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Interactive comment on "Carbon accumulation rates in salt marsh sediments suggest high carbon storage capacity" *by* X. Ouyang and S. Y. Lee

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1. Authors use a factor to convert from loss-on-ignition to carbon based upon mangrove soils, which have wood. Why not use one derived for salt marsh soils, such as that reported by Craft et al. (1991)?

Response: There is a typo here, the cited factor is from Ford et al. (2012), which describes the soil carbon converted from soil organic matter for saltmarsh with a factor of 0.55, which is easier to use than that given by Craft et al. (1991) using a formula.

2. Latitude is not an appropriate proxy for climate along coastlines. Climate normal data is freely available on the web and authors should be using data from the closest station at an approximate altitude.

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Response: We take the point that drivers such as local ocean currents may cause deviations in temperature from the latitudinal trend but our intention was to address broad patterns in CAR according to latitude. As advised by the referee, we use climate data near the sampling sites to incorporate the potential relationship between CAR and mean annual temperature (MAT) in a stepwise regression model. There is no correlation between CAR and MAT (P=0.689). In addition, regression tree analysis is applied to compare the impact of Mean tidal range (MTR), MAT and dominated genera on CAR (Fig. 5 in revised ms). MTR and the dominant genera constitute the primary branches of the regression tree, while MAT is not an independent determinant of CAR.

3. It is impossible to check the work of the investigators as individual entries are not associated with their source. Even without this I have found errors in table 1. For instance, there is no place called “Eastport” in the province of New Brunswick. In New Brunswick the grass genus Elymus is usually a dune plant, not a marsh plant, but I cannot check to see if I am mistaken or the data is incorrect. Authors must carefully error check every data entry and provide sources. I am not familiar with a Rhome Delta in France – perhaps this is the Rhone? (With a reference associated one would be able to check it.) I do not know how the authors could have got an accurate latitude and longitude from a location called Rhode Island– what marsh or in the vicinity of what? Rhode Island has an extensive bay and an oceanic coastline as well as an offshore island. In Table 1 sometimes the state is given – if we know it is Mass (=Massachusetts) then there is no need to mention “New England” as Mass is a more precise location. Cobscook Bay is in the State of Maine, part of the US and quite distant from Nova Scotia. Prince Ed- ward Island is a province of Canada and is not part of the province of New Brunswick. Neither Brackley nor Malpeque Bay is in New Brunswick. Australia and China are in- appropriate as site names. Again, authors need to double check every data point as I have not been able to.

Response: We have added the source reference of each data point in Table 1, and checked site names and location data. We trusted the site names were correct from

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the references, but have conducted a search of all and made some corrections to some names, as suggested. Problems arise from some sites being located on the border between two adjacent countries or regions. For example, sampling site “Eastport” is indicated in Chmura and Hung (2004) as in New Brunswick in the text and Fig.1 of the reference. Also Elymus arenarius is involved as a saltmarsh sampling site at Escuminac in this reference. However, Elymus arenarius is excluded in our calculation of CAR as mentioned in “data analysis”, such that it will not affect our result of the CAR calculation. CAR data of saltmarsh in Rhode Island come from Weinstein and Kreeger (2000)’s sampling in the 1990s.

4. I am uncomfortable with analyses limited to the genus level. For instance, on the east coast of North America north of New Jersey, Spartina alterniflora generally occupies more frequently flooded low mash or in nearly anaerobic soils within the high marsh. Otherwise the high marsh area is dominated by Spartina patens. The two grasses have very different growth forms and root/rhizome architecture. On other coastlines S. alterniflora may be found as an invasive. Again, in the northern marshes along the North American east coast Juncus gerardii grows at elevations above S. patens and Juncus balticus is found growing above J. gerardii on Canadian coasts. Yet on the mid-Atlantic coast of the eastern US marshes we find marshes dominated by Juncus roemarianus, which is found in the low marsh. Species of the genus Puccinellia are found in temperate marshes on both sides of the Atlantic, not just in the arctic.

