

NOTES

INTERNATIONAL SYMPOSIUM ON GEOLOGY AND GEOPHYSICS OF THE INDIAN OCEAN (GIO-96), 21-25 OCTOBER, 1996

The National Institute of Oceanography, Goa, organised an International Symposium on the **Geology and Geophysics of the Indian Ocean (GIO-96)**, 21-25 October, 1996, coinciding with three decades of oceanographic research in India. The objectives of the symposium were to bring the results of various studies to a common platform, to promote exchange of ideas, to find out the gaps in existing knowledge and to develop collaborative programs that lead to a better understanding of the Indian Ocean. The symposium was mainly sponsored by Council of Scientific and Industrial Research, Department of Ocean Development, Office and Naval Research, USA, Department of Science and Technology, Oil and Natural Gas Corporation Ltd., Gas Authority of India Ltd., and International Lithosphere Program.

The general recommendation of the Panel of experts and the participants was that a majority of scientific problems could be addressed by formulating collaborative programmes. Because of its strategic location and the expertise developed over the years, it was strongly felt that the National Institute of Oceanography, India, should take lead in studying various scientific problems pertaining to the Indian Ocean.

Structure and Tectonics: Chairman: Prof. Manik Talwani, Members: Prof. Olav Eldholm, Prof. J.G. Sclater, Mr. R.R. Nair and Dr. D. Gopala Rao

Scientific Problems Identified :

1. Age and location of the oldest oceanic crust off the east coast of India.
2. Extent of the Cretaceous quiet zone.
3. Origin and extent of the 85°E ridge.
4. Temporal and spatial relationship of the onshore and offshore tectonic and stratigraphic elements.
5. Origin of the Laxmi and Laccadive Ridges
6. Nature and age of the Laxmi Basin crust.
7. Explanation of the magnetic lineations observed north of Laxmi ridge.
8. Evolution history of the Arabian sea in light of mapped paleo-propagating ridges.
9. Role of the Re-Union hotspot vis-a-vis various observed tectonic features.
10. Age of the seamounts in the Indian Ocean.

Recommendations :

- * To map the extent of Mesozoic anomalies along the Eastern Continental Margin of India.
- * To re-examine the magnetic data in the conjugate Somali and Mascarene Basins and revise the reconstruction models of the Arabian Sea.
- * It is time to emphasise on seismic investigations in the Arabian Sea and Bay of Bengal.
- * Obtain heat flow values.
- * Obtain ages of seamounts and volcanoes
- * Investigate the possibility of drilling on Laxmi Ridge and 85°E Ridge.

Prof. Manik Talwani, Rice Univ., U.S.A., Prof. Olav Eldholm, Oslo Univ., Norway and Prof. J.G. Sclater, Scripps Institute of Oceanography, U.S.A. have expressed their desire to collaborate with NIO and other Indian scientists to study the scientific problems related to the Indian Ocean.

Dr.D.Haldar, Geological Survey of India, proposed a collaborative study on dating of seamounts and volcanoes.

Particle Flux and Sedimentary Processes: Chairman: Prof.S.E.Calvert, Members: Prof.B.L.K. Somayajulu, Prof.S. Krishnaswami, Mr.R.R.Nair and Dr.J.Kravitz

Scientific Problems Identified:

1. Type of organic carbon at molecular level and processes of degradation and accumulation.
2. Sources of organic carbon in the Bay of Bengal and Arabian Sea
3. Rates of Sulphate reduction at the base of OMZ
4. Origin of gas hydrates in Bengal Fan and Indus Fan
5. Sediment budget calculations - river discharge, influence of monsoons.

Recommendations:

- * To resolve the causes for the enrichment of the organic carbon in marine sediments.
- * To estimate the contribution of major rivers and understand the role of monsoons on the build up of continental margins.

Prof.S.E.Calvert, Univ. of British Columbia, Canada, Dr.G.Cowie Univ. of Edinburgh, UK and Dr.R.Keil, Univ. of Washington, USA, proposed a collaboration with NIO to study the factors that control the organic carbon preservation along the western continental margin of India, the influence of dissolved oxygen on the benthic foraminifera to identify the species assemblages that are attuned to the oxygen content in the sediment and in the water column.

