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FRV *Scotia*

Survey 1611S

REPORT

11-23 December 2011

Loading: Aberdeen, 8/9 December 2011
Unloading: Aberdeen, 23 December 2011

In setting the Survey programme and specific objectives, etc the Scientist-in-Charge needs to be aware of the restrictions on working hours and the need to build in adequate rest days and rest breaks as set out in Marine Scotland's' Working Time Policy (Lab Notice 34/03). In addition, the Scientist-in-Charge must formally review the risk assessments for the survey with staff on-board before work is commenced.

In the interest of efficient data management it is now mandatory to return the Survey Report, to I Gibb and the Survey Summary Report (old ROSCOP form) to M Geldart, within four weeks of a survey ending. In the case of the survey Summary Report a nil return is required, if appropriate.

Personnel

J Dunn	(SIC)
G Slesser	
N Collie	
K Cook	
J Hunter	
S Robinson	
D Lee	
M Geldart	
J Rasmussen	
R Wilson	Strathclyde University

Project: ST03P – 13 days

Sampling gear: Mooring recovery and servicing equipment, Hydrographic CTD/Carousel; Plankton nets (ARIES).

Fishing gear: Recovery trawl.

Area: Northwestern North Sea - Faroe Shetland Channel.

Objectives

1. To recover and service and redeploy three Faroe-Shetland Channel ADCP moorings.

2. To conduct routine hydrographic sampling at stations along the standard JONSIS, Fair Isle-Munken line and possibly two stations on the old Nolso-Flugga survey line. A new survey line called the Cape Wrath-Munken line will be sampled.

3. To conduct plankton and hydrographic sampling with ARIES in the Faroe Shetland Channel.

Narrative

Staff joined *Scotia* at 0900 (times GMT through out) and the vessel sailed at 1000 approximately. Following completion of musters, drills, and Captain's briefing the vessel made for a deep hole in the outer Moray Firth where test deployments of the CTD and plankton crane/winch system were both successfully carried out.

Scotia made passage for the eastern most end of the JONSIS line were work started at 0015 and continued uninterrupted with station four being reached by 0845 on Monday 11December.

The JONSIS line was completed by 1125 and the vessel set away in freshening winds and swell to the end of the Fair Isle- Munken line. However it proved to be too windy and with a big swell for work to continue, therefore *Scotia* dodged along the line towards the first ADCP mooring position NWSD (60 26.99N 004 22.49W) as the forecast suggested that winds would be lighter in that area.

The mooring was recovered successfully in heavy seas. The vessel then made its way to the second ADCP mooring NWSE (60 16.50N 004 19.97W) but by now the sea state was too rough to communicate with the mooring or risk releasing it, so the vessel made it's way back to the first mooring position and successfully redeployed the now serviced ADCP.

Scotia then made it's way to the end of the Fair Isle-Munken line and successfully completed CTD's and ARIES stations towards the NWSD mooring position.

On arrival many attempts were made in good conditions to communicate with the mooring with no success. *Scotia* then moved to the third ADCP mooring NWSE (60 30.51N 4 34.00W) position, where it was recovered. The vessel then returned to the second mooring position and attempts were made using a creeper to dislodge the release mechanism on the mooring with no success.

Attempts were abandoned and *Scotia* returned to CTD and ARIES stations on the Fair Isle-Munken line.

On completion of the Fair Isle-Munken line the vessel proceeded to conduct hydrographic sampling on the Cape Wrath-Munken survey line. Towed deployments of the ARIES sampler were carried out at two of the deepest stations along the line. During sampling along this line a break was made to redeploy the third ADCP mooring NWZE (59 54.30N 06 10.02W) at 0925 on 17 December.

Scotia then turned north and proceeded to the north end of the Nolso-Flugga line where CTDs and ARIES deployments were carried out at stations along the line. This was completed by 1330 on Monday 17 December and the vessel made passage to the second mooring site to deployed a creeper and the recovery trawl in an attempt to try to recover or dislodge the ADCP .

Despite spending all day on this task and snagging something on the seabed twice, *Scotia* failed to recover the ADCP. The ship made it's way to ADCP mooring D (60 16.42N 4 19.98W) and carried out a 24 CTD profile, starting at 1715. On completion of this *Scotia* made passage to Aberdeen docking on Thursday 22 December at 0900.

Results

The first part of the survey was carried out in marginal weather and it is a testament to the professional approach of the officers and crew that steady progress was made despite the sea and wind conditions.

