**Reply to Anonymous Referee #1**

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

General comment: This manuscript presents findings from a field study of the variation in organic carbon (OC) in seagrass sediments at 19 sites in Tanzania. It hypothesized that three plant traits – biomass (above and below ground), shoot density and N content – might explain seagrass sediment OC content. There was no link found between seagrass sediment OC content and the three functional traits analysed, despite variations in functional traits among seagrass communities. This a finding that would be useful to publish, however the manuscript needs to be improved. The introduction needs to be further developed and references updated. The methodology needs to be more detailed, as it stands it is not really possible to replicate the study. The use of a sediment grab for sample collection in the field and methodology (unclear) of sediment core collection and bulk density calculation is a weakness of the study, these should be clarified and the potential implications of using these should be appropriately discussed. The Methods should have a separate and condensed data analyses section, as it stands analyses are included within each section and that leads to continued repetition. There is a confusion in this manuscript as to what belongs in which section, with parts of the Discussion placed in the Methods and Results, and Methods in Results. The lack of environmental information from each location is a weakness in this study, as many studies have highlighted the effect environmental variables can have on OC storage. There is a recent paper by Gullstrom et al 2017 which presents insights on blue carbon from this region, including a sampling location (of nine in total) in 2012 at the same location sampled in the study for this manuscript. The authors cite this paper briefly, but it is critical that this manuscript clearly state how it is novel and how it differs from Gullstrom et al 2017. Furthermore, the variation among species in regards to OC has also been studied before, and therefore it is important to highlight what is novel in this manuscript, at the moment this is not clear from the text.

Thank you for your comments, we agree with your critical assessment of the manuscript and have incorporated this feedback to improve the manuscript by a) expanding our introduction to more fully place our study into the literature, b) adding much more detail and rearranging our methodology, c) properly organizing the manuscript, and d) discussing the novel contribution of this work and its limitation within the context of previous work in the field. By incorporating this feedback, in particular the need to highlight what is novel in our study and place our work more firmly in the literature, we believe our manuscript has gained both clarity and strength. Previously, this information was mostly in the discussion and we realize that not setting up the context of the study made both the introduction and discussion weak and unconvincing. In addition, we have expanded our analysis and reporting of the landscape sediment data, as these data are key in the discussion of our finding of low OC storage, and are integral to aim of the study. 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:**

<u>Abstract</u>

L2: what does “highly diverse mean”? it is not necessary and can be deleted

In this context, highly diverse is referring to the seagrass diversity at our sites, which make it an ideal setting to investigate the relationship between plant functional traits and sediment OC stocks. The Western Indian Ocean contains 13 seagrass species, with eight species occurring at our sites in Zanzibar. However, we concede that other locations have similar or higher diversity and have removed "highly diverse" from the sentence.

L3: delete "amount of"

Thank you for pointing out these superfluous words, we have removed them.

Include how the sediment OC was quantified in the abstract – how deep were the cores and to what depth is the calculation being standardized

If word limit allows, consider including some basic biomass, density and N data in the abstract itself.

Thank you we have updated the abstract to include more information on coring methodology and trait results, please see:

P1 L13-23: "Sediments within four biogeographic zones (fore reef, reef flat, tidal channel, and seagrass meadow) of the landscape were characterized, and sediment cores were collected within seagrass meadows to quantify OC storage in the top 25 cm and top meter of the sediment. We identified five distinct seagrass communities that had notable differences in the plant traits, which were all residing within a thin veneer (ranging from 19 to 78 cm think) of poorly sorted, medium-coarse grained carbonate sands on top of carbonate rock. One community (B), dominated by Thalassodendron ciliatum, contained high amounts of above (972±74 g DWm-2) and belowground (682±392 g DWm-2) biomass composed of low elemental quality tissues (leaf C:N=24.5; rhizome C:N=97). While another community (C), dominated by small-bodied ephemeral seagrass species, had significantly higher shoot density (4178 shoots m-2). However, these traits did not translate into differences in sediment OC storage and across all communities the percentage of OC within sediments was similar and low (ranging from 0.15% to 0.75%), as was the estimated OC storage in the top 25 cm (14.1±2.2 Mg C ha-1) and top meter (33.9±7.7 Mg C ha-1) of sediment."

Introduction

P1L5-8: Seagrasses are now accepted as important carbon sinks; this idea needs to be reworked and the literature updated. I would suggest looking at recent work by Duarte, Macreadie, Marbá to start with.

Here we had chosen to be conservative in our wording, purposely adding the word 'potentially' because of several factors. First, there is a very wide range of organic carbon (OC) stocks across seagrass ecosystems (as illustrated in paragraph 2 of the intro) and in some locations, sediment OC stocks has been found to be very low (please see Lavery et al. 2013; Campbell et al. 2014; Schile et al. 2016; Janowoska et al. 2016), so making the statement that all seagrass systems are important regulators of climate (via sequestration of atmospheric $CO_2$) could be an oversimplification. Second, this issue is further muddled when you incorporate the contribution of inorganic carbon precipitation within seagrass systems to the budget, which results in the emission of $CO_2$ (please see Macreadie et al. 2017). Lastly, current methodologies for determining accumulation rates and residence times of OC within seagrass sediments have been called into question (see Johannessen and Macdonald 2016 and Belshe et al. 2017, respectively).

This is not to say that we do not think seagrass ecosystems can be very important natural OC sinks, so in line with this comment we have removed the word potentially and added more references.

