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Book Review

"Advances in Earthquake Prediction: Research and Risk Mitigation", by Ragnar Stefansson, Springer/Praxis, 2011; ISBN: 978-3-540-47569-9, USD 139.00

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This book is really a review of earthquake research in Iceland, to which the author has greatly contributed during his over 40 year long scientific career, focusing on the issue of earthquake prediction in the specific seismic region called the South Iceland Seismic Zone (SISZ), located in the South Iceland lowland (SIL). Successful earthquake prediction may be considered a result of intelligent reasoning based on various observations, such as long term earthquake statistics, tectonic features of the given area, foreshocks, ground water, strain and stress, seismic wave velocity anomalies, radon anomalies, fluid intrusions and many other factors. This reasoning is true worldwide but the different factors may be of different importance in different seismic regions of the world. In this sense, Iceland is a unique place—as there is hardly another divergent plate boundary in the world that is available for conducing similar earthquake research. Most divergent plate boundaries are under deep ocean or—as the region of the East African Rift—are difficult to access because of logistic reasons. Thus, the information in the book is very valuable to the understanding of global plate tectonics as it focuses on the only divergent plate boundary in the world that is available for so detailed seismological research studies.

Earthquake prediction in Iceland can be described as moderately successful and in this sense the book presents very good results. However, one must consider that the relatively warm material of an oceanic ridge is incapable of accumulating as high stress as the colder material of old plates in subduction zones. Therefore, earthquakes at ridge boundaries take place at a lower level of stress; they thus have smaller magnitudes and take place more often. The shorter the seismic cycle, the easier it is to predict the earthquakes on a statistical basis—and this is one clue to the success of earthquake prediction in Iceland. Oceanic ridges have also an additional feature, namely transform faults. The SISZ is really a zone between two such transform faults, exhibiting a specific manner of faulting called the bookshelf tectonics. A considerable part of the book is devoted to studying this type of earthquake generation process. Although bookshelf tectonics is known to exist in other areas of the world, outside oceanic ridges it is more of an exception than a rule. Although the author claims that the obtained results could be applied to other regions of the world, no attempt of such application is being made to areas outside Iceland, except for naming several such regions. Nevertheless, the book presents perhaps the best study of bookshelf tectonics ever performed. It is also a uniquely detailed study of seismicity of a ridge region, namely the SISZ, based on both historical and instrumental observations.

The book appears to have a confusing title. Judging by the title alone, one may expect an up-to-date review of modern methods and achievements in earthquake prediction and of methods of coping with earthquake hazards. Instead one finds the book to be a description of earthquake prediction research in Iceland. Very little is said about risk mitigation, and in this sense the title of the book is misleading. Those people who are interested in earthquake prediction or earthquake risk mitigation will feel disappointed by

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the book, while those who are interested in earthquake research in Iceland might not reach for the book unless otherwise informed of its contents.