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Impact of meteorological forcing on seasonal phytoplankton succession in a peri-urban lake

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Sessions

RS22 Urban freshwaters

RS11 Fundamental and applied freshwater (rivers, lakes & wetlands) ecology

Abstract

Located in the Great Paris peri-urban area (France), Lake Champs-sur-Marne is a former shallow sandpit whose water source is primarily groundwater and now, a eutrophic recreational water body. The water quality must comply with European Union bathing water directive. The monitoring of water quality has been set up since the late 2000's with the deployment of autonomous submersible sondes recording for physics, biology and chemistry parameters whereas phytoplankton identification and enumeration have been implemented since April 2019. Unlike phosphorus, nitrogen was found to be the limiting nutrient for substantial algal growth. During the summer 2019, a massive bloom of nitrogen-fixing cyanobacteria *Aphanizomenon flos-aquae* was observed in parallel with nitrogen depletion in water. Although the same pattern of nitrogen was observed in 2020, no cyanobacteria bloomed. Despite similar average air temperatures between summers 2019 and 2020, the lack of a strong thermal stratification was observed throughout the summer 2020. This phenomenon led to a dominance of chlorophycean and later cryptophycean species with total algal biovolumes much lower than those developed by cyanobacteria the previous year. As commonly assumed, global warming will increase water temperatures, strengthen water column thermal stratifications and subsequently lead to more frequent and more severe cyanobacterial blooms. However, complex interplays between meteorological conditions and phytoplankton traits may result in different species assemblages, potentially outcompeting cyanobacteria.