RRS *Challenger*

Cruise 126

Leg A: Southampton to Fairlie, April 11 to 26, 1996

Leg B: Fairlie to Fairlie, April 27 to May 12, 1996

LOIS Shelf Edge Study (SES) Cruise 6

Principal Scientist: Dr Paul Tett
(Napier University, Edinburgh)
July 1997

CRUISE REPORT CONTENTS

SUMMARY AND SCIENTIFIC OVERVIEW 2
Figures 4
Figure 1. Ship's track
Figure 2. S-line sections
OBJECTIVES AND ACHIEVEMENTS 5
Objectives (from cruise plan) 5
Achievements 6
Tables 7
Table 1. Moorings
Table 2. Sections worked with CTD or SeaSoar
Table 3. Time-series stations
Table 4. Concurrent samplings for phytoplankton pigments
PERSONNEL 8
SCIENTIFIC NARRATIVE 9
Leg A 9
Leg B 12
Tidal data 15
TECHNICAL REPORTS 15
Computing (Alan Taylor, Legs A & B) 15
Moorings (A.Harrison, Leg A) 15
Fluorometers and Nitrate Analysers (I. Ezzi, Leg A) 16
Sediment traps and water-column POC (F. Perez Castillo, Leg A) 16
Marine Snow Camera (A. Geary, Leg A) 17
Comparison Of Aquatracka Mk2 & Wetlabs WS3S Fluorometers (N. Mathers, Leg A) 18
CTD, TSG and Flow-through Systems (J.Wynar, Leg B) 19
Chlorophyll, and dissolved Nutrients, Organic Matter & Iodine species (K. Jones, Leg B) 19
CTD oxygen sensor calibration, and Microplankton respiration (H.Wilson, Leg B) 20
Primary production (L. Gilpin, Leg B) 22
Transmissometer calibration, and SPM characteristics (R.McCandliss, Leg B) 22
Benthic sampling (M.Harvey & L.Mitchell, Leg B) 22
TABLES OF OBSERVATIONS 23
Table 5: CTD casts
Table 6: Other events, Leg B

SUMMARY AND SCIENTIFIC OVERVIEW

The LOIS Shelf Edge Study (SES) region lies between 7 and 10 °W, 56 and 57°N, extending from the outer edge of the Malin shelf across the continental slope of the Rockall Trough. The main aims of cruise CH126 were to service moorings and carry out CTD and SeaSoar surveys in the SES region, and study selected sites in detail during the anticipated period of the spring phytoplankton bloom. In addition, Argos-tracked drifters were to be released, benthic sampling carried out, and marine optical measurements made.

Challenger sailed from Southampton on 11 April 1996 and collected the remainder of the scientific party off Dunstaffnage on 14 April. Leg A was mainly given to recovery and deployment of moorings and to tows of SeaSoar, and ended in Fairlie on 26 April. Leg B left Fairlie on 27 April and emphasised CTD sections and sea-bed coring, together with studies of biological processes, bio-optics and SPM. It ended at Fairlie on 12 May 1996. Figure 1 gives cruise tracks. The scientific instruments generally worked well, and only a little time was lost through equipment failure or bad weather.

Moorings

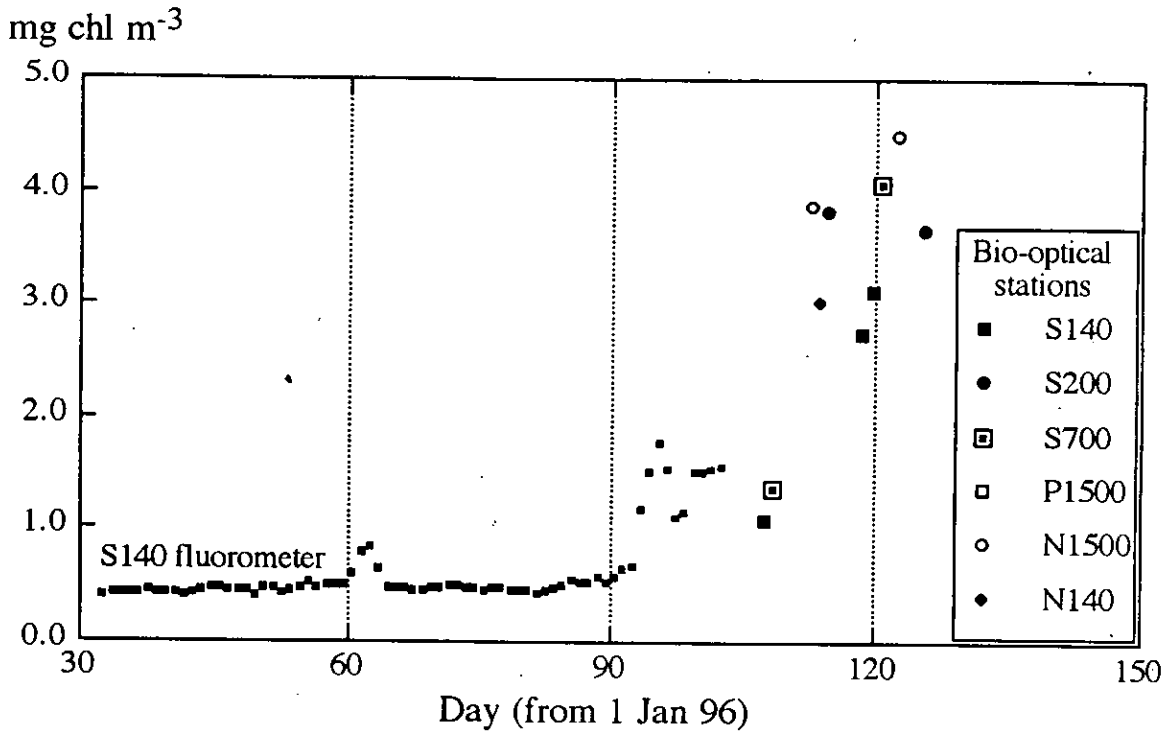
The three 'Cascade' moorings and a sub-surface current meter mooring at S300 were found to be missing. ,All other moorings laid by SES cruise 5 were recovered, and all planned moorings were laid, although in some cases short of full equipment, during Leg A. This Leg left a fully instrumented S-line, from S140 to S700, current meter moorings at N140 and N1500, the sediment trap mooring at N1500 and a new mooring at P1500. Colour sensors were deployed at the surface at S140, S200 and S700, and fluorometers near the bed at S140, S700 and N1500, and in mid-water at P1500, in order to record the Spring Bloom and its sedimentation. During Leg B the U-mooring from S200 and the Sub-surface moorings from N300 and S300 were recovered, the first because it had been damaged by fishing, and the others as a precaution against such damage. More details are given in Table 1 and in a separate report by Alan Harrison (POL).

CTD and SeaSoar Sections

The CTD was equipped with transmissometer, fluorometer, oxygen sensor, altimeter and rosette sampler. CTD stations were worked along the N-, P-, R- and S- lines as detailed in Table 2. During Leg B these sections included nutrients. Some of these lines were also worked with SeaSoar (equipped with CTD and fluorometer) during Leg A (see Fig. 1), after gaining familiarity with operating the vehicle in deep water on north-south lines. During the three passages between the SES region and Fairlie, the S-line was extended onto the shelf, and during Leg B lines were worked from L1000 onto the shelf in the vicinity of St Kilda and back to N2000. The sections showed a number of interesting features, exemplified in the case of the S-line in Figure 2.

The Spring Phytoplankton Bloom

As shown below, the fluorometer record from S140 suggests that phytoplankton abundance began to increase from 1 April. During the first week (April 14-21) of Leg A we observed higher chlorophyll concentrations in the surface water of the ocean and shelf, and lower concentrations at the shelf break, perhaps due to greater mixing here. By the end of the Leg, however, concentrations were enhanced everywhere except in mixed waters near Islay. Nutrient measurements during Leg B showed that, although nitrate remained abundant in ocean waters and at the shelf break, it was depleted in surface waters on some parts of the shelf, and dissolved silica was depleted in many places. There was some evidence of phytoplankton sinking on the shelf, and of a shift from diatoms to flagellates, which may have resulted from a lack of silica.



Provisional time-series of surface-layer chlorophyll, including data from bio-optical stations during CH126 and from a recording fluorometer at S140. The fluorometer signal has been converted using a calibration from a previous deployment, and may include some the effects of fouling towards the end of the record.

Other measurements were made at selected stations, and included: bio-optical properties including the absorption spectra of sampled particulates and the attenuation spectra of upwelling and downwelling light; the primary production and respiration rates of the microplankton; and the character, amount and sinking rate of SPM. The results of these measurements will illuminate the dynamics of the bloom.

Other studies

During Leg A, a Snow Camera was used to photograph mid-water particles at stations on the S- and N- lines. Samples were collected for organic particulates.

During Leg B, the Multi-Corer was used successfully at N2000, N1500 and R1000. Some of the resulting cores used for measurements of oxygen demand. Others were sectioned and stored for subsequent chemical and biological analyses. Although the Corer was deployed there, adequate bed samples could not be obtained at S700. The Bed-hop camera was used at the coring stations and also at S5 on the shelf. Water samples were taken and stored for analysis of dissolved organic matter and iodine species. Twenty-one Argos tracked drifters were released in three circles to the south of the S-line.

Figures

Figure 1. Ship's track.

(a) During Leg A, from 14 April (day 105, Dunstaffnage) to 26 April (day 117, Fairlie), 1996; the passage from Southampton to Dunstaffnage is not shown. The track on day 107 includes a search for a seaman missing from a fishing boat. The heavily worked E-W lines are the SES N- and S- lines, where moorings were serviced. Most of the rest of the track in the SES region was made during SeaSoar tows (see below).

(b) During Leg B, from 27 April (day 118, Fairlie) to 12 May (day 133, Fairlie), 1996. The three circles at 9°15'N were the sites of drifter releases on days 126 (two outer sites) and 130. The northwards extension on days 128-129 included the KL line towards St Kilda and the KN line away from the islands. The latter terminated in the most distant SES standard location, the N2000 coring site.

(c) During SeaSoar operation on 20-21 April (days 111-112), 1996. The track commenced with north and south- wards tows along the 1000m depth contour, followed by a northwards tow along the 500m contour, and three tows along the 200 m contour. The latter were interrupted by recovery of a drifting ADCP mooring. The final part of the track included tows parallel to the S-, and along the R- and P-, lines.

Figure 2. S-line sections

Traced from sections plotted on board. Density, salinity and fluorescence are for 27-30 April and show the extended S-line, starting at S1 on the continental shelf and reaching west to S1500. In provisional interpretation, the main features are:

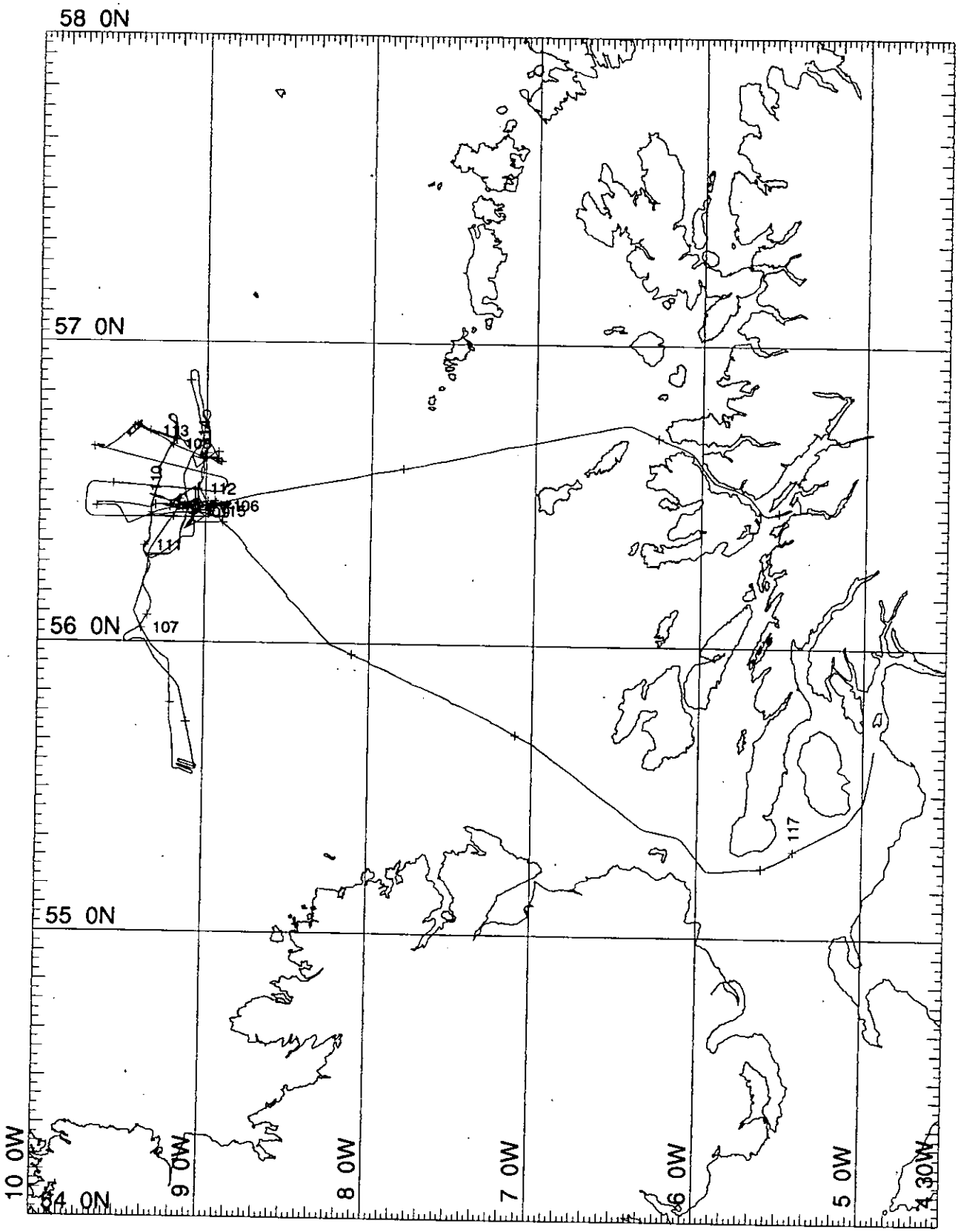
(1) Low salinity, and density, cold, water of Scottish Coastal Current extending to about 7°40'W, vertically mixed and with low fluorescence between 7°00' and 7°20'W;

(2) Weak density stratification (due to warming) in top 100m of the water column from 7°40, associated with high near-surface fluorescence (and lowered transmittance) in both shelf and ocean waters;

(3) A core of high salinity (warm, transparent) water, exceeding 35.40 psu between 75m and the sea-bed at the Shelf Break; another core, reaching 35.38 psu, in the eastern part of the shelf depression at 8°W: are these Slope Current water?

(4) A pool of relatively cold, and thus high density, water lying partly on the western side of the shelf depression (and kept in place by Slope Current flow?); associated with this water, a region of enhanced fluorescence (and lowered transmission) which was most marked near the bed of the depression, suggesting sedimentation of Spring Bloom phytoplankton.

The remaining section is for red beam transmittance section from S140 to S1000 on 5 May. Near-surface low transmission due to high chlorophyll. Regions of lower transmission near the bed between 500 and 1000 m water depth on the slope may be resuspension due to internal tidal mixing. Maximum Spring tide on May 4.



