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Biogeosciences Discussions

Interactive comment on "Modeling dissolved oxygen dynamics and coastal hypoxia: a review" *by* M. A. Peña et al.

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We thank A. Dale for his constructive evaluation and useful recommendations to improve our manuscript. Basically, we agree with the reviewer that the paper will benefit from better reorganization to avoid overlap among sections and to improve readability. In the revised manuscript we have extensively reorganized the manuscript following his many useful detailed comments, added relevant figures to support the main text, and added a table summarizing the model studies carried out in the "case studies" discussed in the manuscript.

A major issue raised by this reviewer is the overlap of sections 2 ("Approaches to modeling dissolved oxygen dynamics") and 3 ("Modeling the effect of oxygen depletion on biogeochemical cycles"). To address this issue, we have reorganized the text and

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improved the focus of each section.

Section 2 is now entitled “Major physical and biogeochemical processes” and the text has been modified by: i) shortening and combining the text of subsections 2.2 (water column dynamics) and 3.1 (Processes in the water column), ii) subsection 2.4 (advective-dispersive transport) has been moved to precede the subsection discussing oxygen production and consumption, and iii) we added a schematic figure illustrating major processes in the water column and sediments.

Section 3 is now entitled “Modeling the effects of hypoxia on biogeochemical cycles and ecosystem” and has been restructured to include subsections on: “Phosphorus remobilization” (originally subsection 3.2.1), “Sediment denitrification and ammonium release” (originally subsection 3.2.2), “Food web interactions” (originally subsection 5.1), and “Bioturbation, and bioirrigation” (originally subsection 3.2.1).

Subsection 3.2.3 “Transient adjustment versus steady state” has been expanded to become a section.

Section 4 “Nutrient enrichment and hypoxia models” has been renamed “Modeling hypoxia: Case studies” and moved to the end of the paper before the “Synthesis and recommendation” section. The text has been revised such that: i) the information on the Gulf of Mexico that was in the introductory paragraph is moved to the subsection dealing with this region, ii) the information on the Black Sea model presented in section 3.1 is moved to the Black Sea subsection, and iii) we included the “Oxygen Minimum Zone” in detail as a case study using the material that was formerly in Section 6 (climate change effects).

All the other points raised by the reviewer (Other important comments) have been taken into account, including the addition of the following figures and tables: i) a map showing hypoxic areas where model studies have been carried out, ii) a schematic figure illustrating major pelagic and benthic processes, iii) one figure illustrating each of the case studies discussed in Section 4 (i.e. Northern Gulf of Mexico, Black Sea, Baltic

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Sea and Oxygen Minimum Zones), iv) a synthesis table summarizing the modeling studies that have been done so far in the “case studies” regions, and v) a table listing specific research areas requiring urgent attention to produce more robust models. We have also shortened and removed references from the introductory paragraphs at the start of each major section and modified the “Synthesis and recommendation” section to include a bullet list of focal points of attention.

Interactive comment on Biogeosciences Discuss., 6, 9195, 2009.