

Not My Fault: The final 2018 seismic wrap: the lower 48 and the North Coast

Lori Dengler/For the Times-Standard

Posted: January 30, 2019

2018 was a relatively quiet year for the contiguous 48 states and on the North Coast. There were no damaging earthquakes and fewer felt ones than the past few years. But there were two unusual tsunamis in places that few would expect.

The final 2018 tally for earthquakes of M3 or larger in the lower 48 was 586, and included 54 4s, seven 5s and one 6. The August 22 M6.2 off the coast of southern Oregon was the largest of the year. Centered on the Blanco fault, about 160 miles off the coast, it was reported felt lightly by about a hundred people in coastal Oregon and Northern California.

The Blanco fault is the plate boundary between the Juan de Fuca and Pacific plates, and is part of the same tectonic regime that contributes most of the earthquakes on California's North Coast. All but one of the 2018 magnitude 5 earthquakes were in this same system – two on the Blanco, two in the Gorda plate and two on the Mendocino fault. The largest North Coast quake of the year was the January 25 M5.8 on the Mendocino fault about 100 miles west of Cape Mendocino. Fortunately, this earthquake, like all of this year's 5s was too far offshore to cause significant impacts.

Only five North Coast earthquakes were widely felt, with 100 or more felt reports to the USGS Did You Feel It (DYFI) web site. The most widely felt was the M4.7 on March 23 with 1441 reports. Overall, the North Coast continued its relatively quiet trend of the past four years. Sixty earthquakes of M3 or larger were detected last year, well below the long-term average of about 100 but above the 2017 count of only 45.

There was only one earthquake in the M5 range not offshore of Northern California or Southern Oregon. An M5.3 on April 5th was located in the Channel Islands about 40 miles south of Santa Barbara and felt by nearly 13,000 people. It caused slight damage to ranch buildings on Santa Cruz Island items toppled from shelves in coastal Santa Barbara County, but otherwise few impacts.

It was one of ten US earthquakes in 2018 reported felt by at least 3000 people on the DYFI web site. The champion this year was the Berkeley M4.4 on January 4th with over 38,000 reports. The most interesting, from my perspective, was the same-sized earthquake on December 12th in Eastern Tennessee.

The Tennessee quake was within the East Tennessee Seismic Zone. Nearly 10,000 people reported feeling the earthquake, some from areas 300 miles away. The Berkeley earthquake of the same magnitude received many more felt reports but was felt at distances only half as far away. The eastern US is much less tectonically active than the west resulting in a cooler crust that transmits seismic waves more efficiently than the warmer west. Eastern quakes are always felt over a larger area than the western equivalent.

The overall number of lower 48 quakes large enough to be felt was nearly half the average of the preceding four years. The main reason was the continuing decline of human-induced earthquakes in Oklahoma. All of the earthquakes above were natural or tectonic earthquakes caused by the heat within the earth. Earthquakes of the past decade in much of the Midwest have a different source, the injection of waste fluids into deep wells from drilling and hydraulic fracturing operations.

Oklahoma has been the poster child for human-induced seismicity. From a pre-injection average of one or two quakes per year, the state experienced 863 M \geq 3 earthquakes in 2015 and had the most felt earthquakes in the contiguous 48 states between 2014 and 2017. In 2015, the State began to regulate the volume and injection rate of waste fluids and quakes began to decline. Last year the number was down to 161, still well above the pre-injection era number, but a noticeable reduction. With 226 M \geq 3 quakes in 2018, California regained its top lower-48 spot.

Oklahoma is not the only state with an injection earthquake problem. Other states with similar human-caused earthquakes of M \geq 3 in the past year include Texas (28), Kansas (20), Nebraska (13) and New Mexico (8). Nebraska is new to this list with disposal wells near the town of Stapleton likely accounting for this cluster.

And now to tsunamis. Whenever a tsunami is recorded along a lower 48 coastline, Crescent City usually has the highest measurement. In 2018, Crescent City didn't even make the race. There were two recorded tsunami events. On May 15th, tide gauges from Maryland to Connecticut recorded a 3 to 8 inch wave and on

December 21, a 3.5-foot surge was recorded along the SW Florida coast. Both of the tsunamis were caused by large-scale atmospheric pressure variations and are called meteotsunamis. Like earthquake-caused tsunamis, they involve water displacement from the sea floor to the ocean surface and propagate in the same way as any other tsunami. They are relatively rare and usually modest in amplitude. But like sneaker waves, they can prove deadly to unsuspecting beach goers.

Note: Almost all of the data in this column was drawn from the Advanced National Seismic System repository. ANSS is a consortium of regional seismic networks. The USGS compiles and reviews data that can be used by anyone by the USGS and is accessible at <https://earthquake.usgs.gov/earthquakes/map/>.

This site operated during the government shutdown and at first glance, appeared to be functioning normally. However, maintenance was been deferred and review of events was cursory. Hazards research was put on hold and community meetings addressing resiliency and preparedness cancelled. Shutdowns are bad for employees, the science and for all of us who live in earthquake country. We cannot afford another one.

Lori Dengler, PhD, is an emeritus professor of geology at Humboldt State University, and an expert in tsunami and earthquake hazards. For questions or comments about this column and requests for free copies of the preparedness magazine "Living on Shaky Ground," leave a message at (707) 826-6019 or email Kamome@humboldt.edu

<https://www.times-standard.com/2019/01/30/lori-dengler-final-2018-seismic-wrap-the-lower-48-and-the-north-coast/>