



Analysis of drought events in a Mediterranean semi-arid region, Using SPOT-VGT and TERRA-MODIS satellite products

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In semi-arid regions, and northern Africa in particular, the scarcity of rainfall and the occurrence of long periods of drought, represent one of the main environmental factors having a negative effect on agricultural productivity. This is the case in Central Tunisia, where the monitoring of agricultural and water resources is of prime importance. Vegetation cover is a key parameter to analyse this problem. Remote sensing has shown in the last decades a high potential to estimate these surface parameters.

This study is based on two satellite products: SPOT-VGT (1998-2012) and TERRA-MODIS (2001-2012) NDVI products. They are used to study the dynamics of vegetation and land use. Different behaviors linked to drought periods have been observed. A strong agreement is observed between products proposed by the two sensors. Low spatial resolution SPOT-VGT and TERRA-MODIS NDVI images were used to map the land into three characteristic classes: olive trees, annual agriculture and pastures. An analysis of vegetation behaviour for dry years is proposed using the Windowed Fourier Transform (WTF). The Fourier Transform is able to analyze the frequency content of a signal in the time domain by decomposing the signal as the superposition of sine and cosine basis functions. Analysis for annual agricultural areas demonstrates a combined effect between climate and farmers behaviours. In these areas, bare soils show a high increasing for drought years. Highest percent of bare soil is retrieved with TERRA-MODIS than with SPOT-VGT. This could be explained by the spatial resolution of the two sensors. The temporal series of optical images are finally used to calculate a drought index, namely the VAI (Vegetation Anomaly Index), on the plain of Kairouan (Amri et al., 2011). This index shows a high correlation with precipitation statistics.