

Times Standard

Not My Fault: You can't avoid earthquakes, but you might get a heads up before the strongest shaking

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ShakeAlert™

AN EARTHQUAKE HAS
BEEN DETECTED

SHAKING EXPECTED



Cell phone screen of the WEA ShakeAlert sent to Humboldt County residents on May 21st. 2023 following the M5.6 earthquake on the Mendocino fault.

Two earthquakes in the magnitude 5 range occurred in Northern California this month. On May 11th, a M5.5 struck Plumas County near the south shore of Lake Almanor and last Sunday, a 5.6 hit offshore of Cape Mendocino in Humboldt County. They occurred at opposite sides of Northern California's complex geologic framework and were unrelated.

The Lake Almanor earthquake was centered nine miles southeast of Chester. More than 6700 felt reports were made to the USGS Did You Feel It site - as far south as Visalia and north to the Oregon border. The earthquake caused items to fall from shelves and triggered rockslides, but no injuries or significant damage was reported.

The Lake Almanor earthquake was caused by rupture on a north-south oriented normal fault. Normal faults are extensional, caused by stretching, the dominant style of faulting in the Basin and Range

tectonic province. The May 11th quake was near the western edge of the Basin and Range and had nothing to do with Mt. Lassen volcano.

Last Sunday May 21st, a M5.6 earthquake occurred on the Mendocino fault, 60 miles west of Cape Mendocino. It didn't get as many felt reports as the Lake Almanor quake due to its offshore location, but 602 people did file reports on the Did You Feel It site, from Bodega Bay to Brookings Oregon and inland to Chico. No damage was reported.

The Mendocino fault is one of the most active faults in California. Thirty-nine M5.0 and larger earthquakes have been recorded on the fault since 1970, the largest a 7.1 in 1994. The fault marks the transform plate boundary between the Gorda and Pacific plates and earthquakes like the recent 5.6 show east - west strike-slip motion. Slow spreading along the Gorda ridge to the west and the tug of the Cascadia subduction zone to the east create constant shear along the fault.

The Lake Almanor and the Mendocino fault earthquakes were more than 230 miles apart and caused by different tectonic processes but share one thing in common. Both triggered the ShakeAlert Early Warning System. Relying on a dense network of seismic stations, ShakeAlert detects an earthquake in the first seconds after the rupture begins. Automated algorithms calculate the epicenter, magnitude, and areas where shaking will be felt. If magnitude and shaking strength exceed a preset threshold, audio and text alerts are issued within the next few seconds and, hopefully, before the strongest shaking occurs.

Detection and analysis are just the first two steps in the process. What is the more challenging is getting alerts to you. Alerts are delivered to cell phones in three ways. All use the same information from the West Coast ShakeAlert Earthquake Early Warning System seismic monitors. In California, ShakeAlert is overseen by the USGS and the California Governor's Office of Emergency Services. The message is short – an audible announcement “Earthquake, Earthquake – Drop Cover and Hold On.” Your screen shows ‘ShakeAlert AN EARTHQUAKE HAS BEEN DETECTED SHAKING EXPECTED’ with the Drop Cover Hold On graphic.

Wireless Emergency Alerts (WEAs) is a national system overseen by FEMA. WEAs include AMBER Alerts to locate abducted children; Imminent Threat Messages for severe disasters such as wildfire, earthquakes, tsunamis, and severe weather; and Presidential Alerts. WEAs rely on prearranged agreements between government agencies and private cell phone companies.

No need to sign up to receive WEAs. When an earthquake of magnitude 5 or larger occurs and is likely to be widely felt, the WEA is issued. WEAs don't know your location; area cell towers broadcast the message to all phones within a defined geographic area. If you don't want to receive WEA alerts, you can opt out by deactivating it in your phone settings.

You can also download the free MyShake App. In addition to delivering a ShakeAlert-powered message, MyShake uses your phone's motion sensors to record ground motion to add to the felt database. You can also share information about your experience of the shaking. MyShake uses a magnitude 4.5 threshold to issue alerts. You can define a homebase in MyShake that will send messages both via cell towers in the likely felt area and to your phone regardless of where you are. Remember to activate location services to receive alerts.

If you have an Android-based cell phone you probably already have ShakeAlert software and you don't need to download anything. ShakeAlert works on Android in a similar way to MyShake. If you don't want the messages, you can opt out by deactivating alert delivery in your settings.

Earthquake alerts are still new in California and each event is an opportunity to refine the system. Sometimes people far out of the area receive an unnecessary alert while others in the shaking zone don't receive messages. If you are near the epicenter, you will feel shaking before the alert arrives. In rural areas, cell phone coverage can delay/complicate reception. We have no sea bottom instruments so offshore quake shaking arrives at the coast at the same time the alerts do.

The most challenging part of ShakeAlert is what you do with the information. You only have an instant to react, and human brains are not good at responding to novel situations. The most important thing is not to move. If you are physically able, drop to the ground. If there is a nearby desk or table – get under it. In bed? Stay there.

I received last Sunday's alert as I was working in our garden. I lay down on the ground to maximize my odds of feeling weak vibrations. It was an open area, and nothing was nearby to fall on me. In this case I felt nothing.

Had I been inside I would have sat still and covered the back of my neck with my arm. My knees aren't good enough to get under the table. Had I been driving I would have slowed and looked for a safe place to pull over to the side of the road. If I felt nothing after a minute, I'd be back on my way. One exception - if I was in a tsunami zone I would have continued cautiously driving until I was out of it.

At present, no ShakeAlert-powered products include tsunamis. The National Weather Service under NOAA is responsible for tsunami alerts, not the USGS. It takes several minutes to assess tsunami potential after an earthquake, far longer than the few second time window for ShakeAlert. If a Tsunami Warning is issued for our coastline, it will trigger a WEA alert just as ShakeAlert does for earthquakes. Always remember that the shaking itself may be the first warning for a tsunami coming from nearby.

Don't confuse Earthquake Alerts with county emergency notifications. All California counties have systems to alert you to hazardous situations. These notifications are issued after deliberation by officials and are sent to people who have signed up beforehand to receive notices via text, phone and/or email. If you haven't signed up, check with your county OES office and find out how to do so.

More on ShakeAlert and earthquake shaking notification at <https://www.usgs.gov/faqs/how-do-i-sign-shakealtr-earthquake-early-warning-system>.

Lori Dengler is an emeritus professor of geology at Humboldt State University, an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times--Standard's. Not My Fault are archived 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 a free copy of the North Coast preparedness magazine "Living on Shaky Ground."