Biogeosciences Discuss., 8, C128–C129, 2011
www.biogeosciences-discuss.net/8/C128/2011/

Biogeosciences Discussions

Interactive comment on "A coupled physical-biological model of the Northern Gulf of Mexico shelf: model description, validation and analysis of phytoplankton variability" *by* K. Fennel et al.

Anonymous Referee #1

Received and published: 1 March 2011

I have read the manuscript with interest but felt that it should not be accepted by BGD without a major revision. General comments 1. Sylvan et al. (2006) note that the phosphorus limits the growth of phytoplankton. How can the authors justify using a biological model without phosphorus to assess primary production variability and light-limited/nutrients-limited effects? 2. The model is driven by the climatologic surface heat and freshwater fluxes. Is it good enough to character the interannual change of the circulation? 3. The physical model results should be presented and also be compared with the observations. Without the physical part information, it is impossible

to tell whether the model really reproduce the same dynamic in the model domain. It's very important because the trustable biological distribution is based on the reasonable physical dynamics. 4. Current model-data comparison is not proper for the biological part validation. The model time (1990-1998) does not overlap with in situ data (2000-2004) and satellite data (climatology 1998-2004). Why not simulate from 2000 to 2004 or even longer to overlap the time period of the in situ data and satellite data? And also, several profiles comparisons need be done for the vertical validation.

Specific comments: 1. P.126 L.12: "for out model domain" to "for our model domain"? 2. P.132 L.17: "Interestingly the simulated growth rates are very similar in all three regions with minima . . .. . . in summer (Fig. 8d)". It should be Fig. 8a, right? But the maxima of the growth rate show in May, not in summer? 3. P139 L.15-22: "We believe that advection is the primary process. . .. . ." Could you show some figures to illustrate the difference of modeled circulation pattern in the years with higher/lower discharge respectively? 4. In Fig. 7, could you give the seasonal change of mixed layer depth as well? 5. In Fig. 7: Phytoplankton biomass reaches its peak in June, growth rate, however, reaches its maximum in May based on Fig. 8a. It is contra-intuitive that growth rate variation precedes that of phytoplankton biomass. Why?

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