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Vegetation recovery monitoring using time series of vegetation indexes obtained from SPOT/VEGETATION data

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The ability of NDVI (Normalized Difference Vegetation Index) time series to capture the different fire induced dynamic on vegetation covers has been widely investigated by Telesca and Lasaponara using the detrended fluctuation analysis (DFA), which permits the detection of persistent properties in nonstationary signals. Nevertheless, no comparative evaluation has been performed with other vegetation indexes such as MSI (Moisture Stress Index) and the NDWI (Normalized Difference Water Index)In this study, we compared the evolution of dynamical trend of time series of vegetation indexes obtained from SPOT/VEGETATION data.
We used time series of vegetation indices from 1998 to 2005 and exactly series of NDVI(Normalized Difference Vegetation Index) , MSI (Moisture Stress Index) and NDWI (Normalized Difference Water Index), where
NDVI = [b3-b2]/ [b3+b2];
MSI = [b4]/ [b3];
NDWI = [b3-b4]/ [b3+b4]
But, in order to eliminate the phenological fluctuations we processed the departure series of these indices, namely in order
NDVId = [NDVI - <NDVI>]/std (NDVI)
MSId = [MSI - <MSI>]/std (MSI)
NDWId = [NDWI - <NDWI>]/std (NDWI)
where < > is the decadal mean and std( ) is the decadal standard deviation. The decadal mean < > and the standard deviation were calculated for each decade, e.g. 1st decade of January, by averaging over all years in the record.

We focused on two sites Cagnano Varano (FG), fire affected , and Monte Sant'Angelo (FG) fire unaffected.
The scaling coefficient on the series of NDVI for the fire affected site suggests a persistent character in this series, instead for the unburned site for which the scaling coefficient indicates an anti-persistent behaviour. The other two vegetation indices examined, the MSI and the NDWI, have showed the same behavior for both the two sites (burnt and un-burnt). Indeed the scaling coefficient on NDVI time series for Cagnano site (fire-affected) is always greater than $\frac{1}{2}$; whereas for Monte Sant'Angelo site (fire-unaffected) the scalig coefficient is less than 1/2 or exceeds it slightly. Conversely, the scaling coefficient on MSI and NDWI time series both Cagnano (fire-affected) that Monte Sant'Angelo (fire-unaffected), is always greater than 1/2.
The values obtained for the 3 investigated indexes shows that the vegetation index which best the NDVI enable us to better discriminate burned areas from un-burned
References
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