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Interactive comment on "From meteorological to hydrological drought using standardised indicators" *by* L. J. Barker et al.

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We would like to thank the reviewer for the positive feedback on our manuscript and are grateful for the comments on how it can be improved. We particularly appreciate the comments regarding the generalisation of the results. As well as addressing the individual comments set out by the reviewer, we will bear this in mind when preparing the revised manuscript and make any other sections more precise where necessary.

Here, we respond to each comment in turn:

Major issues:

1) Although we agree that the determination of drought onset and termination would be an interesting addition, we feel it is beyond the scope of this paper and are the subject

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of studies by themselves (e.g. Brubaker and Entekhabi, 1996; Eltahir and Yeh, 1999; Yuan and Wood, 2013). The focus here is how to monitor droughts for early warning purposes, i.e. look over which time scales drought conditions may become apparent in the monitored indicators, rather than how the onset or termination of an event can be defined. For example, in a given catchment, SSI-1 maybe most strongly correlated to SPI-6, therefore if you have a precipitation deficit over 6 months you may start to implement plans to mitigate the impact of a hydrological streamflow drought.

2) We thank the reviewer for pointing out our lack of clarity in this section. In the revised manuscript we will make the results clearer and precise. In regards to the example given P12839 L1-4: This is talking specifically about SPI-1 and SPI-6 as a start and then goes on to compare these shorter accumulation periods to the longer 18 month accumulation period on L5. We will make this comparison clearer in the revised text.

3) The calculation of drought characteristics was intended as an exercise in characterising droughts in UK catchments using SPI and SSI, both of which have been little used previously in the UK. As such, this section of the paper supplements existing knowledge of the baseline hazard and the types of droughts that occur in the selected catchments which may help in the formulation of local drought management plans. It is the time scales (accumulation periods) that are relevant to decision makers monitoring drought. The duration of the SPI accumulation period most strongly correlated to SSI-1 (given the term 'SPI-n') is the timescale over which precipitation should be monitored to identify a possible future hydrological drought. We will make this clearer in the revised paper.

4) Thank you again for pointing out our imprecise description of the results, we will amend this in the revised manuscript to make our meaning clearer and to give a better description of the results.

Minor issues:

1) We assume the reviewer refers to Table 3 showing the correlation coefficients

HESSD

12, C6392–C6395, 2016

for Spearman correlations between hydrological drought characteristics and SAAR (standard-period average annual rainfall). We would say that although the correlation coefficients for clusters 1 and 2 are larger than those for clusters 3 and 4, when taking all catchments together the correlation coefficients are much larger than those for clusters 1 and 2. This suggests that the strong correlation for all catchments is not simply a result of the strong correlation for catchments in clusters 1 and 2 but showing the relationship between the hydrological drought characteristics and SAAR across all catchments.

2) We included the boxplots (Figures 2 and 4) to indicate the within-cluster variability of the drought characteristics. We appreciate that for a full understanding of the spatial variability the reader is required to cross-reference Figure 1 (location of catchments coloured by cluster), Figure 2 or 4 (boxplots showing within cluster variability of drought characteristics) and Figure 3 or 5 (maps showing spatial variability of calculated drought characteristics). We could therefore consider adding the coefficient of variation to Figures 3 and 5 in the revised manuscript if this would aid the interpretation of the figures.

3) We did in fact mean to type 'giving the duration of SPI-n'. However, we thank you for bringing this potential misunderstanding to our attention and we will rewrite this sentence to improve the wording of this sentence in the revised manuscript.

4) We included a brief introduction and a reference for SAAR data on page 12835 L14-16. If this is not sufficient we could consider adding more detail to the description in the revised manuscript.

References

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HESSD

12, C6392–C6395, 2016

Eltahir, E. A. B., and Yeh, P. J. F.: On the asymmetric response of aquifer water level to floods and droughts in Illinois, Water Resources Research, 35, 1199-1217, 10.1029/1998WR900071, 1999.

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