

Ocean Salinity Differences: Surface vs. Deep Transcription

I might just say something here about these floats with the extra near surface sensors, the kinds of things we can learn from those. So we saw this slide before. This is temperature and salinity as a function of depth, and this is from an Argo float in the area of the SPURS experiment. Salinity is high at the surface and decreases as you go down. Temperature of course is high at the sea surface and decreases as you go down. This is from skin to deep. This is kind of the whole thing from skin to deep.

But if you go to the next one, let's say something about the skin. This is some things measured in the SPURS area from a float that was equipped with our auxiliary SST sensor. Here what we've done with this one, in the high resolution part near the surface, we just compared the measurements over a year at 15 meters depth. That's 45 feet versus the temperature right at the surface which is the same for salinity. You can see on the left here all of these profiles basically go that there's not a whole lot of difference between what happens at 15 meters and what you see all the way up to a depth of 1 m.

But suddenly you see between 1m. and the sea surface the temperature really doesn't increase as to what it is at 15 m. The wind does a good job here of mixing up the upper 15 m. of the ocean in this area; it's just as if you were stirring up a cup of coffee. But right at the surface there is a transfer of the properties between the atmosphere and the ocean, and a very thin layer where the temperature is warmer by several degrees up there, and that's important. The temperature in the large scale you'll remember is warmer at the sea surface, colder as you go deep.

How does that temperature, that heat, get in? Well here's how it's getting in; it's getting in in the upper 1 m. or so. If you look at salinity on the other side here you see something kind of similar. That salinity between 15 m. and all the way up doesn't change very much over the course of all these profiles over a year. But again it's in the upper 1 m. or so where you see these changes, and generally the upper waters are fresher when you see those changes.

Now why is it? That freshness is indicative of rainfall events. Most of the time we don't have rain. You would just see no change between 15 m. and the sea surface, but there are enough events you can see here when the salinity is lower by as much as a whole salinity unit. All of those events are associated with rainfall. Of course we chose the SPURS area because it is an area of big evaporation. It's a little funny maybe that all of the signals are in rainfall. But evaporation is a little different than rainfall because there's no such thing as an evaporation event. It's something that happens slowly but constantly, and it's not easy to see events, whereas the freshening here really is events. Storms come along, it rains, then the surface ocean gets fresher, and the storms move away. But there's no analog with evaporation; it's something that happens slowly but much more constantly.