

Tracking Diurnal and Episodic Hypoxia and Impacts to Nutrient Cycling in a Shallow, Well-Mixed, Subtropical Estuary.

Austin Fox¹, Mary MacDonald¹, Rebecca English¹, Tyler Provoncha²

¹Florida Institute of Technology, Melbourne, FL, USA

²Brevard Zoo, Melbourne, FL USA

In shallow, well-mixed and eutrophic estuaries, dissolved oxygen (DO) can cycle between anoxia and supersaturation over diurnal periods. This diel hypoxia contributes to feedback loops sustaining degraded water and sediment quality. Organic-rich sediments with high sediment oxygen demand contribute to hypoxia and vertical gradients for dissolved oxygen with lowest concentrations at the sediment water interface, even when the water column is well-mixed. Vertical gradients and highly variable concentrations of DO complicate efforts to quantify the extent and duration of hypoxia in these shallow, well-mixed systems. We deployed a network of >80 continuous monitoring stations to track concentrations of DO in the benthic boundary layer throughout the Indian River and Banana River Lagoons, Florida. This approach has captured diel and episodic hypoxic events that were otherwise not detected. During summer months, diel hypoxia throughout Banana River Lagoon contributes towards a decrease in nutrient removal efficiency and the assimilative capacity of this system. Combining data for sediment nutrient cycling under differing redox conditions with this high-resolution data for dissolved oxygen, we are better able to quantify feedback loops between eutrophication and hypoxia. These feedback mechanisms can lead to more frequent hypoxia even when nutrient loading remains unchanged and can contribute towards the decoupling of algae blooms from external nutrient loading.