

Not My Fault: The continuing earthquake, volcano story of 2018

Lori Dengler/For the Times-Standard
Posted June 13, 2018

Nearly halfway through 2018, and from my perspective, Hawaii has been the most interesting story. Hawaii boasted the largest U.S. quake of the year, the M 6.9 on May 4th, and is second only to Alaska in producing M 3 and larger quakes. And Hawaii's quakes are all the more interesting as they are related to volcanism.

At Kilauea, the Lower East Rift Zone eruption that began in early May is now the most active phase of the eruption that has been nearly continuous since 1983. Magma continues to drain from the summit and feed fissures 25 miles to the east. Voluminous amounts of lava have erupted in the Leilani Estates and Lanipuna Gardens area and now cover eight square miles, destroying at least 600 homes. Lava flows have completely filled in Kapoho Bay near the eastern tip of the island.

As the magma drains from the summit, ground water percolates into the magma chamber. After a day or so, the accumulated water flashes to steam, blasting bits of rock and magma chunks into the air. The steam blasts reach heights of about 10,000 feet, releasing the energy equivalent to an earthquake in the magnitude 5 to 5.5 range that are felt widely. After each steam explosion, the earthquake rate declines and then builds again reaching a peak just before the next blast. Hundreds of small quakes are recorded each day with 20 to 30 in the magnitude 3 range that are large enough to be felt on the southern part of the island. This pattern has been well established for the past few weeks but it won't last forever. Eventually, the magma may drain to depths where this geothermal system no longer works or the magma could cease flow out and begin to rise again. But for the next days or perhaps weeks, Hawaii residents are likely to get their daily seismic blast.

The Kilauea eruption has been a spectacular show to follow. With daily updates from the USGS Hawaii Volcano Observatory and terrific video, it is soap opera for us volcanophiles. And although the property damage has been significant – the Federal Emergency Management Agency declared the area a major disaster on May 11 – there has been no loss of life. The one significant injury was to a man who had refused evacuation orders and was hit by a chunk of lava spatter. Hawaiian officials have now

announced they may arrest people who loiter near lava flows or refuse to evacuate.

There are good reasons why the toll has been minimal. Kilauea is a relatively well-behaved volcanic system, the magma is fluid and gasses are able to readily escape. The federal government and the State of Hawaii have invested resources in monitoring and in emergency response. The movement of magma can be measured by the seismicity patterns and ground deformation. Gas emissions can be quantified and projections of hazardous areas can be determined. While the course of this eruption can't be predicted, the short-term hazards can be forecast and the public forewarned.

A very different volcanic story is playing out in Guatemala. Like Kilauea, Volcán de Fuego (Volcano of Fire), is one of the most active volcanoes in the world. But the similarities end there. Kilauea is a shield volcano, made up entirely of basalt which, when molten, can readily flow because of its low silica content. Fuego is a stratovolcano, similar to Mt. Shasta and the other Cascade volcanoes, and has had a more tumultuous history – erupting both lava flows and great volcanic blasts similar to Mt. St. Helens. The magma that feeds Fuego has much higher silica content than Kilauea making it difficult for gasses to escape. A particularly deadly threat from volcanoes like Fuego is the pyroclastic flow – superheated and gas-charged masses of pumice, ash and rock fragments that can travel at speeds of more than 80 miles per hour. Stratovolcanoes and also much more likely to produce volcanic mudslides (lahars) because they are steeper and have an abundance of easily-mobilized ash and other volcanic material.

On 2 June, Fuego experienced its most powerful eruption since 1974, blasting ejecta nearly four miles high and triggering pyroclastic flows and lahars that engulfed villages. The current death toll stands at 110, with nearly 200 people still unaccounted for and 300 injuries. There was no warning.

Why such a different outcome at Fuego than at Kilauea? Fuego is inherently a more hazardous beast than Kilauea – the silica-rich magma means a greater potential for explosiveness. But the eruption has only been moderate so far and no volcano springs into action without tell-tale precursory activity. Guatemala is an impoverished country and does not have the resources for comprehensive monitoring. There was only one seismograph in operation near the volcano. In contrast, more than 100 seismic instruments at Kilauea. Fuego is also much more difficult to access than Kilauea. It is

extremely rugged countryside where installing and maintaining instruments is not easy. Resources and terrain have also hampered the response.

There is a lesson from Kilauea and Fuego. Understanding the science of how volcanic systems work and investing resources in monitoring and response does make a difference. California's volcanoes are much more like Fuego than Kilauea and the USGS' California Volcano Observatory keeps close track of them. Volcanic systems can lay dormant for hundreds of years, but when they re-awake, it can happen with only a few weeks of warning, and that warning depends on having the right equipment and personnel to pick it up.

Note: the USGS Volcano Observatories are online at <https://volcanoes.usgs.gov/vhp/observatories.html>

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 <http://www.times-standard.com/opinion/20180613/lori-dengler-the-continuing-earthquake-volcano-story-of-2018>