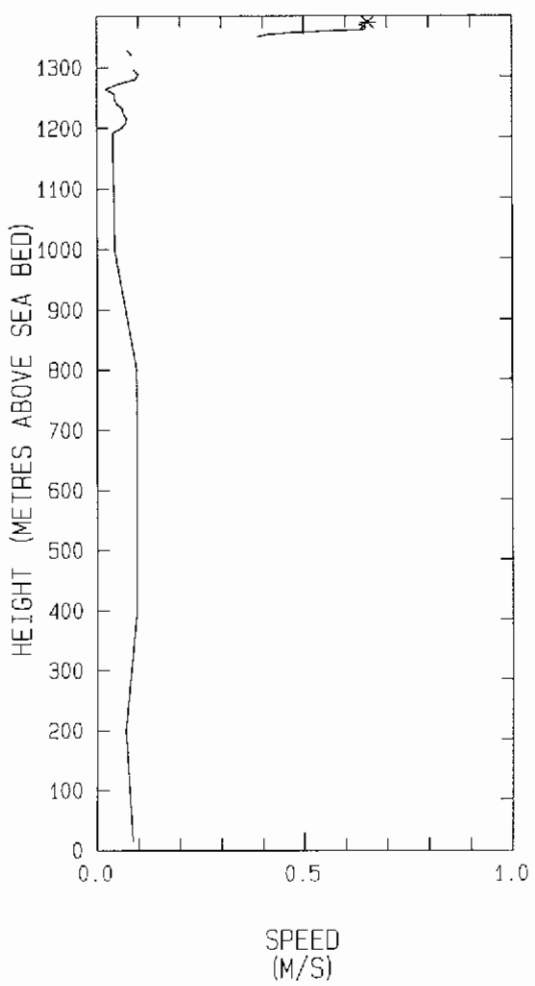
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

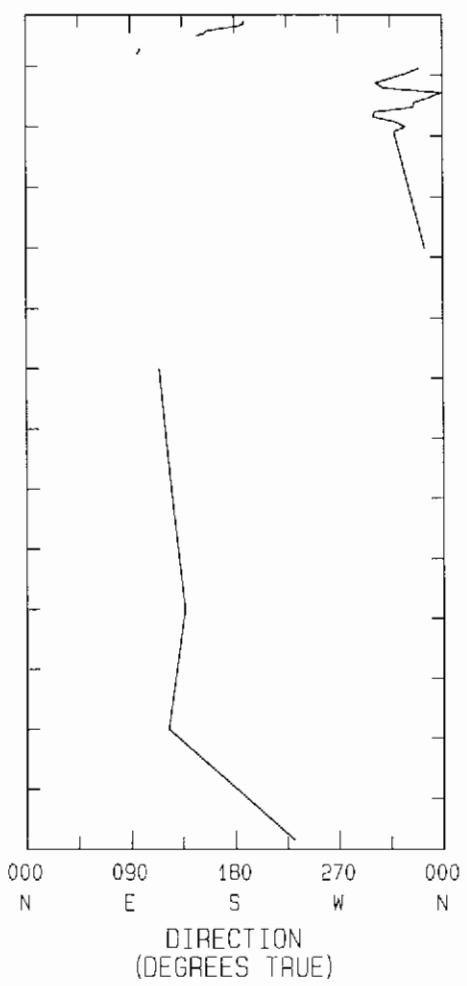
21-NOV-97 TO 09-DEC-97

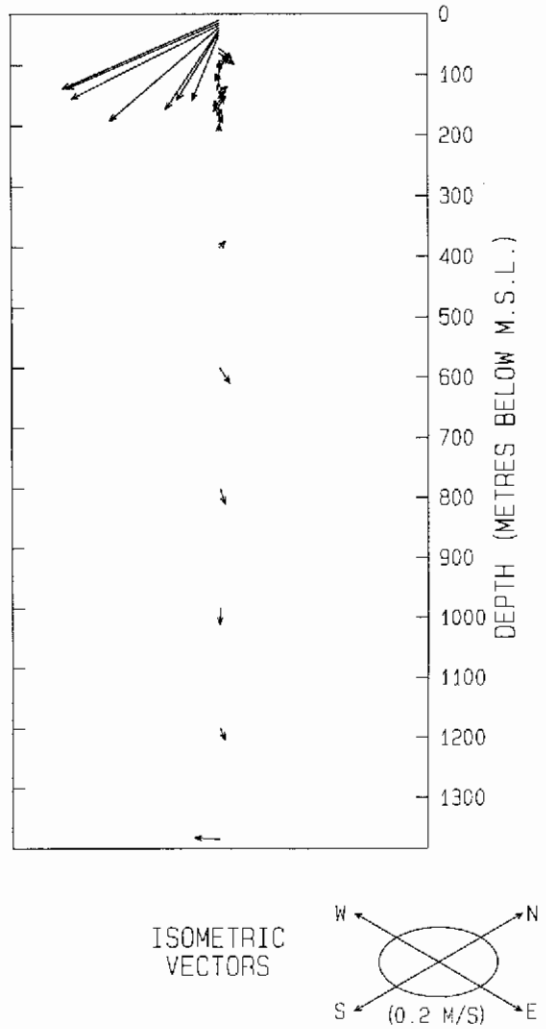
REF. NO: 10328/1488

FIGURE NO: 7.2.4

01AB238-0900







MAX. CURRENT AT 1374M ABOVE BED OCCURS IN THIS PROFILE
ASTERISK ON SPEED PROFILE INDICATES MAX. SPEED AT THAT DEPTH
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NUMBER: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DIRECTION IS DEGREES TRUE TOWARDS
PROFILE TIME: 19-NOV-97 19:40 GMT
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

CURRENT PROFILE AT TIME OF MAXIMUM SPEED OBSERVED AT HEIGHT 1374M ABOVE SEA BED

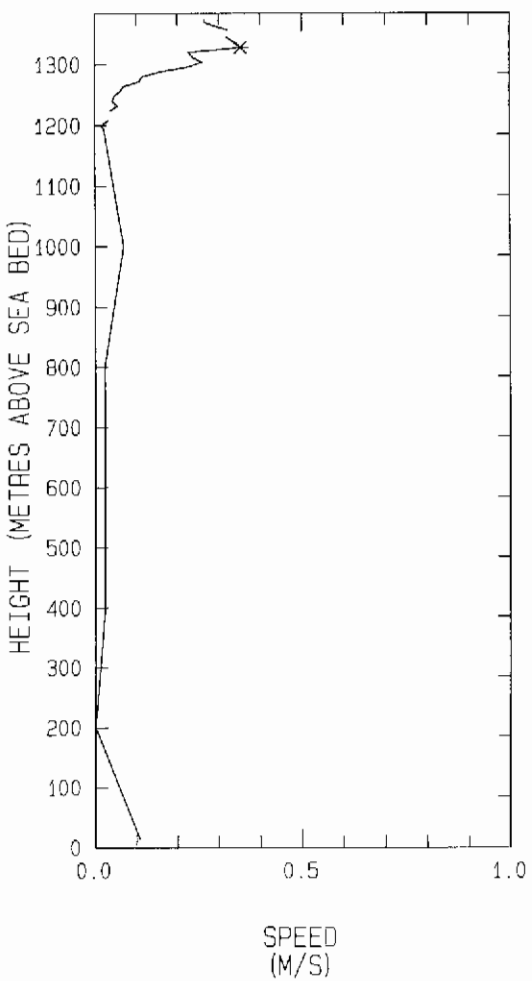
REF NO C10328

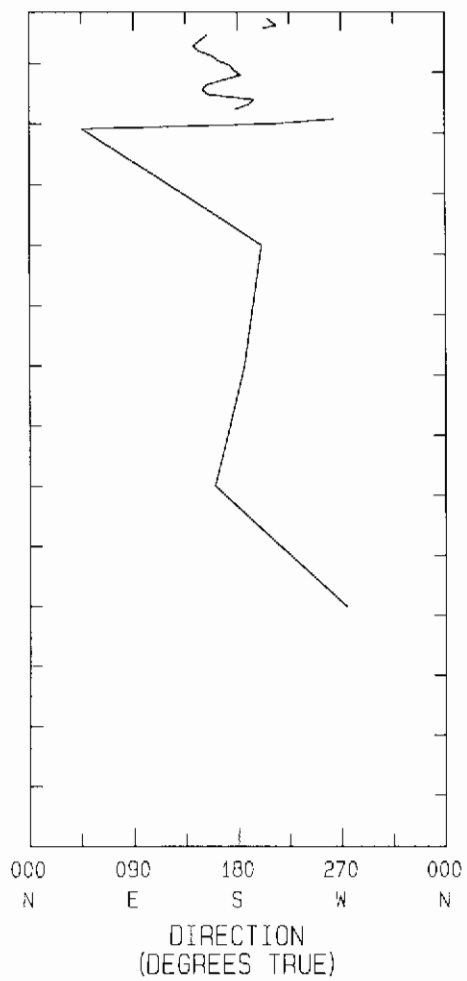
FIG NO B.1

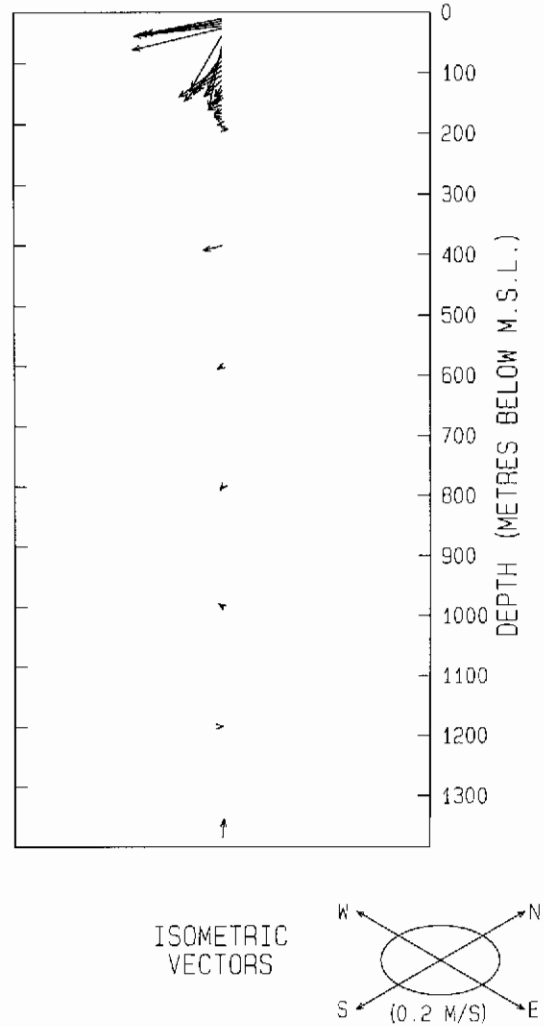
PLOT DATE: 22-JAN-98

FILE: ADCPRCM2D2C32

01AB238-0900







MAX. CURRENT AT 1328M ABOVE BED OCCURS IN THIS PROFILE
ASTERISK ON SPEED PROFILE INDICATES MAX. SPEED AT THAT DEPTH
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NUMBER: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DIRECTION IS DEGREES TRUE TOWARDS
PROFILE TIME: 06-DEC-97 09:40 GMT
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

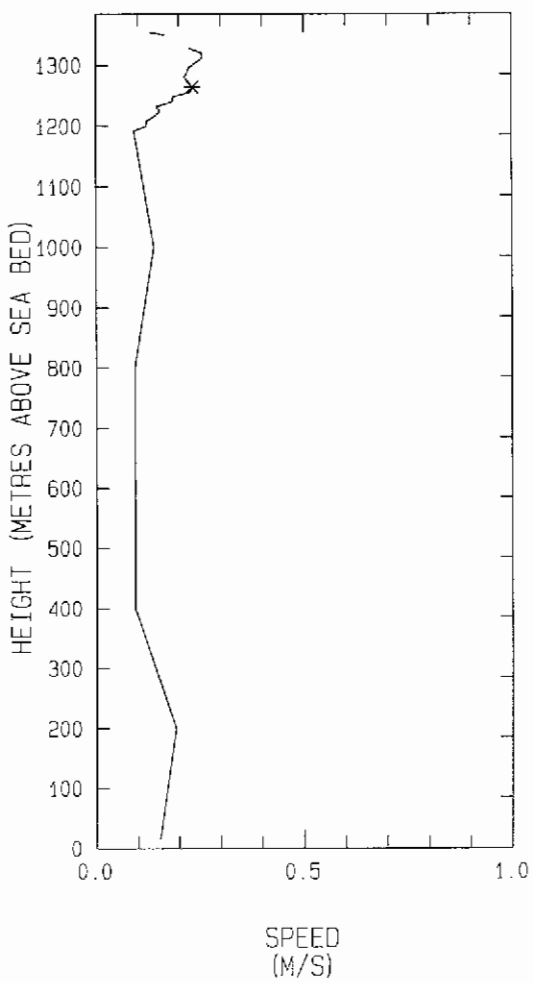
CURRENT PROFILE AT TIME OF MAXIMUM SPEED OBSERVED AT HEIGHT 1328M ABOVE SEA BED

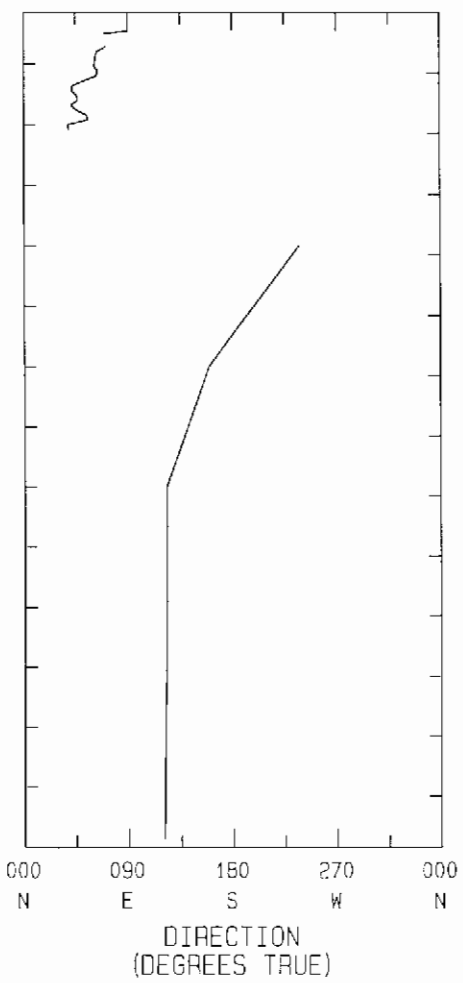
REF NO C10328

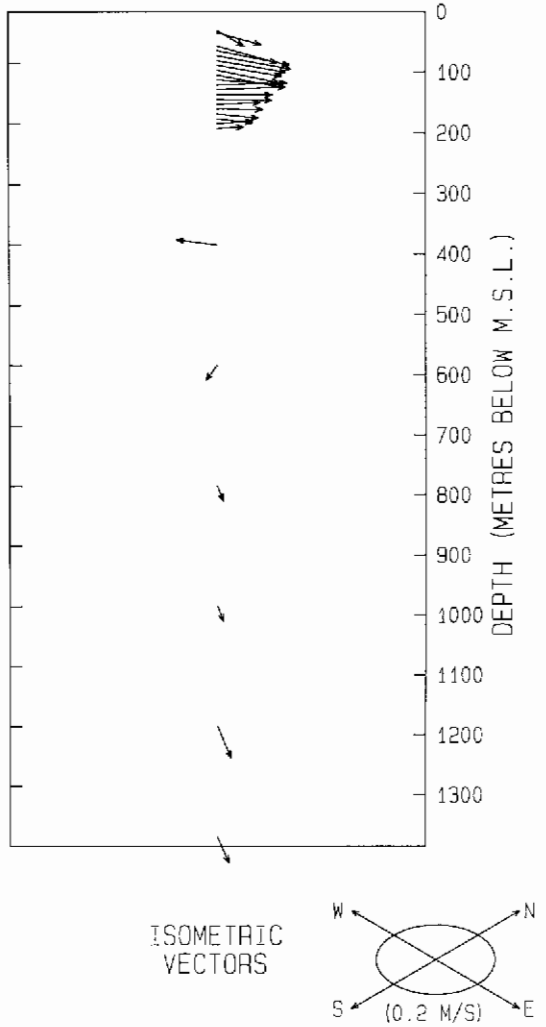
FIG NO 8.2

PLOT DATE: 22-JAN-98

FILE: ADCPRCM2DPC24







MAX. CURRENT AT 1264M ABOVE BED OCCURS IN THIS PROFILE
ASTERISK ON SPEED PROFILE INDICATES MAX. SPEED AT THAT DEPTH
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NUMBER: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DIRECTION IS DEGREES TRUE TOWARDS
PROFILE TIME: 29-SEP-97 10:00 GMT
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

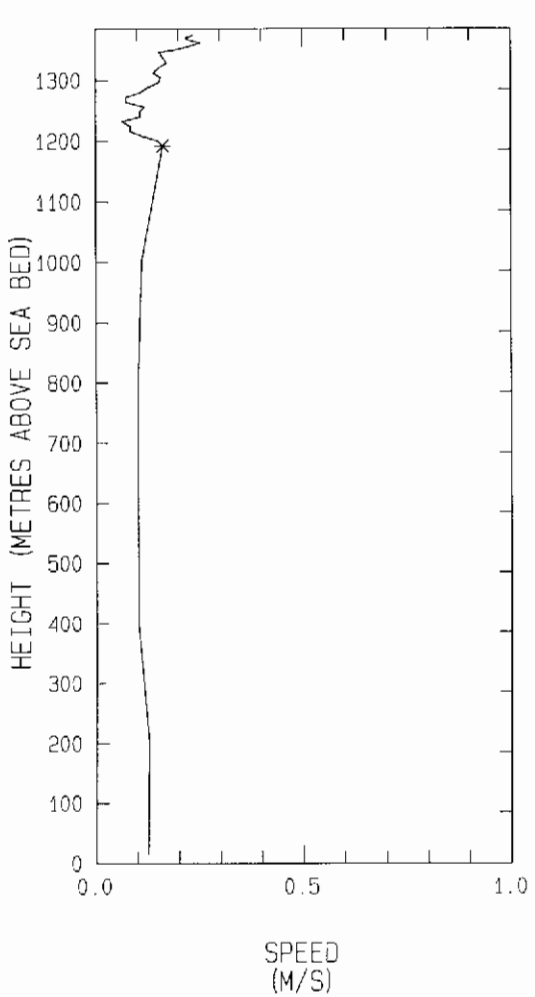
CURRENT PROFILE AT TIME OF MAXIMUM SPEED OBSERVED AT HEIGHT 1264M ABOVE SEA BED

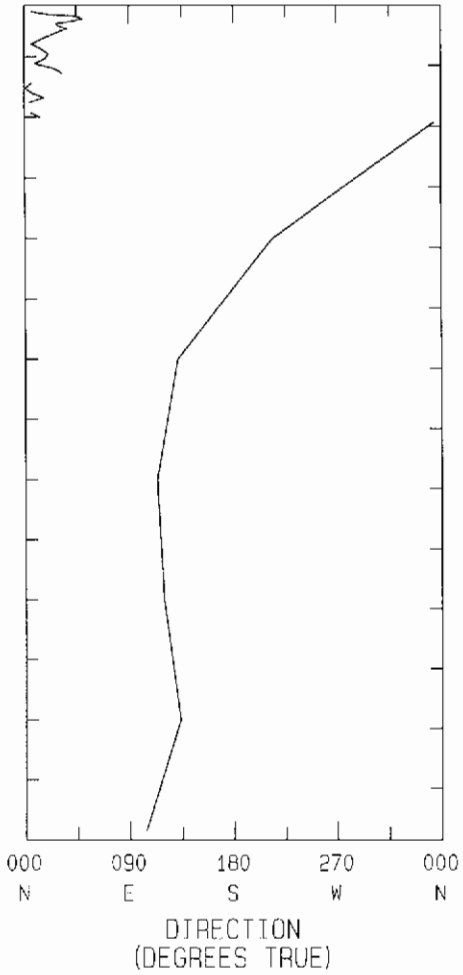
REF NO C10328

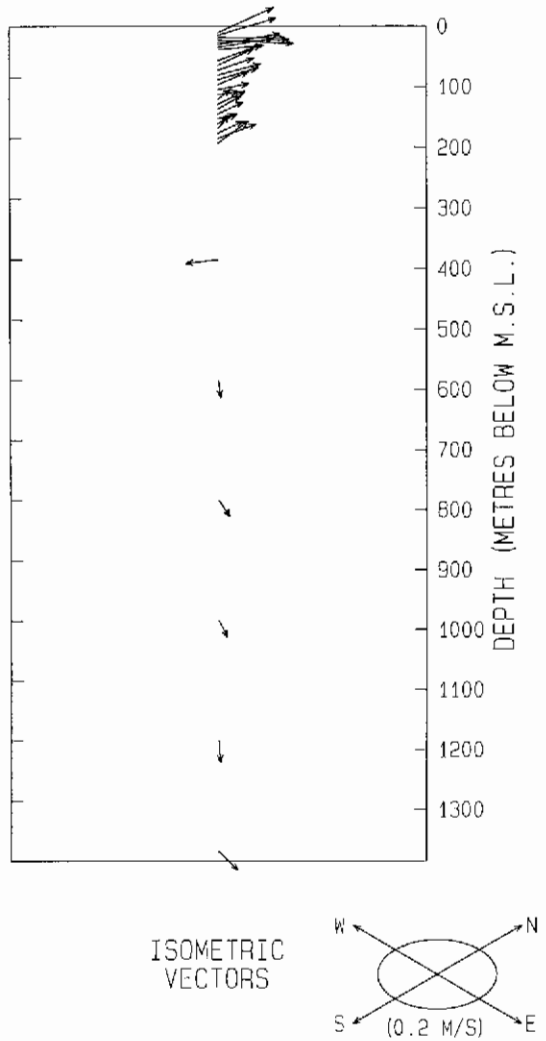
FIG NO 6.3

PLOT DATE 22-JAN-98

FILE: ADCPRCM2DPC16







MAX. CURRENT AT 1192M ABOVE BED OCCURS IN THIS PROFILE
ASTERISK ON SPEED PROFILE INDICATES MAX. SPEED AT THAT DEPTH
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NUMBER: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DIRECTION IS DEGREES TRUE TOWARDS
PROFILE TIME: 09-OCT-97 05:00 GMT
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

CURRENT PROFILE AT TIME OF MAXIMUM SPEED OBSERVED AT HEIGHT 1192M ABOVE SEA BED

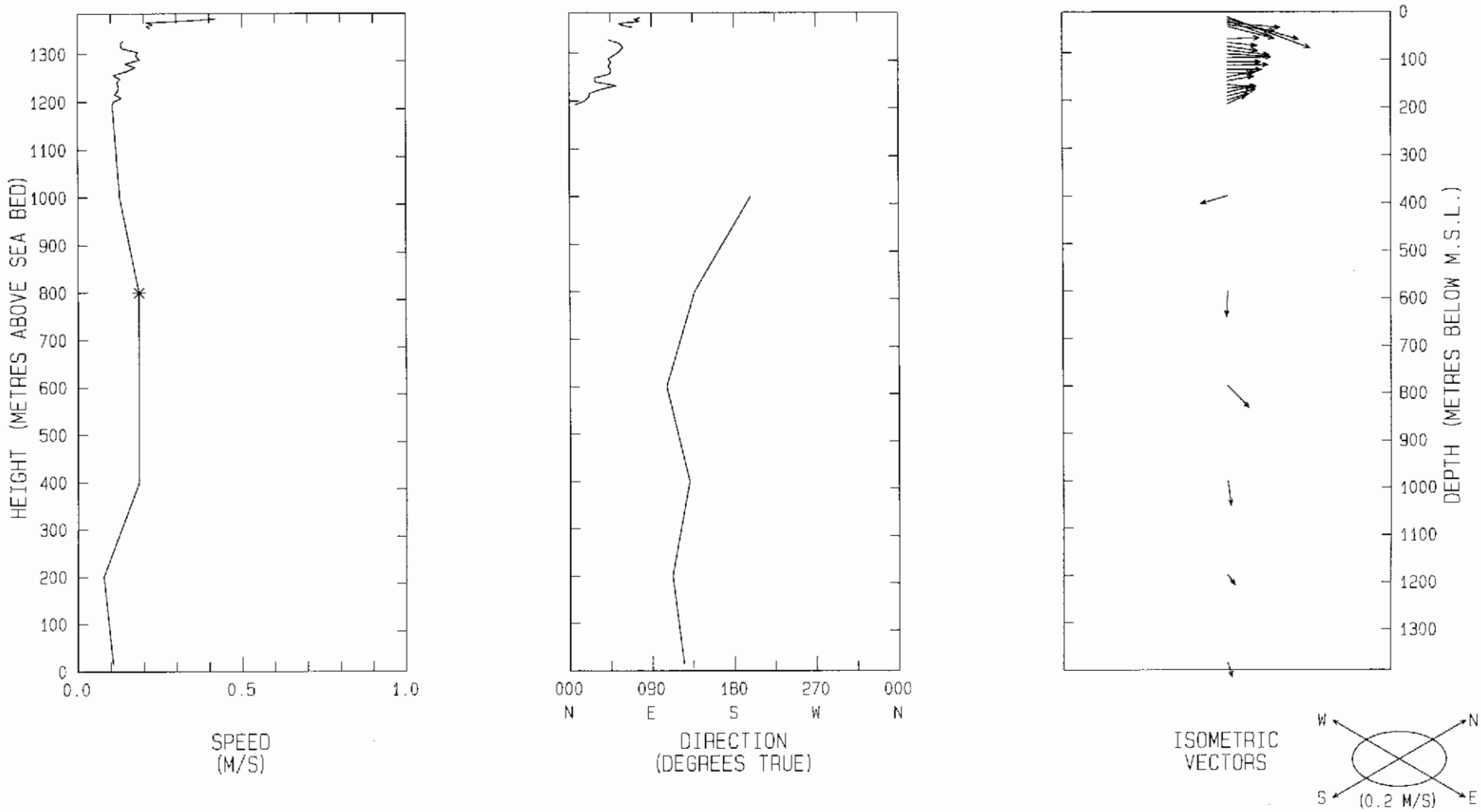
REF NO C10328

FIG NO 8.4

PLOT DATE: 22-JAN-98

FILE: ADCPRCM2DPC07

01AB238-0900



MAX. CURRENT AT 800M ABOVE BED OCCURS IN THIS PROFILE
ASTERISK ON SPEED PROFILE INDICATES MAX. SPEED AT THAT DEPTH
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NUMBER: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DIRECTION IS DEGREES TRUE TOWARDS
PROFILE TIME: 06-OCT-97 02:20 GMT
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

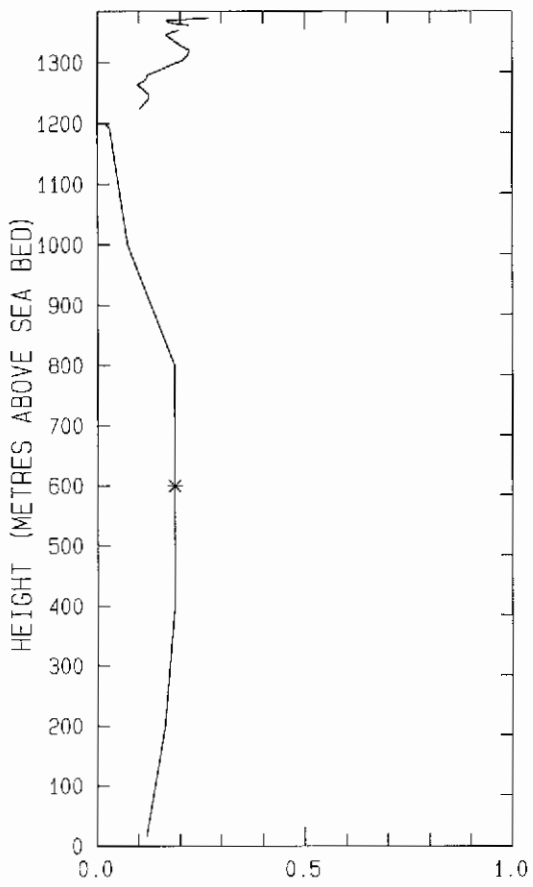
CURRENT PROFILE AT TIME OF MAXIMUM SPEED OBSERVED AT HEIGHT 800M ABOVE SEA BED

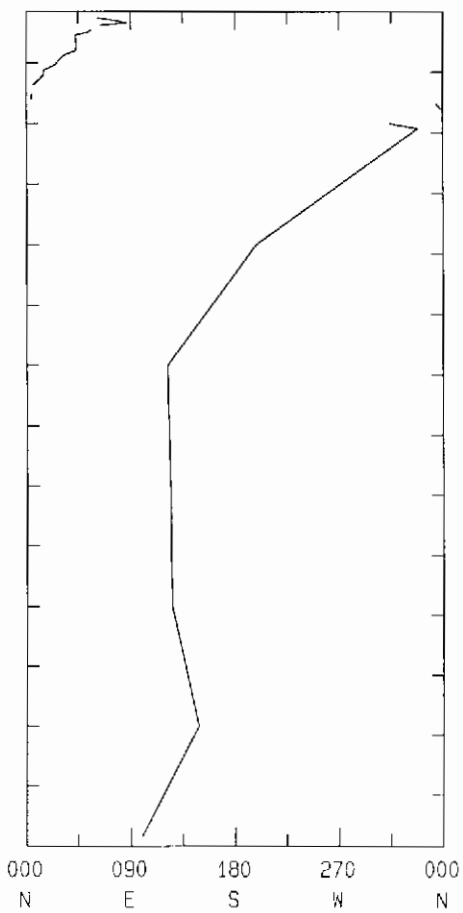
REF NO C10328

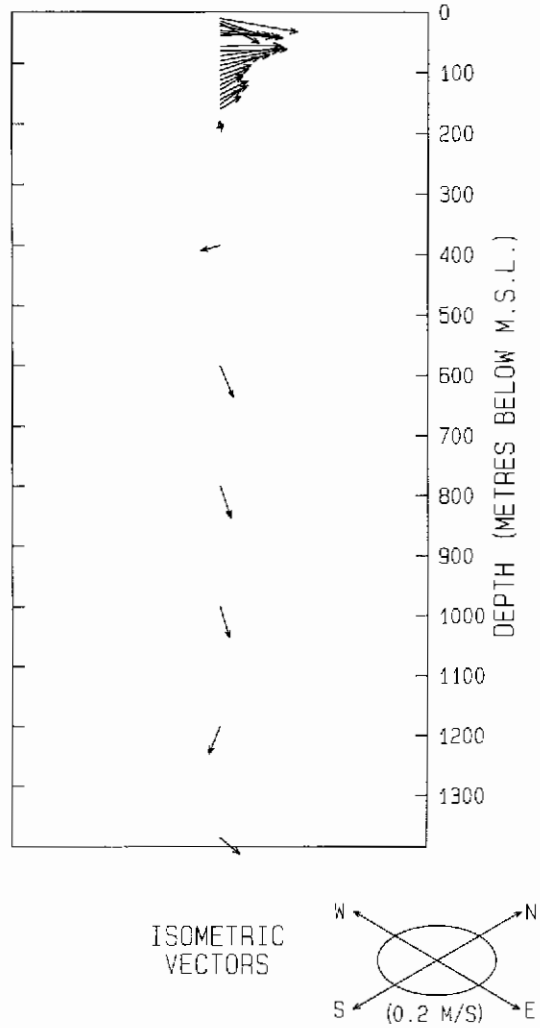
FIG NO 8.6

PLOT DATE: 22-JAN-98

FILE: ADCPRCM2JPC05







MAX. CURRENT AT 600M ABOVE BED OCCURS IN THIS PROFILE
ASTERISK ON SPEED PROFILE INDICATES MAX. SPEED AT THAT DEPTH
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NUMBER: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DIRECTION IS DEGREES TRUE TOWARDS
PROFILE TIME: 07-OCT-97 14:00 GMT
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

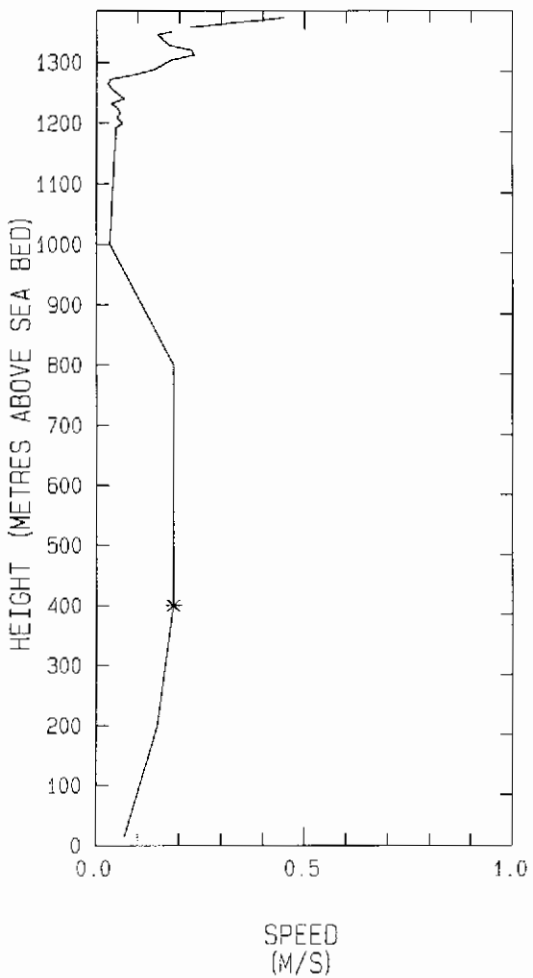
CURRENT PROFILE AT TIME OF MAXIMUM SPEED OBSERVED AT HEIGHT 600M ABOVE SEA BED

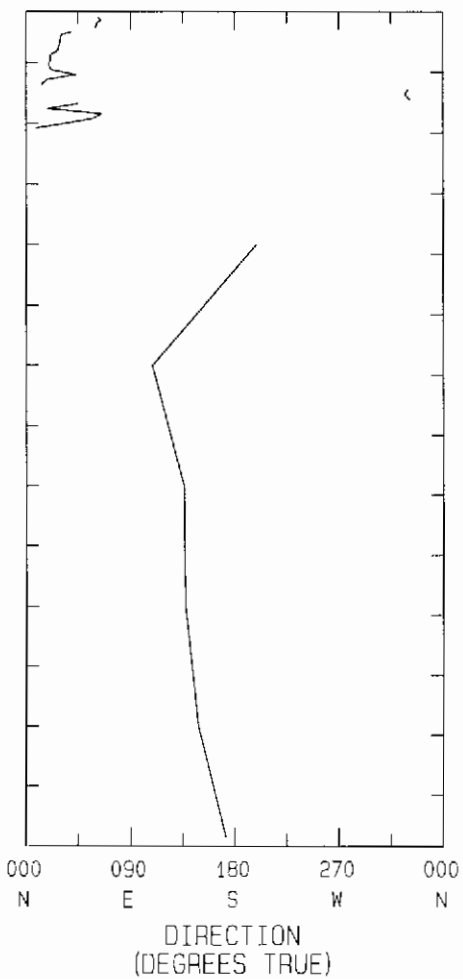
REF NO C10328

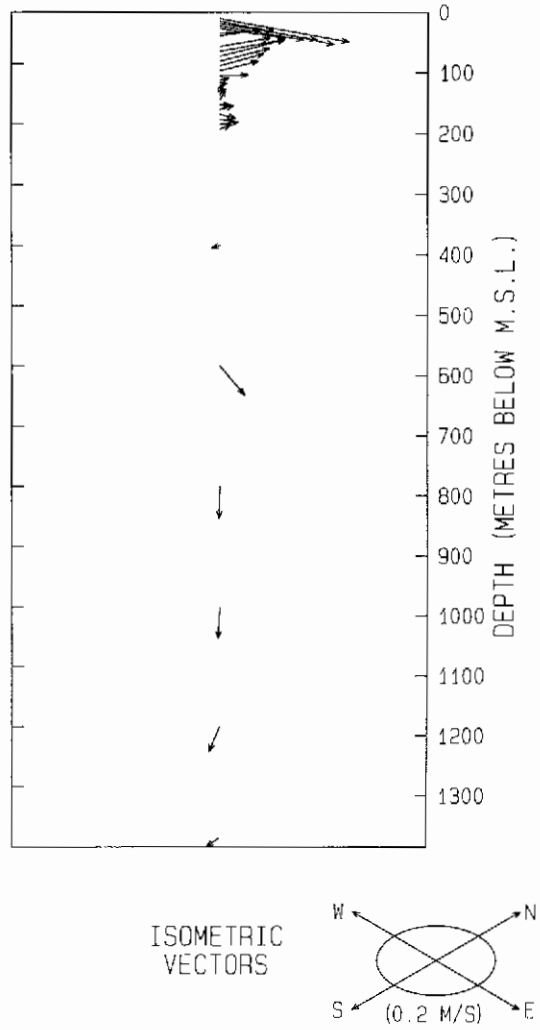
FIG NO 8.7

PLOT DATE: 22-JAN-98

FILE: ACCPRCM2DPC04







MAX. CURRENT AT 400M ABOVE BED OCCURS IN THIS PROFILE
ASTERISK ON SPEED PROFILE INDICATES MAX. SPEED AT THAT DEPTH
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NUMBER: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DIRECTION IS DEGREES TRUE TOWARDS
PROFILE TIME: 07-OCT-97 22:20 GMT
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

CURRENT PROFILE AT TIME OF MAXIMUM SPEED OBSERVED AT HEIGHT 400M ABOVE SEA BED

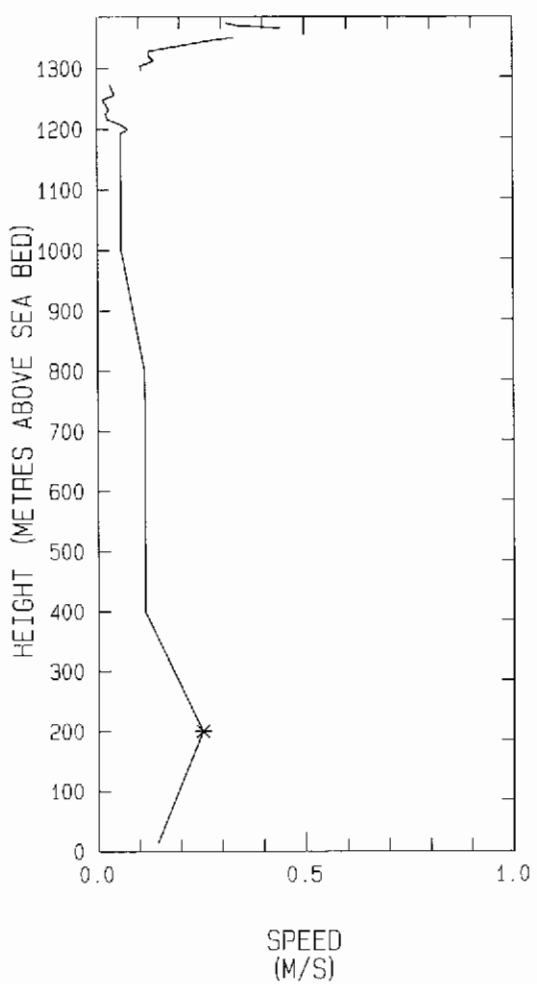
REF NO C10328

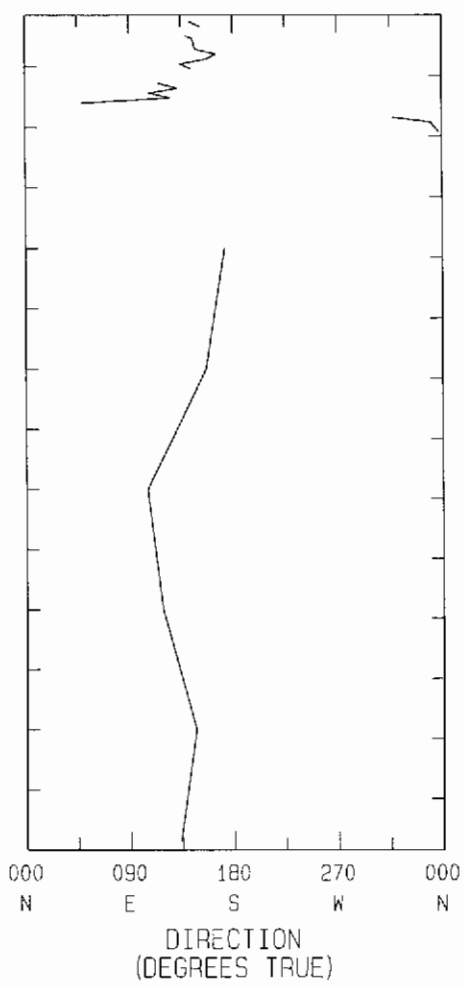
FIG NO 8.8

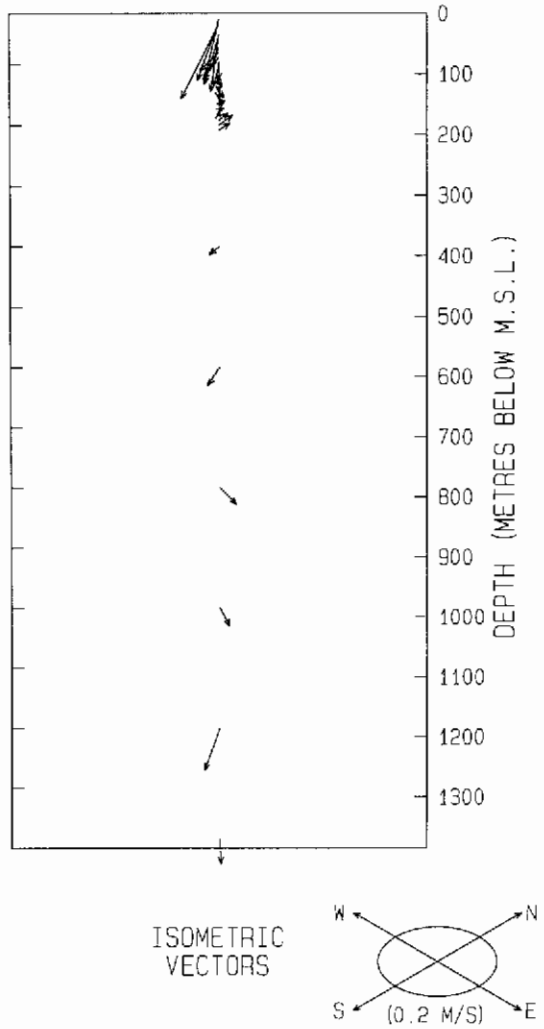
PLOT DATE: 22-JAN-98

FILE: ADCPRCM2DPC03

01AB238-0900







MAX. CURRENT AT 200M ABOVE BED OCCURS IN THIS PROFILE
ASTERISK ON SPEED PROFILE INDICATES MAX. SPEED AT THAT DEPTH
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NUMBER: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DIRECTION IS DEGREES TRUE TOWARDS
PROFILE TIME: 14-NOV-97 22:00 GMT
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

