

EARTHQUAKE: Ridgecrest, California

CS3

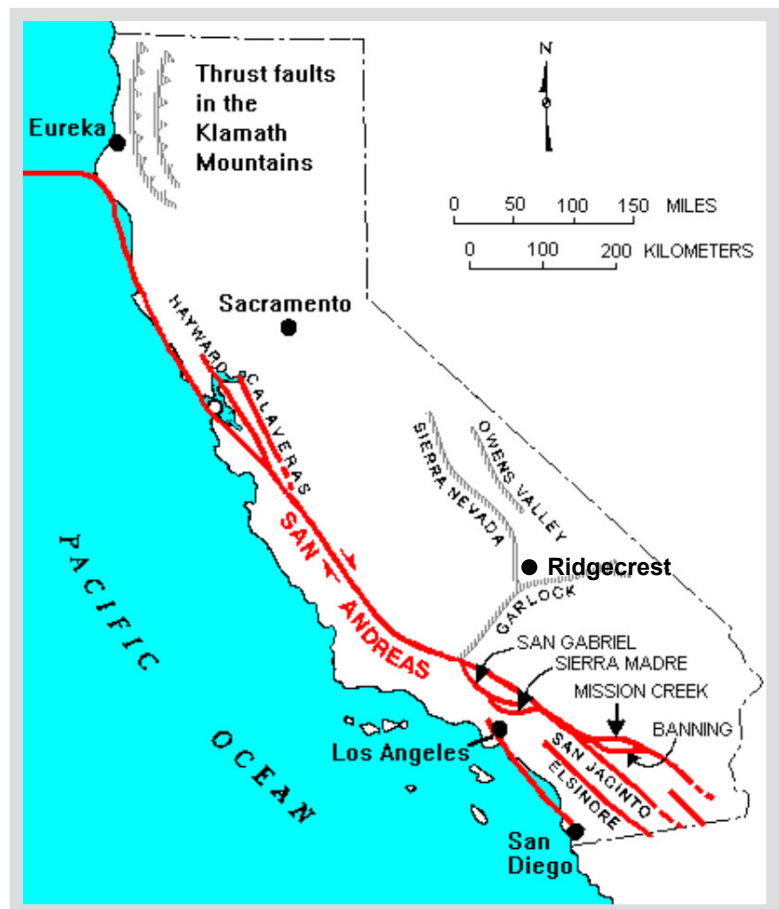
Very Strong “Intensity VII” Earthquake impacts rural California communities and is felt throughout Southern California.

Summary

The Ridgecrest earthquakes began on July 4, 2019, with a magnitude 6.4 quake, as measured by seismologists. It moved along 9 miles of a strike-slip fault line. The next day, a larger earthquake of magnitude 7.1 occurred. This quake moved along 30 miles of Garlock strike-slip fault line and was followed by 26,000 aftershocks over multiple days. These quakes rattled most of Southern California, but the strongest shaking occurred about 120 miles north of Los Angeles, near the small desert town of Ridgecrest.

Impact on Communities

When the quake struck, the townspeople of Ridgecrest felt the violent shaking through their feet and body. About 65 children, 17 musicians, and 400 audience members were present at a 4th of July play at Burroughs High School in Ridgecrest. They evacuated the building when the shaking began. Townspeople at home and in stores saw and heard items on shelves and in cupboards vibrating, rattling around, falling off, and breaking. Furniture that was screwed to the wall stayed standing, but furniture, like bookshelves, that weren't screwed to the wall fell over. Many people knew to duck, cover, and hold on under tables and desks as the best safety procedure to survive an earthquake. There were no reported deaths from the Ridgecrest earthquakes. Luckily, the strongest shock waves traveled northwest toward the uninhabited areas of the Mojave Desert.



California Department of Conservation. "Teacher Feature: California Has Its Faults." <https://www.conserva-tion.ca.gov/cgs/Pages/TeacherResources/faults.aspx> (accessed February 21, 2020).

It is estimated that at least 100 homes and businesses were damaged in the communities of Ridgecrest and Trona. A new *fault* line cut the surface across a dry lake bed and caused damage to a local elementary school. Mobile homes were torn off foundations, chimneys fell, gas lines leaked, and some homes caught fire. The Naval Air Weapons Station also suffered costly damage to its buildings and equipment. State officials sent more than 100 aid workers to the scene from Sacramento, Los Angeles, San Bernardino, and Fresno counties to help affected communities. Overall, many buildings survived since they were newer buildings. Older buildings with unreinforced bricks, brittle concrete, and single-family homes not bolted to their foundations do not survive *earthquakes* as well. Many businesses were up and running within a day or two of the *magnitude 7.1 earthquake*.

