Barrier islands are the first line of defense against tropical storms and hurricanes for coastal areas. Historically, tropical cyclonic events have had a great impact on the transgression of barrier islands, especially the Chandeleur Island chain off the eastern coast of Louisiana. These islands are of great importance, aiding in the protection of southeastern Louisiana from major storms, providing habitat for nesting and migratory bird species, and are part of the second oldest wildlife refuge in the country. In 1999, Hurricane Georges caused severe damage to the chain, prompting restoration and monitoring efforts by both federal and state agencies. Since then, multiple storm events have steadily diminished the integrity of the islands. Hurricane Katrina in 2005 shattered all previous restoration efforts, with Hurricane Gustav in 2008 exacerbating island erosion and vegetation loss. 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.