

DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS  
CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE,  
LOWESTOFT, SUFFOLK, ENGLAND

2002 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 11

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	Dr N Greenwood	Mr J Read	Dr G Tattersall
	Ms C Chambers	Dr J Bunt	

DURATION: 13 August – 24 August

LOCALITY: North Sea

AIMS:

The work was directed toward:

- a) A better understanding of the circulation processes of the southern and central North Sea in order to characterise the transport of nutrients from UK waters.
- b) Improved knowledge of the processes that determine areas of strong phytoplankton production in the vicinity of the cold pool region south-east of the Dogger Bank.

The main sampling aims of the cruise were:

1. Recover the free-floating satellite-tracked buoys deployed during cruise Corystes 8/02.
2. To undertake Scanfish and CTD surveys to collect information on the water column structure in relation to nutrient and plankton dynamics.
3. Conduct productivity experiments and assess nutrient uptake.

NARRATIVE (all times GMT):

RV Corystes sailed at 11:08 13 August and headed for a CEFAS sonar buoy deployed in the vicinity of the Indefatigable Bank that had ceased to function. The buoy was recovered and a replacement deployed by 2219h. The first scanfish section towards the Upper Scruff commenced at 00:45 14 August and on completion at 10:11 three Argos drifting buoys, A6, A7 and A4 were recovered. Problems with the port cable winch delayed the start of the second scanfish section but this was completed using the starboard winch, albeit prematurely following a loss of communication with the fish shortly before the planned end of section, at 06:08 15 August. Three more Argos drifting buoys, A13, A15 and A14 were then recovered, the first having lost its drogue. Plans to continue with a scanfish section were postponed whilst the loss of communication with the scanfish was investigated. Meanwhile, in ideal weather conditions, Argos buoys A11, A16 and A8 were recovered.

The scanfish communications problem was believed to be a consequence of towing cable malfunction and a repair effected. After collection of samples for a productivity experiment, site P1, a third scanfish section started at 03:21 16 August but this was also terminated early

when communication with the fish was again lost, suggesting that the cable had sustained further damage. The cable was substituted by that on the port winch and the section recommenced at 13:16, successfully completed at 20:45. Scanfish sections 4 and 5 were completed over-night and the next day. Samples from the near-surface were collected at 02:30 during section 4 for a second productivity experiment, site P2.

Argos buoy A3 was recovered at 15:49 17 August and A1 at 19:04. Scanfish sections 6, 7, 8 and 9 followed during 18 August. Samples were collected for a third productivity experiment, site P3, during the early hours of the next day. Scanfish section 10 was then completed, followed by the recovery of Argos buoys A9 and A10. Data quality from scanfish section 10 was poor and a suspect lead was replaced prior to starting section 11. The logged CTD data was still poor and after recovery at 19:42 19 August the towing cable was again inspected and one of the data lines found to have a high resistance. The fault was rectified by connecting to a spare line and section 12, a repeat of section 11, was completed without any problems.

Eight CTD stations were worked along scanfish section 10, just north of Clay Deep, collecting water samples for nutrient, oxygen, chlorophyll, suspended particulate matter and plankton analyses. In order to relate these to the physical conditions it was decided to repeat the earlier scanfish section (10) which yielded poor data and section 13 was completed at 22:35 20 August. Following an analysis of measurements from this section samples were collected at a fourth productivity site, P4, early the following morning and NIOZ core samples collected later that day at the eight CTD stations. Two cores were collected at each site, one for nutrient analyses of the sediment pore water and the second for chlorophyll measurements in the upper 3cm.

A 230 km scanfish section (14) from Clay Deep to Terschelling Bank was worked over-night and completed at 8:15 22 August. During the final stages of this section the back-up battery supply was intermittently powering the system, indicating another possible towing-cable fault and a further repair was made. Plans for a scanfish section NW from Texel were abandoned in view of the heavy northerly swell and *Corystes* made for the start of section 15, worked steaming almost due west between 14:29 and 23:52 22 August. Section 16, to Texel then followed, being completed at 11:41 23 August, when *Corystes* steamed for Lowestoft and docked at 00:15 24 August.

## RESULTS

All the scientific aims of the cruise were completed despite the technical problems encountered. An extensive scanfish survey of the cold pool region south east of the Dogger Bank was undertaken. Figure 2 shows the bottom temperature from the scanfish sections. Bottom fronts were detected with gradients strongest on the eastern and western margins and weakest north - south. A double thermocline system existed over most of the region.

Of the 16 ARGOS buoys deployed 13 were recovered and 1 has been left to continue the study into late autumn. The general tracks of the buoys during July and August are shown in Figure 3 with their August recovery positions. The strongest flows do appear to correspond with the regions of strongest bottom temperature gradient.

