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Eruption Clues

UNH researchers create snapshot of volcano plumbing

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UNH RESEARCHERS NOW BETTER UNDERSTAND THE JOURNEY OF MAGMA, OR MOLTEN ROCK, IN ONE OF EUROPE'S LARGEST AND MOST ACTIVE VOLCANOS, MOUNT ETNA IN SICILY. WEAD/SHUTTERSTOCK STOCK PHOTO.

Much like a forensic team recreates a scene to determine how a crime was committed, UNH researchers are using scientific sleuthing to better understand the journey of magma, or molten rock, in one of Europe's largest and most active volcanos, Mount Etna. Researchers applied several techniques, in a new way, to create a more accurate picture of the volcano's plumbing system

and how quickly the magma rises to the top to cause an eruption. Their findings contribute to our understanding of how and when volcanoes erupt.

In their study, recently published in the journal Geochemical Perspective Letters, the UNH team set out to determine if the magma lingers below in pockets of the volcano or if it pushes up all at once. To put the pieces of the puzzle together, they combined three approaches previously not used together to reconstruct the ancient magma plumbing system by looking for chemical signatures in lava rock collected from flows on the surface. They examined the elements making up minerals in the volcanic rocks in order to assess conditions under which the minerals crystallized.

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"As magma moves up through Earth's crust beneath the volcano, it starts to crystallize," says Sarah Miller, an affiliate and instructor in UNH's department of Earth sciences and lead author of the study. "Some elements move rapidly and some more slowly, so there is a chemical record of events in those crystals that can help us determine their journey."

Extracting the timing and magma source information for ancient volcanism demonstrates how long-lived pre-eruptive processes of transport and storage work at Mount Etna. The researchers found a range of crystallization depths, suggesting there were discrete

sites beneath the volcano where the rising magma crystallized.

Their chemical forensic work showed two interesting things about the volcano. First, the source that produced magma in the ancient Mount Etna is much the same as what happens in Mount Etna in the present-day. Secondly, they showed that the crystals were virtually chemically identical to the lavas in which they erupted. This second finding suggests that in Mount Etna, the length of time for crystal storage beneath the volcano is likely relatively short, a result which could help provide insight with recent findings for larger more explosive eruptive systems like Yellowstone.

“This proof-of-concept work puts us in a position to apply our approach more widely to other volcanoes,” said Julie Bryce, professor and chair of Earth sciences and a co-author of this paper. “Our work advances ways we can examine and think about volcanic plumbing systems beneath frequently active volcanic centers. Reconstructing the dynamics of these plumbing systems, and knowing how long-lived they are, helps in anticipating future changes in eruptive potential.”

In addition to Miller and Bryce, Madison Myers ‘10 and Earth sciences research scientist Florencia Fahnestock of UNH were co-authors. Myers, now a postdoctoral scholar at the Laboratoire Magmas et Volcans in France, launched some of this work in her undergraduate thesis.

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Program, and the French Agence Nationale de la Recherche.

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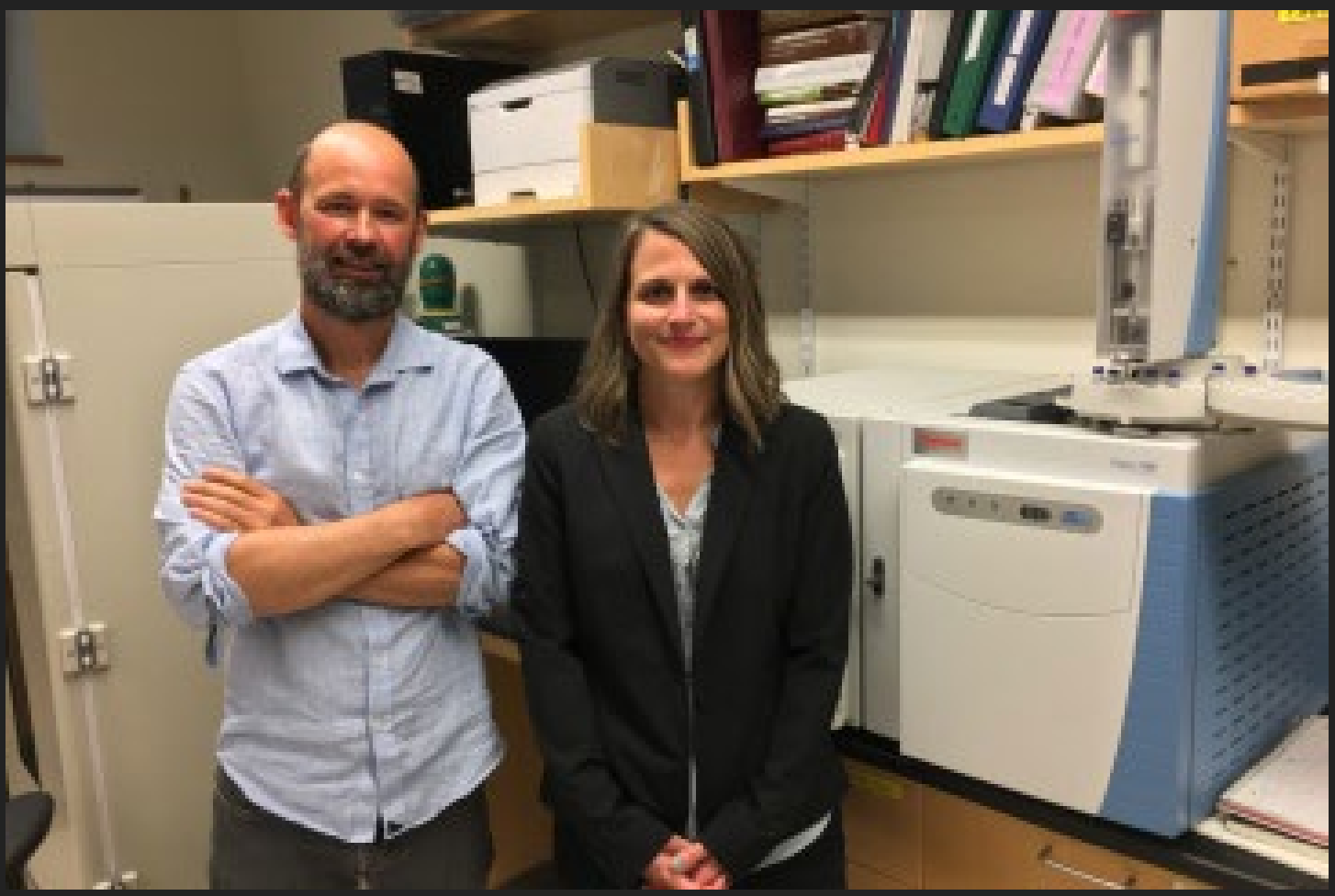

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