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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Predicting natural streamflows in regulated snowmelt-driven watersheds using regionalization methods" *by* D. Kim and J. Kaluarachchi

Anonymous Referee #2

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General comments

The paper provides an interesting approach for streamflow prediction in gauged and ungagged snow-fed watersheds under data limited condition and applies a conceptual hydrologic model to evaluate its results. In other words according to the recent classification of Razavi and Coulibaly (2013) it is comparing two main categories of regionalization methods i.e. hydrologic model-independent (FDC approach) and hydrologic model-dependent ones (Tank model) which both have same snow component. Consider to emphasis on this aspect since a few studies, so far, have focused on the application of these two categories of regionalization techniques.

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Discussion Paper

Specific comments and questions 1.The “Description of study area and data” is presented after the “Methodology” section which makes it hard to match the methodology and models with available data and descriptions of the study area. Consider to discuss the study area and data prior to methodology.

2.“Regulated” term is used as another equivalent for the term “Ungauged” throughout the paper. For example in the abstract “regulated (ungauged)” or in conclusion “regulated or ungagged watersheds”. The watersheds in this study are regulated but not unguaged although they are considered as ungauged in terms of natural streamflow. Please clarify it.

3.In Table 2 NSE values of verification period for the two first watersheds are higher than those of the calibration period which doesn’t seem normal and is not consistent with the trend of corresponding VE values and for Tank model in average VE of verification period is smaller than the one for calibration period. Explain this issue and the calibration and verification periods as well.

4.Since the FDC model is sensitive to the snowmelt coefficient and it can also be sensitive to the coefficient for rainfall, what is the reason behind the assumption of recession coefficients of snowmelt and rainfall?

5.By “multiple donor data sets” do you mean multiple donor catchments or multiple variables or both? It needs to be clarified. When multiple catchments are used instead of one the methodology of regionalization is expected to be different. This difference is not clearly explained in the methodology.

6.The last statement of the abstract is “. . .the FDC method can perform better than Tank Model under minimal data availability.” while the results of this study do not indicate to that. Table 2, for example, shows that the average value of NSE for Tank model is higher than the one for FDC method while VE values are not consistent with this result. Also the “Discussion” and “Conclusion” sections mention the similar or competitive performance of the two approaches under data limited conditions.

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Technical errors 1.Page 9458 line 2 “Of course the performance of . . .” is incomplete. Consider to replace it with :“Of course the good performance of . . .”.

2.Page 9458 line 24 “However, it is difficult confirm that. . .” should be “However, it is difficult to confirm that. . .” .

Reference T., Razavi, P., Coulibaly . 2013 . Streamflow Estimation in Ungauged Basins: Review of Regionalization Methods. J. Hydrol. Eng., 18(8), 958–975.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 9435, 2013.