Ship Island, MS: An Example of Rapid Hurricane Driven Erosion

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Introduction/Background

- Mississippi Islands relatively unaffected by human development
- An opportunity to study a natural sand dominated system in Mississippi
- Ship Islands maintain geometry caused by Camille
- Similar changes in Islands from Georges
- Ship Islands- most visited and site of historic Fort Massachusetts
Goals/Importance

- Study of a “natural system” on a highly modified coast - natural shoreline evolution
- Transfer of knowledge to developed shorelines along Northeast Gulf Coast - event vs. continuous processes
- Consequences of human interaction - environmental changes in habitat

- Ship Islands offer protection to highly developed shoreline between Gulfport and Biloxi
- Change in Mississippi Sound-Gulf of Mexico circulation and mixing
- Loss of habitat and recreational space
- Navigation hazards
Methods

- GPS shorelines before and after Hurricane George
- Digitized shorelines prior to 1993
- GIS analysis of shoreline positions through time
- Field photos and notes from visits directly after George and in following months
- Buoy reports
Hurricanes

- 1906
- 1916
- Ethel-1960
- Camille-1969
- Georges-1998
Pre-Camille

1966 Categories

- Erosion
- Translation
- Accretion

Years:
- 1850
- 1917
- 1950
- 1966

Categories:
- Pre-Camille
- 1966

MDEQ - Mississippi Office of Geology
Post Camille

1970 Shoreline

1966 Shoreline
Pre Georges

1986
1993
1997

Erosion
No change
Translation
Accretion
Post Georges

1997 Shoreline

Oct 98
July 99
Post George Morphology

30 m of erosion
Area Change 1850-1999

- 1850-1966 loss of 4.64 acres/year
- 1970-1999 loss of 5.95 acres/year

Dredging Begun Across Ship Island Bar (1948)

Camille, Georges
Wind Data
Future Predictions

- Calculated 2017 area from cross island transects (1986-1997) = 611 acres
- Calculated 2017 area from long term area change (graph of 1850-1999) = 600 acres
Conclusion

• Ship Islands are predominantly erosional; westward migration minimal
• Cyclical island breaching and thinning on E. Ship, nearly steady state on W. Ship
• Island Loss increased from 4.6 to 6.0 acres/yr. after Hurricane Camille
• Dredging across Ship Island Bar in 1948 effected long-term erosion rate