



## How does the soil moisture influence the surface energy fluxes? An observational study at La Herrería Forest (Central Spain)

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This work presents the characterization and comparison of the response of evapotranspiration (ET) to variations in shallow soil moisture (SM) in three years with different precipitation regimes: 2017, 2018 and 2019, through the analysis of tower data from La Herrería site, a forest site in the foothills of the Guadarrama Mountains in Spain. The aim of this work is to improve the comprehension of the relations of these variables (ET and SM) and their dependence on rain regimes in the studied years. To assess this, monthly SM regimes are considered, with three main types: transitional, wet and dry. The study shows the highly variable response of ET to variations in SM, which depends on the three considered SM regimes. In transitional regimes, SM strongly constrains ET variability, in wet regimes, SM does not impact ET variability, and in dry regimes, SM has a small impact in ET variability, due to its small variations. In particular, the months which suit satisfactorily to these regimes are identified, such as July 2018 (transitional,  $r=0.73$ ), November 2019 (wet,  $r=-0.27$ ) and August 2018 (dry,  $r=0.36$ ), being  $r$  the coefficient of linear correlation between ET and SM. Some months that do not fit in the proposed scheme are also identified, and they have to be analyzed independently. This research shows the need to take into account different physical processes that affect ET, the complexity in the treatment of observational (tower) data for this type of analysis, and illustrates how the election of the length of the studied period is important for this type of analysis. Hence, it should be carefully chosen, because the interpretation of the results can be different depending on this choice.