

A satellite map of Florida and the surrounding Gulf of Mexico. The land is shown in shades of green and brown, while the water is a deep blue. The coastline of Florida is clearly visible, including the panhandle, the peninsula, and the Florida Keys. The text "A Google Earth Tour of Florida's Shoreline" is overlaid in white, bold, sans-serif font. Below it, the text "With help from you!" is also in white, sans-serif font. In the bottom right corner, there is a small text block containing credits and coordinates.

A Google Earth Tour of Florida's Shoreline

With help from you!

Image U.S. Geological Survey
Image © 2009 DigitalGlobe
Image USDA Farm Service Agency
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
26°56'52.53" N 80°07'53.97" W

Florida

1,200 miles of coast
53% barrier islands
663 miles of beaches



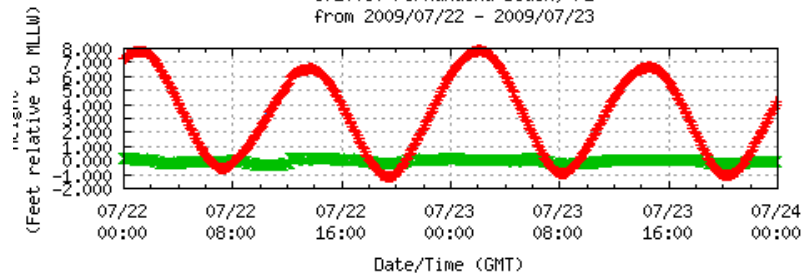
Florida

- Capital Tallahassee
- Population
15,982,378
- Most populous
metropolis is Miami
- Longest river is the
St. Johns
- Highest point 345 feet



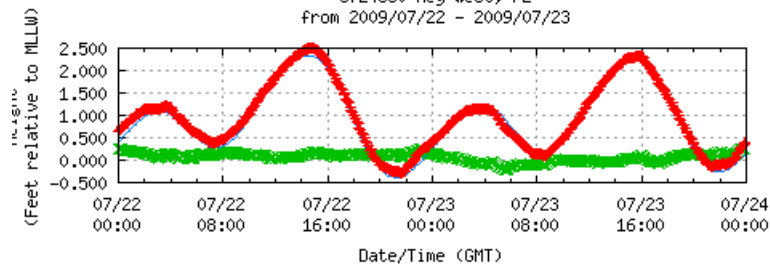
Florida's Tides

NOAA/NOS/CO-OPS
Verified Water Level vs. Predicted Plot
8720030 Fernandina Beach, FL
from 2009/07/22 - 2009/07/23



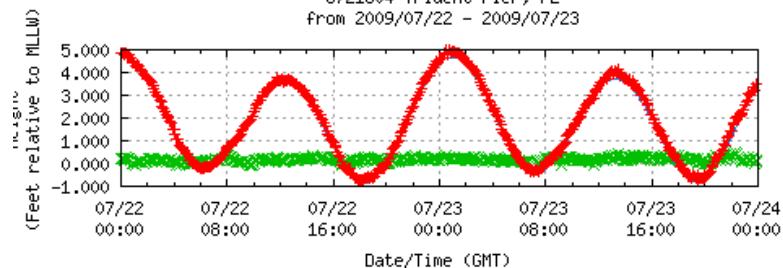
Predicted WL — (Obs-Pred) x Observed WL +

NOAA/NOS/CO-OPS
Verified Water Level vs. Predicted Plot
8724580 Key West, FL
from 2009/07/22 - 2009/07/23



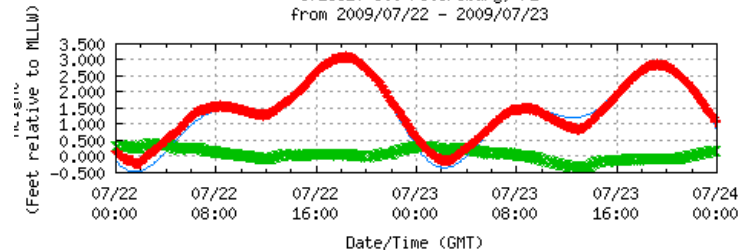
Predicted WL — (Obs-Pred) x Observed WL +

NOAA/NOS/CO-OPS
Verified Water Level vs. Predicted Plot
8721604 Trident Pier, FL
from 2009/07/22 - 2009/07/23



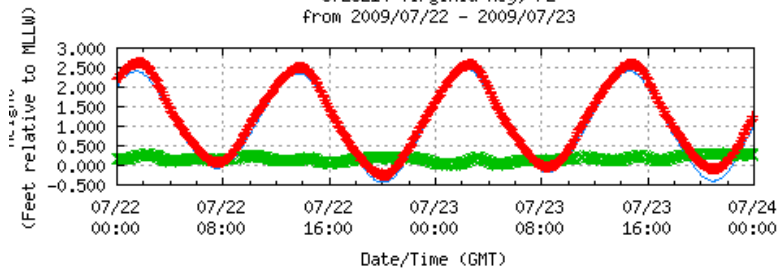
Predicted WL — (Obs-Pred) x Observed WL +

NOAA/NOS/CO-OPS
Verified Water Level vs. Predicted Plot
8726520 St. Petersburg, FL
from 2009/07/22 - 2009/07/23



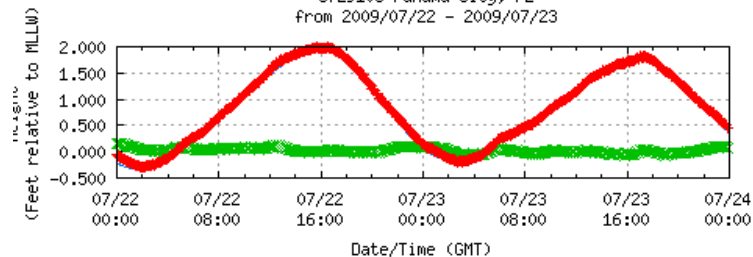
Predicted WL — (Obs-Pred) x Observed WL +

NOAA/NOS/CO-OPS
Verified Water Level vs. Predicted Plot
8723214 Virginia Key, FL
from 2009/07/22 - 2009/07/23



Predicted WL — (Obs-Pred) x Observed WL +

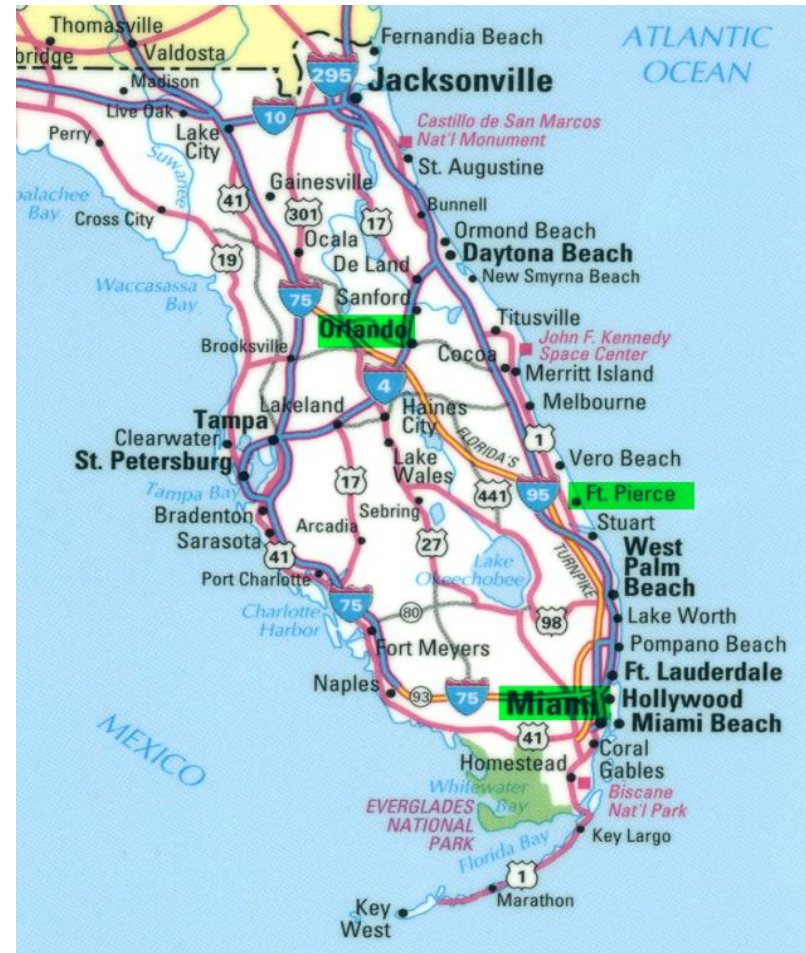
NOAA/NOS/CO-OPS
Verified Water Level vs. Predicted Plot
8729108 Panama City, FL
from 2009/07/22 - 2009/07/23



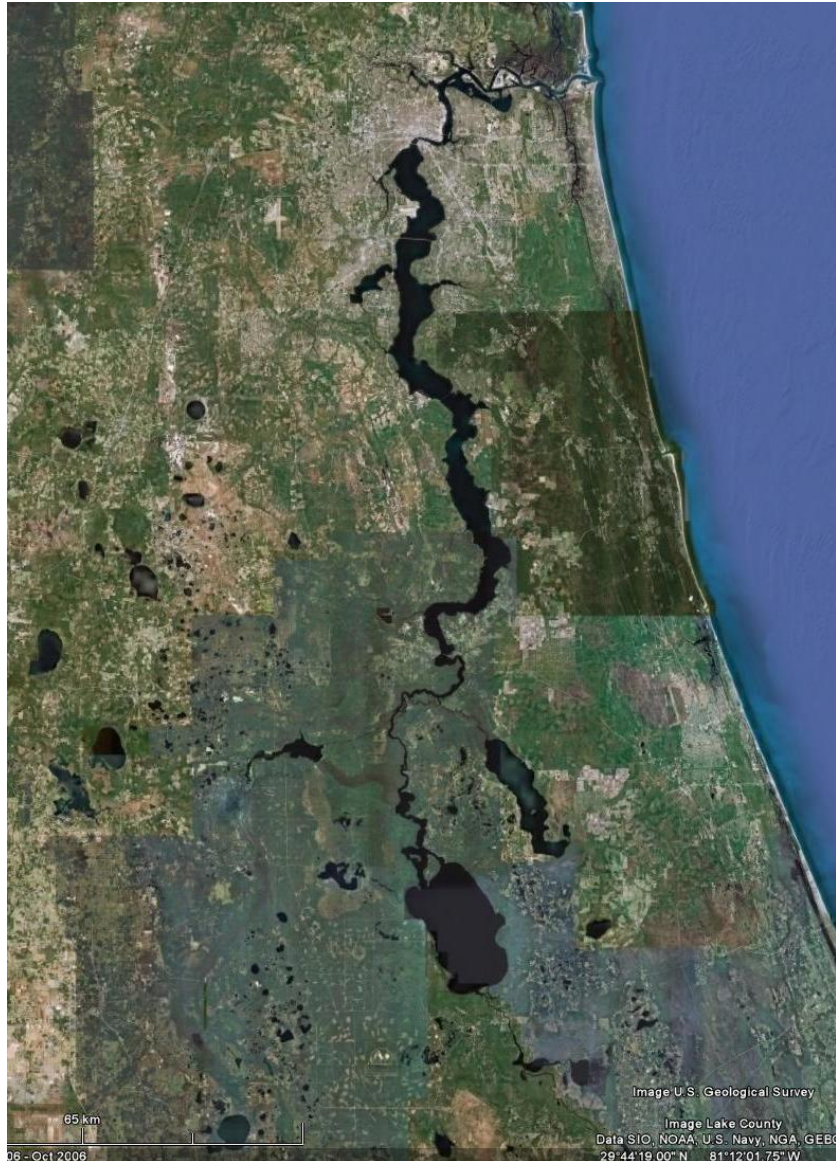
Predicted WL — (Obs-Pred) x Observed WL +

East Coast Florida

- 550 miles of barrier islands and coastal inlets
- Contains both Mesotidal *and* Microtidal environments



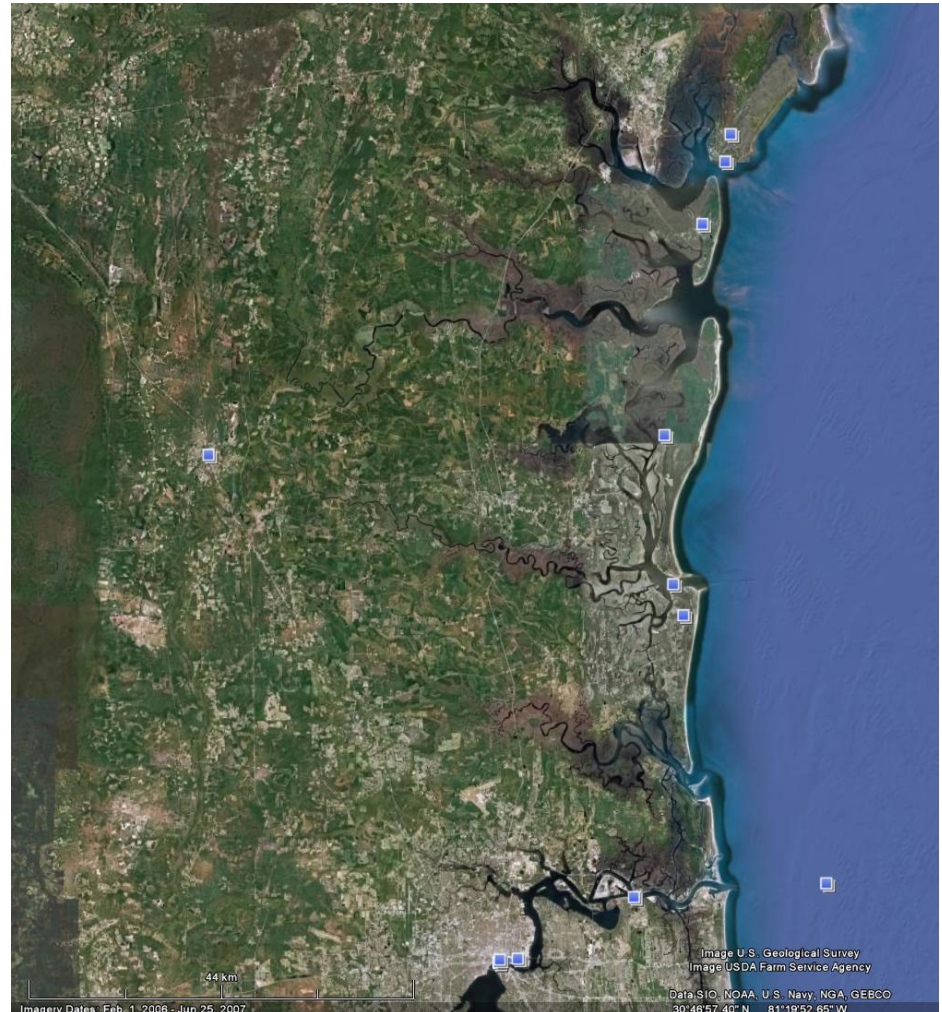
Major Rivers and Water Features



- **St. John's River**
 - 285 miles (longest river in Florida)
 - Flows Northward
- **St. Mary's River**
 - 185 miles
 - Border between GA and FL

