MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, NR33 0HT, ENGLAND

1994 RESEARCH VESSEL PROGRAMME

REPORT : RV CORYSTES : CRUISE 7/94

STAFF:

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Mr N Faber (P/T)
Mr Erik Olsen (GMI) (P/T)
Mr L Fernand
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Mr A Harrison (POL) (P/T)
Mr J Lawrence (P/T)
Mr K Medler (P/T)
Mr Iain Herdman (GMI) (P/T)

UCNW - University College of North Wales.
POL - Proudman Oceanographic Laboratory.
GMI - Geological and Marine Instrumentation, Denmark.

DURATION: 10 June - 6 July.

LOCALITY: Irish Sea, North Channel and Malin Shelf.

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. The main sampling aims of the cruise are:

1. To lay and turn round mooring arrays in the North Channel and western Irish Sea, thereby monitoring the flow regime.
2. Deploy and retrieve free floating ARGOS buoys in the North Channel and western Irish Sea to determine the Lagrangian circulation.
3. Undertake associated physical and biological surveys of the region in support of 1) and 2).
4. Perform further trials of the SCANFISH, aimed at meeting the specification defined prior to purchase.

NARRATIVE (all times are GMT; See Fig. 1 for cruise track):

RV Corystes sailed at 20:30 (10 June), passing through the English Channel for Holyhead. En route (11 and 12 June) two deployments of the SCANFISH were made for familiarisation. Despite some quirks within the software, the system performed well, undulating comfortably from 5 - 80 m.

At 0730 13 June the POL (Proudman Oceanographic Laboratory) personnel were embarked by Searider from Holyhead, followed immediately by a ballasting trial of one free floating

ARGOS drifter. In the afternoon, 4 ARGOS drifters were deployed in the western Irish Sea (Fig. 3; * denoting start time and date) whilst en route to the North Channel.

The following three days (14 - 16 June) were occupied with mooring (Fig. 2) deployments, principally in the North Channel, but also one at the northern end. Interspersed, were the deployment of 4 ARGOS buoys, ADCP surveys and CTD work, the latter including discrete nutrient, chlorophyll, suspended load and salinity samples.

Friday (17 June) brought news that a fishing boat working out of Belfast had caught an ARGOS drifter. Subsequently, colleagues at DANI were able to retrieve the damaged instrument. Having completed the mooring work, John Read and the POL personnel were exchanged at Holyhead for Stuart Jones, Erik Olsen and Iain Herdman. We returned to the western Irish Sea, undertaking a CTD transect whilst the GMI personnel made modifications to the SCANFISH and associated software. The SCANFISH was tested and overnight a station occupied next to a current meter rig for subsequent comparison of the ADCP and current meters. Further SCANFISH tests were made (18 June) before the GMI personnel were disembarked at Dublin, the weather preventing the use of Holyhead.

For the period until we docked in Workington (22:00 22 June), a grid comprising SCANFISH legs interspersed with stations for discrete CTD's, plankton samples and bottom sediment samples was undertaken, starting at Dublin and finishing at the southern end of the North Channel (Fig. 4). Part way, the discrete stations were abandoned as the increased sea state made launching and recovery of the SCANFISH difficult without damage to the CTD sensors.

During the mid-cruise break, John Lawrence was replaced by Ken Medler and Nick Faber and three long poles were purchased to help fend off the SCANFISH during deployment and recovery. On leaving Workington (10:00 24 June), the SCANFISH grid was recommenced, passing from the southern end to the northern end of the North Channel. At 23:20 26 June SCANFISH work was abandoned as the FSI CTD conductivity sensor was damaged, presumably on a rock or static gear. The GMI temperature sensor had not worked throughout the cruise, and as salinity is derived within the instrument and raw conductivity not logged it was not possible to proceed using temperature from the FSI and conductivity from the GMI. The SCANFISH body emerged unscathed, the data record showing that the damage occurred whilst the instrument was turning at its closest approach to the bed (set to 10 m). The assumption is that a rock was grazed or the remains of static gear caught in the FSI sensor protruding from the SCANFISH.

Following this, discrete CTD's and plankton hauls were made along a number of transects through the North Channel, until Tuesday 28 June. The remaining time until Stuart Jones was exchanged for John Read at Holyhead (08:00 30 June) was occupied with the retrieval of 4 ARGOS buoys and CTD, plankton net and grab stations.

