



SESSION 2

TOXIC CYANOBACTERIA IN THE CONTEXT OF CLIMATE CHANGE

Impacts of multiple global change factors on toxic cyanobacteria: from elements to traits and toxicity



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Global environmental change involves shifts in a wide range of environmental factors including elevated CO₂ levels, warming and changes in nutrient availabilities. This interplay of environmental stressors complicates our understanding on the impacts of global change for harmful cyanobacteria blooms. Many cellular processes rely on the availabilities of nutrients, while temperature is a major driver for metabolic rates, and CO₂ for photosynthesis and carbon acquisition. Together, these environmental factors determine a wide range of cellular traits. Inspired by trait-based approaches and ecological stoichiometry, this talk will explore the combined effects of CO₂, temperature, and nutrient availabilities on various traits, notably growth, nutrient acquisition, and toxin synthesis in harmful cyanobacteria. Results demonstrate that both CO₂ and temperature enhance nutrient acquisition in diazotrophic and non-diazotrophic cyanobacteria. Some responses are largely consistent across genotypes while other vary, suggesting for the potential for selection. Moreover, CO₂, temperature, and nutrient mediated changes in carbon and nutrient acquisition affected cellular elemental ratios, with largely predictable patterns in a range of cyanobacterial competitive traits, including colony formation, gas vesicle synthesis, as well as toxin quota and composition. Together, these findings contribute to a mechanistic understanding on the impacts of combined global change stressors on harmful cyanobacterial physiology and, ultimately, bloom toxicity.