CURRENT PROFILE AT TIME OF MAXIMUM SPEED
OBSERVED AT HEIGHT 200M ABOVE SEA BED

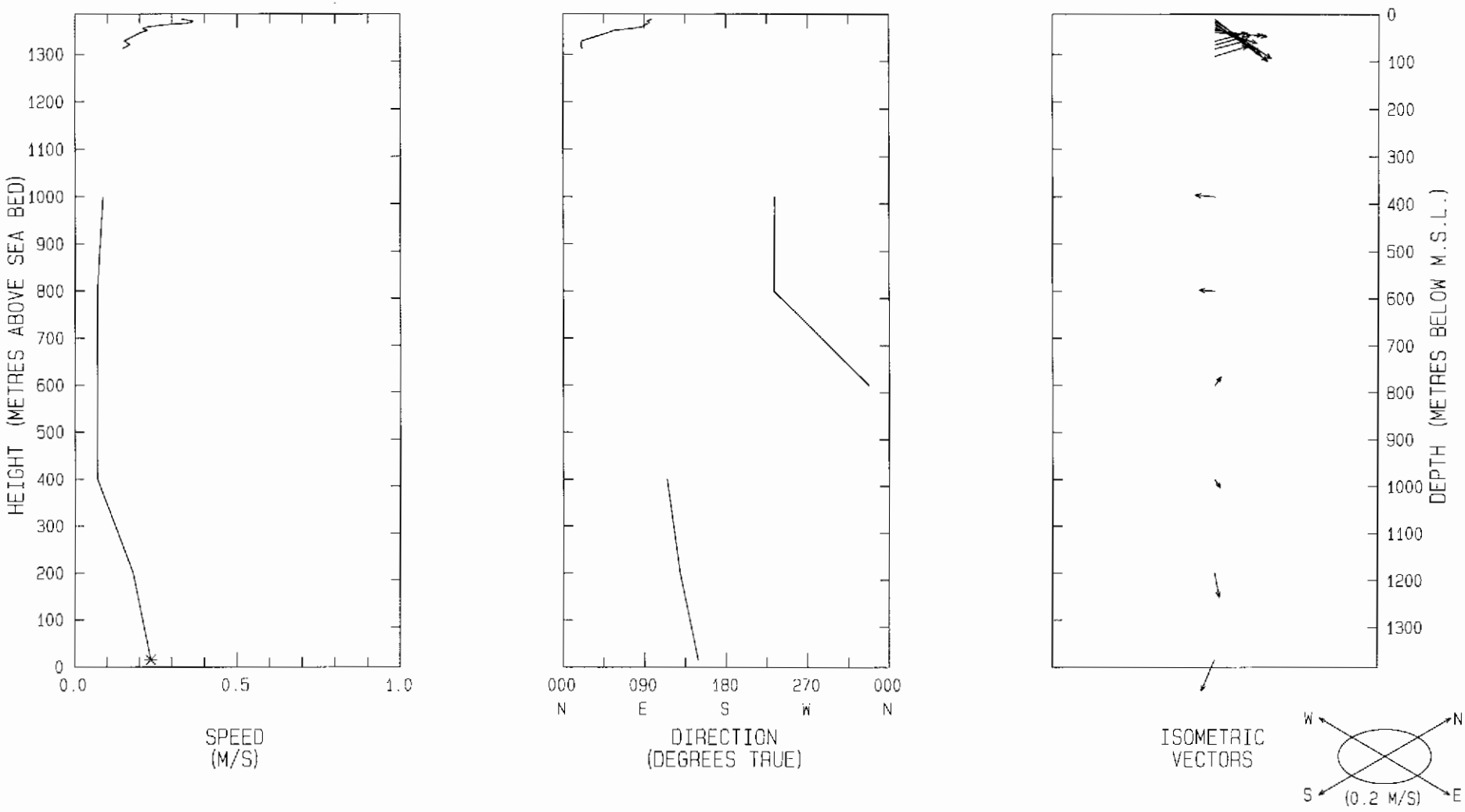
REF NO C10328

FIG NO 8.9

PLOT DATE: 22-JAN-98

FILE: ADCPRCM2DPC02

01AB238-0900



MAX. CURRENT AT 15M ABOVE BED OCCURS IN THIS PROFILE
ASTERISK ON SPEED PROFILE INDICATES MAX. SPEED AT THAT DEPTH
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NUMBER: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DIRECTION IS DEGREES TRUE TOWARDS
PROFILE TIME: 30-SEP-97 08:40 GMT
ANALYSIS PERIOD: 22-SEP-97 13:00 TO 09-DEC-97 06:00 GMT

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

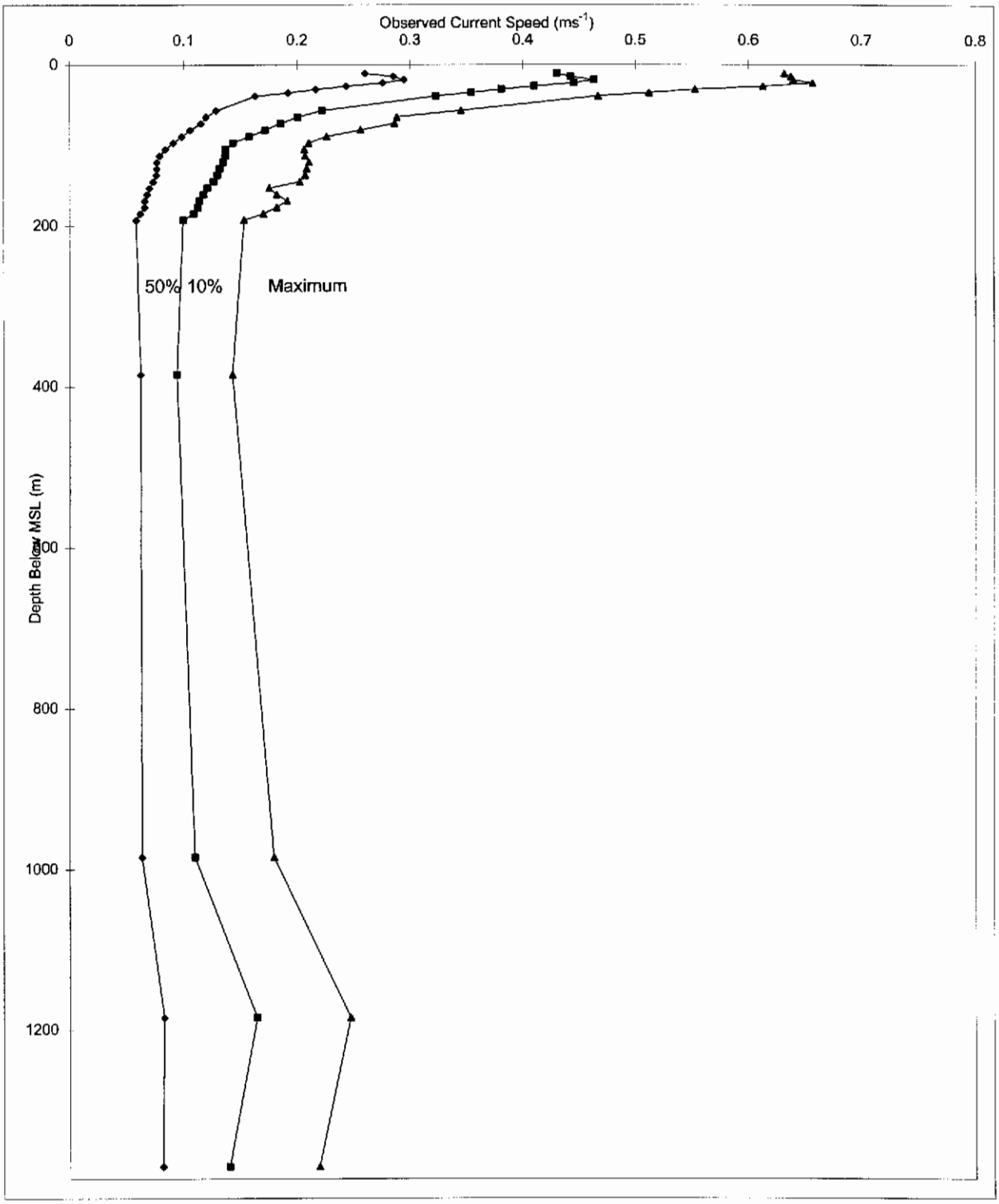
CURRENT PROFILE AT TIME OF MAXIMUM SPEED OBSERVED AT HEIGHT 15M ABOVE SEA BED

REF NO C10328

FIG NO 8.10

PLOT DATE: 22-JAN-98

FILE: ADCPECM2DPC01



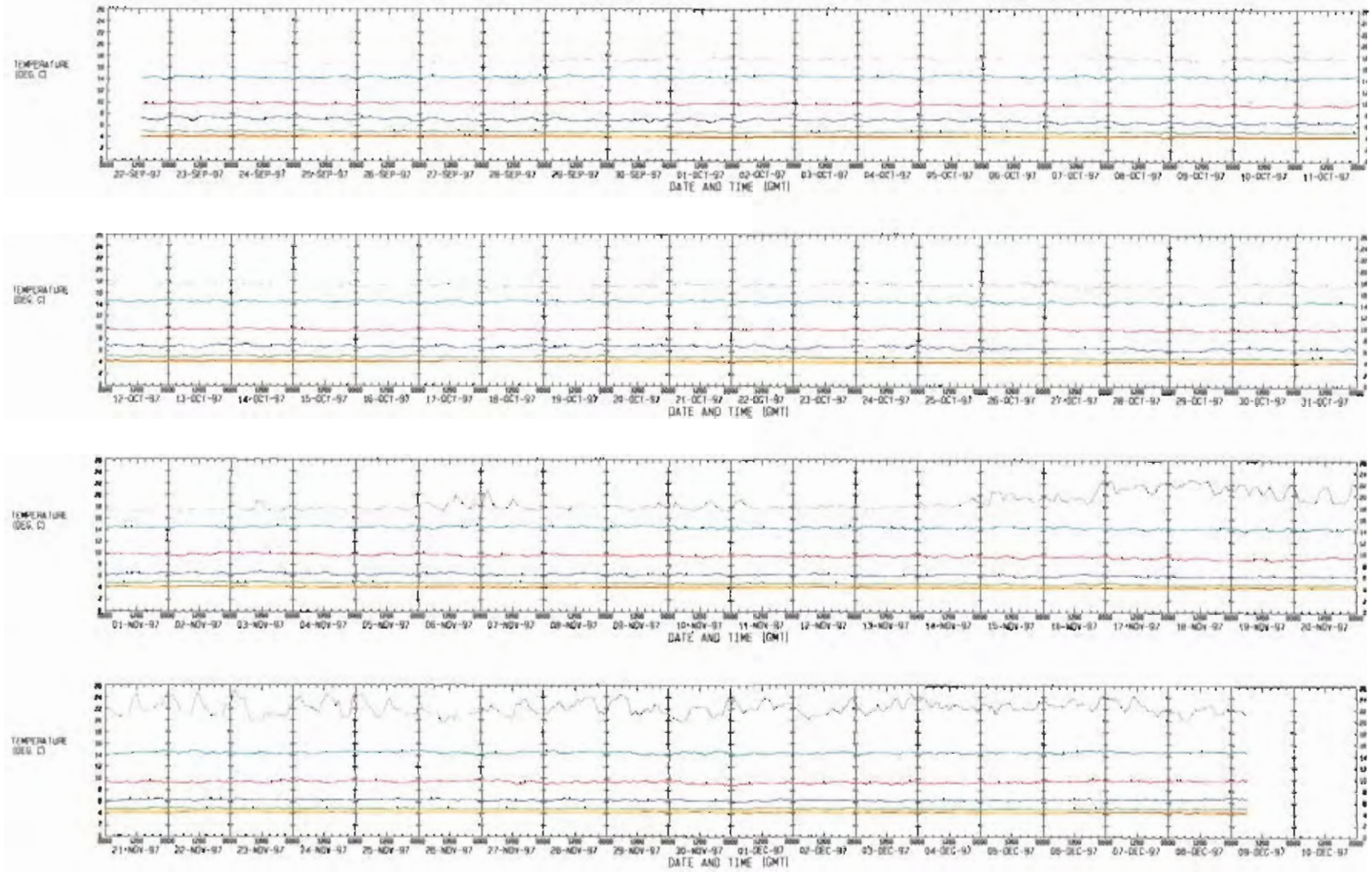
Instruments:
RDI 300KkHz Workhorse (Serial No. 0393)
RDI 150kHz Broadband ADCP (Serial No. 02308)
RCM7/8 11398/12418/11400/12417/11260/11492

LOCATION: Block 17 - GIRASSOL
OSITION: 7 40.20'S, 011 40.95'E
WATER DEPTH : 1385m
ANALYSIS PERIOD: 22-SEP-97 TO 09-DEC-97
SAMPLING INTERVAL: 20min

GEOS	EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS STATISTICAL PROFILE PLOT FOR 50%, 10% AND MAXIMUM VALUES	REF NO C10328 FIG NO 9

FILE: FIG9.XLS

PLOT DATE: 15-JAN-98



NOTES:

INSTRUMENT	SERIAL NO	HAB (m)	
WHORSE	0393	1340	BROWN
ADCP	02308	1180	CYAN
RCM7	11398	1000	RED
RCM7	12418	800	BLUE
RCM7	11400	600	GREEN
RCM7	12417	400	MAGENTA
RCM8	11260	200	ORANGE
RCM8	11492	15	YELLOW

WATER DEPTH: 1385m
SAMPLING INTERVAL: 20 MINUTES

EEA DEEPWATER CURRENT MEASUREMENTS

OBSERVED TEMPERATURE

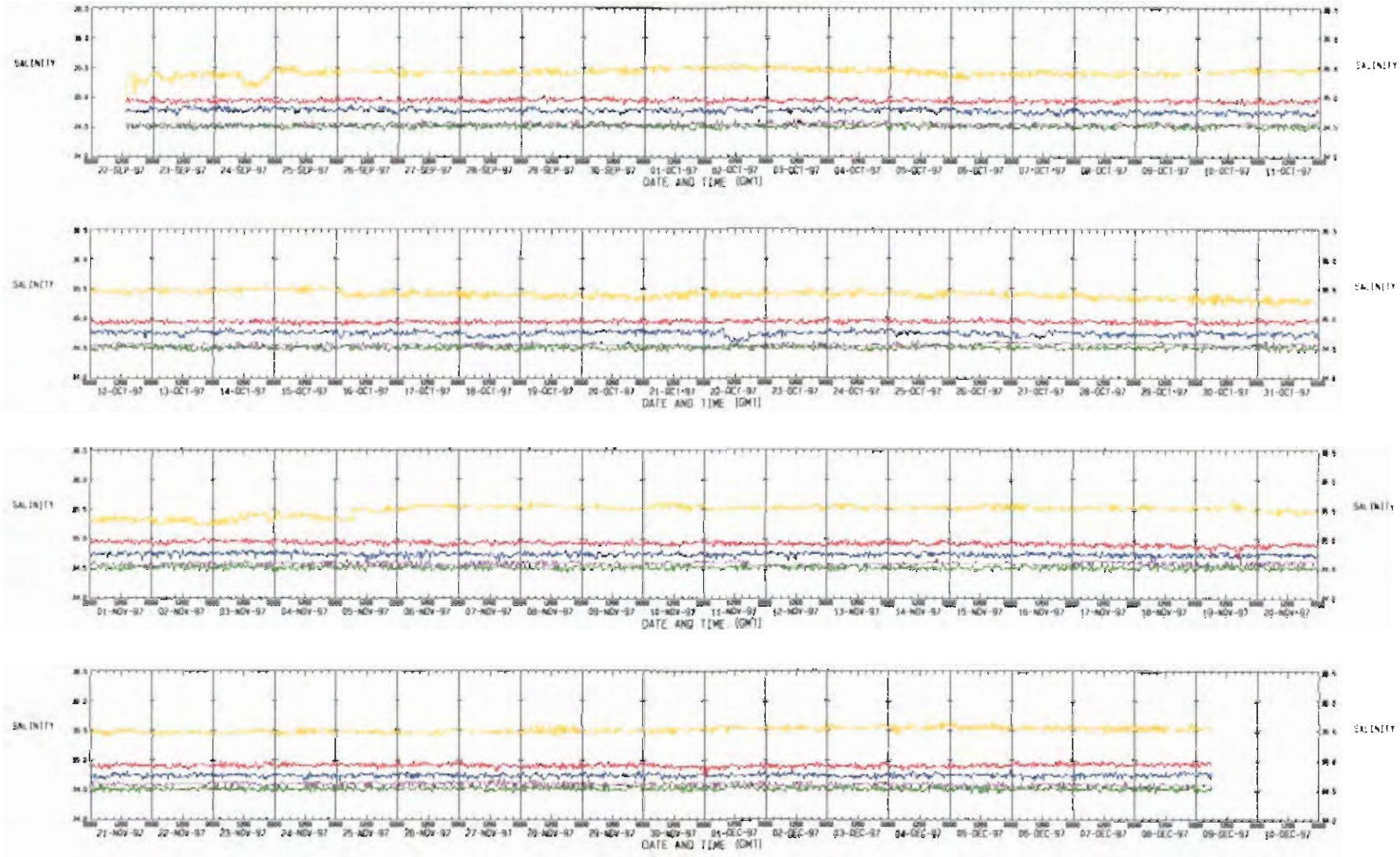
FROM ADCP & RCM MEASUREMENTS

22-SEP-97 TO 09-DEC-97

REF. NO: 10328/1448

FIGURE NO 10

PLOT DATE: 23-JAN-98 FILE: TEMP



NOTES

INSTRUMENT	SERIAL NO	HAB (m)	
RCM7	11398	1000	RED
RCM7	12418	800	BLUE
RCM7	11400	600	GREEN
RCM7	12417	400	MAGENTA
RCM8	11492	15	YELLOW

WATER DEPTH 1385m
SAMPLING INTERVAL 20 MINUTES
SALINITY ADJUSTED FOLLOWING CTD MEASUREMENTS

EEA DEEPWATER CURRENT MEASUREMENTS

OBSERVED SALINITY

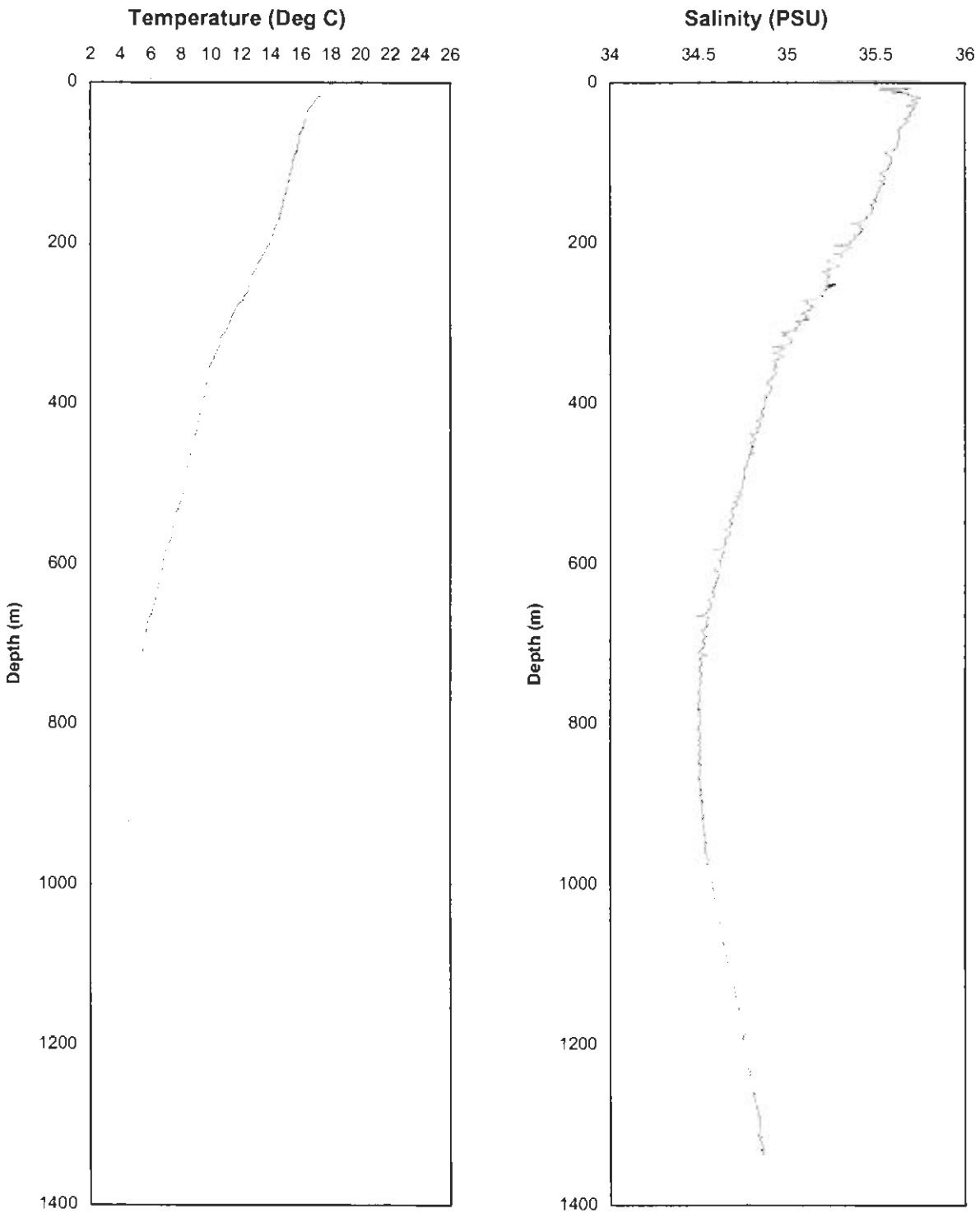
FROM RCM MEASUREMENTS

22-SEP-97 TO 09-DEC-97

REF. NO. 1032B/1448

FIGURE NO 11

PLOT DATE 31-JAN-98 FILE SAL



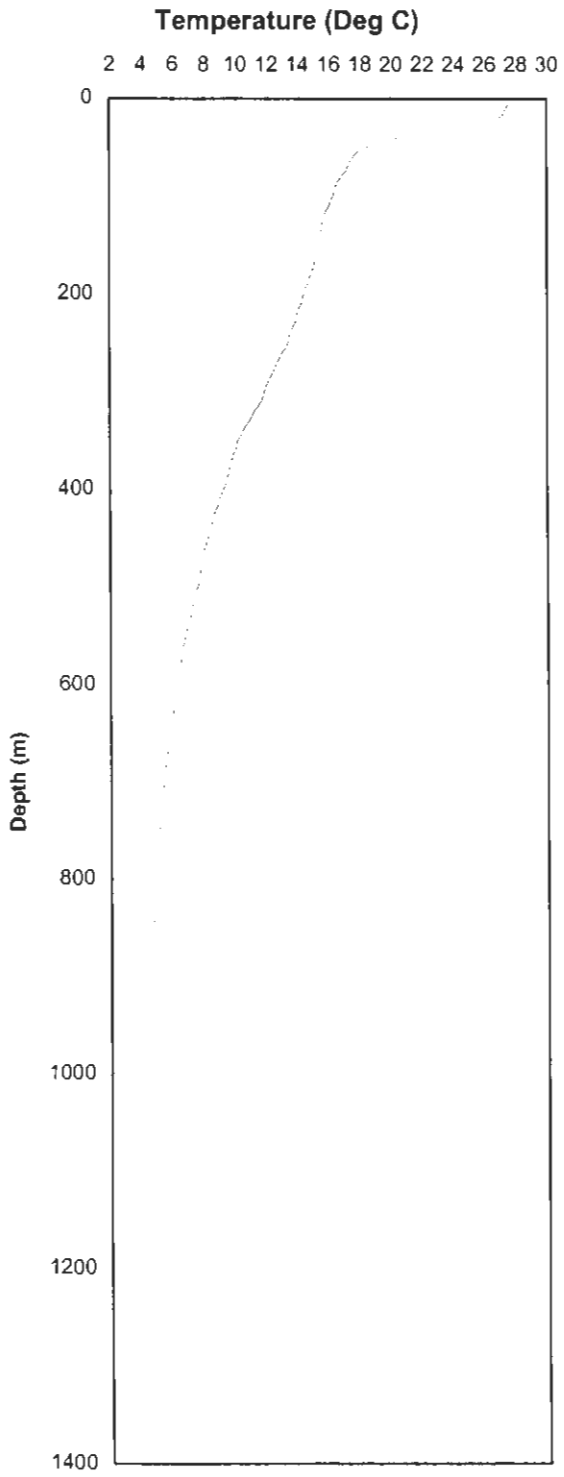
Location: Block 17
Position: 7° 40.20'S, 011° 40.95'W
Date of Cast: 22-Sep-97 12:47 to 13:26GMT

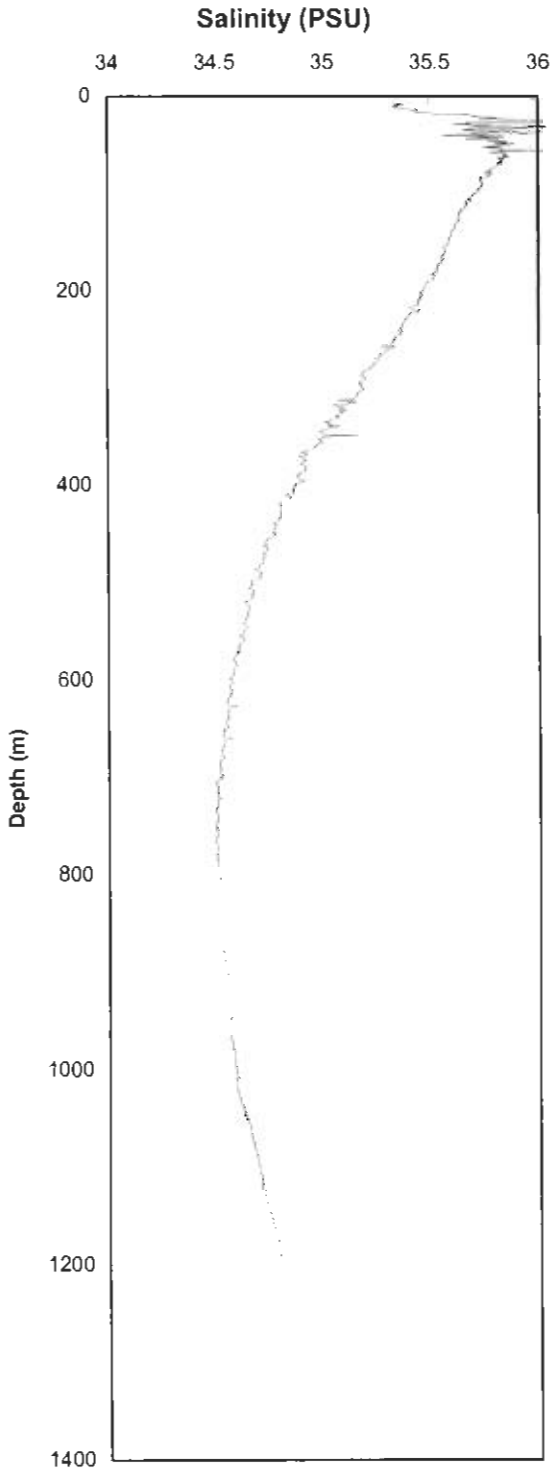
Instrument: SeaBird CTD
Serial Number: 2391
Sampling Interval: 0.5 sec

GEOS	**EEA Girassol Mooring - Block 17 Installation** **Temperature and Salinity Profiles Post-Deployment**	REF: 10328/1488 FIG No: 12.1

C10328/1488/Ctd.xls
EEA Girassol Mooring - Block 17 Phase 1

Updated: 16/10/97

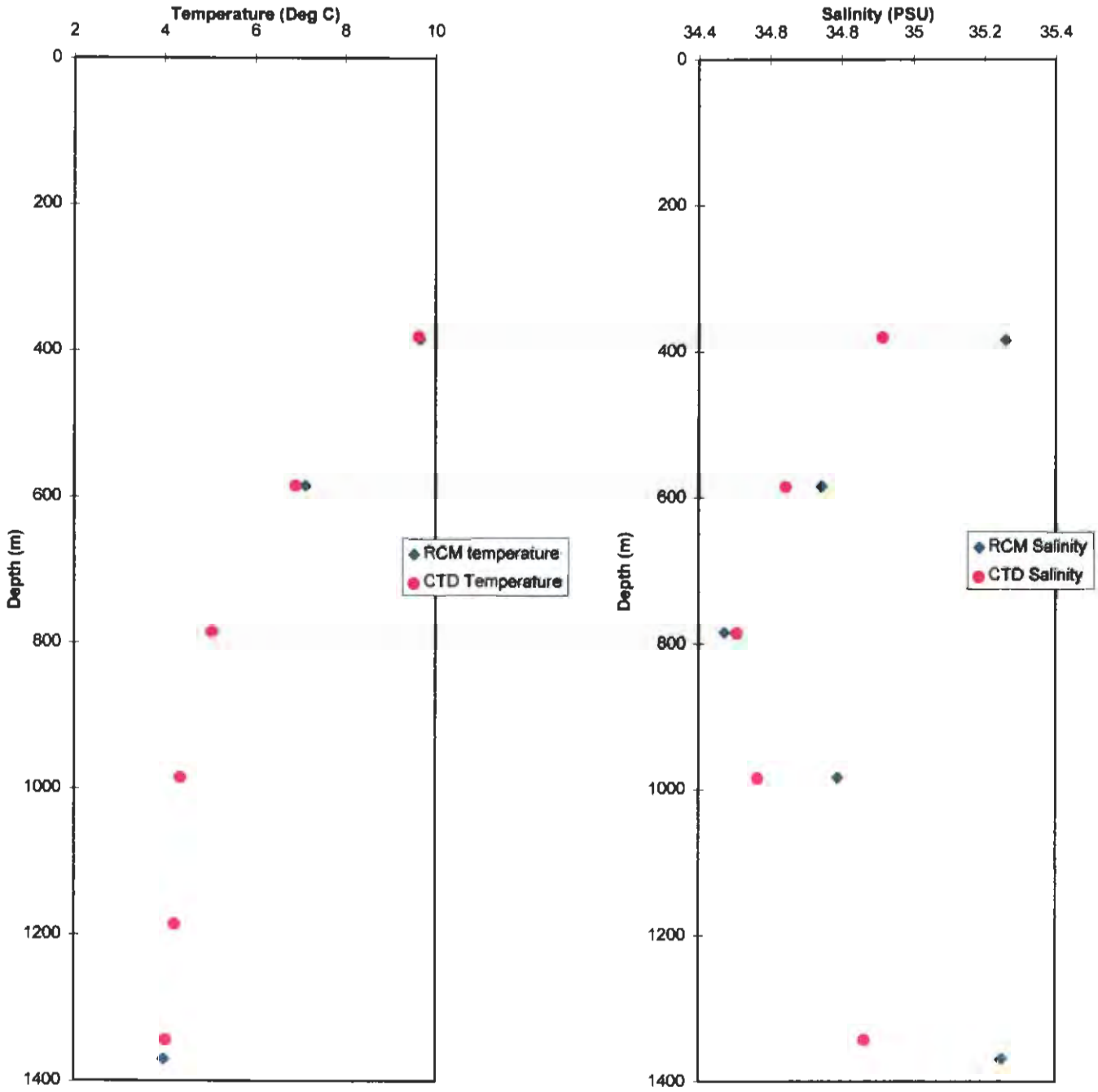




Location: Block 17
Position: 7° 40.20'S, 011° 40.95'W
Date of Cast: 10-Dec-97 12:30 to 13:05GMT

Instrument: SeaBird CTD
Serial Number: 2391
Sampling Interval: 0.5 sec

GEOS	**EEA Girassol Mooring - Block 17 Phase 1** **Temperature and Salinity Profiles Post-Deployment**	REF: 10328/1488 FIG No: 12.2



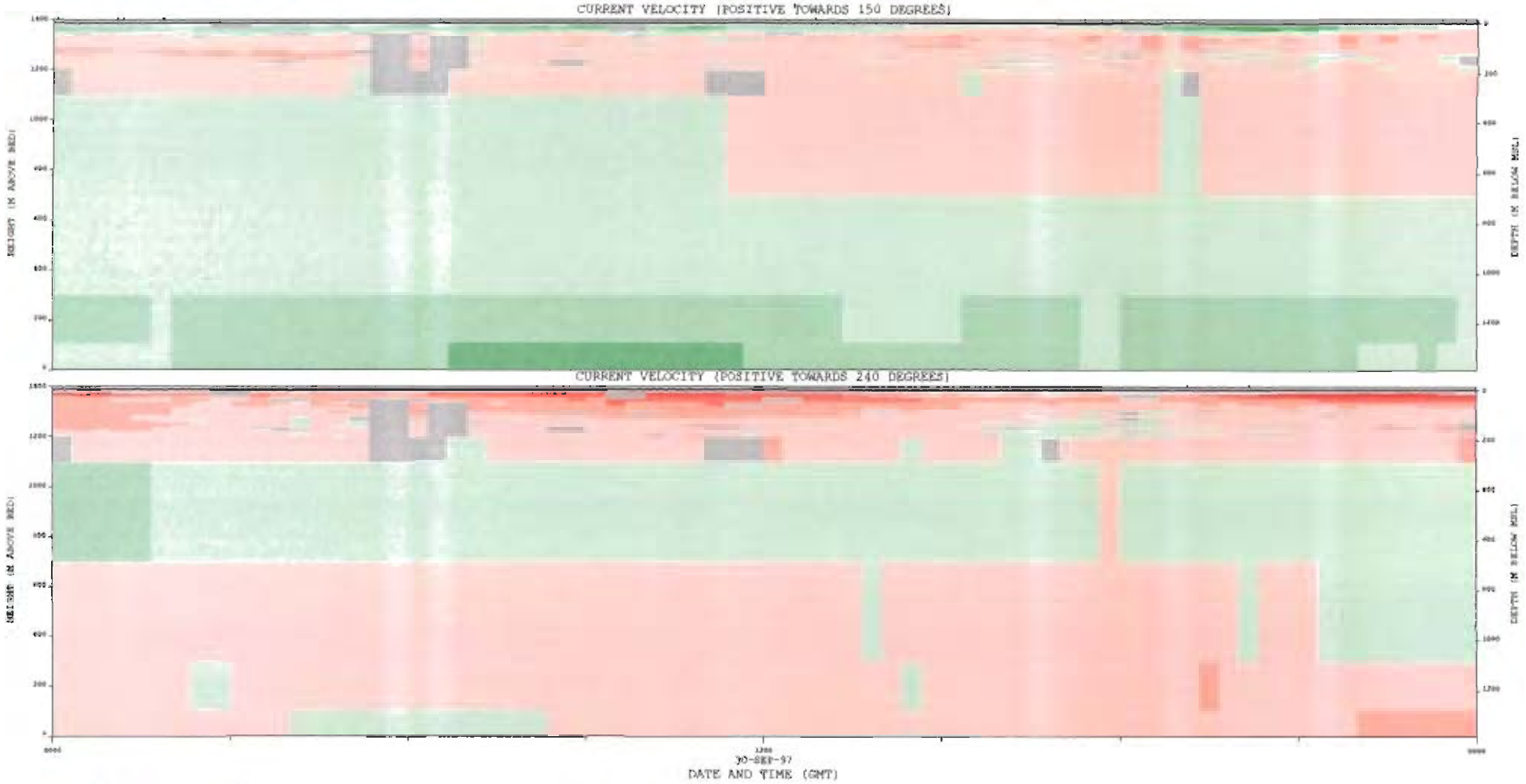
Location: Block 17
Position: 7° 40.20'S, 011° 40.95'W
Date of Cast: 22-Sep-97 12:47 to 13:26GMT
Date of Comparison: 22-Sep-97 13:00GMT

Instrument: SeaBird CTD
Serial Number: 2391
Sampling Interval: 0.5 sec

GEOS	**EEA Girassol Mooring - Block 17 Installation** **Temperature and Salinity Profiles Post-Deployment**	REF: 10328/1488 FIG No: 12.3

C10328/1488/Ctd.xls
EEA Girassol Mooring - Block 17 Phase 1

Updated: 22/01/98



NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

RCM2 & RCM3 SPEEDS FORCED FROM RCM4

RSA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

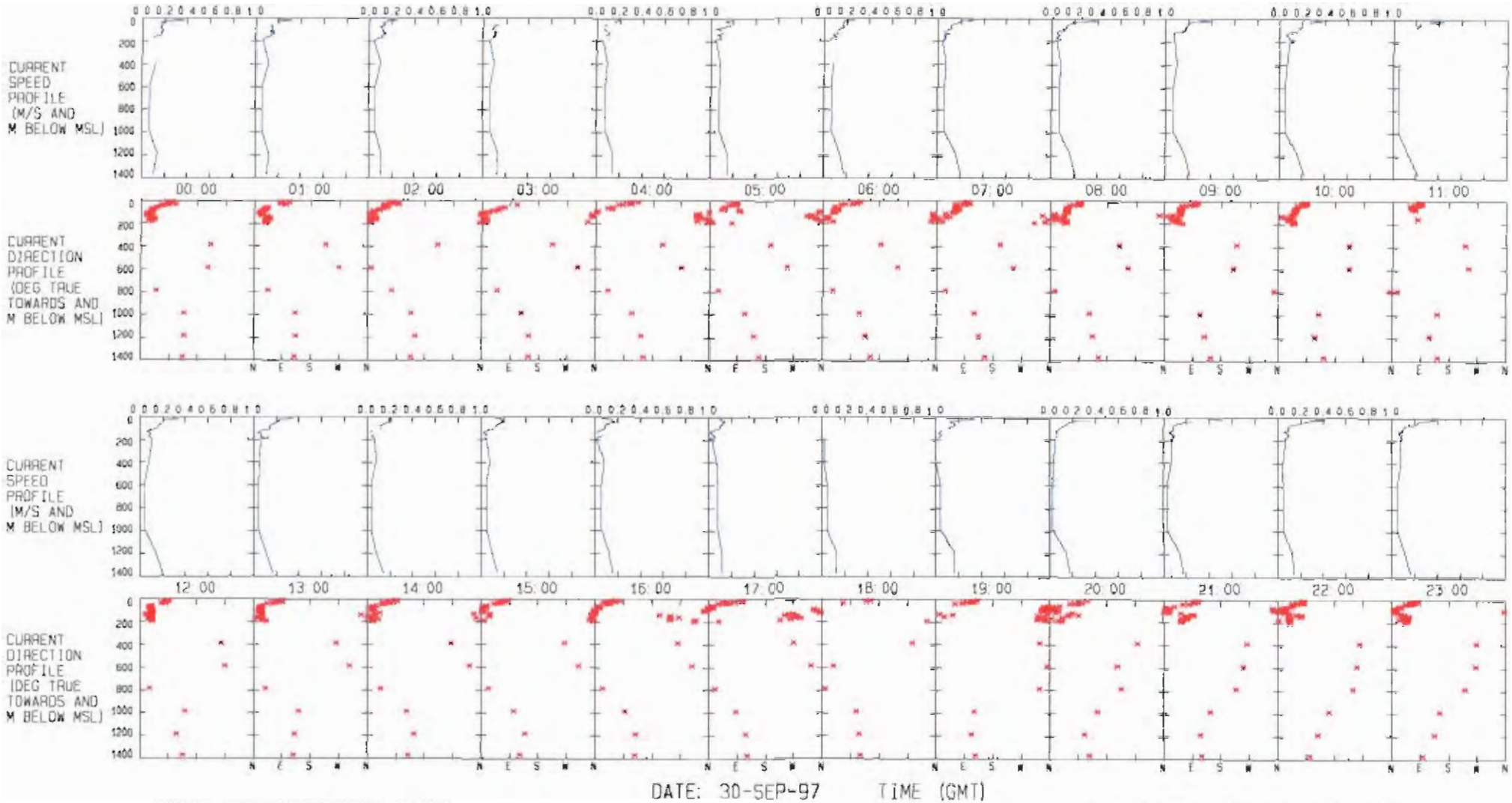
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 1 (30-SEP-97)

