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Repeat rainfall simulation experiments for post-fire erosion risk assessment and modeling in two eucalypt stands in Portugal

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The present work is part of the EROSFIRE project (POCI/AGR/60354/2004), funded by the Portuguese Foundation for Science and Technology (FCT). In a nutshell, the project wants to evaluate the suitability of rainfall simulation experiments (RSE's) to assess and model soil erosion hazard in recently burnt eucalypt plantations, nowadays the predominant forest type on the Serras of north-central Portugal.

RSE's were carried out at various occasions during the first two years following wildfires, including at six study sites where erosion plots were monitored for a direct comparison of natural and artificial rainfall events. MEFIDIS was chosen as the principal tool for erosion modelling.

The proposed presentation will focus on the RSE results obtained for two neighbouring eucalypt stands during the first year following a moderate-severity wildfire in early July 2005. The main difference between the stands is their pre-fire land management, one site having been ploughed in down slope direction and the other lacking evidence of mechanical ground operations. Between September 2005 and July 2006, a total of 32 RSE's were carried out using a portable simulator following the Cerdà et al. (1997) design. This was done in four field campaigns, each campaign involving two pairs of RSE's at each site and each pair of RSE's involving one high- (40-45 mm/h) and one extreme-intensity (80-85 mm/h) experiment on two adjacent plots.

The RSE's at both sites produced high runoff coefficients in September 2005 (median

values of 70-80 %), which then tended to decrease with time after fire, most markedly so at the ploughed site. The sediment losses produced by the RSE's also tended to decrease with time after fire but the most conspicuous phenomenon was the contrast between a few high (80-100 g/m2) versus mostly low values ($<$ 20 g/m2). These high losses all occurred during the first two campaigns, i.e. in September and November 2005. Initial MEFIDIS results for the RSE's are encouraging with respect to runoff generation in particular but are currently being reviewed.