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Earth System Dynamics
Discussions

Interactive comment on "Rankings of extreme and widespread dry and wet events in the Iberian Peninsula between 1901–2016" *by* Margarida L. R. Liberato et al.

Anonymous Referee #1

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This study describes the main dry and humid events that have affected the Iberian Peninsula from 1901 to 2016. The research topic addressed is relevant nevertheless, the study is principally descriptive. This is not a limitation per se, but further discussion should be necessary to justify the relevance and novelty of this study in comparison to the several studies (some of them very recent) analysing droughts from different perspectives in the Iberian Peninsula. In addition, there are some methodological issues that should be considered to remove some interpretations of the obtained results. There are also some data issues and recommendations to improve the manuscript. I would suggest a major revision of this manuscript. Comments: 42. typo: Spatial extend 44. I would also mention environmental or ecologic droughts

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(e.g. https://doi.org/10.1016/j.earscirev.2019.102953) 44-54. I do not think necessary here to describe in depth these drought types. 58. The PDSI is not recent. I suggest to cite a study that reviews drought indices (e.g. https://doi.org/10.1175/1520-0477-83.8.1149, https://doi.org/10.1007/s40641-018-0098-x). 63-68. I would remove this criticism of the PDSI. I do not it is needed here. 85. This is not a water balance model. The SPEI is not intended to be soil moisture metric. 93-99. I would suggest to revise recent literature on this topic also in the Iberian Peninsula (https://doi.org/10.1002/joc.6719, https://doi.org/10.1007/s11600-018-0138-x, https://doi.org/10.1111/nyas.14365, https://doi.org/10.1002/joc.6126). 115. Nevertheless, the relevant issue is the number of stations used in the Iberian Peninsula. This is very relevant in this study. This is very relevant in this study since this may affect the obtained results since few interpolated stations may filter too much the spatial variance of the specific drought episodes. 117. I wonder on the goodness of the VPD data for the first decades of the XXth century. 132-146. There are strong uncertainties related to the calculation of the evaporative demand prior 1960s. This explains that some drought datasets based on the AED start in the decade of 1960 (https://doi.org/10.3390/data2030022). I am not convinced by the arguments provided to justify the use of the CRU dataset for the long-term, mostly for the atmospheric demand, at least in Spain few of the data necessary to calculate the AED with the FAO-56 method is not available. If author's main focus is the long term, I would recommend focusing only on precipitation data and the SPI. This would reduce uncertainty since CRU precipitation data shows good capacity to reproduce long-term precipitation variability in the region (https://doi.org/10.1088/1748-9326/ab9c4f). 183-185. Repeated above. 166. I suggest restricting the analysis to time scales below 12 months. The autoregressive character of SPEI and SPI affect the identification of the drought events and the possible trends (e.g., https://doi.org/10.1002/joc.6350, https://doi.org/10.1175/JCLI-D-15-0590.1, https://doi.org/10.1016/j.scitotenv.2020.140094). Fig. 2 Most of the events identified are recorded in the decades of 2000 and 2005. I would ask if AED uncertainties may be biasing this issue. Droughts based on precipitation data do not show so im-

portant trends (https://doi.org/10.1002/joc.6719). Also SPEI data based on high quality data in Spain does not show so important trend (https://doi.org/10.1002/joc.6126). 221-234. Remove 18 and 24 months. Persistence should be also recorded with 6- and 12-month SPEI and it is not affected by the mentioned autocorrelation problems. 236-244. I would not use different thresholds. This makes the structure of the article more complex unnecessarily. Figure 1. Is this needed? Discussion: There is not a discussion section that discusses in depth the obtained results and some comparison with the scientific literature related to droughts published in the Iberian Peninsula in recent years. I think extremely necessary to write an independent discussion section in which the caveats of the data and methodology are stressed, but also the implications in the current climate change scenario and the possible novelty of the results in relation with the existing literature.

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