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Meteorological parameters controlling d18O and dD values in precipitation over the northwest Iberian Peninsula and their relationship with paleoclimate studies.

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Isotopic composition of the rainwaters can be controlled by several meteorological parameters like the temperature, the precipitation amount, the moisture source region or the atmospheric circulation patterns, depending on the region where the study is developed and the time-scale you are working with. The relationship between stable isotopes variability observed in the rain samples and these different parameters, is very important to develop a good interpretation and analysis of d18O variability observed in different paleoclimate records such as speleothems or ice cores. Northwest Iberian Peninsula is a very oceanic region (Cfb – Köppen climate classification) with a high density of d18O speleothem records. Because of its latitudinal situation, is also one of the best regions all over the North Hemisphere, to identify Atlantic climate and paleoclimate variability using different climate proxies. Here in this study, we investigate the influence of these meteorological parameters over 104 different rain samples collected in Langreo (NW Iberia – 43.3075N, 5.6933W) during 2015 and 2016, showing very low significant correlation between temperature (r = 0.31), amount effect (r = -0.27), circulation pattern (Lamb weather types, r = 0.17) and source effect (back-trajectories calculated with HYSPLIT model). Taking into account these results, we introduce the analysis of several new parameters related with the evaporation in the vertical profile of the atmosphere during the precipitation events, which have not been studied yet (lifted condensation level – LCL, Convective condensation level – CCL, level of free convection – LFC, convective inhibition – CIN), using reanalysis dataset ERA-Interim from the European Center for Medium range Weather Forecast (ECMWF) and atmospheric soundings at 00 and 12 UTC of Santander Airport located 150km away from the region studied. These results provide us information about the relationship between d18O variability observed in the rain and the clouds characteristics of each event. Finally, we also use principal component analysis to try to determinate the influence of each parameter analyzed in each event, and check the results with a d18O speleothem proxy of the last 500yr collected in a cave located close to the region monitored in this study.