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Scottish Marine Biological Association

Dunstaffnage Marine Research Laboratory

CRUISE REPORT

S.M.B.A., P.O. Box No. 3, Oban, Argyll, Scotland.

Scottish Marine Biological Association

Dunstaffnage Marine Research Laboratory

Cruise Report

R.R.S. Challenger

Cruise 9/87

8 Jan - 22 Jan 1987

Cruise Report

RRS Challenger Cruise 9/87

8th to 22nd January, 1987

Leg 1: Oban to Oban (8th - 13th Jan)

Leg 2: Oban to Campbeltown (13th - 22nd Jan)

Personnel: Legs (1) and (2)

A. Edwards	(1,2)	SMBA	Principal Scientist
C. Griffiths	(1,2)	SMBA	
N. MacDougall	(1,2)	SMBA	
D. Meldrum	(1)	SMBA	
J. Graham	(1,2)	SMBA	
W. Yeomans	(1,2)	University of Stirling	
R. Powell	(1)	RVS	
C. Petre	(2)	SMBA	
K. Jones	(2)	SMBA	
B. Grantham	(2)	SMBA	
P. Bradley	(2)	University of Glasgow	

Aims:

1) To collect large volume water samples for radio-Caesium analysis along a line of stations Sound of Mull - Barra Head - shelf edge for MAFF, Lowestoft and elsewhere for University of Glasgow.

2) To service SMBA mooring "Y" in the Tiree Passage.

3) To work CTD stations along a line Sound of Mull - Barra Head - Anton Dohrn Seamount - Rockall.

4) To work CTD stations along sections in the Minch.

5) To work CTD stations, collect water samples for nutrient and phytoplankton determinations and to measure light attenuation along various sections on the continental shelf north of Malin, in the Clyde Sea and Irish Sea.

6) To use an acoustic doppler current profiler to examine currents over the Great Plateau and in the Arran Deep in the Clyde Sea.

7) To collect sediment cores in the Irish Sea.

8) To service and relay current meter moorings in the Clyde Sea.

9) To collect zooplankton samples under various conditions on the shelf and in the Clyde Sea.

Narrative:

Scientific personnel joined Challenger at Oban North Pier at 1100Z on 8th of January. The ship sailed at 1430Z and headed for station 1G at the western end of the Sound of Mull. Bissett Berman CTD systems were tested at this station. It was found that the hydrographic wire winch could not be engaged, so water bottle sampling was abandoned for the night and the ship worked stations during the night with CTD and surface sampling only. After completing station 7G in the early morning of the 9th January, the ship returned to the Tiree Passage to recover mooring "Y" at first light. The mooring sustained some damage during recovery in windy conditions which was rectified in shelter during the morning: in calmer weather the mooring was relaid about 1400Z. The hydrographic winch had in the meantime been repaired and so it was possible to use a Niskin bottle and weight as a lead-line combination to take near bottom large volume water samples for Caesium determination from stations 4G to 7G during the afternoon. Because no metering gear had been provided during refit for the hydrographic wire, it was not possible to take mid-water large volume samples. Challenger then resumed CTD profiling and bottom water sampling at stations 8G and westward past Barra Head. Work on this section to Anton Dohrn Seamount continued during the 10th January and the mount was reached at midnight in conditions that continued calm, with only light swell. After the completion of station G at first light on the 11th, the line of stations towards Rockall was abandoned in the expectation of imminent southerly

gales and "Challenger" headed in worsening conditions for the Butt of Lewis to work sections in the Minch, aiming to arrive at Oban on 13th January. CTD section L was started at 0700Z in Eddrachillis Bay on the 12th and completed in a fresh easterly wind at midday. Line K was worked in similar conditions from 1600 to 2200Z, after which part of line HD was done early on the 13th, bottom Caesium samples were collected at stations C2 and C1 at the western end of the Sound of Mull and the vessel steamed to Dunstaffnage for a personnel and equipment change at about 1400Z.

