SMBA Dunstaffnage Marine Research Laboratory

Cruise Report: RRS CHALLENGER, Cruise 17/1976

Duration: 0930h 7th December - 0900h 20th December 1976.

All times GMT.

Locality: Rockall Channel, 55° - 59°N.

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Aims:

1) to service the current meter mooring in 57°N, 9°W.

2) to work four STD sections across the Rockall Channel between Porcupine Bank and Anton Dohrn Seamount.

3) to obtain Shipek grab samples for the Dept. of Geology, Univ. Coll. of Wales, Aberystwyth.

4) to collect 50 litre surface water samples at standard positions over the Scottish shelf for radiocaesium determination by the Fisheries Radiobiological Laboratory, Lowestoft.

Narrative. CHALLENGER sailed from Barry at 0930h, 7 December. After engine trials in the offing and arrival of a replacement greaser, the ship set course at 1530h at half-speed in south-westerly winds of force 7 - 8. The Tuskar light was reached at 0730h, 8 December and it was decided to turn northward in order to have the shelter of the Irish coast on passage to the working area. Full speed was resumed in westerly winds which slowly moderated during the day to force 5 - 6.

After leaving the North Channel in a moderate swell and decreasing wind, work began at the first station of the Malin Head - Rockall Bank section at 1625h, 9 December. 160m. of STD cable were removed after tests at station A, and additional lengths of 500m and 400m with crushed and bird-caging cable were cropped at stations C and D, producing some improvement in the trace.

Work on the section continued throughout the following day in westerly force 5 - 6 winds. At station H the driving chain for the reeving gear of the STD winch barrel became detached at the start of hauling, causing some loose turns to become badly nipped at 2200m. As only one layer of cable remained on the winch below this, it was decided to retain the nipped portion and limit future observations to 2000m. Spiking was still present, varying in severity with ship motion and lowering speed. At speeds below 1m. sec^{-1} it was seen to be almost entirely coincident with the ship's most pronounced starboard rolls. The slip-ring assembly was examined and the accessible joints re-soldered. Although the trace was noticeably improved, spiking on vigorous starboard rolls continued, suggesting a mechanical cause, which could not however be traced.

The Malin Head - Rockall Bank section was completed at 1310h, 11 December, and work began on the Anton Dohrn Seamount section at 1445h, with westerly force 6 winds. Increased swell led to bad STD spiking. Shipek grab samples were obtained at stations on Rockall Bank, but attempts to sample at 1000m. at station D resulted in the 5mm wire becoming jammed in the sheaves within the winch house. The wire was retained above the damaged portion at 720m. for grabbing during the cruise to a limit of 600m.

Station S of the section was worked by 0613h, 13 December and the ship returned to station R to search in force 3 - 4 winds for the current meter mooring. Although the spar buoy was absent, the buffs marking the sub-surface float were sighted after a short search, and hauling commenced from this end at 0950h. The meters, anchor and ground wire were recovered, but the buoy anchor and buoy wire had apparently been unshackled from the ground wire. Because of gear shortages, the probability of more intensive fishing in the area and the relatively long interval before re-visiting the station it was decided not to re-lay the mooring on this cruise. The final station of the section was completed at 1510h, 13 December.

The large amount of steaming time which would have been involved in working the two southern sections originally planned for the cruise, and the 2000m. depth restriction on the STD, meant that it was more profitable to continue work in the areas of equal interest to the northward of the sections already completed, and work began at station A of the St. Kilda shelf-edge section at 2045h. Winds had become southerly, force 4 - 5. Grab samples were taken at the first four stations, and work continued without incident to the westernmost station (J) at 1942h, 14 December. Three stations were then worked en route to Rosemary Bank, and the section from the bank to the shelf in the vicinity of 58°N, 8°W was completed between 0845h, 15 December and 0812h, 16 December, grab lowerings being made at all shelf stations.

The continuing fine weather made it possible to work two shelf stations en route to the radiocaesium sampling line, and as the first of these began at St. Kilda, opportunity was taken to call at the island during the afternoon of 16 December. The STD and grab sections were worked between 2106h, 16 December and 1314h, 17 December. South-easterly winds which rose rapidly to 40kt. after completion of the second line of stations prevented the taking of STD observations at the caesium stations, but 50 litre surface samples were taken through the non-toxic pump as usual at all ten stations between 1605h and 0615h, 18 December.

CHALLENGER berthed at Dunstaffnage at 1055h, 18 December to disembark staff and equipment, sailing again at 1500h to reach Barry on 20 December.

Results Aim 1) The current meter mooring laid on 9 October was recovered on 13 December. The two meters appeared to have functioned correctly, making a continuous sequence of observations from 6 August, and a total of 180 days' records for 1976. It seems probable that the spar buoy went adrift and the buoy anchor subsequently fouled fishing gear, being cleared by the removal of the shackle from the outer end of the ball-bearing swivel at the end of the ground line. The swivel would have probably also been removed if the rig had suffered from deliberate interference.

Aim 2) The Malin Head - Rockall Bank and Anton Dohrn Seamount sections were given priority in view of the initial weather situations of the cruise and their value as part of a long-term series, and it was subsequently more expedient to work in the northern part of the Rockall Channel. Four deep-water sections were completed between 55° and 59°N in the course of seven days.

