R.R.S. "Challenger" 124/96 Cruise Report

January 7th to 27th 1996

Natural Environment Research Council
Dunstaffnage Marine Laboratory
P.O.Box 3 Oban
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Marine Physics Group Cruise Report, January 1996

Anton Edwards

Scientific Personnel

Anton Edwards	DML (Principal scientist)	Emily Roberts	DML
Martyn Harvey	DML	Brian Grantham	DML
Neil MacDougall	DML	Dr John Leftley	DML
Dr Lynda Mitchell	SAMS	Penny Holliday	SOC
Barbara Smallwood	University of Liverpool	Keith Gillon	JNCC

Aims

1. To work a series of stations around the Clyde Sea
2. To service the DML/SES (Shelf Edge Study) current mooring Y in the Tiree Passage
3. To work the Anton Dohrn - Rockall seamount CTD/nutrient/chlorophyll section
4. To work CTD and water sampling stations in the SES area lines N and S
5. To service and check SES moorings from the shelf and slope region.
6. To obtain multi-cores and gravity cores at SES stations and over the continental shelf.

Narrative

January 7th. Some scientific staff (AE,NMcD,BG,MH,ER) joined "Challenger" at Greenock (Garvel Basin) at 1230. The remainder (JL,LM) were aboard by 2300.

January 8th. The vessel sailed at 1000 for stations in the Clyde Sea. Station CL1 was reached in the afternoon and abandoned because of the strong south-easterly wind and active swell. The ship sheltered overnight in Kilbrannan Sound.

January 9th. With strong south-easterly gales and forecast force 9 winds, the ship continued to shelter in Kilbrannan Sound. A station at CL7 was abandoned about 1300 because of the difficulty of remaining on station. No work was done overnight.

January 10th. Conditions improved overnight and, at first light, course was set for station CL1. A ring of CTD stations was then worked clockwise round Arran. Conditions remained calm, with light winds. During the evening the wind freshened slightly from the south and the ring of stations was completed around midnight. The ship then steamed through the North Channel via the Sound of Islay to the Sound of Mull.

January 11th. In a freshening south-easterly wind, CTD work was recommenced at station 1G in the west end of the Sound of Mull around noon. The mooring in the Tiree Passage was inspected about 1400 but could not be recovered because of an unfavourable combination of strong southerly wind and tide. The CTD and water bottling line was resumed and continued through the night.

January 12th. The CTD tail failed in the early hours of the morning and was replaced. The ship continued over the continental shelf, reaching the shelf break around nightfall. Once station Q on the

continental slope had been passed, water sampling was stopped so as to reduce station time in an attempt to complete the WOCE line to Rockall with CTD work only before the weather broke.

January 13th. The day dawned with only a light swell that gradually rose during the daylight hours under an increasing southerly wind. The Anton Dohrn seamount was reached in the evening. Moderate swell and winds were encountered during the evening.

January 14th. Winds were slight in the morning and remained so throughout the day as Challenger steamed towards Rockall. Stations D to A were postponed so as to make Rockall in daylight. After the CTD tail had been remade, these stations were worked towards midnight in only light winds and swell. Stations A and B were worked successfully but C and D were abandoned when the CTD tail had to be repaired again during passage to station E. We resumed water bottling at E at midnight.

January 15th. After crossing the deep water of the western Rockall Trough, a ring of 2000m CTD stations around the Anton Dohrn sea-mount was started around noon. Work continued in a fresh wind and moderate swell. A southerly wind rose during the day and with it the swell so that passage from station H3 to L was impeded and the vessel hove to at station L at midnight to await an improvement.

January 16th. Wind and swell had moderated sufficiently by 0400 to permit working onwards round the Anton Dohrn ring. Despite winds rising to 25-30 knots and an again rising swell, the last ring station H6 was completed by 1600 and the "Challenger" headed east to station M to start a series of bottle sample stations towards the continental shelf.

January 17th. Station O was abandoned at 0400 because of a strong southerly wind and associated wind. About 1100 there was no forecast improvement so the ship headed to shelter. After a lively passage, shelter was gained on the north side of Coll about 2300.

January 18th. With continuing southerly winds, the ship remained in the lee of Coll today.

January 19th. A lull in the wind during the morning around the time of slack water permitted the recovery of mooring "Y" in the Tiree Passage from 1150. All was successfully recovered by 1220. Relaying started about 1443Z and was complete by 1452Z. The ship then steamed west towards station N140 in freshening southerly wind once more. By 2100 the we had passed Barra Head but wind and swell had increased to the point where further progress was uncomfortable and pointless. In view of a worsening forecast of southerly gales, the ship steamed slowly to shelter on the north side of Coll.

January 20th. "Challenger" remained in the lee of Coll throughout while a south-easterly gale blew.

January 21st. As the wind moderated slightly, the ship steamed west once more to coring station R1000. On arrival, large volume water samples were gathered for the incubation of the forthcoming cores. Swell and sea however were too high for safe use of the corer. The ship hove to for the night.

January 22nd. At first light, as the main wire was being readied for coring, it was veering with a leading rope gantline so as to feed it through the main block. Because of loose turns, it snagged on the winch and therefore suddenly hauled. Although not attached to the corer, the gantline rope that was by now lying on deck unfortunately snagged it. The momentum of the turning winch raised the corer violently, toppling it. The consequent damage prohibited further use of the corer.

We gave thanks to God for our preservation from personal injury and sailed in search of the LOIS/SES mooring at S140. The mooring was recovered around noon. Two toroids marking other LOIS/SES moorings in the neighbourhood were checked correct. No sign of other moorings at S200, S300 and S700 was seen. The vessel then went to S1500 so as to work CTD and water bottle stations eastward back to the shelf along line S. The wind remained easterly with a moderate swell.

January 23rd. Line S was finished around noon and the ship steamed to N140 to work westward along the N line. Easterly winds abated slightly during the day. The multi-corer was repaired during the day.

January 24th. After N900 was finished around 0100, the ship steamed to R1000 for coring at dawn. Three good sets of cores had been gathered by midday and the ship returned to N1100 to complete line N. A westward line of CTD stations was started at S1500 shortly before midnight.

January 25th. "Challenger" worked west over the Hebrides Terrace Seamount in a strong easterly wind. In view of the forecast persistence of this wind, the difficulty of station keeping and the impossibility of working a planned north-south section over the sea mount in such a lively easterly swell, we abandoned the line at T4 and headed towards Ardrossan. Progress was very slow against the weather for the remainder of the day.

January 26th. Dawn found us north-west of Malin Head. In the continuing easterly wind we continued passage to Ardrossan.

January 27th. Scientific gear was unloaded after 0800. All scientific staff were clear of the vessel by 1300.

