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MRV *Scotia*

Survey 1421S

PROGRAMME

8-20 October 2021

Loading: Aberdeen, 06 October 2021
Unloading: Aberdeen, 20 October 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: 11 days: ST05B; 2 days COMPASS

Gear

Sea-Bird CTDs (SBE9, SBE25, RBR, SBE37's and SBE56's), mooring frames (AL-200s), ADCPs and current meter instrumentation, water filtering equipment, plankton nets, mooring equipment, chemistry sampling equipment. Mooring components (anchor, chain, etc.).

Objectives

1. Test the SBE911 and CTD carousel (main CTD crane) and the SBE25 at Goldeneye location and collect water samples (*).

2. Perform hydrographic sampling along the JONSIS long term monitoring section in the northern North Sea.

3. Perform hydrographic sampling along the long term monitoring Faroe-Shetland Channel Fair Isle – Munken (FIM) section.

4. Perform hydrographic sampling along the long term monitoring Faroe-Shetland Channel Nolso – Flugga (NOL) section.

5. Turn around (refurbish) the Loch Ewe metocean buoy mooring and repair or swap over its SBE37 instrument.

6. Carry out the Loch Ewe CTD transect and collect water, phytoplankton and zooplankton samples.

7. Deploy ADCP (Sig250) in trawl resistant AL-200 frame in Linne Crowlin (east Skye, new frame prepared).

8. Recover ADCP (Sig250) in trawl resistant AL-500 frame in the Little Minch and deploy

ADCP (Sig250) in trawl resistant AL-200 frame in the same location (new frame prepared).

9. Recover ADCP (Sig500) in steel frame in Loch Erisort (east Lewis) and deploy ADCP (AWAC) in steel frame in the same location.

10. Run the thermosalinograph (TSG) throughout the survey. TSG will be cleaned prior to sailing.

11. Run the VMADCP on all the standard sections.

12. Take water samples for long term storage on Fair Isle – Munken or Nolso – Flugga section stations.

13. Carry out oil degrading bacteria work: water filtration on selected NOL/FIM stations.

14. Test Aberdeen University Holocam in deeper water (on plankton crane, 500-1000 m – depth pending confirmation from UoA).

15. If weather/time permits perform Shelf CTD lines.

16. If weather/time permits, perform CTD line along the AlterECO line and gather additional data near Stonehaven (*).

17. If weather/time permits repeat the JONSIS line at the end of the cruise and extend to 001° 30’ east.

18. If weather/time permits, perform VMADCP/CTD survey work in the Moray Firth and/or Aberdeen Bay.

(*) The AlterEco line may need to be sampled at the start of the survey, instead of at the end, depending on the analysis of some samples. In that case, the Goldeneye sampling will still be carried out but the testing of the CTD will happen along the AlterEco line. The order of the “Procedure” section below would change, in that case.

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.

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, two 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.

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.

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.

West coast CTDs and mooring work will be carried out next. All deployments and recoveries

will take place during daylight hours. The order of this work may change subject to weather and timings (daylight etc.). Passage will first be made to Loch Ewe where the metocean buoy mooring will be refurbished by retrieving it on board, replacing any components and re-deploying it (including fixing or replacing the SBE37 instrument on the buoy) and a line of CTD stations will be conducted towards the mouth of the loch, with additional plankton sampling. Upon completion, *Scotia* will steam to Linne Crawlin (east of Skye) to deploy an ADCP, and then on to the Little Minch deployment site to recover and ADCP instrument frame and deploy a new one. Scotia will then sail to the Loch Erisort (east Lewis) mooring location to recover and re-deploy an ADCP instrument frame.

Depending on timings and other considerations (e.g. weather), CTD sampling along the Shelf lines off the west coast will be carried out. A post-deployment calibration dip for the SBE37 instruments recovered will be carried out at a suitable location.

On completion of the above and if time allows, additional work (listed among the survey 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)

MIN	57° 28.804' N 006° 57.600' W	AL-500 trawl resistant frame (Sig250)
LE	58° 06.623' N 006° 21.531' W	Steel frame (Sig500)

Mooring Positions (Deployment)

CRO	57° 19.480' N 005° 52.120' W	AL-200 trawl resistant frame (Sig250)
MIN	57° 28.804' N 006° 57.600' W	AL-200 trawl resistant frame (Sig250)
LE	58° 06.623' N 006° 21.531' W	Steel frame (AWAC)

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-200s) 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 gamma 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. The Loch Ewe metocean buoy will be recovered and re-deployed using the cod end crane and the bottom net drum.

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

Two container laboratories will be used (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 and cleaned (fish-free) freezer on the lower container deck.

(NOTE: The position of the CTD sampling station in the Goldeneye oil field may 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 co-ordinating 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
04 October 2021

