SMBA, Dunstaffnage Marine Research Laboratory.

Cruise Report : RRS CHALLENGER Cruise 3/1975.

Duration : 1215 h 4 March to 0930 h 13 March 1975.
All times GMT.

Locality : Rockall Channel, 55°30' to 57°30'N.

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Aims : 1) To establish a current-meter mooring in 57°N, 9°W.

2) To work hydrographic sections across the Rockall Channel from 55° 34'N, 08° 38'W to Rockall Bank and from Rockall to 57°N, 9°W by way of Anton Dohrn Seamount.

3) To obtain bottom samples for the Dept. of Geology, UCW, Aberystwyth.

4) To work short hydrographic sections off the shelf to the north of the current-meter mooring.

5) To obtain 50 l suface water samples for 137 Cs analysis by the Fisheries Radiobiological Laboratory, Lowestoft.

6) To gain experience of the STD cassette-tape data-logging system.

7) To make XBT observations for transmission to Bracknell.

Cruise Narrative, Ship and Equipment performance are detailed in the report submitted to the Research Vessel Base.

Results : Aim 1) The mooring was laid in excellent weather on 5 March. Apart from some fouling of the turns on the drum by shackles towards the end of the ground line, no trouble was encountered and laying was completed by 0930 h. The buoy was sighted and the position re-checked during the afternoon whilst working STD stations, and the light was observed in the early hours of the following morning whilst making for shelter. However, when CHALLENGER returned to the position at 0800 h 11 March no trace of the mooring was found. A box search covering a radius of approximately 5 miles from the Decca co-ordinates of the mooring was carried out in very clear and calm conditions without sighting either the spar buoy or the buff attached to the sub-surface float. Sightings of a 30 cm diameter orange trawl-float and other floating debris suggested that the sub-surface buff should have been seen if still in position.

On completion of the search at 1500 h a Gifford grapnel was attached to the tapered warp and drags were made across the line of the ground wire. No contact was made with the rig, and after some 3 hours it was agreed to encircle the position with the warp in order to sweep the whole area. Again, no contact was apparent and at 2100 h it was necessary to set course for Dunstaffnage.

Loss of the rig could have resulted from: a) Position fixing errors; b) Storm damage; or c) Damage or tampering by passing vessels. None of these causes can be ruled out; a) taken on its own seem unlikely, for although Decca and Loran - C readings were sometimes inconsistent, repeatable readings were

obtained for most of the daylight hours, both when laying and attempting recovery. Whilst a position error beyond the 5-mile radius of the box-search may be discounted, smaller errors were almost certainly present, and will have added to the difficulties in grappling for the rig. It appears that more time should be spent in future in reconciling the positions, orientation and dimensions of the rig with a large scale chart of Decca and Loran co-ordinates subsequent to laying. Satellite navigation should be considered for the future, and may be essential for deploying stations further to the west.

b) could be a contributory cause if the spar buoy had become detached by storm damage. Strong north-westerly winds with heavy swells occurred on four of the six days between laying the rig and returning to the position. All the components of the rig were new and properly secured, however, nor does it seem probable that unusually strong currents had caused either the spar buoy or sub-surface float to be towed under and crushed.

From several points of view it seems most probable that c) was the chief cause of the loss. A number of Russian and Norwegian stern-trawlers were fishing in the area when we returned to it, and it seems possible that one of these may have towed down the rig at night, moving the rig and possibly causing the implosion or detachment of the spar buoy or sub-surface float. In such a case all traces of the mooring would be absent from the correct position and only a transponding release would offer any chance of finding the current-meters unless wide-spread bottom

trawling was undertaken.

No certain steps can be taken to prevent loss in the future, but increased publicity in advance of laying the mooring seems desirable. News items in the fishing press could help to inform foreign vessels, and posters should be circulated to British fishing ports and foreign laboratories. 'Dayglo' paint should be used on the buoys, and it could be worth marking the line of the rig by a second, independent, spar buoy. Accoustic releases should be fitted to the meter wire if the necessary transducers can be installed on the ship.

Better arrangements are needed for grappling. Damage to the tapered wire resulted from laying it in a bight around the mooring, and it would be preferable to carry 1000 m of less specialised warp either as a leader on one of the drums, or on an auxilliary winch. A heavy six-pronged grapnel should be attached some 10 m after the Gifford grapnel.

Aim 2) A section through the current-meter position to Anton Dohrn Seamount was begun on 5 March, but after working 1 water-bottle and 5 STD stations a forecast of force 10 winds forced the abandonment of the section at 0030 h 6 March. With more favourable forecasts to the south, it was decided to make for the Malin Head - Rockall section, but work here was unable to commence until 1400 h 8 March and was interupted between 0530 h 9 March and 0600 h 10 March by heavy sea and swell conditions. Despite two further 6-hour breaks due to engine room repairs the section of 17 stations was completed at 1530 h 11 March, all but one of the stations being worked by STD, the exception being worked by water-bottles whilst the STD cable connection was under repair.

The completed Malin Head - Rockall section is of especial interest as having been worked during a period of moderate to strong north-westerly winds. The earlier section towards Anton Dohrn Seamount should provide sufficient data to assess mass transport along the shelf-edge before the onset of these winds.

Aim 3) Shipek grab samples were sucessfully obtained at the 10 shelf stations of the sections and at an additional station on Rockall Bank.

Aim 4) Time did not permit the working of further shelf-edge sections.

Aim 5) 10 surface 50 litre samples were taken between Ardmore Point and 57°N, 9°W for 137 Cs analysis.

Aim 6) Data from the STD were logged upon cassette-memory tapes via the Hewlett-Packard 9820A calculator at most stations. Programme development proceeded at sea and enabled many potential snags to be overcome. Plotting programmes were also developed and allowed the recorded data to be examined in detail immediately after the lowering. The tapes will allow further calibration and data-processing programmes to be developed in the laboratory.

Aim 7) No XBT probes were available, but 12 messages were coded from the STD traces and despatched to Bracknell.

D.J. Ellett
26 March 1975