In addition to Nelleman et al. 2009 who coined the term "blue carbon" we have added three pioneering works in the field of seagrass blue carbon (Mateo et al. 1997; Romero et al. 1994; and Pergent et al. 1994) along with other seminal works in the field, including Duarte et al. 2005, Fourqurean et al. 2012 and Macreadie et al. 2014.

P2L1-4: Previous research studying the link between seagrass species and plant characteristics needs to be described in greater detail to identify what the gap is that this manuscript would be filling. As it stands from the Introduction it would seem that seagrass sediment OC is known to vary with seagrass functional traits and environmental conditions and that blue carbon has already been assessed at the study location. From the introduction, it seems that there is no novelty in this study other than studying this link at a new locations (Tanzania), which is not true based on Gullstrom et al 2017, and is a different aim than the one described. I would suggest greater focus on the functional trait approach.

Thank you for calling this to our attention, we see that our introduction was lacking a clear synopsis of the past work and the placement and aims of this work. To remedy this, we have now added/changed the Introduction in the following ways:

P3 L25-P4 L5: "A suite of studies have shown that larger OC stocks can be found in sediments under seagrasses with conservative 'slow' plant traits, such as high above and belowground biomass (Armitage and Fourqurean, 2016; Dahl et al., 2016; Gullström et al., 2017), and low-quality tissues (Kaal et al., 2016; Serrano et al., 2016b; 2012; Trevathan-Tackett et al., 2017). OC stocks have also been positively correlated with shoot density, both directly (Dahl et al., 2016) and indirectly (Serrano et al., 2014). However, at global and regional scales, when comparing OC storage across disparate sites, the explanatory power of plant traits can be overshadowed by abiotic factors, such as differences in sediment properties and water flow regimes (Campbell et al., 2014; Dahl et al., 2016; Lavery et al., 2013; Serrano et al., 2016a). Although the largest OC stores are found within meadows of seagrasses with 'slow' plant traits (Fourqurean et al., 2012b; Serrano et al., 2012; 2016a), further evidence is needed to confirm the universality of plant traits as proxies for sediment OC content within a given site. The aim of this study was to determine whether seagrass community traits can be linked differences in sediment OC content within meadows residing in the open coastal waters of Zanzibar, Tanzania. Our sites were located within three meadows that contained up to eight co-occurring seagrass species, with a wide breath of functional traits (Gullstrom et al. 2002), all residing within a landscape with similar abiotic conditions (Shaghude et al., 2002). Our goal was to add to the growing body of evidence investigating where, and to what extent, plant community traits can be used to determine the size and variability of OC storage within seagrass sediments "

P2L7-10: This needs clarification, yes there is variation in OC stocks given the different factors described in the previous paragraph and site-specific quantification of OC is needed, but there is no clear link between that fact and the "formable obstacle for reliably valuing the ecosystem service of OC". There is an idea missing here to link these two or greater clarification

Thank you for pointing out the need for clarification here. We were referring to the difficulty in achieving a robust estimate of an OC stock because the potential for high variability necessitates an intensive, time consuming sampling effort, which can be an obstacle. We have clarified the text as follows:

P2 L17-24: "The potential for high variability in OC stocks presents a formable obstacle for reliably valuing the ecosystem service of OC storage because baseline stock estimates are needed before conservation or restoration can be incentivized under a blue-carbon framework (Barbier et al., 2011; Costanza et al., 1997; 2014; Herr et al., 2012; Macreadie et al., 2014). To achieve IPCC tier 3 standards of accuracy for OC stock inventories considerable sampling effort is required (Howard et al., 2014; Macreadie et al., 2014).

A potential solution is to utilize easy-to-measure functional traits that can be linked to ecosystem functions underlying the service of OC storage as a proxy for sediment OC content (de Bello et al., 2010; de Chazal et al., 2008; Grime, 2001; Kremen, 2005). "

P2L11: "fast-slow" is not common terminology used for the different life strategies of seagrasses, see Kendrik et al 2012 BioScience and Orth et al 2006 BioScience who use "ephemeral" and "persistent" or O'Brien et al 2017 MPB which uses "persistent", "opportunistic" and "colonizing". Orth et al 2006 is cited at the end of this section, but the terminology used by them is not included.

The terminology used here ('fast-slow plant economic spectrum') is from very well know work on plant traits.

Díaz, S., et al., The plant traits that drive ecosystems: Evidence from three continents, Journal of Vegetation Science, 15(3), 295–11, doi:10.1658/1100-9233(2004)015[0295:TPTTDE]2.0.CO;2, 2004.

Wright, I. J., et al. The worldwide leaf economics spectrum, Nature, 428(6985), 821–827, doi:10.1038/nature02403, 2004

Reich, P. B.: The world-wide "fast–slow" plant economics spectrum: a traits manifesto, Journal of Ecology, 102(2), 275–301, doi:10.1111/1365-2745.12211, 2014.

We also specifically link this terminology to the commonly used terminology in seagrass studies, please see:

P3 L21-24: "Seagrass interspecies variation in these traits place them within the continuum of the 'fast-slow' plant economic spectrum, with small-bodied, ephemeral species, such as *Halophila spp.*, *Halodule spp*., and *Zostera spp.* on the 'fast' acquisition end, and large-bodied, persistent species, such as *Enhalus spp.*, *Thalassia spp.* and *Posidonia spp.*, on the 'slow' conservation end (Orth et al., 2006)."

