CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE,

LOWESTOFT, SUFFOLK, ENGLAND

DRAFT 2003 RESEARCH VESSEL PROGRAMME
Report: RV CORYSTES: CRUISE 11

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Sailing Time 10:00 GMT on 14th August
Docking Time 08:00 GMT on 27th August
LOCALITY: Western English Channel

AIMS*:*

This cruise was a companion cruise to Cory 8/03 and was designed to include some recovery of instrumentation deployed during cruise 8. The work was generally aimed at achieving a better understanding of the dynamics of the circulation processes of the Western English Channel. Specifically, this cruise aims to better characterise the extent and nature of density-driven and seasonal jet-like circulations which may act as a direct and rapid pathway for the transport of material. The previous cruise found an extensive bloom of the dinoflagellate *Gyrodinium Aureolum (now renamed Kareni Miximotoi).* The nature of the flows associated with fronts and the structure of the bottom frontal structures is of primary intereast.
The main sampling aims of the cruise were:

1. To characterise the hydrographic structure associated with frontal regions and investigate the transport pathways by use of towed undulating CTDs.
2. To characterise the biological transport indicators by species identification.
3. Recover ARGOS drifting buoys.
4. Recover Moorings (ADCP and thermistor chain).

Cruise Narrative

Corystes sailed on the morning tide and a test CTD cast successfully conducted off Southwold, progress continued to the work area at the Casequettes TSS which started at 13:00 on the Friday. A CTD and net cast were performed and a scanfish line was commenced from the middle of the separation zone, towards the south west along the centre of the channel. Further scanfish and CTDS were conducted along the South Cornish and Devon coasts. On Sunday 17/8 after a scanfish line from Salcomb a personnel and instrumentation change over occurred in Plymouth by sea rider, a ring net was lost at the CTD station here. Two hours was spent in an unsuccessful attempt to retrieve an Argos buoy. Further CTD and scanfish lines were performed in combination along the coast Cornish towards the Scillies.
During a scanfish tow through the Scilly Isles – Lands End gap a marker Dann was caught and necessitated retermination of the cable. Further CTDs were performed around the Scillies and an Argos buoy recovered, the continuous logger failed at around this time. A scanfish line was performed to the East of the Scillies scanfish line and then continued to the Ushant area. On the 22/8 after a series of CTDs the moorings were approached in moderate visibility. The toroid was absent but the ADCP frame was present, however after firing the release the recovery pellets did not appear. Two runs were performed with the grapnel and while the mooring was caught it was mostly likely parted at the ADCP. In bad visibility Argos buoy 13681 was recovered. The toroid of the eastern mooring was found one mile off position, and recovered successfully. The adcp was found to be on its side at the original position and was successful grappled at the first attempt. Overnight a Scanfish line across the Herd deep followed by CTDs was undertaken. Further scanfish lines from the central channel down to Isle de Sept, then across to Brittany were performed and more lines towards the South English coast. On Sunday afternoon after accurately locating the ADCP frame a grapple was performed and caught the ground line,

however the ADCP was no longer attached. The search continued using a simple grapple device until 22:50 (GMT). Further scanfish lines and CTD were performed until 22:30 on Monday 25th. A further test of the starboard tow cable on the return journey indicated no fault with the cable, in contrast to previous tests. Hanging tests using 950kg on the towed body winch indicated no faults.

Scientific Report.

A total of 317 stations were logged consisting of 19 scanfish lines, 68 CTDs and associated Net hauls with the remainder being underway stations. Station positions are given in Figure 1. Samples for Plankton, Nitrate, Nitrite, Ammonia and Chlorophyll were taken at all CTD stations, net hauls were performed at most of the CTD positions. During scanfish legs surface underway samples of Chlorophyll and Nutrients and Plankton were taken.

The weather was generally good through out the trip leading to very warm surface layers with narrow frontal regions towards the Cornish coast (Figure 2). The bottom temperature clearly shows the coldest water south of the Lizard and the potential pathway for circulation around it. Strong gradients were observed in the area off Ushant with weaker gradients in the area around 4º W. The flow around Lands Ends was complicated but indicated a pathway to the Celtic Sea. The flow regime has been well delineated by the ARGOS buoys (Figure 3). Most of which while having been influenced by wind were also apparently baroclinically driven. The Ushant section (Figure 4) is a typical of the scanfish lines and shows the surface and bottom fronts clearly. The fluorescence structure is also apparent with high surface levels.

