

The study of soil, hydrological, erosion and vegetation processes following wildfire in the Colmeal study area, central Portugal

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The EROSFIRE-II project (PTDC/AGR-CFL/70968/2006) has as overall aim to predict soil erosion risk in recently burnt forest areas, including following common post-fire forest management practices. Although the project's main focus is on on-site erosion processes, also the export of sediments out of small catchments is addressed. To this end, a study area of about 60 ha located near to the village of Colmeal (municipality of Góis, central Portugal) was instrumented extensively following a wildfire during August 2008, and has been monitored intensively afterwards. Five hillslopes were equipped with runoff plots of different dimensions and sediment fences, whereas a further five hillslopes were equipped with sediment fences only. An almost entirely burnt catchment of about 10 ha was instrumented with H-flume and a gauging station composed of a rainfall gauge, a water level sensor, a turbidity sensor and an automatic sampler. Preliminary analysis clearly shows the complexity of runoff generation and the associated sediment transport in recently burnt areas, with pronounced differences between hillslopes and across spatial scales as well as with marked variations through time. Therefore, further data analysis as well as model application and testing will go hand-in-hand with continued field monitoring of the hydrological and erosion response of this area, in particular in the framework of the PhD fellowship of the fifth author.

Notwithstanding the logistic difficulties inherent to a study area at a 2-hour drive distance from the project's home base, it has been possible to extend the scope of the work in the Colmeal area beyond that of above-mentioned hydrological-erosion research. The additional research topics being addressed are amongst others: (i) generation of high-resolution Digital Terrain Models using digital aerial photography and terrestrial laser scanning; (ii) recovery of the vegetation following fire and logging, with a special emphasis on the role therein of germination; (iii) direct and indirect wildfire effects on topsoil physic-chemical properties, in particular water repellency, organic matter content and composition, and carbon and nitrogen content; (iv) effectiveness of hydro-mulching to reduce overland flow generation and/or sediment losses; (v) the eco-toxicological effects of ash-loaded runoff; (vi) nutrient losses by runoff at the hillslope to catchment scale. The last topic deserves special mention in that it concerns a pilot-study for the recently approved FIRECNUTS project (PTDC/AGR-CFL/104559/2008).

The proposed presentation will show results from several of the above-mentioned topics, mainly to illustrate the multi-disciplinary nature of the ongoing research in the Colmeal study area.