Biogeosciences Discuss., 12, C8881–C8883, 2016
www.biogeosciences-discuss.net/12/C8881/2016/

Biogeosciences Discussions
Open Access
EGU

Interactive comment on "Closing a gap in tropical forest biomass estimation: accounting for crown mass variation in pantropical allometries" *by* P. Ploton et al.

Anonymous Referee #2

Received and published: 6 January 2016

General comments

This very interesting article by Ploton et al. aims at closing a gap in tropical forest biomass estimation by accounting for crown mass variation in pantropical allometries that usually consider parameters such as diameter in breast height (D), tree height (H) and wood density () to estimate aboveground biomass and carbon stocks of tropical forests. The study indicates that the widely used reference model proposed by Chave et al. (2005, 2014) introduces a systematic underestimation of total aboveground biomass of approx. 20% for the largest trees, as well as an average error of 50% at the individual tree level, because of the high variability of mass between trees

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

with similar D, H and values. This uncertainty could be associated to different strategies of energy investment between tree height and crown development, which likely results in different crown mass ratios among trees with similar diameter, height and wood density. Therefore the study proposes a modeling strategy that decomposes total tree mass into trunk and crown masses to improve the accuracy of forest carbon estimates by accounting for a crown mass proxy for the largest trees in the stand that significantly reduces the range of plot-level error. The authors compile a unique dataset on >650 trees across five tropical countries to quantify the error of allometric biomass models at individual plot levels and show that the range of plot-level error is significantly reduced from -23–16% to 0–10% when accounting for a crown mass proxy in tropical biomass models. These findings indicate that variation in crown mass ratio in tropical trees could be a major source of error in current allometric models and that currently employed allometric models could be substantially improved when crown metrics such as crown depth and crown diameter were incorporated in pantropical allometries.

Specific comments

In the manuscript the authors suggest that incorporation of the crown mass ratio into commonly used allometric equations could improve the accuracy of forest carbon estimates. So my suggestion is to incorporate this information into the analysis by comparing calculated estimates of aboveground biomass between the proposed models and to discuss different results regarding strategies of carbon allocation between stem and crown mass and its implications for tropical carbon storage. For instance, the authors could include a table stating respective forest carbon estimates for the investigated study sites and compare reported estimates to the results derived by their novel approach accounting for a crown mass proxy. This would allow for a more direct comparison between the biomass estimates derived from the respective models and could be used to discuss the importance of incorporating crown metrics in allometric models to account for potential alterations in carbon allocation in response to projected global changes.

BGD

12, C8881–C8883, 2016

Technical corrections

Page 19714; Line 4: Consider stating: ". . ., which play a major role in the global carbon balance (REFs)."

Page 19714; Line 8: Consider changing the sentence to: "However, local forest biomass estimations commonly represent the foundation for the calibration and validation of remote sensing models."

Page 19724; Line 20: Consider stating: "This threshold was mirrored by a break point in the relationship between total tree mass and the compound predictor variable used in the reference allometric model of Chave et al. (2014).

Interactive comment on Biogeosciences Discuss., 12, 19711, 2015.