

R1/12

Not to be cited without prior reference to the Marine Laboratory, Aberdeen

FRV *Scotia*

Cruise 0497S

REPORT

21 March - 4 April 1997

Loading: Aberdeen
Unloading: Aberdeen

Personnel

| | |
|----------------|---------------------------|
| W R Turrell | PSO |
| R Payne | HSO |
| G Slessor | HSO |
| R D Adams | SO |
| S Dye | University of East Anglia |
| L Bullough | Aberdeen University |
| P McGarr | DML |
| H Chambers | Visitor |
| Martin Collins | Aberdeen University |
| Scott Bradley | Aberdeen University |
| Steve Addison | Aberdeen University |

Gear

BT101 Monk
Gear recovery net

Objectives

1. To perform hydrographic surveys along the standard Faroe-Shetland Channel sections.
2. To attempt recovery of the single NWOCE ADCP mooring at the shelf edge west of Shetland.
3. To deploy a deepwater ADCP mooring near the centre of the Faroe-Shetland Channel.
4. To deploy and recover an experimental benthic lander and camera system at various locations west of Shetland.
5. To perform repeat ADCP sections in conjunction with satellite altimeter over-flights.
6. To perform experimental deep water trawls northwest of Shetland.

7. To perform hydrographic surveys along the JONSIS standard section and in the northern North Sea if time permits.
8. To collect the Fair Isle caesium sample

Narrative

Scotia sailed from Aberdeen at 1400 hours on Friday 21 March. She proceeded slowly northwards while trials of the newly installed 3D GPS system took place. These were concluded at 2030 hours, and *Scotia* then proceeded to the eastern end of the JONSIS line. The ADCP was calibrated during the northeastward leg. Work commenced at station 10 of the JONSIS line at 0645 hours on Saturday 22 March, and the survey line was completed at 2000 hours that day. *Scotia* then proceeded to the Fair Isle caesium position, where a water sample was collected. She then proceeded to sheltered waters west of Flugga, where the AUDOS Lander system was tested. After a successful trial deployment, *Scotia* proceeded to the first station on the Nolso Flugga line.

Work along the Nolso Flugga section commenced at 1030 hours on Sunday 23 March, and was completed at 1200 hours the following day. *Scotia* then proceeded to the start of the Fair Isle Munken section, where work commenced at 1840 hours on Monday 24 March. By 0100 hours on Tuesday 25 March three stations of the section had been completed when deteriorating weather forced work to be abandoned. A slight lull at 0900 hours permitted two further stations to be attempted, in Force 7 winds, until again the weather forced work to end and *Scotia* dodged until 1800 hours on Thursday 27 March. During this interval winds exceeding Force 10 were experienced. As the nearest shelter was 130 nm away it was not possible to move from the centre of the channel and severe conditions were encountered.

At 1800 hours on Thursday 27 March work at the sixth station of the Fair Isle Munken section was started, and a further two stations subsequently completed. By 2250 hours on Thursday 27th winds again exceeded Force 8 and work was again suspended. *Scotia* dodged all night, until 1100 hours the following day when conditions allowed a search to be made for the missing ADCP. Despite repeated attempts to locate the acoustic beacons attached to the ADCP mooring, no evidence of its location was obtained within a 20 km radius of its last known position. As conditions were too poor to restart other work, *Scotia* dodged towards the location of the Nordic WOCE ADCP.

Severe weather continued during the remainder of Friday 28 March, until 2030 hours, by which time it had moderated sufficiently to allow CTD work to recommence along the Fair Isle Munken line. Three stations were completed before again severe weather stopped work.

Based on a five day forecast obtained from the Aberdeen weather centre, *Scotia* slowly made her way to the location of the NORDIC WOCE ADCP mooring. Work commenced at 0600 hours on Saturday 29 March, and the mooring was deployed by 0900 hours. The AUDOS lander was subsequently deployed at 1000 hours. *Scotia* then proceeded to undertake a deepwater trawl, which was completed by 1700 hours on Saturday 29 March. Again owing to deteriorating weather, *Scotia* abandoned fishing and passage was made to the remaining three CTD stations on the Fair Isle Munken section. These were completed by 2200 hours, and passage was made to the start of the Topex - Poseidon satellite altimeter overpass track. Survey work along this track commenced at 0000 hours on Sunday 30 March. Very poor weather was

experienced during this survey, with winds of up to Force 9. The northwesterly leg was performed at just 2 knots, and was completed at 2040 hours on 29 March. The southeasterly leg was performed at 8 knots and was completed by 0340 hours on Monday 31 March.

