

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.

Anonymous Referee #3

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This study investigates the isotopic variability in rainfall in the northern Iberian Peninsula at daily and monthly time scales. Several climatic and geographic factors that can help to explain isotope composition are discussed, such as temperature, amount of precipitation, the site elevation, and continental effects. Also, the study aims to link the isotopic variability to air mass pathways (i.e., moisture source effect) using back trajectories and rainfall types (frontal versus convective) based on different weather regimes of precipitation.

Overall, I found the study very interesting and potentially relevant. The study combines isotope measurements in rainfall with a meteorological perspective that can help to

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explain the isotope variability along a transect of the northern Iberian Peninsula where different weather systems and processes can have an alternating influence on precipitation formation, potentially supporting an improved interpretation of paleoclimate archives in the region. However, I also have a few major concerns that need to be addressed before considering potential publication. In its current state, the storyline of the manuscript is at several places hard to follow, with discussion of results placed in different (sub)sections. In addition, the quality of the text allows for improvements. Please, see for more details general comment #1 and several other specific and technical comments. Another main concern is related to the analysis of the back trajectories that aim to provide an indication of the moisture source / air mass origin and the linkage of this origin to the isotope signals in precipitation. If my understanding is correct, the idea is that moisture pathways from the Atlantic leave a different isotopic imprint than those arriving from the east over the Mediterranean Sea. This analysis, however, seems somehow problematic as for all sites in the study area by far the larger part of trajectories arrive from the west / northwest. In addition, the manuscript states at several occasions that the isotope signals on the western and eastern margins of the Iberian Peninsula are relatively similar. As a consequence, the presented results in section 4.3 appear to be not in line with the stated conclusions derived from this analysis. Please, see for more details general comment #2. My recommendation is to satisfactorily address these two major comments as well as the specific and technical comments, and to resubmit a revised manuscript for consideration of publication.

Please also note the supplement to this comment:

<https://acp.copernicus.org/preprints/acp-2020-861/acp-2020-861-RC3-supplement.pdf>

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

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