Biogeosciences Discuss., 7, C3210–C3213, 2010
www.biogeosciences-discuss.net/7/C3210/2010/

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 #3

Received and published: 8 October 2010

This manuscript presents a review of recent studies using Si isotopes and Ge/Si ratios for deciphering the origin of DSi in continental waters. The topic is essential for a better understanding of the biogeochemical cycle of silica and global change. The ms covers the different aspects of the terrestrial cycle of silica with a focus on the role of plants. Several recent reviews have already been published on the same topic but this one is valuable because it presents the state of the art of the (still limited) courageous studies dedicated on Si geochemical tracers. I beleive that the ms could become a useful publication if the authors would agree to clarify what are the insights so far given by

the tracers compared to the initial issues and how the tracers could be useful for the future. To justify the use of the geochemical tracers the authors write p 5895 : " . . ., we suggest that Si mass-balance study should be combined with geochemical tracers (Ge/Si ratios and_30Si) to make better assumptions about the Si origin in the aqueous phase of welldefined soil-plant systems.

But the informations given throughout the chapter 5 fail to answer the issues of the origin of DSi. Here are some examples :

p. 5899 : " The relative contribution of weathering and BSi cycling in weathering-unlimited systems is still poorly quantified "

p. 5901 : " Si isotope signatures in the Congo Basin were controlled by a mixing of both neoformation and dissolution of clay minerals (Cardinal et al., 2010).

p. 5903 " However, in these systems, the role of secondary clay mineral formation/dissolution on the DSi isotope compositions is not clearly determined. "

p. 5903 : " In this climate weathering-limited environment, the DSi load to rivers seems mainly governed by the litho/pedogenic processes such as silicate weathering and clay minerals neoformation ".

p. 5903 " In this scenario (Fig. 3c), the DSi exported from the soil profile could have biogenic, lithogenic and pedogenic signatures as in Scenario 1 "

I encourage the authors to reassess the objective of the paper in order to convince the reader of the usefulness of the approach, otherwise the perspectives given at the end of the conclusion " The geochemical tracers (Ge/Si ratios and _30Si) will help us quantify anthropogenic and natural variations and allow the relevant processes to be incorporated into predictive models for DSi loads in rivers (Garnier et al., 2006; Bernard et al., 2009) to predict DSi loads in rivers. " is not meaningful .

Detailed comments :

BGD

7, C3210–C3213, 2010

1) these is a contradiction between the two following statements :

p. 5878, 13-14 : " the dissolution of silica. . .. is strongly pH dependent . . ...at pH < 9"

p. 5879, 7-8 : " the solubility of silica . . ..is essentially constant between the pH limits of 2 and 8.5 "

I suggest to remove "is strongly pH-dependent and" from the first sentence

2) table 1 : Please indicate the original reference of this sequence : Goldich 1938

3) table 2 : This table presents Si concentration of plants with a precision of 0,01% ; what is the significance of that precision ?

4) p. 5887, 28 : maize is not strictly a Si-accumulator considering the data presented Table 2 (0,83%) and the definition given p. 5885, 15 (>1%).

5) p.5888, 5 : the reference of Sommer et al. and Street-Perrott and Barker are not pertinent here ; please remove.

6) p.5889, 9 : Conley (2002)'s valuable contribution was to make an estimation of the plant BSi and compare it to marine BSi ; but there is no demonstration here that the former exerts a strong control to the latter ; this remains to be done. . ..

7) p. 5889, 10-13 : I do not think Sommer et al. is the good reference for the kinetics of silicate minerals ; see for instance White and Brantley, 1995, Reviews in Mineralogy, vol 31 ; besides other factors should be added in this list i.e. plant type and climate.

8) p. 5893, 10 : Meunier et al. (2001) is not the appropriate ref ; see refs. therein. 9) p. 5895, 17 : remove primary because a mass-balance approach cannot descrimitate Si from primary vs secondary minerals.

10) Fig 3 : Values of DSi, delta Si and Ge/Si should be included at it has done before for instance in Fig. 1. Otherwise it just appears as another conceptual classification not really valuable because there are many more cases than that in the real world.

BGD

7, C3210–C3213, 2010

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

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper