

CONTACT PROGRAM ON PALAEOMAGNETIC AND ROCK MAGNETIC RESEARCH

A national interactive workshop on "Palaeomagnetic and Rock Magnetic Research in India" was held in January 2002 under the auspices of the Department of Science and Technology under the Deep Continental Study program with the objective of enlarging the scope and visible impact of these studies [Curr. Sci., 2002; v. 83(1); pp 14-15]. The workshop, while drafting agenda for future research, recommended holding contact programs on advanced palaeomagnetic techniques and on application of AMS techniques. As a sequel to the recommendations of the workshop, a fifteen-day contact program on palaeomagnetic and rock magnetic research was organized at the Centre for Earth Science Studies (CESS), Trivandrum during June 16-30, 2003. The program was oriented towards introducing and familiarizing the conventional, as well as new techniques of palaeomagnetic and rock magnetic investigations among the young researchers from universities and scientific organizations. The course was intended to draw attention to the principles and state-of-the-art practices of palaeomagnetism and rock magnetism and to demonstrate their use in determining the evolutionary processes of the Earth's crust. The program is ultimately aimed to build up expertise in the field of palaeomagnetic and rock magnetic research in India.

Twelve candidates were selected for the course from IITs (Kharagpur, Kanpur, Roorkee), Universities (Jammu, Lucknow, BHU, Punjab, Sri Venkateswara) and other organizations (NIO, IIG, WIHG, DGM, Kerala). Research interests of the selected candidates cover wide range of topics in earth sciences related to the early crustal evolution and deformation, metamorphic and igneous complexes, sedimentary basins, lake sediments, marine sediments and palaeoclimate and Recent to Quaternary alluvial geology. Considering the composition and varied interests of the participants, the program was so designed to cover all the above aspects. The participants were supplied with lecture notes, compendium of interesting review papers and a CD containing two text books, other literature and some software programs for data processing and analysis.

Dr. D.N. Avasthi, the Chairman of the PAMC of the Deep Continental Studies (DCS) of the DST inaugurated the program on June 16, 2003 with a lecture on "Indian Lithosphere Beyond Landmass". Subsequent technical program was categorized into three distinct parts. The initial part covered concepts, techniques, methods and instrumentation. G. Balasubramonian (CESS) had given introductory lectures covering physical principles

of magnetism. Subsequent lectures covered the concepts, techniques and methods in Palaeomagnetism (T. Radhakrishna, CESS), fundamentals, methods and techniques of rock magnetism (S.J. Sangode, WIHG) and laboratory methods and instrumentation that include principles and operation of various magnetometers, demagnetizers and hysteresis loop tracers (R. Venkatachalapathy, Annamalai University). These three resource persons have taken the lead role throughout the program.

The second part of the program was devoted to sampling techniques, techniques of palaeomagnetic data processing and analysis, rock magnetic application in earth sciences like their usage as palaeoclimatic proxies, sediment source modeling and environmental aspects. During this stage, Dr. R. Shankar, Department of Marine Sciences, Mangalore University joined the faculty to cover some of the above useful aspects.

Last part of the program was mainly devoted to discussing the case histories, particularly from India. At this stage the participants were introduced to the instrumental measurements (spinner magnetometer, demagnetisers and susceptibility meter). Practical training also was imparted on methods of applying corrections to the field orientations, structural corrections, stereographic plotting, calculation of cartesian and polar coordinates, statistical treatment, calculations of palaeopole and palaeolatitudes etc. Emphasis was also laid on the Indian APWP and tectonic configurations, integration of the results with geochemical, petrological and geochronological investigations, Arabian Sea and Bay of Bengal palaeoclimate proxies and sediment source modeling using rock magnetic properties, variety of environmental applications, archaeomagnetism and palaeointensity studies.

