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## Study says quake warning systems could save lives

### First signs of an earthquake might lead to early warning systems, researchers say.

By  
**Usha Lee McFarling**  
LOS ANGELES TIMES  
Sunday, November 13, 2005

PASADENA, Calif. -- Faint signals during the first moments of a large earthquake can be used to predict the severity of ground shaking before a fault has finished rupturing, potentially offering crucial seconds for early warning, according to

A few seconds might not sound like much but could be enough to turn off natural gas to prevent fires, and phone systems to protect them from failure, order children to dive under desks and allow surgeon rooms to pull scalpels away from vital organs.

"Fifteen seconds seems huge to me," said Lucy Jones, the scientist-in-charge at the U.S. Geological Survey in Pasadena. "We have engineers who say, 'If you could give me 100 nanoseconds, it would be useful.'"

In the study in last week's issue of the journal Nature, Richard Allen, a seismologist at the University of Berkeley, and Erik Olson of the University of Wisconsin, Madison, analyzed 71 recent earthquakes.

They found that the weak pressure waves that radiate out immediately from faults, called "P waves," are of low frequencies. Larger earthquakes were preceded with P waves of low frequency, they found. This allows researchers to describe the size and location of an earthquake within four seconds and sometimes within two.

"We're not going to be able to predict earthquakes in the near future. The only other option is short-term warnings of a few seconds," Allen said.

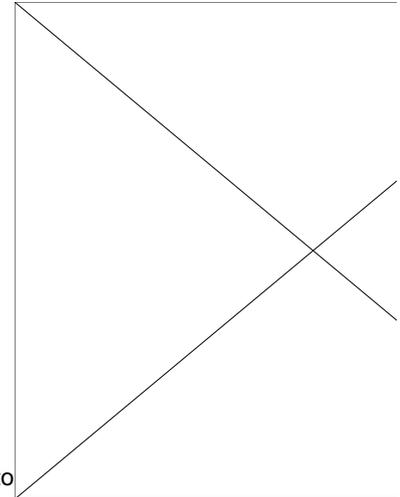
If there were a system in place to transmit the information, notice of impending shaking could be disseminated within five seconds, Allen estimated.

Very large quakes, such as the magnitude-7.9 earthquake that hit Alaska in November 2002, can last minutes. Shaking begins almost immediately near an epicenter, but it can take seconds, or tens of seconds, to occur in areas farther away.

Other geologists, however, say that liability and logistical issues would doom a system to false alarms.

They point out that in Indiana, 10 minutes of warning for a tornado last Sunday didn't help much. In New York, warnings for Hurricane Katrina still left many vulnerable.

Another problem, Jones said, is that the information yielded in the early seconds of a quake isn't precise.



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might be a magnitude 3.5 or it might be an 8," she said. "I wouldn't want to be issuing early warnings b

The study, which suggests that larger earthquakes announce themselves differently than smaller ones because it challenges a current scientific doctrine called "the cascade model."

That model suggests all earthquakes start out the same. In small quakes, according to the cascade m stops relatively soon. In larger quakes, a small slip loads stress onto the patch of fault next to it, and th continues, or cascades, through longer stretches of fault.

In contrast, the new study says that when a large earthquake is but "a small fraction of what it's going played its cards and said, 'I'm going to be big,' " said Tom Jordan, a seismologist at the University of S and director of the Southern California Earthquake Center. "That offers hope."

Allen is currently testing a system to create early-warning maps. Jones said her U.S. Geological Surve preliminary steps to test whether early information from quakes could provide rapid warnings without g unacceptable level of false alarms.

The U.S. Geological Survey is hoping to get the millions of dollars it needs for 3,000 seismic stations, : its Advanced National Seismic System coordinator.

But David Wald, a U.S. Geological Survey seismologist, says a warning system wouldn't be a panacea: damage: "You could only save so many lives. Putting all your money in early warning isn't going to kee from collapsing."

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