



Future projections of fire danger in Brazilian biomes in the 21st century

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In the global context, Brazil is one of the regions more severely affected by fire occurrences, with important consequences in the global CO₂ balance, the state of the Amazon forest and the ecological diversity of the region. Brazil is also one of the few regions experiencing a raise in annual mean temperature above 2.5o during the 20th century, which may further increase between 2o and 7o until 2100 and, likely, be accompanied by a decrease in precipitation [1]. As the fire occurrence and severity largely depends on these two variables, it is worth assessing the evolution of fire danger for the coming decades.

In order to obtain a detailed characterization of the future fire patterns in the different biomes of Brazil, we use outputs from a regional-downscaling of the EC-Earth climate model at 0.44 degrees spatial resolution for two future scenarios, an intermediate (RCP4.5) and a more severe (RCP8.5) one. We use a fire danger index specifically developed for the Brazilian climate and biome characteristics, the IFR from INPE. This index relies on values of maximum temperature, accumulated precipitation over different periods, minimum relative humidity and vegetation cover to estimate the likelihood of fire occurrence.

We find a systematic increase of the days with critical fire risk, which is more pronounced in RCP8.5 and mostly affects months when fire activity takes place. Temperature increase is the most determinant factor for the increase in fire danger in the dry regions of savannah and shrubland, a result to be expected as fuel is already very dry.

[1] Collins, M., R. Knutti, J. Arblaster, J.-L. Dufresne, T. Fichefet, P. Friedlingstein, X. Gao, W.J. Gutowski, T. Johns, G. Krinner, M. Shongwe, C. Tebaldi, A.J. Weaver and M. Wehner, 2013: Long-term Climate Change: Projections, Commitments and Irreversibility. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.