



Interactive comment on “Spatial variability of northern Iberian rainfall stable isotope values: Investigating climatic controls on daily and monthly timescales” by Ana Moreno et al.

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We have read Rev1’s comments about our manuscript and appreciate his/her sincerity. We acknowledge his/her opinion about the novelty and interest of our data. However, we disagree with many of his/her observations as indicated in this response:

1) First, regarding the question of which factor influencing rainfall d18O composition is emphasized in this manuscript, we would like to note that the manuscript refers to a large number of factors and analyze the role they play in the variability of d18Orainfall. Our objective is to “assess the principal influencing factors determining rainfall isotopic

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Discussion paper

variability” although we agree we are not always able to quantify the effects of every factor since they are frequently playing an overlapping role. We state both in the abstract and in the conclusions the important role played by geographical factors when referring to annual averages and at a spatial approach but temperature and moisture origin and uptake are fundamental factors to explain the seasonality and the differences between “Atlantic” sites and “Mediterranean” ones. Therefore, it is fundamental to characterize the $\delta^{18}\text{O}$ rainfall at different sites and at different time scales. For example, in this manuscript we present for the first time in Spain the combination of seven sites to account for the regional spatial variability and the combination of daily and monthly data to account for the temporal scale. This is a huge exercise that for sure will be of interest for this community, even if we don't success on quantifying the effect of every factor separately.

2) Second, Rev1 considers the purpose of this study does not seem to fit the scope of the ACP based on the “local” character of our research. We totally disagree with this remark. In ACP there are many papers focused on a regional approach, not all the studies have general implications for atmospheric science as Rev1 indicates. Here is a short list of recent papers in ACP dealing with rainfall stable isotopes in quite local settings or focused on single events:

Bonne, J.-L., Masson-Delmotte, V., Cattani, O., Delmotte, M., Risi, C., Sodemann, H. and Steen-Larsen, H. C.: The isotopic composition of water vapour and precipitation in Ivittuut, southern Greenland, *Atmospheric Chemistry and Physics*, 14(9), 4419–4439, doi:<https://doi.org/10.5194/acp-14-4419-2014>, 2014.

Bonne, J.-L., Meyer, H., Behrens, M., Boike, J., Kipfstuhl, S., Rabe, B., Schmidt, T., Schönike, L., Steen-Larsen, H. C. and Werner, M.: Moisture origin as a driver of temporal variabilities of the water vapour isotopic composition in the Lena River Delta, Siberia, *Atmospheric Chemistry and Physics*, 20(17), 10493–10511, doi:<https://doi.org/10.5194/acp-20-10493-2020>, 2020.

Dittmann, A., Schlosser, E., Masson-Delmotte, V., Powers, J. G., Manning, K. W., Werner, M. and Fujita, K.: Precipitation regime and stable isotopes at Dome Fuji, East Antarctica, *Atmospheric Chemistry and Physics*, 16(11), 6883–6900, doi:<https://doi.org/10.5194/acp-16-6883-2016>, 2016.

Jeelani, G., Deshpande, R. D., Galkowski, M. and Rozanski, K.: Isotopic composition of daily precipitation along the southern foothills of the Himalayas: impact of marine and continental sources of atmospheric moisture, *Atmospheric Chemistry and Physics*, 18(12), 8789–8805, doi:<https://doi.org/10.5194/acp-18-8789-2018>, 2018.

Lee, K.-O., Aemisegger, F., Pfahl, S., Flamant, C., Lacour, J.-L. and Chaboureau, J.-P.: Contrasting stable water isotope signals from convective and large-scale precipitation phases of a heavy precipitation event in southern Italy during HyMeX IOP 13: a modelling perspective, *Atmospheric Chemistry and Physics*, 19(11), 7487–7506, doi:<https://doi.org/10.5194/acp-19-7487-2019>, 2019.

Okazaki, A., Satoh, Y., Tremoy, G., Vimeux, F., Scheepmaker, R. and Yoshimura, K.: Interannual variability of isotopic composition in water vapor over western Africa and its relationship to ENSO, *Atmospheric Chemistry and Physics*, 15(6), 3193–3204, doi:<https://doi.org/10.5194/acp-15-3193-2015>, 2015.

Pfahl, S., Wernli, H. and Yoshimura, K.: The isotopic composition of precipitation from a winter storm – a case study with the limited-area model COSMOiso, *Atmospheric Chemistry and Physics*, 12(3), 1629–1648, doi:<https://doi.org/10.5194/acp-12-1629-2012>, 2012.

Steen-Larsen, H. C., Sveinbjörnsdóttir, A. E., Peters, A. J., Masson-Delmotte, V., Guishard, M. P., Hsiao, G., Jouzel, J., Noone, D., Warren, J. K. and White, J. W. C.: Climatic controls on water vapor deuterium excess in the marine boundary layer of the North Atlantic based on 500 days of in situ, continuous measurements, *Atmospheric Chemistry and Physics*, 14(15), 7741–7756, doi:<https://doi.org/10.5194/acp-14-7741-2014>, 2014.

3) Finally, Rev1 propose presenting our manuscript as a Methodological report instead of a Research report. We agree this can be a good change and, after conversation to the Editor, we will move our manuscript to Methodological report format.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-861>, 2020.