INSTITUTE OF GEOLOGICAL SCIENCES

GEOPHYSICAL DIVISION

MARINE GEOPHYSICS UNIT

REPORT NO. 33

PROJECT 72/3

Cruise report for M.V. Researcher 14th May 1972 - 16th June 1972

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Summary

This report describes project 72/3, a gravity and magnetic survey in part of the English Channel, west of Cherbourg. It was carried out as part of the Anglo-French effort to produce geological and geophysical maps of the channel, this area having previously been covered by a sampling and shallow seismic survey. The British Hydrographic Office is currently making a bathymetric survey of part of the western Channel during the course of which gravity and magnetic observations are being made, and has set up a Decca Hifix chain for this purpose. Our survey was planned so as to be complementary to the H.O. survey and make the best use of the Hifix chain. Due to a long spell of almost continuous westerly gales, only about half of the expected cover was achieved. Since a certain amount of shelter was afforded east of the Channel Islands and off the French coast, the Survey was concentrated in this area. For most of the period it was impossible to obtain useable gravity data in the open water of the Channel.

During this survey the NERC IBM 1130 computer was carried and a group of scientists from Cambridge University, Department of Geodesy and Geophysics was on board. Geophysical and navigational data logged on magnetic tape were processed on the computer, and profiles and anomaly maps were prepared.

Mobilisation

M.V. Researcher was mobilised by RVB, and sailed from Barry on May 14, equipped with the following instruments:

LaCoste sea gravity meter
Barringer magnetometer
ORE profiler/precision echo-sounder
MS 47 transit sonar
Decca Hifix and Mk 21
NERC data logger
Computer container lab.

Narrative

Sailing from Barry was delayed for 14 hours by bad weather, and on leaving, Researcher sailed on direct passage to the Channel Islands. However off Cornwall the generator placed on board for the sparker work in the North Sea broke adrift and fell onto its side and the computer generator broke loose. Researcher anchored in Mounts Bay and the deck generators were re-secured.

Work began on May 15th, using Hifix fixing and good gravity, magnetic and bathymetric data were recorded. The MS 47 was tried on the first two lines, but the rig was not satisfactory at the survey speed (between 9 and 10 knots).

Researcher entered Plymouth on May 19th and the I.G.S. data logger was installed (without tape deck). On the following day sailing was postponed because the LaCoste gravity meter was malfunctioning, and again later because of bad weather. On May 22nd Researcher sailed for Jersey where she was to take on scientists from Cambridge.

During the second leg SW-W'ly gales persisted, and it was scarcely possible to work anywhere except in the Bays of St. Brieuc and Mont St. Michel, and in the partial lee of the Channel Islands. During the period from May 23rd to June 2nd the majority of the time was spent in harbour, but by altering the proposed survey lines so as to operate in sheltered waters as far as possible, 1200 km of line were run. In port, however, time was well spent in debugging the data processing software package for the 1130 and this work progressed very well indeed. By the end of the second leg the processing programmes were all running and the Cambridge group were able to leave the ship with daily profiles of magnetics, gravity and bathymetry, and anomaly and track maps on mercator projection. Unfortunately this leg was brought to a premature end a day early when the computer generator caught fire. Researcher entered St Helier harbour on June 2nd to repair the generator and take on new personnel.

Continued bad weather prevented sailing until June 4th but the weather remained good for the rest of the project. During this leg we were able to log on magnetic tape using our own logger, the tape deck having been installed in Jersey. These tapes were read

into the 1130 and profiles plotted for some of the log 3 data.

On June 6th the ORE profiler was landed in Jersey for trans-shipment to Barry where it was wanted for installation in Discovery. From then on the ship's MS36 echo sounder was used for depths until it failed. Researcher berthed in Lowestoft at 1030 on June 11th.

In Lowestoft the Cambridge computer laboratory and data logger were removed and the Edo-Western profiler fitted. The latter was tested on passage to Aberdeen and produced a profile with little penetration, but the digitiser did not work.

A number of short gravity lines were run in the Wash, to supplement the subsequent gravity survey covering the drying areas using a hovercraft.

Off St. Abb's Head a short sparker and profiler line was run over the site of a hole drilled by M.V. Whitethorn.

Equipment

LaCoste gravity meter

A great deal of trouble was experienced with this instrument. Whilst in Plymouth a gyro became defective and was replaced. During the rest of the period several faults occurred and a number of parts were replaced. In addition the platform supply regulators both failed to regulate, apparently due to failure of special resistors in the control circuit. Unfortunately no spares were available and so the platform performance was poor in rough seas. Most of the noise on the gravity meter output disappeared when an independent power supply was tried, so arrangements were put in hand to install a separate generator when the ship went to Lowestoft. In subsequent use the output has been largely free from high frequency noise, but other faults have occurred. It seems clear that the meter should be given a factory overhaul as soon as it is available.

Magnetometer

No trouble was experienced with the magnetometer except that the event marker could not be operated.

Profiler/PDR

The ORE was substituted for the Edo-Western system originally requested, because RVB still awaited the delivery of the digitiser for the latter at the beginning of the project. Some foresight at RVB would have permitted fitting of the Edo-Western without its digitiser, obviating the need for the ORE. The Edo-Western was scheduled to be fitted at the end of the Channel project and the ORE had to be taken off before this because a profiler was required for Discovery.

The ORE cable no longer has any faring fitted and consequently the wire towing angle is too great. The rig used in Researcher is not entirely suitable and it is recommended that a more suitable davit is constructed, to be fitted when the ORE is carried. This davit should include an accumulator, similar to a hydrographic davit, so that the fish can be safely towed on its electrical cable: the same davit should then be suitable for the Edo-Western profiler.

