

Analysis of Burned Area, Fire Hotspots and MODIS AOD Products in the Caatinga Biome of the Brazilian Northeast

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Abstract

In the Brazilian Northeast (NEB), there is a scarcity of studies on atmospheric aerosols, primarily due to the limited network of air quality stations. Consequently, aerosol optical depth (AOD) data from satellites becomes crucial for the region. Vegetation fires are frequent and a significant source of aerosols in the NEB. This study analyzes the relationship between fire hotspot data (MODIS MOD14/MYD1A), burned area data (MODIS MCD64A1 and MapBiomas) and AOD data from the MODIS sensor (MOD04 and MYD04). We analyze the AOD products Dark Target (DT), Deep Blue (DB), Dark Target 3km (DT3k), and MCD19A2, which have spatial resolution of 10, 10, 3 and 1 km, respectively, from 2015 to 2018. We also use AOD data from MERRA2 reanalysis with horizontal resolution of 50 km. Monthly and spatial averages of AOD were calculated for the Caatinga biome in the NEB. The monthly total burned area and fire hotspots were averaged for the four years. The results show that in the second semester there is an increase in burned area and fire hotspots, with a maximum in October. The DB and MCD19A2 products have similar behavior, also increasing from July, with a maximum in October. However, MCD19A2, DT and DT3K show a peak of AOD in Feb-Mar-Apr, which does not agree with the burned area and fire hotspots pattern, and may thus be attributed to other aerosol sources such as Saharan dust, for example. MERRA AOD agrees with burned area and fire hotspots data during the second semester, with a maximum in November, and does not present a second peak in the first semester as the DT, DT3k and MCD19A2 products do. These results show that AOD data from DB and MERRA have the most similar temporal patterns with burned area and fire hotspots data between the analyzed AOD products.

Early Career Scientist

YES, I am an early career scientist.

IGAC Activities

MAP-AQ: Monitoring, Analysis and Prediction of Air Quality, BBURNED: Biomass Burning Uncertainty: ReactionNs, Emissions and Dynamics

IGAC Regional Working Groups

Americas Working Group, Southern Hemisphere Working Group