For the second leg of the cruise, a meter wheel from RVS was temporarily rigged so as to be able to work water bottles at known depths. Lines E and F of CTD stations were completed during the night; by morning on the 14th the chemical autoanalysis system had been set up and line FL was started off Oban in the Firth of Lorn. CTD dips, sampling for nutrients and for phytoplankton concentrations at the FL stations were complemented by zooplankton pumped sampling at station FL12 on the 14th and FL6 on the 15th after noon. Section D eastward to Islay was completed during the evening of the 15th and the early hours of the 16th, followed by lines C, A and, early on the 17th, Y.Y1 had to be abandoned in a strong south-easterly gale, the ship headed for line Z but this too had to be ignored in the worsening gale and the ship headed for shelter in Brodick Bay east of Arran, where the night was spent. In the afternoon of the 18th, other work being impossible because of the continuing south-easterly winds, a section from Ardwell Bay to Blindman Rock, Kintyre, was worked with the acoustic doppler current profiler (ADCP). This section was repeated three times in the night and the ship then regained shelter at Brodick in the afternoon of the 19th. Eventually, the gale abated during the night of the 19th and the vessel left Brodick at 0600 on the 20th to seek current meter moorings C6, which could not be found, C4 and C5, which were successfully recovered in the afternoon.

In the afternoon of the 20th, the vessel resumed CTD and water sampling work from the North Channel to the Arran Deep. The ADCP was used along and transverse to the Arran Deep during the night. In the morning of the 21st, moorings C7 and C8 were laid in the Arran Deep and "Challenger" returned to station work, working from the north end of Arran to Loch Fyne and Kilbrannan Sound before finishing the cruise at Campbeltown in the morning of the 22nd. Scientific personnel disembarked and ships officers kindly collected a few large volume surface water samples at stations Z1 to Z6 and one other in the North Channel later in the day on passage to Birkenhead.

Results

Table 1 lists CTD and sampling stations: stations close to Rockall and some around the Hebrides were skipped to save time on leg 1; strong south-easterly gales on the 17th, 18th and 19th forced the abandoning of all Irish Sea work and of some Clyde Sea stations, together with some ADCP work.

Moorings are summarised in table 2. One at C6 was not found, although it had been sighted a week and half earlier by the D.A.F.S. vessel "Scotia". Others were recovered and relaid successfully.

Equipment

1) CTD systems worked well and could be conveniently handled with the new hydrographic davit and winch.

2) Water sampling was difficult on two counts:

a) The otherwise excellent hydrographic davit had, curiously, been supplied only with one set of metering gear. This gear was in constant use for the CTD: it was, and always will be, quite impracticable to switch wires. On this cruise, a meter wheel kindly supplied at short notice by RVS was lashed to the davit and was

just workable: I do not recommend it as a permanent arrangement because the wheel is unreadable by the winchman and safe use therefore depends entirely on the scientist at the rail, who himself can barely read it. The scene is set for unlimited frustration and an accident.

b) There was no adequate laboratory provision for a water bottle rack and handling site. Benches, sinks and power points had been laid out so that there was nowhere for a ready made rack to fit. On this cruise a portable rack was lashed in the fish lab but was inconvenient to use because the bench was too wide, operators had to stand in a throughfare, and the only sink was also in use as a wash sink. Such arrangements are particularly bad for accurate chemical work.

These are serious deficiencies which need urgent rectification: metering gear must be provided for the hydrographic wire, preferably with a repeater at the rail; a wall in the wet lab must be cleared of power points, fitted with a narrow (450 mm) draining bench, taps and space for a rack of, say, eight water bottles - the best position is probably in the after part of the fish lab, on the port bulkhead.

3) The overside zooplankton sampling pump worked successfully despite some leakage at the filters. The filter units were damaged during the storm of 17th - 19th. The apparatus could be redesigned to be rather less cumbersome.

4) The ADCP appeared to work well, apart from its inability to recieve good ships heading information. As a result, many out of range headings were recorded which on playback caused repeated system failures, preventing data retrieval for tabulation.

Table 1

Challenger Cruise 9/87: Station List

This list summarises the work done on the cruise according to station. The headings given are:

Station: Station Name, with any alternatives in parentheses.