REF. NO: 10328/1488

FIGURE NO: 13.1.1

01AB238-0900



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

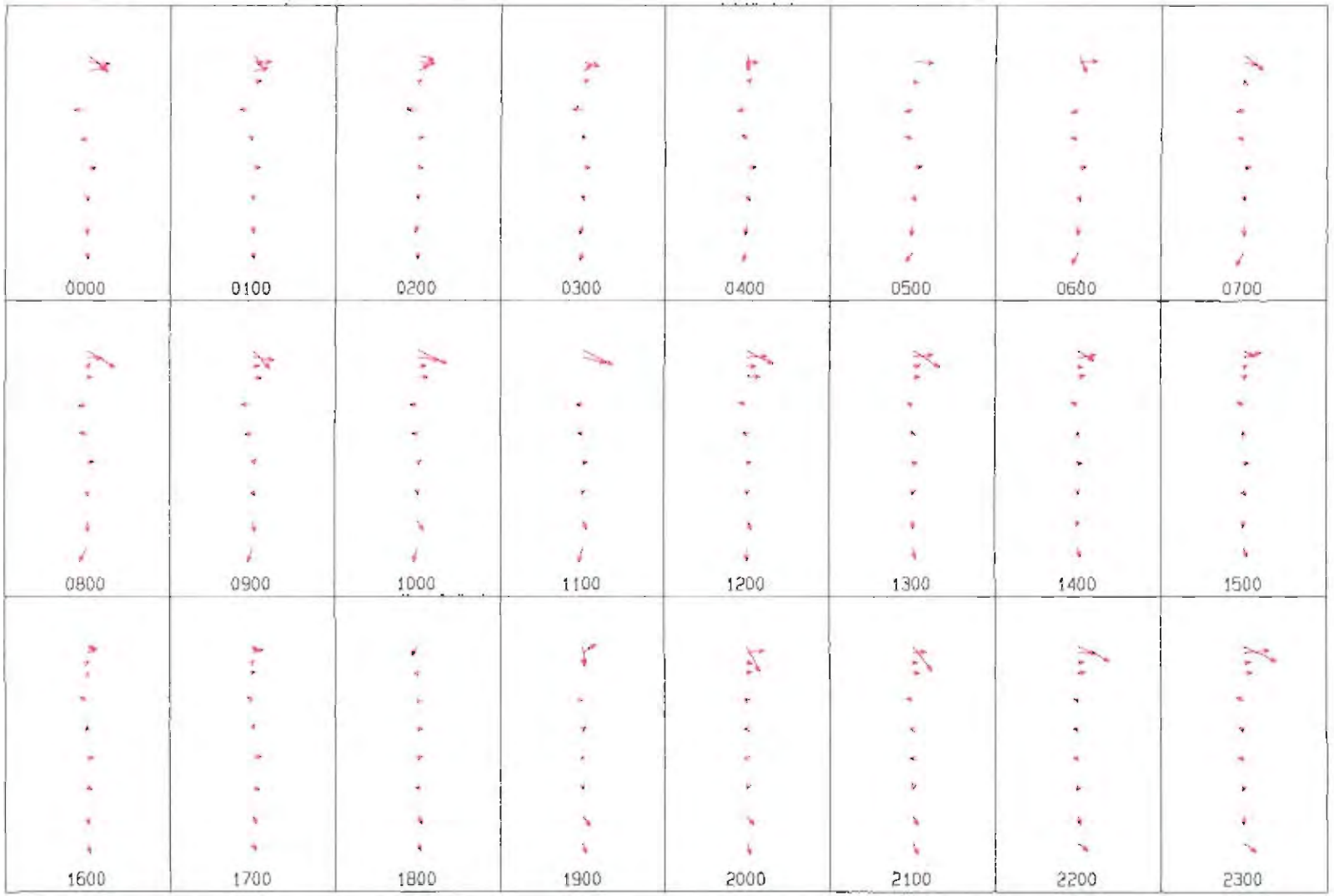
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 1 (30-SEP-97)

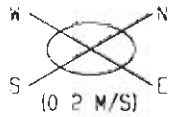
REF NO C10328
FIG NO 13.1.2

PLOT DATE: 26-JAN-98

FILE: AN01SEP30PSU



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

GEOS

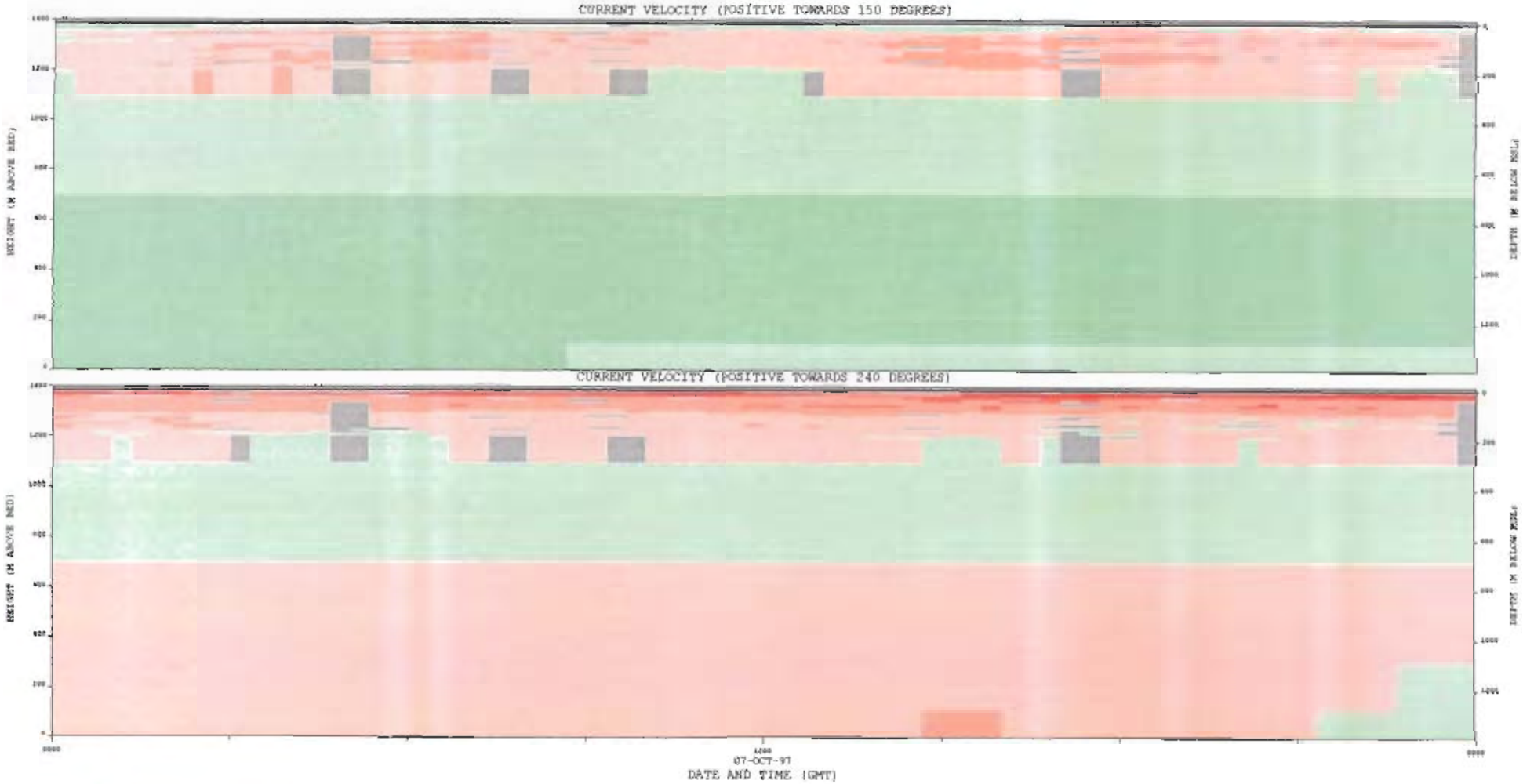
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES
30-SEP-97 00:00 TO 30-SEP-97 23:00

REF NO C10328
FIG NO 13.1.3

PLOT DATE 26-JAN-98

FILE: SPIA01



CURRENT VELOCITY (M/S)

0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50

MISSING OR ERROR FLAGGED DATA

NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20minS

RCM7 & RCM8 SPEEDS FORCED FROM WCM4

BEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

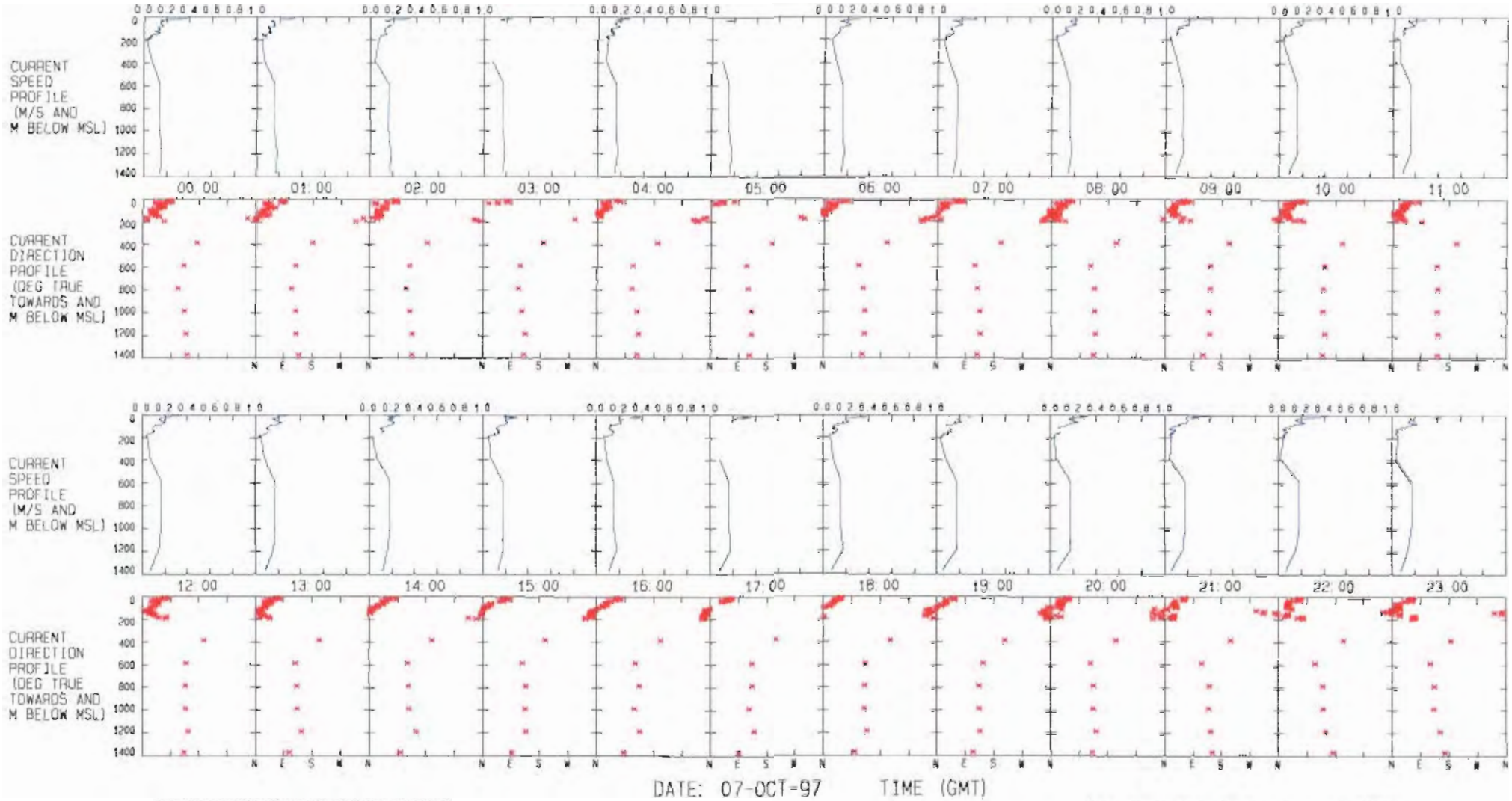
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 2 (07-OCT-97)

REF. NO: 10328/1488

FIGURE NO: 13.2.1

PLOT DATE: 30-JAN-98 PLOT EVENT2



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0060
DEPTH OF WATER: 1385M

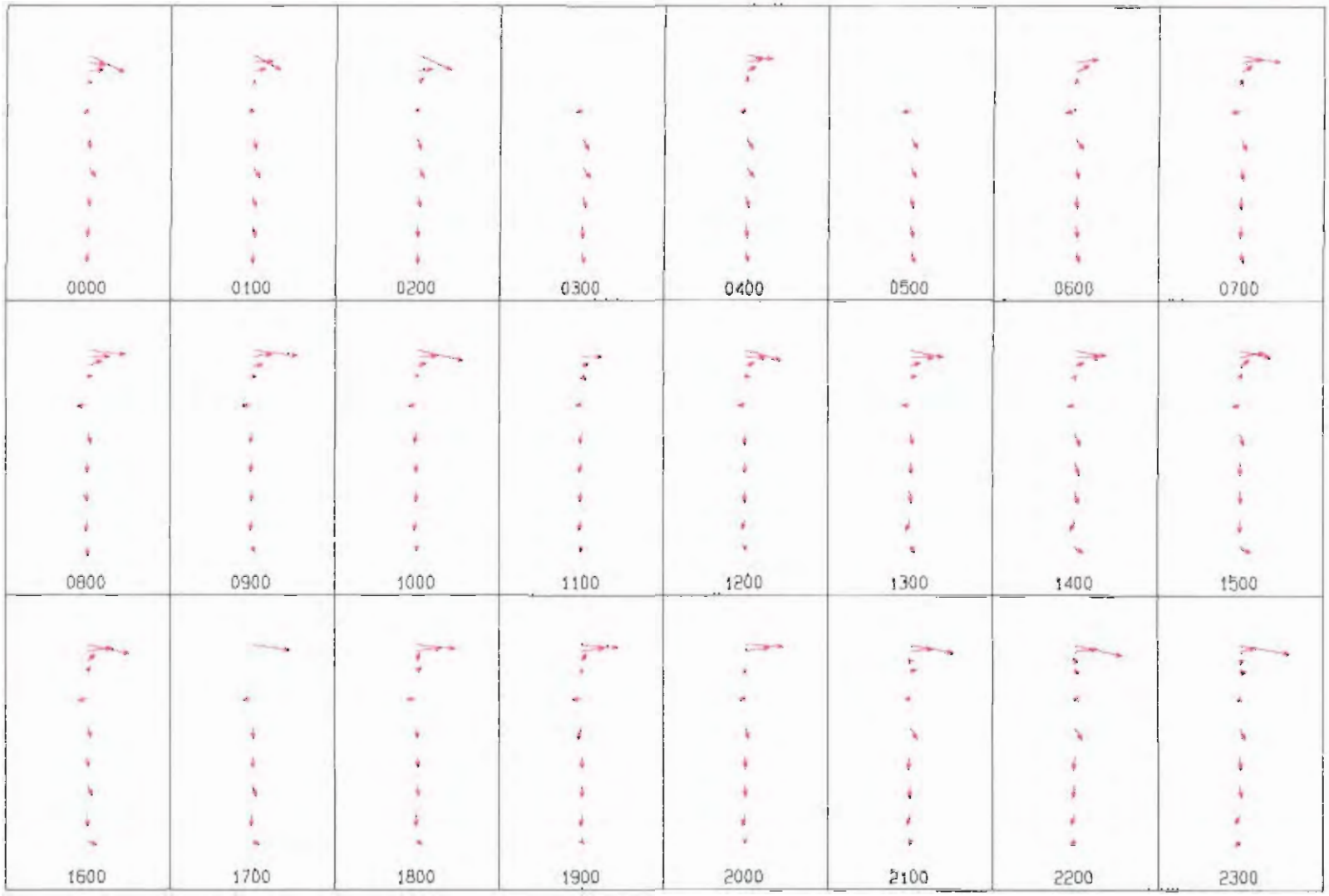
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 2 (07-OCT-97)

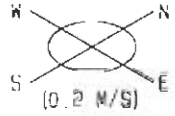
REF NO C10328
FIG NO 13.2.2

PLOT DATE 26-JAN-98

FILE: ANS1OCT97PSQ



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

GEOS

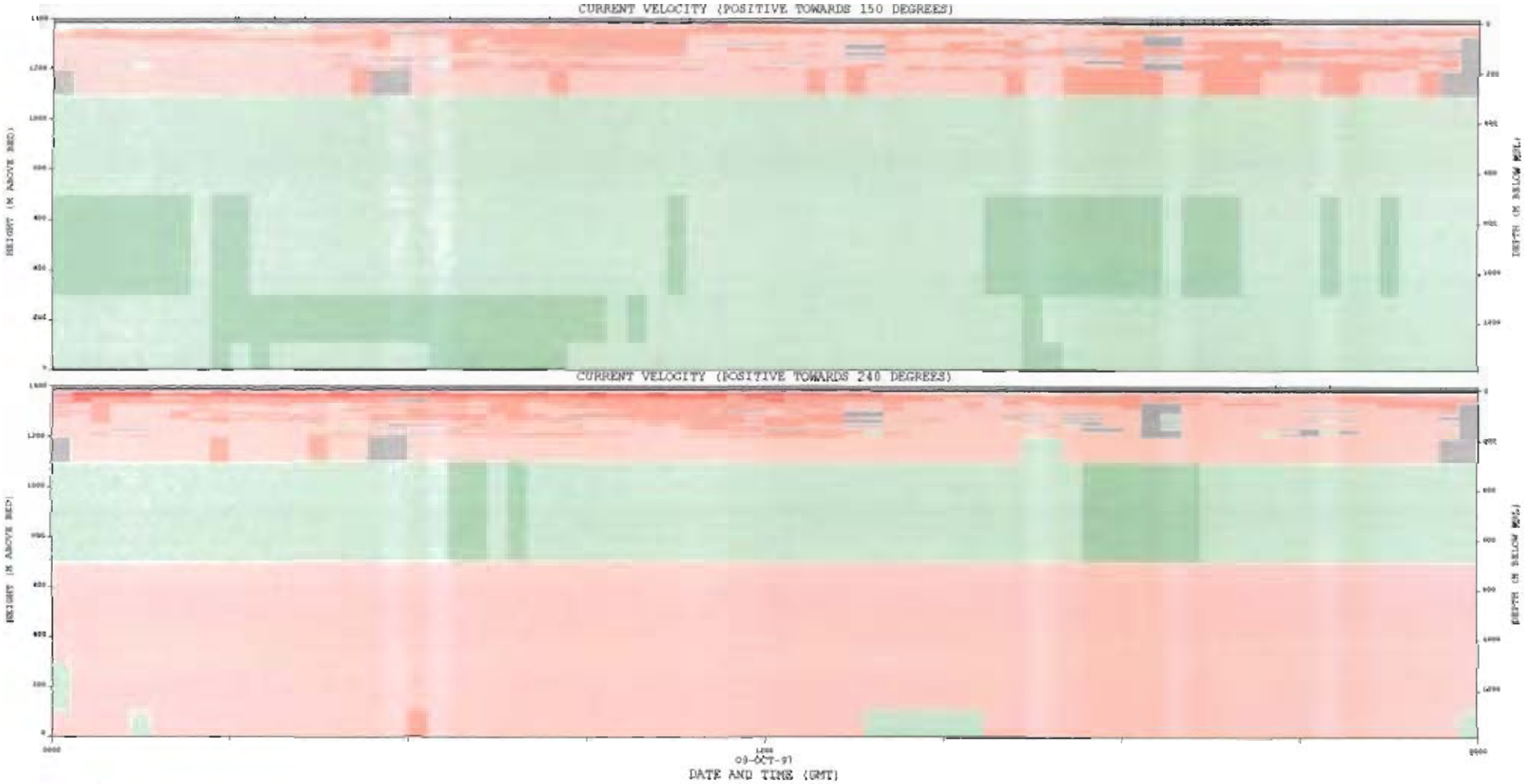
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES
07-OCT-97 00:00 TO 07-OCT-97 23:00

REF NO C10328
FIG NO 13.2.3

PLOT DATE 26-JAN-98

FILE: SPIA02



NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

RCM8 & RCM9 SPEEDS FORCED FROM RCM4

BEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

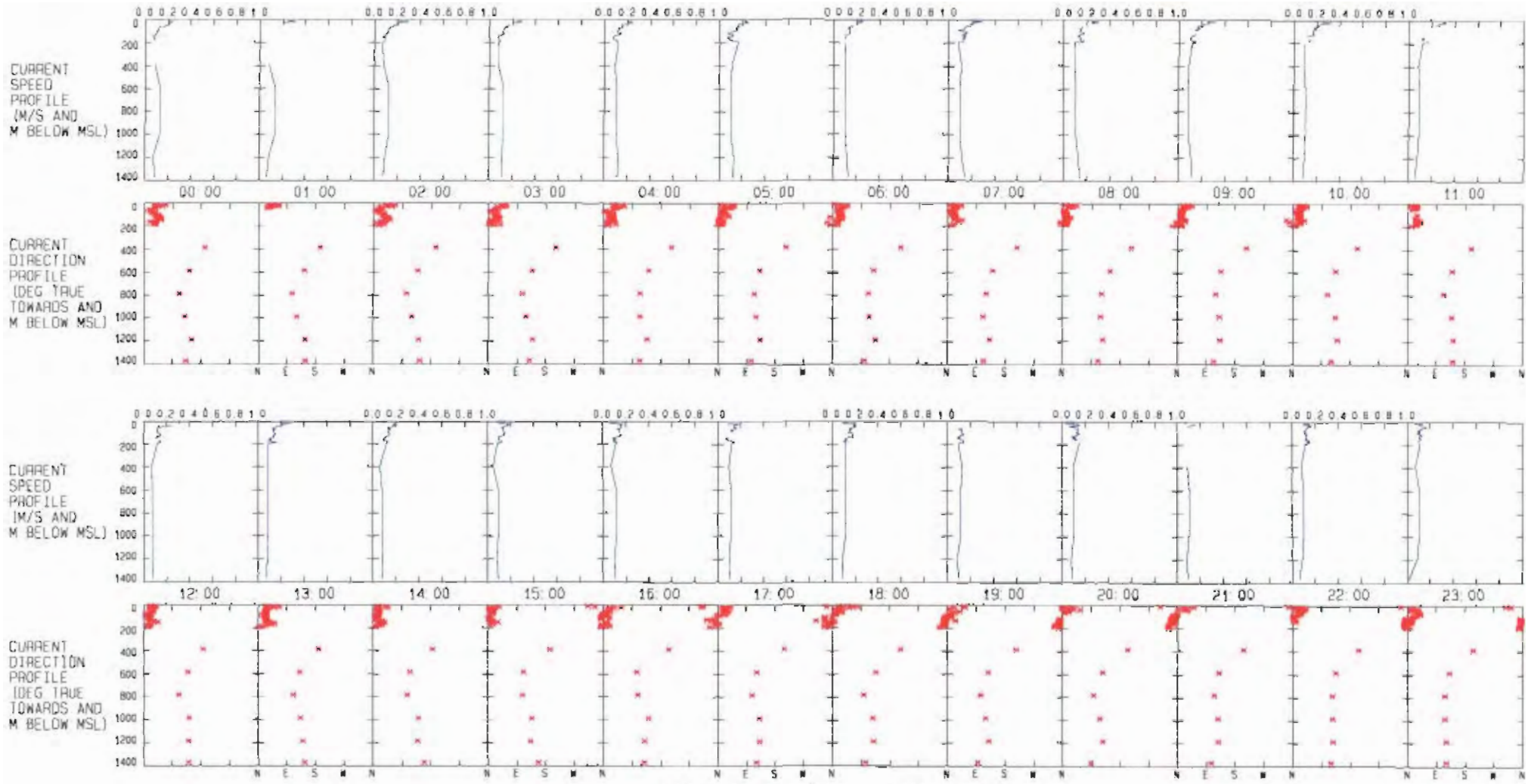
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 3 (09-OCT-97)

REF. NO: 10328/1488

FIGURE NO: 13.3.1

01AB238-0900



HCM2 & HCM3 SPEEDS FORCED FROM HCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

GEOS

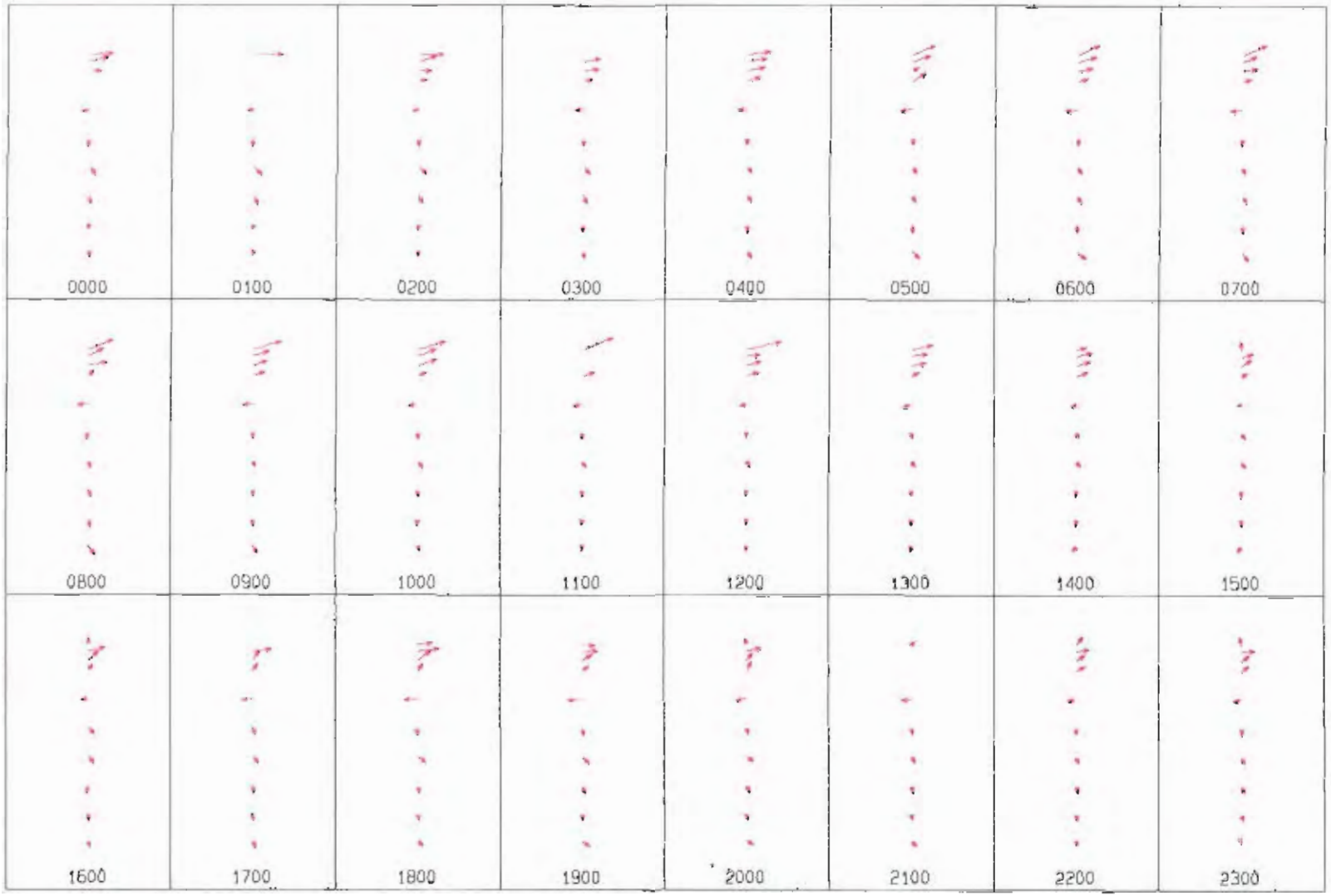
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 3 (09-OCT-97)

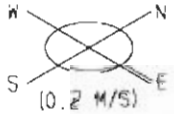
REF NO C10328
FIG NO 13.3.2

PLOT DATE 26-JAN-98

FILE: ANDTOCT09PSQ



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES

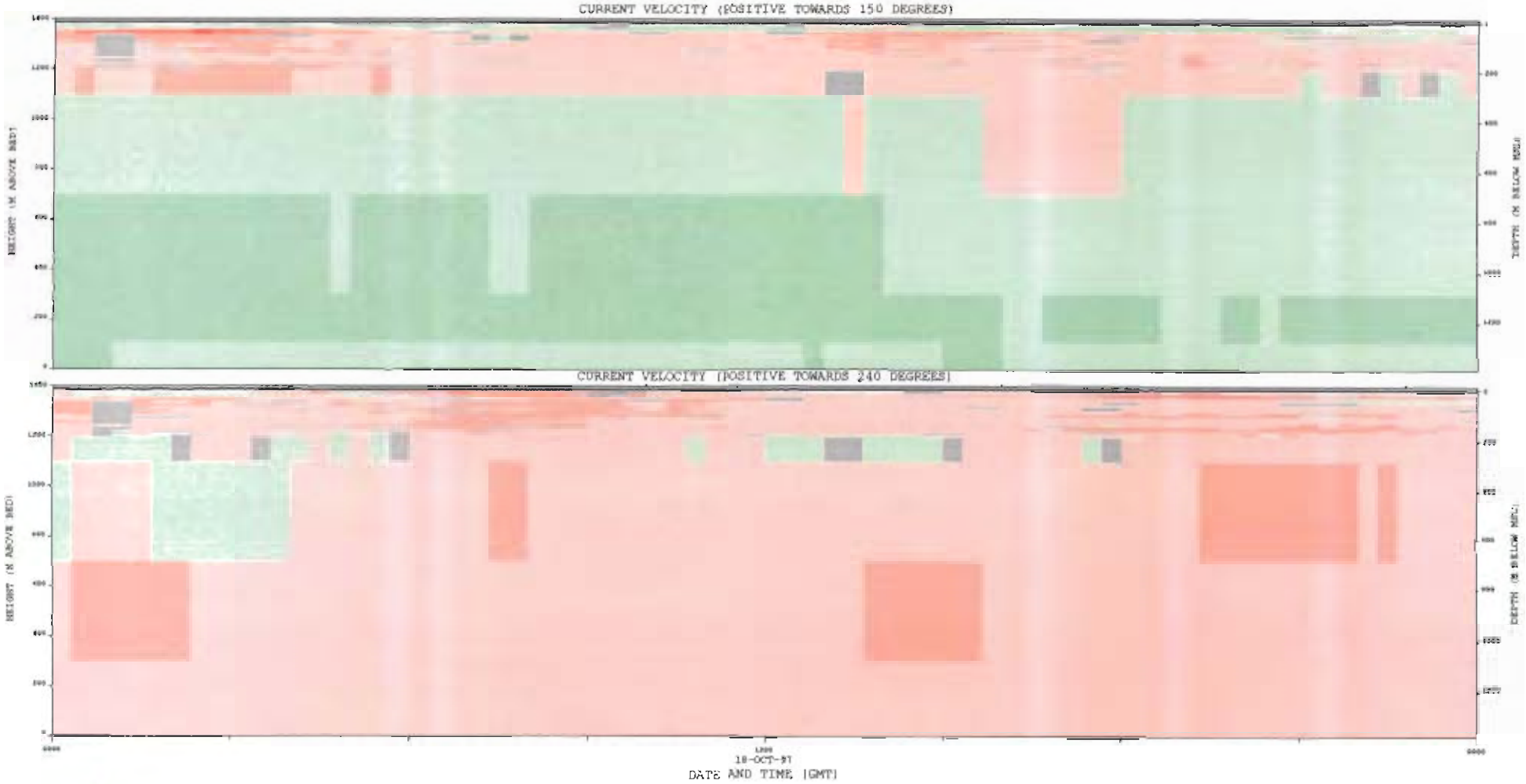
09-OCT-97 00:00 TO 09-OCT-97 23:00

REF NO 610328

FIG NO 13.3.3

PLOT DATE 26-JAN-98

FILE: SPIA03



CURRENT VELOCITY (M/S)

0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50

MISSING OR ERROR FLAGGED DATA

NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

RCM7 & RCM8 SPEEDS FORCED FROM RCM4

ESA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

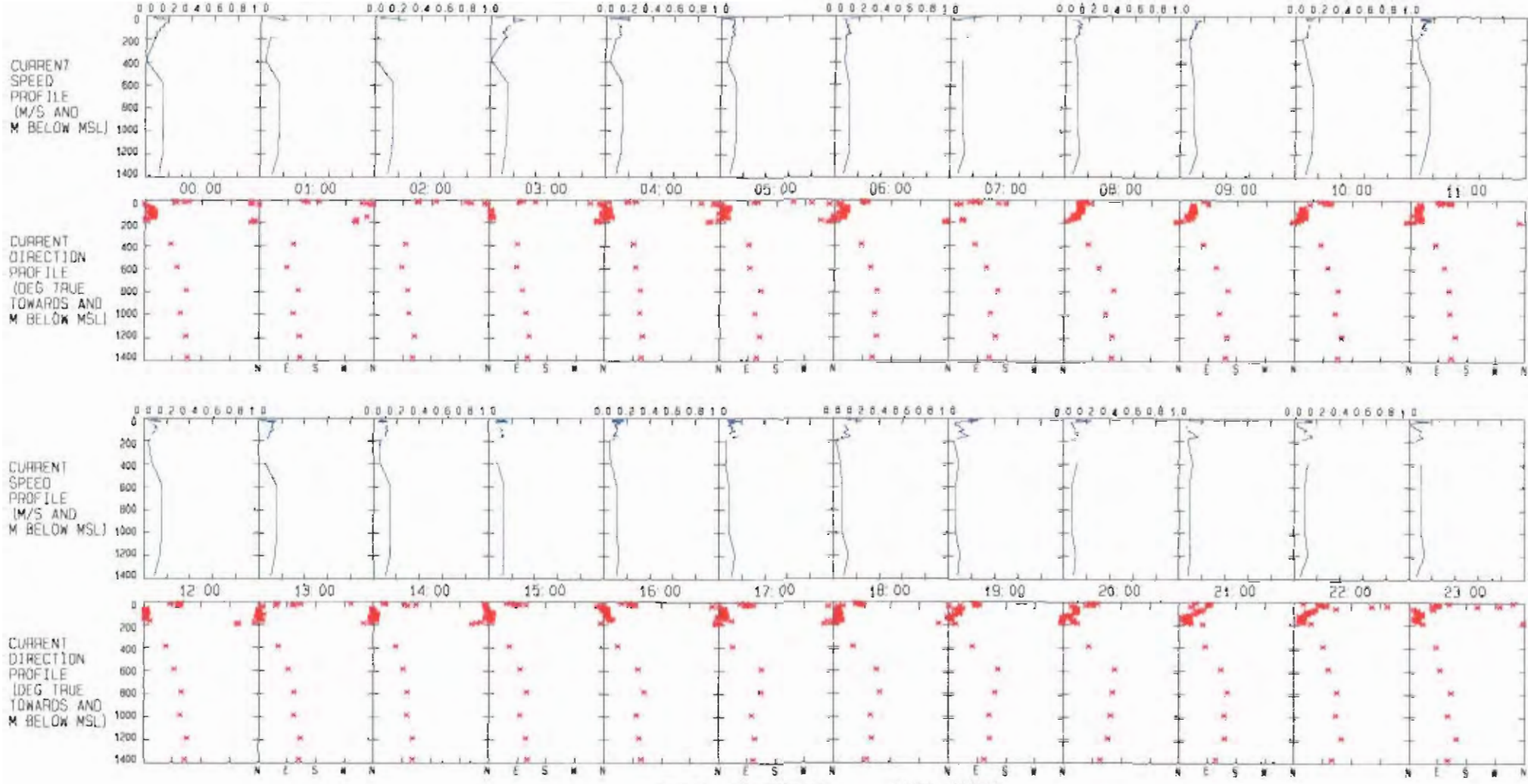
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 4 (18-OCT-97)

REF. NO: 10328/1488

FIGURE NO: 13.4.1

01AB238-0900



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

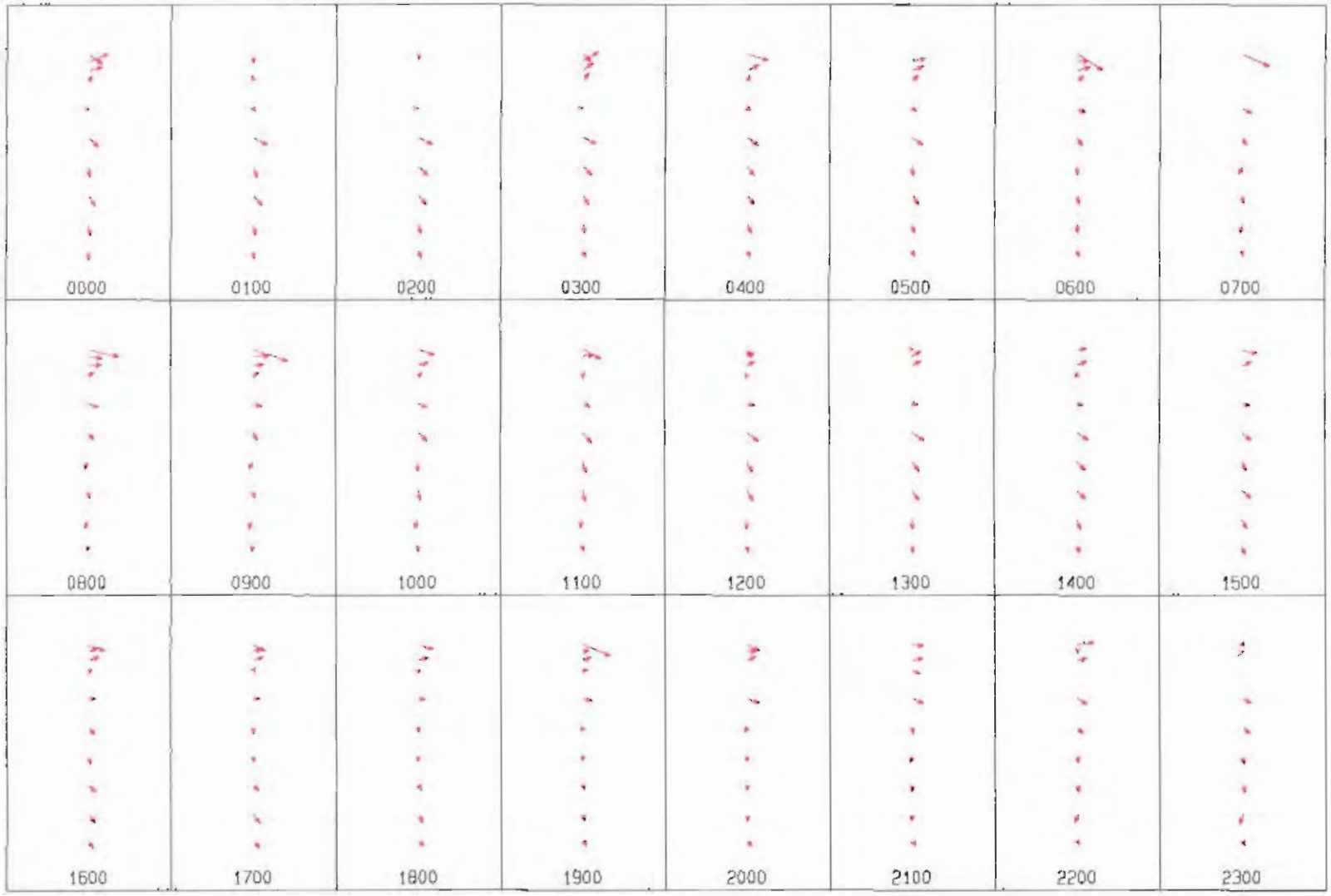
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 4 (18-OCT-97)