Results

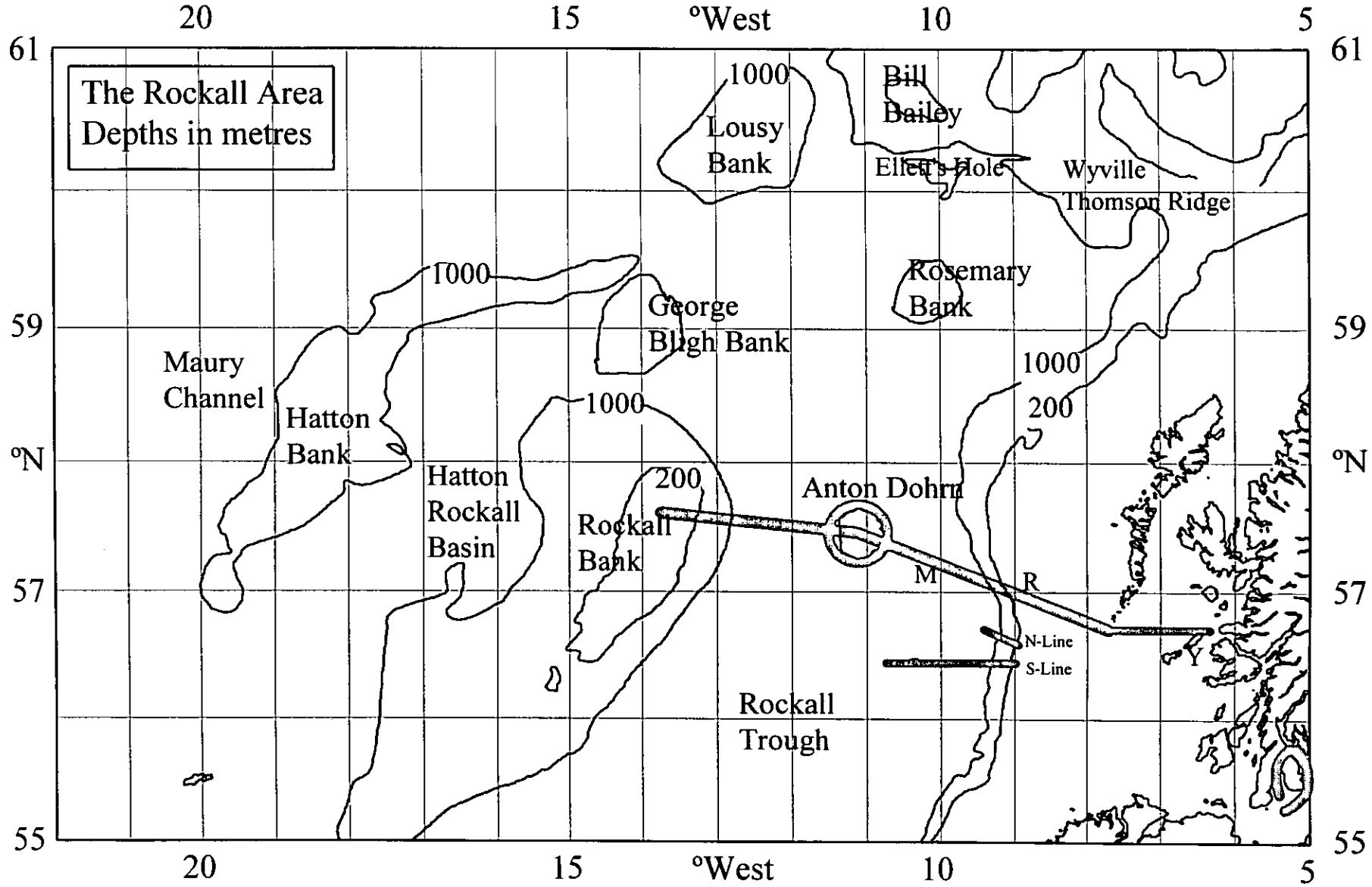
CTD and nutrient stations

All CTD and water bottle stations are listed in the following table. Representative sections are appended to this report. Water samples listed in the table were analysed for nutrient concentrations with a Lachat autoanalyser. Samples for iodine analysis were dispatched to Dr V.W.Truesdale at Oxford Brookes University.

Stations in the Clyde Sea

Stn	Lat °N	Long °W	Depth, m.	CTD depth approx	SS, SC.	Iodine (deck tank)	Water bottles, Nutrients, Chlorophyll	Date/ Time	Disc/ Dip
CL1	55° 17'	5° 17'	50	40	✓	001		10/1016	01/001
CL2	55° 21'	5° 22'	50	40	✓	002	5,10,20,30	10/1122	01/002
CL3	55° 26'	5° 26'	45	35	✓	003		10/1240	01/003
CL4	55° 31'	5° 26'	83	79	✓	004		10/1331	01/004
CL5	55° 35'	5° 25'	135	128	✓	005		10/1422	01/005
CL6	55° 39'	5° 26'	136	124	✓	006		10/1520	01/006
CL7	55° 43'	5° 19.5'	121	111	✓	007		10/1625	01/007
CL8	55° 48'	5° 15'	164	154	✓	008		10/1731	01/008
CL9	55° 44'	5° 11'	169	156	✓	009		10/1827	01/009
CL10	55° 40'	5° 04'	165	155	✓	010		10/1933	01/010
CL11	55° 36'	4° 59'	144	134	✓	011		10/2029	01/011
CL12	55° 31'	4° 59.5'	110	100	✓	012		10/2142	01/012
CL13	55° 26'	4° 02'	119	109	✓	013		10/2256	01/013
CL14	55° 21'	4° 04'	64	54	✓	014		10/2352	01/014

5°



Working areas R.R.S "Challenger" cruise 124/96

Stations over the Shelf and in the Rockall Trough										
Stn	Lat °N	Long °W	Depth, m.	CTD depth approx	SS	Iodine	Water bottles: Nutrients, Chlorophyll (400ml) from non-toxic, 5,15,30,60m	Date/ Time	Disc/ Dip	Day Grab
1G	56 40.0	6 08	158	148	✓	015	-	11/1241	01/015	-
2G	56 41.0	6 17	35	23	✓	016	5,15,23	11/1507	02/016	✓
3G	56 42.5	6 22	-	-	✓	017	Steam through only	11/1607	-	-
4G	56 44.0	6 27	109	100	✓	018	5,15,30,60,100	11/1713	02/017	✓
5G	56 44.0	6 36	-	-	✓	019	Steam through only	11/1845	-	-
6G	56 44.0	6 45	42	35	✓	020	5,15,30,35	11/1938	02/018	-
7G	56 44.0	7 00	146	135	✓	021	5,15,30,60,100,135	11/2101	02/019	✓
8G	56 44.0	7 10	-	-	✓	022	Steam through only	11/2251	-	-
9G	56 44.0	7 20	156	145	✓	023	5,15,30,60,100,150	12/0030	02/020	✓
10G	56 44.0	7 30	221	210	✓	024	5,15,30,60,100,200	12/0354	02/022	-
11G	56 44.0	7 40	54	40	✓	025	5,15,30	12/0539	02/023	-
12G	56 45.5	7 50	-	-	✓	026	Steam through only	12/0635	-	-
13G	56 47.0	8 00	126	115	✓	027	5,15,30,60,100	12/0721	02/024	✓
14G	56 48.5	8 10	-	-	✓	028	Steam through only	12/0856	-	-
T	56 50.2	8 20	142	130	✓	029	5,15,30,60,100,125	12/1034	02/025	✓
15G	56 53.0	8 30	132	120	✓	030	5,15,30,60,100,120	12/1144	02/026	-
S	56 57.0	8 47	132	120	✓	031	5,15,30,60,100	12/1441	02/027	✓
R	57 00.0	09 00	136	126	✓	032	5,15,30,60,100	12/1551	02/028	-
R1	57 01.5	09 06	156	145	✓	033	5,15,30,60,100	12/1801	02/029	✓
Q	57 03.0	09 13	288	274	✓	034	5,15,30,60,100,200	12/1902	02/030	-
Q1	57 04.5	09 19	822	810	✓	035	5,30,60,100,200,300,500,600,785	12/2132	03/031	-
P	57 06.0	09 25	1419	1390	✓	036	-	13/0005	03/032	-
P1	57 07.5	09 33	1787	1762	✓	037	-	13/0126	04/033	-
O	57 09.0	09 42	1935	1905	✓	038	-	13/0336	04/034	-
N	57 14.0	10 03	2110	2105	✓	039	-	13/0656	05/035	-
M	57 18.0	10 23	2220	2210	✓	040	-	13/1209	06/036	-
L	57 22.0	10 40	2253	2238	✓	041	-	13/1412	07/037	-
K	57 24.0	10 52	788	768	✓	042	-	13/1755	07/038	-
J	57 27.0	11 05	591	580	✓	043	-	13/1947	08/039	-
I	57 28.0	11 19	755	740	✓	044	-	13/2134	08/040	-
H	57 29.0	11 32	2028	2013	✓	045	-	13/2330	08/041	-
G	57 29.5	11 51	1796	1786	✓	046	-	14/0305	09/042	-
F	57 30.5	12 15	1810	~1800	✓	047	-	14/0709	10/043	-
E	57 32.0	12 38	1660	1650	✓	048	-	14/1030	09/044	-
A	57 35.0	13 38	112	100	✓	051	-	14/1926	03/045	-
B	57 34.0	13 20	182	170	✓	050	-	14/2104	03/046	-
E	57 32.0	12 38		~1650	-	-	5,60,100,200,500,700,1000,1500	15/0100	-	
G	57 29.5	11 51		~1800	-	-	5,60,100,200,500,700,1000,1500	15/0500	-	
H	57 29.0	11 32	2023	2013	✓	052	-	15/0845	11/047	
H1	57 38.0	11 18	1878	1800	✓	053	-	15/1241	12/048	
H2	57 41.0	11 00	2083	2071	✓	054	-	15/1553	13/049	
H3	57 33	10 44	2133	2110	✓	055	-	15/1937	14/050	

