

The main recommendations of the Group Discussion are as follows :

- (i) Studies may be initiated under deep continental study programme to relate metallogeny with other aspects of deep continental crust as a follow up or continuation project of the DCS project.
- (ii) Integration of geological, geophysical and geochemical studies may be taken up in a suitable manner and mechanism for the same may be worked out.
- (iii) Studies on Late Proterozoic crustal development *vis-a-vis* Malani volcanism may be taken up with special emphasis on geochemical and geophysical aspects.
- (iv) Publication of full text of papers, after peer review, as proceedings of the Group Discussion was recommended.

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GROUP DISCUSSION ON MODELLING IN EARTH SCIENCES WITH SPECIAL REFERENCE TO DECCAN VOLCANISM—A REPORT

The Deccan volcanism is the latest tholeiitic continental flood basaltic episode in the Indian region covering an area of 0.5 million km². It has attracted the attention of geoscientists worldwide due to its large volume and timing of its origin close to the K-T boundary. Its origin is attributed to the magmatic activity of the Re-union hot spot at the time of the formation of the western passive margin of India. A three-day group discussion on 'Modelling in Earth Sciences with special reference to Tectonics and volcanism in the Deccan Volcanic Province (DVP)' sponsored by Earth System Science Division of the Department of Science and Technology, New Delhi was organised by the National Geophysical Research Institute, Hyderabad, India, during April 27–29, 1993. Forty-one papers dealing with geological, geochemical and geophysical constraints and modelling of Deccan Volcanism were presented. In the opening remarks Dr. B. P. Radhakrishna, President of Geological Society of India, pointed to (i) the need for further studies to identify the feeder dykes, (ii) establish the chemical stratigraphy, (iii) verify the general applicability of N-R-N palaeomagnetic stratigraphy for the entire DVP and (iv) constrain petrogenetic modelling through further detailed work on the petrography, and geochemistry including isotopic studies.

The main highlight of the meeting was in constraining the duration of the Deccan Volcanism. ³⁹Ar – ⁴⁰Ar dating has provided compelling evidence for a longer duration of Deccan Volcanism. The older lavas of Jawahar-Poladpur Formations yield plateau ages of ~67 Ma and the younger ones of Mahabaleswar ~62 Ma. In the upper lava sequences red boles are more common between flows, which indicate long breaks between eruption episodes. The available evidence indicates eruption between 67 Ma to 62 Ma ago. DT eruption was not triggered by bolide impact at 65 ± 0.08 Ma. Volcanic activity straddles the K-T boundary. The mass extinction at K-T boundary could be a combined effect of DT volcanism as well as bolide impact. Biostratigraphic evidence from the East Coast suggests at least 9 million years duration for DT volcanism. Fossil evidence in the inter-trappean Lameta beds also indicates a much longer duration for Deccan Volcanism.

The interpretations of the DSS data over this region show that the elastic structure below the Deccan Trap is highly complex. There are clear evidences of vertical and lateral variations in the physical properties indicative of complex

magmatic emplacement pattern within the crust during Deccan volcanism. Analysis of geophysical fields produced by the deformation due to Volcanism load over Indian lithosphere associated with its passage over Reunion hot spot has yielded information about the variation in the thicknesses of elastic lithosphere and oceanic crust.

The following recommendations were made :

- (i) Geological Survey of India to be requested to publish the geological maps of the region. This will help in getting an estimate of the total volume of the lavas, basement topography, flow-by-flow stratigraphy, feeder dykes etc. The data gaps then need to be filled.
- (ii) Existing geophysical, geological and geochemical data to be compiled in one volume.
- (iii) A borehole to be drilled in the Western region such as Alore where the Deccan Traps are thinnest, to calibrate geophysical interpretation and to undertake the geochemical and geological studies of the cores to constrain modelling activities as mentioned below.
- (vi) Studies of the chemical geodynamics of the Deccan Trap for characteristics of the magma reservoirs and crust and mantle contamination.

Discussions brought out that the whole Deccan Trap region comprises of two main domains: (i) the region N and NW of Sonata belt, having the earliest probable pristine picritic flows and (ii) the region South of sonata belt closer to the West Coast where the lowest layer may have primitive elements. Upper sequences are contaminated. The Eastern part is poorly studied. Three regions in DVP as subdivided above may be chosen based on accessibility and level of information.

- (v) To carry out modelling of the thermo-mechanical processes of the lithosphere-aesthenosphere system involved in the Deccan Volcanic Province such as (i) modelling of plume dynamics, (ii) Modelling of the structure of the lithosphere, and (iii) Complex interaction of plume and lithosphere.
- (vi) To constrain the models as mentioned above, the crust and mantle changes associated with these thermomechanical processes be investigated using (i) high frequency seismic tomography coupled with (ii) potential and (iii) electromagnetic geophysical measurements, (iv) Q structure and (v) anisotropy to be investigated using other seismological studies.

It is hoped that on the basis of identified gaps in the data and modelling needs, further multi-disciplinary and multi-institutional research programmes can be optimally planned in this Challenging Area.

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ACTIVITIES OF THE GEOLOGICAL SURVEY OF INDIA TRAINING INSTITUTE

In the early days of the history of the Geological Survey, training for the new entrants was invariably given by some of their seniors in the field, while conducting regular mapping on mineral investigation. Since the early 50s training camps were held for a couple of months each year, mainly in geological mapping for newly recruited officers of the Survey, though a few from the State Geological Surveys and the Universities were also given an opportunity to take advantage of this facility, at their own cost. With increase in the number of recruits and the need to familiarise them in many specialised sub-disciplines (like petrology, geophysics, engineering geology, photogeology etc.), it was felt that a full fledged Training Institute is necessary and this was started in 1976. Its Headquarters is now at Hyderabad.