

Biogeosciences Discuss., referee comment RC2  
<https://doi.org/10.5194/bg-2022-66-RC2>, 2022  
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## Comment on bg-2022-66

Anonymous Referee #3

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Referee comment on "Variation in calcification of *Reticulofenestra* coccoliths over the Oligocene–Early Miocene" by José Guitián et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-66-RC2>, 2022

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I enjoyed reviewing the paper by Guitián et al., I'm looking forward to seeing the paper published and I suggest a moderate/minor revision before being suitable for publication.

The paper is mostly well written however here and there some sentences are not hanging and as if the authors don't feel like getting deep into the discussions.

I also suggest reviewing some of the Figures that are difficult to follow.

Down there are my comments:

### Abstract

Line 12: the coccoliths and,

Line 14: the ocean carbon system is not an environmental parameter. I understand what the authors are referring to, but this sentence should be rephrased.

- **Introduction**

Line 34: "cellular growth and degree of cellular calcification" both need some citations (that is not Bolton et al., 2016 which is already cited many times in the text).

Line 35: do you mean that the cellular calcification is controlled by the thickness of coccoliths? The way it is written seems to me that also the growth rate is controlled by coccolith thickness. Add: the latter is first order controlled...".

Line 38: CO<sub>2</sub> is one of the media carbonate chemistry parameters. I would delete CO<sub>2</sub> and leave "changing carbonate chemistry".

Line 39-44 I think that the aim of the paper should be better expressed here. It is only partially clear that you would like to test whether variation in cellular calcification due to CO<sub>2</sub> variations is transient or last longer in geological times. I guess that the final aim is to be able with these data/analyses to reconstruct past ocean CO<sub>2</sub>? It would be important that the main scientific questions are better expressed in this paragraph.

Line 55: check on Copernicus's rules on how to cite these papers. Maybe: (1.55 mm, Bollmann, 2014, Fuertes et al., 2014; ...). Not sure but please check if the brackets are correct. And more in general check in the whole text.

- **Approaches for estimation of coccolith thickness**

Line 68: cellular calcification: do you mean the thickness?

Line 72 delete :

Line 80: following Young (1998)

Line 89: (e.g. Fuertes et al., 2014)

- **Calibration of absolute...**

Line 103: check if it is correct to write the reference in this way. Should it be: described in Golnzalez Lemos et al. (2018)?

Line 104: Figure 1 in brackets.

Line 107: "as similar field of view as possible" or "as a similar field of view as possible"

### **3.3 Calculation of**

Line 136: check if it is correct to write the reference in this way. Should it be by Flores and Sierra (1997)?

- **Indices of variations...**

Line 158: delete double brackets

#### **4.1 Thickness of Oligocene nannofossils**

Figure 4a: in the caption or in the figure, the authors should mention what the different names referred to. E.g. retics = Reticulofenestra; pelag = Coccolithus and so on.

Line 199-202 and Figure 4 + caption: I cannot find Figure 4c and I think the authors are referring to Figure 4a. I suggest renaming every graph as 4a,b,c,d so that it is easier to follow. As I mentioned in the previous comment would be also important to make explicit the abbreviations (e.g. pelag). Moreover in Fig. 4b if the values refer to a species would be ideal to add the full name for Coccolithus and Discoaster (e.g. Coccolithus pelagicus). Use L instead of major axis (as explained in the text) or be consistent in the text and in the graph using Length or L or major axis.

Line 210: "future studies should be interpreted": I don't get it: instead of what. Size?

#### **4.2 Relationship between...**

Line 215: it would be nice to add a table with all values e.g. mean, median sd deviation more complete than table 10, maybe in the supplementary.

Line 216: is this increase in ks correlated with variations in size significant? Could you add the r<sup>2</sup> values in the plots (since you represented already the trend lines)?

Figure 5 and caption: You should add in the caption or in the figure the number of specimens and of samples measured for each time interval. You should choose also here if you want to use "major axis" or l or Length.

Line 218: Do you mean that there are no data available on Ks on large populations of extant Noelaerhabdaceae? If yes, could you rephrase and avoid to you: "we are aware".

In general, I don't get the main message in this chapter: the main issue is that the authors found mainly stable Ks. But when Ks is bigger, the length of *Reticulofenestra* is smaller. First of all, would be important in Figure 5 to have also one graph with all values together and not separated into different intervals. Would be also nice to have a regression line and r2.

The second key message of this chapter is that studies on living coccolithophores don't show the same relation but indeed the opposite one ( $> L$  and  $> Ks$ ). I think this part could be implemented because the chapter stops with two pending sentences that don't explain this opposite trend. Especially the last sentence: I don't understand why it is written here at the end of the paragraph and what the author wanted to explain/evidence. All population refers to what? Do you mean in the different intervals? Are you referring only to *Reticulofenestra*? I guess yes due to the name of the chapter and also looking at Fig. 4b (thickness versus major axis). Can you add the slopes and calculate r2 for every group in Figure 4b?

#### **4.3 Indicators of coccolith calcification and relationship to the preservation**

Line 243:  $r=0.63$  to what it refers to? Is this value represented in Table 2? Could you otherwise add it since it refers only to small coccoliths? I think that in general, it's very hard to follow Table 2 so I might misunderstand this part. The abbreviations need to be explicit. Could you make them explicit in the caption?

Line 251: this paragraph has been copied twice (see line 237) and needs to be deleted.

Table 10: caption: "Samples, ages and the values of the median values of the measured morphological parameters". Could you also add for each sample the number of measured

specimens?

Line 269: NAR is also inversely correlated with the length suggesting a lower accumulation rate when large cells...

Line 275: I would be more cautious and delete strongly for -0.64.

Line 278: check if the reference is written in the right way following Copernicus regulations.

#### **4.4 Temporal trends in *Reticulofenestra* calcification and relationship to environmental factors**

Figure 6: can you add the series in the figure?

The symbols used in this Figure are hard to follow. The authors should use different colours instead of different types of symbols (or in combination different colours and symbols). For sure they have to avoid using the same symbol and colour with smaller sizes of the symbols. This refers to a and c.

For figure b, why is there a hiatus in size trend in the Miocene?

For Figure a, the line should be deleted or used for all the sets of data. Otherwise, this representation is misleading.

Figure e and f: are these two graphs correlated in the right way? CO<sub>2</sub> and temperature seem to go in opposite directions which surprises me a lot. Maybe it's a matter of resolution, but these two graphs one next to the other seem to say two different stories.

Line 287: when you use the word significantly does it mean that there's a statistical analysis behind it?

Indeed, it would be important, if you have the data of Ks and the other parameters for the same sample, to statistically correlate them.

Lines 283-285: this description is not really accurate. It's true only the authors avoid to considers the two samples with lower dissolution resistant species. Moreover, the point just after the OMT exhibit similar values compared to the Early to Middle-Oligocene sample. Should be carefully re-written.

Line 315: these studies: which one?

Line 324-326: This sentence is pending. I mean: what do the authors mean with this paragraph?