



Continuous passive measurements of canopy fluorescence at 687 and 760 nm

Fabrice Daumard (1), Yves Goulas (1), Sébastien Champagne (1), Antoine Fournier (1), Abderrahmane Ounis (1), Jean-François Hanocq (2), and Ismaël Moya (1)

(1) LMD-CNRS, Palaiseau, France (fabrice.daumard@lmd.polytechnique.fr), (2) INRA, Montfavet, France

A field platform for continuous measurement of chlorophyll fluorescence at the canopy level was set up at the INRA site of Avignon. This platform is dedicated to the development and test of passive and active airborne and space-borne vegetation fluoro-sensors. It consists of a 21-m high crane equipped for fluorescence measurements. The crane is installed in the middle of fields dedicated to agricultural research. Thanks to a jib of 24 m and a 100 m long railway, nadir viewing fluorescence measurements can be performed over various field crops.

In 2008 the platform was equipped with a passive instrument (TriFLEX), based on the simultaneous measurements of the spectral radiances from the vegetation and from a reference panel by two different spectrometers. Fluorescence fluxes at 687 (Fs687 nm) and 760 nm (Fs760) are retrieved from the in-filling of the atmospheric oxygen absorption band. Several vegetation indexes such as the photochemical reflectance index (PRI) and the normalized difference vegetation index (NDVI) are also retrieved, thanks to an additional large band spectrometer. Long-term measurements made on different crops are presented. On a sorghum canopy, water stress is associated with a decrease of both Fs687 and Fs760 fluorescence. Measurements conducted during the growth of a sorghum field show that crop development induced a decrease of the red to near infrared fluorescence ratio measured at the canopy level. This decrease is more important at canopy level than at leaf level. This more important decrease of the fluorescence ratio at canopy level is attributed to a reabsorption of red fluorescence (Fs687) during its transfer through the canopy layers.