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MCD64A1 collection 6 validation over Brazilian Cerrado

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Over the last two decades, special attention has been devoted to mapping vegetated areas affected by fire using orbital remote sensing, covering a variety of techniques based on a diversity of sensors with different spatial, spectral and temporal resolutions. Among these initiatives appears the Moderate Resolution Imaging Spectroradiometer (MODIS) burned area product by NASA, the so-called MCD64A1 Direct Broadcast Monthly Burned Area Product, which is available globally and monthly back to August 2000 at 500m resolution. The MCD64A1 product is currently used in the framework of the Global Fire Emissions Database (GFED) initiative and was recently adopted as the standard MODIS burned area product replacing MCD45A1. The product is now being generated based on an enhanced version of the original one; also using the new Collection 6 (versus Collection 5.1) surface reflectance and active fire input data. A collection refers to a periodically reprocessing process of the entire MODIS data archive and consists of enhanced algorithms and other refinements in calibration, geolocation, among others. In such context, a systematic validation of the new version of the product, hereafter MCD64A1 C6, is crucial to evaluate the detection quality of the algorithm and to estimate the expected error associated to the burned area mapping. Accordingly, the objective of this work is to undertake an accuracy assessment of the new MCD64A1 C6 for the whole Brazilian Cerrado during the 2015 fire season and to compare the results with those derived from the old collection 5.1. The validation approach was conducted over an area of 2,045,000 km^2 using reference data generated by the National Institute of Space Research (INPE) derived from Landsat-8 OLI images enclosing 113 path/rows. Results reveal very distinct spatial behavior, in particular, due to a great diversity of land use and land cover types along the entire Cerrado biome. In general, both collections show lower errors in the northern sector than in the southern one. This fact is related to the presence of cropland burning in the southern Cerrado which is generally difficult to map. MODIS standard products (MCD45A1 and MCD64A1 C5) are known to be very conservative in the sense that a low level of false alarms is attained with frequent occurrences of omission errors, in particularly in Cerrado. Our results show that the MCD64A1 C6 presents, on average, a reduction of 10% in the omission errors when compared to the old C5. However, it was observed that the new MCD64A1 C6 has a greater incidence of commission errors, especially in agricultural burning.