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## June: 1992 Landers Earthquake



Surface rupture from the 1992 Landers earthquake | SCEC

The 1992 magnitude 7.3 Landers earthquake was a pivotal event for seismologists working at the cusp of a new technological era in their profession. “Most people are more aware of Loma Prieta (1989) and Northridge (1994) because they had much bigger urban impacts, so they got more public attention,” said **Susan Hough**, a seismologist at the U.S. Geological Survey. “But Landers was the biggest earthquake in southern California in 40 years.”

Landers was among the first big earthquakes to take advantage of the build-out of modern seismic networks that had been happening in the U.S. since the 1970s, she added, “and its surface structure was on full display in the desert. That really gave us a bounty of instrumental data that drove the science forward in some exciting ways.”

The Landers earthquake yielded valuable information about how earthquakes interact with one another even at remote distances, how aftershocks are triggered, and how earthquakes break across complicated sets of faults, she noted.

At USGS, Hough helped deploy and monitor portable seismometers in the southern San Andreas region after the April 1992 Joshua Tree earthquake sequence. By late June almost all of the other research teams in the field had pulled their portable instruments, “but the USGS kept ours out,” she recalled. “In my career, Landers was the big fish that didn’t get away.”

**Jeffrey Freymueller**, a postdoc in 1992, was part of the first generation of students to use GPS for earth science research. Freymueller, now Endowed Chair for Geology of the Solid Earth at Michigan State University, had been waiting to get data analysis set up and new software to use on two other GPS projects when the Landers earthquake hit. He and geophysicist Paul Segall from Stanford University drove their GPS equipment out to the Landers field where the scene was “chaotic,” with overlapping field teams trying to sort out their surveys, he recalled.

He spent the rest of 1992 analyzing data collected from Landers. “Back in those days, you had to find and download all the GPS data from around the globe for any day you wanted to work on, and estimate the satellite orbits yourself,” he said. “The post-earthquake survey was pretty easy, as there were about three weeks of concentrated data. But the pre-earthquake data was spread out over many days, sometimes months apart. Sometimes I had to analyze a day of global data to get one survey of one site.”

“I learned a lot from Landers, from efficient data analysis to earthquake slip modeling, to navigating complicated collaborations,” he added.

One day while guarding a GPS receiver along a side road, Freymueller talked with a local woman who shared her fear of aftershocks. “I had the back door of the Jeep open to provide shade, so I just invited her to sit down in the shade for a few minutes and try to relax a bit. I tried to explain some facts about aftershocks and earthquakes – we know that they will continue for a while, but the rate will decrease with time. Some will be bigger than others, but the bigger ones are less common than the small ones, and the chance of a really big event happening in the same place as the Landers earthquake was very small. I think it helped her, at least for a while.”

## KEEP ON READING

Read more about this month’s historic earthquake in key papers from SSA journals. The following papers will be **available for free for two weeks, from 20-Jun-2022 to 4-Jul-2022**.

[Local Observations of The Onset of a Large Earthquake: 28 June 1992 Landers, California](#)

R. Abercrombie; J. Mori (1994)

[Slip Distribution of the 1992 Landers Earthquake and Its Implications for Earthquake Source Mechanics](#)

B.P. Cohee; G.C. Beroza (1994)

[Investigation of the Rupture Process of the 28 June 1992 Landers Earthquake Utilizing TERRAscope](#)

D.S. Dreger (1994)

[Southern Surface Rupture Associated with the M 7.3 1992 Landers, California, Earthquake](#)

S.E. Hough (1994)

[Co-seismic Displacements of the 1992 Landers Earthquake Sequence](#)

K.W. Hudnut et al. (1994)

[Shear Zones Formed Along Long, Straight Traces of Fault Zones during the 28 June 1992 Landers, California, Earthquake](#)

A.M. Johnson et al. (1994)

[Spatial and Temporal Distribution of Slip for the 1992 Landers, California, Earthquake](#)

D.J. Wald; T.H. Heaton (1994)

[Continuous Measurements of Crustal Deformation for the 1992 Landers Earthquake Sequence](#)

F.K. Wyatt et al. (1994)

[A Structural Interpretation of the Aftershock “Cloud” of the 1992 Mw 7.3 Landers Earthquake](#)

J. Liu et al. (2003)

[Site Resonance from Strong Ground Motions at Lucerne, California, During the 1992 Landers Mainshock](#)

N.H. Sleep (2012)

[Validation of Fault Displacements from Dynamic Rupture Simulations Against the Observations from the 1992 Landers Earthquake](#)

Y. Wang; C. Goulet (2021)



[Emerging from the Stress Shadow of the 1992 Mw 7.3 Landers Southern California Earthquake? A Preliminary Assessment](#)

E. Hauksson et al. (2002)



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