Anonymous Referee #2

Referee comments shown in black, Author replies shown in blue, Changes to manuscript in purple

Overall comments

The manuscript by Belshe et al. attempts to provide insights into blue carbon storage capacity in seagrass areas off Zanzibar Island. While I view the study a welcome addition to the increasing global and regional focus on blue carbon sequestration, the style of argument/discussion places the authors' findings in a negative light rather than a substantial progress in this field. I have elaborated on this matter below, and other suggestions that will improve the manuscript. I look forward to reading a revised version of the manuscript in the near future.

Thank you for this comment, we agree that we were not emphasizing the findings of this study in the right way and are grateful for the opportunity to improve our argument tone and style. We realize that our writing style, especially in the discussion, was too circuitous and instead of placing our novel findings within the discussion on the controls over OC storage in seagrass systems, we failed to highlight our work. In addition, we did not set up our discussion properly in the introduction, which left us over explaining some aspects in the discussion. This further muddled our discussion and our main findings (the forest) be lost in the 'trees'. We have (for the most part) rewritten our discussion and strengthened our introduction. We believe these changes have greatly strengthened and clarified the manuscript and hope now that our findings are highlighted because we believe they add a key piece to the picture of how sediment characteristics modulate the effect plant traits on OC storage. Below, in response to your specific comments, we have specifically addressed all of these issues and give reference to changes made to the manuscript.

Specific comments

1) One of the shortfalls in Fourqurean et al. 2012's paper is the limited number of African meadows considered in that paper's meta-analysis. This current study complements those already done off the African continent and would therefore allow more robust regional estimates in OC sequestration capacity. The authors, however, reported and emphasized low OC stocks in their study sites. This is not novel, in my opinion, since the authors' 33.9 Mg C ha-1 estimates: 1) still fall in the global range of 9-628 Mg Corg ha-1 in Fourqurean et al. 2012; 2) is just slightly higher than Fourqurean et al. 2012's estimate for the Indo-pacific region of 23.6 Mg Corg ha-1; and 3) not that much different to those estimates done in SE Asia, which is in the same bioregion as this study (see below on this, and please also refer to OC stock estimates in Miyajima et al. 2015; Gilis et al. 2016, Quak et al. 2016; Rozaimi et al. 2017).

Thank you for this comment as the placement of our results into the body of evidence for the Indopacific region was neglected in our discussion and greatly improves the manuscript.

P12 L6-16: "The OC storage in the top 25 cm (14.1±2.2 Mg C ha^{-1}) or the top 1 m (33.9±7.7 Mg C ha^{-1}) of sediment at our sites was comparatively lower than the global average (194.2±20.2 Mg C ha^{-1} in the top 1 m) for seagrass ecosystems (Fourqurean et al., 2012a); however, fell within the range of storage (1.9 to 293 Mg C ha^{-1}) reported for seagrass sediments within the Tropical Indo-Pacific bioregion (Alongi et al., 2016; Campbell et al., 2014; Fourqurean et al., 2012a; Miyajima et al., 2015; Phang et al., 2015; Rozaimi et al., 2017; Schile et al., 2016). Compared to other sites within the Indo-Pacific bioregion, OC storage at our sites were lower than stocks reported for meadows in Thailand (37.5 to 120.5 Mg C ha^{-1}; Miyajima et al., 2015), Malaysia (46 to 70 Mg C ha^{-1}; Rozaimi et al., 2017), Indonesia (34.3 to 293.3 Mg C ha^{-1}; Alongi et al., 2016) and Singapore (129.4 to 149.6 Mg C ha^{-1}; Phang et al., 2015). Although, in comparison to sites on the western side of the Indo-Pacific region, our sites' OC stocks fell within the range reported for sites in the Arabian Gulf (1.9 to 109 Mg C ha^{-1}; Campbell et al., 2014), and Zanzibar, mainland Tanzania, and Mozambique (21.3 to 73.8 Mg C ha^{-1} in the top 50 cm; Gullström et al., 2017).

We did not add the contributions of either Gillis et al. 2017 or Quak et al. 2016 because they only sample surface sediments (top 5-10 cm), and although these studies are informative when looking to understand transfer and deposition of OC within and between ecosystems they cannot inform us about OC storage.

