

Homing in on a potential pre-quake signal

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In a new analysis of the 2004 magnitude 6.0 Parkfield earthquake in California, David Schaff suggests some limits on how changes measured by ambient seismic noise could be used as a pre-earthquake signal.

Changes in seismic velocity--changes in the speeds at which seismic waves move through the Earth's crust--have been identified during and after many earthquakes. But do these changes also happen before an earthquake, and could they be measured as a way to predict a quake on the way? The search for a clear and measurable pre-quake signal has been called "the holy grail of seismology."

In a new analysis of the 2004 magnitude 6.0 Parkfield earthquake in California, David Schaff suggests some limits on how changes measured by ambient [seismic noise](#) could be used as a pre-earthquake signal. Ambient seismic noise refers to the "background hum" of the Earth--the [surface waves](#) found all over the planet's crust that are caused mostly by wind and ocean waves. Changes in seismic velocity can be measured using seismic noise observations, which are often recorded continuously at seismic stations and therefore can provide a detailed record of a pre-earthquake time period.

Using a complete set of noise data from the Parkfield earthquake, Schaff was able to search for a pre-seismic signal to the quake. He was unable to detect any pre-seismic [velocity change](#) for Parkfield using the noise data, but he notes that any pre-[seismic signal](#) may have been too small, too short in duration, or in a different area outside of the network of seismic monitors. The analysis did allow Schaff to place an upper

limit on how large such a signal might be, depending on how many days it might be observed before the main quake.

The paper, "Placing an Upper Bound on Preseismic Velocity Changes Measured by Ambient Noise Monitoring for the 2004 Mw 6.0 Parkfield Earthquake (California)" will appear in the August issue of the *Bulletin of the [Seismological Society of America](#)*.

More information: "Placing an Upper Bound on Preseismic Velocity Changes Measured by Ambient Noise Monitoring for the 2004 Mw 6.0 Parkfield Earthquake (California)" by David P. Schaff, Columbia University. *BSSA*, Volume 102:4.

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