1. Two ADCP moorings were recovered, serviced and redeployed successfully.

2. Hydrographic sampling was carried out on all stations of the standard JONSIS, Fair Isle-Munken and Nolso-Flugga lines, and the new Cape Wrath-Munken line.

3. Plankton samples and OPC data were collected using ARIES in the Faroe Shetland Channel.

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

5. CTD data were e-mailed to BDOC through out the cruise for submission to the Met office for input to weather forecasting models.

6. As there was no chemist or nutrient lab on board all samples were stored, in either fridge or freezer.

7. The thermosalinograph was flushed out at end of cruise and water sampling lab cleaned.

Detailed results of the hydrographic data collected during the cruise will be made available as the data is worked up. Data from the optical plankton counter (OPC) obtained during ARIES deployments were investigated during the cruise.

Preliminary OPC data analysis

Abundances of equivalent spherical diameters corresponding to the copepodite stages 4 and 5 of *Calanus finmarchicus* were plotted against depth to obtain vertical profiles across the Fair Isle-Munken (FIM), Cape-Wrath-Munken (FWZ) and Nolso-Flugga (NOL) lines (Figure 1-3). 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 for the FIM and NOL lines (Figure 4). The annual integrated abundances from 2005 to 2011 (excluding 2010 as sampling did not take place) are plotted on the same scale to illustrate differences in spatial distributions. Concentrations of *Calanus* C4-5 size particles were generally high on all deeper stations and comparable to previous years. Concentrations of *Calanus* C4-5 size particles on the new FWZ line were the same as for the standard FIM and NOL lines (Figure 5).

