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# Assessing meteorological fire danger in the Zambezia province of Mozambique

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Annually 6 to 10 million hectares of forests, savannas and grasslands burn in Mozambique, the vast majority due to human related activities including farming, hunting and charcoal production. These activities, combined with the impacts of climate change, have led to an increase in the number and intensity of uncontrolled fires often implying serious socioeconomic, ecosystem and biodiversity consequences.

Founded in 2009, Portucel-Mozambique is responsible for Mozambique's largest integrated forestry project for paper, pulp and energy production. The properties are mainly located in the northern province of Zambezia and the daily activities of the company have been significantly affected by fires.

Here we present and discuss the main results obtained within a project supported by the World Bank on the development of an early warning system for forest fire in the Zambezia province. The core of the project is a statistical model of exceedances of energy released by fires that relies on a Generalized Pareto distribution that uses, as a covariate of its scale parameter, the Fire Weather Index (FWI), an index of meteorological fire danger that is part of the Canadian Forest FWI System. The model was calibrated using information covering the period from 2004-2017 and validated during 2018. Daily values of released energy at each pixel are derived from the Fire Radiative Power (FRP) product that is operationally disseminated by EUMETSAT Satellite Application Facility on Land Surface Analysis (LSA SAF). Information relies on data provided by the SEVIRI instrument on-board Meteosat geostationary satellites. Five classes of fire danger (low, moderate, high, very high and extreme danger) are then defined for each pixel, on a daily basis, according to the level of probability for three ranges of energy released: below 800 GJ, between 800 and 2 000 GJ and above 2 000 GJ. Results put into evidence the key role played by meteorological conditions in the occurrence of large fire events characterized by high values of energy released. For instance, 73% (90%) fires recorded during the calibration (validation) period releasing energy above 2 000GJ are in pixels classified as of extreme danger.

Information about active fires and meteorological fire danger in the Zambezia province is currently available in near-real time at the CeaseFire website developed with similar objectives but for Portugal (http://idlcc.fc.ul.pt/CeaseFire/index.php). The platform provides maps and user friendly information of FWI and classes of fire danger for five days prior, the current day and the next two days. This tool is currently being daily used in an operational way by the Portucel-Mozambique team responsible for fire management.

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