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FRV *Scotia*

Cruise 1807S

REPORT

7-20 December 2007

Loading: Aberdeen, 4/5 December 2007

Unloading: Aberdeen, 20 December 2007

Personnel

J Dunn (In charge)
J Hunter
N Collie
K Cook
J Rasmussen
D Lichtman
B Berx
M Rose
S Robinson
M Pan
D Mayor (Aberdeen University)
E Gontikakai (Aberdeen University)

Project: AE11r - 14 days

Sampling gear: Hydrographic CTD; Plankton nets (ARIES) Mega corer

Fishing gear: None

Area: North Sea-Faroe Shetland Channel.

Objectives

1. To conduct routine hydrographic sampling at stations along the standard JONSIS, Fair Isle-Munken and Nolso-Flugga survey lines.
2. To conduct plankton and hydrographic sampling with ARIES in the Faroe Shetland Channel.
3. To take core samples for benthic primary productivity in the Faroe Shetland channel.

Narative

Scotia sailed from Aberdeen at 10:00 on the 10 of December in poor weather conditions to make for the eastern end of the JONSIS line, however by 18:00 the vessel was forced to turn back and seek shelter just off Fraserburgh. By 07:00 on the 11December the sea state and wind had gone down sufficiently to allow passage to a deep trench in the Moray Firth to carry out test deployments of the CTD/carousel and associated crane. A one ton weight was towed to

test the plankton crane and winch function, on successful completion of this an ARIES test deployment was carried out.

The vessel made passage to the eastern end of the Jonsis line, where work commenced on Monday 8 December. ARIES and CTD were successfully deployed on an extra station. *Scotia* was forced to break off work after completing station ten at 02:30 on the 9 December due to very heavy swell and gale force winds.

The vessel dodged in the area of station nine for twenty two and a half hours, sampling recommencing at 22:15 on the 9 December and completing the Jonsis line at 12:45 on Monday 10 December.

Scotia proceeded to the southern end of the Fair Isle-Munken line and started work on Fim station one at 19:30 on Monday 10 December. Work continued steadily until 23:00, when on Sefos 2 station the hydraulic clamps on the CTD crane failed and had to be replaced.

Progress along the Fim line was steady with station Fim 5 being reached by 09:00, however ARIES was towed in the wrong direction and the tow had to be repeated.

Scotia deployed a CTD at Fim six at 12:30, but on recovery of ARIES it was found that the sampler had failed at the maximum depth of the tow. The battery pack was replaced and the tow was repeated, unfortunately the same thing happened again. The decision was made to replace the codend unit as it was suspected that the o rings were gripping the drive shaft on the motor.

After preparing the Methot net for deployment the wind and sea had increased to the point where the station had to be abandoned, and *Scotia* was forced to dodge.

After dodging for nine hours, *Scotia* reached Fim seven by 18:00 and continued working steadily along the line reaching Fim nine by midnight on Wednesday 12 December. At Fim station 10 the CTD was deployed but the wind and sea state had increased to the point where *Scotia* was again forced to dodge in winds gusting up to 55knt.

The vessel dodged until 18:00 when the master made the decision to seek shelter at Faeroe and *Scotia* made a difficult passage to the southernmost island in the Faeroe archipelago reaching suitable position at 23:25 on Thursday 13 December.

Scotia sheltered in the lee of Sydero in severe and unrelenting winds, at times gusting up to 75 knots for fifty two hours until Sunday 16 December at 02:30, when the vessel made passage to Nol eleven and started work. However only three stations had been completed when at Nol eight *Scotia* was forced yet again to dodge in heavy swell and strong winds. The sea state and wind had dropped sufficiently by 09:50 on Monday 17 December to allow work on the Fim line to resume.

At Nol six a retaining pin on the plankton crane head came loose and fell out while ARIES was being towed with 1400meters of wire out. The sampler was safely recovered and the engineers manufactured a replacement pin for the crane head.

On the same station *Scotia* suffered steering problems which prevented ARIES being deployed in the early hours of Tuesday 18 December, these problems took about six hours to find and repair.

Work continued steadily along the Nol line with a Mega corer being deployed at Nol four at 19:30. Unfortunately on recovery the corer had failed to take any cores although there was

evidence of it having been on the bottom. Unfortunately there was not time to allow a further deployment.

Scotia completed five more stations before breaking off after Nol two at 04:20 to make passage to Aberdeen docking at 05:00 hrs on 20 December.

