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Not My Fault: A little excitement in the Gorda plate

Lori Dengler/For the Times-Standard
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I got up as usual on Tuesday, grabbed a cup of tea, and logged on to the USGS earthquake site to update the Humboldt Earthquake Hotline. I notice a cluster of earthquakes far offshore of Del Norte County. Local earthquakes always pique my interest and the process I went through on Tuesday is a good illustration of the seismic information flow, the importance of caution with preliminary results and how it fits in to the North Coast tectonic story.

First, to dispel any suspense, these earthquakes were not particularly unusual nor were they a sign of something ominous coming our way soon. And second, a disclaimer. Almost all of my information sources are publically available and you could have gotten this information as quickly as I did if you knew where to look.

First I checked texts from the National Tsunami Warning Center (see below on how to get them). A Tsunami Information statement reported a magnitude 5 earthquake at 5:17 am PDT, with a location near the Gorda ridge about 140 miles offshore of the Del Norte coastline. The message stated that "No Tsunami was Expected" and had been issued three minutes after the earthquake.

The USGS initial email posting on the earthquake came in a few minutes later with a magnitude of 4.2 and a location a little to the south of the tsunami center location but in the same general area. I quickly lost interest in this earthquake, as my eyes were drawn to the M5.2 12 minutes later. As I was looking at its location, my phone beeped and a tsunami center text announced a 5.6 at 7:45 am in the same area as the earlier quakes. By the time I posted the hotline message (707 826-6020) a little after 9 am, the USGS noted six earthquakes in the sequence ranging in magnitude between 3.4 and 6.6 and all in an area 127 to 141 miles west of Crescent City.

You could have found all of this out by looking at the USGS latest earthquakes page at quake.usgs.gov. At first glance, you might think all of these earthquakes were off the coast of Oregon. The southern Oregon coastline juts to the west of the northern California coast, which means some Oregon communities end up closer to the epicenter. The M5.6 was 137 miles W of Crescent City and 132 miles WSW of Gold Beach, OR.

At 10:22 am, another earthquake popped up on my computer, at M 3.3 and only 40 miles from Crescent City. I was suspicious. While earthquakes can happen anywhere in our offshore area, this location was unusual. It was about 90 miles from the earlier sequence and I noticed that the location errors were very large. So I made use of connections and sent a text to Peggy Hellweg, Operations Manager of the Berkeley Seismological Laboratory to have a closer look. About a half hour later after re-evaluation, the location moved near the earlier. It became a much more sensible aftershock with a magnitude of 4.9.

At first glance, this might seem like very sloppy science. What it illustrates is limitations in automated analysis and the problem of locating far offshore earthquakes. Epicenter determination is a triangulation process. An earthquake happens and within a few seconds the initial seismic waves should be picked up by at least four seismic stations. If the epicenter is the midst of the station group, computer algorithms get a pretty good location. But if all the stations are clustered on one side, there is little constraint on where and how deep the earthquake is. We don't have offshore instruments and it may take the eye of a trained seismologist to get a reasonable result. I've learned to always be cautious with initial locations, to always list them as preliminary and get feedback from the experts before I make any grand interpretations.

By noon on Tuesday, the sequence seemed to over. The final tally: 11 earthquakes ranging in magnitude from 2.8 to 5.6 centered on N-S oriented normal faults. Normal faults mean stretching or extension and it is no surprise that these earthquakes were near the flanks of the Gorda ridge, the spreading center between the Gorda and Pacific plates.

A little after 10 pm, another alert sounded on my phone. A M4.5 earthquake on the Mendocino fault about 40 miles offshore of Cape Mendocino. This is the most seismically active area of our region. In 2018, seven earthquakes of M4 or larger have occurred on or near the Mendocino fault, including a M5.8 in January. I'd argue no relation to the earlier Gorda ridge cluster more than 145 miles away, just coincidence that they occurred on the same day.

"These earthquakes are good aren't they? They relieve fault stress," came the inevitable comment on Facebook. Alas no. Reason 1 – these earthquakes weren't anywhere

near the faults where the greatest earthquake threat is and Reason 2 – small and moderate earthquakes just don't release much energy. So take these earthquakes as a reminder that we do live in earthquake country and it's always a good idea to prepare.

Note: to get alert messages, send the text 'follow NWS_NTWC' to 40404. You will receive all statements and bulletins issued by the Tsunami Warning Center. Normal text charges apply. More information at http://wcatwc.arh.noaa.gov/?page=productRetrieval. If you sign up for County emergency notification, you will receive texts/emails whenever a Tsunami Warning or other warning message has been issued for our area https://humboldtgov.org/2014/Emergency-Notifications (Humboldt County), https://preparedelnorte.com/resources/Everbridge (Del Norte).

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