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FRV *Scotia*

Cruise 0607S

REPORT

27 April – 16 May 2007

Loading: Aberdeen
Unloading: Aberdeen

Personnel

G Slesser	in charge	
J Beaton		
N Collie	27 April - 9 May	
M Rose	27 April - 9 May	
J Turriff	27 April - 9 May	
D Watson	27 April - 9 May	
D Mayor	27 April - 9 May	Aberdeen University
E Gontikaki	27 April - 9 May	Aberdeen University
K Peach	9 - 16 May	
F Neat	9 - 16 May	
R Kynoch	9 - 16 May	
L Allan	9 - 16 May	
J Treasurer	9 - 16 May	Artoe Marine Laboratory

Gear

SeaBird CTDs, ADCPs, Current Meters, SonoBuoys, Acoustic Releases, Recovery Trawl, 184 Jackson Deepwater Trawl, Maxi-corer.

Objectives

1. To perform hydrographic surveys along the JONSIS 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 redeploy two current meter moorings E of Shetland.

5. To perform CTD hydrographic surveys E of Shetland.

6. To take core samples for deep sea sediment carbon cycling in the Faroe Shetland Channel

7. To carry out CTD hydrographic survey across the Anton Dohrn Seamount.

8. To deploy an ADCP mooring on the Wyville-Thomson Ridge.

9. To carry out deepwater trawling during the spawning season at Anton Dohrn Seamount, east of the Rockall Plateau, the shelf edge and Rockall Bank.

Out-Turn Days per Project: 20 days: AE11RO

Narrative

Scotia sailed from Aberdeen at 1000 (all times are GMT) on Friday 27 April for the start of the JONSIS standard section. On route a test dip of the 911+ CTD was performed. CTD measurements and water sampling commenced at 2232 on Friday 27 April. The line was completed at 0934 on Saturday 28 April (Stns.130-141).

Scotia then made passage to the start of the most southerly (60 0.00'N) of three CTD lines, East of Shetland 1. Work commenced at 1632 on Saturday 28 April and was completed at 0508 on Sunday 29 April (Stns.142-153). Scotia proceeded to the start of the CTD line East of Shetland 2 and worked commenced at 0852. CTD stations were worked until 1042 on Sunday 29 April up to the inner most mooring East Shetland 1 (60 34.43'N 000 38.13'W). Work then commenced to recover this mooring and the outermost mooring East Shetland 2 (60 28.55'N 000 07.92'W). During recovery operations of both of these moorings, messages transmitted from the acoustic releases at both moorings indicated that the moorings had been released. However, the moorings remained in position. Both these moorings required a creeper weight dragged around both positions to nudge the moorings free of the anchor weight. Both moorings were successfully recovered undamaged and redeployed (60 34.42'N 000 38.01'W, 60 28.50'N 000 08.04'W). Investigations will continue to find the cause of the moorings failing to surface when apparently released from the mooring anchor. The sampling of the East Shetland 2 CTD line recommenced at 2106 on Sunday 29 April followed by sampling East Shetland line 3. These lines were completed at 1958 on Monday 30 April (Stns.154-176).

Scotia then made passage to the start of the Nolso-Flugga line for CTD measurements and water sampling. Work commenced at 2116 on Monday 30 April and worked up to Nolso – Flugga station 4. At this station coring work commenced at 0745 on Tuesday 1 May and continued till 0226 on Wednesday 2 May. The Nolso – Flugga line was resumed and followed by working the Fair Isle – Munken line. These lines were completed at 2200 on Thursday 3 May (Stns.177-208).

Passage was made overnight to the ADCP mooring position NWSE (60 16.91'N 004 19.25'W). This mooring was recovered at 0710 followed by NWSD (60 27.09'N 004 22.62'W) at 0850 on Friday 4 May. The data were downloaded from the ADCPs, the moorings refurbished and moorings NWSD (60 26.96'N 004 22.54'W) and NWSE (60 16.61'N 004 20.11'W) were redeployed at 1547 and 1806 on Friday 4 May respectively.