Secondary scientific aims of the cruise were to look at the productivity and nutrient availability in the cold pool region. Four productivity experiments were performed and

successful incubations were achieved at the surface, bed and twice at the thin layer fluorescence maximum. Comparable results were achieved at all stations with reduced values near the surface.

In accordance with understanding of the nutrient dynamics a section of 8 CTDS was performed along a section through the cold pool region and NIOZ cores for pore waters and chlorophyll were taken at these points. Figure 4 shows the density structure (lines) on top of the fluorescence structure with the oxygen concentration over lain. Reduced levels of oxygen existed near the bed with more oxygen present in the zones of highest chlorophyll concentration. Throughout the entire extent of the cold pool region there existed a thin layer (<1m thick) of high (> 5v) fluorescence. The nutrient source to sustain this layer was unclear as only low levels of TOXN were detected.

The co-operation and of the officers and crew of Corystes in ensuring that the aims of this cruise were achieved is gratefully acknowledged. Their determination and assistance to overcome problems with winches, towing cables and CTD A-frame were especially appreciated.

Ken Medler  
Liam Fernand  
23 August 2002

Seen in draft:  
A Reading (Master)  
B Salter (Fishing Skipper)

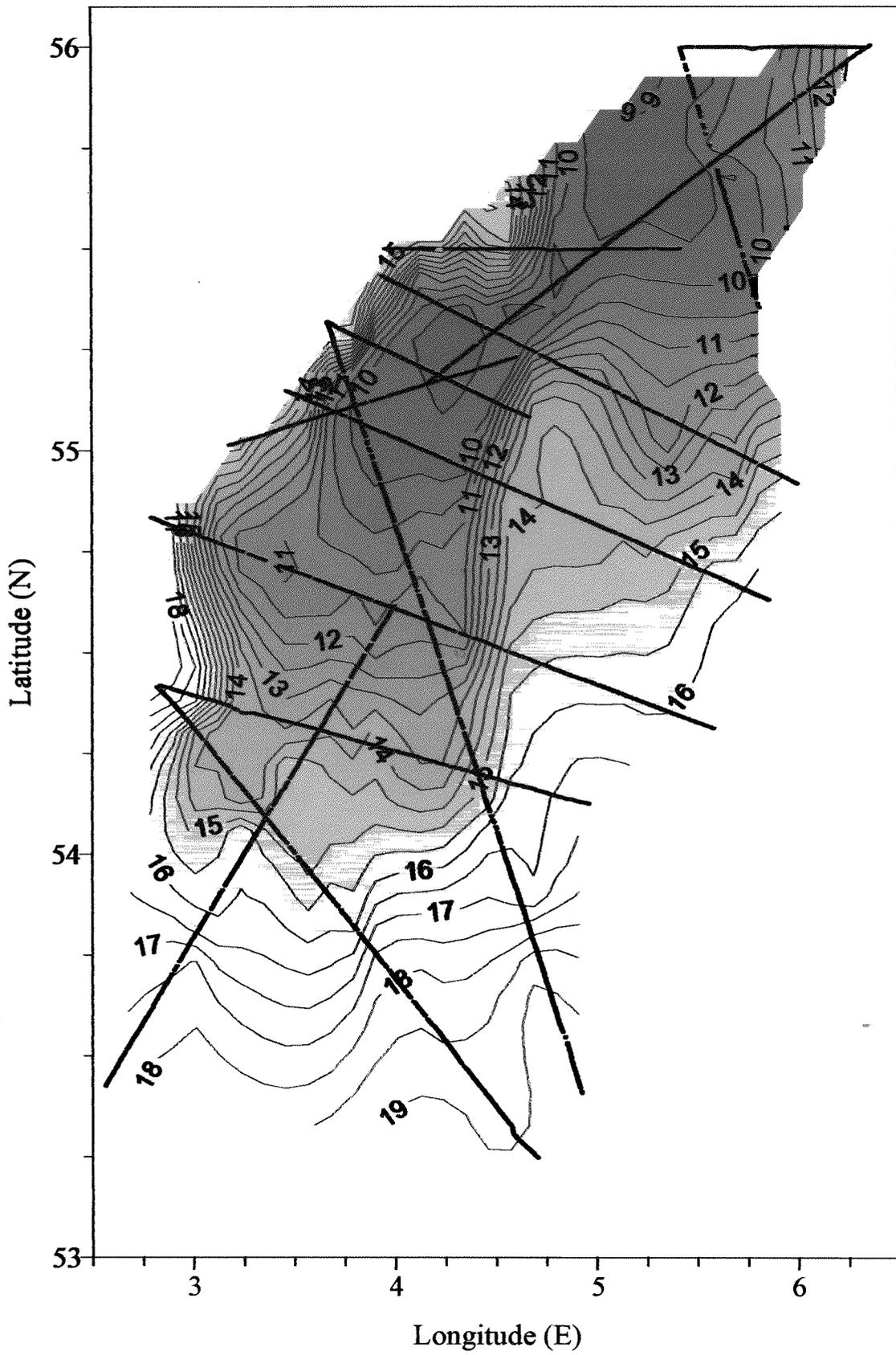
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Figure 2 Bottom Temperature 13 - 24 August



