

Interactive comment on “Major role of marine vegetation on the oceanic carbon cycle” by C. M. Duarte et al.

Anonymous Referee #2

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General comment: This is a very interesting paper on the importance of benthic vegetation in the ocean carbon budget, which is highly needed for our understanding of the complicated carbon cycling. The paper is doing a great job of constructing reliable estimate based on the data available, and it is clear from this paper, that much more work is needed to fully understand the carbon cycle in the ocean. The authors have used an innovative approach by applying two different approaches to make the budgets: a top-down and a bottom-up approach. The estimates come out quite similar and provide good confidence on their findings. And the results are quite surprising compared to previous estimates, which have neglected the importance of marine vegetation in the ocean carbon budget. This paper suggests that the marine vegetation contribute with about 50% of the carbon burial and that previous estimates of coastal carbon burial have to be increased to the double. Also the export from the benthic vegetated systems to the ocean is estimated to be much higher than previous, probably sufficient to support the heterotrophy of the ocean. This is an important paper, which contains novel ideas for discussion of the ocean carbon cycling and highlights the gaps

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of our knowledge. Finally the paper underlines the perspectives of the anthropogenic pressures on the marine vegetation.

Specific comments: Macroalgae and (benthic vegetation on?) coral reefs are only used in the budget in Table 3, but are not included in Table 1+2, and I guess that this is because you assume that there is no carbon burial in these systems? This is very briefly mentioned in the introduction (p661, l 5-10). Could you comment further on this - e.g. when you present the calculations done for Table 1?

P 666, l 1. What do you mean by “in contrast with” in this sentence? Is this respiration higher or lower or do you refer to something else? The sentence is not clear.

P666, l 14. How has the value 94% been derived? Is it based on some of the measured values from the studies in Table 1 - please clarify.

P668, l1-25. I find the conclusion in the second paragraph complex, as it combines area loss of marine vegetation and reduced sediment loading of the ocean into one figure of carbon burial (50%). The loss of marine vegetation includes both carbon burial in the coastal zone and carbon export to the ocean, whereas the lack of sediment load represents something that never reaches the ocean. Maybe the overall effect on the carbon cycling will be the same, but I find the constellations difficult.

P669, l 13-15. I am not sure I understand this sentence. How can an error in the carbon estimates ever influence (accommodate) the atmosphere CO₂? Please clarify

Technical comments: P 660, l 7 - spelling error: vegetated P 660, l 18 - NEP is not defined P 661, l 16 - spelling error: salt marshes P 664, l 22 - total sediment input 20000 Tg y⁻¹? P 666, l 6 - NCP is not defined P666, l 8 - insert to between “need be” P 666, l 15 - NEP is not defined P 667, l 23 - is “conform” the right term here or should it be confirm? P 668, l 1 - spelling error: extent P 668, l 6 - spelling error: by Table 1 - note 1 and 2 is the same and can be combined

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