Implications of allometry

The thoughtful paper by Asner et al. (1) needs clarification. A major conclusion is that light detection and ranging (LiDAR)-based sampling combined with an allometric model of tree biomass that uses height measurements is significantly better than simply using the Intergovernmental Panel on Climate Change Tier 1 prescribed forest carbon values (2) for a given area [395 teragrams (Tg) or 10^{12} grams carbon (C) vs. 587 Tg C]. We are not convinced.

First, the authors (1) biased the IPCC estimate upwards (i) by not stratifying the study site with existing vegetation cover maps (Ministerio del Ambiente or Global Land Cover 2000) and (ii) by not using a map of forest fractional cover or other methods for down-calibrating forest carbon estimates. For our analysis using average IPCC Tier I values downscaled with forest fractional cover (fC) based on the method of Matricardi et al. (3), we estimate 538 Tg C for the study area.

Second, the selection by the authors (1) of a specific allometric equation based on Chave et al. (4), suggesting that it is more robust than the alternatives because it includes height, is an unsubstantiated assumption. The inclusion of height with stem diameter (dbh) can improve generalized allometry when there is a variant relationship between biomass and dbh (where trees of the same dbh differ in biomass because of height differences). This is a logical conclusion drawn by the authors (1); however, most of the height values in this study were actually estimates from a model of height using a small sample of heights and dbh measurements. The paper does not adequately interpret Chave et al. (4) and leaves open too many questions to be addressed here. Suffice it to say that the selection of this allometry is singularly significant to the results and conclusions, perhaps more so than the use of height from either LiDAR or a model.

We would suggest that, as also noted by Chave et al. (4), a locally derived allometric model would be better in the ab-

sence of destructive samples and actual measures of height for individual trees. When one selects the locally derived allometric model developed by Winrock International (5) (cited but dismissed in the paper), it is possible to get far different results that raise the overall carbon values of the study area. Based on data presented in the paper, we do have an approximate notion of the dbh range. When we select an approximate mean dbh and compare the difference between the allometric model that was used and the one developed by Winrock International (5) in that location, the total carbon estimated for their study would be increased to as much as 495 Tg C. The combination of a vegetation classification map, a fractional forest cover map, and an alternative allometric equation suggests much closer agreement with an IPCC Tier I assessment (8%) and reduces the importance of LiDAR in the final outcome. We believe the authors (1) have not made a substantial case for their method and have, instead, shown the sensitivity of the choice of biometry.

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