Hydrology and Earth System Sciences

Discussions

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Interactive comment on "Hybrid climate datasets from a climate data evaluation system and their impacts on hydrologic simulations for the Athabasca River basin in Canada" *by* Hyung-Il Eum and Anil Gupta

Anonymous Referee #1

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The study evaluated different climate dataset source against climate stations using multiple indices and generated a synthetic dataset based on the ranks. Afterwards, the VIC model is applied as proxy validation tool to evaluate multiple datasets and generated datasets. The research is innovative and the structure of the paper is clear. Methods are valid. My only concern is about results. The performance of the VIC model in the study. It is not like what author stated "most of the climate datasets performed well". On the contrary, in Christina and Firebag the NSE is below 0.45 for any datasets, and the worst is even below 0 which is in Pembina with NARR. The

results of the model seemed unreliable. Please check the model and improve the performance of hydrological modeling. 1. Section 2.1 What's is the time duration of the climate observation data at AHCCD stations? 2. Method: Is the evaluation carried out on the whole time period and could be regarded as the average performance over the time? Is there any temporal variation of the performance for different observation dataset at different stations, and how do you consider the temporal variation of the performance? 3. Section 3.1.3 It is not clear how the dataset is generated. Do you just choose the best one based on the evaluation over time or make a combination of several good ones? 4. 3.2 proxy validation "it is questionable if the hybrid climate dataset can represent a historical climate better than the individual gridded climate dataset. Utilizing a proxy validation approach (Klyszejko, 2007), this study applied streamflow records to confirm the superiority of the derived hybrid climate dataset over other existing climate datasets." The underlying assumption is that the better input data could derive a more realistic streamflow simulation. The VIC model is calibrated against different dataset, so the calibration of parameters could offset the error from the input data. Judging the superiority through the output of a hydrological model is not straightforward and could even be misleading. How to consider the propagation of the error from the input through calibration? 5. Could you specify what input you used here for the VIC model? 6. The number of Results should be 4. 7. 3.1 Precipitation performance measures in Alberta, could you explain why ANUSPLIN and Township underestimate extreme precipitation? 8. Figure 10 is it a maximum, minimum or mean temperature in this figure? 9. Page 15 line 24-26 "Over the five hydrometric stations, most of the climate datasets performed well with the exception of NARR in the Pembina catchment." Please explain why NARR in Pembina performs bad which only got -0.85 for NSE. The criterial of well or not well is quite subjective. In Hinton the model performance could be acceptable. However, in Christina and Firebag the NSE is even below 0.45 for any cases and In Pembina and Clearwater NSE below 0.7. This is not a behavioral model honestly. Is the model suitable for the river basin? If it is suitable why the NSE is low? I suggest to check the calibration of the model. Otherwise the

proxy validation is not reliable. 10. Figure 12 is suggested to be refined it is hard to tell the difference between different experiments. Is it m3/s in the label of Y axis? There is lack of label of X axis.

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Discussion paper