Latitude: usually rounded to the nearest minute or half minute.

Longitude: usually rounded to the nearest minute or half minute.

Date: Greenwich Mean Time.

Time: Greenwich Mean Time.

Depth: Sounding with Precision Depth Recorder at start of station, metres.

CTD: The Bissett Berman CTD was used on leg 1; Neil Brown Instrument Systems CTD on leg 2.

Disc: Floppy disc used to store CTD data.

Dip: Reference number of CTD dip.

Sal: Salinity samples taken for CTD checking purposes, usually at surface via non-toxic pump and at the wire depth stated (metres).

Cs: Large volume (25 or 50 litres) water samples collected for radio-Caesium analysis by University of Glasgow (*, acidified) or M.A.F.F. Lowestoft (non-acidified). Samples marked "a" were collected on the day following that shown for the remainder of the station's work.

Nutrients: Nutrient samples were collected at the number of depths shown for nitrate, ammonium, phosphate and ~~nitrate~~ silicate. analysis. Samples were usually at depths 5, 10, 20, 40, 80 m and near bottom.

Phytoplankton: Samples were collected at the number of depths shown for chlorophyll concentration determination. Samples were usually at depths 5, 10, 20, 40, 80 m and near bottom.

Zooplankton: Pumped zooplankton samples were taken at 10 and 30 metres and split to medium and fine fractions.

Table 1

Station (alternatives)	Lat. °N	Long. °W	Date	Time Z	Depth M	CTD/Biss. Disc	Ber. Dip.	Sal.	Cs	Nutrients + Phytoplankton	Light Meter	Zooplankto
1G(C1)	56:40	6:07	8	1911	73	038	001	0, 60	0, 0*			
1G(C1)	56:40	6:07	8	2028	70	038	002					
2G(C2)	56:41	6:17	8	2135	38	038	003	0, 30	0, 0*			
3G	56:42.5	6:22	8	2230	-	-	-	0				
4G(C3)	56:44	6:27	8	2316	135	038	004	0, 115	0, 130a			
5G	56:44	6:36	9	0007	-	-	-	0				
6G(C4)	56:44	6:45	9	0058	41	038	005	0, 130	0, 40a			
7G(C5)	56:44	7:00	9	0226	146	038	006	0, 130	0, 140a			
8G	56:44	7:10	9	1947	-	-	-	0				
9G(C6)	56:44	7:20	9	2120	170	038	007	0	0, 150			
10G	56:44	7:30	9	2218	225	038	008	0, 210				
11G(C7)	56:44	7:40	9	2321	70	038	009	0, 60	0, 65			
12G	56:45.5	7:50	10	0030	-	038	-	0				
13G(C8)	56:47	8:00	10	0135	124	038	010	0, 100	0, 120			
14G	56:49	8:10	10	0220		038	-	0				
T	56:51	8:20	10	0320	142	038	011	0, 130				
15G(C9)	56:53	8:30	10	0421	133	038	012	0, 125	0, 130			
S	56:57	8:47	10	0645	130	038	013	0, 120				
(R)16G(C10)	57:00	9:00	10	0828	138	038	014	0, 100	0, 130			
Q	57:03	9:13	10	1135	315	038	015	0, 305				

Table 1 (Continued)

