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Animating Volcanic Processes

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Animating Volcanic Processes

Abstract

Animation is a powerful tool for making scientific processes accessible to non-specialists. Volcanic processes, for example, often require animated visualizations to explain the physics of what occurs beneath the Earth's surface. We are partnering with geoscience professor Jeffrey Johnson to tell the story of Santiaguito Volcano (Guatemala), where eruptions occur approximately hourly and specialized sensors are used to detect pre-eruptive activity. Specifically, we are working to illustrate subtle slope changes caused by fluctuation in the volcano's pressure, which are detected by devices called tiltmeters.

We use vector animation to create stylized representations of these Earth processes. Our work combines digitally-hand-drawn frames with the use of automatic interpolation to create smooth and graphical animations. Annotations and visual cues are added to draw focus to important sequences. Our goal is to make educational animations more entertaining by incorporating artistic flourishes like characters, a stylish color palette, and a hand-drawn look.

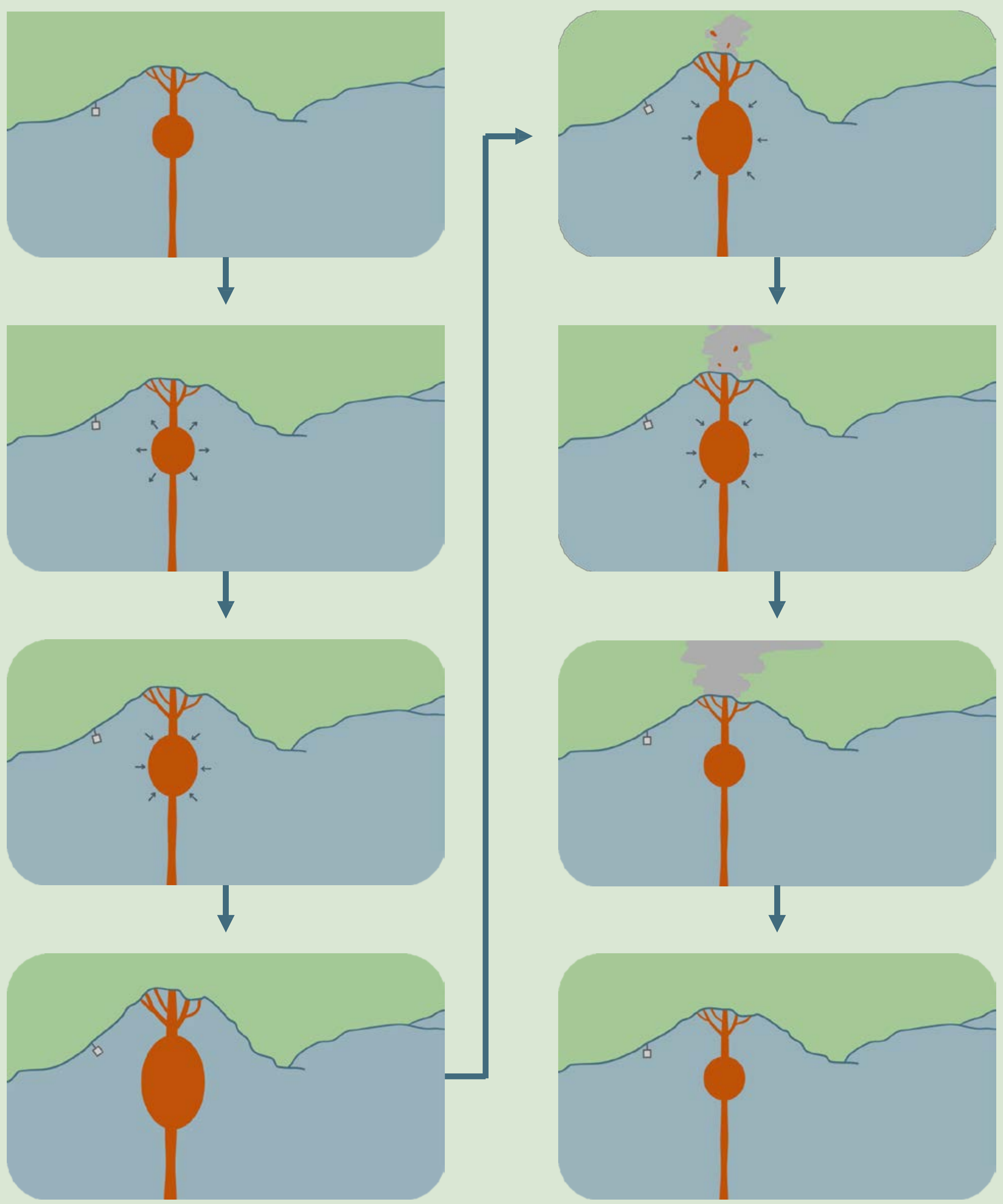
Animation permits creative freedom to incorporate artistic touches to scientific materials. The Santiaguito project is expected to be the first of several volcano STEM stories that could be produced using the same stylization. The project is especially gratifying in that it is able to bring together the departments of science and art; we believe collaboration between different disciplines is a fantastic way to engage with what exists outside our everyday lives.