Soon after covering the fundamental concepts of palaeomagnetism and rock magnetism, a field trip was organized to the Attapady valley, which is the western extension of the Bhavani shear zone on the southern flanks of the Nilgiri massif. The area was selected in view of the importance attached to its distinct role in the geodynamic continental reconstructions during the Precambrian era. The fieldwork concluded with a visit to the Cenozoic sedimentary coastal sequences in Varkala-Paravur sector. During the fieldwork, participants acquired experience in field sampling methods for palaeomagnetic investigations, particularly of drilling the core samples and the orientation methods. Dr. Mathew Joseph, a junior geologist -in

Geological Survey of India, Trivandrum (formerly in palaeomagnetism laboratory of CESS) joined the resource personnel for the fieldtrip and subsequent laboratory work. Dr. A. D. Singh, Department of Marine Sciences, Cochin University introduced the participants to the sedimentary sequences.

While Dr. Avasthi gave a lead to the program by inaugurating it, Shri T. M. Mahadevan chaired the valedictory function on the last day of the contact program. He gave a lecture on "The Indian Lithosphere: the Geology and Evolution" stressing upon the significance of thermal events in crustal evolution and its implications in Palaeomagnetism. He then conducted an interactive session inviting the views and reactions of the participants on the program. A feedback pro-forma collected from the participants was also discussed. It is quite pleasing to note

the overwhelmingly positive response from the participants. They expressed in unanimity that the program benefited them and would be useful in their research programs. A few participants felt that additional practical component could have benefited them more. Finally all the participants expressed the desirability of conducting similar courses and also an advanced course by covering more case histories and by increasing the laboratory practical component. The Chairman emphasized the need for large interactive research projects jointly by the participants in areas of common interest and the participants reacted positively to the suggestion.

Centre for Earth Science Studies T. RADHAKRISHNA
Trivandrum

Email: tradhal@rediffmail.com

WORKSHOP ON GRAVITY METHOD FOR GEODYNAMIC STUDIES AND RESOURCE EXPLORATION: NEW TRENDS AND INNOVATIONS

The above workshop was organized by the National Geophysical Research Institute as part of CSIR Diamond Jubilee Celebrations. Dr. V. P. Dimn, Director, NGRI welcomed the guests and participants of the workshop and described the various activities undertaken by NGRI as part of CSIR Diamond Jubilee Celebrations. Dr. D. C. Mishra, the then Project Leader, Gravity Group highlighted the installation of an Absolute Gravimeter in NGRI and preparation of a revised Bouguer anomaly Map of India on 1:2 million scale with 5 mGal contour interval as a collaborative project between NGRI and the Geological Survey of India (GSI). The workshop was inaugurated by Dr. H. K. Gupta, Secretary, Department of Ocean Development (DOD) who also inaugurated the Gravity Observatory constructed for housing the new gravimeter. This new gravimeter is acquired under a collaborative program between Council of Scientific and Industrial Research and DOD. On this day, the draft copy of the revised Bouguer Anomaly Map of India was also released by Dr. P. C. Mandal, Director General, GSI and Dr. Han Narain released the abstract volume. During the inaugural session, a brief presentation on the highlights of this instrument which can measure the absolute value of gravity field at a site to an accuracy of 2 microGal with a precision of 1 microGal at quiet site. The future programs related to this gravimeter as (I) establishing gravity bases in India and Antarctica, (n) crustal deformation studies and (in) study related to

sea level changes along west and east coasts of India were also explained.

During the course of the workshop, twenty six invited presentations were made by scientists from different geoscientific organizations of the country. The presentations were broadly classified into five groups: (i) Theoretical Developments, (n) Gravity Map of India and its Applications, (in) Marine Gravity and its Applications, (IV) Gravity Method and Geodynamic Studies, (v) Gravity Method for Hydrocarbon and Mineral Exploration.

Five presentations were made in group (I). They were basically related to spectral and coherence estimation by different methods and their comparative study with special emphasis on use of multi-taper windows. Application of fractals using scaling distribution function and its application to field data was presented. The application of stabilized analytic signal in potential field based on Tikhonov's regularization method was discussed. A joint computational scheme for computation of gravity and magnetic fields due to arbitrary shaped bodies and inversion of gravity anomalies using SVD due to a fault model and its application over field data was also presented. In group (n), four presentations were made related to Indian geology through images of potential fields and their geodynamical aspects. In this regard, special emphasis was made to identify past tracks of plumes and hotspots based on gravity anomalies and their relation to seismicity. Based on modeling gravity