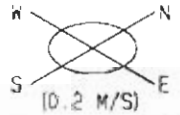
REF NO C10328
FIG NO 13 4.2

PLOT DATE: 26-JAN-98
FILE: ANG10CT18PSD

01AB238-0900



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES

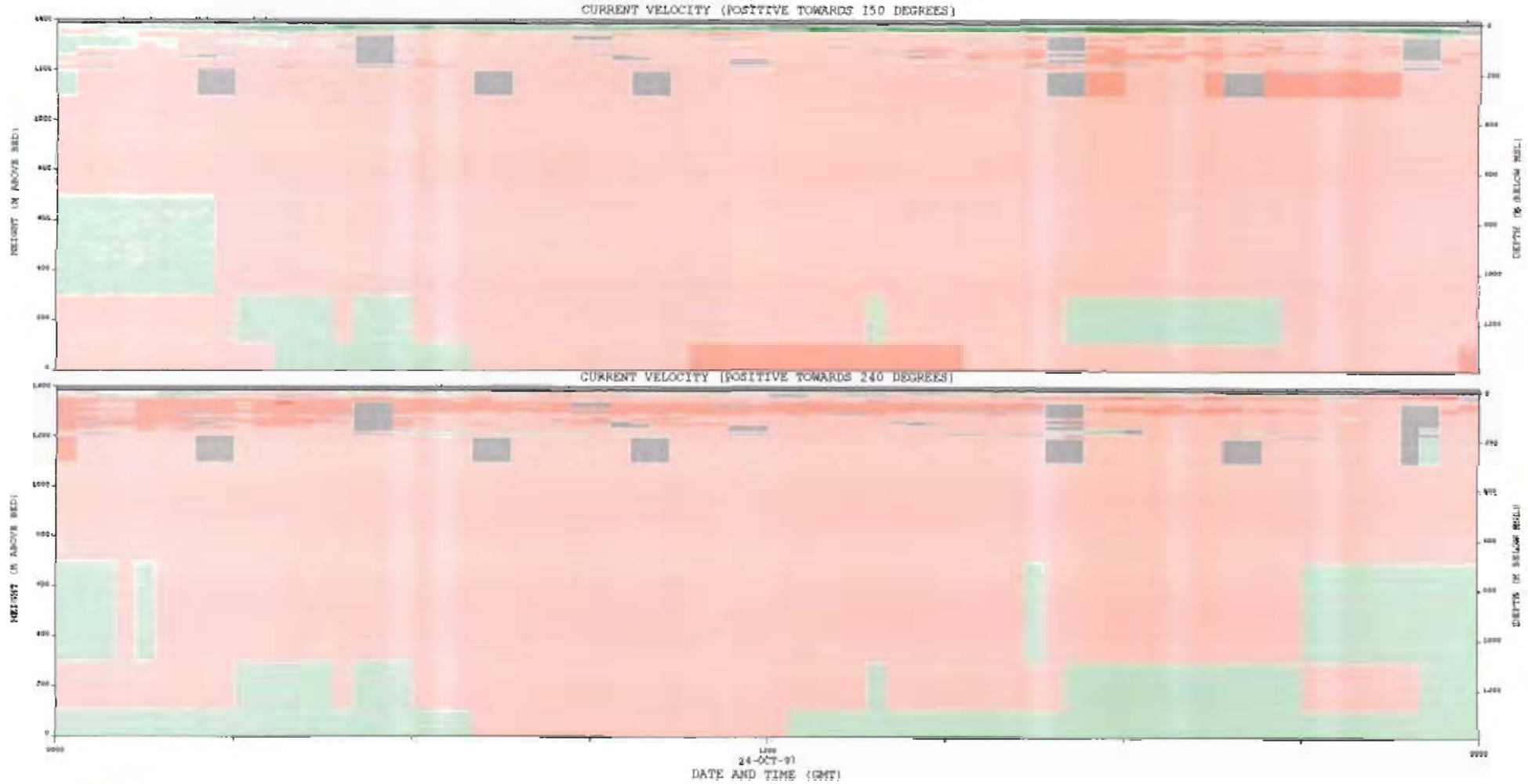
18-OCT-97 00:00 TO 18-OCT-97 23:00

REF NO C10328

FIG NO 13.4.3

PLOT DATE: 26-JAN-98

FILE: SPIA04



CURRENT VELOCITY (M/S)

0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50

MISSING OR ERROR FLAGGED DATA

NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/9
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11240/11402
SAMPLING INTERVAL:	20mins

RCM9 & RCM7 SPEEDS FORCED FROM RCM4

SEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

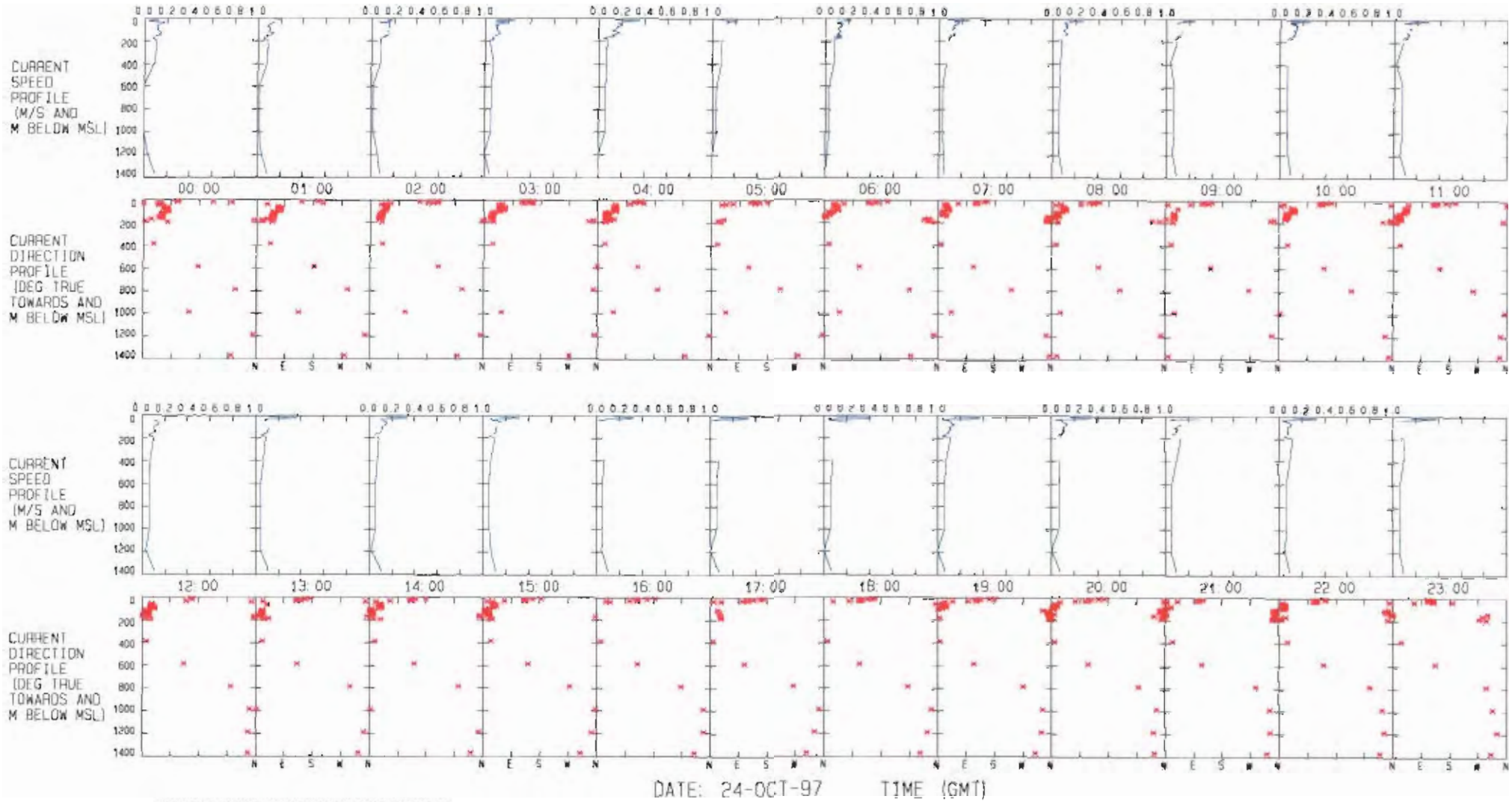
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 5 (24-OCT-97)

REF. NO: 10328/1488

FIGURE NO: 13.5.1

01AB238-0900



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

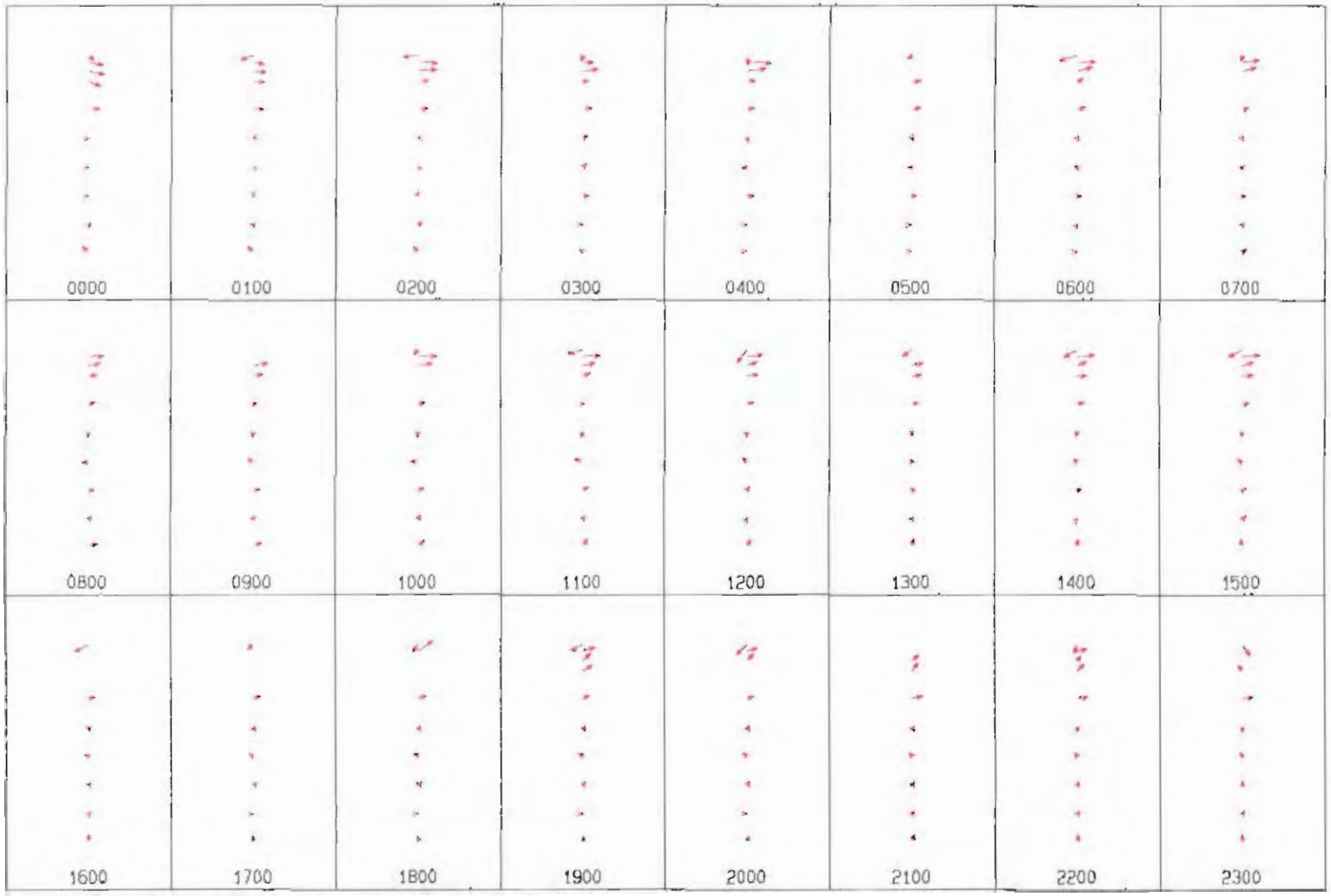
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 5 (24-OCT-97)

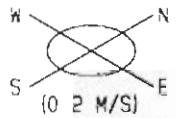
REF NO C10328
FIG NO 13.5.2

PLOT DATE 26-JAN-98

FILE: AN61DC124P5Q



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

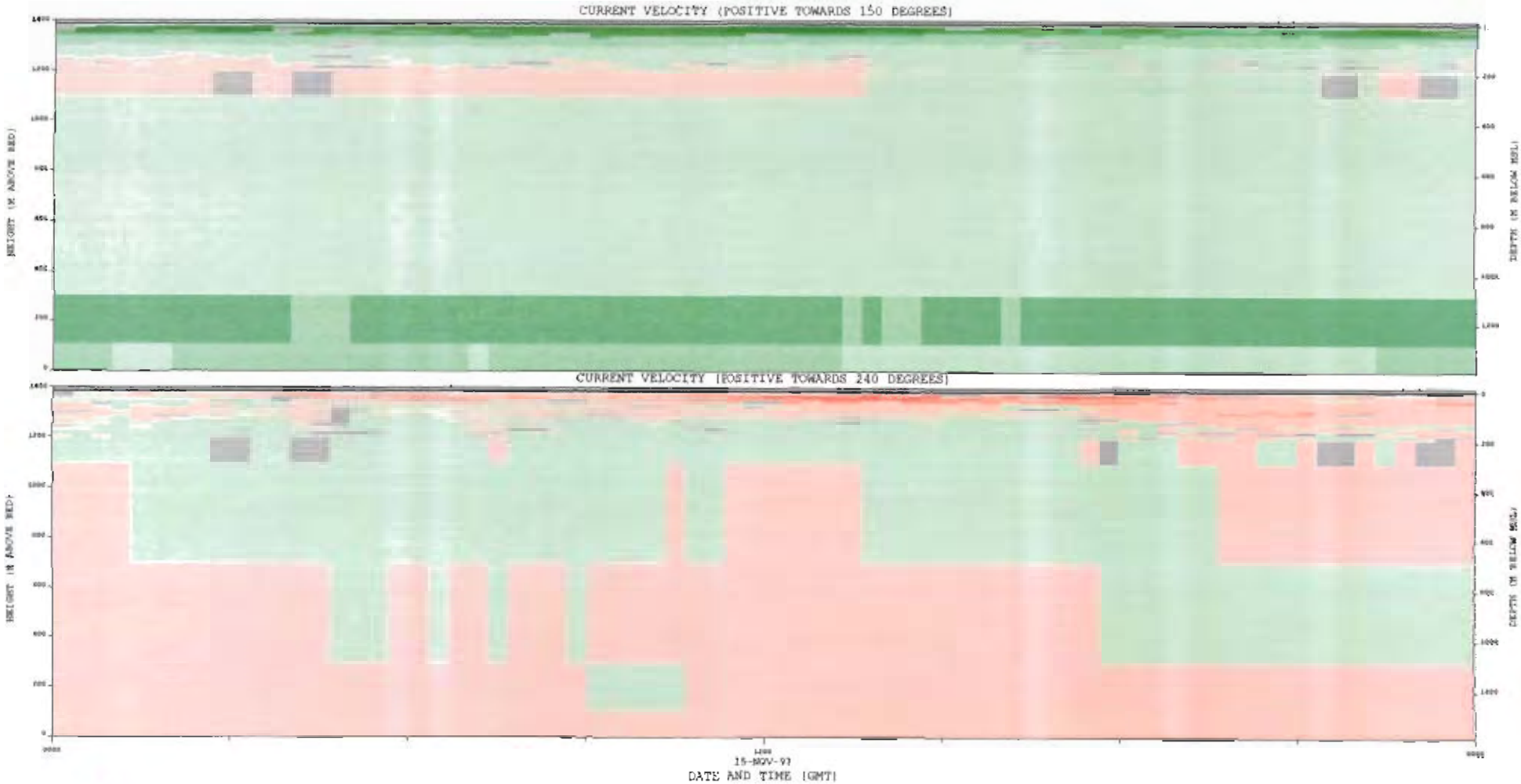
GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES
24-OCT-97 00:00 TO 24-OCT-97 23:00

REF NO C10328
FIG NO 13.5.3

PLOT DATE: 26-JAN-98
FILE: SPIR05



CURRENT VELOCITY (M/S)

0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50

MISSING OR ERROR FLAGGED DATA

NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

RCM7 & RCM8 SPEEDS FORCED FROM RCM4

BEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

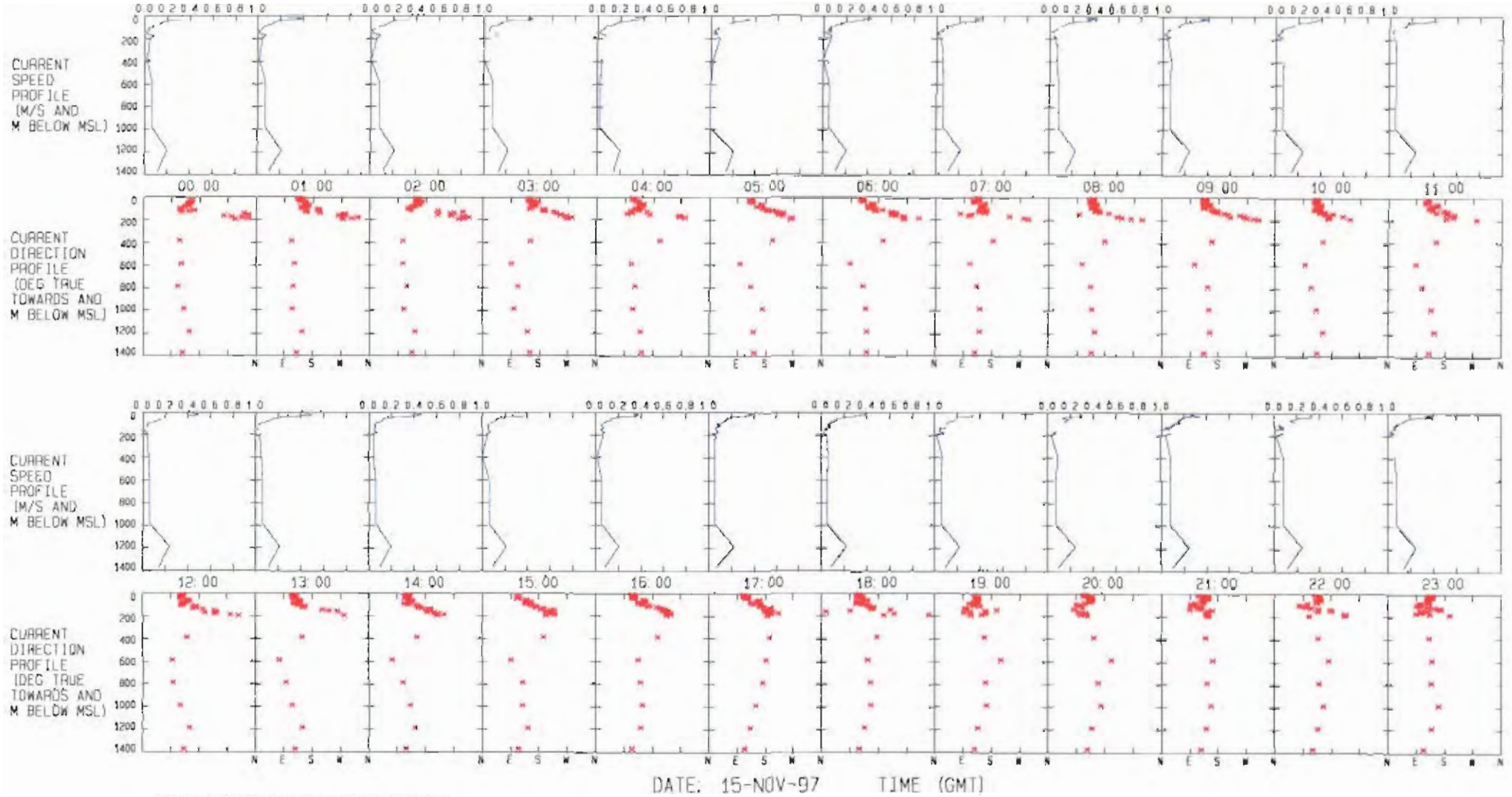
EVENT 6 (15-NOV-97)

REF. NO: 10328/1488

FIGURE NO: 13.6.1

PLOT DATE: 25-JAN-98 FILE: EVENT6

01AB238-0900



ACM2 & ACM3 SPEEDS FORCED FROM ACM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40 20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

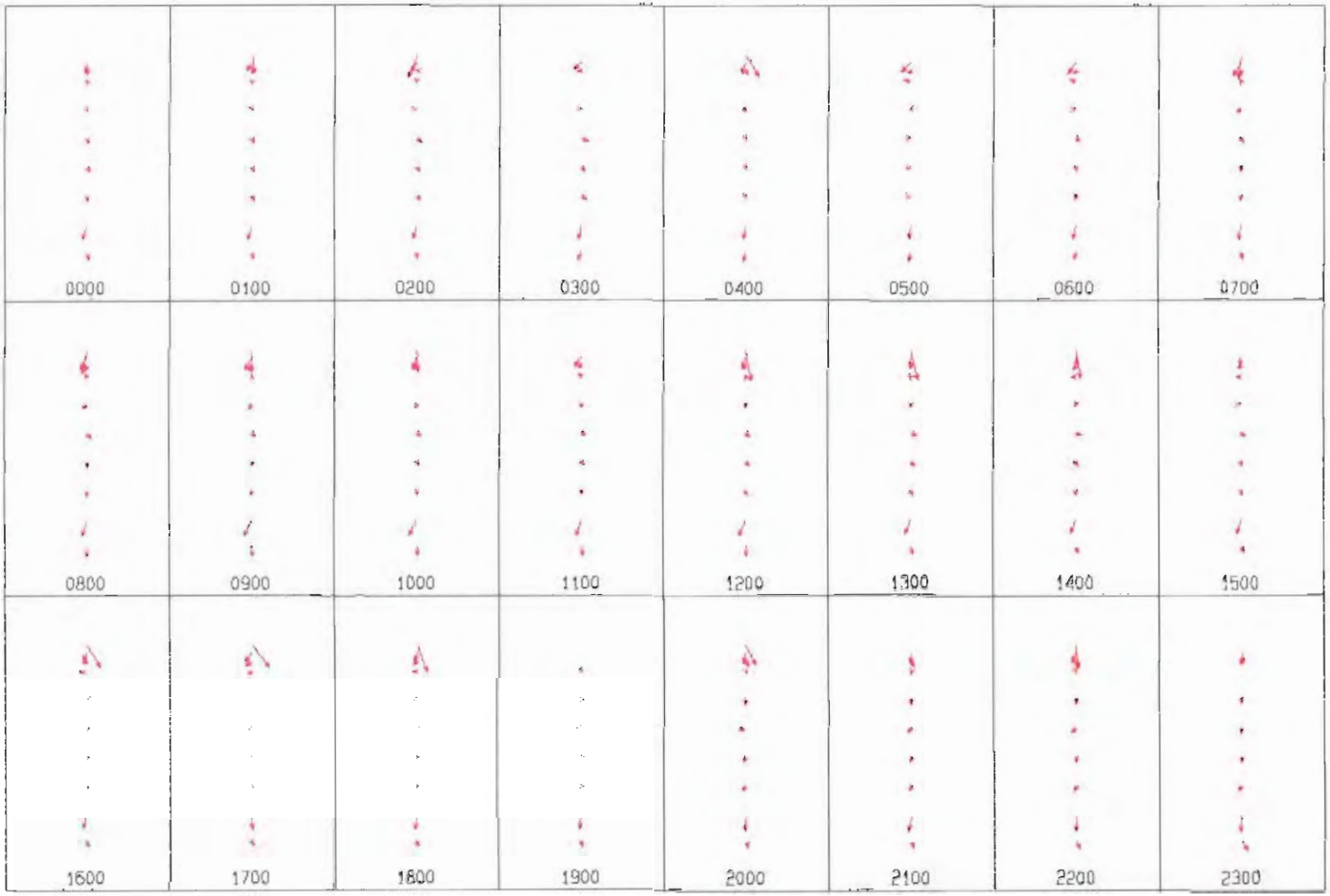
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE EVENT 6 (15-NOV-97)

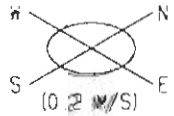
REF NO C10328
FIG NO 13.6.2

PLOT DATE: 26-JAN-99

FILE: ANG1NOV15PS0



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 137OM BELOW M.S.L
DIRECTION IS DEGREES TRUE

GEOS

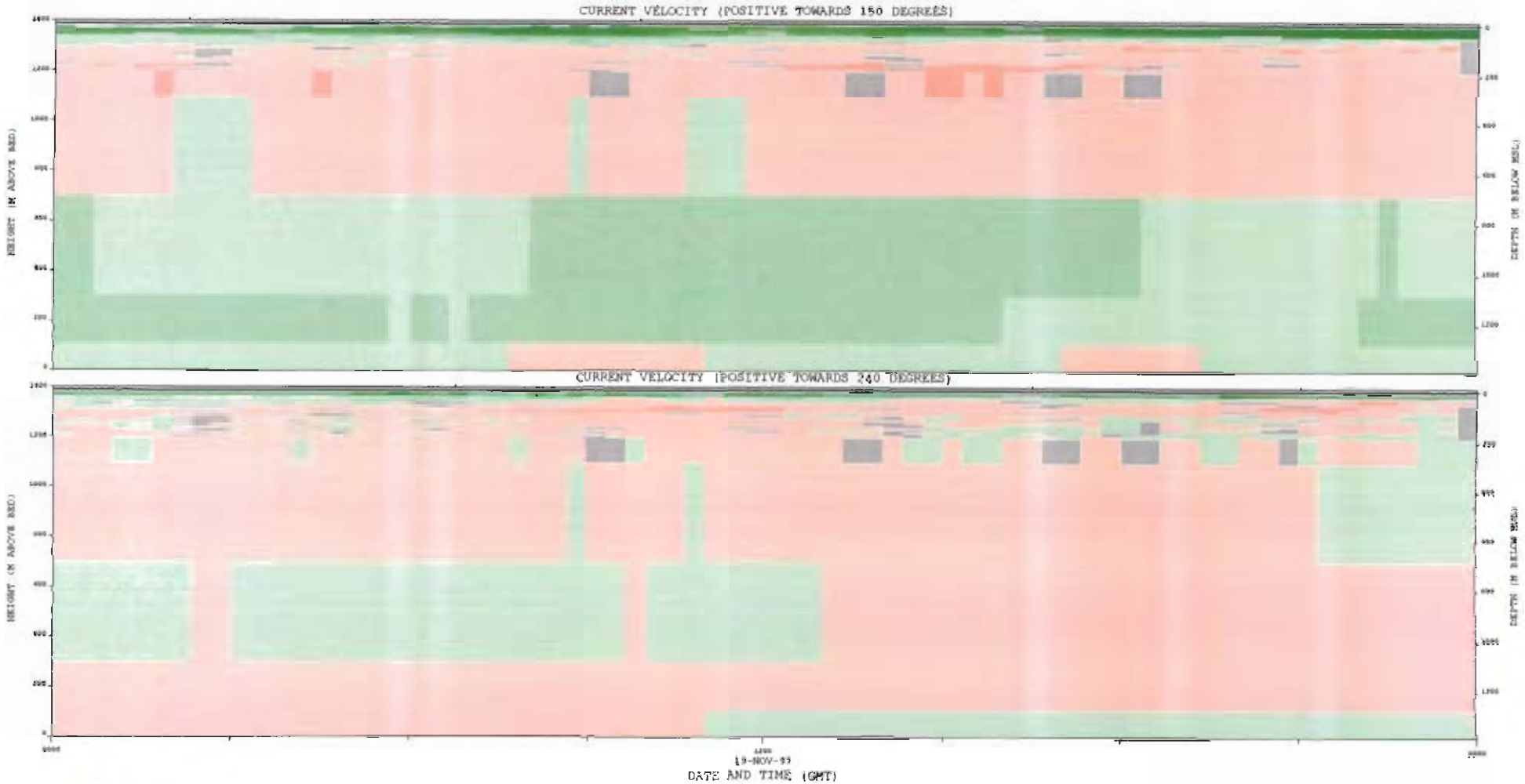
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES
15-NOV-97 00:00 TO 15-NOV-97 23:00

REF NO C10328
FIG NO 13.6.3

PLOT DATE: 26-JAN-98

FILE: SPIR06



CURRENT VELOCITY (M/S)

0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50

MISSING OR ERROR FLAGGED DATA

NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 46.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

RCM7 & RCM8 SPEEDS FORCED FROM RCM4

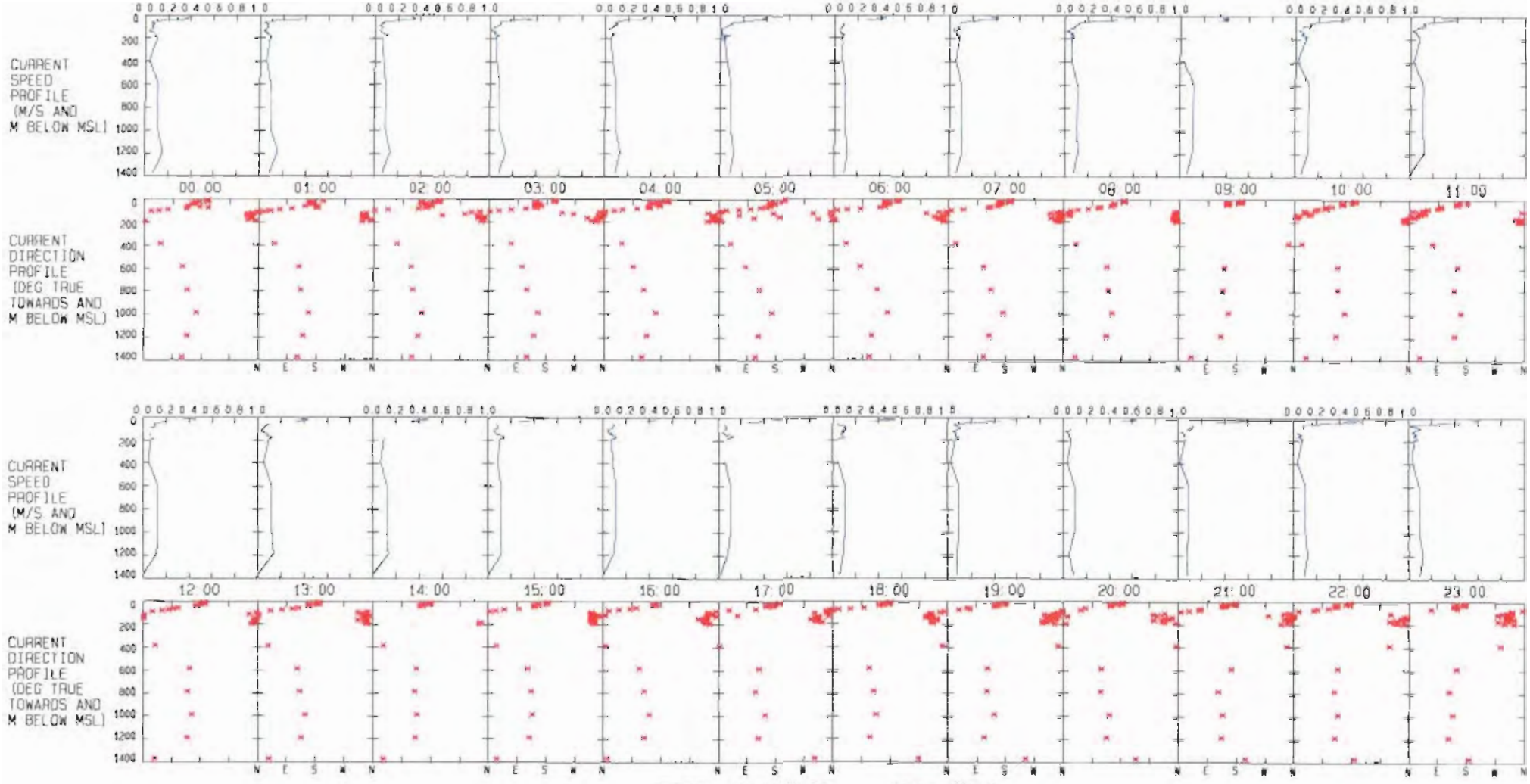
ESA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 7 (19-NOV-97)

REF. NO: 10328/1488

FIGURE NO: 13.7.1



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

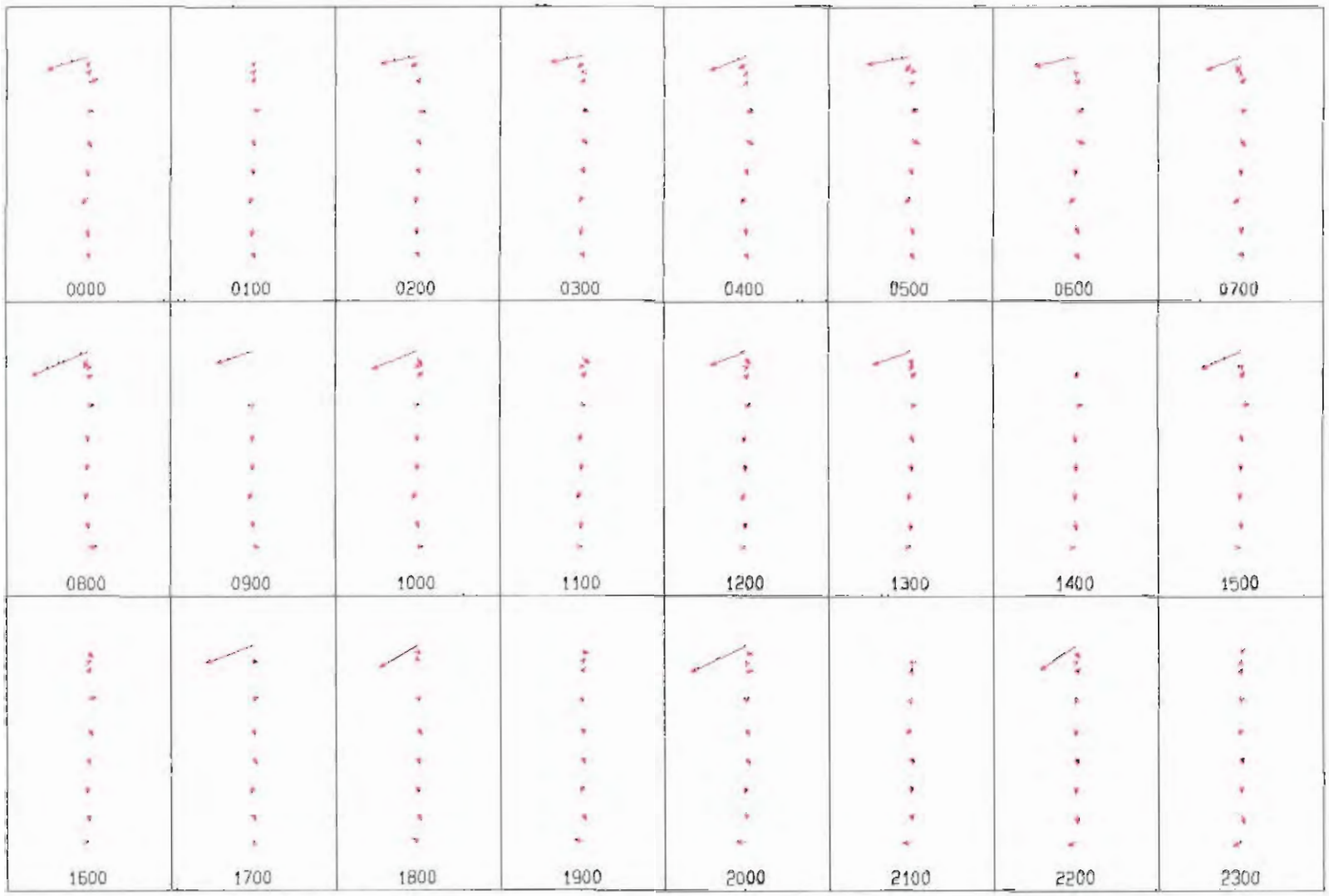
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 7 (19-NOV-97)

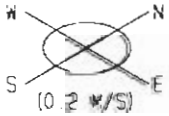
REF NO C10328
FIG NO 13.7.2

PLOT DATE: 26-JAN-98

FILE: AND3NOV19P5Q



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES

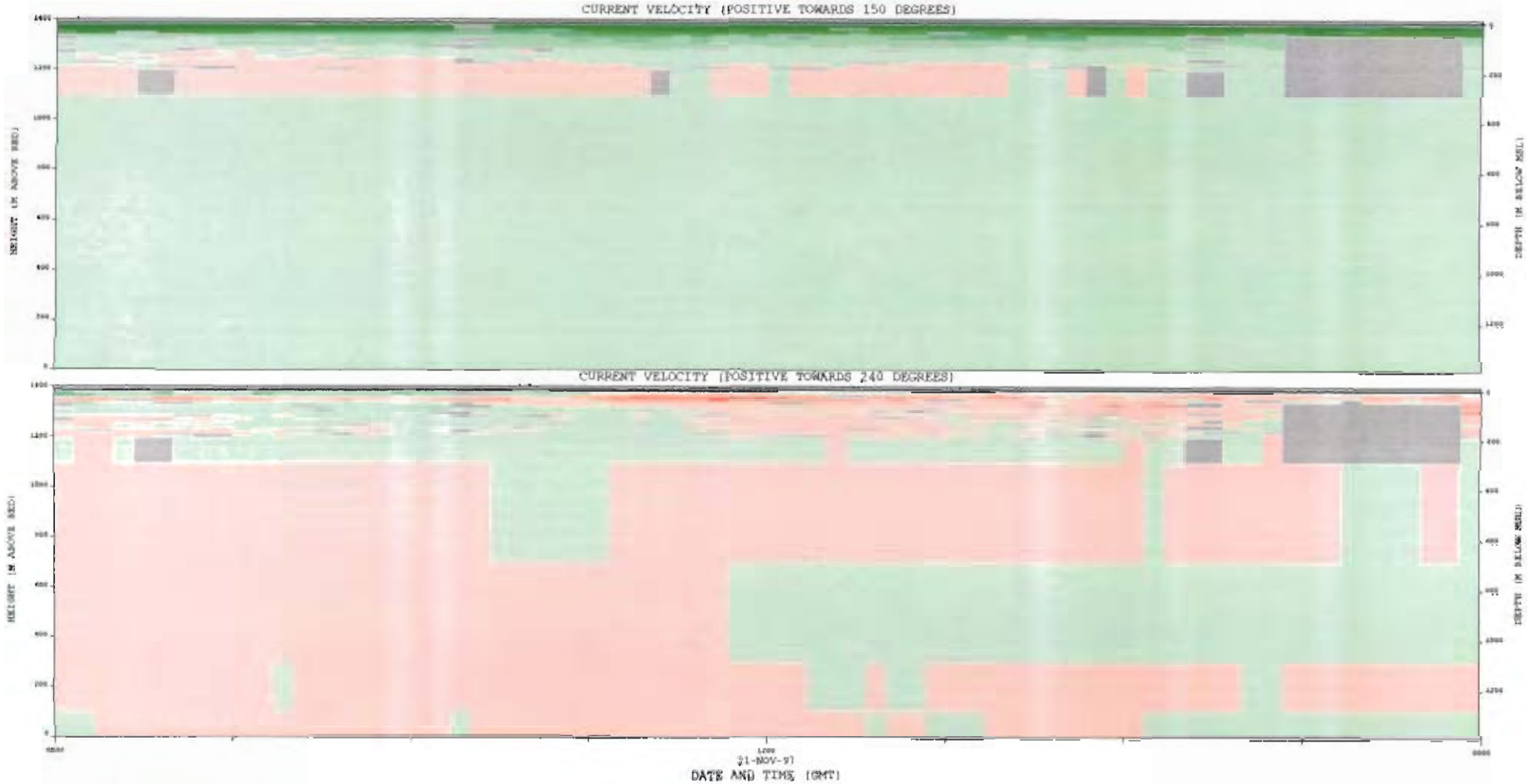
19-NOV-97 00:00 TO 19-NOV-97 23:00

REF NO C10328

FIG NO 13.7.3

PLOT DATE: 26-JAN-98

FILE: SPIR07



NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

RCM8 & RCM9 SPEEDS FORCED FROM RCM4

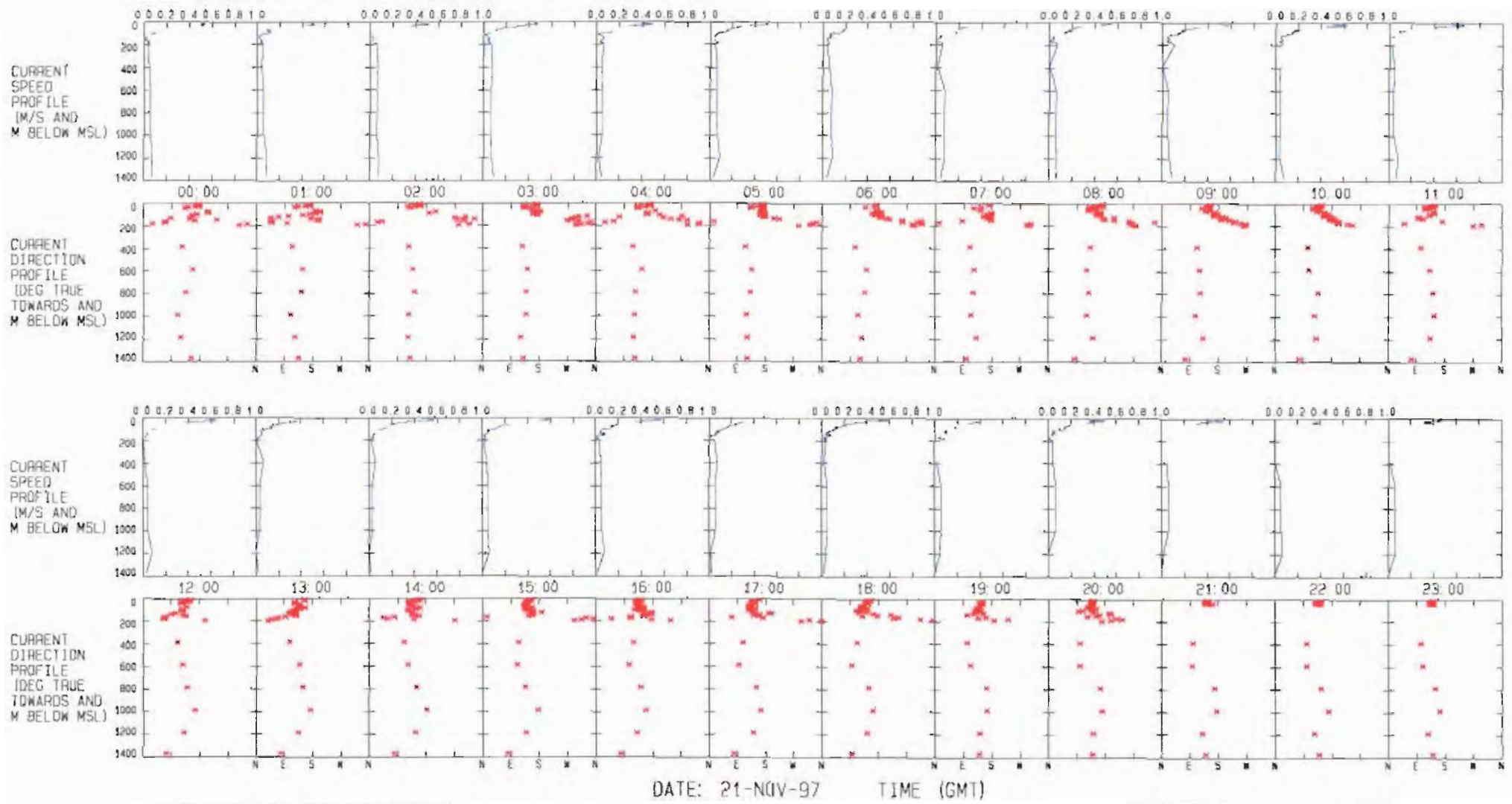
ESA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 8 (21-NOV-97)

