Geophysical Research Abstracts
Vol. 17, EGU2015-6757, 2015
EGU General Assembly 2015

Monitoring vegetation recovery in fire-affected areas using temporal profiles of spectral signal from time series MODIS and LANDSAT satellite images

Danai Georgopoulou (1) and Nikos Koutsias (2)

(1) Department of Environmental and Natural Resources Management, University of Patras, G. Seferi 2, GR-30100 Agrinio, Greece. (georgopou.danai@windowslive.com) , (2) Department of Environmental and Natural Resources Management, University of Patras, G. Seferi 2, GR-30100 Agrinio, Greece. (nkoutsia@upatras.gr)

Vegetation phenology is an important element of vegetation characteristics that can be useful in vegetation monitoring especially when satellite remote sensing observations are used. In that sense temporal profiles extracted from spectral signal of time series MODIS and LANDSAT satellite images can be used to characterize vegetation phenology and thus to be helpful for monitoring vegetation recovery in fire-affected areas. The aim of this study is to explore the vegetation recovery pattern of the catastrophic wildfires that occurred in Peloponnisos, southern Greece, in 2007. These fires caused the loss of 67 lives and were recognized as the most extreme natural disaster in the country's recent history. Satellite remote sensing data from MODIS and LANDSAT satellites in the period from 2000 to 2014 were acquired and processed to extract the temporal profiles of the spectral signal for selected areas within the fire-affected areas. This dataset and time period analyzed together with the time that these fires occurred gave the opportunity to create temporal profiles seven years before and seven years after the fire. The different scale of the data used gave us the chance to understand how vegetation phenology and therefore the recovery patterns are influenced by the spatial resolution of the satellite data used. Different metrics linked to key phenological events have been created and used to assess vegetation recovery in the fire-affected areas. Our analysis was focused in the main land cover types that were mostly affected by the 2007 wildland fires. Based on CORINE land-cover maps these were agricultural lands highly interspersed with large areas of natural vegetation followed by sclerophyllous vegetation, transitional woodland shrubs, complex cultivation patterns and olive groves.

Apart of the use of the original spectral data we estimated and used vegetation indices commonly found in vegetation studies as well as in burned area mapping studies. In this study we explore the strength and the use of these time series satellite data to characterize vegetation phenology as an a aid to monitor vegetation recovery in fire affected-areas. In a recent study we found that the original spectral channels, based on which these indices are estimated, are sensitive to external vegetation parameters such as the spectral reflectance of the background soil. In such cases, the influence of the soil in the reflectance values is different in the various spectral regions depending on its type. The use of such indices is also justified according to a recent study on the sensitivity of spectral reflectance values to different burn and vegetation ratios, who concluded that the Near Infrared (NIR) and Short-Wave Infrared (SWIR) are the most important channels to estimate the percentage of burned area, whereas the NIR and red channels are the most important to estimate the percentage of vegetation in fire-affected areas. Additionally, it has been found that semi-burned classes are spectrally more consistent to their different fractions of scorched and non-scorched vegetation, than the original spectral channels based on which these indices are estimated.