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Estimating burn severity and vegetation recovery using satellite MODIS data

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What are the various ecological effects caused by fires of different severity? This issue has been addressed in this paper using satellite remote sensing technologies in order to assess burn severity degrees and vegetation recovery capability.
Traditional methods of recording burn severity and vegetation recovery involve expensive and time -consuming field survey. The available remote sensing technologies may enable the development of standardized burn-severity and monitoring techniques which can be available for large areas, at low cost and in near-real time.
This paper, fire severity degrees were obtained using spatial autocorrelation statistics, such as Moran's I, Geary's C, and Getis-Ord Local Gi index (see Anselin 1995; Getis and Ord 1992) applied to the delta Normalized Bun Ratio (dNBR) computed from MODIS data.
Spatial statistical indices enable us to characterize the spatial autocorrelation within a user-defined distance. For each index, the output is a new image which contains a measure of autocorrelation around the given pixel. The efficacy of spatial autocorrelation statistics applied to MODIS images was evaluated using independent data set such as field survey, metrics from satellite time series and higher resolution satellite data.
For the same study area, we also assess the vegetation recovery capability using the detrended fluctuation analysis (DFA) which enable us to carry out a dynamical characterization of vegetation dynamics before and after fire occurrence. DFA was applied to NDVI(Normalized Difference Vegetation Index) which seems to be more effective than other indices, such as NDWI and MSI (see Lanorte et al. EGU 3690) and NBR (Normalized Burn Ratio) see Montesano et al. (abstract EGU 3623).
The DFA has been extensively applied to NDVI time series derived from SPOT-VEGETATION (Telesca et al.). It is expected that NDVI time series from MODIS should provide significant improvements due the higher spectral and spatial resolutions (acquisition from 250 m to 1 km).
Results from both spatial autocorrelation statistics and DFA clearly showed that the use of satellite remote sensing techniques has significant potentiality for operative research in the field of forest fire and enable the setting up of a multipurpose tool from the identification and mapping of burned areas to the monitoring of post fire recovery