ESTIMATING ABUNDANCE OF LEGACY NUTRIENTS AND DORMANT CYANOBACTERIA IN LAKE OKEECHOBEE SEDIMENTS

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Lake Okeechobee is a large (~1730km^2), shallow (average depth 2.7m) lake which has experienced decades of extensive nutrient and sediment loading from its watershed. Physical barriers have disrupted natural flushing processes over the past century, causing sediments and associated nutrients to accumulate over time. Due to its size:depth ratio, the lake is highly susceptible to wind-driven sediment resuspension, with studies showing that internal nutrient loading can exceed external loading within a given year. In addition to resuspending particulate-associated organic and inorganic phosphorous and nitrogen containing compounds, wind may also disperse dormant cyanobacterial cells throughout the water column. Under favorable conditions these previously quiescent cells may have sufficient light and nutrients to rapidly replicate and initiate bloom formation.

To test for sediment-associated cyanobacteria, a pilot study is being conducted to collect and analyze sediment cores and overlying water samples from areas of the lake with sediments prone to resuspension. Lake-wide sediment mapping studies were conducted in 1988, 1998 and 2006, with cores taken from approximately 170 sites with known coordinates. Results from these studies helped focus collection efforts on sites which previously produced cores with high mud and nutrient content. The nutrient content (e.g. TP, TN, OPO_4, NH_4, NOx) of these sediment/water samples are being analyzed using the standard SFWMD methodologies. The samples are also being examined for the presence of cyanobacterial cells using fluorescence microscopy (FM), and a proposed DNA analysis. The FM analysis checks for potentially viable cells using a combination of chlorophyll autofluorescence, DNA stains (e.g. DAPI) and other cell viability stains (e.g. SYTO9/PI). Genetic analysis uses quantitative-PCR to determine the abundance and identity of any sediment associated cyanobacteria, and to reveal which cells can produce known cyanotoxins. This study will help identify sediment roles in bloom formation on the lake and lead to better predictive tools.

PRESENTER BIO: Dr. Jones is a senior scientist at the South Florida Water Management District with more than 15 years' experience in environmental research and experimental design. He is proficient in numerous molecular biology/genetic techniques used to identify and quantify pelagic and benthic microorganisms in freshwater and marine ecosystems.