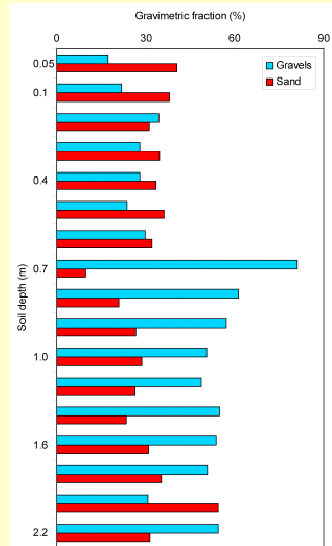
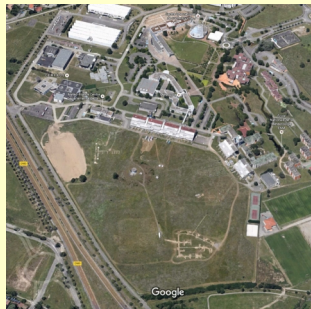


METEOPOLE-FLUX: an observatory of terrestrial water, energy, and CO₂ fluxes in Toulouse

Jean-Christophe Calvet, Jean-Louis Roujean, Sibò Zhang, William Maurel, Bruno Piguet, Joël Barrié, Gilles Bouhours, Jacques Couzinier, Olivier Garrouste, Sandrine Girres, David Suquia, and Diane Tzanos

The METEOPOLE-FLUX project aims at monitoring a large suburban set-aside field in the city of Toulouse (43.572898 N, 1.374384 E). Since June 2012, these data contribute to the international effort to monitor terrestrial ecosystems (grasslands in particular), to the validation of land surface models, and to the near real time quality monitoring of operational weather forecast models. Various variables are monitored at a subhourly rate: wind speed, air temperature, air humidity, atmospheric pressure, precipitation, turbulent fluxes (H, LE, CO₂), downwelling and upwelling solar and infrared radiation, downwelling and upwelling PAR, fraction of diffuse incoming PAR, presence of water intercepted by vegetation (rain, dew), soil moisture profile, soil temperature profile, surface albedo, transmissivity of PAR in vegetation canopy. Moreover, local observations are performed using remote sensing techniques: infrared radiometry, GNSS reflectometry, and multi-band surface reflectometry using an aerosol photometer from the AERONET network. Destructive measurements of LAI, green/brown above-ground biomass, and necromass are performed twice a year. This site is characterized by a large fraction of gravels and stones in the soil, ranging from 17% to 35% in the top soil layer (down to 0.6 m), and peaking at 81% at 0.7 m. The impact of gravels and stones on thermal and moisture fluxes in the soil has not been much addressed in the past and is not represented in most land surface models. Their impact on the available water content for plant transpiration and plant growth is not much documented so far. The long term monitoring of this site will therefore improve the knowledge on land processes. The data will be used together with urban meteorological data to characterize the urban heat island. Finally, this site will be used for the CAL/VAL of various satellite products.



Novel objectives

- Radiative transfer within the vegetation canopy
- Reflectometry in the solar spectrum (photometer)
- GNSS reflectometry
- ... LONG TERM OBSERVATIONS



PAR sensors
under the
vegetation
(10 cm, 20 cm,
30 cm)

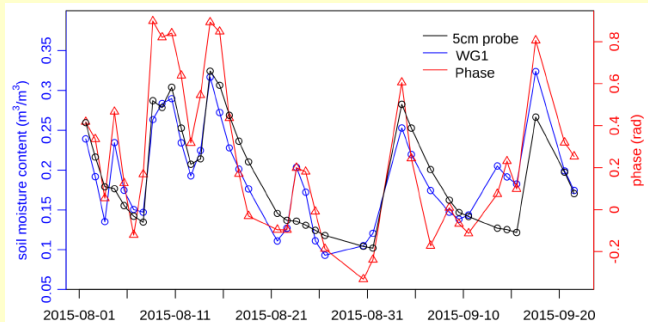
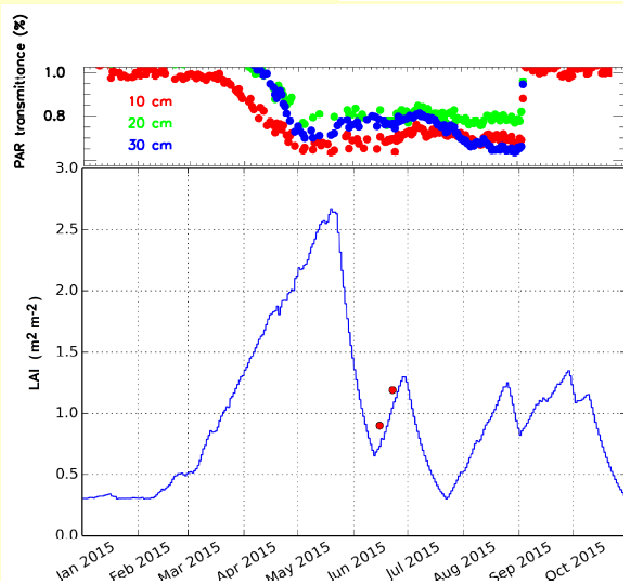
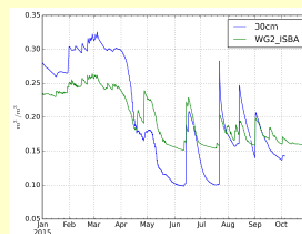
GPS antenna
at the top of
CNRM
building
(29.4 m
above
ground)



Results

ISBA-A-gs model simulations vs:

- observed soil moisture at -30cm
- observed radiation transmittance
- destructive LAI measurements



Surface soil moisture from GNSS reflectometry:

The method proposed by Larson et al. (2008) is used to analyse the signal to noise ratio of the GPS signal. The high position of the antenna permits sampling the whole site (> 10 ha).

It is found that the phase correlates with surface soil moisture estimates (either model or observations).

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