Preliminary announcement

Workshop on a new "Plant Facility" in Wageningen

- Several presentation will be given
- A visit to the facility nearby can be made
- We end with drinks

Wednesday 7 September 2011
Time: 14:00 – 16:30
Room Gaia 1, Droevendaalsesteeg 3 in Wageningen

Further information will soon come at: www.geo-informatie.nl

Recently, a laboratory measurement facility has been realized for assessing the anisotropic reflectance and emittance behaviour of soils, leaves and small canopies under controlled illumination conditions. The facility consists of an ASD FieldSpec 3 spectroradiometer covering the spectral range from 350 – 2500 nm at 1 nm spectral sampling interval. The spectroradiometer is deployed using a fiber optic cable with either a 1°, 8° or 25° instantaneous field of view (IFOV). These measurements can be used to assess the plant pigment (chlorophyll, xanthophyll, etc.) and non-pigment system (water, cellulose, lignin, nitrogen, etc.). The thermal emittance is measured using a NEC TH9100 Infrared Thermal Imager. It operates in a single band covering the spectral range from 8 – 14 μm with a resolution of 0.02 K. Images are 320 (H) by 240 (V) pixels with an IFOV of 1.2 mrad. A 1000 W Quartz Tungsten Halogen (QTH) lamp is used as illumination source, approximating the radiance distribution of the sun. This one is put at a fixed position during a measurement session.

Multi-angular measurements are achieved by using a robotic positioning system allowing to perform either reflectance or emittance measurements over almost a complete hemisphere. The hemisphere can be sampled continuously between 0° and 80° from nadir and up to a few degrees from the hot-spot configuration (depending on the IFOV of the measurement device) for a backscattering target. Measurement distance to targets can be varied between 0.25 and 1 m, although with a distance of more than 0.6 m it is not possible to cover the full hemisphere. The goal is to infer the BRDF (bidirectional reflectance distribution function) and BTDF (bidirectional thermal distribution function) from these multi-angular measurements for various surface types (like soils, agricultural crops, small tree canopies and artificial objects) and surface roughness. The steering of the robotic arm and the reading of the spectroradiometer and the thermal camera are all fully automated.

In the near future a pulsed LED illumination system will be added in order to perform measurements on induced chlorophyll fluorescence of photosystem PSII. The facility may be used, e.g., for studying the functioning of photosynthesis yielding plant responses to different stress factors. Through information on photosynthesis it may contribute to studies on the carbon cycle and through transpiration it may contribute to studies on the hydrological cycle. It is expected that this facility will increase our understanding of the response of natural and agro-ecosystems to climate change.

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