Dr. Richards

DUNSTAFFNAGE MARINE LABORATORY

and the

SCOTTISH ASSOCIATION for MARINE SCIENCE

OBAN, ARGYLL, SCOTLAND

Rockall Channel time-series

LOIS Shelf-Edge Study pilot programme

CRUISE REPORT

RRS CHALLENGER

CRUISE 112/1994

28 April - 13 May 1994

DML, P.O.Box No.3, OBAN, ARGYLL, PA34 4AD, SCOTLAND

RRS CHALLENGER, Cruise 112/1994

Duration:	0815h 28 April - 0810h 13 May 1993 All times GMT	
Locality:	Rockall Channel, Scottish continental shelf and shelf-edge.	
Staff: 28 - 30 April	A.Harrison	(POL)
	D. Braden	(POL)
30 April - 13 May	D. J. Ellett	
	Dr. J. M. Graham	
	Dr. K. Jones	
	S. M. Harvey	
	J. Watson	
	Dr. D. Smallman	
	C.R. Griffiths	
	N. MacDougall	
	I. Ezzi	
	T.A. Wilding	
	Ms. G. Bell	(Sunderland University)
	Ms. S. Bronsden	(SUDO)
	Ms. M. Davey	(University of Warwick)

Aims:

1) To service the POL ADCP mooring in the North Channel on the passage north from Barry to Campbeltown.

2) To work the CTD stations of the Anton Dohrn Seamount section, between the shelf-edge and Rockall in order to continue the Rockall Trough time-series as a UK contribution to WOCE Goal 2.

3) To recover and redeploy a temperature-salinity recorder and thermistor chain at station M of the Anton Dohrn Section.

4) To service the DML current meter mooring in the Tiree Passage.

5) To sample benthos at Station M using the epibenthic sled and the Agassiz trawl.

6) To collect a suite of physical, nutrient and biological profiles and samples, including multi-coring, at the shelf-edge west of Barra as part of the LOIS pilot studies.

7) To work the shelf-edge - Sound of Mull CTD section, with nutrient and tracer sampling.

8) To collect grab samples of the bottom deposits at stations 1D to 4D west of Islay for SURRC analysis.

9) To work the PROFILE sampling stations around the Arran deep, as time permits.

Narrative :

"Challenger" sailed from Barry at 0815h **28 April** with Messrs. Harrison and Braden aboard and proceeded to the North Channel in good weather. POL North Channel mooring site E was reached at 1136h **29 April** and contact was made with the ADCP mooring. At 1257h the release was fired and the instrument was recovered by 1326h. Data from the instrument were downloaded and the mooring was redeployed at 0143h **30 April.** The ship steamed for Campbeltown and berthed at 0800h to disembark Messrs Harrison and Braydon and take aboard DML staff and gear.

"Challenger" departed from Campbeltown at 1200h, and in view of the continuing fine weather it was decided to set courses to begin the Anton Dohrn Seamount CTD section from Rockall. *En route* at 0935h **1May** station IS of the Malin Head - Rockall section was worked in order to test the CTD system and to supplement past time-series data at the site. The Anton Dohrn Seamount section was begun at station A, close to Rockall, at 0030h **2 May.** Water bottle samples for nutrients and chlorophyll were taken to depths of 600m at alternate CTD stations to O, and at each station to R thereafter. After completion of water column sampling at M the temperature/salinity mooring deployed in September 1993 on cruise 105 was successfully contacted and released at 0815h **3 May.** Recovery was complete by 0921h and station work resumed at N at 1228h. At P the CTD cable was found to have become damaged by the winch flanges, necessitating the removal of the defective section and the remaking of the cable joint. The deep-water part of the section was completed at station R at 0650h **4 May.**

Following this the ship steamed to soundings of 1600m on the Barra Fan where an epibenthic sledge haul was made between 0918 and 1306h. The fluorometer was installed on the Sea-Bird CTD and a cross-slope section of six stations (N1 to N6) was worked to 500m depth from 1545 to 2153h in 56°40'N. "Challenger" then steamed overnight to the vicinity of station M of the Anton Dohrn Seamount section. Sea and swell had increased during the preceeding 48h, but conditions were suitable for an Agassiz trawl which was made between 0829 and 1256h **5 May.** Three multicorer drops were made and completed by 1833h, and

were followed by a wire test of the acoustic release for the replacement temperature/salinity mooring which had been assembled during the day.

Planned deployment of the mooring on **6 May** was prevented by southwesterly winds of force 8 and a heavy swell, and the ship was kept hove-to in the vicinity of M throughout the day. Marginal improvement overnight allowed final wire tests of buoyancy to be made at 0308h **7 May**, followed by an epibenthic sled haul between 0716 and 1152h. With no immediate improvement in the weather forecast, it was agreed to attempt to relay the mooring, and this was successfully completed beween 1406 and 1456h. After a short surface plankton haul, "Challenger" left station M and proceeded for a more detailed shelf-edge section of the upper 500m between station O, where work began at 1839h, and R, which was completed at 0620h **8 May**.

In improving weather, work continued eastwards along the section between the shelf-edge and the Sound of Mull, station 1G off Ardmore Point being completed at 0149h **9 May**. A core was collected *en route* with the Sholkovitz corer at station 10G, east of Barra Head. In calm weather, the ship laid overnight in the vicinity of the Tiree Passage current meter mooring, and whilst awaiting low water slack tide for the recovery, a brief visual topographic survey of the Treshnish Isles was made. The mooring was successfully recovered between 1110 and 1126h and redeployed between 1225 and 1234h. After a CTD lowering in the vicinity of the mooring, the ship steamed to work the CTD section between Skerryvore and Islay. This was completed at 2104h, and was followed by CTD stations west of Islay (8D to 0D), grab samples being attempted at 4D to 1D. This section was completed at 0635h **10 May** and courses were set for the southernmost line of a grid of CTD and bottom sampling stations covering the shelf-edge and slope region between 56°10' and 56°50'N at 10' latitude intervals. This was begun at 1004h 10 May and continued throughout **11 May**. CTD profiles to 500m or near-bottom depth were obtained at three positions between 8°40' and 9°25'W on each of four east-west lines and at six sites on one line (56°20'N). Craib cores or Shipek grab samples were attempted at fifteen sites. The grid was completed at 0004h **12 May**.

Cruise work was completed with a shelf CTD section from Barra Head to Skerryvore, worked between 0554 and 1006h. The few hours in hand gave the opportunity to circumnavigate the island of Staffa and inspect its geology. Overnight "Challenger" entered the Firth of Lorne and berthed at Oban Railway Pier at 0810h **13 May**. After discharging scientists and equipment, the ship sailed for Barry at 1200h.

General results: (see also individual topic reports below)

Aim 1) The POL 150khz Acoustic Doppler Current Profiler (ADCP) moored in the North Channel was successfully contacted at a range of 650m and recovered on 29 April, and was found to be in good order and still operating. After downloading the data, it was redeployed at the same position and depth in the early hours of 30 April.

Aim 2) All the stations of the Anton Dohrn Seamount CTD section were completed between 0030h 2 May and 0700h 4 May. The results (Figures 2a-2d) confirm the indications of deep mixing over the seamount during the previous winter shown by the results from the eastern half of the section during the March cruise. Recently oxygenated water reached down to almost 1000db on the flanks of the seamount and to over 750db east of Rockall. Between this water and the Labrador Sea water layer at 1500-2000db an oxygen-depleted layer intruded in the east of the channel at depths of 750-1000db, but was found at 1000-1200db in the west.

Aim 3) The Sea-Cat temperature-salinity recorder and Aanderaa thermistor chain moored at station M at a depth of about 650m in September 1993 were recovered on 3 May. Water was found to have leaked onto circuit boards in the Sea-Cat logger from a loose nut on the pressure sensor tubing, invalidating the record. The manufacturers have since replaced the circuit boards. A successful record was obtained from the thermistor chain, although the absence of the depth information from the Sea-Cat makes interpretation uncertain.

A mooring similarly configured (Figure 3) was moored at M in a depth of 2225m, with the replacement Sea-Cat at a depth of about 680m, and with a 50m thermistor chain beneath. Recovery is scheduled for August.

Aim 4) The current meter mooring deployed in the Tiree Passage on 14 March was recovered on 9 May. The two current meters, at depths of ca.26 and 36m had functioned correctly and gave good records. A replacement mooring was laid an hour later, in similar depths and with the same spacing of current meters.

