Layers of the Lake

Grade Level: 3-6
Subject Areas: Geological sciences, climatology
Duration: 50 minutes or less (allow time for preparation)
Setting: classroom
Skills: classifying, inferring, addition/multiplication

Related State Content Benchmark Objectives
- **Generate scientific questions about the world based on observations**
- **Develop an awareness of and sensitivity to the natural world (i.e. global warming)**
- **Describe natural changes in the earth's surface**
- **Explain how rocks and fossils are used to understand the history of the earth**

Objectives
Students will be able to:
- carry out a scientific experiment
- explain that the lake bottom is different everywhere and what it is made of
- explain how sediments are taken from the lake floor
- Differentiate between a model and real life

Materials
- clear cup filled with different layers (sand, mud, sugar, oil) to represent lake floor sediments
- clear straw
- pencil
- paper
- rulers
- Internet access (for teacher)
- Student worksheet (see page 71)

Background
Climate is important to our everyday life: it determines where we (and other life forms) live and what we eat. The Earth is warming due to greenhouse gas concentrations. To understand the implications of this warming, we need to understand how climate has changed over geologic time.

The ocean floor and lake bottoms are made up of "layers" of various sediment and materials that can give an indicator as to what past conditions were like. These layers act as a "time capsule" locking up what the conditions were like when the sediment was deposited. For example, finding wood chips in a layer of sediment would tell us about the activity in the area at a particular time. Likewise, fossils in the sediment layers can tell us what the conditions were like when that organism was alive, and chemical tests can tell us how old the organisms, and hence the layer of sediment, are.

Scientists can look at layers of sediment that have built up on the lake or ocean bottom by taking a core sample of the bottom. This will provide a window into what the different layers are, how thick they are, what organisms are in each layer, and how old the layers are. This can tell us about past climate, and can be used to predict future climates. In this activity, you are going to be taking a core sample of a model lake bottom, and then you will determine the age of each layer.

The Activity

Prior to the lesson: Clear, plastic cups should be filled with different materials (sand, mud, sugar, soil, clay) in layers to represent the ocean seafloor. Putting potting soil on the bottom layer is the best way to keep the materials in the straw. The number of cups depends on the number of students, or groups of students (groups is most

effective). Each cup should look different so students understand that ocean or lake bottoms are not uniform. The cups may be covered in cloth so students do not see the different layers, or left visible. The clear straws should be cut to slightly longer than the layers of sediment. Each student should receive their own straw, even if sharing cups.

The first half of the lesson should be spent discussing what climate is (long term weather), why we study climate and how we study climate. The easiest way to do this is using a Power Point Presentation. Pictures can be taken from the Internet to show different world climates (i.e. tundra, desert, rainforest), and different ways that climate is studied (i.e. tree rings, corals, ocean and lake drilling). The way ocean and lake cores are taken from drill ships must be explained to students to understand the experiment.

1. Each student (or group of students) is given a cup with different layers and a clear straw.
2. It should be explained to the students that the straw represents the way a big ship would take sediment from the lake floor and the cup represents the lake floor.
3. Students will place one finger over one end of the straw and push the other end of the straw into the sediment. They will pull the straw out keeping their finger over the opening and lay their straw on the desk. If more than one student is using the cup, students should take turns.
4. Students should then answer the following questions:
    A. Draw a picture of what you see in the straw.
    B. How long is the sediment in your straw (in centimeters)?
    C. How many layers are there in the straw?
    D. If each layer represents 1000 years, how old is your sediment?
    E. What might the different layers in your straw represent in the ocean or lake?
5. Students should compare their straws with other students, especially those using the same cup of materials. They will see that not all straws look the same. This can lead to a discussion on how you don't always know what you will get when you drill into the ocean floor and why everyone did not get the same results.

Assessment

Students will participate in class discussions and various ideas and questions will be addressed. Students will be observed during the activity and required to complete the questions.

Additional Resources

Oceanography, Superific Science Series: Book VII, Lorraine Conway (ed), Linda Akins (ill), Good Apple Inc., 1982, IL, 60p.

http://www.uwsp.edu/geo/faculty/rittor/geog101/lectures/climates_marine_west_coast.html

http://www.ngdc.noaa.gov/paleo/

Taking Sediments from the Lake Floor

Name_____ Date_____

Directions: The purpose of this activity is to understand how sediments are taken from the ocean/lake floor, using a model. You will be given a clear straw and a cup filled with different materials. The straw represents the way a big ship would take sediment from the ocean/lake floor. The cup represents the ocean/lake floor. Push your straw into the "lake floor", place your finger over the opening to create suction and then pull the straw up.

1. Draw a picture of what you see in the straw.

2. How long is the sediment in your straw (in centimenters)?

3. How many layers are there in the straw? _____

4. If each layer represents 1000 years, how old is your sediment?

_____

5. What might the different layers in your straw represent in the lake?