

# Convection

## Location

Ground floor, Our World exhibition

## In a nutshell

Watch heat as it's transferred through water. Convection is the process by which heat is transferred through a material by the movement of the material itself.



## What to do

Pressing the button turns on the light to make the movement easier to see and turning the dial controls the temperature of the heater. Watch the shadows of the convection currents to see the water molecules rise once heated, cool and fall back down.

## Time Required

KS1 & KS2 2 minutes per student.

## What's happening?

Imagine a pan of water on a cooker being heated. The water at the bottom heats first, as it does so the molecules move faster and the water expands becoming less dense than the surrounding water, so it rises. As it reaches the surface of the pan it cools, becomes denser and starts to sink. This cycle of up and down is called a convection current and it continues until all the water is heated. As well as this small scale example it also happens on a larger global scale.

Atmospheric currents occur when air at the equator receives more energy from the sun than at the higher latitudes. This hotter air rises up and travels towards the poles while cooler air rushes in to keep the balance. As the Earth turns, the air travelling towards the poles is deflected, this is the Coriolis Effect. As the cool air falls, a number of convection cells are formed around the globe, creating the Trade winds and Westerlies. On a slightly smaller scale different types of land will emit different amounts of heat - a concrete city will create strong thermals. This can be witnessed via birds circling in thermal currents or gliders using them to travel through the skies.

In the ocean the top 50-100 metres of oceans, known as surface water is affected by the movement of the air above. The air literally drags the top layer of water along with it. The water below also moves in convection currents, either due to heat or salt content. These affect the density of the water, producing thermohaline currents. A good example is the Gulf Stream; the warm water moves up towards the UK and gradually cools. By the time the water gets to Greenland it has cooled enough to sink down. Warmer water moves in to fill the gap and the current is moving.

Within the Earth the rock deeper inside the planet it is very hot, enough to be semi-liquid, a solid that flows. The closer the magma is to the heat at the centre, the less dense it becomes and the more it rises. Convection currents set up in the same way as in air or water. The difference in the rock cycle is that the heat comes from the centre of the Earth rather than the sun.

## Curriculum links

<b>Curriculum links</b>	
<b>KS1/2</b>	<p><b>English - Spoken language</b></p> <ul style="list-style-type: none"> <li>- give well-structured descriptions, explanations and narratives for different purposes, including for expressing feelings</li> <li>- use spoken language to develop understanding through speculating, hypothesising, imagining and exploring ideas</li> </ul> <p><b>English - Reading – comprehension</b></p> <ul style="list-style-type: none"> <li>- (Yr1) discussing word meanings, linking new meanings to those already known</li> <li>- (Yr2) discussing and clarifying the meanings of words, linking new meanings to known vocabulary</li> </ul>

## Relates to:

Workshops & Theme Days	Shows	Trails	Other exhibits
<ul style="list-style-type: none"> <li>• The Water Cycle (KS2)</li> <li>• System Earth day (KS2)</li> </ul>	<ul style="list-style-type: none"> <li>• Blue Marvel (Planetarium, all ages)</li> </ul>		<ul style="list-style-type: none"> <li>• Changing world</li> <li>• Heat cam</li> <li>• Water cycle</li> </ul>

