

Interactive comment on “Carbon emissions from deforestation in the Brazilian Amazon region predicted from satellite data and ecosystem modeling” by C. Potter et al.

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The Reviewer comments on this paper can be addressed by three comprehensive replies from the authors:

1) The new and unique aspects of this work are a combination of using MODIS satellite images to first quantify and map standing forest biomass pools across the entire Amazon region in manner consistent with tree production estimates and soil properties, and second is to simulate the loss of forest carbon to the atmosphere in a mechanistic manner that maps and tracks all the pools of wood and litter remaining for years following anthropogenic disturbance. We submit that this is the first study to report either one

C564

of these original features for understanding the Amazon carbon cycle, much less to combine them into one set of results for the region. Specifically, the model predictions presented in Figure 5 are first-of-their-kind to simulate disturbance net ecosystem carbon fluxes ... before, during and after deforestation across the entire Brazilian Amazon region. Specifically, we use MODIS EVI for forested areas prior to deforestation and then reduce it to observed levels (from field studies) after clearing without resetting the simulation trajectory. All model carbon pools (wood, leaf, root) are altered dynamically in the simulations of clearing and burning anywhere and everywhere that it has been mapped out by PRODES results.

2) Relevance of our findings in the larger context of tropical anthropogenic land cover change and the carbon cycle has been discussed already in the Introduction to the paper. We maintain that previous studies of carbon emissions from tropical deforestation globally vary so greatly and are so difficult to compare, due to differences in (land cover) data sources, estimated regional extents, and carbon computation methodologies, that these CASA model predictions for the Amazon can only be fairly compared to other rigorous estimates of land cover change within the Amazon region, and not yet globally. We do not consider selective logging impacts in this study. Also, on a side note, we can confirm that anthropogenic land cover change and deforestation are considered the same in our study, and that Landsat-resolution (or finer) remote sensing is the only accurate enough satellite data to use in mapping out such small-scale changes in tropical forest.

3) Although the paper could be easily reorganized into more conventional section headings (Introduction, Methods, Results, Discussion, and Conclusions), we as authors cannot see how that would make the study much easier for the reader to distill all relevant information. In a revised version, we will attempt to do so however, and also improve the quality and clarity of the methods and figures, in a point-by-point reply to the Reviewers.

Reply to the Comments of D. Morton

C565

These comments are much appreciated and worthy of discussion in a revised version of the paper. We have re-checked the PRODES dataset and can confirm that annual deforestation maps derived from PRODES may include a small area of deforestation from previous years in that some pixels were previously cloud-covered and therefore the deforestation was not recorded until that year but actually occurred in a previous year. For each year of PRODES reporting, here are several classes of deforestation which define the year that the deforestation was observed and the number of previous years that were cloud covered. For our analysis, we did not want to omit areas deforested and therefore used all of the classes for each year of deforestation regardless of the number of years of previous clouds. There is little indication however that the deforested area reported for 2000 likely to be three times higher than would be expected for 2000 alone.

On the second point raised about the missing scenes in Maranhao, we are not clear on where D. Morton has obtained this information. The PRODES dataset does not indicate whether or not the scene was previously missing and we cannot obtain the individual years of data for each state to verify such omissions.

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C566