

Ocean Currents and Jet Streams

Teacher Background

In the 1700s when the American colonies were dependent on sailing ships to receive mail from England the constant complaint was that it took 2 weeks longer for the mail to travel from Falmouth, England to New York than it did to travel from London to Providence, Rhode Island. Benjamin Franklin, deputy Postmaster General at the time, was asked to investigate. Franklin spoke with his cousin, a Nantucket whaling captain, and found the canny New Englanders knew all about (and also how to avoid) a current that delayed the colonies-bound mail by 70 miles a day, and sometimes even carried ships back towards England when the winds were light. Franklin had a map printed showing the Gulf Stream, but the Falmouth captains apparently ignored the information. As sagacious Ben said in another context, "Some are weather wise and some are otherwise."

Wind is one of the main forces behind surface currents. The Coriolis effect causes currents in the open ocean north of the equator to move in a clockwise direction while currents south of the equator move in a counterclockwise direction. Surface currents which originate near the equator are warm currents and those that originate closer to the poles are cold currents. Continents are another factor which influence currents by causing the currents to be deflected from their original path.

Surface currents have a considerable effect on the climate of areas along their path. England and Iceland have much warmer and more moderate climates than would be expected just by looking at their location. Their latitude is similar to that of northern Canada, Labrador and Alaska, which experience a very different climate. It's all due to the warm Gulf Stream.

Objectives

Students will become familiar with ocean currents and wind patterns.
Students will make comparisons between wind patterns and ocean currents.

Materials

- 9 x 12 inch aluminum pan
- clay
- flexible straw (the kind that's bendable)
- water
- small piece of aluminum foil
- ocean current diagram
- wind pattern diagram
- tracing paper

Vocabulary

current, Gulf stream, jet stream, latitude, longitude

Engage

Distribute the Student Worksheets and the Ocean Currents and Wind Patterns diagrams. Explain to students that surface currents originating near the equator are warm while currents originating at the cooler latitudes are cold. Have students color the warm currents red and the cold currents blue. Instruct students to trace the wind diagram and place the tracing on top of the ocean current diagram. Ask students to record their observations in their journals. (Students should notice a correlation between ocean currents and wind patterns.) Discuss their observations as a class. Point out that wind is only one factor that influences ocean currents and discuss the other factors. (Coriolis effect, deflection by continents, location from which they originate.)

Explain/Explore

1. Using the clay make continents along both sides (lengthwise) of the aluminum pan.
2. Fill the middle section of the pan with water. Do not fill the pan so much that the continents are submerged!
3. Make 3 or 4 small rafts (approximately 1 cm square) out of the piece of aluminum foil.
4. Place your rafts in the “ocean.”
5. Bend the straw and place the long end of the straw (end furthest from the bend) in your mouth. Aim the short end of the straw at your “ocean” and blow gently causing a breeze. You do not need to blow hard enough to have a visible movement of the water. A current should begin to form.
6. Observe the path of the rafts and record your observations.
7. Repeat the process blowing in different directions. Record your observations in your journals. What factors influenced the path of the rafts? How did the path differ when the winds blew in different directions? Make a general statement about the connection between wind patterns and ocean currents based on your observations.

Suggested URLs

Ocean Currents and Jet Streams

http://www.oar.noaa.gov/k12/html/ocean_currents.html

NOAA Office of Oceanic and Atmospheric Research web page for students on ocean currents: includes good background information, activities and links to additional resources.

<http://www.windows.ucar.edu/>

Windows to the Universe provides a simple explanation of ocean currents in their “Our Planet” section.