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Book Review

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Bruce A. Bolt. *Earthquakes and Geological Discovery*. New York: Scientific American Library, W. H. Freeman and Company. 1993. 229 pp. \$32.95.

When reviewing a book it is customary to ask three questions: (1) What are the qualifications of the author? (2) What is the nature of the audience being addressed? (3) What material is covered in the book? Bruce A. Bolt, the author of *Earthquakes and Geological Discovery*, is Professor of Seismology at the University of California, Berkeley, and is well-known to both the seismological and the earthquake engineering communities. The title of the book is somewhat misleading as to the contents, for it implies a narrower emphasis on the geological discoveries than is the case. The book actually presents a rather broad treatment of seismology, earthquakes, and relevant geology, all presented at a level that is appropriate for the educated layperson.

The most striking feature of the book is the more than 200 illustrations including photographs, maps, diagrams, etc., all interesting and informative and of high quality. In this book you can see Charles Richter as a young man, the famous 1940 El Centro accelerogram, a photo of Robert Mallet, waves on a seismogram: p, pp, ppp, ps, ss, sss, Raleigh wave. Just examining each illustration and reading its caption is a good education on earthquakes, seismology, and geology.

The titles of the nine chapters are: (1) The Origins of Seismology, (2) Seismic Waves (3) The Instrumental Surveillance of Earthquakes, (4) The Sources of Earthquakes, (5) The Earth's Crust and Plates, (6) The Image of the Earth's Interior, (7) Predicting Strong Ground Shaking, (8) Forecasting Earthquakes, (9) Reducing Seismic Risk. Each chapter contains numerous illustrations and the subject matter is clearly explained without introducing a single mathematical equation. The author says: "The book is designed for the reader who would like to know how earthquake recordings, which appear on visual display as wiggly lines, can provide answers to basic questions about the Earth's character far from places where the recordings are made. Although it is not possible here to give complete coverage of all important geological work in which earthquakes now play a central role, the earthquake case histories and geophysical studies discussed give a realistic flavor of the broad scientific accomplishments of seismology and should satisfy the curious reader." The reviewer believes

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that the author has accomplished his purpose though if the reader has an engineering or scientific background it would be helpful.

The reviewer found Chapter 5, The Earth's Crust and Plates, and Chapter 6, The Image of the Earth's Interior, to be particularly informative. These chapters really form the heart of the book and justify its title. These chapters contain information that is usually not readily available to engineers and others not specializing in seismology and geology. The topics covered in Chapter 5 are: the concept of a crust, exploring the crust, oceanic and continental differences, continental drift, the theory of plate tectonics, earthquake mechanisms along the plate margins, tectonic plates and the distribution of volcanoes, the 1990 Philippine fault rupture, intraplate earthquakes, quiet gaps in earthquake zones, the hazard from plate-edge earthquakes. Chapter 6 begins with an illuminating discussion of the interior of the earth which includes a good picture of the inner solid core, outer liquid core, transitional shell, lower mantle, upper mantle, asthenosphere, lithosphere, and crust. The following topics are then treated: interpreting waves that have traveled through the planetary interior, names of the different waves, travel times of earthquake waves, the discovery of the earth's inner core, echoes from the core, the inverse problem, the earth's oscillations, three-dimensional images of the earth's interior, and the convective motions of the mantle. The reader will find the material presented in these two chapters to be very interesting and very clearly presented and, no doubt, will clarify numerous misconceptions.

The material presented in Chapter 7, Predicting Strong Ground Shaking, covers the estimation of ground motions as is customarily done for important projects. This gives a very interesting treatment of the problem that will be illuminating to project managers, architects, and others not closely involved in earthquake engineering. The chapters on forecasting (not predicting) earthquakes and reducing seismic risk are rather brief accounts of topics relevant to earthquake engineering. The only criticism the reviewer has is the absence of Chapter 10, The Role of Earthquake Engineering. However, the book can be recommended to earthquake engineers who will certainly learn much from reading it.