

Where on Earth?

Activity from: http://www.pbs.org/wgbh/nova/teachers/activities/2515_venus.html

Objective:

To collect data and create maps to observe the relationship among volcanoes, earthquakes and lithospheric plates.

Materials:

copy of "Where on Earth?" student handout
access to resources from the Internet or school library
3 overhead transparencies
overhead projector

Activity:

Organize students into three groups and distribute a "Where on Earth?" student handout to each group. Assign each team to research and plot one of the following:

- 20 recent volcanoes
- 20 recent earthquakes
- Boundaries of Earth's major lithospheric plates

If students are having trouble finding information, direct them to the Web sites listed in Resources below. If students are using books for their research, they can plot major or famous volcanoes and earthquakes instead of recent ones. Make sure groups use different symbols for volcanoes and earthquakes so that they can be distinguished on the overhead projection.

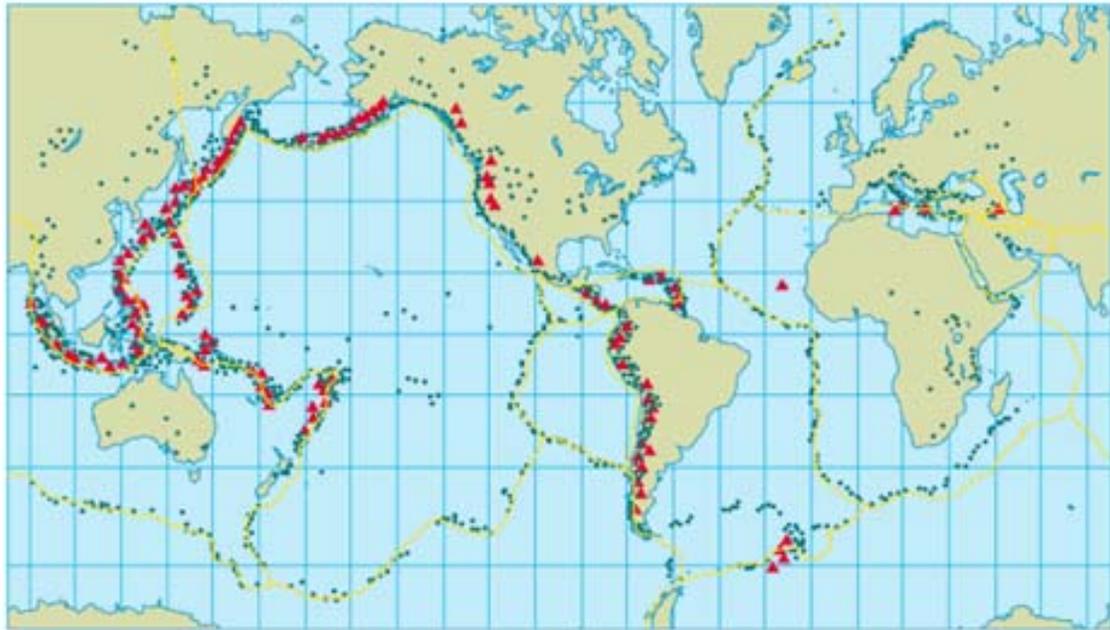
After the groups plot their data, transfer the information to the three transparency maps. First project the volcano and earthquake maps one on top of the other. Ask students to describe any patterns they observe. Then lay the plate boundaries map on top of the other two maps. Ask students to compare the locations of volcanoes and earthquakes with the locations of the plate boundaries and describe any patterns they observe. Finally ask students to explain the apparent relationship between the location of the plates and the occurrence of volcanoes and earthquakes in those regions.

Discussion:

Volcanoes and earthquakes are not randomly distributed around the globe. Instead they tend to occur along limited zones or belts. With the understanding of plate tectonics, scientists recognized that these belts occur along plate boundaries. According to the theory of plate tectonics, the Earth's outer shell (lithosphere) is made up of seven large and many smaller moving plates. As the plates move, their boundaries collide, spread apart or slide past one another, resulting in geological processes such as earthquakes, volcanoes and mountain making. You might want to point out that not all volcanoes occur at plate boundaries. Some occur in the middle of plates in areas known as "hot spots." The Hawaiian Islands are an example of this type of volcano.

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When comparing their maps, students will notice that volcanoes and earthquakes frequently occur at plate boundaries. Students who are familiar with the theory of plate tectonics might be able to explain the pattern or relationship they observe. Other students can conduct additional research to find information to help them explain their observations.



▲▲ Volcanoes
●● Earthquakes

This map shows how some of the world's volcanoes and earthquakes occur along tectonic plate boundaries.

Resources:

Be sure to check out the laminated National Geographic map you received with last winter's activities. The bathymetry shows spreading centers (mid-ocean ridges) and other indicators of plate motion/boundaries.

Articles

Parfit, Michael. "Living with Natural Hazards." National Geographic (July 1998): 2-39. Describes volcanoes, floods, earthquakes, tornadoes, hurricanes and wildfires from the perspective of people who cope with them. Insert displays a distribution map of the natural hazards of North America.

USGS. This Dynamic Earth: The story of Plate Tectonics

Web Sites

NOVA Online—Deadly Shadow of Vesuvius <http://www.pbs.org/vesuvius/> will include, among other features, an examination of the United States Geological Survey (USGS) Rapid Response Team, which waits in readiness to fly anywhere in the world at a moment's notice to monitor potentially dangerous active volcanoes.

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USGS Earthquake Information <http://quake.wr.usgs.gov/> Sponsored by the USGS, this site itemizes earthquake activity worldwide, including date, time, location, depth and magnitude.

Volcano World: Current Volcano Activity
http://volcano.und.nodak.edu/vwdocs/current_volcs/current.html Includes a map and list of the world's most recent volcanic eruptions.

The "Where on Earth" activity aligns with the following National Science Education Standards:

Grades 9-12:

Science Standard D: Earth and Space Science

Energy in the earth system

The outward transfer of earth's internal heat drives convection circulation in the mantle that propels the plates comprising earth's surface across the face of the globe.

The origin and evolution of the earth system

Interactions among the solid earth, the oceans, the atmosphere and organisms have resulted in the ongoing evolution of the earth system. We can observe some changes such as earthquakes and volcanic eruptions on a human time scale, but many processes such as mountain building and plate movements take place over hundreds of millions of years.