9/7/68

M.V. Surveyor I.G.S.
Irish Sea 17-4-68 - 13-5-68

CONTENTS

SUMMARY

M.V. SURVEYOR was mobilised at Barry and executed a geophysical programme in and west of Cardigan Bay. Extensive cover of the area was achieved with sparker, gravity and magnetic traverses plus some transit and side scan sonar lines. The deep seismic lines commissioned by IGS in 1968 were re-run to obtain better definition of the upper layers.

PERSONNEL

Day 107-119	120-125	129-133	133-135	
G Day	G Day	G Day	G Day	IGS party chief
	R McQuillin		M Tully	IGS
N Kenolty	N Kenolty	N Kenolty	N Kenolty	IGS
A Myint	A Myint	A Myint	A Myint	IGS
R Floyd	R Floyd			IGS
B King	B King	C Himsworth	C Himsworth	RVU Technician
M Leek	M Leek	M Leek	M Leek	Surveyor i/c
J Martin	J Martin	J Martin	J Martin	Surveyor
A Mould	A Mould	A Mould	A Mould	Surveyor
		R Monk	R Monk	Surveyor

OBJECTIVE

The principal objective of this project was to re-run the deep seismic lines, commissioned by IGS in 1968, using a sparker equipment to improve the definition in the upper layers. These lines were to be interleaved by further lines, on some of which deep seismic cover had subsequently been obtained by other operators. In addition gravity and magnetic observations were to be made, and where possible, sideways looking sonar equipment was to be used. Further interleaving lines and cross lines were proposed to complete the coverage.

NARRATIVE

After mobilisation SURVEYOR sailed from Barry on Friday April 17th (day 107), and proceeded to the survey area in the vicinity of Cardigan Bay.

On the morning of day 108 when the ship had been rolling gently for some time the generators started misfiring and it was found necessary to flush out the fuel lines which had been contaminated with rust and water shaken up from the bottom of the tank by the ship's motion.

After getting the generators to run smoothly some difficulty was experienced in rigging up the sparker gear. The first survey line was commenced at 2020 day 108, and survey proceeded routinely until a gale sprang up on day 110 and shelter was obtained at anchor off Rosslaire. The next day the wind had not abated and an attempt was made to take the Zodiac dinghy into Rosslaire to ascertain if a berth was available, but the engine would not run properly and finally blew out a plug. There appears to be no public VHF frequency with which to raise Rosslaire and with the wind from the west it would have been foolhardy to try to enter without a pilot, so since further gales were forecast, it was decided to sail to Dublin and to use Dublin as the base point for the whole survey. SURVEYOR berthed in Dublin at 111/2000.

The next two days were spent in Dublin working on the equipment. On the morning of day 114, when there was no longer a gale forecast for the Irish Sea, SURVEYOR sailed and returned to the survey area. On the following day a fresh gale blew from the north and work was continued in Tremadoc Bay where some shelter was afforded, and no swell was present. That night was spent at anchor in Tremadoc Bay and the following day a series of short lines was begun extending southwards covering the area of interest as containing possible sites for shallow drilling.

SURVEYOR berthed in Dublin as planned 119/1000 and sailed 120/1130.

On the evening of day 121 the weather deteriorated and we left Cardigan Bay to work north of the Kish Bank, in the lee of the Irish Coast, where some short gravity lines were run to delineate the northward end of the anomaly there. By midday 112 the wind had dropped and it was possible to resume the main survey.

SURVEYOR sailed for Barry in the evening of day 124 where she was to have fitted a gyro compass, auto-pilot and towed log. The log and

compass were fitted within the three days anticipated, but inadequate arrangements had been made to fit the auto-pilot to the steering gear and by day 129 it was clear that considerable delay would be involved in fitting it. It was decided to sail the following morning without the auto-pilot and SURVEYOR sailed at 129/1030 to resume the survey.

On day 133 she berthed in Fishguard for the steering gear manufacturer's representative to take measurements and design the necessary linkages for the auto-pilot. This opportunity was taken to shut down the main AC generator and repair a leaking fuel connection. On re-starting the gravity meter after the break in supply, the platform failed to stabilise in the long axis. The rest of the project was completed with the gravity meter not working; however prior to entering Dublin in the evening of day 134 the fault was corrected and the platform apparently worked correctly.

