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Biogeosciences Discussions

Interactive comment on "The stoichiometric ratio during biological removal of inorganic carbon and nutrient in the Mississippi River plume and adjacent continental shelf" *by* W.-J. Huang et al.

Anonymous Referee #2

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1. general comments Using changes in the DIC and TA pools to track nutrient removals in the plume seems like an interesting and innovative way to check on whether Redfield ratios exist in this plume (as uptake). The better term for this is to use TN and TP, rather than portions of the DIN and DiP pool. Afterall, the authors are examining the TC pool, not part of the DIC pool (e.g., fatty acids, or whatever).

2. individual scientific questions/issues ("specific comments") 2.a near shore sources: There is a gradient of speculation to firm conclusion regarding the estuarine sources of silicate. I.e.: Abstract line 15: near shore source of silicate are attributed to marshes as potential sources of Si 3.7 line12: we. . .'speculate" 3.7 line 21 "may also reflect a

preferentially high source term for SI from the marsh." 4. line 9 "inputs from marshes were contributing factors" This string of logic is inconsistent and inappropriate. It can be speculative, but not a conclusion.

2.b The Liu et al. 2011 paper is based on only 24 h data and the measured TSS concentrations were several times higher than those in Das et al. 2011. In contrast, Das et al. 2011 (Environmental Research Letters 6: 025001) used many years of monthly samples to conclude that the carbon export was minor. You really have to wonder about using a one-time sampling with very different numbers to use for an extrapolation to estimate export (of Si) of something they did not measure.

2.c How much of the change in nitrate and carbon can be attributed to sinking particles? The hypoxia in bottom waters is driven by this amount. Dagg and Breed (2003) estimate that the amount of Carbon sinking to the bottom layers equals the amount produced in the surface waters (Table 1; J. Mar. System. 43: 133-152). Surely this sedimentation rate affects the distribution of carbon in the plume, contributes to the sag at 10-20 psu, and occurs at the edge of the buoyancy plume (which is where the turbulence of diatoms diminishes, hence their sinking rate). In addition, this salinity range is where microzooplankton grazing is at its maximum (Liu and Dagg 2003 Mar. Ecol. Prog. Ser. 258: 31-42)

2.d There is more than nitrate involved. I suppose that nitrite is a very small portion of the DIN pool, but NH4 is also there and can be recycled within the DIN pool. Relying on nitrate alone seems risky without data to show it is a meaningless contributor to the N uptake rates.

2.e Re: 3.6, line 20-30 makes a distinction between the northeast and northwestern part of the sampling area. These are quite different areas, in that the northeast zone has suspended sediments, different clay-nittate exchange capacities, and very different light conditions.

2.f Is the TN, TP pools conservatively mixed? If not, then you have to assume that there

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is a loss term (e.g., grazing, sinking particles, etc). which affects the interpretation of the mixing diagrams. I am pretty sure that these are not conservative – why else is there a hypoxic zone in the bottom?

2.g The authors might compare the Si export of Struyl et al. on an area basis and the amount of Si in the river. How large is the theoretical export from the estuary compared to the river flowing past the estuary mouth?

3. compact listing of purely technical corrections at the very end ("technical corrections": typing errors, etc.). none, not that its perfect, but because it is fairly loose throughout and changes are needed, per comments above

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Interactive comment on Biogeosciences Discuss., 9, 1557, 2012.