Stations over the Shelf and in the Rockall Trough										
Stn	Lat °N	Long °W	Depth, m.	CTD depth approx	SS	Iodine	Water bottles: Nutrients, Chlorophyll (400ml) from non-toxic, 5,15,30,60m	Date/ Time	Disc/ Dip	Day Grab
L	57 22	10 40	2182	2168	✓	056	-	16/0335	15/051	
H4	57 15	10 53	1720	1700	✓	057	-	16/0710	16/052	
H5	57 11	11 11	2104	1994	✓	058	-	16/1024	17/053	
H6	57 18	11 30	2040	2025	✓	059	-	16/1415	18/054	
J	57 27	11 05	1833	1820	✓	060	-	16/1813	15/055	
Y	Mooring instrument position 56° 37.33' 6° 24.33' laid in 43m of water around high tide. Clear by 19/1/96 1452									
R1000	56 30	9 17	991	980	✓	061	100 l. incubation water from bottom	21/2015	04/056	
S1500	56 27	9 39	1414	1400	✓	062	5,60,100,200,500,700,1000,1300	22/1937	05/057	
S1000	56 27	9 20	988	970	✓	063	5,30,60,100,200,500,600,800,970	22/2245	06/058	
S850	56 27	9 15	900	880	✓	064	5,60,100,200,500,600,700,800	23/0220	10/059	
S700	56 27	9 10	660	645	✓	065	5,30,60,100,200,300,500,600	23/0600	10/060	
S500	56 27	9 07	546	530	✓	066	5,15,30,60,100,200,300,540	23/0102	03/061	
S300	56 27	9 04	290	270	✓	067	5,15,30,60,100,200,280	23/0910	05/062	
S200	56 27	9 03	195	183	✓	068	5,15,30,60,100	23/1040	06/063	
S140	56 27	8 58	146	136	✓	069	5,15,30,60,100	23/1247	07/064	
N140	56 36	8 56	133	120	✓	070	5,15,30,60,100	23/1425	11/065	
N200	56 37	9 01	195	185	✓	071	5,15,30,60,100	23/1544	11/066	
N300	56 38	9 01	311	280	✓	072	5,15,30,60,100,200	23/1625	11/067	
N600	56 38	9 04	477	460	✓	073	5,15,30,60,100,200,400	23/1919	12/068	
N700	56 38	9 07	708	700	✓	074	5,30,60,100,200,500,600	23/2017	12/069	
N900	56 40	9 10	861	850	✓	075	5,60,100,200,500,600,700,800	23/2255	12/070	
N1100	56 40	09 15	1160	1150	✓	076	5,60,100,200,500,700,800,1000	24/1447	13/071	
N1500	56 43	09 25	1482	1466	✓	077	5,60,100,200,500,700,1000,1300	24/1708	14/072	
S1500	56 27	09 39	1515	1495	✓	078	-	24/2307	16/073	
T1	56 28	09 57	1739	1729	✓	079	-	25/0203	17/074	
T2	56 28	10 10	1125	1117	✓	080	-	25/0450	18/075	
T3	56 28	10 22	1067	1060	✓	081	-	25/0657	19/076	
T4	56 28	10 32	1403	1383	✓	082	-	25/0910	19/077	

Underway fluorimetric measurements

The DML recording GPS/fluorimeter ran continuously throughout most of the cruise.

Day Grab Samples: 11-12 Jan. 1996

Station	Lat. (N)	Long.(W)	Depth	Date	Details
2G	56:41	06:17	40	11 Jan	v. small sample, v. coarse, small pebbles
4G	56:44	06:27	115	11 Jan	large amount of fine sand NB ship drifting into deeper water
7G	56:44	07:00	145	11 Jan	lots of gloopy mud, fine sandy mud
9G	56:44	07:20	160	11 Jan	as above, but coarser
13G	56:47	08:00	110	12 Jan	loose medium/coarse sand
T	56:50	08:20	135	12 Jan	coarse sand

Station	Lat. (N)	Long.(W)	Depth	Date	Details
S	56:57	08:47	125	12 Jan	no sample recovered in 3 attempts ground too scoured?
R1	57:01.5	09:06	220		Unsuccessful after 3 attempts

Coring at R1000: 24 Jan 1996

MC1	o/b	bottom	i/b
Lat. (N)	56:30:58	56:31:14	56:31:33
Long. (W)	09:17:58	09:17:46	09:17:28
Time	808	837	857
Depth	1014		

MC2	o/b	bottom	i/b
Lat. (N)	56:30:55	56:31:17	56:31:34
Long. (W)	09:17:48	09:17:23	09:17:04
Time	920	949	1009
Depth	1003		

MC3	o/b	bottom	i/b
Lat. (N)	56:30:45	56:30:58	56:31:03
Long. (W)	09:17:44	09:17:07	09:16:48
Time	1032	1102	1118
Depth	1001		

Moorings

The layout of the mooring relaid at station Y in the Tiree Passage is shown in the following figure.

Objectives

All objectives were achieved in whole or in large part.

