Climate of the Past Discussions

Clim. Past Discuss., referee comment RC1
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# Comment on cp-2021-34

Anonymous Referee #1

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Referee comment on "The triple oxygen isotope composition of phytoliths, a new proxy of atmospheric relative humidity: controls of soil water isotope composition, temperature, $CO_2$ concentration and relative humidity" by Clément Outrequin et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2021-34-RC1, 2021

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I have reviewed the manuscript entitled "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." submitted by Outrequin et al., for publication in Climate of the Past. This investigation is directed to develop a new proxy for quantitative paleo-humidity reconstructions based on triple oxygen isotopes in biogenic silica from plants. The authors calibrate their proxy using growth chamber and demonstrate that the 17Oexcess parameter in photoliths is sensitive different RH conditions, while is barely affected by temperature or CO2 concentrations, among other parameters. The analytical approach and the experimental set-up seems thoughtful and well-designed. The authors try to explain slight deviations of the analytical data with respect to expected results, for example, by assuming that heterogeneous silicification processes may contribute to an apparent kinetic fractionation between evaporated leaf water and silica. The manuscript is well-written and the science is convincing. In my opinion, the authors should address some analytical details and clarifications before publication:

- Lines 75 to 80. The authors should cite here recent studies that used triple oxygen and hydrogen isotopes in hydration water of minerals as a quantitative proxy for paleo-humidity reconstructions, including Evans et al., 2018 and Gázquez et al., 2018. These studies are totally related to the final goals of this manuscript and should be cited as an example of quantitative RH proxy based on triple oxygen isotopes.

- In lines 108 to 114. I wonder if the author could translate this paragraph into a conceptual figure, explaining the sensitivity the isotope ratios to these parameters. Otherwise, it may be difficult to follow for non-specialized readers.

- Sections 3.1 and 3.2. Did the air inlet to the chamber atmosphere come from the same

cylinder as for the analyzer when doing the calibration with liquid waters? Did the instrument use Air Zero (dry synthetic air)? Did you replace the air in the chambers with the same carrier? I am asking this because, in my personal experience, the use of different carrier gases (i.e. dry atmospheric air vs dry synthetic air) for calibration and for online measurements of water vapor can produce an offset in 17Oexcess. This needs to be clarified in this sections.

- In section 3.2. Please, can you give the typical H2O concentrations measured with the CRDS analyzer from the chamber atmosphere? Did you consider/apply any linearity correction for the isotopic values? Did you take any measurement to monitor the drift of the instrument between calibrations?

References

Evans, N.P., Bauska, T.K., Gázquez, F., Brenner, M., Curtis, J. H., Hodell, D.A., 2018. Quantification of drought during the collapse of the classic Maya civilization. Science, 361 (6401), 498–501.

Gázquez, F., Morellón, M., Bauska, T., Herwartz, D., Surma, J., Moreno, A., Staubwasser, M., Valero-Garcés, B., Delgado-Huertas, A., Hodell, D.A., 2018. Triple oxygen and hydrogen isotopes of gypsum hydration water for quantitative paleo-humidity reconstruction. Earth Planet. Sci. Lett. 481, 177–188.