

2.5

GLACIER DYNAMICS

What causes melt water in below freezing temperatures?

Activity Time: 20 minutes

Background

This experiment will demonstrate one way a glacier moves. Glaciers are slow-moving masses of ice that exist where more snow falls than melts. The layers and layers of snow which fall year after year are compressed to form ice. Glaciers act like rivers, flowing downhill under the influence of gravity. As they move, glaciers can widen and deepen valleys, and grind boulders into pebbles. They occupy about 10% of the Earth's land, mostly in Greenland and Antarctica. Here, glaciers can be as much as 2 miles thick and weigh more than millions of tons. This weight can cause the bottom layer of ice to melt and to become soft and pliable. This melt water or soft ice reduces the friction between the bedrock and the ice, causing the glacier to move more easily. Why do students use blue ice cubes? Blue ice occurs in the Polar Regions in mature ice. The color comes from old, compressed ice where the air bubbles have all been squeezed out.

Introduction

Begin by writing "Know", "Wonder", and "Learn" on the board. Ask students what they know about ice and write that under the word "Know". Now ask them what they wonder about ice and write that below the "Wonder". As a class, complete this chart with what they have learned at the end of the investigation. Before giving directions, show pictures of glaciers to the class found on **Example 2.6: Kinds of Glaciers**.

Directions

1. Place 2 ice cubes several inches apart on the wax paper.
2. Put the rubber fingertip on your index finger.
3. Push down with your rubber finger on one of the ice cubes.
4. Leave the other one alone, making it the "control" in the experiment.
5. Predict what will happen to the ice cubes.
6. Push together or take turns pushing down on one of the ice cubes for about 5 minutes.
7. Observe what happens to both ice cubes.
8. Remove ice and dry off wax paper with a paper towel.
9. Hold wax paper up to see which ice cube melted more by viewing the imprint on the paper.

Discussion

- Which ice cube melted faster?
- What happened to the ice cube that you pushed on?
- Why is there more water around the one that you pushed on?
- Where did the dent in the cube come from? (*Your finger*)
- What is another way to do this experiment?

Assessment

Use **Exit Ticket 2.5** to answer the following question: *If the ice cube is the glacier, what is represented by your finger pressing down?*

Extension

Draw around the imprint of the melt water. Put a piece of graph paper under the wax paper and count the squares covered by the two ice cubes. Compare the results.

Materials

Per team of 2:

- 2 (same size) ice cubes made with blue food coloring.
- 1 sheet of wax paper
- 2 rubber fingertips (found at an office supply store)
- Paper towels

Related Activities

- What happens to a glacier under pressure? **(2.3)**

Vocabulary

Glacier: an ice mass that continually accumulates from compacted snow that deforms under its own pressure.

ALIGNMENT TO NGSS:

Scientific and Engineering Practices

- Asking questions
- Using models
- Planning and carrying out investigations
- Constructing explanations
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Crosscutting Concepts

- Cause and effect
- Systems and models
- Stability and change

Disciplinary Core Ideas

- K-5: ESS2.A; ESS2.C; PS3.C
- 6-8: ESS2.A; ESS2.C; PS3.C