

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

1997 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 7

STAFF:

Dr J Brown	Mr L Fernand
Mrs A Reeve	Mr J Read
Dr E Young	Mr A Young
Ms J Cooper (UWB)	Mr S Jones

UWB - University of Wales, Bangor

DURATION: 18 - 30 July

LOCALITY: North Sea

AIMS:

The work is directed at a better understanding of the dynamics of the circulation processes fringing the north east coast of England, between the Firth of Forth and Flamborough Head, and in vicinity of the Dogger Bank. It is intended to characterise the extent and nature of the density driven and seasonal jet like circulation which, from previous work in the Irish Sea and limited historical data, we believe acts as a direct and rapid pathway for transport of material from the coastal region to the central North Sea. Subsequently, the knowledge will be viewed with respect to the nutrient dynamics of the region and concerns that elevated levels of contaminants on the Dogger Bank have originated in the near coastal region. The main sampling aims of the cruise are:

1. To deploy three mooring arrays.
2. Deploy free floating satellite tracked buoys and subsequently retrieve a number in order to determine the Lagrangian circulation.
3. Undertake associated physical and chemical surveys of the region in support of 1) and 2).

SUPPLEMENTARY AIM:

4. Where possible, recover Minipod, Tetrapod and marker buoys in the Wash which were previously to be recovered on Cirolana 7b/97.

NARRATIVE (all times GMT):

RV CORYSTES sailed at 0800 18 June for the Outer Silver Pit to trial the Scanfish and CTD rosette system. After several hours the NT network system began to give problems, largely preventing logging, data transfer and printing via it. Fortunately, having learnt from previous experience (we have not had a fully functional ship board system since the de-commissioning

of the Pathworks net-work) we were able to adopt inconvenient ad-hoc procedures thereby allowing the cruise to proceed.

Instrument trials were successfully completed and tests confirmed that the ships echo sounders interfered with the ADCP. Consequently, it was necessary to run with this equipment switched off during Scanfish and CTD legs.

Following this, *Corystes* proceeded to the North-east coast (19 June) for deployment of three Argos drifters offshore of the 50 m contour (Fig. 1). On completion, a series of Scanfish sections were undertaken (Fig. 1) from 19 - 21 July between the north-east coast and Dogger Bank. After line 15 (Fig. 2), the end of the pressure compensation bulb associated with the conductivity cell on CTD 1322 was found to be missing. As the conductivity data in the near bed mixed zone recorded during the tow appeared to be stable and some oil remained in the cell it must be assumed that the failure occurred during or immediately before recovery. In the absence of spares, the rosette CTD (1366) was inserted on the Scanfish and a comparatively short section (16) undertaken. On recovery, the oil in this conductivity cell was depleted, which prevented further use if a rosette capability were to be retained. The loss of oil has been a continual problem for several years, imposing severe limitations on the prolonged use of what are otherwise very good instruments.

Work continued until 23 July, collecting data via the controlling CTD, although the conductivity data is of low quality. Fortunately, the density signal was dominated by temperature and in this instance the noisy salinity signal, although inconvenient in terms of processing, did not greatly detract from the aims of the work. During this period, news reached us (22 July) of *Cirolana's* bow prop. problems (*Cirolana 7b/97*) and a request arrived (23 July) for us to attempt recovery of at least part of the remaining equipment at the end of our work, requiring some curtailment and subsequently further compressing the short turn around prior to *Corystes 8/97*.

Work proceeded eastward (Figs. 1 & 2) with a series of Argos buoy, mooring and Scanfish deployments. Two of the moorings (M1 & M3) used the new the ADCP workhorses and bottom mounted frames, configured as in Fig. 3. Until this point, they had only been deployed in shallow water (<25 m), therefore at M1 a test recovery was tried. The backup recovery worked first go and the mooring was recovered from the toroid end and re-laid. A draw back of the present system is that the ADCP frame has to be lowered to the sea bed for deployment and the release mechanism is prone to premature release particularly in rougher conditions. Additionally, it is not possible to determine whether the frame is upright. The remaining mooring (M2) was a conventional 'U'-shaped equipped with two Valeport BFM 308's. Also during this period, Mr Read improvised a bladder, utilising a finger from a rubber glove, for the FSI CTD (1322) and it was tested overnight (23 - 24 July) in a bucket. The test appeared successful, and with a protective cover fashioned from plastic water piping placed over the 'bladder' the instrument was tested on Scanfish during a short tow (24 July). The instrument appeared to function correctly, with the conductivity remaining remarkably stable in mixed waters.

