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On the characterization of vegetation recovery after fire disturbance using Fisher–Shannon analysis and SPOT/VEGETATION Normalized Difference Vegetation Index (NDVI) time series

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Time series can fruitfully support fire monitoring and management from statistical analysis of fire occurrence (Tuia et al. 2008) to danger estimation (lasaponara 2005), damage evaluation (Lanorte et al 2014) and post fire recovery (Lanorte et al. 2014). In this paper, the time dynamics of SPOT-VEGETATION Normalized Difference Vegetation Index (NDVI) time series are analyzed by using the statistical approach of the Fisher–Shannon (FS) information plane to assess and monitor vegetation recovery after fire disturbance. Fisher–Shannon information plane analysis allows us to gain insight into the complex structure of a time series to quantify its degree of organization and order. The analysis was carried out using 10-day Maximum Value Composites of NDVI (MVC-NDVI) with a 1 km $\times$ 1 km spatial resolution. The investigation was performed on two test sites located in Galizia (North Spain) and Peloponnese (South Greece), selected for the vast fires which occurred during the summer of 2006 and 2007 and for their different vegetation covers made up mainly of low shrubland in Galizia test site and evergreen forest in Peloponnese. Time series of MVC-NDVI have been analyzed before and after the occurrence of the fire events. Results obtained for both the investigated areas clearly pointed out that the dynamics of the pixel time series before the occurrence of the fire is characterized by a larger degree of disorder and uncertainty; while the pixel time series after the occurrence of the fire are featured by a higher degree of organization and order. In particular, regarding the Peloponneso fire, such discrimination is more evident than in the Galizia fire. This suggests a clear possibility to discriminate the different post-fire behaviors and dynamics exhibited by the different vegetation covers.

Reference

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