Unrest and eruptions

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Monogenetic cones at Mauna Kea (Hawaii, USA). Photo by Helena Albert. Credit: *Geology*, Albert et al.

Seismic, deformation, and gas activity (unrest) typically precedes volcanic eruptions. Tracking the changes of this activity with monitoring data makes it increasingly possible to successfully forecast eruptions from stratovolcanoes. However, this is not the case for monogenetic volcanoes (usually the result of a single magmatic pulse). Eruptions from these volcanoes tend to be small but are particularly difficult to anticipate since they occur at unexpected locations, and there is very limited instrumental monitoring data.

Many monogenetic volcanic fields occur in high-density, populated areas and tourist destinations (e.g. Canary Islands, Auckland City, Mexico City, Izu-Tobu volcanic field), and thus even a small eruption can have a major economic and societal impact. Helena Albert and colleagues have compiled historical accounts of felt seismicity and combined this information with petrological studies to propose a new conceptual model.

Albert and colleagues show that seismic crises occur about a year, two to three months, and a few weeks before eruption, and that these correspond to magmatic intrusions and mixing at mid-crustal depths, followed by magma transport to the surface. They propose a general model for these eruptions in which early dike intrusions in the crust do not erupt (e.g., stalled intrusions) and make small plumbing systems, but they probably are key in creating a thermal and rheological pathway for later dikes to be able to reach the surface.

These observations provide a conceptual framework for better anticipating monogenetic eruptions in similar settings and magmatic fluxes and should lead to improved strategies for mitigation of their associated hazards and risks.

More information: Years to weeks of seismic unrest and magmatic intrusions precede monogenetic eruptionsHelena Albert et al., http://geology.gsapubs.org/content/early/2016/02/05/G37239.1.abstract.

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