

Not to be cited without prior reference to the Laboratory

FRV *SCOTIA*

Cruise 1208S Part 1

REPORT

26 September – 9 October

Loading: Aberdeen

Unloading: Ullapool

Personnel

G Slesser in charge

M Geldart

D Lichtman

N Collie

J Turriff

D Watson

D Mayor Aberdeen University

E Lines Aberdeen University

Gear

SeaBird CTDs, ADCPs, Current Meters, SonoBuoys, Acoustic Releases, Recovery Trawl, Maxi-corer.

Objectives

1. To perform hydrographic surveys along the JONSSIS standard section in the northern North Sea.
2. To perform hydrographic surveys along the standard Faroe Shetland Channel sections.
3. To service two ADCP moorings in the Faroe Shetland Channel.
4. To recover and re-deploy two current meter moorings in the Fair Isle Channel.
5. To perform CTD hydrographic surveys E of Shetland.
6. To take core samples for benthic productivity in the Faroe Shetland Channel
7. To carry out a CTD survey along the shelf edge

Out-Turn Days per Project: 14 days: Ae11r0

Narrative

Scotia sailed from Aberdeen at 0930 (all times are GMT) on Friday 26 September 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 on the JONSIS section at 0121 on Saturday 27 September. The section was completed at 1159 on the same day (Stns.459-470).

Scotia then proceeded to the Fair Isle Channel to recover and re-deploy two current meter moorings. Fair Isle Channel South mooring (59°28.33'N 002°01.79'W) was recovered at 1404 and redeployed (59° 28.29'N 002° 01.83'W) at 1535 on Saturday 27 September. Fair Isle Channel North mooring was recovered at 1800 on Saturday 27 September. Failing light resulted in the redeployment (59° 43.34'N 001° 41.48'W) of this mooring to be delayed until the following morning at 0727.

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 1002 on Sunday 28 September and was completed at 2110 on Sunday 28 September (Stns.471-481), followed by East Shetland section 2 commencing at 0029 and finishing at 1203 on Monday 29 September (Stns. 482 -492). *Scotia* then proceeded to the start of the section East Shetland 3 and work commenced at 1423. This section was completed at 0023 on Tuesday 30 September (Stns. 493-502).

Scotia then made passage to the start of the Nolso-Flugga standard monitoring section for CTD measurements and water sampling. Work commenced at 0801 on Tuesday 30 September and worked up to Nolso – Flugga station 4. At this station coring work commenced at 2100 after a small delay to make repairs to the plankton crane and continued till 0330 on Wednesday 1 October. The Nolso – Flugga section was resumed and completed at 2212 on the same day (Stns. 503-519). Due to gale force weather conditions on arrival at the start of the Fair Isle – Munken section shelter was made S of Suduroy, Faroe Islands. Easing weather conditions allowed *Scotia* at 0700 on Friday 3 October to made passage to the start of the Fair Isle – Munken section. Sampling continued along the section until 0900 on Saturday 4 October. At this point recovery and redeployment of the ADCP moorings commenced.

ADCP mooring NWSD (60° 21.98'N 004° 22.55'W) was recovered at 0940 Saturday 4 October followed by ADCP mooring NWSE (60° 16.64'N 004° 20.08'W). The data was downloaded from these ADCP instruments, the moorings refurbished and redeployed. ADCP moorings NWSE (60° 16.66'N 004° 20.13'W) and NWSE (60° 26.93'N 004° 22.45'W) were deployed at 1647 and 1845 respectively, both on Saturday 4 October.

Passage was made to recommence sampling the Fair Isle – Munken section but on arrival at the sampling station the weather conditions had deteriorated and *Scotia* hove to until the weather improved. Sampling resumed the following day at 1324 on Sunday 5 October and the line was completed at 1624 on Sunday 5 October (Stns.520-533).

The remaining part the cruise was spent working CTD sections on the shelf edge between the Butt of Lewis and West Shetland and North Minch (Stns.534-579). The *Scotia* docked at Ullapool 1500 on Wednesday 8 October for the end of the first part of the cruise and a complete change of scientific personnel.

Results

The weather conditions throughout the cruise were mixed from good to gale force. A 30 hour period between sampling the Nolso-Flugga and Fair Isle-Munken sections was spent in shelter at S of Suduroy, Faroe Islands.

1. The JONSSIS standard section in the northern North Sea was surveyed.
2. The two standard Faroe Shetland Channel sections were surveyed.
3. The Nordic WOCE ADCP moorings NWSD and NWSE were recovered successfully, the data downloaded, moorings refurbished and redeployed.
4. The two moorings Fair Isle Channel mooring were successfully recovered and redeployed.
5. Three lines of CTD stations were sampled East of Shetland.
6. 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 ^{13}C -labelled organic matter was introduced into each sediment core at the start of the experiment and is subsequently followed (chased) into dissolved CO_2 and bacteria/macrofauna/meiofauna biomass, as evidenced by incorporation of the ^{13}C signature. A total of 18 cores fitted with air-tight lids were incubated at the ambient temperature (0.7°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 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. (Emma Lines and Daniel Mayor, Oceanlab, University of Aberdeen).

7. Five lines of CTD stations were sampled in the area encompassing the Butt of Lewis, West of Shetland and North Minch.

Throughout the cruise, sea surface temperature, salinity and fluorescence recordings were made using a Sea-Bird SBE21 Thermosalinograph and Wet Labs 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.