

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-296

Anonymous Referee #1

Referee comment on "Spatially referenced Bayesian state-space model of total phosphorus in western Lake Erie" by Timothy J. Maguire et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-296-RC1>, 2021

The authors applied a spatially referenced Bayesian state-space model to conduct an analysis on how in-lake (Erie) TP concentrations are affected by the adjacent river basin. In general, the paper is adequately written (this means that the authors could improve the manuscript to succeed a smoother experience for the reader) and I find their effort decent in terms of methodological analysis. The presentation of the results is satisfactory, with convincing explanations when needed.

GENERAL COMMENTS:

- Although that in introduction you speak about the absence of scientific investigation in correlating out-of-the lake and in-lake nutrient concentrations, I think that the authors must highlight their contribution better. For this reason, I propose to add some lines explaining your contribution to the methodology used and how this progresses science beyond the state-of-the-art .
- By applying the Bayesian methodology and using three different chains, in my opinion, you should speak about convergence. It is a prerequisite for the model used here.

LINE-SPECIFIC COMMENTS:

Line 32: I suggest to add one recent and very relevant reference after Schneider and Blaha, 2020: Mellios, N. K., Moe, S. J. and Laspidou, C.: Using Bayesian hierarchical modelling to capture cyanobacteria dynamics in Northern European lakes, *Water Research*, 186, 116356.

Line 37: Please use 2 as superscript in km². Correct t throughout the manuscript.

Line 65: My opinion is to erase "within".

Line 66: Please use "it does not" instead of "it is does not".

Line 79: Please use "extend from" instead of "range from".

Line 111: Please erase the "the".

Line 188: Use "values" instead of "vales".

Line 190: After "were collected" use ";" instead of comma in order to make the sentence smoother for the reader.

Line 291: Please use "also" instead of "too".

To this end, I recommend the manuscript for publication with minor revisions.