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Hydrology and Earth System Sciences
Discussions

# *Interactive comment on* "Parameter regionalization of a monthly water balance model for the conterminous United States" *by* A. R. Bock et al.

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The authors have submitted an interesting paper on parameter regionalization system to transfer parameter values and model uncertainty information from gaged to ungaged areas .The applied methods maximize the use of available runoff information. The paper is well written and well organized and presents a potentially useful method that has not been widely used in hydrology. The main idea is to define hydrologic similarity between gaged and ungaged basins using (Fourier Amplitude Sensitivity Test) parameter sensitivities. The manuscript contains innovative idea. This can be an important



addition to hydrological domain. It should be considered for publication. Below are my comments that may be useful to the authors in updating the manuscript.

MAJOR POINTS

[1] Method Process diagram: A conceptual flow diagram is needed to explain the parameter regionalisation procedure more effectively. To visualize the most innovative aspect of the proposed methodology, connection between the first and second classification need more clarification. Figure 4 of the paper titled, "A different light in predicting ungauged basins: regionalization approach based on eastern USA catchments" [Shoaib et al., 2013] can be seen as an example.

[2] My other concern on the paper is that the best MWBM results were not shown relatively as achieved in simulating low –and median flows across the CONUS. Representation of the relative variability of MWBM results in low –median and high flow will enhance the importance of the paper.

MINOR REMARKS

[3]

p. 10030, line 8: the term FOPV needs more explanation. It is not particularly self-explaining to readers who are not familiar with GSA.

p. 10030, lines 14-15: Please clarify why you have avoid incorporating the seasonal adjustment factors in the FAST analysis

p. 10037, lines 24-25: The multi-term objective function is unclear. Inserting an equation with the mathematical definition of the objective function would help here. Though NSE, logNSE are mentioned in the manuscript, it is not clear what the authors try to represent the term multi-term objective function. What about SQRT NSE?

p. 10058 and 10066, Figure 6 and Figure 14 are not that clear. It is understandable after reading the text, but it could be much improved

p.10056, Figure 4 could be improved by showing the relative scale of sensitivity. The figure can be more quantifiable, to make the methods more applicable.

[4] A recently published papers on Monthly Runoff Regime Regionalization through Dissimilarity –based Methods[Qamar et al., 2015] and Simultaneous calibration of hydrological models in geographical space [Bárdossy et al., 2015] can be seen as added reference.

REFERENCES

Bárdossy, A., Huang, Y., and Wagener, T (2015), Simultaneous calibration of hydrological models in geographical space, Hydrol. Earth Syst. Sci. Discuss., 12, 11223-11268, doi:10.5194/hessd-12-11223-2015.

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Shoaib SA, Bárdossy A,Wagener T, Huang Y, Sultana N (2013) A different light in predicting ungauged basins: regionalization approach based on eastern USA catchments. J Civ Eng Archit USA 7(3):364–378,ISSN1934-7359

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