

## Ocean Literacy Principle #3

The ocean is a major influence on weather and climate.

Literacy Principle #3 Slideshow: Click [here](#) to view the slideshow containing all of the video links to each of the demonstrations for convection and the NOAA hurricane simulation.

### ***Ocean Sciences Sequence Curriculum for Grades 6–8: The Ocean–Atmosphere Connection and Climate Change***

<https://mare.lawrencehallofscience.org/>

<https://mare.lawrencehallofscience.org/curriculum/ocean-science-sequence>

#### **The Ocean as a Heat Reservoir**

Overview: A dramatic demonstration with balloons is used to review the concept that water is a heat reservoir. Students then use “active reading” to read, annotate, and discuss an article about the ocean as a heat reservoir. Students apply what they have learned to solve a mystery about the average temperatures in two cities.

Student learning is focused on the following key concept:

- The ocean covers 70% of Earth’s surface, and all this water has a huge impact on temperatures on Earth.

Students also learn:

- Average temperatures near the coast are moderated by the ocean.

#### **The Puzzling Case of the Daily Rains**

Overview: his session begins with a quick review of the idea that differences in density are responsible for the movement of both water and air. Then students are introduced to the puzzling tropical weather pattern of daily rains in Costa Rica. A demonstration of a cloud in a jar helps students understand evaporation and condensation in terms of water molecules and heat energy. Students apply this deeper understanding of the water cycle to the solution of the mystery and write explanations in their Investigation Notebooks.

This session introduces some of the interconnections between the ocean and atmosphere that will be explored in the rest of the unit.

Student learning is focused on the following key concepts:

- If enough heat energy is added to liquid water, some of the water molecules at the surface evaporate into the air as water vapor.
- If enough heat energy is taken away from water vapor, some of the water molecules condense into liquid water.
- Evaporation and condensation move heat energy around Earth. Without this, Earth would be much hotter in some places and much colder in others.

Students also learn:

- The water cycle is very complex.

- The atmosphere and ocean are connected.
- Both water and air are set in motion by differences in density.
- When water evaporates, heat energy moves from the ocean into the atmosphere in water vapor molecules.
- When water vapor cools and condenses, heat energy that was originally in the ocean is released into the atmosphere.
- Winds caused by differences in air density move heat energy (inside water vapor molecules) around the world.

[Simulation Activities](#) from the Lawrence Hall of science, University of California Berkeley including:

Heat Energy and Moving Molecules

Density of Liquids and Ocean Currents

Can Climate Change Affect Ocean Currents

The Carbon Cycle and Climate Change

Water Cycle in a Bottle:

[https://docs.google.com/document/d/1dFq-LQAWcn89mnotJY9v39LaqcMa9hh3KOP2Q\\_49ktA/edit?usp=sharing](https://docs.google.com/document/d/1dFq-LQAWcn89mnotJY9v39LaqcMa9hh3KOP2Q_49ktA/edit?usp=sharing)

This activity will allow students to visualize the water cycle, in particular evaporation and condensation. An extension of this activity would be to have students think about how this activity could be amended to represent the different seasons such as using 3 different jars, one containing water at room temperature and a third containing cold water. It is important to make a connection between the water in the jar to the ocean surface water temperature.

NOAA: Hurricane Simulation: <https://scijinks.gov/hurricane-simulation/>

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