

2.4

GLACIER DYNAMICS

How do glaciers move over bumpy bedrock?

Activity Time: 20 minutes

Background

This experiment will demonstrate how a glacier moves across a bumpy bedrock or land surface. A glacier is a large mass of ice that acts like a river, flowing downhill under the influence of gravity. Glaciers are frozen to the bedrock, but when the pressure builds up on the bottom layer, it melts and becomes soft and pliable. As ice passes over a rise (a bedrock bump), the pressure rises and lowers the melting point even more. On the downside of the rise, the pressure lowers and the water refreezes, producing regelation ice.

Directions

1. Fill the cake pan with water and place in the freezer until the water is frozen.
2. Remove the ice from the pan by running water over the underside of the pan.
3. Look at the ice block from all angles.
4. Set the ice block back in the freezer on a wire rack.
5. Lay a brick or something heavy on top of the ice block.
6. Predict what will happen to the ice block.
7. After several hours, take the ice block out and observe what happened.
8. Answer the question: "How can a glacier move over a bumpy bedrock?"

Discussion

- What happened to the shape of the ice?
- Where did the ice change, on the top or on the bottom?
- Did the ice block sit higher or lower on the wire rack?
- Why did the shape at the bottom of the ice change? (*The ice melts due to the pressure of the weight of the brick. The ice shape looks like what is on the bottom, similar to a glacier on bedrock.*)

Assessment

Use **Exit Ticket 2.4** to explain how ice was able to form around the wire rack, and compare this to how a glacier behaves.

Extension

Use the same ice block.

Ask students to devise another experiment showing ice melting from pressure.

Materials

- A square cake or a loaf pan
- Water
- A freezer
- A wire rack
- A brick or a heavy object

Related Activities

- What happens to a glacier under pressure? **(2.3)**
- What causes melt water in below freezing temperatures? **(2.5)**

Vocabulary

Glacier: large masses of ice that move due to gravity, friction, and melting.

Regelation: the melting of the ice due to pressure and its refreezing.

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