Station (alternatives)	Lat. °N	Long. °W	Date	Time Z	Depth M	CTD/Biss. Ber. Disc	Dip.	Sal.	Cs	Nutrients + Phytoplankton	Light Meter	Zooplankton
P	57:06	9:25	10	1249	695	038	016	0, 650				
O	57:09	9:42	10	1428	1930	038	017	0, 1900				
N	57:14	10:03	10	1655	2115	039	018	0, 1998				
M	57:18	10:23	10	1927	2212	039	019	0, 2195				
L	57:22	10:40	10	2134	2180	046	020	0, 2160				
K	57:24	10:52	10	2359	850	046	021	0, 835				
J	57:27	11:05	11	0145	606	046	022	0, 584				
I	57:28	11:19	11	0312	725	046	023	0, 682				
H	57:29	11:32	11	0439	1963	047	024	0, 1925				
G	57:29½	11:51	11	0652	1792	047	025	0, 1792				
1L	58:17	5:18	12	0705	120	047	026	0, 116				
2L	58:17	5:30	12	0808	78	047	027	0, 72				
3L	58:17	5:39	12	0905	119	043	028	0, 113				
4L	58:17	5:50	12	1000	104	043	029	0, 91				
5L	58:17	6:00	12	1051	115	043	030	0, 102				
6L	58:17	6:11	12	1143	36	043	031	0, 25				
9K	57:43	5:48	12	1556	80	047	032	0, 75	0*			
8K	57:43	5:54	12	1645	162	047	033	0, 150	0*, 155*			
7K	57:43	6:01	12	1801	164	047	034	0, 140	0*			
6K	57:43	6:08	12	1842	125	047	035	0, 120	0*			
5K	57:45	6:13	12	2010	68	047	036	0, 63	0*			
4K	57:47	6:19	12	2053	77	047	037	0, 70	0*			
3K	57:49	6:24	12	2132	76	047	038	0, 70	0*			

Table 1 (Continued)

Station (alternatives)	Lat. °N	Long. °W	Date	Time Z	Depth M	CTD/Biss. Ber. Disc	Dip.	Sal.	Cs	Nutrients + Phytoplankton	Light Meter	Zooplankton
2K	57:51	6:30	12	2211	106	047	039	0, 80	0*, 100*			
HD1	57:08	7:11	13	0342	134	047	040	0, 100				
HD2	57:05	7:00	13	0455	145	047	041	0, 135				
HD3	57:02	6:50	13	0553	124	048	042	0, 122				
HD4	56:59	6:38	13	0703	101	048	043	0, 100				
2G(C2)	56:41	6:17	13	0930		-	-	-	35, 35*			
1G(C1)	56:40	6:07	13	1035		-	-	-	50, 50*			

CTD Change: Neil Brown 1

Station	Lat.	Long.	Date	Time	Depth	CTD/NBIS Disc	Dip					
E5	56:16	6:05	13	1752	97	017	044	0, 90	-	-	-	-
E4	56:14	6:02	13	1837	85	017	045	0, 75	-	-	-	-
E3	56:11	5:59	13	1924	99	017	046	0, 80	-	-	-	-
E2	56:08	5:56	13	2008	95	017	047	0, 90	-	-	-	-
E1	56:05	5:53	13	2045	104	017	048	0, 98	-	-	-	-
P7	55:53	6:29	13	2322	21	017	049	0	-	-	-	-
P6	35:57	6:35	14	0009	57	017	050	0, 30	-	-	-	-
P5	56:01	6:41	14	0102	65	017	051	0, 40	-	-	-	-
P4	56:05	6:47	14	0155	55	017	052	0, 10	-	-	-	-
P3	56:09	6:53	14	0246	72	017	053	0, 50				
P2	56:13	6:59	14	0344	78	017	054	0, 60	-	-	-	-
P1	56:17	7:05	14	0440	89	017	055	0, 50	-	-	-	-

Table 1 (Continued)

