

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

1996 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 9

STAFF:

- |   |                                      |
|---|--------------------------------------|
| Dr J Brown                                    | Mr L Fernand                         |
| Mrs A Reeve (27 June - 19 July)               | Mr K Medler                          |
| Mrs A Winpenny (11 - 24 July)                 | Dr E Hill (UCNW) (27 June - 11 July) |
| Ms P Kerrigan (27 June - 11 July)             | Ms M Angelico (UCNW) (11 - 16 July)  |
| Mr K Horsbrugh (UCNW) (27 June - 11 July)     |                                      |
| Mr J Read (27 June - 2 July & 5 - 24 July)    |                                      |
| Mr S Jones (27 June - 11 July & 16 - 24 July) |                                      |

UCNW - University College North Wales

DURATION: 27 June - 24 July

LOCALITY: Irish Sea, North Channel, Malin Shelf and North Sea (Figs. 1 & 2).

AIMS:

The work is directed at a better understanding of the dynamics of the North Channel which control the flushing characteristics of the Irish Sea. Net outflow from the Irish Sea is northward, but there are apparently long periods of inflow on the western side of the channel. It is not known to what extent outflowing water recirculates and extends southward along the Irish coast or what importance inflows of Atlantic water have on flushing characteristics of the region. Variability in the flow regime and factors governing it are poorly understood. In addition, work will be undertaken off the north east coast of England to examine elements of the circulation. The main sampling aims of the cruise are:

1. To deploy and recover mooring arrays in the North Channel/western Irish Sea and North Sea.
2. Deploy and retrieve free floating Argos buoys in the North Channel/western Irish Sea and North Sea to determine the Lagrangian circulation.
3. Undertake associated physical and biological surveys of the region in support of 1) and 2).
4. Perform trials of a self contained broad band ADCP.
5. Conduct a Tin Tow survey of the western Irish Sea .
6. Undertake a Scanfish and nutrient survey in Liverpool Bay (AE0529)

NARRATIVE (all times GMT):

RV CORYSTES sailed at 1700 27 June for an area offshore of Middlesbrough and trials of the new CTD rosette and Scanfish deployment frame (28 June). Once successfully completed a series of Scanfish sections were undertaken between the English coast and the Dogger Bank (Fig. 1), taking care to complete the inshore part of the lines during daylight in order to avoid

the profusion of static gear. Where necessary, the inshore end of the lines were augmented with conventional CTD casts. During the first leg, problems were encountered with the new NT server and network. Despite the considerable efforts of members of ISG before sailing, the system was unreliable and sustained logging across it was impossible as software crashed and responses were extremely slow. To avoid loss of data and potential loss of equipment, the limited space of PC hard drives had to be used, and data subsequently transferred over the network, placing constraints on the duration and integrity of data logging. Work proceeded well, even during a period of comparatively rough weather (29 June) when towing the Scanfish, a sufficiently long length of cable apparently decoupling the motion of the ship from that of the instrument. During recovery of the Scanfish on 30 June the instrument failed to dock into the new latch, necessitating recovery to be made without latching. During this operation damage was sustained to the port end plate and control flap when the instrument fell to the deck. During the first phase of the cruise the docking latch was continually 'gummed' with viscous grease from the new towing cable. The remainder of the work in the region of the Dogger Bank was occupied with current meter deployments, CTD work and Argos buoy deployments.

Work in the area ceased late Monday (1 July) and Mr Read was put ashore at Aberdeen (2 July) whilst on passage to the Irish Sea. With the assistance of colleagues at SOAEFD, Mr Read returned the damaged parts to the Danish manufacturers, with replacements to be collected in the Isle of Man on arrival.

Activity in Irish Sea commenced (4 July) with Argos Buoy deployments (Fig. 3) followed by a CTD line across the centre of the gyre. Mr Read and the Scanfish parts were collected in the Isle of Man on the evening of 5 July. Three moorings were laid to the west of the Isle of Man (6 July; Fig. 4), before trials of the repaired Scanfish. On completion, a Scanfish grid was occupied (Fig. 5) until 9 July. Following this, a CTD 'anchor' station was occupied for 21 hours in the centre of the western Irish Sea adjacent to a DANI mooring (STN 45; Fig. 4) and LOUGH FOYLE, finishing in order to dock in Douglas at approximately 1800 10 July. On the steam to Douglas the oil bladders associated with the conductivity cells of both the CTD's had to be refilled as they continue to leak.

