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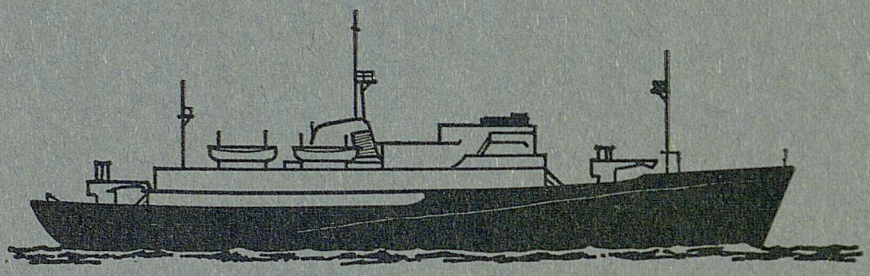
NATIONAL INSTITUTE OF OCEANOGRAPHY
WORMLEY, GODALMING, SURREY



R. R. S. DISCOVERY

CRUISES 27 AND 28 REPORT

JUNE — JULY 1969

GEOLOGICAL OBSERVATIONS

N. I. O. CRUISE REPORT No. 27 and 28
(Issued June 1970)

National Institute of Oceanography

Wormley, Godalming, Surrey.

R. R. S. Discovery

Cruises 27 and 28 Report

June - July 1969

Geological Observations

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N. I. O. Cruise Report No. 27 and 28

(issued June 1970)

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R. R. S. "Discovery"

Report of Cruises 27 and 28

9th June - 24th July

Scientific Staff	Before 30th June	After 3rd July	After 17th July
Mr. B. J. Barrow	x	-	-
Mr. R. H. Belderson	x	x	x
Mr. S. V. Bicknell	x	-	-
Mr. D. G. Bishop	x	x	x
Mr. R. Bonner	x	x	x
Mr. R. Dobson	x	x	x
Mr. R. H. Edge	x	x	-
Mr. H. M. C. Fielding	x	x	x
Mr. T. M. Jones	-	x	x
Mr. N. H. Kenyon	-	x	x
Mr. V. A. L. Lawford	x	x	-
Mr. A. F. Madgwick	x	-	-
Dr. B. S. McCartney (Leader Air Gun Team)	x	x	x
Mr. R. J. Morris	-	x	x
Mr. R. Peters	x	x	x
Mr. D. G. Roberts	-	x	x
Dr. J. S. M. Rusby (Leader GLORIA Team)	x	x	x
Mr. M. L. Somers	x	x	x
Mr. N. D. Smith	x	x	-
Mr. A. H. B. Stride Principal Scientist	x	x	x
Mr. A. R. Stubbs	x	x	x
Mr. K. D. Walton	x	x	x
Mr. S. K. Willis	x	x	x
Mr. P. G. Woods	x	-	-

Dates

Monday 9th June	Ship departed L. Fyne for Mediterranean.
" 30th June	Ship reached Gibraltar.
Thursday 3rd July	Ship departed Gibraltar for Mediterranean.
" 17th July	Ship called at Gibraltar.
" 24th July	Ship reached Southampton.

Equipment used

Gloria (Geological long range inclined asdic), air guns, short range side-scan asdic, P. D. R., Neuston, one metre N113, one metre N113, Oxfam nets.

Projects

1. Sea trials and use of Gloria

The first trials of this equipment in the open sea were made in the

western part of the Mediterranean in the lee of the Balearic Isles in order to be reasonably certain of good conditions for its launching, recovery and use. This sea also provided a wide variety of sea floor types which could be examined within a relatively small area, so giving a first indication of the potentialities of the method as soon as possible.

Deep lying basin floor was found to be as uniform as expected and contrasted markedly with the continental slopes dissected by submarine canyons and deformed by slumps Besides this more or less predictable information certain new features were found. The latter include rocky benches trending along the continental slope, faults and bands seemingly of variable roughness trending down the slope.

A detailed account of the handling and operation of the operation of the equipment will be prepared by Dr. J. S. M. Rusby for the whole period of operation during the summer of 1969.

2. Sea trials and use of air gun reflection profiling equipment (Dr. B. S. McCartney)

Instrument tests included the following work. Measurements were made of the depth at which hydrophones towed for various rigs and ships' speeds; air gun pressur waveforms were photographed from the C. R. O. as functions of the number, depth, volume and pressure of the guns; some noise level recordings on tape were made to examine the influence of flow noise as a function of hydrophone spacings.

