

# The Water Cycle Transcription

Of course we know that the oceans have 97% of the free water on the planet. That is vitally important to the water cycle. One of the points I like to emphasize is that the water cycle is mostly an oceanic and atmospheric phenomena. The land plays a relatively minor role, though of course it's very important to us.

I want to talk a little more about heat; we'll go up to the temperature ball here. We'll just look at this picture of the annual sea water temperature at the surface. Reds are very high temperatures. These are temperatures in degrees Centigrade. So the 30 degrees is over 80 degrees Fahrenheit. You see that the tropics are warm, and the high latitudes are cold.

That has a great consequence for the ocean, because the temperature of water tells us a lot about how dense it is. We know that cold water is denser than warm water. What we have is this warm water in the tropics that is actually floating on cold water that's flowed underneath from high latitudes.

Just to give you a little feel for how that varies with the seasons. Here are monthly averages of surface temperatures plotted on the globe. As the globe rotates you can see the migration of the warm water with the sun. So the warm water in the northern hemisphere summer goes north, and in the southern hemisphere summer the warm water goes south. That's just to give you a feel for how the seasonal forcing of the ocean temperature is occurring.

Let me now go to this slide which shows a vertical profile of temperature in the ocean. It is warm near the surface. It has a region down to maybe about a 1000 m. depending on where you are. Where the temperature drops pretty steeply we call that the thermocline, meaning a rapid change. The deep ocean is relatively uniform in temperature, and mostly less than 4 degrees Centigrade, so less than about 40 degrees Fahrenheit. That's the kind of picture that develops. As I mentioned earlier that cold water flows down from the high latitudes, and sits down underneath this warm water at the surface. Again, because of that density difference, heat makes the water expand, cold makes it contract.