



Analysis of persistence in time series of VEGETATION data for monitoring burned areas

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In this paper, fire-Persistence or long term dependencies was investigated using two different methods: the Detrended Fluctuations Analysis that provides the scaling coefficient and the Aggregate Variance that provides an estimate of the Hurst index.

Both DFA and AV were applied to satellite time series (from 1998 to 2005) of some commonly used vegetation indices NDVI (Normalized Difference Vegetation Index), MSI (Moisture Stress Index) and NDWI (Normalized Difference Water Index),

A comparison and quantitative analysis of persistence in these different time series was carried out for two sites: Cagnano Varano (FG) affected by fire and Monte Sant' Angelo (FG), characterized by similar vegetation cover and never affected by fire during the time window of concern. To eliminate the seasonal effects appropriate filtering was applied to all the different time series of vegetation indices.

Both the scaling coefficient and the Hurst index calculated from the NDVI time series Cagnano site suggest a persistent character in the vegetation behavior and well discriminate the fire- affected from the fire un-affected site. Both the analyses carried out confirmed that NDVI performs better than the NDWI and MSI. The NDVI best discriminates burned areas from non-burned site and exhibited an anti-persistent behaviour as expected. In contrast, both MSI and the NDWI, showed the same behavior for the two investigated sites: Cagnano Varano (FG) affected by fire and Monte Sant' Angelo (FG) non affected by fire or other natural/anthropogenic disturbances during the investigated period.

These results pointed out that, among the considered time series, NDVI performs better the other indices.

The results of quantitative analysis pointed out that both the DFA and AV can properly estimate the persistence characteristic of vegetative cover and then monitor the resilience of vegetation following a fire event.