

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.

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An excellent and interesting paper and good to see a national scale analysis of historic drought.

I have some general comments which I hope may be helpful:

In the abstract you could say '108 near natural catchments'. I think it would be useful for water managers to know up-front the type of catchment you are analysing as they deal with a whole range of catchment conditions.

page6 lines9-16 To expand on the previous comment, much of the time water resource

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planning has to deal with non-natural flows. For this situation your method would require naturalisation of recorded flow series before model calibration and flow series extension. Alternatively, model calibration with artificial influences included. It's obviously achievable but a longer procedure with more room for introducing error.

page6 line23 Would it be worth appending a list in the supplement of the 108 catchments shown in Figure 1? I found myself trying to work out which Anglian catchments were used and others may want to do the same in other parts of the UK.

Figure 2. The Maximum Intensity appears to be dimensioned in units of time. Should it be defined by say a horizontal dotted line from the lowest SSI point (-2) to the Y axis, plus a vertical line (with arrowheads at each end) from the dotted line to SSI zero line? The dimension would then be SSI.

page14 lines7-8 1989-90 was severe in East Anglia, particularly for groundwater. So are you saying '...with the latter being particularly severe for the 1990s as a whole'?

Figure 6. Looking at the Anglian region it is clear that use of different characteristics identifies different droughts i.e. 1891-1910, 1920-22, 1975-6, 1990-92. Water resource modelling often shows that there is sometimes very little difference between major droughts when it comes to defining system yield for use in the supply-demand balance. If you look at Fig. 10 of our 2015 paper you can see that simulated reservoir drawdown at Grafham was very similar for 4 droughts: 1920-1, 1933-4, 1944-7 and 1975-6. Tweaks to the WR model parameters, e.g. frequency of supply restrictions, have been shown to invoke one or other of these droughts as critical. The point I'm making is that only by simulating a WR system over the whole historic series (behavioural analysis) will the critical drought be found - I think you say this later in the paper!

page20 line11 better to stick with 'near natural catchments'?

page22 lines5-6 we found 1989-92 to be the most severe in the north of the Anglian region, including the Lud catchment, not the whole region (2015 paper Table 2). It

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ranked only 9th for Alton in Suffolk. But as you point out: different method, different durations.

page23 lines 6-10 1943-46 drought significant in west of Anglian region (2015 paper abstract and Table 2 for Grafham 24 months period)

page24 lines12-13 Extending the hydrological series back from 1920 to 1800 did not introduce different critical droughts - they all remained post-1920 (2015 paper Table 3). It didn't change the approach or methodology, so could you delete 'approaches' and just say '...planning in particular water...'?

page 24 lines17-21 Totally agree! I noted this in our 2015 paper Conclusions point 6.

page 25 lines15-22 'non-stationarities in catchment response or land use change' may not be an issue for water resource planning. Current or projected future (planned) artificial catchment influences can be added to an extended naturalised series for use in water resource models. Catchment change etc. would of course be important for corroboration with documentary evidence.

The first referee questions why the choice of 3 and 12 month SSI. From the water resources planning and management perspective longer droughts have been a concern, notably during the 2010-12 episode, with the ever increasing impact of global warming. So, although drought structure under a changing climate is conjectural, 24 and 36 month SSI would be interesting!

And a few typos:

page2 line34 'quantify and understand'?

page8 line12 delete the ', they'

page 12 line20 you use the word 'record' when technically the earlier data is not recorded, so perhaps say 'period'? Anywhere else in paper?

page16 line14 'major droughts for'?

page17 line18 1890-1910

page17 line 21 'regularly'

page17 line29 At

page23 line19 Should it be Figure 5 or 7?

Kind regards, Gerry Spraggs

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