Scottish Marine Biological Association

Dunstaffnage Marine Research Laboratory

CRUISE REPORT

R.R.S. CHALLENGER

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SCOTTISH MARINE BIOLOGICAL ASSOCIATION

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Cruise Report

R.R.S. CHALLENGER

Cruise 10/1981

4 July - 14 July 1981.

R.R.S. CHALLENGER, Cruise 10/1981

Duration: 1030h 4 July - 1100h 14 July 1981.

All times BST.

Locality: Minches, Scottish continental shelf and Rockall Channel.

Staff:

D. T. Meldrum	
R. Bowers	
D. J. Edelsten	
Dr. J. Graham	
N. D. Pascoe	
N. MacDougall	
P. Johnston	(Marine Biology Station, Portaferry)
Miss A. Ashcroft	(Marine Biology Station, Portaferry)
A. G. Gordon	(Woods Hole Oceanographic Instn.)
D. L. Schneider	(Woods Hole Oceanographic Instn.)

Aims:

(1) To service the SMBA shelf-edge current meter mooring at station R ($57^{\circ}00'N$ $9^{\circ}00'W$), and the corrosion potential current meter (CPCM) at Z ($57^{\circ}18'N$ $7^{\circ}40'W$) off South Uist.

(2) To make an extensive CTD survey of the Scottish coastal current between the North Channel and Cape Wrath with surface sampling of radio-caesium for the Nuclear Geochemistry Unit, Glasgow University.

(3) To collect sediment cores with the WHOI tripod corer at a number of locations along the axis of the coastal current to provide information about deposition and dispersion of Irish Sea wastes.

(4) To measure chlorophyll concentrations over the Shelf and Shelf-edge.

(5) To work two CTD sections across the continental slope zone to provide comparison with others worked during April.

(6) To collect 50 litre surface samples for radio-caesium determination by the Fisheries Radiobiological Laboratory at ten standard positions between the Sound of Mull and the Shelf-edge; these samples also to provide an intercalibration of the Lowestoft and Glasgow methods of determination.

Narrative: All gear was loaded on to CHALLENGER during the morning of 3 July, and by evening all scientists had assembled on board. After a fruitless wait for a parcel of spares from RVS Barry, CHALLENGER sailed at 1030h on 4 July in fair weather and at once set course for the first coring position, X1, at 55°00'N 5°18'W. Three coring attempts at this position, off the entrance to Loch Ryan, and at 55°00'N 5°22'W failed to return specimens despite the apparently coreable sediments revealed by grab samples, and problems with the closure of the corer's lower sphincter were diagnosed. The corer was repaired while CHALLENGER headed towards the first CTD/surface sample station, but further grabs returned sand only and coring was abandoned at 2058h. Station 1A, close under the Mull of Kintyre, was reached at 2345h and line A worked throughout the night. Winds freshened from the south reaching gale force with rain as line B was worked west from the Kintyre peninsula towards Islay. Nevertheless, the corer was deployed at X2 close to station 4B and a 43 cm core retrieved at 1106h on 5 July. Improving weather accompanied the passage from the end of line B to the start of line C in the land-locked waters of Laggan Bay, Islay; the section being completed at 2138h in the entrance to Lough Foyle. Line D was commenced 41 miles to the west of Islay at 0411h on 6 July and completed in freshening south-westerlies at 1151h under the Rhinns of Islay. Course was then set to the south of Colonsay to pick up the start of line E off the NW coast of Jura. A successful core was obtained at X3 between stations 2E and 3E at 1743h, the section being completed at the Ross of Mull at

1925h. Station 1F between Iona and Staffa was reached in a moderate south-westerly sea at 2309h, the line being finished close to Tiree at 0207h on 7 July. An additional station, Y, was included close to the SMBA mooring in the Tiree Passage to allow intercomparison of the WHOI, MAFF and Glasgow University radio-caesium determinations, course then being set for the Sound of Mull and the start of line G, the well established caesium sample section. Poor visibility restricted progress to the west, but a core sample was recovered at X4, close to station 8G, at 1355h. This proved to have been disturbed and CTD/surface sample stations were continued west to 11G, south of Barra Head. The coring station, a basin 205 m deep, was re-occupied at 2017h and a 52 cm undisturbed core retrieved, prior to heading for the nearby station 1H in improving weather. The wind continued to moderate throughout the night as section H was worked to the west of the Small Isles and had backed south-easterly by the time the line was completed in Loch Bracadale at 0325h on 8 July. CHALLENGER then headed west along line I to S.Uist before steaming north-east to enter Loch Dunvegan for the start of line J at 1114h. A further mud core, X5, was recovered close to the end of this line off the Sound of Harris at 1732h and was sectioned on the way to station 1K in the mouth of Loch Seaforth. Calm weather allowed steady progress along line K, the north tip of Skye being passed at midnight. Having completed the line at 0229h on 9 July, CHALLENGER steamed north and successfully sampled the final core position, X6, which had been previously occupied by the RV KNORR in May 1976. Pressing crew shortages forced a brief

