“Accretion, retreat and transgression of coastal wetlands experiencing sea-level rise”
by Angelo Breda et al.

Response to the interactive comments from **Referee 2.**

The comments from the referee are shown below in italics and in blue colour. Our responses are presented below each comment in regular font. Proposed changes in the text as a consequence of the adaptation of the paper to the referee’s comments are presented in italics and between quotation marks.

Referee 2

A. General comments:

This is an interesting manuscript that investigates how accretion and migration affect wetland response to SLR by using a numerical tool that includes hydrodynamic and sediment transport mechanisms as well as vegetation and landscape dynamics. The paper is very well written and provides important insights regarding wetland evolution under climate change conditions.

Answer: We thank the reviewer for the very positive assessment of our paper. It is also our belief that this study provides an important contribution to the ongoing discussion of wetland evolution under climate change.

B. Specific comments:

[95-105] The description of experiments is not clear. This part would be clearer if you included the reference to Fig.1c in line [103] when starting the description of experiment 2. Even so, the best thing would be to include a figure with the conditions of each experiment.

Answer: In order to improve the description of the experiments, we have modified Figure 1 including a sub-figure with the conditions of each experiment. Please notice that we will replace the word “experiment” with “simulation” throughout the manuscript (as requested by Reviewer 1) in order to better convey the idea that our results correspond to simplified domains based on general characteristics of a wetland in Australia (Area E). In the said paragraph, a reference to each simulation figure will be included when describing the simulations. The edited Figure 1 is presented below.

