

Hydro-Geochemical characterization of eutrophication by phosphorus in Lake Taihu, China

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Lake Taihu is the third largest freshwater body in China and serves as a major drinking water source for several millions of people. Having been an oligotrophic lake in the 1960s, today particularly high phosphorus contents are responsible for the frequent serious growths of harmful cyanobacteria blooms in the lake. Safe drinking water production is, thus, highly threatened due to the formation of cyanotoxins as well as taste and odor compounds during the drinking water production process. Sediments in Lake Taihu store major parts of the phosphorus in this aquatic system. Resuspension events of sediments happen on a regular basis during storm events as the average depth of Lake Taihu is only less than 2 m.

In this study, we have analyzed phosphorus geochemistry in sediments, suspended particulate matter, as well as in the dissolved phase of the lake water at several locations across the northern Lake Taihu. Speciation studies of phosphorus in sediments revealed a large fraction of naturally releasable phosphorus at the sediment/water interface. Further, suspended particulate matter contains much higher phosphorus concentrations than the respective underlying sediments. Coupled with water quality time-series - recorded with advanced depth-profiling monitoring technologies - we get highly resolved insights into the dynamic behavior of phosphorus during sediment resuspension events in this lake.

Our results will be used to identify specific sequences of environmental conditions (e.g. thermal stratification of the water column and meteorological conditions) with distinct high risk for a subsequent formation of serious harmful algal blooms. This data will contribute to derive early warning models for a safe drinking water production from Lake Taihu.