



Currituck Sound Monitoring Array

Facilitating Innovation in Estuarine Research through State-of-the-Art Observations

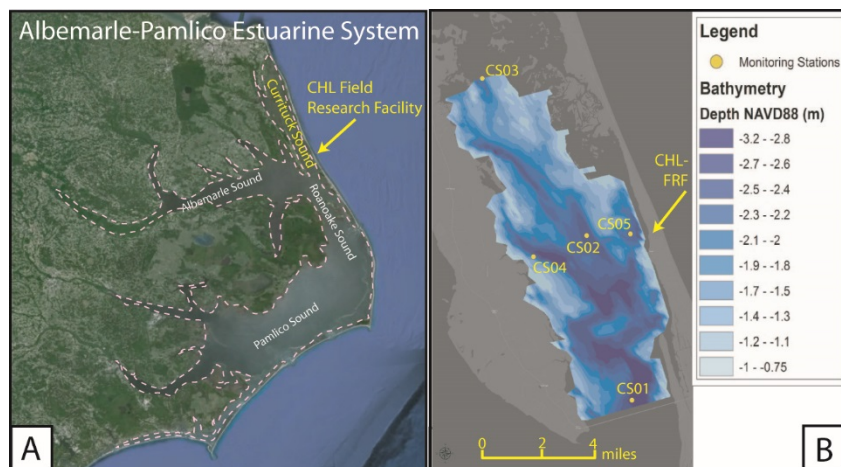


Figure 1: (A) Location of Currituck Sound within the greater Albemarle-Pamlico Estuarine System. (B) Bathymetric map of Currituck Sound showing the location of the five monitoring platforms.

The U.S. Army Engineer Research and Development Center (ERDC) Coastal and Hydraulics Laboratory (CHL) is installing a long-term estuarine monitoring array in the greater Albemarle-Pamlico Estuarine System (APES). CHL's property encompasses nearly a kilometer of pristine estuarine shoreline on Currituck Sound, which is part of the greater Albemarle-Sound Estuarine System (APES; Figure 1A). Once fully online (summer, 2016), the five monitoring platforms (Figure 1B) will provide real-time meteorological, hydrodynamic, and water quality measurements along both cross-shore and alongshore axes of Currituck Sound. This monitoring array will be one of the most comprehensive, relative to estuary size, suite of long-term, real-time, lagoonal estuarine measurements in the world. The platforms themselves are available to host additional

instrumentation in support of more focused estuarine research experiments for both USACE and the greater scientific community.

Problem

Significant progress has been made towards understanding circulation dynamics/hydrodynamics and associated sediment transport in coastal and open estuarine environments. However, comparable research efforts in complex, lagoonal estuaries has only seen limited success. In particular, modeling of hydrodynamics and the transport of mixed sand-mud (heterogeneous) sediments, including efforts to model storm surge and associated coastal erosion, in these complex regions suffers from a paucity of high-resolution, long-term data. These complex systems are common along the U.S. coastlines, representing ~13% of the world's shorelines, and present a great challenge to both coastal planners as well as potential military operations. The new monitoring array in the Currituck Sound will provide critical baseline data to improve our understanding of hydrodynamics and sediment dynamics, as well as changes in water quality and shoreline stability, in complex estuaries, providing quantitative improvements for existing estuarine models.

What We Can Do

The monitoring platforms have been designed to last for ~30 years under North Carolina's harsh environment, withstanding yearly nor'easters, tropical events, and winter ice (Figure 2). The platforms have further been designed with special, diver-free instrument deployment and retrieval systems, to minimize maintenance costs. Finally, the platforms have been designed with sufficient physical space, power, and data collection/streaming capabilities allowing visiting researchers to incorporate specialized instrumentation in support of future field experiments or studies.

- Measurements at all stations will include
 - winds (including a full wind profile at CS02)
 - waves, currents, water level
 - temperature, turbidity, salinity.
- Measurements at select stations will include
 - seabed elevation change

- light attenuation
- dissolved oxygen, Chlorophyll A fluorescence (algae), dissolved organic matter fluorescence (fDOM), and pH.
- All data will be publically available in real-time via the CHL Data Portal, CHL's state-of-the-art data discovery tool and repository.

Why You'll Want to Work with Us

The research team at the Field Research Facility has over 30 years of experience in deploying and maintaining oceanographic instruments, from designing instrument-specific mounts that can survive under harsh conditions, to QA/QC-ing and interpreting complex oceanographic data. Specific capabilities include:

- complete metal fabrication shop for instrument mount fabrication
- multiple vessels designed for shallow-water research.

ERDC Points of Contact

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Figure 2: CS05 monitoring platform.

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