Times-Standard
Times-Standard / Humboldt Beacon

Not My Fault: The Shake Cottage, earthquakes, and megastorms: planning will make you safer

Lori Dengler/For the Times-Standard
Posted August 20, 2022
https://www.times-standard.com/2022/08/20/lori-dengler-the-shake-cottage-earthquakes-and-megastorms/

It's been a good first weekend at the Humboldt County Fair. Several hundred people have taken a 'ride' in the Quake Cottage – California's travelling earthquake simulator. A main purpose of the simulator is to get people thinking about earthquakes and how to prepare for them. If the mark of success is getting questions, this little Quake Cottage has been a smash hit.

A common query is how does the Quake Cottage rank on the Richter Scale? I like this question because it provides an opportunity to clear up some magnitude confusion. To begin with, forget 'Richter.' Charles Richter was a giant in the annals of seismology, but we haven't used his definition of magnitude in over a half century.

We still use Richter's concept of using numbers roughly between 1 – 10 to describe the size of an earthquake. An earthquake in the magnitude 3 range in Richter's day will still be 3ish today. Richter defined has scale as logarithmic with each whole number step meaning ten times larger amplitude on the standard seismograph of the time. The modern magnitude scale is still logarithmic, but it makes more sense to use energy to rank size; each number jump corresponds to a 32-fold increase in the energy released.

Magnitude by itself doesn't tell you how much damage an earthquake will cause. In 2021, three earthquakes made it into the M8 range, but none caused damage. The earthquakes were centered in remote areas and few people even reported feeling them. The deadliest quake of 2022 killed more than 1000 but only had a magnitude of 6. It was in a populated region near the Afghanistan-Pakistan border where many people live in structures not designed to resist strong shaking.

Location is not the whole story. How rapidly a fault ruptures and how much slip it causes can also make a big difference in what you experience and how much damage results. Some earthquakes snap with a bang, the fault rupture moving as fast or faster than the speed of sound. Others break more slowly, producing long rolling vibrations that may be felt only weakly or not at all.

The Quake Cottage at the Humboldt County Fair is a three-minute ride. If a real earthquake shook this long, it would probably fall into the magnitude 8 to 9 range. But it doesn't have the complexity of a real earthquake and most of the motion is side-to-side in one direction. And of course, the biggest difference is that it won't catch you unaware.

Another common question is when will the next earthquake happen. Earthquakes can't be predicted but we can make estimates of where they are more likely to occur. The location of active faults, past history of regional earthquakes, and measuring regional stress fields helps to spotlight regions with a greater potential for strong shaking. It's a little like horse racing – pedigrees and past performance are important. The North Coast is an odds-on favorite when it comes to a likely place for California quakes. But longshots can surprise us.

Probability is hard for people to grasp, and I'm not convinced it is of crucial importance. Last week, the New York Times published an article, "The California Megastorm," about increased likelihood of catastrophic flood events (https://www.nytimes.com/interactive/2022/08/12/climate/california-rain-storm.html). It's worth a read and the graphics are terrific. It's a summary of a recent study led by climate scientist Daniel Swain from UCLA looking a probabilities and some of the impacts of a prolonged atmospheric river hitting the State.

Anyone who has lived on the North Coast for awhile has probably heard of the 1964 flood. Called the "pineapple connection" because the storm path brought warm wet air along a southerly path by Hawaii, the entire Pacific Northwest was pummeled by rainfall for about two weeks. Road and bridge damage made it the costliest disaster in Caltrans history and the peak flows on many North Coast rivers still hold the record.

Events like 1964 are now called atmospheric rivers for the concentrated and sustained focusing of moisture-laden air. They occur every year and one or two such storms account for much of our annual precipitation. 1964 was large but not the largest California has experienced. The Sacramento floods of 1861-62 was the largest atmospheric river in the State's history with elevated rainfall dumping about ten feet of water over 43 days. An estimated 4000 people died, and the losses would have exceeded 3 billion in current dollars.

Concern about these intense, extend atmospheric river events led the USGS to conduct a multi-hazards study in 2010. Called ARkStorm for Atmospheric River times 1000, it looked at projected rainfall, winds, and human infrastructure impacts in a repeat of the nineteenth century flood in our 21st century environment. Losses were estimated on the order of $725 billion.

ARkStorm was a deterministic study. The USGS made no estimate of how likely such an event was. They took the parameters of the 1862 event and plugged it into our modern world. The new study attempts to put such events in a probabilistic framework, arguing that a warming world has made events that occurred on a several century recurrence in the past, much more likely.

Please don't let probabilities confuse you. Earthquakes and megastorms will happen in the future. Pre-event planning will mke a difference.. On a personal level, realizing that a family emergency plan, ability to receive emergency notifications, and know how and when to evacuate, can be lifesaving.

The Quake Cottage is meant to be fun and get you thinking about earthquakes in a way that is not frightening. We've noticed that kids are often more receptive to the experience than their parents and will often leave the trailer talking about what they can do at home to reduce shaking damage. Time for the grownups to take their suggestions.

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."