Comment on bg-2022-37

Anonymous Referee #2

Referee comment on "Temperature sensitivity of soil organic carbon respiration along the Rwenzori montane forests elevational transect in Uganda" by Joseph Okello et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2022-37-RC2, 2022

It is my pleasure to read and review this manuscript written by Joseph Okello et al. I congratulate the authors on a very substantial piece of work, nicely written up, general nicely documented and discussed by the authors with novelty design and solid data. Indeed, it is interesting work. Indeed, the authors offer a manuscript that illustrates interesting findings supporting some hypotheses raised during the last years: first, that soil organic carbon respiration positively responses to soil temperature; second, that mineralization and depletion of readily available carbon in soil is also a regulator of soil organic carbon variation with the changing of soil physicochemical properties and microbial community-induced by climate warming over time. Overall I support publication of this work, yet I have some comments to be considered (moderate revisions).

Thank you very much for appreciating our work and equally for the careful review and insightful suggestions to further improve the manuscript. We are greatly humbled by your support!

Small comments are on Abstract /Conclusion to present the findings of the selected soil microbial community to be involved in the SOC respiration processes of Q10 models. And it is better to give a feedback to the findings. Also, SOC should be given an abbreviation in the beginning of the abstract.

We appreciate these suggestions. We agree to revise the manuscript to give feedback on microbial community that the microbial community structure was not affected along the climate gradient. Additionally, as suggested we shall abbreviate soil organic carbon as SOC in the abstract. It is a pity that we couldn`t discuss more on microbial community. We noted that

microbial community structure did not show significant effects with altitude nor CO_2 emission. We feel these results of microbial community structure along the climate gradient are important to include in the abstract. The result is consistent with several studies that found no effect of temperature on microbial community structure e.g. (Karhu et al., 2014; Nazaries et al., 2015; Wei et al., 2014).

Introduction: authors should give that the effect of soil microbial community on SOC during climate warming is not yet well established. Maybe this can be added to the introduction to better develop the current study. Not?

Thank you for this suggestion. Indeed, we agree to add a statement in the introduction about the controversies on the effect of soil microbial community on SOC in response to climate warming. i.e. "Several studies reported reduced microbial biomass in response to warming being linked to either depletion of labile carbon (Bradford et al., 2008; Knorr et al., 2005) or a decrease in carbon use efficiency (Allison et al., 2010; Tucker et al., 2013). However, other studies found no effect of climate warming on microbial community (Karhu et al., 2014; Nazaries et al., 2015; Wei et al., 2014). This means that the changes in soil CO_2 emissions upon warming result from alteration in the activity of native microbial community without altering microbial community structure."
Our study on microbial community along the microclimate gradient in montane forests is consistent with the latter findings.

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