Scanfishing continued until 27 July, interrupted only by the fouling of a dahn buoy (26 July). Whilst this caused the abandonment of the particular section, damage was mercifully slight, with the communications cable being damaged and requiring termination. Additionally in the period, 4 more Argos buoys were deployed in the vicinity of the Tail End (Fig. 1).

The following day (28 July), a line was occupied west of the Dogger Bank comprising alternate Scanfish and CTD sections. The second Scanfish line was cut short when the port flap motor jammed. Fortunately, it was possible to repair using a spare and a final leg was undertaken east from Blyth on the north east coast (29 July). Prior to this a nearby Argos buoy was retrieved.

Finally, the Minipod, Tetrapod and marker buoys left in the Wash by Cirolana were recovered on the morning of 30 July, before returning to Lowestoft that evening.

RESULTS (Preliminary):

1 - 3. The extensive Scanfish surveys of the region between the north east coast and the Dogger Bank revealed the region to be strongly stratified (Fig. 4), however bottom temperatures to the north of the region were approximately 2.5°C warmer than last year. Inshore, salinity made a significant contribution to the density field, whilst in the vicinity of the Dogger Bank the density field was entirely temperature controlled. The situation between the region is presently not clear owing to the problems with the pressure compensation bulb on the FSI CTD and the unreliable nature of this sensor on the instrument supplied with Scanfish.

The satellite tracked Argos drifters demonstrated a strong southward flow parallel to the coast, turning offshore over a broad area north of Flamborough Head. It is too early in the deployment period for other elements of the non-tidal long term residual to be determined.

The Scanfish transects showed a series of strong bottom fronts associated with the shallowing topography of the edges of the Dogger Bank and the north east coastal region. In the region between, north - south sections showed a more gentle gradient of bottom temperature, albeit with regions in which gradients were more intense. These bottom fronts are characteristic of regions of more intense and persistent density driven flow. The most intense flow being associated with greatest gradients.

Often the bottom frontal regions fringing the Dogger were associated with areas of comparatively high phytoplankton activity as determined by Fluorometer (Fig. 4d) and discrete measurements. A series of Scanfish/CTD sections to the west of the Dogger examined this in some detail, taking discrete samples for nutrients, chlorophyll, oxygen and suspended load. Analysis of this data awaits return to the laboratory. In addition, this repeat section indicated what was thought to be perturbations in the pycnocline based on single sections were in fact associated with comparatively small topographic features.

4. The Tetrapod, Minipod and four guard buoys laid in April were recovered from the Wash.

The original and supplementary aims of the work were met, despite periods when considerable maintenance work on instrumentation was required and limitations on data logging imposed by the unreliability of the ship board computing system. The latter was unfortunately true of last year and at times one questions the value of the present system.

More positively, the re-engineered Scanfish deployment frame and docking latch performed well, enabling recovery and deployment in sea states of at least Force six.

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.

30 July 1997
Dr Juan Brown
(Scientist-in-Charge)

SEEN IN DRAFT:

D McDarren (Master)
T Durrant (Senior Fishing Skipper)

