Decadal scale modeling of berm and dune evolution using a coupled nearshore and aeolian process model
Matthew B. Vincent, University of North Carolina Wilmington, Department of Earth and Ocean Sciences, Wilmington, NC. mbv4297@uncw.edu
Joseph W. Long, University of North Carolina Wilmington, Department of Physics and Physical Oceanography, Wilmington, NC. longjw@uncw.edu
Andrea D. Hawkes, University of North Carolina Wilmington, Department of Earth and Ocean Sciences, Wilmington, NC. hawkesa@uncw.edu

Abstract
Coupled process-based aeolian and hydrodynamic sediment transport models have become increasingly popular in the study of barrier island resilience. However, many applications of these models to the barrier island environment generalize the cross-shore profile by using an idealized dune shape and constant sloping beach, neglecting small-scale features like the dynamic berm that separates foreshore and backshore environments. Models that include these small-scale features of the profile often lack ground-truth data at frequent time intervals to test and improve model formulations. In this study, I will collect repeat field observations from Masonboro Island, NC to expand, calibrate, and test a coupled process-based, nearshore hydrodynamic and aeolian sediment transport model—XBeach-Duna. I will analyze model results of historical and projected evolutionary trends of the foredune and berm along the island to better understand the forcings and feedbacks of these two features.

Figure 1: Generalized cross-shore profile of a beach-dune system (Modified from Sherman and Bauer (1993) and Cohn et al. (2019)) Core processes are shown according to Cohn et al. (2019) and generalized sub-environments are delineated by Sherman and Bauer (1993).

Figure 2: Expected project workflow. Analysis for all models will include examining dune and berm evolution.

References