

5.5

GLOBAL WARMING

Where does cold water move in the ocean?

Activity Time: 20 minutes

Background

Scientists believe that the recent stronger hurricanes have been fueled by the warmer water in the Polar Regions. As global warming continues, these Polar Regions are experiencing melting ice in the ocean water. The ocean water doesn't reflect the sun's rays like ice. It absorbs the light of the sun and turns it into heat. This warm water causes other ice to melt in the water, too. When thinking about this melting ice, students might guess this cold water stays near the surface of the ocean and is warmed by the sun. The fact that cold water sinks surprises them.

Directions

To start:

1. On a globe, show students the Polar Regions and tell them about the ice melt that occurs due to climate change.
2. Explain that scientists believe the warmer oceans in this region are changing the weather patterns and warmer oceans are causing stronger hurricanes. As air travels over warmer oceans, it picks up more moisture and energy for storms.
3. Warm water expands and this expansion has caused a 2 mm rise in sea level.

To do:

1. With a pencil, punch 4 holes near to bottom of the paper cup, evenly spacing them.
2. Set the cup in the jar so that it rests on the mouth of the jar.
3. Mark the jar with a piece of masking tape about one half inch (1.25 cm) above the holes in the cup.
4. Lift the cup and fill the quart jar with warm water to the tape line. Remove the tape!
5. Put the cup back in the jar and add the ice cubes to the cup.
6. Wait one minute.
7. Add 3 drops of food coloring to the cup, trying to avoid the ice cubes.
8. Observe.

Discussion

- What happened?
- Why did the colored water sink to the bottom?
- What did you learn about how cold water moves?
- Why does cold water sink? Cold water is more dense (the molecules are closer together) than warm water so it sinks.

Assessment

Complete **Assessment 5.5**: *Where does cold water move in the ocean?* (See **Rubric 5.5** for scoring.)

Extension

Ask students to find out about convection currents in the ocean. How do these currents affect weather?

Materials

Per Group:

- 1 - 8 oz Styrofoam or paper cup
- 1 quart small-mouth jar
- 1 pencil
- 1 quart warm water
- Masking tape
- 2 ice cubes
- Food coloring

Related Activities

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

Vocabulary

Convection Current: a movement of water as its temperature changes. The warmer or expanded water is less dense, so it rises. The colder, more dense water sinks.

ALIGNMENT TO NGSS:

Scientific and Engineering Practices

- Asking questions
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- 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: PS4.A; PS4.B; PS4.C
- 6-8: PS4.A; PS4.B; PS4.C