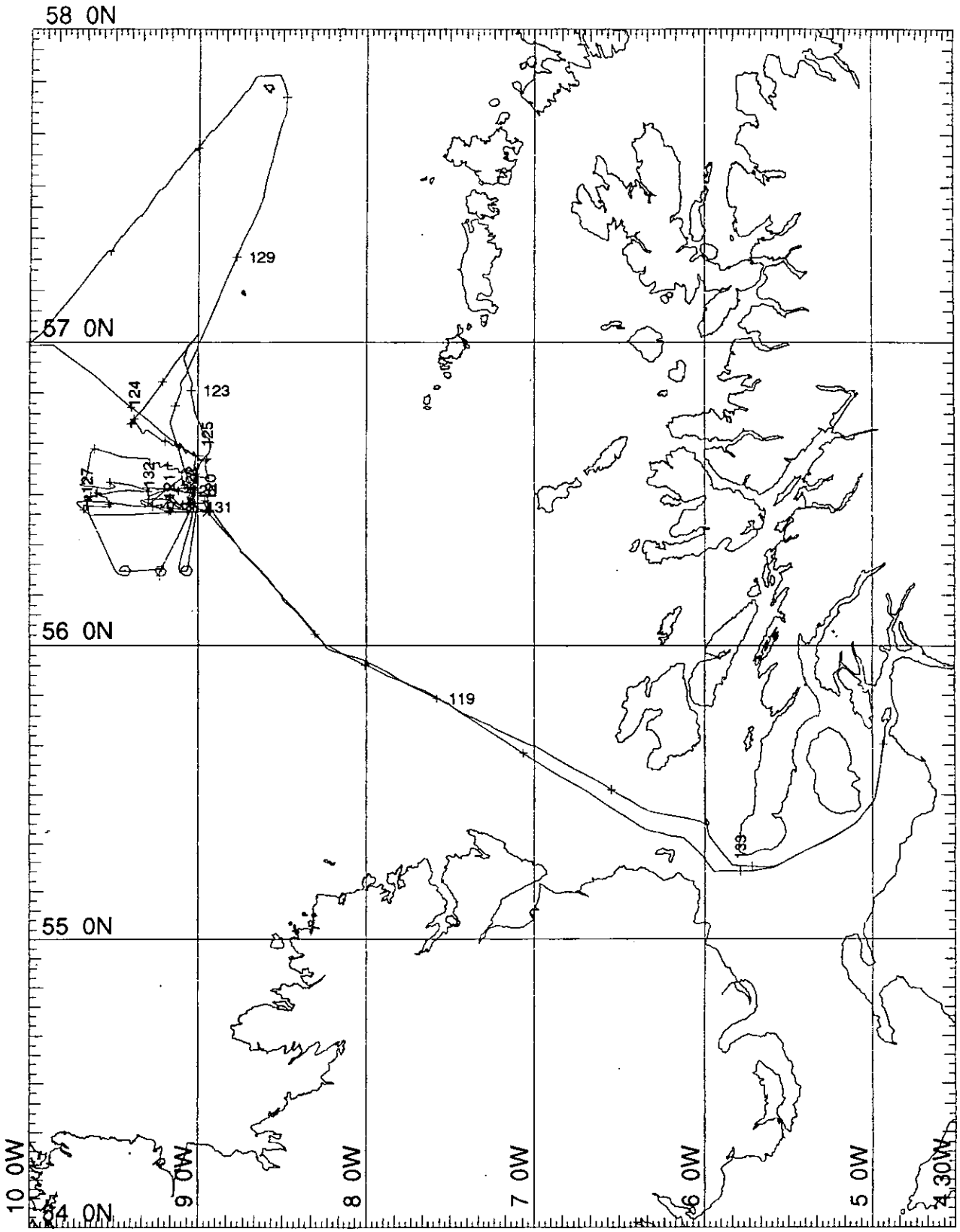
MERCATOR PROJECTION

GRID NO. 3

SCALE 1 TO 2250000 (NATURAL SCALE AT LAT. 54)

INTERNATIONAL SPHEROID PROJECTED AT LATITUDE 54

Challenger 126A Cruise Track



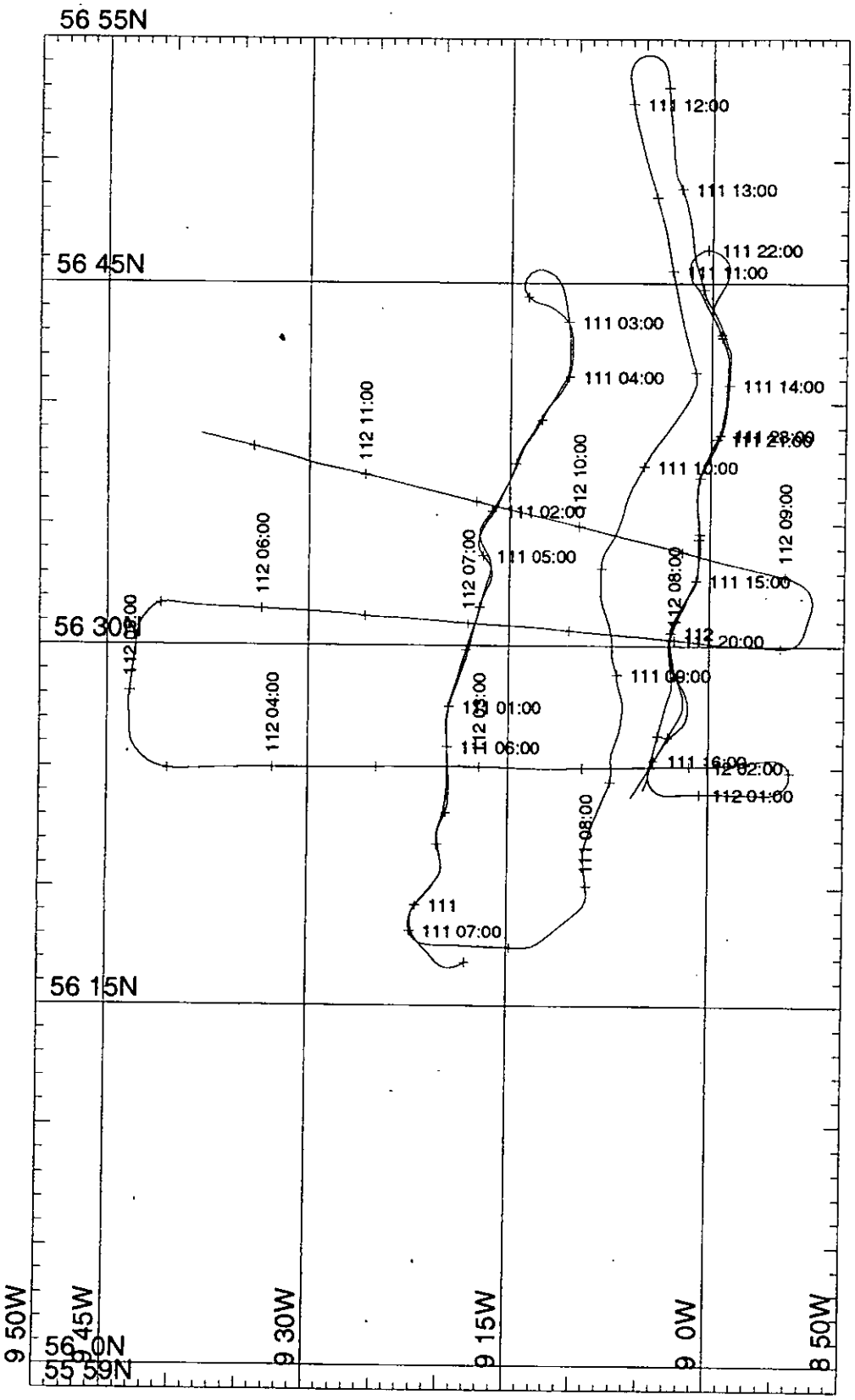
MERCATOR PROJECTION

GRID NO. 3

SCALE 1 TO 2250000 (NATURAL SCALE AT LAT. 54)

INTERNATIONAL SPHEROID PROJECTED AT LATITUDE 54

Challenger 126B Cruise Track



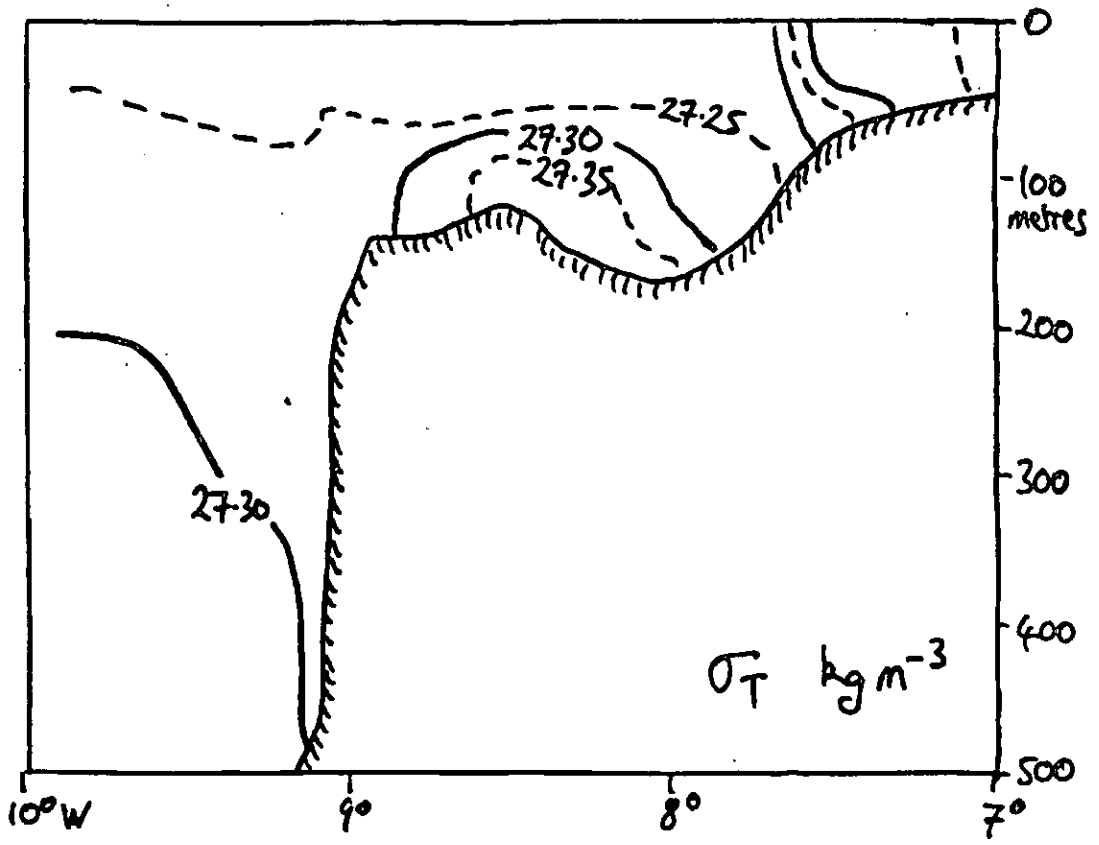
MERCATOR PROJECTION

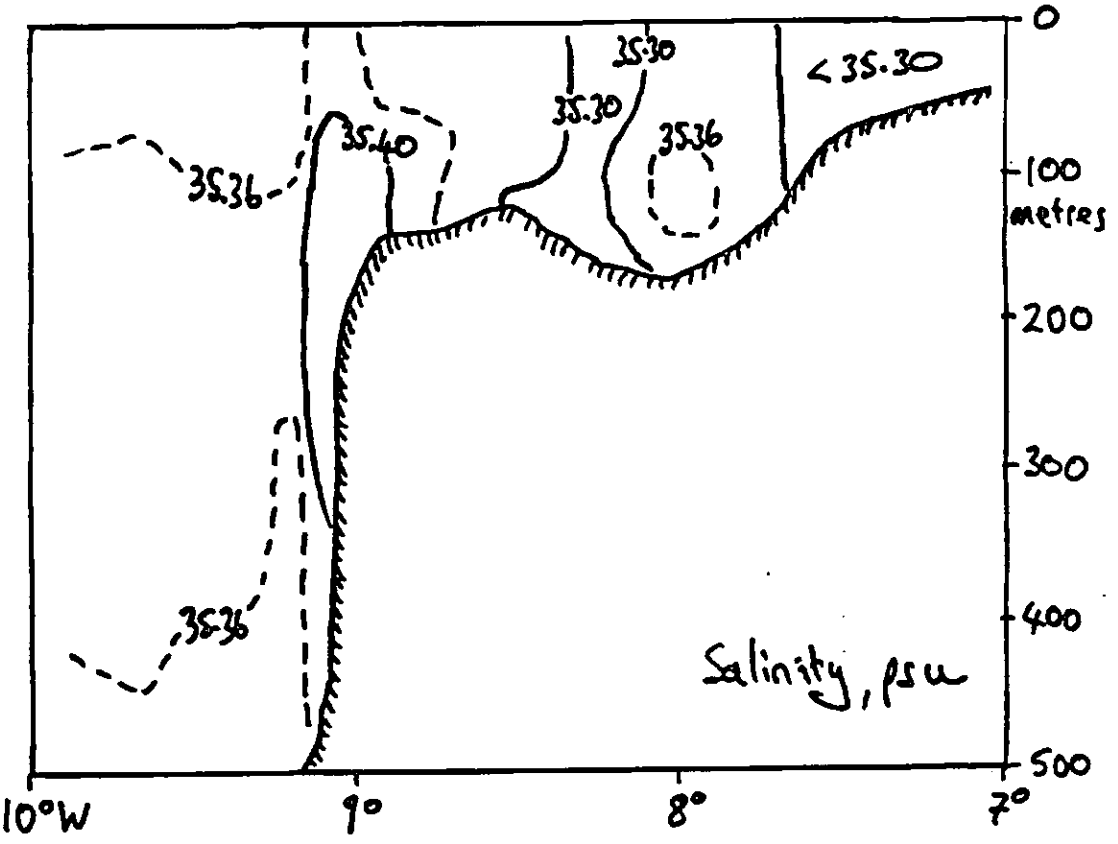
SCALE 1 TO 900000 (NATURAL SCALE AT LAT. 0)

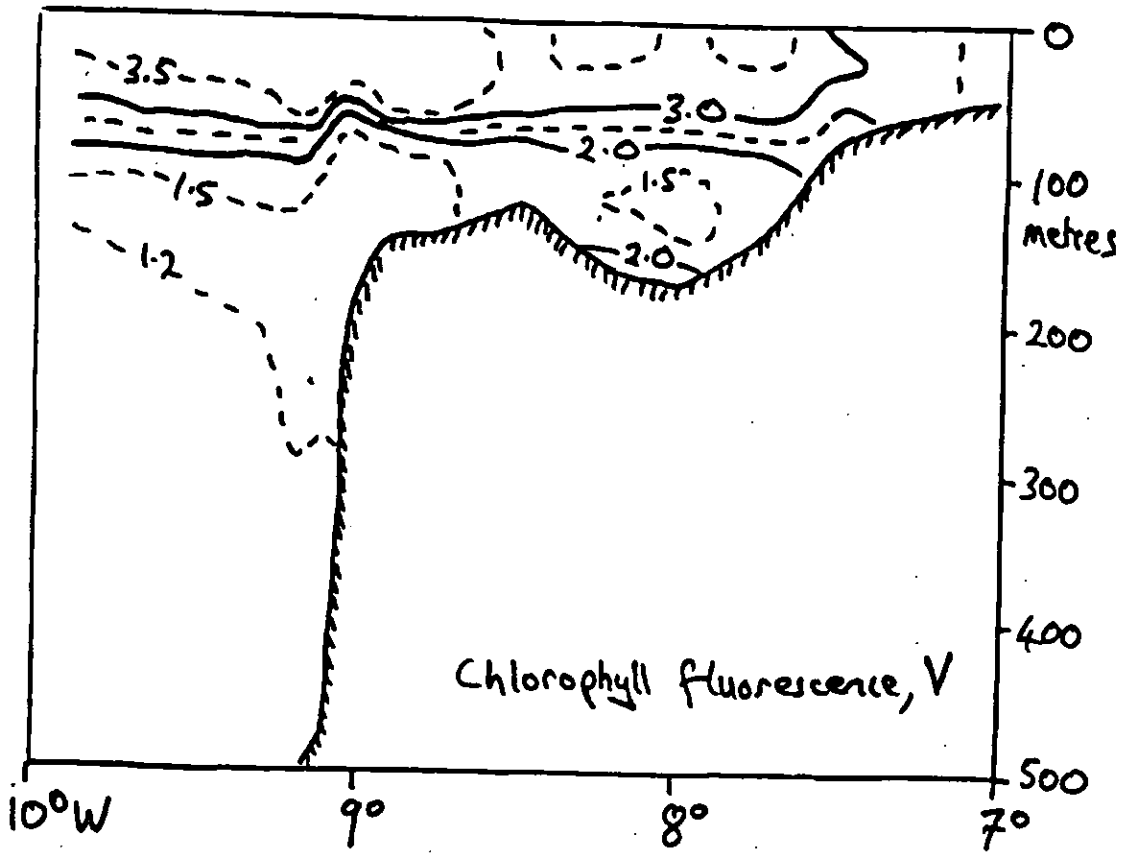
INTERNATIONAL SPHEROID PROJECTED AT LATITUDE 56

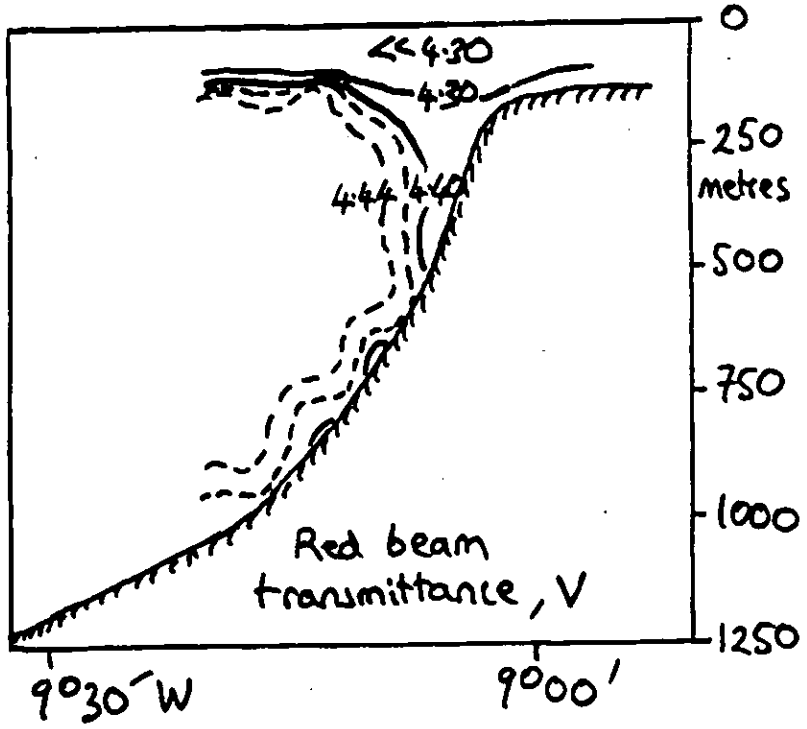
GRID NO. 1

RRS Challenger - SES6 - SeaSoar Lines 4-12


0
27·25
27·30
27·35
100
metres
200
27·30
300
400
σ_T kg m^{-3}
500
10°W
9°
8°
7°


0
35·30
35·30
< 35.30
35·40
35·36
35·36
100
metres
200
300
35·36
400
Salinity, psu
500
10°W
9°
8°
7°


3.5
3.0
2.0
1.5
1.5
2.0
1.2
0
100
metres
200
300
400
500
Chlorophyll fluorescence, V
10°W
9°
8°
7°


<4·30
4·30
4·44
4·40
0
250
metres
500
750
1000
1250
Red beam
transmittance, V
9°30'W
9°00'

OBJECTIVES AND ACHIEVEMENTS

Objectives (from cruise plan)

LOIS - SES objectives and schedule of cruises

The objectives of the LOIS Shelf Edge Study are:

(a) to identify the time and space scales of ocean-shelf momentum transmission and to quantify the contributions to ocean-shelf water exchange by physical processes;

(b) to estimate fluxes of water, heat and certain dissolved and suspended constituents across a section from the shelf edge with special emphasis on net organic export from, and nutrient import to, the shelf;

(c) to relate sediment properties and fluxes to the physical context;

(d) to incorporate process understanding into models which will be tested by comparison with observations and provide a basis for estimation of fluxes integrated over time and the length of the shelf edge.

