INTRODUCTION

The Chandeleur Islands comprise a 50 km long island chain located South-Southeast of St. Bernard Parish, Louisiana. As part of the Breton National Wildlife Refuge, the islands house many types of vegetation that provide the means for a suitable habitat for many species of wildlife, several of which are threatened and endangered. Over the past 2000 years, the Chandeleur Islands have acted as a prime target for hurricanes that pass through the Gulf of Mexico. The effect of these hurricanes has temporarily deteriorated the island’s stability and wildlife population. These barrier islands are also the first line of defense for coastal cities. They protect marshes and estuaries that contribute directly and indirectly to the livelihood of thousands of people along the Louisiana coast. This project looks to assess the impact of hurricanes, cold fronts, winds, and ENSO to aid resource managers in restoration projects that can benefit the islands and minimize loss.

GOALS

• Quantify damage from tropical cyclonic events during the past 30 years
• Measure vegetation/land loss and growth over a 30-year period
• Evaluate land loss trends and correlate trends to weather and sea surface phenomena
• Assess barrier island transgression using MODIS imagery from 2000 to 2009
• Perform accuracy assessment of results
• Contribute to restoration and management efforts

METHODS

Data Acquisition

• Landsat 2-4 MSS and Landsat 6 TM. USGS Global Visualization Viewer
• ASTER: Land Processes Distributed Active Archive Center (LP DAAC) using the NASA Warehouse Inventory Search Tool (WIST)
• MODIS: LP DAAC

Land Area Loss/Gain

• After water was masked out of the images, land area was measured for each image in hectares using ERDAS IMAGINE®.

Vegetation Loss/Gain

• Normalized Difference Vegetation Index (NDVI) was performed on each image ranging from August 16, 1979, to January 30, 2009. Measurements of vegetation in hectares were computed in ERDAS IMAGINE for each image.

Accuracy Assessment

• An accuracy assessment was conducted on a land/water classified 2007 ASTER scene using a 2007 QuickBird® image as ground reference data.

RESULTS

Shoreline Change

<table>
<thead>
<tr>
<th>Year</th>
<th>1979</th>
<th>1989</th>
<th>1999</th>
<th>2009</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LAND AREA CHANGE IN HECTARES 1979-2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
</tr>
<tr>
<td>1989</td>
</tr>
<tr>
<td>2008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VEGETATED AREA CHANGE IN HECTARES 1979-1989</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
</tr>
<tr>
<td>1989</td>
</tr>
<tr>
<td>2008</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VEGETATED AREA CHANGE IN HECTARES 1979-2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
</tr>
<tr>
<td>1989</td>
</tr>
<tr>
<td>2008</td>
</tr>
</tbody>
</table>

ACKNOWLEDGMENTS

Dr. Kenton Ross, Joe Spruce
Science Systems and Applications, Inc.

Dr. Ioannis Georgiou, Dr. Mike Miner
Pontchartrain Institute for Environmental Sciences, University of New Orleans

CONCLUSIONS

• An increase in frequency and intensity of storms over the past decade has hindered regeneration of the islands and has made them more susceptible to damage from natural phenomena, such as cold fronts, winds, and waves.
• Results demonstrated that vegetated areas and land areas began decreasing dramatically in 1994. These results are consistent with the most recent study conducted by PIES and USGS.
• Accuracy assessment conducted on the results from Phase 1 proved to be 91% accurate.
• Northern and middle portions of the islands remained mostly stationary throughout 2000-2008, except directly following Hurricane Katrina in 2005. The southern portion of the islands steadily transgressed landward throughout the entire period, but transgression was accelerated by Hurricane Katrina’s impact in 2005.
• Chandeleur Islands have experienced an increase in vegetation and land loss over the past decade. The transgression of the islands has also been accelerated because of tropical cyclones. Without restoration efforts, coastal Louisiana will lose its first line of defense from future tropical cyclones.

NASA MISSIONS

Terra

NASA PARTNERED MISSIONS

Landsat 2-4 MSS & Landsat 6 TM

NASA APPLIED SCIENCES NATIONAL APPLICATIONS

Ecological Forecasting

Natural Hazards

NASA DEVELOP Program, John C. Stennis Space Center

Dr. Iaonnis Georgiou, Dr. Mike Miner
Pontchartrain Institute for Environmental Sciences, University of New Orleans

Landsat 2-4 Multispectral Scanner (MSS), Landsat 5 Thematic Mapper (TM) will be utilized to detect land loss, island transgression, and vegetation change from 1979 to 2009. This study looks to create a more synoptic view of the transgression of the Chandeleur Islands and correlate weather and sea surface phenomena with erosion trends over the past 30 years, so that partnering organizations such as the Pontchartrain Institute for Environmental Sciences (PIES) can better monitor and address the continual change of the island chain.

Data from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), Moderate Resolution Imaging Spectroradiometer (MODIS), Landsat 2-4 Multispectral Scanner (MSS), and Landsat 5 Thematic Mapper (TM) will be utilized to detect land loss, island transgression, and vegetation change from 1979 to 2009. This study looks to create a more synoptic view of the transgression of the Chandeleur Islands and correlate weather and sea surface phenomena with erosion trends over the past 30 years, so that partnering organizations such as the Pontchartrain Institute for Environmental Sciences (PIES) can better monitor and address the continual change of the island chain.

REFERENCES

• Northern and middle portions of the islands remained mostly stationary throughout 2000-2008, except directly following Hurricane Katrina in 2005. The southern portion of the islands steadily transgressed landward throughout the entire period, but transgression was accelerated by Hurricane Katrina’s impact in 2005.
• Chandeleur Islands have experienced an increase in vegetation and land loss over the past decade. The transgression of the islands has also been accelerated because of tropical cyclones. Without restoration efforts, coastal Louisiana will lose its first line of defense from future tropical cyclones.