

2.6

GLACIER DYNAMICS

How is glacier goo similar to a real glacier?

Activity Time: 45 minutes

Background

Glaciers are slow-moving masses of ice that exist where more snow falls than melts. 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. As they move, glaciers can widen and deepen valleys, flatten forests and grind boulders into pebbles.

Gravity drives glaciers in 2 ways: by sliding over the bedrock with melt water and by ice building up in the middle, forcing the edges to expand. In the Polar Regions, glaciers are frozen to the bedrock and move very slowly, from 30 feet to a half mile each year. During a surge, glaciers can move as much as 250 feet per day for several years before returning to their normal flow. When they move quickly, they develop cracks called crevasses.

Directions

1. Examine the "Kinds of Glaciers" sheet. Which glacier is getting smaller (retreating) and which is breaking off into the ocean (calving)? The glacier made in the PVC pipe is a valley glacier.
2. Give each team 1 bag of goo and ask them to just look at it in the bag.
3. Ask students to write down their predictions of how the goo will feel, how it will act and what will happen when it flows down the chute. Include the time it will take for it to reach the bottom of the chute.
4. Remove the goo from the bag and divide it among the team members.
5. Describe the properties of goo. Is it a solid or a liquid? Does it feel sticky or warm?
6. What happens when you stretch it slowly or stretch it quickly? What happens when you flatten it?
7. Take all of your team's goo and place it at the higher end of your PVC pipe, tray or cookie sheet. Press it down so it sticks to the surface.
8. Start your timer and leave the goo alone while writing down your observations.
9. Stop your timer when the goo front touches your desk. Record this time.

Discussion

- Compare your time with the rest of the class. What could account for differences? (*amount of goo, timer error, location of starting line*)
- How is glacier goo similar to a real glacier? (*Moves slowly, stretches and breaks like glaciers, acts like a solid and a liquid*)
- How are they different? (*glaciers are compressed snow crystals, goo is sticky, goo does not melt*)
- What other variables could you test with glacier goo?
- If a variable was added, what would this experiment serve as? (*the control*)

Assessment

Use **Exit Ticket 2.6** to answer the following question: *How is glacier goo similar to a real glacier?*

Extension

Students make goo in class and examine the states of matter and chemical reactions as they stir the mixtures together.

Materials

Per Team

- 1 bag of glacier goo (**see attached recipe**)
- 1 paint tray, cookie sheet, or PVC pipe (cut in half horizontally)
- Books or objects to raise tray, sheet or pipe
- Copies of "Kinds Of Glaciers"
- Timer
- Copies of "Glacier Goo Investigation"

Related Activities

Freeze a paper cup filled with water, pebbles and sand. Tear off the paper cup and place the ice on a slanted surface. Observe while the ice is melting and inspect the remains of the glacier (till).

Vocabulary

Crevasse: deep crack in the ice of a glacier.

ALIGNMENT TO NGSS:

Scientific and Engineering Practices

- Asking questions
- Using models
- Planning and carrying out investigations
- Constructing explanations
- Obtaining, evaluating, and communicating information

Crosscutting Concepts

- Systems and system models
- Stability and change

Disciplinary Core Ideas

- K-5: ESS2.A; ESS2.C; PS1.A; PS2.A; PS2.B
- 6-8: ESS2.A; PS1.A; PS2.A