

Interactive comment on “Signatures of human intervention – or not? Downstream intensification of hydrological drought along a large Central Asian River: the individual roles of climate variability and land use change” by Artemis Roodari et al.

Anonymous Referee #1

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The manuscript presents an interesting study on the intensification of downstream hydrological drought caused by meteorological and Human influences using a physically-based hydrological model and drought indices (SPEI, SPI and SDI). The study is suitable for publication in Hydrology Earth System Sciences (HEES) Journal. However, a major revision is required regarding the following comments;

General Comments 1. The introduction section needs to be rearranged and improved.

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Specifically, the authors should start the introduction by stating how their research constitute a global problem before highlighting the regional problems identified in the Central Asian River Basin. I suggest that the authors start the introduction with line 66:81 (meaning it should be moved up and edited meaningfully) before discussion on the study basin. In doing so, however, the authors should ensure the literature cited are relevant in the body of work and should reflect in the discussion section. 2. The methods used in this research has a good scientific foundation. Nonetheless, the reasons for selecting the hydrological model need to be highlighted in a few sentences given that other hydrological models can perform this same task. Why use this model and why is it important. The authors mentioned the scarcity of data as a limitation of this research, does this model help to alleviate the problem of data scarcity? Why do the authors choose this model over other hydrological models? 3. Results and Discussion: The result was well presented; however, the discussion was not adequately presented. The authors need to discuss the result by comparing or contrasting conclusions made with relevant literature. The underlying physical processes and human activities that were outlined to be responsible for the derived result should have strong theoretical underpinning. Only then can the result have a strong scientific basis and meaning. If this is not done, this section may look like a mere presentation of result. I will suggest the authors separate the result from the discussion. It will help to know where the result presentation ends and where the discussion begins. 4. It is fascinating to see that the authors presented a limitation of this research. Clarity on limitations is beneficial in outlining the extent of possible errors. However, it will be more meaningful, for instance, if the authors specifically suggest a likely better approach to help limit uncertainties inherent in the result. For instance, is there a hydrological model that does better in the data-scarce region and that will capture different processes as highlighted by the model used; otherwise could developing such a model be a way to limit uncertainties? Moreso, will comparing different meteorological dataset to determine which best captures drought (with reference to SPEI and SPI) within the study site help limit uncertainty for better policy formulation on water resource management? All

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these specific forward-looking documentation can be made to readers to know about possibilities and solutions since the data may inaccurately depict reality. And in-turn improve the quality of the manuscript 5. The grammar is sometimes not correct. The authors should allow a native speaker to help improve some sentences.

Specific comments Line 97: remove “s” from occurs Line 117-118: the sentence on this line ended with “most of the crops located in the traditionally irrigated areas (Wardlaw et al., 2013)”. I feel this sentence is incomplete or rather add no additional meaning to the preceding sentence. Line 151: put “.” After Ssn Line 161: delete “that” Line 261: remove “the” before give Line 294: Sentence not understandable. The authors placed Iran after requirement. The sentence needs to be rewritten to portray real meaning. Line 300-304: more explanation needs to be given about streamflow loses. Since soil evaporation is not enough reason as to why 60% of stream water is lost in the hyper-arid region, an explanation should be provided from the literature with regards to the inferences made by the author. Since the authors outlined that deep aquifer recharge and deep infiltration may be responsible for loses, more explanation should be given with references from existing literature. Line 350: delete “with” after was Line 355-359: there is a need to corroborate the role Ep plays in intensifying or moderating drought. The authors need to discuss with relevant literature. Line 434-436: The authors should compare or contrast their findings/conclusions with relevant literature Line 437: recast sentence. Line 441: remove “s” from estimate Line 486-487: the sentence starting with demand is not understandable, please recast. Line 500-501: what do the authors mean by “consequence of the extension the.” please recast to portray the intended meaning Line 508: Do not start the sentence with “this”

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