CIRP's RSM Tools
Coastal Modeling System
GenCade

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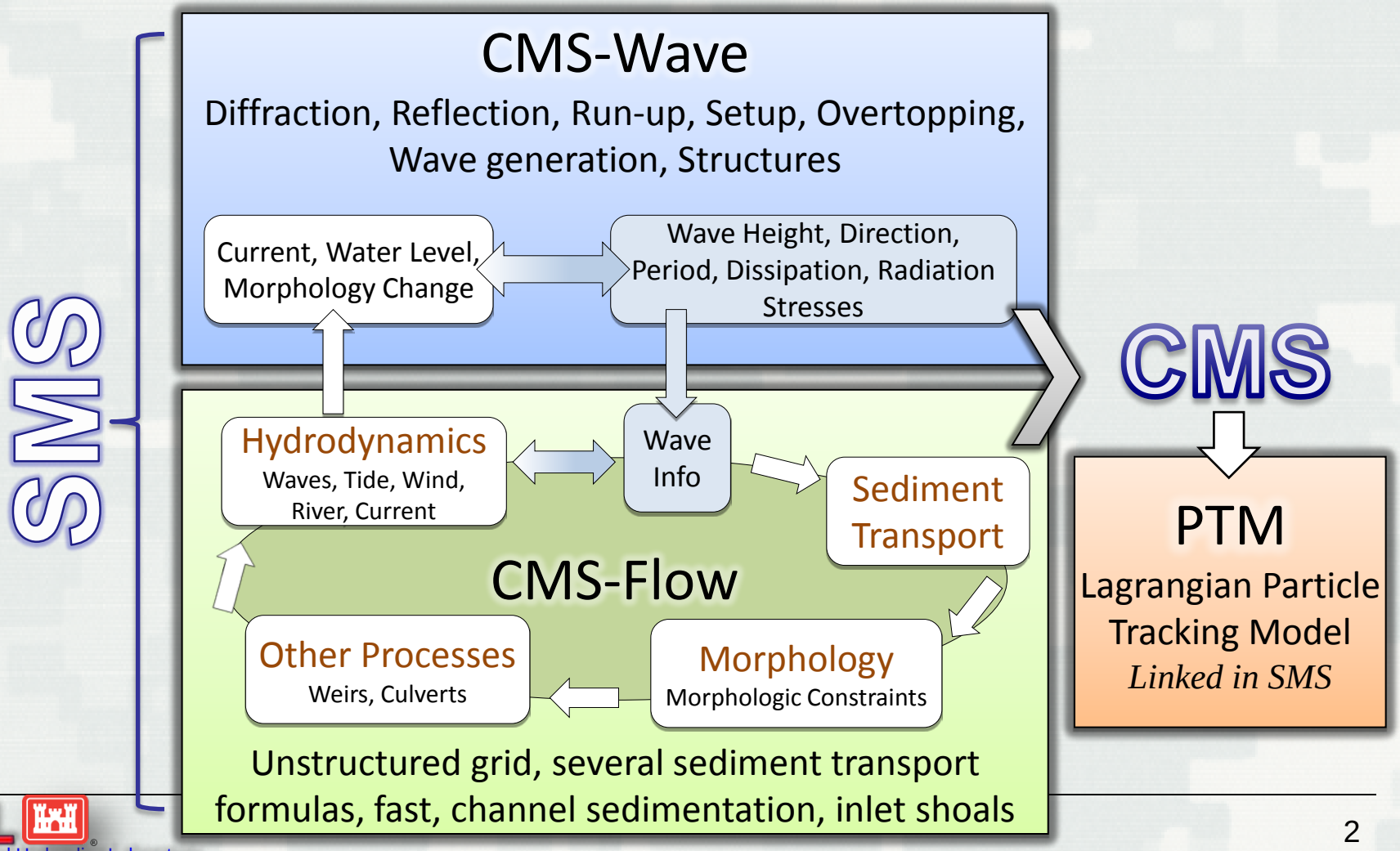
BUILDING STRONG®

Coastal Modeling System (CMS)

What is the CMS? Integrated wave, current, and morphology change model in the Surface-water Modeling System (SMS).