Seven SES cruises were scheduled for 1995-96, to study the shelf edge west of Scotland. The first cruise, Charles Darwin 91, took place in March 1995, and involved bathymetric and sea-bed survey and the placing of a skeletal array of moorings. CD93, in May 1995, fully instrumented the mooring lines and studied the spring phytoplankton bloom. Subsequent cruises using *Challenger* have serviced the moorings, repeated CTD sections, and carried out special studies. *Challenger* 126 is the sixth SES cruise.

Study region and survey strategy for *Challenger* 126

SES mooring lines. The SES south mooring line (S) (which carries the majority of the sensors) runs E-W from 150S at about 56°27'N, 9°00'W to 700S, and the north mooring line (N) runs WNW from 130N at about 56°37'N, 8°55'W to the 1500N sediment trap mooring. The shelf break is at about 9°05'W on S and about 9°00'W on N. The **detailed study region** is bounded by these lines. A **"slow" survey**, with detailed pelagic and benthic sampling, emphasises stations on S, with additional sampling near 1000R, 1500N, and 2000N.

The **SeaSoar survey** covers a somewhat larger area, with 4 cross-slope sections (S, R, P and N; each about 50 km long, 140-1600 m water depth) and 3 along-slope sections (50 km long) S-N from 56°18'N to 56°44'N, in water depths 170 (repeated), 500 and 1000m. The vehicle is equipped with CTD and fluorometer.

The **"fast" (CTD) survey** includes stations on S, R, P and N. The **CTD system** comprises transmissometer, fluorometer, pumped oxygen sensor and PAR sensors, and a tone-fire rosette equipped with 12 10-litre go-flo bottles. Surface seawater is supplied to thermosalinograph, transmissometer, fluorometer, and these, together with pyrrheliometer, are logged continuously.

Objectives of CH126

Observations in 1995 (by CD92 and CD93) suggest that thermal stratification and the Spring Bloom of phytoplankton should be developing during the first half of May 1996. Moored instruments (some deployed during earlier cruises) will monitor the time-course of the bloom, and CH126 will collect time-series of samples from some of the slow survey stations. Some moorings (including a new site at P1500) will be specially instrumented to record the sinking of the spring bloom. Bio-optical measurements will help calibrate moorings, define optical conditions for the bloom, and provide sea-truth for SeaWiFS. It is assumed that biological and chemical instruments deployed on CH126A in April will be recovered during June/July.

Leg A

(a) Recover, service and (re)deploy SES moorings.

(b) SeaSoar survey at Neap and at Spring tides.

(c) CTD profiles: to calibrate moored instruments; and at other stations from "fast" survey, as time permits.

(d) Specialised optical measurements: for calibration of moored optical sensors; and to relate to SeaWiFS data.

(e) Opportunistic CTD stations during passage to and from study region.

Leg B

(a) "Slow" survey for pelagic biology and SPM. At least four stations occupied for 24 hours each. Detailed optical measurements (during daytime), and repeated CTD-waterbottle casts at all mooring sites, penetrating to within 5 m (ideally 2 m) of the bed, providing: water for all required analyses, including chemistry, photosynthesis, respiration; and near-bottom water for core incubation. Special sampling for SPM.

(b) Multi-corer (and associated CTD) sampling at 1000R, 1500N and 2000N.

(c) Drifter experiments. Release of Argos-tracked drifters; release and recovery of in-situ productivity incubations.

(d) "Fast" CTD survey.

(e) Bio-optical measurements.

(f) Water sampling at dawn whenever possible for deck productivity incubation.

(g) Opportunistic CTD stations during passage to and from study region.

Achievements

All the objectives of the cruise were at least partly achieved. Some SeaSoar tows were made following 1000m and 500m contours during Spring tides on 17-18 April, but the main survey with the vehicle was carried out on April 20-21, between Spring and Neap tides. An attempt to tow SeaSoar along the S line during Neap tides on April 24-25 was aborted because of unsuitable weather. The constraints on the SeaSoar survey were, firstly, concern for the safety of the vehicle, and secondly, time conflicts with servicing of moorings. The satellite deploying SeaWiFS was not, in fact, launched in time for the cruise, but the bio-optical work nevertheless provides valuable information for studies of Spring Bloom phytoplankton. Six time-series stations were worked during Leg B, two of which involved following a productivity drifter. Two of the fixed stations were terminated early because of instrument failure or bad weather; the mean duration of the other four was 0.93 day. The opportunistic stations worked on passage along the S-line gave useful insights to shelf-ocean relationships and Spring Bloom dynamics, and it was therefore decided to make use of time in hand during Leg B to gain further information about this by working stations from the north part of the SES region to St Kilda. Because of commercial trawling activity near the shelf break, three moorings deployed in this region during Leg A were recovered during leg B. Finally, samples were collected which should allow inter-calibration of the several methods used for measurement of chlorophyll during SES (see Table 4).

Tables

Table 1. Moorings.

The table summarises moorings recovered, deployed and lost during CH126A (information collated by R. Cramer, BODC). In addition, CH126B made the following recoveries (details collated by J.Hughes, BODC):

S200 U-mooring (deployed 24 April): parts recovered on May 7 (adrift at 56°31.41'N 9°02.81'W, water depth 234m) and May 10 (toroid etc at 56°30.14'N 9° 02.07'W, water depth 191m), damaged, probably by commercial trawling.

N300 sub-surface mooring (deployed 23 April): recovered May 9 at 14:49, from 56°37.60'N 9°01.22'W (water depth 302m), for fear of loss by commercial trawling. A Spar marker buoy at N300 was also recovered on 9th May at 56°37.65'N 9°01.10'W (water depth 301m):

S300 sub-surface mooring (deployed 19 April): recovered May 10 at 14:02, from 56°27.47'N 9°03.87'W (water depth 306m), for fear of loss.

Table 2. Sections worked with CTD or SeaSoar.

The table summarises sections crossing the shelf break, and largely east-west. In addition, the following (north-south) lines were worked with SeaSoar:

16 April, starting at 17hr: from 56°00 to 56°45'N along 1000m isobath, undulating between surface and 350m (file SS26Dxxx);

16-17 April, starting at 23hr: from 56°45' to 56°17'N along 1000m isobath (file SS26Dxxx);

17 April, from 56°17' to 56°29'N mostly along 500m isobath, but sometimes in deeper water (for safety) (file SS26Dxxx);

20 April, starting at 00hr, from 56°19' to 56°45'N. along 1000m isobath, undulating between surface and 350m (file SS26D018);

20 April, starting at 03hr, from 56°45' to 56°19'N. along 1000m isobath (file SS26D019);

20 April, starting at 07hr, from 56°19' to 56°53'N, along 500m isobath (file SS26D021);

20 April, from 56°53' to 56°24'N, along 200m isobath (sometimes in deeper water), undulating to 160m (file SS26D022 & ..023);

20 April, starting at 19hr, from 56°23' to 56°44'N, along 200m isobath (file SS26D024 ?);

29-21 April, starting at 22hr, from 56°44'N to 56°24'N, along 200m isobath (file SS26D025).

Table 3. Time-series stations.

The table lists stations were repeatedly sampled during single visits in the course of CH126B. In the case of the experiments with a drifting productivity rig, the cited station is that at which the rig was deployed.

Table 4. Concurrent samplings for phytoplankton pigments.

The table (prepared by J.Hughes, BODC) lists Leg B stations from which water sampled for chlorophyll (and other phytoplankton pigments have been, or will be analysed, by several methods. These data should allow inter-calibration of chlorophyll measurement methods.

CHALLENGER 126A (SES 6)					MOORINGS DEPLOYMENTS/RECOVERIES/LOSSES
Date & Time	Site	Latitude	Longitude	Depth	Mooring Type
DEPLOYMENTS					
15/04/96 12:29	S140	56 27.22N	8 57.79W	146	MET BUOY
15/04/96 13:39	S200	56 27.53N	9 2.77W	202	TOROID MOORING
15/04/96 18:00	S600	56 27.43N	9 7.76W	588	POL 75kHz ADCP
17/04/96 08:05	S140	56 28.03N	8 57.76W	148	TOROID MOORING
17/04/96 10:15	S140	56 27.40N	8 57.40W	145	LARGE TOROID MARKER BUOY
17/04/96 15:04	S140	56 27.80N	8 57.51W	146	U - SHAPE CURRENT METER MOORING WITH SPAR BUOY
18/04/96 14:24	S700	56 27.70N	9 9.75W	699	SUB-SURFACE THERMISTOR CHAIN/CURRENT METER MOORING
18/04/96 16:53	S700	56 28.21N	9 9.80W	698	TOROID MOORING
19/04/96 12:45	S300	56 27.30N	9 3.86W	291	SUB-SURFACE THERMISTOR CHAIN/CURRENT METER MOORING
19/04/96 15:01	S300	56 27.69N	9 3.61W	290	TOROID MOORING
21/04/96 16:56	P1500	56 39.07N	9 35.59W	1501	MID-WATER SUB-SURFACE FLUOROMETER/CURRENT METER MOORING
22/04/96 15:28	N1500	56 42.56N	9 24.53W	1469	SUB-SURFACE SEDIMENT TRAP/ CURRENT METER/FLUOROMETER MOORING
23/04/96 12:40	N140	56 36.30N	8 55.90W	134	U - SHAPE CURRENT METER MOORING WITH SPAR BUOY
23/04/96 13:23	N140	56 36.21N	8 55.36W	133	BOTTOM PRESSURE RECORDER
23/04/96 16:09	N300	56 37.44N	9 1.31W	300	SUB-SURFACE CURRENT METER MOORING
23/04/96 18:39	N300	56 37.56N	9 1.21W	301	SPAR MARKER BUOY
24/04/96 08:19	S140	56 27.53N	8 57.65W	149	BROAD-BAND ADCP
24/04/96 13:16	S200	56 27.14N	9 2.98W	207	U - SHAPE CURRENT METER MOORING WITH LARGE TOROID BUOY
RECOVERIES					
15/04/96 16:34	S140	56 27.53N	8 57.95W	147	TOROID MOORING
17/04/96 09:25	S140	56 27.56N	8 57.47W	146	LARGE TOROID MARKER BUOY
17/04/96 10:36	S140	56 27.60N	8 57.64W	146	U - SHAPE CURRENT METER MOORING WITH SPAR BUOY
17/04/96 17:55	S700	56 28.62N	9 9.57W	749	SUB-SURFACE THERMISTOR CHAIN/CURRENT METER MOORING

CHALLENGER 126A (SES 6)					MOORINGS DEPLOYMENTS/RECOVERIES/LOSSES
Date & Time	Site	Latitude	Longitude	Depth	Mooring Type
19/04/96 15:45	S600	56 27.70N	9 7.39W	543	POL 75kHz ADCP
19/04/96 18:33	S140	56 27.47N	8 57.78W	155	BROAD BAND ADCP (RDI ADCP)
20/04/96 17:45	S400	56 26.43N	8 58.04W	145	NARROW BAND ADCP (RVS ADCP)
21/04/96 19:18	N1500	56 43.78N	9 24.14W	1461	SUB-SURFACE SEDIMENT TRAP/ CURRENT METER MOORING (POP-UP SEDIMENT TRAP)
23/04/96 07:39	N140	56 36.39N	8 55.95W	136	BOTTOM PRESSURE RECORDER
23/04/96 08:27	N140	56 36.63N	8 55.95W	136	SPAR MARKER BUOY
24/04/96 08:42	S140	56 27.46N	8 57.42W	146	LARGE TOROID MARKER BUOY
LOSSES					
CH125A	S700	56 27.11N	9 9.44W	701	TOROID MARKER BUOY
CH125A	CC1	56 36.51N	9 0.92W	227	SUB-SURFACE CASCADE THERMISTOR CHAIN MOORING
CH125A	CC2	56 37.30N	9 2.11W	357	SUB-SURFACE CASCADE THERMISTOR CHAIN MOORING
CH125A	CC3	56 42.89N	8 59.46W	234	SUB-SURFACE CASCADE THERMISTOR CHAIN MOORING
CH125A	S300	56 27.14N	9 3.97W	299	SUB-SURFACE CURRENT METER MOORING
CH125A	N300	56 37.64N	9 1.11W	304	SPAR MARKER BUOY

Cross slope lines worked during CH126

Line (if s†)	Start day	End day	SeaSoar or CTD	First CTD cast no. (or SS26 file)	Last cast no. *	From site or position	To site or position	Details: on standard section, site positions are 140, 150/160, 200, 300, 500, 700, 850, 1000, 1150, 1300, 1500
S	108	110	CTD	06	15	S140	S1500	not 160,1150,1300
S (s)	111	112	SS	D026		56°25' 8°54'	56°25' 9°43'	
R (s)	112		SS	D027		56°32' 9°42'	56°30' 8°54'	
P (s)	112		SS	D028		56°33' 8°53'	56°39' 9°38'	
N	113	114	CTD	20	26	N1500	N140	not 1300,1150,850, 150
S+ (s)	115	116	CTD	35	45	S1000	S1 at 55°40', 7°00'	not 850-500,200, 160; plus S8-S1
S+	118	121	CTD	47	80	S1	S1500	not 160,850,1150, 1300; plus S1-S8
N (s)	124		CTD	97	107	N1500	N140	not 1150
P (s)	125		CTD	108	117	P140	P1500	not 1150
R (s)	125	126	CTD	118	127	R1500	R140	not 1150
S	126	127	CTD	128	140	S140	S1500	not 1150
KL (s)	128	129	CTD	155	165	L1000	KL1	L1000;KL500,200; 57°N9°W; KL7-1
KN (s)	129		CTD	165	175	KL1	N2000	KL1;KN1-7, 200,500,1000m; N2000
S+ (s)	131	132	CTD	190	202	S1000	S3 at 55°48'N 7°30'W	not 1500-1150; plus S8-S3

† s = (quasi)synoptic section, others assembled from stations worked over several days;

* some casts may relate to other work

Time-series stations during CH126B

Station	Start date	day	time	CTD cast	End day	time	cast	Dur-ation (day)	Max. CTD depth	Notes
S140	28-Apr	119	11:47	55	120	12:00	67	1.01	140	
S700	29-Apr	120	23:36	71	121	15:30	77	0.66	700	Transmiss-ometer failures
S200	30-Apr	121	22:03	80	122	8:02	86	0.42	200	Ended by bad weather
N1500	2-May	123	7:26	87	124	6:00	97	0.94	500	
S1300/ prod. rig	6-May	127	1:51	140		23:18	151	0.89	200	Following drifting rig
S160/ prod. rig	10-May	131	0:07	181		20:58	189	0.87	160-350	Following drifting rig, interrupted by moorings recovery

Complementary chlorophyll sampling during CH126B

CTD cast	SES site	DML fluor (1)	QUB fluor (2)	UWB/DML fluor (3)	UWB(MOG) fluor (4)	UWB(MOG) spec (6)	UWB(MOG) HPLC (7)
46		+			+	+	
51	S5	+		+	+	+	
55	S140	+			+	+	
56	S140	+	+				
58	S140	+		+			
63	S140		+	+			
66	S140	+			+	+	
67	S140	+	+				
69	S1500	+	+				
73	S700	+	+	+			
75	S7000	+	+		+	+	+
78	S500	+	+				
84	S200	+	+				
89	N1500		+		+	+	+
90	N1500	+	+				
95	N1500	+	+	+			
98	N1300	+	+				
99	N1000	+	+				
101	N850	+	+				
102	N700	+	+				
114	P850	+	+				
115	P1000	+	+				
116	P1300	+	+				
117	P1500	+	+				
119	R1300	+	+				
134	S850	+	+				
135	S1000	+	+				
136	S200	+	+		+	+	+
141	S1300		+	+			
143		+			+	+	
144		+			+	+	+
145					+	+	
146		+		+	+	+	+
149		+			+	+	+
154	R1000				+	+	+
164	KL2	+		+			
177	N2000	+	+		+	+	+
178	N300	+	+				
182	S160	+	+				
184	S160	+			+	+	+
185		+			+	+	+
186	S200	+			+	+	+
187					+	+	+

Key:

(1) DML : Ken Jones, Dunstaffnage Marine Laboratory;200ml GF/F filtered seawater for analysis in Turner Designs fluorometer. (2) QUB : Linda Gilpin, Queens University Belfast; 200ml seawater filtered through polycarbonate membranes for size fraction analysis in Turner Designs fluorometer. (3) UWB/DML : Hilary Wilson, University of Wales, Bangor/ Dunstaffnage Marine Laboratory; 200ml GF/F filtered seawater for analysis in (DML) Turner Designs fluorometer & 400ml filtered through 2mm membrane and GF/F.
(4) UWB(MOG) : Paul Smith and Ru Morrison, University of Wales, Bangor (Marine Optics Group): (fluor) 250ml GF/F filtered seawater for analysis in UWB Turner fluorometer (on ship). (5) MOG: (spec) 1 to 2 litres GF/F filtered seawater for analysis in Shimadzu UV160 spectrophotometer. (6) MOG (HPLC) 250ml GF/F filtered seawater for HPLC analysis.

