

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

1979 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA: CRUISE 9

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

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DURATION:

Left Grimsby 0730 hours, 26 September

Arrived Immingham 0900 hours, 20 October

All times are GMT

LOCATION:

Within 30 miles of $46^{\circ}59'N$, $14^{\circ}48'W$, the centre of the Tourbillon moored current meter array.

AIMS:

1. To share with the French Research Vessel NOROIT the detailed water mass sampling of the region lying within 30 miles of $46^{\circ}59'N$, $14^{\circ}48'W$ during two 5-day periods separated by about 6 days.
2. To monitor with the RV NOROIT the movements of a cluster of free-drifting floats released within the Tourbillon array in early September.
3. To release and track for as long as possible some IOS-type floats in the Tourbillon area.
4. To make as many near-bottom STD casts as possible with the MAFF STD whilst on station alone.

NARRATIVE:

RV CIROLANA left Grimsby at 0730h, 26 September and steamed to Brest docking there 48 hours later. Within a few minutes of tying up a COB-CNEKO deck-laboratory was being swung on board by a shore-side crane and during the morning of 28 September it was made fast and connected up to the ship's electrical and salt water supplies. A spare CTD/STD wire was also taken on board.

The ship sailed from Brest at 1615h, 28 September, and at 0930h 30 September lay close to RV NOROIT near the central station of the Tourbillon current meter array. (See Figs. 1(a) and (b)). Two French scientists, the Chief Engineer and a boatman, came on board via a Zodiac in order to pass over float sampling equipment and discuss the results of the exercise to date; detailed data exchange taking place daily as from 27 September via radio links.

By 1200h 30 September the visitors had returned to the RV NOROIT and a series of MAFF float tests began on the hydro-wire. Whilst floats were being built during the late afternoon the MAFF CTD/STD wire on the auxiliary cable winch was paid away to 4000 m with a 50 Kg weight on the end and then hove back onto the winch drum in a "stretched" condition. The float tests ended for the day at 2135h with a final test in this series being made between 0830 and 0930h the next day.

Overnight the ship steamed to the north-west corner of the Tourbillon area and via examination of the thermograph the position of various "fronts" thought to border the central eddy were determined. A CTD (to 2500 m) and an XBT grid to and fro across the main front began at 1113h and ended at 0650h 2 October when it merged with the main Tourbillon CTD sampling scheme. Whilst this mini-grid was being worked the spare CTD wire was put onto the main cable winch.

It had been agreed with the RV NOROIT that RV CIROLANA would work the northern half of the main Tourbillon CTD grid and in excellent conditions station after station to and from 4000 m was sampled for 60 hours. By 2016h 4 October however a westerly gale had developed and the ship dodged after completing 16 of the scheduled 20 stations (see fig. 1(b)). With continued bad weather forecast the next morning RV NOROIT sailed for Brest after finishing 14 of her stations and RV CIROLANA steamed southwards in order to be ready to complete her grid once the weather had improved. By 1700h in fact a CiNo station (i.e. CIROLANA-NOROIT) was being worked and two more were completed in worsening conditions in the next 11 hours. Just after the ascent phase of the third station had begun electrical contact was lost with the probe at 3500 m and an anxious hour passed before the probe appeared at the surface.

The ship dodged from 0800-1630h 6 October in a full south-westerly gale and then ran north-eastwards before the wind to the central zone of the grid. During the passage tests showed that the electrical fault lay some 1488 m down the 5000 m of wire from the winch barrel. Consequently leads for the spare wire were rigged and at 1030h 7 October this wire was "stretched" by paying it out to 4000 m and then heaving it back onto the main cable winch. As the final 1000 m was brought in the winch cheek plates began to buckle and once the wire was safely back on board (1230h) all ideas of using this winch had to be abandoned. At 1300h work began on reeving the MAFF CTD wire from the auxiliary cable winch to the net drum so that the weak part of the wire could be uncovered and attended to. By 1500h 4500 m of wire had been checked and a 30 cm long damaged section appeared. The cable was chopped at this point with the remaining 1080 m or so on the auxiliary cable winch being passed from the starboard to the port drums. Reeving back the wire from the net drum to the auxiliary cable winch began at 1815 and ended at 2359h. The wire was then "stretched" yet again.

