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On the detection of droughts by means of NDVI: the role of climatic clustering.

G. Laguardia

European Commission, DG Joint Research Centre, Institute for Environment and Sustainability (giovanni.laguardia@jrc.it)

It is well known that vegetation phenology can be viewed as an integrated response to water and energy budget. However, the signature of such response is difficult to be recognised and used for drought detection purposes because of the non-trivial effects of weather variability over vegetation in different climatic regions.

Starting from SPOT-VEGETATION data obtained by VITO (http://free.vgt.vito.be/), we extracted the time series of monthly maximum value composite Normalized Difference Vegetation Index (NDVI) for the Italian territory. We processed the monthly NDVI data with Fourier analysis with the purpose of both enlightening the connections of the vegetation dynamics with the rainfall and thermal regime and of reducing the number of variables to be investigated. We compared the Fourier amplitudes and phases to ground based climatic variables for evaluating the role of climate on the vegetation dynamics.

We figured out that drought events in arid climatic divisions have as a major effect the change in the timing of the growing season; when major events occur (e.g., 2003 drought), the autumn growing season is strongly affected. In sub-humid divisions the timing of the growing season remains unchanged (at the monthly scale), while the average NDVI has slight decreases. In humid divisions it is possible to observe even increases in vegetation activity: moderate drought events move the water and energy budget to more favorable conditions.

The monthly NDVI time series have been compared to the Standardized Precipitation Index and to modelled soil moisture time series in order to evaluate the response of vegetation to major drought events.