

# A SOUTH ATLANTIC BIGHT SHELF-TO-GULF STREAM OBSERVATION PROGRAM: TRANSECT EXPEDITION TO ASSESS LAND-TO-SEA HABITATS VIA INTERDISCIPLINARY PROCESS STUDIES ( )

TEAL-SHIPS

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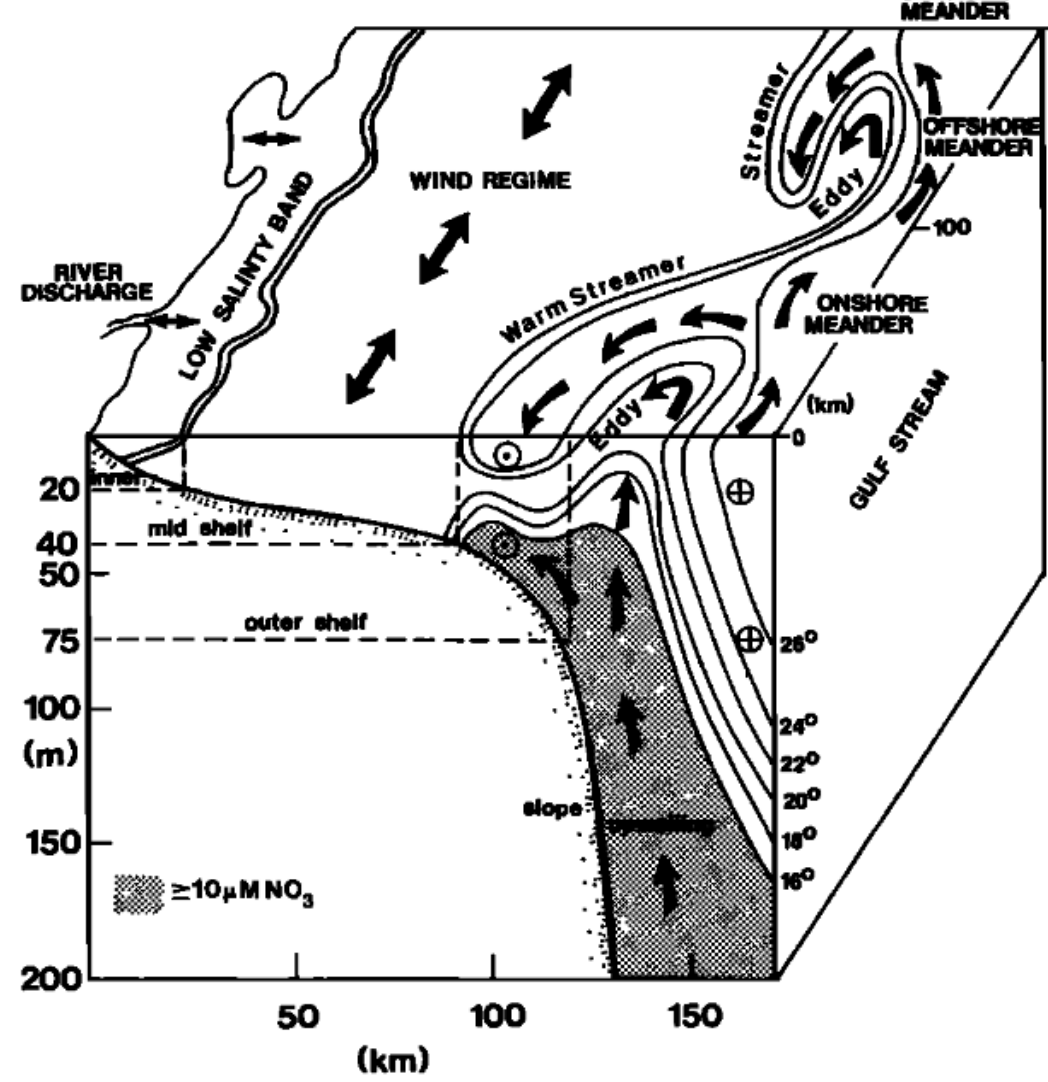


