**Biogeosciences
Discussions**

Interactive comment on "The role of wind in hydrochorous mangrove propagule dispersal" *by* T. Van der Stocken et al.

T. Van der Stocken et al.

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First of all, we would like to thank anonymous reviewer 1 for the positive and constructive comments, which we used to further adjust our manuscript. More detailed description of the changes we made per comment is given below.

Anonymous Referee #1

Specific comments:

(1) Abstract. There are a few typos, including incorrectly identifying the number of mangrove species being studied.

answer:

We corrected the typos in the abstract: - 5 species replaced by 4. - deleted 'of'

(2) There are two locations in the manuscript where the scientific language is not correct: (a) P. 897, line 20. There are very few "established facts" in science, and none of those studies cited make that argument. Please re-word. (b) P. 910, lines 3-4. We do not prove hypotheses true, we simply fail to reject them. This may sound trivial, but it is an important distinction.

answer:

(a) changed 'established fact' into 'well-endorsed subject'. (b) We rephrased this sentence in such a way that the triviality is gone.

(3) Table 1 is excellent, but there may be a need in the text for a better description of the dispersal structures of these mangrove species. The authors did a great job canvassing a range of dispersal unit types available in mangroves globally. I would certainly spend more time making that clear. But also, the authors mention fruit, propagule, and seed. However, Heritiera disperses as a fruit (i.e., has an embedded seed) and while you may be able to argue that it is a form of a propagule, it differs completely from the propagule referenced for Ceriops and Rhizophora. Please spend more time explaining the biology to the readers.

answer:

- We adjusted the text to make it clear that the chosen propagules of the 4 species cover the range of dispersal unit types in mangroves globally.

- propagule: a dispersal unit (seed, fruit,. . .).

(4) Along with dispersal, there is quite a bit of new research being dedicated toward facilitation. It may not matter as much that propagules (etc.) dispersal to a new location, but rather the vegetative conditions encountered may be more important. From the perspective of individual based modeling, this is likely to be more important than dispersal but is not addressed.

answer:

Propagules will only grow in a suitable habitat, yet the knowledge whether or not propagules will be dispersed towards these suitable areas, is of equal importance. In the field of mangrove ecology, there exists an apparent scientific gap with respect to the actual dispersal and recruitment mechanisms and the role of abiotic factors (i.e. hydrodynamics, wind) on propagule dispersal. More research has been done on the facilitation phase.

(5) Discussion. I must say that stating "... [that] the influence of wind is more pronounced for dispersal units with a lower density" is fairly obvious. I like what you did to document how different, but I think that not discovering this would have been grounds to suggest that your experiment was flawed rather than this being a major study result.

answer:

A quantification of species-specific differences is, however, required in order to explain field observations from a mechanistic point of view. Moreover, in our dispersal model species-specific influences of wind need to be defined to simulate field conditions as realistic as possible.

(6) Discussion. In regards to Individual Based Models (IBM), do these authors have their own suite of IBMs? I cannot agree that knowing what propagules are likely to disperse to new areas based on incorporating wind into dispersal modeling will advance mangrove IBMs at all. The scale is not right. IBMs are applied to small areas that have the suite of propagules already, and proper recruitment functions for propagules already on site become the limiting variable. Indeed, recruitment is so variable that IBMs are more limited by spatial variability in recruitment than they would ever be by knowing whether an individual species might make it to the simulated plot. There may be some instances where knowing something about dispersal would improve what species to include in specific model runs; probably not where the suite of mangroves are limited to three, for example. But, the key is that without the sensitivity analyses,

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such links should be toned down. Now, if you have your own IBMs, understand how they work, and do the sensitivity modeling that suggests that dispersal to a specific site is important relative to recruitment, early growth (along salinity, fertility, HS, light, etc gradients), self-shading, and disturbance gradients, then that would be a different matter. That does not seem to be the case though. It is too speculative.

answer:

We will use a particle tracking model (Delft3D-PART) where we can follow mangrove propagules as individuals (Langrangian) with user-defined characteristics, a model which has been used in various studies such as sediment plumes due to dredging activities, dispersal of eelgrass seeds, plume dilution and oil-spill modeling (mid field scale: few kms). Recently a model has been improved to study larvae dispersal over more than 100km (personal communication, Jan Van Beek, our collaborating partner at Deltares). We replaced 'IBM' by the specific model in which the outcome of this research will be incorporated.

(7) Discussion. What does "... this study may be a first step into the challenge to construct a model in which propagules can be followed as particles to which specific properties are being assigned" mean?

answer:

We replaced this sentence by a more detailed description of our future modeling plans.

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