On the southernmost section surface temperatures were above 10°C, with surface salinities exceeding 35.35‰, until Rockall Bank was approached (see figure). The mixed layer extended below 200m. depth at the majority of stations in the warmer water, but decreased to about 100m. over the bank. At station O, at the bank edge, only a shallow (20m.) mixed layer existed, and the temperature profile beneath this showed a frontal structure. The three sections worked subsequently showed a progressive northward decrease in the distribution of this warmer and deeply mixed water, and salinities within it declined to values of about 35.30‰. At stations D and F of the Rosemary Bank section the STD profiles and surface thermograph trace indicated a frontal discontinuity extending to at least 500m. depth. Salinity values in the upper layers to the north west of this front were of the order of 35.2‰, a marked contrast to observations made during winters of the 1960's, when water of salinity greater than 35.4‰ occupied the complete width of the Rockall Channel at 58° 30'N.

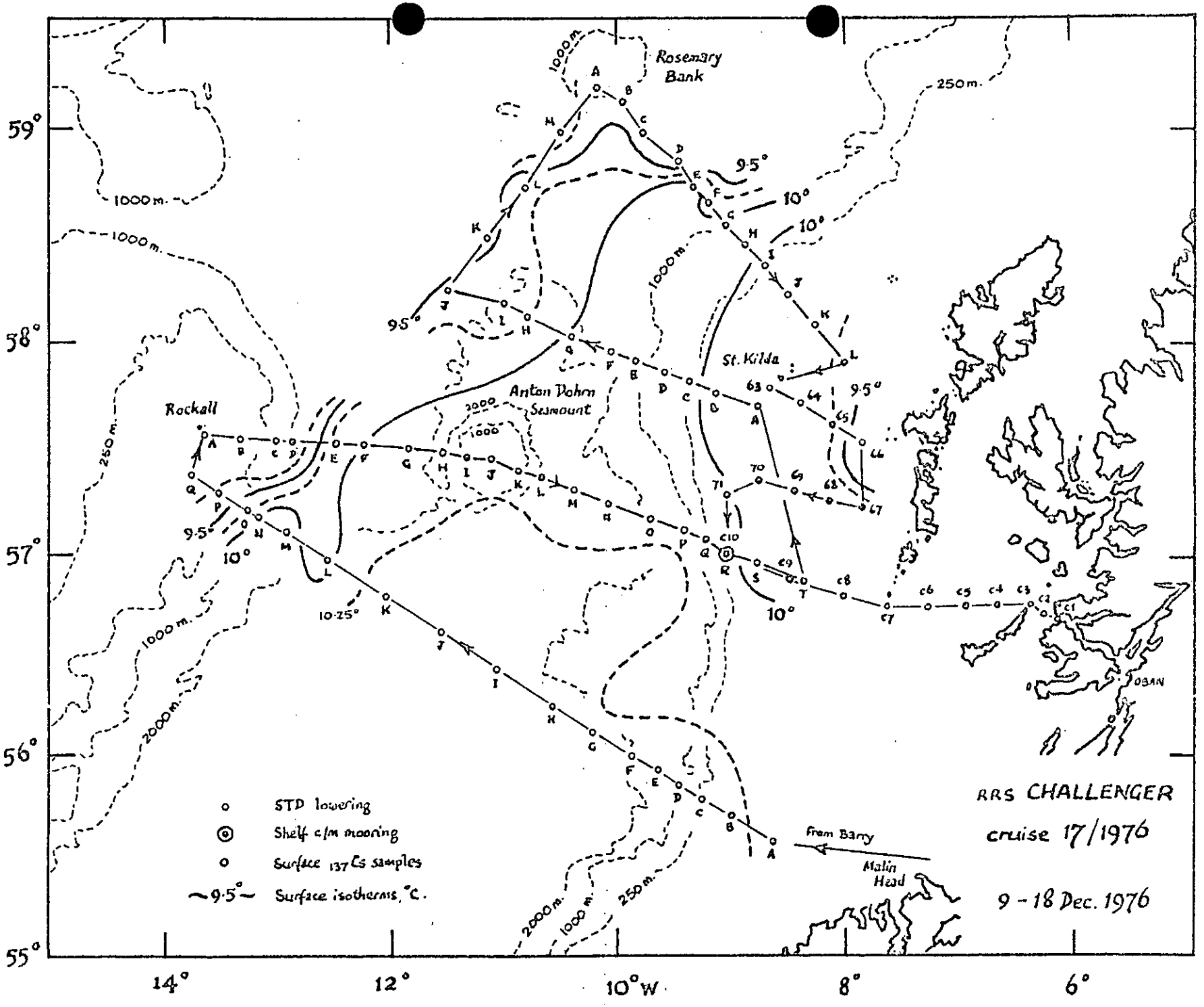
Two short sections were worked on the shelf to the south of St. Kilda to provide information on winter conditions in this area, and it is hoped to repeat these at other seasons.

Aim 3) 33 Shipek grab samples were obtained from the shelf and slope regions for the Department of Geology, University College of Wales, Aberystwyth. Attempts to sample at depths below 600m. were unsuccessful due to the relatively light weight of the grab, which allowed the wire to jump out of sheaves on downward rolls on a number of occasions.

Aim 4) Surface samples for the determination of $_{137}Cs$ by the Fisheries Radiobiological Laboratory were collected from the non-toxic seawater supply at ten standard positions between the shelf-edge and the Sound of Mull. Due to rough weather, STD lowerings were not made at these stations.

Miscellaneous) Soundings were taken on passage on the Scottish shelf between the easternmost stations of the Anton Dohrn Seamount section and the St. Kilda section for Dr. E.J.W. Jones, Department of Geology, University College, London.

D.J. Ellett
7 January 1977.


Rosemary Bank
Rockall
Anton Dohrn Seamount
St. Kilda
OBAN
Malin Head
From Barry
1000m.
250m.
2000m.
9·5°
10°
10·25°
59°
58°
57°
56°
55°
14°
12°
10°W
8°
6°
STD lowering
Shelf c/m mooring
Surface 137Cs samples
Surface isotherms, °C.
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