

CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE,
LOWESTOFT, SUFFOLK, ENGLAND

1999 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 5

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	Miss J Taylor	Mr J Read
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	Mr E Tinton	Dr C Whalley
	Mr D Denoon	

DURATION: 14 June – 1 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 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 concerns that elevated levels of contaminants on the Dogger Bank have originated in the near coastal region. Additionally, work includes the servicing of a moorings in the vicinity of the Outer Gabbard as part of the National Marine Monitoring Programme. The main sampling aims of the cruise were:

1. To service a smart mooring at the Outer Gabbard.
2. To deploy five mooring arrays in the vicinity of the Dogger Bank.
3. Deploy free floating satellite tracked buoys in order to determine the Lagrangian circulation. Subsequently, a number may be retrieved.
4. To undertake Scanfish, CTD and grab surveys of the north-east coast and Dogger Bank to collect information on nutrients, suspended sediment and metals.
5. Conduct experiments to examine the near-bed cross frontal circulation.

NARRATIVE (all times GMT):

RV CORYSTES sailed at 10:00, with a reduced complement, for the Outer Gabbard to service a Smart Mooring and perform a number of CTD casts for calibration purposes. On completion (23:00), CORYSTES returned to Lowestoft in order to pick-up Mr Burton (08:00 15 July) before sailing for the Humber Estuary to collect two crew at approximately 20:00. Before entering the Humber the opportunity was taken to collect a large volume water sample for metal analysis. Overnight, we proceeded to mooring position B (Fig. 1), laying three Argos satellite tracked drifting buoys (A3-5) en-route. All five ADCP moorings were laid

during the day (16 July) plus a further three Argos buoys (A9-11). Throughout, weather conditions were excellent.

Following this, a series of east/west Scanfish sections were planned on the western flank of the Dogger Bank (Fig. 2). During the second of the sections (no. 23; Fig. 2; 17 June) it was discovered that the majority of the ships freshwater had been discharged overnight. This necessitated a change in the intended programme for a visit to the River Tyne to collect water. The Scanfish leg was extended westward before recovery. Three Argos buoys (A6-8) were then deployed and a CTD undertaken (26; Fig. 1) before a further Scanfish line (28; Fig. 2) was occupied. In order to avoid static fishing gear, the Scanfish leg was timed to arrive in the coastal zone just after first light (18 July).

CORYSTES docked in the River Tyne at 07:30, sailing again at 16:00. An Argos buoy was deployed before Scanfish line 30 was occupied (Fig. 2). Following this, 20 CTD's (31-50; Fig. 3) were undertaken along the Scanfish line for metal, nutrient, sediment and chlorophyll analysis. A further Argos buoy (A1) was deployed before a series of Scanfish transects (52-57; Fig. 2) between the coast and the Dogger Bank. During this period a FSI CTD, recently serviced, had to be removed from the Scanfish as the temperature and conductivity sensors both developed what appeared to be independent faults. The fault finding process and choice of a replacement CTD required communication with the laboratory, which was not helped by the inadequate phone range.

A period of excellent weather ensued, during which (23 - 25 June) a trial release of rhodamine was undertaken. Associated with the release were a series of Scanfish legs and CTD's (58-66; Fig. 3), the latter to characterise nutrient and chlorophyll distributions.

Following this, a series of Scanfish lines (97-99; Fig. 3) were occupied and a number of NIOZ coring stations (100-105; Fig. 4) undertaken (26 June), the latter completing a survey that was curtailed by bad weather and equipment failure during CORYSTES 9/98 last year. Between 27 and 29 June work was concentrated in the vicinity of the eastern Dogger Bank, with a series of Argos buoy deployments (A12-22), a scanfish lines (110), CTD (111-153) and NIOZ (156-174) coring stations for metal analysis. This was punctuated by a solenoid 'sticking' on the starboard gantry during a CTD, causing the frame to remain in the fully extended position. Fortunately, the problem was rapidly rectified by the Chief Engineer. Finally, two Scanfish transects (176 & 177) were occupied before the deployment of a final Argos buoy (A23; 30 June) and the return to Lowestoft, docking at 10:00 1 July.

