Mark E. Everett: Near-Surface Applied Geophysics

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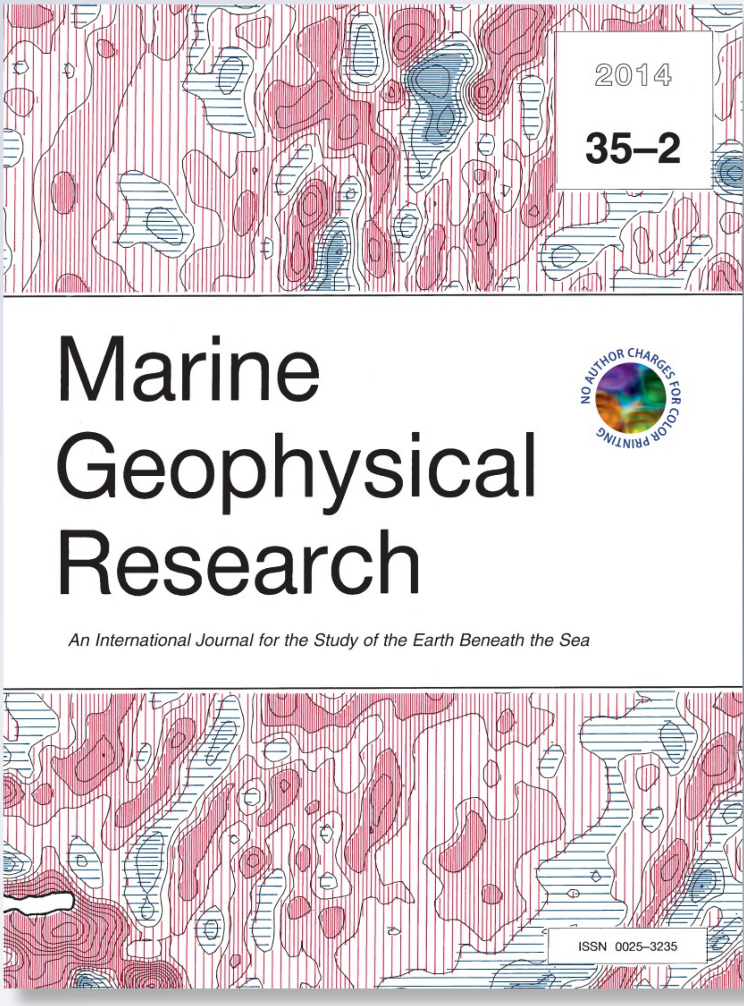

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BOOK REVIEW

Mark E. Everett: Near-Surface Applied Geophysics

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Near-Surface Applied Geophysics (Cambridge University Press, 403 pp.) by M. E. Everett is a textbook suitable for geophysicists who appreciate a clear and comprehensive overview of the current state of near-surface geophysics. This book will benefit geophysicists with a good working background in calculus, linear algebra and differential equations by updating and refreshing their knowledge of electrical potential methods, inversion, and many of the latest problems and tools in the field. One chapter is dedicated to emerging methods (Chap. 10) such as nuclear magnetic resonance, landmine detection, GPR interferometry, and seismoelectric effects.

Near-surface geophysical methods are so numerous and varied that omissions are expected in this relatively short overview. Undergraduate or graduate students who use this book should have a good physics and mathematics background. Many of the mathematical explanations will require supplemental reading (available in the extensive reference list) and or supplementary guidance by an experienced geophysicist.

This book emphasizes the wide variety of analytical approaches used to interpret each type of geophysical field data. Following the introduction, Chap. 2 overviews geophysical signal theory. For magnetic data (Chap. 3), deconvolution methods and image filters are highlighted. Sensitivity functions and anisotropy analyses are stressed for electrical resistivity data (Chap. 4). Continuous wavelet transform analysis handles depth determination in spontaneous potential data (Chap. 5). The chapter that deals with seismic reflection and refraction methods (Chap. 6) provides clear explanations of geophone response, resolution and dip moveout. Surface wave analysis (Chap. 7) includes clear explanations of the latest techniques in both multi-channel seismic and passive seismic analysis. Although I could not directly interpret all the available electromagnetic induction data types after reading this chapter (Chap. 8), its exposition remains lucid and insightful throughout. Chapter 9 deals mainly with ground-penetrating radar data and tools, and is the strongest chapter in the book. A significant portion of the book is dedicated to inversion including linear (Chap. 11), non-linear local (Chap. 12), and global methods (Chap. 13). I regret the absence of the capacitively coupled resistivity (a dipole–dipole method) and that gravity (time-lapse) methods are relegated to the chapter on emerging methods (Chap. 10).

Most classical geophysical techniques are covered except borehole methods, radiometry and heat flow. This book's arrival is timely given the unprecedented growth in the geophysical evaluation of the shallow earth where humans live, work, travel, store their waste, and extract food and water. Although it would be hard to interpret data seen for the first time with only this book, it ably directs the reader to both the classical literature and the latest developments in the field. I eagerly await future editions of this book.

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