

DEPARTMENT OF EARTH SCIENCES
UNIVERSITY OF CAMBRIDGE

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BULLARD LABORATORIES
MADINGLEY RISE
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CAMBRIDGE
Cruise Report

RRS JOHN MURRAY

Cruise 8/81

29 June (Dundee)
to 9 July (Plymouth)

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Distribution
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18th June 1981

Dear Seismologist,

Explosions in North Sea, JM 8/81

I enclose the final plans for this work. The starting point has been changed, but fortunately Dundee and Newcastle are equidistant from the laying positions so the timing is unchanged.

If it is necessary to alter the schedule you will be telephoned by Dr Mary Fowler from 36 Marlow Road, Cambridge. Her telephone number is (0223) 69023. Please make appropriate arrangements for messages to be passed on to you if you are unavailable. You should not need to phone Mary, but if you do and if you cannot get any reply from her number then try (0223) 51686, which will connect you to the switchboard of the Department of Earth Sciences when you must ask to speak to the secretary at the Bullard Labs. If you can't get through thus try Chris Adams (or the Duty Officer at the weekend) at RVS, Barry (0446) 737451.

We should be most grateful if you could make any adjustments to paper speeds or gains that will enable you to get better records of these events. Penny Barton will circulate shot instants relative to Rugby MSF radio timesignals when we get back to Cambridge.

Yours sincerely,

Mary Parsons pp Drum
D.H. Matthews.

LAND RECORDING PARTIES JM 8/81

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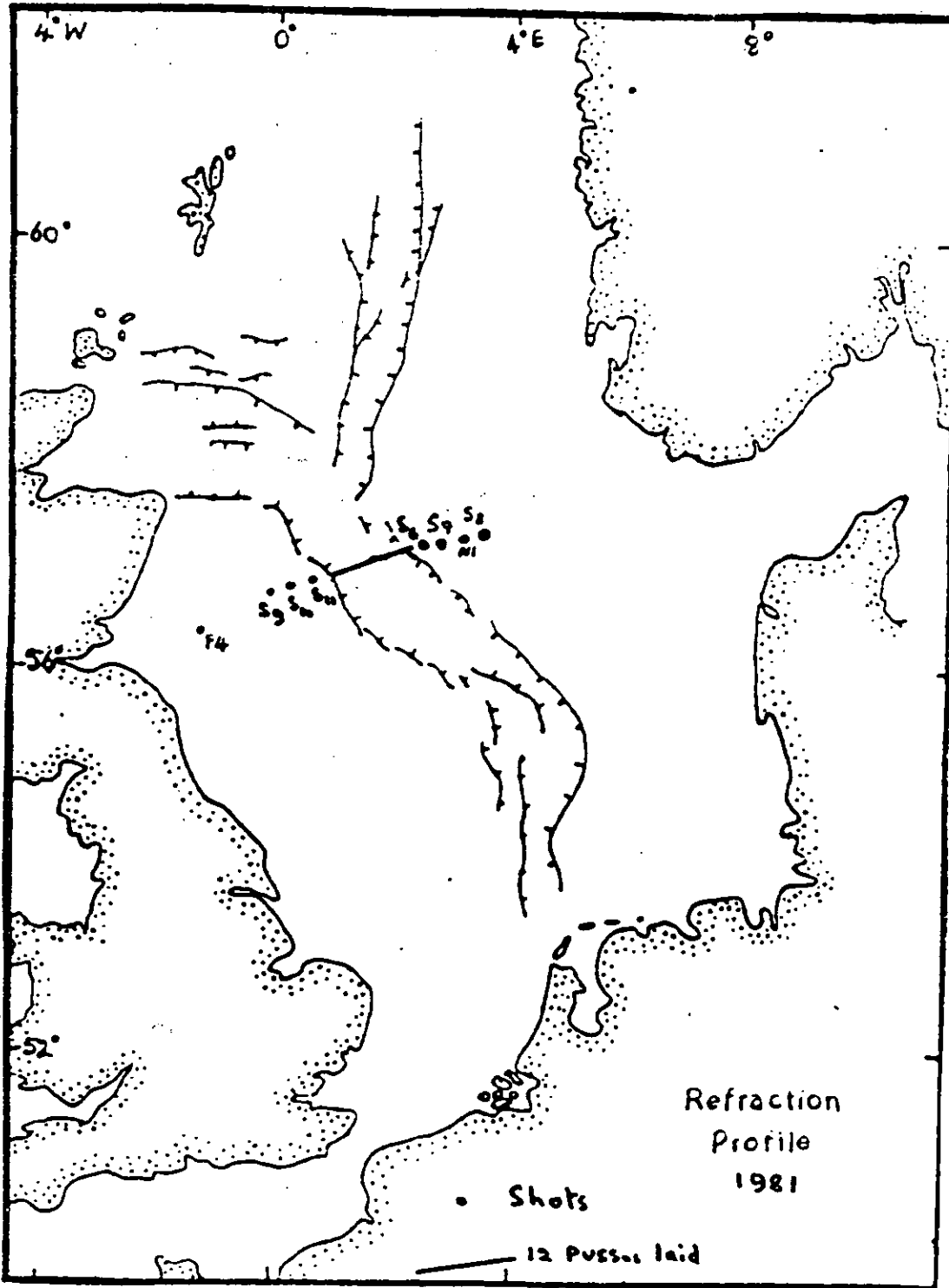
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FIGURE 2



