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Interactive comment on “Analysis of projected hydrological behavior of catchments based on signature indices” by M. C. Casper et al.

Anonymous Referee #3

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General: In general, the paper shows an interesting application of a model that runs at the hourly time step, and trying to detect possible differences in streamflow with respect to signature indices into the future. However it is a bit hard to extract the conclusions of this paper, especially due to a lack of conclusions section. There are a few things that the author should help explain or perhaps address in the revision of this paper. The author uses a model that runs at the hourly time scale, but I wonder if, for the purposes of the signature indices that were chosen, if hourly flow that is calculated is necessary. The FDC that is constructed does use hourly flow information, but I would like to see what the difference from a FDC using daily data would be. If there is a distinct difference, it would be interesting to state what the difference is. I think that the selection of signature indices do tell us information about hydrologic systems,

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Interactive Discussion

Discussion Paper



Interactive
Comment

but I think that the interpretation of these indices relative to the different catchments and marching forward through time would offer extra interesting information that might help with the overall story. Another point that was unclear was the difference of the meteorological information that you are feeding into the model between time periods. It would be interesting what the possible differences between these catchments would be based on the inputs in order to form hypotheses, and then to test whether your hypotheses is correct. Along with this point, saying that time series of climatic data should be referenced, saying to where the information was acquired. Without this information, the experiment that you ran would be hard to replicate. The use of english in the discussion can be said a bit cleaner, but overall the use of english is ok.

Specific: Page 3572 Line 7 – You mention the use of 3 catchment models, where I believe you mean to say 3 catchments or perhaps 3 catchment model runs. The way you currently word it makes it sound like there are 3 separate models that are applied in the paper. Page 3575 Line 17 – It is unclear to me how you go about the calibration of the model that you use for these 3 catchments. I know of the 9 signature indices that are used, but it is unclear how the results that you present are found. If they are found by manual calibration with regard to these 9 indices, then that must be stated. Page 3578 line 10 – You mention the use of FDCs created from hourly discharge, but I think it would be useful if you explicitly say why this FDC is different than those built from daily or monthly data (what mechanisms are being captured using hourly data that aren't captured using a coarser time step). Page 3579 line 19 - Why were the points along the FDC chosen? Was there a reason why exceedence probabilities of 0.2 and 0.7 were chosen as opposed to 0.3 and 0.6? Page 3580 line 17 – It would be helpful to list the last 4 signature indices in a similar way to the first 5 so that the structure stays the same. In other words, the last 4 signature indices should be numbered 6-9. Page 3581 line 16 – The large bias that is seen for this catchment can also be due to a model structure that doesn't simulate the physical structure of the catchment. Bias can indeed be explained by calibration error or incorrect runoff data, but error introduced by model structure should also be included in this list.

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