RESULTS (Preliminary):

- 1) Of the instrumentation on the 'smart' mooring, the water sampler collected a full complement of samples, the NAS-2 sampler had performed for approximately two thirds of the deployment, but unfortunately the data logger (UMI) worked only sporadically. The instrumentation was remarkably free of biological fouling.
- 2) The moorings were deployed as planned.
- 3) 23 Argos buoys were deployed in two groupings (Fig. 1). Those to the west of the Dogger Bank, largely drogued at 30 m, were intended to demonstrate the Lagrangian circulation associated with the bottom fronts between the north-east coast and Dogger Bank. Two were drogued at 15 m in order to assess the near surface response in comparison to that at

30 m. A second group, drogued at 15 m, were deployed on the eastern Dogger Bank/Tail End region. It is intended to recover the instruments on CORYSTES 7/99 in July/early August.

- 4) The series of Scanfish legs showed the majority of the region to be stratified, with pronounced bottom fronts fringing the Dogger Bank and north-east coast. During the initial Scanfish legs over the Dogger Bank the water column was stratified. However, following the work along the north-east coast a combination of cooler northerly winds and wind mixing 'removed' the thermocline. Associated with the bottom fronts were enhanced levels of chlorophyll, whilst on the shallower Dogger Bank fluorescence was highest near the bed. In the deeper water, sharp gradients of fluorescence were associated with the base of the thermocline.
- 5) It is hoped that weak cross frontal velocities associated with the bottom fronts can be measured with a Lagrangian tracer. With this in mind, an experimental release of rhodamine was conducted at 54° 54.2'N 1° 12.9'E. The dye was tracked for six hours following release, 'flying' the Scanfish within an envelope from 2.5 m to 10 m from the seabed. Following an overnight break an unsuccessful attempt was made to locate the patch. It might be that the current fluorometer does not have the required sensitivity to enable tracking for significant periods, a matter that will be pursued between cruises.

Fortunately, no time was lost to weather, however, operational difficulties resulted in the loss of approximately 5% of the scheduled cruise time. Whilst there was a consequential impact on the cruise aims, the work was largely successful, aided by the hard work, enthusiasm and good humour of the ships officers and crew.

Juan Brown
(Scientist-in-Charge)
1 July 1999

SEEN IN DRAFT:

B Chapman (Master)
A Lincoln (Senior Fishing Skipper)

DISTRIBUTION:

BASIC LIST+

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Miss J Taylor	Mr J Read
Dr E Young	Mr E Tinton
Mr K Medler	Dr C Whalley
Mr D Denoon	Dr D Mills
Dr S Malcolm	

