SCOTTISH MARINE BIOLOGICAL ASSOCIATION

Dunstaffnage Marine Research Laboratory

Cruise Report

R.R.S. CHALLENGER

Cruise 7/1979

10 - 23 May 1979

RRS CHALLENGER, Cruise 7/1979

Duration of cruise: 1055h 10 May - 0946h 23 May 1979.

All time BST.

Locality: Rockall Channel and Scottish continental shelf.

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Aims: a) Hydrographic

1) To service the SMBA shelf current meter mooring in 57°N, 9°W and deploy deep moorings at stations M, F & P of the Anton Dohrn Seamount section.
2) To service IOS moorings I1 and I4 around the northern and western peripheries of the Rockall Channel.
3) To work the Anton Dohrn Seamount CTD section.
4) To work additional CTD sections in the northern Rockall Channel as time permitted.
5) To collect 50 litre water samples for radiocaesium analysis and CTD profiles at standard positions between the shelf-edge and the Sound of Mull.

b) Benthic

6) To obtain epibenthic sled samples of the abyssal macrobenthos at the SMBA permanent station in 54°40'N, 12°16'W at 2900 m depth.

7) To obtain deep plankton hauls at the permanent station with the rectangular mid-water trawl.

8) To obtain Agassiz trawl hauls between Anton Dohrn Seamount and the St. Kilda continental slope.

Narrative: CHALLENGER sailed from Ardrossan at 1055h 10 May in fine weather and made a good passage to the shelf-edge mooring. The existing mooring, laid on 15 January was sighted at 0750h 11 May and its successor was laid nearby between 0921 and 0951h. The previous mooring was raised between 1050 and 1134h and course was set for IOS mooring I2 near the Wyville-Thomson Ridge in continuing fine weather. Acoustic releases were tested from 2300h to 0230h 12 May during the passage and soundings were logged on the approach to the mooring position from 0815h.

Attempts to operate the acoustic command release of mooring I2a began at 0938h, but neither this single current meter mooring nor the four meter array at I2 responded until 1930h, when the release at the latter position was activated in locked-on mode. The release was operated at 2156h when minimal range had been found, but although apparently fired, did not rise from the bottom. It was deduced from the weak signal that the release was lying on the bottom without buoyancy. A further search for I2a in the locked-on and firing modes produced no results and was discontinued at 2343h.

A CTD section was begun in the vicinity across Cirolana Deep, but at 0620h 13 May at the fourth station the cable entry plug of the CTD sea unit was cracked upon hoisting out. Repairs were completed by 0800h, but as a call to Mr Gould of IOS confirmed that replacement of the mooring was still desirable despite the losses, the section was discontinued and preparations made for launching. The south-westerly winds had risen to force 7-8 during the night however, and at 1015h it was decided to heave-to to await an improvement in the weather. CHALLENGER dodged on south-westerly courses during the remainder of the day and throughout 14 May, when winds attained force 9 at times. During the forenoon of 15 May winds became westerly and gradually decreased to force 7, making it possible to head for mooring I3, situated to the east of George Bligh Bank. An acoustic search began at 1250h and the release was switched on at 1320h. At 1335h the release was fired; recovery of the mooring proceeded smoothly and was completed by 1521h. A replacement mooring was wound on, and was laid between 1815 and 1940h. After checking the acoustic release, course was set for mooring I1, south of Lousy Bank.

An acoustic search for the mooring began at 0415h 16 May. In the absence of a response at the position to the three modes of the release, a box search was begun at 0430h and continued until 0830h without success. As the north-easterly winds were strengthening, a new mooring was laid at 0919 - 1021h and the ship set course back to the position of I2 at 1035h, arriving at 2135h. Winds were force 7-8, but with little immediate prospect of improvement it was decided to launch the mooring, and the station was re-laid between 2230 and 2351h.