REF. NO: 10328/1488

FIGURE NO: 13.8.1



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

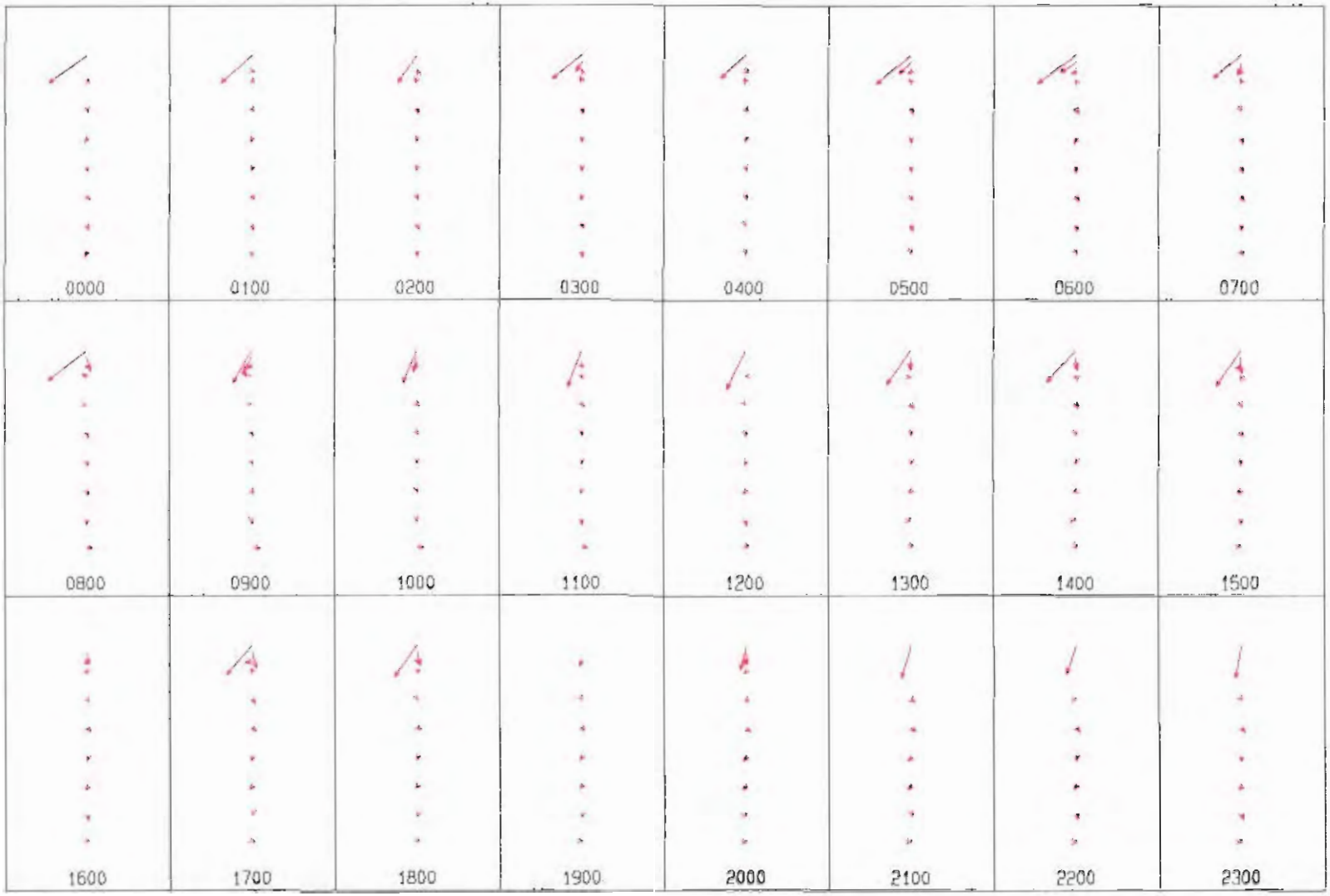
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 8 (21-NOV-97)

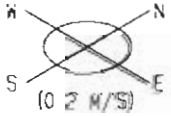
AFF NO C10328
FIG NO 13.8.2

PLOT DATE: 26-JAN-98

FILE: ANG1NOV21PSG



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 137CM BELOW M.S.L
DIRECTION IS DEGREES TRUE

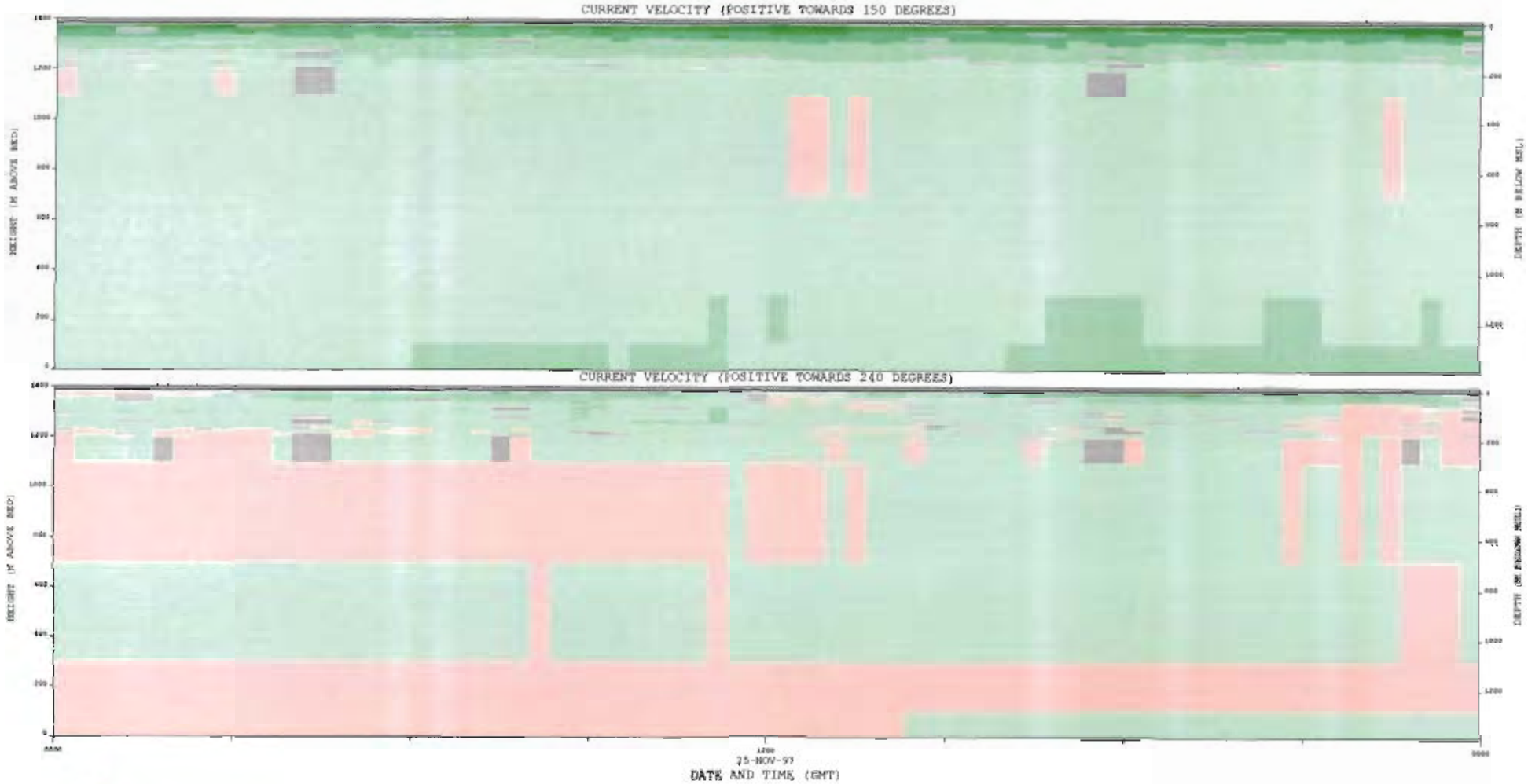
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES
21-NOV-97 00:00 TO 21-NOV-97 23:00

REF NO C10328
FIG NO 13.8.3

PLOT DATE: 26-JAN-98

FILE: SPIRO8



CURRENT VELOCITY (M/S)

0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50

MISSING OR ERROR FLAGGED DATA

NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 11417/11260/11492
SAMPLING INTERVAL:	20mins

RCM7 & RCM8 SPEEDS FORCED FROM RCM4

ESSO

ESSO GIRASSOL DEEPWATER CURRENT MEASUREMENTS

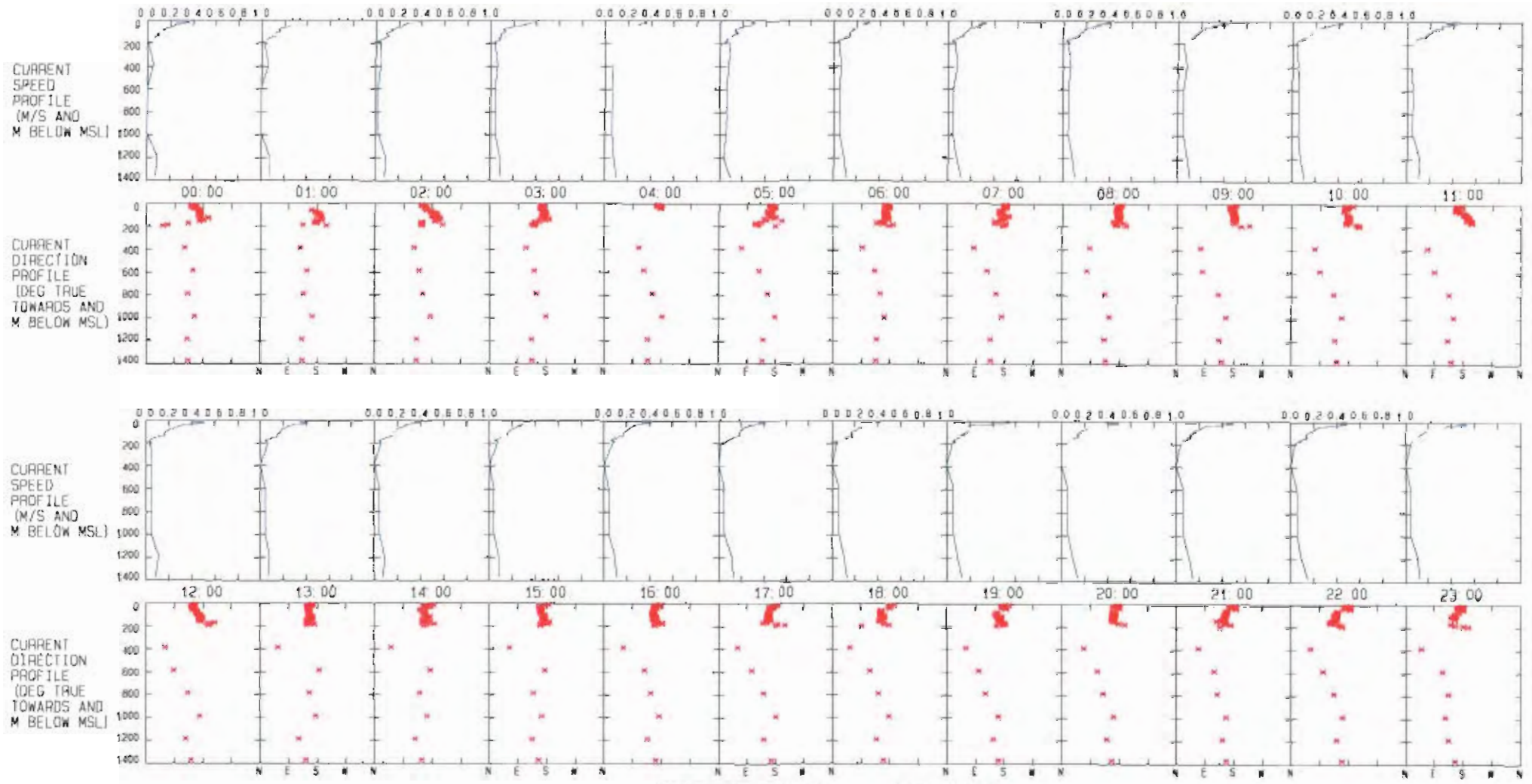
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 9 (25-NOV-97)

REP. NO: 10328/1488

FIGURE NO: 13.9.1

01AB238-0900



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

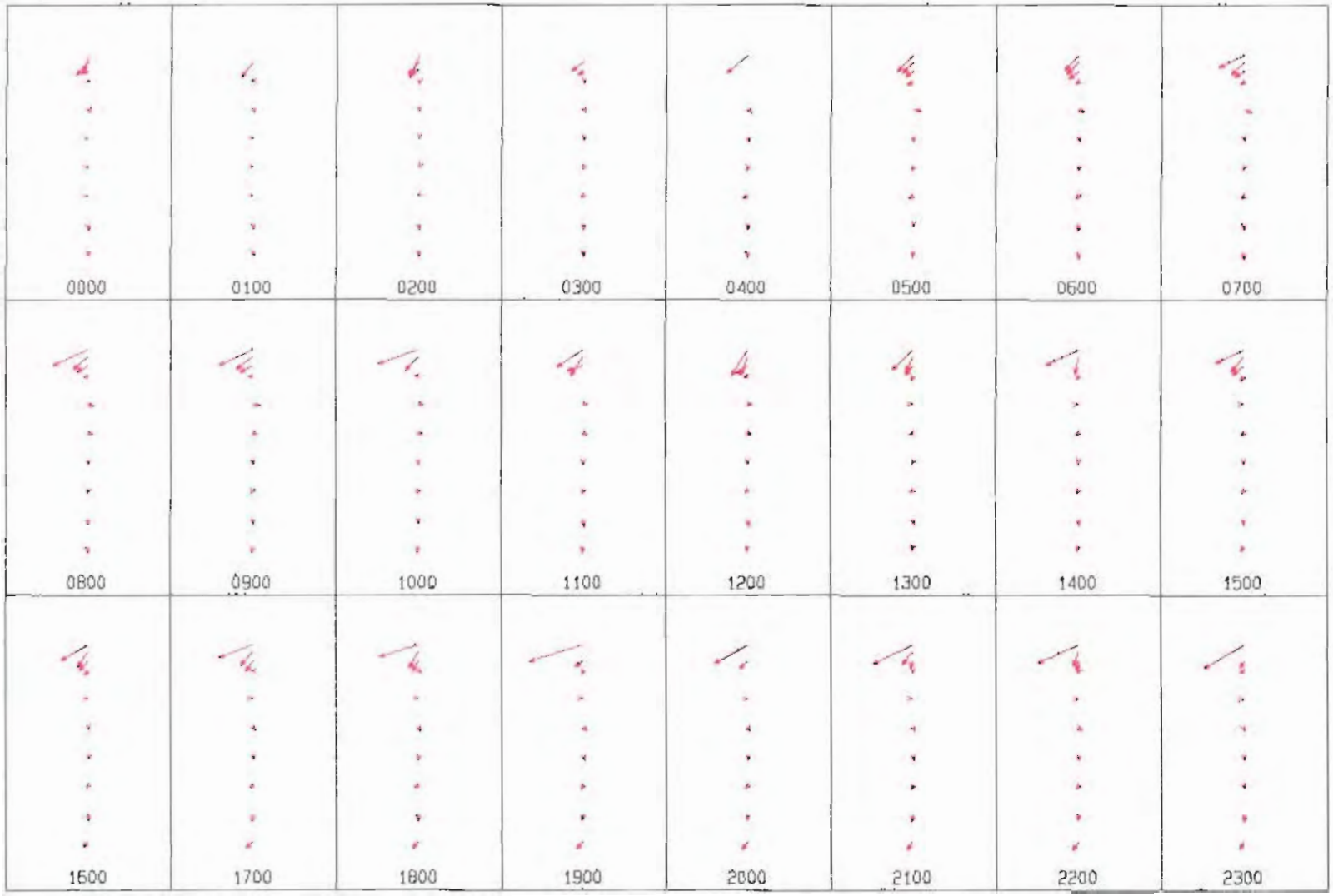
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 9 (25-NOV-97)

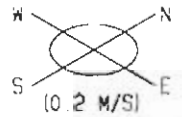
REF NO G10328
FIG NO 13.9.2

PLOT DATE 26-JAN-98

FILE: ANG1NOV25P50



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES

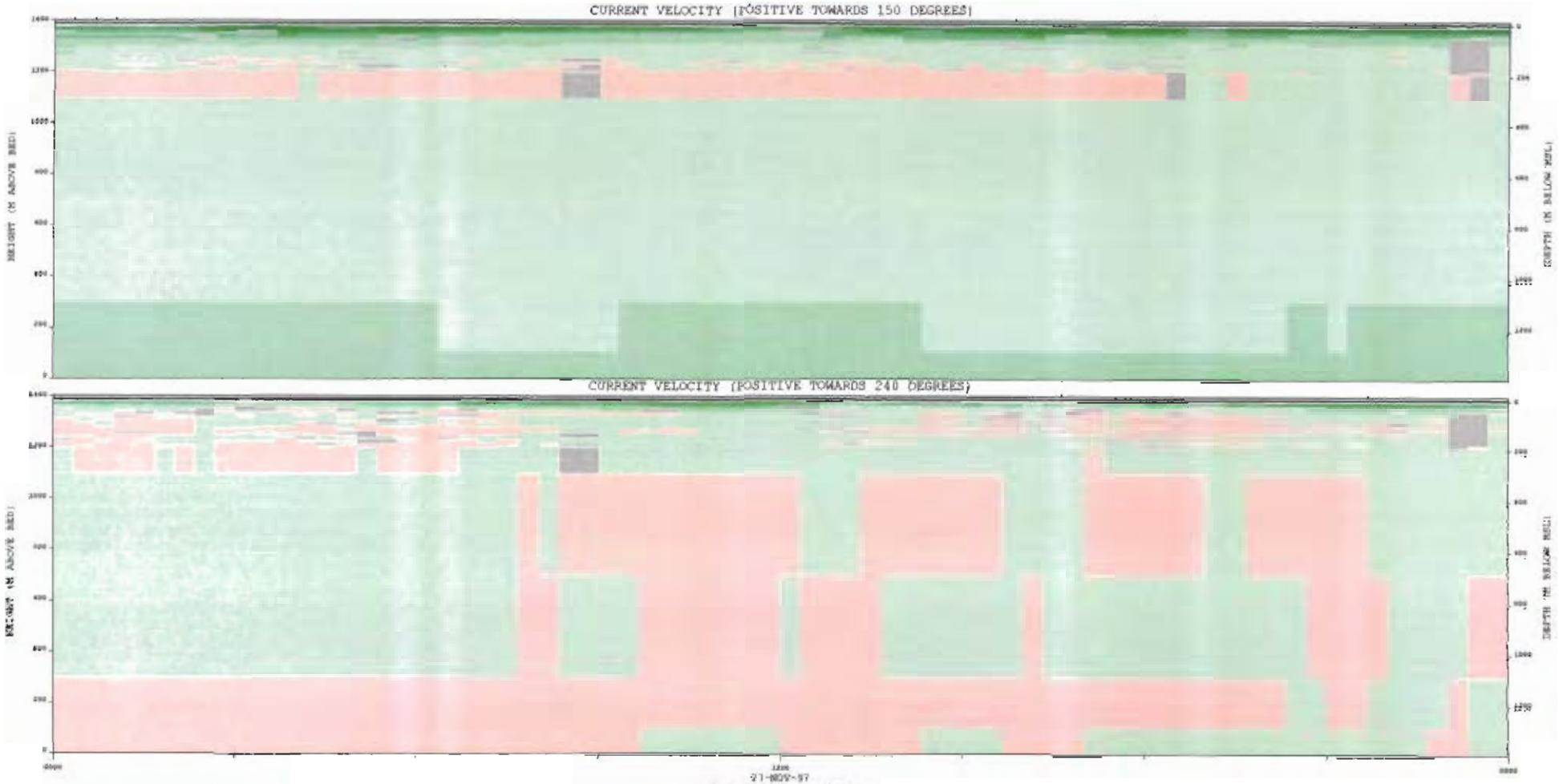
25-NOV-97 00:00 TO 25-NOV-97 23:00

REF NO C1032B

FIG NO 13.9.3

PLOT DATE: 26-JAN-98

FILE: SPIR05



CURRENT VELOCITY (M/S)

0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50

MISSING OR ERROR FLAGGED DATA

NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40,20'S, 01[illegible] 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/9
SERIAL NUMBER:	0393 01308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

RCM9 & RCM9 SPEEDS FORCED FROM RCM4

BEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

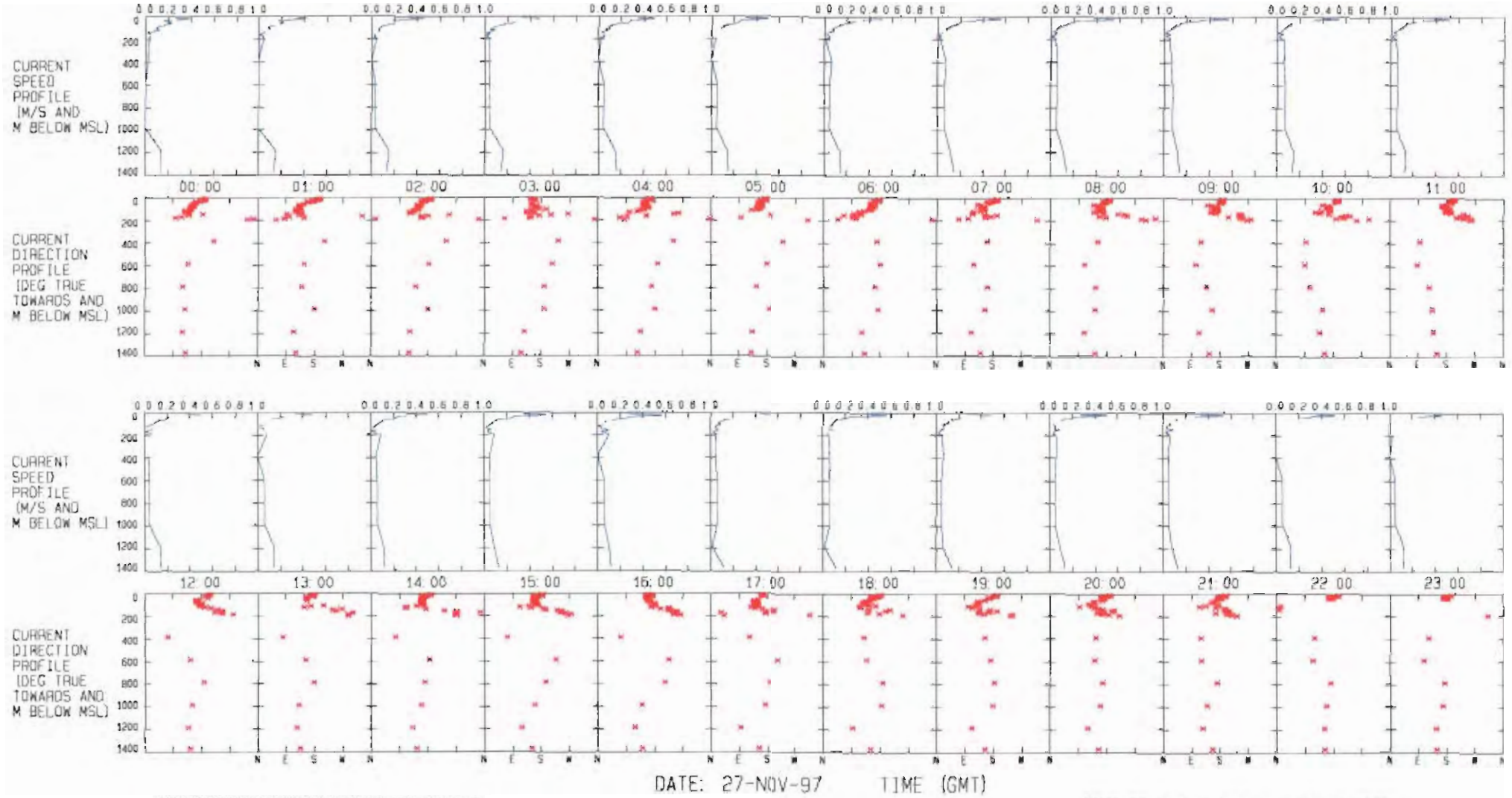
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 10 (27-NOV-97)

REF. NO: 10328/1488

FIGURE NO: 13.10.1

01AB238-0900



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

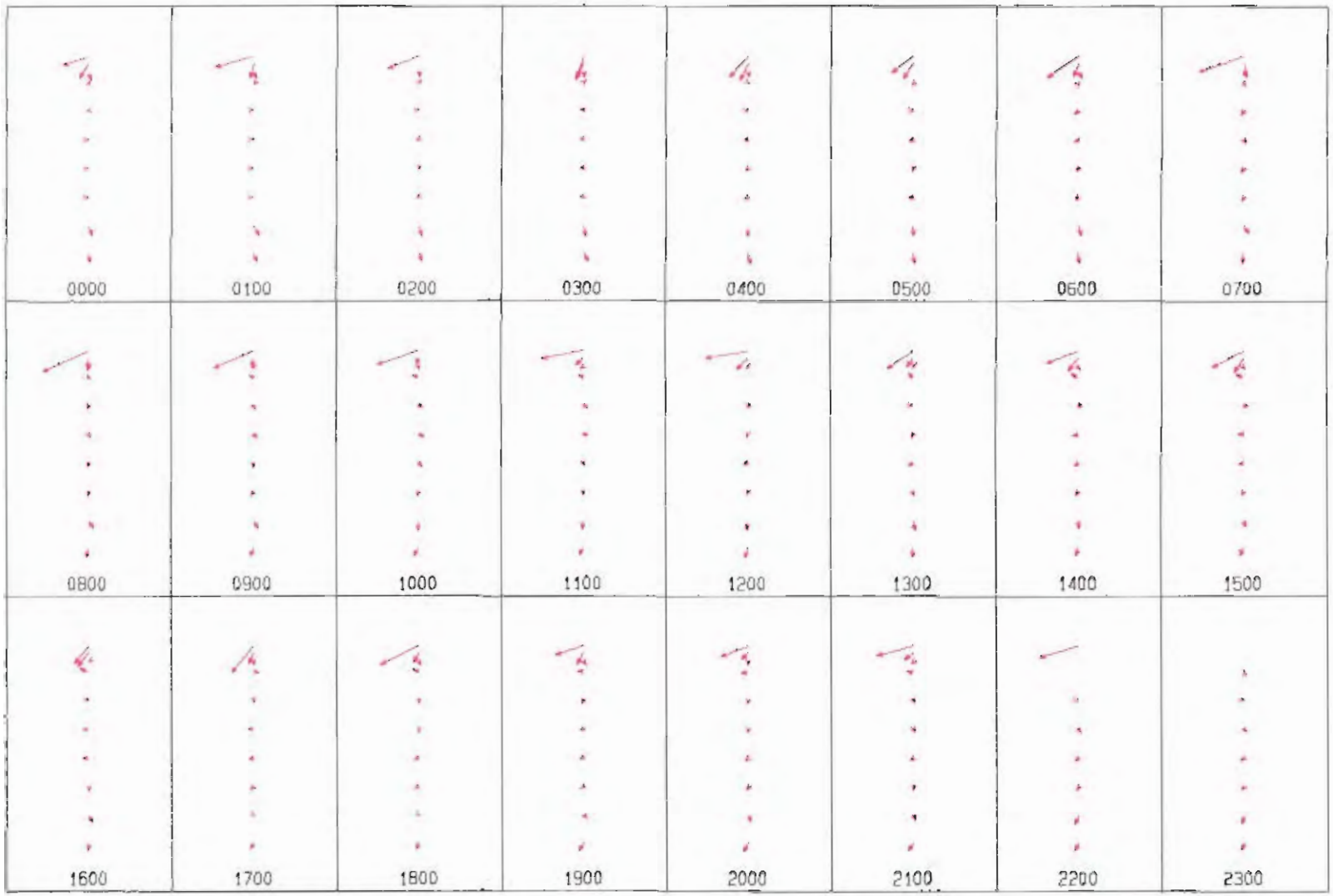
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 10 (27-NOV-97)

REF NO C10328
FIG NO 13.10.2

PLOT DATE: 28-JAN-99

FILE: ANG1NOV27PSD



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40 20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs

NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

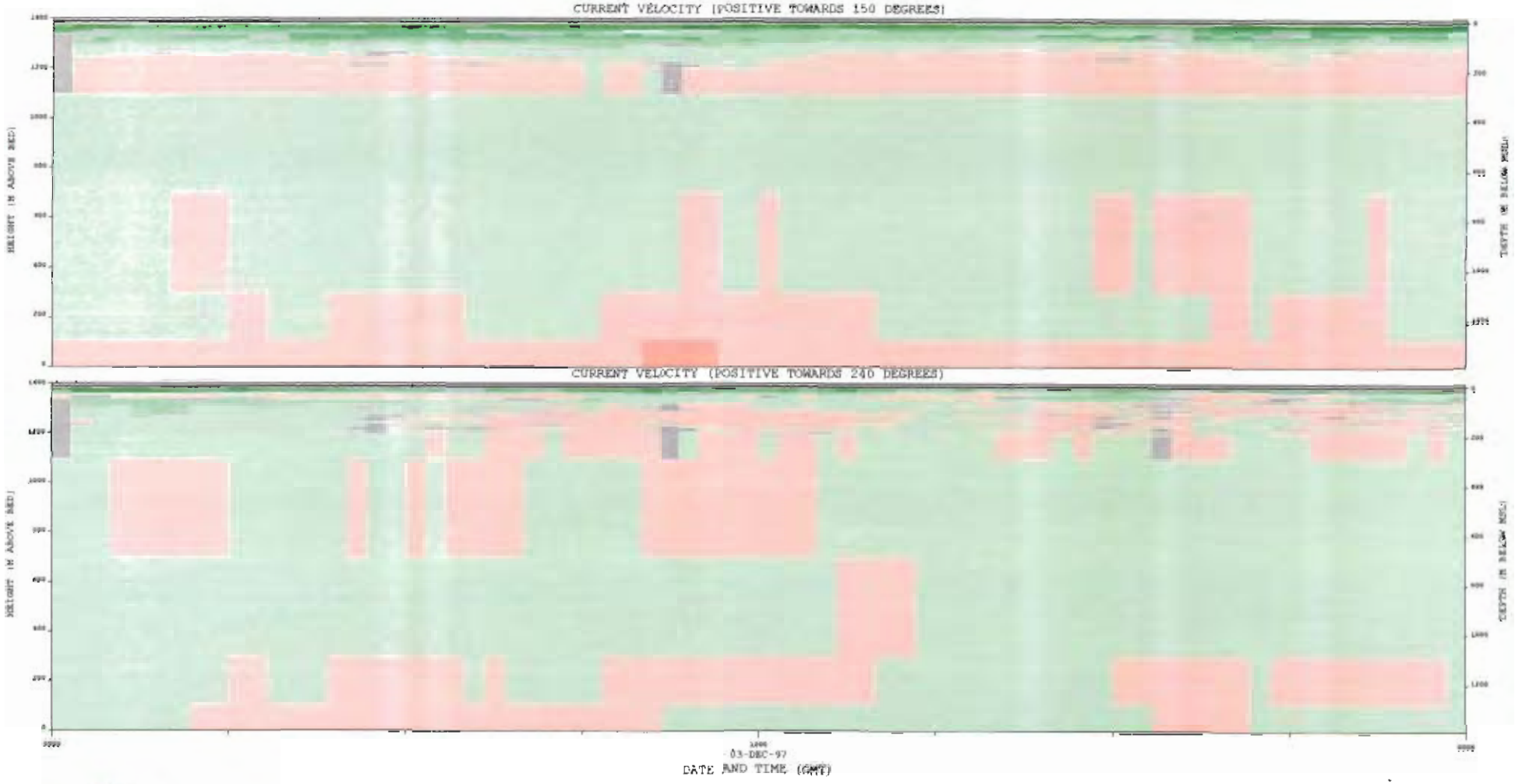
SEQUENCE OF ISOMETRIC VECTOR PROFILES

27-NOV-97 00:00 TO 27-NOV-97 23:00

REF NO C1032B
FIG NO 13.10.3

PLOT DATE: 26-JAN-98

FILE: SPTA10



NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/9
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

RCM2 & RCM3 SPEEDS FORCED FROM RCM4

ESA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

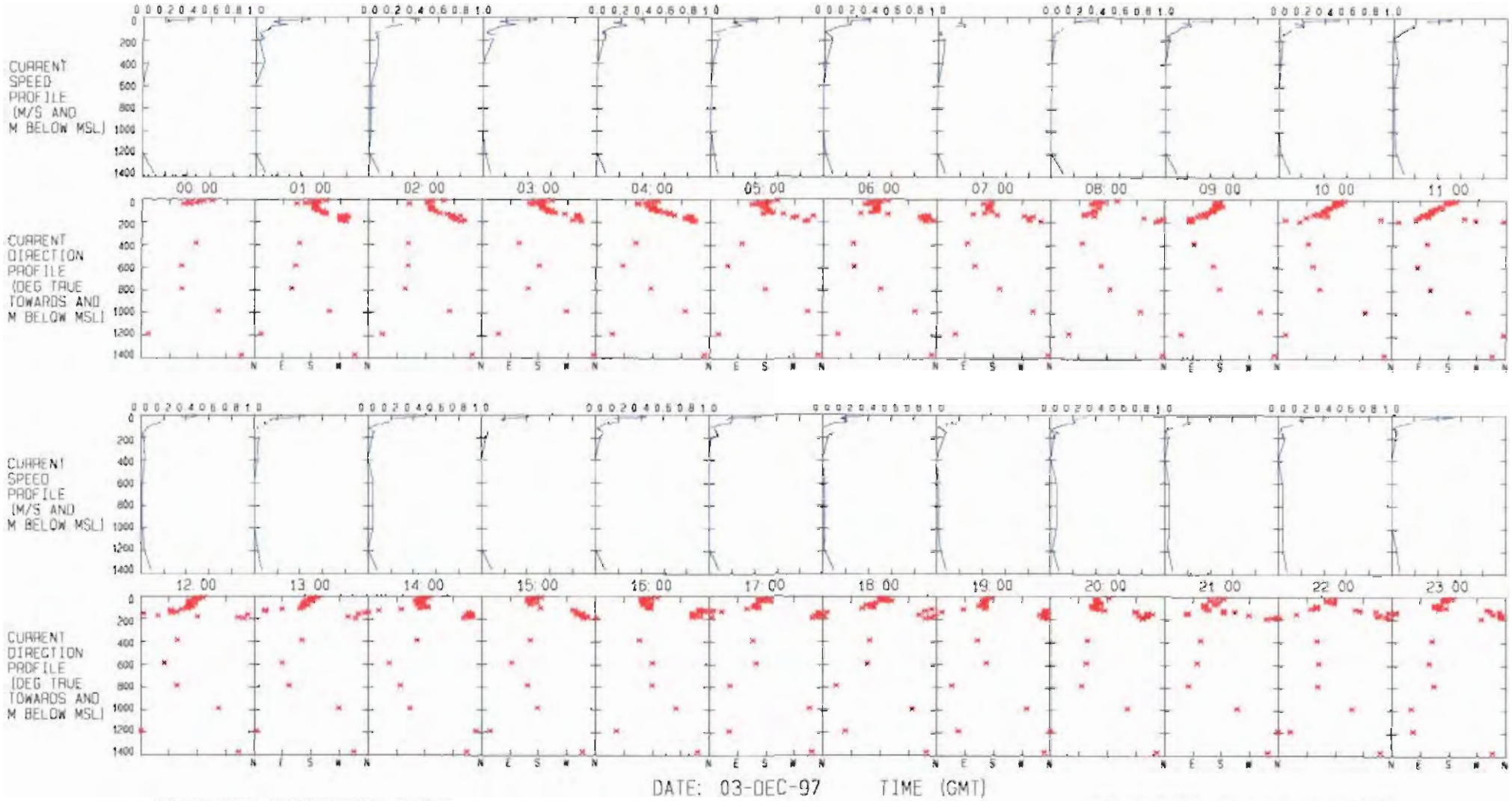
TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

EVENT 11 (03-DEC-97)

REF. NO: 10328/1488

FIGURE NO: 13.11.1

01AB238-0900



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40 20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0000
DEPTH OF WATER: 1385M

