

G/116/68

University College London Geology Department

Moray Firth IV Cruise 30 October 1968 - 24 November 1968

Purpose of cruise: To investigate the geological structure and geological history of the eastern English Channel by geophysical and geological methods.

Equipment: Depth recorder, Seismic profiler (E.G.G. sparker N.E.R.C.), Side-scan sonars (Bath University and E.G.G. type from N.E.R.C.), Magnetometer (N.E.R.C.), Corer (Hull University), Shipek Sampler (N.E.R.C.)

This cruise was divided into three parts:-

Part 1: 30 October to 3 November 1968

From Hull to Plymouth.

Chief Scientist: Dr. A. J. Smith (U.C.L.)

Scientist: R. Dingwall (U.C.L.)

Technicians: K. Stephens (U.C.L.)

S. Jones (NERC)

Part 2: 6 November to 14 November 1968

From Plymouth to Southampton.

Chief Scientist: Dr. A.J. Smith (U.C.L.)

Scientists: R. Dingwall (U.C.L.)

J. Redding (U.C.L.)

Technicians: K. Stephens (U.C.L.)

S. Jones (NERC)

J. Joseph (Bath University)

P. Parsons (Bath University)

Observer: M. Knights (NERC)

Part 3: 18 November to 24 November 1968

From Southampton to Plymouth

Chief Scientist: Professor D. T. Donovan (U.C.L.)

Scientists: R. Dingwall (U.C.L.)

J. Redding (U.C.L.)

Technicians: K. Stephens (U.C.L.)

S. Jones (NERC)

Narrative

30/10/1968.

Sailed from Hull at 13.30, checked all equipment before and during cruise south to Thames Estuary. Kelvin Hughes MS 36 Echo Sounder which was repaired by Kelvin Hughes Engineers at Hull was found to be useless. No geophysical equipment fitted for first part of cruise.

31/10/1968.

Off Thames Estuary. Commenced programme of sampling at 08.00 using Shipek Grab. First station at  $52^{\circ}5'N$   $1^{\circ}45'E$ . Subsequent stations at five mile intervals southwards on  $1^{\circ}45'E$  to  $51^{\circ}20'N$ . Last sample collected at 18.15, just after dark. Ten samples collected (U.C.21 - U.C.30). Samples to be split - half of each sample to be given to Dr. B. D'Olier of Sir John Cass College, London. All samples were of unconsolidated material, many of them fine grained and with high organic content. Formalin was added to the samples. Wind freshening from southwest, anchored off Broadstairs for most of the night.

1/11/1968.

Sailed in the early hours for the Dover Strait. From 09.30 to 15.30 used Shipek Grab to take samples of superficial sediments along line of proposed Channel Tunnel. Seventeen samples (U.C.31 to U.C.47) collected at approximately half mile intervals between  $51^{\circ}00'N$   $1^{\circ}32'E$  (approx) and  $51^{\circ}02'N$   $1^{\circ}17'E$ . Samples composed mainly of coarse sand and broken shell fragments. From 16.15 to 18.00 attempted to collect samples at three stations (U.C.48 to U.C.50) between Folkestone and Dungeness using the free fall corer. Lower Cretaceous rock was recovered at one of these stations.

2/11/1968.

The general area of work was to south of Isle of Wight. Free fall corer used throughout day in order to obtain samples of rock. In most cases samples of rock and superficial sediment were collected, in a few cases only superficial sediment was recovered. Rock samples ranged from Chalk to Upper Jurassic; superficial sediments were predominantly of flint pebbles. Programme commenced at 08.00 at  $50^{\circ}30'N$   $0^{\circ}50'W$  and continued at intervals of about 5 miles until 18.30 at  $50^{\circ}20'N$   $2^{\circ}20'W$ . Twelve samples (U.C.51 to U.C.62) collected.

Left area at 18.30 and sailed for Plymouth.

3/11/1968.

Arrived Plymouth Sound in early morning, anchored for part of day and tied up in Inner Basin dock at 16.00 hours.

4/11/1968 and 5/11/1968.

Geophysical equipment fitted by N.E.R.C. technicians, modifications made to some of sampling gear, large generator installed and the Bath University Side-scan sonar

ught aboard.

6/11/1968.

Left Inner Basin, Millbay dock at 06.45 and anchored in Plymouth Sound at 07.15. Weather bad, spent day preparing for next part of cruise.

7/11/1968.

Left anchorage at 07.00 and passed breakwater at 07.40. Weather poor, wind force 5 to 6 from S.E. Streamed sparker and side-scan sonar at 08.00 and obtained records of high standard on north-south and northeast - southwest lines in Lyme Bay.

