

Comment on hess-2021-528

Anonymous Referee #2

Referee comment on "Attribution of climate change and human activities to streamflow variations with a posterior distribution of hydrological simulations" by Xiongpeng Tang et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-528-RC2>, 2022

The authors evaluated the attribution of climate change and human activities to streamflow variations with a posterior distribution of hydrological simulations. The contribution distribution has been evaluated in many hydrologic fields using the different methods, however, the posterior distribution has been rarely considered. The author tried to provide a solution to evaluate the attribution of climate change and human activities considering the simulation uncertainty.

- Line 65-70, the second type of method seems to be no difference with the third type of method. For example, I can understand that controlling human activities should be to change the climate factor like the second method simulating multiple scenarios by changing one impact factor. What is the nature difference for the two methods, please describe more clearly.
- Line 91-94, as you stated, Farsi and Mahiouri(2019) has also analyzed the uncertainty of hydrological simulations in the process of quantifying the CR of CC and HAs to streamflow changes, however, you thought they only constructed the posterior distribution of the contribution rates of climate change and human activities, and did not specify the accurate contribution rates. I don't think so, Farsi have provided the PDF of contribution rates which can tell high-probability contribution rates clearly. Therefore, what is the innovation for this study differing from the previous studies, not averaging the contribution rates with high-probability NSE.
- Line 344-345. The plant-available water coefficient is set to 0.5, why? It is just to match the result of your proposed method? In addition, the contribution method should be not your finding, is it?
- L440, the sensitivity analysis method is not describe clearly, SUFI-2 is a optimal method, and how it conduct parameter sensitivity analysis, what is its relation with Latin hypercube sampling
- About "equifinality for different parameters" of hydrological simulations. The author selected some experiments with high NSE larger than 0.75 to construct the posterior histogram frequency distribution (PHD) of the contribution rate of climate change and human activities to streamflow changes, and then quantify the contribution rates with higher probability. I think it does not solve the "equifinality for different parameters". The simulations with higher probability still exist the "equifinality for different

parameters". To exclude it, the uncertainty (pdf) of parameter should be analyzed to screen out abnormal parameter values. After that, the contribution rates with higher probability are really results excluding the "equifinality for different parameters". these suggestion may be added into the discussion section in revised manuscript.