

'Lava Bombs' Manufactured during U of I-Led Study on Stability of Volcanic Formations

June 04, 2020

MOSCOW, Idaho — June 4, 2020 — University of Idaho volcanologist [Erika Rader](#) and colleagues investigated the growth of volcanic formations by manufacturing lava bombs, melted blobs of lava ejected from a volcano.

The research could provide insights into modeling lava flows and ensuring human safety during eruptions. The paper was published this week in the [Bulletin of Volcanology](#), a peer-reviewed scientific journal.

Volcanoes eject lava bombs when gas bubbles in the lava burst. Over time, the bombs can stack into a volcanic spatter pile. The speed at which a pile forms affects its stability.

"If the volcano spits out lava bombs really fast, the bombs don't have time to cool and just run downhill," said Rader, an assistant professor in U of I's [Department of Geological Sciences](#). "If the buildup is really slow, each bomb cools and you're basically stacking up bowling balls. But somewhere in the middle, the bombs land on each other when they are still a peanut butter consistency, sticking together to form tall, strong spatter piles."

The collapse of a spatter pile can release or redirect a lava flow. Volcanologists model lava flows for safety reasons, but when a spatter pile collapses and suddenly changes the direction of flow of lava, the models have to be rerun, Rader said.

"If we could model the stability of these spatter piles, that would help us predict changes in lava flow," Rader said.

To identify the conditions that result in natural spatter piles, the researchers developed the first experimental method to create lava bombs and the piles. They tried various techniques to create realistic lava bombs using melted basalt at the [Syracuse Lava Project](#) facility at Syracuse University in New York.

"A leaf blower just created strings of lava," Rader said. "And shooting an air cannon into molten rock or dropping molten rock from height became too hard to control. We found that kneading gravel into the molten rock with a paddle cooled the rock realistically. It was like kneading pizza dough."

The team stacked the kneaded lava on top of each other to create piles. They found the length of time that the bombs spent at high heat — or remained gooey — highly influenced the hardened bombs' internal structure and the cohesion of the spatter pile, or the strength of the final structure.

The team's new method accurately replicated the structure of spatter piles from the Eastern Snake River Plain in Idaho. The experiment indicated that bombs from Southern Idaho spatter vents would have started around 1,832-2,012 degrees Fahrenheit and hardened into their final shape around 1,562-1,652 degrees Fahrenheit. The spatter pile likely accumulated at a rate of 8.2-14.8 feet every hour.

"These are the types of studies that sound crazy but that gather the data necessary to run the models that keep people safe during an eruption," Rader said.

Media Note: [A video associated with the study's methods is available on U of I's website.](#)

Video Caption: Molten rock is poured from a hydraulic tilting furnace. Researchers experiment on the best method for forming and stacking lava bombs and volcanic spatter piles. Video by Erika Rader.

Dr. Rader's research was supported by an appointment to the NASA Postdoctoral Program at the NASA Ames Research Center, administered by Universities Space Research Association under contract with NASA.

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