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CRUISE REPORT

Ship Name: VEMA Cruise No: 3619
Departure: 20 December, 1980 from Mombasa
Date Port
Arrival: 15 January, 1981 at Durban
Date Port
Days at Sea: 26 Days Foreign Port: 4
(Count day of departure but (number of days in arrival port
not day of arrival in port) before next leg)

Area of Operation: Somali and Comoro Basins in the western Indian Ocean (17° S - 1° N,
 39° - 49° E).

Program Description: Determine the plate tectonic evolution of parts of the Somali
and Comoro basins (separation of Madagascar and Africa) by identifying magnetic
anomalies, determining fracture zone orientations, and locating the extinct spreading
center(s). V361: MCS lines were supplemented, and a reconnaissance of the rifted
Madagascar margin was undertaken. Data collected include 3.5 KHz echograms, seismic
reflection profiles, sonobuoys, magnetics and gravity.

Program supported by what contract: NSF OCE 79-19389

Participants: (All L-DGO unless otherwise specified)

| <u>Name</u> | <u>Title</u> |
|---------------|---|
| M.F. Coffin | Co-Chief Scientist |
| D.A. Falvey | Co-Chief Scientist (University of Sydney, Australia) |
| G.I. Prasad | Geologist (University of Dar es Salaam, Tanzania) |
| R. Roessler | Sr. Electronics Technician |
| K. Little | Electronics Technician |
| P. Williams | Data Technician |
| W.J. Robinson | Computer Technician |
| M. Bole | Mechanical Technician |
| A. Hazelman | Mechanical Technician |

All inquiries regarding cruise should be made to the chief scientist.

SCIENTIFIC PROGRAM

VEMA 3619 departed Mombasa, Kenya, on December 20th, 1980, and arrived in Durban, South Africa, on January 15th, 1981, having completed 5400 nautical miles of track. The first segment of the cruise consisted of a 350 mile large airgun/sonobuoy transect of the Tanzanian margin. This was undertaken to supplement the MCS lines completed on V3618 in order to better understand the structure of sheared margins and to locate the continent/ocean boundary.

The second and major segment of the cruise consisted of five long (300 to 700 mile) north-south lines in the Somali Basin. The purpose of this segment was to determine the plate tectonic evolution of part of the Somali Basin, i.e., the kinematics of the separation of Madagascar from Africa, from sea floor spreading magnetic lineations, fracture zone orientations, and by precisely locating the extinct spreading center(s) between the two land masses. Preliminary data analysis reveals that magnetic anomalies M8 through M25 (tentative) are present; sea floor spreading between Africa and Madagascar occurred from ~ 170 to ~ 120 million years before present.

The third segment of V3619 was devoted to three ~ 250 mile, approximately north-south large airgun/sonobuoy transects of the Comoro Basin and Madagascar margin, for the purpose of comparing this margin with its analog, the Kenya/Somalia margin. Navigational uncertainties on the bridge, unfortunately did not allow us to go closer to the coastline than the 2500 meter isobath off Madagascar.

The final part of the cruise was a ~ 1200 mile transit leg from the Comoro Basin to Durban, South Africa.

EQUIPMENT

Magnetometer: Due to a lack of ordered spare chips, the magnetometer did not function on V3618A. However, before W. Robinson departed from V3618, he devised a modification employing available spare chips. R. Roessler implemented the modification, and after several days of tuning and telex communication with W. Robinson at L-DGO, the instrument became functional once again. The two men mentioned are to be complimented for their competence and perseverance. It should now be obvious, however, that the L-DGO magnetometer is outdated; for a relatively small expenditure, a stock (e.g. Varian) magnetometer and bottle could be obtained. It would not require tuning (e.g., nearly constant attention on V3619), would read directly in gammas, and would come with adequate documentation.

Gravimeter: The sea gravimeter was doused in saltwater from a broken pipe during V3618. On V3619 any course changes resulted in rapid blue/red trace deviations (table dumping); the table required approximately 30 minutes to recover. Despite communications with L-DGO, this problem was not rectified. It appears that no one at L-DGO or on board ship has the technical expertise to trouble-shoot the gravimeter and table. There was inadequate documentation aboard.

Precision Depth Recorder: The only echo-sounder used was the 3.5 KHz. The 12 KHz recorder has been cannibalized for spares. The 3.5 KHz recorder was fairly dependable, yet it is also outdated. Any worthwhile information other than depth is lost from 0-100 fms, 400-500 fms, 800-900 fms, etc., due to lack of a programming function. It is thus suggested that the UGR's replace the PDR's.

Note: A decision was made by Ship Ops Group several years ago to use 3.5 KHz as standard P.D.R. 12 KHz no longer essential

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Seismic Profilers: The L-DGO seismic profilers were electronically reliable, but mechanically shot. Throughout the leg problems occurred; Profiler "A" is now working thanks to the ingenuity of the chief engineer using a door latch, teflon brake, and matchstick. The filters on the profilers are of dubious integrity - results could not be reproduced from channel to channel. Thus MCS filters (Ithaco) were borrowed and they worked well. When the L-DGO profilers were working, the records were of excellent quality.

Airguns, Sonobuoys and Eel: The Lamont airgun and Bolt guns performed admirably, as did the new eel. Thirty-six of approximately fifty-five sonobuoys were at least partially successful.

Computer: The computer worked well until it died shortly before the leg ended. Hence not all of the data collected is on disk or tape yet. The computer operator had no ability to repair hardware, so repairs were impossible.

TECHNICAL STAFF

The two air gunners, A. Hazelman and M. Bole, performed their jobs competently and enthusiastically. They were a pleasure to have aboard. The science technicians displayed varying degrees of competence and motivation. R. Roessler was extremely valuable; if any serious breakdowns occurred, he was the only person who could undertake the repairs. He took an above-average interest in the equipment. The science staff as a whole was easy-going and highly compatible, valuable characteristics which no doubt contributed to the success of this cruise.

The nature of the L-DGO science technician's job is such that turnover is high and quality low. Perhaps better approaches than present would be a technician "pool", or each major working group having its own technician(s). If a seagoing technician did not have to spend eleven months of the year at sea, we are certain that more competent, more mature, and more satisfied technicians would be employed.

ACKNOWLEDGEMENTS

We are grateful to Captain Henry Kohler and the entire friendly and cooperative crew of the VEMA for their help in achieving our scientific objectives.

V3619

TRACK CHART

