Correlations between vegetation index and soil moisture index in pasture areas

Ana M. Tarquis[1,2,†], Carmelo Alonso[3], Juan J. Martín-Sotoca[4], and Rosa M. Benito[1]

[1]Grupo de Sistemas Complejos, Universidad Politécnica de Madrid (UPM), Madrid, Spain

[2]Research Center for the Management of Agricultural and Environmental Risks (CEIGRAM), UPM, Madrid, Spain

[3]Earth Observation Systems, Indra Sistemas S.A., Madrid, Spain

[4]Dpto. de Ciencia, Computación y Tecnología, Universidad Europea de Madrid, Villaviciosa de Odón, Spain

The study of the dynamics of the vegetation cover, such as pasture, is the result of a complex interaction between vegetation, soil and climate and man activity. In south Europe, drought has severe consequences in these areas. One aspect to understand it is to characterize the spatial patterns of pasture along the seasons and their relation with soil moisture content.

The normalized difference vegetation index (NDVI) has been used in drought assessment during the last decade. However, 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.

To study these correlations, monthly Sentinel-2A images, from July 2015 till August 2016, were processed to extract NDVI and NSMI, with a resolution of 20×20 m. An area was selected, approximately 6.55 km^2 (2.56×2.56 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*.

Correlations of NDVI and the corresponding NSMI pixels were calculate with a resolution of 20×20 m with and without any segmentation. Then, these correlations were up scaling to the whole image. The results showed a different behaviour depending on the NDVI set and the scale used for the correlations.

---

†   E-mail: anamaria.tarquis@upm.es