Positions of shots and Pusses.

Final**PROVISIONAL PLAN FOR J.M. 8/81**All times are British Summer Time (i.e. GMT plus one hour)

Dundee

June 29 Mon HW ~~Newcastle~~ 1400. load explosives pm. Sail on completion, 145' to P₁ (29 hours at 5 knots or 21 hours at 7 knots).

30 Tues passage. Commence laying on arrival?

July 1 Wed lay PUSSEs P₁ to P₁₂. Lay OBH/S at end near P₁₂.

2 Thurs 0800 shot S8 (250 kg; 5 min window)
1100 shot N1 (500 kg; 10 min) floated
1400 shot S7 (250 kg; 5 min)
1600 shot S6 (125 kg; 5 min)
steam 135' to F4 (27 or 19 hr)

3 Fri 2000 shot F4 (1000 kg; 10 min) floated [or S9, S10 or S11]
steam 62' to S9 (12½ or 9 hrs)

4 Sat 1000 shot S9 (250 kg; 5 min)
1400 shot S10 (250 kg; 10 min) [or F4]
1900 shot S11 (125 kg; 10 min) [or F4]
on completion we shall fire any explosive that we have left in several shots at S11, leaving only 4 x 2.2 kg sticks for OBH/S trails, then steam 45' to P₁₂ (9 or 6.4 hr) [or to P₁]

5 Sun recover OBH/S and PUSSEs

6 Mon Spare day. OBH/S trials. Fire shot, 2.2 kg, at S9 and/or S10.

7 Tues Spare day. OBH/S trials. Fire shot, 2.2 kg, at S9 and/or at S10. Depart for Plymouth by noon, 590' (4d 22h at 5 knots).

8 Wed Spare day. Depart for Plymouth by 2359, 590' (3d 12 hr at 7 knots).

12 Sun Cruise ends. HW Plymouth 1500

15 Wed Ship sails for IMER cruise.

Note

We can only work in daylight for optimum Decca accuracy: on July 5 the sun rises at 0417 and sets at 2152. The PUSSEs are programmed to record in windows of 5 or 10 minutes duration at preset times, so once they are laid shots must be fired at the correct times or not at all. If bad weather intervenes PUSSE laying can be delayed by multiples of 24 hours, imposing a corresponding delay on the rest of the programme. The spare days at the end may be used in this way. The shots do not necessarily have to be fired in the planned order. Priority is given to shot F4, and the variations indicated in square brackets are intended to ensure that F4 is fired. As the ship cannot enter harbour with explosives on board, anything left over must be destroyed at the end. Each day at around 0900 RRS John Murray will speak with her base in Barry, South Wales, (tel. 0446 737451 Mr Chris Adams, Operations Office) by radiotelephone. At sea, before shots are fired, the ship will transmit a warning signal on VHF channel 16 and on 2182 kHz. These will be voice transmissions in English. Any changes in plan will also be transmitted.