Aim 5) An epibenthic sled haul was made upon the Barra Fan in depths of 1640m on 4 May and was successful in recovering a good sample of *Ledella pustulosa*. An agassiz trawl was attempted at station M on 5 May, but the well-worn net became torn and obtained no sample. An epibenthic sled haul at the same station on 7 May retrieved a good sample dominated by *Ophiomusium*.

Aim 6) In all, six short sections and a repeat of the eastern part of the Anton Dohrn Seamount section with additional stations were worked across the shelf-edge between 56°10' and 57°00'N, with the aim of examining north-south temperature and salinity variations. Fluorometer profiles were taken to 500m depth, and nutrient samples were obtained at 56°20' and 57°00'N. Figures 4a - d show the repeated part of the 57°N section. At fifteen stations on the five southern lines the suitability of the bottom for benthic lander sampling was investigated with a Shipek grab and a Craib corer. Details of the bottom type encountered are given in Table 2 below.

Aim 7) The section from the shelf-edge in 57°N to the Sound of Mull was worked during 7 - 9 May, and results are shown in Figures 5a - d. The Skerryvore to Islay and Barra Head to Skerryvore sections were worked on 9 and 12 May, respectively, and the shelf section west of Islay on 9 - 10 May. Fluorometer profiles were obtained and nutrient samples were taken.

Aim 8) Shipek grab samples were obtained for SURRC at stations 1D to 4D west of Islay. 30-litre near-bottom water samples were taken at these stations. A Sholkovitz core was also taken from the deep water east of Barra Head for SURRC.

Aim 9) No opportunity occurred to work the PROFILE stations in the Firth of Clyde, but alternative back-up arrangements for "Calanus" to work the grid were in hand.

Individual topic reports

1) Nutrient sampling

Water bottle samples were taken for nutrient analysis at 35 stations between Rockall and the Sound of Mull. The water was filtered through 6F/C glassfibre paper and then frozen at -20° in polythene bottles.

Analysis by Autoanalyser for nitrate (plus nitrite), phosphate, silicate and ammmonium will be carried out ashore at DML.

B.E. Grantham

2) Benthic reproduction studies

As a result of a successful Agassiz tow at station M, 84 specimens of *Amphianthus inornata* (an anemone epizoic on the gorgonian *Acanella arbuscula*) were collected. About 50 of these will be suitable for an electrophoretic study intended to assess the relative proportions of individuals resulting from sexual and asexual reproduction. The rest will be used in a preliminary study of lipid biochemistry in this species. On behalf of Mr. C. Bishop (SUDO), 42 echinoderms were taken from the haul. The catch included specimens of the echinoid *Echinus affinis* (15) and the asteroids *Plutonaster bifrons* (7) and *Bathybiaster vexifiller* (15). All the material was frozen at -70°C.

S.K. Bronsden (Southampton University Dept. of Oceanography)

Acknowledgements

I thank Captain Plumley, his officers and crew for their assistance in completing this successful cruise, and personally for the good wishes from all, and splendid farewell dinner, on this my forty-ninth and final "Challenger" cruise. I am extremely grateful for much help from many marine staff over the past twenty years of NERC cruises, and who will be remembered by me with much affection. In return, I can only hope that the process of gathering a valuable body of data from the stormiest quarter of the UK seas has not seemed reminiscent of Figure 7!

D.J. Ellett
16 September 1994

Table 1. RRS "Challenger" Cruise 112/1994 : Station List
(Times and positions refer to start of CTD lowerings where taken)

Date 1994	Start GMT	Stn.	Lat. N. ° '	Long. W. ° '	Sdg. (m)	CTD Dip no.	Notes
			POL North Channel mooring				
29 Apr	1257	E	54 46.1	05 24.2	-	-	Mooring released
30 Apr	0143	E	54 46.1	05 23.8	147	-	Mooring redeployed
			Passage to Rockall				
1 May	0635	-	56 15.3	10 12.4	-	-	Surface salinity sample only
	0705	-	56 21.0	10 39.0	-	-	Surface salinity sample only
	0935	IS	56 26.1	11 02.9	2463	001	- - -
	1300	-	56 35.8	11 21.2	-	-	Surface salinity sample only
	1430	-	56 43.6	11 39.8	-	-	Surface salinity sample only
	1630	-	56 53.9	12 04.8	-	-	Surface salinity sample only
	1800	-	57 01.4	12 23.2	-	-	Surface salinity sample only
	1930	-	57 09.5	12 39.6	-	-	Surface salinity sample only
	2100	-	57 17.2	12 56.8	-	-	Surface salinity sample only
			Anton Dohrn Seamount section				
2 May	0030	A	57 34.9	13 38.1	118	002	6 w/b -
	0228	B	57 33.9	13 20.1	183	003	- -
	0413	C	57 32.9	13 00.0	301	004	5 w/b -
	0538	D	57 32.2	12 52.0	1080	005	- -
	0728	E	57 32.0	12 38.0	1651	006	8 w/b -
	1047	F	57 30.4	12 14.8	1815	007	- -
	1339	G	57 29.5	11 51.0	1802	008	7 w/b -
	1701	H	57 29.0	11 31.7	2022	009	- -
	1937	I	57 27.8	11 20.1	770	010	7 w/b -
	2151	J	57 27.0	11 05.1	590	011	- -
	2329	K	57 24.0	10 52.0	803	012	7 w/b -
3 May	0154	L	57 22.0	10 40.0	2167	013	- -
	0501	M	57 18.0	10 23.1	2224	014	8 w/b -
	0815	M	57 13.3	10 24.2	2225	Temp-salinity recorder mooring raised	
	1228	N	57 14.0	10 03.1	2115	015	-
	1637	O	57 09.1	09 42.2	1947	016	8 w/b -
	2041	P	57 06.1	09 25.1	1400	017	7 w/b -
4 May	0443	Q	57 02.9	09 13.1	327	018	6 w/b -
	0627	R	57 00.0	09 00.0	137	019	4 w/b -
			Epibenthic sledge haul on the Barra Fan				
4 May	0918	-	56 49.3	09 25.5	-	-	Sledge overboard
	1045	-	56 46.5	09 27.7	1640	-	Sledge on bottom
	1146	-	56 45.0	09 26.4	-	-	Commenced hauling
	1306	-	56 42.6	09 24.9	-	-	Sledge inboard
			Shelf - slope section in 56°40'N				
4 May	1545	N1	56 40.0	08 49.9	132	020	Fluorometer installed on CTD
	1655	N2	56 40.0	08 57.8	150	021	-
	1741	N3	56 40.0	09 02.0	540	022	-
	1845	N4	56 40.0	09 07.0	800	023	CTD to 500m
	1957	N5	56 40.0	09 11.9	989	024	CTD to 500m
	2129	N6	56 40.0	09 19.9	1235	025	CTD to 500m

w/b = no. of water bottle samples

Table 1 (continued). RRS "Challenger" Cruise 112/1994 : Station List
(Times and positions refer to start of CTD lowerings where taken)

