Geophysical Research Abstracts
Vol. 14, EGU2012-13524-2, 2012
EGU General Assembly 2012

Overland flow generation processes in sub-humid Mediterranean forest stands

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Forest soils in north and central Portugal have suffered and continue to suffer major structural changes as a result of forest management techniques, such as clear-felling and as a result of wildfire and rip-ploughing, which is carried out to prepare the ground for planting tree seedlings. In soils that have undergone these changes, the characteristics tend to be different for coniferous plantations, where the root system tends to die when the trees are cut following fire and subsequently may be consumed by fire to form a macropore network, and other types of tree plantations where the root system remains alive and allows regrowth from the sawn tree stumps. Overland flow thresholds decrease sharply as a result of rip-ploughing and forest fires and increase following clear-felling. The time taken for trees to reach maturity after wildfire differs markedly betwen the two main species (Pinus pinaster Aiton and Eucalyptus globulus Labill.) stands.

In this paper, overland flow is considered in relation to rainfall, throughfall and throughflow, both in terms of hydrology and hydrochemistry

in an attempt to understand overland flow generation mechanisms for a variety of forest land uses (mature pine and eucalyptus, pine seedling regrowth and eucalyptus regrowth from tree stumps, eucalyptus plantations and burned pine). Overland flow generation processes change sharply, even within a single rainfall event, as reflected in the soil hydrological processes and the hydrochemical fingerprints. These effects result from the different contact times for water and soil, which cause differences in the absorption and exhudation processes for the two species