shore visit to Lochinver at 0900h, this landfall having been selected after careful recourse to an AA Members' Handbook, 1972 edition. The weather remained fine throughout the day, line L being traversed from Eddrachillis Bay to Tiumpan Head before rounding the Butt of Lewiss at 1900h en route to line M. Detailed chlorophyll sampling was commenced on this leg, fluorometer lowerings using the Mk 2 Irish Spooling Gear being supplemented by frequent water bottle casts. On completion of station 6M at 0124h on 10 July, CHALLENGER turned south to traverse line N from Gallan Head past the Flannans and across the shelf-edge to the deep water south-east of Rosemary Bank, some time being lost owing to bow-prop troubles. Heading south again in continuing fine weather, CHALLENGER reached the start of line O at 0524h on 11 July. The passage of a front during the night produced a change to north-easterly winds as CHALLENGER worked line O to the south, turning eastwards to pass close to St. Kilda at 1040h and reaching the last station of the section near the Monach Isles at 1619h. The CPCM at station Z was retrieved intact at 1949h in fine calm conditions, the current meter then being checked for balance on the hydrographic wire. Section P was commenced off South Uist at 2120h, the records showing considerable amounts of patchy warming as a result of the calm weather. The night remained fine and the westermost station of the line was completed at 0713h on 12 July. CHALLENGER then steamed WSW, picking up the Anton Dohrn CTD section at station N in a sounding of 2160 m prior to performing a series of closely spaced CTD and fluorometer casts across the shelf-edge

as far as station R (57°N 9°W), where the shelf mooring was retrieved complete at 2139h and re-deployed at 2325h. The section was resumed at 2336h, now including the large volume ^{137}Cs water samples for MAFF, and completed off Barra Head at 0658h on 13 July. CHALLENGER then turned south along line Q in light north-westerlies and drizzle, course being altered to the east over the Stanton Banks at 1224h to complete the section close to the Torran Rocks at 1904h. Course was then set for Ardrossan, detouring slightly to allow coring to be attempted once more in the North Channel at 0422h on 14 July. The sediments again proved unsuitable and CHALLENGER continued into port at Ardrossan.

Results: Aim 1). Mooring R was retrieved without difficulty and relaid at 2325h on 12 July in 57°00.1'N 9°00.6'W.

Mooring Z was retrieved intact at 1949h on 11 July but was not relaid.

Aim 2) Predominantly fine weather allowed all the planned stations to be occupied and a total of 141 CTD casts were performed. The water sampling programme was also completed. The CTD tail failed on one occasion and had to be replaced.

Aim 3) Successful cores were obtained by WHOI at five of the six planned sites and sub-samples distributed to the Fisheries Radiobiological Laboratory, Lowestoft and to the Nuclear Geochemistry Unit, University of Glasgow. A coring report, based on WHOI field notes, is given in Appendix A.

Aim 4) Continuous surface temperature, salinity and fluorometer readings were taken throughout the Shelf and Shelf-edge section of the cruise, supplemented by lowerings and water bottle casts at selected stations.

Aim 5) Both slope CTD sections were completed successfully.

Aim 6) All standard radio-caesium stations were sampled, bringing the total weight of water samples on board to 2.3 tonnes.

Miscellaneous

A prototype electronic counter/display was fitted to the CTD winch for part of the cruise. Extensive repairs were made to the ship's master clock system.

Acknowledgement

Particular thanks are due to Capt. Selby-Smith and his crew who allowed optimum use to be made of the unusually fine weather.

D. T. Meldrum

October 1981.

APPENDIX A

R.R.S. Challenger Cruise 10/81 Coring Report

Position X1 North Channel

Two attempts were made to core the sediment at the entrance to Loch Ryan at 55 00N 5 18W in a sounding of 77m and 55 00N 5 22W (sounding 135 m). Both attempts failed owing to a combination of corer problems and unsuitable sediment. Grab samples taken at 55 00N 5 26W (sounding 120 m) and 55 03N 5 29W (sounding 112 m) returned sand only, and coring was not tried. On the return journey at the end of the cruise a further attempt was made 9 miles south of the Mull of Kintyre at 55 09N 5 47W (sounding 139 m), but the grab again returned sand only and coring was abandoned.

Position X2 (4B) Southern Approach to Sound of Jura
55 37.7N 5 55.7W (sounding 105 m)

A successful core, 44 cm long, was obtained on the second attempt in strong southerlies and was completely extruded.

Description: 'Uniform grey mud from bottom to within 10 cm of the surface. Very few shell fragments. Top 10 cm were inhomogeneous with lighter tan sediment swirled through the grey mud. The top sediment was not scooped because it was uneven and disturbed. Corer banged several times against side of ship while being brought aboard.'

Position X3 (3E) Firth of Lorne
56 10.3N 5 58.6W (Sounding 125 m)

The 50 cm core recovered here was scooped untrimmed for the first 10 cm and the remainder extruded.

Position X4 (8G) Sea of the Hebrides
56 44.0N 7 07.9W (Sounding 205 m)

The first core obtained was disturbed and was not sampled for Glasgow University. The second attempt yielded 52 cm of undisturbed sediment.