Performance of Equipment

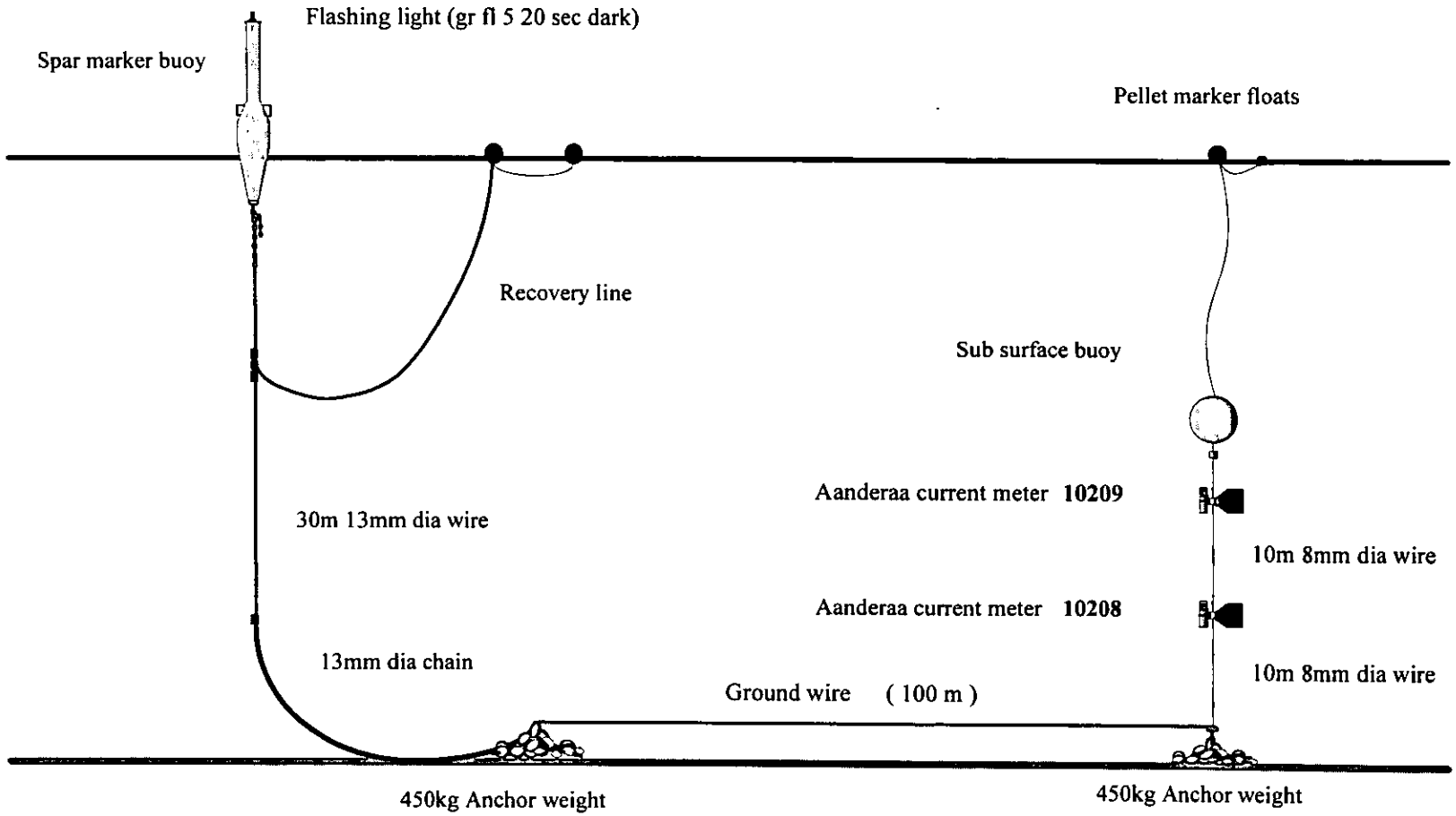
All other ship's equipment performed satisfactorily.

Acknowledgements

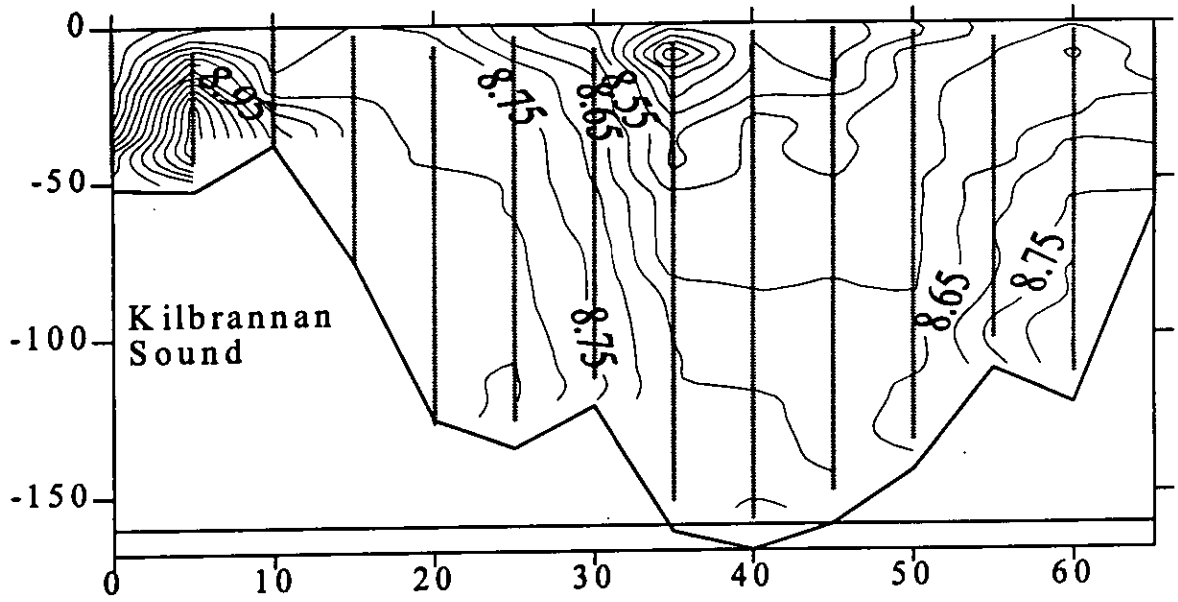
The competent and cheerful services of the master, Mike Harding, and all his crew are cordially acknowledged. Particular thanks go to the engineers and crew who worked so assiduously at the repair of the corer. Without them, the objective would not have been gained.

This was the last of the DML WOCE cruises: the DML participants, in unwelcome valedictory times, are especially grateful to all their SAMS and university colleagues who so assiduously, cheerfully and willingly helped to man or woman this cruise.

