RESEARCH & DEVELOPMENT UPDATE

Patricia DiJoseph, PhD
Harbors & Navigation Committee and QPI Meeting
18-19 April 2018
USACE NAVIGATION MISSION

Corps is tasked with maintaining a vast, aging water resources infrastructure portfolio that is critical to national well-being.

Navigation projects at coastal ports and along inland waterways facilitate marine transportation and help support complex, dynamic, global freight supply chains.

Challenge going forward is how to optimally support the national Marine Transportation System (MTS) using available resources.
AIS DATA PROCUREMENT

Commercial providers offer archival data and real-time feeds, addressing many of the logistics needs of shippers and carriers.

Coast Guard’s NAIS is the authoritative government repository for archival AIS. Available to federal personnel via manual data requests through USCG NavCenter:
http://www.navcen.uscg.gov/?pageName=NAISmain

USACE maintains an Interagency Security Agreement (ISA) with USCG to enable AIS data sharing and web services access to its Nationwide AIS.
LOCK OPERATIONS MANAGEMENT APPLICATION (LOMA)

Provides situational awareness and information dissemination for tactical navigation operations.

Serves diverse navigation stakeholders:
- Aids lock operators with lockage planning, maintenance.
- Provides vessel operators with dynamic navigation information.
- Gives Corps management an operational view of waterways.
- Included information interfaces with internal and external navigation systems.

Uses AIS to track and communicate with vessels.
Variety of built-in analysis and visualization capabilities:

- Heat/cluster maps
- Vessel track line overlays
- Traffic statistics (vessel types, counts, sizes, etc.)
- Travel/dwell time analysis
- Time history plots of vessel speeds and trip counts
AISAP TRACK LINE OVERLAYS
POTENTIAL APPLICATIONS

- Wake-induced wave energy/shoreline erosion (couple to numerical wave models as well as field measurements).

- Provide monthly indicators for port throughput based on calibration with Corps’ Waterborne Commerce Statistics

- Functional performance evaluation of jetties and breakwaters (for wave and adverse current suppression)
POTENTIAL APPLICATIONS

- Vessel traffic patterns within a channel
  - Two-way passing
  - Overtaking
- Vessel traffic effects on transit times
- Operating conditions effects on transit times
RESILIENCY STUDIES
HURRICANE MATTHEW 2016 – NET VESSEL COUNT

Port of Savannah - Cargo and Tanker Net Vessel Count

Captain of the Port declares port CLOSED on 10/06/2016 at 18:00UTC

Hurricane Matthew passes on 10/07/2016 at 07:00UTC

PSAV fully reopens to vessel traffic on 10/12/16 at 07:00UTC

Hurricane Matthew declared a tropical storm 9/28/2016 00:00UTC

Bayesian changepoint algorithm detects changepoint from recovery to "post storm normal" on 10/22/16

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HURRICANE HARVEY 2017 VESSEL LOCATIONS

Hurricane Harvey Cargo and Tanker Vessel Signal Density Plots

Created with ERDC Automatic Identification System Analysis Package (AISAP)

August 1, 2017
Tropical Storm Harvey will be named August 16

August 24, 2017
USCG declares Port of Houston under condition Yankee

August 25, 2017
USCG declares Port of Houston under condition ZULU

August 26, 2017
Hurricane Harvey makes landfall at Rockport & becomes a tropical storm over inland Texas

August 28, 2017
Harvey recedes towards the Gulf, record rainfall recorded at 51.88 in

September 4, 2017
Vessels queue at anchorage areas. Port reopens with restrictions September 6th.

ERDC Navigation Data Performance Team: Katherine Touzinsky, Kenneth N. Mitchell, Patricia Dijoseph, Marin Kress
Corps Shoaling Analysis Tool (CSAT)

➢ What will the channels look like in the future?
➢ Use historical survey data from eHydro and generate difference grid sets between dredging events
➢ Predict average shoaling rates and dredging requirements per channel reach
➢ Report volumes at different depth/time intervals and shoaling rates
➢ Efficiently process large spatial datasets
Engineering With Nature®

...the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.

Key Elements:

- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Broaden and extend the benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners
MOBILE BAY, AL

**WRDA86:**
Place all dredged sediments in ODMDS
- 4.0 Mcy/yr, Hopper Dredge, 20-Miles
- Tripled maintenance costs
2014 Decision reversed
- ERDC Tools and Technologies
- RSM Interagency Work Group

**$12M annual value**
- Thin Layer Placement in Mobile Bay
- Sand Island Beneficial Use Area (SIBUA)
  - Downdrift benefits to Dauphin Island
  - Protect lighthouse
- Fill dredge holes
  - Brookley Hole, Oyster Holes
- Gaillard Island
  - Biodegradable Containment
  - Marsh Creation
  - Brown Pelican

**Future in-Bay placement:**
- Thin Layer Placement
  - 1000 acre emergent marsh
HORSESHOE BEND ISLAND EWN PROJECT
ATCHAFALAYA RIVER, LA

**Producing Efficiencies**
Material placement created new channel, reduced frequency of maintenance dredging; shortened transit distance for ships.

**Using Natural Processes**
Used rivers natural flow and conveyance to engineer/construct island.

**Broadening Benefits**
New placement option for material; economic benefits for navigation; diverse habitat created; site used for recreational purposes.

**Promoting Collaboration**
MVN and ERDC partnered with USFWS, Port of Morgan City to achieve results.

THANK YOU

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