

## ***Interactive comment on “The triple oxygen isotope composition of phytoliths as a proxy of continental atmospheric humidity: insights from climate chamber and climate transect calibrations” by Anne Alexandre et al.***

**Anonymous Referee #2**

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The authors present the results of triple oxygen isotope measurements of plant silica. The aim of this study is introducing  $\delta^{17}\text{O}$  and  $\delta^{18}\text{O}$  of phytoliths as proxy for the relative humidity (RH).

The authors conducted laboratory experiments with controlled irrigation water composition, temperature and relative humidity. Data show that the difference in  $\delta^{17}\text{O}$  between irrigation water and phytolith changes with RH. That is expected as the kinetic fractionation becomes more important at lower RH. Because kinetic fractionation follows a slope 0.516 (and 0.528 was used as reference line for defining  $\delta^{17}\text{O}$ ), resultant

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$\delta^{17}\text{O}$  values of the phytolith change with RH.

The authors point out that the weakness of this study is the lack of vapor data. That is true and the study would certainly have benefited from such data. The results show that the phytoliths fall on a line about parallel to the water evaporation trend typical of leaf water.

In figure, the lines should go through all data, including the RH = 100 points. If necessary, draw curves. There is no physical reason why the laws of nature stop operating at RH = 85. It is a continuum; possibly with gradually changing mechanisms above RH = 85. That should not be camouflaged in the figure. For readers with a b&w printer only, different symbols would be appropriate to distinguish the different data.

In figure 1, " $\delta^{17}\text{O}$ -excess" (top, bottom) is not relative to VSMOW. It is, however, reported relative to a reference line with slope (0.528) and intercept (0). Delete "VSMOW". Also, the  $\Delta^{18}\text{O}$  should not be reported relative to VSMOW; it's a difference between  $\delta$  values; delete VSMOW here, too.

Line 386ff: Don't give numbers like  $27.948 \pm 7.168$  ! Give  $28 \pm 7$ . Only report significant number of digits. See also line 405; never give more digits than the uncertainty allows. Change throughout the entire manuscript.

My major criticism on this paper is that it is not evaluated how precise ( $\pm$  RH values) the approach is for the reconstruction of the RH. Also, completely missing is a discussion on the heterogeneity of leaf water and the effect on the phytolith composition. Eventually, people will use fossil phytoliths for reconstructing past RH and they will not know from which part of the plant the samples come. After this assessment, come to a decision on whether this proxy works or not (for useful applications). The lack of a quantitative assessment of all uncertainties is a general problem of many proxies.

With some corrections and such a quantitative discussion, the manuscript is surely worth being published in Biogeosciences.

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