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MRV *Scotia*

Survey 0521S

PROGRAMME

1-13 May 2021

Loading: Aberdeen, 29 Apr 2021

Unloading: Aberdeen, 13 May 2021

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 (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

Out-turn days per project: 13 days: ST05B

Gear

Sea-Bird CTDs (SBE9, SBE25, RBR, SBE37's and SBE56's), mooring frames and 40" buoys, ADCPs and current meter instrumentation, water filtering equipment, plankton nets, mooring equipment, chemistry sampling equipment.

Objectives

1. Test the SBE911 and CTD carousel (main CTD crane) and take water samples in a position within or adjacent to the Goldeneye oil field.
2. Perform hydrographic sampling along the JONSIS long term monitoring section in the northern North Sea.
3. Recover and re-deploy one ADCP (NWSE, RDI Longranger) on a single string mooring at a position on Fair Isle – Munken (FIM) section.
4. Recover one ADCP (NWER, Sig100) on a single string mooring on the NOL section.
5. Perform hydrographic sampling along the long term monitoring Faroe-Shetland Channel Nolso – Flugga (NOL) section.
6. Perform hydrographic sampling along the long term monitoring Faroe-Shetland Channel Fair Isle – Munken (FIM) section.
7. Deploy ADCPs at mooring locations NWSG (RDI Longranger) and NWSD (Sig100) on the FIM section.
8. Recover an ADCP (Sig250) in an AL-500 frame north of Solan Bank.

9. Deploy one ADCP (Sig250) in a trawl resistant AL-500 frame in the Little Minch.
10. Recover one ADCP (Sig500) in steel frame in Loch Carron.
11. Deploy one ADCP (Sig250) in a trawl resistant AL-500 frame in Linne Crowlin.
12. Deploy one ADCP (Sig500) in steel frame in Loch Erisort.
13. Carry out a line off CTD stations in Loch Ewe between the mouth of the loch and the metocean buoy position.
14. Run the thermosalinograph throughout the survey.
15. Run the VMADCP on all the standard sections.
16. Take water samples for long term storage on Fair Isle – Munken or Nolso – Flugga section stations.
17. Ancillary sampling: 1) Take water samples for filtration for bacteria at selected stations in the FSC; 2) Take phytoplankton net samples at selected stations in the FSC; 3) Take zooplankton net samples for flame shell larvae in Loch Carron.
18. If weather/time permits conduct CTD sections on the west coast, from the coastline up to the edge of the continental shelf (“Shelf” sections).
19. If weather/time permits repeat the JONSIS line at the end of the cruise and extend to 001° 30’ east.
20. If weather/time permits perform fine scale VMADCP/CTD survey work on the JONSIS line (around 59° 17’ N, 001° 15’ W).
21. If weather/time permits, perform VMADCP/CTD survey work in the Moray Firth and/or Aberdeen Bay.
22. If weather/time permits, perform CTD deployments along the AlterECO line (offshore from Aberdeen)

Procedure

On sailing from Aberdeen *Scotia* will make passage to the Goldeneye oil field to test the CTD and carousel water sampler on the main CTD crane and to collect baseline water samples for any potential future Carbon Capture & Storage (CCS) monitoring. The target sampling position will be 58° 0.3’ N 0° 21.96’ W (which is inside the oil field) or, if not possible, as close as practicable near 58° 0.9’ N 0° 19.92’ W, which is just outside.

On completion of these tests and sampling, *Scotia* will sail to the JONSIS section to carry out sampling with the CTD and carousel water sampler. On one of the deeper CTD stations on JONSIS, the SBE37s that will be deployed later in the survey will be strapped to the carousel for a calibration dip (stopping at intervals on the way up). On completion of the JONSIS section *Scotia* will make way to the Faroe Shetland Channel.

Faroe Shetland Channel (all mooring deployment during daylight hours):

Passage will be made towards the NWSE mooring location near the Foinaven Development Area to recover the single string mooring currently deployed (doing a pre-recovery CTD dip)

and deploy a new pre-assembled mooring in the same location. Passage will then be made towards the eastern (Shetland) end of the Nolso – Flugga (NOL) section to start collecting long term monitoring samples and taking CTD profiles from the start of the section up to the NWER mooring location, where an ADCP mooring will be recovered (doing a pre-deployment CTD dip). The NOL section will then be completed. Depending on timings and other considerations (e.g. weather), the order may be changed to recover the mooring prior to starting hydrographic sampling. The SBE37s recovered from NWSE and NWER will be strapped to the carousel at a selected deep CTD station for a calibration dip.