PERSONNEL

Officers and Ratings (both Legs)

Name	Rank	Name	Rank
Long, G.M.	Master	**Trevaskis, M.**	CPO(D)
Gauld, P.D.	C/O	**Vrettos, C.**	PO(D)
Atkinson, R.M.	2/0	**Crabb, G.**	SG.1A
Morse, J.T.	2/0	**Perkins, J.**	SG.1A
McDonald, B.	C/E	**Johnson, R.**	SG.1A
Smith, R.S.	2/E	**Wyness, M.**	SG.1A
Slater, I.M.	3/E	**Elliott, C.**	S.C.M.
Lutey, W.D.	Elec.	**Welch, G.**	Chef
		Robinson, P.	Stwd
		Stephen, R.	Stwd
		Pringle, K.	MM.1A

Scientists, Leg A (11-26 April)

Name	Cabin	Main Task	From
Alan Harrison	S2	Moorings, acting P.S. 11-14th	POL
Alan Taylor	F/S	Computing (SeaSoar)	RVS
Andy Geary	S5	Snow Camera	SOC
Fernando Perez-Castillo	S6	Sediment traps, POM	UWB
Graham Ballard	S4	Moorings	POL
Howard Anderson	S7	Computing	RVS
Ivan Ezzi*	S6	Moored nitrate analysers and fluorometers	DML
Nigel Mathers	S1	Moored optical instruments/SeaSoar	UWB
Paul Tett*	P/S	Principal Scientist	Napier
Phil Taylor	S3	Instruments/moorings	RVS
Ray Cramer	S5	Data	BODC
Ru Morrison	S4	Bio-optics	UWB
Simon Watts	S3	Instruments/SeaSoar	RVS
Tony Banaczek	S7	Moorings	POL

* joined at Dunstaffnage, 14 April.

Scientists, Leg B (27 April - 12 May)

Name	Cabin	Main Task	From
Alan Taylor	F/S	Computing	RVS
Andy Jones	S3	Instruments	RVS
Anne Hammerstein	S5	Optical instruments	UWB
Hilary Wilson	S5	Oxygen sensor, microplankton respiration	UWB
John Hughes	S6	Data	BODC
John Wynar	S3	Instruments	RVS
Ken Jones	S2	Chlorophyll and nutrients/DOC	DML
Linda Gilpin	S7	Primary production	QUB
Lynda Mitchell	S1	Benthos	DML
Martyn Harvey	S6	Benthos	UWB
Paul Smith	S4	Bio-optics/phytoplankton composition	UWB
Paul Tett	P/S	Principal Scientist	Napier
Robin McAndliss	S7	SPM	UWB
Ru Morrison	S4	Bio-optics/DOC	UWB

SCIENTIFIC NARRATIVE
(Times in GMT)

Leg A

Thursday April 11 [Year-day 102]: *Challenger* left Southampton at 08hr, having boarded 12 scientists and their equipment, including most moorings gear. During the next 3 days made passage to Dunstaffnage by way of the western Irish Sea and the Sound of Islay.

Sunday April 14 [Day 105]: *Challenger* hove-to off Dunstaffnage until 09hr. Ezzi and Tett, and DML equipment, taken on board by transfer from Calanus. Passage through Sound of Mull to S140 in SES region. Winds 5-7, overcast, some rain.

Monday April 15 [Day 106]: Attempts to make CTD profile at S140 ran into difficulties, first with dirty slip-rings, then with CTD winch control. Engineers worked on the latter throughout night and morning. Bad weather prevented mooring deployment during the morning, but the S140 Meteorological Buoy and S200 instrumented toroid were deployed in the early afternoon, followed by CTD casts 001 and 002 at S200 and S140 once winch repairs had been completed. After this the S140 instrumented toroid was retrieved (with much soft brown fouling) and a sea-bed ADCP deployed at S600. SeaSoar was deployed after dark, at 21hr, but was brought in after half an hour because the weather prevented *Challenger* making more than 6 knots, and SeaSoar would not undulate properly. Work was suspended until Tuesday morning.

Tuesday April 16 [Day 107]: At 05 hr *Challenger* responded to a request to help search a region NW of Malin Head, in which a fishing boat had reported a man overboard. After a 3 hr passage south, the search started at 08hr, and *Challenger* was released at 11hr. Proceeded to 56°00'N, where SeaSoar was deployed, after some preliminary work, at 17hr. The vehicle was towed north along the 1000m contour, undulating mostly between the surface and 350m. Weather improving, sky almost cloud-free by end of day.

Wednesday April 17 [Day 108]: At 23hr on 16th, *Challenger* turned at 56°45'N and towed SeaSoar south along the 1000m contour. At 0 hr, this line ended at 56°17'N and *Challenger* proceeded north along the 500m contour, although with some detours into deeper water. The SeaSoar tow ended at 56°29'N and the vehicle was brought safely inboard. CTD cast 003 was made at the site of recovery, and chlorophyll samples regularly taken from the deck tank system during the tows. The ship then proceeded to S140, where an instrumented toroid mooring was deployed at 08hr. Recovering the U-mooring at S140 was complicated by the presence of a marker toroid close to the U-mooring; the marker was recovered and re-laid further away. An optical station with two CTD casts was made near the instrumented toroid, and the U-mooring was then re-laid at 14hr. S700 was then visited and the pop-up mooring recovered after CTD cast 006. This is a complex mooring, with many thermistor strings, and recovery was not complete until nearly 20hr. The mooring appeared to have been moved about 1 nm north of its deployment position, and the marker toroid laid at S700 during CH125 was not seen. The ship then returned to S140 and began a line of CTD casts, starting with 007, during which the Snow Camera was used. During cast 008 (S200) the oxygen pump and plenum were disconnected, as a test; they were reconnected for cast 009 (S300).

Thursday April 18: [Day 109] At the end of the CTD cast at S300 it was found that the Snow Camera was defective, and it was replaced by an older unit. Casts 010 and 011 were carried out at S500 and S700 before worsening weather (swell across wind) brought CTD work to a halt at 04hr. The ship remained near S700, where a heavily-instrumented pop-up mooring and an instrumented toroid were deployed in the afternoon. An optical station, with CTD cast 012, was worked between the deployments. A review of the performance of the oxygen sensor system indicated that, despite the use of a new sensor for this cruise, and plumbing with an air release valve, the 'oxygen current' signal showed (a) substantial differences between the down- and up- casts, and (b) excessive noise. At 18hr, *Challenger*

arrived at the position of the S300 pop-up mooring, but the acoustic release could not be detected. A search of the vicinity revealed no trace of either this mooring or the S300 marker toroid. At 22hr, night work began with a CTD profile at S850, continued with a profile (cast 014, with Snow Camera) at S1000 just before midnight.

Friday April 19: [Day 110] A profile (CTD 015, with Snow Camera) was carried out in worsening weather at S1500, ending at 06hr. After this, *Challenger* sailed slowly back to S300, where a pop-up mooring was deployed at 12hr, followed by a CTD (017). As a result of tightening of the oxygen sensor connections before CTD014, the amount of noise in the oxygen current downcast was much decreased, although the upcast remained very different from the downcast. At 15hr an instrumented toroid was deployed at S300, and *Challenger* then attempted to recover bottom mounted ADCPs. Those at S600 and S200 were successfully recovered, but no convincing acoustic contact was made with the S400 instrument. At 19hr the French fishing boat 'Eureka' was seen close to the S300 site, and unfruitful attempts made to contact her. Three hours were then spent on acoustic search for the missing ADCP along the 300m contour south of S300, with no contacts, and at 23hr SeaSoar was deployed in good conditions, with the ship moving into deeper water. A preceding CTD (for calibration of SeaSoar's sensors) was aborted when 'birdcaging' of the CTD cable was discovered.

Saturday April 20: [Day 111] At about midnight the first SeaSoar line, running north from 56°19'N along the 1000m contour, was begun, with undulations to 350m, recorded to file SS26D018. At 3hr the line was completed at 56°45'N, and *Challenger* turned to repeat the tow to the south (file SS26D019), ending at 7hr in good conditions. A northwards line along the 500m contour (file SS26D021) ended at 56°53'N at 12hr. Half of the 500m of SeaSoar cable was then reeled back onto the drum, leaving 250m out, and *Challenger* then began towing south along the 200m contour, with undulations to about 160m (files SS26D022 and 023). During this run an Argos signal from the missing S400 ADCP was detected, and so SeaSoar undulation was stopped at 56°24' and the vehicle brought inboard soon after 16hr.The missing ADCP was found floating near the S140 site and was successfully recovered at 18hr. It seemed, from damage to the frame and buoyancy, and barnacle growth to have been trawled some weeks earlier; and to have released its anchor when commanded on Friday 19th. SeaSoar was re-deployed, with 250 m cable out, at 19 hr at 56°23'N, and the survey was resumed going north on the 200m contour (SS26D024 ?). At 22hr the ship turned at 56°44'N to complete the third (south-going) tow along the 200m contour (SS26D025). The weather became increasingly good during the day, with only light winds, good visibility, much sunshine, and regular swell, providing ideal conditions for towing SeaSoar.

Sunday April 21: [Day 112] SeaSoar towing continued in good conditions. The tow along 200m ended 01hr, and *Challenger* then turned onto the first cross-slope section, beginning a little south of S140, at 56°25'N, 08°55'W, before 02hr. Undulation depth was increased to the maximum possible (190m with 250m cable out) as deeper water was reached, and the tow (SS26D026) continued westwards, parallel to, but south of the S-line, until south of S1500 (09°41'W) after 04hr. An eastwards tow along the R-line (SS026D027) was begun after 05hr; *Challenger* turned onto the P-line, towing westwards, at 9hr (SS26D028) and SeaSoar was brought safely in at 12hr near P1500 (56°39'N, 9°38'W). A CTD profile (018) was carried out at this position in order to calibrate the SeaSoar sensors and to sample for POC and pigments. CTD hauling-in speed was kept to 30m/min (cf. 50-60 m/min normal) to avoid cable stress associated with rotation of the CTD frame because of the Snow Camera assembly attached to one side. The performance of the oxygen sensor seemed good now that sharp bends had been removed from its tubing. Although lacking PAR sensors, the CTD was also used as part of an optical station, which was completed with casts of the INF300 fluorometer and PRR600 spectroradiometer. The Secchi depth here, at 5m, was much less than at optical stations carried out earlier (11-12m). A Pop-up mooring (carrying a fluorometer and RCM-transmissometer in mid-water) was deployed at P1500 at 17hr. *Challenger* then moved to N1500 and recovered the sediment trap mooring at this site by soon after 19hr. CTD stations (with use of the Snow Camera) were begun at N1500 at 21hr (cast 019). During the day the weather worsened, with increasing cloud cover, wind and rain.

Contoured plots from the SeaSoar tows showed relatively more fluorescence, and more temperature stratification, in the upper 200 m of the oceanic water column than on the shelf. Profiles from the CTD casts in 1500m showed mid-water bands up to 100 m thick of low transmission.

Monday April 22: [day 113] CTD stations (with the Snow Camera) continued at N1000 and N700 (casts 020, 021), returning to N1500 at 07hr. Weather was less favourable, on account, especially, of crossed wind and swell directions. The Bottom Pressure recorder at N1500 was searched for acoustically but not found; last contact had been in August 1995. After a CTD cast (022) and optical station (Secchi depth now 8.5m) the Sediment Trap mooring was re-deployed. At 16hr *Challenger* proceeded eastwards, the weather continuing poor. The three Cascade moorings (CC1-CC3), which had been placed by an earlier cruise just beyond the shelf break in the vicinity of the N-line, were searched for acoustically, but none was found. A fishing boat was seen working across the site of CC3. At 23 hr CTD casts (with Snow Camera) began at N140 (023) on the N-line.

Tuesday April 23: [day 114] CTD stations continued at N200, N300 and N500 (cast 026) at 03hr, after which heavy swell prevented further deployment of the instrument, rendered unwieldy by the frame for the Snow Camera's flash. *Challenger* went to N140, where the Bottom Pressure recorder and Spar Buoy marker were recovered soon after 07hr, followed by CTD 027 at 09hr. An Optics station was worked in improving conditions at 10hr, followed by CTD 028. At 13hr deployment of a U-mooring was completed, and the Bottom Pressure recorder was replaced soon afterwards. At 16hr a Pop-up mooring was deployed at N300, and, after a delay while the ship's hydraulic crane was repaired, a Spar Buoy marker placed close by at the same site. Calibration CTD 029 was carried out at 19hr. A line between N300 and S300 was acoustically searched between 20 and 23 hr, revealing an acoustic release probably placed by CD91 at S300. The position was noted, but no attempt will be made on CH126 to recover the instrument, since its prone position suggests that it is attached to only part of the mooring, and has no remaining buoyancy. As on previous days, small periods of time were used for tests of acoustic releases on the hydrographic wire.

Wednesday April 24: [day 115] CTD stations on the S-line (S140, S200, S500, S300, casts 030-033) were worked overnight, to allow completion of Snow Camera observations (the device had failed during previous casts at S140 and S200). After this, the Camera and its frame were removed from the CTD. At 07hr *Challenger* was on station at S140. An ADCP was deployed at 8hr and a marker Toroid buoy recovered. At 10hr an Optics station (CTD cast 034) was worked at S200, and at 13hr a U-mooring (with toroid surface buoy) was deployed here. During the afternoon an acoustic trials mooring was deployed at S600, ranged from several distances, and recovered at 17hr. *Challenger* then sailed westwards to begin a SeaSoar line near S1500. However, there was a large and irregular swell, and it was decided that conditions were too risky to launch the undulator. At 20hr, therefore, a line of CTD stations along the homeward course was begun with cast 035 to the south of S1000. It was continued with S300 and S140 (cast 036-037).

Thursday April 25: [day 116] CTD stations were continued at 15' intervals from 8°45' (cast 038) to 7°00'N, 55°40'W (cast 045). The transmissometer plug, which had flooded during cast 37, was replaced for cast 38. When plotted as a section, the CTD station line showed several interesting features, including a transition at about 7°30'W from thermally layered high salinity waters to vertically mixed lower salinity waters, and the presence of higher near-bed fluorescence and beam attenuation at stations centred on 8°00'W and in a depression of the shelf sea-bed. When cast 045 was brought inboard at 13hr, most sampling ceased, although the Flo-thru system continued to run. *Challenger* rounded the Mull of Kintyre at 18hr and spent the evening in the outer Firth of Clyde, while scientific work was completed onboard, gear packed, final graphs plotted, and reports written. Rain and overcast sky for most of the day.

Friday April 26: [day 117]. Soon after 07hr, *Challenger* tied up at the NATO pier at Fairlie. Personnel and gear were exchanged during the day.

Leg B

("Slow" **stations** and "fast survey" **lines** in bold)

Saturday April 27: [day 118] *Challenger* sailed from Fairlie soon after 07hr. The non-toxic supply was turned on at about 08hr (south of Little Cumbrae), and the first station (K1, cast 046) worked was for Optics in bright sunshine, in the North Channel west of Kintyre. Sampling on the extended S-line, repeating, in reverse order, the inward work, began at S1 (55°40'N, 7°00'W, cast 047) at 20hr.

Sunday April 28: [day 119] Station S5 (55°56'N, 8°00'W, cast 051) was worked at 03hr. In the centre of the depression south of the Stanton Banks, it showed increased near-bed fluorescence and beam attenuation. Respiration rates and absorption spectra were measured here. The extended S-line was continued slowly, in a heavy swell, until **S140** was reached, and worked as an Optics station, at 12hr (cast 055). Settling Velocity Tubes (SVTs) were set up at 13hr, and CTD casts were made at 14hr and then every 2 hours, with cast 060 at 22hr.

Monday April 29: [day 120] CTD casts continued every 2 hours at **S140**, in a heavier swell, with a pre-dawn cast (063) for productivity and respiration at 04hr. An optical station was worked at 11hr, and the last CTD cast (067) at 12hr. During the morning, colder water penetrated near the sea-bed, with increased near-bed fluorescence. *Challenger* then proceeded to a site a little south of S1500 for CTD casts 068 (to 100m with dwirr & uwirr) and 069, ending at 18hr. After this 500m of main cable was run out and cut off as being unsound for heavy use. Site S1000 was worked (cast 070) at 21hr, and **S700** reached for a "slow" station at 23hr. Weather during the day was a mixture of sunny intervals and showers, and the swell continued heavy and sometimes troublesome.

Tuesday April 30: [day 121] At **S700**. The first CTD cast (071) took place around 00hr, and cast 072 was carried out at 01hr. Both showed problems with transmissometer SN103, which was therefore replaced with SN125 for cast 073, at 03hr. The cast took 'pre-dawn' water for productivity and respiration incubations, as well as standard samples. Cast 074 was carried out at 05hr for bottom water in which to incubate cores. The transmissometer signal continued poor during both these casts. The Bed-hop Camera was deployed for at 06hr, and drops with the Multi-corer began at 08hr. These could not be carried out at the original site, as this was now occupied by the S700 moorings. Coring was abandoned at 11hr after 3 drops which brought back no, or very little, mud. An Optics station was worked at 13hr, and SVTs deployed at 14hr. CTD cast 075 at 12hr showed continuing transmissometer problems, and CTD breakout box OSG2 was therefore replaced by OSG1 before cast 076 at 15hr. This cast showed a good transmissometer signal but had not been logged, so was immediately followed by cast 077, the last at **S700**. CTD casts 078 and 079 were carried out at S500 and S300 on the way to **S200**, which was reached soon after 19hr. The next cast was at 20hr (080) and then at 2 hour intervals.

Nutrient profiles at S700 showed near-surface depletion of silicate relative to nitrate and night-time ammonium peaks at 60m. Observations with the Galai video microscope showed abundant diatoms.

Wednesday May 1: [day 122] CTD cast 082 took place at **S200** at 00hr. Subsequent casts were made at 2 hr intervals, including 084 for 'pre-dawn' water for production and respiration measurements, until 086 at 08hr. After this, increasing NNE wind and swell prevented further work over the ship's side. From about 10hr onward *Challenger* was moving slowly northwards, and at 13hr this was formalised as a track roughly along the 200m contour, with hourly sampling from the non-toxic supply for chlorophyll and nutrients. Although the wind was strong (25 knots gusting to 30) and cold, the sky was largely free of clouds and the air clear, with a brilliant sun. The barometer was rising.

Thursday May 2: [day 123] Sampling the non-toxic supply continued through the night. By 4hr *Challenger* had reached 57°00'N (having averaged about 1.6 knots) and, in order to keep head to the NNE wind, was moving into shallower water and away from the shelf break, which tended NNW at this latitude. The cold clear weather continued, but the wind was

moderating. At 5hr conditions were better, and the ship proceeded to the 24-hr station **N1500**, arriving for the first CTD (cast 087) at 07hr. Deep (1500m) and shallow (100-500m) casts were alternated, to 092 at 23hr. Multi-coring operations were successful, with drops MC4 to MC6 all returning 10 cores. The Bed-hop Camera as used in the evening. An Optical station was worked at 13-16hr, and a Settling Velocity experiment set up with 5m water at 15hr. Samples for production and respiration were taken in the evening. The sun shone brilliantly for much of the day. In the afternoon gannets were diving close to the ship, the first time this behaviour had been observed during CH126.

