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

1979 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA: CRUISE 6

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

STAFF:

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DURATION:

Sailed Grimsby 1530 h, 5 June
Docked Grimsby 2105 h, 1 July

LOCALITY:

Eastern Atlantic

AIMS:

1. To recover the NEADS-6 upper bottom c/m mooring at 52°30'N 17°45'W and replace it with a full depth mooring.

2. To recover the seven upper bottom c/m moorings deployed along 41°N during CIROLANA 6/78.

3. To lay a further seven upper bottom c/m moorings at positions between the NEA low level waste dumpsite and the European continental slope.

4. To conduct hydrochemical sampling and TSD calibration in the vicinity of the NEA dumpsite (around 46N 17°W).

5. To conduct an XBT and/or STD reconnaissance of an eddy over the Biscay Abyssal Plain (location to be determined).

6. To sample bottom living fish and other species in the NEA dumpsite using traps and hooks.

7. To collect deep sea sediment cores using the Boomerang Corer (principally at the NEA dumpsite).

8. To take XBT profiles at hourly intervals on passage throughout the cruise.

9. To collect bulk surface water samples for FRL along the northern part of the cruise track (Caesium samples).

NARRATIVE:

CIROLANA sailed at 1530 h, 5 June and proceeded to her main working area in the

eastern Atlantic. On passage, surface caesium samples were taken at 30 mi spacing intervals west of the Lizard and a programme of hourly XBT dips with continuous bathmetric measurements was begun on reaching the Continental Slope.

Between 1400 h 8 June and 1422 h 9 June, upper bottom moorings R, O and N were laid on the Continental Slope and Porcupine Abyssal Plain (see attached chart). As normal, deep wire tests of the acoustic release system were made prior to each launch and each deployment was timed to coincide with a SatNav update. Each mooring consisted of two current meters set at 50 m above the bed and at 4000 m depth respectively. Thereafter, between 0820 h and 1538 h, 10 June the existing upper bottom mooring ("E") at the NEADS-6 site was recovered and replaced with a full depth mooring ("T") consisting of 5 current meters set at depths between 187 m and 4074 m. Following a hydrocast to determine the Brunt Vaisala frequency in the near-bottom layer CIROLANA proceeded south to recover the 7 existing moorings along 41°N, making PDR and XBT measurements on passage as before.

Between 1230 h 13 June and 1036 h 15 June, five of the seven moorings had been successfully interrogated and recovered. The two remaining moorings "F" and "I" gave no response on interrogation and after an extended search around their launch sites both were presumed adrift and further attempts at recovery were abandoned. During this 3 day period the opportunity was taken to measure some 5.8 km of mooring rope for the two full-depth moorings to be laid by R.V. JEAN CHARCOT in August; these measurements were made under the same tension as the moorings will experience when deployed (1400 lb approx.). CIROLANA then returned northwards to the NEA dumpsite, arriving 0700 h 17 June.

While waiting for a TSD fault to be repaired R.V. ANTON DOHRN was encountered working in the dumpsite area and between 1415 h and 1600 h Messrs Dickson and Folkard went aboard to exchange relevant information (mooring sites, acoustic release frequencies, deep trawling and fish trap sites etc). By 1643 h with the TSD repair completed CIROLANA began her first deep TSD cast in the southern part of the dumpsite, with Niskin sampling throughout the water column to provide basic hydrochemical data and TSD calibration. During recovery of this first cast however the winch barrel and "cheeks" began to show signs of collapse, rendering the winch unserviceable by the time the gear was recovered. With no suitable alternative winch available further TSD work was then abandoned in favour of Nansen casts. Between 0830 h, 18 June and 2301 h 22 June a total of 14 deep hydrocast stations were worked within both the old and new dumpsite areas. In each case the emphasis lay in sampling within the bottom 1000 m of the water column; the bottom samples were all taken within 5-15 m of the bed and the remaining 9 bottles in each cast were placed at 10, 20, 30, 50, 75, 100, 250, 500 and 1000 m above the bottom sample. Each sample was analysed on board for temperature, salinity, nitrate, nitrite, ammonia, silicate, oxygen, pH and Redox potential. During this period a range of ancillary work was undertaken. At one station central to the dumpsite the above hydrochemical parameters were measured at 100 m intervals throughout the water column in addition to the near-bottom series. (ie samples at a total of 50 depth intervals from the surface to the bottom). At the same station a total of 180 l of water were recovered from the benthic boundary layer using 30 l Niskin casts, for polonium/americium, plutonium and caesium analyses at FRL. At this and one other station, 20 x 25 l surface water samples were also taken for FRL. Three deployments and recoveries of the abyssal fish traps were made in the centre of the dumpsite in water depths of 4720-4763 m and for durations of 19.7, 19.8 and 20.2 hours. The FRL deep-submergence scintillation counter was tested on the hydrowire; and after a/r wire-tests, an upper-bottom mooring of 3 current meters (+50, +612 and +739 m from the bed) was laid in the location of the preexisting NEADS-5 mooring of IOS Wormley, (mooring "T" on attached chart).

