

Understanding mysterious continental intraplate earthquakes

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A new volume published by the Geological Society of America sheds light on mysterious earthquakes in the interiors of continents. These earthquakes, like those that occur in the central U.S., are what the book's editors describe as "an embarrassing stepchild of modern earthquake seismology." Continental Intraplate Earthquakes: Science, Hazard, and Policy Issues provides a comprehensive overview of these rare but very real global hazards.

The plate tectonics revolution of the 20th century elegantly explained why most earthquakes occur where they do – at Earth's plate boundaries. It didn't explain, however, the occurrence of intraplate quakes and the deformation processes that give rise to them. As a result, geologists studying areas like the central U.S., western Europe, and Australia, don't know what causes these quakes, how often they will happen in the future, and how dangerous they are.

"Progress has been slow and somewhat difficult," said volume editor Seth Stein of Northwestern University, Evanston, Illinois, USA. "Because deformation within plates is slow compared to more rapid plate boundary motions, seismicity is much lower and harder to study."

Stein points out that in recent years important insights are emerging with use of new research techniques and approaches. Space geodesy can measure intraplate deformation. Paleoseismology can extend the somewhat sketchy instrumental record backwards in time. Numerical deformation modeling can be used to test hypotheses regarding stresses.

The emerging picture shows earthquakes moving around among faults, which are active for some time and then become inactive for a long time. The results can be used to develop strategies for mitigating earthquake damage while balancing the resources required with those needed for other

societal goals.

In organizing the publication Stein and co-editor Stéphane Mazzotti of the Geological Survey of Canada drew on presentations from a number of meetings and other sources that integrated what has been learned from earthquakes around the world. "Because these earthquakes are relatively rare in any given area, combining data from many areas provides valuable insights," said Stein.

One group of papers addresses where intraplate quakes occur and what causes them. A second group assesses the hazards posed and challenges in estimating probability, size, and shaking. A third group explores public policy issues surrounding cost-effective hazard mitigation.

Source: Geological Society of America

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