Friday May 3: [day 124] CTD profiling continued at **N1500**, including a 'pre-dawn' cast (095) to take water for production and respiration. The station ended with cast 097 at 6hr, which was treated as the first **"fast" survey** station on the **N-line**. Cast 102 at N700 was abandoned at 15hr because of CTD failure, and repeated at 18hr after cable retermination. The N-line was completed at N140 (cast 107) at 23hr.

Saturday May 4: [day 125] Weather conditions were improving during the night. CTD casts continued from 108 at P140 at 01hr at the start of the **P-line**. P1500 (cast 117) was reached at 12hr. The **R-line** was begun at R1500 (cast 118) at 14hr.

Sunday May 5: [day 126] Weather good. R140 (cast 127) was reached at 03hr, and the **S-line** begun at S140 (cast 128) at 04hr. The flotation circle of a large fish cage was seen drifting near S700 at 0hr, and at 10hr a message was received from the seismic survey vessel *Academician Nemchinov* to say that a drifting toroid(?) had been seen at 57°00'N, 9°52'W. Since all toroids placed during CH126A were in place, it was thought that this might be the missing S700 marker toroid, placed during CH125. It was decided not to recover. After S1000 (cast 135) the S-line was interrupted to return to S200 for water for production measurements (cast 136, with PAR sensor dwirr #1 replaced by #8) and optical measurements. These were completed by 14hr, and *Challenger* proceeded, in fine weather, to 56°15'N, 9°13'W in order to release DML/SOC **Argos drifters**. CTD cast 137, at the centre of the first drifter release circle, was delayed while the CTD cable was reterminated. The cast (to 250 m) was begun at 16:22, in 592m, and 7 drifters (PTT 16771-16777) released in sequence by 18:22, forming a circle of radius 2 nm. CTD cast 138 at 56°15'N, 9°26'W (1196m) was begun at 19:34 at the centre of the second drifter release circle, and 7 drifters (16778 - 16784) released by 21:14. *Challenger* then returned to the S-line, commencing CTD 139 at S1500 at 23hr.

Monday May 6: [day 127]. Cast 140 was carried out at S1300 at 02hr. 'Pre-dawn' cast 141 went to 100m at 03:39-03:52, to provide water for productivity and respiration measurements, and an ***in situ* production rig**, suspended from a Dan buoy with VHF beacon, was launched at sunrise at 04:39 at 56°28'N, 9°31'W. *Challenger* followed the rig as it drifted, and CTD casts (to 200m) and optical measurements were made at c.2hr intervals, starting with cast 142 at 05hr. SVTs were filled at 15hr, and the rig was recovered in good weather at sunset, 20:33, at 56°30'N, 9°39'W. This was followed by a standard CTD cast (150) at 21hr, and a 200m cast (151) at 23hr at the extrapolated position of the rig. The effect of fine weather was seen in the development of a warmer superficial layer, about 20m deep, with higher fluorescence (which was, however, partly inhibited during the middle of the day). A boat drill was held in the afternoon, including practice with fire hoses.

Tuesday May 7: [day 128] The midnight to 4am BST watch was suspended as *Challenger* proceeded to **R1000** in fine weather, for CTD cast 152 at 05hr. Cast 153 took deep water for core incubation, and was followed by four drops (MC7-10, 3 successful) of the Multi-corer between 7hr and 10hr. At 11hr the *Academician Nemchinov* reported a drifting buoy at 56°31'N,9°02'W. An Argos transmission received on *Challenger*, and a message from POL, confirmed by 14hr that this buoy was the subsurface float of the S200 U-mooring, with Argos beacon PTT 24573. Work at R1000 was thus ended early, at 14hr, after an optical station and photography with the Bed-hop Camera. The weather was fine and the sea calm, and the buoy was seen from several miles distance where reported. At 15hr the buoy (two surface pellets and a 48" float with Argos beacon) was grappled and brought inboard; one

RCM7 current meter remained of the mooring. *Challenger* then proceeded to L1000 (cast 155 at 16hr) to begin the KL line. DML/WOCE station at 57°00'N, 9°00'W (cast 158) was reached at 21hr. KL7 (cast 159), 16 nm onto the shelf, showed higher fluorescence in the bottom mixed than in the surface mixed layer.

Samples taken during the day, and observed by microscope and with the Galai video system, showed increasing numbers of dinoflagellates and small flagellates in the microplankton. Spectrophotometry of (phytoplankton-dominated) SPM on filters showed that the absorption peak at 410nm was less in proportion to that at 430nm than during previous days.

Wednesday May 8: [day 129] CTD stations continued along the KL line towards the St Kilda group. The shallow depression from KL6 to KL3 had colder, slightly deoxygenated, bottom water, with increased near-bed fluorescence. KL2, north of the depression, also showed increased near-bed fluorescence, however, and a sample was taken for measurement of respiration rate. *Challenger* worked station KL1, between Hirta and Boreray, at 08hr (cast 165), and then began the KN line towards N2000 (at 56°00'N, 10°00'W) . The weather, which had been showery in the early morning, grew increasingly sunny, and a barbecue was held on deck in the early evening as the ship crossed the shelf break at stations KN200 and KN500 (casts 172-173, 16-17hr). **N2000** was reached at 22hr, and the coring station was begun with a CTD cast (175) for near-bed water.

Thursday May 9: [day 130] Multi-corer drops MC11-MC13 were successfully completed by 04hr. They were followed by a standard CTD cast (176) which took water samples from near-bed, at 2038m, to 200m, and, at 06hr, a drop of the Bed-hop Camera. An optical station was worked at 9hr (CTD 177), and *Challenger* then proceeded to N300 in fine weather, arriving at 14 hr. After CTD cast 178 the **N300 subsurface mooring** was successfully popped-up and recovered, despite the proximity of a fishing boat which came with 2 cables of the floating mooring and spar. The marker Spar buoy mooring at N300 was recovered at 17hr. *Challenger* then made a course to about V200, stopping briefly near S160 for CTD cast 179 to 50m for PAR measurement. The third set of Argos drifter releases (16784-16790, 24308) was begun at 20:28 with CTD cast 180 at 56°15'N,9°04'W. One drifter was released there and the other 6 in a circle of diameter 2 nm, ending at 22:12.

Friday May 10: [day 131] *Challenger* took up station at site **S160** with CTD 181 at 00hr. 'Pre-dawn' cast 182 at 04hr took water for production and respiration measurements, and a **drifting production rig** was deployed at 04:43 (sun 2° above horizon) at 56°27.7'N, 9°01.3'W. The drifter was followed until 12hr, with CTD casts 183-185 and optical measurements. During this time a toroid was seen, out of position, at 59°29'N,9°02'W. When investigated, it proved to be the other part of the **S200 U-mooring**, which had been partly recovered on Tuesday. Pulling in the toroid and ground line led to recovery of an acoustic release and 2 RCMs, the latter very battered and without vanes. Thus all instruments were finally recovered from this array. It seemed that the mooring had probably been on the deck of another ship before being put back in the water. After this unscheduled recovery, *Challenger* moved to S300 for the scheduled recovery of the sub-surface mooring there, halting on the way at S200 for a CTD (186) and Optical station at 13hr. The recovery of the **S300 mooring** took 2 hours, and was a complex task because of the thermistor chains taped to the wire. After completion *Challenger* returned to the last known position of the productivity rig, and, after some searching was found at 17hr with the aid of the rig's VHF beacon. Two CTD casts (187, 188) and an Optics station were worked, and a SVT experiment was set up. Despite more wind and swell, the production rig was safely recovered at 20:43 at 56°32.2'N, 9°05.5'W, followed by CTD cast 189. After this, *Challenger* went to S1000 to begin at 23hr the first cast (190) of the **extended S-line** section on the homeward passage to Fairlie. This cast was accompanied to 986m by MOGI (the mascot of the UWB Marine Optics Group), who returned safely but bedraggled.

Saturday May 11: [day 132]. CTD casts continued on the S-line, reaching S140 (cast 196) at 06hr. By this time supplies of tubes for storing iodine and filtered chlorophyll samples were running out. CTD casts were continued across the shelf, from S8 to S3, with the Bed-hop

Camera being deployed at S5 (55°57'W, 8°00'N) in the centre of the depression to the south of the Stanton Bank. Scientific work was concluded at 16hr at S3 (7°30'W, cast 202). *Challenger* continued the homeward passage through the North Channel and into the Firth of Clyde in good weather ...

Sunday May 12: [day 133] ... tying up at the NATO pier at Fairlie at 07hr. This ended the cruise.

Tidal data

From Admiralty Tables, for (standard port) Ullapool (57°54'N, 5°10'W). Range is the larger of those between preceding or following LW and the given HW. High water at St Kilda about an hour earlier, range about ⅔ of that at Ullapool. * marks the New Moon.

Date	Apr-11	Apr-17	Apr-18	Apr-26	May-04	May -11
Tide	neap	spring*	spring	neap	spring	neap
GMT hr of HW	13	06	07	14	20	14
Range (m)	2.3	4.7	4.7	1.7	4.7	2.5

TECHNICAL REPORTS

Computing (Alan Taylor, Legs A & B)

Data for navigation, underway instruments, SeaSoar and the CTD were logged using the ABC system. The data arriving at the level B from the level A's was archived to 1/4" tape and passed onto the level C. The data was recorded in RVS format data files and processed if required. All raw and processed data files were compressed and archived at the end of each leg. These archive tapes were then passed onto the BODC representative.

The computer system generally operated satisfactorily. The only exceptions were the CTD level A, which refused to initially log two casts, and the level B which locked up on the 10th May and had to be reset. This resulted in the loss of approximately 2.6 minutes of data.

Moorings (A.Harrison, Leg A)

A total of 31 mooring operations took place over a time period totalling 7.5 days comprising 12 recoveries and 19 deployments. The mooring at S300 was missing and could not be located by acoustic search or ARGOS beacon scans. Similarly all three Cascade moorings deployed on CH125 were also missing. An attempt was also made to recover the missing BPR at N1500 but nothing was found.

The set-up for the mooring array instrumentation was returned to the summer configuration on all moorings with the top current meters moved up to within 30m of the surface on the current meter moorings and thermistor strings incorporated on all South section moorings, including the four instrumented surface toroid buoys, but excluding the S200 "U" mooring. The MET buoy was also re-installed at the S140 site.

The ADCP at S140 was turned round after servicing but the instrument at the S400 site was not located on position, and it was not until after an acoustic search to the south of this site that the frame surfaced at 22:00 on 19/4/96, some 8 km out of position. Alerted by the ARGOS alarm system, the badly damaged frame was tracked by the shipboard GONIO receiver and finally recovered at 17:50 the following day. The retrieved data showed that the frame had been trawled on its side for 3.5 hr on the 26th Feb 96 and then remained on the sea-bed until release on the 19th April 96.

All the mooring deployments/recoveries took place from the after deck of *Challenger* using the Port/Strbd Auxiliary winches, the main "A" frame and the ships crane. All the ships equipment worked well, the only problem being a broken hydraulic pipe on the crane which was repaired by the engineers after a short delay.

The weather for mooring work was generally good, but at times was marginal resulting in the loss of half a day when conditions were judged too severe for safe working.

Two trial moorings were deployed and successfully retrieved at site S600 to evaluate the POL 75KHz ADCP and a SONARDYNE release acoustics unit. Although two more previously lost moorings were found making a total of 5 identified locations, there was no time in the scientific programme allocated to dragging.

Fluorometers and Nitrate Analysers (I. Ezzi, Leg A)

Three Chelsea Instruments Aquatracka fluorometers were used on or from the ship, one attached to the CTD, one in the deck tank being fed from non-toxic sea water supply for continuous underway sampling and one on the towed vehicle SeaSoar. In order to calibrate the CTD instrument, water samples were taken from 5m and 30/60m alternately from all CTD dips and filtered/frozen for later extraction and measurement at DML. The deck tank fluorometer was calibrated using water samples taken from the tank at regular intervals. Deck tank samples were also used for calibration of the Sea Soar fluorometer.

Four Chelsea Instruments Recording Aquatracka fluorometers were deployed from moorings during the cruise, as detailed in the following table. On 15th April Recording Aquatracka fluorometer 012 was recovered from the S140 toroid buoy (deployed 1st February). The Scientific Overview gives preliminary results, shown as chlorophyll using an earlier calibration of the instrument. Although there was some concern that increased fluorescence towards the end of the record resulted from fouling, it was reassuring that transmissometer records from S140 (data from Tony Banaczek) showed parallel changes. Post deployment calibration of fluorometer 012 was carried out on board against a range of concentrations of *Skeletonema costatum* (cultured at DML) in local sea water.

Following the return of four NAS2 *in situ* nitrate analysers from WS Oceans for servicing and repair, they were deployed as detailed in the above table. All four instruments performed adequately on the bench prior to deployment.

INSTRUMENT	NUMBER	DATE DEPLOYED	STATION	DEPTH
NITRATE ANALYSER	1750	15/4/96	S200	SURFACE
NITRATE ANALYSER	1753	17/4/96	S140	SURFACE
NITRATE ANALYSER	1752	18/4/96	S700	SURFACE
NITRATE ANALYSER	1754	19/4/96	S300	SURFACE
FLUOROMETER	012	14/4/96	S140	138m
FLUOROMETER	013	18/4/96	S700	690m
FLUOROMETER	014	21/4/96	P1500	700m
FLUOROMETER	011	22/4/96	N1500	1490m

Sediment traps and water-column POC (F. Perez Castillo, Leg A)

The recovery of the sediment trap array at station N1500 (deployed in cruise SES-5 (CH125) in February) was started at 18hr on April 21, and took about an hour. Material had been

collected properly in both traps (i.e. those deployed at 1000m and 1400m). The current-metre/transmissometer data recorded during the deployment period seems to be reliable.

The two Parflux mark 7G-21 sediment traps were re-deployed at nominal depths of 1000m and 1400m (100m above sea-bed), on one mooring at station N1500N on April 22. A Current-meter/ Transmissometer and a Fluorometer were included, near the bed, in the array. The mooring anchor was released at 15:28, at a sea-bed depth of 1442m.

To prepare the traps for deployment, a standard procedure was carried out. Each bottle was coded using an engraver and then marked as: XVII A No. bottle (1000m trap) and XVII B No. bottle (1400m trap). Where XVII is the code of the deployment and A or B is the code for trap position in the array. The bottles were then washed with Decon-90 detergent and rinsed with distilled water. On April 19, three days before re-deployment, a preservative was prepared, consisting of GF/F filtered deep seawater (800m) from station S1000, plus 5% of a reagent containing formaldehyde, NaCl and Borax. Before deployment, each trap's cone and baffle were washed with Deacon-90 and rinsed with distilled water. The cone was washed using a sponge and the baffle using a wash bottle brush. Then, both were fitted in the trap's frame and the trap was covered with a plastic bag to keep it dust-free. Bottles were filled with the preservative and fitted in each trap. Finally, traps were programmed for 22 events at seven day intervals with the exception of event 1 (5 days), starting on April 23, 1996 at 12:00 and ended on September 15, 1996 at 12:00.

To complement the sediment trap experiment, seawater samples were taken for the analysis of particulate organic matter (POM). The samples were taken at several depths from CTD casts (see Table). Between 800 and 1000 ml were filtered through pre-combusted GF/F filters. The filters were then frozen and brought back to DML for analysis for particulate organic carbon and nitrogen.

Station	**S200**	**S140**	**S300**	**S700**	**S1500**	**P1500**	**N1500**
Date	15-Apr	15-Apr	17-Apr	18-Apr	19-Apr	21-Apr	21-Apr
Time (GMT)	14:46	15:52	23:39	3:07	3:51	12:47	21:14
CTD cast	1	2	9	11	15	18	19
sea-bed at (m)	174	146	344	721	1524	1530	1465
sample depth (m)							
5	+	+	+	+	+	+	+
15	+	+	+	+	+	+	+
30	+	+	+	+	+	+	+
60	+	+	+	+	+	+	+
100		+	+	+	+	+	+
200	156	135	+	+	+	+	+
300			337				
400				+	+		+
500							
600				+	+		+
700				687		+	
800				702	+		+
1000							
1200					+	+	+
1400					1488	1405	1430
1500					1505	1533	1464

Marine Snow Camera (A. Geary, Leg A)

The primary objective was to study the temporal and spatial distributions of 'marine snow' across the Hebridean Shelf Edge. Marine snow may be described as particles, generally of biogenic origin, greater than 0.5mm. These particles are important in biogeochemical cycling and particularly in the oceans' carbon cycle, despite being in generally low concentrations.

Their fragility means that conventional sampling techniques such as sediment traps, although providing good data on particle flux, are unable to give reliable data on size distributions in the water column.

Cruise 126(A) provided a good opportunity to test the newly developed OCEAN INSTRUMENTATION MK 7 underwater camera. The camera was attached to the CTD frame using a rigid scaffold rig. The centre of the camera lens was set at a critical distance of 80 cm from the centre of a fresnel lens. This lens had set 30 cm behind it, a high powered 300 microsecond METZ flash unit. The result was a column of light which was photographed at right angles, giving a sample volume of 20 litres. Photographs were taken every 15 seconds throughout the water column. A total of 14 sites were monitored representing sea depths from 140 to 1500 m on the North and South SES lines. This gave between approximately 100 and 400 frames (or samples) per site to be analysed. If any interesting features were seen on the CTD display, then 2 minute stops were made at these points (8 shots). All deployments were successful.

Analysis of the frames will be undertaken at SOC, using KONTRON image analysis software. This allows visualisation of the image and enables the user to check and correct for over/under estimates of particle number and over/under estimation of size. The results are input to a specially written set of LOTUS 1-2-3 macros with the result being full depth profiles of particle abundance (No/l) and concentration (ppm) for all size categories.

