# Assessing the accuracy of relative humidity prediction using an empirical relationship based on rice (*Oryza sativa* L.)

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A recent study by Kaushal and Ghosh [1] demonstrated the potential of stable isotope ratios in rice grain organic matter for reconstruction of relative humidity integrated over the growing season. Based on available oxygen isotope data of rice grains from literature and new analysis, a case has been presented here that evaluates the validity of an empirical relationship proposed in the above study [1] for predicting the growing season relative humidity condition across latitudes covering both northern and southern hemisphere. For this, we used isotopic data from literature [2-4] that covers countries such as USA, Japan, Spain, Italy, France, Thailand and Australia. New isotopic measurements were carried out on rice grain samples from Taiwan. The oxygen isotope composition of the source water for the respective locations were obtained from the IAEA-GNIP and literature, and used for calculating the oxygen isotope enrichment in the rice grain organic matter. Assessment of accuracy for relative humidity prediction was performed by examining the differences between predicted and observed value of relative humidity. Results show that the equation enables accurate predictions for the humid locations, i.e., within the ± 3% uncertainty limit. However, the equation overestimates the values (< +8 %) for the drier locations. The factor responsible for overestimations are the errors associated with the source water isotopic composition adopted and/or the uncertainty associated in our assumption of the growing season months and hence in the measured values of relative humidity used for comparison. To address the discrepancy, we will validate observations from regions for which the above parameters are precisely known. The results of this study will have significant implications in adding confidence to the proposed empirical relationship [1] for reconstruction of relative humidity using rice grown in diverse climatic regions across the globe.

[1] Kaushal, R. & Ghosh, P (2018) *J. Geophys. Res. Biogeosciences* **123**, 1–17. [2] Kelly, S. *et al.* (2002) *Eur. Food Res. Technol.* **214**, 72–78. [3] Korenaga, T. *et al.* (2010) *Anal. Sci.* **26**, 873–878. [4] Suzuki, Y. *et al*. (2008), *Food Chemistry* **109**, 470–475.