Aim paragraph: The aim needs to be modified, it does not appear to be to "identify where high sediment OC stocks occur" but whether three specific functional traits can be used as proxies for sediment OC content. There is no need to mention the five seagrass communities, focus on the question and the hypothesis. Rewrite.

Thank you, we have modified our aim statement, please see

P3 L35 –P4 L5: "The aim of this study was to determine whether seagrass community traits can be linked differences in sediment OC content within meadows residing in the open coastal waters of Zanzibar, Tanzania. Our sites were located within three meadows that contained up to eight co-occurring seagrass species, with a wide breath of functional traits (Gullstrom et al. 2002), all residing within a landscape with similar abiotic conditions (Shaghude et al., 2002). Our goal was to add to the growing body of evidence investigating where, and to what extent, plant community traits can be used to determine the size and variability of OC storage within seagrass sediments."

Methods

A clear description of the characteristics that influence OC content in seagrass sediments at the three seagrass meadows sampled is needed, as they were mentioned in the Introduction and that information is lacking form the methods section, i.e. water depth, water clarity, hydrodynamics, geomorphic setting, etc.

Thank you for pointing out the lack of information in our methods, we have now added more information about the study area, please see:

Information on hydrodynamics: P4 L13-18: "The regional hydrodynamics are complex and primarily influenced by ebb-flood tidal phases but are also influenced by the East African Coastal Current (EACC) and monsoon winds (Mahongo and Shaghude, 2014; Shaghude et al., 2002; Zavala-Garay et al., 2015). The tidal cycles are semi-diurnal ranging from mesotidal during neap tide (~1 m amplitude) to macrotidal (from 3 to 4 meters in amplitude) during spring tide (Shaghude et al., 2002; Zavala-Garay et al., 2015). Strong tidal currents can reach velocities that range from 0.25 to 2 m/s (Shaghude et al., 2002). "

Information on the geomorphic setting and water depth: P4 L19-31: "Sample sites were established within three seagrass meadows (M1, M2, M3) in open coastal waters adjacent to coral cays west of the main city, Zanzibar Town (Figure 1). These meadows were chosen because they contained a range of seagrass species (up to eight species) with different life-history strategies, and at the same time had similar landscape positions and abiotic properties, such as shallow water depth, carbonate sediments, and negligible terrestrial inputs (Shaghude et al., 2002). 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. The seagrass within these meadows are growing within a shallow sediment layer on top of an uplifted Pleistocene carbonate platform (Kent et al., 1971; Short et al., 2007). The sediments are biogenic, with the major constituents being benthic foraminifera, molluscs (pelecypods and gastropods) and coral, with negligible terrigenous inputs (G.R. Narayan unplub.; Shaghude et al., 2002). "

Data on physical properties of the water column: P9 L3-6: "Physical properties of the water column were similar among meadows, with pH ranging from 8.19 to 8.31 ($F_{2,35}$=9.01, $p$=0.06), dissolved oxygen ranging from 6.5 to 8.8 mg/L ($F_{2,35}$=2.53, $p$=0.09), conductivity ranging from 53.7

to 54.1 S/m

($F_{2,35}$=0.18, $p$=0.84). Water temperature ranged from a mean of 26.4°C in M1, to 26.3°C in M2 and 27.1°C in M3. Light attenuation (Kd) through the water column was similar among meadows (mean Kd= 0.35, $F_{2,29}$=1.45, $p$=0.25)."

P3L2: Cite Figure 1 here. P3L5: change "warm and moist" to "tropical"

We have now changed warm and moist to tropical.

P3L6: when are the monsoon seasons?

We have now added information on the monsoon seasons: "The northeast monsoon occurs from November to February and the southeast monsoon occurs from April to September."

P4. The use of a Van Veen Sampler if used for BC quantification is a weakness of the study, as this is not a method that reliably samples the exact volume or depth of sediment, it is greatly affected by the type of sediment and can be affected by the speed at which it drops. Was it used only for sediment characterization or for blue carbon quantification? at the moment this is not clear from the text, and collecting the "the upper 5-10 cm of sediment" is not a reliable method for quantifying sediment OC. Can you reliably say that the same depth was sampled at each site or is it possible that at some sites the grab collected more superficial sediment while at others it potentially collected deeper sediment? this is critical as OC content tends to decrease at greater sediment depths and given a general vertical accretion of 2 mm per year, you may have sampled completely different time periods. This needs to be adequately discussed as it is a key limitation of the study.

P4L15: "Surface sediments (top 2-3 cm) were also collected" how? using what? was the same processing protocol used?

Thank you for these comments as it shows that our methods did not clearly distinguish how sediment was collected for characterization as opposed to how sediments were collected for OC analysis. We collected 3 types of sediment samples and did not use the van veen sampler for blue carbon quantification. We have added a further description of our sampling, analysis and data handling methods.

