

Not My Fault: The 2022 mid-year earthquake report

Lori Dengler/For the Times-Standard

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Six months is too short a time to see any definitive trends in earthquake activity, but I enjoy looking for patterns and here are a few things that stand out in 2022.

The good news is that no catastrophic earthquakes have occurred so far. By catastrophic, I mean casualties in the several thousands, and/or a substantial economic hit. The June 21st M5.9 earthquake in Afghanistan that I wrote about last week was horrific for the people in the region but is unlikely to take nearly the toll of the underlying political issues in the county.

In terms of numbers, the first half of 2022 racked up 67 earthquakes of magnitude 6 or larger but only three in the M7 range. Since 2000, the half-year average has been closer to 80 M6s and about 8 in the M7 range. There is considerable variation in these numbers from year to year. The first half of 2009 had only 57 and 2011 hit 130 magnitude 6s. But this year has been at the low end so far.

No 2022 quakes have even reached the mid to upper 7 range. The largest to date was a M7.3 on March 16 about 30 miles off the coast of Japan's Fukushima Prefecture. This earthquake may offer a clue as to why seismicity levels seem a bit subdued.

The Fukushima earthquake was located within the aftershock zone of the 2011 M9 Great East Japan Earthquake. When the earthquake happened, I immediately suspected that it was another 2011 aftershock. It is a little unusual for such a large aftershock to occur so long after the main earthquake, but not unprecedented. Magnitude 9 earthquakes make big changes in the regional stress and some scientists now argue that the imprint could last centuries (<https://temblor.net/earthquake-insights/megathrust-earthquakes-impact-surrounding-seismicity-for-centuries-14194/>).

I keep tabs on the rate of seismicity in the rupture area of the 2011 earthquake. Before 2011, the background rate of magnitude 4.5 and larger earthquakes averaged 35 per

year. Following the 9.1, earthquake activity soared - over 2100 were recorded in 2011. Over the following decade, the numbers slowly declined reaching 81 last year. I'd argue we are still in the tail end of that aftershock window.

But "tail end" is important and the area is not producing as many aftershocks as a few years ago. Other aftershock sequences are also in decline or nearly over. The largest earthquake of last year was last July's 8.2 south of the Alaska Peninsula. It produced aftershocks, about 30 in the M4 – M5.5 range in the latter half of 2021 but has gone largely quiet this year. The aftershock sequences of the two other M8s of last year (South Sandwich Islands and the Kermadecs) also appear to be nearly over.

The aftershock story also plays a role in the decline of US seismicity rates in the first half of this year. Only 25 earthquakes in the lower 48 made it into the magnitude 4 range and none were as large as 5. The aftershock hotspots of the past few years – Ridgecrest in South Central California, Western Nevada, and Central Idaho – are all quieting down. They aren't completely done. A 3.9 near the town of Mina in Nevada on Thursday was a reminder that the M6.5 Monte Cristo sequence is not over yet.

The most seismically active region of the coterminous 48 states was Texas. 110 magnitude 3 or larger earthquakes were recorded in Texas, just edging out California's 106. Ten of the Texas quakes made it into the M4 range. Most of these earthquakes are in the western part of the State. Seismicity in this region began to climb in 2020 and has reached a new high in the first half of 2022. The likely culprit is the disposal of waste fluids from drilling operations into deep wells. Fortunately, the area is sparsely populated and few of these earthquakes have been reported felt. But with the number and magnitude of these induced earthquakes increasing, it raises concerns that larger magnitude events could occur, impacting areas as far away as El Paso or Central Texas.

Another area that interests me is Hawaii. Hawaii is a seismically active place, and the earthquake activity is a direct or indirect result of the volcanism on the Island. In 2015, seismologists working at the Hawaii Volcano Observatory noticed a tightly concentrated zone of earthquakes beneath the town of Pahala. Nearly 100 M3s were reported last year and we are on pace to equal or exceed that number in 2022.

These earthquakes are not associated with an eruption. They are also deeper than most earthquakes on the Island, around 20 miles beneath the surface. One hypothesis is they represent a deep lateral magma conduit that has

congealed near Pahala, and magma continues to be blocked at that point. What is clear is that the Pahala sequence shows no sign of slowing down.

I usually find a surprise in earthquake patterns. This year, the most intriguing earthquakes are in South Carolina. A 3.4 earthquake occurred last Sunday near the town of Elgin. On Wednesday, a 3.5 and a 3.6 earthquake occurred in nearly the same spot. Nineteen smaller earthquakes have also been recorded. The larger earthquakes were felt throughout South Carolina and by a few as far away as Mississippi, Indiana, and Maryland.

They were certainly a surprise to the many people who had never felt an earthquake before, but they aren't unprecedented in the region. They are natural tectonic events in the diffuse seismic zone east of the Appalachians. Although far less frequent than earthquakes in the western US, east coast quakes have occurred in the past – the most notable in August 1886 near Charleston, killing 60 people and causing damages in excess of 165 million in today's dollars.

I can't predict what the second half of 2022 will bring. We may be in the tail end of aftershock sequences right now, but it only takes moments for another major quake to occur and start a new pattern of events.

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/resources> and may be reused for educational purposes. Leave a message at (707) 826-6019 or email rctwg@humboldt.edu for questions and comments about this column, or to request a free copy of the North Coast preparedness magazine "Living on Shaky Ground."