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FRV *Scotia*

Cruise 1292S

REPORT

19 September - 2 October 1992

Ports

Loading Aberdeen
Unloading Aberdeen

Personnel

W R Turrell SSO (in charge)
R Payne HSO
G Slesser HSO
R D Adams SO
J Dunn HSO (19-23 September)

Objectives

1. To collect hydrographic and chemical samples along the Fair Isle-Munken (Faroe) and Nolso (Faroe) - Flugga (Shetland) standard sections.
2. To survey the standard JONSIS, East Shetland (ES) and northern North Sea (EC) sections.
3. Conduct preliminary investigation of the slope current north west of Shetland using the vessel-mounted Acoustic Doppler Current Profiler (ADCP).
4. Conduct restricted survey of the Moray Firth.
5. Collect the Fair Isle radio-caesium sample for analysis by MAFF, Lowestoft.

Supplemental Objectives

6. Complete herring larval survey previously abandoned during a charter vessel cruise owing to weather conditions.

Narrative

FRV *Scotia* sailed from Aberdeen during the morning of Saturday 19 September. She immediately proceeded to the west Hebrides area where the herring larval survey commenced. This concluded four days later, after a total of 58 hauls employing the Gulf III plankton sampler had been completed. Mr J Dunn and Mr J Barkess were landed by boat at Stromness, Orkney at 0700 on Wednesday 23 September.

Scotia then proceeded to the beginning of the Fair Isle-Munken section, which was completed by 0900, Thursday 24 September. The Nolso-Flugga section was then surveyed, concluding at 1330 the following day. *Scotia* then steamed to a position northwest of Shetland where a line of stations were performed out to the 500 m contour using the Neil Brown Instrument System "Smart" CTD. On immediate examination of the data a 24 hour ADCP survey was established in order to examine the slope current indicated by a core of high salinity observed above the 250 m contour. This was completed by 2140 on Saturday 26 September. During the survey the analogue output of the EK500 scientific sounder had been recorded and interesting traces noted. A short plankton haul using the Gulf III sampler was performed in order to aid interpretation of these traces.

The three east Shetland sections were performed over the following two days, ending at 1200 on Monday 28 September. *Scotia* then proceeded to Fair Isle, where the caesium sample was collected, and then

continued on to the start of the JONSIS standard North Sea section. This was completed by 1200 on Tuesday 29 September. An extension to this line was then worked, up to the start of the EC North Sea section, which was worked back in towards the Moray Firth, concluding at 1200 the following day.

During the remaining 36 hours a CTD and ADCP survey of northerly, central and southerly sections of the Moray Firth were conducted. On conclusion at 0000 on Friday 2 October, *Scotia* proceeded to Aberdeen, where she berthed at 0900. During the cruise a total of 137 hydrographic stations, 59 plankton hauls and 50 hours of ADCP surveys had been performed.

Results

Faroe-Shetland Channel: Only the first three stations crossing the Scottish Continental shelf edge of each of the two standard sections were surveyed using the CTD, hence allowing analysis on board. These revealed, however, a confined slope current centred above the 250 m contour. North Atlantic water typically exhibited salinities of 35.35 (35.36) and temperatures of 10.19°C (9.89°C) as observed at the Fair Isle-Munken (Nolso-Flugga) section.

Slope Current Survey: The initial CTD and ADCP survey along the section chosen perpendicular to the slope northwest of Shetland again revealed the core of the current above the 250 m contour. It also confirmed that the operational range of the VM-ADCP was about 300 m. On this basis a suitable sub-section was chosen, approximately 11.1 km long. This was repeatedly traversed during a 24 hour period at 10 knots. Initial results were not dramatically clear and some complex processing is required in order to remove the effects of tidal currents. The simple averaging performed previously may no longer be adequate. The implementation of the processing programmes required to remove the tide using a least-squares-fitting procedure was commenced on board.

One result relevant to future shelf edge studies in relation to fisheries is that there are no clear surface features (temperature, salinity or fluorescence) which clearly mark the location of the slope current. However, the EK500 38 kHz system clearly showed up diurnally migrating plankton which may have exhibited important features relating to the slope current (internal waves and cross-shelf flow). These results await fuller analysis.

East Shetland Hydrography: The three sections east of Shetland again revealed the narrow zone (~40 km) of well-mixed water in the deep water (>100 m) immediately to the east of the island where locally generated mixing is insufficient to account for the vertical homogeneity. Water in the mixed zone typically exhibited a salinity of 35.3 and temperature of 10.5°C.

Northern North Sea Hydrography: Results obtained along the JONSIS line again revealed the vertically well-mixed Fair Isle Current (S=34.91, t=12.28°C) lying inshore from the stratified northern North Sea. The thermocline generally lay at a depth of ~50 m. Water lying offshore from the FIC had typically S=35.31 and t=9.15°C. The cooled bottom water often noted in the centre of the Fladen Ground was quite warm (~7-7.5°) compared to previous years.

Moray Firth Hydrography: The hydrographic stations performed in the Moray Firth revealed a predominantly well-mixed water column. Temperatures and salinities were typically 12.4°C and 34.85 respectively. Some residual stratification was observed on the southern shore, with surface salinities reduced to 34.0.

Technical Developments: During the cruise a colour contouring system was developed for near-real time analysis of CTD data. A display/editing programme for thermosalinograph data was also developed. Unfortunately the ROSette Instrumented Environmental Sampler (ROSIE) was not available for this cruise as technical problems arose, delaying its development. It is now planned to test ROSIE in a sea loch.

W R Turrell

5 November 1992

F.R.S. SCOTIA CRUISE 12 19 SEPT - 1 OCT 1992

