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Geology

Earthquake Alerts: Buying a Few Precious Seconds

Californians are long used to earthquakes coming without notice. Now two scientists have found a way to get several seconds of warning—not much time, but enough to save lives.

Seismologists Richard Allen of the University of Wisconsin and Hiroo Kanamori of the California Institute of Technology looked at the state's sophisticated network of 150 monitoring stations, which have recorded seismic disturbances as they happen for nearly eight years. The two decided that with a little tweaking the system could do more.

Earthquakes simultaneously emit two kinds of energy waves from their epicenters—S-waves, which collapse buildings and rip up the ground, and P-waves, which pack little energy but travel much faster. The researchers reasoned that if the relationship between the early-arriving P-waves and the later, ground-shaking S-waves could be figured out, a tiny window would open for predicting quakes.

So Allen and Kanamori developed algorithms correlating P-wave characteristics to the strength of the S-waves rumbling right behind them. They then programmed the seismic stations to forward P-wave data to a central site, from which warnings could be issued. The system, called Elarms, is being tested for accuracy and could be in place within two years.

Warning times will depend on the distance from the epicenter of a quake. "At the epicenter, you'd get zero to a few seconds of warning, but at 60 kilometers you'd get 20 seconds," Allen says. The primary beneficiaries would include airports, utilities, and such emergency services as the police. Allen believes the system could "provide enough time for individuals to take cover, for manufacturers to shut down dangerous machines, and for control towers to stop airplanes from landing."

—*Michael W. Robbins*