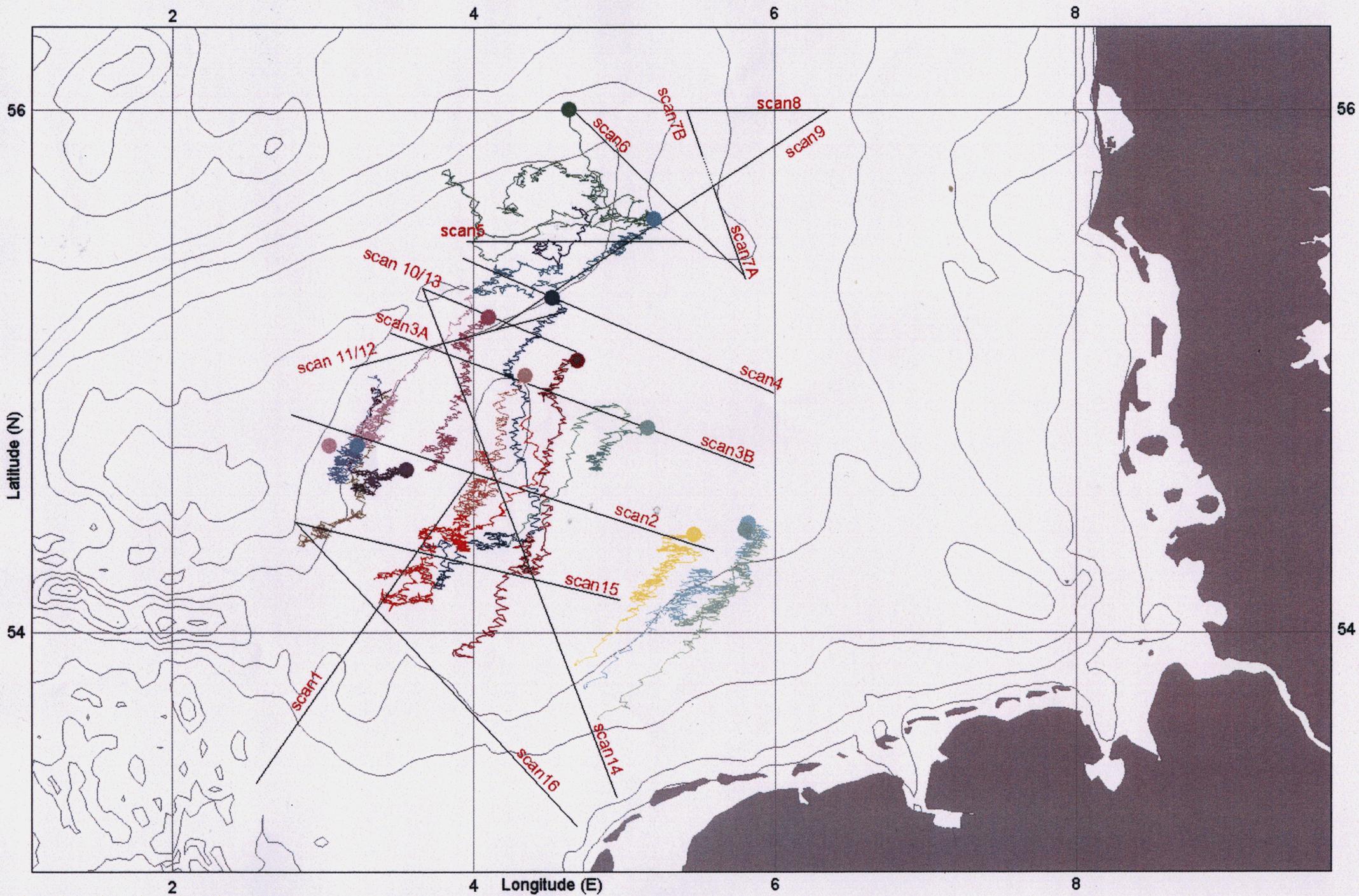


Figure 3: August and July drifter tracks and recovery positions with scanfish survey lines

Figure 4 Density ( $\sigma_t$  kg m<sup>-3</sup>), fluorescence (volts) and Oxygen (ml l<sup>-1</sup>) from CTD's along Section 10