Station	Lat.	Long.	Date	Time	Depth	CTD/NBIS Disc	Dip.	Sal.	Cs	Nutrients + Phytoplankton	Light Meter	Zooplankton
FL15	56:25	5:36	14	1105	208	017	056	0, 50	-	5	Y	-
FL14	56:20	5:41	14	1419	130	017	057	0, 60	-	5	Y	-
FL13	56:17	5:50	14	1522	195	017	058	0, 180	-	5	Y	-
FL12(4E)	56:14	6:02	14	1652	83	017	059	0, 83	-	4 + Productivity	-	10,30
FL11	56:11	6:10	14	2022	76	017	060	0, 60	-	5	-	-
FL10	56:07	6:20	14	2128	69	017	061	0, 50	-	5	-	-
FL9	56:03	6:30	14	2259	47	017	062	0, 35	-	4	-	-
FL8	56:00	6:50	15	0024	58	017	063	0,50	-	5	-	-
FL7	56:00	7:00	15	0154	70	017	064	0, 60	-	5	-	-
FL6	56:00	7:15	15	0312	117	017	065	0, 100	-	5	-	-
FL5	56:00	7:30	15	0435	124	017	066	0, 115	-	6	-	-
FL4	56:00	7:45	15	0610	165	017	067	0, 150	-	6	-	-
FL3	56:00	8:00	15	0747	147	017	068	0, 138	-	6	-	-
FL2	56:00	8:15	15	0917	162	017	069	0, 145	-	6	-	-
FL1	56:00	8:30	15	1042	136	017	070	0, 125	-	6	Y	-
FL0	56:00	8:45	15	1304	140	017	071	0, 120	-	5 + Productivity	Y	10, 30
D0	55:46	8:00	15	1758	112	017	072	0, 104	0*	6	-	-
D1	55:46	7:41	15	1953	88	017	073	0, 80	0*	5	-	-
D2	55:46	7:29	15	2110	59	017	074	0, 54	0*, 25*, 50*	-	-	-
D3	55:46	7:14	15	2233	63	017	075	0	0*	4	-	-
D4	55:46	7:04	15	2346	53	017	076	0, 40	0*, 25*, 45*	-	-	-

Table 1 (Continued)

Station	Lat.	Long.	Date	Time	Depth	CTD/NBIS Disc	Dip	Sal.	Cs	Nutrients + Phytoplankton	Light Meter	Zooplankton
D5	55:46	6:55	16	0119	48	017	077	0, 41	0*	4	-	-
D6	55:46	6:46	16	0231	47	017	078	0, 40	0*	4	-	-
D7	55:46	6:37	16	0337	68	017	079	0, 61	0*, 30*, 60*	-	-	-
D8	55:46	6:29	16	0457	27	017	080	0	0*	2	-	-
7C	55:42	6:22	16	0654	27	017	081	0	-	2	-	-
6C	55:37	6:26	16	0747	86	017	082	0, 95	-	-	-	-
5C	55:33	6:30	16	0843	110	017	083	0	-	-	-	-
4C	55:28	6:33	16	0936	100	017	084	0	-	5	Y	-
3C	55:23	6:37	16	1112	106	017	085	0, 80	-	5	Y	-
2C	55:19	6:41	16	1210	73	017	086	0, 40	-	-	Y	-
1C	55:14	6:45	16	1317	25	017	087	0, 15	-	2	Y	-
5A	55:09	6:00	16	1732	107	017	088	0, 97	0*	5	-	-
4A	55:11	5:56	16	1833	145	017	089	0, 135	0*, 60*, 120*	-	-	-
3A	55:13	5:52	16	1925	136	017	090	0, 125	0*	5	-	-
2A	55:15	5:47	16	2025	142	017	091	0, 120	0*, 50*, 100*	-	-	-
1A	55:17	5:43	16	2126	40	017	092	0	0*	3	-	-
5Y	55:13	5:38	16	2302	92	017	093	0, 75	-	5	-	-
4Y	55:09	5:32	17	0028	110	017	094	0, 100	-	5	-	-
3Y	55:05	5:26	17	0224	100	017	095	0, 80	-	5	-	-
2Y	55:01	5:20	17	0411	92	017	096	0, 75	-	3	-	-
GA1	55:15	5:05	18	1830	-	-	-	0	-	-	-	-
GA2	55:17	5:10	18	1900	-	-	-	0	-	-	-	-
GA3	55:19	5:15	18	1930	-	-	-	0	-	-	-	-

Table 1 (Continued)

