

Dear editor and reviewer,

Thank you very much for your precious suggestions that contributed to the overall improvement of the manuscript.

In the following our answers to your comments. We also made other small adjustments (all marked in red).

Best regards

Francois Burgay, Andrea Spolaor & co-authors

#Editor's comments

Title: I recommend changing the title again.... the phrase "might have had a negligible role..." is not very satisfying in a title. You could consider something more general like "Atmospheric Fe supply and marine productivity in the Glacial North Pacific Ocean" or "Aeolian Fe flux in the NEEM ice core and potential linkages to North Pacific productivity during the last glacial cycle"

We believe that your suggestion "Atmospheric Fe supply and marine productivity in the Glacial North Pacific Ocean" fits and we changed accordingly.

Line 14 (and elsewhere): when defining acronyms, the words only get uppercase letters if they are proper names or formal terms. Eg. high-nutrient low-chlorophyll (HNLC)

We changed also Marine Primary Production, Last Glacial Period, Total Dissolvable Fe and other words (with lowercase letters)

Line 16, 68: "over the last millennia" implies a much more recent record.... Suggest revising

We changed into "the last glacial cycle", also considering that this manuscript covers the last glacial cycle.

Line 18: Suggest "...reconstructing past aeolian Fe fluxes."

Done

Lines 20-23: Suggest revising so that you provide some actual Fe fluxes rather than just saying they were lower or higher during particular periods.

We introduced in brackets the average Fe flux value.

Line 21: "Fe fluxes at the NEEM site were four times lower...."

Done

Lines 34/35: Could use a citation here.

We added two citations: Lambert et al., 2008 (already cited in the main text) and Luthi et al., High-resolution carbon dioxide concentration record 650.000-800.000 years before present. Nature 453 (2008)

Line 189: "...most relevant dust source was southern South America...."

Done

Line 233: "...from the NEEM ice core was recently published...."

Done

Lines 237-243: Suggest breaking these sentences up a little more so that you can be more specific/clear about the differences between your data and the Xiao et al 2020 NEEM Fe data. In the ideal case, it would be possible to plot the two datasets together so that readers can directly compare.

We rewrote the paragraph introducing the differences as a bullet point list. We believe that in this way is more easily readable and the differences are showed in a clearer way.

Lines 278-288: This is a pretty general point and maybe not worth getting into, but given the NEEM location I'm surprised earlier workers on dust provenance didn't consider the Canadian Shield or Arctic Archipelago as potential source regions. On the timescales in question, Laurentide and Innuitian ice sheets meltwater systems would've generated plenty of available sediment for aeolian transport to the nearby NEEM site. It's possible I'm mischaracterizing the previous work... have only really looked at the Han 2018 paper. Anyways, this isn't really directed at your paper in particular but just a point to consider for dust provenance.

We agree and we added a short sentence saying that additional investigations are needed to better identify the dust sources that influence Greenland (L279-280)

Line 289: Do you mean something like "All variables considered..."?

Yes. Changed accordingly.

Line 325: "Propose" instead of "report" hypotheses?

Done

Line 389: Given the Xiao paper, suggest "In this study, we provide a high-temporal-resolution Fe record from"

Done

#Reviewer's comments

This is a revised manuscript which I believe has adequately addressed the points raised by previous reviewers. The manuscript should be carefully read to ensure that there are no grammatical mistakes, a few are listed below.

The questions regarding stronger water stratification during the Last Glacial Period are addressed clearly in the revised manuscript, with more explanation for how the authors came to this conclusion for the readers.

Authors added more information regarding the leaching procedure that was used to determine the labile portion of Fe, including acidifying samples for 1 month with 2% nitric acid, consistent with Koffman et al., 2014. They also highlight the importance for maintaining the same procedure for other ice core trace elemental studies for adequate comparison which I fully agree with.

Minor comments

Suggest changing title of section 2.1 to: “Sampling and processing”

Line 133: don’t start sentence with the abbreviated name

Line 134: replace “stays for seawater” with “indicates seawater”.

Line 139: replace “ans” with “and”

Line 140-141: replace “whose values are from” with “previously determined by...”

Line 213: Add “During” at beginning of sentence

Line 231: replace “scopes” with “scope”

Line 245: replace “consistently” with “consistent”

Line 277: remove the “...”

Line 279: “Strontium and lead isotopes indicate that Saharan dust contributed to the overall NEEM dust budget primarily during...”

All these comments were implemented in the main text and marked in red.

Line 282-285: rewrite this sentence, its confusing as written now

We rewrote the sentence (L274-276)