

What's going on at Kīlauea Volcano? Overview of the May 2018 New Eruptive Episode

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The events of May, 2018 teach us that one cannot become complacent in monitoring active volcanoes. Kīlauea gave us an incredible surprise when its two active lava lakes (one at Pu'ū 'Ō'ō active since 1983 and the other at the summit since 2008) collapsed following an earthquake swarm (1000's of mostly small, <M4, although one was M6.9). The earthquakes originated in the shallow mantle (40-50 km deep) and propagated to the summit reservoir before extending down Kīlauea's east rift zone at depths of 2-5 km. Unexpectedly, the earthquakes and surface deformation propagated ~20 km down rift from the Pu'ū 'Ō'ō vent to an area in the lower east rift zone that last erupted in 1955. Unfortunately, this area is now home to 1000's of people who built homes during the 63 years since the last eruption despite the area being in hazard zoned 1, the most dangerous on the island.

The initial phase of the new rift eruption was characterized vigorous steam release along an ~6 km long fissure system that cracked roads and house foundations. The fissures then produced weak lava fountains of pasty (cool) lava along a discontinuous system of vents. A few of these vents persisted long enough to produce short (1-2 km) lava flows destroying ~30 homes and produced noxious sulfur dioxide gas. This lava is thought to have been stored for decades in the rift zone. The fissures extended several km downrift producing longer lava flows destroying more homes and threatening the Puna Geothermal power plant. Unfortunately, the height of the fountain (100+ m) and the vigor of the eruption increased signaling the arrival of more fluid magma, probably from mantle. The new flows rapidly traveled to the ocean producing a new hazard from the boiling of seawater to produce "laze" (toxic HCl-rich steam), which has been detected >6400 km downwind in Guam. The new flows from vents that had previously died reactivated send flows to the north destroyed even more homes, cut important access roads, burned power lines and covered two of the wells at the power plant. This new activity forced the Governor of Hawaii to declare a state of emergency requiring the immediate evaluation of the affected areas. The lower rift eruption is continuing as of May 31.

Simultaneously in early May, the summit lava lake continued collapsing to more than 300 m deep, which led to a warning of potential explosive eruptions. The fear was the lake would subside to more than 550 m (depth of the water table) allowing water to flow into the conduit causing explosive eruptions. A similar event occurred in 1924 causing months of explosive eruptions. The steady collapse of the lava lake resulted in the closing of Hawai'i Volcanoes National Park. Steam explosions started the next day and are continuing typically to heights of 3-5 km with one reaching 9 km. Ash from these explosions have blanketed neighboring communities. The USGS Hawaiian Volcano Observatory, located on the rim of Kīlauea's caldera, was closed as cracks formed in its floors, sulfur gas levels rose and ash rained over the buildings. Explosions are

continuing daily (usually 3+ km high) as of May 31. The lecture will include any significant eruption changes during early June.