After the NOL section, *Scotia* will head south to the western (Faroe) side of the Fair Isle – Munken (FIM) section to carry out standard CTD and water sampling along that line. At relevant locations, CTD sampling will be interrupted to deploy two ADCP moorings (NWSE and NWSD) before the line is completed.

West coast moorings (all deployments during daylight hours):

Passage will then be made to the Solan Bank mooring position and an ADCP mooring on an AL-500 trawl resistant frame will be recovered, downloaded and re-assembled. We then intend to deploy an AL-500 in the Little Minch and another AL500 in Linne Crowlin (east of Skye) and to recover an ADCP in a steel frame with popup buoys in Loch Carron. Note that we may decide to carry out the Little Minch work after the work east of Skye, or vice versa. On completion of that work, *Scotia* will sail to the mouth of Loch Erisort (on the east coast of Lewis) to deploy the instruments recovered from Loch Carron.

Depending on timings and other considerations (e.g. weather), CTD sampling along the Shelf lines off the west coast will be carried out.

Once that work is completed and if time allows, *Scotia* will carry out a short line of CTD stations in Loch Ewe (note that this work may be carried out immediately after the Solan Bank mooring recovery, instead, esp. if conditions are right and it looks like there will be time on the cruise to carry out this work).

On completion of the above and if time allows, additional work (listed among the cruise objectives) along the JONSIS line, in the Moray Firth and North Sea will be carried out prior to *Scotia*'s return to Aberdeen.

Mooring Positions (Recovery)

NWSE	60° 16.348' N 004° 23.038' W	Short single string mooring
NWER	61° 07.887' N 002° 05.114' W	Short single string mooring
SOLB	59° 10.606' N 004° 58.684' W	AL-500 trawl resistant frame
LC2010	57° 21.433' N 005° 40.408' W	Steel ADCP seabed frame

Mooring Positions (Deployment)

NWSE	60° 16.356' N 004° 23.054' W	Short single string mooring
NWSD	60° 27.060' N 004° 22.440' W	Short single string mooring
NWSG	60° 30.480' N 004° 34.020' W	Short single string mooring
CRO	57° 19.480' N 005° 52.120' W	AL-500 trawl resistant frame
MIN	57° 28.800' N 006° 57.600' W	AL-500 trawl resistant frame
LE	58° 06.610' N 006° 21.520' W	Steel ADCP seabed frame

Scientific Procedures

It is expected that deployments of hydrographic equipment will be carried out with the CTD crane whilst the vessel is on station. The plankton crane will be used for the deployment of ADCP moorings in trawl-resistant frames (AL-500s) and short single-string moorings from the hanger deck using an acoustic release to release the frames once they are on/close to the seabed. The steel ADCP frame will most likely be deployed off the aft using the gammer frame, or cod end crane, with the ADCP frame threaded on a bite of rope going back to the net drums. The deployment rope is then pulled through once the frame is on the seabed.

Plankton net samples will be taken using the plankton crane and wire.

Two container laboratories will be required (one for water filtering and a dry container for communications with sampling equipment). Chlorophyll samples will be stored frozen in the freezer in the Fish House. Nutrient samples will be stored frozen in an empty freezer on the lower container deck.

(NOTE: The position of the CTD sampling station in the Goldeneye oil field will be adjusted for any exclusion zones and oil infrastructure).

(NOTE: The survey will take *Scotia* into the Foinaven Development Area. This is now standard practice and normal on-site communications will be established with the Foinaven coordinating officer).

(NOTE: Hydrographic stations at NOL and FIM have been amended to avoid entering Faroese territorial waters).

Normal contacts will be maintained with the laboratory.