In Douglas, Dr Hill, Ms Kerrigan and Mr Jones were exchanged for Mr Horsbrugh, Mrs Winpenny and Ms Angelico. Additionally, a current meter found on the western shore of the Island was collected from the coastguard in Peel. The instrument had been lost in 1994, but unfortunately is unusable as the base of the case was missing, although the fin is in good condition.

CORYSTES sailed at 0745 12 July to commence a Tin Tow (TTN) grid through the western Irish Sea (Fig. 6). During the first cast the CTD failed and the back up failed after the third cast. The fault on the latter was traced to a faulty pressure sensor and one was cannibalised from the other CTD, and for the most part this instrument worked until the end of the grid (late evening 14 July) The unreliability of the CTD's coupled with their poor accuracy underlines the urgent need to bring the replacement instruments in to use. During this period the Manx coastguard informed us of a toroid washed up on Jurby Head. With the assistance of Dr Browns father and friends Mr Jones was able to secure the buoy and it was eventually recovered from the beach and stored for subsequent collection. At an appropriate moment in the TTN grid the remainder of the mooring (G), approximately one mile out of position, was recovered intact.

Following the TTN work a series of Scansfish lines were occupied (15 July) at high and low water in Liverpool Bay to assess conditions in the vicinity of a planned JoNuS (AE0529) mooring and process site. Static gear prevented work as close in shore as intended. Towing in water of 20 m or less is possible in reasonable sea state and with low vertical cycling rates, although care is needed.

On 16 July the Argos buoys were recovered, the new tracking device picking up signals at up to 6 miles range. At 1700 Mr Angelico was put ashore in Port Erin and Mr Jones rejoined the ship. CORYSTES then steamed north to mooring (F; Fig. 4) with the intention of recovering and redeploying mounted with a new broad band ADCP. On arrival, this mooring was also found to be out of position with the sub-surface buoy floating on the surface several miles away. The component parts of the mooring were recovered with the loss of one current meter, the record from the other indicating damage from trawling only five hours previously. The test of the ADCP was postponed and a CTD line occupied before collection of the final mooring on the morning of the 17 July. CORYSTES then sailed for the North Sea.

After passage via the Pentland Firth, Mrs Reeve was put ashore in Berwick-on-Tweed (19 July). The remaining time before docking in Lowestoft (0300 24 July) was occupied with Scansfish, CTD's, mooring and Argos buoy recovery. During this period a number of problems were encountered with Scansfish. One occasion the instrument broached the surface and after apparent correction sank to the sea bed for approximately a minute before hauling of the towing cable brought it to the surface for recovery. Fortunately little damage was sustained and subsequent viewing of the data suggests that the control flaps had become temporary jammed. Scansfish work was prematurely ended on the evening of 22 July when a break in the power cable leading from the vapour block to the junction box caused a loss of power to the instrument. Additionally, the broad band ADCP was successfully tested for 36 hours on mooring E (Fig. 7).

## RESULTS (Preliminary):

1 - 3.

### Western Irish Sea:

The Scansfish survey demonstrated the presence of strong thermal stratification throughout the western Irish Sea extending into the southern North Channel. A north-south section along the centre of the deep basin indicated doming of the pycnocline under both centres of stratification. Despite the comparatively brief deployment period the Argos buoys described the gyre circulation of the southern centre (Fig. 3). The closely spaced CTD section across the gyre demonstrated a 'pool' of comparatively depleted oxygen and high nutrients contained by the stratification. The current meter data will be used to assist in detiding the shipboard ADCP data and help in validation of the North Channel modelling. The CTD/ADCP 'anchor' station will provide information on the velocity profile in presence of strong stratification, enabling validation of numerical models.

### North Sea:

The region was strongly stratified (surface to bottom temperature difference  $\sim 8^{\circ}\text{C}$ ) north of the Flamborough Front as expected for the time of year. Drifter tracks indicated a general movement of water southward along the north-east coast of England. The buoys in the

vicinity of the Dogger Bank showed an essentially weak circulation with a number grounding on the Bank. This data awaits more complete analysis on return to the laboratory.

