Geoscientific

Model Development

Discussions

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GMDD

Interactive

comment

Interactive comment on "ML-SWAN-v1: a hybrid machine learning framework for the prediction of daily surface water nutrient concentrations" *by* Benya Wang et al.

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Dear editor Please find attached review comment according to reviewing criteria. The manuscript is well written. However some discussion on ecological importances should be included to enhance pratical contribution of the research. I do hope that my comment can help to improve quality of this manuscript in particular and quality of the GMD in general.

Sincerely yours. Thu-Huong T. Hoang Hanoi University of Science and Technology

1. Does the paper address relevant scientific modelling questions within the scope of

GMD? Does the paper present a model, advances in modelling science, or a modelling protocol that is suitable for addressing relevant scientific questions within the scope of EGU?

The paper demonstrated a hybrid model of RM and GBM, which was able to predict and explain accurately the historical missing data as well as different pathways of TN export from two distinct catchments. The scientific question is suitable for the aim of GMD.

2. Does the paper present novel concepts, ideas, tools, or data?

In the present paper, a novel hybrid model has been developed and presented by the authors.

3. Does the paper represent a sufficiently substantial advance in modelling science?

The novel model developed by the authors could also be applied in different research areas, demonstrating a huge significance of this paper.

4. Are the methods and assumptions valid and clearly outlined?

Methods and data analysis were thoroughly presented.

5. Are the results sufficient to support the interpretations and conclusions?

Overall, the results and discussion satisfied the major aim of this paper, though several results were not carefully presented. For instance, the RMSE of results in Figure 4 and the meaning of Figure 5 in contribution to the comparison of models that the authors could pay more attention to.

6. Is the description sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? In the case of model description papers, it should in theory be possible for an independent scientist to construct a model that, while not necessarily numerically identical, will produce scientifically equivalent results. Model development papers should be similarly reproducible. For MIP and benchmarking pa-

pers, it should be possible for the protocol to be precisely reproduced for an independent model. Descriptions of numerical advances should be precisely reproducible.

The method as well as code and data provided by the authors could be utilized to reproduce a similar work.

7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

The novelty was shown in comparison with a wide range of previous reports.

8. Does the title clearly reflect the contents of the paper? The model name and number should be included in papers that deal with only one model.

In the reviewer's point of view, the title could be improved to be more strength using the result of the discovery of pathways contribution of nutrient, not only prediction of concentration as its current state. The model name and version were provided.

9. Does the abstract provide a concise and complete summary?

The content of the abstract is totally good, however, it may better if the authors reduce the introduction of models and add more results of their works.

10. Is the overall presentation well structured and clear?

The paper was well and logically organized.

11. Is the language fluent and precise?

The authors used language precisely with clear meaning.

12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

Yes, it was accurately shown.

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced,

combined, or eliminated?

The manuscript more focuses on modelling techniques, only a few ecological discussion was provided. The manuscript provided some discussion on the source of TN in Ellen Brook and Murray River, however, the discussion should be presented better to avoid subjective idea only reflect author assumption. Discussion should better follow results and references The main idea of the Ecological Modelling is not only a prediction tool but also an explanation of ecological significance and pattern of environmental variables. The paper will be greatly improved if the authors spent more discussion on temporal and spatial patterns of predicted variables. Main question can be - How different b/w patterns of DON, TN, NH-N. How results can be used to explain the source of nutrient, - Transformation of nitrogen (in different forms of NH4-N, TN, DON, etc.) from source to river water bodies. - Solution to improve eutrophication situation in river

14. Are the number and quality of references appropriate?

Yes.

15. Is the amount and quality of supplementary material appropriate? For model description papers, authors are strongly encouraged to submit supplementary material containing the model code and a user manual. For development, technical, and benchmarking papers, the submission of code to perform calculations described in the text is strongly encouraged.

The authors provided sufficiently the code and data of the developed model.

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2020-4, 2020.