EFFECTS OF EXPERIMENTAL NUTRIENT ENRICHMENT ON PHYTOPLANKTON ASSEMBLAGE STRUCTURE AND CYANOTOXINS

***Viviana Mazzei*[1], *Emily Karwacki*[1], *Keith A. Loftin*[2], *Jose V. Lopez*[3], *Lauren E. Krausfeldt*[3], *Barry H. Rosen*[4], *and Hidetoshi Urakawa*[4]**

[1]U.S. Geological Survey, Caribbean-Florida Water Science Center, Orlando, FL, USA
[2]U.S. Geological Survey, Kansas Water Science Center, Lawrence, KS, USA
[3]Nova Southeastern University, Dania Beach, FL, USA
[4]Florida Gulf Coast University, Ft. Myers, FL, USA

Eutrophication is the most cited cause of harmful algal blooms (HABs). However, there is contradictory evidence regarding the direct role of elevated nutrients as a trigger for HAB formation and toxin production. In-situ mesocosms were used to experimentally test the short-term (72 hours) effects of ammonium (NH_4), nitrate (NO_3), and phosphate (PO_4) enrichment on the natural phytoplankton assemblage of the Caloosahatchee River, Florida and examine their ability to trigger a bloom, drive bloom assemblage structure, and influence cyanotoxin production. Three independent experiments were conducted to capture natural temporal variability in water quality and phytoplankton assemblages. Quantitative taxonomic analysis was performed to characterize the phytoplankton assemblage structure across treatment over the 72-hour experiment. Changes in the abundance of potentially toxic cyanobacteria in response to nutrient enrichment was determined by measuring the concentrations of the cyanotoxin biosynthesis genes for anatoxin (*anaC*), saxitoxin (*sxtA*), microcystin (*mycE*), cylindrospermopsin (*cyrA*), and nodularin (*ndaF*). The influence of elevated nutrient treatments on expression of these genes was determined by measuring the concentration of cyanotoxins encoded by those genes.

NH_4, NO_3, and SRP were significantly elevated in their corresponding treatment chambers relative to control chambers during all three mesocosm deployments. Total algal cell density, chlorophyll-a, and phycocyanin were significantly elevated in the NH_4 and NO_3 treatments by 72 hours during the June 2020 and February 2021 deployments, but a switch to dominance by cyanobacterial HAB species in response to elevated nutrients was not observed. These results imply that nitrogen rather than phosphorus is limiting in the lower reaches of the Caloosahatchee River and that algal responses to nutrient enrichment are seasonally variable. There were no significant treatment effects on cyanotoxin biosynthesis gene or cyanotoxin concentrations relative to controls during any of the three deployments suggesting that nutrient enrichment is not the key driver of toxic HABs in freshwaters.

PRESENTR BIO: Dr. Mazzei is a community ecologist and phycologist. She is currently a Mendenhall Postdoctoral Research Associate at the USGS Caribbean-Florida Water Science Center where she is working on several projects investigating HAB dynamics and toxicity in freshwaters across the nation.