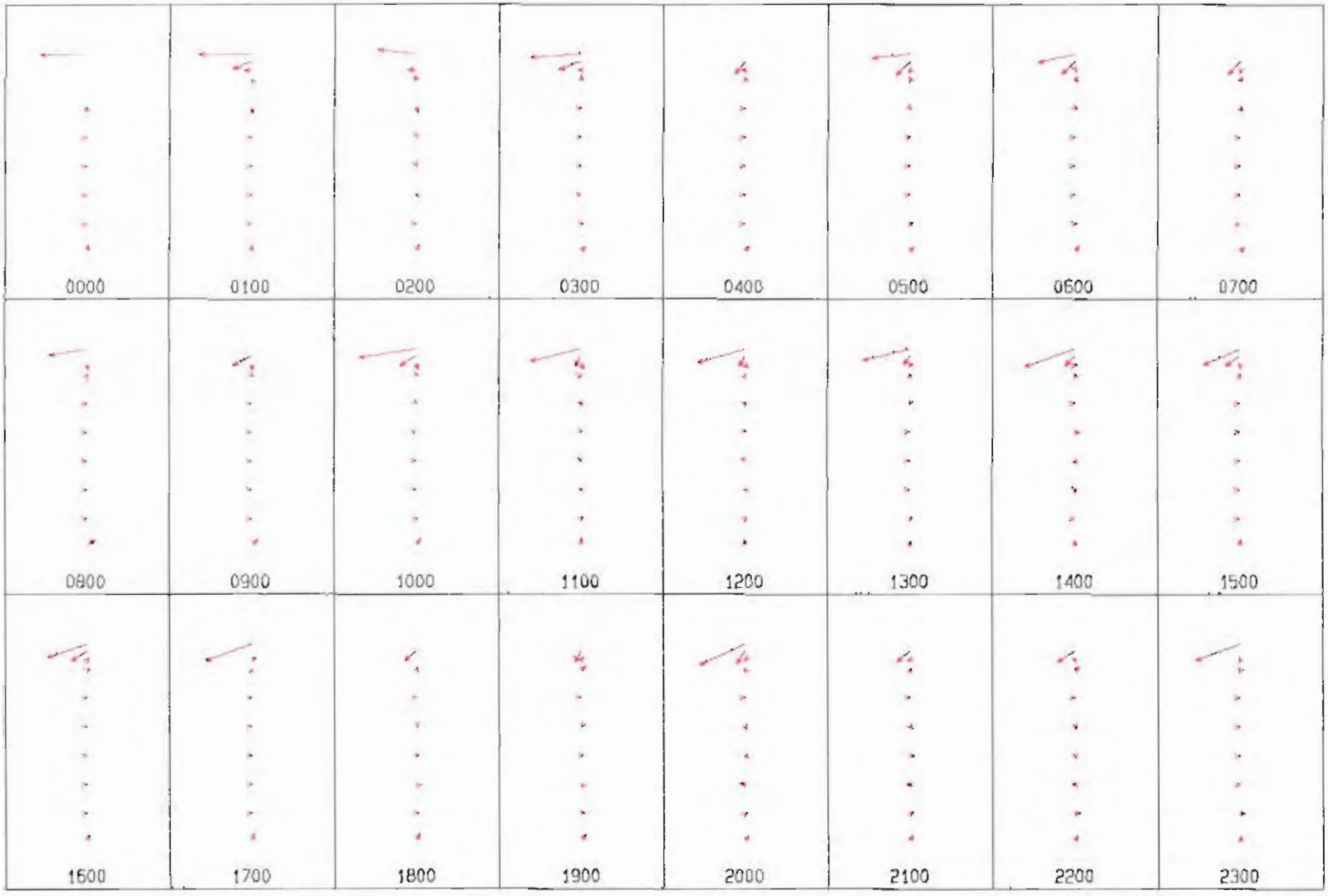
EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 11 (03-DEC-97)

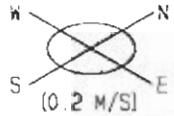
REF NO C10328
FIG NO 13 11.2

PLOT DATE: 26-JAN-98

FILE: ANG1DEC03PSQ



LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: RCM2 & RCM3 SPEEDS FORCED FROM RCM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES

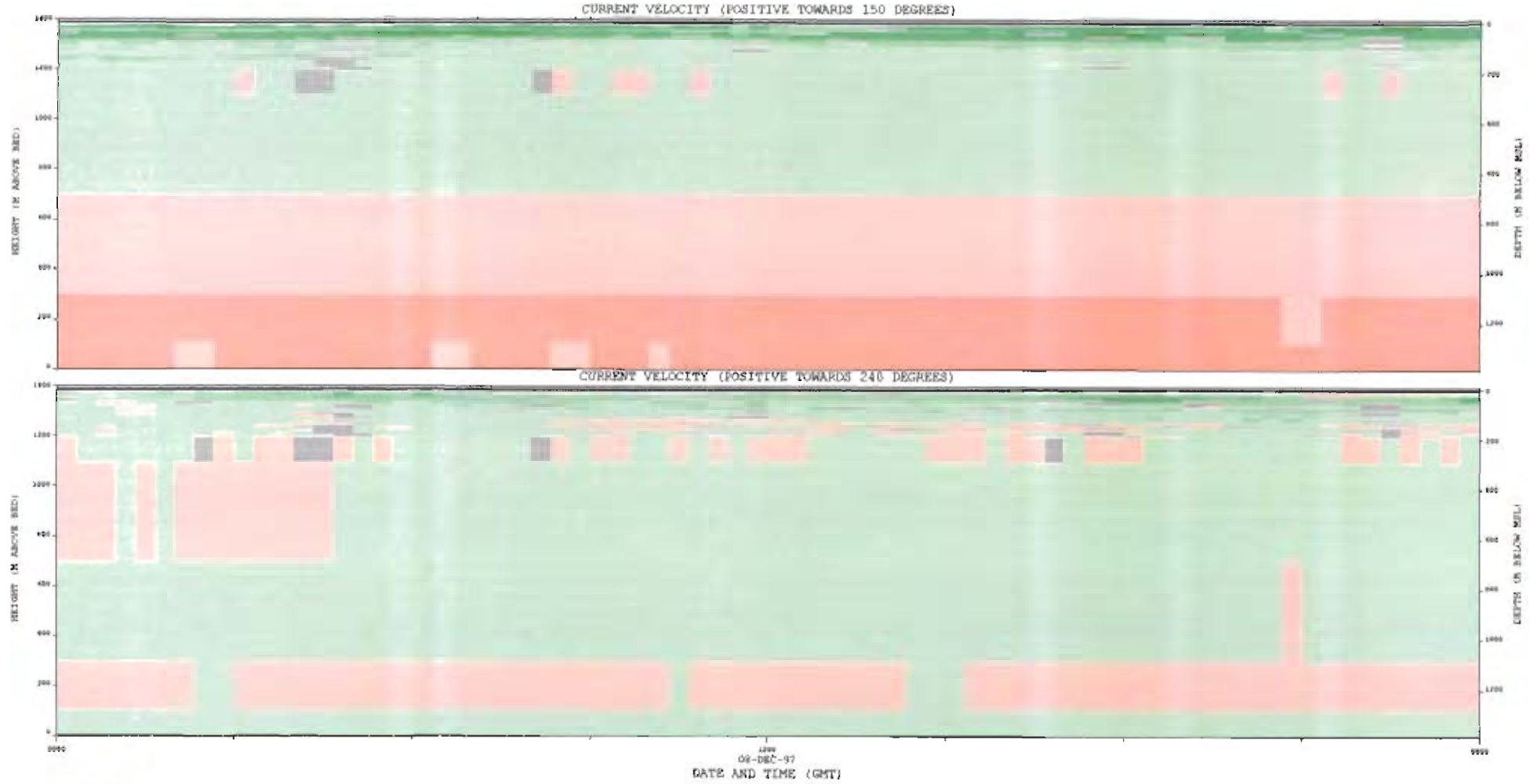
03-DEC-97 00:00 TO 03-DEC-97 23:00

REF NO C10328

FIG NO 13.11.3

PLOT DATE: 26-JAN-98

FILE: SP1A11



NOTES:

LOCATION:	BLOCK 17 - GIRASSOL FIELD
POSITION (WGS84):	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT TYPE:	RDI 300KHZ WORKHORSE ADCP RDI 150KHZ ADCP AANDERAA RCM7/8
SERIAL NUMBER:	0393 02308 11398/12418/11400 12417/11260/11492
SAMPLING INTERVAL:	20mins

RCM2 & RCM3 SPEEDS FORCED FROM RCM4

EEA GIRASSOL DEEPWATER CURRENT MEASUREMENTS

TIMESLICE OF ALONG AND ACROSS SLOPE VELOCITY COMPONENTS (m/s)

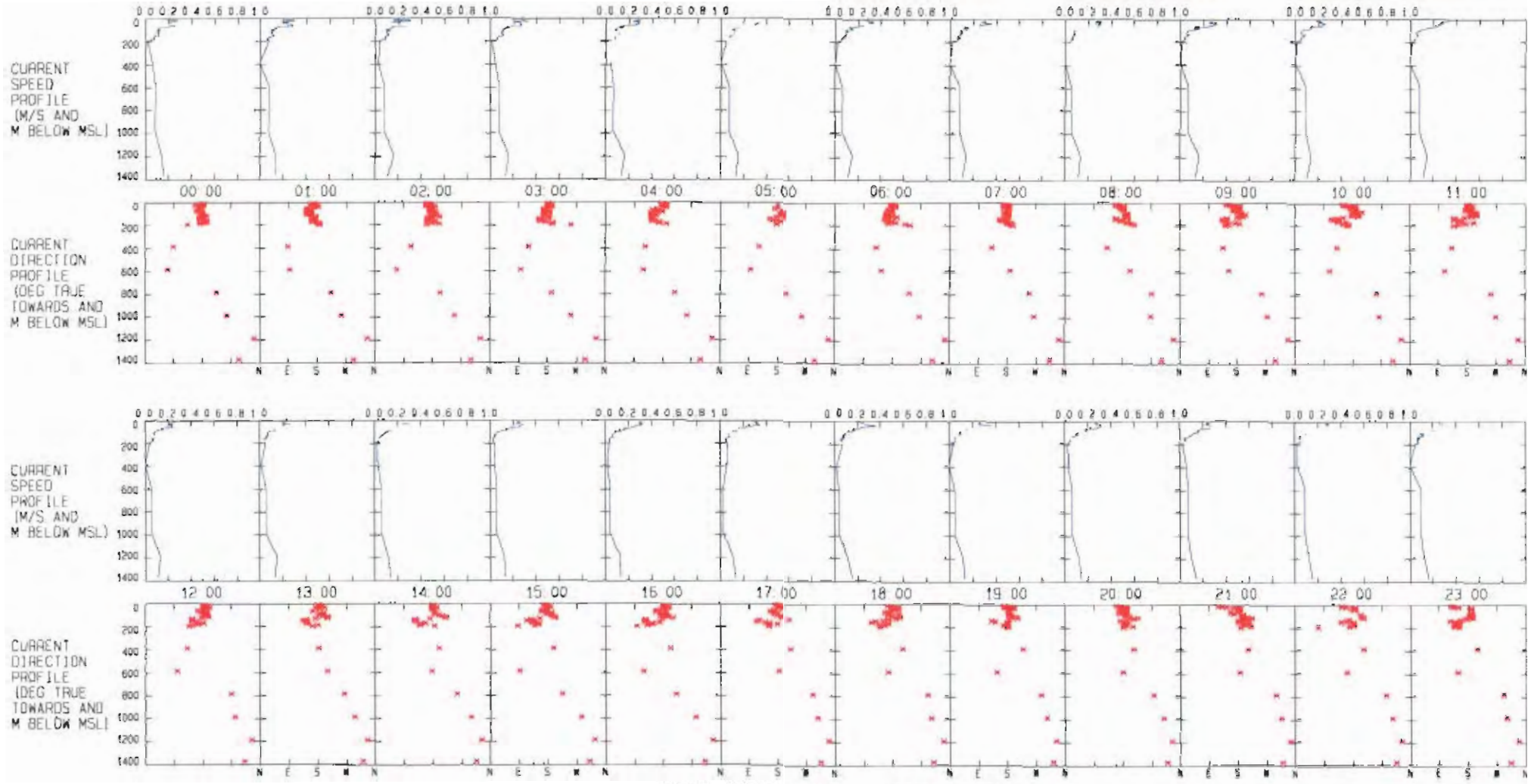
EVENT 12 (08-DEC-97)

GEOS

REF. NO: 10328/1488

FIGURE NO: 13.12.1

01AB238-0900



RCM2 & RCM3 SPEEDS FORCED FROM RCM4
SAMPLING INTERVAL: 20 MINS
POSITION: 7 40.20'S, 011 40.95'E

TYPE OF METER: Combination of ADCPs
SERIAL NUMBER: 0001
DEPTH OF WATER: 1385M

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

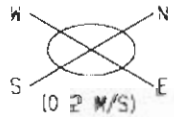
OBSERVED CURRENT VELOCITY PROFILE SEQUENCE
EVENT 12 (08-DEC-97)

REF NO C10328
FIG NO 13.12.2

REDT DATE 26-JAN-98

FILE: ANG10EC08PS1

LOCATION: BLOCK 17 - GIRASSOL
POSITION: 7 40.20'S, 011 40.95'E
SERIAL NO.: 0000
INSTRUMENT TYPE: Combination of ADCPs



NOTE: ACM2 & ACM3 SPEEDS FORCED FROM ACM4
DEPTH RANGE: 3 - 1370M BELOW M.S.L
DIRECTION IS DEGREES TRUE

GEOS

EEA GIRASSOL DEEP WATER CURRENT MEASUREMENTS

SEQUENCE OF ISOMETRIC VECTOR PROFILES

08-DEC-97 00:00 TO 08-DEC-97 23:00

REF NO C10326

FIG NO 13.12.3

PLOT DATE: 26-JAN-98

FILE: SPIRE

PLATES

LIST OF PLATES

PLATE 1 **Removing Pennants from the Winch**

PLATE 2 **Winding Wires onto the Winch**

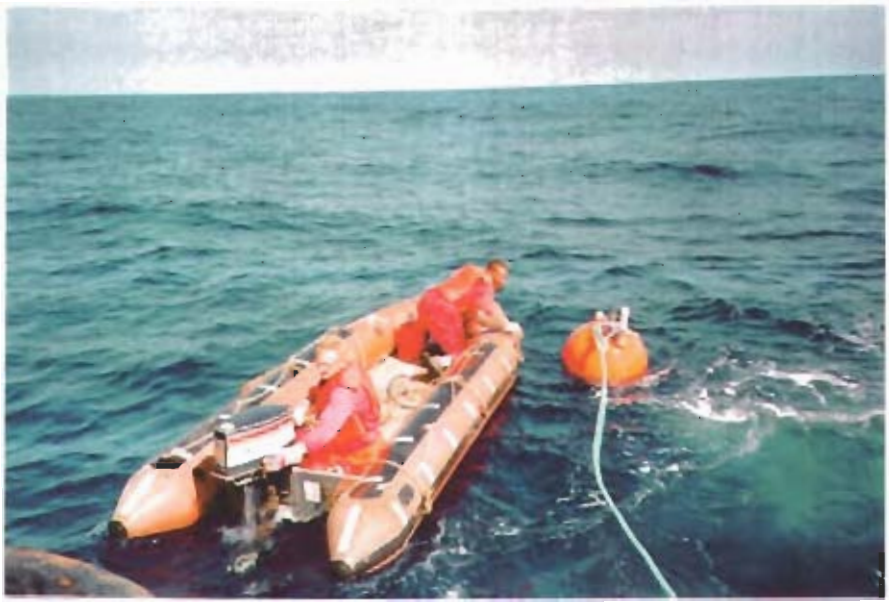


PLATE 3 **Recovering the Workhorse ADCP**

PLATE 4 **Bio-fouling on the Workhorse ADCP**

PLATE 5 **Recovering the Broadband ADCP and Flotation Collar**

PLATE 6 **Recovering an RCM and Glass Buoyancy**

APPENDICES

APPENDIX A

Quality Control

A. QUALITY CONTROL

Quality control checks are applied at two levels: within the instrument and during post-processing.

A1 Instrument Quality Control

The principal screening of ADCP measurements occurs within the instrument firmware using three procedures:

- The **signal-to-noise ratio** of each acoustic return is checked against an acceptable threshold level and the return is deemed invalid when below the threshold. The threshold is set at 6dB.

- The **'percent-good'** value for each velocity estimate is the number of acoustic returns or 'pings' that pass the signal-to-noise threshold. If this percentage falls below a threshold, the velocity estimate for the depth cell is rejected. The percent-good pings (PGP) threshold is set at 25%.

- The **number of pings** used in each ensemble. The standard deviation of the velocity estimate is inversely proportional to the number of pings averaged. The standard deviation in the velocity measurements was 0.004ms^{-1}.

A2 Post-Processing Quality Control

A2.1 Preliminary Quality Control Checks

Once the recorded data were transferred to Fugro GEOS' VAX 4000/200 computer, a number of standard quality control procedures were applied:

- Data affected by sidelobe reflection from the sea surface (the upper 6% of the ADCP measurement range), were error flagged.
- Time slices of pitch, roll, heading, echo amplitude and percentage good pings were plotted (Figures A1.1 to A1.10) to identify periods with low PGP returns.
- Records with less than 25% 'good pings' were error-flagged.
- Records with current speeds beyond extreme limits (negative speeds, 'spikes' or successive rates of change in current speeds above 0.2ms^{-1}) were error-flagged.

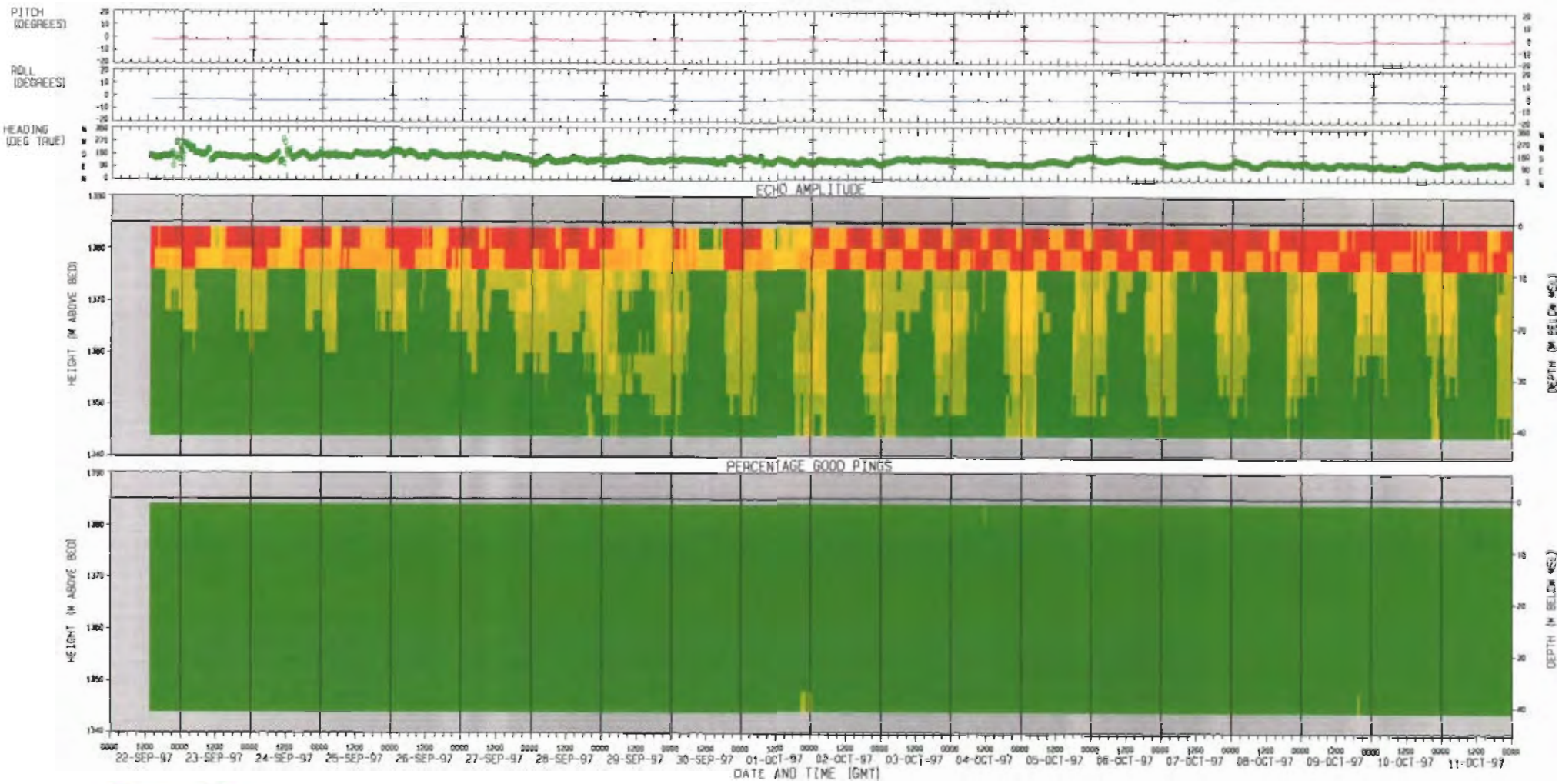
Preliminary plots of observed current speed and direction were generated, for all valid bins. The data were then inspected by an experienced oceanographer to identify any remaining anomalous values.

A2.2 Secondary Quality Control Checks

The main function of subsequent quality control procedures was to identify and remove any remaining erroneous records, seen as 'noise' or 'spikes' in the data, which are primarily caused by acoustic interference or inhomogeneities in the water column between the four beams. One indicator of possible recording inconsistencies is error velocity.

Error Velocity

The error velocity is the difference between the two estimates of vertical velocity generated by the four ADCP beams. Time series of error velocity indicated that it was suitable to error flag error velocity based on a threshold value.



ECHO AMPLITUDE (dB)
126.00
122.00
118.00
114.00
104.00
98.00
92.00
86.00

PERCENTAGE GOOD PINGS
75.00
50.00
25.00
20.00
15.00
10.00
5.00
2.00

MISSING OR ERROR FLAGGED DATA

NOTES:

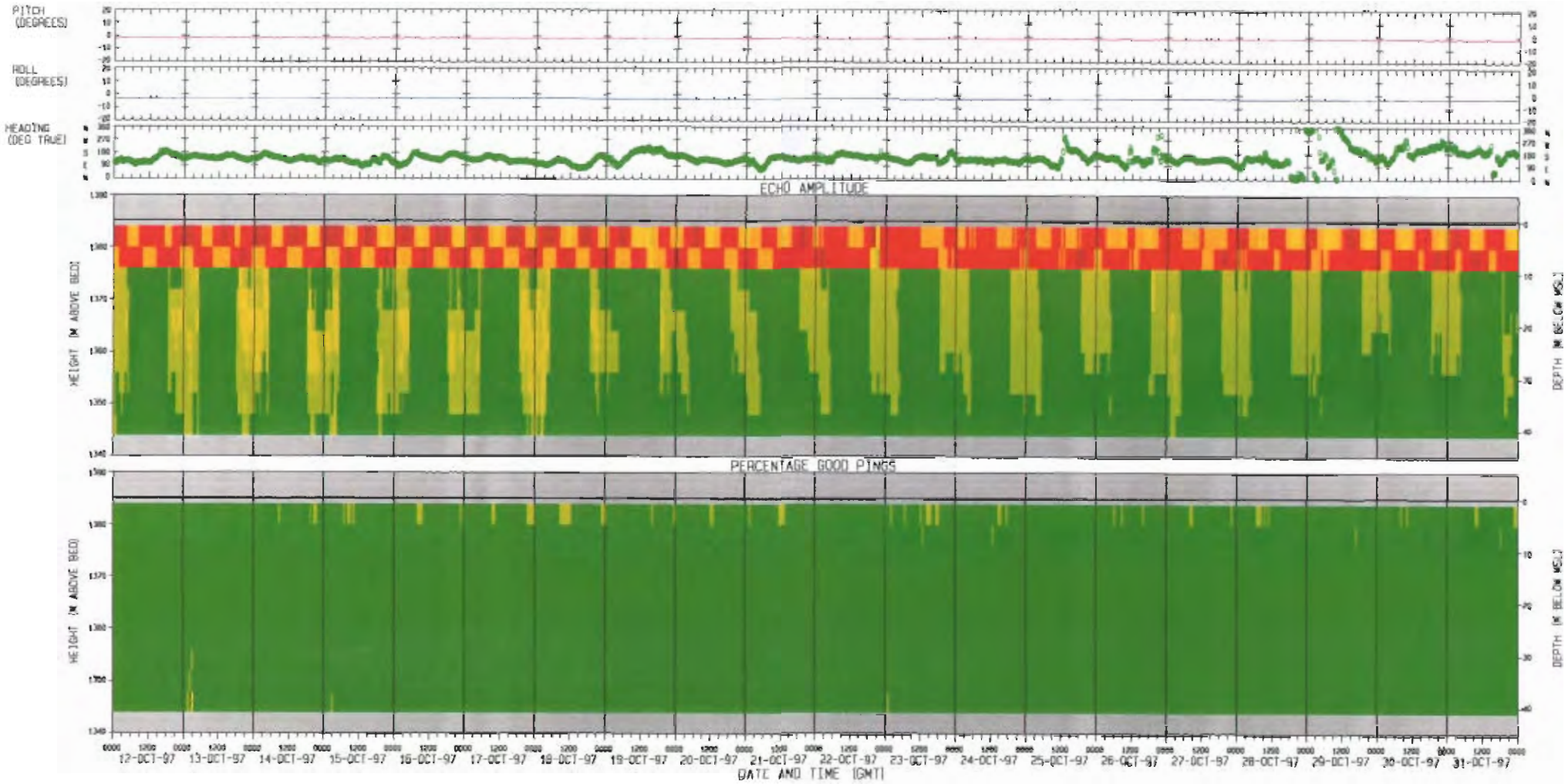
INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1365m
INSTRUMENT DEPTH:	45m
SAMPLING INTERVAL:	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

ADCP PITCH, ROLL AND HEADING
ECHO AMPLITUDE AND PERCENTAGE GOOD PINGS
22-SEP-97 TO 11-OCT-97

REF. NO C10328
FIGURE NO: A4.1

PLOT DATE: 29-JAN-98 FILE: ANGA4SET



ECHO AMPLITUDE (dB): 128.00, 122.00, 116.00, 110.00, 104.00, 98.00, 92.00, 86.00

PERCENTAGE GOOD PINGS: 75.00, 50.00, 25.00, 20.00, 15.00, 10.00, 5.00, 2.00

MISSING OR ERROR FLAGGED DATA

NOTES:

INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	45m
SAMPLING INTERVAL:	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

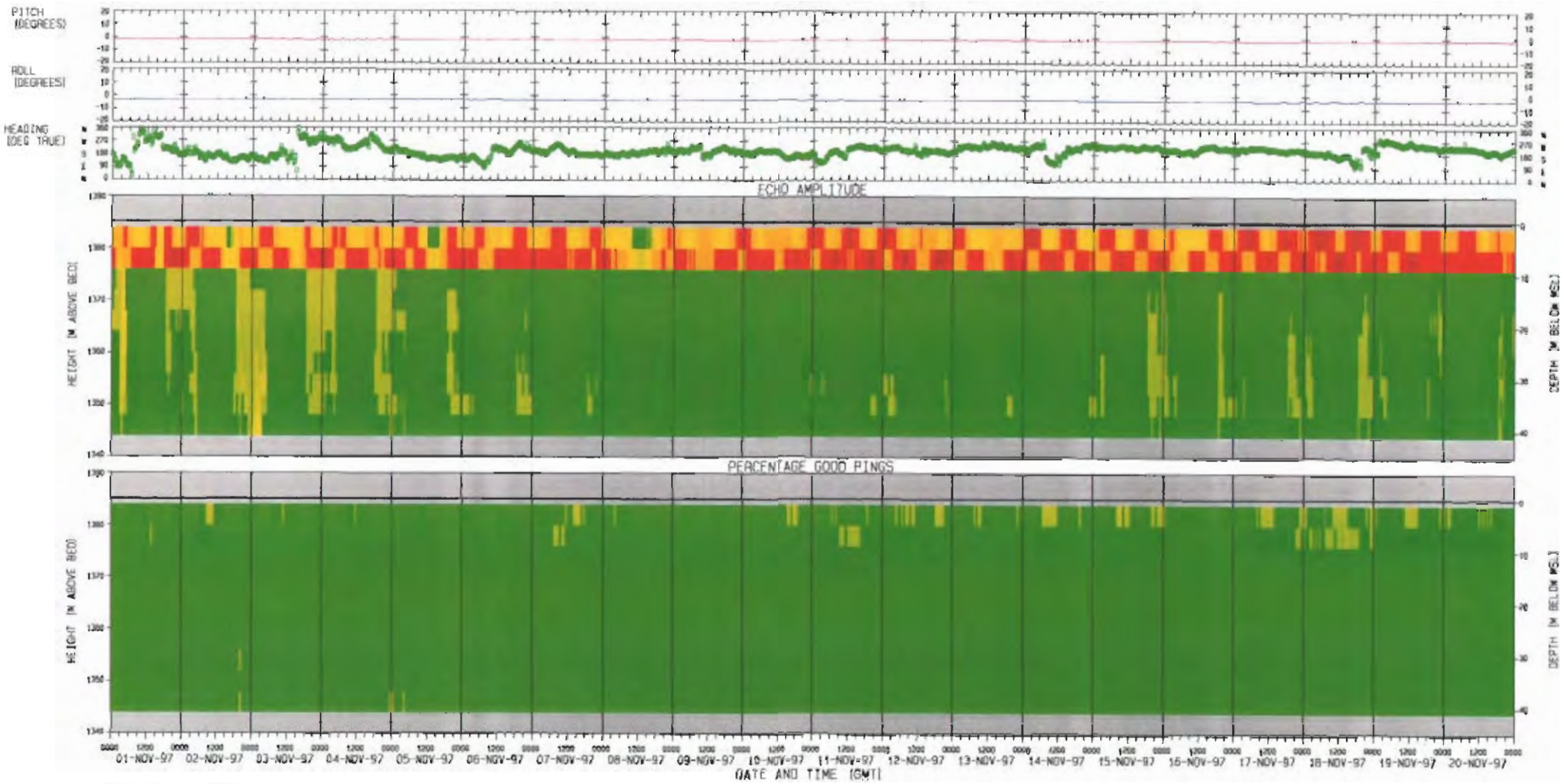
ADCP PITCH, ROLL AND HEADING

ECHO AMPLITUDE AND PERCENTAGE GOOD PINGS

12-OCT-97 TO 31-OCT-97

REF. NO: C10328

FIGURE NO: A1.2



ECHO AMPLITUDE (dB)
126.00
122.00
116.00
110.00
104.00
98.00
92.00
86.00

PERCENTAGE GOOD PINGS
75.00
50.00
25.00
20.00
15.00
10.00
5.00
2.00

MISSING OR ERROR FLAGGED DATA

NOTES:

INSTRUMENT TYPE:	RDI 300KHZ ADCP
SERIAL NUMBER:	0393 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	? 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	4m
SAMPLING INTERVAL:	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

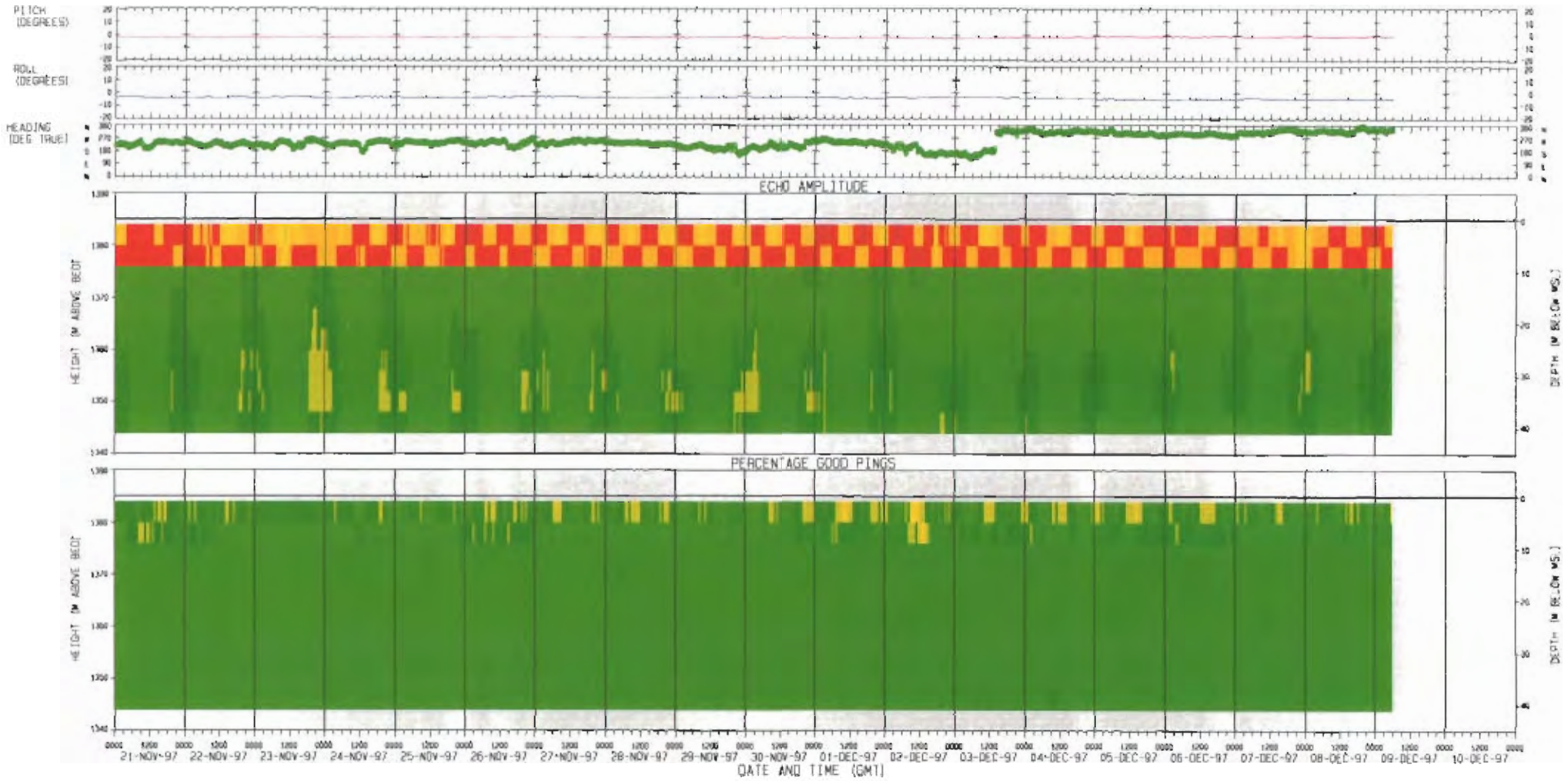
ADCP PITCH, ROLL AND HEADING
ECHO AMPLITUDE AND PERCENTAGE GOOD PINGS
01-NOV-97 TO 20-NOV-97

REF. NO 610328

FIGURE NO: A4.9

PLOT DATE: 20-JAN-98

FILE: ANGA4ADCP



ECHO AMPLITUDE (DB): 128.00, 122.00, 116.00, 110.00, 104.00, 98.00, 92.00, 86.00

PERCENTAGE GOOD PINGS: 70.00, 50.00, 25.00, 20.00, 15.00, 10.00, 5.00, 2.00

MISSING OR ERROR FLAGGED DATA

NOTES:

INSTRUMENT TYPE	RDI 300kHz ADCP
SERIAL NUMBER	0393 (TRANSDUCER)
LOCATION	BLOCK 17 - GIRASSOL
POSITION	7 40.21'S, 011 40.95'E
WATER DEPTH	1365m
INSTRUMENT DEPTH	45m
SAMPLING INTERVAL	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

ADCP PITCH, ROLL AND HEADING

ECHO AMPLITUDE AND PERCENTAGE GOOD PINGS

21-NOV-97 TO 09-DEC-97

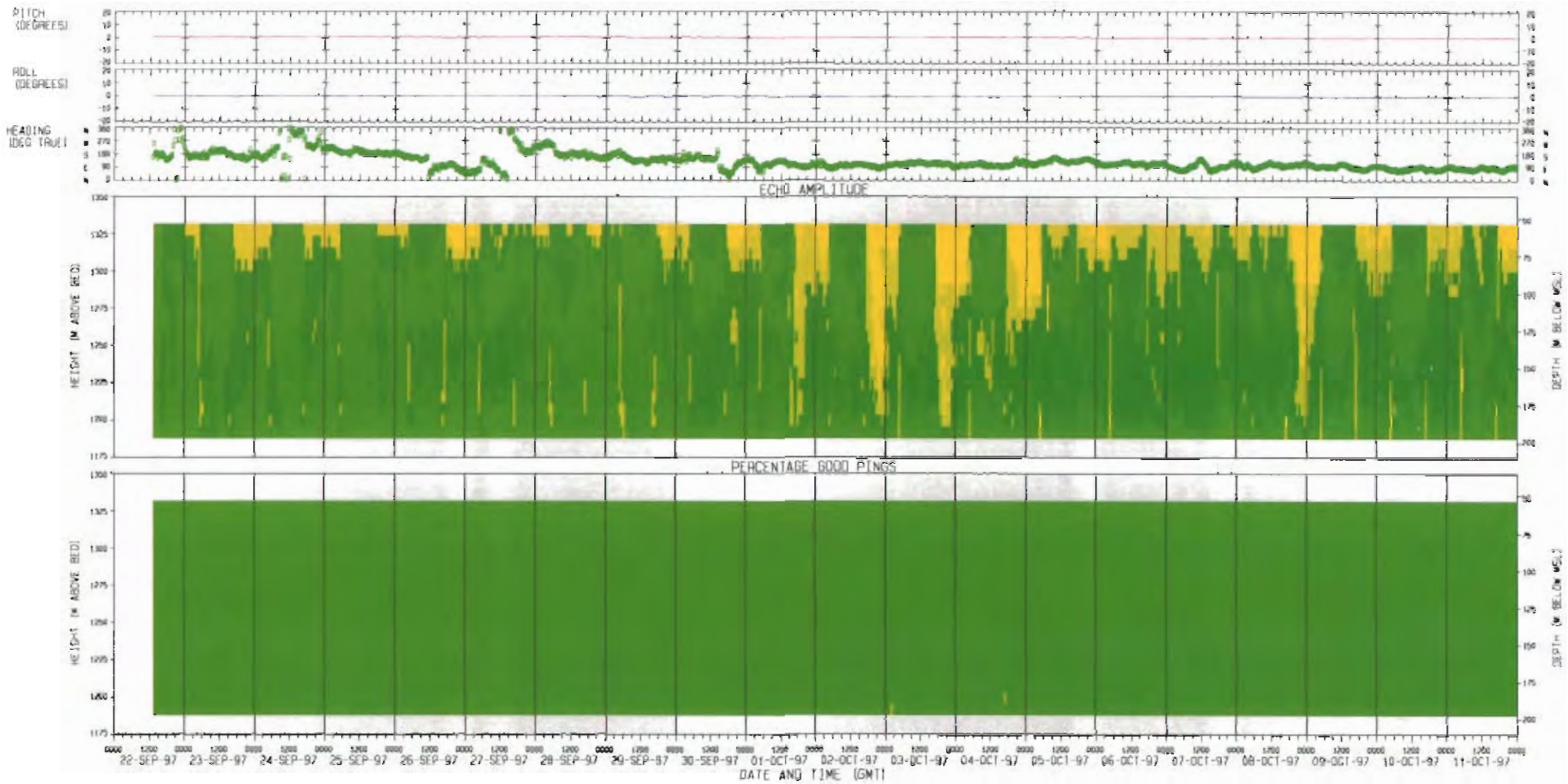
REF. NO C10328

FIGURE NO A1.4

PLOT DATE: 31-JAN-98

FILE: ANGHRDC4

01AB238-0900



ECHO AMPLITUDE (dB): 128.00, 122.00, 116.00, 110.00, 104.00, 98.00, 92.00, 88.00

PERCENTAGE GOOD PINGS: 75.00, 50.00, 25.00, 20.00, 15.00, 10.00, 5.00, 2.00

MISSING OR ERROR FLAGGED DATA

NOTES.

