

R1/12

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FRV *SCOTIA*

Cruise 0508S

## **REPORT**

6-25 May 2008

**Loading:** Aberdeen  
**Unloading:** Aberdeen

### **Personnel**

G Slesser	In charge	
M Geldart		
D Lichtman		
M Rose		
D Watson		
N Collie	6-16 May	
J Turriff	16-25 May	
D Mayor		Aberdeen University
E Lines		Aberdeen University
J Beaton	16-25 May	SAMS
T Sherwin	16-25 May	SAMS

### **Gear**

SeaBird CTDs, ADCPs, Current Meters, SonoBuoys, Acoustic Releases, Recovery Trawl, Maxicorer.

### **Objectives**

1. To perform hydrographic surveys along the JONSIS standard section in the northern North Sea.
2. To deploy two current meter moorings in the Fair Isle Channel.
3. To recover two current meter moorings E of Shetland.
4. To perform CTD hydrographic surveys E of Shetland.
5. To perform hydrographic surveys along the standard Faroe Shetland Channel sections.
6. To service two ADCP moorings in the Faroe Shetland Channel.
7. To take core samples for deep sea sediment carbon cycling in the Faroe Shetland Channel.
8. To recover and redeploy an ADCP mooring on the Wyville-Thomson Ridge.

9. To carry out a CTD survey on the Wyville-Thomson Ridge.
10. To carry out a CTD survey on Rosemary Bank.
11. To carry out a CTD survey along the shelf edge.

**Out-Turn Days per Project:** 20 days: Ae11r0

## **Narrative**

*Scotia* sailed from Aberdeen at 1130 (all times are GMT) on Tuesday 6 May for the start of the JONSIS standard section. On route test dips of the 911+ CTD were performed to test the CTD crane and CTD instrumentation and for crew familiarisation of the CTD crane operation. CTD measurements and water sampling commenced at the JONSIS section at 0242 on 7 May. The section was completed at 1514 on Wednesday 7 May (Stns.147-158).

*Scotia* then proceeded to the Fair Isle Channel to deploy two current meter moorings. These moorings were deployed at 1657 (59°28.33'N 002°01.79'W) and 1847 (59°43.39'N 001°41.53'W) on Wednesday 7 May. Following this *Scotia* made passage to the start of the most southerly (60°0.00'N) of three CTD sections, East of Shetland. East Shetland section 1 commenced at 2127 on Wednesday 7 May and was completed at 0912 on Thursday 8 May (Stns.159-169) and this was followed by East Shetland section 2 commencing at 1220 and finishing at 2350 on Thursday 8 May (170-180). Passage was then made to Lerwick to allow a FRS staff member to depart for Aberdeen. On completion of staff transfer to Lerwick by small boat at 0730 on Friday 9 May *Scotia* made passage for the innermost East Shetland mooring position (60° 34.40'N 000°38.05'W). This mooring and the outermost East Shetland mooring (60°28.51'N 000° 08.30'W) were successfully recovered at 1320 and 1515 respectively on Friday 9 May. *Scotia* then proceeded to the start of the CTD section East of Shetland 3 and work commenced at 2040. This section was completed at 0812 on Saturday 10 May (Stns.181-190).

*Scotia* then made passage to the start of the Nolso-Flugga standard monitoring section for CTD measurements and water sampling. Work commenced at 0925 on Saturday 10 May and worked up to Nolso – Flugga station 4. At this station coring work commenced at 2055 and continued till 0430 on Sunday 11 May. The Nolso – Flugga line was resumed at 0556 and completed at 2119 and followed by working the Fair Isle – Munken standard monitoring section. This section was completed at 0007 on Tuesday 13 May (Stns.191-221).

Passage was made overnight to the ADCP mooring position NWSE (60° 16.91'N 004° 19.25'W). This ADCP buoy set adrift last October and recovered by the Norwegian coastguard during December 2007 was deployed (60° 16.64'N 004° 20.08'W) at 0715 on Tuesday 13 May. Passage was made to ADCP mooring position NWSD (60° 27.09'N 004° 22.62'W) and this mooring was recovered at 0925 on Tuesday 13 May. The data were downloaded from the ADCP, the mooring refurbished and redeployed (60° 26.98'N 004° 22.55'W) at 1400 on Tuesday 13 May.

The remaining part of the first half of the cruise was spent working CTD sections on the shelf edge between the Butt of Lewis and West Shetland (Stns.222-258) and finally before entering Stornoway for the half landing test dips were done on the newly acquired Sbe19plus CTD. The *Scotia* entered Stornoway at 0830 on Friday May 16 for a mid cruise break and a change of FRS staff and the joining of SAMS personnel.

*Scotia* departed from Stornoway at 0900 on Saturday 17 May for the SAMS mooring position (60° 14.71'N 009° 00.76'W) at the Ellett Gulley (Wyville Thomson Ridge). Arriving at 2235, CTD

stations were worked till 0706 on Sunday 18 May when recovery of the SAMS mooring commenced.