Submitted:
J Dunn/K Cook
10 January 2012

Approved:
I Gibb
10 January 2012

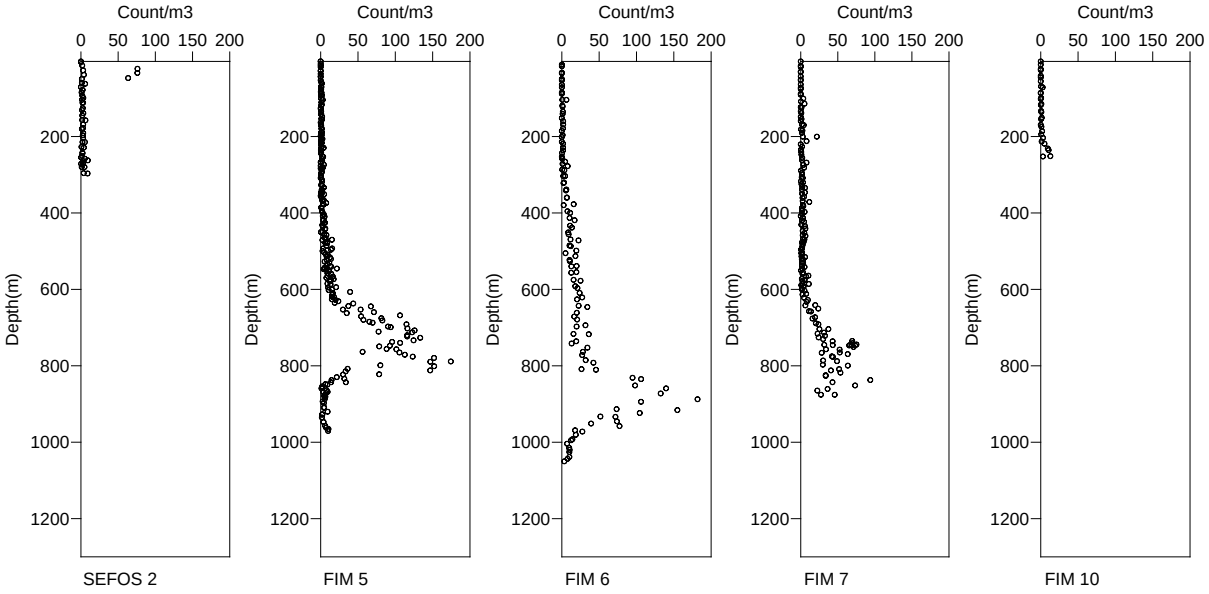

Figure 1: OPC data for the Fair Isle-Munken line

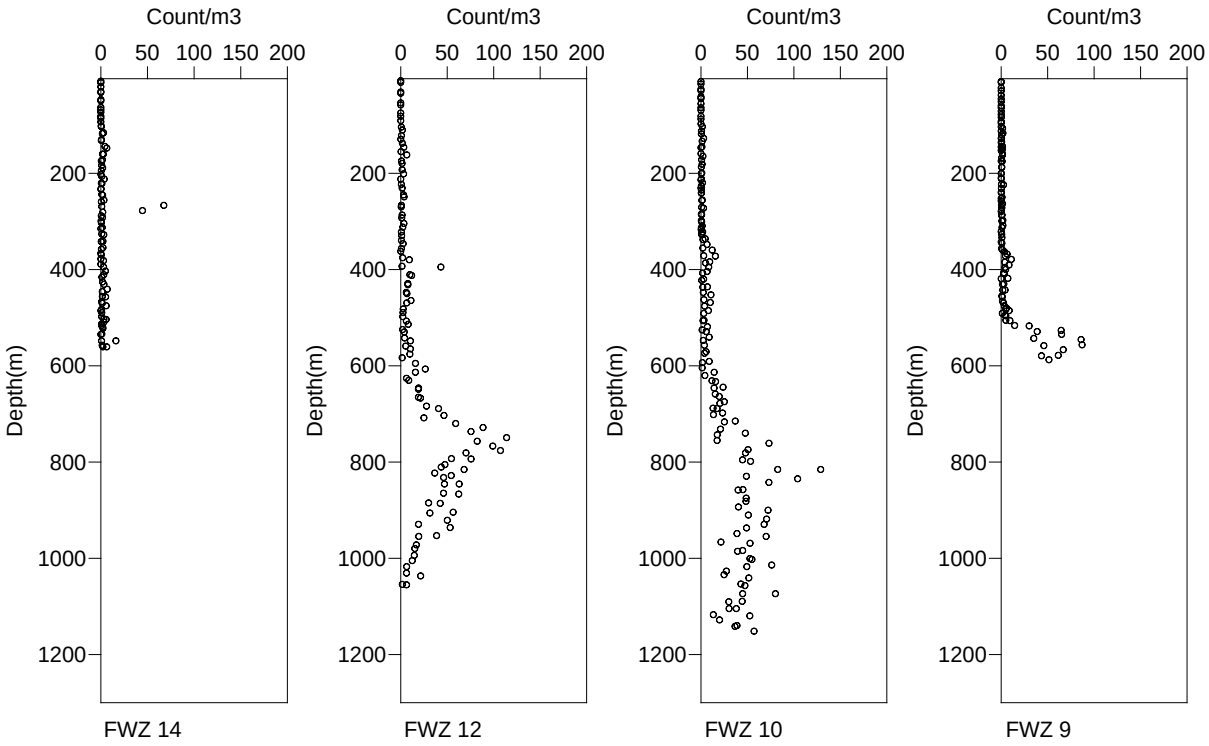

Figure 2: OPC data for the Cape Wrath-Munken line

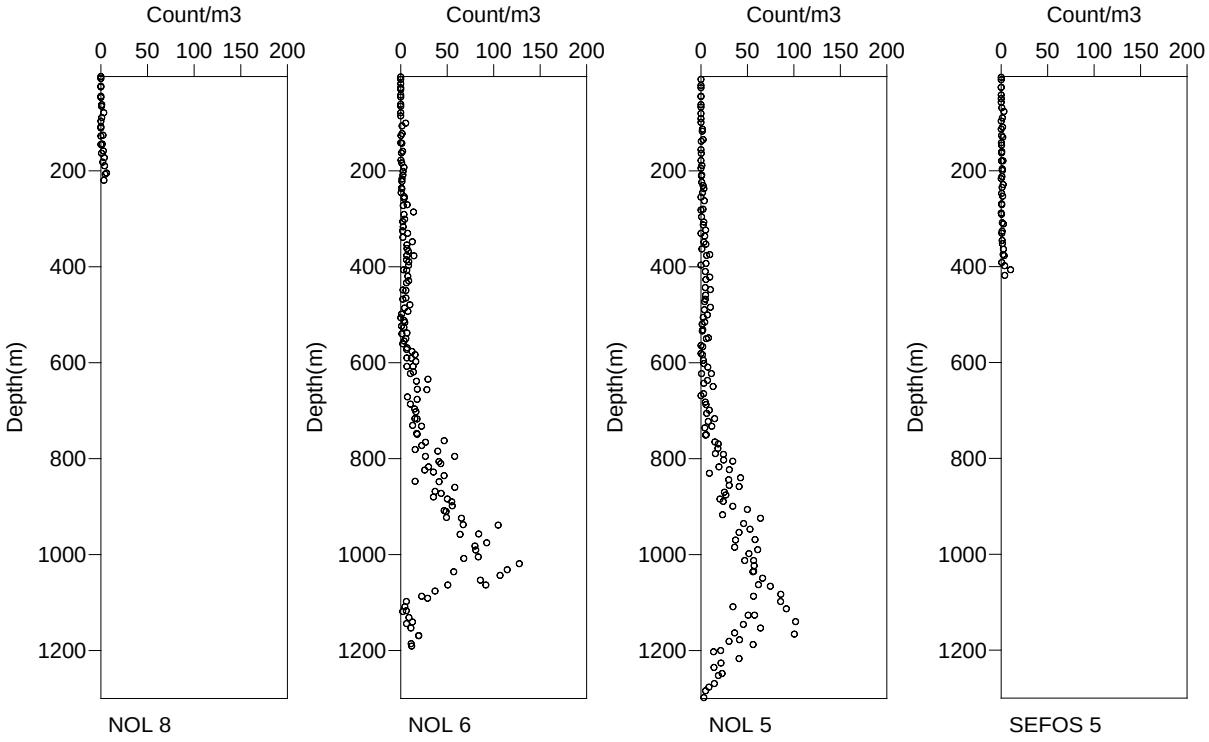

Figure 3: OPC data for the Nolso-Flugga line

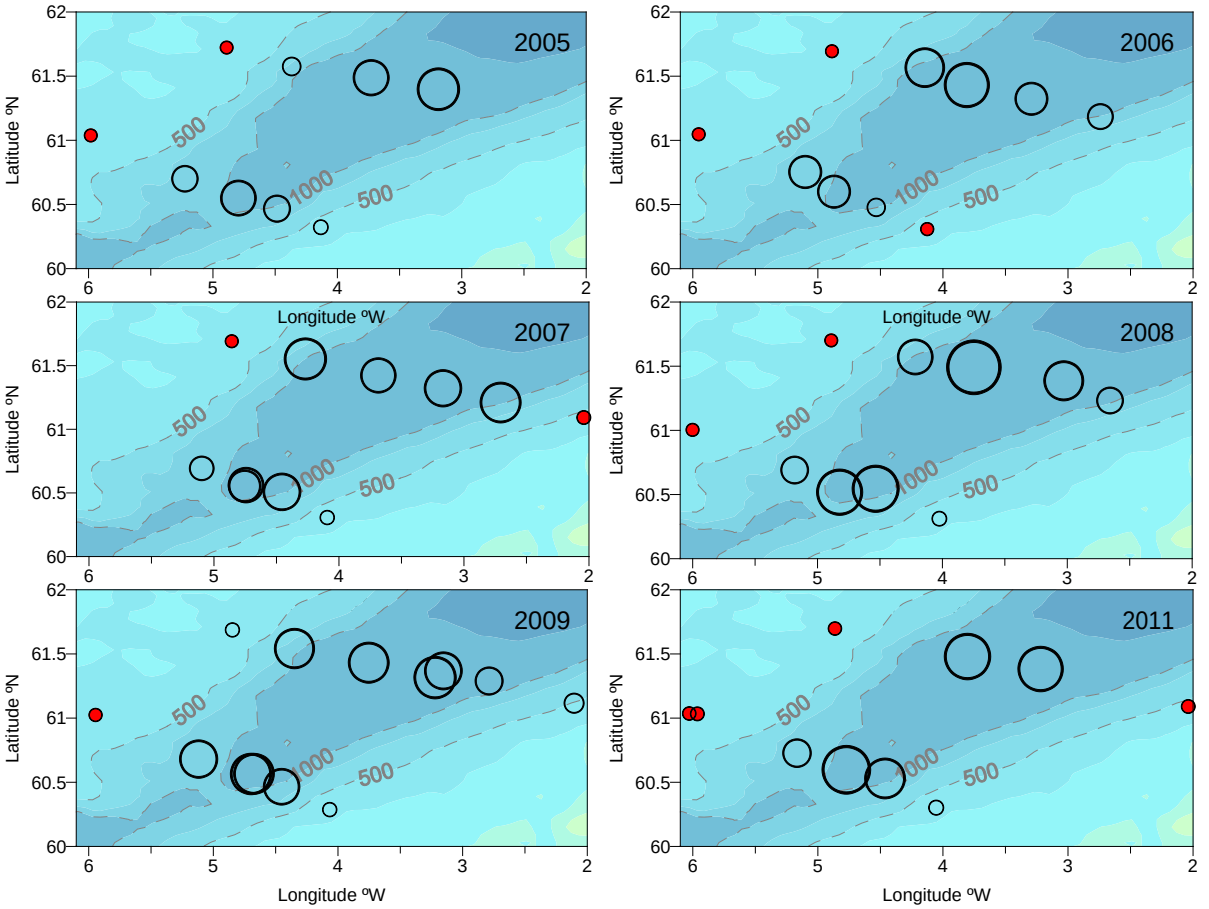

Figure 4: Integrated OPC counts for FIM and NOL Lines. Note for 2009, only OPC counts deeper than 600m has been integrated to provide an estimate of concentration.

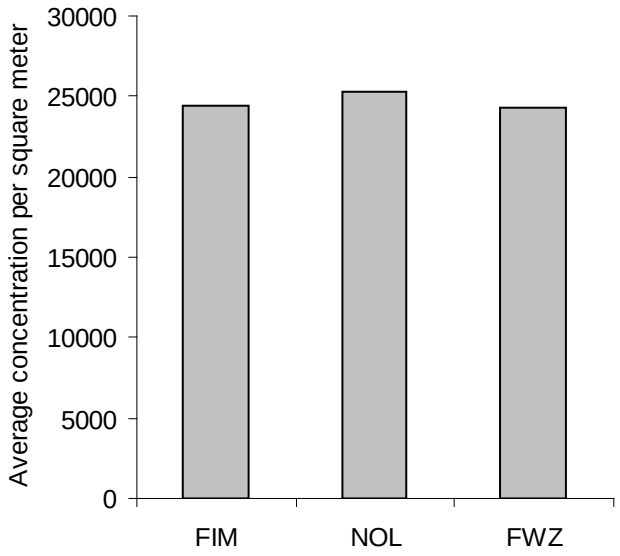

Figure 5: Average integrated OPC counts for deep stations (>1000m) on FIM, NOL and FWZ lines

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° 05.00'W	90 m	8.5 km