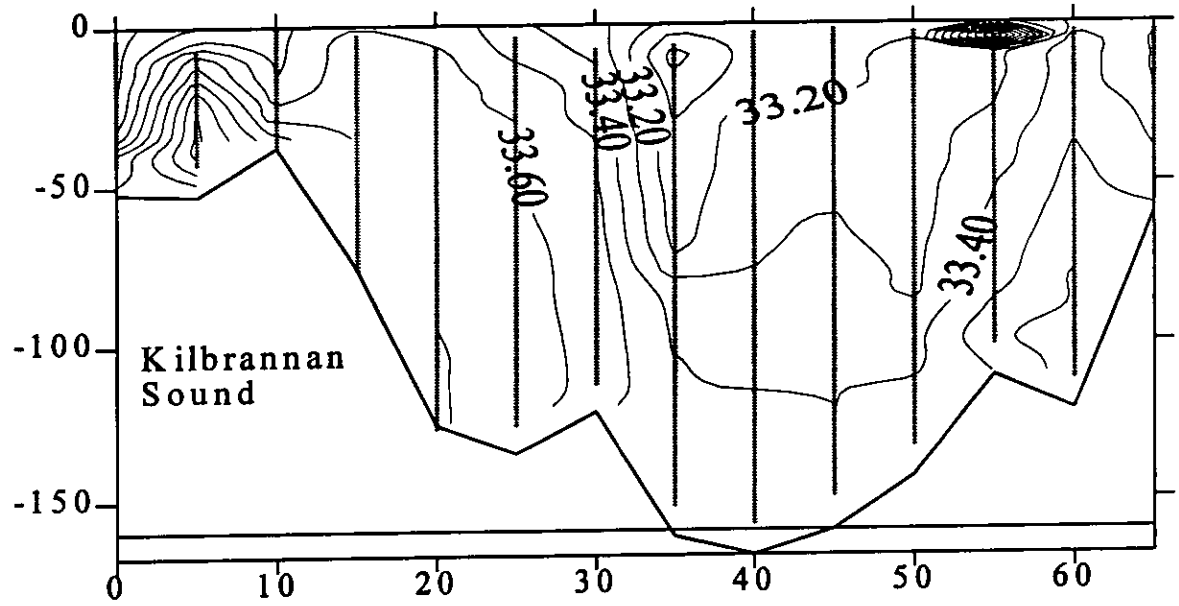
Tiree Passage Mooring Y



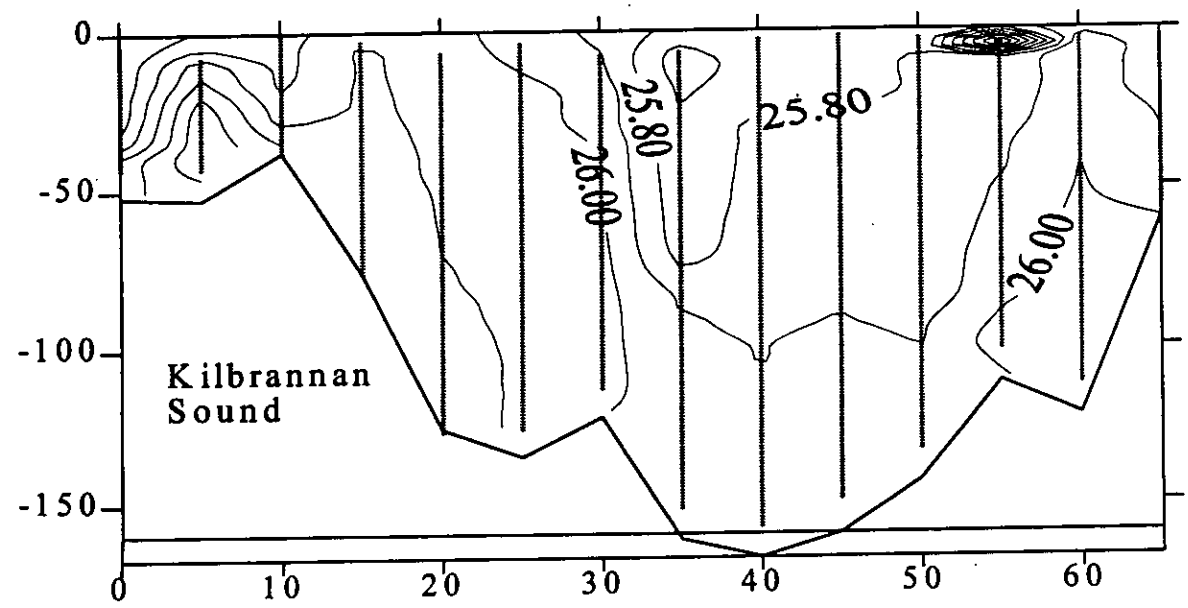
Clyde Sea 10-1-96 Temperature



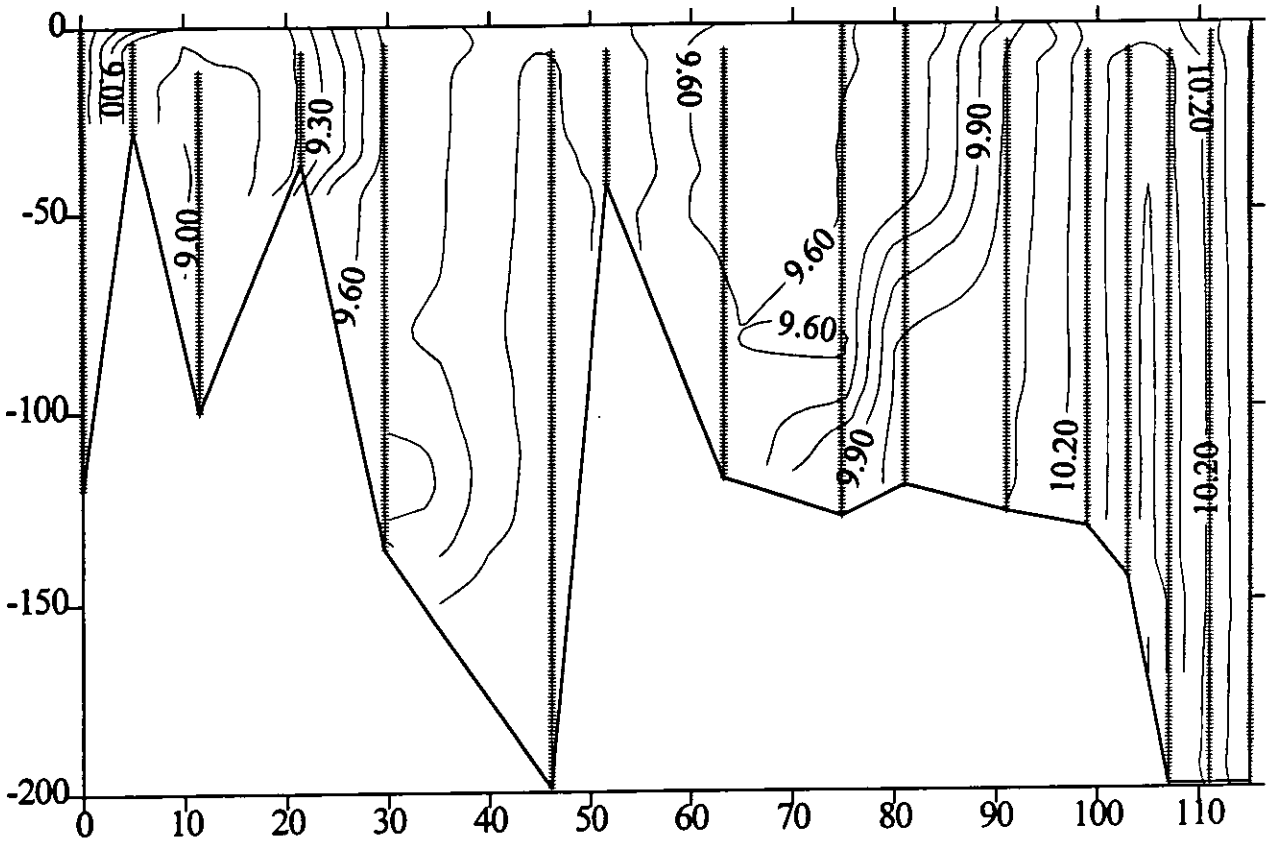
Clyde Sea 10-1-96 Salinity



Clyde Sea 10-1-96 Density, kg/m³

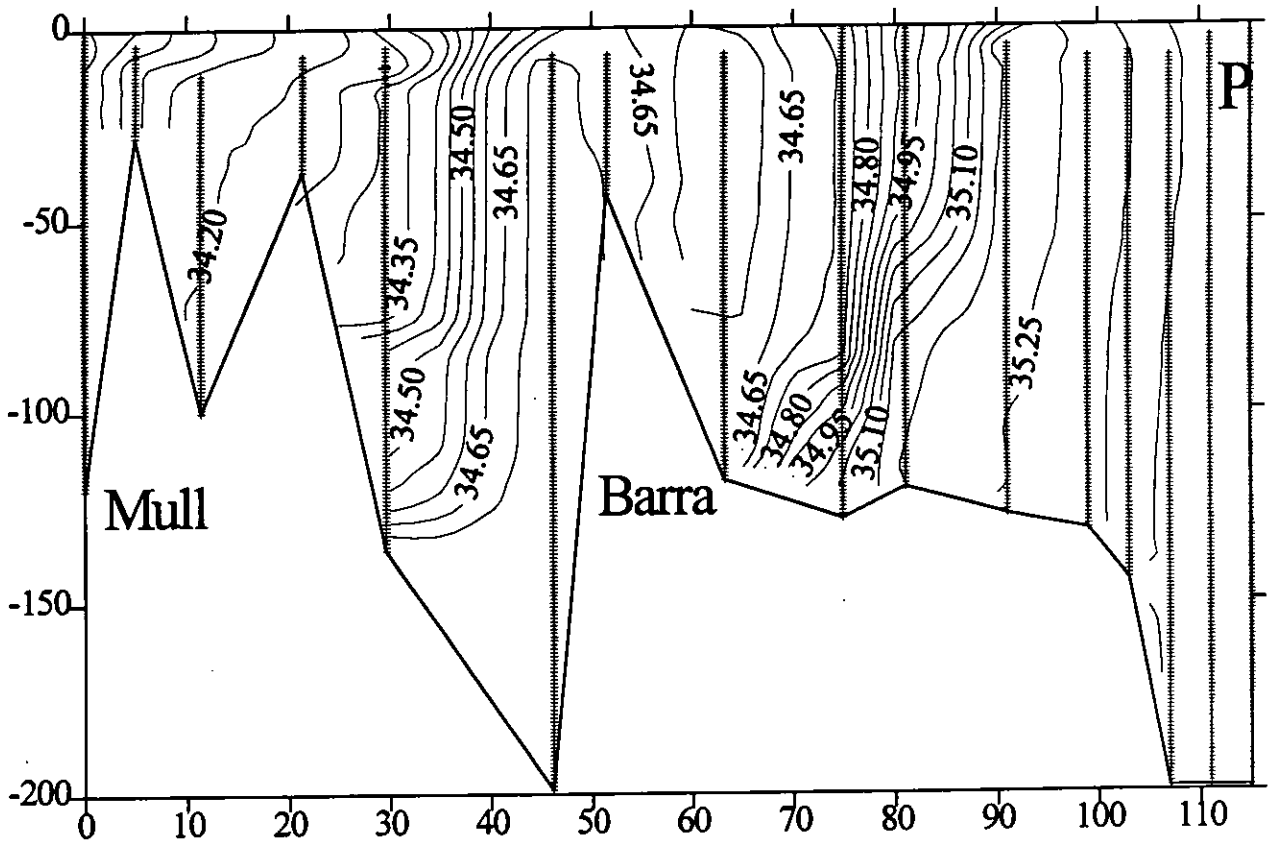


