1.1

SEA LEVEL CHANGE

How do glaciers change sea level?

Activity Time: 45 minutes

Background

There are two kinds of ice in the Polar Regions, sea ice and land ice. Sea ice forms from ocean water and is about 1 meter thick after a cold winter. Some of the sea ice melts each summer. Land ice forms on land from precipitation that falls and accumulates on the ground. Layers of snow build up, causing pressure on the snow crystals beneath and the air is pushed out. Eventually the snow is compacted into layers of ice. This ice becomes a glacier that acts like a river, flowing downhill. Once the glaciers meet the ocean, they break off and become floating icebergs. This activity helps students understand which ice is causing the sea level to rise.

Directions

1. Using a globe, show Antarctica (91% of world's ice) and Greenland (8% of world's ice).
2. Explain that ice sheets can be as much as 2 miles thick (give example of how far that is from school) and that moving glaciers flow outwards to the ocean.
3. Set up aquarium or container with the ice sheet resting on the upside down cup. (Land Ice)
4. Partially fill container with colored water and mark the sea level with marker.
5. Place the lamp over the ice sheet in container and turn it on.
6. Ask students to formulate a question about the investigation as set up. (What will happen to the level of water as the ice melts?)
7. Ask for prediction about the aquarium's sea level.

Student Activity

Which causes sea level rise, melting land ice or melting sea ice?

1. Give each pair of students a cup with one ice cube in it.
2. Ask each pair of students to mark a 4 centimeter line on their cup.
3. Tell students to pour warm water to that line, checking their accuracy at eye level.
4. Ask students to finish this hypothesis: "If the ice melts completely, the sea level _____ rise."
5. Discuss results.
6. Announce that an ice sheet has calved. (Broken off)
7. Ask for hypothesis for: "What will happen to your sea level if you add an iceberg?"
8. Ask each pair to put an ice cube in their glass and mark the new level.
9. Discuss results.
10. Check the demonstration aquarium for sea level changes.

Discussion

- Why did the sea level not change once the ice melted in the glass? *(The ice already took up the space in the water. When it melted, it just filled in that space which is called displacement.)*
- Which changes sea level: land ice or sea ice? *(Answer: land ice)*

Assessment

Use **Exit Ticket 1.1** to answer the following question: *Describe the difference between land ice and sea ice and explain what happens to sea level when these two different types of ice begin to melt.*

Extension

As a class, record measure and record sea level differences on the board and average sea level rise. This information could be graphed as well. Predict what 2 or more ice cubes would do to the cup's level. Add the ice to check prediction.

Materials

- Plastic cups - *1 per group*
- Ice cubes - *2 per group*
- Ice Sheets - thin sheet of ice made in baggie or Tupperware
- Rulers - *1 for each group*
- Markers - *1 for each group*
- Small pitchers of water
- Aquarium with colored water
- Large plastic cup upside down on which ice sheet rests

Related Activities

- How much of an iceberg floats above the surface? **(4.1)**
- What causes melt water in below freezing temperatures? **(2.5)**

Vocabulary

Ice sheet: ice that covers land that is more than 50,000 kilometers (12 million acres) and is very thick.

Sea level: the measurement of the place where the water meets the land, halfway between high and low tide.

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: ESS2A; ESS2.C; ESS3.B; PSI.A
- 6-8: ESS2A; ESS2.C; ESS3.B; PSI.A