The data from the thermistor chain from the Eastern mooring (Figure 5) shows that a strong mixing event occurred dramatically changing the thermal structure in a region that was known to be transitional. In comparison to Cory 803 there was much greater influx of salty shelf water with much greater variation West – East than previously. The region near the French coast was stratified in contrast to the earlier cruise.

Phytoplankton

Both quantitative and qualitative samples for phytoplankton analysis were taken during the cruise. Quantitative samples were taken from discrete depths directly from the CTD rosette bottles. Qualitative samples were obtained using a 25 micron mesh net which was hauled vertically from the sea surface to a depth of 50 m, where water depth allowed, and back to the surface at most CTD stations. Samples were preserved in both Lugol's Iodine and neutral formaldehyde. During Scanfish tows and long steams between stations, surface samples were also taken periodically from the continuous sea water supply pumped from a depth of 4 m.

In general terms, the net hauls were very rich in zooplankton over the entire study area. Two phytoplankton blooms were encountered. A bloom of *Pseudo-nitzschia* was present around the coast of Brittany, and a bloom of *Emiliania huxleyi* was found in mid-Channel south of Start Point. The *Pseudo-nitzschia* bloom extended from the southern limit of the study area (48º 10'N), and west to at least 6 west at this latitude. The northeastern boundary of the bloom approximated the line of Scanfish Leg 255 (Line #14), and it extended northwestwards out to CTD station 199 (49º 10'N 5º 55'W). Cell densities were estimated as 200,000-1,000,000 cells per litre at the surface, and uncalibrated chlorophyll data from the CTD indicated values of 3-10 µg Chl a/l within the bloom. Unavailability of surface underway data disallows any more clear definition of the bloom extremities.

Visible water discolouration caused by a bloom of the coccolithophore *Emiliania huxleyi* was first observed at CTD station 215 (ca. 49º 15'N 4º 40'W). Although the water was slightly milky in appearance, the colour was not as intense as would have been the case if cell densities were within the range 2-5 million cells/l. Nevertheless, rough measurements gave estimates of surface concentrations of the order 200,000-500,000 cells per litre. High frequency surface sampling was subsequently initiated in the bloom area, which extended over both mooring positions (4º 15' to 3º 30'W) in the middle of the Channel and south from these locations towards the French coast. At the inshore edge of the bloom, at station 211, the net haul was full of bivalve larvae.

In the northern section of the study area, phytoplankton were quite sparse. Net hauls here were dominated by two species of radiolarian. Further west, towards the Scilly Isles, copepods were more predominant. Otherwise these samples comprised small naked and armoured dinoflagellates.