The remaining part of the first half of the cruise was spent working CTD stations along the shelf edge between the Butt of Lewis and West Shetland (Stns.209-264) prior to entering Ullapool for the half landing at 1630 on Tuesday 8 May.

Scotia departed from Ullapool at 1900 on Wednesday 9 May. Three trawls were completed on the shelf edge at depths of 500, 750 and 1000m. Two Methot net deployments were undertaken to depths of 900 m over a depth of 1000m. Passage was made to Rockall and 2 trawls were undertaken at depths of between 600 and 700 m on the eastern rise of the bank. Two methot net deployments were carried to a depth of 900 m. Passage was made to the Anton Dohrn Seamount where three trawl surveys were made. A north south section of CTD stations were also worked at this point (Stns. 266 – 272). Methot net sampling was undertaken on the

southern rise of the seamount, the summit and the northern rise. On passage to Rosemary Bank, a Methot net deployment was made to 900 m over a depth of 2100 m. Three trawls were made on Rosemary Bank at depths of 1000, 800 and 600 m. Two Methot nets deployments were made before making passage back to the shelf edge where a final methot net deployment was made to a depth of 1310 m.

Finally before departing for Aberdeen a CTD hydrographic survey section was carried out between the shelf edge and the Butt of Lewis (Stns. 273 – 276). The *Scotia* returned to Aberdeen, where she berthed at 0500 on Wednesday 16 May.

Results

The weather conditions throughout the cruise were excellent apart from near to gale force conditions over a two day period prior to entering Ullapool for the half landing. Despite this work continued.

1. The JONSIS standard section in the northern North Sea was surveyed.

2. The two standard Faroe Shetland Channel sections were surveyed.

3. The two Nordic WOCE ADCP moorings NWSD and NWSE were recovered successfully, the data downloaded and redeployed. The recovered ADCP data will be processed in the laboratory by in-house software.

4. The current meter moorings E of Shetland were recovered, the data successfully downloaded and the current meter moorings redeployed. The current meter data will be validated, edited and processed on return to the laboratory.

5. Three lines of CTD stations were sampled East of Shetland.

6. Deep sea sediment carbon cycling (Evina Gontikaki and Daniel Mayor, Oceanlab, University of Aberdeen).

   The response of a deep sea benthic community to an input of fresh organic matter was examined over a six day period in the Faroe - Shetland Channel. Stable isotope (^{13}C)-labelled diatoms were used as the tracer of labile carbon, and the uptake of this tracer was followed into the macrofauna, bacteria and dissolved $^{13}CO_2$ over the incubation period. The consumption of O_2 and the cycling of NH_4^+, NO_3, $Si(OH)_4$ and PO_4 were also examined over the duration of the experiment.

   All sampling was undertaken at 61 13 88'N, 002 40 62'W in 1080 m of water. Water samples were collected at 10, 400 & 1060 m to determine background concentrations of ^{13}C in the settling particulate material. A day grab was initially deployed to examine the suitability of the sediments for coring. A total of 24 cores (10 cm internal diameter) from 1080 m were successfully achieved. Three of these cores were immediately sampled to examine the macrofaunal (250 µm sieve) and meiofaunal biomass in the 0-2, 2-5 & 5-10 cm depth horizons. An additional set of 3 cores were sampled to determine the initial bacterial biomass and pore water CO_2 content in the 0-0.5, 0.5-1, 1-2, 2-3, 3-5 & 5-10 cm depth horizons. The remaining 15 cores were incubated in a chiller-cabinet at the bottom temperature (1.1 ˚C). The ^{13}C-labelled diatoms were added to the 12 experimental cores, and the remaining 3 served as controls. Water samples were removed daily from each core to determine the uptake of O_2 and the production of $^{13}CO_2$. The water sampled from each core was replaced with bottom water collected from 1060 m. Sub-sets of cores were sacrificed after 3 and 6 days and sampled for

macrofauna, meiofauna and bacterial biomass.