For collection methods for sediment characterization please see: P5 L6-10: "For this landscape-level sediment characterization, the upper 5-10 cm of sediment was collected using a Van Veen sampler (3 mm plate, 250 cm²) at 29 locations following the bathymetric gradient and spatially distributed to cover the four biogeographic zones. Sediment samples were rinsed with clean freshwater in order to remove soluble components and dried at 40°C for at least 48h. Two subsamples (of each set) were sieved in a stack-shaker sieve for 10 min. "

and P5 L10-12: "To assess differences in local sediment characteristics, compared to landscape sediment properties, surface sediments within different seagrass communities (see below for details on communities) were collected by scooping the top 2-3 cm of sediment by hand into a 50 ml falcon tube "

please see for sediment collection for OC analysis: P6 L13-19: "Three sediment cores were taken with a hand-driven, 7.6 cm internal diameter corer on SCUBA, within each of the five identified seagrass communities and on bare sediment adjacent to, but outside of the seagrass meadows. Within each community, cores were distributed among the three meadows, resulting in one core extracted per community per meadow. Due to the shallow and variable sediment accumulation on top of the carbonate platform at our sites, the depth 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. "

P4L1&20: When in October?

We have added more precise dates of our sampling, please see

P5 L16: "Between September 17th and October $17^{th}$…"

P4L20-21: Describe the zonation P3L21-22: How were the 50 m transects conducted? perpendicular to the coast line? consider including the transects in the figure. Change wording to: "A snorkeling survey was conducted at each meadow, consisting of five 50 m transects throughout each meadow. Based on this initial survey, six to seven distinct vegetation zones were identified for each meadow."

Thank you for this suggestion, we have taken your sentence and replace ours, and have added that the transects were perpendicular to the coast line and added information about the zonation please see P5 L15-18. "A snorkeling survey was conducted at each meadow, consisting of five 50 m transects (perpendicular to the coast line) throughout each meadow. Based on this initial survey, six to seven distinct vegetation zones were identified for each meadow. The pattern of zonation within the meadows was a mosaic of patches, following both the depth gradient and running parallel to the coastline."

P1L23: a quadrat of what size and for which purpose? If this is linked to the following paragraph consider merging the two.

Thank you for pointing out the lack of information here, we tossed a quadrat haphazardly to establish specific site locations. Once these locations were established we used the same quadrat and tossed it 6 times to quantify % cover of seagrasses. We have clarified this in the text but have kept the two paragraphs separate, as the first paragraph is in regards to the establishment of sites, and the second to the specific sampling at the sites, please see:

P5 L18-19: "Within each zone, a 0.25 $m^2$ quadrat was haphazardly tossed to establish the specific site locations."

P4L24-25: delete ", with the average distance of between sites of 261±194 meters for M1, 170±93 meters for M2 and 165±98 meters for M3"

This specific information was added to help the reader better understand how far apart our sites where from each other and to support the variogram plots showing that there was no detectable spatial autocorrelation in our data. We believe this may of be of interest to some readers, however can take it out if necessary.

P4L33-34: "square root transformed to down weight the influence of abundant species, and relativized to the total abundance of each site"

Here we are reporting the data transformation we utilized, which is a transformation commonly used when calculating a dissimilarly matrix to reduce the influence of variables with high values (e.g. very abundant species) in multivariate procedures based on dissimilarity indices (Digby & Kempton 1987). Such standardizations make all species have similar "importance" and thus "avoids a strong weighting by a few highly abundant species" (Ludwig & Reynolds 1988, p. 215). Without this standardization, rare species are often making little contribution to dissimilarities.

Digby, P.G.N. & Kempton, R.A. (1987) Multivariate Analysis of Ecological Communities. Chapman & Hall, London.

Ludwig, J.A. & Reynolds, J.F. (1988) Statistical Ecology: a Primer on Methods and Computing. Wiley, New York.

Quinn, GP & Keough M.J. (2002) Experimental Design and Data Analysis for Biologist Cambridge University Press, New York.

P4Section2.2: Change title to: "Seagrass community composition"

P5Section2.3: change title to "Seagrass functional traits"

Thank you, we have taken this suggestion and changed the text accordingly.

P5L7 & L14: What do you mean by "seagrass plants"? Do you mean a shoot? a shoot with rhizome and root attached? a ramet?

Thank you for this suggestion, we meant ramet and have changed the text accordingly.

P5L8: to what sediment depth was the core collected?

P5L9: washed free of sediment with what? diameter of mesh is needed if one was used.

We have added more precise information on our biomass sampling, please see

P5 L29- P6 L1: "Biomass cores encompassing both seagrass shoots and the entire rhizosphere (ranging from 10-30 cm depth) were taken by placing a 13-cm diameter PVC ring on top of the sediment and using a knife and garden trowel to remove all plant biomass within the ring. This methodology was utilized because of the coarse, shallow carbonate sediments at our sites. Plant material was placed directly into a mesh bag (2 mm mesh size), rinsed free of sediment in the field, stored in plastic bags, and frozen for subsequent analysis."

P5L8: why was leaf area not measured? it greatly affects seagrass cover and canopy structure.

Unfortunately, we did not measure and report leaf area in the study, which is a limitation of our sampling.

P5L11: change "number m-2" to "shoots m-2" P5L15: What do you mean by "second-ranked"?

from oldest or youngest?

P5L16: How did you remove epiphytes? acid, scraping? & what did you use to homogenize the samples?

We have changed the text from 'number' to 'shoot' and added more information about our methods, please see:

P6 L5-10: "Five seagrass ramets per species were collected from each site and used to quantify the % nitrogen (N) of leaf and rhizome tissue of each species. A section of rhizome and the second-ranked (from youngest) leaf of each of the five shoots was taken, scraped gently to remove epiphytes, and dried at 60°C for 48 hours. 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. "

I would suggest putting all stats in a separate section titled "Data analyses".

Thank you for this suggestion, we moved all data analysis to one section.

