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Comparison of iron and phosphorus mobilization from sediments inhabited by *Littorella uniflora* and *Sphagnum* sp. at different sulfate concentrations

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With 6 figures and 1 table

Abstract: Atmospheric deposition of sulfur may cause both acidification and elevated sulfate concentrations in oligotrophic softwater lakes. This change is often followed by rapid expansion of mosses and concomitant suppression of isoetid plant species. Sediment columns inhabited by isoetids (*Littorella uniflora*) and mosses (*Sphagnum* sp.) were percolated with artificial porewater containing low (14 µM) and high (182 µM) sulfate concentrations to analyse the effect of vegetation and sulfate on iron (Fe) and phosphorus (P) mobilization from sediments. Due to oxygen release from plant roots, the redox potential (E_h) was high (400 to 500 mV) in sediments with *L. uniflora* and there was no consumption of sulfate in any of the sulfate treatments indicating an insignificant sulfate reduction rate. During the 13-week percolation period, low amounts of Fe (<2 mmol m^{-2}) and P (~1 mmol m^{-2}) were mobilized from the sediment to the water. For sediment with *Sphagnum,* E_h was lower (<200 mV) than for sediment with *L. uniflora,* however, E_h was significantly higher in the low sulfate than in the high sulfate treatment. The consumption of sulfate was 0.36 and 3.43 mmol m^{-2} d^{-1} for cores with low and high sulfate, respectively, but no significant influence of sulfate consumption rates on Fe and P mobilization was found. For cores with *Sphagnum,* the mobilization of Fe was about 300 mmol m^{-2} and for P it was about 20 mmol m^{-2} which were one to two orders of magnitude higher than observed for cores with *L. uniflora*. Analysis of solid sediment fractions of Fe and P before and after the experiment indicated that the high mobilization of Fe from sediment with *Sphagnum* originated from the redox sensitive Fe fraction whereas P originated from mineralization of organic P compounds in the surface of the sediment.

Introduction

Atmospheric deposition of sulfur may cause both acidification and elevated sulfate concentrations in oligotrophic soft-water lakes. This change is often

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