**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "Fuzzy committees of specialised rainfall-runoff models: further enhancements" *by* N. Kayastha et al.

Anonymous Referee #3

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The paper presents an application of a multi-model combination approach known as "fuzzy committee models'. Several case studies are presented that examine the utility of the methodology. I had several main comments, mostly related to the depth of analysis and the study design.

1. A concern I had is related to the calibration/verification approach. There is little discussion about how these periods were selected (and indeed the various data lengths are very short). There is very little discussion about what the verification results revealed, which is disappointing as the ranking of the approaches changed between calibration/verification suggesting potential overfitting.

2. The authors present results for both RMSE and NSE. Including both of these statistics is redundant as they target exactly the same flow characteristics (they minimize

squared differences between observed/simulated flows). Only one should be used. Given the emphasis on squared flows, these statistics are also biased toward optimizing high flow simulations, so the results are not surprising. I would suggest selecting a variety of statistics that capture different elements of the hydrograph rather than a single summary statistic. This would make the discussion/assessment richer.

3. Somewhat related to this, the discussion of the results was rather shallow. Table 3 is not really discussed at all, and to me this provided the most food-for-thought regarding the results. I think the paper would be enhanced by expanding this table to better examine the differences between the models (using other statistics) and then providing a deeper analysis of what this table reveals.

4. One thing I found lacking in the paper was a discussion of the importance of recognizing uncertainty in the modeling process. Indeed, the multi-model approach is often favored as it addresses the idea of 'structural uncertainty' or the potential error/bias when relying on a single model structure. Here, the authors have not addressed uncertainty at all in their analysis, and I think this is a real weakness. The analysis of uncertainty is by now routine in hydrologic modeling studies and should form part of the basis by which different models are compared. In some cases, there are only small differences between the model simulations, which makes relying on a single summary statistic troublesome. If the results were expanded to consider predictive uncertainty then the comparison of models would be more convincing.

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