2) There is a fixation by this study as well as others already published on trying to predict OC storage capacity by biological and or physical drivers. It has already been suggested in Lavery et al. 2013 that variability can be expected and therefore I don't find it surprising Gullstrom et al. 2017 had different results compared to this study. Furthermore, many studies, e.g. Serrano et al. 2016a, already connected sediment grain size as negatively correlated with OC stocks. I don't see the logic, therefore, to persist looking into such "geophysical constraints" whereupon low OC stocks are to be expected. As it stands, this is the angle that the authors communicated, and therefore I view this study's findings not very interesting. BG is rarely seen as a journal of negative results and I recommend the authors portray their findings in a different light. What I do find interesting is that high seagrass biomass/density does not necessarily translate to high sediment OC stocks, especially in reference to the study's findings in Community B. Indeed, this is in stark comparison to e.g. Macreadie et al. 2012&2015's, and Serrano et al. 2014&2016's Posidonia studies, where such correlation is expected. I believe this angle can pique the interests of BG readers more than how it is now.

Thank you for this comment, this has shown to us that as our discussion did not clearly place our results within the literature and did not highlight the findings of our study, we have greatly modified the discussion in the following ways:

First, we thought we were highlighting the finding that high seagrass biomass/density does not necessarily translate to high sediment OC stocks but now see that this may not have been clear enough. We have improved our discussion in regards to this, please see:

P12 L17-26: "A clear contrast emerges when comparing OC storage within community B, dominated by the large-bodied, persistent species *T. ciliatum*, to locations that contain seagrass species with similar life-history strategies and traits. Even with the combined attributes of producing a high quantity (AG biomass: 972±74 g DWm^{-2}; BG biomass: 682±392 g DWm^{-2}) of low-quality tissues (leaf: 1.54±0.05 %N; rhizome: 0.46±0.2 %N), community B's sediment OC stocks (32.2±7.9 Mg C ha^{-1}) were at least 3-fold lower than what has been reported for *Posidonia oceanica* (105 to 829 Mg C ha^{-1}), *Thalassia testudinum* (124 to 210 Mg C ha^{-1}) and *Amphibolis antarctica* (115 to 335 Mg C ha^{-1}) meadows (Fourqurean et al., 2012b; Mateo et al., 1997; Serrano et al., 2012; 2014). All of these species possess traits that place them on the 'slow' conservation-side of the plant economic spectrum associated with higher ecosystem OC storage (Díaz et al., 2004; Orth et al., 2006; Reich, 2014; Wright et al., 2004). The breakdown of the relationship among plant traits and OC storage in this study indicates that other factors may be interacting to control OC deposition and/or stabilization within the sediment."

Second, from the past two decades of research in both terrestrial and marine sciences there has been a paradigm shift in the understanding of how the boundary conditions of the soil or sediment determine the relative importance of plant characteristics (i.e. tissue quality) in OC stabilization. If we are to ever understand the variability in OC across blue carbon ecosystems we have to identify and quantify the interactions between plant and sediment characteristics.

Third, the growing body of literature in blue carbon ecosystems has begun to show a very interesting picture of how geophysical properties of the sediment modulate the role of plant characteristics in OC stabilization. Serrano et al. 2016a showed that fine sediments were significantly positively correlated with OC storage within all seagrasses they studied (see Table 3 of their manuscript); however, the amount of variation explained (r2) was higher for small-bodied, ephemeral seagrasses. The overshadowing the explanatory power of plant characteristics by sediment characteristics at sites with a high abundance of fine sediments is also reported by Miyajima et al. 2015, Dahl et al. 2016, Rohr et al. 2016 and van Katwijk et al. 2011. What becomes even more interesting is that once sediments become moderately coarse, plant characteristics (biomass and tissue quality) rise in importance as explanatory variables and become more important than sediment characteristics (Dahl et al. 2016; Serrano et al. 2016a). Finally, what we specifically add to the picture and believe the readers of BG will find interesting is that once sediments become very coarse and shallow, large inputs of low quality OC are not necessarily stabilized against microbial decay. Our study completes the picture that shows the non-linearity in the interaction between plant traits and sediment characteristics on OC storage in seagrass ecosystems.