At this stage it became apparent from Lowestoft that French attempts to locate mesoscale eddies for the Tourbillon experiment using satellite tracked buoys had been unsuccessful, implying that CIROLANA would be involved in an XBT search for an eddy rather than the planned XBT survey. Accordingly CIROLANA left the dumpsite area at 0300 h 23 June, to conduct a widespread XBT search of the area between the dumpsite

and the European Continental Slope. By 1305 h, 27 June a total of 1150 survey miles had been completed with XBT's at hourly intervals and with breaks to launch upper-bottom moorings P, S and Q on the 24th and 25th June. On 26th and 27th June with little signs of an eddy "signature" in the thermal structure, two intersecting hydrographic sections (200 miles total length, stations every 20 mi) were worked to 400 m depth, across the area where French buoy tracks had most consistently shown evidence of eddy activity in the past.

With this survey completed CIROLANA proceeded to Brest arriving 0755 h, 28 June. Following discussions with C.O.B. personnel concerning the forthcoming TOURBILLON exercise, and the landing of heavy c/m mooring gear, CIROLANA left Brest at 1700 h 29 June and continued to Grimsby, docking 2105 h, 1 July.

Results

1. Six of the eight existing moorings, including NEADS-6 were recovered without difficulty. Of these, two moorings (G and H) incorporated acoustic releases which had been used previously and both showed heavy corrosion in a single (but different) component of the release mechanism. From this it is evident that the IOS problems with occasional release components of dissimilar stainless steel have not yet been solved, and that when present the dissimilar component can act as an anode for the rest. The two moorings which were lost were the only other moorings which had releases undergoing their second deployment. It is assumed that in these cases corrosion of the release had proceeded to the point where the mooring were set adrift. Although the single-deployment releases looked in good condition (as had the other releases after their first deployment) it is recommended that the releasing mechanisms should be replaced after each prolonged period of deployment.

2. Of the 12 current meters recovered, seven had complete or almost complete records, four had full term records of direction and temperature but no velocity information and one had no record (tape loop snagging around the drive capstan). The problem of the four partial records is a new one. Its cause was a batch of rotor counters in which the rotating magnet was mounted off centre by the manufacturer. At room temperature these magnets were free to rotate within their chamber in the end caps and thus passed the standard pre-cruise velocity check run by RVST. However after deployment, cooling and contraction of the end cap evidently caused the magnets to foul the walls of this chamber so that they provided only one velocity reading after deployment (while the meter-case cooled). These off centre magnets would not have been given the normal all-temperature velocity check by the manufacturer since they are bought as individual components by MAFF to fit end-caps manufactured by IOS. A visual check of the magnets is sufficient to overcome this problem in the future and it also appears that the problem is not present in rotor counters bought since last year. Of 11 new rotor counters examined after discovering the problem, all were correctly mounted.

3. Preliminary current meter data analysis on board indicates the same type of energetic record at NEADS-6 as encountered during previous deployments at this site. Of the 41°N records so far examined, all indicate a predominantly southward flow across the section in apparent confirmation of general circulation model results. Although no data on current speed are available from "G" and "H", this circulation tendency is unambiguously shown in the current direction data at these sites.

4. The seven upper-bottom moorings off the continental slope and the full-depth mooring at NEADS-6 were laid without difficulty.

5. Hydrochemical sampling at the NEA dumpsite was successfully accomplished as outlined above. While problems with the winch prevented the planned TSD calibration, the TSD itself worked well during this station and some partial claibration should be possible.

6. Since ANTON DOHRN's programme within the dumpsite was largely based on bulk

sediment sampling using the box corer (with on board examination for surface radioactivity), the planned sampling of the dumpsite with the boomerang corer was not carried out.

7. The extensive XBT transects worked during the cruise, once again showed the presence of large-amplitude cold-core features (eddies or frontal meanders) over the rough topography on the flanks of the mid-Atlantic Ridge. The amplitude of these features appeared to diminish with distance eastward from the Ridge crest/oceanic polar front. In the "Tourbillon area" over the Porcupine and Biscay abyssal plains, no clear evidence of eddies was observed in either the XBT profiles or the subsequent hydrocast sections; the survey in this area passed through all the sites suggested by C.O.B. Brest on the basis of buoy tracks and on the XBT survey in May by R.V. JEAN CHARCOT.

