Geophysical Research Abstracts
Vol. 16, EGU2014-979-1, 2014
EGU General Assembly 2014

Water repellency and organic matter composition after a wildfire: new insights using thermal analysis

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Water repellency, a key parameter in the hydrological and ecological behaviour of ecosystems, is one of the main soil properties affected by wildfire through its impact on organic matter (Shakesby and Doerr, 2006). This study examines the link between post-fire organic matter quantity and composition, soil water repellency and related hydrological properties in order to (i) examine the influence of different organic matter pools on soil hydrological properties and (ii) to explore the use of these links as a proxy for soil hydrological impacts of fire. Soil samples from five fire-affected burned and unburned control sites in Andisols terrain in Tenerife, previously studied for water repellency and hydrology-related properties (Neris et al., 2013), were selected and thermogravimetric analysis (TG) carried out to evaluate fire impacts on their organic matter composition. A decrease in the organic matter quantity as well as in the relative amount of the labile organic matter pool and an increase in the recalcitrant and/or refractory pool depending was observed in the burned soils. TG data, using 10 ºC temperature range steps, allowed reasonable prediction of soil properties evaluated, with R2 ranging from 0.4 to 0.8. The labile pool showed a broad and positive influence on most soil properties evaluated, whereas the refractory pool and the dehydration range affected the surface water holding capacity and water repellency. These results, in conjunction with the simplicity of the TG analysis suggest that, following a calibration step to link TG data to the site-specific post-fire soil properties, this method may be a useful tool for rapid and cost-effective soil hydrological response evaluation after the fire.

References

Neris, J., Tejedor, M., Fuentes, J., Jiménez, C., 2013. Infiltration, runoff and soil loss in Andisols affected by forest fire (Canary Islands, Spain). Hydrological Processes 27(19), 2814-2824.

Shakesby, R.A., Doerr, S.H., 2006. Wildfire as a hydrological and geomorphological agent. Earth-Science Reviews 74(3-4), 269-307.