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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Tailor-made spatial patterns for hydrological model parameters combining regionalisation methods" *by* Laura Rouhier et al.

Anonymous Referee #2

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The article proposes a new strategy to regionalize hydrological model parameters. In particular, the new method is a combination of three existing regionalization method. The method is tested using data from two French catchments. The authors claim that the new method shows superior performance and at the same time reduces the number of free parameters. While the results seem to be interesting, I have several major concerns.

1. The authors pick one regionalization method (Exp1) and compare it with the combinedd regionalization method (Exp2). It is possible that Exp1 is not very suitable for the study catchments. The authors should show how the other two regionalization

methods perform in the study catchments.

2. The authors are saying that the new regionalization method is superior to one of the exiting regionalization method. However, I do not think the improvements are really significant. The figures (Figures 9 and 10) show that the new method marginally improves prediction when the baseline performance is low. In fact, for certain cases (Fig. 10d) the performance actually declines.

3. There are countless number of published papers on hydrological modelling. If the authors want to show something new, they need to do more than what they have done. In my opinion, proving something using data from a small/climatologically homogeneous region does not make a lot of sense given that we already know a lot from previous modelling exercises. If the authors want to prove that their conclusions are meaningful, they need to consider a much larger number of catchments situated across climatic and geographic regions.

4. How useful are the conclusions from this study for other hydrological models? Are they also applicable to other models? If not, I am not sure how useful the results from this study are. If yes, can the authors explain why?.

5. The authors are claiming that the new method has helped them in reducing the number of free parameters from 12 to 5. However, 5 is not a small number. Many researchers have argued that a hydrological model with just 4 free parameters can perform well (e.g., Hornberger et al., 1985). Thus, to me, the model is unnecessarily complex even after the simplification exercise.

6. The methods are quite confusing in this study. The authors are saying the new regionalization method is helping in model calibration. Regionalization methods re used for prediction in ungauged/pseudo-ungauged basins. Once the model parameters are calibrated using data from gauged basins, the model should work for the ungauged basins without calibration. The authors need to explain their methods clearly.

Overall, the authors need to substantially expand their analysis to show that their results are meaningful. Presentation can be improved. Often unconventional terms such as specialization are used. The authors need to define them properly before using them.

Reference: Hornberger, G. M., Beven, K. J., Cosby, B. J., & Sappington, D. E. (1985). Shenandoah watershed study: Calibration of a topographyâĂŘbased, variable contributing area hydrological model to a small forested catchment. Water Resources Research, 21(12), 1841-1850.

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