EVALUATION OF MODIS VEGETATION PRODUCTS FOR SAHELIAN LANDSCAPES (GOURMA, MALI)

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ABSTRACT

LAI is a key variable that controls energy interception, carbon and water fluxes at the leaf and canopy levels. Hence, an accurate description of its seasonal and inter-annual variations is required to correctly simulate carbon assimilation, primary production and plant transpiration throughout the year. Mainly due to the difficulties associated to field measurements in an arid environment like the Sahel, little is known about the spatial and temporal variabilities of the LAI for sahelian pastoral landscapes.

Nowadays, satellite derived vegetation products such as the MODIS (Moderate Resolution Imaging Spectroradiometer) ones can provide useful information on the spatio-temporal variabilities of vegetation variables (LAI, FCover, FPAR) but the accuracy of such products still need to be evaluated in an arid environment characterized by a low vegetation cover, bright soils and high aerosol loading.

This study aims to evaluate the accuracy of MODIS vegetation products, mainly LAI but also vegetation cover fraction (FCover), fraction of absorbed PAR (FAPAR) and primary production in the Sahel. The field work was conducted in the northernmost AMMA (African Monsoon Multidisciplinary Analysis) site located in the Gourma region of Mali (Mougin et al., 2008). The presence of large homogeneous and flat surfaces characterized by a high seasonal and inter-annual variability makes the Gourma site particularly well suited for validation exercises. Since 2000, the Gourma site has been integrated in the site network of the VALERI (Validation of Land European Remote Sensing Instruments) and CEOS/Land Product Validation projects (Baret et al., 2008; Morisette et al., 2006).

Within this frame, the seasonal and inter-annual vegetation dynamics for the 3 main sahelian surfaces, namely grasslands on sandy soils, erosion rocky surfaces and open forests on clay soil, were monitored during the 2005-2008 period.

Firstly, we will present the methodology based on the use of hemispherical pictures to estimate the LAI of the grass cover and trees at a plot scale. Second, the up-scaling procedure with relies on a specific field sampling strategy combined with the use of vegetation indices extracted from high resolution satellite images (SPOT and FORMOSAT) will be described. Third, the derived seasonal and inter-annual vegetation variations for the 3 typical surfaces are confronted to MODIS derived products at 1 km scale. Based on this comparison, the accuracy of MODIS products is estimated and discussed. We also give relevant information on the accuracy of other available vegetation products like primary production, tree and crop cover.

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