

Response to the reviewers' comments on “*racing the contributions of dust sources on deposition and phytoplankton carbon uptake in global oceans*”

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Dear Editors and Reviewers:

We sincerely thank you for your letter and for the valuable comments. **We agree to remove the article from the Special Issue and publish it in the regular section of Biogeosciences.** We have carefully considered all comments and revised the manuscript accordingly. The revisions in the manuscript are marked in **red**, while the corresponding quotations in this response letter are presented in *blue italics*. The main revisions in the paper, along with point-by-point responses to the comments, are as follows.

In response to the reviewers' comments, we have added relevant limitations in the Abstract and made revisions to improve the clarity, wording, and formatting of the manuscript.

Response to the comments from reviewer

Many thanks for your hard work in revising your manuscript. I believe that it is almost ready for publication now. However, I would urge you to include in your abstract the limitations of your study raised by the reviewers (summarized of course), highlighting the need for further research and observations in undersampled areas. Additionally, I have few minor changes to request on the figures and identified some typos in your revised manuscript (attached PDF). I will be very happy to accept your manuscript following these very minor changes.

Response: We sincerely appreciate your suggestions and your recognition of our improved work. We have added “*However, the study is limited by sparse observations and simplified assumptions, and further observations in undersampled regions would help to better constrain phytoplankton responses to dust-derived iron.*” in the Abstract (Lines 39-42).

The minor changes mentioned in the attached PDF are recorded as follows:

Line 49: “that” was added in the sentence.

Line 50: “be” was removed in the sentence.

Line 54: The reference format has been revised.

Line 60: Capitalization errors have been corrected.

Line 62: We added a reference to support the opinion “hydrothermal inputs are promptly precipitated at depth in the ocean (Lough et al., 2023).”.

Reference

Lough, A. J. M., Tagliabue, A., Demasy, C., Resing, J. A., Mellett, T., Wyatt, N. J., and Lohan, M. C.: Tracing differences in iron supply to the Mid-Atlantic Ridge valley between hydrothermal vent sites: implications for the addition of iron to the deep ocean, *Biogeosciences*, 20, 405-420, <https://doi.org/10.5194/bg-20-405-2023>, 2023.

Line 114: “(pCO₂)” was removed in the sentence.

Line 125: “ratios” was removed in the sentence.

Line 191: The punctuation has been corrected to use periods “.”.

Line 212: The corresponding web address (<https://climatedataportal.metoffice.gov.uk/>) was added.

Line 217: The “%” symbol was removed.

Line 460: The word was revised as “than” in the sentence.

Line 462: The sentence was changed to “The interpolated result of Fe solubility showed that high Fe solubility primarily occurred in EA and NA, particularly in north-central EA.”

Line 502: Spaces have been added at the corresponding positions in the sentence.

Line 506: “in” was added in the sentence.

Line 512: Thank you for the suggestion. We intended to indicate that the seasonal patterns of marine phytoplankton carbon uptake and dust deposition in EA differ, without implying higher or lower values, so we have kept the original phrasing.

Lines 540–542: The sentence was revised to “Dust-driven phytoplankton carbon uptake is the highest in HNLC regions of the NP across all seasons, except in winter, accounting for 86.1% in spring.”

Line 601: Spaces have been added at the corresponding positions in the sentence.

Line 829: Spaces have been added at the corresponding positions in the sentence.

Lines 834-842: We have added the relevant information on Acknowledgments and Author Contributions.

Fig. 1: Thank you for your suggestion. We have changed the labels of the HNLC regions in the figure to a darker color for clearer emphasis. The specific description of the HNLC regional division is provided in Lines 194-197 of the manuscript.