Sound of Mull to Shelf Edge 11-12/01/96 Temperature °C



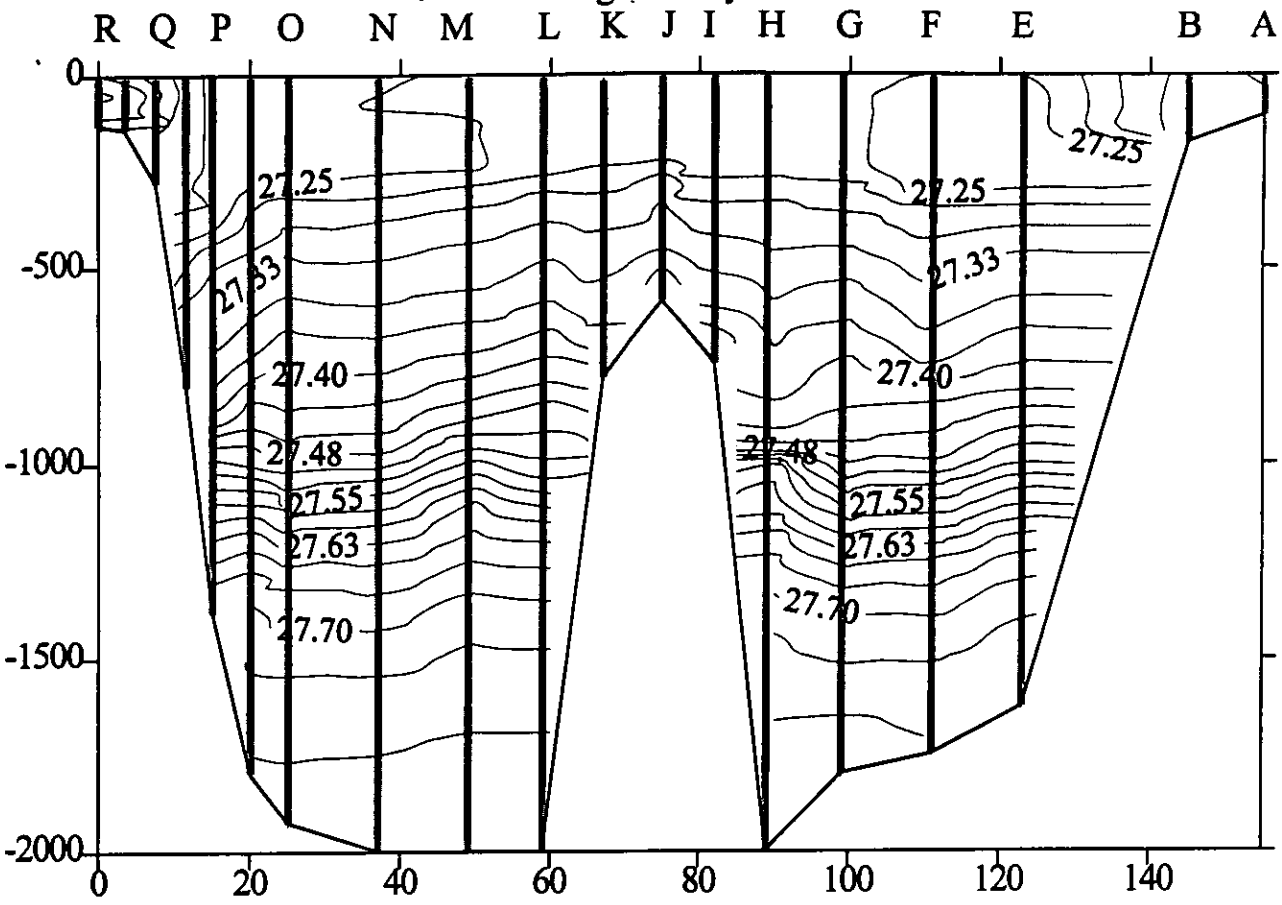
Distance, nm

Sound of Mull to Shelf Edge 11-12/01/96 Salinity

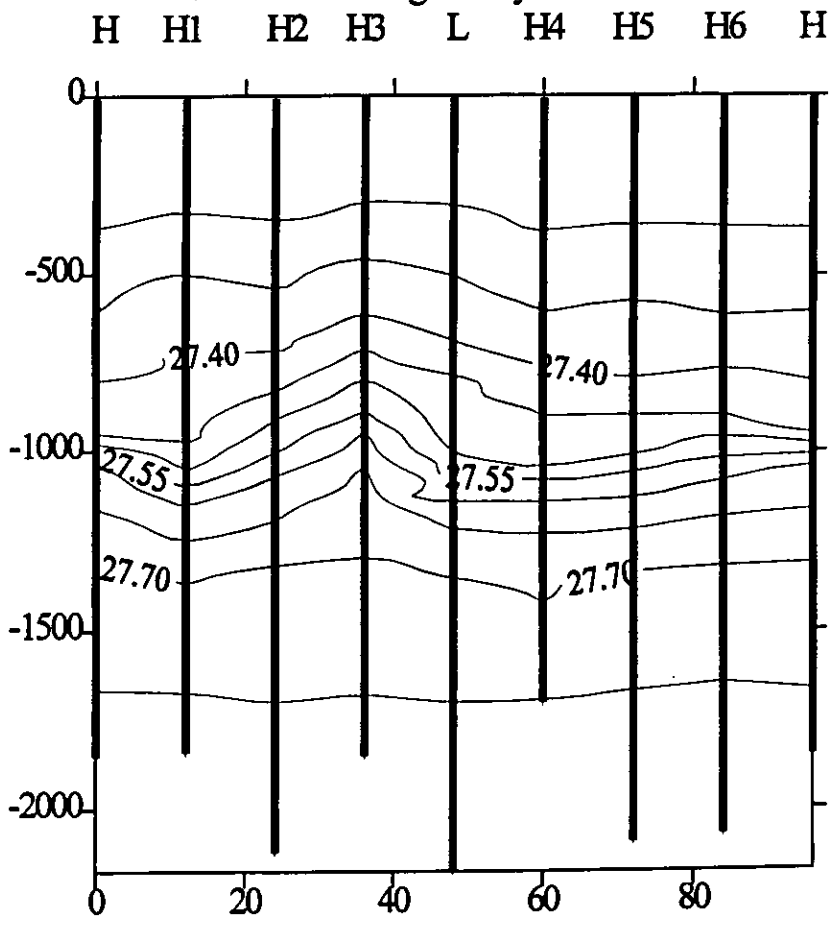


Challenger 124/96 January 11 to 12 1996
