



The 1.5°C global warming target and its impact on future burned area in the Brazilian savanna

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Fires have substantial economic, social and health related impacts worldwide. In fire-prone regions, such as the Brazilian savanna (cerrado), fire shapes ecosystem composition and structure, influencing species abundance and diversity. Therefore, it is crucial to understand how climate-change might affect fire patterns in the coming decades.

Relying on results from a regional climate model - the Rossby Centre regional atmospheric model, RCA4 - we assess fire danger and burned area (BA) patterns in the Brazilian cerrado over the recent past and their future trends. Fire danger is evaluated by means of the Daily Severity Rating (DSR), an extension of the Canadian Forest Fire Weather Index (FWI) System, whereas BA patterns are derived from the AQM product that is based on information provided by the MODIS radiometer on-board Terra and Aqua polar orbiters. The rationale is to use a statistical linear model that is able to explain about 71% of the interannual variability of the logarithm of BA in 2003-2017 using as predictor fire season averaged DSR. The model is then used to project future fire BA over the Brazilian cerrado using DSR from climate scenarios of the Intergovernmental Panel on Climate Change's Representative Concentration Pathways (RCP) 2.6 and 4.5.

Results show an increase in future BA for both scenarios, that is especially pronounced in the case of RCP 4.5 where mean BA is expected to increase by 39% by the end of the 21st century, most of this increase occurring already in the first half. We also find that, for RCP 2.6, the scenario that is closer to the 1.5°C warming of the Paris Agreement goals, the resulting change in BA would be much smaller, peaking at 22% increase by mid-century, and then decreasing to 11% above 2005 values. Extreme event likelihood also increases in both scenarios, possibly meaning an increase in intensity and frequency of fire events, highlighting the importance of keeping to the 1.5°C warming target by 2100.

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