



Effects of wildfire on soil organic carbon export by runoff in Central Portugal

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Forest fires, a frequent and recurrent phenomenon in Mediterranean ecosystems, have several ecological and environmental impacts caused in part by short- and medium-term effects on soil physical and chemical characteristics as well as on organic matter (OM) composition, properties and dynamics and hence upon microbial populations. This negatively affects soil health and quality, and enhances the occurrence of erosive processes and the loss of a non-renewable natural resource such is the soil. Due to the large C pool present in soils, even small changes in soil OM may have a significant effect on biogeochemical cycles and on global climate. Even though some authors consider that organic C mobilized by erosion processes may be protected from mineralization, the general tendency is to consider that soil erosion exposes OM to mineralization processes and represents the main factor of C losses from the planet's surface.

Whilst it is well documented that wildfires can have major impacts on hydrological and erosion processes, the associated transport of organic matter has received considerably less research attention. The FIRECNUTS project (PTDC/AGR-CFL/104559/2008) addresses this research gap by studying, among others, the export of organic carbon in a recently burnt forest area of 250 ha in north-central Portugal (Sever do Vouga). To this end, five slopes with contrasting forest types (eucalypt vs. Maritime Pine plantations) and geologies (schist vs. granite) are being monitored for sediment losses since a wildfire that occurred in July 2010. For reference, also a neighboring, long-unburnt eucalypt plantation is being monitored. The sediments collected by sediment fences were measured and collected at monthly intervals during the first 6 or 12 months after fire. The total carbon content of the sediment samples was measured using a Shimadzu TOC analyzer.

Preliminary results revealed marked differences in organic carbon concentrations between the two burnt eucalypt stands with contrasting geologies as well as between the pine and the eucalypt stand with the same geology. Somewhat surprisingly, organic carbon concentrations were comparatively in the case of the unburnt eucalypt stand. The temporal variation in organic carbon concentrations with time-since-fire was not very pronounced but that in total exports were.