Results

The survey was conducted in the breaks between some extreme weather and sea conditions, which prevailed during the entire cruise.

1. The JONSIS standard section in the northern North Sea was surveyed completely, including an extra station at the eastern end and four ARIES tows.
2. Plankton and water samples were collected using CTD, ARIES and a Dual Methot net in the Faeroe Shetland Channel.
3. A Mega corer was deployed at a station in the Faeroe Shetland Channel.

Throughout the cruise surface temperature, salinity and fluorescence recordings were made using a Sea-bird SBE21 Thermosalinograph and a Sea Point Fluorometer.

The supply pipe to the Fluorometer in the water sampling room blew off during the cruise causing a minor flood and the bilge alarm to go off.

The water sampling room was thoroughly cleaned, and the thermosalinograph thoroughly flushed out with fresh water at the end of the cruise.

Detailed results of the hydrographic data collected during the cruise will be made available as the data is worked up and interpreted by the laboratory.

The Bran and Luebbe auto analyser performed efficiently, during the cruise, and kept pace with number of samples being produced. A total of 725 samples were processed for total oxidised nitrogen, silicate and phosphate.

Results will be available when data is fully worked up by the laboratory.

OPC data

Data from the optical plankton counter (OPC) obtained during ARIES deployments were investigated during the cruise. Abundances of equivalent spherical diameters corresponding to the copepodite stages 4 and 5 of *Calanus finmarchicus* were plotted with depth to obtain vertical profiles across the Fair Isle-Munken (Figure 2) and Nolso-Flugga (Figure 3) transects.

ARIES was also deployed 4 times on the JONSIS line this year, and a similar plot was produced for these results (Figure 1).

The preliminary analysis provide counts of a particular size category, but makes no distinction between species, so it is necessary to verify OPC results with a more detailed analysis of the collected plankton samples at a later stage.

In addition to vertical profiles of OPC counts, integrated abundances of Calanus C4-C5 sized particles were also calculated and plotted on a spatial scale (Figure 4). These integrated abundances were compared to values from 2005 and 2006 OPC values.

The new deployments of ARIES on the JONSIS line revealed low concentrations on these

shallow stations. Typically, *Calanus finmarchicus* overwinters at depths between 600 and 1000m, so it is not surprising that these stations showed little/no *Calanus* as the bottom depth is around 150m.

The concentrations of *Calanus* sized particles on the Fair Isle Munken Line were low in 2006, but this year, the concentrations are comparative to previous concentrations observed in 2005 and earlier years. The layer of over-wintering organisms appears to be located around 800m and span the width of the channel in this area.

On the Noslo-Flugga line, higher concentrations are typically observed on one side of the deep (>600m) channel between the Faroes and Setland. During the past two years the higher concentrations were observed either on the western side (2006) or the eastern side (2005), but in 2007 there appear to be high concentration of overwintering *Calanus* copepodites across the entire channel in similar concentrations.

