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MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1981 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA : CRUISE 4

(Provisional: Not to be quoted without prior reference to the author)

STAFF:

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DURATION:

Left Grimsby 0100 h 31 March
Docked Grimsby 1915 h 23 April

All times are GMT.

LOCALITY:

Vicinity of the low-level radioactive waste dumpsite, (LLDS), at 46°N 17°W.

AIMS:

1. To undertake a detailed survey of water column conditions over and around the Finn seamount which lies close to the dumpsite.

2. To retrieve three current meter moorings laid around the seamount in October 1980.

3. To collect water and trap fish at the site and at a position 100 miles to the south of it for AEP 1.

4. To calibrate (a) the Guildline deep-water CTD
and (b) the athwartships component of the EM log.

5. To search the region 46°-50°N, 20°-22°W for eddy features similar to that found at 47°N 15°W during the Tourbillon 79 exercise and in particular to map the distribution of dissolved oxygen and silicate.

6. To identify the water mass structure in the vicinity of the MAFF Slope Section current meters (area 38°N, 10°W) at least once during the cruise.

7. To confirm the existence of two nephel plumes in the Porcupine Bank region for AEP 3.

NARRATIVE:

The scientific staff left Lowestoft at 0700 h, 30 March and were on board the ship by 1200 h. Owing to a salt water recirculation problem sailing was delayed by a tide and the afternoon was spent testing and lashing down equipment. Just prior to the planned sailing time detailed instructions of a restrictive nature were received from the French authorities via the Laboratory concerning proposed work in the French EEZ.

The ship sailed at 0100 h, 31 March and set course for 49°N 10°W which was reached at 1300 h, 2 April. This position lies outside the French EEZ and in fact the overall programme was altered slightly so that all the work would be accomplished in the EEZ's of either the UK or the Republic of Ireland or international waters.

The Guildline CTD system and Sea Martec nephelometer had been attached to the large Niskin rosette during passage and both, together with the Niskin bottles and mechanism, were tested at 49°N, 10°W. The ship then steamed to the edge of the Continental Slope and three stations were occupied at various depths. All of them were essentially tests of the sampling system and the computer software. No readings were obtained from either of the nephelometers being carried and advice was sought of Mr R Newman in Seattle who had loaned them to MAFF.

By 1830, 3 April the ship was steaming for the LLDS which was reached at 1450 h, 4 April. A fish trap was launched at 47°N, 17°11W, the proposed bulk-water sampling site, and the ship them moved some twenty miles eastwards to the vicinity of the Finn seamount. By this time it had become clear that the photomultipliers in both nephelometers had been broken in transit and that they could not be used during the cruise. The Laboratory was informed of the situation.

During the morning of 5 April an XBT/PDR survey was made of the Finn seamount region. It consisted of 4 lines running across the peak to adjacent deep water areas. XBT's were launched at 5 minute intervals. The PDR records were used to pick out the best positions for the grid of CTD stations around and over the seamount.

The CTD sampling began at 1620 h, 5 April and lasted until 1800 h, 10 April initially: three stations being occupied on each of the four transects. In fact breaks in the work occurred as fish traps were recovered and relayed at about 24 hour intervals while almost all of 9 April was spent getting 500 litres of surface and bottom water respectively at 46°N, 17°11'W; a position common to both the old and new dumpsites. Great difficulty was experienced in reeving back onto the winch the first 700 metres of wire from this station which lay in 4715 m of water. All earlier stations had been some 4000 m at most in depth and the reeving gear had worked adequately though not entirely satisfactorily. The extra length required for the bulk-water station revealed a "hole" in the layers of wire up against the port side of the drum and it was this feature which gave all the trouble.

