

Clim. Past Discuss., referee comment RC3
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Comment on cp-2021-34

Anonymous Referee #3

Referee comment on "The triple oxygen isotope composition of phytoliths, a new proxy of atmospheric relative humidity: controls of soil water isotope composition, temperature, CO₂ concentration and relative humidity" by Clément Outrequin et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-34-RC3>, 2021

Authors Outrequin et al. submitted a manuscript about recent experiments investigating the controls over the triple oxygen isotope composition of phytoliths and the feasibility of using phytoliths as a paleo-aridity proxy. The authors detail a well thought out plant growth chamber experiment where temperature, carbon dioxide concentration, and humidity are each controlled. The authors conclude that relative humidity has the largest influence on the triple oxygen isotope value of the phytolith. The authors provide a new dataset from West Africa and examine the range in triple oxygen isotope values. They compare their new results to previously published plant growth experiments and data from West Africa grasslands. It would be interesting to see values from different regions. However, the authors note in the conclusions that doing so is beyond the scope of the study. The only major critique of the paper is that the data from West Africa are not really described in terms of how it can be used to reconstruct relative humidity. The manuscript only notes that it follows closer to the 2018 growth experiment calculation due to the differences in the $\delta^{18}\text{O}$ value of the initial water. It would be interesting to use Eq. 12 to predict the relative humidity in the modern analog (knowing the initial $\delta^{18}\text{O}$ value of the precipitation water). Overall, this manuscript details a very time intensive and difficult study and does a good job of distinguishing the main driver of the oxygen isotope composition of phytoliths. This manuscript is fitting for the journal and suitable for publication, pending addressing the major (optional) comment above and the small (and optional) comments below.

Line 97: The denominator should be 18, not 17

Figure 4: Are there any open red or blue circles? (Phyto predicted?) There are dotted lines but in the legend it says there are open red and open blue circles. May be worthwhile to add error bars on the phytolith measurements. Why not add Eq. 12 and predict relative humidity of the natural phytolith samples?