MAFF float tests began again at 0730h 8 October and two floats were set for 4000 m depth and released at 1930h that day and 0830h the next day. This work was interspersed with "listening-stations" (ie CTD casts to 1500 m) for the French floats. At 1730h the ship ran southwards to a relatively shallow area where near-bottom CTD casts could be made with the MAFF CTD wire. Between 2346 8 October and 0430 9 October 3 lowerings to within 3-5 metres of the sea-bed were made in ideal conditions. The ship then steamed to 43°36.9, 15°25, the position at which the RV JEAN CHARCOT had seen a MAFF sub-surface buoy porpoising. No trace of the buoy could be found although the acoustic release was called up and used to guide the ship over the position of the current meter rig.

In the forenoon of 10 October passage back to the central area of the Tourbillon grid was made and both sets of floats were "fixed" before a CTD grid across the centre of the Tourbillon eddy was begun. A north-westerly gale prevented further work on this mini-grid after 1740h 11 October when 7 stations of a planned 14 had been completed. The ship dodged throughout 12 October but by 1300h 13 October was able to begin passage to station CI 401, the first station of the fourth phase of CTD sampling of the main Tourbillon grid.

Radio contact with RV NOROIT had been re-established on 11 October as the vessel steamed from Brest to the Tourbillon area in the teeth of the gale. Hence it was known that at about 1700h 13 October both vessels were beginning the final CTD main grids with RV CIROLANA taking the southern half of the grid in this case. As station CI 404 began electrical contact with the probe was lost again and this time the fault was thought to be within 8 metres of the slip-rings. Between 0415h and 1200h 14 October the MAFF CTD wire was run off onto the net drum and 3500 m of French CTD wire run from the main cable winch to the auxiliary winch. Stations CI 404-416 were completed between 1200h 14 October and 0740h 16 October although only sampling to 3000 m, rather than the 4000 m as originally planned, was possible. No fault could be found in the MAFF CTD cable once the tension had been taken off it.

Since daylight is needed for picking-up MAFF floats the CTD grid had to be called off at station CI 416 and the ship ran to each float position in turn. Although the floats were easily located the release mechanisms could not be made to work and the instruments had to be abandoned at 1800h 16 October. A final "listening-station" for the French floats was carried out between 2045-2112h and then the ship set course for Brest. During this steam XBT's were launched at hourly intervals until the 1000 m isobath was reached and the Precision Depth Recorder (PDR) was run until the 200 m isobath had been passed.

At 0830h 18 October RV CIROLANA was tied up in Brest and by 1230h the COB-CNEXO Decklab had been removed and 6000 m of CTD wire spooled on a borrowed deck-winch. The ship left Brest at 1400h and docked at Immingham at 0900h 20 October.

RESULTS

1. Most of the planned water mass sampling of the region within 30 miles of the centre of the Tourbillon current meter array was carried out in association with RV NOIROIT. The sampling revealed the presence

of Mediterranean Water at the centre of an eddy system of diameter 60-80 miles at a depth of 800-110 m. All the original temperature and salinity data collected on the cruise is now held by COB-CNEXO.

2. The French floats were successfully tracked throughout the period spent in the Tourbillon area. Ranges of 130 Km after two months at sea were found to be possible. The clock-drift on the two moored floats was such that by early October the ship was being fixed by Satellite Navigator only and not by the moored beacons as planned. This implies that the fixing of the other floats may have been done within relatively large tolerances. However, all in all the float tracking was an enormous technical success and puts in the shade all other systems presently available. For the most part the 7 floats tracked moved coherently in a clockwise manner round the eddy (see Fig. 2) at various depths between 0 and 1800 m. All the original float data is now shared by COB-CNEXO and Museum National, Paris.

3. The MAFF-IOS type floats could not be deployed in large numbers or for most of the time spent in the area because, in the main, they did not pass their wire-tests apparently. The two floats deployed took up depths of 4000 m \pm 100 m: the float deployed at the centre of the eddy not moving very much whilst that deployed towards the edge averaged 6 Kms per day for 6 days on a course that was somewhat different to that of nearby French floats.

4. 3 near-bottom CTD casts were made for Mlle. Vangreishem of COB-CNEXO with a French-owned CTD. There was no time to test the MAFF STD and not enough wire to do near-bottom casts in the Tourbillon area itself.

5. A comparison of salinity sampling techniques was carried out at sea and showed MAFF salinities to be consistently less than COB values by 0.01‰. All variables apart from differences in actual volume sampled and in methods of filling and rinsing the two types of bottles appear to have been eliminated.

6. An appraisal of the present MAFF position vis-a-vis CTD work and float exercises has been written as a separate report. The situation in both cases is very similar to that found in 1968 when we began our moored current meter operation in earnest.

