

Volcanic eruption signals simulated in lab for first time

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(PhysOrg.com) -- For the first time, seismic signals that precede a volcanic eruption have been simulated and visualized in 3-D under controlled pressure conditions in a laboratory. The ability to conduct such simulations will better equip municipal authorities in volcanic hot spots around the world in knowing when to alert people who live near volcanoes of an impending eruption.

The international research team that conducted the experiments at the University of Toronto published its findings in an article in the prestigious journal, *Science*, on Oct. 10.

Using equipment funded by the Canada Foundation for Innovation, scientists tested fracture properties of basalt rock from Mount Etna, the active volcano found on the island of Sicily in southern Italy. They were able to record the seismic signals that are routinely generated during earthquakes that occur before volcanic eruptions. The seismic (sound) waves recorded by the team were similar to those emitted by a church organ pipe and are ubiquitous in active volcanic regions.

"The holy grail of volcano research is to be able to predict with complete accuracy when and how exactly a volcano will erupt," said Philip Benson, Marie-Curie Research Fellow in Earth Sciences at University College London (UCL), who conducted the experiments in U of T's Rock Fracture Dynamics Facility. "We are not there yet and, frankly, we may never be able to achieve that level of detail. However, being able to simulate the pressure conditions and events in volcanoes greatly assists

geophysicists in exploring the scientific basis for volcanic unrest, ultimately helping cities and towns near volcanoes know whether to evacuate or not."

Benson noted that nearly 500 million people live near enough to the Earth's 600 active volcanoes to endure physical and economic harm should a serious eruption occur. "That is why improved understanding of volcanic mechanisms is a central goal in volcano-tectonic research and hazard mitigation."

The international collaborators in the simulation experiments were Sergio Vinciguerra of the National Geophysics and Volcano Institute (INGV) in Rome, Italy; Philip Meredith of the Rock and Ice Physics Laboratory at UCL; and Paul Young, Keck Chair of Seismology and Rock Mechanics at the University of Toronto and the university's vice-president (research).

Young noted that while this particular rock fracture research focused on volcano dynamics, the knowledge generated from investigation into rock fracturing also has direct application in a wide variety of areas, such as mining, construction of buildings and bridges, oil and gas exploration and in earthquakes and other earth sciences phenomena.

Provided by University of Toronto

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