

Preface

The book consists of seven chapters. The introductory remarks in the first chapter focus on the electromagnetic waves and their role in probing the earth. The second chapter deals with the interpretation and application of deep electrical and electromagnetic soundings. Interesting case histories are reported from Finland, former USSR and different geological terrains in India to solve geodynamic and crustal problems. The ocean bottom magnetotellurics, an important exploration tool in marine environment and more so with the present thrust on gas hydrates, is covered in the third chapter. The contributions cover studies on oceanic mantle conductivity structure using very long period signals, theory and interpretation of ocean bottom magnetovariational data, the design of the ocean bottom electrometers and a case study around Peninsular India. There is a detailed description in Chapter 4 on 1D, 2D and 3D modeling. Electromagnetic migration is an important inclusion in this chapter. Theory and practise of the thin sheet modeling, finite difference modeling, consideration of a transitional earth and robust estimation of transfer function for a magnetovariational array are some of the useful topics of this chapter. Chapter 5 deals with the inversion techniques. An overview is presented on the framework of the inverse problems on electromagnetics with regard to global optimization, genetic algorithm, Backus-Gilbert approach, stochastic method and simulated annealing concept. An example of inversion of DC sounding data by matrix method is also illustrated in this chapter. The time domain electromagnetics (TEM) plays a major role in electromagnetic exploration. Chapter 6 is devoted to the theory, instrumentation and case studies with TEM, Deep TEM and Long Offset TEM methods. The electromagnetic method started with the exploration of mineral and groundwater at shallower depths. In order to complete the history of electromagnetic methods. Chapter 7 outlines shallow electromagnetics, VLF, the theory of large rectangular loops and bore hole geophysics.

The students, researchers, academicians and professionals will find the book useful and informative.

In the course of preparation of material for this important publication the editors have taken help from many people in India and abroad. The editors record a deep sense of gratitude to all the authors who accepted their invitation to contribute to this book. It took more time than envisaged to edit, to bring the text to the same format and retrace many diagrams. Mr. Samar Mukherjee of IIT, Kharagpur loaded all the manuscripts on PC and Ms. Rita Singh of

NGRI, Hyderabad reformatted all the text materials. At NGRI, Prof. P.S. Moharir provided free access to his computer. Mr. S.P. Hazra, Mr. T. Sarkar of IIT, Kharagpur and Mr. M. Jaya Rama Rao at NGRI have traced the diagrams neatly. The graphic production of the cover page, designed by Dr. S.K. Verma, is by Mr. K. Govindarajan at Association of Exploration Geophysicists, Hyderabad. The editors are grateful to all of them.

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