

Glaciers: Modes of Erosion

4th Grade

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References:

- <http://tv11.geo.uc.edu/ice/modules/dynamic/make.html>

Benchmarks & Objective:

ES 8: Describe how wind, water and ice shape and reshape Earth's land surface by eroding rock and soil in some areas and depositing them in other areas producing characteristic landforms (e.g. dunes, deltas, glacial moraines).

Materials:

Glacier 1 (internal deformation)

- 1 part borax solution (1 tsp borax per 1 cup of water)
- 4 part Elmer's glue
- 4 part water

(Mix above together to create a viscoplastic glacier to show how glaciers flow)
ramp or fake mountain with cirque for glacier to sit in

Glacier 2 (basal sliding)

- bake pan
- sand
- water
- hair dryer

(Fill bottom of cake pan with sand, pour some water in the pan and tilt so that glacier forms on one side of the pan in freezer).

Target Concept:

Students should understand that glaciers build over many years of retained snow accumulation. As they flow, there are two primary ways in which glaciers erode- as their melt water flows the landscape is carved, in addition the great mass of ice acts as a bulldozer scraping the landscape?

Initial Introduction:

Students will be asked how glaciers form. Where are most of the glaciers in the world located? Why? Why don't we have glaciers in Ohio now?

Procedure:

Students will look at glacier one and make observations. What will happen as the glacier melts? (List their hypotheses on the board). How does the glacier flow? Will it go down the slope? What will happen to the sand as the glacier melts?

Ask a student to use the hair dryer on the bottom of the inclined glacier pan to observe melt and basal sliding. Discuss the pros and cons of the models with respect to real glaciers.

Students will then observe the Elmer's Glue Glaciers with a similar discussion. How does the Elmer's glue glacier compare to the ice model? Where does the glacier flow fastest?

Have the students design an experiment to see where the glacier flows fastest. They may want to stick flags (or toothpicks, paint, or some other marker) into the glacier in a straight line to see how the line moves over time.

Students should be asked what happens to the mountain as the glacier flows down. Erosion and deposition will be discussed, along with the formation of glacial moraines. Students may take the glacier and put it on some soil and watch what happens to the sediment as the glacier flows. This should be performed last as it will dirty the glacier.

Target Observations:

- Ice is an agent of erosion. Glaciers erode the landscape as they scrape mountains. Glacier melt carves the landscape.

Extensions:

Students can examine pictures of real glaciers and discuss the surface features they see.