

M.V. EMERALD - September 1977

Scottish Leg 4

East Shetland, East Orkney and Forties
Areas.

by

N.G.T. Fannin

OBJECTIVES

Several objectives were planned during leg 4. These were as follows:

1. To complete the survey of the eastern side of the Shetland sheet including the area between $59^{\circ}50'N$ and $60^{\circ}N$.
2. To collect samples in areas of shell sand accumulation to the east of Orkney.
3. To complete the sediment sampling programme on the Forties and Peterhead sheets between $57^{\circ} - 58^{\circ}N$ and $2^{\circ}E$ to $2^{\circ}W$.

PERSONNEL

N.G.T. Fannin Party Chief
R. Holmes
C. Graham
R.S. Sutherland
P.J. Wiggins
W. Wight

EQUIPMENT

The following equipment was used during the cruise:

1. Shipek Grab.
2. Gravity corer with both rock barrels and NX sediment barrel.
3. One metre rock drill with sub sea system camera.
4. Six metre vibrocorer.

The shipek grab performed satisfactorily during leg 4. At the beginning of the trip the existing wire on the shipek winch was replaced by a new length of 305m of 6mm wire. The gravity corer also worked well and gave no problems. The use of the NX sediment barrel adaptors for bolt attachment to the rock barrel base plate proved convenient and easy to use.

The one metre rock drill performed well also and 3 cores were recovered, the longest being 0.41m in length. All of these sites were drilled through a sediment cover and no difficulties

were encountered with blockage of the barrel by pebbles. However, it should be noted that because of the carriage design the actual reach of the barrel into the seabed is 0.8m only. Redesign of the carriage should be considered to maximise the drilling reach.

Unfortunately at site +60-01/204 after full penetration of the barrel into the seabed (without reaching rockhead) the barrel stopped rotating and failed to retract. On recovery a dead short between two phases was discovered and it was concluded that a motor winding had burnt out. A spare motor was not available and the drill was non operational for the rest of the cruise.

At the beginning of the leg approximately 280m of electric cable was added to the vibrocorer cable drum to allow sampling in the survey areas. This cable length had previously been damaged and the insulation level reduced. This normally unacceptable expedient was an operational necessity and fortunately the cable functioned satisfactorily during the cruise. A careful watch should however be kept on the state of this cable.

The vibrocorer performed well throughout the leg and no difficulties were encountered. The method of core extraction could however be improved and attention should be paid over the winter to devising a simple and efficient technique.

RESULTS

During leg 4, 179 stations were occupied as follows:

Sheet No.	Stations	Shipek	Rock Corer	Sediment Corer	Vibro-Corer	1m Drill
+60/-01	97	94	47	21	12	3
+60/-02	8	8	7	-	-	-
+59/-01	19	19	9	11	-	-
+59/-02	13	13	11	-	-	-
+58/-03	9	9	2	4	3	-
+57/-01	7	7	-	4	2	-
+57/+00	9	9	-	9	-	-
+57/+01	17	17	-	16	-	-

Shetland Sheet: Preliminary sampling is now about complete on the eastern side of the Shetland sheet. A few rock drill sites remain but the basic pattern has been established. The southern part of the area is floored by an extensive platform of what are probably Devonian sandstones and mudstones (flagstones). The northern edge of this area is partly faulted against Dalradian and Moinian basement, though in some areas the Devonian rocks may rest unconformably on the basement. Superimposed on this is the Pobie or Unst Basin, faulted on its western margin and filled with Triassic and younger sediments. The Quaternary sediments consist of small pockets of brown or grey "till" and reddish sandy and pebbly clay filling small hollows in the rock platform. The Recent sand cover in the area passes offshore from white or yellowish shell sand into fine olive grey shelly terrigenous sands.

Orkney area: Severe currents made it impossible to anchor at a site of primary interest east of the Pentland Skerries and instead a large seabed mound was sampled to the east of Copinsay. Coarse shell sands at least 1.80m thick were cored at this site and it is likely that the whole mound is a bank of shell sand. About 5 kilometres to the south-east a flat seabed site over a rockhead hollow was cored and 3.02m of fine-medium shell sand was recovered. Bulk grab samples were taken at both these sites and a series of gravity core and grab samples were taken along a south-easterly course off the east Orkney platform.

Forties area: Work in this area was considerably hampered by poor weather. Only two vibrocore sites were occupied respectively recovering olive grey fine sand and dark grey soft clay typical of sediments previously encountered. A series of gravity core and grab samples were collected to the west and south of the Forties field. These confirmed an already established pattern of a thin (<50cm) cover of fine-very fine sands resting on soft clays.

APPENDIX I

Ship's Log

Leg 3 - Friday 2nd September - Friday 16th September

Personnel: J. Chesher (Senior Scientist)
M. Dean
H. Robertson
P. Wiggins
N. Ruckley
C. Graham

Saturday 3rd September

0000-1200 In port, Peterhead, routine port visit.
1200-2400 Steaming to E. Shetland area.

Sunday, 4th

0000-0800 Steaming to E. Shetland area.
0800-1500 Routine sampling GC and SG. Weather too bad for vibrocoring (SW7-9).
N.B. Lost cone dredge 1200 hrs due to wire parting as dredge streamed with current. Rotten wire.
1500-1725 Steaming for shelter in Dales Voe due to bad weather.
1725-2400 At anchor in Dales Voe waiting on weather. Checks on ORE etc.

Monday, 5th

0000-2400 At anchor Dales Voe waiting for weather, SW7-9 loc 10.

Tuesday, 6th

0000-0800 At anchor due to bad weather.
0800-1200 Commenced routine sampling in embayment between Whalsay and Fetlar.
1200-1930 Vibrocoring in vicinity of 60°30'N, 00°30'W.
1930-2400 Bombing, shipek grab and cone dredge, during night. Weather worsening gradually.

