From Communities to Carbon ("C2C"): BGC glider surveys of export on the Oleander Line

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The ocean's biological carbon pump transfers carbon from the sunlit surface to the deep ocean, playing a critical role in regulating atmospheric CO_2. However, we lack a clear understanding of how different phytoplankton communities influence the efficiency of this pump. At the Middle Atlantic Bight shelfbreak, cold and productive shelf waters meet the warmer and saltier slope sea, giving rise to dramatic gradients in ocean conditions that create a mosaic of phytoplankton communities. An existing OVSN-funded project has installed an Imaging FlowCytobot (IFCB) on the commercial vessel *CMV Oleander*, providing an unprecedented window into how phytoplankton communities change across this dynamic boundary. But these surface observations cannot tell us what happens to the carbon these organisms produce: how much sinks to depth, and how do the physics below the surface shape the phytoplankton communities we observe?

Our team will deploy a biogeochemical ocean glider equipped with sensors measuring temperature, salinity, oxygen, chlorophyll, particles, and nitrate along a ~70 km section of the *Oleander* line, profiling from the surface to the seafloor across water depths of ~60 m to 1000 m, for approximately 5 months. By combining the glider's surface-to-bottom measurements with the IFCB's surface phytoplankton imagery, we will build a three-dimensional picture of how ocean physics, chemistry, and biology interact to control carbon export. This project leverages existing OVSN infrastructure, the NSF-funded *Oleander* Program's regular environmental observations (Andres et al., 2025), and an NSF-funded Ocean Observatories Initiative glider, maximizing scientific return on OVSN's investment while advancing our ability to track carbon flows in the Northwest Atlantic.