After an early morning fish trap recovery on 11 April the first of the three current meter rigs laid around the Finn seamount in October 1980 was cut acoustically and brought on board between 1022 h and 1130 h. A feature of the recovery operation was the need to keep the ship's bow-thrust unit clear of the loops and bights of courlene clustering around the float. In fact during the second recovery operation (1230-1419 h) some courlene was sucked into the bow-thrust unit and also caught up in the region of the ship's propellor. Fortunately the bow-thrust could be housed and the steering was unaffected but clearly there could be no more CTD sampling until the bow-thrust and propellor areas had been examined. Consequently the ship set course for Falmouth where divers cut away the courlene in the period 1400-1600, 13 April. Whilst the ship was running into and out of Falmouth an attempt was made to measure the salinity of water samples taken thus far on the cruise so that comparisons could be made with the Guildline CTD data but it was unsuccessful. The current meter tapes were translated and plotted up however. Shortly after this work had been completed the computer began to fail. After consultation with Mr Moore of RSG 3 boards were transferred to the back-up unit and it came into service for the rest of the cruise.

By midday on 15 April the ship was back in the LLDS area and at 1413 h a fish trap left out for four days was recovered: it contained one rat-tail, the first sign of life after 4 deployments. CTD sampling around the Finn seamount began again at 1730 h and continued until 1000 h, 18 April. Early in this phase of the work it became clear that the clutch on the winch, which had been giving trouble since the afternoon of 7 April, was opening up during the heaving-in operation and chocks had to be inserted between the clutch handle and the gear housing to keep it going. This development meant that there was little point in steaming southwards to deeper water to clear the "hole" in the wire at 4700 m since all the wire will have to be taken off the winch barrel before repairs can be made. Furthermore it was felt best to restrict further CTD sampling to 3500 m routinely with an absolute maximum of 3750 m on one occasion to meet a special need.

During the afternoon of 18 April the final two fish traps were recovered. Given the paucity of the catch to date (1 fish) 4 hooks provided by Mr S Rice had been attached, as an "added extra", to the deployments of 16 and 17 April respectively and 3 fish were caught on them compared with one in the 4 baited cages.

Since wind and sea conditions in the period 15-18 April had not been good enough to allow recovery of the third current meter mooring it was felt best to leave it in position for recovery later in the year. Consequently at 1534 h, 18 April the ship moved off from the LLDS along a nine-station CTD section which passed through the Tourbillon region of September-October 1979.

This section was completed by 2330 h, 20 April and a second "MAFF Slope Section" begun as a continuation of it at 0600 h the next day. It had been noted on 20 April, however, that the clutch area of the CTD winch had begun to shed a metallic ooze and that the vertical movements of the drive shaft and barrel-mounting were becoming more pronounced. Close inspection of the clutch during the early morning station of 21 April and a look at the data collected suggested that it was not reasonable to take any further risks with the CTD and so the sampling programme was ended a little prematurely. The ship then set course for Grimsby and docked at 1915 h 23 April. A successful salinity determination exercise on samples taken during the cruise was carried out on the run home.

RESULTS:

1. Throughout the cruise the big Niskin rosette and the Guildline CTD performed faultlessly: there is every indication too, from informal calibrations done during the cruise, that the CTD data is of the highest quality. Formal calibrations will be made via the samples and data brought back to Lowestoft.

   After a short "teething-trouble" period the B10 software - as adapted by Lowestoft to suit the MAFF HP - also performed faultlessly.

   A more detailed report on these and other technical aspects of the cruise has been provided for AEP 3 as a separate document.

2. A first-look at the data from the detailed survey of the Finn seamount area suggests that whilst there is a uniform blanket of water covering the region between 1500 m and the bottom (circa 4300 m) very intense mixing of North Atlantic Central and Deep and Mediterranean Waters takes place in the 800-1200 m zone (see Figs 1 & 2) and that this may be occurring around the central ie "peak" stations. There was no suggestion in the XBT (T4's) data of the existence of the seamount producing isotherm doming

3. Two of the three current meter moorings laid in October 1980 were recovered: the third had to be left in place. Preliminary working-up of the data suggests that the mean monthly near-bottom flow may be clockwise round the mountain but this trend is not easily seen in the sequence of shorter-term events recorded.

4. 500 litres of near-bed and near-surface water were collected and 5 Rat-tails (Coryphaenoides guntheri) caught for AEP 1 from the LLDS region.

