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Interactive comment on "Integrated radar and lidar analysis reveals extensive loss of remaining intact forest on Sumatra 2007–2010" *by* M. B.Collins and E. T. A. Mitchard

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ALSO PROVIDED AS A .PDF IN THE SUPPLEMENT

We thank reviewer #4 for their time and helpful comments. General response Whilst the methodological descriptions are detailed, we agree with the reviewer that this level of detail is required to be entirely transparent in the approach that we took. With regards the specific comments, the first concerns mangroves. We excluded the mangrove forest areas principally by excluding areas of forest which we had estimated to be below 20m high. Visual examination of the resulting radar maps revealed that this process had successfully excluded the mangrove forests of Sembilang national park

to the south of Berbak national park, the location of which we knew from GIS shapefiles, and field experience. The reviewer also mentioned the atypical nature of the plots used to quantify AGB at Berbak. The ZSL project commissioned an Indonesian forestry specialist to perform these surveys, who followed the nested plot approach in order to maximise the number of samples across a forest which is particularly difficult to access. The majority of biomass is in the large trees (Slik et al., 2013), which improves our confidence that the exclusion of smaller trees <15cm will not have caused significant impact upon our results. The reviewer mentioned the updated work of Chave (2014), which we appreciate. This work was originally undertaken in 2011 when these equations were not available, moreover we need to ensure consistency with the approach currently being followed by the ZSL project, including the biomass and carbon calculations used in their REDD+ project design documents. This consistency should help ensure that the present piece of work has an applied impact on the ground in Sumatra. Future work will use the updated equations. It is also relevant here that recalculating biomass using the relevant Chave (2005) equations does not significantly change AGB values, in this region at least: values at a plot level differ by <2 %. Section 2.4.2. We have re-written this section to make it clearer that we believe Lorey's height at 20m (plus the associated biomass estimation) to be a useful threshold to distinguish between plantations and natural forest, and that we are excluding plantations. Section 2.4.3. At this step we are applying a mean value of AGB for pixels which are above the saturation limit of the radar and lidar data. Agreed, we would expect that the estimates of peatland AGB are lower than terra firme forests in Asia. However in this case we are limited to field data from the peat swamp forests, but wanted to model AGB across a broader landscape likely also including such dryland forests. The purpose of mentioning the higher average value for Asian forests was to indicate that we were being both parsimonious and conservative by using the lower values which we had actually obtained from local field data. Section 2.6.1. On the radiometric correction: we tried several different approaches to the normalisation procedure. Where we used subsets of data which we perceived as not having changed, these (a) represented proportionally few pixels in the entire scene, and (b) only represented a subset of higher biomass forest; whereas for a normalisation procedure we required a distribution of values from high to low backscatter representing different types of forest in different environmental conditions. As an indication we have provided a graphical analysis of the pixel values before and after the normalisation procedure, which draws the mean values of the annual distributions together:

Figure 1.

Section 2.7. We will revise the text to clarify the specific relationships to which we refer.

References Slik, J. W. F., Paoli, G., McGuire, K., Amaral, I., Barroso, J., Bastian, M., Blanc, L., Bongers, F., Boundja, P., Clark, C., Collins, M., Dauby, G., Ding, Y., Doucet, J.-L., Eler, E., Ferreira, L., Forshed, O., Fredriksson, G., Gillet, J.-F., Harris, D., Leal, M., Laumonier, Y., Malhi, Y., Mansor, A., Martin, E., Miyamoto, K., Araujo-Murakami, A., Nagamasu, H., Nilus, R., Nurtjahya, E., Oliveira, Á., Onrizal, O., Parada-Gutierrez, A., Permana, A., Poorter, L., Poulsen, J., Ramirez-Angulo, H., Reitsma, J., Rovero, F., Rozak, A., Sheil, D., Silva-Espejo, J., Silveira, M., Spironelo, W., ter Steege, H., Stevart, T., Navarro-Aguilar, G. E., Sunderland, T., Suzuki, E., Tang, J., Theilade, I., van der Heijden, G., van Valkenburg, J., Van Do, T., Vilanova, E., Vos, V., Wich, S., Wöll, H., Yoneda, T., Zang, R., Zhang, M.-G. and Zweifel, N. (2013), Large trees drive forest aboveground biomass variation in moist lowland forests across the tropics. Global Ecology and Biogeography, 22: 1261–1271. doi: 10.1111/geb.12092.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/12/C7001/2015/bgd-12-C7001-2015-supplement.pdf

Interactive comment on Biogeosciences Discuss., 12, 8573, 2015.

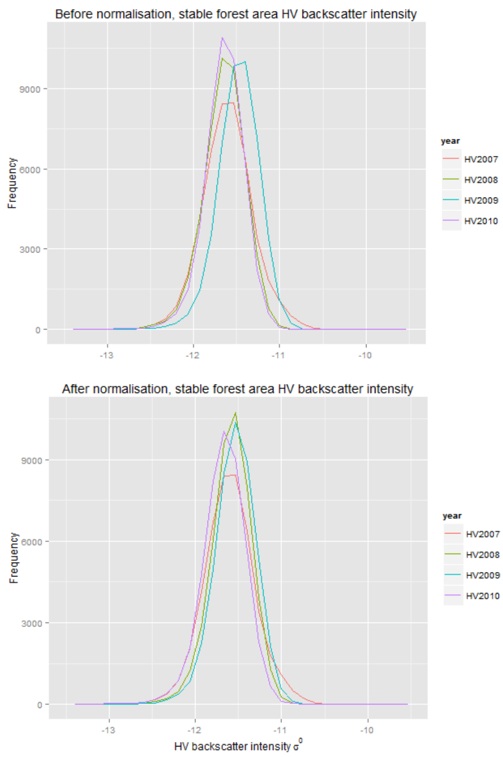

Fig. 1.