Contents

Preface *v*

1. INTRODUCTORY REMARKS **1-18**

1. Electromagnetic Waves in Geophysics: A personal perspective **3**
   J.R. Wait
2. Role of Electromagnetics in Probing the Earth **4**
   D. Guptasarma
3. Antennas in Geophysical Environment **10**
   J. R. Wait

II. ELECTRICAL AND ELECTROMAGNETIC SOUNDING **19-226**

4. Dilemmas of the MT Interpretation, EM Field Distortion or Real Indication of Resistivity Distribution **21**
   A. Ádám
5. The Fennoscandian Shield: A treasure box of deep electromagnetic studies **31**
   T. Korja and S.-E. Hjelt
6. Magnetotelluric Technique **74**
   B.P. Singh and S.G. Gokarn
7. Rotation Invariant Magnetotelluric Tensors: A case study from West Singhbhum (Bihar, India) **99**
   K.K. Roy, S. Srivastava and A.K. Singh
8. Magnetotelluric Model of Singhbhum Granite Batholith **120**
   K.K. Roy, A.K. Singh and C.K. Rao
9. Telluric Field Observations During the Earth Tremor Activity Near Gandipet (Hyderabad, India) **152**
   S.V.S. Sarma, T Harinarayana and C.V.G. Krishna

10. Deep Electrical Conductivity Investigations in Some Geothermal Areas of India **160**
T. Harinarayana and S.V.S. Sanna

11. Frontier Technologies for Hydrocarbon Exploration Electrical Conductivity Reference Exploration (ECRE) **176**
R. Karmann, J.L. Seara and U. Jensen

12. Technology and Some Results of Deep Electromagnetic Soundings in the Former USSR **188**
I.S. Feldman

13. Direct Current Resistivity Traversing Across Singhbhum Shear Zone Near Ghatshila-Mosabani (Eastern India) **205**
K.K. Roy, L.K. Das, H. Das, K.K. Mukherjee, M.K. Sen, P.S. Routh, D.K. Saha, M.K. Rai, D.C. Naskar and R. Chunduru

III. OCEAN FLOOR ELECTROMAGNETICS **227-280**

14. Oceanic Mantle Conductivity Structure Determined from Magnetotelluric Data: Hollister revisited **229**
Wenjie Dong, Randall Mackie and Theodore Madden

15. Methods for the Analysis and Interpretation of the Sea Floor Electromagnetic Fields **248**
O.N. Zhdanova and M.S. Zhdanov

16. On the Design of Ocean Bottom Electrometer **260**
R.V. Iyengar

17. EM Sounding of Sea Bottom Around Indian Peninsula **268**
E. John Joseph, R.V. Iyengar and L.A. D'Cruz

IV. ELECTROMAGNETIC MODELLING **281-438**

18. Electromagnetic Migration **283**
M.S. Zhdanov

19. Numerical Modelling in Electromagnetic Induction **299**
J.T. Weaver

20. Thin-Sheet Modelling for Deep Electromagnetic Studies in the Fennoscandian Shield **364**
P. Kaikkonen

21. The Generation and Thermal and Electromagnetic Effects of Rising Melt in a Three-Dimensional Subducting Lithospheric Slab Model **387**
F.W. Jones, F. Pascal and M.E. Ertman

22. Fast Difference-Differential Modelling for Geophysical Electrodynamics **402**
V. Druskin, L. Knizhnerman and T. Tamarchenko

23. The 2- and 3-D Modelling of EM Induction and Current Channelling in the Saurashtra and Adjoining Regions **412**
K. Veeraswamy

24. Magnetotelluric Response on a Layered Earth with Non-monotonic Resistivity Distribution **425**
B.P. Pal

25. Application of Robust Estimation of Transfer Functions for a Magnetovariational Array in Eastern India **432**
Nandini Nagarajan

V. INVERSE PROBLEMS **439-516**

26. Geophysical Inversion **441**
V.K. Gatir

27. Crustal Resistivity Inversion Using Global Optimization Techniques **465**
P.S. Routh and K.K. Roy

28. Backus-Gilbert Magnetotelluric Inversion **488**
A. Manglik and P.S. Moharir

29. Stochastic Inversion of Magnetotelluric Data **497**
B.B. Bhattacharya and R.K. Sarkar

30. Computational Efficiency of the Matrix Method in the Inversion of Resistivity Sounding Data **507**
M. Israil, Sri Niwas and K.N. Khattri

VI. TRANSIENT ELECTROMAGNETICS **517-596**

31. Application of Ground Transient EM Systems in Geophysical Exploration **519**
A.K. Sinha

32. Diffusion of an Electromagnetic Pulse in a Heterogeneous Earth **527**
S.K. Verma

33. The Theoretical Study of a Possible High Resolution Resistivity Sounding Technique for Groundwater Exploration in Hard Rocks **566**
M. Poddar

34. Transient CFS Response Over a Multilayer Earth **575**
H.P. Patra and N.L. Shastri

35. Frontier Technologies for Hydrocarbon Exploration, Deep Transient Electromagnetic Sounding (DTEM) **585**
R. Karmann, U. Matzander, J.R. Rossow, J.L. Seara, K.M. Strack and P.A. Wolfgram

VII. SHALLOW ELECTROMAGNETICS **697-652**

36. Recent Developments in Quantitative Interpretation of VLF-EM Data **599**
A.K. Sinha

37. A Study on the Possibility of Assessing Anisotropy Due to 2D Structures from VLF-EM Data **607**
I.B. Rama Prasada Rao, R.R. Mathur and N.S. Patangay

38. Response Resolution of Shielded Conductors Through Multifrequency Measurements: A review **616**
D. Indira Nagubai and P.D. Saraf

39. Electromagnetic Depth Sounding on a Transitional Earth Using Large Rectangular Loop Source **628**
K. Prabhakara Rao, PD. Saraf and K. Mallick

40. Application of Electromagnetic Propagation Logging in the Interpretation of Fresh Water Neogene Sands of Upper Assam Tertiary Basin (India) **639**
G.K. Handique, A.K. Saikia, RX Mallick and S.C. Das