What weekend's earthquakes mean for future seismic activity in the Bay Area

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Large earthquakes occurred much more frequently in the Bay Area during the 19th century, says Stanford geophysicist Greg Beroza. Last weekend's magnitude 6.0 quake in Napa was a reminder to stay ready for something bigger.

This past Sunday, two significant earthquakes occurred within hours of each other. Early in the morning, a magnitude 6.0 struck near Napa, Calif. Although it was a relatively tame earthquake, more than 100 people were injured and property damage in the region could total an estimated $1 billion. Later in the day, a 6.9 magnitude earthquake shook rural areas in central Peru.

Greg Beroza, a professor of geophysics at Stanford, said that the Napa temblor was a reminder that earthquake activity in the San Francisco Bay Area in the nearly 25 years since the Loma Prieta earthquake has been exceptionally low.

"The 19th century was not like this at all, and earthquakes large enough to cause damage in the Bay Area occurred much more frequently," said Beroza, who leads a research group that studies earthquakes. "The earthquake on Sunday was a timely reminder that the recent quiescence can not last.

"The rapid onset of shaking that so many people felt is a reminder that earthquakes hit suddenly," he said. "Damage in this earthquake was localized because the earthquake was not that large. Much larger and

more damaging earthquakes with stronger shaking of longer duration lurk in our future."

The time to prepare for earthquakes is now. A wide range of earthquake preparedness information is available through the Earthquake Country Alliance. For Stanford-specific earthquake preparedness information, please visit: ucomm.stanford.edu/quake/preparedness/

How did this earthquake compare to the 1989 Loma Prieta earthquake?

Aside from the fact that the Loma Prieta earthquake was much bigger – magnitude 6.9 – Sunday's earthquake was a "strike-slip earthquake." This means that the two sides of the fault slid horizontally past one another. In the Loma Prieta earthquake the slip was known as oblique, meaning that there was both horizontal and vertical motion of the two sides of the fault. Also, these earthquakes did not occur on the same fault. Sunday's earthquake probably occurred on a strand of the West Napa Fault, whereas the Loma Prieta earthquake occurred in close proximity to the San Andreas Fault.

Was there any connection between the Napa earthquake and the one that struck Peru later on Sunday?

There was no connection. Very large earthquakes have been observed to trigger small earthquakes at great distances, but the earthquake near Napa, despite the damage, was modest in size. Statistics compiled by the U.S. Geological Survey show that there are, on average, more than 100 earthquakes per year of magnitude 6 and larger.

Was this weekend's activity a harbinger of a larger earthquake that will strike this area in the near future?

There are several concerns. The most likely scenario is that there will be smaller earthquakes called aftershocks that might cause further damage to already compromised buildings. A less likely possibility – but still possible – is that there will be an earthquake of comparable size or larger. Both of these probabilities decay rapidly with time, so the longer we go without them happening, the better.

Provided by Stanford University