Biogeosciences Discussions

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Comment on bg-2022-20

Anonymous Referee #2

Referee comment on "The influence of mesoscale climate drivers on hypoxia in a fjord-like deep coastal inlet and its potential implications regarding climate change: examining a decade of water quality data" by Johnathan Daniel Maxey et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2022-20-RC3, 2022

The major challenge of the authors' work is to tease apart seasonal and inter-annual climate variations affecting the organic matter (OM) loading and hypoxia formation in a deep coastal inlet. Considerable amount of observational data is acquired and statistically processed to address three issues (in line 76 – 86): (1) effects of rainfall on OM loading and oxygen distribution; (2) effects of climate forcing on rainfall patterns and associated hypoxia formation; (3) implications on greenhouse gas emissions in this seasonally hypoxic system. Overall, I find issue #1 is well demonstrated, #2 is logically sound; and #3 is loosely based on current dataset. Nevertheless, the topic is interesting and, once the manuscript is improved, it will be suitable for publication in Biogeosciences. The following major issues are suggested for the authors to consider in the next round of revision.

(1) I am not sure whether the rainfall pattern shows seasonal variation? I am very confused with the 8 panels in figure 2, because the authors did not describe any panel (A through H) at all. Is it possible to have a simpler version of figure 2, and demonstrate the rainfall pattern?

(2) In figure 3, what is the meaning of x-axis? Does higher values represent more rainfall? My intuition is that, more rainfall results in higher river flow; but why would the Pearson corr. different towards the left of the two panels (at low rainfall and low river flow)?

(3) In figure 4, the upper panel show no significant seasonal variations in organic carbon loading; in figure 10, why OM loading is low during positive SAM? Can the authors show correlation between SAM and OM loading to support this claim? In addition, the daily average farm carbon load is much lower than riverine input; I would suggest the upstream dams are a much more important factor to consider because dams may dampen seasonal

variabilities of river flow and OM loading.

(4) This manuscript does not present any greenhouse gas data; with these data the manuscript would have been more convincing by linking the greenhouse gas formation to SAM and further to climate variation. The aim #3 of this manuscript remains unresolved.