Brazil Oceans:
Using NASA's Aquarius Sensor to Monitor Salinity Levels in the Amazon Delta

by

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SHOT- Video: KSC-11-S-00049. Kennedy Space Center Media Archives

WOMAN NARRATOR

Five, Four, Three, Two, One. We have ignition, and lift off of Aquarius and the Sac-D observatory.

AUDIO- *Kopeika* by Et. Free Music Archive

TREVER (Voice Over)

The Aquarius sensor was launched on June 10th of 2011 onboard the Argentinian Sac-D satellite. NASA and Argentina's National Commission on Space Activities partnered for this monumental scientific endeavor. This entry marks the first time humans have been able to measure sea-surface salinity from space.

INT. SCENE. DAY. BLDG 1216, Media Room
TREVER SITTING AT INTERVIEW TABLE IN SUIT
SHOT- MEDIUM

TREVER

Hello, my name is Trever Johnson and I am a student researcher with NASA DEVELOP National Program, and I will be your host for this presentation.

INT. SCENE. DAY. BLDG 1216, Media Room
TREVER AND CHRISTINA AT INTERVIEW TABLE IN SUITS WITH NASA AND DEVELOP LOGOS IN THE BACKGROUND ON SCREEN
SHOT- FULL

TREVER

With me this morning, I have Christina Welch, who is a fellow researcher, who is going to give us a demonstration of the Aquarius Sensor's accuracy.

INT. SCENE. DAY. BLDG 1216, Media Room
CHRISTINA SITTING AT INTERVIEW TABLE IN SUIT
SHOT- MEDIUM

CHRISTINA

Good morning, Trevor.

TREVER

Good morning.

CHRISTINA

Even though Aquarius is orbiting four hundred miles above the surface of the Earth, it has an accuracy of .2 psu, which is the equivalent of a pinch of salt in a gallon of water.

SHOT- Video: Conceptual visualization of the Aquarius/SAC-D. Aquarius Mission Website

CHRISTINA (VOICE OVER)

Aquarius is composed of three radiometers, which align to form a two hundred and forty two mile swath. The sensor travels at a polar orbit to complete global coverage every seven days. And a scatterometer is built in to account for ocean surface roughness. At present time, we are addressing the limitation of Aquarius with regards to coastline contamination.

INT. SCENE. DAY. BLDG 1216, Media Room
TREVER AND LAUREN AT INTERVIEW TABLE IN SUITS WITH NASA AND DEVELOP LOGOS IN THE BACKGROUND ON SCREEN
SHOT- FULL

TREVER

With me today, I have my colleague, Lauren, who is going to delve more into that.

INT. SCENE. DAY. BLDG 1216, Media Room
LAUREN SITTING AT INTERVIEW TABLE IN SUIT
SHOT- MEDIUM

LAUREN

Thanks, Trever. Today I brought you a graphic so you can better understand the Aquarius sensor.

SHOT(S) - Screenshot of JPL PO.DAAC, Aquarius Map Prezi, Freshwater Plume Animation

LAUREN (Voice Over)

The data shown in the map shows the final two weeks in August of 2011 of the first data ever collected by the sensor. The highlighted area is the freshwater plume extending from the mouth of the Amazon River. The Amazon River is the largest fluvial output in the world, which ejects large amounts of freshwater into the Atlantic Ocean. At two hundred centimeters per second, this prevents the immediate mixing of fresh and saltwater. This low salinity phenomenon is perfect for studying the capabilities of Aquarius in hopes of calibrating the sensor for coastline application.

INT. SCENE. DAY. BLDG 1216, Media Room
TREVER AND CHASE AT INTERVIEW TABLE IN SUITS WITH NASA AND DEVELOP LOGOS IN THE BACKGROUND ON SCREEN
SHOT- FULL

Audio- *Brazilian wax on wax off* by Krackatoa. Free Music Archive

TREVER

To get these really crisp beautiful images with all these colors takes a lot of data acquisition and a lot of data crunching. Here with me I have my colleague Chase Mueller who's going to really delve into that and get into the nitty gritty of how we got these images.

INT. SCENE. DAY. BLDG 1216, Media Room
CHASE SITTING AT INTERVIEW TABLE IN SUIT
SHOT- MEDIUM

CHASE

Alright, thanks Trever.

