# Coastal Inlets Research Program

# Tools to Investigate Erosion due to Vessel Operations

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## Issue

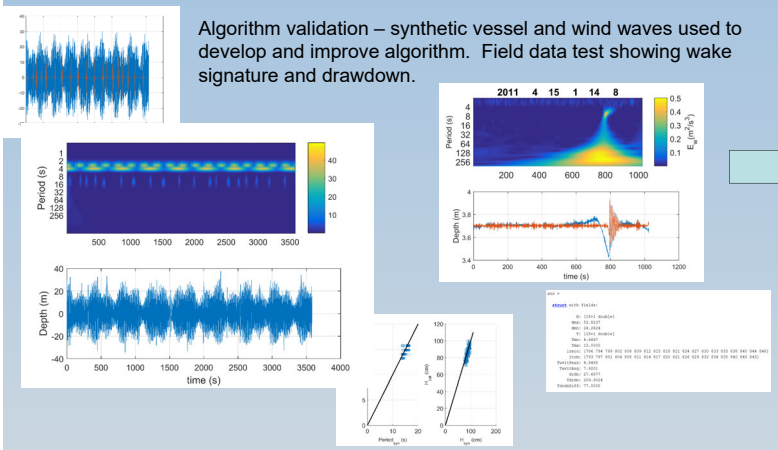
The arrival of larger Post Panamax vessels combined with the overall projected increase in commercial and recreational vessel traffic requires new technologies and techniques to rapidly assess the potential impact to shoreline stability and vulnerable ecological communities

## Research Goals

This research aims to:

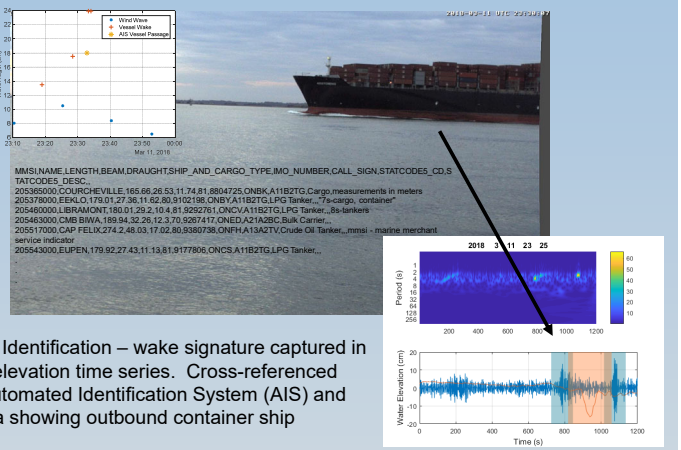
- Develop tools to quantify the effect of vessel wake on shoreline erosion
- Develop indicators to match vessel wake signature to individual vessel type

## Vessel Wake Detection



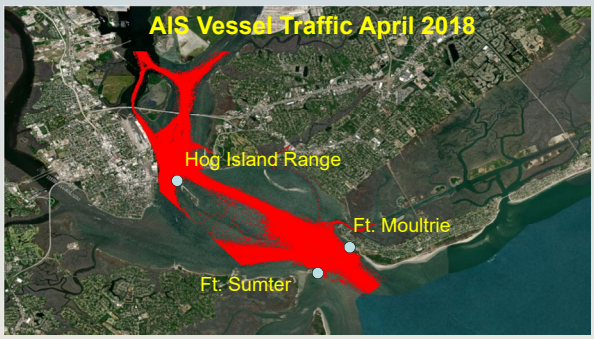

Algorithm validation – synthetic vessel and wind waves used to develop and improve algorithm. Field data test showing wake signature and drawdown.

## Cross-reference with AIS

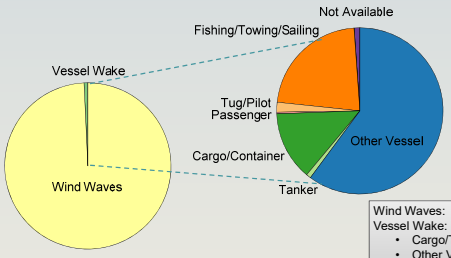



Vessel Identification – wake signature captured in water elevation time series. Cross-referenced with Automated Identification System (AIS) and camera showing outbound container ship

# Tool Application – Charleston Harbor Deepening Project



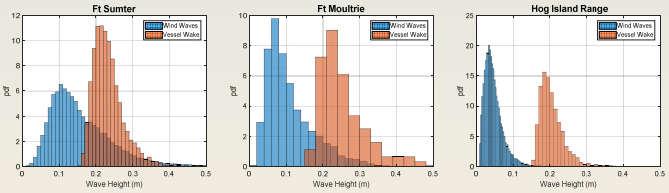

Total Energy Dissipated 2018 Pre-construction Phase – Ft Sumter

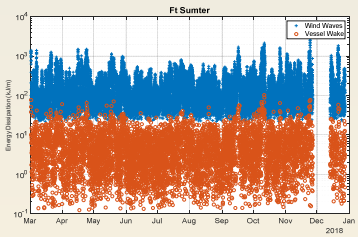



Energy x $10^4$ kJ/m

| | |
|---|---|
| Wind Waves: | 432 |
| Vessel Wake: | 3.0 |
| • Cargo/Tanker | 0.5 |
| • Other Vessel | 2.5 |
| Total Energy: | 435 |

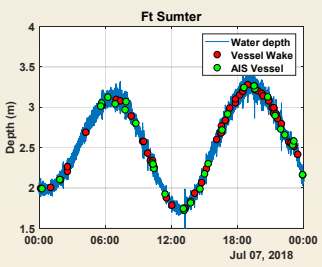
Wave Height Distribution 2018




Total vessel wake and wind energy in 2018

Vessel activity July 4th weekend




## Future Work

- Improve amplitude detection algorithm to better constrain uncertainty for vessel wake and drawdown
- Further testing on other datasets – different environmental settings and navigation conditions
- Automation to support projects – develop robust software IO and uncertainty analysis

## Availability

- Vessel wake prediction tools
- Technical Reports, Technical Notes, journal papers, and presentations
- Assistance through emails, phone calls, workshops, DOTS training
- CIRP website http://cirp.usace.army.mil/

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