During the remainder of the cruise the North Channel and western Irish Sea moorings were serviced. The highlight of this period was the retrieval of a current meter rig for POL. We had serviced a mooring on the east side of the North Channel (17:00 1 July) and were proceeding to service another on the west side when a Russian or Lithuanian freighter was spotted in mid-channel displaying the 'not under command' signal. On closer inspection it was 'anchored' to the POL mooring by its rudder. Fortunately, the sea state was slight and Corystes was able to provide assistance, first cutting the mooring line to the sea bed and then pulling clear the surface toroid and attached S4 current meters. The freighter was last observed steaming north.

Before departure for Lowestoft (3 July) we attempted and failed to retrieve one ARGOS buoy just south of the Mull of Galloway and retrieved one in the western Irish Sea. The intervening periods were filled with CTD work.

RESULTS (Preliminary):

1) The mooring work was largely successful (see Fig. 2 for positions). Two moorings laid in the western Irish Sea during Cirolana 5/94 were replaced. The meters were recovered intact, although the eastern most was approximately two cables off position, presumably moved by trawling activity. All the MAFF moorings laid during the first week in and to the north of the North Channel were turned round during the final week of the cruise. The deep mooring (260 m) located in Beauforts Dyke was a conventional 'U'-shaped, but with an acoustic release for the current meters and sub-surface buoy. This arrangement performed well, with the current meters retrieved on release, followed by the remainder of the mooring.

Two moorings designed to measure the near surface layer of the water column were laid in the centre of the channel for POL. One was recovered at the end of the cruise, whilst the other will be retrieved by POL in August. Additionally, a 150 k Hz bottom mounted ADCP was turned around and a 75 k Hz ADCP tested over 6 tides.

2) The free floating ARGOS buoys provided an interesting description of the circulation pattern of the region (Fig. 3). The residual circulation of the western Irish Sea was observed to be cyclonic, with a stagnation point at the centre. This is consistent with the density distributions revealed by the SCANFISH and CTD surveys. It was interesting to note that the residual flow in the North Channel appears at first sight comparatively disorganised, with the possible exception of the buoy deployed at the south western end, which apparently joined the organised circulation pattern of the western Irish Sea.

Whilst the overall data return was good, the number of fixes per day from the buoys was a little disappointing. We attribute this largely to incorrect advice from the manufacturers as to the ballasting of the buoys. There was a good correlation between poor weather and a reduction in data return, suggesting the buoys were too low in the water. This was not evident on deployment as the sea state was slight. On recovery it was noticeable the buoys were spending more time just below the surface than above. This was partly attributable to the efficiency of the drogue, and should be largely remedied by the addition of an elastic tether to partially decouple the buoy and drogue and the reduction of ballast so the buoys float higher. The wind drag should not be unduly increased and the tracking by VHF during recovery should be much improved. Real time access by phone from the ship to the ARGOS computer would also be advantageous during recovery. At present, FAXES are received daily, but information is up to 12 hours old.

3) The SCANFISH with the FSI sensor proved highly effective. In combination with the shipboard ADCP it enables rapid and closely spaced sampling of the density and current structure (Fig. 4 & 5). In addition, 89 CTD stations (Fig. 2) were occupied, with discrete samples taken for nutrient, chlorophyll and suspended load analysis. For the stations in the western Irish Sea Day grabs (21) were successfully taken for characterisation of the bottom sediment type. Vertical plankton net hauls were also made at 51 stations for later analysis for *Nephrops* larvae and Copepods.

4) Although still in a development phase, the GMI SCANFISH performed well, providing a major addition to our hydrographic surveying capability. It was possible to undulate between the surface and 120 m comfortably, on occasion reaching 130 m, whilst travelling at 7 - 8 knots. The modifications made by the GMI personnel allow the altimeter to govern the turning height above the bed of the SCANFISH (set to 10 m). The principal problems with the instrument were

a) On launching and particularly recovery in rougher weather damage can easily occur to the CTD sensors. The relative lightness of the instrument means that its weight fails to draw out the winch cable (11.7 mm) initially. During recovery, unless poles are used the instrument swings wildly before it can be manhandled onto the deck.

b) The GMI CTD temperature sensor worked spasmodically, approximately 10% of the time. As it is the temperature corrected conductivity that is logged and not raw conductivity (non standard) an estimate of salinity was largely unavailable from this instrument.

c) The controlling software is apt to crash every 24 - 36 hours. This can only be rectified by a hard reset of the PC, with an attendant possibility of losing control of the SCANFISH.

d) The technique for creating data files at the end of tows is very time consuming. Without the security of the FSI CTD, this would have caused considerable delay at the end of each SCANFISH transect.

