

# Polar Seas



Image Credit: Marjorie Teo, Unsplash

The seas surrounding the Arctic and Antarctica are some of the most productive and unique on the planet. As well as being home to some iconic animals, they are also vital to keep the climate stable.

## Ocean 'Conveyor Belt'

So you might be thinking, what on Earth does the ocean have to do with climate. Well, lots actually!

The ocean has a complex circulation system called the Global Ocean Conveyor. It moves water, salt, nutrients and heat

around the world. It is powered mostly by wind at the ocean surface, but deeper currents are driven by changes in water density (that basically means how 'heavy' the water is).

Salt water (like seawater) is heavier than freshwater, and cold water is heavier than warm water.

So, if the system is working well, the ocean is warmed by the sun near the Equator and is moved by winds and currents towards the Poles. There it cools, sinks, and moves back towards the Equator again.

Find out more in [this Ted-Ed video](#) about ocean circulation!

## Is this Affected by our Changing Climate?

Sadly, yes.

Melting land ice and increased rainfall – as consequences of climate change – have the potential to disrupt the oceans' chemical and physical properties, which will impact this complex circulation system.



## Polar 'Kitchen Science'

Set up this cool ocean circulation experiment using equipment you might have in your kitchen at home.

### You will need:

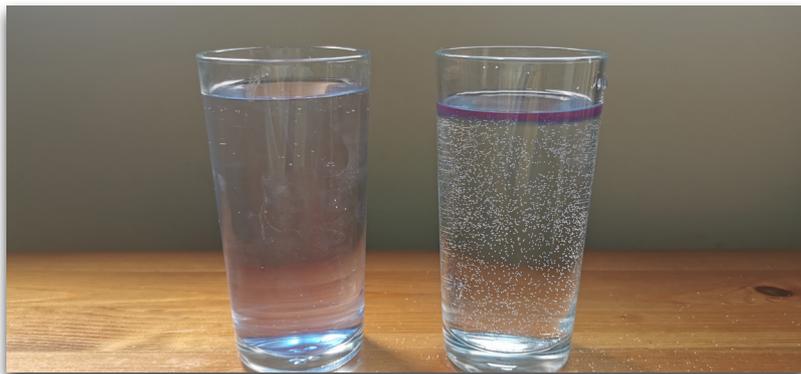
- 2 glasses of equal size (or containers that you can see through easily)
- Food colouring (any colour!)
- Ice cube tray



### Method:

1. Make some ice cubes using tap-water with a few drops of food colouring. Be very careful or get an adult to help when using the food colouring as it can stain.
2. Fill the 2 containers with tap-water.
3. Add salt to one of the containers. Roughly 7 teaspoons for every litre of water is ideal (for a normal size drinking glass, 2 teaspoons is enough).
4. Leave the containers to reach room temperature.
5. Place 1 of the ice cubes into each glass and observe what happens as it melts.

We used the 'time-lapse' function on our phone camera to capture the melting ice and see the results more clearly. Scientists often use photography and videography when carrying out experiments, so why not give it a go at home?



### You should notice 2 main things during this experiment:

In the freshwater container, you should be able to see currents of colder water from the ice cube moving towards the bottom of the container. Cold water is heavier than warm water.

In the saltwater container you should see that the freshwater from the ice cube is sitting on top of the warmer salt water in the container. Salt water is heavier than fresh water.

This is what happens when warmer temperatures melt the ice at the poles. The fresh water released from the ice sits near the ocean surface, preventing the sinking that helps drive the ocean conveyor.



## Meanwhile, In Scotland....:

Ocean circulation is the reason for Scotland's climate and, without it, the weather would be much colder and drier than we are used to.

A huge current called the Gulf Stream brings us warm water from central America that makes Scotland much warmer than other places at the same latitude as we are.

Try this- visit Google Maps and make sure you are seeing 'globe view' (when we draw maps flat, all of the countries change shape!). Zoom out and have a look at how near Scotland is to the Arctic circle. Look at the other countries that are as near as we are, do they have the same climate that we have?



This is a very complex system, and we only explore one part of it today. To find out more [click here!](#)

And to play a fun online game about ocean currents, [click here!](#)

