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Spatial evaluation of the caatinga plant height using drone images

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The Caatinga biome in Brazil is the largest dry forest in America. Its area comprises over than 150 families of plants that associated with soils and climate show diverse physiognomies, where the plants present great variation in relation to density distribution, size, biomass and height. Understanding how the caatinga species behave in response to the climate can provide indicators for their preservation policies and for the analysis of their resilience in face of anthropic activities and climatic changes scenarios. For that is important to know how carbon can the caatinga plants stock. In this context, monitoring and account the above ground biomass of the forests for different biomes have been on focus in many change climate researches. A very important parameter used for estimating biomass is the plant height. With the advent of remote sensing, photogrammetry and geographic information system (GIS), new technologies and tools, such as unmanned aerial vehicle or drones, have been used to acquire imagens with high spatial resolution, in a fast and low-cost way. The images are easily converted in large quantities of georeferenced data that can be used to extract vegetation indices and biometric parameters of the plants. Thus, the objective of this study was to evaluate the spatial variation of the plant height in an area of pristine Caatinga using cameras that capture red, green and blue (RGB) images installed in a drone. Flights were done in an area of interest (AOI) of 5 ha during the wet and dry season. The date of the flights were defined by weather, and the light condition varied from full sun to full overcast. It was used a commercial drone (Phanton 3 Standard) with its 12 megapixel RGB camera attached to the drone on a gimbal. The gimbal compensates for the drone movement during the flight. The images were captured at 80 m above ground level (AGL), with the camera settings adjusted to lighting conditions and set to a fixed exposure for each flight. The point cloud obtained was imported into the Quick Terrain Modeler (QTM) software and the AGL Analyst tool was used from the Analysis menu to obtain the Canopy Height Model (CHM). The CHM shows an image with the height, in meters, of the studied area with caatinga vegetation. Transects of the CHM were used for spatial evaluation of plant height. According to the transect, were observed threes with maximum height of 5.5 m, 4,0 m or 3,0 m. The results were according to those measured in the field surveys, and also with those presented in the literature using traditional and high precision methods. The estimation of plant height of the caatinga vegetation from point clouds obtained by RGB cameras settled in drones was an efficient technique to assess height of trees in large area. Also, this data can be used with models to estimate above ground biomass and carbon stock in caatinga areas.
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