Visit to an Ocean Planet

**Adapted from:  http://sealevel.jpl.nasa.gov/education/activities/ts1siac2.pdf**

**Salinity and Deep Ocean Currents**

**Overview:**

Ocean currents arise in several ways. Wind moves water along the surface of the ocean to form wind-driven currents. Other types of ocean currents are caused by differences in water temperature and salinity. In this experiment, you (the learner) will hypothesize the cause of ocean currents and then develop a model to explain the role of salinity and density in deep ocean currents.

**Materials:**

- 2 baby food jars (or 2 small, glass bottles)
- 2 index cards (preferably laminated)
- Table salt
- 2 Colors of food coloring (preferably red and blue)
- Plastic shoebox (the clear variety)
- 3 Maps - wind driven surface currents, sea surface temperatures, surface salinities

**Pre-Lab Questions:**

1) Look at the three maps provided. What is the relationship between sea surface temperature, salinity and the location of the warm and cold currents?

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2) Why might you suppose the salinity is greatest near the equator?

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3) Off of the eastern coast of South America, the salinity is higher than you might expect. Why do you suppose this is the case? (please reference your notes for chapter 15)

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4) Read through the lab. Make a prediction about the results.
Procedure:

1) Fill both jars with water. Fill one jar full of salt water solution and dye it blue (if a container of this liquid is not provided) and fill one jar full of plain water and dye it red. Fill your jars almost completely to the top, leave approximately 2 mm of space at the top of the bottle/jar.

2) Place a 3” x 5” index card on top of the salt water and carefully invert it. Place the salt water jar on top of the fresh water container and have someone carefully remove the card. Observe the results.

3) Use the second set of jars to repeat the experiment. This time, invert the fresh water jar over the salt water jar. Remove the card, and observe the results.

4) Take the jars from question #3, turn horizontally, remove the card and observe the results.

Discussion Questions:

1) Is salt water more dense or less dense than fresh water? Make sure that you explain your answer in terms of the results that you obtained from your experiment.

2) If evaporation causes surface water to be salty, where would you expect ocean water to be very dense?

3) Does this correspond to where deep ocean currents originate? If not, can you explain why?

4) Does the density of ocean water have any relationship to the temperature of ocean water? If so, what is the relationship?

5) Draw a side perspective of deep water ocean currents knowing what you know about how water moves with varying salinities.