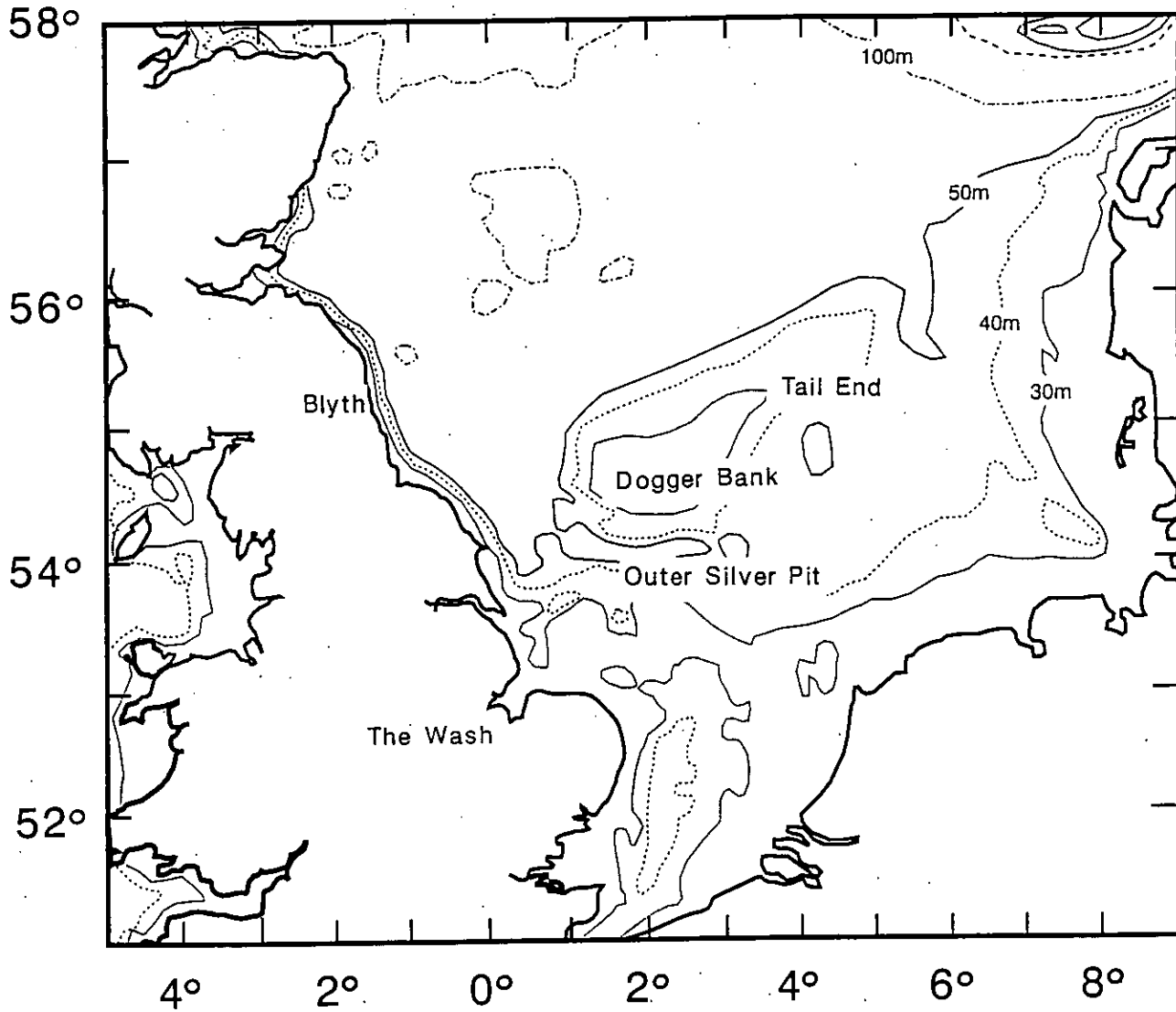
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BASIC LIST+

Dr J Brown x 10	Mr L Fernand
Mrs A Reeve	Mr J Read
Dr E Young	Mr S Jones
Mr K Medler	Mr A Young

