

Real-World Videos

SCIENCE FOR A CHANGING WORLD

Learning Objectives Covered:

- A. describe the scope and applications of geology.
- C. demonstrate how geologists employ the scientific method.

Length: 8:11

Summary: The U.S. Geological Survey (USGS) is the leading agency providing reliable scientific information for informed decision and policy making. This video outlines a brief history of the USGS and the significance of USGS's work and mission in today's world. When it was founded in 1879, the primary focus of the survey was mineral resources and mining geology as well as mapping, paleontology, and stratigraphy. Since its foundation, the USGS has evolved to provide fundamental scientific data relevant to water resources, changing Earth processes, and even the moon landings. Today, USGS scientists throughout the United States gather data in six science mission areas critical to the well-being of the nation and world:

- **Ecosystems**—monitors many functions vital to human populations, including soil formation, crop pollination, nutrient cycling, water purification, waste treatment, and atmosphere regulation.
- **Energy, minerals, and environmental health**—assesses the quantity and quality of resources, including environmental impacts of extraction and use.
- **Climate and land use**—uses research, monitoring, remote sensing, modeling, and forecasting to address human impact.
- **Natural hazards**—assesses the threat of natural hazards for public knowledge and policy making.
- **Water**—monitors resources.
- **Core science systems**—translates scientific data into formats that are accessible and understandable.

Classroom Use: This video helps students understand some of the many ways in which geology solves significant and critical problems faced by human populations today. Before showing the video, ask students to reflect on what geologists do and what types of problems they solve. In addition, ask them to create a list of what they believe to be some of the greatest risks facing human populations (regionally or globally). After viewing the video, facilitate a discussion about

the relevance of geology to society. What types of problems (e.g., climate change, clean water, land use, agriculture, natural resources) does geology seek to solve?

Adaptation:

- The video could be used with this chapter’s “Geology in the News” activity (which would provide specific examples of USGS projects) to form a lesson on the relevance of geologic research to society.

Review and Discussion Questions

1. What are some of the major areas of geology that the USGS supports?
2. What are some of the greatest challenges that the Earth System faces today?
3. How does the work of the USGS help address some of the challenges that the Earth System faces today?

Credit: USGS

HYDRAULIC FRACTURING: USING SCIENTIFIC METHODS TO EVALUATE TRADE-OFFS

Learning Objectives Covered:

- A. describe the scope and applications of geology.
- C. demonstrate how geologists employ the scientific method.

Length: 3:07

Summary: This video uses the example of hydraulic fracturing (fracking) in Colorado to discuss how scientists gather objective data that can be used to guide environmental regulations. Environmental engineers are investigating the potential impacts of fracking on water and air quality, human health, and energy sustainability, with an emphasis on neutrality. Stakeholders will be able to use the information—such as methane concentration in the atmosphere and the persistence of fracking fluids in ecosystems—to create a decision framework to improve environmental policy. In the case of fracking, for which two opposing points of view are often at odds, science can provide the best source of trusted information.

Classroom Use: Remind students that the scientific method yields verifiable results, and therefore, science can provide impartial evidence in cases where opposing sides may have a biased view about a topic (see **Box P.1** for a review). Show the video as one example of a controversial topic. Then, divide the class into groups of two to three students, and ask students to come up with another example of a controversial issue that geologists could evaluate in an

impartial way. Examples include global climate change and sea-level rise, earthquake and tsunami hazards, soil conservation and land-use planning, or ecosystem impacts of coal mining.

Review and Discussion Questions:

1. The video references one side contradicting the other side. Who or what are the sides being referenced? What factors influence their views of fracking?
2. What are some of the questions that scientists are asking about hydraulic fracturing?
3. If you lived in Colorado where this fracking is happening, what sources of information would you turn to?

Credit: Science 360 News (NSF)

Activities

GEOLOGY IN THE NEWS

Learning Objectives Covered:

- A. describe the scope and applications of geology.
- C. demonstrate how geologists employ the scientific method.

Activity Type: Online Investigation

Time in Class Estimate: Variable (depends on class size and depth of discussion)

Recommended Group Size: 1–4 students

Materials: Internet access

Classroom Procedures Ask students to visit the USGS Science Snippets website (<http://www.usgs.gov/news/science-snippets>) and select an article of interest to read. While reading, students should focus on how the scientific method (see **Box P.1**) is being implemented by answering the following questions: What is the problem being solved or hypothesis being tested? What kinds of data are being collected? How are data collected? Then have students summarize what they learned from the article and discuss the ways in which geology provides impartial scientific evidence that is relevant to contemporary world challenges.

Adaptations:

- For online classes, students can be assigned to groups to read and discuss the same article or all students can post summaries to a discussion board.
- For a less open-ended assignment, several articles could be preselected for the entire class.