

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
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Comment on hess-2020-681

Anonymous Referee #2

Referee comment on "A Bayesian approach to understanding the key factors influencing temporal variability in stream water quality – a case study in the Great Barrier Reef catchments" by Shuci Liu et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-681-RC2>, 2021

Liu et al. conducted an improved Bayesian approach to evaluate the temporal variability in stream water quality and the related key factors. This study aimed to: i) identify the key influencing factors, and ii) predict the temporal variation, taking advantages of multiple locations and multiple water quality monitoring data. In addition, authors divided the study sites into two clusters and analyzed separately, which might avoid potential uncertainty issues caused by a single model, and improve the scientific and reliability of the modelling results.

This study is an interesting topic and generally well written. It contributes to our knowledge of both the further application of the developed Bayesian model framework and the understanding the temporal water quality variability in the Great Barrier Reef catchments. In general, this piece of work could be considered for publication after some unclear concerns were addressed.

Major Comments:

- *Section 2.2.2* The authors gave a detailed process of data extraction and processing. Among them, it was noticed that "The start and end points of a specific event were determined by using a local minimum method that calculates the first derivative of the streamflow record (separated from baseflow)". Basing on your data processing method, when can be identified as the start or end points? I think more details of the key standard or parameter maybe better for the readers to further understand your approach.
- The authors divided the site locations of the GBR catchments into two clusters (wet and dry), and modelled separately. The advantages of the subsequent result are obvious, i.e., pertinence, reliability and so on. However, whether the strong pertinence will reduce the universality of this approach and limit its universal application? And if it is

necessary to add the model and discussion of all sites?

- The authors targeted nine common water quality indicators, including sediments, nutrients and salinity. But in the nutrients part, they only focused on N and P, without any constituents about Carbon studied. Why? Please explain it.
- 2.2.2 again "The event-mean concentration (EMC) was then calculated for each event that had at least two samples on each of the rising and falling limbs of the hydrograph." Table C2 showed the Number of EMCs for each constituent. So what is the approximate amount of data per event? Why you set two samples as the minimum limitation? whether two samples are too few?
- I also noticed that you normalized the data of each event first and then calculate the Event mean concentration. If this process is necessary?

Minor comments:

- Fig 1d six_NRM regions
- Table 1 Delete the comma at the end of the sentence in the item "Land use/land cover" of Cluster 2
- L274 Delete the full name of "MCMC", which has appeared in the line 261.