We have rewritten the discussion to better reflect our findings and interpretation of these results within the context of the literature. Following the paragraph on the comparison of OC storage in community B to other species with similar traits, please see the following:

P12 L26- P15 L6: "On one hand, water flow at our sites is energetic with moderate to high current velocities (ranging from 0.25 to 2 ms^{-1}; Shaghude et al., 2002), sediments are poorly sorted, and both sediment accumulation and the amount of fine sediments (~1% <63 size fraction) is low (Table 1). These ecosystem properties are characteristic of low-depositional environments and would support the viewpoint that low OC deposition of aboveground autochthonous litter and allochthonous inputs are limiting OC accumulation. However, the high autochthonous inputs of belowground tissues (up to 1074 g DWm^{-2}) at our sites places up to an estimated 386.6 g OC m^{-2} directly into the sediment, providing direct evidence that OC enters the sediment. The C:N ratio (97) of these belowground inputs approach a theoretical threshold (100) where litter decomposition greatly slows due to nutrient limitation of decomposers (Zechmeister-Boltenstern et al., 2015), and if the tissues of *T. ciliatum* are similar to other long-lived seagrass species they contain a high abundance of complex chemical compounds such as lignin (Kaal et al., 2016; Klap et al., 2000; Papenbrock, 2012; Trevathan-Tackett et al., 2017). Low OC storage with high autochthonous inputs gives greater weight to the argument that OC is not stabilized within the coarse, shallow sediments of our sites, despite the low-quality of seagrass inputs.

These results fit within the emerging framework that the stabilization of OC within soils and sediments is a whole-ecosystem property (Lehmann and Kleber, 2015; Schmidt et al., 2011).

This view posits that all organic matter can decay quickly if conditions are right (Gramss et al., 1999; Hamer et al., 2004; Hazen et al., 2010; Wiesenberg et al., 2004). However, decomposition can be altered by ecosystem properties that impede the microbial access to, or remineralization of, certain molecules (Lehmann and Kleber, 2015; Schmidt et al., 2011). For example, in sediments with low oxygen concentrations, the decomposition of complex, recalcitrant OC can be impeded (due to a lack of electron acceptors or enzyme cofactors that require oxygen), resulting in the selective preservation of 'oxygen-sensitive' OC (Arnarson and Keil, 2007; Burdige, 2007; Burdige and Lerman, 2006; Hedges and Keil, 1995; 1999; Keil and Mayer, 2014). Likewise, sediment minerology and aggregation can reduce the bioavailability and accessibility of OC to microbes and enzymes (Arnarson and Keil, 2001; 2007; Hedges and Keil, 1999; Keil and Mayer, 2014; Mikutta et al., 2006; Schrumpf et al., 2013; Six et al., 2004; 1998; Sollins et al., 1996; Tisdall and Oades, 1982). Alternatively, in the absence of ecosystem controls, even low-quality, chemically complex compounds such as lignin can be degraded relatively quickly (Dittmar and Lara, 2001). This view shifts plant input quality into an auxiliary role, with the persistence of sediment OC ultimately determined by geophysical properties of the sediment.

The modulation of the effect of plant traits by sediment properties on OC storage is seen when comparing our sites on the western coast of Unguja Island, Zanzibar to meadows located on the south and east coast of the island. At these other locations, sediment OC storage is two to three times higher than what was measured in our sites (40.7 to 73.8 Mg C ha^{-1} in the top 50 cm), and is positively correlated to seagrass biomass at the landscape scale, with the largest stocks located in sediments beneath large, persistent species (Gullström et al., 2017). *T. ciliatum* occurs at all locations, and contains similar amounts (AG biomass: 556±200 g DWm^{-2}; BG biomass: 983±564 g DWm^{-2}) of low elemental quality (AG tissue %N: 1.4±0.1; BG tissues %N: 0.7±0.1) plant tissues (Gullström et al., 2017). What does differ between our sites and these meadows to the south and east are the sediments. The biogenic carbonate sediments that occur on the western side (where our sites occur) differ greatly from the eastern and southern coasts of the Island (Shaghude et al., 1999). The western carbonate sediments are composed of reefal foraminifera, mollusk, echinoderm and coral components and are characterized as coarse gravely sand (Table 1), whereas the eastern and southern sediments are composed primarily of remnants from calcareous green algae (*Halimeda* spp.; Shaghude et al., 1999), which form algal mounds, allowing for greater deposition of fine particles and deeper accumulations of carbonate mud (Kangwe et al., 2012; Muzuka et al., 2005). The narrow range of sediment properties found across the three meadows we sampled leaves us only the ability to piece together trends with data from others' work and speculate that differences in OC storage among regions of the island are due to the disparity in sediment characteristic, since plant traits were similar. Another limitation of this work is that we are unable to identify the exact control(s) within the sediment environment controlling OC stabilization (or lack thereof), though we hypothesize it is linked to oxygen availability and sediment structure (accessibility).