CMS Applications

POC: Alejandro Sanchez

Statements of Need

Need long-term morphologic evolution predictors
Tracking Number 2008-N-6

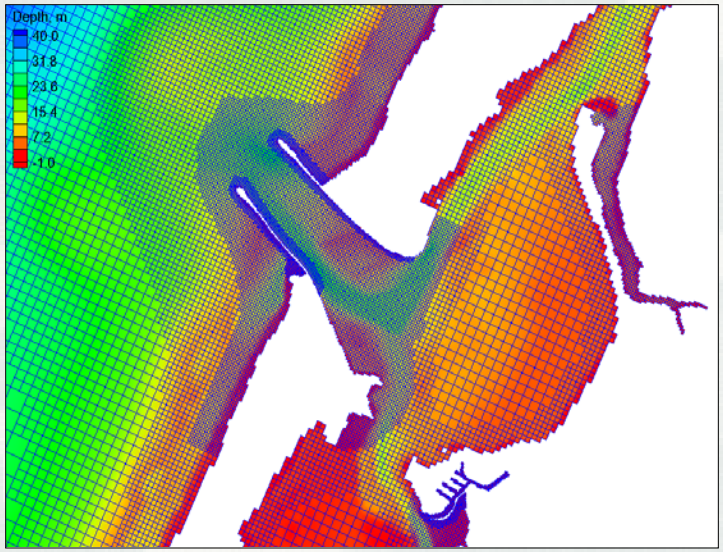
Types of Applications

Channels: Deepening, widening, lengthening, realigning

Jetties: Lengthening, raising, rehabbing

O&M: Placement areas – berms, wetlands

Processes: *Navigability* – waves and currents; *Environmental* – circulation, sediment transport; *Regional Sediment Management* – evolution of placement areas



CMS Grid at Humboldt Entrance, CA

The World of CMS

West Coast/Pacific

Mouth of Columbia River, WA/OR
Seattle, WA (CMS-Wave)
Grays Harbor, WA
Willapa Bay Toke Point, WA (NWS)
Willapa Bay Center, WA
Noyo, CA
Humboldt, CA
Ocean Beach, CA
Dana Point, CA
Pelekane, HI
Cold Bay, AK
Ketchikan, AK (CMS-Wave)

Great Lakes

Cleveland Harbor, OH
New Buffalo, MI
Lake Erie
Ontario Beach, Rochester, NY

Gulf

Bahia Grande, TX
Mouth of Colorado River, TX
Matagorda Ship Channel, TX
Baffin Bay, TX
Corpus Christi Bay, TX
Houston-Galveston, TX
Sabine Pass, TX

Gulf (cont)

Port of S. LA, Bonne Carie, LA
White Ditch, Plaquemines Parish, LA
Pensacola Pass, FL
Eglin-Ft. Walton Beach, FL
New Pass, FL (SAJ)
Big Sarasota Pass, FL (SAJ)
Sarasota Bay (SAJ)
Blind Pass, FL
Johns Pass, FL
Tampa Bay, FL
Venice Inlet, FL
Gordon Pass, FL
Longboat Pass, FL
Wiggins Pass, FL
Gasparilla Island, FL
Anna Maria Island, FL
Cape Sable Canal, FL
Key West Federal Navigation Channel (SAJ)

Atlantic

Singer Island, FL
Palm Beach Harbor/Lake Worth Inlet, FL (SAJ)
Sebastian Inlet, FL
St. Augustine, FL
Jacksonville Harbor, FL (SAJ)
Rudee Inlet, VA
Poplar Island, MD
St. Jerome Bay, MD

Atlantic (cont)

