Natural Variability in Ocean Salinity Transcription

Here, this looks at natural variability on various time scales. I'm just going to open one here, which is the year-to-year time scale, and just show you some pictures. I'll show you a picture of El-Nino. This is kind of a canonical picture of what the Pacific Ocean does during an El Nino. This is a schematic. Here is Australia and New Guinea on the left hand side, South America on the right hand side; this is the tropical Pacific Ocean. The trade winds generally blow from the east to the west, and they push cold water across the Pacific. The water in the western Pacific Ocean actually stays quite warm.

When an El Nino occurs, that warm water shifts back towards the east, and storms and rain associated with that warm water also shift towards the east. So the rainfall patterns change dramatically in the Pacific Ocean during an El Nino, and that changes where the water falls on the sea surface. That changes the salinity of the surface. That influences the circulation at the surface, which is part of the whole dynamic of the way El Nino progresses. It usually lasts about a year, and then it fades away.

The salinity data that we'll collect from Aquarius will be important to apply in studying the dynamics of El Nino, and help us to improve our forecasts, and better predict when an El Nino is going to start and how intense it's likely to be, and so on and so forth. There's a very fine interaction in the amount of heat storage in the upper ocean, and the temperature of the sea water, and how much rainfall you are getting. Aquarius data will help us understand those dynamics a lot.

To wrap up here, the Aquarius measurement of ocean salinity is really a pioneering measurement. We'll be able to obtain global maps of the ocean salinity every seven days, every week, and we'll average that data over monthly time scales so we can look at the seasonal to interannual variability, and really understand how that's coupled with changes in the atmosphere, and things that are changing with ocean circulation.

Now, we actually already have pretty good rainfall estimates from satellites, so we will be able to compare our observations of salinity with those rainfall estimates from other satellites. We also have a very good idea of ocean surface circulation from our satellite altimetry and our ocean vector winds program. So we will be able to understand more about relations between changes in ocean salinity and changes in the ocean circulation. We also have sea surface temperature measurements from various satellites. We got a whole bunch of these pieces all there. The thing we have been missing is the ocean salinity. So that's the final piece of the puzzle that we can put together by flying this Aquarius mission and making these measurements.