

Understanding Paleoclimate

**Exercise prepared by the American Geosciences Institute (Copyright 2018)
Grades 6-12**

Climate scientists study evidence in the geologic record, such as fossils, to figure out what climate was like over hundreds of thousands of years (“paleoclimate”). One fossil they use is pollen, a part of a flowering plant that helps make a seed. Pollen can be blown into lakes, where it is preserved in sediment. Pollen from spruces, which do well in cold climates, can suggest what climate was like when spruce pollen was deposited.

This is a good example of Earth system interactions. Evidence from the biosphere (pollen) is deposited in sediment (geosphere) to reveal past climate (atmosphere interacting with hydrosphere over time). Geologists study sediment layers to see what pollen those layers contain. From those data, scientists learn what climate was like — and perhaps how it changed over time.

Materials

For each group of 3-5 students:

- Blue, red, green, and yellow soft modeling clay, such as Play-Doh™
- Small container (milk carton or plastic cup such as small drink cup)
- Small PVC or metal pipe (1/4-1/2 inch diameter)
- Thin stick, such as pencil (fits snugly but moves inside pipe)
- Pen or pencil and paper
- Metric ruler

Procedure

1. Working in a small group, spread layers of blue, red, green, and yellow clay — in any order and thickness — in your small container. The container represents a lake, and clay represents settled sediment layers at the lake bottom.
2. Drill a core, or small cylinder of clay, by slowly twisting and pushing your small pipe straight down through the layers of clay. Then carefully pull the pipe back up. Use your thin stick to slowly push the core out of the pipe.
3. Observe the patterns of colored clay in the core sample. Sketch the core on your paper. Note which end of the core is the top (most recent sediments) and which end is the bottom (oldest). Label the color of each layer. Measure and record the thickness of each sediment layer in centimeters.
4. The colors of clay represent sediments that have settled over time. Imagine it has taken 1,000 years for each centimeter of sediment to settle. How many years does your core represent overall? How many years does each layer represent?
Label your drawing to tell the time (in years before present) represented by the bottom of each layer.
5. Imagine that *blue* clay represents sediments containing pollen from cold-climate plants, such as spruce and alder trees. *Red* represents sediments having pollen from warm-climate plants, such as oak trees and grasses. *Green* represents sediments with mostly spruce and alder pollen, with a little oak and grass pollen. *Yellow* represents sediments with mostly oak and grass pollen, with a little spruce and alder pollen. What was the climate like around the lake when each layer was deposited?
6. Write a paragraph describing the climate history represented by your core, from older sediments deposited long ago to younger sediments deposited more recently.