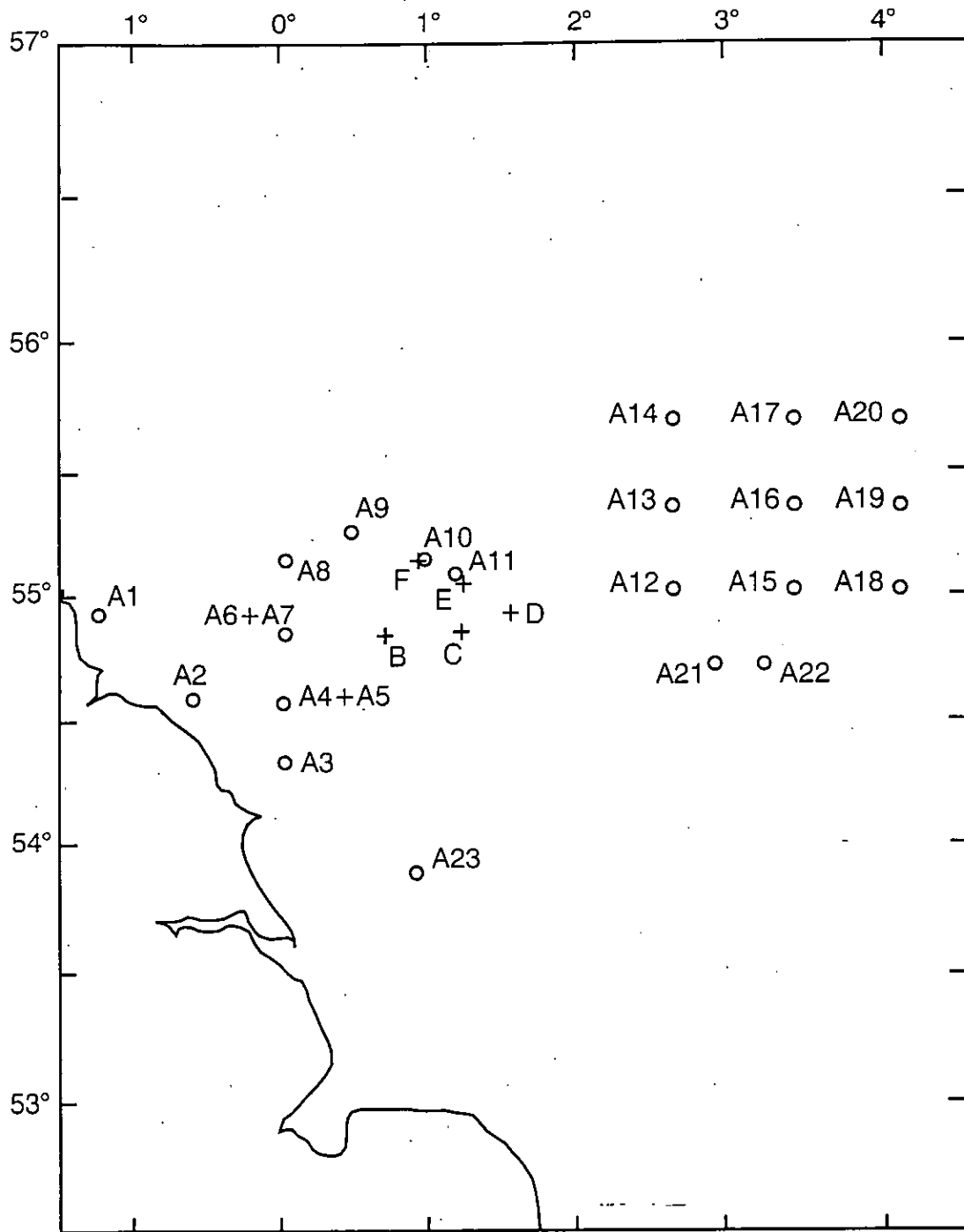


Figure 1. Location of Argos buoy releases and current meter mooring positions.

