

## ***Interactive comment on “Carbon sources supporting benthic mineralization in mangrove and adjacent seagrass sediments (Gazi Bay, Kenya)” by S. Bouillon et al.***

**S. Bouillon et al.**

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We are grateful to Referee #1 for his/her thoughtful comments; the suggestion to elaborate on a few issues throughout the manuscript will certainly be taken up, and will hopefully make the manuscript more accessible to a wide audience. Below, we will briefly discuss the other issues raised, with the original referee comments preceeding each response.

REF : The manuscript "Carbon Sources supporting benthic mineralization in mangrove and adjacent seagrass sediments (Gazi Bay, Kenya)" by Bouillon et al. focuses on the mineralization of organic matter in mangrove and adjacent seagrass sediments. The manuscript is well written and all figures appear to be useful and clear and in general it deserves publication. However, in wide parts the manuscript is too short and difficult to understand for non-specialists. As explained a bit more in detailed in the below comments, almost each section would benefit, if the authors spend a few more words on the issue to be reported on. As a final recommendation, I should recommend

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publication of this work after serious clarification efforts, which should enable the ms. to be better communicated.

REPLY: We have gone through the ms and for the revised version, have modified several sections (rephrased and/or added some extra information) to make the ms. clearer and more comprehensible to a wide audience.

REF: Abstract, 2nd para: It is not really clear, why the mineralization is overestimated. Does the carbon budgeting comprise a sink of carbon, which has been assigned to mineralization, which however rather should be assigned to a trapping of organic carbon? The last two sentences (starting from: Based on. . .) hardly tell, which carbon comes from where and goes where to. Please clarify.

REPLY: It should be stressed that we do not claim that mineralization itself is generally overestimated, but that measured mineralization rates overestimate the importance of mineralization as a fate of the local macrophyte carbon. Since mineralization is fuelled in part by either other local C sources (phytoplankton, microphytobenthos, epiphytes) and/or imported C sources (in this case predominantly mangrove C) mineralization rates measured in e.g. seagrass beds cannot, in general, be simply used to infer the relative importance of mineralization as a fate of seagrass production. In some cases (e.g. Barrón et al. 2004, in Limnology & Oceanography 49: 1642-1651) this is obvious since seagrass production is insufficient to explain mineralization rates, but in many other cases this will not be evident without additional stable isotope data.

REF: P313, I10: . . .and a major fate of their primary production is its in-situ decomposition (or mineralization). REF: P313, I14/15: . . .exported out of the system (. . .).

REPLY: Both suggestions have been incorporated in the revised ms.

P313, I19: This section is too short and this first sentence too long. What means "widespread" distributed? Please clarify, what is meant with and happens with internal or external production.

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REPLY: "Widespread" is used here to indicate "common" or "a general feature", this has been modified in the revised ms. See reply#2 above for second comment.

REF: P314, I12-15: Does this mean that the mineralization within the seagrass meadows was fuelled by organic here or above? Or elsewhere? Is internal production meant here?

REPLY: The sentence "A recent study by Holmer et al. (2004)..." stresses the difference in the origin of C for bacteria these authors observed between pristine seagrass beds (where local seagrass production was a major C source for benthic mineralization) and anthropogenically impacted ones (where organic carbon from the water column, trapped in the seagrass beds, was found to be a significant C source for sedimentary bacteria).

REF: P314, I21-26: Similar to the abstract, it is not really clear, why there is an overestimation of the mineralization processes. REPLY: See reply to second comment.

REF: P315, I12: . . . range between 710 and 1365 gC m<sup>-2</sup> y<sup>-1</sup>. Capital C, not square-centimeter? REPLY: Yes.

REF: Results: The first paragraph of this section is a miracle to me. It might help to show the number in a table. Moreover, it is difficult to find out, which environment shows which delta C13 shift. To what are the per cent numbers related? Please expand and clarify this section.

REPLY: In order to keep the results section brief we had deliberately chosen to summarize these data in text. However, we will add a summarising table with average values and ranges for the relevant parameters; this should give the reader a clearer and more complete picture. The percentages are mg TOC per mg sediment (dry weight), the latter is now mentioned explicitly in the M&M section.

REF : P319, I18: seagrass (instead of seagass) REPLY : has been corrected.

REF: P323, I13: Please add a short comment here, what the (erroneous) implications

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of this overestimate would be and what the implications of a reliable estimate would be (beside the obvious fact that a reliable estimate better describes the system). Are there any consequences for other systems?

REPLY: The main implications of our data and the literature compilation is quite basic, i.e. it offers the opportunity to refine our understanding of C fluxes in seagrass (and others) ecosystems, and hence, to help in better balancing the seagrass C budget. Some of the patterns we describe here for seagrasses may indeed also hold true for other coastal ecosystems (mangroves, salt marshes), as suggested by e.g. the work of Boschker et al. (1999) for salt marshes and our own work for mangrove systems others than the one mentioned in this study.

REF: Fig. 1: Please, insert a larger scale map to locate the sampling site. Please also add the latitude and longitude scales to the plot. Fig. 2: Please, indicate in the plot the different types of samples. The captions of Figs. 3 and 4 seem to be wrong or exchanged? In the plot, which is now Fig. 4, please, indicate in the plot the different types of samples. Fig. 5c: Please, indicate in the plot the different types of samples. REPLY : Figure legends have been added on the plots, and indeed, the captions of Fig. 3 and 4 were accidentally swapped.

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