Date	Station	Ctd no.	Frame interval	Time in	Time out	Lat (N)	Long (W)	Cast depth (m)
South line								
17/4/96	S140	007	15 s	21:29:47	no record	56 25.71	08 58.56	145
18/4/96	S500	010	15 s	1:26:15	2:10:21	56 27.26	09 06.42	513
18/4/96	S700	011	15 s	3:11:27	4:14:38	56 26.26	09 10.12	719
18/4/96	S1000	014	15 s	23:52:19	1:10:07	56 27.48	09 18.12	998
19/4/96	S1500	015	15 s	3:55:03	no record	56 27.65	09 39.13	1524
23/4/96	S140	030	15 s	23:42:38	0:01:35	56 26.25	08 59.25	149
24/4/96	S200	031	15 s	1:07:33	1:29:40	56 26.85	09 03.05	204
24/4/96	S500	032	15 s	2:00:49	2:41:48	56 26.86	09 06.88	543
24/4/96	S300	033	15 s	3:22:12	4:00:03	56 26.72	09 04:44	334
North line								
21/4/96	1500	019	15 s	21:12:37	23:12:?	56 42.97	09 23.82	1465
22/4/96	1000	020	30 s	1:50:28	3:11:36	56 41.08	09 10.96	1008
22/4/96	700	021	15 s	4:23:21	5:23:15	56 39.16	09 06.57	696
22/4/96	140	023	15 s	22:57:35	23:16:24	56 37.05	08 56.14	136
23/4/96	200	024	15 s	0:15:06	0:36:33	56 36.87	09 00.41	190
23/4/96	300	025	15 s	1:09:10	1:36:22	56 36.85	09 01.38	309
23/4/96	500	026	15 s	2:14:12	2:55:22	56 37.18	09 05.20	529

Camera used: Ocean Instrumentation Mk VII // IOS MK IV. Flash used: 300 microsecond Metz. Film type: Ilford 400asa XP2.

Comparison Of Aquatracka Mk2 & Wetlabs WS3S Fluorometers (N. Mathers, Leg A)

During cruise CH126A the opportunity arose to compare the Aquatracka Mk2, fitted as a standard fluorometer to the Neil Brown C.T.D. system and the relatively new Wet Labs Wetstar WS3S fluorometer. The Aquatracka has been in service with the U.K Oceanographic community for some 10 years and has given very good results in both fidelity of data and general reliability. The WS3S is a low power fluorometer using different optics and can be used in either a flow-through or pumped mode. The WS3S was connected to the breakout box on the C.T.D. frame which carries 12V to the fluorometer and takes the d.c output signal to an A/D card in the Neil Brown C.T.D. The inlet tube of the fluorometer was set at a level

with the optical window of the Aquatracka and the distance between the instruments was about 10 cm. A funnel with a diameter of about 7 cm was attached to the inlet tube to assist operation when the WS3S was to be used in a flow through mode. The first test was carried out using the output from a Seabird pump, which was drawing water through the oxygen plenum, feeding into the top of the WS3S flow tube. The pump supplied 12. 5 ml s^{-1} through the flow tube and was arranged so that the flow was the same on either the down or up cast. Due to the pumping rate and the length of the tubing involved there was a delay of about 0.5 s before the water drawn in reached the WS3S optics and this corresponded to about 0. 5 m in depth. Several casts were done using the WS3S in this mode until the stations exceeding the instrument's maximum working depth of 500m were reached. When the fluorometer was refitted for further shallow casts it was connected in flow -through mode with the funnel on the bottom flow nozzle to give a good collection of water on the down cast. Finally both top and bottom nozzles were fitted with funnels and further casts down to 500m were taken.

There has been no time to arrive at a comparison of the accuracy of the two fluorometers, as chlorophyll calibration samples are yet to be analysed. With the WS3S in the pumped mode it showed a flatter response than the Aquatracka with some falling off at the greater concentrations but this may be due to the flow rate being at the low end of the manufacturer's recommended range of 10 to 30 ml s^{-1}. This conclusion is reinforced by the very similar curves which were displayed by both fluorometers during the free flow up and down casts. In my opinion this WS3S instrument will be very useful where fluorometric measurements are required in towed bodies, in shipboard underway pumped systems and on battery CTDs where power is at a premium.

CTD, TSG and Flow-through Systems (J.Wynar, Leg B)

The CTD system worked reliably throughout leg B, downtime being due to re-termination of the conducting cable on two occasions. Also, noisy transmissometer data were traced to a pair of faulty leads. In total, 157 casts were achieved with no losses or breakages.

In general, the TSG and Flow-through instruments all operated without any problems over the period of the cruise. The only exception being the necessity to reset the thermosalinograph computer on one occasion to clear an abnormally high and erroneous housing temperature. This problem was probably due to a data spike.

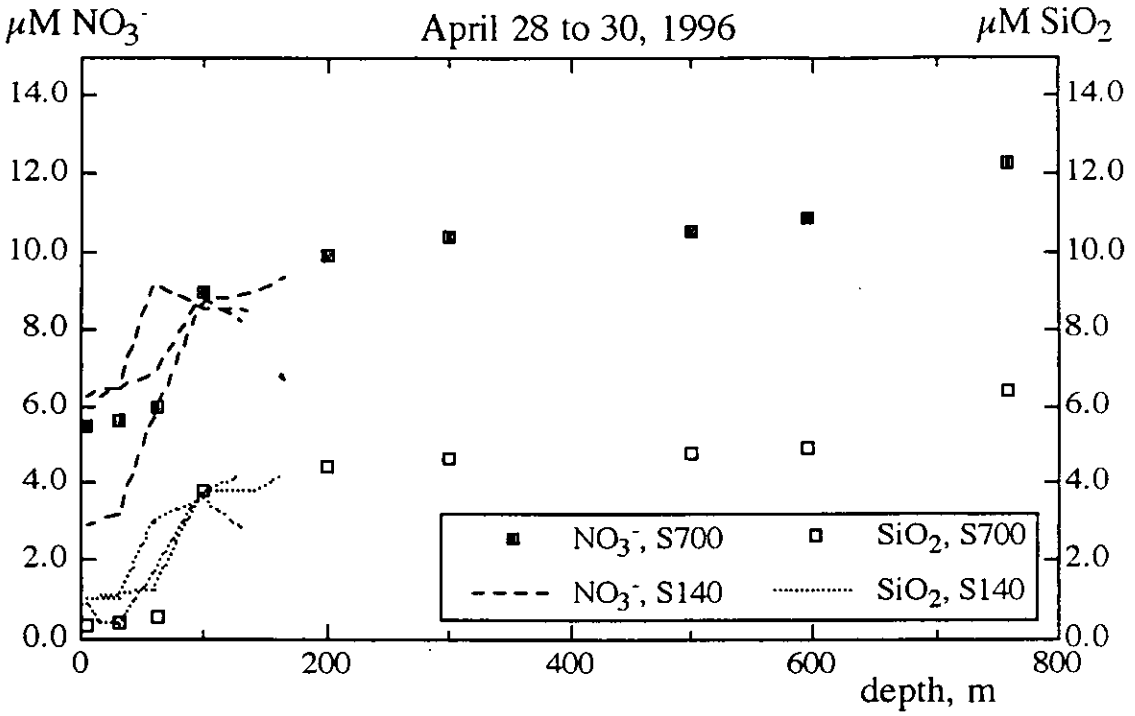
Other instrumentation used included the ADCP which was operating continually during the cruise using Transect software. Salinity calibrations were produced using a Guildline salinometer from samples taken from the CTD and non-toxic supply. Initially the salinometer was found to have a poor sample flow-through which was remedied by a thorough overhaul.

Chlorophyll, and Dissolved Nutrients, Organic Matter & Iodine Species (K. Jones, Leg B)

Water samples from the upper 100 m at each station were filtered through GF/F glass fibre filters and the filters stored frozen for later analysis for chlorophyll a at DML. Samples were also taken at each station from the non-toxic seawater supply and treated in a similar manner. Results of chlorophyll analyses will be used to calibrate the CTD fluorometer and the deck-tank fluorometer monitoring near-surface chlorophyll concentrations.

Samples from 126 CTD casts from the Hebridean shelf and shelf edge region were analysed, on board ship, for nitrate (+ nitrite), ammonium, phosphate and silicate using a Lachat QuikChem 2000 flow injection analyser.

Nutrient distributions in the SES area were consistent with observations from the previous Leg of the cruise which indicated that the spring bloom had begun and was further developed on the shelf and at the seaward end of the SES-box transects. Typical profiles are shown below: Lowered nitrate, phosphate and silicate concentrations were observed above the pycnocline due to uptake by phytoplankton at all stations. At oceanic stations silicate concentrations were relatively more depleted than nitrate.



Nitrate and silicate profiles at the shelf edge and middle slope, early in Leg B.

Nitrate, phosphate and silicate concentrations increased sharply below the pycnocline in the oceanic stations. Bottom water at 2000 showed considerable enrichment with dissolved silicate relative to nitrate which suggests that Rockall Trough or areas to the north is a site enhanced deposition and remineralisation of diatom frustules. The high relative silicate concentrations in deep water at S1500 (also noted during previous cruises) might be explained by mixing of this water with the silicate-rich deep watermass in the Rockall trough.

Ammonium concentrations were generally very low within the SES box but 24h time-series measurements made at a number of stations seaward of the shelf break indicated a marked increase in ammonium concentrations within the pycnocline during late-evening. Although there were no direct observations of zooplankton biomass made, it seems likely that this increase was due to excretion of ammonia by vertically migrating grazers. High concentrations of ammonia perhaps persisted longer in the pycnocline than elsewhere in the water column because of reduced turbulence. Elsewhere in the euphotic zone uptake of ammonia by phytoplankton and dispersion through the surface mixed layer would have reduced ammonia concentrations rapidly.

The transects across the shelf break and shelf to St Kilda to the north of the SES area showed greater nutrient depletion over the shelf and indicated that the relative depletion of nitrate and silicate were similar. Ammonium concentrations in shelf waters were markedly higher than beyond the shelf break suggesting relatively higher level of grazing.

Water samples were taken at selected stations along the S and N line transects within the SES box, filtered and stored for later analysis for dissolved organic carbon at PML (A.Miller) and dissolved organic nitrogen and phosphorus at DML.

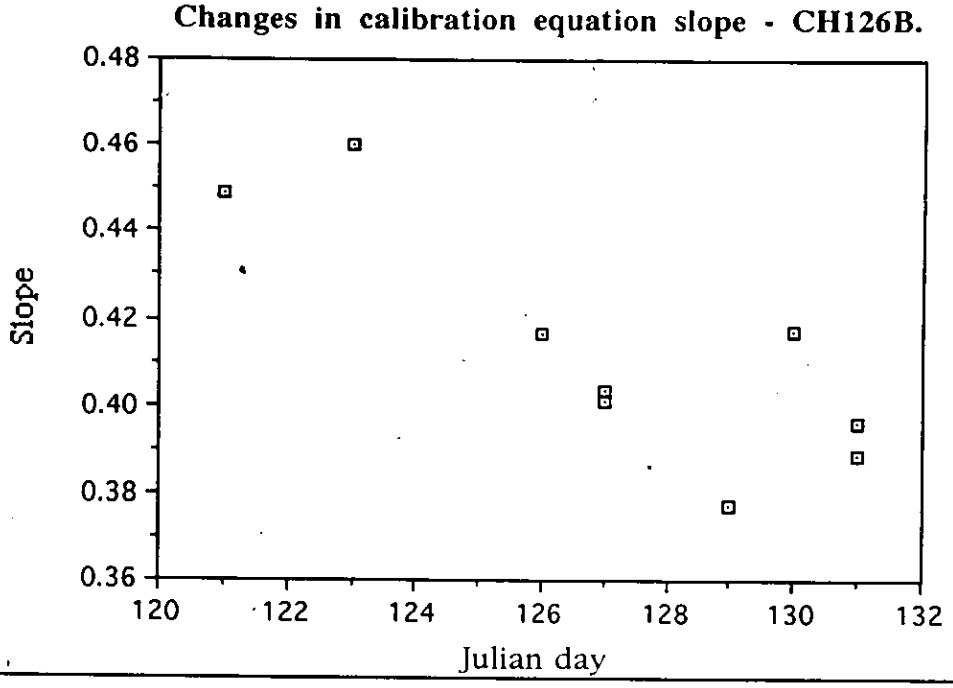
Water samples were taken from the non-toxic supply for later analysis for iodide and iodate (by V.Truesdale, Oxford Brookes University).

CTD oxygen sensor calibration, and Microplankton respiration (H.Wilson, Leg B)

The objective of this cruise was to estimate respiration in the water column during the Spring Bloom and to calibrate the CTD-mounted dissolved oxygen sensor.

Ten oxygen profiles were sampled for calibration at a maximum of two day intervals. The calibration equation was obtained by regressing the sensor current in μA against O/S*, where O=dissolved oxygen concentration measured by Winkler titration of water samples,

and S*=corrected oxygen saturation. The slope changed with time, perhaps because the CTD had recently been fitted with a new sensor.



Water was sampled at eleven sites and incubated in the dark to measure oxygen uptake by microplankton (all organisms of sizes less than 200 μm). All surface measurements of microplankton respiration were significant, as were those made at the lower part of the water column in regions of high fluorescence in the shelf depressions at S5 and KL2. Mid-water measurements showed no microplankton respiratory activity. 'Bacterial samples' were filtered through 2 μm membrane filters before incubation. Most of them showed significant bacterial respiration at depths where microplankton respiration was significant. Measurements of chlorophyll and particulate organic carbon in these samples will be made at DML using stored material, as well as bacterial enumeration and evaluation of protozoan biomass.

Date	Station	CTD cast	Depth (m)	Microplankton respiration (μM/d)	Bacterial respiration (μM/d)
27/4/96	S5	52	165	1.77*	2.906*
28/4/96	S140	58	5	1.739*	-0.661 ns
29/4/96	S140	63	5	1.363*	0.089 ns
30/4/96	S140	73	15	2.142*	0.767*
1/5/96	S200	84	15	1.535*	-0.093 ns
2/5/96	1500	91	89	0.698 ns	0.773*
3/5/96	1500	95	15	3.545*	0.948*
6/5/96	S1300	141	13	3.038*	1.146*
6/5/96	S1300	146	100	0.084 ns	-0.323 ns
8/5/96	KL2	164	118	1.565*	0.445*
10/5/96	S160	182	14	3.927*	1.926*

*significant ns not significant

Primary production (L. Gilpin, Leg B)

Water samples from a range of stations were incubated with $H^{14}CO_3^-$ on board ship, and two *in situ* experiments were carried out with drifting rigs (see Tables 3 and 5). Chlorophyll was also measured. The results will provide estimates of primary production and of the parameters of photosynthesis-irradiance curves.

Transmissometer calibration, and SPM characteristics (R.McCandliss, Leg B)

The overall project objectives, which extend over SES cruises 2-7, include:

a) Measurement of variation in concentration of suspended particulate matter (SPM) at the shelf edge over a range of spatial and temporal scales using moored and CTD-mounted optical beam transmissometers.

b) Determination of SPM composition, size and settling velocity by analysis of water samples.

c) Modelling of SPM dynamics over short term and seasonal time scales using coupled physical/biogeochemical numerical models

d) Assimilating model output with measurements to estimate along- and across- slope fluxes of constituents of SPM.

During CH126B, a total of 155 samples were collected from rosette GO-FLO bottles during CTD casts and filtered through pre-weighed 47mm GF/C filters. Between 8 and 10 litres of water were filtered for each sample. These samples will be used to convert optical beam attenuation measured by the CTD-mounted transmissometer into total SPM concentration.

It was not possible to perform any analysis of particle size on this cruise, because despite attempts to repair it, the relevant part of the Galai Laser particle sizer was again not working. The video component of the unit was functioning, however, and 63 water samples from the CTD were videoed for shape analysis at a later date. The videoed samples were predominately from the surface water in order to view the spring bloom and roughly determine which species were dominating. The video unit proved very useful for 'at a glance' assessment of the different stages of the bloom at different stations, and it will be possible to classify many of the organisms down to species level.

A total of 5 deployments of the UWB Settling Velocity Tubes were made, at S140, S700, 1500, S1300 and S160. Only surface samples were taken in order to determine the settling rate of the phytoplankton. Previous problems with premature triggering by swell waves on entering the water, and various mechanical failures of the new triggering system, which hampered work in the last cruise, were much improved this time. Upon recovery from the water, the tubes were set upright on a stand and sub-samples were withdrawn from the base of the tube at 2, 10, 20, 40, 80, 160, 320, 440 and 600 minutes. 250 ml aliquots from each sample were filtered through GF/F filters and then frozen while awaiting acetone extraction of the chlorophyll and fluorescence measurement.

Benthic sampling (M.Harvey & L.Mitchell, Leg B)

30/4/96: at S700. The original position was judged to be too close to a recently deployed toroid mooring so another was chosen nearby. The Bed-hop Camera was deployed and 25 photographs of the sea bed were taken. The CTD was used to obtain 12 bottles (approx. 120 litres) of water from 5 m above the sea bed. This was to be used for the incubation of sediment samples during determination of benthic respiration rates. The Multi-corer was then deployed twice but was unsuccessful both times as the sediment was too coarse and sandy to stick in the tubes. After consulting the detailed bathymetric chart a position that appeared to be more suitable (not on a ridge, and therefore less likely to be subjected to stronger flows which might cause scouring of the bed) was chosen. The Multi-corer was deployed there but this was again unsuccessful. The one retrievable core (10 cm long) from this third deployment was sectioned for grain size analysis.

2/5/96: at 1500. The CTD was used to obtain water from 5 m above the sea bed. Three successful drops of the Multi-corer produced a set of mud cores about 20cm long.