Why were ANOVAs used instead of mixed effects models which would have accounted for the non-independence of the samples?

We used ANOVAs with meadow as a direct effect in our models instead of a random effect because we only have three levels in our factor meadow. Treating factors with a small number of levels as random leads to very small/imprecise estimates of random effect, and can lead to numerical difficulties. In general, at least a minimum of 5 or 6 levels are required to estimate an among-level variance.

Please see:

Clark, Tom S, and Drew A Linzer. 2015. "Should I Use Fixed or Random Effects?" *Political Science Research and Methods* 3 (02). Cambridge University Press: 399-408.

Crawley, Michael J. 2002. *Statistical Computing: An Introduction to Data Analysis Using S-PLUS*. John Wiley & Sons.

http://bbolker.github.io/mixedmodels-misc/glmmFAQ.html#should-i-treat-factor-xxx-as-fixed-or-random

We were also concerned about violating the assumption of spatial independence in all of our analysis, therefore spatial independence was confirmed with variogram plots of model residuals using the gstat package (Zuur et al., 2009).

If the %N cannot be statistically assessed because of unequal and small sample sizes then you should only report it or exclude it from the manuscript.

In regards to our statistical procedure for determining differences in %N among communities, we have opted to use a conservative approach (to reflect the unequal sample sizes) of confidence interval estimation and clearly state this in our methods. The use of non-overlapping confidence intervals to detect differences is based on the classical statistical interpretation of probabilities (frequentist approach). For non-overlapping intervals, it is correct say with 95% confidence there is a difference (at $p<0.05$). It does become trickier to say that overlapping intervals are actually the same (without conducting further test to get the p-value) so we simply report the results from the overlapping groups and only state differences for the non-overlapping groups.

Quinn, GP & Keough M.J. (2002) Experimental Design and Data Analysis for Biologist Cambridge University Press, New York.

P6L13: a lot more detail on sediment coring methods is needed. For example, lacking information includes: dimensions and material of corer, how did you measure compaction from coring, etc. Below you mention that core depth went from 19-78 cm, that information should be up here not further down.

Thank you for bringing to our attention the lack of information in our coring methods, we have added information to make these methods more complete, please see:

P6 L13-23: "Three sediment cores were taken with a hand-driven, 7.6 cm internal diameter corer on SCUBA, within each of the five identified seagrass communities and on bare sediment adjacent to, but outside of the seagrass meadows. Within each community, cores were distributed among the three meadows, resulting in one core extracted per community per meadow. 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. Core compaction was not measured in this study but was assumed to be minimal due to the coarse sediment composition. 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."

P6: there is an issue with the methodology for bulk density determination, if 15 ml from a core that has already been cut are being collected (by some undefined methodology) then the bulk density cannot really be reliable. Why did you not collect a specific volume of sample from the field from the first place and do bulk density on that?

P6L17: Acidification with what? % which acid

P6L18: include the units of CC

Thank you for pointing out this mistake, we did take a specific volume and had incorrectly put 15 ml (this was the vial size the sediment was transferred to after subsetting). We have added the correct volume to our methodology and improved the explanation of the handling and subsetting of our cores, and added information on the acidification procedure and units of CC, please see:

P6 L23-28: "In the lab, cores were sectioned into 3 cm slices. From each slice, a 15 $cm^3$ (3 x 2.5 x 2 cm) rectangular cavity was used to further subset each slice of sediment, which was subsequently oven dried (60°C) and weighed for dry bulk density determination. 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). The OC content (CC; g $C/cm^3$) of each 3 cm slice was calculated from measured % OC and the dry bulk density (DBD) of the slice following Eq. (1): "

P6L28-29: not clear on why you state you only have N=18 as it was stated that there were three biomass cores collected at each location, that gives you (19 sites * 3) n=57. To avoid repetition, you should have a unified data analyses section.

For our OC analysis, we took 3 cores in each of the five communities + within bare sediment outside/adjacent to meadows (3*6=18). We have increased our explanation of coring methodology to make this clearer in the text. Please see:

P6 L13-16: "Three sediment cores were taken with a hand-driven, 7.6 cm internal diameter corer on SCUBA, within each of the five identified seagrass communities and on bare sediment adjacent to, but outside of the seagrass meadows. Within each community, cores were distributed among the three meadows, resulting in one core extracted per community per meadow. "

Results

P7L7: what do you mean by "water clarity was high"? Provide data for comparison, for light attenuation too.

To avoid discussing any results within the Results section we have removed "water clarity was high" and simply reported the mean Kd value.

PL10: ", suggesting energetic hydrodynamic conditions" either you have data on hydrodynamic conditions or you are speculating, this should be adequately addressed or deleted.

Here we are presenting data on the coarse, poorly sorted sediments of our sites. Sediments that are poorly sorted indicate that they were deposited during energetic hydrodynamic conditions. Although this is an indirect indicator of hydrodynamics, it provides a temporally integrated picture of the hydrodynamics that is more informative than any point measurements of water flow we would have been able to take during our short sampling campaign. This is because the hydrologic regime of the area is complex and temporally variable being influenced by 1) ebb-flood tidal phases 2) the East African Coastal Current (EACC) and 3) monsoon winds (Mahongo and Shaghude, 2014; Shaghude et al., 2002; Zavala-Garay et al., 2015). In addition, the tidal cycles are semi-diurnal and exhibit a broad range over time (ranging from mesotidal during neap tide (~1 meter amplitude) to macrotidal (from 3 to 4 meters in amplitude) during spring tide (Shaghude et al., 2002; Zavala-Garay et al., 2015)).

