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NEWS SERVICE

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AGU '95

Earthquake precursors: a cautious report from Parkfield

In the years since his serendipitous discovery of odd electromagnetic signals preceding the 1989 Loma Prieta earthquake, Antony Fraser-Smith says he has been "trying to fish for earthquakes."

He has placed his instruments - antennas tuned to pick up ultra-low-frequency electromagnetic waves - at five locations in California where large quakes are expected. If his antennas detect sharp signal changes in the weeks preceding a major earthquake, Fraser-Smith may have discovered a new means to understand - and perhaps predict - how some earthquakes start.

Now he cautiously reports that he may have hooked a quake - specifically, the magnitude 5.0 temblor that shook Parkfield, California on Dec. 20, 1994.

Fraser-Smith, a professor of geophysics and electrical engineering at Stanford, and electrical engineering graduate student Tom Liu presented their data on Dec. 11 at the American Geophysical Union meeting in San Francisco.

"My instruments detected some magnetic field changes that started a month before the [Parkfield] earthquake," Fraser-Smith said. "They were quite substantial as compared to the normal background noise. They clearly were confined to the Parkfield area, and they didn't stop but continued [for more than a week after the quake] as I would have expected. That was the same pattern I observed after the Loma Prieta earthquake.

"They were not nearly as big as the Loma Prieta signals, but the earthquake was a lot smaller," Fraser-Smith said. The Loma Prieta quake was measured at a magnitude 7.1. In that event, as at Parkfield, his instruments recorded a sharp change in signals during the month before the quake and continuing for some time afterward.

Because a magnitude 5.0 earthquake is much smaller than a magnitude 7.1, he said, the Parkfield signals would have been undetectable if not for the fact that his instruments were set up almost on top of the quake's epicenter.

Fraser-Smith characterized his results as "interesting; another possible example of precursor signals." But he cautioned that more study must be done to show if and when electromagnetic signals precede an earthquake.

One reason for his caution is that he detected similar large signal changes a year earlier, but those were not followed by any nearby earthquakes.

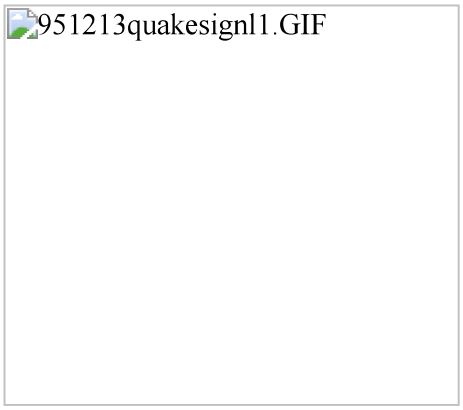
Another reason for caution, he said, is that heavy rainfall during the months from October to December of 1994 might have confounded the results, since water is a conductor of electricity.

However, changes in water flow deep below the surface also may have meant that shifts in the earthquake fault were easier than usual to detect. This is how one hypothesis explains Fraser-Smith's signals: Subtle movements along the fault may precede an earthquake. Those movements could allow water trapped in pores deep in the earth to flow together temporarily along the narrow crack of the fault and create a long electrical conductor - in effect, an

underground antenna.

In spite of his cautious approach to the data, Fraser-Smith says he is "quite optimistic" that a method of earthquake prediction will be developed sooner or later. He envisions networks of instruments placed along major faultlines in populated areas that could provide the populace with hours or days of warning before a quake.

Whether some of those instruments will be electromagnetic detectors remains to be seen, but Fraser-Smith said that a number of other scientists around the globe are working on similar approaches. In fact, he is currently working with an international group of scholars to evaluate a Russian method based on electrical signals. The group is a subcommittee of the Gore-Chernomyrdin Environmental Working Group, led by U.S. Vice President Albert Gore and the Russian Prime Minister.



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Note to reporters: Fraser-Smith will present his data at Moscone Center in AGU poster session S12B-11, on Monday afternoon, Dec. 11.

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