Description: 'Top water drained off and core left overnight before extruding. Tube worms were protruding from the top. Core was extruded completely.'

Position X5 (5J) Little Minch
57 37.4N 6 58.0W (Sounding 158 m)

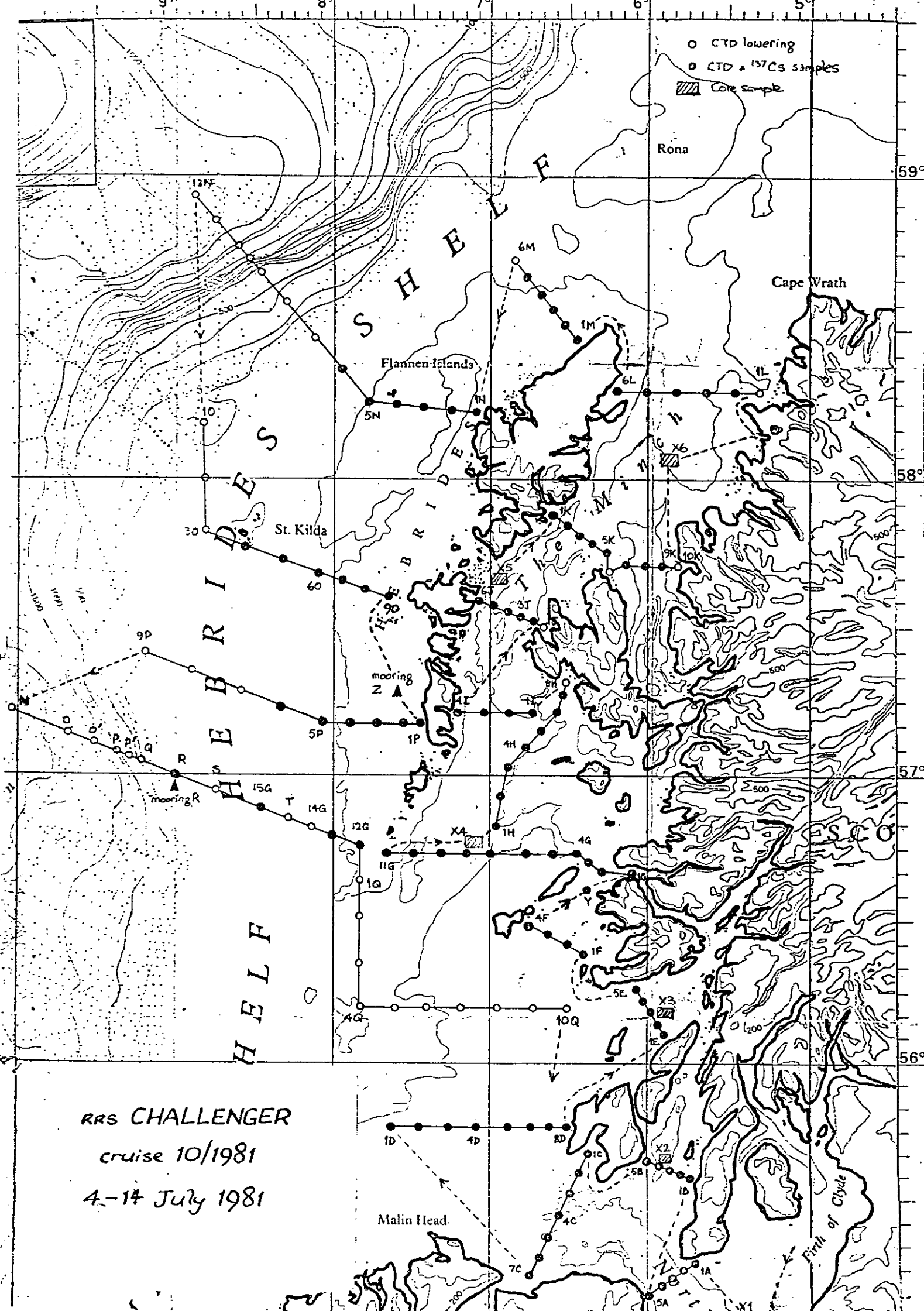
A 14 cm core was recovered at the third attempt, the first two having failed owing to problems with the bottom sphincter value.

Description: 'Bottom valve did not close completely - 25 cent piece size opening. Not sure if any sediment drained through. When brought aboard the core barrel remained full of water and had to be siphoned. The surface of the sediment, however, had two large cracks in it where the surface had pulled apart. Also was higher on one side than the other. No really soft, fluffy top material.'

Position X6 North Minch
58 05.7N 5 51.6W (Sounding 100 m)

A 56 m core was recovered at the first attempt.

Description: 'Surface looked only slightly disturbed: some worms visible on surface. Scooped 2 cm, extruded remainder.'


CTD lowering
CTD + 137Cs samples
Core sample
Rona
Cape Wrath
Flannen Islands
St. Kilda
Malin Head
Firth of Clyde
mooring Z
mooring R
HEBRIDES SHELF
MINCH
59°
58°
57°
56°
RRS CHALLENGER
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