Comment on bg-2022-152

Anonymous Referee #1

Referee comment on "Role of phosphorus in the seasonal deoxygenation of the East China Sea shelf" by Arnaud Laurent et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2022-152-RC1, 2022

Thank you for the opportunity to review the manuscript titled "Role of phosphorus in the seasonal deoxygenation of the East China Sea shelf." I think the manuscript addresses an important problem and has the potential of becoming a worthwhile contribution. The approaches are robust, and the results are elegantly presented. I have offered below a couple of comments, which hopefully can improve the manuscript.

1. Introduction: Suggest adding some more background/literature information on the relative importance of P limitation, N limitation, and light limitation in coastal environments, including literature specific to the Changjiang Estuary. This can help the readers set up expectations and better appreciate the results presented in the later sections.

2. The entire modeling analysis and results are focused on DIN and DIP. What are the roles of other subspecies of N and P? I am not suggesting the authors to re-do the work with TN and TP, but some discussion on the relative importance of DIN (DIP) vs. non-dissolved N (P) can be beneficial. This is especially true for the proposed N+P dual nutrient reduction (28% and 44%). A 28% reduction of TN is not equivalent to a 28% reduction of DIN. The same argument is true for P.

3. The analysis of loading reduction scenarios makes the paper stronger and more management relevant. One suggestion is to present the loading reductions in the context of major sources for this system. What are the main contributors of riverine TN and TP loads? How would the proposed reductions be achieved by management actions by targeting those major sources? Some recommendations based on literature and/or the authors' experience with the watershed will be helpful.

4. The majority of the analysis is based on established models. I do not have any issues

with the modeling framework, but some statements on the model assumptions and uncertainties are recommended. In addition, have there been any bioassay sampling to verify the model-derived N or limitation status?

5. For the correlation result (Section 3.2), please specify what correlation method was used and justify the choice.

6. This research is comprehensive and should have broad relevance. Some discussion that compares the results with other systems or transfer the insights to other systems will be very helpful.

7. Figure 1: How were the six zones determined. Please clarify in the caption and methods.

8. Please be mindful on the use of significant digits. For example, 68.0×10^3 km2 (Line 155), 75×10^8 mol N (line 336), and other occurrences.