

Materials and Preparation for Ocean Influences Climate: Modeling to Understand

Science notebooks and pencils for students

Water cycle physical models:

Option1: Water Cycle Model. Available from NASCO, <https://www.enasco.com/p/Water-Cycle-Model-Only%2BSA09171>. Ask for a discount if you're purchasing several

models. Also check [amazon.com](https://www.amazon.com) for a better price. Each model can cost \$50-\$90.

Ideally, you'll want 1 per table group of 4 students, plus 1 extra model (Figure ____). If this is not possible for your school's science budget, consider applying to NOAA Planet Stewards for a grant. (See Internet Resources.)

Option 2: Make your own model with two plastic boxes, or a box and a bag. Use a plastic box with lid – the kind you get from the grocery store with salad or spinach inside - for the main part of the model. Freeze water in a small plastic box with lid (like Ziploc's 1-cup size) for the cloud. Alternatively, use a sandwich size Ziploc bag with ice cubes for the cloud (Figure ____).

Option 3: Use plastic boxes (see Option 2) and have your students make a miniature world inside prior to the science lesson. Use clay to form the land, as it will withstand water. The land should cover about half of the box and should slope downward toward the ocean, which will be the part of the box with no clay (Figure ____).

Ice – enough to put under each cloud of the water cycle model. If you are making your own models, fill each small plastic box $\frac{1}{4}$ full of water and freeze ahead of time, or put 6 ice cubes into each sandwich size Ziploc bag to sit on the top of each model.

Warm tap water for the ocean for each Model A. The water should be “bathtub warm,” as warm as possible without the possibility of burning a child in the case of a spill. The warmer the water, the more evaporation.

Cold tap water for the ocean for Model B.

Measuring cup or a measured mark on the plastic models to ensure that each model has the same amount of water.

Masking tape to tape lids closed and a permanent marker to label each model A or B.

Small towels – 1 for each table group

Blue food coloring – optional, if you want to color the ocean. A few drops in each ocean.

Smartboard word splash: evaporation, condensation, precipitation, runoff, heat source

Prepare Materials

Ahead of time, label all models (but one) Model A, using a permanent marker and masking tape. Attach label to the side of each model where it can be seen easily. Label one model, Model B.

The day of the lesson, at least 10 minutes before students arrive in the classroom, have all models set up so the water will have had a chance to begin evaporating. Place each Model A at a table group with a towel. Place one Model B away from the others for the second part of the lesson.

Measure the same amount of warm water into the ocean of each Model A. Fill up to the coastline – the point where the ocean meets the land. If not using a model with a land component, fill the plastic box approximately $\frac{1}{3}$ full. Immediately place the lid on each model after adding the water. Tape closed. (Every time you open the lid, you lose some of the water that is evaporating.)

Place ice on the top of each box lid above the ocean. If using a purchased water cycle model, fill the indentation in the lid with ice and cover with the cloud. Otherwise, place frozen plastic box, or a ZipLoc bag of ice, on top of the lid over the ocean.

Name _____

Summative Assessment: Ocean Influences Climate

"I can't believe all this rain we're having! Again!" your friend from a different class exclaims. "On the way to school, I saw some streets completely flooded! We never used to get floods like this. What's going on!?!"

- 1) Explain to your friend why the climate in your area is changing.
 - a. Explain **why** the ocean is warming.
 - b. Explain **how** the warming ocean is causing more and heavier downpours in some areas.
- 2) On the back, draw a conceptual model to go with your explanation.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Draw a conceptual model (with labels and arrows) to help show your friend what you mean. Show **why** the ocean is warming, and **how** the warming ocean is creating heavier downpours and more downpours.

Grading Rubric	3	2	1
The written response explains why the ocean is warming, and how this is creating more and heavier downpours.	The explanation is complete and clear. It is written in a logical sequence and is easy to understand cause and effect.	The explanation is mostly complete, but is missing a component; and/or parts of it are unclear.	The explanation is missing two or more components; and/or it is very difficult to understand cause and effect.
The conceptual model shows why the ocean is warming, and how this is creating more and heavier downpours.	The model clearly and accurately shows all major causes and effects of why the ocean is warming and how it is creating more precipitation.	The model is basically clear and accurate, but may be missing a cause or effect of ocean warming and increased precipitation, or may be a bit confusing.	The model is missing two or more major causes or effects of ocean warming and increased precipitation. It would be difficult to understand correct cause and effect relationships here.
The conceptual model includes accurate pictures, labels and arrows.	Pictures, labels, and arrows on the model are accurate.	Pictures, labels, and arrows on the model are mostly accurate, but a few are missing, or may be incorrect.	Several of the pictures, labels, or arrows are not correct or are missing on the model.