Submitted:
A Gallego
19 April 2021

Approved:
. Gibb
22 April 2021

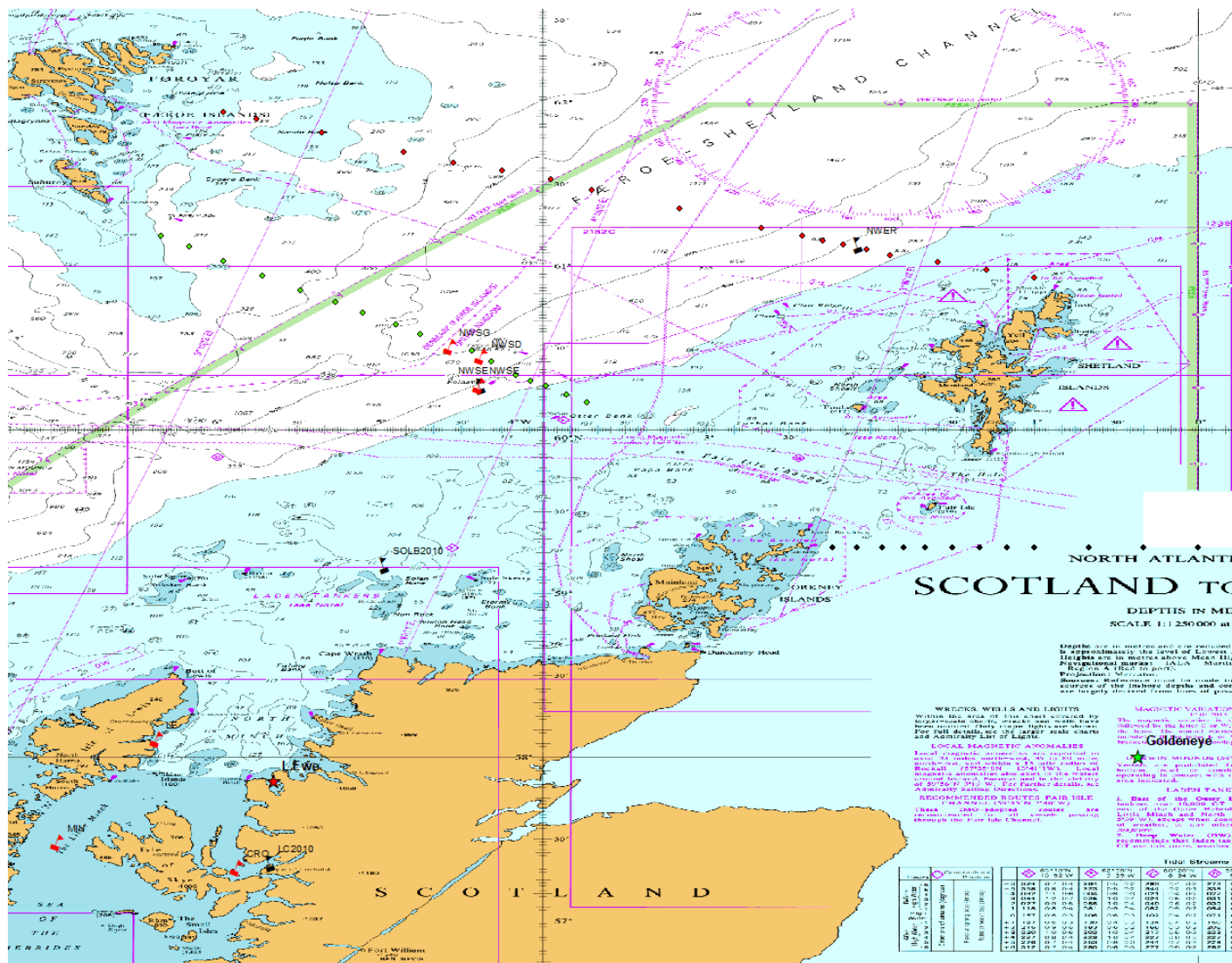


Chart showing key activities on 0521S

JONSIS Line

#	Name	Latitude	Longitude	Depth	Spacing
01	JO 1	59° 17.00' N	02° 14.00' W	75 m	
02	JO 1A	59° 17.00' N	02° 5.00' W	90 m	4.59 nm
03	JO 2	59° 17.00' N	01° 56.00' W	100 m	4.59 nm
04	JO 3	59° 17.00' N	01° 48.00' W	80 m	4.08 nm
05	JO 4	59° 17.00' N	01° 40.00' W	90 m	4.08 nm
06	JO 5	59° 17.00' N	01° 30.00' W	95 m	5.10 nm
07	JO 6	59° 17.00' N	01° 20.00' W	110 m	5.10 nm
08	JO 6A	59° 17.00' N	01° 10.00' W	120 m	5.10 nm
09	JO 7	59° 17.00' N	01° 0.00' W	125 m	5.10 nm
10	JO 8	59° 17.00' N	00° 40.00' W	120 m	10.20 nm
11	JO 9	59° 17.00' N	00° 20.00' W	140 m	10.20 nm
12	JO10	59° 17.00' N	00° 0.00' W	135 m	10.20 nm
Totals				1180 m	68.36 nm

Nolso-Flugga (NOL)

#	Name	Latitude	Longitude	Depth	Spacing
01	NOL-01	60° 56.00' N	01° 00.00' W	110 m	
02	SEFN1	60° 58.70' N	01° 17.70' W	125 m	9.00 nm
03	SEFN2	61° 01.40' N	01° 35.40' W	155 m	8.99 nm
04	NOL-02	61° 04.00' N	01° 53.00' W	270 m	8.91 nm
05	SEFN3	61° 06.00' N	02° 01.50' W	440 m	4.57 nm
06	NOL-03	61° 08.00' N	02° 10.00' W	550 m	4.57 nm
07	SEFN4	61° 09.30' N	02° 17.50' W	630 m	3.85 nm
08	NOL-3a	61° 11.00' N	02° 25.00' W	730 m	3.98 nm
09	NOL-04	61° 14.00' N	02° 40.00' W	1080 m	7.82 nm
10	NOL-05	61° 21.00' N	03° 10.00' W	1370 m	16.03 nm
11	NOL-06	61° 28.00' N	03° 42.00' W	1235 m	16.84 nm
