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Post-fire vegetation dynamics in Portugal

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The number of fires and the extent of the burned surface in Mediterranean Europe have increased significantly during the last three decades. This may be due either to modifications in land-use (e.g. land abandonment and fuel accumulation) or to climatic changes (e.g. reduction of fuel humidity), both factors leading to an increase of fire risk and fire spread. As in the Mediterranean ecosystems, fires in Portugal have an intricate effect on vegetation regeneration due to the complexity of landscape structures as well as to the different responses of vegetation to the variety of fire regimes. A thorough evaluation of vegetation recovery after fire events becomes therefore crucial in land management.

In the above mentioned context remote sensing plays an important role because of its ability to monitor and characterise post-fire vegetation dynamics. A number of fire recovery studies, based on remote sensing, have been conducted in regions characterised by Mediterranean climates and the use of NDVI to monitor plant regeneration after fire events was successfully tested (Díaz-Delgado et al., 1998). In particular, several studies have shown that rapid regeneration occurs within the first 2 years after the fire occurrences, with distinct recovery rates according to the geographical facing of the slopes (Pausas and Vallejo, 1999).

In 2003 Portugal was hit by the most devastating sequence of large fires, responsible by a total burnt area of 450 000 ha (including 280 000 ha of forest), representing about 5% of the Portuguese mainland (Trigo et al., 2006).

The aim of the present work is to assess and monitor the vegetation behaviour over Portugal following the 2003 fire episodes. For this purpose we have used the regional fields of the Normalized Difference Vegetation Index (NDVI) as obtained from the VEGETATION-SPOT5 instrument, from 1999 to 2008. We developed a methodology to identify large burnt scars in Portugal for the 2003 fire season. The vegetation dynamics was then analysed for some selected areas and a regression model of post-fire recovery was fitted to the recorded values of NDVI. The model allowed characterising the dynamics of the regeneration process. It was found that recovery rates depend on geographical location, fire intensity/severity and type of vegetation cover.

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