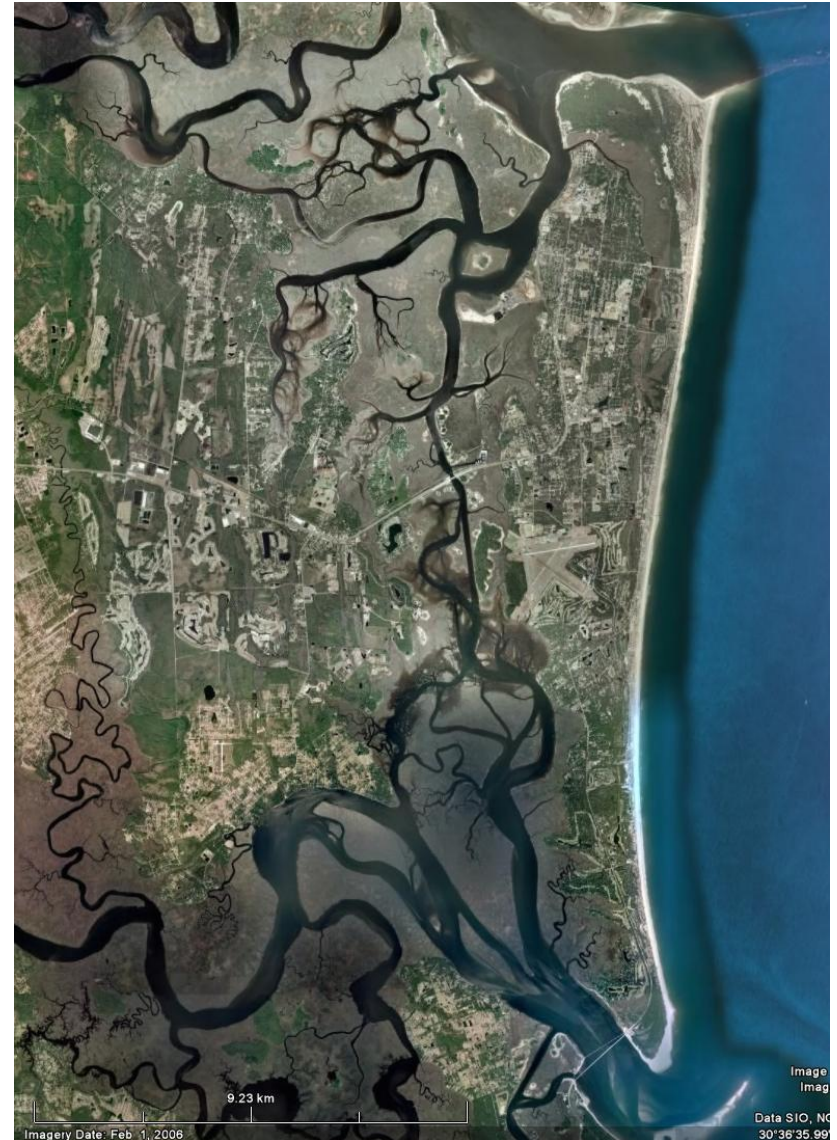
Northeast Florida

- Short barrier islands
 - Drumsticks
- Well developed sand dunes
- Extensive marsh and tidal flats
- Mixed energy environment (Mesotidal)

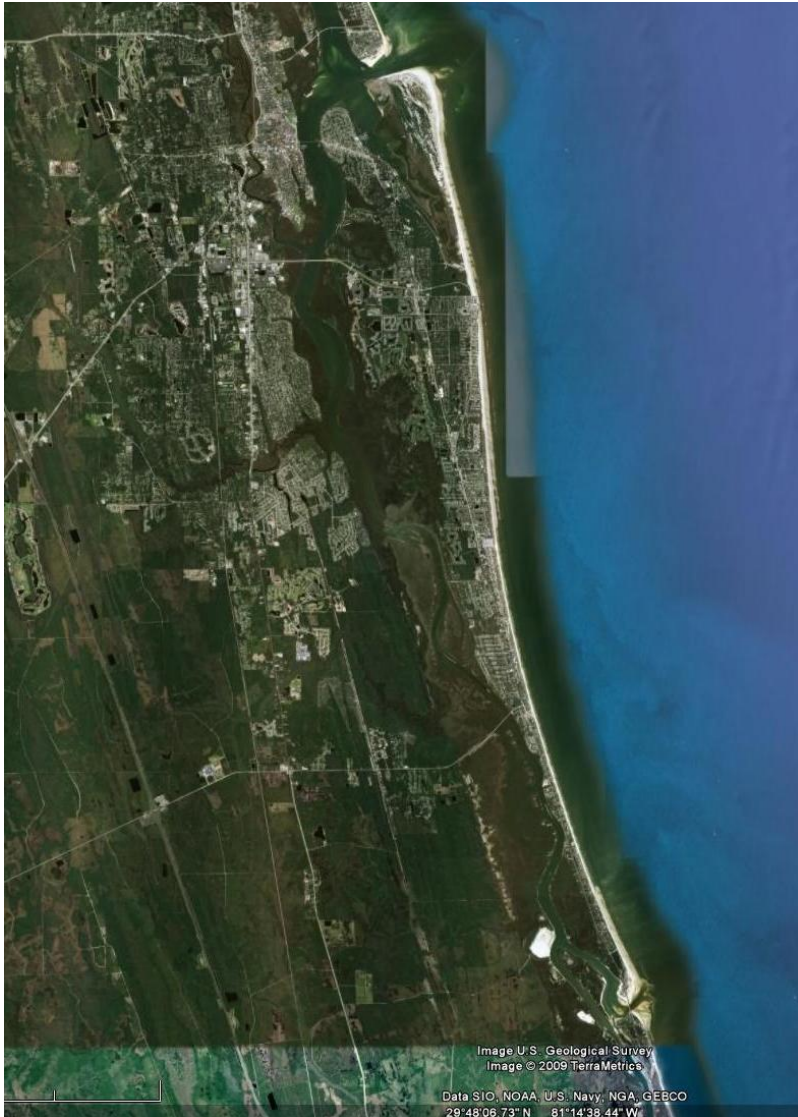


Amelia Island

- Southernmost of the chain of the Atlantic coast barrier islands that stretch from North Carolina to Florida

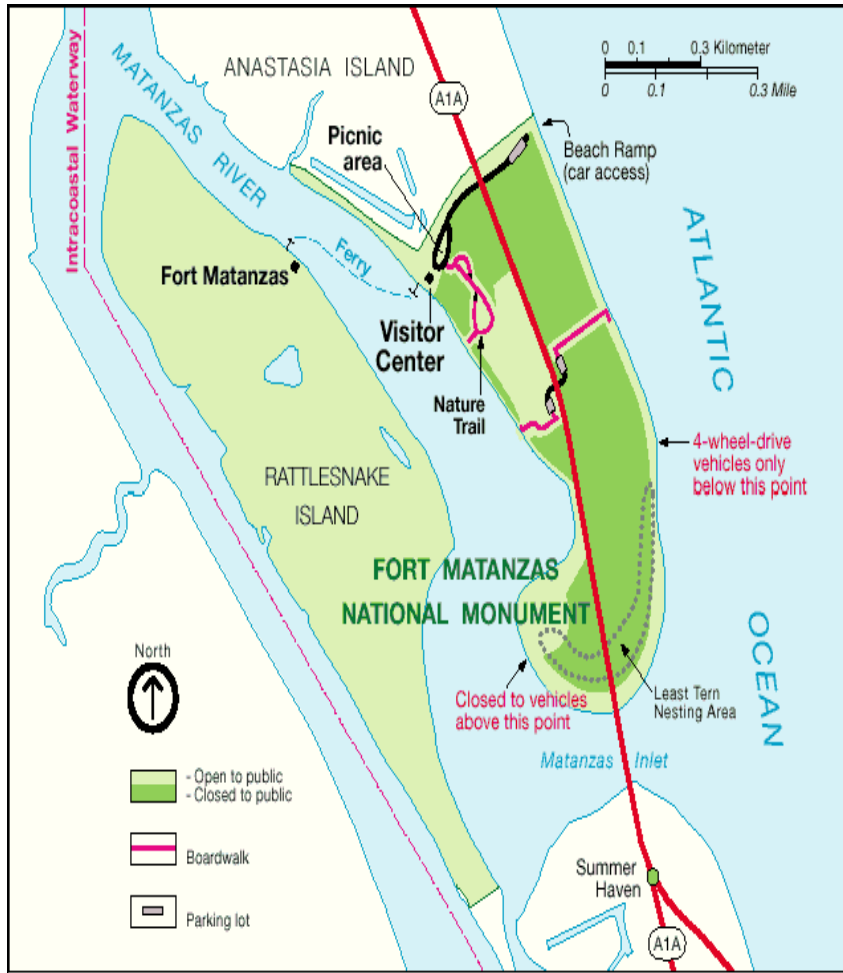


Central –Southern Florida

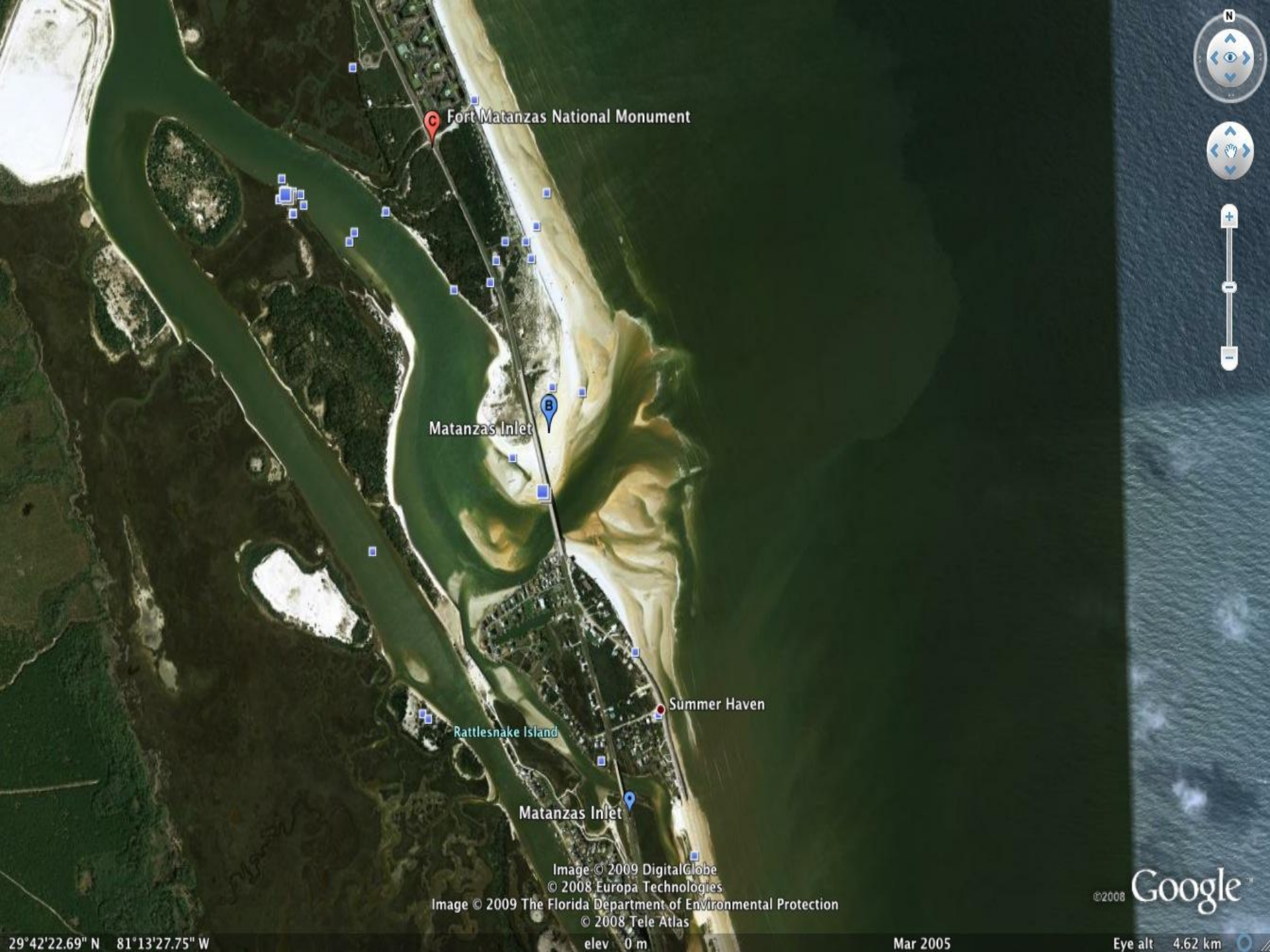


- Wave dominated
- Barrier islands have long, continuous dunes
- **Cape Canaveral National Seashore**
 - 25 mi of national shoreline
- **Guana-Tolomato-Matanzas Research Reserve**
 - Matanzas Inlet
 - Stretches 30 mi North and South of St. Augustine

Matanzas National Estuarine Research Reserve



- Contains saltmarshes, mangrove tidal wetlands, oyster bars, estuarine lagoons, and offshore seas in NE Florida
- **Matanzas Inlet**
 - Unaltered inlet
 - Provides/supports commercial and recreational fish



Fort Matanzas National Monument

Matanzas Inlet

Rattlesnake Island

Summer Haven

Matanzas Inlet

Image © 2009 DigitalGlobe
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Image © 2009 The Florida Department of Environmental Protection
© 2008 Tele Atlas