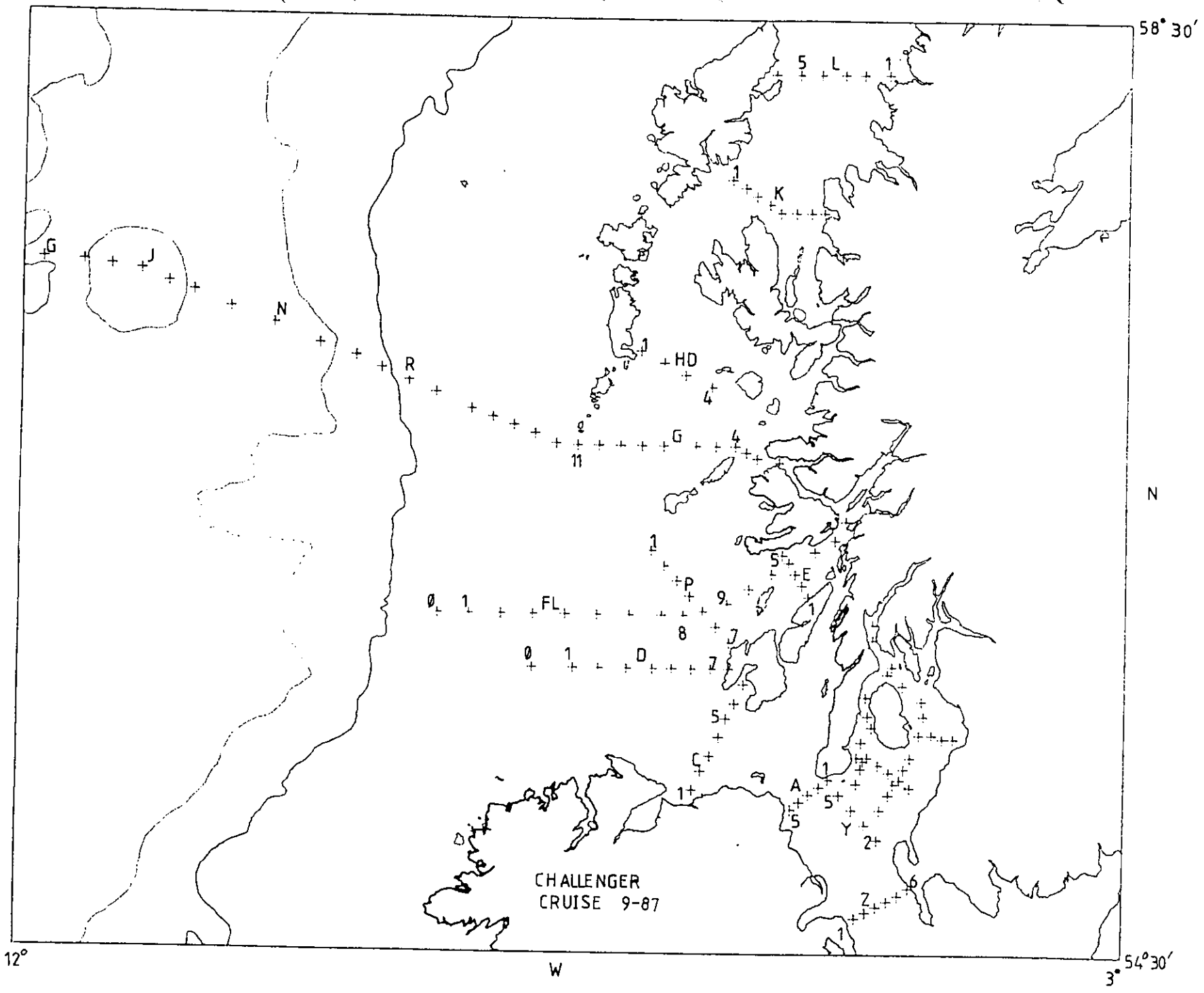
Station	Lat.	Long.	Date	Time	Depth	CTD/NBIS Disc	Dip.	Sal.	Cs	Nutrients + Phytoplankton	Light Meter	Zooplankton
GA4	55:21	5:20	18	2000	-	-	-	0	-	-	-	-
GA5	55:23	5:25	18	2030	-	-	-	0	-	-	-	-
GA6	55:23	5:30	18	2100	-	-	-	0	-	-	-	-
AB4	55:09	5:19	20	1454	66	017	097	0, 50	-	5	Y	-
AB7	55:13	5:15	20	1609	54	017	098	0, 49	-	4	Y	-
AB13	55:16	5:13	20	1719	52	017	099	0, 36	-	4	-	-
AB20	55:20	5:08	20	1818	57	017	100	0, 50	-	4	-	-
AB24	55:23	5:05	20	1925	81	017	101	0, 77	-	4	-	-
AB25	55:29	5:01	20	2110	108	017	102	0, 100	-	6	-	-
AB26	55:29	4:55	20	2230	80	017	103	0, 74	-	5	-	-
AB27	55:28	4:50	20	2339	66	017	104	0, 60	-	4	-	-
AB28	55:28	4:45	21	0106	46	017	105	0, 40	-	4	-	-
AB30	55:34	4:59	21	0604	121	017	106	0, 112	-	6	-	-
AB32	55:38	5:00	21	0727	117	018	107	0, 98	-	6	-	-
AB30	55:34	4:59	21		-	-	-	-	-	Productivity	Y	-
AB37	55:42	5:09	21	1607	176	018	108	0, 165	-	6	-	-
AB38	55:47	5:14	21	1702	164	018	109	0, 153	-	6	-	-
AB40	55:54	5:23	21	1902	147	018	110	0, 143	-	6	-	-
AB41	55:58	5:23	21	1958	112	018	111	0, 90	-	6	-	-
AB42	55:55	5:16	21	2147	119	018	112	0, 105	-	6	-	-
AB45	55:39	5:26	21	2316	137	018	113	0, 90	-	6	-	-
AB46	55:34	5:25	22	0029	110	018	114	0, 80	-	6	-	-
AB48	55:31	5:23	22	0137	88	018	115	0, 80	-	6	-	-

