

[Reviewer's comments are inserted in regular font and responses are in blue.]

Responses to Reviewer #1

In my mind, the authors very carefully addressed all the points raised in the interactive comments and I think that the manuscript is ready for publication.

Some technical corrections that might be considered:

Comment 1 (C1): P2, L22: “In this experiment” seems not ok as this was the experiment where biological processes were disabled. Better: “With this experiment it is shown” or similar

Response (R): Revised as suggested.

C2: P2, L24: Physical processes could be more explicit: that are advection and vertical diffusion

R: The sentence in question is rewritten as: “Our results suggest that the combination of physical processes (advection and vertical diffusion) and sediment oxygen consumption largely determine the spatial extent and dynamics of hypoxia on the Louisiana shelf.”

C3: P6, L101: Li et al. (submitted), probably (2015) otherwise not in the references

R: Corrected. It should be Li et al. (2015).

C4: P9, L169: directions seems not correct, better coordinates

R: Revised as suggested.

C5: P9; L170: better velocity components

R: Revised as suggested.

C6: P9, L174: equation 1

R: Revised as suggested.

C7: P23, L497: I was struggling with the conclusion that organic matter from inshore waters may help to reduce the overestimated DO in bottom waters and SOC. How does this hypothesis fit to the sensitivity experiment, where you neglect biological processes?

R: The sensitivity experiment where we disable biological processes emphasizes the importance of sediment oxygen consumption and physical processes, whereas the sensitivity experiment where we add a constant oxygen consumption rate to the water column emphasizes the potential role of organic matter from inshore waters. Both experiments complement our oxygen balance analysis and help to understand the relative

importance of different processes contributing to hypoxia generation.

We would like to note that, while the sensitivity experiment without biological processes in the water column suggests that sediment oxygen consumption and physical processes (advection and diffusion) largely determine the spatial extent of hypoxia, it does not provide a full picture of the factors controlling hypoxia. For that an accurate representation of the different biogeochemical processes, including the source of organic matter from inshore waters, is needed.