

Response Letter for “Exploring Silicon Isotope Fractionation by Silicoflagellates: Results from a KOSMOS Experiment off Peru (egusphere-2025-5079)” by Grasse et al.

We would like to thank the editor, Javier Arístegui, and the reviewers, Jill Sutton and one anonymous reviewer, for their time and effort in helping improve this manuscript. Following their evaluation, minor revisions have been requested, which we have addressed carefully. We thank the reviewers for their thoughtful and constructive comments. The reviewers' comments are listed below, and our responses are provided in blue.

Reviewer Jill Sutton:

Dear Editors,

The scientific contribution of the work by Grasse et al. is excellent and highly relevant for researchers studying the biogeochemical cycling of silicon. Their results are truly interesting. This is the second time I have reviewed the manuscript, and the authors have done an excellent job addressing all of my questions, as well as those of the other reviewer. Overall, I find the text a pleasure to read, although it can be somewhat wordy, particularly in the discussion section. Minor/technical revisions to improve conciseness, in particular in sections where the text becomes verbose (i.e. Section 4.1.2 Phase II and Section 4.2), would help to strengthen the manuscript's impact.

Sincerely,
Jill Sutton

We thank the reviewer for this suggestion and have carefully revised the entire manuscript for conciseness, with particular attention to the flagged sections (4.1.2 and 4.2). Redundant clauses and wordy phrasing were removed, short consecutive sentences merged where appropriate, and transitions streamlined. All scientific content, interpretations, and citations have been retained throughout. We hope the revised version now reads more clearly and concisely.

Reviewer 2

I am glad to see the authors have well addressed most of the comments. Here are a few minor corrections that I spot on during reading, but did not read this in great details, so the ms could be beneficial for an English checking.

We thank the reviewer for their positive assessment and for spotting these additional minor corrections. We have addressed all the points raised and have carefully checked the entire manuscript for English language and expression. We believe the text has been improved accordingly.

Line 40: 'of stable silicon isotopes' should be removed.

Removed

Line 295: the title could be smoothed as 'Statistical and Sensitivity Analysis of the Si Isotope Fractionation Factors'

Modified accordingly.

Line 302: 10% variation of initial dSi should be justified. Why initial dSi concentration cannot vary more largely?

The analytical uncertainty of spectrophotometric dSi measurements is well below 10%, typically on the order of 1 to 3% for routine continuous flow autoanalyzer measurements used in oceanographic studies

(Grasshoff et al. 1999). The $\pm 10\%$ variation applied in our sensitivity analysis was therefore not intended to reflect instrument precision alone, but rather to account for the broader uncertainty in the initial dSi concentration in the mesocosm surface layer. This broader uncertainty accounts for the fact that, although the amounts of deep water added to the surface layer are known, some uncertainty remains in such a large mesocosm experiment, including a potential slight decrease in dSi due to biological uptake, or an increase via dissolution of biogenic particles or admixture with the bottom layer, before the first dSi measurement on day 12. While the exact degree of variation in dSi is difficult to constrain, we are confident that $\pm 10\%$ represents a reliable estimate of the upper bound for this combined uncertainty in the initial dSi concentration. We also note that we already acknowledge in the manuscript that the fractionation factor determined here represents a first-order estimate, and that dedicated culture studies under controlled conditions are needed to better constrain the Si isotope fractionation factor of silicoflagellates.

Line 610: 'This' should be removed.

Removed

Line 613: do you mean 'the factors controlling Si isotope values of silicoflagellates'

We thank the reviewer for this careful reading. "Silicoflagellates" was a typographical error and has been corrected to "silicifiers" in the revised manuscript. *"Up to now, the factors controlling Si isotope in silicifiers have remained unclear, mainly due to numerous unknowns in their dSi uptake and silicification"*.

Line 690: perhaps better to say silicoflagellates play a minor role in 'modern ocean'...

Modified accordingly

References

Grasshoff, K., Kremling, K., & Ehrhardt, M. (1999). Methods of Seawater Analysis, Third Edition. Wiley-VCH. New York.