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FRV *Scotia*

Cruise 0610S

REPORT

14 May – 1 June 2010.

Loading: Aberdeen

Unloading: Aberdeen

Personnel

G Slesser	SIC
M Geldart	
D Lichtman	
A McIntosh	
L Morley	
N Collie	14-21 May
J Dunn	14-21 May
P Walsham	14-21 May
D Mayor	Aberdeen University 21May-1June
S McDonough	Aberdeen University
J Beaton	SAMS

Out-turn days per project: 19 AE11R0

Gear

Sea-Bird CTDs and Carousel Water Sampler, ADCP and Current Meter Instrumentation, Mooring Equipment, Recovery Trawl, Ocean Sampler

Objectives

1. Perform hydrographic surveys along the JONSIS standard section in the northern North Sea.
2. Perform biological sampling along the JONSIS standard section and East Coast section using the Ocean Sampler.
3. Recover and redeploy two current meter moorings East Shetland.
4. Perform a CTD survey East Shetland
5. Perform hydrographic surveys along the standard Faroe Shetland Channel sections.
6. Carry out deep sea coring at Nolso - Fugga station NOL-04.
7. Take samples for long term storage at Fair Isle - Munken stations FIM-01 and FIM-06.
8. Service three ADCP moorings in the Faroe Shetland Channel.

9. Deploy one additional ADCP moorings for the THOR project in the Faroe Shetland Channel.
10. Recover and redeploy a SAMS ADCP mooring on the Wyville -Thomson Ridge.
11. Perform CTD surveys across the Fair Isle channel and along the Shelf Edge as time allows.

Narrative

Scotia sailed from Aberdeen at 0930 (all times are GMT) on Friday 14 May for the start of the East Coast line to carry out biological sampling using the Ocean Sampler. Prior to starting this work the CTD instrument package was successfully tested (Stn 135).

Sampling of the East Coast section using the Ocean Sampler commenced at 1430 on Friday 14 May and was completed at 0300 on Saturday 15 May. Passage was made to the start of the JONSIS section for sampling with the CTD/Carousel and Ocean Sampler. This work commenced at 1005 on Saturday 15 May and was completed at 0113 on Sunday 16 May (Stns. 136-147). *Scotia* then made passage to work the three CTD sections East of Shetland and work commenced at 0708 on Sunday 16 May. These sections were completed at 2132 on Monday 17 May (Stns. 148-179).

Passage was made to the current meter mooring E Shetland 2. On arrival interrogation by hydrophone failed to communicate with the mooring. A grid search was made north and south of the mooring position with no success and no indication of the mooring was shown on the echo sounder. Using the change over instrumentation this mooring (60° 10.00'N 000° 09.97'W) was deployed at 1320 on Tuesday 18 May. *Scotia* then made way to E Shetland 1 mooring position. On arrival this mooring was successfully recovered at 1749 and redeployed at 1919 (60° 18.65'N 000° 42.16'W) on Tuesday 18 May. Two CTD stations were performed at both mooring sites. (Stns. 180-181). Thereafter, the *Scotia* proceeded to the east most end of the E Shetland 2 section for CTD sampling. This work commenced at 0218 on Wednesday 19 May and was completed at 1156 (Stns. 182-190) on the same day. Prior to departing for Lerwick an acoustic survey was carried out to try and locate a missing acoustic release from a previous E Shetland 1 mooring without success.

Scotia berthed at 0900 on Thursday 20 May for a mid cruise break at Lerwick where a visit was made to a ships chandler to purchase an anchor weight for the E Shetland 2 mooring. On consultation with the project scientist it had been decided to lift this mooring again and deploy the remaining Sea-Bird Microcat on this mooring rather than mooring E Shetland 1. The *Scotia* departed at 0900 on Friday 21 May for the E Shetland 2 mooring position. This mooring was recovered at 1114 and redeployed (60° 10.00'N 000° 10.00'W) at 1210 with the Sea-Bird Microcat instrument. A calibration CTD was carried out after the mooring deployment (Stn. 191). Passage was then made to the start of the Nolso – Flugga section for CTD and water sampling. This work commenced at 1806 on Friday 21 May and was completed at 1117 on Sunday 23 May (Stns 192-208). During the sampling of this section a break was made at station NOL-04 to carry out coring work for Aberdeen University personnel. Six deployments of the multi-corer were taken to retrieve 32 successful cores. This was followed by a CTD/water sampler cast to collect water for the experiment. Passage was then made to the SAMS ADCP mooring position (60 15.60'N 009 00.90'W) on the Wyville-Thomson Ridge.

