

# ***Interactive comment on “HydroMix v1.0: a new Bayesian mixing framework for attributing uncertain hydrological sources” by Harsh Beria et al.***

## **Anonymous Referee #2**

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With the submitted manuscript, Beria et al present a new framework for end-member mixing analysis that deals with an explicit treatment of involved uncertainties using Bayesian methods. Instead of using traditional Gaussian error propagation that assumes stationary probability distributions, this Bayesian framework relies on likelihood estimation techniques that are commonly used for hydrological model parameter estimation. After deriving the theory of the approach, the authors apply their new framework on a set of case studies starting with synthetically derived data up to a real mountainous catchment in the Swiss Alps.

The study addresses a well-known problem in hydrograph separation, which is the

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treatment of uncertainty, especially when only small samples sizes are available. The proposed Bayesian framework seems to provide a promising direction to provide estimates with reliable uncertainty quantification. For these reasons, I believe that this paper will make a valuable contribution to Geoscientific Model Development after some minor remarks have been addressed:

1. There is heavy referencing especially at the introduction, which sometimes appears to be inadequate (see comments in attached manuscript). Also, some literature on uncertainty in hydrograph separation is missing.
2. Some work is necessary at section 2 (Model description and implementation) to add more clarify and structure to this section. It is hard to understand what the authors are doing here.
3. Do you really need so many case studies? They make the paper long and heavy. If you don't need them to make your point, please reduce to 1 or two of them.

Some more specific and technical comments are provided in the attached pdf.

Please also note the supplement to this comment:

<https://www.geosci-model-dev-discuss.net/gmd-2019-69/gmd-2019-69-RC2-supplement.pdf>

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