I.O.S.

RRS DISCOVERY
CRUISE 85

1 - 30 AUGUST 1977

GEOLOGICAL STUDIES IN THE EASTERN MEDITERRANEAN

Cruise Report No 85

1980

INSTITUTE OF OCEANOGRAPHIC SCIENCES

NATURAL ENVIRONMENT RESEARCH COUNCIL

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On citing this report in a bibliography the reference should be followed by the words UNPUBLISHED MANUSCRIPT.

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(Colossus)

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Institute of Oceanographic Sciences,
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SCIENTIFIC PERSONNEL

Mr. S. Audley - Computing
Mr. B.J. Barrow - Applied Physics
Mr. R.H. Belderson - Geology
Mrs. G.F. Caston - Geology
Mr. W.E. Elford - Ocean Engineering
Mr. C.G. Flewellen - Applied Physics
Miss D. Heathershaw - Computing
Mr. T. Hogarth - Applied Physics
Mr. N.H. Kenyon - Geology
Mrs. J.G. Legg - Applied Physics
Mr. C.D. Pelton - Geology
Mr. R.D. Peters - Workshop
Mr. J. Revie - Applied Physics
Mr. M.L. Somers - Applied Physics
Dr. A.H. Stride - Geology - Principal Scientist

OBJECTIVES

Two previous reconnaissance cruises using GLORIA (long range side-scan sonar) in the Eastern Mediterranean had indicated a band of well defined structural grain extending along the Hellenic Outer Ridge, as well as showing the presence of two other similar outer ridges. These studies also revealed a progressive decrease in the intensity of deformation towards the outer side of each of them and raised interesting questions about the origin of the compression.

The purpose of the present cruise was to test and extend the tentative earlier conclusions by obtaining more data. The main need was to extend the reconnaissance into remoter parts of the sea and, in some crucial regions, to obtain complete enough coverage with GLORIA to prove continuity of specific features. It was also intended to take advantage of the recently increased range of the higher resolution side-scan system to obtain details about the relief that could not be resolved by GLORIA.

In geographical terms it was necessary to determine, a) the limits of the Calabrian Outer Ridge; b) the relationship of the Hellenic Outer Ridge to its possible analogue in the Ionian Isles of Western Greece; c) the location of any features attributable to salt tectonics; d) the relationship of the Hellenic and Cyprus Outer Ridges; e) the form and trend of structures in the Hellenic Trough Complex.

Opportunity was also taken to use the equipment on the passage to and from the United Kingdom.

NARRATIVE

The scientific party joined ship at Lisbon on 30th July. The vessel sailed on 1st August. The run to the Eastern Mediterranean provided an opportunity to use the side-scan sonars so as to improve existing coverage. Work with GLORIA in the Eastern Mediterranean began on 6th August and this first leg ended at Rhodes on 16th August. The ship sailed from Rhodes on 18th August and GLORIA and the air-gun were again used until 20th August and then taken inboard. Further coverage with the short range side-scan sonars was obtained on the homeward run. The vessel reached Barry on 30th August.

NOTES ON EQUIPMENT

Short range side-scan sonar (Jill Legg)

The 30 and 36kHz side-scan sonars were used in the Mediterranean, for just over half of the cruise, as narrow beam echo-sounders in typical water depths of 2500 to 3500 metres. For the rest of the time, on shallower ground, the systems were used in the side-scan sonar mode with ranges of 500, 1000, 1500 and 2500 metres, the range sometimes being limited by refraction but mostly by sea noise.

The 30kHz transducer, which was mounted flat on the plate, had a beam pattern at some tilt angles which gave a multiple fringe effect on the record. This problem was not apparent on the record from the 36kHz transducer, which was mounted off the plate, but the record showed a very weak bottom echo on ground with poor reflectivity.

Telesounder (Jill Legg)

At the end of the cruise, in shallow water, the 250kHz Telesounder system was used to obtain a tape recording of the two transducer signals when transmitting on one transducer only. The recordings were needed for an experiment with signal processing. The beam patterns on the port side, where the transducers were mounted off the plate, were very different, one exhibiting a multiple beam effect. The beam patterns of the starboard transudcers, mounted flat on the plate, were better matched, and so the starboard signals were used for the recording.

Gloria long range side-scan sonar (J. Revie)

This was the second operational cruise of the GLORIA Mark II system. The equipment used was exactly as in the last cruise and the short length of main towing cable used for the latter part of the last cruise was used throughout. The sonar vehicle was deployed and recovered successfully once in each leg of the cruise and a total running time of 11 days was accomplished with no major breakdowns.

The tape recording system was as in the last cruise with two recorders running simultaneously but interleaved and, although some minor problems were

encountered with the recorders, the two information tracks were successfully replayed from all 139 tapes recorded.

For the entire cruise the 2 second, 50Hz pulse was transmitted at 20 second pulse repetition period and good records out to full range on both sides of the ship's track were obtained for most of the time.

SCIENTIFIC RESULTS

The cruise produced a mass of valuable data about the morphology and structure of the Eastern Mediterranean sea floor. This lends considerable weight to interpretations of the limited amount of GLORIA data previously available as well as enabling concepts that had been developed for some areas to be applied to a much larger portion of the sea floor. In some localities it was possible to trace submarine structures towards similar ones known on land.

Some of the main conclusions were concerned with the finding of diapirs and their interpretation as salt karst of submarine origin. They were associated particularly with evidence in favour of thrusting and transcurrent faults in the most disturbed part of the Hellenic Outer Ridge.

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