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Biogeosciences Discussions

Interactive comment on "Sediment and carbon accumulation vary among vegetation assemblages in a coastal saltmarsh" *by* Jeffrey J. Kelleway et al.

Anonymous Referee #1

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Kelleway et al present an interesting work on medium-term and short-term accretion and deposition dynamics in different vegetation communities of a salt-marsh site on the Australian East coast. By combining different methods for measuring short- and medium-term deposition and accretion, they were able to reveal that considerable differences exist between communities with regard to accretion and organic-matter source. The manuscript presents some novel aspects on sediment and organic matter dynamics within salt-marsh systems. Unfortunately, however, I cannot recommend the work for publication before several shortcomings, often with regard to the structure of the ms, have been considered. Overall, the connection between hypotheses/research

questions and the rest of the ms is very weak. Thus, large parts of the discussion have not been sufficiently set up in the introduction and particularly not in the hypotheses. No doubt the study used interesting methodology and a wide array of tools; however, in most parts it does not become clear to the reader why certain analyses/methods were conducted or why they are necessary at all until one gets to the respective parts in the discussion of the ms. The authors need to make clear that this work is not simply about comparing different methods for assessing deposition, accumulation, and accretion dynamics. I will try to elaborate on this in the following:

NOTE: Your line numbering starts over on every new page, that was tricky ;)

Title page:

L1 The title could be more specific, but I don't have strong opinions on that. It seems that throughout the ms you rather use the terms deposition and accretion. So why is "accumulation" used in the title?

L18 Please make clear that this is a case study, conducted in one marsh system only. "within 3 vegetation types common throughout Australia" could be misleading and can give the impression that this is a larger scale study which has been replicated in several systems. Please, also discuss implications of this missing replication.

Main part: L1+3 please be consistent in your wording coastal wetland <-> coastal saltmarsh, please use different terms only if you mean different things, otherwise that can be confusing..

L13 give correct reference Kirwan instead if "Kirwin"

L18 you use the term sediment for both, the suspended matter that can deposit on the marsh surface but also to that what others refer to the "soil" of the marsh. I know, that is hair-splitting, but please make sure that you don't confuse the reader too much. Especially when you are talking about organogenic systems (L15), you should not use the term sediment when actually referring to something like a peat soil. Please

check out “Do marine rooted plants grow in sediment or soil? A critical appraisal on definitions, methodology and communication” (Kristensen and Rabenhorst 2015) for clarity.

L24-25 There is also work focused on other species (Schoenoplectus) by for instance Langley or Langley and Megonigal (PNAS or Nature) or by Rooth (2003) on Phragmites that could be mentioned here.

L39 I think this study of Kirwan et al (2013) was only on decay but not on the balance between OM inputs and decay. I think Mueller et al (2016; GCB) is more focused on the link between the two or Kirwan and Megonigal (2013; Nature) at least discusses both.

Page 3 L2 Hemminga and Buth 1991 give a nice citation here on litter-quality effects on decay

Page3 L13-15 Please give expected directions of effects in your hypotheses instead of only expecting that they will “vary”.

L15-18 It seems like the second aim of this study is a methods comparison. I see this as a major weakness of the manuscript. Like mentioned above, either justify why the application of the different methods was necessary to answer you research questions or save that for a very nice second manuscript. Otherwise it is hard to follow your structure.

Page4 L4,5 give range or st deviation for biomass values

L11 to what depths was biomass assessed here?

L23+L32 Briefly mention why those measurements were conducted and don’t just list them. Well, an informed reader can probably guess why you measured elevation or deployed marker horizons; however, when it comes to 2.5(isotopes) or 2.7 (13CNMR) you need to give a rationale.

Page6 L21 which functional groups, why was this done?

Page7 L17 Is this method needed to better interpret isotope data? L24 did you really assess net accretion or accumulation?

Page10 L32 why are you using “organogenic” instead of “organic” deposition?

Page12 L28-34 I think this is a real highlight of your study. Try to better set up this whole redistribution thing in your intro. I guess there is relatively little known about these dynamics.

Page13 L16-18 I don’t buy that based on 13C natural abundance only! Did you consider that 13C-fractionation processes during of organic matter decay are inducing shifts in your signatures? Are differences between litter and fresh biomass large in your species? Can your other methods support/help here?

Page14 L11 following: I think it goes too far to discuss sequestration rates based on the presented data. You studied processes on the marsh surface, which may affect C sequestration, but here you should really stick to “deposition”. Also “surface C sequestration” sounds odd to me. I don’t know if C sequestration can be determined at the surface if a more or less permanent process is meant. It needs to become clear that deposition, accumulation, and sequestration are different processes. Further down in the paragraph you are using accumulation again. Please be sure to be consistent in the use of terminology.

L26 and the whole paragraph: You don’t have a hypothesis on decomposition. This needs to be linked!

Page15 L21 “Reddy and DeLaune 2008” is a nice textbook indeed, but I know there is a bunch of peer-reviewed primary research or even review articles out there that should be rather cited here!

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