Reply to RC2

Leah A. Jackson-Blake et al.

Author 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-AC2, 2022

Many thanks to reviewer #2 for a useful set of comments. You have made some very good general points, and I think we can improve the paper by taking them on board.

One of the reviewer's main concerns was that the paper doesn't represent a particularly strong contribution. We hope that we can address this by adjusting the way information is presented in the abstract, introduction, discussion and conclusions, and by adding a section on using the GBN to support management. We see the paper's main contribution as being two-fold:

- We demonstrate a simple, easy-to-use alternative to discrete BNs for water quality modelling. Bayesian Networks (BN) are increasingly popular in environmental modelling, and discrete networks are almost universally used, despite the fact that a number of studies have pointed out their disadvantages when data are continuous. We demonstrate that a simple continuous Gaussian BN (GBN) is easy to develop (our scripts are available; these would be further tidied up and archived in Zenodo during revision), and performs well compared to a standard discrete BN. It is true that we used existing methods and that the GBN performance wasn't particularly impressive in this case. But it performed as well as/better than the discrete BN, and overall I think that just demonstrating this simple, easy-to-use alternative to discrete BNs for water quality modelling is a useful contribution, given the increasing popularity of BNs. We can try to highlight this point more throughout the text, e.g. by reordering some of the ways information is presented in the abstract, introduction, discussion and conclusions.
- This paper is one of the first to attempt seasonal forecasting of lake water quality. Seasonal forecasting (i.e. where forecasts are produced with lead times of 1-6 months) of streamflow has received a lot of attention in recent decades, whilst seasonal forecasting of water quality is in its infancy (to our knowledge, this would only be the 4th paper on this topic, and 2 of the existing ones relate to flowing waters rather than lakes). To strengthen the paper's contribution in terms of demonstrating using a BN for seasonal water quality forecasting, we suggest adding in a section to show the lake water quality bulletin we developed, using the GBN prognoses, to support management of the lake.

In the attached response_to_reviewer2 file we provide additional comments in response to individual points raised and suggestions for changes we would make during revisions.

Please also note the supplement to this comment:
https://hess.copernicus.org/preprints/hess-2021-621/hess-2021-621-AC2-supplement.pdf