Seen in draft
Peter Carmichail
Fishing master

JONSIS Line
Preliminary OPC Results 1807S

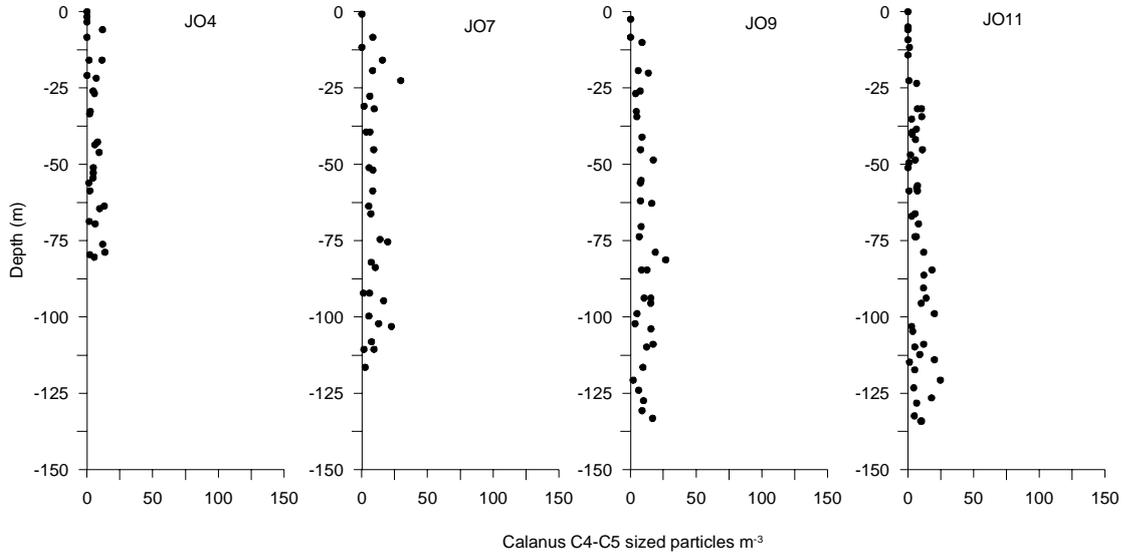


Figure 1: OPC Counts of Calanus C4-C5 sized particles with depth on the JONSIS line.

Fair Isle - Munken Line
Preliminary OPC Results 1807S

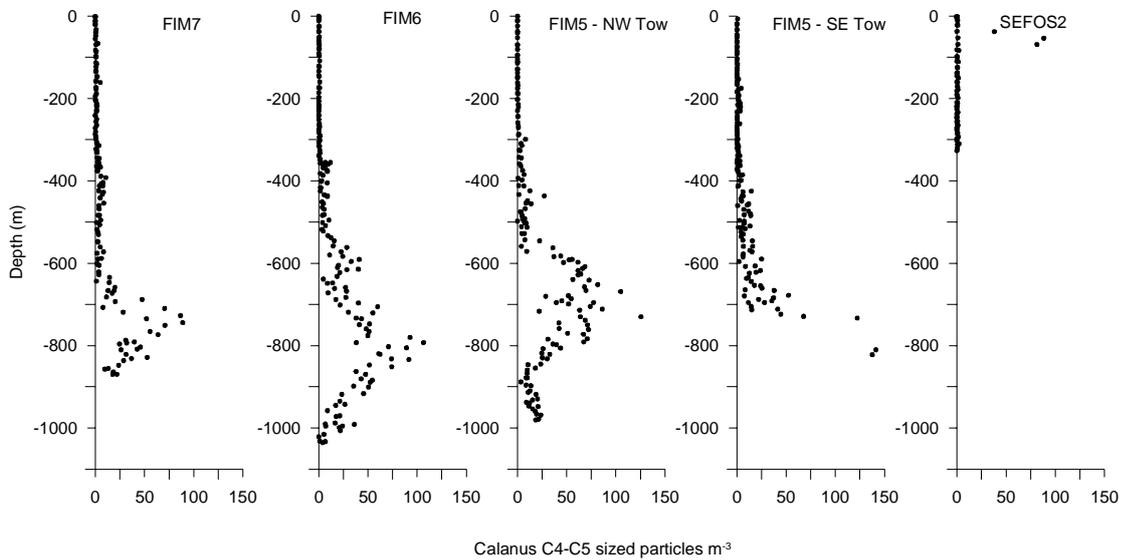


Figure 2: OPC Counts of Calanus C4-C5 sized particles with depth on the Fair Isle - Munken line.