The link from our sediment characteristics to the energetic hydrodynamic conditions is supported by previous work that directly measured hydrodynamics in the same area as our sites and is discussed in the Discussion, please see:

P12 L27-31: "…..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. "

P7L11-12: add standard deviations when providing means. No measure of variation is given in the supplementary material either, given that there are multiple samples per type of meadow this needs to be included. Stats can be done as well from my understanding of the sampling design, why haven't they been done?

Thank you for pointing out that we did not put the standard deviation in the text; however, the mean and SD in phi units were reported in the table in the supplements. From this comments we realize that what was lacking was a clear measure of variability of sediments within and among the zones, and in general these data were not highlighted. We have added four things to better show case these data.

First, we have moved the table to the main text for easier access, and have expanded the reporting of the sediment characterization to include a clearer measure of the spread of distributions (D10-D90).

P7 L8-16: "We used the logarithmic Folk and Ward method (Folk and Ward, 1957) to compare sediment gain size distributions because it places more weight on the central portion of the distribution and less on the tails, and was more appropriate for our sediments, which had a large particle size range (Blott and Pye, 2001). The physical description of sediments was based on the granulometric output and appearance of the bulk sediment after Folk (Folk, 1954). Summary statistics (mean, median (D50), standard deviation, skewness, and kurtosis) were estimated for each zone based on log-transformed data using the G2Sd R package (Fournier et al., 2014). As an indication of variability of grain sizes found within each zone, a measure of the spread of grain sizes (D10-D90) was calculated by subtracting the grain size at which 10% (D10) of the grains are more coarse from the grain size (D90) where 90% of the grains are found to be more coarse (Blott and Pye, 2001)."

Second, in the Results we report the median grain size (D50) along with the spread (D10-D90) as we believe this is the most intuitive way to present these results.

P9 L8-13: "There were no major (compositional or granulometric) differences among the four zones, with all classified as poorly-sorted, gravelly sand with negative skewed distributions, indicating a tail of coarser particles (Table 1). All regions contained approximately 15% gravel, 84% sand, and 1% mud. However, the median grain size within seagrass meadows (D50=641 µm) was slightly smaller, but within the distribution spread (D10-D90=1938 µm), than sediments from the reef flat (865 µm; D10-D90=1937 µm), fore reef (779 µm; D10-D90=1911 µm) or sediments found in deeper areas of the tidal channel (750 µm; D10-D90=1995; Table 1)."

Third, we have added a figure (Figure 2), which shows the mean grain size distribution of each zone along with the grain size distribution of all samples for each zone. We believe this is a very easy way for the reader to gain a good understanding of the distribution similarities and to see the variability in distributions within the zones.

Fourth, we have added the analysis of differences among zones for each grain size class.

P7 L16-18: "Differences among the four landscape zones were compared for each grain size class of Udden-Wentworth scale using a Kruskal-Wallis test with a post-hoc t-test with pooled standard deviation."

Results: P9 L13-20: "When comparing zones for each Udden-Wentworth size classes individually, there were no differences among zones in regards to their abundance of gravel (>2000 µm; H(2)=1.27, *p*=0.736), medium sand (500-1000 µm; H(2)=0.732, *p*=0.866), fine sand (125-250 µm; H(2)=1.551, *p*=0.671), very fine sand (63-125 µm; H(2)=2.138, *p*=0.544) and silt (<63 µm; H(2)=4.345, *p*=0.227; Figure 2). However, there were differences among zones in their abundance of coarse sand (1000-2000 µm; H(2)=14.328, *p*=0.003) and medium-fine sand (250-500 µm; H(2)=8.071, *p*=0.045), with seagrass sediments containing a lower abundance of coarse sand than the fore reef (*p*=0.0004) and reef flat (*p*=0.0008), and seagrass sediments containing a higher abundance of medium fine sand than the reef flat (*p*=0.013; Figure 2)."

P7L18 "using a combination of nMDS and hierarchical clustering" this should be deleted from the results, it should only be in the Methods.

P7L19-20. Delete this sentence, not needed.

P7L18-21: Should now read: "Five distinct species assemblages were identified, here- after referred to as communities A, B, C, D, and E."

Thank you for these suggestions, we have deleted sections and incorporated your sentence suggestion.

P7L24: review comment on the appropriate terminology for seagrass life strategies instead of "fast-growing". Rephrase bc not all those species are "fast-growing"

Thank you we have changed "fast-growing" to ephemeral

P8L5: Should read "T. ciliatum" as it has already been presented in the previous para- graph, you could even just use TC as the abbreviation has already been mentioned as well.

Thank you, we have taken your suggestion and shortened to T. ciliatum.

P8L2-12 & L13-22: These paragraphs need to be rewritten to clearly state the biomass of each community and each meadow, do not try to discuss why one meadow had more than the other or one community more than the other, just state what you found. There is an inherent complication from assessing community and biomass which needs to be addressed in the Discussion, as there was no interaction the wording of the text also needs to reflect that.

We stand by the way the biomass results are presented, we feel we have clearly stated the biomass of each community and meadow, which is given in parentheses adjacent to each community and meadow. Here we are not discussing results but giving more complete information by ranking the meadows and providing further information about differences (i.e. community B contains 7-fold higher AG biomass than the rest…), and listing the species of seagrass that is driving any differences in biomass. We feel providing a list or table would be redundant and not provide clearer information than the figure and text.

