#3607

FIRE AND ICE

Grade Levels: 10-13+
34 minutes
AMBROSE VIDEO PUBLISHING 1997

DESCRIPTION

Visual images help illustrate the geological history of earth, a combination of fire and ice. Emphasizes the paramount importance that liquid water has in sustaining life. Notes the narrow range of temperature necessary for this to occur. Documents with photography of volcanoes, theories of life's origins, and the knowledge that earth is still an active, changing planet. Narrated by James Earl Jones.

ACADEMIC STANDARDS

Subject Area: Science

- Standard: Understands basic features of the earth
  - Benchmark: Knows that earth is the only body in our solar system that appears able to support life (See Instructional Goal #1)
  - Benchmark: Knows the properties that make water an essential component of the earth system (e.g., its ability to act as a solvent, its ability to remain a liquid at most earth temperatures) (See Instructional Goal #2)
- Standard: Understands basic earth processes
  - Benchmark: Knows the effects of the movement of crustal plates (e.g., earthquakes occur along boundaries between colliding plates; sea floor spreading occurs where plates are moving apart; mountain building occurs where plates are moving together; volcanic eruptions release pressure created by molten rock beneath the earth's surface) (See Instructional Goal #3)
  - Benchmark: Knows how the evolution of life on earth has changed the composition of the earth's atmosphere through time (e.g., one-celled forms of life emerged more than 3.5 billion years ago; evolution of photosynthesizing organisms produced most of the oxygen in the modern atmosphere) (See Instructional Goal #4)

INSTRUCTIONAL GOALS

1. To depict the origin of life on earth.
2. To present water as vital to the existence of life.
3. To examine the movement of crustal plates that resulted in changes on the earth's surface.
4. To discuss the emergence of an oxygen-rich atmosphere upon the earth and its affects on early forms of life.

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VOCABULARY

1. galactic
2. primeval
3. aa
4. pahoehoe
5. black smokers
6. tube worms
7. Heimaey
8. Ragnarok
9. Vatnajokull Glacier

BEFORE SHOWING

1. Research the distances of the moon and the earth from the sun.
   a. Compare the sizes of the moon and the earth.
   b. Describe the climates on the moon and the earth.
   c. Discuss the possible reasons for the contrast of climates on these two heavenly bodies.
2. Discuss the various theories about the origin of the earth (creation and evolution).
3. Discuss the possible reasons for the title of the video.

DURING SHOWING

Discussion Items and Questions

1. View the video more than once, with one showing uninterrupted.
2. Pause after the section describing the atmosphere and temperatures of the earth at the beginning of its history.
   a. What gases were found in the atmosphere during this period?
   b. What was the temperature of the earth during this time?
3. Pause after the section on water.
   a. Why is water so vital to the existence of life?
   b. What percent of our bodies is made up of water?
   c. Why is it important that the temperature of the earth during stay within a narrow range?
4. Pause after the section on Yellowstone National Park.
   a. What double helix molecule carries the blueprint for life?
   b. When did the first living molecules appear?
   c. What kinds of organisms were considered to be the first form of life on earth? Where did these organisms flourish?
   d. What site in the United States has a similar environment?
   e. What happens to the hot steam when the temperature on land plunges below zero?

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f. What animal comes to Yellowstone in the winter to thaw out near the hot water? Where does the heat come from?

5. Pause after the section on lava.
   a. What causes volcanoes to erupt?
   b. What do the scientists call lava that is thick and flows very slowly?
   c. What do they call the lava that flows more quickly and has a ropey texture?

6. Pause after the section on black smokers.
   a. Where are black smokers found and what causes them?
   b. What gives the black smokers their black color?
   c. What role do black smokers have in sustaining life in the deep sea?
7. Pause after the section on Iceland.
   a. What is unique about the crustal plates and ridges in Iceland?
   b. What is Ragnarok?
   c. What natural disaster occurred on the island of Heimaey in 1973?
   d. What were the advantages of living on this mid-Atlantic ridge?
   e. What is the biggest icecap in Europe?
   f. How thick is the Vatnajokull Glacier?
   g. What happened to the Vatnajokull Glacier in 1996?

8. Pause after the section explaining about the appearance of green forms of life.
   a. What kind of life existed on earth for billions of years before plants appeared?
   b. How did the green forms of life gets their energy and food?
   c. What gas began to build up in the atmosphere during this time?
   d. What happened to the organisms that could not survive in an atmosphere of oxygen?
   e. How many years ago did this evolution begin?
   f. The sky in the video is yellow.
      (1) What color did it become when oxygen was abundant?
      (2) Is there a scientific basis for this?

AFTER SHOWING

Applications and Activities

1. Draw a wall-sized timeline of the origin of the earth. Summarize the events during each phase.
2. Research and report on the following topics:
   a. Black Smokers
   b. Aa and Pahoehoe
   c. Travels of Saint Brendan
   d. Icelanders' Sagas
   e. Ragnarok
   f. Heimaey
   g. Vatnajokull Glacier

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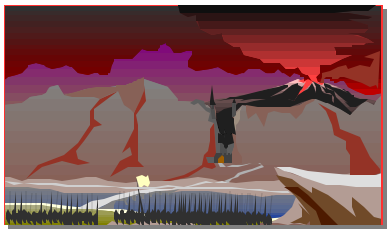

3. Make 3-D volcano models.
4. Make a trivia chart about volcanoes
   a. Earliest recorded eruption.
   b. Most recent eruption.
   c. Most devastating eruption in terms of lives lost.
   d. Most devastating eruption in terms of property damage
   e. Sites of active volcanoes in the world.
5. Report on methods scientists use to develop theories about the origin of life.
6. Research other places in the world that have geothermal features similar to Yellowstone National Park. Point them out on a map.
7. Make drawings or illustrations describing the periods mentioned in the video.

RELATED RESOURCES

Captioned Media Program

- Evolution #3357
- Geology: Our Restless Planet #3037

World Wide Web

The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid-safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **HAWAIIAN VOLCANOES**

http://www.solarviews.com/eng/hawaii.htm

Includes pictures of aa and pahoehoe lava flows from Hawaiian volcanoes.

- **THE ORIGIN AND EVOLUTION OF LIFE**

http://cmex-www.arc.nasa.gov/VikingCD/Puzzle/EvoLife.htm

Presents five illustrated phases in the emergence of life: evolution of the cosmos, prebiotic earth, early evolution of life, evolution of advanced life, and the future.

- **EVOLUTIONARY TIMELINE**

http://www.talkorigins.org/origins/geo_timeline.html

Contains a colorful evolutionary timeline beginning with 4600 myr ago.

- **VOLCANO WORLD**

http://volcano.und.nodak.edu/

Contains valuable and interesting facts for learning about volcanoes. Topics to choose from include: current eruptions, volcano of the week, video clips of lava flows, and making volcano models.