

Interactive comment on “Large-scale predictions of saltmarsh carbon stock based on simple observations of plant community and soil type” by Hilary Ford et al.

Anonymous Referee #2

Received and published: 30 September 2018

Major comments This is an important topic and it would be useful to have good predictors for a region, however, the information provided does not yet support the validity of a national inventory.

Methods There is no mention of how the locations of transects and quadrats were chosen. Methods suggest that vegetation types were specifically chosen, but later (ln 118) it is mentioned that an analysis was conducted to determine how they fit in NVC classes. This sounds a bit circular. Were vegetation types specifically targeted? It is not clear why the statistical analyses had to be restricted to a linear model (ln 150) – it should not be restricted to because citizen scientists might use it- application of

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models is not commonly tasks that citizen scientists perform. If so, authors could provide a spreadsheet to perform the calculation. Location was divided into two classes, north and south Wales, and entered as a categorical variable. Is there a major biogeographical change between north and south? If latitude was considered important why not simply use latitude, rather than using a categorical value, to increase the ability to distinguish a gradient?

Vegetation covered To determine how geographically broad the results of this study could be one, needs to know more about the vegetation sampled, and that not sampled. Only 5 salt marsh vegetation classes are listed in this study – all simply identified by a dominant(?) species – two are identified by the same species, *Juncus maritimus*. How many quadrats were sampled in each vegetation class and were these equally distributed among the marshes? What proportion of cover is attributed to the dominant species? What types of species occur with the dominant? It would be useful to provide a table showing typical species composition and cover. It is likely that perennials will contribute more to soil carbon than annuals and graminoids over forbs (although *Triglochin* and *Plantago* can have substantial belowground biomass). Species richness was not found to be a significant explanatory variable, but what about the proportion of perennial vs annual plants? How many NVCs are there in UK salt marshes?

Breadth of Geographical Application Authors suggest that their model can be used to estimate carbon stocks in the UK and perhaps northwestern Europe, as well. Yet, not all plant communities present in Welsh salt marshes were sampled (ln 289). What communities does this study miss from Wales and across the UK? How much salt marsh area is not accounted for? Authors further that their model could be applied from the Baltic to Portugal – is the vegetation really that consistent?

Unexplained variability Authors seem to have preliminarily truncated statistical analyses for this study. They note in the Discussion that ~50% of the variation in the marshes they studied has yet to be statistically explained, further noting that the rest of the variation might be attributed to differences in grazing, salinity, pH, geomorpho-

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logical context, level of urbanisation, past disturbance, whether in a dynamic or stable area. Authors have reported data on grazing, salinity and pH that could easily be assessed in an expanded model. Geomorphological context can easily be determined from the maps in the supplementary material. As they mention “level of urbanisation” in the context of the study by Deegan et al. (2012). I assume they refer to nutrient loading of the estuary. Nutrient loading is not limited to urban development, but also to agricultural uses. If watershed nutrient loading models have been developed for UK estuaries the nutrient loading could be assessed as a predictor as well. Level of disturbance/exposure seems to be similar to “whether the marsh sits in a dynamic or stable area”, something that could be determined fairly easily.

Soil Carbon IPCC guidelines for calculation of greenhouse gas emission from land use change in coastal wetlands (Kennedy et al. 2013) suggest stocks be considered over 1 m depth. Granted such depths are difficult to sample and accurately measure bulk density, but not all soil samples in this study reached even 10 cm depth, yet this study is supposedly focussed on the upper 10 cm of soil. And, different soil parameters were measured over different depths. It is not clear how soil was sampled to determine bulk density over 10 cm depth – and this is a very critical element, central to the entire study. Text states that soil was collected from 2 cm to 9.5 cm. I suspect that the sampling ring mentioned was not 3.1 cm high but 7.5 cm high (diameter and height reversed in text?). Soil organic carbon was determined from this sample, as well. This is not quite 10 cm and why was the surface 2 cm not collected? The bulk density and soil carbon measurements do not correspond to the soil texture which was determined only on the surface 5 cm (Ln 133). Do authors have any idea what the soil is like below 10 cm depth? Are any of the sampled marshes filled or previously drained and now restored? Did Emmett et al. (2010) establish a relationship between OC and LOI to derive the conversion of 55% (Ln 131)?

First National Inventory of blue carbon storage? It is a bit preliminary for authors to claim to have the first national inventory of blue carbon storage.

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Technical Editing Figure 1 fig b needs a scale bar Figure 2 compares carbon stocks at a single marsh applying results of different models. However, because the areas covered are different it is not a fair comparison of the difference in carbon stocks predicted by the model. Ln 41 Soil organic carbon IS belowground Ln 45 I am surprised that salt marshes are considered terrestrial habitats Ln 87 What current inventory? Ln 121 samples are dried to there is no longer a loss of moisture rather than for a prescribed time –Did authors assess whether 72 hrs adequate? Ln 367 what is meant by a “pioneer community” here? Ln 390 Since level of disturbance/exposure seems to be similar to “whether the marsh sits in a dynamic or stable area” seem to be the same there is no reason to cite an unpublished manuscript. Ln 269 shouldn't 0.45 be 45%?

References cited Kennedy HA, Alongi DM, Karim A, Chen G, Chmura GL, Crooks S, Kairo JG, Liao B, Lin G. 2013. Chapter 4 Coastal Wetlands In: Supplement to the 2006 IPCC Guidelines on National Greenhouse Gas Inventories: Wetlands.

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2018-339>, 2018.

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