Measuring Earthquakes

Earthquakes can be measured in many ways. This study has already stated the *magnitude* measurement, or energy released, during a quake. Quite often *magnitude* is the measurement reporters share on the news after a major quake. Another measurement is the length of the *fault* lines, which were 9 miles and 30 miles long in Ridgecrest. The sides of the *fault* lines moved 3 to 16 feet past each other! This movement is called *slip*, another observation scientists can measure after an *earthquake*. Combined, these measurements help scientists describe and understand what caused the *earthquake* and its potential impacts.

There is another measurement of an *earthquake* known as *intensity*. *Intensity* is the amount of shaking that is felt by humans on the surface of the earth at a particular spot during an *earthquake*. After an *earthquake*, people who experienced movement can report what they felt, and scientists will use that data to create an *intensity* map like the one for the Ridgecrest *Earthquake* on the following page. This map was created by the contribution of

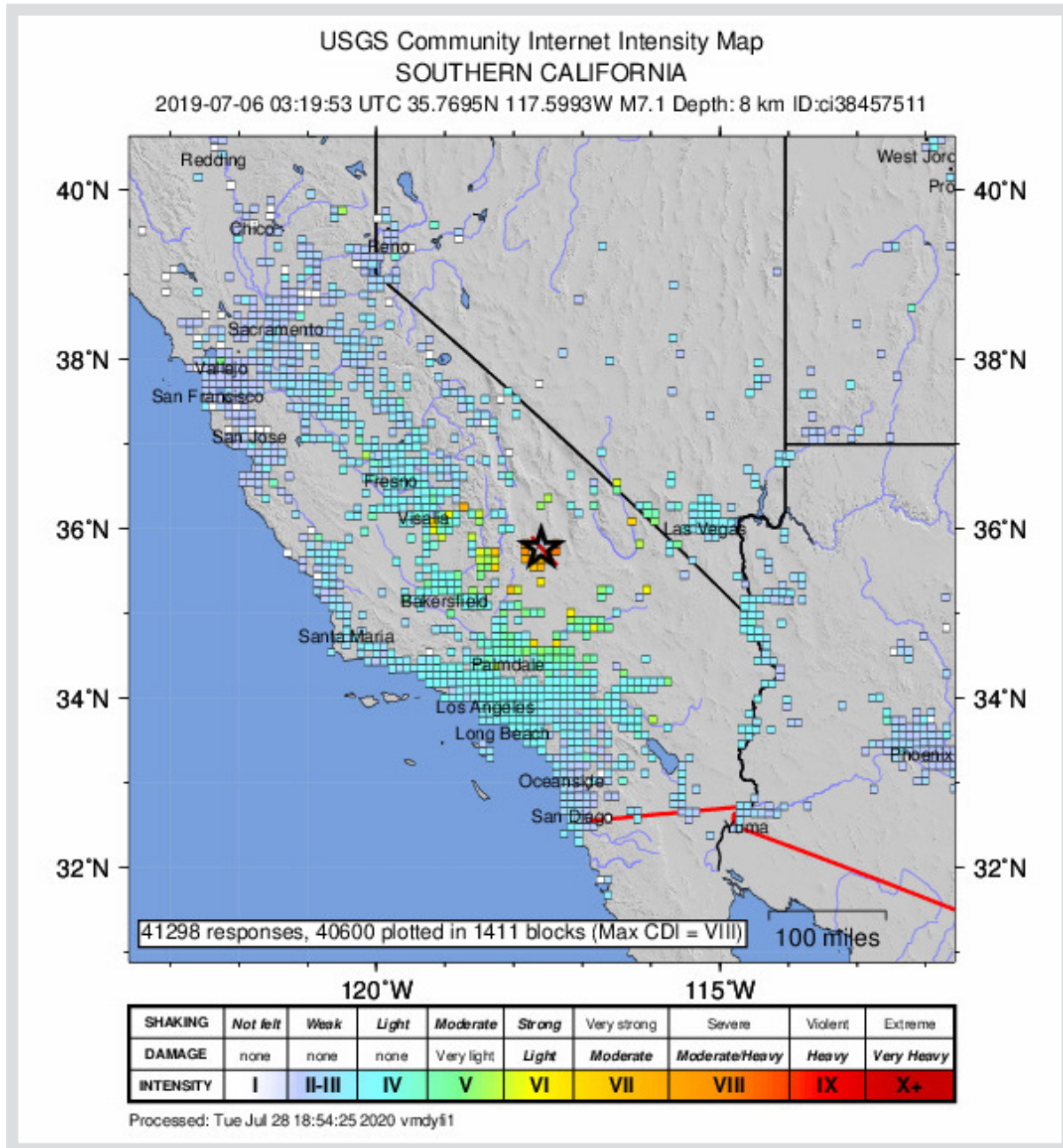


In this image taken from video provided by Ben Hood, a firefighter works to extinguish a fire, Thursday, July 4, 2019, following an *earthquake* in Ridgecrest, Calif. Ben Hood via AP. <https://abcnews.go.com/US/earthquake-preliminary-66-magnitude-rocks-southern-california/story?id=64135583> (accessed July 27, 2020)