However, this study does add a key piece to the growing body evidence showing that geophysical conditions of the sediment modulate the importance of plant traits in regards to retention of OC within blue carbon ecosystems (Alongi et al., 2016; Armitage and Fourqurean, 2016; Campbell et al., 2014; Dahl et al., 2016; Miyajima et al., 2017; Röhr et al., 2016; Samper-Villarreal et al., 2016; Serrano et al., 2016a). Here we show that once sediments become very coarse and shallow, large inputs of low-quality seagrass OC are not necessarily stabilized against microbial decay. This extends and contrasts previous work from sites without high sediment loading and fine sediments, which show plant traits (biomass, density, and cover) became better predictors for OC storage as sediments become more coarse (Dahl et al., 2016). This increase in explanatory power by plant characteristics as sediments become coarser was also shown for large-bodied, persistent species (*Posidonia* spp. and *Amphibolis* spp.) inhabiting more exposed sites (Serrano et al., 2016a). Sites with the largest stores of OC recorded for seagrass are negligibly correlated with fine sediment content and occur within dense meadows of the long-lived species *P. oceanica*, which form and persist in stable environments without high sediment inputs (Peirano and Bianchi, 1995; Serrano et al., 2012; Serrano et al. 2016a). However, as the abundance of fine sediments increase, OC storage can be high even in meadows composed of species with “fast” traits, and characteristics of the sediment become better predictors of OC content (Dahl et al., 2016; Lavery et al., 2013; Röhr et al., 2016; Serrano et al., 2016a; van Katwijk et al., 2011). A positive correlation between fine sediment and OC storage has been shown for small-bodied seagrass species at 20 sites across three bioregions (Temperate Southern Ocean, Tropical Indo-Pacific, and Mediterranean; Serrano et al., 2016a). At adjacent estuarine sites in Thailand with a high contribution of terrestrial inputs and fine sediment, a relatively smaller-bodied seagrass (*Cymodocea serrulata*: 120 Mg C ha^{-1}) had higher OC storage than the large-bodied, persistent seagrass (*Enhalus acoroides*: 86 Mg C ha^{-1}; Miyajima et al., 2015). A similar association between high OC storage and fine sediment was demonstrated across a range of conditions in the Temperate North Atlantic for the small-bodied species, *Zostera marina* (Dahl et al., 2016). Based on the results presented here, in combination with the findings outlined above, we hypothesize the interaction between plant traits and sediment properties is non-linear, with the effect of sediment properties dominating at the extremes of the sediment spectrum. In high depositional environments with an abundance of fine sediments, characteristics of the sediment overshadow the effect of plant traits on OC storage. In moderate depositional areas with coarser sediments, the importance of plant traits increase and meadows with “slow” traits tend to store more OC. And finally, this study shows that once the flow-regime becomes energetic enough to create very coarse sediments and sediment limitation, properties of the sediment can again outweigh plant traits to limit OC storage even under meadows with traits conducive to OC storage.

This study, placed into the context of the growing body of evidence of the large variation in OC storage in seagrass ecosystems (Campbell et al., 2014; Dahl et al., 2016; Lavery et al., 2013; Miyajima et al., 2015; Röhr et al., 2016; Samper-Villarreal et al., 2016; Serrano et al., 2014; 2016a; 2016b), illustrates the complexity of controls and mechanisms that govern OC storage in seagrass sediments. Even within meadows with similar environmental conditions, data on plant traits or carbon sources (as a proxy for OC input quality) cannot alone provide a full picture of the location or magnitude of sediment OC; therefore, we caution against their singular use as proxies for OC storage. Future efforts should focus on quantifying the interactions among properties of OC inputs (quantity and quality) and a suite of geophysical sediment properties, including minerology, structure, and the full range of the grain size distribution. Once these interactions can be quantified, spatial information on sediment parent material (Hartmann and Moosdorf, 2012) and composition can be integrated with data on seagrass characteristics and extent to better model the spatial variability of OC storage within seagrass sediments.”