Some of the cores were used for measurement of the benthic respiration rate. Further cores were sectioned for subsequent determination of the sulphate reduction rate, porosity, organic matter content and particle size analysis. Six cores were sliced into 1 cm sections and frozen for geochemical analyses (CH, ^{13}C, ^{210}Pb, ^{14}C, lipids). Three surface sediment samples were preserved in formalin for meiofauna counts. The Bed-hop Camera was deployed and 25 photographs of the sea bed were taken.

7/5/96: at R1000. The CTD was deployed to obtain water from 5 m above the sea bed. Four drops of the Multi-corer were required to produce sufficient cores (One drop failed to collect any sediment cores). Cores were about 20 cm long and muddy with some sand near the surface. Some of the cores were used for measurement of the benthic respiration rate. Further cores were sectioned for subsequent determination of the sulphate reduction rate, porosity, organic matter content and particle size analysis. Six cores were sliced into 1 cm sections and frozen for geochemical analyses (CH, ^{13}C, ^{210}Pb, ^{14}C,, lipids). Three surface sediment samples were preserved in formalin for meiofauna counts. The Bed-hop Camera was deployed and 25 photographs of the sea bed were taken.

9/5/96: At 2000. The CTD was deployed to obtain water from 5 m above the sea bed. The Multi-corer was deployed 3 times obtaining a set of mud cores about 15 cm long. Some of the cores were used for measurement of benthic respiration rate. Some cores were sectioned for sulphate reduction rate, porosity, organic matter content, particle size analysis. Six cores were sliced into 1 cm slices and frozen for geochemical analyses (CH, ^{13}C, ^{210}Pb, ^{14}C,, lipids). Three surface sediment samples were preserved in formalin for meiofauna counts. The Bed-hop Camera took 25 photographs.

11/5/96: at S5. The Bed-hop Camera was deployed and 25 photographs taken at this station in a depression on the continental shelf. The photographs will be used to assess the type of sediment here, with a view to using it in the future as an on shelf coring site.

TABLES OF OBSERVATIONS

The tables that follow were compiled by R. Cramer (Leg A) and J. Hughes (Leg B).

Table 5: CTD casts.
Leg A: 1-45; Leg B: 46-202.

Table 6: Other events, Leg B.
Argos drifter releases, Settling Velocity Tube and Multi-corer deployments.

CHALLENGER 126A (SES 6)								CTD CASTS
Cast	Start Date/Time	End Date/Time	Start Lat	Start Lon	Site	Start Depth	Bottle Depths	Comments
CTD1	15/04/96 14:49	15/04/96 15:14	56 27.38N	9 2.17W	S200	171	6,16,30,60,100,156	O2 pump fitted. 50m yoyo.
CTD2	15/04/96 15:50	15/04/96 16:12	56 28.31N	8 58.14W	S140	146	5,15,30,60,100,135	Mooring retrieval calibration.
CTD3	17/04/96 05:35	17/04/96 06:08	56 27.03N	9 12.91W		843	8,348	SeaSoar calibration at end of run.
CTD4	17/04/96 11:19	17/04/96 11:43	56 27.84N	8 57.07W	S140	144		No bottles fired. Downwelling PAR
CTD5	17/04/96 11:44	17/04/96 12:03	56 28.08N	8 57.00W	S140	145	5,6,10,15,22,27,34,60, 100,139	
CTD6	17/04/96 16:21	17/04/96 17:09	56 28.31N	9 10.39W	S700	738	7,61,718	WetStar Fluorometer off (500m limit). Upwelling PAR
CTD7	17/04/96 21:26	17/04/96 21:53	56 25.77N	8 58.51W	S140	145	5,30,135	Snow camera
CTD8	17/04/96 22:52	17/04/96 23:11	56 25.78N	9 2.99W	S200	172	5,60,169	No snow camera
CTD9	17/04/96 23:39	18/04/96 00:13	56 25.99N	9 5.04W	S300	343	5,15,30,60,100,200,337	No snow camera
CTD10	18/04/96 01:26	18/04/96 02:10	56 27.26N	9 6.42W	S500	513	5,30,500	Snow camera
CTD11	18/04/96 03:11	18/04/96 04:14	56 26.26N	9 10.12W	S700	719	8,17,31,61,104,203,401, 600, 687,702	Snow camera.
CTD12	18/04/96 15:31	18/04/96 16:20	56 28.66N	9 9.19W	S700	652	6,6,9,13,16,21,24,30,60, 608	
CTD13	18/04/96 22:03	18/04/96 22:47	56 27.59N	9 12.99W	S850	822	5,60,800	No snow camera
CTD14	18/04/96 23:52	19/04/96 01:10	56 27.48N	9 18.12W	S1000	998	7,35,797,995	Snow camera
CTD15	19/04/96 03:55	19/04/96 05:47	56 27.65N	9 39.13W	S1500	1,524	7,19,36,64,105,203,405, 600,800,1201,1488,1505	Snow camera
CTD16	19/04/96 10:04	19/04/96 10:18	56 28.20N	9 2.99W		244		Transmissometer Cal
CTD17	19/04/96 13:20	19/04/96 13:47	56 27.02N	9 4.00W	S300	300	7,64,286	No Wetstar fluorometer. No PAR
CTD18	21/04/96 12:48	21/04/96 14:50	56 39.09N	9 36.93W	P1500	1,531	5,8,11,14,31,62,105,200, 700,1200,1405,1533	Trans Cal at 700m
CTD19	21/04/96 21:14	21/04/96 23:10	56 42.98N	9 23.81W	N1500	1,465	5,15,31,63,101,201,400, 600,801,1200,1430,1464	

Check with BODC before using this data (25/04/96)

Time in GMT

CHALLENGER 126A (SES 6)								CTD CASTS
Cast	Start Date/Time	End Date/Time	Start Lat	Start Lon	Site	Start Depth	Bottle Depths	Comments
CTD20	22/04/96 01:42	22/04/96 03:11	56 41.08N	9 10.94W	N1000	1,008	5,30,80,982	
CTD21	22/04/96 04:24	22/04/96 05:24	56 39.17N	9 6.57W	N700	696	5,60,700	
CTD22	22/04/96 09:18	22/04/96 11:15	56 42.82N	9 24.19W	N1500	1,469	5,8,11,14,17,22,30,61, 100,200,399,1481	Transmissometer Cal for SedTrap mooring
CTD23	22/04/96 22:54	22/04/96 23:18	56 37.05N	8 56.14W	N140	136	9,34,129	
CTD24	23/04/96 00:14	23/04/96 00:36	56 36.87N	9 0.41W	N200	191	8,64,182	
CTD25	23/04/96 01:09	23/04/96 01:37	56 36.85N	9 1.38W	N300	307	5,30,305	
CTD26	23/04/96 02:16	23/04/96 02:56	56 37.18N	9 5.19W	N500	526	11,66,518	
CTD27	23/04/96 09:13	23/04/96 09:28	56 35.83N	8 56.40W	N140	137	5,33,131	
CTD28	23/04/96 11:16	23/04/96 11:35	56 35.63N	8 54.84W	N140	136	5,8,11,14,17,20,25,30,60, 100,130	
CTD29	23/04/96 19:06	23/04/96 19:41	56 37.96N	9 1.93W	N300	392	5,60,384	WetStar Fluorometer fitted. Both PARs.
CTD30	23/04/96 23:40	24/04/96 00:01	56 26.30N	8 59.01W	S140	146	10,35,140	Camera on
CTD31	24/04/96 01:08	24/04/96 01:29	56 26.83N	9 2.91W	S200	197	11,65,191	Camera on
CTD32	24/04/96 02:01	24/04/96 02:46	56 26.88N	9 6.35W	S500	509	10,35,495	Camera on
CTD33	24/04/96 03:23	24/04/96 04:03	56 26.57N	9 4.35W	S300	329	10,66,330	Camera on
CTD34	24/04/96 10:01	24/04/96 10:23	56 27.05N	9 2.43W	S200	176	5,8,11,14,17,20,30,60,100,170	
CTD35	24/04/96 19:58	24/04/96 20:45	56 25.35N	9 19.04W		1,039	5,60,500	Finished with Camera
CTD36	24/04/96 22:04	24/04/96 22:32	56 26.29N	9 3.68W		236	5,30,248	
CTD37	24/04/96 23:28	24/04/96 23:41	56 24.89N	8 55.19W		144	10,65,137	
CTD38	25/04/96 01:09	25/04/96 01:23	56 18.78N	8 45.20W		141	11,35,133	
CTD39	25/04/96 03:09	25/04/96 03:22	56 9.38N	8 30.19W		118	10,65,111	
CTD40	25/04/96 05:03	25/04/96 05:18	56 0.04N	8 15.11W		158	10,35,151	
CTD41	25/04/96 06:28	25/04/96 06:43	55 56.07N	7 59.96W		173	10,65,167	

Check with BODC before using this data (25/04/96)

Time in GMT

CHALLENGER 126A (SES 6)								CTD CASTS
Cast	Start Date/Time	End Date/Time	Start Lat	Start Lon	Site	Start Depth	Bottle Depths	Comments
CTD42	25/04/96 08:04	25/04/96 08:18	55 52.12N	7 45.02W		141	5,30,136	
CTD43	25/04/96 09:32	25/04/96 09:42	55 48.21N	7 30.00W		71	5,65	
CTD44	25/04/96 11:13	25/04/96 11:23	55 44.21N	7 14.72W		59	7,31,56	
CTD45	25/04/96 12:34	25/04/96 12:44	55 39.79N	6 59.57W		43	6,30,36	

CTD STATIONS AND SAMPLING SUMMARY

Cruise	Cast	Start time	End time	Site	Lat N	Lon W	Dpth	Chl	Nuts	SPM	Oxygen	Iodine	Prod	Phyto	POC	DOM	Resp	Abs Spc	Yellow	Comments
CH126B	CTD46	27/04/96 14:30	27/04/96 14:53		55 24.40	5 58.78	97	X	X	X				X				X		Optical station 7
CH126B	CTD47	27/04/96 20:06	27/04/96 20:20	S1	55 39.90	7 00.34	47	X	X			X								
CH126B	CTD48	27/04/96 21:39	27/04/96 21:51	S2	55 43.98	7 15.14	57	X	X											
CH126B	CTD49	27/04/96 23:13	27/04/96 23:28	S3	55 48.15	7 30.29	73	X	X											
CH126B	CTD50	28/04/96 00:51	28/04/96 01:15	S4	55 52.08	7 45.01	140	X	X											
CH126B	CTD51	28/04/96 02:42	28/04/96 03:10	S5	55 55.99	7 59.84	174	X	X		X	X				X		X		Optical station 8
CH126B	CTD52	28/04/96 05:03	28/04/96 05:22	S6	56 00.06	8 15.11	159	X	X	X		X					X			
CH126B	CTD53	28/04/96 07:33	28/04/96 07:53		56 09.62	8 30.10	119	X	X	X		X								
CH126B	CTD54	28/04/96 09:53	28/04/96 10:15		56 18.83	8 44.94	141	X	X	X		X								
CH126B	CTD55	28/04/96 11:51	28/04/96 12:18	S140	56 26.58	8 56.21	142	X	X	X		X		X				X	X	Optical station 9
CH126B	CTD56	28/04/96 14:06	28/04/96 14:30	S140	56 26.61	8 55.02	145	X	X				X	X		X				
CH126B	CTD57	28/04/96 16:00	28/04/96 16:22	S140	56 26.56	8 56.07	144	X	X						X		X			
CH126B	CTD58	28/04/96 18:03	28/04/96 18:25	S140	56 26.43	8 56.18	142	X	X							X				
CH126B	CTD59	28/04/96 20:00	28/04/96 20:25	S140	56 26.32	8 56.68	144	X	X	X										
CH126B	CTD60	28/04/96 21:59	28/04/96 22:25	S140	56 26.55	8 56.39	143	X	X	X										
CH126B	CTD61	29/04/96 00:01	28/04/96 00:25	S140	56 26.50	8 55.39	143	X	X											
CH126B	CTD62	29/04/96 01:58	29/04/96 02:19	S140	56 26.62	8 57.01	145	X	X											
CH126B	CTD63	29/04/96 03:35	29/04/96 03:59	S140	56 26.43	8 55.79	144						X	X	X		X			Production/respiration
CH126B	CTD64	29/04/96 06:02	29/04/96 06:17	S140	56 26.60	8 56.15	144	X	X											
CH126B	CTD65	29/04/96 08:00	29/04/96 08:20	S140	56 26.67	8 56.39	143	X	X	X										
CH126B	CTD66	29/04/96 09:59	29/04/96 10:19	S140	56 26.62	8 56.01	142	X	X	X				X				X	X	Optical station 10
CH126B	CTD67	29/04/96 12:00	29/04/96 12:25	S140	56 26.88	8 55.81	143	X	X	X			X	X						
CH126B	CTD68	29/04/96 16:05	29/04/96 16:13	S1500	56 25.99	9 38.45	1496													To 100m depth
CH126B	CTD69	29/04/96 16:27	29/04/96 17:44	S1500	56 26.09	9 39.04	1508	X	X	X	X		X	X						No light meters
CH126B	CTD70	29/04/96 20:41	29/04/96 21:40	S1000	56 27.93	9 18.84	1018	X	X			X				X				No light meters
CH126B	CTD71	29/04/96 23:36	30/04/96 00:42	S700	56 26.67	9 10.42	748	X	X	X										
CH126B	CTD72	30/04/96 01:19	30/04/96 02:19	S700	56 26.68	9 09.32	694		X	X		X								
CH126B	CTD73	30/04/96 03:20	30/04/96 04:20	S700	56 26.70	9 09.49	704	X	X				X	X	X		X			New transmissometer
CH126B	CTD74	30/04/96 04:59	30/04/96 05:59	S700	56 29.20	9 09.98	680													Core incubation water
CH126B	CTD75	30/04/96 11:48	30/04/96 12:54	S700	56 26.74	9 09.89	722	X	X	X			X	X				X	X	Optical station 11
CH126B	CTD76	30/04/96 14:58	30/04/96 15:28	S700	56 26.90	9 10.18	739													Not logged
CH126B	CTD77	30/04/96 15:30	30/04/96 16:13	S700	56 27.41	9 10.73	773	X	X											

CTD STATIONS AND SAMPLING SUMMARY

Cruise	Cast	Start time	End time	Site	Lat N	Lon W	Dpth	Chl	Nuts	SPM	Oxygen	Iodine	Prod	Phyto	POC	DOM	Resp	Abs Spp	Yellow	Comments
CH126B	CTD78	30/04/96 17:20	30/04/96 17:56	S500	56 27.85	9 05.73	478	X	X	X			X	X		X				
CH126B	CTD79	30/04/96 18:37	30/04/96 19:01	S300	56 28.07	9 03.48	283	X	X			X								
CH126B	CTD80	30/04/96 19:32	30/04/96 19:57	S200	56 27.98	9 02.54	200	X	X			X								
CH126B	CTD81	30/04/96 22:03	30/04/96 22:31	S200	56 28.65	9 03.17	255	X	X			X				X				
CH126B	CTD82	01/05/96 00:00	01/05/96 00:23	S200	56 28.06	9 02.52	200	X	X	X										
CH126B	CTD83	01/05/96 02:00	01/05/96 02:24	S200	56 28.10	9 02.59	207	X	X	X										
CH126B	CTD84	01/05/96 04:01	01/05/96 04:21	S200	56 28.10	9 02.52	204	X	X				X	X	X		X			
CH126B	CTD85	01/05/96 06:00	01/05/96 06:18	S200	56 28.07	9 02.70	216	X	X											
CH126B	CTD86	01/05/96 08:02	01/05/96 08:31	S200	56 28.32	9 02.93	237	X	X											
CH126B	CTD87	02/05/96 07:26	02/05/96 09:24	N1500	56 44.28	9 23.34	1500	X	X			X								Light meters off
CH126B	CTD88	02/05/96 09:59	02/05/96 11:19	N1500	56 44.03	9 24.09	1509													Core incubation water
CH126B	CTD89	02/05/96 15:26	02/05/96 15:51	N1500	56 44.52	9 23.15	1506	X		X			X	X				X	X	To 100m; optical station 12
CH126B	CTD90	02/05/96 17:49	02/05/96 18:58	N1500	56 44.14	9 23.76	1508	X	X	X	X		X	X		X				
CH126B	CTD91	02/05/96 19:46	02/05/96 20:01	N1500	56 44.19	9 23.15	1492													To 100m only
CH126B	CTD92	02/05/96 22:32	03/05/96 00:01	N1500	56 44.78	9 23.40	1516	X	X	X										
CH126B	CTD93	03/05/96 00:26	03/05/96 01:02	N1500	56 43.93	9 23.77	1498	X	X	X										To 500m only
CH126B	CTD94	03/05/96 01:59	03/05/96 03:11	N1500	56 44.02	9 23.68	1500	X	X											
CH126B	CTD95	03/05/96 03:38	03/05/96 03:53	N1500	56 44.01	9 23.54	1495	X	X				X	X	X		X			To 200m only
CH126B	CTD96	03/05/96 04:18	03/05/96 04:49	N1500	56 44.02	9 23.86	1504	X	X											To 500m only
CH126B	CTD97	03/05/96 06:02	03/05/96 07:27	N1500	56 44.19	9 23.65	1500	X	X											
CH126B	CTD98	03/05/96 08:28	03/05/96 09:51	N1300	56 42.16	9 19.27	1296	X	X				X	X					X	
CH126B	CTD99	03/05/96 11:07	03/05/96 12:08	N1000	56 40.31	9 11.93	1016	X	X				X	X						
CH126B	CTD100	03/05/96 12:43	03/05/96 13:00	N1000	56 40.68	9 11.68	1016			X									X	To 100m; Light meters on
CH126B	CTD101	03/05/96 13:28	03/05/96 14:23	N850	56 39.72	9 08.40	848	X	X	X			X	X					X	
CH126B	CTD102	03/05/96 17:25	03/05/96 18:10	N700	56 39.17	9 06.67	700	X	X	X			X	X					X	
CH126B	CTD103	03/05/96 18:52	03/05/96 19:30	N500	56 38.15	9 04.00	495	X	X	X						X			X	
CH126B	CTD104	03/05/96 20:03	03/05/96 20:37	N300	56 38.15	9 01.60	381	X	X	X									X	
CH126B	CTD105	03/05/96 21:18	03/05/96 21:39	N200	56 36.76	8 59.48	154	X	X	X						X			X	
CH126B	CTD106	03/05/96 22:07	03/05/96 22:24	N150	56 36.47	8 58.65	140	X	X	X									X	
CH126B	CTD107	03/05/96 23:28	03/05/96 23:46	N140	56 36.88	8 56.19	132	X	X	X										
CH126B	CTD108	04/05/96 00:43	04/05/96 01:03	P140	56 32.99	8 56.11	137	X	X	X									X	
CH126B	CTD109	04/05/96 01:39	04/05/96 01:57	P150	56 33.66	9 00.23	152	X	X	X										