JO 2	59° 17.00'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° 00.00'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° 00.00'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 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

Faroe – Cape Wrath line stations

	Name	Latitude	Longitude	Depth	Spacing	
01	FWZ-19	59° 30.00' N	06° 10.00' W	152 m		CTD
02	FWZ-18	59° 34.82' N	06° 10.00' W	196 m	4.81 nm	CTD
03	FWZ-17	59° 39.64' N	06° 10.00' W	220 m	4.81 nm	CTD
04	FWZ-16	59° 44.45' N	06° 10.00' W	277 m	4.80 nm	CTD
05	FWZ-15	59° 49.27' N	06° 10.00' W	457 m	4.81nm	CTD
06	FWZ-14	59° 54.09' N	06° 10.00' W	600 m	4.81 nm	CTD, ARIES
07	FWZ-13	59° 58.91' N	06° 10.00' W	970 m	4.81 nm	CTD
08	FWZ-12	60° 03.73' N	06° 10.00' W	1082 m	4.81 nm	CTD, ARIES
09	FWZ-11	60° 08.54' N	06° 10.00' W	1195 m	4.80 nm	CTD
10	FWZ-10	60° 12.76' N	06° 10.00' W	1212 m	4.21 nm	CTD, ARIES
11	FWZ-09	60° 18.18' N	06° 10.00' W	616 m	5.41 nm	CTD, ARIES
12	FWZ-08	60° 23.00' N	06° 10.00' W	423 m	4.81 nm	CTD
13	FWZ-07	60° 30.63'N	06° 13.88'W	302 m	7.86 nm	CTD
14	FWZ-06	60° 38.26'N	06° 17.77'W	275 m	7.86 nm	CTD
15	FWZ-05	60° 45.89'N	06° 21.69'W	184 m	7.86 nm	CTD
16	FWZ-04	60° 53.52'N	06° 25.65'W	138 m	7.86 nm	CTD
17	FWZ-03	61° 01.14'N	06° 29.63'W	142 m	7.85 nm	CTD
18	FWZ-02	61° 08.76'N	06° 33.65'W	125 m	7.85 nm	CTD
19	FWZ-01	61° 16.38' N	06° 37.70' W	100 m	7.86 nm	CTD

Table 4

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
NOL-06	61° 28.00' N	03° 42.00' W	1235 m	31.9 km	CTD, 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
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
NOL-01	60° 56.00' N	01° 00.00' W	110 m	16.7 km	CTD

CTD/Water Sampler Station Positions