3) As it stands, using %N as a predictor variable is a particularly weak approach. Seagrasses are naturally N limited and therefore I don't see its justification in this study. I note the authors attempted to relate N content/decomposition to CNP stoichiometry (Pg 2 L 29-31) but I need further convincing before agreeing this as a viable approach.

Thank you for this comment as it shows we did not fully elaborate on how plant tissue quality (as represented by %N) can influence decomposition and therefore storage of OC. We have expanded our introduction to add information supporting the inclusion of %N data:

P3 L7- L15: "Seagrass tissue stoichiometry has been correlated with decomposition rates, with tissues containing relatively higher nitrogen and phosphorus content decomposing faster (Enriquez et al., 1993), at least in the initial phase of decomposition (Berg and McClaugherty, 2014). Low concentrations of nitrogen (C:N ratio above 20-25) within tissues indicate the potential for microbial nitrogen limitation, necessitating nitrogen immobilization from the environment and resulting in low carbon-use efficiency during litter decomposition (Berg and McClaugherty, 2014; Hessen et al., 2004; Sinsabaugh et al., 2013). Furthermore, the nutrient content of tissues co-vary with other structural and chemical properties that reflect the plant species' ecological strategy, and can serve as a proxy of tissue quality and decomposability (Birouste et al., 2012; Cornwell et al., 2008; Freschet et al., 2012; Zechmeister-Boltenstern et al., 2015)."

4) I am not comfortable with the authors' way in presenting OC cycling as the alternative explanation for their findings of low OC stocks. The context linking sequestration capacity and OC cycling is too broad in the absence of sufficient evidence, which in turn made it a rather unconvincing discussion. I suggest the authors discuss the findings along the lines that the studied meadows have low capacity to sequester autochthonous inputs. Such approach would still be in the bigger auspices of OC cycling and will not stray too far from the body of evidence already presented.

We would argue the counter point as our data show that large amounts of autochthonous (belowground seagrass tissues) inputs are added directly to the sediments. Further, the interpretation of correlations between seagrass inputs (based on C isotopes) and OC stocks is based on the assumption that tissue quality (recalcitrance) is the only mechanism for OC stabilization within sediments and soils. And as we have pointed out above this assumption has been called into question with a large body of evidence showing that all types of organic matter can be decomposed if the conditions are right, and it is the boundary conditions of the sediment that mediate this relationship.

Though we do concede that the way we presented this in our discussion was unconvincing, we have updated our discussion on this topic, please the text above in regards to comment 2, specifically the paragraphs that start with: "On one hand,…" and "These results fit within…".

5) There is an underlying initial assumption by the authors that seagrass tissues are buried in the sediment and therefore sequestration occurred. It is unfortunate that OC provenances did not fall into the scope of this study. I do not insist this be done, but nonetheless, it is reasonable to

infer from the results in Miyajima et al. 2015; Gilis et al.2016, Quak et al. 2016 and Rozaimi et al. 2017 on seagrass endmember contributions to OC sediment sequestration. The seagrass meadows in these four studies (with the exception of particular sub-tropical and temperate meadows in Miyajima et al. 2015) and those in this study are in the same bioregion (after Fourqurean et al. 2012). The studies I quote reported low seagrass contributions and also low OC stocks to the sediment. I also refer the authors to Bouillon et al. 2004 for a data set on OC provenances that were obtained closer to their sites. These papers may assist the authors in arguing their case succinctly.

Thank you for this comment as it shows us that the core of our viewpoint on OC cycling was not conveyed. We argue just the opposite and feel strongly feel that when OC reaches the sediment it continues to be cycled. Please see our response to the comment above in regards to our view on the assumption that OC from seagrass sources translates into OC stabilization and therefore high OC stocks, we posit that this is only the case under certain sediment conditions.

