

## ***Interactive comment on “Contributions of the direct supply of belowground seagrass detritus and trapping of suspended organic matter to the sedimentary organic carbon stock in seagrass meadows” by Toko Tanaya et al.***

**Anonymous Referee #1**

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The paper was well executed and written and presented novel data on seagrass carbon dynamics. Particularly, this paper fills in a much needed gap on tropical blue carbon ecosystems and the contribution of belowground biomass (esp. sheathes) to carbon stocks, the latter often erroneously overlooked or lumped in as the sediment carbon stock. It would be interesting to expand on this study by looking at similar variables at deeper depths so that (a) it is comparable to global studies that look at 30-100 cm depths, and (b) we can understand better the long-term contributions of seagrass and allochthonous OC where living biomass isn't present and detritus has been processed

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more by microbial remineralization. There are some concerns about the lumping of different vegetation types into a site average, but otherwise these are minor revisions.

Abstract – Lines 3, 11, 13: What is meant by enrichment? Looking at the next sentences, ‘accumulation’ may be a more accurate term. Change throughout the manuscript. – Line 5: ‘bodies’ is an uncommon term for seagrasses and should be ‘plants’ or ‘biomass’ here and throughout the manuscript – It will be helpful to describe what species of seagrass are being studied in the abstract. – Line 16: no need to hyphenate blue carbon. Change throughout the manuscript as well.

Introduction – Lines 17-30: Consider Trevathan-Tackett et al. 2017 as a specific review of seagrass recalcitrance and the potential for contributing to OC stocks (doi: 10.3389/fpls.2017.00925); it will also be useful in the first section of the discussion. Also consider new research on prevalence of OC in seagrass meadows using eDNA: Reef et al 2017 doi: 10.1002/lno.10499

Methods – How are you considering leaf detritus in these sediment measurements/calculations? In sections 2.2 it says it's a part of the dead plant structures but not in the calculations. Is it assumed that 100% of the surface leaf detritus is exported and not buried? – Why is the  $C_{sed}$  calculation multiplied by 1/3 (eqs. 6 & 8)? – How do equations 7 and 8 relate to traditional mixing model methods to look at OC prevalence? Were the end-members (seagrass, POM, algae/coral, terrestrial) taken into account? It seems a waste not to use this stable isotope to quantitatively obtain OC contribution values.

Results – Since section 3.2 only has one sentence, I'd suggest adding it to the next OC section – One suggestion is to make a supplementary table(s) for the statistics. This would make reading the text easier. – Where are the data on the differences between vegetated, unvegetated and bare OC stocks and fractions? This will be very important in the interpretation of  $OC_{bio}$  and  $OC_{dead}$ . This will give better resolution into the differences within and between back-reef and estuary regions – What about

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correlations between living AG:BG?

Discussion – Page 10, Lines 17-19: NO, we cannot assume constant to 1-m depth. There are important processes that affect OC down core, most notably the reduction on living biomass with depth, change in bulk density and microbial remineralization, so there is absolutely no meaning to the OC<sub>bio</sub> to OC<sub>total</sub> estimate. Please remove this sentence and calculation and find another more robust way to compare the OC<sub>bio</sub> data to previous literature – Second paragraph: Anoxic sediments that generally reduce decomposition rates also can lead to higher preservation of OC

Figures Figure 1 is low quality and fuzzy and thus hard to read Figure 3: please define the abbreviations in the caption.

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-522>, 2017.