4. Despite problems with the increasingly unreliable TTN CTD's the grid (Fig 6) was successfully completed. As expected, zooplankton concentrations were low with apparently few *Nephrops* larvae. The samples await analysis in the laboratory.
5. The Scanfish and nutrient survey in Liverpool Bay was completed successfully (Fig. 5). It was not possible to tow in the vicinity of the proposed mooring site owing to static gear, and the lines had to be worked approximately 4 miles to the north west. Towing in shallow water (< 20 m) proved to be possible with care at a ships speed of approximately 6 knots and with clime and dive rates of approximately 0.2 m s<sup>-1</sup>. On this occasion the sea state was slight, but difficulties might be expected in heavier seas as relatively short lengths of cable are deployed reducing the decoupling between Scanfish and ship motion. Surveys were conducted twice at low water and once at high water demonstrating temporary stratification at low water due to the differential advection of near bottom and surface waters (tidal straining). Surface nutrient levels recorded half hourly during the survey.

The aims of the work were met, despite periods when considerable maintenance work was required to keep instrumentation working and limitations on data logging imposed by the unreliability of the ship board computing system.

The hard work, enthusiasm and good humour of the ships officers and crew was much appreciated and contributed significantly to the success of the work.

23 July 1996  
Dr Juan Brown  
(Scientist-in-Charge)

SEEN IN DRAFT:

B Chapman (Master)  
W May (Senior Fishing Skipper)

DISTRIBUTION:

