KCTS Pledge Night Break 3_ Transcription

00:00 **Host:** You have a satellite of your own. We were talking about it last break. It is called Aquarius. So Aquarius has joined the family of NASA satellites.

00:07 **Dr. Lagerloef:** Right. As you remember, the image we showed at the beginning of the program, this one here that shows the constellation of NASA missions. On the very upper right-hand corner you can see Aquarius on the screen. It's the very same one that we just showed you at the last break. It was launched two years ago in 2011. We've been collecting data since late August 2011. When we get to this August we will have completed two full years of data. That means we will have collected two seasonal cycles. We'll be able to watch how the ocean salinity changes as the rainfall patterns shift with the seasons over the ocean. The key science objective for making this measurement from space—people may wonder why we want to make this measurement–is to understand the connection, the linkage between changes in the global water cycle. That means rainfall patterns, evaporation patterns, floods, droughts, river runoff, melting ice, all of those things where waters around the planet are shifting. Most of that flux of water is in and out of the ocean between the ocean and the atmosphere. About 80% of the global water cycle is just water going from the atmosphere to the ocean in terms of evaporation and rainfall. That changes the salinity at the surface. We're measuring salinity constantly. We're relating that to changes in rainfall that we can see from other satellites, and changes in the sea ice and so forth. Then where the salinity changes the density of sea water, that influences ocean circulation. That feeds back onto the atmosphere, so we have a coupled system. We've never been able to make this measurement to see how that coupling processes work until we had this salinity measurement.

01:49 **Host:** Is there a length of time that you will need Aquarius to collect this data to see a picture? Is there a length of service here that you are looking at?

01:08 **Dr. Lagerloef:** Yeah. There really is. We designed this mission to gather data for at least three years. That doesn't mean it stops in three years. We have to go for at least three years. That allows us to get three annual cycles so we can see the same changes and seasons. We can measure the interannual variability like El Nino and La Nina. We'll see one side or the other of that during the lifetime of this mission. That sets up the baseline for longer term measurements. Now, if we survive during those first three years, we'll just keep on going. NASA will continue to fund us. We'll have to write a proposal every two years or so. As they keep funding us we'll keep taking measurements. This satellite can go for 10 or 12 years.

02:44 **Host:** What do you look for everyday? What is the data that you look at? What does it look like? You're measuring salinity, you're looking for patterns.

02:54 **Dr. Lagerloef:** First of all, the satellite makes about 14 orbits a day. So we don't get to see the whole earth in one day. It takes 7 days for the satellite to map the whole globe. What we do is we look at the data every day. We monitor the quality of the data. If there are any glitches we immediately pay attention to those. What I want to turn your attention to here is this first map. We call

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this our first light image, what you are seeing on the screen here. This we published just a few weeks after we turned on the sensor. The team, myself, and everyone that has been involved in this project were just so amazed at the quality of the data that we see here. It's even better now that we've had a lot of time to work through the data and improve the calibration and so forth. This astonished us in a number of ways. One of the first things you see in the middle of this picture is this zone of water in the ocean that is colored purple right off the Amazon River. We were just amazed to see this level of detail in the picture. What you see here is a change in color between the saltiest water and the least salty water. The reddest colors are about 3.7 % or 37 parts per thousand salinity. The blue and purple colors are down around 32. So you're seeing the outflow of the Amazon here.

04:13 **Host:** You see a little outflow of the Columbia. Maybe.

04:16 **Dr. Lagerloef:** That's the Orinoco River that you see further to the northwest there. If you look closely you'll see a little appendix of blue off the Florida panhandle. A hurricane had just recently gone through the Gulf of Mexico and left that residue of fresh water behind. We were astonished at the amount of detail that we were getting in this data. It was really amazing surprise.

04:36 **Host:** I want to remind viewers. You can monitor Aquarius, and the mission, and find out so much more about this satellite, that you are the leader of by going to http://aquarius.nasa.gov/ . This is really fascinating. Are the oceans more saline? If so, what does that mean?

04:55 **Dr. Lagerloef:** The main purpose of Aquarius is to look at the coupling--the interaction between the ocean and the global water cycle. What we are looking at now in trends and historical data, that we're starting to see this too in Aquarius after two years of data, is that the saltier parts of the ocean—that red area you saw in the North Atlantic for example—is getting saltier over time. Slightly. But it's getting saltier. And the blue colored portions you saw on that map—the fresher regions of the ocean—are getting fresher. This is an indication that the global water cycle with global warming is actually spinning up and happening more rapidly. So we have more evaporation in one part of the ocean, and more precipitation rainfall in another part of the ocean. We're seeing that signature now in the ocean salinity.