Topic: Hurricane Prediction
Lesson Title: Hurricane Prediction Lab
POST VISIT LESSON – Convection
Grade Level: 6th-8th Grade
Science Domain: Earth Science

Connecting to the Next Generation Science Standards

MS-ESS2-C: THE ROLES OF WATER IN EARTH'S SURFACE PROCESSES ESS2.D: WEATHER AND CLIMATE	
Performance Expectations: Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	**Connections to Classroom Activity** **Students:** Students will use water of different temperatures and different salinity to model how salinity and temperature affect the ocean currents.
Science and Engineering Practices	
• Developing and using models • Planning and carrying out investigations	• Students will plan their investigation, conduct the investigation, collect the data, and finally make conclusions based on their data analysis.
Disciplinary Core Idea	
ESS2: Earth's Systems PS3: Energy Performance expectation: Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic	Students will develop and use a model to discover the properties of convection in water and then apply that knowledge to the ocean currents on Earth.

circulation that determine regional climates.	

Teacher Background Information

During the Infinity Science Center visit, students were exposed to many ways that our environment is monitored. One big concept that in Weather and Climate is that of convection. Convection in the atmosphere, water, and in the interior of Earth. It is important for students to see, first hand, the reactions and properties of hot vs cold water. In later units of study, the connection from convection in water to weather and climate will help students to understand how this complex process drives Earth's climate. It is also important for students to understand that convection happens in our atmosphere (a gas), in oceans (liquids), and in the mantle of Earth (solids). In this POST VISIT LESSON, students will be asked to design their own investigation using simple materials. This can be difficult for some students and can be adjusted to help scaffold learning where needed.

Statement of Learning Objective: ABCs – Audience, Behavior, Condition

I can design and make a model of how convection drives the ocean currents which drives weather on Earth.

Materials:

- tap water
- access to hot pot for heating water
- beakers
- food coloring
- Optional: salt for extending the lesson to include salinity
- measuring tools (graduated cylinders, scoops or teaspoons)
- Optional: digital scales
- Optional: large plastic tubs

Safety: Supervise students using a hot pot or make that a teacher led activity.

Adaptations/Accommodations for Exceptional Students:

Work with these students to make a plan. Help them design a data table. Review the question that is to be answered and the procedure until they are sure of the activity.

Literacy Connections:

- **Isaac's Storm: A Man, a Time, and the Deadliest Hurricane in History by Erik Larson**
- **Hurricanes by Paul Kupperberg**
- **Hurricane Katrina: Devastation on the Gulf Coast by Debra Miller**
- **Hurricane Force: Tracking America's Killer Storms by Joseph B. Treaster**
- **Storm Surge: The Science of Hurricanes by Don Nardo**

5E Instructional Process:

Engage:

Activity: Class Brainstorm: Where does the ocean water go? How does it get distributed on Earth?

- **Make a poster to record the ideas of the class about the question above.**

Guiding Questions for the class discussion:

1. **Does water from one ocean ever cycle through another ocean?**
2. **Why does water feel warm in some places and cold in others when you are swimming in a river or lake?**
3. **How does salt change how water behaves?**

Explore:

- Begin by telling students that they are going to design an experiment to determine how temperature affects the way that water moves.
- Give them a lab sheet and review the materials that are available to them.
- Let them know that this is a team lab and they must start by planning the inquiry.
- When they have a plan, they may come to the teacher for approval to begin. (See Lab ANSWER KEY for ideas to look for in their plans).
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Explain:

Students will make a diagram in their science notebooks to explain how cold and warm water affects the ocean currents. The diagram should be labeled and an explanation about the diagram should be under the diagram.

Evaluate:

1. Students should include how cold water is more dense and sinks and warmer water is less dense and rises. They should explain the concept of convection and relate that to ocean currents.