CTD STATIONS AND SAMPLING SUMMARY

Cruise	Cast	Start time	End time	Site	Lat N	Lon W	Dpth	Chl	Nuts	SPM	Oxygen	Iodine	Prod	Phyto	POC	DOM	Resp	Abs Spc	Yellow	Comments
CH126B	CTD110	04/05/96 02:24	04/05/96 02:46	P200	56 33.90	9 01.98	206	X	X											
CH126B	CTD111	04/05/96 03:12	04/05/96 03:30	P300	56 34.11	9 03.21	295	X	X	X										
CH126B	CTD112	04/05/96 04:10	04/05/96 05:00	P500	56 34.65	9 06.82	501	X	X	X										
CH126B	CTD113	04/05/96 05:20	04/05/96 05:56	P700	56 35.45	9 10.89	709	X	X	X										
CH126B	CTD114	04/05/96 06:37	04/05/96 07:31	P850	56 35.81	9 13.85	853	X	X				X	X						
CH126B	CTD115	04/05/96 08:03	04/05/96 09:10	P1000	56 36.44	9 17.33	1010	X	X				X	X						
CH126B	CTD116	04/05/96 10:03	04/05/96 11:14	P1300	56 37.55	9 27.41	1294	X	X	X			X	X						
CH126B	CTD117	04/05/96 12:05	04/05/96 13:20	P1500	56 38.59	9 37.61	1536	X	X	X	X		X	X						
CH126B	CTD118	04/05/96 14:16	04/05/96 15:24	R1500	56 31.95	9 41.56	1534	X	X	X										
CH126B	CTD119	04/05/96 16:31	04/05/96 17:28	R1300	56 31.60	9 29.57	1301	X	X	X			X	X						
CH126B	CTD120	04/05/96 18:57	04/05/96 19:55	R1000	56 30.95	9 17.78	1009	X	X	X										
CH126B	CTD121	04/05/96 20:25	04/05/96 21:24	R850	56 30.99	9 14.47	877	X	X	X										
CH126B	CTD122	04/05/96 22:07	04/05/96 22:50	R700	56 30.89	9 11.04	682	X	X	X										
CH126B	CTD123	04/05/96 23:35	05/05/96 00:05	R500	56 30.69	9 07.03	494	X	X	X										
CH126B	CTD124	05/05/96 00:42	05/05/96 01:10	R300	56 30.44	9 03.99	330		X	X										
CH126B	CTD125	05/05/96 01:30	05/05/96 01:50	R200	56 30.23	9 02.40	196	X	X	X										
CH126B	CTD126	05/05/96 02:17	05/05/96 02:33	R150	56 30.27	8 59.45	143		X	X										
CH126B	CTD127	05/05/96 03:07	05/05/96 03:20	R140	56 30.09	8 55.99	142	X	X	X										
CH126B	CTD128	05/05/96 04:06	05/05/96 04:22	S140	56 26.82	8 57.72	144	X	X	X				X						
CH126B	CTD129	05/05/96 04:54	05/05/96 05:09	S160	56 27.75	9 01.27	162	X	X	X										
CH126B	CTD130	05/05/96 05:26	05/05/96 05:44	S200	56 26.84	9 02.99	202	X	X	X										
CH126B	CTD131	05/05/96 06:01	05/05/96 06:23	S300	56 26.91	9 04.09	311	X	X	X										
CH126B	CTD132	05/05/96 06:44	05/05/96 07:17	S500	56 27.72	9 05.79	488	X	X											
CH126B	CTD133	05/05/96 07:49	05/05/96 08:34	S700	56 28.97	9 10.03	691	X		X				X						
CH126B	CTD134	05/05/96 09:13	05/05/96 10:01	S850	56 27.83	9 12.87	831	X	X	X			X	X						
CH126B	CTD135	05/05/96 10:45	05/05/96 11:40	S1000	56 27.65	9 18.37	1006	X	X	X			X	X						
CH126B	CTD136	05/05/96 13:06	05/05/96 13:30	S200	56 26.66	9 03.03	199	X	X	X			X	X				X		Optical station 13
CH126B	CTD137	05/05/96 16:22	05/05/96 16:44	V600	56 14.89	9 13.19	602													To 150m only
CH126B	CTD138	05/05/96 19:34	05/05/96 19:47	V1200	56 14.85	9 26.12	1200													To 250m only
CH126B	CTD139	05/05/96 23:27	06/05/96 00:54	S1500	56 27.80	9 39.72	1535	X	X	X										No light meters
CH126B	CTD140	06/05/96 01:51	06/05/96 02:58	S1300	56 27.67	9 31.32	1305	X	X		X									No light meters
CH126B	CTD141	06/05/96 03:39	06/05/96 03:52	S1300	56 27.62	9 31.08	1300	X					X	X	X		X			To 100m; light meters on

CTD STATIONS AND SAMPLING SUMMARY

Cruise	Cast	Start time	End time	Site	Lat N	Lon W	Dpth	Chl	Nuts	SPM	Oxygen	Iodine	Prod	Phyto	POC	DOM	Resp	Abs Spc	Yellow	Comments
CH126B	CTD142	06/05/96 05:11	06/05/96 05:29		56 27.66	9 30.96	1298	X												To 200m; optical station 14
CH126B	CTD143	06/05/96 07:05	06/05/96 07:28		56 28.52	9 31.93	1318	X										X		Optical station 14
CH126B	CTD144	06/05/96 09:00	06/05/96 09:24		56 29.19	9 32.45	1327	X						X				X		Optical station 15
CH126B	CTD145	06/05/96 11:07	06/05/96 11:32		56 29.89	9 35.19	1392	X		X								X	X	To 200m; Optical station 16
CH126B	CTD146	06/05/96 13:20	06/05/96 13:51		56 29.54	9 36.23	1413	X		X				X	X		X	X		Optical station 17
CH126B	CTD147	06/05/96 16:12	06/05/96 16:25		56 29.57	9 37.70	1452	X												
CH126B	CTD148	06/05/96 17:43	06/05/96 17:57		56 28.83	9 39.16	1477													
CH126B	CTD149	06/05/96 19:01	06/05/96 19:23		56 29.62	9 39.66	1500	X		X				X				X		Optical station 18
CH126B	CTD150	06/05/96 21:09	06/05/96 22:50		56 28.74	9 39.73	1490	X	X		X									
CH126B	CTD151	06/05/96 23:18	06/05/96 23:36		56 29.53	9 40.60	1511													
CH126B	CTD152	07/05/96 03:32	07/05/96 04:21	R1000	56 31.06	9 18.01	1013	X	X											
CH126B	CTD153	07/05/96 05:02	07/05/96 06:44	R1000	56 31.12	9 17.94	1013													Core incubation water
CH126B	CTD154	07/05/96 10:41	07/05/96 11:10	R1000	56 30.77	9 17.85	1006	X	X	X				X				X		Optical station 19
CH126B	CTD155	07/05/96 16:46	07/05/96 17:34	L1000	56 44.11	9 09.88	1021	X	X	X										
CH126B	CTD156	07/05/96 18:31	07/05/96 19:05	KL500	56 51.26	9 06.16	567	X		X										
CH126B	CTD157	07/05/96 19:41	07/05/96 20:00	KL200	56 54.07	9 03.94	191	X	X	X										
CH126B	CTD158	07/05/96 20:56	07/05/96 21:15	WOCE	56 59.92	8 59.88	131	X	X	X										
CH126B	CTD159	07/05/96 22:39	07/05/96 22:57	KL7	57 09.22	8 52.35	127	X	X	X										
CH126B	CTD160	08/05/96 00:22	08/05/96 00:42	KL6	57 18.52	8 45.02	144	X	X	X										
CH126B	CTD161	08/05/96 02:15	08/05/96 02:31	KL5	57 28.21	8 36.96	159	X	X	X										
CH126B	CTD162	08/05/96 03:37	08/05/96 03:50	KL4	57 36.67	8 33.63	153	X	X	X										
CH126B	CTD163	08/05/96 04:35	08/05/96 04:48	KL3	57 40.50	8 31.37	153	X	X	X										
CH126B	CTD164	08/05/96 05:38	08/05/96 05:49	KL2	57 46.00	8 28.96	125	X	X						X		X			
CH126B	CTD165	08/05/96 07:13	08/05/96 07:25	KL1	57 51.15	8 30.91	72	X	X											
CH126B	CTD166	08/05/96 08:49	08/05/96 09:06	KN1	57 48.11	8 43.05	142	X	X											
CH126B	CTD167	08/05/96 10:02	08/05/96 10:19	KN2	57 44.43	8 49.11	143	X	X	X										
CH126B	CTD168	08/05/96 11:08	08/05/96 11:24	KN3	57 40.66	8 55.41	148	X	X											
CH126B	CTD169	08/05/96 12:10	08/05/96 12:29	KN4	57 37.06	9 01.46	147	X	X											
CH126B	CTD170	08/05/96 13:18	08/05/96 13:34	KN5	57 33.18	9 07.65	147	X	X											
CH126B	CTD171	08/05/96 14:25	08/05/96 14:40	KN6	57 29.42	9 13.94	150	X	X	X										
CH126B	CTD172	08/05/96 15:38	08/05/96 15:58	KN200	57 24.44	9 20.91	205	X	X	X										
CH126B	CTD173	08/05/96 16:50	08/05/96 17:18	KN500	57 20.48	9 27.69	511	X	X	X										

CTD STATIONS AND SAMPLING SUMMARY

Cruise	Cast	Start time	End time	Site	Lat N	Lon W	Dpth	Chl	Nuts	SPM	Oxygen	Iodine	Prod	Phyto	POC	DOM	Resp	Abs Spc	Yellow	Comments
CH126B	CTD174	08/05/96 18:02	08/05/96 18:53	KN1000	57 17.68	9 31.48	1017	X	X		X									
CH126B	CTD175	08/05/96 21:47	08/05/96 23:14	N2000	57 00.06	10 00.03	2070													
CH126B	CTD176	09/05/96 04:23	09/05/96 05:11	N2000	57 00.05	10 00.00			X		X	X								Core incubation water
CH126B	CTD177	09/05/96 08:30	09/05/96 08:51	N2000	56 59.49	10 01.19		X	X	X			X	X				X	X	200m; PAR on; optics 20
CH126B	CTD178	09/05/96 14:00	09/05/96 14:27	N300	56 38.14	9 01.65	382	X		X			X	X						
CH126B	CTD179	09/05/96 18:46	09/05/96 18:53		56 27.53	9 00.37														
CH126B	CTD180	09/05/96 20:28	09/05/96 20:45	V200	56 14.89	9 03.93	160	X												
CH126B	CTD181	10/05/96 00:07	10/05/96 00:23	S160	56 27.83	9 01.41	163	X		X										
CH126B	CTD182	10/05/96 03:43	10/05/96 03:59	S160	56 27.70	9 01.45	161	X					X	X	X		X			
CH126B	CTD183	10/05/96 05:36	10/05/96 05:49		56 28.43	9 01.74	169	X	X		X									
CH126B	CTD184	10/05/96 07:11	10/05/96 07:40	S160	56 29.07	9 02.91	236	X						X				X	X	Optical station 21
CH126B	CTD185	10/05/96 10:49	10/05/96 11:12		56 31.88	9 02.20	200	X						X				X		Optical station 22
CH126B	CTD186	10/05/96 12:30	10/05/96 12:55	S200	56 28.02	9 01.95	175	X		X				X				X	X	Optical station 23
CH126B	CTD187	10/05/96 18:02	10/05/96 18:25		56 31.95	9 04.75	360	X		X				X				X		Optical station 24
CH126B	CTD188	10/05/96 19:54	10/05/96 20:22		56 32.18	9 05.59	400	X	X	X	X									
CH126B	CTD189	10/05/96 20:58	10/05/96 21:40		56 32.63	9 05.52	400	X	X											
CH126B	CTD190	10/05/96 22:50	10/05/96 23:57	S1000	56 28.43	9 17.81	1010	X	X	X		X								
CH126B	CTD191	11/05/96 00:51	11/05/96 01:37	S700	56 29.17	9 10.04	683	X	X	X		X								
CH126B	CTD192	11/05/96 02:17	11/05/96 02:51	S500	56 27.90	9 05.88	484	X	X	X		X								
CH126B	CTD193	11/05/96 03:19	11/05/96 03:39	S300	56 28.33	9 03.62	299	X	X			X								
CH126B	CTD194	11/05/96 04:08	11/05/96 04:24	S200	56 28.08	9 02.72	214	X	X			X								
CH126B	CTD195	11/05/96 04:47	11/05/96 05:00	S160	56 27.70	9 01.43	162	X	X			X								
CH126B	CTD196	11/05/96 05:36	11/05/96 05:49	S140	56 28.45	8 57.80	143	X	X			X		X						
CH126B	CTD197	11/05/96 07:25	11/05/96 07:39	S8	56 18.84	8 44.96	142	X	X											
CH126B	CTD198	11/05/96 09:05	11/05/96 09:18	S7	56 09.43	8 29.80	118	X	X											
CH126B	CTD199	11/05/96 10:42	11/05/96 10:58	S6	56 00.11	8 15.26	159	X	X											
CH126B	CTD200	11/05/96 12:13	11/05/96 12:31	S5	55 56.28	8 00.04	174	X	X											
CH126B	CTD201	11/05/96 14:49	11/05/96 15:03	S4	55 52.09	7 44.85	140	X	X											
CH126B	CTD202	11/05/96 16:05	11/05/96 16:15	S3	55 47.88	7 29.88	70		X											

Chl = Chlorophyll, Nuts = Dissolved Inorganic Nutrients, SPM = suspended particulate matter, Prod = primary production, Phyto = preserved phytoplankton
POC = particulate organic carbon, DOM = dissolved organic matter, Resp = bacterial respiration, Abs Spc = absorption spectra, Yellow = yellow substance

Releases of Argos-tracked drifters

PTT no.	Date/time of release	Lat N	Lon W	Sea-bed depth (m)
16771	5/5/96 16:56	56 14.75	09 13.23	
16772	5/5/96 17:12	56 15.70	09 12.24	553
16773	5/5/96 17:27	56 15.65	09 14.22	689
16774	5/5/96 17:42	56 14.73	09 15.21	748
16775	5/5/96 17:56	56 13.76	09 14.19	712
16776	5/5/96 18:10	56 13.77	09 12.22	486
16777	5/5/96 18:22	56 14.76	09 11.34	425
16778	5/5/96 19:59	56 14.69	09 26.02	1176
16779	5/5/96 20:13	56 14.76	09 28.02	1256
16780	5/5/96 20:25	56 15.65	09 27.02	1262
16781	5/5/96 20:37	56 15.64	09 25.22	1125
16782	5/5/96 20:50	56 14.72	09 24.22	1139
16783	5/5/96 21:02	56 13.83	09 25.19	1146
16784	5/5/96 21:14	56 13.82	09 27.08	1199
16785	9/5/96 20:58	56 14.71	09 03.88	158
16786	9/5/96 21:14	56 14.78	09 06.02	174
16787	9/5/96 21:26	56 15.65	09 04.98	163
16788	9/5/96 21:38	56 15.64	09 03.05	156
16789	9/5/96 21:51	56 14.64	09 02.08	203
16790	9/5/96 22:01	56 13.78	09 03.11	159
24308	9/5/96 22:12	56 13.80	09 05.05	172

Settling Velocity Tube Experiments

Event	Start	End	Site	Comments
SVT1	28/4/96 13:14	28/4/96 13:18	S140	2 tubes at 6m
SVT2	30/4/96 13:51	30/4/96 13:56	S700	1 tube at 7m
SVT3	2/5/96 15:13	2/5/96 15:16	N1500	2 tubes at 5m
SVT4	6/5/96 14:42	6/5/96 14:47		1 at 5m, 1 at 1m
SVT5	10/5/96 19:15	10/5/96 19:27		1 tube at 5m

Multi-corer samples

Core	Date & Time	Stn	Lat N	Lon W	Depth	Comments
MC1	30/4/96 8:40	S700	56 29.07	09 10.05	696	Unsuccessful
MC2	30/4/96 9:48	S700	56 28.98	09 10.34	696	Unsuccessful
MC3	30/4/96 10:53	S700	56 27.60	09 11.20	696	Unsuccessful
MC4	2/5/96 12:45	N1500	56 44.17	09 23.94	1504	9 cores
MC5	2/5/96 14:40	N1500	56 44.08	09 23.72	1503	10 cores
MC6	2/5/96 16:39	N1500	56 43.98	09 23.89	1505	10 cores
MC7	7/5/96 7:33	R1000	56 30.97	09 17.39	989	
MC8	7/5/96 8:25	R1000	56 30.91	09 17.82	1005	
MC9	7/5/96 9:19	R1000	56 31.04	09 17.75	1004	Unsuccessful
MC10	7/5/96 10:02	R1000	56 30.89	09 17.67	999	8 cores
MC11	9/5/96 0:11	N2000	57 00.00	10 00.34	2058	9 cores
MC12	9/5/96 1:54	N2000	57 00.07	10 00.18	2058	10 cores
MC13	9/5/96 3:37	N2000	56 59.89	09 59.98	2050	