Liam Fernand
(Scientist-in-Charge)
27th August 2003

Figure 1 Survey Area

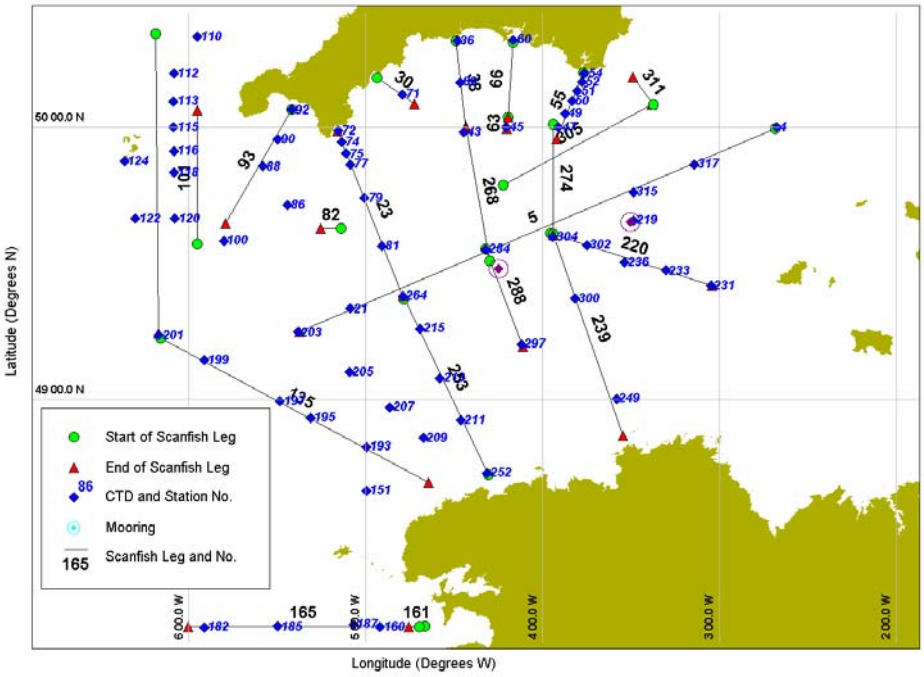


Figure 2 Bottom Temperature Corystes 11 August 2003

