

## Learning from Earthquakes

# M5.4 Chino Hills, California, Earthquake

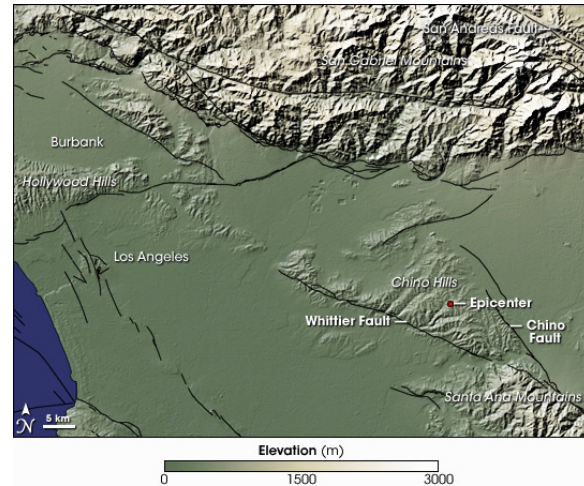
*Caltrans geologist Martha Merriam contributed this report.*

Late in the morning on July 29, 2008, a M5.4 earthquake shook southern California. The earthquake was the strongest to hit the Los Angeles area since the 1994 Northridge earthquake. It occurred at a depth of 9 miles and the aftershock sequence was 75% less energetic than the average California aftershock sequence for a M5.4 mainshock, possibly because of its depth.

Strong shaking was reported to the north in the Chino basin and to the west in the Los Angeles basin. Buildings swayed in downtown Los Angeles 28 miles from the epicenter, area amusement parks were evacuated and temporarily shut down, but damage was minor. California State University, Fullerton, located about

10 miles west, suffered some damage in its older buildings. A minor landslide near Route 91 in the Anaheim Hills, 7 miles to the south, caused some traffic congestion, but no injuries or structural damage were reported. The volume of telephone use after the shock disrupted service into the afternoon, and some power outages occurred.

The earthquake gave organizers of the Great Southern California Shake-out (<http://www.shakeout.org/>), planned for later this year, an opportunity to promote the event and stress the need for preparedness in this active seismic area. The magnitude 5.4 earthquake is about 5,000 times smaller than the magnitude 7.8 earthquake, considered realistic for the region, that will be depicted in the Shakeout.



*Location of the Chino Hills earthquake epicenter.*

Ground shaking predicted by the latest ground motion prediction equations developed for use in the 2008 USGS seismic hazard maps fits well with most observed recordings of this event. The greatest acceleration observed (horizontal pga) was about 0.44 g recorded near Walnut, about 11 km northwest of

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the epicenter. Peak velocity measured at the Walnut station was 38 cm/sec and the duration was a few seconds. Recordings in the greater Los Angeles area were commonly in the 10% g to 20% g acceleration range, and peak velocities in that area were mostly in the range 5 to 15 cm/sec.

According to Sue Hough of the USGS, the earthquake occurred in a complicated tectonic region, namely, the wedge sandwiched between the Whittier and Chino Hills faults that has many small faults with different orientations. The current theory (offered by Caltech seismologist Egill Hauksson) is that the wedge conceals a structure known as the Yorba Linda trend with no surface expression but with a linear trend of seismicity. The moment tensor showed a mixture of thrust and left-lateral strike-slip faulting on a plane striking  $43^\circ$  east of north, with a southerly dip of  $58^\circ$ . The preliminary locations of aftershocks suggest that this is the fault plane.

Updates to this information may be found at: <http://www.cisn.org/>.