5.3 GLOBAL WARMING

Why is albedo important in the polar regions?

Activity Time: 20 minutes

Background

Albedo is a measure of how much light energy is reflected off an object and how much is absorbed and turned into heat energy. A light colored or shiny object will reflect more light than a dull, dark colored object. (An ideal white body would register as 1.0 and black as 0) Albedo plays an important role in heating the earth. Land and water heat up more than snow and ice. The Polar regions count on a high albedo to keep their region cold. As more of the ice melts in global warming, more heat is absorbed by the ocean and the land mass of Greenland and Antarctica. This causes more melting of the ice sheets and sea ice and in science is called a positive feedback.

Materials

For Each Team:

- 1 picture of a glacier (see attached sheet)
- 2 aquarium tape thermometers
- Desk lamp
- Time

Directions

1. Check the thermometers for the same color reading on both. Warm the colder thermometer with finger pressure if they are not the same.
2. Place the picture of the glacier face up under the lamp.
3. Slide one thermometer face up under the glacier picture under the white ice.
4. Slide the other thermometer under the dark land area.
5. Set the timer for five minutes.
6. Turn on the lamp and wait for the timer to go off to read the thermometers.

Discussion

- What were the temperature readings?
- Which one was the coolest?
- Why was one cooler than the other? *(White reflects more of the light waves than the dark colored area. The absorption of the light waves increases the temperature.)*
- What happens to the ocean temperature when there is more ice? *(It stays colder because the ice reflects the heat.)*
- What happens to the darker ocean when more ice melts? *(The ocean absorbs more heat and becomes warmer, which melts more ice.)*

Assessment

Use **Exit Ticket 5.3** to answer the following question: *Why is albedo important in the polar regions?*

Extension

Design an experiment to test albedo on your school site.

Related Activities

- How is water affected by the Greenhouse Effect? **(5.2)**

Vocabulary

Albedo: a measure of how much light energy is reflected off an object and how much is absorbed and turned into heat energy.

Reflect: to send back light, sound, or heat to its point of origin (where it came from).

ALIGNMENT TO NGSS:

Scientific and Engineering Practices

- Asking questions
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Constructing explanations
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Crosscutting Concepts

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

Disciplinary Core Ideas

- K-5: ESS2.A; ESS2.C; PS3.D
- 6-8: ESS2.A; ESS2.C; ESS2.D; ESS3.D; PS3.D