

Risk of 8.0 earthquake in California leaps; still, it's business as usual

Joseph Serna, Rong-Gong Lin II and Rosana Xia, Los Angeles Times, 3-11-15

A new report from the U.S. Geological Survey shows it is increasingly likely a magnitude 8.0 or greater earthquake will hit California, but that "doesn't change the bottom line" for the state's emergency management workers, an agency official says.

Lucy Jones, a USGS seismologist and Mayor Eric Garcetti's adviser on earthquakes, tweeted Tuesday about the randomness of big quakes.

"This new science doesn't change the bottom line for emergency managers," she wrote. "Which one happens in our lifetimes is a random subset."

The tweet was in response to a question posed to Jones about the practical takeaway for those trying to prepare the state for just such a disaster.

On Tuesday, the USGS adjusted its bigquake forecast, hiking its estimate on the chances of an 8.0 earthquake in California in the next 30 years from 4.7% to 7%.

Scientists said the reason for the increase was the growing understanding that earthquakes weren't limited to separate faults but could begin on one fault and jump to others. The result could be multiple faults rupturing in a simultaneous megaquake.

Stated another way, the chance of an 8.0 or greater quake in California can be expected once every 494 years. The old forecast calculated a rate of one 8.0 or greater earthquake every 617 years.

"The new likelihoods are due to the inclusion of possible multi-fault ruptures, where earthquakes are no longer confined to separate, individual faults but can occasionally rupture multiple faults simultaneously," said USGS seismologist Ned Field, the lead author of the report.

"This is a significant advancement in terms of representing a broader range of earthquakes throughout California's complex fault system."

The report says past models generally assumed earthquakes were confined to separate faults — or that long faults such as the San Andreas ruptured in separate segments.

But recent large California earthquakes showed how they could rupture across multiple faults at the same time. Many of those faults are in the Los Angeles area.

The Whittier Narrows earthquake, magnitude 5.9, struck on the Puente Hills thrust fault system on Oct. 1, 1987. Three days later, a magnitude-5.6 aftershock hit on a different fault. That aftershock killed one person, twisted chimneys and broke windows. Damage was reported in Whittier, Pico Rivera, Los Angeles and Alhambra.

Much larger quakes also showed how this could occur, including two that hit the Mojave Desert in the 1990s: the 1992 magnitude-7.3 Landers earthquake and the 1999 magnitude-7.2 Hector Mine earthquake.

It also happened in the 7.2 earthquake that hit along the California-Mexico border on Easter Sunday in

2010. Scientists said the border quake directed tectonic stress toward Southern California, putting the region at a higher risk for a future quake.

Data showed the April 4, 2010, quake and its aftershocks triggered movement on at least six faults, including the Elsinore and San Jacinto faults. Those faults run close to heavily populated areas in eastern Los Angeles County and the Inland Empire.

At the time, scientists said the imagery gave proof that earthquakes zipping along a fault can jump over gaps as long as seven miles. Previously, only jumps of three miles had been observed. There was also proof that earthquakes could reverse directions, an observation that had never been seen before.

Dramatically, proof of earthquakes jumping fault boundaries occurred in the massive 9.0 earthquake that hit off Japan in 2011. "The 2011 magnitude 9.0 Tohoku, Japan, earthquake also violated previously defined fault-segment boundaries, resulting in a much larger fault-rupture area and magnitude than expected, and contributing to the deadly tsunami and Fukushima nuclear disaster," the report said.

"As the inventory of California faults has grown over the years, it has become increasingly apparent that we are not dealing with a few well-separated faults, but with a vast interconnected fault system," the report said. "In fact, it has become difficult to identify where some faults end and others begin, implying many more opportunities for multi-fault ruptures."