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# Quake Warning System May Buy Precio Time

## It can sound alarm up to 40 seconds before ground moves

**By Kathleen Doheny**
***HealthScoutNews Reporter***

THURSDAY, May 1 (HealthScoutNews) -- Earthquakes are nature's scary surprises. By the time you realize you're experiencing a temblor, the shaking is often half over, leaving you to wonder if another one will follow quickly.

Long-time residents of earthquake country swear that their animals sometimes alert them by acting strangely, while others warn that it's "earthquake weather" when the mercury rises.

Soon there may be a more scientific warning for residents of southern Californi

In the May 2 issue of *Science*, researchers describe an early-warning system fo region that could give as much as 40 seconds' notice before a strong ground m was due. Once in place, the system could help stem disaster by giving people e time to take shelter, evacuate buildings, stop trains, and divert aircraft.

The amount of warning time will depend on how far a person is from the epicer says Richard M. Allen, a professor of geology and geophysics at the University Wisconsin-Madison and the lead author of the paper. "If you are at the epicent we're talking about zero, one, maybe two seconds. If you are 60 kilometers [3 miles] away, we are talking about 20 seconds of warning."

The proposed new early warning system, called ElarmS, uses a network of 155 seismic stations already in place in southern California, called TriNet, now part California Integrated Seismic Network.

"TriNet has two rapid reporting systems," Allen says. "CUBE is a paging system gives the magnitude and location of the earthquake. The other is the Shake Ma shows the distribution of the ground motion across southern California. They're available within minutes."

TriNet stations record ground motion, including P waves, the first seismic arriva an earthquake, and the usually larger amplitude S waves, which are responsibl most of the damage to buildings during a quake.

"We are using the P waves to locate and determine the magnitude of the earth and, based on that, issue a warning," Allen says.

To test the concept of ElarmS, Allen and his co-author, Hiroo Kanamori of the

California Institute of Technology in Pasadena, gathered waveform data from 5 recent California earthquakes and estimated the magnitude from the P waves a other data.

Early-warning systems are already in place in other locations, Allen says. Mexic for instance, has an early warning system based on measurements of ground r along the coast, where the quakes tend to occur, and can transmit alerts to the before the ground motion arrives.

Southern Californians live above many active faults, some of which are directly densely populated metropolitan areas. So measuring the P waves, rather than for the S waves or waiting until the ground motion reaches a particular thresho other systems do, is a better idea, Allen says.

The next step, Allen says, is to test the new system in the "real time system th Trinet already runs" to see how accurate the magnitude estimates based on P v are.

Other experts praise the paper's scientific value but question whether the early warning system will be logistically feasible.

"The paper is excellent work," says Bill Spencer, a professor of civil engineering University of Illinois at Urbana-Champaign. The system might work best, he ad conjunction with buildings equipped with shock absorber-like systems that caus building to adapt to the magnitude of the quake to sustain the least damage. "T are already inside some large buildings," he says.

"Scientifically it's a very good paper," agrees David Wald, a seismologist with th United States Geological Survey in Golden, Colo., who helped develop the Shak "But I have reservations about implementation of an early-warning system." Pu the system into practice, he says, would involve complicated logistics.

"You could stop elevators at a certain floor [if the warning was issued]. You cou install electronic freeway signs, saying 'Don't go over this overpass.' But a lot o things rely on human response." And that might not be so predictable, he says

"The amount of [warning] time this system would provide is very little for the p closest," he says. "People who would need the most warning would get the leas

Yet, Allen counters that any warning is better than none. After the Northridge o of 1994, he says, "buildings were red-tagged up to 60 kilometers from the epic In the 1989 Loma Prieta quake, highways and buildings 50 miles from the epic collapsed.

**More information**

For details on how earthquakes occur, visit the **Institute for Crustal Studies**. more facts about tremors from the **U.S. Geological Survey**.

SOURCES: Richard M. Allen, Ph.D., professor of geology and geophysics, Unive Wisconsin, Madison; David Wald, Ph.D., seismologist, United States Geological Survey, Golden, Colo.; Bill Spencer, professor of civil engineering, University of Illinois, Urbana-Champaign; May 2, 2003, *Science*; photo by J. Dewey, U.S. Geological Survey

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