INSTRUMENTS

Sparker

It had not been possible to fit the sparker hut, originally fitted out for MORAY FIRTH IV, on SURVEYOR, so a new hut had to be built and fitted out when SURVEYOR was in Barry. Consequently insufficient time was available to test the sparker gear and power supplies before sailing. This and the dirty generator fuel caused some loss of time. One of the IGS power supplies was in a poor state, having a faulty transformer lead, and in the IGS trigger unit the main relay was dirty and would not hold in. When these initial problems had been sorted out, the equipment ran smoothly enough for the rest of the period.

One short line was run with the nine-candle array at 7000 joules, but only about ½ second (2 way travel time) penetration was achieved. The rest of the survey was run at 1000 joules.

A prototype Geomechanique sparkarray with numerous wire electrodes was tried and produced such good records with a shorter pulse length signal than the nine-candle array, that it was used exclusively from day 116 until day 132 by which time most of the wires had burnt down to the tube and parts of the tube had been eaten away. In this condition

the records were worse than could be obtained using the nine-candle array. The array would probably last considerably longer at lower energy, but very little penetration was achieved at 500 joules, when this was tried. When this array (which was known on board as the Toothbrush) discharges, the voltage at the trigger unit falls to 1000v, whereas with the conventional array it falls only to 2700v. Another phenomenon observed during its use was that sparks jumped from the sidescan armoured towing cable to the ship. This suggested that perhaps the earth return electrode used did not provide a sufficiently good path to earth.

This array is very much easier to handle than the conventional type and requires no maintenance, but is probably costlier to run.

Gravity meter

The LaCoste & Romberg is very much improved since the new auto-reader was fitted and the damping increased. The response to ishtailing is reduced and a much smoother record is produced. When the ship is lying alongside in calm water there is still some small amplitude variation of the gravity trace. At sea when there is cross-coupling error, the red trace which has been adapted to read cross-coupling, appears to be correlated with the gravity trace. This suggests that the cross-coupling error is being over or under corrected. This should be checked by taking the ship over a gravity range when conditions for cross-coupling errors exist.

One AC regulator failed to regulate and a faulty transistor was found in it. However after a while it began to function normally again. A variable transformer is used to reduce the input voltage to 110v, and where this was first sited it produced noise on the sparker record. At the end of the period the optics motor became noisy sounding as if the bearings were worn. This may be connected with the variation in the gravity trace mentioned above.

Using the meter value on return to Barry as base, and calibration factor of .9918 mgal, per meter division, the following misclosures were obtained

Barry, day	107	-1.1 mgal
Dublin,	112	+0.3 mgal
Dublin,	119	+0.5 mgal
Dublin,	134	+1.3 mgal

Echo Sounder

The MS 32 echo sounder was modified prior to the cruise to enable it to be used with the existing hull transducer. This model is designed to read depth under the keel, and the adjustment available on the stylus was only just sufficient to adjust it to read true depth when operating on the feet scale. It could not then be switched to the fathoms scale. This type of echo sounder is not very suitable for continuous survey.

During the cruise bar checks were made at intervals of about 48 hours while at sea.

Side scan sonar

The supply input socket was found to be wired incorrectly as was the main towing cable connector. Since the system had been tested using the short towing cable, it seems likely that it was working in a non-standard condition and therefore probably would not work now with the short towing cable. In addition the connection between the towing cable and the fish is not satisfactory (it flooded three times and had to be re-made). This connection should be improved.

After the side scan had been operating for 24 hours the recorder became extremely hot and the cooling fan was found not to be running. This was due to a loose plug connection and it seems likely that the fan had not run since the recorder was reassembled by the manufacturers recently.

A long length of line with a buoy on the end was attached to the ish to facilitate recovery should it break away from the towing cable if it went aground. This made the fish tow at about 10 metres with all the cable out. When the ship was slowed to 2 or 3 knots, the fish only sank to just over 20 metres.

It is not entirely satisfactory to run the side scan on a sparker survey. It needs slower speeds to tow deeply enough to get good records and the sparker signal is picked up by the side scan, producing noisy records. Its output also deteriorates considerably with a rough sea. However when working it produces valuable pictures of the sea floor.