Response: There is not sufficient information about detailed halophyte composition in the collated references, thereby hindering our attempt to conduct further fine-grained analyses beyond the genus level. We will indicate this limitation in the “Results and Discussion” section. Again, this study is meant to be a broad scale analysis of the global pattern of CAR in salt marsh communities. As such, variations at a fine scale are not necessarily addressed.

5. Table 4 shows data that is not compiled by the authors. The source of this data should be mentioned in the table caption.

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Response: Data in Table 4 is just compiled by us, and data analysis is undertaken based on original data collated from the references. To avoid confusion, we will specify the source of these data in the table caption.

6. Table 5 By America are the authors referring to North or South America? There is no CAR data for South Africa so an estimation is made based on Spartina alterniflora. This might be appropriate if S. alterniflora grew in South African tidal marshes – it does not. Mediterranean climates, such as that of South Africa, exist on a number of coastlines not identified by the authors.

Response: Table 5 - America means USA. We mention Spartina rather than Spartina alterniflora, as the value in Table 4 was approximated to represent CAR of South Africa. There are many reports of Spartina in South Africa saltmarshes, e.g. Adams and Bate (1995);Pierce (1983);Ranwell (1967).

7. Line 9 – lead-210 is not a "marker" it gives a rate not a specific time.

Response: We will replace "marker" with "tracer", and the original expression in this line is changed to "including long-term profiles of 137Cs, 210Pb and short-term marker horizons".

References

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Weinstein, M. P., and Kreeger, D. A.: Concepts and Controversies in Tidal Marsh Ecology, Springer, New York, US, 583-595, 2000.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/10/C9001/2014/bgd-10-C9001-2014-supplement.pdf

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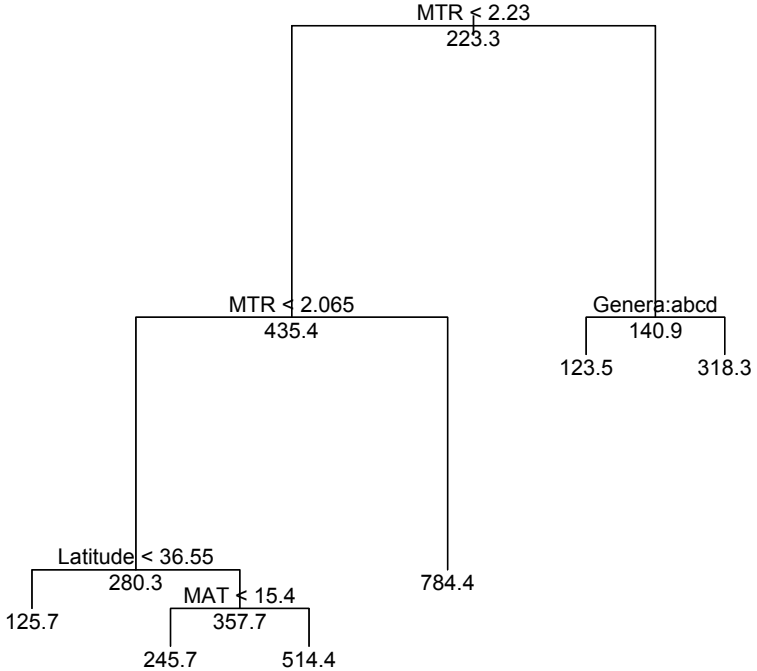
Interactive comment on Biogeosciences Discuss., 10, 19155, 2013.

Fig. 5 Regression tree for estimating CAR from latitude, mean tidal range and dominated genera. At each internal node, we asked the associated question, and go to the right child if the answer is “no”, go to the left child if the answer is “yes”. MTR denotes mean tidal range. a, b, c and d denotes *Puccinellia*, *Distichlis*, *Spartina* and *Phragmites*, respectively.



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