Geophysical Research Abstracts
Vol. 17, EGU2015-13799, 2015
EGU General Assembly 2015

Export of solids and nutrients from burnt areas: effects of fire severity and forest type

Nelson Abrantes, Inês Morais, Vera Silva, Mauxa C Malvar, Sérgio Prats, Celeste Coelho, and Jan J Keizer
CESAM and Department of Environment, University of Aveiro, 3810-193 Aveiro, Portugal (njabrantes@ua.pt)

In the last few decades, the number of wildfires has markedly increased in Mediterranean Europe, including Portugal. Besides a range of direct impacts, wildfires can significantly alter the geomorphological and hydrological processes during a period commonly referred to as the "window-of-disturbance". It is now increasingly recognized that these indirect wildfire effects depend strongly on fire severity, i.e. the heating-induced changes in vegetation and litter cover as well as in topsoil properties such as infiltration capacity, aggregate stability and soil water repellency. Nonetheless, the exact role of fire severity in post-fire hydrological and erosion processes is still poorly quantified in many parts of the world, including Portugal. Another important gap in fire-related research stills to be the impacts of wildfire on soil fertility losses, in particular through erosion by runoff. Both research gaps were addressed in this study, following a wildfire that took place in July 2013 in Talhadas (Sever do Vouga, Aveiro) and burnt circa 815 ha. In the burnt area and the surrounding unburnt areas, six study sites were selected and, immediately after the fire, instrumented with slope-scale runoff plots. Two of the sites were long-unburnt, two were burnt at low severity and the other two were burnt at high severity; for all of them one being covered by a Eucalyptus globulus plantation and the other by a Pinus pinaster plantation. Following the instrumentation of the sites, runoff was measured at 1- to 2-weekly intervals and, whenever possible, runoff samples were collected for subsequent analysis in the laboratory with respect to total suspended sediments content and total nitrogen and total phosphorus concentrations. The results obtained in this study showed that the severity of the fire played a more important role in the loss of nutrients and solids than the type of vegetation. While the occurrence of fire markedly increased soil (fertility) losses, this effect was much stronger following a high-severity than low-severity fire. In the case of the pine slope, this effect of fire severity could be attributed to post-fire pine needle cast, with pine needles being scorched by the low-severity fire and being combusted in the high-severity fire. Looking at the temporal evolution, for both pine and eucalyptus slopes, significant exportations of solids as well nutrients were still found 10 months after the fire occurrence (May 2014) . This study highlight the importance of wildfire as a driver for the soil and fertility loss with consequent/potential impacts on surface water quality.