There then followed yet another persistent period of severe weather, with winds decreasing below Force 8 for the first time at 0300 hours on Wednesday 2 April. Work commenced on recovery of the AUDOS lander at 0600 hours, and this instrument was successfully recovered by 0715 hours. A trawl at the sight of the lander deployment was immediately started, and was completed by 1100 hours that day. Again severe weather commenced and all operations had to be abandoned. As no further work was possible in the main survey area *Scotia* departed and made passage for the Moray Firth, where a further AUDOS lander trial was planned in the deep water trench off Fraserburgh. On arrival, at 0600 hours Thursday 3 April severe weather with winds of over Force 9 were again experienced. A deployment was not possible, and *Scotia* steamed south to obtain sheltered waters off Cruden Bay. As the 3D GPS antennae had been dislodged by the severe weather, a further calibration run was necessary, which was completed by 1600 hours on Thursday 3 April. As all possible work had been completed *Scotia*, thankfully, entered Aberdeen at 2000 hours that night.

Results

The cruise was characterised by appalling weather. Despite this all objectives were achieved, to some extent:

1. To perform hydrographic surveys along the standard Faroe-Shetland Channel sections: Both sections were surveyed. Initial results show a remarkably fresh version of Arctic Intermediate/North Icelandic Water (AI/NIW) was present during the survey. The density structure of the Fair Isle Munken section was also remarkable, with isopycnals sloping from the Faroese plateau down across the Channel to the Scottish side. Geostrophic estimates of flow, using the 27.6 σ_{θ} level as the level of no motion, reveal a strong southerly flow of intermediate water hugging the Faroese slope, and a very weak slope current on the Scottish side. North Atlantic Water (NAW) appeared to fill the central Channel area rather than the more normal Modified North Atlantic Water (MNAW).
2. To attempt recovery of the single NWOCE ADCP mooring at the shelf edge west of Shetland: An intensive acoustic search was made for this mooring, in weather conditions that precluded any fishing attempts. These conditions did not hinder the acoustic search, as under similar conditions, and using the same acoustic equipment, the AUDOS lander and the NWSD moorings were successfully communicated with. As the NWSE mooring had twin acoustic beacons fitted, and these were in excellent condition when the mooring was last communicated with in October 1997, it appears inconceivable that the mooring is still located in the area. As both releases were triggered on the first recovery attempt, the ADCP floatation will be no longer attached to the anchor. As the glass buoyancy modules were recovered from a beach in Orkney, the mooring is now negatively buoyant, lying on the sea bed trailing the acoustic releases. Hence it will be highly mobile and will certainly have been moved by the severe currents encountered in this area. If the weather had permitted trawling this would have been attempted simply in order to meet the insurance requirements. As the weather did not permit trawling at that time, and as there is in my opinion no