DHM

~~20 Jun 1981~~

17 June 1981

Personel

Dr D. H. Matthews

Penny Barton

Martin Rayner

John Leonard

Jeremy Duschewes.

Capt Mike Harding

Mate Geoff Price

Cruise Report of Proceedings

Ship.....JOHN MURRAY, North Sea..... Cruise No ..8/81.....

Cruise Dates (Inclusive, port to port) 29 June (Dundee) to 9 July (Plymouth).....

It is requested that the following aspects of the cruise may be covered in this report of proceedings for dispatch or delivery to the Director, Research Vessel Base, immediately on return to port.

- a) Main objectives of the cruise.
- b) Geographical area. Reference stations or points in latitude and longitude.
- c) Sea and weather conditions encountered.
- d) Conduct of cruise, main problems encountered and success or otherwise of the programme.
- e) Equipment performance.
- f) Ship performance.
- g) Any recommendations.
- h) Signature and date.

Brief comments are preferred but if necessary please continue on another sheet.

Our objective was to fire five shots missed due to bad weather last summer, and three new ones at S9 - 11, and to record them on 12 buoyed Pull-Up Shallow water Seismometers (PUSS) laid in the same positions as last year along a line 35' SSW from the Cod Oilfield (see map). Priority was to be given to the one-ton charge at F4, vital to the whole experiment. We planned also to test a newly built pop-up Ocean Bottom Hydrophone/Seismometer.

This year the sea was calm enough throughout the operation, but the main objective was not achieved because the one-ton shot at F4 missed fire after a faultless lay. Only the first three metres of the Cordtex fuse fired. The charge was subsequently detonated from an inflatable boat by attaching another slow-burning fuse and detonator to the blown off end of the Cordtex fuse, but of course this explosion was not fired into a PUSS recording window.

We stayed at position F4 overnight and next day we fired a buoyed half-ton shot, F4', into the ten-minute recording window intended for shot S10, and a quarter-ton shot, F4", into S11. We did not fire shots at S9 - S11.

Recovery went well although the SELCO spar buoys are awkward to grapple and could be improved. Several appeared to have been attacked by fishermen, losing stray lines, radar reflectors and bottom weights. The OBH/S trial was successful so the ship was free to leave for Plymouth by 2300 on Sunday 5th after firing the left-over explosives at S10 position.

We have done a minimal amount of replaying on board. The OBH/S, laid at the eastern end of the line, worked well and recorded shots and an airgun. It is low on battery power. We have replayed part of the tapes from four PUSSES: the one laid at the eastern end of the line, nearest to charges S6 - 8 and N1, recorded all these but not F4'. The two westernmost PUSSES were both found to have smashed geophone gimbals and the hydrophones were noisy and obscured by an airgun. They have recorded N1 and S6 - 8, but poorly. We replayed the fourth PUSS from the western end of the line: it has recorded F4' well, and N1 too as well as an airgun. We cannot yet be sure whether the half-ton shot F4' will prove to have been big enough or not.

