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Interactive comment on "Seasonal evolution of net and regenerated silica production around a natural Fe-fertilized area in the Southern Ocean estimated from Si isotopic approaches" *by* I. Closset et al.

Anonymous Referee #1

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Materials & Methods - Page 6335, Lines 18-20 reference Figure 1 which does not show these transects discussed here

- Section 2.2 - adding 100% DSi of the 30Si tracer sounds like a recipe for horrible memory effects in the mass spec. I understand why this was necessary (i.e. RhoDISS measurements, especially given the high ratios of DSi:BSi and the thermal conditions restricting the physicochemical and bacterial-enhanced silica dissolution rates) but please comment on why memory effect wasn't an issue?

- Section 2.3 - please be more clear in the topic sentences of the first and second paragraphs that you are referring to the dissolution (i.e. DSi) and production (i.e. bSi)

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samples, respectively.

Results - Section 3.1 - Using the "æ" symbol is distracting, please stick to the conventions used in the previous literature you cite (for example, use Fripiat et al. 2009). Also, since you are using the 2-compartment model, why even discuss the Nelson and Goering model? It has been discussed elsewhere (e.g. Fripiat et al. 2011b, Elskens et al. 2007) so this one- compartment model discussion isn't necessary.

- page 6340 - Since ICPMS is rarely used for silica dissolution (until Fripiat's method in 2009) please indicate your internal standard, this would be useful to the community.

- Section 3.3 - if F station was limited by Fe, the trend in RhoProd with depth (i.e. strongly coupled to euphotic zone) fits very well with previous observation in the HNLC equatorial Pacific for RhoProd (perhaps a consistent feature in such regions).

- Page 6342 line 25: "integrated rhoDISS did not vary over depth" this quantity is already integrated (no vertical variability) so I presume just "RhoDiss" was meant.

- Page 6343: Here you discuss figure 5; however, this figure is redundant, and therefore unnecessary, considering all this data is already reported in Table 2 and Table 3.

- Page 6344, line 2: integrated VSi is a meaningless value (i.e. units of d-1 integrated over euphotic zone meters?). Do you mean that this integrated value was an average of all VSi or VDiss in the euphotic zone? Was the integrated Rho divided by the integrated BSi? Or were the VSi or VDiss values integrated to the depth of the euphotic zone and then divided by the depth of the euphotic zone to make the appropriate d-1 units? Please clarify.

- Page 6344, line 4-5: if VSi is <0.1 d-1, this may be an artifact of siliceous detritus, which is important in other HNLC regions (e.g. Krause et al. 2010, L&O)

- Page 6349 - line 2 - please correct spelling (Amazone to Amazon)

- Page 6350-51 - 6.2 uM could potentially induce some degree of Si kinetic limitation

BGD
11, C2031–C2033, 2014

(i.e. V at ambient DSi < Vmax), were the kinetic measurements done using this 30Si tracer instead of 32Si?

- Section 4.2.4 - while this is interesting, especially the implications for the Si leak hypothesis, ultimately, this is much weaker than the rest of the manuscript. For instance, a paleo- extrapolation is made by comparing one profile from this study in each of the plateau and HNLC regions, and even with the n = 3 for A3 reported by Mosseri et al., this seems like a considerable over-extrapolation given such limited data. Plus, the presence of the plateau (which is responsible for the natural Fe fertilization) also drives considerable differences in what types of physical mechanisms may alter local biogeochemistry (e.g. strong internal wave activity) relative to the open-water regions of the So. Ocean. Ultimately, all the discussion of decoupling between Si and C or N uptake seems to lead up to this section. Given the shaky ground, it may be worthwhile to tone down (also make more concise) most of section 4.2, especially since this line of discussion isn't one of the stated objectives in the introduction.

- Page 6351, line 20-22 - the coupling of Si production with light has also be observed in the equatorial Pacific and north Pacific Subtropical gyre (from strong coupling of Si metabolism to Fe or N metabolism in each region, respectively).

Interactive comment on Biogeosciences Discuss., 11, 6329, 2014.