CHALLENGER ran before the wind to the position of mooring I4, south-west of Rosemary Bank, and contacted the release and beacon at 1124 and 1140h respectively on 17 May. The ship heaved-to in force 8 winds at 1230h to await an improvement in the weather and a moderation to force 7 occurred the following morning. Wire tests of releases were made at 0545-0655h 18 May and the release at I4 was fired at 0758h. The mooring was recovered between 0810 and 0925h without incident, but the combination of continuing heavy swell with snow squalls postponed re-laying. Further wire tests of releases were made from 1050 to 1445, by which time some improvement in the weather was evident, and after regaining position, mooring I4 was re-laid between 1612 and 1744h. The ship set course for the position of SMBA mooring F, to the west of Anton Dohrn Seamount at 1800h in fining weather. The improvement was shortlived however, and after arriving at station F at 0400h 19 May and laying the mooring between 0436 and 0544h, wind and swell again increased on the passage to station M, between the seamount and the continental shelf. Long-term forecasts showed the incoming depression as persisting in the area for at least 72 hrs, and hence it was decided to begin laying the mooring at 1437h in force 8 southerly winds. Although these attained force 9 before completion of the mooring at 1600h, no undue strain was put upon the gear during the buoy-first launch. The ship remained hove-to until 2035h, when course was set for station P, winds having perversely decreased to force 6-7 in the interim. Station P was reached at 0030h 20 May and the ship hove-to in variable force 2 winds, but with a slowly declining heavy swell. Wires were wound on the winches between

0600 and 0730h and the mooring was set on the continental slope in 1000m depth at 0845 to 0938h. After checking the acoustic release, the ship set course for station J of the CTD section with a view to completing the eastern half of the section during the remaining time available. Stations J to L were worked between 1749 and 2254h and the ship proceeded to station M for an Agassiz trawl haul, which was taken between 0113 and 0540h 21 May. CTD lowerings recommenced at station M at 0736h and continued throughout the day in excellent weather at the centre of an extensive depression. Radiocaesium sampling began at the shelf-edge at 2110h and continued to the Sound of Mull at 1042h 22 May, with CTD observations at all stations except C1. The ship then steamed to Loch Moidart to begin a section across the Sea of the Hebrides to Loch Boisdale, but troubles with the boiler superheating occurred en route and it was decided to head for open water to enable tests to be made. These showed that cold water was being drawn into the system whenever the ship stopped on station and after discussion it was agreed at 1500h to cancel further work and head for Ardrossan so that the boiler could be shut down and repairs effected before the following cruise. Surface temperature and salinity sampling was carried out through the Tiree Passage to the west coast of Islay. The ship berthed at Ardrossan at 0946h 23 May.

Results: a) Hydrographic

Aim 1) The SMBA shelf current meter mooring was serviced on 11 May. The existing mooring was close to the position of laying, but had been tampered with as the pick-up line had been cut off and the buoy anchor

was tangled with the ground wire. The upper meter, nominally at 43 m, had functioned correctly and should provide 116 days of record, but the lower meter at 113 m nominal depth had leaked through corrosion at the thermistor housing. Moisture had bridged the timing contacts, so that the tape was fully used upon recovery, although the early part of the record should be valid.

The three deep single-strand moorings were launched without incident during 19 - 20 May and details are given in Table 1. Despite losing the advantage which anchor-first deployment gives of positioning the moorings precisely, the buoy-first system gives greater flexibility of working during poor weather, as strains upon the 8 mm wire are low until the release of the anchor. Six 17" diameter glass spheres were attached in pairs at moorings F and M to reduce the knock-down of up to 160 m which occurred during 1978 deployments. Recovery of F and M is planned for CHALLENGER cruise 16/1979 in October and of P for cruise 13 in mid-September.

Aim 2) Mr Cherriman has contributed the following report on the servicing of the IOS moorings:

Mooring IOS - 260 (I2) and 261 (I2a)

Both of these moorings were originally deployed within $\frac{1}{2}$ mile of each other. On approaching the nominal position an attempt was made to switch on the beacons, with negative result. Extensive transmission was made whilst on position with the same result. A box search of both moorings was made, still without response. On completion of the box search the final approach to the position was from the north-west when

CHALLENGER CRUISE 7/1979

D01, D02 entries for ROSCOP form

SMBA 1 mooring recovered, with 1 current meter, 115 days' data (Shelfedge mooring R @ 57°00.9'N, 09°01.7'W; other c-m lashed.

4 moorings laid (including re-laying R & laying F, M, P).

IOS 3 moorings recovered with 9 current meters, 3@ 264 days
4@ 254 "
1@ 228 "
1@ 33 "

4 moorings laid

DEA 14 June 1982

261 lost

an attempt was made on the release frequency, with a positive result. It soon became apparent that the command release (C.R.) was laying on the bottom from the directivity of the signal. This was confirmed when after the C.R. went through the firing position it failed to leave the sea bed. The C.R. failed to respond at all on 320 Hz.

Conclusion:

Mooring 260 broke away somewhere below the Command Beacon. 261 broke away completely. 1 current-meter recovered 228 days

Mooring IOS - 258 (I3) 4 current-meters 4@254 days each

58°55.82'N, 13°15.11'W

was the next mooring recovery attempt. This was switched on and recovered without incident. All four current meters had functioned with full data tapes.