12	FARN2	61° 32.00' N	03° 57.00' W	1200 m	8.18 nm
13	NOL-07	61° 35.00' N	04° 15.00' W	990 m	9.08 nm
14	FARN1	61° 38.00' N	04° 33.00' W	530 m	9.07 nm
15	NOL-08	61° 42.00' N	04° 51.00' W	235 m	9.44 nm
16	NOL-09	61° 49.00' N	05° 21.00' W	180 m	15.84 nm
17	NOL-10	61° 54.00' N	05° 45.00' W	290 m	12.37 nm
18	NOL-11A	61° 56.50' N	05° 57.00' W	159 m	7.0 nm
Totals				10245 m	162.60 nm

Fair Isle - Munken (FIM) (Amended for presence of Foinaven oil platform*).

#	Name	Latitude	Longitude	Depth	Spacing
01	FIM-01	60° 10.00' N	03° 44.00' W	150 m	
02	SEFF1	60° 13.00' N	03° 51.50' W	170 m	4.74 nm
03	FIM-02	60° 16.00' N	03° 59.00' W	200 m	4.84 nm
04	SEFF2	60° 18.00' N	04° 04.50' W	330 m	3.36 nm
* 05	<i>FIM-03</i>	<i>60° 20.00' N</i>	<i>04° 10.00' W</i>	<i>390 m</i>	<i>3.03 nm</i>
06	FIM-04	60° 25.00' N	04° 19.00' W	655 m	6.88 nm
07	FIM-05	60° 29.00' N	04° 26.00' W	995 m	5.45 nm
08	FIM-06	60° 35.00' N	04° 45.00' W	1090 m	11.15 nm
09	FIM-6a	60° 38.00' N	04° 54.00' W	1030 m	5.33 nm
10	FIM-07	60° 43.00' N	05° 06.00' W	915 m	7.70 nm
11	FIM-08	60° 47.00' N	05° 16.00' W	830 m	6.34 nm
12	FIM-09	60° 51.00' N	05° 29.00' W	600 m	7.36 nm
13	FARF3	60° 56.70' N	05° 42.80' W	333 m	8.90 nm
14	FIM-10	61° 02.00' N	05° 57.00' W	280 m	8.68 nm
15	FARF2	61° 07.20' N	06° 09.40' W	250 m	7.95 nm
16	FIM-11A	61° 11.30' N	06° 20.00' W	242 m	7.0 nm
Totals				8,558 m	108.18 nm