See How Winds Drive Ocean Currents

Although other causes are also at work, ocean surface currents are caused mostly by wind, especially winds that blow in one direction for long periods. In this activity, you will create a model ocean, blow “wind” over it, and see how wind affects ocean surface currents.

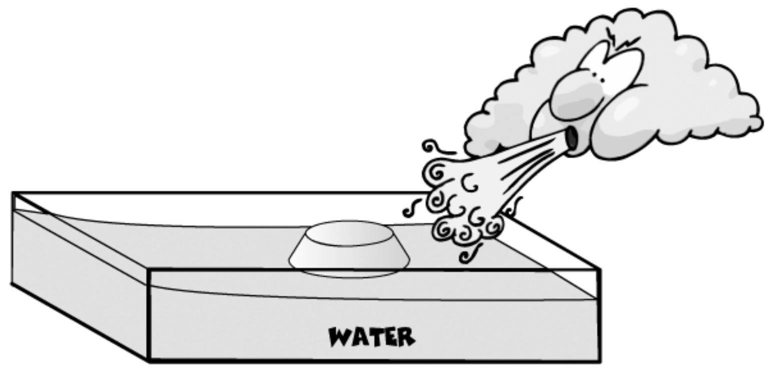
Materials:

- Clear, shallow, glass baking dish or clear tray
- Food coloring
- Cereal bowl (or finger bowl)
- Petri dish or small shallow bowl
- Assortment of waterproof objects with irregular shapes
- Map of ocean currents (can use Jason-1 Adventures game board)
- Map of global wind patterns (see Panel 6 on this poster)
- Towels

Preparation:

This activity is best completed in small groups. Make sure that the model ocean containers (glass baking dish or clear tray) are shallow, otherwise it is difficult to see the bottom counter currents.

In Step 3, you can use any bowl or object that sticks above the water. In Step 4, you can use any small bowl or other object that is short enough to be below the water line.



Teachers may wish to demonstrate this for the entire class by placing the clear “ocean” container on an overhead projector and adjusting the focus of the projector as needed.

Procedure:

1. Carefully fill the clear tray with water. Do not fill it completely to the top. Let the water settle.

2. Place a drop of food coloring at one end of the tray and gently blow across the tray. Observe and make a sketch of what you see happening at the surface of the water. Make another sketch of what you see happening along the bottom of the dish. Are your sketches different from each other? If so, how are they different? Where do the currents move most rapidly? What happens to the water as it moves away from the wind source?

3. Gently place the cereal bowl upside-down in the center of the glass tray. Make sure that the bowl sticks out of the water. If it does not, pour some of the water out of the tray and try again. The bowl represents an island. Add a drop of food coloring in front of the island and gently blow across the tray. Observe and sketch what happens to the food coloring in front and back of the island. What effect does the island have on the current? Is the current stronger in front of or behind the island? How can you tell?

4. Remove the cereal bowl. Change the water if the food coloring added during Step 3 makes in difficult to see additional drops. Add a petri dish that is completely below the water line. The petri dish represents a submerged island Add a drop of food coloring between you and the submerged island and blow

See How Winds Drive Ocean Currents (cont'd)

across the tray. Observe and sketch what happens to the food coloring. How are these results different from those obtained for the island in Step 3?

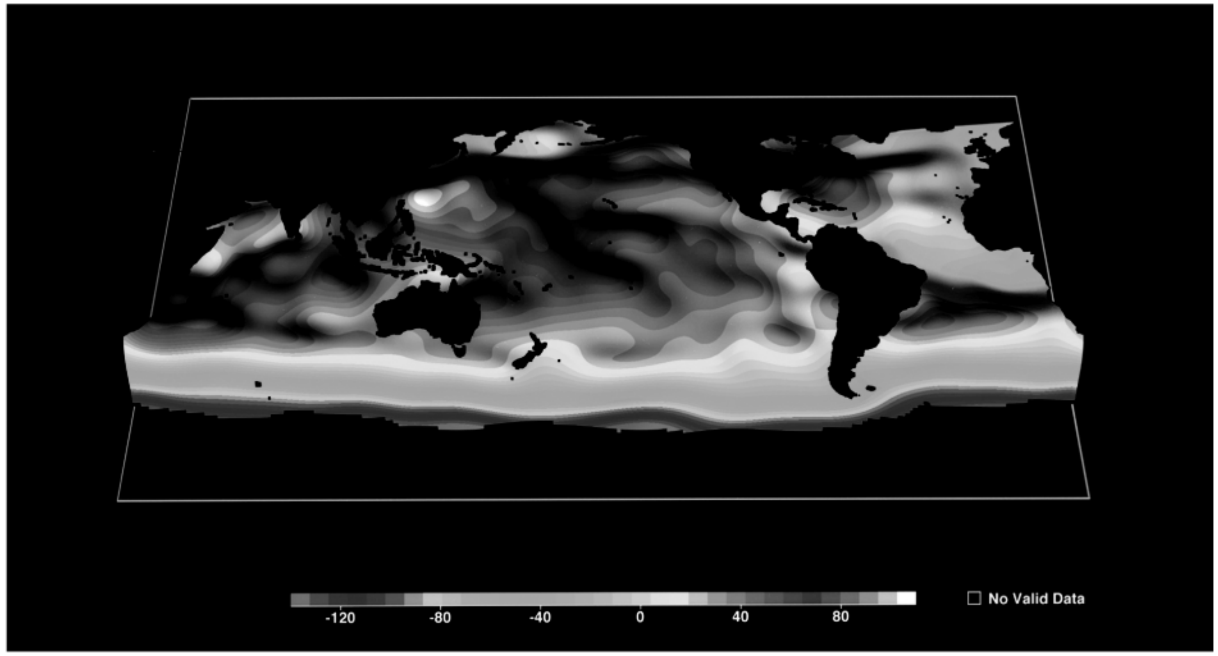
5. Repeat the procedure, but use objects of irregular shapes. Are the currents more or less complex with the odd-shaped objects? Explain.

