Foreword

Geomagnetic Methods and Lithospheric Structure

Perturbations in the earth's magnetic field have long been studied for deciphering its internal structure. These, like other geophysical probes, received a new impetus over the past 3 decades from developments of high resolution measuring systems and the availability of large high speed computers and are being increasingly applied to obtain finer constraints on models of earth structure. Globally consistent set of magnetic data yielded by highly sensitive satellite-borne magnetometers and the new ocean bottom magnetometers further spurred this activity with design of even more incisive experiments and numerical models. These developments worldwide had parallels in Indian programmes of studying the solid earth. Some of these including analysis of MAGSAT data over the Indian region, results of magnetic array studies and of palaeomagnetic signatures of the still enigmatic Deccan Volcanic Province created in a brief intense spurt of prodigious volcanic activity, are included in this volume.

The practice of geomagnetic exploration, however, remains an extremely delicate exercise owing to the specificities of the dipolar field, and the problems of noise, calling for much ingenuity and elaborate methodologies, that still largely reside in the personal experiences of those who helped refine the wide range of these technologies. It was therefore felt desirable to specially invite these authors to contribute state-of-the art papers with a view to bringing out an authentic account of their perceptions and experiences gained through a lifetime of sustained work in an important area of geophysical practice. These papers might seem to overweigh the volume but would, it is hoped, serve to create a rich illuminating perspective for future researchers to explore the potential of yet inscrutable signatures of the earth's internal structure in the space-time patterns of its magnetic field.

Papers included in this volume on lithospheric structure constructed from geomagnetic anomalies, present only a partial view of what has been and is being done by Indian geoscientists in this field, such as for example the recent magnetotelluric explorations in some parts of the country and the considerable airborne magnetic exploration carried out by the Geological Survey of India. This has resulted partly because of the pattern of response received from those who agreed to contribute to this volume, and partly because of inadvertent omissions to invite those who could have made a notable contribution.

These limitations notwithstanding, it is felt that this special issue which was designed at the suggestion of Professor V K Gaur, would serve as a valuable reference to students and professional scientists interested in the principle and practice of using geomagnetic field variations to explore the earth's deep structure.

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