LEARNING FROM THE PAST TO INFORM LAKE OKEECHOBEE MANAGEMENT IN THE LOSOM ERA

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Long-term water quality and phytoplankton monitoring in Lake Okeechobee plays a key role in identifying sources of impairment, providing input for complex modeling, and supporting scientifically based management decisions. Complex multivariate statistical analyses of the data, coupled with process-based and/or statistical models of water quality are critical for a better understanding of possible impacts the newly developed Lake Okeechobee System Operating Manual's (LOSOM) operating schedule may have on water quality, and consequently on the bloom dynamics and Lake ecology.

Hierarchical cluster analysis of the historic water quality data revealed that the lake can be divided into ten site clusters and three major zones with distinct water quality conditions. Ordination analysis showed that a combination of different physicochemical variables drove phytoplankton community dynamics and toxin concentrations across different Lake regions and periods. The lake often exhibited nitrogen limitation during summer, when cyano-blooms were widespread resulting in higher nutrient uptake. Increases in ammonium concentrations at nearshore sites were common in mid-summer, which most likely helped to sustain cyano-blooms later in the season. Nitrogen enrichment in spring and early summer favored the dominance of non-diazotrophic *Microcystis aeruginosa*, while N-limitation later in the season increased the abundance of diazotrophic species. Highest microcystins concentrations were detected early in the bloom seasons, but toxin concentrations were not always positively correlated with total cyanobacteria or *M. aeruginosa* cell densities. The strength of correlations between biotic and abiotic water quality parameters varied in space and time. The magnitude and toxicity of cyanobacterial blooms varied annually and can be viewed as probabilistic events that depend on highly complex non-linear interactions between different biotic and abiotic factors that are subject to chaotic dynamics in the lake, which need to be further investigated and modeled to effectively manage Lake Okeechobee water releases under the new LOSOM regulation schedules.

PRESENTER BIO: Dr. Anna Wachnicka is a principal scientist with >20 years of experience in designing and leading interdisciplinary projects aimed at optimizing strategies for the management of change in coastal and inland waters driven by climate change and watershed hydrologic alterations. She is currently leading Lake Okeechobee HAB and mitigation research initiatives.