Wednesday, 7th

0000-0745 Routine night sampling.
0745-0830 Commenced laying anchors for vibrocoring.
0830-2000 Vibrocoring and shipek grab in E. Shetland area north of 60°30'N. Slight delay 0930-1000 with forward anchor shackle.
2000-2400 Routine sampling in northern part of Sheet 60°30'N, 01°W.

Thursday, 8th

0000-0730 Routine sampling in northern part of Sheet 60°30'N, 01°W.
N.B. N.A. Ruckley bruised and cut fingers starting

Sykes winch at 0130hrs.
Lost NX barrel and adaptor due to pin insecurely positioned at 0000hrs.
Vibrocoring in north of Sheet 60°30'N, 01°W.
Routine sampling (abandoned vibrocoring due to weather).
Routine sampling Sheet 60°N 01°W.

0730-0930
0930-2000
2000-2400

Friday, 9th

0000-1400 Routine sampling Sheet 60°N 01°W continued bombing and shipek during day due to weather- NW7
1400-1405 H. Robertson caught Sykes winch handle on thumb, badly bruised, skin broken. Electric start on winch essential.
1405-2000 Routine sampling eastern half of Sheet 60°N 01°W.
2000-2130 Lost gravity corer. Links twisted and caught in shute as bomb lifted aboard slightly too far.
Wire parted. Effected replacement of gravity corer.
2130-2400 Routine sampling.

Saturday, 10th

0000-0700 Routine sampling eastern part of Sheet 60°N 01°W.
0700-1700 Vibrocoring in 60°N 01°W.
N.B. Vibrocore gate failed to open on second station.
1700-2030 Attempted to use drill at site 107:- problems with television due to lack of picture in water and also initial settinf up due to faulty fuse. Raised to surface, fault due to half flooded camera through rear.

2030-2400 Routine sampling in 60°N 01°W.

Sunday, 11th

0000-0800 Routine sampling in 60°N 01°W.
0800-1000 Laying anchors at drill site - reoccupation of 107.
Installation of Sub Sea System television system.
N.B. Wiggins hit on nose by Marlin Spike operated by Senior Scientist while extracting core from rock barrel.
1000-1120 Effecting repairs on midi drill - pressure bag compensator bag punctured.
1120-1200 Lowered drill to seabed. Drill rotated but did not lower in carriage.
1200-1300 Checked out drill on deck - alright.
1300-1430 Lowering drill to seabed. Drilling 30m and recovery.
1420-1500 Poor core, inconclusive result, re-drilling at above site.
1500-1530 Drill carriage did not lower to seabed. Lifted aboard.
1530-1630 Relowering drill to seabed. Difficulty in starting rotation off rat.
1630-1730 Electric cable with plastic hose and television cable caught under rudder due to current. Sixty feet of cable trapped. Strong current not evident at site.
1730-2030 Heaving anchors and steaming to Lerwick to obtain diver services to release cables from ship.
2030-2400 In port Lerwick.

ABBREVIATED CRUISE LOG

(Times in B.S.T.)

Thursday 15th September

1200-2400 Portcall: IGS personnel join Emerald. P.J. Wiggins and C. Graham remain on board from Leg 3.

Friday, 16th

0000-1740 Portcall.
1740 Cast off for Lerwick.
18.45-2400 Begin gravity coring and grab sampling south of Bressay.

Saturday, 17th

0000-0620 Gravity coring and grab sampling.
0620-1920 Rock drilling with one metre rock drill.
1920-2400 Gravity coring and grab sampling.

Sunday, 18th

0000-0710 Gravity coring and grab sampling.
0710-1500 Rock drilling with 1m rock drill. Motor failure - drill non operational.
1530-1920 Vibrocore sampling.
1920-2400 Gravity coring and grab sampling.

Monday, 19th

0000-0740 Gravity coring and grab sampling.
0740-2015 Vibrocore sampling.
2015-2400 Gravity coring and grab sampling.

Tuesday, 20th

0000-0500 Gravity coring and grab sampling.
0500-1910 Vibrocore sampling.
1910-2400 Gravity coring and grab sampling.

Wednesday, 21st

0000-0700 Gravity coring and grab sampling.
0700-1950 Vibrocore sampling.
1950-2400 Gravity coring and grab sampling.

Thursday, 22nd

0000-0650 Gravity coring and grab sampling.
0650-1230 Vibrocore sampling.
1230 Abandon vibrocore operations due to heavy swell.
1230-2400 Gravity coring and grab sampling.

Friday, 23rd

0000-0020 Gravity coring and grab sampling.
0020-0845 Steam to Orkney area.
0845-1355 Vibrocore sampling.
1355-1500 Echosounder site survey.
1500-1930 Vibrocore sampling.
1930-2205 Gravity coring and grab sampling.
2205-2400 Steam to Forties area.

Saturday, 24th

0000-0740 Steaming to Forties area.
0740-1430 Vibrocore sampling.
1430 Abandon vibrocore sampling in SE gale.
1430-2400 Gravity coring and grab sampling.

Sunday, 25th

0000-1015 Gravity coring and grab sampling.
1015 Abandon work in SE gale and heavy swell.
1015-2400 Waiting on weather.

Monday, 26th

0000-0810 Waiting on weather.
0810-1835 Gravity coring and grab sampling.
1835-2400 Steaming to Aberdeen.

Tuesday, 27th

0000-0800 Steaming to Aberdeen.
0800-2400 Portcall in Aberdeen.

ACKNOWLEDGEMENTS

Warm thanks are due to the Officers and crew of M.V. Emerald who offered the utmost help and co-operation throughout the cruise.