Evaluating fire danger in Brazilian biomes: present and future patterns

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Climate change is expected to have a significant impact on fire occurrence and activity, particularly in Brazil, a region known to be fire-prone [1]. The Brazilian savanna, commonly referred to as cerrado, is a fire-adapted biome covering more than 20% of the country's total area. It presents the highest numbers of fire events, making it particularly susceptible to changes in climate. It is thus essential to understand the present fire regimes in Brazilian biomes, in order to better evaluate future patterns.

The CPTEC/INPE, the Brazilian Center for Weather Forecasting and Climate Research at the Brazilian National Institute of Space Research developed a fire danger index based on the occurrence of hundreds of thousands of fire events in the main Brazilian biomes [2]: the Meteorological Fire Danger Index (MFDI). This index indicates the predisposition of vegetation to be burned on a given day, for given climate conditions preceding that day. It relies on daily values of air temperature, relative humidity, accumulated precipitation and vegetation cover.

In this study we aim to access the capability of the MFDI to accurately replicate present fire conditions for different biomes, with a special focus on cerrado. To this end, we assess the link between the MFDI as calculated by three different reanalysis (ERA-Interim, NCEP/DOE Reanalysis 2 and MERRA-2) and the observed burned area. We further calculate the validated MFDI using a regional climate model, the RCA4 as forced by EC-Earth from CORDEX, to understand the ability of the model to characterize present fire danger. Finally, the need to calibrate the model to better characterize future fire danger was also evaluated.

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