7. A north - south CTD section was carried out on the Anton Dohrn Seamount..

8. Due to the call off by SAMS personnel due to ADCP instrument malfunction, the mooring was not deployed as planned.

9. Deepwater survey of Anton Dohrn Seamount, Rockall and Rosemary Bank May 2007 (Francis Neat and Kevin Peach)

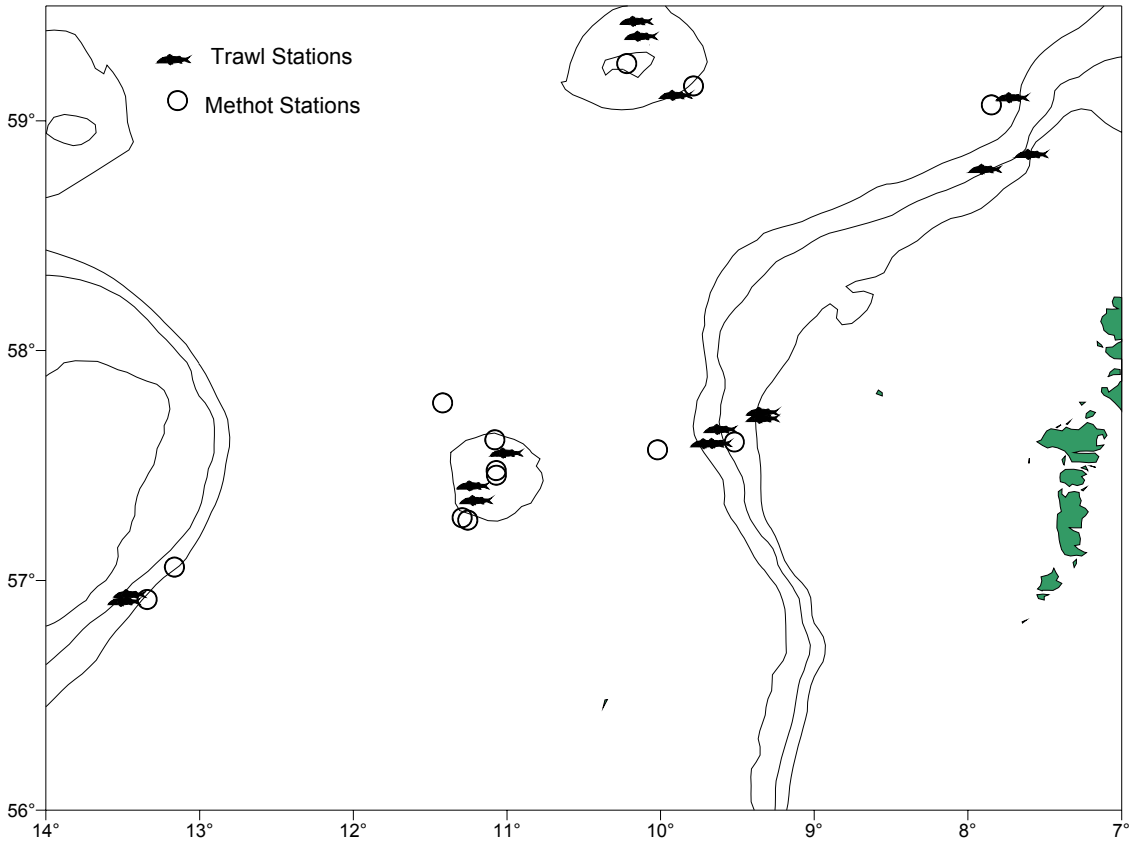
   The scientific objective of this part of the survey was to collect biological information from trawl and Methot net surveys in order to make a comparison between the benthopelagic and mesopelagic fauna found on the seamounts and banks with that on the continental shelf edge. The entire catch from trawls surveys was sorted by species, weighed and length frequency data taken. For certain species of interest (Table 1) detailed information was taken that included weight, length, sex, maturity, liver and gonad weight and collection of otoliths and genetic samples. Previously unrecorded species were identified, photographed and preserved for future reference. All benthos and invertebrate fauna was frozen for future identification. The Methot net samples were sorted into fish, large crustaceans and general zooplankton. Fish samples were either preserved in ethanol for future identification or frozen in water if too large. Temperature and depth loggers were attached to the trawl and Methot net and set to record at 1 min and 30 second intervals.