Sound of Mull to Shelf Edge at station P

Rockall Trough Density 12-14/01/1996

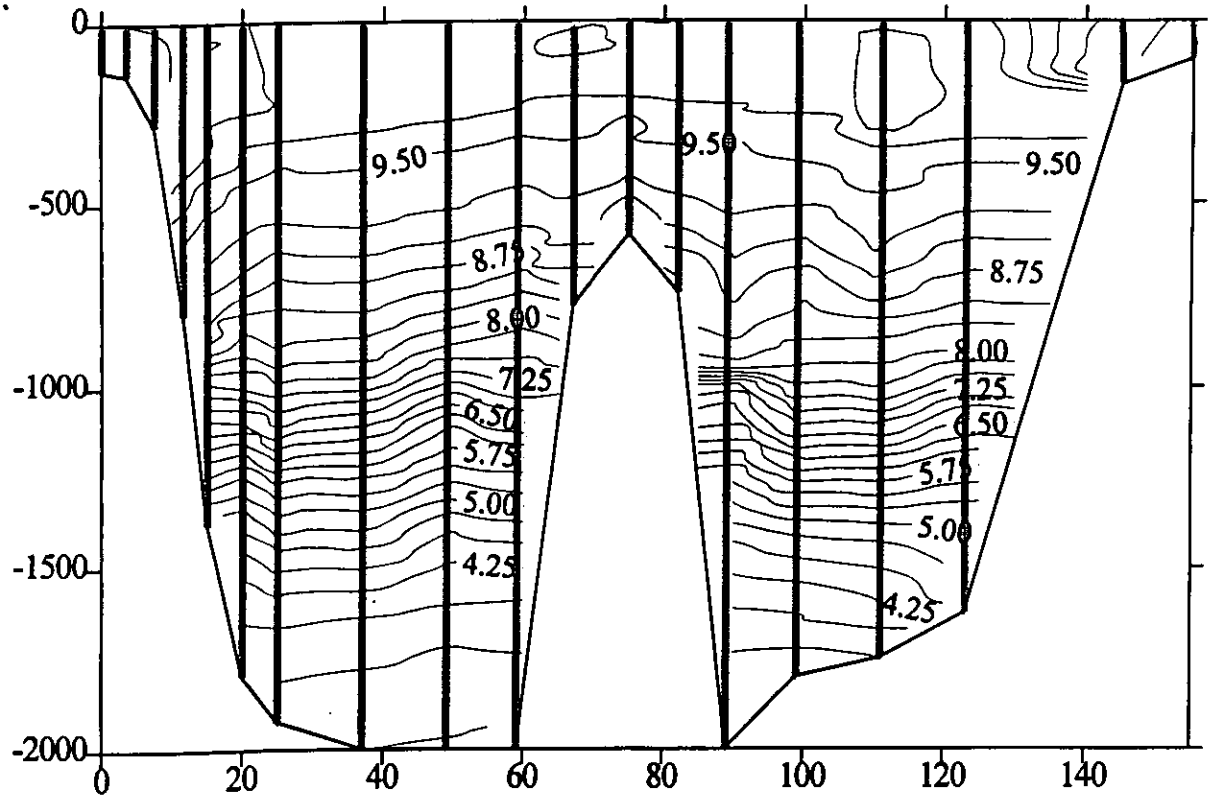


Anton Dohrn Ring Density 15-16/01/1996



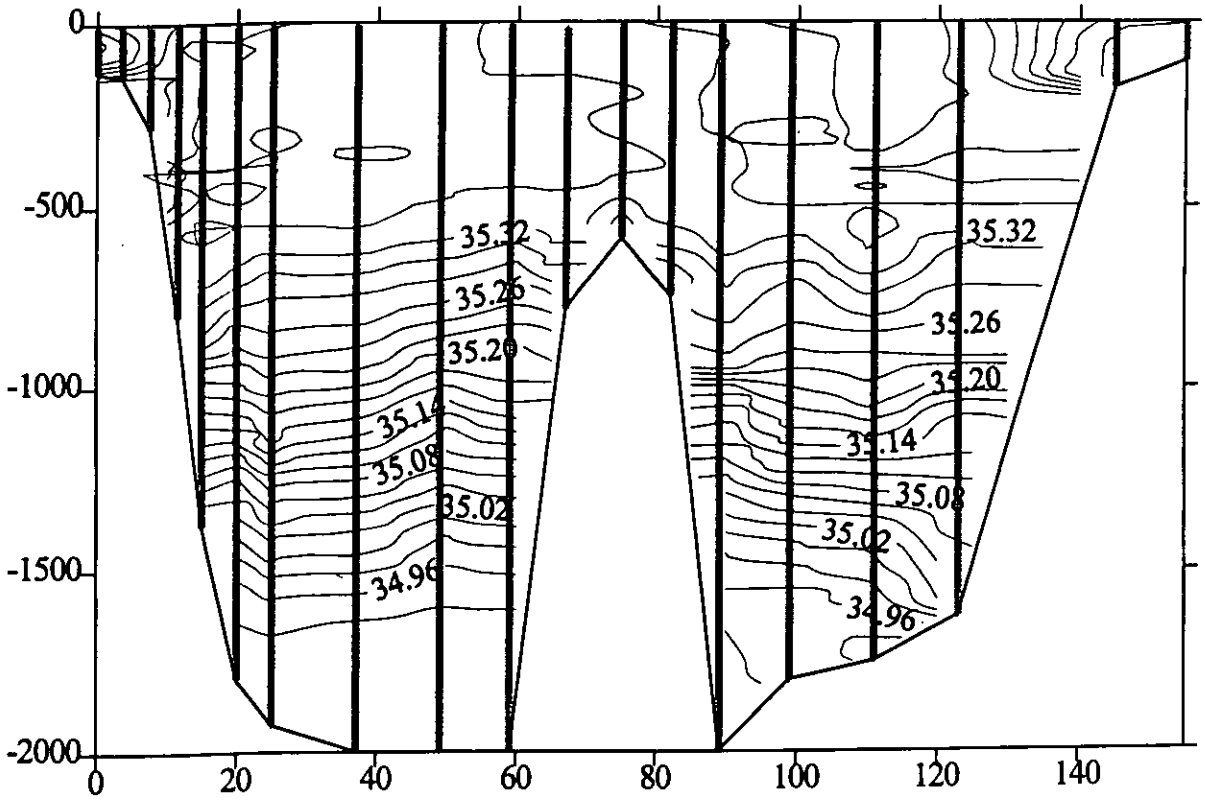
Challenger 124/96 January 12-16
Density in the Trough and around Anton Dohrn