5. A CTD section from the LLDS to the foot of the Continental Slope was completed (see Fig 3). It's main feature was a region of Mediterranean water at depth only 40 miles west of the 1979 Tourbillon eddy. As far as can be judged a stable blanket of water fills the water column below 2000 m over the whole of this section.

   Dissolved oxygen and silicate samples down to 3500 m were taken for the Tourbillon participants and AEP 3 respectively at each station. Two thermometers were calibrated for pressure by being paired with thermometers of known calibrations at various stations on the section.

6. Three stations across the Continental Slope were occupied in order to provide some idea of the water masses in the vicinity of the MAFF Slope Section current meters (area 48°N, 10°W).

It was not possible to collect water and trap fish for AEP 1 100 miles south of the LLDS or to look for nephel plumes for AEP 3. The EM log was not calibrated because it failed frequently in the first part of the cruise and was eventually turned off.

J W Ramster
29 April 1981

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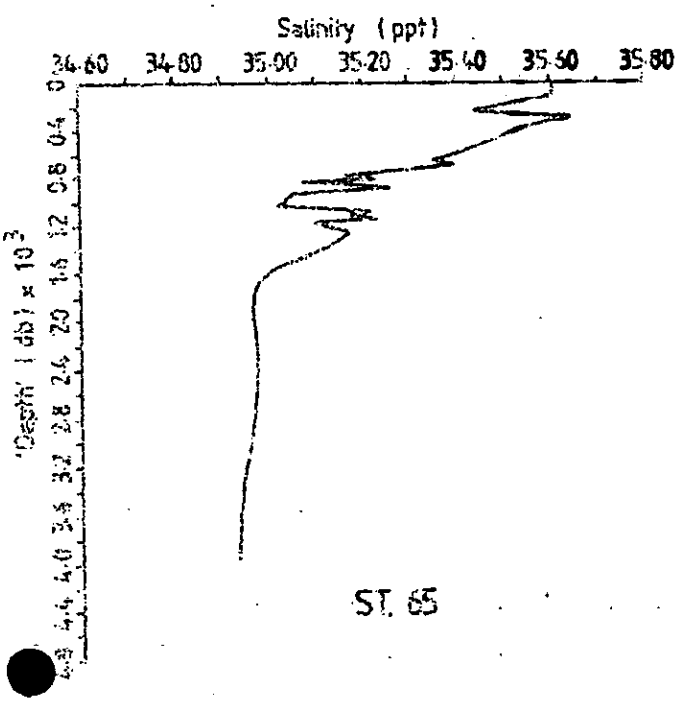

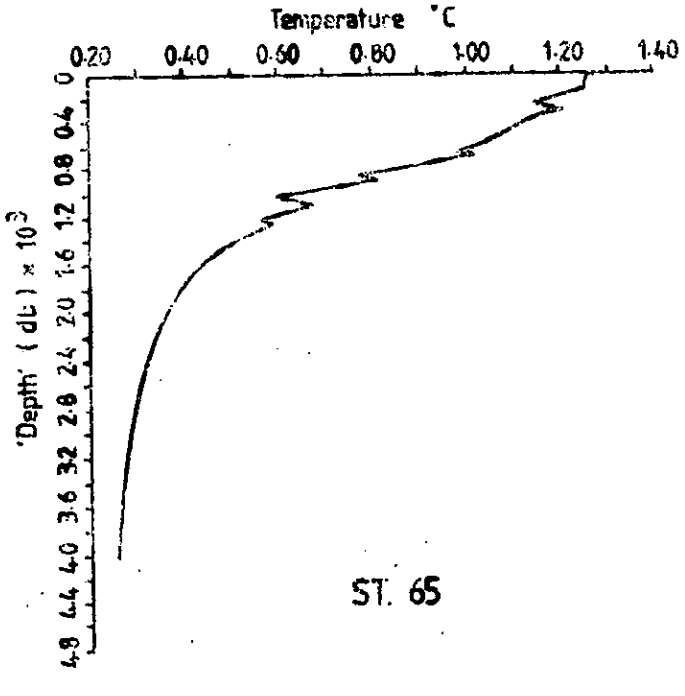

Fig 2 Density (sigma-t) Distribution at 792 db around the Finn Seamount (45° 54' N, 16° 34' W)

