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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 #1

Received and published: 13 October 2009

Overall a very interesting manuscript that deserves publication in the journal. Below are some points that would strengthen the manuscript

The conclusion and discussion sections should weigh natural versus anthropogenic influences

What are the consequences of your findings for floodplains as well as riverine fluxes and deposition of heavy metals and nutrients?

Do you think for your detailed studied profiles sources and sinks could be quantified in a mass balance? Figure 3 seems to suggest that.

The terms "fraction", "biogeochemical pools" and "fractionations" should be clearly defined in the text and coordinated with each other.

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Interactive Discussion
Discussion Paper

Can you exclude bioturbation by worms or reworking of the soil through flooding events? If so, this should be clearly stated in the text.

What role does biology play in the processes described? Would dissolution processes and profiles described be similar without plant cover?

9525 L4: Why are P and N important? Also point this out in the introduction

L7 age gradient âĞŠ please provide number ranges

L8 please name the biogeochemical pools addressed

L9 name mechanism for transfer of Ca P to org P and reverse trend for Cu

L 14 “almost an order of magnitude higher than tropical environments” âĞŠ provide number

L17 “can be exceedingly high in these ecosystems” âĞŠ in comparison to which ecosystems?

9527 L29 early stagesâĞŠ provide age range in years

End of chapter âĞŠ provide reasoning why Cu and P are important parameters. Are they proxies for nutrients and heavy metals? If so, why were they chosen over say N and Cd? Perhaps they are important parameters for specific compartments, plants, mechanisms or processes? If so; which ones and which important role do they play

Also give a reason for why the study area was chosen and not elsewhere

9528 L 16: briefly explain the chronosequence approach

9529 L1/2 how do the methods 137Cs and luminescence compare or is this a combined method in which one techniques contributes to the other?

9530 The entire methods section does not say anything about sampling. Can the authors provide a few lines about this?

BGD

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The term “fractionation” in this manuscript seems to describe an analytical protocol to extract either P or metals. Could you replace it by “extraction” in order to avoid confusion with isotope fractionation (not true for P but for instance various Cu isotopes exist)

9531

Statistical analyses need some more references

Probably IP and OP mean inorganic and organic phosphorous âĞŠ if not done previously spell out before first time use of abbreviation

The descripton of Fig 3 is good but the authors seem to equal biogeochemical pools with age sections (probably corresponding to depth sections) of the soil. First it would be nice to see a correlation between depth and age and second perhaps compartments can be defined that correspond to age brackets. For instance younger soil within the grass root zone and older soils within the deeper root zone of larger plants. Do plants play a role or are there any other mechanisms for this age trend?

9532 First paragraph is a good comparison to other studies. Can these results be incorporated in one of the figures?

L19-21: Can you elaborate with a few lines how you calculated the dissolution rates? This should then go into the methods section and could perhaps be substantiated with an example calculation

Can you give a reason why the comparison to Krakatau was chosen? Would any comparison to a similar climatic zone be possible?

9533

How much apatite is present in soils and background geology of your study area?

(also on 9534) By Fractions A, B, and C etc do the authors rather mean zones or age sections of the soil?

BGD

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9534

L20 high pH conditions.==> please provide number ranges

9535 How do you define “relatively dry”. This should be substantiated by precipitation heights and set in comparions to other climates that should be named

The authors probably address the climate in the Danube valley near Vienna. This should be written out in case people only scan the conclusion

L5 biogeochemical pools: which ones? Can you name them?

Biogeochemical transformations can occur very rapidly. Can you substantiate this with number ranges and set into comparison with slower systems?

Fig 1. Can the flow direction of the river be clearly indicated and an inset of a European map be provided?

Fig 2. Does the uncertainty stem from repeat analyses ?

Fig. 3 Are these data from one of the soil profiles (if so which one? And are the other profiles similar?) or from all 7 profiles taken? This should be pointed out.

Fig4 Why does the uncertainty decrease with age? Can this be explained in the text? Also why do the dissolution rates change most drastically between 100 and 200 years? Is it really exhaustion of soils > 200 a or do other mechanisms such as agglomeration or different binding properties play a role? Fig 3 and 4 are you sure you mean g kg-1 on the y-axis not mg kg-1?

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