Publication

Characterizing the redox status in three different forested wetlands with geochemical data

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Biogeochemistry and regulation of redox processes in wetlands and especially their source sink functions regarding sulfur, nitrogen, iron, and alkalinity are still poorly understood and become increasingly important in a world of global change. We investigated three forested wetlands within the Lehstenbach catchment (Fichtelgebirge, Northeastern Bavaria, Germany) differing in their degree of water saturation, vegetation, and availability of iron with stable sulfur analysis as well as geochemical analysis (iron, nitrate, sulfate, and oxygen contents in soil solutions and groundwater). Results indicated considerable nitrate, sulfate, and iron reduction rates bound to high spatial and temporal heterogeneity at all three sites. Sites differed significantly regarding their oxygen saturation and their dynamics of sulfur and iron reduction. The sequential reduction chain did not seem an applicable concept to describe redox dynamics at micro-(cm(2)) or mesoscale (m(2)) because of (1) high small-scale heterogeneity and (2) an absence of clear relationships between redox indicative parameters. The latter might be caused by redox processes occurring simultaneously at the investigated spatial and temporal scales. However, a tendency toward exclusive relationships between oxygen and iron, nitrate and iron, and delta S-34 with oxygen, nitrate, and sulfate indicated that the sequential reduction chain might be a suitable modeling concept for macroscale (km(2)) investigations with large sample numbers.
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