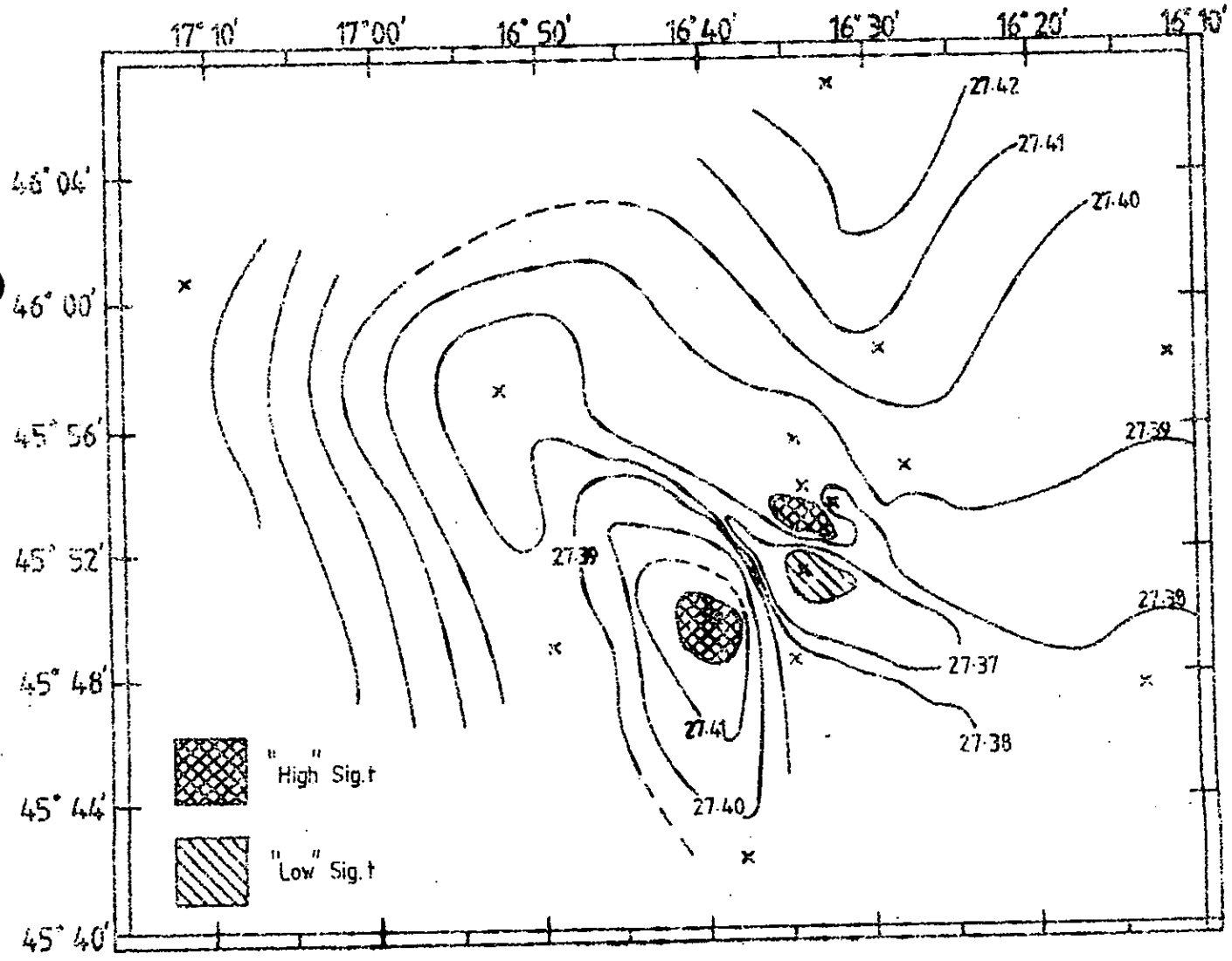

Fig 3

Salinity (‰) Section from LLDS to Continental Slope.