

Experimental volcanoes make a blast

Controlled explosions could aid monitoring of active eruptions.

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A row of miniature volcanoes exploded last week — on command.

Volcanologists detonated explosive charges buried in a meadow in Ashford, New York, blowing 12 small craters in the ground and throwing debris 80 metres in the air. The aim was to recreate, in true-to-life detail, what happens when a volcanic eruption punches through Earth's crust.

For some experiments, “you need to be big and messy and outdoors”, says Greg Valentine, a volcanologist at the University of Buffalo in New York and the experiment’s organizer.

Seventeen scientists and nine students from five countries descended on the meadow for the tests on 7-8 May. They monitored each blast with an array of instruments, including high-speed cameras, seismometers and low-frequency, ‘infrasound’ microphones. “We’re collecting the same information that you would at a real volcanic eruption,” says Valentine.

The work could guide the way that active volcanoes are monitored, and could help safety officials to decide where to restrict public access at volcanoes such as Italy’s Stromboli, where dozens of tourists arrive every night to watch spectacular fire fountain displays, says Jacopo Taddeucci, who studies eruptions at the National Institute of Geophysics and Volcanology in Rome.

Valentine says that controlled explosions can provide details about eruptions that cannot be gathered through bench top experiments. For instance, many volcanoes erupt repeatedly at the same crater, yet few experiments have been done on whether a pre-existing crater affects the shape of later eruptions in the same place. In pilot versions of the New York experiments done in 2012, Taddeucci, Valentine and others found that repeat explosions from the same crater tend to limit the distance that rocks spray out¹. And the deeper a crater is, the more it restricts those dangerous jets.

This time around, Valentine's team dug two trenches — one of them 1 metre deep and the other 1.5 metres deep — and filled them with layers of natural materials such as sand and gravel of different particle sizes. The scientists planted explosives at various depths and set them off. "It sounds more like a thump than a bang," says Valentine. Left behind were craters as wide as 2 metres and as deep as 45 centimetres.

The work could help scientists better understand shallow, intermittent explosions — like those created when magma heats groundwater, says Jenni Barclay, a volcanologist at the University of East Anglia in Norwich, UK who was not involved in the study. However, she says that it is not yet clear whether experimental blasts will yield unusual enough results for officials to redraw volcano hazard maps.



Alison Graettinger

Researchers excavate a crater to see it in cross-section.

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References

1. Taddeucci, J. *et al. Geophys. Res. Lett.* **40**, 507–510 (2013).