Rooster Island, MD
Havre De Grace, MD
Ocean City Inlet, MD
Cape Fear, NC
St. Augustine, Del. Bay, DE
Point Lookout, NY
Shark River Inlet, NJ
Hereford Inlet, NJ
Pleasant Bay, MA
Lake Montauk, NY
Askaroken, NY
Shinnecock Inlet, NY
Moriches Inlet, NY
East Harbor, MA (NAE)
Rhode Island (RSM) (NAE)
Great Egg Harbor, NJ (NAP)

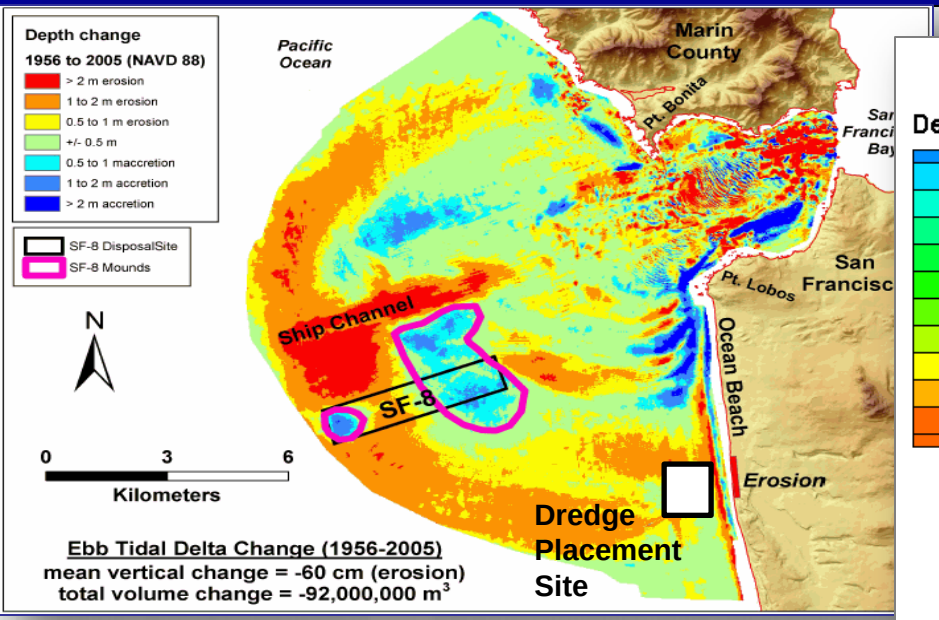
International

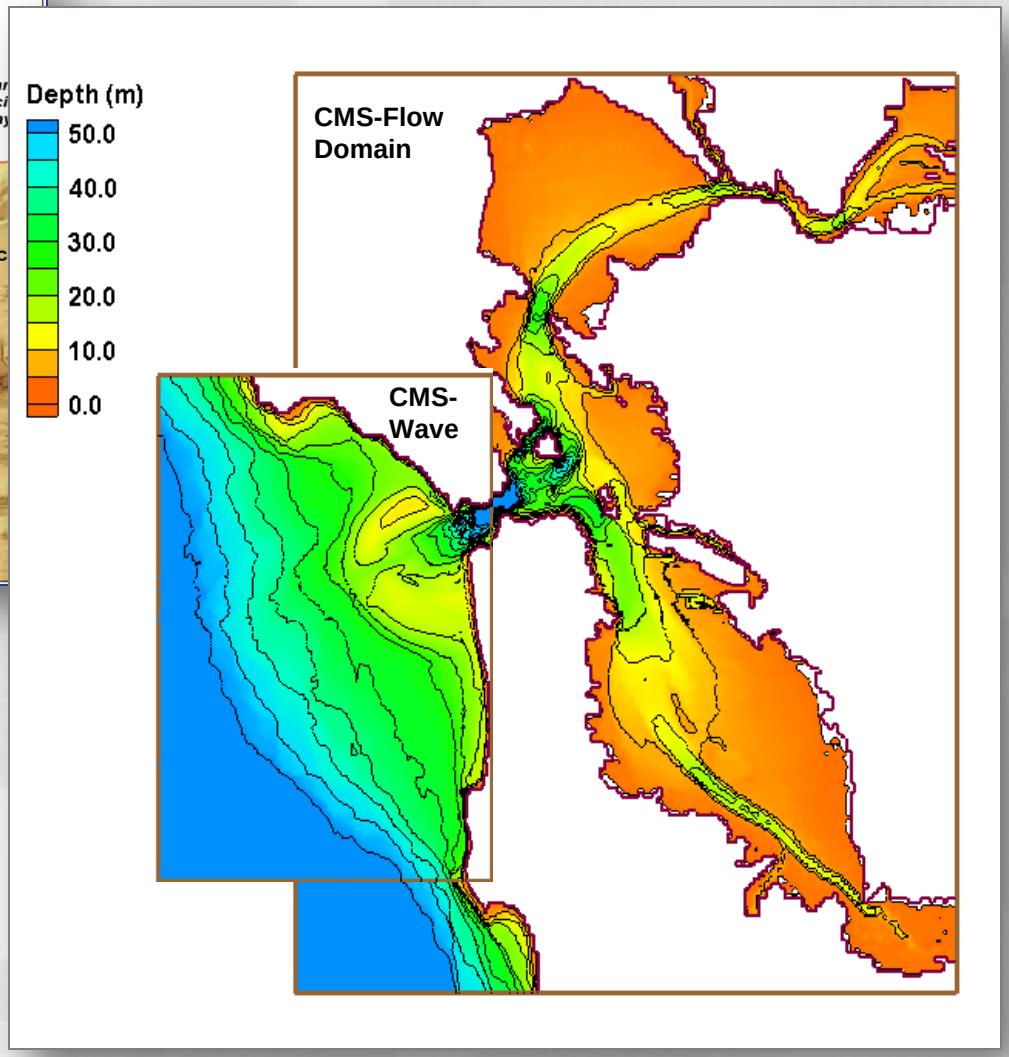
NW Australia
Veracruz, Mexico
