

Lamont - Doherty Geological Observatory | Palisades, N.Y. 10964  
of Columbia University

Telephone: Code 914, Elmwood 9-2900

Cable: LAMONTGEO

Palisades New York State

TWX-710-576-2653

CRUISE REPORT

Ship Name: VEMA Cruise No: 3617  
Departure: October 15, 1980 from Colombo, Sri Lanka  
Date Port  
Arrival: November 13, 1980 at Mombasa, Kenya  
Date Port  
Days at Sea: 29 Days Foreign Port: 6 (Colombo)  
(Count day of departure but (number of days in arrival port  
not day of arrival in port) before next leg)

Area of Operation: Owen Basin and north flank of Sheba Ridge in the Arabian Sea.

Program Description: SEE ATTACHED SHEETS

Program supported by what contract: NSF OCE-79-19241

Participants: (All L-DGO unless otherwise specified)

<u>Name</u>	<u>Title</u>
James Cochran	Chief Scientist
Carol Geller	Graduate Student
Michael Steckler	Graduate Student
David Roach	Heat Flow Technician
William Robinson	Computer Technician
Kevin Little	E. T.
Edward Christian	E. T.
Patrick Williams	Data Quality Control
Hector Smith	Air Gunner

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

## CRUISE REPORT

Ship Name: VEMA

Cruise No: 3617

### Program Description:

The principal objective of this cruise was a study of the nature of the transition between the Sheba Ridge, which has been an active mid-ocean ridge since the Miocene and the much older (probably Mesozoic) Owen Basin. The goal of the study was to learn something of the initial rifting processes which result in the breaking of lithospheric plates and the initiation of seafloor spreading.

The cruise was plagued with equipment problems which forced a scaling down of our original plans and about which I will have more to say below. We were, however, able to obtain six lines across the magnetic quiet zone and Sharbithat Ridge, the structures separating Sheba Ridge and the Owen Basin, as well as a longitudinal profile along the quiet zone, although the usefulness of the latter line was severely affected by the fact that there was no working reel at that time. Eighteen sonobuoy refraction lines were run, both in the magnetic quiet zone and in the Owen Basin.

We also obtained magnetic lines in the Owen Basin which run completely onto the continental shelf of Oman between 19°N and 20°N (see attached map). These yielded magnetic anomalies which although of fairly low amplitude could be tentively correlated between tracks although we could not tie them to the time scale at present.

Probably the most successful part of the cruise, at least in terms of data acquisition was the heat flow program. Four multipenetration "pogo" stations were occupied, three in the magnetic quiet zone and one in the Owen Basin, and a total of about 30 measurements were obtained. The values in the Owen Basin were consistently near 1.5 H.F.U. which is somewhat greater than would be expected for crust of its supposed age. The values in the westernmost station were in the range of 2.5 - 2.7 H.F.U. and in two eastern stations about 1.9 - 2.0 H.F.U. It is also interesting that as the Owen fracture zone is approached, the magnetic anomalies on Sheba Ridge decrease in amplitude and become more difficult to decipher. Also the ridge loses something of its mid-ocean ridge type cross section - almost as if spreading had a harder time getting going at its eastern extremity.

I have already mentioned that the cruise was plagued by equipment problems. There were difficulties with almost every system in the upper lab which caused significant down time or degradation of data quality. This might be considered bad luck, but looking back on the five cruises which I have been on during the last four years, they all experienced moderate to severe equipment problems. I think we have slipped into a pattern where we expect and accept instrument problems and the resulting loss of data and efficiency.

I think improvement needs to come in two areas. The first is the equipment itself, most of which is ten years out of date and worn out. Much of it is the identical quipment that was on Vema when I first sailed on her

Cruise Report: Vema 3617 (cont...)

in 1972. The equipment, instead of being continually rebuilt and patched together, needs to be systematically replaced and updated. With the amount of money that goes into data acquisition for each leg there is no reason why we need to keep using gravity fed chart recorders which are subject to frequent clogs or floods. There is no reason why, when I have a heat flow program that depends on having a 12 kHz receiver, I should have to depend on a rebuilt Korean War vintage government surplus unit which doesn't work! Put simply, the present MGG equipment on Vema is an embarrassment to the laboratory.

The second area where improvement is needed is the technical support, both at home and on the ship. This has a couple of aspects. One is simply communications. I don't know how the Data Acquisition Department at Lamont got the impression that a new eel was not needed and so left an eel which had just missed the ship in Singapore sitting in the agents warehouse. The shipboard people not only all knew it was needed but were under the impression it would be sent. Also under communications there is the problem of supplies and spares. The shipboard E.T.'s don't know what they have or need and thus usually do not send for anything until they are completely out of it - creating a crisis. Also when they do order supplies, they do not get all that they ask for. Apparently the people back home do not always believe them.

The second aspect is the quality and training of the E.T.'s. The senior E.T. was on vacation this month which left me with two kids who have four months on Vema and who turned out to have huge holes in what they are familiar with. The gravity system in particular seems to be a mystery. The cross coupling computer is not working and has not worked for at least two months and nobody was even aware of it. I don't know how long it has been down but I do know it has not been calibrated for at least four months.

What I would advocate is having fewer E.T.'s, perhaps only one, but making sure that he is experienced, completely familiar with the equipment and a long term employee. Of course this would mean paying the E.T.'s more and seeing that they are rotated home regularly. What I can visualize after Harry Van Santford retires, is having three experienced E.T.'s, one of whom is doing a four month tour on the ship and the other two being back at Lamont handling the responsibilities that Harry has now. These persons could also be familiar with and work in developing some of the new instrumentation which we are going to need to stay competitive in the future.

James R. Cochran  
Chief Scientist

