Climate of the Past Discussions

Clim. Past Discuss., referee comment RC2
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Comment on cp-2022-67

R. Sparkes (Referee)

Referee comment on "Deglacial records of terrigenous organic matter accumulation off the Yukon and Amur rivers based on lignin phenols and long-chain *n*-alkanes" by Mengli Cao et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2022-67-RC2, 2022

The authors have produced an interesting study comparing biomarkers from two sediment cores in the north Pacific. Each core covers the Pre-Boreal to Holocene period, one was collected from offshore the Amur River in Asia, one from off the Yukon River in North America. Both are subarctic environments, subject to environmental changes during the late glacial period and into the Holocene interglacial.

The study focuses on lignin phenol biomarkers, but also includes data from isoGDGTs, n-alkanes and the IP25 ice boundary biomarker. However, from the manuscript title and introduction section it is not initially clear which parts of the study are novel data, and which are re-analysis of existing datasets.

While I have few queries about the overall findings of the study, I recommend that the introduction is re-written in several places to improve clarity.

Major comments:

Throughout the introduction there is frequent discussion of long chain n-alkanes and n-alkyl lipids. However, when reading through to the results section it becomes clear that the authors did not extract or analyse n-alkanes themselves, rather just used published data from other studies. However, the authors do seem to have analysed isoGDGT lipids, which are not mentioned in the introduction at all. I strongly recommend re-writing the introduction to ensure that there is not a surprise for the reader when they reach the Methods section.

Line 215: “From the polar fractions of the lipid extracts used by Meyer et al”

- It is not clear whether the authors have re-analysed lipids extracted by Meyer, or re-extracted their sediments. The Meyer paper reports n-alkane concentrations, but the paper mentions adding a C46 GDGT at the time of extraction. Did Meyer pre-emptively include a C46 GDGT? This needs clarifying, since there seems to be a contradiction
- If the authors re-extracted sediments, how were they stored until this work? If they analysed lipids that had been extracted previously, how were the extracts stored?

Minor comments

Line 55-56: “Around 70 % of the Yedoma region thawed beneath thermokarst lakes and streams since 14.7 ka BP”

- It is not clear what is meant here. 70% of the area thawed, or 70% of the area below lakes thawed?
- I suggest rephrasing for clarity

Lines 64, 116: “*Alnus*” “Populus-Salix”

- For readability by non-experts, it would be useful to include the common names

Lines 104-106: “The Yukon Basin was mostly unglaciated during the LGM, featuring permafrost and remains mostly so until today.”

- This is an awkward phrasing, that could be clearer. Do you mean “remains mostly so”, implying that the basin is still stable, or “remained so until today”, implying that the basin has recently started to change?

Lines 106-107: “Arctic coasts today often are eroded at high rates of up to several meters

per year”

- This is an awkward sentence that could be rephrased

Line 108: “… suggesting…”

- It is not immediately clear how the first part of this sentence suggests the second part

Line 199: “8 lignin phenols”

- The eight phenols are implied in the section above, but not stated explicitly

Lines 208-210: Choice of HMW n-alkanes

- Each paper uses different n-alkanes to calculate “HMW Alk”. Is it possible to return to the original source data and recalculate so that identical alkanes are used for each basin?

Line 261: “S/V and C/V ratios”

- It would be useful to define the various lignin ratios in one place, and explain their uses, before starting to apply them

Lines 295-296: “The deglacial evolution of the TEX86 L -derived SST ranging from 4.48 to 10.81â□□”

- This sentence needs re-writing

Line 301: “progressively”

- “Progressive” does not seem to adequately describe the data shown in the figure. A different adjective would be useful here. A clarification stating the duration over which this temperature drop happens would be helpful

Line 381: “PB,”

- Comma not required here