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Scaling properties of vegetation and soil moisture indices: multifractal and joint multifractal analysis

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The distribution and phenology of vegetation is largely associated with climate, terrain characteristics and human activity. Remote sensing data provide the opportunity to monitor the dynamics of vegetation, its changes and its impact on the environment. The images of Guadalajara (Central Spain), which correspond to an area of 250x250 km. Normalized difference of vegetation index (NDVI) and soil humidity (NDSI) values which had been extracted with a resolution of 512x512 pixels for this area at March and June of 2006 were analysed using multifractal analysis (MFA). The MFA gives a new representation of two images at different times, which allows the analysis of the vegetation scenario using different parameters from the multifractal spectrum.

The relationship between soil humidity and vegetation area was studied by multiplying both measures to create a partition function and applied a joint multifractal analysis (JMFA). The comparison of the relation between both measures, at different seasons of the year, differentiates two different situations. This approach could be a powerful way to monitor various dynamic parameters of the vegetation in Central Spain.