

Dear Editor and Reviewers,

We appreciate your positive recommendation as well as the insightful comments on our manuscript titled '*Perturbation increases source-dependent organic matter degradation rates in estuarine sediments*'. Below, we respond in detail to the minor comments raised by Reviewer #2. For each point, we describe the corresponding revisions made and indicate how these comments have been addressed in the revised manuscript.

Kind regards,

Guangnan Wu, on behalf of the coauthors

NB: Our response is given in red below, also referring to the line numbers in the revised manuscript with Word's **simple markup** where the edited text can be found.

Reviewer #2:

Overall the authors have addressed the comments from the discussion round in a thorough and integrated way. I support their assertion that it is valid to normalize mineralization rates to carbon content and that the results support a genuine difference in reactivity between marine and terrestrial sediment OM. The issue I raised concerning the use of Redfield stoichiometry to estimate DIC fluxes from ammonium data in the whole-core incubation has been circumnavigated in the new version through a direct correction of the DIC data to remove the contribution of CaCO_3 dissolution. I am satisfied that this approach is valid.

We thank the reviewer their positive assessment of the revised manuscript.

However, I suggest some further clarification of how the results of this section are reported and discussed. The authors highlight that DIC production is approx. 4-5 times higher on a molar basis than O_2 consumption. Later in the discussion (Line 625-627) there is a statement that aerobic mineralization accounts for only 25-30% of total mineralization, and therefore that anaerobic mineralization is important. This is presumably a reference to the excess DIC production assuming standard stoichiometry of degrading OM, but it is not made clearly. I would suggest to add already in the Methods section the approach that will be used to differentiate aerobic from anaerobic mineralization rates when processing the data.

We have now clarified in the Methods section how aerobic and anaerobic mineralization rates were differentiated (Line 294–297).

Minor comments:

Line 139 "This study show"

Line 156 "being subaerially in a holding basin"

Line 298 "while avoiding oxygen supply as a limitation" (can be removed)

Line 584-587 sentence is too long

Changed. We also checked and corrected spelling and grammar in the revised manuscript.