The air gun equipment was operated successfully for a total running time of 140 hrs., with the ship generally at 6 knots, to provide Mufax records covering over 800 nautical miles of track. It took some time to make the new electrically triggered air guns work reliably enough for five or six of them to be used together in the towed array. The guns generally worked at 800 p. s. i. for four or five hours, before air leaks became unacceptable and the array needed to be serviced or guns replaced. A shipboard testing of the guns was carried out in a 40 gallon drum of water on the poop.

The older, 28 ins^3, free-running 'Ewing' type gun was put to use and operated satisfactorily, when the air-gun array was unserviceable and could generally be relied upon for 10 hours after which replacement of the P. T. F. E. piston seal was necessary. Results with this gun at 1,500 p. s. i. were only slightly inferior to the triggered guns, of total capacity 50 cu. ins., firing at 800 p. s. i.

The new compressor overheated at first, due to poor ventilation in the space aft of the Upper Scientific Hold. This was overcome by inserting a continuous flow, sea-water heat exchanger kindly lent by the ship's engineers to cool the recirculating fresh water. A blower fan at the air inlet duct also helped.

The new 200 ft. long towed hydrophones were satisfactory acoustically, but are still mechanically weak especially at towing speeds above 6 knots. One of these hydrophones was halved in length and used for the majority of the cruise.

The new receiver console and modified Mufax recorder were generally quite reliable. The 4 sec. sweep speed on the recorder was useful especially in the Mediterranean where the depth range throughout a run was considerable. Two-way travel times within the sea floor varied from about 0. 5 to 2 secs. depending upon location and sea-state. Recordings on 24 magnetic tapes of reflection profiling runs were made for further analysis in the laboratory.

3. Evolution of the Balearic Islands Ridge

Work carried out between and around the Balearic Isles was largely designed to aid interpretation of the Gloria records by providing information about the structure, composition and origin of the sea floor. Extensive side-scan asdic coverage of the shelf was complemented on the surrounding slopes by 12 air gun profiles showing the underlying structure and profiles of its surface obtained by P. D. R. and by the side-scan asdic used as a narrow beam echo-sounder.

4. Evolution of the eastern continental margin of Spain

Exploratory work was carried out on the Mediterranean continental slope of Spain in order to provide a link between the new work around the Balearic Isles and published geological studies of the Atlantic side of Iberia.

5. Reflection profiles west of Iberia

The quality of the profiles of the continental borderland west of Iberia obtained by means of air gun reflection equipment was not as good as profiles of the Mediterranean floor because of the rough seas encountered.

6. Short range side-scan asdic survey

Every opportunity was taken to use the short range side-scan asdic on the continental shelf and upper part of the continental slope, both as a reconnaisance tool and for filling gaps in existing coverage. Valuable data was obtained while on passage past Ireland, in the Celtic Sea, around Iberia, the Balearic Isles, off North Africa and, while storm-bound, to the east of Corsica. The new information relates to bed-transport paths, geological structure and erosional features such as submarine canyons.

Use of the equipment as an echo-sounder was of particular value because of its far narrower sound beam than the conventional echo sounder, which allowed the relief to be seen without the usual distortion in the form of parabolic echoes.

