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Interactive
comment

Interactive comment on "Bayesian joint inference of hydrological and generalized error models with the enforcement of Total Laws" *by* Mario R. Hernández-López and Félix Francés

H. Tyralis

montchrister@gmail.com

Received and published: 18 March 2017

In this manuscript, the authors model jointly the hydrological and error model parameters in a Bayesian framework. I am particularly interested in the mathematical theory of the model. Therefore, I took a closer look at the 2nd and 3rd section. In general trying to model the errors using varying parameters, which depend on the level of the hydrological model prediction is interesting. Furthermore, the derivations are far from trivial and the theoretical results are useful.

It seems that the authors first try to form the errors. As a result, some parameters of the model must be expressed as functions of the other parameters (e.g. implementing the law of total expectation and the law of total variance), with a simultaneous reduction

of the parameter space. Here I think that the title of the manuscript is misleading, since satisfying the two laws must be mandatory. Therefore, the term "enforcement" seems unnecessary. I suggest that less emphasis is given to the enforcement and more to the investigation of various forms of the errors because the latter is the cause for further examining the two laws, while the former is the consequence.

Regarding the mathematical part of the manuscript, I recommend that the authors separate the notation for parameters and variables, to ease understanding of the framework and help the reviewing process. Please see the supplement for more details.

Lastly, I do not understand why we should sample from eq. (19) of the manuscript rather than using the distribution of line 335. This would seem the straightforward approach, considering eq. (18) of the manuscript. Once these issues are addressed, I believe the paper would be a useful contribution.

References

Hemelrijk J (1966) Underlining random variables. Statistica Neerlandica 20(1):1–7. doi:10.1111/j.1467-9574.1966.tb00488.x

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/hess-2017-9/hess-2017-9-SC1-supplement.pdf

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2017-9, 2017.