Geophysical Research Abstracts
Vol. 21, EGU2019-2329, 2019
EGU General Assembly 2019

Future global climatology of critical forest flammability events

Matthias Boer (1), Hamish Clarke (1,2), Rachael Nolan (1), Víctor Resco De Dios (3), and Ross Bradstock (2)

(1) Western Sydney University, Hawkesbury Institute for the Environment, Penrith, Australia (m.boer@westernsydney.edu.au), (2) Centre for Environmental Risk Management of Bushfires, University of Wollongong, Wollongong, Australia , (3) Department of Crop and Forest Sciences-AGROTECNIO Center, Universitat de Lleida, E 25198 Lleida, Spain

Most forests are inherently flammable and can burn whenever the fine dead surface fuels dry out to ignitable levels, which has been shown to only take a few weeks of dry warm weather conditions in temperate eucalypt forests of Southeast Australia. At the landscape scale, potential for large fires strongly increases with the spatial connectivity of dry fuel areas and with the duration of this connected dry fuel state, which we refer to as a critical forest flammability event. To quantify the potential for landscape scale forest fire thus requires: (i) spatially continuous predictions of daily fine dead fuel moisture content (FM), and (ii) objective identification of critical FM thresholds controlling the likelihood of major landscape fire events in global forest regions.

Here, we apply a physically-based model for prediction of FM from gridded daily vapour pressure deficit data to create 30-year global climatologies of daily FM under current (1980-2017) and projected future climates. Critical FM thresholds were identified for global forest regions under current climate using global burned area data and the monthly distribution of predicted FM for the fire-affected areas. The mean annual frequency of critical forest flammability events was then calculated for current and future climates as the number of days per year that predicted FM drops below the empirically derived FM thresholds for major landscape fire. We demonstrate the potential of this approach for global forest regions using two global climate models and two representative concentration pathways.

Identifying global forest regions that may transition to increasing or decreasing frequencies of critical forest flammability events could help fire managers and other decision makers with strategic planning and prioritisation of resource allocation and scientific research.