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Importance of micrometeorological measurement campaigns: challenges and contributions

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A successful micrometeorological measurement campaign covers the hypothesis, the planning of the measurement program, the field work, the building of quality controlled data base, the data analysis, answering the relevant scientific questions and ends with the publication, dissemination of results. First, the Hungarian micro-meteorological measuring programs including the available instrumentation and observation network will be introduced.

The modelling of the surface-air interactions and the determination of radiation balance components will be demonstrated by an investigation in the frame of ECLAIRE EU-7th integrated project. In this program the flux of ozone and the partitioning of stomatal and non-stomatal deposition parts were determined over a natural grass surface based on eddy-covariance measurements and on a developed SVAT model.

Numerous experiments were conducted above water surfaces. Among them, here we refer to a measurement campaign co-ordinated by the Budapest University of Technology and Economics above Lake Fertő, which is shared by Austria and Hungary. The main objective was the measurement of momentum and evaporation fluxes over the open lake surface and in the partially water-covered reed patches. The dominant parameter is the fetch, i.e. the distance along the wind direction, measured from the change in the roughness.

The Upper Air Research Observatory of the Hungarian Meteorological Service in Szeged near to a small airport provides ideal circumstances for micrometeorological measurements and for following the processes in the boundary-layer. The international observation campaigns during the winter of 2013 and the summer of 2015 (surface energy components, SODAR measurements) gave the opportunity to test new devices such as the quadrocopter for measuring the transition between stable and unstable stratifications.

Micrometeorological measurements provide fundamental information for atmospheric chemistry and physics as well. This justifies the long-term co-operation with the Budapest Platform for Aerosol Research and Training research facility. The meteorological data are indispensable for evaluating, interpreting and understanding important phenomena and processes in the air such as new aerosol particle formation and consecutive growth, and the effects of the built environment on dispersion of air pollutants. In these cases, both complementary measurements and modelling calculations are usually performed. Micrometeorological measurements have also main importance in investigations of indoor climate and air quality.

Micrometeorological measurements were also involved in the Hungarian contribution for the Andes expedition (radiation and energy component terms. Here we demonstrate the comparison calculations with the WRF model.

In these projects, although they are covering many aspects, the investigation of near-surface radiation and energy budget, the use of mobile micrometeorological observation instruments are common. These observations connect the micrometeorology with other scientific disciplines in a vital way.