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BOOK REVIEW

Review of "Gravity and Magnetic Exploration: Principles, Practices and Applications" by W. J. Hinze, R. R. B. Von Frese and A. H. Saad

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The past few decades have seen a rapid expansion in the geophysical sciences. No longer a boundary subject that links geology and physics, geophysicists study the composition and interior structure of Earth and our Planetary System. Such breadth might mean a loss sight of the traditional "core" of the subject. This book is a timely reminder that one of those core subjects, Earth's potential fields, are alive and well and continue to be of interest to researchers in industry, government and academia.

The book begins with an overview of potential fields and geophysical practices. The rest of the book is then neatly divided into two parts: one covering gravity and the other magnetic exploration methods. The topics discussed under each method are similar and cover the physical principles and the acquisition, processing and interpretation of each data set.

The book is generally well written and illustrated. There is some repetition, but otherwise the text is engaging. The print figures are black and white and some are quite busy, but all are necessary and they compliment the text well. A website provides supplementary information, including colour and expanded versions of some figures. The website also hosts four additional chapters on the application of potential field methods to near-surface investigations, energy and mineral resources, and lithospheric studies. There are also a number of exercises for students. Regrettably, the exercises are based on commercial software and no open source software or MATLAB scripts are provided.

The book will probably appeal most to researchers working in the "Grav/Mag" teams of industry, national surveys and academic applied geophysics departments. The book considers field design, errors, data processing techniques and reduction, theory and interpretation. Case history studies are focused mainly on topics of interest to the hydrocarbons and mining industry such as the depth to "basement" in sedimentary basins and the geometry of ore bodies. The book considers both terrestrial and satellite measurements, processing of data from fixed platforms and moving vehicles, and the ambiguity problem in potential field interpretation. Because of this, the book should be of interest to students, especially those engaged in undergraduate and Masters research projects and graduate level (Ph.D) taught courses and research.

The book may appeal less to researchers working at the larger crustal and lithospheric scales. Gravity and magnetic methods have played major roles in our understanding of the structure of Earth's crust and the development of plate tectonics. Marine magnetics, for example, has made seminal contributions to the hypothesis of seafloor spreading, to absolute plate motions and, more recently, to the question of the fixivity of hotspots. Marine gravity has made seminal contributions to the structure of plate boundaries, to the thermal and mechanical properties of the lithosphere and, more recently, to dynamic topography and its role in contributing to long-term vertical crustal motions due, for example, to mantle convection. These topics are not covered in the book.

In summary, the authors should be congratulated on producing a scholarly book on an enduring geophysics core subject. "Grav/Mag" is still seen by many as a "value for money" tool for exploring Earth's crust and upper mantle in frontier offshore and onshore areas and a necessary geophysical technique to employ prior to seismic and drilling. The book will certainly be on my shelf and I trust on that of many other explorationists also.

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