   The survey has yielded valuable information on seamount fauna. A number of fish species were found to be spawning on the seamounts such as blue ling (*M. dipterygia*), red fish (*S. mentella*) and several species were in a post spawning state such as black scabbard (*A. carbo*) and roundnose grenadier *(C. rupestris*). In addition to biological sampling of more common species for future otolith and genetic studies, several species of fish were sampled that had not previously been recorded such as the spookfish, Scopelosaurus, etc. The Methot net samples have yet to be worked up, but the initial sift showed a highly diverse and interesting mesopelagic community that included species of commercial interest such as juvenile anglerfish (*L. piscatorius*) and possibly also black scabbard (A. carbo) as well as many rare samples in excellent condition for identification. Also of note was the capture of a large Ommistrepid squid at 900 m over a depth of 2100 m.

Species (latin name and FRS code)	Purpose	Numbers sampled
Lophius Piscatorius (ANG)	General biological	8
Molva dipterygia (BLI)	Genetics, otoliths	38
Helicolinus dactylopetrus (BLM)	Genetics, otoliths, morphometrics	50
Aphanopus carbo (BSC)	Genetics, otoliths	148
Centrophorus crepidator (CCR)	General biological	2
Coelorhynchus coelorhynchys (COC)	General biological	17
Mora moro (MOR)	General biological	24
Coraphanoides ruperstris (RNG)	General biological	29
Denia calceus (SHS)	General biological	20

Table 1: Summary of deepwater biological sampling.

Deepwater Fishing & Methot Netting Positions May 2007



Trawl Positions

Haul	Depth	Duration	Stat Sq	Area	Comments
S07/141	162	30	44'E0	Edge	Instrumentation
S07/142	176	37	44'E0	Edge	Instrumentation
S07/143	540	30	44'E0	Edge	
S07/144	760	30	44'E0	Edge	
S07/145	1000	30	44'E0	Edge	
S07/146	680	30	42'D6	Rockall	
S07/147	680	30	42'D6	Rockall	
S07/148	650	25	43'D8	Anton Dohrn	Fast
S07/149	650	19	43'D8	Anton Dohrn	Fast
S07/150	740	30	44'D9	Anton Dohrn	
S07/151	910	30	47'E0	Rosemary Bank	
S07/152	610	30	47'D9	Rosemary Bank	
S07/153	820	30	47'D9	Rosemary Bank	
S07/154	1050	30	47'E2	Edge	
S07/155	1050	45	46'E2	Edge	
S07/156	200	12	46'E2	Edge	Instrumentation

Methot Positons

Haul No	Day/Night	Depth	Sampler Depth	Area
DM07.136	D	1000	860	Edge
DM07.137	N	1000	900	Edge
DM07.138	D	1000	900	Rockall
DM07.139	N	1000	900	Rockall
DM07.140	D	590	530	Anton Dohrn
DM07.141	D	1000	900	Anton Dohrn
DM07.142	N	1000	900	Anton Dohrn
DM07.143	N	590	530	Anton Dohrn
DM07.144	D	1000	900	Anton Dohrn
DM07.145	D	1994	1000	North Anton Dohrn
DM07.146	D	410	460	Rosemary Bank
DM07.147	D	1000	1120	Rosemary Bank
DM07.148	D	1350	1310	Edge

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
25 May 2007