Nolso - Flugga Line
Preliminary OPC Results 1807S

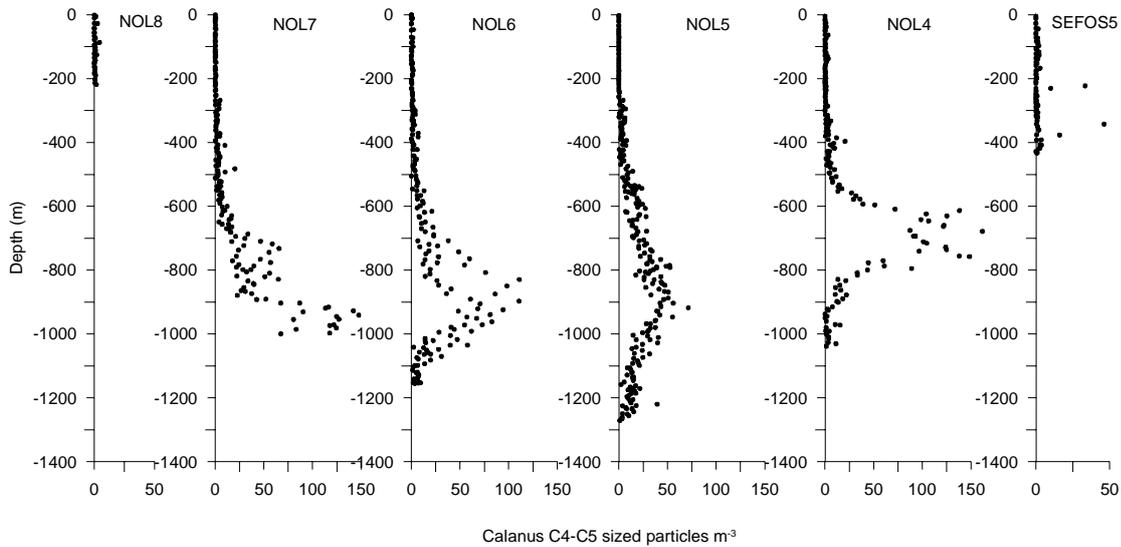


Figure 3: OPC Counts of Calanus C4-C5 sized particles with depth on the Nolso - Flugga line. Notice different abundance scale on a most eastern and western stations (NOL8 and SEFOS5).

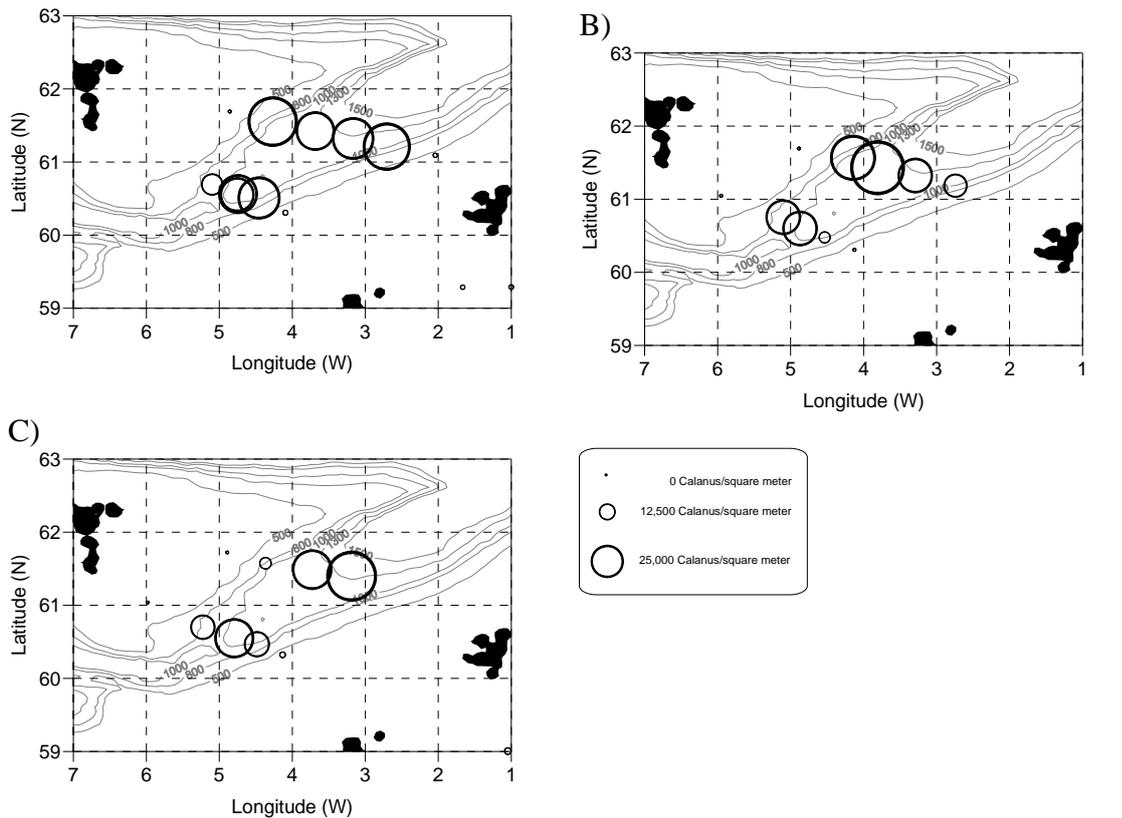


Figure 4: Integrated abundances of OPC counts of particles of the size of Calanus C4-C5: A) Results for current cruise, 2007 B) Results from Cruise 1906, 2006 C) Results from 1805S, 2005. Note that one 2007 ARIES deployment as been left out as results yielded very high OPC counts, but no Calanus copepodites were identified by a rapid visual analysis of nets.