A road was heavily damaged in Ridgecrest due to the *earthquake* on the 4th of July. <https://spec-trumnews1.com/ca/la-west/news/2019/07/08/earthquake-economic-losses-estimated-at-1-billion-> (accessed July 27, 2020)

thousands of people that felt the *earthquake* and reported to scientists a rating for what the shaking was like. Following an *earthquake*, you can report to scientists what you felt online at <https://earthquake.usgs.gov/earthquakes/eventpage/tellus>.



The Did you Feel It? Map recorded felt responses from the Bay Area to San Diego. Source: <https://earthquake.usgs.gov/earthquakes/eventpage/ci38457511/dyfi/intensity> (accessed July 27, 2020)

If a similar *earthquake* were to happen (*intensity* VII) in your community, which buildings would be **least likely** to have damage? Which buildings would be **most likely** to have damage? How can we better prepare ourselves, our families, and our communities in the event of an *intense earthquake*?

Intensity and Magnitude Comparison Chart

Intensity Rating	Intensity Descriptions	Possible Magnitude
I	Insignificant. Unnoticed. Felt by only a very few people under just the right conditions. Detected mostly by Seismography.	2-3
II	Somewhat Weak. Felt only by a few people while sleeping, especially on upper floors of buildings.	
III	Weak. Felt by quite a few people indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Cars that are at a stop or parked may rock slightly. Vibration similar to the passing of a large truck on the freeway.	
IV	Moderate. Felt indoors by many, outdoors by few during the day. At night, some people were woken. Dishes, windows, doors askew; walls make cracking sound. Sensation like a heavy truck striking building. Parked cars rock noticeably.	
V	Somewhat Strong. Felt by nearly everyone; many were woken. Some dishes, windows broken. Unstable objects overturned.	4
VI	Strong. Felt by all; many frightened. Some heavy furniture moved; a few instances of plaster falling from ceilings and walls. Damage slight.	5
VII	Very Strong. Insignificant damage in buildings of good design and construction; slight to moderate in well built, regular <i>structures</i> ; considerable damage in regular <i>structures</i> ; significant damage in poorly built or badly designed <i>structures</i> .	
VIII	Destructive. Damage slight in specially designed <i>structures</i> ; considerable damage with partial collapse in regular but sturdy <i>structures</i> . Damage great in poorly built <i>structures</i> . Fall of smokestacks, columns, monuments, walls. Heavy furniture overturned.	6
IX	Ruinous. Damage considerable in specially designed <i>structures</i> ; well designed frame <i>structures</i> tilted. Damage great in sturdy buildings; partial collapse. Buildings shifted off foundations.	7
X	Disastrous. Some well-built wooden <i>structures</i> destroyed; most masonry and frame <i>structures</i> with foundations destroyed. Train tracks bend greatly.	
XI	Very Disastrous. Few, if any, masonry <i>structures</i> remain standing. Bridges destroyed. Train tracks bend greatly.	8
XII	Catastrophic. Damage is total. Lines of sight are uneven. Objects thrown into the air.	

Adapted from "Magnitude/Intensity." Pacific Northwest Seismic Network. <https://pnsn.org/outreach/about-earthquakes/magnitude-intensity> (accessed February 21, 2020)



A mobile home damaged by the Ridgecrest earthquakes. Even though mobile homes might not be anchored to their foundations, it is still safer to duck, cover, and hold on inside of one than it is to run outside during an earthquake. <https://www.accuweather.com/en/weather-news/earthquake-jolts-southern-california-on-independence-day-strongest-in-the-region-since-1994/432075> (accessed July 27, 2020)

Earthquake Hazard Risk in California

The California State Hazard Mitigation Plan outlines earthquakes as 1 of 3 primary hazards we face. *Earthquakes* represent the most destructive hazard both in terms of probability and *magnitude*. According to our partners at the California Earthquake Authority, there are 15,700 *faults* in the state, and of those, over 500 are active *faults*. Most Californians live within 30 miles of a *fault* line, and there is over a 99% chance that a *magnitude 6.7* will occur in the state.