7. XBT and PDR sections of the route from the Tourbillon area to the Continental Slope were made and the results will be passed on to the national data centre (MIAS) in due course.

J W Ramster
21 October 1979

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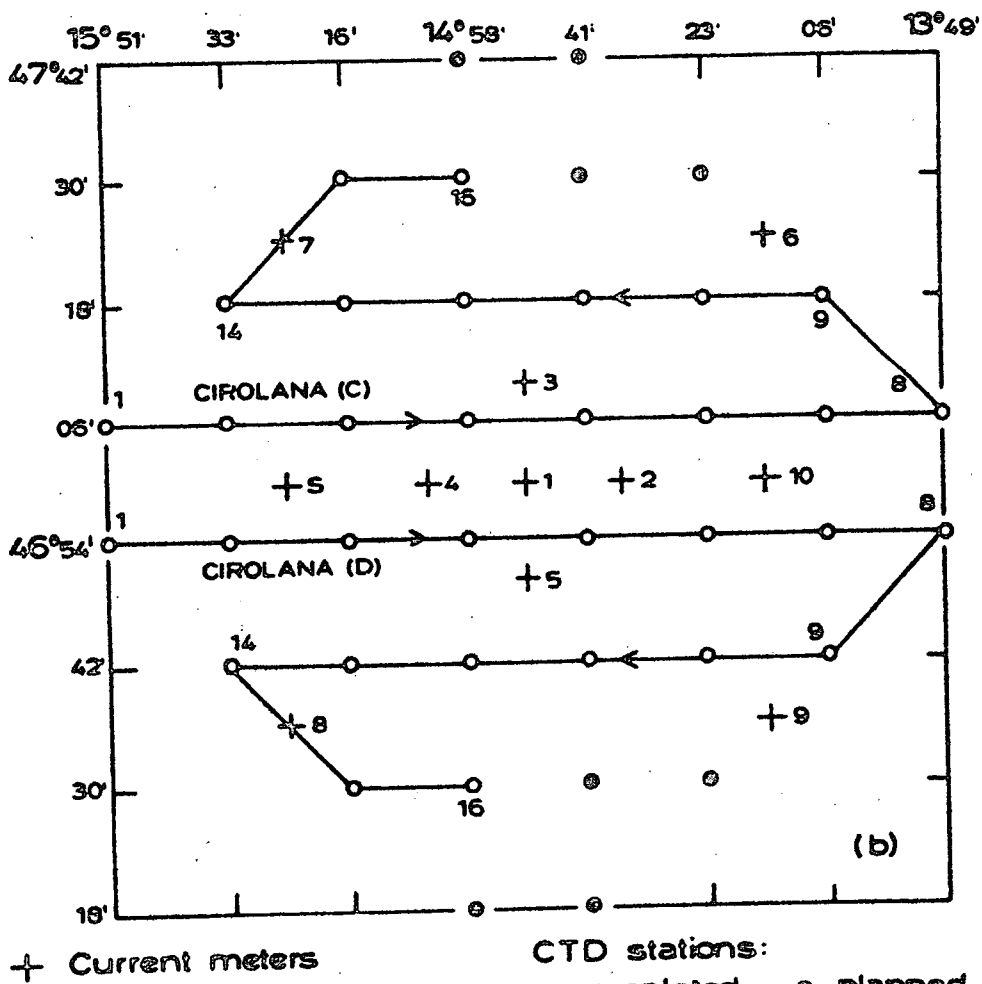
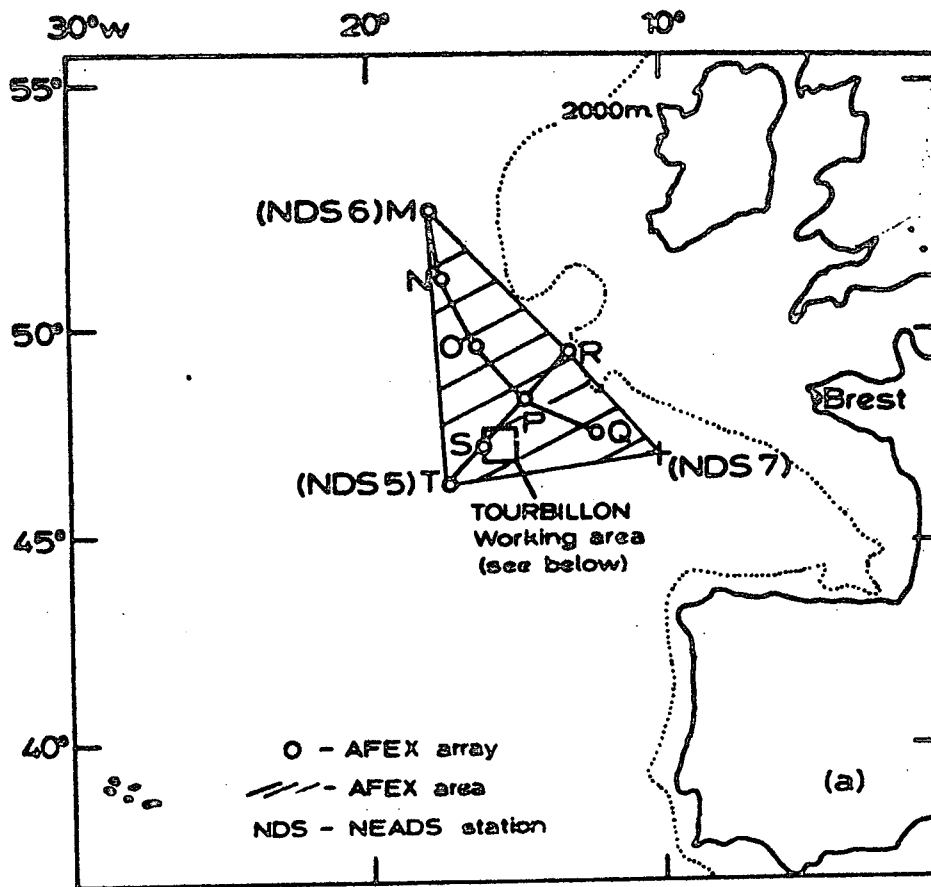


