

Interactive comment on “High-spatial resolution probability maps of drought duration and magnitude across Spain” by Fernando Domínguez-Castro et al.

Anonymous Referee #2

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The paper presents a methodology to characterize drought duration and intensity over Spain using two climatic indices: SPI and SPEI. The work uses a gridded dataset of SPI and SPEI values calculated weekly at high spatial resolution over Spain. From this dataset and using SPEI and SPI at four different time scales, the authors obtain a peak-over-threshold empirical series of drought duration and magnitude on which they fit a Pareto distribution. The fitted probability distribution is then used to produce maps of the maximum drought duration and magnitude of different time scales. The work differs from previous drought characterization efforts in the high spatial and temporal resolution at which the study is conducted, and the use of a GP distribution to capture the probability distribution of extreme anomalies, which is critical for correct drought

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characterization.

I found the study valuable from the methodological point of view and from the insight it provides on drought patterns. The paper provides important methodological guidance on the most adequate probability distribution to characterize exceedance thresholds through a thorough analysis of different candidate probability distributions that could represent the POT series. It also shows that the spatial patterns of drought can be very different when droughts are characterized at different time scales. I do not have major methodological concerns, however, the paper is written such that some methodological and conceptual aspects are not clear. Part of the problem is that the paper needs to be heavily edited for language and style. Also, the authors need to pay attention to details. For instance, some of the symbols used in the equations are not defined in the main text or the symbols used in the text and the equation are different (e.g. x_0 , w_j). The labels of Figure 1, 2 and 3 cannot be read and their general quality need to be improved. There are many awkwardly written sentences throughout the paper that are distracting and detract from the quality of the study. The paper, as currently written, is not ready for publication.

Section 2.2. discusses the arbitrary nature of selecting thresholds in the indices to define drought, and how these thresholds are different for different activities or processes impacted by drought. Then in Page 4 line 6 says that the studies uses an 'arbitrary' threshold of zero and define drought as an event with an index below zero. Isn't it the standard way of applying these indices to define drought? In that case, zero represents the long term average climatology and therefore it could be argued it is not an arbitrary threshold. The way the paragraph is written makes me doubt whether I am actually interpreting this correctly. I suggest that paragraph is edited to be more specific or clear about what the authors actually mean. Also, a few additional details in the methodology, such as how were the climatic inputs used to produce the indices gridded, may help interpret the results.

I have a few additional questions: why does the paper use the word centile instead of



percentile? Does it have a specific meaning, like the percentile from the empirical cdf? Page 4 line 21: does the 0th percentile actually exist? Does it refer to the minimum value in the record? Page 7 line 9-10: I am not sure you should expect that low model-observation agreement is caused by the lower sampling size at long time scales. Why would that be? Goodness of fit and robustness are different things.

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