This combined study and reference text provides a comprehensive account of the principles, practices, and application of gravity and magnetic methods for exploring the subsurface using surface, subsurface, marine, airborne, and satellite measurements. Key current topics and techniques are described, including high-resolution magnetic investigations, timevariation gravity analysis from surface and satellite gravity measurements, absolute and gradient gravimetry, and the role of GPS in mapping gravity and magnetic fields. The book also describes the physical properties of rocks and other Earth materials that are critical to the effective design, implementation, and interpretation of surveys, and presents an overview of digital data analysis methods used to process and interpret anomalies for subsurface information.

Each chapter starts with a general overview and concludes with a list of key concepts that help readers review what they have learned. An appendix provides a grounding on basic data analysis using simple and accessible mathematical notation. Study questions and problem sets on an accompanying website, together with computer-based exercises available online, give readers hands-on experience of processing, modeling, and interpreting gravity and magnetic anomaly data. A comprehensive suite of full-color case histories on the book's website illustrates the practical utility of modern gravity and magnetic surveys in energy, mineral, environmental, archaeological, and engineering exploration and lithospheric studies, as well as their potential limitations.

This book is an ideal text for advanced undergraduate and graduate courses but also serves as a reference for research academics, professional geophysicists, and managers of exploration programs that use gravity and magnetic methods. It is a valuable resource for all those interested in petroleum, engineering, mineral, environmental, geological, and archaeological exploration of the lithosphere.

"Written by three leading researchers, this is a comprehensive textbook that takes its readers from the fundamentals of potential fields through modern data acquisition, processing, modeling and inversion to practical interpretation. The theory and mathematical derivations are suitable for both beginners and experienced geophysicists. Well-organized and nicely illustrated, it is both informative and clearly written."

Professor Dr Alan Green Institute of Geophysics, ETH-Swiss Federal Institute of Technology

"This extensive work is much more than just a textbook: it includes detailed discussions, such as the philosophy of modeling and the nature of errors. which are critical to properly interpreting gravity and magnetic data, but are often glossed over. A very useful addition to practitioners' reference shelves and an excellent textbook for advanced students.

Roger C. Searle, Professor Emeritus, Department of Earth Sciences, Durham University

"The geophysical applications of gravity and magnetic techniques have advanced a great deal in the 21st century. Thus, this rigorous book covering the physical basis, analysis, interpretation, and applications of these techniques is a timely and important contribution. It is designed to serve both the student and practitioner and is enhanced by an innovative website." Professor G. Randy Keller Geology and Geophysics, University of Oklahoma; Director of Oklahoma Geological Survey

Cover illustration: graphical representation of (top to bottom) vertical gradient of magnetics; vertical gradient of gravity; subsurface Earth model. Image © and courtesy of Geosoft Inc.



- Comprehensive study questions for individual chapters
- Four ancillary chapters of case histories illustrating the applications and limitations of the methods
- Access to industry-standard Geosoft Inc. software for the processing and interpretation of gravity and magnetic data
- Online exercises and data sets demonstrating analysis, modeling and interpretation using the software
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