Ocean Sci. Discuss., 8, C207–C209, 2011
www.ocean-sci-discuss.net/8/C207/2011/

Ocean Science
Discussions

Interactive comment on "Silicon pool dynamics and biogenic silica export in the Southern Ocean, inferred from Si-isotopes" *by* F. Fripiat et al.

Anonymous Referee #1

Received and published: 25 May 2011

General comments

This paper presents new Si isotopic data in the Southern Ocean, the data are numerous and of good quality. This manuscript only presents data of the sub-surface and deeper layers and discusses them in terms of mixing between the water masses. Another manuscript in preparation discusses the surface data in term of Si uptake. It would maybe be better to merge the two manuscripts and discuss the variations in the water column as a whole. I found the paper a bit confusing as it refers to numerous water masses without showing a complete schematic or figure. The results are there but they need to be presented more clearly and in a more synthetic way. One way to increase the importance of the manuscript would be to compile all data available in the Southern Ocean to complete Figure 6, maybe by having a two panels figure for the two

basins (Atlantic and Indo-Australian).

Specific comments

Introduction P641, L16-17: please explain how the structure of the microbial food web impacts the N/Si decoupling P641, L19-20; Si remineralization can also be important P642, L27: I believe you mean Beucher et al., 2007 P643, L10: Fripiat et al is actually in preparation (not 2011), the results are not available to the reader

Materials and methods P643, L24: please specify the pressure used to filter the samples, diatoms cells can break under high pressure and release intracellular silicic acid which could affect the delta30Si of the dissolved and of the particulate Si

Results P645, L20-23: confusing, we expect the average delta30Si to characterize the north-south gradients, what's the point of giving the above 100m vs. below delta30Si averages? P645-646, L26, 1-8: The water masses need to be defined and illustrated on a figure. I suggest a three panel ODV figure with temperature, salinity and oxygen with the fronts and location of the water masses. I would also extend the description of the different water masses and zones in the result.

Discussion P646, L20-26: Here again a figure would be more than useful, a figure like the one in Sarmiento et al., 2004 would really bring some clarity to the manuscript. P652, L10-15 discuss this in regards to Hendry 2011 Hendry, K.R., Georg, R.B., Rickaby, R.E.M., Robinson, L.F. & Halliday, A.N., Deep ocean nutrients during the Last Glacial Maximum deduced from sponge spicule silicon isotopes., Earth and Planetary Science Letters, 2010 P653, L5-10: how would Si fractionation during dissolution influence this?

Conclusion P655, L18-19: are there references that illustrate this statement? Do the models (Reynolds, Wischmeyer) agree?

References I don't think you can reference manuscripts submitted or in preparation.

Table 1 some of the standard deviations are extremely high (0.36‰ raising questions

on the validity of the data. Table 2 these data would be better presented on a figure or schema that would locate the different water masses. Fig. 1 the font used is too small; the figure could show the different zones (so you would not need to describe them in the legend) Fig. 2 Fonts too small, the figure would be clearer if presented side by side, why do STF and SAF present two front lines in the BGH study (North and South?). Isolines are not visible in the delta30Si distribution Fig. 3 font too small Fig. 4 different font size (LCDW in legend), where does the PF AASW value come from (not in table 2 or Fig. 6)? Fig. 6 this great schematic could be even better if you included all the masses and mixing (LCDW, AABW, thermoclines. . .), you could merge Fig 4 and 6 in a two panel figure where the mixing arrows would match the mixing lines (colors) and with different colors for the water masses. The figure could be enhanced if it also included the data from Cardinal 2005 and create a similar schematic for the Indo-Australian basin. This could be a great reference for models.

Interactive comment on Ocean Sci. Discuss., 8, 639, 2011.