

Interactive comment on “Historic hydrological droughts 1891–2015: systematic characterisation for a diverse set of catchments across the UK” by Lucy J. Barker et al.

Anonymous Referee #2

Received and published: 16 July 2019

The authors present a study of hydrological drought events over the 1891-2015 period utilizing newly established datasets. I think it is a valuable contribution to the hydrological and low flow and drought community. I would suggest to publish the paper after some minor revisions.

General comments:

Little information is given on the basic datasets used for driving the hydrological model. Please elaborate in more detail on the digitized meteorological data. Is this raw data or have they undergone a homogenization procedure? I also think that a reference for a paper in “preparation” is not suitable. Moreover I think that there has to be a more

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in-depth description of the hydrological modelling. E.g. Smith et al. (2019) used six evaluation metrics some of the specific for low flows. What are these metrics and what is the performance? Please provide some information in this respect.

You use the SSI as a standardized hydrological drought indicator. What about the uncertainties considering the fitting of the distribution and how do these translate in terms of derived drought metrics? Since you use mostly rankings of the top events it is rather crucial how the fitting performs particularly at the tails of the distribution. Could you just exemplarily give an indication of possible change in the ranking of some drought metric from fitting uncertainty?

Figure layout: For Figures 3, 5 and 10 I suggest to place the acronyms for the region outside the plot area along the y-axis for better readability. Also rethink the arrangement of catchments along the y-axis, perhaps there is a better way than a strict North/South (driven by climate) alignment (e.g. low flow characteristics). Figure 5: The colorbar as a gradient from red to yellow is in general appropriate for this kind of data in terms of figure layout guidelines. However, since the displayed data is a ranking, I think that the reader would like to see first of all where the top ranked events are. This is not easy in this case. Perhaps you could try a colorbar with more colors? (in R: RColorBrewer palette "Spectral") Or combine two colorbars, one for the top 3 (or 5?) and one for the rest. Don't know how it would look, but it is perhaps worth a try to get the essential information better across.

Several times across the manuscript I stumbled over the terms droughts, drought event or drought periods. I'd like to see more consistency with these terms. The list of major droughts (Table 1) is mostly termed events, however, the 1890-1910 period is not an event from an event definition point of view. This comes rather clear in Figure 10a, where the "long drought" is clearly made up of several individual events(!) all of them with a distinct beginning and end. On the other hand, 1921 (Figure 10b) is clearly an event itself, it has a distinct beginning and end. I suggest to define the names of the major droughts as in Table 1 and stick to the terms, e.g. "1890-1910 drought

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period”, “1921 event”, “1976 event”, etc. I think that an event stretching over several years could be termed as the “year xxxx event”, with the year being that with maximum drought intensity for example, which has to be defined obviously.

Specific comments:

P2L20: “. . .short periods of warm and dry weather. . .”

P2L24: “Moreover, greater climatic variability could mean an increase in persistent blocking episodes and multi-year droughts” please provide a reference for this statement.

P6L5: “Smith et al. (2019) also” please be generally careful with the citations, there are some other inconsistencies.

P6L11: “Low Flow Benchmark Network (LFBN)”

P11L3: suggestion: “For both time scales considered, events tend. . .”

P19L6: “. . . e.g. 1895 saw extreme flow deficits across Scotland and Northern Ireland. . .”

P22L10: In this section some recent research would be appropriate to cite, since there are some events detected in the present paper also listed as extreme droughts in other regions of Europe for example in:

Hanel, M., Rakovec, O., Markonis, Y., Máca, P., Samaniego, L., KyseláĀ, J., & Kumar, R. (2018). Revisiting the recent European droughts from a long-term perspective. *Scientific Reports*, 8(1). <https://doi.org/10.1038/s41598-018-27464-4>

Haslinger, K., & Blöschl, G. (2017). Space-Time Patterns of Meteorological Drought Events in the European Greater Alpine Region Over the Past 210 Years. *Water Resources Research*, 53(11), 9807–9823. <https://doi.org/10.1002/2017WR020797>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019->

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