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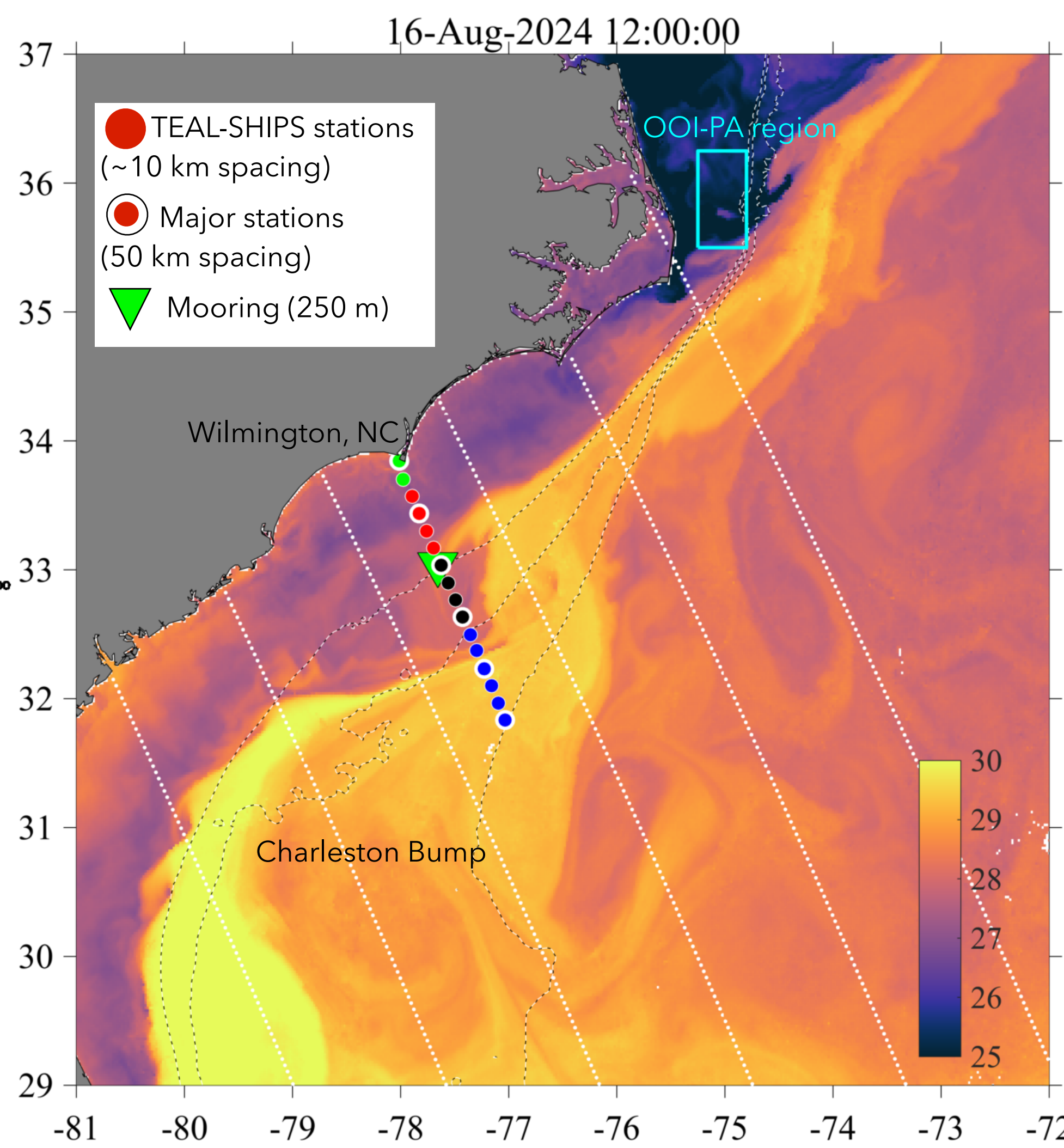


## 1. Introduction and project goals

- South Atlantic Bight (SAB) continental shelf waters transition from freshwater-influenced nearshore to tropical Gulf Stream offshore.
- Well-documented effects of Gulf Stream variability on shelf biogeochemistry across timescales (e. g., Fig. 1).
- We introduce an observational program (TEAL-SHIPS) to “take the pulse” of shelf-to-Gulf Stream ecosystems through interdisciplinary ship-based sampling (Fig. 2).