BASIC LIST+

Dr J Brown x 10

Mrs A Reeve

Mr J Read

Mr S Jones

Mr L Fernand

Mrs A Winpenny

Mr K Medler

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Fig. 1

North Sea working area

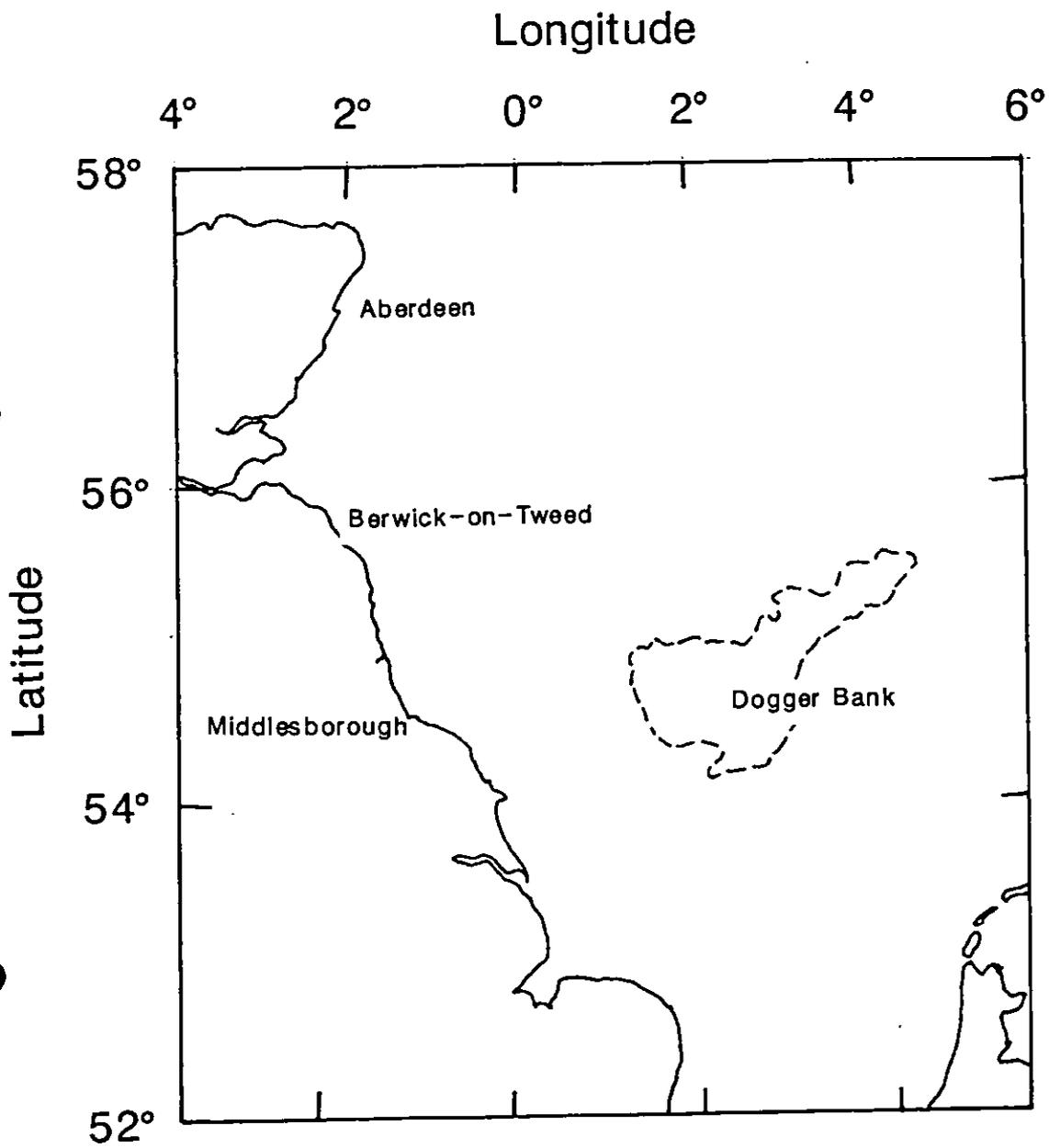


Fig. 2

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Irish Sea working area

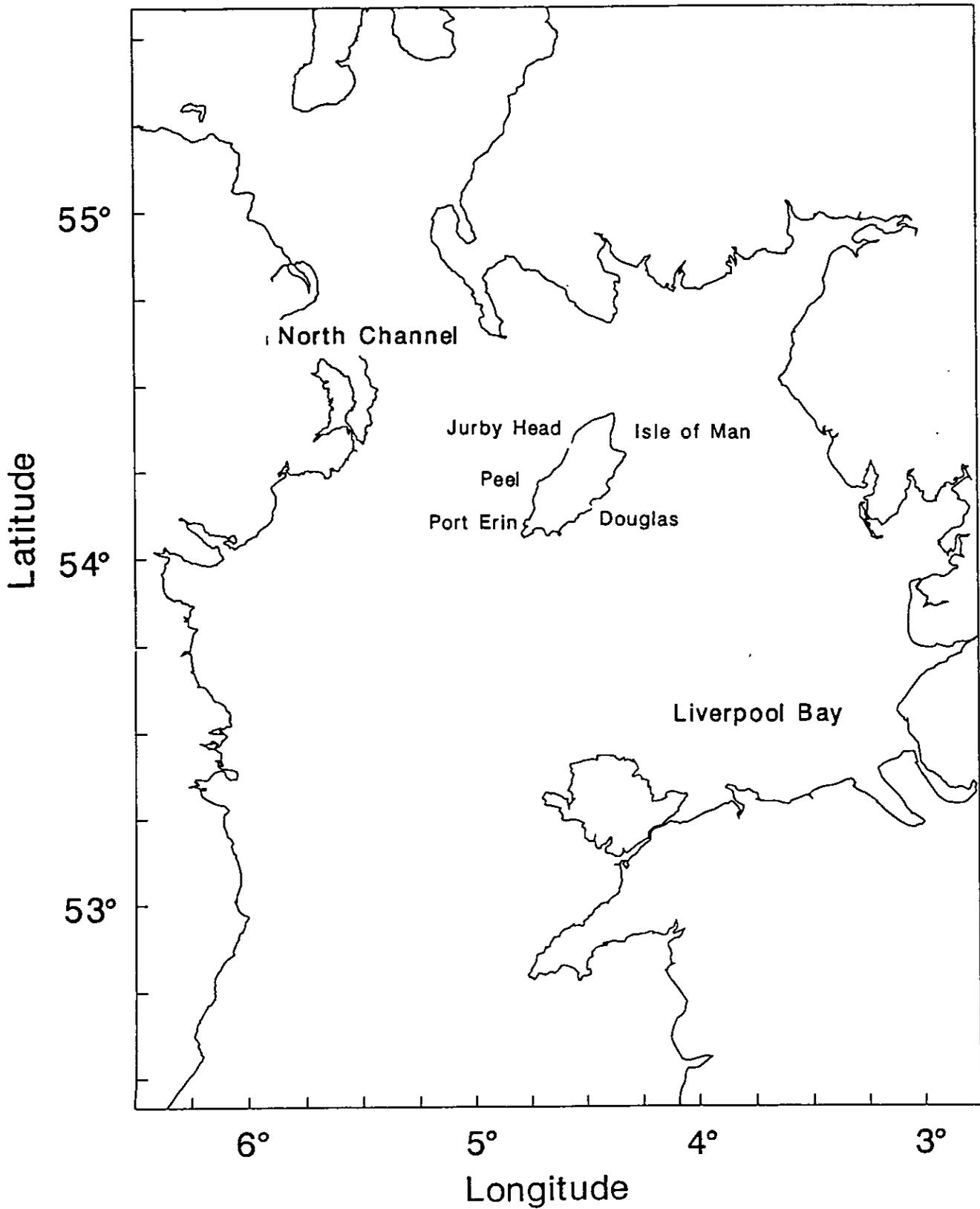
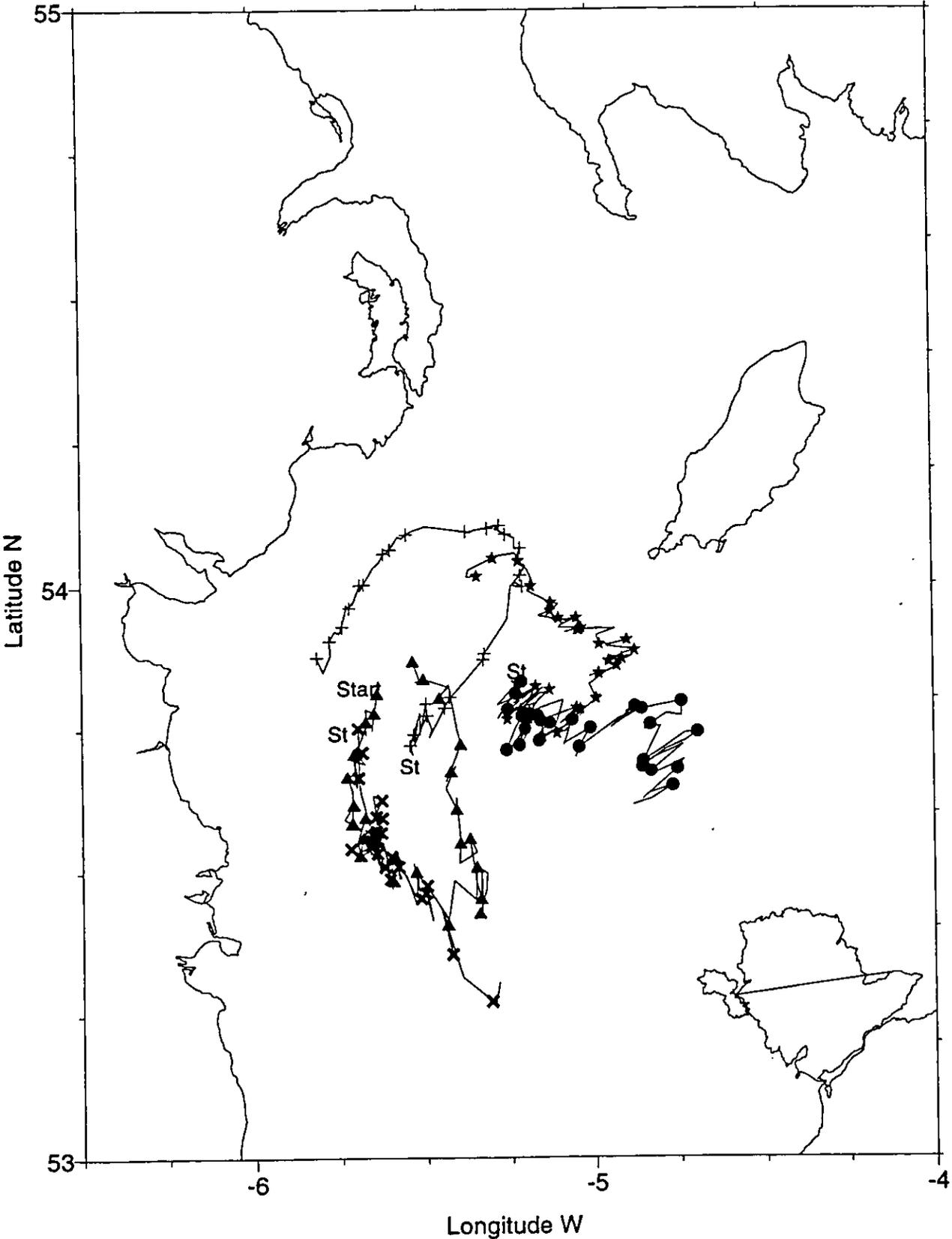


