Why Care About Ocean Salinity? Transcription

As in the other talks in this series, today I'm going to talk about salinity in the ocean. The title is skin to deep which means the skin is the surface of the ocean; the deep is everything below it. Why do we care about salinity and how does it get from the surface into the deep or wherever else it might go? Just to start off, anybody who has ever gone swimming at their favorite beach knows the ocean is salty. The question is how quantitative can we be about that.

Why do we care about salinity at all? Well salinity is interesting because it is a mirror of the global water cycle which we're going to talk about in a minute. In addition to that it influences the density of sea water just like temperature does. So it has some bearing on where the water actually goes.

So if you look at the first slide here, the *Global Water Reservoirs and Fluxes*, you can see that the numbers there, atmosphere, oceans, and land. The big numbers next to those titles are just the volume in some units of how much fresh water is in these places. So you can see the ocean as 1,400,000 in sum units, on land about 59,000, in the atmosphere only 16, and 97% of all the freshwater in the world is in the ocean. The land counts a little bit, the atmosphere doesn't count much at all, even though that 16 units in the atmosphere is certainly very important in its own way.

You can also see on these boxes how freshwater moves from one box to another. For the ocean it can leave by evaporation into the atmosphere. It can come back via precipitation from the atmosphere. It can also come in via rivers. Its evaporation and precipitation that is most of this. River runoff is important near the coast, but out in the middle of the large scale ocean we don't see very much of that of course.

The next one is a picture of how all this fits together. You have the land. At high latitudes you have ice which can either melt in the spring and release a lot of freshwater into the ocean, or freeze in the fall and take up freshwater from the ocean which leaves salt behind, and makes the ocean saltier in the fall and fresher in the spring. Then you have all of this water being transferred from the ocean to the atmosphere via evaporation.

It's kind of interesting that if you looked in the ocean and the atmosphere there's more water contained in the upper one meter—that's the upper 3 feet of ocean—than there is in the entire atmosphere above that piece of water. There's not very much water in the atmosphere of course, but the humidity that is there is important to the atmospheric circulation and the whole water cycle.

Let's go to the next one which is another kind of diagram of the same idea. This one is a little bit misleading because you can see down there in the lower right corner, that's the ocean. So you can see here again the arrows noting evaporation off of the ocean, and precipitation on ocean and the land, and then the runoff.

But this figure was undoubtedly put together by somebody who doesn't study the ocean, because in fact that little piece of ocean down there on the right side is about 70% of the surface of the

earth, whereas this figure would say the land is 90% of this diagram, but it's actually completely the other way around. It's the ocean that is 70% of the surface of the earth. The way the ocean and the atmosphere interact in the water cycle above the ocean is considerably different than it might be over the land. That's kind of a little bit of what we're going to talk about today.