

## Abstract

Wildfire susceptibility mapping based on Random Forests. The case study of Santa Cruz (Bolivia)

by

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Wildfires are one of the major catastrophic phenomena that affect the different ecosystems of Bolivia. In the last years, the department of Santa Cruz has been the most affected by this hazard, thus, there is an urgent need for effective management of wildfires to reduce the severe loss of human life, ecosystems and properties in the areas affected. Mapping the spatial prediction of wildfire susceptibility is an excellent guiding tool for emergency land management, wildfire prevention, mitigation of fire impacts by on-time responses and recovery management. Different methods have been proposed to model the susceptibility of wildfires but the use of Machine Learning (ML) algorithms enable the modelization of high dimensional and complex non-linear phenomena, which is exactly what the study of wildfire integrated with geo-environmental variables requires. This project provides insight into the use of Random Forests (RF) algorithm for the elaboration of wildfire susceptibility maps for the department of Santa Cruz (Bolivia). In this study, the data regarding the burned areas that occurred throughout the 2010 - 2016 period has been modeled using the RF algorithm. The output of the RF model is the susceptibility map of the study area, that provides an analytical framework in which the underlying patterns of wildfire occurrence in Santa Cruz and their major drivers can be better understood. Besides, its performance was assessed by the ROC curve method and tested with the dataset of the burned areas of 2017 - 2019. Both attested the reliability of the model and its results. Finally, the same methods were applied in San Ignacio de Velasco, one of the municipalities most affected by wildfires, in order to compare the performance of the model when studying a smaller and more homogeneous area, and, consequently, a smaller and less diverse dataset. In both cases, the accuracies of the prediction were high, as desired.