CORYSTES 7/97

Location chart



CORYSTES 7/97

Moorings, ARGOS buoys and CTD stations

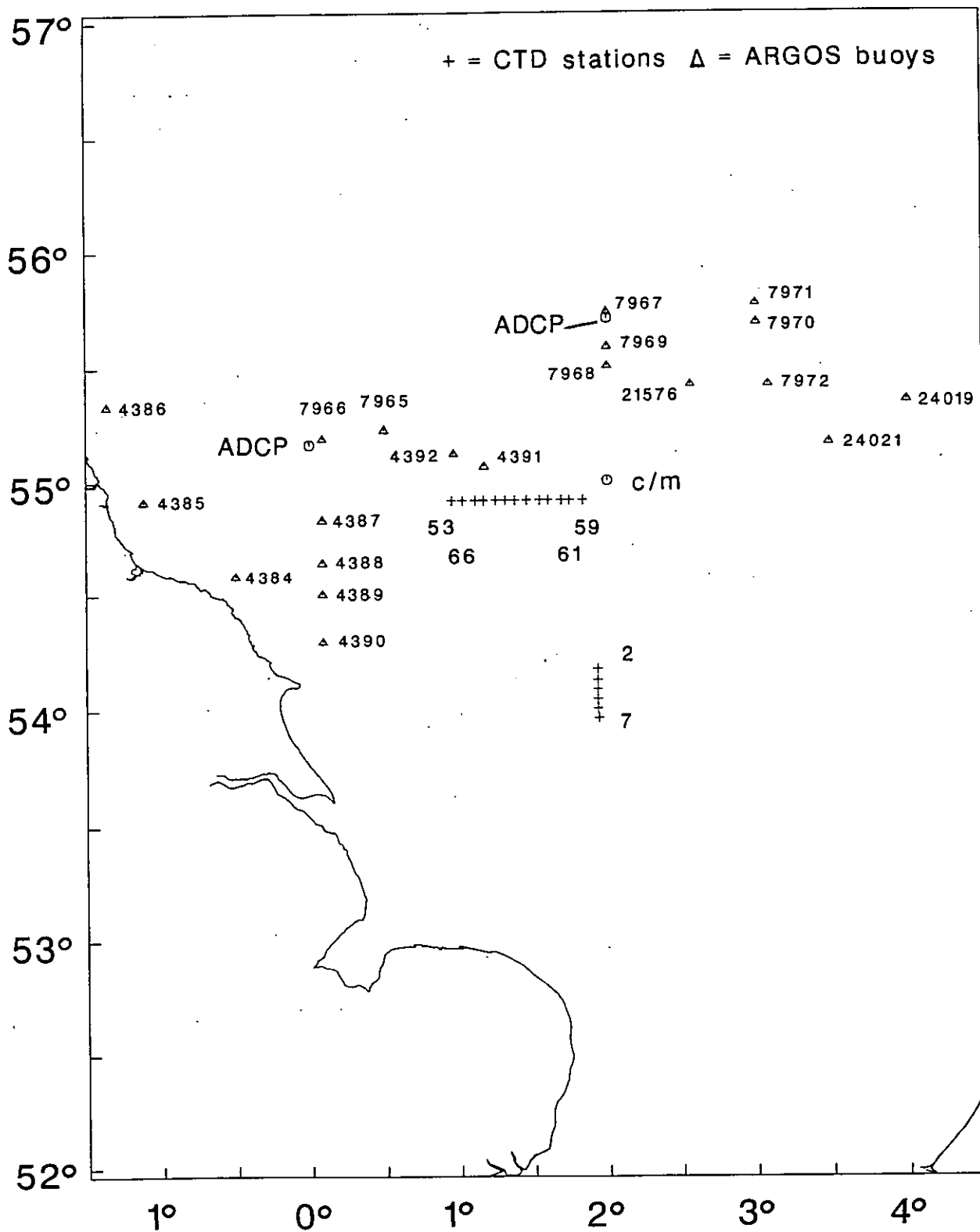
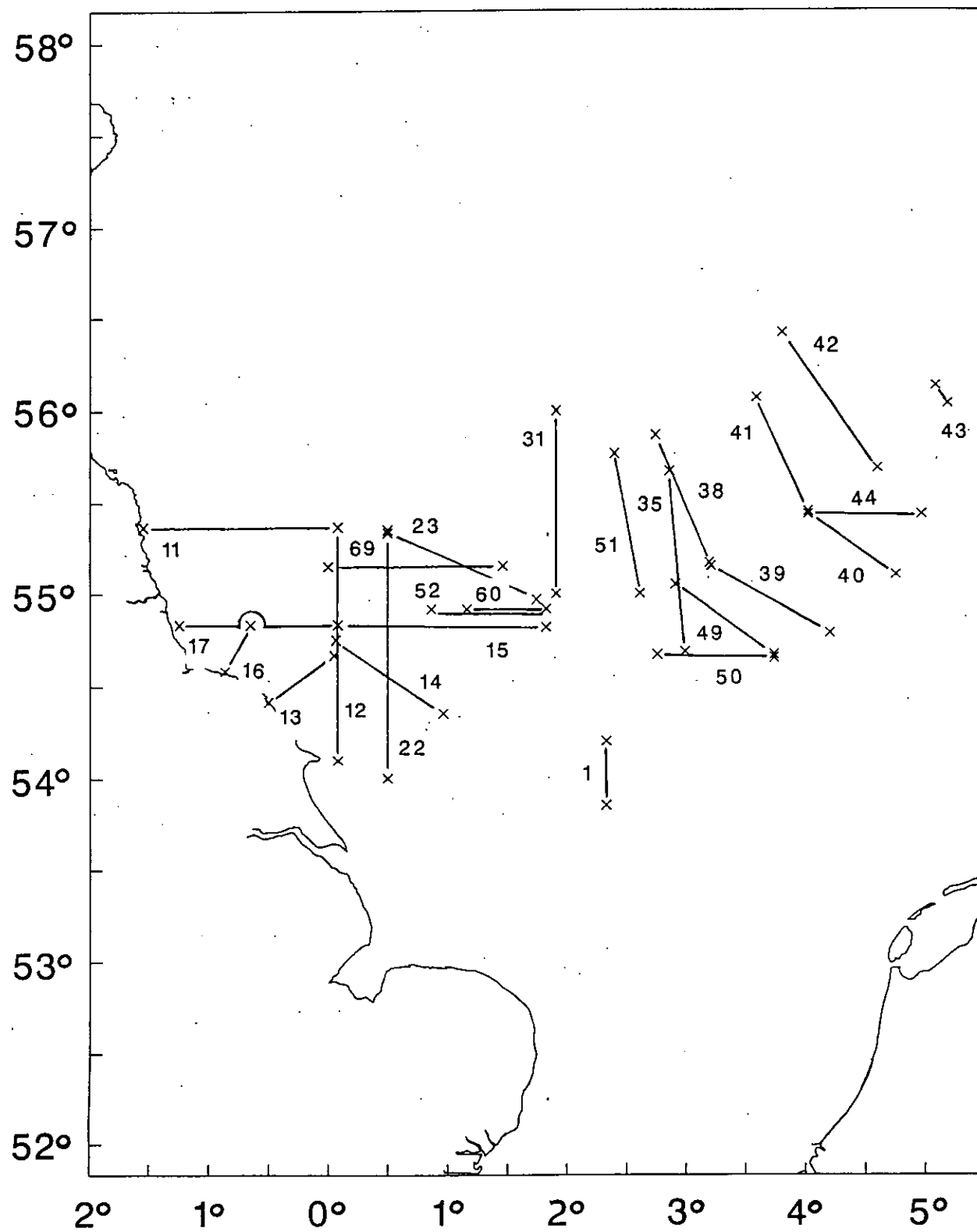


