ScienceNews

Activity Guide for Students: Get to Know Your Local Geology

Directions:
In this activity, you will learn about plate tectonics and research the geology of your state or region. You will work in groups to analyze geologic maps to determine how the data displayed in the map reveal the geologic and tectonic history of the state. Then, you will discuss how the data displayed in the map were gathered and how maps are constructed from those data. For the last step, your group will plan an investigation to gather data and integrate the data into your state's geologic map.

The setup
After you have read the *Science News* article "How the Earth-shaking theory of plate tectonics was born," answer the following questions as part of your homework.

1. Summarize Alfred Wegener's original concept of continental drift.

2. Identify three reasons why geologists objected to Wegener's continental drift hypothesis.

3. Summarize the theory of plate tectonics.

4. Name some technological advancements since the early 20th century that made it possible to gather evidence to support the theory of plate tectonics.

Class discussion
After your class has reviewed the answers to the homework questions, you will discuss the evolution of the theory of plate tectonics and do a timeline to show how the data grew to support the theory. Be prepared to answer the following questions.

1. How were Harry Hess and Robert S. Dietz influenced by the earlier ideas of Wegener and Arthur Holmes?

2. What types of evidence changed scientists' minds about the mechanisms governing tectonic plates?

3. How do you think plate tectonics research has advanced since 1967?

Online investigation

With your group, you will use library and internet resources to investigate how the movement of tectonic plates influences the formation of geologic features. Pay special attention to which plate motions cause each type of geologic feature and how that structure forms.

Answer the following question.

1. What geologic features, or landforms, are caused by tectonic processes?

How to read a geologic map

Your teacher will explain how to read a geologic map and provide you with references or resources to support you as you complete the homework assignment. You will be asked to review a geologic map provided by your teacher and answer the following questions.

1. List the important geologic features shown on the map.

2. List any features or symbols that you do not understand.

Day 2 work

Conduct research

After the class has reviewed the answers to the homework assignment, rejoin your group. With your group, research your state's geology. Use internet resources, your local library, local agricultural extensions or your state's geological survey to find different geologic maps and resources for your state or the state or region assigned by your teacher. Analyze the key, scale and symbols of the map. Answer the following questions in your group:

1. For what state or region did you find a geologic map?

2. What source did you use to find a geologic map of your state?

3. What information does the map show?

4. What information does the map NOT show?

5. How can you use the data presented in the map to identify geologic features and landforms caused by plate tectonics?

Analyze data

Carefully analyze your state or regional geologic maps. Then, use the maps to answer the following questions with the class.

1. How would you describe the average age or the range in ages of rocks exposed at Earth's surface in your state?

2. What types of rocks (sedimentary, metamorphic or igneous) are most common at Earth's surface in your state?

3. What structures on the geologic map can be directly related to the tectonic history of the state?

4. In what type of geologic or tectonic setting do the types of rocks located in your state generally form?

5. How does the geologic or tectonic setting in which the rocks in your state formed relate to the current geologic and tectonic setting of your state?

6. How does the theory of plate tectonics explain the types of rocks and landforms in your state?

Plan an investigation
After your class has identified landforms and types of rocks located within your state, discuss the following topics with your group and answer the questions. Plan an investigation to answer questions about your state or region's geologic history and make a proposal for the investigation.

1. How do scientists gather the data used to construct a geologic map?

2. What questions do you have about the rock units, geologic structures and landforms of your state or area that are not answered by the map you analyzed?

3. List at least three questions you could answer by conducting an investigation to improve the map. Then, choose one of the questions to answer in your investigation.

4. What type of data is required to answer your question, and how could you gather that information?

5. How could you incorporate the new information into the existing geologic map?

6. As a group, create a proposal for an investigation to answer your question. Include the question to be answered, a summary of the data to be gathered and a procedure for gathering that information. Then, describe how the data and the answer to the question will be presented.