

SUGGESTED REFERENCES

- *Exploring the Environment*
http://www.cotf.edu/ete/modules/volcanoes/volcano.html
- *How Volcanoes Work*
http://www.space.com/scienceastronomy/planetearth/volcano_science.html
- *Nova Online*
Can We Predict Eruptions?
http://www.pbs.org/wgbh/nova/vesuvius/predict.html
- *Volcano World*
http://volcano.und.nodak.edu
- *Volcanoes: Can We Predict Volcanic Eruptions?*
http://www.learner.org/exhibits/volcanoes/entry.html

NATIONAL SCIENCE EDUCATION STANDARDS

5 - 8

Earth and Space Science

Structure of the Earth System

9 - 12

Earth and Space Science

Energy in the Earth System

*Source: *National Science Education Standards, 1996, National Academy Press*

CREDITS

The producers thank Electric Sky for materials used in this program.

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SCIENCE SCREEN REPORT

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SCIENCE SCREEN REPORT

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VOLCANIC PREDICTION



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SYNOPSIS

Volcanoes are some of Mother Nature's most fascinating phenomena, threatening with volcanic ash and the intense heat of spewing lava. Volcanoes can be unpredictable. For hundreds of years, some have remained dormant, in absolute calm, only to erupt quite suddenly, threatening all surrounding life. In the past, studying volcanic activity was extremely dangerous for scientists. Now, they have access to tools such as global positioning systems and seismometers to help in predicting volcanic activity.

In this edition of SCIENCE SCREEN REPORT, we see how scientists are improving the ability to warn people about possible volcanic eruptions in their areas. They research gases in and around volcanoes, as well as lava flow and viscosity. They study how far volcanic ash travels, and the direction to which lava will flow and when it will harden. They study seismic activity related to the increased pressure prior to eruption.

CURRICULUM UNITS

- EARTH SCIENCE
- ENVIRONMENTAL SCIENCE
- GEOLOGY
- PHYSICAL SCIENCE

RUNNING TIME

15:28

BACKGROUND

The earth is home to over 500 active volcanoes. Most of these are located at plate boundaries, or places where the lithosphere is broken up. Their powerful energy cannot be tamed, but scientists are working to control the risks and dangers they hold.

An eruption might spew lava and send clouds of ash 30 kilometers into the sky. These ash clouds can disturb the atmosphere, affect airplane travel, and destroy surrounding crops. Scientists think that the ash and gases associated with volcanic activity might have long-term impact on the global climate.

Much of the program focuses on Iceland. This is because it is a highly active volcanic area, with one of its one hundred and fifty volcanoes erupting every four years. Volcanologists from all over the world are drawn to this area because the island has seen a dramatic increase in volcanic activity in the last few years. In the southern regions of Iceland, there are two volcanoes that have been labeled extremely dangerous. The dangers of these volcanoes not only include the ash clouds and lava, but the effects of the heat from the magma on the ice of the surrounding glaciers. It could melt several hundred meters of ice in minutes, causing an enormous flood wave.

In order to tell which direction lava might flow, and how long it might take to harden, scientists study lava viscosity, which reflects the amount of gases dissolved into the liquid rock. They use a rotation viscosimeter, which measures the level of resistance of a reheated lava sample on a turning rod to decipher the viscosity of the sample.

In Iceland, there is a meteorological institute that studies earthquakes. They monitor 43 different digital seismic stations. Every year, they record about ten thousand small earthquakes. The seismometers are able to detect even the most gentle rumbles. Volcanologists are watching the frequency of the quakes, because in the days leading up to an eruption, the small quakes become more frequent.

The ash clouds of volcanoes have been known to disrupt life several thousands of kilometers away from an eruption site. Scientists all over the world are constantly finding new ways to aid in predicting volcanic activity to make it safer for everyone affected by their extraordinary power.

ADVANCED ORGANIZERS

Prior to showing this video, students should have some understanding of the following benchmarks for Science Literacy, Oxford University Press which are excerpted and, in some cases, abbreviated below. Refer to the Benchmarks for more information.

Benchmark 4: The Physical Setting

Section C - Processes that Shape the Earth

Know by Grade 8

- The interior of the earth is hot. Heat flow and movement of material within the earth causes earthquakes and volcanic eruptions and creates mountains and ocean basins. Gas and dust from large volcanoes can change the atmosphere.

Know by Grade 12

- Earthquakes often occur along the boundaries between colliding plates, and molten rock from below creates pressure that is released by volcanic eruptions, helping to build up mountains. Under the ocean basins, molten rock may well up between separating plates to create new ocean floor. Volcanic activity along the ocean floor may form undersea mountains, which can thrust above the ocean's surface to become islands.

**Benchmarks can be found at www.project2061.org/tools/benchol/bolintro.htm*

CRITICAL THINKING EXERCISES

1. Have students research how scientists predict hurricanes, earthquakes, snow storms, etc. Compare the findings to that of volcanic prediction techniques.
2. Ask students why some volcanoes erupt and others do not. Ask them to give examples of currently active volcanoes.
3. Have students draw diagrams of what happens when different tectonic plates collide or slide past each other. (also include mid oceanic ridge)
4. Design an experiment to show the rate at which different liquids flow, and relate these results to the viscosity of the liquids.
5. Design an experiment to show how far different size particles will travel as a result of a volcanic eruption.

VOCABULARY

Andesitic

Caldera

Basaltic

Dormant

Interferometry

Lithosphere

Magma

Rotation viscosimeter

Seismometers

Tephra

Viscosity

Volcanology

CAREER POSSIBILITIES

- CARTOGRAPHER
- EARTH SCIENTIST
- ENGINEER
- GEOLOGIST
- SEISMOLOGIST
- VOLCANOLOGIST