**Review of 'Storylines of UK drought based on the 2010-2012 event' by Chan et al.**

This paper assesses the impacts of different storylines of UK drought based on the 2010-2012 drought event. The results demonstrate the importance of meteorological preconditions, catchment characteristics controlling recovery time and the vulnerability of UK catchments to a 'three dry winter' scenario.

Overall I enjoyed reading the paper, it is nicely written and figures are well presented. There is some interesting analysis and conclusions that will be of great benefit to those working on drought in the UK and further afield. However, I do have some major comments for the authors to consider. In particular, some of the methods need clarification and better justification, and there needs to be more critical discussion and reflection on the use of storylines in drought analysis.

*Main Comments*

*Plausibility.* As noted in the introduction, 'Storylines are defined as physically self-consistent unfoldings of past events and the **plausible evolution** of these events in a future climate (Shepherd et al. 2018).'. I would like to challenge the authors and encourage more critical discussion in the manuscript on how 'plausible' the storyline scenarios are. You have implemented a number of different storylines but there is very little consideration of the plausibility of these storylines in terms of the atmospheric conditions that are needed to create them. Where is the evidence that you are implementing 'plausible' changes to this event that link to physical climate processes? What is the evidence that these are really '**physical** climate storylines'? You note that the 12month precipitation-deficits from the storylines are in line with other climate scenarios but many of your scenarios are based around precipitation deficits that span more than one year (i.e. up to three dry winters). The manuscript needs more critical discussion of the plausibility of the storylines and a fuller consideration of their limitations.

*Delta change approach.* Aligned with the comment above is the use of the delta change approach to represent changes in climate. There are a whole host of problems with delta change approaches (see Fowler et al, 2007 https://doi.org/10.1002/joc.1556) and again, in terms of plausibility, I think it is difficult to argue that applying mean monthly factors to a past drought event gives you a realistic picture of the 'hydrological impacts of climate change'. Again, there is no critical discussion of this in the paper.

*Estimating return periods.* In Section 2.2.1 you use annual average three month rainfall from 1965 – 2015 to estimate 10, 20, 50 and 100-year return periods. Firstly it is not clear what the source of this rainfall data is (I assume CEH-GEAR as this is referenced below?). Secondly, if it is CEH-GEAR (or Had-UK) then the rainfall data are available for much longer time periods (1890-2017). So why choose a shorter time period which could make your estimates less robust, particularly when you are trying to estimate a 1 in 100 year return period of rainfall?

*Catchment recovery time.* I don't really understand why you choose the baseline simulation as your threshold for the catchment recovery time. This isn't necessarily an indication of the catchment having 'recovered' – the baseline simulation may still be very low flows. Is the time calculated from the very beginning of the simulation? This metric needs to be better clarified and justified.

*Model Performance metrics.* Better justification for this choice of metrics is needed – what do they represent and why are they appropriate for this analysis? Should NSE (a metric focused on high flows) really be given equal weighting? Some maps of model performance (where dots are coloured by their best NSE/logNSE value for example) would be useful so we can see the spatial differences in model performance. I would expect more detailed analysis of how the model performs for the 2010-2012 event given the focus of the paper.

*Data Availability.* The data availability section needs to cover **all** the data used and produced in the paper. Will you be making the storyline input data available (i.e. the modified rainfall and temperature timeseries) for others to use? Will you be making the outputs available? This is important for reproducibility, transparency etc.

*Technical / Minor Comments*

L14. 'highly conditioned by its meteorological preconditions'. Not entirely sure what you mean here, can you clarify?

L55. You might also consider citing Dobson et al (https://doi.org/10.1029/2020WR027187) which considers the future spatial dynamics of droughts and water scarcity across England and Wales.

L116. It would be useful to add a map of the catchments (with the catchment boundaries) into the supplementary information. This would help highlight their size and spatial coverage across GB.

L150. 'The temporal variability of the reduced preconditions precipitation'. This doesn't make sense to me and should be reworded.

Figure 9 – how much variation is there in the percentage/absolute changes between the different clusters? i.e. are the projected changes in rainfall very different for cluster 1 compared to cluster 5? Might be worth adding these plots to the supplementary information for context as most of the subsequent analysis is focused on the changes for each cluster.

Figure 12 is quite blurry – can you increase the resolution?