Grand Cayman Is., Bahamas
Bardawil Lagoon, Egypt
Nanaimo, British Columbia, Canada (CMS-Wave)
Papua New Guinea (CMS-Wave)
Equatorial Guinea, Africa (CMS-Wave)

CMS Licenses

CANADA	4
CHINA	5
COLOMBIA	1
GERMANY	1
GUATAMALA	1
INDIA	1
INDONESIA	1
ITALY	1
JAPAN	1
JORDAN	4
ROMANIA	2
S. KOREA	6
SPAIN	5
TAIWAN ROC	1
U.K.	4
USA	30
VENEZUELA	1
VIETNAM	2
TOTAL	71

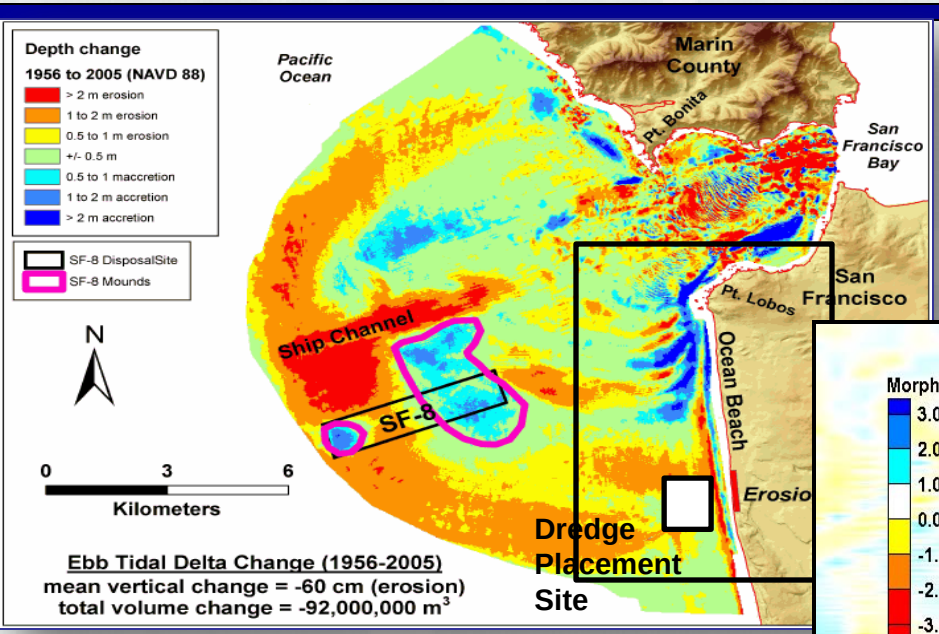
RSM Applications of CMS: Ocean Beach, CA