Date 1994	Start GMT	Stn.	Lat. N. ° '	Long. W. ° '	Sdg. (m)	CTD Dip no.	Notes
			Benthic sampling and mooring at station M				
5 May	0829	M	57 16.7	10 22.2	-	-	Agassiz trawl shot
	1017	M	57 12.0	10 18.9	2250	-	Trawl on bottom
	1116	M	57 10.7	10 17.0	-	-	Began to haul
	1200	M	57 09.9	10 16.4	-	-	Surface salinity sample
	1256	M	57 07.5	10 13.9	-	-	Trawl inboard
	1513	M	57 17.6	10 23.2	-	-	1st multicorer drop on bottom
	1645	M	57 17.8	10 23.2	2240	-	2nd multicorer drop on bottom
	1802	M	57 17.9	10 23.0	2238	-	3rd multicorer drop on bottom
	1900	M	57 17.5	10 23.9	-	-	Acoustic release tested
6 May	1100	M	57 17.3	10 23.0	-	-	Hove-to for weather all day
7 May	0308	M	57 15.8	10 25.4	-	-	Glass floats tested
	0427	M	57 15.0	10 26.2	2164	1004a	CTD/Seacat calibration
	0716	M	57 17.8	10 22.7	-	-	Sledge shot
	0854	M	57 14.4	10 26.9	2250	-	Sledge on bottom
	1100	M	57 11.2	10 28.6	-	-	Hauling sledge
	1152	M	57 09.9	10 29.2	-	-	Sledge inboard
	1456	M	57 17.7	10 23.7	2232	-	Mooring anchor released
	1523	M	57 18.0	10 23.8	2225	-	Final mooring position
	1532	M	57 18.0	10 23.9	-	-	Plankton haul
			Cross-slope and shelf-edge to Sound of Mull section				
7 May	1839	O	57 08.9	09 42.0	1942	026	7 w/b CTD to 500m
	2143	P1	57 07.6	09 33.7	1770	027	8 w/b CTD to 500m
	2301	P	57 06.0	09 25.0	1351	028	9 w/b CTD to 500m
8 May	0200	Q1	57 05.1	09 18.9	587	029	8 w/b CTD to 500m
	0330	Q	57 03.0	09 13.0	280	030	6 w/b -
	0506	R1	57 01.4	09 06.4	151	031	6 w/b -
	0554	R	56 59.9	09 00.0	138	032	6 w/b -
	0754	S	56 56.8	08 46.6	129	033	6 w/b -
	0924	15G	56 53.0	08 30.0	129	034	6 w/b -
	1054	T	56 50.3	08 20.0	138	035	6 w/b -
	1148	14G	56 48.5	08 10.0	132	-	Surface salinity sample only
	1236	13G	56 47.0	08 00.0	118	036	6 w/b -
	1350	12G	56 45.5	07 50.0	52	-	Surface salinity sample only
	1444	11G	56 44.0	07 39.6	60	037	4 w/b -
	1553	10G	56 43.9	07 30.0	219	038	7 w/b -
	1622	10G	56 44.0	07 29.7	-	-	Sholkovitz core taken
	1740	9G	56 43.9	07 19.6	163	039	6 w/b -
	1827	8G	56 44.0	07 09.9	-	-	Surface salinity sample only
	1910	7G	56 44.0	06 59.9	143	040	7 w/b -
	2055	6G	56 43.8	06 45.1	45	041	5 w/b -
	2144	5G	56 44.0	06 36.0	-	-	Surface salinity sample only
	2226	4G	56 44.0	06 27.0	90	042	5 w/b -
	2308	3G	56 42.5	06 22.0	-	-	Surface salinity sample only
	2354	2G	56 41.1	06 17.0	42	043	3 w/b + 2Cs
9 May	0049	1G	56 40.0	06 08.0	201	044	6 w/b + 2Cs

2Cs = 2 large-volume samples for radiocaesium

Table 1 (continued). RRS "Challenger" Cruise 112/1994 : Station List
(Times and positions refer to start of CTD lowerings where taken)

Date 1994	Start GMT	Stn.	Lat. N. o '	Long. W. o '	Sdg. (m)	CTD Dip no.	Notes	
			Recovery and redeployment of Tiree Passage mooring					
9 May	1110	Y	56 37.7	06 24.2	46	-	Spar buoy grappled	
	1126	Y	56 37.7	06 24.2	48	-	All inboard	
	1225	Y	56 37.2	06 23.9	43	-	Redeployment commenced	
	1232	Y	56 37.2	06 23.9	44	-	Spar buoy anchored	
	1255	Y	56 36.9	06 24.1	49	045	-	
			Skerryvore - Islay section					
9 May	1630	P1	56 16.9	07 04.9	89	046	-	
	1719	P2	56 13.0	06 58.9	81	047	-	
	1802	P3	56 08.9	06 52.6	75	048	-	
	1844	P4	56 05.0	06 46.7	54	049	-	
	1927	P5	56 01.0	06 40.9	66	050	-	
	2012	P6	55 57.0	06 35.1	56	051	-	
	2059	P7	55 53.1	0629.1	31	052	-	
			West of Islay section					
9 May	2153	8D	55 46.1	06 31.1	33	053	-	
	2228	7D	55 45.9	06 37.5	63	054	-	
	2312	6D	55 45.9	06 46.6	48	055	-	
10 May	0002	5D	55 46.0	06 55.7	49	056	-	
	0045	4D	55 46.1	07 04.0	53	057	1Cs	Shipek grab
	0224	3D	55 46.3	07 16.5	64	058	1Cs	Shipek grab
	0332	2D	55 46.1	07 29.0	60	059	1Cs	Shipek grab
	0500	1D	55 46.1	07 41.1	86	060	1Cs	Shipek grab
	0630	0D	55 46.1	07 59.9	110	061	-	
			Outer shelf/slope station grid					
10 May	1004	EE5	56 10.0	08 40.0	127	062	Craib corer and grab	
	1324	EE4	56 10.3	09 09.8	190	063	Craib corer and grab	
	1438	EE3	56 10.0	09 25.1	1060	064	Craib corer	CTD to 500m
	1812	DD3	56 20.0	09 25.0	1250	065	6 w/b, grab	CTD to 500m
	1904	DD3a	56 20.0	09 20.1	1111	066	7 w/b	CTD to 500m
	2110	DD3b	56 20.2	09 14.9	849	067	7 w/b	CTD to 500m
	2205	DD4	56 19.9	09 10.3	540	068	7 w/b, grab	CTD to 500m
11 May	0038	DD4a	56 20.4	09 05.2	157	069	5 w/b, grab	
	0246	DD5	56 20.1	08 40.0	154	070	4 w/b, grab	
	0440	CC5	56 30.2	08 39.8	141	071	Grab	
	0644	CC4	56 30.0	09 10.0	682	072	Craib corer	CTD to 500m
	0933	CC3	56 30.2	09 24.8	1182	073	Craib corer	CTD to 500m
	1103	BB3	56 40.0	09 25.2	1323	074	Craib corer	CTD to 500m
	1416	BB4	56 40.3	09 09.5	922	075	Craib corer	CTD to 500m
	1630	BB5	56 40.1	08 40.2	138	076	Craib corer	
	1831	AA5	56 50.3	08 39.6	135	077	Craib corer	
	2028	AA4	56 50.0	09 10.1	991	078	Craib corer	CTD to 500m
	2333	AA3	56 50.5	09 24.7	1581	079	Craib corer	CTD to 500m

Table 1 (continued). RRS "Challenger" Cruise 112/1994 : Station List
(Times and positions refer to start of CTD lowerings where taken)

Date 1994	Start GMT	Stn.	Lat. N. o '	Long. W. o '	Sdg. (m)	CTD Dip no.	Notes
			Barra Head to Skerryvore section				
12 May	0554	11G	56 44.0	07 40.0	64	080	-
	0651	Q4	56 38.6	07 32.5	223	081	-
	0803	Q3	56 33.0	07 25.1	176	082	-
	0905	Q2	56 27.5	07 17.6	74	083	-
	1000	Q1	56 22.0	07 10.0	52	084	-

Table 2 . Details of bottom sampling across the shelf-edge

	Stn.	Sdg.	Sampler	Bottom type
56°10'N				
	EE5	128	Shipek :	Coarse sand and stones. V. small sample. Multicorer useable.
	EE4	190	Craib + 2 Shipek :	Failed.
	EE3	1030	Craib :	Failed.
56°20'N				
	DD3	1218	Shipek :	Fine mud? Mostly washed away on retrieval.
	DD4A	158	Shipek :	Sand and stones, some fine material.
	DD5	153	Shipek :	Muddy sand, multicorer useable.
56°30'N				
	CC5	153	Shipek :	Coarse sand, multicorer useable.
	CC4	678	Craib :	Top 0.5-1.0 cm fine mud, coarser mud below.
	CC3	1218	Craib :	Top 0.5-1.0 cm fine mud, coarser mud below.
56°40'N				
	BB3	1350	Craib :	Very thin finer top layer (ca. 0.2 cm), coarser beneath.
	BB4	930	Craib :	Core short and disturbed. Sediment appears coarser than at previous stations, though still coarse mud rather than sand. Finer surface layer 0.5-1.0 cm deep.
	BB5	138	Craib :	No core obtained. From what remained, appears to be coarse sand.
56°50'N				
	AA5	135	Craib :	Failed. Scoured bottom.
	AA4	972	Craib :	Failed.
	AA3	1583	Craib :	Uniform v. fine appearance.