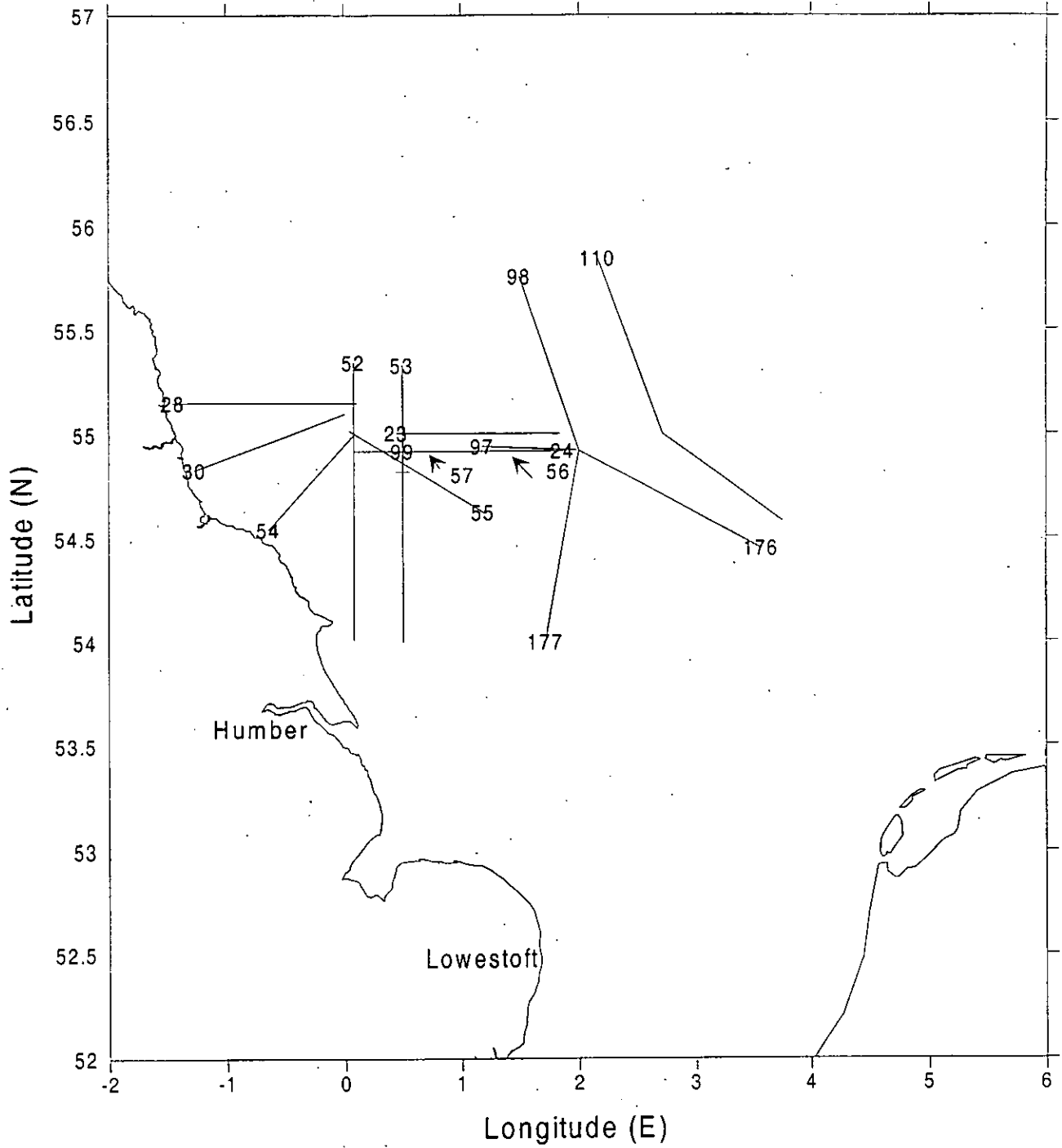


Figure 2 Location of Scanfish Legs Corystes 5/99

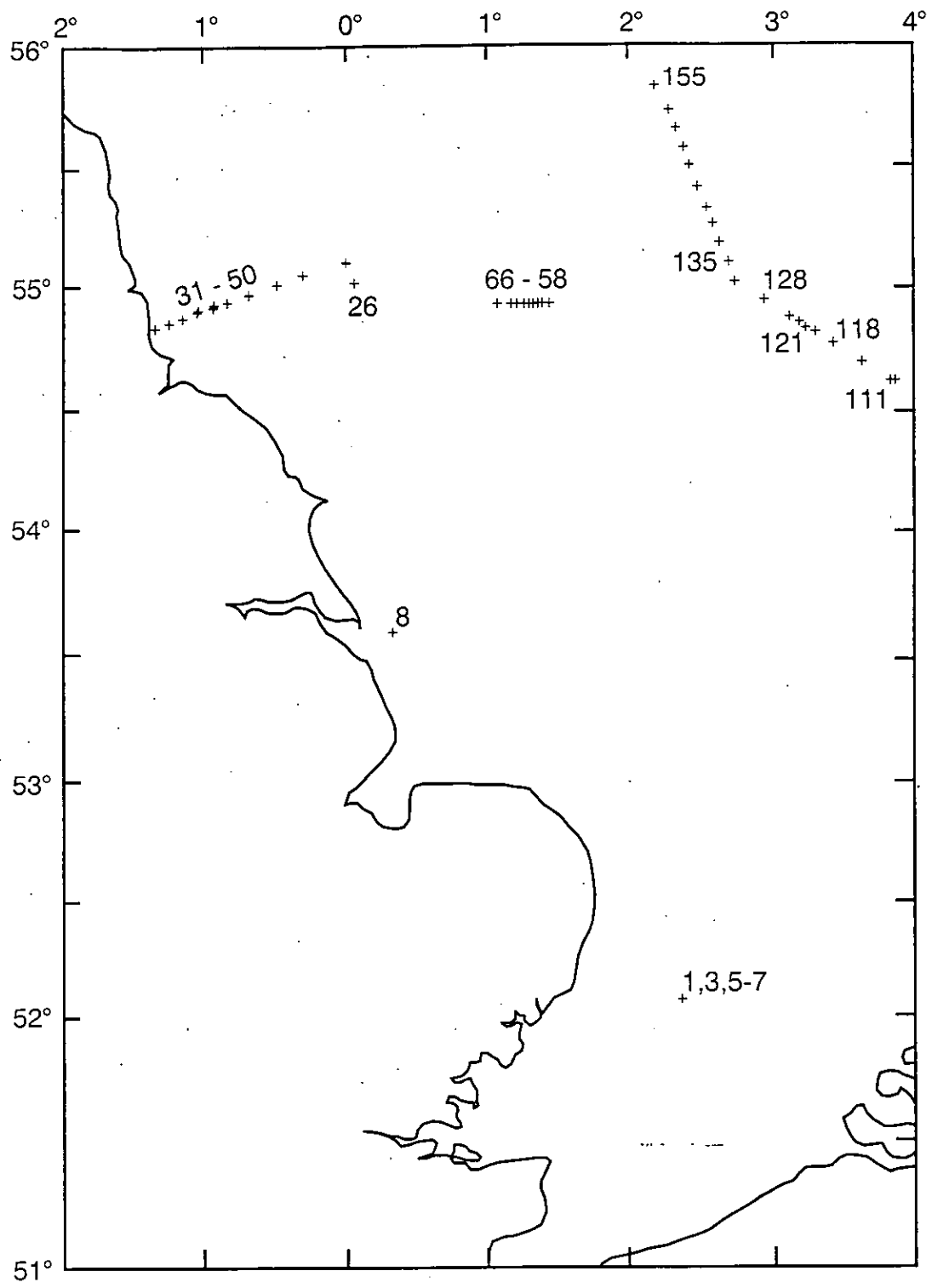


Figure 3. Location of CTD stations.

