



Photo-oxidation of dissolved organic matter in river water and its effect on trace element speciation

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Limnol. Oceanogr., 51(4), 2006, 1716-1728 | DOI: 10.4319/lo.2006.51.4.1716

ABSTRACT: To investigate the effect of photodegradation of fluvial dissolved organic matter (DOM) on dissolved trace element distributions, we performed a 3-week incubation of water from the lower Pearl River (Mississippi). The experiment was performed in natural light (with dark controls) and examined both the changes in DOM and changes in physical-chemical speciation of a suite of trace metals. During the incubation, dissolved organic carbon (DOC) decreased in the light by about 20%, whereas ultraviolet light absorbance decreased by nearly 40%; dark controls showed no significant change in DOC. For the trace elements, a variety of behaviors were observed. Some elements (alkali and alkaline earth metals, Mo, Mn, Cd, and Zn) showed no change in concentration or speciation. A number of elements, however, did show significant changes in the light. For example, there was a significant, continuous decrease in dissolved (<0.02- μ m) Fe in the light samples during the experiment. This and other speciation results indicate that organically complexed Fe was released during photo-oxidation of the lowmolecular-weight DOM; this was followed by subsequent precipitation of the released Fe as additional colloidal FeOOH. Other elements (Ce, Cu, Cr, Pb, V, and U) also showed decreases in the dissolved (<0.02- μ m) fraction with time. Some of these elements, as well as Co and Ni, also showed decreases in their retention by an anion exchange column, likewise implying a decrease in their organically complexed forms.

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