On day 132 one channel stopped working and this was later traced to a faulty transistor in one print amplifier. The spares carried should include an amplifier as well as any other plug in units.

Transit sonar

The new rig for mounting the transducer worked but was finally damaged. The tensioning wire passing under the hull parted early in the cruise. At first the transducer had been directed too steeply in the water but after re-aligning to about 5^{o} or 6^{o} in Dublin records were obtained. The quality and cover are inferior to the side scan so it was not used when the latter was working.

Magnetometer

The new RVU Barringer magnetometer was installed for the cruise and operated well. The sensor cable is easier to handle than the Varian cable. On this cruise it was necessary to tow the magnetometer close to the side scan and a longer magnetometer cable was necessary to remove the sensor from interference by the side scan.

The winch was too fast to haul in the magnetometer and side scan cables normally, but could be used with only half a turn of wire on the drum, allowing it to surge.

Decca Navigator

Main chain Decca seems to have been adequate generally for this survey, but night effects were still present and enough to make positions unreliable at dawn and dusk. When it was necessary to change chain near dawn or dusk there was usually a discrepancy which at one time was as great as 0.8 N.M. If chains were changed during the day and the local corrections, if any, applied, there was not usually any apparent discrepancy.

Towed log

This proved valuable in showing up erratic Decca observations and is definitely an asset.

Navigation in general

Strong tides are encountered in this area and in order to avoid large variations in the Eötvos correction course alterations were restricted to 2^{o} as far as possible. This was satisfactory generally if the ship began a line on approximately the correct heading, but otherwise large course alterations had to be made to stay close to the line.

Suitability of ship

SURVEYOR has proved to be a most satisfactory vessel for this type of work. The only serious shortcoming is the exposed access to the plotting room, and to a lesser extent the laboratory (instrument room).

