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Biogeosciences Discussions

Interactive comment on "Quantifying the Cenozoic marine diatom deposition history: links to the C and Si cycles" *by* Johan Renaudie

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Thanks to Anonymous Referee #2 for their thoughtful review.

Concerning the quality of the smear slide descriptions: indeed I will add a more thorough discussion on all the caveats concerning smear slide descriptions in the Material and Methods, as, of course, I am aware of them. I would like however to point out that Figure 2 shows that, despite all their problems, smear slide descriptions data do seem to preserve correctly the spatial pattern (though clearly at a lower resolution). What was missing however are figures showing that the per-site temporal trends are also preserved in these data: I attach here a figure (that I could add as supplementary figure if needed) comparing directly biogenic silica abundance as seen through the lens of the smear slide descriptions and actual measurement of biogenic silica using chem-

ical methods (namely density separation, double leaching by Na2CO3 and wet alkaline extraction; data from Bohrmann 1988, Gurvich 1988, Forehlich et al 1991 and Wang et al. 2004) on a few sites for which both data are available on a long enough depth range to enable direct visual comparisons. They do show that, even if there is not an exact 1-to-1 correspondence (which is not to be expected anyway as one measures a percentage of objects when the other measures a weight percentage), the temporal trend is indeed preserved.

Concerning the statement that "globally averaged smear slide data should largely track variations in global accumulation rates", I was merely pointing out the idea that, unless there has been secular changes in global sedimentation rates, trends in relative abundances and in accumulation rates shouldn't differ widely from one another when averaged globally. I could modify this sentence however if this is seen as being too speculative.

Specific Points: 1) While the peak itself of the higher abundance event is indeed slightly above the E/O boundary (though bear in mind that the resolution is 1-Myr), the beginning of this event is slightly below the E/O boundary which is why i referred to it as being Late Eocene. I'll try to clarify this in-text. On a related note, a reader made me realized I incorrectly used the base of the Bartonian instead of the base of the Priabonian as base of the late Eocene: it will be corrected in the final Figure. 2) The fact that the event seems limited to the Southern Ocean is discussed in-text. Concerning the depletion of carbonates, while this is indeed a possibility (and I will mention it in the revised text), I think carbonate microfossils (judging by the smear slides data) are still fairly abundant in the Southern Ocean up to the late Miocene (see for instance fig. 6B of Renaudie & Lazarus 2013).

Additional references:

Bohrmann, Gerhard (1988): Zur Sedimentationsgeschichte von biogenem Opal im nördlichen Nordatlantik und dem Europäischen Nordmeer. Berichte aus dem Son-

derforschungsbereich 313, Christian-Albrechts-Universität, Kiel, 9, 221 pp (dataset: http://dx.doi.org/10.1594/PANGAEA.79531)

Froelich, Philip N; Malone, PN; Hodell, David A; Ciesielski, Paul F; Warnke, Detlef A; Westall, Francis; Hailwood, Ernie A; Nobes, DC; Fenner, Juliane M; Mienert, Jürgen; Mwenifumbo, CJ; Müller, Daniel W (1991): Biogenic opal and carbonate accumulation rates in the subantarctic South Atlantic: The late Neogene of Meteor Rise Site 704. In: Ciesielski, PF; Kristoffersen, Y; et al. (eds.), Proceedings of the Ocean Drilling Program, Scientific Results, College Station, TX (Ocean Drilling Program), 114, 515-550 (dataset: http://dx.doi.org/10.1594/PANGAEA.754799)

Gurvich, Evgeny G (1998): Metallonosnye Osadki Mirovogo Okeana (Metalliferous Sediments of the World Ocean). Nauchnii Mir (Moscow), 340 pp (dataset: http://dx.doi.org/10.1594/PANGAEA.773679)

Renaudie, Johan and Lazarus, David (2013): On the accuracy of paleodiversity reconstructions: a case study in antarctic Neogene Radiolarians. Paleobiology, 39(3), 491-509.

Wang, Rujian; Li, Jianru; Li, Baohua (2004): Data report: Late Miocene-Quaternary biogenic opal accumulation at ODP Site 1143, southern South China Sea. In: Prell, WL; Wang, P; Blum, P; Rea, DK; Clemens, SC (eds.) Proceedings of the Ocean Drilling Program, Scientific Results, College Station, TX (Ocean Drilling Program), 184, 1-12. (dataset: http://dx.doi.org/10.1594/PANGAEA.785059)

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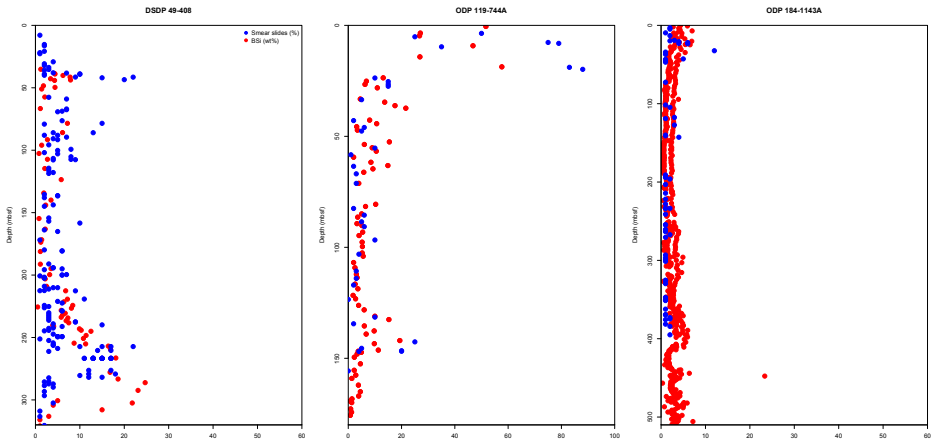

Fig. 1. Comparison between smear slide-derived (blue) and geochemically-mesured biogenic silica (red) measurements for DSDP site 408 and ODP sites 704A and 1143A.