We are unclear by what you mean by: "There is an inherent complication from assessing community and biomass which needs to be addressed in the Discussion, as there was no interaction the wording of the text also needs to reflect that" Can you please clarify this for us?

P8L26-29: Why is there no standard deviation included for the density? and why does it say "(based on the negative binominal model)" & "estimated means"? From the text, the density was directly measured from the biomass cores, so if that data is directly available there should be no need to estimate it from a model and no problem with including standard deviations.

Because data on shoot density consist of counts (and cannot be negative), these data inherently cannot meet the assumption of normality (therefore cannot be statistically analyzed with ANOVA or similar that rely on a Normal distribution). Instead you must utilize another type of distribution, a binomial (Poison or negative binomial). Here we are reporting the statistical output (estimated means) from this analysis, as you rely on the estimated 95% confidence intervals to distinguish differences among groups (no overlap in CI indicating differences). Within the figure, the mean and the CIs are plotted and we feel this is an easier way to clearly see the CI for each community within each meadow than to list means along with the non-symmetrical estimated CI for each community/meadow combination in the text. Also within the figure, the actual data are plotted for the reader to see the range of shoot density measured for each community within each meadow. However, if you feel strongly that this information should be added, we could add a table to the supplementary information with the estimated CIs.

P9L4-5: "The entire range of leaf nitrogen content of communities A and B fell below the global threshold (1.82%) indicating nutrient limitation in seagrasses (Duarte, 1990)." this not belong in a Results section, move to Discussion if appropriate.

Thank you, we have deleted this sentence.

P9L10-12: "indicating the potential for nitrogen limitation and low microbial carbon-use efficiency during litter decomposition, both of which can lead to higher sediment OC sequestration (Berg and McClaugherty, 2003; Hessen et al., 2004)." this not belong in a Results section, move to Discussion if appropriate.

Thank you we have moved this information to the Introduction to support why we measured %N.

P8L31-P9L16: The inclusion of N% needs to be carefully revised. It should only report the %N as the stats are very weak, and in my opinion, %N is not needed and can be deleted from the manuscript. It is also not adequately discussed in the Discussion, just delete it.

Thank you for pointing out the need to further discuss our findings on tissue % N, we have now compared our tissue quality results to what was found by Gullstrom et al. 2017, and in general discussed tissue quality in the context of OC storage, please see

P12 L33- P13 L5 : "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."

and P13 L24-36. 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)."

In regards to our statistical procedure for determining differences in %N among communities, please see the comment above on P 9 or this document.

P9L18-19: "The depth that cores penetrated into the sediment varied from 19 to 78 cm and was dictated by the limited sediment accumulation on top of carbonate rock." This is not part of Results, move to Methods.

Thank you we have moved this information to the Methods

P9L19-25: If there is no variation in the top 25cm and core depth varied, then it cannot be said that "all cores exhibited the typical trend of decreasing %OC with depth into the sediment". This needs to be clarified, I assume it only refers to cores deeper than 25cm? how many cores were deeper than 25cm? that information is not presented in the text.

There were not differences in the mean and variance of %OC among groups (seagrass communities or meadows), this does not mean that in the top 25 cm of the sediment there was no variation from the upper cm to the lower cm in the sediment profile, just that all cores exhibited similar variation. If you view Figure 6, you can see that most (13 out of 18) cores exhibit the trend of decreasing %OC with depth. To be more accurate in our statement we have modified the text to say:

P11 L19-21: "Most cores (13 out of 18) exhibited the typical trend of decreasing % OC with depth into the sediment, within the notable exception of two cores taken outside of seagrass meadows (F: bare sediment; Figure 6), where % OC increased with depth, which calls into question our assumption that seagrass meadow extent has not changed over time."

In addition to the figure 6, which shows core lengths, we have added to our methods how many cores were over 25 cm (16 out of the 18).

P9L25-29: "This indicates that the bare areas may have been colonized by seagrass in the past, contributing to an increase in carbon storage within deeper layers of the sediment. Thus, it must be noted that in order to associate present seagrass communities with long term carbon storage in sediments, we assumed there were no historic differences in communities during past carbon deposition." This does not belong in a Results section, any assumptions of past seagrass presence should be clearly stated in the Methods and discussed in the Discussion. Delete from here.

Thank you, we have moved this assumption to its appropriate place in the Methods.

P9L30: What are you referring to when using the term "OC storage"? clarify the term.

OC storage is how much carbon is being stored in a pool and is analogous to OC stock, we have changed to “OC stored” within this sentence as this may reduce confusion.

P10L1-3: “Model validation of normality (Shapiro Wilks test) were met for all OC models (Supplementary Table S2), and variogram plots of model residuals showed no clear patterns indicating that the assumption of independence was met (Supplementary Figure S4).” This does not belong here, it belongs in the Methods, there is a clear confusion in this manuscript as to what belongs in which section.

Thank you we have moved this information to the methods.

Discussion

First paragraph: Restructure to remind the reader first of the link between traits and OC storage, then go into what was found overall. The following text can be deleted from here: “We hypothesized that communities with either high shoot density, low tissue nitrogen content, or a high proportion of belowground biomass would store more OC within their sediments. From this, it would be expected that community B (dominated by Thalassodendron ciliatum), with combined traits of high AG and BG biomass and low tissue nutrient content, or community C with high shoot density in two of the three meadows sampled would store more sediment OC.”. Again, use adequate terminology for seagrass life strategies.

