OLD DOMINION UNIVERSITY
Center for Coastal Physical Oceanography

INSTITUTE FOR COASTAL ADAPTATION & RESILIENCESM

Fall 2025 Virtual Seminar Series

"MEASURING WHAT MATTERS: RELIABLE DRONE MONITORING OF HYBRID NATURE-BASED SHORELINE CHANGE"

HANNAH SIRIANNI
East Carolina University

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3:30 PM EST

ZOOM LINK
Meeting ID: 974 2572 5966
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Abstract

Nature-based shoreline protection is expanding rapidly, yet most monitoring captures only infrequent, post-construction snapshots that overlook short-term and seasonal dynamics. At Sugarloaf Island, North Carolina, we conducted eight seasonal drone surveys between 2023 and 2025, each covering paired east and west island segments to document shoreline and habitat change before, during, and after installation of hybrid Wave Attenuation Devices (WADs) and oyster breakwaters. Using drone-based photogrammetry and RTK-GNSS control, each dataset produced dense point clouds (>700 pts/m²), 0.05 m digital elevation models, and 0.007 m orthomosaics with sub-decimeter geolocation accuracy (XY RMSE = 0.008–0.044 m; Z RMSE = 0.030–0.089 m). Repeat surveys reveal localized sediment accretion and marsh persistence behind WADs, contrasting with continued retreat along unprotected margins. Along a representative transect, marsh-edge retreat declined from ~5 m pre-installation to <0.3 m post-installation, indicating a measurable reduction in shoreline migration. This seasonally structured, high-precision record demonstrates how continuous drone monitoring can capture geomorphic and ecological responses to hybrid shoreline stabilization and provides a reproducible foundation for evaluating the performance and adaptability of nature-based coastal infrastructure.

Biography

Dr. Hannah Sirianni earned a B.A. and M.A. in Geography from the University of Hawaiʻi at Mānoa and a Ph.D. in Geosciences from Florida Atlantic University. She is an Associate Professor in the Department of Earth, Environment, and Planning at East Carolina University. Her research integrates drone-based photogrammetry, RTK-GNSS surveying, and geospatial analysis to quantify shoreline and habitat change and to advance reproducible methods for coastal mapping and resilience assessment.

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