

Interactive comment on “Importance of the information content in the study area when regionalising rainfall-runoff model parameters: the role of nested catchments and gauging station density” by Mattia Neri et al.

Anonymous Referee #2

Received and published: 29 April 2020

The authors present a very good work on assessing the reliance of model regionalization approaches on the gauged data content. The methodology is clear and easy to follow. Their results indicate that transferring the entire parameter set, thus keeping the correlation among model parameters, outperforms the parameter-averaging kriging method. The output-averaging methods using more than one donor basins is more robust than the one-donor method. The most similar method based on geomorphological and climatic descriptors tends to show higher transferability in sparsely gauged areas than the nearest neighbor method. The findings provide important ref-

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erence for the community when conducting hydrological modeling in sparsely or un-gauged basins. My major concern is that the structure of the manuscript is a bit scattered. The abstract and results sections are lengthy, from my taste. The authors could consider potential rephrase or reorganization. In addition, some Paragraphs in the results section should move to the methodology section. My second concern is that the applied two hydrological models have different calibrated/regionalized parameter spaces. In particular, the TUW model implies 11 parameters for calibration, while the GR6J model has less 8 parameters for calibration/regionalization. Some discussions on the effects of the size of parameter space on the results are needed. Third, the studied 209 catchments vary across a large range of area from 13 to 6000 km². But, the models didn't use distributed parameter values. That is, the spatial variability of parameters in large basins wasn't considered. The author should also add discussions on the performance of the regionalization approaches in catchments with distinct basin areas (small, moderate and large basin). Finally, the authors should also specify how they sampled catchment subsets from the total 209 catchments when investigating the effects of station density. Did they sample manually or using automatic scripts? The thing here is how to guarantee that the sampled catchments are evenly distributed across the country. The sampled catchments concentrating in a small region could result in a same station density with the evenly distributed catchments. Some specified comments: 1. Please, keep "HBV" and "TUW" consistent. Otherwise, the readers would find three hydrological models in this study. Actually, there are only tow models; 2. Lines 8-10, consider to move to introduction section; 3. Lines 21-22, may consider to remove; 4. Lines 33-34, you already specified "how" above. Consider to remove; 5. Line 67, "the best the best"; 6. Line 96, what do you mean by "continuous simulating daily models"? 7. Line 116, "the more"; 8. Line 259, how to calculate "stream network density", please specify this; 9. Lines 305-322, consider to move that to introduction. Here, you could add description on your method to choose the number of donor catchments; 10. Line 289, by running; 11. Lines 366-373, move to methodology section; 12. Line 392, "as anticipated" – "as introduced"; 13. Line 402, so relevant – so obvious;

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14. Lines 425-426, 460-471, move to methodology; 15. Line 507, KGE and NSE; 16. Lines 528-533, consider to rephrase that. Hard to follow; 17. Lines 538-540, could you add some discussions on that? 18. Lines 570-577, consider to move to methodology; 19. Lines 685-687, please rephrase that, cannot follow; 20. Please, consider to reduce the number of figures. Try to aggregate Figures 1 and 2. One of the options is try to present the performance of the two hydrological models in one figure instead of showing separately, such as figures 10-11, 12-13, 14-15. Or you may consider to provide the figures in a supplementary file.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-38>, 2020.

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