

Interactive comment on “Carbon dynamics in the Mekong Delta” by Alberto V. Borges et al.

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Reviewer comment: I read this manuscript with interest as it contains an excellent set of data in a large estuary. It is, however, a bit long especially the abstract. I have sampled in the Mekong Delta several times myself but the branch and place names are not familiar even to me. They should be omitted from the abstract.

Reply: We thank the reviewer for her/his positive evaluation of the paper. We kept the location names in the abstract; The Mekong delta is composed of different branches/rivers so it is necessary to name them in the abstract to clearly specify where we sampled; further south of our sampling area the Hau river (refer to figure 1) is an important component of the delta that was not sampled; in the paper we report two distinct data-sets, one of which is a mangrove site located in Ca Mau peninsula; this is a relatively extensive mangrove area that is frequently referenced by name in liter-

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ature. In Biogeosciences, there is no size limit for the abstract. We acknowledge that our abstract is a bit long, but this reflects the descriptive nature of the paper of a rather large data-set.

Reviewer comment: 1. The $\Delta TA/\Delta DIC$ ratio of 0.55-0.87 is attributed only to aerobic degradation of organic matter and sulfate reduction. I don't understand why dissolution of calcite/aragonite and dolomite is not at play.

Reply: We have added a discussion on the possibility of $CaCO_3$ dissolution, and text now reads: "The slope of the linear regression of ΔTA versus ΔDIC ranged between 0.55 and 0.87. Such values might result from a combination of aerobic organic matter degradation (-0.2) and dissolution of $CaCO_3$ (or $CaMg(CO_3)_2$) (2.0). Accordingly, these values of relative changes of ΔTA versus ΔDIC would require that $CaCO_3$ dissolution corresponded to 34 and 48% of aerobic organic matter degradation, respectively. Such a large $CaCO_3$ dissolution is very unlikely in the Mekong delta because Ca^{2+} and Mg^{2+} showed conservative mixing as a function of salinity (Fig S3), and because particulate inorganic carbon (PIC) is relatively low in the Mekong delta compared to POC. The %PIC of TSM reported by Huang et al. (2017) is one order of magnitude lower ($\sim 0.1\%$) than the %POC of TSM we report (1-8%, Fig. 5)."

Reviewer comment: 2. Many figures show good correlations but with only a few points. The high correlation coefficients, however, may not be statistically significant due to the small sample size. The p values should also be shown.

Reply: We have added p values to the regressions

Reviewer comment: 3. The authors stated, correctly, that CH_4 has received much less attention on shelves compared to CO_2 . But, surely the authors know that Tseng et al., CSR, 2017,135,23-34 published CH_4 data on shelves off the Mekong River delta.

Reply: We now refer to the Tseng et al. (2017) CH_4 data, text reads: "The CH_4 concentration in the most off-shore sampled station was indeed close to atmospheric

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equilibrium in April 2004 (2 nmol L⁻¹) for a salinity of 31.9, but was higher in October 2004 (17 nmol L⁻¹) reflecting the lower salinity of 17.0. These values encompassed the CH₄ concentrations of 4-6 nmol L⁻¹ reported by Tseng et al. (2017) 150 km away from the Mekong delta river mouth.”

Reviewer comment: 4. A recent paper in JGR Biogeosciences(Huang et al., 2017, 122,1239) reported carbon export from many rivers around the SCS. A comparison would be of interest.

Reply: We have included the Huang et al. (2017) reference in the discussion of PIC (refer to above reply) and river TA and DOC concentrations, text now reads:

“Our TA values converge with the median (1082 μmol kg⁻¹) of a large data-set during 1972-1996 period from 42 stations in the lower Mekong delta compiled by the Mekong River Commission and reported by Li et al. (2014), and the average of TA data (1026 μmol kg⁻¹) acquired by Huang et al. (2017).”

and

“Within the freshwater zone (salinity <1), DOC values (2.4±0.2 mg L⁻¹, n=19) were within the range (0.9-5.1 mg L⁻¹) reported by Huang et al. (2017), and δ¹³C-DOC values (-27.8 ± 0.6 ‰, n=19) were again consistent with a dominance of terrestrial C₃ vegetation inputs, and close to values reported by Martin et al. (2013) slightly upstream in the lower Mekong”

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