Biogeosciences Discussions

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Comment on bg-2021-105

Anonymous Referee #2

Referee comment on "Distribution of coccoliths in surface sediments across the Drake Passage and calcification of *Emiliania huxleyi* morphotypes" by Nele Manon Vollmar et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-105-RC2, 2021

The manuscript "Distribution of coccoliths in surface sediments across the Drake Passage and calcification of Emiliania huxleyi morphotypes" by Vollmar et al. is dealing with the study of coccolithophore assemblages in surface sediments of southernmost Chile and across the Drake Passage and the factors limiting their distribution, as well as the identification of the prevailing *E. huxleyi*morphotypes in order to evaluate their biogeography in relation to changing environmental conditions. *E. huxleyi* coccolith mass variations have been evaluated.

The manuscript is well written and provides novel data concerning the coccolithophore distribution in the surface sediments of the area.

There are few points that I would like to comment:

- Introduction, l. 91. The authors state that they will perform *huxleyi* coccolith mass variations evaluations in pre-industrial assemblages to compare with plankton data. It is not clear if this will be used for acidification effect evaluations? However the dating of the studied surface sediments is not very precise (see comments below), thus it cannot be used as a straightforward evidence for evaluating current climatic/environmental impacts. Please clarify.
- Material and Methods, l. 132-135. The dating of the studied material is vague. Former AMS datings in near surface sediments of previous studies in the broader have been used and the authors conclude to ages "most likely mid to late Holocene". Do these datings come from the surface samples or from certain depths? Is there a possibility to estimate the age of the nearest of your surface samples to those of the former studies, by using an available sedimentation rate for the area? Please clarify.

Also, please use Mid and Late Holocene, as these are official chronostratigraphic units.

- 175, it is not clear how many specimens/morphotypes have been analyzed per sample. Is it at least 20 coccoliths?
- 195, this is rather confusing, plankton samples may differentiate from the surface samples (e.g., due to dissolution as you state later on), so why identify type O a potential Type B/C that lost the thin plate when being in the sediment? Maybe clarify even at this stage that "type O" may not totally correspond to the certain morphotype recorded in the plankton, or give it a different, descriptive name that you will keep it all over the manuscript.
- 345-350, is it acceptable to correlate "Mid-Late Holocene" surface sediments with the present day surface waters conditions? This needs to be more documented, e.g., are there evidence (from sediment cores) about the paleoceanographic evolution of the area during the Holocene?
- 372-374. Overcalcified E. hux specimens (primary calcification) have been also found e.g., in the Aegean Sea, Mediterranean, during the winter season, strongly correlated with low temperatures. It would be useful to discuss the occurrence of these morphotypes in respect to what happens with them at different parts of the world ocean. Apparently your specimens cannot directly prove primary overcalcification as secondary calcite precipitation in the "Mid-Late Holocene" surface sediments cannot be excluded? In the same way that many "type O" 's might be originally type B/C

Triantaphyllou, M.V., Dimiza, M.D., Krasakopoulou E., Malinverno E., Lianou, V., Souvermezoglou, E., 2010**.**Seasonal control on *Emiliania huxleyi*coccolith morphology and calcification in the Aegean Sea (Eastern Mediterranean). *Geobios*,43: 99-110.

Meier, K. J. S., L. Beaufort, S. Heussner, and P. Ziveri. 2014. The role of ocean acidification in Emiliania huxleyi coccolith thinning in the Mediterranean Sea. Biogeosciences 11: 2857–2869.

Triantaphyllou, M.V., Baumann, K.-H., Karatsolis, B.Th., Dimiza, M.D., Psarra, S., Skampa, E., Patoucheas, P., Vollmar, N.M., Koukousioura, O., Katsigera, A., Krasakopoulou, E., Nomikou, P., 2018. Coccolithophore community response along a natural CO_2gradient off Methana (SW Saronikos Gulf, Greece,NE Mediterranean). *PLOSONE*: https: //doi.org/ 10.1371/journal.pone.0200012

- 520-525, "type O" distribution is problematic as you also state. It is because what you have counted may not really represent original type O. Could you differentiate in a possible way, the real type O from the dissolved B/C? It would be useful to produce a figure similar to Fig. 11 with all Ehux morphotypes plotted with CEX, to see which of them are more related to dissolution.
- 532-535, again a correlation of Holocene surface sediments with plankton assemblages must be treated with caution as the time interval in between them is not negligible. Also to show any agreement it would be useful to do a statistical correlation between all

available mass values, taking into account the different methodologies.

- 538-539. The statement is rather vague, when projecting Mid-Late Holocene to the future. Will it be a primary coccolithophore feature? What about potential dissolution? May be additional correlation with potentially available sediment trap data of the broader area would be useful.