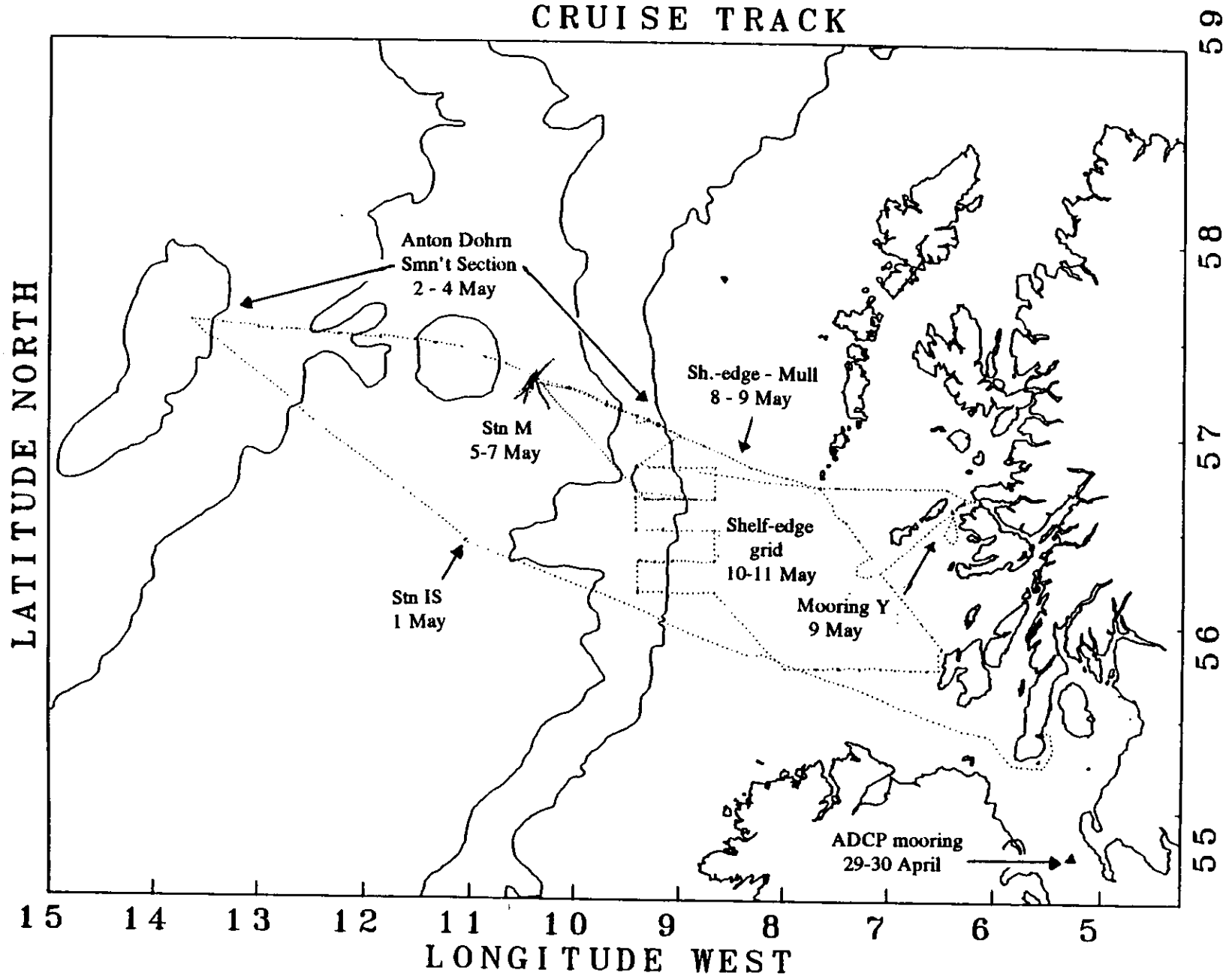


Figure 1. RRS "Challenger" Cruise 112 / 1994. 28 April - 16 May 1994.

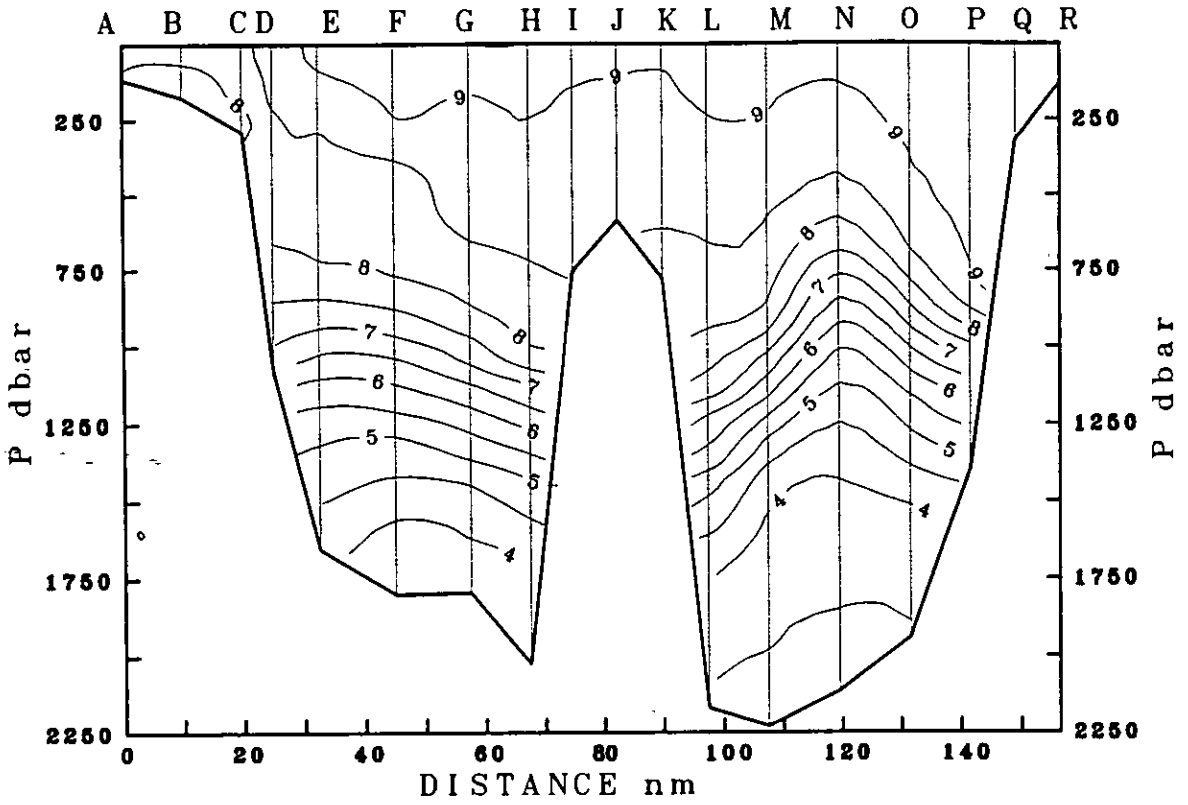


Figure 2a. Anton Dohrn Seamount section, 2 - 4 May 1994. Temperature (°C).