Table 1

JONSIS line stations

Name	Latitude	Longitude	Depth	Spacing
JO 1	59°17.00'N	02°14.00'W	75 m	
JO 1A	59°17.00'N	02°5.00'W	90 m	8.5 km
JO 2	59°7.00'N	01°56.00'W	100 m	8.5 km
JO 3	59°17.00'N	01°48.00'W	80 m	7.6 km
JO 4	59°17.00'N	01°40.00'W	90 m	7.6 km
JO 5	59°17.00'N	01°30.00'W	95 m	9.5 km
JO 6	59°17.00'N	01°20.00'W	110 m	9.5 km
JO 6A	59°17.00'N	01°10.00'W	120 m	9.5 km
JO 7	59°17.00'N	01°0.00'W	125 m	9.5 km
JO 8	59°17.00'N	00°40.00'W	120 m	18.9 km
JO 9	59°17.00'N	00°20.00'W	140 m	18.9 km
JO10	59°17.00'N	00°0.00'W	135 m	18.9 km

Table 2

Fair Isle - Munken line stations

Name	Latitude	Longitude	Depth	Spacing	
FIM-01	60° 10.00' N	03° 44.00' W	150 m		CTD
SEFOS-1	60° 13.00' N	03° 51.50' W	170 m	8.9 km	CTD
FIM-02	60° 16.00' N	03° 59.00' W	200 m	8.9 km	CTD
SEFOS-2	60° 18.00' N	04° 04.50' W	330 m	6.3 km	CTD, ARIES
FIM-03	60° 20.25' N	04° 09.00' W	390 m	6.3 km	CTD
FIM-04	60° 25.00' N	04° 19.00' W	655 m	12.4 km	CTD
FIM-05	60° 29.00' N	04° 26.00' W	995 m	9.8 km	CTD,ARIES
FIM-06	60° 35.00' N	04° 45.00' W	1090 m	20.6 km	CTD, ARIES, MIKT Priority station for ARIES
FIM-6a	60° 38.00' N	04° 54.00' W	1030 m	9.9 km	CTD
FIM-07	60° 43.00' N	05° 06.00' W	915 m	14.3 km	CTD, ARIES
FIM-08	60° 47.00' N	05° 16.00' W	830 m	11.7 km	CTD
FIM-09	60° 51.00' N	05° 29.00' W	600 m	13.9 km	CTD
FIM-10	61° 02.00' N	05° 57.00' W	280 m	32.4 km	CTD, ARIES
FIM-11	61° 12.00' N	06° 22.00' W	240 m	29.1 km	CTD

Table 3

Nolso - Flugga line stations

Name	Latitude	Longitude	Depth	Spacing	
NOL-11	62° 00.00' N	06° 12.00' W	125 m		CTD
NOL-10	61° 54.00' N	05° 45.00' W	290 m	26.0 km	CTD
NOL-09	61° 49.00' N	05° 21.00' W	180 m	22.9 km	CTD
NOL-08	61° 42.00' N	04° 51.00' W	235 m	29.3 km	CTD, ARIES
NOL-07	61° 35.00' N	04° 15.00' W	990 m	34.2 km	CTD, ARIES
NOL-06	61° 28.00' N	03° 42.00' W	1235 m	31.9 km	CTD, MIKT, ARIES Priority station for ARIES
NOL-05	61° 21.00' N	03° 10.00' W	1370 m	31.2 km	CTD, ARIES Priority station for ARIES
NOL-04	61° 14.00' N	02° 40.00' W	1080 m	29.6 km	CTD, ARIES
NOL-3a	61° 11.00' N	02° 25.00' W	730 m	14.5 km	CTD
SEFOS-6	61° 09.30' N	02° 17.50' W	630 m	7.4 km	CTD
NOL-03	61° 08.00' N	02° 10.00' W	550 m	7.1 km	CTD
SEFOS-5	61° 06.00' N	02° 01.50' W	440 m	8.5 km	CTD, ARIES
NOL-02	61° 04.00' N	01° 53.00' W	270 m	8.5 km	CTD
SEFOS-4	61° 01.40' N	01° 35.40' W	155 m	16.7 km	CTD
SEFOS-3	60° 58.70' N	01° 17.70' W	125 m	16.7 km	CTD, ARIES
NOL-01	60° 56.00' N	01° 00.00' W	110 m	16.7 km	CTD

