

Department of Geodesy and Geophysics
Cambridge University

R.R.S. JOHN MURRAY
REPORT ON CRUISE 4/69
MAY 1969

Celtic Sea

Marine Geophysical Cruise to S.W. of Ireland

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D A T E S

Leg (1)	Sailed from Barry	a.m.	2nd May
	Arrived Cork	a.m.	12th May
Leg (2)	Sailed from Cork	a.m.	14th May
	Arrived Barry	a.m.	24th May

SCIENTIFIC PERSONNEL FOR LEGS (1) AND (2)

Dr F. Gray

Dr A.P. Stacey

Mr R. Scrutton

Mr A. Ziolkowski

Mr T.R.E. Owen

Mr M. Mason

Mr T. Vertue

CRUISE INTENTIONS

The purpose of this cruise was to extend the work already carried out in the Porcupine Bank and Porcupine Bight area on DISCOVERY in September 1966.

It was proposed to shoot 1 refraction line in the Porcupine Bight to look at sediment thicknesses. Because of limitations in the amount of explosives which can be carried by JOHN MURRAY, it was intended to limit this line to 30 miles long. A second line was to be shot in deeper water to the S.W. of Porcupine Bank to obtain Moho arrivals. Also we proposed to carry out reflection profiling with an airgun and our new flexotir array, mainly in the Porcupine Bight area where we hoped to obtain better penetrations than previously. Finally, we intended to extend our previous gravity and magnetic survey over the Bank to the south.

NARRATIVE

Leg (1)

The first three days were taken up with steaming towards the first refraction line and during this time all of the equipment to be used on this cruise was tested. The magnetometer and PDR performed satisfactorily but the ships timing system did not function and one of our own clocks was rigged to provide time marks on the gravimeter and magnetometer. The first trials of our new seismic streamer purchased from Geomecanique were carried out at this time (see Project Report). We arrived at the first refraction station on the 4th in the forenoon and spent the day calibrating the airgun by firing at different depths with the hydrophone receiver at different depths. We have found it desirable to shoot refraction lines through the night as radio reception is better.

We started launching sonobuoys at the SE end of line (1) (Stn (1)) at 2300 hours and had completed firing schedule of 900 lbs by 0300 hours (5th).

On returning to the buoys, we found that they had drifted as much as 5 miles and sound ranging was required to find them.

The reversal of line (1) took place over the night of 5/6th May and 750 lbs of geophex was used.

As the weather was still good, it was decided to run out to 17°W and shoot the longest of our refraction lines, taking magnetic and bathymetric

observations on the way. The gravimeter recorder broke down, and was repaired by 2300 hours on the 6th May.

On reaching the northern end of the line (3) we found that the weather was deteriorating and decided to continue surveying until weather improved. Started laying buoys at south end of line (3) at 2030 hours on the 8th May. Firing schedule of 1500 lb was completed by 0400 hours (9th May).

The weather began to deteriorate as we ran back to recover the buoys and we had difficulty in recovering them. The last buoy which had been tied to an anchored Dan buoy had stopped transmitting and so we were not able to sound range on it. We searched for 10 hours without success. I suspect that heavy seas and strong winds pulled the pellet floats supporting the anchor wire under and they collapsed. The weight of wire then pulled under the Dan buoy and finally the sonobuoy.

The weather was now too bad to attempt to reverse line (3) and the weather chart showed a large depression in Mid-Atlantic so we decided to run back towards Porcupine Bight making magnetic observations on the way. The magnetometer was streamed at 2256 hours on the 9th May. This work was continued most of the way to Cork and we tied up alongside in Cork at 0740 hours on the 10th May.

Leg (2)

Sailing was delayed for 24 hours because the cook on JOHN MURRAY was taken ill and had to be removed to hospital. A replacement cook arrived at 1100 hours on the 14th and we sailed at noon. On the way down river from Cork the scientific radar stopped working so we went alongside at Cobh and Decca engineers repaired the set in 30 minutes. It was decided to head straight for line (3) to try to complete this line.

After leaving Fastnet we ran into a very bad swell which slowed the ship down to 7 knots. On the 15th, the ship was rolling so badly that gravity readings had to be abandoned and the gravimeter clamped. We continued magnetometer survey until the 17th when further gale warnings meant that reversal of line 3 would have to be abandoned at that time and so we ran back towards Porcupine Bight.

On reaching the Continental Slope it was decided to carry out some gravimeter calibrations and this was followed by some tests on marine seismex (see later).

The remaining three days in the Porcupine Bight area were taken up with seismic profiling. Ways of depressing the airgun to the required depth were tried and the optimum position of array and source were found. Excellent records were obtained.

We were unable to make gravity measurements while using the profiling system as the Paxman generator had to be run and this has undesirable effects on the gravimeter.

We would like to thank Capt. Perry, the officers and crew of JOHN MURRAY for their help and active participation in the scientific work of the ship.

PROJECT REPORTS

Flexotir arrays.

This new seismic streamer recently purchased from Geomecanique-Paris was used for the first time on this cruise. We were most impressed with its low noise characteristics - particularly at low frequencies. The designers (Institute Francais du Petrole) claim this is due to careful balancing of the neutral buoyancy, the design of the spring in front of the array and the ability to tow the array down to 150ft below wave noise. Troubles experienced were

- (1) Leaking occurred in the connectors between sections. (Since returning from the cruise, the manufacturers have replaced the towing cable and have said they will replace the faulty connectors).
- (2) The 30 pairs of conductors in the towing cable broke. This was temporarily repaired and gave us no further trouble.

Airgun

Having decided that it was necessary to tow the airgun at a depth of 60ft., it was found that by hanging 400 lb. of anchor chain just above the airgun and lowering the gun on the main warp, the required depth was easily attained.

Refraction

The solution to a large number of misfires on the previous cruise on JOHN MURRAY (11/68) was found by buoying all charges over 100 lb so that they did not sink too deep. The floats were made by filling the 50 lb

charge cardboard boxes with expanded polystyrene (1 box per 100 lb), and the charge was suspended 200 ft below the float on 3/8" nylon line.

The method of launching was to pay out the line first, light the fuse and launch the float followed by the charge. No charges launched in this way misfired.

Marine Seismex

A small quantity of marine seismex was used to compare its sinking rate, depth of detonation and ease of handling, with geophex.

It was found that the sinking rate was 2.7 ft/sec compared with 3.3 ft/sec for geophex.

Six charges of seismex were fired

2 between 200 - 250 ft

3 between 250 - 300 ft

1 at 315 ft

The final charge set to detonate at 340 ft misfired.

With geophex we found that charges set to detonate at 280 ft misfired and the maximum safe limit was 250 ft.

We felt that seismex was easier to handle and to make up into larger charges and felt safer to use.

DISTRIBUTION

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