

Not My Fault: A recap of all things seismic in 2019

Lori Dengler/For the Times-Standard
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I'd been holding my breath. Now I can breathe out and officially say it was a quiet year as far as earthquakes were concerned. Both the number of large earthquakes and earthquake-related casualties came in below average.

The May 26 M8.0 in Peru was the chart topper in size for the year. It was felt throughout the country and in neighboring Ecuador, Colombia and Brazil. But even though the USGS estimated 1.6 million people experienced strong to severe shaking, the impacts were modest for a quake of this size. It damaged nearly 1000 structures and displaced over 1000 families but caused only two deaths. The depth of the earthquake (76 miles) and the location away from heavily populated areas mitigated effects.

A better way to look at seismic activity is the energy release from all earthquakes, rather than just focusing on the largest event. Earthquakes release an enormous amount of energy. The largest atomic bomb ever tested (Tsar Bomba, detonated in the atmosphere by the USSR in 1961) had a yield of 50 megatons of TNT. This is roughly the energy released by a single magnitude 8.4 earthquake. Of course there is a significant difference in how that energy is released. Fortunately for us, most earthquake energy goes into the earth – in the frictional sliding involved in rupture. Only a tiny fraction goes into the seismic waves that cause damage.

The annual earthquake energy budget varies considerably from year to year. The average over the past two decades has been roughly equivalent to three Tsar Bombas. 2011 was at the top in that time window, releasing more than 14 Bombas in energy. 2019 is at the bottom of the list at about 75% of a single Bomba.

The reason for the lower energy release was fewer magnitude 7s. The difference in size between a 6 and a 7 might not sound like much but the magnitude scale is logarithmic and each unit increase in magnitude corresponds to a more than 30-fold increase in energy. The average number of 7s is 15 per year and 2019 only produced nine and they were mainly at the lower end of the range.

What does it mean? Not much in terms of what to expect for this year. In our relatively short window of instrumental records, we've seen decades where the earthquake activity was relatively low and others where it was very high. The ten years between 1955 and 1965 produced the two largest earthquakes on the planet (1960 Chile M9.5 and 1964 Alaska M9.4) and several quakes in the upper 8 range. The 1970s and 80s were much quieter with no earthquake larger than an 8.3.

You don't need a great earthquake to cause major impacts. According to NOAA statistics, 98% of earthquake deaths are caused by earthquakes less than magnitude 8. The deadliest year of the past two decades was 2010. It did produce a number of big earthquakes including the M8.8 Chile earthquake. But it was the relatively modest M7 Haiti quake that caused almost all of the estimated 320,000 earthquake casualties that year.

44 earthquakes caused fatalities in 2019 – up from the 24 per year average of the past two decades. But only three caused more than 40 casualties and the worst, the November 26 M 6.4 in Albania, killed 52 (see Not My Fault 12/4/19). The total 288 makes this the second lowest in the past twenty years and the fourth lowest since 1970, well below the 3,670 median. The culprits this year were the usual – collapse of poorly built structures.

In the US, California took over first place from Alaska with the largest quake of the year, the July 5th M7.1 Ridgecrest earthquake. That earthquake produced the first US earthquake fatality since the 2003 San Simeon quake. A man was crushed beneath a car during the M6.4 foreshock on July 4th. He was in Pahrum, Nevada nearly 100 miles from the epicenter and became Nevada's first known historic earthquake death. A word of caution to all of you do-it-yourself mechanics: he was working on his car and the vehicle had not been jacked up safely. The relatively mild ground motion was enough to topple it.

The Ridgecrest earthquakes and the vigorous aftershock sequence put California in the lead for the number of earthquakes likely felt (1,236*), up a whopping 700% over the average of the past decade. The aftershocks are likely to continue through the year but the number and magnitude will continue to decrease, unless, of course, another significant earthquake occurs on a nearby fault segment.

The rest of the nation was relatively quiet. Hawaii (at 88) came in a distant third behind California and Alaska for felt earthquakes, a sharp decrease from the nearly 3000

of last year while the Lower Puna eruption at Kilauea was in full swing. That eruption was declared over in September 2018 and Kilauea has been quiescent since then. But keep tuned on Hawaii - Kilauea's big neighbor Mauna Loa may be re-awakening. The world's largest volcano (and largest mountain) activity status was raised to an advisory in July based on increased seismicity beneath the volcano and inflation of the summit area.

On the North Coast, seismicity continues to be subdued. We did experience one widely felt earthquake – the 5.6 on June 23rd in the Mendocino triple junction region. But the overall number of magnitude 3 and larger earthquakes was only 72, well below the 100 average of the past 40 years. It's been nearly ten years since our last significant quake. More about that next week.

Note: *I use earthquakes of M3 or larger as a proxy for felt events in the lower 48. Alaska did report over 1700 M3s in 2019, more than California but many in remote areas and unlikely to be felt.

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