

Not My Fault: Tickles from the Gorda plate – a good reminder to plan ahead

Lori Dengler/For the Times-Standard

Posted: Aug. 2, 2017

We had a few jiggles this week. A magnitude 5.1 struck around 5 pm last Friday and a 4.6 a little after 10 am the next day. They were similar earthquakes – both offshore on vertical faults and, because of their offshore locations, felt only lightly. I was at home sitting in front of my computer on Friday when that unmistakable little vibrational buzz interrupted my work. It was short, just a couple of shakes and lasted less than five seconds. Our dog Lila was on the floor next to me. No she doesn't predict earthquakes, but she did give me a dirty look that implied I was doing something to cause it. I was at the Farmers Market on Saturday and didn't feel the 4.6.

Both of these earthquakes were "ordinary" Gorda plate earthquakes. What is the Gorda plate and what makes them ordinary? First a little backtracking. Tectonic plates are the thick slabs of the earth's outer surface that are constantly in slow motion – driven by the heat within the earth and moving about as fast as your fingernails grow. There are 12 major plates – the Pacific plate is the largest one – and dozens of smaller ones.

Great fault systems form at the boundaries between plates, and leave most plate interiors relatively earthquake free. The Pacific Ring of Fire is so named because convergent plate boundaries rim much of the Pacific causing most of the world's great earthquakes and volcanic eruptions. Our little corner of the Ring of Fire has plate boundaries, volcanoes and earthquakes. The active Cascade volcanoes from Northern California (Lassen) to British Columbia (Garibaldi) trace out the extent of the Cascadia subduction zone, the shortest convergent segment along the Pacific Rim where the Juan de Fuca plate is slowly descending beneath the North American plate.

Enter the Gorda plate – one of the smallest plates on the earth's surface. If you look at a map of global plates, you will see a tiny series of triangular lines outlining the boundaries between the Juan de Fuca and Pacific plates just offshore of the Pacific Northwest. Go to Google Earth and you can see the scars of the boundaries firmly etched in the sea floor off the coast. The southern part

of the Juan de Fuca plate just off the Northern California and Southern Oregon coasts is often called the Gorda plate, after the Gorda (fat) basin, the rich offshore fishing area named by Portuguese fishermen who settled in the area in the 19th century.

The Gorda plate is one of the smallest ones on the earth's surface – only 75 to 140 miles in width from where it is created offshore on the Gorda ridge to where it sinks beneath the North American plate. For those of us lucky enough to live on the North Coast, we live, work and play atop the Gorda plate. It is about 8 miles beneath Eureka and Arcata, and 10 miles under Crescent City. It gently dips like a ramp eastward, reaching a depth of about 60 miles under Mt. Shasta.

The general framework of plate tectonics is that all the action, like earthquakes and eruptions, occurs near the plate boundaries and the interior of the plate is quiet. The Australian plate is good example – earthquakes are rare down under and there are no active volcanic areas anywhere on the continent. But the Gorda plate is just too small to retain its integrity. The Gorda plate is being crushed - shoved by the Pacific plate to the south and pushed by the larger segment of the Juan de Fuca to the North. The result is faults and earthquakes not only on the edge of the Gorda plate, but scattered within it. Many geoscientists don't even call Gorda a plate any more – it is a deformation zone instead.

What I felt last Friday and some of you felt on Saturday was the result of that crushing – two small faults that broke. These faults within the Gorda plate are the most common source of felt earthquakes in Humboldt County. Most Gorda plate earthquakes are too far offshore to cause damage but there are notable exceptions. Our last significantly damaging North Coast quake was a M 6.5 on January 9, 2010. It was only about 20 miles off the coast and caused more than \$20 million in damages. Other notable Gorda earthquakes include the November 1980 M 7.2 that knocked down an overpass on Hwy 101 and the June 1932 M 6.2 very close to the coast caused chimneys to collapse killing a woman in Eureka. The January 1922 M 7.5 earthquake ranks as the largest North Coast earthquake of the past century. It was centered about 60 miles off the coast right between the epicenters of this week's tremors.

So do those quakes mean more are on the way? Of course. We live in the most seismically active area of the lower 48 and earthquakes are a fact of life on the North Coast. But there is nothing about our 5.1 and 4.6 that points the date of our next larger shaker. Just be

assured that we are one week closer than we were last week and it's a good time to go over your emergency plans and supplies.

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