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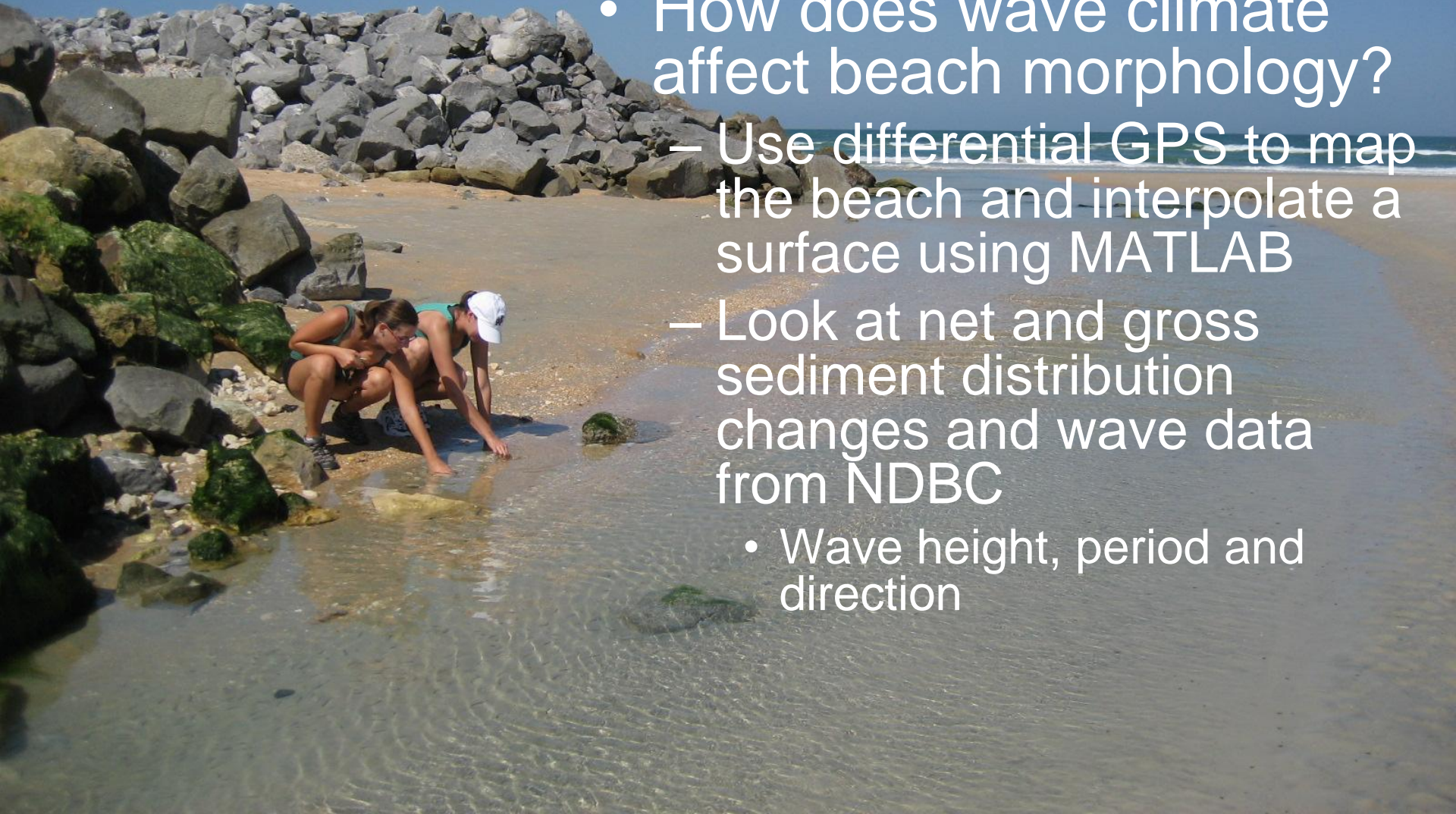
29°42'22.69" N 81°13'27.75" W

Mar 2005

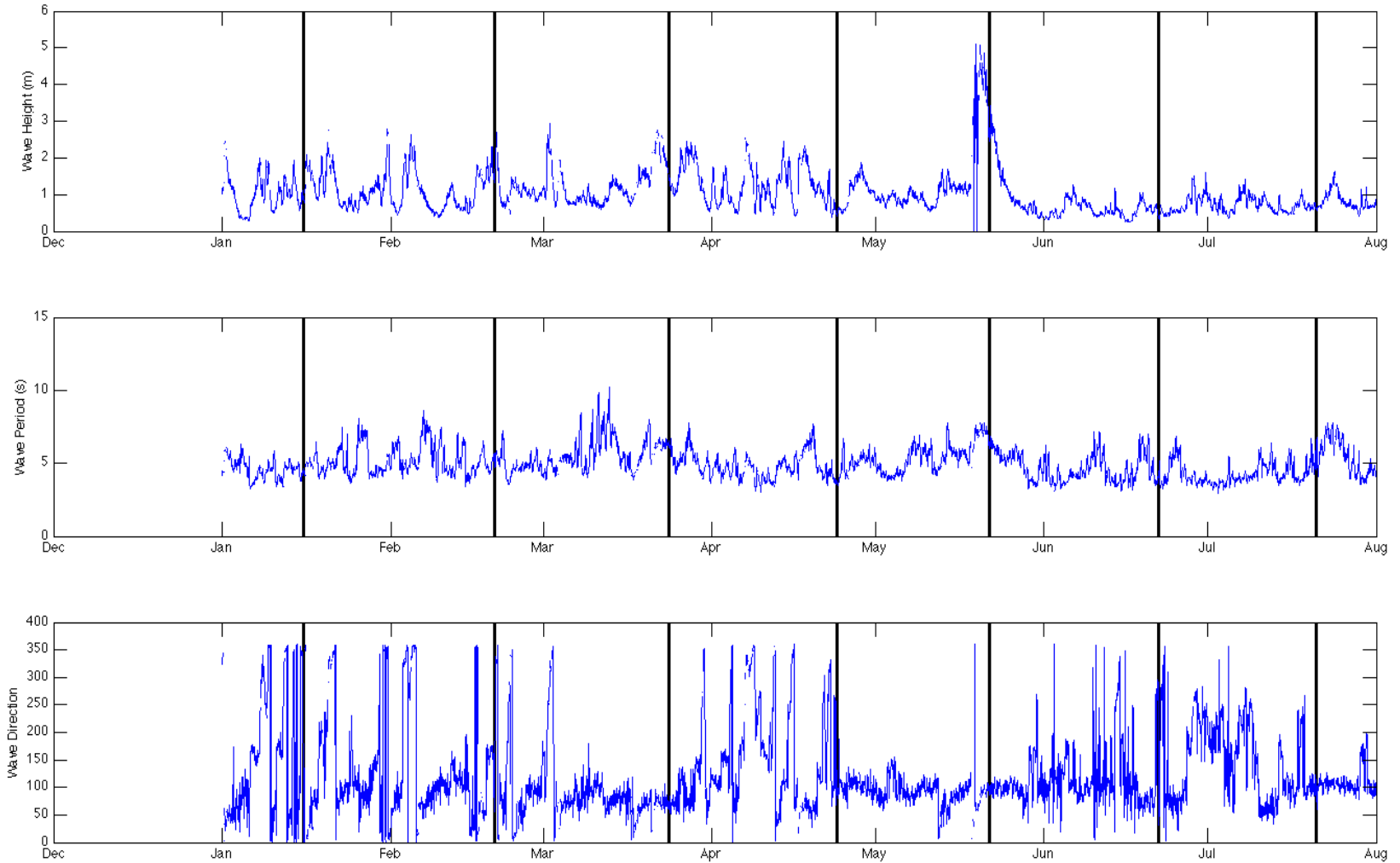
Eye alt 4.62 km

Research at Matanzas Inlet

- How does wave climate affect beach morphology?
 - Use differential GPS to map the beach and interpolate a surface using MATLAB
 - Look at net and gross sediment distribution changes and wave data from NDBC
 - Wave height, period and direction

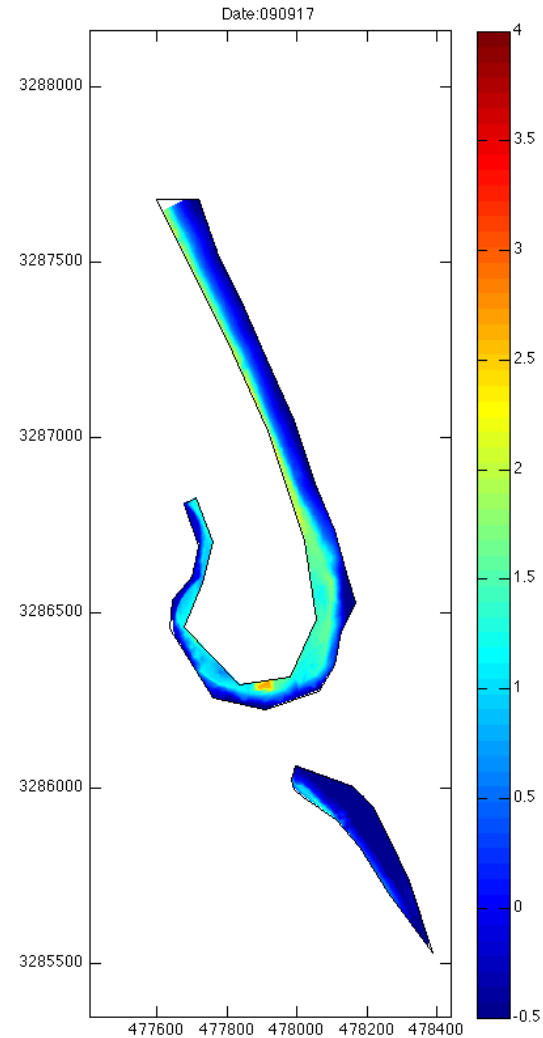
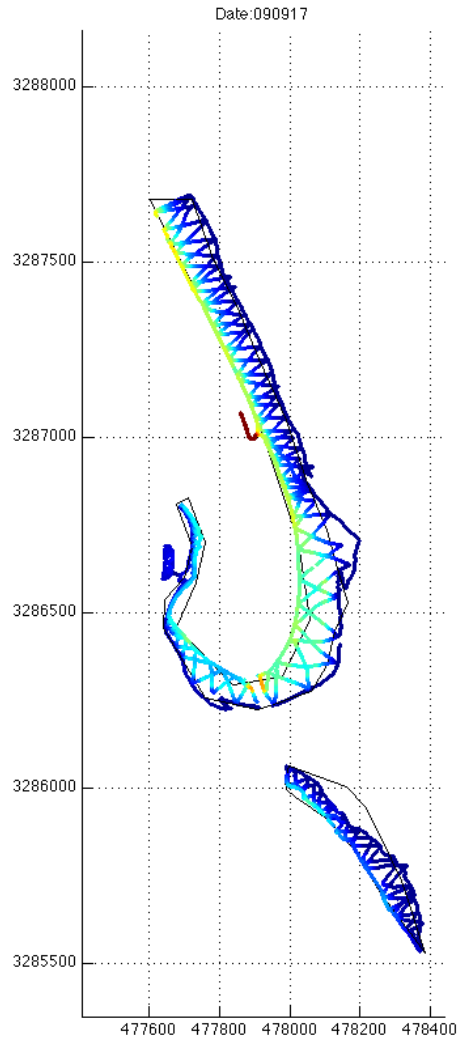


Wave Data



*Black bars indicate survey dates

Survey (elevation) Data



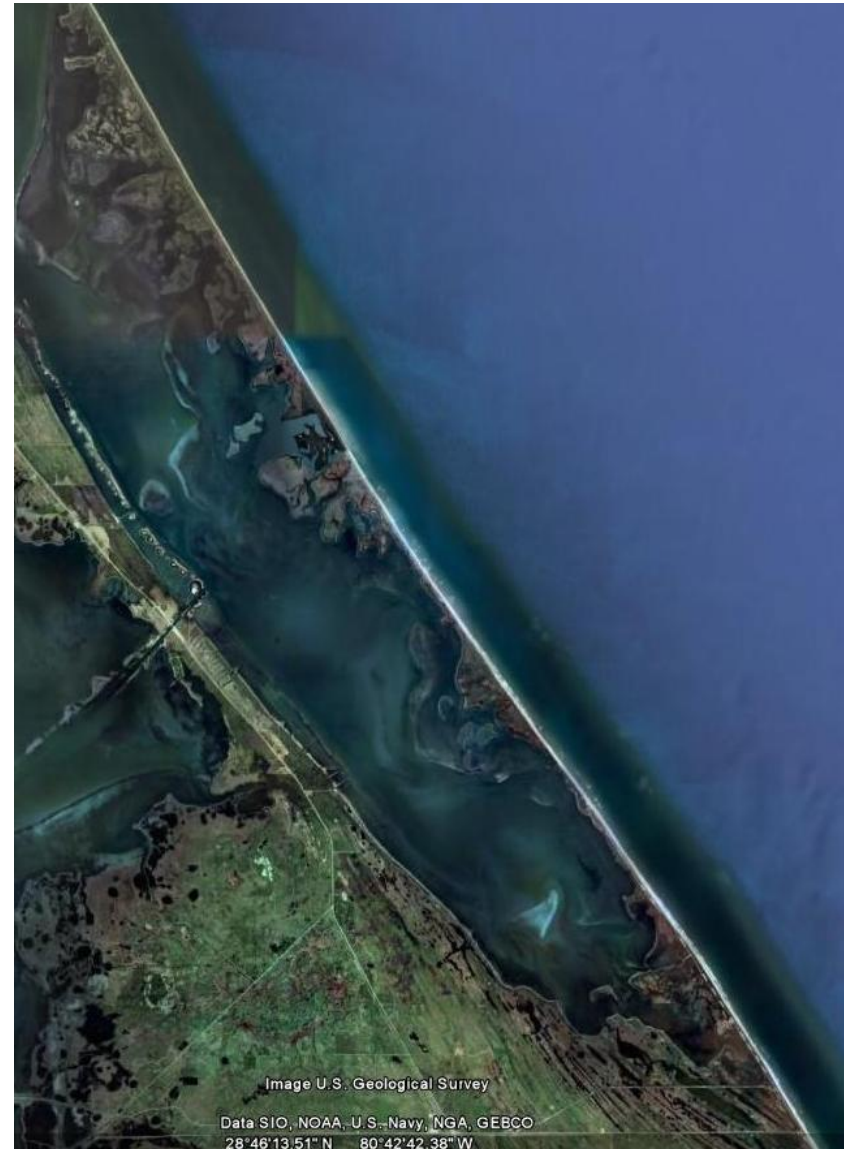
Survey: 9/17/2009

Look at correlations between wave and survey data

- Initial observations include:
 - Gross beach volumetric change is correlated with deep water wave directions
 - Highly oblique waves correspond to greatest gross morphologic variability
 - Increasing wave periods are associated with more orthogonal wave directions
 - Correspond to decreased erosion and net accretion

Cape Canaveral National Seashore

- Contains ocean, beach, hammock, lagoon, saltmarsh and pine flatland habitats
- 58,000 acres of barrier island
- Relatively stable barrier beach backed by a productive lagoon system (Indian River Lagoon)



