Geophysical Research Abstracts
Vol. 21, EGU2019-5110, 2019
EGU General Assembly 2019


# Assessing post-fire soil erosion and its mitigation with Morgan-Morgan-Finney model in a recently burned Maritime Pine stands

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Wildfires have become a recurrent threat for many Mediterranean forest ecosystems. The characteristics of the Mediterranean climate, with its warm and dry summers and mild and wet winters, make this region prone to wildfire occurrence as well as to post-fire soil erosion. The wide recognition of wildfires as a driver for runoff and erosion in burnt forest areas has created a strong demand for model-based tools for predicting the post-fire hydrological and erosion responses and, in particular, for predicting the effectiveness of post-fire management measures to mitigate these responses.

In this presentation, we will analyse how well hydrological and erosion model calibration can be transferred between burnt areas and treatments. To this end, we used data from three field experiments in north-central Portugal. The Colmeal experiment was carried out in two Maritime Pine stands following a 2008 wildfire, and tested the effectiveness of spontaneous needle cast and hydromulching. The Colmeal measurement and modelling results were published in Prats et al. (2016) and Vieira et al. (2018). The Castanheira de Pera study site was set up as a pilot station on post-fire erosion and its mitigation (spontaneous and manipulated needle cast), upon request from the national Institute of Nature Conservation and Forestry of Portugal (ICNF), following the so-called Pedrógão-Góis wildfire of June 2017 in central Portugal. The Loriga experiment was started only recently, in the framework of the EPyRIS SUDOE project, following a wildfire on 24 August 2018, and aims to assess the effectiveness of mulching with pine needles and with pine chips in a former Maritime Pine stand. Both mulch treatments explicitly targeted minimal application rates (1.3 and 2.6 Mg ha-1).

In a nutshell, the Colmeal experiment showed that hydromulching was more effective than spontaneous needle cast to reduce overland flow generation but similarly effective to reduce erosion. The overall runoff coefficient decreased from 43 % under untreated conditions to 10 and 23 %, respectively, while soil losses dropped from 3.7 Mg ha-1 y-1 under untreated conditions to 0.5 and 0.4 Mg ha-1 y-1. The runoff and erosion rates of all three treatments could be predicted with reasonable accuracy by Morgan-Morgan-Finney model.

The insights gained in the application of the three models to the Colmeal data set will now be applied to the initial data from Castanheira de Pera and Loriga experiment, in particular to assess the importance of local factors in the models' performance.

Vieira, D.C.S., Serpa, D., Nunes, J.P.C., Prats, S.A., Neves, R., Keizer, J.J., 2018. Predicting the effectiveness of different mulching techniques in reducing post-fire runoff and erosion at plot scale with the RUSLE, MMF and PESERA models. Environmental Research 165: 365–378.

Prats S.A., Malvar M.C., Vieira D.C.S., MacDonald L., Keizer J.J., 2016. Effectiveness of Hydromulching to reduce runoff and erosion in a recently burnt Pine plantation in Central Portugal. Land Degradation & Development.