

How does melting **sea ice** affect sea levels?

Data shows us that sea levels are rising, but what exactly is causing this? Find out with a simple experiment – you might be surprised.

Arctic sea ice has an important role in maintaining the Earth's climate. Data shows that, over the years, Arctic sea ice has continued to decrease – but it's not contributing to rising sea levels. What does this mean? Experiment to find out. Let's experiment to find out.

Experiment 1: See ice melting!

For this experiment, we're setting up an ocean environment, and using ice cubes to represent the Arctic sea ice.

What you'll need:

- A clear glass or plastic container, like a baking dish or beaker
- A jug of water (room temperature)
- A tray of ice cubes
- A marker
- A ruler
- Pen and paper
- A small plastic cup or container

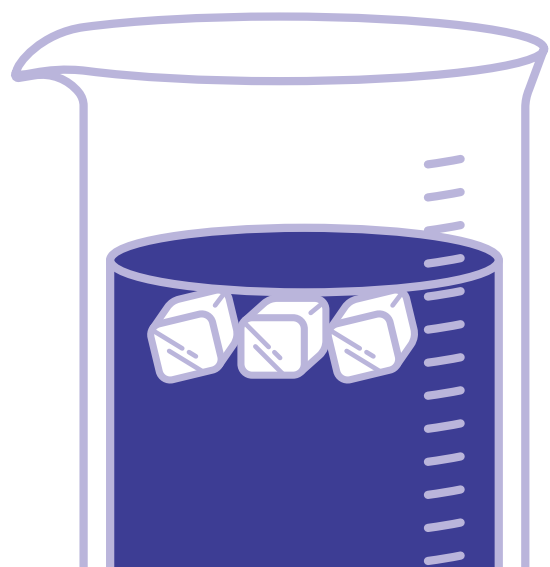
Optional: blue food colouring, rocks and plastic animals to bring your ocean environment to life.

Write down your prediction:

what do you think will happen as the ice cubes melt?

Getting started

1. Put enough water in your dish to fill it halfway.
2. Add a few ice cubes to the water. Remember, these are acting as the Arctic sea ice, so make sure they're floating and not touching the bottom of the dish.
3. Use your ruler to measure exactly how deep the water is and record it in the table on the following page.
4. You might also like to mark the depth on the side of your container - but check with your parents first!
5. Watch how the ice cubes change shape as they melt.
6. Measure the water level when they are melted to half their size.
7. When the ice cubes are fully melted, use the ruler to measure the final depth of the water.
8. Write this figure in the table on the following page. What do you notice?



Record your measurements here:

Starting water level with sea ice (ice blocks) (cm)	Water level with half melted sea ice (cm)	Water level with fully melted sea ice (cm)

What did you observe?

Can you explain the results?

We wanted to investigate how the status of sea ice doesn't change the sea level. Sea ice forms, grows, and melts only in the ocean. In this process, the sea water is simply shifting between a solid and liquid state. So, the overall volume of water doesn't change – only its state does.



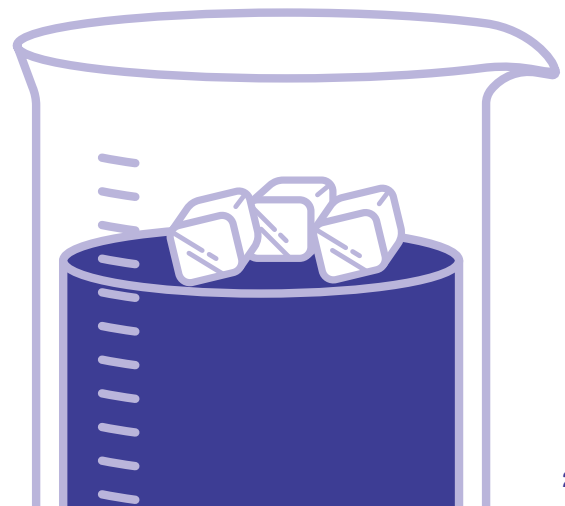
Experiment 2: Dive a little deeper!

If melting Arctic sea ice is not changing sea levels, then what is? Let's try another experiment to find out.

1. Save the water from the first experiment and continue to use the same dish.
2. Use plasticine or an upside-down bowl to create a land mass that sits in the water.
3. Use your ruler to measure exactly how deep the water is and write this down in the table below.
4. Place a number of ice cubes on top of your land. These now act as land ice!
5. Allow the ice cubes to melt. Watch what happens and record your observations below.
6. Measure the water level again when they are half-way melted.
7. When they are fully melted, use the ruler to measure the final depth of the water.
8. Write this figure in the table on the following page. What do you notice?

Record your prediction here:

what do you think will happen as the ice cubes melt?



Record your measurements here:

Starting water level with sea ice (ice blocks) (cm)	Water level with half melted sea ice (cm)	Water level with fully melted sea ice (cm)

What did you observe?

Can you explain the results?

Glaciers are an example of land ice. They are very large sheets of ice and snow, which exist on land all year long. They are found in the mountains of every continent except Australia.

As temperatures rise, glaciers melt faster than they accumulate new snow. And as this land ice melts, the water eventually runs into the ocean.



Experiment 3: Things are heating up

Let's keep experimenting to investigate one more factor that could be influencing changes in ocean levels – and this is temperature.

You will need a thermometer to do this experiment.

1. Put enough water in your dish to fill it halfway.
2. Use your ruler to measure exactly how deep the water is and record it in the table on the following page.
3. Use a hot water bottle or a heat pack to warm the water. You must have a grown up help you for this bit.
4. Use a thermometer to track the changing temperature of the water. Write the temperature in the table below and then measure the depth of the water at different temperatures.
5. What happens to the water?



Staying safe

Make sure you ask for help before heating up your water, and don't carry the hot water by yourself.



Record your measurements here:

	Starting conditions	Measurement 1	Measurement 2	Measurement 3
Water temperature (°C)				
Depth of Water (cm)				

What did you observe?

Can you explain the results?

What does it all mean?

Quick quiz: Think about ice

Consider where on Earth ice naturally occurs. Make a list of a few places in nature where you might find ice, and sort it into two categories: ice that is on land and ice that is in the sea.

Land ice	Sea ice	Not sure

Rising sea levels are one of the clearest signs of global warming. It's also one of the biggest problems that global warming is causing.

Using the results from your experiments, can you identify the two main causes of sea levels rising.

What did we see?

In the experiments, we saw that:

- The water level **increased** when the land ice melted into the water.
- The water level **increased** when the water temperature was higher.

What do these two things have in common?

The answer is HEAT.

As our planet becomes warmer, land ice melts and flows into the oceans. More water in the oceans makes sea levels higher.

And as water becomes warmer, it expands and increases in volume. This is called 'thermal expansion'.

And now we can answer our original question:

If melting sea ice is not changing sea levels, then what is?

It is because of rising global temperatures.

But *hold up!* If that's the answer, then why is melting Arctic sea ice so bad?

Arctic sea ice plays an important role in moderating global warming. Its bright surface reflects sunlight back into space to prevent the ocean from absorbing extra solar energy (which would raise temperatures even further). It also plays a role in the movement of ocean currents. And of course, sea ice is an important habitat for animals like the polar bear.