BOOK REVIEW

PROCEEDINGS OF GOLDEN JUBILEE SEMINAR ON EXPLORATION GEOPHYSICS IN INDIA edited by K. Choudhury, S. De, B.P. Pal, U.K. Biswas and B. Ghosh. Geol. Surv. India Spec. Publ. no.49, 1999, 509p. Price: Rs.400

The volume consists of 50 papers from a seminar held in 1995 to commemorate the golden jubilee of geophysical studies in Geological Survey of India (GSI). The keynote address by Dr. Hari Narain, former Director, National Geophysical Research Institute, which set the tone for the seminar, recalls that India's entry into geophysics was not far behind Europe's. The establishment of Survey of India in 1767, the geomagnetic observatory at Colaba in 1847, Geological Survey of India in 1851 and India Meteorological Department in 1875 were landmark events. The functioning of triangulation survey network from 1799, the theory of isostasy formulated by Pratt in 1852, setting up of as many as 30 gravity stations spread across the country between 1865 and 1873 and publication by Oldham in 1888 of a catalogue of Indian earthquakes were commendable achievements. Exploration geophysics, an offspring of the twentieth century, appeared in the Indian scene as early as 1923 when Burmah Oil Corporation used torsion balance to conduct gravity survey in the Indus valley. The three other principal methods of prospecting, namely, electrical, magnetic and seismic arrived, in a gross sense in that order, in the next three decades.

Broad and ambitious in its aim, this special publication encompasses eight themes. The first three respectively deal with the integrated use of multiple methods for mineral prospecting, utility of geophysics in the study of structure and tectonics of the earth's crust and exploration for energy resources. While the fourth theme dwells on the advances and innovations in geophysical methodology and interpretation, the fifth presents instances of laboratory studies, instrument development and even a geophysical survey for a specific industrial objective. The next two themes pertain to marine geophysics and utilization of airborne and satellite geophysical data. The special theme of the seminar, namely, the role of geophysics in environmental studies is the concluding topic.

Experts in the respective fields introduce five of the eight themes. In introducing the theme of geophysical mapping for structures and tectonics, R.N. Bose reminds us about the versatility of geophysics in that it can cover all scales from small to large, all depths from deep to shallow and all geographical settings, as also the different stages of an exploration programme. Describing the new trends in exploration for energy resources, Kharak Singh underscores the evolution to the current state of the art in three-dimensional (3-D) seismic acquisition, processing and interpretation. In his remarks about the future of geophysical technology, D. Guptasarma lays special emphasis on shear wave seismics, semblance analysis, seismic tomography, wide band complex resistivity, direct detection of groundwater, and the use of pseudorandom binary sequence excitation for various controlled sources in geophysical exploration. While introducing his topic, B.R.J. Rao, reviews a decade of marine geophysical activities in GSI, consisting of mapping of the Exclusive Economic Zone and the engineering geophysical investigations carried out under different geotechnical projects, and identifies the future directions the endeavours may take. The special theme on environment is introduced by A.K. Saha, who recounts how geophysics can play a leading role in solving environmental problems relating to groundwater, saline water invasion, land subsidence and earthquakes.

Majority of the papers document exploration case histories involving either regional or smaller

scales, and the diverse goals outlined under the various themes. While gravity and magnetic methods are still the primary tools for regional and tectonic investigations, the application of deep resistivity surveys and seismic tomography has come to the fore. The papers on mineral exploration highlight the extensive use of induced polarization (IP) method in the search for gold, uranium and metallic sulphides, with one paper concluding that in the Indian geological context, only the measurement of I.P. in the time domain is effective. The quest for these minerals has also employed self-potential, magnetic and electromagnetic, spectrometric and several variants of the resistivity method. The conventional resistivity surveys turn out to be singularly useful in environmental studies related to groundwater as well as for the detection of voids in the coalmines. While the papers on hydrocarbon exploration present accounts of seismic stratigraphic analysis, 3-D seismic data analysis and an integrated geophysical survey, a perspective paper on Gondwana coal exploration turns out to be a good tutorial article on the topic. Two papers document the effectiveness of marine seismics in charting respectively the paleogeomorphology of a region in the East Coast of India and the seabed topography near a port in the West Coast.

The papers suggesting innovative techniques include one on inversion of magnetotelluric data by very fast simulated annealing method and another on signal enhancement by optimization of sweep parameters in the Vibroseis survey. Papers on laboratory work provide guidelines, useful in the field and in the design of sensors. The review articles include one on the seismicity of Deccan Trap, another on anisotropy in seismic exploration and still another on the utilization of satellite altimeter data.

The volume has a wealth of information for profitable use by students, researchers, professionals and policy makers.

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MINERAL WEALTH OF THE OCEAN: ***A Treatise on distribution, origin, exploration, mining and development of sea-floor non-living resources*** by Anil K. Ghosh and Randhir Mukhopadhyay. Oxford and IBH Publishing Co. Pvt. Ltd., 255p. Price: Rs.350 (Indian subcontinent only)

Oceans are the warehouse of minerals and energy and provide the cheapest mode of transport besides catering to recreational activity. Oceans also control the climate of the globe. The famous voyage of *HMS Challenger* in 1872-76 brought out a wealth of information on the oceans. The publication of a book entitled "The Mineral Resources of the Sea" in 1965 drew the attention of decision makers, scientists and technologists to the importance of ocean resources. To utilize the resources of the sea for mankind, debates on legal regime commenced as part of UN resolution, and UNCLOS-III established different regimes, which have become the law from 16th November 1994. Since last three decades, technologies have been developed for exploration, exploitation and extraction processes of resources of the sea. A series of publications have come out on this theme during the last four decades. G.S. Roonwal published a book on "The Indian Ocean - Exploitable Mineral and Petroleum Resources" in 1986.

The authors of the present book have described in nine chapters the evolution of oceans,