Do the currents always move in the direction of the wind? If not, what factors might influence the direction of movement? How do bottom currents differ from top currents? Why?

Explanation:

Winds create ocean currents, just as your breath created currents in your model ocean. Wind-driven ocean currents are complicated by many other factors, including Earth's rotation, land masses, seafloor topography, and tides. The complex patterns of ocean currents are also influenced by the salinity (saltiness) and temperature of the ocean itself.

Ocean circulation patterns influence climate and living conditions for plants and animals, even on land. Ocean currents affect everything from the routes taken by ships to the distribution of plants and animals in the sea.



Ocean topography, as measured by the Topex/Poseidon satellite (Jason-1's older brother) in October 1992. Warmer water on the surface is pushed around by strong winds, creating ocean currents and such conditions as the occasional El Niño. Colors (which show here only as shades of gray) show the different heights of the ocean's surface, which also represents ocean temperature.

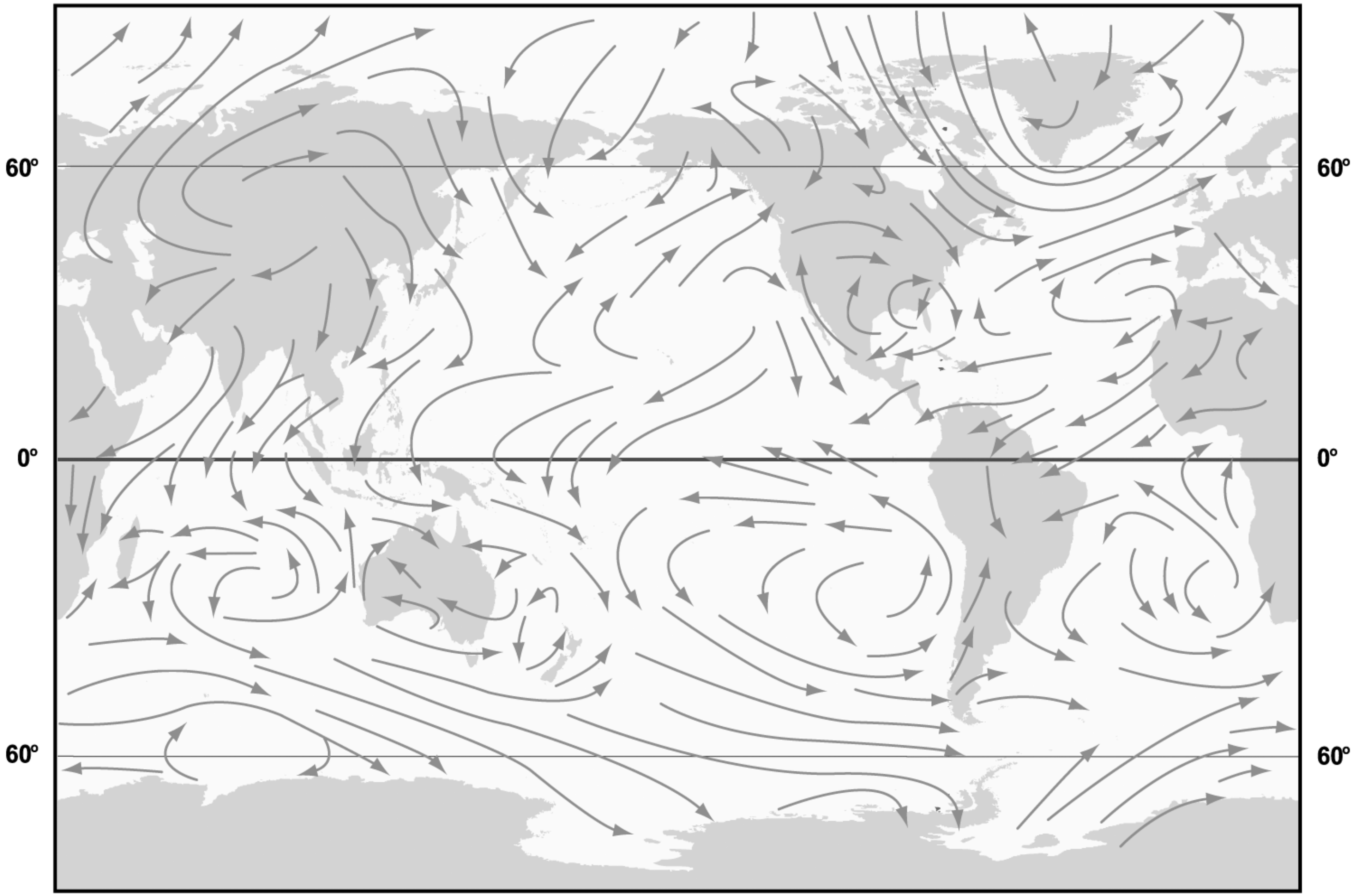
To Investigate Further:

As you might expect, flow in the ocean can be very different from flow in the laboratory. It is very difficult to model the motion, viscosity*, and geometry of Earth's oceans in a simple experiment. To see the real world effect of winds on ocean circulation, compare a map of wind patterns (see Panel 6 on this poster) and a map of surface currents (as shown on the Jason-1 Adventures on the High Seas game board on the front of this poster). Do these patterns look similar?

Source:

Adapted from James A. Kolb, *Marine Biology and Oceanography, Grades Seven and Eight*. Marine Science Center, Marine Science Project: For Sea. Poulsbo, Washington.

** How easily a liquid flows: For example, honey has a higher viscosity than water.*



Global wind patterns