

Interactive comment on “Identification of spatiotemporal patterns of biophysical droughts in semi-arid region – a case study of the Karkheh river basin in Iran” by B. Kamali et al.

Anonymous Referee #2

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Review: "Identification of spatiotemporal patterns of biophysical droughts in semi-arid region – a case study of the Karkheh river basin in Iran"

The paper aims at intercomparing meteorological, hydrological, and agricultural drought for a river basin in Iran, which plays an important role for food production. While the study has potential to provide very useful insights into drought propagation, I have several major concerns regarding methodology and paper organization. The manuscript needs thorough revision and additional analyses would be highly recommendable, which goes beyond major revisions. I therefore opt for rejection of the manuscript in its current form.

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Major concerns:

[1] The paper aims at investigating drought propagation for different sub basins of the Karkheh river basin by intercomparing SPI based on observed precipitation with SRI and a soil moisture deficit index (SMDI), both based on modeled data. I am skeptical about intercomparing modeled data. Do you really compare drought propagation properties of the system or do you compare model behavior in a way? SRI and SMDI are both driven by observed precipitation that you compare it to. Isn't that circular reference? I would suggest to compare SPI to observed data, at least for a few available stations.

[2] In its currently presented form the results are not reproducible owing to incomplete methods description, or at least lacking information in the corresponding part of the manuscript. Much information needed on methodology is presented here and there in the results section. Examples are:

- Information on spatial and temporal resolution of calibration data is missing in methods section
- You use annual yield for calibration: how reliable is calibration with annual data that is influenced by a multitude of factors other than meteorological ones, e.g. nutrient availability and management practices?
- How exactly is SRI calculated? Reference period?
- Based on which thresholds are the drought events delineated?
- Description of sub basins needed

[3] In my view there is potential to conduct further analysis that go beyond visual comparison of timeseries and extracted drought characteristics for selected events. Figures 2, 3, 5, and 6 show calculated time series with additional information on severity (color coded). I would suggest to think about further synthesizing analyses addressing the linkage between the different types of drought AND differences among catchments (that go beyond correlation and the event-based information in Table 4), e.g. systematic differences in lag time between different types of drought among catchments.

[4] There is a large body of literature on comparing different drought indicators repre-

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senting different types of drought. Existing literature needs to be better incorporated into this study.

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