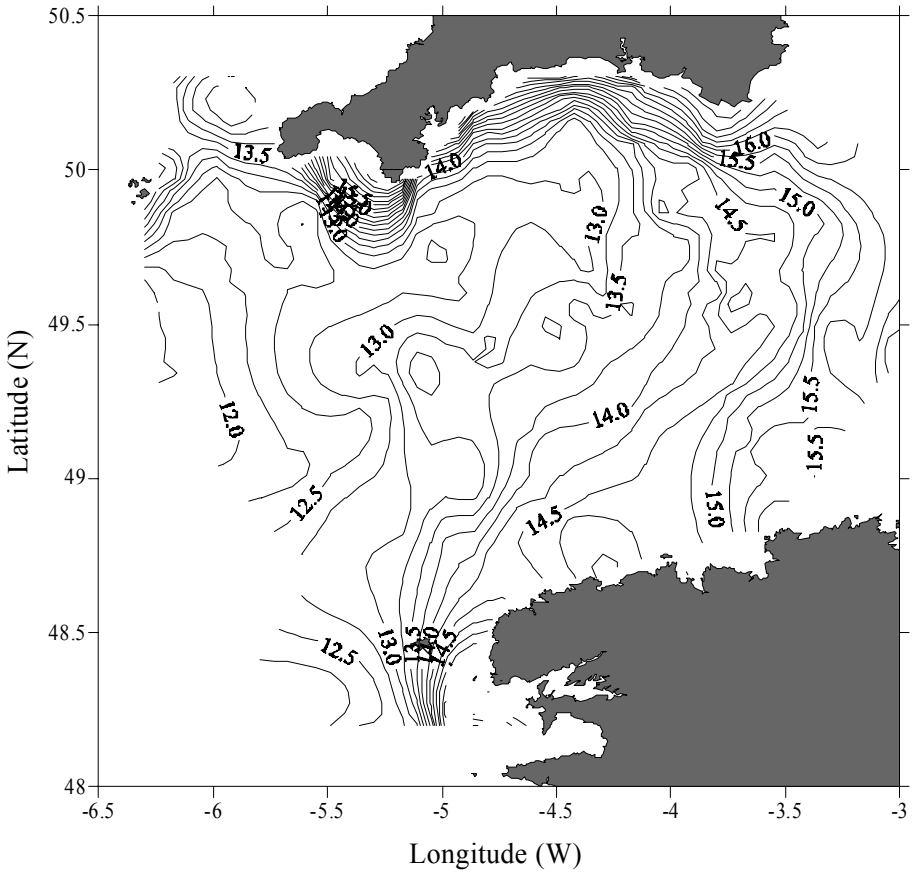


Figure3

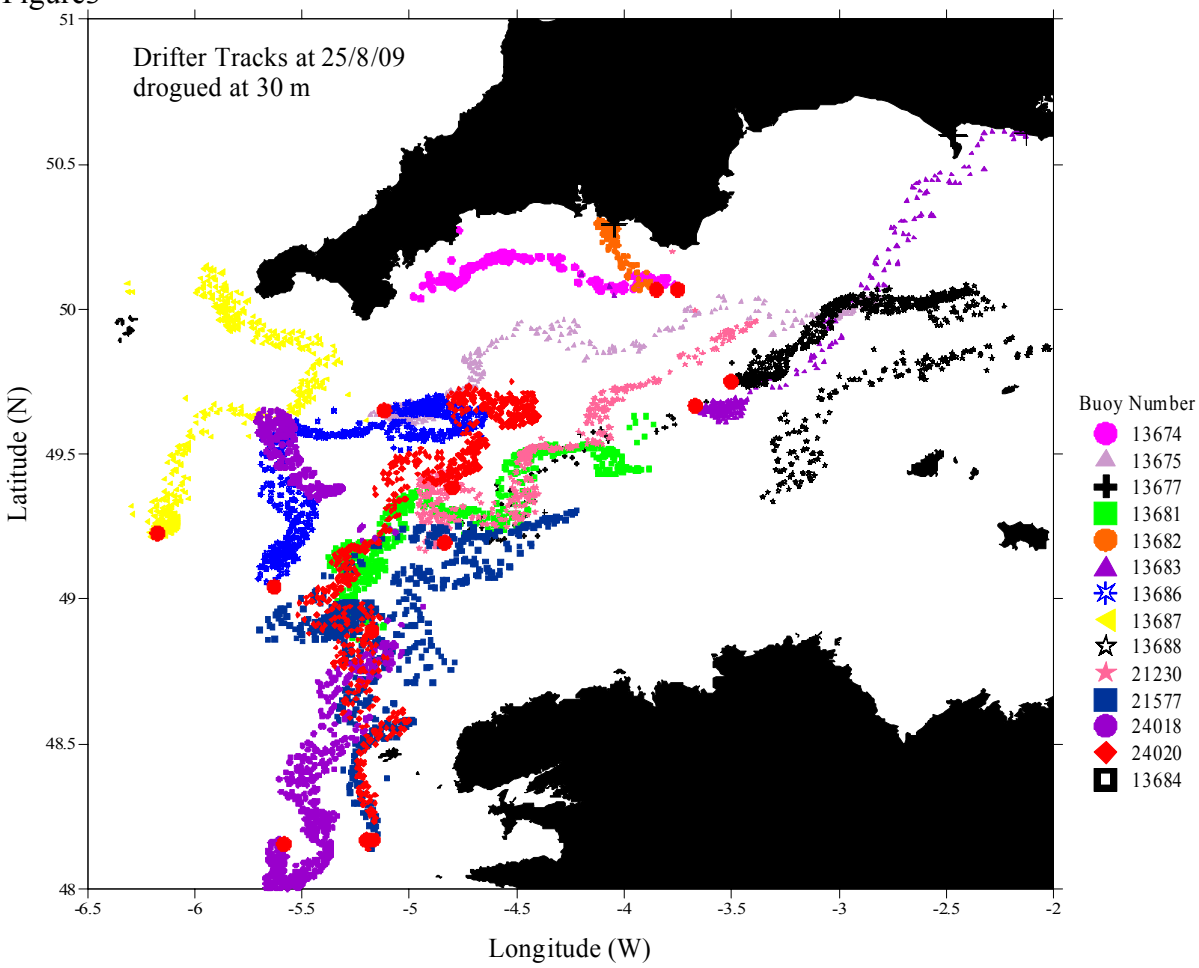


Figure 5 Thermistor chain data

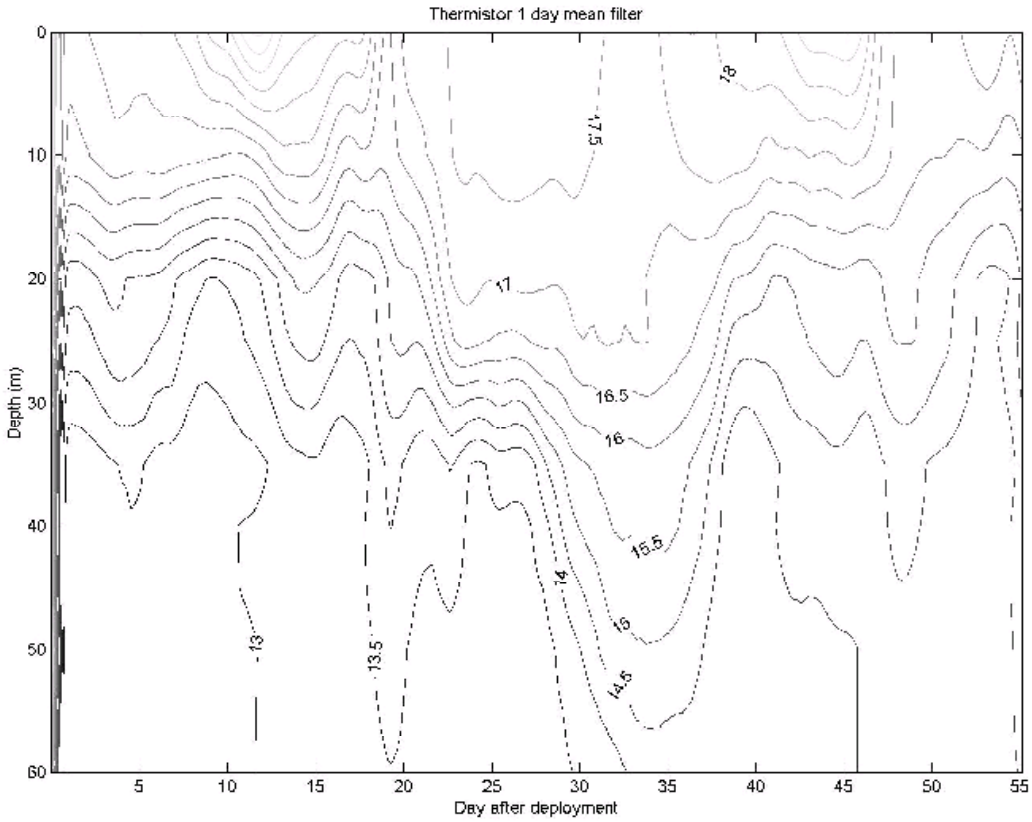
