

Interactive comment on “Hierarchical Sensitivity Analysis for Large-scale Process-based Hydrological Modeling with Application in an Amazonian Watershed” by Haifan Liu et al.

Anonymous Referee #2

Received and published: 14 April 2020

General Comments: Sensitivity analysis is an effective tool for identifying important uncertainty sources and improving model calibration and predictions. This study used an advanced hierarchical global sensitivity analysis framework to investigate the uncertainty sources of a three-dimensional, process-based hydrologic model in Amazon catchment. Three uncertainty sources are considered including model parameters, model structure and climate scenarios.

I think this research topic is meaningful in hydrology community, especially for a large scale catchment study. This paper is well organized and easy to read. The conclusions are well supported by the results and data. However, some important problems

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are not clear, which should be addressed before publication. Please see the specific comments.

Line 55: Please give a brief description to other global sensitivity analysis methods, e.g., the sensitivity analysis based on information entropy.

Line 290: Are the three aquifer models sufficient to investigate the sensitivity of the model output to aquifer thickness? Please justify it.

Line 293: Are these model weights used for model averaging or model combination?

Line 297: Parameters' ranges have influence on the results of sensitivity analysis, please explain the allowable ranges of these parameters in Table 2.

Line 346: It is good to investigate the contribution of groundwater system to streamflow, and this research find that the thickness of an aquifer will greatly influence the water redistribution process in the aquifer. However, I want to see the influences of aquifers' thicknesses on streamflow in more detail, such as, the unconfined aquifer and the confined aquifer, It is expected that the unconfined aquifer has more influence on streamflow, because it has stronger interaction with surface flow.

Line 383: what's the meaning of prior weights here, will they used for Bayesian model averaging?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-87>, 2020.

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