

PFNS_case study

Case study focused on season transitions in rural and urban area derived from micrometeorological measurements

Vegetation is a climate modifier - primary like Amazonian forest or secondary such as agricultural fields of Pannonian lowlands in Central Europe. At the time of growing season start enhanced evapotranspiration shifts energy balance partition towards latent heat flux. This surface flux alteration converges into the boundary layer, and can be detected in the daily variations of air temperature and humidity as well as daily temperature range records.

The following indices will be used in order to assess phenology impact and season transitions in daily micrometeorological records.

- a) A daily afternoon average relative humidity ($R1 = q/q_{sat}(T_{max})$), calculated using average daily specific humidity (q) and maximum temperature (T_{max}), identifies the minimum daily relative humidity. It is expected that the R1 annual signal will reflect the influence of plant phenology and consequent changes in surface fluxes partitioning.
- b) Relative humidity R2 ($R2 = q_{sat}(T_{min})/q_{sat}(T_{max})$) is calculated to check the impact of plant development on the daily ratio of humidity "stored" in nocturnal/early morning RSL occupied by canopy ($q_{sat}(T_{min})$) and humidity in the well-developed layer associated with T_{max} ($q_{sat}(T_{max})$).

Task:

- 1) Time series of micrometeorological measurements and phenological observations in dominant plant canopies will be explored to select indices best-recording signatures of plant growth stages in temperature and humidity daily variations:
 - a) timing of extreme values and inflection points of relative humidity (R1 and R2).
 - b) normalized daily temperature range (DTR/T)
 - c) we manage to identify the following stages: a) start of flowering (orchard)/spring start of the growing season (crop), b) full bloom (orchard)/development (crop), c) maximum LAI reached/yield formation (orchard, crop), d) start of dormancy (orchard)/ leaf drying (crop). Average DOY for dominant plants corresponds to the timing obtained from climatological time series recorded on representative climate station.
- 2) Time series of micrometeorological measurements in urban areas will be used to identify events associated with 1a and 1b, particularly related to UHI.