Cape Canaveral



University of Florida's Coastal Research Program at KSC



John Jaeger

Associate Professor, Geological Science, University of Florida

Peter Adams

Assistant Professor, Geological Science, University of Florida

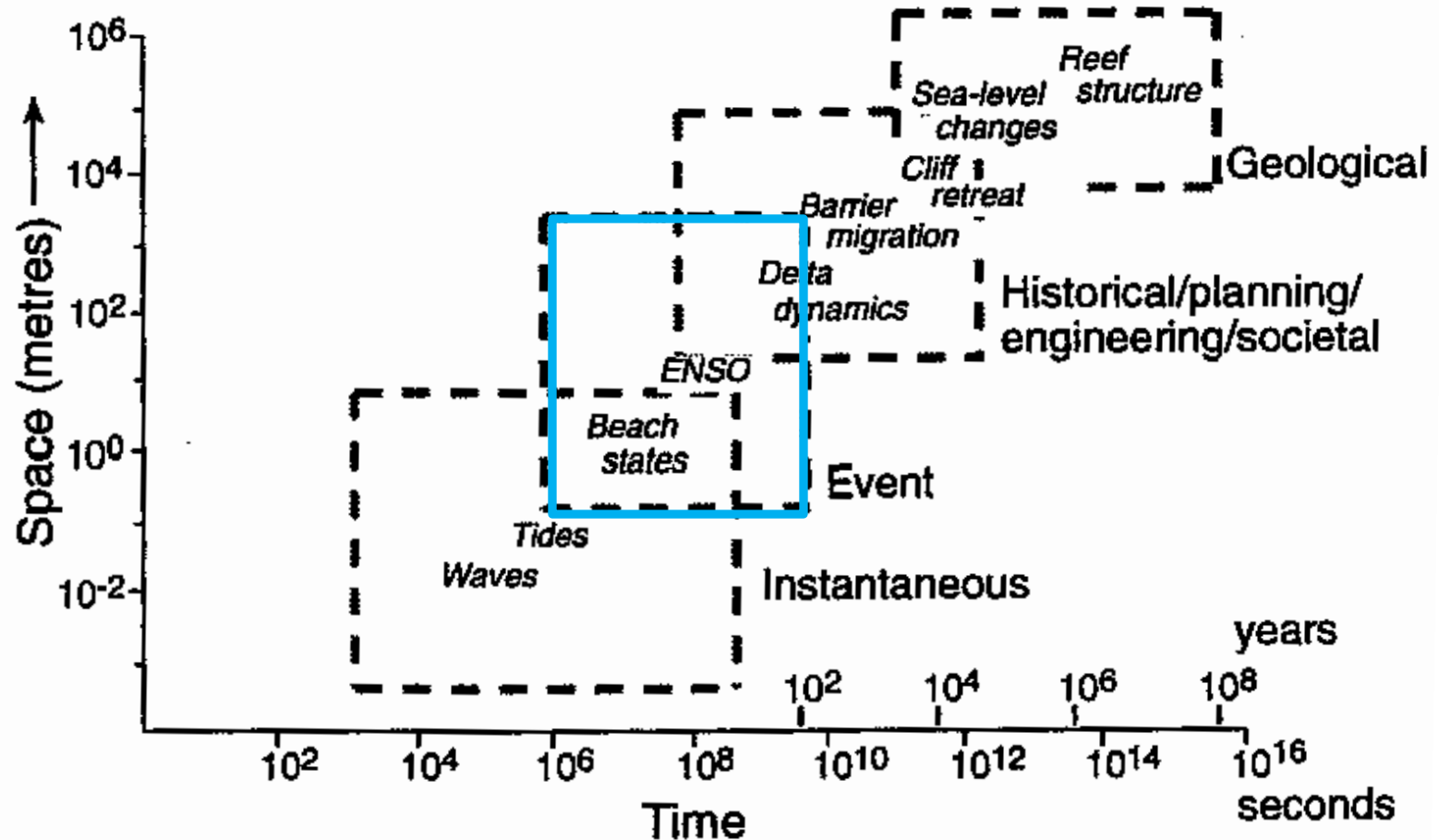
Richard MacKenzie

PhD Student, Geological Science, University of Florida

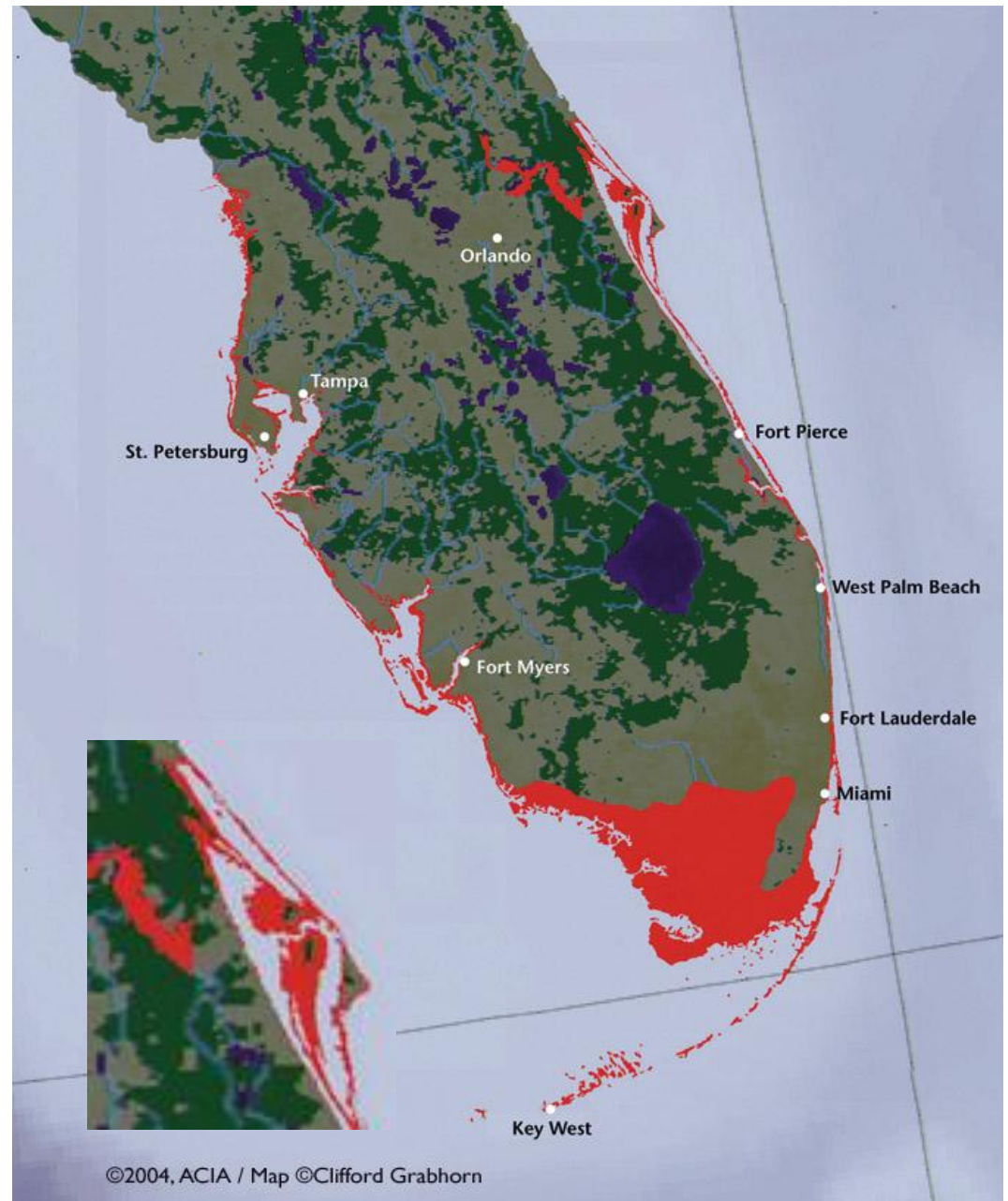
Thanks to Our DVT Research Partners at:

- KSC
 - John Shaffer
- USGS
 - Nathaniel Plant
 - Dave Thompson
 - BJ Reynolds
 - Kara Doran
 - Katy Serafin
- Dynamac
 - Carlton Hall
 - Ron Schaub
 - Shanon Gann
- FWS
 - Jim Lyon
- USAF
 - Angy Chambers

Spatial and Temporal Scales in Coastal Change



Modeled Effects of a 1 meter Increase in Local Relative Sea-Level on Florida and Cape Canaveral



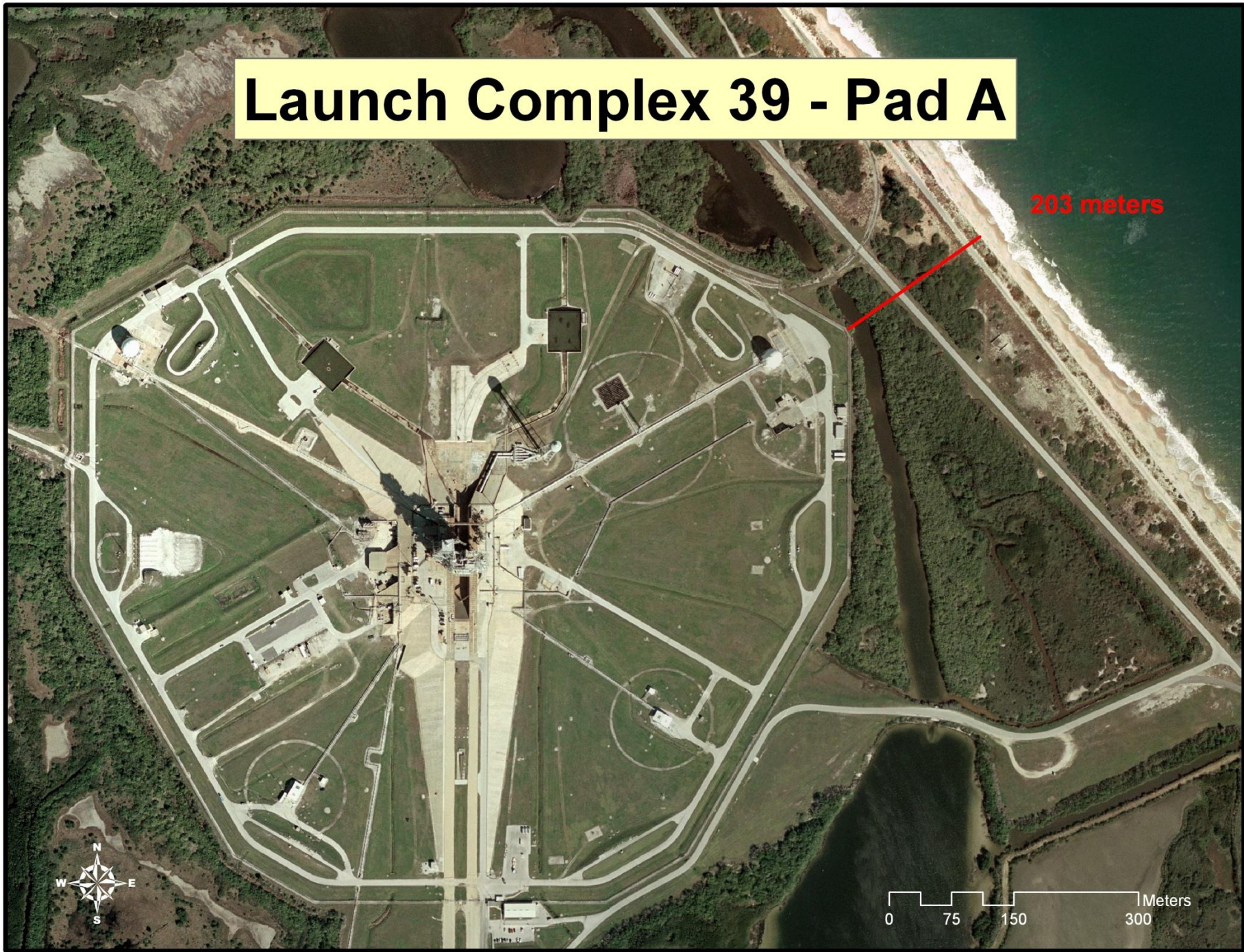
Specific KSC Near-Coastal Infrastructure Vulnerabilities

