

Review for manuscript “Diverging hydrological drought traits over Europe with global warming”

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General comments

While the authors adequately addressed most of the minor points risen in my previous review, my major point, i.e. the one on model validation, has in my opinion not been sufficiently addressed. The authors now cite two studies, which previously used a similar model setup as used in this study. I had a look at these two studies, which indeed demonstrate that that previous LISFLOOD model setup simulated drought deficits well. However, the present study seems to use a setup obtained using a different objective function than in these previous studies, which do not mention the Kling-Gupta efficiency (KGE) used here. I would be surprised if calibrating on the classical KGE resulted in good low flow performance because that metric puts more weight on high than low flows (see e.g. [Garcia et al., 2017]). Given the choice of this objective function, it seems even more crucial to show the reader that the simulated droughts have the same statistical characteristics as the observed droughts. I therefore still think that presenting one summary figure of model performance in terms of different drought characteristics in the methods section is required to strengthen trust in the key messages of the paper. Why is providing such a figure such a big deal?

Specific comments

Methods: The methods section has considerably improved in clarity. However I would still expect some actual proof for the suitability of the model for drought analyses in Europe. As I suggested in my earlier two reviews, this could be achieved by comparing observed to simulated drought characteristics (duration and deficit) for a set of example catchments.

The study reads generally well on a paragraph level but would still profit from editing on a sentence level and from a consistent use of tense. I am going to make a few examples under ‘suggested edits’, however, this list is not exhaustive.

Minor points

I would add labels (a), (b),... to all subfigures presented. This would facilitate referencing in the text. Panel labels are actually required according to the HESS manuscript submission guidelines, which say: 'Labels of panels must be included with brackets around letters being lower case (e.g. (a), (b), etc.).'

Suggested edits:

- l. 14: ‘drought’ instead of ‘low-flow’?
- l. 84: ‘provide’ instead of ‘provided’
- l. 93-96: sentence would read much better in active mode.
- l. 100: remove ‘of’
- l. 103: specify ‘compartments’ already up here.
- l. 142: ‘consists’ instead of ‘consist’.
- l. 148: ‘Specifically’ instead of ‘in detail’

I. 157: provide a reference to the 'literature'

I. 177: 'extend instead of 'go up to'

I. 215-223: section needs rephrasing because the term 'D events' suggest that the lomax function is fitted to the number of events, which is not the case as it was fitted to deficits (D). Suggestion: 'the series of deficits were fitted...'

I. 487: 'scenarios' instead of 'scenario'

Reference used in this review

Garcia, F., N. Folton, and L. Oudin (2017), Which objective function to calibrate rainfall–runoff models for low-flow index simulations?, *Hydrol. Sci. J.*, 62(7), 1149–1166, doi:10.1080/02626667.2017.1308511.