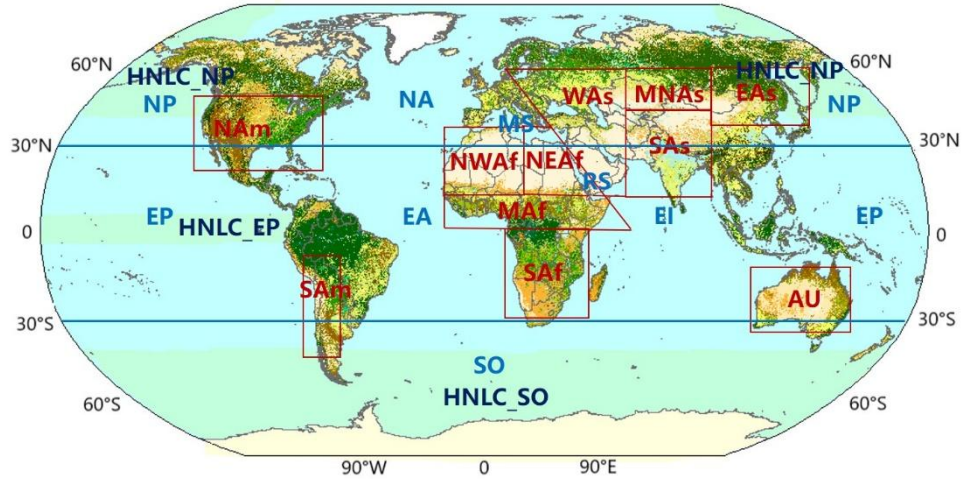


Fig. 1 The classification of global main dust source regions and oceans
(Dust source regions: NWAf - Northwest Africa; NEAf - Northeast Africa; MAF - Middle Africa; SAF - South Africa; NAm - North America; SAm - South America; WAs - West Asia; MNAs - Middle-North Asia; EAs - East Asia; SAs - South Asia; AU - Australia.)
(Oceans: NP - North Pacific Ocean; NA - North Atlantic Ocean; MS - Mediterranean Sea; RS - Red Sea; SO - Southern Ocean; EP - Equatorial Pacific Ocean; EA - Equatorial Atlantic Ocean; EI - Equatorial Indian Ocean; HNLC_EP - high nutrient, low chlorophyll regions in Equatorial Pacific Ocean; HNLC_NP - high nutrient, low chlorophyll regions in North Pacific Ocean.)

Fig.6: We have added blue lines to Fig.6, in combination with the land-sea boundaries, to indicate different ocean regions.

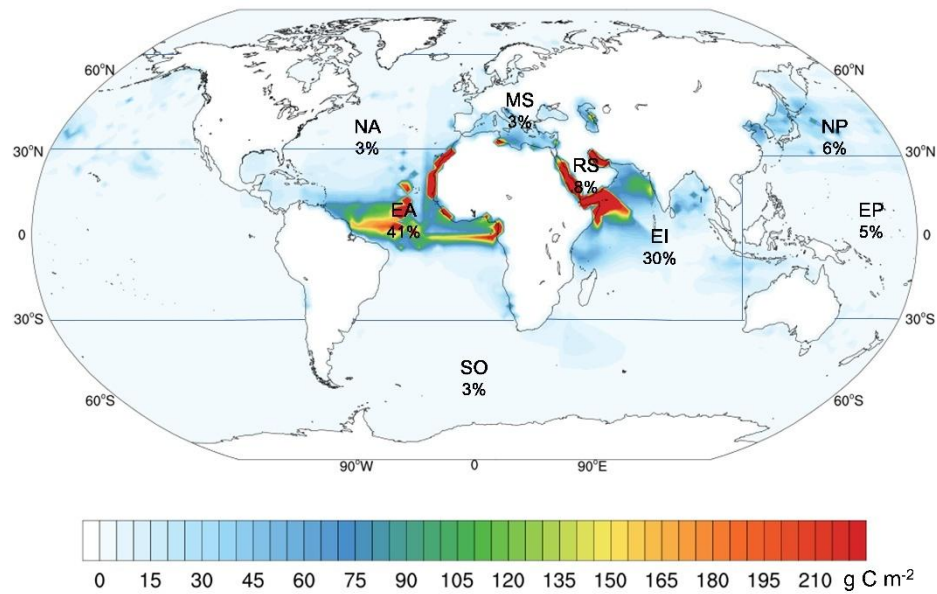


Fig. 6 The annual phytoplankton carbon uptake induced by dust deposition. Blue lines together with land-sea boundaries indicate different ocean regions. The percentages represent the proportion of annual dust-driven phytoplankton carbon uptake in each ocean to global ocean

Once again, thank you very much for all the comments and suggestions.