Post-fire vegetation behaviour in large burnt scars from 2005 fire season in Spain

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Wildfires have a wide diversity of impacts on landscape which, in turn, depend on the interaction of fire regimes (e.g. intensity, extent, frequency) and the response of vegetation to them in short and long-terms. The increase in erosion rates and the loss of nutrients by runoff in the first months following the fire are among the major impacts of wildfires. A minimum of 30% of vegetation cover is enough to protect soils against erosion but vegetation may require a long period to reach this threshold after severe fires. Since erosion risk is strongly linked to vegetation recovery rates, post-fire vegetation monitoring becomes crucial in land management.

Fire regimes in the Mediterranean have been changing in the past decades due to modifications in both socio-economic and climate patterns. Although many vegetation species in Mediterranean ecosystems are adapted to wildfires, changes in fire regime characteristics affect the ability of ecosystems to recover to their previous state. In Spain, fire is an important driver of changes in landscape composition, leading to dominance of shrubland following fire and to a major decrease of pine woodlands (Viedma et al., 2006).

Remote sensing is a powerful tool in land management, allowing vegetation monitoring on large spatial scales for relatively long periods of time. In order to assess vegetation dynamics, monthly NDVI data from 1998-2009 from SPOT/VEGETATION at 1km spatial resolution over the Iberian Peninsula were used.

This work focuses on 2005 fire season in Spain, which registered the highest amount of burnt area since 1994, with more than 188000 ha burnt. Burnt scars in this fire season were identified by cluster analysis. Post-fire vegetation recovery was assessed based on the monoparametric model developed by Gouveia et al. (2010) that was applied to four large scars located in different geographical settings with different land cover characteristics. While the two northern regions presented fast recovery, in the remaining areas (centre and south), vegetation recovered very slowly and irregularly. Four years following the fire, vegetation density in these two scars was still markedly below pre-fire levels. Spatial patterns of recovery times were assessed in order to evaluate the influence of physical factors such as fire damage, pre-fire vegetation density and land-cover type, in post-fire behaviour of vegetation for each scar. Pre-fire land-cover type raised as a key factor that may partially explain the differences observed, with shrublands and mixed forests recovering faster than coniferous.

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