Interactive comment on "Technical note: Uncertainty in multi-source partitioning using large tracer data sets" *by* Alicia Correa et al.

Anonymous Referee #1

Received and published: 29 June 2019

The manuscript entitled "Technical note: Uncertainty in multi-source partitioning using large tracer data sets" by Correa et al. presents a method to estimate the uncertainty of mixing models in flow partitioning for four different water sources (end-members) contributing to a mixing hydrologic system. They use a Taylor series approximation to solve the set of mass balance equations and apply it to a tracer dataset from an experimental catchment in Ecuador. Even though I appreciate the authors' effort to provide the tracer community with a potentially valuable tool (code freely available) to evaluate uncertainty in multi-source mixing systems, I agree with the other reviewer of the manuscript, Bettina Schaefli (further refereed as BS), that it is too condensed in its current form. This factor makes the development of the system of equations' solution difficult to follow, and this must be improved. In addition, I am a bit concerned that

this method and the presented illustration example have been reported previously by (Correa et al., 2019). Therefore, I strongly encourage the authors to: 1) mention openly whether their uncertainty estimation method is different than/similar to (the same?) the one applied in the aforementioned paper and ii) to apply their method to 1-2 additional illustration examples from the published literature or, at the very least, include the evaluation of outliers suggested by BS to differentiate this work from the one of (Correa et al., 2019).

Major Comments:

- The authors claim the robustness of their method (P.2, L.34), but do not discuss this consideration in comparison for example, to the commonly applied Gaussian error propagation approach. I think it would be great to evaluate and discuss this in the manuscript to add value to the usefulness of the presented methodology. This could also help differentiate this work from the work of (Correa et al., 2019).

- System of equations and resolution: please make sure to define clearly all of the notation in the set of equations to facilitate the readability of their resolution throughout the paper. All the considerations within the resolution of the system must also be clearly stated.

Specific comments:

- Page 1, Lines 12-13: this sentence is incomplete. Please correct.

- P.1, L.15: "dataset".

- P.2, L.7: Replace "novel" by "the availability of".

- P.2, L.12: Delete "novel".

- P.2, footnote: I think "M" refers to the mixture, not to a source. Correct if necessary.

- P.7, L.4: n is approximately 30 for each source, or among all sources

- P.7, L.21 and L.23: I think you refer to streamflow (or mixture, M), and not to spring water (SW). Correct if necessary.

- Table 2: report λ values

REFERENCED LITERATURE

Correa, A., Breuer, L., Crespo, P., Célleri, R., Feyen, J., Birkel, C., Silva, C. and Windhorst, D.: Spatially distributed hydro-chemical data with temporally high-resolution is needed to adequately assess the hydrological functioning of headwater catchments, Sci. Total Environ., 651, 1613–1626, doi:10.1016/J.SCITOTENV.2018.09.189, 2019.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2019-197, 2019.