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Interactive comment on “Mangroves facing climate change: landward migration potential in response to projected scenarios of sea level rise” by D. Di Nitto et al.

Anonymous Referee #2

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I found this paper to be a simplistic attempt to quantify the response of mangrove to climate change. While the authors have attempted to be innovative by considering the zonation of species as an indicator of their capacity to adapt, I do not feel they have adequately captured to contribution of sediment and morphological change to the adaptive capacity of mangroves. The bulk of literature indicates that the morphological response of mangrove areas to sea level rise is the primary component to their adaptation, while the species response follows this. This paper has taken the alternate approach, with greater consideration given to the species response to inundation, rather than the sedimentary contributions. By not considering the geomorphological response to climate change, their projections of propagule dispersal and tidal range

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effects are flawed from the outset as both of these factors will be influenced by any future changes in geomorphology.

There is substantial literature about the response of mangroves and coastal wetlands to sea-level rise, much of which has not been cited in this paper. I urge the authors to consider reading some of this recent literature to better characterise the response of mangrove to climate change. A good starting point would be the article of Mckee et al. (2012). There is also many recent modelling papers that characterise the morphological response of mangrove to sea-level rise, none of which have been cited in this publication. The approach employed was a simple bathtub model or bath fill approach; which has been disputed in the literature as an overly simplistic approach that does not adequately characterise the response of these systems to higher rates of sea-level rise (See Rogers et al. 2012). I would suggest the authors employ further analysis of accretion to try to capture this in their modelling.

Given the simple approaching to modelling, I also question the use of IPCC 2001 scenarios. The AR4 projections are an improvement on the TAR and could be readily incorporated. Given the impending release of AR5, this paper would be substantial dated and require further analysis to come in line with the most recent analyses. It would also be useful to indicate how the sea level rise scenarios align with the emissions scenarios employed (SRES).

I would encourage the authors to consider the species response as a secondary step following a geomorphological consideration. This would provide substantially new contribution to the literature about the response of mangroves to climate change. I have also included additional comments in the attached pdf.

Some references that may be a useful starting point:

McKee, K., K. Rogers and N. Saintilan. 2012. Response of Salt Marsh and Mangrove Wetlands to Changes in Atmospheric CO₂, Climate, and Sea Level. p. 63-96. In B. A. Middleton (ed.), *Global Change and the Function and Distribution of Wetlands*.

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Springer Netherlands.

Rybczyk, J. M. and J. C. Callaway. 2009. Surface elevation models. In G. M. E. Perillo, E. Wolanski, D. R. Cahoon and M. M. Brinson (eds.), Coastal wetlands: An integrated ecosystem approach. Elsevier, Amsterdam, The Netherlands.

Rogers, K., N. Saintilan and C. Copeland. 2012. Modelling wetland surface elevation and its application to forecasting the effects of sea-level rise on estuarine wetlands. *Ecological Modelling*, 244:148-157.

Kirwan, M. L., G. R. Guntenspergen, A. D'Alpaos, J. T. Morris, S. M. Mudd and S. Temmerman. 2010. Limits on the adaptability of coastal marshes to rising sea level. *Geophys. Res. Lett.*, 37:L23401.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/10/C2637/2013/bgd-10-C2637-2013-supplement.pdf>

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