What Are Ocean Deserts? Transcription

I'm going to take you on a slightly different tangent here, and look at global chlorophyll in the ocean instead of maps of salinity. We're able to look at visible bands to look at the changing color of the ocean which tells us something about the plants growing in the ocean. So these greener areas are higher productivity. You see redder patches where it's very high. Also overlaid here is the changing vegetation index on the continents. You can see—if you watch this a few times—the seasons changing as we go through the greening up and the browning down as the seasons change.

Well, there's seasonal changes too in the northern hemisphere spring, there's the big bloom in the ocean, and so on. We know from these maps that we have for the last 10 years, we can see these desert regions in the ocean, the blue areas, and the boundary of the green areas of the continent correspond kind of to the green areas of the ocean. The Sahara Desert has a counterpart in the Atlantic. Well, the high salinities are out there in those deserts as well.

Where there's a lot of evaporation and little precipitation, there is higher salinity. You can see this from all of the historical data by looking at our average sea surface salinity map on the right, and against our estimates of the difference between evaporation and precipitation in the Atlantic in meters per year. There is an excess of evaporation in areas of low latitude here from 12 to 24 north. They corresponds generally to the areas of high salinity, but you can see also this correspondence between the brown on the continents and the high salinity, and where the zero line is for evaporation minus precipitation is also the boundary between green and brown on the continent. All of this fits together in the grand picture of how things work.

We know about these areas of high salinity in all the subtropical oceans. I'll show you that in the next picture. If you look at the whole globe and look at the average surface salinity, you see that the Atlantic is saltier than the Pacific, but there are high salinity regions in the subtropics of each of the ocean basins. These are the desert regions where there is a lot of evaporation. There are also the blue areas where there is higher precipitation, more precipitation than evaporation, and in the tropics and in the Intertropical Convergence Zone and in the high latitudes.

People have taken all of the salinity data at the surface that is available for the last 15 years and looked at trends in salinity. It's really fantastic results, and kind of expected or maybe it is unexpected, is all these salty regions—the red areas in the previous map—are getting saltier, and the fresher regions are getting fresher. This is kind of the signature of the drier places getting drier and the wetter places getting wetter. That's the result that we would expect if we saw an acceleration of the water cycle as if the atmosphere is getting warmer, holding more moisture, and is able to precipitate more in the wet areas, and it's drying out in the dry areas. This seems like a very conclusive result of an impact of global warming. Our idea is to really nail that by going out into the Atlantic and studying the salinity variations there to prove that it's not from oceanographic conditions, that this trend is happening.