6) I am particularly uncomfortable with the supposition laid in Pg 9 L25-28 on the historical colonization of seagrasses in the study area vis-à-vis carbon deposition and seagrass community structure. It is not supported by historical data and/or organic matter provenances (see above). The authors should have considered that the period of carbon accumulation (re Serrano et al. 2016b) is an important aspect of blue carbon accounting. A stronger case is needed before readers would agree to the assumption posed by the authors.

Thank you for this comment as it shows that our writing was not clear, we were trying to say that because we did not have information on the species composition, traits, or meadow extent from the past we had to assume that the current state of the meadow was representative of conditions in the past. We have clarified this by adding to the Methods:

P6 L20- 22: "We also assumed that there were no historic differences in community composition, plant traits, or meadow extent during past carbon deposition because there were no historic data available at our sites, which is a limitation of this study."

And to the Results:

P11 L19- 21: "Most cores (13 out of 18) exhibited the typical trend of decreasing % OC with depth into the sediment, with the notable exception of two cores taken adjacent to seagrass meadows (F: bare sediment; Figure 7), where % OC increased with depth, which calls into question our assumption that seagrass meadow extent has not changed over time."

7) I recommend adding a Figure or Table summarizing the OC density (g OC cm-3) and/or sediment dry bulk density data to complement Figs 6 and 7.

Thank you for this suggestion we have added two supplementary figures, one showing the frequency distribution of dry bulk density of our OC sediment cores (Supplementary Figure S3) and a figure of the OC density with depth for all cores and all communities (Supplementary Figure S4). And have also added to the text, please see:

P11 L22- 24: "Sediment bulk density ranged from 0.939 to 1.714 g DW cm^{-3}, with mean and median values of 1.303 and 1.299 g DW cm^{-3}, respectively (Supplementary Figure S3). Patterns in sediment OC density (g OC cm^{-3}) mirrored the trends seen in % OC (Supplementary Figure S4)."

Methods and design

8) General comments:

a) specify water column depths of the sampled sites;

Thank you, we have now added more information about our sites, including water depth, please see:

P4 L23- 28: "M1 is located in shallow waters (70 cm – 380 cm in depth) to the southeast of Kibandiko Island and encompasses an area of 15 hectares, which include several small intermittent patch reefs. M2 is also located 1.5 km to the west of M1, and encompasses an area of 4.8 hectares. M2 resides within a shallow lagoon (50 cm – 320 cm in depth) adjacent to a sand spit and fringing reef on the north-eastern side Changu Island. M3 covers 4.6 hectares and is located in shallow waters (50 cm – 375 cm in depth) north of Chumbe Island, adjacent to patch reefs and a sand spit. M3 resides 16 to 17 km south of M1 and M2, respectively."

b) specify if epiphytes were removed before weighing biomass samples for above-ground plant parts;

Thank you we have improved our methods and have added information on the removal of epiphytes, please see:

P6 L2- 4:" Green leaves (above-ground biomass) and living root, rhizome, and short-shoots (below-ground biomass) were separated, scraped of epiphytes, and dried at 60°C until a constant weight was reached, then weighed to obtain above and below ground biomass (g DW m-2) for each species."

c) clarify sediment acidification protocols;

Thank you we have improved our methods and have added information on sediment acidification, please see:

P6 L25- 26: "Dried sediments were homogenized in a ball mill and % organic carbon (OC) was determined, after acidification with 1 M HCL to remove carbonates, on an elemental analyzer (Euro EX 3000; EuroVector)."

d) specify the use of CN ratio calculations in methods.

Thank you we have improved our methods and have added information on the C:N ratio calculations:

P6 L8- 10: Tissue samples were then homogenized with a mortar and pestle and subsequently measured on an elemental analyzer (Euro EX 3000; EuroVector) to determine the % N and % C of each species at each site, and tissue stoichiometry (C:N ratio) was calculated."

9) Coring methodology: a) I can accept that core compaction during sampling can be assumed negligible for short cores but longer cores require core length corrections. Please refer to Howard et al. 2014; b) I find it perplexing that the authors included extremely short cores in analysis

when in fact it was possible to get longer cores within the same community site (i.e. A, B, C and F). The only logic I fathom is the insistence on a replication/ecological approach, which is not particularly essential in these types of biogeochemical/biogeophysical studies. Such inclusions of short and long cores as "replications" invites greater variability and more questions are thus raised on the robustness of the findings.

