

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.

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diana.dinitto@gmail.com

Received and published: 20 August 2013

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Anonymous Referee #1

This referee has stated that the manuscript is acceptable for publication in Biogeosciences pending two (minor) technical corrections and a few textual improvements.

Technical comment 1: The study area, Gazi Bay, is described as ‘macrotidal’. However, its tidal range is reported as 3.5 m which classifies this as a mesotidal envi-

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ronment (e.g. see: K.R.Dyer (Ed.), 1997. Estuaries: A Physical Introduction, Wiley, p6). The authors of this manuscript agree with this comment and have corrected this throughout the manuscript. Technical comment 2: The discrepancy (<12% for all but one sp.) between the expected mangrove species distribution areas on the basis of inundation classes (TMAI) and the observed mangrove species distribution areas in the field (TMA) is explained by mapping classification errors and errors in the topographical measurements.

The authors of this manuscript have adjusted this explanation according to the comments by the referee:

‘As the applied vegetation classification confirms the occurrence of a specific zonation or spatial structure in Gazi Bay, which is highly related to inundation patterns, we can conclude that sensitivity to alterations in topography can be significant from a certain limit and should therefore be aligned to vegetation distributions when data is available. Furthermore, the wind set-up may have affected the high water line measurements at spring tide. In addition, the inundation classification according to Watson (1928), which is based on inundation frequency, may not always yield fully satisfactory results, esp. in regions with an irregular tidal regime and/or irregular elevation profile, where the duration of inundation seems equally important, as was shown by Van Loon et al. (2007).’

Added reference: Van Loon, A.F., Dijkma, R. and Van Mensvoort, M.E.F. (2007) Hydrological classification in mangrove areas: A case study in Can Gio, Vietnam. Aquatic Botany, Volume 87, 1, 80 – 82.

Other (minor) comment 1:

The paper talks about non-invadable areas at the inward land margin of the mangroves, and how sea level rise would cause a decrease in the areas of landward *Avicennia marina* and *Ceriops tagal* due to the topographical settings at the edge of the (human-)inhabited area. I suggest the authors introduce the term “coastal squeeze”

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here, as this is a generally widely accepted term for this phenomenon (see Doody, J.P. (2004) 'Coastal squeeze' - an historical perspective. *Journal of Coastal Conservation*, 10/1-2, 129-138.)

The term coastal squeeze was introduced in the manuscript as follows. In the introduction: However, mangroves areas situated in a physiographic setting that limits landward migration due to obstacles or steep gradients and with a net decrease in sediment elevation or sediment accretion that is insufficient to keep up with SLR, are most vulnerable (Gilman E. L. et al. 2008). Landward obstructions, artificial or natural, have an effect on ecosystems that would normally move landward in response to erosive forces. Where there is a rise in sea level relative to the land a coastal squeeze takes place (Doody 2004). Added reference: Doody, J.P. (2004) 'Coastal squeeze' - an historical perspective. *Journal of Coastal Conservation*, 10/1-2, 129-138.

In the conclusion:

Landward migration of mangroves in Gazi Bay appears to be limited under the maximum scenario as the highest intertidal inundation class strongly decreases due to the topographical settings at the edge of the inhabited area. Consequently, the coastal squeeze will signify a decrease in the *Avicennia*-dominated assemblages if they fail to adapt to a more frequent inundation or if competition with other species will prevail.

Other (minor) comment 2: When quoting multiple authors, please follow a chronological order, starting with the oldest reference.

All references have been adjusted according the guidelines of Biogeosciences.

Interactive comment on *Biogeosciences Discuss.*, 10, 3523, 2013.