

Global Ocean Circulation Transcription

If you change the temperature and salinity of water, you change your density; you change how heavy your water is. That will influence your ocean circulation. We can look at this in a little more detail; there is a nice presentation here. This is a demonstration of how the density of water affects the flow. Lighter water tends to rise, while the heavier water tends to sink. This is illustrated in this example over here.

[Video] This is a simple demonstration of what happens when two fluids of different densities are allowed to come into contact with each other. On the left side we have yellow fluid which is freshwater at room temperature, on the right side is water of approximately 35 parts per thousand of salinity with blue dye, and a plastic divider between the two sections now. We're going to remove the plastic divider and see what happens.

The denser blue water quickly flows under the less dense yellow water. We get an internal wave sloshing back and forth. You can see the surface is calm. Internally between the two different densities we get a wave that sloshes back and forth, and we get a slight green layer where the two different salinities have mixed.

I think this should be enough of a demonstration. Additionally, we need to take into account that the ocean is heavily influenced by the rotation of the earth, which is not the case in this lab experiment. We're going to talk about that a little later, but generally the trait for freshwater and heat changes density. That's a really important concept which drives circulation not only on the horizontal plane, but also with depth.

A prominent example is the formation of North Atlantic deep water which fills big amounts of the world's ocean basins, especially the Atlantic. It's formed in the polar regions, especially in the Labrador Sea and the Nordic Seas, the Norwegian Sea and then the Greenland Sea. Only by losing an enormous amount of heat, and still carrying a lot of salt, so this water is able to sink to the deep ocean from these exclusive locations.