

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/ivers 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 $\mu\text{mol kg}^{-1}$) 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 $\mu\text{mol kg}^{-1}$) acquired by Huang et al. (2017).”

and

“Within the freshwater zone (salinity <1), DOC values (2.4 \pm 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 $\delta^{13}\text{C}$ -DOC values (-27.8 \pm 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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