Launch Complex 39 - Pad A

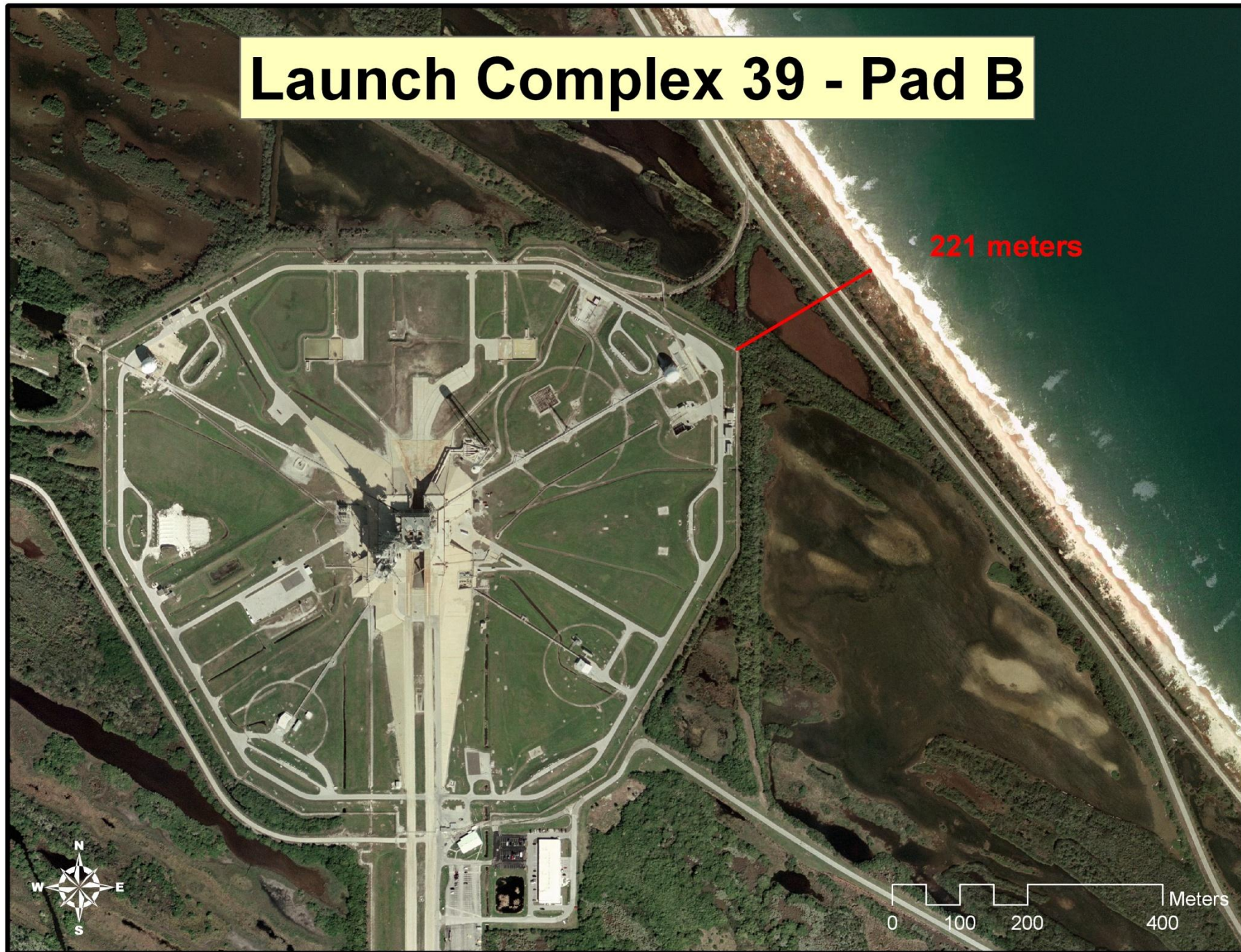
203 meters



0 75 150 300 Meters



Launch Complex 39 - Pad B

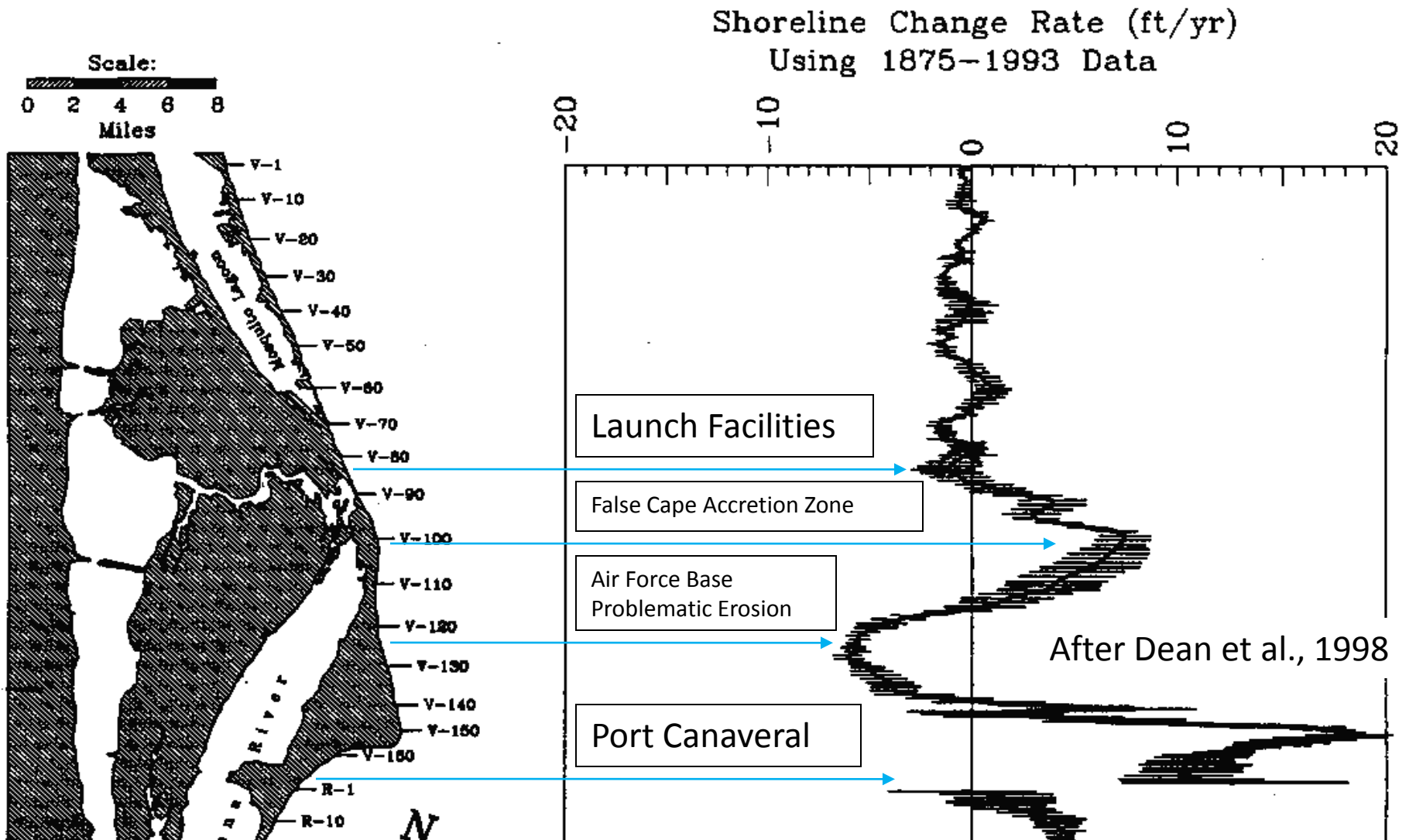


Launch Complex 37



Launch Complex 34 - Apollo 1





Shoreline Analysis at Launch Complex 39 - Pad B



Legend

- 2007_02
- 2006_06_30
- 2005_04_08
- 2002_03_18
- 2000_12_23
- 1923
- 1853

0 50 100 200 Meters

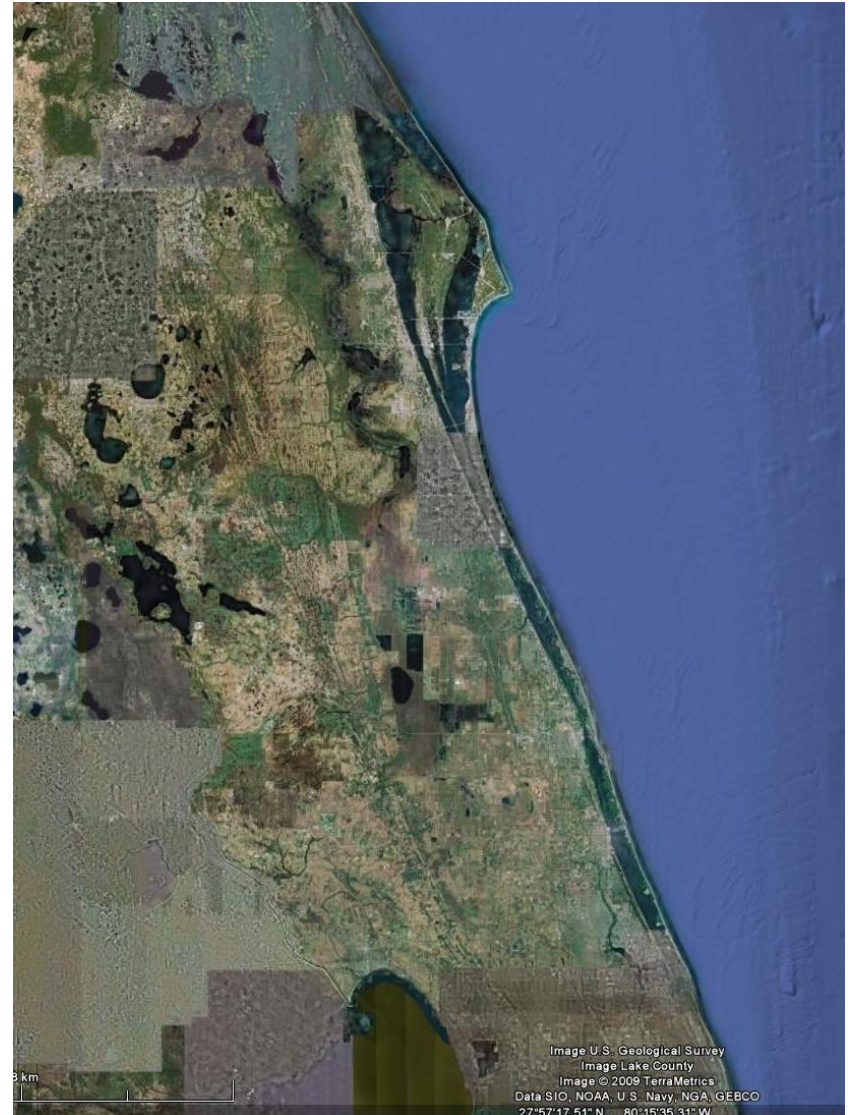






Water

- **Indian River Lagoon**
 - 150 mi long
 - Bordered by Canaveral Island National Seashore (N), Cape Canaveral (E), Jupiter Island (S), and mainland FL (W)
 - North America's most diverse estuary
 - Contains 6 inlets



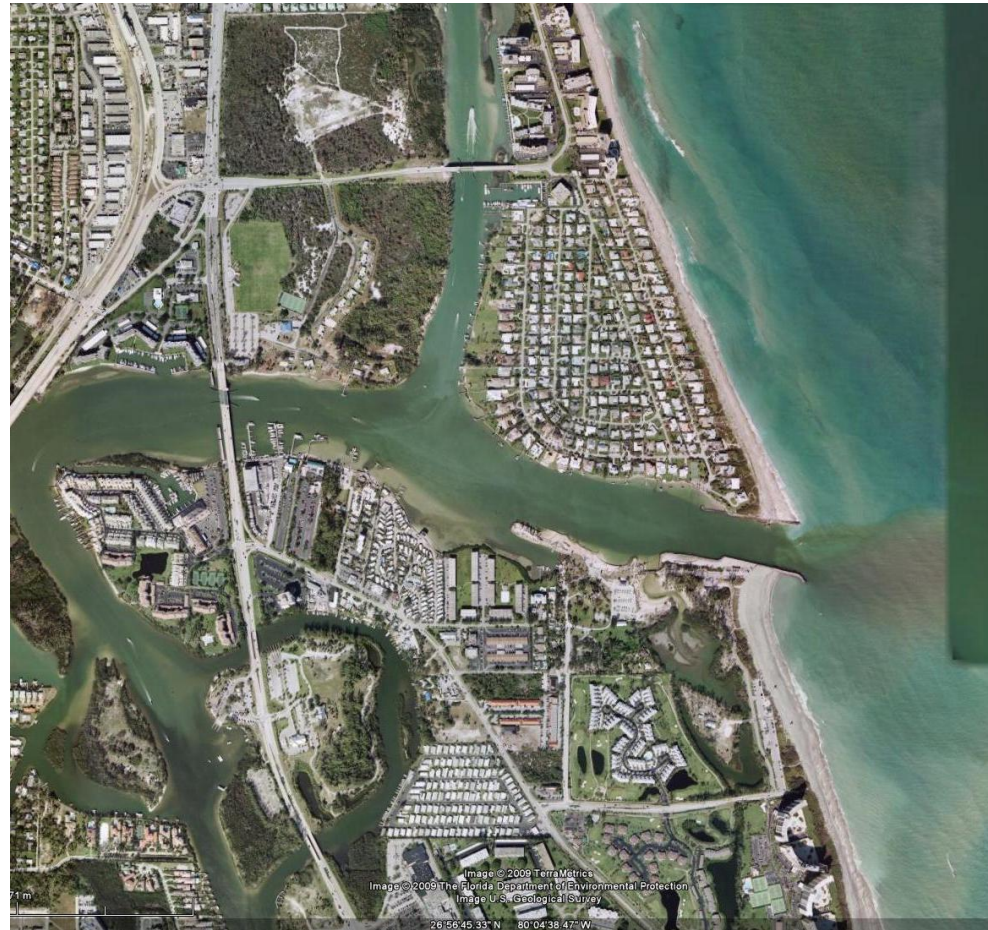
South coast

- mangrove coasts and associated salt marshes
- barrier islands
- sandy beaches
- Florida Keys



Jupiter Inlet

- Outflow for the Loxahatchee River
- Small and narrow
- Shoaling and fast currents make it dangerous
- Considered unnavigable by U. S. Coast Guard



Florida Bay area

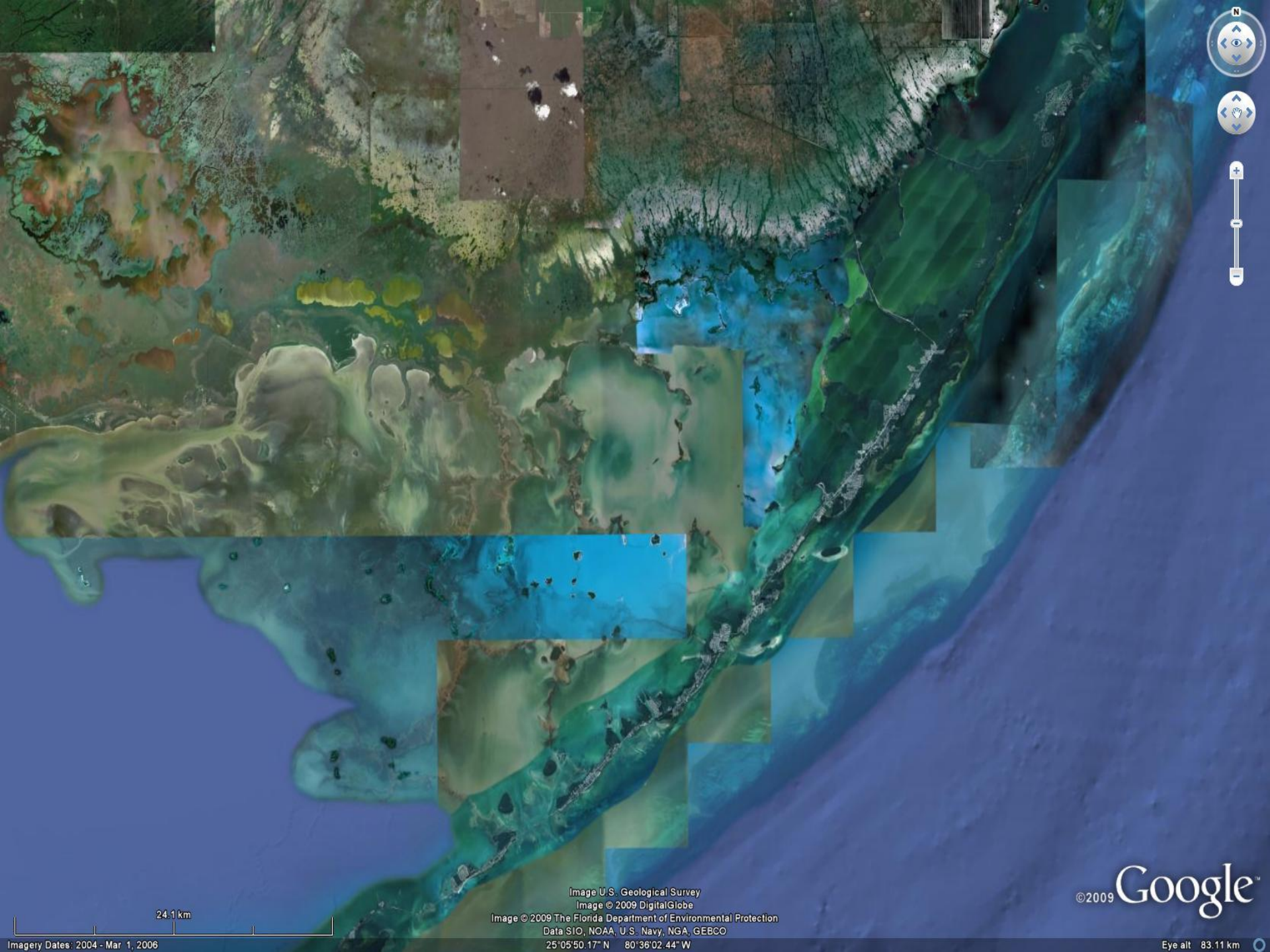
Islands are round or elliptical

2 types of islands:

- completely covered with mangrove
- atoll-like rim of mangrove enclosing a depression

shoreline: mostly lime and muds





24.1 km

Image U.S. Geological Survey
Image © 2009 DigitalGlobe
Image © 2009 The Florida Department of Environmental Protection
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
25°05'50.17" N 80°36'02.44" W

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Eye alt 83.11 km

➤ Sandy beaches

- Poorly developed S of Key Biscayne but some occur as small pockets in the Florida Keys and shallow bays behind the Keys
- Most extensive beaches of SW Fl are the 16 km long beach on Cape Sable and the 10 km long Highlands beach



Cape Sable

➤ Florida Keys

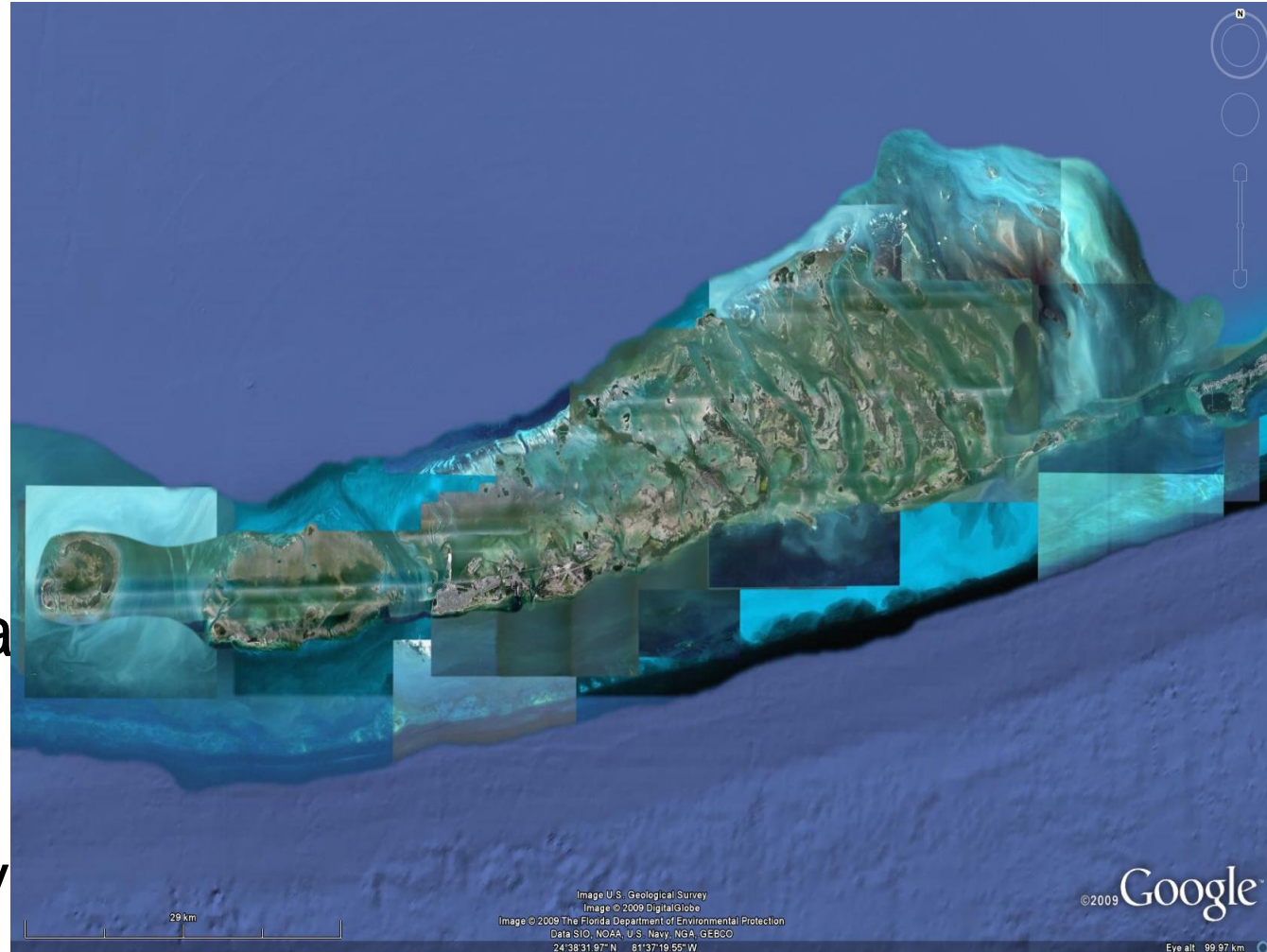
- One half on the area covered by mangrove swamps
- Shoreline: mostly rock or muddy intertidal flats that border mangrove shoreline
- Only a few sandy beaches
- Offshore: coral reefs forming banks and channels



Bahia Honda

➤ Florida Keys

- 1700 islands
- NE-SW arc, 240 km long
- From Soldier key to Key West
- Upper Keys (Bahia Honda northwards)
- Lower Keys (Pig Pine Key



➤ Florida Keys

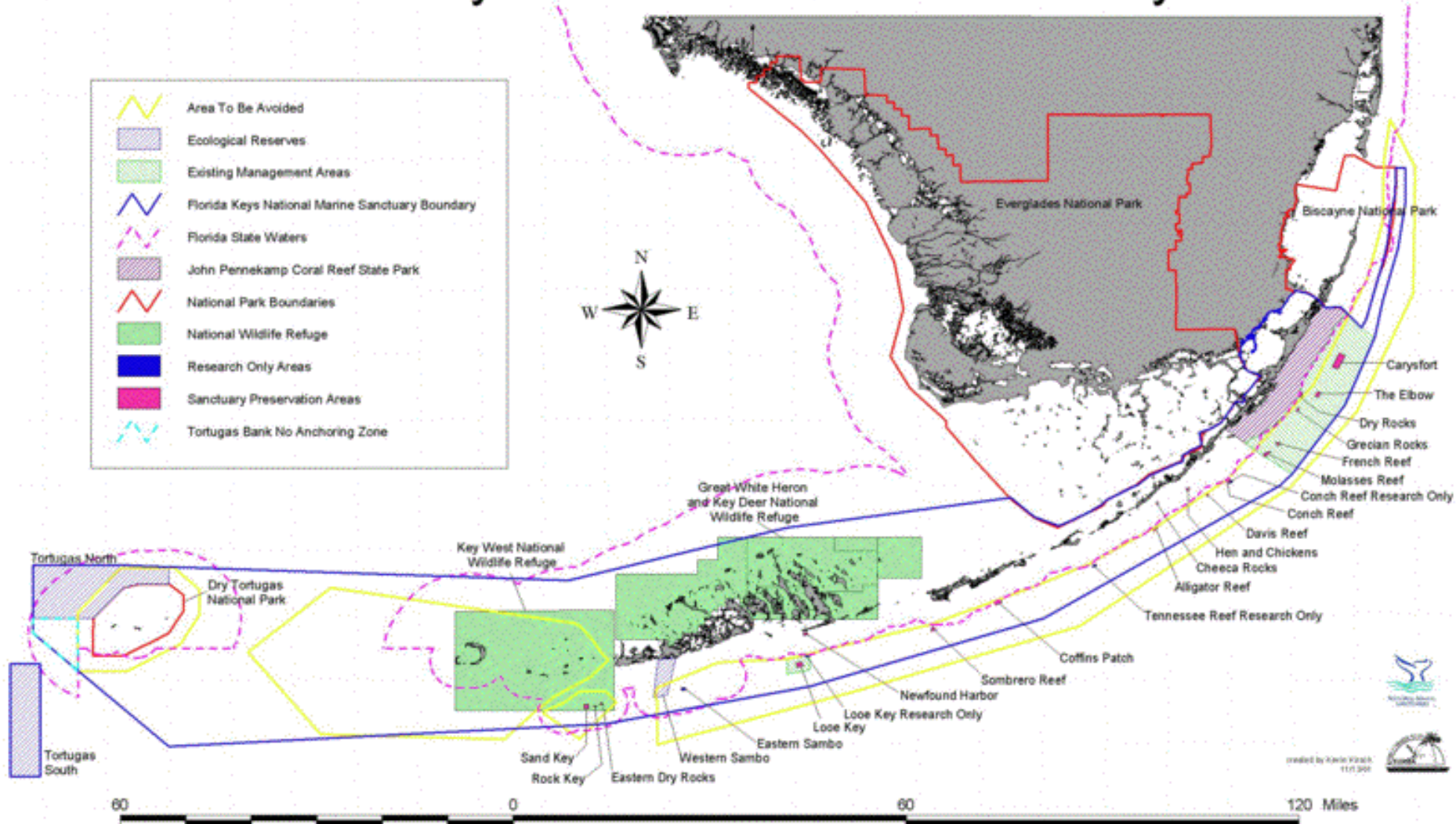
Include diverse habitats such as:

- Seagrass meadows
- Mangrove islands
- Coral reefs



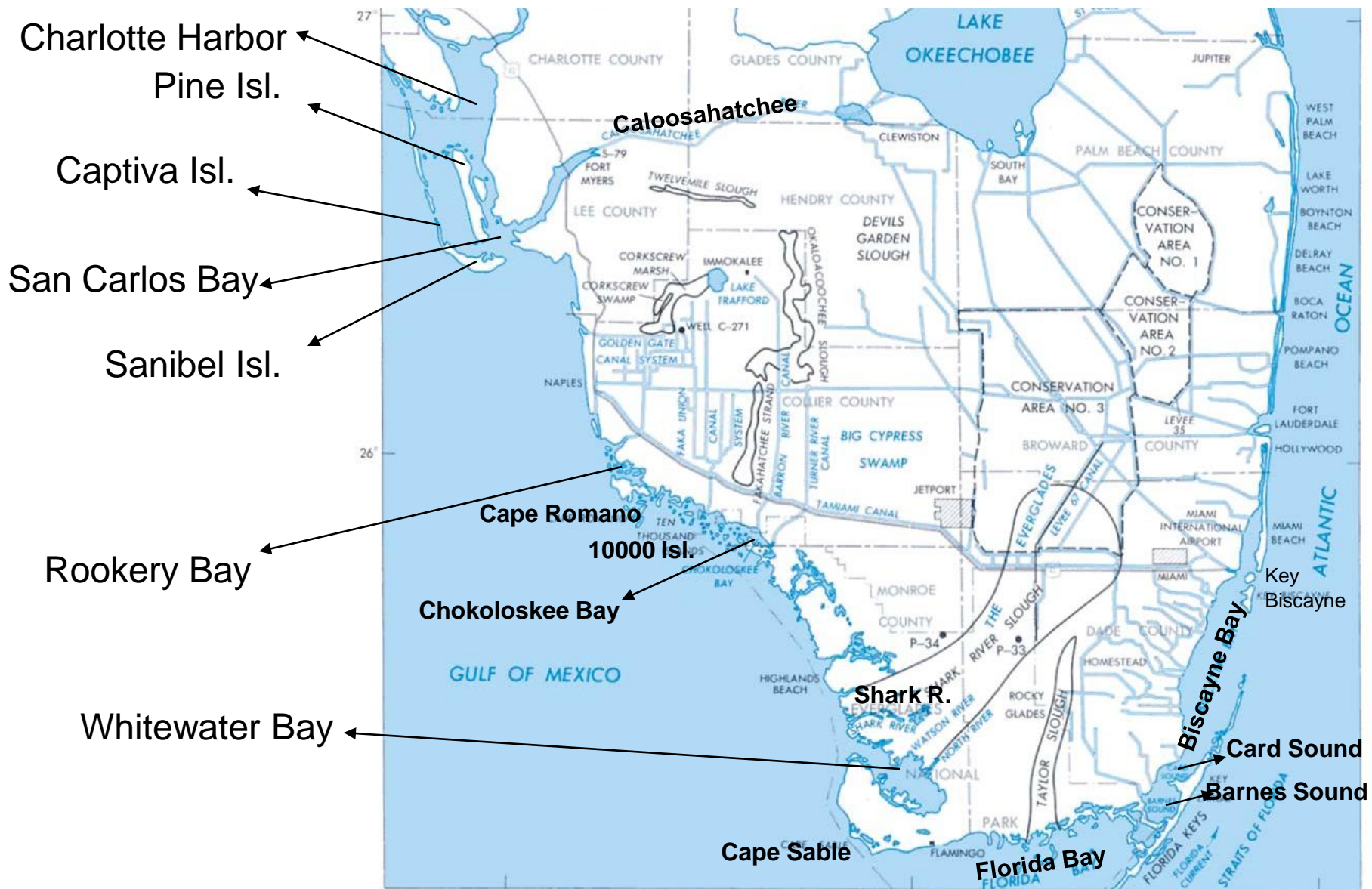
Efforts to protect this
ecosystems...