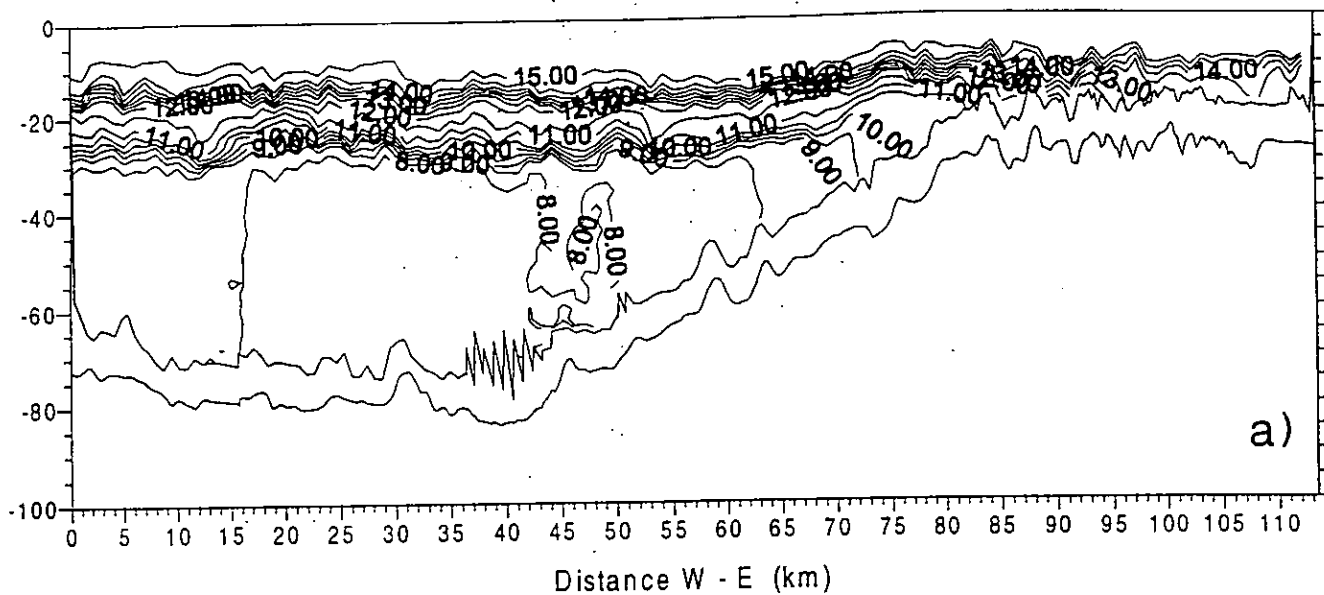
Fig. 3

CORYSTES 7/97

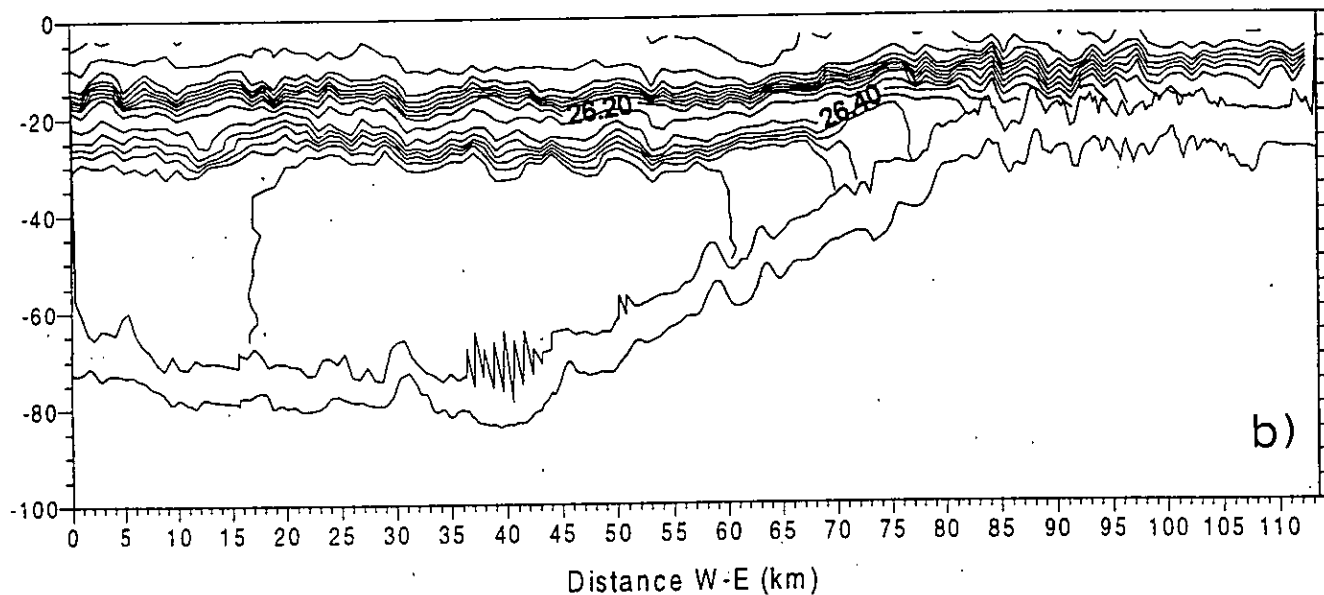
Scanfish tows



FSI Temperature Plot Leg co07015



Density Sigma-t Leg co07015



