



EGUsphere, referee comment RC3  
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## **Comment on egusphere-2022-1329**

Anonymous Referee #3

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Referee comment on "Fossil coccolith morphological attributes as a new proxy for deep ocean carbonate chemistry" by Amanda Gerotto et al., EGU sphere,  
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In this manuscript, the authors deepen on the issue of how the dissolution affects the coccolith morphology and calcification by using both targeted lab experiments and sediment-core sample from a natural setting. The experimental approach, as well as the statistical treatment of the data is accurate and well developed. This work brings out interesting results and useful insights for reflection when it comes to evaluate the role of coccolithophore within the carbonate production, as well as to use the fossil assemblages in reconstructing past evolution and/or oceanographic conditions. The outcomes are well displayed and robustly discussed in the manuscript. Although, I report below some specific comments to be addressed by the authors, and some technical corrections that need to be fixed in the text.

### **Some specific comments:**

- The title should reflect better the novelty of this research, by adding a reference to the new index suggested here.
- 487-490: To observe the evolutionary trends it is important to study long-time intervals (see Beaufort et al 2022à 2 Myr, Bolton et al 2016à 15 Myr). How long can be the time covered by the shallow sediment cores? I think it is better to state that it is necessary to pay attention to the bias that can be introduced by the dissolution when it comes to use the  $k_s$  factor and/or thickness for evolutive studies.
- Suggestion: maybe the authors could take into account to attribute a specific short name to the new dissolution index "ratio  $\sigma/k_s$  vs. mean  $k_s$ ". The advantages would be: i) to characterize better the index and make it more "recognizable" among the community; ii) to make the text easier to read.

### **Technical corrections**

- 14: complex
- 26: vs has to be written in italics

- 75: coccoliths morphology, distribution and abundances
- 144: "ODV" State the entire "Ocean Data View" when mentioning it for the first time
- 172-174: specify the relative abundance of *G. caribbeanica*, what are the other "thinner" species and their abundance.
- 236: erase "extracted variables"
- 279: (e.g. 17930)
- Figure 3: I would change the x axis with the depth, instead of using the site ID, which is more meaningful for the discussion of the data. In this way I would erase also the arrow pointing the increasing depth. Then, recall the table 1 in the caption.
- 271: I would change the title of this section linking this more to the results, as it is more related to a discussion section connecting the morphological data directly with the environmental factors. Change with something more like "Morphological changes in natural conditions"
- 287: be consistent when using "versus" along the entire text. I suggest to always use *vs.*
- 338: Change with "comparison"
- 376: species difference → probably meaning "assemblage composition"? Please be more specific.
- 383-384: change "coccolith" with assemblages
- 391: I would not use the "life-cycle" in the section title as it is not discussed in depth, but just briefly mentioned. Please change the section title according to the main point presented in section 5.2.
- 411 and 435: ECS → state the acronym when mentioned for the first time, but I guess that the authors meant SCS.