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NDVI as a tool for measuring impact of climate variability upon vegetation

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Land-atmosphere interactive processes are useful to understand impacts of year by year climate variability and to highlight possible trends, since the status of the natural vegetation cover is strongly controlled by climate factors.
The so-called NDVI (Normalized Difference Vegetation Index), derived from the red and the near infrared channels of NOAA satellite, is a reliable indicator applicable to the analysis of photosynthetic biomass variations in vegetated areas.
NDVI images, derived on a monthly basis by maximum composite value technique, can become a useful tool to monitor the dynamics of vegetation and to determine the maximum level of vegetation greenness observed over every year.
Interannual variability of precipitation is likely to have a significant impact on the greenness of vegetation cover, since rainy seasons are expected to stimulate a much richer plants development than drier ones.
The present poster intends to outline a research, jointly carried by ARPAS (the Regional Environmental Protection Agency of Sardinia) and the "Department of Man and Territory" of the University of Perugia, that aimed to correlate the year by year variability of hydrological variables (precipitation and soil water content) and the maximum annual NDVI over the island of Sardinia.
In order to do that, the authors defined four test areas, extending from 235 km^2 to 1015 km^2. Test areas were chosen in order to be mostly covered by natural vegetations, according to CORINE land-cover.
Over such areas surface measures by ARPAS stations were compared against annual maximum NDVI index from 1998 to 2008, focusing on the so-called "rainy season" that in Sardinia ranges from October to April.
Precipitation for the selected areas was measured with the network of ground stations of ARPAS. Evapotranspiration was estimated by means of Hargreaves-Samani method applied to data from the above stations. Finally, estimation of the soil moisture content was carried out by means of a daily time step simplified water balance model.
Despite the low resolution of NDVI images, the maximum value of each year responded quite well to interannual variability of precipitation and soil water content.
Different NDVI responses was observed in relation to the various land cover classes of CORINE data. Because of the low image resolution and of the complex spatial patterns of vegetated area under investigation, this analysis was performed using the second level of the CORINE hierarchical classification.
In the last phase of the study, the authors defined a few small test area completely homogeneous as far as the type of land cover. This further analysis aimed to highlight different responses by the different type of vegetations: deciduous woods, evergreen, prairies and others.