Salinity ppt Leg co07015

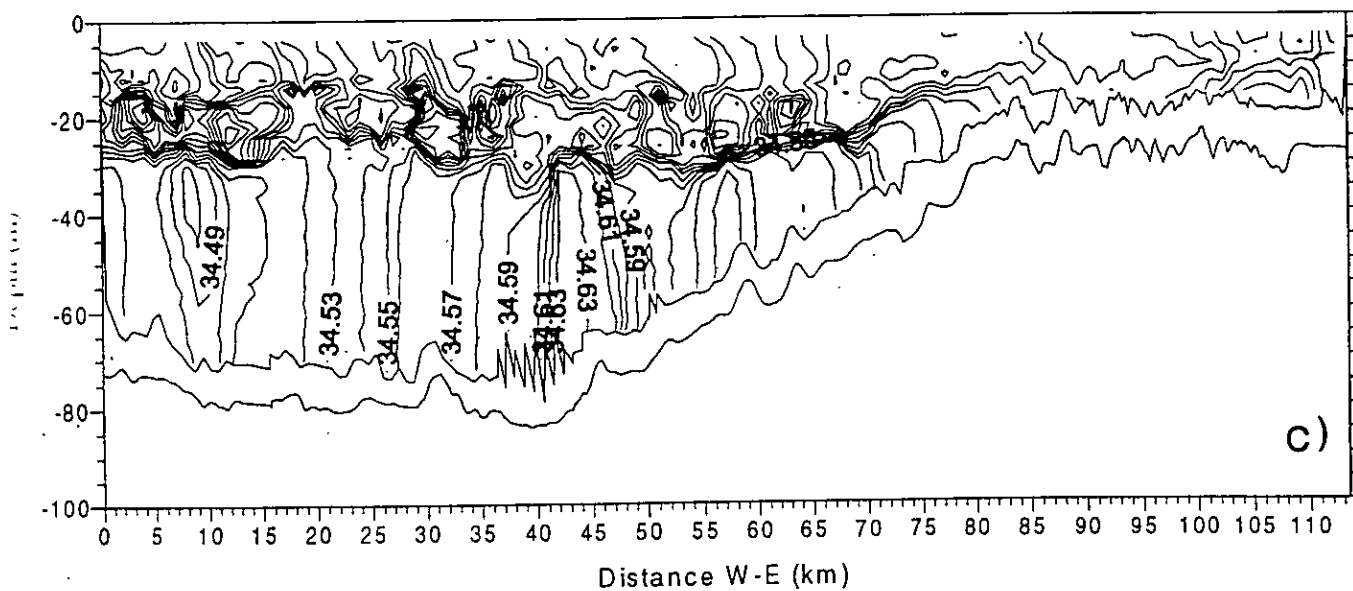
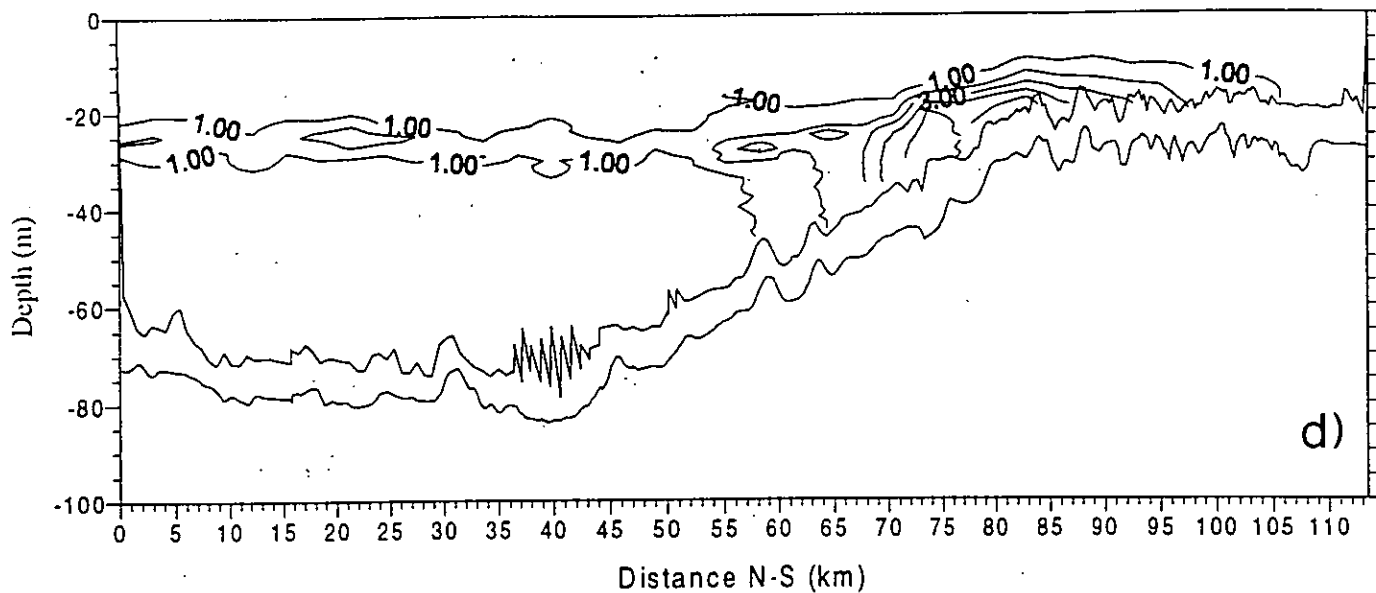


Fig. 4

Fluorescence ppt Leg co07015



Turbidity ppt Leg co07015