There were signs of corrosion on this mooring.

Mooring IOS - 259 (I1) lost

was then approached with no response at all. Again a box search was made with no response from the C.B. or C.R.

Conclusion:

Mooring broke away from the release mechanism or below.

Mooring IOS - 257 (I4) 4 current-meters 3@264 days each 1@ M_2 33 days only

was recovered successfully without incident. The corrosion on this mooring was very extensive, especially on the release mechanism which was corroded away to such an extent that the survival of this mooring could only be placed at a few more days.

Three of the four current meters had functioned with full data tapes, and the fourth failed after approximately $\frac{1}{2}$ tape with a main battery collapse.

All four moorings were replaced: IOS Nos. 268-271 inclusive (I1 - I4). Deployments were successful without incident.

268 4cm
269 3
270 4
271 4

Moorings I2 and I3 incorporated prototype transponders at 200 metres - initial results indicate a useful range of 3km.

Aim 3) Due to the unsettled weather and the priority given to mooring activities it was not possible to work the Anton Dohrn Seamount CTD section in full, but the portion from the seamount eastwards was worked between 1749h 20 May and 2243h 21 May. The replacement CTD sea-unit worked well apart from some spiking which coincided with ship movements or with shocks during the unlaying of turns from the winch drum.

Aim 4) A section across Cirolana Deep near the Wyville-Thomson Ridge was begun on 13 May, but not completed due to the fracturing of the connector to the CTD sea-unit at the fourth station and a lack of time after its replacement. The deep was sampled at its centre to 1670 m however and temperatures of 4.1°C in the lowest 100 m of the water column give evidence of Norwegian Sea overflow water.

Aim 5) 50-litre surface water samples for radiocaesium analysis by the Fisheries Radiobiological Laboratory were collected at ten standard sampling positions across the Scottish continental shelf and CTD lowerings were made at all but the easternmost station. At all stations the thermocline was weak (0.5 deg. C or less) and

shallow (less than 10 m), and surface temperatures were 2 to 2.5 deg. C below values recorded in late May 1976.

b) Benthic

Aims 6 & 7) As bad weather delayed the completion of the mooring programme until 20 May and forecasts continued to be unfavourable thereafter, there was neither sufficient time nor opportunity to reach the permanent benthos station in 54°40'N, 12°16'W.

Aim 8) An Agassiz trawl haul was made in depths of 2200 m in the vicinity of station M, to the east of Anton Dohrn Seamount between 0113 and 0540h 21 May. Despite some initial difficulties with seized blocks and a broken lead within the pinger, a good haul was obtained. At a first sorting, the species obtained appear to be those taken in previous trawls at this site during 1978 and 1979.

