SMBA Dunstaffnage Marine Research Laboratory

Cruise Report: RRS CHALLENGER, Cruise 5A/1976.

Duration: 1600h 29 March - 0945h 5 April 1976. All times BST.

Locality: Rockall Channel.

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Aims:

1) To establish a current meter mooring in 57°N 9°W with the aim of continuing observations at this station throughout the year.
2) To work the Anton Dohrn Seamount hydrographic section.
3) To launch a satellite-tracked buoy fitted with a thermistor chain and wave recorder and to make TSD observations in the vicinity of the launching position.
4) To work a shelf-edge section towards St. Kilda, if time permits.
5) To obtain 50 litre surface water samples over the Scottish shelf for ^{137}Cs analysis.

6) To transmit messages of vertical temperature profiles to Bracknell.

Narrative: The ship sailed from Aberdeen at 1600 h, 29 March, six hours later than intended due to continuing strong westerly winds. Passage was made through the Pentland Firth on the morning of 30th March, and CHALLENGER turned southward through the Minch that evening. Westerly winds were of force 7 - 8 with a heavy swell when the ship passed Barra Head at 0900 h, 31st March. It was decided to dodge towards the position for the current meter mooring to await an improvement in weather conditions. This occurred in the early hours of 1st April, when winds dropped to force 4 - 5 and turned north-westerly, reducing the swell. The mooring was laid between 0202 and 0250 h, 1st April without incident.

As the lull in winds was not expected to be of any great duration, the ship steamed towards Rockall with the aim of deploying the TWERLE-Nimbus F buoy as far to the westward as practicable. At 1554 h on the same day it was launched in $12^{o}37'W$ longitude, but was subsequently found to have ceased transmitting. Recovery was completed by 1650 h and the ship steamed for the westernmost station of the Anton Dohrn Seamount section, work on this commencing at 2020 h. STD stations were worked eastward along the section, and preparations were made to launch the repaired TWELRE buoy at station G at 0900 h, 2nd April. Unfortunately transmission was again found to have ceased, and work on the section resumed without interruption.

During the day winds turned southerly and increased, and

after crossing Anton Dohrn Seamount had reached force 7 - 8. Work continued to station O at 0108 h, 3rd April, when the increasingly heavy swell and 45 kt. winds permitted STD observations to 700 m only. Further work being imprudent, the ship steamed for Barra Head, passing by the mooring position at 0316 h, when it was confirmed that the spar buoy was in position and alight.

Barra Head was reached at 0830 h, 3rd April and the ship anchored in Usinish Bay, S. Uist at 1326 h. Winds had moderated somewhat by the following morning and the ship weighed anchor at 0612 h, 4th April. Swell to the westward of Barra Head was still large and winds were of force 6, but station C8 of the 137Cs sampling positions was worked with the STD at 1132 h before the ship returned eastwards to sample the seven easternmost caesium stations. STD lowerings were made at all except the last of these.

Results. Aim 1) The current meter mooring was deployed at 0250 h, 1st April, with two current meters at 30 & 100 m depth in soundings of 134 m. Although laid at night by Decca fixes, due to a temporary fault on the satellite navigation system, observations two days later when the system was again in use confirmed that the mooring was laid very close to the nominal position of 57°00'N, 09°00'W.

Aim 2) Stations A to N of the Anton Dohrn Seamount hydrographic section were completed, and station O worked to 700 m between 2020 h, 1st April and 0108 h 3rd April. Weather prevented the working of the five easternmost stations, but current meter data should be available to provide contemporary estimates of transport at the shelf-edge.

Aim 3) Although a number of faults within the buoy transmit terminal of the TWERLE buoy were discovered and rectified, reliable transmission could not be achieved. During the launching on 1st April the buoy received two sharp knocks from the blocks of the stern gantry, but it is not certain that it was transmitting immediately before this. Subsequent work resulted in transmissions during the evening of 1st April, but these had ceased when fresh launching preparations were begun on the following morning. In view of the unreliability of the unit and the decreasing suitability of launching sites as the ship proceeded eastwards, it was decided to forgo further attempts at launching.

Aim 4) The large proportion of poor weather encountered during the cruise gave no opportunity to work additional shelf-edge sections.

Aim 5) Failure of a joint in the non-toxic sea-water system prevented sampling for caesium at the three stations to the west of Barra Head when making for shelter on 3rd April, but stations C1 to C8 were worked on 4th April, en route for Dunstaffnage. STD observations were made at stations C2 to C8. Colder, fresher water occupied the upper layers, giving temperature and salinity inversions at the five deeper stations. The (inverse) thermocline was found at 15 - 20 m depth except at stations C8 and C6 where it was at about 100 m depth.

Aim 6) Seven messages of vertical temperature profiles were coded from STD traces and five were sent to Bracknell. As the ship now carries no radio operator it was necessary for a member of the scientific team to pass the messages to coast radio stations,

and this factor is likely to reduce the number of messages sent from future cruises.

Miscellaneous) After radio communication on 1st April with r.v. CIROLANA, engaged in an Anglo-Norwegian blue whiting survey, watch was kept on the PDR for mid-water echo-traces centered upon two depth bands at 200 and 440 m (The upper layer was ascribed to myctophids and the lower to blue whiting). To SW of Anton Dohrn Seamount on 1st April traces were present at both depths, but were very light. In the vicinity of the Rockall Bank shelf-edge light 'comet' traces were present at 440 - 470 m with a more continuous, but light, layer above at 220 - 240 m. On 2nd April over the west side of Anton Dohrn Seamount a group of heavier traces existed at 420 m, with individual peaks rising to 350 m. There was no upper trace. On the same day, over the south-east quadrant of the seamount small discontinuous traces were found, centering upon 440 and 500 m depth. An upper layer at 220 - 240 m was more continuous.

D.J. Ellett
6th April 1976.