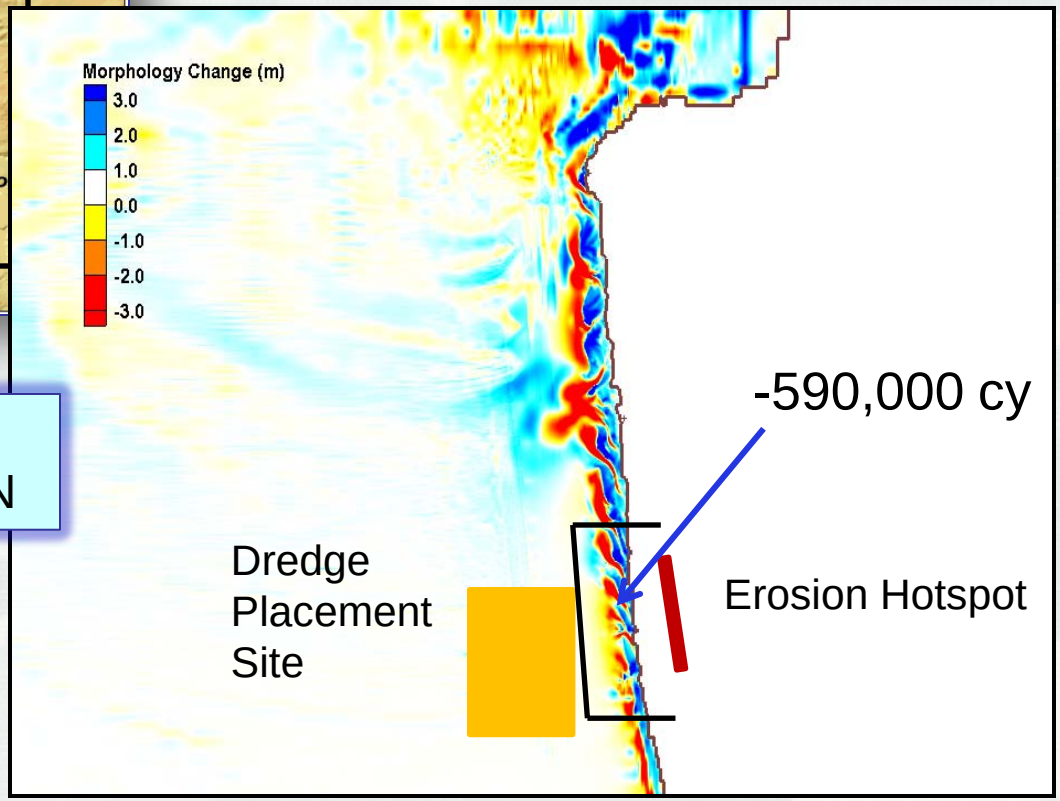


POCs: Honghai Li, Lihwa Lin, CHL
Lisa Andes, Frank Wu, SPN

RSM Applications of CMS: Ocean Beach, CA



Sediment Transport (bedload + suspended load) Bed Elevation Change after 25-day Simulation

