
HOW DOES THE OCEAN CIRCULATE? PART 3

In our Boredom Busters we did three basic experiments to look at what causes water movement in our oceans. The experiments covered thermohaline circulation and tides. Of course there are many more processes that influence the movement of our water such as wind, think how wind pushes water up the beach or the fact that our planet is rotating, this rotation help the water to move too by the Coriolis effect .

Today we will try and join everything together and explain why it is important.

We talked about the density layers in our ocean. Let's imagine sitting on a boat out in the ocean with about 2km of water underneath us. The water under us would not have all the same density. There would be layers. These layers we define as water masses. Water masses are water that has originated from a certain place and have a specific density e.g. Antarctic Bottom Water, Labrador Sea Water, Mediterranean Water. These water masses enter the Global Conveyor Belt also known as Thermohaline Circulation and are transported around the world's oceans. Let's go back to the boat and look down into the ocean. The water masses would be moving in different directions. It would look like a motorway junction that had a number of roads going in different directions at different levels (Figure 1).



FIGURE 1: DUBLIN MOTORWAY JUNCTION [HTTPS://WWW.TRIPSAVVY.COM/DUBLINS-M50-ROAD-TOLLS-1542998](https://www.tripsavvy.com/dublins-m50-road-tolls-1542998)

The following NOVA video shows this Global Conveyor belt, the importance of Antarctica and the Arctic in formation of deep water masses, and how the ocean regulates our climate. You can also see the little circles in some of the currents. These are called eddies and we have studied these in NUIG on a number of transatlantic cruises.

<https://www.pbslearningmedia.org/resource/nves.sci.earth.oceancirc/global-ocean-circulation/>

The water masses in the deep Atlantic can be seen in Figure 2. This simple drawing shows a slice through the Atlantic Ocean. The North label is the Arctic and the South label is the Antarctic. The equator would be in the middle of the figure. The arrows show you the direction the water masses are travelling e.g. North Atlantic Deep Water is travelling from the Arctic towards the Antarctic and

the Antarctic Bottom Water is going in the opposite direction. You can see what water masses sit above and below and remember this will be down to the density! Can you see Med. Water: that means water from the Mediterranean Sea. Water flows out of the Mediterranean and into the Atlantic. We often find this water when we are on Oceanography cruises off the coast of Ireland!

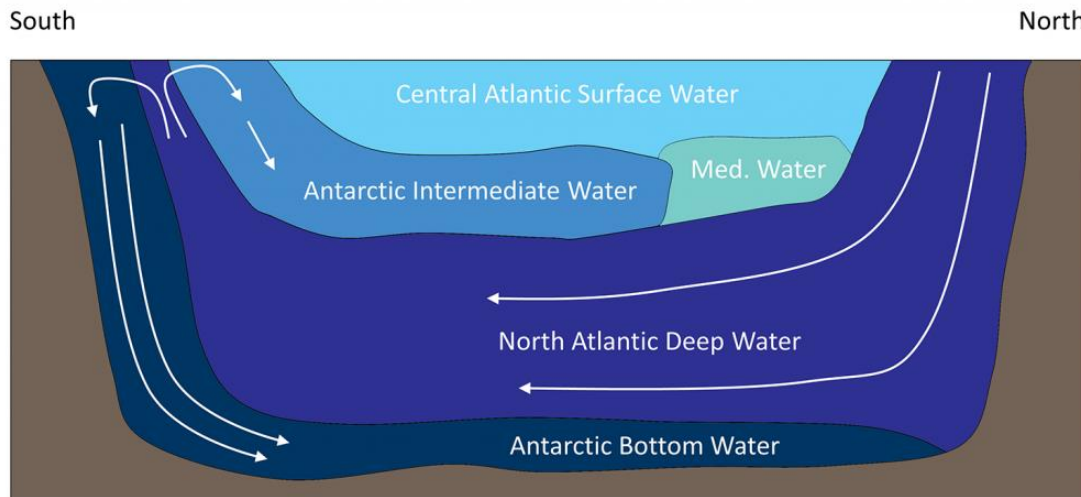


FIGURE 2: ATLANTIC WATER MASSES

<https://rwu.pressbooks.pub/webboceanography/chapter/9-8-thermo haline-circulation/>

WHY IS THIS IMPORTANT?

Our oceans are an extremely important part of our climate regulation. Leona Caldron (12 years old) explains why the climate is changing <https://www.youtube.com/watch?v=Sv7OHfpIRfU>. Our oceans have a large heat capacity and NASA shows this with a great balloon experiment <https://climatekids.nasa.gov/ocean/>. It is important that we study the ocean so that we understand it and learn how to protect it.

CREDITS

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