

Interactive comment on “A standardized index for assessing sub-monthly compound dry and hot conditions” by Jun Li et al.

Anonymous Referee #2

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HESS-2020-383 review

The paper discusses a standardized index for assessing compound dry and hot conditions. Overall, I find the paper not in a really good shape, and I have to admit that I found it really hard to read due to the excessive amount of acronyms. The paper is so technical that for a reader who does know something about the topic, it is still very hard to follow. For me it did not become entirely clear what are now the new insights that can be learned by creating this new index that were not known before. I also think that the authors should make a new selection of figures and reduce the paper to the essentials, because with the figures in the text and the supplementary material there are so many panels showing China that it becomes overwhelming to the reader. I put some comments below that could help in improving the paper.

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It could be good to mention already in the title that this study only concerns China. The paper does not deliver a universal index for compound dry and hot conditions, but one that is only developed for application in China.

As a reviewer, it did not become completely clear to me what the exact problem is of combined dry and hot conditions. There are many examples, but their explanation does not really get to the core: why do we need an indicator for dry and hot? Please improve this in the revision.

I find the methods a little ill-described. There are many references back to previous papers, but please list the equations of the equations that you take from these papers, because now the reader has to look up essential information in previous papers. Also, please be exact what the source of the input data is that is needed to compute all the variables that you need.

Line 203: how does one use a probability distribution to create daily time series, and against what is it fitted? I do not understand the procedure.

Line 219: what is copula theory?

Lines 226-250: This could use some explanatory figures. It is nearly impossible to understand for a reader that is not familiar with the specialized methods that are used here.

Line 265: I think that there are more appropriate and far older references for the definition of the POD and FAR.

Section 3.1: What is the added value from SAPEI compared to much simpler metrics as soil moisture, or if that is not available P-E, or an simple estimation of evapotranspiration?

There are too many references to the supplementary material throughout the text. I suggest the authors reevaluate the necessity for each of the figures and come up with a set that is crucial to the story. This is not a research letter, there is more than enough

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space.

Line 462. If a hot index is based on absolute temperature, it seems trivial that places that are closer to the equator at low altitudes have the largest probability of a hot event. Can you explain more about the location where the outcome surprised you, or where new insights were found?

Lines 485 and further: How are the RCP scenarios computed in your index? This does not seem trivial to me, how is the input acquired? It would be nice to know which of the observed increases in due to temperature alone and which due to more complex interactions?

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