



Spatial variability of northern Iberian rainfall $\delta^{18}\text{O}$ values: investigating climatic controls on event timescales

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This study presents isotopic measurements (i.e., $\delta^{18}\text{O}_p$ and $\delta^2\text{H}_p$) of precipitation from seven sites in northern Spain in a W-E transect for 2010-2017. The main goal is to characterize regional rainfall isotopic variability evenly (rainfall samples were collected for every event) and assess the principal influencing factors at seasonal and inter-annual scales. Air temperature, amount of precipitation and moisture source are considered as factors influencing $\delta^{18}\text{O}_p$ and $\delta^2\text{H}_p$ values and trends in the studied sites. This spatio-temporal approach allows for exploring the role of water mass source in determining the isotopic composition of rainfall in northern Iberia by using *d-excess* values, rainfall components and back-trajectories. The results show that the type and origin of precipitation significantly modulates the $\delta^{18}\text{O}_p$ values and ranges and, together with the distance from coast and altitude, are responsible for the main differences observed among the seven studied sites. Here we found that more than one source of moisture adds a level of complexity to the well-known influence of air temperature and precipitation amount on $\delta^{18}\text{O}_p$ variability. Detailed discussions of the different factors and the likely mixed influences on the spatial and temporal scale would be of paramount importance for future paleo-environmental studies.