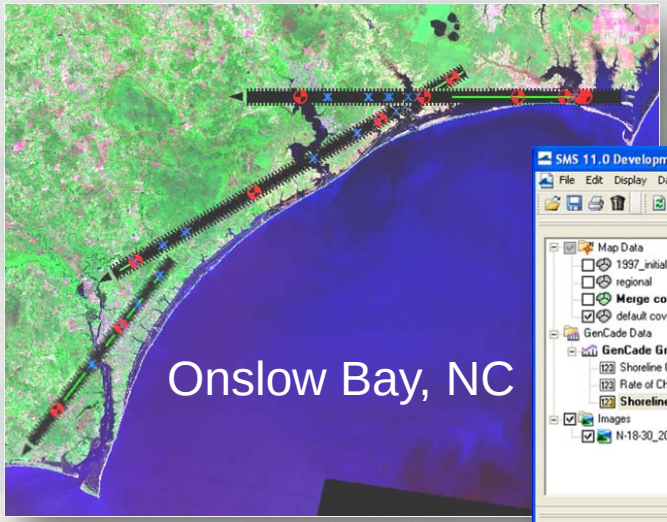


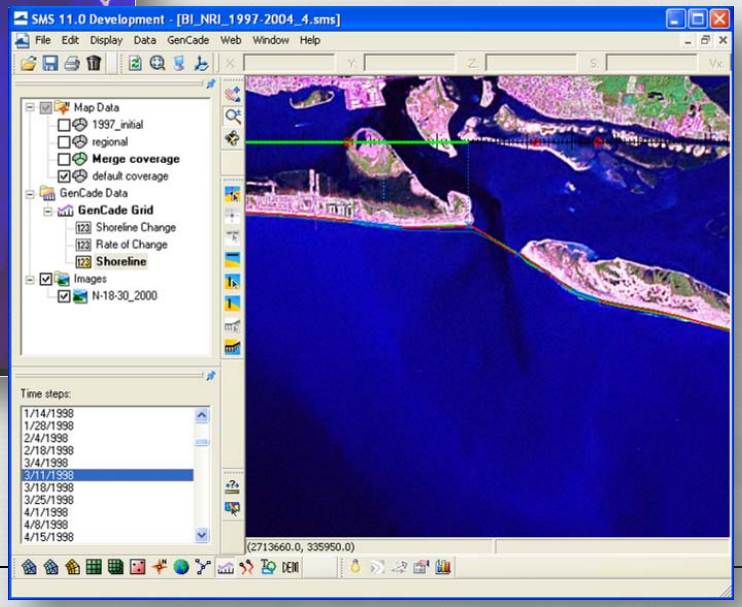
POCs: Honghai Li, Lihwa Lin, CHL
Lisa Andes, Frank Wu, SPN

GenCade

What is GenCade?

- Integrated GENESIS and CASCADE models for shoreline change and regional sediment calculation
- Connects inlets, navigation channels, ebb and flood shoals, and beaches in engineering activities in a regional framework.
- Decision-making support for planning, operation, and engineering.



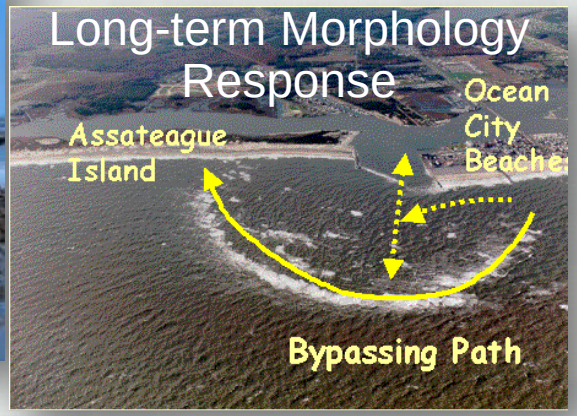


First GenCade Workshop, Feb '11

Next GenCade Workshop, Aug '11

POC: Ashley Frey

GenCade (cont.)