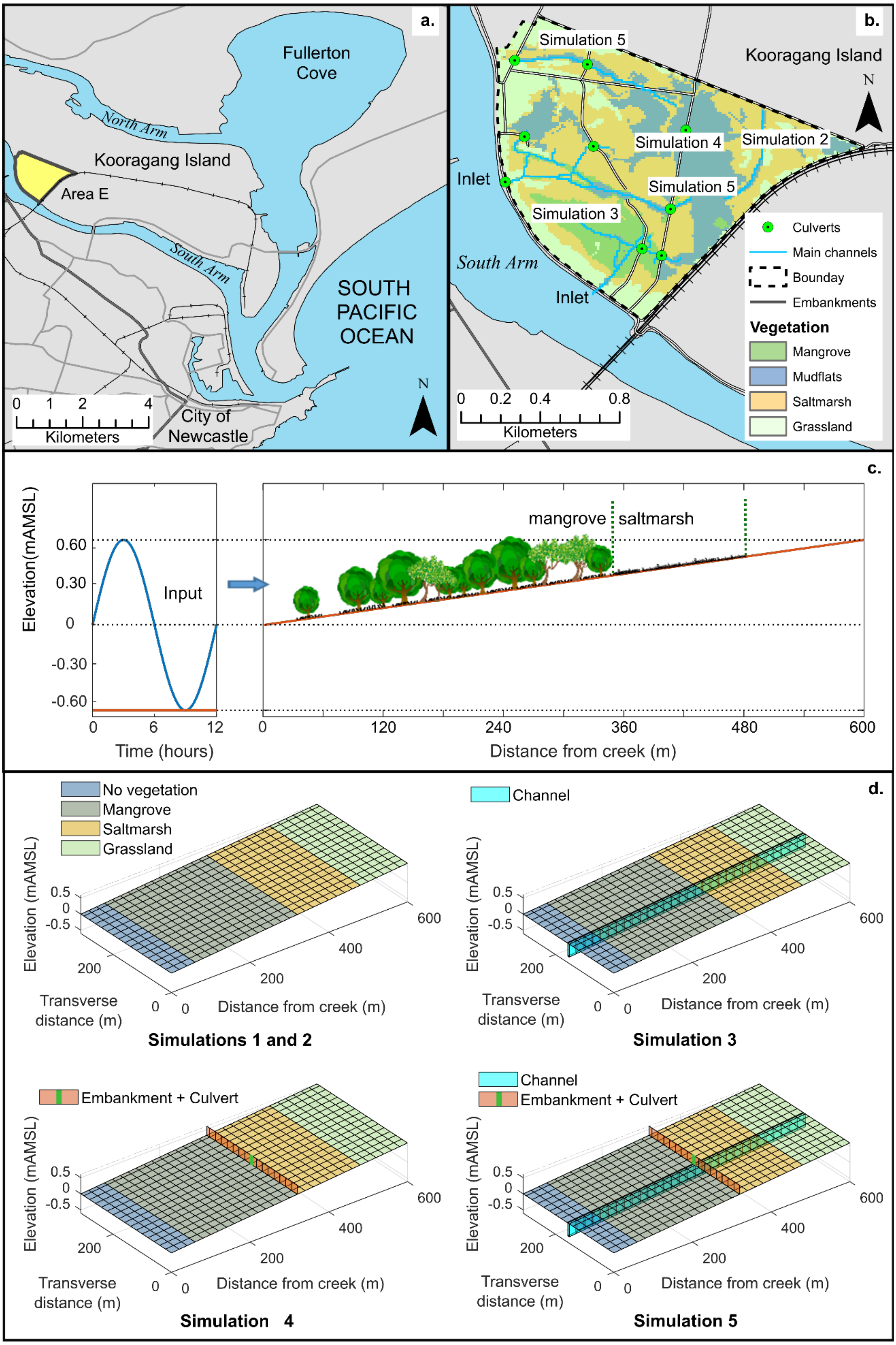

Figure 1 - Field site and areas within the site characterised by the numerical simulations: a) Area E of Kooragang wetlands, b) areas within the wetland were the simplified simulations represent the dominant processes, c) schematic longitudinal view of the domain setup and sinusoidal wave input (adapted from Rodriguez et al. (2017)), d) schematic isometric view of each simulated domain and their hydraulic features. Vegetation cover is only indicative and roughly corresponds to early stages of the simulations. Elevation unit, mAMSL, stands for metres above mean sea level.

[Discussion] Your experiments use a sinusoidal wave of constant amplitude, however the real tide often presents a neap spring tide cycle. How would your results be different if you included that variability?

Answer: We tested the implementation of a time series of water levels that included neap and spring tide variability. During this testing, saltmarsh area slightly increases landward as some areas became inundated during the highest spring tides, while mangrove areas were not affected because hydroperiod remain mostly unchanged. Such effect was only observed in the simulations without the embankment. This small saltmarsh extension does not change the overall conclusion of findings because:

1. Saltmarsh occupation reaches the upstream domain border quite early in the simulation (experiments 1-3), and most of saltmarsh loss is due to mangrove encroachment on the downstream edge. Thus in terms of total wetland area, there is no significant change of the outcomes.
2. Accretion in this increased saltmarsh area (if using neap/spring input) is negligible as both sediment concentration and water depths are too low in such high areas.

We will add at the end of the conclusions the following paragraph indicating assumptions and limitations of our model:

"The results presented in this study show generalized conditions of wetland dynamics under sea-level rise by using several simplified domains that focus on individual mechanisms affecting ecogeomorphic evolution . This approach can support a broader perspective on the potential fate of coastal wetlands in general, but some limitations arise as part of the model assumptions. As with most wetland evolution models, we did not consider soil processes other than accretion, disregarding swelling, compaction and deep subsidence. Measurements in wetlands of the Hunter Estuary show that long-term surface elevation changes are mostly due to accretion, supporting our assumption (Rogers et al. 2006; Howe et al. 2009). Another process that we did not consider was the effects of marsh edge retreat due to ocean or wind waves (Fagherazzi et al. 2012; Carniello et al. 2012), which can have a significant role in coastal wetland evolution. Most coastal wetlands in Australia are estuarine and not exposed to ocean waves, whereas wind effects in our wetland were not important due to the absence of large open water areas where wind waves could fully develop. We also simplified the tidal signal without including neap-spring cycles, which sped up computations but may have affected the results. However, preliminary tests including neap-spring tide variability showed only small differences in the initial landward edge of saltmarsh, which did not affect the accretion dynamics due to the small depths and low sediment availability in that area. Finally, our simulations did not include the effect of storms, which can influence sediment availability, water depths and velocities. We believe that in our case excluding storm effects is justifiable based on Rogers et al. (2013), who found that in these fine sediment environments storms affect accretion dynamics over the short term (immediate erosion or low accretion

followed by increased deposition over the next months), but they do not change the long-term trend of accretion and elevation gain rates."