**Matherial and Methods**

*CAETÊ performance evaluation*

In order to evaluate the performance of the two CAETÊ approaches in represent the spatial distribution of vegetation carbon storage and NPP we compared the model results with established maps available in literature and databases through linear regression and by computing the absolute difference between CAETÊ’s and reference’s maps. For carbon storage it was used Baccini et al. (2012) and Saatchi et al. (2011) maps, and for NPP the map produced by MODIS NPP Project (MOD17A3; data available at http://www.ntsg.umt.edu/project/mod17).

For carbon storage only the aboveground carbon was considered (leaves and aboveground woody tissues) since for Baccini’s map the available data comprises this vegetation portion and Saatchi’s map estimated belowground biomass through allometric equations. Besides, the reference maps represent living biomass instead of carbon content (as simulated by CAETÊ) in that sense, for the purpose of comparison we considered a carbon percentage of 47.5% in living biomass (THOMAS; MARTIN, 2012).

Furthermore, we also compared CAETÊ results regarding carbon storage and NPP with *in situ* measurements available in literature (Table SMXX and Table SMXX, respectively) throughout the study area (Figure SMXXX). The comparison was made using linear regression. For coordinates where more than one measurement the mean value was considered. When the data corresponded to living biomass, only 47.5% of the value was considered (Thomas & Martin, 2012).

**Results**

*Evaluating CAETE performance*

*Aboveground carbon storage*

Figure XX (a, b and d, e) show the spatial distribution of aboveground carbon storage comparison between the CAETÊ simulation in its two approaches and the two reference maps, Saatchi et al., (2011) and Baccini et al. (2012). We also show in Figure XX (c, f) the relation of grid-cell mean values for this variable between the modeled and the references.

Both CAETÊ approaches show regions where the carbon stock is over or underestimated compared to estimations, what can be seen both in the comparison maps and the correlation graphs. PFTA tends to overestimate carbon stock in most of Amazon basin, mainly in the central region and at the basin edges, hence, in general, PFTA shows low agreement and large discrepancies in the range of values relatively to the data used as reference. In its turn TBA presents better agreement with references, matching the observed values reasonably well, presenting more areas of total concordance (white cells in Fig. XXa and d) as well as higher amount of points approximating to the 1:1 line (Fig. XX c and f). However, where TBA simulation doesn't totally match with the estimation by Saatchi et al., (2011) and Baccini et al., 2011) it tends to subestimate mean carbon values for example in the east and southwest of the basin. The same way as for PFTA, TBA overestimates carbon stocks mainly at the edges of the studied region.Amazon basin. The spatial pattern comparison previously described repeats for both reference maps, although CAETÊ simulations better agree with Baccini’s map in its both versions.

Within the studied region the model CAETÊ simulated a total aboveground carbon stock of 127.89 and 85.99 PgC for PFTA and TBA, respectively; while Baccini et al. (2012) estimated 80.23 PgC and Saatchi et al. (2011) 71.67 PgC; it demonstrate that TBA also better agree with references regarding total carbon stock. Our results evince that the inclusion of trait variation in vegetation models in fact plays a paramount role in predicting carbon stock both considering spatial distribution and total values.

In situ measurements