

Comment on cp-2021-50

Louisa Bradtmiller (Referee)

Referee comment on "North Atlantic marine biogenic silica accumulation through the early to middle Paleogene: implications for ocean circulation and silicate weathering feedback" by Jakub Witkowski et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-50-RC2>, 2021

This paper provides a new long-term record of biogenic silica flux from the North Atlantic; such records are scarce, and as such I think this is an important contribution to the long-term climate change community. In general the text is clearly written and organized. I make a few suggestions to strengthen the main arguments of the paper, as well as a few more specific comments.

In general, it would be helpful for the authors to discuss in more detail the conditions in which diatom productivity is limited by silicon rather than another nutrient(s). As the authors point out, productivity can be limited by silicon supply from weathering, supply from circulation/upwelling, OR the (lack of) other nutrients. It would also be helpful to see a discussion of whether/how we know that diatom productivity is limited in the long term/large scale by silicon supply from weathering, rather than by a combination of these other factors.

Figure 2. Please label/identify the fit lines (assuming that's what those are) in the figure caption.

Section 3.2 How significant are these correlative relationships given that the bioSiO₂ fluxes are based on 1) smoothed sedimentation rates and 2) interpolated DBD measurements? I'm skeptical that these mean much; the authors could certainly make a case for why they do, but they haven't done so thus far.

Figure 3. These axis labels won't make sense to many readers – what do the numbers represent?

Figure 4. Some of these colors are quite hard to see, especially the light yellows and purples. There are a lot of different things to distinguish, but perhaps these can be a bit darker, or changed for different colors?

Lines 460-465 The previous paragraph attributes some flux changes to changes in preservation of bioSiO₂. Can that be ruled out, or at least shown to be insignificant as it relates to the changes described in this paragraph and the next? If so, the authors should make that case, and if not, should discuss the implications for their interpretations.

Last paragraph of section 4.3 This last sentence highlights the difficulty of using bioSiO₂ flux to test the effects of the weathering feedback – changes in flux are just as likely to reflect a change in ocean circulation as they are the weathering feedback. Could the authors try to disentangle these things a little more in this last section?