



Analyses of Vegetation and Soil Moisture Correlations During a Cycle

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The term drought is normally used to refer to deficiency in rainfall, soil moisture, vegetation greenness or ecological conditions. To calculate the impact of a drought is crucial in determining the environmental and agricultural consequences. However, drought intensity varies spatially and temporally pointing out the complexity to study this hazard. Due to this, the use of remote sensing data has been increasingly used as it provides more continuous information in time and space than other approaches.

The Normalized Difference Vegetation Index (NDVI) has been used in drought monitoring and assessment during the last decade. However, several authors have found that there is a time lag between a rainfall deficit and NDVI response and some authors question the correlation between NDVI and the soil moisture content measured with the Normalized Soil Moisture Index (NSMI). The objectives of this study were to determine whether there are spatial correlations of NDVI with NSMI and how the scales affect them.

In order to establish these comparisons, monthly Sentinel-2A images, from July 2015 till August 2016, were processed to extract NDVI, with a resolution of 10mx10m, and NSMI, with a resolution of 20mx20m. An area was selected, approximately 6.55 Km²(2.56 Km x 2.56 Km), and located in a pasture landscape at the north of the Community of Madrid (Spain) between the municipalities of “Soto del Real” and “Colmenar Viejo”.

NDVI pixels were classified as: bare soil (NDVI<0.2), mixture of soil and vegetation and full vegetated (NDVI>0.5). Correlations for each set of NDVI and the corresponding NSMI pixels were calculate with a resolution of 20x20m as well as without any segmentation. Then, these correlations were upscaling up to the whole image.

The results showed a different behavior depending on the NDVI set and the scale used for the correlations. The discussion will be exposed in the context of based index pasture insurance.

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