On arrival at 0630 on Monday 24 May exhaustive attempts were made to locate the SAMS ADCP mooring at the position and in the immediate surrounding area without any success. The search was abandoned at 1430 and *Scotia* made way to the start of a CTD line of stations from the Wyville-Thomson Ridge across the Faroe Bank Channel (Stns. 209-217). The work commenced at 1643 and was completed at 0640 on Tuesday 25 May. Passage was then made

to the start of the Fair Isle – Munken section which commenced at 1029 on Tuesday 25 May. This section was completed at 1659 on Wednesday 26 May (Stns. 218-231).

Following this *Scotia* made way to deploy ADCP Mooring NWSF. On arrival at the deployment site it was found that instrumentation for deploying the mooring had been left behind in Aberdeen. Arrangements were immediately made to have the instrument sent to Scrabster for pick up after the remaining moorings had been recovered and redeployed. ADCP Moorings NWSD*, NWSD and NWSE were recovered successfully at 1353, 1530 and 1721 respectively on Wednesday 26 May. The data from these ADCP instruments were downloaded, batteries replaced and made ready for redeployment. These ADCP moorings NWSD* (60° 30.48'N 004° 34.00'W), NWSD (60° 26.95'N 004° 22.25'W), NWSE (60° 16.49'N 004° 19.99'W) were successfully deployed at 2107 on Wednesday 26 May, 0905 and 1148 on Thursday 27 May respectively. *Scotia* then made passage for Scrabster.

The instrumentation was picked up by small boat from the Scrabster Harbour Master and *Scotia* returned to the NWSF mooring position. During deployment of this mooring it was discovered that the acoustic release had been set by the manufacturer with the wrong default settings and the instrument manual contained no information on how to reset the instrument. Not wishing to waste time trying to resolve this problem passage was made to the start of the Cape Wrath – Faroe CTD line (Stns. 232- 244). This work commenced at 0306 on Saturday 28 May and completed at 0012 on Sunday 30 May. During passage to the start of this line contact was made with the manufacturers of the instrument. On discussion with the manufacturers “helpdesk” it was confirmed that this new acoustic release had been set with the wrong settings. Another manual was e-mailed to the ship and instructions were found to make modifications to the settings of the instrument. The trawl proof ADCP mooring NWSF (60° 12.00'N 004° 00.06'W) was finally deployed at 0907 on Sunday 30 May. Before leaving the mooring site CTD's were carried out (Stns. 245-257). This work was completed at 1748 on Sunday 30 May. The *Scotia* then made passage to the start of a Fair Isle CTD section. This work commenced at 0545 on Monday 31 May and was completed at 1131 on 31 May (Stns. 258-265) before making passage for Aberdeen where *Scotia* berthed at 0600 on Tuesday 1 June.

Results

The weather conditions throughout the cruise were good to very good and no time was lost due to weather.

1. CTD and water sampling was carried out along the JONSIS standard section in the northern North Sea.
2. Biological sampling was carried out along the JONSIS standard section and East Coast section using the Ocean Sampler
3. Current meter mooring E Shetland 1 was successfully recovered and redeployed. Current meter mooring E Shetland 2 was not recovered after an extensive search. This mooring was replaced by back up mooring equipment and instrumentation.
4. Four CTD lines were surveyed E Shetland.
5. Hydrographic surveys along the standard Faroe Shetland Channel sections were performed.
6. Six multi-corer deployments were carried out at Nolso-Flugga station NOL-04 resulting in 32 successful cores being taken. See the note below on this deep sea sediment carbon cycling experiment.

7. Samples for long term storage at Fair Isle – Munken stations FIM-01 and FIM-06 were taken.
8. Three ADCP moorings in the Faroe Shetland Channel were recovered, data downloaded, and redeployed.
9. One additional ADCP moorings for the THOR project in the Faroe Shetland Channel was deployed.
10. An unsuccessful attempt was made to recover a SAMS ADCP mooring on the Wyville-Thomson Ridge. An extensive hydrophone search was made without locating this mooring.
11. CTD sampling was carried out across the Fair Isle Channel.

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. All salinity water samples collected during the cruise were analysed on board. 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.

Deep sea sediment carbon cycling

D Mayor and S McDonough, Oceanlab, University of Aberdeen.

The benthic response to an influx of organic material was investigated in the deep waters (NOL4; 1080 m) of the Faroe-Shetland Channel (61 13 88 N, 2 40 62 W). Specifically, this study addressed the following hypothesis:

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

This was examined using a stable isotope pulse-chase experiment. Different quantities of either low- or high-quality ^{13}C -labelled organic matter was introduced into each sediment core at the start of the experiment and was subsequently followed (chased) into dissolved CO_2 and bacteria/macrofauna/meiofauna biomass, as evidenced by incorporation of the ^{13}C signature. A total of 32 cores fitted with air-tight lids were incubated at the ambient temperature for 6 days. Each treatment (control, low-quality/low-quantity, low-quality/high-quantity, high-quality/low-quantity and high-quality/high-quantity) was replicated 6 times. Water samples were taken each day to determine concentrations of O_2 , total 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.

G Slesser
22 June 2010