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Preliminary study of the short term response of soil properties to forest fire in the South of Spain

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Forest fires are a widespread phenomenon in Mediterranean environments, where they are favored by drought and high temperatures conditions that are common in summer. Wildfires affect dramatically to soil physical, chemical and biological properties, which changes the hydrological and erosive soil response. The removing of vegetation leads to erosive and degradation processes, very important immediately after the fire.
The objectives of this study are: i) to compare the properties of soils affected by a recent wildfire to the properties of soils that were not; ii) to assess the effect of the vegetal cover in the short-term response of soil to wildfire.
The experimental area is located in the South of Spain, 32 km western of the city of Málaga. In general, the area is characterized by a sub-humid Mediterranean climate (mean annual precipitation: 699 mm year-1; mean annual temperature: 17°C), with a substratum of alkaline metamorphic rocks. Vegetation cover consists on a mixed open wood of Quercus spp. and Pinus spp. with typical degraded Mediterranean scrub, where the dominant genus are Ulex spp. and Cistus spp. This area was partially affected by a wildfire on September 11th 2011
Three soil microenvironments were selected in burned and unburned soils: soil covered by shrubs, trees and bare soils. Unburned area was adjacent to the burned one and both of them had the same general conditions. On each microenvironment samples of the first 5 cm of soil were collected on September 19th 2011. The analyzed properties in the laboratory were pH, electrical conductivity (EC), texture, organic matter (OM), aggregate stability (AS), cationic exchange capacity and water repellency (WR). Likewise, unsaturated infiltration rate was calculated in field conditions on the sampling date.
When we analyzed the samples without taking into account the vegetation cover, our results suggested that the fire affected mainly to pH ($p<0.001$), EC ($p<0.001$) and OM ($p<0.01$) Surprisingly, AS and WR were not significantly affected by the wildfire ($p>0.05$). When we performed the analyses dividing the samples according to vegetal cover, the ANOVA showed that the wildfire only affected the OM content in soil covered by shrubs. In soil covered by trees and bare soil OM decreased, but it was insignificant. pH showed the opposite trend and EC was affected beneath all the vegetal covers. SWR and AS were not affected in any microenvironment.