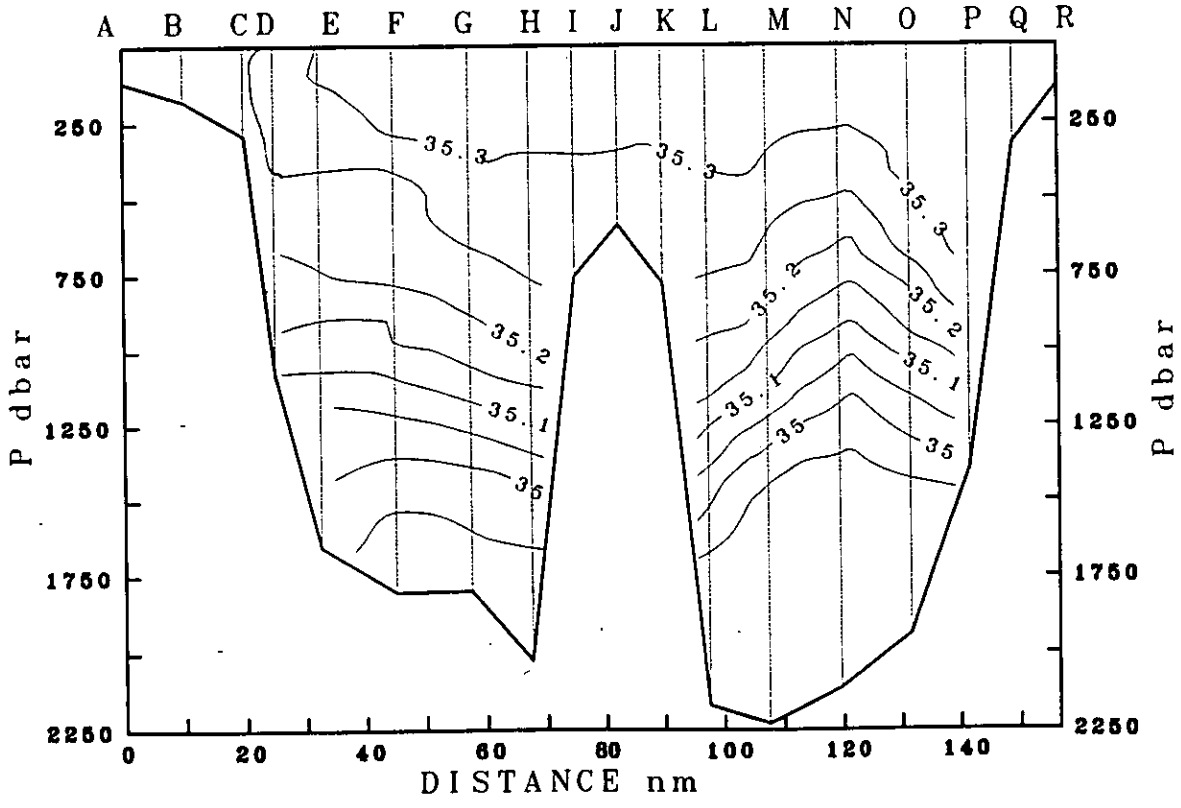


Figure 2b. Anton Dohrn Seamount section, 2 - 4 May 1994. Salinity (psu).

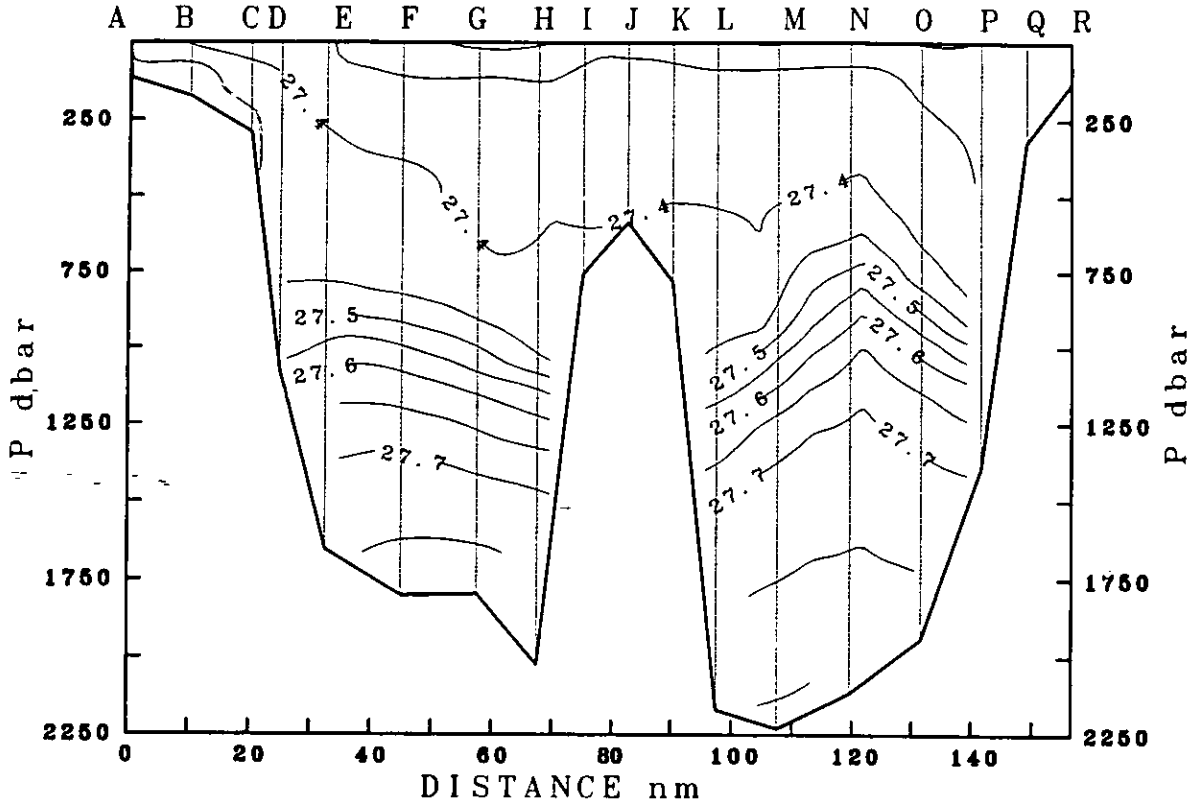


Figure 2c. Anton Dohrn Seamount section, 2 - 4 May 1994. Density (sigma-t).

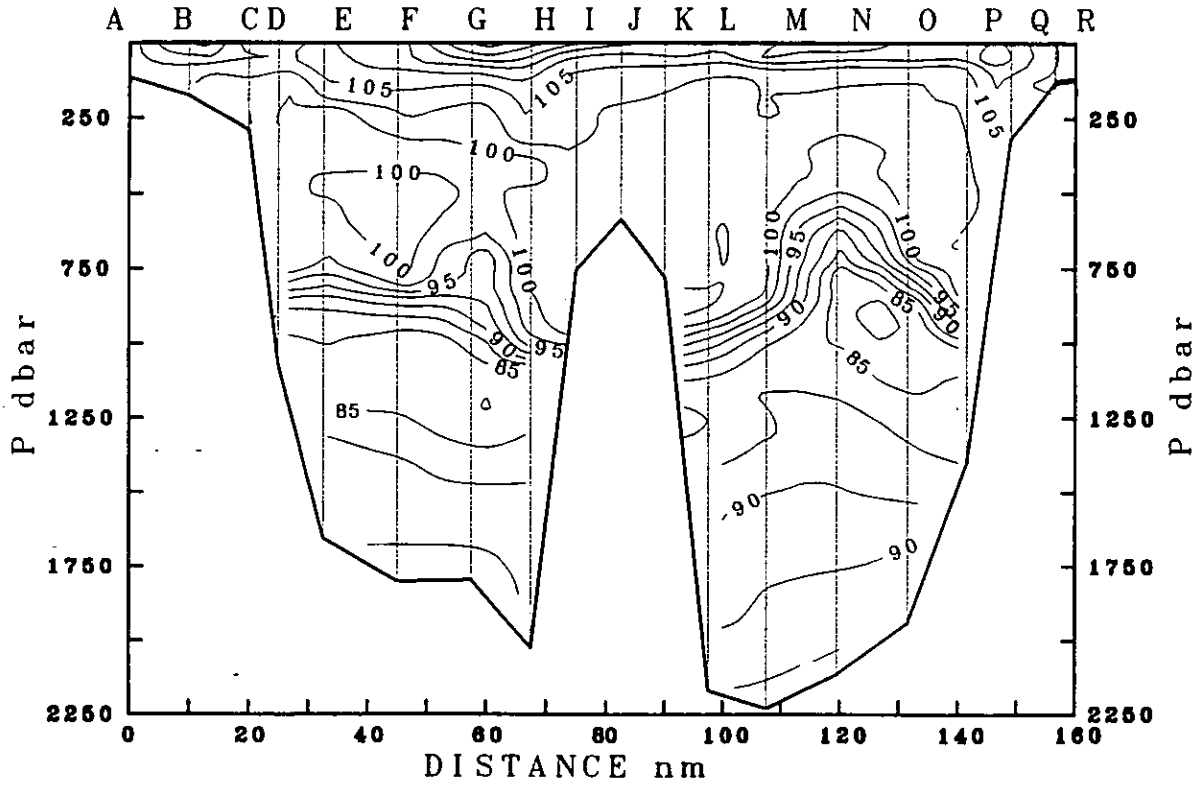
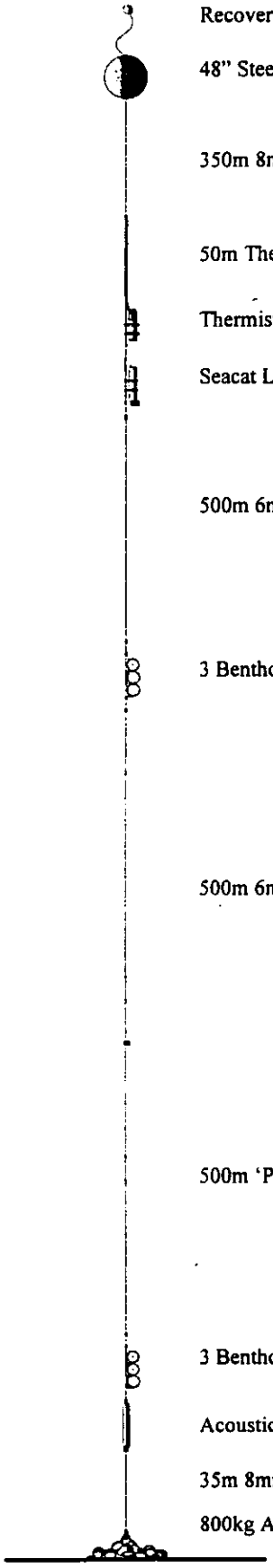


