

Biogeosciences Discuss., referee comment RC2
<https://doi.org/10.5194/bg-2021-333-RC2>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on bg-2021-333

Anonymous Referee #2

Referee comment on "How much do bacterial growth properties and biodegradable dissolved organic matter control water quality at low flow?" by Masihullah Hasanyar et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-333-RC2>, 2022

This work presents a sensitivity analysis of water quality model where authors include new considerations about organic matter degradation kinetics and the proportion of organic matter fractions.

First of all, I would like to recognize that I am not a big expert in the topic, so my concerns might be associated with the lack of a strong expertise in the methods applied here and the literature on this topic. Still, the methodology applied sounds appropriate to fulfil the objectives of the work. The results are clear and well presented. Even, without a strong expertise in modelling and I could read the whole manuscript getting a good global understanding of it. Therefore, I think authors did a good job to convey their methodological approaches and results. Still, there are several aspects of the writing which could be improved for a better reader flow, but also to highlight better the findings of this study.

First of all, after reading the introduction and the discussion of the manuscript a few times, I still have problems to discern what is the novelty this manuscript brings to the field. The main findings of the manuscript are that bacterial growth rates and yield and the proportion of biodegradable DOM are the most important parameters explaining the variability of dissolved oxygen by the model. The importance of heterotrophic bacteria activity and properties of the dissolved organic matter pool are pinpointed as important parameters to explain uncertainties of water quality models in the introduction (lines 49 to 60). Then, what is this manuscript offering new (or different) from previous studies? This should be more emphasized at the end of the introduction but also by putting findings better into context of previous studies in the discussion.

To be more specific, I suggest to emphasize what research gap or methodological failure authors found and try to solve in the paper. Then, please, specify better what are the research questions or objective of this work. Right now, the last paragraph of the introduction reads more like a list of things authors do along the manuscript more than present their research questions.

About the discussion. In my opinion, the discussion section of any scientific paper should:

- interpret results (why do you find those outputs),
- put findings into the context of previous research (are your findings in agreement with previous studies? Do you find different patterns to what is expected?),
- are there any limitations in the experimental design that should be addressed in future studies? What next steps or how future actions should be?
- expose the implications of those findings (why are they important and, if this particular study case, how should we proceed to solve potential problems).

Authors use the discussion mainly to expose potential implications of their findings and suggest management recommendations. So, I miss a much deeper look into the interpretation of their results, if their findings agree or not with previous research, and the discussion of limitations and future steps needed (for instance, see comments of reviewer 1). The discussion in its current shape is mainly focused on how to design an urban monitoring program which could detect efficiently and quickly problematic changes in water quality. I think this topic is interesting and appropriate, however, I think authors go too deep into their recommendations based on the scope and objectives of the paper. As far as I understand, the main focus of the paper is to evaluate which important biological parameters should be considered in future model for water quality monitoring, not to evaluate and design monitoring programs. For that, a different experimental approach would be necessary (e.g. looking particularly at the effect of pollution sources like waste water treatment plants and so on).

Second, and also related to my concern about the novelty of the study. In this case about the methodological part. Authors state that they incorporate in their analysis new parameters regarding the repartition and degradation of organic matter. What do author mean with new parameters? New regarding what exactly? C-RIVE? Reading section 2.2. of methods, I cannot figure out what parameters are introduced as new, at least, regarding C-RIVE. Section 2.2.1, about OM degradation parameters just state parameters already included in C-RIVE. So, what is new in this regard? In section 2.2.2. about the partitioning of organic matter fractions, I see a change from only considering the concentration of individual fractions (DOM1, DOM2, POM1...), to the author's version where also the proportion (or ratio) between fractions are considered as well. Another change is that authors pooled DOM1 and DOM2 fractions to create a new fraction called BDOM. Am I missing something? What is really new/different in this approach regarding to previous work in C-RIVE? Is the use of proportions of OM fractions or the pooling of DOM1 and DOM2 into BDOM really making a change from the use of single fractions alone used before?

Maybe my doubts are associated with my lack of expertise in the topic. But still, even if this is the case, I think authors should clarify the mentioned aspects and pinpoint the novelties of their approach but also their findings, if they want to reach a wider audience of readers.

Finally, I appreciate that the methods and result are explained with a lot of detail. That really facilitates the understanding of the work by non-expert reader as me. However, there are parts of the manuscripts which are over-explained or are repetitive (e.g. compare last paragraph of introduction and first paragraph methods, or the legend of figure 4 with lines 254-259). Also, authors abuse a bit of introductory sentences or openings to state what is coming next (e.g. lines 388-389). Removing those parts will facilitate the reading without losing any level of explanation.