Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC7
https://doi.org/10.5194/hess-2021-621-RC7, 2022

Reply on AC5

Anonymous Referee #2

Referee comment on "Seasonal forecasting of lake water quality and algal bloom risk using a continuous Gaussian Bayesian network" by Leah A. Jackson-Blake et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-621-RC7, 2022

I agree it isn't necessary to create an MLR. For one thing, I suspect the predictive skill would be pretty similar to the GBN.

At the same time, it would be nice to elucidate how the GBN could be advantageous relative to more conventional linear statistical models for algal bloom forecasting (while also acknowledging GBN limitations). It's true that BNs have particular features documented in previous literature (e.g., Lines 76-83) but not all of these are unique to BN models, many weren't demonstrated in this case study, and some might be debatable for a GBN (given the linearity and distributional constraints). Perhaps one important distinction of the GBN is the multivariate structure illustrated in Figure 7. Perhaps the authors could explore and discuss this a bit further in the context of their case study.

Here are a couple of the relevant papers for Lake Erie. One uses an MLR and the other is similar to MLR in some ways (I think). So they might provide good context for this discussion, as well as the discussion of seasonal bloom forecasting, in general.

Obenour, D. R., Gronewold, A. D., Stow, C. A., & Scavia, D. (2014). Using a Bayesian hierarchical model to improve Lake Erie cyanobacteria bloom forecasts. Water Resources Research, 50(10), 7847-7860.

Ho, J. C., & Michalak, A. M. (2017). Phytoplankton blooms in Lake Erie impacted by both long-term and springtime phosphorus loading. Journal of Great Lakes Research, 43(3), 221-228.

Thanks for the interesting discussion. Good luck with your revisions.