

Comment on hess-2021-156

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Referee comment on "On the selection of precipitation products for the regionalisation of hydrological model parameters" by Oscar M. Baez-Villanueva et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-156-RC1>, 2021

General comments

This study examines the impact of four gridded daily precipitation products on daily runoff simulations in ungauged sites. The evaluation is tested using a large sample of near-natural catchments in Chile. The regionalisation of model parameters includes three methods (spatial proximity, similarity and regression). The results are evaluated by various runoff efficiency criteria and are compared over diverse hydrological regimes across the study region. The results show any noticeable impact of spatial resolution of precipitation product on runoff model efficiency. Also, the precipitation products corrected with daily gauge observations did not necessarily translate into improved hydrological model performance. The precipitation products with the best performance during calibration and/or verification did not necessarily provide the best simulations in ungauged sites. The best regionalisation approach is the similarity, regardless of the choice of gridded precipitation product or the calibration criteria. The results indicate that the performance of regionalisation depends on the hydrological regime.

The study presents an interesting analysis that adds some new understanding of the impact of using different precipitation inputs to predict daily runoff hydrographs in data-sparse and ungauged catchments. The manuscript has a good structure and reads well. I like the comparative focus of the analysis. The use of a large sample of catchments in very diverse climate and runoff generation conditions brings interesting and new findings. I have only a few remarks or suggestions which might be considered for extending some of the results and supporting interpretations made. These include:

- The main focus is to evaluate the impact of selected precipitation products on regionalisation model performance. Still, the description and demonstration of the similarity and differences between the products and eventually at site measurements are very brief. Comparing of the long-term averages gives some impression about the consistency between the products, but it will be very interesting to see (and evaluate)

some more detailed analysis of the differences between these products, such as the difference in seasonal distribution, intermittency/frequency of rainfall, days without rain, daily extremes etc. Can such additional differences/similarities explain more the differences between the results (i.e. calibration/validation/regionalisation performance, methods, time periods)?

- The testing of regionalisation performance for the full period of observations (1990-2018) somewhat mixes the interpretations. I like the idea of splitting the period into calibration and two validation periods showing different climate conditions. So, testing the regionalisation model performance for the same periods can bring some additional information about the performance of different methods in different climate conditions and also show the loss in regionalisation compared to calibration and validation efficiencies.
- The results indicate that the calibration procedure can compensate for some differences in precipitation products. It will be interesting to see which model parameters/runoff generation processes are affected and whether and how the parameter values change between different hydrological regimes. Are the other simulated components of water balance similar as well (between the products)?
- It will be interesting to see some disentangling difference between similarity and spatial proximity methods for linking the results with previous studies. Is it the averaging of ten simulations or the similarity between the catchment attributes that impact the regionalisation performance? What is the impact of averaging ten simulations compared to simulations based on the most similar catchment only?

Specific comments

Table 1: Leave-one-out and jackknife cross-validation are likely the same procedure. Please consider using, for consistency, only one term for the same procedure.