Thank you we have deleted these two sentences from the discussion.

P10L21: Change “must” to “may”. In the introduction it was clearly mentioned that there are a number of environmental variables that can affect OC storage, so this is not a finding from this study, you should refer back to the published literature on the topic.

Thank you we have changed must to may. We by no means want to convey that study is the only study with data to support that an interaction between factors can influence OC storage. But we are stating that our study provides another piece of information (from a different site with sediments on the opposite end of the spectrum from what has been presented before) that support a non-linear interaction between plant and sediment characteristics. We have modified our discussion to extensively discuss our findings in the context of the published literature, please see:

P14 L4-L30: “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.

P11L2-4: move this last sentence to be the first (topic) sentence of that paragraph, edit accordingly.

Thank you for this suggestion.

P11L11-14: Gullstrom et al 2017 is a blue carbon study which included a sampling location (of nine in total) in 2012 at the same location sampled in the study for this manuscript. It is critical that this manuscript clearly state how it is novel and how it differs from the Gullstrom et al 2017 paper in, which has already presented OC storage insights from this region, including the site sampled. The variation among species in regards to OC has also been studied before, and therefore it is very important to highlight what is novel in this manuscript, at the moment this is not clear.

Thank you for this comment as we needed to more properly distinguish this study, which is from the same region but a different location, from the work recently published by Gullstrom et al. 2017.

P13 L20-P14 L1: "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."

As to the novelty of our study, we acknowledge that variation in OC storage among species and in relation to plant and sediment characteristics has been the topic of other research efforts. However, this study does add a key piece to the growing body of evidence showing that geophysical conditions of the sediment modulate of importance of plant traits in regards to retention of OC within blue carbon ecosystems. Specifically, we show that once sediments become very coarse and shallow, large inputs of low quality OC are not necessarily stabilized against microbial decay. This in in contrast to previous work showing that once sediment becomes moderately coarse, plant traits outweigh sediment characteristics, as opposed to sites with a high abundance of fine sediments where OC storage can be high even in meadows composed of species with "fast" traits. This study completes a picture that shows the non-linearity in the interaction between plant traits and sediment characteristics on OC storage. The specific contribution of our work in the context of others is discussed in P14 L4-L30 and is pasted in response to a previous comment.

P11L14-15: "Because most seagrass species occur at all locations, the contrast in OC storage among sites is likely influenced by differences in the depositional environment and/or sediment." This is clear from a number of studies now, why was no information collected on how the environmental characteristics vary at each location? This a weakness of the study.

The environmental characteristics that we specifically measured in our study were water depth, water temperature, ph, dissolved oxygen, light attenuation, and sediment characteristics. A suite of studies have shown that when comparing disparate sites (from very different environments), the explanatory power of plant traits can be overshadowed by abiotic factors, such as differences in sediment properties and water flow regimes. Therefore, the specific aim of this study was to was to determine whether seagrass community traits can be linked differences in sediment OC content within meadows residing within a landscape with similar abiotic conditions. We were able to show that even within sites with very similar environmental characteristics, plant traits cannot always be used as a proxy for sediment OC content

The limitations of the study need to be discussed, for example, how many years of carbon burial do the cores represent? potential effects of coring methodology? data which is lacking? & suggestions for future studies?

We completely agree that limitations should be further discussed in addition to providing suggestions for other studies. We have added the following sections to our discussion, please see:

P13 L32- P14 L3: "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)."

and

P15 L2-6: "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."

Conclusion

Why are figures and literature cited in the conclusion? This conclusion needs to be incorporated in the Discussion itself adequately.

Thank you, we have removed this from our conclusions.

Figures

In Figure 1 M1, M2 and M3 are differentiated by three different colours (yellow, green and red), I would suggest that these same three colours are used for the figures that refer to meadows 1,2,3 differentiating them from the figures that refer to the different communities (A,B,C,D,E,F). As it stands, from the colour scheme it seems that you are referring to communities when in fact you are differentiating the communities according to the meadow. I would also suggest not using green and red together, as that is not easily distinguishable for colour blind (Daltonism) readers, may I suggest the three primary colours, changing the light green for a light blue? whichever colours are chosen, please be consistent among the figures.

We also agree that the color scheme was too much, and have now changed all meadow-specific colors to a gray scale.

Supplementary

I would not include any of this as supplementary material, except Table S1 in the main text. If it is important information then include it in the main text, if not then delete it. Needed stats should be incorporated into the text but a lot of that information and figures are simply not needed.

We also agree that there is a lot of information in the supplements and do think that Table S1 should be moved to the main body of the text. However, we also feel that some readers may want to look in more detail at the statistical outputs, model validations, and background data and at this time will keep the supplement unless the Editor and others feel we should remove. We are very open to suggestions and can remove any information or move it to the main text.

Technical corrections:

P3L4-6 & P11L1: There should be no italics for "spp."

P3L7: Change "objective" for "aim"

P3L28: Delete "," after several

P3L29: Typo should be "west of"

P4L2-3: Change "50-m transects" to "50 m transects"

P4L23: should be six to seven, not 6 to 7

P4L29: ", and" should not be in italics

P5L1: "nonmetric" should be "non-metric"

P6L17: "3-cm" should be "3 cm" P9L32: "1 meter" should be "1 m"

Thank you for your attention to detail, we have changed the text accordingly.