

An Exploratory Analysis of Brazilian Forest Fires

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Abbreviated abstract: Brazil has extensive plant formations throughout its territory that are affected daily by fire occurrences. Identifying the locations and frequency of these fires in a time series can help to create strategies and take steps to avoid them. Based on geo-spatial data captured by reference satellites and made available by the National Institute for Space Research (INPE), it will carry out an exploratory analysis using data from the AQUA_M-T reference satellite in order to analyze the spatiotemporal distribution of the focuses of fire, based on the fire risk categorization defined by INPE.

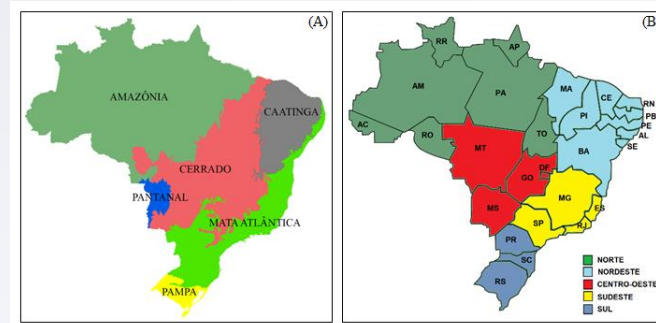
Problem, Data

Motivation: Location and frequency of fires in Brazilian territory.

- Data collected through the Queimadas program, developed by INPE.
 - AQUA_M-T reference satellite
- Study areas:
 - Biomes: Amazônia, Caatinga, Cerrado, Mata Atlântica, Pampa e Pantanal.
 - Seasons: Winter, Autumn, Spring and Summer
 - Geographic Regions: Midwest, Northeast, North, Southeast and South
- Temporal analysis comprises the period of the last 5 years, between 2106 and 2020.

Study area and units of spatial analysis:

(A) Biomes, (B) Geographic regions and federative units (states).

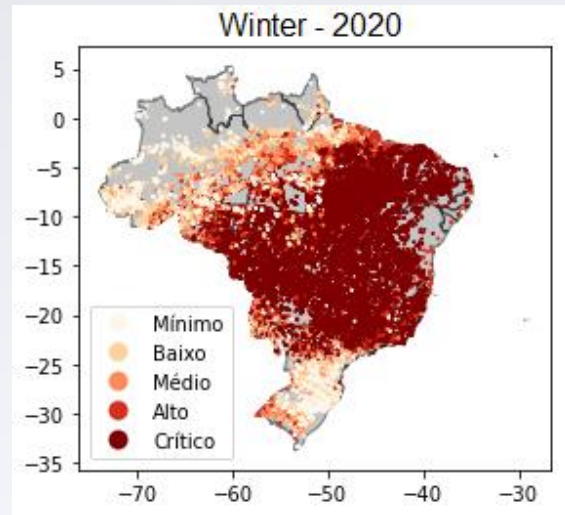


Methods

- We use Python and Numpy, Geopandas and Matplotlib libraries.
- Categorization of the Fire Risk variable.

| Classes Risco Fogo | Valores do Risco Fogo (RF) |
|--------------------|----------------------------|
| Minimum | $RF < 0,15$ |
| Low | $0,15 < RF \leq 0,40$ |
| Medium | $0,40 < RF \leq 0,70$ |
| High | $0,70 < RF \leq 0,95$ |
| Critical | $RF > 0,95$ |

Winter 2020. Year and season that registered the most fires in the study area. →



Results and Conclusions

- 2020 was the year with the highest number of fires.
- 52% of the fires are classified as critical.
- Amazônia and Cerrado are the biomes that have the most critical fires. Pampa the smallest.
- 89% of the Caatinga fires have critical fires.
- Winter has the highest amount of burning and the highest % of burning at the critical level.
- Summer is the season that has only 5% of fires.
- Northeast and Southeast present 75% of critical fires. 60% of fires in the southern region are classified as minimal and low risk.
- Mato Grosso and Pará are the states with the highest number of fires in the period studied.

