

ENCYCLOPEDIA *of* SOLID EARTH GEOPHYSICS

edited by

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Preface

All information about the Earth's interior comes from field observations and measurements made within the top few kilometers of the surface, from laboratory experiments and from the powers of human deduction, relying on complex numerical modeling. Solid Earth Geophysics encompasses all these endeavors and aspires to define and quantify the internal structure and processes of the Earth in terms of the principles of physics, corresponding mathematical formulations and computational procedures. The role of Solid Earth Geophysics has gained prominence with increasing recognition of the fact that knowledge and understanding of Earth processes are central to the continued well being of the global community. Apart from persistent search for natural resources, this research line is linked to basic investigations regarding the mutual relationships between climate and tectonics and on the effects of global change in terms of a wide spectrum of natural hazards. Consequently, the pursuit of this science has seen spectacular progress all over the world in recent decades, both in fundamental and applied aspects, necessarily aided by advancements in allied fields of science and technology.

The *Encyclopedia of Solid Earth Geophysics*, aims to serve as a comprehensive compendium of information on important topics of Solid Earth Geophysics and provide a systematic and up-to-date coverage of its important aspects including primary concepts as well as key topics of interest. It, however, does not claim to chronicle each and every niche area that in reality is a part of this multi-disciplinary and multi-faceted science. Neither does it attempt to describe the basic physics of matter and energy systems, which comprise the underlying tenets of geophysical research. The first edition of this Encyclopedia, edited by Prof. James David, was published in 1989 by the Van Nostrand Reinhold publishing company. The extraordinary growth and diversification of this science over the last twenty years called for a complete revision.

This is realized by identifying the necessary topics and bringing together over 200 articles covering established and new concepts of Geophysics across the sub-disciplines such as Gravity, Geodesy, Geoelectricity, Geomagnetism, Seismology, Seismics, Deep Earth Interior and Processes, Plate Tectonics, Geothermics, Computational Methods, etc. in a consistent format. Exceptional Exploration Geophysics and Geotechnical Engineering topics are included for the sake of completeness. Topics pertaining to near Earth environs, other than the classical Solid Earth, are not within the scope of this volume as it is felt that the growth of knowledge in these fields justify a dedicated volume to cover them.

Articles written by leading experts intend to provide a holistic treatment of Solid Earth Geophysics and guide researchers to more detailed sources of knowledge should they require them. As basic understanding and application of Solid Earth Geophysics is essential for professionals of many allied disciplines such as Civil Engineering; Environmental Sciences; Mining, Exploration and software industries; NGOs working on large scale social agenda; etc., it would be useful to them to have access to a ready and up to date source of knowledge on key topics of Solid Earth Geophysics. Hopefully, this Encyclopedia would prove to be an authoritative and current reference source with extraordinary width of scope, drawing its unique strength from the expert contributions of editors and authors across the globe.

I am grateful to Anny Cazenave, Kusumita Arora, Bob Engdahl, Seiya Uyeda, Rainer Kind, Ajay Manglik, Kalachand Sain and Sukanta Roy, members of the Editorial Board for their constant advice and guidance in developing the framework of this Encyclopedia and help with the editorial work. I am equally grateful to all the authors who readily agreed to contribute and honoured the guidelines and time schedule.

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Harsh K. Gupta