Rockall Trough 12-14/01/1996 Temperature °C



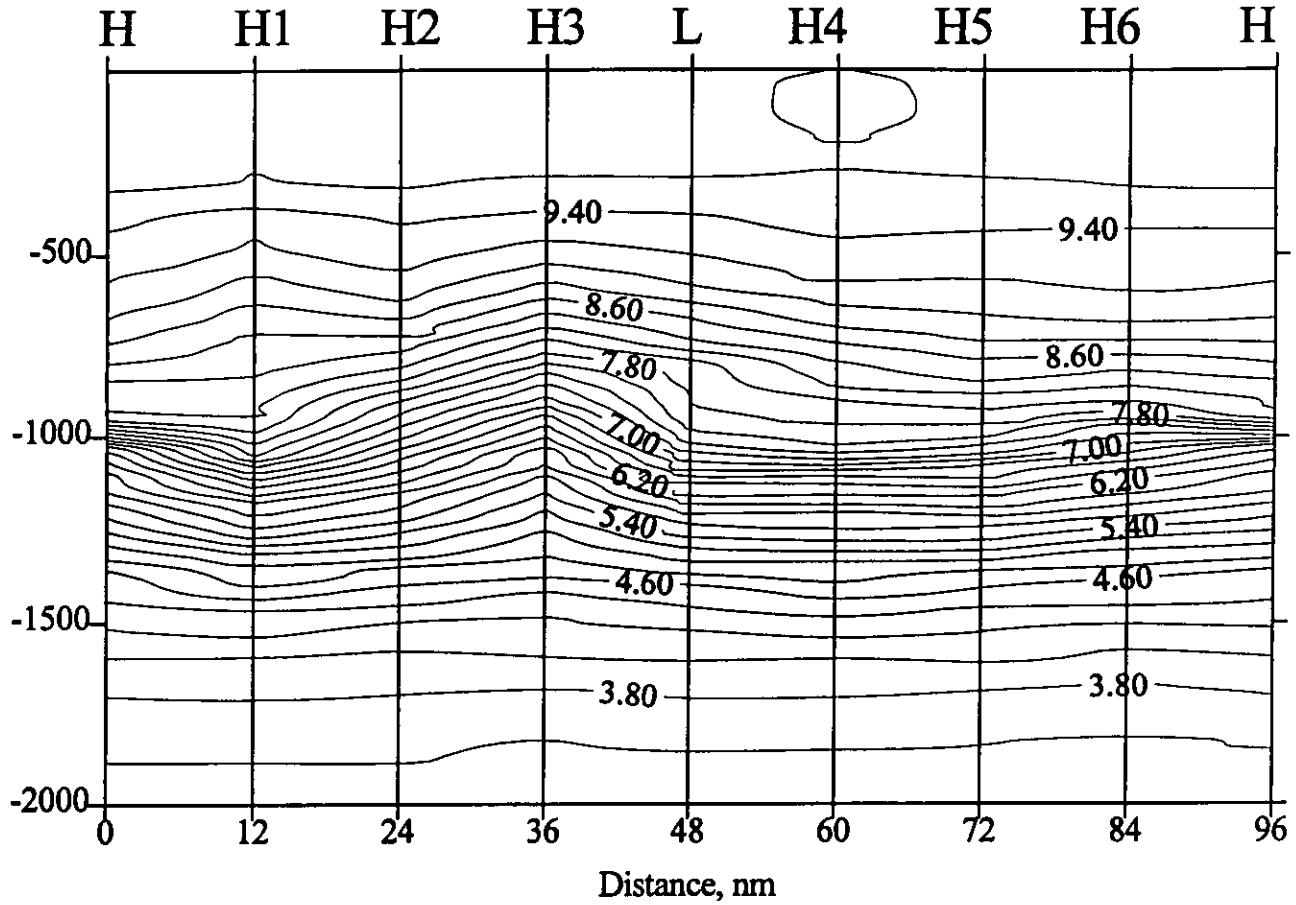
Distance, nm

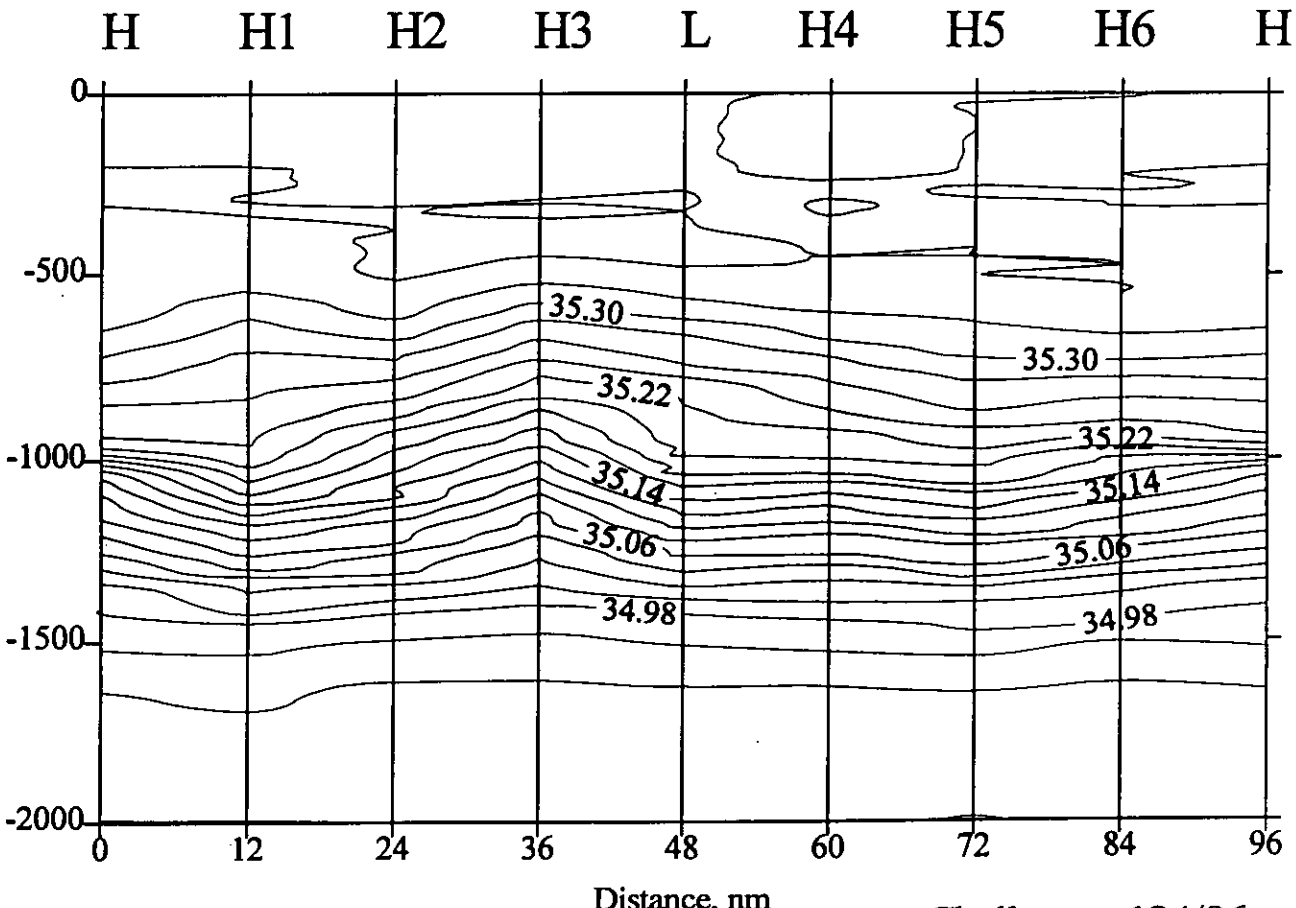
Rockall Trough 12-14/01/1996 Salinity



Challenger 124/96 January 12 to 14 1996
Shelf Edge - Anton Dohrn - Rockall

Anton Dohrn Ring Temperature, 15-16/01/96





Challenger 124/96

The Anton Dohrn Ring Section January 15-16 1996