Florida Keys National Marine Sanctuary



created by Kacie P. Smith
11/1/2008

South coast - major coastline features



Gasparilla Isl. ←

Pine Isl. ←

Captiva Isl. ←

Sanibel Isl. ←

Cape Sable ←

Stump Pass Beach
Don Pedro Island
Gasparilla Island
Cayo Costa

Fort Myers

Mound Key Archaeological

Koreshan State Historic Site

Lovers Key

Delnor-Wiggins Pass

Naples

Fakahatchee
Strand
Preserve

Collier-Seminole

Belle Glade

Florida

41

80

2

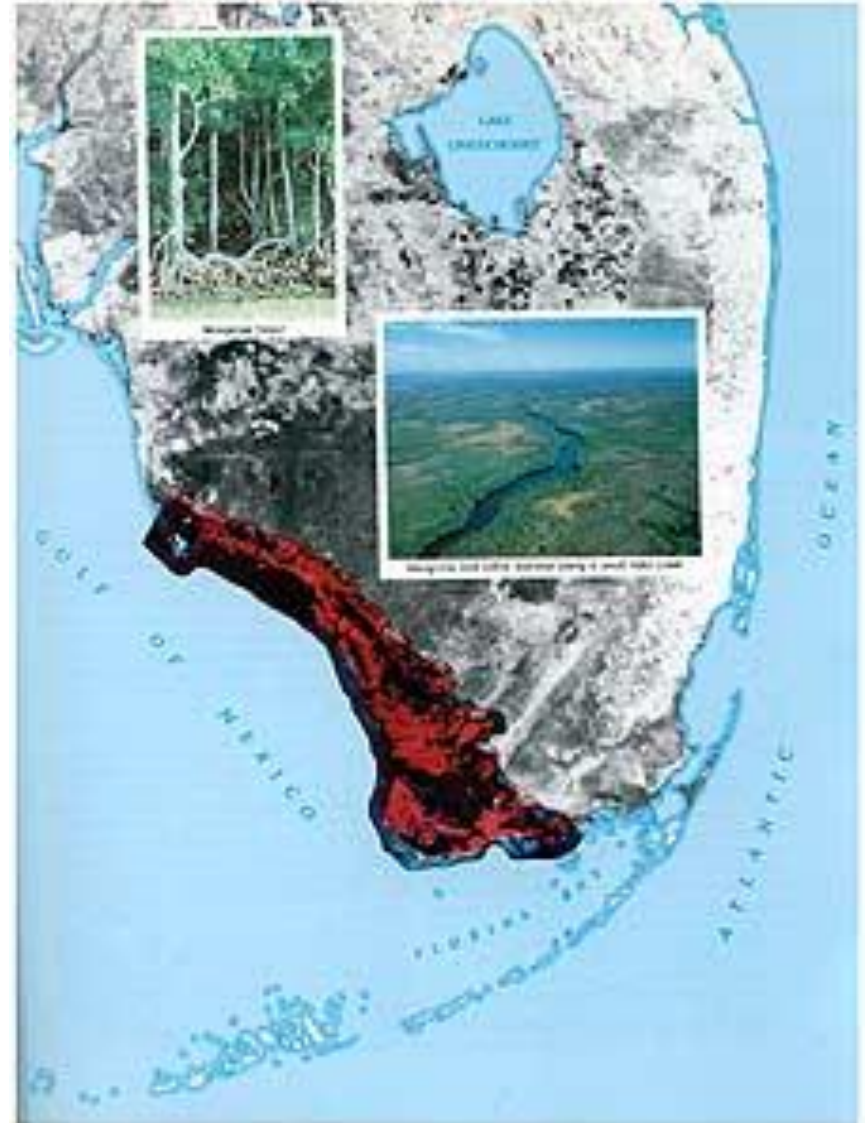
75

41

➤ Mangrove coast

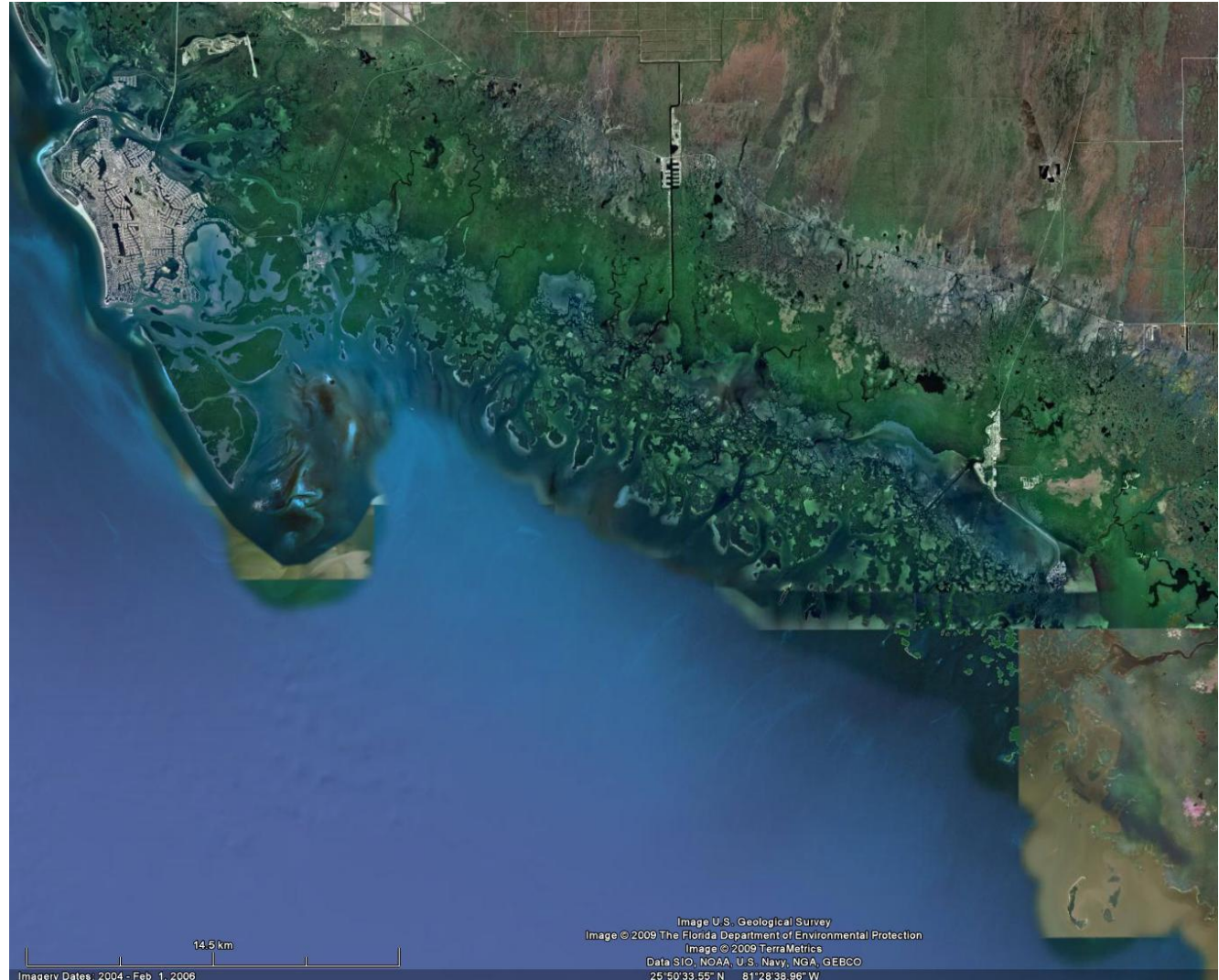
Mangroves:

- Along coastline
(greatest development
along estuaries N of
Cape Sable- mangrove
flats along Shark river &
tribitaries)
- Forming islands:—
10000 Islands area
Florida bay area



Ten Thousand Islands

- Mangroves build upon oyster bars that grow perpendicular to the tidal flow , giving the islands their characteristic shape



➤ Barrier islands

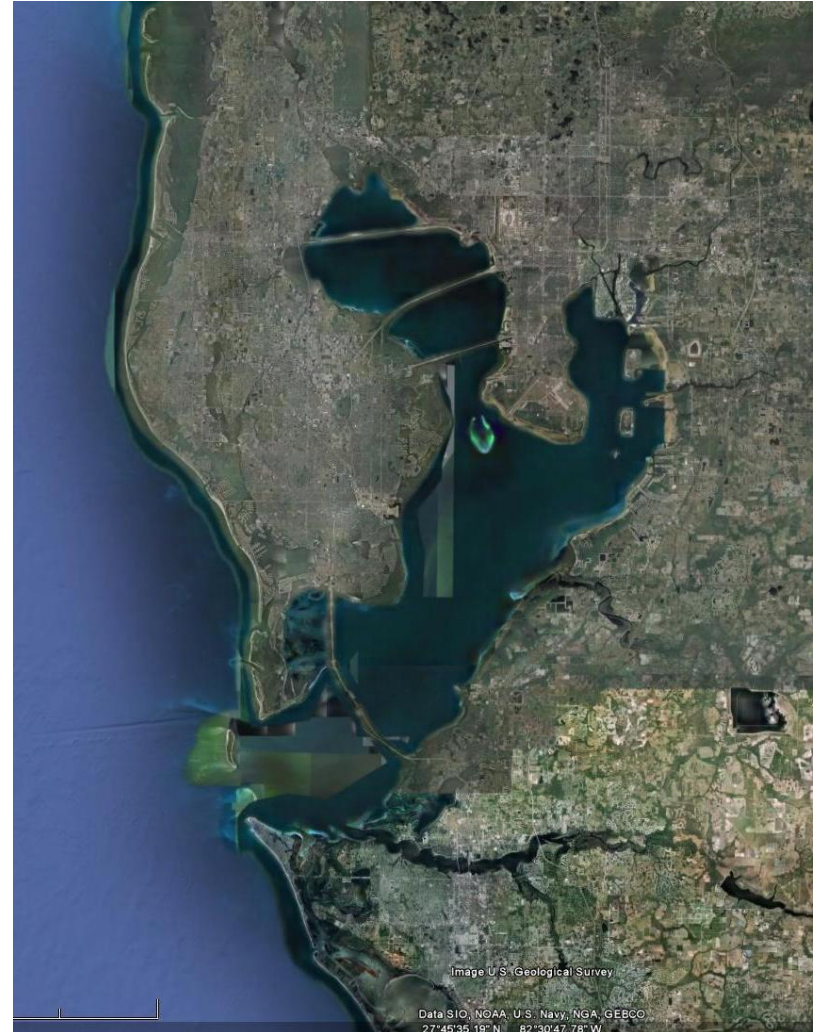
- Extend down the W coast for about 300 km from Anclote Key to Cape Romano

(Gasparilla Isl, La Costa Isl, Captiva Isl, Sanibel Isl., Keewaydin Isl)



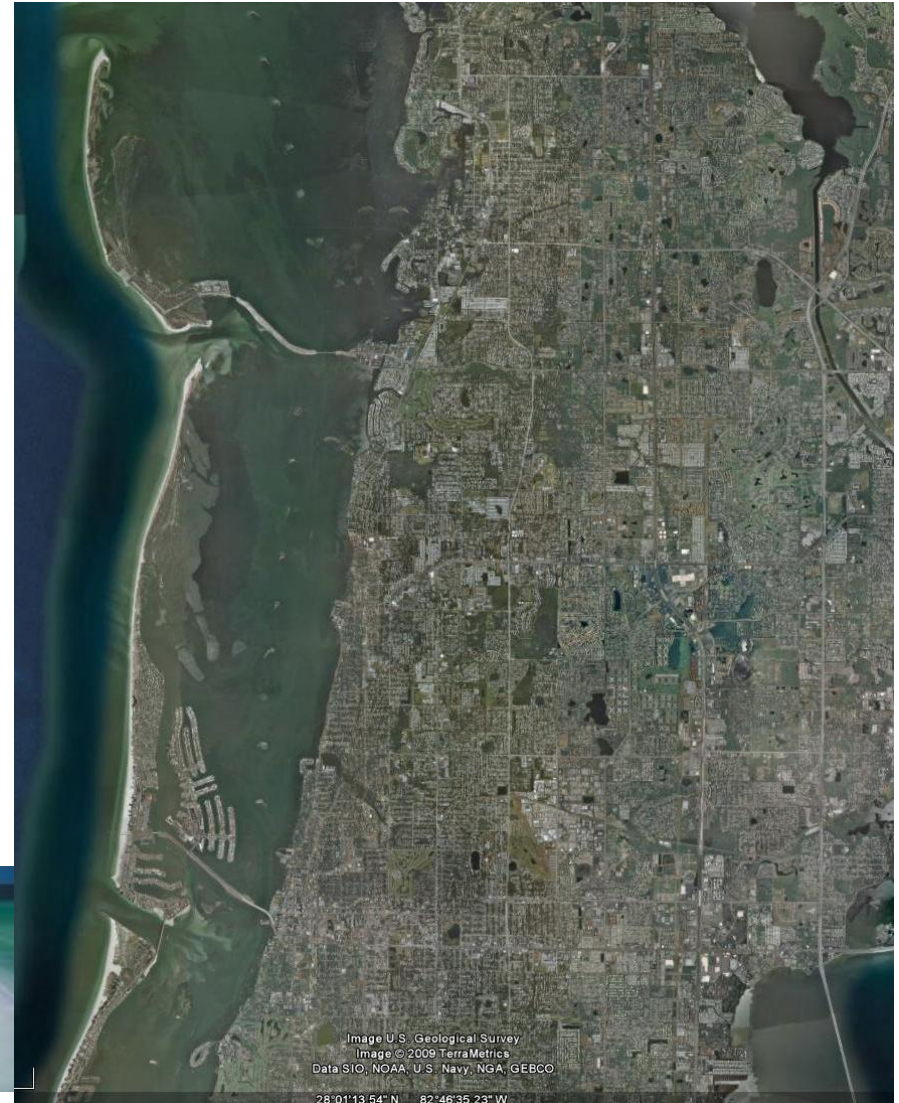
West-Central Florida

- Very diverse with 29 islands and 30 tidal inlets
- Sediment starved coast with materials resulting from reworking
- Combination of wave dominated and mixed energy features



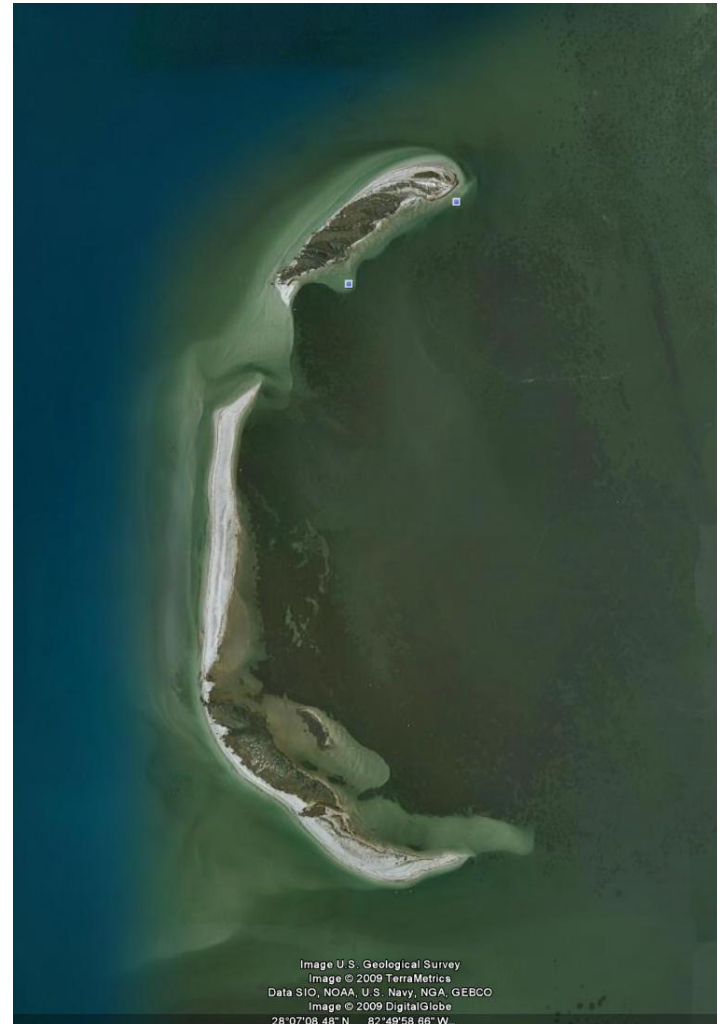
West-Central Florida

- Honeymoon Island is entirely a state recreation area
- Caladesi Island is accessible only by boat
- Clearwater Beach Island is highly developed



