Estimating the Above Ground Biomass of Brazilian Savannah (Cerrado) using multi-sensor approach

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The Brazilian Savanna, known as Cerrado (Cerrado sensu lato (s.l.), is the second largest biome in South America. It comprises different physiognomies due to variations of soil, topography and human impacts. The gradients of tree density, tree height, above ground biomass (AGB) and wood species cover vary according to the Cerrado formation, ranging from different grassland formations (Campo limpo, Campo sujo), savannah intermediary formations (Campo cerrado and Cerrado sensu stricto - s.s) and forest formations (Cerradão, Mata ciliar, Mata de galeria and Mata seca).

Although the carbon stock in Cerrado is lower than in the Brazilian Amazon, the conversion of this biome to other types of land use is occurring much faster. In the last ten years, the degradation of Cerrado forest was the second largest source of carbon emissions in Brazil. Therefore, effective methods for assessing and monitoring aboveground woody biomass and carbon stocks are needed. A multi-sensor Earth Observation approach and machine learning techniques have shown potential for the large-scale characterization of Cerrado forest structure. The aim of this study is to present a method to estimate the AGB of the Brazilian Cerrado using ALOS-PALSAR (L-band SAR), Sentinel-1 (C-band SAR), Landsat, LIDAR (LIght Detection And Ranging) and field datasets. Field data consisted of 15 plots of 1 ha area located in Rio Vermelho in Goiás-State (Brazil). We used a 2-step AGB estimation (i) from the field AGB using LIDAR metrics and (ii) from LIDAR-AGB to satellite Earth Observation scales following a Random Forest regression algorithm. The methodology to estimate ABG of Cerrado Stricto Sensu vegetation is part of the Forests 2020 project which is the largest investment by the UK Space Agency, as part of the International Partnerships Programme (IPP), to support in the improvement of the forest monitoring in six partner countries through advanced uses of satellite data.

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