EGUsphere, referee comment RC2
https://doi.org/10.5194/egusphere-2022-1329-RC2, 2023

Comment on egusphere-2022-1329

Anonymous Referee #2

Referee comment on "Fossil coccolith morphological attributes as a new proxy for deep ocean carbonate chemistry" by Amanda Gerotto et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-1329-RC2, 2023

General comments:

In this manuscript, Gerotto et al. make use of dissolution lab experiments and sediment samples for develop a proxy for the reconstruction of past carbonate dissolution dynamics. For do that, they compare morphological measurements of coccoliths came either from modern surface sediments along basin-scale environmental vertical gradients as those resulting from dissolution experiments using sediment samples taken elsewhere on the Pacific. The thematic thread conveys the reader naturally to the theme under study. The Theoretical background is comprehensive but concisely enough to give support to the discussion. The methods are described in-depth and are suitable for addressing the aim of the study. The Results are properly weighted into a well-structured Discussion. They properly recognize in M&M and Discussion that the sensitivity resulted from dissolution experiments and modern samples cannot be compared directly, as well as, has critically described the effects of Calgon® solution in carbonate particles. Therefore, after minor reviews posted below are addressed, I find this manuscript is suitable for publication in Egusphere.

Specific comments:

Title – Much more straightforward if it includes that a new proxy was developed

Figure 1 – Include a larger inset map; In captions remove source of the data and direct the reader to M&M

- In the RDA model it's appear to be redundant variables (ex. the TA-Sal, pH-pCO2 and N-P pairs of variables are expected to be strongly autocorrelated as Fig. 5a actually shows) that might be introducing statistical noise and eventually reducing % of explained variance and/or impeding a more direct evaluation of mayor environmental drivers on coccolith morphology. If you think it could be the case, apply a test for identify redundant variables (ex. varclus procedure in RStudio) and redo the RDA analysis including only non-redundant variables.

- Mention in the discussion the environmental data used was not obtained in-situ but from climatologies including interpolations, etc.

- It's possible to evaluate how well your proxy predict bottom omega calcite using an

independent dataset?

107 - Remove (n = 28) from the Introduction

360 – It’s seemed a word as “caused” is missing

451 - Replace “environmental conditions” by “nutrients conditions”

465 – 466 elaborate better the question “…to trace their evolution safely, or instead be a good…”

476-479 – Elaborate better the end of this paragraph

520 – Maybe “complementarity” could be more precise than “complexity”