There were no problems with equipment or ship and we are grateful to the Master, to the mate Geoff Price who was tireless on deck and as another shotfirer, to all on board and to Stan Smith who installed the RVS equipment in Dundee. The voluntary silence during PUSS recording windows imposed on their ships by the seismic recording

companies using airguns within 200 km of us is appreciated, although one airgun was still firing at the west end of the line in all our windows. The failure of charge F4 in excellent weather causes us to consider abandoning the present floated charge system used for N1 and F4 and to favour using buoyed charges, fitted with ordinary slow burning fuses and detonators and pushed off a redesigned firing table from a moving ship, for all future large shots. This was the system employed for the shots fired this year except N1 and F4.

Drum.

D.H. Matthews
At Sea
7th July 1981.

Comment.

Shot F4' proved to be large enough, and even F4" was well recorded. We now have a digitised record section showing the ¹⁷⁵163 traces recorded by the PUSSES during the two years work. We also have 86 excellent recordings across Norway from the CANOBE experiment of last year.

DHM

27 Aug 1981

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4th August 1981

Dear Dave

Thank you for recording the shots which we fired in the North Sea this year. I enclose a list of the shot positions, times, and depths. I am sorry that I did not get it ready sooner, but the Decca corrections were a long time coming through.

We apologise for the late firing of the 1000kg charge at F4. I hope that everyone had not given up and gone home by the time we did fire it. This disaster was due to a loop in the Cordtex fast-burning fuse, causing severance of both fuse systems. The blasted-off ends of the Cordtex were visible at the sea surface, and a new detonating package successfully fired the charge at 2145BST (see table). The positioning and hence timing of this charge are not as precise as for the other shots because the buoyed explosive drifted considerably during its 105 minutes in the water but I enclose the best estimates.

Because our sea-bottom instruments were not recording when F4 finally went off, we abandoned the third day's schedule in favour of firing the biggest charge we could in the same place as F4, into our next 10 minute recording window on the PUSSES, ie at 1400 on 4th July. The details of this 450kg charge, F4', and a further 125kg charge, F4'', fired in the same place at 1900 to finish the explosives, are enclosed.

Preliminary analysis of our data shows that the 450kg charge was probably big enough to give us most of the information that we need, so a third expedition to that jinxed area will hopefully NOT be necessary!

I would be very interested to hear what your data is like. Once I have incorporated this year's data into my dataset, I will be in touch with you so we can make arrangements to meet and discuss our results.

Best wishes.
Yours sincerely,

Penny Barton
Penny Barton

SHOT	SIZE KG	DAY	DATE	TIME B.S.T. HRS:MIN:SECS	POSITION		DEPTH M	
					LATITUDE	LONGITUDE	SHOT	SEA
S8	250	183	2/7/81	08:02:13.342	57°18'15.975"N	03°24'21.305"E	54	64
N1	500	183	2/7/81	11:03:46.092	57°16'57.961"N	03°08'33.186"E	52	67
S7	250	183	2/7/81	14:02:09.413	57°13'05.364"N	02°52'30.666"E	59	73
S6	125	183	2/7/81	16:02:13.340	57°10'22.853"N	02°38'51.011"E	64	74
F4	1000	184	3/7/81	21:45:01.513	56°29'27"N	01°11'42"W	49	69
F4'	450	185	4/7/81	14:03:05.738	56°27'46.833"N	01°12'10.576"W	55	69
F4"	125	185	4/7/81	19:02:06.838	56°27'44.166"N	01°12'15.268"W	72	72

TIME

This is in British Summer Time (GMT + 1) as recorded from MSF Radio (60 KHz) broadcast from Rugby. This is equivalent to Universal Time (UT1 ie GMT) but differs from Co-ordinated Universal Time (UTC, the Caesium standard) potentially by as much as 0.9 seconds (see Admiralty List of Radio Signals Volume 5).

If you used a different coded radio time signal there may well be a correction to make to our times so please contact me and we can try to figure out what it should be.

POSITION

Co-ordinates are derived from Decca Navigator readings which were sent to Decca Ltd for full correction and translation into latitudes and longitudes. Each point is said to be good to within 25m of true position.

LAND RECORDING PARTIES JM 8/81

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