Figure 2d. Anton Dohrn Seamount section, 2 - 4 May 1994. Oxygen saturation (%)



Recovery Line

48" Steel Sphere

350m 8mm PVC Coated Wire

50m Thermistor Chain No. 1760

Thermistor Logger No. 1282

Seacat Logger No. 1004

500m 6mm PVC Coated Wire

3 Benthos Spheres

500m 6mm PVC Coated Wire

500m 'Paraline' Polyester Rope

3 Benthos Spheres

Acoustic Release No. 38

35m 8mm Dia Galvanised Wire

800kg Anchor Weight

Mooring Position: **57 17' 59 N 10 23' 51 W**

Water Depth: **2225m**

Thermistor Logger: **1282**

Time of first cycle: 1800.0Z 05-05-1994
Time of last cycle:
Sample interval: 60 mins.

Thermistor chain No: **1760**

Length: 50m
1st sensor: 1.5m above Seacat.

Sensors spaced at 5m intervals from 1st sensor.
total of 11 sensors in chain.

Seacat Logger: **1004**

Time of first cycle: 0530.0Z 07-05-1994
Time of last cycle:
Sample interval: 10 mins.

Acoustic release: **AR38**

Codes: **07 - 03 Spare = 11**
Release= 12

Figure 3. Details of mooring deployed at Station M, 7 May 1994.

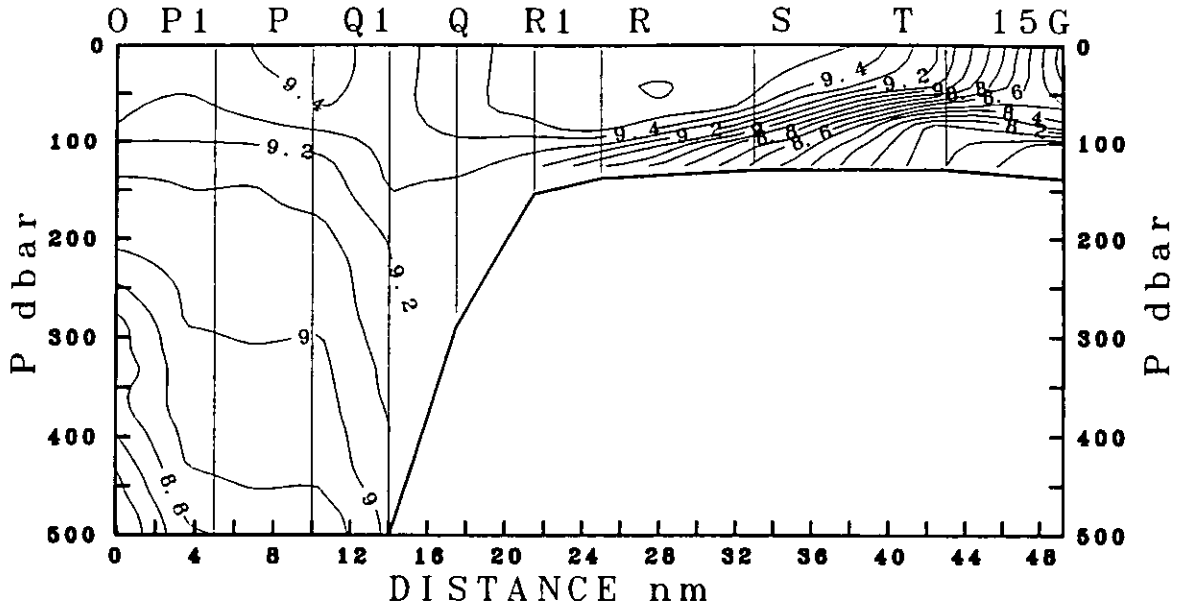


Figure 4a. Shelf-edge section at 57°N, 7 - 8 May 1994. Temperature (°C).

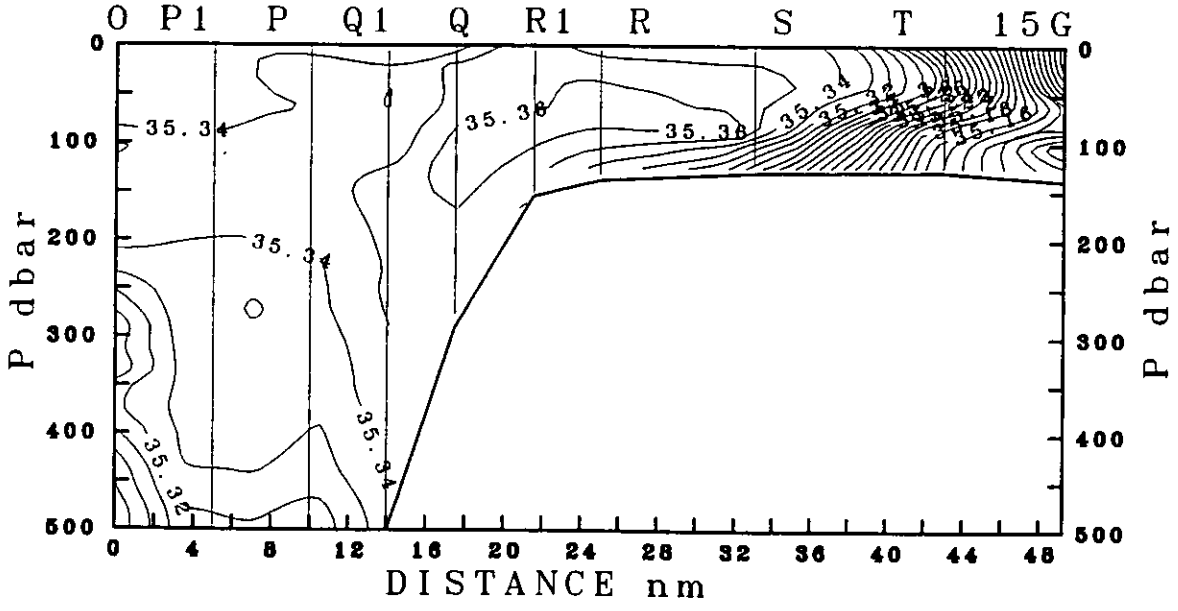


Figure 4b. Shelf-edge section at 57°N, 7 - 8 May 1994. Salinity (psu).

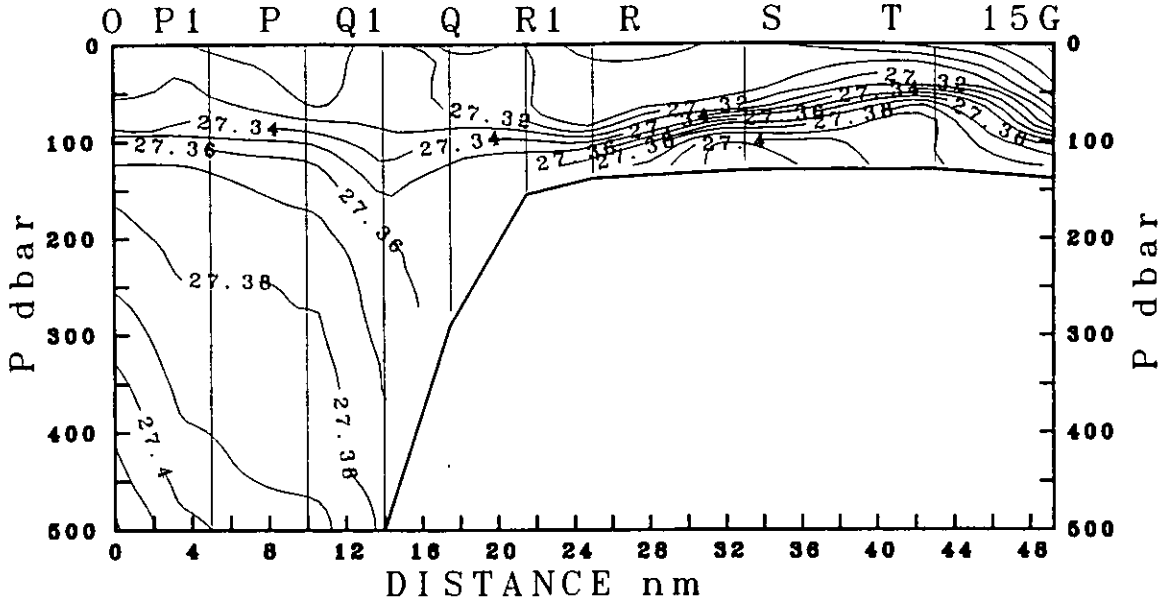


Figure 4c. Shelf-edge section at 57°N, 7 - 8 May 1994. Density (sigma-t).

