

Science Lesson - How does salt affect ocean currents?

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Farmland Elementary School, Fourth Grade

Objective - Students will be able to explain how salt water impacts water currents.

MCPS Essential Questions:

How can weather conditions be observed, measured, and described?

What is needed to carry out a task or conduct an investigation?

How can tools, materials, and skills be used to carry out a task, conduct an investigation, or address a problem?

Montgomery County Public Schools Science Indicators:

2.4.E.2 Recognize and describe that each season has different weather conditions.

7.3.A.1 Develop an understanding of the characteristics and scope of technology.

Materials:

1. Golf Balls
2. Glass beakers (with wide mouth)
3. Water with high salt concentration (You may need to heat the water before adding the salt, about 2 tablespoons per $\frac{1}{2}$ cup of hot water. Allow salt water to cool to room temperature. Make ahead of time.)
4. Clear plastic cups
5. Water droppers
6. Burette for class demonstration at end (optional)
7. Discovery Education video describing currents, and what causes water currents.

Activator/Warm-up - demonstrate golf balls in salt and in fresh water. What do students notice? (Use two clear containers or glasses. Fill one with tap water, and the other with high salinity water. The golf ball in the salt water will float to the surface. The golf ball in the fresh water will sink.)

Whole Group:

1. Vocabulary instruction - define:
 - a. Currents ("winds of the ocean") - review past discussions on how warm and cold air work to create wind.
 - b. Density - **Density** is how close together the molecules of a substance are or how much **mass** a substance has in a given space. If you have one cup of jelly

beans and one cup of marshmallows...the jelly beans have more **mass**...there is more "stuff" compacted into the cup. The marshmallows are mostly air. If you put each of those cups in a microwave to melt...the sugar and water that makes up the jelly beans would almost fill the cup to the top. The sugar and water that makes up the marshmallows would only fill the cup a little bit because marshmallows have less **mass**, they are mostly made of air. Materials with more **density** weigh more. A cup of jelly beans weighs more than a cup of marshmallows.

- c. Salinity - The amount of salt dissolved in the waters of the Earth's oceans
2. Make predictions: What will happen when you add salt water (identified by food coloring) to fresh water (use organizer)
3. Students will work in pairs to carefully add drops of salt water (colored with food coloring) and will note that the salt water moves to the bottom of cup. (Hold the dropper tip gently next to the inside of the cup, near the water line.)
4. Students will record observations on organizer.
5. Students will explain what they think is happening when the salt water moves to the bottom of the cup.
6. When students have finished noting observations and explanations, the teacher will demonstrate adding salt water to a beaker using a burette to minimize the turbulence. Put salt water in the burette. The tip of the burette should be inside the beaker, close to but above the water line, and touching the side of the beaker. Gently turn the stopcock to allow a small amount of salt water to leak into the tap water. Discuss with students what happens. The colored salt water should be visible and should move to the bottom of the beaker.
7. Class discussion of what happened. Lead students to understanding that water with more salt has a higher density than fresh water. This water is "heavier" so it will sink. The movement contributes to the currents in the water.
8. Show video clip from Discovery Education (United Streaming) that demonstrates how cold water is denser, and thus sinks, and how salt water contributes to the currents in the ocean. (*Currents* video clip)
9. Discuss any new information gained from the video clip.

Closure:

Students will respond to an exit card asking "How does the salt in the ocean affect the ocean currents? Use examples from our explorations to support your answer."

Name _____

How Does Salt in Water Affect Ocean Currents?

1. Based upon our discussions, and the observations you made of the golf ball in salt water, what do you predict will happen when you add a dropperful of salt water to fresh water?

2. Gather your materials:
 - a. Clear plastic cup with $\frac{1}{2}$ cup of tap water.
 - b. Dropper
 - c. Small cup of salt water

3. What does the tap water look like? _____

4. What does the salt water look like? _____

5. Take a dropperful of salt water and CAREFULLY and GENTLY empty the drops into the tap water. Your dropper should be almost touching the top of the tap water. Do this three times. Describe your observations for each trial.

Trial 1	
Trial 2	
Trial 3	

6. Which do you think is more dense, the tap water or the salt water? What happened to make you think this?

7. How do you think the salt in the oceans might affect the water currents? Why?