D.J. Ellett

31 May 1979

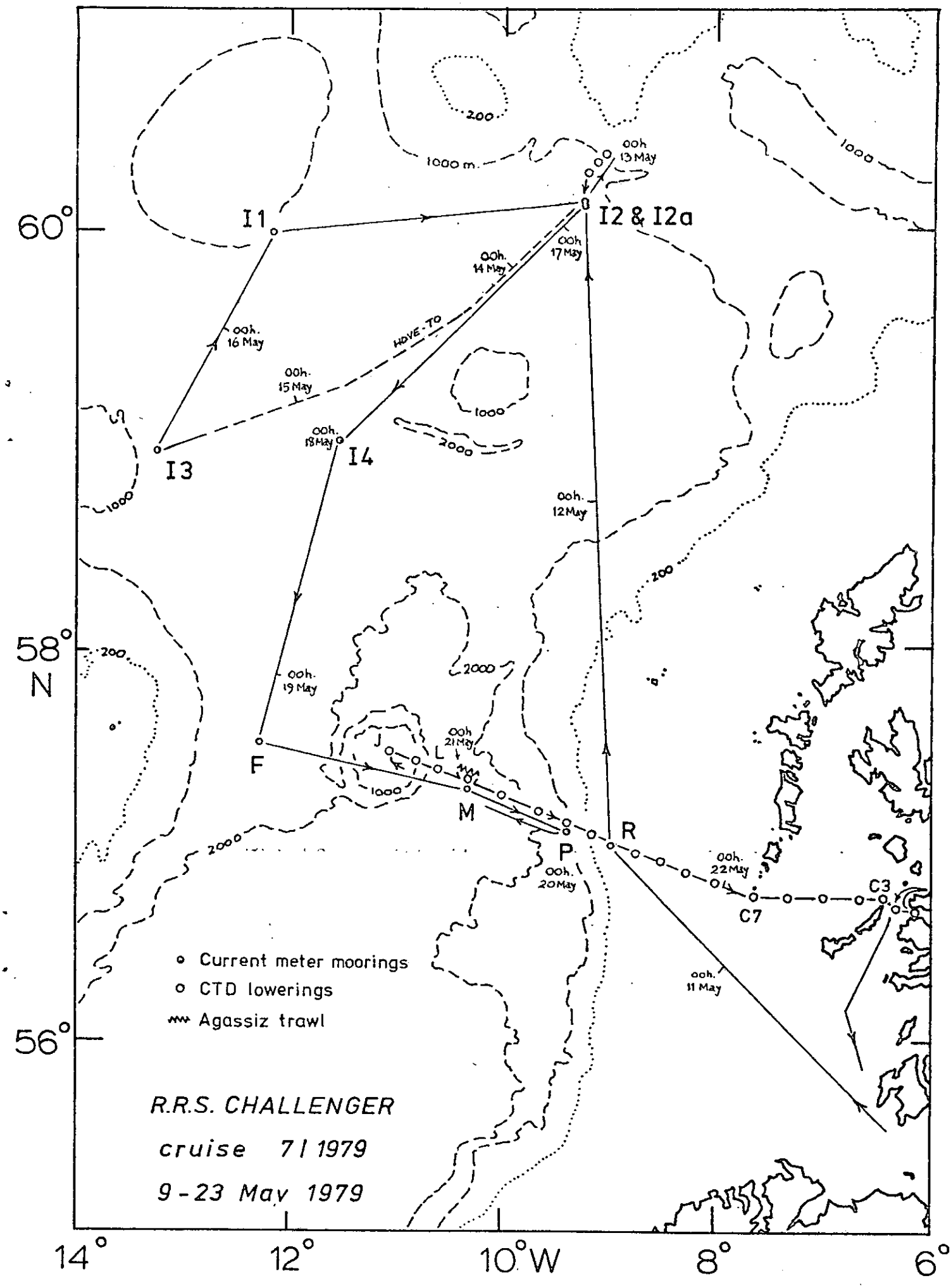
Table 1. Details of SMBA current meter moorings set during CHALLENGER cruise 7/1979.

Station		F	M	P	R
Position	N	57° 30.2'	57° 13.4'	57° 06.3'	56° 59.2'
	W	12° 16.0'	10 22.2'	09° 23.5'	09° 02.7'
SMBA Mooring no.		51	52	53	50
Sounding (m.)		1789	2245	992	136
Nominal depth of sub-surface float (m.)		55	146	80	26
Nominal meter depths (m.) (P: pressure sensor) (All have temperature sensors)		68 P	159 P	92 P	40 47 days
		479 P	570 P	242 P	110 " "
		982 P	1072 P	491 P	-
		1733	1823	892 P	-
Sampling frequency		30 mins	30 mins	20 mins	10 min
Laid at (GMT)		0444h	1500h	0838h	0851h
		19 May 1979	19 May'79	20 May'79	11 May 1979

Table 2. Details of IOS moorings set during CHALLENGER cruise 7/1979.

Station	I1	I2	I3	I4
Position N	59° 58.6'	60° 11.2'	58° 55.3'	58° 51.7'
W	12° 12.3'	09° 18.1'	13° 16.3'	11° 37.7'
IOS Mooring no.	269	270	268	271
Sounding (m.)	1120	1370	1615	1860
Nominal depth of sub-surface float (m.)	246	110	195	223
Nominal meter depth (m.) (P: pressure sensor) (All have temperature sensors)	267 P	131 P	216 P	244 P
	672	535	620	652
	1075	939	1024	1055
	-	1315	1529	1561
Sampling frequency	60 mins	60 mins	60 mins	60 mins
Laid at (GMT)	0921h	2251h	1841h	1644h
	16 May 1979	16 May '79	15 May '79	18 May '79
DURATION days	3@95	3@96	95	4@92
		1@45	91	
			95	
			93	

taken from CMI


60°
58° N
56°
14°
12°
10° W
8°
6°
I1
I2 & I2a
I3
I4
F
L
M
P
R
C3
C7
00h. 13 May
00h. 17 May
00h. 14 May
00h. 16 May
00h. 15 May
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00h. 11 May
HOVE-TO
200
1000 m.
1000
2000
Current meter moorings
CTD lowerings
Agassiz trawl
R.R.S. CHALLENGER
cruise 7 / 1979
9 - 23 May 1979