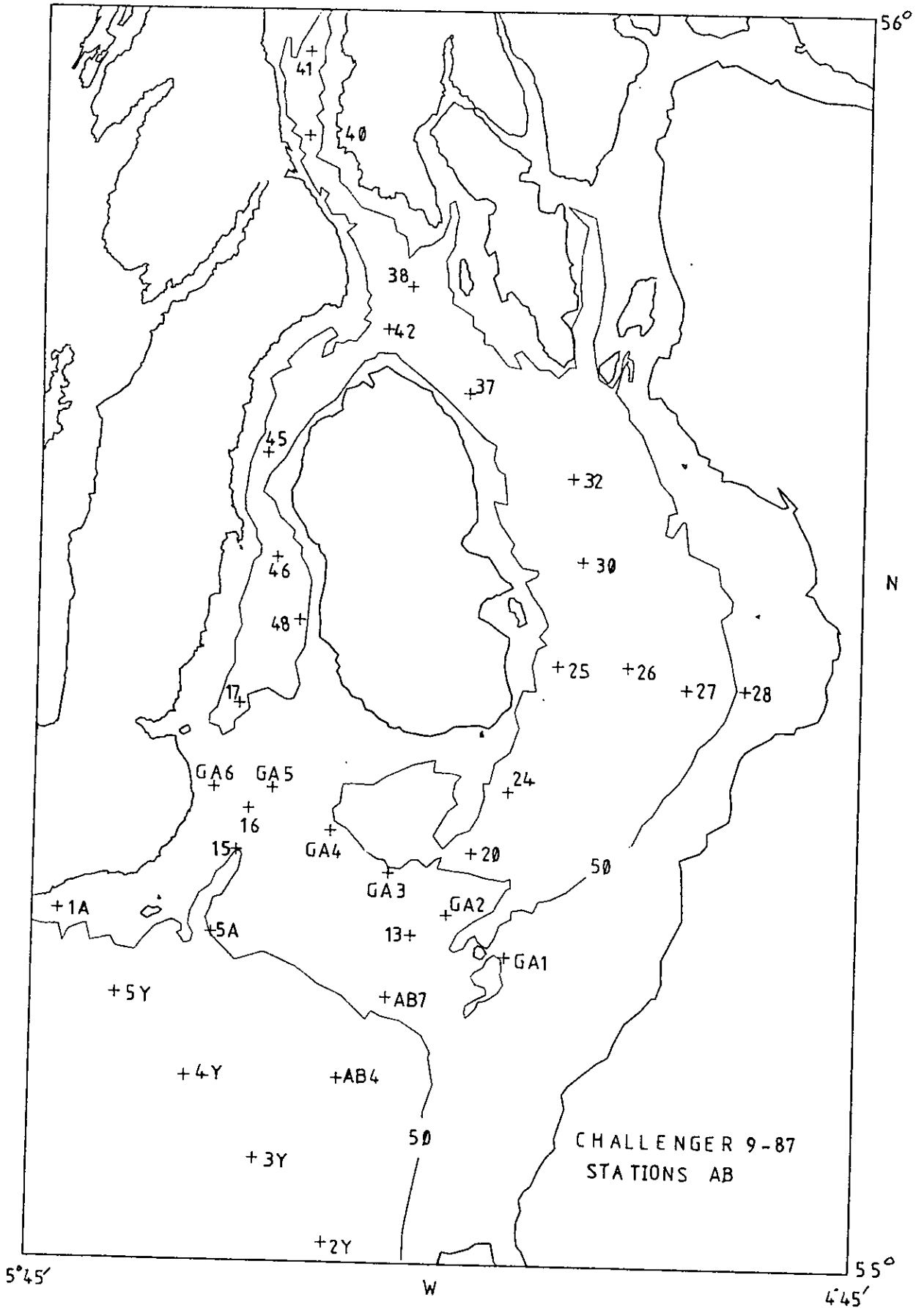
Table 1 (Continued)

