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Earth Observation Applications, Societal Challenges and Economic Benefits (5)

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MONITORING BURNED AREAS IN THE AMAZON FOREST FROM TIME SERIES SATELLITE DATA

Abstract

Human action potentiates the climatic effects and is the main cause of the burning events in the Amazon Forest, occurring mainly in areas of deforestation and management of agriculture and pasture. Therefore, land use and cover condition the burning patterns of the Amazon forest, where Conservation Units and Indigenous Lands are important barriers, while sites with intense deforestation, fragmentation and presence of highways present a higher number of fires.

The Amazon region, with a total extension of 5.5 million km2, presents a high vulnerability to forest fires due to the following factors: most species do not tolerate recurrent burn events, the organic matter essential to the maintenance of ecological processes is incinerated, and changes occur in the floristic and structural composition of the forest. The fragmentation of the Amazonian landscape makes the forest more susceptible to fire events. Burnings in the Amazon are concentrated along the "deforestation arc," a growing region between the eastern and southern edges of the forest with intensified anthropogenic actions. In the interior of the Amazon, the deforestation arc has lower biomass and drier climates, resulting in larger burnings. The effects of climate change on the Amazon region provide for the expansion of forest fires in the region due to more frequent droughts and intensification of land use.

Among the sensors with high temporal resolution, the MODIS sensor has been prominent in the mapping of fires in the different terrestrial biomes and of burned areas. The MODIS product of thermal anomalies (MOD14 / MYD14) has been widely used in the study of fires in the Amazon. Some studies, evaluated the product for the Amazon region in the north of the State of Mato Grosso and found that the method hit 51.58% of the total areas burned, where most of the undetected areas occur in small areas (average size of 38.74 ha). In addition, the MOD14 product could overestimates the amount of burned areas by mistakenly considering areas of exposed soils, forests and other types of land cover.

This research aims at evaluating MODIS time series spectral indices for mapping burned areas in some areas of the Para and Rondonia states (Brazil), located in the arc of deforestation, and at assessing their occurrences in the different types of land use/land cover during the period 2012-2016 because an accurate and validated automated detection system still need improvements to be operative.