Geophysical Research Abstracts
Vol. 12, EGU2010-10839, 2010
EGU General Assembly 2010

Remote sensing based mapping of leaf nitrogen and leaf area index in European landscapes using the REGularized canopy reFLECtance (REGFLEC) model

Eva Boegh (1), Rasmus Houborg (2), Jerzy Bienkowski (3), Christine Braban (4), Tommy Dalgaard (5), Netty van Dijk (4), Ulrike Dragosits (4), and Enzo Magliulo (6)

(1) Roskilde University, ENSPAC, Roskilde, Denmark (eboegh@ruc.dk, +45 4674 3031), (2) NASA Goddard Space Flight Center Greenbelt, MD 20771, USA (Rasmus.Houborg@nasa.gov), (3) Research Centre for Agricultural and Forest Environment, Polish Academy of Sciences, Poland (bienkowjerzy@poczta.onet.pl), (4) Centre for Ecology and Hydrology (CEH), Edinburgh Research Station, Bush Estate, Penicuik, UK (ud@ceh.ac.uk), (5) Dept. of Agroecology and Environment, Research Centre Foulum, Postbox 50, 8830 Tjele, Denmark (Tommy.Dalgaard@agrsci.dk) , (6) CNR ISAFoM Via Patacca, 85, S. Sebastiano (Na), Italy (enzo.magliulo@cnr.it)

Leaf biochemistry and biophysical parameters are important for simulating soil-vegetation-atmosphere exchanges of energy, water, CO2 and nitrogen. The accumulation of leaf nitrogen (N) in vegetation canopies is a major component of the ecosystem N balance, and leaf N concentration and leaf area index (LAI) are also important determinants of the maximum photosynthetic capacity and CO2 uptake by plants and trees. Even though agro- and ecosystem-models can simulate leaf N uptake and LAI of vegetation canopies, regional modeling requires detailed spatial information about soil properties, N fertilization and atmospheric N deposition rates which are not easily accessible. In this study, high spatial resolution remote sensing data from the SPOT satellites were acquired within the NitroEurope project to prepare maps of leaf N and LAI for 5 European landscapes. Mapping was conducted using the REGFLEC model which is an automatic and image-based methodology recently developed for regional chlorophyll (Cab) and LAI estimation (ie. Houborg and Anderson, JARS 3, 2009). REGFLEC combines models for atmospheric correction (6S), canopy reflectance (ACRM) and leaf optics (PROSPECT). The only input information required are sensor characteristics, atmospheric properties (ie. derived from AIRS and MODIS satellite sensors) and maps of soil types and spectral vegetation classes within the study area. REGFLEC solves for the soil background reflectance and builds land cover specific look-up tables which are facilitating fast computation of Cab and LAI from spectral band reflectances or vegetation indices. Model performance previously proved very promising in Denmark (ie.Houborg and Boegh, Remote Sens. Env., 112, 2008) and in Maryland, USA (ie. Houborg et al., Remote Sens. Env., 113, 2009). In this study, REGFLEC performance is evaluated and discussed using field measurements of leaf N, SPADmeter data (SPAD 502 DL) and LAI (LAI-2000) in European landscapes located in Denmark, Poland, Scotland, the Netherlands and Italy. The inverse model estimations of soil reflectance parameters and canopy parameters are discussed in relation to the prevailing soil types and vegetation characteristics of land cover classes across the 5 European landscapes