

Interactive comment on “Seasonal variability and sources of in situ brGDGT production in a permanently stratified African crater lake” by Loes G. J. van Bree et al.

Anonymous Referee #2

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General Comments

The paper by van Bree and coauthors lays out a clever study to examine crucial questions on the relationship between measured brGDGTs and climate parameters. Their main takeaway is that measured brGDGTs likely represent variations in bacterial communities that respond to seasonal stratification change, and thus downcore are indirectly, but significantly, related to climate parameters such as temperature. They thoroughly examine this in a very clear way by taking time series data from all potential sources of brGDGTs, along with DNA data, and then use rigorous statistical comparisons to demonstrate their findings. I think the writing and organization is very clear,

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logical, and direct, and I was left without a doubt that their findings are backed with robust analyses. I learned a lot reading this manuscript and I recommend it for publication. Please find my specific comments/questions along with technical corrections and comments on the paper's figures below.

Specific Comments

Lines 37-38: What does (sub-) mean? Are you talking about the tropics or subtropics? Speleothems are in both?

Lines 46-47: Why is temperature the most important climate parameter to reconstruct? Particularly if you're focusing on the tropics, temperature doesn't change much.

Really nice thorough introduction, very clear and informative

Please include a brief (one sentence) analysis of the samples run in the two different labs. Was there any significant difference in any way? If not, I think just stating that there were no discernable differences would be fine.

Be clearer at the end of the discussion section about the drawbacks of applying brGDGTs to downcore studies. What time scales would work best? Could we trust the absolute T values, or focus on variability?

I think the authors should consider adding some of the folks named in the acknowledgments to the author list if they contributed a large amount of work, particularly the first three people, which sounds like they did.

Technical Corrections

Line 16: SPM is defined, but not used in the rest of the abstract

Line 48: revise 'supposed to be' to 'supposedly'

Line 61: remove comma

Line 63: remove comma after 'additional'

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Line 67: remove comma after '(Illa")'

Line 68-71: this sentence is unclear due to the structure and perhaps misplacement of the word 'for' and 'with'. Please revise.

Line 75: add comma after 'Also', but I suggest using a different word, such as 'Further'.

Line 81: add comma after 'soils'

Line 83: add comma after 'factors'

Line 84: separate out light and mixing regime even if they're from the same study.

Line 85: add comma after 'chemistry'

Line 86: add comma after '2010)'

Line 103: SPM is defined as suspended particles, but perhaps use suspended particulate matter

Line 190: revise to 'into apolar, neutral and polar fractions'

Line 192: remove 'then' and revise 'similar' to 'similarly'

Line 193: rewrite this sentence perhaps to something like 'The lake sediment samples were also extracted and processed like the SPM'.

Line 203: what is Ø?

Line 423: remove 'is shown in Fig. 8' and reword so that Fig. 8 is just cited

Lines 427 and 519: formatting of $R^2 > 0.2$, the spacing is weird

Line 454-456: rephrase or remove the 'on the one hand' and 'on the other'

Line 491: add comma after 'Chala'

Line 515: remove 'but indirect' or add commas around it

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Lines 521-522: rephrase to be more direct. 'only a few of the comparisons between. are moderately correlated' or something.

Line 546: change 'less extensive' to something less negative

Line 555: change 'realized' to 'noted'

Line 559: remove 'also'

Line 648: change 'temperate' to 'temperature'

Line 666: add 'other' after 'variable'

Line 683: add something like ', which is indirectly related to climate' at the end of the sentence.

Formatting inconsistencies

Include n values with your r^2 and p values, particularly when you make a conclusion from the relationship (or lack thereof)

Sometimes the Oxford comma is used (e.g. title of section 2.2.1.), but often it's not. Either is fine, but be consistent.

Sometimes supplemental info is cited in the text as 'Table S.2' and sometimes as 'Table S4'. Either is fine, but be consistent.

Sometimes °C follows the temperature value directly, and other times there's a space between. Either is fine (I think?), but be consistent.

Sometimes $R^2 = \#$ and sometimes $R^2 = \#$. Either is fine, but be consistent.

Figures

In general, they look nice, but appear as different people made different plots – I suggest using consistent fonts throughout. Also, the fonts are very, very small. I view the plots as full page graphs, and can still barely see a lot of the axis labels and numbers,

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particularly in figures 4, 6, and 7. This is crucial to change.

Fig. 2: Show where in East Africa this is with an inset map.

Fig. 3: The key is confusing because not all the colors are in it. I understand that the descriptions are in the caption, but perhaps have a clearer key with differently weighted lines. For instance, for the water T at various depths have solid lines in different colors (perhaps a bit thinner than what's there), as you do, and then different dashed lines for other variables plotted.

Fig. 4: Font is very small. . . will need to be whole page to barely see it. Perhaps get ride of the y axis labels on the second and third columns, smush them together, and make the axes and colorbar font much larger

Fig. 7: very blurry, but perhaps that's an artifact of the submission system. If not, it'd be great to update it to higher resolution.

Fig. 8: looks really nice!

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