Times Standard

Not My Fault: Two interesting earthquake sequences: a reminder of our unique geologic setting

Lori Dengler for the Times-Standard
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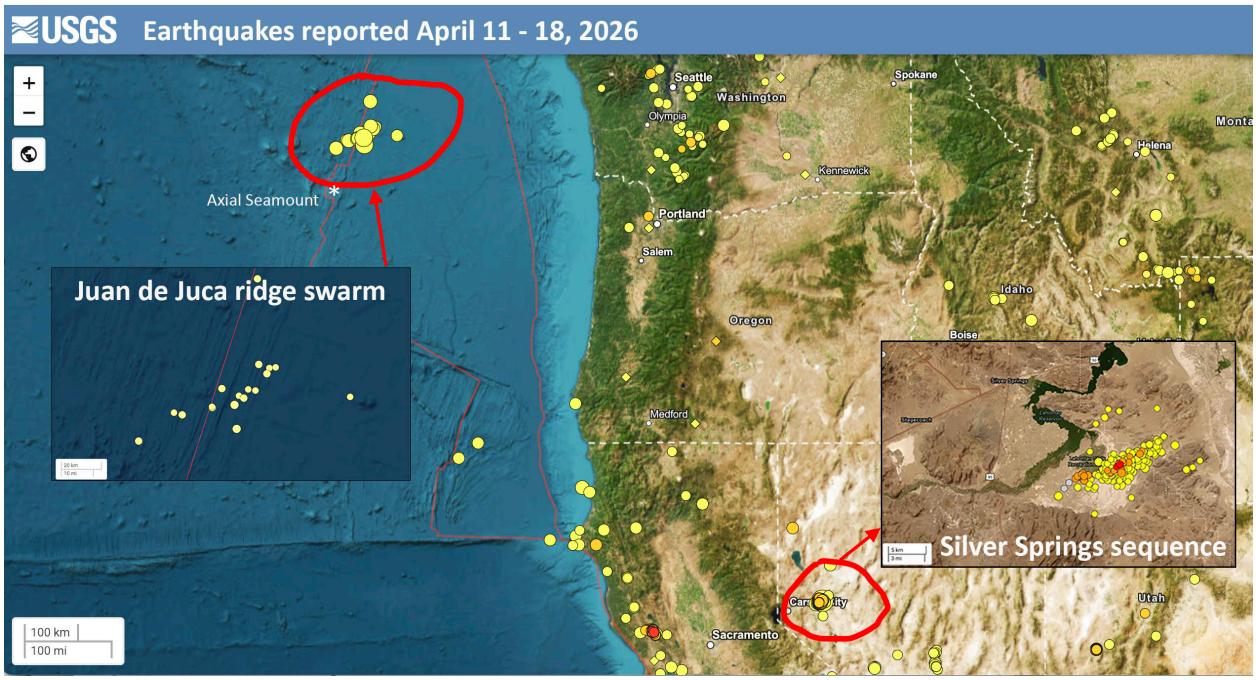

This map shows earthquakes reported by the USGS in the Western U.S. during the week of April 11. Two areas are circled with inset enlargements: the Juan de Fuca Ridge swarm far off the coast of Washington state and the Silver Springs, Nevada sequence. Also shown is the location of Axial Seamount, a shield volcano on the seafloor roughly 70 miles SSW of the Washington swarm.

2026 continues to be a relatively quiet year from an earthquake and tsunami perspective. Four earthquakes have made it into the magnitude 7 range, the larges a M7.5 on March 24 in the Tonga Islands area of the southwestern Pacific. It was felt on two of the Tonga islands but it's depth of nearly 150 miles beneath the surface and distance away from populated areas meant the shaking was modest and it posed no tsunami threat.

Five earthquakes were close enough to populated areas to cause fatalities and the 2026 quake death toll currently stands at 18. It's always a loss when people die in earthquakes, but the impacts have been modest compared to other years. The deadliest was a M5.8 in Afghanistan on April 3 that claimed 12 lives due to the collapse of buildings not designed to withstand the side-to-side motions of seismic waves.

Two earthquake sequences in the Western U.S. this week may have raised a few eyebrows but caused no damage. They were no surprise to seismologists and are only related to each other in

reflecting the complex tectonic setting of the region. They do tell an interesting story and may dispel some media misinformation.

The first sequence was centered nearly 500 miles north of us on the Juan de Fuca ridge 230 miles west of the central Washington coast. It began with a M2.9 on April 12 just after midnight. Eighteen earthquakes followed over the next nine hours, including a 4.2 and a 4.1, the largest in the series. No earthquakes have been reported in this area since then, apparently shutting down as abruptly as it started. We call this a swarm where all of the earthquakes are similar in size and no one larger earthquake stands out as a mainshock.

None of the earthquakes in this swarm were reported felt and all were too small to trigger any tsunami alerts. The Juan de Fuca ridge is the spreading center that separates the Juan de Fuca plate from the Pacific plate, similar to the Gorda ridge off the northern California coast. The earthquakes weren't large enough to be recorded well enough on land-based seismic stations to determine the faulting characteristics. The epicenters appear to trend in an ENE direction in map view, but locations this far from shore have larger uncertainties and aren't good enough to determine a causative fault.