**Figure 1:** Schematic of cross-shelf dynamical regimes and shelf-break influence on nutrient input (Lee, Yoder and Atkinson, 1991)<sup>1</sup>



## Goals

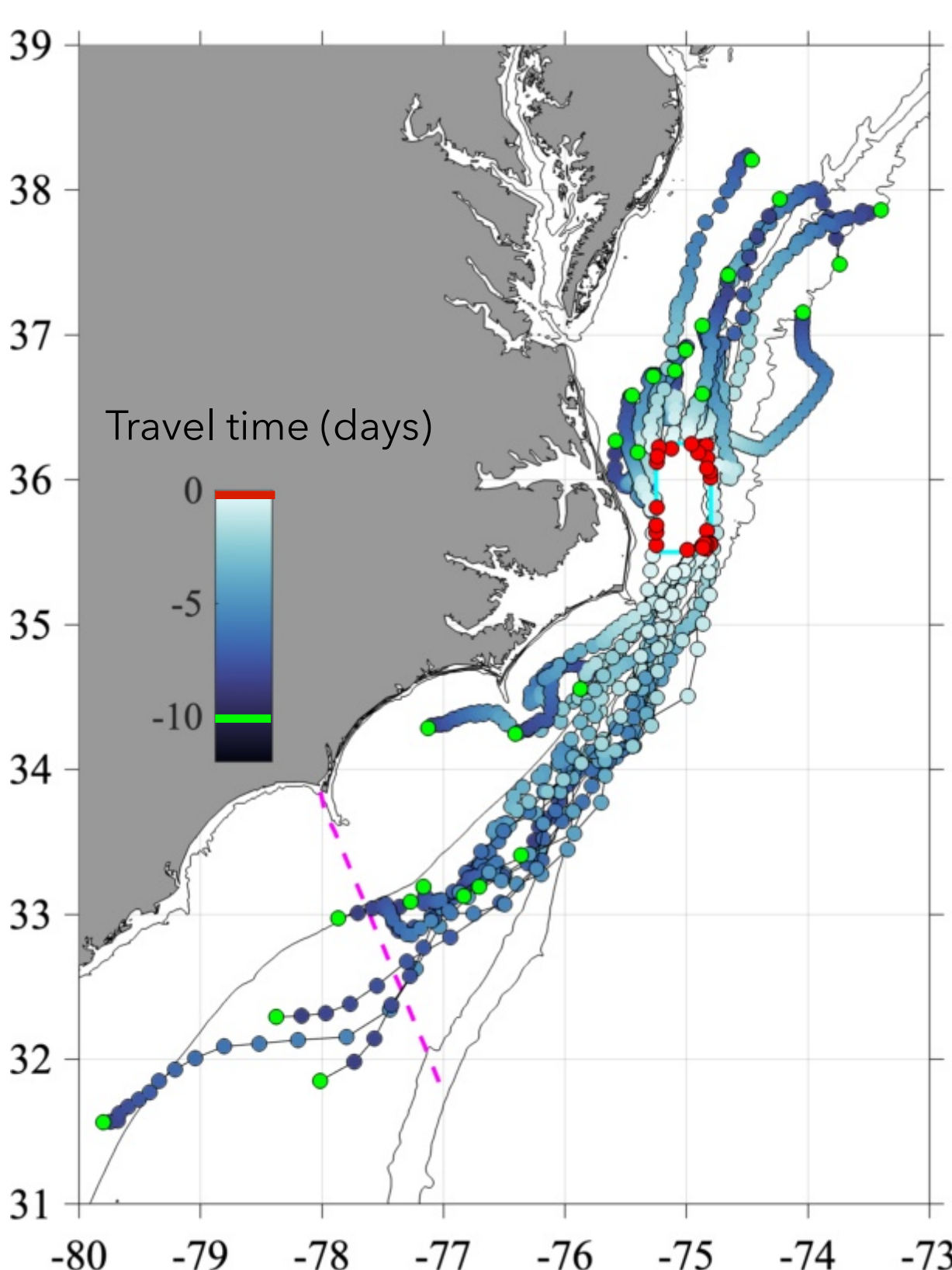
- Characterize the habitat gradient from coastal NC into the Gulf Stream, through physical, chemical, and biological seasonal snapshots.
- Determine food web interactions from archaeo-/bacterio-plankton to nekton through observations, rate measurements, and isotopic composition.
- Define a baseline of seasonal transitions to initialize model predictions of future ecological changes.

