

REPLY to reviewer comments in round two (R2):

FROM EDITOR

The second review of your manuscript has now been submitted, and the reviewer is very pleased with the overall revisions. They have suggested a few minor edits, which I believe will be helpful in providing a final polish to the manuscript.

Please address these points and submit a revised version, including a step-by-step response to the reviewer's comments and a tracked-changes manuscript highlighting all modifications.

With kind regards

Tina Treude

REPLY: We appreciate this positive assessment and have made the requested edits as detailed below.

FROM REVIEWER:

Thank you for carefully considering my previous comments. The manuscript has been significantly improved. I only have a few additional minor comments and editorial suggestions:

Lines 261–276: The list of morphological criteria is very useful. If possible, please move part of this information into a small table with simple schematic sketches for each feature, which would make it easier for readers to use as a reference.

REPLY: We added the table including the sketches (Table 1).

Lines 291–297: The description of R- vs V-unit dissolution could be tightened for clarity. For example, you might phrase it along the lines of:

“R-units, which are smaller and radially oriented, dissolve conspicuously faster than the larger, vertically oriented V-units...”

REPLY: We replaced lines 291-297 with the following: NEW TEXT: “In *S. apsteinii*, R-units, which are smaller and radially oriented, dissolve conspicuously faster than the larger, vertically oriented V-units (Figs 6, 7, see also Drescher et al 2012). Since lopadoliths contain calcite only, as opposed to e.g. aragonite (Walker et al 2024), the latter observation illustrates

that differential dissolution kinetics of biogenic calcium carbonate cannot be inferred from the polymorph only (Langer and Ziveri 2025).”

*Lines 362–377: The comparison with *C. leptoporus* is interesting. Please cite explicitly in the main text the Ω_{calcite} used in Langer et al. (2007), rather than only later, so that readers can more easily compare experimental conditions.*

REPLY: We added the following to line 365: NEW TEXT: “... earliest feature of dissolution in *C. leptoporus* dissolved at an omega calcite of 0.5, is the separation...”

Lines 380–394: When discussing future ocean acidification, please make clear that most surface waters will remain supersaturated with respect to calcite, and that your results are most directly relevant to locally undersaturated conditions (e.g. upwelling regions, eddies, sea-ice melt, or pore waters).

REPLY: NEW TEXT (inserted before line 392: “Please note that most surface waters will remain supersaturated with respect to calcite, so that our results are most directly relevant to locally undersaturated conditions (e.g. upwelling regions, eddies, sea-ice melt, or pore waters)”

Language / typos:

*Check carefully for minor typos and spacing issues (e.g. missing spaces around “*G. huxleyi* morphotype-specific”; “*lopadolith R-units lopadolith R-units*” appears twice around line 291).*

REPLY: We corrected minor typos and spacing issues.

*Ensure that all species names are consistently italicised throughout (e.g. *Gephyrocapsa huxleyi*, *Coccolithus braarudii*, etc.).*

REPLY: We italicised all species names.

Data availability:

Please provide a provisional PANGAEA entry title and DOI, or explicitly state that the data will be archived at PANGAEA and that the DOI will be added in the final version, in accordance with Biogeosciences data policy.

REPLY: We added the following Data Availability Statement: “The data will be archived at PANGAEA and the DOI will be added in the final version.”

With these small changes, I consider the manuscript ready for publication.

REPLY: Appreciated.