Interactive comment on "Estimating aboveground carbon density and its uncertainty in Borneo's structurally complex tropical forests using airborne laser scanning" *by* Tommaso Jucker et al.

Tommaso Jucker et al.

dac18@cam.ac.uk

Received and published: 8 May 2018

R2 comment: Dear editor and authors, This paper deals with the estimation of aboveground biomass in the tropical forest of Borneo Island using the model and airborne laser scanning. I think that this paper is very innovative and important for the evaluation of the carbon stock of the tropical forest. The model of this study can estimate aboveground carbon density (ACD) well, but I'd like to request one to authors. Coomes et al. (2017) reported that ACD is closely related to basal area than to tree height. However, canopy cover at 20m and top-of-canopy height by airborne laser scanning were not good correlation with basal area (Fig.3). I understand that data from airborne

laser scanning is not enough and we have to know the basal area and woody density to estimate ACD by using your model. Please give us some suggestion to estimate the ACD by only airborne laser scanning data in the future. If authors are possible, please add explanation for the difference of representativeness of the data between field observation and airborne laser scanning.

Response: Thank you for reviewing and helping us improve our manuscript, we are pleased you found it of interest. Regarding the estimation of carbon stocks directly from LiDAR, our results clearly show that while attempts to generate general equations that can be applied across forest types are promising, in order to obtain accurate and unbiased estimates of carbon stocks these equations need to be calibrated locally with field data (see comparison between fig 2a and 2b in the main text). In the revised manuscript we go into more detail regarding some of the pros and cons of using Asner and Mascaro's (2014) approach for estimating aboveground carbon density (ACD) from LiDAR. We recognise that by focusing on one (or in our case two) LiDAR metrics for estimating ACD, Asner and Mascaro's (2014) approach may well sacrifice goodness-of-fit compared with locally tuned multiple regression models that incorporate many more LiDAR metrics. However, by doing so the derived models have the virtue of being more applicable and generalizable to other forest types. Looking forward, what our results suggest is that by developing a library of locally-calibrated versions of Asner and Mascaro's (2014) model that adequately capture underlying variation in forest basal area, we will approach a point where variation among forest types is characterised well enough to allow ACD to be estimated directly from LiDAR with little or no need for calibration with field data.

R2 comment: This manuscript is nicely ordered, but order of the figure number is not correct, especially page 11 (order is Fig.2, Fig.5 (line 385), Fig.3), please correct it.

Response: We have corrected this, thank you.

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2018-74, 2018.