SHOT(S)- Screenshot of HDF View, Screenshot of USGS Global Visualization Viewer, Screenshot of TSS Model from ArcGIS, Screenshot of ArcMap

CHASE

So, we can open the downloaded data in a program called HDF View. This provides us with salinity and coordinate information in separate files that we can

then merge using Excel. Once that is complete the data can then be displayed in ArcGIS as shown here. Since we also want to test salinity values with respect to total suspended sediment we also had to download the MODIS red band for the region using the USGS Global Visualization Viewer. With this model, from a previous DEVELOP project, we were able to remove all cloud cover and convert the red band radiance values to total suspended sediment.

INT. SCENE. DAY. BLDG 1216, Media Room
TREVER AND JAKEB AT INTERVIEW TABLE IN SUITS WITH NASA AND DEVELOP LOGOS IN THE BACKGROUND ON SCREEN
SHOT- FULL

TREVER

So why study sea surface salinity? What's the importance of that? With me today I have my fellow researcher, Jake Prickett, who's going to go into depth as to why we would need to be looking at this.

INT. SCENE. DAY. BLDG 1216, Media Room
JAKEB SITTING AT INTERVIEW TABLE IN SUIT
SHOT- MEDIUM

JAKEB

That's right Trever. In a world filled with disasters such as earthquakes and tornados, it may seem frivolous to launch a satellite to measure sea surface salinity. The Aquarius sensor technology can be used to access areas once logistically impossible to retrieve data. Such an accurate coastal salinity measurement is needed for both the local and global communities. With this knowledge, scientists can work hand in hand with policy makers to create sound regulations for the Amazonian region as well as global areas.

INT. SCENE. DAY. BLDG 1216, Media Room

TREVER AND JEANETTE AT INTERVIEW TABLE IN SUITS WITH NASA AND DEVELOP LOGOS IN THE BACKGROUND ON SCREEN
SHOT- FULL

Audio- Rattle Your Cage by Krakatoa. Free Music Archives.

TREVER
Jeanette, question, what have we really found? What kind of results have we been looking at?

INT. SCENE. DAY. BLDG 1216, Media Room
JEANETTE SITTING AT INTERVIEW TABLE IN SUIT
SHOT- MEDIUM

SHOT-Inset Map from ArcGlobe

JEANETTE
Well, Trever, so far we have found a positive visual correlation between sea surface salinity and total suspended sediment. A statistical analysis will enable future studies to validate our hypothesis that sea surface salinity and total suspended sediment are correlated. Should this correlation be confirmed, it is our hope that this method will allow for accurate coastal measurements worldwide.

INT. SCENE. DAY. BLDG 1216, Media Room
TREVER AND ASHLEY AT INTERVIEW TABLE IN SUITS WITH NASA AND DEVELOP LOGOS IN THE BACKGROUND ON SCREEN
SHOT- FULL

TREVER
So Ashley, we’ve looked at all the processes that have gone into this project, the imaging, the results, the data acquisition, what’s next? What’s our take away?

INT. SCENE. DAY. BLDG 1216, Media Room
ASHLEY SITTING AT INTERVIEW TABLE IN SUIT
SHOT- MEDIUM

SHOT- Inset Image of INPA Logo

ASHLEY

Well Trever, DEVELOP focuses on the end user, as an end result of this project, we will be creating a hard copy to hand over to our end users. Brazil's National Institute for Amazonian Research has expressed interest in this tutorial for monitoring salinity data to benefit their local fisheries and aquaculture. Overall, this methodology can be used in any region – specifically with future DEVELOP projects in mind.

INT. SCENE. DAY. BLDG 1216, Media Room
TREVER AND ASHLEY AT INTERVIEW TABLE IN SUITS WITH NASA AND DEVELOP LOGOS IN THE BACKGROUND ON SCREEN
SHOT- FULL

TREVER

Thank you Ashley, and on behalf of the Brazil Oceans team, we'd like to thank the NASA DEVELOP National Program and the Langley Research Center for their opportunity and support during this internship. And we'd like to thank you the viewer for your time.

SHOT- Acknowledgements