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Interactive comment on "Mapping tropical forest biomass with radar and spaceborne LiDAR: overcoming problems of high biomass and persistent cloud" *by* E. T. A. Mitchard et al.

Anonymous Referee #1

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[all page/line references refer to the PDF version of the manuscript (bgd-8-8781-2011.pdf)]

The manuscript BG-2011-149 "Mapping tropical forest biomass with radar & spaceborne LiDAR: overcoming problems of high biomass and persistent cloud" by Mitchard and colleagues combines extensive field data and multi-sensoral remote sensing data to map forest biomass in a national park in Gabon. Estimating forest biomass across large areas is challenging, yet increasingly important in light of the ongoing carbon accounting discussion. I agree with the authors that traditional field-based or remote sensing (optical or single sensor) approaches are not useful for large-area mapping for

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various reasons and that using LiDAR in combination with other RS data is the way forward. The manuscript describes a new and interesting approach along these lines. The authors combined extensive field data with radar imagery and LiDAR data to estimate biomass for a poorly studied ecoregion. Specifically, the study is among the first to combine ICESat GLAS LiDAR data and ALOS PALSAR L-band images. Overall, the research topic of the manuscript is novel, the methodology appears sound (but see comment below regarding error estiamtion), and the results of this study are both interesting and relevant. Although the applicability of the outline method is somewhat doubtful, given the still substantial field data that would be needed to implement the approach for large areas as well as the absence of a spaceborne LiDAR for at least another couple of years, the manuscript is an interesting contribution and worthwhile publishing in BGD.

I identified a number of mostly minor points the authors should revise before final acceptation of this manuscript: - Would be good to reflect the regional character of this study already in the title - p8787 line 14: please check sentence - p8787 line 25-27: not sure this is a good reasoning. E.g., one could create cloud-free mosaics by exploring the full depth of the Landsat archive (for an example: http://globalmonitoring.sdstate.edu/projects/congo/) - p8792 line 27: altitude should be elevation - Methods section: it would be good to include a flowchart outlining the individual steps taken to derive the final biomass map. - The first three section of the results chapter are currently a mix of methods (which model types, etc) and results (e.g., parameter estimation). On the other hand, some analyses are not described in the methods section at all (biomass estimation, DBH estimation, etc). Would be good to include all steps taken in the methods (see above comment) and only show the results of these analyses in the results section. - p8793 line 19: please provide a reasoning for the type of model (equation, e.g., why second-order?) that was used. - P8794 line 15: Which different models were compared? - It would be good to have the error estimation as a part of the results section (not a separate chapter). I also think that the authors could get rid of the subchapter headings and simply have a single

section for 5, 5.1, and 5.2. - Some of the error estimations seem to be a bit shaky. Examples of this include p8797 lines 27-28 and p8789 line 12-13. Why 10%? Why 5%? Any justification for these 'best guesses'? - Given the rather arbitrary choice of individual errors, I am not sure how useful the estimation of a confidence interval around the biomass estimation really is. Also, why is the lower bound of the confidence interval a better estimate than the median or mean of that interval? This sounds, at least from a statistical point of view, somewhat counterintuitive. - p8801 line 14-18: please revise this section to reflect the current (at best uncertain) status of the DESDynI mission.

Interactive comment on Biogeosciences Discuss., 8, 8781, 2011.

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