G Day
19 May 1970

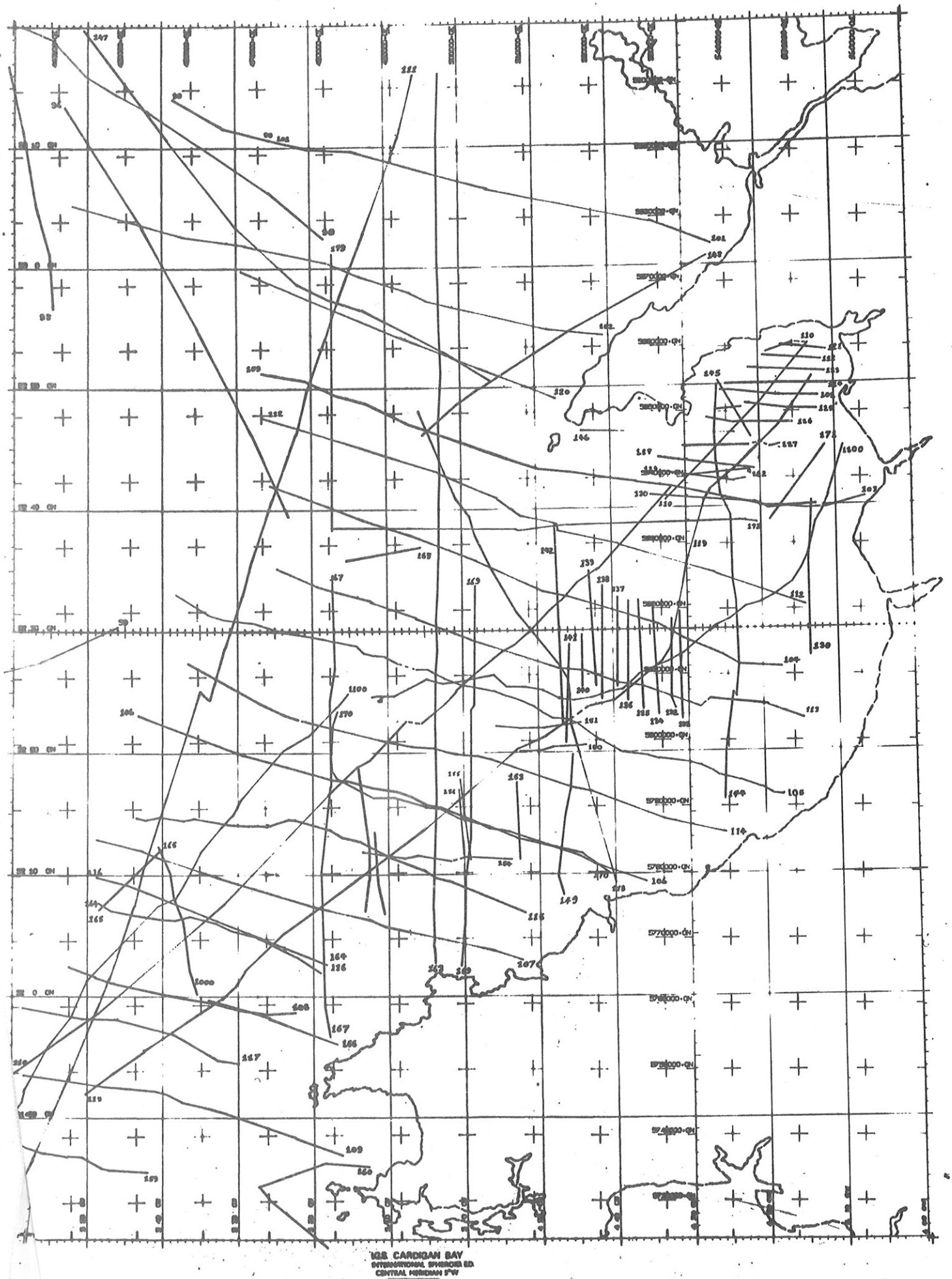
COVERAGE ON SURVEY LINES

Line No	No of fixes	Sparker (power)	Grav.	Mag.	Side scan	Transit
90	23	1000		x	x	
91	6		x			
92	11		x			
93	8		x			
94	7		x			
95	6		x			
96			x			
97	18		x			
98	25		x			
99	12		x			
101	32	1000	x	x		
102	30	"	x			
103	44	"	x			
104	44	"	x			
105	58	"	x	x	x	x
106	33	"	x			
107	31	"	x			
108	17	"	x			
109	23	"	x	x	x	
110	94	"	x	x	x	x
111	89	"	x	x		
112	41	"	x			
113		"	x	x		
114	49	"	x			
115	44	"	x			
116	25	"	x			
117	20	"	x			
118	58	"	x	x		x
119	83	"	x	x	x	
120	20	"	x			
121	6	"	x			
122	8	"	x			
123	9	"	x			
124	13	"	x			
125	17	"	x			
126	13	"	x			
127	10	"	x			

Line No	No of fixes	Sparker (power)	Grav.	Mag.	Side scan	Transit
128	9	1000	x			
129	9	"	x			
130	14	"	x			
131	13	"	x			
132	9	"	x	x		
133	12	"	x	x		
134	10	"	x	x		
135	10	"	x	x		
136	11	"	x			
137	11	"	x			
138	10	"	x			
139	16	"	x			
140	6	"	x			
141	7	"	x			
142	13	"	x			
143	15	"	x			
144	37	"	x			
145	10	1000& 3000	x			
146	10		x			
147	36		x			
148	36	1000	x	x		x
149	16	"	x	x		x
150	7	"	x	x		x
151	8	"	x	x		x
152	18	"	x	x	x	x
153	6	"	x	x		
154	4	"	x	x	x	
155	9	"	x	x	x	x
156	6	"	x	x		
157	13	"	x	x		
158	11	"	x	x		x
159	14	"	x	x		x
160	14	"	x			
161	6	"	x			
162	6	"	x			
163	59	"	x	x		
164	18	"	x	x		

Line No	No of fixes	Sparker (power)	Grav.	Mag.	Side scan	Transit
165	7	1000	x	x		
166	12	"	x	x		
167	31	"	x	x		
168	6	"	x	x		
169	26	"	x	x		
170	23	"				
171	7	"				
172	27	"			x	
173	18	"		x	x	
1000	11	"	x	x		
1100	78	"				

x = data for all or part of line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CENTRAL MERIDIAN 5°W