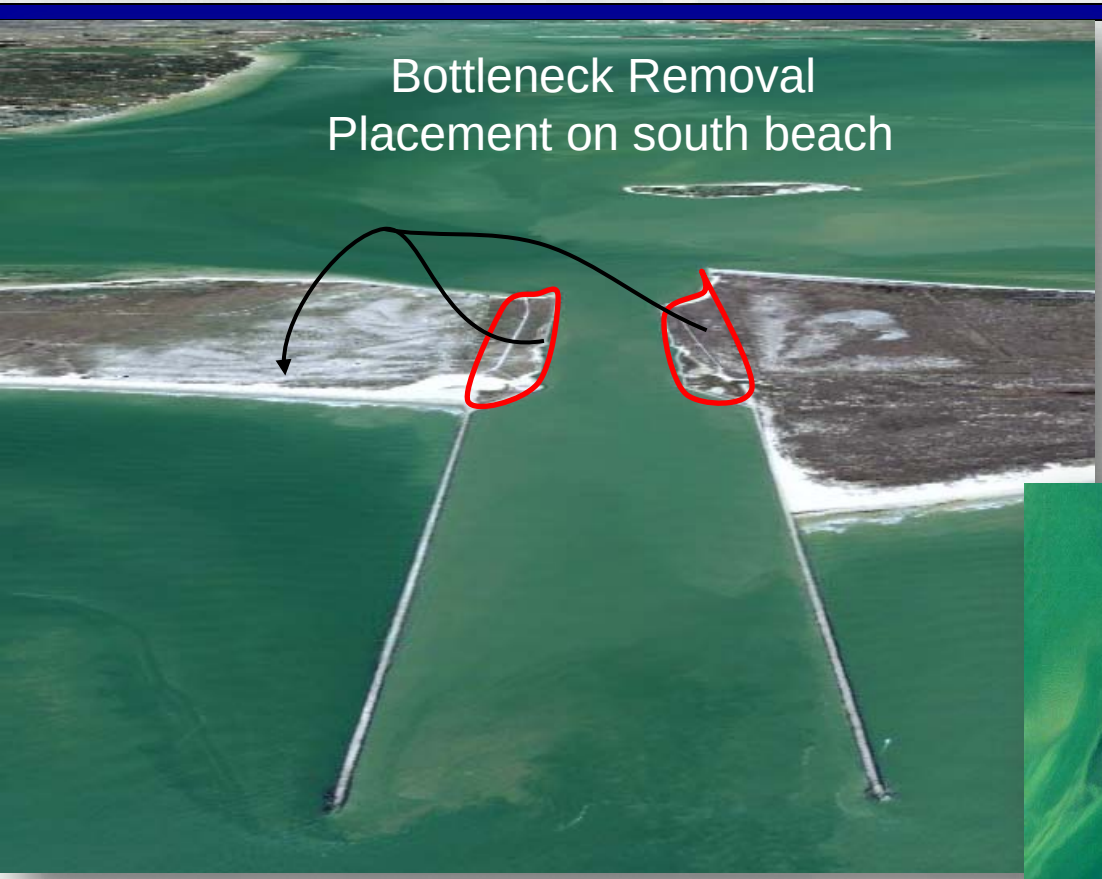


Why GenCade?

- Sediment storage and transfer (bypassing, back-passing)
- Navigation channel maintenance
- Multiple interacting inlet dredging & placements on beaches
- Cumulative impacts
- Sources & sinks (shoal dredging and beach nourishment)
- Compatibility with data and previous calculations
- In SMS 11.0; PC, user-friendly interface for engineers & scientists

