Aquarius First Light Data Transcription

First lets go to the Aquarius "First Light" image. We call this the "First Light" image because this is the first image we published after the first 2 ½ weeks of data were collected. When we first turned the instrument on in late August we found the pre-launch calibrations were off by a significant amount, but we were very quickly able to use the surface data like Yi was just showing you and some ocean modelling data to quickly adjust the calibration of the instrument onboard and our ground processing algorithms.

As soon as we made those adjustments and mapped out the salinity, and we got an image like this. We knew we were on the right track, that Aquarius was working very well, and it was tracking the major patterns of ocean salinity. So I want to describe a few key features that we see in this "First Light" image. I'll show you some subsequent data later on in the presentation.

First of all what you see right in the center is the red color regions. These are false color images with the brighter red colors represent higher salinities, and the bluer greener colors represent lower salinities. So right there in the North Atlantic Ocean between Florida and the west coast of Africa we see the highest salinities in the open ocean. Those salinities are generally around 37 to 37½ parts per thousand.

And we see something similar in the South Atlantic Ocean. Again if you remember that evaporation precipitation map I showed you a little while ago, these are the areas that are dominated by evaporation. Very little rain falls in these areas. These are the arid regions of the climate system on the planet. This is where all the deserts are on the land, so this is where you would expect to find the highest salinities, and in fact we do.

If you look over at the Pacific Ocean you'll see in the north and south Pacific there are areas of high salinity as well, but you see the overall pattern of the Pacific Ocean is that this salinity is lower on average than it is in the Atlantic Ocean. We have higher salinities in the subtropics just as we do in the Atlantic, but the polar regions and the tropical regions of salinity is quite a bit less.

We know this from historical data. The saltiness of the Pacific Ocean is less than the saltiness of the Atlantic Ocean. There's a reason for that. We discussed this a little bit last week. That is on average the Atlantic Ocean loses more to evaporation to the atmosphere than it gets back in rainfall and river runoff. The opposite is true for the Pacific. The Pacific Ocean gets more rainfall and more river runoff than it loses in evaporation.

So basically the atmosphere is sort of like a conveyor belt. It takes water out of the Atlantic Ocean, carries it across the continent, actually mostly across the Central American subcontinent, and then it falls as rainfall on the Pacific Ocean. These interactions between the ocean and the atmosphere are very important for governing our climate system.

A couple of other things that you'll want to note in this image are that we see some really important details that we didn't expect to find. If you'll bring your pointer over the region off the

northwest corner of South America there you'll see some blue covered regions; those are very low salinity waters. In the data we were showing you from the World Ocean Atlas that Yi was discussing a few minutes ago, you didn't really see this structure at all. With Aquarius data this is revealed quite clearly.

We can show you a more close-up view of this if you want to go to the next level here. We're going to blow up this area and show it to you in more detail. The Amazon River empties into the Atlantic Ocean right where that lower arrow is. As you know this is one of the largest watersheds in the entire world. To the north and west of it is the Orinoco River. You can clearly see the plumes of freshwater from both of these rivers as they flow into the Atlantic Ocean and merge. They get caught up in the North Atlantic Countercurrent that flows from west to east, so you can see it moving its way across the Atlantic Ocean there in that low salinity region. This also coincides with the area where there is the most rainfall in the Atlantic. The combination of the river runoff and the rainfall makes this one of the lowest salinity areas that we know of.

There's a similar process going on in the Northern Indian Ocean, so if you want to go over to that display, we'll look at the contrast between the Arabian Sea and the Bay of Bengal. We're looking at the North Indian Ocean here. This area called the Arabian Sea is between Saudi Arabia and India and off the Horn of Africa, and you'll notice that the salinity there is quite high. This is an arid region. There is very little runoff or rainfall in this area and the salinity is quite high.

Just to the east of that over on the other side of the Indian subcontinent there's quite a bit of rainfall from the monsoons and also from the major rivers that run into the Bay of Bengal from India and the Himalayan Mountains, and the Ganges River for example. Those all act to dilute the waters of the surface. So we see in this small region of the ocean this strong contrast between low salinity and high salinity that we see in the larger structures of the open ocean. This kind of detail you couldn't see with much clarity with the historical data because the sampling there is so sparse. With Aquarius we're getting to see much more detail with this sort of thing.