



Seasonal fire dynamics in Brazilian biomes in the last years

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A worldwide increase in the number of vegetation fires occurred in the last decades and Brazil accounts for the highest records in South America. The use of fire is still common as a tool for soil management, deforestation, pasture renewal and manual sugar-cane harvesting in developing regions. However, inadequate fire use causes socioeconomic and environmental damages. In this context, an assessment of the potential fire risk of vulnerable lands can be used to minimize harmful consequences and promote sustainable land management and practices. Therefore, the aim of this study was to evaluate the seasonal predominant fire risk in the Brazilian biomes (Amazonia, Caatinga, Cerrado, Mata Atlântica, Pampas e Pantanal) from 2001 to 2017 according to the fire risk (FR) model from Center for Weather Forecasting and Climate Studies/National Institute of Space Research (CPTEC/INPE). The FR model estimates the daily fire risk in a given region based on the number of consecutive days without precipitation during the last 120 days, the maximum daily temperature, the minimum daily relative air humidity and the local vegetation type. The meteorological data were obtained from the Climate Prediction Center and from reanalysis of the European Center for Medium-Range Weather Forecasts Interim Reanalysis. The vegetation type is a reclassification of Brazil's MapBiomas v3.0 dataset in seven predominant land cover classes defined by the Brazilian Institute of Geography and Statistics-IBGE. All input datasets were interpolated to a grid of 25x25km spatial resolution. From the daily FR data, the monthly predominance of FR in each biome was calculated, issuing the monthly median values within the 25th and 75th percentiles values for the same month of all years. The predominant FR values were evaluated in five categories: 1-minimum: $FR < 0.15$, 2-low: $0.15 < FR < 0.40$, 3-medium: $0.40 < FR < 0.70$, 4-high: $0.70 < FR < 0.95$ and 5-critical: $FR > 0.95$). The biomes showed different seasonal distributions of FR. Caatinga, Cerrado and Pantanal were the biomes with more months susceptible to fire, with medium to high FR, and concentrated in the dry season (June to November, May to October and June to September, respectively). Amazonia, with ~ 5 million km², and Pampas showed minimum to low FR, with maximum values in August. Mata Atlantica has a low-medium FR from April to September. This study showed that an adequately fire use in the land management and agricultural practices or prescribed fires to minimize fuel to avoid dangerous forest fires must be applied in different periods for each biome in order to minimize the FR.

Keywords: fire modelling, fire risk, Cerrado, Amazonia

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