

Biogeosciences Discuss., referee comment RC1
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Comment on bg-2020-490

Zuo Xue (Referee)

Referee comment on "Do Loop Current eddies stimulate productivity in the Gulf of Mexico?" by Pierre Damien et al., Biogeosciences Discuss.,
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The manuscript by Damien et al. provides a high-quality study of meso scale eddy's impact on the productivity in the Gulf. This study combines remote sensing (surface CHL) and a well-validated numerical model (subsurface physics and biogeochemical cycling, model calibration was published in 2018) to diagnose the feature of eddy as well as impact on productivity, specifically in summer and winter times. The authors conclude that the surface CHL pattern might not necessarily reflect the condition in the upper water column and LCEs can trigger PP during wintertime. This study is original and of good importance to link meso- to large- scale ocean dynamics with ecosystem. Overall, I only have one suggestion-since the authors argue that the winter total PP is correlated not only eddy activity but also vertical mixing and the interaction between wind and the LCEs, why not carry out some sensitivity tests by manipulating the strength of wind-induced mixing in winter to support such hypothesis? Below are some minor suggestions.

The title could be more informative, after all this is not an outreaching seminar talk.

Line 22. I do not think they only shed from Yucatan, they can shed from the Loop Currents in any place in the GoM.

Line 24-26, the sentence is too long—consider break into two.

Line 56, a vertical nutrient transport

Line 105, details about the boundary and atmospheric forcing is needed, as well as rivers, although similar to Damien et al. 2018

Line 197, less remarkable

Line 205, what does "zonal" mean here?

Line 207, also see

208-212, here you mean the model results, so try not to use "images"

Line 233, r instead of R

Line 279-287 & Figure 6. Winter should be DJF and summer should be JJA, right?

Line 312, we choose to

Line 323-328, very good figure 8. needs more words for the salinity as well

Line 344, missed a period at the end of the line

Line 353, that is not affected...

Line 363, what is an eroded salinity maximum?

