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Biogeosciences Discussions

Interactive comment on "Rates of biogeochemical phosphorus and copper redistribution in young floodplain soils" *by* F. Zehetner et al.

Anonymous Referee #3

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The paper, which is very well written, two key results of the investigation are discussed: What is the reason for the initially high dissolution rate of primary mineral P during weathering of soil deposited in the Danube floodplain? Why is mineral Cu not transformed into organic forms as found for P?

It was suggested that the high dissolution rate of phosphorus may be caused by the small grain size of primary P minerals. As the soil consists of a significant portion of clay, the explanation makes sense. In addition, there may be a second explanation. Although most sedimentary and igneous phosphate rock minerals have a low reactivity in near neutral or alkaline conditions, there is a small group of so called 'reactive' phosphate rock types that have a much higher solubility than phosphate rock. The high reactivity of these specific phosphate rock types is explained in the difference in their

molecular structure, whereby a large proportion of the phosphate ions is substituted by carbonates. It could be that such phosphate compounds were present explaining the high initial solubility of mineral P.

Concerning copper, the authors do not find the same increase in organically bound Cu as for phosphorus. Organic matter bound Cu remained relatively constant over time. The authors explain this by the low Cu uptake by plants and microorganisms due to a high soil pH followed by a Cu solubility.

The Cu:P ratio in crops is around 1:4000, showing that much less copper is cycling through the biological system than phosphorus. If the initial Cu concentration in the fraction representing organically bound Cu is the same as in organic matter derived from plants, one may actually do not expect any more Cu bound to organic matter. It could be useful to check the initial Cu:P ratio in the fraction representing organically bound Cu and P.

Interactive comment on Biogeosciences Discuss., 6, 9525, 2009.