They certainly look to be associated with the ridge; an active spreading center where volcanic and geothermal activity are common. If you've been following volcanic news reports, you might think this earthquake swarm is a sign that Axial Seamount is finally about to erupt. Axial Seamount is a gentle bulge on the Pacific sea floor straddling the rift zone. Classified as a shield volcano, it extends roughly 30 miles in length and rises 3600 feet above the sea floor. It is the site of frequent, small, effusive eruptions that are detectable only by sensitive instruments on its flanks. Eruptions on Axial Seamount were detected in 1998, 2011, and 2015, each lasting no more than a few weeks.

In December 2024, a group of scientists led by William Chadwick of Oregon State announced that the Axial Seamount network showed the volcano was inflating and had reached 95% of the value before the 2015 eruption. At that time, they concluded that a new eruption was likely in the next year. Volcanoes can be fickle, and Axial Volcano is still biding time. The seamount is still inflating, and an eruption could occur at any time. See the most recent eruption forecasts at https://axial.ceoas.oregonstate.edu/axial_blog.html.

This week's earthquakes were centered 60 miles NNE of Axial Seamount. There have been no changes detected in the deep ocean instrumentation since the earthquake swarm began and both seismologists and marine volcanologists concur that there appears to be no link between the two. Axial Seamount will eventually erupt again but it is nothing to worry about. As the basaltic lava oozes out on the seafloor, it will raise the deep ocean temperature around the went by a few degrees and be observed only by the instrument network and marine denizens of the seafloor nearby.

The second sequence began on April 13 with a M5.7 at 6:29 PM PDT in Western Nevada about 275 miles SE of us, near the town of Silver Springs. This was a more typical earthquake sequence with a mainshock followed by numerous aftershock. The mainshock garnered nearly 6500 felt reports, most in a swath from Carson City to San Francisco but a few as far away as Salt Lake City and Las Vegas. It was strong enough to knock items from the shelves of grocery stores in the epicentral region, but no injuries or significant damage was reported.

The 5.7 was centered only a few miles beneath the surface on an ENE trending strike-slip fault. It has been followed by 245 aftershocks to date, clearly defining the 10-mile fault rupture. Most of the aftershocks have been too small to be felt, but 24 made it into the M3 range and felt in nearby towns. The sequence is by no means over; four small earthquakes popped up on my computer Saturday morning as I was writing this column. The USGS estimates a 50% likelihood of more M3s this week and a small chance of an M4.

The Nevada quake was also an opportunity for the USGS and Nevada Seismological Laboratory at the University of Nevada to test out their expanded ShakeAlert earthquake early warning notification system in Nevada. Earlier this year, congress appropriated $34.85 million to upgrade instrumentation and monitoring infrastructure and fully integrate Nevada's network with California's.

In the past, lack of Nevada data has caused problems for ShakeAlert in eastern California. The increase in funding may have been sparked in part because of a false alert sent in December 2025 that notified many Californians to expect shaking after the system detected a bogus M5.9 near the California – Nevada border. To accurately detect and estimate the magnitude of an earthquake, you need stations that surround the epicenter. ShakeAlert can't function well for quakes near the border if there is poor data coming in from one side.

Full integration of Nevada into the ShakeAlert system is not expected until 2028, but improvement may already seen from this week's ShakeAlert notification. Thie initial alert was sent 17 seconds after the earthquake origin, estimating a magnitude of 5.3 and an epicenter location within two miles of the final reviewed location. With improved instrumentation, that notification time should drop to less than 10 seconds and provide greater accuracy in magnitude estimate soon.

Earthquakes in this area of Nevada are no surprise. It's in the transition area between the Eastern California shear zone and the Basin and Range terrain, both systems that developed to accommodate the stretching of western North America caused by the plate motion between the Pacific and North American plates. Contrary to many maps, this plate boundary is not a simple line with the San Andreas fault separating the two areas. It's a broad zone with deformation extending at least as far inland as Utah.

Nevada has seen its share of earthquakes in recent times. A M5.7 struck just 11 miles south of this week's tremor in December 2024. The May 2020 M6.5 Monte Cristo and the July 2021 M6.0 Antelope Valley earthquakes were about 50 and 60 miles away respectively. Even larger earthquakes have occurred in earlier times. 1954 was a particularly shaky era for the region with magnitude 6.2, 6.5, 7.1, and 6.9 earthquakes all occurring within a 60-mile range of this week's activity.

Most of these Nevada earthquakes have been centered in remote areas with few people. But Nevada's population is growing, and a repeat of the larger 1954 earthquakes would cause significant losses. There are also several faults mapped as active in the greater Las Vegas area that have not produced strong earthquakes since the area boomed in the 1940s. It wouldn't surprise me at all if the next damaging U.S. quake came from Nevada.

Lori Dengler is an emeritus professor of geology at Cal Poly Humboldt, and an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times--Standard's. All Not My Fault columns are archived online at https://kamome.humboldt.edu/taxonomy/term/5 and may be reused for educational purposes. Leave a message at (707) 826-6019 or email Kamome@humboldt.edu for questions and comments about this column or to request copies of the preparedness magazine "Living on Shaky Ground."