

**A Remotely Sensed Assessment of the Modern Mississippi River
Delta Lobe Complex:**

Short Term Evolution and Response to Tropical Cyclones

by

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SHOT - CLIP OF STENNIS MONUMENT

SHOT - MARSHLAND STOCK FOOTAGE

JASON:

The Spring of 2012 here at Stennis Space Center, we have spent our time studying wetlands such as these where the Mississippi River empties into the Gulf of Mexico, and we will be talking a little bit more about the importance of these wetlands as we get into our video.

EXT. SCENE DAY - IN FRONT OF SWAMP AT BAYOU SAUVAGE NATIONAL WILDLIFE REFUGE

CAPTIONS NEXT TO EACH TEAM MEMBER GIVE NAME, UNIVERSITY AFFILIATION, AND MAJOR

CANDIS:

Hi! My name is Candis Mallett and I am a recent graduate from the University of Southern Mississippi: Gulf Park campus; I received my Bachelor's of Science in Geography and I had the privilege of leading this team this term.

CODY:

I'm Cody Dockens. I am a junior at the University of New Orleans, majoring in Environmental Studies. This is my second term with DEVELOP.

TRAVIS:

Hi, I'm Travis Brannen. I am a mechanical engineering student at the University of New Orleans, and this is my second term with DEVELOP.

JASON:

My name is Jason Jones. I have a Bachelor's of Science in Geography with an emphasis in Remote Sensing and a minor in computer science from the University of Southern Mississippi.

SHOT - EARTH ZOOM TO BIRDFOOT DELTA

SHOT - DELTA FORMATION FOOTAGE

SHOT - MARSH FOOTAGE

CANDIS:

The Louisiana Bird's Foot Delta is located in Plaquemines Parish, in southern Louisiana, at the mouth of the Mississippi River. A delta is a landscape that forms at the mouth of any river by sediment deposition of fine grains and sediments, and the Mississippi River is no exception. The Bird's Foot delta began forming approximately 1,000 years ago and is the seventh sustainable delta the Mississippi River has seen throughout the past 7,000 years.

SHOT - SHIPS, FISHING BOATS

CODY:

The importance of the Bird's Foot Delta comes from it being the only navigable entry-way into the Mississippi River, through which ships can distribute products and goods throughout the Mississippi waterway. The Mississippi River delta has been home to people over thousands of years, who make their life along the water in different types of fisheries such as shrimping, fishing, crabbing or oystering.

EXT. SCENE DAY - IN FRONT OF SWAMP AT BAYOU SAUVAGE NATIONAL WILDLIFE REFUGE

BRANDIE:

My name is Brandie Mitchell, and I am the student director for NASA DEVELOP at Stennis Space Center. Being a lifelong resident

of coastal Louisiana, I have personally felt the effects of wetland loss in coastal Louisiana. This is my backyard, and it serves as a first line of defense from hurricanes and tropical storms. Without marshes and swamps such as these, my home is at risk.

EXT. SCENE DAY - IN FRONT OF SWAMP AT BAYOU SAUVAGE NATIONAL WILDLIFE REFUGE LOCATION 2

SHOT - IMAGES OF LEVEE CONSTRUCTION

TRAVIS:

As the population expanded, people moved into more low lying areas, and after the 1927 floods, the Army Corp of Engineers was tasked with the responsibility to build levies to protect the inhabitants of southeast Louisiana living along the Mississippi.

SHOT - BROWSER WINDOW OBTAINING LANDSAT DATA FROM GLOVIS

JASON:

Searching the USGS GloVis online database, we first documented available imagery. Although some ASTER, ALI, and Hyperion imagery was available, no cloud-free data covered the entire area. We were able to finally obtain Landsat 5 TM scenes for multiple years between 1985 and 2011. All were taken in either October or November to maintain consistent seasonal conditions.

SHOT - NDVI IMAGE OF 1985

JASON:

The near infrared and red wavelength data were corrected for atmospheric haze and then used to create a Normalized Difference Vegetation Index, or NDVI, image for each date, such as the one you see here. All nine of these NDVI images were stacked into a single image, similar to stacking multiple layers into a sandwich. Using an unsupervised classification we then turned the image into a map of changes between layers.

SHOT - CHANGE CLASS MAP FOR BETWEEN 1985 AND 2011

JASON:

Overall, comparing the '85 and 2011 change categories, there was more land marsh gain than there was loss. Gain was roughly 26,500 hectares, whereas loss was approximately 16,600 hectares. Since this is not what we expected, let's look closer at specific dates.

SHOT - CHANGE CLASS MAPS OF 1985 AND 1991 AND 1991-1996

JASON:

As you can see in the greens and reds, between '85 and '91, then again between '91 and '96, land marsh gain exceeded the loss. Although Hurricane Florence crossed the location in 1998, it only did so as a category 1. In '92, Hurricane Andrew was a category 3, but it made landfall much further west. Our data suggest that these storms did not cause substantial large scale damage to the bird's foot area.

SHOT - CHANGE CLASS MAPS OF 1996-2000 AND 2000-2004

JASON:

But in the next several years, we read a very different story. As you can see in red, loss exceeded gain. Extensive further analysis is needed, but a possible contributing factor is the combined impact of Hurricanes Danny, Jorge, and Lily from '97, '98, and 2002 respectively.

SHOT - CHANGE CLASS MAPS OF 2004-2005 AND 2004-2006

JASON:

Although time didn't permit detailed analysis of every storm, we were able to examine impacts of Hurricane Katrina. Between '04

and '05, one and a half months after Katrina, the data show a land and marsh loss of 4085 hectares, which is almost 16 square miles. However, as you can see on the right, comparing the '04 and '06 data reveals a gain of roughly 9500 hectares indicating not only recovery but also overall gain. We also detected a similar increase between '06 and 2011.

SHOT - CHANGE CLASS MAP OF 1985-2011

JASON:

In conclusion, we were able to map wetland changes on roughly 5 year intervals between 1985 and 2011. Although there were several periods where substantial land loss occurred, such as following Hurricane Katrina, there was an overall wetland area gain between '85 and 2011. Additional research is needed to assess the accuracy of these change products, and also to consider the impacts of historic hurricanes.

SHOT - THANK YOU!

Cajun Music Plays

Roll Credits.