

13th International Conference on **toxic** cyanobacteria

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ABSTRACT BOOK

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P108 - 280

Exploring the role of climate change in toxic benthic cyanobacterial proliferation in Lake Lugano (Switzerland and Italy)

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Free-floating toxic cyanobacterial mats were observed for the first time in Lake Lugano (Switzerland and Italy) during the past two summers. The underlying causes of the rapid proliferation of benthic cyanobacteria remain unclear, and the potential negative effects on the ecosystem and water quality pose a new challenge for water management. Climate change is promoting the dominance of cyanobacteria in aquatic ecosystems; however, the effects on benthic species are still poorly understood. To investigate the source of cyanobacterial mats and the drivers of their proliferation in Lake Lugano, we conducted a study on the community structure and distribution of benthic cyanobacteria, focusing particularly on toxic species. We collected samples of cyanobacterial mats from the watershed of Lake Lugano and assessed their taxonomic composition using microscopy and high-throughput sequencing of the 16S rRNA amplicon sequence variants (ASVs). Cyanotoxins were quantified using liquid chromatography-mass spectrometry (LC-MS). The results were compared with the community structure and cyanotoxin profiles of floating mats and physicochemical variables. Our findings revealed that potential toxin-producing genera were widespread in benthic mats (e.g., *Oscillatoria* sp., *Phormidium* sp., *Tychonema* sp., *Scytonema* sp.). We observed distinct spatial distributions of anatoxin-producing and microcystin-producing cyanobacteria, which appeared to be influenced by different environmental variables (e.g., temperature, phosphorus levels, light availability). These results suggest that ongoing environmental changes could drive the future increase of toxic benthic cyanobacterial blooms. Although identifying the source of floating mats is challenging, the study emphasizes the urgent need for extensive research to identify high-risk areas and develop a management strategy to assist relevant authorities in mitigating the impact of these harmful blooms.

Keywords: benthic cyanobacteria, anatoxin, microcystins, deep lakes, climate change

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