**Figure 2:** TEAL-SHIPS transect (every other station plotted) overlaid with NOAA Advanced Clear-Sky Processor for Ocean (ACSP) L3 0.02° resolution daily SST. The Gulf Stream is in the strongly deflected state<sup>2</sup>. Dashed lines denote 200-, 600-, 1500-m isobaths. The Pioneer Array (OOI-PA) region denoted by cyan box. White dots are AVISO satellite altimeter tracks.

## 2. Planned research activities

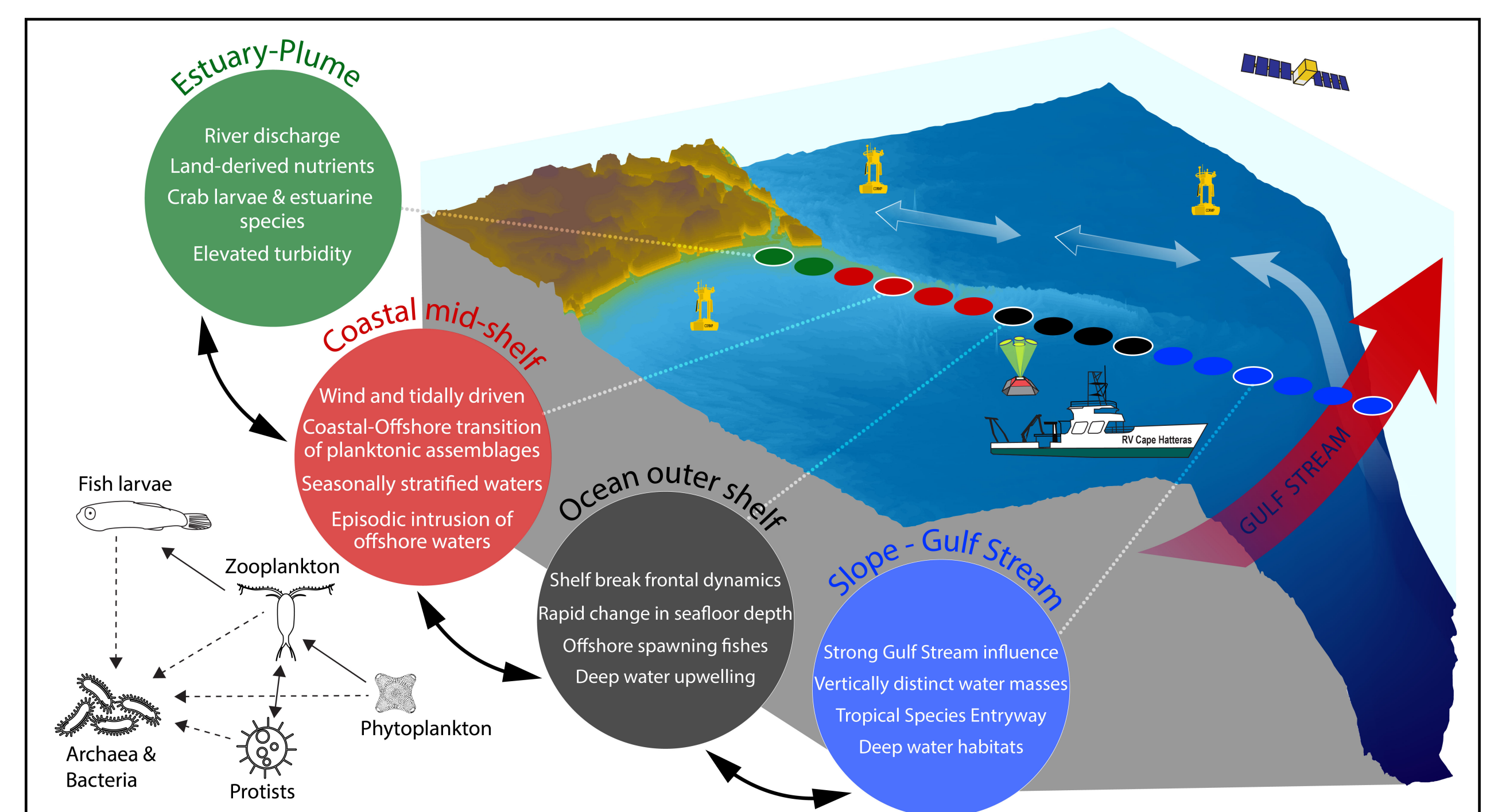
- RV Cape Hatteras and RV Cape Fear 2.0:  
8 x 4 day cruises (2025 - 2026)  
Cape Fear River mouth to 250 km offshore
- **Shelf-slope mooring:** Bottom-mounted ADCP and bottom temperature/salinity
- **Underway Data:** currents, surface temperature, salinity, chlorophyll
- **CTD water samples:** surface-to-1500 m (cell counts, nutrients, microbial DNA)
- **CTD Profiles:** surface-to-1500 m (T, S, O<sub>2</sub>, pH, chlorophyll)
- **Net Tows:** plankton tows with bongo net (e.g., zooplankton, larval fish eggs)
- **Bottom Trawl Surveys:** 20-minute tows at major stations with 75-foot mongoose net
- Laboratory analyses (e.g., mass spectrometry and emerging contaminants) conducted at UNCW Center for Marine Science

