Geophysical Research Abstracts
Vol. 14, EGU2012-3647, 2012
EGU General Assembly 2012

Evaluation of the Two-stream Inversion Package (JRC-TIP) over the Hainich Forest FLUXNET site

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The Joint Research Centre Two-stream Inversion Package (JRC-TIP) makes use of the MODIS and MISR white sky albedo products to deliver consistent sets of information about the terrestrial environments. The baseline version of the JRC-TIP operates at a spatial resolution of 0.01degree and yields estimates of the Probability Distribution Functions (PDFs) of the effective canopy Leaf Area Index (LAI), the canopy background albedo, the vegetation scattering properties, as well as, the absorbed, reflected and transmitted fluxes of the vegetation canopy. In this contribution the evaluation efforts of the JRC-TIP products are extended to the deciduous forest site of Hainich (Germany) where multiannual datasets of in-situ estimates of canopy transmission - derived from LAI-2000 observations - are available. As a Fluxnet site, Hainich offers access to camera acquisitions from fixed locations in and above the canopy that are being used in phenological studies. These images qualitatively confirm the seasonal patterns of the effective LAI, canopy transmission and canopy absorption products (in the visible range of the solar spectrum) derived with the JRC-TIP. Making use of the LAI-2000 observations it is found that 3/4 of the JRC-TIP products lie within a +/- 0.15 interval around the in-situ estimates of canopy transmission and absorption. The largest discrepancies occur at the end of the senescence phase when the scattering properties of the vegetation (evidenced by the pictures) and the effective LAI (also derived from LAI-2000 measurements) are experiencing large simultaneous changes. It was also found that the seasonal pattern of vegetation scattering properties derived from MISR observations in the near-infrared varies together with the Excess Green index computed from the various channels of the camera data acquired at the top of the canopy. The approach adopted in the present study is cost-effective, rather simple but efficient to provide a first evaluation of the JRC-TIP baseline products at 0.01degree spatial resolution and can be extended to other Fluxnet sites offering similar facilities.