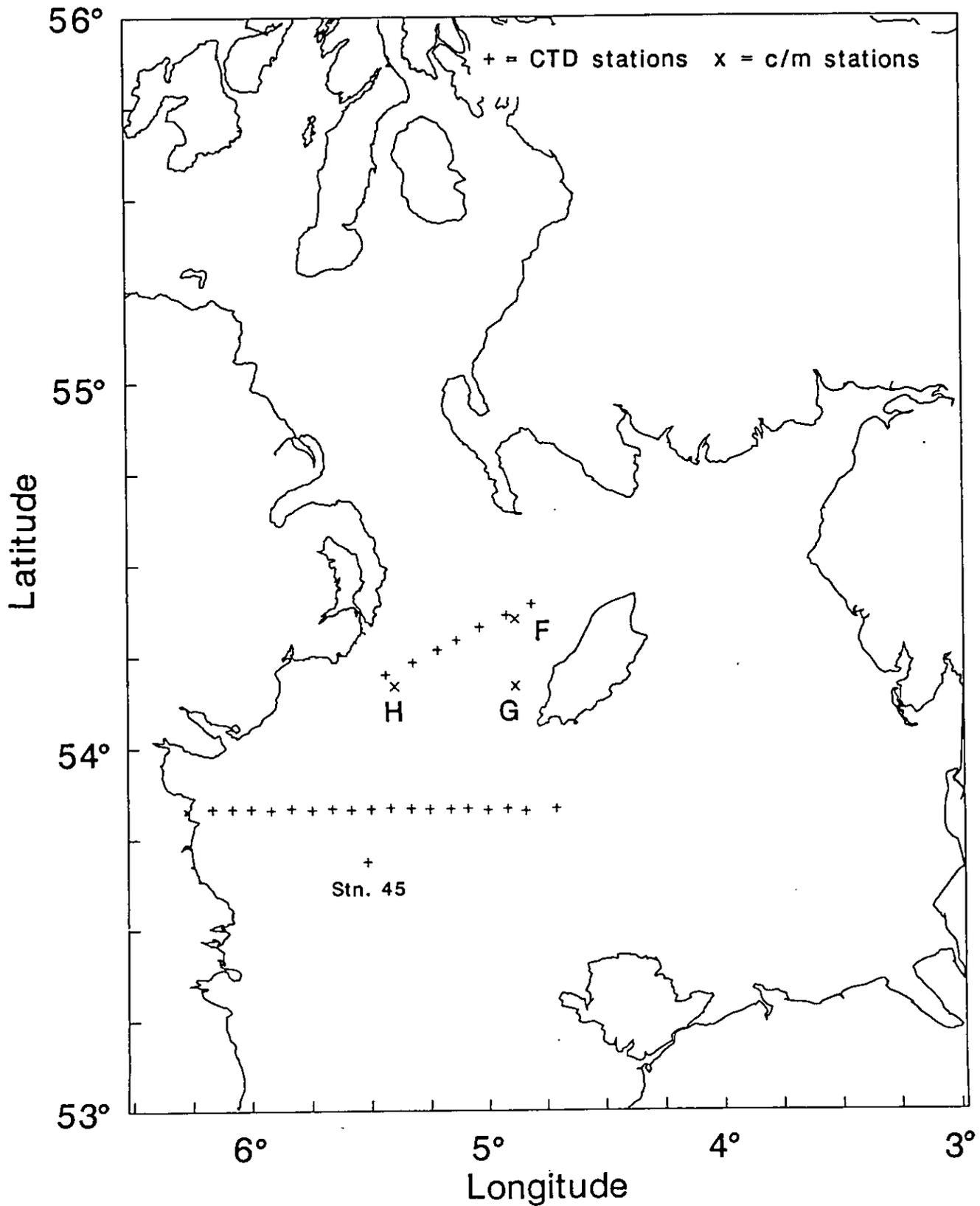
Fig. 3

Drifter track Corystes 9/96 July 4th - 16th



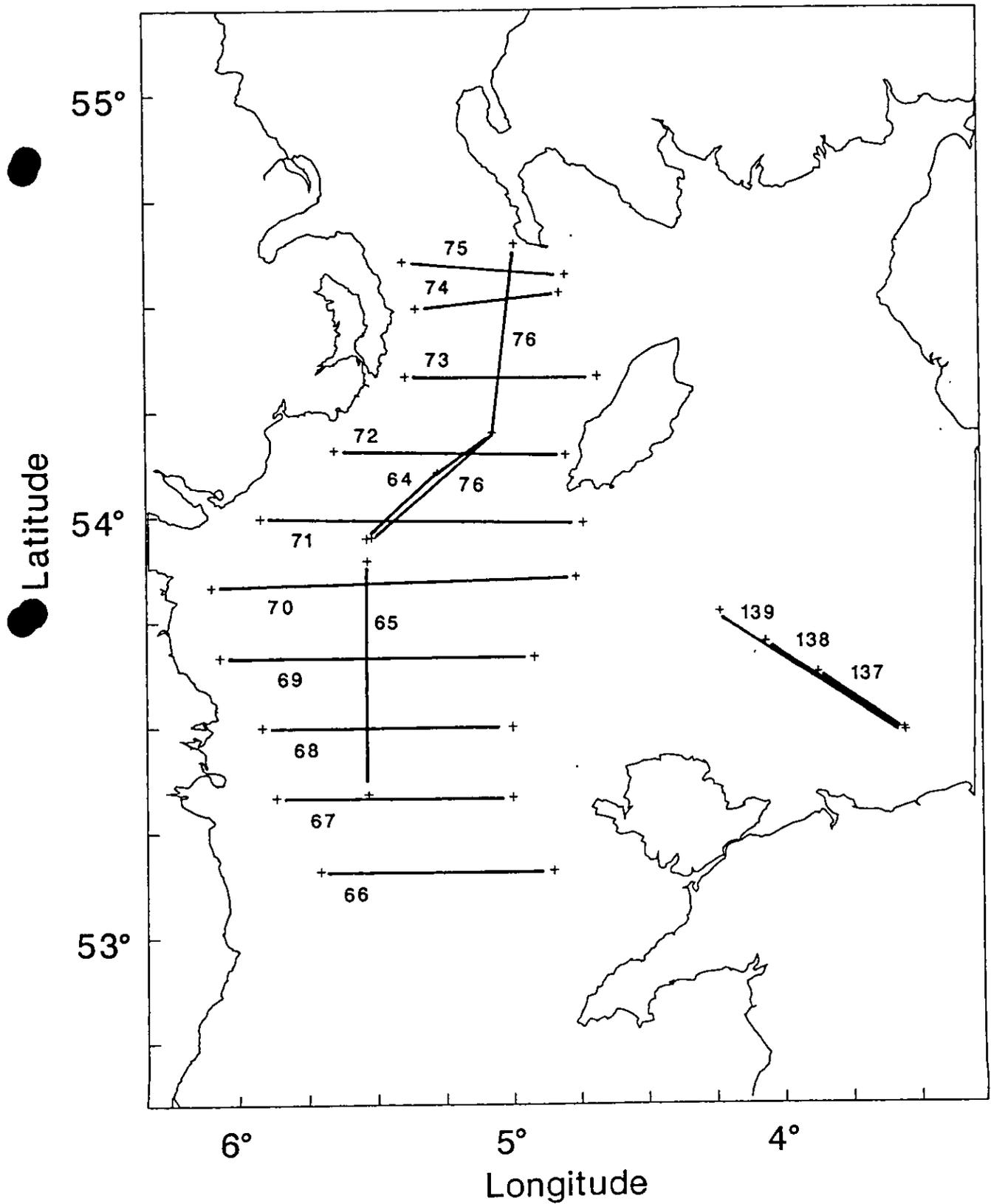
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Current meter and CTD stations - Irish Sea