Weather worsened in evening and about 23.30 hours the small generator between 1 and 2 hatches, which had been used for extra power, was flooded. All gear hauled in at 23.40 and decided to seek shelter to west of Bolt Head.

8/11/1968.

Anchored in Bigbury Bay until 11.00. Weather improved during morning and we resumed the programme with sparker (at 1000 joules), magnetometer and side-scan sonar (E.G.G.) in Lyme Bay. Weather still rather poor but good records obtained throughout the day.

9/11/1968.

Continued sparker work eastwards until 09.00 hours when all the gear was hauled in board. Commenced coring programme in southeast part of Lyme Bay at 10.00. First coring station at  $50^{\circ}10'N$   $2^{\circ}55'W$  (station number U.C.63) continued coring at 5 mile intervals along  $2^{\circ}55'W$  to  $50^{\circ}40'N$  (station number U.C. 69). A further three stations were manned to west of this line late in the day (U.C.70 to U.C.72).

The coring programme was only partially successful due to thickness of superficial sediments (mainly fine sand).

The Bath Side-scan sonar was used throughout the day but the result varied considerably in quality though in some places rock outcrops were discernible. At dusk this Side-scan sonar was hauled in and the coring programme terminated.

Sparke and Side-scan sonar (E.G.G.) work resumed and a series of lines between the middle line of the Channel and the South Coast of the Isle of Wight were traversed.

10/11/1968.

Sparke and Side-scan sonar (E.G.G.) work continued through the night. Coring resumes at 09.00. A series of coring stations (U.C.73 - 84) were manned in the southeast part of Lyme Bay. The stations were at two mile intervals along  $1^{\circ}25'W$   $1^{\circ}30'W$  and  $1^{\circ}35'W$  between the latitudes  $50^{\circ}30'N$  and  $50^{\circ}38'N$ . At nine stations core samples were recovered, samples were of Jurassic clays and marls. The operating depth varied between 12 and 20 fathoms.

Seismic (sparke) and magnetometer work was resumed at dusk along north-south lines south of the Isle of Wight.

11/11/1968.

Seismic and magnetometer work continued until 08.30 when coring was resumed, this time to the south of the Isle of Wight. Chalky rock and Mesozoic clays were recovered during the day, though many tubes were badly damaged. Nine stations were manned (U.C.85 to U.C.93) and samples were recovered at eight of these stations. The Bath University Side-scan sonar was used throughout the day and some good records were obtained. Seismic and magnetometer work resumed after dusk. Good records obtained on lines between south coast and centre of Channel.

12/11/1968.

During the night weather worsened and no coring could be carried out during the day. Seismic and magnetometer runs continued during the day but as weather continued to deteriorate it was decided to haul in all the gear and make for shelter off Yarmouth (Isle of Wight.) Scientific work terminated at 16.40 and the ship anchored at 19.30.

13/11/1968.

The whole day was passed at anchor off Yarmouth. It was decided to make Southampton the 'change-over' port rather than Dover. Ship owners, Bath University and University College London informed by radio-telephone.

14/11/1968.

Weighed anchor at 07.30 hours and proceeded up the Solent and down to Spithead. Winds strong from the east and the weather forecasts were bad. Decided, when off Bembridge Ledges, that conditions were unsuitable for any work and returned to the Solent. Anchored in Southampton Water at 13.30, weighed anchor at 15.30 and alongside at Southampton at 16.15.

15/11/1968 - 17/11/1968.

Bath University equipment taken off ship and Bath University technicians, J. Joseph and P. Parsons, and Dr. Smith and M. Knights left ship. Kelvin Hughes called in to repair echo-sounder. Preparations made to resume cruise.

18/11/1968.

Left Southampton at 12.30. At 15.55 started sparker run from off Isle of Wight to the East en route for Strait of Dover. The MS 36 Echo Sounder, supposed to have been repaired by Kelvin Hughes at Southampton was found to be still useless.

19/11/1968.