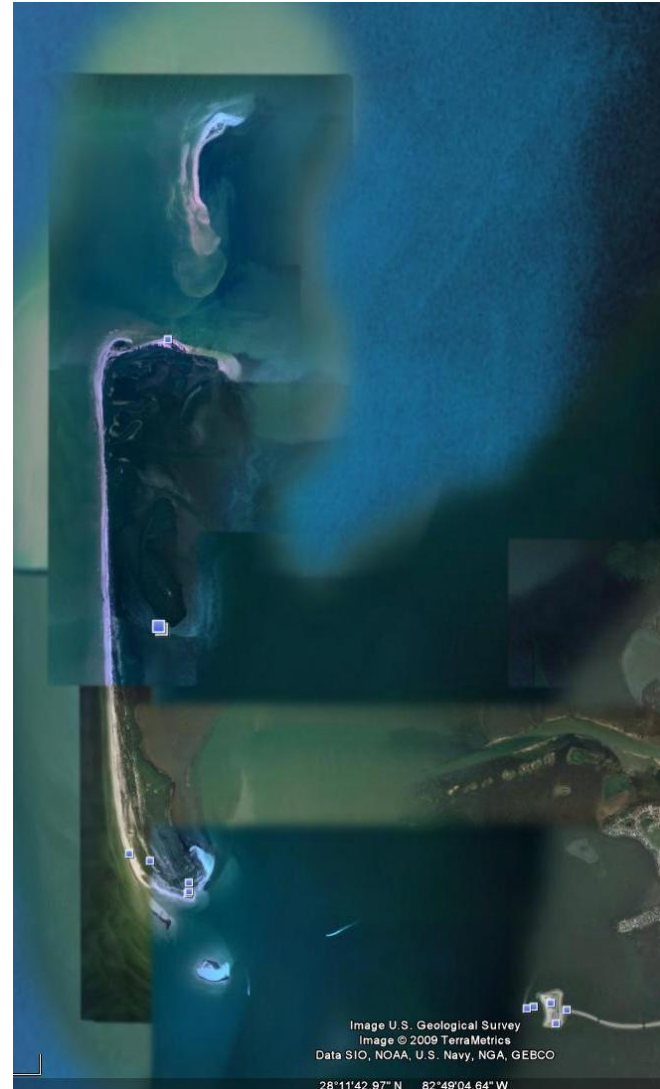
West-Central Florida

- THREE-ROOKER BAR ISLAND
- Small, semi-circular island
- Emerged within the last decade
- Accumulating sand from other eroding islands



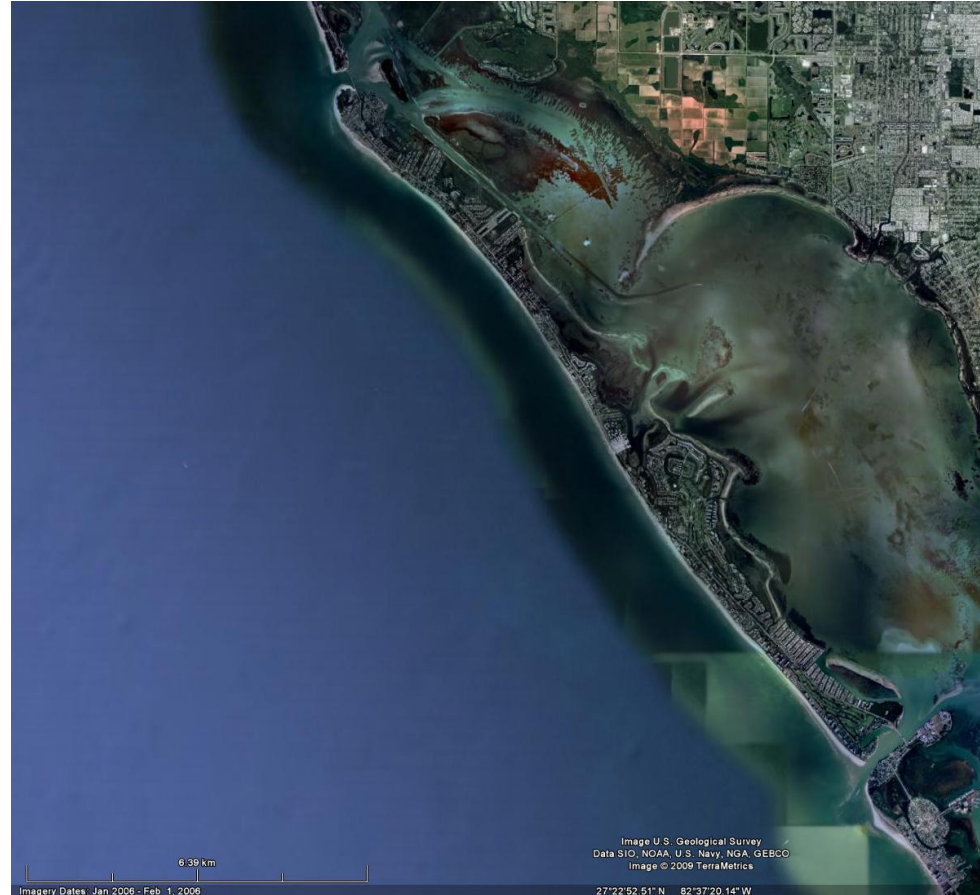
West-central coast

- ANCLOTE KEY
- Northern most island
- Houses Anclothe Key State Preserve and National Wildlife Refuge
- Experiencing erosion



West-Central Florida

- Longboat Key
- 10 miles long
- Lido Key
- Formed artificially in the 20's when a series of mangrove islands was filled with dredge material



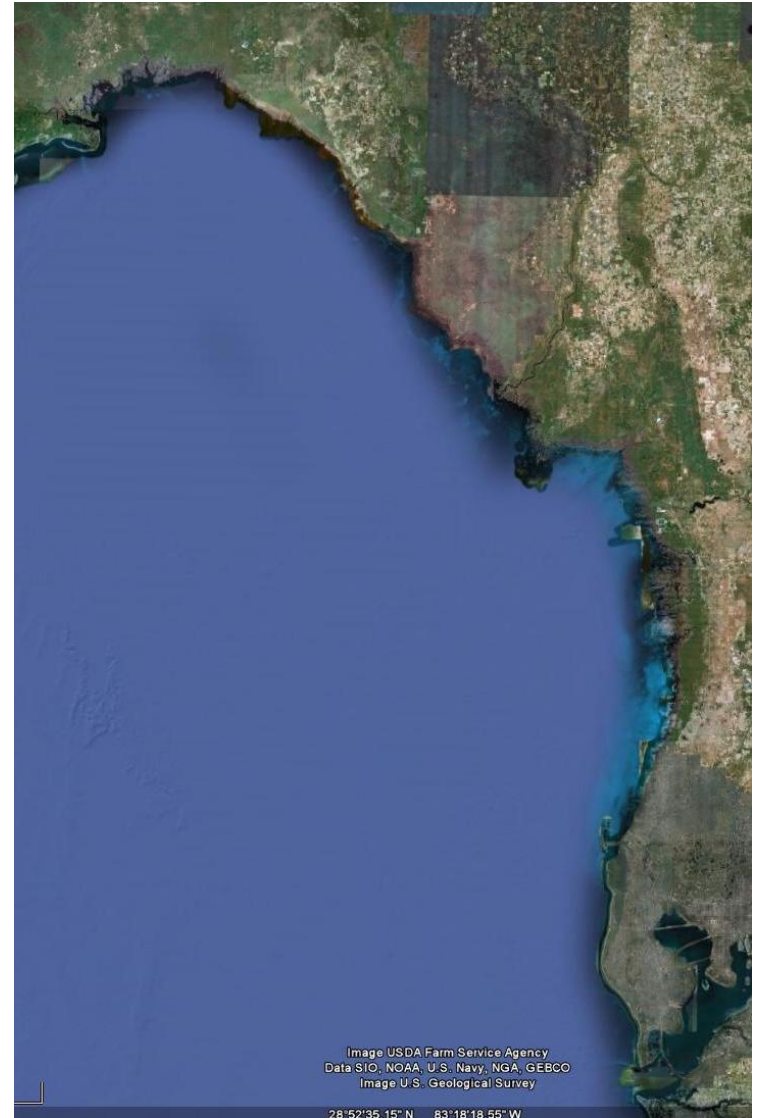
Florida Big Bend

- SUWANNEE COAST
- Extends from Bowlegs point to the Withlacoochee river
- Includes the Cedar Keys which consist of twelve small barrier islands



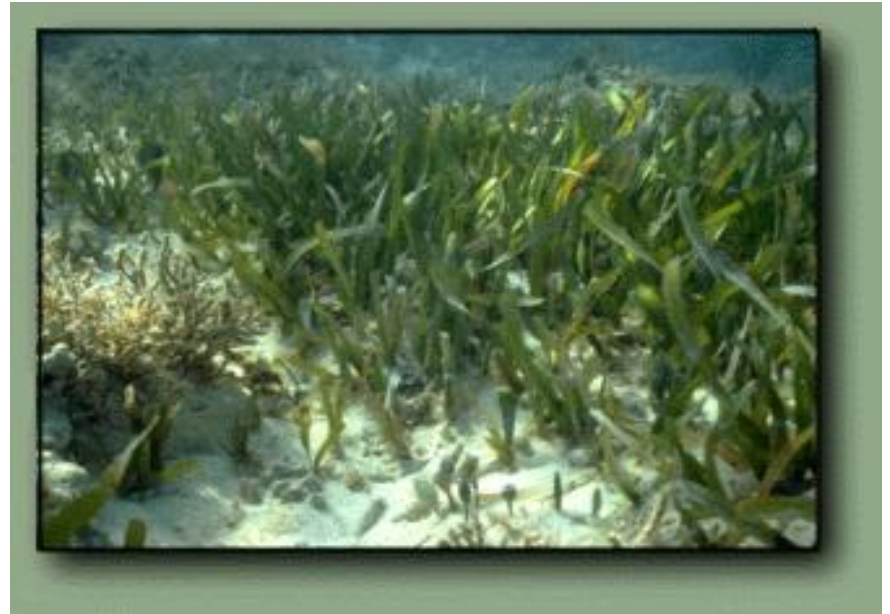
Florida Big Bend

- Extends from the St. Marks River to Anclote River
- Shallow offshore shelf
- Creasent shaped coastline
- Low wave action
- Few narrow sandy beaches



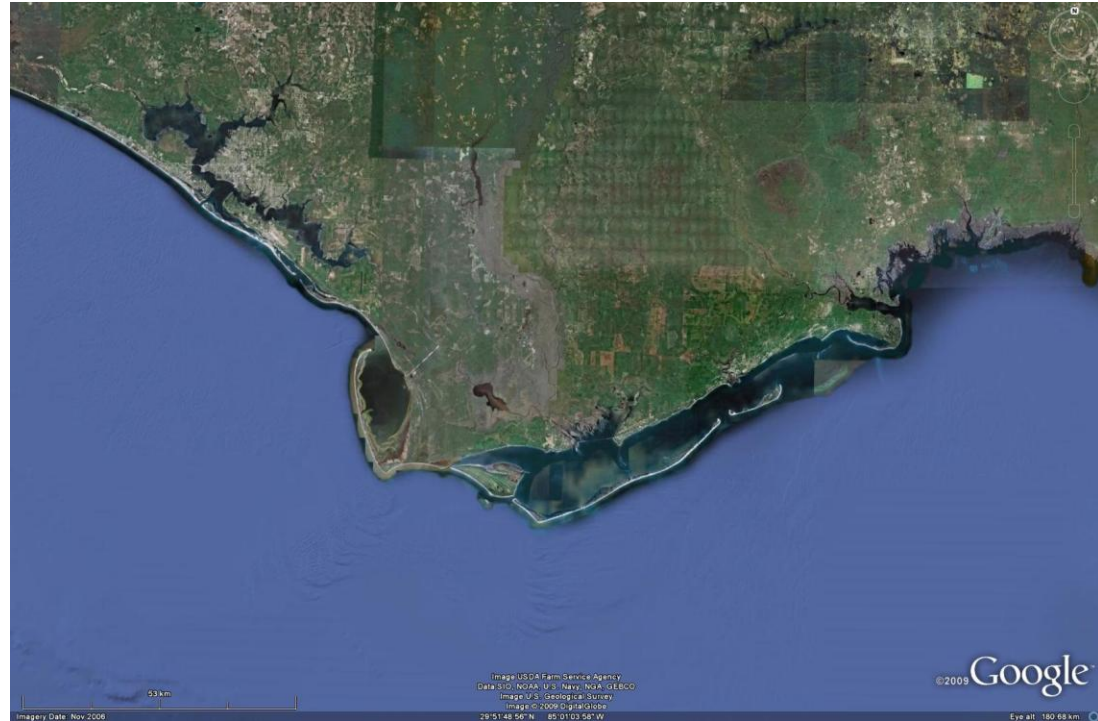
Florida Big Bend

- Tidal creek and river delta dominated
- Extensive Seagrass beds, salt marshes and coastal wetlands
- Area divided into three subregions



Florida Panhandle

- Sediment source from the Apalachicola river
- Nearly continuous barrier islands
- Result from sediment reworking
- Mostly wave dominated with a east-west sediment drift



Florida Panhandle

- St. Vincent Island is protected by the National Wildlife Refuge and is a haven for endangered species (bald eagle)
- St. George Island was split in two in 1954 by the army corp of engineers to form a shipping channel
- Dog Island was frequented by pirates and is extensively studied by FSU



Florida Panhandle

- Perdito Key is a 247 acre island in which half is preserved and half is covered by upscale development
- Santa Rosa barrier island is 40 miles long and is mostly protected by the Gulf Island National Seashore



Where do I stand on global



When you are in deep trouble,
say nothing, and try to look inconspicuous.