NC STATE UNIVERSITY



1. Introduction and Background

Study Area

The Pamlico-Albemarle Sound System (PASS) is situated in the mid-Atlantic coastal area of North Carolina and is the second-largest estuary in the United States.

This system displays significant vertical and horizontal density gradients that govern exchange flow and material transport.



Figure 1: Study domain and major river and ocean water inputs to PASS. The red border shown depicts the area that the ADCIRC mesh enncompasses.

understand





Baroclinic 3D modeling of circulation patterns in the Pamlico-Albemarle Sound System Seun Omogbehin¹ ***** J.C. Dietrich¹

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4. Conclusions

- Surface-salinity time series from the density spin-up were extracted at Oregon Inlet, Ocracoke Inlet, central Pamlico Sound, and central Albemarle Sound. The model captures tidal oscillations, wind-driven pulses, and spatial gradients (Oregon \approx 31 psu \rightarrow Albemarle \approx 2–3 psu) over the 78-day run, indicating realistic baroclinic adjustment.
- 3D ADCIRC reproduces summer stratification patterns across PASS.
- Exchange flow between inlets and inner basins is evident in salinity peaks and lags.

Future Work

- Integrate nutrient and HAB tracers to link circulation with bloom risk.
- Extend hindcasts to spring/fall to capture seasonal stratification shifts.
- Inclusion of heat flux forcing.
- More Intensive analysis of results.