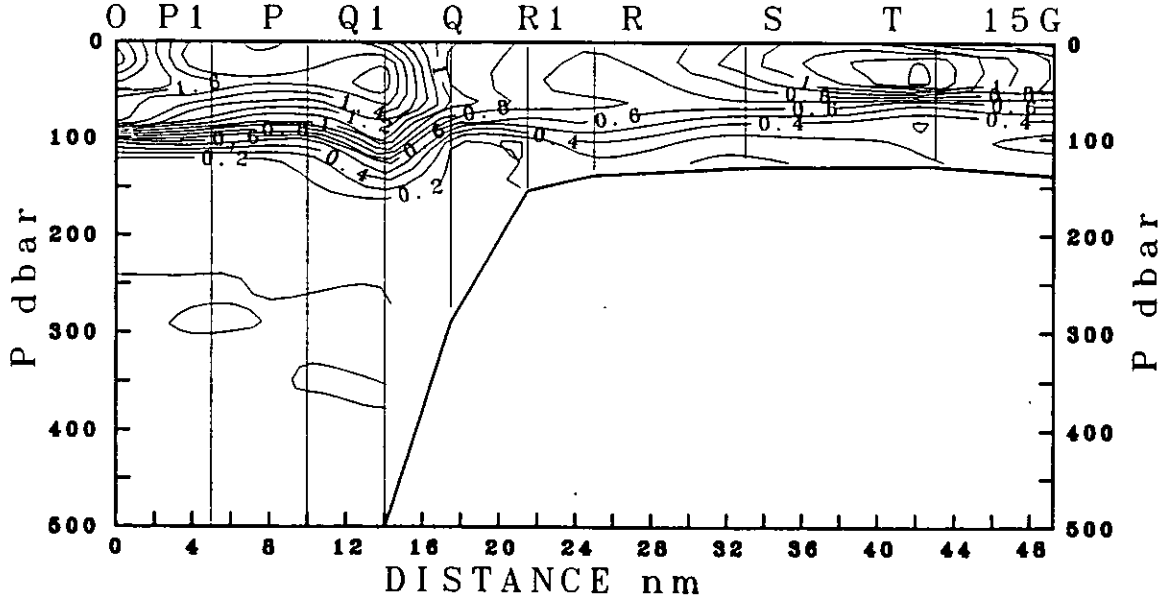


Figure 4d. Shelf-edge section at 57°N, 7 - 8 May 1994.
Fluorescence (fluorimeter voltage).

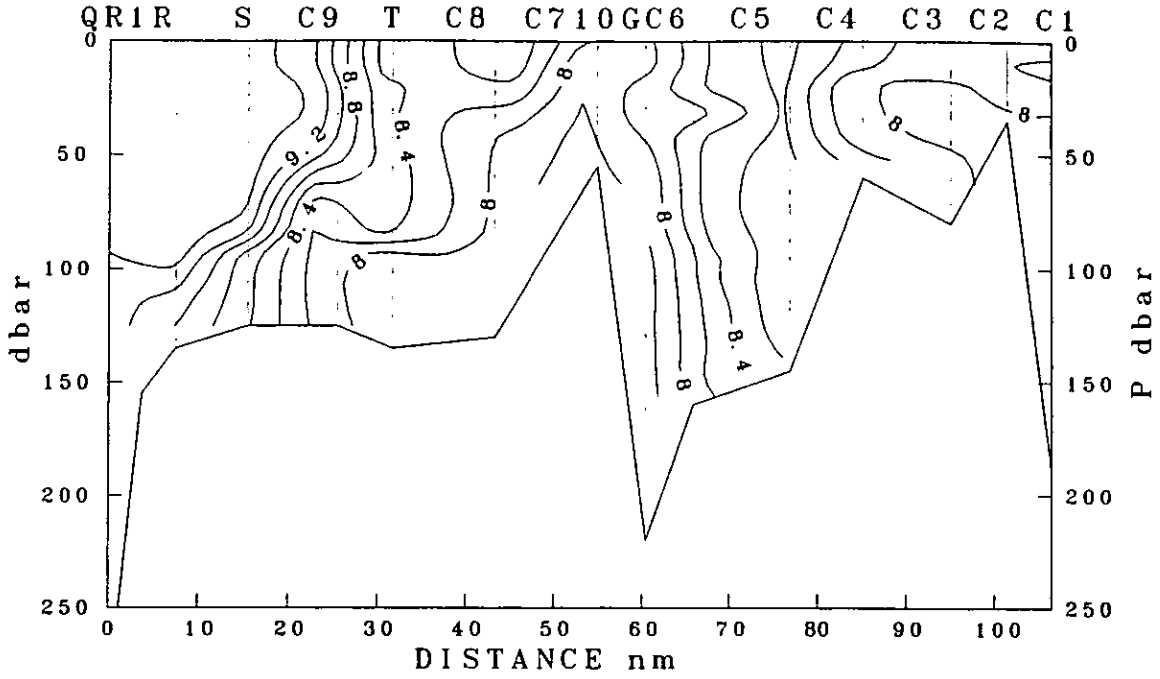


Figure 5a. Shelf-edge - Sound of Mull section, 8 - 9 May 1994. Temperature (°C).

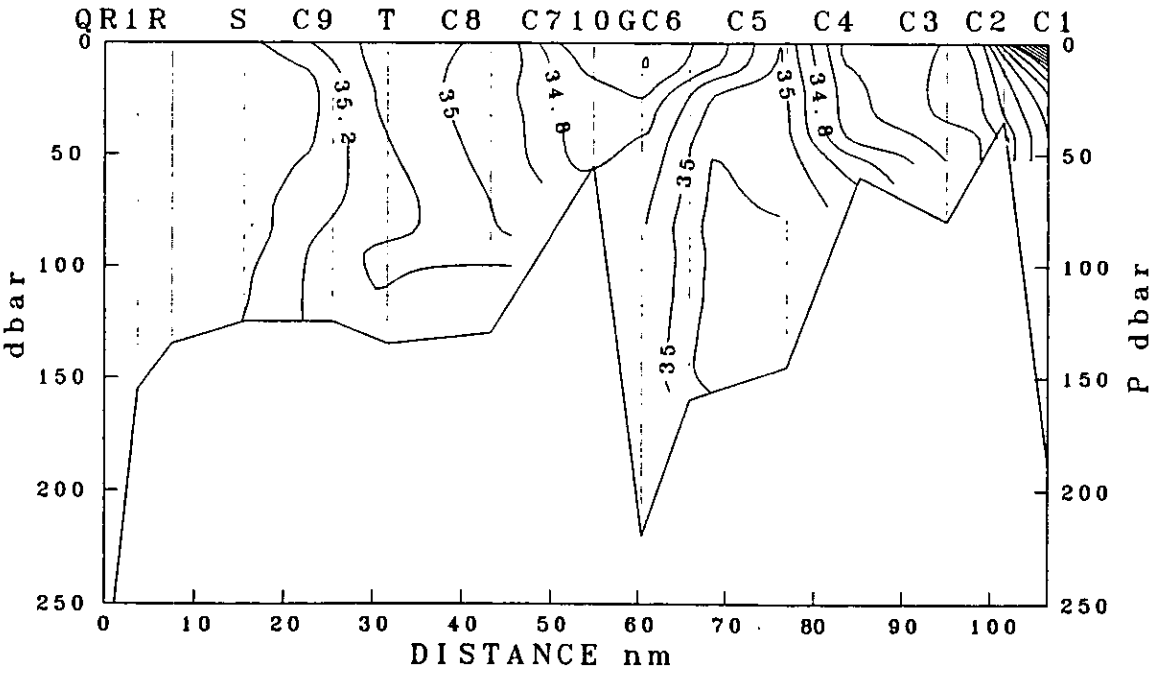


Figure 5b. Shelf-edge - Sound of Mull section, 8 - 9 May 1994. Salinity (psu).

