Volcanic IntEruptions

Purpose

Students will describe how gas and dust from large volcanoes can change the atmosphere and describe how climates sometimes have changed abruptly in the past as a result of changes in Earth's crust, such as volcanic eruptions.

Materials

For the teacher: chalk, chalkboard
For each student: copy of Black Line Master (BLM) *The Year Without a Summer*
For each group of students: materials for presentations
For the class: video on volcanoes (e.g., *Volcano!* by DiscoverySchool Video), research materials

Activity

A. Pre-Activity Video and Discussion

1. Have students watch the video on volcanoes and instruct them to notice any changes that occurred in the atmosphere as a result of a volcanic eruption.
2. Explain that lava is not the only thing that spews out of an erupting volcano. Discuss how volcanoes also release huge amounts of dust, ash, and sulfur dioxide (aerosol) into the air.
3. Ask students: "What effects might this have on the atmosphere?"
4. Distribute a copy of the BLM *The Year Without a Summer* and direct students to read the two excerpts from articles written about a particular incident that occurred in 1816.
5. After students have read the article, discuss with students how the eruption of Tambora in Indonesia released flame, ash, and millions of tons of sulfur dioxide into the atmosphere for five days.
6. Ask students: "Can you explain why this eruption affected the climate in the summer of 1816? Why were countries far away from the eruption affected?"
7. Explain how the ash and sulfur dioxide that spewed out of the volcano blocked/reflected the sun's energy away from Earth, but did not prevent Earth from losing its heat energy. Explain that this caused the drastic temperature changes.
8. Discuss how volcanic ash and aerosol clouds can travel around Earth for years in the atmosphere and stratosphere, impacting the climate for long periods of time.

(continued)

INCORPORATING **TECHNOLOGY**

Have students visit NASA's Classroom of the Future at www.cotf.edu/ete/modules/volcanoes/volcano.html to learn more about volcanoes and the University of North Dakota's Volcano World at volcano.und.edu/vwdocs/current_volcs/current.html to track current eruptions.

connecting across the curriculum

Social Studies

Have students place pushpins with tags labeling their volcano on a world map and look for trends in the locations of volcanic eruptions.

Standards Links
7.3.7, 7.4.2

Activity (continued)

B. Research Project

1. Divide students into groups and assign each group a volcano to research from the list on the BLM.
2. Write the following on the chalkboard:
   - Date of the most devastating eruption
   - The geographical location of the volcano and the effects of its eruption on other geographic areas
   - How the eruption changed Earth's atmosphere
   - How long the atmosphere was affected by the eruption
   - Whether the eruption is/was associated with a mass extinction
   - If the eruption occurred during modern times, how it impacted the people living near the site
3. Inform students that they will be making presentations about their volcanoes. Tell them they should do something creative for their presentations, such as write a front-page newspaper article or series of diary/journal entries written from the perspective of someone who experienced the eruption, create video footage, etc.
4. Inform students that they must include the information listed on the chalkboard in their presentations. [Inform students that this information also appears on the BLM *The Year Without a Summer*.]

C. Presentation

1. Have groups share their presentations with the rest of the class.
2. Discuss how major volcanic eruptions can have short-term and long-term effects on climate because of the release of lava, soot, and aerosols.
3. Discuss how, on a larger scale, some people theorize that the largest mass extinction of life in history was caused by the dust and ash from the eruptions of the Siberian Traps. Explain that, in addition, the eruption released toxic chemicals into the air, which created "acid rain."

Classroom Assessment

Basic Concepts and Processes

As students are working on their research, during and after the presentations, ask questions, such as the following:

📖 Explain the changes volcanoes can make in Earth's atmosphere and climate.

📖 What consequences can those changes have for people and other organisms on the planet?

Did you have any difficulties completing your research?

Name: _____

THE YEAR WITHOUT A SUMMER

Excerpt from an article in *The Decatur County Journal*, June 9, 1892

…According to the records, January and February of that year were warm and spring-like. March was cold and stormy. Vegetation had gotten well along in April when real winter set in. Sleet and snow fell on seventeen different days in May. In June there was either frost or snow every night but three. The snow was five inches deep for several days in succession in the interior of New York and from ten inches to three feet in Vermont and Maine. July was cold and frosty, ice formed as thick as window panes in every one of the New England States. August was still worse; ice formed nearly an inch in thickness, and killed nearly every green thing....

Excerpt from Mount Washington Observatory's *The Weather Notebook*, by Dave Thurlow and Bob Henson, 1999

…In Williamstown, at the northwest corner of Massachusetts, the temperature dropped from 83 degrees at noon on June 5 to only 45 degrees the next morning–and that was the high for the day! Ice formed as far south as Philadelphia and it snowed across northern New England. The weather finally warmed up, but just after the Fourth of July, another sharp cold front hit the Northeast. What was left of the summer's crops was finally destroyed by killer frosts in late August and September. This brutal cool down was caused by something halfway around the world. The volcano Tambora, in Indonesia, had blown its top a year earlier in the largest eruption of modern times.

Choose one of the following to research:

The Siberian Traps	El Chichon	Krakatau
Mt. Pinatubo	Mt. Agung	Mt. St. Helens

Answer the following questions:

- Date of the most devastating eruption
- The geographical location of the volcano and the effects of its eruption on other geographic areas
- How the eruption changed Earth's atmosphere
- How long the atmosphere was affected by the eruption
- Whether the eruption is/was associated with a mass extinction
- If the eruption occurred during modern times, how it impacted the people living near the site