



Comparison of field spectroradiometer and modis vegetation indices for estimating plant height in semi-natural meadows

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The main purpose of this work is to evaluate the most appropriate Vegetation Indices (VI) from MODIS (250 m resolution), to identify and assess the growth pattern of semi-natural meadows in northern Portugal. Sixteen-day MODIS-TERRA (250x250m) composites from 2001 to 2008 were used to examine the annual temporal profile of the NDVI and EVI, and their relationship with ground based observation of vegetation growth and reflectance inferred by spectroradiometer. The CORINE Land Cover maps from 2000 and information from field work were used to select suitable test sites, with at least 2x2 km mostly covered by semi-natural meadows. The whole site was considered as a unit, instead of using a pixel by pixel approach. This is done to prevent misregistration and other sources of errors to contaminate the temporal profiles. The median value of all pixels in each test site is used to compute the NDVI and EVI temporal profiles. Spectral measurements were performed monthly at field level using a handheld spectroradiometer (325nm and 1075nm). Eighteen campaigns of reflectance measurements were carried out in the period between July 2007 and December 2008, sampling all phenological stages of the semi-natural meadows.

These field measurements were used to compute NDVI and EVI data using the information of bandwidth from MODIS.

The Savitzky-Golay filter was used for smoothing the VI time series, as well as to extract a number of NDVI and EVI metrics by computing derivatives.

The analysis of VI temporal profiles from different sensors showed more sensibility of the spectroradiometer to detected small in-season variations of growth, related with the pasture re-growth. Furthermore, the EVI from MODIS demonstrated more sensibility to detected re-growth than the NDVI. While both vegetation indices were sensitive to changes in plant height at the beginning of growing season, the NDVI became insensitive to additional growth when grass reached heights of 0.4 m (30% of maximum height). The EVI performed reasonably well up to grass plant heights of 0.7 m.

Preliminary results suggest a great sensibility of EVI temporal profiles from MODIS to detect the main phenological events of semi-natural meadows, even in situations of high plant height. Since the biomass and LAI are parameters highly related with vegetation height, the information derived from this study might help to understand the impact of management practices on vegetation dynamics and to compare the differences of vegetation dynamics between years in response to inter-annual climatic variations.