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Discussions

Interactive comment on "A baseline probabilistic drought forecasting framework using Standardized Soil Moisture Index: application to the 2012 United States drought" *by* A. AghaKouchak

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This paper presents a nonparametric statistical baseline approach for drought prediction using standardized soil moisture index. To the best of my knowledge, previous studies have primarily focused on precipitation for persistence-based statistical drought prediction. This study highlights the fact that given the higher persistence of soil moisture compared to precipitation, a baseline forecasting using soil moisture would improve drought prediction. The methodology is proposed as an additional model that can be used alongside with the currently available techniques. The framework is novel and given the importance of the topic, I believe the article is suitable for publication

pending a revision. Also, the study focuses on the 2012 drought, a major recent event that has not been explored in the literature yet. I have included some comments and suggestions below:

-In Equations 1 to 3, it is not clear whether the initial conditions can obtained from one year before the target month year (for example, for predicting January, February drought). This needs more explanation.

-While the difference between precipitation and soil moisture persistence is shown, it would be good to include the improvements in using soil moisture in terms of drought probabilities (either showing them side by side, or showing the differences).

-While this approach probably improves drought prediction, ideally, soil moisture should be combined with other variables for a more robust statistical prediction. Can this model be extended to higher dimensions (e.g., using precipitation or runoff)? Given that both precipitation and soil moisture data are available, it is worth exploring this issue.

-Discuss uncertainties associated with the input variables. Acknowledge the limitations of the available soil moisture data sets.

- SSI is a new relatively new index and has not been used for drought prediction before. The description of the suggested nonparametric approach needs to be discussed in more details. Why a nonparametric approach?

- What is the advantage of using SSI over the other soil moisture-based indices?

-Is there an opportunity to integrate the upcoming satellite soil moisture data sets (e.g., SMAP) and the currently available SMOS data? It is worth to include a discussion on this topic.

-Would it be possible to condition forecasts on large scale climatic oscillations? For example, sampling from historical data with a certain condition (e.g., ENSO pattern).

-The fact that the drought probabilities drop at longer lead times worth a discussion.

-Can this model be used for drought recovery too (i.e., probability of drought recovery)? Discuss.

-Conclusions should be extended with a discussion on limitations of the methodology and data sets.

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