

Interactive comment on “A generic method for hydrological drought identification across different climate regions” by M. H. J. van Huijgevoort et al.

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First, we would like to thank the Editor Dr. Sally Thompson for her careful reflections on the manuscript. We have tried to address the issues raised by the Editor in the answers to the referees (see, also the Introduction at the start of the reply to Referee 2). Here, we shall give a short reaction to the points raised by the Editor.

1. *The validity of using modeled data as a basis for the development of the technique. This point was raised by both reviewers. In the absence of validation*
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of the modelled flow data, particularly in light of some of the difficulties associated with predicting flow in arid rivers using many land surface schemes, the implementation of the drought identification approach proposed here is one that compares model data with model data. There is a need to bring this back to "reality" with use of measured flow data. Should such a comparison now be attempted, please bear in mind two very valuable comments made by reviewer 2: firstly that the length of record used must be sufficiently long to capture the large interannual and even interdecadal variability in flow regimes in many arid basins; and secondly, that the identification of low or no flow conditions from gauge data may be problematic and merits additional validation prior to using the flow record directly.

We want to make clear that the method can be applied both to observed and to modelled data, and was not developed for modelled data alone. The occurrence of regular no-flow periods in time series of several climates across the globe both in observed and modelled data triggered the development of the combined method for drought analysis. We strongly feel that a validation of the land surface models at global scale is beyond the scope of this paper, since the data are only used to illustrate differences between the drought identification methods. Since these differences can be judged in a relative way, the validation of the absolute values is not necessary for the aim of this paper. In the next phase, the land surface models together with a set of global hydrological models will be intercompared and compared against documented sources using the proposed methodology to find out if these models are able to adequately capture drought characteristics.

2. *Both reviewers were somewhat skeptical about the conceptual approach adopted. Reviewer 1 questioned the use of single metrics as indicators of drought. Reviewer 2 questioned both the novelty of the approach and its ability*

to detect meaningful symptoms of hydrological drought that could feasibly occur under low flow regimes, even when flow was maintained overall. The conceptual basis for the proposed method therefore requires additional justification. Reviewer 1 proposed some additional literature that could be consulted to bolster this aspect of the paper.

We will elaborate the Introduction of the paper and change some parts of the description of the methodology to improve the clarity of the conceptual basis used. The references proposed by Referee 1 were included for this aspect. The proposed additions are included in the authors' reply to Referee 1 (points 1 and 4).

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