Monitoring subsidence and vent wall collapse on Kilauea Volcano, Hawaii

March 29 2013

Kilauea Volcano in Hawaii experienced its first summit eruption in 26 years when a new vent along the east wall of Halema'uma'u Crater opened in March 2008. Since that time, the vent has become wider as parts of the wall around it became unstable and collapsed into the active lava lake within the vent, sometimes triggering small explosions.

Richter et al. have monitored surface deformation in the area around the new vent since 2008 using interferometric synthetic aperture radar (InSAR) from the TerraSAR-X satellite along with a digital elevation model of the topography based on lidar data. They were able to generate interferograms (a type of image) with a pixel resolution of about 3 meters (10 feet), which revealed centimeter-scale subsidence in the area within 100 meters (328 feet) of the vent rim. They note that this deformation cannot be detected by other techniques.

In general, the authors find that subsidence and increasing vent area track each other: the vent was more stable at times when subsidence rates were lower, while periods when the subsidence rate increased tended to be followed by collapse of parts of the vent wall. They suggest that it may be possible to identify areas where the vent rim is likely to fail soon on the basis of subsidence rate monitoring. The study demonstrates the potential for using high-resolution satellite interferometry for monitoring potential hazards.

More information: TerraSAR-X interferometry reveals small-scale deformation associated with the summit eruption of Kilauea Volcano,

Hawai'iG, eophysical Research Letters, doi:10.1002/grl.50286 , 2013
onlinelibrary.wiley.com/doi/10 … 2/grl.50286/abstract