A more detailed report will be prepared to add the experience gained on Cirolana 5/94. Trials of with the Optical Plankton Counter (OPC) were not possible, as the incorrect securing screws were provided and there was evidence that the aluminium threads in the OPC had been partially stripped. A spoiler was tried on the trail top edge of the instrument combined with longer flaps. The effect was to provide greater lift, but reduced the ability to dive near the surface.

The cruise aims were successfully met, in no small part due to the expertise and enthusiasm of the ships crew and officers, as well as the scientific staff.

Juan Brown
5 July 1994

SEEN IN DRAFT:

M.J. Willcock (Master)
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DISTRIBUTION:
BASIC LIST+

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Mr J Read	Mr J Lawrence
Mr S Jones	Mr K Medler

Fig. 1

RV CORYSTES 7/1994 CRUISE TRACK

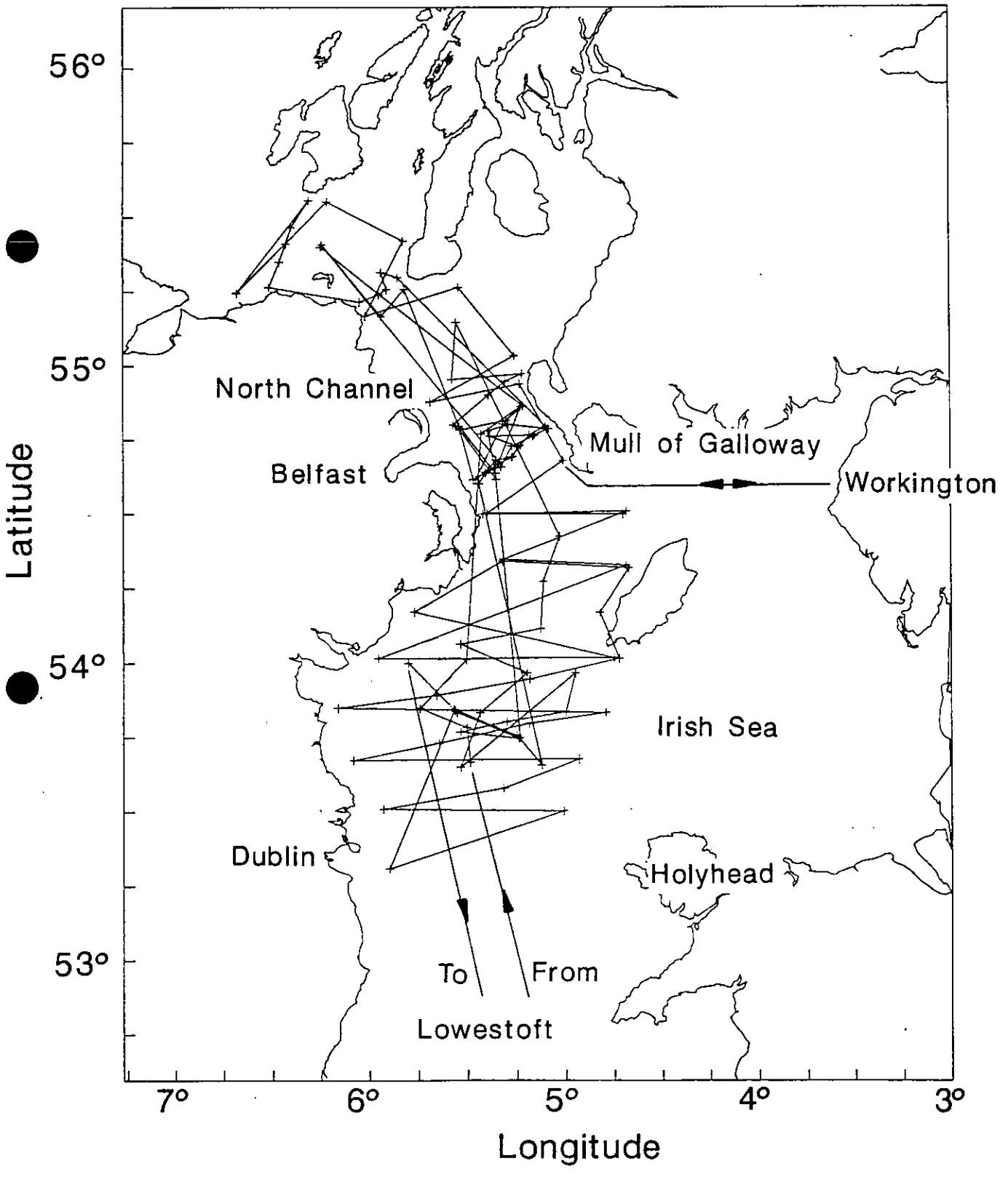