Station	Lat.	Long.	Date	Time	Depth	CTD/NBIS Disc	Dip.	Sal.	Cs	Nutrients + Phytoplankton	Light Meter	Zooplankton
AB17	55:27	5:28	22	0248	67	018	116	0, 60	-	5	-	-
AB16	55:22	5:27	22	0345	41	018	117	0, 35	-	4	-	-
AB5A	55:16	5:30	22	0503	55	018	118	0, 48	-	4	-	-
AB15	55:20	5:28	22	0609	53	018	119	0, 45	-	3	-	-
1Z	54:40	5:30	22	-	-	-	-	0	0*	-	-	-
2Z	54:41½	5:25	22	-	-	-	-	0	0*	-	-	-
3Z	54:43	5:20	22	-	-	-	-	0	0*	-	-	-
4Z	54:44½	5:15	22	-	-	-	-	0	0*	-	-	-
5Z	54:46	5:10	22	-	-	-	-	0	0*	-	-	-
6Z	54:48	5:05	22	-	-	-	-	0	0	-	-	-
MAFF	North	Channel	22	-	-	-	-	0				

Challenger Cruise 9/87: Current Meter Moorings

Mooring		Position		Depth	Date	Time	Meter Depths(m)
Y	Lifted	56°37.8'N	6°23.5'W	51 m	9/1/87	0903	39
Y	Laid	56°37.6'N	6°23.2'W	49 m	9/1/87	1453	37
C6	Not Found	-		-	-	-	-
C4	Lifted	55°19.7'N	5°29.9'W	49 m	20/1/87	1123	17, 41
C5	Lifted	55°21.7'N	5°27.1'W	41m	20/1/87	1301	29
C7	Laid	55°25.22'N	5°03.30'W	119m	21/1/87	1024	82, 92, 114
C8	Laid	55°24.53'N	5°02.30'W	80m	21/1/87	1311	59, 75


58° 30′
N
54° 30′
12°
W
3°
CHALLENGER
CRUISE 9-87
G
J
N
R
HD
K
L
G
P
E
FL
D
A
Y
Z
C


56°
41
40
38
42
37
45
32
46
30
48
N
25
26
27
28
17
GA6
GA5
24
16
15
GA4
20
50
GA3
GA2
1A
5A
13
GA1
5Y
AB7
4Y
AB4
50
CHALLENGER 9-87
STATIONS AB
3Y
2Y
5°45'
W
55°
4°45'