

Library

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

1977 RESEARCH VESSEL PROGRAMME

REPORT: RV CORELLA: CRUISE 12

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

STAFF

- D Harding (NIC)
- A R Folkard
- B F Riches
- D G Hughes
- M Cryer

DURATION

| | | |
|--------------------------------------|---|------------------|
| Departed Lowestoft 1000 hrs 3 August |) | All times G.M.T. |
| Docked Lowestoft 0730 hrs 16 August |) | |

LOCALITY

West Central North Sea

AIMS

1. To map the position of the oceanographic front found between Flamborough Head and the Dogger Bank.
2. To investigate physical and biological phenomena (a) on either side of the front and (b) at and adjacent to the thermocline in the stratified water mass forming one side of the front.

NARRATIVE

RV CORELLA sailed at 1000 h 3 August to the start of the sampling grid. The equipment used on this cruise included the environmental package, with monitors for temperature, salinity, oxygen, pH, transparency and chlorophyll and an HLC particle counter, to which seawater from 4 metres depth was pumped continuously throughout the cruise, and which continuous records of these variables were made. A tow net was also deployed to sample temperature and oxygen levels at depth and by attaching a hose to the towed body through which water was pumped on board from greater depths to a second fluorometer. All this equipment was rigged and calibrated on 3 August and after initial problems with the rig for towing the hose attached to the towed body a suitable towing arrangement was achieved and sampling commenced at 0810 h 4 August at 53°40'N, 01°50'E. This first grid was completed at 1957 h 6 August off the Yorkshire Coast near Whitby. A tight grid of stations was then worked offshore from Whitby on 7 August to determine the movement of the front in response to the tidal stream along this part of the coast. Problems were experienced with the hose attachment on the towed body as it was raised and lowered in the water column and this method of working was abandoned in favour of stopping the ship and sampling from depth using the hose and a thermometer attached to the hydrographic wire. This method was used throughout a complete tidal cycle on 8 August on a line of stations between 54°31'N, 00°36'W and 54°40'N, 00°21'W in mixed coastal waters, in the frontal zone and in stratified water to the NE of the front. The autoanalyser was also brought into use on 8 August and test samples run at the surface and from deep water along with samples for plankton and chlorophyll 'a' analysis.

On 9 August work continued on the line of stations off Whitby using the tow net to take temperature profiles in the three water masses and a grid of stations sampled from the offshore end of the sampling line to Sunderland using the auto analyser on line to sample Nitrate, Nitrite and Ammonia between offshore stratified water through the frontal zone to mixed coastal waters and polluted inshore water in Tees Bay.

The ship laid off Sunderland for the night and docked at 0800 h on 10 August for water. Whilst in Sunderland the chlorophyll samples were analysed and equipment reorganised ready for the second half of the cruise.

RV CORELLA sailed from Sunderland at 0700 h 11 August and recommenced work with the whole range of instruments, including the auto analyser and towed body, on a grid of stations from Tees Bay along the Yorkshire coast. Legs of the grid extended from mixed coastal water to stratified offshore water beyond the front and temperature profiles were made at regular intervals by raising and lowering the towed body. This work continued on 12 August on a very tight grid of stations to determine the best location for parachute drogues to be released. These were eventually set a mile apart in the frontal zone one at 30 metres depth at $54^{\circ}27.1'N, 00^{\circ}22.9'W$ and the other 15 metres deep at $54^{\circ}26.6'N, 00^{\circ}24.4'W$. CORELLA laid near the deeper drogue tracking both drogues for one complete tidal cycle and sampling vertical profiles of temperature at hourly intervals. On 13 August the tow net was rigged with a 60 mpi net which was linked by the hose to a pump on deck and a series of hauls made from the surface to 40 metres and 5 metre intervals in the thermally stratified water. Once this work was completed a line of stations was worked through the frontal zone, the drogues recovered with the loss of one parachute and a start made on a grid of stations between the Yorkshire coast and the Dogger Bank. On this homeward grid the towed body was deployed at 30 metres, below the thermocline, and at fixed stations it was raised and lowered in the water column to obtain vertical profiles of temperature. The grid was completed at 1440 h 15 August at $55^{\circ}43.6'N, 01^{\circ}45.8'E$ and RV CORELLA steamed for Lowestoft. At 1520 h gear trials were made with the tow net fitted with two flowmeters, one mounted on the tail plane and the other in the nose cone an arrangement which worked very satisfactorily.

The cruise was concluded at 0730 h 16 August when CORELLA docked at Lowestoft.

RESULTS

The oceanographic front was not very strongly developed between the Dogger Bank and east coast of England but a fairly well defined transition zone about a mile wide was located about ten miles off Whitby and work was therefore concentrated in this region.

The first grid showed that the temperature ranged from 12 to $14^{\circ}C$ at 4 m and from 14° to $9.5^{\circ}C$ between 4 m and 50 m in the stratified water. Twelve days later the temperatures had increased and ranged from 14.2° to $16^{\circ}C$ at 4 m over the same area of sea indicating a southward movement of surface water.

Between the two surveys transects across the front near Whitby also showed a southerly and onshore movement of surface water that was confirmed by the drogue tracking experiment, and which also showed a similar movement in the deeper water at 30 m.

Nutrient and Chlorophyll values were as expected higher, in the mixed water inshore than in the stratified offshore water. Chlorophyll levels were highest just above the thermocline and nutrient levels highest below the thermocline. The thermocline was located between 20 and 25 m in the strongly stratified water in; the frontal zone, it was not well defined, or more than one thermocline occurred; and in coastal waters the water was thoroughly mixed with a very slight temperature gradient between surface and bottom water.

Plankton samples and particle sizes have still to be fully analysed, but it was apparent from microscopic examination of frontal water near Whitby that the major constituents of the phyto-plankton were Dinoflagellates; the most common being Ceratium furca, Ceratium tripos, Ceratium sp near longiceps, Dinophysis norvegica and Goniaulax sp. Trials with the plankton net and pump were also very encouraging, indicating that it was possible to collect samples from different depths quite easily and that fish larvae which passed through the pump were relatively undamaged.

D Harding (NIC)
23 August 1977

INITIALLED: AJL

SEEN IN DRAFT:

Master - J E M Balfour
Fishing Skipper - E T Bridge

DISTRIBUTION:

Basic List
D Harding (NIC)
A R Folkard
B F Riches
D G Hughes
M Cryer