Thank you for pointing out the need for clarity here. Because of the extremely shallow sediment at our sites, it was not possible to take cores all the same length, we have made this more clear in the methods.

P6 L16- 19:"Due to the shallow and variable sediment accumulation on top of the carbonate platform at our sites, the depth of penetration of sediment cores varied from 19 to 78 cm. The presence of the impenetrable carbonate layer was verified manually after the core was extracted by hand or by inserting a metal rod."

Because our core length was variable, we estimated carbon storage in two ways.

P6 L31- P 7 L3:" The amount of carbon stored in each core was calculated by summing the OC content in each depth increment (slice). Because the total core length varied among sites (from 19 to 78 cm) total core carbon storage was estimated in two ways. First, estimates of storage in the top 25 cm of sediment were calculated because at this depth there were nearly full data sets in all cores (16 out of 18 cores were longer than 25 cm). Second, to make estimates comparable to other studies, storage in the top meter of sediment was estimated by gap filling missing data down to one meter using a negative exponential model with the drc package (version 3.0-1; Ritz et al., 2015)."

10) General writing clarity

Pg 3 L16-18: "Yet, the...

Gullstrom et al. 2017) – Does not fit in Methods. Either move or remove to the appropriate section.

Thank you for pointing this out, we have removed this sentence

Pg 9 L10-12:"...indicating the...Hessen et al. 2004)." Does not fit in Results. Either move or remove to the appropriate section.

We have moved this sentence to the proper place in the Introduction

Pg 10 L5-8: Break this into two sentences

We took this advice and broke the sentence in two.

Pg 10L30-31: "Some of...biomass" - Unclear sentence structure. Please edit.

With the changes previously made in the Discussion we removed this sentence.

Pg 11 L15: ...and/or sediment <what?> - Sentence appears hanging.

With the rewrite of our discussion this sentence was removed.

Pg 12 L29-30: A general rule I follow is to avoid references in conclusions, which would otherwise infer weak arguments for a study.

Thank you for the advice, we removed any reference in our conclusion.

Figure captions: Please consider truncating the captions to relaying the most relevant information only.

We reduced the two large figure captions (Figures 1 & 2) but feel the remaining captions provided necessary information.

11) Minor technical edits

Pg 1 L13: is sediment -> in sediment

Pg 2 L25: determinates-> determinants

Pg 4 L7: Sedimentary samples -> Sediment samples

Pg 6 L20: g OCper dry weight <sediment?>

Pg 7 L13: granumetrical -> granulometric

Pg 13 to 20: Please relook at the reference list thoroughly:

a) spacing between words, italicizations of species and genus names that are lacking should be edited;

b) edit Serrano et al 2016 to Serrano et al. 2016a and 2016b, and the latter was already accepted as BG and should not be a BGD citation;

c) you should cite the more recent Costanza et al. 2014 paper, rather than the 1997 paper;

d) consider updating/revisiting the reference list as suggested in this review: Bouillon et al. 2004. et al. Biogeosciences 1, 71–78. Costanza et al. 2014. Glob.Environ. Chang. 26, 152–158. Fourqurean et al. 2012. Nat. Geosci. 5, 505–509.Gillis et al. J. Sea Res. 120, 35–40. Gullström et al. 2017. Ecosystems 1–16. https://doi.org/10.1007/s10021-017-0170-8 Howard et al. 2014. Coastal Blue Carbon: Methods for assessing carbon stocks and emissions factors in mangroves, tidal salt marshes, and seagrass meadows. Macreadie et al. 2012. Glob. Chang. Biol. 18, 891–901. Macreadie et al. 2015. Proc. R. Soc. B Biol. Sci. 282. Miyajima et al. 2015. Global Biogeochem. Cycles 29, 397-415. Quak et al. 2016. Estuar. Coast. Shelf Sci. 182, 136–145. Rozaimi et al. 2017. Mar. Pollut. Bull. 119. 253-260. Serrano et al. 2014. Global Biogeochem. Cycles 28, 950–961. Serrano et al. 2016a. Biogeosciences 13, 4915–4926. Serrano et al. 2016b. Biogeosciences 13, 4581–4594.

Thank you for your attention to detail and for providing this list, it was very helpful and enabled us to quickly pinpoint the literature you were referring to.