

Time-Variable Deformation in the New Madrid Seismic Zone

Eric Calais¹ and Seth Stein²

New geodetic measurements show that the New Madrid is currently deforming too slowly, if at all, to account for large earthquakes in the region over the past 5000 years. This result, together with increasing evidence for temporal clustering and spatial migration of earthquake sequences in continental interiors, indicates that either tectonic loading rates or fault properties vary over a few thousand years.

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Summary

A recent study published by a team of researchers from Purdue and Northwestern Universities finds that the risk of a significant earthquake from the New Madrid fault may be significantly less than previously thought. The study, published in the March edition of the journal *Science*, was headed by Eric Calais, professor of geophysics at Purdue University, and Seth Stein, William Deering professor of Earth and Planetary Sciences at Northwestern University.

The Purdue and Northwestern team studied the New Madrid fault motion for eight years using new technology-global positioning system (GPS) measurements. The GPS measurements found that there does not appear to be enough stress accumulating at the New Madrid Fault line to produce a large earthquake. Specifically, the fault system was moving about 0.2 millimeters per year, versus the minimum of two millimeters per year that is needed to result in a sizable earthquake.

The study also explored the possibility that the fault stress could be transferring to other fault lines. This would signify that the earthquake hazard is much broader than the New Madrid Fault.

The study is controversial. Many scientists find no fault with the data itself, but disagree with the conclusions drawn from the data. Scientists from the Mid-American Earthquake (MAE) Center have stated that the readings might also suggest that tension along the fault is so great that it is no longer able to move. Scientists from the U.S. Geological Survey (USGS) have stated that an eight year study is not a long enough time upon which to draw conclusions.