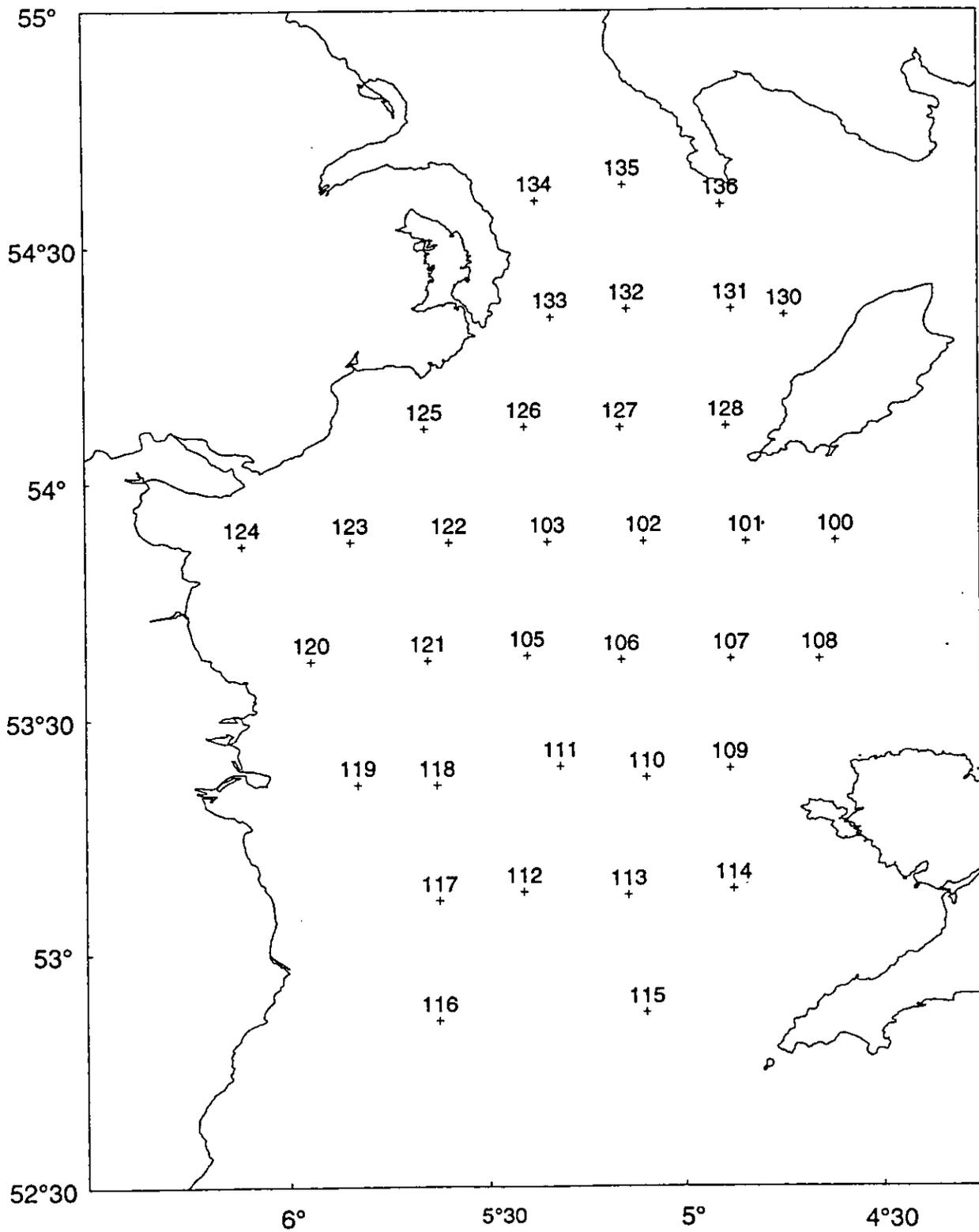


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'SCANFISH' tows - Irish Sea



TTN Positions Corystes 9/96



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Current meter and CTD stations - North Sea