## 3. Regional observing connections:



**Figure 4:** Global Drifter Program (<https://www.aoml.noaa.gov/proj/global-drifter-program/>) of unique drifters that arrived at OOI-PA (1979 - 2024). TEAL-SHIPS transect in purple.

- We welcome collaboration with MAB/SAB oceanographic community, coastal observing programs (e.g., CORMP), radar observations (ECU), satellite, regional ship- and glider-based sampling and modeling efforts.
- Example surface water connectivity to OOI-PA estimated with Global Drifter Program (GDP):
  - SAB-originated surface drifters are ~50% of GDP drifters that reach OOI-PA. Travel times are 7 - 10 days (Fig. 4).
- Broader goal to establish a continuously running oceanographic transect in the South Atlantic Bight, upstream of the Gulf Stream separation at Cape Hatteras.



**Figure 3:** Schematic of TEAL-SHIP transect from shelf-to-Gulf Stream and the transition between physical regimes and habitats. Also depicted are supplemental measurements from coastal buoys and satellite.

## Postdoc Position

- Fully-funded postdoctoral research position with research cruise leadership opportunities
- Collaboration and support across disciplines and institutions
- Please spread the word to recently graduated PhDs interested in interdisciplinary observational oceanography!
- Contact Dr. Bradley Tolar ([tolarb@uncw.edu](mailto:tolarb@uncw.edu)) for more information

## ASLO Aquatic Sciences (26 - 31 March, 2025) Session

- **SS36** Coast-to-boundary current systems and the ecological, biogeochemical, and physical processes within
- Submissions open September 9!

## References

1. Lee, T. N., Yoder, J. A., & Atkinson, L. P. (1991). Gulf Stream frontal eddy influence on productivity of the southeast U.S. continental shelf. *Journal of Geophysical Research: Oceans*, 96(C12), 22191-22205. <https://doi.org/10.1029/91JC02450>
2. Bane Jr., J. M., & Dewar, W. K. (1988). Gulf Stream bimodality and variability downstream of the Charleston bump. *Journal of Geophysical Research: Oceans*, 93(C6), 6695-6710. <https://doi.org/10.1029/JC093iC06p06695>

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