INSTRUMENT TYPE.	RDI 150KHZ ADCP
SERIAL NUMBER.	Q2308 [TRANSDUCER]
LOCATION.	BLOCK 17 - GIRASSOL
POSITION.	7 40 20'S, 011 40 99'E
WATER DEPTH.	1365m
INSTRUMENT DEPTH.	205m
SAMPLING INTERVAL	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

ADCP PITCH, ROLL AND HEADING

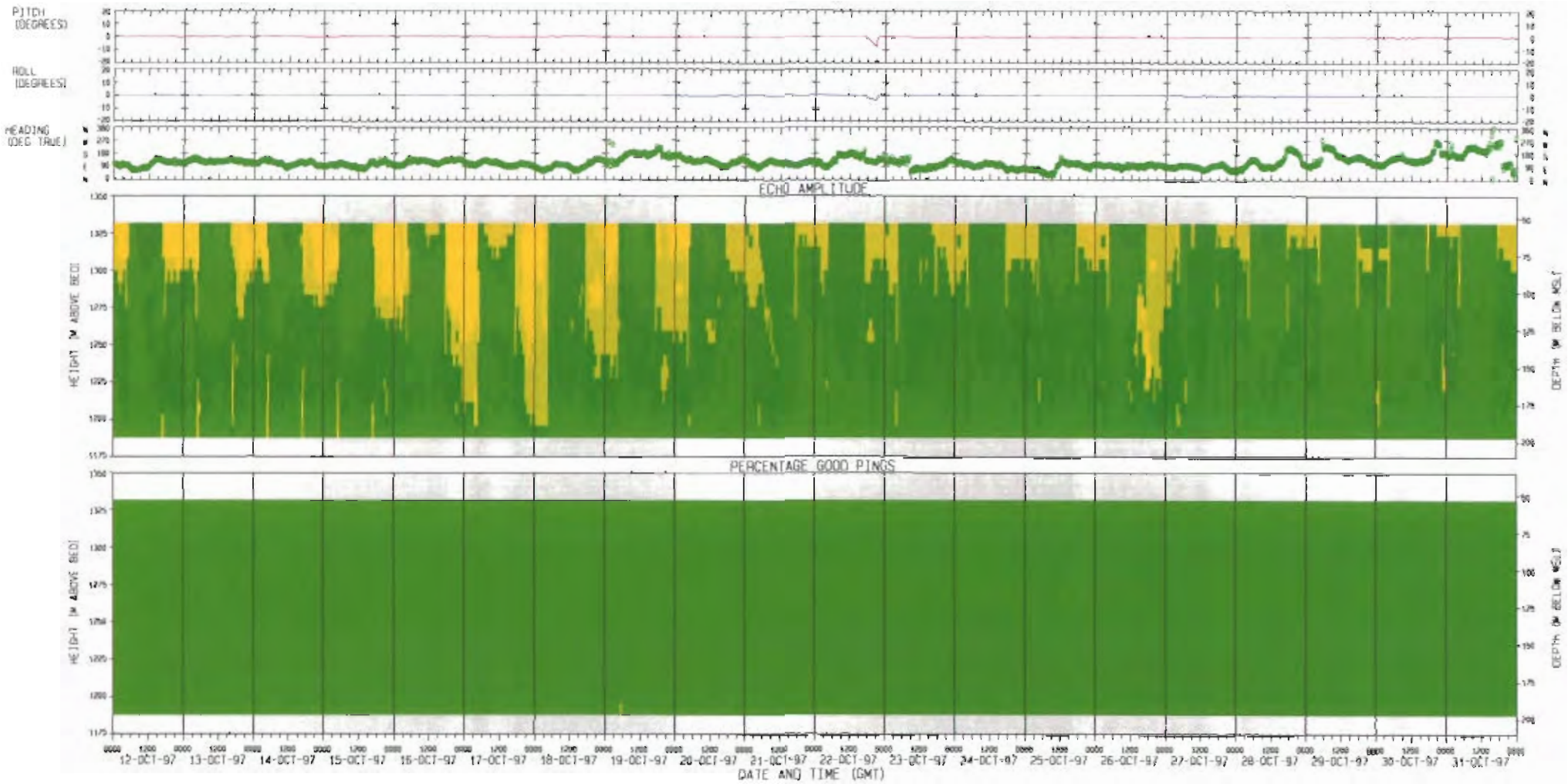
ECHO AMPLITUDE AND PERCENTAGE GOOD PINGS

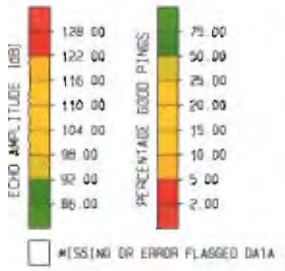
22-SEP-97 TO 11-OCT-97

REF. NO C10328

FIGURE NO. A2.1

PLOT DATE: 22-JAN-98 FILE: ANGGC1





NOTES

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER	023DB (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

ADCP PITCH, ROLL AND HEADING

ECHO AMPLITUDE AND PERCENTAGE GOOD PINGS

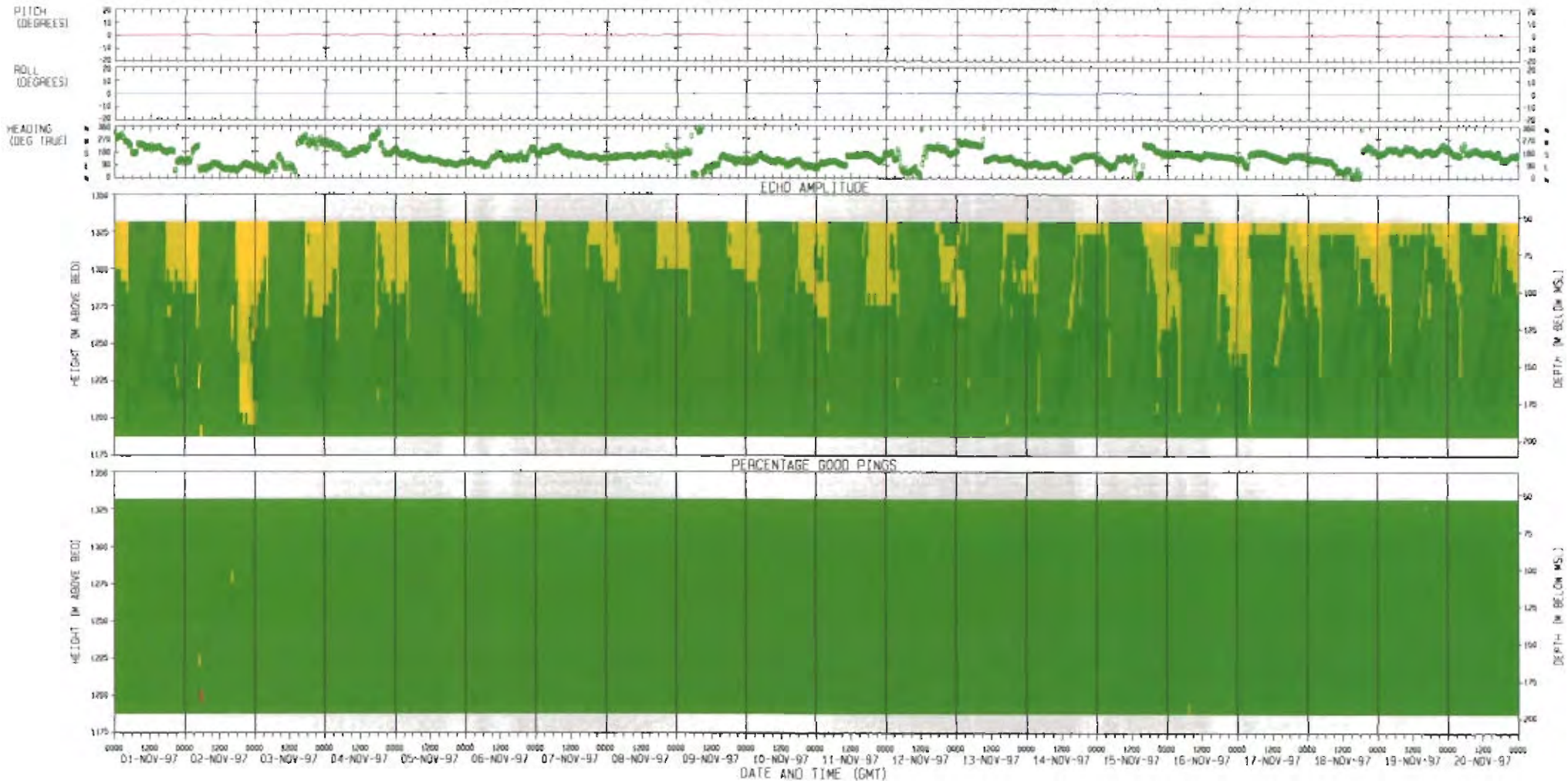
12-OCT-97 TO 31-OCT-97

REF. NO C1032h

FIGURE NO. A2.2

PLOT DATE: 29-JAN-98 FILE: ANGOC2

01AB238-0900



NOTES:

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40 20'S, 011 40 95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

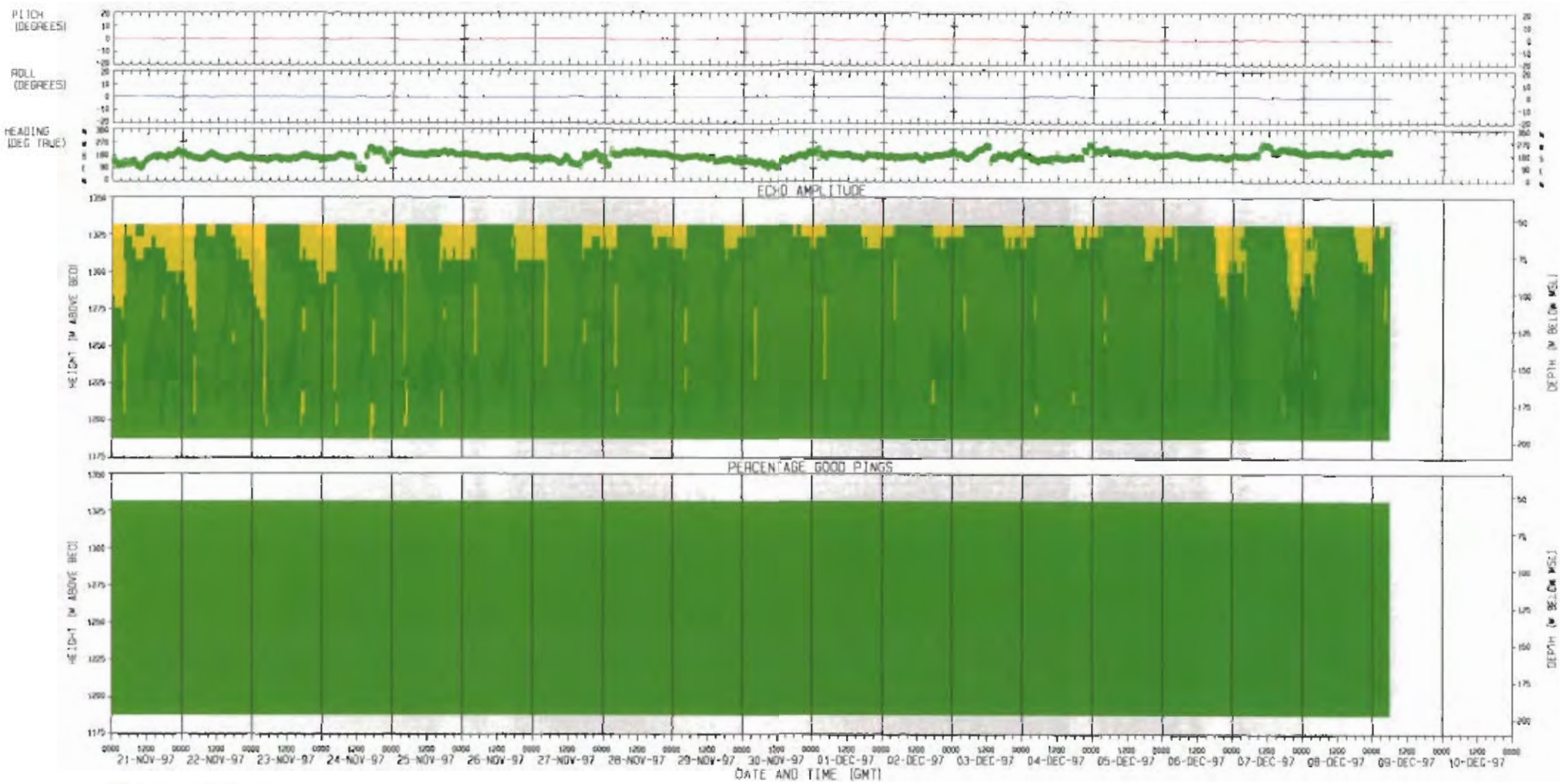
ADCP PITCH, ROLL AND HEADING
ECHO AMPLITUDE AND PERCENTAGE GOOD PINGS
01-NOV-97 TO 20-NOV-97

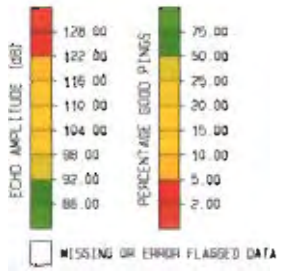
REF NO C10328

FIGURE NO A2.3

PLOT DATE: 22-JAN-98 FILE: ANGGC3

01AB238-0900





NOTES.

INSTRUMENT TYPE:	RDI 150KHZ ADCP
SERIAL NUMBER:	02308 (TRANSDUCER)
LOCATION:	BLOCK 17 - GIRASSOL
POSITION:	7 40.20'S, 011 40.95'E
WATER DEPTH:	1385m
INSTRUMENT DEPTH:	205m
SAMPLING INTERVAL:	20 MINS

ELF ANGOLA ADCP MEASUREMENTS

ADCP PITCH, ROLL AND HEADING
ECHO AMPLITUDE AND PERCENTAGE GOOD PINGS
21-NOV-97 TO 09-DEC-97

REF. NO D10328

FIGURE NO A3 4

PLOT DATE: 31-JAN-98 FILE ANGDC4

APPENDIX B

Daily Survey Reports

APPENDIX C

System Configuration, Deployment Logsheets and Test Results

C. SYSTEM CONFIGURATION

The following section provides details of the ADCP system configuration for the duration of the measurements described within this report. Equipment setup and deployment sheets are also included.

C.1 Workhorse ADCP

Deployment Period 22 September 1997 to 9 December 1997	
Instrument Frequency	300kHz (Workhorse)
Serial Number	0393
Head Angle	20 degrees
Head Arrangement	Convex
Firmware Version	8.18
Transducer Depth	45m below MSL
Bin Length	4m
Blank Beyond Transmit	1.76m
Depth of Bin 1 (centre)	39m
Number of Valid Bins (below shadow zone)	8
Depth of Bin 8 (centre)	11m
Ping Rate	26.7 seconds
Pings per Ensemble	45
Record Interval	20 minutes
ADCP Co-ordinate System	Earth Co-ordinates
Quality Parameters Logged	Echo amplitude, percentage good pings
Tilt Sensors	Enabled
Fish Rejection Algorithm	Not Enabled

C.2 Broad-Band ADCP

Deployment Period 22 September 1997 to 9 December 1997	
Instrument Frequency	150kHz (Broad-band)
Transducer Serial Number	02308
Head Angle	20 degrees
Head Arrangement	Convex
Firmware Version	5.47
Transducer Depth	205m below MSL
Pulse Length	9.06m
Bin Length	8m
Blank Beyond Transmit	2m
Depth of Bin 1 (centre)	193m
Number of Valid Bins	18
Depth of Bin 18 (centre)	57m
Ping Rate	1.5 seconds
Pings per Ensemble	25
Record Interval	20 minutes
ADCP Co-ordinate System	Earth Co-ordinates
Quality Parameters Logged	Echo amplitude, percentage good pings
Tilt Sensors	Enabled
Fish Rejection Algorithm	Not Enabled

Broadband 150 kHz

150.and

ADCP DEPLOYMENT LOG SHEET

Contract No: C10328
Contract Name: EEP Fl-Matos Deepwater Current Meas't
Location: GIRASSOL Field
(Lat/Long): 7°40.20'S, 011°40.95'E
Nominal Water Depth: 1390m
Time Zone: GMT
Transducer Depth: 205m
Magnetic Variation:
Date/Time Switched on: 21-Sep-97 14:40 local
Argos ID: 1540
Date/Time Switched off:
Date/Time Deployment: 22-Sep-97 10:10 local
Date/Time Recovery: 09-Dec-97 09:30 GMT

ADCP Serial No: 02308
ADCP Firmware Version No:
ADCP Head Serial No:
Power Supply: External - DC ☐ VAC ☐
SN: Frequency: ~~300~~ 150 kHz
Internal - DC ☑
MB of Memory Fitted:
MB of Memory Available:

DEPLOYMENT ORIENTATION: Upward ☑ Downward ☐

DEPLOYMENT METHOD:
Vessel Mounted ☐ Rig Mounted ☐ Seabed Frame ☐ Hull Mounted ☐ Moored ☑

REAL-TIME DATA: YES ☐ NO ☑ COMMUNICATIONS: RS422 ☐ RS232 ☐

COMMS SETTINGS: 9600 ☐ N ☐ 8 ☐ 1 ☐

ADCP SET-UP PARAMETERS

Earth Co-ordinates	Yes	☑	No	☐	Beam Co-ordinates	Yes ☐ No ☐
Echo Amplitude	Yes	☐	No	☐	% Good Pings	Yes ☑ No ☐
Spectral Width (not selectable (if earth co-ordinates selected)	Yes	☐	No	☐	Status	Yes ☐ No ☐
Range Switch Setting	High	☐	Low	☐	Pre-deployment clock check	☑
					Post-deployment clock check	☐ Error

PROFILING PARAMETERS

Expected Ranges:
Depth Cell Length: 8m
No Depth Cells: 18
No Pings: 25
Pulse Cycle:
Collect Cycle: 20mins
Pulse Length: 9.06m
Blank: 2m

BOTTOM TRACK OPERATION (If Applicable)

Pulse Length (s):
Bin Length (m):
No. Bins:
Blank:
Bottom Track Ping Interval:
No. BT Pings to Filter:
Pre-amp Gain:
Monitor Beam:

REAL-TIME SET-UP (If Applicable)

Software Used:
PC Type:
Hard Disc Size:
File Stem:

Raw Data Storage:
Summary Data Storage:
Nominal Heading of Rig (If Applicable): °T
Local Contact:
Telephone:

20° Convex BB

LOGSHEET002/260796

Workhorse 300kHz

BROADBAND ADCP DEPLOYMENT LOG SHEET

Contract No C10328
Contract Name FEP Timor Sea Equator Current Meters
Location GIRASSOL Field
(Lat/Long) 7°40.20'S, 011°40.15'E
Nominal Water Depth 1385m
Time Zone GMT
Transducer Depth/~~Height above bed~~ 45m
Magnetic Variation
Date/Time Switched on 21-Sep-97 13:00
Argos ID 1541
Date/Time Switched off 22 Sep 97 09:10
Date/Time Deployment 22-Sep-97 09:10
Date/Time Recovery

ADCP Serial No
ADCP Firmware Version No
Electronics housing depth rating 1000/3000
ADCP Head Serial No:
Depth rating 1000m/3000m
Power Supply: External - DC ☐
Internal - DC ☐
SN ..... Frequency 300 ~~k~~ MHz
Battery capacity fitted
MB of Memory Fitted
MB of Memory Available
Battery pack configuration details

DEPLOYMENT ORIENTATION: Upward ☑ Downward ☐

DEPLOYMENT METHOD:
Vessel Mounted ☐ Rig Mounted ☐ Seabed Frame ☐ Hull Mounted ☐ Moored ☑

REAL-TIME DATA: YES ☐ NO ☑ COMMUNICATIONS: RS422 ☐ RS232 ☐

COMMS SETTINGS: 9600 ☐ ..... N ☐ 8 ☐ 1 ☐

ADCP SET-UP PARAMETERS

Water track setup
Pings per ensemble 45
Depth cell size 4m
No of depth cells 20
Blank after Transmit 1.76m
Profile mode
Ambiguity velocity mode 1 170

Data collection setup
Time between ping groups
Time per ensemble 20 mins
Deployed Length
Velocity Yes/No
Co-ordinates system Beam/Earth
Correlation Yes/No
Intensity Yes/No
% good Yes/No
Status Yes/No
Enable recorder Yes/No
Enable serial output Yes/No
Band rate

BB Test successfully completed Yes/~~No~~
(printout attached to this form)

Mooring Configuration
Argos ID 1541
Argos ID
Buoyancy collar
type FT/CRP

Release code 093
Release code 096

REAL-TIME SET-UP (If Applicable)
Software Used
PC Type
Hard Disc Size
File Stem

Raw Data Storage
Summary Data Storage
Nominal Heading of Rig (If Applicable) °T
Local Contact
Telephone

OPERATOR: SIGNATURE: DATE:

Deployment WSAH/CLP Cathryn Bunroe
Recovery WSAH/CLP Cathryn Bunroe 09-DEC-97

GEOS

LOGSHEET28/131097

01AB238-0900

RCM DEPLOYMENT LOG SHEET

MOORING/CONTRACT DETAILS

Contract No: C10328
Contract Name: EEP ELF Angola Deepwater Current Meas'ts
Location: GIRASSOL field
Position (Latitude): 7°40.20'S
Mooring Name: MA → SV1
(Longitude): 011° 40.95'E
Nominal Water Depth: 1390m
Time Zone: GMT (local + 1)

INSTRUMENT/SENSOR DETAILS

Instrument Type: ~~RCM 4~~ ~~RCM5~~ RCM7 ~~RCM8~~
Instrument Serial Number: 11398
GEOS/WENV Number: warn off. 400.45015
Temperature Sensor ☑ wide
Pressure Sensor ☑
Conductivity Sensor ☑
Serial No/Pressure Range:
Conductivity Sensor Serial No:
NB 100 PSI rated to 60m, 400 PSI rated to 260m

DEPLOYMENT/RECOVERY DETAILS

Date/Time of Deployment: 22-Sep-97 09:10
off: 10:09GMT
Date/Time of Recovery: 09-DEC-97 09:30GMT
Instrument Height above bed: ≈1000m
Instrument Status on Recovery
Working ☑ Stopped ☐ Damaged ☐ Flooded ☐

DATA LOGGING DETAILS

DSU Serial Number: 7073
Sampling Interval: 20 mins.
Pre-Deployment DSU Date/Time Check ☑
Post-Recovery DSU Date/TimeCheck ☐
Instrument Switch on Date/Time: 21-Sep-97 13:00
DSU Timing Error +/- mins:
Date/Time of last Record:
Data/Instrument Notes
Pressure sensor faulty - returned to UK.
Number of Records: 34560
Expected No of Records: 34560
File Name: 1398(new).dat

CHECKLISTS (Refer to Technical Instructions TI004)

AFTER RECOVERY

- ☑ 1) Note Instrument/Mooring Recovery Details
- ☑ 2) Check Instrument Condition on Recovery
- ☑ 3) Clean and Open Instrument
- ☑ 4) Stop Instrument Logging
- ☑ 5) Recover Data
- ☑ 6) Report Instrument Status

PRIOR TO DEPLOYMENT

- ☑ 1) Check Instrument Condition
- ☑ 2) Check Instrument Configuration
- ☑ 3) DSU Time/Date Check
- ☑ 4) Start Instrument Logging
- ☑ 5) Close and Prepare for Deployment
- ☑ 6) Note Instrument/Mooring Deployment Details

OPERATOR:	SIGNATURE:	DATE:
CLP / WJAH	Cathryn Provins	22-Sep-97 09-DEC-97

GEOS

LOGSHEET004/020997

01AB238-0900

RCM DEPLOYMENT LOG SHEET

MOORING/CONTRACT DETAILS

Contract No: C10328
Contract Name: EEP ELF Angola Deepwater Current Meters
Location: GIRASSOL Field
Position (Latitude): 7°40.20'S
Mooring Name: MD6→SV1
(Longitude): 011°40.95'E
Nominal Water Depth: 1390m 85
Time Zone: GMT

INSTRUMENT/SENSOR DETAILS

Instrument Type: ~~RCM 4~~ ~~RCM5~~ RCM7 ~~RCM8~~
Instrument Serial Number: 12418
GEOS/WENV Number: not marked (new) .400.97419
Temperature Sensor ☑ wide
Pressure Sensor ☐
Conductivity Sensor ☑
Serial No/Pressure Range:
Conductivity Sensor Serial No:
NB 100 PSI rated to 60m, 400 PSI rated to 260m

DEPLOYMENT/RECOVERY DETAILS

Date/Time of Deployment: 22-Sep-97 09:10
Date/Time of Recovery: 09-Dec-97 09:30GMT
Instrument Height above bed: ≈800m
Instrument Status on Recovery
Working ☑ Stopped ☐ Damaged ☐ Flooded ☐

DATA LOGGING DETAILS

DSU Serial Number: 9360
Sampling Interval: 20 mins
Pre-Deployment DSU Date/Time Check ☑
Post-Recovery DSU Date/TimeCheck ☐
Instrument Switch on Date/Time: 21-Sep-97 13:00
DSU Timing Error +/- mins:
Date/Time of last Record:
Data/Instrument Notes
Rotor catching on WENV. chider.
Number of Records: 34560
Expected No of Records: 34560
File Name: 2418orw.dat

CHECKLISTS (Refer to Technical Instructions TI004)

AFTER RECOVERY

- ☑ 1) Note Instrument/Mooring Recovery Details
- ☑ 2) Check Instrument Condition on Recovery
- ☑ 3) Clean and Open Instrument
- ☑ 4) Stop Instrument Logging
- ☑ 5) Recover Data
- ☑ 6) Report Instrument Status

PRIOR TO DEPLOYMENT

- ☑ 1) Check Instrument Condition
- ☑ 2) Check Instrument Configuration
- ☑ 3) DSU Time/Date Check
- ☑ 4) Start Instrument Logging
- ☑ 5) Close and Prepare for Deployment
- ☑ 6) Note Instrument/Moormg Deployment Details

OPERATOR:	SIGNATURE:	DATE:
CLP / WJAH	Catherine Prunier	22-Sep-97 09-Dec-97

GEOS

LOGSHEET004/020997

01AB238-0900

RCM DEPLOYMENT LOG SHEET

MOORING/CONTRACT DETAILS

Contract No: C10328
Contract Name: EEP ELF Angola Deepwater Current Meters
Location: GIRASSOL Field
Position (Latitude): 7°40.20'S
Mooring Name: M06 → SV1
(Longitude): 011°40.95'E
Nominal Water Depth: 1390m
Time Zone: GMT

INSTRUMENT/SENSOR DETAILS

Instrument Type: ~~RCM 4~~ ~~RCM5~~ ~~RCM7~~ ~~RCM8~~
Instrument Serial Number: 11400 (box = 11401?)
GEOS/WENV Number: 400.94089
Temperature Sensor: ☑ wide
Pressure Sensor: ☑
Conductivity Sensor: ☑
Serial No/Pressure Range:
Conductivity Sensor Serial No:
NB 100 PSI rated to 60m, 400 PSI rated to 260m

DEPLOYMENT/RECOVERY DETAILS

Date/Time of Deployment: 22-Sep-97 09:10
Date/Time of Recovery: 09-Dec-97 09:30 GMT
Instrument Height above bed: ~800m
Instrument Status on Recovery
Working ☑ Stopped ☐ Damaged ☐ Flooded ☐

DATA LOGGING DETAILS

DSU Serial Number: 7148
Sampling Interval: 20 mins.
Pre-Deployment DSU Date/Time Check ☑
Post-Recovery DSU Date/TimeCheck ☐
Instrument Switch on Date/Time: 21-Sep-97 13:00
DSU Timing Error +/- mins:
Date/Time of last Record:
Data/Instrument Notes
Rotor counter failure + biofouling on bottom of magnet.
Rotor bee. No speed recorded (0)
Number of Records: 34560
Expected No of Records: 34560
File Name: 11400cmw.dat

CHECKLISTS (Refer to Technical Instructions TI004)

AFTER RECOVERY

- ☑ 1) Note Instrument/Mooring Recovery Details
- ☑ 2) Check Instrument Condition on Recovery
- ☑ 3) Clean and Open Instrument
- ☑ 4) Stop Instrument Logging
- ☑ 5) Recover Data
- ☑ 6) Report Instrument Status

PRIOR TO DEPLOYMENT

- ☑ 1) Check Instrument Condition
- ☑ 2) Check Instrument Configuration
- ☑ 3) DSU Time/Date Check
- ☑ 4) Start Instrument Logging
- ☑ 5) Close and Prepare for Deployment
- ☑ 6) Note Instrument/Mooring Deployment Details

OPERATOR:	SIGNATURE:	DATE:
CLP/WJAH	Catherine Prince	22-Sep-97 09-Dec-97

GEOS

LOGSHEET004/020997

RCM DEPLOYMENT LOG SHEET

MOORING/CONTRACT DETAILS

Contract No: C10328
Contract Name: FEF ELF Angola Deepwater Current Meter
Location: GIRASSOL Field
Position (Latitude): 7°40.20'S
Mooring Name: M6 → SV1
(Longitude): 011°40.95'E
Nominal Water Depth: 1390m
Time Zone: GMT

INSTRUMENT/SENSOR DETAILS

Instrument Type: ~~RCM 4~~ ~~RCM5~~ RCM7 ~~RCM8~~
Instrument Serial Number: 12417
GEOS/WENV Number: not marked (new) 400.97418
Temperature Sensor ☑ wide
Pressure Sensor ☐
Conductivity Sensor ☑
Serial No/Pressure Range:
Conductivity Sensor Serial No:
NB 100 PSI rated to 60m, 400 PSI rated to 260m

DEPLOYMENT/RECOVERY DETAILS

Date/Time of Deployment: 22-Sep-97 09:10
Date/Time of Recovery: 09-Dec-97 09:30GMT
Instrument Height above bed: ≈400m
Instrument Status on Recovery
Working ☑ Stopped ☐ Damaged ☐ Flooded ☐

DATA LOGGING DETAILS

DSU Serial Number: 3453
Sampling Interval: 20 mins
Pre-Deployment DSU Date/Time Check ☑
Post-Recovery DSU Date/TimeCheck ☐
Instrument Switch on Date/Time: 21-Sep-97 15:00
DSU Timing Error +/- mins:
Date/Time of last Record:
Data/Instrument Notes: Started ½hr later → fewer records.
Number of Records: 34524
Expected No of Records: 34524
File Name: 2417cmw.dat

CHECKLISTS (Refer to Technical Instructions TI004)

AFTER RECOVERY

- ☑ 1) Note Instrument/Mooring Recovery Details
- ☑ 2) Check Instrument Condition on Recovery
- ☑ 3) Clean and Open Instrument
- ☑ 4) Stop Instrument Logging
- ☑ 5) Recover Data
- ☑ 6) Report Instrument Status

PRIOR TO DEPLOYMENT

- ☑ 1) Check Instrument Condition
- ☑ 2) Check Instrument Configuration
- ☑ 3) DSU Time/Date Check 1min out. wait?
- ☑ 4) Start Instrument Logging
- ☑ 5) Close and Prepare for Deployment
- ☑ 6) Note Instrument/Moorng Deployment Details

OPERATOR:	SIGNATURE:	DATE:
CCP / WJAH	Cathryn Pinna	22-Sep-97 09-Dec-97

GEOS

LOGSHEET004/020997

01AB238-0900

→ Uk.

RCM DEPLOYMENT LOG SHEET

MOORING/CONTRACT DETAILS

Contract No: C10328
Contract Name: EEF EIF Angola Deepwater Current Meters
Location: SIRASSO Field
Position (Latitude): 7°40.20'S
Mooring Name: MM6 → SV1
(Longitude): 011°40.95'E
Nominal Water Depth: 1390m
Time Zone: GMT

INSTRUMENT/SENSOR DETAILS

Instrument Type: ~~RCM4~~ ~~RCM5~~ ~~RCM7~~ RCM8
Instrument Serial Number: 11260
GEOS/WENV Number: 400.94096
Temperature Sensor: ☑ wide
Pressure Sensor: ☐
Conductivity Sensor: ☑
Serial No/Pressure Range:
Conductivity Sensor Serial No:
NB 100 PSI rated to 60m, 400 PSI rated to 260m

DEPLOYMENT/RECOVERY DETAILS

Date/Time of Deployment: 22-Sep-97 09:10
Date/Time of Recovery: 09-Dec-97 09:30GMT
Instrument Height above bed: ≈200m
Instrument Status on Recovery
Working ☑ Stopped ☐ Damaged ☐ Flooded ☐

DATA LOGGING DETAILS

DSU Serial Number: 5093
Sampling Interval: 20 mins.
Pre-Deployment DSU Date/Time Check ☑
Post-Recovery DSU Date/TimeCheck ☐
Instrument Switch on Date/Time: 21-Sep-97 13:00
DSU Timing Error +/- mins:
Date/Time of last Record:
Data/Instrument Notes
Minor conductivity leak-through.
Number of Records: 34560
Expected No of Records: 34560
File Name: 1260raw.dat

CHECKLISTS (Refer to Technical Instructions TI004)

AFTER RECOVERY

- ☑ 1) Note Instrument/Mooring Recovery Details
- ☑ 2) Check Instrument Condition on Recovery
- ☑ 3) Clean and Open Instrument
- ☑ 4) Stop Instrument Logging
- ☑ 5) Recover Data
- ☑ 6) Report Instrument Status

PRIOR TO DEPLOYMENT

- ☑ 1) Check Instrument Condition
- ☑ 2) Check Instrument Configuration
- ☑ 3) DSU Time/Date Check
- ☑ 4) Start Instrument Logging
- ☑ 5) Close and Prepare for Deployment
- ☑ 6) Note Instrument/Moorng Deployment Details

OPERATOR:	SIGNATURE:	DATE:
CLP/WSAH	Cathryn Pinnix	22-Sep-97 09-Dec-97

GEOS

LOGSHEET004/020997

01AB238-0900

→ UK .

RCM DEPLOYMENT LOG SHEET

MOORING/CONTRACT DETAILS

Contract No: C10328
Contract Name: EEP Ekrafla Deepwater Current Meters
Location: GIRASSOL Field
Position (Latitude): 7°40.20'S
Mooring Name: Mob → SV1
(Longitude): 011°40.95'E
Nominal Water Depth: 1390m
Time Zone: GMT

INSTRUMENT/SENSOR DETAILS

Instrument Type: ~~RCM 4~~ ~~RCM5~~ ~~RCM7~~ RCM8
Instrument Serial Number: 11492
GEOS/WENV Number: not marked. 400.94231
Temperature Sensor ☑ wide
Pressure Sensor ☐
Conductivity Sensor ☑
Serial No/Pressure Range .....
Conductivity Sensor Serial No: .....
NB 100 PSI rated to 60m, 400 PSI rated to 260m

DEPLOYMENT/RECOVERY DETAILS

Date/Time of Deployment: 22-Sep-97 09:10
Date/Time of Recovery: 09-Dec-97 09:30 GMT
Instrument Height above bed: ~15m
Instrument Status on Recovery
Working ☑ Stopped ☐ Damaged ☐ Flooded ☑

DATA LOGGING DETAILS

DSU Serial Number: 9356
Sampling Interval: 20 mins.
Pre-Deployment DSU Date/Time Check ☑
Post-Recovery DSU Date/TimeCheck ☐
Instrument Switch on Date/Time: 21-Sep-97 13:00
DSU Timing Error +/- mins: .....
Date/Time of last Record: .....
Data/Instrument Notes
Water inside → ik. Same no records. Inbalu through around conductivity all. not through it.
Number of Records: 34560
Expected No of Records: 34560
File Name: 1492 caw.dat

CHECKLISTS (Refer to Technical Instructions TI004)

AFTER RECOVERY

- ☑ 1) Note Instrument/Mooring Recovery Details
- ☑ 2) Check Instrument Condition on Recovery
- ☑ 3) Clean and Open Instrument
- ☑ 4) Stop Instrument Logging
- ☑ 5) Recover Data
- ☑ 6) Report Instrument Status

PRIOR TO DEPLOYMENT

- ☑ 1) Check Instrument Condition
- ☑ 2) Check Instrument Configuration
- ☑ 3) DSU Time/Date Check
- ☑ 4) Start Instrument Logging
- ☑ 5) Close and Prepare for Deployment
- ☑ 6) Note Instrument/Moorng Deployment Details

OPERATOR:	SIGNATURE:	DATE:
CLP/ WJAH	Cathryn Pinnix	22-Sep-97 09-Dec-97

GEOS

LOGSHEET004/020997

CTD PROFILE LOG SHEET

Contract No	C10328	Contract Name	FEA Angola Deepwater Current Meters
Vessel	O.C.I. Tempest	Date	10-Dec-97
Location	Block 17 - GIRASSOL Field	Position (Lat/Long)	nom: 7°40.20'S, 011°40.95'E
Time Zone	GMT	Nominal Depth	1385m

CTD PROFILE

Instrument	Seacat Profiler v3.1	Serial Number	2391 (WENV.: 460.97508)
Depth Rating	5000 psi	Sampling Rate	0.5 sec.
Header File		Data File Name	SV100.hex

Start Time	12:30	Depth (m)		Lat ≈ 7°40.194'S	Long 011°39.035'E
End Time	13:05	Depth (m)		Lat 7°40.489'S	Long 011°38.694'E

CROSS CALIBRATION

Time		Depth (m)	
SIS Temp (°C)		SAL Sample Ref	
CTD Temp (°C)		CTD Salinity	

GENERAL CONDITIONS		Seastate (Hs)	calm
Wind Speed		Wind Direction	

NOTES

OPERATOR:	SIGNATURE:	DATE:	
WJAH/CLP	Calvin Fromm	10-Dec-97	GEOS

CTD PROFILE LOG SHEET

Contract No	C10328	Contract Name	EEP Cll Angola Deepwater Current Meters
Vessel	OIL Tempest	Date	22-Sep-97
Location	Girassol Field - Block 17	Position (Lat/Long)	
Time Zone	GMT	Nominal Depth	1385m

CTD PROFILE

Instrument	Seacat Profiler V 3.1		Serial Number	2391 (UENV: 460.97508)	
Depth Rating	5000 psi		Sampling Rate	0.5 sec	
Header File	~~Angola.00~~		Data File Name	Angola.00	
Start Time	12:47	Depth (m)	Lat	7°40.75'S	Long 011°40.95'E
End Time	13:26	Depth (m)	Lat	7°41.333S	Long 011°40.942E

CROSS CALIBRATION

Time		Depth (m)	
SIS Temp (°C)		SAL Sample Ref	
CTD Temp (°C)		CTD Salinity	

GENERAL CONDITIONS		Seastate (Hs)	calm
Wind Speed		Wind Direction	

NOTES 1410m of wire (counter). Initial results indicate reached ≈ 1350m.