After breakfast started Shipek sampling in area between The Ridge and Dungeness. 11 stations (U.C.L. 96 - 106) worked successfully. The original plan for sparker lines from NW to SE was abandoned because of traffic. Lines then laid out SW - NE. But on starting the first line in c 12 fm the sparker record was found



unsatisfactory, because pattern of stripes on left-hand side of recording paper obscured first echo and sometimes first multiple of bottom. The origin of the stripes was not definitely established. Possibly the one which obscured bottom was due to reflection of direct pulse from ship's stern, but more likely to be due to some characteristic of the hydrophone. We were unable to remove the offending stripe either by changing spacing of spark array and hydrophone, or by cutting out some of the hydrophone units. It was removed by putting hydrophone pre-amplifiers on 12v battery supply and isolating them from ship's earth, but this also reduced signal strength so much that only the bottom and no strata were recorded. We therefore decided to work in deeper water where the first return from the bottom would lie to the right of the offending stripes, and laid out overnight courses in SW-NE direction between The Ridge and the French coast.

20/11/1968.

Sparker continued all night. During daylight hours resumed Shipek sampling and worked 18 stations (UCL 107 to 124) in good conditions - slight sea and wind, high cloud, sunny.

This sampling was to NW of The Ridge and samples ranged from medium sand to pebbles with living sessile organisms, also living gastropods, echinoids.

During the night resumed sparker and magnetometer traverses on NE - SW lines between The Ridge and the French coast. Abandoned this due to fog at 02.30 21/11/1968

21/11/1968.

All day coring in Dover Strait. 16 stations worked from UCL125 to 140. Samples of Gravel, chalk and greensand recovered. Several coring tubes damaged. Weather good all day - sunny, little wind or sea.

In the evening started sparker and magnetometer runs to SW, parallel to French coast, and back towards Dover Strait. Continued all night without incident. Sparker hydrophone output recorded on magnetic tape.

22/11/1968.

Continuation of sparker/magnetometer run in morning. Wind stronger (4 - 6 forecast), sea choppy, poor visibility. It was too rough for sampling so sparker and magnetometer were continued all day.

In the evening started a sparker and magnetometer run westwards, having done all we could in the Dover Strait under the circumstances. Wind about the same all day, probably force 4 - 5.

23/11/1968.

Wind continued around force 4 and it was reckoned too rough for coring so a projected line in mid-channel was abandoned. Sparker and magnetometer were run all day, but, in the afternoon the weather worsened and records deteriorated. All gear was brought inboard at 18.00 hours.

The rest of the survey lines which had been laid out on the way home were abandoned

and we headed back to Plymouth against a westerly wind which was probably force 7.

24/11/1968

Tied up in inner basin, Millbay Dock, Plymouth at 0800.

#### General Comments

Considering the lateness in the year the cruise must be described as successful. We were extremely fortunate with the general weather conditions which prevailed but the success of the cruise was due in no small measure to the ship Moray Firth IV and its master, Captain Eastlane, and crew. The ship proved to be well suited to our needs and illustrated how a well built coaster of about 800 tons with relatively minor modifications can make a good research ship for continental shelf work. The major drawback is the heavy work load placed on the ship's officers. For more prolonged work a normal three watch system rather than a watch and watch system should be used. This extra staffing would place pressure on the ship's accommodation but it should prove feasible, with a ship of the Moray Firth IV type, to build accommodation in one of the holds.

The auxiliary power provided by the N.E.R.C. generator proved to be sufficient and the system of using No. 1 hold as a power house worked well. It was a pity that the Bath University side-scan needed its own generator, the latter generator was extremely vulnerable on deck; it also suffered because of the small capacity of its petrol tank.

The coring derrick on No. 1 hatch worked reasonably well, though some provision for greater safety during handling should be developed. The side of the ship could do with some protection and some means of steadying the corer while in the air is required. During this cruise there were no mishaps but at times extremely dangerous situations developed in spite of the precautions we had taken. The motor driving the winch was just adequate for the size of the corer being operated and, as it happened, the length of wire on the winch was just enough for eastern Channel work. For more general use on the shelf a larger winch with 80 to 100 fathoms of wire (c.f. 35 fathoms on this trip) would be required with a proportionately larger driving motor. The clear view of coring operations from the bridge was an important safety factor and lends support to the use of this type of vessel. Unfortunately the long and heavy ship's boom which had to be used for lowering and raising the Bath University Side-scan sonar led to hard work for the full complement. If the Moray Firth IV is used again a boom or crane of smaller size should be fitted.

This report would not be complete without special mention of the efforts made by the N.E.R.C. Research Vessel Unit under the personal supervision of Mr. J. Cleverly. They worked with speed and vigour to make modifications to increase the efficiency of the ship at both Hull and Plymouth. Mr. M. Knights, who was aboard the ship for part of the cruise, was of considerable assistance and Mr. S. Jones, who was present throughout the whole cruise, worked unstintingly and by his skill and general good humour ensured the success of the venture.