SESSION 3

# ECOLOGY OF CYANOBACTERIA - TOXIC CHAB IN FRESHWATERS AND COASTAL SYSTEMS

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Biogeochemical constraints on ecosystem stoichiometry and its influence on cyanotoxin hazards

Cyanobacteria growth and toxin production in lakes is often regulated by the absolute and relative availability of limiting elements such as phosphorus (P) and nitrogen (N). Yet, the relative supply of these elements to phytoplankton is governed by a complex set of biogeochemical interactions that are interdependent with physical factors and the biogeochemical cycles of other elements such as carbon (C) and micronutrients. Indeed, increased productivity caused by elevated nutrient loading to lentic ecosystems alters the relative rates of P and N recycling and exacerbates stoichiometric imbalances between the availability of these nutrients and their demand by cyanobacteria and other phytoplankton. Here I will explore recent developments in modeling the stoichiometric variation in lakes across large spatial scales by utilizing common models of P and N cycling. In particular, I will explore how stoichiometric variability in P and N availability changes with trophic state due to interactions with the C cycle that modifies nutrient burial, denitrification, and N fixation rates. By combining nutrient-phytoplankton biomass yield relationships, I will estimate the tipping point N:P ratio for lentic ecosystems that results in putatively P or N limited phytoplankton and subsequently compute the specific stoichiometric imbalance in single nutrient (P or N) currency. These estimates provide quantitative metrics for the degree of P or N deficiency (or sufficiency) relative to the other nutrient and are useful for predicting cyanotoxin hazards across large spatial scales. When combined with human use data, cyanotoxin hazard predictions may be formalized into a human health risk framework.