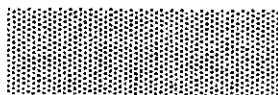
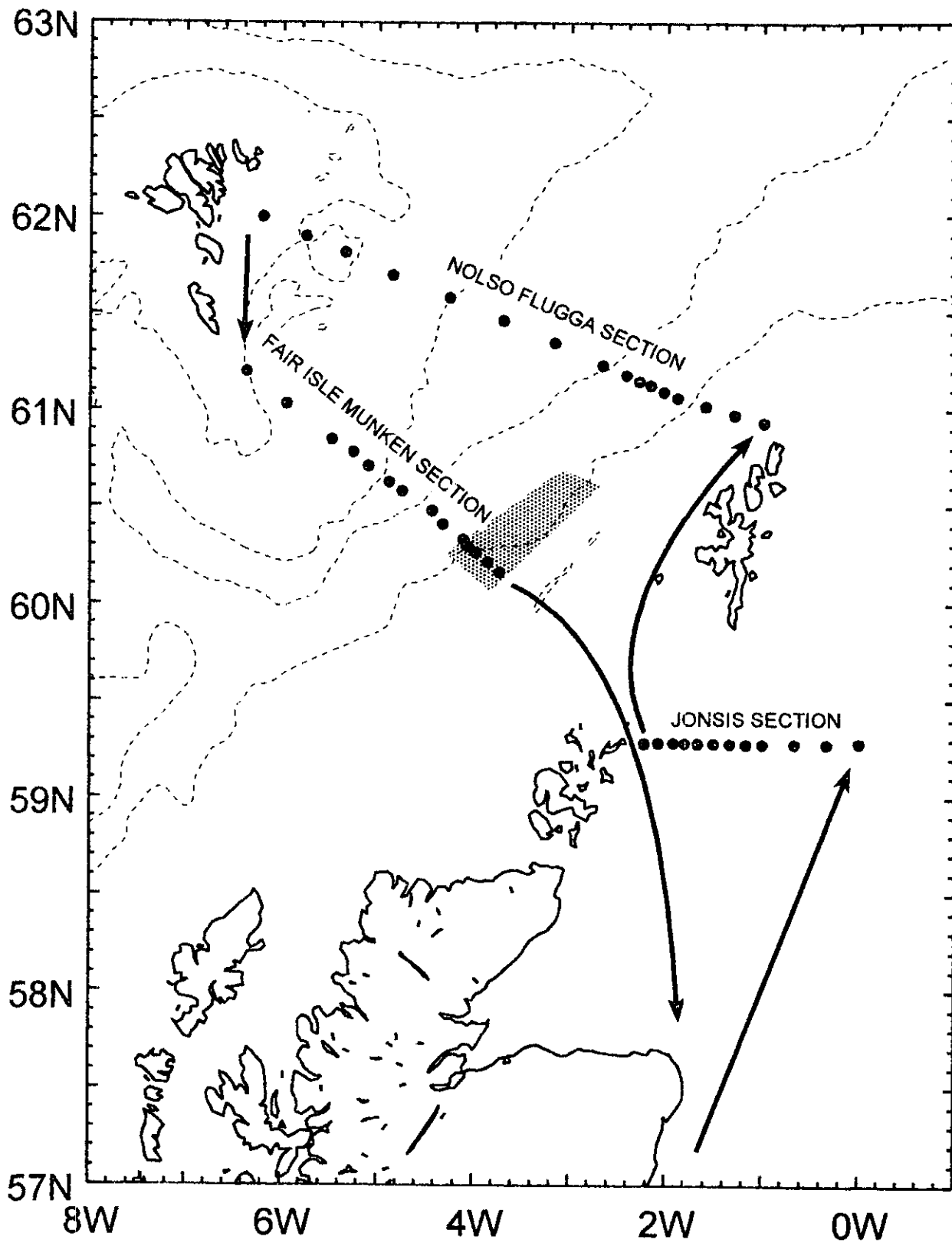
possibility that the mooring remains in the area, valuable usable survey time was not wasted on a futile search.

3. To deploy a deepwater ADCP mooring near the centre of the Faroe-Shetland Channel:
This mooring was successfully deployed.
4. To deploy and recover an experimental benthic lander and camera system at various locations west of Shetland: Two deployments were achieved; a trial deployment in sheltered waters west of Shetland and a full deployment in 800 m near the Foinaven oil field. Initial results indicate the system worked and fish possibly tracked during the deployment period.
5. To perform repeat ADCP sections in conjunction with satellite altimeter over-flights: This was achieved but under severe weather conditions. It is not yet known if the data will be suitable for altimeter calibration.
6. To perform experimental deep water trawls northwest of Shetland: Unfortunately due to the weather conditions only two deep water trawls were achieved. However, fish samples were collected and fully processed on board.
7. To perform hydrographic surveys along the JONSIS standard section and in the northern North Sea if time permits: This section was successfully surveyed. Results indicate an interesting indication of Atlantic water inflow, possibly from the east Shetland area. Conditions were vertically homogeneous.
8. To collect the Fair Isle caesium sample: This water sample was collected.

W Turrell
16 April 1997

Seen in draft: J Nichols

CRUISE TRACK - 0497S



LANDER AND ADCP DEPLOYMENTS, DEEP WATER TRAWLING