

Interactive comment on “Impacts of a weather event on shelf circulation and CO₂ and O₂ dynamics on the Louisiana shelf during summer 2009” by W.-J. Huang et al.

Anonymous Referee #1

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General Comments

This manuscript compares results from two summer shelf-wide surveys on the Louisiana shelf to study the role of circulation in the distribution of pCO₂ and O₂. I think the authors started out with a good idea to describe why the 2009 summer hypoxic area was an anomaly in comparison to previous measurements. However, the results, as presented, do not support the conclusions of the paper. The Results section should be rewritten to present all the Figures and Tables (in the current ms, half of the figures are presented in the Discussion) and to connect the dots between the mechanisms suggested for explaining the differences between 2007 and 2009. Further, the rigor in comparing only two surveys is questionable. I suggest bringing other published

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data (much of which has been previously published by the co-authors) to this analysis. Overall, the Results need a thorough reworking and all data used in this analysis needs to be explained and presented in this section. There has also been much recent work on shelf metabolism (see Guo et al. 2012; Murrell et al. 2013), impacts of physical forcing on hypoxia (Wang and Justic 2009; Fennel et al. 2013), and distributions of nutrients and organic (Lehrter et al. 2013) matter that the authors missed in the discussion.

Specific Comments

p. 3, lines 12-14: Many studies have directly investigated the role of circulation on freshwater distribution (in addition to the references above and those already in the ms see Dinnel and Wiseman 1986; Nowlin et al. 2005; Walker et al. 2005; Schiller et al. 2011). The context of the current study should be placed in this body of work.

P.4, paragraph beginning line 24-: You need to include more information here to help the reader understand your data and how you plan to quantitatively compare results from the two cruises. How many stations were occupied on each cruise? What depths were sampled? Why were the spatial extents of the two cruises different? When comparing the data between the two cruises, how are you handling the different spatial extents? What kind of CTD was used? What is the precision of the O₂ measurements with CTD and by Winkler?

p. 7, line 27: It is generally thought that the late spring/early summer discharge controls the amount of freshwater on the shelf. Here, you compare the July/August discharge? What did discharge look like for spring-summer in 2007 and 2009?

p.7, line 13-: Be clear here how you compared the two cruises. Define your “eastern” and “western” areas. How did you account for differences in sampling domains? What are the \pm errors presented? No statistical tests are presented to indicate that the air-sea CO₂ fluxes were different.

BGD

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p. 7, line 24: Is this the actual hypoxic area from the August 2007 cruise or from the LUMCON mid-summer survey?

p.7: Please thoroughly present all the figures and tables in the Results. If there are differences that you point out, present a statistical test and p-value. Otherwise, the results cannot be quantitatively evaluated.

p. 9: In light of the major issues with the Results, I am unable to evaluate the merits of the Discussion.

Fig. 1. Relabel the “Chla” axes. If the satellite data is being used as tracer of water masses, i.e. CDOM+Chla, as described in the text, it is not tracking chlorophyll a.

Fig. 2. Are these surface samples or profile data? Even with the inset differences are not clearly observed. Could you provide statistics to test for differences between E and W shelf domains? Also, perhaps outline the two domains on the figure.

Fig. 4. Subplots (a-d) are labeled in a different order than the figure caption. Explain in the methods how you calculated the bottom-water hypoxic area from these data.

Figs 5-9. Present these in the Results. By the time the results are completed, the reader should understand all the data used in the study and have at least a high level understanding of how the various analyses fit together to address the problem being addressed.

References not checked

Interactive comment on Biogeosciences Discuss., 10, 19867, 2013.

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