Geophysical Research Abstracts
Vol. 18, EGU2016-4236, 2016
EGU General Assembly 2016

Low-wind summers promote blooms of cyanobacteria in Lake Tiefer See, NE Germany

Ulrike Kienel (1), Georgiy Kirillin (2), Brian Brademann (1), Brigit Plessen (1), Nadine Dräger (1), and Achim Brauer (1)

(1) GeoForschungsZentrum Potsdam, Climate Dynamics and Landscape Evolution, Potsdam, Germany (ukienel@gfz-potsdam.de), (2) Leibniz-Insitute of Freshwater Ecology and Inland Fisheries, Müggelseedamm 310, 12587 Berlin, Germany

Low-wind summers promote blooms of cyanobacteria in Lake Tiefer See, NE Germany
Monitoring in three successive but meteorologically different summer seasons in 2012 to 2014 revealed a major impact of the duration of low-wind periods in summer on the outcome of cyanobacteria blooms. During summer 2014, the period from mid-June to mid-September with wind speeds below the average of 3.5 m s-1 promoted a bloom of Limnothrix redekekei with up to 12 mg particulate matter per liter. This bloom from June to September 2014 led to an enrichment of 13C in the organic matter deposited, and terminated a weak diatom spring bloom. The shorter low-wind period from mid-July to mid-September 2012 caused a less strong 13C enrichment by a weak bloom of cyanobacteria, which coexisted with diatoms, while no such bloom occurred during generally windier summer 2013.
The validity of the observed relation of 13C enrichment by cyanobacteria blooms during extended low-wind periods in summer was tested using annual measurements of delta13Corg in the varved sediments deposited between AD1924 and 2008 and the mixing depth as derived from FLake-model calculations based on meteorological data from Schwerin (for 1951-2008). Accordingly, the duration of mixing depth less than 3.5 m water depth explains 25% of the variability of 13C enrichment by cyanobacteria blooms for the full period from 1951 – 2006. The explained variability increases to 53% when the period with increased nutrient load from1970 onwards is considered.
In terms of explained variability of lake production, this relation is supplementary to the inverse relation of diatom silica determined by the duration of lake mixing in spring, which is suppressed during the period of increased nutrient load.