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## Individual tree detection in intact forest and degraded forest areas in the north region of Mato Grosso State, Brazilian Amazon

Show affiliations

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The State of Mato Grosso - MT has the second largest area with degraded forest among the states of the Brazilian Legal Amazon. Land use and land cover change processes that occur in this region cause the loss of forest biomass, releasing greenhouse gases that contribute to the increase of temperature on earth. These degraded forest areas lose biomass according to the intensity and magnitude of the degradation type. The estimate of forest biomass, commonly performed by forest inventory through sample plots, shows high variance in degraded forest areas. Due to this variance and complexity of tropical forests, the aim of this work was to estimate forest biomass using LiDAR point clouds in three distinct forest areas: one degraded by fire, another by selective logging and one area of intact forest. The approach applied in these areas was the Individual Tree Detection (ITD). To isolate the trees, we generated Canopy Height Models (CHM) images, which are obtained by subtracting the Digital Elevation Model (MDE) and the Digital Terrain Model (MDT), created by the cloud of LiDAR points. The trees in the CHM images are isolated by an algorithm provided by the Quantitative Ecology research group at the School of Forestry at Northern Arizona University (SILVA, 2015). With these points, metrics were calculated for some areas, which were used in the model of biomass estimation. The methodology used in this work was expected to reduce the error in biomass estimate in the study area. The cloud points of the most representative trees were analyzed, and thus field data was correlated with the individual trees found by the proposed algorithm. In a pilot study, the proposed methodology was applied generating the individual tree metrics: total height and area of the crown. When correlating 339 isolated trees, an unsatisfactory  $R^2$  was obtained, as heights found by the algorithm were lower than those obtained in the field, with an average difference of 2.43 m. This shows that the algorithm used to isolate trees in temperate areas did not obtained satisfactory results in the tropical forest of Mato Grosso State. Due to this, in future works two algorithms, one developed by Dalponte et al. (2015) and another by Li et al. (2012) will be used.

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