

Ice Investigation

In this activity, you will carry out an investigation to find out ‘how melting polar ice caps affect sea levels?’ This is an important question for many coastal communities including here in Plymouth, UK.

Follow the instructions below and the Ocean Lesson video with the National Marine Aquarium to set-up the investigation, read on to find out the science behind the results.

INTRODUCTION:

Just like the ice in your drink melts on a summers day the same thing happens to ice in nature; if the temperature gets warm enough, ice melts. We are going to explore what happens to sea levels if the ice at the North Pole melts, or if the ice at the South Pole melts.

We want to find out if the melting ice at either the north pole or the south pole affects sea levels? It is a very important question for the millions of people who enjoy living along the coasts of the world.

Research Questions (challenge level increases):

- What makes solid ice turn into liquid water?
- What is the process called when solid ice turns into liquid water?
- Name an animal that lives in the north pole, and one that lives in the south pole?
- Can you think what might be causing the temperature of the Earth to rise?

YOU WILL NEED:

- Playdoh or modelling clay, or even homemade salt dough will work.
- Measuring jug.
- Two clear plastic or glass containers, bowls or cups will work.
- Coloured tape or marker pen.
- Tap water and ice cubes.

INSTRUCTIONS:

1. Place a lump of modelling clay in one container and flatten the top slightly. This container is a model of the South Pole, the clay is the continent of Antarctica. Leave some space between the sides of the dough and the wall of the container, so that you can add water later.
2. Place another lump of clay in the other container. This container is a model of the North Pole, the clay is the land surrounding the Arctic Ocean.
3. Measure 20ml tap water and pour into the South Pole container to be the Southern Ocean, repeat with the North Pole container, this is the Arctic Ocean.

4. Place two ice cubes on top of the dough in the South Pole container. Place two ice cubes in the ocean in the North Pole container. Mark the water level on the outside of each container with a pen or coloured tape.
5. Leave for an hour to allow the ice in your model to melt. Keep an eye on the ice cubes in the South Pole model to make sure they stay balanced on the dough, and that the water from the melted ice cubes can trickle off the dough into the 'ocean'.
6. Once the ice has completely melted, measure the water level in each container again and answer the questions below:
 - Has the water level changed in any of the containers?
 - Why do you think this is?
 - Is this happening in the real world?

WHAT HAPPENED?

The ice cubes on the dough are modelling the southern polar ice cap, and the cubes in the ocean are the floating northern polar ice cap. The ice in the North Pole is a floating ice sheet on the ocean, but the ice in the South Pole is mainly an ice sheet on top of the land continent of Antarctica. As floating ice melts in water, the space the ice took up is replaced by water, so the water level in the North Pole model does not increase as the ice cubes melt. But, when an ice sheet on land (such as in Antarctica or Greenland) melts, this does cause an increase in the water level. This is what you should have seen happening in the South Pole model, with an increase of around one centimetre, depending on the shape of the dough and the size of the ice cubes. It is thought that if all of the ice on the poles melted, sea levels would increase by at least 60m, due entirely to the ice on the South Pole melting!

CLEANUP:

If you would like to re-use the Playdoh or modelling clay, leave it to dry before replacing it in the pot. If you used marker pen on the containers and would like to remove the marks, try wiping them with a wet cloth or rubbing alcohol.

Further Research Questions:

- Why is the South Pole so much colder than the North Pole?
- How could rising sea levels affect the coasts of the country where you live?
- How could melting ice caps affect wildlife in the north and south pole?
- How could we try to stop the ice caps melting?