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Comment

***Interactive comment on “Importance of intertidal sediment processes and porewater exchange on the water column biogeochemistry in a pristine mangrove creek (Ras Dege, Tanzania)” by S. Bouillon et al.***

**Anonymous Referee #3**

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This manuscript describes the effects of tidal fluctuations on water column characteristics in a pristine mangrove creek. Through the sampling of TSM, POC, and DOC, CH<sub>4</sub>, and partial pressure of CO<sub>2</sub> variations which occurred during a diurnal tidal period were examined. In addition, stable isotope analysis was used to gain insight into the fundamental differences of both POC and DOC material exchange. In this mangrove tidal creek, which lacks upstream freshwater inputs, the authors discuss the possible importance of pore water seepage back into the water column during low tide as a main biogeochemical exchange point with the water column.

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Introduction: The introduction does a good job of outlining the main scientific “issues” in mangrove ecosystems: decline in total area, lack of nutrient budget information, effects of material export to off-shore habitats, etc. There is also a thorough review on the role of nutrient exchanges in the water column and the possible role of pore water in that exchange.

P 320 Ln. 14 Why not cite McClaine et al 2003, this was an article on biological hotspots?

P 321 Ln. 1 The manuscript states that little is known about belowground productivity, which is valid; but in the following statement about aboveground litterfall dynamics why not cite Twilley and Rivera-Monroy’s research on mangrove litterfall in the Southern Everglades? This is a similar “pristine” ecosystem that might offer an interesting comparison to the research site in Tanzania.

The authors make note to a larger research effort to study nutrient dynamics in mangrove systems in east Africa P322 Ln. 25. It would be interesting to learn more about what make s this study site unique as compared to other research locations in Africa and beyond.

The word “pristine” was used several times, including in the title & P322 Ln29, to describe the study site. I wonder how subjective of a term this is. One reader’s (or writers) idea of pristine would probably vary greatly from another’s, and in the methods section does little to clarify the term.

Methods: After reading through the methods section I was confused about where the sample station was actually located along the tidal creek. While high resolution sampling was conducted (over two days) why not give more complete info on sample locale. P. 323 Ln. 6 The term “midway” was used to describe sample location between the upper reaches of the creek and the marine opening. This left me asking the question of what distance was the site from direct marine influence? Without a spatial scale (meters) on the insert map of Figure 1, this information was hard to gauge. How far inland

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was the site from the terrestrial end of the creek? What was the landscape gradient (topographic) along the creek? Were there any geomorphologic features that might have helped to increase the water residence along the sample area that may of lead to the increased salinity values?

P. 323 Ln. 9: Sampling was conducted towards the “end of the dry season” what is the precipitation pattern at this time? The specific timing of this sampling, since it was only over the course of two days, in relation to freshwater precipitation inputs, may have significant implications on the short term salinity changes noted at the study site. Was there any precipitation during the experiment? A more informative study site description would help to answer these questions and give the reader a better grasp as to the uniqueness of the study site.

Results: P. 325 Ln.6: I am a bit confused with the terms “inner and outer” in relation to different parts of the tidal creek and how salinity varied between sites. I was under the assumption that there was only one sample location.

Discussion: Overall, I found the discussion broken up and difficult to follow. The individual points that were made were valid; however their organization could be refined.

P.326 Ln.23 “Assuming that pore water seepage is the main source of the elevated salinity.” This pore water salinity scenario makes sense, but the text does not do much too truly convince the reader that this is indeed what is occurring. In the introduction several citations were listed which state that there is pore water seepage into the water column-this might be a good time to revisit those findings for comparisons.

P.326 Ln.25 How was the calculation for the pore water contribution “pore water contribution was approximately 30%” determined? There is a great deal of data presented in Table 2, specifically, estimates of pore water contributions to the creek water column at low tide. Two things: why not discuss the importance of the other percentages 19% and 87% listed? Secondly, the terms high and low used to describe pore water salinity are confusing when those terms are also used to differentiate tidal stages (high and

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low tide).

Throughout the discussion there is a great deal of specific data reported, if possible try to address the data more so in the results section.

It would be nice to spend more time in the discussion comparing these data to other study sites. How would these results vary in an impacted mangrove system or in a system with decreased freshwater inputs due to anthropogenic influences?

P. 328 Ln.6 there is mention of isotopic mixing; it would be interesting to actually see a simple mixing model presented that would specifically state what percentages the marine and mangrove pools are contributing during both low and high tide. This would help to bolster the tidal influence story and clearly state the different component pools of organic carbon.

In the discussion it would be interesting if these findings were put into the context of the literature, not only for mangrove ecosystems, but coastal wetland ecosystems in general. This would also help the section read more like a discussion of the findings and not a regurgitation of the results.

Mention of crab burrows appears at the end of the discussion as a possible source of increased solute exchange. It would have been nice to read more about this earlier in the discussion.

Section sub-headings would go a long way to help organizing the discussion and to clarifying the manuscript. For example  $^{13}\text{C}$  data is spread over several paragraphs of the discussion, if possible, group these findings together for a more cohesive presentation.

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