

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
<https://doi.org/10.5194/hess-2021-451-RC2>, 2021
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Comment on hess-2021-451

Anonymous Referee #2

Referee comment on "Producing hydrologic scenarios from raw climate model outputs using an asynchronous modelling framework" by Simon Ricard et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-451-RC2>, 2021

The manuscript "Producing hydrological scenarios from raw climate model outputs using an asynchronous modelling framework" demonstrates a new method to simplify the conventional climate-hydrological modelling chain for climate impact assessment. This method basically only needs to calibrate the hydrological models using the raw regional climate model (RCM) outputs in the historical period against the observed empirical cumulative distribution and then run the calibrated hydrological model using the raw RCM outputs in the future periods. Finally, the future hydrological scenarios can be generated based on the observed discharge and the perturbation factors derived from the simulated hydrological response in the historical and future periods.

This method sounds promising, but I am disappointed that the authors did not present a comprehensive validation, which is especially important to introduce a new method. There is only one figure (Fig. 6) to visualize the validation results, but the shift of the spring peaks cannot persuade me to trust the method. Based on the results, I am thinking whether this method can be applied for all RCM outputs or only some RCM outputs that contain insignificant biases. Like other hydrological model calibration studies, the authors should plot the empirical cumulative distribution against the observed one and provide statistical criteria results to evaluate the two different distributions in both calibration and validation periods. In addition, the hydrological scenarios generated by this method should be validated. Therefore, the authors should generate a hydrological "scenario" for the historical period and validate it against observations in terms of various aspects, e.g. extremes, water balance and seasonal dynamics. The above mentioned validation procedure is just to prove that the new method generates reasonable scenarios. It will add more values if the authors can compare the "scenarios" for the historical period generated by both the conventional and new methods with observations.

The structure of this manuscript is also problematic. The title of section 2 is methods, but this section includes study area, data, methods and results. I am afraid that the authors need to re-write the manuscript based on the two major problems, but I am looking

forward to seeing comprehensive validation results for the proposed method in future.