

# How Does Melting Ice Affect Sea Level?

## Preview

### Arctic Ice Loss

The area covered by sea ice in the Arctic Ocean has been shrinking. For many decades, more sea ice has melted away during summers than has reformed during winters. Projections show that the ocean around the North Pole could be ice-free during summers as early as the year 2030! How might the melting of this sea ice — an area larger than the country of India — affect the rest of the world?

The ice sheet on Greenland is also shrinking. Over the past 30 years, the total area of the Greenland ice sheet affected by summer melting has grown. What effect might the melting of Greenland's ice sheet have on the rest of the world?

### Antarctic Ice Loss

Antarctica has ice sheets on land, floating ice shelves, and sea ice surrounding it. How would the melting of these three different kinds of ice affect the rest of the world?

In this activity, you'll make two models that are identical except for one factor: one will have ice on "land" and the other will have ice in the "sea." You'll compare how melting ice affects each model.

## Prepare

### Make two identical pieces of ice

1. Put water into one of your small plastic containers so it is approximately  $\frac{1}{2}$  inch deep.
2. Pour the water into a measuring cup so you know exactly how much you have.
3. Pour that same volume of water into each of the two small plastic containers and put them in the freezer.

## Time

⌚ 1 hour

## Tools & Materials

- Transparent plastic food container, about 8" x 6" x 2" (2)
- Plastic food container, about 4" x 4" (2)
- Aquarium gravel (2 cups)
- Overhead transparency marker
- Measuring cup
- Labels (2)
- Colored markers
- + Large sheet of construction paper or poster board
- + Water

📖 Items found in this book

- Items included in the Flexhibit Kit, available from <http://www.andrill.org/flexhibit>.
- + Additional items

### Make two models of land and sea

1. Put a label on the outside of each of the two rectangular containers. Write "Ice on Land" on one container and "Ice in Water" on the other.
2. Pour 1 cup of gravel into each container. Tilt and shake each container gently so the gravel is piled in one end to form the "land."
3. Gently pour  $1\frac{1}{2}$  cups of water into each container. Make sure that the water doesn't cover the surface of the gravel.
4. In the Ice on Land container, place one of the pieces of ice on top of the gravel. No part of the ice should be in the water.
5. In the Ice in Water container, put the piece of ice in the water, so no part of it is supported by the gravel.
6. On the outside of each container, mark the water level, using an overhead-transparency marker.
7. Have a discussion with your team members: What do the different parts of the model represent in the real world? In the model, what is the significance of the water level?



### What about a beach resort?

On the "land" area of your model, use small objects to represent buildings, roads, and parking lots right along your "beach." What might happen to your resort as the ice melts in each model?

### Wait for the ice to melt

1. Put both containers in a place where they won't be disturbed while the ice melts. If it's necessary to leave them for more than a few hours, put lids on the containers to keep water from evaporating.
2. After both pieces of ice have melted, check and mark the water levels again.



**Ponder. . .**

Imagine a flat beach area with roads, houses, and shops just beyond the sand. Now imagine how rising sea levels would affect your mental picture. Describe what might happen in your scene year after year as sea levels rise and water covers more of the land.

Go back to the Preview section of this activity. Based on your results, answer the questions about sea ice, Greenland's ice sheet, and the three types of ice in Antarctica.

## Practice

### Got the Big Idea?

When ice that is floating in the ocean melts, sea level does not change. This applies to all floating ice, including sea ice and ice shelves. When ice that is on land melts and runs into the sea, additional water is being added to the ocean, so sea level rises.

### Get ready to present

Think of an introductory comment or question you can use to explain what the two models show.

As the ice will likely melt during the Flexhibit, you may want to make a chart with drawings or photographs showing how the two models look before and after the ice melts. Emphasize the observed change in water levels so you can draw a connection to changes in sea level. Another option would be to prepare an extra set of the models so that Flexhibit attendees can see what they look like before and after melting.

## Present

When you set up your station, be sure that visitors will be able to see the difference in water levels for the container with ice on land. Be ready to explain that the water level represents sea level for the whole world.

For visitors who are interested and engaged with the concept, you might share some of the estimates (below) of the amount of sea-level rise that would result from the melting of ice in different places.

Ice Sheet	Estimated Sea-Level Rise
Greenland	7 meters
West Antarctica	7 meters
East Antarctica	70 meters