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# Not My Fault: Quake Alert gets tested on the North Coast

Lori Dengler/For the Times-Standard
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In the past five weeks, the North Coast has experienced magnitude 5.8, 5.2, 4.9 and 4.8 earthquakes. No surprise. The Mendocino triple junction area and adjacent areas are the most seismically active area of the lower 48 states. But one thing was different. For the first time, the Earthquake Early Warning System was triggered in our area and several hundred people received alerts BEFORE they actually felt the shaking.

Earthquake Early Warning (EEW) has been under development in California for over a decade as a collaborative project between the U.S. Geological Survey, Berkeley Seismology Lab, Caltech and the California Office of Emergency Services. EEW is NOT earthquake prediction. We can't predict earthquakes hours, days or weeks before they happen.

We can pinpoint an earthquake AFTER it begins, after the rupture starts. By having a dense network of high-quality seismic instruments, the rupture can be identified in a few seconds. Superfast algorithms compute the epicenter, a likely magnitude and the area where the earthquake will be felt. Mexico was the first country in the world to do this and Japan has been routinely alerting for strong shaking for more than a decade.

Seismic waves travel very fast, a few miles every second. For earthquake early warning, two types of seismic waves are important. The Primary or P-waves travel at speeds of more than 11,000 miles per hour in the crust. The Secondary or S-waves are about two-thirds as fast and always trail the P waves. This is important because S-waves shake harder than P waves and are the ones we worry about. The aim of EEW is to use P-waves recorded near the epicenter to analyze shaking potential and get that information out to communities before the damaging S-waves arrive. That means seconds!

Time is of the essence. It takes four to eight seconds to get enough information to put out an alert and transmit it to computers and cell phones. There is no time for a seismologist to review the data; everything must be automatic. And the system needs to know where you are to work. It would make no sense to send out an alert to people unlikely to feel the earthquake. EEW detects, analyzes, determines the shaking area, and sends alerts to people within the calculated shaking area by making use of location services on your cell phone. For people close to the epicenter, the alert will arrive after the shaking begins. But for areas about twenty miles away and further, the notification will give people a few seconds warning before the strongest shaking occurs.

EEW was launched to the public in California during the Great ShakeOut of October 17, 2019. The MyShake app was made available for free download on either Android or iPhone platforms. I downloaded it the day it came out and have been waiting ever since to see if it worked. I thought I would have the opportunity on March 18th when a 5.2 struck just offshore of Cape Mendocino. I felt that jolt pretty strongly – a little after 3 pm and strong enough that I dropped to the floor and covered my head. 190 MyShake alerts were sent out for that earthquake and I heard from many people that they got the warning a few seconds before the shaking arrived, and from several others that the alert came in a few seconds into the earthquake.

Why didn't I get an alert? I was just outside the shaking alert box. The EEW system, estimates a preliminary magnitude, and defines a polygon where the shaking is likely to be strong enough to be noticed, equivalent to an intensity III on the shaking strength scale. On March 18th the system calculated a magnitude of 5.0 and the polygon extended from Shelter Cove to just south of Arcata and inland to Bridgeville. I was just north of the boundary

Four days later, I did get an alert. I was sitting where I am now, working at my desk when my phone loudly barked – EARTHQUAKE EARTHQUAKE DROP COVER AND HOLD ON. So I did, I dropped under my desk and looked at my phone screen. MyShake said a magnitude 6.2 earthquake had occurred. I waited, I waited a little more. After about a minute, it was clear that I was not going to feel anything.

This time, the algorithm had overestimated the magnitude. There was an earthquake and it was located just about where the EEW location had put it, but it was only a magnitude 4.8, not a 6.2. It was reported felt by about 500 people – mainly in the Cape Mendocino to Eureka area but by some as far away as Mendocino and Del Norte Counties. Many of my friends who had the MyShake App got the notification before they felt it. I live in McKinleyville, and although a number of my neighbors felt it, I did not.

Every time an alert is issued, the EEW research team examines how accurate the forecast was (magnitude and

location) who received alerts and who didn't. These two earthquakes provided the first good data sets for North Coast earthquakes and the opportunity to understand why magnitudes were over/under estimated and who received alerts.

This is the steep part of the learning curve for Earthquake Early Warning in California. In the past month, the system has been triggered for earthquakes in Southern California, Eastern California and the North Coast. Each event is an opportunity to refine the system, revise the algorithms and protocols and get it better next time. In my unscientific survey of friends on FaceBook, I'd say the general reception has is positive, that people are more tolerant of false positives (getting an alert when you don't feel a quake) than not getting an alert for an earthquake that they feel. I think it's exciting to be part of this experiment and how each earthquake we are getting closer to a reliable early warning system.

My thanks to CalOES and the scientific team developing Earthquake Early Warning capacity in California. I am a fan.

Note: to download the MyShake App, just search for the name at your App store. It will only work if you enable location services all of the time and have cell connectivity. Questions – visit myshake.org. Previous columns related to EEW at
https://www2.humboldt.edu/kamome/sites/default/files/5_9_2019_eew_sites.pdf
https://www2.humboldt.edu/kamome/sites/default/files/10_23_2019_myshake.pdf

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Lori Dengler is an emeritus professor of geology at Humboldt State University, an expert in tsunami and earthquake hazards. Questions or comments about this column, or want a free copy of the preparedness magazine "Living on Shaky Ground"? Leave a message at (707) 826-6019 or email Kamome@humboldt.edu

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