Geophysical Research Abstracts, Vol. 8, 00338, 2006
SRef-ID: 1607-7962/gra/EGU06-A-00338

An inter-sensor and inter-year stable relationship for estimating forest LAI using within-stand NDVI variability

G. le Maire (1), C. François (1), K. Soudani (1), H. Davi (1), V. Le Dantec (2), B. Saugier (1), E. Dufrêne (1)

(1) Université Paris-Sud XI & CNRS - Ecologie Systématique et Evolution - Bât. 362 - 91405 Orsay Cedex - France (guerric.le-maire@ese.u-psud.fr), (2) Centre d'Etudes Spatiales de la Biosphère CESBIO - 18 avenue Edouard Belin - BPI 2801 31400 Toulouse Cedex 9 - France

The Leaf Area Index (LAI), which is a key feature describing the forest ecophysiological processes, can be estimated from remote-sensed images. The Normalized Difference Vegetation Indices (NDVI), derived from these images is widely used for LAI estimation through empirical relationships. However, these empirical relationships vary between years and between sensors, and their use requires calibration with ground measurements for each image. In this study, we show that the logarithm of the standard deviation of within-stand NDVI is linearly correlated with the mean LAI of the stand, and that this relationship is stable between sensors and between years. The study relies on observations of eleven remote-sensed images acquired in the managed Fontainebleau forest (France), including six different sensors with a 20- to 30-m spatial resolution (SPOT1, SPOT2, SPOT4, LANDSAT ETM+, IKONOS, and HYPERION), and eight different years. In situ measurements of LAI have been performed with the LAI-2000 Plant Canopy Analyser on about 41 stands each year, including oak, beech, mixed oak-beech and pine stands. Relationship between the mean LAI and the standard deviation of the NDVI is explained by the shape of the within-stand LAI distribution and the shape of the within-stand LAI - NDVI curves. Inter-sensor and inter-year stability of mean LAI vs. NDVI standard deviation is explained by the low sensitivity of the standard deviation to additive or proportional shifts on NDVI.