ShakeAlert® activities for formal and informal learning settings

Kinesthetic Modeling & Interpreting GPS Data Maps

Demonstrating Tectonic Motions in Earthquake Hazard Regions

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OVERVIEW

The ground is always moving. Within a tectonic plate, some parts of the land move more quickly or in different directions from other regions nearby. This can cause the land to deform, stretch, compress, and twist, until it breaks along a fault, creating an earthquake. This motion can be measured and monitored using the Global Positioning System (GPS; Vocabulary Appendix A).

Using hand and body motions, data from GPS and maps, learners explore ground deformation at and near plate boundaries. Ground deformation is then related to seismic hazards and societal impacts. In the 5-minute activity, learners explore the concept of vectors by kinesthetically enacting ground movement using their body and hand movements (Figure 1). In the 20-minute activity, learners model GPS ground motion in different regions and connect deformation to earthquake hazards. In the 45-minute activity learners distinguish between different boundary types by measuring the vectors within tectonic plates. They identify regions with higher earthquake hazards and compare their findings to earthquake shaking potential maps.

Why is it important to learn about plate motions and ground deformation near plate boundaries? More than 143 million people are exposed to potential earthquake hazards in the U.S. that pose the risk of thousands of lives and billions of dollars in damage. Identifying regions with higher seismic hazards is fundamental to earthquake preparedness. The ShakeAlert Earthquake Early Warning System, which in part integrates GPS data, is an important tool used for hazard preparedness for the West Coast of the United States.

Scan QR code for full activity

Time: 5-, 20-, and 45-minute guided activities that can be adapted for audience and venue.

Audience: Novice and experienced geoscience learning groups.

Subject: Natural Hazards: Earthquakes, Geoscience.



Figure 1: Learners demonstrating different velocities as represented by vectors.

OBJECTIVES

Learners should be able to:

- Explain that velocity has two components; the speed and direction of ground movement.
- Illustrate or describe two types of tectonic plate boundary motion using velocity vectors.
- Identify regions more likely to have higher earthquake hazards using relevant GPS evidence.

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