Fig 1. (a) The AFEX array and area (b) The Tourbillon array and CTD grid

Fig. 2a TOURELLOU
Circana Grid C

S‰ at salinity maximum of
Mediterranean water.

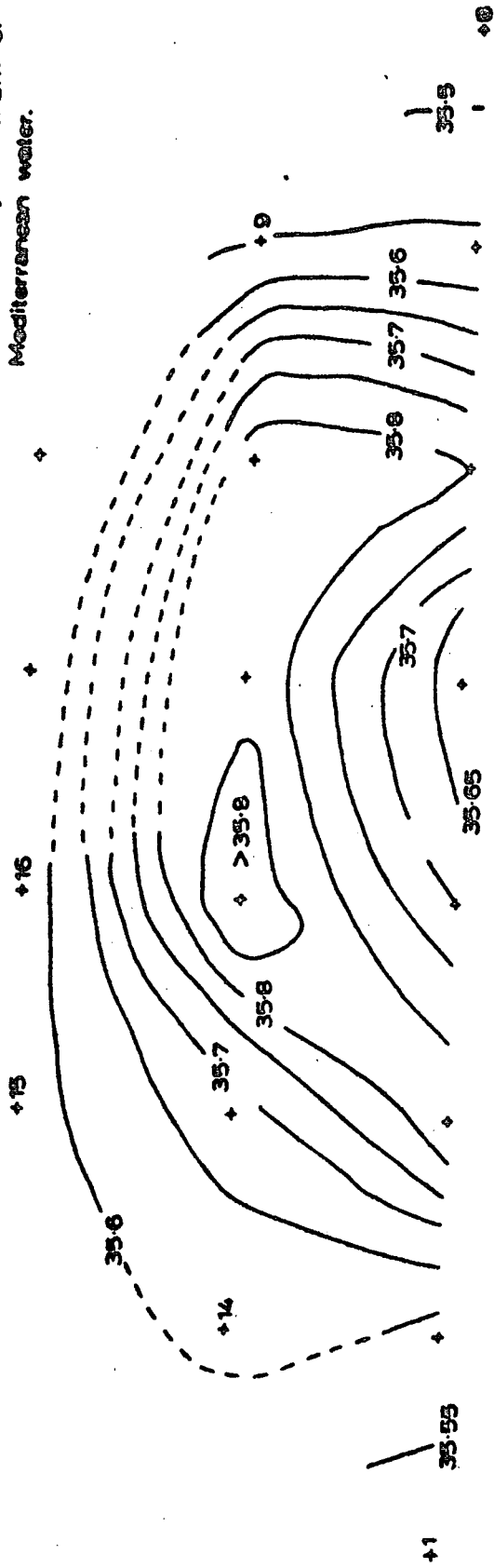


Fig. 2b.
FLOATS
Selected trajectories
22 Sept - 15 Oct 1979

