

Biogeosciences Discuss., referee comment RC3
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Comment on bg-2020-449

Mariem Saavedra (Referee)

Referee comment on "Abundances and morphotypes of the coccolithophore *Emiliana huxleyi* in southern Patagonia compared to neighbouring oceans and Northern Hemisphere fjords" by Francisco Díaz-Rosas et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-449-RC3>, 2021

Review of the manuscript "Abundances and morphotypes of the coccolithophore *Emiliana huxleyi* in southern Patagonia compared to neighboring oceans and northern-hemisphere fjords"

Summary

In this manuscript, Díaz-Rosas and co-authors study for first time the coccolithophore assemblages in the Patagonian fjords/channels using surface and CTD plankton samples retrieved during late (austral) spring 2015 (in 21 stations) and early-spring 2017 (in 11 stations). The authors evaluate how a suite of environmental variables (such as sea surface temperature, salinity, calcite saturation state, etc) influence the coccolithophore distribution, abundance, diversity and biomass.

Díaz-Rosas et al. show that *Emiliana huxleyi* is clearly the predominant taxa occurring across a wide range of physico-chemical conditions and they thoroughly assess the degree of calcification of different morphotypes dwelling in the Patagonian fjords. Using an outline mean index niche analysis, the authors find out that *E. huxleyi* moderately calcified A morphotype (which dominates the *E. huxleyi* assemblages) exhibits the widest niche, and that the R/hyper-calcified morphotype displays a more restricted niche in the study area. Because *E. huxleyi* is observed in low pH/ calcite saturation state environments, Díaz-Rosas et al. emphasize the high capacity of *E. huxleyi* for adaptation to environmental change, in contrast to other coccolithophore taxa.

In this piece of research, the authors briefly compare *E. huxleyi* and diatom abundances and biomass within the study area, and they also compare their coccolithophore findings in the Patagonian fjords to available plankton data from the Norwegian fjords, as well as to other areas such as the eastern South Pacific, Southern Ocean, Drake Passage and the Atlantic Patagonian Shelf.

General comments

This manuscript addresses relevant scientific questions within the scope of BG and it is definitely of interest for the coccolithophore and the micropalaeontological communities. It

is well written, logically structured, and presents an invaluable coccolithophore dataset, which has been thoroughly analysed by the authors using robust statistical/ecological tools.

The title reflects the contents of the manuscript and the authors present a good summary of their work in the abstract. The state of the art and the main aims of this piece of research are properly introduced in the first section. The scientific methods used in this study seem adequate and are described in detail in section 2 of the manuscript. In my opinion, mathematical formulae, symbols, abbreviations and units are correctly defined and used through the text. The interpretations and substantial conclusions proposed here have been logically derived from their findings, and supported by the original data shown in section 3 (Results). Figures and tables are clear and of high quality, which notably helps the reader (Tables such as 1 and 4 are just great!). I just have minor suggestions regarding the figures (see specific comments/technical corrections). I find that the references cited in the manuscript are adequate and the authors give proper credit to already published work. The supplementary material is extensive and of high quality. I would probably move some of the supplementary figures/plates to the main manuscript (see specific comments).

Specific comments / minor suggestions

Line 76: Specify where was this observed.

Line 181: I find interesting the information regarding the malformed coccospheres, although they are just marginally mentioned in the introduction and here. Maybe the supplementary material Figure S2 (i.e. the plate) could be moved to the main text and the authors could mention a bit more about malformations in the results section.

Lines 202-205. I am not a diatom specialist, but I am aware that in the Southern Ocean, many diatoms are colonial and chain-forming, and thus it is difficult to enumerate at a quick glance. Can the authors specify if the diatoms were counted (or semiquantitatively estimated) as frustules or valves? can they specify if the diatoms were broken or intact? I think that only frustules (= cells) should be compared to coccospheres. Maybe the authors can elaborate more on this point.

Lines 374-375: I am aware that supplementary material Figure S10 contains a lot of information. It is up to the authors, but I consider that it could be also moved to section 3.3 of the manuscript.

The following point has already been mentioned by #Reviewer 2. The authors already uploaded all the scanning electron micrograph image datasets in <https://doi.org/10.5281/zenodo.4292020> and they state that all data resulting from this study are available from the corresponding author upon request, which is great for the scientific community. However, I think it would be worthy to also upload the rest of the valuable data shown in some of the tables from the supplementary material in an Open Access library/repository such as PANGAEA.

Technical corrections

Line 69: I recommend using either CO_3^{2-} or $[\text{CO}_3^{2-}]$, just for consistency (e.g., see lines 40, 449, Table 2...)

Line 100: "and" instead of "but".

Line 111: "and" instead "Focusing on the cosmopolitan *E. huxleyi*"

Line 233: Double check if you need "in situ" here.

Line 235: "We also included CO₂, which was moderately correlated with pH (Spearman correlation = 0.8)..."

Line 244: Are diatom abundances cells/L? Can the authors specify?

Lines 277-278: Either: "the potential biases from comparing data from both SEM and Utermöhl counts were minimized" or "the potential bias from comparing data from both SEM and Utermöhl counts was minimized".

Line 308: "were corrosive to calcite" sounds rather dramatic. I would use: "where undersaturated occurred".

Line 309: Here and elsewhere in the text. Because it is the beginning of a sentence the whole name (i.e. "*Emiliana huxleyi*") should be written instead of the abbreviation ("*E. huxleyi*")

Line 344: Add "taxa" or "species" after coccolithophore.

Line 475: "Niche analysis of *E. huxleyi* morphotypes..."

Line 564: *E. huxleyi* (in italics)

Figure 1: Is it possible to make the station numbers lighter to see them more clearly?

Figure 2 (caption). Since there is a coccosphere of *E. huxleyi* morphotype O in this figure, I guess the authors mean "The main *E. huxleyi* morphotypes recorded..." (delete A)

Figures 4 and 6: In the text of the manuscript, salinity does not have any units, I would delete "(psu)" for consistency.