

## Reply to comment of referee #1

I want to greatly thank the referee for the constructive and helpful comments, and address here the main concerns raised by the referee. As correctly noted, the relationship between averaged surface air temperatures and the  $\delta^2\text{H}_{\text{LM}}$  chronology indicates inconsistency over time (cf. line 322-328 and Fig. 7b and c). I agree with the referee that this observation reveals the current drawback to quantitatively reconstruct temperature changes using tree-ring  $\delta^2\text{H}_{\text{LM}}$  values and requires in a revised manuscript not only further highlighting but also guidance on how to address this issue in future studies. This will also involve an attenuation of the current paleoclimatic potential of tree-ring  $\delta^2\text{H}_{\text{LM}}$  values. I also agree with referee #1 that the submitted manuscript insufficiently emphasized the originality of our investigation particularly with respect to earlier studies. Anhäuser et al. (2017a,b) quantified and evaluated primarily the spatial  $\delta^2\text{H}_{\text{precip}}-\delta^2\text{H}_{\text{LM}}$  relationship using numerous sampling sites. However, in both studies  $\delta^2\text{H}_{\text{LM}}$  values were exclusively measured from homogenized tree-ring sections of one or two decades (this crucial information is missing in the submitted manuscript). On the contrary, the here submitted manuscript firstly describes the temporal  $\delta^2\text{H}_{\text{precip}}-\delta^2\text{H}_{\text{LM}}$  relationship at a single site and annual resolution. Hence, this approach sets the current study clearly apart from earlier investigations.

Overall, by addressing the raised main concerns of referee #1 in accordance with the above outlined brief respond, the manuscript is considered to notably improve in a revised version. Therein we will further address all comments of the detailed supplemental review of referee #1.

Sincerely, Tobias Anhäuser