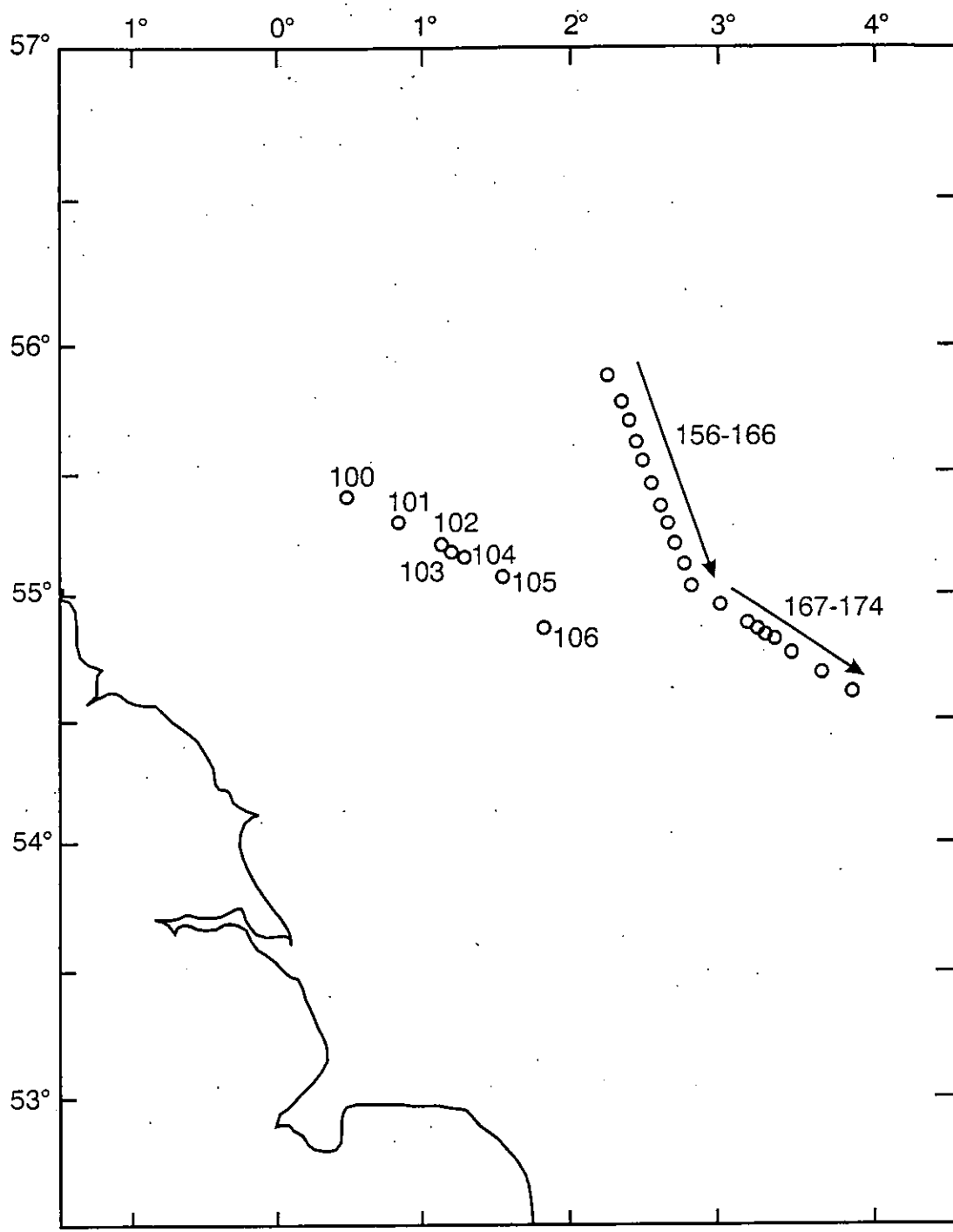


Figure 4. Locations of NIOZ corer sampling stations.