Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
https://doi.org/10.5194/hess-2021-58-RC2, 2021


# Comment on hess-2021-58

Anonymous Referee #2

Referee comment on "Technical note: PMR – a proxy metric to assess hydrological model robustness in a changing climate" by Paul Royer-Gaspard et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-58-RC2, 2021

Firstly, apologies for my delay.

This is an interesting, well written and presented manuscript proposing a simple metric for evaluation of hydrological model robustness to climate variability during the calibration period. Overall I think that the paper is suitable for publication with some minor revisions and clarifications.

First, while the motivation for such an indicator is framed in the context of climate change impact assessment and the simulation of conditions different from those observed, the metric is limited to assessing transferability within the context of observed climate variability/change. In the conclusion it is stated that the new metric can be used to help select models for climate change impact assessment. I think it should be clarified that just because a model is more robust in the period of observations, that does not necessarily mean it will be robust to changes outside the range of variability in those observations.

Upon reading I was left wondering how the idea of moving biases might help inform model selection. The authors indicated that they saw little clustering of biases by indicators of catchment topography or climate. Did this assessment (not presented) include information on groundwater storage which may be more challenging for GR4J to capture.

The authors identify sub periods without any recognition of drivers of climate variability and their periodicities. Might it be possible to condition selection of L based on predominant modes of variability, eg. NAO?

I agree with the other reviewer on the limitation of examining absolute bias and urge the authors to consider the solution offered. I was also a little concerned that using the average to limit the effect of 'drastically wrong' years may in fact be ignoring the most informative data points we have. Understanding why such years are so poor surely offers important insight. Perhaps some further discussion of this could be offered.

Does the metric assume that the observational uncertanties are stationary?

Finally, the aim of the modelling exercise is often important to study design. The metric is limited here to assessing annual flows. How might this be used if the emphasis of the

modelling study is on low flows, or high flows under climate change for example.