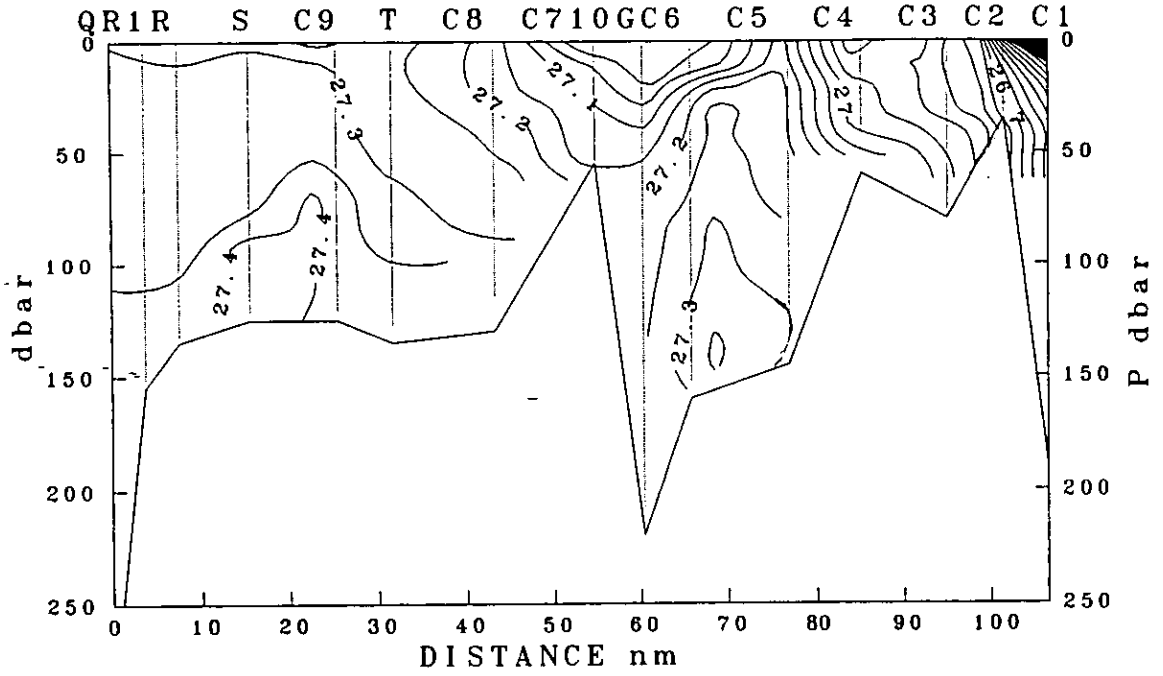


Figure 5c. Shelf-edge - Sound of Mull section, 8 - 9 May 1994. Density (sigma-t).

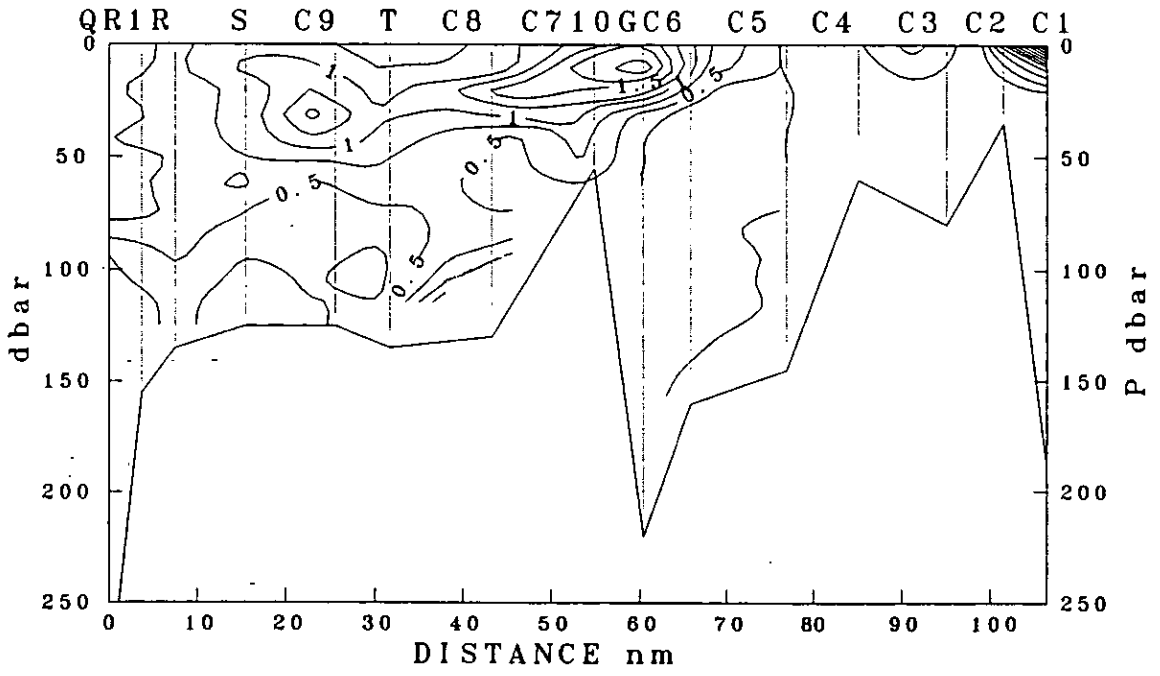
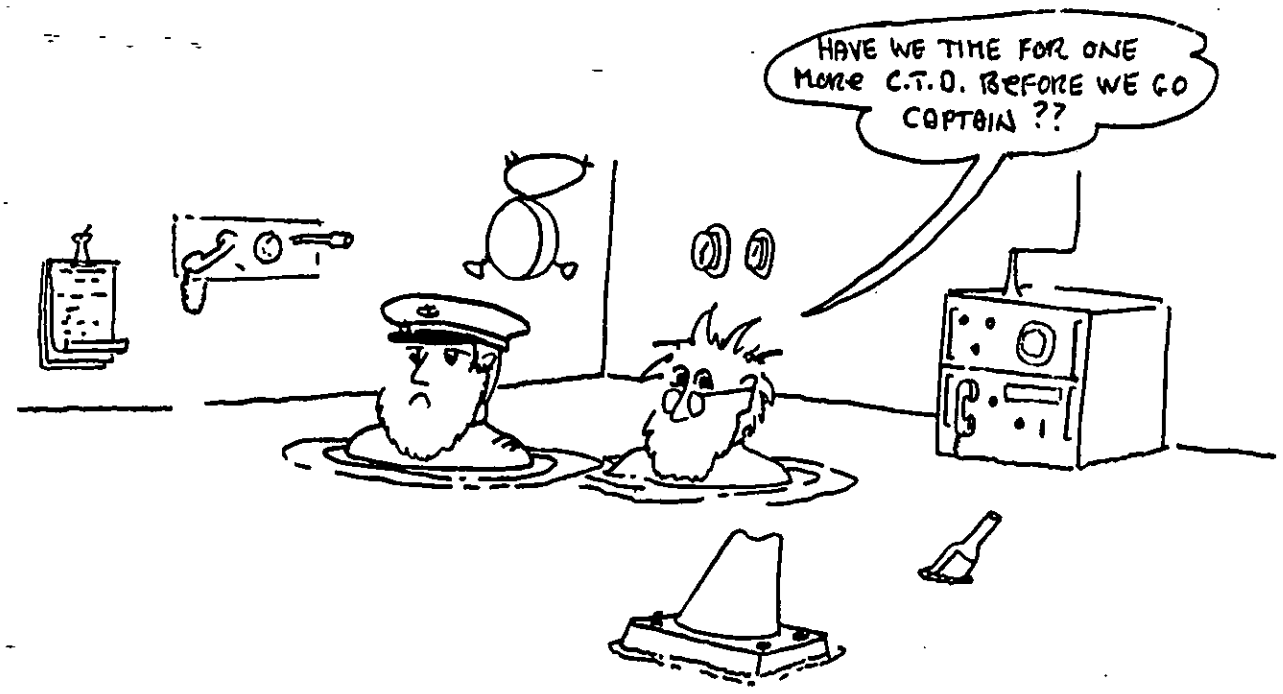


Figure 5d. Shelf-edge - Sound of Mull section, 8 - 9 May 1994.
Fluorescence (fluorimeter voltage).



by Lindsay, Ardrossan

Figure 6. On course for performance pay. (Any resemblance to Captain Peter Maw and the report writer is completely coincidental.)