

**Review Round 3 of „Quantifying input uncertainty in the calibration of water quality models: reshuffling errors via the secant method“ by Xia Wu, Lucy Marshall and Ashish Sharma, December 2021**

Thanks to the authors for their effort in improving the manuscript. Overall, the changes made have increased clarity and do help to better understand the working principles behind BEAR and its purpose. Yet, some of the revised sections point into a direction that I struggle to comply with:

“Therefore, a modification should be made in the IBUNE approach to improve the accuracy of input error identification.” (l. 54-55) I disagree with the revised version of this sentence and therefore suggest to delete it. It indicates that there was a flaw in the IBUNE method that has to be fixed. However, as Bayesian approach, IBUNE simply samples errors without processing them unlike BEAR, which is also stated in l. 344ff.: “In the IBUNE framework (Ajami et al., 2007), the errors are also sampled from the error distribution, but not reordered. Thus, the error precision at each time step cannot be guaranteed. In the BEAR method, adjusting the sampled errors according to the inferred error rank reduces the randomness of the error allocation in the IBUNE framework...” This randomness in sampling is part of the fully Bayesian approach and not something that per se has to be fixed. That said, I find the second sentence about a “guaranteed error precision” unclear and obsolete, and suggest deleting it.

Overall, this pertains to the general question of whether BEAR is a full Bayesian approach that I referred to as “arbitrary error treatment” in earlier rounds of reviewing and that Reviewer 2 highlighted in great detail pointing also at the theoretical problems underlying the approach.

This is clarified in l. 154 ff. to some degree, i.e. “the BEAR method does not provide formal Bayesian inference”. However, this statement is still somewhat hidden in the article and therefore I would like to second the suggestion of reviewer 2 in generally renaming the method a “Pseudo-Bayesian error analysis with reordering”.

Renaming BEAR to pBEAR (for example) might not appear too appealing to the authors but it would be a more honest name of the method and therefore increase scientific soundness. Hence, I suggest publishing the manuscript with this minor name modification all over the manuscript. I stick to my former evaluation that this manuscript is a valuable contribution to the general discussion of input error treatment. The methodology of BEAR is an idea worth publishing and with the label “pseudo-Bayesian” this will also be a clear contribution to a broad audience.