Fig. 2

CORYSTES 7/94

+ = CTD stations • = current meter stations

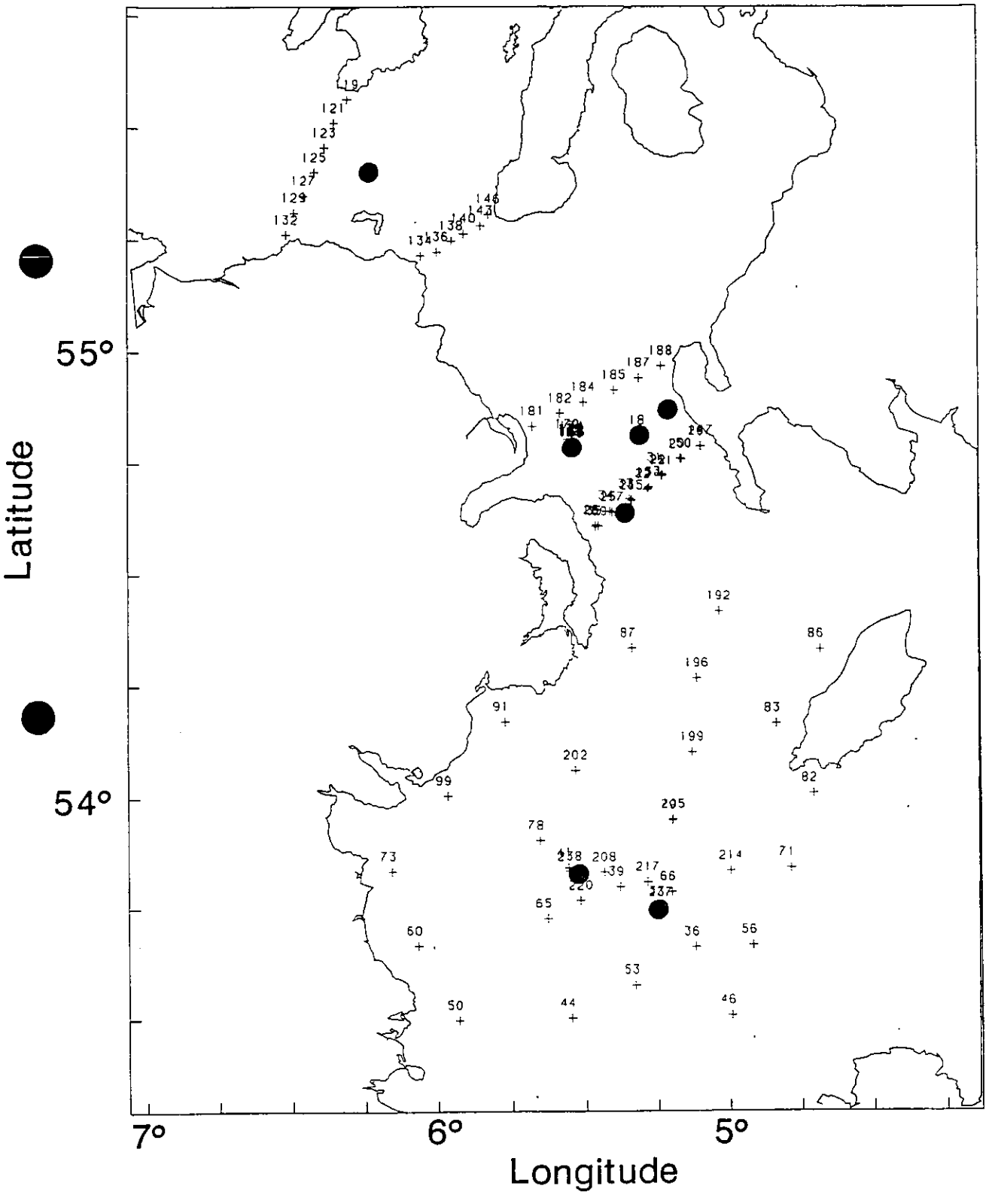


Fig. 3

CORYSTES 7/94

Tracks of 'ARGOS' drifting buoys

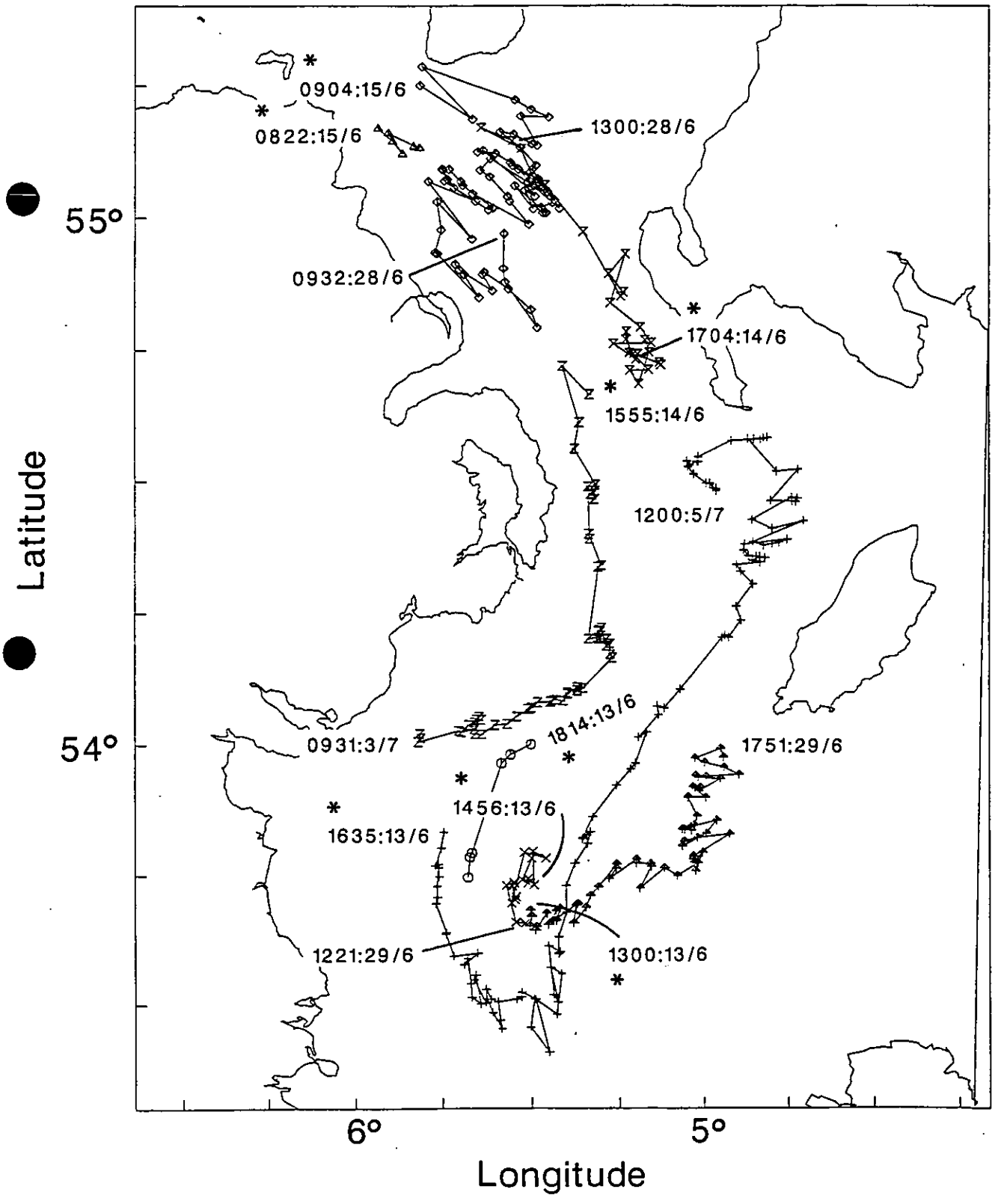
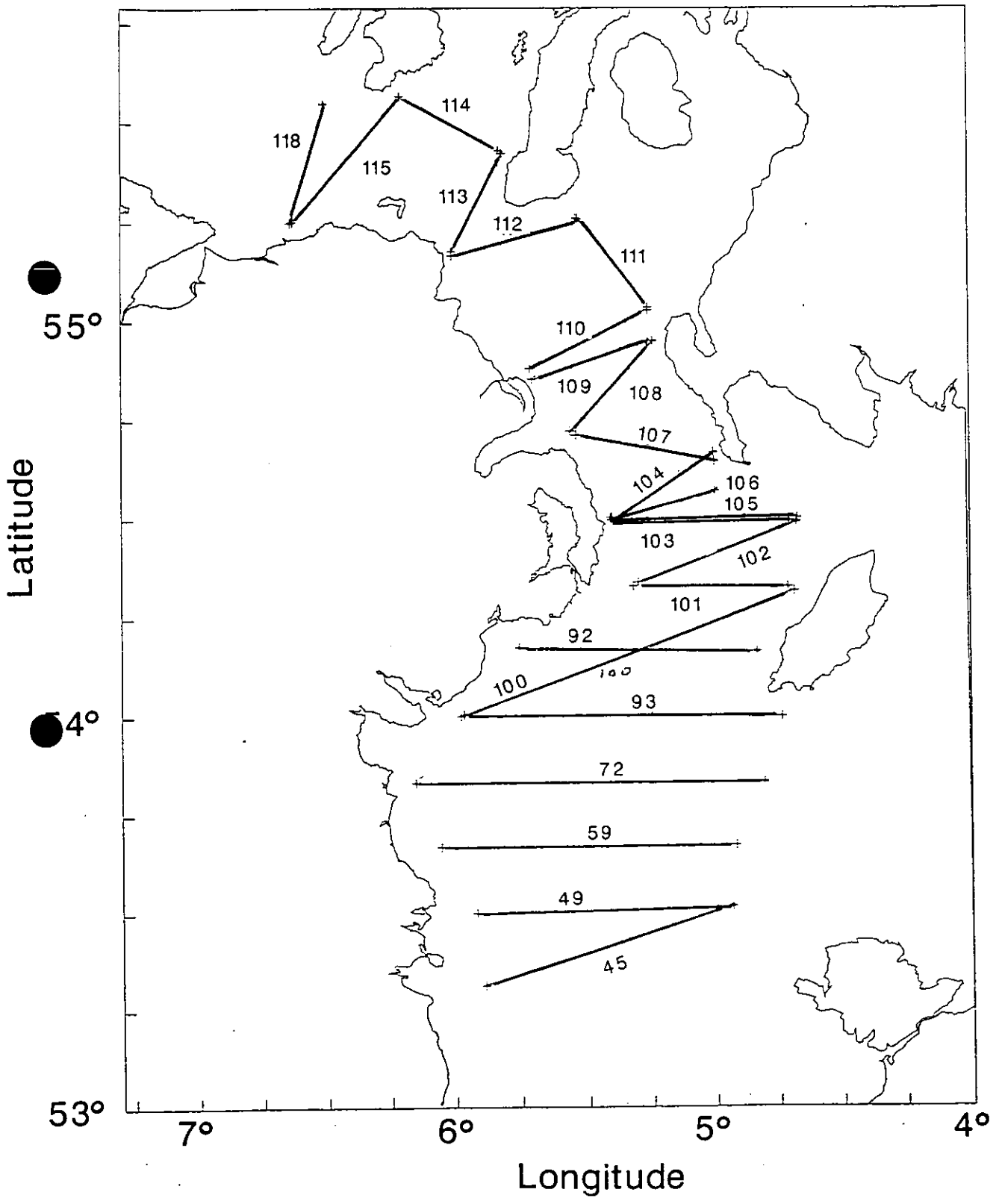
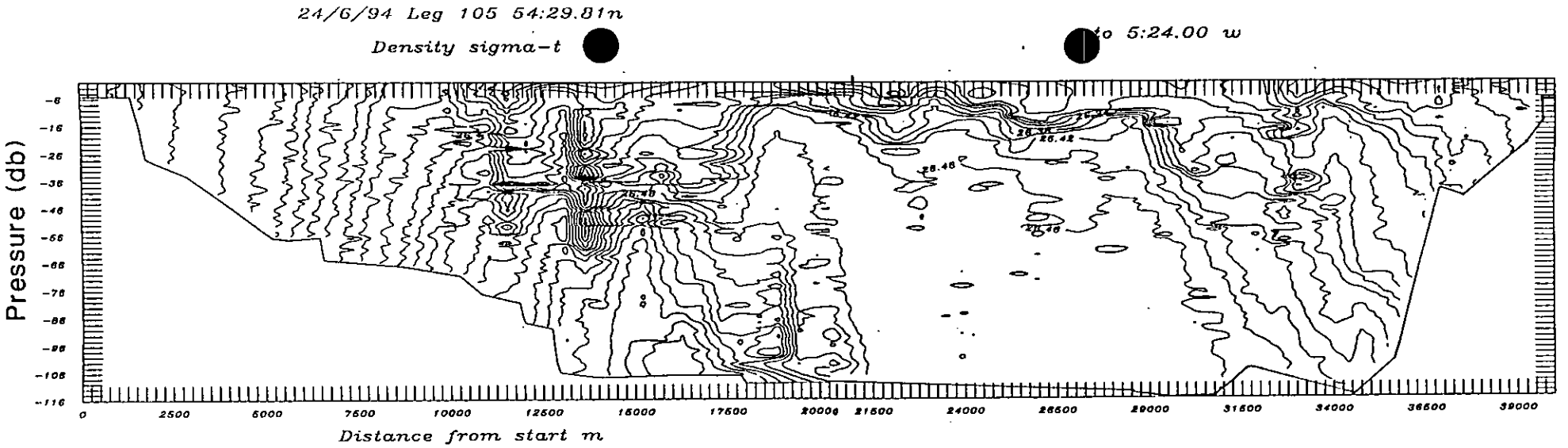