7. Collection of zooplankton for chemical analysis (R. J. Morris)

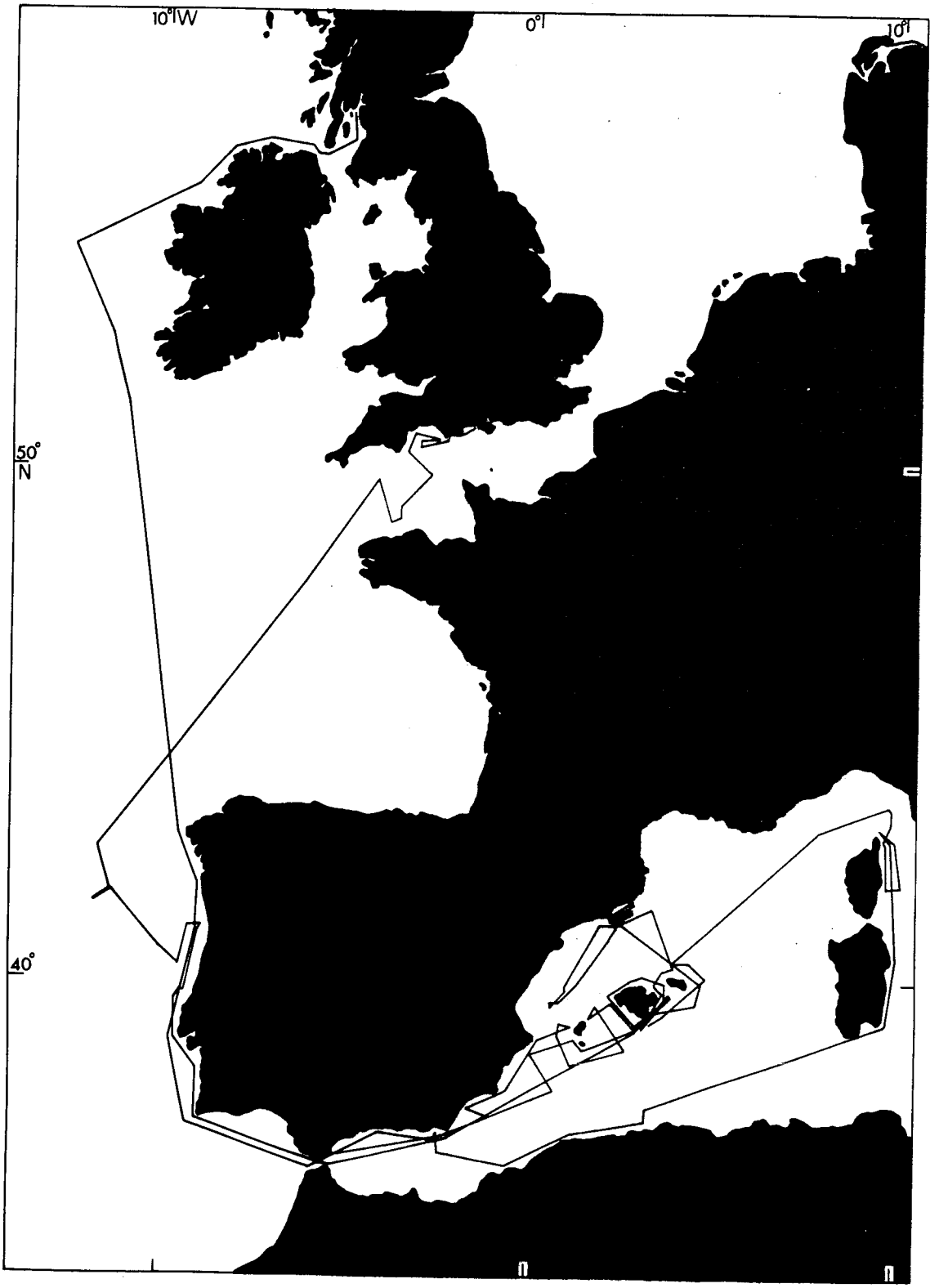
Zooplankton were collected at 14 surface stations in the Western Mediterranean and at 1 station off the west coast of Portugal. Three types of surface net were used - a neuston net and a one metre N113 net with TMT8 mesh, both towed at 5-6 knots and a one metre N113 Oxfam net towed at $1\frac{1}{2}$-2 knots. All specimens were stores under nitrogen at -20°C.

The animals primarily of interest were the small Crustaceans, the Copepods and Euphausiids which occur at the sea surface at night. Also caught were squid and pelagic fish such as Myctophids, which undergo large vertical daily migrations. The Lipids of all these animals will be analysed for their constituent Fatty Acids.

In addition, samples of jellyfish and surface living fish such as flying fish and garfish were retained for later analysis of their pesticide content by the Government Chemist.

Station List

Date	Discovery Station Number	Latitude	Longitude	Net	Towing Speed
4/7/69	7000	37°48'	00°27'	NN	5-6 knots
	7001	37°52'	00°25'	NN	"
5/7/69	7002	38°33'	01°24'	NN	"
6/7/69	7003	39°16'	03°15'	NN	"
8/7/69	7004	41°02'	02°19'	Oxfam	1½ knots
	7005	41°02'	02°13'	N113 8 mesh NN	6 knots
9/7/69	7006	40°00'	01°28'	N113 8 mesh NN	6 knots
11/7/69	7007	41°18'	03°30'	NN	6 knots
12/7/69	7008	39°31'	03°24'	Oxfam	2 knots
13/7/69	7009	39°22'	01°43'	N113 8 mesh NN	6 knots
	7010	39°24'	01°52'	NN	"
14/7/69	7011	38°30'	00°56'	N113 8 mesh NN	6 knots
15/7/69	7012	37°35'	00°33'	N113 8 mesh NN	5½ knots
16/7/69	7013	36°25'	03°37'	NN	6 knots
17/7/69	7014	36°30'	07°33'	Oxfam NN	1½ knots 5½ knots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