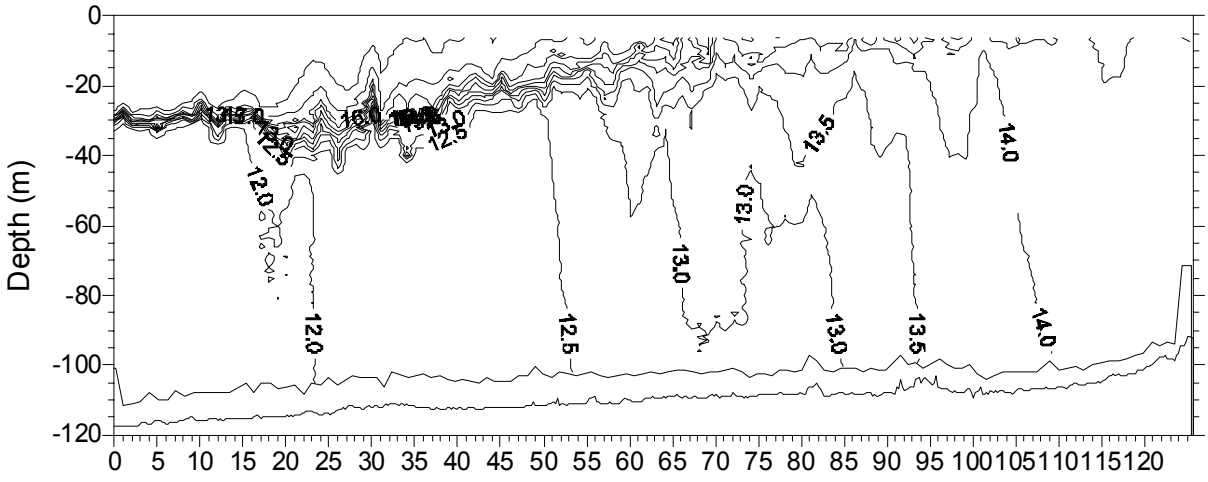
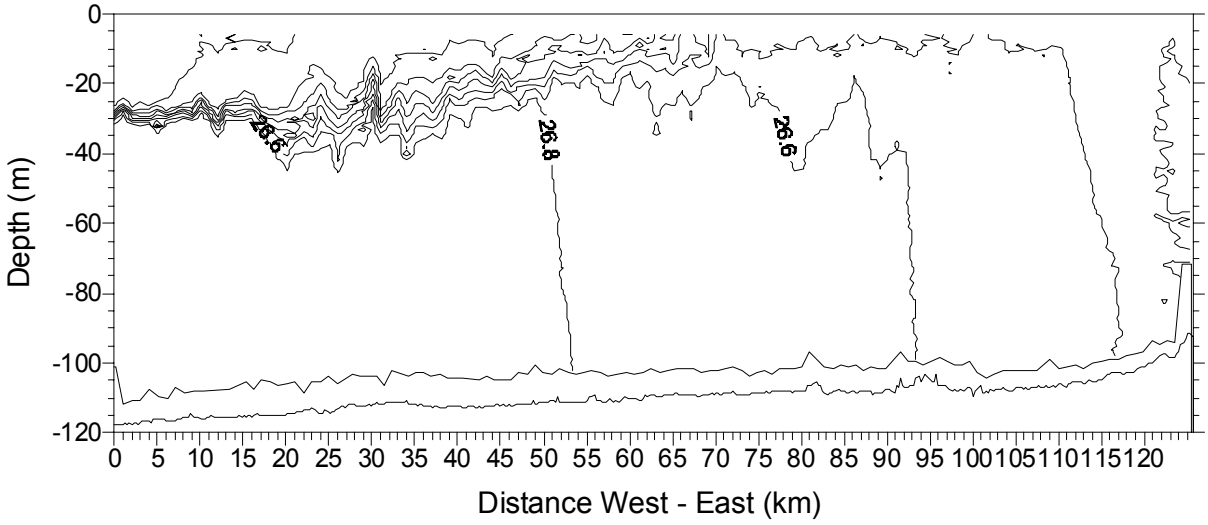


Figure 4 Temperature Plot Leg 135



Density Sigma-t



Fluorescence (volts)