Sea Level Changes and Paleoceanography: Chairman: Prof.Bilal U. Haq, Members: Prof.Bjorn A. Malmgren, and Mr.R.R.Nair

Scientific Problems Identified:

1. Reliable sea level curves of varying time scales for Indian Coast
2. High resolution paleo-monsoon studies
3. Thermohaline circulation in the Northern Indian Ocean
4. Possibility of abrupt climatic events in the Indian Ocean

Recommendations:

- * To construct a reliable sea level curve and update based on ONGC drill hole data and other palaeontological and geomorphic evidences for different tectonic blocks of the Indian coast.
- * To study paleo-monsoon variability on short time scale through tree rings and corals and on millennium scale through sediment cores.
- * To understand the thermohaline circulation through Indonesian archipelago and its influence on the paleo-monsoon.

Other Important Scientific Problems

Comparison of tectonic, volcanic and hydrothermal processes over slow spreading ridges and back-arc basins.

Recommendations:

- * To compare tectonic, volcanic and hydrothermal processes of Mid- Atlantic Ridge with those of Carlsberg Ridge.
- * To compare tectonic, volcanic and hydrothermal processes of Mariana Trough with those of Andaman backarc basin.

Prof.Peter Rona, Rutgers University, U.S.A. proposed a collaboration with NIO to compare

the result of Carlsberg Ridge program with that of Mid Atlantic Ridge and Andaman back-arc basin with that of Mariana Trough.

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'CARBONATITE WORKSHOP' HELD AT AMBADONGAR: DECEMBER 6-11, 1996.

Twelve foreign and eight Indian pundits on carbonatites besides others took active part in an 'International Carbonatite Field Workshop' held at Ambadongar, Gujarat, India during 6 - 11 December, 1996. The workshop was sponsored by the Science and Research Centre of the Gujarat Mineral Development Corporation, Ahmedabad and organised by V.B. Vora, (Science and Research Centre, GMDC, Ahmedabad), S.G. Viladkar, (St. Xavier's College, Mumbai), Keith Bell (Carleton University, Ottawa, Canada), and A. Simonetti, (University of Freiberg, Germany). Penrose conference style was adopted for the proceedings with plenty of time for discussions. A monograph on 'Ambadongar carbonatites' by S.G.Viladkar, St. Xavier's College, Mumbai was released by J. Gittins on the occasion. Field work studying the different types of carbonatites, fenites and alkaline rocks and their field relations around Ambadongar - Panvad - Kawant - Narmada were carried out in the forenoon and papers were presented in the afternoon. The smaller number of participants enabled better interaction among delegates in the field as well as during the presentation of papers. The salient features of the papers presented are:

1. An overview of the history and geology of the Ambadongar carbonatite complex since its discovery in 1963 was provided by S.G. Viladkar.
2. Ambadongar carbonatite - alkalic complex associated with Asia's largest fluorite deposit (c. 8 million tonnes of fluorite) is posing problems of poor grade (20 - 25% CaF_2 with larger amounts of CaCO_3 (5 - 8%) in the gangue in recent years which is causing problems in beneficiation using conventional floatation cells. Column floatation and acid leaching are being attempted but seems to increase the cost and thereby the economic viability of the Project in a Market Economy environment. Aspects on better ore grade and cheaper beneficiation options need to be explored. (V.B. Vora and other GMDC officers).
3. Sr and Pb isotopic studies in fluorite indicate very complicated open system behaviour, such as carbonatitic fluids interacting into fluids from Bagh sandstone (Sr isotopic data), and in addition with fluids from Precambrian rocks (Pb isotopic data) (K. Bell, Carleton University, Canada, and A. Simonetti, University of Freiberg, Germany).
4. Eight out of the nineteen carbonatite complexes in India belong to the economically important carbonatite complexes (EICC). These EICC include Ambadongar, Sevattur, Newania, Samalpatti, Pakkanadu, Beldih, Sung, and Samchampi. Among these, available data points to the Samchampi Complex in Assam as the most important economically, with potential sources of Nb, Ta, Fe, P, Ti, and REE (Krishnamurthy and others, Atomic Minerals Division, Hyderabad).
5. Carbonatite complexes will become important sources for REE, and Nb in the 21st Century, as any breakthrough in low temperature superconductivity would increase the demand for rare earths manifold. Carbonatite complexes were classified into four facies, namely extrusive, vent, hypabyssal and plutonic and examples for the different types provided (D.P. Gold, The Pennsylvania State University, U.S.A.).
6. Pyrochlore, enriched in Nb (with A site deficiency) in the lateritic soil capping the Leushe carbonatite, Zaire, is being worked by funding from the European Community which consumes a third of the world's Nb. (A.R. Wooley, Natural History Museum, London).