8. The fish traps together with baited hooks were successfully laid and recovered at 3 sites in the NEA dumpsite. No fish were caught but a total catch of 266 gammarid amphipods of 2 species to 122 mm length were recovered and frozen for analysis at FRL.

9. Bulk surface water (caesium) samples for FRL were collected along the northern part of the cruise track and at each current meter mooring site together with large bulk samples, at the surface and near-bottom layers of the dumpsite for Polonium/americium/plutonium/caesium analysis. R/V ANTON DOHRN obtained a near-bottom water sample from the dumpsite at MAFF request, for Ra_{228} analysis at Hamburg.

R R Dickson
9.7.79

INITIALLED: AJL

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DISTRIBUTION:

Basic List

R R Dickson
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R J Read
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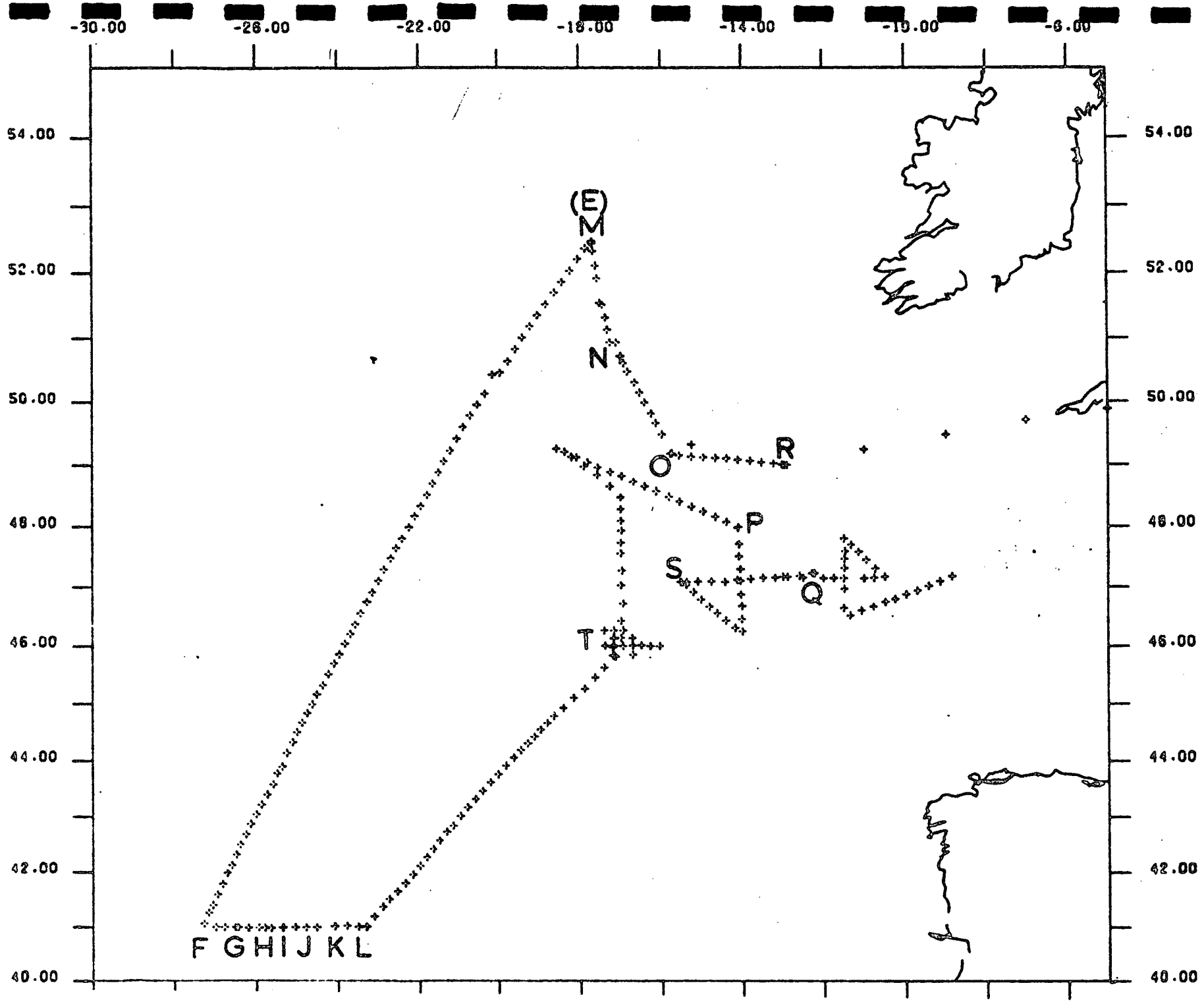
M R Thomas
J Wickins (Conwy)
J Gould, IOS (2)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