

List of revisions for Manuscript No. egusphere-2024-1691-Version2

Speleothem evidence for late Miocene extreme Arctic amplification - an analogue for near future anthropogenic climate change?

by Umbo et al, submitted for publication in Climate of the Past.

Dear Prof. Reyes

I would like to thank you for your time and patience in editing our manuscript. I appreciate that it has been a considerable wait but I can now confirm the accompanying manuscript by Vaks et al has now been accepted and I will forward the acceptance email to you personally.

In addition to this, we have made some minor alterations to our manuscript as helpfully suggested by reviewer Julian Murton. I would like to thank Julian for his efforts which have resulted in a considerably improved manuscript such that we are confident it will be well placed in your journal.

I provide point-by-point list of the changes which we have made in response to the reviewer's suggestions below, with our response highlighted in red.

Please do not hesitate to let us know if there are any further comments or concerns.

Kind regards

Stuart Umbo

Revisions

The authors have carried out admirably almost all of the revisions I suggested. The only one to follow up, which I think was missed in the response document, was in my general comments about the Introduction:

The introduction must also state clearly how this ms differs from the Vaks et al. ms in review.

The revised manuscript differs considerably from the original submission and has been edited to remove all content estimating emissions from permafrost thaw, which is the focus of the Vaks et al manuscript. As such, there is now little overlap in content between the manuscripts and we feel that such a statement is now unnecessary and would likely feel strange to the reader. We therefore chose not to include such a statement of difference.

Line 37: "warmer-than-present temperatures", as per line 41.

This has been corrected

Line 55: replace semi-colon with comma.

This has been corrected

Line 59: "Greenland Ice Sheet..." (proper noun).

This has been corrected

Line 72: “Late Miocene”, i.e., upper case ‘Late’ (see Aubry et al., 2023, Fig. 1 in Newsletters on Stratigraphy Volume 57 Number 1 (2024), p. 25 – 36; DOI: 10.1127/nos/2023/0767. See also Aubry et al. 2021. Both pdfs are attached, I hope.

Thank you for the pdfs – this was very useful. All geological epochs have been corrected accordingly throughout the manuscript.

Line 73: between ... and...

This has been changed

Lines 77, 82, 83, 304, 350 etc.: “Late Miocene”, “Middle Miocene”, “Late Miocene”, as above.

All geological epochs have been corrected accordingly throughout the manuscript.

Line 92: “Tortonian Stage of the Late Miocene Subepoch”

This has been added

Line 126: “Tortonian Stage” (proper noun, see p. 6, column 2, paragraph 1 of Aubry et al., 2023)

This has been corrected

Lines 151-2: please write out acronyms: IUPAC, VPDB and VSMOW before using them.

The full wording has been added.

Line 176: Tables S1 and S2 are missing from the 14-page pdf of the Supplementary Online Materials. Please add them or delete reference to them.

These tables were submitted as an Excel file “Umbo et al Supplementary tables 1-10.xlsx”. They are large (>300 rows) and are therefore unsuitable for a pdf. We have therefore chosen to keep them in Excel format only.

Line 295 and number of supporting figures: Do you mean Fig. S6 rather than S5, because S6 shows trace element spectral analysis results? Please check and update the numbering of all the supplementary figures, because the first citation I can find of Fig. S4 is on line 457, AFTER the narrative has referred to Fig. S5.

Thank you for spotting this. All figure numbers have now been updated.

Lines 301-2: “An additional principal component (PC2) is identified in STBB I – 1 but is not explored further.” I’m confused, because two PCs have been identified in lines 285 – 292. Is this additional PC therefore PC3 rather than PC2?

This is an oversight, leftover from a prior iteration of the manuscript and has now been removed.

Line 333: insert ‘the’ before ‘surface’. 3

This has been added

Line 336: avoid use of colloquial English “it’s” and write “it is”.

This has been corrected

Line 337: insert ‘of heat’ after ‘conduction’.

This has been added

Line 346: insert a comma after 'Spain'.

This has been added

Line 349: insert a semi-colon after 'Eagle Cave', and a comma after 'however'. Ditto line 460.

This has been added

Line 349: when you say 'a small offset (<2°C)' it may be clearer to write "a small offset ($\leq \pm 2^\circ\text{C}$)".

This has been added

Line 351. Insert a full stop after 'present day'.

This has been added

Line 384: 'suggest' [subject 'findings' is plural]

This has been corrected

Line 386: insert 'a' before 'Tortonian'.

This has been added

Line 391: remove full stop after '2022)'

This has been corrected

Line 419: 'marine' [common noun as you are referring to more than one MIS]. Also insert 'that formed' after 'speleothems'.

This has been corrected

Line 420: 'Middle Pleistocene' [proper noun' see Aubry et al., 2023, referred to above]

This has been corrected

Line 401: 'provides'

This has been corrected (*line 491 in Version 2 document)