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Discussions

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

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First of all, we appreciate your comments on our manuscript. We are happy to respond your comments as follows.

1. We agree to your comment on the content. We will place the "Description of study area and data" prior to the methodologies.

2. The regulated watersheds in the study are gauged, but they are regarded as un-gauged watersheds because streamflow observations are not natural due to extreme regulations such as river diversions and reservoir operations. Hence, we use the ex-

pression "regulated (ungauged)" as you commented. We will comment on this more clearly.

3. The Sevier River at Hatch includes the Mammoth Creek watershed. Hence, the property of the Mammoth Creek is confounded into the Sevier River at Hatch. These two watersheds have some similarity. The FDC has more uncertainty in the low and high flow than in the normal flow. Streamflow observations in these two watersheds during the calibration period included low and high flows while only normal flows between high and low flows were observed for the verification period as depicted in Figure 5. The normal range of streamflow observations during the verification period may produce better NSE than the calibration period for these two watersheds. We will add this comment in the discussion.

4. Snowmelt from the snow cover has longer travel time than rainfall. Indeed, snowmelt will be infiltrated mostly if its depth is not greater than the infiltration rate of soil. Unlike rainfall events, snowmelt cannot have intermittent strong intensity without a sudden temperature rise. Hence, the recession coefficient of snowmelt can be much greater than that of rainfall. As you commented, the coefficient of rainfall can affect the snowmelt index if rainfall runoff accounts for a great portion of the hydrograph. Low sensitivity of coefficient of rainfall could not be general for all snow-fed watersheds. However, rainfall does not significantly affect daily hydrograph in the study area because snowmelt runoff accounts for the main portion of hydrograph. Thus, the coefficient of rainfall is not sensitive to the correlation coefficient between CPI and streamflow. We will update the manuscript accordingly.

5. "Multiple donor sets" in the manuscript means the multiple donor variables. For regulated watersheds, we used CPI and neighbor streamflow observations.

6. We will correct the abstract to reflect the discussions and conclusions accordingly. The FDC method has competitive performance under low data availability, but it could not always be better than the Tank Model.

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