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Biogeosciences Discussions

Interactive comment on "Tracing the origin of dissolved silicon transferred from various soil-plant systems towards rivers: a review" *by* J.-T. Cornelis et al.

Anonymous Referee #2

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The authors have compiled an interesting range of studies looking at geochemical pathways of Si through soil-plant systems, focusing on Ge/Si ratios and Si-isotopes as geochemical tracers. The paper fits well into a growing scientific conscience that silicon is strongly cycled in terrestrial vegetation before its land-to-river transfer.

I feel the paper really starts of from page 5891, when the authors compile studies that have looked at transfer of dissolved Si from soil-plant systems towards rivers. The chapters before are reminiscent of other review papers, which the authors also refer to, and from my point of view can be substantially reduced. This paper should be about

the soil-plant system to river transfer, and I feel the specific parts on plant Si, mineral Si and biogenic Si preservation cuurently only serve to distract from this focus.

I found it a bit strange that wetlands are only briefly touched on (page 4892, line 10-12), while storage of biogenic Si in other systems (forests, grasslands) is actually discussed in paragraph 2.4.2 in much greater detail. Some recent studies in wetlands, which show strong control on Si accumulation in these systems by diatoms and vegetation, control by wetlands of lake Si biogeochemistry and significant interactions between cellulose and lignine and Si in wetland macrophytes actually belong in this summary.

I would suggest that the authors start the transfer of dissolved Si section (from page 5891 onwards) with a brief overview of ecosystem Si accumulation, reducing the current detail on forests, at the same focusing a bit more on these recent wetland studies. The first paper below on Phragmites actually fits well in the discussion on solubility on page 5878, the last paper fits into the short discussion on cellulose-biogenic Si interactions in plants.

Struyf E. et al. (2007) Phragmites australis and Si cycling in tidal wetlands. Aquatic Botany, 87, 134-140. Struyf E. & Conley DJ. (2009) Silica: an essential nutrient in wetland biogeochemistry. Frontiers in Ecology and Environment, 7(2), 88-94. Kokfelt U. et al. (2009) Diatoms in peat – Dominant producers in a changing environment? Soil Biology & Biochemistry, 41, 1764-1766. Kokfelt U. et al. (2010) Wetland development, permafrost history and nutrient cycling inferred from late Holocene peat and lake sediment records in subarctic Sweden, Journal of Paleolimnology, 44, 327-342. Schoelynck J. et al. (2010) Silica uptake in aquatic and wetland macrophytes: a strategic choice between silica, lignin and cellulose? New Phytologist, 186, 385-391.

In the following chapters, the authors succeed at really grabbing the attention of the reader, because here they manage to bring a new message by bringing a range of studies together: this is what a review paper in Biogeosciences should do. They provide a nice overview of the use of geochemical tracers, clearly showing the huge potential of studies combing different tracers. The 4 presented scenarios provide new insight in the important link between soil biological Si cycling and the weathering environment, and succeed at providing good guidelines for future research on this topic.

I think this paper should be published, but I would strongly suggest the authors to reduce the first 15 papers of the manuscript substantially, and focus on the geochemical tracers and the scenario approach.

Interactive comment on Biogeosciences Discuss., 7, 5873, 2010.