

# Measuring a Changing Volcano

When magma pushes up through Earth's crust, it must displace the surrounding and overlying rocks as it works its way toward the surface. When magma enters a shallow reservoir beneath a volcano, the ground above that magma chamber can "inflate," pushing the ground upward and outward away from the center of the volcano. This build-and-demonstrate model shows how GPS can measure inflation/deflation of a volcano and how surface cracks can form as the "volcano" changes.

## Learning Objectives:

Students will:

- interpret GPS or deformation data to determine how the volcano's surface changes over time.

## Steps

Step 1: **Build the model:** balloon and tubing buried under flour or sand with gumdrop GPS stations on the surface.

Step 2: **Predict:** "When the volcano inflates, will stations move closer or farther apart?"

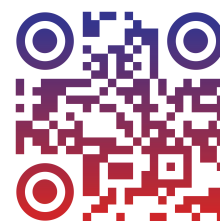
Step 3: **Inflate slowly:** Pump air in and have students observe and measure distances between stations.

Step 4: **Deflate:** Let air out and compare patterns.

Step 5: **Connect:** Ask: "If we can measure tiny changes at the surface, what can we infer about what's happening below?"



- Use sand or flour. Flour will show caldera formation while sand will show overall deformation.
- Measure distance differences between gumdrop GPS stations.
- Earthquake swarms are connected to volcanic activity. Link to video in the QR code at the right.
- NGSS: MS-ESS2-2, HS-ESS2-1, HS-ESS2-3, Developing and Using Models, Stability and Change, Patterns.



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