The SAMS mooring was recovered at 1000 and after downloading the data and refurbishing the instrument the mooring was redeployed along with two Sea-Bird Microcats at 1930. The CTD stations at this location were recommenced and completed (Stns 259-275) at 0153 on Monday 19 May.

Passage was then made to Rosemary Bank where two CTD lines were carried out, sampling commenced at 0807 on Monday 19 May. At the end of the first line, 5 CTD stations were carried out firing all bottles at 50m and again at 500m for a nutrient sampling variance study. On completion of the CTD survey (Stns 276-300) at 1344 on Tuesday 20 May passage was made to Rockall Bank to sample the Ellett standard monitoring section up to the Scottish Shelf. The Ellett section commenced sampling at 0452 on Wednesday 21 May and ceased at 2051 on Friday 23 May for departure to Aberdeen. (Stns. 301-329). The *Scotia* berthed at 0600 on Sunday 25 May.

## Results

The weather conditions throughout the cruise were excellent apart from near to gale force conditions over a short period during sampling of the Ellett standard monitoring section. Approximately 5.5 hrs of ship time was lost while dodging the poor weather.

1. The JONSIS standard section in the northern North Sea was surveyed.
2. The two moorings were deployed successfully in the Fair Isle Channel.
3. The current meter moorings E of Shetland were recovered, the data successfully downloaded. The current meter data will be validated, edited and processed on return to the laboratory.
4. Three lines of CTD stations were sampled East of Shetland.
5. The two standard Faroe Shetland Channel sections were surveyed.
6. The Nordic WOCE ADCP mooring NWSD was recovered successfully, the data downloaded and redeployed. The Nordic ADCP mooring NWSE that came adrift during recovery operations during October 2007 and recovered by the Norwegian coastguard was also successfully deployed. The recovered data from the NWSD mooring will be processed in the laboratory by in-house software.
7. Cores were successfully taken for the deep sea sediment carbon cycling study. The benthic response to an influx of organic material was investigated in the deep waters (1080 m) of the Faroe-Shetland Channel (61 13 88 N, 2 40 62 W). Three deployments of the multi-corer were necessary to retrieve 20 successful cores from the seabed. A CTD deployment was also necessary to collect bottom water (1070 m) for the experiments. Specifically, this study addressed the following hypothesis:

“Food quality influences the rates and pathways through which organic carbon is processed in deep sea sediments”.

This was examined using a stable isotope pulse-chase experiment. A pulse of either low- or high-quality <sup>13</sup>C-labelled organic matter was introduced into each sediment core at the start of the experiment and is subsequently followed (chased) into dissolved CO<sub>2</sub>

and bacteria/macrofauna/meiofauna biomass, as evidenced by incorporation of the  $^{13}\text{C}$  signature. A total of 18 cores fitted with air-tight lids were incubated at the ambient temperature ( $0.7^\circ\text{C}$ ) for 6 days. Each treatment (control, low-quality & high-quality) was replicated 6 times. Two additional cores were incubated using a concentration of high-quality food identical to that used in our previous experiments (May 2007; cruise 0607S) in order to examine inter-annual variability in the benthic response. Water samples were taken each day to determine concentrations of  $\text{O}_2$ , total  $\text{CO}_2$  and  $^{13}\text{CO}_2$ . At the end of the experiment, 3 cores from each treatment were sampled for sediment bacteria and the remaining 3 were sampled for macrofauna and meiofauna. (Emma Lines and Daniel Mayor, Oceanlab, University of Aberdeen).

8. SAMS staff successfully recovered the bottom mounted RDI Longranger Workhorse ADCP mooring deployed by *Discovery* in September 2007 in 1300 m of water in the Ellett Gully, just west of the Wyville Thomson Ridge. Data were downloaded and the ADCP recharged and redeployed, along with 2 Seabird Microcats, at 1930 GMT 18 May. Inspection of the downloaded data showed that the ADCP had performed satisfactorily during its deployment. (Toby Sherwin).
9. A closely spaced CTD section was conducted approximately N-S across the Ellett Gully at the position of the mooring. There was a minimum of  $4^\circ\text{C}$  at the seabed at a single cast on the northern side of the gully, but overall temperatures were relatively warm, indicating that the transport of overflow water was low. Cold water was noticed on the Faroe Bank at the northern end of the section in a depth of about 500 m. (Toby Sherwin).
10. North-South and West East CTD sections were sampled over Rosemary Bank.
11. 29 of the 35 stations of the Ellett Standard monitoring section (Rockall – Scottish Shelf) was carried out.

Throughout the cruise, sea surface temperature, salinity and fluorescence recordings were made using a Sea-Bird SBE21 Thermosalinograph and Sea Point Fluorometer. Surface samples were taken throughout the cruise to calibrate these data. Detailed results of the data collected during the cruise will be made available as these data are worked up and interpreted in the laboratory. Calibrations were carried out on *Scotia* for both the thermosalinograph and CTD instrumentation. All hydrographic data are delivered to the ICES and BODC data centre in due course over the following year.

G Slesser  
3 June 2008