OPERATOR:	SIGNATURE:	DATE:	
WSA/CLP	Catriona Fonseca	22-Sep-97	GEOS

```
------------------------------------------------------------
-----------
------------------------------------------------------------
-----------
BBTEST V 1.10 1997/09/20 20:13:30.38
------------------------------------------------------------
-----------
------------------------------------------------------------
-----------

------------------------------ CONNECT TEST ------------------
-----------
---Wakeup message---

Broadband ADCP Version 5.47
RD Instruments (c) 1991-95
All rights reserved.
>

COM port   : COM1
Baud rate : 9600

TEST OK

-------------------------------- INFO TEST --------------------
-----------
    Frequency:  153600 HZ
Configuration:  4 BEAM, JANUS
  Match Layer:  10
   Beam Angle:  20 DEGREES
 Beam Pattern:  CONVEX
  Orientation:  DOWN
 Xducer Ser #:  02308
    Sensor(s):  HEADING  TILT 1  TILT 2  TEMPERATURE
 XDC Firmware:   1.16
 CPU Firmware:   5.47
 DEMOD #1 Ver:  ad46, Type:   3
 DEMOD #2 Ver:  ad46, Type:   3
 PWRTIMG  Ver:  c5d3, Type:   4
 REC Firmware:   3.22


TEST OK

---------------------------- BUILT IN TESTS -----------------
-----------
```

```
---PI test---
[BEGIN Built In Tests]
   CPU RAM Test ........... PASS
   Realtime Clock Test .... PASS
   Timing Card RAM Test ... PASS
   Demod RAM Test ......... PASS  PASS
[END Built in Tests]

---PT1 test---

DAC/ADC Test Results  = $0 ... PASS

---PT2 test---

AMBTEMP =      27.5 Degrees C
VMVDD3  =      15.8 Volts
VMVDD1  =       5.0 Volts
VMVDC   =      54.6 Volts

---PT3 test---

Correlation Magnitude:

                Lag  Bm1  Bm2  Bm3  Bm4
                  0  255  255  255  255
                  1  188  185  184  186
                  2   84   76   74   77
                  3   54   45   49   47
                  4   72   70   76   69
                  5   67   74   65   69
                  6   32   42   24   37
                  7   16   17   26   13

  High Gain RSSI:    40   33   38   27
   Low Gain RSSI:    18   12   17    9

    Demod  1 DAC:   119  117  117  119, Duty:    48   51   49
 50, LPF:  0
    Demod  2 DAC:   120  117  120  119, Duty:    49   47   48
 52, LPF:  0

Receive Test Results = $00000000 ... PASS

---PT4 test---

IXMT    =       6.2 Amps  peak
```

```
VXMT     =     197.7 Volts peak
Transmit Test Results = $00 ... PASS

---PT5 test---

    0     0     0     0
    0     0     0     0
    0     0     0     0
    0     0     0     0
  255   255   255   255
    0     0     0     0
    0     0     0     0
  255   255   255   255
    0     0     0     0
    0     0     0     0
    0     0     0     0
  255   255   255   255
Electronics Test Results = $00000000 ... PASS

---PT6 test---
Receive Bandwidth:
    Sample       bw     bw     bw     bw     bw
      rate   expect    Bm1    Bm2    Bm3    Bm4
       154       39     29     29     29     30 Khz
   results            FAIL   FAIL   FAIL   PASS

---PT7 test---
RSSI Time Constant:

RSSI Filter Strobe 1 =   38400 Hz
  time    Bm1    Bm2    Bm3    Bm4
  msec   cnts   cnts   cnts   cnts
     1     20      3     20      1
     2     23      9     23      8
     3     25     11     25     10
     4     27     14     26     12
     5     29     16     28     14
     6     30     18     29     16
     7     31     20     30     17
     8     33     22     31     19
     9     33     23     32     20
    10     34     24     33     21
   nom     39     30     37     26
result     PASS   PASS   PASS   PASS
```

TEST FAILED

---------- SENSORS TEST ----------

Pitch	Roll	Heading	Temperature	Salinity	Depth	Face	
deg	deg	deg	deg C	ppt	m		
OK	OK	OK	OK	NONE	NONE		
-11.89	10.26	28.12	24.26	35	0.0	DOWN	- ok

TEST OK

---------- ALARM CLOCK TEST ----------

- Sent profiling commands
- Reset ADCP clock time to PC time
- Reset time of the first ping
- Saved ensemble 1 to recorder
- Saved ensemble 2 to recorder
- Saved ensemble 3 to recorder
- Recovered ensemble 1 from recorder
- Time of first ensemble equal to time of the first ping
- Recovered ensemble 2 from recorder
- Recovered ensemble 3 from recorder
- Saved and recovered ensembles the same

TEST OK

---------- MULTIPLE DEPLOYMENTS TEST ----------

- Sent profiling commands
- Saved deployment 1
- Saved deployment 2
- Saved deployment 3
- Recovered deployment 1
- Recovered deployment 2
- Recovered deployment 3
- Saved and recovered ensembles the same

TEST OK

---------- ERASE RECORDER ----------

---Response---
RS = 000,010 ---------- Rec Space Used (MB), Free (MB), (999

= Erasing)

RECORDER ERASED

---------- RUBBING BEAMS TEST ----------

- Collected statistical data:
41 33 40 27

Beam1 Beam2 Beam3 Beam4
OK OK OK OK

TEST OK

---------- RUBBING BEAMS TEST ----------

- Collected statistical data:
41 31 39 28

Beam1 Beam2 Beam3 Beam4
OK OK OK OK

TEST OK

20 SEP 1997 19:10:36.29 Deployment file ANGLA.CMD contents: start----------

```
;  CR1
CR1

;  ED0800
ED0800

;  ES35
ES35

;  EX11111
EX11111

;  TE00:20:00.00
TE00:20:00.00

;  TP00:26.65
TP00:26.65

;  WD111100000
WD111100000

;  WP00045
WP00045

;  WN020
WN020

;  WS0400
WS0400

;  WF0176
WF0176

;  WV170
WV170

;  EZ1111111
EZ1111111

;  EA00000
EA00000

;  EB00000
```

```
EB00000

;  CF11101
CF11101

;  CK
CK

;  CS
CS

;Created as: ANGLA.CMD (1997/09/20 19:09:13.24  PLAN Version 1.
20 )
;Deployment hours = 1800.00
;Temperature      = 0.00
;Frequency        = 307200.00

20 SEP 1997 19:10:36.34 Deployment file ANGLA.CMD contents: end
-----------------

20 SEP 1997 19:10:36.34 ------- INITADCP STARTED ------

20 SEP 1997 19:10:36.34 Deployment file: ANGLA.CMD
20 SEP 1997 19:10:36.34 DOS command line: ANGLA.CMD
20 SEP 1997 19:10:38.48 CR1...OK
20 SEP 1997 19:10:38.54 ED0800...OK
20 SEP 1997 19:10:38.54 ES35...OK
20 SEP 1997 19:10:38.59 EX11111...OK
20 SEP 1997 19:10:38.59 TE00:20:00.00...OK
20 SEP 1997 19:10:38.59 TP00:26.65...OK
20 SEP 1997 19:10:38.65 WD111100000...OK
20 SEP 1997 19:10:38.65 WP00045...OK
20 SEP 1997 19:10:38.70 WN020...OK
20 SEP 1997 19:10:38.70 WS0400...OK
20 SEP 1997 19:10:38.70 WF0176...OK
20 SEP 1997 19:10:38.76 WV170...OK
20 SEP 1997 19:10:38.76 EZ1111111...OK
20 SEP 1997 19:10:38.76 EA00000...OK
20 SEP 1997 19:10:38.76 EB00000...OK
20 SEP 1997 19:10:38.92 CF11101...OK
20 SEP 1997 19:10:38.92 CK...OK
20 SEP 1997 19:10:39.03 INITADCP: Set ADCP clock = PC clock
20 SEP 1997 19:10:39.03  ,  97/09/20,19:10:39  (PC time , ADCP
time)
20 SEP 1997 19:10:39.14 INITADCP: Setting deployment name to AN
GLA  ...OK
```

```
20 SEP 1997 19:10:39.20 ADCP Harware information begin --------
-------

20 SEP 1997 19:10:39.20 Sent command (RF) with ADCP response:
RF = 0,20815872 ----------- Rec space used (bytes), free (bytes
)

>20 SEP 1997 19:10:39.25 Sent command (RR) with ADCP response:
Recorder Directory:
Volume serial number for device #0 is 0000-0105

  No files found.

  Bytes used on device #0 = 0
Volume serial number for device #1 is 0000-0105

  No files found.

  Bytes used on device #1 = 0
Total capacity   =   20815872 bytes
Total bytes used =          0 bytes in 0 files
Total bytes free =   20815872 bytes

>20 SEP 1997 19:10:39.64 Sent command (PS0) with ADCP response:
       Frequency:  307200 HZ
   Configuration:  4 BEAM, JANUS
     Match Layer:  10
      Beam Angle:  20 DEGREES
    Beam Pattern:  CONVEX
     Orientation:  UP
       Sensor(s):  HEADING  TILT 1  TILT 2  TEMPERATURE
Temp Sens Offset:  -0.31 degrees C

    CPU Firmware:  8.18 [0]
   Boot Code Ver:  Required:  1.12   Actual:  1.12
    DEMOD #1 Ver:  ad48, Type:  1f
    DEMOD #2 Ver:  ad48, Type:  1f
    PWRTIMG  Ver:  85d3, Type:   4

Board Serial Number Data:
   E4  00 00 00 9A BB 30  09 DSP727-2001-04D
   2A  00 00 00 76 29 38  09 REC727-1000-04A
   72  00 00 00 76 26 39  09 PIO727-3000-04C
   5F  00 00 00 76 26 FF  09 CPU727-2000-00F
>20 SEP 1997 19:10:40.41 Sent command (PS3) with ADCP response:
```

Beam Width: 3.7 degrees

Beam	Elevation	Azimuth
1	-69.82	270.54
2	-69.64	90.53
3	-70.58	359.47
4	-70.12	179.47

Beam Directional Matrix (Down):

0.3449	-0.0032	0.9386	0.2426
-0.3477	0.0032	0.9376	0.2406
0.0031	-0.3323	0.9431	-0.2434
-0.0032	0.3398	0.9404	-0.2380

Instrument Transformation Matrix (Down): Q14:

1.4407	-1.4475	-0.0112	0.0164	23605	-23716	-184	269
0.0061	-0.0208	-1.4785	1.4973	100	-340	-24223	24531
0.2665	0.2644	0.2695	0.2635	4367	4332	4415	4317
1.0430	1.0346	-1.0463	-1.0231	17088	16951	-17143	-16762

Beam Angle Corrections Are Loaded.
>20 SEP 1997 19:10:41.29 Sent command (AC) with ADCP response:

ACTIVE FLUXGATE CALIBRATION MATRICES in FLASH
Calibration date and time: 7/8/1997 08:24:05

S inverse

Bx	2.8319e-01	2.8999e-01	-6.9870e-04	3.6034e-02
By	-7.5831e-03	-4.2537e-03	-8.9797e-03	3.9863e-01
Bz	-1.4724e-01	1.6790e-01	2.2701e-01	2.7253e-03
Err	3.3312e-01	-3.2585e-01	4.5690e-01	1.3152e-02

Coil Offset

3.5840e+04
3.3267e+04
3.3550e+04
3.4487e+04

Electrical Null

34516

TILT CALIBRATION MATRICES in FLASH
Calibration date and time: 7/8/1997 08:19:52
Average Temperature During Calibration was 23.8 øC

	Up			Down	
Roll	2.4254e-07	-1.4433e-05		-1.8304e-07	1.5328e-05
Pitch	-1.4784e-05	3.5202e-07		-1.5260e-05	1.6447e-07
Offset	2.9758e+04	3.0530e+04		3.0348e+04	3.2363e+04

Null	33256

>20 SEP 1997 19:10:43.32 Sent command (RN?) with ADCP response:
Current deployment name = ANGLA

>20 SEP 1997 19:10:43.37 Sent command (DEPLOY?) with ADCP response:
Deployment Commands:
PA ---------- Pre-Deployment Tests

RE ---------- Recorder ErAsE
RN ---------- Set Deployment Name

WF = 0176 ---------- Blank After Transmit (cm)
WN = 020 ---------- Number of depth cells (1-128)
WP = 00045 ---------- Pings per Ensemble (0-16384)
WS = 0400 ---------- Depth Cell Size (cm)

```
WV = 170 ----------------- Mode 1 Ambiguity Vel (cm/s radial)

TE = 00:20:00.00 --------- Time per Ensemble (hrs:min:sec.sec/1
00)
TF = **/**/**,**:**:** --- Time of First Ping (yr/mon/day,hour:
min:sec)
TP = 00:26.65 ------------ Time per Ping (min:sec.sec/100)
TS = 97/09/20,19:10:43 --- Time Set (yr/mon/day,hour:min:sec)

ES = 35 ------------------ Salinity (0-40 pp thousand)

CF = 11101 --------------- Flow Ctrl (EnsCyc;PngCyc;Binry;Ser;R
ec)
CS ------------------------ Start Deployment
>20 SEP 1997 19:10:44.31 ADCP Harware information end ---------
---------

20 SEP 1997 19:10:44.42 ADCP recorder info: 0 bytes used, 20815
872 bytes free
20 SEP 1997 19:10:45.40 ADCP data to serial interface : OFF
20 SEP 1997 19:10:45.40 ADCP data to internal recorder: ON
```

APPENDIX D

Calibration Certificates

GEOS

Global Environmental and Ocean Sciences

Gemini House, Hargreaves Road, Swindon, Wiltshire, SN2 5AZ, UK

Instrument Calibration Certificate

Instrument Manufacturer: Aanderaa
Instrument Type: RCM (4,5,7,8) 7
Instrument Serial Number: 11398
GEOS Number: 400.45015

Pressure (Pressure)

Range	A	B	C	D
1000	-2.31928e+001	1.03280e+000	0.00000e+000	0.00000e+000

Speed (Speed)

Range	A	B	C	D
fixed	1.10000e-002	2.90600e-003	0.00000e+000	0.00000e+000

Temperature (Temperature)

Range	A	B	C	D
high	1.00400e+001	2.46900e-002	-1.54900e-006	2.21400e-009
low	-2.54300e+000	2.28100e-002	-1.34400e-006	1.93700e-009
wide	-4.61604e-001	3.65362e-002	-1.00104e-005	5.40816e-009

Direction (Direction)

Range	A	B	C	D
fixed	1.00000e+000	3.50000e-001	0.00000e+000	0.00000e+000

Conductivity (Conductivity)

Range	A	B	C	D
0-74	-4.02008e-002	7.27472e-002	0.00000e+000	0.00000e+000

Operator: W.S. Ocean Systems Ltd

Date: 23-Jul-97

GEOS

Global Environmental and Ocean Sciences

Gemini House, Hargreaves Road, Swindon, Wiltshire, SN2 5AZ, UK

Instrument Calibration Certificate

Instrument Manufacturer: Aanderaa
Instrument Serial Number: 12418
Instrument Type: RCM (4,5,7,8) 7
GEOS Number: 400.97419

Speed (Speed)

Range	A	B	C	D
fixed	1.10000e-002	2.90600e-003	0.00000e+000	0.00000e+000

Temperature (Temperature)

Range	A	B	C	D
high	1.00400e+001	2.46500e-002	-1.54900e-006	2.21400e-009
low	-2.52000e+000	2.28100e-002	-1.34400e-006	1.93700e-009
wide	-3.63100e-001	3.59100e-002	-8.38800e-006	4.30000e-009

Direction (Direction)

Range	A	B	C	D
fixed	1.00000e+000	3.50000e-001	0.00000e+000	0.00000e+000

Conductivity (Conductivity)

Range	A	B	C	D
0-74	7.25700e-002	7.25700e-002	0.00000e+000	0.00000e+000

Operator: Aanderaa
Date: 27-Jun-97

Global Environmental and Ocean Sciences

Gemini House, Hargreaves Road, Swindon, Wiltshire, SN2 5AZ, UK

Instrument Calibration Certificate

Instrument Manufacturer: Aanderaa
Instrument Type: RCM (4,5,7,8) 7
Instrument Serial Number: 11400
GEOS Number: 400.94089

Pressure (Pressure)

Range	A	B	C	D
1000	-9.68166e+000	1.00300e+000	0.00000e+000	0.00000e+000

Speed (Speed)

Range	A	B	C	D
fixed	1.10000e-002	2.90600e-003	0.00000e+000	0.00000e+000

Temperature (Temperature)

Range	A	B	C	D
high	9.99382e+000	2.50309e-002	-2.11901e-006	2.42095e-009
low	-2.55408e+000	2.29305e-002	-1.85729e-006	2.32607e-009
wide	-5.02925e-001	3.64723e-002	-9.74469e-006	5.31499e-009

Direction (Direction)

Range	A	B	C	D
fixed	1.00000e+000	3.50000e-001	0.00000e+000	0.00000e+000

Conductivity (Conductivity)

Range	A	B	C	D
0-74	-2.55389e-001	7.26215e-002	0.00000e+000	0.00000e+000

Operator: W.S. Ocean Systems Ltd

Date: 23-Jul-97

GEOS

Global Environmental and Ocean Sciences

Gemini House, Hargreaves Road, Swindon, Wiltshire, SN2 5AZ, UK

Instrument Calibration Certificate

Instrument Manufacturer: Aanderaa
Instrument Type: RCM (4,5,7,8) 7
Instrument Serial Number: 12417
GEOS Number: 400.97418

Speed (Speed)

Range	A	B	C	D
fixed	1.10000e-002	2.90600e-003	0.00000e+000	0.00000e+000

Temperature (Temperature)

Range	A	B	C	D
high	1.00900e+001	2.46200e-002	-1.54900e-006	2.21400e-009
low	-2.43900e+000	2.27200e-002	-1.34400e-006	1.93700e-009
wide	-2.89600e-001	3.58300e-002	-8.38800e-006	4.30000e-009

Direction (Direction)

Range	A	B	C	D
fixed	1.00000e+000	3.50000e-001	0.00000e+000	0.00000e+000

Conductivity (Conductivity)

Range	A	B	C	D
0-74	-2.15800e-001	7.19200e-002	0.00000e+000	0.00000e+000

Operator: Aanderaa
Date: 27-Jun-97

GEOS

Global Environmental and Ocean Sciences

Gemini House, Hargreaves Road, Swindon, Wiltshire, SN2 5AZ, UK

Instrument Calibration Certificate

Instrument Manufacturer: Aanderaa
Instrument Type: RCM (4,5,7,8) 8
Instrument Serial Number: 11260
GEOS Number: 400.94096

Speed (Speed)

Range	A	B	C	D
fixed	1.10000e-002	2.90600e-003	0.00000e+000	0.00000e+000

Temperature (Temperature)

Range	A	B	C	D
high	9.98770e+000	2.45686e-002	-1.15447e-006	1.89628e-009
low	-2.59944e+000	2.25629e-002	-5.19634e-008	8.50737e-010
wide	-4.43719e-001	3.57550e-002	-7.94674e-006	3.98846e-009

Direction (Direction)

Range	A	B	C	D
fixed	1.00000e+000	3.50000e-001	0.00000e+000	0.00000e+000

Conductivity (Conductivity)

Range	A	B	C	D
0-74	-7.24700e-002	7.24700e-002	0.00000e+000	0.00000e+000

Operator: W.S. Ocean Systems Ltd

Date: 22-Jul-97

GEOS

Global Environmental and Ocean Sciences

Gemini House, Hargreaves Road, Swindon, Wiltshire, SN2 5AZ, UK

Instrument Calibration Certificate

Instrument Manufacturer: Aanderaa
Instrument Type: RCM (4,5,7,8) 8
Instrument Serial Number: 11492
GEOS Number: 400.94231

Speed (Speed)

Range	A	B	C	D
fixed	1.10000e-002	2.90600e-003	0.00000e+000	0.00000e+000

Temperature (Temperature)

Range	A	B	C	D
high	9.97001e+000	2.46514e-002	-1.51294e-006	2.16781e-009
low	-2.51501e+000	2.20107e-002	1.01093e-007	1.14365e-009
wide	-4.45476e-001	3.56126e-002	-7.96383e-006	4.18266e-009

Direction (Direction)

Range	A	B	C	D
fixed	1.00000e+000	3.50000e-001	0.00000e+000	0.00000e+000

Conductivity (Conductivity)

Range	A	B	C	D
0-74	1.16192e+000	7.16410e-002	0.00000e+000	0.00000e+000

Operator: W.S. Ocean Systems Ltd

Date: 22-Jul-97

SBE S/N 195057-2391 26 March 1997

Pressure calibration: PAINE 211-36-730-02 5000 psia S/N 180493

Temperature Compensation (TC) value = -141

Straight Line Fit:

Pressure(psia) = M * N + B (N = Binary output)

M = -0.65014 B = 2546.40

Quadratic Fit:

Pressure(psia) = A0 + A1 * N + A2 * N * N (N = binary output)

A0 = 2546.67320 A1 = -6.501358e-01 A2 = -3.959561e-08

		Straight Line Fit		Quadratic Fit	
Pressure (psi)	Output (N)	error, psi	error, %FS	error, psi	error, %FS
14.64	3896.15	-1.277	-0.03	-1.590	-0.03
1015.08	2358.02	-1.726	-0.03	-1.664	-0.03
2015.17	821.04	-2.557	-0.05	-2.307	-0.05
3015.13	-719.94	-0.665	-0.01	-0.416	-0.01
4015.15	-2259.01	-0.079	-0.00	-0.017	-0.00
5015.07	-3796.85	-0.187	-0.00	-0.499	-0.01
4015.12	-2261.02	1.256	0.03	1.318	0.03
3015.08	-723.18	1.483	0.03	1.733	0.03
2015.07	816.87	0.253	0.01	0.502	0.01
1014.95	2354.00	1.020	0.02	1.082	0.02
14.62	3890.10	2.667	0.05	2.356	0.05

Output binary values are averages of 101 samples taken at 2 Hz.

SEASOFT Versions 3.3M and higher will prompt for A0, A1, and A2

SEASOFT Versions 3.3L and lower will prompt for M and B

SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington 98005 USA
Phone: (206) 643 - 9866 Fax: (206) 643 - 9954 Internet: seabird@seabird.com

SENSOR SERIAL NUMBER = 2391
CALIBRATION DATE: 25-Jul-97s

TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

g = 4.18282819e-03
h = 5.96515388e-04
i = 3.95441131e-06
j = -1.82910244e-06
f_0 = 1000.000

IPTS-68 COEFFICIENTS

a = 3.64546882e-03
b = 5.84938581e-04
c = 8.96477182e-06
d = -1.82869261e-06
f_0 = 2480.840

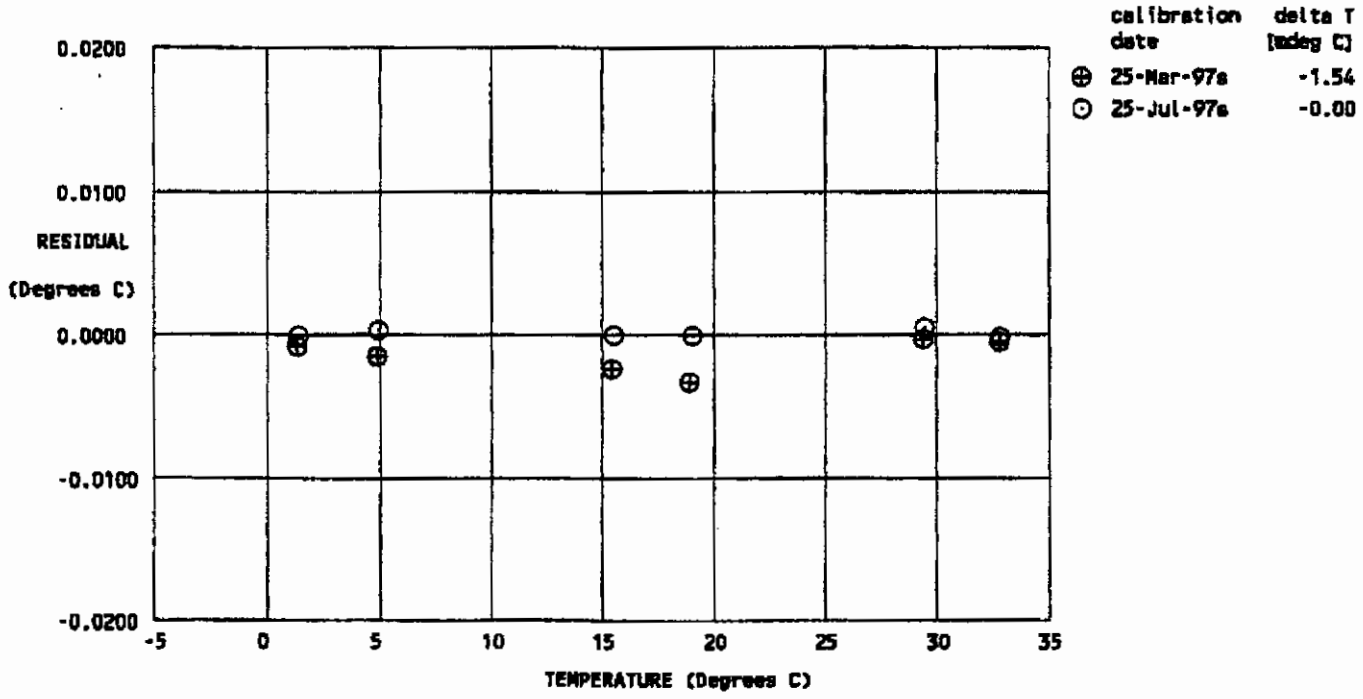
BATH TEMP (ITS-90 °C)	INSTRUMENT FREQ (Hz)	INST TEMP (ITS-90 °C)	RESIDUAL (ITS-90 °C)
1.1630	2480.840	1.1629	-0.00014
4.7030	2686.193	4.7032	0.00024
15.3250	3374.222	15.3249	-0.00010
18.8190	3625.289	18.8189	-0.00015
29.2600	4453.288	29.2604	0.00040
32.6340	4746.721	32.6337	-0.00026

Temperature ITS-90 $= 1/\{g + h[\ell n(f_0/f)] + i[\ell n^2(f_0/f)] + j[\ell n^3(f_0/f)]\} - 273.15$ (°C)

Temperature IPTS-68 $= 1/\{a + b[\ell n(f_0/f)] + c[\ell n^2(f_0/f)] + d[\ell n^3(f_0/f)]\} - 273.15$ (°C)

Following the recommendation of JPOTS: T_{68} is assumed to be 1.00024 * T_{90} (-2 to 35 °C).

Residual = instrument temperature - bath temperature



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington 98005 USA
Phone: (206) 643 - 9866 Fax: (206) 643 - 9954 Internet: seabird@seabird.com

SENSOR SERIAL NUMBER = 2391
CALIBRATION DATE: 25-Jul-97s

CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

GHIJ COEFFICIENTS

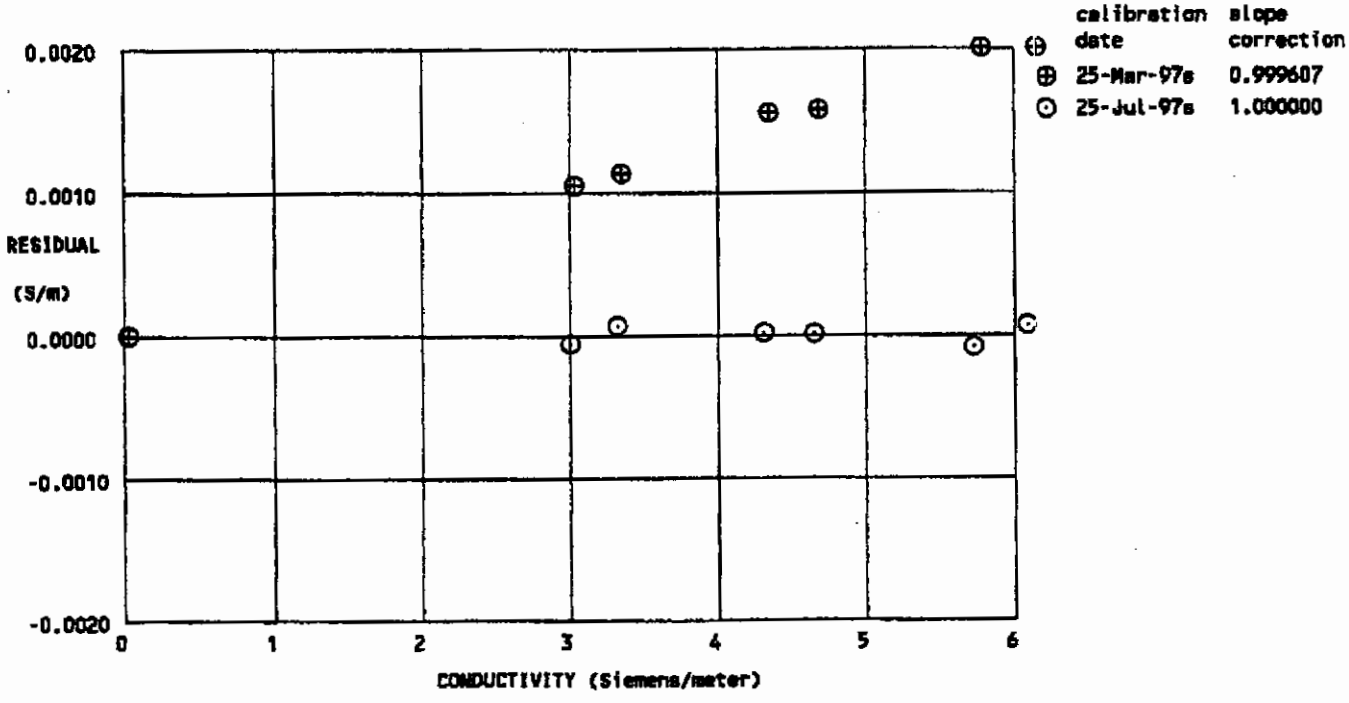
g = -4.08673082e+00
h = 4.89312424e-01
i = 5.36578373e-04
j = 3.69660376e-06
CPcor = -9.57e-08 (nominal)
CTcor = 3.25e-06 (nominal)

ABCDM COEFFICIENTS

a = 4.33490178e-04
b = 4.89587490e-01
c = -4.08756236e+00
d = -9.15352749e-05
m = 3.1
CPcor = -9.57e-08 (nominal)

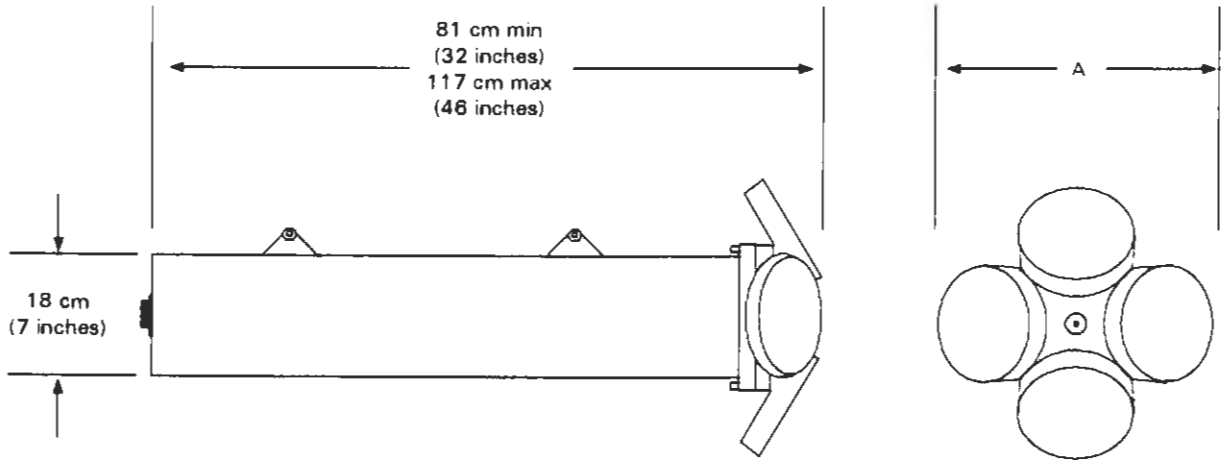
BATH TEMP (ITS-90 °C)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (kHz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
0.0000	0.0000	0.00000	2.88533	0.00000	0.00000
1.1630	34.5865	2.97224	8.27272	2.97218	-0.00006
4.7030	34.5869	3.28334	8.64322	3.28340	0.00006
15.3250	34.5891	4.27835	9.73211	4.27836	0.00001
18.8190	34.5885	4.62321	10.08167	4.62322	0.00001
29.2600	34.5889	5.69666	11.09817	5.69657	-0.00009
32.6340	34.5850	6.05452	11.41672	6.05458	0.00006

Conductivity = $(g + hf^2 + if^3 + jf^4) / [10(1 + \delta t + \epsilon p)]$ Siemens/meter
Conductivity = $(af^m + bf^2 + c + dt) / [10(1 + \epsilon p)]$ Siemens/meter
t = temperaure [deg C]; p = pressure [decibars]; δ = CTcor; ϵ = CPcor;
Residual = (instrument conductivity - bath conductivity) using g, h, i, j coefficients



APPENDIX E

Equipment Technical Specifications



MODEL #	WEIGHT IN WATER	MODEL #	WEIGHT IN WATER	"A" DIMENSION
RD-DR0075	75.8 kg	RD-SC0075	78.9 kg	76.2cm (30.0in)
RD-DR0150	22.2 kg	RD-SC0150	25.0 kg	45.7cm (18.0in)
RD-DR0300	10.0 kg	RD-SC0300	12.7 kg	40.6cm (16.0in)
RD-DR0600	9.3 kg	RD-SC0600	12.3 kg	33.0cm (13.0in)
RD-DR1200	1.6 kg	RD-SC1200	4.5 kg	21.6cm (08.5in)

SPECIFICATION

Acoustic Characteristics

Acoustic Beams: 4 beam JANUS, oriented 30 degrees off vertical in 90 degree azimuth increments (optional 20 degree beam configurations are available to order).

Velocity Range: ±10m/sec
No of Depth Cells: Up to 128
Depth Cell Length: 1 to 32m
Long Term Accuracy: ±0.2% ±0.5cm/sec
Short Term Accuracy:

Short Term error at Depth Cell Lengths (cm/sec)

Model #	1m	2m	4m	8m	16m	32m
RD-SC/DR0075	240	120	60	30	15	8
RD-SC/DR0150	90	45	22	11	6	3
RD-SC/DR0300	30	15	8	4	2	1
RD-SC/DR0600	10	5	3	2	-	-
RD-SC/DR1200	4	2	1	-	-	-

Current Time Measurement

Maximum Operational Renge in metres

Model #	Freq kHz	D/C Powered	A/C Powered
RD-SC/DR0075	75	350m	700m
RD-SC/DR0150	150	250m	400m
RD-SC/DR0300	300	120m	250m
RD-SC/DR0600	600	60m	100m
RD-SC/DR1200	1200	30m	30m

Direction Accuracy: ±2 degraes (for ±30 degrees tilt)

Data Recording

Type: EPROM
Capacity: Up to 20Mbytes, 6Mbytes standard

Power

Internal Batteries: Alkaline or optional Lithium single or double pack.

External DC Power: +5.5 to 15VDC and +12.5 to 40 VDC external power may be used Instead of batteries. Optional 115VAC, 50-60Hz input power is available for RD-DR models.

Electrical Interface

Data Interface Type: RS422 serial @ .3 to 19.2k baud. Can also be configured to RS232.

Communications Protocol: ASCII based control commands. Leader/trailer bounded block of 8 bit bytes for current profile data.

Output Data: North. East and Vertical current velocity components for 128 cells. Echo Level for 128 cells. Data Validity status of each cell, Time, Water Temperature, X and Y Tilt, BIT Status, BIT Diagnostics and other data.

Physical Configurations

Operating Prassure: 2000 PSI. Optional high pressure units are available.

GEOS

Technical Information

RDI WORKHORSE ADCP

DESCRIPTION

The Workhorse ADCP is designed for general-purpose shallow-water current monitoring at instrument depths ranging from 5-200m. Its small size, its mooring accessories, and its comprehensive software makes it easy and inexpensive to use. Its plastic housing will not corrode or degrade with time, and every surface can be painted with anti-fouling paint.

The internal electronics retain the time-tested signal processing used in RDI's BroadBand product line to give you the best measurement performance possible. The electronics have been redesigned for miniature size, lower cost and easier manufacturing.

While large, expensive components (i.e. for high power or lower frequencies) were eliminated, no compromise was made that fundamental design is the same as a BroadBand, you can be confident that it will work from the outset.

INSIDE A MONITOR

The Monitor consists of a transducer assembly and a three-board system electronics. The transducer housing and pressure case are made from high-strength plastic composite, internally reinforced with metal where required.

Data are transmitted in either an ASCII or binary format. Monitor software assists users in the following operations: testing; data collection planning; real-time data collection; display and recording data listing; display and conversion to engineering units in an ASCII format.

MOORING ACCESSORIES

A PVC bottom frame, filled with 50kg of lead shot, can be deployed in shallow water from a small boat. The frame is available in kits that are assembled on site.

THE WORKHORSE SENTINEL

The Sentinel, a self-contained instrument, is about twice the length of the Monitor. The Sentinel can function in real-time mode the same as a Monitor. It can use its internal batteries and data recording as backup. The Monitor can also function like a Sentinel by adding internal recording and an external battery case.

SPECIFICATION

Water Velocity Profiles
Depth Cell Size: 1-16m
Number of Cells: 1-128
Max. Velocity: 10 m/s
Minimum Ping interval: 0.07 s plus sound travel tima (use 1.4 ms/m of range; multiply sound travel time by 1.8 for 1 m cells)

Meesurement Performance

Cell size (m)	Standard deviation (mm/s) 1	First Cell ranga (m) 2	Min depth (m) 3	Max range (m) 4	
	1	130	3	5	110
	2	45	4	8	120
	4	25	6	12	130
	8	12	10	22	150
	16	5	18	40	165

Notes: (1) standard deviation is ADCP uncertainty given a single-ping, (2) the first cell range is the distance from the transducer to the centre of the first cell. (3) the minimum depth assumes one good depth cell. (4) max range is a nominal value based on typical oceanic backscatter; actual range will vary depending on environmental conditions. Assuming the ADCP is pointed vertically(0° tilt), the maximum range is limited to 94% of the distance to the surface.

Echo Intensity
Sampling: uses same depth cells and time intervals as velocity.
Uncartainty: ±1.5 d8

Maximum Resistance of Power Conductors
The peek current depends on the transmit pulse which depends on the cell depth size. The maximum cable resistance (the sum of both power conductors) assumes a ping rate of 2/second, a supply voltage of 48 VDC and a voltage drop across the cable of 15 VDC.

Depth cell (m)	Maximum Cable resistance (Ω)
1	100
2	88
4	71
8	42

Power
DC input: 20-60 VDC
Power Required:
Transmit: 200 W
Process: 3 W
Standby: 0.3 mW
Approximate Energy Consumption:
$E = N \{a8 + \beta(R + 50\ m)\} + \gamma D$ where:
N = total number of pings
E = energy consumption (W-hours)
8 = depth cell size (m)
R = profiling range (m)
D = deployment duration (days)
α = 8 x 10-5 W-hour/m
β = 1.2 x 10-6 W-hour/m
γ = 8 x 10-3 W-hour/day
Note: multiply R by 1.8 (for 1-m cells)

Transducer and Hardware
Frequency: 300 kHz
Bandwidth: 75 kHz
Beam Angle: 20°
Configuration: 4-beam, convex
Max Tilt: 20°
Housing & Transducer Material: Composite plastic
External Connector: 7-pin low-profile underwater-mateable

Other Sensors
Water Level (Optional)
Type: Strain Gauge
Range: 0-256 m
Accuracy: ± 5 m over 0-200 m depth
Resolution: 0.25 m
Temperature
Transducer mounted
Range: -5° to +45°C
Uncertainty: ± 0.4°C

Tilt
Range: ± 20°
Uncertainty: ± 2°
Compass
Type: flux gate
Uncertainty: ± 5° @ 60° magnetic dip angle
Mex Tilt: 20°
Downloadable user calibration

Environmental
Max. Depth: 200m
Operating Temperature: -5° to 60 °
Storage Temperature: -5° to 80°
Vibration: MIL-STD-167.1 type 1
Shock: 20 δ Static

Dsta Communication
Serial: RS232.RS422 or RS485
Baud Rate: 300-115.200 baud. 9600 is standard
Data Format: ASC11 or binary

Anti-Fouling Paint
Any anti-fouling paint may be applied to any surfece. Care should be taken on the transducer surfaces to ensure the paint is applied uniformly.

Standard Accessories
8ottom-mounted frame: PVC filled with lead shot, assembled on-site. External battery pack.

Standerd Software
The Monitor comes with software that assists in the following operations: testing, data collection, display and recording, data listing, and data conversion into engineering units in an ASC11 format.

SPECIFICATION

Measuring System
Self balancing bridge with sequential meesuring of six channels and recording in solid state memory

The Channels are:

1. **Reference**
   This is a fixed reading that acts as a control on the performance of the RCM and also as an Identification of individual instruments.

2. **Temperature**
   Standard is Low Range (-2.46 to 21.4°C). Also available are; Wide Range (-0.34 to 32.17°C); High Range (to 36°) and Arctic Range (-2.64 to 5.62°C in channel 4). Sensor type is Thermistor (Fenwall GB32JM19) and accuracy is ±0.05°C. Resolution is 0.1% of range selected and response time is 12 seconds (63%).

3. **Conductivity**

Sensor Type	Inductive Cell 2994
Ranges	0-74mmho/cm
Accuracy	0.1% of range
Resolution	±0.025mmho/cm

4. **Pressure**

Sensor Type	Bourdon tube driving a potentiometer
Range	0-8000psi
Accuracy	±0.1% of range
Calibration	Lowest calibration pressure 14.24psi

5. **Current Direction**

Sensor Type	Magnetic compass with needle clamped onto potentiometer ring
Resolution	0.35°
Accuracy	+5° for speeds from 5-100cm/s +7.5° for speeds 2.5-5 and 100-200cm/s
Max compass tilt	12° from horizontal

6. **Current Speed**

Range	2 to 295cm/s
Accuracy	±1cm/s or ±2% of the actual speed, whichever is greater
Starting Velocity	2.0cm/sec

Vector Averaging
During the selected recording interval, the number of rotor revolutions and the direction of the compass are sampled every 12 seconds and broken into Easting and Northing components. Successive components are added and intermediately storad. When the selected recording interval has elapsed the resultant average vector and its angle is calculated and recorded.

Clock

Type	Quartz Crystal
Accuracy	Better then ±2sec/day within 0° to 20° range
Sampling Intervals	0.5, 1, 2, 5, 10, 15, 20, 30, 60 and 120 minutes selected by interval selecting switch

External Triggering — A 6v pulse to terminal activates instrument

Recording System

Type	Data storage unit 2990
Coding	PDC-4
Storage Capacity	Maximum 10,900 records of all channels (ie. 75 days with 10 minute intarvals)

Telemetry

Acoustic	By switching on and off all acoustic carrier
Frequency	16.384kHz ±5Hz
Detection Range	Typical 2,000 metres with hydrophone receiver

Depth Capacity — 6,000 metres RCM8 (2,000 metres RCM7)

Net Weight

Recording Unit	In air 15.2kg RCM8 (13.6kg RCM7) In water 10.9kg RCM8 (8.8kg RCM7)
Vane Assembly	In air 14.1kg RCM8 (12.2kg RCM7) In water 11.8kg RCM8 (9.5kg RCM7)

Dimensions

Recording Unit	Height 520mm RCM8 (495mm RCM7) Diameter 128mm
Overall Length	865mm
Overall Height	540mm
Vane Size	485 x 500mm

Gross Weight

Recording Unit	20.5kg RCM8 (18.5kg RCM7)
Vane Assembly	22.0kg RCM8 (20.0kg RCM7)