GenCade

Matagorda Ship Channel Structural Alternatives



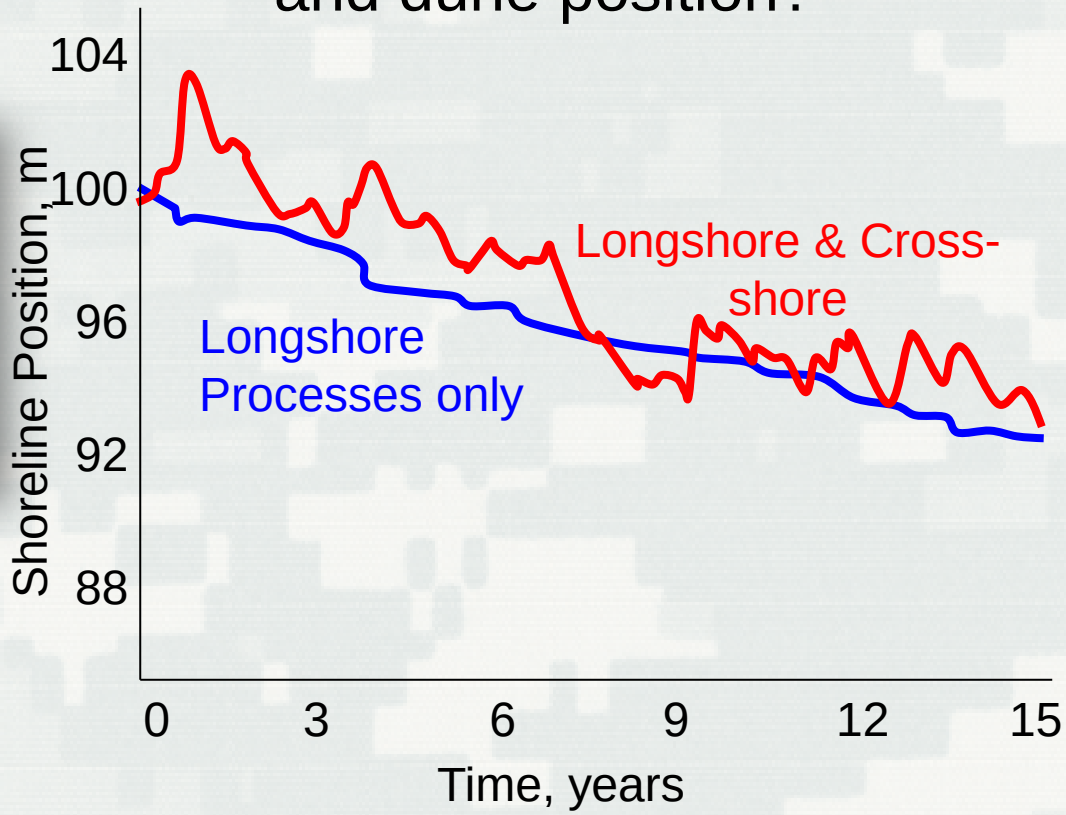
GenCade evaluated shoreline change and downdrift inlet response for various alternatives

Statements of Need

Need long-term morphologic evolution predictors
Tracking Number 2008-N-6

Implement Cross-shore Processes

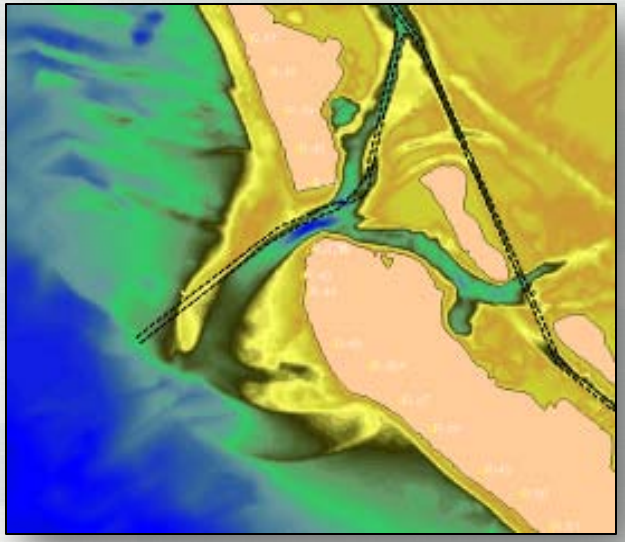
How do cross-shore processes affect shoreline and dune position?



Spit Growth, Inlet Migration & Channel Evolution

(a) shoals navigation channel, (b) reduces tidal exchange into bay/estuary/lagoon, (c) reduces sand bypassing.

Action 3.2.2 of Navigation Strategic Vision
"Establish practices…optimize environmental windows…maximize beneficial use of O&M"



Inlet Cross-Sectional Evolution: as function of time varying longshore transport, cross-shore transport, and channel shoaling