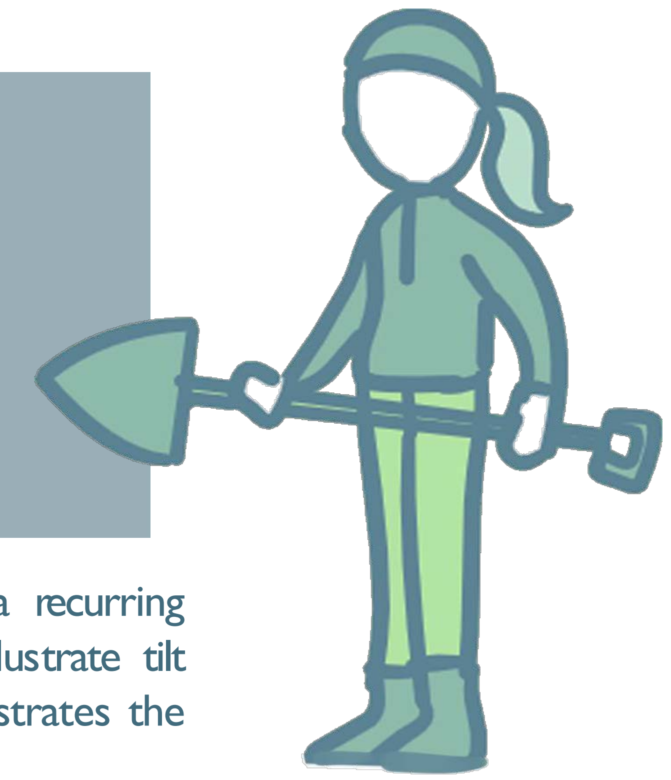
This student presentation is available at ScholarWorks: https://scholarworks.boisestate.edu/under_showcase_2020/131

Animating Volcanic Processes

Clare Nelson, Wyatt Wurtenberger, and Dr. Jeffrey B. Johnson

Since October 2019, Clare Nelson and Wyatt Wurtenberger, two illustration students at Boise State, have been working with geoscience professor Dr Jeffrey Johnson to create graphical animated representations of the processes that take place below the surface of volcanoes. Specifically, this first collaborative story has "cartoonized" Guatemala's Santiaguito volcano and illustrated the way its surface deforms as its magma chamber expands. This cross-section view of the volcano demonstrates the purpose of a tiltmeter, a device which detects changes in the volcano's slope throughout its eruption cycle.





Meet Pele, named after the Hawaiian deity of volcanoes and fire, who will be a recurring character throughout this series of animated shorts. Here, she is helping to illustrate tilt caused by pressure in the volcano's magma chamber. This sequence also demonstrates the movement of a tiltmeter, but on a highly exaggerated scale.

To the left is a still frame from drone footage taken at Santiaguito by Dr Jeffrey Johnson and his team, and below is the cartoonized version of the scene. The image in the bottom right helps to describe the sensitivity of a tiltmeter by imagining a scenario in which one end of Central Park is lifted by the width of a dime. A tiltmeter can detect even this very small change in slope.

The main purpose of this project is to simplify these volcanic landscapes into graphics that are easy to read, and to turn complicated processes into more approachable content.