Biogeosciences Discussions

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Comment on bg-2021-159

Anonymous Referee #3

Referee comment on "Mangrove sediment organic carbon storage and sources in relation to forest age and position along a deltaic salinity gradient" by Rey Harvey Suello et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-159-RC3, 2021

This study deals with the within system variability and sources of SOC in mangroves of Guayas delta, Ecuador, concerning forest age (young vs old) and position (i.e., distance from sea and salinity gradient-downstream, Intermediate and upstream). At the outset I must say that study is quite simple with basic data set for a single estuarine-marine system. However, within this data, authors have tried to extract information which is not readily available for the mangrove ecosystem. For the journal like Biogeosciences, I would have definitely liked to see some more information with additional rigour, for example, the information vis-à-vis age of the sediments, particularly where authors are trying to make distinction between old and new mangroves. Having said that, given the scope of the study and data generated, authors have done a nice job. I have some observations which is of moderate in nature

- The objectives of the study are clear and followed standard protocols to achieve the objectives. The categorization of sites based on historical LANDSAT satellite images is also acceptable. However, the sites classified as young witnessed colonization in the last three decades (after 1993). So the younger sites are not actually young and are established forests now; they are just relatively younger than other sites. I request the authors to address this point in detail for clarity.
- The authors discussed the factors responsible for variation in SOC stock and sources between young and old sites and among the position. However, from the data, it is apparent that there are significant differences in SOC stock and content between marine and estuarine mangroves. So I request the authors to address the point in the discussion. Further, I suggest the authors discuss the contrasting behavior of upstream old and young sites concerning sites of intermediate and downstream location.
- If I am not wrong, from the figure it is apparent the younger sites are on eastern banks and old sites are on western banks, but the GPS points given in Table S1 provide the opposite information. Is it possible that the GPS points are misplaced in Table S1, check!
- In the discussion, authors state that the in younger marsh sedimentation is higher than the older marsh and extended the analogy to the studied mangrove system. As the younger mangrove grew on the tidal mudflat (I believe), Am I right in assuming that

the sedimentation rate would have been similar with or without mangrove. What role the mangrove played in increasing the sedimentation rate?

- By comparing the sediment cores from younger and older mangrove systems, are not you comparing two different time periods? For example, sediment at 50 cm depth at younger mangrove may represent much younger time period than at older mangrove. While making an interpretation, particularly related to relative contribution of allochthonous and autochthonous carbon contribution at a particular time period, how do you reconcile this fact. I think authors should think this through.
- The authors state that the sediment $\delta^{13}C$ values of the sediment cores are 6-10‰ higher relative to the average vegetation of the sites. If I am seeing it correctly the total variation in d13C across all reservoirs are in the range of - 32 to -24 per mil. Where is the difference of 10 per mil?
- Also, authors state that $d^{13}C$ values of the older sites (at the Intermediate, Downstream and Marine sites) are more negative than the younger sites. I am not sure if this is unequivocal. Pl. check.