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Mapping burned areas and burn severity patterns across the Mediterranean region

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The Mediterranean region is highly susceptible to wildfires. On average, about 60,000 fires take place in this region every year, burning on average half a million hectares of forests and natural vegetation. Wildfires cause environmental degradation and affect the lives of thousands of people in the region. In order to minimize the consequences of these catastrophic events, fire managers and national authorities need to have in their disposal accurate and updated spatial information concerning the size of the burned area as well as the burn severity patterns. Mapping burned areas and burn severity patterns is necessary to effectively support the decision-making process in what concerns strategic (long-term) planning with the definition of post-fire actions at European and national scales.

Although a comprehensive archive of burnt areas exists at the European Forest Fire Information System, the analysis of the severity of the areas affected by forest fires in the region is not yet available. Fire severity is influenced by many variables, including fuel type, topography and meteorological conditions before and during the fire. The analysis of fire severity is essential to determine the socio-economic impact of forest fires, to assess fire impacts, and to determine the need of post-fire rehabilitation measures. Moreover, fire severity is linked to forest fire emissions and determines the rate of recovery of the vegetation after the fire.

Satellite imagery can give important insights about the conditions of the live fuel moisture content and can be used to assess changes on vegetation structure and vitality after forest fires. Fire events occurred in Greece, Portugal and Spain during the fire season of 2009 were recorded and analyzed in a GIS environment. The Normalized Difference Vegetation Index (NDVI), the Enhanced Vegetation Index (EVI) and the Normalized Burn Ratio (NBR) were calculated from 8-days composites MODIS/TERRA imagery from March to October 2009. In addition, subtracting a post-fire from a pre-fire image derived index produces a measure of absolute change of the vegetation condition, like the differenced Normalized Burn Ratio index (dNBR).

The aim of this study was the assessment of fire severity across diverse ecological and environmental conditions in the Mediterranean region.

The specific objectives were:

• The analysis of the correlation between the fire severity and local site conditions, including topography, fuel type, land use, land cover.

• The analysis of the correlation between fire severity and fire danger conditions during the fire, as estimated by the European Forest Fire Information System.

• Assessing the performance of several vegetation indices derived from MODIS imagery in estimating fire severity.

• Assessing the permanence of the burnt signal for large fires as an estimate of fire severity.