The electrical connection to the ORE fish had to be remade, and there is still some doubt as to whether we are obtaining full power output. Although much of the area worked in contained rock bottom where no penetration would be expected, nowhere was any significant penetration achieved.

MS 47 sonar

This was only used on the first two lines. At the speed of operation the overside rig was not suitable and the sonar was abondoned for the rest of the project. When the vessel entered St. Malo for shelter it was impossible to turn and berth starboard side to, because of the very high wind in the basin. The bracket for the MS 47 was squashed when the ship was blown against the quay.

MS 36 Echo sounder

The ship's echo sounder was used when it was considered imprudent to launch the ORE fish in the bad weather conditions, and after the ORE had been taken off. It gave a fair amount of trouble requiring attention several times.

Navigation equipment

Decca Hifix and main chain both worked well. One Hifix baseline extension was easily crossed east of Guernsey. In order to avoid the tiresome passage across the channel to cross the other baseline, the Hifix was set up several times by relocating the intersection of two visual transit lines just off St. Martin's Point, Guernsey. The ship's radar was not entirely reliable. It did not appear to have been regularly serviced and basic spares were not carried on board.

Data logger

The NERC logger was used for the first part of the project and the IGS logger for the last part. The new IGS thermal printer has been totally reliable and a great improvement over the old creed printer.

Line No.	Grav.	Mag.	Ore	MS 47	MS 36	Hifix	Decca Main Chain	Data Logger	Fixes	Miles (n)	K Metres
1	″	From 7	From 14	″	1-14	″	″	″	52	85	157
2	″	″	″	″	–	″	″	″	50	63	117
3	″	″	″	–	″	″	″	″	21	32	59
4	″	″	″	–	1-8	″	″	″	22	35	65
5	″	″	″	–	–	″	″	″	26	40	119
6	″	″	″	–	–	″	″	″	13	22	41
7	″	″	″	–	–	″	″	″	49	69	128
8	″	″	″	–	–	″	″	″	45	66	123
9	″	″	″	–	–	–	″	″	7	18	33
10	″	″	″	–	–	″	″	″	35	52	96
11	″	″	″	–	–	″	″	″	22	33	61
12	″	″	″	–	–	″	″	″	37	60	111
13	″	″	″	–	–	″	″	″	30	42	78
14	″	″	″	–	–	1-42	42-48		48	95	176
15	″	″	–	–	″	–	″		7	12	22
16	″	″	–	–	″	–	″		27	43	80
17	″	″	–	–	″	–	″		24	36	70
18	″	″	5-24	–	1-4	–	″		26	36	67
19	″	″	″	–	–	–	″		25	39	65
20	″	″	″	–	–	–	″		27	40	74
21	″	1-5	″	–	–	–	″		15	19	28
22	″	–	–	–	″	–	″		8	12	22
23	″	–	–	–	″	–	″		13	26	48
24	″	–	–	–	″	″	–		8	16	30
25	″	–	11-17	–	1-10	″	–		17	32	60
26	″	–	″	–	–	1-19	17-22		22	33	61
27	″	″	″	–	–	–	″		12	18	33
28	″	″	″	–	–	–	″		9	16	30
29	″	″	″	–	–	–	″		9	18	33
30	″	–	″	–	–	–	″		3	5	9
31	″	–	″	–	–	–	″		9	12	22
32	5-10	3-10	″	–	–	–	″		10	16	30

Cont'd.....

33	≠	≠	≠	-	-	-	≠		10	17	32
34	≠	≠	≠	-	-	-	≠		13	19	35
35	≠	≠	≠	-	-	9-14	1-9		14	15	29
36	≠	≠	≠	-	-	≠	-		20	29	54
37	≠	1-18	≠	-	-	1-50	10-26		26	37	69
38	≠	-	≠	-	-	-	≠		10	13	24
39	≠	≠	≠	-	-	≠	≠	≠	106	145	269
40	-	-	-	-	-	-	-	-	91	128	237
42	-	-	-	-	-	-	-	-	31	44	82
42	≠	≠	-	-	1-70 from 7	≠	≠	≠	96	114	211
43	≠	≠	-	-		≠	≠	≠	84	119	221
44	≠	≠	-	-	-	≠	≠	≠	14	22	50
45	≠	≠	-	-	-	≠	≠	≠	46	52	96
46	≠	≠	-	-	-	≠	≠	≠	37	49	91
47	≠	≠	-	-	-	≠	≠	≠	41	58	107
48	≠	≠	-	-	-	≠	≠	≠	40	60	111
49	≠	≠	-	-	≠	≠	≠	≠	27	32	59
50	≠	≠	-	-	≠	≠	≠	≠	23	23	43
51	≠	≠	-	-	≠	≠	≠	≠	14	19	35

TOTAL MILES (N) SURVEYED = 2092

TOTAL KILOMETRES SURVEYED = 3921

PERSONNEL

		Leg 1	Leg 2	Leg 3	Leg 4
M. Bacon	I.G.S.			*	
J. Day	"		PC		PC
A. Dobinson	"		*	*	
H. Kenolty	"	*	*		*
B. Lynas	"	*			
L. Neil	" (Bath student)			*	*
M. Tully	"	PC		PC	
A. Allerton	Cambridge	*	*		
D. Sewert	"		*		
A. Stacey	"	*	*		
G. White	"		*		
J. Jones	R.V.B.	*	*	*	
D. Wilson	"				*
J. Meloed	Huntings	*	*	*	*
A. Mould	"	*	*	*	*

PC = Party Chief

Leg 1 14 May - 22 May
Leg 2 23 May - 2 June
Leg 3 4 June - 11 June
Leg 4 14 June - 16 June Passage to Aberdeen