Approved:
I Gibb
05 October 2021

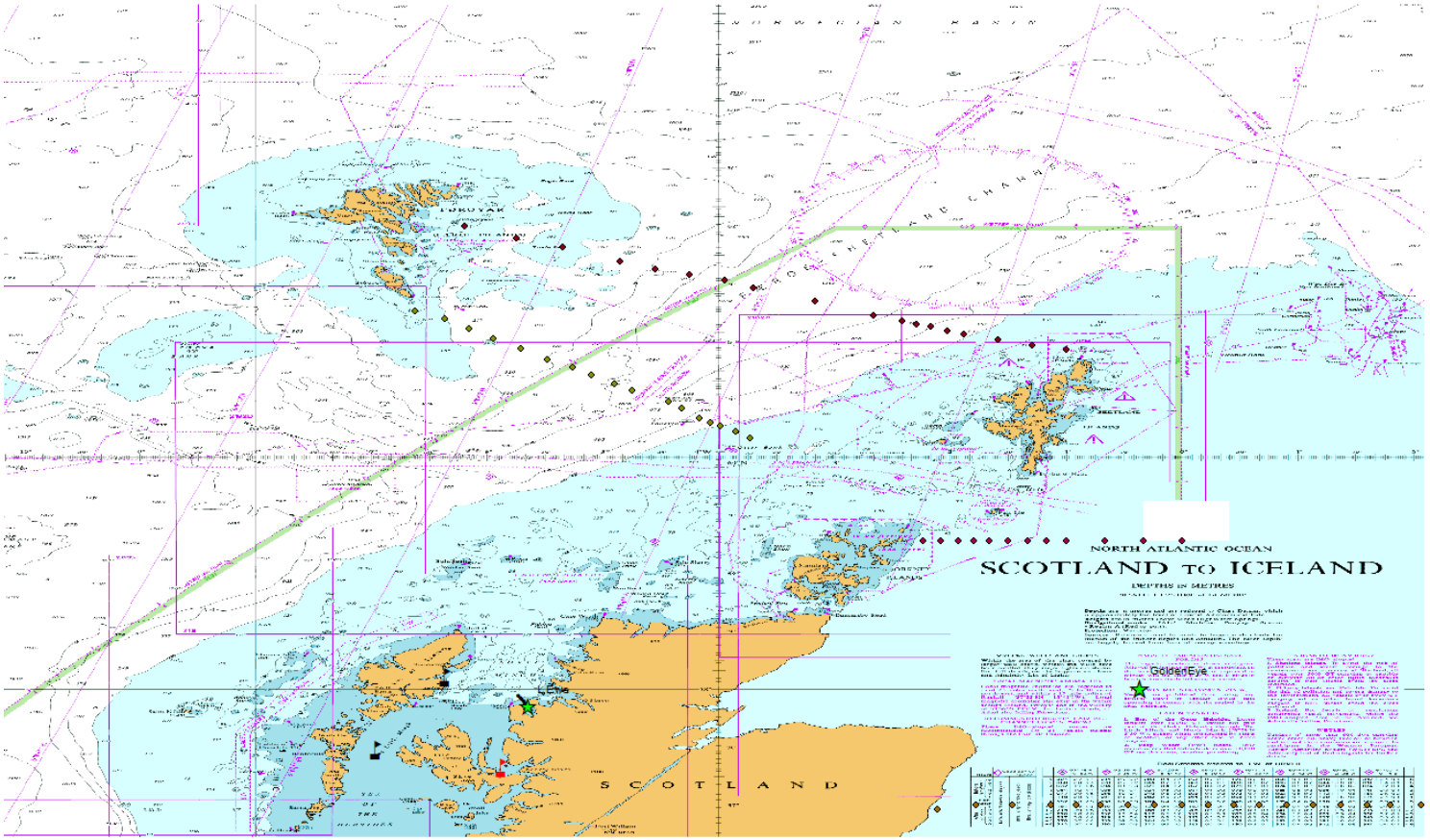

Chart showing key activities on 1421S

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*	*FIM-03*	*60° 20.00' N*	*04° 10.00' W*	*390 m*	*3.03 nm*
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

AlterEco line

#	Name	Latitude	Longitude	Depth [m]	Spacing
01	AlterEco1	57° 00.00' N	02° 04.00' E	92	
02	AlterEco2	57° 00.00' N	01° 48.00' E	94	8.72 nm
03	AlterEco3	57° 00.00' N	01° 36.00' E	99	6.54 nm
04	AlterEco4	57° 00.00' N	01° 22.00' E	104	7.63 nm
05	AlterEco5	57° 00.00' N	01° 08.00' E	85	7.63 nm
06	AlterEco6	57° 00.00' N	00° 54.00' E	102	7.61 nm
07	AlterEco7	57° 00.00' N	00° 40.00' E	92	7.61 nm
08	AlterEco8	57° 00.00' N	00° 27.00' E	89	7.09 nm
09	AlterEco9	57° 00.00' N	00° 14.00' E	84	7.09 nm
10	AlterEco10	57° 00.00' N	00° 00.00' E	83	7.61 nm
11	AlterEco11	57° 00.00' N	00° 14.00' W	79	7.61 nm
12	AlterEco12	57° 00.00' N	00° 28.00' W	82	7.63 nm
13	AlterEco13	57° 00.00' N	00° 42.00' W	68	7.63 nm
14	AlterEco14	57° 00.00' N	00° 55.00' W	75	7.07 nm
15	AlterEco15	57° 00.00' N	01° 08.00' W	67	7.07 nm
16	AlterEco16	57° 00.00' N	01° 28.00' W	68	10.91 nm
17	AlterEco17	57° 00.00' N	01° 47.00' W	98	10.56 nm
18	*AlterEco18*	*56° 57.80' N*	*02° 06.80' W*	*47*	*10.78 nm*
			Totals	1508 m	136.83 nm

Loch Ewe line

stn	lat		lon		
0	57	50.982	5	39.010	W
1	57	52.104	5	39.674	W
2	57	53.061	5	40.245	W
3	57	53.977	5	41.118	W
4	57	54.893	5	41.992	W
5	57	55.810	5	42.865	W
6	57	56.726	5	43.739	W
7	57	57.642	5	44.612	W
8	57	58.559	5	45.486	W