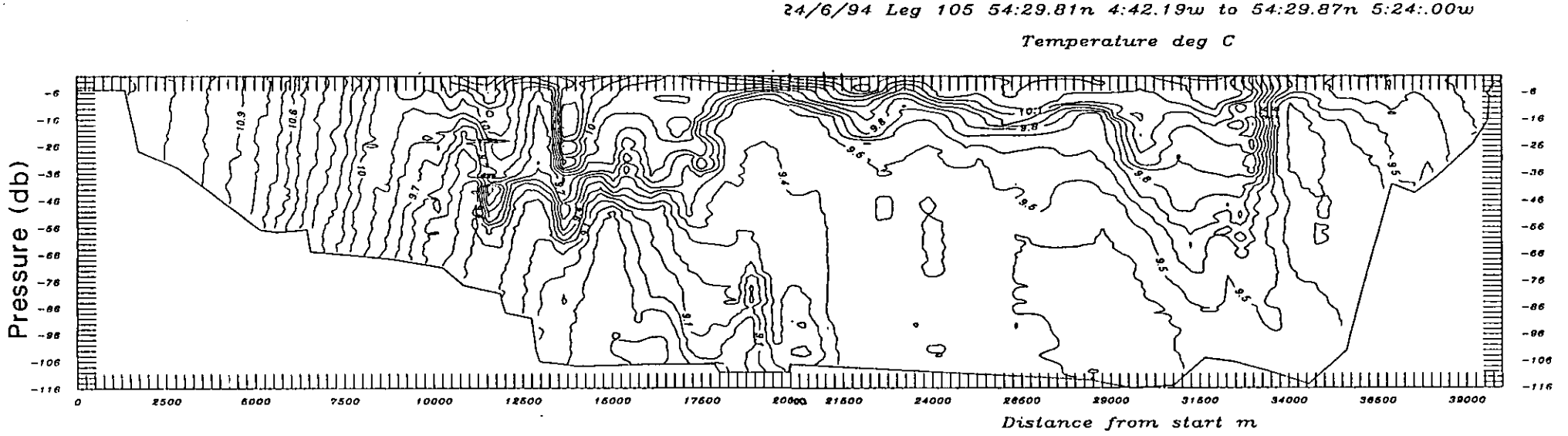
Fig. 4

CORYSTES 7/94

Scanfish Sections







CORYSTES 7/94

Fig. 5